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SS-T61-19
LMSD-448258
10 May 1961
Copy No. E501
51 Sheets

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SAMOS/MIDAS
PERSONNEL SYSTEM SPECIFICATIONS
AND
DESIGN
LAUNCH COMPLEX I
POINT ARGUELLO

Contract Nos. AF 04(647)-787
and AF 04(647)-563

Prepared by

PERSONNEL REQUIREMENTS SECTION
61-93

CLASSIFICATION CHANGED
IN ACCORDANCE WITH
MSD # 91156
DATED 2-14-63
INITIALS fmd

APPROVED:

John F. Gross
for R. D. KING
SYSTEMS OPERATIONS MANAGER
SATELLITE SYSTEMS

APPROVED:

D. J. GRIBBON
SATELLITE SYSTEMS DIRECTOR

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FOREWORD

This report is one of a series designed to advance the knowledge of requirements of the personnel complement of the Satellite Launch Control System and is prepared in compliance with Section I, Tab 5, Paragraph III B5 of the MIDAS Work Statement, LMSD NO. 368843-A, and with Paragraph 1. 2. 6. 4. 2 of the Samos Work Statement, LMSD NO. 369201B. This report is based on detailed studies of the hardware and its physical location on-site at Launch Complex Number 1, Point Arguello, and on analyses and predictions of work to be done against a schedule as indicated in the Introduction to this report.

Concise and complete definition of the personnel system associated with test site activities is a prerequisite to Contractor and Air Force personnel planning.

It is requested that comments and suggestions regarding this report be submitted to the Personnel Requirements Section, LMSD D/61-93, Sunnyvale, California.

CONTENTS

ILLUSTRATIONS

SECTION I
INTRODUCTION

In the interests of advancing the knowledge of the LMSD personnel complement required to implement the Satellite System Integrated Test Philosophy, this document describes a functional organization designed to prepare and launch satellite vehicles and produce reliable test and evaluation data.

This document identifies LMSD engineering, technician, and direct-support personnel required to operate and maintain Launch Complex I at Point Arguello. The data provided will be limited to activities defined in the integrated test philosophy and predicated on a schedule of one satellite launch per month from each of the two launch pads at Launch Complex I, Point Arguello.

To reiterate the concepts set forth in the Satellite Systems Test Philosophy, establish guide lines for the activities described in this document, and further substantiate Personnel Planning Information, the following parameters are cited:

(A) Systems Tests

Systems tests will be limited to satellite vehicle tests affecting the preparation of a vehicle for flight readines.. Where practicable, and within the limits of available facilities, these tests will be performed at the launch complex. In the eventuality of failures involving schedule delays, the satellite vehicle may be returned to a back-up area (MAB) for comprehensive tests. Should major rework and tests become necessary the vehicle may be returned to Sunnyvale.

(B) Integrated Systems Tests

When warranted by prolonged storage, integrated systems tests may be performed at the back-up area prior to flight-readiness testing at the launch complex.

(C) Modifications

Modifications will be limited to those design changes considered mandatory for reliability of the vehicle in flight. It is anticipated that such modification will affect only the index vehicle of a block of vehicles.

(D) Component Supply

The supply of component parts or assemblies necessary for back-up during preflight tests will be made available and will present no delay of the scheduled activities.

(E) Ground Support and Handling Equipment

Ground support and handling equipment will be maintained and updated (modified) as dictated by vehicle configuration requirements. Maintenance and modifications will be scheduled to avoid conflict with satellite launch activities.

SECTION II
SYSTEM DESCRIPTION

GENERAL

The Samos/MIDAS Satellite Systems employ a network of bases, centers, and stations to prepare the vehicles for flight and to control them during launch, ascent, and orbit. This report presents personnel information exclusively for the launch site at Point Arguello.

The Point Arguello Launch Complex consists of a Launch Operations Building (LOB) and two Launch Pad and Service Buildings (see Fig. 1). These installations are supported by a Technical Support Building and a Complex Service Building.

The Complex Service Building is used, primarily, for engineering office space, but contains one room for Kellogg communications equipment. The Technical Support Building is shared by the Air Force, LMSD, and CVA. It affords office and booster maintenance facilities, as well as a satellite storage area, during extended inclement weather or when emergency repairs are necessary.

The Launch Operations Building is a two-level structure. The Launch Control Room and an area accommodating racks of electronic equipment required to operate consoles are on the upper level (Fig. 2). The lower level contains racks of electronic equipment and electrical and mechanical service equipment. Telephone equipment and a standby room for pad crews are also located on this level.

The two Launch Pad Service Buildings are identically constructed. The upper surface of the building is the launch pad (see Fig. 3). The two

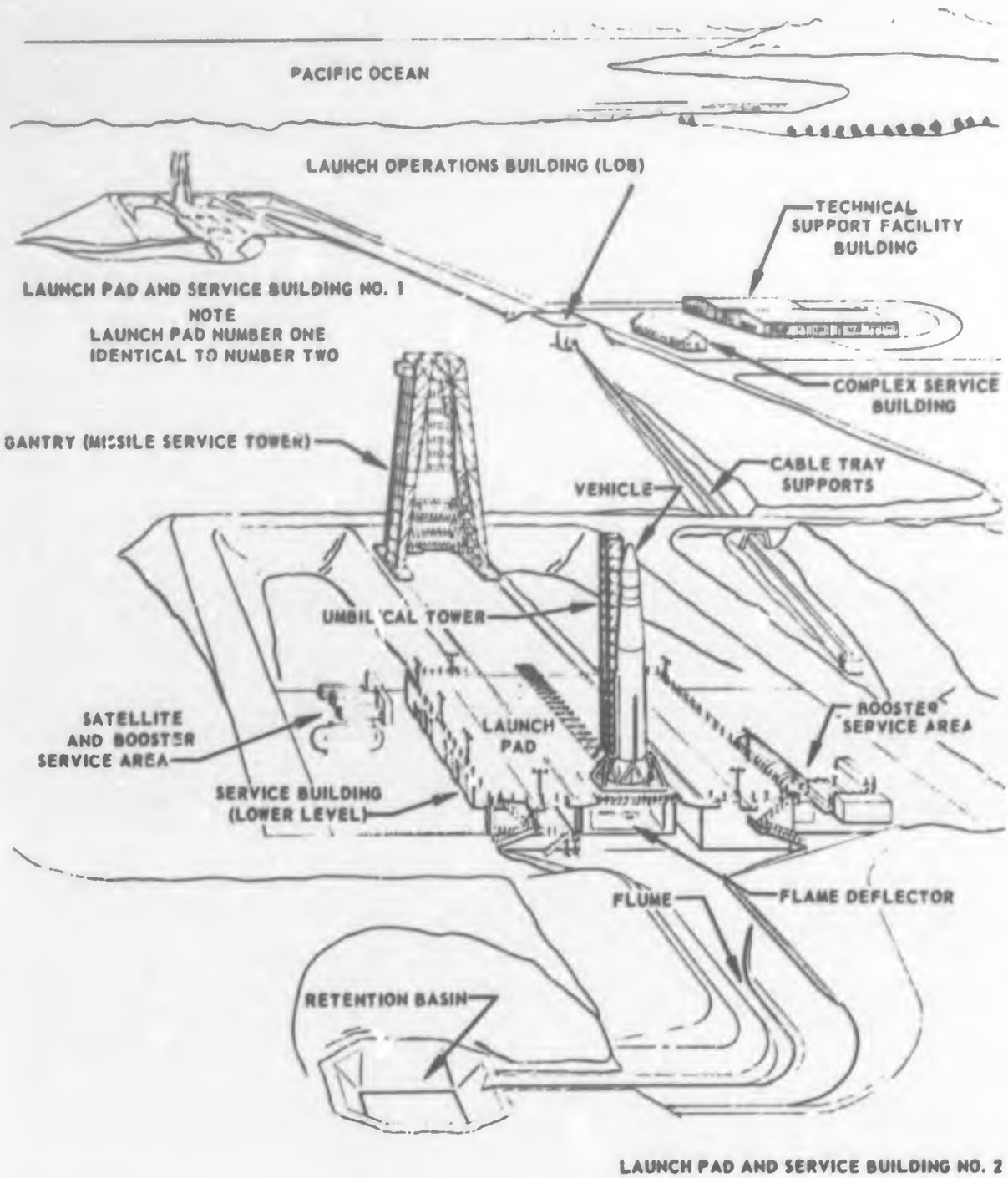


Figure 1 Launch Complex I, Point Arguello

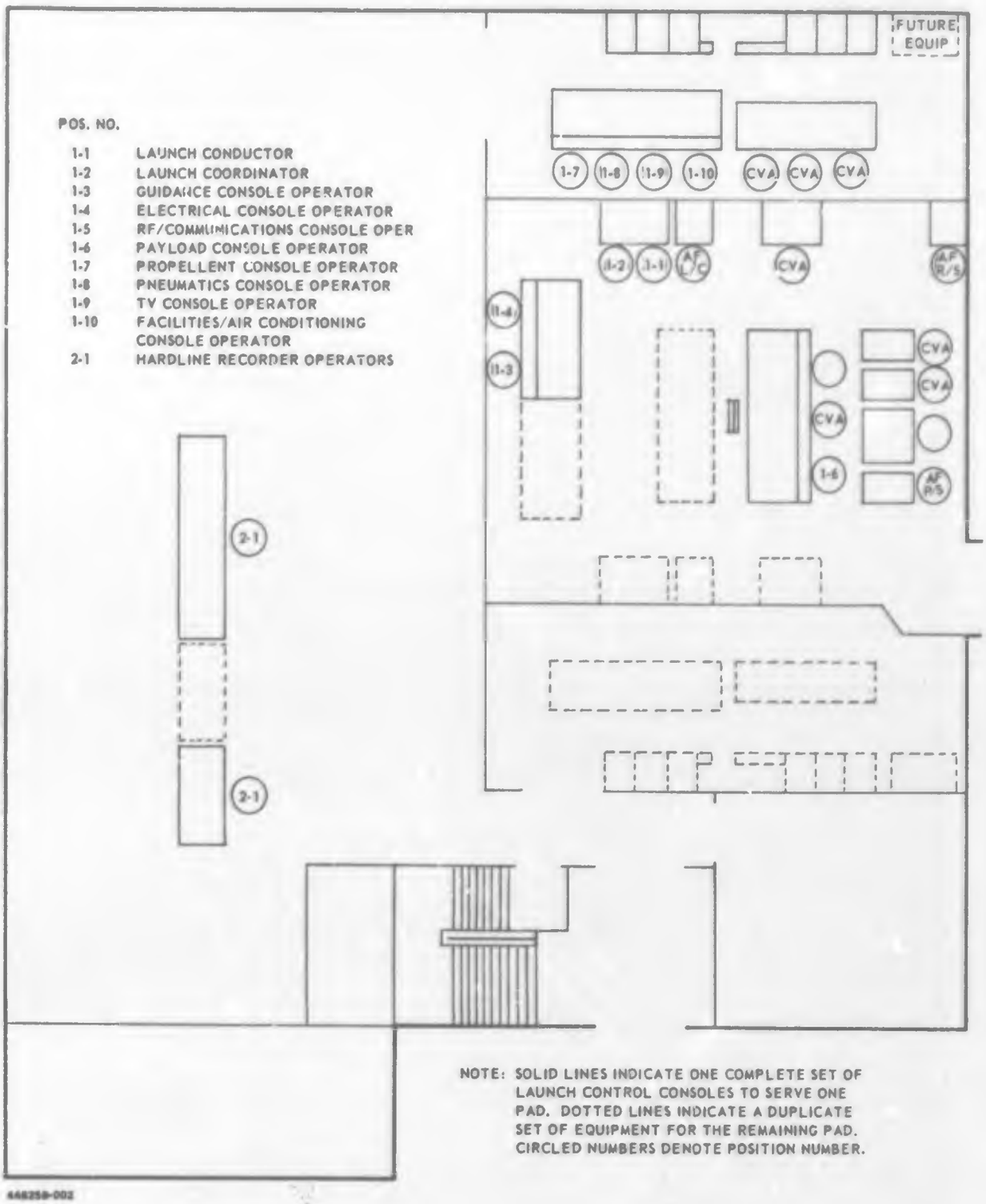
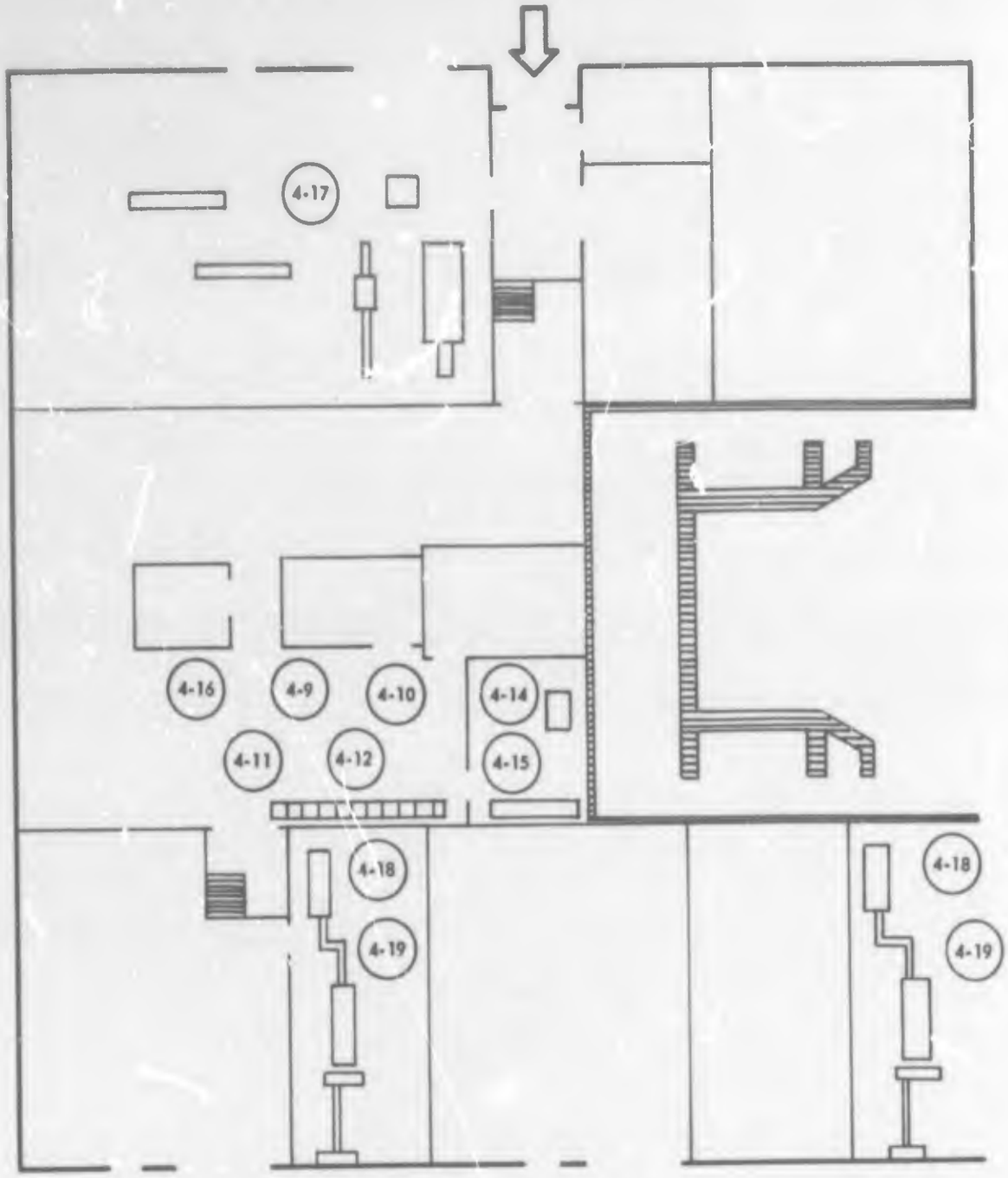


Figure 2 Upper Level, Launch Operations Building



NOTE: CIRCLED NUMBERS IDENTIFY POSITION NUMBER OF PERSONS OPERATING AND MAINTAINING EQUIPMENT.

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Figure 3 Lower Level, Launch Pad

floor levels beneath the pad surface contain spaces for electrical supply, hydraulic equipment, and other vehicle test equipment. Space is also provided for propellant control facilities and equipment storage.

The Satellite System consists of a booster and an orbital-stage vehicle. The booster and the orbital-stage vehicle each have propulsion and guidance control systems peculiarly adapted to the portion of the mission which each accomplishes. For purposes of tracking and data transmittal, vehicle telemetry communication systems are provided. A brief description of the Satellite System follows.

BOOSTER VEHICLE

The booster vehicle consists of a thin-walled, stainless-steel, cylindrical section that contains its own propulsion, flight control, guidance and hydraulic systems. The primary mission of the booster vehicle is to elevate the orbital-stage vehicle to a predetermined point in space at predetermined velocity.

SATELLITE VEHICLE*

Spaceframe

The spaceframe of the satellite vehicle maintains the aerodynamic and structural shape of the satellite and houses and supports the system and subsystem components that are integral to the satellite. It provides the necessary environmental protection and is designed to permit access to the components during the prelaunch operations.

Propulsion

The satellite vehicle propulsion system provides the final thrust which enables the vehicle to achieve the desired orbital altitude and angular

*Unless otherwise modified, "vehicle" refers to the orbital stage vehicle.

velocity. The major elements constituting the propellant group are the propellant tank assembly, propellant feed and lock system, propellant pressurization system, and the propellant tank ullage rocket system.

Internal Electrical Power System

The internal electrical power system provides power during flight from primary and secondary batteries or from secondary batteries and a solar array. The output of the primary power source is applied directly to the D-C regulators, inverters and power amplifiers.

Guidance and Control System

The satellite guidance and control system positions the satellite to the prescribed attitude for each phase of flight after separation of the satellite vehicle from the booster. The guidance equipment provides the signals necessary for the control equipment to change the attitude of the satellite.

The satellite vehicle control system actually consists of three systems. The pneumatic control system, the hydraulic control system, and the orbital-attitude control system. These three systems control the vehicle movements about the reference pitch, roll, and yaw axes during the Agena ascent and orbit phases.

The satellite vehicle guidance system consists of an inertial reference package and flight control electronics, horizon sensors for reference signals, and a velocity meter to determine engine cut-off. During the Agena ascent phase, the equipment applies signals to the pneumatic and hydraulic control systems. Guidance during the orbital phase is provided by the horizon sensors and the control gyros in the orbital-attitude control system. Following reorientation, the horizon sensors and the pitch reaction wheel provide the orbital attitude control.

Reconnaissance Payload

The mission of the satellite vehicle is to reconnoiter selected areas of the earth's surface and to provide the information in a form suitable for recovery by the ground portion of the satellite system. The exact nature of the payload depends upon the type of information desired and the method to be used in recovery of the information.

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SECTION III
JOB SEQUENCE SUMMARY

DESCRIPTION

The Job Sequence Summary (starting below) lists the operations which must be performed at the launch complex from the day that the orbital-stage vehicle is delivered at the launch complex, Missile-On-Site (MOS), until actual launch. The days are numbered in inverse order and are called the "R-Minus" (R-) days. The days called out represent activity schedule and not actual calendar days. Provision is not made in the numbering for abnormal activity such as a "hold" for correction of malfunction or for unusual or special tests. Each "day" of effort is performed during two eight-hour shifts. Figure 4 is a chart of the operations performed from MOS to launch.

Pad refurbishing operations are not included in this summary since the amount of pad rewiring and repair varies considerably from launch-to-launch, depending upon the difference between vehicle missions and the extent of pad damage. An additional five days are normally required for refurbishing between a launch and MOS for the next vehicle.

The schedule implied in the Job Sequence Summary represents a goal to be attained when vehicle design becomes sufficiently stable and when enough launches have been conducted from this complex to standardize the procedures.

DAY	JOB OPERATION
R-18	Pre-Launch Complex Operations
	1. Transport vehicle from Missile Assembly Building to Launch Complex I area and install in checkout dolly in horizontal position.

DAY	Pre-Launch Complex Operations (Continued)
R-17	2. Install umbilical and test plug and perform SS/C power-on check. With umbilical mast in horizontal position, vehicle must be connected to mast through umbilical and test plug.

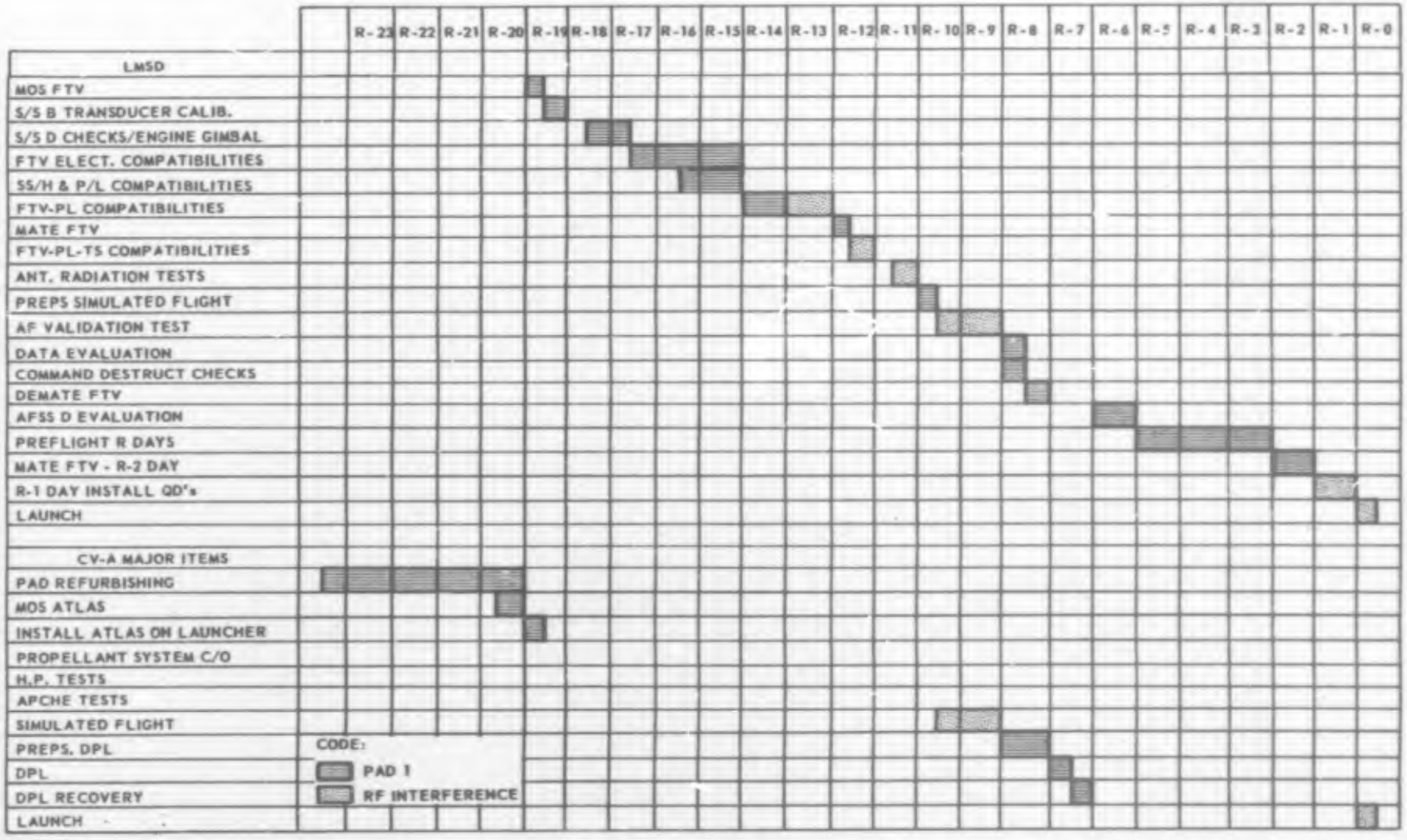

Figure 4 Job Operations Schedule

DAY		JOB OPERATION
R-17 (Cont.)	3.	Clear pad area (for the safety of personnel) and perform high-pressure SS/B functional check. This test is controlled from the launch control room of the Launch Operations Building.
	4.	Perform the SS/D compatibility checks while the vehicle is still in the horizontal position. This test is controlled and monitored from the launch control room and is also monitored from the Launch Pad Service Building test plug panels.
R-16	5.	Remove vehicle from checkout dolly, raise to vertical position, and mate to adapter which has been previously mated to the booster.
	6.	Perform premature-separation destruct checks.
R-15	7.	Perform umbilical drop tests. This test verifies: a. Nitrogen quick-disconnect release compatibility b. Correct lanyard length c. Proper fast retraction of the mast (initial movement) d. Proper action of pneumatic cylinder (for lanyard pull) e. No damage to the vehicle portion of the quick-disconnect.
R-14 & R-13	8	Perform SS/H command compatibility checks. These checks are commanded from Vandenberg Tracking Station (VTS) and monitored in the Launch Pad Service Building test plug panels. The payload is not installed at this time, but the payload breakout boxes are. Payload voltages are thus monitored during this test to assure that commands and functions will be transmitted to the payload in proper sequence and voltage level.

DAY		JOB OPERATION
R-12	9.	Install payload and make electrical connections. Perform payload compatibility tests. SS/H, with VTS commanding, exercises payload to verify proper functions.
R-11	10.	Perform RF checks with missile service tower removed. This is the first time that radiation has occurred through the vehicles antennas. All transmitters are operated with VTS commanding and monitoring.
R-10	11.	Prepare for simulated flight. a. Install batteries in the missile service tower and connect to vehicle to allow switching from external to internal power b. Install squib monitors in tower and connect to vehicle circuits c. Install "discrete signal" monitor to assure proper booster/satellite interface.
R-9 & R-8	12.	Perform AF validation test. This is the simulated flight test in which LMSD, CVA, and Air Force Space Systems Division (AFSSD) personnel participate. Upon successful completion no changes may be made without the specific approval of AFSSD. The test embraces the following sequence: a. Perform simulated countdown b. Perform simulated boost phase c. Perform simulated orbital injection d. Perform simulated first orbit to verify guidance and control capability e. Verify payload control capability f. Verify re-entry capability (as applicable). This test is controlled through RF with test plug and umbilical removed. (Tests b through f.)

DAY		JOB OPERATION
R-7	13.	Perform second destruct checks with RF commands to assure destruct capability. PMR Range Safety Commanding.
	14.	De-mate vehicle and remove payload. Return payload to payload laboratory for environmental control and security. Vehicle may be transported to Technical Support Building. Vehicle will be impounded until R minus days. From this day through R-5 day simulated flight data is reduced and evaluated.
R-6	15.	Note: Booster contractor performs dual-propellant load test. This is a Convair-AFSSD validation check and no LMSD personnel are permitted on the pad for safety reasons.
AFSSD Evaluation Day	16.	AFSSD conducts evaluation meeting with LMSD to discuss any discrepancies which may have become evident during the validation test. Upon buy-off, vehicle is ready for following sequence.
R-5	17.	Perform R-5 day vehicle and complex functions.

a. Perform engine functional test
b. Install test plug cables on the mast
c. Tighten and safety all vehicle connectors (this will be a continuing function from this point through R-1 day.)
d. Perform complex facility leak checks
e. Perform functional test on umbilical drop system
f. Perform lanyard pull test
g. Remove umbilical head and return to MAB for thorough inspection and repair as necessary
h. Perform lift-off system tone test in conjunction with Convair
i. Perform functional test of deluge system

DAY	JOB OPERATION
R-4	18. Perform R-4 day vehicle and complex functions.
	a. Perform vehicle transducer calibration
	b. Perform vehicle temperature channel calibration
	c. Perform SS/D pneumatics leak check
	d. Perform propellant-tank temperature and weight calibration checks.
	e. Perform SS/D compatibil SS/H command checks, command-decoder sequence-programmer function test, and RF validation test
	f. Accomplish hydraulic system servicing
	g. Assemble turbine start can in a safe area and perform destruct initiator checkout.
R-3	19. Perform R-3 day vehicle and complex functions.
	a. Perform vehicle high-pressure functional check
	b. Perform complex facilities high-pressure functional check
	c. Cycle vehicle pneumatic system
	d. Purge and leak-check radiometer system, if applicable
	e. Accomplish engine servicing
	f. Install payload pyrotechnics
	g. Install engine compartment temperature sensing instrumentation
	h. Transport vertical stand to pad.
R-2	20. Perform R-2 day vehicle and complex functions.
	a. Remove engine and turbine covers
	b. Install premate pyrotechnics
	c. Fill and filter hydraulic system
	d. Perform miscellaneous SS/A, SS/C, and SS/D work
	e. Place vehicle in vertical stand

DAY		JOB OPERATION
R-2 (Cont.)	f.	Install solar arrays if applicable
	g.	Load propellant transfer sets
	h.	Sample propellants to determine freedom from contaminants
	i.	Enable nitrogen purge system
	j.	Test and activate acid detector system
	k	Install vehicle secondary batteries
	l.	Install GRD mechanical items as applicable
	m.	Perform premate inspection (Q. A.)
	n.	Mate vehicle to adaptor
	o.	Transport payload to pad
	p.	Charge launch complex helium bottles
	q.	Q. A. conducts patchboard inspection in Launch Operations Building and Launch Pad Service Building
	r.	Perform complex facility power checks
	s.	Seal and safety wire all consoles and racks
	t.	Fill and bleed lines on mast.
R-1	21.	Perform R-1 day vehicle and complex functions.
	a.	Install postmate pyrotechnics and rockets
	b.	Mate payload
	c.	Install fairings
	d.	Accomplish SS/H RF-cable hookup
	e.	Perform destruct checks
	f.	Install J-100 umbilical and make all plug connections
	g.	Connect all flex lines and quick-disconnects to vehicle
	h.	Install payload blanket and lanyard if applicable
	i.	Perform payload verification checks with Vandenberg Tracking Station commanding and MAB Ground Station monitoring
	j.	Perform LMSD lift-off tone test
	k.	Accomplish countdown clock check out

DAY	JOB OPERATION
R-1 (Cont.)	l. Perform time pulse generator test
	m. Perform hardline recorder checkout
	n. Perform umbilical pneumatic cylinder check cut
	o. Perform TV camera check out
	p. Connect the nitrogen cascade
	q. Raise mast to final vertical position
	r. Refrigerate propellants and conduct final sampling

R-0

22. The countdown:

The countdown embodies the detailed checkout of the complete satellite control system and verification of flight readiness of the satellite vehicle. The details are separately accounted for and checked off step-by-step in task groups numbered 1 through 14. Not all of these tasks are Lockheed's responsibility; however, they are performed concurrently with the tasks that are specifically Lockheed's responsibility. The combined efforts are coordinated through the Air Force Space Systems Division Launch Controller, whose responsibility is to initiate the start of the countdown, to conduct evaluation activities and to control the terminal count through to the announcement of "Clear to Launch."

A list of tasks performed during countdown and the responsibility for each follows:

TITLE	RESPONSIBILITY
Countdown Initiation	AFSSD Launch Controller
Orbital-Stage Electronics Warm-Up	Lockheed Launch Coordinator
First-Stage Gyro Spin-Motor Test and T/M Checks	Booster Launch Coordinator
Orbital-Stage Guidance and Flight-Control Checkout	Lockheed Launch Conductor

TITLE	RESPONSIBILITY
Orbital-Stage Electronics Checkout	Lockheed Launch Conductor
Range Safety Command Tests	AFSSD Launch Controller
Orbital-Stage Arming	Lockheed Launch Conductor
Missile Flight Safety System Connect & Arming	Booster Launch Conductor
Countdown Evaluation	AFSSD Launch Controller
Plug Disconnect and Tower Removal	Booster Launch Coordinator/ Lockheed Launch Conductor
Orbital-Stage Tanking	Lockheed Launch Conductor
Orbital-Stage Pressurization	Lockheed Launch Conductor
Countdown Evaluation	AFSSD Launch Conductor
Terminal Count	AFSSD Launch Conductor

Task 1 - Countdown Initiation

The countdown initiation is the responsibility of the AF Space Systems Division Launch Controller. The Satellite Test Center (STC) and all associated launch base activities are cleared on a direct line intercom loop. Real time span required is 15 minutes (T-time, T-480 to T-465 minutes) and all blockhouse personnel and pad personnel are required on-site during this period.

Task 2 - Orbital-Stage Electronics Warm-Up

The Orbital-stage electronics warm-up is the responsibility of the Lockheed Launch Conductor. The intercom loop is assigned for the satellite guidance checkout activities. The real time required is 60 minutes (T-time, T-465 to T-405 minutes, inclusive). Personnel requirements are as follows:

Launch Operations Building (LOB)

1. Complex Safety Officer
2. Lockheed Documentation Engineer
3. Lockheed Electrical Console Operator
4. Lockheed Facility Console Operator
5. Lockheed Guidance Console Operator
6. Lockheed Launch Coordinator
7. Lockheed Launch Conductor
8. Lockheed Recorder Console Operator

Task 2 (Cont.)

Launch Pad Building (LPB) Personnel

1. AFSSD Pad Operations Controller
2. Complex Safety Technician
3. Lockheed Electrical Panel Operator Rack Set B
4. Lockheed Guidance Panel Operator Rack Set C
5. Lockheed Pad Chief

Task 3 - First-Stage Gyro Spin Motor Test and T/M Checks

First stage on booster activities are the responsibility of the Convair Launch Conductor and the AF Space Systems Division Launch Controller. Real time required is 40 minutes (T-time, T-465 to T-425 minutes). These tests are performed concurrently with Lockheed's orbital-stage electronic warm-up tests.

Task 4 - Orbital-Stage Guidance and Flight-Control Checkout

Orbital-stage guidance and flight-control checks are the responsibility of the Lockheed Launch Conductor. The communications intercom loop is under the control of guidance console operations. The real time required for this test is 120 minutes (T-time, T-405 to T-285 minutes).

LOB Personnel

1. Complex Safety Officer
2. Lockheed Documentation Engineer
3. Lockheed Guidance Console Operator
4. Lockheed Launch Conductor
5. Lockheed Launch Coordinator
6. Lockheed Recorder Console Operator

LPB Personnel

1. AF Space Systems Division Pad Operations Controller
2. Complex Safety Technician
3. Lockheed Guidance Panel Operator

Task 5 - Orbital-Stage Electronic Checkout

This activity is the responsibility of the Lockheed Launch Conductor. The intercom loop is under terminal count control. The real time required for this test is 120 minutes (T-Time; T-405 to T-285 minutes) and is performed concurrently with Task 4.

Task 5 (Cont.)

The personnel required for this activity are:

LOB Personnel

1. AF Space Systems Division Launch Controller
2. Complex Safety Officer
3. Lockheed Documentation Engineer
4. Lockheed Electrical Console Operator
5. Lockheed Launch Coordinator
6. Lockheed Launch Conductor
7. Lockheed Payload Console Operator
8. Lockheed RF Console Operator

Ground Station Personnel

Ground Space Communication Station:
- UHF Engineer
- VHF and VERLORT Engineer
- Payload (appropriate) Engineer

Lockheed Missile Assembly Building
- Ground Station Engineer
- Payload (appropriate) Engineer
- Ground Station Technicians
- Payload Technicians

Missile Flight Safety Officer

LPB Personnel

1. AF Space Systems Division Pad Operations Controller
2. Complex Safety Technician
3. Lockheed Electrical Panel Operator
4. Lockheed Payload Panel Operator
5. Lockheed RF Panel Operator
6. Lockheed Vehicle - Payload Engineer

Task 6 - Range Safety Command Tests

The range safety command tests are the responsibility of the AF Space Systems Division Launch Controller. The intercom is connected with telemetry, destruct and missile electrical activity, and the booster contractor control. The real time required for this operation is 30 minutes (T+Time, T-285 to T-255 minutes). The personnel associated with this activity are as follows:

LOB Personnel

1. AF Space Systems Division Launch Controller
2. Complex Safety Officer
3. Convair Launch Conductor
4. Convair Launch Control Officer
5. Lockheed Documentation Engineer

Task 6 (Cont.)

6. Lockheed Launch Conductor
7. Lockheed Launch Coordinator
8. Operation & C/O Console Operator
9. Safety Monitor (PMR)

LPB Personnel

1. AF Space Systems Division Pad Operators Controller
2. Complex Safety Technician (AF)
3. Booster Electrical Technician
4. Convair Pad Chief
5. Convair Stand Talker
6. Lockheed Pad Chief
7. Lockheed Pyrotechnics Technician
8. Lockheed Mechanical Technician
9. Operations and Checkout Technician (AF)

Special destruct-simulator equipment is required for this operation. Both the booster and the satellite vehicle are affected.

Task 7 - Orbital-Stage Arming

The orbital-stage arming is the responsibility of the Lockheed Launch Conductor, and the intercom circuit is between the Missile Service Tower and LMSD Launch Control personnel. The real time required for this operation is 45 minutes. (- Time, T-255 to T-210 minutes.)

LOB Personnel

1. AF Space Systems Division Launch Controller
2. Complex Safety Officer
3. Lockheed Documentation Engineer
4. Lockheed Launch Comductor
5. Lockheed Launch Coordinator
6. Lockheed Pneumatic Console Operator

LPB Personnel

1. AF Space Systems Division Pad Operations Controller
2. Complex Safety Technician
3. Lockheed Pad Chief
4. Lockheed Pyrotechnics Engineer
5. Lockheed Pyrotechnics Technicians (two required)
6. Pacific Missile Range Safety Monitor (PMR)

A special arming kit of two microammeters and assorted resistors will be required.

Task 8 - Missile Flight-Safety System Connect and Arming

This activity is the responsibility of the Convair Launch Conductor. The real time required for this task is 30 minutes (T-time, T-255 to T-225 minutes) and it is performed concurrently with Task 7.

Task 9 - Countdown Evaluation

The countdown evaluation is the responsibility of the AF Space Systems Division Launch Controller. The intercom loop is a direct line to critical areas for status reports. The real time required for this activity is 30 minutes (T-time, T-210 to T-180 minutes). Both LOB and LPB personnel are utilized as required for verification of status in their respective areas of activity.

Task 10 - Plug Disconnect and Tower Removal

The responsibility for this operation is jointly that of the Convair Launch Conductor and the Lockheed Launch Conductor. The intercom loop includes the Pad, Tower, LMSD and Booster Contractor. The real time required for this operation is 60 minutes (T-time, T-180 to T-120 minutes). The personnel required for this operation are as follows:

LOB Personnel

1. Complex Safety Officer
2. Convair Launch Conductor
3. Lockheed Documentation Engineer
4. Lockheed Electrical Console Operator
5. Lockheed Launch Coordinator
6. Lockheed Launch Conductor

LPB Personnel

1. AF Space Systems Division Pad Operations Controller
2. Complex Safety Technician (AF)
3. Convair Electrical Technician
4. Convair Mechanical Technician
5. Convair Stand Talker
6. Convair Tower Operator
7. Lockheed Electrical Panel Operator
8. Lockheed Pad Chief
9. Lockheed Mechanical Technician

Task 11 - Orbital-Stage Tanking

This operation is under the control of the Lockheed Launch Conductor. The real time required is 55 minutes (T-time, T-120 to T-65 minutes). The intercom loop is primarily between the timing and pressure-monitoring activities. Personnel associated with this activity are:

LOB Personnel

1. Complex Safety Officer
2. Lockheed Documentation Engineer
3. Lockheed Launch Conductor
4. Lockheed Launch Coordinator
5. Lockheed Pneumatic Console Operator
6. Lockheed Propellant Console Operator
7. Lockheed Recorder Console Operator

LPB Personnel

1. AF Space Systems Division Pad Operations Controller
2. Complex Safety Technician (AF)
3. Lockheed Pad Chief
4. Lockheed Propulsion Crew

NOTE Pad area is cleared upon completion of 10 percent fueling

Task 12 - Orbital-Stage Pressurization

This activity is the responsibility of the Lockheed Launch Conductor and the intercom loop remains cleared with tanking and pressurization controls. Real time required for this activity is 20 minutes (T-time, T-65 to T-45 minutes). The personnel associated with this activity are:

LOB Personnel

1. Complex Safety Officer
2. Lockheed Documentation Engineer
3. Lockheed Launch Conductor
4. Lockheed Launch Coordinator
5. Lockheed Pneumatic Console Operator
6. Lockheed Recorder Console Operator

LPB Personnel

None

Task 13 - Countdown Evaluation and Status Verification

This activity is the responsibility of the AF Space Systems Launch Controller on a direct line intercom loop with all critical areas. The real time required is 15 minutes (T-time, T-45 to T-30 minutes).

All launch control room personnel are required for this activity and LPB personnel are on an "as required" basis.

Task 14 - Terminal Count

The Terminal Count is the responsibility of the AF Space Systems Division Launch Controller. The intercom loop is on terminal count and all major activity is centered around the launch control room monitors and the booster fueling activities. The real time required for this operation is 30 minutes (T-time, T-30 to T-0 minutes). The personnel associated with this activity are as follows:

LOB Personnel

1. AF Space Systems Division Launch Controller
2. Camera Console Operator
3. Complex Safety Officer
4. Convair Blockhouse Monitor
5. Convair Launch Analyst
6. Convair Launch Conductor
7. Convair Launch Operator
8. Convair Sanborn Observer
9. Convair Standby Status Monitor
10. Lockheed Documentation Engineer
11. Lockheed Facilities Console Operator
12. Lockheed Guidance Console Operator
13. Lockheed Launch Coordinator
14. Lockheed Launch Conductor
15. Lockheed Payload Console Operator
16. Lockheed Pneumatic Console Operator
17. Lockheed Propellant Console Operator
18. Lockheed RF Console Operator
19. Operation and Checkout Console Operator (AF)
20. Lockheed Electrical Console Operator

LPB Personnel

None

Task 14 (Cont.)

Ground Station Personnel

1. AF Space Systems Division Guidance Project Officer
2. AF Space Systems Division Tracking Controller
3. Ground Space Comm. Station
4. Lockheed Missile Assembly Building
5. Missile Flight Safety Officer
6. Mod II Guidance Station

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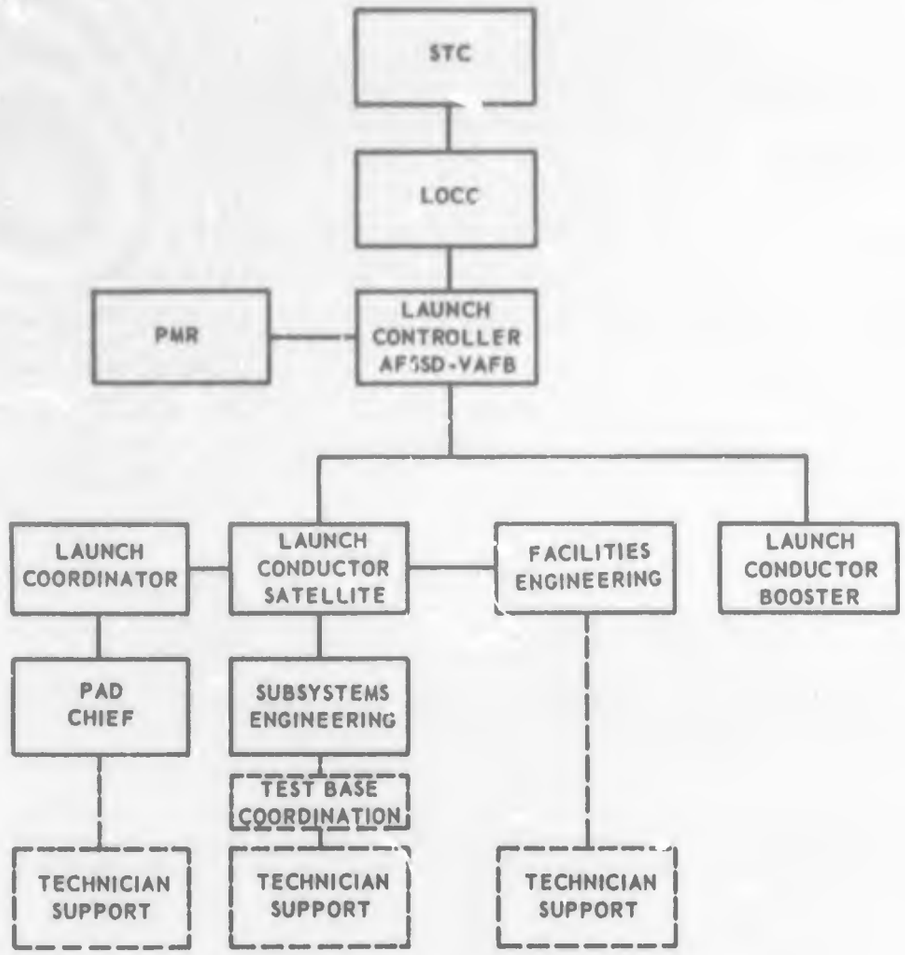
SECTION IV
MANNING TABLES

The total LMSD manning personnel required for one launch pad for one shift is 81. Manning Tables I, II and III list LMSD personnel required in the Launch Operations Building, the Launch Pad, and on the vehicle. Personnel required for two-shift operation is twice the one-shift complement. Single pad manning must be doubled again for two pad operations.

Each of the positions in the manning table is described in the following section (V), position descriptions. The position number assigned each position in the manning table is carried in the position description and on the diagrams which indicate working position of console operations.

The accompanying diagram, Figure 5, illustrates the responsibility relationships during countdown. Prior to countdown the responsibility relationships correspond essentially to the administrative organization for LMSD personnel.



NOTE:

DOTTED LINES TO TECHNICIAN SUPPORT GROUPS INDICATE TECHNICAL GUIDANCE, NOT LINE SUPERVISION. SYSTEMS SUPPORT LINE SUPERVISION IS NOT SHOWN.

448258-005

Figure 5 Responsibility Relationship During Countdown

MANNING TABLE I

COMPLEX I PT. ARGUELLO

LAUNCH OPERATIONS BUILDING

Pos. No.	Position Title	Single Pad Operation Basic Shift Manning
	Launch Control Room	
1-1	Launch Conductor	1
1-2	Launch Coordinator	1
1-3	Guidance Console Operator	1
1-4	Electrical Console Operator	1
1-5	RF Communications Console Operator	1
1-6	Payload Console Operator	1
1-7	Propellant Console Operator	1
1-8	Pneumatics Console Operator	1
1-9	TV Console Operator	1
1-10	Facilities/Air Conditioning Console Operator	1
	Launch Operations Bldg. Equipment Room	
2-1	Hardline Recorder Operators	2
	Total Launch Operations Bldg. Manning	12

MANNING TABLE II

COMPLEX I PT. ARGUELLO

Pos. No.	Position Title	Single Pad Operation Basic Shift Manning
	Vehicle	
3-1	Test Base (Shops) Coordinator	1
3-2	SS/A Structures Mechanic	3
3-3	SS/B Propulsion Mechanic	3
3-4	SS/C Electrical Technician	2
3-5	SS/B Pyrotechnics Engineer	1
3-6	Missile Test Mechanic/Electrical and Electronic	2
3-7	SS/D Guidance Technician	2
3-8	Payload Technician	2-4*
3-9	SS/H Electronic Technician	3
3-10	Geophysical Research Directorate Engineer	1
3-11	Telemetry Engineer	1
3-12	T/M (Electronic) Technician	1
3-14	Facilities Engineer/Data Link	1
3-15	RF Equipment Maintenance Tech.	2
3-16	SS/H RF Hookups Engineer	1
3-17	SS/H RF Hookups Technician (Electronics)	1
3-18	Missile Service Tower Payload Engineer	1
	Total Vehicle (Missile Service Tower) Manning	28-30*

NOTE: Vehicle personnel work also in the Launch Pad Building and in the Complex Service Building.

* Variation depends on the type of payload.

MANNING TABLE III

COMPLEX I PT. ARGUELLO

Pos. No.	Position Title	Single Pad Operation Basic Shift Manning
	Launch Pad	
4-1	Pad Chief	1
4-2	Operations Ground Equipment Electrical/ Electronics Leadman	1
4-3	Operations Ground Equipment Electronics Technician	5
4-4	GE Electrical Technician	5
4-5	Mechanical Technician - Leadman	1
4-6	Fluid Systems Mechanic	6
4-7	Operations Ground Equipment Engineer	1
4-8	Ground Power Equipment Electrical Technician	1
4-9	SS/D Guidance Test Panel Engineer	1
4-10	SS/H Test Panel Engineer (RFP)	1
4-11	SS/D Test Panel Technician	1
4-12	SS/H RF Panel Technician	1
4-13	Mechanical Systems Engineer/OGE Advisor	1
4-14	Pneumatics Engineer	1
4-15	Pneumatics Technician	2
4-16	Vehicle Test Plug Equipment Engineer	1
4-17	Air Conditioning and Refrigeration Engineer	1
4-18	Propellant Engineer	2
4-19	Pneumatic Engineer (High Pressure Gas (Mechanical)	4
4-20	Pneumatic Engineer (High Pressure Gas Source)	1
4-21	Pneumatic Technician (High Pressure Gas Source)	1
	Total Launch Pad Manning (including all floors)	39

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SECTION V
POSITION DESCRIPTIONS

This section presents a brief description of each position which must be manned in order to provide a one-shift complement of launch complex personnel to process and launch a vehicle.

The duties, environment, and qualifications of each position are summarized in the position descriptions. When the duties described are related to the job sequence summary, the relationships of the personnel and processes involved in the mission of Launch Complex I at Point Arguello are obtained.

POSITION DESCRIPTION

POS. NO. 1-1

Position Title: LMSD LAUNCH CONDUCTOR

General Features:

Position Summary: The LMSD Launch Conductor is the one designated engineer in charge of all vehicle testing performed at the launch complex. Responsibility covers the entire spectrum of testing from MOS through launch. From the launch conductor's console, monitors compatibility tests and countdown sequence tests in conformance with approved test procedures and/or countdown manual. Determines technical validity of test results to determine impact of test outcome on the continuance of the testing sequence. Makes decision regarding modification of test procedures in interest of achieving test objectives. In the event of component or system malfunction, makes overall decision as to course of action to be taken. Assures that personnel performance and equipment operation is such that safety of personnel and equipment is maintained. Performs liaison with Air Force Launch Controller during validation type testing and actual launch countdown. Is the LMSD contact for the decisions on and status of the Agena vehicle. Coordinates testing sequences with VTS to insure vehicle tracking station compatibility from the standpoint of command, tracking, and data acquisition capability.

Environment: Functions in Launch Control Room during vehicle and launch complex systems compatibility tests and during demonstration tests for sell off to Air Force.

Qualifications: A B.S. degree in electrical or electronic engineering is desirable. Diversified experience in pneumatics, propulsion, fluid systems, and mechanics is essential. A minimum of three years direct experience in satellite launch systems work is mandatory.

POSITION DESCRIPTION

POS. NO. 1-2

Position Title: LAUNCH COORDINATOR

General Features:

Position Summary: Directs OGE personnel in the prelaunch checkout of orbital stage vehicle. Assures the technical integrity of all satellite launch control equipment, test plug checkout equipment, propellant transfer systems, pneumatics, umbilical release system, and all related electrical and mechanical support equipment. Directs all work effort, scheduling, and coordination at the launch complex. Directs the activities of the pad chief. Acts as LMSD representative for outside contacts such as CVA, SSD, and PMR. Assures the technical integrity of pre-launch installation, modification, maintenance, and testing of OGE equipments at the launch complex.

Environment: Located at the launch complex. Performs duties in the launch operations building, technical support building, and the launch pad service building. Works indoors and outdoors as required. Works under direction of the launch conductor during launch operations, but reports administratively to the Launch Operations Engineering Manager. Environment is sometimes hazardous.

Qualifications: An engineering degree and extensive experience in mechanical, electro-mechanical, hydraulic, pneumatic, electrical, and electronic systems is mandatory. At least one year experience in satellite launch systems is mandatory. Previous flight test and test data evaluation is necessary.

POSITION DESCRIPTION

POS. NO. 1-3

Position Title: GUIDANCE CONSOLE OPERATOR

General Features:

Position Summary: Operates guidance console during checkout and system test, and assures the functional integrity of the Guidance and Control subsystem. Checks out, analyzes results and prescribes correction of any malfunctions in the guidance subsystem. Operates console during launch day operations. Monitors checkout of gyro torquing, horizon sensors, flight control commands, velocity meters and timer motor. Runs closed loop guidance checks. Verifies guidance ready for launch. Prepares test procedures and writes final evaluation reports. Recommends necessary design changes to guidance design group to correct chronic malfunctions of console and supervises modifications.

Environment: Mans guidance console in launch control room during subsystem tests and on launch day. Reports to launch conductor. May interchange with SS/D Guidance Test Panel Engineer.

Qualifications: Requires a B.S. degree in electrical/electronics or equivalent in electronic/electrical circuit design. Experience in guidance and control systems circuitry and operation is mandatory. Must be thoroughly familiar with launch and checkout equipment. Must be able to supervise checkout of the guidance system and to write test procedures.

POSITION DESCRIPTION

POS. NO. 1-4

Position Title: POWER DISTRIBUTION GSE AND VEHICLE POWER CONSOLE OPERATOR

General Features:

Position Summary: Responsible for electrical modifications, calibration, checkout and launch monitoring of controls and readouts of the Power Control and Monitor Console. Performs systems analysis to insure launch control systems compatibility with individual vehicles. Investigates modification requirements, evaluates engineering changes. Ascertains blueprint coverage, and changes if required. Writes test procedures for systems checkout. Modifies vehicle functional generator for systems checkout. Provides engi. neering support for systems checkout, for vehicle compatibility tests and for vehicle systems test. Implements instrumentation and recording requirements.

Environment: Works in Launch Control Room during countdown, pad electrical room and pad area as required during modifications, checkout, and launch preparation.

Qualifications: Requires electrical engineering degree, or equivalent in education and experience. Requires one or more years experience with OGE power and controls monitoring systems, including instrumentation technique.

POSITION DESCRIPTION

POS. NO. 1-5

Position Title: **RF CONSOLE OPERATOR AND COMMUNICATIONS ENGINEER**

General Features:

Position Summary: Operates RF console to control SS/H vehicle equipment. Verifies primary umbilical functions as being correct. By means of voice communications, assists remote groups in checkout and test functions. Analyzes SS/H circuit design and recommends changes. Monitors test, repair, modification, and maintenance of equipment. Assists in preparation of countdown manuals, test procedures, and engineering flight reports. Evaluates SS/H status and determines flight readiness.

Environment: Mans the RF console during checkout and countdown. Reports to the Launch Conductor and acts as SS/H technical advisor.

Qualifications: Requires B.S in electronics, or equivalent experience, with a minimum of one year experience in communications and control systems.

POSITION DESCRIPTION

POS. NO. 1-6

Position Title: PAYLOAD CONSOLE OPERATOR

Position Summary: Assigns and directs special tests pertaining to the payload. During prelaunch, monitors and evaluates information fed to the hardline recorders, quality and status of the video signals and general status of the payload. Reports results to the Launch Conductor on request.

Environment: Works in Launch Pad Building

Qualifications: Requires B.S. in electrical engineering or equivalent experience. Must be familiar with payload operations and circuitry, and countdown procedures.

POSITION DESCRIPTION

POS. NO. 1-7

Position Title: PROPELLANT CONSOLE OPERATOR

General Features:

Position Summary: The Propellant Console Operator is responsible for assuring that the vehicle propulsion system is properly inspected in accordance with accepted engineering specifications and procedures. Verifies that required modifications are incorporated and functionally tested. Assures that the propulsion system reflects the latest approved changes. Supervises the installation of appropriate umbilical lines to the vehicle. Revises test procedures pertinent to the vehicle propulsion system as necessary. Directs the complete component checkout. Monitors the propulsion system functional and pressure tests and assures the integrity of the groundline instrumentation checkout and calibration. Directs the vehicle propulsion/complex compatibility checks from the Launch Control Room Propellant Console. Operates the propellant console during launch operations.

Environment: Performs duties in the engineering area of the Missile Assembly Building, at the launch pad, on the Missile Service Tower, and in the launch control room of the Launch Operations Building. Coordinates with the Pneumatics Console Operator and the propellant engineers in the fuel and acid rooms. Reports to the Launch Conductor during launch operations, otherwise to the SS/B engineering supervisor.

Qualifications: Must have an engineering degree or equivalent experience. Detailed knowledge of pneumatics, pressurization, propellants, and propulsion systems is essential. A minimum of two years actual experience in research and development of mechanical, electrical, and electronic equipment and in all phases of the checkout, test, and evaluation of components of both the propulsion and pneumatics system is mandatory. Must be capable of performing the complete duties of pneumatics console operator.

POSITION DESCRIPTION

POS. NO. 1-8

Position Title: PNEUMATICS CONSOLE OPERATOR

General Features:

Position Summary: Assures that the vehicle pneumatics system is properly inspected in accordance with existing engineering specifications and procedures. Verifies that modifications, if applicable, are correctly incorporated and functionally tested. Verifies that the pneumatics system reflects latest changes. Supervises installation of umbilical lines to the vehicle. Updates test procedures related to the vehicle pneumatic system as required. Directs the complete component checkout, critical systems leak checks, ground line instrumentation checkout and calibration, and the vehicle/complex pneumatics compatibility checks from the Launch Control Room Pneumatics Console. Operates the pneumatics console during launch operations.

Environment: Performs duties in the engineering area of the Missile Assembly Building, at the launch pad, on the missile service tower, and in the launch control room of the Launch Operations Building. Coordinates with the propellant engineers in the fuel and acid rooms and with the Propellant console operator. Reports to the launch conductor during launch operations, otherwise to the SS/B engineering supervisor.

Qualifications: Must have an engineering degree or equivalent experience. Detailed knowledge of pneumatics, pressurization, propellants, and propulsion systems is essential. A minimum of two years actual experience in an R and D atmosphere covering all mechanical, electrical, and electronic phases of the checkout, test, and evaluation of components of both the propulsion and pneumatics system is mandatory. Must be capable of performing the complete duties of the propellant console operator.

POSITION DESCRIPTION

POS. NO. 1-9

Position Title: CLOSED CIRCUIT TV OPERATOR

General Features:

Position Summary: Maintains and checks out closed circuit television equipment. Directs cameras by remote control to monitor propellant loading, umbilical condition, area clearance, umbilical disconnect, mast retraction and test procedures. Adjust camera controls, including zoom, focus and iris controls, and pan end tilt units, for optimum viewing.

Environment: Works on pad and in blockhouse under supervision of GSE electronics supervisor.

Qualifications: Must have basic knowledge of electronics plus specialized training in closed circuit TV equipment. Must be sufficiently familiar with vehicle configuration and system test sequences to properly operate camera for monitoring.

POSITION DESCRIPTION

POS. NO. 1-10

Position Title: FACILITIES/AIR CONDITIONING CONSOLE OPERATOR

General Features:

Position Summary: Responsible for electrical modifications, calibrations, checkout, and launch monitoring of controls and readouts of propulsion and facility launch systems. Performs system analysis to insure LCS compatibility with individual vehicles. Actively monitors umbilical mast, TV and deluge status during a countdown. Evaluates mast trench and mast cable damage; repairs as necessary and verifies status. Investigates modification requirements, evaluates engineering changes. Ascertains blueprint coverage, and changes if required. Writes test procedures for systems checkout. Modifies vehicle functional generator for systems checkout. Provides engineering support for systems checkout for vehicle compatibility tests, and for vehicle systems tests. Implements instrumentation and recording requirements. Researches squib monitoring requirements. Modifies squib monitor and provides engineering support during vehicle systems run.

Environment: Works in launch control room during countdown, pad propellant and pressurization rooms as required during modification, checkout and launch.

Qualifications: Requires electrical engineering degree, or equivalent in education and experience. Requires one or more years experience with propellant and pressurization electrical control and monitor systems, as well as interface circuitry for umbilical mast and deluge control and readout.

POSITION DESCRIPTION

POS. NO. 2-1

Position Title: HARDLINE RECORDERS/ELECTRONIC TECHNICIAN

General Features:

Position Summary: Monitor power console and operate circuit breakers on orders from AGE engineer during countdown phase. Reports readiness of equipment on request of the launch coordinator. Read and record propellant loading functions, pressurization functions, and power on vehicle umbilical functions. Maintain, modify, calibrate, and check out recording equipment. Record significant events on recorder tapes.

Environment: Works in equipment room of launch control building during all vehicle test procedures, system runs, and countdowns. At other times works throughout complex on maintenance, and modification and checkout of consoles. Reports to the shop supervisor and as a member of the launch team; takes direction from the launch coordinator.

Qualifications: Must have electronics background with special recorder training. Must be familiar with all functions monitored on test points of the vehicle. Must know circuitry of all consoles in launch control building in order to maintain, modify, and check them out.

POSITION DESCRIPTION

POS. NO. 3-1

Position Title: TEST BASE (SYSTEMS SUPPORT) COORDINATOR

General Features:

Position Summary: Coordinate all work to be performed by shop personnel on vehicle and AGE. Coordinate with pad chief and test conductor on schedules and changes to the schedule. Inform shop supervisors of work required. Direct shop personnel in absence of supervisor. Follow up completed work as to quality assurance record books (sell off). Participate in daily work scheduling meetings. Coordinate on delivery of pad kits and equipment to pad and on transporting vehicle to pad with military escort. Sign for access to pad for individuals not on access list. Maintain daily log on status of work in progress including reasons for delays.

Environment: Works in all areas including MAB and pad from receipt of vehicle to launch. Reports to shop department manager.

Qualifications: Ability to organize and coordinate activities of modification, checkout and test of vehicle with all affected groups. Must have working knowledge of design, inspection, checkout and scheduling. Requires a total of five years education and experience in scheduling and monitoring shop work, including recent experience in research and development shop work. Must be able to assess the affect of delays on shop work completion schedules.

POSITION DESCRIPTION

POS. NO. 3-2

Position Title: SS/A STRUCTURES MECHANIC

General Features:

Position Summary: Perform vehicle alignment functions, structural modifications, and other vehicle handling functions. Remove and replace cover plates. Mate, demate, and handle orbital-stage vehicle under technical direction of SS/A engineer. Layout, cut and fabricate by riveting structural parts for the orbital stage vehicle. Perform developmental fabrication as required by engineering order.

Environment: Works for shop supervisor under technical direction of SS/A engineer on the launch pad and the missile service tower. Retires to blockhouse a member of the Red Crew during countdown. Works in areas requiring strict adherence to safety regulations.

Qualifications: Must have training and experience in fabrication of sheet metal and structural metal parts. Must be adept in use of mechanic's tool, and power operated tools such as drill, power screwdriver, riveting hammer, etc. Must be able to make layouts and fabricate parts in accordance with engineering prints and engineering orders. Must be able to join structural parts by riveting and welding. Must have detailed knowledge of safety regulations pertaining to work areas.

POSITION DESCRIPTION

POS. NO. 3-3

Position Title: SS/B PROPULSION MECHANIC

General Features:

Position Summary: Inspects engine and related components and systems such as fuel, hydraulic, and pressurization for security of attachment, corrosion, freedom of movement (movable parts) etc. Prepares propulsion system for functional tests by attaching necessary tubing, flex lines, cabling, gauges, and other measuring devices as required. Performs modifications, repairs, and/or maintenance as applicable to the propulsion system, compiles data from gauges and other measuring devices as required. Performs engine servicing functions. Performs leak checks.

Environment: Works in Missile Assembly Building, Complex Service Building, and launch complex on the pad or in the Missile Service Tower. Reports to the shop supervisor through the lead technician.

Qualifications: Must have training and experience in high and low pressure gas handling. Must be able to fabricate and install high pressure gas plumbing. Should have working knowledge of internal mechanism of gas regulation, check valves, control valves, and quick disconnects. Must be able to read and interpret engineering blueprints and engineering orders. Must have complete knowledge of safety regulations applicable to high pressure gas handling. Must have a minimum of 5 years experience, 3 of which may be in the jet propulsion field as flight test mechanic. Two years experience must be in missile or satellite launch systems. Must have a very good general knowledge of mechanics, electricity, pneumatics, hydraulics, and fuel systems. Ability to adapt to an R&D environment is essential. Must have detailed understanding of safety regulations.

POSITION DESCRIPTION

POS. NO. 3-4

Position Title: SS/C ELECTRICAL TECHNICIAN

General Features:

Position Summary: Assist in electrical testing of the vehicle and associated equipment in accordance with written test procedure or engineering work order. using common and special types of test equipment. Make modifications to vehicle wiring from engineering blueprints and schematics. Take voltage readings and verify that the voltages are within specified limits. Actuate, check out, and install specialized missile batteries. Check out and install pyrotechnic devices. Arm and disarm pyrotechnic devices on the orbital stage vehicle. Check out, maintain, operate, and modify as required the support equipment required for electrical testing of the vehicle and for installation and checkout of pyrotechnic devices.

Environment: Works on and around launch pads, using engineering work orders and engineering prints. Uses all types of common electrical test equipment and tools. Careful observance of safety regulations is required while checking high voltage circuits and while working on the missile service tower and on Hi-Lift device. Works as required with the SS/B propulsion mechanic.

Qualifications: Must have experience in vehicle wiring modification, and checkout. Must be able to use quickly any of the common types of electrical and electronic test equipment. Must have a clear and detailed knowledge of safety regulations for the area and type of work engaged in.

POSITION DESCRIPTION

POS. NO. 3-5

Position Title: SS/B PYROTECHNICS ENGINEER

General Features:

Position Summary: Review design of pyro system in vehicle and launch complex. Prepare procedures, issue engineering work orders and provide coordination and technical direction for pre-flight checkout of pyrotechnics circuits and for preflight installation of pyro devices. Has cognizance of safe handling, transporting and storage of explosives - including verification of on-hand supply of pyrotechnics to support all scheduled VAFB tests. Reads squib circuit monitor records after systems run and certifies squib circuits ready for flight. Will prepare Subsystem B pyro test procedures, wiring diagrams of all pyro systems, issue engineering work orders for performance of pyro operations, maintain a Subsystem B pyro status report indicating progress in modification, checkout and launching operations for each vehicle. Design and oversee the fabrication of any special test aids. Prepare trouble and failure reports.

Environment: Works in MAB, pyro checkout area and launch pad (gantry or horizontal). Reports to Subsystem B engineering group supervisor.

Qualifications: Engineering training with ordnance and electrical experience. Must have intimate knowledge of all vehicle and launch complex pyro devices and associated electrical circuits. Must be familiar with squib monitors at system test complex and pad, assuming proper training and experience background, and engineer will normally attain operational capability in six months.

POSITION DESCRIPTION

POS. NO. 3-6

Position Title: MISSILE TEST MECHANIC/ELECTRICAL AND ELECTRONIC

General Features:

Position Summary: Receive, qualify, install, and check out pyrotechnic devices and actuating devices in vehicle and AGE - including batteries. Perform bi-monthly inventory and monitor storage environment. Prepare for and transport class A, B, and C pyrotechnics under ICC regulations. Modify and check out pyrotechnics and devices in accordance with established test procedures or by Engineering Work Order. Install and check out destruct system and arming system. Disarm, remove, and make safe all pyrotechnics in event launch is cancelled. Prepare and witness on-base destruction of pyrotechnics.

Environment: Functions at pyrotechnics magazines, in the assembly and checkout area, on the launch pad and on-the-road. Reports to group supervision, (electrical, of System Support).

Qualifications: Experience in aircraft or missile electrical circuitry should total 3 to 5 years. Must have thorough knowledge of related test equipment and current rating of explosive devices. Requires approximately three months on-the-job training in procedures specific to launch pad operation.

POSITION DESCRIPTION

POS. NO. 3-7

Position Title: SS/D GUIDANCE TECHNICIAN

General Features:

Position Summary: Performs vehicle guidance modifications, repairs, checkout, and tests in accordance with test procedures and Engineering Work Orders. Performs bench checks of vehicle equipment.

Environment: Works in pad building and at vehicle in the Missile Service Tower. Follows technical direction of SS/D engineer under line supervision by System Support supervisor.

Qualifications: Must have electronic technical school training in electronic theory and in use and operation of standard electronic test equipment, plus experience on guidance and controls. Laboratory experience and familiarity with system test equipment operation is desirable. Must be able to perform test procedures in accordance with written instructions.

POSITION DESCRIPTION

POS. NO. 3-8

Position Title: PAYLOAD TECHNICIAN

Position Summary: Installs breakout boxes at pad during SS/H and payload compatibility checks. Monitors voltages to payload. Monitors command responses during simulated flight. Removes and reinstalls payload as necessary in preparation for launch day.

Environment: Works at the pad as assigned by the group supervisor of System Support. Receives technical direction from the payload leadman.

Qualifications: A thorough knowledge of basic electronics theory is essential. Must have high proficiency at trouble shooting, a thorough understanding of theory and operation of ground reconstruction electronics equipment and test consoles. Must be able to use standard and specialized test equipment, read and interpret electrical, mechanical, and electronics schematics and blueprints.

POSITION DESCRIPTION

POS. NO. 3-9

Position Title: SS/H ELECTRONIC TECHNICIAN

General Features:

Position Summary: Maintain, modify, repair, calibrate and test SS/H equipment in accordance with engineering work orders and established test procedures. Performs all test and modifications of airborne beacons and electromechanical tuners.

Environment: Works on Missile Service Tower and in Launch Pad Service Building. Reports to System Support coordinator.

Qualifications: Experience in maintenance, repair, modification, and trouble shooting electronic equipment is mandatory. Specific experience in repair, trouble shooting and modification of SS/H equipment is desirable.

POSITION DESCRIPTION

POS. NO. 3-10

Position Title: GEOPHYSICAL RESEARCH DIRECTORATE ENGINEER

General Features:

Position Summary: Evaluates the Geophysical Research Directorate (GRD) payload. Checks compatibility and design of instrumentation and directs GRD instrumentation checkout runs at Missile Assembly Building and pad. Directs GRD instrumentation laboratory calibrations of equipment and provides data analysis section with specified readout data ranges for system runs. Evaluates final launch condition documentation. Supervises performance of modifications as necessary.

Environment: Works at launch pad, to determine final status of instrumentation aboard the vehicle at the Missile Assembly Building and Launch Pad Service Building.

Qualification: Must have B. S. in Electrical Engineering or equivalent experience and be familiar with RF systems, transducers, recorders, and data analysis. Special experience in solar ultra-violet, cosmic radiation, and Micrometeorite sensor applications is mandatory. Familiarity with infrared measurement techniques is desirable.

POSITION DESCRIPTION

POS. NO. 3-11

Position Title: TELEMETRY ENGINEER

General Features:

Position Summary: Evaluate the composite telemetry system. Assure compatibility and design application of all system data sensing devices. Direct the checkout and calibration of the data handling system. Studies, analyzes and recommends revisions to telemetry documentation as necessary. Coordinate and direct the incorporation of all T/M modification as required. Confirm final vehicle status. Determine that all T/M components have been functionally tested and are ready for system checkout. Direct the checkout of critical instrumentation. Assure compatibility between vehicle and checkout equipment. Monitor final checkout and determine proper operation of the instrumentation system. Support all subsystems using T/M by evaluating readout data and analyzing malfunctions. Verify ascent and orbital operation readiness of major instrumentation quantities. Support launch countdown sequence as required.

Environment: Works in Missile Assembly Building at the ground station and at the launch complex. Reports to the engineering supervisor normally but during launch operations receives direction from the launch conductor.

Qualifications: Must have an engineering degree or equivalent experience specializing in electromechanical and instrumentation systems. Extensive experience with RF systems and instrumentation is required. A minimum of one year on the job training covering tape recorders, data compilation, data analysis, calibration techniques, precise measuring devices, and electrical and mechanical testing. Equipment is essential. Ability to apply engineering principles and experience to all phases of the composite telemetry system to assure flight readiness is mandatory.

POSITION DESCRIPTION

POS. NO. 3-12

Position Title: T/M (ELECTRONIC) TECHNICIAN

General Features:

Position Summary: Perform checkout, calibration, modification and functional operation of composite instrumentation system. Supports system runs, performs launch readiness checks of critical end instruments under technical direction of T/M engineer. Verify final vehicle T/M system status with respect to both electrical and mechanical equipment. Stand by during launch as technical support in event of abort or malfunction.

Environment: Works in T/M lab, MAB checkout complex and launch pad. Reports to T/M supervisor of system support.

Qualifications: First and second year college level courses in electronics, mathematics, shop electronics, and physics are desirable. Three years experience in electronics repair, troubleshooting, and maintenance is mandatory. An additional year of on-the-job-training on end instruments, T/M systems and all OGE, vehicle and instrumentation checkout consoles and test equipment is mandatory. Working knowledge of every phase of all telemetry equipment.

POSITION DESCRIPTION

POS. NO. 3-14

Position Title: RF ENGINEER/DATA TRANSMISSION

General Features:

Position Summary: Develop Design Criteria and Requirements. Coordinate and monitor design and manufacture of R-F data link equipment and problems of equipment maintenance and operation. Direct installation and checkout, develop procedures, reports, and preventive maintenance check lists. Monitor RF open and closed loop systems during functional period. Recommend modifications of equipment for product improvement and support of S/S modifications.

Environment: Works in Pad Service Building, Launch Operations Building, mast, service tower, and throughout pad area. Functions with associate contractors and with SS personnel. Reports to Group Supervisor Electronics/ Facilities.

Qualifications: Requires a B. S. degree in electronics or equivalent experience in design of electronic equipment. Extensive experience in R-F systems, high frequency transmitters and receivers, antenna systems design and checkout is required, frequency capabilities and geographical limitations. Must have knowledge of high frequency cabling and cable pressurization techniques.

POSITION DESCRIPTION

POS. NO. 3-15

Position Title: RF EQUIPMENT MAINTENANCE TECH.

General Features:

Position Summary: Trouble shoot and repair RF data link equipment; perform modification of RF data link equipment under technical direction of RF engineer/data transmission. Assist RF engineer/data transmission in checkout of equipment during run-in period. Perform preventive maintenance in accordance with schedule established for the equipment.

Environment: Works in Pad Service Building, LOB missile service tower, and throughout launch complex area. Works under technical direction of RF engineer/data transmission. Reports for job assignment and other administrative matters to System Support supervisor.

Qualification: Requires a minimum of two years of experience in trouble shooting, repairing and maintenance of electronic equipment which uses coaxial cable and wave guide circuitry. Must be familiar with theory and techniques of transmission of signal by coaxial cable and waveguide. Experience in repair and maintenance of the RD data link equipment at the launch complex is desirable.

POSITION DESCRIPTION

POS. NO. 3-16

Position Title: SS/H RF COMMAND AND CONTROL ENGINEER

General Features:

Position Summary: Responsible for initiating tests to determine system integrity and to ensure air-ground compatibility. Review systems designs, recommends design changes, and monitor tests of RF systems. Write test procedures, acceptance test specifications and determine advance requirements for test equipment.

Environment: Works within Missile Assembly Building and at launch complex facilities pad and Missile Service Tower.

Qualifications: B.S. in electronics or equivalent experience, and a minimum of one year specialized experience in microwave RF systems; a working knowledge of communications and controls for flight systems is required. Must have ability to write acceptance test specifications and engineering reports.

POSITION DESCRIPTION

POS. NO. 3-17

Position Title: SS/H ELECTRONICS TECHNICIAN/RF HOOKUPS

General Features:

Position Summary: Perform RF measurements such as VSWR measurements, insertion loss measurements, OGE equipment testing and checkout. Perform modifications to fit military specifications and qualifications. Clean up QA squawks and insure all plugs are mated properly for vehicle electrical and payload electrical compatibility. Troubleshoot and perform antenna radiation checks and perform preparations for simulated flight as well as standby for engineering support during simulated flight and during period R-5 day through launch. Continue to support engineering and clean up vehicle. Maintain up-to-date inspection log book.

Environment: Works on pad and mast. Reports to System Support Group Supervisor - Command H.

Qualifications: Must have working knowledge of S-band and acquisition beacons, command decoder sequence programmer, power control unit, F-data link transmitter, doppler beacon, H-timer, command receivers, mixer filter and intermediate storage unit. Ability to read and interpret schematics coupled with experience in equipment testing and checkout is mandatory.

POSITION DESCRIPTION

POS. NO. 3-18

Position Title: MISSILE SERVICE TOWER PAYLOAD ENGINEER

Position Summary: Assigns and directs special tests pertaining to the payload. Monitors vehicle instrumentation points, evaluates quality and status of video signals, and checks general status of the payload. Assists Payload Console Operator prior to launch to maintain environmental requirements of the payload.

Environment: Works at Missile Service Tower.

Qualifications: Requires B.S. in electrical engineering, or equivalent experience. Must be familiar with payload operations and circuitry, and countdown procedures.

POSITION DESCRIPTION

POS. NO. 4-1

Position Title: PAD CHIEF

General Features:

Position Summary: Prepares and implements detailed integrated pad work schedules based upon overall milestone schedule. Coordinates with booster personnel and PMR personnel. Prepares R-day schedule book. Prepares launch recovery plan and complex activation plan. Controls and directs pad activity during pre-launch and launch countdown until pad area is cleared. Has the responsibility for directing all work at the pad when emergencies require return to pad during periods when pad is normally cleared. Assists the launch conductor and the launch coordinator from the pad as required.

Environment: Duties are performed at the launch complex on the pad, on the upper levels of the missile service tower and in the Launch Operations Building. Work requires strict enforcement and adherence to established safety practices.

Qualifications: An engineering degree or equivalent combination of education and flight test experience is required. Must have a better than average overall knowledge of all subsystems and their interfaces. Engineering flight test experience in collecting, analyzing, and reducing data is necessary. A minimum of three years experience in all phases of launch complex work, both vehicle and facilities, is mandatory.

POSITION DESCRIPTION

POS. NO. 4-2

Position Title: OPERATIONS GROUND EQUIPMENT ELECTRICAL/ ELECTRONICS LEADMAN

General Features:

Position Summary: Calibrate, maintain, and modify OGE equipment at pad in accordance with engineering work orders and established test procedures. Turn on power for ground power equipment operation, and check operation of power systems. Operate Rack Set B circuit breakers and monitor function and operation of power supplies. Monitor and report circuit breakers status and meter reading in fuel room, acid room, and pneumatics room. Connect umbilical cabling on tower and maintain standby battery rack. Maintain, modify as required, and check out the ground power equipment. Supervise crew who perform the above work.

Environment: Leadman of a crew of technicians working on pad and in the electrical room, acid room, fuel room, transformer room of the Launch Pad Building, and on the Missile Service Tower. Reports to Electrical/ Electronics Group Supervisor, System Support.

Qualifications: Must have five years experience in electrical electronics repair and maintenance. Should have special training in operation and maintenance of Sanborn, Esterline Angus, and C & E recorders. Must have detailed knowledge of circuitry of OGE equipment at the pad. Must know ground power equipment, including pneumatics, and propellant loading systems. Experience with cabling of the mast and launch complex is mandatory. Must be able to supervise the work of technicians with similar skills.

POSITION DESCRIPTION

POS. NO. 4-3

Position Title: OPERATIONS GROUND EQUIPMENT ELECTRONICS TECHNICIAN

General Features:

Position Summary: Operate recorders under technical direction of subsystem engineer. Calibrate, maintain and modify GSE equipment at pad.

Environment: Works in pad support building electrical room. Reports to launch systems electrical/electronics group supervisor.

Qualifications: Must have experience in electronics repair with special training in operation and maintenance of Sanborn, Esterline Angus and C & E recorders. Must have detailed knowledge of circuitry in GSE equipment at the pad.

POSITION DESCRIPTION

POS. NO. 4-4

Position Title: OGE ELECTRICAL TECHNICIAN

General Features:

Position Summary: Repairs, maintains, modifies electrical equipment on the launch complex. Alters checkout gear to assure compatibility with the vehicle. Removes and replaces electrical components that cannot be repaired at the launch pad. Conducts electrical system checkout and test in accordance with established test procedures. Fabricates harness assemblies as required. Conducts continuity checks, trouble shoots, analyzes discrepancies, and determines repairs.

Environment: Performs duties both indoors and outdoors at the launch complex pad area, launch operations building, complex service building and missile service tower. Reports to the shop supervisor through the OGE electronic/electrical leadman.

Qualifications: Must have a complete knowledge of basic electricity. Must be able to read and understand complex electrical diagrams and schematics. Ability to apply basic theory to daily problems is essential. Familiarity with vehicle and related checkout equipment circuitry is mandatory. A minimum of two years experience in launch systems electrical fabrication and/or system testing and checkout is required.

POSITION DESCRIPTION

POS. NO. 4-5

Position Title: MECHANICAL TECHNICIAN - LEADMAN

General Features:

Position Summary: Under the technical direction of the cognizant engineer, installs, modifies, repairs, maintains, and operates various mechanical systems such as propellant, pneumatic and umbilical release. Is thoroughly familiar with schematics and drawings of the complete launch system and with operating procedures and functional capabilities.

Environment: Leadman of a crew of technicians who work on the launch pad, in the propellant and pneumatic rooms, the high pressure storage and control areas, umbilical mast trench, and in the upper levels of the missile service tower. Reports to Mechanical Group Supervisor, Syst. Supp't.

Qualifications: Must have five years experience in aircraft or missile manufacturing, repair and maintenance. Must be able to interpret blueprints and engineering orders and accomplish the actual fabrication and installation of changes. Should be mechanically skilled in fabrication and assembly of tubings, aluminum, steel and other parts required in the propellant and pneumatics systems. Must have complete knowledge of the functional capability and performance of the complete launch system. Must be able to supervise the work of technicians with skills similar to his own.

POSITION DESCRIPTION

POS. NO. 4-6

Position Title: FLUID SYSTEMS MECHANIC

General Features:

Position Summary: Installs, modifies, repairs, maintains and operates, propellant transfer, flushing, and other mechanical fluid systems equipment in accordance with engineering work orders and test procedures. Fabricates, cleans, and installs piping assemblies from high pressure tubing stock. Performs loading, draining, flushing, purging, and other cleaning operations on the propellant systems. Sets up propellant systems for remote or automatic operation. Fabricates, installs, tests, umbilical couplings, flexible hoses, and release cable assemblies. Performs maintenance and repair activities as required by engineering work order and established test procedures.

Environment: Works in the propellant (IRFNA and UDMH) rooms, on the launch pad, in the umbilical mast trench area, and in the upper levels of the missile service tower. Reports to the System Support supervisor.

Qualifications: Requires a minimum of three years experience in aircraft or missile manufacture, repair and maintenance. Must be skilled in fabrication, assembly, installation and checkout of tubing systems, and parts as used in a fueling system. Should be able to work in hazardous areas for long periods.

POSITION DESCRIPTION

POS. NO. 4-7

Position Title: OPERATIONS GROUND EQUIPMENT ENGINEER

General Features:

Position Summary: Responsible for compatibility and operational integrity of power distribution systems. Recommends modifications of power cabling and power distribution system as required to provide compatibility with other systems of the launch complex. Gives technical direction to ground power electrical technicians in maintenance, repair, modification and checkout of the power distribution system including power distribution Rack Set B.

Environment: Works at the Launch Pad Building, acid room, fuel room, transformer room and on the Missile Service Tower. Gives technical direction to ground power equipment electrical technicians.

Qualifications: Requires a B.S. degree in electrical engineering or the equivalent in experience in electrical system design. Experience design and design modification of missile launch systems is mandatory. One or more years experience in launch complex electrical system is desirable. Knowledge of the electrical power requirements for satellite launch from Launch Complex 1 is mandatory. Familiarity with launch procedures is desirable.

POSITION DESCRIPTION

POS. NO. 4-8

Position Title: GROUND POWER EQUIPMENT ELECTRICAL TECHNICIAN

General Features:

Position Summary: Turn on power for ground power equipment operation, and check operation of power systems. Operate Rack Set B circuit breakers and monitor function and operation of power supply. Responsible for circuit breakers and meter reading in fuel room, acid room, pneumatics room. Connects umbilical cabling on tower and maintains standby battery rack. Maintains, modifies as required, and checks out ground power equipment.

Environment: Functions as pad in acid room, fuel room, transformer room, and on tower. Reports to Systems Support electrical/electronics group supervisor.

Qualifications: Background in fundamentals of electricity and on-the-job training for familiarization with ground power equipment, with pneumatics, with propellants loading systems, and with cabling systems of mast and complex is mandatory.

POSITION DESCRIPTION

POS. NO. 4-9

Position Title: SS/D GUIDANCE TEST PANEL ENGINEER

Position Summary: Monitors SS/D operation and status during checkout and countdown using SS/D test panel. Collects, analyzes, and reduces data using the outputs of the guidance test panel. Monitors the operation of hard line recorders. Determines SS/D equipment readiness for launch. Determines cause of variation from normal operation during checkout of SS/D during countdown in accordance with test procedure. Recommends and makes necessary changes to test procedures. Recommends design changes in SS/D equipment as required to maintain compatibility between SS/D of the vehicle guidance and the launch complex.

Environment: Works in Launch Pad Service Building and reports to Launch Conductor during countdown. May interchange positions with the Guidance Console operator. May work in the Guidance Checkout Trailer.

Qualifications: Requires B.S. in engineering, or equivalent experience, plus extensive experience with the Satellite Guidance and Control System and with the launch complex guidance and control equipment. Must be thoroughly familiar with launch operation procedures. Must be able to perform bench checks in case of guidance equipment failures. Must be able to monitor checkout of the guidance system and to write test procedures.

POSITION DESCRIPTION

POS. NO. 4-10

Position Title: SS/H TEST PANEL ENGINEER (RFP)

General Features:

Position Summary: Monitor all information brought out to the SS/H test plug rack in Launch Pad Service Building. Conduct trouble shooting tests of SS/H equipment. Assures safety of SS/H equipment at the launch complex. Give technical direction to maintenance technicians during SS/H equipment trouble shooting. Monitor recording of hard-line data and analyze hard-line data for SS/H.

Environment: Mans R-F test panel in the Launch Pad Service Building and reports to launch conductor during checkout and countdown.

Qualifications: Normally requires a B.S. degree in electrical or electronic engineering plus one or more year's system experience in operation, maintenance, and repair of SS/H equipment.

POSITION DESCRIPTION

POS. NO. 4-11

Position Title: SS/D TEST PANEL TECHNICIAN

General Features:

Position Summary: Monitors, SS/D functions during pre-flight checkout using Lockheed Guidance Panel of Rack Set C in the Launch Pad Building. Operates test panel during SS/D checkout. Checks out Lockheed guidance panel, performs maintenance, repair, and modification under technical direction of the SS/D test panel engineer. Monitors operation of the SS/D recorders in Rack Set C. Assures readiness of recorders for operation.

Environment: Works in vehicle checkout room of the Launch Pad Building. Receives technical direction from SS/D test panel engineer. Reports administratively to System Support supervisor.

Qualifications: Must have experience in operation of standard electronic test equipment, and in troubleshooting and repair of electrical and electronic equipment. Requires additional on-the-job experience in monitoring checkout of SS/D vehicle equipment from vehicle checkout room. An understanding of the SS/D vehicle equipment and the function monitored is desirable.

POSITION DESCRIPTION

POS. NO. 4-12

Position Title: SS/H RF PANEL TECHNICIAN

General Features:

Position Summary: Monitors SS/H checkout panel and recorders during pre-flight checks. Verifies panel readings, checks voltages, sets and operates recorders. Adjusts, modifies, calibrates RF panel and recorders as required. Maintains equipment and assures readiness for tests.

Environment: Works in vehicle checkout room of the Launch Pad Service Building. Takes technical direction from SS/H engineer and reports to the Syst. Suppt. supervisor.

Qualifications: A complete understanding of basic electricity and electronics is required. Must be thoroughly familiar with RF panel and SS/H recorders. Ability to troubleshoot, analyze, repair, or modify equipment from blueprints, schematics, or detailed wiring diagrams is mandatory. Normally 2 years experience associated with launch systems is required.

POSITION DESCRIPTION

POS. NO. 4-13

Position Title: MECHANICAL SYSTEMS ENGINEER/OGE ADVISOR

General Features:

Position Summary: Assure the functional integrity of the complete mechanical launch system. (Propellant, pneumatic, umbilical release etc.) Responsible for the design compatibility of all new equipment. Continually evaluate performance of system during countdown and prescribe corrective action for any abnormal operation.

Environment: Works in all areas of the launch pad and missile service building and tower, as well as the propellant and pneumatic control consoles in the Launch Operation Building. Returns to the pad as a member of the red crew during launch holds, aborts, or post launch evaluation. Reports to Launch Systems Mechanical Group Supervisor.

Qualifications: Mechanical Engineering Degree or equivalent experience plus five years of construction or equipment installation and checkout experience. Able to work with toxic materials, high explosives and high pressure gas in confined areas or high above the ground.

POSITION DESCRIPTION

POS. NO. 4-14

Position Title: PNEUMATICS ENGINEER

General Features:

Position Summary: Assure the functional integrity of all OGE and satellite pneumatic systems. Direct changing of configuration for remote or automatic launch as required. Check out, analyze, and prescribe correction of any malfunctions in the systems. Recommend design changes to eliminate problems or potential problems in reliability or operation of the system. Direct installation and checkout of new equipment. Direct repair and modification of existing equipment. Write test procedures when not engaged in launch,modification, or checkout operations.

Environment: Works in the launch pad pneumatic room, umbilical mast area, missile service tower upper levels, complex service building, and launch operations building. Work is occasionally hazardous. Reports to the Launch Systems Mechanical Group Supervisor.

Qualifications: A B.S. degree in mechanical engineering, or equivalent experience is necessary plus a minimum of three years in operations, maintenance, design and/or manufacture of pneumatic equipment and pneumatic-operated systems.

POSITION DESCRIPTION

POS. NO. 4-15

Position Title: PNEUMATICS TECHNICIAN

General Features:

Position Summary: Operate controls on pneumatic control unit to route gases to proper area for use at time of launch. Prepare associated lines, valves and other equipment, modify, repair, and maintain the pneumatic system. Calibrate gages and regulators. Support all OGE functional tests prior to launch and functions as member of launch team on R-zero day. Remove, replace, or repair any damaged equipment after launch. Become a member of Red Crew during launch.

Environment: Works as member of launch team on R-zero day on pad in pneumatics high and low pressure areas, indoors. Works under technical direction of pneumatic engineer. Reports to System Support Supervisor. Work requires strict adherence to safety regulations.

Qualifications: Must have training and experience in high and low pressure gas handling. Must be able to mock up, fabricate and install high pressure gas plumbing. Should have working knowledge of the internal mechanisms of regulators, check and relief valves, and pressure recording equipment. Must be able to read and interpret gas flow schematics and mechanical prints. Must be thoroughly familiar with safety precautions and procedures required to handle high pressure gas.

POSITION DESCRIPTION

POS. NO. 4-16

Position Title: VEHICLE TEST PLUG EQUIPMENT ENGINEER

General Features:

Position Summary: Responsible for electrical modifications, calibrations, checkout, and directs launch monitoring assistance of controls and readouts of the TPE. Perform Systems Analysis to ensure TPE capability on all subsystems for individual vehicles. Investigate modification requirements of the vehicle test plug equipment, evaluate and incorporate engineering changes. Ascertain blueprint coverage, and change if required. Write test procedures for systems checkout. Modify vehicle functional generator for systems checkout. Provide engineering support for systems checkout, for vehicle compatibility tests and for vehicle systems tests. Implement instrumentation and recording requirements.

Environment: Work in LPSB electrical room and pad area as required during modifications, checkout, and launch.

Qualifications: Requires an engineering degree or equivalent in education and experience. Requires one or more years experience with AGE monitoring and control systems.

POSITION DESCRIPTION

POS. NO. 4-17

Position Title: AIR CONDITIONING AND REFRIGERATION ENGINEER

General Features:

Position Summary: Assure that the vehicle and payload conditioned air is being delivered at the proper temperature and relative humidity. Monitor the fuel and oxidizer chilling operation to assure that propellant temperatures are within specified limitations prior to vehicle loading. Monitor the incorporation of any modifications to the air conditioning equipment to prevent violation of system design specifications. Assist in post launch inspection of pad to determine the extent of damage to air conditioning ducting. Initiate repair work orders. Monitor and approve repair work.

Environment: Perform duties both indoors and outdoors at the launch complex during pre-launch and post-launch operations and also at the facility engineering area. Coordinates with the air conditioning console operator. Reports to the Mechanical Engineering Supervisor.

Qualifications: Requires a B.S. degree in mechanical engineering with specialized experience in air conditioning and refrigeration. Must have a minimum of 1 year experience with specially designed highly complex electronically instrumented refrigeration and air conditioning equipment. Must have a good working knowledge of the vehicle and payload air conditioning requirements.

POSITION DESCRIPTION

POS. NO. 4-18

Position Title: PROPELLANT ENGINEER

General Features:

Position Summary: Propellant Engineer is responsible for the performance of, and the modification work and functional checkout of the propellant transfer sets in the IRFNA and UDMH rooms. Directs complete scale calibration and checkout of propellant transfer equipment. Directs the performance of modification work, repair, and maintenance of the propellant transfer set. Direct and approve the proper calibration of weight scales. Direct the calibration and checkout of transducers. Direct the functional check of the pad propellant system. Direct propellant loading through 10%. Monitor propellant chiller temperatures prior to and during 10% loading. Coordinate 10% scale weight with propellant console operator in launch control room. Assure that valving is properly set. Return to launch operations building and remain there with red standby crew. In the event of a malfunction of the launch complex propellant system, determine the nature of the malfunction, and direct repair as required.

Environment: Works in propellant rooms of the pad service building, the launch control room of the launch operations building, and in the launch complex technical support building. Performs functions indoors, outdoors on the launch pad, and on the service tower. Works under strict safety regulations. Reports to the Launch Systems Mechanical Group Supervisor.

Qualifications: Must have an engineering degree or equivalent experience in hydraulics, pneumatics, and fluid systems. A complete knowledge of propellants and precision measuring devices is mandatory. A minimum of one year experience in satellite propellant systems and propellant sets is essential.

POSITION DESCRIPTION

POS. NO. 4-19

Position Title: PROPELLANT SYSTEMS TECHNICIAN/MECHANICAL

General Features:

Position Summary: Maintain, modify and repair all types of propellant equipment such as scale mechanisms and propellant tanks and vehicle propellant systems. Functionally check out systems. Make calibrations and pressure checks, load and unload propellants and cleaning fluids. Flush and purge propellant systems. Modify equipment per engineering drawing release. Flush and purge tanks. Check for leaks. Check weight and balance and calibrate scales. Calibrate and check out transducers. Perform facilities functional tests. Control fluid chilling or heating as required. Fill transfer sets from propellant source. Load propellant (through 10% loading). After 10% loading, return to launch operations building to act as member of Red Standby Crew. Return to pad in case of emergency. Secure pad after launch. Flush and purge fuel fluid equipment. Replace contaminated components and damaged parts. On occasion will operate console during systems checks to OGE except during launch.

Environment: Works in propellant rooms as operator of all equipment, under direction of Engineering Work Orders and operational procedures. Performs as member of launch team. Performs duties on pad during pre-launch and post-launch periods. Works under technical direction of the cognizant systems engineer. Reports to the System Support Supervisor. Work requires strict adherence to safety regulations.

Qualifications: Must be fully trained and experienced in handling of UDMH and IRFNA, plumbing, mechanical blueprint reading, hydraulics, and weights and measures. A good working knowledge of electricity is essential.

POSITION DESCRIPTION

POS. NO. 4-20

Position Title: PNEUMATIC ENGINEER/HIGH PRESSURE GAS SOURCE

General Features:

Position Summary: Responsible for the functional integrity of the pneumatic control systems, gas pressurization and other mechanical systems. Write test procedures to be followed for checkout, maintenance, and launch operation of the pneumatic systems. Assure compatibility with other launch equipment and vehicle requirements. Direct installation and checkout of new equipment and all repair and modification of existing equipment. Directs setup for remote or automatic operations for launch. Perform functional checkout of the system and analysis of performance.

Environment: Launch pad pneumatic room, high pressure area, umbilical mast area, upper level of Missile Service Tower, Complex Service Building and at pneumatic control console in Launch Operations Building. Reports to Launch Systems Mechanical Group Supervisor.

Qualifications: Requires a B.S. degree in ME or equivalent combination education and experience. Requires 3 years experience in operation, maintenance, design, or manufacture of pneumatic equipment and pneumatically operated systems.

POSITION DESCRIPTION

POS. NO. 4-21

Position Title: PNEUMATIC TECHNICIAN/HIGH PRESSURE GAS SOURCE

General Features:

Position Summary: Fabricate, clean and install piping assemblies from high pressure tubing stock. Perform functional and leak checks, flush, purge, and other cleaning operations on the pneumatic system. Set up the system for automatic or remote operation. Fabricate and install umbilical coupling release cable assemblies, install and check out all umbilical couplings and flex hoses to the vehicle and perform maintenance and repair activities to the pneumatic and umbilical release systems under technical direction of Pneumatic Engineer, under supervision of the Mechanical Group Supervisor, System Support.

Environment: Works in launch pad high pressure gas storage area at high pressure control cabinets in pneumatic control room, in the umbilical mast trench area and in missile service tower upper levels. Reports to Mechanical Group Supervisor, System Support.

Qualifications: Skill in fabrication and assembly of flared tubing parts, installation and checkout in high pressure gas system. Must have 3 years experience in missile or aircraft maintenance, repair or manufacturing.