SECURITY MARKING

The classified or limited status of this report applies to each page, unless otherwise marked.
Separate page printouts MUST be marked accordingly.

THIS DOCUMENT CONTAINS INFORMATION AFFECTING THE NATIONAL DEFENSE OF THE UNITED STATES WITHIN THE MEANING OF THE ESPIONAGE LAWS, TITLE 18, U.S.C., SECTIONS 793 AND 794. THE TRANSMISSION OR THE REVELATION OF ITS CONTENTS IN ANY MANNER TO AN UNAUTHORIZED PERSON IS PROHIBITED BY LAW.

NOTICE: When government or other drawings, specifications or other data are used for any purpose other than in connection with a definitely related government procurement operation, the U. S. Government thereby incurs no responsibility, nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

MARTIN
MARIETTA

MM-25 (10-62)

MARTIN COMPANY

CONTRACT AF04(695)-150

MOL-EFT PROGRAM

MODEL SPECIFICATION

AIRBORNE VEHICLE EQUIPMENT

MOL-EFT-AVE-1000

15 March 1965

REVISION NO. 1

3 MAY 1965

MARTIN COMPANY
DENVER, COLORADO
AEROSPACE DIVISION OF MARTIN-MARIETTA CORPORATION

FOREWORD

This document is submitted under Task 5.13 of Exhibit A to Contract AF04(695)-150 in accordance with Line Item 3C-10 of Contractor Specification SSS-TIII-010 DRD (Rev. 3), dated 15 April 1963 and DSCNs 1 thru 99.

This document is approved by S.A. No. 127, cited TWX SSHKT 17307 September 1965 (Martin Ref: 5-W-13238) in accordance with SCD S3-3007.

CONTENTS

CONTENTS (Cont'd.)

CONTENTS (Cont'd.)

MODEL SPECIFICATION
AIRBORNE VEHICLE EQUIPMENT

1.0 SCOPE

1.1 General - This specification establishes the design, fabrication and performance requirements for a Simulated Laboratory, to be used with a Titan IIIC booster (SLV 9 or subsequent), for the Manned Orbiting Laboratory - Early Flight Test (MOL-EFT) Program. The launch vehicle for the MOL-EFT Program requires a Titan IIIC booster, including Transtage, a Simulated Laboratory, and a Gemini Spacecraft. Acceptance test requirements for the Simulated Laboratory as assembled with the Transtage are defined in Section 4, herein. The Simulated Laboratory flight test article is identified as follows:

HSQ Flight Article (Heat Shield Qualification Test)

1.2 Classification - The Simulated Laboratory shall be as follows:

Employment:	HSQ Flight - Sub-orbital trajectory
Designer:	Martin Company - Aerospace Division of Martin-Marietta Corporation
Recovery Spacecraft: (Gemini Reentry Module)	McDonnell Aircraft Corporation St. Louis, Missouri

1.3 Mission and Flight Objectives - The mission is to launch a Titan IIIC vehicle complete with Simulated Laboratory, Gemini Spacecraft, and Transtage to fly a designated MOL boost trajectory. The objective shall be to provide verification of proper operation of the Gemini heat shield and obtain launch and ascent environmental data. The following is a complete list of flight test objectives:

1.3.1 Primary Objective - Verify the Gemini heat shield as modified to accommodate the MOL crew transfer method.

1.3.1.1 Secondary Flight Objectives

a. Collect data on ascent environment for the Orbiting Vehicle structure.

b. Demonstrate structural integrity and control capability of the Titan IIIC for launch and ascent with an MOL type payload.

c. Demonstrate the MOL outboard profile compatibility with the ITL concept.

d. Demonstrate recovery/retrieval techniques.

e. Exercise selected segments of the MOL network.

2.0 APPLICABLE DOCUMENTS

2.1 General - The following documents, of the issue date shown, form a part of this specification to the extent specified herein. In the case of conflict between the requirements of this specification and any other referenced documents, the requirements of this specification shall govern.

2.1.1 Specifications

2.1.1.1 Military

MIL-W-8160D (1)	Wiring, Guided Missile, Installation of, General Specification for, dated 24 December 1963
MIL-B-5087A (1)	Bonding, Electrical, for Aircraft, dated 29 January 1958
MIL-M-8555A	Missiles, Guided: Design and Construction General Specification for, dated 6 October 1960
MIL-A-8421B	Air Transportability Requirements, General Specification for, dated 5 May 1960
MIL-C-45662A	Calibration System Requirements, dated 9 February 1962

2.1.1.2 System Program Documents

MTP-AERO 61-78	Surface Wind Statistics for Patrick Air Force Base, dated 10 October 1961
NASA Technical Note D-610	Monthly and Annual Wind Distribution as a Function of Altitude for Patrick Air Force Base, dated July 1961
SSD-62-166	Program 624A Environmental Requirements Specification, dated 1 November 1962

2.1.1.3 Contractor-Prepared Documents - The following Contractor-Prepared Specifications, of the issue date shown, and the latest changes thereto as approved by the Contracting Officer shall apply:

2.1.1.3.1 Specifications

IFS-MOL-EFT-60001	Interface Specification - Simulated Laboratory to Gemini Spacecraft
IFS-MOL-EFT-60002	Interface Specification - Orbiting Vehicle to Ground Equipment
IFS-MOL-EFT-61001	Interface Specification - SSLV to Simulated Laboratory
SSS-TIII-010 SLV	Detail Specification for Standard Space Launch Vehicle (U), dated 23 April 1962, Revision 1, dated 10 October 1962

2.1.1.4 Contractor Controlled Documents

MMS-K227	Laquer, Acrylic, High Temperature Resistant, dated 19 January 1960 with Amendment "A", dated 26 October 1964
EPS-30049	Laquers, Application of, dated 25 June 1964

2.1.1.5 Air Force Exhibits

Exhibit WDT 57-17, Rev. 5 (1) with Attachment (1)	Instructions for Serialization and Ballistic Missile Components and Assemblies, dated 5 February 1958, with Amendment 1, dated 27 April 1959, with Attachment 1, dated 15 September 1961

2.1.2 Military Standards

MIL-STD-129B	Marking for Shipment and Storage, dated 10 April 1959
MIL-STD-9A	Screw Thread Conventions and Methods of Specifying, dated 26 May 1960
MIL-STD-10A	Surface Roughness, Waviness, and Lay, dated 13 October 1955.

2.1.2 Military Standards - Continued

MIL-STD-12B	Abbreviations for Use on Drawings and in Technical Type Publications, dated 18 May 1959
MIL-STD-106	Mathematical Symbols, dated 16 August 1951
JAN-STD-19	Joint Army-Navy Standard for Welding Symbols, dated 13 November 1947
MIL-STD-130B	Identification Marking for U.S. Military Property, dated 24 April 1962

2.1.3 Publications

MS-33586A (ASG)	Metals, Dissimilar, Definition of, dated 16 December 1958
IRIG-106-60	Telemetry Standards - Interrange Instrumentation Group of the Range Commanders Conference, dated November 1960
MS-33540	Safety Wiring, General Practices for, dated 17 March 1959
MIL-HDBK-5	Metallic Materials and Elements for Flight Vehicle Structures, dated November 1, 1964
AFMTC-REG-80-14	Testing/Evaluation of Systems, Subsystems and Equipments, dated 14 August 1963

3.0 REQUIREMENTS

3.1 General Requirements - A Simulated Laboratory shall be provided that will be compatible with the Titan IIIC booster vehicle and Gemini capsule, and shall be fabricated for use on a test flight from the Eastern Test Range (ETR). The configuration shall be as defined in Figure 1A, General Description; Figure IB, Structural Arrangement and Mechanical Interface Drawing.

3.1.1 Functional Characteristics - The functional characteristics of the Orbiting Vehicle shall satisfy the following system requirements:

a. Sub-orbital flight;

b. Provision for Gemini separation for reentry (electrical discrete only);

c. Unpressurized Simulated Laboratory;

d. Integral Launch - All elements of the Orbiting Vehicle, i.e., Transtage, Simulated Laboratory and Gemini Spacecraft launched together.

3.1.2 Performance Characteristics - The Simulated Laboratory shall be designed within the following constraints:

a. The Simulated Laboratory shall have a nominal diameter of 10 feet;

b. The Simulated Laboratory shall have a nominal length of 33 ft., 8 inches;

c. The maximum dry weights of the Simulated Laboratory shall be as follows:

Simulated Laboratory, Contractor Controlled (including ballast)	*
Gemini Reentry Module and Gemini Conical Adapter - GFAE (including GFAE ballast)	*
Total maximum dry weight	20,200

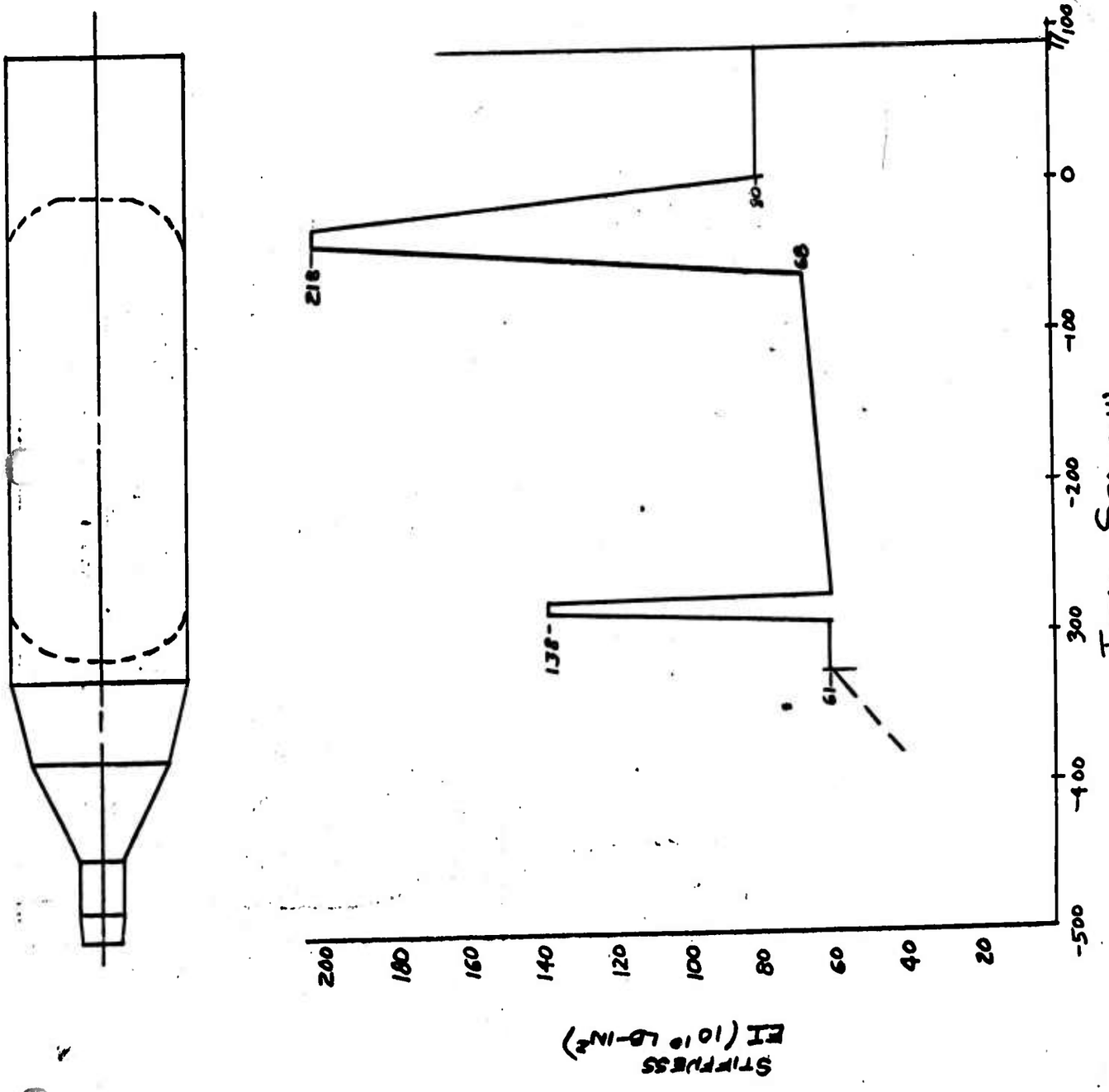
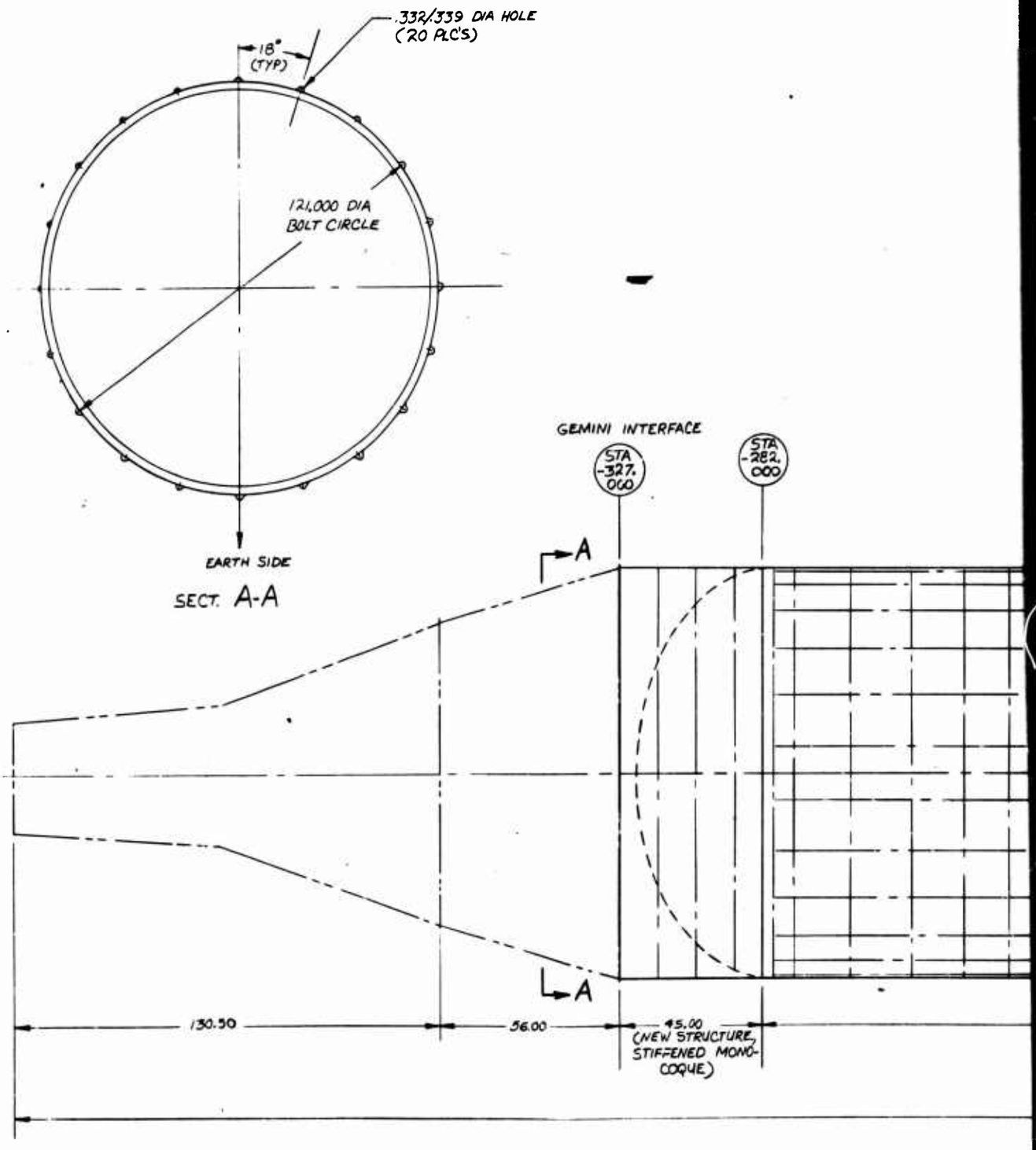
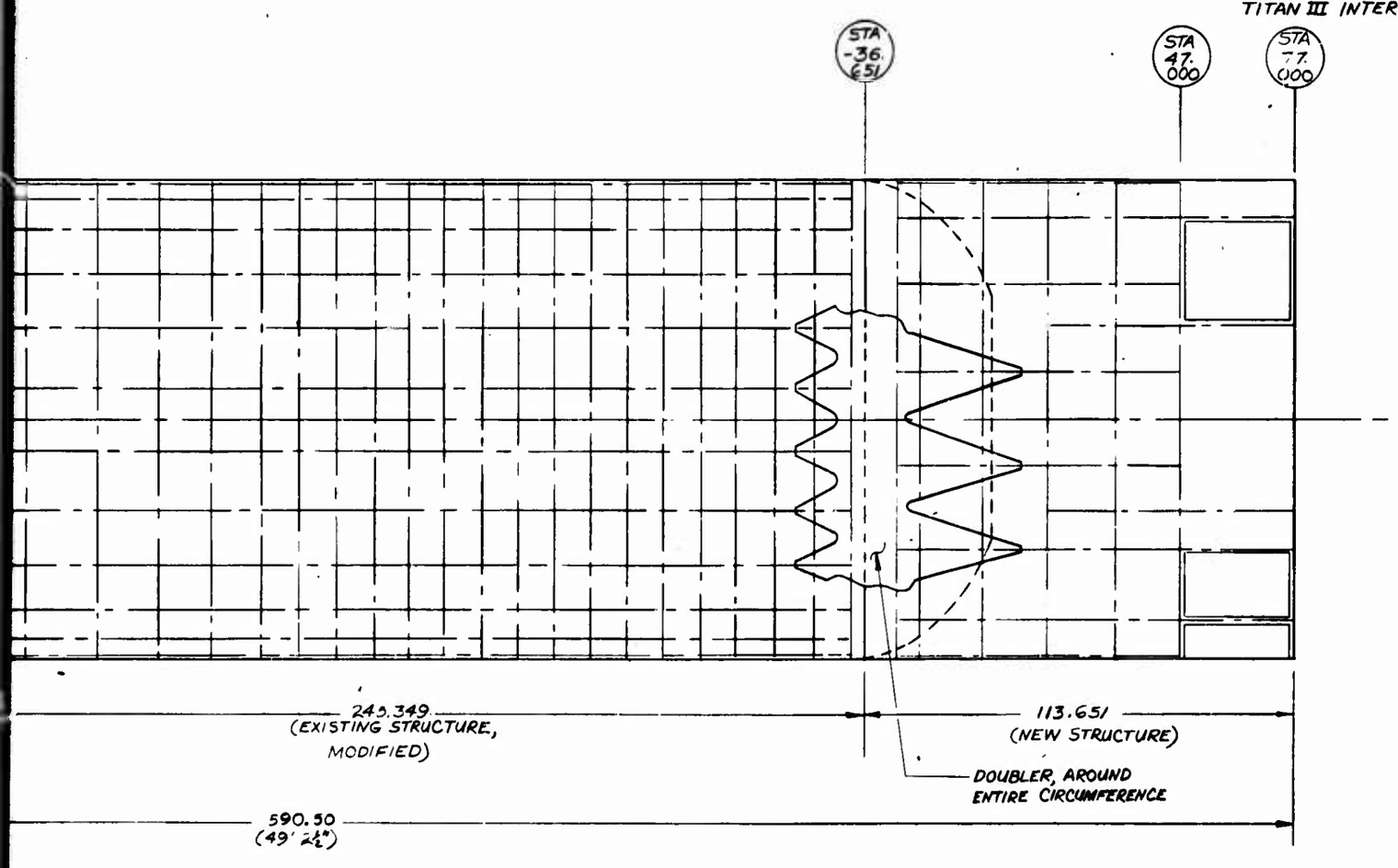


FIG. 1A MOL-HSQ GENERAL DESCRIPTION


.332/.339 DIA HOLE
(20 PLC'S)
18°
(TYP)
121.000 DIA
BOLT CIRCLE
EARTH SIDE
SECT. A-A
GEMINI INTERFACE
STA
-327.
000
STA
-282.
000
A
A
130.50
56.00
45.00
(NEW STRUCTURE,
STIFFENED MONO-
COQUE)

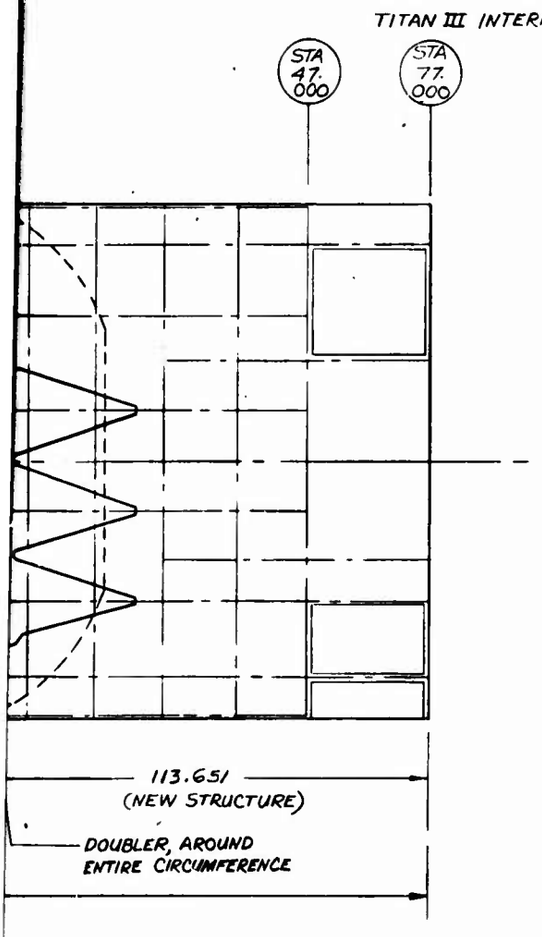
2

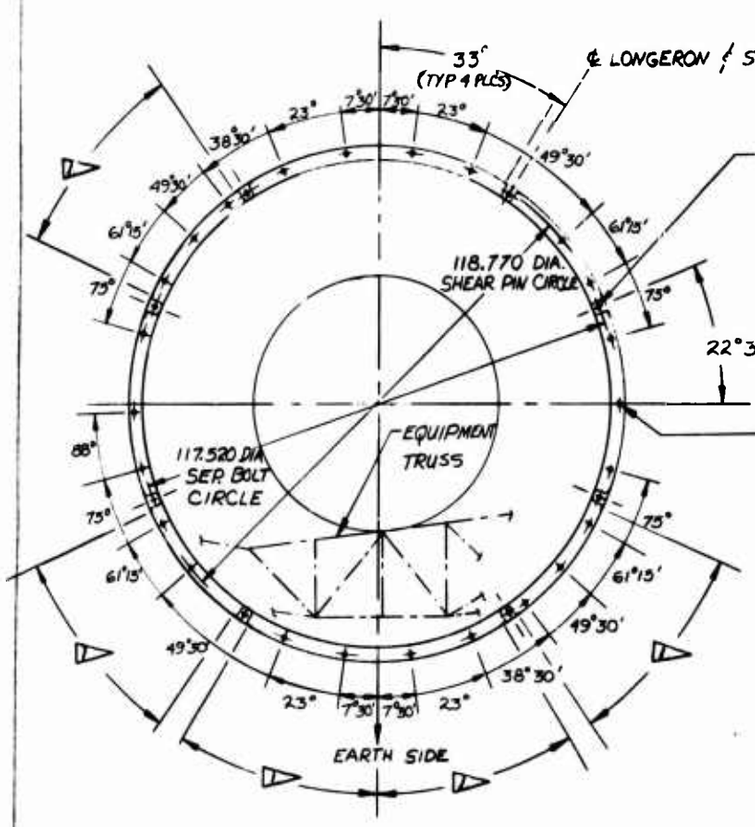

TITAN III INTERFAC
STA -36.651
STA 47.000
STA 77.000
243.349
(EXISTING STRUCTURE, MODIFIED)
113.651
(NEW STRUCTURE)
DOUBLER, AROUND ENTIRE CIRCUMFERENCE
590.50
(49' 2½")

NOTES:

1. ▷ EQUIPMENT & ENTRY ACCESS DOORS.
2. INDICATIONS OF FRAMES & STRINGERS ARE FOR INF
   ONLY AND ARE NOT TO BE USED FOR INSPECTION P

3



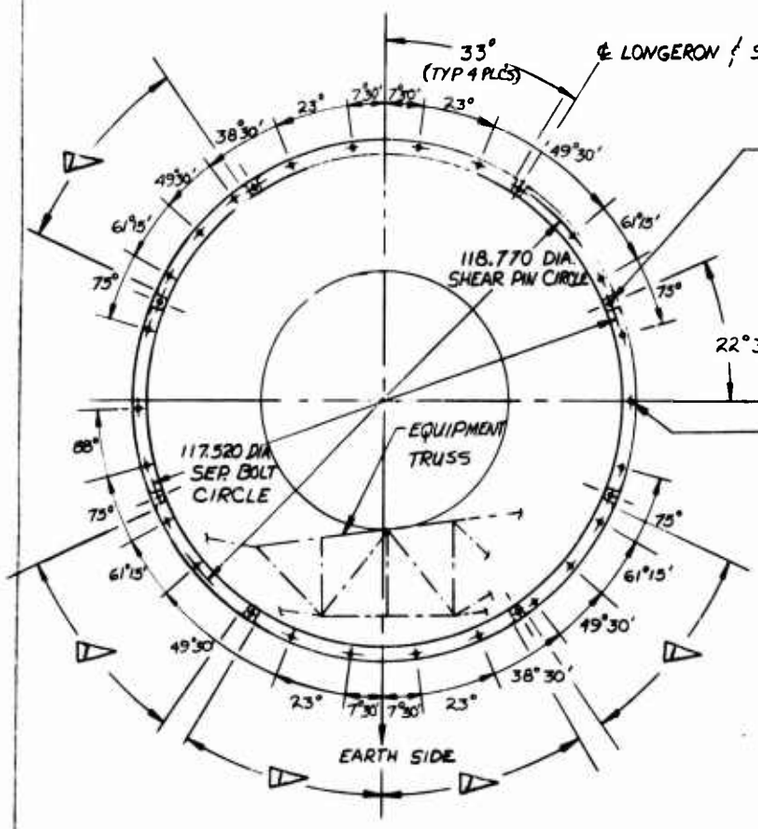


NOTES:

1. ▷ EQUIPMENT & ENTRY ACCESS DOORS.
2. INDICATIONS OF FRAMES & STRINGERS ARE FOR INFORMATION ONLY AND ARE NOT TO BE USED FOR INSPECTION PURPOSES.

4

INTERFACE



MARTIN COMPANY
THE AEROSPACE DIVISION OF MARTIN MARIETTA CORPORATION
FRIENDSHIP INTERNATIONAL AIRPORT, BALTIMORE

FIG. I-B, STRUCTURAL ARRANGEMENT & MECHANICAL INTERFACE DRAWING

CODE IDENT NO	SIZE	
38597		PAGE 8
SCALE		SHEET

3.1.2 Continued

Simulated Laboratory, Contractor Controlled (excluding ballast)	*

* To be supplied at a later date

The weights listed above for the individual components are design objectives and not inspection weights. Only the total maximum dry weight, ± 200 lbs., is to be used for inspection and considered a guarantee.

d. Center of gravity and inertia characteristics for the Simulated Laboratory and Gemini shall be as follows:

Center of Gravity	x = -170.0 in
Roll Moment of Inertia (Ix)	10,500 slug-ft^2
Pitch and Yaw, Moment of Inertia	114,000 slug-ft^2

e. Physical characteristics shall be simulated within the following specified tolerances:

Weight	± 200 lbs
CG	± 6 in. longitudinally
Moment of Inertia	± 10%
Stiffness	± 10%

f. Actual weight and longitudinal CG shall be determined for the Laboratory at the Contractor's facility.

3.2 Design and Construction

3.2.1 Materials, Parts, and Processes - The selection and application of suitable parts, materials, and processes shall be the responsibility of the contractor.

3.2.2 Dissimilar Metals - Dissimilar metals shall not be installed in direct contact without insulating material, except where propellant compatibility requirements preclude the use of insulating material. Dissimilar metals shall be as defined in MS 33586A.

3.2.3 Air Transportability - The Simulated Laboratory shall be air transportable in accordance with the requirements of MIL-A-8421B, except that no formal demonstration of air transportability shall be required.

3.2.4 Workmanship - Workmanship for the Laboratory, including all parts and accessories, shall be of top quality with particular attention given to the following:

a. Freedom from blemishes, burrs, and sharp edges;

b. Required tolerances on dimensions;

c. Compliance to designed radii of fillets;

d. Adequate and correct marking of parts and assemblies;

e. Thoroughness of cleaning, soldering, welding, brazing, and finishing;

f. Alignment of parts and assemblies in accordance with specified requirements;

g. Satisfactory tightness of assembly screws and bolts.

3.2.5 Equipment and Furnishings, Installation of - The equipment and components specified in Appendices I-A and I-B of this specification shall be installed in the quantity and under the applicable conditions set forth herein.

3.2.5.1 Serialization of Components, Sub-assemblies and Assemblies - Non-standard parts and/or components, except instrumentation, that are listed in Appendix I-B of this specification shall be serialized. The Contractor shall not be responsible for serialization of Government-furnished airborne equipment (GFAE). Serialization shall be progressive from the lowest serialized assembly, including all higher assemblies and including the end item. Items to be serialized shall be assigned serial numbers by the Contractor. All serial numbers shall be numerical and consecutive and in production sequence order. Serialized components shall comply with the requirements of WDT 57-17, with deviations as listed in Appendix II herein.

3.2.6 Design Standards

3.2.6.1 Design shall be in general accordance with the applicable provisions of the following documents:

MIL-M-8555A	MIL-STD-9A
MIL-STD-10A	MIL-STD-12B
MIL-STD-106	JAN-STD-19
MS-33540	MIL-HDBK-5

3.3 Simulated Laboratory - The Simulated Laboratory shall consist of the following subsystems:

a. Structures Subsystem;

b. Instrumentation and Telemetry Subsystem;

c. Electrical Power and Distribution Subsystem;

d. Ballast Subsystem;

e. Installation Subsystem.

3.3.1 Structures Subsystem - The Simulated Laboratory structure shall consist of a forward skirt to mate with the Gemini conical adapter, a cylindrical tank section, and an aft cylindrical adapter section. The Laboratory structure shall consist of a cylindrical structure, of aluminum rib-stiffened semi-monocoque construction, with a nominal diameter of 10 feet and a nominal length of 33 ft., 8 inches.

3.3.1.1 Structural Design Criteria - The Simulated Laboratory shall be designed to criteria derived from the application of SSD Exhibit 62-166, as defined herein. The Simulated Laboratory shall be designed to sustain all loads without internal positive or gage pressure in the Laboratory. The Simulated Laboratory shall be designed to withstand collapsing differential pressure of at least 0.25 psi. Adequate venting shall be provided to prevent the occurrence of collapsing pressures. All components and equipment located in the Simulated Laboratory shall be accessible through openings in the end domes or access doors. All Laboratory structure access doors shall be removable and replaceable when the Orbiting Vehicle is in a prelaunch condition. The airframe for the Laboratory shall have adequate strength to withstand all design loads and temperature associated with the mission requirements. Adequate stiffness and rigidity shall be provided throughout the structure to meet stiffness requirements shown on Figure 1A, based on control system characteristics, and to withstand design loads without incurring excessive deflections and deformations.

3.3.1.1.1 Factors of Safety - The factors of safety to be used for design are:

a. Structure

	Limit	Ultimates
Where no hazard to personnel exists	1.25	2.00
Where hazard to personnel exists	1.25	2.00

3.3.1.1.2 Ground Handling - Ground handling conditions shall not govern the design of the overall Simulated Laboratory structure other than local attachment fittings.

3.3.1.1.3 Handling - During hoisting, erecting, and assembly operations, the empty Laboratory shall be capable of withstanding a limit load factor of 2 g in any direction.

3.3.1.1.4 Transportation - The Simulated Laboratory shall be capable of being transported (less Gemini and ballast) in a transtainer. The Simulated Laboratory shall operate satisfactorily after being subjected to the atmospheric pressures associated with ground transport from sea level to 6,500 feet, and air transportation from sea level to 30,000 feet. Components shall be designed for a descent rate, during air transportation of 8,000 feet per minute. During both air and ground transportation, the Simulated Laboratory shall be vented. The combined limit loads during trailer transport for which the Laboratory structure shall be designed, shall not exceed the following:

Load Combination	g forces		
	Longitudinal*	Lateral	Vertical
1. Emergency	+ 5 g Ult.**	0	+ 1 g
2. Emergency	0	0	+ 4½ g Ult.
3. Flight and Taxi	± 3 g limit	0	+ 1 g
4. Flight and Taxi	0	0	± 3 g limit
5. Road	0	± 1½ g limit	+ 1 g + 3 g
6. Limit Road	± 1½ g limit	± ½ g limit	- 1 g

* Positive vertical load factor is downward and positive longitudinal load factor is forward.

** Air transportation emergency landing condition.

The weight of the Simulated Laboratory shall not exceed 12,890 pounds in the configuration as prepared for transportation on the transtainer.

3.3.1.1.5 Structural Requirements during Launch - The Simulated Laboratory structure shall be capable of withstanding all critical loads and associated environments imposed during launch. The Simulated Laboratory shall be capable of withstanding the forces resulting from maximum ground wind condition as specified in SSD Exhibit 62-166, when mounted atop the Titan IIIC booster launch vehicle on the ETR launch stand and with the Gemini capsule installed.

3.3.1.1.6 Structural Requirements during Flight - The Simulated Laboratory structure shall be designed to withstand all critical loads and associated environments imposed during flight, as defined herein. Standard 624A procedures shall be used in computing wind rosette and load combinations.

3.3.1.1.6.1 Maneuvering Loads - Bending moments and axial loads resulting from flight along programmed design trajectories shall be considered.

3.3.1.1.6.2 Wind Shear Loads - Loads induced by wind shears shall consider flexible body and aeroelastic conditions. For determining loads due to wind and wind shears, SSD Exhibit 62-166 shall be used.

3.3.1.1.6.3 Gust Effects - Gust loads shall be considered along the design boost trajectory for operations through 75,000 ft. altitude. The gust induced loads shall be determined by dynamic analysis. The resultant gust loads shall be added to the wind shear loads.

3.3.1.1.6.4 Transonic Buffet - Random loads induced by buffet in the transonic speed region shall be considered in the design of the Laboratory structure.

3.3.1.1.6.5 Aeroelastic Requirements - Local panel aeroelastic instabilities shall not result in structural failures.

3.3.1.1.7 Stiffness - The mounting structure for Simulated Laboratory equipment and components shall be designed with adequate stiffness to avoid resonances which would be harmful to the equipment or components.

3.3.1.2 Simulated Laboratory Construction - The Laboratory structure shall consist of a forward skirt, a cylindrical tank section, and an aft cylindrical adapter that will mate with the Transtage at Titan IIIC Station 77.0, as shown in Figure 1B.

3.3.1.2.1 Forward Skirt Assembly - The forward skirt shall consist of that structure extending forward from the Laboratory tank to the Gemini conical adapter. The forward skirt shall be of aluminum alloy semi-monocoque construction. The forward mating plane shall be constructed to match the Gemini conical adapter. The structure interface connection of the forward Laboratory skirt and GFAE conical adapter shall utilize the Gemini/GLV 20 bolt pattern geometry.

3.3.1.2.2 Simulated Laboratory Tank Assembly - The Laboratory structure shall consist of a modified Titan II Stage I oxidizer tank, including a forward ellipsoidal dome with a forward access door, and an aft ellipsoidal dome with an aft access way approximately 36 inches in diameter. The connection of the barrel section of the aft skirt assembly shall be reinforced with an external doubler. The barrel section shall be reinforced to meet the modulus of elasticity requirements of Figure 1A.

3.3.1.2.3 Aft Adapter Assembly - The aft adapter assembly shall consist of that structure extending back from the aft end of the Laboratory tank assembly to the tension splice of the Transtage mating plane at Titan IIIC Station 77.0. (For reference, see Figure 29A of Specification SSS-TIII-010 SLV, pp 231a). The aft adapter section shall be constructed of aluminum alloy semi-monocoque skin panels and frames.

3.3.1.2.4 Ballast Attach Points - Ballast attachment points in the Laboratory shall be provided as necessary.

3.3.1.2.5 Trusses and Mounting Bracketery - Trusses and mounting bracketry shall be provided for mounting instrumentation and electrical components listed in Appendix I-B.

3.3.1.3 Simulated Laboratory Surface Finish - The Laboratory exterior surface shall be coated with paint (MMS-K227) and applied in accordance with EPS-30049.

3.3.2 Instrumentation and Telemetry Subsystem - The instrumentation and telemetry subsystem shall have the capability of transmission of high frequency data (including vibration and acoustics) and acquisition and transmission of low frequency data (including temperature and pressure). The high frequency data shall be transmitted by a SSB transmission system located in the Simulated Laboratory. The low frequency data shall be transmitted by a PCM telemetry system located in the Simulated Laboratory. Transducers, signal conditioners, and transmitters with multiplexer and antenna system, shall be provided as required to acquire and/or transmit the data measurements as listed in Table I. Operating characteristics of the telemetry system shall conform to the telemetry standards and requirements set forth in document IRIG 106-60 to the extent applicable and with the deviations as stated in Appendix II herein. The method of handling the data measurements is as follows:

TABLE I

PAYLOAD MEASUREMENT ALLOCATIONS FOR TIIIC MOL-EFT FLIGHT

These measurements only will be transmitted from the Simulated Laboratory (PCM system) and are in addition to those TIIIC measurements already defined in the Master Program Management Plan (SSD-CR-64-14) and Supplement thereto for the Titan IIIC vehicle to be used for the MOL-EFT flight.

No. of Measurements	Type of Measurements	Transducer Location	Frequency
3	Aero Buffet Pressure	Lab Tank	400 SPS
1	Aero Buffet Pressure	Aft Adapter	400 SPS
3	Aero Pressure	Lab Tank	100 SPS
3	Aero Pressure	Aft Adapter	100 SPS
4	Aero Temperature	Lab Tank	40 SPS
2	Aero Temperature	Aft Adapter	40 SPS
1	Instrument Power Supply	Lab Tank	20 SPS

3.3.2 Continued

Both SSB and PCM transmitting systems shall be provided in the Simulated Laboratory. The SSB modulator and transmitter shall be provided for transmission of instrumentation signals. The transducers and associated hardware necessary to generate these instrumentation signals are not a part of this contract. "Low frequency data" shall be acquired and transmitted from the Simulated Laboratory. This data shall be time multiplexed by a PCM encoder in the Simulated Laboratory and cabled to a PCM/FM transmitter in the Laboratory. The RF output of the PCM and SSB transmitters shall be combined in a multiplexer, equally divided by a three-port junction and routed to two diametrically opposite omni-directional antennas. (Refer to Figures 2 and 3). Supplemental PRD input shall be in accordance with AFMTC-REG-80-14.

3.3.2.1 Instrumentation and Telemetry Equipment - The instrumentation and telemetry system shall consist of the following items of equipment.

3.3.2.1.1 Simulated Laboratory Tank Components

Quantity Required	Description
3	Buffet pressure transducers
3	Pressure transducers
4	Temperature reference compensators
1	3-Port Junction

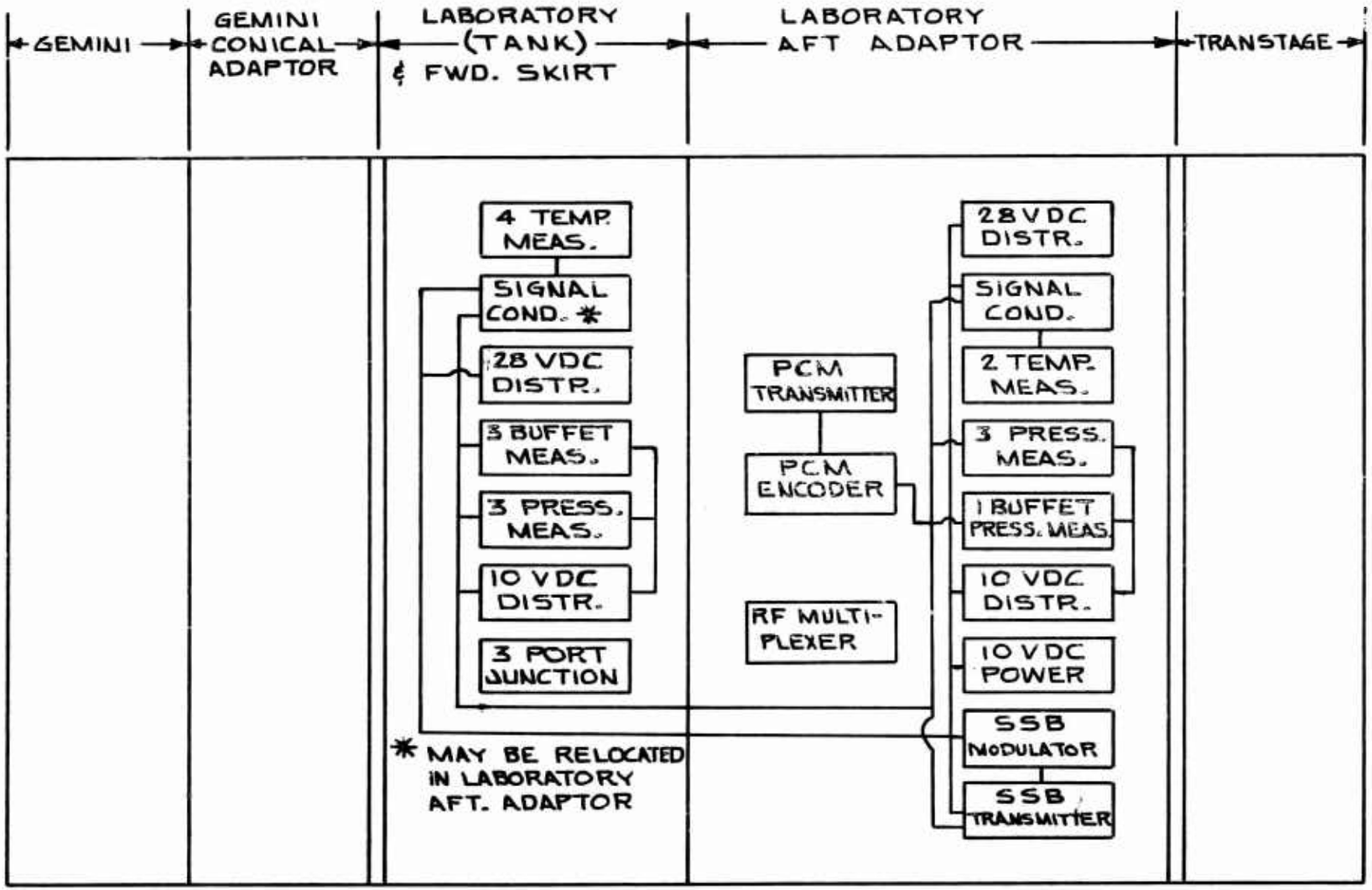


FIGURE 2

MOL-EFT INSTRUMENTATION & TELEMETRY EQUIPMENT LOCATIONS
(HSQ FLIGHT ONLY)

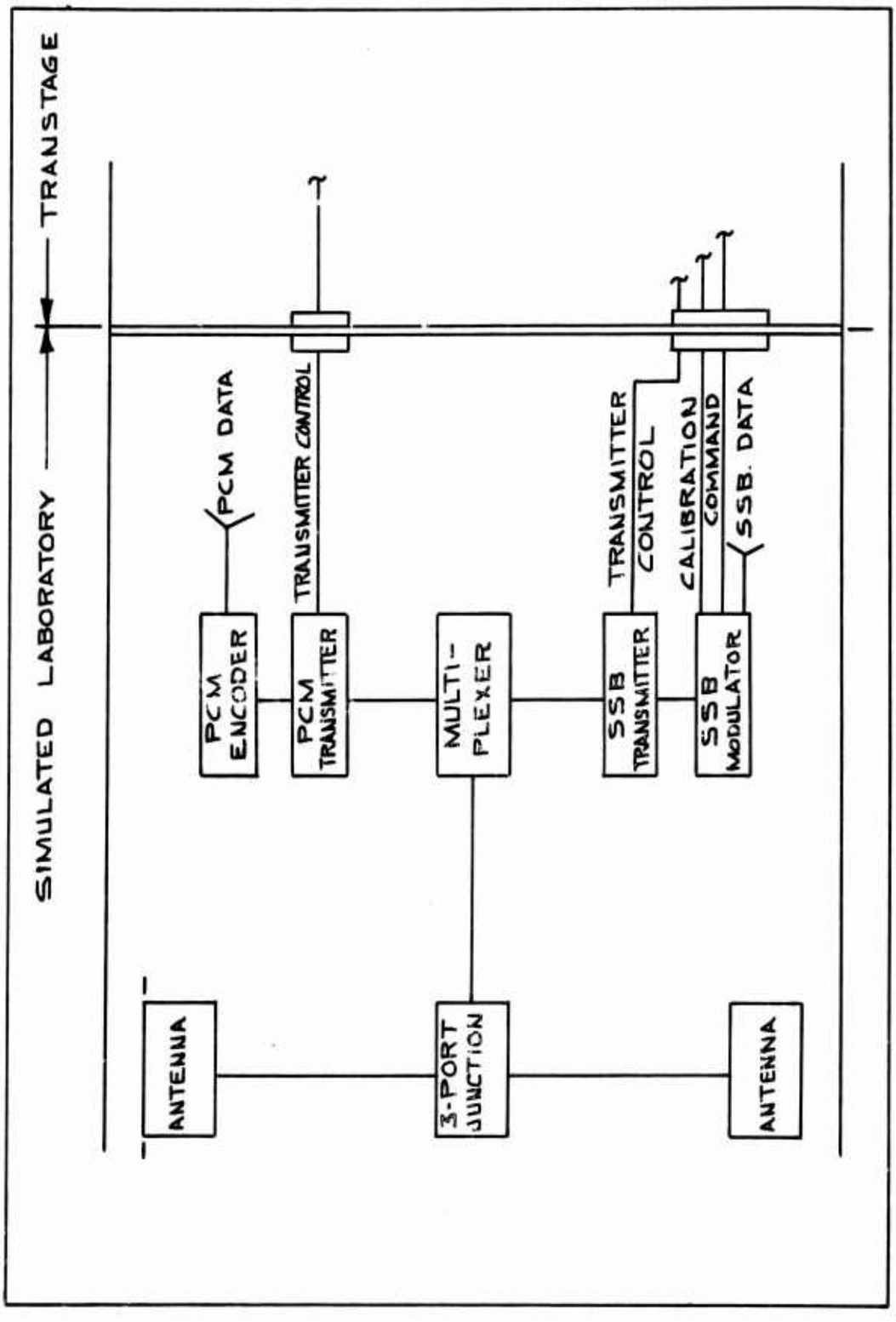


FIGURE 3
MOL-EFT DATA TRANSMISSION SYSTEM

3.3.2.1.2 Aft Adapter Section Components

Quantity Required	Description
1	Buffet pressure transducers
3	Pressure transducers
2	Temperature reference compensators
2	Voltage distribution unit
1	10-VDC power supply
1	SSB Transmitter (231.4 MC, with power output of at least 50 watts)
1	PCM Transmitter (237.0 MC, with power output of at least 50 watts)
1	SSB Modulator
1	PCM Encoder
1	RF Multiplexer

3.3.2.1.3 Unassigned Telemetry Channels - Unassigned telemetry channels (spares) shall be as shown in Table IA.

3.3.2.2 R.F. Transmission - The telemetry RF hardware shall consist of two omni-directional antennas mounted diametrically opposite on the Simulated Laboratory, one three-port junction and a multiplexer to combine the two transmitter outputs. (Refer to Figure 3). The losses in the RF transmission system, from the transmitter output through the antennas shall not exceed 5.4 db. The transmitter output shall not see a VSWR greater than 2.0.

TABLE 2A

SUMMARY OF TELEMETRY SYSTEM CHANNEL ALLOCATIONS

Transmission Frequency	Channel Available	Measurements Assigned*	Channels Unassigned**
SSB System			
30 - 3000 cps	15		15
PCM System			
400 sps	20	4	16
200 sps	20		20
100 sps	36	6	30
40 sps	35	6	29
20 sps	85	1	84
100 sps, bi-level	8		8
20 sps, bi-level	40		40

* Equipment shall be provided as listed in Appendix I-B to accomplish the assigned measurements acquistion and transmission.

** Unassigned channels are based on equipment capability. Crystals, amplifiers, transducers, and associated equipment are to be provided under separate contractual action if additional channels are utilized.

3.3.3 Electrical Power and Distribution Subsystem

3.3.3.1 Simulated Laboratory Power Supply - A Simulated Laboratory Power Supply (SLPS), consisting of a battery and the associated distribution and control equipment, shall be provided to supply power to the data transmission equipment to be installed in the Simulated Laboratory and for instrumentation equipment installed in the flight vehicle. The battery used for the SLPS shall be rated at 60 ampere-hours at standard conditions. For general electrical usage, power shall be provided at 28 VDC (nominal) with the power conforming to the characteristics specified in paragraphs 3.3.3.1.2 and 3.3.3.1.3.

3.3.3.1.1 Batteries - The SLPS for the HSQ Flight shall consist of one (1) 28 VDC battery. At standard conditions, the SLPS shall have sufficient capacity to supply all of the SLPS power load requirements for the scheduled flight through Gemini separation. (Refer to Figure 4 for power and distribution diagram).

3.3.3.1.2 Operation Voltage - DC voltages for the Simulated Laboratory power system, exclusive of noise and ripple, shall be maintained at the load terminals, in accordance with the following:

Condition	Limits
Ground Power	25 to 31 VDC
Simulated Airborne Power	25 to 31 VDC
Airborne Batteries	25 to 31 VDC
Maximum voltages on transients	38 volts

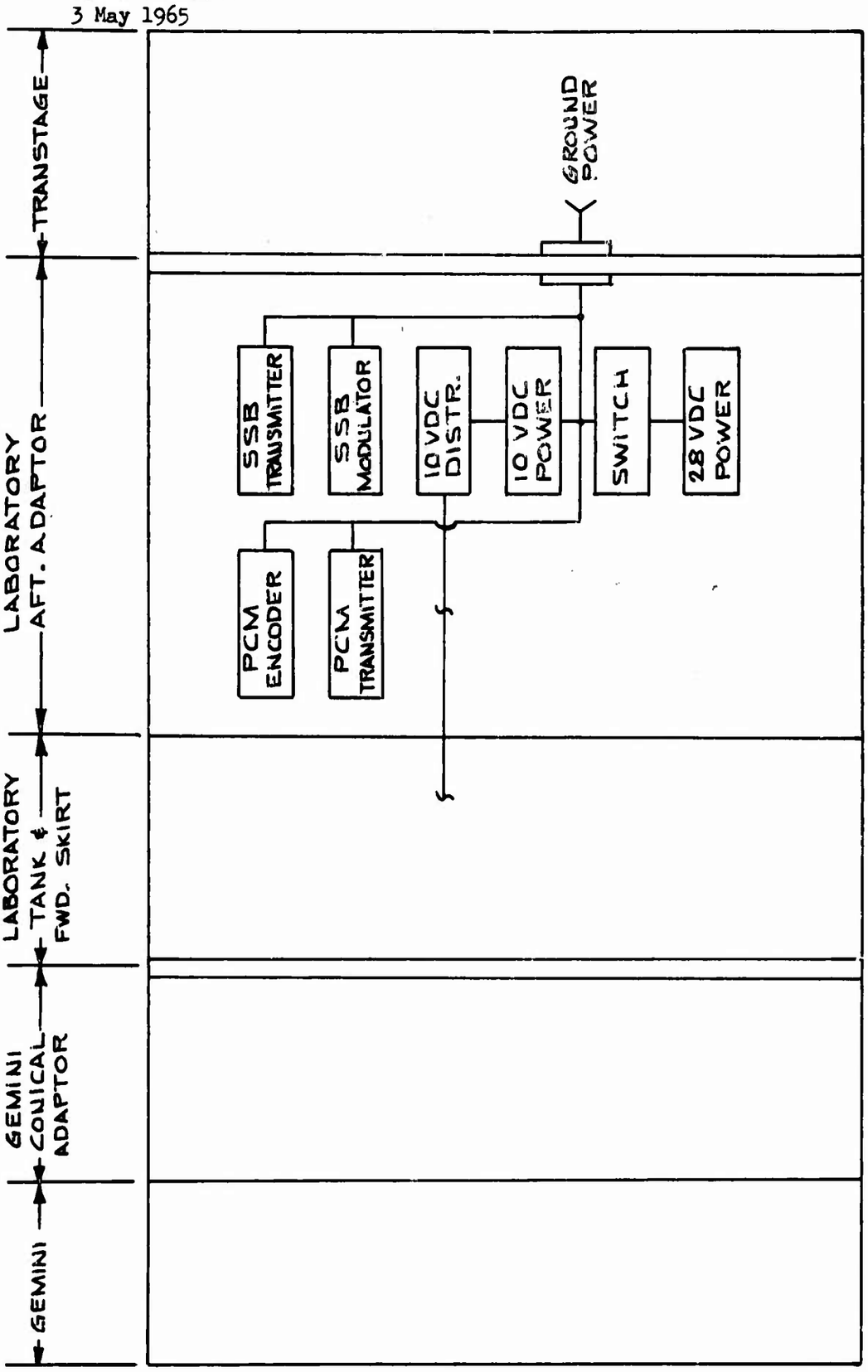


FIGURE 4
MOL-EFT ELECTRICAL POWER AND DISTRIBUTION
(ASQ FLIGHT ONLY)

3.3.3.1.3 Noise and Ripple Voltage - The SLPS noise and ripple voltages shall not exceed 2.5 volts peak, of which not more than 1.25 volts peak may be generated by airborne equipment. The SLPS noise level voltage shall be measured within the frequency range of DC to 5 KC.

3.3.3.1.4 Instrumentation 10 VDC Power - A 10-VDC regulated power supply system shall be provided for instrumentation equipment. Power for the 10 VDC supply shall be supplied from ground power or the 28 VDC (nominal) battery.

3.3.3.1.4.1 Instrumentation Power - The transducer excitation power supply shall supply regulated 10 VDC power to the transducers in the Simulated Laboratory.

3.3.3.2 Distribution and Grounding - Wiring, buses, connectors, switching, and control shall be provided as required to distribute the electrical power. A grounding system shall be included in the Simulated Laboratory to interconnect the Simulated Laboratory and the Transtage grounding to provide a single point ground. A power transfer switch shall be provided for ground power transfer to SLPS.

3.3.3.2.1 Electrical Interfaces with AGE - Signals and power required for the Simulated Laboratory from AGE and signals to AGE from the Laboratory shall be routed through the Transtage and shall use existing Transtage umbilicals for the Laboratory/AGE interface.

3.3.3.2.2 Power Wiring - Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160D, with the deviations as listed in Appendix II herein.

3.3.3.2.3 Instrumentation Wiring - Instrumentation wiring and connectors shall be provided as required for supplying excitation power to and routing the output signals from the instrumentation specified in Section 3.3.2.

3.3.3.3 Bonding - Bonding shall be in accordance with the requirements of MIL-B-5087 except for the deviations specified in Appendix II herein and the following requirements:

a. All chassis shall be bonded to the Simulated Laboratory structure.

b. The Simulated Laboratory shall be bonded through a connection to the Titan IIIC vehicle which, in turn, shall be connected through the launch stand to the facility ground.

c. All trusses will be bonded to the airframes by means of direct metal-to-metal bonding techniques.

3.3.4 Ballast Subsystem

3.3.4.1 Ballast - Sufficient ballast shall be provided in the Simulated Laboratory such that the Laboratory vehicle will conform to the total weight and center of gravity characteristics as specified herein. The ballast shall be manufactured and mounted such that it can be installed and removed through the access openings in the Simulated Laboratory tank.

3.3.5 Installation Subsystem

3.3.5.1 Installation and Interface Provisions - The Simulated Laboratory shall be designed to mate with the Titan IIIC Transtage and the GFAE Gemini conical adapter with all of the interfaces specified herein. Connectors shall be incorporated in the wiring harness at the interfaces. Mounting provisions for transducers, instrumentation equipment, wiring harnesses, and ballast shall be provided.

3.3.5.1.1 Telemetry Interfaces - Telemetry interface requirements shall be compatible with interface specifications referenced in Section 2.0.

3.3.5.1.2 Gemini Separation Signal - The Transtage flight sequence system shall provide, through the Simulated Laboratory, a contact closure for Gemini separation. The contacts shall be rated at 100 ma minimum, 20 amperes maximum at 28 VDC. This signal will occur * seconds prior to opening the Transtage retro vent valves. The voltage drop in the Simulated Laboratory and Transtage shall not exceed 0.9 volts at 1.0 amperes D.C.

3.4 Environmental Requirements - The following conditions, occurring separately or in combination, may occur during storage, shipping and handling. Equipment shall be designed to meet operative requirements after being subjected to these conditions. Shipping conditions, as stated, allow for normal protection of existing packaging in accordance with Section 5.0 herein. Stated conditions allow for transport of equipment installed in the Laboratory, from VIB to launch site. See Simulated Laboratory Environmental Requirements, Table II and Figures 5, 6, 7, 8A and 8B.

*To be supplied.

SIMULATED LABORATORY ENVIRONMENTAL REQUIREMENTS

System Phase

TABLE II

Environmental Parameters	Transportation, Storage and Handling	Prelaunch	Launch and Boost
Temperature	-35 to +160°F unless environmental control measures are employed (0 to 100°F for Ordnance items) (-35 to +90°F for batteries)	Surrounding air temperatures ranging from 25 to 100°F	Aerodynamic heating flux to components at a maximum rate of 8 BTU/FT^2-min. for 6 minutes.
Humidity	Relative humidity up to 100° including condensation or frost.	Relative humidity up to 100% for compartments not air conditioned, including condensation or frost.	No Requirement
Salt Fog	No Requirement	Exposure as encountered in coastal areas.	No Requirement
Fungus	No Requirement	Exposure as encountered in coastal areas equivalent to 28 day exposure to selected fungi in a fungus chamber. Materials which are fungus nutrients shall not be used.	No Requirement
Sand & Dust	No Requirement	Exposure to graded wind-blown sand and dust, equivalent to 6 hours in a sand and dust chamber.	No Requirement

SIMULATED LABORATORY ENVIRONMENTAL REQUIREMENTS

TABLE II (Cont'd.)

Environmental Parameters	Transportation, Storage and Handling	Prelaunch	Launch and Boost
Explosion	No Requirement	Equipment shall not ignite an explosive atmosphere.	Same Requirement
Electro-Interference	No Requirement	Equipment shall not cause of be subject to electromagnetic interference.	Same Requirement
Propellant Compatibility	No Requirement	Exposed surfaces shall withstand exposure to propellant fumes for 1 minute (N_2O_4, N_2H_2 and UDMH). Protective coatings or replacement may be employed where state-of-the art precludes compliance.	No Requirement
Sunshine	No Requirement	Non-metallic surfaces shall withstand deteriorating effects of sunshine.	No Requirement
Operational Life	One Year in Sheltered Storage Conditions	Three times maximum operating time to launch.	Three times the duration required to achieve apogee.

SIMULATED LABORATORY ENVIRONMENTAL REQUIREMENTS

TABLE II (Cont'd.)

Environmental Parameters	Transportation, Storage and Handling	Prelaunch	Launch and Boost
Sustained Acceleration	No Requirement	1 g (gravity)	Forward longitudinal 3.7 g's. Pitch and Yaw (either direction) 3 g's
Altitude	Sea level to 15,000 ft. during air transportation	Sea level to 2500 ft.	Sea level to APOGEE at a rate determined by the flight profile
ACOUSTIC	No Requirement	No Requirement	As encountered during liftoff and maximum Q flight phases; Requirements shown in Figure 5.
Surface Winds	No Requirement	Per specification of MTP-AERO 61-78, "Surface Wind Statistics for Patrick AFB."	Wind and Wind Shear Requirements apply for critical conditions.
Wind and Wind Shear	No Requirement	No Requirement	Specification of NASA technical Note D-610 "Monthly and Annual Wind Distribution as a Function of Altitude for Patrick AFB.

SIMULATED LABORATORY ENVIRONMENTAL REQUIREMENTS

TABLE II (Cont'd.)

Environmental Parameters	Transportation, Storage and Handling	Prelaunch	Launch and Boost
Shock	As encountered in normal handling operations. See SSD-62-166, Para. 3.3.1 d and 3.3.3 c only.	No Requirement	Exposure to a complex wave consisting of several high frequency decaying sinusoids with a response spectra equivalent to a 240 g half sine pulse of 0.2 mil. sec. to 85 g half sine 0.2 mil. sec. pulse duration depending on distance from Sta. 77.0 for structure mounted equipment. For truss mounted equipment, aft compartment, shock load levels equal 120 g for 0.2 mil. sec. pulse duration.
Vibration	No Requirement	No Requirement	Booster requirements including transtage are found in SSD-62-166, Para. 3.3.4 d only; Equipment, Mission and Crew Module requirements shown in Figures 6, 7, and 8.

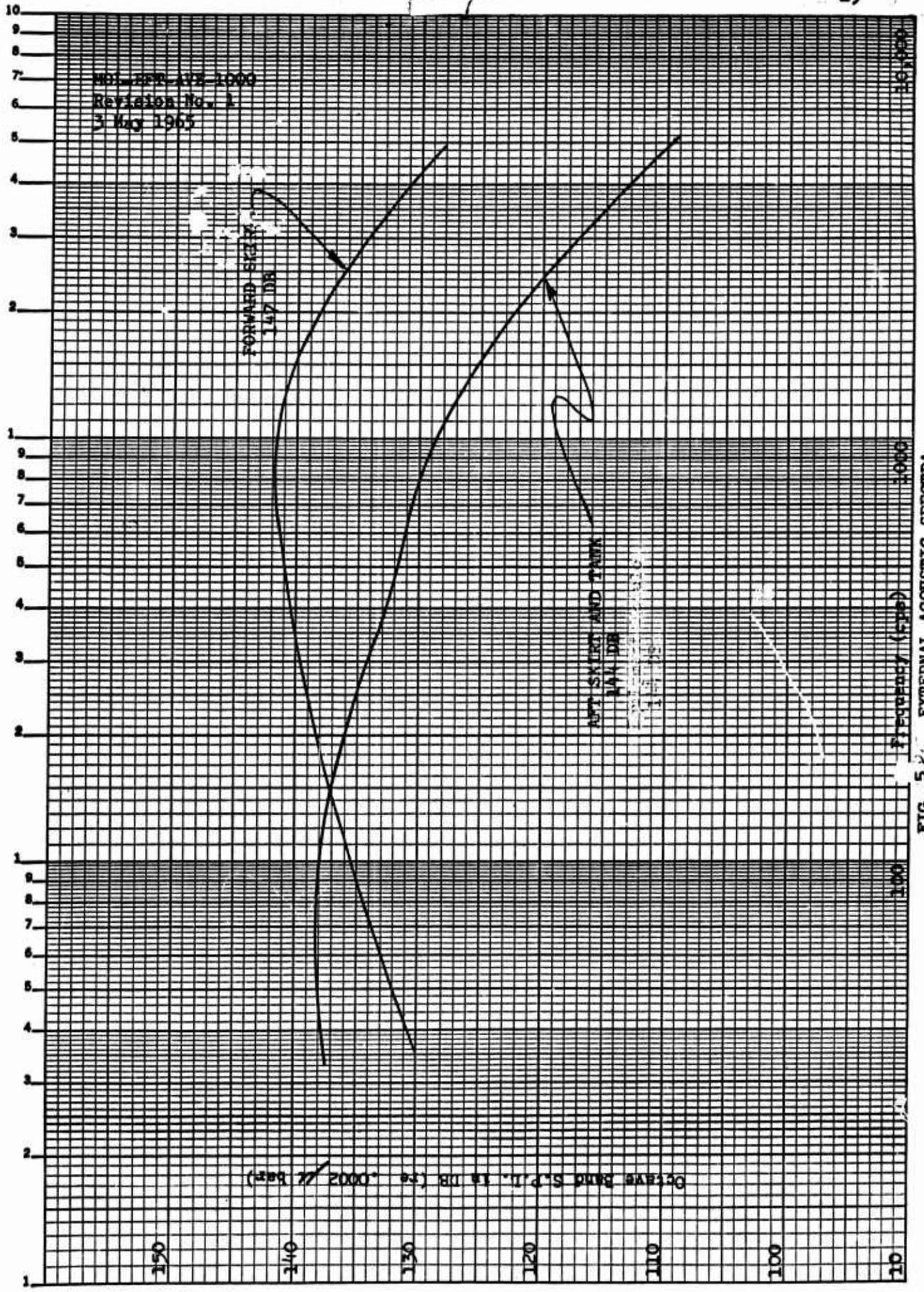
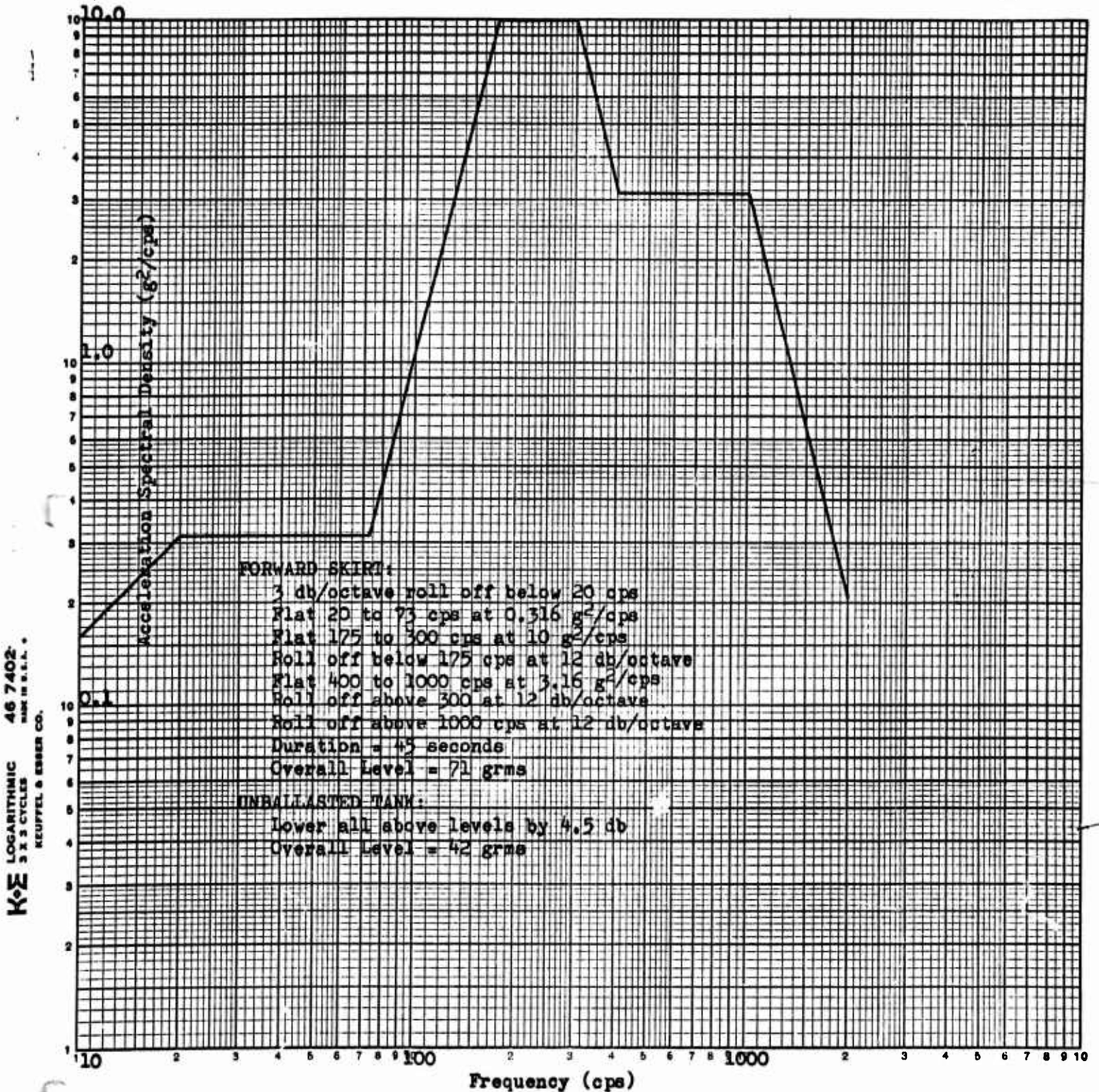


FIG. 5 EXTERNAL ACOUSTIC SPECTRA

K&E SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO. MADE IN U.S.A.
3 CYCLES X 70 DIVISIONS



RANDOM VIBRATION
MOL-EFT FORWARD SKIRT AND
UNBALLASTED TANK SECTION

Figure 6

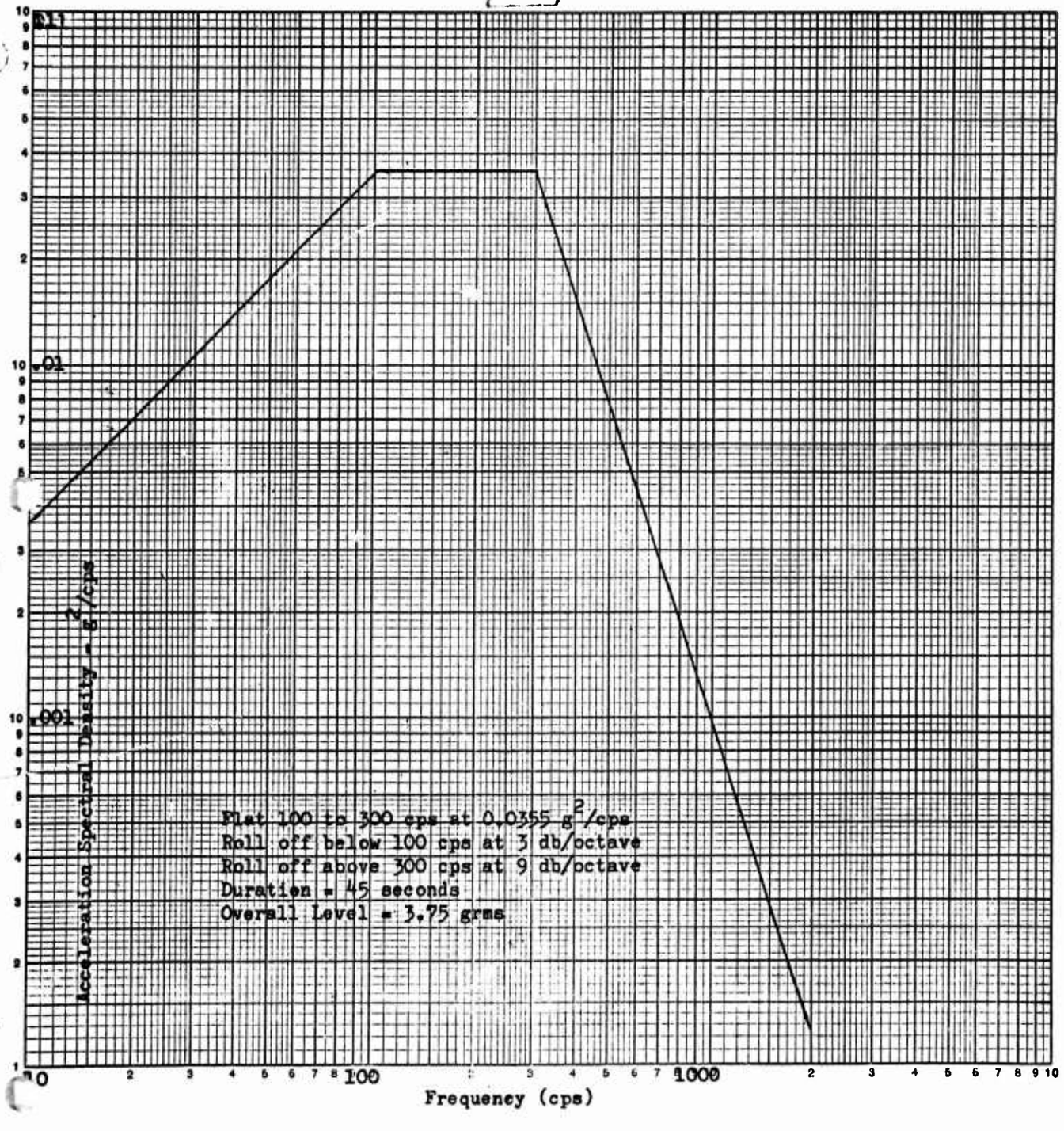
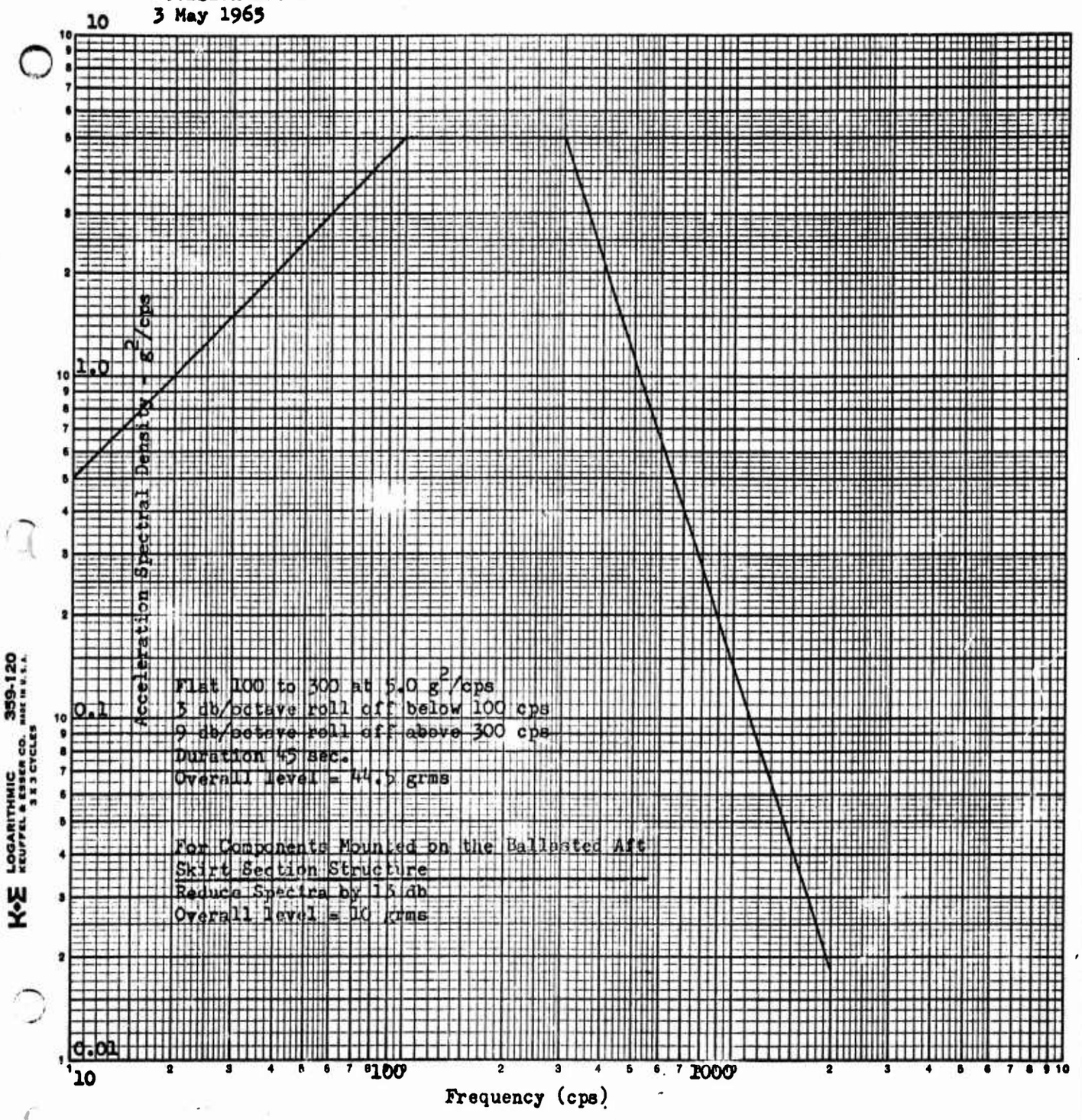


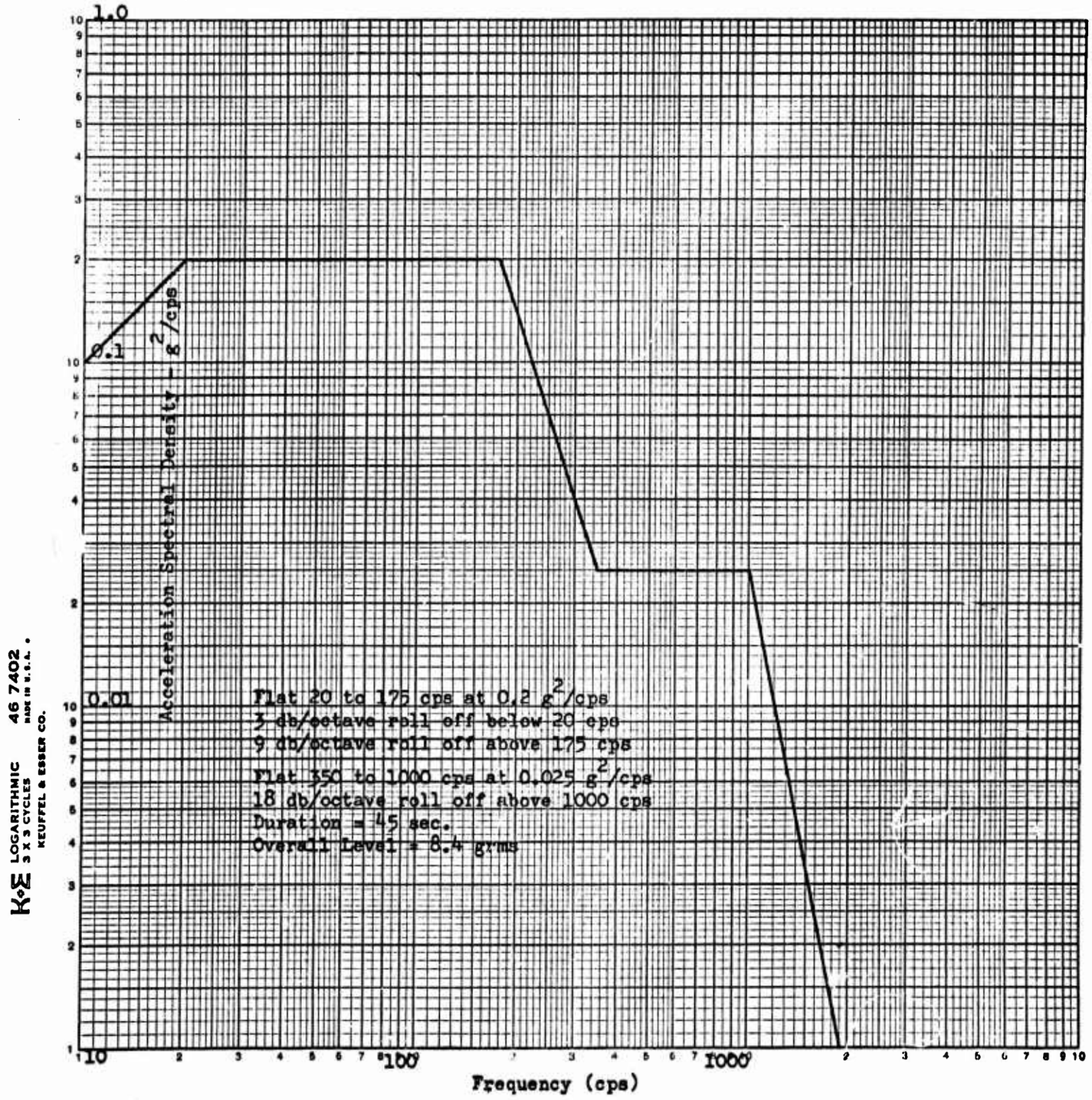
FIGURE 7

RANDOM VIBRATION
MOL-EFT BALLASTED TANK SECTION STRUCTURE



RANDOM VIBRATION
MOL-EFT AFT SKIRT
SECTION STRUCTURE

Figure 8A



RANDOM VIBRATION
MOL-EFT AFT SKIRT TRUSS

Figure 8B

4.0 QUALITY ASSURANCE PROVISIONS

4.1 General - The acceptance of the Simulated Laboratory by the Procuring Agency is predicated upon delivery by the contractor of a Simulated Laboratory tested in accordance with the test philosophy as stated in the contract Program Plan and as defined herein. The Simulated Laboratory shall have been constructed, inspected, and tested in accordance with the applicable drawings, test procedures and specifications. Proof of compliance to the applicable drawings and specifications shall be maintained during the course of manufacture by the Contractor's quality control system. Data showing proof of compliance shall be continuously available during the course of manufacture and testing for AFQC surveillance in accordance with the terms of the contract. Reverification of compliance of the airborne Laboratory equipment or its subsystems or components to applicable drawings or specifications shall not be required at the time of acceptance except as specifically provided herein. The specific condition for acceptance of the Simulated Laboratory shall be the successful compliance with the requirements of 4.1.5 herein.

4.1.1 Data Available Prior to Final Acceptance and Test - Prior to acceptance testing, all component and subsystem test data together with build logs, MRB actions, and Quality Control data shall be made available for review by SSD/Aerospace at the Contractor's facility.

4.1.2 Point of Acceptance - The Simulated Laboratory shall be accepted at the Contractor's manufacturing facility, at a designated test area in the VTF. Items as approved by SSD designated for separate or direct shipment to the launch site need not be present at the time of acceptance of the Simulated Laboratory.

4.1.3 Acceptance - The Simulated Laboratory shall be accepted in accordance with the provisions stated in the contract work statement and in Paragraph 4.1.5 herein.

4.1.4 Inspections, Checkouts, and Tests - Checkout and test of the Simulated Laboratory and equipment, during and after completion of fabrication, shall be as defined herein. Measuring instruments shall be calibrated in accordance with MIL-C-45662A.

4.1.4.1 In-Line Inspection and Factory Tests - In-line inspections, checkouts, and functional tests shall be those tests and inspections performed prior to movement of the Laboratory to the vertical test fixture (VTF) to verify compliance with the requirements of the applicable drawings and this specification. These tests shall include, but not be limited to, visual inspection, physical measurements, finish, normal structural and welding physical measurements, finish, normal structural and welding inspections, continuity, insulation resistance and others as identified on the Contractor's drawings.

4.1.4.2 Acceptance Tests - Acceptance tests shall be those tests performed in the vertical test facility (VTF) to demonstrate compliance with the requirements set forth herein and with the Contractor's drawings. Acceptance tests shall be run on the Simulated Laboratory as a functionally assembled unit with the modified Titan IIIC Transtage. These tests shall be of the end to end subsystem functional type. The subsystems test shall be followed by a simulated flight test (combined systems test) bypassing non-applicable portions of Stage O, Stage I, and Stage II. Engine gimballing will not be mandatory.

4.1.5 Acceptance Tests

4.1.5.1 Subsystem Tests - The following subsystems shall be tested on the Simulated Laboratory:

4.1.5.1.1 Electrical Power and Distribution Subsystem

a. Verification of a single point ground;

b. Ground power application;

c. Verify electrical voltage at loads.

4.1.5.1.2 Telemetry Subsystem

a. Verify PCM encoder and transmitter operation;

b. Verify single side band transmitter operation;

c. Verify antenna system (insertion, VSWR);

d. Verify end instruments and signal conditioning.

4.1.5.1.3 Flight Control Subsystem - (Laboratory Tested with Transtage)

a. Verify gain change of adapter programmer;

b. Verify polarity of adapter programmer.

4.1.5.2 Simulated Flight Sequence - The Simulated Laboratory acceptance test sequence shall be based upon the Titan III CST sequence. The applicable portions of the test sequence shall be those functions associated with the Orbiting Vehicle Flight ending with separation of the Gemini reentry module. Acceptance tests shall be performed in the Vertical Test Facility (VTF) and shall be performed on the Simulated Laboratory as a functionally assembled unit (consisting of a modified Transtage and Simulated Laboratory). The ACSP guidance shall be adequately simulated to permit running a Transtage CST except that engine gimballing will not be mandatory. The following new events shall be incorporated into the Titan III CST during the Simulated Laboratory CST:

4.1.5.2 Continued

a. 28 VDC power transfer

b. PCM link verify

c. SSB link verify

d. Separation discrete verify

4.1.6 EMI Testing

4.1.6.1 Electromagnetic Compatibility - EMI tests at the VIB and launch pad areas at ETR will demonstrate electromagnetic compatibility of the MOL-EFT systems, the Titan IIIC booster, the Gemini spacecraft, the AGE, and the ETR facilities and equipment.

5.0 PREPARATION FOR DELIVERY

5.1 Marking of Shipments - Equipment items of the system shall be identified and otherwise marked in accordance with the requirements of MIL-STD-129.

5.1.1 Packing - The following items shall be packed separately from the booster for delivery to the assembly area:

Simulated Laboratory, Contractor Furnished

5.1.2 Separate Shipment - Components, including, but not limited to, removable ballast and the battery may be shipped separately.

5.1.3 Direct Shipment - Components procured from Vendors, including but not limited to the battery, may be shipped directly from the Vendor's facility to ETR upon SSD approval.

6.0 NOTES

6.1 Definitions - Terms used in this specification shall be defined as follows:

6.1.1 Contractor - The Contractor shall be the Martin Company, a Division of Martin-Marietta Corporation, Post Office Box 179, Denver, Colorado, 80201.

6.1.2 Simulated Laboratory - The Simulated Laboratory, as furnished by the Contractor, including the Laboratory tank, the aft adapter, the forward mating ring and accessory equipment.

6.1.3 Orbiting Vehicle - The assembled vehicle including the Simulated Laboratory, the TIII Transtage, the Gemini reentry module and Gemini conical adapter.

6.1.4 Unsheltered Area - An unsheltered area shall be defined as one which is subject to the natural environment to be found in the continental United States, excluding Alaska, in which the temperature may range from -35°F to +160°F and where the only protection afforded to the equipment is its own packaging and/or a tarpaulin or similar cover.

6.1.5 Semi-Sheltered Area - A semi-sheltered area shall be defined as an unheated, uninsulated, enclosed building without air conditioning; designed to provide protection against rain, snow, sleet, and wind; with a measure of protection against solar radiation, sand, and dust, and other natural environment in continental United States, excluding Alaska, in which the temperature may range from -35°F to +135°F. Temperature and humidity variations will be such that condensation does not occur.

6.1.6 Sheltered Areas - A sheltered area shall be defined as a normally heated, insulated, enclosed structure with weather-tight roof, walls, windows and doors designed to provide protection against rain, snow, sleet, wind, sand, dust, solar radiation, and other natural environments in which the temperature may range from +32°F to + 125°F. Temperature and humidity variations will be such that condensation does not occur.

6.1.7 Payload - The payload shall consist of the Simulated Laboratory and the Gemini reentry module and Gemini conical adapter.

6.2 Abbreviations - Abbreviations as used throughout this specification are defined as follows:

cps	Cycles per second
CST	Combined Systems Test
dbm	Decible level referenced to one milliwatt of power
ETR	Eastern Test Range
GFAE	Government-Furnished Airborne Equipment
GFE	Government-Furnished Equipment
HSQ	Heat Shield Qualification
MMC	Martin-Marietta Corporation
MOL-EFT	Manned Orbiting Laboratory-Early Flight Test
mcs	Megacycles per second
mw	Milliwatts
PCM	Pulse Code Modulation
psig	Pounds per square inch guage pressure
SPL	Sound Pressure Level
SLPS	Simulated Laboratory Power Supply
SPS	Samples per second
SRM	Solid Rocket Motor
SSB	Single Side Band
VSWR	Voltage Standing Wave Ratio
VTF	Vertical Test Facility

6.3 General Notes

6.3.1 It is anticipated that the wind will not exceed the ground wind plus gusts profile shown in SSD Exhibit 62-166, except during hurricane or severe thunderstorm conditions. The ground wind plus gust profile of SSD Exhibit 62-166 is used in the various analyses conducted of launch vehicle/payload combinations to be launched from ETR. The effect of ground wind induced oscillations is to be considered in the analysis of loads due to ground winds.

6.4 Ordering Data - The following groups of equipment when assembled in the field will constitute a complete Orbiting Vehicle:

a. Simulated Laboratory (including aft adapter) and associated equipment (Contractor furnished);

b. Titan IIIC Transtage (GFAE-Contractor modified);

c. Gemini capsule including conical adapter (GFAE).

When orders are placed in accordance with this specification, the Procuring Agency will specify the schedules and quantity of articles to be delivered. The equipment designated for direct shipment from vendors' facilities is authorized to be inspected and accepted at source, and delivered separately to a Contractor established schedule. The schedule to which it is delivered at the using site will, however, be such that it will support the using site need date for which it is intended.

APPENDIX I-A

GOVERNMENT-FURNISHED EQUIPMENT, CONTRACTOR-INSTALLED

Item	Description	Quantity
1	Gemini Spacecraft, including conical adapter and ballast (also includes Gemini instrumentation);	1 Structural Test Capsule
2	Titan II Stage I Oxidizer Tank	1
3	Titan IIIC Transtage (Contractor to modify)	1

APPENDIX I-B

CONTRACTOR FURNISHED EQUIPMENT, CONTRACTOR INSTALLED

Item	Description	Identification*	Quantity	Unit Wt**
1	Battery	PD 94S0026	1	50
2	Relay	PD 72S0070	1	3.25
3	10 Volt Instrumentation Power Supply		1	8.5
4	Telemetry Antenna	804A3350110	2	11
5	T/M Modulator, Single Side Band		1	15
6	T/M Transmitter Single Side Band		1	23
7	3 Port Junction	PD 95S0098	1	1
8	Motor Driven Switch	PD 72S0067	1	5
9	Instrumentation, including the following:			
	a. Buffet Pressure Transducers		4	0.6
	b. Pressure Transducers		6	0.6
	c. Temperature Sensors (with associated conditioning equipment)		6	0.8
	d. 10 Volt Voltage Distribution Units		2	0.9
10	RF Multiplexer	PD 85S0097	1	6
11	PCM Multiplexer Encoder	PD 64S0376	1	26
12	PCM Transmitter		1	25

*Equivalent parts may be substituted to meet MOL-EFT requirements
**For information only

APPENDIX II

Deviations

Deviation 1 — Paragraph 3.3.3.2.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: In Paragraph 3.3.2.1, insulating tubing shall be in accordance with the Contractor's Materials Specifications which shall meet the propellant compatibility and environmental requirements of SSS-TIII-010 SLV.

Reason for Change and Remarks: The insulating tubing must meet the propellant compatibility and environmental requirements of SSS-TIII-010 SLV.

Deviation 2 — Paragraph 3.3.3.2.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: In Paragraphs 3.6 through 3.6.1.4, the basic electrical and mechanical intent of Specification MIL-W-8160 shall be met, but wires and cables used shall meet propellant compatibility requirements.

Reason for Change and Remarks: This deviation is necessary due to the characteristics of the storable type of propellants used in Program 624A where compatibility demands selection of wires, cables, insulation materials, and tubing suitable for the application.

Deviation 3 — Paragraph 3.3.3.2.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: In Paragraph 3.6.1.7, the wiring that supplies power to the current sensitive ordnance devices shall not meet the maximum voltage drop requirements.

Reason for Change and Remarks: Upon providing power to the current sensitive ordnance devices, the voltage drop exceeds the allowable drop of 2V dc maximum. The ordnance devices are current sensitive. Therefore, the current supplied is the controlling in flight factor and the voltage drop will exceed the limitations of MIL-W-8160.

Deviation 4 — Paragraph 3.3.3.2.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: In Paragraph 3.6.2f(2), the identification of the termination will not be printed on the sleeve.

Reason for Change and Remarks: It is very impractical and costly to identify wire and cable terminations on the sleeve.

Deviation 5 Paragraph 3.3.3.2.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: In Paragraph 3.6.2.1e, wire segment letters may be changed to two-way permanent splices.

Reason for Change and Remarks: Splices are identified with a reference designation for splice usage control, in accordance with the wiring checkout diagrams.

Deviation 6 Paragraph 3.3.3.2.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: In Paragraph 3.7.4, approval is required for use of post insulated terminals and splices.

Reason for Change and Remarks: These terminals are not in the QPL for MIL-T-7928. Further, different materials are required to meet compatibility requirements.

Deviation 7 Paragraph 3.3.3.2.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: In Paragraph 3.7.5, terminal blocks will be physically interchangeable with MS25123, but will be made of propellant compatible materials.

Reason for Change and Remarks: This deviation is necessary due to the characteristics of the storable type propellants used in the Program 624A where compatibility demands selection of materials suitable for the application.

Deviation 8 Paragraph 3.3.3.2.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: In Paragraph 3.7.6.3, connectors will meet or exceed the electrical and performance requirements of MIL-C-5015 and MIL-C-26482. The materials, construction, and finishes will be changed.

Reason for Change and Remarks: This deviation is necessary due to the characteristics of the storable type propellants used in the Program 624A where compatibility demands selection of materials suitable for the application.

Deviation 9 — Paragraph 3.3.3.2.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: In Paragraph 3.7.6.4, the shell material of coaxial connectors will be aluminum instead of silver plated brass.

Reason for Change and Remarks: This deviation is necessary due to the characteristics of the storable type propellants used in the Program 624A where compatibility demands selection of materials suitable for the application.

Deviation 10 — Paragraph 3.3.3.2.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: In Paragraph 3.10, cushion clamps will be physically interchangeable, where possible, with MS 21919, but will have propellant compatible materials. The types of clamps used must comply with stress and dynamic requirements.

Reason for Change and Remarks: This deviation is necessary due to the characteristics of the storable type propellants used in the Program 624A where compatibility demands the selection of materials suitable for the application.

Deviation 11 — Paragraph 3.3.3.2.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: In Paragraph 3.6.2.1f, wire size will not be included in wire number for pigtails on vendor furnished components.

Reason for Change and Remarks: Wiring diagrams do not control wire size of pigtails. Presently this is controlled by procurement description drawings.

Deviation 12 Paragraph 3.3.3.2.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: Delete reference to MIL-E-25366 from MIL-W-8160.

Reason for Change and Remarks: This requirement is too all-inclusive and would create confusion in establishing applicability. It covers the general requirements for the installation of electric and electronic systems and equipment, not the installation of wiring and wiring devices.

Deviation 13 Paragraph 3.3.3.2.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: Delete the requirements of Paragraphs 3.14.1 through 3.14.1.2.1 and 4.3.

Reason for Change and Remarks: Wiring and interconnection diagrams will be prepared, as required, in accordance with the Contractor's Class III drawing system. As such, they will not necessarily comply entirely with MIL-D-70327, MIL-S-25063, and MIL-H-5166. These diagrams will be available for review at the contractor's facility but they will not be submitted for formal approval.

Deviation 14 Paragraph 3.3.3.2.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: In Paragraph 3.2, specifications and standards will not necessarily be selected in accordance with MIL-D-70327.

Reason for Change and Remarks: This requirement would be too restrictive for model shop operation and could result in added cost to obtain material or parts or delay in time to obtain approval for use of non-standard items.

Deviation 15 Paragraph 3.3.3.2.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: Delete the requirements of Paragraph 4.3.1.

Reason for Change and Remarks: Wiring mockup requirements should not be imposed for a model shop program that involves only one (1) article.

Deviation 16 Paragraph 3.2.5.1

Requirement: Paragraph 1.2 of WDT 57-17 requires compliance with Exhibit 57-1, 57-2, and 57-3.

Deviation: Exception is taken to the requirements of Exhibits 57-1, 57-2, and 57-3.

Reason for Change and Remarks: The maintenance, failure data and consumption reporting requirements are no longer current for this program. The exhibits were developed early in the ballistic missile program era, and the requirements have been superseded by later exhibits and MIL specification requirements.

Deviation 17 Paragraph 3.2.5.1

Requirement: Paragraph 3.1.2 and 3.1.3 of WDT 57-17 requires data card preparation and submittal.

Deviation: Data cards need not be prepared or submitted.

Reason for Change and Remarks: MOL-EFT R&D launch activities will be under the control of the contractor, and cards, established for military inventory control, will not be needed.

Deviation 18 Paragraph 3.3.3.3

Requirement: Bonding shall be in accordance with the requirements of MIL-B-5087.

Deviation: In Paragraphs 3.8.1 and 3.8.2, change the reference from MIL-W-5088 to MIL-W-8160.

Reason for Change and Remarks: MIL-W-8160 is the specification used for guided missile wiring. MIL-W-5088 is used for aircraft wiring.

Deviation 19 Paragraph 3.3.3.3

Requirement: Bonding shall be in accordance with the requirements of MIL-B-5087.

Deviation: In Paragraph 3.10.1, add the following sentence: "The mating of iridited surfaces is acceptable and considered to have an RF impedance equivalent to bare metal-to-metal.

Reason for Change and Remarks: Iridited surfaces provide a more permanent bond than bare metal-to-metal; data available at the Martin-Denver environmental laboratory shows the RF impedance of bare metal-to-metal and iridite-to-iridite bonds to be equivalent over the frequency range of 150 kcs to 20 mcs.

Deviation 20 Paragraph 3.3.3.3

Requirement: Bonding shall be in accordance with the requirements of MIL-B-5087.

Deviation: In Paragraph 3.10.1, delete the fourth sentence and substitute the following: "Bonding jumpers shall not be used, except where by reason of over-riding design considerations, the members to be bonded are not in contact with each other, or intermittent separation of the members occurs. Such bonding jumpers shall comply with good RF bonding techniques."

Reason for Change and Remarks: Such cases may exist where bonding jumpers must be used; the requirement of Paragraph 3.10.1 (that a lab demonstration proves maximum impedance of 80 milliohms from 150 kcs to 20 mcs) is not realistic when applied to the practical usage of bonding, jumpers. References: "DESIGN TECHNIQUES FOR INTERFERENCE - FREE OPERATION OF AIRBORNE ELECTRONIC EQUIPMENT", prepared by Frederick Research Corp. on Contract AF33(038)23341, dated 1952; Figure 3.1.3.2-F shows impedance of flat bonding jumper to be more than 9 ohms at 20 mcs; data available at Martin-Denver Environmental Laboratory substantiates this showing RF impedance for 4" x 1" bonding strap to exceed 1 ohm at 20 mcs.

Deviation 21 Paragraph 3.3.2

Requirement: Operating characteristics of the telemetry system shall conform to the telemetry standards and requirements set forth in document IRIG-106-60.

Deviation: The requirements in Appendix I to IRIG-106-60 referring to spurious and harmonic emissions shall not be demonstrated.

Reason for Change and Remarks: Conformance to these requirements need not be demonstrated.

Deviation 22 Paragraph 3.2.6.1

Requirement: Requires the design to be in general accordance with MIL-M-6555A.

Deviation: Delete Paragraph 3.1.14 Environment

Reason for Change and Remarks: Environmental requirements are in the body of the model specification.

Deviation 23 Paragraph 3.3.3.2.2

Requirement: Electrical wiring shall be in accordance with MIL-W-8160D.

Deviation: In Paragraph 3.6.2f(4), wire indentification and color (if applicable) of each conductor will be on the wire inside the cable jacket. (Applicable to cables with 10 or more conductors.) The identification will be within 3 inches of the wire termination. The plug number only will be indentified on the outside of the cable jacket.

Reason for Change and Remarks: Each wire of the cable will be identified per code inside the fabricated cable jacket and wiring diagrams must be referred to for circuit modification. Use of sleeve over the outer jacket is felt to be an unnecessary and costly procedure.

Deviation 24 Paragraph 3.3.3.2.2

Requirement: Electrical wiring shall be in accordance with MIL-W-8160D.

Deviation: In Paragraph 3.6.2 a wire identification sleeve within three inches of each end of the wire may be used as an alternate to stamping the wire number on the wire jacket every 15 inches.

Reason for Change and Remarks: No stamping process exists which will consistently prevent degradation of jacket insulating properties.

Deviation 25

Requirement: The lab electrical system shall meet the requirements of MIL-W-8160D.

Deviation: Paragraph 3.5.3 of MIL-E-25366C referenced in MIL-W-8160D, delete "The use of relays shall be held to a minimum".

Reason for Change and Remarks: Minimum implies avoidance regardless of alternatives. Relays will be used where they are judged to be the most reliable choice.

Deviation 26

Requirement: The lab electrical system shall meet the requirements of MIL-W-8160D.

Deviation: Delete all requirements of Paragraph 4.6.3 of MIL-E-25366C referenced in MIL-W-8160D.

Reason for Change and Remarks: Environmental requirements including material compatibility is controlled by this model spec.

Deviation 27

Requirement: The lab electrical system shall meet the requirements of MIL-W-8160D.

Deviation: Delete the requirements of Paragraph 3.2.13 of MIL-E-8189B referenced in MIL-W-8160D, and replace with the following: The shield of shielded cables, other than coaxial, which are internal to a black box shall be grounded to the black box chassis by a bonded insulated ground lead attached to the shield by a crimp ferrule or the shield shall be insulated and crimped or soldered to a connector receptacle contact where shield carry through or continuity is required.

Reason for Change and Remarks: Alternative method to optimize packaging and circuit design.

Deviation 28

Requirement: The lab electrical system shall meet the requirements of MIL-W-8160D.

Deviation: Delete the last sentence of Paragraph 3.4.5 of MIL-E-25366C, referenced in MIL-W-8160D.

Reason for Change and Remarks: Environmental requirements and test definition will be controlled by this model spec.

Deviation 29

Requirement: The lab electrical system shall meet the requirements of MIL-W-8160D.

Deviation: Delete all requirements of the first sentence of Paragraph 3.2.6 "wire coding" of MIL-E-8189B, referenced in MIL-W-8160D.

Reason for Change and Remarks: Martin Company standards and present practice do not provide for marking of wiring inside of equipment.

Deviation 30

Requirements: MOL-EFT requires that MIL-STD-130B be the applicable document for "identification marking of U. S. Military Property". Para. 2.1 of MOL-EFT-AVE-1000 - the following documents of the issue date shown shall form a part of this specification to the extent specified herein. Subordinate documents selected for use shall be of the issue in effect in in "DCD index of specifications and standards", dated 19 July 1961 with supplement 1 thereto, dated April 1962. A supplement list of specifications applicable to the equipment originally designed for Titan I and Titan II usage is contained in Appendix II deviations.

Deviation: The following is a list of components and the specific component level deviations authorized:

1. Switch motor driven 28 V. DC-20 Ampere (PD 72S0067)

Titan II	Titan III
MIL-E-5272B (Environmental Testing)	MIL-E-5272C (1)
MIL-S-8484 (Seals and Seal Testing)	Cancelled
MIL-I-8500 (Interchangeability & Replaceability)	MIL-I-8500B
MIL-I-26600 (EMI)	MIL-I-26600 (2)
MIL-D-70327 (Drawings)	MIL-D-70327 (1)
MIL-STD-129B (Mark for Shipment)	MIL-STD-129C
MS-24123 (Plate - Identification)	MS-24123A
MS-33586 (Metals - Definition)	MS-33586A
MS-20426 (Rivets)	MS-20426C
AN-3179 (Inductor - Lab Test)	AN-3179 (1)

2. Transducer - Differential Pressure (PD 74S0032)

Titan II	Titan III
MIL-I-8500A (Interchangeability & Replaceability)	MIL-I-8500B
MIL-STD-16B (Electrical Connectors)	MIL-STD-16C
MIL-STD-130A (Identification & Marking)	MIL-STD-130B
MS-24123 (Plate - Identification)	MS-24123A
MS-33540 (Safety Wiring)	MS-33540C
FED. Test Method STD. 151 (Metals)	FED. Test Method STD 151a

3. Power Supply - Strain Gage - 10V. DC to DC & 5V. DC to DC (PD 94S0016)

Titan II	Titan III
MIL-C-6021B (Castings)	MIL-C-6021D
MIL-I-8500A (Interchangeability & Replaceability)	MIL-8500B
MIL-I-26600 (EMI)	MIL-I-26600 (2)
MIL-STD-130A (Identification & Marking)	MIL-STD-130B
ANA Bulletin 143D (Standards)	MIL-STD-143
FED. Test Method STD. 151 (Metals)	Fed. Test Method Std. 151A

APPENDIX III

COMPONENT QUALIFICATION PROGRAM

Item	Description	Identification***	Qualified By Titan III D.A.T. Tests
1	Battery	PD 94S0026-001	X
2	Relay	PD 72S0070-501	X
3	10 Volt Instrumentation Power Supply	PD 94S0016-059	+
4	Telemetry Antenna	804A3350110-069	X
5	T/M Modulator, Single Side Band	PD 64S0331-019	Not Req'd.
6	T/M Transmitter Single Side Band	80801H24000-159	X
7	3 Port Junction	PD 85S0098-001	X
8	Motor Driven Switch	PD 72S0067-501	X
9	Instrumentation, including the following:		
	a. Buffet Pressure Transducers		X
	b. Pressure Transducer		X
	c. Thermocouples and Temperature Reference Compensators		X
	d. Voltage Distribution Units		X
10	RF Multiplexer	PD 8580097-005	X
11	PCM Multiplexer Encoder	PD 64S0375-039	X
12	PCM Transmitter		X

***Equivalent parts may be substituted to meet MOL-EFT requirements.
+Qualified under Titan II Program.

APPENDIX IV

STRUCTURAL LOAD TESTS

A. General Description

The Contractor shall perform the following structural load tests in accordance with the MOL-EFT Subsystem Test Plan. The test loads shall be in accordance with the MOL-EFT Program requirements, as established by the Contractor and approved by SSD. MAC will provide engineering inputs as required for those tests pertaining to the Gemini adapter MOL-EFT interface.

1. Static limit load test of the Simulated Laboratory and the Titan III/Laboratory interface shall be performed. (This includes the Martin half of the Simulated Laboratory/Gemini conical adapter interface).
2. Static limit load test on Laboratory structure ballast mounting provisions shall be performed.
3. Static limit load tests of the equipment mounting trusses shall be performed.

The test results shall be submitted in accordance with Data Requirements Documents SSS-TIII-010 DRD.

SUPPLEMENTARY

INFORMATION

MARTIN COMPANY
DENVER DIVISION

CONTRACT NO. AF04(695)-150

SPECIFICATION

CHANGE NOTICE

NO. 3
DATE 1 March 1966

SPEC NO. MOL-EFT-AVE-1000
TITLE Model Specification Airborne Vehicle Equipment
DATED 15 March 1965
REVISION NO. 1 DATED 3 May 1965

AD 472 438

PURPOSE OF CHANGE: This change accomplishes the following:

A. Adds static grounding provisions and a ground strap between the Laboratory structure and the Gemini conical adapter.

B. Provides for transmission of Gemini measurements through the laboratory SSB and PCM transmitters.

This change incorporates SCNP C (M40012) as approved by SCD C3-3335, dated 16 November 1965 (Martin Ref. 5W16990).

INSTRUCTIONS:
Replace Page 15 with revised Page 15
Replace Figure 2, Page 17 with revised Figure 2, Page 17
Replace Page 20 with revised Page 20
Replace Figure 4, Page 22 with revised Figure 4, Page 22
Replace Page 23 with revised Page 23
Replace Page 24 with revised Page 24
Replace Page 39 with revised Page 39
Add page 24a

AUTHORIZATION: SCD C3-3335, dated 16 November 1965 (Martin Ref. 5W16990) and CCN 1480, dated 25 January 1966 (Martin Ref. 6W02042).

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

APPROVAL

Form DEN 1016-01(11-63)

TABLE I

PAYLOAD MEASUREMENT ALLOCATIONS FOR TIIIC MOL-EFT FLIGHT

These measurements only will be transmitted from the Simulated Laboratory (PCM system) and are in addition to those TIIIC measurements already defined in the Master Program Management Plan (SSD-CR-64-14) and Supplement thereto for the Titan IIIC vehicle to be used for the MOL-EFT flight.

No. of Measurements	Type of Measurements	Transducer Location	Frequency
3	Aero Buffet Pressure	Lab Tank	400 SPS
1	Aero Buffet Pressure	Aft Adapter	400 SPS
3	Aero Pressure	Lab Tank	100 SPS
3	Aero Pressure	Aft Adapter	100 SPS
4	Aero Temperature	Lab Tank	40 SPS
2	Aero Temperature	Aft Adapter	40 SPS
1	Instrument Power Supply	Lab Tank	20 SPS
(SCN 3) 10	Aero Pressure (MAC)	Conical Adapter (MAC)	20 SPS

* This page supersedes and replaces Page 15 and incorporates SCN 3.

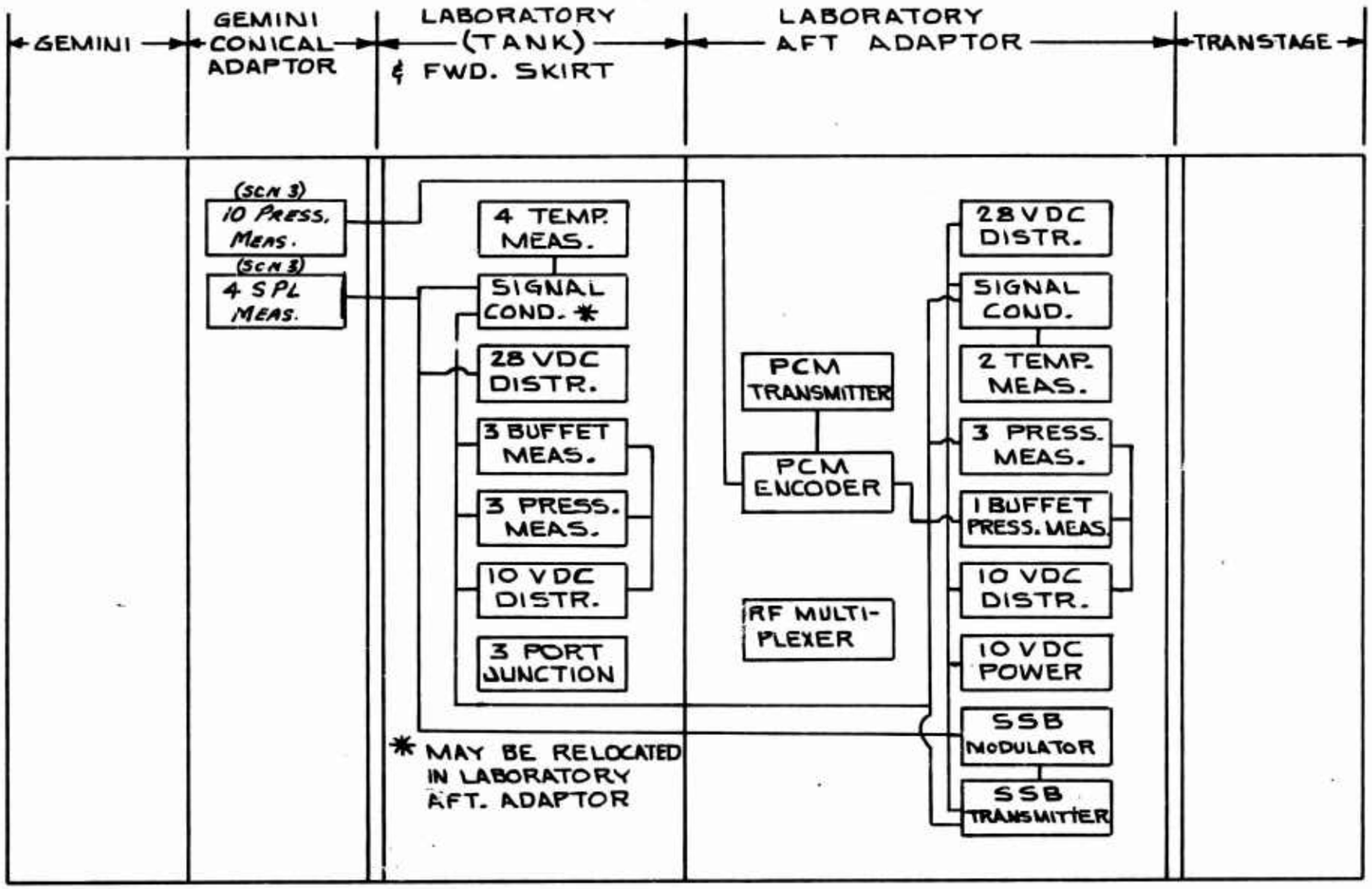


FIGURE 2

MOL-EFT INSTRUMENTATION & TELEMETRY EQUIPMENT LOCATIONS
(HSQ FLIGHT ONLY)

• This page supersedes and replaces Page 15 and incorporates SCN 3.

TABLE IA

SUMMARY OF TELEMETRY SYSTEM CHANNEL ALLOCATIONS

	Transmission Frequency	Channel Available	Measurements Assigned*	Channels Unassigned**
	SSB System			
(SCN 3)	30-3000 cps	15	4	11
	PCM System			
	400 sps	20	4	16
	200 sps	20		20
	100 sps	36	6	30
	40 sps	35	6	29
(SCN 3)	20 sps	85	11	74
	100 sps, bi-level	8		8
	20 sps, bi-level	40		40

* Equipment shall be provided as listed in Appendix I-B to accomplish the assigned measurements acquistion and transmission.

** Unassigned channels are based on equipment capability. Crystals, amplifiers, transducers, and associated equipment are to be provided under separate contractual action if additional channels are utilized.

*This page supersedes and replaces Page 20 and incorporates SCN 3.

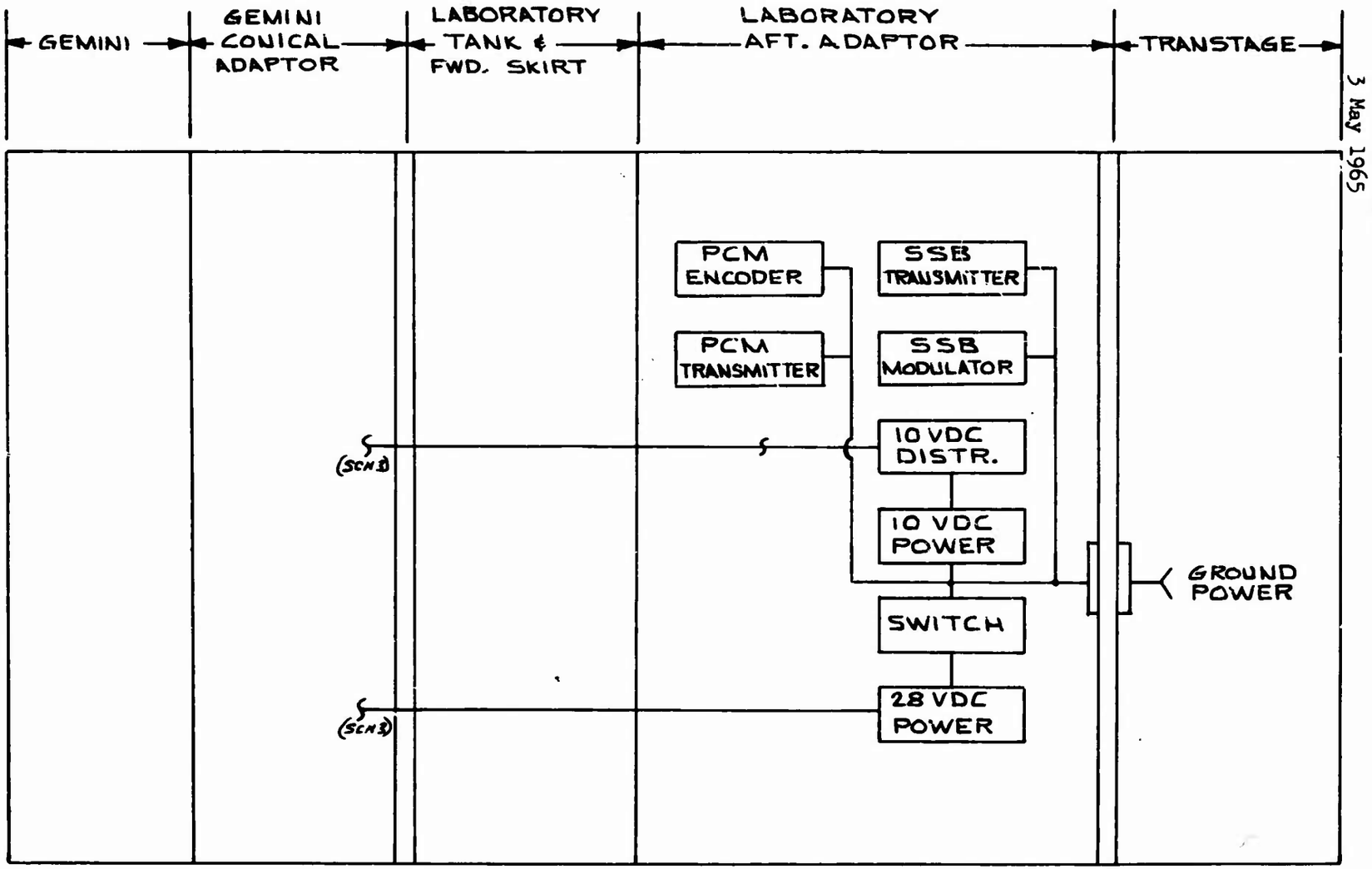


FIGURE 4

MOL-EFT ELECTRICAL POWER AND DISTRIBUTION
(HSQ FLIGHT ONLY)

• This page supersedes and replaces Page 15 and incorporates SCN 3.

3.3.3.1.3 Noise and Ripple Voltage - The SLPS noise and ripple voltages shall not exceed 2.5 volts peak, of which not more than 1.25 volts peak may be generated by airborne equipment. The SLPS noise level voltage shall be measured within the frequency range of DC to 5 KC.

3.3.3.1.4 Instrumentation 10 VDC Power - A 10-VDC regulated power supply system shall be provided for instrumentation equipment. Power for the 10 VDC supply shall be supplied from ground power or the 28 VDC (nominal) battery.

(SCN 3) 3.3.3.1.4.1 Instrumentation Power - The transducer excitation power supply shall supply regulated 10 VDC power to the transducers in the Simulated Laboratory and the Gemini Conical Adapter.

3.3.3.2 Distribution and Grounding - Wiring, buses, connectors, switching, and control shall be provided as required to distribute the electrical power. A grounding system shall be included in the Simulated Laboratory to interconnect the Simulated Laboratory and the Transtage grounding to provide a single point ground. A power transfer switch shall be provided for ground power transfer to SLPS.

3.3.3.2.1 Electrical Interfaces with AGE - Signals and power required for the Simulated Laboratory from AGE and signals to AGE from the Laboratory shall be routed through the Transtage and shall use existing Transtage umbilicals for the Laboratory/AGE interface.

3.3.3.2.2 Power Wiring - Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160D, with the deviations as listed in Appendix II herein.

3.3.3.2.3 Instrumentation Wiring - Instrumentation wiring and connectors shall be provided as required for supplying excitation power to and routing the output signals from the instrumentation specified in Section 3.3.2.

3.3.3.3 Bonding - Bonding shall be in accordance with the requirements of MIL-B-5087 except for the deviations specified in Appendix II herein and the following requirements:

a. All chassis shall be bonded to the Simulated Laboratory structure.

b. The Simulated Laboratory shall be bonded through a connection to the Titan IIIC vehicle which, in turn, shall be connected through the launch stand to the facility ground.

c. All trusses will be bonded to the airframes by means of direct metal-to-metal bonding techniques.

---

* This page supersedes and replaces Page 23 and incorporates SCN 3.

3.3.4 Ballast Subsystem

3.3.4.1 Ballast - Sufficient ballast shall be provided in the Simulated Laboratory such that the Laboratory vehicle will conform to the total weight and center of gravity characteristics as specified herein. The ballast shall be manufactured and mounted such that it can be installed and removed through the access openings in the Simulated Laboratory tank.

3.3.5 Installation Subsystem

3.3.5.1 Installation and Interface Provisions - The Simulated Laboratory shall be designed to mate with the Titan IIIC Transtage and the GFAE Gemini conical adapter with all of the interfaces specified herein. Connectors shall be incorporated in the wiring harness at the interfaces. Mounting provisions for transducers, instrumentation equipment, wiring harnesses, and ballast shall be provided.

3.3.5.1.1 Telemetry Interfaces - Telemetry interface requirements shall be compatible with interface specifications referenced in Section 2.0.

3.3.5.1.2 Gemini Separation Signal - The Transtage flight sequence system shall provide, through the Simulated Laboratory, a contact closure for Gemini separation. The contacts shall be rated at 100 ma minimum, 20 amperes maximum at 28 VDC. This signal will occur __*__ seconds prior to opening the Transtage retro vent valves. The voltage drop in the Simulated Laboratory and Transtage shall not exceed 0.9 volts at 1.0 amperes D.C.

(SCN 3) 3.3.5.1.3 Interface Connectors - Electrical and instrumentation connectors shall be provided at the forward and aft interfaces as follows:

Connector No.	Part No.	Usage	Location
1	PTO2CP-14-12P**	Signal	Gemini Interface
2	PTO2CP-14-12PW**	Signal	Gemini Interface
3	PTO2CP-20-41S**	Instrumentation	Gemini Interface
4	81D30-32-6P	Power and Control	Transtage Interface
5	PD81S0130-019	Signal	Transtage Interface

* To be supplied
** Or Equivalent

---

* This page supersedes and replaces Page 24 and incorporates SCN 3.

(SCN 3) 3.3.5.1.4 Interface Grounding

3.3.5.1.4.1 Transtage Interface - The single point ground identified in Paragraph 3.3.3.2 herein shall be wired into Connector #4 in

(SCN 3) 3.3.5.1.4.2 Gemini Interface - An RF grounding strap shall be installed and electrically bonded to the Simulated Laboratory.

Two static ground wires shall be provided through Connectors #1 and #2 and shall be bonded to the same Simulated Laboratory structural member as the RF bonding strap.

(SCN 3) 3.3.5.1.5 Interface Data Transmission - The measurements identified below shall be telemetered through the Simulated Laboratory PCM and SSB systems.

(SCN 3) 3.3.5.1.5.1 PCM System - Signals from ten aero pressure measurements in the Gemini spacecraft shall be brought through Connector #3 and telemetered by the Simulated Laboratory PCM transmitter.

(SCN 3) 3.3.5.1.5.2 SSB System - Signals from four SPL measurements in the Gemini Spacecraft shall be brought through Connector #3 and telemetered by the Simulated Laboratory SSB transmitter.

3.4 Environmental Requirements - The following conditions, occurring separately or in combination, may occur during storage, shipping and handling. Equipment shall be designed to meet operative requirements after being subjected to these conditions. Shipping conditions, as stated, allow for normal protection of existing packaging in accordance with Section 5.0 herein. Stated conditions allow for transport of equipment installed in the Laboratory, from VIB to launch site. See Simulated Laboratory Environmental Requirements, Table II and Figures 5, 6, 7, 8A, and 8B.

---

*This page is added by SCN 3.

6.2 Abbreviations - Abbreviations as used throughout this specification are defined as follows:

	cps	Cycles per second
	CST	Combined Systems Test
	dbm	Decible level referenced to one milliwatt of power
	ETR	Eastern Test Range
	GFAE	Government-Furnished Airborne Equipment
	GFE	Government-Furnished Equipment
	HSQ	Heat Shield Qualification
(SCN 3)	MAC	McDonnell Aircraft Corporation
	MMC	Martin-Marietta Corporation
	MOL-EFT	Manned Orbiting Laboratory-Early Flight Test
	mcs	Megacycles per second
	mw	Milliwatts
	PCM	Pulse Code Modulation
	psig	Pounds per square inch guage pressure
	SPL	Sound Pressure Level
	SLPS	Simulated Laboratory Power Supply
	SPS	Samples per second
	SRM	Solid Rocket Motor
	SSB	Single Side Band
	VSWR	Voltage Standing Wave Ratio
	VTF	Vertical Test Facility

*This page supersedes and replaces Page 39 and incorporates SCN 3.

MARTIN COMPANY
DENVER DIVISION

CONTRACT NO. AF04(695)-150

SPECIFICATION **CHANGE NOTICE**

NO. 4
DATE 8 March 1966

AD-472 438

SPEC NO. MOL-EFT-AVE-1000
TITLE Model Specification Airborne Vehicle Equipment
DATED
REVISION NO. 1 DATED 3 May 1965

PURPOSE OF CHANGE:

This change incorporates the new PCM and SSB frequencies as recommended by AFWTR.

This change incorporates SCNP D (M40011) as approved by SCD C3-3249 dated 12 October 1965 (Martin Ref. 5-W-15198).

INSTRUCTIONS: Replace page 19 with revised page 19.

AUTHORIZATION: SCD-C3-3249 dated 12 October 1965 (Martin Ref. 5-W-15198) and Change Order No. 60-38 dated 17 February 1966 (Martin Ref. 6-W-02546).

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

E. H. Sorensen
APPROVAL

Form DEN 1016-01(11-63)

3.3.2.1.2 Aft Adapter Section Components

Quantity Required	Description
1	Buffet pressure transducers
3	Pressure transducers
2	Temperature reference compensators
2	Voltage distribution unit
1	10-VDC power supply
(SCN 4) 1	SSB Transmitter (231.9 MC, with power output of at least 50 watts)
(SCN 4) 1	PCM Transmitter (236.2 MC, with power output of at least 50 watts)
1	SSB Modulator
1	PCM Encoder
1	RF Multiplexer

3.3.2.1.3 Unassigned Telemetry Channels - Unassigned telemetry channels (spares) shall be as shown in Table IA.

3.3.2.2 R.F. Transmission - The telemetry RF hardware shall consist of two omni-directional antennas mounted diametrically opposite on the Simulated Laboratory, one three-port junction and a multiplexer to combine the two transmitter outputs. (Refer to Figure 3). The losses in the RF transmission system, from the transmitter output through the antennas shall not exceed 5.4 db. The transmitter output shall not see a VSWR greater than 2.0.

*This page supersedes and replaces page 19 and incorporates SCN 4.

SPECIFICATION **CHANGE NOTICE**

NO. 5
DATE 9 March 1966

SPEC NO. MOL-EFT-AVE-1000
TITLE Model Specification Airborne Vehicle Equipment
DATED 15 March 1965
REVISION NO. 1 DATED 3 May 1965

PURPOSE OF CHANGE:

This change deletes the requirement for Electromagnetic Compatibility Testing of the Simulated Laboratory of the VIB.

This change incorporates SCNP I (M40027) as approved by SCD-C3-3485 dated 3 February 1966 (Martin Ref. 6-W-01791).

INSTRUCTIONS: Replace pages iii and 36 with revised pages iii and 36.

AUTHORIZATION: SCD-C3-3485 dated 3 February 1966 (Martin Ref. 6-W-01791) and CCN 1506 dated 7 February 1966 (Martin Ref. 6-W-02774).

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

E. N. Sorensen
APPROVAL

FORM DEN 1016-01(11-63)

CONTENTS

*This page supersedes and replaces page iii and incorporates SCN 5.

4.1.5.2 Continued

a. 28 V DC power transfer

b. PCM link verify

c. SSB link verify

d. Separation discrete verify

(SCN 5) 4.1.6 Electromagnetic Compatibility Testing

(SCN 5) 4.1.6.1 Electromagnetic Compatibility - Testing at the launch area at ETR will demonstrate electromagnetic compatibility of the MOL-EFT systems, the Titan IIIC booster, the Gemini Spacecraft, the AGE and the ETR facilities and equipment.

*This page supersedes and replaces page 36 and incorporates SCN 5.

SUPPLEMENTARY

INFORMATION

MARTIN COMPANY
DENVER DIVISION

CONTRACT NO.

SPECIFICATION

CHANGE NOTICE

NO. 6
DATE 16 March 1966

SPEC NO. MOL-EFT-AVE-1000
TITLE Airborne Vehicle Equipment Specification
DATED 15 March 1965
REVISION NO. 1 DATED 3 May 1965

PURPOSE OF CHANGE: This change adds additional wiring and an electrical connector at Station 77 for an added Gemini Redundant Separation Enable Signal.

This change incorporates SCNP-H as approved by SCD C3-3486, dated 9 February 1966 (Martin Ref. 6W02098).

INSTRUCTIONS: Replace Pages 15, 17, 20, 24, and 24a with revised Pages 15, 17, 20, 24, and 24a.

AUTHORIZATION: SCD C3-3486, dated 9 February 1966 (Martin Ref. 6W02098) and CCN 1515, dated 14 February 1966 (Martin Ref. 6W02773).

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

APPROVAL

Form DEN 1016-01(11-63)

TABLE 1

PAYLOAD MEASUREMENT ALLOCATIONS FOR TIIIC MOL-EFT FLIGHT

These measurements only will be transmitted from the Simulated Laboratory (PCM system) and are in addition to those TIIIC measurements already defined in the Master Program Management Plan (SSD-CR-64-14) and Supplement thereto for the Titan IIIC vehicle to be used for the MOL-EFT flight.

No. of Measurements	Type of Measurements	Transducer Location	Frequency
3	Aero Buffet Pressure	Lab Tank	400 SPS
1	Aero Buffet Pressure	Aft Adapter	400 SPS
3	Aero Pressure	Lab Tank	100 SPS
3	Aero Pressure	Aft Adapter	100 SPS
4	Aero Temperature	Lab Tank	40 SPS
2	Aero Temperature	Aft Adapter	40 SPS
1	Instrument Power Supply	Lab Tank	20 SPS
(SCN 3) 10	Aero Pressure (MAC)	Conical Adapter (MAC)	20 SPS
(SCN 6) 2	Separation Enable Voltage	Forward Skirt	100 SPS bi-level

* This page supersedes and replaces Page 15 and incorporates SCN 6.

FIGURE 2

Deleted

(SCN 6)

* This page supersedes and replaces Page 17 and incorporates SCN 6.

TABLE 1A

SUMMARY OF TELEMETRY SYSTEM CHANNEL ALLOCATIONS

	Transmission Frequency	Channel Available	Measurements Assigned*	Channels Unassigned**
	SSB System			
(SCN 3)	30-3000 cps	15	4	11
	PCM System			
	400 sps	20	4	16
	200 sps	20		20
(SCN 6)	100 sps	36	8	28
	40 sps	35	6	29
(SCN 3)	20 sps	85	11	74
	100 sps, bi-level	8		8
	20 sps, bi-level	40		40

* Equipment shall be provided as listed in Appendix I-B to accomplish the assigned measurements acquisition and transmission.

** Unassigned channels are based on equipment capability. Crystals, amplifiers, transducers, and associated equipment are to be provided under separate contractual action, if additional channels are utilized.

* This page supersedes and replaces Page 20 and incorporates SCN 6.

3.3.4 Ballast Subsystem

3.3.4.1 Ballast - Sufficient ballast shall be provided in the Simulated Laboratory such that the Laboratory vehicle will conform to the total weight and center of gravity characteristics as specified herein. The ballast shall be manufactured and mounted such that it can be installed and removed through the access openings in the Simulated Laboratory tank.

3.3.5 Installation Subsystem

3.3.5.1 Installation and Interface Provisions - The Simulated Laboratory shall be designed to mate with the Titan IIIC Transtage and the GFAE Gemini conical adapter with all of the interfaces specified herein. Connectors shall be incorporated in the wiring harness at the interfaces. Mounting provisions for transducers, instrumentation equipment, wiring harnesses, and ballast shall be provided.

3.3.5.1.1 Telemetry Interfaces - Telemetry interface requirements shall be compatible with interface specifications referenced in Section 2.0.

(SCN 6) 3.3.5.1.2 Gemini Separation Signal - The transtage flight sequence system shall provide, through the Simulated Laboratory, two discrete signals, each one from a separately energized system and each one through two series contacts, for initiating Gemini separation. These contacts shall be rated at 100 ma minimum, 10 amperes maximum at 28 vdc. The guidance computer will be programmed to send the discretes in the time period between 30 and 31 seconds after first transtage shutdown. The discretes shall be brought into the Simulated Laboratory through the Station 77.0 interface connectors. Each pair shall be routed on opposite sides of the Simulated Laboratory to different connectors in the forward dome and then to Connectors #1 and #2 at the Gemini interface. The resistance between the pins of either connector, as measured at the Simulated Laboratory/Gemini interface, with the transtage relay closed, shall be less than 2.0 ohms. The maximum current to be drawn through either circuit shall be 0.5 amperes.

The PCM (100 sps) bi-level channels will be utilized to telemeter the signals received from monitoring, within the Laboratory of the two return lines of the Gemini Separation Enable circuits (see Figure 5). The monitoring wire, from a three-way splice, shall be routed through a 10,000 ohm (minimum) isolation resistor located as near the three-way splice (measurement source) as practical. The 10,000 ohm resistor shall perform two functions:

a. Prevent the Gemini circuitry from respending to an inadvertant signal applied to the monitoring circuit;

b. Isolate the Gemini Separation Enable Circuitry from inadvertant loads (shorts) in the monitoring circuit.

---

* This page supersedes and replaces Page 24 and incorporates SCN 6.

(SCN 3) 3.3.5.1.3 Interface Connectors - Electrical and instrumentation connectors shall be provided at the forward and aft interfaces as follows:

Connector No.	Part No.	Usage	Location
1	PT02CP-14-12P**	Signal	Gemini Interface
2	PT02CP-14-12PW**	Signal	Gemini Interface
3	PT02CP-20-41S**	Instrumentation	Gemini Interface
4	81D30-32-6P	Power and Control	Transtage Interface
5	PD81S0130-019	Signal	Transtage Interface

* To be supplied
** Or Equivalent

(SCN 3) 3.3.5.1.4 Interface Grounding

3.3.5.1.4.1 Transtage Interface - The single point ground identified in Paragraph 3.3.3.2 herein shall be wired into Connector #4 in

(SCN 3) 3.3.5.1.4.2 Gemini Interface - An RF grounding strap shall be installed and electrically bonded to the Simulated Laboratory.

Two static ground wires shall be provided through Connectors #1 and #2 and shall be bonded to the same Simulated Laboratory structural member as the RF bonding strap.

(SCN 3) 3.3.5.1.5 Interface Data Transmission - The measurements identified below shall be telemetered through the Simulated Laboratory PCM and SSB systems.

(SCN 3) 3.3.5.1.5.1 PCM System - Signals from ten aero pressure measurements in the Gemini spacecraft shall be brought through Connector #3 and telemetered by the Simulated Laboratory PCM transmitter.

(SCN 3) 3.3.5.1.5.2 SSB System - Signals from four SPL measurements in the Gemini Spacecraft shall be brought through Connector #3 and telemetered by the Simulated Laboratory SSB transmitter.

3.4 Environmental Requirements - The following conditions, occurring separately or in combination, may occur during storage, shipping, and handling. Equipment shall be designed to meet operative requirements after being subjected to these conditions. Shipping conditions, as stated, allow for normal protection of existing packaging in accordance with Section 5.0 herein. Stated conditions allow for transport of equipment installed in the Laboratory, from VIB to launch site. See Simulated Laboratory Environmental Requirements, Table II and Figures 5, 6, 7, 8A, and 8B.

* This page supersedes and replaces Page 24a and incorporates SCN 6.

MARTIN COMPANY
DENVER DIVISION

CONTRACT NO. AF04(695)-1[illegible]

SPECIFICATION

CHANGE NOTICE

NO. 7
DATE 13 April 1966

SPEC NO. MOL-EFT-AVE-1000
TITLE Airborne Vehicle Equipment Specification
DATED 15 March 1965
REVISION NO. 1 DATED 3 May 1965

PURPOSE OF CHANGE: This change adds the experiments to the Simulated Laboratory.

This change incorporates SCNP G (UCN40018) as approved by SCD C3-3509 dated 18 February 1966 (Martin Ref. 6W02913).

INSTRUCTIONS: Replace pages 1, 2, 3, 4, 6, 9, 11, 14, 15, 16, 18, 19, 20, 21, 22, 23, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, and 53 with revised pages 1, 2, 3, 4, 6, 9, 11, 14, 15, 16, 18, 19, 20, 21, 22, 23, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49 and 53.

Add pages 4a, 6a, 8a, 14a, 14b, 14c, 14d, 14e, 14f, 23a, 23b, 23c, 35a, 42a, 43a, 50a, 50b, and 50c

AUTHORIZATION: SCD C3-3509, dated 18 February 1966 (Martin Ref. 6W02913), and CCN 1529 dated 10 March 1966 (Martin Ref. 6W04379).

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

BUREAU OF BUDGET APPROVAL NO. _____

G E Simpson
APPROVAL

Form DEN 1016-01(11-63)

MODEL SPECIFICATION
AIRBORNE VEHICLE EQUIPMENT

1.0 SCOPE

1.1 General - This specification establishes the design, fabrication and performance requirements for a Simulated Laboratory, to be used with a Titan IIIC booster (SLV 9 or subsequent), for the Manned Orbiting Laboratory - Early Flight Test (MOL-EFT) Program. The launch vehicle for the MOL-EFT Program requires a Titan IIIC booster, including Transtage, a Simulated Laboratory, and a Gemini Spacecraft. Acceptance test requirements for the Simulated Laboratory as assembled with the Transtage are defined in Section 4, herein. The Simulated Laboratory flight test article is identified as follows:

HSQ Flight Article (Heat Shield Qualification Test)

1.2 Classification - The Simulated Laboratory shall be as follows:

(SCN 7)

Employment:	Primary Mission - HSQ Flight; Sub-Orbital Trajectory Secondary Payload Mission - Following Gemini Re-entry Module Separation maneuver Simulated Laboratory into an approximately circular 160 nautical mile orbit.
Designer:	Martin Company - Aerospace Division of Martin-Marietta Corporation
Recovery Spacecraft: (Gemini Re-entry Module)	McDonnell Aircraft Corporation St. Louis, Missouri

1.3 Mission and Flight Objectives - The mission is to launch a Titan IIIC vehicle complete with Simulated Laboratory, Gemini Spacecraft, and Transtage to fly a designated MOL boost trajectory. The objective shall be to provide verification of proper operation of the Gemini heat shield and obtain launch and ascent environmental data. The following is a complete list of flight test objectives.

1.3.1 Primary Objective - Verify the Gemini heat shield as modified to accommodate the MOL crew transfer method.

---

* This page supersedes and replaces Page 1 and incorporates SCN 7.

(SCN 7) 1.3.1.1 Secondary Mission Objectives

a. Collect data on ascent environment for the Orbiting Vehicle structure.

b. Demonstrate structural integrity and control capability of the Titan IIIC for launch and ascent with an MOL type payload.

c. Demonstrate the MOL outboard profile compatibility with the ITL concept.

d. Demonstrate recovery/retrieval techniques.

e. Exercise selected segments of the MOL network.

(SCN 7) 1.3.1.2 Tertiary Mission Objectives

a. Demonstrate the capability of the transtage to maneuver the Simulated Laboratory and the Gemini conical adapter (including the Secondary Payloads within the Laboratory) into an approximately circular 160 nautical mile orbit.

b. Demonstrate the capability of the Transtage ACS to reorient the Laboratory for satellite dispensing and to stabilize the Laboratory for a total duration of approximately 7 hours from launch while coasting in orbit.

c. Eject OV-1 Experiment.

d. Eject OV-4 Experiment.

e. Conduct secondary experiments during the boost phase and following the termination of the Transtage third burn.

---

* This page supersedes and replaces Page 2 and incorporates SCN 7.

2.0 APPLICABLE DOCUMENTS

2.1 General - The following documents, of the issue date shown, form a part of this specification to the extent specified herein. In the case of conflict between the requirements of this specification and any other referenced documents, the requirements of this specification shall govern.

2.1.1 Specifications

2.1.1.1 Military

MIL-W-8160D (1)	Wiring, Guided Missile, Installation of, General Specification for, dated 24 December 1963
MIL-B-5087A (1)	Bonding, Electrical, for Aircraft, dated 29 January 1958
MIL-M-8555A	Missiles, Guided: Design and Construction General Specification for, dated 6 October 1960
MIL-A-8421B	Air Transportability Requirements, General Specification for, dated 5 May 1960
MIL-C-54662A	Calibration System Requirements, dated 9 February 1962

2.1.1.2 System Program Documents

MTP-AERO 61-78	Surface Wind Statistics for Patrick Air Force Base, dated 10 October 1961
NASA Technical Note D-610	Monthly and Annual Wind Distribution as a Function of Altitude for Patrick Air Force Base, dated July 1961
SSD-62-166	Program 624A Environmental Requirements Specification, dated 1 November 1962

(SCN 7) 2.1.1.3 Contractor Prepared Documents - The following Contractor-Prepared Specifications of the latest contractual issue and the latest changes thereto as approved by the Contracting Officer shall apply:

---

* This page supersedes and replaces Page 3 and incorporates SCN 7.

2.1.1.3.1 Specifications

	IFS-MOL-EFT-60001	Interface Specification - Simulated Laboratory to Gemini Spacecraft
	IFS-MOL-EFT-60002	Interface Specification - Orbiting Vehicle to Ground Equipment
	IFS-MOL-EFT-61001	Interface Specification - SSLV to Simulated Laboratory
	SSS-TIII-010 SLV	Detail Specification for Standard Space Launch Vehicle (U), dated 23 April 1962, Revision 1, dated 10 October 1962
(SCN 7)	IDRD-MOL-HSQ-63001	Simulated Laboratory to OV-1
(SCN 7)	IDRD-MOL-HSQ-63002	Simulated Laboratory to OV-4
(SCN 7)	IDRD-MOL-HSQ-63003	Simulated Laboratory to Zero "G" Propellant Gauging
(SCN 7)	IDRD-MOL-HSQ-63004	Simulated Laboratory to Corner Reflectors
(SCN 7)	IDRD-MOL-HSQ-63005	Simulated Laboratory to Resolution Paint Pattern
(SCN 7)	IDRD-MOL-HSQ-63006	Simulated Laboratory to Protuberance
(SCN 7)	IDRD-MOL-HSQ-63007	Simulated Laboratory to Structural Panel
(SCN 7)	IDRD-MOL-HSQ-63008	Simulated Laboratory to ORBIS-Low
(SCN 7)	IDRD-MOL-HSQ-63009	Simulated Laboratory to Fuel Cell Element
(SCN 7)	IDRD-MOL-HSQ-63010	Simulated Laboratory to Micrometeoroid Detectors
(SCN 7)	IDRD-MOL-HSQ-63011	Simulated Laboratory to Heat Transfer Test Capsule
(SCN 7)	IDRD-MOL-HSQ-63012	Simulated Laboratory to Bio-Cell

(SCN 7) 2.1.1.4 DELETED

---

* This page supersedes and replaces Page 4 and incorporates SCN 7.

2.1.1.5 Air Force Exhibits.

Exhibit WDT 57-17, Rev. 5 (1) with Attachment (1)	Instructions for Serialization and Ballistic Missile Components and Assemblies, dated 5 February 1958, with Amendment 1, dated 27 April 1959, with Attachment 1, dated 15 September 1961

2.1.2 Military Standards

MIL-STD-129B	Marking for Shipment and Storage, dated 10 April 1959
MIL-STD-9A	Screw Thread Conventions and Methods of Specifying, dated 26 May 1960
MIL-STD-10A	Surface Roughness, Waviness, and Lay, dated 13 October 1955.

* This page is added by SCN 7.

3.0 REQUIREMENTS

3.1 General Requirements - A Simulated Laboratory shall be provided that will be compatible with the Titan IIIC booster vehicle and Gemini capsule, and shall be fabricated for use on a test flight from the Eastern Test Range (ETR). The configuration shall be as defined in Figure 1A, General Description; Figure IB, Structural Arrangement and Mechanical Interface Drawing.

3.1.1 Functional Characteristics - The functional characteristics of the Orbiting Vehicle shall satisfy the following system requirements:

(SCN 7) 3.1.1.1 Primary Mission

a. Sub-orbital flight;

b. Provisions for Gemini separation for re-entry (electrical discrete only);

c. Unpressurized Simulated Laboratory;

d. Integral Launch - All elements of the Orbiting Vehicle, i.e., Transtage, Simulated Laboratory and Gemini Spacecraft launched together.

(SCN 7) 3.1.1.2 Secondary Payloads Mission

a. Orbital Flight;

b. Provisions for ejecting OV-1 and OV-4 secondary payloads satellites (electrical discretes and physical eject confirmation only);

c. Provisions for secondary payloads experiments remaining in Simulated Laboratory as defined in the individual IDRD's.

3.1.2 Performance Characteristics - The Simulated Laboratory shall be designed within the following constraints:

a. The Simulated Laboratory shall have a nominal diameter of 10 feet;

b. The Simulated Laboratory shall have a nominal length of 33 ft., 8 inches;

---

* This page supersedes and replaces Page 6 and incorporates SCN 7.

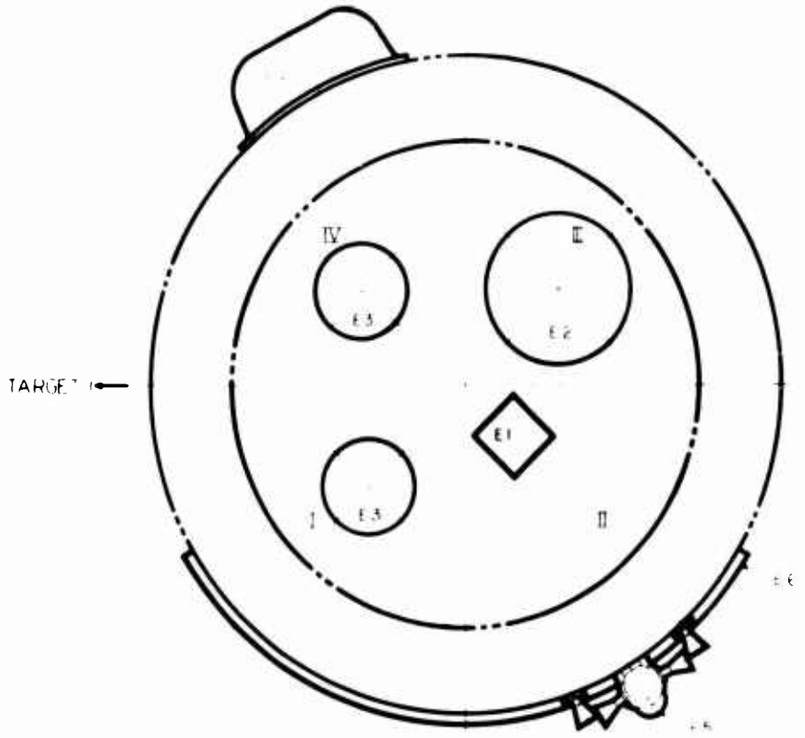
3.1.2 Performance Characteristics - (continued)

(SCN 7)

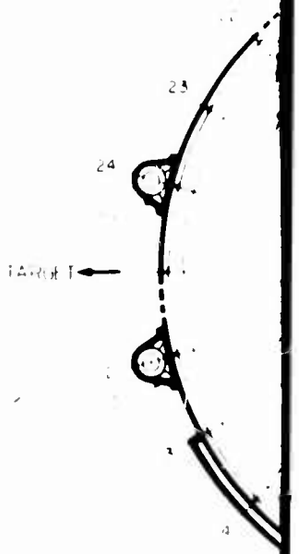
c. The maximum dry weights of the Simulated Laboratory shall be as follows:

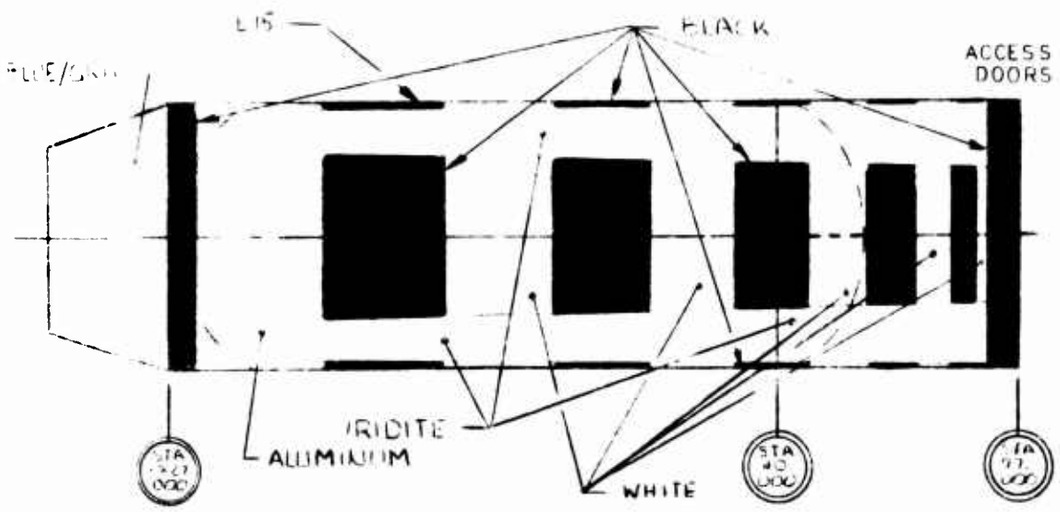
Simulated Laboratory, Contractor Controlled (including ballast)	13,795 lb.
Gemini Reentry Module and Gemini Conical Adapter - GFAE (including GFAE ballast)	6,405 lb.
Total maximum dry weight	20,200 lb.

* This page is added by SCN 7.

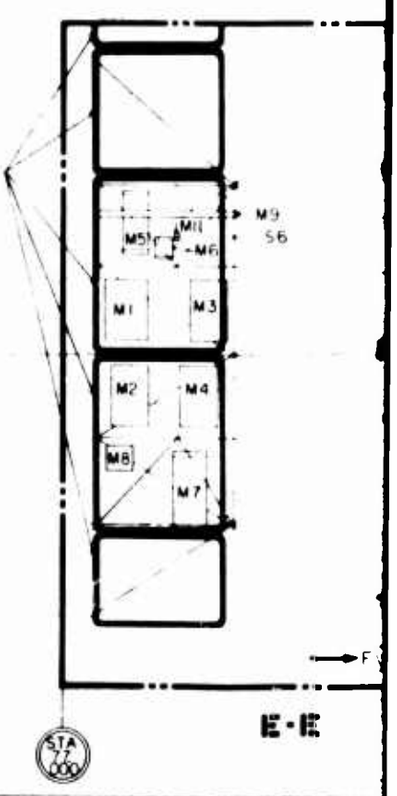


A-A

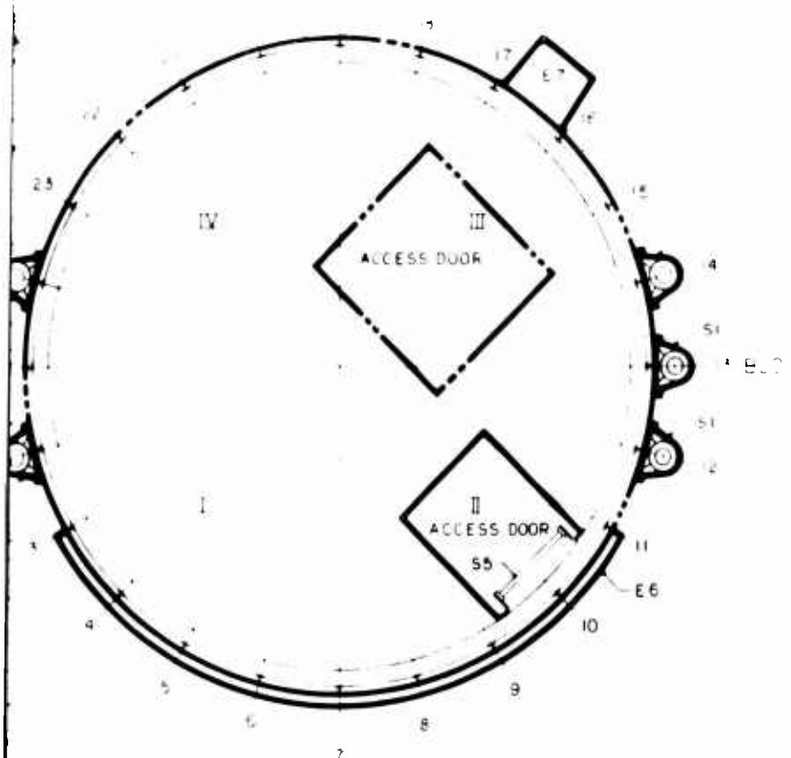




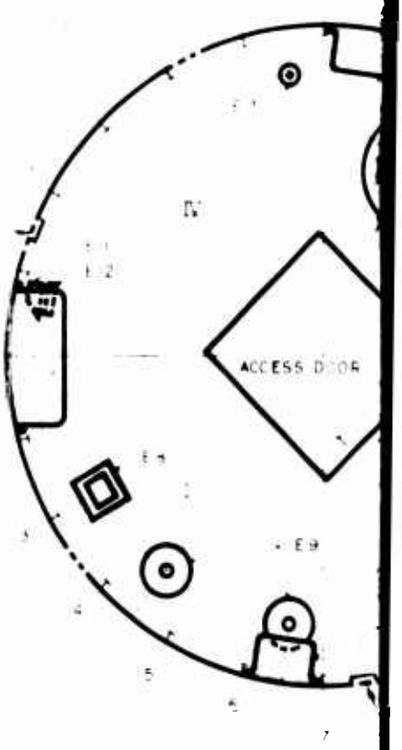
PAINT PATTERN
NOT SCALE



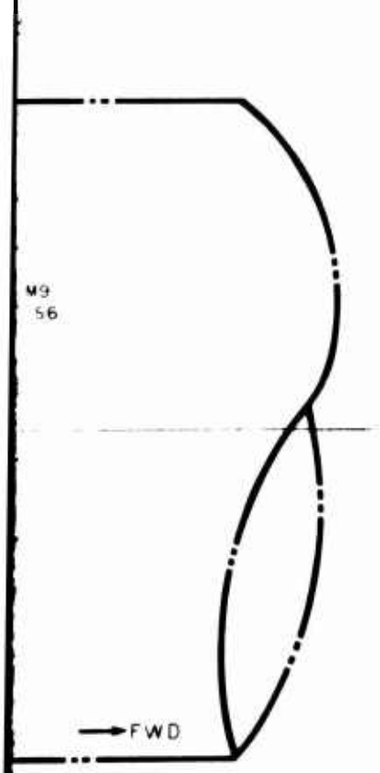
E-E


IV
III
ACCESS DOOR
I
II
ACCESS DOOR
S5
E6
S1
S1
4
11
10
9
8
7
6
5

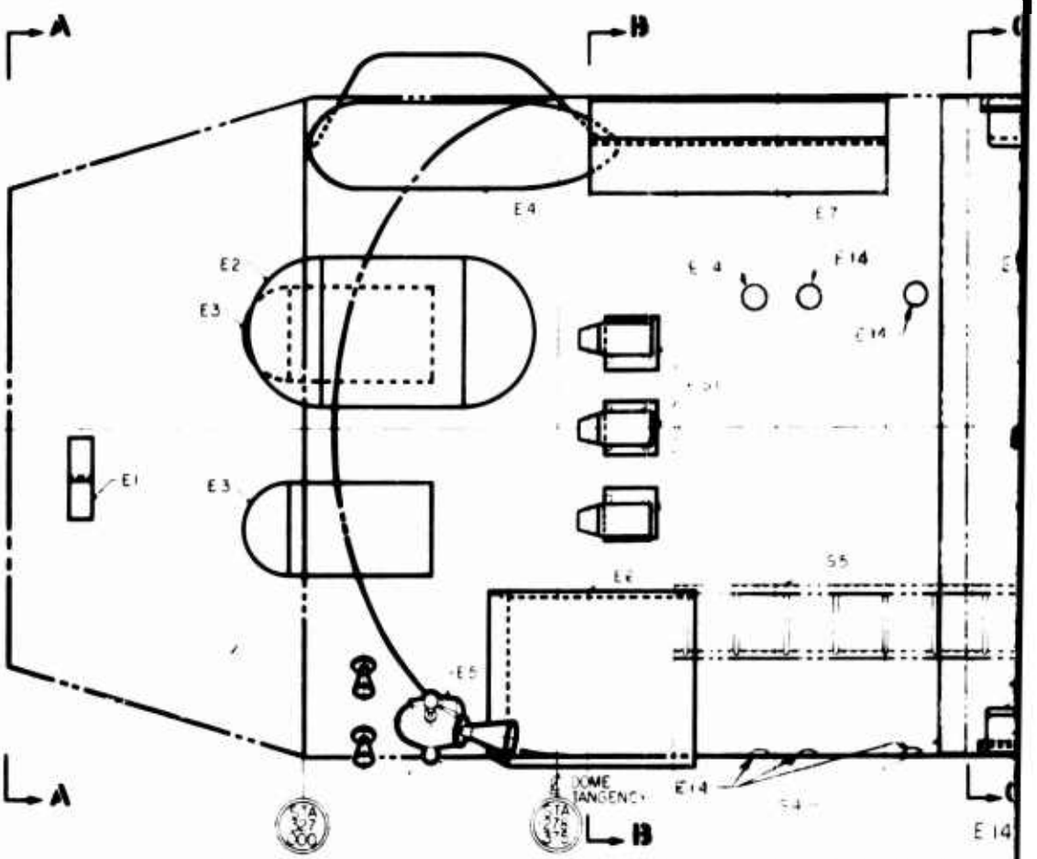
B-B


IV
ACCESS DOOR
E2
E3
E9
5
4

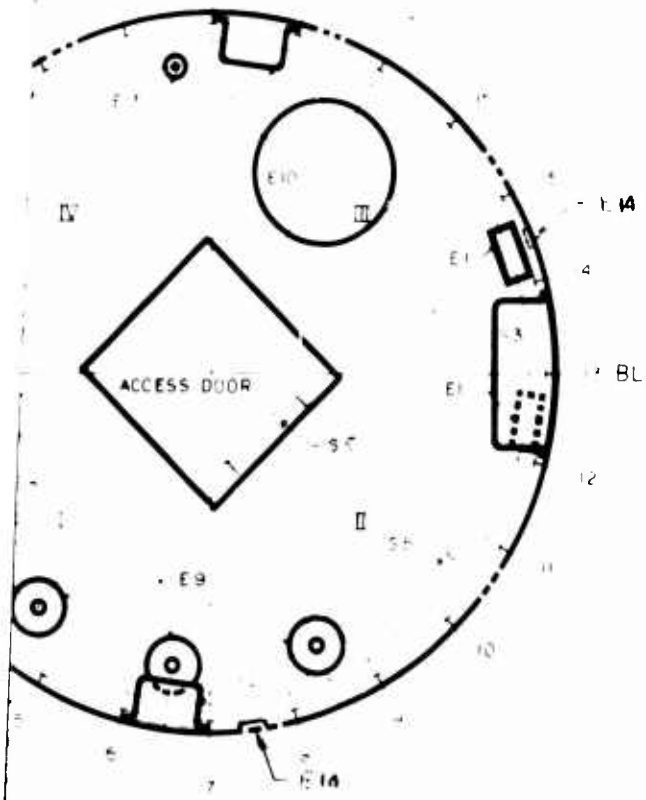
C-C


M9
S6
FWD

E-E

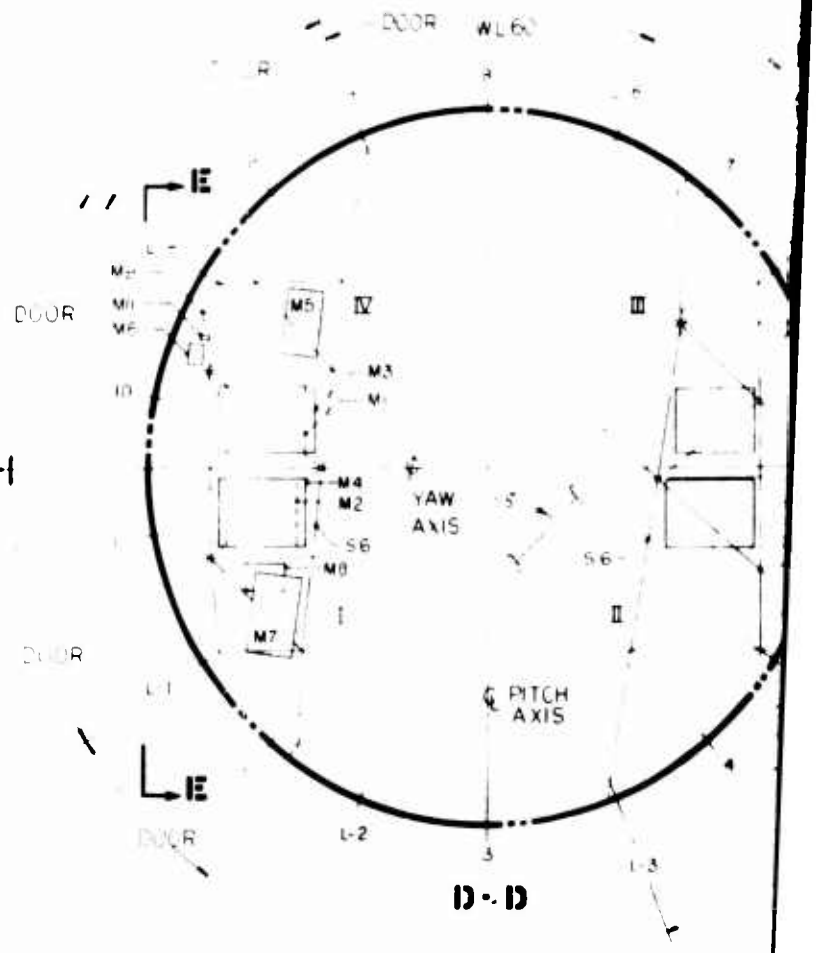

A
B
E4
E7
E2
E3
E1
E3
E4
E14
E14
E6
S5
E5
E14
S4
DOME TANGENCY
A
B
E14

2

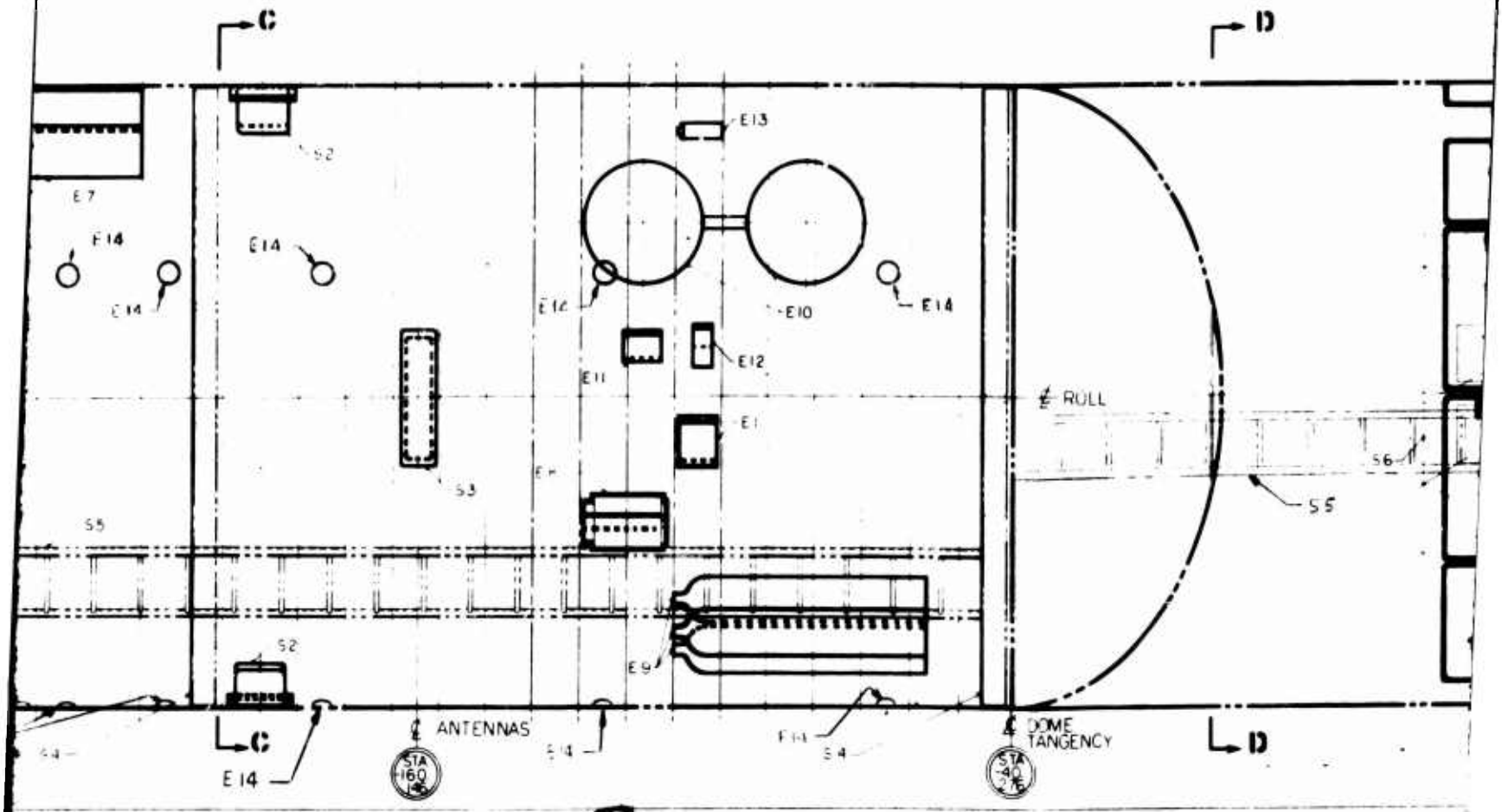


C - C

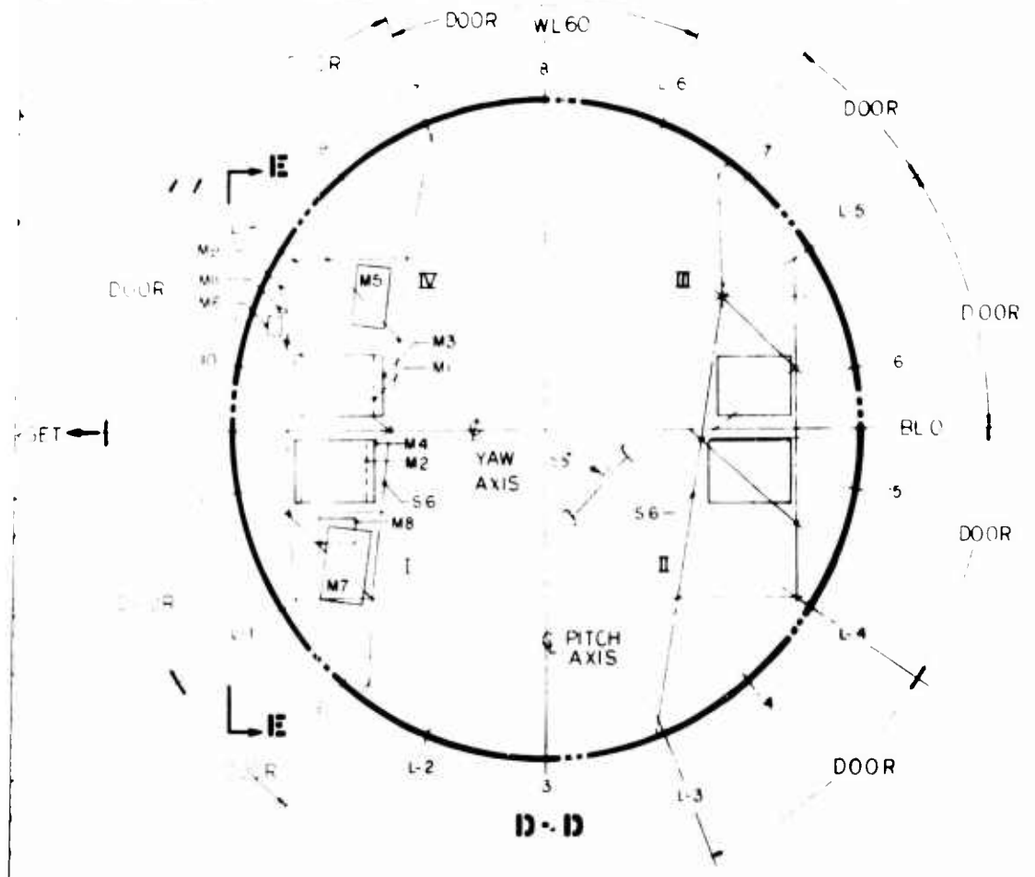
TARGET



D - D



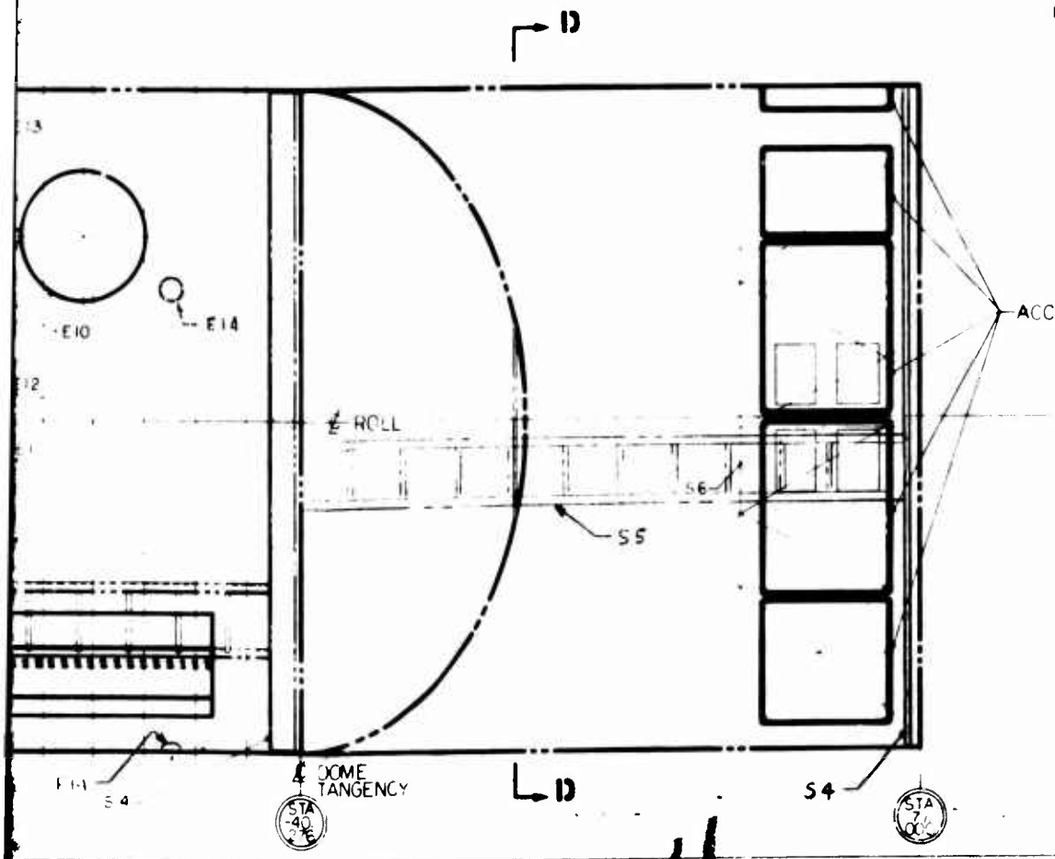
3



EXPERIMENTS
E1 MICROMETEROID(2)
E2 CV
E3 OV (4)
E4 PROTUBERANCE(FAIRING)
E5 PROTUBERANCE(ACS MOTOR)
E6 STRUCTURAL PANEL
E7 HEAT TRANSFER TEST CAPSULE
E8 FUEL CELL EQUIPMENT PANEL
E9 FUEL CELL BOTTLES 3)
E10 ZERO G PROPELLANT GAGING
E11 ORBIS LOW TRANSMITTER
E12 ORBIS LOW ANTENNA
E13 BIO CELL
E14 CORNER REFLECTOR(8)
E15 PAINT PATTERN

SUPPORT EQUIPMENT
S1 RETRO MOTORS 5)
S2 COMMAND CONTROL ANTENNA 2)
S3 TM ANTENNA (2)
S4 SERVICE PLATFORM (2)
S5 LADDER (2)
S6 EQUIPMENT TRUSS (2)

INSTRUMENTATION
M1 BATTERY( )
M2 PCM ENCODER
M3 SSB TRANSMITTER
M4 PCM TRANSMITTER
M5 SSB MODULATOR
M6 MOTOR DRIVEN SWITCH
M7 MULTIPLEXER
M8 10 VOLT POWER SUPPLY
M9 TERMINAL STRIP (28V( )
M10 3 PORT JUNCTION
M11 VDU



* THIS PAGE IS ADDED BY SCNT

MARTIN COMPANY
ADDED EXPERIMENTS
MOL-HSQ
MOL-EET-AVE-1000,R1
E FIGURE 1-C
* PAGE 80

3.1.2 (continued)

Simulated Laboratory, Contractor Controlled (excluding ballast)	*

* To be supplied at a later date

The weights listed above for the individual components are design objectives and not inspection weights. Only the total maximum dry weight, ± 200 lbs., is to be used for inspection and considered a guarantee.

(SCN 7)

d. Center of gravity and inertia characteristics for the Simulated Laboratory, Gemini and Simulated Laboratory Experiments shall be as follows:

Center of Gravity x = - * in.

Roll Moment of Inertia (Ix) 10,500 slug-ft^2

Pitch and Yaw, Moment of Inertia 114,000 slug-ft^2

* To be supplied at a later date.

e. Physical characteristics shall be simulated within the following specified tolerances:

Weight	± 200 lbs
CG	± 6 in. longitudinally
Moment of Inertia	± 10%
Stiffness	± 10%

f. Actual weight and longitudinal CG shall be determined for the Laboratory at the Contractor's facility.

3.2 Design and Construction

3.2.1 Materials, Parts, and Processes - The selection and application of suitable parts, materials, and processes shall be the responsibility of the contractor.

3.2.2 Dissimilar Metals - Dissimilar metals shall not be installed in direct contact without insulating material, except where propellant compatibility requirements preclude the use of insulating material. Dissimilar metals shall be as defined in MS 33586A.

---

* This page supersedes and replaces Page 9 and incorporates SCN 7.

3.3 Simulated Laboratory - The Simulated Laboratory shall consist of the following subsystems:

a. Structures Subsystem;

b. Instrumentation and Telemetry Subsystem;

c. Electrical Power and Distribution Subsystem;

d. Ballast Subsystem;

e. Installation Subsystem;

(SCN 7) f. Experiment Subsystems

3.3.1 Structures Subsystem - The Simulated Laboratory structure shall consist of a forward skirt to mate with the Gemini conical adapter, a cylindrical tank section, and an aft cylindrical adapter section. The Laboratory structure shall consist of a cylindrical structure, of aluminum rib-stiffened semi-monocoque construction, with a nominal diameter of 10 feet and a nominal length of 33 ft., 8 inches.

(SCN 7) 3.3.1.1 Structural Design Criteria - The Simulated Laboratory shall be designed to criteria derived from the application of SSD Exhibit 62-166, as defined herein. The Simulated Laboratory shall be designed to sustain all loads without internal positive or gage pressure in the Laboratory. The Simulated Laboratory shall be designed to withstand a collapsing pressure of at least 0.25 psi for air transportation. Both the forward dome and skirt shall be designed for an internal compartment pressure of +3.0 to -0.5 psi with respect to free stream ambient for flight conditions. The forward dome shall be reinforced with fiberglass to withstand collapsing differential pressure of 3.0 psi minimum for flight conditions. Adequate venting shall be provided in the tank area to prevent the occurrence of collapsing pressures in excess of those defined above. All openings in the forward dome and forward skirt shall be closed off. The aft skirt shall be designed to withstand collapsing differential pressure incurred during flight. Equipment located above the forward dome shall not be accessible from the Simulated Laboratory. All components and equipment located aft of the Simulated Laboratory forward dome shall be accessible through an opening in the Simulated Laboratory aft dome and access doors. Laboratory structure access doors shall be removable and replaceable when the Simulated Laboratory Vehicle is in a prelaunch condition. The airframe for the Laboratory shall have adequate strength to withstand all design loads and temperature associated with the mission requirements. Adequate stiffness and rigidity shall be provided throughout the structure to meet stiffness requirements shown on Figure 1A, based on control system characteristics, and to withstand design loads without incurring excessive deflections and deformations.

---

* This page supersedes and replaces Page 11 and incorporates SCN 7.

3.3.1.2.1 Forward Skirt Assembly - The forward skirt shall consist of that structure extending forward from the Laboratory tank to the Gemini conical adapter. The forward skirt shall be of aluminum alloy semi-monocoque construction. The forward mating plane shall be constructed to match the Gemini conical adapter. The structure interface connection of the forward Laboratory skirt and GFAE conical adapter shall utilize the Gemini/GLV 20 bolt pattern geometry.

(SCN 7) 3.3.1.2.2 Simulated Laboratory Tank Assembly - The Laboratory structure shall consist of a modified Titan II Stage I oxidizer tank, including a forward ellipsoidal dome and an aft ellipsoidal dome with an aft access way approximately 32 inches in diameter. The connection of the barrel section of the aft skirt assembly shall be reinforced with an external doubler. The barrel section shall be reinforced to meet the modulus of elasticity requirements of Figure 1A.

3.3.1.2.3 Aft Adapter Assembly - The aft adapter assembly shall consist of that structure extending back from the aft end of the Laboratory tank assembly to the tension splice of the Transtage mating plane at Titan IIIC Station 77.0. (For reference, see Figure 29A of Specification SSS-TIII-010 SLV, pp 231a). The aft adapter section shall be constructed of aluminum alloy semi-monocoque skin panels and frames.

3.3.1.2.4 Ballast Attach Points - Ballast attachment points in the Laboratory shall be provided as necessary.

3.3.1.2.5 Trusses and Mounting Bracketry - Trusses and mounting bracketry shall be provided for mounting instrumentation and electrical components listed in Appendix I-B.

(SCN 7) 3.3.1.3 Simulated Laboratory Surface Finish - The Simulated Laboratory exterior surface shall be painted and/or treated for optical tracking as shown in Figure 1 of IDRD-MOL-HSQ-63005.

---

* This page supersedes and replaces Page 14 and incorporates SCN 7.

(SCN 7) 3.3.1.4 Experiment Provisions - Experiment provisions shall be provided in the Simulated Laboratory for the following experiments:

a. OV-1
b. OV-4
c. Heat Transfer Test Capsule (HTTC)
d. Zero "G" Propellant Gauging
e. Micrometeoroid Detector
f. ORBIS-Low
g. Bio-Cell
h. Fuel Cell
i. Protuberance
j. Structural Panel
k. Corner Reflectors
l. Resolution Paint Pattern

In addition to the basic provisions for the experiments listed above, three permanently installed floors and two airborne ladders shall be incorporated in the Simulated Laboratory as shown in Figure I-C. The floors and ladders shall provide access to the experiments prior to launch. A truss shall be provided for batteries in the aft skirt to meet experiment power requirements.

Five retro-rocket motor assemblies shall be provided and installed on the forward end of the Laboratory. These motors shall provide a minimum retro-grade velocity increment of 8 ft/sec. between the Gemini Re-entry Module and the Simulated Laboratory and impart a pitch-up motion to the Simulated Laboratory. The motor assemblies shall be similar to the Titan III, Stage II/Stage III staging motors.

(SCN 7) 3.3.1.4.1 OV-1 Mounting Provisions - Structural mounting provisions shall be incorporated for mounting the OV-1 experiment through the Simulated Laboratory forward dome. The experiment shall be truss mounted such that the forward portion of the experiment projects forward of the dome as shown in Figure I-C herein and Figure 1 of IDRD-MOL-HSQ-63001. The experiment shall be located such that it has a clear path through the Gemini Conical Adapter (after separation of the Gemini re-entry module) for ejection in orbit. Guide rails or a guide tube shall be provided to assure clearance of the OV-1 through the Gemini Conical Adapter Module during ejection. A pressure tight well shall be provided from the dome down to the experiment mounting interface to prevent air leakage across the dome. The OV-1 Experiment will be pressure tight at the interface to complete the leak path seal. The Contractor mounting provisions for the experiment

---

* This page is added by SCN 7.

(SCN 7) 3.3.1.4.1 (continued)

shall permit lowering the OV-1 Experiment to the upper floor of the Simulated Laboratory for access to the experiment. The complete experiment shall be capable of being installed into and removed from the Simulated Laboratory only from above the forward dome with the Gemini Spacecraft not installed.

(SCN 7) 3.3.1.4.2 OV-4 Mounting Provisions - Structural mounting provisions shall be provided for mounting both units of the OV-4 Experiment through the Simulated Laboratory forward dome. The experiment shall be truss mounted such that the forward portion of the experiment satellites project forward of the dome as shown in Figure I-C herein and Figure 1 of IDRD-MOL-HSQ-63002. The experiment shall be located such that it has a clear path through the Gemini Conical Adapter (after separation of the Gemini re-entry module) for ejection in orbit. A pressure tight well shall be provided below the dome, including the experiment mounting interface, to prevent air leakage across the dome. The Contractor mounting provisions for the experiment shall permit lowering the OV-4 Experiment to the upper floor of the Laboratory for access to the experiment. The complete experiment (including launch tube) shall be capable of being installed and removed from the Simulated Laboratory only from above the forward dome, with the Gemini Spacecraft not installed. The satellites, not including the launch tube, shall be removable from the Simulated Laboratory through the door in the aft skirt.

(SCN 7) 3.3.1.4.3 HTTC Mounting Provisions - Structural mounting provisions shall be provided for the HTTC Experiment in the forward portion of the Simulated Laboratory tank section as shown in Figure I-C herein and Figure 1 of IDRD-MOL-HSQ-63011. The experiment shall be mounted through the skin of the Simulated Laboratory to provide a wide angle view for radiant heat dissipation from the experiment radiator to space. An external fairing shall provide aerodynamic protection for the experiment during the atmospheric portion of flight. The fairing shall have air pressure integrity to prevent leakage of air into or out of the Simulated Laboratory. The fairing shall incorporate a door which shall be capable of being opened after atmospheric flight. The HTTC experiment shall be capable of being installed and removed from the inside or the outside of the Simulated Laboratory, and shall be removable from the Laboratory through the door in the aft skirt. The experiment shall be bracket mounted to the ring frames and stringers of the Laboratory.

---

* This page is added by SCN 7.

(SCN 7) 3.3.1.4.4 Zero "G" Propellant Gauging Mounting Provisions - Structural mounting provisions shall be provided for the Zero "G" Propellant Gauging Experiment in the aft portion of the Simulated Laboratory tank section as shown in Figure I-C herein and Figure 1 of IDRD-MOL-HSQ-63003. Provisions shall be made in the Simulated Laboratory for lowering the experiment into the Laboratory through the hole in the upper dome used for mounting the OV-1 Experiment and then through a hole in the upper floor of the Simulated Laboratory to its mounting location. The experiment shall be mounted on supporting bracketry structure attached to the ring frame, stringers, and skin of the Simulated Laboratory. The experiment shall be capable of being installed into the Simulated Laboratory prior to the OV-1 and/or Gemini Spacecraft emplacement. The Zero "G" Propellant Gauging Experiment shall not be capable of being removed from the Simulated Laboratory with the OV-1 and/or Gemini Spacecraft installed on the Simulated Laboratory.

(SCN 7) 3.3.1.4.5 Micrometeoroid Detector Mounting Provisions - Structural mounting provisions shall be provided for the Micrometeoroid Detector Experiment packages in the Simulated Laboratory. One package shall be mounted forward of the forward dome such that a 120° minimum view angle may be attained in the forward direction. The second package shall be mounted in the aft tank area looking away from the earth (during stabilized flight) in orbit. These locations shall be as shown in Figure I-C herein and Figure 1 of IDRD-MOL-HSQ-63005. A door shall be provided over the aft experiment package to protect the experiment from aerodynamic effects during flight through the atmosphere. This door shall be capable of being opened in orbit to provide a minimum view angle of 120°. The door, prior to opening, shall be pressure tight to maintain the Laboratory pressure venting control. The forward experiment package shall be truss mounted off the forward dome and shall be mounted in a protective box to protect the unit from the OV-4 launching rocket blast and Gemini separation ordnance. A door on the protective box shall be provided and shall be opened after separation of the OV-4 Satellites.

---

* This page is added by SCN 7.

(SCN 7) 3.3.1.4.6 ORBIS-Low Mounting Provisions - Structural mounting provisions shall be provided for the ORBIS-Low experiment transmitter and antenna packages in the aft tank area of the Simulated Laboratory as shown in Figure I-C herein and Figure 1 of IDRD-MOL-HSQ-63008. Each unit shall be bracket mounted to frames and stringers of the Simulated Laboratory structure. A door shall be provided over the antenna package for protection against aerodynamic effects during flight through the atmosphere. The door shall be capable of being opened during powered flight. The door shall be pressure tight prior to opening to maintain Simulated Laboratory pressure venting control.

(SCN 7) 3.3.1.4.7 Bio-Cell Mounting Provisions - Structural mounting provisions shall be incorporated for mounting the Bio-Cell experiment in the aft tank area of the Simulated Laboratory as shown in Figure I-C herein and Figure 1 of IDRD-MOL-HSQ-63012. The experiment shall be mounted on bracketry attached to the Laboratory ring frames and thermally isolated from the Simulated Laboratory environment by super-insulation, thermal stand-offs and an enclosure.

(SCN 7) 3.3.1.4.8 Fuel Cell

(SCN 7) 3.3.1.4.8.1 Mounting Provisions - Structural mounting provisions shall be provided for the Fuel Cell Element and supporting components in the aft portion of the Simulated Laboratory as shown in Figure I-C herein and Figure 1 of IDRD-MOL-HSQ-63009.

(SCN 7) 3.3.1.4.8.2 Support Experiment - The experiment support equipment consists of the following major subassemblies which shall meet the requirements of IDRD-MOL-HSQ-63009:

a. Pressurization Pallets - The Pressurization Pallets shall consist of pressure regulators, squib operated start valves, relief valves, and filters to control the flow of gas from the storage containers (c) to the Fuel Cell (3.3.1.4.8.1).

---

* This page is added by SCN 7.

(SCN 7) 3.3.1.4.8.2 (continued)

b. Storage Containers - The storage containers shall be used to store the hydrogen and oxygen gas for use in the Fuel Cell. Three bottles shall be provided, two bottles for hydrogen and one bottle for oxygen.

c. Radiator Panel - The Radiator Panel shall be a segment of the Simulated Laboratory skin having suitable resistors to absorb the electrical output of the Fuel Cell and capable of rejecting the energy from the Laboratory as heat.

d. Vent Lines - Tubing shall be routed from the appropriate Fuel Cell and support equipment fitting (H_2, O_2, H_2O, and H_2 and O_2 relief valves) to the Simulated Laboratory skin and overboard.

The packages (a) and (b) shall be mounted by suitable bracketry attached to the ring frames and stringers within the tank section of the Simulated Laboratory. Interconnecting tubing and wiring shall be provided to complete the installation.

(SCN 7) 3.3.1.4.9 Protuberance - The Protuberance Experiment, provided by the Contractor shall consist of an aerodynamic fairing, a dummy attitude control system (ACS) rocket-motor cluster, and required instrumentation as defined by IDRD-MOL-HSQ-63006. These two units shall be mounted approximately 180° apart on the periphery of the Simulated Laboratory on the forward skirt as shown in Figure I-C herein. Structural mounting provisions shall also be provided on the Simulated Laboratory. The fairing and rocket-motor cluster shall not be attached to the Simulated Laboratory during shipment to AFETR.

(SCN 7) 3.3.1.4.10 Structural Panel Mounting Provisions - Structural mounting provisions shall be provided on the Simulated Laboratory for the Structural Panel Experiment just aft of the rocket motor cluster of the Protuberance Experiment. The panel shall be located such that half of the structural panel is centered behind the dummy ACS rocket motor cluster and half is located in clear air flow, as shown in Figure I-C herein and Figure 1 of IDRD-MOL-HSQ-63007. The structural panel and Douglas Furnished instrumentation wiring and signal conditioning equipment shall not be attached to the Simulated Laboratory for shipment to AFETR.

---

* This page is added by SCN 7.

(SCN 7) 3.3.1.4.11 Corner Reflector Mounting Provisions - Structural mounting provisions shall be provided on the Simulated Laboratory for the corner reflectors along the length of the Laboratory as shown in Figure 1 of IDRD-MOL-HSQ-63004. Provisions shall be made to accommodate 18 corner reflectors. The corner reflectors shall be mounted from inside the Simulated Laboratory. The corner reflectors when installed in the Simulated Laboratory shall not degrade the pressure integrity of the tank. No provisions shall be made in the Simulated Laboratory to protect the corner reflectors from ground environment prior to flight nor from aerodynamic effects during atmospheric flight.

(SCN 7) 3.3.1.4.12 Door Ordnance - Two cable cutters and two pressure cartridges shall be provided to initiate the opening of each door required by the following experiments:

ORBIS-Low - One Door
Micrometeoroid Detectors - Two Doors
HTTC - One Door

(SCN 7) 3.3.2 Instrumentation Subsystem - The Instrumentation Subsystem shall provide three separate systems for data acquisition and transmission. These systems are the Single Side Band System (SSB), the Pulse Code Modulation System (PCM), and the Pulse Amplituded Modulation (PAM) (Orbital) System. The operating characteristics of the instrumentation subsystems shall conform to the telemetry standards and requirements set forth in document IRIG-106-60 to the extent applicable and with the deviations as stated in Appendix II herein.

(SCN 7) 3.3.2.1 Single Side Band (SSB) - The SSB System shall consist of a modulator and a transmitter and shall provide the capability of transmitting high frequency data during the boost phase of the flight.

(SCN 7) 3.3.2.1.1 SSB Modulator - The SSB Modulator shall be capable of simultaneously accepting fifteen (15) data inputs (channels) each input consisting of a signal of 30 to 3,000 cps. The modulator shall provide a frequency multiplexed output to the SSB transmitter.

---

* This page is added by SCN 7.

(SCN 7) 3.3.2.1.2 SSB Transmitter - The Transmitter shall provide a 50 watt minimum output to the antenna system with a center frequency of 231.9 mc. The transmitter shall be capable of accepting the output of either the SSB Modulator (Para. 3.3.2.1.1) or the Voltage Controlled Oscillator (VCO), and Mixer Assembly (3.3.2.3.2).

(SCN 7) 3.3.2.1.3 Measurement Requirements - No signal conditioning shall be done by the Contractor. Any single input to the SSB Modulator shall not exceed 5 volts peak to peak and 312 millivolts (MV) RMS at 30 to 3,000 cps. Four measurement channels shall be provided for the Gemini and six measurement channels shall be provided for the Structural Panel experiment.

(SCN 7) 3.3.2.2 Pulse Code Modulation (PCM) - The PCM system shall consist of a PCM Encoder and a PCM Transmitter and shall provide the capability of transmitting sampled analog and bi-level (on-off) data during the boost phase of the flight.

(SCN 7) 3.3.2.2.1 PCM Encoder - The PCM Encoder shall be capable of simultaneously accepting inputs for 196 analog channels and 48 bi-level channels and shall multiplex the inputs into a 172,800 bit per second (nominal rate) NRZ pulse train output. The sampling rate versus channels is as follows:

No. of Channels	Type	Samples Per Second
85	Analog	20
35	Analog	40
36	Analog	100
20	Analog	200
20	Analog	400
40	Bi-Level	20
8	Bi-Level	100

(SCN 7) 3.3.2.2.2 PCM Transmitter - The Transmitter shall provide a 50 watt minimum output to the antenna system with a center frequency of 236.2 mc. The transmitter shall accept the output from the PCM Encoder (3.3.2.2.1).

(SCN 7) 3.3.2.2.3 Measurement Requirements - The measurements shall be as shown in Table I. The responsibility to furnish regulated power, transducers, wiring, and signal conditioning for experiment measurements shall be as defined in the applicable interface specifications. The signal conditioners shall provide 0-40 mv signals for PCM transmission.

---

* This page supersedes and replaces Page 15 and incorporates SCN 7.

(SCN 7)

TABLE I

Payload Measurement Allocations for TIIIC MOL-EFT Flight

These measurements only will be transmitted from the Simulated Laboratory and are in addition to those TIIIC measurements already defined in the Master Program Management Plan (SSD-CR-64-14) and supplement thereto for the TIIIC Vehicle to be used for the MOL-EFT flight:

No. of Measurements	Type of Measurement	Range	Location of Transducer	Sampling Rate
2	Buffet Pressure	0-15 psia	Fwd Skirt	400 sps
2	Buffet Pressure	0-15 psia	Lab Tank	400 sps
4	Aero. Pressure	± 10 psia	Fwd Skirt	100 sps
1	Compt. Pressure	0-15 psia	Fwd Skirt	100 sps
1	Compt. Pressure	0-15 psia	Aft Skirt	100 sps
3	Aero. Skin Temp.	0-1000°F	Fwd Skirt	40 sps
2	Aero. Skin Temp.	0-1000°F	Lab Tank	40 sps
1	Aero. Skin Temp.	0-1000°F	Aft Skirt	40 sps
1	Power Supply Voltage	0-11.0 VDC	Lab Tank	20 sps
10	HSQ (McDonnell)	0-40 mv	Gemini Adapter	20 sps
6	Pressure (HTTC)	0-20 mv	Lab Tank	20 sps
10	Temperature (HTTC)	0-20 mv	Lab Tank	20 sps
2	Acceleration (DAC)	0-40 mv	Lab Tank	400 sps
4	Strain (DAC)	0-40 mv	Lab Tank	400 sps
4	Temp (DAC)	0-40 mv	Lab Tank	20 sps
6	Heat Flux (DAC)	0-40 mv	Lab Tank	20 sps
5	Heat Flux (Protuberance)	0-3 BTU	Fwd Skirt	20 sps
8	Heat Flux (Protuberance)	0-3 BTU	Lab Tank	20 sps
2	Temp (Protuberance)	0-1000°F	Fwd Skirt	20 sps
8	Temp (Protuberance)	0-500°F	Fwd Skirt	20 sps
5	Temp (Protuberance)	0-500°F	Lab Tank	20 sps
2	Pressure (0-G Gauging)	0-5 VDC	Lab Tank	100 sps
2	Volume (0-G Gauging)	0-5 VDC	Lab Tank	100 sps
1	Flow (0-G Gauging)	0-5 VDC	Lab Tank	400 sps
2	Temperature	0-20 MV	Lab Tank	400 sps

* This page supersedes and replaces Page 16 and incorporates SCN 7.

FIGURE 3

Deleted

(SCN 7)

* This page supersedes and replaces Page 18 and incorporates SCN 7.

(SCN 7) 3.3.2.3 PAM (Orbital) System - The PAM System shall consist of a Frequency Modulated (FM) Transmitter, VCO and Mixer Assembly, one tape recorder, two Pulse Amplitude Modulator (PAM) commutators and a clock. The system shall provide the capability for data recovery for 6 days of orbit. The total data recovered will be dependent upon ground support capabilities.

(SCN 7) 3.3.2.3.1 FM Transmitter - The FM Transmitter shall provide a 10 watt nominal output to the antenna system with a center frequency of 236.2 mc. The transmitter shall accept the output of the VCO and Mixer Assembly. (Para. 3.3.2.3.2).

(SCN 7) 3.3.2.3.2 VCO and Mixer Assembly - The assembly shall accept the two outputs from the Tape Recorder (Para. 3.3.2.3.3) and the two PAM Commutators and provide a multiplexed output to the 10 watt FM Transmitter (Para. 3.3.2.3.1) or the SSB Transmitter (Para. 3.3.2.1.2).

(SCN 7) 3.3.2.3.3 Tape Recorder - The Tape Recorder shall provide a capability of recording signals from DC to 150 cps on two tracks. The recorder shall provide a capability to reproduce the recorded data at 26 times the record rate and with the tape traveling in the opposite direction. The tape recorder shall be capable of storing 180 minutes of data.

(SCN 7) 3.3.2.3.4 Pulse Amplitude Modulated (PAM) Commutator - Two PAM commutators shall be provided. Each commutator shall provide for 78 differential channels (inputs) with a range of 0 to 20 MV. Each commutator shall provide a 100% duty cycle of 90 time slots which are sampled once each two seconds (90 X .5 PAM Pulse Train). The output of each commutator is paralleled and sent to the tape recorder (Para. 3.3.2.3.3) and to the VCO and Mixer Assembly (Para. 3.3.2.3.2).

(SCN 7) 3.3.2.3.5 Clock - The clock shall place time pulses on the airborne tape which can be correlated with real time during the data reduction process. Time pulses shall also be provided for real time data.

(SCN 7) 3.3.2.3.6 Measurement Requirements - The measurements shall be as shown in Table IA. The responsibility to furnish transducers, wiring, and signal conditioning shall be as defined in the applicable interface specifications.

(SCN 7) 3.3.2.4 Common Equipment - The following equipment is required for two or more systems:

---

* This page supersedes and replaces Page 19 and incorporates SCN 7.

(SCN 7) 3.3.2.4.1 Signal Conditioners - The Signal Conditioners shall provide 0 to 20 MV signals for data transmitted by the PAM commutator. Only voltage divider type signal conditioning shall be provided.

(SCN 7) 3.3.2.4.2 Antenna System - The system shall provide capability for radiating an RF signal from the SSB transmitter and from either the PCM transmitter or the FM transmitter during boost, stabilized flight on orbit and tumbling flight on orbit. The system shall consist of the following equipment: a coax switch, a RF multiplexer, a three-port junction and two omni-directional antennas. The losses in the RF transmission systems shall not exceed 5.4 db from the transmitter output to the antenna connector. The transmitter output shall not see a VSWR greater than 2.0:1.

---

* This page supersedes and replaces Page 20 and incorporates SCN 7.

(SCN 7)

TABLE IA

PAM System Measurements

No of Measurements	Type of Measurement	Range	Transducer Location
1	Voltage	0-35 VDC	Bio-Cell
1	Temperature	0-2.5 VDC	Bio-Cell
1	Photocell Output	0-2.5 VDC	Bio-Cell
2	Pressure	0-4000 psia	Fuel Cell
2	Pressure	0-200 psia	Fuel Cell
1	Pressure	0-15 psia	Fuel Cell
6	Temperature	-50° to 200°F	Fuel Cell
5	Temperature	150° to 250°F	Fuel Cell
1	Temperature	0° to 500°F	Fuel Cell
1	Current	0 to 20 mv	Fuel Cell
2	Current	0 to 10 amps	Fuel Cell
1	Voltage	0-35 VDC	Fuel Cell
4	Voltage	0-1.5 VDC	Fuel Cell
1	Purge Voltage	ON-OFF	Fuel Cell
6	Pressure	0-20 mv	HTTC
3	Acceleration	0-20 mv	HTTC
38	Temperature	0-20 mv	HTTC
1	Temperature	0° to 200°F	HTTC
4	Velocity	0-5 VDC	Micrometeoroid
4	Polarity	0-5 VDC	Micrometeoroid
4	Amplitude	0-5 VDC	Micrometeoroid
4	Microphone	0-5 VDC	Micrometeoroid
3	Eject Events	ON-OFF	OV-1
4	Eject Events	ON-OFF	OV-4
2	Pressure	0-5 VDC	Zero "G" Propellant Gauging
2	Volume	0-5 VDC	Zero "G" Propellant Gauging
1	Flow	0-5 VDC	Zero "G" Propellant Gauging
2	Temperature	0-20 mv	Zero "G" Propellant Gauging

* This page supersedes and replaces Page 21 and incorporates SCN 7.

FIGURE 4

Deleted

(SCN 7)

* This page supersedes and replaces Page 22 and incorporates SCN 7.

(SCN 7) 3.3.3 Electrical Power and Distribution Subsystem - The Subsystem shall provide electrical power within the Simulated Laboratory. A Command Receiver and a sequencer shall control the experiments and the Instrumentation System.

(SCN 7) 3.3.3.1 Power System - The power system shall consist of batteries for the primary power and DC to DC converters to provide regulated transducer excitation power.

(SCN 7) 3.3.3.1.1 Battery Power Systems - The 28 volt system shall consist of four 60 ampere hour batteries. The 25 volt system shall consist of two 400 ampere hour Gemini type batteries. See Table IB for the battery systems characteristics.

(SCN 7)

TABLE IB

Battery Systems

Power System	Buss Steady State Voltages	Noise & Ripple	Transient	Requirements
28 V Instrumentation Two 60 A. H. Batteries	25 - 31 VDC	2.5V peak	38 VDC	During Boost & for SSB Transmitter Backup operation for 6 days
28V Transient Heater Two 60 A.H. Batteries	25 - 31 VDC	No requirement until paralleled with the instrumentation batteries	38 VDC	Power for one HTTC heater until equipment is shut-off. Then batteries shall parallel 28V instrumentation batteries for remainder of six days
25V Experiment Two 400 A. H. Batteries	22 - 29 VDC	1.0V peak	32 VDC	From power transfer until end of 10th day.

(SCN 7) 3.3.3.1.2 Instrumentation Regulated Power Supplies - Table IC shows the regulated power system characteristics:

---

* This page supersedes and replaces Page 23 and incorporates SCN 7.

(SCN 7)

TABLE IC

Regulated Power Supplies

Power Supply	Max Current	When Required
10 ± .025 VDC	2 AMPS	During boost only
5 ± .0055 VDC	0.5 AMPS	Throughout six days

(SCN 7) 3.3.3.1.3 Grounding System - A single ground shall be provided for the primary power system. The power systems on the Simulated Laboratory shall use the structure adjacent to the fuel cell experiment as a single point ground.

(SCN 7) 3.3.3.1.4 Miscellaneous Requirements

(SCN 7) 3.3.3.1.4.1 Electrical Interface with AGE - Signals and power required for the Simulated Laboratory from AGE and signals to AGE from the Laboratory shall be routed through the Transtage and shall use existing Transtage umbilicals for the Laboratory/AGE interface. Battery simulator cables and ordnance test cables shall be brought directly to the Simulated Laboratory.

(SCN 7) 3.3.3.1.4.2 Power Wiring - Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160D and the deviations as listed in Appendix II herein.

(SCN 7) 3.3.3.1.4.3 Interfaces - Interface requirements shall be compatible with interface specifications referenced in Section 2.0 herein.

(SCN 7) 3.3.3.1.4.4 Bonding - Bonding shall be in accordance with the requirements of MIL-B-5087 except for the deviations specified in Appendix II herein and the following requirements:

a. All chassis shall be bonded to the Simulated Laboratory structure;

b. The Simulated Laboratory shall be bonded through a connection to the Titan IIIC vehicle which, in turn, shall be connected through the launch stand to the facility ground;

c. All trusses will be bonded to the airframe by means of direct metal-to-metal bonding techniques.

(SCN 7) 3.3.3.2 Sequencing and Command System - The system shall receive signals from either the Inertial Guidance System or the Command Receivers, condition and route these signals to the proper equipment and ordnance items. The command system shall provide capability for receiving commands from the ground. Sequencing shall be provided as shown in Table ID.

---

* This page is added by SCN 7.

(SCN 7) 3.3.3.2.1 Command Receiver-Decoder - The Command Receiver-Decoder shall have a capability of receiving fifteen (15) tone-pair commands. Two receivers shall be provided, one shall be a back-up. The receiver-decoders shall be compatible with the FRW-2 ground transmitters which use 10 kilowatt linear amplifiers and Sterling or equivalent directional antennas.

(SCN 7) 3.3.3.2.2 Antenna System - The system shall provide capability for receiving ground signals during stabilized flight and tumbling flight. A hybrid junction shall be utilized to receive the signal from two omni-directional antennas and provide the signal to the two command receiver-decoders.

(SCN 7) 3.3.3.3 Ordnance System - The Transtage transient power supply shall be used to supply the electrical power for firing all Contractor powered ordnance items. The discretes to apply this power to the ordnance shall come from the HSQ sequencer. The HSQ sequencer shall be stepped by two discretes originating in the Transtage Inertial Guidance System.

---

* This page is added by SCN 7.

(SCN 7)

TABLE ID

Discrete Requirements

A. Ground Control (Umbilical)

1. 10 Watt Transmitter On-Off
2. Ground Commands 1, 2, and 3
3. SSB and PCM Transmitter Control
4. SSB Modulator Calibration Control

B. Sequencer and/or IGS Discretes

1. Zero "G" Propellant Gauging (each time transtage starts)
2. Gemini Separation (Redundant Discretes)
3. Arm TPS Bus, Sequencer and Fire Retro Rockets
4. Open Doors, HTTC, and ORBIS-Low
5. Start HTTC Pump
6. Arm 25 Volt Bus
7. Eject OV-1
8. Eject OV-4 Transmitting Satellite
9. Eject OV-4 Receiving Satellite
10. Purge Fuel Cell, Open Micrometeoroid Doors, Open Fuel Cell Start Valves, and Deploy ORBIS-Low Antenna
11. Fuel Cell Purge Off
12. Fuel Cell Purge On
13. Fuel Cell Purge Off
14. Fuel Cell Purge On
15. Fuel Cell Purge Off
16. HTTC Off, Fuel Cell Heaters Off
17. Sequencer Reset

C. Command Control

Command No.	Function
1	Turn on 10 Watt Transmitter and Zero "G" Propellant Gauging Electronics
2	Recorder to Playback Mode
3	Recorder to Record Mode, TM Off, Zero "G" Propellant Gauging Electronics Off
4	Spare
5	Fuel Cell Purge On and Fuel Cell Load On
6	Fuel Cell Purge Off
7	ORBIS-Low On
8	Orbital Data System On
9	Orbital Data System Off
10	High Power TM On, Low Power TM Off
11	ORBIS-Low Off
12	Fuel Cell Off
13	Spare
14	Spare
15	Spare

* This page is added by SCN 7.

4.1.4.2 Acceptance Tests - Acceptance tests shall be those tests performed in the vertical test facility (VTF) to demonstrate compliance with the requirements set forth herein and with the Contractor's drawings. Acceptance tests shall be run on the Simulated Laboratory as a functionally assembled unit with the modified Titan IIIC Transtage. These tests shall be of the end to end subsystem functional type. The subsystems test shall be followed by a simulated flight test (combined systems test) bypassing non-applicable portions of Stage 0, Stage I, and Stage II. Engine gimballing will not be mandatory.

4.1.5 Acceptance Tests

4.1.5.1 Subsystem Tests - The following subsystems shall be tested on the Simulated Laboratory:

4.1.5.1.1 Electrical Power and Distribution Subsystem

a. Verification of a single point ground;

b. Ground power application;

c. Verify electrical voltage at loads;

(SCN 7) d. Verify Instrumentation Regulated Power;

(SCN 7) e. Verify Sequencing System.

4.1.5.1.2 Telemetry Subsystem

a. Verify PCM encoder and transmitter operation;

b. Verify single side band transmitter operation;

c. Verify antenna system (insertion, VSWR);

d. Verify end instruments and signal conditioning;

(SCN 7) e. Verify tape recorder operation;

(SCN 7) f. Verify orbital TM transmitter;

(SCN 7) g. Verify command antenna system VSWR;

(SCN 7) h. Verify command receiver system;

(SCN 7) i. Verify orbital clock operation;

(SCN 7) j. Verify VCO operation;

(SCN 7) k. Verify electronic commutators operation.

---

* This page supersedes and replaces Page 35 and incorporates SCN 7.

4.1.5.1.3 Flight Control Subsystem - (Laboratory Tested with Transtage)

a. Verify gain change of adapter programmer;

b. Verify polarity of adapter programmer.

(SCN 7) 4.1.5.2 Simulated Flight Sequence - The Simulated Laboratory acceptance test sequence shall be based upon the Titan III CST sequence. The applicable portions of the test sequence shall be those functions associated with the Orbiting Vehicle Flight, including all in-flight discrete functions in sequence through spacecraft release and through all other functions until all experiments are initiated and/or activated. Acceptance tests shall be performed in the Vertical Test Facility (VTF) and shall be performed on the Simulated Laboratory as a functionally assembled unit (consisting of a modified Transtage and Simulated Laboratory). The ACSP guidance shall be adequately simulated to permit running a Transtage CST except that engine gimballing will not be mandatory. The following new events shall be incorporated into the Titan III CST during the Simulated Laboratory CST:

---

* This page is added by SCN 7.

4.1.5.2 (continued)

a. 28 VDC power transfer;

b. PCM link verify;

c. SSB link verify;

d. Separation discrete verify;

(SCN 7) e. Sequencer operation - verify;

(SCN 7) f. Command system operation - verify;

(SCN 7) g. Orbital TM operation - verify.

(SCN 5) 4.1.6 Electromagnetic Compatibility Testing

(SCN 5) 4.1.6.1 Electromagnetic Compatibility - Testing at the launch area at ETR will demonstrate electromagnetic compatibility of the MOL-EFT systems, the Titan IIIC booster, the Gemini Spacecraft, the AGE and the ETR facilities and equipment.

---

* This page supersedes and replaces Page 36 and incorporates SCN 7.

5.0 PREPARATION FOR DELIVERY

5.1 Marking of Shipments - Equipment items of the system shall be identified and otherwise marked in accordance with the requirements of MIL-STD-129.

5.1.1 Packing - The following items shall be packed separately from the booster for delivery to the assembly area:

Simulated Laboratory, Contractor Furnished

(SCN 7) 5.1.2 Separate Shipment - Components, including, but not limited to, removable ballast, protuberance fairing, ACS motor cluster, HTTC fairing and batteries may be shipped separately.

5.1.3 Direct Shipment - Components procured from Vendors, including but not limited to the battery, may be shipped directly from the Vendor's facility to ETR upon SSD approval.

---

* This page supersedes and replaces Page 37 and incorporates SCN 7.

6.0 NOTES

6.1 Definitions - Terms used in this specification shall be defined as follows:

6.1.1 Contractor - The Contractor shall be the Martin Company, a Division of Martin-Marietta Corporation, Post Office Box 179, Denver, Colorado, 80201.

(SCN 7) 6.1.2 Simulated Laboratory - The Simulated Laboratory, as furnished by the Contractor, including the Laboratory tank, the aft skirt, the forward skirt and mating ring for Gemini, equipment trusses, accessory equipment, and provisions for mounting experiments in the Laboratory.

6.1.3 Orbiting Vehicle - The assembled vehicle, including the Simulated Laboratory, the TIII Transtage, the Gemini re-entry module, and Gemini conical adapter.

6.1.4 Unsheltered Area - An unsheltered area shall be defined as one which is subject to the natural environment to be found in the continental United States, excluding Alaska, in which the temperature may range from -35°F to +160°F and where the only protection afforded to the equipment is its own packaging and/or a tarpaulin or similar cover.

6.1.5 Semi-Sheltered Area - A semi-sheltered area shall be defined as an unheated, uninsulated, enclosed building without air conditioning; designed to provide protection against rain, snow, sleet, and wind; with a measure of protection against solar radiation, sand, and dust, and other natural environment in continental United States, excluding Alaska, in which the temperature may range from -35°F to +135°F. Temperature and humidity variations will be such that condensation does not occur.

6.1.6 Sheltered Areas - A sheltered area shall be defined as a normally heated, insulated, enclosed structure with weather-tight roof, walls, windows, and doors designed to provide protection against rain, snow, sleet, wind, sand, dust, solar radiation, and other natural environments in which the temperature may range from +32°F to +125°F. Temperature and humidity variations will be such that condensation does not occur.

6.1.7 Payload - The payload shall consist of the Simulated Laboratory and the Gemini re-entry module and Gemini conical adapter.

---

* This page supersedes and replaces Page 38 and incorporates SCN 7.

6.2 Abbreviations - Abbreviations as used throughout this specification are defined as follows:

	cps	Cycles per second
	CST	Combined Systems Test
	dbm	Decible level referenced to one milliwatt of power
	ETR	Eastern Test Range
	GFAE	Government-Furnished Airborne Equipment
	GFE	Government-Furnished Equipment
	HSQ	Heat Shield Qualification
(SCN 3)	MAC	McDonnell Aircraft Corporation
	MMC	Martin-Marietta Corporation
	MOL-EFT	Manned Orbiting Laboratory-Early Flight Test
	mcs	Megacycles per second
	mw	Milliwatts
(SCN 7)	PAM	Pulse Amplitude Modulation
	PCM	Pulse Code Modulation
	psig	Pounds per square inch gauge pressure
	SPL	Sound Pressure Level
	SLPS	Simulated Laboratory Power Supply
	SPS	Samples per second
	SRM	Solid Rocket Motor
	SSB	Single Side Band
	VSWR	Voltage Standing Wave Ratio
	VTF	Vertical Test Facility

---

* This page supersedes and replaces Page 39 and incorporates SCN 7.

6.3 General Notes

6.3.1 It is anticipated that the wind will not exceed the ground wind plus gusts profile shown in SSD Exhibit 62-166, except during hurricane or severe thunderstorm conditions. The ground wind plus gust profile of SSD Exhibit 62-166 is used in the various analyses conducted of launch vehicle/payload combinations to be launched from ETR. The effect of ground wind induced oscillations is to be considered in the analysis of loads due to ground winds.

6.4 Ordering Data - The following groups of equipment when assembled in the field will constitute a complete Orbiting Vehicle:

a. Simulated Laboratory (including aft adapter) and associated equipment (Contractor Furnished);

b. Titan IIIC Transtage (GFAE-Contractor modified);

c. Gemini capsule including conical adapter (GFAE);

(SCN 7) d. Experiments as defined herein.

When orders are placed in accordance with this specification, the Procuring Agency will specify the schedules and quantity of articles to be delivered. The equipment designated for direct shipment from vendor's facilities is authorized to be inspected and accepted at source, and delivered separately to a Contractor established schedule. The schedule to which it is delivered at the using site will, however, be such that it will support the using site need date for which it is intended.

---

* This page supersedes and replaces Page 40 and incorporates SCN 7.

APPENDIX I-A

GOVERNMENT-FURNISHED EQUIPMENT, CONTRACTOR-INSTALLED

	Item	Description	Quantity
	1	Gemini Spacecraft, including conical adapter and ballast (also includes Gemini instrumentation);	1 Structural Test Capsule
	2	Titan II Stage I Oxidizer Tank	1
	3	Titan IIIC Transtage (Contractor to modify)	1
(SCN 7)	4	OV-1 Experiment	1
(SCN 7)	5	OV-4 Experiment	1
(SCN 7)	6	Zero "G" Propellant Gauging Experiment	1
(SCN 7)	7	Corner Reflector Experiment	1
(SCN 7)	8	Structural Panel Experiment	1
(SCN 7)	9	ORBIS-Low Experiment	1
(SCN 7)	10	Fuel Cell Element	1
(SCN 7)	11	Micrometeoroid Detector Experiment	1
(SCN 7)	12	Heat Transfer Test Capsule Experiment	1
(SCN 7)	13	Bio-Cell Experiment	1

The following equipment shall be installed only if the flight experiment is not available for installation:

(SCN 7)	14	Dummy OV-1 Experiment	1
(SCN 7)	15	Dummy OV-4 Experiment	1
(SCN 7)	16	Dummy Zero "G" Propellant Gauging Experiment	1
(SCN 7)	17	Dummy Corner Reflectors Experiment	1
(SCN 7)	18	Dummy Fuel Cell Element Experiment	1
(SCN 7)	19	Dummy Micrometeoroid Detector Experiment	1
(SCN 7)	20	Dummy Heat Transfer Test Capsule Experiment	1

* This page supersedes and replaces Page 41 and incorporates SCN 7.

APPENDIX I-B

CONTRACTOR FURNISHED EQUIPMENT, CONTRACTOR INSTALLED

	Item	Description	Identification***	Quantity	Unit Wt**
(SCN 7)	1	Battery	PD 94S0026	4	50
(SCN 7)	2	Relay	PD 72S0070	36 to 40	3.25
(SCN 7)	3	10 Volt Instrumentation Power Supply	PD 94S0016	1	8.5
	4	Telemetry Antenna	804A3350110	2	11
(SCN 7)	5	T/M Modulator, Single Side Band	PD 64S0381	1	15
(SCN 7)	6	T/M Transmitter Single Side Band	80801H24000	1	23
(SCN 7)	7	3 Port Junction	PD 85S0098	1	1
(SCN 7)	8	Motor Driven Switch	PD 72S0067	3	5
(SCN 7)	9	Instrumentation, including the following:			
		a. Differential Pressure Transducers	PD 74S0042	4	0.6
		b. Pressure Transducers	PD 74S0041	6	0.6
		c. Temperature Reference Compensator (with associated conditioning equipment)	PD 64S0376	6	0.8
		d. 10 Volt Voltage distribution units		3	0.9
		e. Transducers to meet experiment measurement requirements. Quantity and types to be determined prior to VTF testing			
(SCN 7)	10	RF Multiplexer	SK808D01402	1	6

* This page supersedes and replaces Page 42 and incorporates SCN 7.

APPENDIX I-B (continued)

	Item	Description	Identification***	Quantity	Unit Wt**
(SCN 7)	11	PCM Multiplexer Encoder	PD 64S0375	1	26
(SCN 7)	12	PCM Transmitter	80801H21000	1	25
(SCN 7)	13	Coax Switch	PD 72S0080	1	N/A
(SCN 7)	14	Command Receiver Antenna	80801J01100	2	N/A
(SCN 7)	15	4 Port Junction	PD 85S0099	1	N/A
(SCN 7)	16	Motor Driven Switch	PD 72S0068	2	N/A
(SCN 7)	17	Battery (400 A.H.)		2	116
(SCN 7)	18	5 Volt Power Supply	SK808D01408	1	1
(SCN 7)	19	VCO Assembly	SK808D01401	1	4
(SCN 7)	20	Tape Recorder	SK808D01407	1	10
(SCN 7)	21	PAM Commutator	SK808D01406	2	14
(SCN 7)	22	Clock	SK808D01404	1	2
(SCN 7)	23	Command Receiver	SK808D01410	2	3
(SCN 7)	24	Command Receiver Decoder	SK808D01412	2	3
(SCN 7)	25	FM 10 Watt Transmitter	SK808D01409	1	3
(SCN 7)	26	Sequencer	SK808D01409	1	N/A

*** Equivalent parts may be substituted to meet MOL-EFT requirements.
** For information only

---

* This page is added by SCN 7.

APPENDIX II

Deviations

Note: Only the first level of reference to those documents listed in Section 2.0 of this specification are applicable.

Deviation 1 (SCN 7) Paragraph 3.3.3.1.4.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: In Paragraph 3.3.2.1, insulating tubing shall be in accordance with the Contractor's Materials Specifications which shall meet the propellant compatibility and environmental requirements of SSS-TIII-010 SLV.

Reason for Change and Remarks: The insulating tubing must meet the propellant compatibility and environmental requirements of SSS-TIII-010 SLV.

Deviation 2 (SCN 7) Paragraph 3.3.3.1.4.2

Requirements: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: In Paragraphs 3.6 through 3.6.1.4, the basic electrical and mechanical intent of Specification MIL-W-8160 shall be met, but wires and cables used shall meet propellant compatibility requirements.

Reason for Change and Remarks: This deviation is necessary due to the characteristics of the storable type of propellants used in Program 624A where compatibility demands selection of wires, cables, insulation materials, and tubing suitable for the application.

---

* This page supersedes and replaces Page 43 and incorporates SCN 7.

Deviation 3 (SCN 7) Paragraph 3.3.3.1.4.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: In Paragraph 3.6.1.7, the wiring that supplies power to the current sensitive ordnance devices shall not meet the maximum voltage drop requirements.

Reason for Change and Remarks: Upon providing power to the current sensitive ordnance devices, the voltage drop exceeds the allowable drop of 2V dc maximum. The ordnance devices are current sensitive. Therefore, the current supplied is the controlling in flight factor and the voltage drop will exceed the limitations of MIL-W-8160.

Deviation 4 (SCN 7) Paragraph 3.3.3.1.4.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

---

* This page is added by SCN 7.

Deviation: In Paragraph 3.6.2f(2), the identification of the termination will not be printed on the sleeve.

Reason for Change and Remarks - It is very impractical and costly to identify wire and cable terminations on the sleeve.

Deviation 5 (SCN 7) Paragraph 3.3.3.1.4.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: In Paragraph 3.6.2.1e, wire segment letters may be changed to two-way permanent splices.

Reason for Change and Remarks: Splices are identified with a reference designation for splice usage control, in accordance with the wiring checkout diagrams.

Deviation 6 (SCN 7) Paragraph 3.3.3.1.4.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: In Paragraph 3.7.4, approval is required for use of post insulated terminals and splices.

Reason for Change and Remarks: These terminals are not in the QPL for MIL-T-7928. Further, different materials are required to meet compatibility requirements.

Deviation 7 (SCN 7) Paragraph 3.3.3.1.4.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: In Paragraph 3.7.5, terminal blocks will be physically interchangeable with MS25123, but will be made of propellant compatible materials.

Reason for Change and Remarks: This deviation is necessary due to the characteristics of the storable type propellants used in the Program 624A where compatibility demands selection of materials suitable for the application.

Deviation 8 (SCN 7) Paragraph 3.3.3.1.4.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

---

* This page supersedes and replaces Page 44 and incorporates SCN 7.

Deviation: In Paragraph 3.7.6.3, connectors will meet or exceed the electrical and performance requirements of MIL-C-5015 and MIL-C-26482. The materials, construction, and finishes will be changed.

Reason for Change and Remarks - This deviation is necessary due to the characteristics of the storable type propellants used in the Program 624A where compatibility demands selection of materials suitable for the application.

Deviation 9 (SCN 7) Paragraph 3.3.3.1.4.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: In Paragraph 3.7.6.4, the shell material of coaxial connectors will be aluminum instead of silver plated brass.

Reason for Change and Remarks: This deviation is necessary due to the characteristics of the storable type propellants used in the Program 624A where compatibility demands selection of materials suitable for the application.

Deviation 10 (SCN 7) Paragraph 3.3.3.1.4.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: In Paragraph 3.10, cushion clamps will be physically interchangeable, where possible, with MS 21919, but will have propellant compatible materials. The types of clamps used must comply with stress and dynamic requirements.

Reason for Change and Remarks: This deviation is necessary due to the characteristics of the storable type propellants used in the Program 624A where compatibility demands the selection of materials suitable for the application.

Deviation 11 (SCN 7) Paragraph 3.3.3.1.4.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: In Paragraph 3.6.2.1f, wire size will not be included in wire number for pigtails on vendor furnished components.

Reason for Change and Remarks: Wiring diagrams do not control wire size of pigtails. Presently this is controlled by procurement description drawings.

---

* This page supersedes and replaces Page 45 and incorporates SCN 7.

Deviation 12 (SCN 7) Paragraph 3.3.3.1.4.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: Delete reference to MIL-E-25366 from MIL-W-8160.

Reason for Change and Remarks: This requirement is too all-inclusive and would create confusion in establishing applicability. It covers the general requirements for the installation of electric and electronic systems and equipment, not the installation of wiring and wiring devices.

Deviation 13 (SCN 7) Paragraph 3.3.3.1.4.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: Delete the requirements of Paragraphs 3.14.1 through 3.14.1.2.1 and 4.3

Reason for Change and Remarks: Wiring and interconnection diagrams will be prepared, as required, in accordance with the Contractor's Class III drawing system. As such, they will not necessarily comply entirely with MIL-D-70327, MIL-S-25063, and MIL-H-5166. These diagrams will be available for review at the contractor's facility but they will not be submitted for formal approval.

Deviation 14 (SCN 7) Paragraph 3.3.3.1.4.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: In Paragraph 3.2, specifications and standards will not necessarily be selected in accordance with MIL-D-70327.

Reason for Change and Remarks: This requirement would be too restrictive for model shop operation and could result in added cost to obtain material or parts or delay in time to obtain approval for use of non-standard items.

Deviation 15 (SCN 7) Paragraph 3.3.3.1.4.2

Requirement: Wiring, cabling, and connectors shall be in accordance with Specification MIL-W-8160.

Deviation: Delete the requirements of Paragraph 4.3.1.

Reason for Change and Remarks: Wiring mockup requirements should not be imposed for a model shop program that involves only one (1) article.

---

* This page supersedes and replaces Page 46 and incorporates SCN 7.

Deviation 16 Paragraph 3.2.5.1

Requirement: Paragraph 1.2 of WDT 57-17 requires compliance with Exhibit 57-1, 57-2, and 57-3.

Deviation: Exception is taken to the requirements of Exhibits 57-1, 57-2, and 57-3.

Reason for Change and Remarks: The maintenance, failure data and consumption reporting requirements are no longer current for this program. The exhibits were developed early in the ballistic missile program era, and the requirements have been superseded by later exhibits and MIL specification requirements.

Deviation 17 Paragraph 3.2.5.1

Requirement: Paragraph 3.1.2 and 3.1.3 of WDT 57-17 requires data card preparation and submittal.

Deviation: Data cards need not be prepared or submitted.

Reason for Change and Remarks: MOL-EFT R&D launch activities will be under the control of the contractor, and cards, established for military inventory control, will not be needed.

Deviation 18 (SCN 7) Paragraph 3.3.3.1.4.4

Requirement: Bonding shall be in accordance with the requirements of MIL-B-5087.

Deviation: In Paragraphs 3.8.1 and 3.8.2, change the reference from MIL-W-5088 of MIL-W-8160.

Reason for Change and Remarks: MIL-W-8160 is the specification used for guided missile wiring. MIL-W-5088 is used for aircraft wiring.

Deviation 19 (SCN 7) Paragraph 3.3.3.1.4.4

Requirement: Bonding shall be in accordance with the requirements of MIL-B-5087.

Deviation: In Paragraph 3.10.1, add the following sentence: "The mating of iridited surfaces is acceptable and considered to have an RF impedance equivalent to bare metal-to-metal.

Reason for Change and Remarks: Iridited surfaces provide a more permanent bond than bare metal-to-metal; data available at the Martin-Denver environmental laboratory shows the RF impedance of bare metal-to-metal and iridite-to-iridite bonds to be equivalent over the frequency range of 150 kcs to 20 mcs.

---

* This page supersedes and replaces Page 47 and incorporates SCN 7.

Deviation 20 (SCN 7) Paragraph 3.3.3.1.4.4

Requirement: Bonding shall be in accordance with the requirements of MIL-B-5087.

Deviation: In Paragraph 3.10.1, delete the fourth sentence and substitute the following: "Bonding jumpers shall not be used, except where by reason of over-riding design considerations, the members to be bonded are not in contact with each other, or intermittent separation of the members occurs. Such bonding jumpers shall comply with good RF bonding techniques."

Reason for Change and Remarks: Such cases may exist where bonding jumpers must be used; the requirement of Paragraph 3.10.1 (that a lab demonstration proves maximum impedance of 80 milliohms from 150 kcs to 20 mcs) is not realistic when applied to the practical usage of bonding, jumpers. References: "DESIGN TECHNIQUES FOR INTERFERENCE - FREE OPERATION OF AIRBORNE ELECTRONIC EQUIPMENT", prepared by Frederick Research Corp. on Contract AF33(038)23341, dated 1952; Figure 3.1.3.2-F shows impendance of flat bonding jumper to be more than 9 ohms at 20 mcs; data available at Martin-Denver Environmental Laboratory substantiates this showing RF impedance for 4" x 1" bonding strap to exceed 1 ohm at 20 mcs.

Deviation 21 Paragraph 3.3.2

Requirement: Operating characteristics of the telemetry system shall conform to the telemetry standards and requirements set forth in document IRIG-106-60.

Deviation: The requirements in Appendix I to IRIG-106-60 referring to spurious and harmonic emissions shall not be demonstrated.

Reason for Change and Remarks: Conformance to these requirements need not be demonstrated.

Deviation 22 Paragraph 3.2.6.1

Requirement: Requires the design to be in general accordance with MIL-M-6555A.

Deviation: Delete Paragraph 3.1.14 Environment.

Reason for Change and Remarks: Environmental requirements are in the body of the model specification.

Deviation 23 (SCN 7) Paragraph 3.3.3.1.4.2

Requirement: Electrical wiring shall be in accordance with MIL-W-8160D.

---

* This page supersedes and replaces Page 48 and incorporates SCN 7.

Deviation: In Paragraph 3.6.2f(4), wire identification and color (if applicable) of each conductor will be on the wire inside the cable jacket. (Applicable to cables with 10 or more conductors.) The identification will be within 3 inches of the wire termination. The plug number only will be identified on the outside of the cable jacket.

Reason for Change and Remarks: Each wire of the cable will be identified per code inside the fabricated cable jacket and wiring diagrams must be referred to for circuit modification. Use of sleeve over the outer jacket is felt to be an unnecessary and costly procedure.

Deviation 24 (SCN 7) Paragraph 3.3.3.1.4.2

Requirement: Electrical wiring shall be in accordance with MIL-W-8160D.

Deviation: In Paragraph 3.6.2 a wire identification sleeve within three inches of each end of the wire may be used as an alternate to stamping the wire number on the wire jacket every 15 inches.

Reason for Change and Remarks: No stamping process exists which will consistently prevent degradation of jacket insulating properties.

Deviation 25

Requirement: The lab electrical system shall meet the requirements of MIL-W-8160D.

Deviation: Paragraph 3.5.3 of MIL-E-25366C referenced in MIL-W-8160D, delete, "The use of relays shall be held to a minimum".

Reason for Change and Remarks: Minimum implies avoidance regardless of alternatives. Relays will be used where they are judged to be the most reliable choice.

Deviation 26

Requirements: The lab electrical system shall meet the requirements of MIL-W-8160D.

Deviation: Delete all requirements of Paragraph 4.6.3 of MIL-E-25366C referenced in MIL-W-8160D.

Reason for Change and Remarks: Environmental requirements including material compatibility is controlled by this model spec.

---

* This page supersedes and replaces Page 49 and incorporates SCN 7.

(SCN 7) Deviation 31

Requirement: The lab electrical system shall meet the requirements of MIL-W-8160D.

Deviation: Paragraph 3.6.2.1.e Delete "segments of wires joined by a two-way permanent splice shall have the same identical segment letter".

Reason for Change and Remarks: Multiple splices may be changed to two-way splices by engineering changes, in which event it would not be economical to re-identify one of the remaining wires.

(SCN 7) Deviation 32

Requirement: The lab electrical system shall meet the requirements of MIL-W-8160D.

Deviation: Delete Paragraph 3.7.7 and substitute the following; "splices may be utilized as required for multiple wire terminations. In line splices (one to one) shall not be used for new design, except for electrical/electronic equipment with pigtails. Repair or modification engineering may utilize in line splices (one to one).

Reason for Change and Remarks: This deviation is necessary to clarify utilization of splices in design. The present 3.7.7 indicates usage of splices shall be held to a minimum. Multiple splice usage is desirable due to propellant compatibility requirements for terminal board installations, but the use of in-line splices (one to one) shall be restricted to limit the splice terminations within a given circuit.

(SCN 7) Deviation 33

Requirement: The lab electrical system shall meet the requirements of MIL-W-8160D.

Deviation: Paragraph 3.3.9 of MIL-E-8189 referenced in MIL-W-8160D delete from the first sentence; "without servicing".

Reason for Change and Remarks: Operation for entire life without servicing is not a requirement and is unduly restrictive.

(SCN 7) Deviation 34

Requirement: The lab electrical system shall meet the requirements of MIL-W-8160D.

Deviation: Paragraph 3.3.10.4 of MIL-E-8189 referenced in MIL-W-8160D; delete "prior approval shall be obtained from the procuring activity for review and approval".

---

* This page is added by SCN 7.

(SCN 7) Reason for Change and Remarks: This requirement is too restrictive in that the characteristics of certain flight control system components require special test equipment. To obtain specific approval prior to accomplishing each design could cause delay in obtaining necessary test facilities.

(SCN 7) Deviation 35

Requirement: The lab electrical system shall meet the requirements of MIL-W-8160D.

Deviation: Paragraph 3.6.3 of MIL-E-8189 referenced in MIL-W-8160D; delete the entire paragraph.

Reason for Change and Remarks: This paragraph specifies that screws shall be tight. This is not definitive, and therefore Martin standards will be utilized.

(SCN 7) Deviation 36

Requirement: The lab electrical system shall meet the requirements of MIL-W-8160D.

Deviation: Paragraph 3.3.10.3 of MIL-E-8189 referenced in MIL-W-8160D; delete the entire paragraph.

Reason: Inclusion of test points adds unnecessary weight and unreliability. Adequate maintenance testing of system components can be conducted on the bench utilizing the normal package external connections.

(SCN 7) Deviation 37

Requirement: The lab electrical system shall meet the requirements of MIL-W-8160D.

Deviation: Paragraph 3.3.17 of MIL-E-8189 referenced in MIL-W-8160D; delete the entire paragraph.

Reason: Applicable environmental requirements are specified in this specification.

(SCN 7) Deviation 38

Requirement: The lab instrumentation system shall meet the requirements of IRIG106-60.

Deviation: Delete the requirements of Paragraphs 2.4.1, 2.4.2, 2,4.3, 2.4.5, and 2.4.6.

---

* This page is added by SCN 7.

(SCN 7) Reason: To utilize minimum bandwidth and utilize to the maximum existing hardware.

(SCN 7) Deviation 39

Requirement: The lab instrumentation system shall meet the requirements of IRIG-106-60.

Deviation: Delete the tape requirements of Section 6.

Reason: To utilize to the maximum extent possible existing hardware.

---

* This page is added by SCN 7.

APPENDIX IV

STRUCTURAL LOAD TESTS

A. General Description

The Contractor shall perform the following structural load tests in accordance with the MOL-EFT Subsystem Test Plan. The test loads shall be in accordance with the MOL-EFT Program requirements, as established by the Contractor and approved by SSD. MAC will provide engineering inputs as required for those tests pertaining to the Gemini adapter MOL-EFT interface.

(SCN 7) 1. Static proof load test of the Simulated Laboratory, Gemini Conical Adapter, and the Titan III/Laboratory interface shall be performed.

(SCN 7) 2. DELETED

(SCN 7) 3. Static proof load tests of the equipment mounting trusses shall be performed.

(SCN 7) 4. Static proof load of experiment mounting structure as is deemed necessary by the Contractor to verify flight readiness shall be performed.

The test results shall be submitted in accordance with Data Requirements Document SSS-TIII-010 DRD.

---

* This page supersedes and replaces Page 53 and incorporates SCN 7.

MARTIN COMPANY DENVER DIVISION

CONTRACT NO. AF 04(695)-150

SPECIFICATION

CHANGE NOTICE

NO. 8
DATE 3 May 1966

SPEC NO. MOL-EFT-AVE-1000
TITLE Model Specification Airborne Vehicle Equipment
DATED 15 March 1965
REVISION NO. 1 DATED 3 May 1965

PURPOSE OF CHANGE: This change revises SCN 7 (in part) to correct page numbering.

This change incorporates SCNP G (C40018) as approved by SCD C3-3509 dated 18 February 1966 (Martin Ref. 6W02913).

INSTRUCTIONS: Remove pages 50a, 50b and 50c added by SCN 7.

Add New pages 51a, 51b and 51c

AUTHORIZATION: SCD C3-3509 dated 18 February 1966 (Martin Ref. 6W02913) and CCN 1529 dated 10 March 1966 (Martin Ref. 6W04379)

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

APPROVAL

(SCN 7) Deviation 31

Requirement: The lab electrical system shall meet the requirements of MIL-W-8160D.

Deviation: Paragraph 3.6.2.1.e Delete "segments of wires joined by a two-way permanent splice shall have the same identical segment letter".

Reason for Change and Remarks: Multiple splices may be changed to two-way splices by engineering changes, in which event it would not be economical to re-identify one of the remaining wires.

(SCN 7) Deviation 32

Requirement: The lab electrical system shall meet the requirements of MIL-W-8160D.

Deviation: Delete Paragraph 3.7.7 and substitute the following; "splices may be utilized as required for multiple wire terminations. In line splices (one to one) shall not be used for new design, except for electrical/electronic equipment with pigtails. Repair or modification engineering may utilize in line splices (one to one).

Reason for Change and Remarks: This deviation is necessary to clarify utilization of splices in design. The present 3.7.7 indicates usage of splices shall be held to a minimum. Multiple splice usage is desirable due to propellant compatibility requirements for terminal board installations, but the use of in-line splices (one to one) shall be restricted to limit the splice terminations within a given circuit.

(SCN 7) Deviation 33

Requirement: The lab electrical system shall meet the requirements of MIL-W-8160D.

Deviation: Paragraph 3.3.9 of MIL-E-8189 referenced in MIL-W-8160D delete from the first sentence; "without servicing".

Reason for Change and Remarks: Operation for entire life without servicing is not a requirement and is unduly restrictive.

(SCN 7) Deviation 34

Requirement: The lab electrical system shall meet the requirements of MIL-W-8160D.

Deviation: Paragraph 3.3.10.4 of MIL-E-8189 referenced in MIL-W-8160D; delete "prior approval shall be obtained from the procuring activity for review and approval".

---

* This page is added by SCN 8.

(SCN 7) Reason for Change and Remarks: This requirement is too restrictive in that the characteristics of certain flight control system components require special test equipment. To obtain specific approval prior to accomplishing each design could cause delay in obtaining necessary test facilities.

(SCN 7) Deviation 35

Requirement: The lab electrical system shall meet the requirements of MIL-W-8160D.

Deviation: Paragraph 3.6.3 of MIL-E-8189 referenced in MIL-W-8160D; delete the entire paragraph.

Reason for Change and Remarks: This paragraph specifies that screws shall be tight. This is not definitive, and therefore Martin standards will be utilized.

(SCN 7) Deviation 36

Requirement: The lab electrical system shall meet the requirements of MIL-W-8160D.

Deviation: Paragraph 3.3.10.3 of MIL-E-8189 referenced in MIL-W-8160D; delete the entire paragraph.

Reason: Inclusion of test points adds unnecessary weight and unreliability. Adequate maintenance testing of system components can be conducted on the bench utilizing the normal package external connections.

(SCN 7) Deviation 37

Requirement: The lab electrical system shall meet the requirements of MIL-W-8160D.

Deviation: Paragraph 3.3.17 of MIL-E-8189 referenced in MIL-W-8160D; delete the entire paragraph.

Reason: Applicable environmental requirements are specified in this specification.

(SCN 7) Deviation 38

Requirement: The lab instrumentation system shall meet the requirements of IRIG106-60.

Deviation: Delete the requirements of Paragraphs 2.4.1, 2.4.2, 2,4.3, 2.4.5, and 2.4.6.

---

* This page is added by SCN 8.

(SCN 7) Reason: To utilize minimum bandwidth and utilize to the maximum existing hardware.

(SCN 7) Deviation 39

Requirement: The lab instrumentation system shall meet the requirements of IRIG-106-60.

Deviation: Delete the tape requirements of Section 6.

Reason: To utilize to the maximum extent possible existing hardware.

---

* This page is added by SCN 8.

17

MARTIN COMPANY
DENVER DIVISION

CONTRACT NO. AF04(695)-150

SPECIFICATION

CHANGE NOTICE

NO. 11
DATE 25 May 1966

SPEC NO. MOL-EFT-AVE-1000
TITLE MODEL SPECIFICATION AIRBORNE VEHICLE EQUIPMENT
DATED 15 March 1965
REVISION NO. 1 DATED 3 May 1965

PURPOSE OF CHANGE: This change incorporates thermal control modifications for the MOL-HSQ experiments.

This change incorporates SCNP-Q (34-C40057)

INSTRUCTIONS: Replace pages 14, 14b, 14c, and 14e with revised pages 14, 14b, 14c, and 14e.

AUTHORIZATION: SCD C3-3655 dated 9 May 1966 (Martin Ref. No. 6W06911)
CCN 1687 dated 10 May 1966 (Martin Ref. No. 6W07383)

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

APPROVAL

FORM DEN 101601 (9-65)

3.3.1.2.1 Forward Skirt Assembly - The forward skirt shall consist of that structure extending forward from the Laboratory tank to the Gemini conical adapter. The forward skirt shall be of aluminum alloy semi-monocoque construction. The forward mating plane shall be constructed to match the Gemini conical adapter. The structure interface connection of the forward Laboratory skirt and GFAE conical adapter shall utilize the Gemini/GLV 20 bolt pattern geometry.

(SCN 7) 3.3.1.2.2 Simulated Laboratory Tank Assembly - The Laboratory structure shall consist of a modified Titan II Stage I oxidizer tank, including a forward ellipsoidal dome and an aft ellipsoidal dome with an aft access way approximately 32 inches in diameter. The connection of the barrel section of the aft skirt assembly shall be reinforced with an external doubler. The barrel section shall be reinforced to meet the modulus of elasticity requirements of Figure 1A.

3.3.1.2.3 Aft Adapter Assembly - The aft adapter assembly shall consist of that structure extending back from the aft end of the Laboratory tank assembly to the tension splice of the Transtage mating plane at Titan IIIC Station 77.0. (For reference, see Figure 29A of Specification SSS-TIII-010 SLV, pp 231a). The aft adapter section shall be constructed of aluminum alloy semi-monocoque skin panels and frames.

3.3.1.2.4 Ballast Attach Points - Ballast attachment points in the Laboratory shall be provided as necessary.

3.3.1.2.5 Trusses and Mounting Bracketry - Trusses and mounting bracketry shall be provided for mounting instrumentation and electrical components listed in Appendix I-B.

(SCN 11) 3.3.1.3 Simulated Laboratory Surface Finish - The Simulated Laboratory exterior surface shall be painted and/or treated for optical tracking as shown in Figure 1 of IDRD-MOL-HSQ-63005. The interior surface of the tank assembly, forward skirt and aft adapter assembly shall be coated with a white acrylic paint.

---

*This page supersedes and replaces Page 14 and incorporates SCN 11.

(SCN 7) 3.3.1.4.1 (continued)

shall permit lowering the OV-1 Experiment to the upper floor of the Simulated Laboratory for access to the experiment. The complete experiment shall be capable of being installed into and removed from the Simulated Laboratory only from above the forward dome with the Gemini Spacecraft not installed.

(SCN 7) 3.3.1.4.2 OV-4 Mounting Provisions - Structural mounting provisions shall be provided for mounting both units of the OV-4 Experiment through the Simulated Laboratory forward dome. The experiment shall be truss mounted such that the forward portion of the experiment satellites project forward of the dome as shown in Figure I-C herein and Figure 1 of IDRD-MOL-HSQ-63002. The experiment shall be located such that it has a clear path through the Gemini Conical Adapter (after separation of the Gemini re-entry module) for ejection in orbit. A pressure tight well shall be provided below the dome, including the experiment mounting interface, to prevent air leakage across the dome. The Contractor mounting provisions for the experiment shall permit lowering the OV-4 Experiment to the upper floor of the Laboratory for access to the experiment. The complete experiment (including launch tube) shall be capable of being installed and removed from the Simulated Laboratory only from above the forward dome, with the Gemini Spacecraft not installed. The satellites, not including the launch tube, shall be removable from the Simulated Laboratory through the door in the aft skirt.

(SCN 7) 3.3.1.4.3 HTTC Mounting Provisions - Structural mounting provisions shall be provided for the HTTC Experiment in the forward portion of the Simulated Laboratory tank section as shown in Figure I-C herein and Figure 1 of IDRD-MOL-HSQ-63011. The experiment shall be mounted through the skin of the Simulated Laboratory to provide a wide angle view for radiant heat dissipation from the experiment radiator to space. An external fairing shall provide aerodynamic protection for the experiment during the atmospheric portion of flight. The fairing shall have air pressure integrity to prevent leakage of air into or out of the Simulated Laboratory. The fairing shall incorporate a door which shall be capable of being opened after atmospheric flight. The HTTC experiment shall be capable of being installed and removed from the inside or the outside of the Simulated Laboratory, and shall be removable from the Laboratory through the door in the aft skirt. The experiment shall be bracket mounted to the ring frames and stringers of the Laboratory. Pro-
(SCN 11) visions shall be made to prevent thermal radiation to space from the interior of the Simulated Laboratory through the opening in the structure.

---

*This page supersedes and replaces Page 14b and incorporates SCN 11.

(SCN 7) 3.3.1.4.4 Zero "G" Propellant Gauging Mounting Provisions - Structural mounting provisions shall be provided for the Zero "G" Propellant Gauging Experiment in the aft portion of the Simulated Laboratory tank section as shown in Figure I-C herein and Figure 1 of IDRD-MOL-HSQ-63003. Provisions shall be made in the Simulated Laboratory for lowering the experiment into the Laboratory through the hole in the upper dome used for mounting the OV-1 Experiment and then through a hole in the upper floor of the Simulated Laboratory to its mounting location. The experiment shall be mounted on supporting bracketry structure attached to the ring frame, stringers, and skin of the Simulated Laboratory. The experiment shall be capable of being installed into the Simulated Laboratory prior to the OV-1 and/or Gemini Spacecraft emplacement. The Zero "G" Propellant Gauging Experiment shall not be capable of being removed from the Simulated Laboratory with the OV-1 and/or Gemini Spacecraft installed on the Simulated Laboratory.

(SCN 7) 3.3.1.4.5 Micrometeoroid Detector Mounting Provisions - Structural mounting provisions shall be provided for the Micrometeoroid Detector Experiment packages in the Simulated Laboratory. One package shall be mounted forward of the forward dome such that a 120° minimum view angle may be attained in the forward direction. The second package shall be mounted in the aft tank area looking away from the earth (during stabilized flight) in orbit. These locations shall be as shown in Figure I-C herein and Figure 1 of IDRD-MOL-HSQ-63005. A door shall be provided over the aft experiment package to protect the experiment from aerodynamic effects during flight through the atmosphere. This door shall be capable of being opened in orbit to provide a minimum view angle of 120°. The door, prior to opening, shall be pressure tight to maintain the Laboratory pressure venting control. The forward experiment package shall be truss mounted off the forward dome and shall be mounted in a protective box to protect the unit from the OV-4 launching rocket blast and Gemini separation ordnance. A door on the protective box shall be provided and shall be opened after separation of the OV-4 Satellites. Both experiment packages shall be
(SCN 11) protected from the thermal environment by using thermal stand-offs for mounting and by wrapping super-installation around the experiment package. Installation of the stand-offs and the superinsulation will be concurrent with the installation of the experiment packages. Provisions shall be made at the aft experiment package to prevent thermal radiation to space from the interior of the Simulated Laboratory through the opening in the structure.

---

*This page supersedes and replaces Page 14c and incorporates SCN 11.

(SCN 7) 3.3.1.4.8.2 (continued)

b. Storage Containers - The storage containers shall be used to store the hydrogen and oxygen gas for use in the Fuel Cell. Threee bottles shall be provided, two bottles for hydrogen and one bottle for oxygen.

(SCN 11) c. Thermal Control Shroud - The Fuel Cell Element shall be mounted within a shroud. The shroud shall be attached to the Simulated Laboratory structure through thermal stand-off isolators. Resistors capable of absorbing the electrical output of the Fuel Cell shall be mounted on the shroud. Three temperature transducers shall be mounted on the shroud.

d. Vent Lines - Tubing shall be routed from the appropriate Fuel Cell and support equipment fitting (H_2, O_2, H_2O, and H_2 and O_2 relief valves) to the Simulated Laboratory skin and overboard.

The packages (a) and (b) shall be mounted by suitable brackets attached to the ring frames and stringers within the tank section of the Simulated Laboratory. Interconnecting tubing and wiring shall be provided to complete the installation.

(SCN 7) 3.3.1.4.9 Protuberance - The Protuberance Experiment, provided by the Contractor shall consist of an aerodynamic fairing, a dummy attitude control system (ACS) rocket-motor cluster, and required instrumentation as defined by IDRD-MOL-HSQ-63006. These two units shall be mounted approximately 180° apart on the periphery of the Simulated Laboratory on the forward skirt as shown in Figure I-C herein. Structural mounting provisions shall also be provided on the Simulated Laboratory. The fairing and rocket-motor cluster shall not be attached to the Simulated Laboratory during shipment to AFETR.

(SCN 7) 3.3.1.4.10 Structural Panel Mounting Provisions - Structural mounting provisions shall be provided on the Simulated Laboratory for the Structural Panel Experiment just aft of the rocket motor cluster of the Protuberance Experiment. The panel shall be located such that half of the structural panel is centered behind the dummy ACS rocket motor cluster and half is located in clear air flow, as shown in Figure I-C herein and Figure 1 of IDRD-MOL-HSQ-63007. The structural panel and Douglas Furnished instrumentation wiring and signal conditioning equipment shall not be attached to the Simulated Laboratory for shipment to AFETR.

*This page supersedes and replaces Page 14e and incorporates SCN 11.

SUPPLEMENTARY

INFORMATION

MARTIN COMPANY
DENVER DIVISION

CONTRACT NO. AF 04(695)-150

SPECIFICATION

CHANGE NOTICE

NO. 9
DATE 6 May 1966

4724438

SPEC NO. MOL-EFT-AVE-1000
TITLE Model Specification Airborne Vehicle Equipment
DATED 15 March 1965
REVISION NO. 1 DATED 3 May 1965

PURPOSE OF CHANGE: This change defines the added status measurements for the Simulated Laboratory.

This change incorporates SCNP M (C40035) as approved by SCD C3-3584, dated 25 March 1966 (Martin Ref. 6W04994).

INSTRUCTIONS: Add New Pages 16a and 21a

Replace Page 42a with revised Page 42a

AUTHORIZATION: SCD C3-3584 dated 25 March 1966 (Martin Ref. 6W04994) and CCN 1646, dated 14 April 1966 (Martin Ref. 6W06387)

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

APPROVAL

TABLE I (Continued)

No. of Measurements	Type of Measurement	Range	Location of Transducer	Sampling Rate
1	Voltage	0-35V	Truss (28 volt)	40 SPS
1	Current	0-40 Amp	Truss (25 volt)	40 SPS
1	Voltage	0-35V	Truss (25 volt)	40 SPS
7	Events HTTC Pump Start Signal, Sequencer Arm Signal, Transtage Start Signal, HTTC and ORBIS-Low Door Opening Signal Sequence #1, HTTC and ORBIS-Low Door Opening Signal Sequence #2, HTTC Door Open (Micro Switch), ORBIS-Low Door Open (Micro Switch)	On-Off	Sequencing and Command System	20 SPS
2	Events Micrometeoroid Doors Open	On-Off	Micro Switch Micrometeoroid Doors	20 SPS
1	Temperature		Simulated Laboratory Air	20 SPS

* This Page is added by SCN 9.

TABLE IA (Continued)

No. of Measurements	Type of Measurement	Range	Transducer Location
1	Voltage	0-35V	Truss (28 volt)
1	Voltage	0-35V	Truss (25 volt)
1	Temperature	0-35V	Simulated Laboratory Air
2	Events Two Micrometeroid Door Openings	On-Off	Micrometeroid Door Micro Switches

* This page is added by SCN 9

APPENDIX I-B (Continued)

	Item	Description	Identification***	Quantity	Unit Wt**
(SCN 7)	11	PCM Multiplexer Encoder	PD 64S0375	1	26
(SCN 7)	12	PCM Transmitter	80801H21000	1	25
(SCN 7)	13	Coax Switch	PD 72S0080	1	N/A
(SCN 7)	14	Command Receiver Antenna	80801J01100	2	N/A
(SCN 7)	15	4 Port Junction	PD 85S0099	1	N/A
(SCN 7)	16	Motor Driven Switch	PD 72S0068	2	N/A
(SCN 7)	17	Battery (400 A.H.)		2	116
(SCN 7)	18	5 Volt Power Supply	SK808D01408	1	1
(SCN 7)	19	VCO Assembly	SK808D01401	1	4
(SCN 7)	20	Tape Recorder	SK808D01407	1	10
(SCN 7)	21	PAM Commutator	SK808D01406	2	14
(SCN 7)	22	Clock	SK808D01404	1	2
(SCN 7)	23	Command Receiver	SK808D01410	2	3
(SCN 7)	24	Command Receiver Decoder	SK808D01412	2	3
(SCN 7)	25	FM 10 Watt Transmitter	SK808D01409	1	3
(SCN 7)	26	Sequencer	SK808D01409	1	N/A
(SCN 9)	27	Temperature Transducers	SK808D01417	4	N/A
(SCN 9)	28	Micro Switches	71E45-1	4	N/A

*** Equivalent parts may be substituted to meet MOL-EFT requirements.

** For information only

* This page supersedes and replaces Page 42a and incorporates SCN 9.

SUPPLEMENTARY

INFORMATION

MARTIN COMPANY MARTIN MARIETTA
DENVER DIVISION

CONTRACT NO. AF04(695)-150

SPECIFICATION **CHANGE NOTICE**

NO. 12
DATE 25 May 1966

4724

SPEC NO. MOL-EFT-AVE-1000
TITLE MODEL SPECIFICATION AIRBORNE VEHICLE EQUIPMENT
DATED 15 March 1965
REVISION NO. 1 DATED 3 May 1965

PURPOSE OF CHANGE: To include new electromagnetic compatibility requirements and to add a "Reference" designation to Figure 1-c (Page 8a).

This change incorporates SCNP-0 (34-C40036)

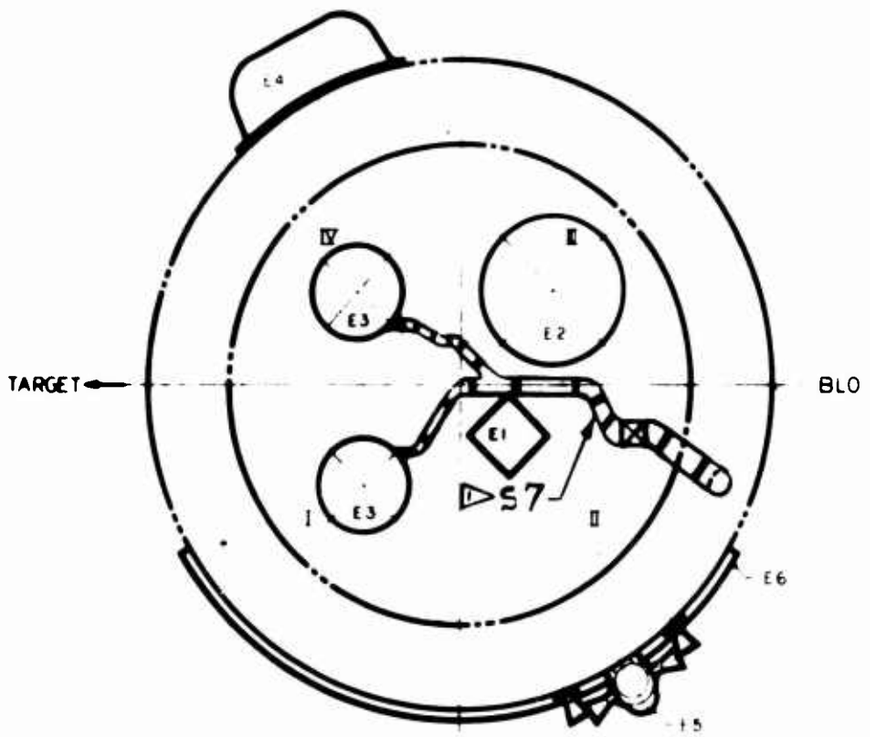
INSTRUCTIONS: Replace Pages 8a and 36 with the revised pages 8a and 36.

AUTHORIZATION: SCD C3-3654 dated 9 May 1966 (Martin Ref. No. 6W06910)
CCN 1688 dated 10 May 1966 (Martin Ref. No. 6W07384).

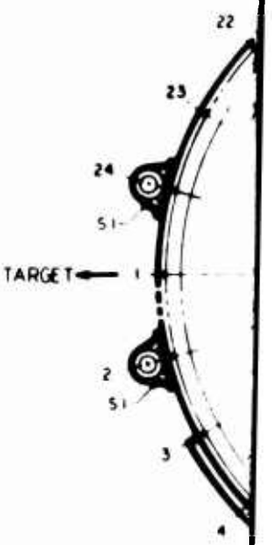
File this page in front of subject document to indicate the latest change.

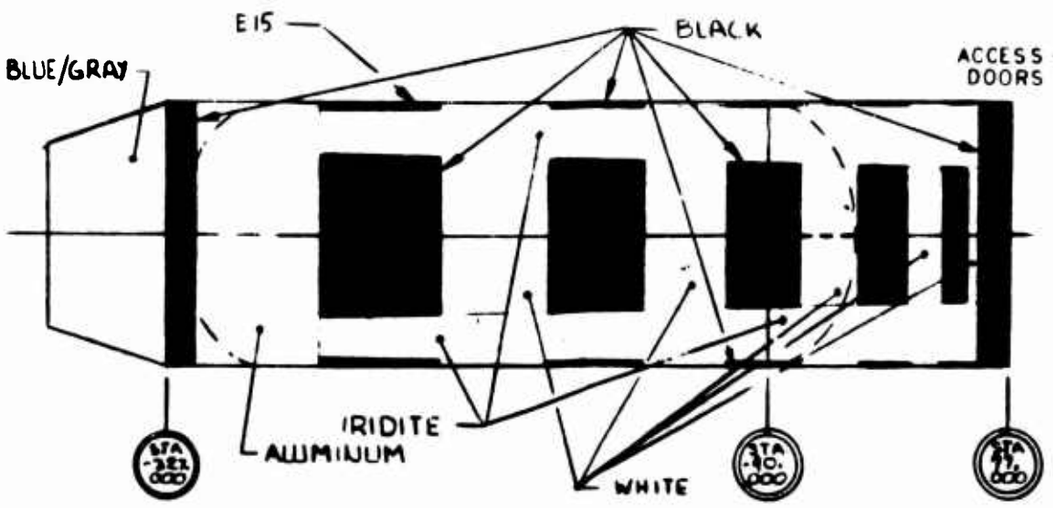
W. B. Wade Jr.
APPROVAL

FORM DEN 101601 (9-65)

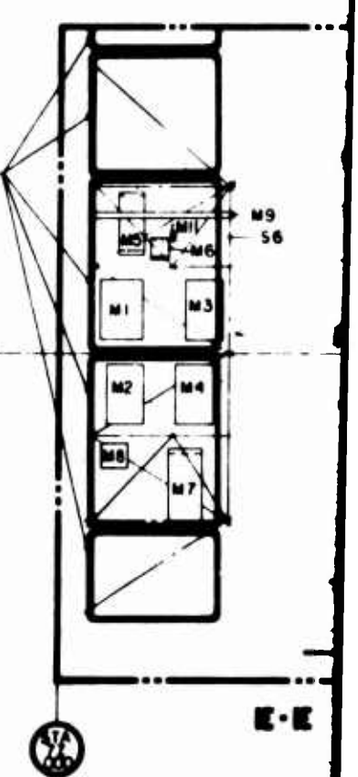


A-A

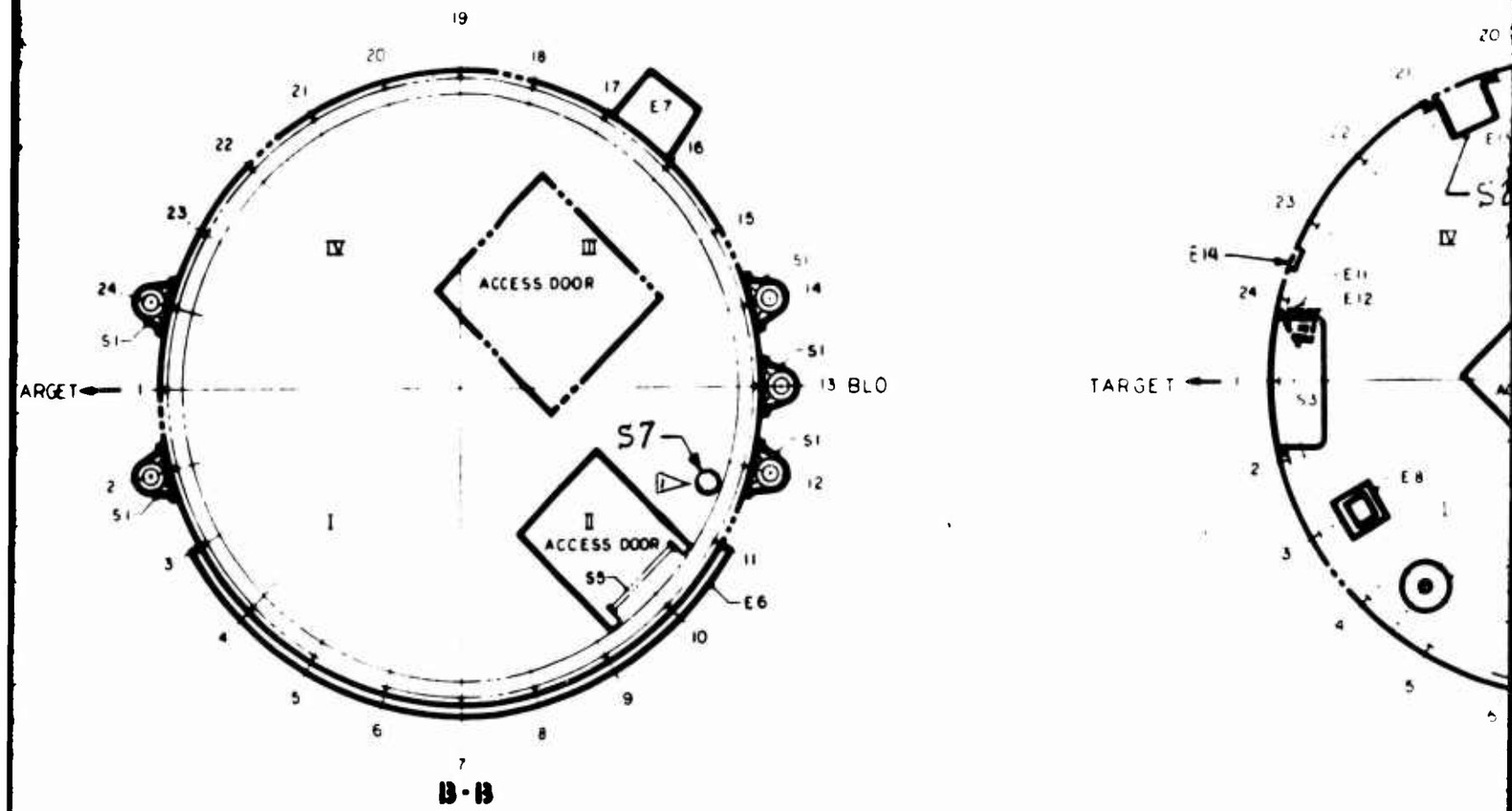


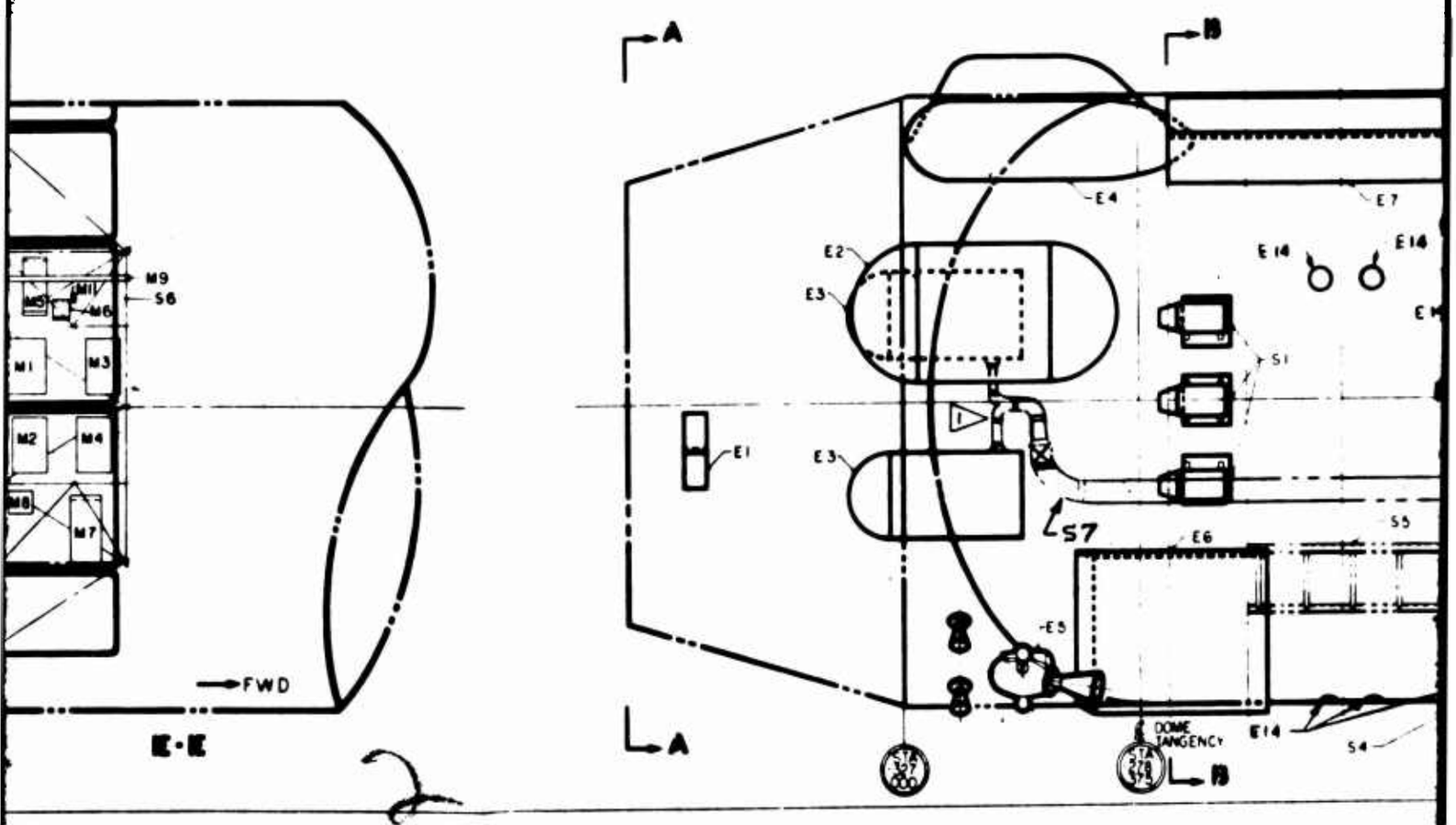


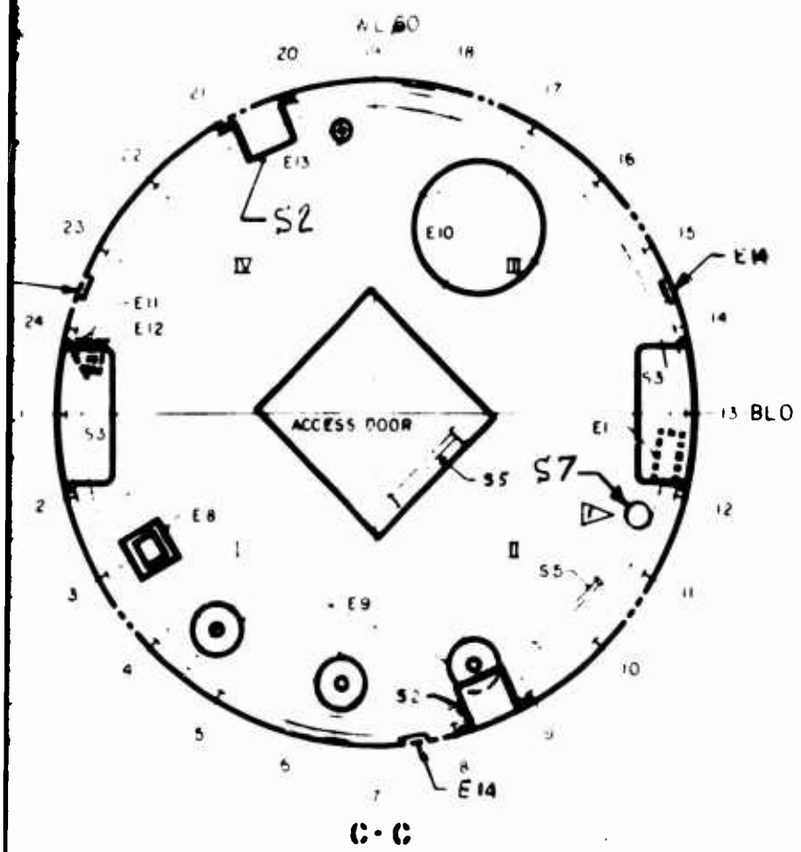
PAINT PATTERN
NO SCALE



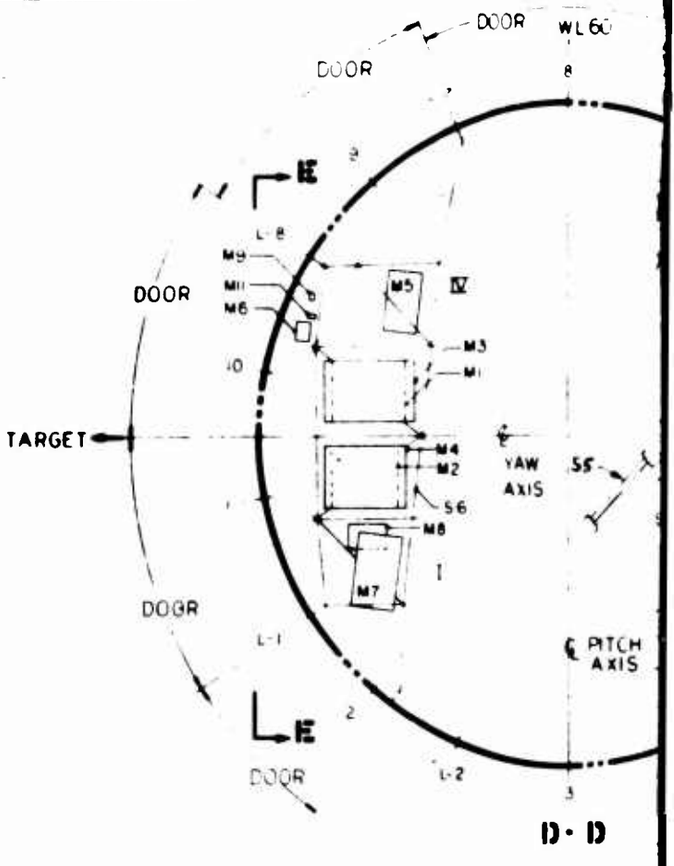
E-E


19
20
18
17
E7
21
22
16
23
15
IV
III
ACCESS DOOR
24
S1
14
S1
TARGET
1
13 BLO
S7
S1
2
S1
12
I
II
ACCESS DOOR
3
11
S5
E6
4
10
5
9
6
8
7
B-B
TARGET
E14
E11
E12
S3
E8

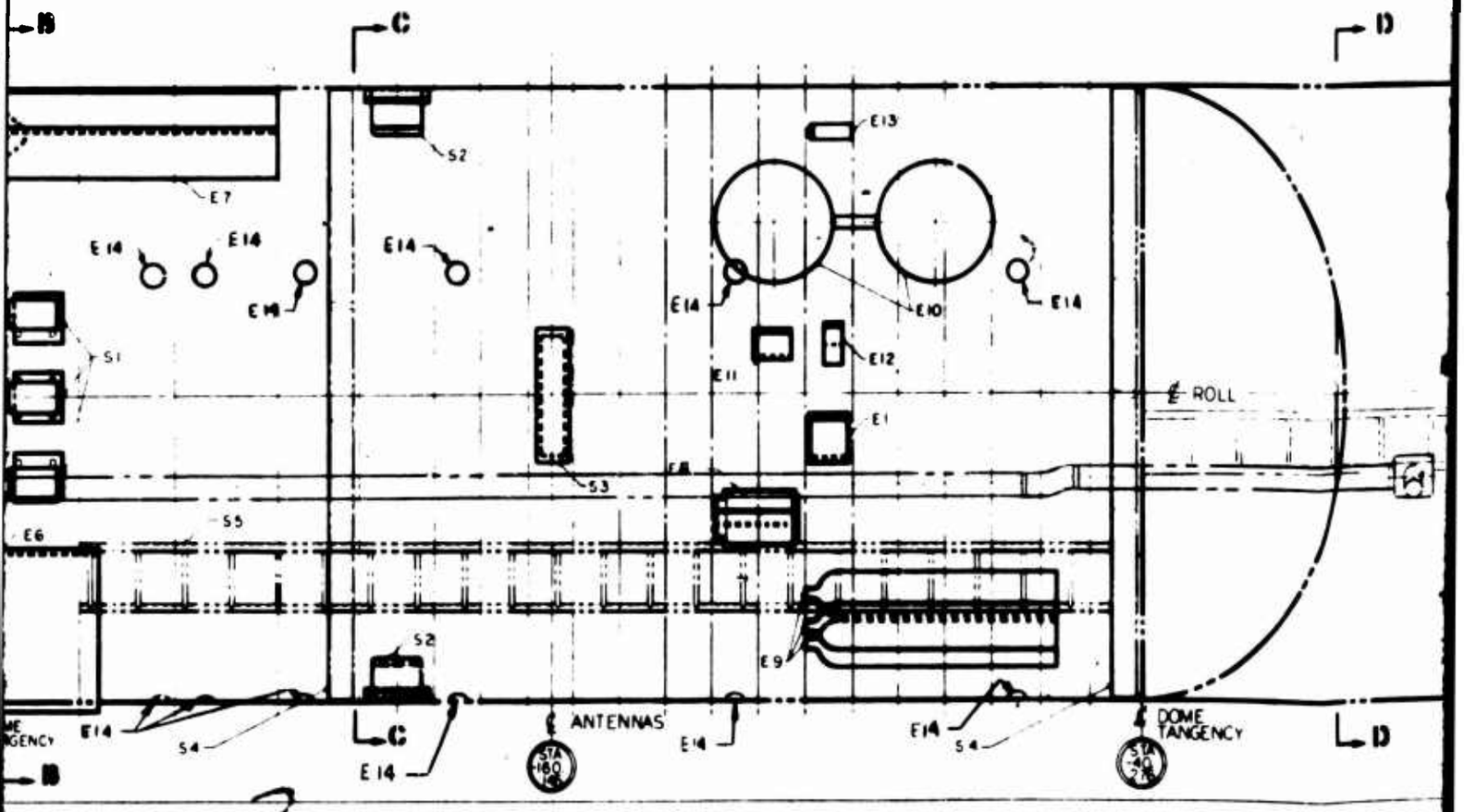

A
B
M9
S6
M5
M6
M1
M3
M2
M4
M8
M7
FWD
E-E
E4
E7
E2
E14
E14
E3
S1
E1
E3
S7
E6
S5
E5
E14
S4
DOME TANGENCY
A
B

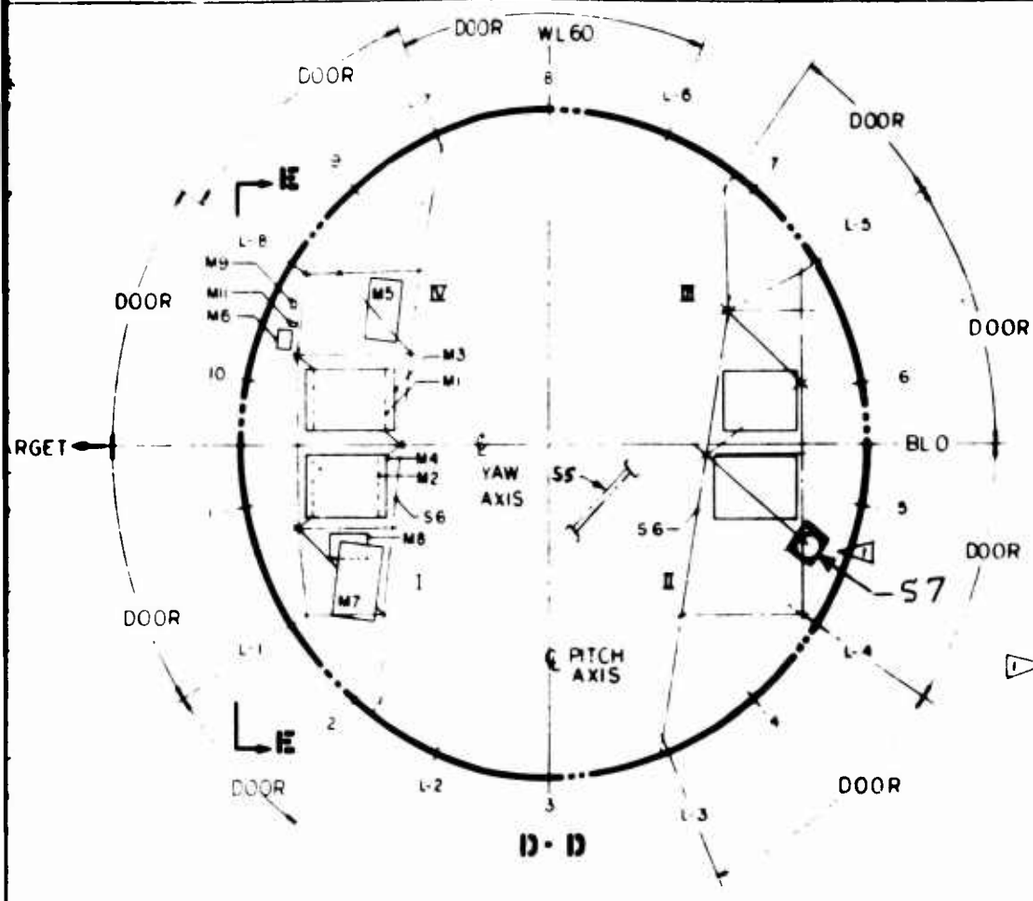

WL 60
S2
E10
E13
E14
ACCESS DOOR
S5
S7
E1
E8
E9
S3
S4
E14
BLO

C - C


DOOR
WL 60
DOOR
TARGET
M9
M11
M6
M5
M3
M1
M4
M2
S6
M8
M7
YAW AXIS
S5
PITCH AXIS
DOOR
DOOR

D - D


B
C
D
E7
S2
E13
E14
E10
E12
E11
E1
S1
S3
S5
E6
S4
E9
ROLL
ANTENNAS
DOME TANGENCY



EXPERIMENTS

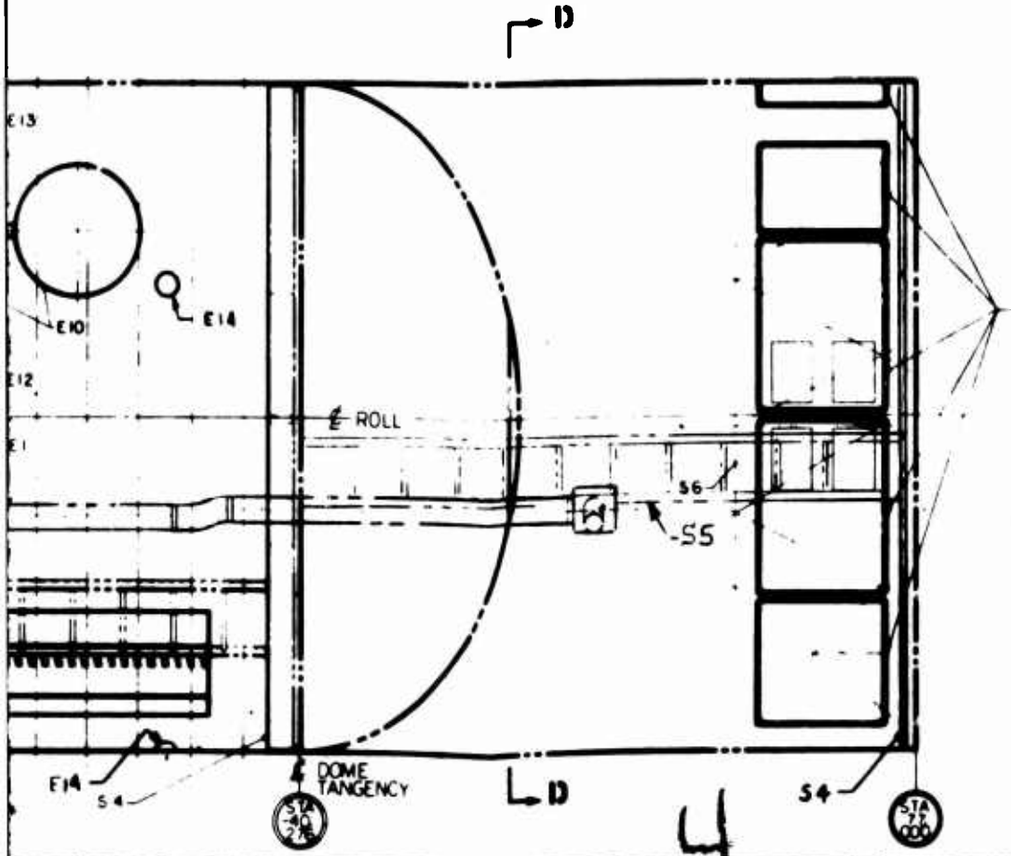
E 1 MICROMETEOROID
E 2 OV 1
E 3 OV-4 (2)
E 4 PROTUBERANCE (FAIRING)
E 5 PROTUBERANCE (ACS MOTOR)
E 6 STRUCTURAL PANEL
E 7 HEAT TRANSFER TEST CAPSULE
E 8 FUEL CELL & EQUIPMENT PANEL
E 9 FUEL CELL BOTTLES (3)
E10 ZERO 'G' PROPELLANT GAGING
E11 ORBIS LOW TRANSMITTER
E12 ORBIS LOW ANTENNA
E13 BIO CELL
E14 CORNER REFLECTOR (8)
E15 PAINT PATTERN

SUPPORT EQUIPMENT

S 1 RETRO MOTORS (5)
S 2 COMMAND CONTROL ANTENNA (2)
S 3 TWT ANTENNA (2)
S 4 SERVICE PLATFORM (3)
S 5 LADDER (2)
S 6 EQUIPMENT TRUSS (2)
1 S7 AIR CONDITIONING DUCTING

INSTRUMENTATION

M 1 BATTERY ( )
M 2 PCM ENCODER
M 3 SSB TRANSMITTER
M 4 PCM TRANSMITTER
M 5 SSB MODULATOR
M 6 MOTOR DRIVEN SWITCH
M 7 MULTIPLEXER
M 8 10 VOLT POWER SUPPLY
M 9 TERMINAL STRIP 28V ( )
M10 3 PORT JUNCTION
M11 VDU



1 Added By SCN #10

(SCN 12) THIS FIGURE FOR REFERENCE ONLY

* This sheet supersedes and replaces Figure 1-C, Page 8a and incorporates SCN # 12.

	GENERAL DYNAMICS
	ADDED EXPERIMENTS MOL-HSQ MOL-EET-AVE-1000, R1
PAGE 8a	E FIGURE 1-C

4.1.5.2 (continued)

a. 28 VDC power transfer;

b. PCM link verify;

c. SSB link verify;

d. Separation discrete verify;

(SCN 7) e. Sequencer operation - verify;

(SCN 7) f. Command system operation - verify;

(SCN 7) g. Orbital TM operation - verify.

(SCN 5) 4.1.6 Electromagnetic Compatibility Testing

(SCN 12) 4.1.6.1 Electromagnetic Compatibility - EMC testing at Launch Complex 40 (AFETR) shall be conducted in accordance with the requirements and procedures set forth in SSD CR-65-273, dated 31 March 1966, EMC Integrated Test Plan. These tests will demonstrate the Electromagnetic Compatibility of the MOL-HSQ systems including scientific experiments, the Titan IIIC booster, the Gemini Spacecraft and supporting AGE, facilities and equipment.

*This page supersedes and replaces Page 36 and incorporates SCN 12.

MARTIN COMPANY
DENVER DIVISION

CONTRACT NO. AF 04(695)-150

17

SPECIFICATION

CHANGE NOTICE

NO. 10
DATE 13 May 1966

AD 474 [illegible]

SPEC NO. MOL-EFT-AVE-1000
TITLE Model Specification Airborne Vehicle Equipment
DATED 15 March 1965
REVISION NO. 1 DATED 3 May 1965

PURPOSE OF CHANGE: This change provides for a fly-away umbilical for the Simulated Laboratory Air Conditioning system.

This change incorporates SCNP N(C40034) as approved by SCD C3-3576A, dated 20 April 1966. (Martin Ref. 6W06166).

INSTRUCTIONS: Replace existing pages 14, 14a, 16a, 21a and 23c with revised pages 14, 14a, 16a, 21a and 23c.

Add New page $14a_1$

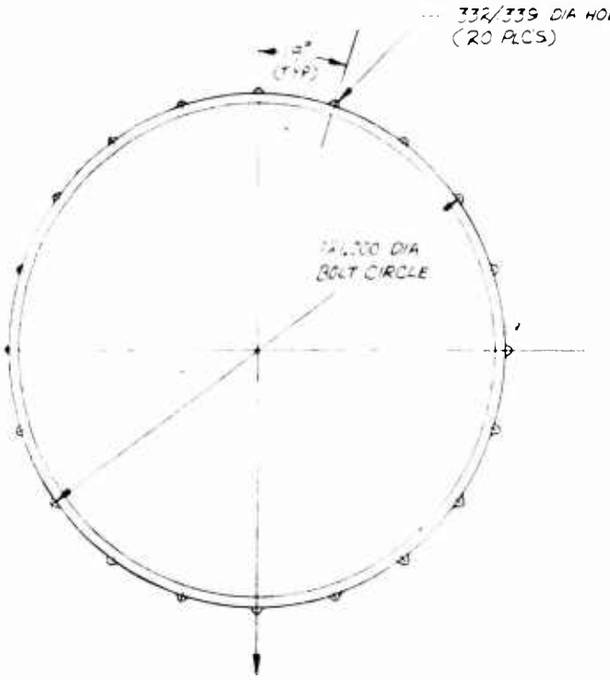
Replace Figures I-B and I-C with revised Figures I-B and I-C.

AUTHORIZATION: SCD C3-3576A, dated 20 April 1966 (Martin Ref. 6W06166)
CCN 1648, dated 25 April 1966 (Martin Ref. No. 6W07031)

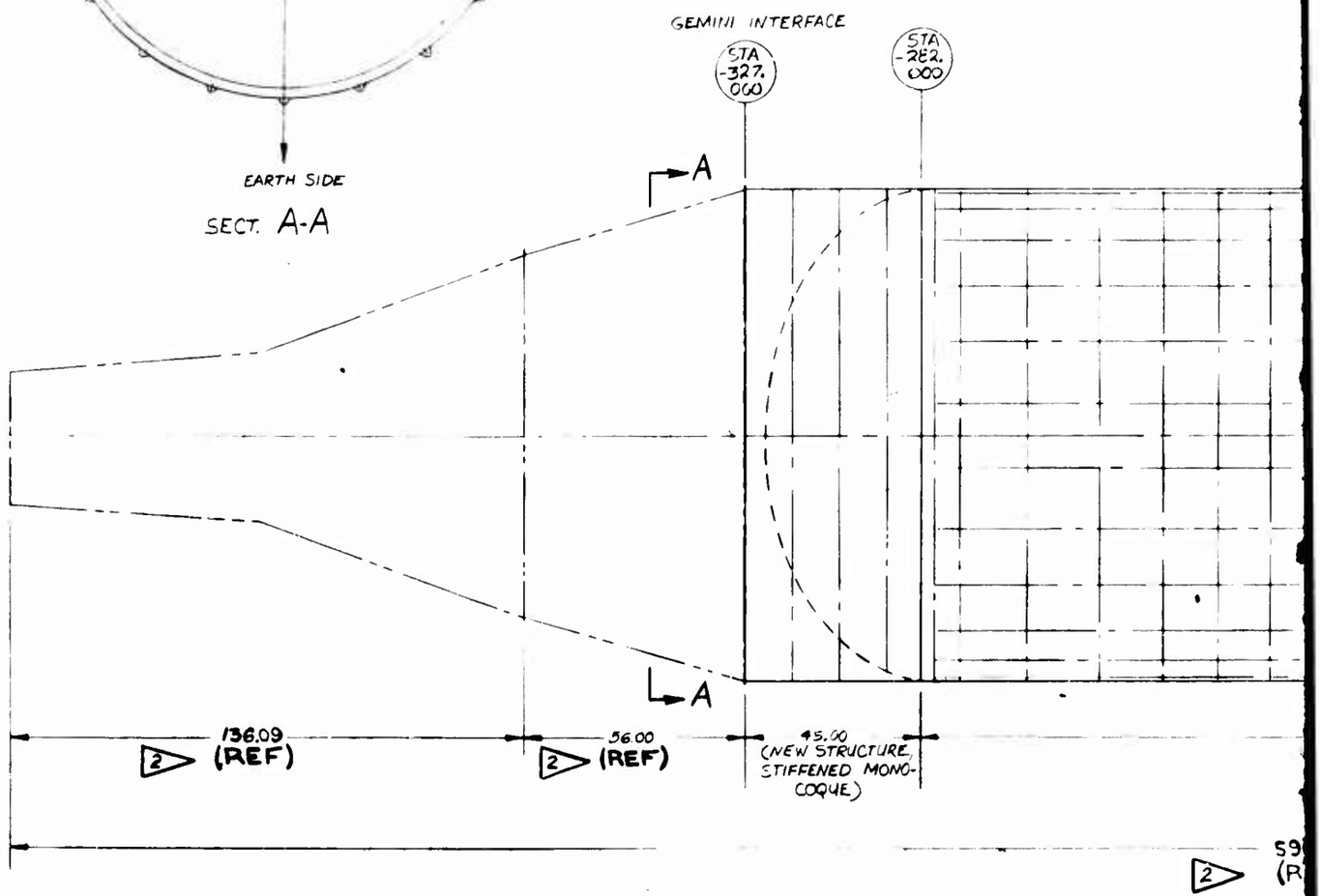
File this page in front of subject document to indicate the latest change.

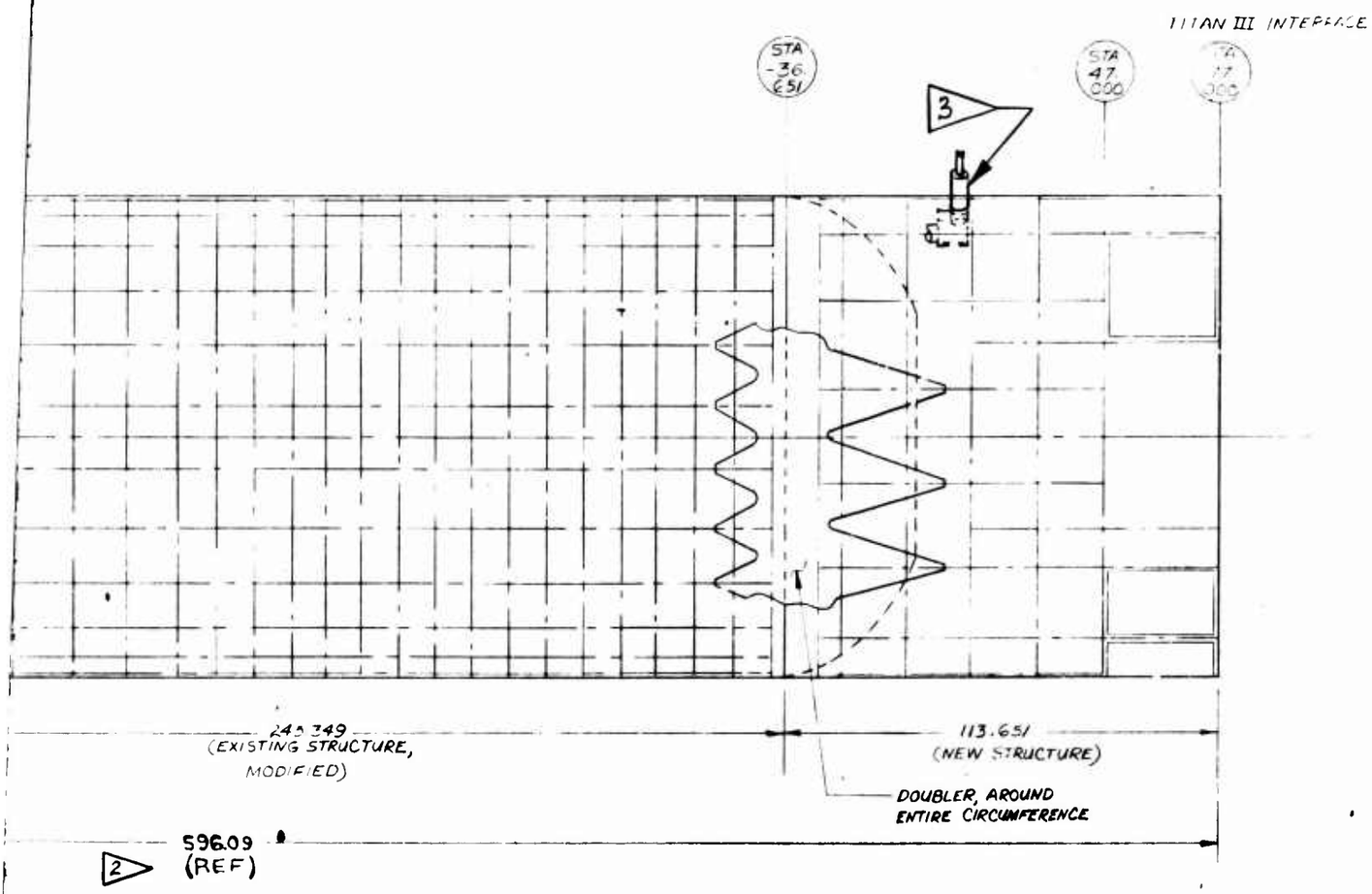
APPROVAL

Form DEN 1016-01(11-63)


.332/.339 DIA HOLE
(20 PLCS)
5°
(TYP)
74.200 DIA
BOLT CIRCLE
EARTH SIDE

SECT. A-A

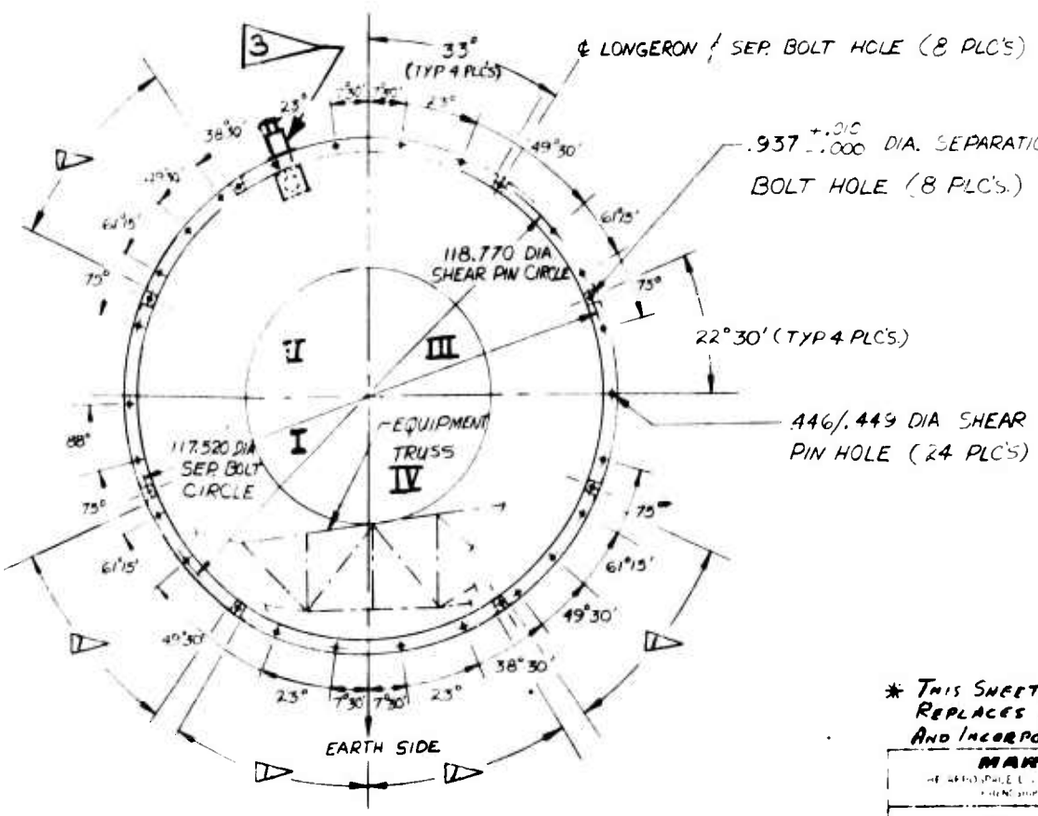

GEMINI INTERFACE
STA
-327.
000
STA
-282.
000
A
A
136.09
(REF)
56.00
(REF)
45.00
(NEW STRUCTURE,
STIFFENED MONO-
COQUE)
2
2
2


TITAN III INTERFACE
STA -36.651
STA 47.000
STA 77.000
3
7°
88°
7°
245.349
(EXISTING STRUCTURE, MODIFIED)
113.651
(NEW STRUCTURE)
DOUBLER, AROUND ENTIRE CIRCUMFERENCE
2
596.09
(REF)

2

NOTES:

1. ▷ EQUIPMENT & ENTRY ACCESS DOORS.
2. INDICATIONS OF FRAMES & STRINGERS ARE FOR INFORMATION ONLY AND ARE NOT TO BE USED FOR INSPECTION PURPOSES.
3. [2] SCN #1
4. [3] CONNECTOR, AIR CONDITIONING FLY-AWAY UMBILICAL ADDED BY SCN #10



3

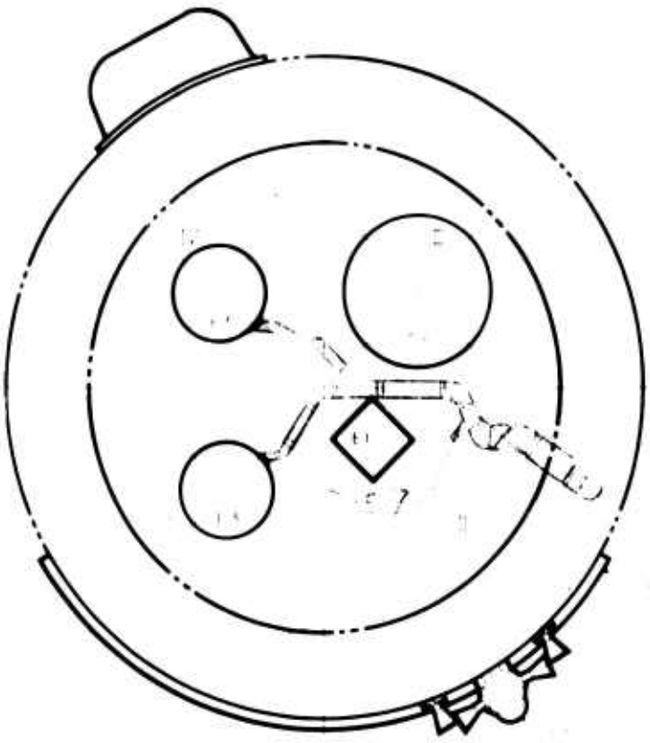
* THIS SHEET SUPERSEDES AND REPLACES FIGURE I-B, PAGE 8 AND INCORPORATES SCN #10

MARTIN COMPANY

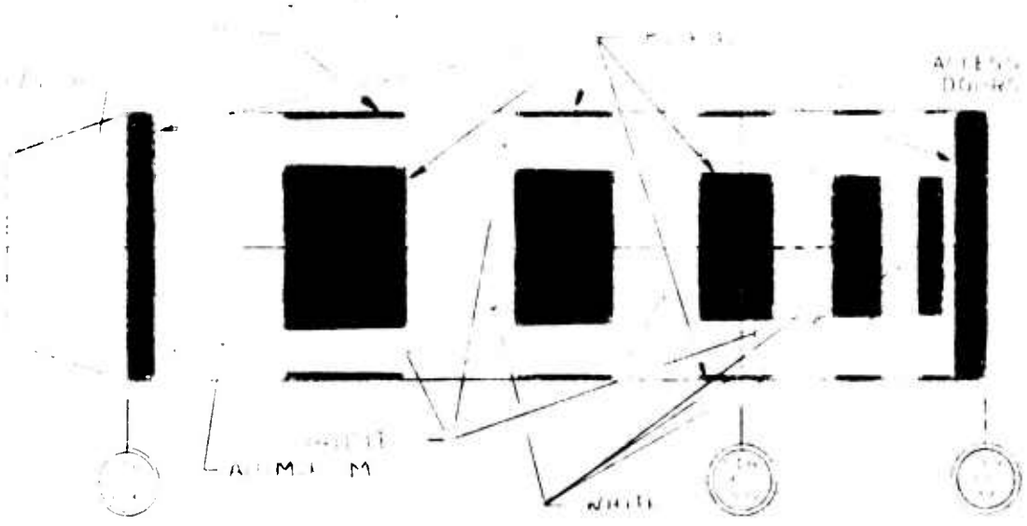
FIG I-B* STRUCTURAL ARRANGEMENT & MECHANICAL INTERFACE DRAWING

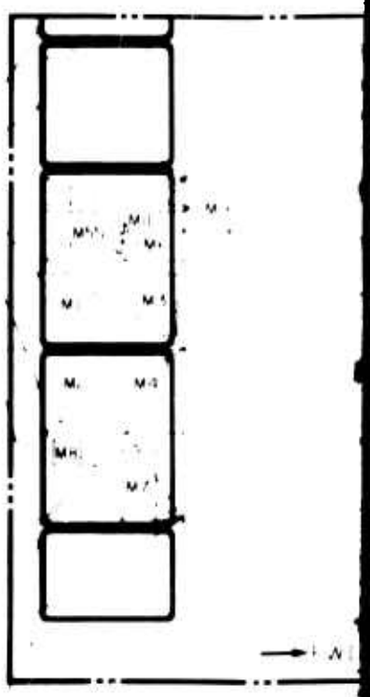
38597

PAGE 8

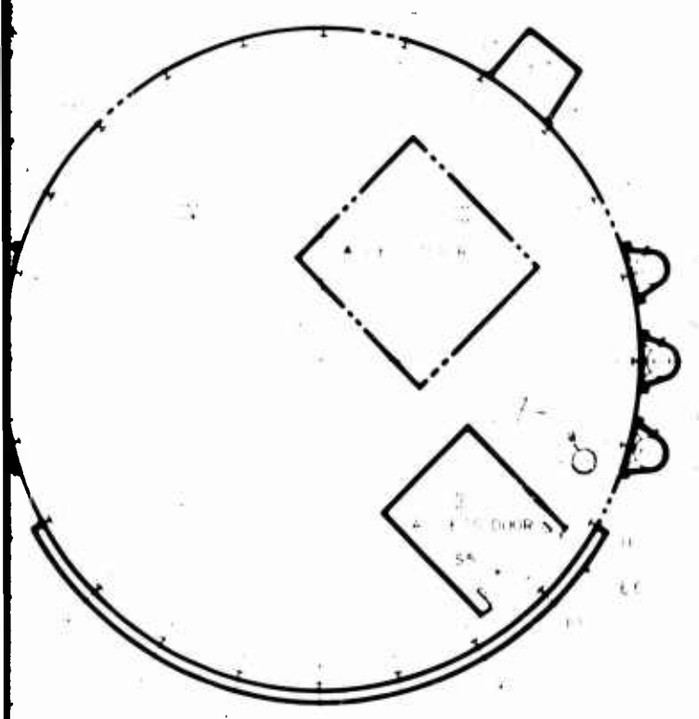


A-A

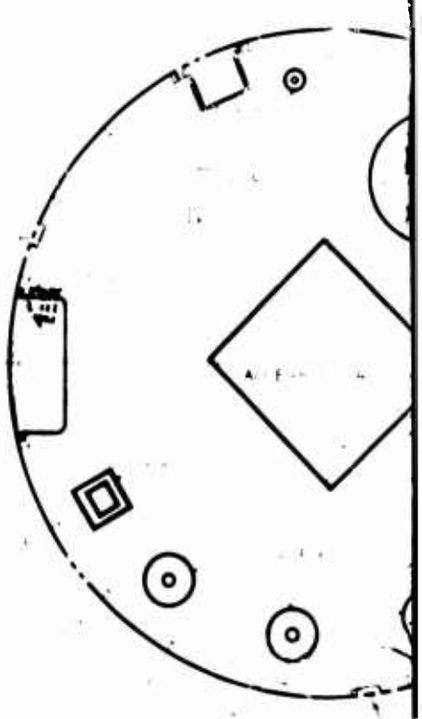




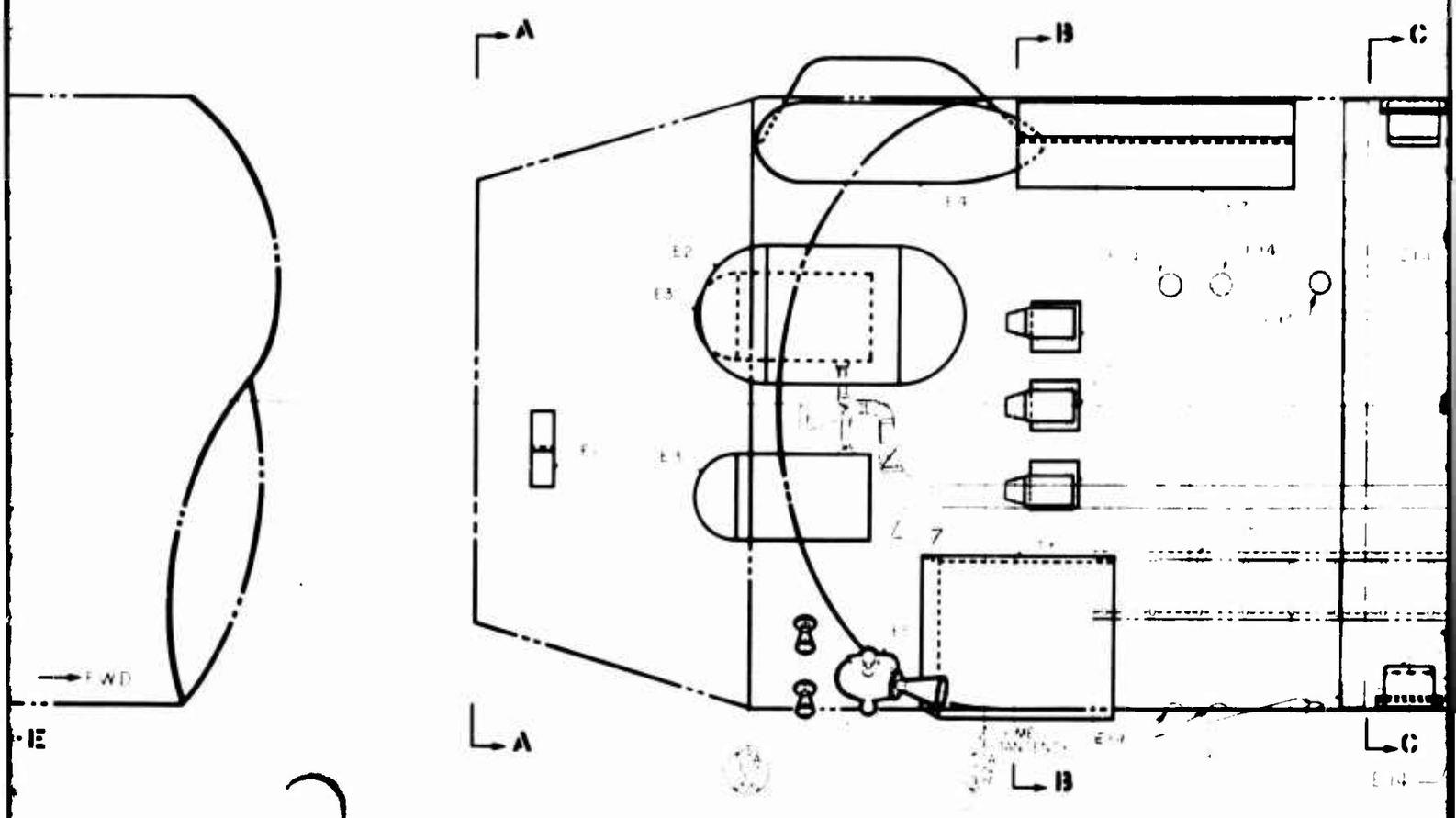
E-E



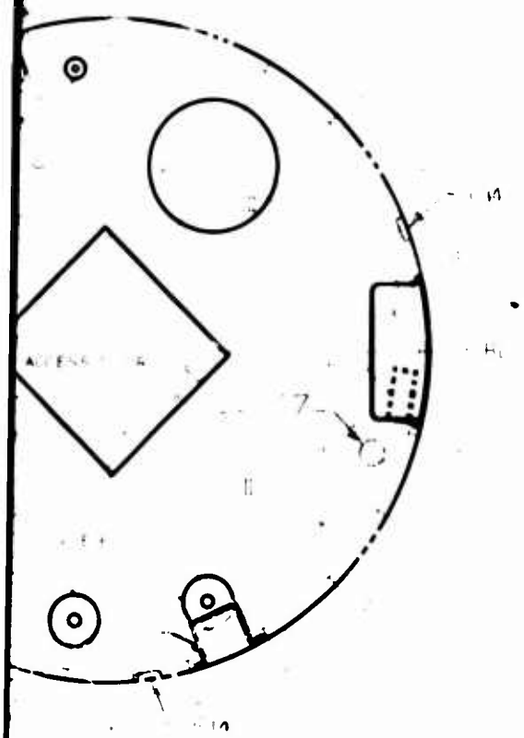
B - B



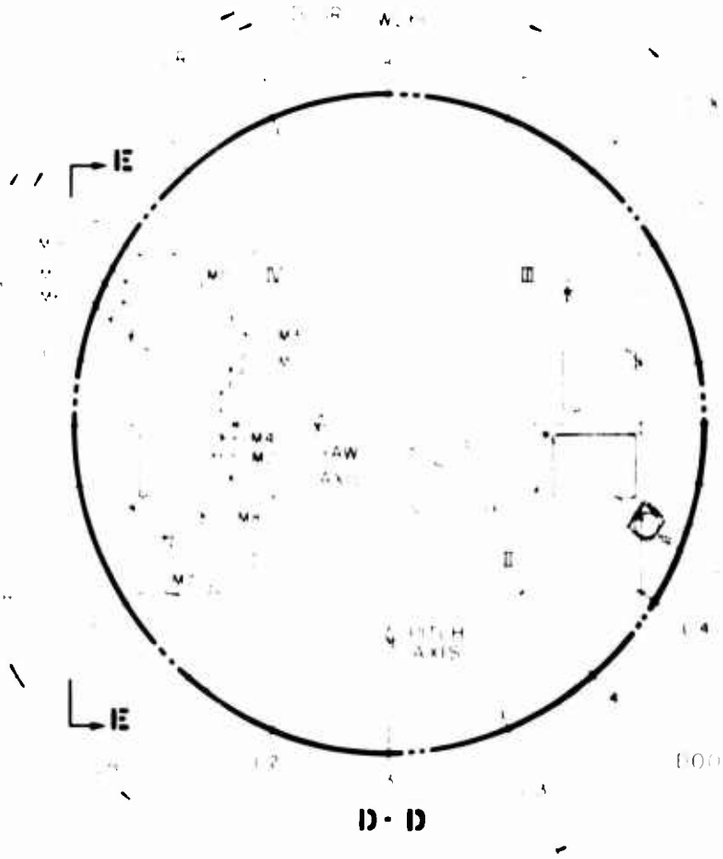
C - C



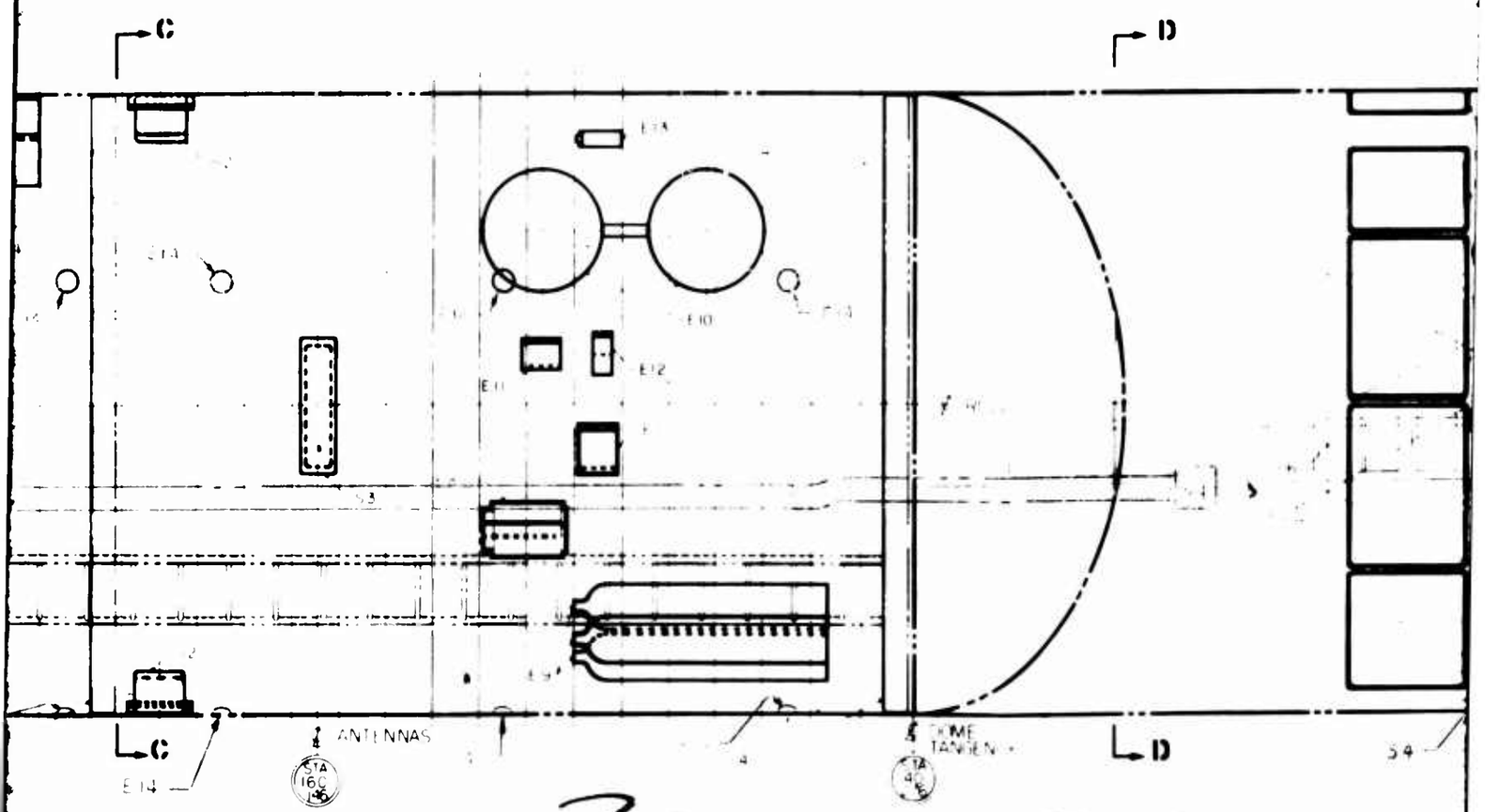
2



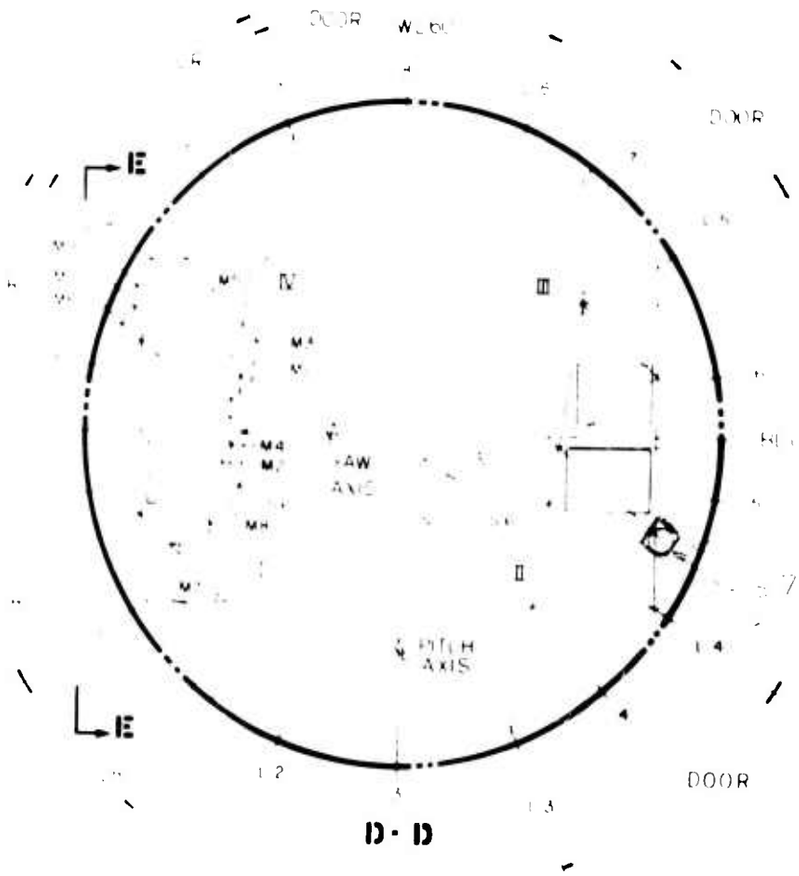
C - C

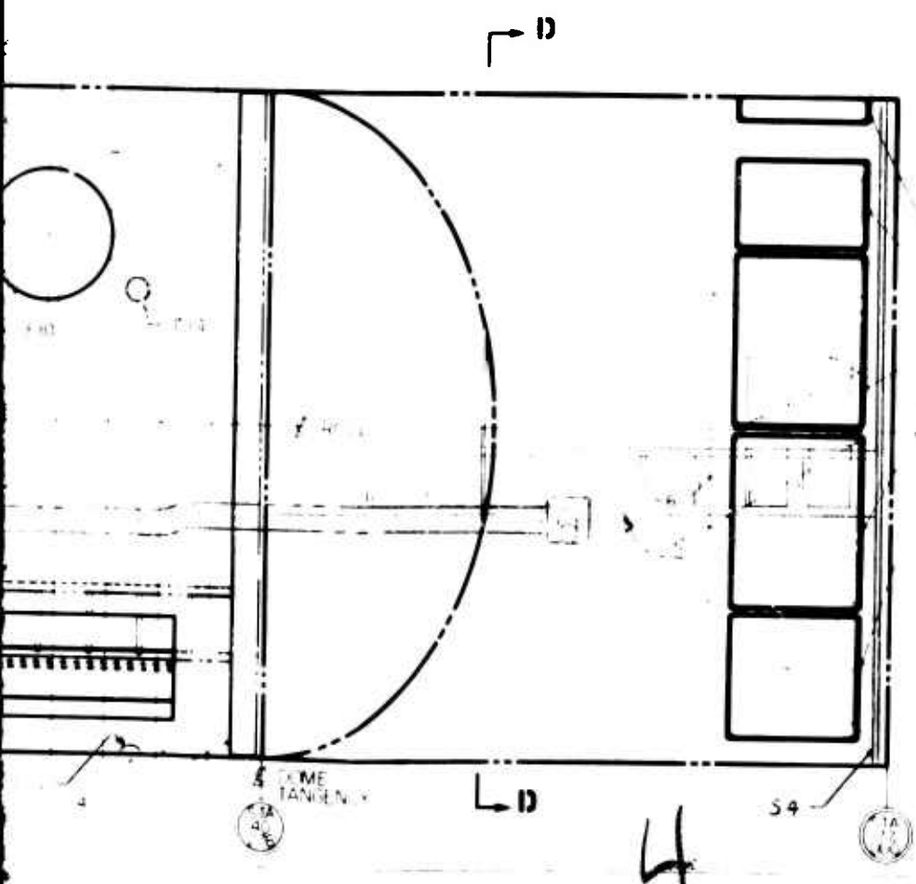


D - D



3





MARTIN COMPANY

4

3.3.1.2.1 Forward Skirt Assembly - The forward skirt shall consist of that structure extending forward from the Laboratory tank to the Gemini conical adapter. The forward skirt shall be of aluminum alloy semi-monocoque construction. The forward mating plane shall be constructed to match the Gemini conical adapter. The structure interface connection of the forward Laboratory skirt and GFAE conical adapter shall utilize the Gemini/GLV 20 bolt pattern geometry.

(SCN 7) 3.3.1.2.2 Simulated Laboratory Tank Assembly - The Laboratory structure shall consist of a modified Titan II Stage I oxidizer tank, including a forward ellipsoidal dome and an aft ellipsoidal dome with an aft access way approximately 32 inches in diameter. The connection of the barrel section of the aft skirt assembly shall be reinforced with an external doubler. The barrel section shall be reinforced to meet the modulus of elasticity requirements of Figure 1A.

(SCN 10) 3.3.1.2.3 Aft Adapter Assembly - The aft adapter assembly shall consist of that structure extending back from the aft end of the Laboratory tank assembly to the tension splice of the Transtage mating plane at Titan IIIC Station 77.0. (For reference, see Figure 29A of Specification SSS-TIII-010 SLV, pp 231a). The aft adapter section shall be constructed of aluminum alloy semi-monocoque skin panels and frames. An 8 inch air conditioning fly-away umbilical connector shall be provided on the aft adapter assembly.

3.3.1.2.4 Ballast Attach Points - Ballast attachment points in the Laboratory shall be provided as necessary.

3.3.1.2.5 Trusses and Mounting Bracketry - Trusses and mounting bracketry shall be provided for mounting instrumentation and electrical components listed in Appendix I-B.

(SCN 7) 3.3.1.3 Simulated Laboratory Surface Finish - The Simulated Laboratory exterior surface shall be painted and/or treated for optical tracking as shown in Figure 1 of IDRD-MOL-HSQ-63005.

---

* This page supersedes and replaces Page 14 and incorporates SCN 10.

(SCN 10) 3.3.1.4 Experiment Provisions - Experiment provisions shall be provided in the Simulated Laboratory for the following experiments:

a. OV-1
b. OV-4
c. Heat Transfer Test Capsule (HTTC)
d. Zero "G" Propellant Gauging
e. Micrometeoroid Detector
f. ORBIS-Low
g. Bio-Cell
h. Fuel Cell
i. Protuberance
j. Structural Panel
k. Corner Reflectors
l. Resolution Paint Pattern

In addition to the basic provisions for the experiments listed above, three permanently installed floors and two airborne ladders shall be incorporated in the Simulated Laboratory as shown in Figure I-C. The floors and ladders shall provide access to the experiments prior to launch. A truss shall be provided for batteries in the aft skirt to meet experiment power requirements. Ducting shall be provided from the fly-away umbilical connector (para. 3.3.1.2.3) to the forward dome area of the Simulated Laboratory tank assembly. The ducting shall be capable of flowing 35 lb/min. of conditioned air to the forward dome area and 25 lb/min. of conditioned air to the aft adapter assembly. Air available in the forward dome area will be further distributed as follows:

a. 25 lb/min. into the upper platform area
b. 10 lb/min. through a positive action motor driven isolation valve, into a manifold which will provide 5 lb/min. into each OV-4 launch tube providing a temperature environment around the OV-4 satellite not to exceed 75°F as determined by a temperature transducer located on the OV-4 launch tube. Manual remote control and position monitoring will be provided for the valve.

Five retro-rocket motor assemblies shall be provided and installed on the forward end of the Laboratory. These motors shall provide a minimum retrograde velocity increment of 8 ft/sec. between the Gemini Re-entry Module and the Simulated Laboratory and impart a pitch-up motion to the Simulated Laboratory. The motor assemblies shall be similar to the Titan III, Stage II/Stage III staging motors.

(SCN 7) 3.3.1.4.1 OV-1 Mounting Provisions - Structural mounting provisions shall be incorporated for mounting the OV-1 experiment through the Simulated Laboratory forward dome. The experiment shall be truss mounted such that the forward portion of the experiment projects forward of the dome as shown in Figure I-C herein and Figure 1 of IDRD-MOL-HSQ-63001. The experiment shall be located such that it has a clear path through the Gemini Conical Adapter (after separation

*This page supersedes Page 14a and incorporates SCN 10.

(SCN 7) 3.3.1.4.1 (continued)

of the Gemini re-entry module) for ejection in orbit. Guide rails or a guide tube shall be provided to assure clearance of the OV-1 through the Gemini Conical Adapter Module during ejection. A pressure tight well shall be provided from the dome down to the experiment mounting interface to prevent air leakage across the dome. The OV-1 Experiment will be pressure tight at the interface to complete the leak path seal. The Contractor mounting provisions for the experiment (continued on next page)

*This page is added and incorporates SCN 10.

TABLE I (Continued)

	No. of Measurements	Type of Measurement	Range	Location of Transducer	Sampling Rate
	1	Voltage	0-35V	Truss (28 volt)	40 SPS
	1	Current	0-40 Amp	Truss (25 volt)	40 SPS
	1	Voltage	0-35V	Truss (25 volt)	40 SPS
	7	Events HTTC Pump Start Signal, Sequencer Arm Signal, Transtage Start Signal, HTTC and ORBIS-Low Door Opening Signal Sequence #1, HTTC and ORBIS-Low Door Opening Signal Sequence #2, HTTC Door Open (Micro Switch), ORBIS-Low Door Open (Micro Switch)	On-Off	Sequencing and Command System	20 SPS
	2	Events Micrometeoroid Doors Open	On-Off	Micro Switch Micrometeoroid Doors	20 SPS
(SCN 10)	1	Temperature		OV-4 Launch Tube	20 SPS
(SCN 10)	1	Valve Position	Travel, Closed	Lab. Tank	20 SPS

* This page supersedes and replaces page 16a and incorporates SCN 10.

TABLE IA (continued)

	No. of Measurements	Type of Measurement	Range	Transducer Location
	1	Voltage	0-35V	Truss (28 volt)
	1	Voltage	0-35V	Truss (25 volt)
(SCN 10)	Deleted			
	2	Events Two Micrometeroid Door Openings	On-Off	Micrometeroid Door Micro Switches

*This page supersedes and replaces Page 21a and incorporates SCN 10

TABLE ID

(SCN 7) Discrete Requirements

A. Ground Control (Umbilical)

1. 10 Watt Transmitter On-Off
2. Ground Commands 1, 2, and 3
3. SSB and PCM Transmitter Control
4. SSB Modulator Calibration Control

(SCN 10)

5. Air Conditioning Valve Control

B. Sequencer and/or IGS Discretes

1. Zero "G" Propellant Gauging (each time transtage starts)
2. Gemini Separation (Redundant Discretes)
3. Arm TPS Bus, Sequencer and Fire Retro Rockets
4. Open Doors, HTTC, and ORBIS-Low
5. Start HTTC Pump
6. Arm 25 Volt Bus
7. Eject OV-1
8. Eject OV-4 Transmitting Satellite
9. Eject OV-4 Receiving Satellite
10. Purge Fuel Cell, Open Micrometeoroid Doors, Open Fuel Cell Start Valves, and Deploy ORBIS-Low Antenna
11. Fuel Cell Purge Off
12. Fuel Cell Purge On
13. Fuel Cell Purge Off
14. Fuel Cell Purge On
15. Fuel Cell Purge Off
16. HTTC Off, Fuel Cell Heaters Off
17. Sequencer Reset

C. Command Control

Command No.	Function
1	Turn on 10 Watt Transmitter and Zero "G" Propellant Gauging Electronics
2	Recorder to Playback Mode
3	Recorder to Record Mode, TM Off, Zero "G" Propellant Gauging Electronics Off
4	Spare
5	Fuel Cell Purge On and Fuel Cell Load On
6	Fuel Cell Purge Off
7	ORBIS-Low On
8	Orbital Data System On
9	Orbital Data System Off
10	High Power TM On, Low Power TM Off
11	ORBIS-Low Off
12	Fuel Cell Off
13	Spare
14	Spare
15	Spare

* This page supersedes and replaces Page 23c and incorporates SCN 10

SUPPLEMENTARY

INFORMATION

AD 472 438

MARTIN COMPANY
DENVER DIVISION

CONTRACT NO. AF04(695)-150

SPECIFICATION **CHANGE NOTICE**

NO. 14
DATE 20 June 1966

SPEC NO. MOL-EFT-AVE-1000
TITLE MODEL SPECIFICATION AIRBORNE VEHICLE EQUIPMENT
DATED 15 March 1965
REVISION NO. 1 DATED 3 May 1965

PURPOSE OF CHANGE:

1) Revise the test requirements for the Simulated Laboratory to require that the Laboratory be Electrically but not mechanically mated with the core boost vehicle during VTF and to redefine the subsystem and CST requirements.

2) Revise the Simulated Laboratory Measurement List

3) Revise the "db" loss in the RF transmission systems from the transmitter output to the antenna connector.

(Incorporates SCNP-S, 34-C 40063)

INSTRUCTIONS: Replace pages 16, 20, 21, 35 and 35a with the revised pages 16, 20, 21, 35 and 35a.

AUTHORIZATION: SCD C3-3674, dated 7 June 1966 (Martin Ref. No. 6W08486)
CO 60-63, cited by TWX SSBKC 17346 dated 10 June 1966
(Martin Ref. No. 6W08471).

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

APPROVAL

(SCN 7)

TABLE I

Payload Measurement Allocations for TIIIC MOL-EFT Flight

These measurements only will be transmitted from the Simulated Laboratory and are in addition to those TIIIC measurements already defined in the Master Program Management Plan (SSD-CR-64-14) and supplement thereto for the TIIIC Vehicle to be used for the MOL-EFT flight:

	No. of Measurements	Type of Measurement	Range	Location of Transducer	Sampling Rate
	2	Buffet Pressure	0-15 psia	Fwd Skirt	400 sps
(SCN 14)	2	Buffet Pressure	0-15 psia	Fwd Skirt	400 sps
(SCN 14)	4	Aero. Pressure	± 10 psid	Fwd Skirt	100 sps
	1	Compt. Pressure	0-15 psia	Fwd Skirt	100 sps
	1	Compt. Pressure	0-15 psia	Aft Skirt	100 sps
	3	Aero. Skin Temp.	0-1000°F	Fwd Skirt	40 sps
	2	Aero. Skin Temp.	0-1000°F	Lab Tank	40 sps
	1	Aero. Skin Temp.	0-1000°F	Aft Skirt	40 sps
(SCN 14)	3	Power Supply Voltage	0-14 VDC	Lab Tank	20 sps
	10	HSQ (McDonnell)	0-40 mv	Gemini Adapter	20 sps
	6	Pressure (HTTC)	0-20 mv	Lab Tank	20 sps
	10	Temperature (HTTC)	0-20 mv	Lab Tank	20 sps
(SCN 14)	2	Acceleration (DAC)	0-40 mv	Lab Tank	800 sps
(SCN 14)	4	Strain (DAC)	0-40 mv	Lab Tank	800 sps
	4	Temp (DAC)	0-40 mv	Lab Tank	20 sps
	6	Heat Flux (DAC)	0-40 mv	Lab Tank	20 sps
	5	Heat Flux (Protuberance)	0-3 BTU	Fwd Skirt	20 sps
	8	Heat Flux (Protuberance)	0-3 BTU	Lab Tank	20 sps
	2	Temp (Protuberance)	0-1000°F	Fwd Skirt	20 sps
	8	Temp (Protuberance)	0-500°F	Fwd Skirt	20 sps
	5	Temp (Protuberance)	0-500°F	Lab Tank	20 sps
	2	Pressure (0-G Gauging)	0-5 VDC	Lab Tank	100 sps
	2	Volume (0-G Gauging)	0-5 VDC	Lab Tank	100 sps
	1	Flow (0-G Gauging)	0-5 VDC	Lab Tank	400 sps
(SCN 14)	2	Temperature	0-20 mv	Lab Tank	200 sps

*This page supersedes and replaces Page 16 and incorporates SCN 14.

(SCN 7) 3.3.2.4.1 Signal Conditioners - The Signal Conditioners shall provide 0 to 20 MV signals for data transmitted by the PAM commutator. Only voltage divider type signal conditioning shall be provided.

(SCN 14) 3.3.2.4.2 Antenna System - The system shall provide capability for radiating an RF signal from the SSB transmitter and from either the PCM transmitter or the FM transmitter during boost, stabilized flight on orbit and tumbling flight on orbit. The system shall consist of the following equipment: a coax switch, a RF multiplexer, a three-port junction and two omni-directional antennas. The losses in the SSB transmission system shall not exceed 6.4 db from the transmitter output to the antenna coupler. Losses in the PCM and 10 watt transmission systems shall not exceed 7.0 db from the transmitter outputs to the antenna connectors. The transmitter output shall not see a VSWR greater than 2.0:1.

---

* This page supersedes and replaces Page 20 and incorporates SCN 14.

(SCN 7)

TABLE IA

PAM System Measurements

	No of Measurements	Type of Measurement	Range	Transducer Location
	1	Voltage	0-35 VDC	Bio-Cell
	1	Temperature	0-2.5 VDC	Bio-Cell
	1	Photocell Output	0-2.5 VDC	Bio-Cell
	2	Pressure	0-4000 psia	Fuel Cell
	2	Pressure	0-200 psia	Fuel Cell
	1	Pressure	0-15 psia	Fuel Cell
(SCN 14)	7	Temperature	-50° to 200°F	Fuel Cell
(SCN 14)	4	Temperature	150° to 250°F	Fuel Cell
	1	Temperature	0° to 500°F	Fuel Cell
(SCN 14)	1	Current	0 to 8 amps	Fuel Cell
(SCN 14)	1	Current	0 to 10 amps	Fuel Cell
	1	Voltage	0-35 VDC	Fuel Cell
	4	Voltage	0-1.5 VDC	Fuel Cell
	1	Purge Voltage	ON-OFF	Fuel Cell
	6	Pressure	0-20 mv	HTTC
	3	Acceleration	0-20 mv	HTTC
	38	Temperature	0-20 mv	HTTC
	1	Temperature	0° to 200°F	HTTC
	4	Velocity	0-5 VDC	Micrometeoroid
	4	Polarity	0-5 VDC	Micrometeoroid
	4	Amplitude	0-5 VDC	Micrometeoroid
	4	Microphone	0-5 VDC	Micrometeoroid
	3	Eject Events	ON-OFF	OV-1
	4	Eject Events	ON-OFF	OV-4
	2	Pressure	0-5 VDC	Zero "G" Propellant Gauging
	2	Volume	0-5 VDC	Zero "G" Propellant Gauging
	1	Flow	0-5 VDC	Zero "G" Propellant Gauging
	2	Temperature	0-20 mv	Zero "G" Propellant Gauging

* This page supersedes and replaces Page 21 and incorporates SCN 14.

(SCN 14) 4.1.4.2 Acceptance Tests - Acceptance tests shall be those tests performed in the vertical test fixture (VTF) to demonstrate compliance with the requirements set forth herein and with the Contractor's drawing. Acceptance tests shall be run on the Simulated Laboratory as an electrically (not mechanically mated) assembled unit with the modified Titan IIIC vehicle. These tests shall be of the end to end subsystem functional type. The subsystems test shall be followed by a simulated flight test (combined subsystem test).

4.1.5 Acceptance Tests

4.1.5.1 Subsystem Tests - The following subsystems shall be tested on the Simulated Laboratory:

4.1.5.1.1 Electrical Power and Distribution Subsystem

a. Verification of a single point ground;

b. Ground power application;

c. Verify electrical voltage at loads;

(SCN 7) d. Verify Instrumentation Regulated Power;

(SCN 7) e. Verify Sequencing System.

4.1.5.1.2 Telemetry Subsystem

a. Verify PCM encoder and transmitter operation;

b. Verify single side band transmitter operation;

c. Verify antenna system (insertion, VSWR);

d. Verify end instruments and signal conditioning;

(SCN 7) e. Verify tape recorder operation;

(SCN 7) f. Verify orbital TM transmitter;

(SCN 7) g. Verify command antenna system VSWR;

(SCN 7) h. Verify command receiver system;

(SCN 7) i. Verify orbital clock operation;

(SCN 7) j. Verify VCO operation;

(SCN 7) k. Verify electronic commutators operation.

---

* This page supersedes and replaces Page 35 and incorporates SCN 14.

(SCN 14) 4.1.5.1.3 (Deleted)

(SCN 14) 4.1.5.2 Simulated Flight Sequence - The Simulated Laboratory acceptance test sequence shall be based upon the Titan III CST sequence. The applicable portions of the test sequence shall be those functions associated with the Orbiting Vehicle Flight, including all in-flight discrete functions in sequence through spacecraft release and through all other functions until all experiments are initiated and/or activated. Acceptance tests shall be performed in the Vertical Test Fixture (VTF) and shall be performed on the Simulated Laboratory as an electrically (not mechanically mated) assembled unit (consisting of a modified booster vehicle and the Simulated Laboratory. The following new events shall be incorporated into the Titan III CST to support the Simulated Laboratory flight:

---

* This page supersedes and replaces page 35a and incorporates SCN 14.

SUPPLEMENTARY

INFORMATION

AD-472 438

MARTIN COMPANY
DENVER DIVISION

CONTRACT NO. AF04(695)-150

SPECIFICATION **CHANGE NOTICE**

NO. 18
DATE 22 November 1966

SPEC NO. MOL-EFT-AVE-1000
TITLE Model Specification Airborne Vehicle Equipment
DATED 15 March 1965
REVISION NO. 1 DATED 3 May 1965

PURPOSE OF CHANGE: To add the requirement to procure hydrogen and oxygen to be used in the fuel cell experiment in the simulated laboratory. (Incorporates SCNP-Y, Martin Proposal 34-C40109)

INSTRUCTIONS: Replace page 14e with revised page 14e.

AUTHORIZATION: SCD C3-3874, dated 13 October 1966 (Martin Ref: 6W15200)
CCN 1934, dated 14 October 1966 (Martin Ref: 6W16090)

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

APPROVAL

Form DEN 101601 (9-65)

3.3.1.4.8.2 (continued)

(SCN 18) b. Storage Containers - The storage containers shall be used to store the hydrogen and oxygen gas for use in the fuel cell. Five bottles shall be provided, three bottles for hydrogen and two bottles for oxygen. Three hydrogen K-bottles-2 for flight and 1 spare. Two oxygen K-bottles-1 for flight and 1 spare. Load 3 K-bottles with gaseous hydrogen and 2 K-bottles with gaseous oxygen in accordance with the requirements specified in IDRD-MOL-HSQ-63009 at a pressure of 2215 ± 50 psig.

(SCN 11) c. Thermal Control Shroud - The Fuel Cell Element shall be mounted within a shroud. The shroud shall be attached to the Simulated Laboratory structure through thermal stand-off isolators. Resistors capable of absorbing the electrical output of the Fuel Cell shall be mounted on the shroud. Three temperature transducers shall be mounted on the shroud.

d. Vent Lines - Tubing shall be routed from the appropriate Fuel Cell and support equipment fitting (H_2, O_2, H_2O, and H_2 and O_2 relief valves) to the Simulated Laboratory skin and overboard.

The packages (a) and (b) shall be mounted by suitable bracketry attached to the ring frames and stringers within the tank section of the Simulated Laboratory. Interconnecting tubing and wiring shall be provided to complete the installation.

(SCN 7) 3.3.1.4.9 Protuberance - The Protuberance Experiment, provided by the Contractor shall consist of an aerodynamic fairing, a dummy attitude control system (ACS) rocket-motor cluster, and required instrumentation as defined by IDRD-~~MOL-HSQ-6~~3006. These two units shall be mounted approximately 180° apart on the periphery of the Simulated Laboratory on the forward skirt as shown in Figure I-C herein. Structural mounting provisions shall also be provided on the Simulated Laboratory. The fairing and rocket-motor cluster shall not be attached to the Simulated Laboratory during shipment to AFETR.

(SCN 7) 3.3.1.4.10 Structural Panel Mounting Provisions - Structural mounting provisions shall be provided on the Simulated Laboratory for the Structural Panel Experiment just aft of the rocket motor cluster of the Protuberance Experiment. The panel shall be located such that half of the structural panel is centered behind the dummy ACS rocket motor cluster and half is located in clear air flow, as shown in Figure I-C herein and Figure 1 of IDRD-MOL-HSQ-63007. The structural panel and Douglas Furnished instrumentation wiring and signal conditioning equipment shall not be attached to the Simulated Laboratory for shipment to AFETR.

*This page supersedes and replaces Page 14e and incorporates SCN 18, dated 22 November 1966.

MARTIN COMPANY
DENVER DIVISION

CONTRACT NO. AF04(695)-150

Specification

CHANGE NOTICE

NO. 19
DATE 29 Nov. 1966

SPEC NO. MOL-EFT-AVE-1000
TITLE MODEL SPECIFICATION AIRBORNE VEHICLE EQUIPMENT
DATED 15 March 1965
REVISION NO. 1 DATED 3 May 1965

PURPOSE OF CHANGE: Update Payload Measurement Allocations for TIIIC MOL-EFT Flight

(Incorporates SCNP-X; Martin Proposal 34-C40103)

INSTRUCTIONS: Replace page 16a with revised page 16a.

AUTHORIZATION: SCD C3-3884, dated 26 October 1966 (Martin Ref: 6W15698)
CCN 1948, dated 28 October 1966 (Martin Ref: 6W16527)

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

APPROVAL

Form DEN 101601 (9-65)

TABLE I (Continued)

	No. of Measurements	Type of Measurement	Range	Location of Transducer	Sampling Rate
	1	Voltage	0-35V	Truss (28 volt)	40 SPS
	1	Current	0-40 Amp	Truss (25 volt)	40 SPS
	1	Voltage	0-35V	Truss (25 volt)	40 SPS
(SCN 19)	9	Events HTTC Pump Start Signal, Sequencer Power, Sequencer Arm Signal, Sequencer Arm Signal, Transtage Start Signal, HTTC and ORBIS-Low Door Opening Signal Sequence #1, HTTC and ORBIS-Low Door Opening Signal Sequence #2, HTTC Door Open (Micro Switch), ORBIS-Low Door Open (Micro Switch)	On-Off	Sequencing and Command System	20 SPS
	2	Events Micrometeoroid Doors Open	On-Off	Micro Switch Micrometeoroid Doors	20 SPS
(SCN 10)	1	Temperature		OV-4 Launch Tube	20 SPS
(SCN 10)	1	Valve Position	Travel, Closed	Lab. Tank	20 SPS
(SCN 15)	1	OV-1 Physical Separation	On-Off	Fwd Tank	20 SPS (Bi-Level)
(SCN 15)	2	OV-4 Physical Separation	On-Off	Fwd Tank	20 SPS (Bi-Level)
(SCN 15)	1	Micrometeoroid Door Closed	On-Off	Fwd Tank	20 SPS (Bi-Level)
(SCN 15)	1	SLPS Current	0-50 Amps	Battery Truss	400 SPS

This page supersedes and replaces page 16a and incorporates SCN 19, dated 29 November 1966.

MARTIN COMPANY
DENVER DIVISION

CONTRACT NO. AF04(695)-150

SPECIFICATION **CHANGE NOTICE**

NO. 20
DATE 8 December 1966

SPEC NO. MOL-EFT-AVE-1000
TITLE Model Specification Airborne Vehicle Equipment, MOL-EFT-AVE-1000
DATED
REVISION NO. 1 DATED 3 May 1965

PURPOSE OF CHANGE: Update MOL-EFT-AVE-1000 to Add Two McDonnel Strain Gage Measurements.

(Incorporates SCNP-AA, 34-C40111)

INSTRUCTIONS: Remove page 16a and replace with revised page 16a.

AUTHORIZATION: SCD C3-3879 dated 18 October 1966 (6W15191)
CCN 1941 dated 24 October 1966 (6W16519)

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

M. Nicely
APPROVAL

Form DEN 101601 (9-65)

TABLE I (Continued)

	No. of Measurements	Type of Measurement	Range	Location of Transducer	Sampling Rate
	1	Voltage	0-35V	Truss (28 volt)	40 SPS
	1	Current	0-40 Amp	Truss (25 volt)	40 SPS
	1	Voltage	0-35V	Truss (25 volt)	40 SPS
(SCN 19)	9	Events HTTC Pump Start Signal,	On-Off	Sequencing and Command System	20 SPS
(SCN 19)		Sequencer Power,			
(SCN 19)		Sequencer Arm Signal,			
		Sequencer Arm Signal,			
		Transtage Start Signal,			
		HTTC and ORBIS-Low Door			
		Opening Signal Sequence #1,			
		HTTC and ORBIS-Low Door			
		Opening Signal Sequence #2,			
		HTTC Door Open (Micro Switch),			
		ORBIS-Low Door Open (Micro Switch)			
	2	Events Micrometeoroid Doors Open	On-Off	Micro Switch Micrometeoroid Doors	20 SPS
(SCN 10)	1	Temperature		OV-4 Launch Tube	20 SPS
(SCN 10)	1	Valve Position	Travel, Closed	Lab. Tank	20 SPS
(SCN 15)	1	OV-1 Physical Separation	On-Off	Fwd Tank	20 SPS (Bi-level)
(SCN 15)	2	OV-4 Physical Separation	On-Off	Fwd Tank	20 SPS (Bi-level)
(SCN 15)	1	Micrometeroid Door Closed	On-Off	Aft Tank	20 SPS (Bi-level)
(SCN 15)	1	SLPS Current	0-50 Amps	Battery Truss	400 SPS
(SCN 20)	2	Strain (MAC)	0-40mv	Gemini Adapter	2 X 400 SPS

This page supersedes and replaces page 16a and incorporates SCN 20 dated 8 December 1966.

MARTIN COMPANY
DENVER DIVISION

CONTRACT NO. AF04(695)-150

SPECIFICATION **CHANGE NOTICE**

NO. 21
DATE 20 December 1966

SPEC NO. MOL-EFT-AVE-1000
TITLE Model Specification, Airborne Vehicle Equipment
DATED
REVISION NO. 1 DATED 3 May 1965

PURPOSE OF CHANGE: Update MOL-EFT-AVE-1000 to Reflect Previously Approved Changes and General Update.

(Incorporates SCNP-V, 34-C40092)

INSTRUCTIONS: Remove pages iii, iv, v, 9, 14a, and 24a and replace with revised pages iii, iv, v, 9, 14a, and 24a.

AUTHORIZATION: SCD C3-3881 dated 19 October 1966 (6W15700)
Change Order 60-74 dated 29 November 1966 (6W17078)

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

G. E. Simonson
APPROVAL

Form DEN 101601 (9-65)

MOL-EFT-AVE-1000
Revision No. 1
3 May 1965

CONTENTS

This page supersedes and replaces page iii and incorporates SCN 21 dated 20 December 1966.

CONTENTS (Cont'd.)

This page supersedes and replaces page iv and incorporates SCN 21 dated 20 December 1966.

CONTENTS (Cont'd.)

This page supersedes and replaces page v and incorporates SCN 21 dated 20 December 1966.

3.1.2 (continued)

(SCN 21) The weights listed above for the individual components are design objectives and not inspection weights. Only the total maximum dry weight, ± 200 lbs., is to be used for inspection and considered a guarantee.

(SCN 7) d. Center of gravity and inertia characteristics for the Simulated Laboratory, Gemini and Simulated Laboratory Experiments shall be as follows:

(SCN 13) Center of Gravity x = -217.0 in.

(SCN 13) Roll Moment of Inertia (Ix) 9,000 slug-ft^2

(SCN 13) Pitch and Yaw, Moment of Inertia 125,000 slug-ft^2

e. Physical characteristics shall be simulated within the following specified tolerances:

Weight	± 200 lbs
CG	± 6 in. longitudinally
Moment of Inertia	± 10%
Stiffness	± 10%

f. Actual weight and longitudinal CG shall be determined for the Laboratory at the Contractor's facility.

3.2 Design and Construction

3.2.1 Materials, Parts, and Processes - The selection and application of suitable parts, materials, and processes shall be the responsibility of the contractor.

3.2.2 Dissimilar Metals - Dissimilar metals shall not be installed in direct contact without insulating material, except where propellant compatibility requirements preclude the use of insulating material. Dissimilar metals shall be as defined in MS 33586A.

This page supersedes and replaces page 9 and incorporates SCN 21 dated 20 December 1966.

(SCN 10) 3.3.1.4 Experiment Provisions - Experiment provisions shall be provided in the Simulated Laboratory for the following experiments:

a. OV-1
b. OV-4
c. Heat Transfer Test Capsule (HTTC)
d. Zero "G" Propellant Gauging
e. Micrometeoroid Detector
f. ORBIS-Low
g. Bio-Cell
h. Fuel Cell
i. Protuberance
j. Structural Panel
k. Corner Reflectors
l. Resolution Paint Pattern

In addition to the basic provisions for the experiments listed above, three permanently installed floors and two airborne ladders shall be incorporated in the Simulated Laboratory as shown in Figure I-C. The floors and ladders shall provide access to the experiments prior to launch. A truss shall be provided for batteries in the aft skirt to meet experiment power requirements. Ducting shall be provided from the fly-away umbilical connector (para. 3.3.1.2.3) to the forward dome area of the Simulated Laboratory tank assembly. The ducting shall be capable of flowing 35 lb/min. of conditioned air to the forward dome area and 25 lb/min. of conditioned air to the aft adapter assembly. Air available in the forward dome area will be further distributed as follows:

a. 25 lb/min. into the upper platform area
b. 10 lb/min. through a positive action motor driven isolation valve, into a manifold which will provide 5 lb/min. into each OV-4 launch tube providing a temperature environment around the OV-4 satellite not to exceed 75° F as determined by a temperature transducer located on the OV-4 launch tube. Manual remote control and position monitoring will be provided for the valve.

(SCN 21) Five retro-rocket motor assemblies shall be provided and installed on the forward end of the Laboratory. These motors shall provide a minimum retrograde velocity increment of 7 ft/sec between the Gemini Re-entry Module and the Simulated Laboratory and impart a pitch-up motion to the Simulated Laboratory. The motor assemblies shall be similar to the Titan III, Stage II/Stage III staging motors.

(SCN 7) 3.3.1.4.1 OV-1 Mounting Provisions - Structural mounting provisions shall be incorporated for mounting the OV-1 experiment through the Simulated Laboratory forward dome. The experiment shall be truss mounted such that the forward portion of the experiment projects forward of the dome as shown in Figure I-C herein and Figure 1 of IDRD-MOL-HSQ-63001. The experiment shall be located such that it has a clear path through the Gemini Conical Adapter (after separation

---

This page supersedes and replaces page 14a and incorporates SCN 21 dated 20 December 1966.

(SCN 3) 3.3.5.1.3 Interface Connectors - Electrical and instrumentation connectors shall be provided at the forward and aft interfaces as follows:

Connector No.	Part No.	Usage	Location
1	PT02CP-14-12P**	Signal	Gemini Interface
2	PT02CP-14-12PW**	Signal	Gemini Interface
3	PT02CP-20-41S**	Instrumentation	Gemini Interface
4	81D30-32-6P	Power and Control	Transtage Interface
5	PD81S0130-019	Signal	Transtage Interface

(SCN 21)

** Or Equivalent

(SCN 3) 3.3.5.1.4 Interface Grounding

(SCN 17) 3.3.5.1.4.1 Transtage Interfaces - The grounding system for the transtage interface in Paragraph 3.2.2 of IFS-MOL-EFT-61001 shall apply.

(SCN 3) 3.3.5.1.4.2 Gemini Interface - An RF grounding strap shall be installed and electrically bonded to the Simulated Laboratory.

Two static ground wires shall be provided through Connectors #1 and #2 and shall be bonded to the same Simulated Laboratory structural member as the RF bonding strap.

(SCN 3) 3.3.5.1.5 Interface Data Transmission - The measurements identified below shall be telemetered through the Simulated Laboratory PCM and SSB systems.

(SCN 3) 3.3.5.1.5.1 PCM System - Signals from ten aero pressure measurements in the Gemini spacecraft shall be brought through Connector #3 and telemetered by the Simulated Laboratory PCM transmitter.

(SCN 3) 3.3.5.1.5.2 SSB System - Signals from four SPL measurements in the Gemini Spacecraft shall be brought through Connector #3 and telemetered by the Simulated Laboratory SSB transmitter.

3.4 Environmental Requirements - The following conditions, occurring separately or in combination, may occur during storage, shipping, and handling. Equipment shall be designed to meet operative requirements after being subjected to these conditions. Shipping conditions, as stated, allow for normal protection of existing packaging in accordance with Section 5.0 herein. Stated conditions allow for transport of equipment installed in the Laboratory, from VIB to launch site. See Simulated Laboratory Environmental Requirements, Table II and Figures 5, 6, 7, 8A, and 8B.

This page supersedes and replaces page 24a and incorporates SCN 21 dated 20 December 1966.

MARTIN COMPANY
DENVER DIVISION

CONTRACT NO. AF04(695)-150

SPECIFICATION

CHANGE NOTICE

NO. 22
DATE 23 December 1966

SPEC NO. MOL-EFT-AVE-1000
TITLE MODEL SPECIFICATION AIRBORNE VEHICLE EQUIPMENT
DATED
REVISION NO. 1 DATED 3 MAY 1965

PURPOSE OF CHANGE: Deletion of Structural Panel Experiment from MOL-HSQ.

(Incorporates SCNP-Z, 34-C40108)

INSTRUCTIONS: Remove pages 4, 8a, 14a, 14e, 16, 41 and replace with revised pages 4, 8a, 14a, 14e, 16, and 41.

AUTHORIZATION: SCD C3-3899 dated 1 November 1966 (6W16173)
CCN 1932 dated 15 November 1966 (6W17036)

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

G E Simpson
APPROVAL

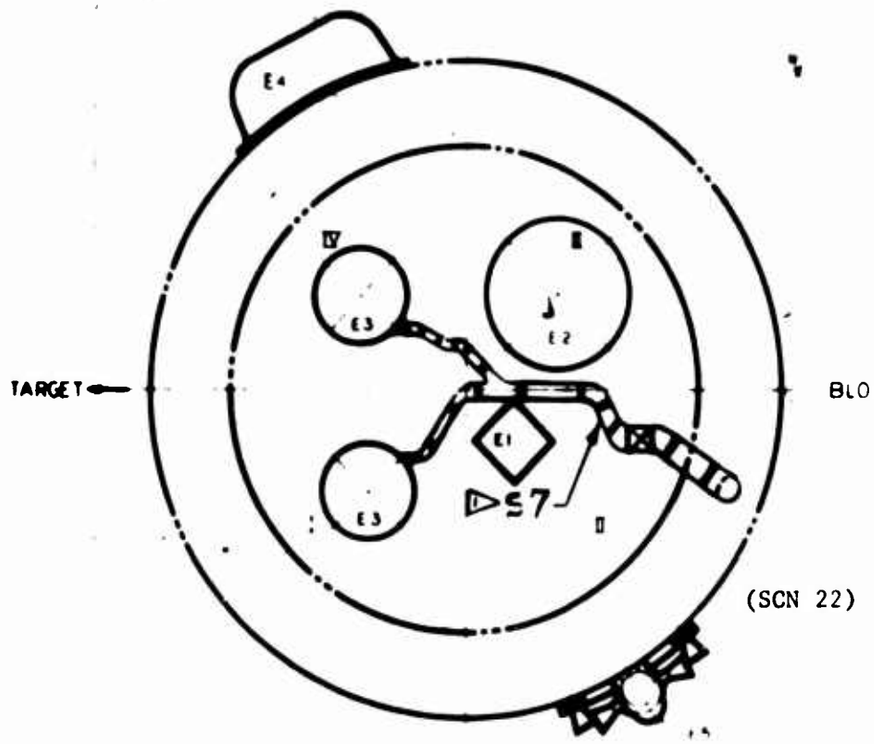
Form DEN 101601 (9-65)

2.1.1.3.1 Specifications

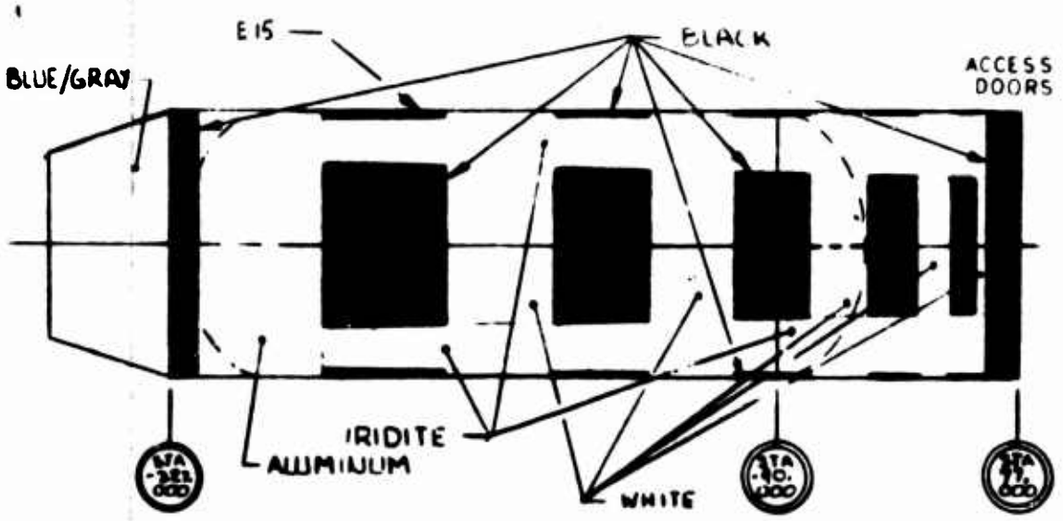
	IFS-MOL-EFT-60001	Interface Specification - Simulated Laboratory to Gemini Spacecraft
	IFS-MOL-EFT-60002	Interface Specification - Orbiting Vehicle to Ground Equipment
	IFS-MOL-EFT-61001	Interface Specification - SSLV to Simulated Laboratory
	SSS-TIII-010 SLV	Detail Specification for Standard Space Launch Vehicle (U), dated 23 April 1962, Revision 1, dated 10 October 1962
(SCN 7)	IDRD-MOL-HSQ-63001	Simulated Laboratory to OV-1
(SCN 7)	IDRD-MOL-HSQ-63002	Simulated Laboratory to OV-4
(SCN 7)	IDRD-MOL-HSQ-63003	Simulated Laboratory to Zero "G" Propellant Gauging
(SCN 7)	IDRD-MOL-HSQ-63004	Simulated Laboratory to Corner Reflectors
(SCN 7)	IDRD-MOL-HSQ-63005	Simulated Laboratory to Resolution Paint Pattern
(SCN 7)	IDRD-MOL-HSQ-63006	Simulated Laboratory to Protuberance
(SCN 22)		
(SCN 7)	IDRD-MOL-HSQ-63008	Simulated Laboratory to ORBIS-Low
(SCN 7)	IDRD-MOL-HSQ-63009	Simulated Laboratory to Fuel Cell Element
(SCN 7)	IDRD-MOL-HSQ-63010	Simulated Laboratory to Micrometeoroid Detectors
(SCN 7)	IDRD-MOL-HSQ-63011	Simulated Laboratory to Heat Transfer Test Capsule
(SCN 7)	IDRD-MOL-HSQ-63012	Simulated Laboratory to Bio-Cell

(SCN 7) 2.1.1.4 DELETED

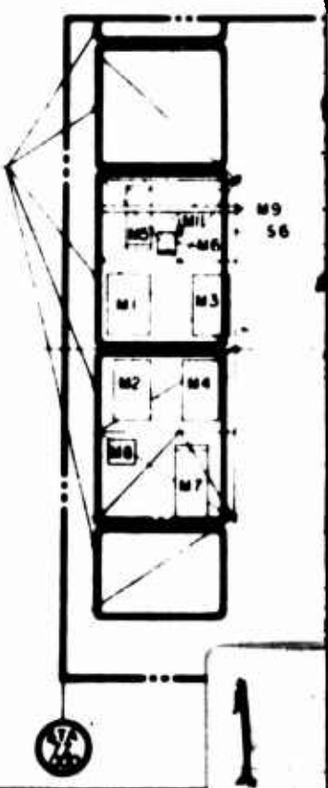
This page supersedes and replaces Page 4 and incorporates SCN 22 dated 23 December 1966.

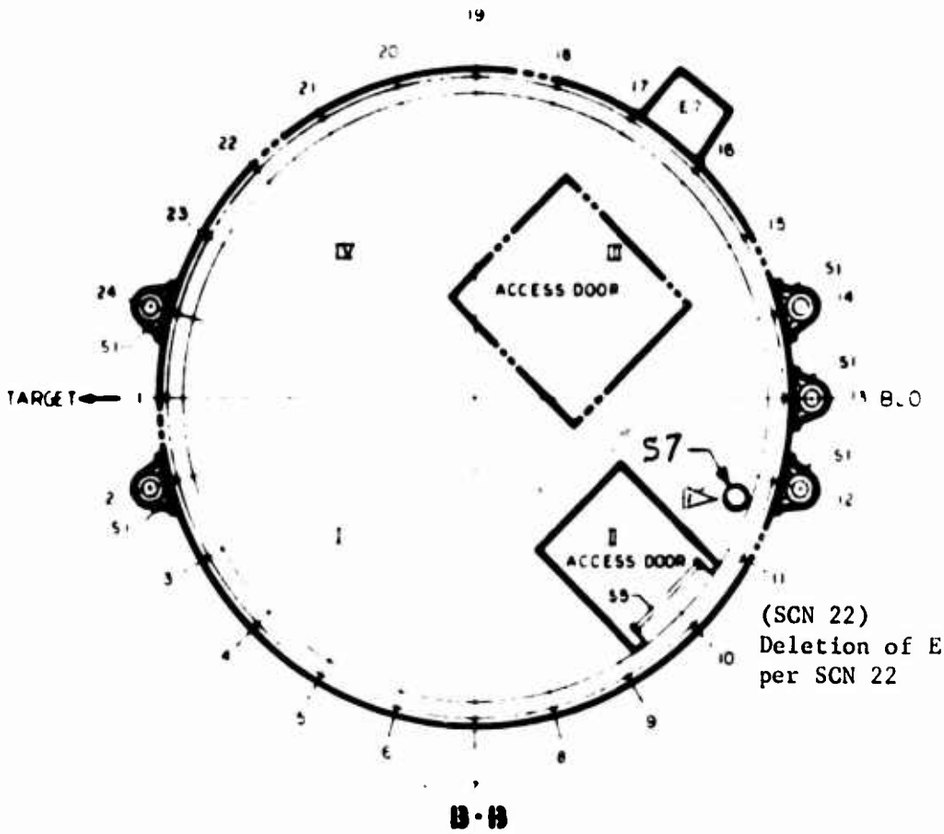


A-A

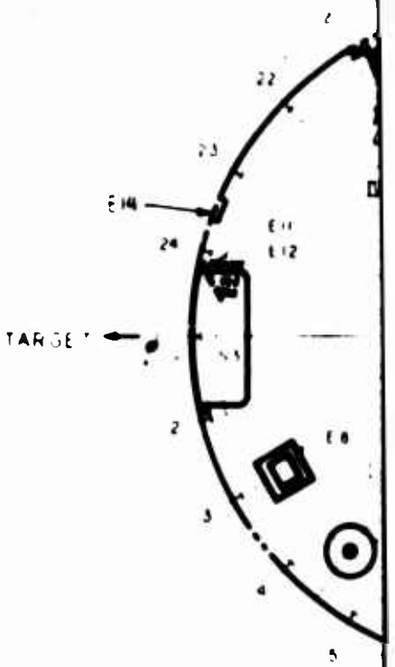


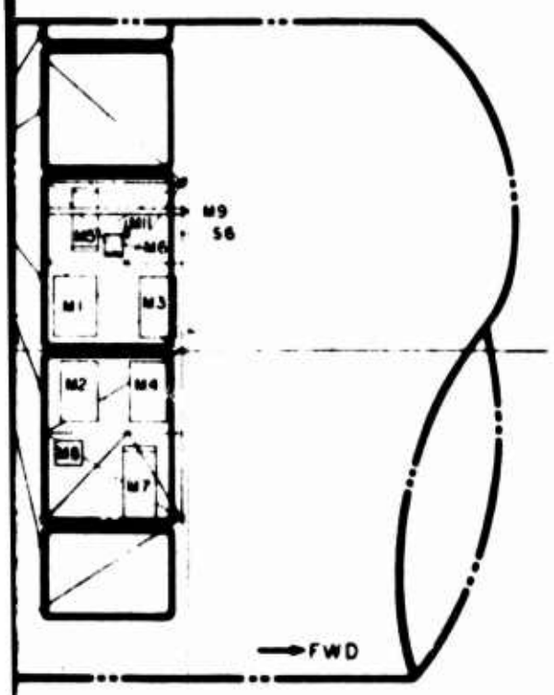
PAINT PATTERN
NO SCALE

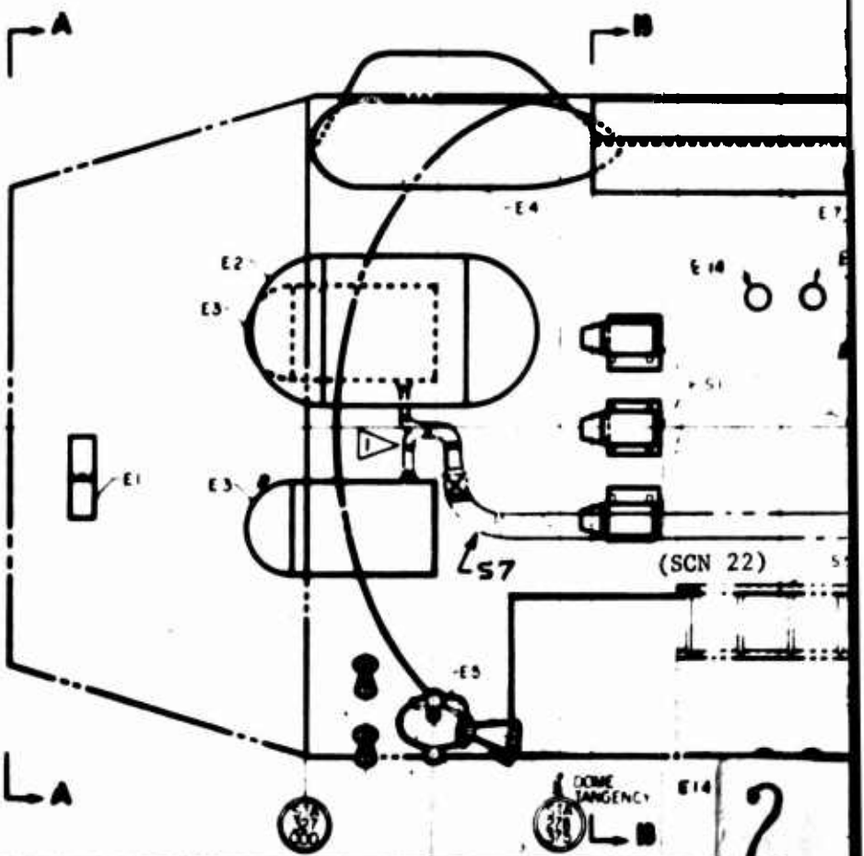




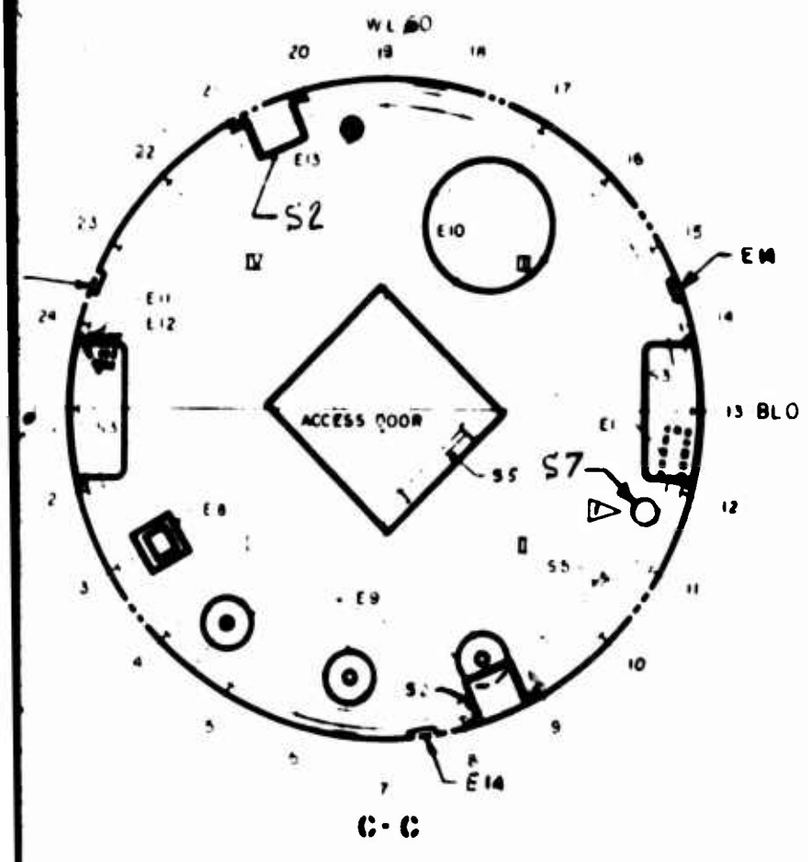
(SCN 22)
Deletion of E-6 Panel
per SCN 22



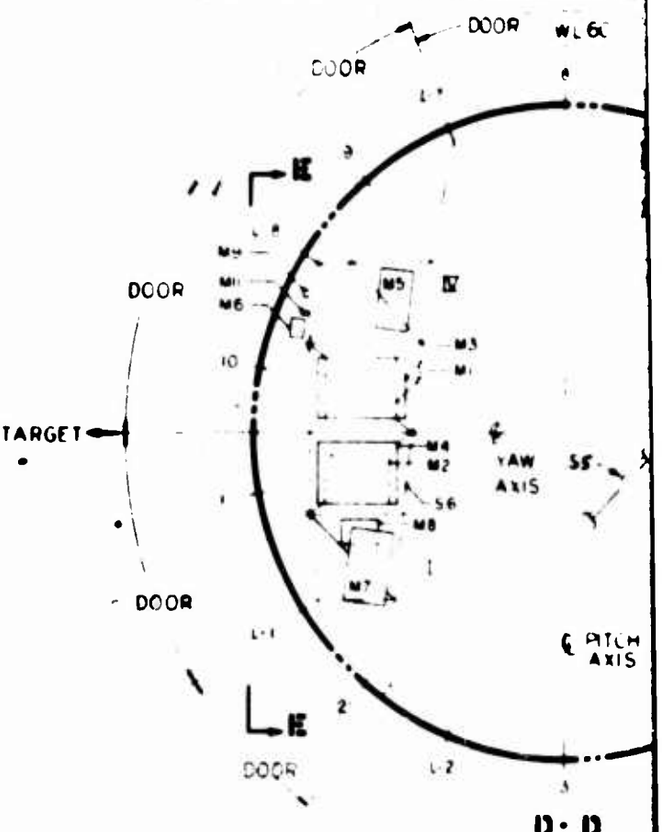




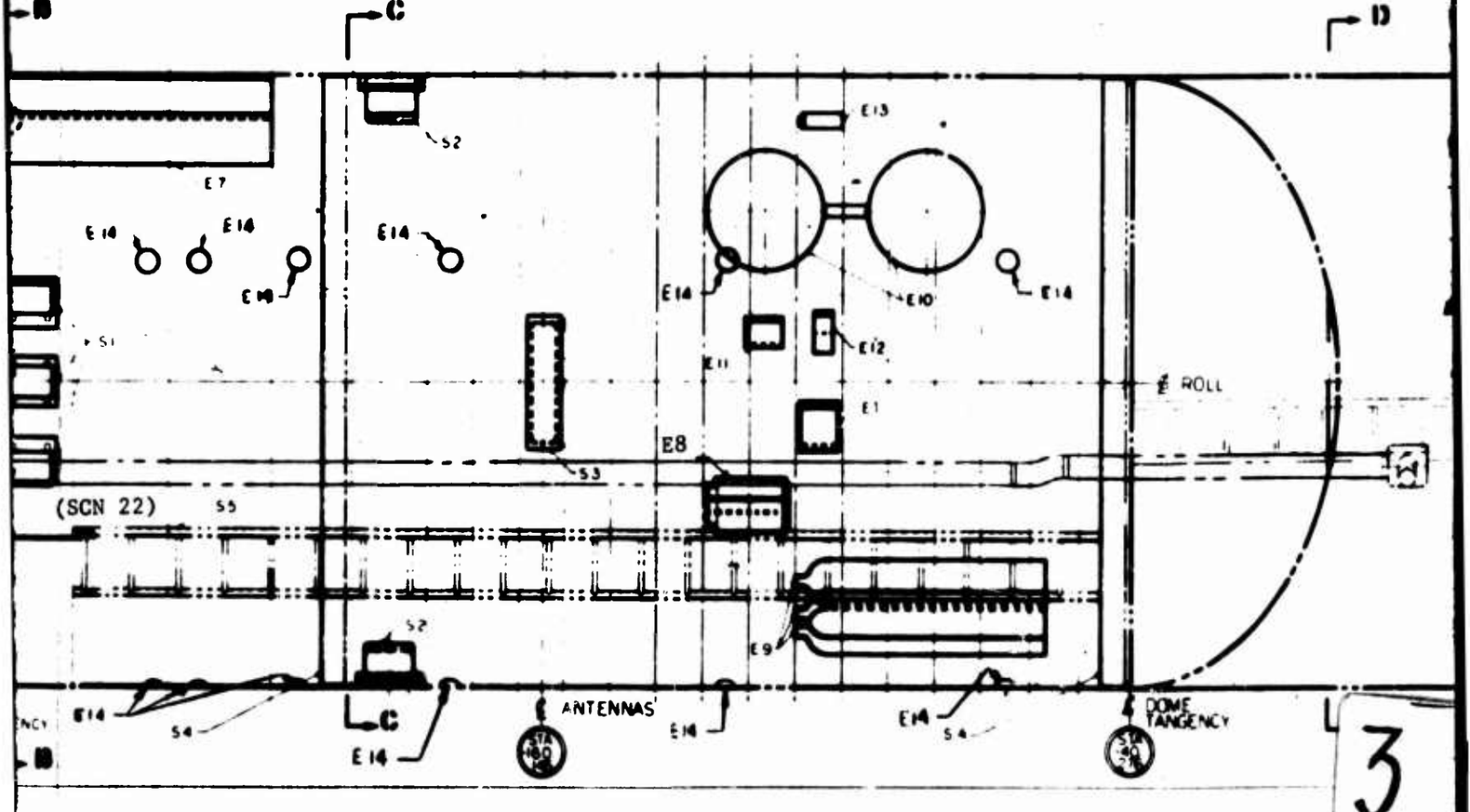
2

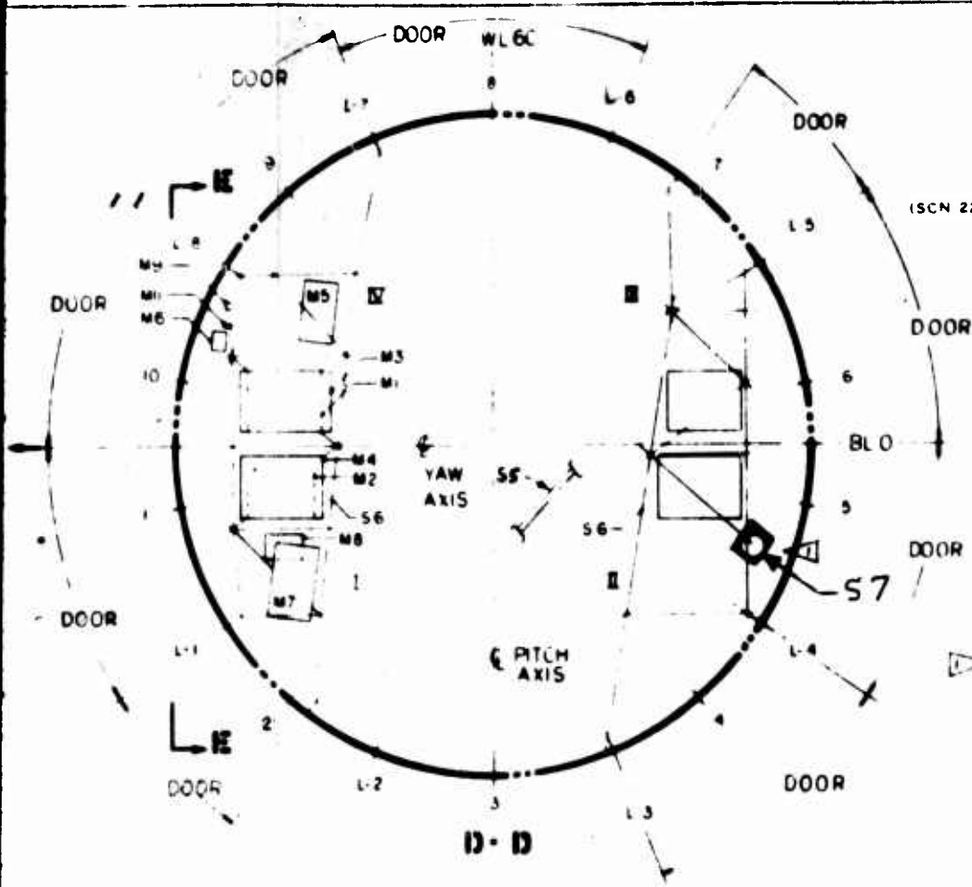

WL 60
ACCESS DOOR
S2
S7
S5
E10
E11
E12
E13
E14
E8
E9
13 BLO

C - C


DOOR
DOOR
WL 6
TARGET
DOOR
DOOR
M1
M2
M3
M4
M5
M6
M7
M8
S5
S6
YAW AXIS
PITCH AXIS

D - D


B
C
D
S2
E7
E14
E13
E10
E12
E11
E1
E8
S3
S1
(SCN 22)
S5
E9
ROLL
S4
ANTENNAS
DOME TANGENCY
STA 30
STA 90



EXPERIMENTS

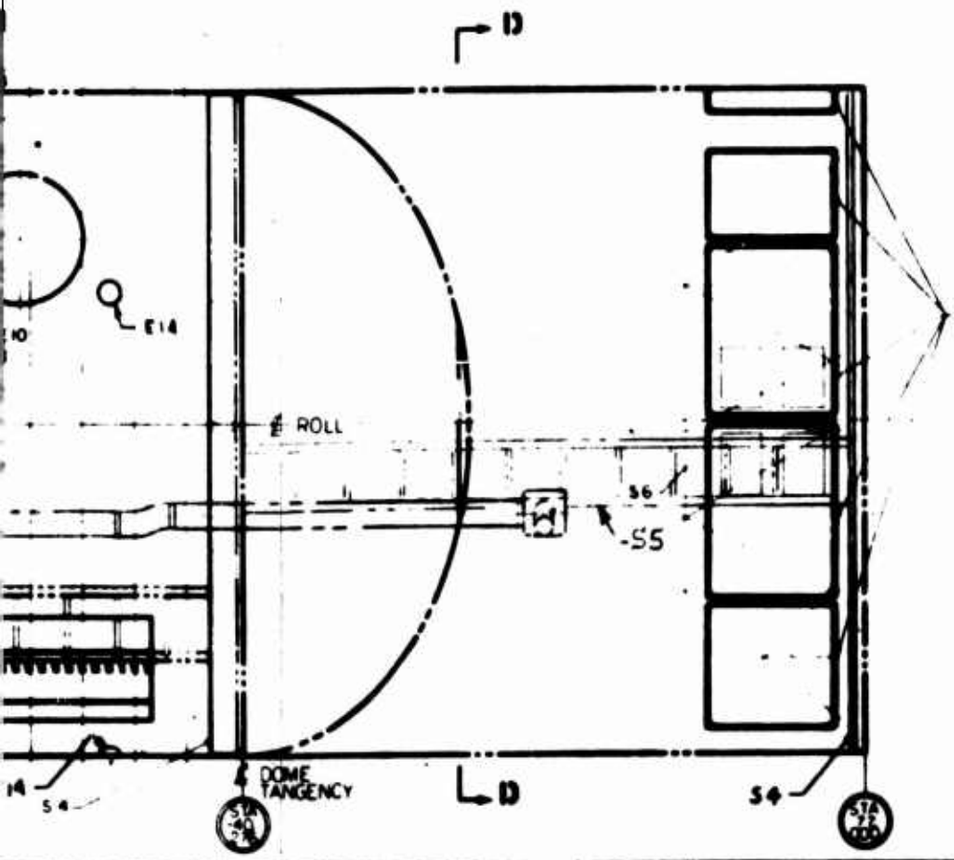
E 1 MICROMETEOROID
E 2 OV 1
E 3 OV 4 (2)
E 4 PROTUBERANCE (FAIRING)
E 5 PROTUBERANCE (ACS MOTOR)
(SCN 22) E 6 DELETED
E 7 HEAT TRANSFER TEST CAPSULE
E 8 FUEL CELL & EQUIPMENT PANEL
E 9 FUEL CELL BOTTLES (3)
E10 ZERO G PROPELLANT GAGING
E11 ORBIS LOW TRANSMITTER
E12 ORBIS LOW ANTENNA
E13 BIO CELL
E14 CORNER REFLECTORS (4)
E15 PAINT PATTERN

SUPPORT EQUIPMENT

S 1 RETRO MOTORS (5)
S 2 COMMAND CONTROL ANTENNA (2)
S 3 TM ANTENNA (2)
S 4 SERVICE PLATFORM (3)
S 5 LADDER (2)
S 6 EQUIPMENT TRUSS (2)
▷ S7 AIR CONDITIONING DUCTING

INSTRUMENTATION

M 1 BATTERY ( )
M 2 PCM ENCODER
M 3 SSB TRANSMITTER
M 4 PCM TRANSMITTER
M 5 SSB MODULATOR
M 6 MOTOR DRIVEN SWITCH
M 7 MULTIPLEXER
M 8 10 VOLT POWER SUPPLY
M 9 TERMINAL STRIP 28V ( )
M10 3 PORT JUNCTION
M11 VDU



ACCESS DOORS

▷ Added 2v SCN 10

(SCN 12) THIS FIGURE FOR REFERENCE ONLY

This Sheet Supersedes and Replaces Figure 1-C, Page 8a and Incorporates SCN 22 dated 23 December 1966

	ADDED EXPERIMENTS
	MOL-HSO MOL-EET-AVE-1000.01
	E FIGURE 1-C

PAGE 8a

(SCN 10) 3.3.1.4 Experiment Provisions - Experiment provisions shall be provided in the Simulated Laboratory for the following experiments:

a. OV-1
b. OV-4
c. Heat Transfer Test Capsule (HTTC)
d. Zero "G" Propellant Gauging
e. Micrometeoroid Detector
f. ORBIS-Low
g. Bio-Cell
h. Fuel Cell
i. Protuberance
(SCN 22) j. Deleted
k. Corner Reflectors
l. Resolution Paint Pattern

In addition to the basic provisions for the experiments listed above, three permanently installed floors and two airborne ladders shall be incorporated in the Simulated Laboratory as shown in Figure I-C. The floors and ladders shall provide access to the experiments prior to launch. A truss shall be provided for batteries in the aft skirt to meet experiment power requirements. Ducting shall be provided from the fly-away umbilical connector (para. 3.3.1.2.3) to the forward dome area of the Simulated Laboratory tank assembly. The ducting shall be capable of flowing 35 lb/min. of conditioned air to the forward dome area and 25 lb/min. of conditioned air to the aft adapter assembly. Air available in the forward dome area will be further distributed as follows:

a. 25 lb/min. into the upper platform area
b. 10 lb/min. through a positive action motor driven isolation valve, into a manifold which will provide 5 lb/min. into each OV-4 launch tube providing a temperature environment around the OV-4 satellite not to exceed 75°F as determined by a temperature transducer located on the OV-4 launch tube. Manual remote control and position monitoring will be provided for the valve.

Five retro-rocket motor assemblies shall be provided and installed on the forward end of the Laboratory. These motors shall provide a minimum
(SCN 21) retrograde velocity increment of 7 ft/sec. between the Gemini Re-entry Module and the Simulated Laboratory and impart a pitch-up motion to the Simulated Laboratory. The motor assemblies shall be similar to the Titan III, Stage II/Stage III staging motors.

(SCN 7) 3.3.1.4.1 OV-1 Mounting Provisions - Structural mounting provisions shall be incorporated for mounting the OV-1 experiment through the Simulated Laboratory forward dome. The experiment shall be truss mounted such that the forward portion of the experiment projects forward of the dome as shown in Figure I-C herein and Figure 1 of IDRD-MOL-HSQ-63001. The experiment shall be located such that it has a clear path through the Gemini Conical Adapter (after separation

3.3.1.4.8.2 (continued)

(SCN 18) b. Storage Containers - The storage containers shall be used to store the hydrogen and oxygen gas for use in the fuel cell. Five bottles shall be provided, three bottles for hydrogen and two bottles for oxygen. Three hydrogen K-bottles-2 for flight and 1 spare. Two oxygen K-bottles-1 for flight and 1 spare. Load 3 K-bottles with gaseous hydrogen and 2 K-bottles with gaseous oxygen in accordance with the requirements specified in IDRD-MOL-HSQ-63009 at a pressure of 2215 ± 50 psig.

(SCN 11) c. Thermal Control Shroud - The Fuel Cell Element shall be mounted within a shroud. The shroud shall be attached to the Simulated Laboratory structure through thermal stand-off isolators. Resistors capable of absorbing the electrical output of the Fuel Cell shall be mounted on the shroud. Three temperature transducers shall be mounted on the shroud.

d. Vent Lines - Tubing shall be routed from the appropriate Fuel Cell and support equipment fitting (H_2, O_2, H_2O, and H_2 and O_2 relief valves) to the Simulated Laboratory skin and overboard.

The packages (a) and (b) shall be mounted by suitable bracketry attached to the ring frames and stringers within the tank section of the Simulated Laboratory. Interconnecting tubing and wiring shall be provided to complete the installation.

(SCN 7) 3.3.1.4.9 Protuberance - The Protuberance Experiment, provided by the Contractor shall consist of an aerodynamic fairing, a dummy attitude control system (ACS) rocket-motor cluster, and required instrumentation as defined by IDRD-MOL-HSQ-63006. These two units shall be mounted approximately 180° apart on the periphery of the Simulated Laboratory on the forward skirt as shown in Figure I-C herein. Structural mounting provisions shall also be provided on the Simulated Laboratory. The fairing and rocket-motor cluster shall not be attached to the Simulated Laboratory during shipment to AFETR.

(SCN 22) 3.3.1.4.10 Deleted

This page supersedes and replaces Page 14e and incorporates SCN 22, dated 23 December 1966.

TABLE I

Payload Measurement Allocations for TIIIC MOL-EFT Flight

These measurements only will be transmitted from the Simulated Laboratory and are in addition to those TIIIC measurements already defined in the Master Program Management Plan (SSD-CR-64-14) and supplement thereto for the TIIIC Vehicle to be used for the MOL-EFT flight:

	No. of Measurements	Type of Measurement	Range	Location of Transducer	Sampling Rate
	2	Buffet Pressure	0-15 psia	Fwd Skirt	400 sps
(SCN 14)	2	Buffet Pressure	0-15 psia	Fwd Skirt	400 sps
(SCN 14)	4	Aero. Pressure	± 10 psid	Fwd Skirt	100 sps
	1	Compt. Pressure	0-15 psia	Fwd Skirt	100 sps
	1	Compt. Pressure	0-15 psia	Aft Skirt	100 sps
	3	Aero. Skin Temp.	0-1000°F	Fwd Skirt	40 sps
	2	Aero, Skin Temp.	0-1000°F	Lab Tank	40 sps
	1	Aero. Skin Temp.	0-1000°F	Aft Skirt	40 sps
(SCN 14)	3	Power Supply Voltage	0-14 VDC	Lab Tank	20 sps
	10	HSQ (McDonnell)	0-40 mv	Gemini Adapter	20 sps
	6	Pressure (HTTC)	0-20 mv	Lab Tank	20 sps
	10	Temperature (HTTC)	0-20 mv	Lab Tank	20 sps
(SCN 22)					
(SCN 22)					
(SCN 22)					
(SCN 22)					
	5	Heat Flux (Protuberance)	0-3 BTU	Fwd Skirt	20 sps
	8	Heat Flux (Protuberance)	0-3 BTU	Lab Tank	20 sps
	2	Temp (Protuberance)	0-1000°F	Fwd Skirt	20 sps
	8	Temp (Protuberance)	0-500°F	Fwd Skirt	20 sps
	5	Temp (Protuberance)	0-500°F	Lab Tank	20 sps
	2	Pressure (0-G Gauging)	0-5 VDC	Lab Tank	100 sps
	2	Volume (0-G Gauging)	0-5 VDC	Lab Tank	100 sps
	1	Flow (0-G Gauging)	0-5 VDC	Lab Tank	400 sps
(SCN 14)	2	Temperature	0-20 mv	Lab Tank	200 sps
(SCN 16)	1	Command Arming Relay Monitor	ON-OFF	Aft Skirt	100 sps

APPENDIX I-A

GOVERNMENT-FURNISHED EQUIPMENT, CONTRACTOR-INSTALLED

	Item	Description	Quantity
	1	Gemini Spacecraft, including conical adapter and ballast (also includes Gemini instrumentation);	1 Structural Test Capsule
	2	Titan II Stage I Oxidizer Tank	1
	3	Titan IIIC Transtage (Contractor to modify)	1
(SCN 7)	4	OV-1 Experiment	1
(SCN 7)	5	OV-4 Experiment	1
(SCN 7)	6	Zero "G" Propellant Gauging Experiment	1
(SCN 7)	7	Corner Reflector Experiment	1
(SCN 22)	8	Deleted	
(SCN 7)	9	ORBIS-Low Experiment	1
(SCN 7)	10	Fuel Cell Element	1
(SCN 7)	11	Micrometeoroid Detector Experiment	1
(SCN 7)	12	Heat Transfer Test Capsule Experiment	1
(SCN 7)	13	Bio-Cell Experiment	1

The following equipment shall be installed only if the flight experiment is not available for installation:

(SCN 7)	14	Dummy OV-1 Experiment	1
(SCN 7)	15	Dummy OV-4 Experiment	1
(SCN 7)	16	Dummy Zero "G" Propellant Gauging Experiment	1
(SCN 7)	17	Dummy Corner Reflectors Experiment	1
(SCN 7)	18	Dummy Fuel Cell Element Experiment	1
(SCN 7)	19	Dummy Micrometeoroid Detector Experiment	1
(SCN 7)	20	Dummy Heat Transfer Test Capsule Experiment	1

This page supersedes and replaces Page 41 and incorporates SCN 22 dated 23 December 1966.

MARTIN COMPANY
DENVER DIVISION

CONTRACT NO. AF04(695)-150

SPECIFICATION **CHANGE NOTICE**

NO. 23
DATE 30 December 1966

SPEC NO. MOL-EFT-AVE-1000
TITLE Model Specification Airborne Vehicle Equipment
DATED
REVISION NO. 1 DATED 3 May 1965

PURPOSE OF CHANGE: Revision of Discrete Requirements

(Incorporates SCNP-W, 34-C40099)

INSTRUCTIONS: Remove page 23c and replace with revised page 23c.

AUTHORIZATION: SCD C3-3845A dated 23 November 1966 (6W16859)
CCN 1986 dated 8 December 1966 (6W17933)

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

Owen H. Graff
APPROVAL

Form DEN 10160 (9-65)

TABLE ID

(SCN 7) **DISCRETE REQUIREMENTS**

A. Ground Control (Umbilical)

1. 10 Watt Transmitter On-Off
2. Ground Commands 1, 2, and 3
3. SSB and PCM Transmitter Control
4. SSB Modulator Calibration Control

(SCN 10) 5. Air Conditioning Valve Control

B. Sequencer and/or IGS Discretes

1. Zero "G" Propellant Gauging (each time transtage starts)
2. Gemini Separation (Redundant Discretes)
3. Arm TPS Bus, Sequencer and Fire Retro Rockets
4. Open Doors, HTTC, and ORBIS-Low

(SCN 23) 5. Deleted

6. Arm 25 Volt Bus
7. Eject OV-1
8. Eject OV-4 Transmitting Satellite
9. Eject OV-4 Receiving Satellite
10. Purge Fuel Cell, Open Micrometeorcid Doors, Open Fuel Cell Start Valves, and Deploy ORBIS-Low Antenna
11. Fuel Cell Purge Off
12. Fuel Cell Purge On
13. Fuel Cell Purge Off
14. Fuel Cell Purge On
15. Fuel Cell Purge Off
16. HTTC Off, Fuel Cell Heaters Off

(SCN 16) 17. Sequencer Reset and Transtage Electrical Power Shutdown

C. Command Control

Command No.	Function
1	Turn on 10 Watt Transmitter and Zero "G" Propellant Gauging Electronics
2	Recorder to Playback Mode
3	Recorder to Record Mode, TM Off, Zero "G" Propellant Gauging Electronics Off
(SCN 16) 4	Transtage Electrical Power Shutdown-Arm
5	Fuel Cell Purge On and Fuel Cell Load On
6	Fuel Cell Purge Off
7	ORBIS-Low On
8	Orbital Data System On
9	Orbital Data System Off
10	High Power TM On, Low Power TM Off
11	ORBIS-Low Off
12	Fuel Cell Off
13	Spare
14	Spare
15	Spare