OPERATION MANUAL

SMS 548

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10393-2-1276-31	6 Aug 63	7 Aug 63	4 Nov 63		
10393-1-4-0840A-31	12 Aug 63	19 Sept 63	24 Oct 63	A-6	15 Nov 63
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10393-1-4-0961-31	25 Sept 63	29 Nov 63			
10393-1-1-1861-31	6 Jan 64	7 Jan 64			
10393-1-2-1656-31	7 Nov 63	10 Dec 63			
10393-1-1-1998-31	22 Jan 64	29 Jan 64			

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*3-115A	14 Oct 63
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3-95A	30 Jan 64
3-97A	30 Jan 64
3-114A	30 Jan 64
3-114BA	30 Jan 64

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CHANGED 14 JANUARY 1964
CHANGED 30 JANUARY 1964
THIS CHANGE 2 FEBRUARY 1964

10393-1-1-1999-31
10393-1-2-2000-31

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10393-1	6 Aug 63	7 Aug 63	4 Nov 63		
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10393-1-2-2000-31	22 Jan 64	27 Jan 64			

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CHANGED 11 FEBRUARY 1964
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THIS CHANGE 21 FEBRUARY 1964

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10393-1-1-1861-31	6 Jan 64	7 Jan 64	*27 Jan 64		
10393-1-2-1656-31	7 Nov 63	10 Dec 63	*10 Feb 64		
10393-1-1-1998-31	22 Jan 64	29 Jan 64			
10393-1-1-1999-31	22 Jan 64	27 Jan 64			
10393-1-2-2000-31	22 Jan 64	27 Jan 64			
10393-1-1-2048-31	30 Jan 64	5 Feb 64			
10393-1-1-2047-31	28 Jan 64	7 Feb 64			
10393-1-2-2091-31	10 Feb 64	11 Feb 64			
10393-1-1-2105-31	14 Feb 64	14 Feb 64			
10393-1-1-2110-31	18 Feb 64	19 Feb 64			
10393-1-5-1998-31	21 Feb 64	21 Feb 64			

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10393-1-1-2047-31	28 Jan 64	7 Feb 64			
10393-1-2-2091-31	10 Feb 64	11 Feb 64			
10393-1-1-2105-31	14 Feb 64	*14 Feb 64	*3 Mar 64		
10393-1-1-2110-31	18 Feb 64	19 Feb 64	5 Mar 64		
10393-1-5-1998-31	21 Feb 64	21 Feb 64			
10393-1-5-1998A-31	5 Mar 64	6 Mar 64			
10393-1-5-2110-31	6 Mar 64	6 Mar 64			

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IV. INSPECTIONS

DISCREPANCIES:	STATUS:	DATE OF INSPECTION:
NONE	S	11 Aug 64
	SIGNATURE AND SECTION OF INSPECTOR:	

V. INSTRUCTIONS

SECTION II

* REPLACED SUPPLEMENTS AND INTERIM PROCEDURES WILL BE LINED OUT IN RED PENCIL.

IF THIS FORM IS TO BE USED FOR CARD CHECKLIST, FOLD ALONG THE CENTER LINE OUTSIDE OF THE BORDER OF THE FORM.

SECTION III

ANY INDIVIDUALS INITIALS APPEARING IN SECTION II WILL COMPLETE SECTION III ON A ONE TIME BASIS.

SECTION IV

THE STATUS BLOCK WILL BE FILLED IN BY THE INSPECTOR USING THE LEGEND: S FOR SATISFACTORY AND U FOR UNSATISFACTORY

OPERATIONS MANUAL STATUS

T.O. 21M-CGM16E-1-1

I. IDENTIFICATION OF BOOK HOLDER

NAME AND GRADE	CREW NR	DATE OF BOOK ISSUE
CORT, DAVID V. A2C	R-12	15 NOV 63

II. RECORD OF ENTRIES

A. CHANGES			B. SUPPLEMENTS			C. INTERIM PROCEDURES		
DATE OF CHANGE	DATE ENTERED	INITIALS	SUPPLEMENT LETTER	DATE ENTERED	INITIALS	NUMBER	DATE ENTERED	INITIALS
1 MAR 63	15 MAR 63	dc	E	30 MAR 63	dc			
15 MAR 63	25 OCT 63	DVC	BD	6 DEC 63	dvc			
3 JUN 63	25 OCT 63	dc	M	27 JAN 64	dvc			
28 JUL 63	25 OCT 63	dc	FS 30 JAN 64	18 FEB 64	DVC			
30 JUL 63	25 JAN 64	dc	FS 2 FEB 64	18 FEB 64	dvc			
15 NOV 63	27 JAN 64	DVC	REPLACEMENT PAGES	10 APR 64	dc			
10 FEB 64	27 APR 64	DVC	SS-1 SAFE SUPPLEMENT	23 APR 64	dc			
			FS 21 FEB 64	27 APR 64	dvc			
			FS 6 MAR 64	27 APR 64	dc			
			SS-2 SAFE SUPPLEMENT	6 MAY 64	dvc			
			SS-3 SAFE SUPPLEMENT	3 JUN 64	dc			
			SS-4 SAFE SUPPLEMENT	11 JUN 64	dc			

III. IDENTIFICATION OF INITIALS

INITIALS	NAME AND GRADE	CREW NR	DATE
DVC	CORT, DAVID V. A2C	R-12	20 JULY 63

\# 3210

SEE SUP M
" " BD
" " SS-1
" " E
" " SS-2
" " SS-3
" " SS-4

T.O. 21M-CGM16E-1-1
(Formerly T.O. 21-SM65E-1-1)

TECHNICAL MANUAL

OPERATION

USAF MODEL

CGM-16E

MISSILE WEAPON SYSTEM

SQUADRON COMPLEXES
OSTF-1
548
566
567
576-C

OPERATION MANUAL

AF04(694)-86

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PUBLISHED UNDER AUTHORITY OF THE SECRETARY OF THE AIR FORCE

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15 NOVEMBER 1962

AIR FORCE, Economy Litho Co., L.A. Calif., 4/17/64 —2000 (General Dynamics|Astronautics)

CHANGED 10 FEBRUARY 1964

SEE SUP 15-1
" " 15-2

T.O. 21M-CGM16E-1-1
(Formerly T.O. 21-SM65E-1-1)

TECHNICAL MANUAL

OPERATION

USAF MODEL

CGM-16E

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PUBLISHED UNDER AUTHORITY OF THE SECRETARY OF THE AIR FORCE

AIR FORCE C.C.P., Sacto., Calif. August 1964—2000

22 MAY 1964

GLOSSARY

TERMS

ABORT: Stopping a missile countdown sequence and performing backout procedures to return the missile and associated aerospace ground equipment to a safe condition.

AZIMUTH: The clockwise angle in degrees between north and a projected line of sight to the missile on the horizontal plane.

BIPROPELLANT: A liquid rocket propellant consisting of a liquid fuel and a liquid oxidizer, each separated from the other until combined to produce thrust.

BOGIE: A low, strongly built, four-wheeled cart which supports the rear of the missile semitrailer.

BOILOFF: Vaporization of liquid oxygen or liquid nitrogen as the temperature of the propellant mass rises during exposure to temperature above the boiling point of liquid oxygen or liquid nitrogen.

CAPACITANCE MANOMETER: A device which changes capacitance with changing hydrostatic pressure due to changing mass.

COLLIMATION: The process of adjusting an instrument so that its reference axis is aligned in a desired direction within a predetermined tolerance.

COUNTDOWN: A progress of events where the missile and launch equipment are sequenced to a point of missile launch.

DELUGE: A method of cooling a flame deflector with water to prevent damage from rocket blast.

DISCRETE SIGNAL: A signal using a fixed voltage to activate missile flight functions, such as staging and sustainer engine cutoff.

DUAL PROPELLANT LOADING: A countdown used for crew training or weapon system checkout.

ERROR SIGNAL: An electrical signal used to displace missile thrust chambers from a zero reference position to correct for missile deviation from a desired flight attitude.

GLOSSARY (Continued)

TERMS (Continued)

FEEDBACK TRANSDUCER: A device that measures one type of energy action and feeds the measured quantity back to a device controlling the original for comparison.

GIMBALS: A mechanical frame containing two mutually perpendicular and intersecting axes of rotation; a universal joint which allows a rocket engine or thrust chamber to swing within limits.

GYROSCOPE: An electromechanical device whose qualities to maintain rigidity in space and precession are used to furnish steering commands and to stabilize the guidance platform.

HEAD SUPPRESSION VALVE: The sustainer main oxidizer valve which varies the flow of oxidizer (liquid oxygen) to maintain current ratio between fuel pump discharge pressure and oxidizer dome pressure to prevent excessive pressure at the turbopumps.

HEAT EXCHANGER: A device which transfers heat from one fluid or substance to another.

HYPERGOLIC: The ability of propellants to ignite spontaneously when mixed.

INITIATOR: Used to ignite the pyrotechnic devices in the solid propellant gas generator.

READY STATE A: A known condition of readiness of the integrated weapon systems such that a countdown and tactical missile launching or training launch may be initiated immediately upon command. This condition is established by successful completion of the ready state A checklist and verified by the missile combat crew.

READY STATE B: A known condition of readiness of the integrated weapon systems such that a dual propellant loading countdown can be initiated through commit, simulated launch, abort, and return to a safe condition for the purpose of training or maintenance checkout. This readiness condition is established by a successful completion of the ready state B checklist sequence, and verified by the missile combat crew.

SERVOAMPLIFIER: An electronic device which converts and amplifies an alternating electrical input signal to direct current for actuating electrohydraulic servovalves.

SERVOVALVE: Electrohydraulic valve which acts in response to electrical control signals.

SITE HARD: That condition of a launch complex which renders it least susceptible to attack, e.g., missile lowered and all doors closed.

SLUG: A relatively small portion of liquid in a compact form.

GLOSSARY (Continued)

TERMS (Continued)

SQUIB: A small device used to fire an engine igniter or to activate a valve, not to be confused with a detonator which explodes.

SUMMING NETWORK: An electrical circuit which contains two or more signals to form a control signal.

TERMINAL BOARD: Insulating board upon which terminals are mounted.

TILLERMAN: One of the two operators who sit in cabs on each side of the four-wheeled bogie which supports the rear of the missile semitrailer, either of whom can steer the bogie.

WET COUNTDOWN: A countdown where all normal countdown events are sequenced except engine start and missile launch.

NON-STANDARD ABBREVIATIONS

ACP: Alternate command post.

AFSC: Air Force specialty code.

AGE: Aerospace ground equipment.

AIG: All-inertial guidance.

BMAT: Ballistic missile analyst technician.

CB: Circuit breaker.

CMG: Control monitor group.

CO_2: Carbon dioxide.

CTS: Checkout test station.

DMCCC: Deputy missile combat crew commander.

DPL: Dual propellant loading.

EMMCC: Erection mechanism motor control center.

EPPT: Electrical power production technician.

GLOSSARY (Continued)

NON-STANDARD ABBREVIATIONS (Continued)

EWO: Emergency war order.

EWO-DPL-EWO: Emergency war order to dual propellant loading to emergency war order.

EWO-LSR-EWO: Emergency war order to launch signal responder to emergency war order.

FRCP: Facilities remote control panel.

GN_2: Gaseous nitrogen.

HPU: Hydraulic pumping unit.

IFSS: Inflight safety system.

LCC: Launch control center.

LES: Launch enable system.

LN_2: Liquid nitrogen.

LOB: Launch operations building.

LO_2: Liquid oxygen.

LSB: Launch and service building.

LSI: Launch and service installation.

LSR: Launch signal responder.

MAMS: Missile assembly and maintenance shop.

MCC: Motor control center.

MCCC: Missile combat crew commander.

MDU: Mobile dynamic unit.

M&E: Mechanical and electrical equipment.

MEM: Missile engine mechanic.

GLOSSARY (Continued)

NON-STANDARD ABBREVIATIONS (Continued)

MER: Missile electrical repairman.

MFT: Missile facilities technician.

MFSS: Missile flight safety system.

MGS: Missile guidance set.

MMT: Missile maintenance technician.

MTP: Missile transfer panel.

NCU: Nitrogen control unit.

OSTF: Operational suitability test facility.

PU: Propellant utilization.

PLCU: Propellant level control unit.

PLM: Prelaunch monitor.

PLS: Propellant loading system.

PLTC: Propellant loading terminal cabinet.

PSC: Pressure system control.

RP-1: Rocket propellant.

RPIE: Real property installed equipment.

RV: Re-entry vehicle.

SAC: Strategic Air Command.

SMA: Squadron maintenance area.

SMS: Strategic missile squadron.

GLOSSARY (Continued)

NON-STANDARD ABBREVIATIONS (Continued)

SPGG: Solid propellant gas generator.

TCTO: Time compliance technical order.

TDDO: Time delay dropout.

TDPU: Time delay pickup.

VAFB: Vandenberg Air Force Base.

ALPHABETICAL INDEX

ALPHABETICAL INDEX (Continued)

ALPHABETICAL INDEX (Continued)

ALPHABETICAL INDEX (Continued)

ALPHABETICAL INDEX (Continued)

ALPHABETICAL INDEX (Continued)

ALPHABETICAL INDEX (Continued)

TABLE OF CONTENTS

INTRODUCTION

This manual includes weapon system description, receipt-through-launch operation plan requirements, and instructions for countdown and emergency conditions for the SM-65E Strategic Missile Weapon System. AFR 122-27 will apply.

Sections I and II are presented to familiarize personnel with the SM-65E Strategic Missile Weapon System and to define its operational and maintenance requirements. Section III provides personnel with normal operating procedures. Section IV provides emergency and tactical trouble analysis procedures. Section V presents the combat crew malfunction isolation procedures. Sections VI and VII provide operating limitations and crew duties, respectively.

The procedures in sections III and IV are also presented in abbreviated form in checklists. Checklists of abbreviated normal operating procedures are presented in T.O. 21-SM65E-CL-1-1-1 through T.O. 21-SM65E-CL-1-1-5. Checklists of abbreviated emergency and tactical trouble analysis procedures are presented in T.O. 21-SM65E-CL-1-1-6 through T.O. 21-SM65E-CL-1-1-10. A reference to the MCCC checklist shall also be considered a reference to the corresponding crew member checklist. These checklists, which are crew-member oriented, are used by the missile combat crew in performing normal, emergency, and tactical trouble analysis operations. The abnormal indication references in the amplified countdown procedures of section III provide a reference to both the trouble analysis procedures of section IV and the abbreviated emergency checklists, since the section IV table numbers and the checklist section numbers are the same. The operations detailed in this manual will require the following technical personnel for their accomplishment:

a. Missile Launch Officer (Missile Combat Crew Commander) (MCCC), Air Force Specialty Code (AFSC) 1825C.

b. Missile Launch Officer (Deputy Missile Combat Crew Commander) (DMCCC), AFSC 1825C.

c. Ballistic Missile Analyst Technician (BMAT), AFSC 312X4C.

d. Electrical Power Production Technician (EPPT), AFSC 543X0 (SMS 548, SMS 566, SMS 567).

e. Missile Facilities Technician (MFT), AFSC 541X0A (SMS 576-C and OSTF-1).

f. Missile Maintenance Technician (MMT), AFSC 443X0A (SMS 548, SMS 566, SMS 567).

The configuration of this manual is written and controlled by the configuration of the launch control system. Launch control system configuration is indicated by the control-monitor group part number listed in table 1-1.

SECTION I

DESCRIPTION OF THE WEAPON SYSTEM

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LIST OF ILLUSTRATIONS (Continued)

LIST OF TABLES

1-1. SCOPE.

1-2. This section presents a physical and functional description of the SM-65E Strategic Missile Weapon System. Included are descriptions of the SM-65E Strategic Missile, launch complex, missile and re-entry vehicle handling and transport, supporting squadron maintenance area, missile checkout operations, maintenance plan, systems, and a listing of personnel. The descriptions are presented to familiarize personnel with the major characteristics of the weapon system. No detailed functional theory or detailed physical descriptions are presented. For detailed descriptions, refer to applicable system organizational maintenance manuals.

1-3. The SM-65E Strategic Missile Weapons System is composed of an integrated system of equipment, personnel, and facilities which support, maintain, test, checkout, and launch the SM-65E Strategic Missile. Supply and maintenance support are provided by Systems Support Manager, prime Air Materiel Areas. Additional logistic support is provided by the parent airbase of the facility. An operational strategic missile squadron consists of nine launch sites located at varying distances from the parent airbase and one squadron maintenance area located at the parent airbase. Additional launch complexes (one each) are Operational System Test Facility -1 (OSTF-1) and SMS 576-C located at Vandenberg Air Force Base, California. Tables 1-1 and 1-2 present the nomenclature of major equipment and leading particulars of the weapon system.

1-4. LAUNCH COMPLEX.

1-5. A typical launch complex (figure 1-1) includes a launch operations building (LOB) and a launch and service building (LSB). Except for the roof and the equipment protruding from it, the buildings are completely underground. The launch and service building and the launch operations building are connected by a tunnel. Within each of these buildings are various items of real property installed equipment (RPIE) and aerospace ground equipment (AGE.). Each site is surrounded by a security fence which terminates at a gatehouse. The OSTF-1 complex (figure 1-2) has only the launch operations building underground. The SMS 576-C complex (figure 1-3) is completely above ground. Both OSTF-1 and SMS 576-C launch complexes contain instrumentation equipment and a utility building.

1-6. LAUNCH OPERATIONS BUILDING.

1-7. The launch operations building (LOB) is the nerve center of the site. The building is located approximately 100 feet from the launch and service building. Entrance to the LOB is provided through a tunnel from the launch and service building. An escape hatch in the roof of the LOB is provided for emergency exit. In addition, at SMS 576-C, entrance can be gained to the launch operations building through blast doors leading to a vestibule. A typical LOB (figure 1-4) contains the following rooms: launch control center (LCC), communications, facilities and power plant, battery, storage room, two offices, and a mess hall. At OSTF-1, the launch operations building (figure 1-5) contains the following rooms: launch control center, communications, mechanical equipment, instrumentation, conference, electrical substation, and an office. At SMS 576-C complex the launch operations building (figure 1-6) contains the

Table 1-1. Federal Supply Classification Nomenclature to Common Nomenclature

PART NUMBER	FSC NOMENCLATURE	COMMON NOMENCLATURE	LOCATION
2131380-501 (Radio CORP of America, New York, N. Y.)	Launch Control Console (type designator to be assigned)	Launch console	Launch control center
F-14001-3 (Aerojet General CORP, Azusa, CALIF.)	Checkout and Control Console Missile Destruct System OA-3195/GSW	Flight safety system checkout console	Launch control center (OSTF-1 and SMS 576-C)
27-68910-859 (General Dynamics/ Astronautics Division of General Dynamics CORP, San Diego, CALIF.)	Control-Monitor Group 1 of 4 2 of 4 3 of 4 4 of 4	Relay logic unit NO. 1 Relay logic unit NO. 2 Signal Responder NO. 1 Signal responder NO. 2	Launch and service building
27-95008 (General Dynamics/ Astronautics Division of General Dynamics CORP, San Diego, CALIF.)	Missile Erection Boom HLU-44/F	Erection boom	Launch and service building
GM43-E4 (Minneapolis Honeywell Missile Equipment Division, Pottstown, PENN.)	Pressure System Control (type designator to be assigned)	Pressurization control unit (PCU)	Launch and service building
5301021 (Kurz & Root CO, Appleton, WIS.)	Power Supply-Distribution Set PP-2537/GSW	28-VDC power supply	Launch and service building
27SE3005 (General Dynamics/ Fort Worth Division of General Dynamics CORP, Fort Worth, Texas)	Distribution Box (type designator to be assigned)	AC distribution box	Launch and service building

Table 1-1. Federal Supply Classification Nomenclature to Common Nomenclature (Continued)

PART NUMBER	FSC NOMENCLATURE	COMMON NOMENCLATURE	LOCATION
27SE3004 (General Dynamics/ Fort Worth Division of General Dynamics CORP, Fort Worth, Texas)	Remote Switching Control C-3183/GSW	Power control unit	Launch and service building
2-00031-539 (Arma Division of American Bosch Arma CORP, Garden City, N.Y.)	Missile Guidance Computer CP-488/DJN-2	Computer	Missile
2-00029-005 (Arma Division of American Bosch Arma CORP, Garden City, N.Y.)	Inertial Guidance Sensing Platform OA-2183/DJN-2	Platform	Missile
2-00044-085 (Arma Division of American Bosch Arma CORP, Garden City, N.Y.)	Missile Guidance Set Control C-3483/DJN-3	Control unit	Missile
27-49501 (General Dynamics/ Astronautics Division of General Dynamics CORP, San Diego, CALIF.)	Missile Launcher (type designator to be assigned)	Launcher	Launch and service building
1023000 (Radio CORP of America, New York, N.Y.)	Semitrailer Mounted Missile Electrical Systems Checkout Test Station (type designator to be assigned)	MAPCHE	Mobile (MAMS or launch area)
226E662G1 (General Electric CO, Schenectady, N.Y.)	Re-entry Vehicle Prelaunch Monitoring Set A/E24T-23(XC-1)	Nose cone monitor	Launch and service building

Table 1-2. Leading Particulars, SM-65E Strategic Missile Weapon System

FACILITIES OR EQUIPMENT	PARTICULARS
SM-65E Strategic Missile:	
Length	Overall, including airframe and component extensions, 81.75 feet
Diameter	Tank section 10.0 feet, tapering to 70.5 inches (48.0 inches with re-entry vehicle adapter) Booster section 10.0 feet, flaring to 16.0 feet
Propellants:	
Fuel	Rocket propellant number one (RP-1)
Oxidizer	Liquid oxygen (LO_2)
Propellant capacities:	
Fuel tank	Approximately 12,000 gallons
Liquid oxygen tank	Approximately 19,000 gallons
Propulsion:	
2 booster engines	330,000 pound thrust (sea level)
1 sustainer engine	57,000 pound thrust (sea level)
2 vernier engines	2,000 pound thrust (sea level)
Guidance System	Inertial guidance
Range	Greater than 5,500 miles
Launch complex:	Soft site: OSTF-1 and SMS 576-C. Semi-hard site underground: SMS 567, SMS 548, and SMS 566.
Launch operations building	Provides space for personnel facilities, communications equipment, and countdown and launch of the SM-65E Strategic Missile

Table 1-2. Leading Particulars, SM-65E Strategic Missile Weapon System (Continued)

FACILITIES OR EQUIPMENT	PARTICULARS
Launch and service building	Provides space and equipment for storage, erection, wet countdown, checkout, and launch of the SM-65E Strategic Missile
Utility building (OSTF-1) and SMS 576-C)	Provides space for crew training, offices, storage and real property installed equipment (RPIE)

following rooms: mechanical and electrical equipment, battery, communications, medical supply, observation gallery, and launch control center.

1-8. LAUNCH AND SERVICE BUILDING.

1-9. The launch and service building (LSB) (figures 1-7 through 1-9) contains equipment and facilities necessary to receive, store, monitor, erect, load, and launch the missile. The missile is received through a missile entry door that forms the front of the missile bay. Installed over this area is a track-mounted missile erection door. The door moves to one side to permit missile erection and launch. The large room to the west of the missile bay is the mechanical and electrical equipment room, which contains electronic equipment, air conditioning and ventilating equipment, electrical-mechanical equipment, and the fuel room. The liquid oxygen room is located to the east of the missile bay. Storage tanks for fuel and liquid oxygen (LO_2), and cylinders of helium (HE) and gaseous nitrogen (GN_2) are located in the area immediately outside the launch and service building.

1-10. The missile entry door is opened to allow the missile and missile semitrailer to enter the missile bay. Contact with a limit switch completes an indicator circuit when the door is closed, and illuminates a green indicator on the facilities remote control panel (FRCP). A red indicator on the facilities remote control panel is illuminated when the door is open.

1-11. The LSB blast protection system consists of the tunnel entrance door, fuel room door, mechanical and equipment area door, liquid oxygen room door, launch and service building escape hatch, associated electrical circuitry, and door position indicators which are monitored at the facilities remote control panel. The escape hatch is not provided with electrical circuitry to indicate an open or closed position. At OSTF-1 the liquid oxygen room has an additional door located in the external wall. No indicator circuitry is provided for this door.

1-12. UTILITY BUILDING.

1-13. The utility building is peculiar to OSTF-1 and SMS 576-C. At OSTF-1, the utility building contains a fuel furnace room and offices. At SMS 576-C, the utility building (figure 1-10) provides facilities for a mess hall, a training room, an office, a storage room, a

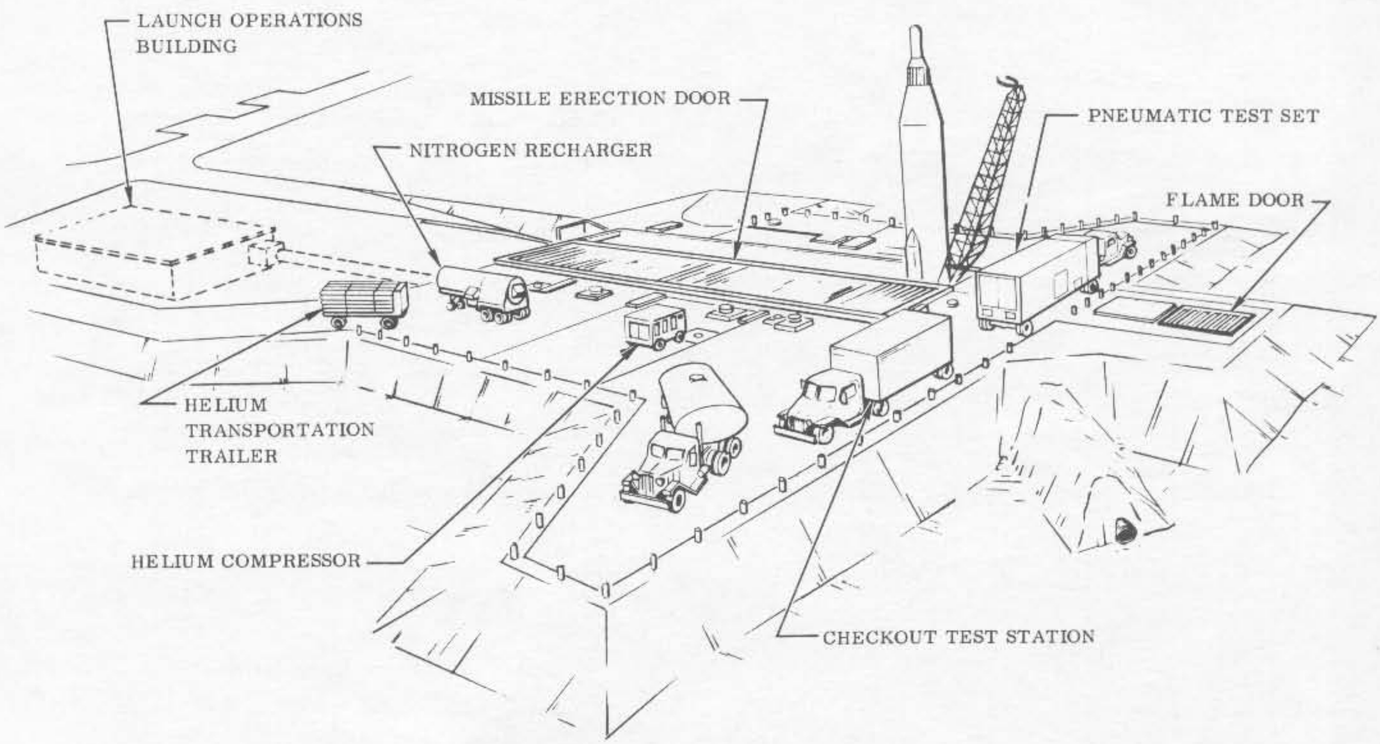

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Figure 1-1. Launch Complex (Typical)

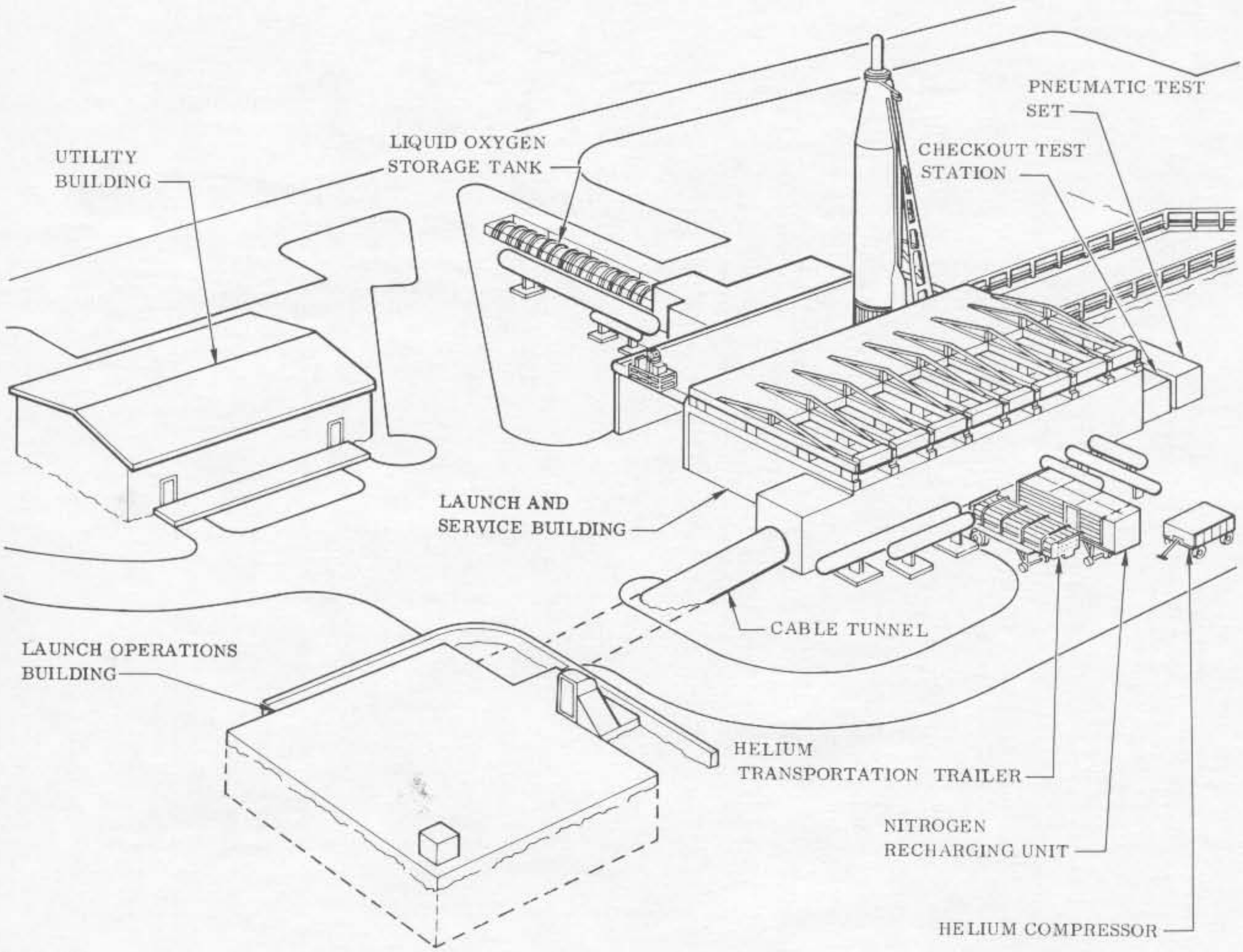


Figure 1-2. Launch Complex (OSTF-1)

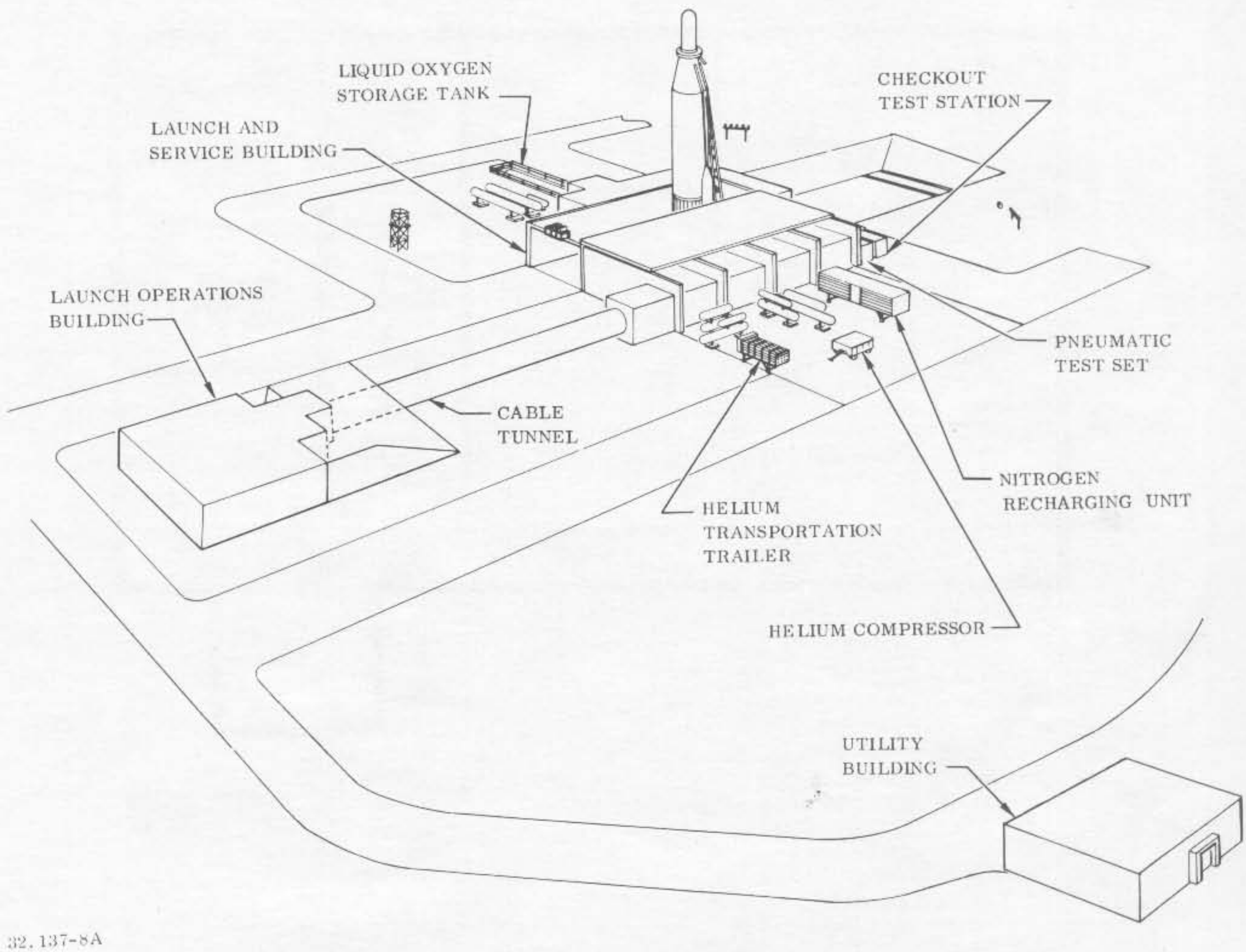
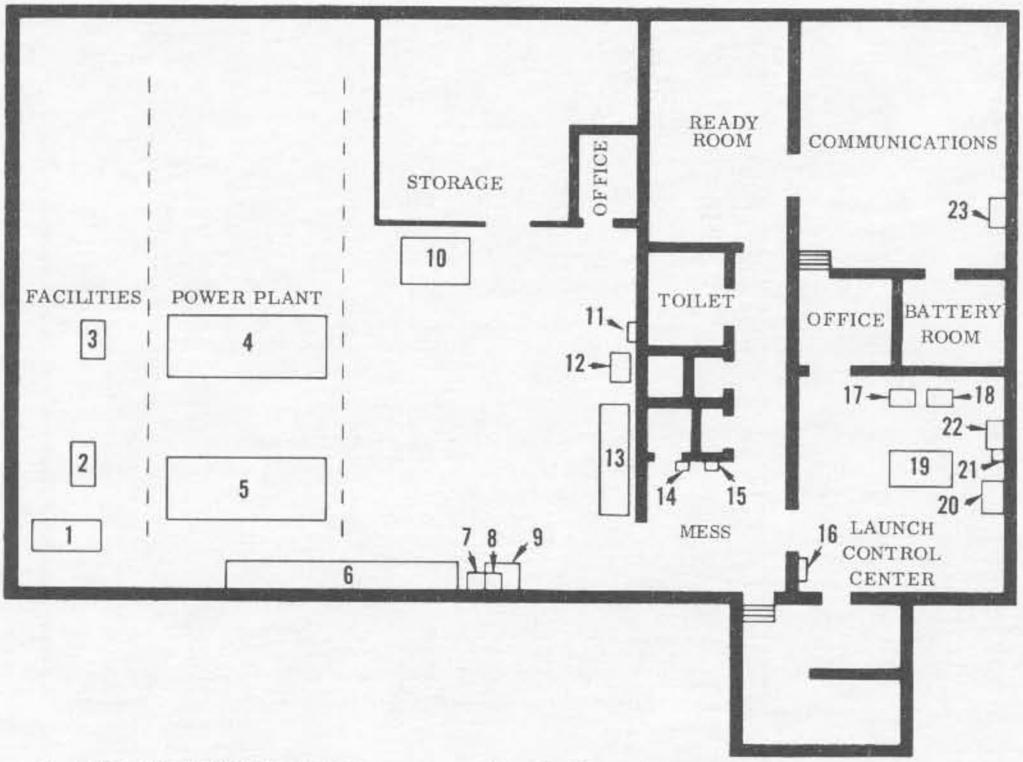


Figure 1-3. Launch Complex (SMS 576-C)



1 ENGINE INSTRUMENT PANEL
2 DIESEL CONTROL PANEL NO. 1
3 DIESEL CONTROL PANEL NO. 2
4 DIESEL GENERATOR NO. 2
5 DIESEL GENERATOR NO. 1
6 MOTOR CONTROL CENTER
7 LIGHTING DISTRIBUTION PANEL
8 DISCONNECT CONTACTOR
9 45-KVA TRANSFORMER
10 480-VOLT SWITCH GEAR
11 125-VDC DISTRIBUTION PANEL
12 125-VDC BATTERY CHARGER
13 125-VDC BATTERY RACK
14 LIGHTING PANEL B
15 LIGHTING PANEL E
16 LIGHTING PANEL A
17 TELEVISION MONITOR
18 TELEVISION MONITOR
19 LAUNCH CONTROL CONSOLE
20 FACILITIES REMOTE CONTROL PANEL
21 GATE CONTROL PANEL
22 FIRE ALARM MASTER CONTROL PANEL
23 COMMUNICATIONS PANEL D

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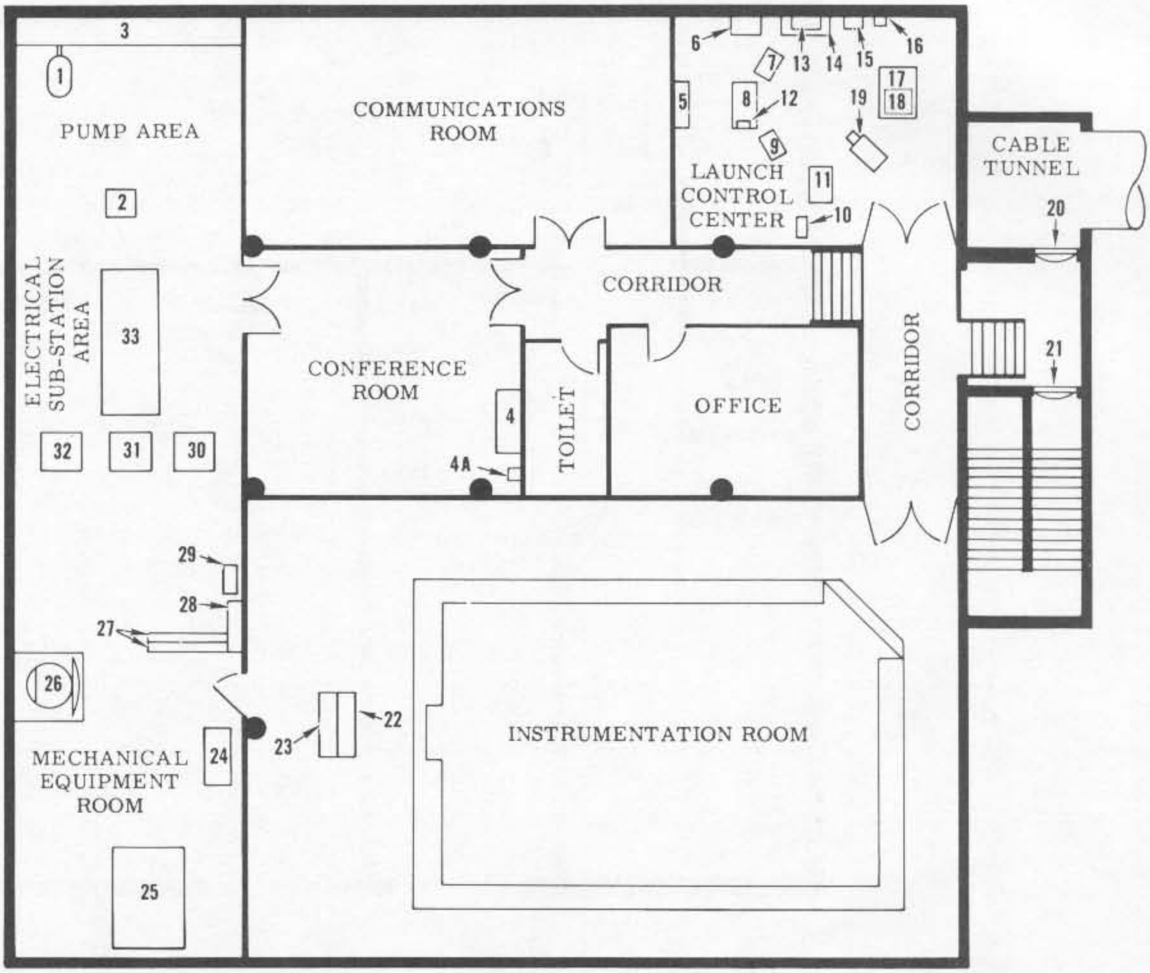
Figure 1-4. Launch Operations Building Equipment Location (Typical)



1 FIRE PUMP
2 FIRE PUMP PANEL
3 WATER DISTRIBUTION MANIFOLD
4 TELEVISION MONITORS
4A ALCO COMM/CONTROL PANEL
5 TELEVISON MONITORS
6 BLAST CLOSURE PANEL
7 TEST AND TRAINING CONSOLE
8 LAUNCH CONTROL CONSOLE
9 OBSERVER CONSOLE
10 RANGE SAFETY SYSTEM PANEL
11 SAFETY OFFICERS CONSOLE
12 AUXILIARY LAUNCH CONSOLE
13 ANNUNCIATOR PANEL
14 FACILITIES REMOTE CONTROL PANEL
15 TELEPHONE CONFERENCE GROUP
16 LAUNCH MAINTENANCE CONFERENCE NETWORK
17 MISSILE DESTRUCT SYSTEM CONSOLE
18 BEACON TRACKING PANEL
19 TELEVISION CAMERA
20 BLAST DOOR AT TUNNEL
21 BLAST DOOR
22 TELEVISION MONITORS
23 INSTRUMENTATION CONSOLE
24 COMFORT AIR CONDITIONING UNIT
25 ELECTRONIC CABINET AIR CONDITIONING UNIT
26 ESCAPE HATCH
27 125-VDC EMERGENCY BATTERY RACK
28 125-VDC EMERGENCY BATTERY CHARGER
29 AIR COMPRESSOR
30 SKID MOUNTED MOTOR GENERATOR SET 1
31 SKID MOUNTED MOTOR GENERATOR SET 2
32 SKID MOUNTED MOTOR GENERATOR SET 3
33 4160 UNIT SUBSTATION

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Figure 1-5. Launch Operation Building Equipment Location (OSTF-1)

1 COMMUNICATIONS EQUIPMENT POWER DISTRIBUTION PANEL
2 125-VDC BATTERY RACK
3 125-VDC DISTRIBUTION PANEL
4 AIR CONDITIONING SYSTEM FAN
5 HEATER
6 AIR CONDITIONING SYSTEM CONDENSER UNIT
7 COOLING WATER PUMP
8 MOTOR CONTROL CENTER
9 15-KVA TRANSFORMER
10 125-VDC BATTERY CHARGER
11 LIGHTING DISTRIBUTION PANEL
12 COMMUNICATIONS POWER DISTRIBUTION PANEL
13 TELEVISION MONITORS
14 TELEVISION CONTROL PANEL
15 AUXILIARY LAUNCH CONSOLE
16 LAUNCH CONTROL CONSOLE
17 TEST AND TRAINING CONSOLE
18 SAFETY OFFICERS CONSOLE
19 COMMUNICATION NET PANEL
20 MISSILE DESTRUCT SYSTEM CONSOLE
21 FIRE ALARM PANEL
22 FACILITIES REMOTE CONTROL PANEL
23 COOLING TOWER (ON ROOF)
24 LIGHTING PANEL E
25 LIGHTING PANEL B

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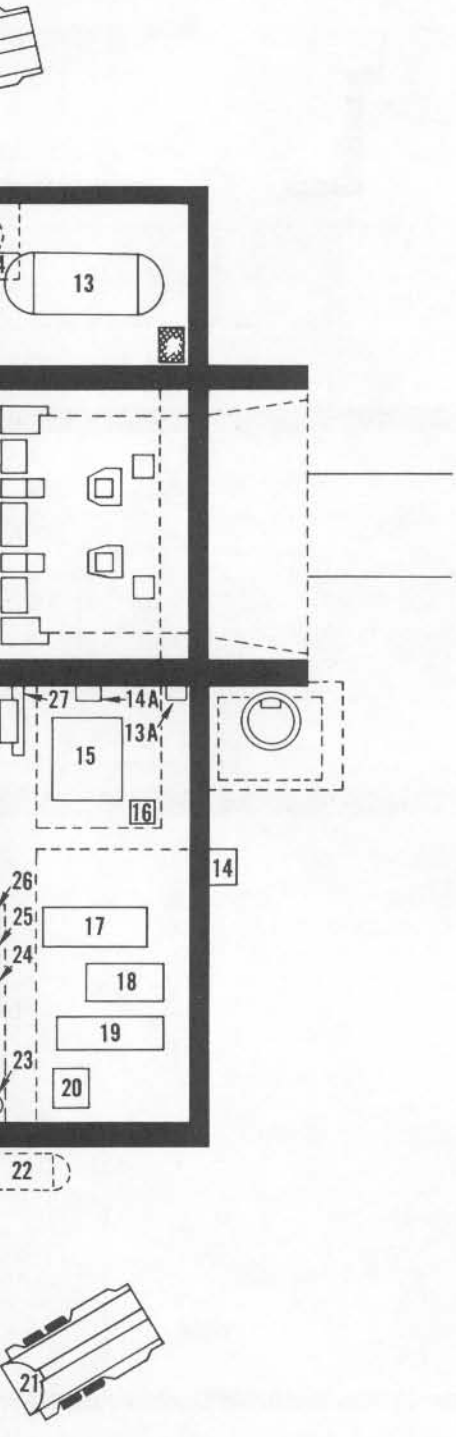
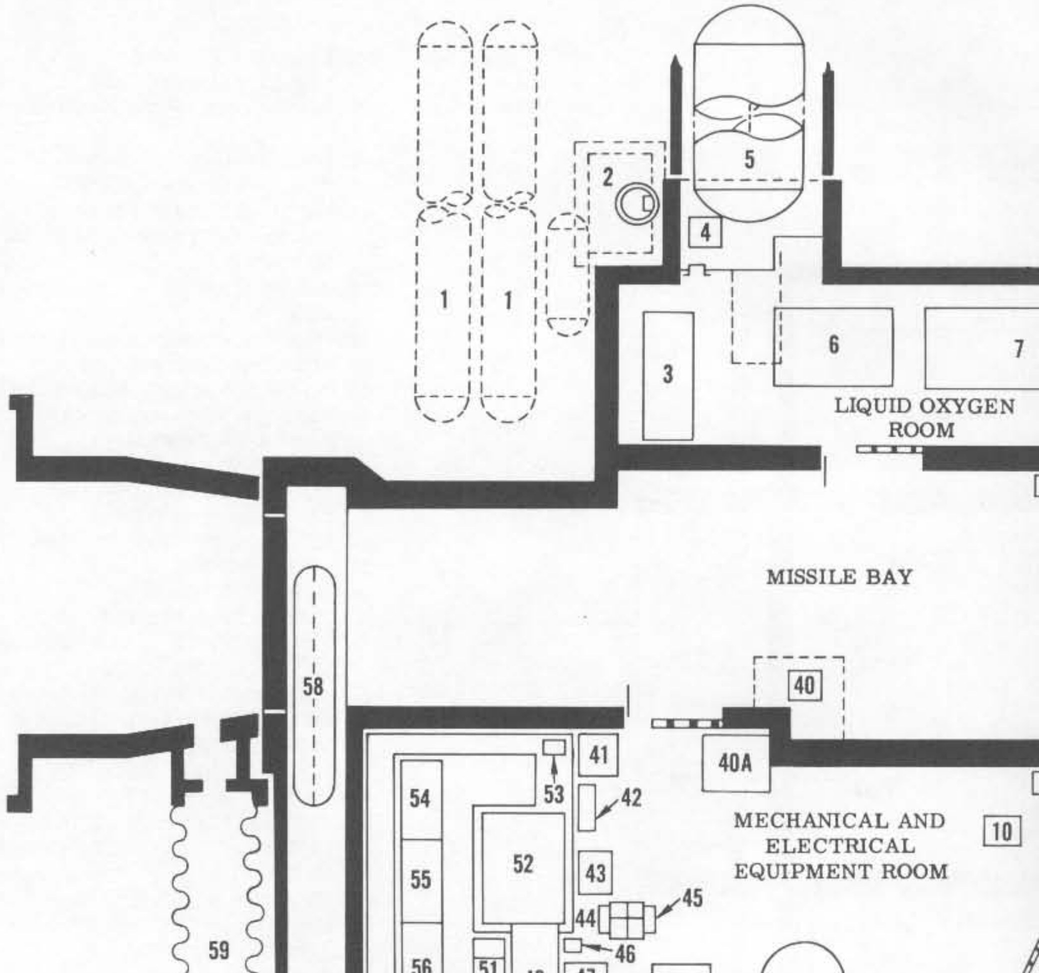
Figure 1-6. Launch Operations Building Equipment Location (SMS 576-C)



1 GASEOUS NITROGEN CYLINDERS
2 LIQUID OXYGEN DRAINAGE SUMP
3 SKID NO. 7
4 VACUUM PUMP
5 LIQUID OXYGEN STORAGE TANK
6 SKID NO. 9
7 SKID NO. 8
8 NITROGEN CONTROL UNIT
9 LIQUID OXYGEN SLUG TANK PANEL
10 OXYGEN DETECTION UNIT
11 LIQUID OXYGEN SUPPLY TRAILER
12 LIQUID OXYGEN CATCH TANK
13 LIQUID OXYGEN SLUG TANK
13A INERT FLUID INJECTION STAND
14 INTERCONNECTING BOX (CHECKOUT) (LOCATED ON ROOF)
14A T-12 REGULATOR
15 PRESSURE SYSTEM CONTROL
16 POWER CONTROL ASSEMBLY
17 HYDRAULIC PUMPING UNIT
18 ERECTION MECHANISM MOTOR CONTROL CENTER
19 MOTOR CONTROL CENTER
20 FACILITY INTERFACE CABINET
21 FUEL SUPPLY TRAILER
22 FUEL CATCH TANK
23 AIR RECEIVER
24 LIGHTING DISTRIBUTION CENTER
25 EMERGENCY LIGHTING PANEL B
26 LIGHTING PANEL A
27 STUBUP PANEL
28 INTERCONNECTING BOX (LAUNCH AND TEST)
28A MISSILE ORDNANCE TEST FIXTURE
28B POD AIR CONDITIONING CONTROL UNITS
29 REMOTE SWITCHING CONTROL
30 FUEL VAPOR DETECTION UNIT
31 SKID NO. 2
32 FUEL STORAGE TANK
33 GASEOUS NITROGEN CYLINDERS
34 LIQUID NITROGEN SUPPLY TRAILER
35 NITROGEN RECHARGER
36 HELIUM CYLINDERS
37 SKID NO. 1
38 LIQUID NITROGEN-HELIUM HEAT EXCHANGER
39 SKID NO. 5
40 COLLIMATOR PIT
40A MISSILE ERECTION DOOR HYDRAULIC POWER UNIT
41 POWER SUPPLY-DISTRIBUTION SET
42 STORAGE BATTERY
43 PROPELLANT LOADING TERMINAL CABINET
44 POWER PANEL PA
45 LIGHTING PANEL B
46 MOTOR GENERATOR DISCONNECT SWITCH
47 SKID-MOUNTED MOTOR GENERATOR
48 DISTRIBUTION BOX (AC)
49 PLATFORM
50 RE-ENTRY VEHICLE PRELAUNCH MONITOR
51 COUNTDOWN GROUP
52 ELECTRICAL PIT
53 POWER SUPPLY DISCONNECT SWITCH
54 CONTROL-MONITOR GROUP 4 OF 4
55 CONTROL-MONITOR GROUP 3 OF 4
56 CONTROL-MONITOR GROUP 2 OF 4
57 CONTROL-MONITOR GROUP 1 OF 4
58 MISSILE ENTRANCE DOOR
59 ENTRANCE TUNNEL
60 TUNNEL TO LAUNCH OPERATIONS BUILDING

Figure 1-7. Launch and Service Building Equipment Location (Typical)


LIQUID OXYGEN ROOM
MISSILE BAY
MECHANICAL AND ELECTRICAL EQUIPMENT ROOM
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1
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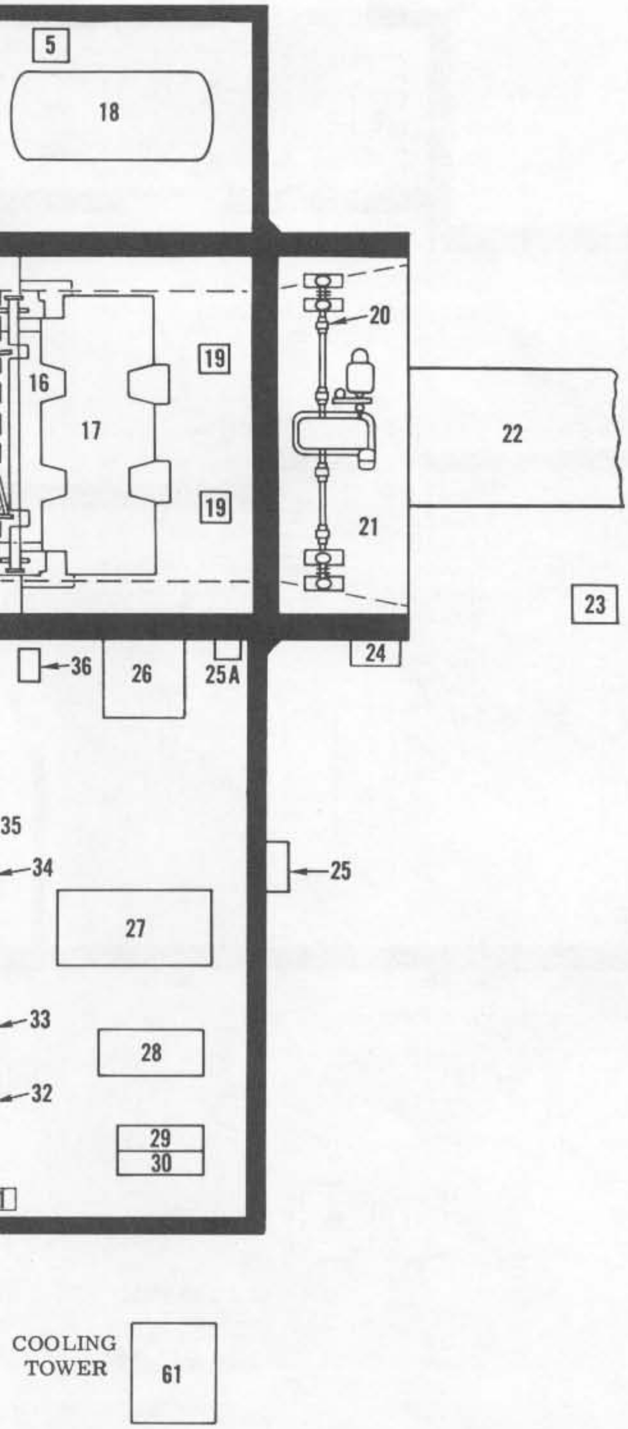
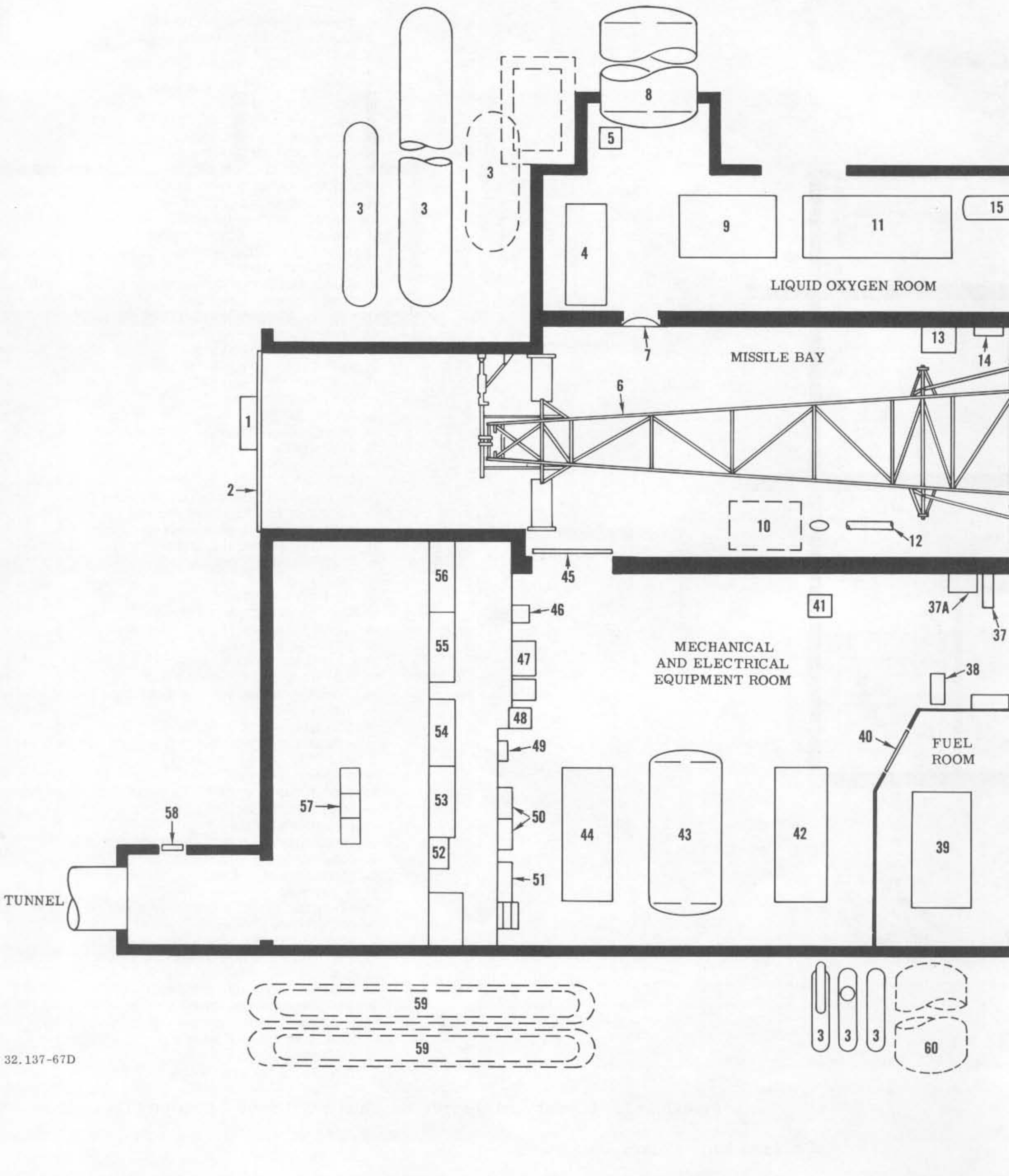


1 TELEVISION TOWER
2 MISSILE ENTRY DOOR
3 GASEOUS NITROGEN STORAGE CYLINDERS
4 SKID NO. 7
5 VACUUM PUMP
6 MISSILE ERECTION BOOM
7 LIQUID OXYGEN ROOM DOOR
8 LIQUID OXYGEN STORAGE TANK
9 SKID NO. 9
10 COLLIMATOR PIT
11 SKID NO. 8
12 INERTIAL GUIDANCE SIGHT TUBE ASSEMBLY
13 NITROGEN CONTROL UNIT
14 INTERCONNECTING BOX (RIGHT UMBILICAL)
15 LIQUID OXYGEN CATCH TANK
16 MISSILE LAUNCHER
17 FLAME PIT
18 LIQUID OXYGEN SLUG TANK
19 LAUNCHER AND BOOM SUPPORT PADS
20 BOOM ERECTION MECHANISM
21 FLAME DOOR
22 DRAINAGE CHANNEL
23 TELEVISION TOWER
24 INTERCONNECTING BOX (CHECKOUT)
25 75 KVA TRANSFORMER
25A INERT FLUID INJECTION STAND
26 PRESSURE SYSTEM CONTROL
27 HYDRAULIC PUMPING UNIT
28 ERECTION MECHANISM MOTOR CONTROL CENTER
29 MOTOR CONTROL CENTER NO. 1
30 MOTOR CONTROL CENTER NO. 2
31 FACILITIES INTERFACE CABINET
32 480V, 3-PHASE, 60-CYCLE, AC POWER DISTRIBUTION PANEL
33 112.5 KVA TRANSFORMER
34 FIRE ALARM CONTROL UNIT
35 OXYGEN DETECTION UNIT
36 STUBUP PANEL
37 INTERCONNECTING BOX (LAUNCH AND TEST)
37A MISSILE ORDNANCE TEST FIXTURE
38 FUEL VAPOR DETECTION UNIT
39 SKID NO. 2
40 FUEL ROOM DOOR
41 POD DEHUMIDIFIER
42 SKID NO. 1
43 LIQUID NITROGEN-HELIUM HEAT EXCHANGER
44 SKID NO. 5
45 MECHANICAL AND EQUIPMENT ROOM DOOR
46 PROPELLANT LOADING TERMINAL CABINET
47 POWER SUPPLY-DISTRIBUTION SET
48 SKID-MOUNTED MOTOR GENERATOR
49 DISTRIBUTION BOX (AC)
50 COUNTDOWN GROUP
51 RE-ENTRY VEHICLE PRELAUNCH MONITOR
52 AUXILIARY CONTROL-MONITOR GROUP
53 CONTROL-MONITOR GROUP 1 OF 4
54 CONTROL-MONITOR GROUP 2 OF 4
55 CONTROL-MONITOR GROUP 3 OF 4
56 CONTROL-MONITOR GROUP 4 OF 4
57 INSTRUMENTATION CABINETS
58 TUNNEL ENTRY DOOR
59 HELIUM CYLINDERS
60 FUEL STORAGE TANK
61 COOLING TOWER

Figure 1-8. Launch and Service Building Equipment Location (OSTF-1)



LIQUID OXYGEN ROOM
MISSILE BAY
MECHANICAL
AND ELECTRICAL
EQUIPMENT ROOM
FUEL
ROOM
TUNNEL
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3
4
5
6
7
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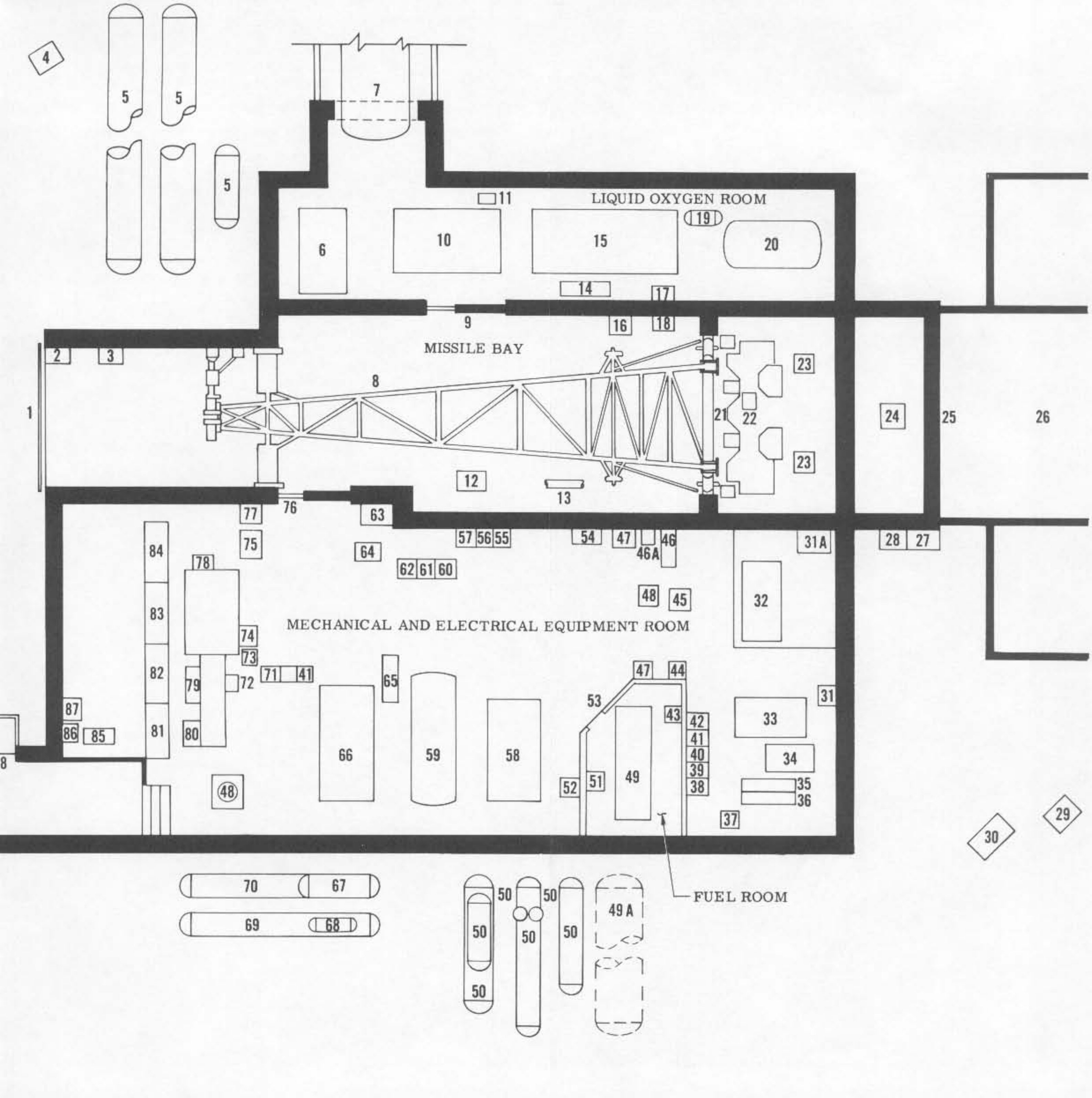
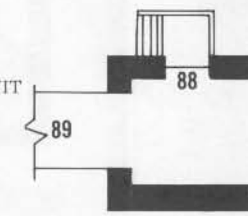


Figure 1-9. Launch and Service Building Equipment Location (SMS 576-C)

1 MISSILE ENTRY DOOR
2 TELEVISION CAMERA
3 MISSILE BAY EXHAUST FAN
4 TELEVISION TOWER
5 GASEOUS NITROGEN CYLINDERS
6 SKID NO. 7
7 LIQUID OXYGEN STORAGE TANK
8 MISSILE ERECTION BOOM
9 LIQUID OXYGEN ROOM DOOR
10 SKID NO. 9
11 LIQUID OXYGEN ROOM EXHAUST FAN
12 COLLIMATOR PIT
13 INERTIAL GUIDANCE SIGHT TUBE ASSEMBLY
14 LIQUID OXYGEN SLUG TANK PANEL
15 SKID NO. 8
16 NITROGEN CONTROL UNIT
17 OXYGEN DETECTION UNIT
18 INTERCONNECTING BOX (RIGHT UMBILICAL)
19 LIQUID OXYGEN CATCH TANK
20 LIQUID OXYGEN SLUG TANK
21 MISSILE LAUNCHER
22 FLAME PIT
23 LAUNCHER AND BOOM SUPPORT PADS
24 BOOM ERECTION MECHANISM
25 FLAME DOOR
26 DRAINAGE CHANNEL
27 INTERCONNECTING BOX (CHECKOUT)
28 PNEUMATIC TEST SET RECEPTACLE
29 TELEVISION GROUND INSTALLATION
30 TELEVISION FLOODLIGHTS
31 MECHANICAL AND EQUIPMENT AREA HEATER CONTROLS
31A INERT FLUID INJECTION STAND
32 PRESSURE SYSTEM CONTROL
33 HYDRAULIC PUMPING UNIT
34 ERECTION MECHANISM MOTOR CONTROL CENTER
35 MOTOR CONTROL CENTER NO. 1
36 MOTOR CONTROL CENTER NO. 2
37 FACILITY INTERFACE CABINET
38 75-KVA TRANSFORMER
39 LOW VOLTAGE DISTRIBUTION PANEL
40 LIGHTING PANEL LC
41 LIGHTING PANEL LB
42 LIGHTING PANEL LA
43 FUEL ROOM VENTILATING DAMPERS
44 POD AIR-CONDITIONING SYSTEM BLOWER CONTROLS
45 POD AIR-CONDITIONING UNIT
46 INTERCONNECTING BOX (LAUNCH AND TEST)
46A MISSILE ORDNANCE TEST FIXTURE
47 FUEL VAPOR DETECTION UNIT
48 MISSILE BAY AIR HANDLING UNIT
49 SKID NO. 2
49A FUEL STORAGE TANK
50 GASEOUS NITROGEN CYLINDERS
51 FUEL ROOM EXHAUST FAN
52 HEATER FAN CONTROLS NO. 1, 2, AND 3
53 FUEL ROOM DOOR
54 REMOTE SWITCHING CONTROL
55 POD AIR-CONDITIONING BLOWER CONTROLS
56 COLLIMATOR PIT HEATING UNIT
57 THRUST SECTION HEATING UNIT
58 SKID NO. 1
59 LIQUID NITROGEN-HELIUM HEAT EXCHANGER
60 POD DEHUMIDIFIER
61 ELECTRONIC CABINET REFRIGERANT COMPRESSOR NO. 2
62 ELECTRONIC CABINET REFRIGERANT COMPRESSOR NO. 1
63 MISSILE ERECTION DOOR HYDRAULIC POWER UNIT
64 MISSILE ERECTION AND FLAME DOOR CONTROLS
65 LIQUID NITROGEN STORAGE PANEL
66 SKID NO. 5
67 GROUND PRESSURIZATION HELIUM CYLINDER
68 ROUTINE HELIUM CYLINDER
69 INFLIGHT B HELIUM CYLINDER
70 HELIUM CYLINDER
71 POWER PANEL PA
72 POWER DISTRIBUTION BOX (AC)
73 SKID-MOUNTED MOTOR GENERATOR
74 PROPELLANT LOADING TERMINAL CABINET
75 STORAGE BATTERY
76 MECHANICAL AND EQUIPMENT ROOM DOOR
77 POWER SUPPLY-DISTRIBUTION SET
78 AUXILIARY LOGIC UNIT
79 COUNTDOWN GROUP
80 RE-ENTRY VEHICLE PRELAUNCH MONITOR
81 CONTROL-MONITOR GROUP 1 OF 4
82 CONTROL-MONITOR GROUP 2 OF 4
83 CONTROL-MONITOR GROUP 3 OF 4
84 CONTROL-MONITOR GROUP 4 OF 4
85 ELECTRONIC CABINET AIR-CONDITIONING UNIT
86 TELEVISION CABINET
87 FIRE ALARM TERMINAL BOX
88 TUNNEL ENTRY DOOR
89 TUNNEL



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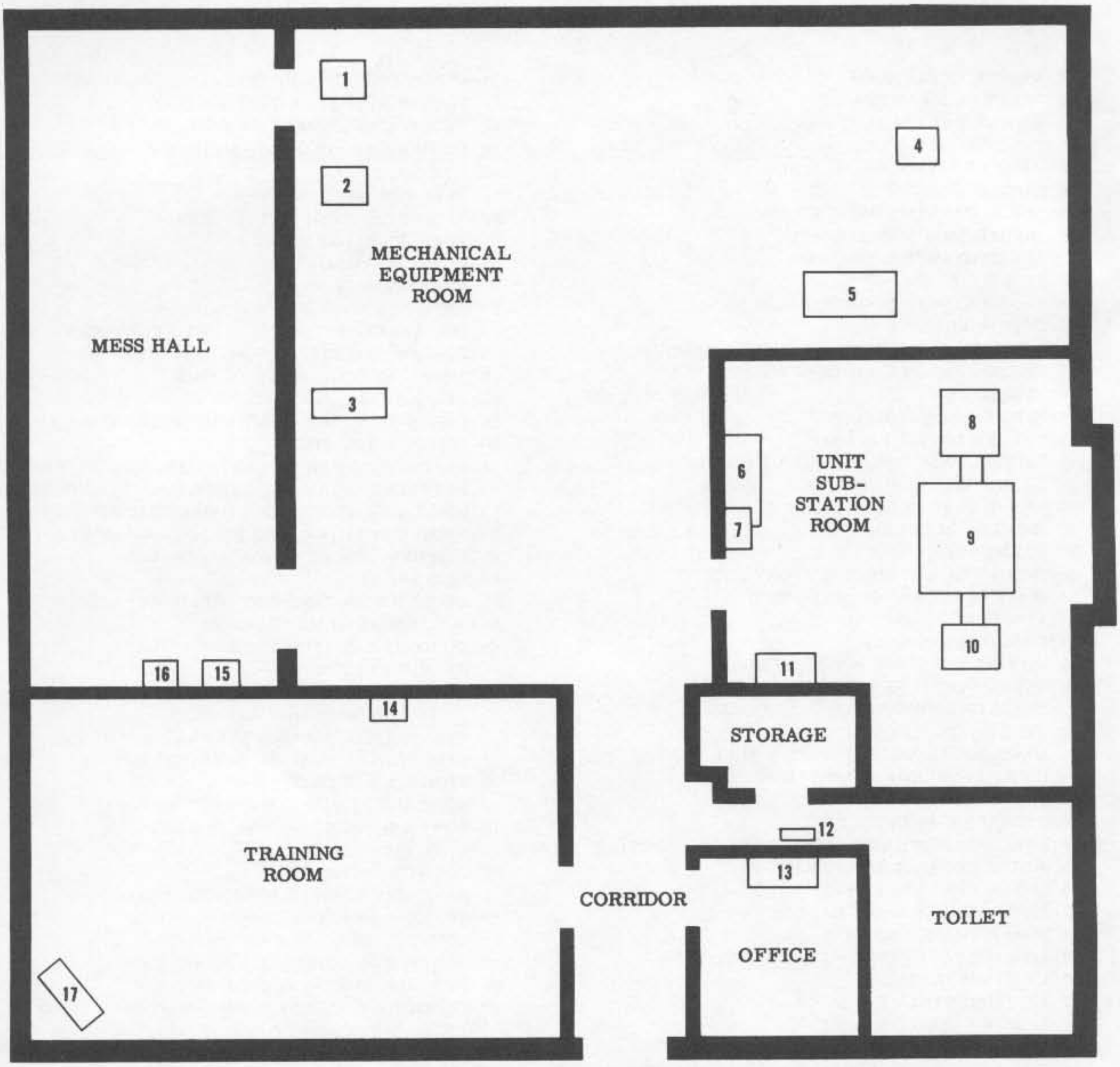


1 INSTRUMENT AIR COMPRESSOR NO. 1
2 INSTRUMENT AIR COMPRESSOR NO. 2
3 CONTROL CABINET, WATER
4 WATER PUMP
5 INSTRUMENT AIR DRYER
6 MOTOR CONTROL CENTER
7 15-KVA TRANSFORMER
8 SUBUNIT NO. 3, 4160-VAC UNIT SUBSTATION (MAIN POWER PANEL)
9 SUBUNIT NO. 2, 4160-VAC UNIT SUBSTATION (1500-KVA TRANSFORMER)
10 SUBUNIT NO. 1, 4160-VAC UNIT SUBSTATION (MAIN DISCONNECT PANEL)
11 WATER PUMP MOTOR START CONTROL UNIT
12 LIGHTING PANEL A
13 FIRE ALARM PANEL
14 HEATING AND VENTILATING SYSTEMS THERMOSTATIC CONTROL
15 HEATING AND VENTILATING SYSTEMS MANUAL CONTROL
16 HEATING AND VENTILATING SYSTEMS DAMPER CONTROLLER
17 TELEVISION MONITOR

32.137-4A

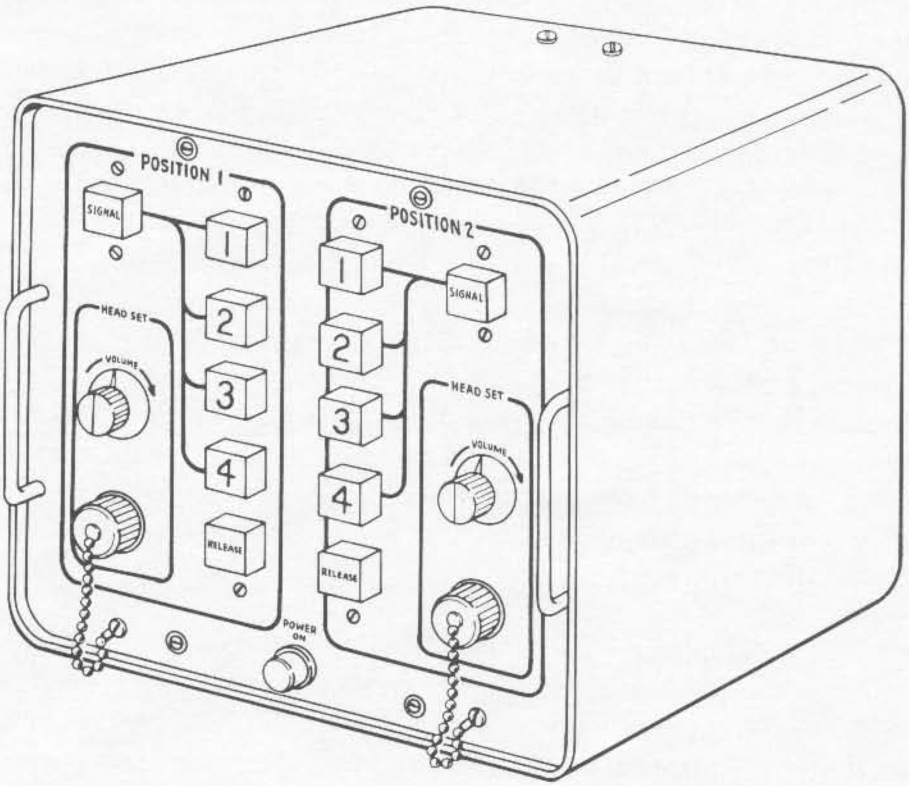
Figure 1-10. Utility Building Equipment Location (SMS 576-C) substation unit room, and a mechanical equipment room. The building has its own heating and ventilating system, and contains various components of RPIE systems which service the LSB and LOB.

1-14. GROUND COMMUNICATIONS SYSTEMS.

1-15. The ground communication systems available at the launch complex are comprised of: the direct line telephone, the research and development (R&D) system (OSTF-1), the administrative dial telephone, the missile flight safety system (MFSS) (OSTF-1 and SMS 576-C), the public address (PA), and the launch maintenance conference network. The maintenance conference network communication system is the primary mode of communication used during missile countdown and launch. It provides direct communication between the launch control console and other specific stations, with no switchboard intervening. Depressing a conference selection pushbutton on a console enables the console attendant to communicate with all stations on the conference net selected. The wing command post (CP) and the alternate command post (ACP) console operators can originate a conference between their stations and the launch control consoles, by depressing a preset conference pushbutton. The wing command post or alternate command post attendant can originate a conference between his station and any combination of the nine launch control consoles, by depressing an arbitrary conference pushbutton. Alarm circuits integrated with this equipment provide both audible and visual alarms in the event of abnormal or faulty equipment operation. The administrative dial telephone serves as a backup communication system for the direct line telephone. Dial lines on the console enable the console operator to call areas not connected by the direct line telephone. The dial lines provide an alternate communication patch in the event of a temporary direct line circuit failure.

1-16. There are numerous communication panels (figure 1-11) within the weapon system complex. Each communication panel accommodates two headsets and is capable of selecting any one of three communication nets for each headset. Each panel has two signalling pushbuttons (call signal at launch control console) and two net release pushbuttons. To establish a conference with the launch control console, depress one of the three net pushbuttons and then depress the signal pushbutton. This causes the corresponding net selected pushbutton on the launch control console to flash and an audible signal to sound. The launch control console operator then depresses the signalling net pushbutton, thus placing his console in communication with the calling station. Depressing the HOLD bar enables the launch control console operator to keep one net open while using another net. Depressing the HOLD bar does not interrupt communication among other stations on the net.

1-17. Explosionproof jacks (figure 1-12) are located throughout the complex. These jacks require a special plug to maintain their explosionproof qualities and have but one capability: signalling and conferring with the launch control console on the maintenance nets. These jacks are normally used when hazardous conditions, such as a high concentration of RP-1, LO_2, or diesel fuel vapors, exist on the complex. They are also used for propellant servicing.



32.137-3

Figure 1-11. Communication Panel

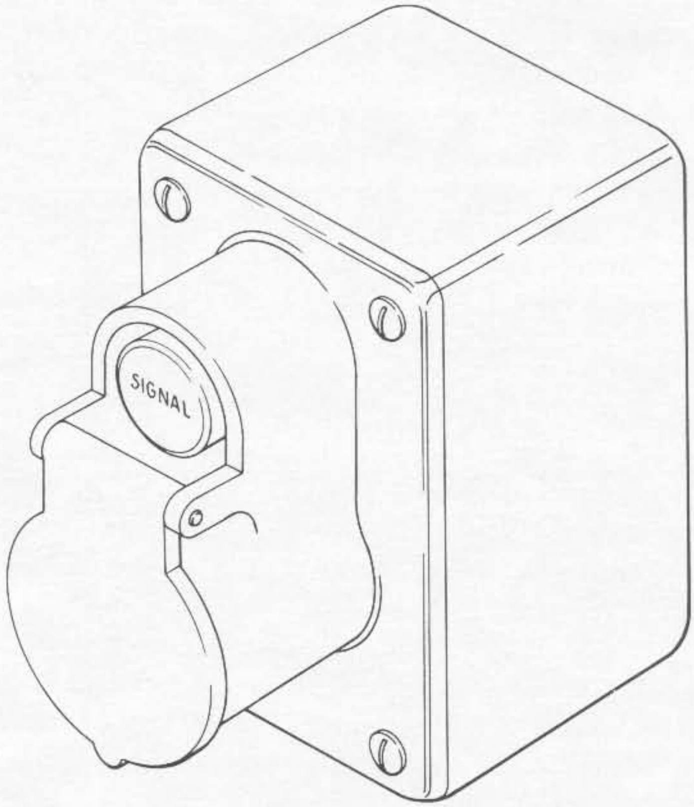


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Figure 1-12. Explosionproof Jack (Typical)

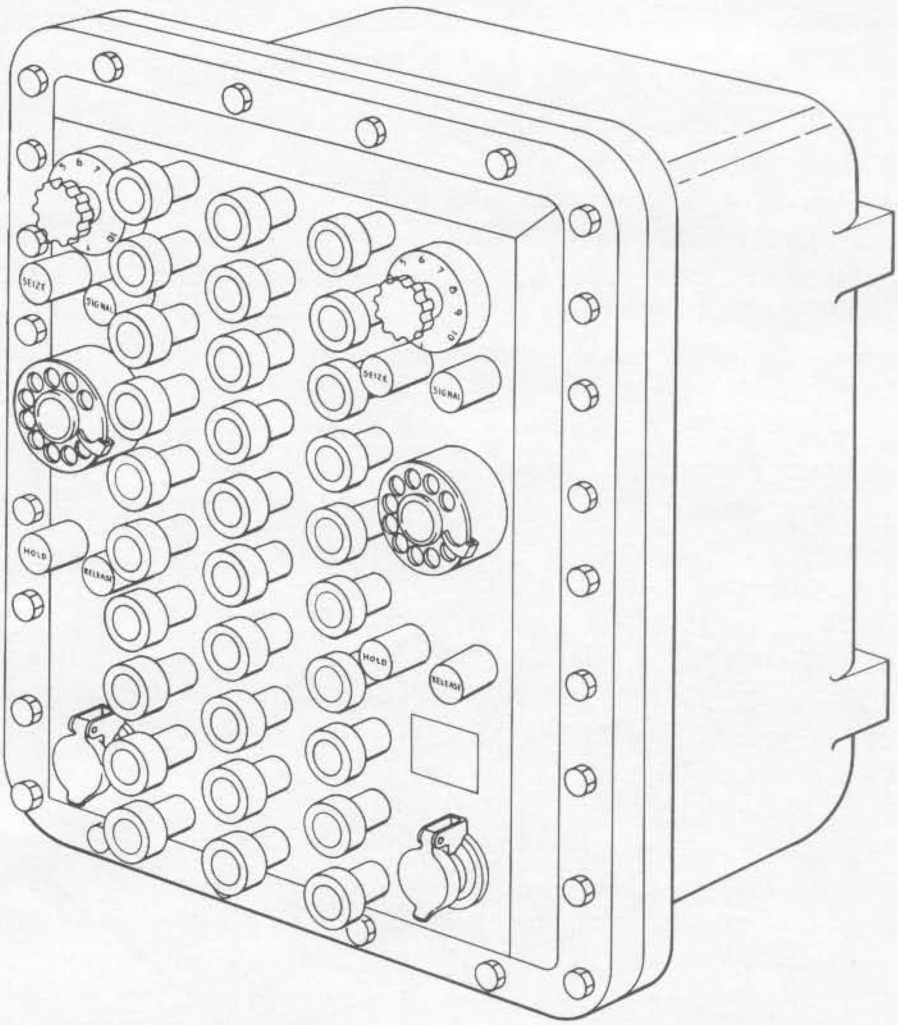
1-18. To prevent an explosion resulting from internal arcing, an explosionproof communication panel (figure 1-13) is used in the fuel room. This panel provides accommodations for two headsets and the capability of selecting any one of three communication nets for each headset. To establish a conference with the launch control console, the net selector dial is positioned to the net desired and then the SEIZE and SIGNAL pushbuttons are depressed. This causes the corresponding net selected pushbutton on the launch control console to flash and an audible signal to sound.

1-19. The research and development communication system (OSTF-1) provides the facilities to support all R&D tasks, such as engineering safety, training, testing, installation, and maintenance. The system consists of numerous stations and is capable of handling many lines in a single conference. R&D communication panels are located throughout the complex and consist of two network lines terminating in a pushbutton, with additional pushbuttons for dial and direct lines. The master R&D communication control panel is located in the communication room of the launch control center.

1-20. Normal communication to the missile bay is automatically disabled during a countdown to reduce possible explosion hazards. The only exception is the explosionproof telephone on the west wall of the missile bay near the booster section of the missile. When communication is disabled, a COMMUNICATION DISABLE indicator on the communication disconnect panel (figure 1-14) illuminates white. If emergency communications are required during countdown, a key operated switch on the communication disconnect panel is turned on to the COMM OVERRIDE position. Communication to the missile bay is then possible and a COMMUNICATION OVERRIDE indicator illuminates red. After countdown is complete, the key operated switch is positioned to RESTORE COMM and the COMMUNICATION DISABLE indicator extinguishes.

1-21. The missile flight safety system (MFSS) communication network (OSTF-1 and SMS 576-C) allows the control circuits to integrate MFSS instrumentation sites and launch complex operator positions. The MFSS supports launch operations by providing protection for populated mainland and offshore island areas. The control point for the MFSS communication system is located at the missile destruct system console. The test and training console (figure 1-15) and the safety officer console contain interface functions with the Pacific Missile Range Operations Center at Point Arguello, California.

1-22. A public address system installed at each site consists of a network of loudspeakers located throughout the site. This system permits the missile combat crew commander to summon individuals to the launch maintenance conference networks throughout the site. Microphone connections into the public address system are available at the communication patch on the launch control console. Strike tone signals are sounded over the public address system to notify missile combat crew members to report to their countdown positions. Pushbuttons used to sound the strike tone are located at the communication patch on the launch control console and in the missile bay.



32.137-2

Figure 1-13. Explosionproof Communication Panel

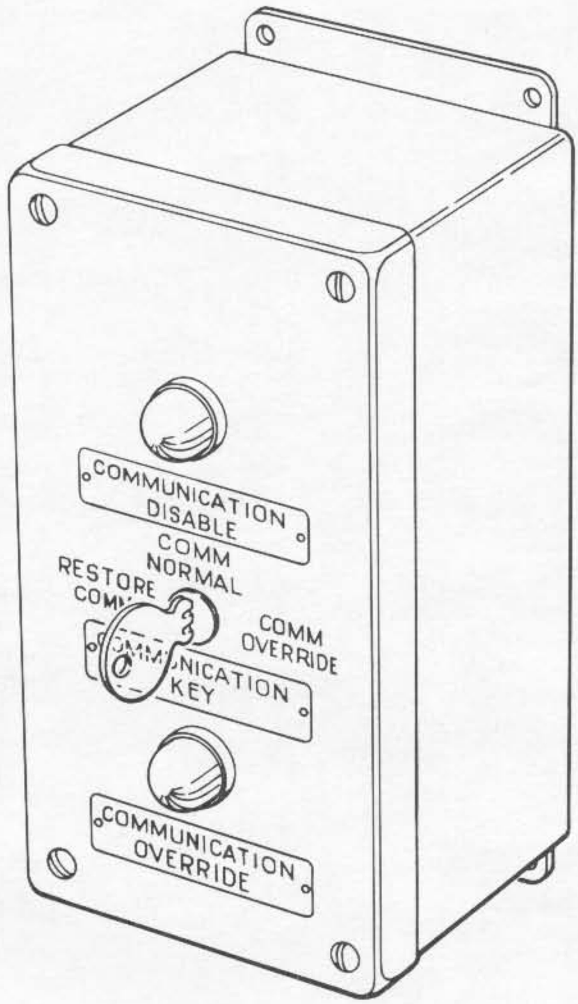


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Figure 1-14. Communication Disconnect Panel

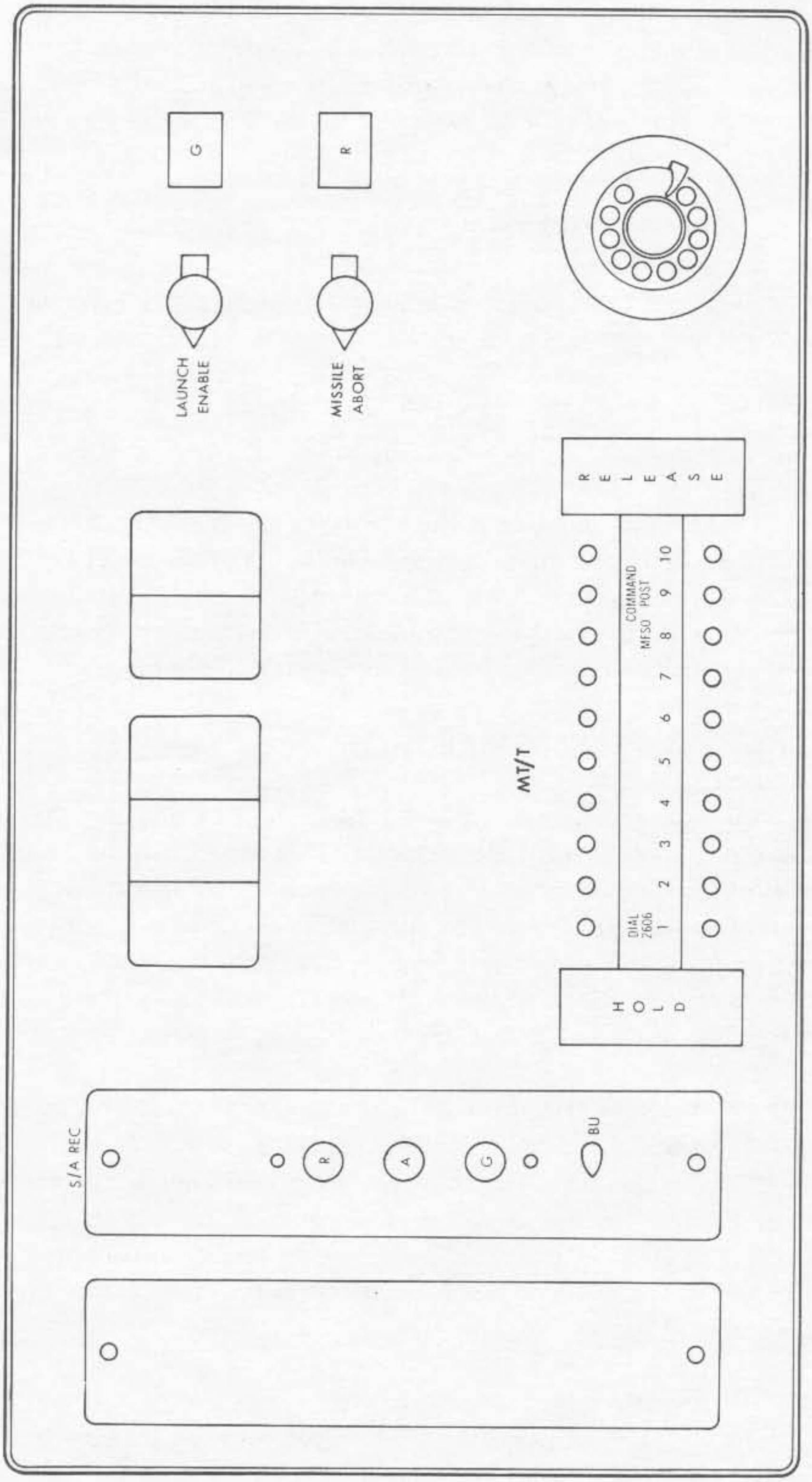

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Figure 1-15. Test and Training Console Panel (OSTF-1 and SMS 576-C)

1-23. LAUNCH ENABLE SYSTEM.

1-24. The launch enable system serves to prevent the untimely launch of a missile by imposing a disabling signal on the launch control equipment. It is controlled from the command post (CP) and alternate command post (ACP). The disabling signal prevents the final countdown phase (commit) from taking place until it is removed by the command post and alternate command post.

1-25. CLOSED-CIRCUIT TELEVISION SYSTEM (TYPICAL).

1-26. The closed-circuit television (TV) system is comprised of four independent loops. Each loop consists of a camera unit, monitors, and the control assemblies required for the transmission of video signals.

1-27. One television camera and supporting pan-and-tilt unit is located on the roof of the launch operations building. This camera observes the topside area and monitors the entrance and exit to the site. Another camera is located in the portal at the entrance to the launch and service building. It is used to identify personnel prior to unlocking the tunnel door. Two more cameras and associated equipment are located in the missile bay to monitor the missile during standby and countdown. All monitors are located in the launch control center. Each camera and monitor is controlled from an individual monitor cabinet.

1-28. CLOSED-CIRCUIT TELEVISION SYSTEM (OSTF-1).

1-29. The closed-circuit television system permits observation of events in progress at the launch and service area and the launch control center of the launch operations building. The system is divided into three independent television loops. Each loop consists of a camera unit, monitors, and the control assemblies required for the transmission of video signals. The video input of each remote monitor is connected in parallel with the input of the correspondingly numbered control monitor. Each of the television loops is identified by the unit number of the camera and monitor included in the loop.

1-30. Two television cameras and supporting pan and tilt units are located on the television towers at the launch and service area. A third television camera, a pan-and-tilt unit, and two remote monitors are located in the launch control center of the launch operations building. Three remote monitors are located in the conference room of the launch operations building. Central control of the system is provided by three control monitors and the power distribution and control panels located at the instrumentation control console in the instrumentation room of the launch operations building.

1-31. Two banks of floodlights are provided for the illumination of the launch and service building during night operations. The floodlights are installed on the television towers and are switched by interconnected controls in both the launch operations building and the launch and service building.

1-32. CLOSED-CIRCUIT TELEVISION SYSTEM (SMS 576-C).

1-33. The closed-circuit television system permits observation of events in progress from the utility building training room and the launch control center of the LOB. The system is divided into three independent television loops. Each loop consists of a camera, monitor, and the control assemblies required for the transmission of video signals. The video input of each remote monitor is connected in parallel with the input of the correspondingly numbered control monitor. Each of the television loops is identified by the unit number of the camera and monitor included in the loop.

1-34. One television camera and its supporting pan-and-tilt unit is located on the television tower on top of the northeast corner of the missile bay. Another camera is installed on a ground level pedestal at the launch and service building. The third camera is installed in the launch control center and is mounted on a mechanical pedestal which is manually adjustable.

1-35. Three camera control units are installed in a cabinet on the wall of the launch control center. Each control unit is mounted below the associated control monitor. The control unit provides power and control voltages for the television camera and contains all controls for remote adjustment of the camera.

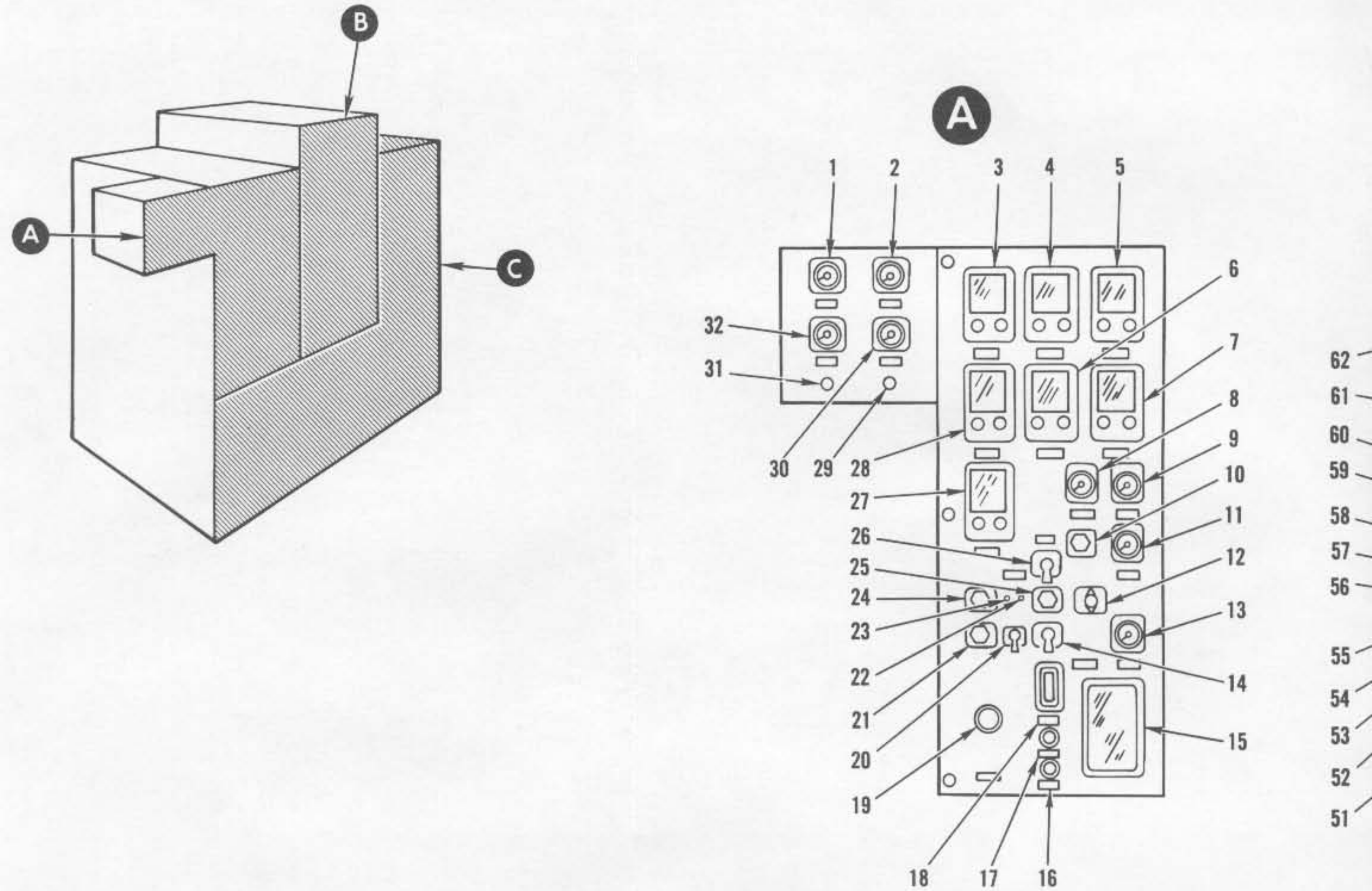
1-36. Three banks of floodlights are provided for the illumination of the launch and service building during night operations. One bank of floodlights is installed on the warning tower, and two banks are located at ground level near the south end of the LOB. The floodlights are switched by interconnected controls in the LOB and LSB.

1-37. All central operating controls of the system are located on the television control console located in the launch control center. This console contains four control panels; two pan-and-tilt control panels and two zoom lens control panels. Each of the panels provides operating controls and DC power supplies which furnish operating voltages for the zoom lens or pan-and-tilt unit of one camera.

1-38. POWER GENERATOR SYSTEM (TYPICAL).

1-39. Power for the launch complex is provided by two 480-VAC, 60-CPS, 3PH generators and their associated exciters, which are mechanically coupled to the diesel engines of the power drive system. The power from the generators is fed to the 480-volt switchgear which contains circuit breakers, control indicators, and the protection devices necessary to maintain and monitor the constant 480-VAC, 60-CPS output to the power distribution system. (See figure 1-16 or 1-17.)

1-40. During normal operation the diesel engine drives the generator and exciter. The exciter generates 125-VDC power which is applied to the field of the generator. The 480-VAC, 60-CPS output from the generator is applied to the generator circuit breaker and generator monitoring circuitry. The generator circuit breaker routes the 480-VAC, 60-CPS output to the switchgear bus, which supplies the feeder breaker circuitry. This applies the voltage to the power distribution system.



BUS VOLTAGE VOLTMETER
INCOMING GENERATOR VOLTMETER
GENERATOR NO. 1 OVERCURRENT PHASE A RELAY
GENERATOR NO. 1 OVERCURRENT PHASE B RELAY
GENERATOR NO. 1 OVERCURRENT PHASE C RELAY
GENERATOR NO. 1 REVERSE POWER RELAY
GENERATOR NO. 1 GROUND CURRENT ALARM RELAY
GENERATOR NO. 1 LINE CURRENT AMMETER
GENERATOR NO. 1 WATTMETER
GENERATOR NO. 1 LINE CURRENT AMMETER SWITCH
GENERATOR NO. 1 EXCITER FIELD CURRENT AMMETER
GENERATOR NO. 1 LOCKOUT RELAY
GENERATOR NO. 1 DC FIELD CURRENT AMMETER
GENERATOR NO. 1 MAIN BREAKER SELECTOR GOVERNOR MOTOR CONTROL SWITCH
GENERATOR NO. 1 VOLTAGE REGULATOR
GENERATOR NO. 1 VOLTAGE ADJUSTMENT RHEOSTAT
GENERATOR NO. 1 CROSS CURRENT COMPENSATION RHEOSTAT
GENERATOR NO. 1 VOLTAGE REGULATOR CHANGE-OVER SWITCH
GENERATOR NO. 1 EXCITER FIELD RHEOSTAT
GENERATOR NO. 1 CIRCUIT BREAKER CONTROL SWITCH

21 GENERATOR NO. 1 MAIN BREAKER SYNCHRONIZING SWITCH
22 GENERATOR NO. 1 MAIN BREAKER RED INDICATOR
23 GENERATOR NO. 1 MAIN BREAKER GREEN INDICATOR
24 GENERATOR NO. 1 MAIN BREAKER VOLTMETER SWITCH
25 GENERATOR NO. 1 MAIN BREAKER FREQUENCY METER SWITCH
26 GENERATOR NO. 1 LOAD DIVISION SWITCH
27 GENERATOR NO. 1 WATTHOUR METER
28 GENERATOR NO. 1 REVERSE POWER RELAY
29 SYNCHRONIZING INDICATOR
30 GENERATOR FREQUENCY METER
31 SYNCHRONIZING INDICATOR
32 SYNCHROSCOPE
33 PHASE A GROUND DETECTOR INDICATOR
34 PHASE B GROUND DETECTOR INDICATOR
35 PHASE C GROUND DETECTOR INDICATOR
36 GENERATOR NO. 2 OVERCURRENT PHASE B RELAY
37 GENERATOR NO. 2 OVERCURRENT PHASE C RELAY
38 GENERATOR NO. 2 REVERSE POWER RELAY
39 GENERATOR NO. 2 GROUND CURRENT ALARM RELAY
40 GENERATOR NO. 2 LINE CURRENT AMMETER

41 G
42 G
43 G
44 G
45 G C
46 G
47 G
48 G
49 G
50 G
51 G
52 G
53 G
54 G
55 G
56 G
57 G
58 G
59 G
60 G

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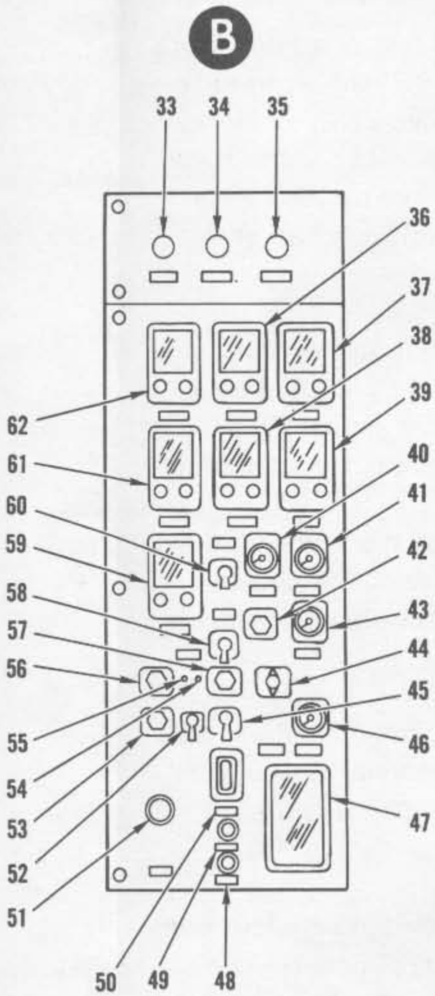
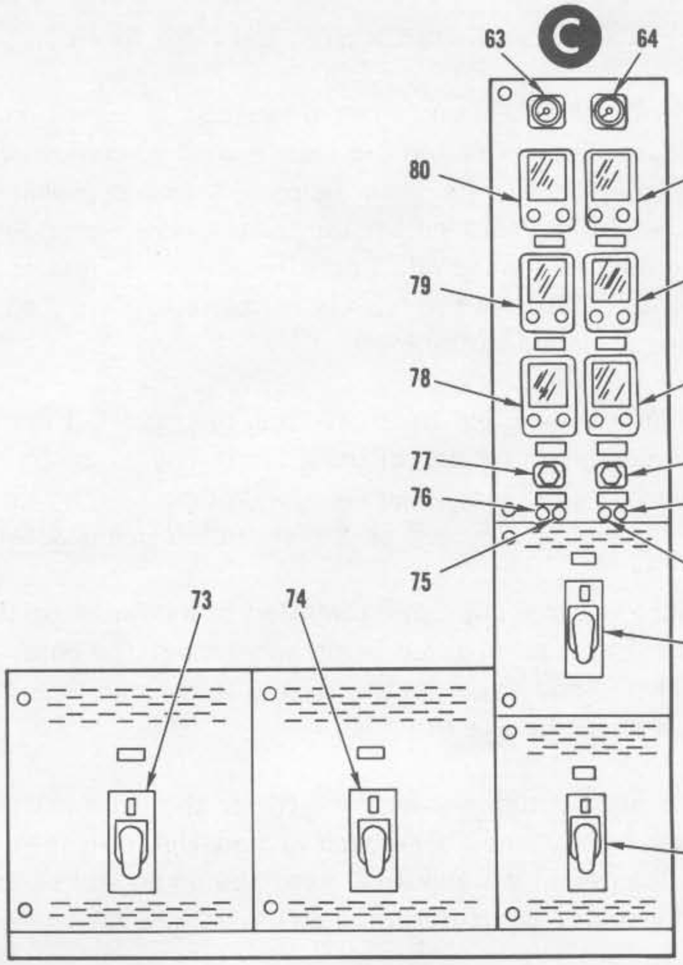
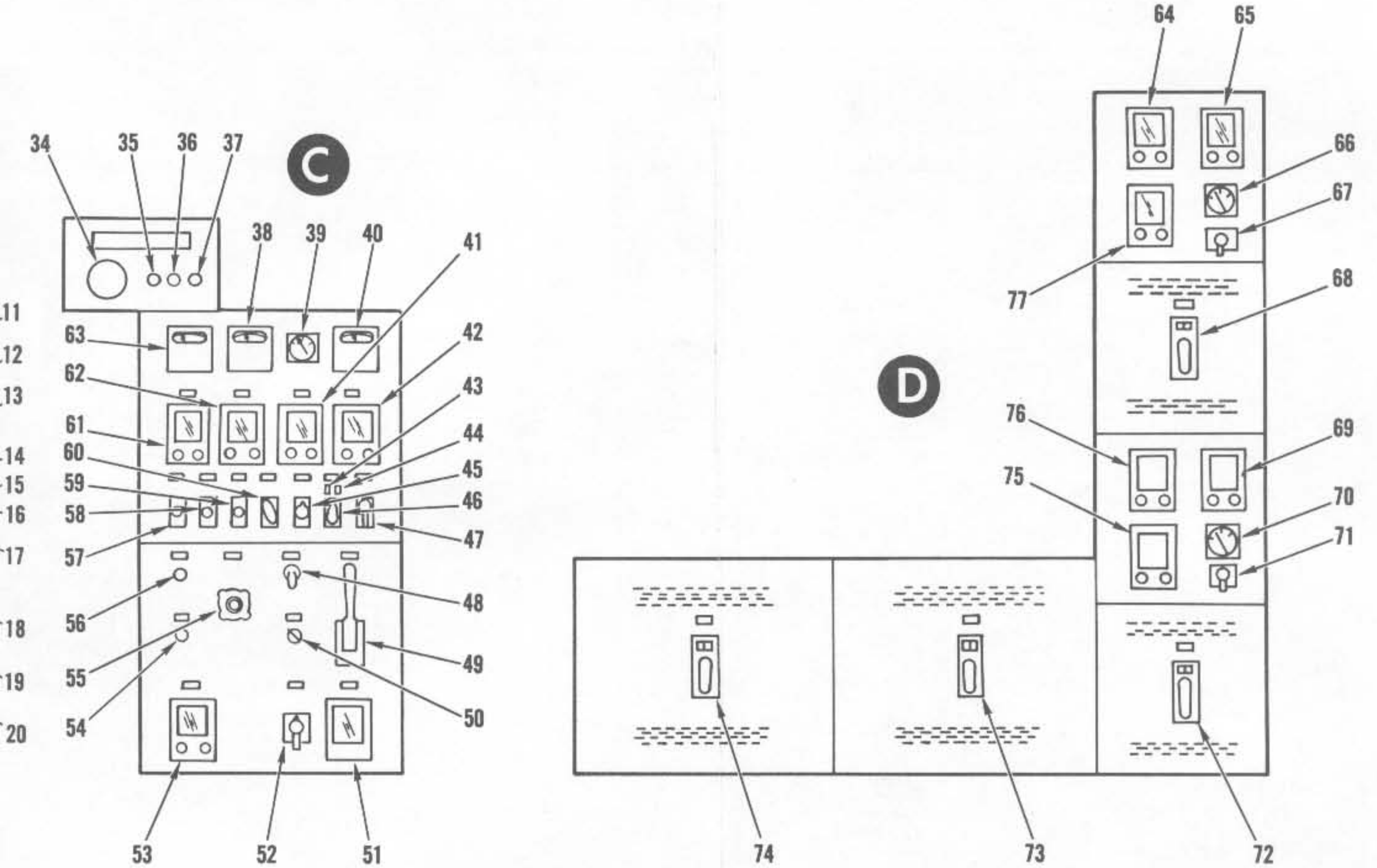
Figure 1-16. 480-Volt Switchgear (SMS 548 and SMS 567)



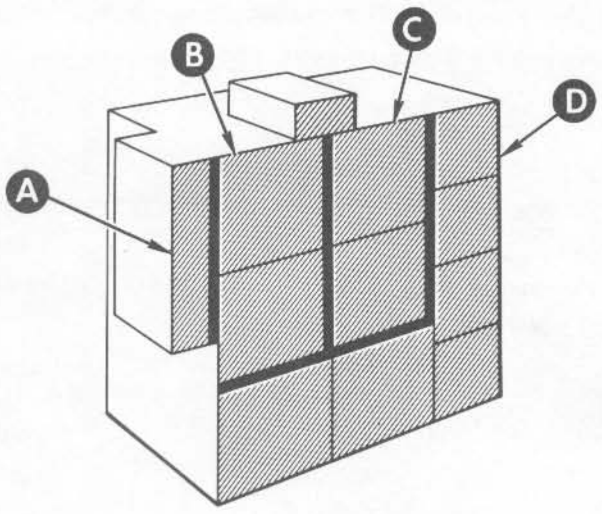


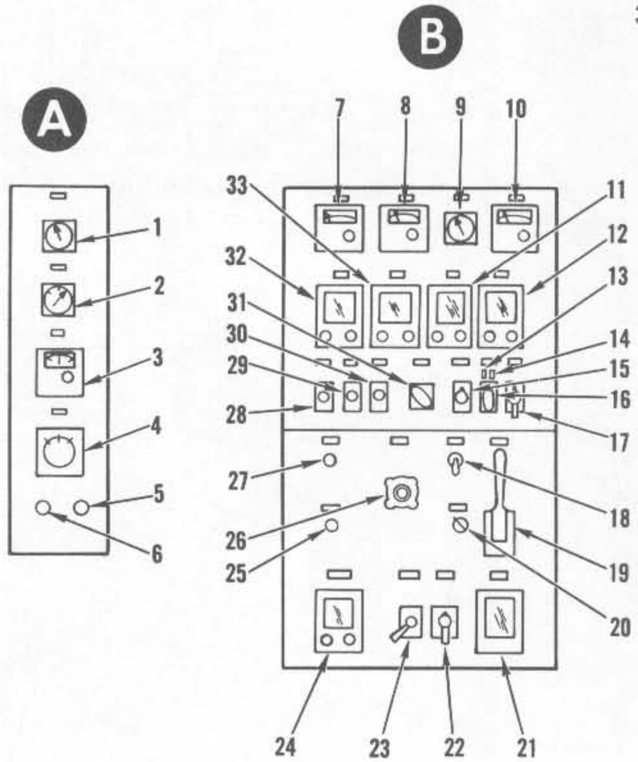
41 GENERATOR NO. 2 WATTMETER
42 GENERATOR NO. 2 LINE CURRENT AMMETER SWITCH
43 GENERATOR NO. 2 EXCITER FIELD CURRENT AMMETER
44 GENERATOR NO. 2 LOCKOUT RELAY
45 GENERATOR NO. 2 MAIN BREAKER SELECTOR GOVERNOR MOTOR CONTROL SWITCH
46 GENERATOR NO. 2 DC FIELD CURRENT AMMETER
47 GENERATOR NO. 2 VOLTAGE REGULATOR
48 GENERATOR NO. 2 VOLTAGE ADJUSTMENT RHEOSTAT
49 GENERATOR NO. 2 CROSS CURRENT COMPENSATION RHEOSTAT
50 GENERATOR NO. 2 VOLTAGE REGULATOR CHANGE-OVER SWITCH
51 GENERATOR NO. 2 EXCITER FIELD RHEOSTAT
52 GENERATOR NO. 2 CIRCUIT BREAKER CONTROL SWITCH
53 GENERATOR NO. 2 MAIN BREAKER SYNCHRONIZING SWITCH
54 GENERATOR NO. 2 MAIN BREAKER RED INDICATOR
55 GENERATOR NO. 2 MAIN BREAKER GREEN INDICATOR
56 GENERATOR NO. 2 MAIN BREAKER VOLTMETER SWITCH
57 GENERATOR NO. 2 MAIN BREAKER FREQUENCY METER SWITCH
58 GENERATOR NO. 2 LOAD DIVISION SWITCH
59 GENERATOR NO. 2 WATTHOUR METER
60 GOVERNOR MASTER TRIMMER SELECTOR SWITCH
61 GENERATOR NO. 2 REVERSE POWER RELAY
62 GENERATOR NO. 2 OVERCURRENT PHASE A RELAY
63 L.O. BUILDING AMMETER
64 L&S BUILDING AMMETER
65 L&S BUILDING OVERCURRENT PHASE A RELAY
66 L&S BUILDING OVERCURRENT PHASE B RELAY
67 L&S BUILDING OVERCURRENT PHASE C RELAY
68 L&S BUILDING FEEDER AMMETER SWITCH
69 L&S BUILDING FEEDER RED INDICATOR
70 L&S BUILDING FEEDER GREEN INDICATOR
71 L.O. BUILDING CIRCUIT BREAKER
72 L&S BUILDING CIRCUIT BREAKER
73 GENERATOR NO. 1 MAIN BREAKER
74 GENERATOR NO. 2 MAIN BREAKER
75 L.O. BUILDING FEEDER RED INDICATOR
76 L.O. BUILDING FEEDER GREEN INDICATOR
77 L.O. BUILDING FEEDER AMMETER SWITCH
78 L.O. BUILDING OVERCURRENT PHASE C RELAY
79 L.O. BUILDING OVERCURRENT PHASE B RELAY
80 L.O. BUILDING OVERCURRENT PHASE A RELAY



41 GENERATOR NO. 2 OVERCURRENT RELAY PHASE 3
42 GENERATOR NO. 2 GROUND OVERCURRENT RELAY
43 GENERATOR NO. 2 CIRCUIT BREAKER RED INDICATOR
44 GENERATOR NO. 2 CIRCUIT BREAKER GREEN INDICATOR
45 GENERATOR NO. 2 AMMETER SWITCH
46 GENERATOR NO. 2 CIRCUIT BREAKER CONTROL SWITCH
47 GENERATOR NO. 2 ENGINE SPEED SELECTOR SWITCH
48 GENERATOR NO. 2 VOLTAGE CONTROL MANUAL-AUTO SWITCH
49 GENERATOR NO. 2 FIELD DISCHARGE SWITCH
50 GENERATOR NO. 2 VOLTAGE CONTROL RHEOSTAT
51 GENERATOR NO. 2 WATTHOUR METER
52 GENERATOR NO. 2 LOAD DIVISION TRANSFER SWITCH
53 GENERATOR NO. 2 REVERSE POWER RELAY
54 GENERATOR NO. 2 HORN SILENCER PUSHBUTTON
55 GENERATOR NO. 2 FIELD RHEOSTAT
56 GENERATOR NO. 2 ALARM INDICATOR
57 GENERATOR NO. 2 FREQUENCY METER SWITCH
58 GENERATOR NO. 2 VOLTMETER SWITCH
59 GENERATOR NO. 2 SYNCHRONIZING SWITCH
60 GENERATOR NO. 2 LOCKOUT RELAY
61 GENERATOR NO. 2 OVERCURRENT RELAY PHASE 1
62 GENERATOR NO. 2 OVERCURRENT RELAY PHASE 2
63 GENERATOR NO. 2 WATTMETER
64 L.O. BUILDING OVERCURRENT RELAY PHASE 1
65 L.O. BUILDING OVERCURRENT RELAY PHASE 2
66 L.O. BUILDING AMMETER
67 L.O. BUILDING AMMETER SWITCH
68 LAUNCH OPERATION BLDG MOTOR CONTROL CENTER CIRCUIT BREAKER OPERATING HANDLE
69 L&S BUILDING OVERCURRENT RELAY PHASE 2
70 L&S BUILDING AMMETER
71 L&S BUILDING AMMETER SWITCH
72 LAUNCH & SERVICE BLDG MOTOR CONTROL CENTER CIRCUIT BREAKER OPERATING HANDLE
73 GENERATOR NO. 1 CIRCUIT BREAKER
74 GENERATOR NO. 2 CIRCUIT BREAKER
75 L&S BUILDING OVERCURRENT RELAY PHASE 3
76 L&S BUILDING OVERCURRENT RELAY PHASE 1
77 L.O. BUILDING OVERCURRENT RELAY PHASE 3

Figure 1-17. 480-Volt Switchgear (SMS 566)





1 BUS VOLTMETER
2 MACHINE VOLTMETER
3 FREQUENCY METER
4 SYNCHROSCOPE
5 SYNCHRONIZING INDICATOR
6 SYNCHRONIZING INDICATOR
7 GENERATOR NO. 1 WATTMETER
8 GENERATOR NO. 1 POWER FACTOR METER
9 GENERATOR NO. 1 AMMETER
10 GENERATOR NO. 1 GENERATOR FIELD AMMETER
11 GENERATOR NO. 1 OVERCURRENT RELAY PHASE 3
12 GENERATOR NO. 1 GROUND OVERCURRENT RELAY
13 GENERATOR NO. 1 CIRCUIT BREAKER RED INDICATOR
14 GENERATOR NO. 1 CIRCUIT BREAKER GREEN INDICATOR
15 GENERATOR NO. 1 AMMETER SWITCH
16 GENERATOR NO. 1 CIRCUIT BREAKER CONTROL SWITCH
17 GENERATOR NO. 1 ENGINE SPEED SELECTOR SWITCH
18 GENERATOR NO. 1 VOLTAGE CONTROL MANUAL-AUTO SWITCH
19 GENERATOR NO. 1 FIELD DISCHARGE SWITCH
20 GENERATOR NO. 1 VOLTAGE CONTROL RHEOSTAT
21 GENERATOR NO. 1 WATTHOUR METER
22 GENERATOR NO. 1 LOAD DIVISION TRANSFER SWITCH
23 MASTER SELECTOR SWITCH
24 GENERATOR NO. 1 REVERSE POWER RELAY
25 GENERATOR NO. 1 HORN SILENCER PUSHBUTTON
26 GENERATOR NO. 1 FIELD RHEOSTAT
27 GENERATOR NO. 1 ALARM INDICATOR
28 GENERATOR NO. 1 FREQUENCY METER SWITCH
29 GENERATOR NO. 1 VOLTMETER SWITCH
30 GENERATOR NO. 1 SYNCHRONIZING SWITCH
31 GENERATOR NO. 1 LOCKOUT RELAY
32 GENERATOR NO. 1 OVERCURRENT RELAY PHASE 1
33 GENERATOR NO. 1 OVERCURRENT RELAY PHASE 2
34 HORN
35 PHASE 1 GROUND DETECTOR INDICATOR
36 PHASE 2 GROUND DETECTOR INDICATOR
37 PHASE 3 GROUND DETECTOR INDICATOR
38 GENERATOR NO. 2 POWER FACTOR METER
39 GENERATOR NO. 2 AMMETER
40 GENERATOR NO. 2 GENERATOR FIELD AMMETER

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1-41. The generator monitoring circuitry consists of transformers connected to the generator bus at the 480-volt switchgear to supply power to the voltage regulator, governor load computer and resistor assembly, generator instruments, and protective relays. The voltage regulator output is directed to the field of the exciter. The voltage regulator controls the exciter field excitation and operates to counteract changes in generator terminal voltage resulting from changing load conditions.

1-42. Changes in generator load and terminal voltage are detected by the load computer assembly circuitry. The load computer applies a signal to the diesel engine governor which increases or decreases the speed of the diesel engine to match power load conditions. The combined effect of voltage regulation and governor load control is to maintain the output of the diesel generator at its rated frequency and voltage.

1-43. When the second diesel generator is started, the generator frequency and voltage are adjusted to match the running generator by means of controls on the 480-volt switchgear panel and synchronizing panel (figure 1-18). The incoming generator circuit breaker is closed only when certain predetermined conditions have been satisfied.

1-44. POWER GENERATOR DRIVE SYSTEM. The power drive portion of the system has a secondary function of supplying steam for domestic hot water and hot water heating components.

1-45. The power drive system consists of two diesel engines, components for handling fuel oil, lubricating oil, and water cooling, and an engine control panel (figure 1-19). The engines are started by injecting compressed air into the engine cylinders and allowing the engine to turn over until normal combustion occurs. During engine operation, a constant engine speed is maintained, regardless of changes in load, by the action of the engine governor.

1-46. The engine cooling system is of the vapor phase type. Normal operating temperature produces low pressure steam in the engine jacket. The jacket water and steam are fed through a steam separator where the steam is centrifugally removed from the water. The water is returned to the engine jacket water cooling system and the steam is fed to a heat exchanger where it is utilized to supply domestic hot water and heating for the launch complex.

1-47. Cooling water from the spray pond (figure 1-20) is pumped through the intercooler, turbocharger, and lubricating oil cooler, where it absorbs heat generated by these components. The water is then returned to the spray pond for cooling before being recirculated through the system. A portion of the spray pond cooling water bypasses the sidestream filter (figure 1-21) and the remainder is piped through the sidestream filter to the spray tips in the spray pond. The sidestream filter removes foreign material from the water to prevent plugging the spray tips. A manually operated globe valve may be partially opened to allow the water to bypass the filter and flow through the second set of spray tips which are used for seasonal operation only. Manual control valves are utilized for controlling the spray pond water level.

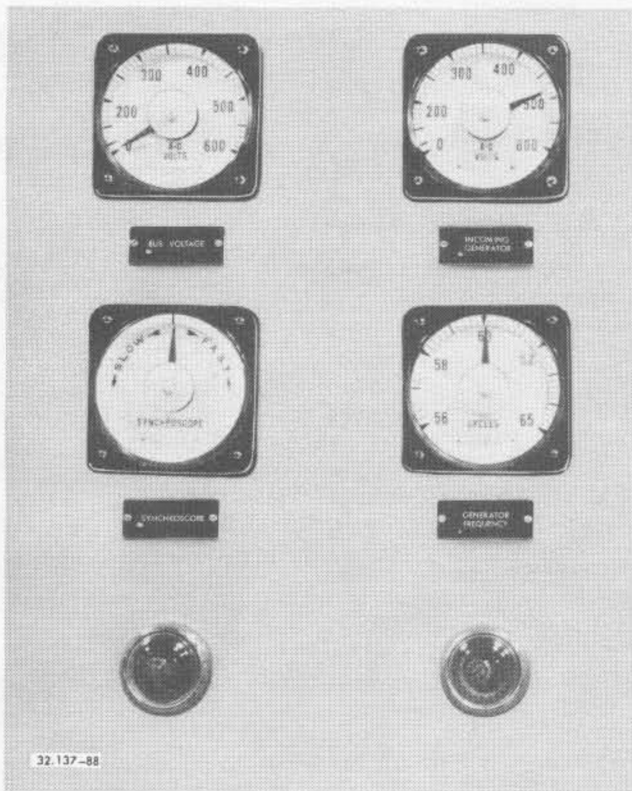
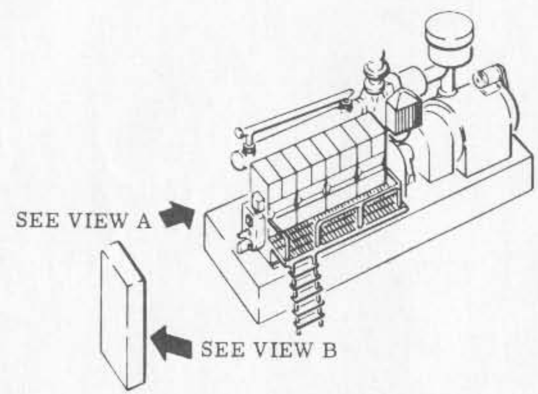
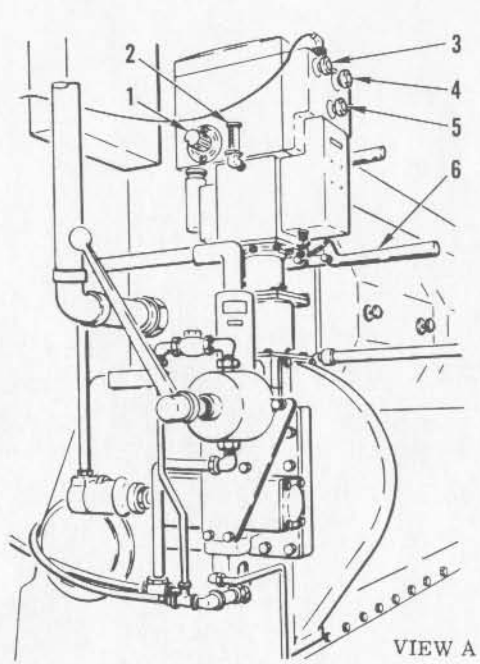
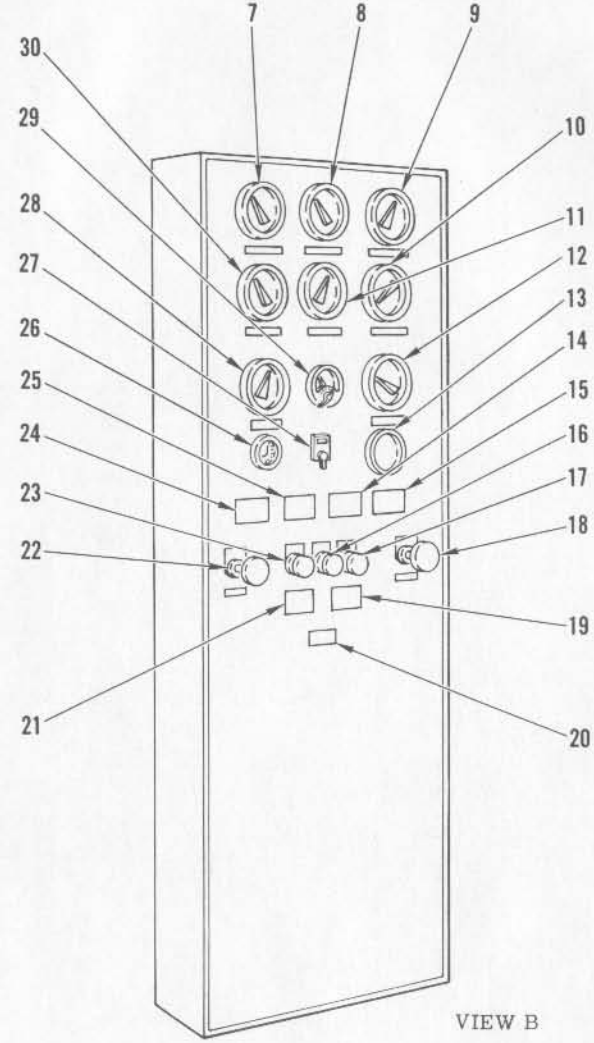


Figure 1-18. Diesel Generator Synchronizing Panel (Typical)







1 PERCENT LOAD (DIAL)
2 GOVERNOR LUBE OIL LEVEL SIGHT GAGE
3 SPEED DROOP (ADJUSTING CONTROL)
4 PERCENT LOAD (ADJUSTING CONTROL)
5 SPEED (ADJUSTING CONTROL)
6 AIR STARTING LEVER
7 LUBE OIL PRESS. (GAGE)
8 FUEL OIL PRESS. (GAGE)
9 STARTING AIR PRESS. (GAGE)
10 LUBE OIL TEMP.-IN (GAGE)
11 AIR MANIFOLD PRESS. (GAGE)
12 LUBE OIL TEMP.-OUT (GAGE)
13 TACHOMETER
14 OVERSPEED (INDICATOR)
15 ALARM CONTROL SET (INDICATOR)
16 ALARM CONTROL OFF (PUSHBUTTON SWITCH)
17 TEST ALARM (PUSHBUTTON SWITCH)
18 EMERGENCY STOP (PUSHBUTTON SWITCH)
19 TURBOCHANGER HIGH TEMPERATURE COOLING WATER LOW PRESSURE (INDICATOR)
20 NAMEPLATE
21 STEAM SEPARATOR WATER LEVEL (INDICATOR)
22 EMERGENCY STOP (PUSHBUTTON SWITCH)
23 STOP ALARM (PUSHBUTTON SWITCH)
24 LOW LUBE OIL PRESSURE (INDICATOR)
25 HIGH WATER TEMPERATURE (INDICATOR)
26 RUNNING TIME METER
27 GOVERNOR MOTOR CONTROL (SWITCH)
28 JACKET WATER TEMP.-OUT (GAGE)
29 PYROMETER
30 JACKET WATER TEMP.-IN (GAGE)

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Figure 1-19. Diesel Engine Control Panel (Typical)

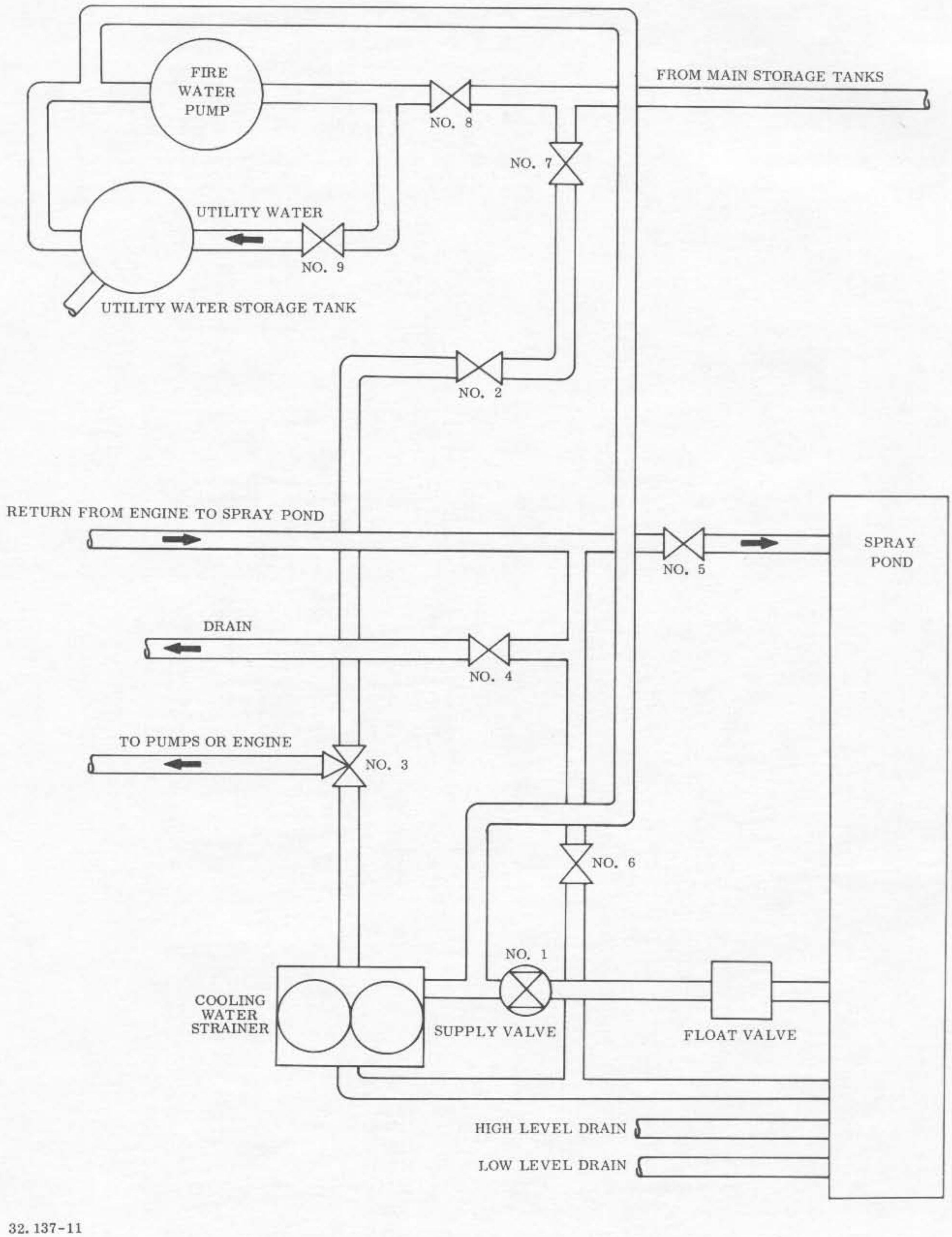


Figure 1-20. Spray Pond System Valves (Typical)

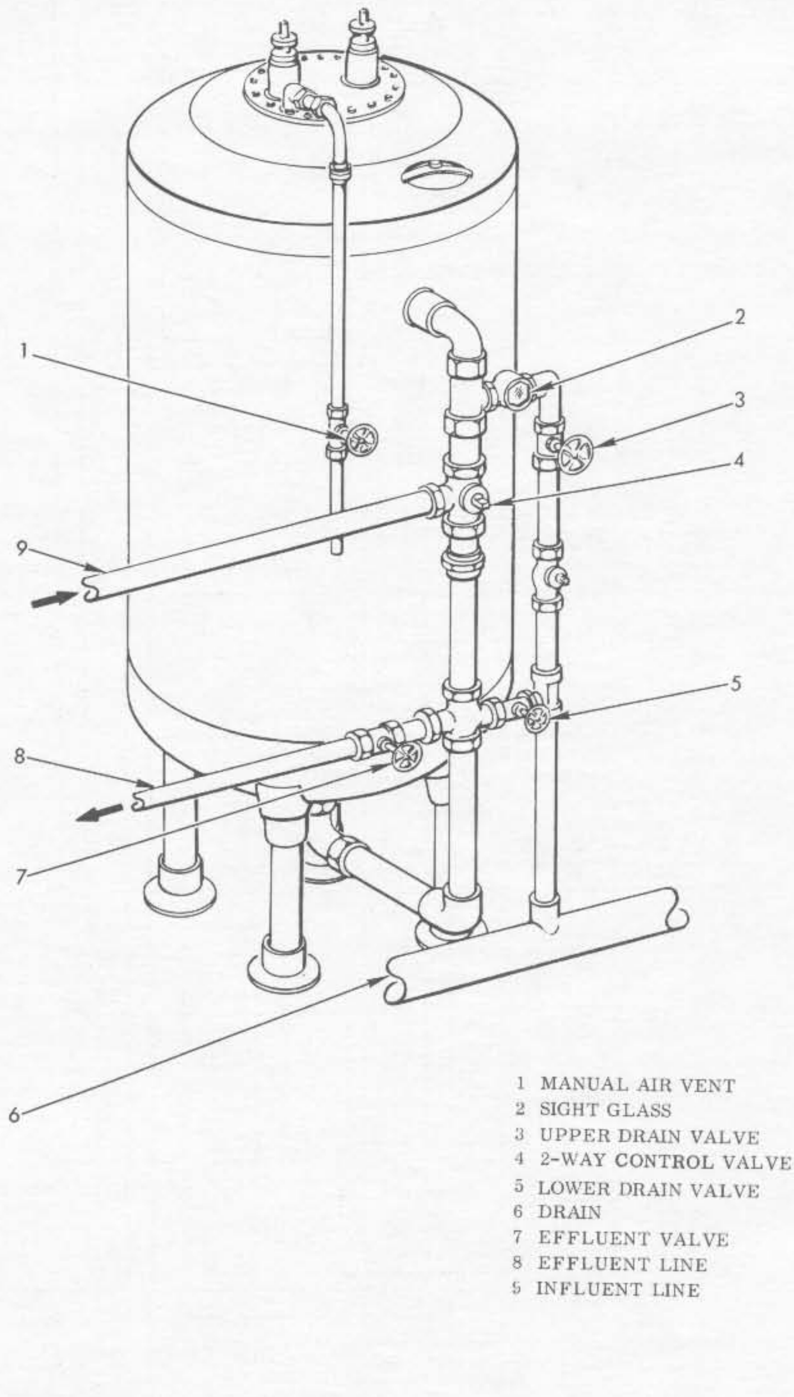


Figure 1-21. Sidestream Filter (Typical)

1-48. Controls and indicators on the engine control panel are used in conjunction with engine mounted controls. The functions of the engine control panel are divided into engine alarm and shutdown devices, and engine condition indicators and gages.

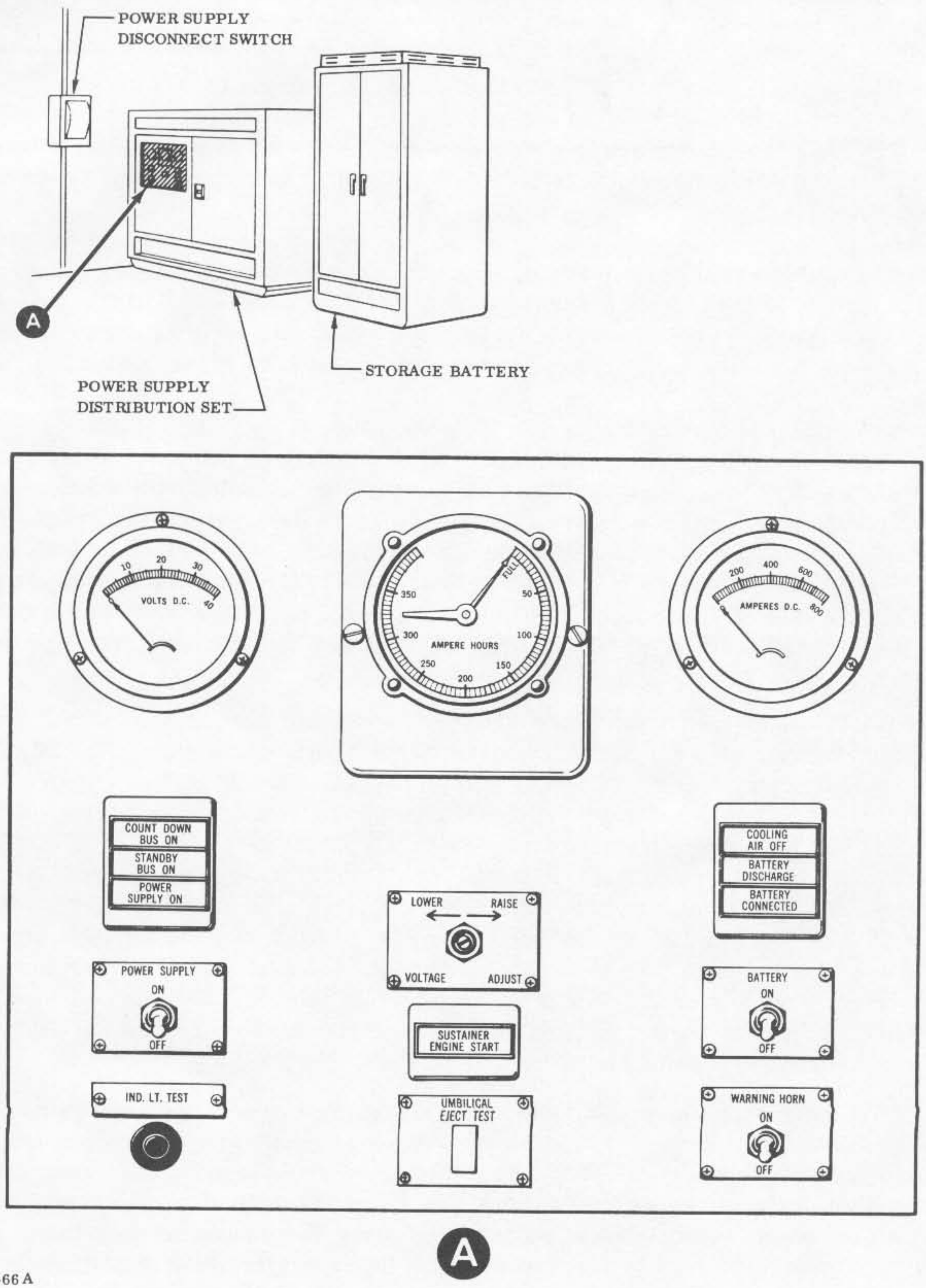
1-49. ELECTRICAL POWER DISTRIBUTION SYSTEM (TYPICAL).

1-50. The electrical power distribution system consists of the LOB power distribution system and the LSB power distribution system. The power distribution systems control, monitor and distribute power.

1-51. The launch operations building power distribution system consists of a motor control center (MCC) (6, figure 1-4), a lighting distribution system, and a 125-VDC distribution system. 480-VAC, 60-CPS power is supplied through the 480-volt switchgear (figure 1-16 or 1-17) in the LOB to the LOB motor control center, which serves as a distribution center for power feeders and motor control. The motor control center consists of individual plug-in modules that contain magnetic starters, circuit breakers, and control buses which perform the control and distribution functions of the motor control center. Lighting distribution consists of a 480-VAC input, a 120/208-VAC output power transformer, lighting distribution panels, receptacles, wall switches and lighting fixtures which perform the lighting functions in the LOB. The 125-VDC distribution system continuously supplies the site with 125-VDC power. This system consists of a 480-VAC input, 125-VDC output battery charger (12, figure 1-4), a 125-VDC output station battery (13), and a 125-VDC distribution panel (11) which perform the 125-VDC power supply and distribution and the emergency lighting power functions.

1-52. The launch and service building power distribution system consists of a motor control center (19, figure 1-7) and a lighting and low voltage distribution system. The launch and service building motor control center receives 480-VAC, 60-CPS power through the 480-volt switchgear (10, figure 1-4) from the diesel generators in the launch operations building. The launch and service building motor control center (19, figure 1-7), serves as a distribution center for power feeders and motor control. The motor control center consists of individual plug-in modules that contain magnetic starters, circuit breakers, and control buses which perform the control and distribution functions of the motor control center. The lighting and low voltage distribution system consists of a 480-VAC input, a 120 to 208-VAC output power transformer, lighting distribution panels, receptacles, lamps, wall switches, lighting fixtures, and the lighting and low voltage distribution center which performs the lighting and low voltage distribution functions in the LSB.

1-53. The power supply-distribution set (figure 1-22) receives 480-VAC, 60-CPS power from the LSB motor control center and distributes the 28-VDC to the launch control, guidance, re-entry vehicle, prelaunch monitor, missile electrical, hydraulic, pneumatic, semitrailer mounted missile electrical systems checkout test station, and erection systems. This set also supplies 28-VDC to an emergency battery to maintain charge on the cells. If the 28-VDC power supply fails during countdown, the emergency battery supplies power to allow continuation of a tactical launch or return to a safe condition in the event of rectifier failure.



32.137-66 A

Figure 1-22. Power Supply-Distribution Set (Typical)

1-54. The skid-mounted motor generator (figure 1-23) receives 480-VAC, 60-CPS power from the LSB MCC and supplies 115-VAC, 400-CPS, 3PH power through the distribution box (AC) to the checkout test station, prelaunch monitor, guidance equipment, and through the control-monitor group (figures 1-24 and 1-25) and the launch and test interconnecting box, to the missile.

1-55. ELECTRICAL POWER DISTRIBUTION SYSTEM (OSTF-1).

1-56. The operating power for Operational System Test Facility I (OSTF-1) is supplied by an overhead power feeder from SMS 576-A, through an underground feeder at the LOB to a step-down transformer and a water pump control unit in the 4160V unit substation (figure 1-26). The 750-KVA, 4160/480V transformer in the 4160V unit substation steps the 60-CPS, 3PH power down from 4160V to 480V. This power is distributed through circuit breakers on the 4160V unit substation to the LOB motor control centers (29 and 30, figure 1-8) and to the LSB 480-VAC, 60-CPS, 3PH power distribution panel. The LSB 480-VAC, 60-CPS, 3PH power distribution panel (32, figure 1-8) distributes power to the two LSB motor control centers and the LSB 112.5-KVA transformer.

1-57. The LOB motor control center NO. 1 distributes 480-VAC, 60-CPS, 3PH power through circuit breakers to the air-conditioning equipment, cooling tower fan, air cooling unit circulating water pumps, and a 112.5-KVA transformer. This transformer steps the 480-VAC, 60-CPS, 3PH power down to supply the launch operations building 120/208V, 3PH, 60-CPS, AC distribution panel. The AC distribution panel supplies lighting panels LA and LB, the public address and telephone equipment room, and a 120/208-VAC, 60-CPS, 3PH power panel. The 120/208V power panel supplies AC power through six circuit breakers to the instrumentation room and the launch control center.

1-58. Lighting panels LA and LB in the LOB supply 120/208-VAC, 60-CPS, 3PH power to lighting fixtures, receptacles, small motors, and other circuits in the building. Lighting panel LA supplies 120/208-VAC power to the 125-VDC emergency battery charger and batteries (28, figure 1-5), which provides both normal and emergency 125-VDC power for the LOB and LSB. The 125-VDC emergency battery charger maintains a 60-cell emergency battery assembly at full charge. This combined system supplies 125-VDC power to emergency lighting panel LE and the facilities remote control panel in the LOB and to emergency lighting panel LE in the LSB. Emergency lighting is controlled by a 2-pole, 60-AMP contactor in the LOB and LSB, the contacts of which are open as long as 120/208-VAC, 60-CPS, 3PH power is available. If this power fails, the contacts close automatically to connect 125-VDC to emergency lighting circuits in both buildings.

1-59. Launch and service building motor control center NO. 1 (29, figure 1-8) feeds various associated end items that require 480-VAC, 60-CPS, 3PH power. Launch and service building motor control center NO. 2 (30, figure 1-8) distributes 480-VAC, 60-CPS, 3PH power to the power supply-distribution set, the skid-mounted motor generator, the 75-KVA, 120/208-VAC, 60-CPS, 3PH transformer, motors that open and close the missile erection door, hydraulic and pneumatic ground support equipment in the LSB, and to all mobile trailers in the launcher area with the exception of the missile flight safety system trailer. The 75-KVA

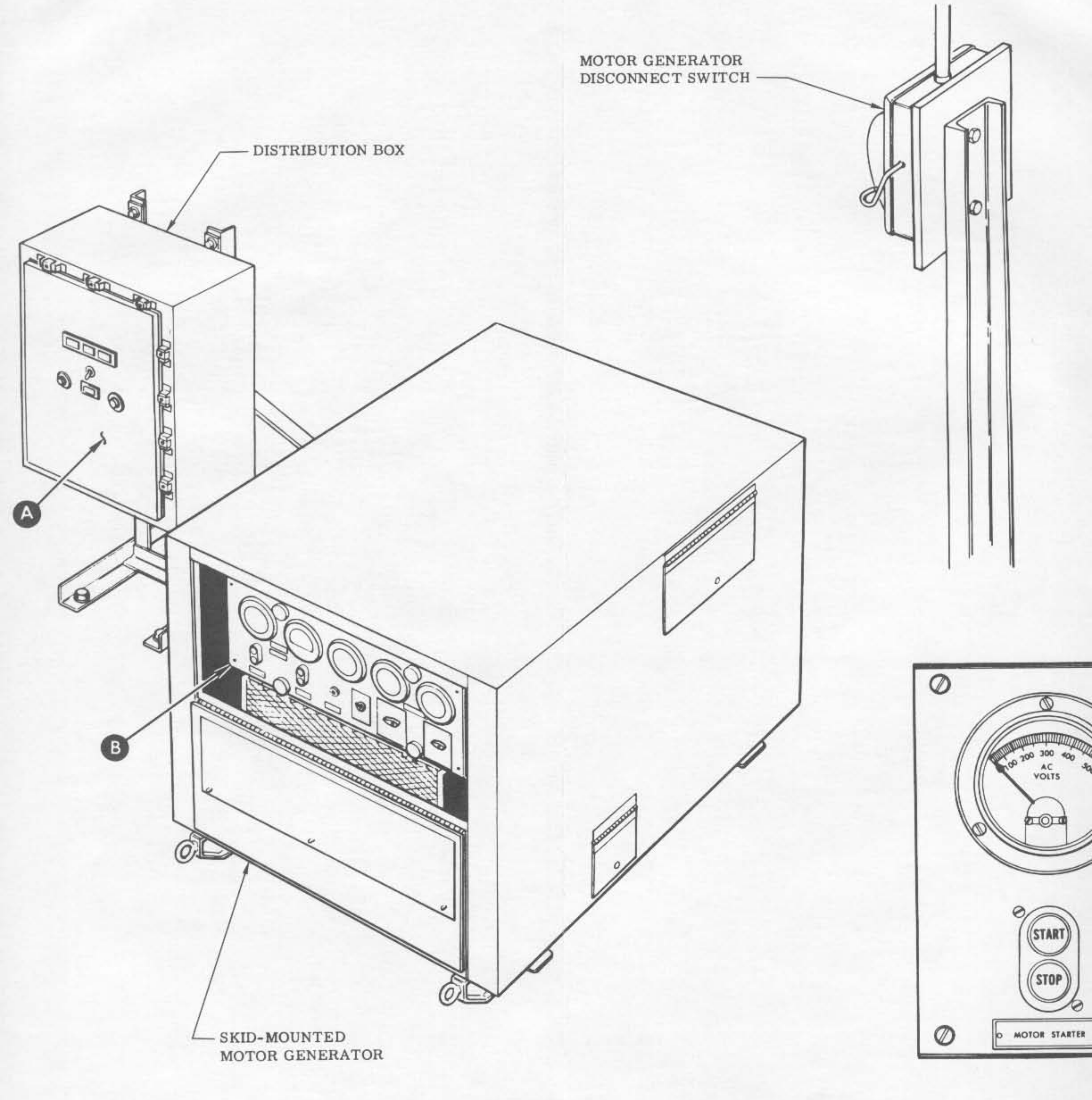
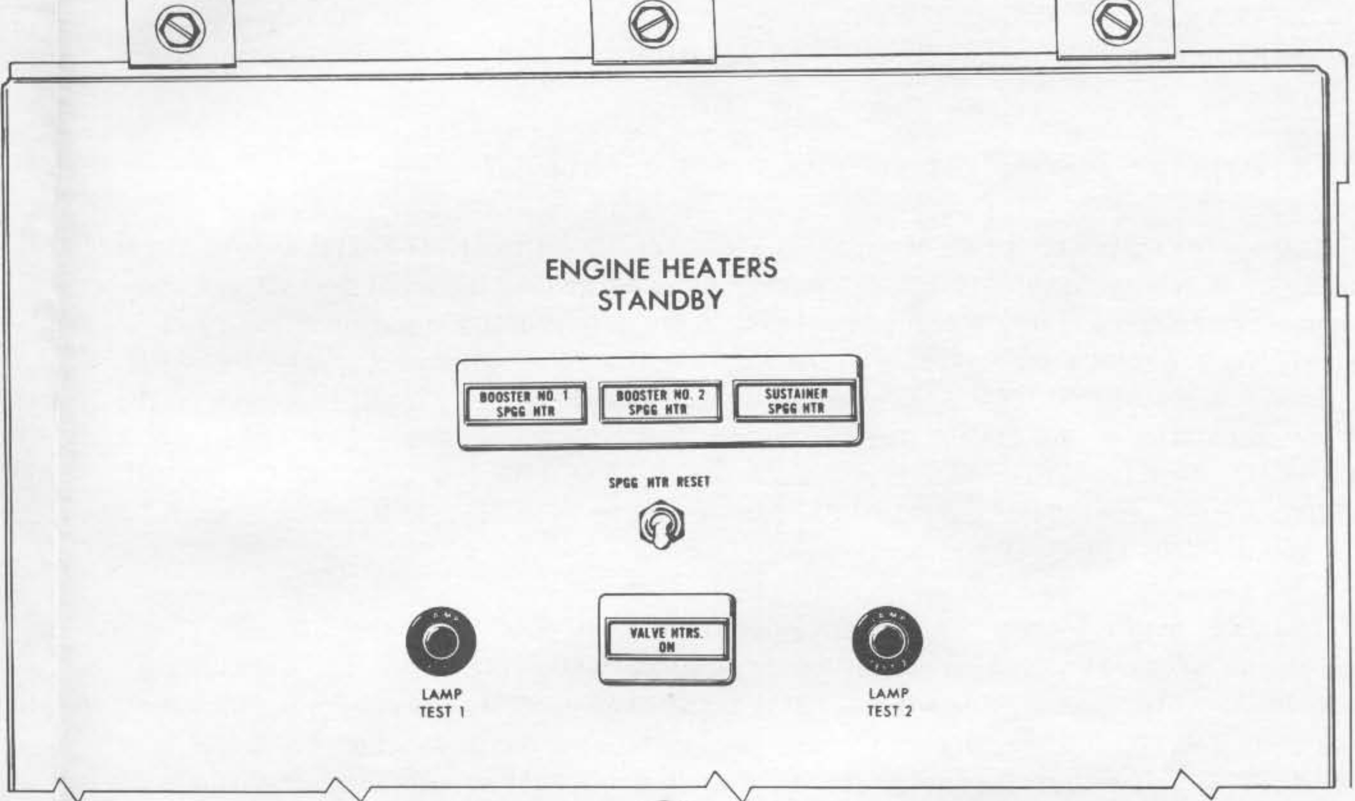
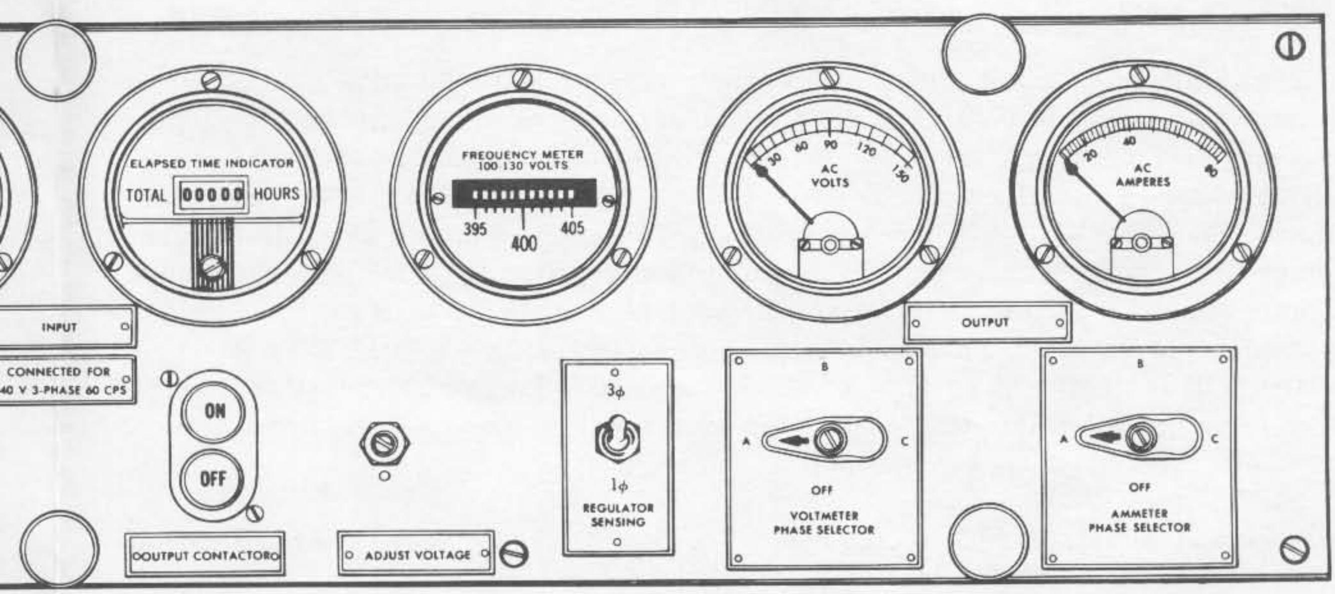


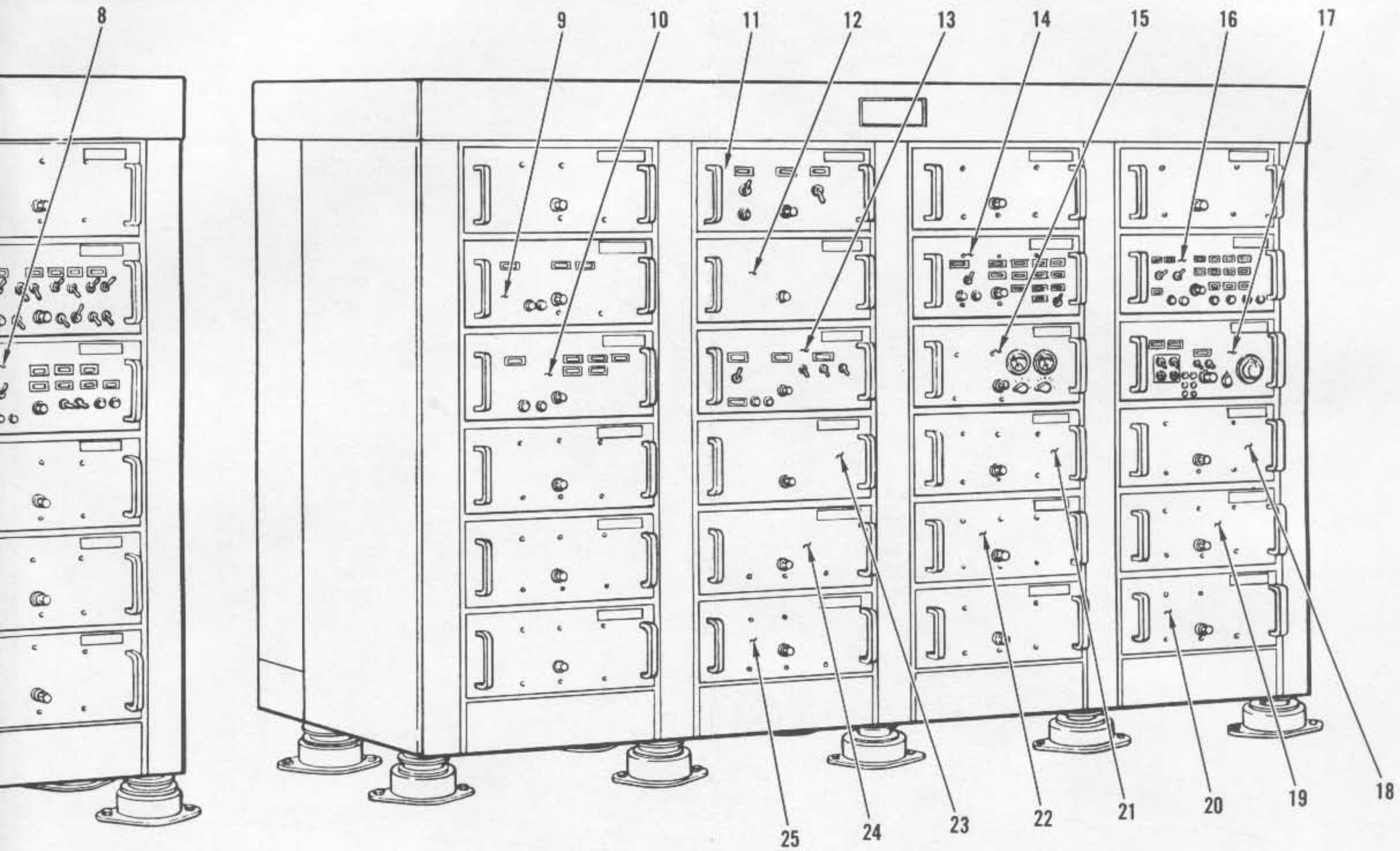
Figure 1-23. AC Power Distribution Equipment


ENGINE HEATERS
STANDBY
BOOSTER NO. 1
SPGG HTR
BOOSTER NO. 2
SPGG HTR
SUSTAINER
SPGG HTR
SPGG HTR RESET
VALVE HTRS.
ON
LAMP
TEST 1
LAMP
TEST 2

A


ELAPSED TIME INDICATOR
TOTAL 00000 HOURS
FREQUENCY METER
100-130 VOLTS
395
400
405
AC
VOLTS
30
60
90
120
150
AC
AMPERES
20
40
80
INPUT
CONNECTED FOR
40 V 3-PHASE 60 CPS
ON
OFF
OUTPUT CONTACTOR
ADJUST VOLTAGE
3ϕ
1ϕ
REGULATOR
SENSING
OUTPUT
B
A
C
OFF
VOLTMETER
PHASE SELECTOR
B
A
C
OFF
AMMETER
PHASE SELECTOR

B



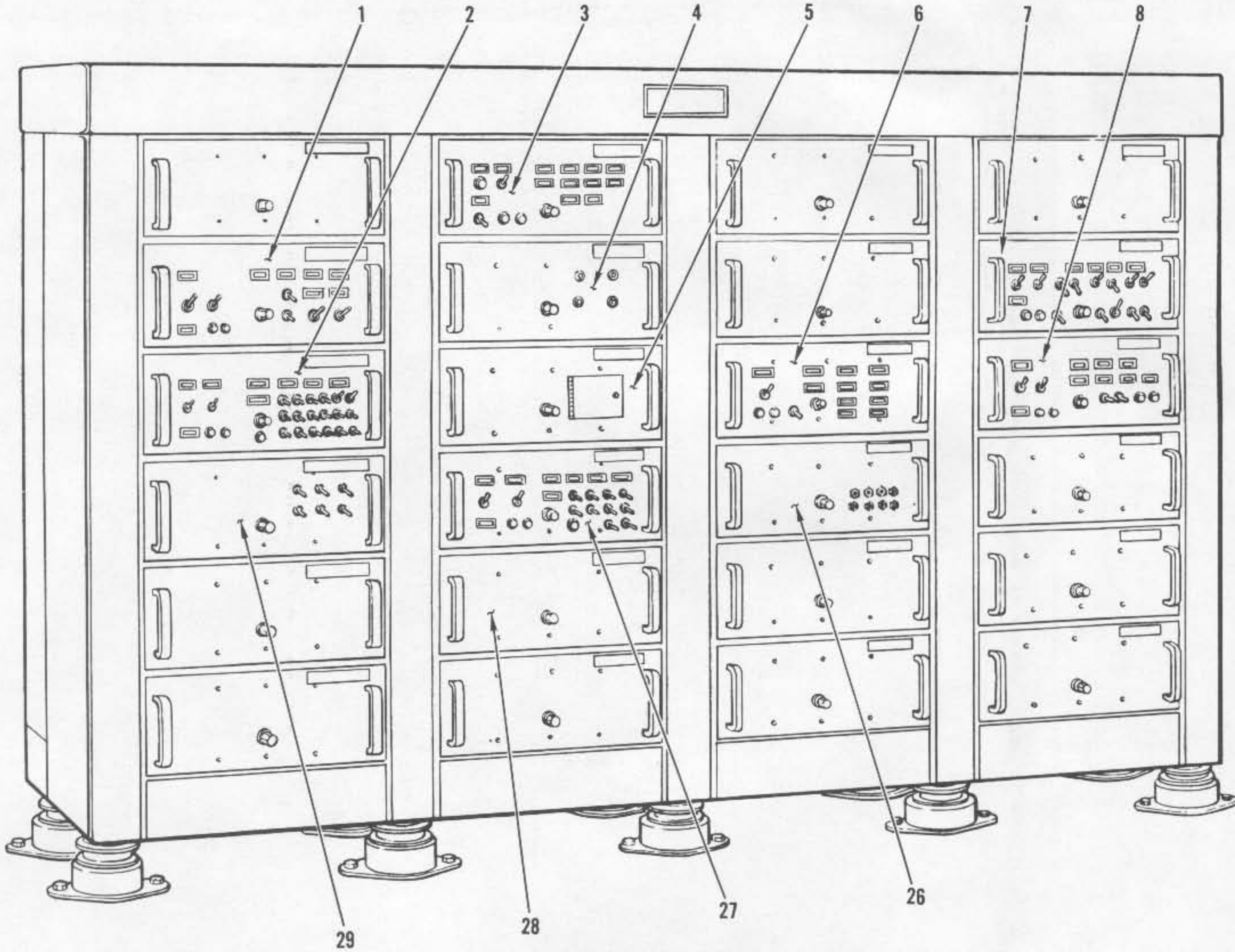
CONTROL-MONITOR GROUP 2 OF 4

A3
SSIS A7
SSIS A8
SSIS A9
CHASSIS A15
30

1) CHASSIS A38
2) CHASSIS A39

16 AUTOPILOT (PANEL 1) CHASSIS A44
17 AUTOPILOT (PANEL 2) CHASSIS A45
18 AUTOPILOT (PANEL 3) CHASSIS A46
19 AUTOPILOT (PANEL 4) CHASSIS A47
20 AUTOPILOT (PANEL 5) CHASSIS A48
21 MISSILE GROUND POWER (PANEL 3) CHASSIS A40
22 MISSILE GROUND POWER (PANEL 4) CHASSIS A41
23 COUNTDOWN (PANEL 1) CHASSIS A34
24 COUNTDOWN (PANEL 2) CHASSIS A35
25 COUNTDOWN (PANEL 3) CHASSIS A36
26 PROPELLANT LEVEL (PANEL 2) CHASSIS A16
27 FUEL TANKING (PANEL 1) CHASSIS A10
28 FUEL TANKING (PANEL 2) CHASSIS A11
29 LO_2 TANKING (PANEL 2) CHASSIS A4

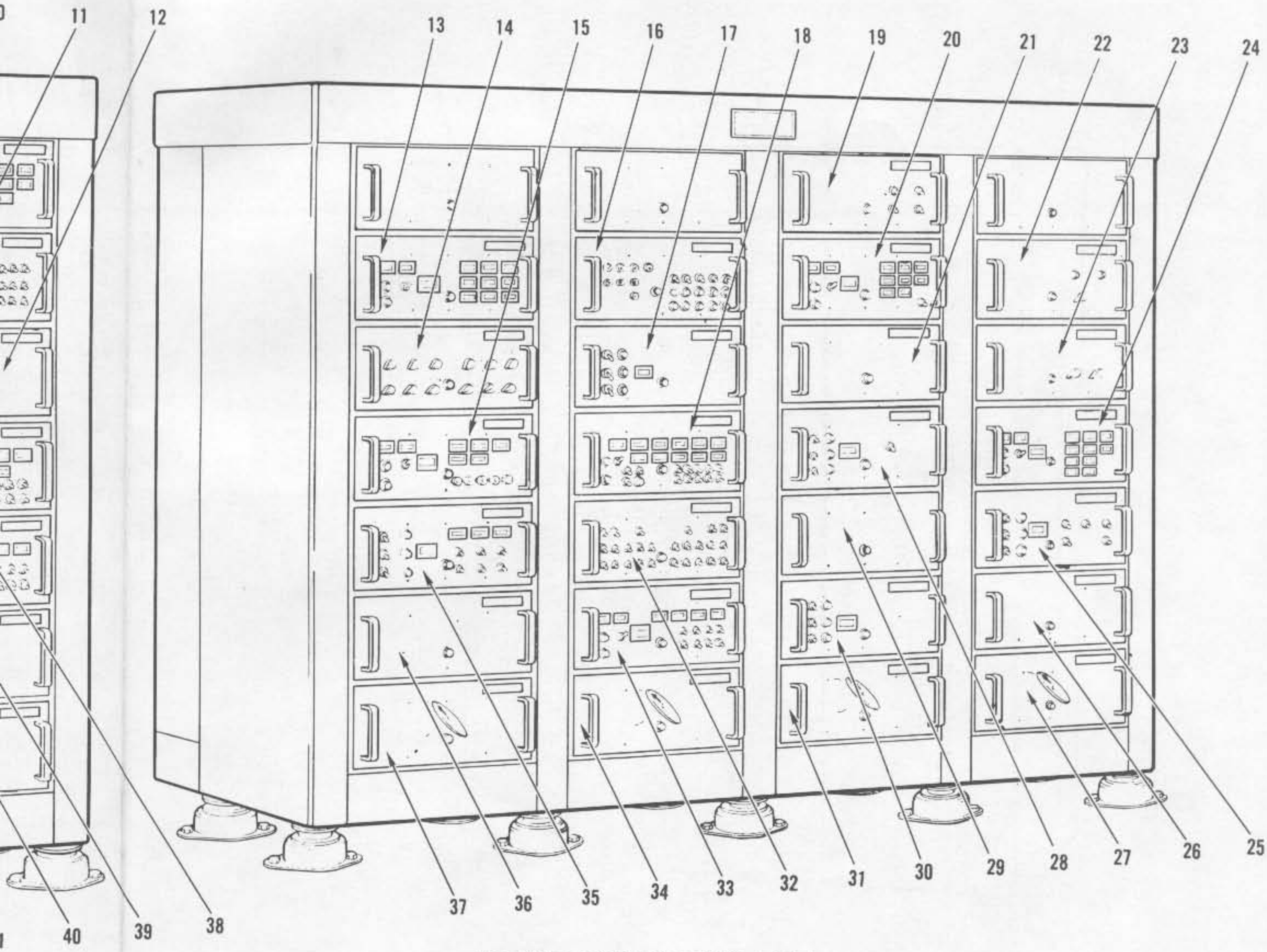
Figure 1-24. Control-Monitor Group 1 of 4 and 2 of 4



CONTROL-MONITOR GROUP 1 OF 4

1 FACILITY CHASSIS A2
2 LO_2 TANKING (PANEL 1) CHASSIS A3
3 PRESSURIZATION (PANEL 1) CHASSIS A7
4 PRESSURIZATION (PANEL 2) CHASSIS A8
5 PRESSURIZATION (PANEL 3) CHASSIS A9
6 PROPELLANT LEVEL (PANEL 1) CHASSIS A15
7 LN_2 HELIUM TANKING CHASSIS A20
8 ERECTION CHASSIS A21
9 GUIDANCE CHASSIS A26
10 RE-ENTRY VEHICLE CHASSIS A27
11 ENGINE (PANEL 1) CHASSIS A31
12 ENGINE (PANEL 2) CHASSIS A32
13 HYDRAULICS CHASSIS A33
14 MISSILE GROUND POWER (PANEL 1) CHASSIS A38
15 MISSILE GROUND POWER (PANEL 2) CHASSIS A39

32.137-20B

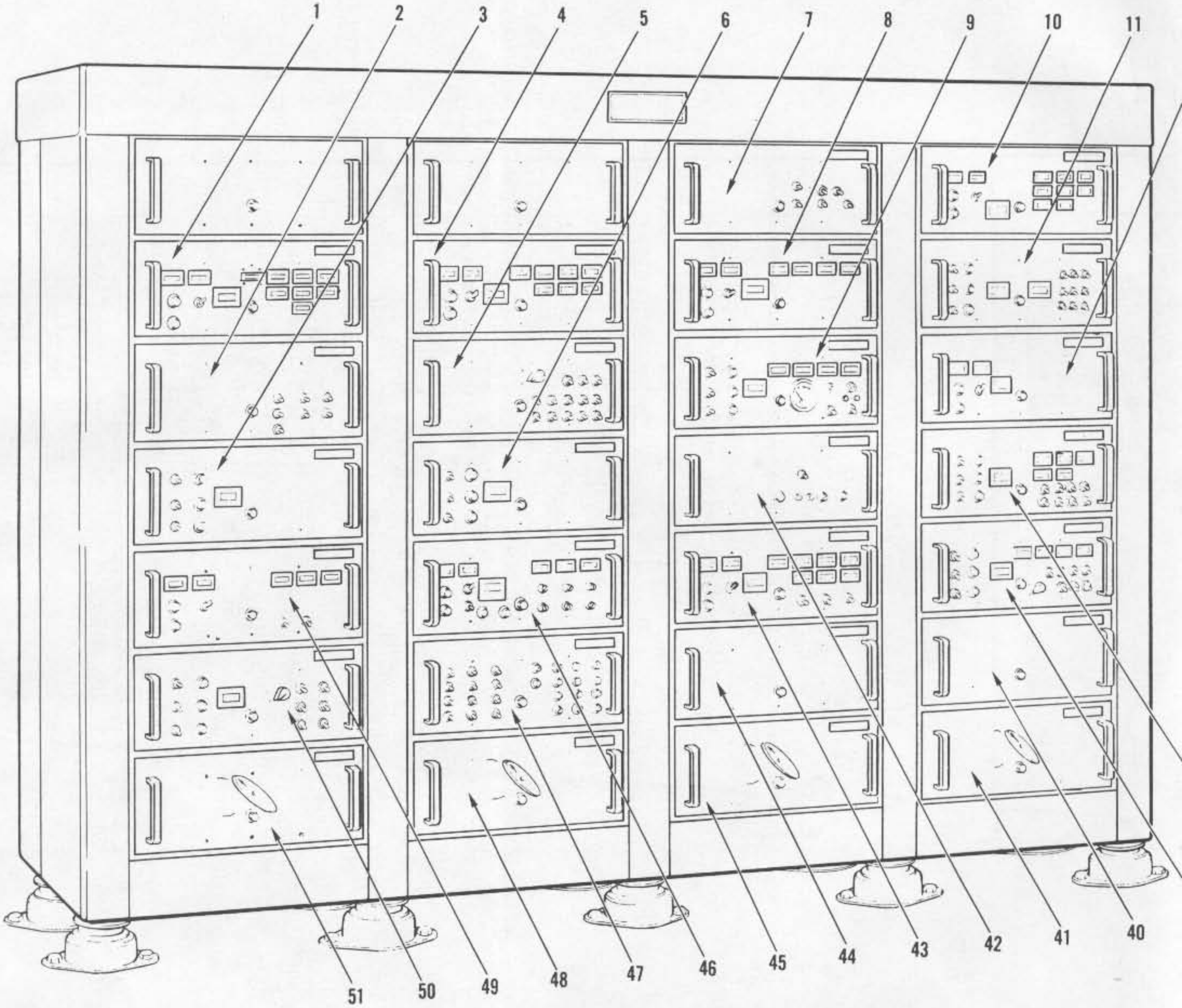


CONTROL-MONITOR GROUP 4 OF 4

SSIS A51
SSIS A52

27 SIGNAL RESPONDER TRANSFER SWITCH CHASSIS A56
28 PRESSURIZATION RESPONDER (PANEL 4) CHASSIS A46
29 PRESSURIZATION RESPONDER (PANEL 5) CHASSIS A47
30 RE-ENTRY VEHICLE RESPONDER (PANEL 2) CHASSIS A48
31 SIGNAL RESPONDER TRANSFER SWITCH CHASSIS A49
32 COUNTDOWN RESPONDER (PANEL 2) CHASSIS A40
33 RE-ENTRY VEHICLE RESPONDER (PANEL 1) CHASSIS A41
34 SIGNAL RESPONDER TRANSFER SWITCH CHASSIS A42
35 GUIDANCE RESPONDER (PANEL 2) CHASSIS A33
36 GUIDANCE RESPONDER (PANEL 3) CHASSIS A34
37 SIGNAL RESPONDER TRANSFER SWITCH CHASSIS A35
38 FACILITY RESPONDER (PANEL 2) CHASSIS A25
39 LO_2 TANKING RESPONDER (PANEL 2) CHASSIS A26
40 LO_2 TANKING RESPONDER (PANEL 4) CHASSIS A27
41 SIGNAL RESPONDER TRANSFER SWITCH CHASSIS A28
42 MISSILE GROUND POWER RESPONDER (PANEL 4) CHASSIS A18
43 LO_2 TANKING RESPONDER (PANEL 1) CHASSIS A19
44 LO_2 TANKING RESPONDER (PANEL 3) CHASSIS A20
45 SIGNAL RESPONDER TRANSFER SWITCH CHASSIS A21
46 PROPELLANT LEVEL RESPONDER (PANEL 1) CHASSIS A12
47 PROPELLANT LEVEL RESPONDER (PANEL 2) CHASSIS A13
48 SIGNAL RESPONDER TRANSFER SWITCH CHASSIS A14
49 ENGINE RESPONDER (PANEL 1) CHASSIS A5
50 ENGINE RESPONDER (PANEL 2) CHASSIS A6
51 SIGNAL RESPONDER TRANSFER SWITCH CHASSIS A7

Figure 1-25. Control-Monitor Group 3 of 4 and 4 of 4



CONTROL-MONITOR GROUP 3 OF 4

1 ERECTION RESPONDER (PANEL 1) CHASSIS A2
2 ERECTION RESPONDER (PANEL 2) CHASSIS A3
3 ERECTION RESPONDER (PANEL 3) CHASSIS A4
4 FUEL TANKING RESPONDER (PANEL 1) CHASSIS A9
5 FUEL TANKING RESPONDER (PANEL 2) CHASSIS A10
6 FUEL TANKING RESPONDER (PANEL 3) CHASSIS A11
7 MISSILE GROUND POWER RESPONDER (PANEL 1) CHASSIS A15
8 MISSILE GROUND POWER RESPONDER (PANEL 2) CHASSIS A16
9 MISSILE GROUND POWER RESPONDER (PANEL 3) CHASSIS A17
10 LN_2 HELIUM TANKING RESPONDER (PANEL 1) CHASSIS A22
11 LN_2 HELIUM TANKING RESPONDER (PANEL 2) CHASSIS A23
12 FACILITY RESPONDER (PANEL 1) CHASSIS A24
13 AUTOPILOT RESPONDER (PANEL 1) CHASSIS A30
14 AUTOPILOT RESPONDER (PANEL 2) CHASSIS A31
15 GUIDANCE RESPONDER (PANEL 1) CHASSIS A32
16 AUTOPILOT RESPONDER (PANEL 3) CHASSIS A37
17 AUTOPILOT RESPONDER (PANEL 4) CHASSIS A38
18 COUNTDOWN RESPONDER (PANEL 1) CHASSIS A39
19 PRESSURIZATION RESPONDER (PANEL 1) CHASSIS A43
20 PRESSURIZATION RESPONDER (PANEL 2) CHASSIS A44
21 PRESSURIZATION RESPONDER (PANEL 3) CHASSIS A45
22 PRESSURIZATION TRANSDUCER RESPONDER (PANEL 1) CHASSIS A51
23 PRESSURIZATION TRANSDUCER RESPONDER (PANEL 2) CHASSIS A52
24 HYDRAULICS RESPONDER (PANEL 1) CHASSIS A53
25 HYDRAULICS RESPONDER (PANEL 2) CHASSIS A54
26 HYDRAULICS RESPONDER (PANEL 3) CHASSIS A55

32.137-21A

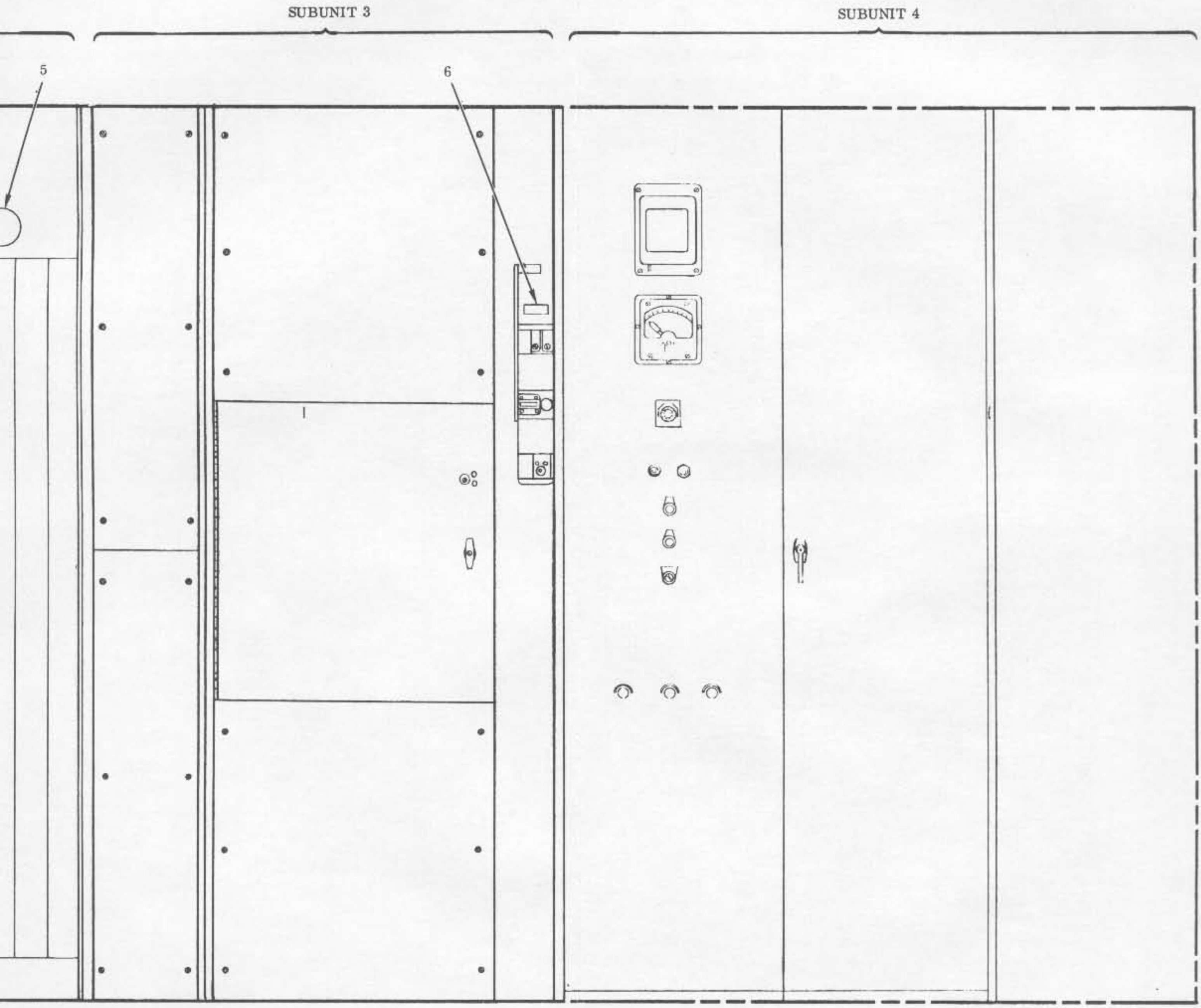
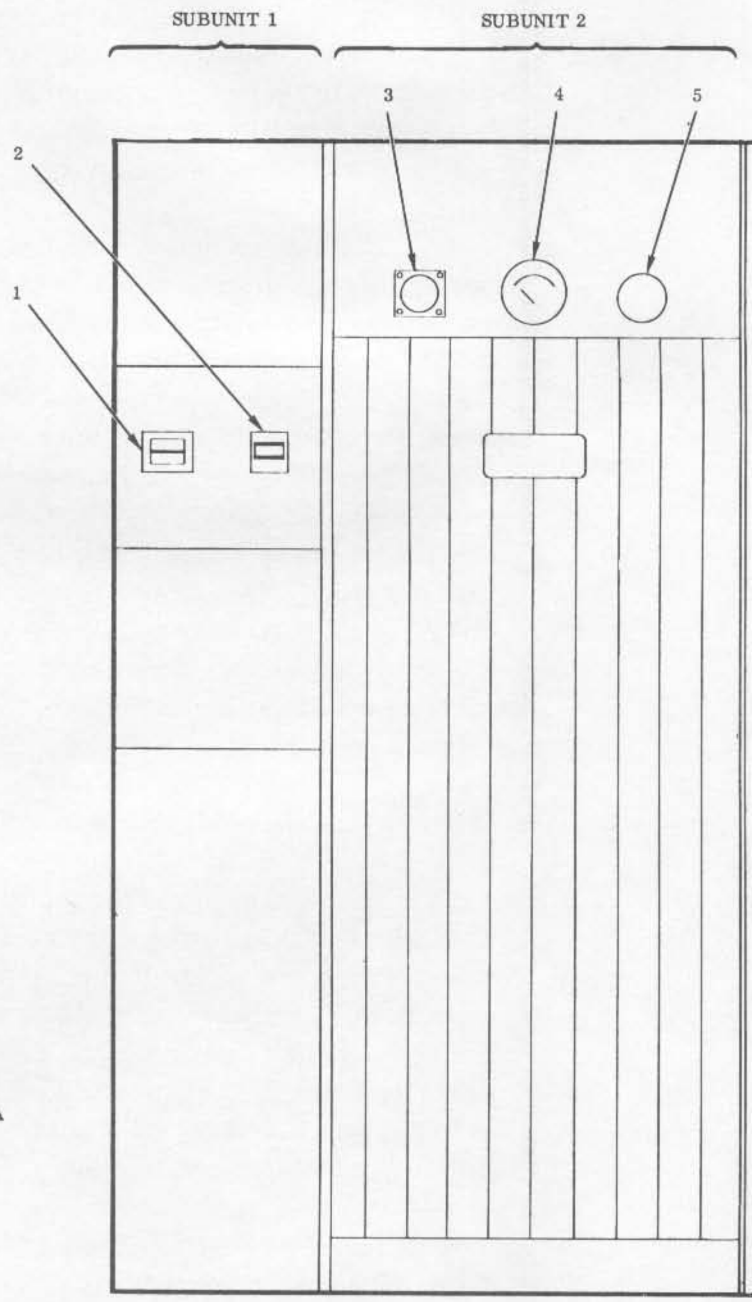


Figure 1-26. Launch Operations Building 4160-Volt Unit Substation (OSTF-1)



1 LAUNCH AND SERVICE BLDG CIRCUIT BREAKER
2 MCC LAUNCH OPER BLDG CIRCUIT BREAKER
3 LIQUID LEVEL GAGE
4 LIQUID TEMP. C° GAGE
5 VACUUM PRESSURE GAGE
6 TRANSF. PRIMARY 4160V-200A KEYED DISCONNECT SWITCH

T1-32.55-4

transformer supplies 120/208-VAC, 60-CPS, 3PH power to the MFSS trailer receptacle in the launcher area.

1-60. The power supply-distribution set (figure 1-27) provides and distributes 28-VDC power to the launch control, guidance, re-entry vehicle, prelaunch monitor, missile electrical, hydraulic, pneumatic, erection systems, and the checkout test station. This unit also supplies 28-VDC power to an emergency battery to maintain charge on the cells. If the 28-VDC power supply fails during countdown, the emergency battery supplies power to allow continuation of a tactical launch or return to safe condition.

1-61. The skid-mounted motor generator (figure 1-23) supplies 115-VAC, 400-CPS, 3PH power through distribution box (AC) to the checkout test station, re-entry vehicle prelaunch monitor, and guidance equipment, and through the control-monitor group (figures 1-24 and 1-25) interconnecting box (launch and test) to the missile.

1-62. The launch and service building 112.5-KVA transformer steps AC voltage down from 480 to 120/208 volts. This transformer supplies power to the LSB AC power distribution panel. The AC power distribution panel supplies five lighting panels and the ground support equipment power panel. The lighting panels supply power to lighting fixtures, receptacles, small motors, TV camera equipment, mobile roof lighting, and control circuits. The AGE. power panel distributes 120/208-VAC, 60-CPS, 3PH power through control circuits to the re-entry vehicle prelaunch monitor, guidance equipment, re-entry vehicle checkout trailer, and through the distribution box (AC) and then the interconnecting box (launch and test) to the missile heater.

1-63. ELECTRICAL POWER DISTRIBUTION SYSTEM (SMS 576-C).

1-64. The operating power for SMS 576-C is received from an overhead power feeder from SMS 576-A. It is then fed through an underground cable to the utility building to a stepdown transformer and water pump control unit in the 4160V unit substation (figure 1-28). The input power is also supplied to two pole-mounted transformers. One pole-mounted transformer supplies power for the gate house and the other supplies power for lighting the security fence. The transformer in the substation unit steps the 4160-VAC, 60-CPS, 3PH power down to 480 volts for distribution to the utility building and the launch and service building motor control centers (35 and 36, figure 1-9).

1-65. The utility building motor control center (6, figure 1-10) distributes 480-VAC, 60-CPS, 3PH power through fused disconnect switches to air-conditioning equipment, a 15-KVA, 480 to 120/208-VAC, 60-CPS, 3PH transformer, and to a 2-KVA, 480 to 120/208-VAC, 60-CPS, 3PH control transformer. The 15-KVA transformer supplies power to the instrument air compressors, to an air dryer, to lighting panel A in the utility building, and to the LOB motor control center (8, figure 1-6).

1-66. The LOB motor control center (8, figure 1-6) distributes the 480-VAC, 60-CPS, 3PH power to four transformers: a 15-KVA, 480 to 120/208-VAC, 60-CPS, 3PH transformer, a

1 STOP PUSHBUTTON
2 START PUSHBUTTON
3 POWER SUPPLY (RECTIFIER VDC)
4 DC VOLTMETER
5 DC VOLTAGE CONTROL
6 INDICATOR LAMP
7 DC AMMETER
8 PRESS TO TEST LIGHT PUSHBUTTON
9 HORN SILENCE SWITCH
10 BATTERY ON-OFF SWITCH
11 AMPERE HOUR METER
12 DISTRIBUTION UNIT
13 MISSILE GROUND POWER EMERGENCY BATTERY

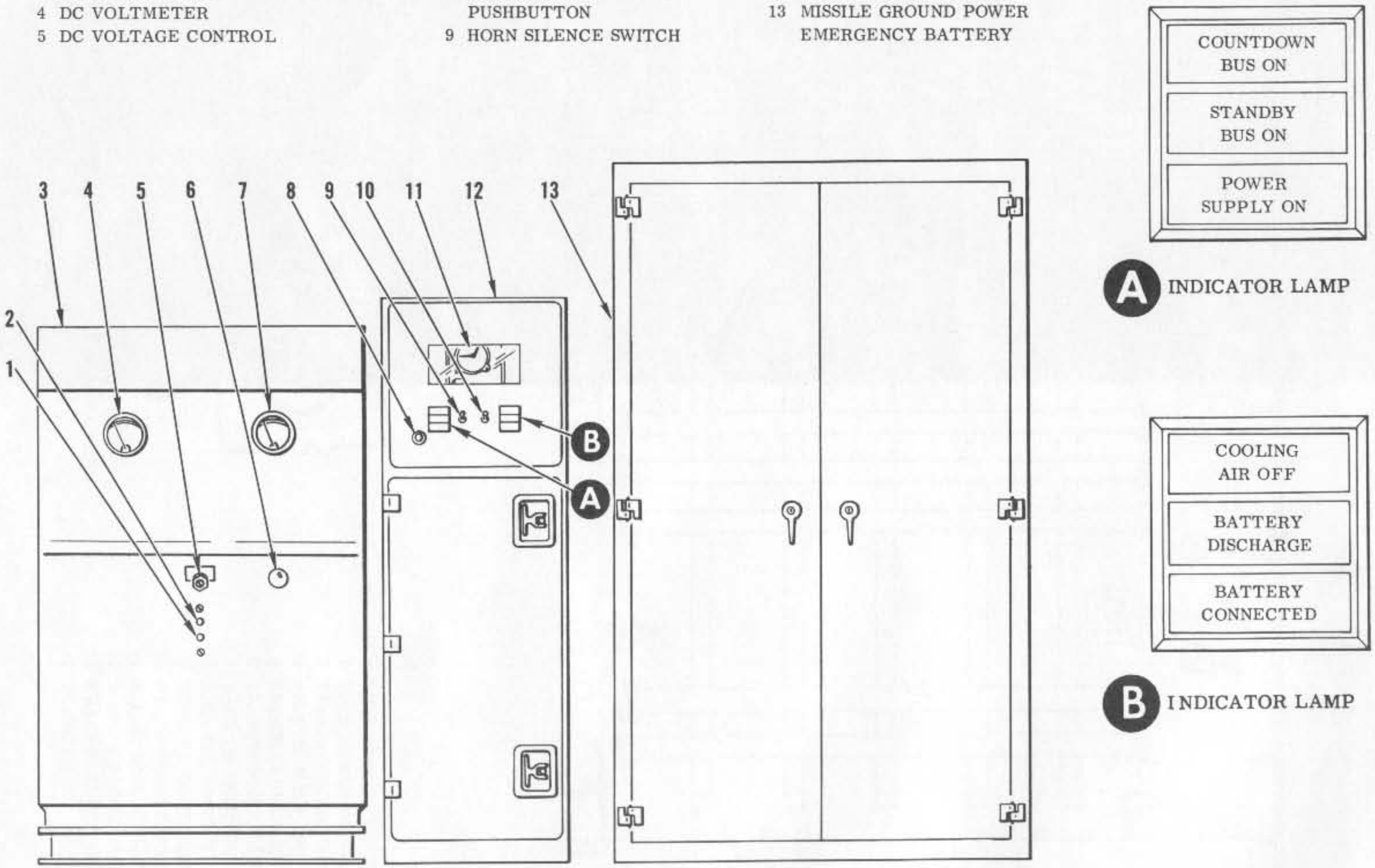


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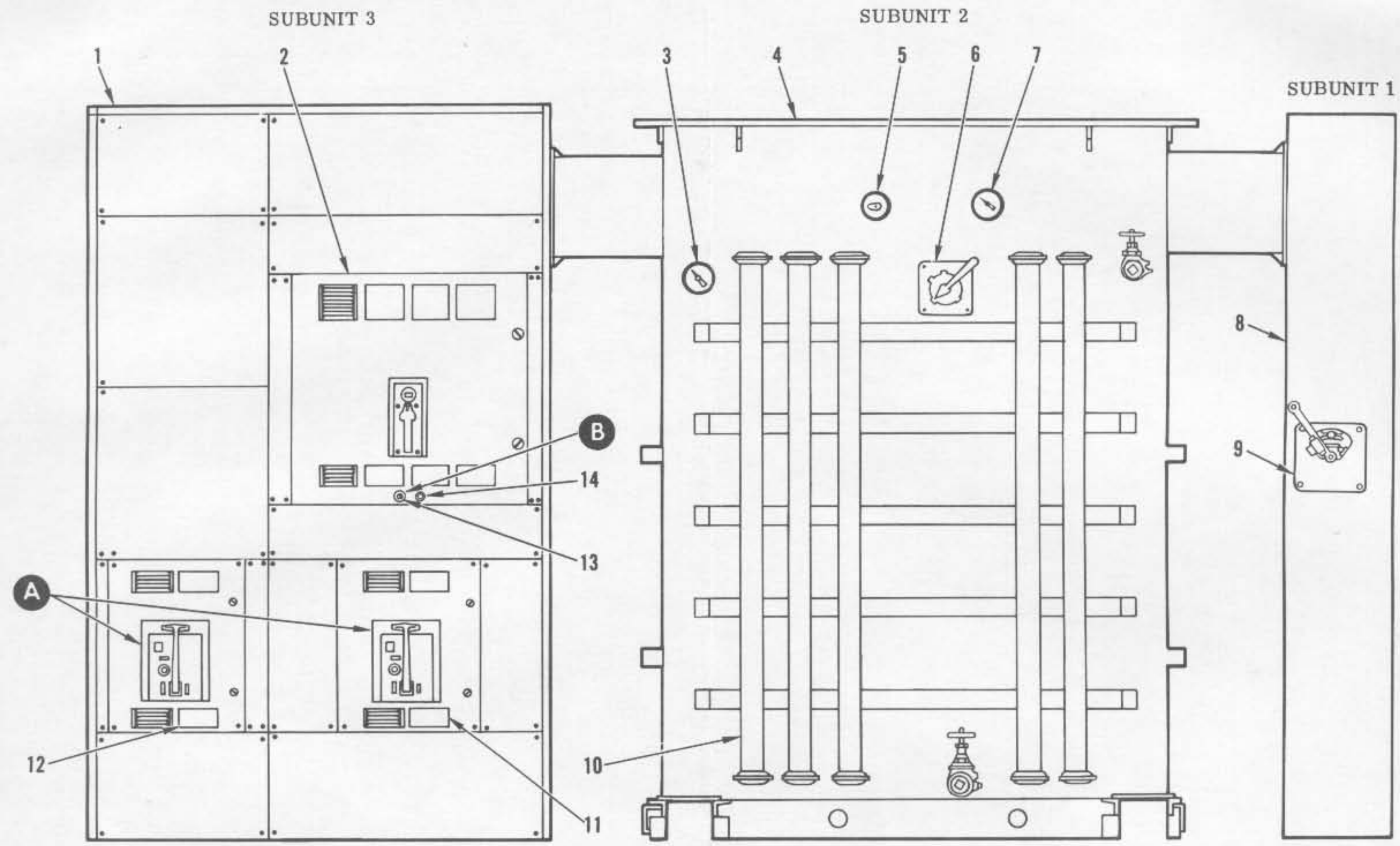
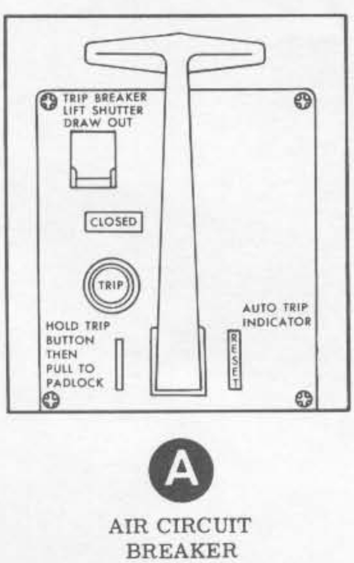
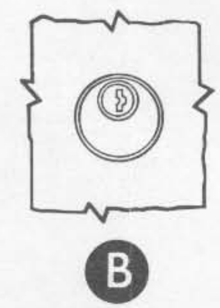
Figure 1-27. Power Supply-Distribution Set (OSTF-1 and SMS 576-C)





AIR CIRCUIT
BREAKER



MAIN 440 VOLT
CIRCUIT BREAKER
LOCK

1 MAIN POWER CONTROL CABINET
2 MAIN BREAKER (480 VOLT)
3 TRANSFORMER TEMPERATURE GAGE
4 4160/480 VOLT 1500 KVA TRANSFORMER
5 LIQUID LEVEL GAGE
6 TRANSFORMER TAP CHANGING SWITCH
7 VACUUM-PRESSURE GAGE
8 MAIN DISCONNECT PANEL (4160 VOLT)
9 NO LOAD DISCONNECT SWITCH
10 TRANSFORMER COOLING FINS
11 A.C.B. 480V UTILITIES BLDG. MCC
12 L AND S BLDGS. H FDR.
13 KEY INTERLOCK (MAIN BREAKER)
14 PLUNGER

32.137-90

Figure 1-28. Utility Building 4160-Volt Unit Substation (SMS 576-C)

3-KVA, 480 to 120/240-VAC, 60-CPS, single phase transformer, a 3-KVA, 480 to 120/208-VAC, 60-CPS, 3PH transformer, and a 1-KVA, 480 to 120/208-VAC, 60-CPS, 3PH control transformer.

1-67. The 15-KVA transformer supplies power to the LOB lighting distribution panel (11, figure 1-6). This panel supplies power to lighting panel B and to communication equipment power distribution panel (1, figure 1-6).

1-68. The 3-KVA, 480 to 120/240-VAC, 60-CPS, 3PH transformer supplies power to an emergency battery charger (10, figure 1-6), which converts the AC input to a 125-VDC output to keep the cells of emergency batteries in a fully charged state. These batteries are used only when it is necessary to deliver emergency power in the event of an AC power failure.

1-69. The LOB emergency lighting disconnect transfer switch receives 125-VDC and 120/208-VAC, 60-CPS, 3PH power. During normal operation, the 3-KVA, 480 to 120/208-VAC, 60-CPS, single phase transformer supplies power to lighting panel E through this switch. If the AC power fails, the emergency lighting disconnect transfer switch opens and another set of contacts close, extending power from the 125-VDC distribution panel (3, figure 1-6) to lighting panel E (24). Lighting panel E then supplies 125-VDC power to all emergency and exit lights in the launch operations building.

1-70. The launch operations building 125-VDC distribution panel supplies the launch and service building motor control center when circuit breakers NO. 1 and 2 are ON. The 125-VDC power is then fed from the circuit breakers through the FUSE DISCONNECT SWITCH in the LSB motor control center to emergency transfer switch LE. If the 60-CPS, 3PH power in the LSB fails, or if the 480-VAC, 60-CPS, 3PH input to the complex fails, removing all AC power, the emergency lighting disconnect transfer switch functions in the same manner as that in the LOB with the following exception. The 60-CPS, 3PH power in the LSB is supplied from the low voltage power and lighting distribution panel. If this output fails, 125 VDC power is supplied to the emergency lights and exit lights in the launch and service building. In normal operation, 125 VDC power is always present at the LOB 125 VDC distribution panel, the LSB motor control center, and the LSB emergency lighting disconnect switch.

1-71. The LSB motor control centers (35, 36, figure 1-9) distribute 480-VAC, 60-CPS, 3PH power to the ground support equipment (through fused disconnect switches), checkout trailers (for heating, lighting, and ventilation), air-conditioning, ventilating, and heating equipment for the facilities in the LSB the 75-KVA, 480-VAC to 120/208-VAC, 60-CPS, 3PH power transformer, flame pit pump, power supply-distribution set, skid-mounted generator, and the emergency lighting disconnect transfer switch.

1-72. The power supply-distribution set (figure 1-27) provides and distributes 28-VDC power to the control monitor group (figures 1-24 and 1-25), re-entry vehicle prelaunch monitor (80, figure 1-9), power distribution box (AC) (72, figure 1-9), countdown group (79, figure 1-9), hydraulic, pneumatic, and erection systems ground support equipment, and checkout trailers. The unit also supplies 28-VDC power to the missile ground power and the 28-VDC emergency battery to maintain the cells on trickle charge. If the 28-VDC power supply output fails, the emergency battery supplies 28-VDC power to the ground support equipment.

1-73. The skid-mounted motor generator (figure 1-23) supplies 115-VAC, 400-CPS, 3PH power through the distribution box (AC) to the checkout test station, and through the control-monitor group to the launch and test interconnecting box group, and in turn to the missile heaters.

1-74. The launch and service building 75-KVA, 480 to 120/208-VAC, 60-CPS, 3PH transformer steps 480 volts down to 120/208-VAC, 60-CPS, 3PH power which is supplied to the LSB low-voltage power and lighting distribution panel (11, figure 1-6). This panel supplies power through fused disconnect switches to lighting panels LA, LB, and LC and to power panel PA (71, 41, 42, and 40, figure 1-9).

1-75. Lighting panels LA, LB, and LC in the LSB supply 120/208-VAC, 60-CPS, 3PH power to all lighting fixtures, and to the warning alarm systems receptacles, small motors, television floodlights (30, figure 1-9), oxygen detection unit, fuel vapor detection unit (17 and 47, figure 1-9), and emergency lighting transfer switch.

1-76. Power panel PA distributes 120/208-VAC, 60-CPS, 3PH power through circuit breakers to the countdown group, re-entry vehicle prelaunch monitor and the power distribution box (AC) to the ground support equipment, control-monitor group, and the missile.

1-77. REMOTE CONTROL AND MONITOR SYSTEM.

1-78. The remote control and monitor system consists of the facilities remote control panel (figures 1-29 through 1-33), the facilities terminal and relay cabinet, and the facilities interface cabinet. The facilities remote control panel consists of a trouble section, a ready-status section, and a control and monitor section. The trouble section contains indicators and annunciator alarms which operate if a facility system fault is detected. The ready-status section contains indicators which monitor the condition of vent dampers, purge and exhaust fans, power circuits, and the door status of various rooms in the LSB. The control and monitor section contains indicators for essential circuits in the system and pushbuttons which are used to start and stop equipment as conditions require. See table 1-3 for FRCP control and indicator functions. The facilities terminal and relay cabinet contains terminal boards and relays which function with the facilities remote control panel, the motor control centers, and systems within the complex. The relays are used to interlock, control, or operate equipment such as the doors, detectors, fans, solenoid valves, and indicators on the facilities remote control panel. The facilities interface cabinet contains terminal boards and relays which interconnect with the launch control equipment such as the missile erection doors and the flame door. This cabinet is also interconnected to the facilities remote control panel.

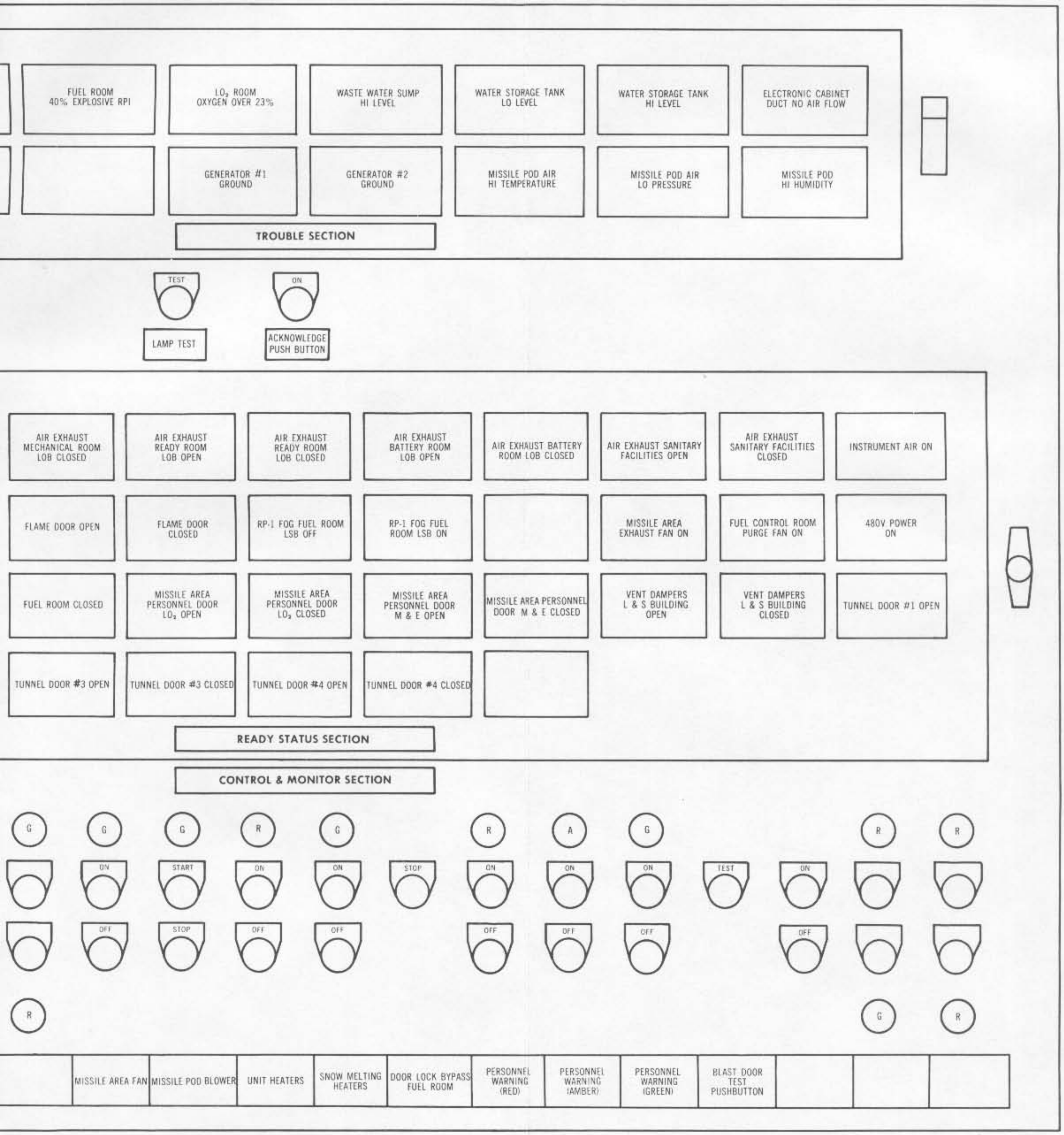
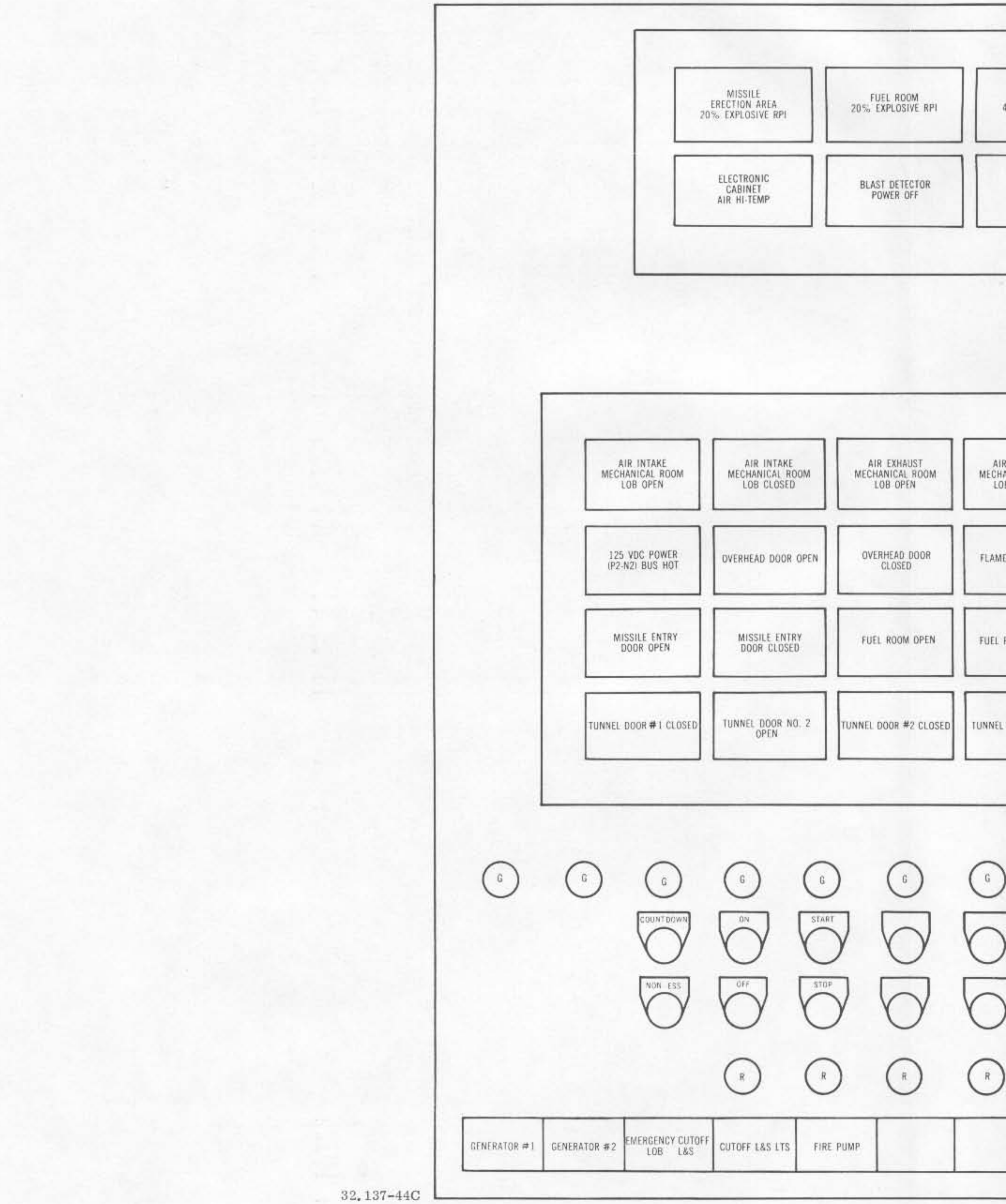


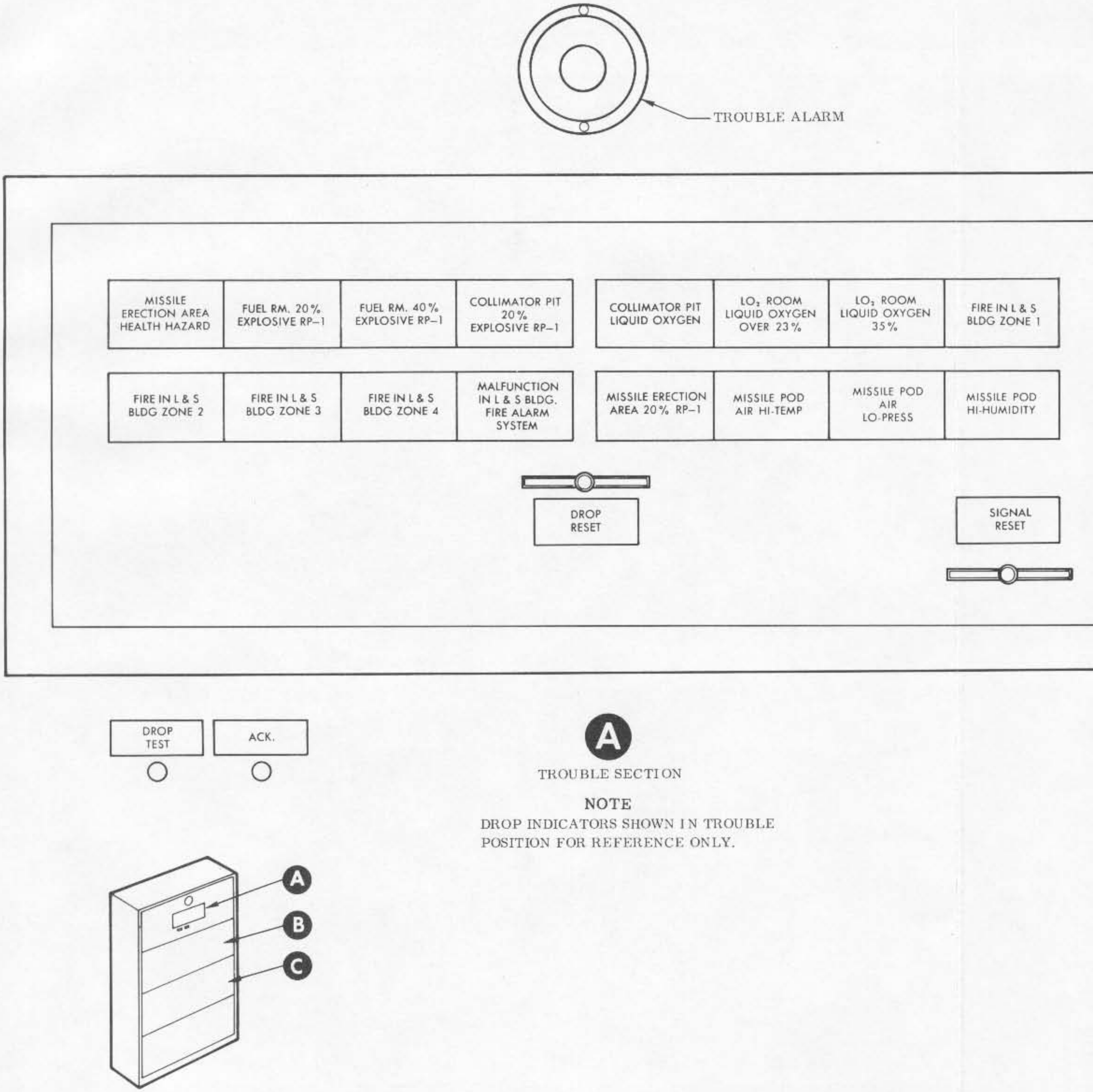
Figure 1-29. Facilities Remote Control Panel (SMS 548, SMS 566 and SMS 567)


MISSILE ERECTION AREA 20% EXPLOSIVE RPI
FUEL ROOM 20% EXPLOSIVE RPI
ELECTRONIC CABINET AIR HI-TEMP
BLAST DETECTOR POWER OFF
AIR INTAKE MECHANICAL ROOM LOB OPEN
AIR INTAKE MECHANICAL ROOM LOB CLOSED
AIR EXHAUST MECHANICAL ROOM LOB OPEN
125 VDC POWER (P2-N2) BUS HOT
OVERHEAD DOOR OPEN
OVERHEAD DOOR CLOSED
MISSILE ENTRY DOOR OPEN
MISSILE ENTRY DOOR CLOSED
FUEL ROOM OPEN
TUNNEL DOOR #1 CLOSED
TUNNEL DOOR NO. 2 OPEN
TUNNEL DOOR #2 CLOSED
G
COUNTDOWN
NON ESS
ON
OFF
START
STOP
R
GENERATOR #1
GENERATOR #2
EMERGENCY CUTOFF LOB L&S
CUTOFF L&S LTS
FIRE PUMP

32.137-44C

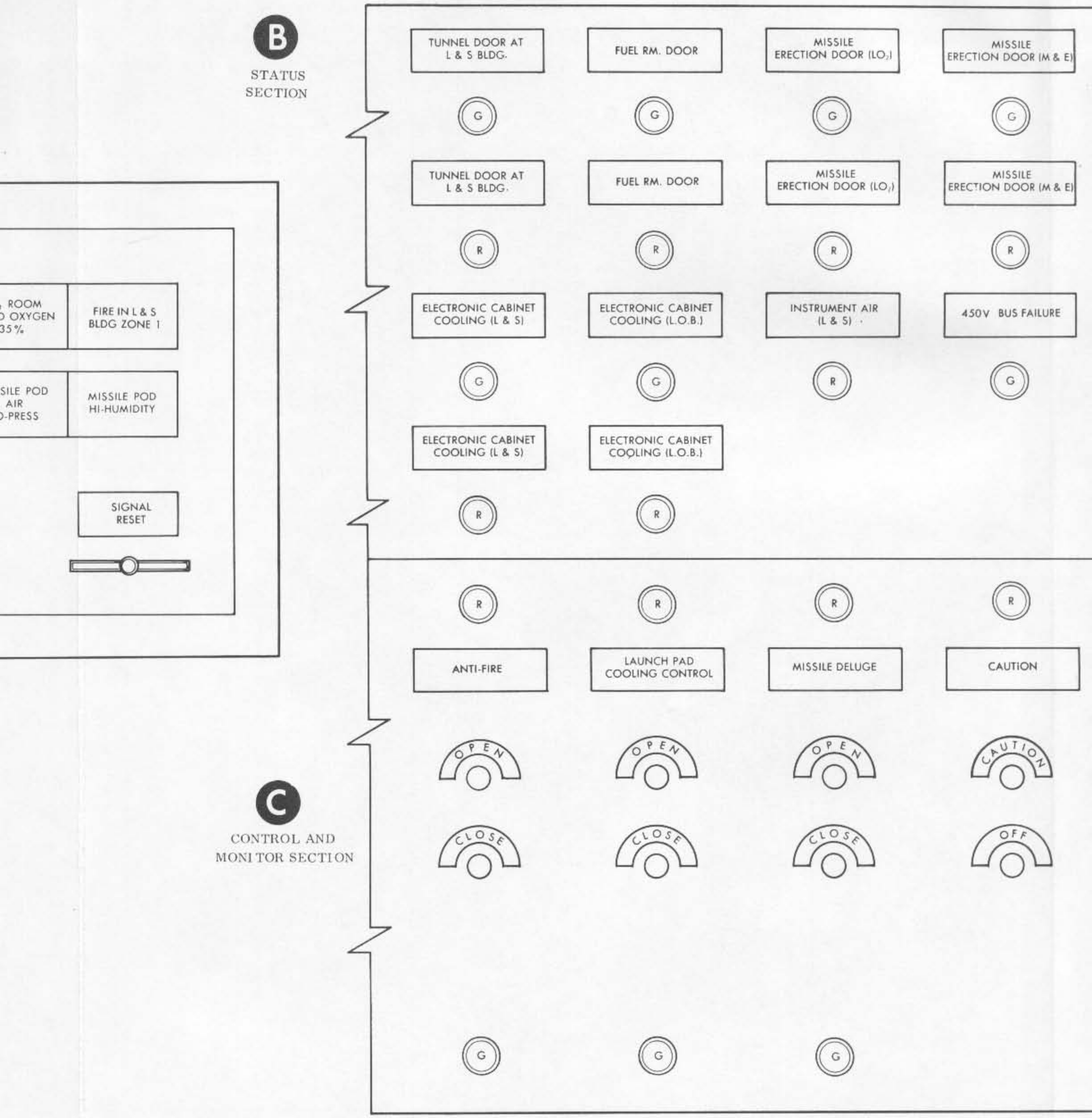
Figure 1-30 deleted.

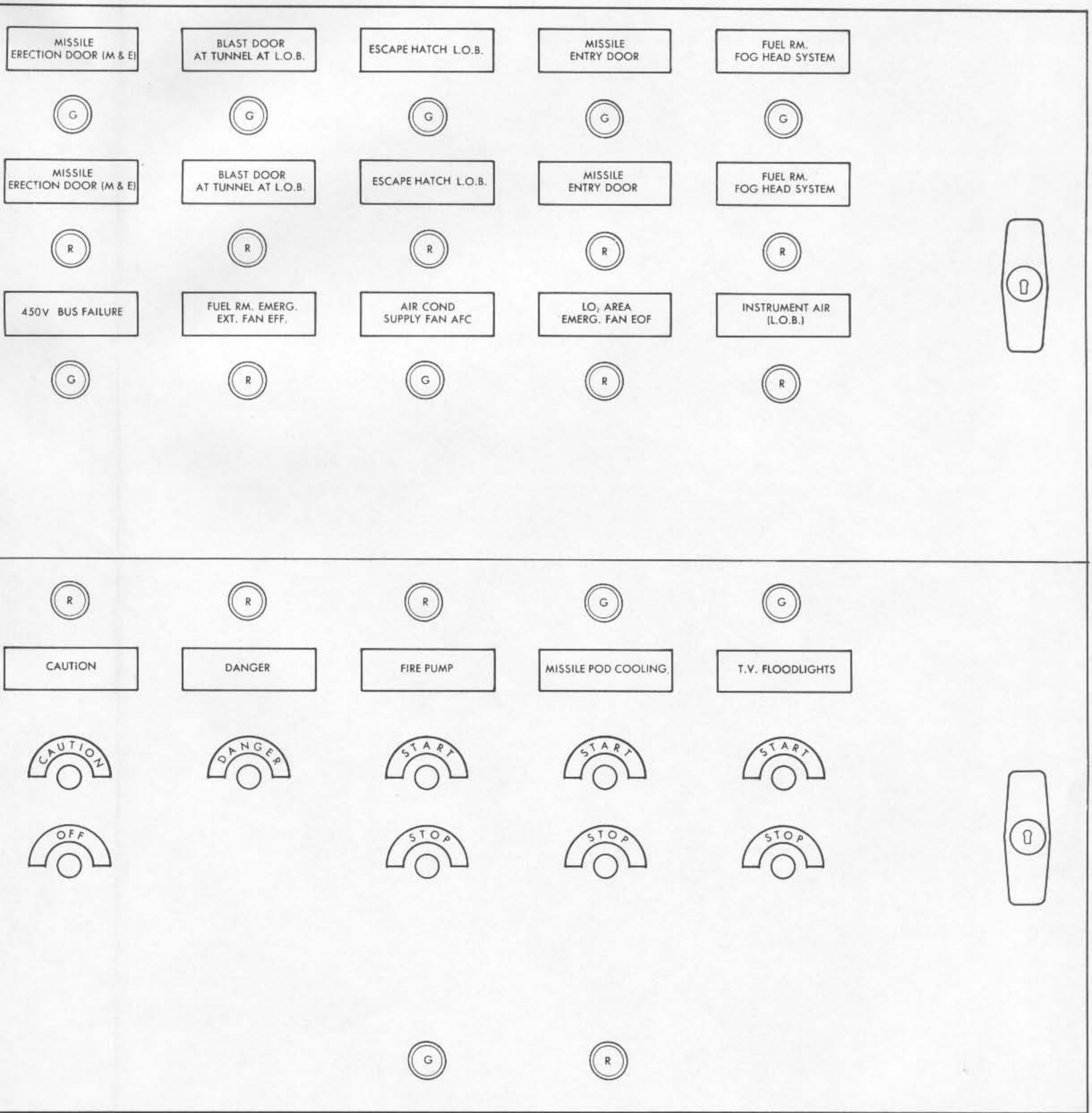
Figure 1-31 deleted.



32.137-97

Figure 1-32. Facilities Remote Control Panel (OSTF-1)


B
STATUS SECTION
TUNNEL DOOR AT L & S BLDG.
FUEL RM. DOOR
MISSILE ERECTION DOOR (LO2)
MISSILE ERECTION DOOR (M & E)
G
TUNNEL DOOR AT L & S BLDG.
FUEL RM. DOOR
MISSILE ERECTION DOOR (LO2)
MISSILE ERECTION DOOR (M & E)
R
ELECTRONIC CABINET COOLING (L & S)
ELECTRONIC CABINET COOLING (L.O.B.)
INSTRUMENT AIR (L & S)
450V BUS FAILURE
ELECTRONIC CABINET COOLING (L & S)
ELECTRONIC CABINET COOLING (L.O.B.)
, ROOM
O OXYGEN
35%
FIRE IN L & S BLDG ZONE 1
SILE POD
AIR
O-PRESS
MISSILE POD HI-HUMIDITY
SIGNAL RESET
ANTI-FIRE
LAUNCH PAD COOLING CONTROL
MISSILE DELUGE
CAUTION
OPEN
CLOSE
OFF
C
CONTROL AND MONITOR SECTION


MISSILE ERECTION DOOR (M & E)
BLAST DOOR AT TUNNEL AT L.O.B.
ESCAPE HATCH L.O.B.
MISSILE ENTRY DOOR
FUEL RM. FOG HEAD SYSTEM
G
G
G
G
G
MISSILE ERECTION DOOR (M & E)
BLAST DOOR AT TUNNEL AT L.O.B.
ESCAPE HATCH L.O.B.
MISSILE ENTRY DOOR
FUEL RM. FOG HEAD SYSTEM
R
R
R
R
R
450V BUS FAILURE
FUEL RM. EMERG. EXT. FAN EFF.
AIR COND SUPPLY FAN AFC
LO2 AREA EMERG. FAN EOF
INSTRUMENT AIR (L.O.B.)
G
R
G
R
R
R
R
R
G
G
CAUTION
DANGER
FIRE PUMP
MISSILE POD COOLING
T.V. FLOODLIGHTS
CAUTION
DANGER
START
START
START
OFF
STOP
STOP
STOP
G
R

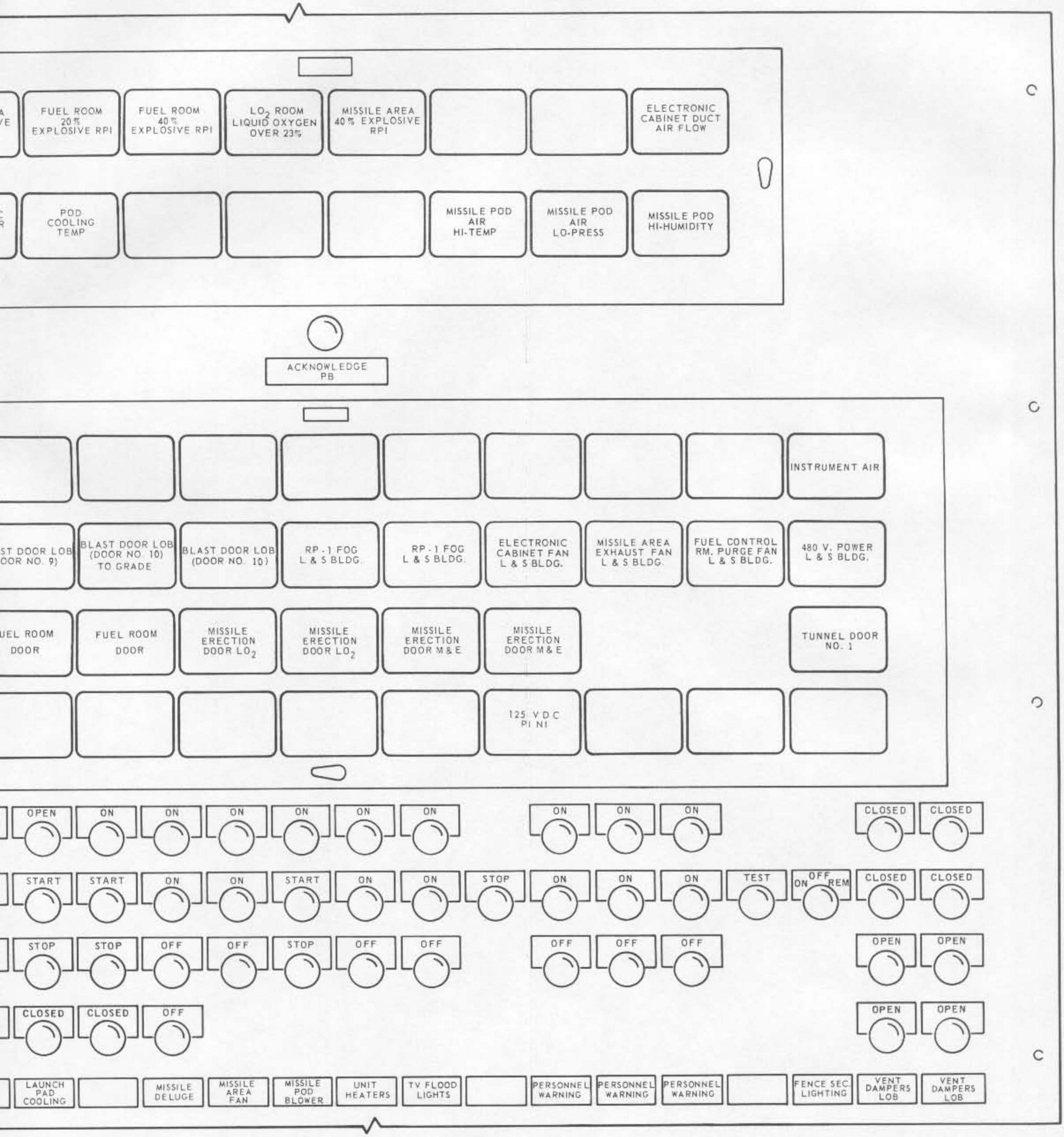
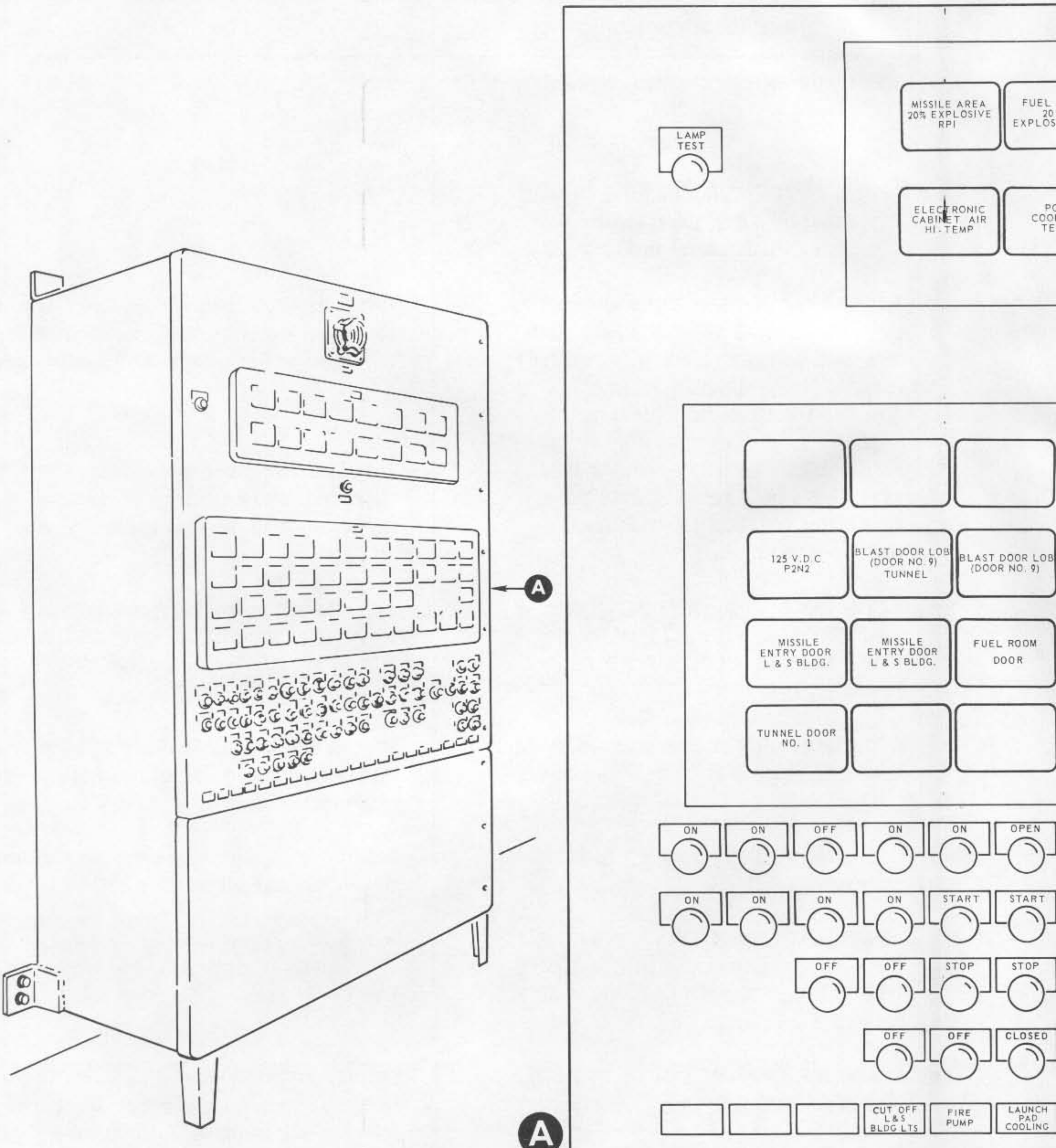


Figure 1-33. Facilities Remote Control Panel (SMS 576-C)



A
LAMP TEST
MISSILE AREA 20% EXPLOSIVE RPI
FUEL
ELECTRONIC CABINET AIR HI-TEMP
125 V.D.C. P2N2
BLAST DOOR LOB (DOOR NO. 9) TUNNEL
BLAST DOOR LOB (DOOR NO. 9)
MISSILE ENTRY DOOR L & S BLDG.
MISSILE ENTRY DOOR L & S BLDG.
FUEL ROOM DOOR
TUNNEL DOOR NO. 1
ON
ON
OFF
ON
ON
OPEN
ON
ON
ON
ON
START
START
OFF
OFF
STOP
STOP
OFF
OFF
CLOSED
CUT OFF L&S BLDG LTS
FIRE PUMP
LAUNCH PAD COOLING
A

32.137-98

Table 1-3. Facilities Remote Control Panel Indicators and Controls

INDICATOR OR CONTROL	FUNCTION
TROUBLE SECTION (All complexes): Note At OSTF-1 a malfunction is indicated by a flag dropping rather than an indicator illuminating.	
MISSILE ERECTION AREA 20% EXPLOSIVE RP-1 (SMS 548, SMS 566, SMS 567), MISSILE AREA 20% EXPLOSIVE RP1 (SMS 576-C), MISSILE ERECTION AREA 20% RP-1 (OSTF-1), indicators	Indicator illuminates when there is a 20% lower explosive limit concentration of RP-1 vapor in the missile erection area.
FUEL ROOM 20% EXPLOSIVE RP1 (SMS 548, SMS 566, SMS 567, SMS 576-C), FUEL RM 20% EXPLOSIVE RP-1 (OSTF-1) indicators	Indicator illuminates when there is a 20% lower explosive limit concentration of RP-1 vapor in the fuel room.
FUEL ROOM 40% EXPLOSIVE RP1 (SMS 548, SMS 566, SMS 567, SMS 576-C), FUEL RM 40% EXPLOSIVE RP-1 (OSTF-1) indicators	Indicator illuminates when there is a 40% lower explosive limit concentration of RP-1 vapor in the fuel room.
COLLIMATOR PIT 20% EXPLOSIVE RP-1 indicator (OSTF-1)	Flag drops when there is a 20% lower explosive limit concentration of RP-1 vapor in the collimator pit.
COLLIMATOR PIT LIQUID OXYGEN indicator (OSTF-1)	Flag drops when oxygen accumulation in the collimator pit is over 22%.
LO_2 ROOM LIQUID OXYGEN OVER 23% (SMS 576-C and OSTF-1), LO_2 ROOM OXYGEN OVER 23% (SMS 548, SMS 566, SMS 567) indicators	Indicator illuminates when gaseous oxygen accumulation in the LO_2 room is over 23% by volume.
MISSILE AREA 40% EXPLOSIVE RP 1 indicator (SMS 576-C)	Indicator illuminates when there is a 40% lower explosive limit concentration of RP-1 vapor in the missile area.

Table 1-3. Facilities Remote Control Panel Indicators and Controls (Continued)

INDICATOR OR CONTROL	FUNCTION
LO_2 ROOM LIQUID OXYGEN 35% indicator (OSTF-1)	Flag drops when gaseous oxygen accumulation in the LO_2 room is over 35% by volume.
WASTE WATER SUMP HI LEVEL indicator (SMS 548, SMS 566, SMS 567)	Indicator illuminates when there is an excessive accumulation of water in the waste water sump.
FIRE IN L & S BLDG ZONE 1, FIRE IN L & S BLDG ZONE 2, FIRE IN L & S BLDG ZONE 3, and FIRE IN L & S BLDG ZONE 4 indicators (OSTF-1)	Zone 1, 2, 3, or 4 flag drops when there is a fire in the corresponding fire zone of the LSB.
WATER STORAGE TANK LO LEVEL indicator (SMS 548, SMS 566, SMS 567)	LO LEVEL indicator illuminates when the water level of the storage tank is low.
WATER STORAGE TANK HI LEVEL indicator (SMS 548, SMS 566, SMS 567)	HI LEVEL indicator illuminates when there is excessive water in the storage tank.
MALFUNCTION IN L & S BLDG FIRE ALARM SYSTEM indicator (OSTF-1)	Flag dropped indicates a malfunction in the circuitry of the LSB fire alarm system.
ELECTRONIC CABINET DUCT NO AIR FLOW (SMS 548, SMS 566, SMS 567), ELECTRONIC CABINET DUCT AIR FLOW (576-C) indicators	Indicator illuminates when no air is flowing in electronic cabinet cooling air duct.
ELECTRONIC CABINET AIR HI-TEMP indicator (SMS 548, SMS 566, SMS 567, SMS 576-C)	Indicator illuminates when there is a malfunction of the electronic cabinet cooling air refrigerant system.
POD COOLING TEMP indicator (SMS 576-C)	Indicator illuminates when there is a malfunction of the pod cooling air refrigerant system.
BLAST DETECTOR POWER OFF indicator (SMS 548, SMS 566, SMS 567)	Indicator illuminates when there is a power failure to the blast detector circuitry.

Table 1-3. Facilities Remote Control Panel Indicators and Controls (Continued)

INDICATOR OR CONTROL	FUNCTION
GENERATOR #1 GROUND indicator (SMS 548, SMS 566, SMS 567)	Indicator illuminates when there is a ground anywhere in the electrical circuitry of the complex if generator NO. 1 is running.
GENERATOR #2 GROUND indicator (SMS 548, SMS 566, SMS 567)	Indicator illuminates when there is a ground anywhere in the electrical circuitry of the complex if generator NO. 2 is running.
MISSILE POD AIR HI TEMPERATURE (SMS 548, SMS 566, SMS 567) MISSILE POD AIR HI-TEMP (SMS 576-C, OSTF-1) indicators	Indicator illuminates when the temperature in the missile pod cooling duct is high.
MISSILE POD AIR LO PRESSURE (SMS 548, SMS 566, SMS 567), MISSILE POD AIR LO-PRESS (SMS 576-C, OSTF-1) indicators	Indicator illuminates when the pressure in the missile pod cooling duct is low.
MISSILE POD HI HUMIDITY indicator (all complexes)	Indicator illuminates when the humidity in the missile pod cooling duct is high.
READY STATUS SECTION (SMS 548, SMS 566, SMS 567, SMS 576-C):	
AIR INTAKE MECHANICAL ROOM LOB OPEN and AIR INTAKE MECHANICAL ROOM LOB CLOSED indicators (SMS 548, SMS 566, SMS 567)	OPEN indicator extinguishes and CLOSED indicator illuminates red when LOB mechanical room air intake blast gate is closed. OPEN indicator illuminates green and CLOSED indicator extinguishes when LOB mechanical room air intake blast gate is open.
AIR EXHAUST MECHANICAL ROOM LOB OPEN and AIR EXHAUST MECHANICAL ROOM LOB CLOSED indicators (SMS 548, SMS 566, SMS 567)	OPEN indicator extinguishes and CLOSED indicator illuminates red when LOB mechanical room air exhaust blast gate is closed. OPEN indicator illuminates green and CLOSED indicator extinguishes when LOB mechanical room air exhaust blast gate is open.

Table 1-3. Facilities Remote Control Panel Indicators and Controls (Continued)

INDICATOR OR CONTROL	FUNCTION
AIR EXHAUST READY ROOM LOB OPEN and AIR EXHAUST READY ROOM LOB CLOSED indicators (SMS 548, SMS 566, SMS 567)	OPEN indicator extinguishes and CLOSED indicator illuminates red when LOB ready room air vent blast gate is closed. OPEN indicator illuminates green and CLOSED indicator extinguishes when LOB ready room air vent blast gate is open.
AIR EXHAUST BATTERY ROOM LOB OPEN and AIR EXHAUST BATTERY ROOM LOB CLOSED indicators (SMS 548, SMS 566, SMS 567)	OPEN indicator extinguishes and CLOSED indicator illuminates red when LOB battery room air exhaust blast gate is closed. OPEN indicator illuminates green and CLOSED indicator extinguishes when LOB battery room air exhaust blast gate is open.
AIR EXHAUST SANITARY FACILITIES OPEN and AIR EXHAUST SANITARY FACILITIES CLOSED indicators (SMS 548, SMS 566, SMS 567)	OPEN indicator extinguishes and CLOSED indicator illuminates red when LOB sanitary facilities air exhaust blast gate is closed. OPEN indicator illuminates green and CLOSED indicator extinguishes when LOB sanitary facilities air exhaust blast gate is open.
INSTRUMENT AIR ON (SMS 548, SMS 566, SMS 567), INSTRUMENT AIR (SMS 576-C) indicators	Indicator illuminates green when instrument air compressor is running. Indicator extinguished indicates that instrument air compressor is not running.
125 VDC POWER (P2-N2) BUS HOT (SMS 548, SMS 566, SMS 567), 125 VDC P2N2 (SMS 576-C) indicators	Indicator illuminates green when there is 125-VDC power available at the P2-N2 bus. Indicator extinguished indicates that there is no 125-VDC power available at the P2-N2 bus.
BLAST DOOR LOB (DOOR NO. 9) TUNNEL (red) (SMS 576-C) and BLAST DOOR LOB (DOOR NO. 9) (green) (SMS 576-C) indicators	Green indicator illuminates and red indicator extinguishes when tunnel door NO. 9 is closed. Green indicator extinguishes and red indicator illuminates when tunnel door NO. 9 is open.

Table 1-3. Facilities Remote Control Panel Indicators and Controls (Continued)

INDICATOR OR CONTROL	FUNCTION
BLAST DOOR LOB (DOOR NO. 10) TO GRADE (red) (SMS 576-C) and BLAST DOOR LOB (DOOR NO. 10) (green) (SMS 576-C) indicators	Green indicator illuminates and red indicator extinguishes when blast door NO. 10 is closed. Green indicator extinguishes and red indicator illuminates when blast door NO. 10 is open.
OVERHEAD DOOR OPEN and OVERHEAD DOOR CLOSED indicators (SMS 548, SMS 566, SMS 567)	OPEN indicator extinguishes and CLOSED indicator illuminates green when overhead door is closed. OPEN indicator illuminates red and CLOSED indicator extinguishes when overhead door is open.
FLAME DOOR OPEN and FLAME DOOR CLOSED indicators (SMS 548, SMS 566, SMS 567)	OPEN indicator extinguishes and CLOSED indicator illuminates green when overhead door is closed. OPEN indicator illuminates red and CLOSED indicator extinguishes when overhead door is open.
RP-1 FOG FUEL ROOM LSB OFF (SMS 548, SMS 566, SMS 567), RP-1 FOG L & S BLDG (SMS 576-C), and RP-1 FOG FUEL ROOM LSB ON (SMS 548, SMS 566, SMS 567) RP-1 FOG L & S BLDG (SMS 576-C) indicators	OFF indicator extinguishes and ON indicator illuminates red when fuel room fog system is on. OFF indicator illuminates green and ON indicator extinguishes when fuel room fog system is off.
ELECTRONIC CABINET FAN L & S BLDG (SMS 576-C) indicators	Indicator illuminates green when electronic cabinet cooling air fan is operating. Indicator extinguishes when electronic cabinet cooling air fan is not operating.
MISSILE AREA EXHAUST FAN ON (SMS 548, SMS 566, SMS 567), MISSILE AREA EXHAUST FAN L & S BLDG (SMS 576-C) indicators	Indicator illuminates green when missile area exhaust fan is operating. Indicator extinguishes when missile area exhaust fan is not operating.
FUEL CONTROL ROOM PURGE FAN ON (SMS 548, SMS 566, SMS 567), FUEL CONTROL RM PURGE FAN L & S BLDG (SMS 576-C) indicators	Indicator illuminates green when fuel control room purge fan is operating. Indicator extinguishes when fuel control room purge fan is not operating.

Table 1-3. Facilities Remote Control Panel Indicators and Controls (Continued)

INDICATOR OR CONTROL	FUNCTION
480 V POWER ON (SMS 548, SMS 566, SMS 567), 480 V. POWER L & S BLDG (SMS 576-C) indicators	Indicator illuminates green when 480-volt power is available to the launch and service building. Indicator extinguishes if 480-volt power is lost.
MISSILE ENTRY DOOR OPEN (SMS 548, SMS 566, SMS 567), MISSILE ENTRY DOOR L & S BLDG (SMS 576-C) and MISSILE ENTRY DOOR CLOSED (SMS 548, SMS 566, SMS 567), MISSILE ENTRY DOOR L & S BLDG (SMS 576-C) indicators	OPEN indicator extinguishes and CLOSED indicator illuminates green when missile entry door is closed. OPEN indicator illuminates red and CLOSED indicator extinguishes when missile entry door is open.
FUEL ROOM OPEN (SMS 548, SMS 566, SMS 567), FUEL ROOM DOOR (SMS 576-C) and FUEL ROOM CLOSED (SMS 548, SMS 566, SMS 567), FUEL ROOM DOOR (SMS 576-C) indicators	OPEN indicator extinguishes and CLOSED indicator illuminates green when fuel room door is closed. OPEN indicator illuminates red and CLOSED indicator extinguishes when fuel room door is open.
MISSILE AREA PERSONNEL DOOR LO_2 OPEN (SMS 548, SMS 566, SMS 567), MISSILE ERECTION DOOR LO_2 (SMS 576-C), and MISSILE AREA PERSONNEL DOOR LO_2 CLOSED (SMS 548, SMS 566, SMS 567), MISSILE ERECTION DOOR LO_2 (SMS 576-C) indicators	OPEN indicator extinguishes and CLOSED indicator illuminates green when personnel door between missile area and LO_2 room is closed. OPEN indicator illuminates red and CLOSED indicator extinguishes when personnel door between missile area and LO_2 room is open.
MISSILE AREA PERSONNEL DOOR M&E OPEN (SMS 548, SMS 566, SMS 567), MISSILE ERECTION DOOR M&E (SMS 576-C), and MISSILE AREA PERSONNEL M&E CLOSED (SMS 548, SMS 566, SMS 567), MISSILE ERECTION DOOR M&E (SMS 576-C) indicators	OPEN indicator extinguishes and CLOSED indicator illuminates green when personnel door between missile area and M&E room is closed. OPEN indicator illuminates red and CLOSED indicator extinguishes when personnel door between missile area and M&E room is open.
VENT DAMPERS L & S BUILDING OPEN and VENT DAMPERS L & S BUILDING CLOSED indicators (SMS 548, SMS 566, SMS 567)	OPEN indicator extinguishes and CLOSED indicator illuminates red when blast gates in the LSB are closed. OPEN indicator illuminates green and CLOSED indicator extinguishes when blast gates in the LSB are open.

Table 1-3. Facilities Remote Control Panel Indicators and Controls (Continued)

INDICATOR OR CONTROL	FUNCTION
TUNNEL DOOR #1 OPEN (SMS 548, SMS 566, SMS 567), TUNNEL DOOR NO. 1 (SMS 576-C), and TUNNEL DOOR #1 CLOSED (SMS 548, SMS 566, SMS 567), TUNNEL DOOR NO. 1 (SMS 576-C) indicators	OPEN indicator extinguishes and CLOSED indicator illuminates green when tunnel door NO. 1 is closed. OPEN indicator illuminates red and CLOSED indicator extinguishes when tunnel door NO. 1 is open.
TUNNEL DOOR NO. 2 OPEN and TUNNEL DOOR #2 CLOSED indicators (SMS 548, SMS 566, SMS 567)	OPEN indicator extinguishes and CLOSED indicator illuminates green when tunnel door NO. 2 is closed. OPEN indicator illuminates red and CLOSED indicator extinguishes when tunnel door NO. 2 is open.
TUNNEL DOOR #3 OPEN and TUNNEL DOOR #3 CLOSED indicators (SMS 548, SMS 566, SMS 567)	OPEN indicator extinguishes and CLOSED indicator illuminates green when tunnel door NO. 3 is closed. OPEN indicator illuminates red and CLOSED indicator extinguishes when tunnel door NO. 3 is open.
TUNNEL DOOR #4 OPEN and TUNNEL DOOR #4 CLOSED indicators (SMS 548, SMS 566, SMS 567)	OPEN indicator extinguishes and CLOSED indicator illuminates green when tunnel door NO. 4 is closed. OPEN indicator illuminates red and CLOSED indicator extinguishes when tunnel door NO. 4 is open.
125 VDC P1 N1 indicator (SMS 576-C)	Indicator illuminates green when 125-VDC power is available at P1 N1 bus. Indicator extinguishes when 125-VDC power is not available at P1 N1 bus.
STATUS SECTION (OSTF-1):	
TUNNEL DOOR AT L & S BLDG (green) and TUNNEL DOOR AT L & S BLDG (red) indicators	Green indicator illuminates and red indicator is extinguished when the LSB tunnel door is closed. Green indicator extinguishes and red indicator illuminates when LSB tunnel door is open.

Table 1-3. Facilities Remote Control Panel Indicators and Controls (Continued)

INDICATOR OR CONTROL	FUNCTION
FUEL RM DOOR (green) and FUEL RM DOOR (red) indicators	Green indicator illuminates and red indicator extinguishes when the fuel room door is closed. Green indicator extinguishes and red indicator illuminates when fuel room door is open.
MISSILE ERECTION DOOR (LO_2) (green) and MISSILE ERECTION DOOR (LO_2) (red) indicators	Green indicator illuminates and red indicator extinguishes when the door between the missile erection area and the LO_2 room is closed. Green indicator extinguishes and red indicator illuminates when the door between the missile erection area and the LO_2 room is open.
MISSILE ERECTION DOOR (M & E) (green) and MISSILE ERECTION DOOR (M & E) (red) indicators	Green indicator illuminates and red indicator extinguishes when the door between the missile erection area and the M & E room is closed. Green indicator extinguishes and red indicator illuminates when the door between the missile erection area and the M & E room is open.
BLAST DOOR AT TUNNEL AT LOB (green) and BLAST DOOR AT TUNNEL AT LOB (red) indicators	Green indicator illuminates and red indicator extinguishes when the tunnel blast door at the LOB is closed. Green indicator extinguishes and red indicator illuminates when the tunnel blast door at the LOB is open.
ESCAPE HATCH LOB (green) and ESCAPE HATCH LOB (red) indicators	Green indicator illuminates and red indicator extinguishes when the escape hatch in the LOB is closed. Green indicator extinguishes and red indicator illuminates when the escape hatch in the LOB is open.
MISSILE ENTRY DOOR (green) and MISSILE ENTRY DOOR (red) indicators	Green indicator illuminates and red indicator extinguishes when missile entry door is closed. Green indicator extinguishes and red indicator illuminates when missile entry door is open.

Table 1-3. Facilities Remote Control Panel Indicators and Controls (Continued)

INDICATOR OR CONTROL	FUNCTION
FUEL RM FOG HEAD SYSTEM (green) and FUEL RM FOG HEAD SYSTEM (red) indicators	Green indicator illuminates and red indicator extinguishes when fuel room fog system is off. Green indicator extinguishes and red indicator illuminates when fuel room fog system is on.
ELECTRONIC CABINET COOLING (L & S) (green) and ELECTRONIC CABINET COOLING (L & S) (red) indicators	Green indicator illuminates and red indicator extinguishes when LSB electronic cabinet cooling system is operating. Green indicator extinguishes and red indicator illuminates when LSB electronic cabinet cooling system is off.
ELECTRONIC CABINET COOLING (L.O.B.) (green) and ELECTRONIC CABINET COOLING (L.O.B.) (red) indicators	Green indicator illuminates and red indicator extinguishes when LOB electronic cabinet cooling system is operating. Green indicator extinguishes and red indicator illuminates when LOB electronic cabinet cooling system is off.
INSTRUMENT AIR (L & S) indicator	Indicator is normally extinguished and will illuminate red when instrument air pressure in the LSB is low.
450 V BUS FAILURE indicator	Indicator illuminates green when there is power present at the 480-volt bus. Indicator extinguishes when there is no power present at the 480-volt bus.
FUEL RM EMERG. EXT. FAN EFF. indicator	Indicator illuminates red when the fuel room emergency exhaust fan is operating.
AIR COND SUPPLY FAN AFC indicator	Indicator illuminates green when the air conditioning supply fan in the launch and service building is operating.
LO_2 AREA EMERG. FAN EOF indicator	Indicator illuminates red when the emergency fan in the LO_2 room is operating.

Table 1-3. Facilities Remote Control Panel Indicators and Controls (Continued)

INDICATOR OR CONTROL	FUNCTION
INSTRUMENT AIR (L.O.B.)	Indicator is normally extinguished and will illuminate red when instrument air pressure in the LOB is low.
CONTROL & MONITOR SECTION:	
GENERATOR NO. 1 and GENERATOR NO. 2 green indicators (SMS 548, SMS 566, SMS 567)	Green indicator illuminates when respective generator is on the line.
EMERGENCY CUT-OFF LOB L & S green indicator and COUNT DOWN and NON-ESS pushbuttons (SMS 548, SMS 566, SMS 567)	Green indicator illuminates when non-essential power is on and countdown bus is off. ON pushbutton shall be depressed when starting countdown and the green indicator will extinguish which indicates that countdown bus is on and nonessential power is off. NON-ESS pushbutton shall be depressed to restore non-essential power.
CUTOFF L & S LTS red and green indicators and ON and OFF pushbuttons (SMS 548, SMS 566, SMS 567, SMS 576-C)	Red indicator illuminates when LSB lights are on. Green indicator illuminates when LSB lights are extinguished. The ON and OFF pushbuttons control the LSB lights.
FIRE PUMP red and green indicators and START and STOP pushbuttons (all complexes)	Green indicator illuminates when fire pump is not operating. Red indicator illuminates when fire pump is operating. The ON and OFF pushbuttons (START and STOP pushbuttons at SMS 576-C and OSTF-1) control the operation of the fire pump.
MISSILE AREA FAN green indicator and ON and OFF pushbuttons (SMS 548, SMS 566, SMS 567, SMS 576-C)	Green indicator illuminates when missile area fan is operating. The ON and OFF pushbuttons control the operation of the missile area fan.

Table 1-3. Facilities Remote Control Panel Indicators and Controls (Continued)

INDICATOR OR CONTROL	FUNCTION
MISSILE POD BLOWER green indicator and START and STOP pushbuttons (SMS 548, SMS 566, SMS 567, SMS 576-C), and MISSILE POD COOLING green and red indicators and START and STOP pushbuttons (OSTF-1)	Green indicator illuminates when missile pod cooling system is operating. Red indicator illuminates at OSTF-1 when missile pod cooling system is not operating. The ON and OFF (START and STOP at OSTF-1) pushbuttons control the operation of the missile pod cooling system.
UNIT HEATERS red indicator and ON and OFF pushbuttons (SMS 548, SMS 566, SMS 567, SMS 576-C)	Red indicator illuminates when unit heaters are operating. The ON and OFF pushbuttons control the operation of the unit heaters.
SNOW MELTING HEATERS green indicator and OFF and ON pushbuttons (SMS 548, SMS 566, SMS 567)	Green indicator illuminates when snow melting heaters are operating. The ON and OFF pushbuttons control the operation of the snow melting heaters.
DOOR LOCK BY PASS FUEL ROOM STOP pushbutton (SMS 548, SMS 566, SMS 567)	STOP pushbutton shall be depressed to open fuel room door lock bypass.
PERSONNEL WARNING (RED) indicator and ON and OFF pushbuttons (SMS 548, SMS 566, SMS 567, SMS 576-C), and DANGER red indicator and DANGER pushbutton (OSTF-1)	Red indicator illuminates when personnel warning light is flashing red. The ON and OFF pushbuttons (DANGER pushbutton at OSTF-1) control the operation of the red personnel warning light.
PERSONNEL WARNING (AMBER) indicator and ON and OFF pushbuttons (SMS 548, SMS 566, SMS 567, SMS 576-C), and CAUTION amber indicator and CAUTION and OFF pushbuttons (OSTF-1)	Amber indicator illuminates when personnel warning light is flashing amber. The ON and OFF pushbuttons (CAUTION and OFF pushbuttons at OSTF-1) control the operation of the amber personnel warning light.
PERSONNEL WARNING (GREEN) indicator and ON and OFF pushbuttons (SMS 548, SMS 566, SMS 567, SMS 576-C)	GREEN indicator illuminates when personnel warning light is flashing green. The ON and OFF pushbuttons control the operation of the green personnel warning light.

Table 1-3. Facilities Remote Control Panel Indicators and Controls (Continued)

INDICATOR OR CONTROL	FUNCTION
BLAST DOOR TEST PUSHBUTTON TEST pushbutton (SMS 548, SMS 566, SMS 567)	TEST pushbutton shall be depressed to test blast door operation.
FENCE SEC LIGHTING ON and OFF pushbuttons (SMS 576-C)	The ON and OFF pushbuttons control the operation of the security lighting system.
LAUNCH PAD COOLING OPEN and CLOSE indicators and START and STOP pushbuttons (SMS 576-C) and LAUNCH PAD COOLING CONTROL red and green indicators and OPEN and CLOSE pushbuttons (OSTF-1)	OPEN indicator at SMS 576-C, or green indicator at OSTF-1, illuminates when launch pad cooling system is operating. CLOSE indicator at SMS 576-C, or red indicator at OSTF-1, illuminates when launch pad cooling system is not operating. The START and STOP pushbuttons at SMS 576-C or the OPEN and CLOSE pushbuttons at OSTF-1 control the operation of the launch pad cooling system.
MISSILE DELUGE ON and OFF indicators and ON and OFF pushbuttons (SMS 576-C), missile deluge and red and green indicators and OPEN and CLOSE pushbuttons (OSTF-1)	ON indicator at SMS 576-C, or green indicator at OSTF-1, illuminates when missile deluge system is operating. OFF indicator at SMS 576-C, or red indicator at OSTF-1, illuminates when missile deluge system is not operating. The ON and OFF pushbuttons at SMS 576-C or the OPEN and CLOSE pushbuttons at OSTF-1 control the operation of the missile deluge system.
TV FLOOD LIGHTS ON indicator and ON and OFF pushbuttons (SMS 576-C), and T.V. FLOOD LIGHTS green indicator and START and STOP pushbuttons (OSTF-1)	ON indicator at SMS 576-C, or green indicator at OSTF-1, illuminates when TV flood light system is operating. The ON and OFF, or START and STOP at OSTF-1, pushbuttons control the operation of the TV flood light system.
VENT DAMPERS LOB OPEN and CLOSED indicator and OPEN and CLOSED pushbuttons (SMS 576-C)	OPEN indicators illuminate when LOB vent dampers are in open position. CLOSED indicators illuminate when LOB vent dampers are in closed position. The OPEN and CLOSED pushbuttons control the operation of the vent dampers.

1-79. LAUNCH OPERATIONS BUILDING ENVIRONMENTAL AND COMFORT AIR CONDITIONING SYSTEM.

1-80. The environmental and comfort air conditioning system circulates filtered air at 70° or 80° F temperature through the operation area for personnel comfort and efficient equipment operation. The system circulates hot water through the launch and service building and launch operations building heating system. At SMS 576-C, heating is accomplished by electrical unit heaters located within the outlet air duct.

1-81. Supply fans provide outside air which is blown over an expansion coil and a heating coil and delivered to all rooms in the operation area. A selector switch actuates one of two thermostats to maintain the desired temperature of 80°F for summer or 70°F for winter. Another thermostat energizes the heating units when the intake air temperature drops below the predetermined temperature. Automatic control deenergizes the supply fans when the system is in the automatic mode and intake air exceeds a predetermined temperature.

1-82. Ventilation for the power plant and facilities area (not applicable to OSTF-1 and SMS 576-C) is provided by a supply fan and two exhaust fans. The supply fan recirculates the air or delivers outside air through the power plant and facilities area, depending on the position of switch operated dampers. The exhaust fans ventilate the battery room and the battery area in the power plant and mechanical equipment room. The fans are controlled by a manual starter and are automatically deenergized when the intake air temperature exceeds a predetermined temperature.

1-83. LAUNCH AND SERVICE BUILDING ENVIRONMENTAL AND COMFORT HEATING AND VENTILATING SYSTEM.

1-84. The environmental and comfort heating and ventilating system transfers and distributes heat throughout the launch and service building, using air handling units, unit heaters, hot water heating coils, and automatically and manually controlled exhaust fans. Hot water distribution piping in this system is interconnected with that in the electronic equipment air conditioning system, thrust section heating system, and pod air conditioning system.

1-85. UTILITY BUILDING HEATING AND VENTILATING SYSTEMS (SMS 576-C).

1-86. The utility building heating and ventilating systems consist of the training room heating and ventilating system, storage room heating and ventilating system, and toilet room exhaust fan.

1-87. The training room heating and ventilating system is composed of an outside air plenum, air circulating unit, and vent air ducts. The outside air plenum serves as a fresh air manifold for the training room and storage area air circulating units. Air is drawn by the training room air circulating unit from the outside air plenum and the return air duct and is forced by a blower through air outlet ducts into the training room and office of the building. The vent air ducts in the training room serve to vent the room to outside atmosphere.

1-88. The storage room heating and ventilating system consists of an air circulating unit and vent air ducts. The storage room air circulating unit draws air from the outside air plenum and the room air inlet. Air is forced by the blower through the air outlet ducts into the unit substation room and the storage room of the utility building. Vent air ducts in the storage room serve to vent air from the substation unit room and the storage room to outside atmosphere.

1-89. ELECTRONIC EQUIPMENT AIR CONDITIONING SYSTEM.

1-90. The electronic equipment air conditioning system supplies conditioned air to the electronic equipment cabinets in the launch and service building to prevent the malfunction of electronic equipment due to overheating or excess humidity. An air handling unit provides constant air flow past a direct expansion coil and a hot water heating coil. A thermostat actuates a hot water control valve, refrigerant valve, and damper motor to maintain the discharge air at desired temperature. The direct expansion coils are cooled by refrigerant liquid from a compressor and condenser. Manual starters on the motor control center are provided for the air handling unit and refrigerant compressor. A sail switch sends an alarm signal to the facilities remote control panel and illuminates an indicator when the delivered air temperature rises to a preset value. The relative humidity of the air delivered is automatically controlled.

1-91. THRUST SECTION HEATING SYSTEM.

1-92. During countdown components in the thrust section must be heated to prevent adverse effects due to loading liquid oxygen and liquid nitrogen. The thrust section heating system delivers 200°F temperature air to a stubup in the missile erection area. A flexible duct routes the heated air to the missile thrust section from the system stubup.

1-93. A pressure blower operates continuously and passes outside air over heating coils and delivers heated air to the missile bay.

1-94. The blower motor is actuated by a switch on the motor control center and a wall mounted START-STOP switch. Automatic controls maintain discharge air within a predetermined temperature range and deenergize the pressure blower motor when the supply air exceeds a predetermined temperature.

1-95. POD AIR-CONDITIONING SYSTEM.

1-96. The pod air-conditioning system uses a pressure blower, dehumidifier, three direct-expansion coils, compressor, condensor, and two hot water heating coils with manual and automatic controls to deliver dry, filtered, constant temperature air under pressure to the missile bay. The pressure blower pulls outside air from the plenum through the direct expansion coil, heating coil, dehumidifier, and an expansion coil, and delivers the air through another expansion coil and heater, and through the missile pod filter housing to the missile bay. The dehumidifier uses four rotating beds of dry desiccant to maintain 50 percent maximum relative humidity in the delivered air which is preheated to 40°F and exhausted by the regeneration fan. The three direct-expansion coils use liquid refrigerant to maintain a constant delivered air temperature of 40°F and to cool supply air, the dehumidifier discharge air, and the pressure blower discharge air. The compressor receives and compresses refrigerant gas from direct-expansion coils and pumps hot refrigerant gas to the condenser where cold water is used to cool and condense the gas to a liquid for reuse in the direct-expansion coils. One heating coil heats the supply air to 40°F when the supply air is below 40°F, and the other is used to heat the pressure blower discharge air to 80°F when a delivered air temperature of 80°F is desired. The pod air-conditiong system is controlled manually by switches and automatically by thermostats and a humidistat. The primary power switches for the pressure blower, dehumidifier, and compressor are located on the motor control center.

1-97. BLAST DETECTION AND PROTECTION SYSTEM.

1-98. The blast detection and protection system has the following two functions: when a nuclear blast is detected, the system seals the buildings to protect personnel and equipment from blast effects; and when a missile is launched, the system protects personnel and equipment from heat and debris. The blast detector operates when a brilliance of light twice that of the sun is detected. A phototube in the blast detector produces a signal which is amplified. The amplified signal triggers an electrical control circuit which operates solenoid valves that provide directional control to the blast gate air cylinders and provides air supply and exhaust to and from blast gates in the LSB. This circuit automatically resets when the blast hazard has passed. The blast gates seal the ventilation openings throughout the LSB and the LOB. Each gate is fastened to the rod of an air cylinder. Gate cylinders in the launch operations building have air continuously applied to either end of each cylinder. The gate cylinders in the launch and service building have air applied only during the opening or closing cycle.

1-99. FUEL VAPOR AND OXYGEN DETECTION SYSTEMS.

1-100. The function of the fuel vapor and oxygen detection systems is to detect the presence of excessive fuel vapor or oxygen content in the air and automatically initiate actions to alleviate the condition. Two fuel vapor detection units and one oxygen detection unit collect air samples at periodic intervals from remote sampling points.

1-101. Each of the detection units isolates vapor detection to a single point for corrective action. The samples are analyzed and if preset levels of vapor concentration are detected, microswitches and relays translate indicator readings into a control voltage to perform the following functions:

a. Control ventilating fans and vents to evacuate excessive vapor concentrations.

b. Operate a water fog system in the fuel room when fuel vapor concentration approaches explosive proportions.

c. Alert personnel in the launch and service building by means of warning horns and lights.

d. Alert the MCCC in the launch operations building through the alarm indicators and trouble horn at the facilities remote control panel.

1-102. FIRE ALARM SYSTEM.

1-103. The fire alarm system provides manual and automatic facilities for fire detection and warning, and central indication of fire location. The system consists of a master control panel, two terminal cabinets, a battery cabinet, alarm bells, fire indicators, manual fire alarm stations, and fire detectors. The fire alarm system provides audible and visual indications when fire occurs in monitored areas of the launch operations building or launch and service building.

1-104. The master control panel monitors five zones in the LOB and LSB, controls relays to energize audible and visual alarms, provides for manual operation and control of the fire alarm system, and gives lamp indications of the power supply within the master control panel for operation of the fire alarm system. The terminal cabinet in the launch and service building interconnects the fire alarm system circuitry, sounds a trouble buzzer when there is a malfunction, silences the trouble buzzer, and gives a lamp indication when a fire is detected in the launch operations building. The terminal cabinet in the LOB provides for interconnection of fire alarm circuitry only. The battery cabinet contains dry cell batteries connected in series. The dry cell batteries supply emergency power to operate the fire alarm system if the AC power supply fails. The alarm bells provide audible warning throughout the LOB and LSB when a fire is detected. Fire indicators illuminate visual warnings when a fire is detected. Manual fire alarm stations allow manual actuation of the fire alarm system. Striking a metal striker to break a glass panel closes contacts to energize a circuit and give a fire alarm. When the air surrounding a fire detector reaches the preset temperature, a fire detector shell expands, closing contacts to energize a circuit and give a fire alarm.

1-105. AREA WARNING SYSTEM.

1-106. The area warning system warns personnel of real or potential dangers in the launch area. The system consists of flashing lights, area warning horns, and associated controls and indicators.

1-107. Green, amber, and red flashing lights are mounted on a light mast near the gate house. The flashing indicators are selected by pushbuttons located on the facilities remote control panel (figures 1-29, 1-30, 1-31, 1-32, or 1-33). The amber flashing indicators warn personnel that a caution condition exists in the launch area. The red flashing indicators warn personnel that a danger condition exists in the launch area. The area warning horns operate when the red flashing indicators are operating.

1-108. WATER SYSTEMS.

1-109. The water supply, the water distribution, and the waste water systems comprise the water systems. The water supply system has the primary purpose of supplying water to underground storage tanks from a public utility source or from deep wells. The water distribution system is pressurized and treats water to remove impurities for distribution throughout the complex. The waste water system collects and disposes of waste water, seepage water, waste fuel and oil and sewage.

1-110. WATER SUPPLY SYSTEM (TYPICAL). The water supply system is the water source for all operations in the LSB and LOB. The system consists of pumps and motors which supply water to storage tanks, chemical feeders that treat water for domestic use, and water storage tanks and level controls. When a well is used as the water source, each well pump is located in a well house. The chemical feeders are connected to the water supply line on the discharge side of the pumps in each well house. Four cylindrical water storage tanks, with a total capacity of 72,000 gallons, are buried near the launch operations building. For complexes using commercial water, two pumps are used to increase water pressure.

1-111. The water supply system operates automatically through the use of control switches, alternators, and water level controllers. WATER STORAGE TANKS LO-LEVEL and WATER STORAGE TANKS HI-LEVEL indicators are provided on the facilities remote control panels (figure 1-29, 1-30, or 1-31) at all sites, except SMS 567-A. Site SMS 567-A has a WATER STORAGE TANK LO-LEVEL indicator only.

1-112. WATER DISTRIBUTION SYSTEM (TYPICAL). The water distribution system is composed of the following major components: utility water pumps, utility water tanks, fire protection water pumps, pressure reducing valves, fuel room fog system solenoid valve, backflow preventer, water softener (SMS 566), iron removal filter (SMS 566), and associated water lines and control. The utility water pumps are controlled by HAND-OFF-AUTO selector switches and are used to draw water from the underground storage tanks and circulate it, either to the utility tank for temporary storage and pressurization, or directly into the water distribution lines. The fire water pump supplements the utility water pumps in the event of fire and is controlled by START and STOP pushbuttons on the facilities remote control panel (figures 1-29, 1-30, or 1-31). The main pressure reducing valve in the water distribution system maintains a constant supply pressure. Three small pressure reducing valves further reduce the pressure to 10.0 PSI for the eyewash and water fountain supply lines. The fuel room fog system solenoid valve controls the water supply to the fog spray nozzles in the fuel room and is controlled by either the fuel vapor detection system or a local START pushbutton. The backflow preventers allow flow from the water distribution system and prevent contaminated water from being drawn into the water distribution system from the hydraulic pumping unit water supply line and the sump eductor water supply line. At SMS 566, the water softener removes hardness from the domestic water and the iron removal filter removes iron and suspended impurities from the domestic water line (figure 1-34).

1-113. WASTE WATER SYSTEM (TYPICAL). The waste water system consists of sump pumps and associated controls to pump waste water, seepage water, waste fuel and oil, and sewage from the sumps located in and around the LOB and LSB to draining areas away from the buildings.

1 PRESSURE GAGES
2 IRON REMOVAL INFLUENT VALVE
3 BRINE TANK
4 WATER SOFTENER EFFLUENT VALVE
5 WATER SOFTENER
6 WATER SOFTENER INFLUENT VALVE
7 WATER SOFTENER 3-POSITION CONTROL VALVE
8 BRINE TANK GATE VALVE
9 DRAIN
10 IRON REMOVAL 3-POSITION CONTROL VALVE
11 IRON REMOVAL TANK
12 WATER SOFTENER BYPASS VALVE
13 IRON REMOVAL BYPASS VALVE

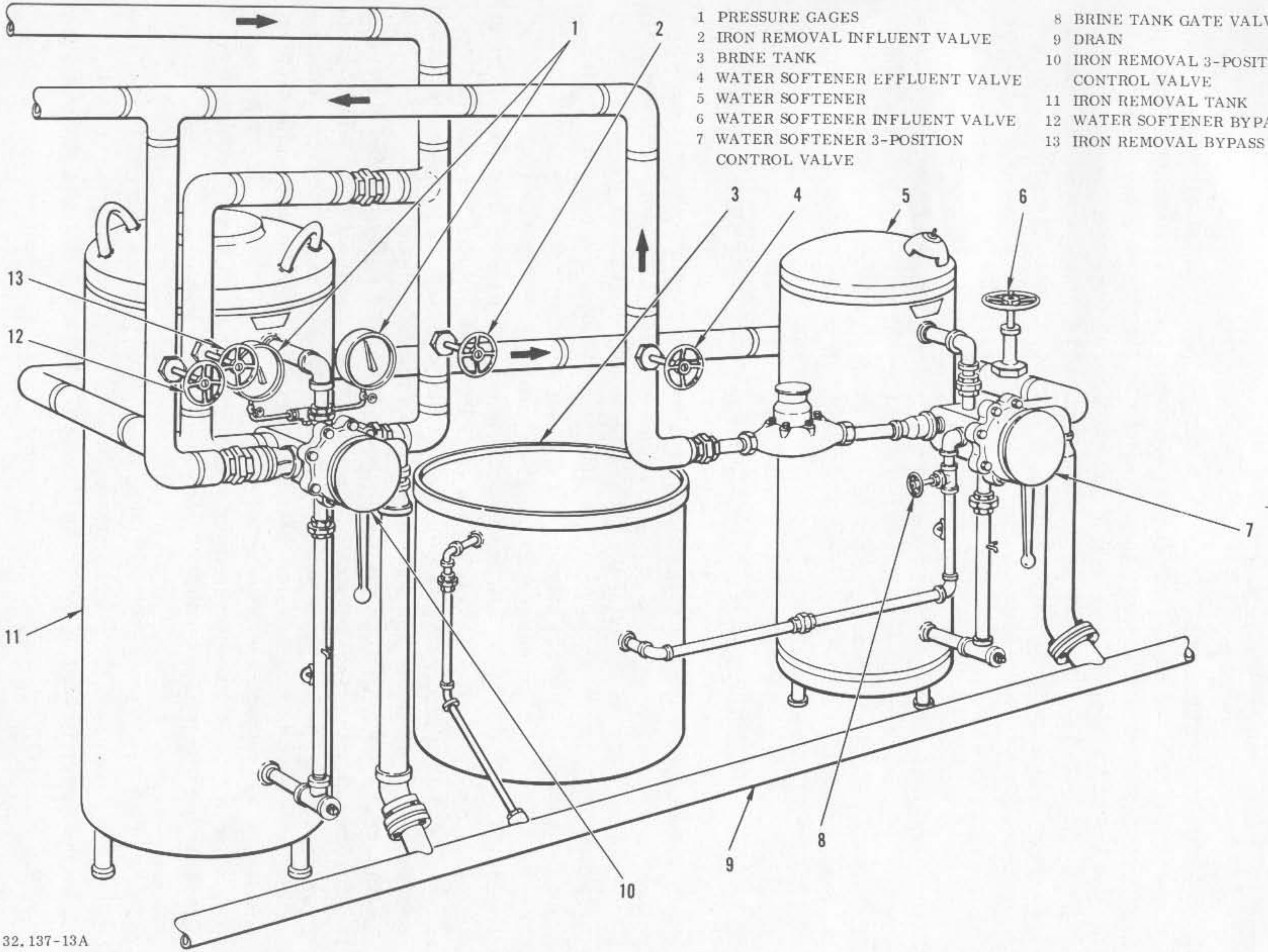


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Figure 1-34. Water Softener and Iron Removal Filter (SMS 566)

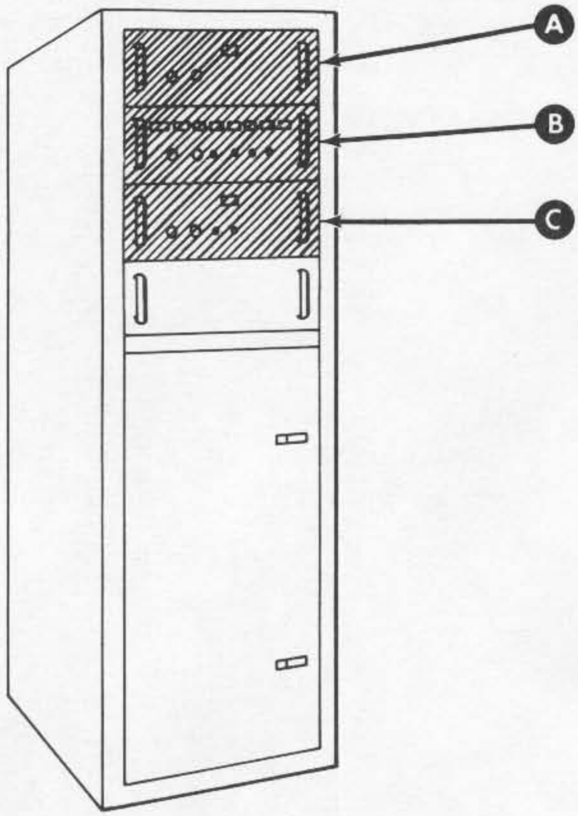
1-114. WATER DISTRIBUTION SYSTEM (OSTF-1). The launch area water supply and distribution system provides pressurized domestic water to the LOB and LSB. Water is supplied for the launch fire protection system from a 27,000 gallon underground storage tank located adjacent to the launch operations building.

1-115. The LOB mechanical equipment room contains the water distribution manifold (3, figure 1-5), a fire alarm control panel, a motor driven centrifugal fire pump (1), and a fire pump panel (2). The fire pump panel continuously monitors and regulates storage tank water depth, and provides for fail-safety and automatic start control of the fire pump. The 3100 gallon per minute motor driven centrifugal fire pump removes water from the storage tank and delivers it to the launch and service building for use by the missile deluge system. The fire pump controller panel provides manual and automatic control of the electric motor driven fire pump.

1-116. Water distribution equipment for the LSB is located in the mechanical and equipment area. This equipment consists of valves, distribution manifolds, and a fire protection pushbutton station. The WATER SYSTEM panel is located on the auxiliary logic unit (figure 1-35) in the mechanical and electrical equipment room. This panel monitors the launch pad cooling and antifire hand valve positions.

1-117. The facilities remote control panel and the auxiliary launch console are located in the launch control center of the LOB. The facilities remote control panel (figure 1-32) provides manual control of all launch fire protection water flow systems. Launch pad cooling and antifire water flow systems are started automatically after commit start, while missile deluge water flow and fuel room fog system water spray are used for emergency fire protection and operated by pushbutton on the FRCP. The auxiliary launch console (figure 1-36) includes a WATER SYSTEM OVERRIDE-NORMAL switch, a WATER ON indicator, a MODE SWITCH, a LAUNCH mode indicator, and a TRAINING mode indicator. When the OVERRIDE-NORMAL switch is set to OVERRIDE, the ready for countdown summary signal is completed without water system ready indication. During a launch countdown, the WATER ON indicator is illuminated green upon engine start and indicates launch pad cooling water is flowing. When the MODE SWITCH is set to LAUNCH, the pod air conditioning valve closes when guidance goes inertial and remains closed until missile away signal is removed. The pod aid conditioning valve will open if missile away signal is removed and return to standby signal is present. When the MODE SWITCH is set to TRAINING, the pod air conditioning valve will remain open at all times.

1-118. WATER DISTRIBUTION SYSTEM (SMS 576-C). The launch complex water distribution system provides water for use at the LSB, utility building and LOB. A supply of approximately 33,000 gallons of water is maintained in the 35,000-gallon capacity storage tank. During checkout and launch operations, a water pump (4, figure 1-10) located in the utility building supplies water to the anti-fire and launch platform cooling systems. Base water pressure is maintained throughout the system under normal conditions.



AUXILIARY LOGIC UNIT

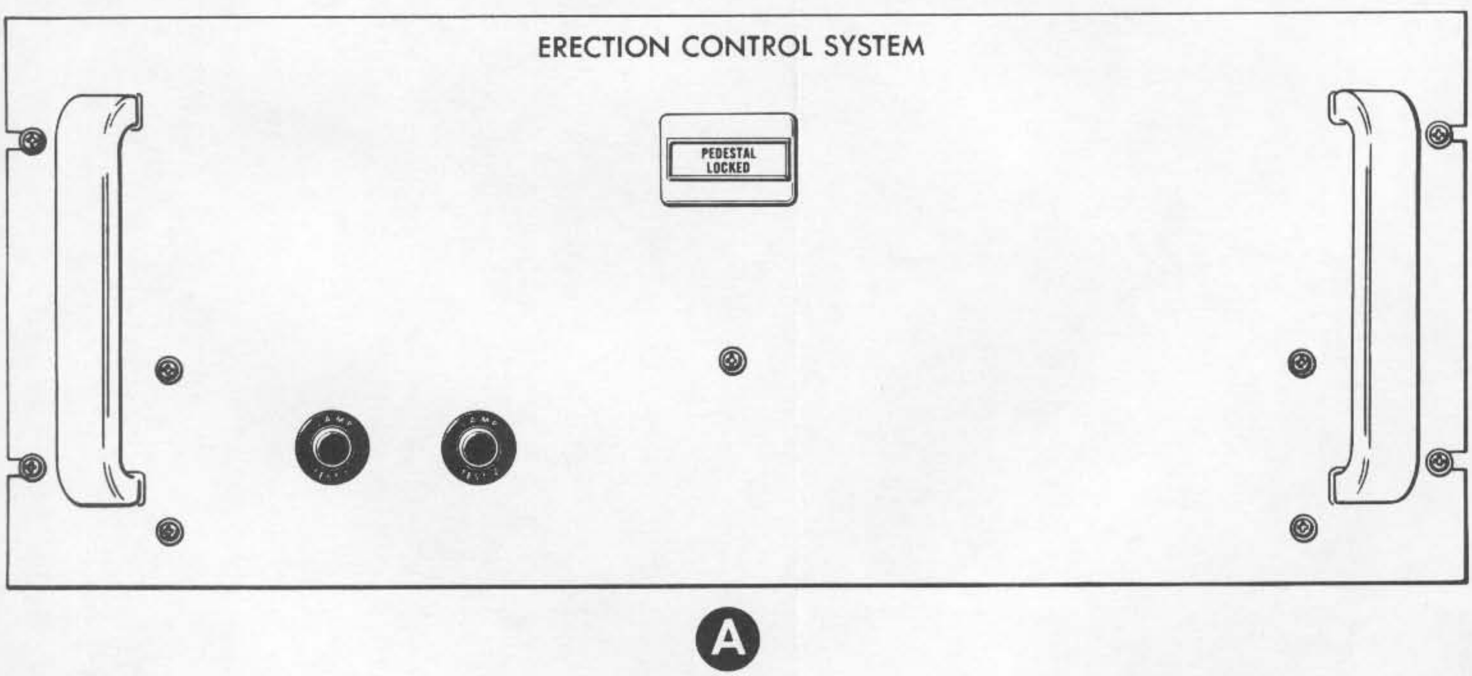


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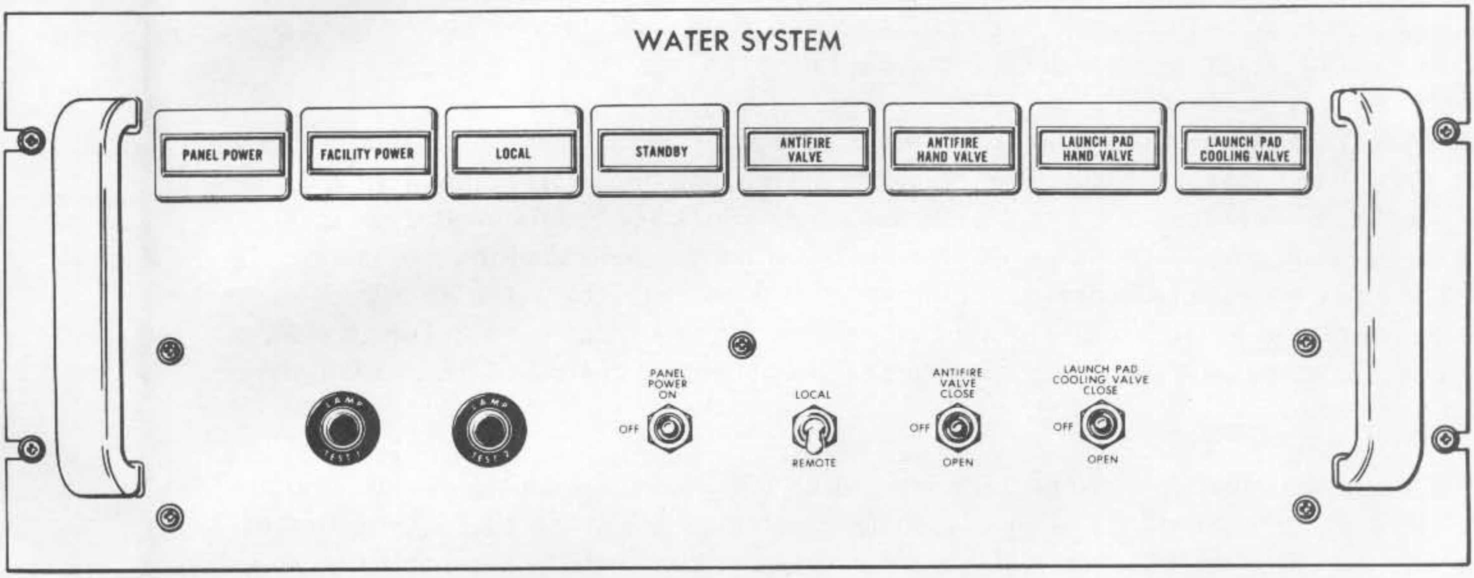
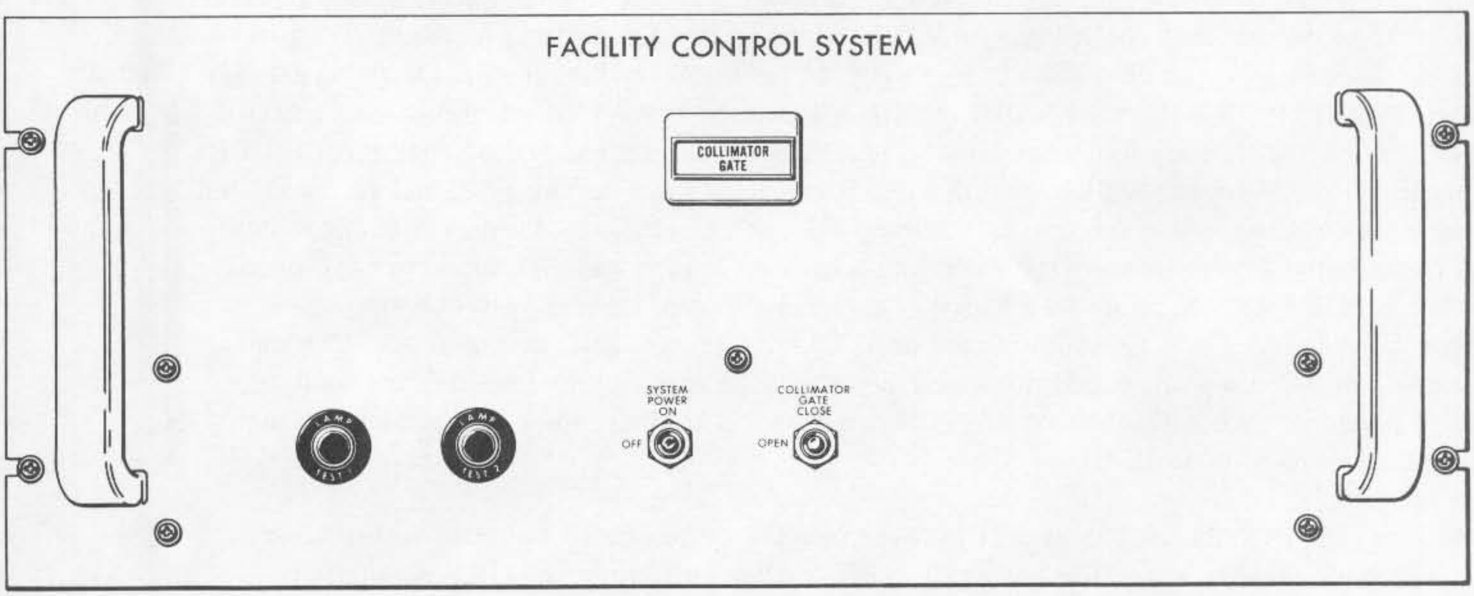
Figure 1-35. Auxiliary Logic Unit (OSTF-1 and SMS 576-C)


WATER SYSTEM
PANEL POWER
FACILITY POWER
LOCAL
STANDBY
ANTIFIRE VALVE
ANTIFIRE HAND VALVE
LAUNCH PAD HAND VALVE
LAUNCH PAD COOLING VALVE
LAMP TEST 1
LAMP TEST 2
PANEL POWER ON
OFF
LOCAL
REMOTE
ANTIFIRE VALVE CLOSE
OFF
OPEN
LAUNCH PAD COOLING VALVE CLOSE
OFF
OPEN

B


FACILITY CONTROL SYSTEM
COLLIMATOR GATE
LAMP TEST 1
LAMP TEST 2
SYSTEM POWER ON
OFF
COLLIMATOR GATE CLOSE
OPEN

C

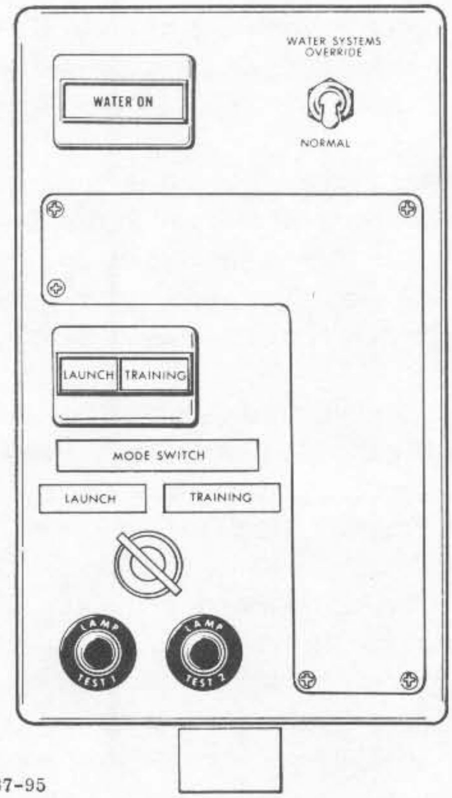


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Figure 1-36. Auxiliary Launch Console (OSTF-1 and SMS 576-C)

1-119. The launch and service building contains four independently operated water systems: the missile deluge system, the antifire system, the launch platform cooling system, and the fuel room fog system. The missile deluge system is available in the event of fire at the missile launcher. It can be operated from a pushbutton station located at the water distribution manifold, or from the facilities remote control panel (figure 1-33) in the launch operations building. The antifire and launch platform cooling systems are employed during missile launch to protect the concrete floor, flame pit, and launch equipment from missile engine flames. The systems can be operated manually from the breakglass stations, the auxiliary logic unit in the LSB, or from the facilities remote control panel in the LOB. Emergency high pressure water spray is provided by the fuel room fog system. It is activated automatically when the fuel vapor detection system senses a concentration of fuel vapor exceeding 40 percent in the fuel room.

1-120. The facilities remote control panel, located in the launch control center of the LOB, provides manual control of all launch fire protection water flow systems. Launch platform cooling and antifire water flow systems are started automatically after commit start, while missile deluge water flow and fuel room fog system water spray are used for emergency fire protection and are operated by pushbuttons on the FRCP.

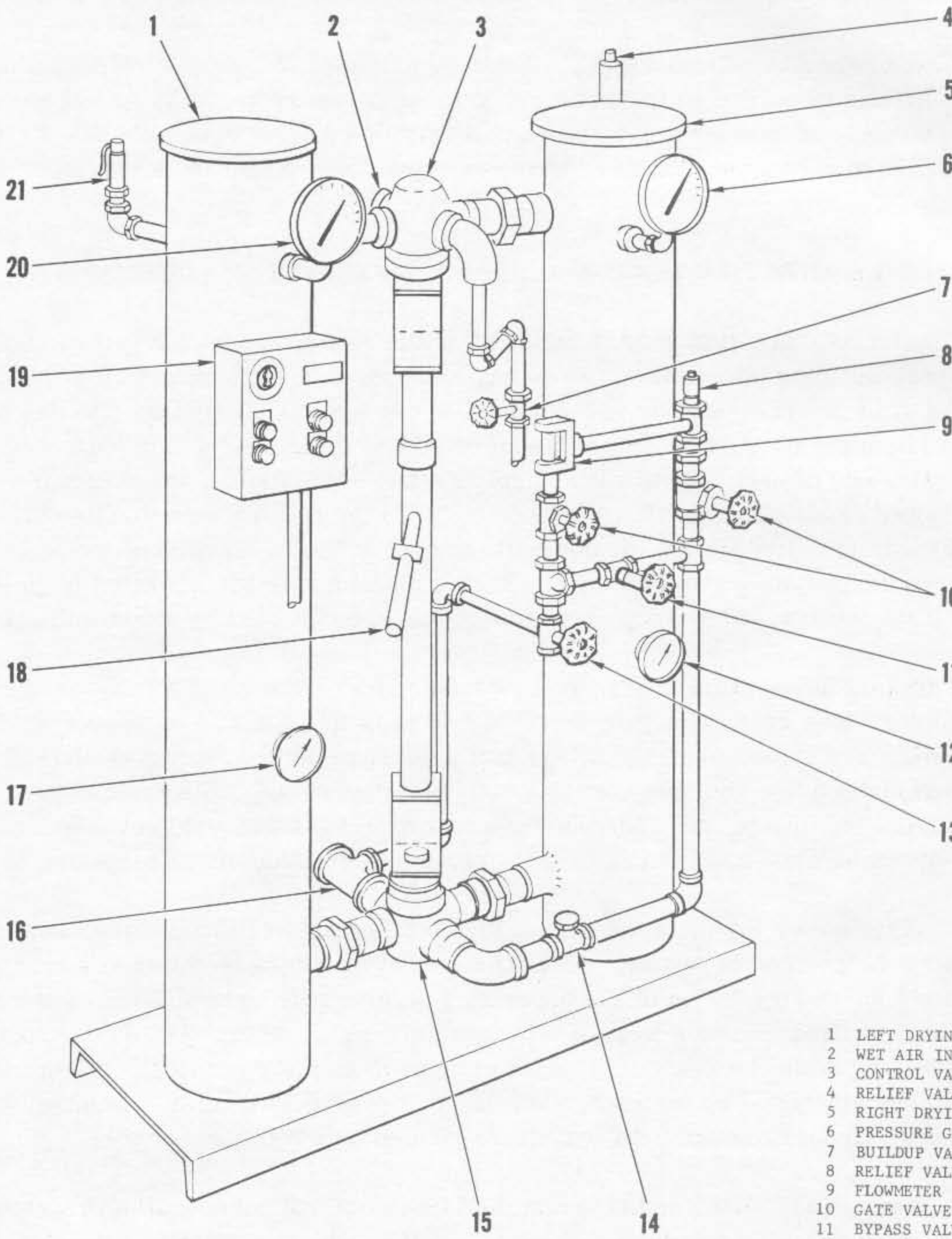
1-121. Located in the mechanical and electrical equipment room of the launch and service building, the auxiliary logic unit (figure 1-35) provides remote monitoring and automatic control of the launch platform cooling and antifire systems during standby, countdown, commit start, and missile launch operations. The auxiliary launch console (figure 1-36) includes a WATER SYSTEM OVERRIDE-NORMAL switch, a WATER ON indicator, a MODE SWTICH, a LAUNCH mode indicator, and a TRAINING mode indicator. When the OVERRIDE-NORMAL switch is set to OVERRIDE, the ready for countdown summary signal is completed without water system ready indication. During a launch countdown, the WATER ON indicator is illuminated green upon engine start and indicates launch pad cooling water is flowing. When the MODE SWITCH is set to LAUNCH, the pod air conditioning valve closes when guidance goes inertial and remains closed until the missile away signal is removed. The pod air conditioning valve will open if the missile away signal is removed and return to standby signal is present. When the MODE SWITCH is set to TRAINING, the pod air conditioning valve will remain open at all times.

1-122. The utility building contains the fire protection pump, electric motor, and electric motor start controls and equipment. The fire protection pump, which is a centrifugal volute-type unit, is driven by the 350-horsepower electric motor. It has the capacity to transfer 3300 gallons of water per minute from the storage tank to the missile deluge system in the LSB.

1-123. INSTRUMENT AIR SYSTEM.

1-124. The instrument air system provides compressed air to start diesel engines (not at OSTF-1 and SMS 576-C) and compressed, dry, filtered air at 270 to 300 PSI to operate blast gates (not at OSTF-1 and SMS 576-C), to pressurize the utility water tank, and to supply various pneumatic controls, valves, and skids in the LOB and LSB. The compressed air system consists of an air compressor, aftercooler, moisture separator, prefilter, air dryer (figure 1-37), afterfilter, instrument air receiver, instrument air filter, air dryer starting air receiver, emergency nitrogen supply, controls, and valves.

1-125. Air pressure is provided by the air compressor, which is normally operated in the automatic mode. An air pressure switch senses the residual pressure in the air receiver. When the pressure falls below 270 PSI, the air pressure switch completes a circuit which energizes a control relay to start the compressor. After starting, the compressor continues to operate until the pressure in the air receiver increases to 300 PSI. This pressure is sensed by the air pressure switch which trips its corresponding relay and stops the compressor. The rest of the components in the instrument air system are employed between



1 LEFT DRYING TANK
2 WET AIR INLET
3 CONTROL VALVE
4 RELIEF VALVE
5 RIGHT DRYING TANK
6 PRESSURE GAGE
7 BUILDUP VALVE
8 RELIEF VALVE
9 FLOWMETER
10 GATE VALVE
11 BYPASS VALVE
12 TEMPERATURE GAGE
13 BLEED FLOW VALVE
14 CHECK VALVE
15 CONTROL VALVE
16 DRY AIR OUTLET
17 TEMPERATURE GAGE
18 CONTROL LEVER
19 CONTROL BOX
20 PRESSURE GAGE
21 RELIEF VALVE

32.109-3

Figure 1-37. Air Dryer, Instrument Air System the air compressor and the air receiver to ensure delivery of dry, filtered air. Circuitry is provided to give an indication of normal operation on the facilities remote control panel.

1-126. The emergency nitrogen supply, which consists of two shutoff valves, a pressure reducing valve incorporating two pressure gages, a pressure relief valve, check valve, and a blowdown valve, is located in the launch and service building near skid NO. 6. The emergency nitrogen supply maintains 250 PSI in the event the compressed air system pressure drops below 250 PSI.

1-127. MISSILE ERECTION DOOR AND FLAME DOOR SYSTEM (TYPICAL).

1-128. The missile erection door is mounted on the roof of the launch and service building. When closed, the door covers the missile bay and approximately one-third of the fixed roof area. The missile erection door is fabricated in one large slab section. Rails, attached to the underside of the door, ride on wheels mounted on lifting mechanisms attached to ribs of the roof. One end of each lifting mechanism is attached to a rib of the roof while the other end is attached to a hydraulic lifting cylinder. When the missile erection door is to be opened, hydraulic cylinders lift the door off the ribs of the roof and support its weight as it opens. During countdown the latching and lifting mechanisms are operated by pneumatically charged accumulators. In standby, these functions are operated by a hydraulic power unit.

1-129. The missile erection door operating mechanism consists of a two-speed reversible electric motor, four gear reduction boxes, a series of drive shafts, and four chain-driven cable drums. The torque provided by the motor through the gear reducer and drive shaft turns a dual chain drive and sprocket assembly attached to the cable drum. Steel cables, extending from the drums, are individually attached to the front and back edges of the door. The door opens or closes according to the direction of rotation of the cable drums.

1-130. Electric power for the operation of the roof is provided through the launch and service building motor control center. After the circuit breakers on the motor control cabinet have been set at ON, operation of the doors may be manually controlled from the missile erection door control switches located on the missile erection and flame door control panel (figure 1-38), or from the FACILITY panel of control-monitor group 1 of 4 (figure 1-24). Limit switches, installed on the roof, energize or deenergize circuits to control the sequence of operations and energize position indicators located on the control panels.

1-131. A green ROOF OPEN indicator on the launch control console illuminates when the missile erection door is open during countdown. If the door is not open, the ROOF OPEN indicator is extinguished. During countdown the missile erection door is automatically controlled by the launch control system. The flame door which is opened prior to missile firing, deflects engine exhaust. The flame door is unlatched, raised, lowered, and latched by hydraulic pressure furnished by a hydraulic power unit. During a countdown the missile erection door is unlatched and raised by pneumatically charged accumulators. The flame door is opened and closed by an electrically operated motor. Limit switches located at the open and closed extent of travel complete indicator circuits to the missile erection and flame door control panel.

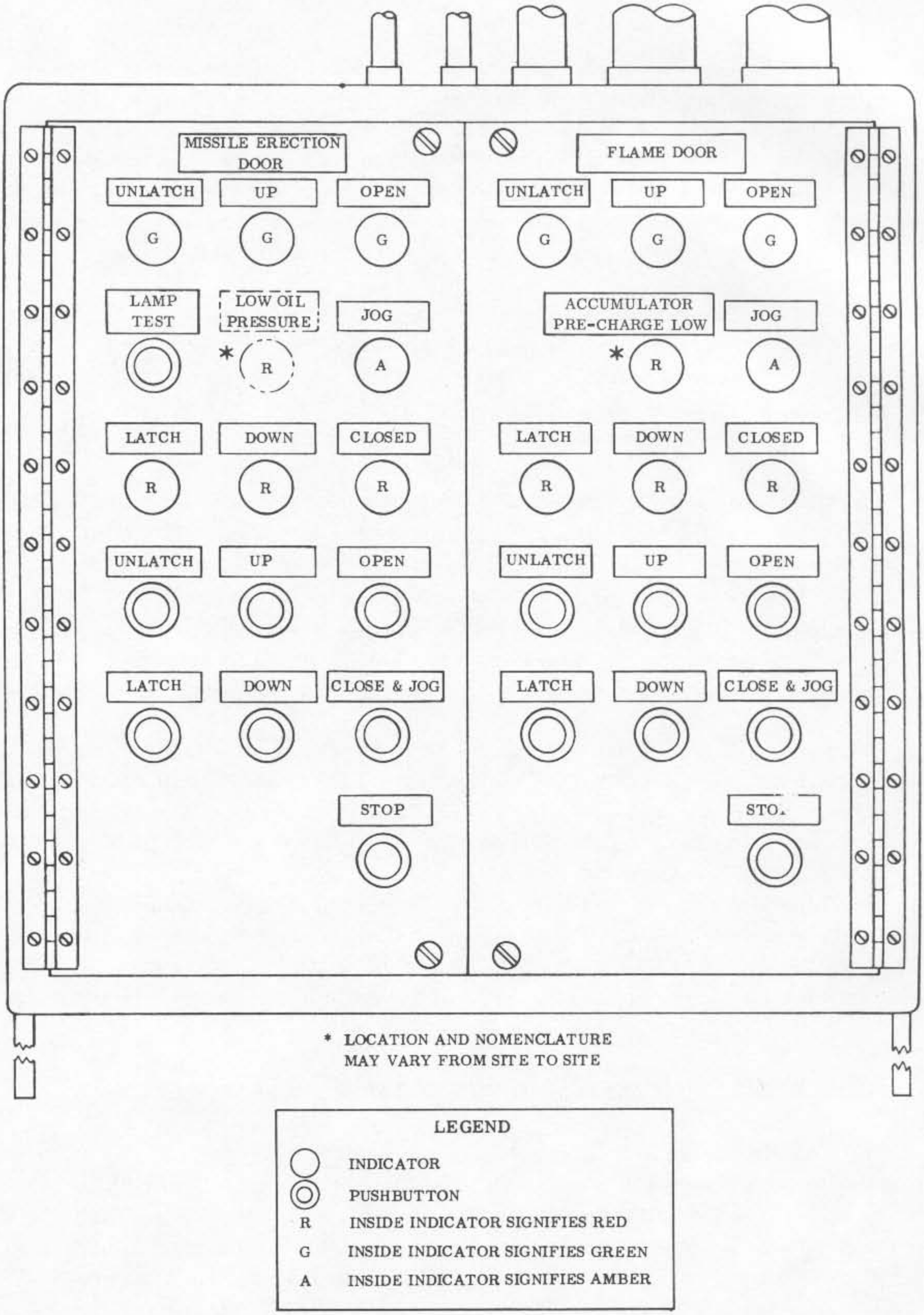


Figure 1-38. Missile Erection Door and Flame Door Control Panels (Typical)

1-132. MISSILE ERECTION DOOR AND FLAME DOOR SYSTEM (OSTF-1).

1-133. The missile erection door, when closed, protects the missile bay from the elements. The door is fabricated in two identical sections: the east missile erection door and the west missile erection door. Rails, on the underside of each missile erection door, ride on wheels mounted on the roof of the launch and service building. Both missile erection doors are operated by an associated operating mechanism mounted on the roof. The doors can be operated simultaneously or individually. Electrical interlocks in the erection mechanism prevent erection of the missile when the missile erection doors are closed.

1-134. Each missile erection door operating mechanism consists of a 7-1/2 horsepower, two-speed, reversible electric motor, and a gear reducer. A drive shaft turns a dual chain drive and sprocket assembly attached to a cable drum. Steel cables, extending from the drums, are attached to the front and back edges of the doors. The missile erection doors are opened or closed, according to the direction of rotation of the cable drums.

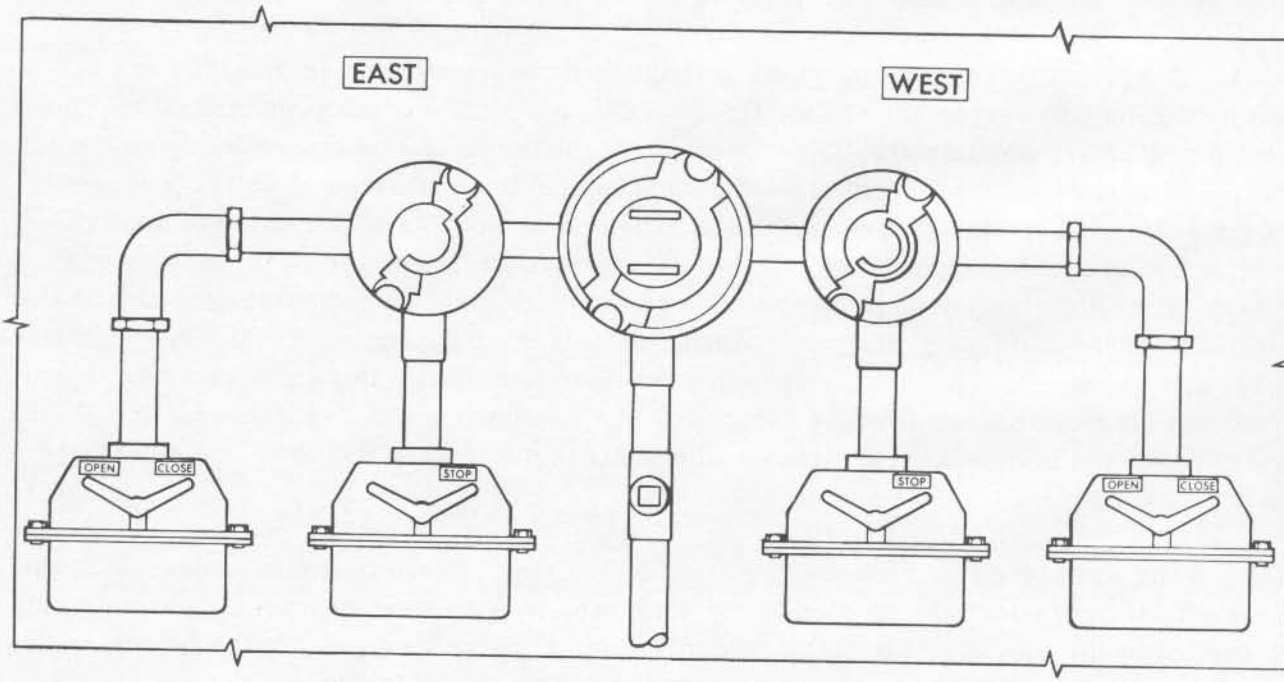
1-135. Electrical power for operation of missile erection doors is provided through motor control center NO. 1. When the circuit breakers on the motor control center are positioned to ON, operation of the missile erection doors can be manually controlled from the missile erection door controls (figure 1-39), located on the wall of the missile bay, or from the FACILITY panel of control-monitor group 1 of 4 (figure 1-24). Limit switches, installed on the roof, control the sequence of operations and energize position indicators on the control panels.

1-136. A green ROOF OPEN indicator on the launch control console illuminates when both missile erection doors are open during countdown. If the console is in operation but the missile erection doors are not open, the ROOF OPEN indicator is extinguished. During countdown the missile erection is automatically controlled by the launch control system.

1-137. The flame door is raised prior to missile firing to deflect missile engine exhaust into the drainage channel. Limit switches, located at the upper and lower limits of travel, complete indicator circuits to the FACILITY panel of control-monitor group 1 of 4 (figure 1-24) and to the launch control console. These panels indicate the open or closed position of the door.

1-138. MISSILE ERECTION DOOR AND FLAME DOOR SYSTEM (SMS 576-C).

1-139. The missile overhead door is mounted on the roof of the launch and service building. The missile erection door covers the missile bay and approximately one-third of the roof area. The missile erection door is fabricated in one large slab section. Rails on the underside of the door ride on wheels mounted on lifting mechanisms attached to ribs of the roof. One end of each lifting mechanism pivots on an axle attached to a rib of the roof while the other end is attached to a hydraulic lifting cylinder. When the missile erection door is to be opened, the hydraulic cylinders lift the door off the ribs of the roof and support its weight as it opens. During countdown, the latching and lifting mechanisms are operated by



32.137-76

Figure 1-39. Missile Erection Door Controls (OSTF-1) pneumatically charged accumulators. In standby, these mechanisms are operated by a hydraulic power unit.

1-140. The missile erection door drive mechanism consists of a 20 horsepower, two-speed, reversible electric-drive motor, two gear reduction boxes, two drive shafts, and dual chain driven cable drums which are attached to gear reduction boxes. Motor torque turns a dual chain drive and sprocket assembly attached to cable drums. Steel cables extending from the drums, are attached to the front and back edges of the missile erection door. The missile erection door opens or closes according to the direction of rotation of the cable drums.

1-141. Electrical power for operation of the missile erection door is provided through the LSB motor control center NO. 2 (36, figure 1-9). After the circuit breakers on the motor control center are positioned to ON, operation of the doors can be controlled from the missile erection door controls located on the missile erection and flame door control panel (figure 1-40). Controls and indicators are provided on the FACILITY panel of control-monitor group 1 of 4 (figure 1-24). Limit switches, installed on the roof, open or close circuits to control the sequence of operations and energize position indicators located on the missile erection and flame door control panels. Electrical interlocks in the erection mechanism prevent erection of the missile when the door is closed. During countdown, the missile erection door is automatically controlled by the launch control system. A ROOF OPEN indicator on the launch control console illuminates amber when the door is closed and green when the door is open.

1-142. The flame door is raised prior to missile firing to deflect engine exhaust into the flame pit. Limit switches, located at the upper and lower extent of travel, complete indicator circuit to the FACILITY panel of control-monitor group 1 of 4 and to the launch control console. These panels indicate the open or closed position of the door.

1-143. MISSILE ERECTION BOOM AND MISSILE LAUNCHER.

1-144. The missile erection boom and missile launcher (figure 1-41), located in the missile bay of the launch and service building, supports, erects, and stabilizes the missile. The launcher is also the interconnecting link between the airborne equipment and the aerospace ground equipment.

1-145. The missile launcher consists of a welded rectangular structure, rise-off disconnect panels, propellant lines, heating and ventilating ducts, hydraulic and pneumatic service lines, an engine purging manifold, and service lines and electrical controls. The launcher is supported by, and pivots on, two shock mounted pivot pedestals. After erection, the missile launcher and missile erection boom are further supported by two boom support pedestals.

1-146. The erected missile is supported by upper and lower pedestals located in the four quadrants of the missile launcher. Each of the four upper pedestals contains a hydraulically actuated holddown hook mechanism. The upper pedestals transmit the missile load onto the lower pedestals after erection and, in conjunction with the holddown hook mechanism, are

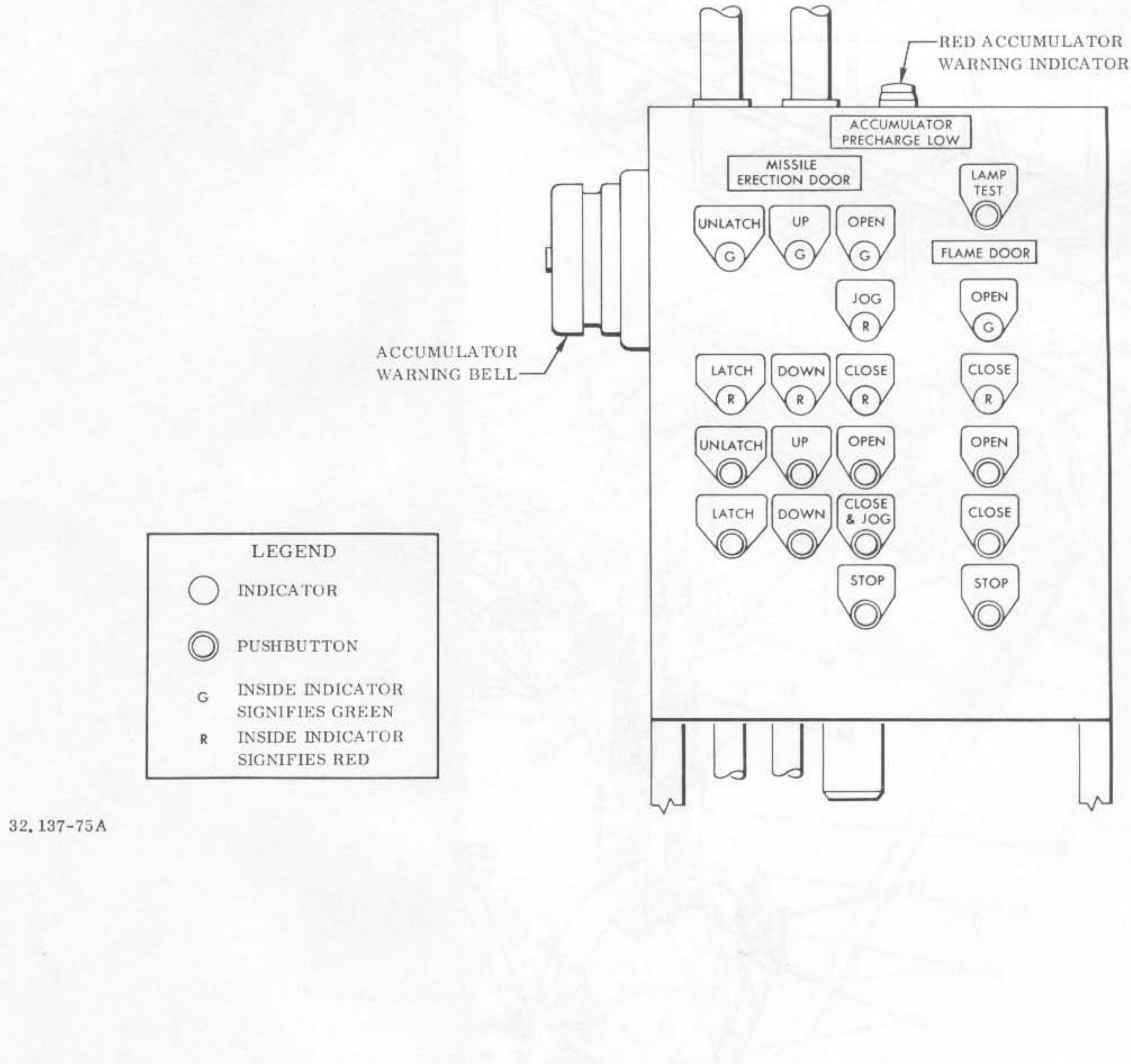


Figure 1-40. Missile Erection Door and Flame Door Control Panel (SMS 576-C)

1 LAUNCHER SWAY SHOCK MOUNT ASSEMBLY
2 UPPER RISEOFF PANEL
3 BOOM-TO-CARRIAGE STRUT
4 ERECTION BOOM
5 MISSILE STRETCH CONSOLE
6 NOSE CLAMP RATIOMOTOR
7 NOSE CLAMP SWAY SHOCK MOUNT ASSEMBLY
8 BOOM REST SHOCK MOUNT ASSEMBLY
9 SWING CYLINDER
10 MISSILE STRETCH STRUT
11 NOSE CLAMP LOCK-UNLOCK CYLINDER
12 NOSE CLAMP, MISSILE STRETCH LINKS
13 NOSE CLAMP SWAY SHOCK MOUNT CONTACT BRACKET
14 NOSE CLAMP OPEN-CLOSE CYLINDER
15 BOOM-TO-LAUNCHER STRUT
16 POD COOLING DUCT
17 LIQUID OXYGEN FILL-AND-DRAIN LINE
18 LIQUID OXYGEN FILL-AND-DRAIN LINE ROTATING CYLINDER
19 LAUNCHER FRAME
20 QUAD I AND II UPPER PEDESTALS
21 RIGHT LAUNCHER PIVOT ASSEMBLY
22 BOOM SUPPORT PEDESTAL
23 QUAD III AND IV LOWER PEDESTALS
24 QUAD III AND IV UPPER PEDESTALS
25 QUAD I AND II LOWER PEDESTALS
26 THRUST SECTION HEATING DUCT
27 LEFT LAUNCHER PIVOT ASSEMBLY
28 LIQUID NITROGEN OVERFLOW DUCTS
29 LAUNCHER, MISSILE STRETCH LINK ASSEMBLIES

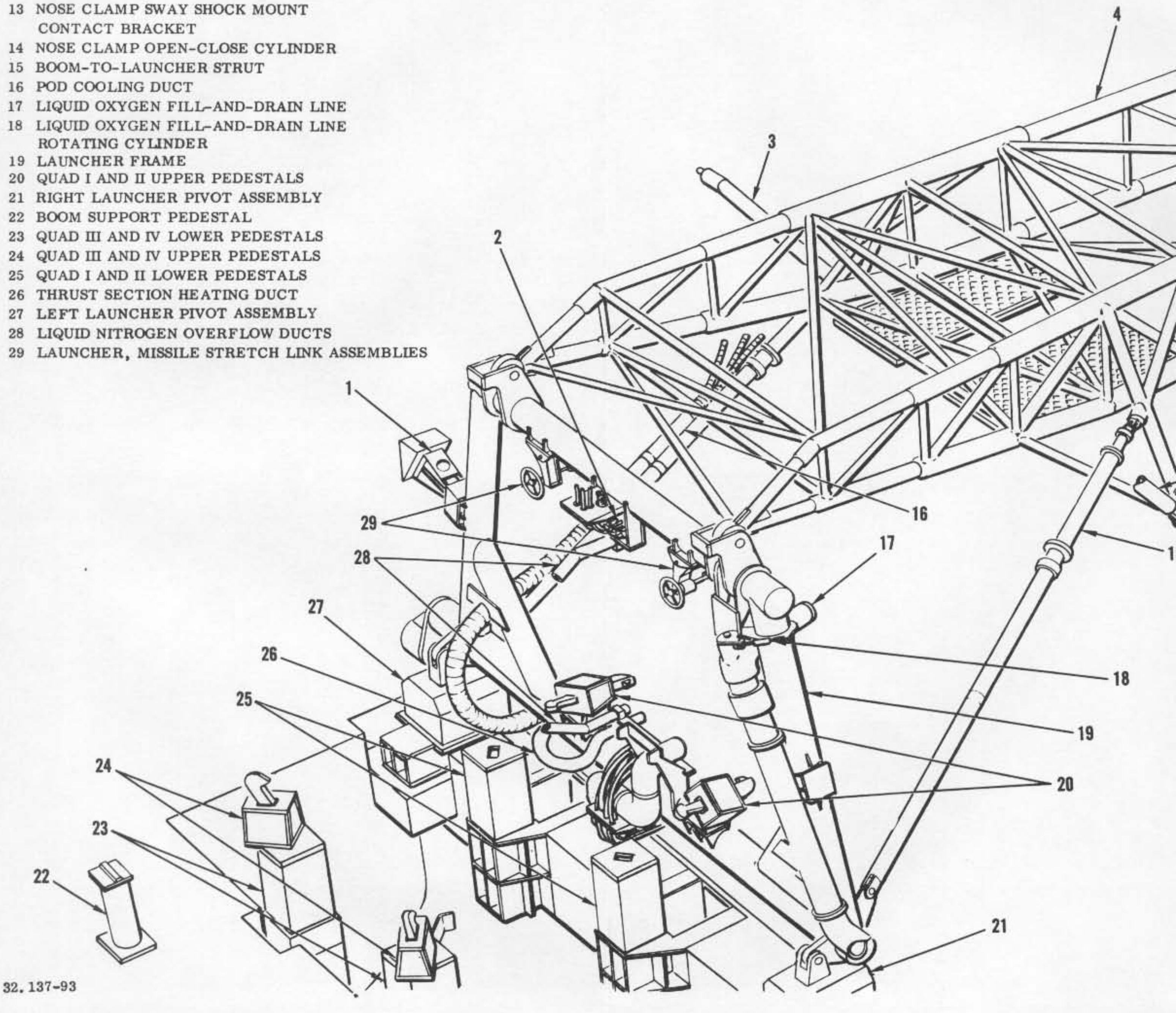
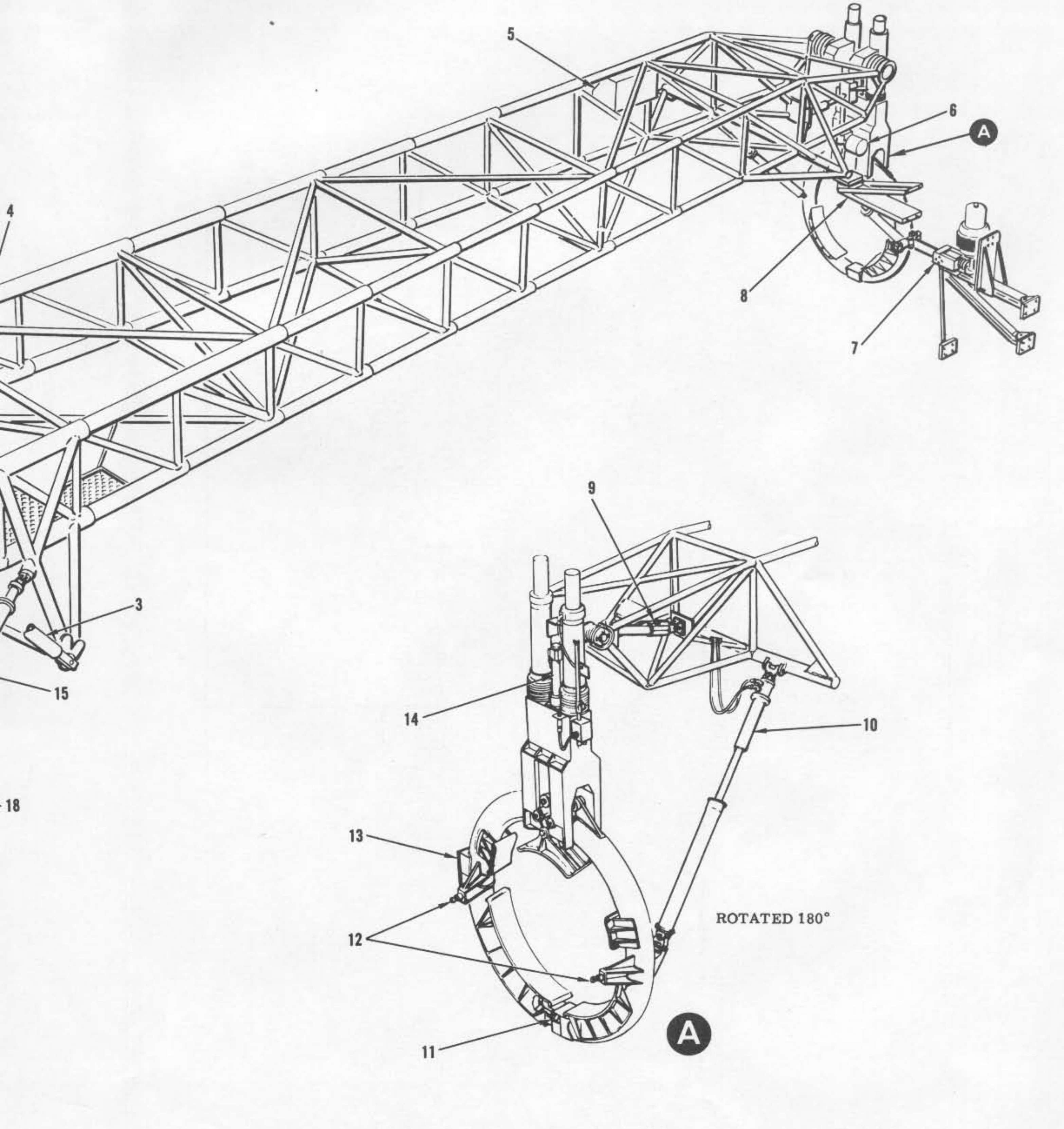


Figure 1-41. Missile Erection Boom and Missile Launcher


5
6
A
4
8
7
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3
15
14
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18
13
12
ROTATED 180°
11
A

the only structural points of missile launcher contact with the missile. The holddown hooks in missile launcher quadrants I and II rotate with the missile launcher and are secured to the aft end of the missile during mating and erection.

1-147. The missile erection boom, a truss-type, tubular steel beam, is attached to the missile launcher by two hinge pins. Two boom to launcher struts, connected between the boom and launcher, are hydraulically retracted and mechanically locked during the missile erection cycle. The lock is disengaged hydraulically during operation of the missile erection boom from the 90-degree to the 100-degree position. A hydraulically operated nose clamp, located at the upper end of the boom, encircles the re-entry vehicle adapter to secure the forward end of the missile to the missile erection boom during erection and lowering operations.

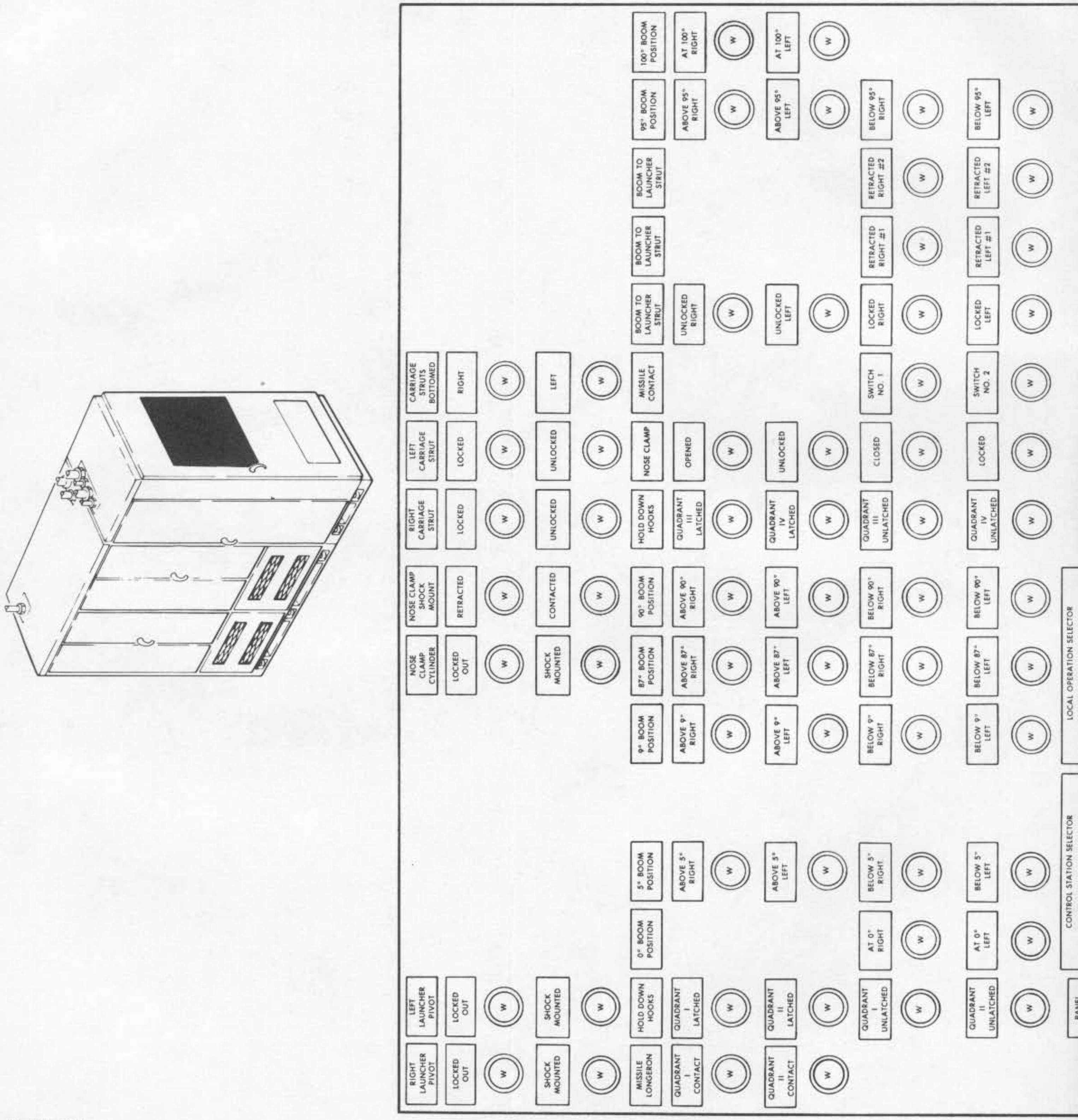
1-148. Hydraulic power for operating boom and nose clamp cylinders is received from the hydraulic power unit in LSB. A missile stretch system, which applies tension to the missile structure, is located on the missile erection boom. Tension is applied if the missile pressurization system fails, or during certain maintenance operations.

1-149. The missile erection boom erection mechanism consists of an electric motor and a mechanical drive mechanism which provide power, controls, and mechanical linkages for erecting and lowering the missile erection boom. The missile erection boom erection mechanism is connected to two carriage assemblies which ride on two parallel rails attached to the side walls of the storage area. Limit switches supply electrical signals to the signal control section of the erection mechanism motor control center (EMMCC) to control the drive motor (figure 1-42 or 1-43).

1-150. Operation of the missile erection system may be controlled from one of three points: the missile transfer panels (figure 1-44) in the missile bay of the LSB, the erection mechanism motor control center (EMMCC), located in the mechanical and equipment area, and the launch control center in the LOB.

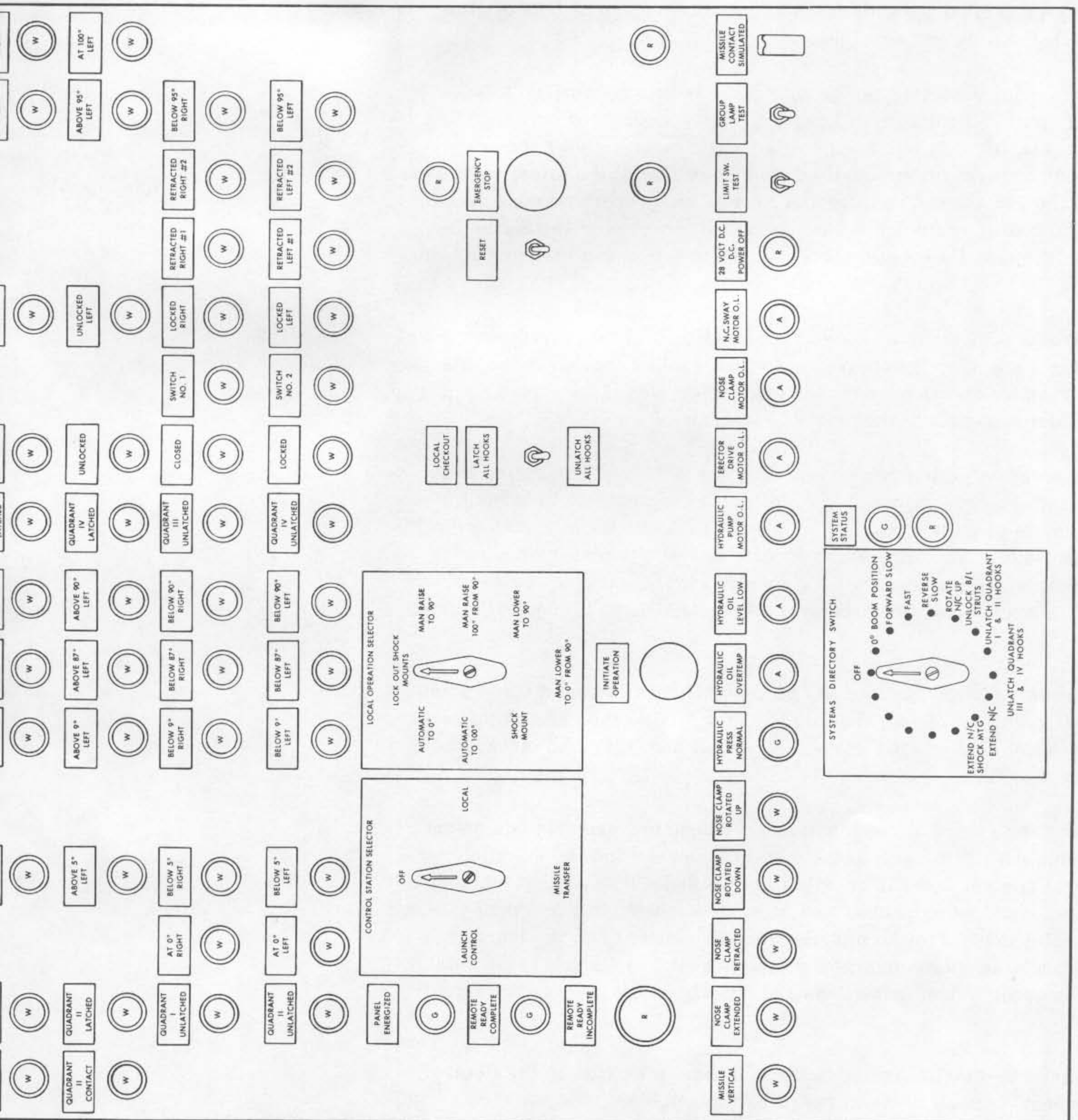
1-151. The missile transfer panels control and monitor the launch and erection equipment necessary for mating and demating the missile to the missile launcher and the missile erection boom. The EMMCC local control panel is an operation, fault location, checkout, and maintenance panel. The panel contains indicators and controls required to place the system in standby condition and transfer control to the missile transfer panels or to the launch control center. The EMMCC also contains emergency bypass switches (figure 1-45) to allow continuation of the erection sequence when indications and signals do not portray the actual status of the equipment.

1-152. Equipment for aligning the missile trailer to the launcher is located on the floor of the missile bay. The equipment consists of two forward rail assemblies, two after rail assemblies, and a hydraulic installation which is mounted on the left-hand rail assembly. A hydraulic cylinder pulls the casters of the semitrailer along the V-rails of the beam



32.137-101A

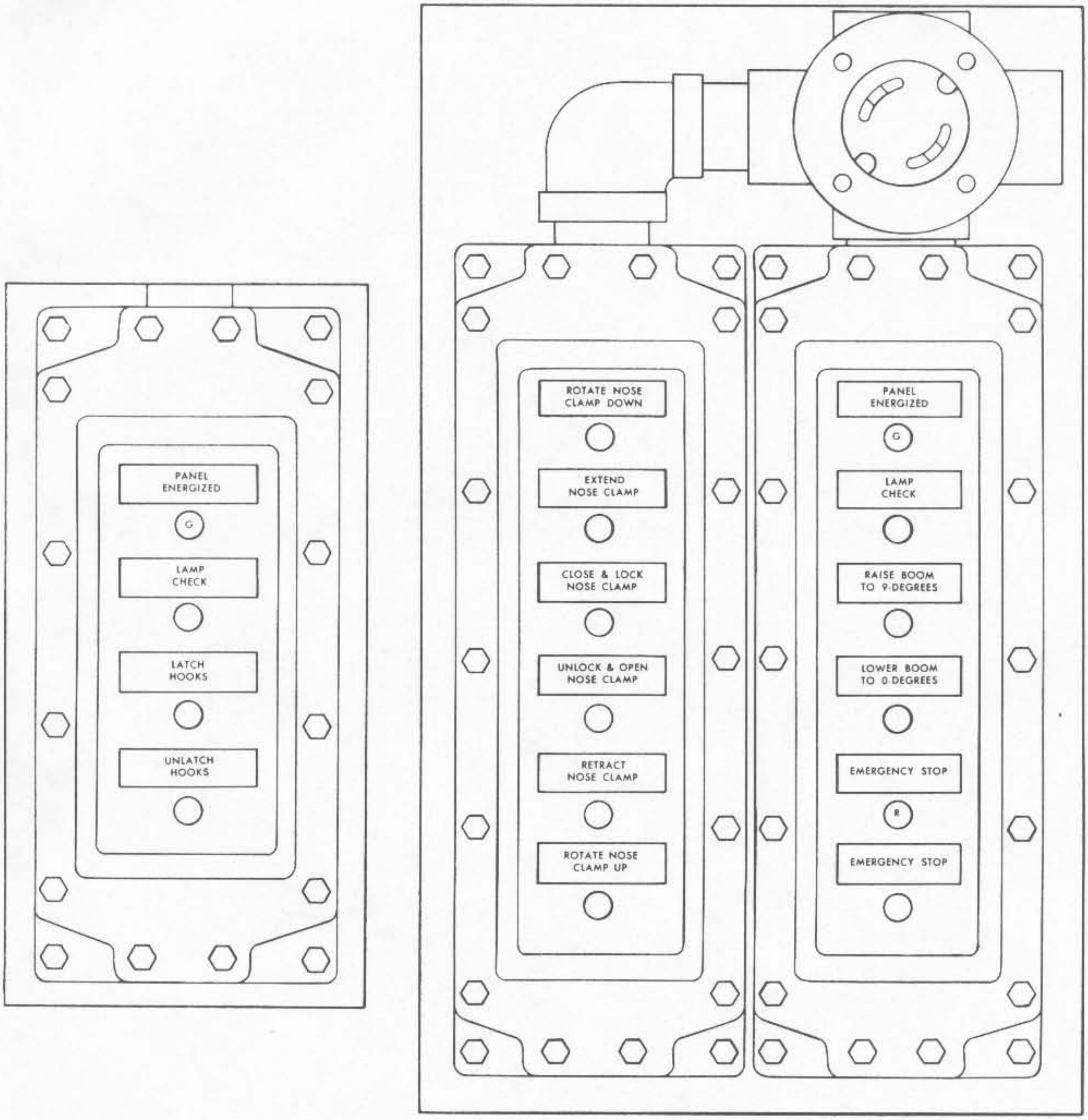
Figure 1-42. Local Control Panel Erection Mechanism Motor Control Center (Typical)



rol Center (Typical)

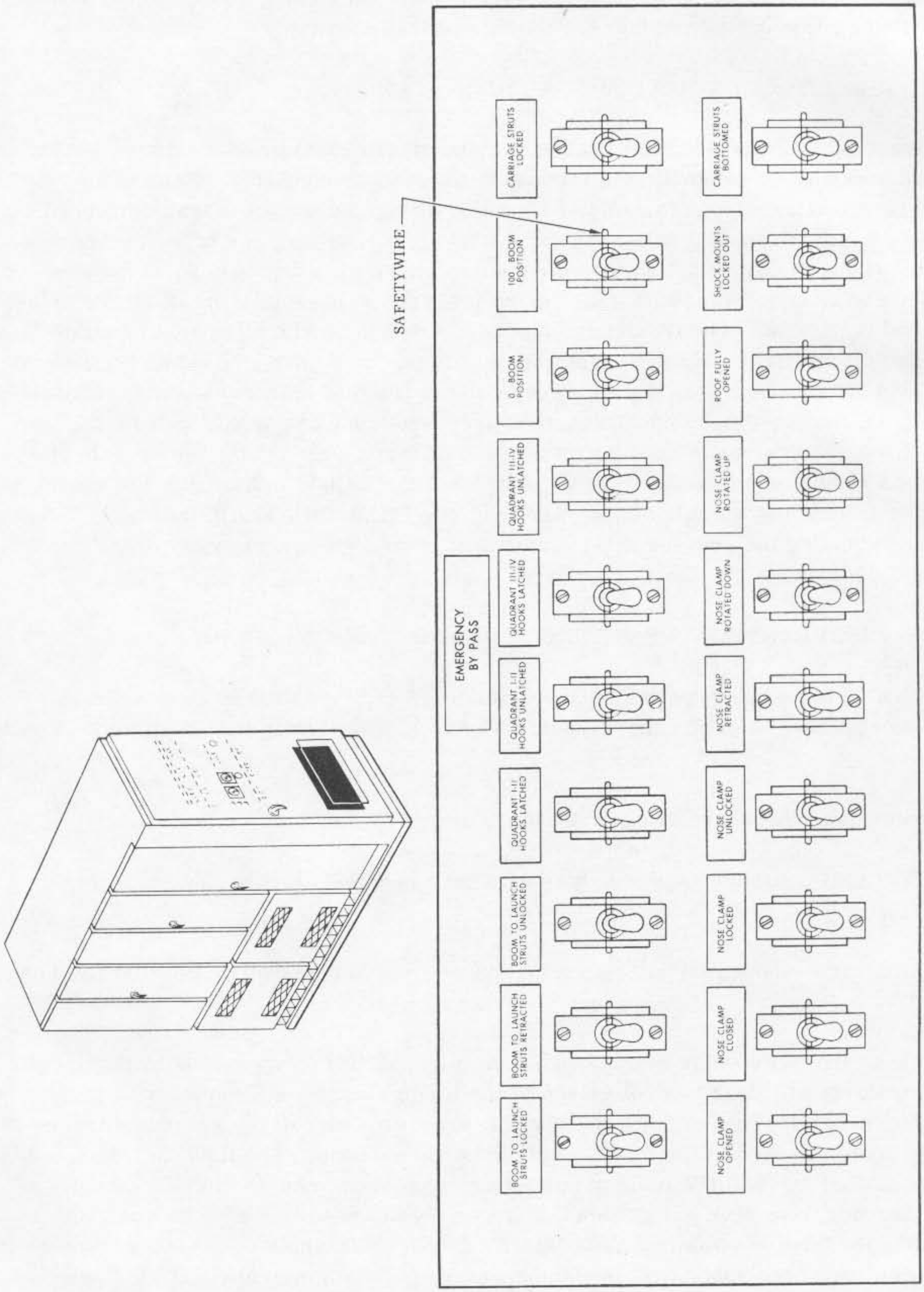
Changed 3 June 1963

(Figure 1-43 deleted.)



32.137-77

Figure 1-44. Missile Transfer Panels



32.14-112

Figure 1-45. Erection Mechanism Motor Control Center Emergency Bypass Switches assembly to mate the missile to the missile launcher. A directional control valve controls the extension and retraction of the cylinder piston rod. An inching control valve controls the rate of retraction during the last 2.50 inches of trailer travel.

1-153. LIQUID NITROGEN-HELIUM LOADING SYSTEM.

1-154. The liquid nitrogen-helium loading system (figure 1-46) provides nitrogen and helium gas pressures to maintain the missile in the standby condition. Routine use and ground pressurization nitrogen is routed from the storage cylinders to transfer control valves and regulators on skid NO. 5 (figure 1-47). It is then supplied to the pressure system control (figure 1-48) to maintain proper missile tank pressure schedules required during standby and countdown modes. (See figure 1-49.) The pressures in all modes, plus refrigerated helium and primary helium supplies, are indicated on the front panel of the PSC. This unit normally operates on automatic pressurization, which is initiated when the AUTOMATIC pushbutton on the emergency status patch of the launch control console is depressed. In the emergency condition, tank pressure must be controlled from the launch control console. In the event that the routine use nitrogen supply fails, emergency pressurization is regulated and supplied to the PSC from the inflight helium storage vessel not selected for loading the missile helium bottles. The PRESSURE MODE indicator illuminates red, indicating the pressurization system is in emergency, when any one of the following conditions exist:

a. TANK DIFFERENTIAL PRESSURE gage indicates less than 2.3 PSI.

b. LO_2 TANK pressure gage indicates less than 1.65 PSI nominal when missile is vertical, or less than 6.7 PSI when missile is horizontal or during the erection or lowering cycle.

c. Instrument air pressure drops to 27.0 (±1.0) PSI.

d. FUEL TANK pressure gage indicates less than 53.0 PSI after having been greater than 60.0 PSI.

e. EMERGENCY pushbutton on pressurization patch of launch control console has been depressed.

1-155. When the countdown is started, gaseous nitrogen from the gaseous nitrogen cylinders is transferred through control valves to the liquid nitrogen storage section of the liquid nitrogen-helium heat exchanger (figure 1-50). Pressure of the gaseous nitrogen forces the liquid nitrogen to the missile helium bottle shrouds. The liquid nitrogen chills the bottles so that a greater volume of helium can be loaded prior to missile rise-off. After the shrouds have been filled, liquid nitrogen continues to flow at a reduced rate to replace fluid loss due to boiloff until COMMIT START. Since helium is used rapidly after rise-off, chilling of the spheres is then unnecessary and the liquid nitrogen is allowed to drain through the two rise-off disconnects.

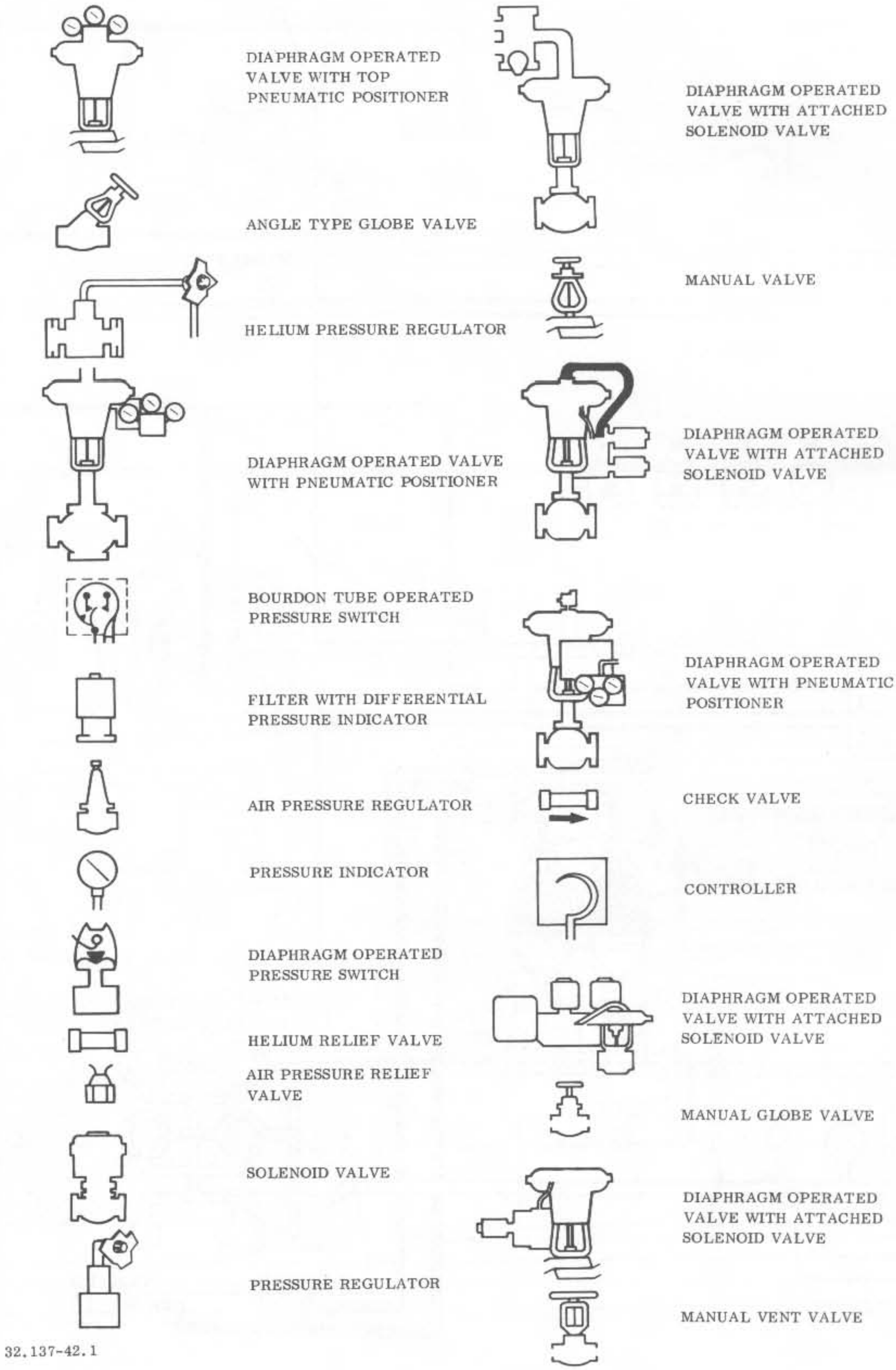


Figure 1-46. Liquid Nitrogen-Helium Loading System (Sheet 1 of 2)

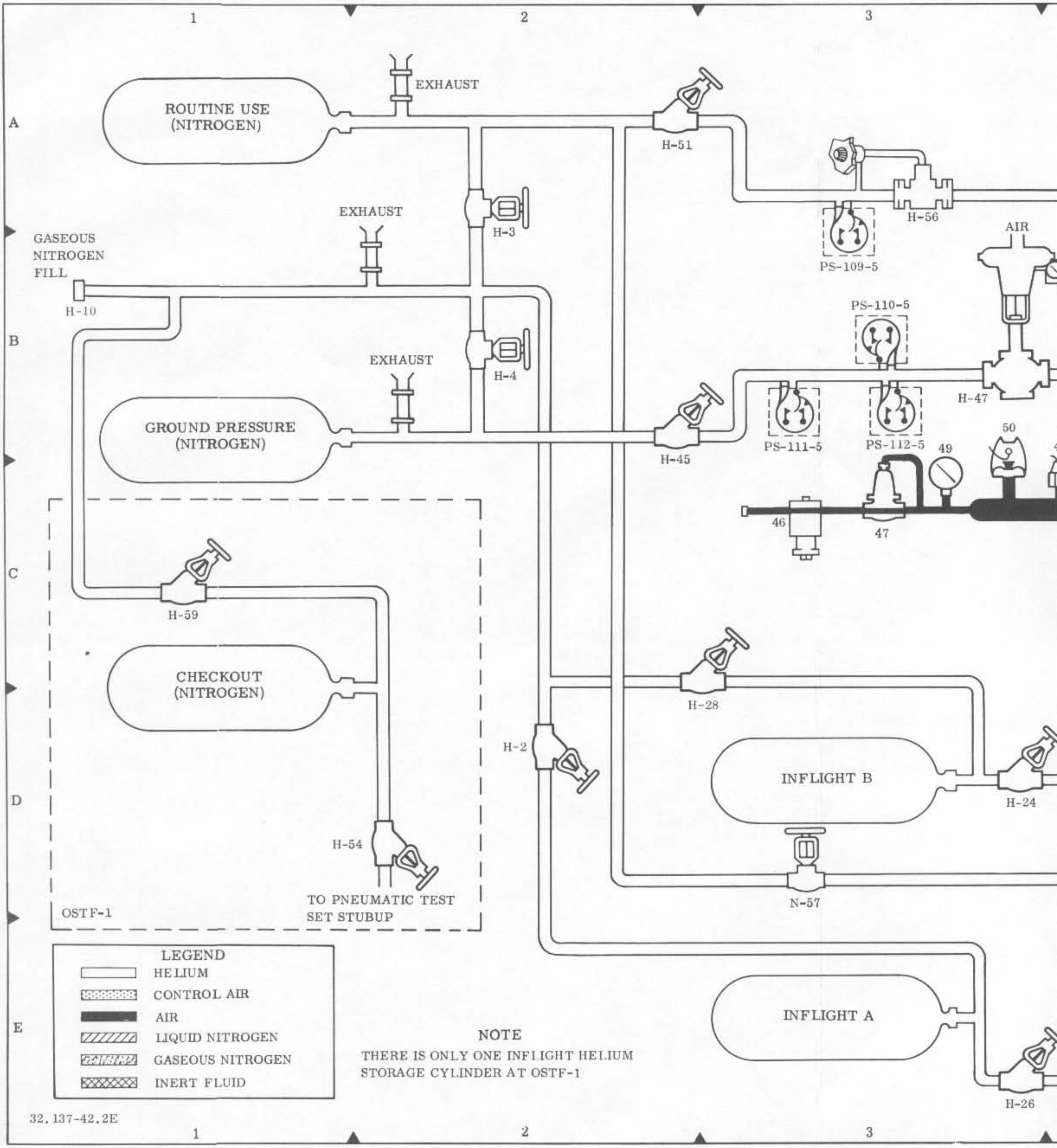
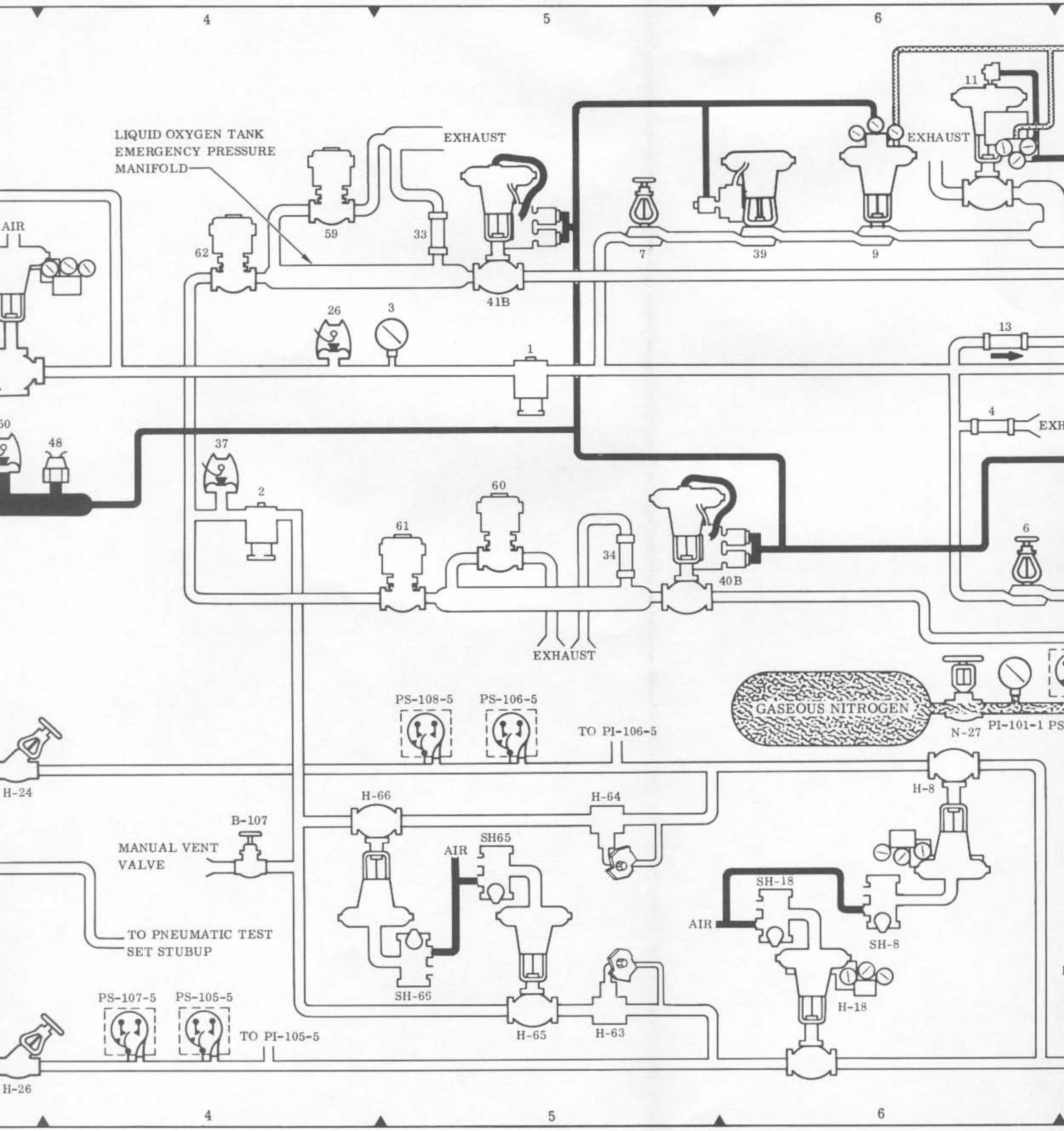
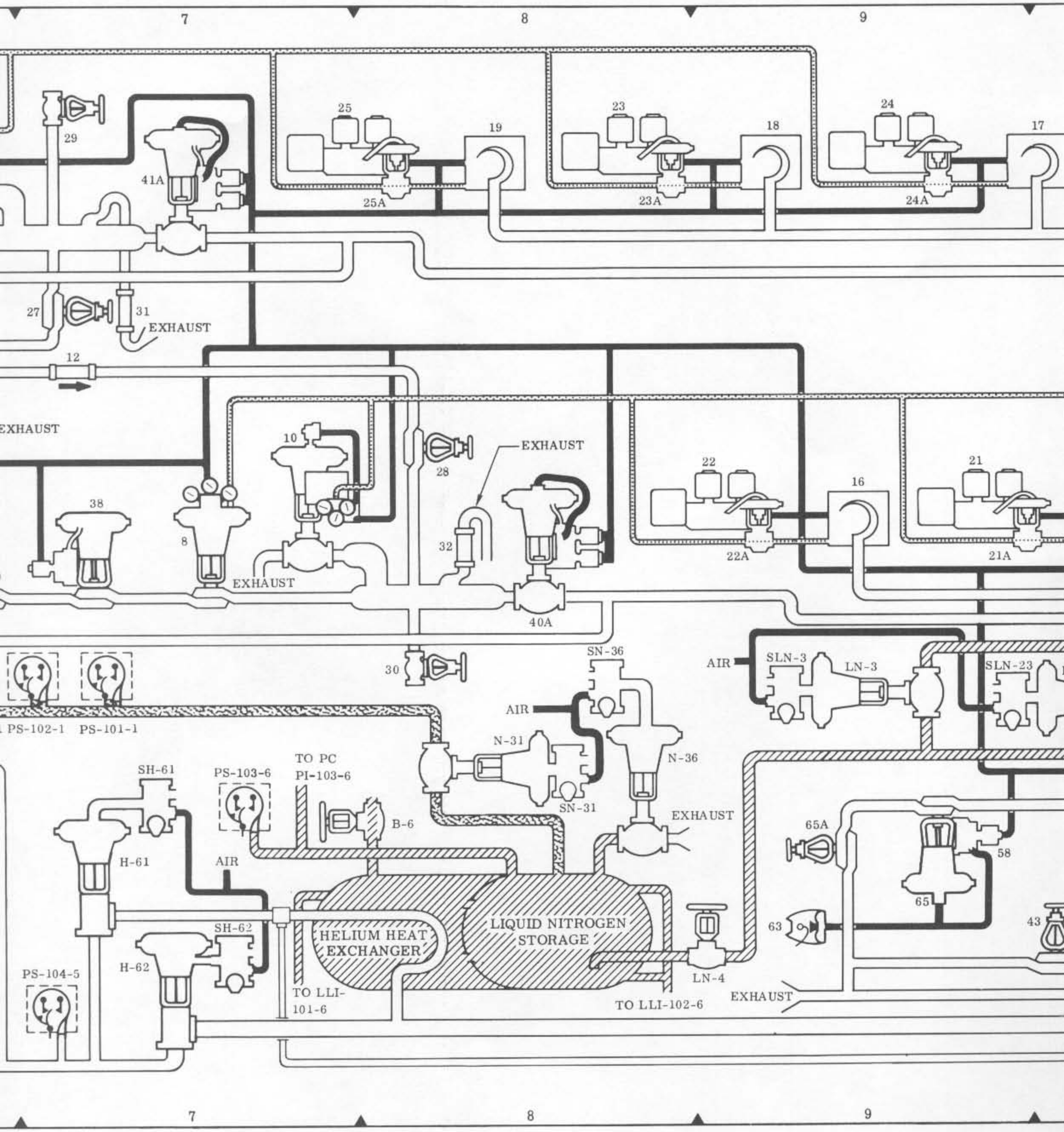


Figure 1-46. Liquid Nitrogen-Helium Loading System (Sheet 2 of 2)


4
5
6
LIQUID OXYGEN TANK
EMERGENCY PRESSURE
MANIFOLD
EXHAUST
EXHAUST
AIR
59
33
62
41B
26
3
1
7
39
9
11
13
4
EXH
60
48
37
2
61
60
34
40B
6
EXHAUST
GASEOUS NITROGEN
N-27
PI-101-1 PS
PS-108-5
PS-106-5
TO PI-106-5
H-24
H-66
H-64
H-8
B-107
MANUAL VENT
VALVE
SH65
AIR
SH-18
AIR
SH-8
TO PNEUMATIC TEST
SET STUBUP
SH-66
H-18
PS-107-5
PS-105-5
TO PI-105-5
H-65
H-63
H-26
4
5
6


7
8
9
29
41A
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19
25A
23
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23A
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17
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27
31
EXHAUST
12
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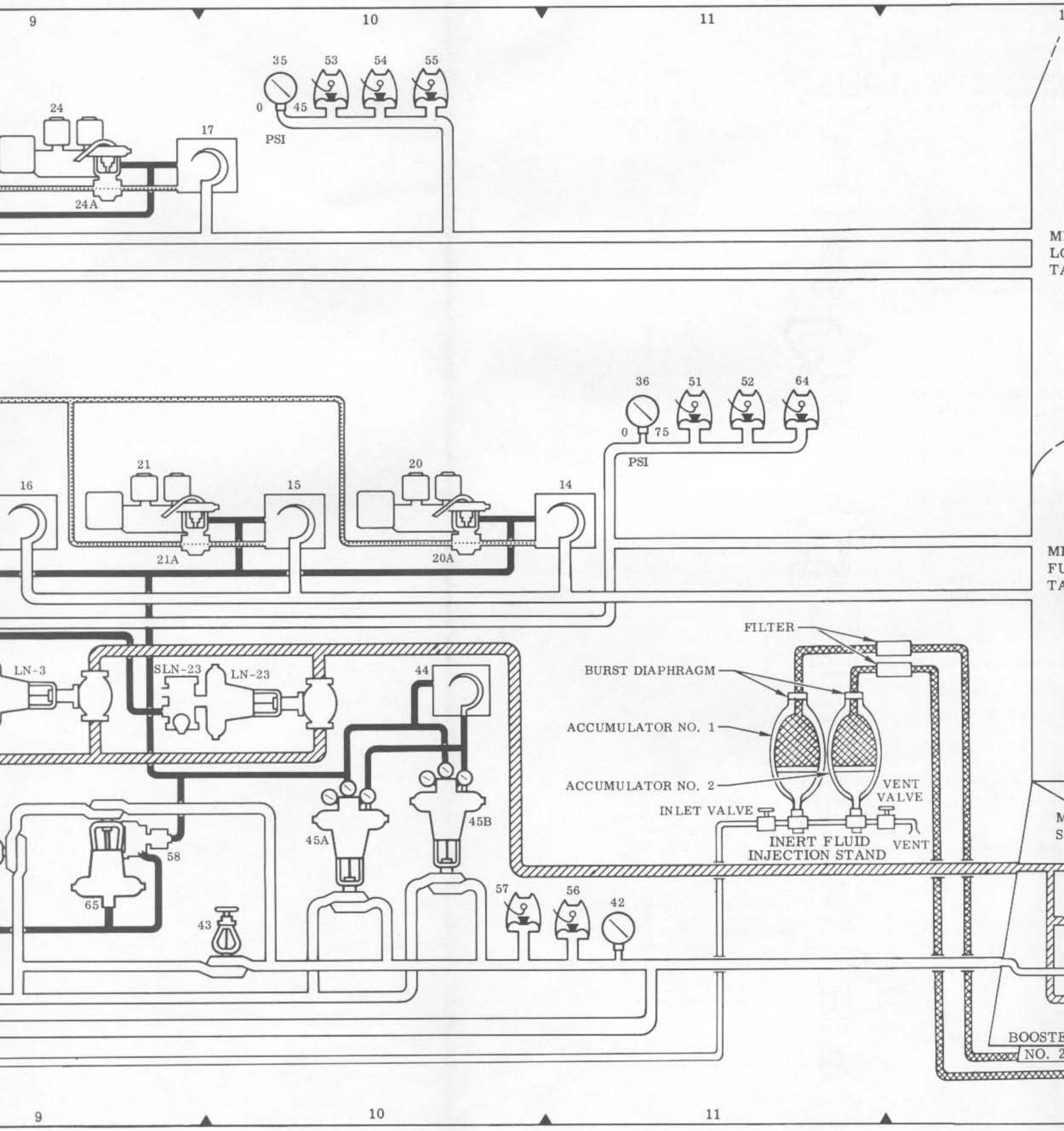
28
EXHAUST
22
16
22A
21
21A
38
8
EXHAUST
32
40A
30
SN-36
AIR
SLN-3
LN-3
SLN-23
AIR
PS-102-1
PS-101-1
N-31
N-36
SN-31
SH-61
PS-103-6
TO PC
PI-103-6
B-6
EXHAUST
65A
58
H-61
AIR
65
SH-62
HELIUM HEAT
EXCHANGER
LIQUID NITROGEN
STORAGE
63
43
H-62
PS-104-5
TO LLI-
101-6
LN-4
TO LLI-102-6
EXHAUST


9
10
11
35
53
54
55
0
45
PSI
24
17
24A
36
51
52
64
0
75
PSI
21
20
16
15
14
21A
20A
FILTER
BURST DIAPHRAGM
LN-3
SLN-23
LN-23
44
ACCUMULATOR NO. 1
ACCUMULATOR NO. 2
VENT
VALVE
INLET VALVE
45B
45A
INERT FLUID
INJECTION STAND
VENT
58
65
57
56
42
43
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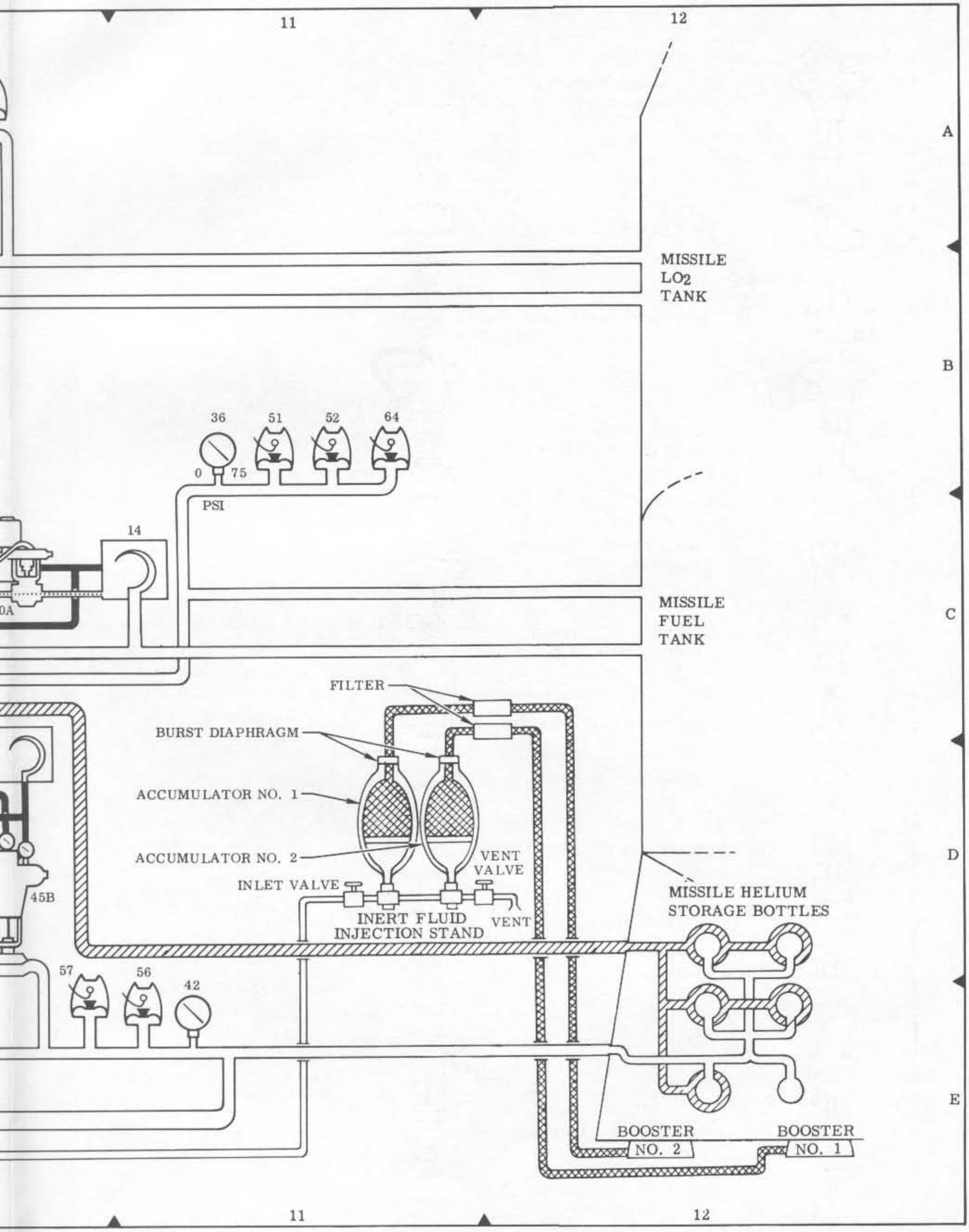
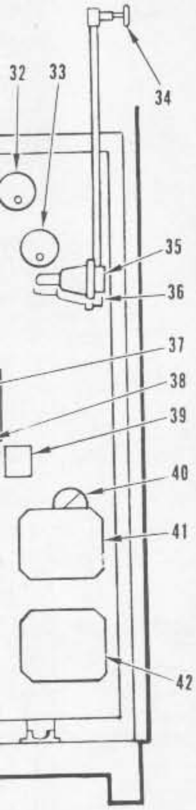
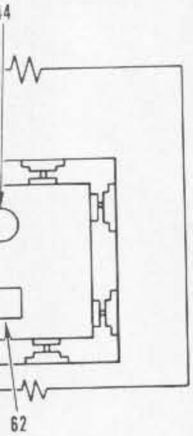


11
12
A
B
C
D
E
MISSILE
LO2
TANK
36
51
52
64
0
75
PSI
14
0A
MISSILE
FUEL
TANK
FILTER
BURST DIAPHRAGM
ACCUMULATOR NO. 1
ACCUMULATOR NO. 2
VENT
VALVE
INLET VALVE
45B
INERT FLUID
INJECTION STAND
VENT
MISSILE HELIUM
STORAGE BOTTLES
57
56
42
BOOSTER
NO. 2
BOOSTER
NO. 1
11
12



ANEL VIEW A
TROL PANEL

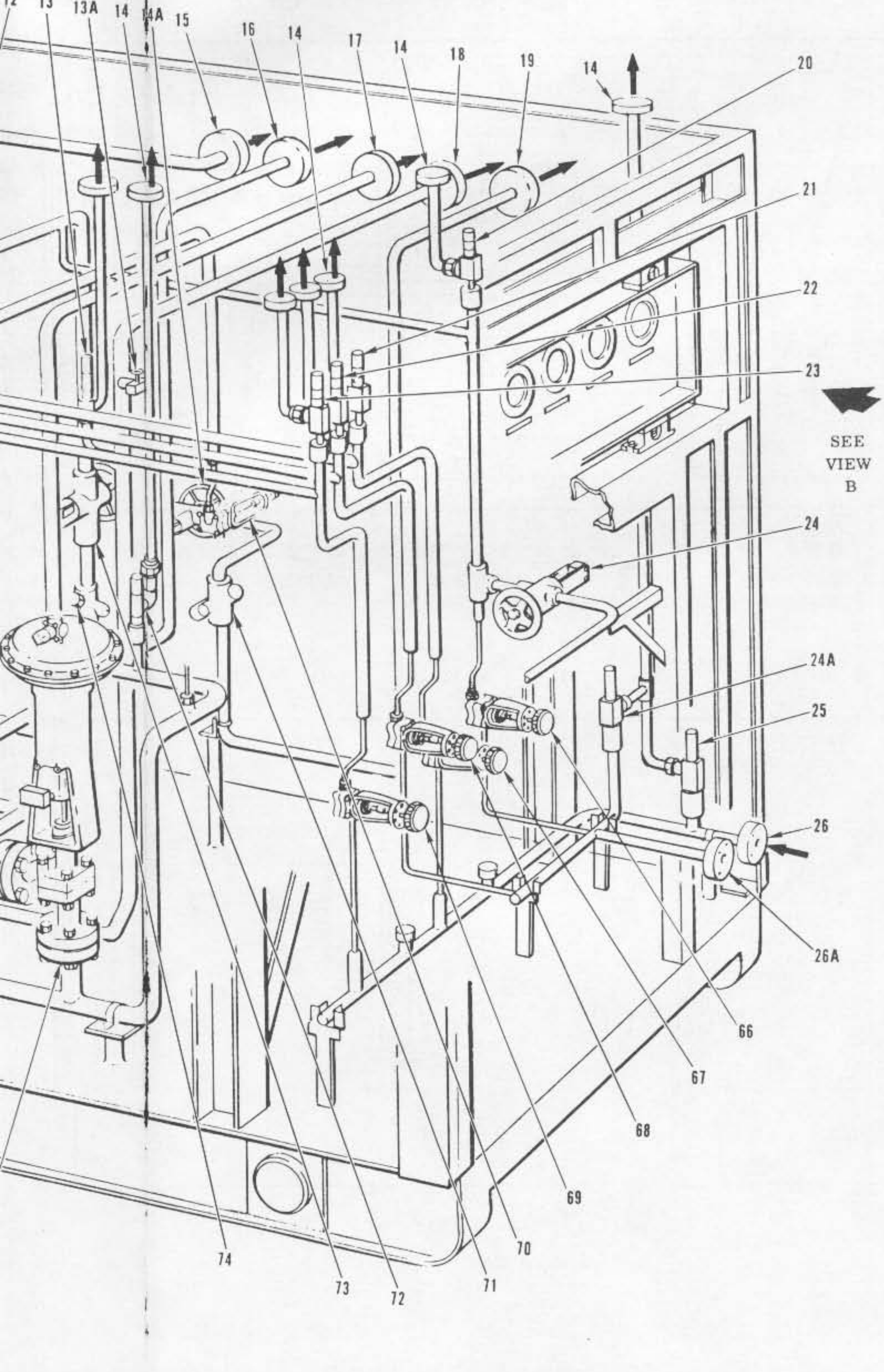


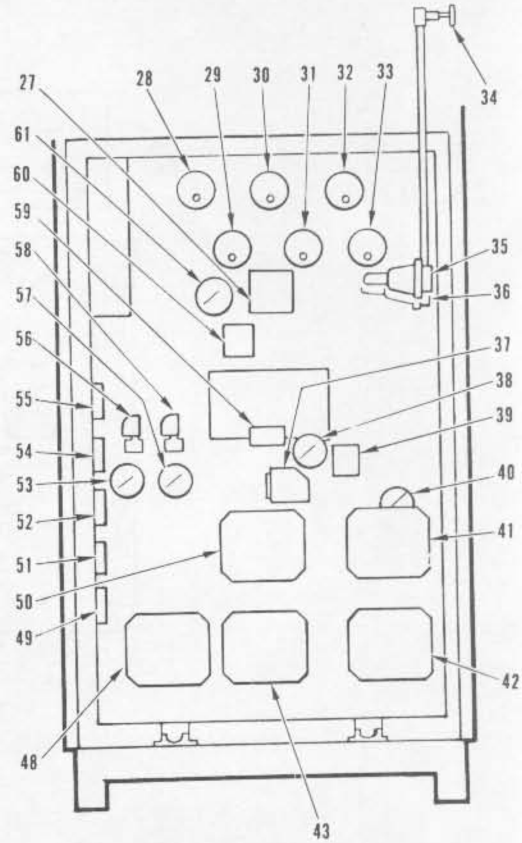
ANEL VIEW B

1 FROM INFLIGHT HELIUM STORAGE CYLINDER A
2 FROM GROUND PRESSURIZATION STORAGE CYLINDER
3 FROM INFLIGHT HELIUM STORAGE CYLINDER B
4 SAFETY VALVE S-30
5 DIAPHRAGM VALVE H-18
6 MANUAL STOP VALVE H-24
7 FILTER H-30A
8 MANUAL VALVE H-45
9 FILTER H-46A
10 FROM ROUTINE USE HELIUM STORAGE CYLINDER
11 DIAPHRAGM VALVE H-8
12 FROM CHECKOUT HELIUM STORAGE CYLINDER
13 RELIEF VALVE S-54
13A MANUAL VENT VALVE B-107
14 TO ATMOSPHERE
14A MANUAL STOP VALVE N-57*
15 PRIMARY HELIUM TO PRESSURE SYSTEM CONTROL
16 AMBIENT HELIUM TO MISSILE
17 HELIUM TO LIQUID NITROGEN STORAGE TANK- HELIUM HEAT EXCHANGER
18 EMERGENCY HELIUM TO PRESSURE SYSTEM CONTROL
19 CHECKOUT
20 RELIEF VALVE S-56
21 RELIEF VALVE S-41
22 RELIEF VALVE S-44
23 RELIEF VALVE S-42
24 MANUAL STOP VALVE H-81
24A RELIEF VALVE S-64 (COMPLEXES SMS-548, 566, 567 AND 576-C); RELIEF VALVE S-64A (COMPLEX OSTF-1 ONLY)
25 RELIEF VALVES S-63
26 HELIUM FILL
26A 6000 PSIG NITROGEN FILL
27 PRESSURE CONTROLLER PC-105-5
28 INSTRUMENT AIR GAGE PI-116-5
29 GROUND PRESS SUPPLY GAGE PI-108-5
30 35 VALVE AIR GAGE PI-115-5
31 EMERGENCY HELIUM SUPPLY GAGE PI-107-5
32 SUPPLY AIR GAGE PI-114-5
33 INFLIGHT HELIUM SUPPLY GAGE PI-104-5
34 INSTRUMENT AIR SHUTOFF VALVE
35 PRESSURE REGULATOR PR-101-5
36 PRESSURE REGULATOR PR-102-5
37 RESET PRESSURE SET POINT
38 GROUND PRESSURE SET POINT GAGE PI-119-5
39 PRESSURE CONTROLLER PC-101-5
40 PRESSURE INDICATOR PI-122-5
41 FLOW TRANSMITTER FT-101-5
42 FLOW TRANSMITTER FT-102-5
43 PRESSURE TRANSMITTER PT-102-5
44 INFLIGHT HELIUM STORAGE A GAGE PI-105-5
45 GROUND PRESS STORAGE GAGE PI-110-5
46 INFLIGHT HELIUM STORAGE B GAGE PI-106-5
47 ROUTINE USE HELIUM GAGE PI-109-5
48 PRESSURE TRANSMITTER PT-101-5
49 PRESSURE SWITCH PS-104-5
50 PRESSURE TRANSMITTER PT-105-5
51 PRESSURE SWITCH PS-105-5
52 PRESSURE SWITCH PS-107-5
53 PRESSURE INDICATOR PI-117-5
54 PRESSURE SWITCH PS-106-5
55 PRESSURE SWITCH PS-108-5
56 SOLENOID VALVE SH-2-5
57 PRESSURE INDICATOR PI-118-5
58 SOLENOID VALVE SH-1-5
59 PRESSURE CONTROLLER PC-102-5
60 MANUAL LOADER ML-105-5
61 PRESSURE INDICATOR PI-124-5
62 PRESSURE SWITCH SP-112-5
63 PRESSURE SWITCH PS-111-5
64 PRESSURE SWITCH PS-110-5
65 PRESSURE SWITCH PS-109-5
66 MANUAL FILL VALVE H-3
67 MANUAL FILL VALVE H-2
68 MANUAL FILL VALVE H-4
69 MANUAL FILL VALVE H-28
70 MANUAL STOP VALVE H-54
71 STRAINER H-55
72 SAFETY VALVE S-29
73 MANUAL STOP VALVE H-51
74 FILTER H-52A
75 DIAPHRAGM VALVE H-61
76 PRESSURE REGULATOR H-56
77 DIAPHRAGM VALVE H-62
78 DIAPHRAGM VALVE H-66
79 PRESSURE REGULATOR H-64
80 DIAPHRAGM VALVE H-65
81 PRESSURE REGULATOR H-63
82 DIAPHRAGM VALVE H-47
83 ORIFICE OF-102-5
84 ORIFICE H-101-5
85 FILTER H-16A
86 MANUAL STOP VALVE H-26

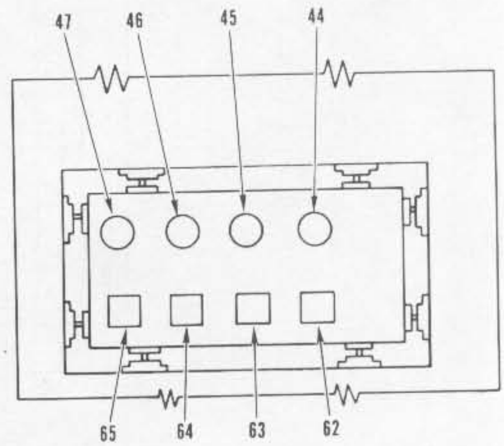
* MANUAL STOP VALVE AND LINE INSTALLED ONLY AT COMPLEXES SMS 548, 566, 567 AND 576-C

Figure 1-47. Helium Control Valve Skid (NO. 5)

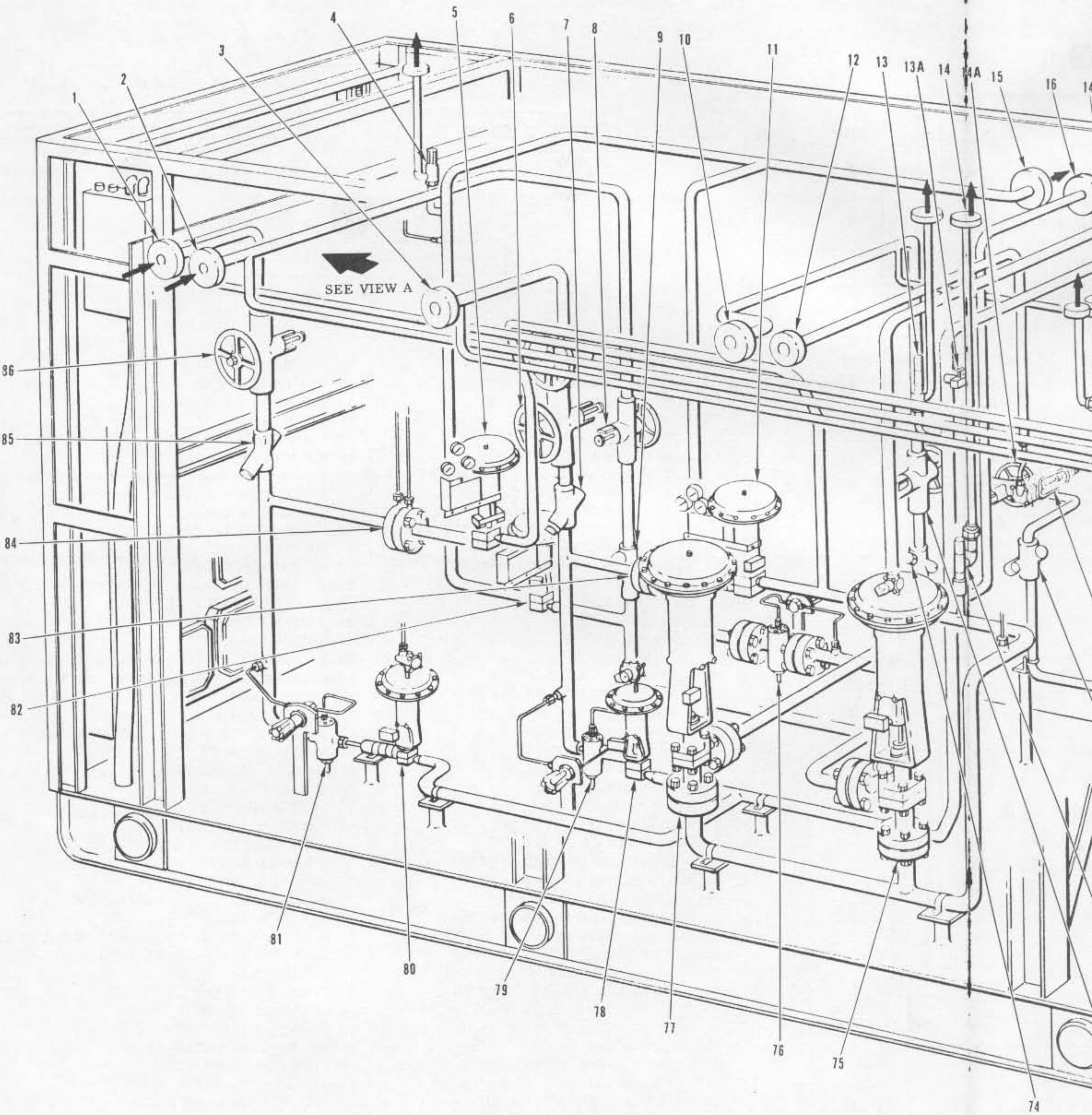




HELIUM TRANSFER PANEL VIEW A
REAR VIEW OF CONTROL PANEL



HELIUM STORAGE PANEL VIEW B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13A
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14A
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SEE VIEW A
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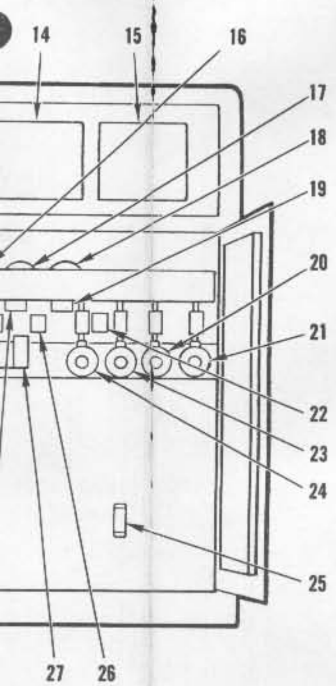
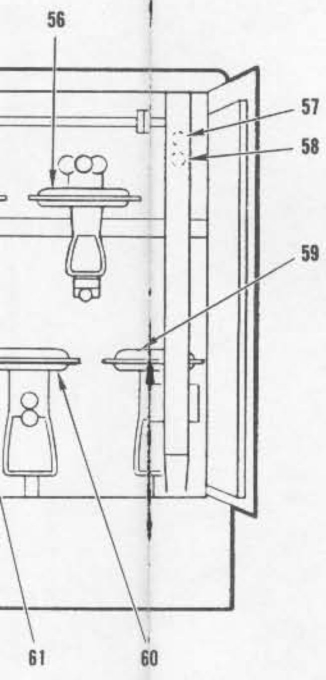
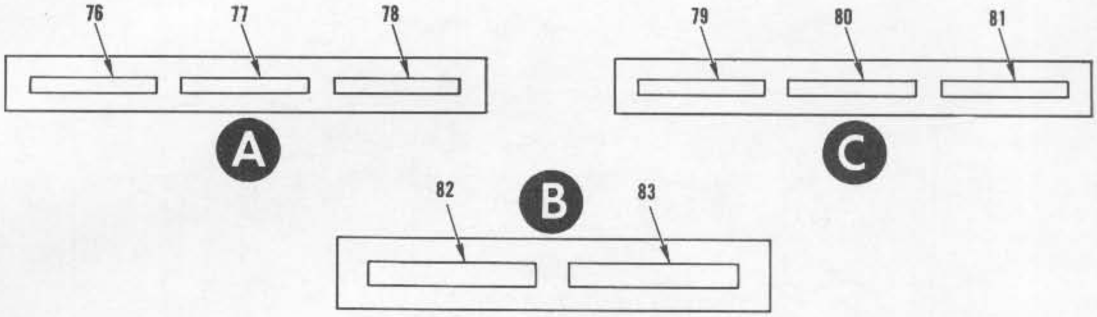
32. 126-88



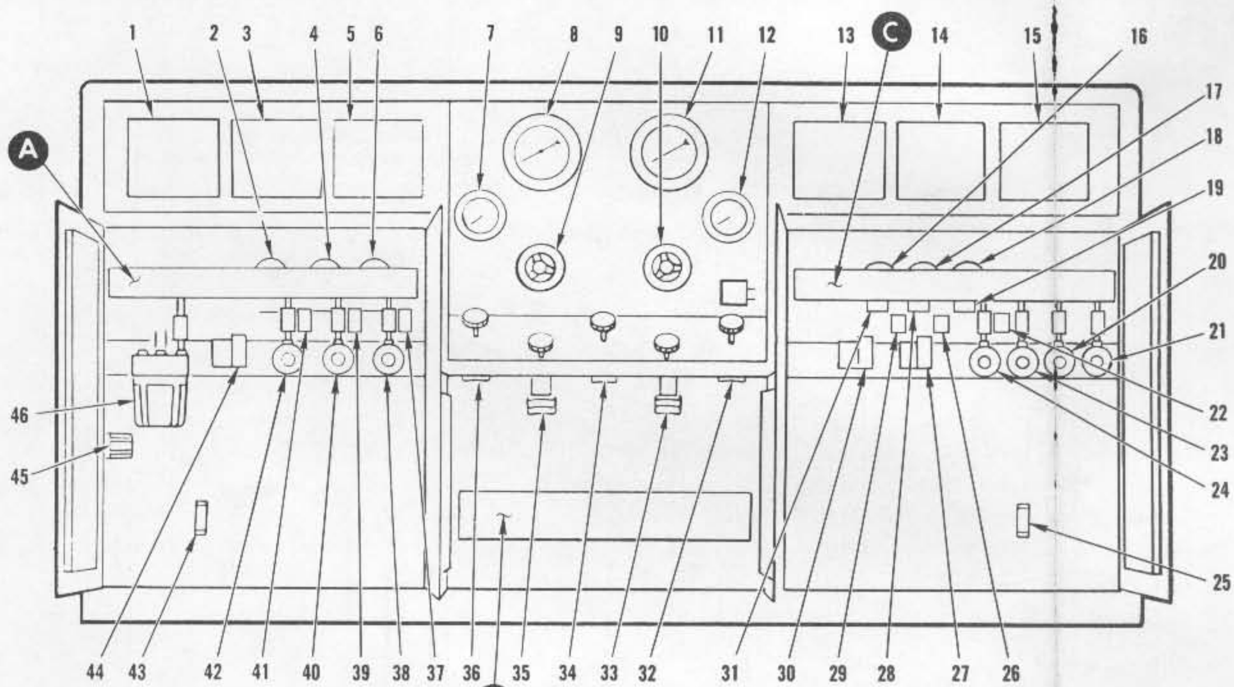
OXYGEN SECTION





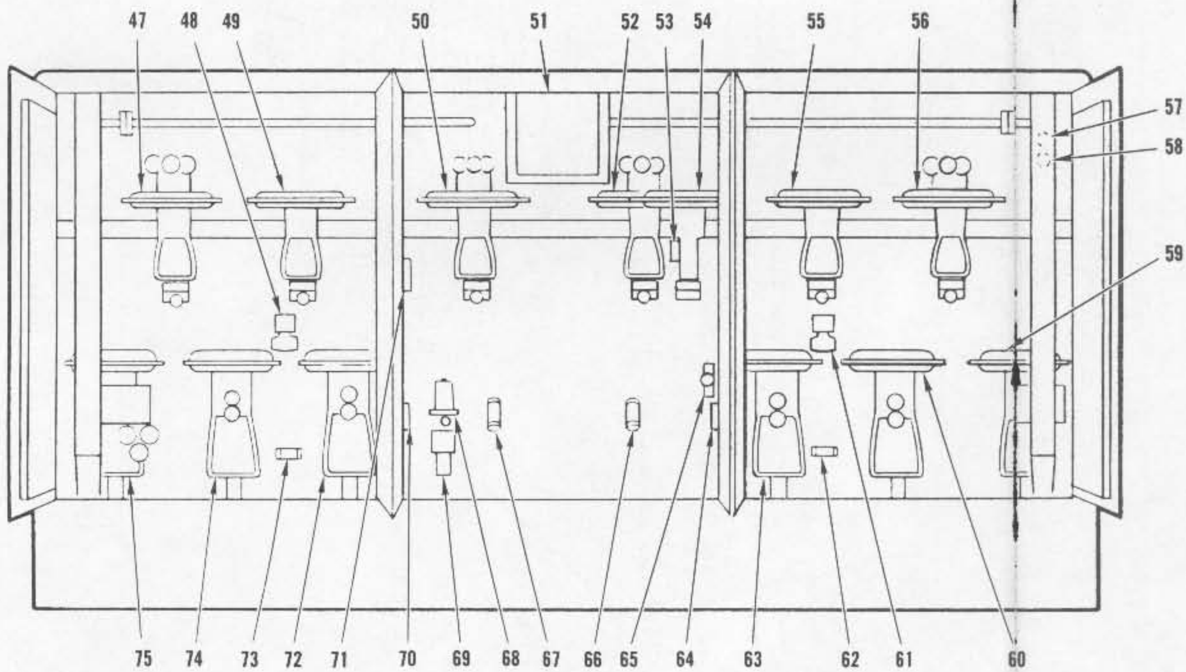
1 CONTROLLER 14
2 DIAPHRAGM VALVE 20
3 CONTROLLER 15
4 DIAPHRAGM VALVE 21
5 CONTROLLER 16
6 DIAPHRAGM VALVE 22
7 REFRIGERATED HELIUM PRESSURE GAGE 42
8 FUEL TANK PRESSURE GAGE 36
9 FUEL TANK EXHAUST MANUAL VALVE 30
10 LOX TANK EXHAUST MANUAL VALVE 29
11 LOX TANK PRESSURE GAGE 35
12 PRIMARY HELIUM SUPPLY GAGE 3
13 CONTROLLER 19
14 CONTROLLER 18
15 CONTROLLER 17
16 DIAPHRAGM VALVE 25
17 DIAPHRAGM VALVE 23
18 DIAPHRAGM VALVE 24
19 SOLENOID SELECTOR VALVE 24A
20 PRESSURE SWITCH 54
21 PRESSURE SWITCH 55
22 SOLENOID VALVE 24
23 PRESSURE SWITCH 53
24 PRESSURE SWITCH 50
25 RELIEF VALVE 31
26 SOLENOID VALVE 23
27 PRESSURE SWITCH 37
28 SOLENOID SELECTOR VALVE 23A
29 SOLENOID VALVE 25
30 PRESSURE SWITCH 26
31 SOLENOID SELECTOR VALVE 25A
32 LOX TANK SUPPLY MANUAL VALVE 27
33 LOX CONTROL MANUAL VALVE 7
34 HELIUM DUMP MANUAL VALVE 43
35 FUEL CONTROL MANUAL VALVE 6
36 FUEL TANK SUPPLY MANUAL VALVE 28
37 SOLENOID SELECTOR VALVE 22A
38 PRESSURE SWITCH 63
39 SOLENOID SELECTOR VALVE 21A
40 PRESSURE SWITCH 51
41 SOLENOID SELECTOR VALVE 20A
42 PRESSURE SWITCH 52
43 RELIEF VALVE 32
44 PRESSURE SWITCH 56
45 PRESSURE SWITCH 64
46 PRESSURE SWITCH 57
47 DIAPHRAGM VALVE 9
48 SOLENOID VALVE 59
49 SOLENOID ACTUATED DIAPHRAGM VALVE 39
50 DIAPHRAGM VALVE 45B
51 CONTROLLER 44
52 DIAPHRAGM VALVE 45A
53 SOLENOID VALVE 58
54 DIAPHRAGM VALVE 65
55 SOLENOID ACTUATED DIAPHRAGM VALVE 38
56 DIAPHRAGM VALVE 8
57 RELIEF VALVE 5
58 RELIEF VALVE 4
59 SOLENOID ACTUATED DIAPHRAGM VALVE 10
60 SOLENOID ACTUATED DIAPHRAGM VALVE 40A
61 SOLENOID VALVE 60
62 RELIEF VALVE 34
63 SOLENOID ACTUATED DIAPHRAGM VALVE 40B
64 SOLENOID VALVE 61
65 MANUAL VALVE 65A
66 CHECK VALVE 12
67 CHECK VALVE 13
68 PRESSURE REGULATOR 47
69 HELIUM FILTERS 1 AND 2
70 SOLENOID VALVE 62
71 PRESSURE GAGE 49
72 SOLENOID ACTUATED DIAPHRAGM VALVE 41B
73 RELIEF VALVE 33
74 SOLENOID ACTUATED DIAPHRAGM VALVE 41A
75 SOLENOID ACTUATED DIAPHRAGM VALVE 11
76 TERMINAL BOARD A
77 TERMINAL BOARD B
78 TERMINAL BOARD C
79 TERMINAL BOARD F
80 TERMINAL BOARD G
81 TERMINAL BOARD H
82 TERMINAL BOARD D
83 TERMINAL BOARD E

Figure 1-48. Pressure System Control



FUEL SECTION CENTER SECTION LIQUID OXYGEN SECTION

FRONT VIEW



REAR VIEW

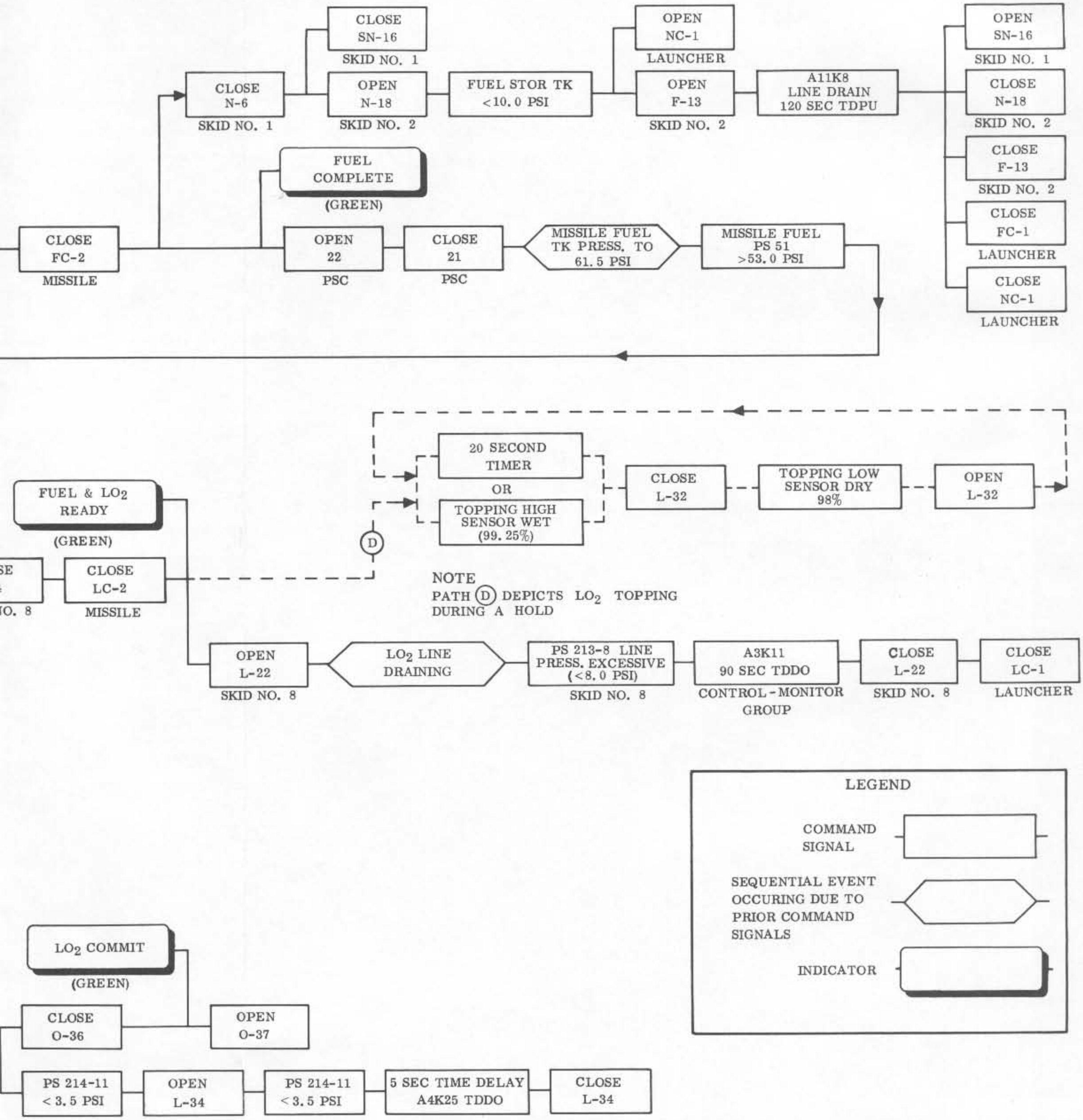
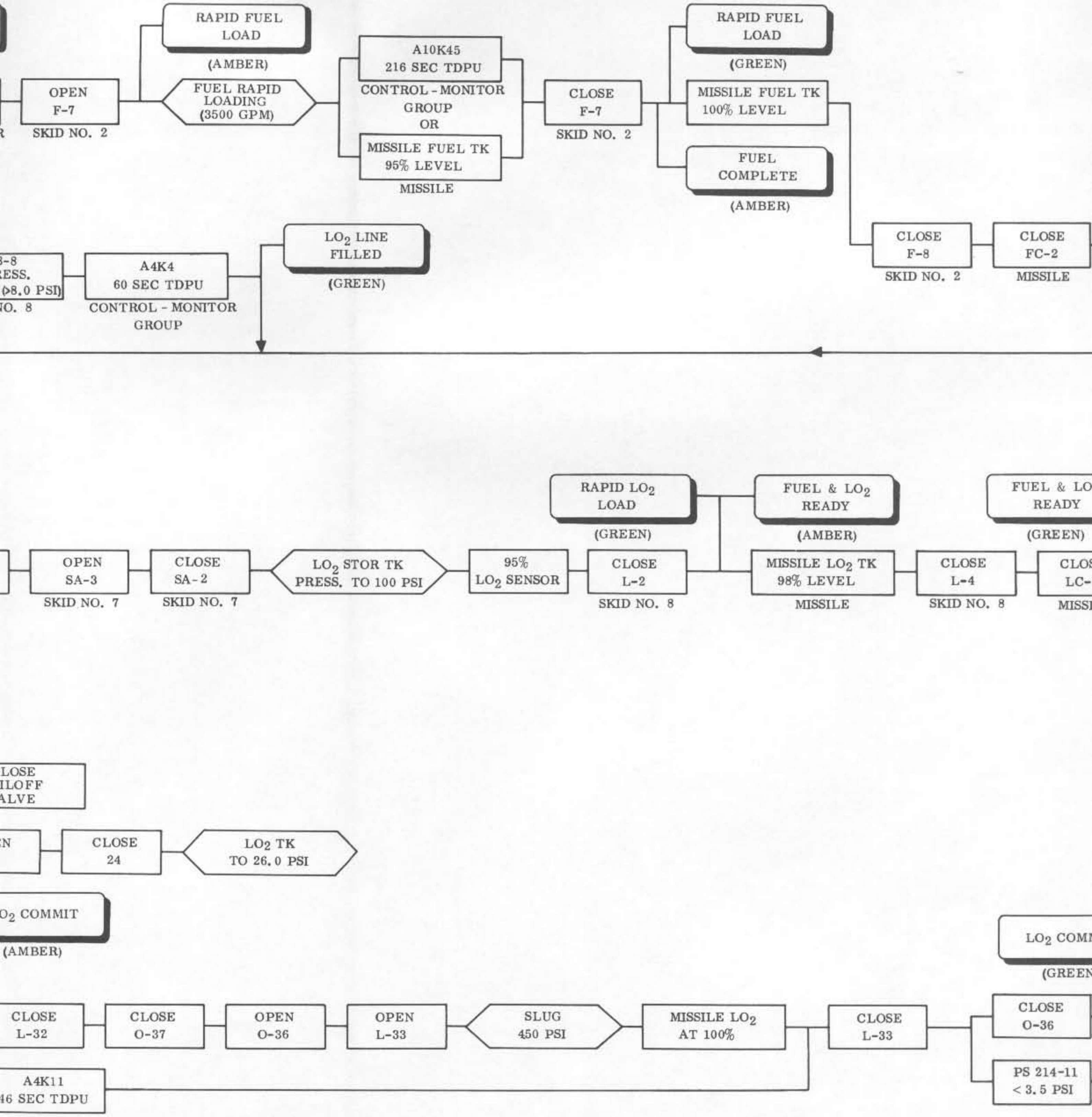
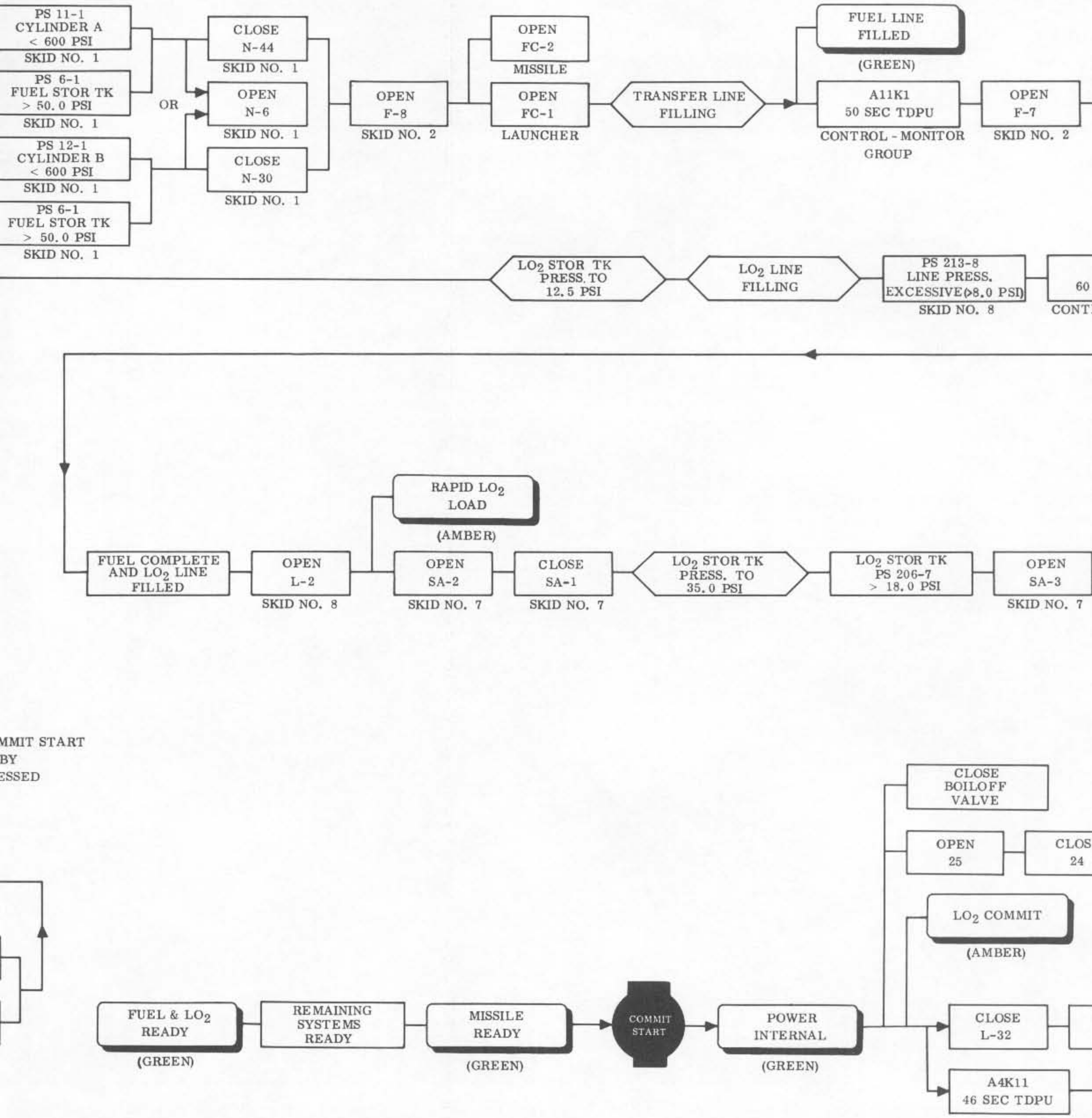
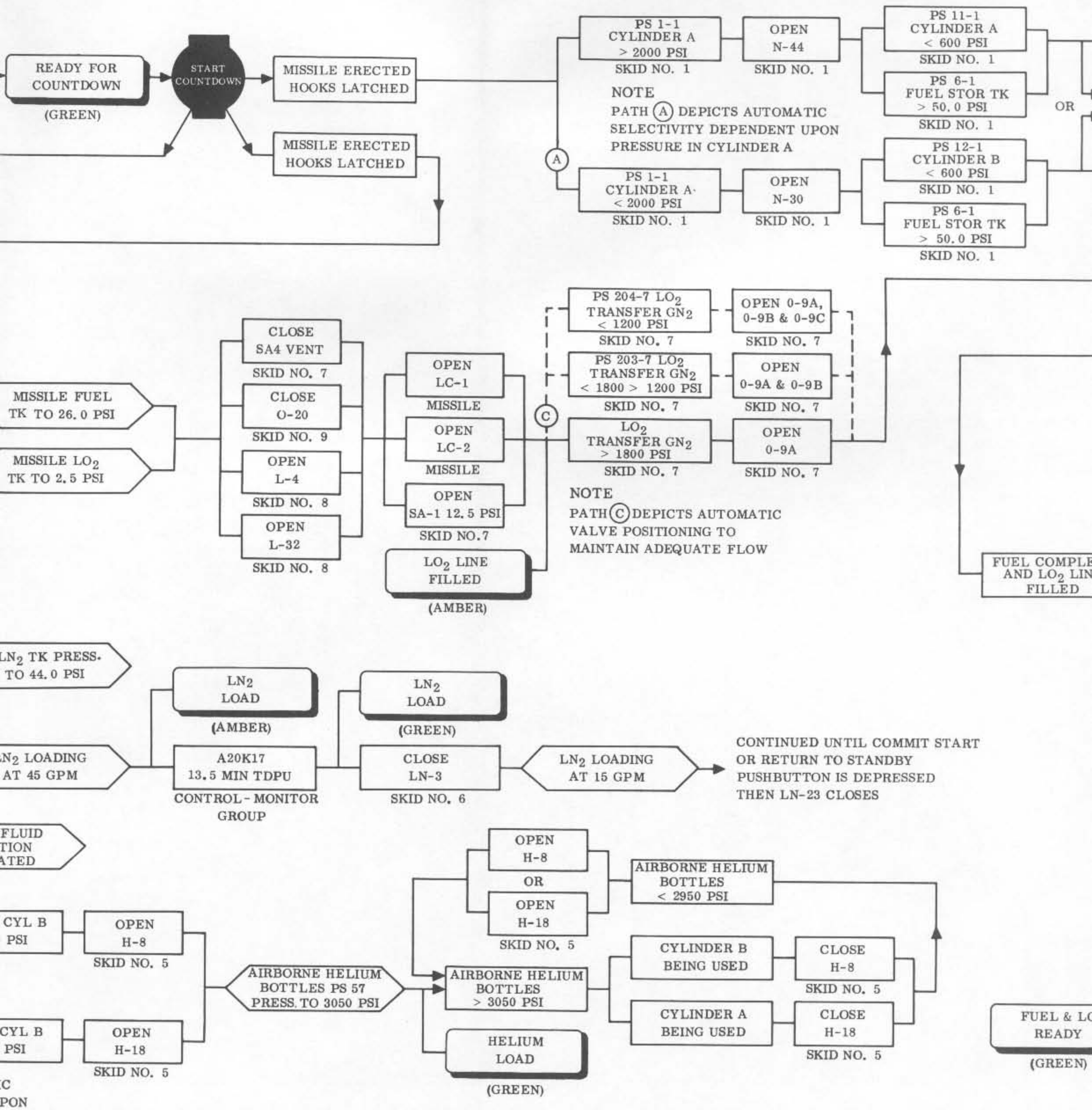


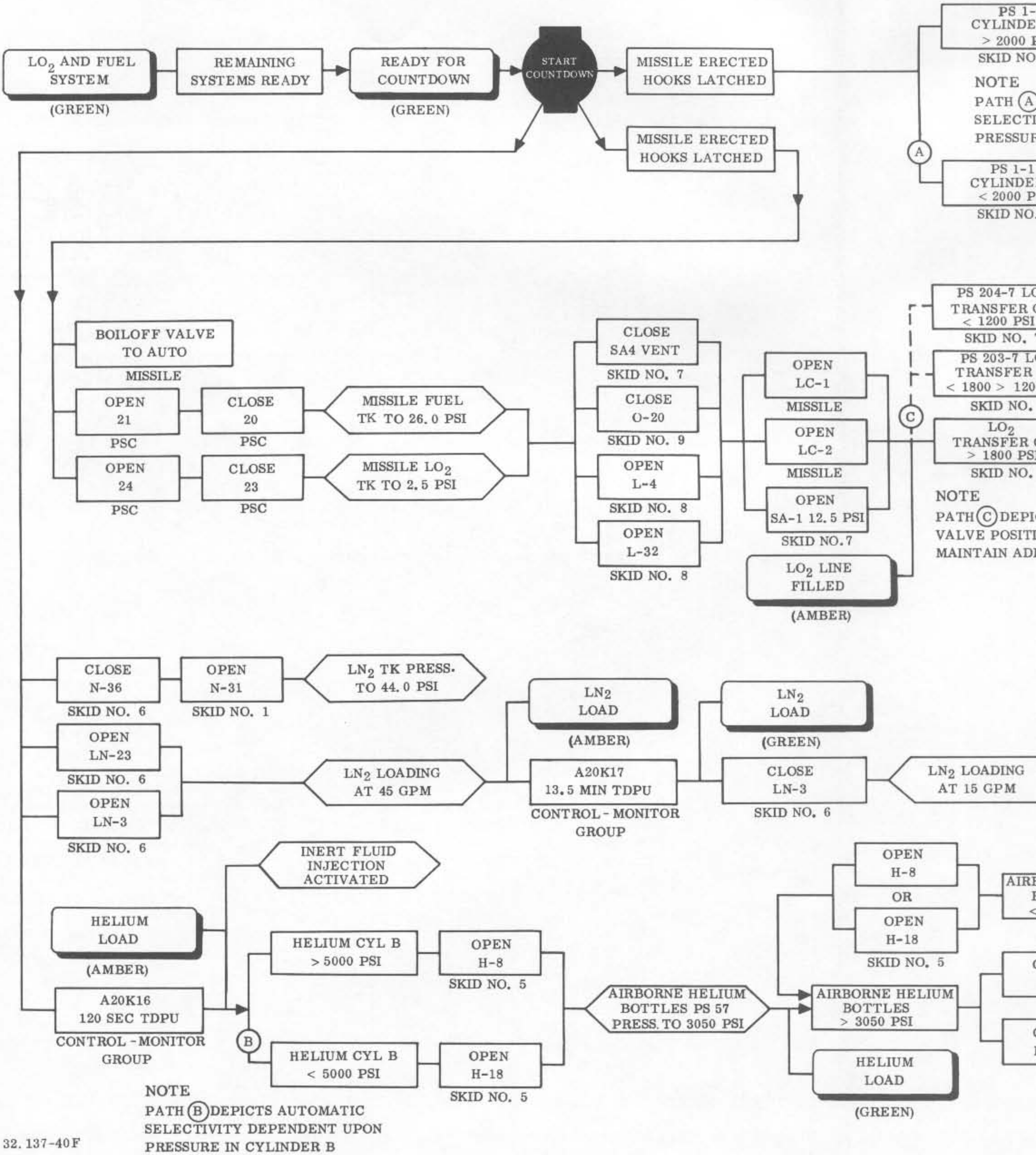
Figure 1-49. Liquid Nitrogen-Helium and Propellant Loading Sequence



RAPID FUEL LOAD
(AMBER)
OPEN F-7
SKID NO. 2
FUEL RAPID LOADING (3500 GPM)
A10K45
216 SEC TDPU
CONTROL - MONITOR GROUP
OR
MISSILE FUEL TK 95% LEVEL
MISSILE
CLOSE F-7
SKID NO. 2
RAPID FUEL LOAD
(GREEN)
MISSILE FUEL TK 100% LEVEL
FUEL COMPLETE
(AMBER)
CLOSE F-8
SKID NO. 2
CLOSE FC-2
MISSILE
A4K4
60 SEC TDPU
CONTROL - MONITOR GROUP
LO2 LINE FILLED
(GREEN)
OPEN SA-3
SKID NO. 7
CLOSE SA-2
SKID NO. 7
LO2 STOR TK PRESS. TO 100 PSI
95% LO2 SENSOR
RAPID LO2 LOAD
(GREEN)
CLOSE L-2
SKID NO. 8
FUEL & LO2 READY
(AMBER)
MISSILE LO2 TK 98% LEVEL
MISSILE
CLOSE L-4
SKID NO. 8
(GREEN)
CLOSE 24
LO2 TK TO 26.0 PSI
(AMBER)
CLOSE L-32
CLOSE O-37
OPEN O-36
OPEN L-33
SLUG 450 PSI
MISSILE LO2 AT 100%
CLOSE L-33
CLOSE O-36
PS 214-11 < 3.5 PSI
A4K11

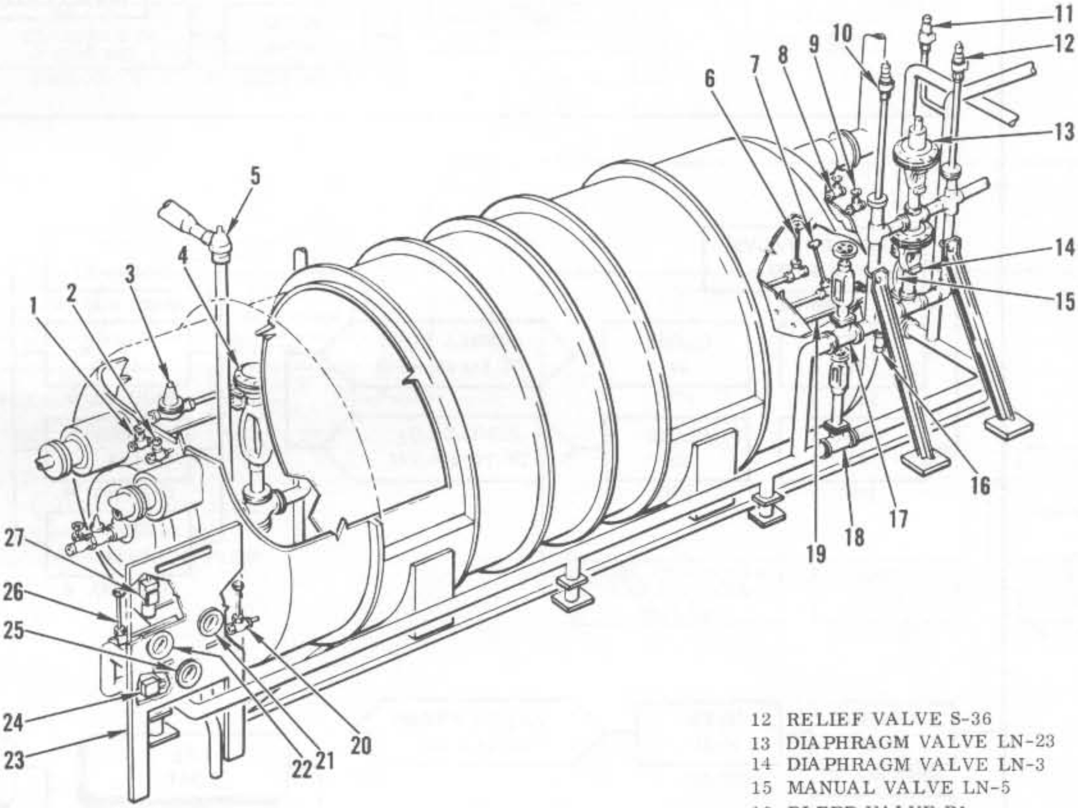

PS 11-1 CYLINDER A < 600 PSI
SKID NO. 1
PS 6-1 FUEL STOR TK > 50.0 PSI
SKID NO. 1
OR
PS 12-1 CYLINDER B < 600 PSI
SKID NO. 1
PS 6-1 FUEL STOR TK > 50.0 PSI
SKID NO. 1
CLOSE N-44
SKID NO. 1
OPEN N-6
SKID NO. 1
CLOSE N-30
SKID NO. 1
OPEN F-8
SKID NO. 2
OPEN FC-2
MISSILE
OPEN FC-1
LAUNCHER
TRANSFER LINE FILLING
FUEL LINE FILLED
(GREEN)
A11K1 50 SEC TDPU
CONTROL - MONITOR GROUP
OPEN F-7
SKID NO. 2
LO_2 STOR TK PRESS. TO 12.5 PSI
LO_2 LINE FILLING
PS 213-8 LINE PRESS. EXCESSIVE(>8.0 PSI)
SKID NO. 8
60
CONT
RAPID LO_2 LOAD
(AMBER)
FUEL COMPLETE AND LO_2 LINE FILLED
OPEN L-2
SKID NO. 8
OPEN SA-2
SKID NO. 7
CLOSE SA-1
SKID NO. 7
LO_2 STOR TK PRESS. TO 35.0 PSI
LO_2 STOR TK PS 206-7 > 18.0 PSI
OPEN SA-3
SKID NO. 7
MMIT START
BY
ESSED
CLOSE BOILOFF VALVE
OPEN 25
CLOS 24
LO_2 COMMIT
(AMBER)
FUEL & LO_2 READY
(GREEN)
REMAINING SYSTEMS READY
MISSILE READY
(GREEN)
COMMIT START
POWER INTERNAL
(GREEN)
CLOSE L-32
A4K11 46 SEC TDPU


READY FOR COUNTDOWN
(GREEN)
START COUNTDOWN
MISSILE ERECTED HOOKS LATCHED
MISSILE ERECTED HOOKS LATCHED
PS 1-1 CYLINDER A > 2000 PSI
SKID NO. 1
OPEN N-44
SKID NO. 1
PS 11-1 CYLINDER A < 600 PSI
SKID NO. 1
PS 6-1 FUEL STOR TK > 50.0 PSI
SKID NO. 1
OR
NOTE
PATH (A) DEPICTS AUTOMATIC SELECTIVITY DEPENDENT UPON PRESSURE IN CYLINDER A
A
PS 1-1 CYLINDER A < 2000 PSI
SKID NO. 1
OPEN N-30
SKID NO. 1
PS 12-1 CYLINDER B < 600 PSI
SKID NO. 1
PS 6-1 FUEL STOR TK > 50.0 PSI
SKID NO. 1
MISSILE FUEL TK TO 26.0 PSI
MISSILE LO2 TK TO 2.5 PSI
CLOSE SA4 VENT
SKID NO. 7
CLOSE O-20
SKID NO. 9
OPEN L-4
SKID NO. 8
OPEN L-32
SKID NO. 8
OPEN LC-1
MISSILE
OPEN LC-2
MISSILE
OPEN SA-1 12.5 PSI
SKID NO.7
LO2 LINE FILLED
(AMBER)
C
PS 204-7 LO2 TRANSFER GN2 < 1200 PSI
SKID NO. 7
OPEN 0-9A, 0-9B & 0-9C
SKID NO. 7
PS 203-7 LO2 TRANSFER GN2 < 1800 > 1200 PSI
SKID NO. 7
OPEN 0-9A & 0-9B
SKID NO. 7
LO2 TRANSFER GN2 > 1800 PSI
SKID NO. 7
OPEN 0-9A
SKID NO. 7
NOTE
PATH (C) DEPICTS AUTOMATIC VALVE POSITIONING TO MAINTAIN ADEQUATE FLOW
FUEL COMPLE AND LO2 LIN FILLED
LN2 TK PRESS. TO 44.0 PSI
LN2 LOADING AT 45 GPM
LN2 LOAD
(AMBER)
A20K17 13.5 MIN TDPU
CONTROL-MONITOR GROUP
LN2 LOAD
(GREEN)
CLOSE LN-3
SKID NO. 6
LN2 LOADING AT 15 GPM
CONTINUED UNTIL COMMIT START OR RETURN TO STANDBY PUSHBUTTON IS DEPRESSED THEN LN-23 CLOSES
FLUID TION ATED
CYL B PSI
OPEN H-8
SKID NO. 5
CYL B PSI
OPEN H-18
SKID NO. 5
C
PON
AIRBORNE HELIUM BOTTLES PS 57 PRESS. TO 3050 PSI
OPEN H-8
OR
OPEN H-18
SKID NO. 5
AIRBORNE HELIUM BOTTLES < 2950 PSI
AIRBORNE HELIUM BOTTLES > 3050 PSI
HELIUM LOAD
(GREEN)
CYLINDER B BEING USED
CLOSE H-8
SKID NO. 5
CYLINDER A BEING USED
CLOSE H-18
SKID NO. 5
FUEL & LC READY
(GREEN)



LO2 AND FUEL SYSTEM
(GREEN)
REMAINING SYSTEMS READY
READY FOR COUNTDOWN
(GREEN)
START COUNTDOWN
MISSILE ERECTED HOOKS LATCHED
MISSILE ERECTED HOOKS LATCHED
NOTE
A
BOILOFF VALVE TO AUTO
MISSILE
OPEN 21
PSC
CLOSE 20
PSC
MISSILE FUEL TK TO 26.0 PSI
OPEN 24
PSC
CLOSE 23
PSC
MISSILE LO2 TK TO 2.5 PSI
CLOSE SA4 VENT
SKID NO. 7
CLOSE O-20
SKID NO. 9
OPEN L-4
SKID NO. 8
OPEN L-32
SKID NO. 8
OPEN LC-1
MISSILE
OPEN LC-2
MISSILE
OPEN SA-1 12.5 PSI
SKID NO. 7
LO2 LINE FILLED
(AMBER)
C
NOTE
CLOSE N-36
SKID NO. 6
OPEN N-31
SKID NO. 1
LN2 TK PRESS. TO 44.0 PSI
OPEN LN-23
SKID NO. 6
OPEN LN-3
SKID NO. 6
LN2 LOADING AT 45 GPM
LN2 LOAD
(AMBER)
A20K17 13.5 MIN TDPU
CONTROL-MONITOR GROUP
LN2 LOAD
(GREEN)
CLOSE LN-3
SKID NO. 6
LN2 LOADING AT 15 GPM
INERT FLUID INJECTION ACTIVATED
HELIUM LOAD
(AMBER)
A20K16 120 SEC TDPU
CONTROL-MONITOR GROUP
B
HELIUM CYL B > 5000 PSI
OPEN H-8
SKID NO. 5
HELIUM CYL B < 5000 PSI
OPEN H-18
SKID NO. 5
AIRBORNE HELIUM BOTTLES PS 57 PRESS. TO 3050 PSI
OPEN H-8
OR
OPEN H-18
SKID NO. 5
AIRBORNE HELIUM BOTTLES > 3050 PSI
HELIUM LOAD
(GREEN)
NOTE
PATH B DEPICTS AUTOMATIC SELECTIVITY DEPENDENT UPON PRESSURE IN CYLINDER B

32. 137-40F



1 MANUAL VALVE LN-22
2 MANUAL VALVE LN-21
3 PRESSURE REGULATOR PR-104-6
4 DIAPHRAGM VALVE N-36
5 RELIEF VALVE S-22
6 MANUAL VALVE LN-9
7 MANUAL VALVE LN-10
8 SENSING LINE VALVE LN-19
9 SENSING LINE VALVE LN-20
10 RELIEF VALVE S-24
11 RELIEF VALVE S-25
12 RELIEF VALVE S-36
13 DIAPHRAGM VALVE LN-23
14 DIAPHRAGM VALVE LN-3
15 MANUAL VALVE LN-5
16 BLEED VALVE B1
17 MANUAL VALVE LN-4
18 MANUAL VALVE LN-1
19 MANUAL VALVE LN-11
20 MANUAL VALVE LN-12
21 LIQUID LEVEL INDICATOR LL1-101-6
22 LIQUID LEVEL INDICATOR LL1-102-6
23 LIQUID NITROGEN STORAGE PANEL
24 PRESSURE SWITCH PS-103-6
25 PRESSURE INDICATOR PI-103-6
26 MANUAL VALVE LN-13
27 PRESSURE TRANSMITTER PT-103-6

32.137-64

Figure 1-50. Liquid Nitrogen-Helium Heat Exchanger Skid (NO. 6)

1-156. Selection and regulation of inflight helium for delivery to the missile helium bottles is accomplished automatically as a part of the countdown sequence. Helium loading is started a short time after countdown is initiated. Helium, under reduced pressure, is routed through control valves to the liquid nitrogen-helium heat exchanger where it is subcooled and passed through the launcher heat exchanger to the missile storage bottles. Automatic venting is controlled by the PSC. During a tactical or training launch, when helium loading starts, ambient helium is also bypassed from the liquid nitrogen-helium heat exchanger and routed to the inert fluid injection accumulators where it fills the dry side of the accumulators, forcing the inert fluid into the two booster engine fuel chambers.

1-156A. During a DPL, gaseous helium at ambient temperature, rather than refrigerated gaseous helium, is loaded aboard the airborne helium bottles. The TRAINING DPL CONVERSION SWITCH on the propellant loading terminal cabinet controls whether ambient-temperature or refrigerated helium will be loaded. Positioning the switch to TRAINING enables the liquid nitrogen-helium loading system to load ambient-temperature helium in a DPL countdown by accomplishing the following:

a. Positions valves to bypass helium around liquid nitrogen-helium heat exchanger, so that helium will be loaded at ambient temperature during countdown.

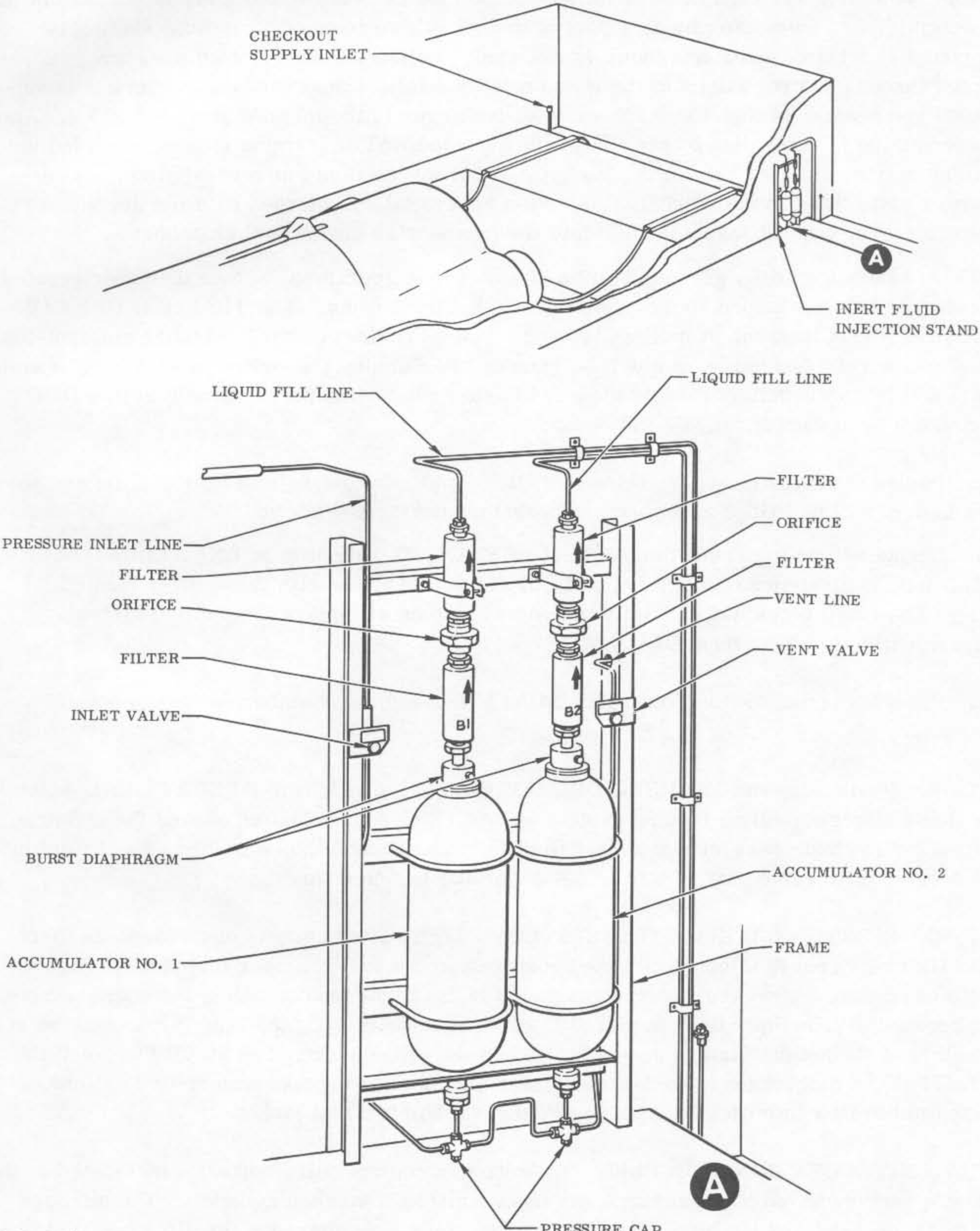
b. Changes logic to permit the SYSTEM IN STANDBY indicator on LN_2 HELIUM TANKING panel, control-monitor group 1 of 4, to illuminate green with valve LN-4 closed. (Valve LN-4 will be closed manually to prevent loading of liquid nitrogen into airborne helium bottle shrouds during DPL.)

c. Provides signal to illuminate TRAINING MODE indicator amber on launch control console.

1-156B. Positioning the TRAINING DPL CONVERSION SWITCH to OPERATIONAL enables the liquid nitrogen-helium loading system to load refrigerated helium aboard the airborne helium bottles and pressurize the inert fluid injection accumulators to inject inert fluid into the booster engines as part of a training or tactical launch countdown.

1-156C. INERT FLUID INJECTION SYSTEM. Shortly after start of countdown, an inert fluid (Lidyne Zero) is injected into the booster engine thrust chamber fuel jackets (figure 1-46) to minimize a pressure surge generated in the flame bucket during the engine starting sequence. The inert fluid is stored in two accumulators (figure 1-50A) pressurized at the start of the helium loading sequence. When the pressure reaches 300.0 PSI (40.0 PSI at OSTF-1), a diaphragm in each accumulator bursts allowing approximately 3 gallons of inert fluid to flow into each booster engine thrust chamber fuel jacket.

1-157. NITROGEN CONTROL UNIT. The nitrogen control unit (figure 1-51), located in the missile bay, receives high pressure gas from a nitrogen storage cylinder. The nitrogen control unit regulates the high pressure gas for various maintenance functions and distributes it to the hydraulic pumping unit (HPU), erection hydraulic power unit, and the propulsion control box.



32.137-105A

Figure 1-50A. Inert Fluid Injection Stand progress, sufficient propellants to accomplish a complete mission, and adequate transfer line and storage tank blanket pressures. The propellant supply patch on the launch control console indicates the status of propellant supplies.

1-161. Propellant transfer is accomplished by the sequential opening of automatic valves in the transfer lines and pressurization of the propellant storage tanks to force the fuel and liquid oxygen through transfer lines and valves into the missile tanks. (See figure 1-49.) Propellant transfer is initiated during countdown when the BOOM CLEAR indicator on the launch control console illuminates green. The relay logic then monitors the transfer by actuating the subsystem valves and relays in a logical sequence.

1-162. When fuel loading (figure 1-53) is initiated, a relatively small charge of nitrogen gas is introduced into the fuel storage tank ullage space. The fuel storage tank is then pressurized to transfer pressure and the fine load valve is opened, allowing fuel to flow slowly into the missile fuel tank. This is followed by rapid loading, then slow final-fill to cutoff.

1-163. Nitrogen gas used for fuel transfer is controlled and monitored at skid NO. 1 (figure 1-54) located adjacent to the fuel room in the LSB. Fuel transfer is controlled and monitored at skid NO. 2 (figure 1-55).

1-164. Transfer of liquid oxygen (figure 1-56) is initiated at the same time as fuel transfer. Automatic control allows the liquid oxygen storage tank to be pressurized just enough to

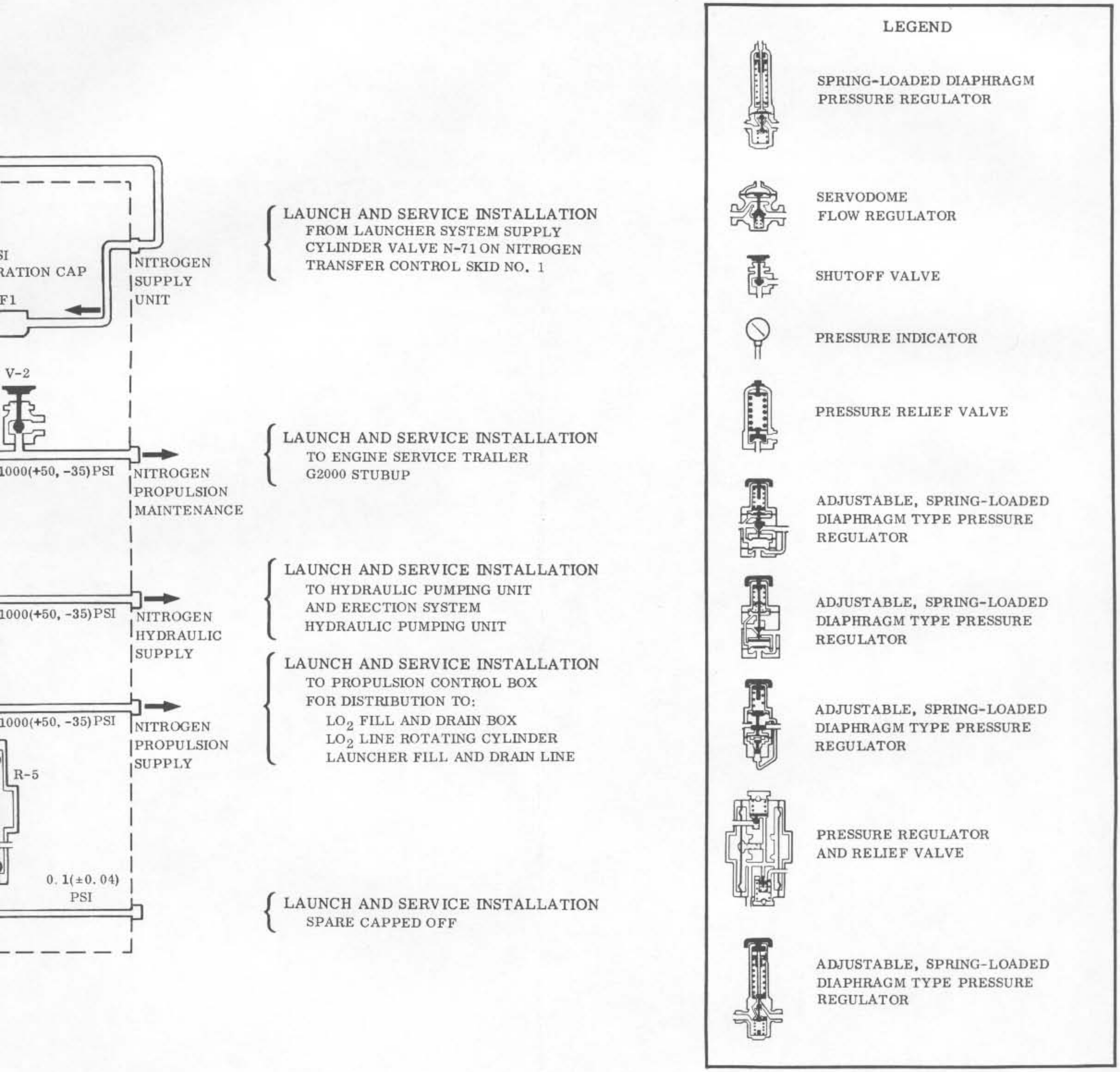
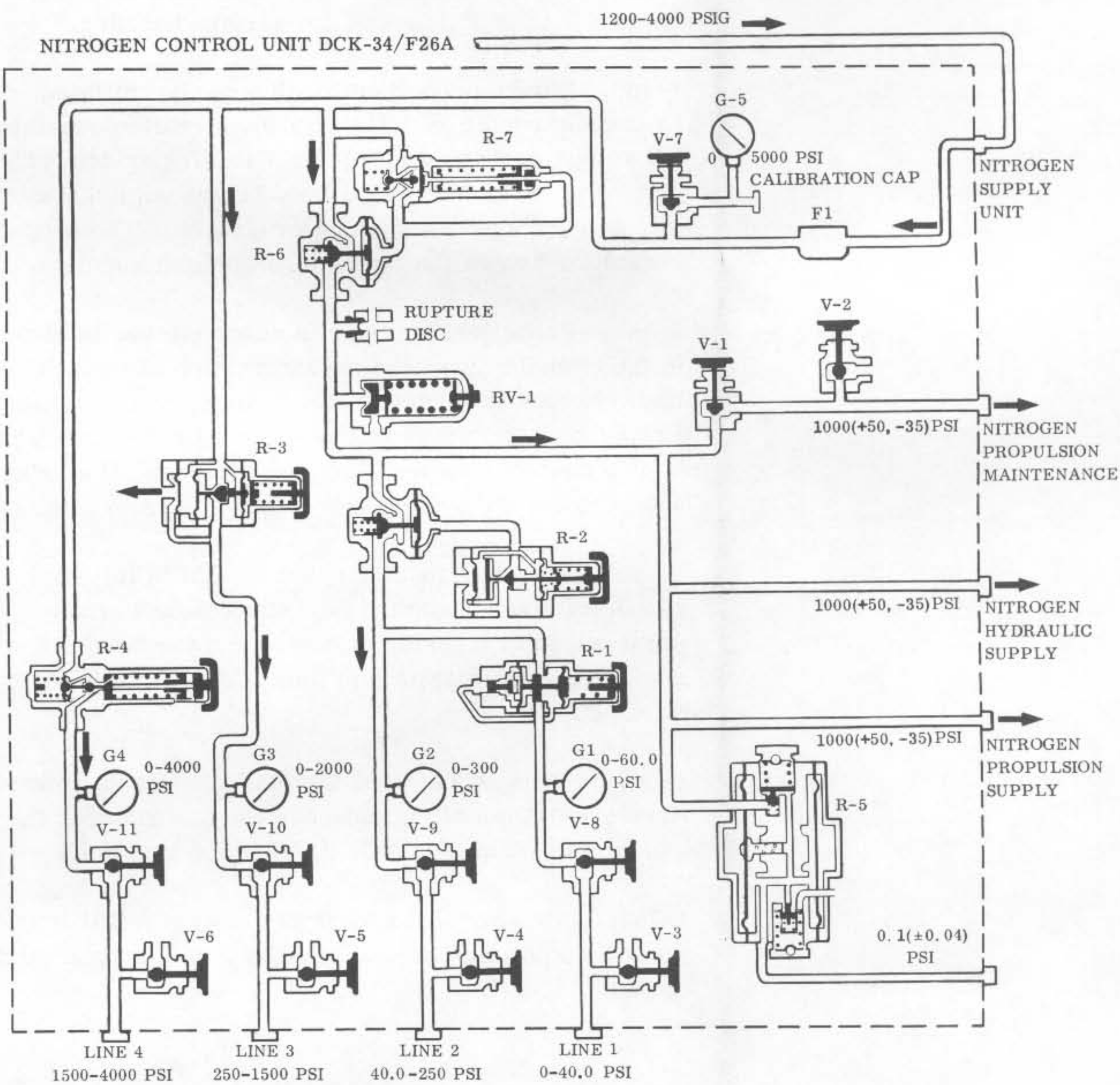


Figure 1-51. Nitrogen Control Unit Piping Diagram



NITROGEN CONTROL UNIT DCK-34/F26A
1200-4000 PSIG
G-5
V-7
0
5000 PSI
CALIBRATION CAP
R-7
R-6
F1
NITROGEN
SUPPLY
UNIT
RUPTURE
DISC
V-2
V-1
RV-1
1000(+50, -35)PSI
NITROGEN
PROPULSION
MAINTENANCE
R-3
R-2
1000(+50, -35)PSI
NITROGEN
HYDRAULIC
SUPPLY
R-4
R-1
1000(+50, -35)PSI
NITROGEN
PROPULSION
SUPPLY
G4
0-4000
PSI
G3
0-2000
PSI
G2
0-300
PSI
G1
0-60.0
PSI
R-5
V-11
V-10
V-9
V-8
V-6
V-5
V-4
V-3
0.1(±0.04)
PSI
LINE 4
1500-4000 PSI
LINE 3
250-1500 PSI
LINE 2
40.0-250 PSI
LINE 1
0-40.0 PSI

32.137-24B

1-158. PROPELLANT LOADING SYSTEM.

1-159. The propellant loading system stores and delivers propellants to the missile within the allotted time during countdown. The system consists of two subsystems, fuel and liquid oxygen. The liquid oxygen storage tank (figure 1-52) and the fuel storage tank are located outside the launch and service building.

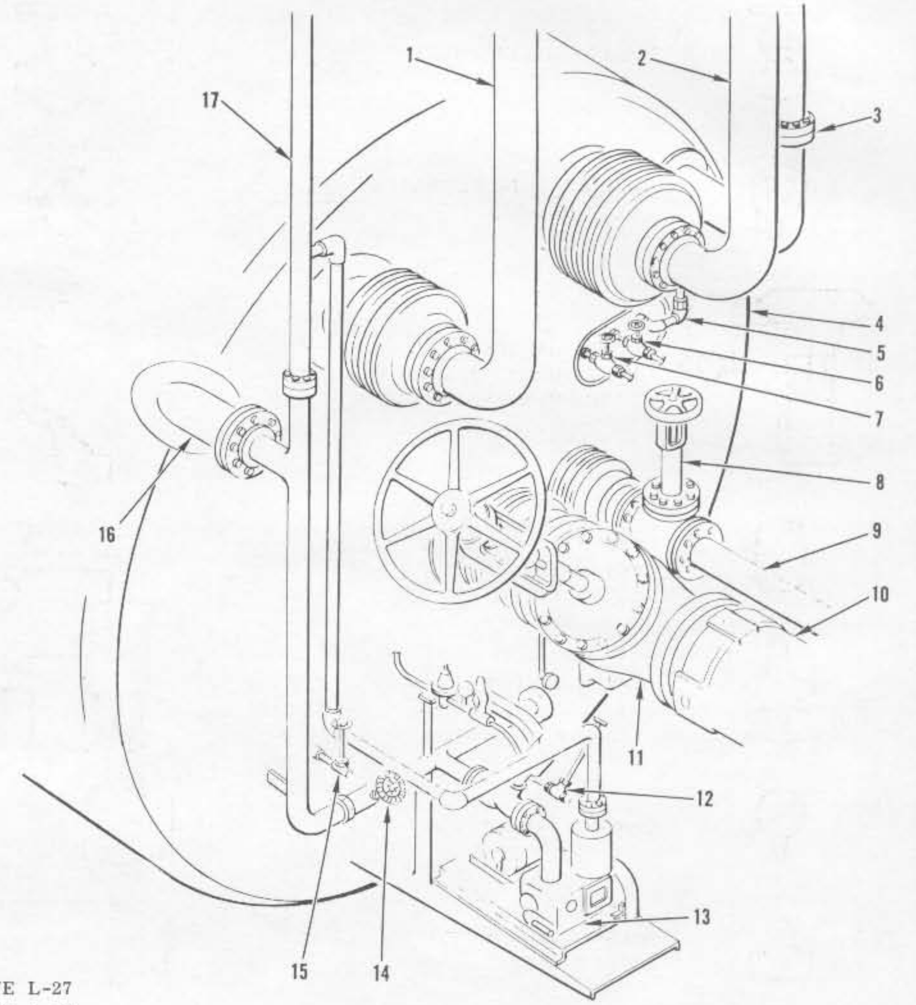
1-160. Before propellant loading can be initiated, the propellant transfer systems must be in standby condition. The standby condition consists of a missile on the launch platform, fill valves connected, propellant loading system valves in correct positions, drain not in progress, sufficient propellants to accomplish a complete mission, and adequate transfer line and storage tank blanket pressures. The propellant supply patch on the launch control console indicates the status of propellant supplies.

1-161. Propellant transfer is accomplished by the sequential opening of automatic valves in the transfer lines and pressurization of the propellant storage tanks to force the fuel and liquid oxygen through transfer lines and valves into the missile tanks. (See figure 1-49.) Propellant transfer is initiated during countdown when the BOOM CLEAR indicator on the launch control console illuminates green. The relay logic then monitors the transfer by actuating the subsystem valves and relays in a logical sequence.

1-162. When fuel loading (figure 1-53) is initiated, a relatively small charge of nitrogen gas is introduced into the fuel storage tank ullage space. The fuel storage tank is then pressurized to transfer pressure and the fine load valve is opened, allowing fuel to flow slowly into the missile fuel tank. This is followed by rapid loading, then slow final-fill to cutoff.

1-163. Nitrogen gas used for fuel transfer is controlled and monitored at skid NO. 1 (figure 1-54) located adjacent to the fuel room in the LSB. Fuel transfer is controlled and and monitored at skid NO. 2. (See figure 1-55.)

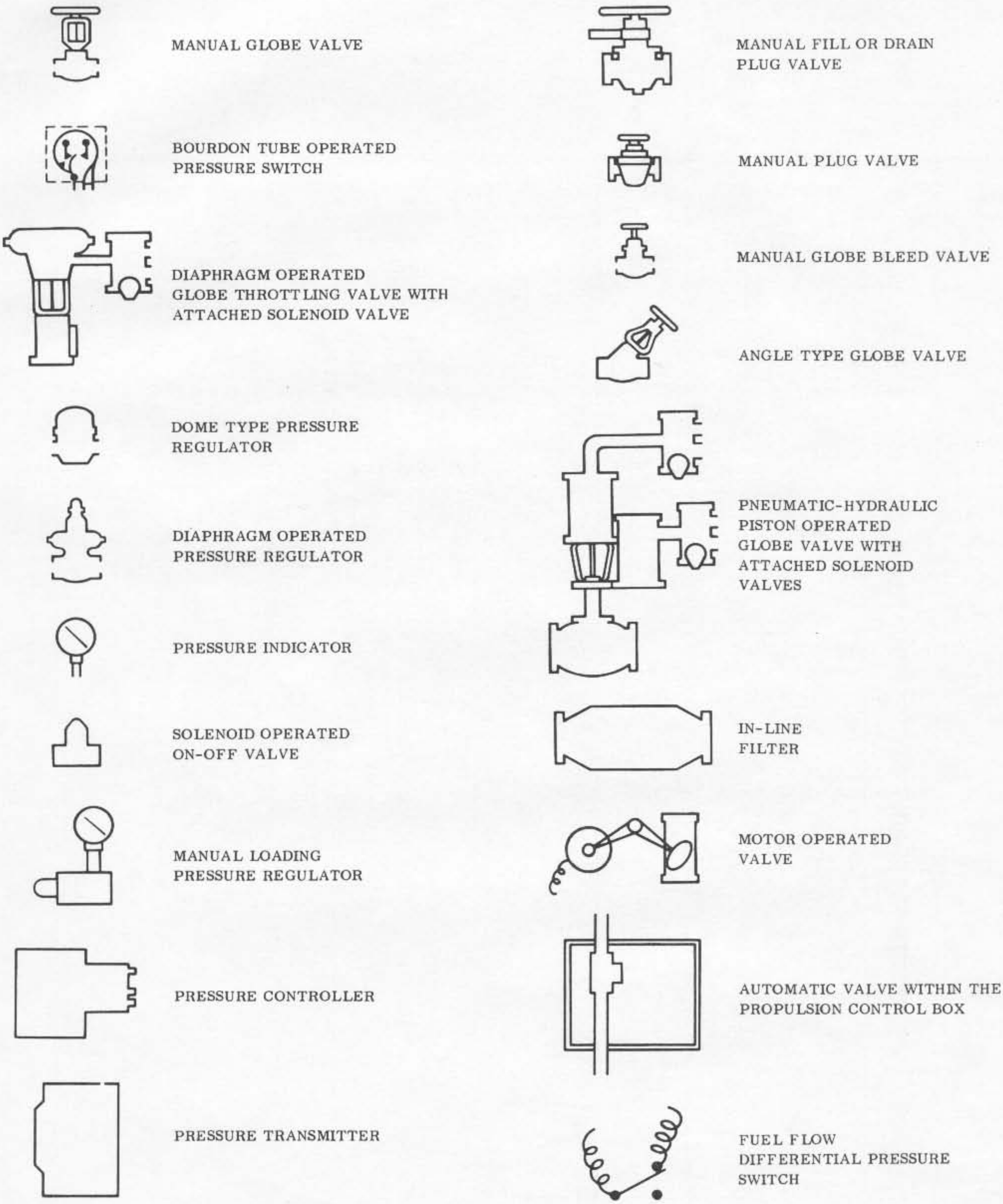
1-164. Transfer of liquid oxygen (figure 1-56) is initiated at the same time as fuel transfer. Automatic control allows the liquid oxygen storage tank to be pressurized just enough to



1 TANK VENT
2 TANK PRESSURE LINE
3 RUPTURE DISK RD-1
4 TANK
5 VACUUM LINE SENSOR CONNECTION
6 LOW PRESSURE SENSOR VALVE L-27
7 HIGH PRESSURE SENSOR VALVE L-26
8 LIQUID OXYGEN SUPPLY STOP VALVE L-1
9 MAIN TANK FILL LINE
10 MAIN TANK OUTLET
11 STORAGE TANK TRANSFER LINE STOP VALVE L-28
12 STORAGE TANK EMPTY LEVEL VALVE L-21
13 VACUUM PUMP
14 MANUAL SHUTOFF VALVE V-2
15 STORAGE TANK FULL LEVEL VALVE L-20
16 VACUUM LINE
17 VACUUM VENT

32.137-15

Figure 1-52. Liquid Oxygen Storage Tank (Typical)



32.137-35.1

Figure 1-53. Fuel Loading System (Sheet 1 of 2)

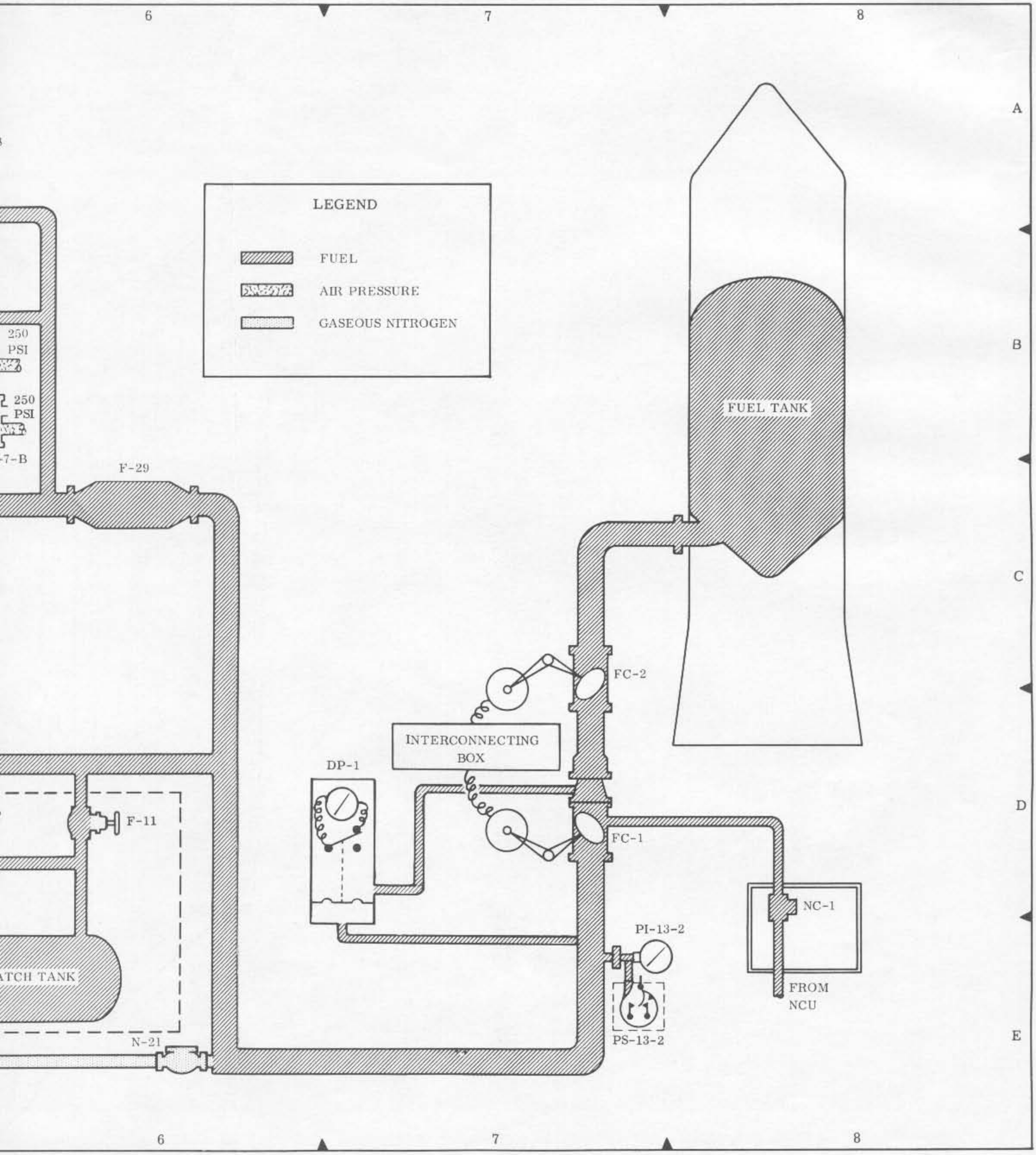
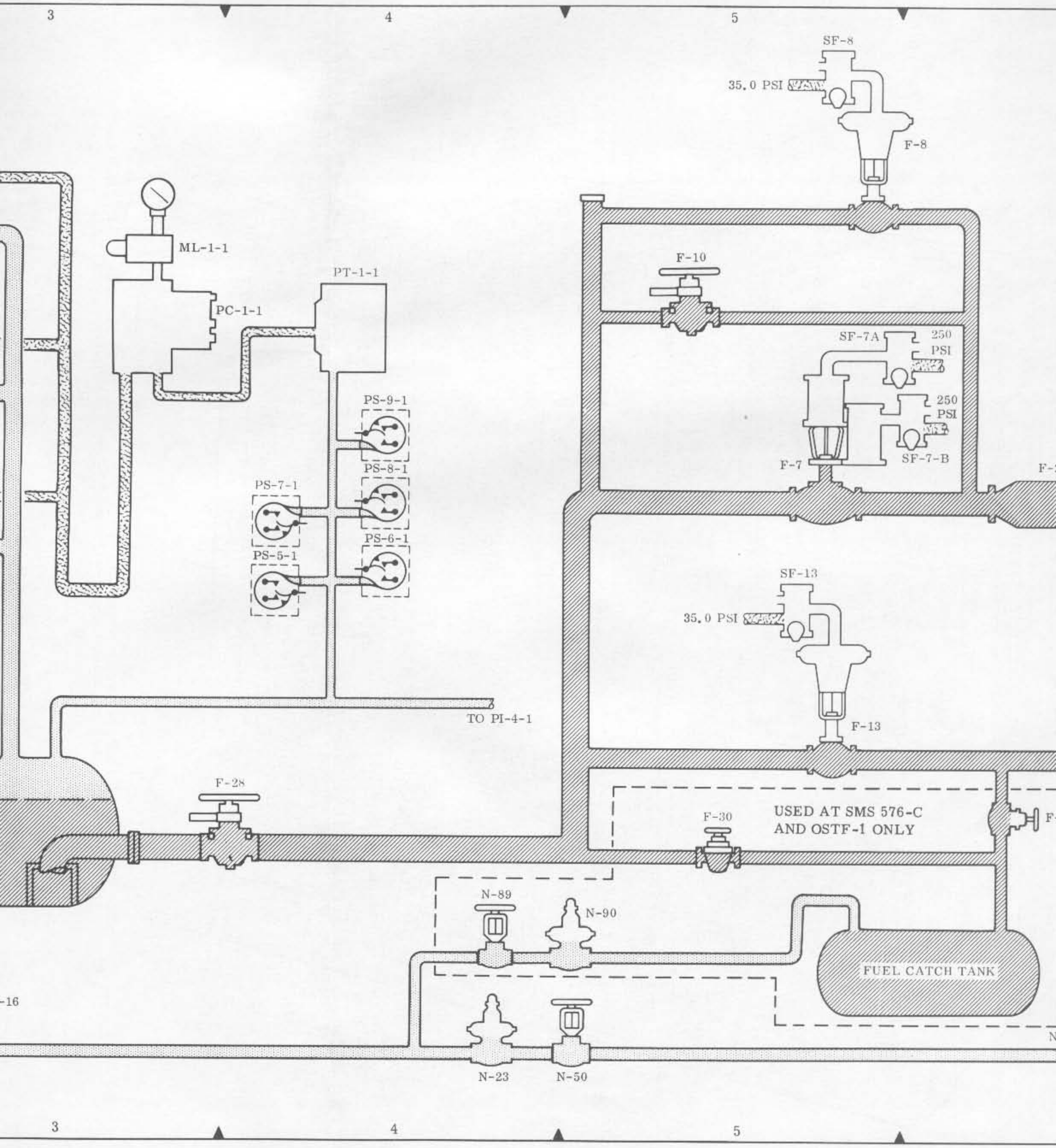
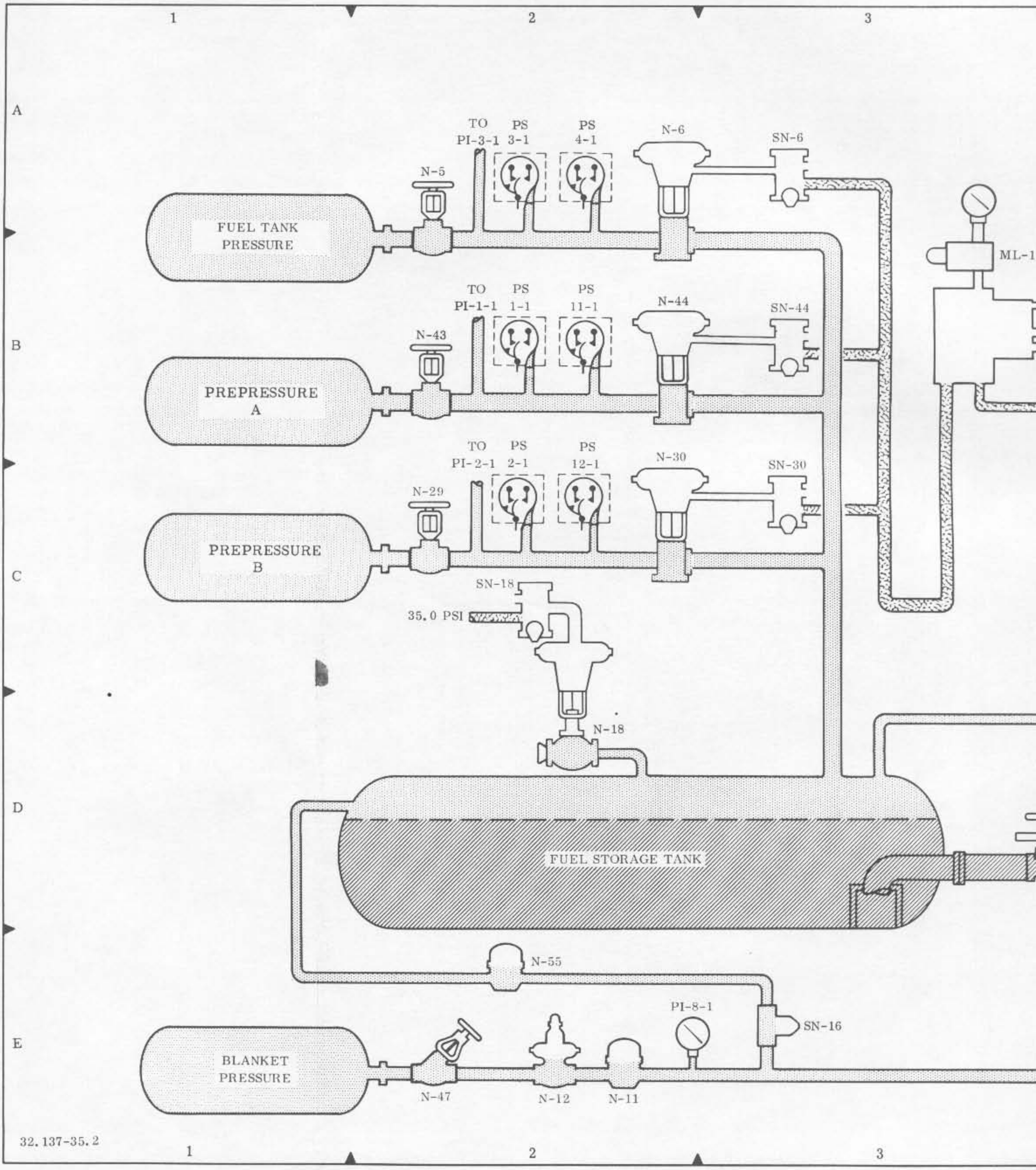


Figure 1-53. Fuel Loading System (Sheet 2 of 2)


3
4
5
SF-8
35.0 PSI
F-8
ML-1-1
PC-1-1
PT-1-1
F-10
SF-7A
250 PSI
250 PSI
F-7
SF-7-B
PS-9-1
PS-8-1
PS-7-1
PS-6-1
PS-5-1
SF-13
35.0 PSI
F-13
TO PI-4-1
F-28
F-30
USED AT SMS 576-C
AND OSTF-1 ONLY
N-89
N-90
FUEL CATCH TANK
N-23
N-50
3
4
5

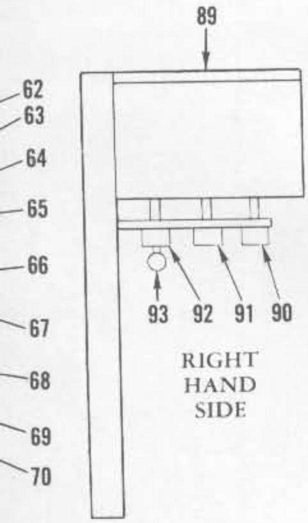


1
2
3
A
B
C
D
E
TO PI-3-1
PS 3-1
PS 4-1
N-6
SN-6
N-5
FUEL TANK PRESSURE
ML-1
TO PI-1-1
PS 1-1
PS 11-1
N-44
SN-44
N-43
PREPRESSURE A
TO PI-2-1
PS 2-1
PS 12-1
N-30
SN-30
N-29
PREPRESSURE B
SN-18
35.0 PSI
N-18
FUEL STORAGE TANK
N-55
PI-8-1
SN-16
BLANKET PRESSURE
N-47
N-12
N-11

32.137-35.2

49 MANUAL VENT VALVE N-66, NITROGEN CONTROL UNIT
50 PRESSURE REGULATOR N-23, FUEL LINE BLANKET SUPPLY
51 NITROGEN GAS TO LN_2/He HEAT EXCHANGER
52 NITROGEN GAS TO FUEL STORAGE TANK
53 NITROGEN GAS TO NITROGEN CONTROL UNIT
54 NITROGEN GAS FROM PRESSURIZATION CYLINDER
55 PRESSURE REGULATOR PR-3-1, 250 PSI VALVE AIR
56 PRESSURE REGULATOR PR-1-1, 20.0 PSI INSTRUMENT AIR
57 PRESSURE REGULATOR PR-2-1, 35.0 PSI VALVE AIR
58 PRESSURE INDICATOR PI-14-1, 300 PSI SUPPLY AIR
59 PRESSURE INDICATOR PI-17-1, 250 PSI VALVE AIR
60 PRESSURE INDICATOR PI-15-1, 35.0 PSI VALVE AIR
61 PRESSURE INDICATOR PI-16-1, 20.0 PSI INSTRUMENT AIR
62 PRESSURE INDICATOR PI-151-1, (REF) Y-4 NITROGEN STORAGE
63 PRESSURE INDICATOR PI-1-1, FUEL PREPRESSURIZATION A STORAGE
64 PRESSURE INDICATOR PI-2-1, FUEL PREPRESSURIZATION B STORAGE
65 PRESSURE INDICATOR PI-3-1, FUEL PRESSURIZATION STORAGE
66 PRESSURE INDICATOR PI-9-1, FUEL STORAGE TANK
67 MANUAL LOADER ML-1-1, FUEL TRANSFER PRESSURE SET POINT
68 PRESSURE INDICATOR PI-19-1, CONTROL VALVE BOOSTER PRESSURE
69 PRESSURE CONTROLLER PC-1-1, FUEL STORAGE TANK
70 PRESSURE CONTROLLER, 106-1, LIQUID NITROGEN STORAGE TANK (REF)
71 PRESSURE SWITCH PS-4-1, PRESSURIZATION CYLINDER PRESSURE FOR ONE LOAD
72 PRESSURE SWITCH PS-3-1, PRESSURIZATION CYLINDER PRESSURE FOR TWO LOADS
73 PRESSURE SWITCH PS-12-1, PREPRESSURIZATION CYLINDER B PRESSURE NOT LOW
74 PRESSURE SWITCH PS-2-1, PREPRESSURIZATION CYLINDER B PRESSURE CORRECT
75 PRESSURE SWITCH PS-11-1, PREPRESSURIZATION CYLINDER A NOT LOW
76 PRESSURE SWITCH PS-1-1, PREPRESSURIZATION CYLINDER A PRESSURE CORRECT
77 PRESSURE SWITCH PS-102-1, LIQUID NITROGEN PRESSURIZATION CYLINDER PRESSURE CORRECT ONE LOAD (REF)
78 PRESSURE SWITCH PS-101-1, LIQUID NITROGEN PRESSURIZATION CYLINDER PRESSURE CORRECT TWO LOADS (REF)
79 PRESSURE SWITCH PS-7-1, FUEL STORAGE TANK TRANSFER PRESSURE
80 PRESSURE SWITCH PS-8-1 FUEL STORAGE TANK PRESSURE NOT EXCESSIVE
81 PRESSURE TRANSMITTER PT-1-1
82 MANUAL LOADER ML-2-1, RESET PRESSURE SET POINT
83 PRESSURE INDICATOR PI-127-1 (REF)
84 MANUAL LOADER ML-106-1, LN_2TRANSFER PRESSURE SET POINT (REF)
85 PRESSURE INDICATOR PI-12-1, FUEL LINE BLANKET SUPPLY
86 PRESSURE INDICATOR PI-11-1, FUEL TANK BLANKET SUPPLY
87 PRESSURE INDICATOR PI-101-1, LN_2 PRESSURE STORAGE (REF)
88 PRESSURE INDICATOR PI-6-1, BLANKET NITROGEN STORAGE
89 JUNCTION BOX JB-1
90 PRESSURE SWITCH PS-6-1, FUEL STORAGE TANK PRESSURE ABOVE INTERMEDIATE
91 PRESSURE SWITCH PS-5-1, FUEL STORAGE TANK PRESSURE LOW
92 PRESSURE SWITCH PS-9-1, FUEL STORAGE TANK BLANKET PRESSURE
93 GAGE SAVER GS-9-1

Figure 1-54. Nitrogen Transfer Valve Skid (NO. 1)



1 STRAINER N-24, BLANKET NITROGEN PRESSURE
2 MANUAL SHUTOFF VALVE N-47, BLANKET NITROGEN PRESSURE
3 REGULATOR N-11, FIRST STAGE BLANKET PRESSURE
4 PRESSURE RELIEF VALVE S-12
5 CONTROL VALVE N-6, FUEL STORAGE TANK PRESSURIZATION
6 REGULATOR N-12, SECOND-STAGE BLANKET PRESSURE
7 NITROGEN GAS FROM FUEL TANK PRESSURIZATION CYLINDER
8 MANUAL SHUTOFF VALVE N-5, FUEL STORAGE TANK PRESSURIZATION
9 GAGE PI-8-1
10 NITROGEN GAS FROM PRESSURIZATION CYLINDER A
11 MANUAL SHUTOFF VALVE N-43, FUEL PREPRESSURIZATION CYLINDER A
12 STRAINER N-19, NITROGEN PREPRESSURIZATION A
13 NITROGEN GAS FROM PRESSURIZATION CYLINDER B
14 MANUAL SHUTOFF VALVE N-29, FUEL PREPRESSURIZATION CYLINDER B
15 NITROGEN GAS FROM FUEL TANK BLANKET PRESSURE CYLINDER
16 FROM LIQUID NITROGEN TRANSFER PRESSURE CYLINDER
17 STRAINER N-20, NITROGEN PREPRESSURIZATION B
18 PRESSURE RELIEF VALVE S-3
19 PRESSURE RELIEF VALVE S-37
20 PRESSURE RELIEF VALVE S-23
21 PRESSURE RELIEF VALVE S-38
22 PRESSURE RELIEF VALVE S-39
23 PRESSURE RELIEF VALVE S-40
24 MANUAL SHUTOFF VALVE N-27, LIQUID NITROGEN PRESSURIZATION CYLINDER
25 PRESSURE REGULATOR PR-3-1, FILTERED AIR SUPPLY
26 PRESSURE REGULATOR PR-1-1, FILTERED AIR SUPPLY
27 PRESSURE REGULATOR PR-2-1, FILTERED AIR SUPPLY
28 MANUAL RECHARGE SHUTOFF VALVE N-4, BLANKET PRESSURE
29 AUTOMATIC VALVE N-31, LIQUID NITROGEN STORAGE TANK PRESSURIZATION
30 MANUAL RECHARGE SHUTOFF VALVE N-26, LIQUID NITROGEN PRESSURIZATION
31 2400-PSI NITROGEN GAS FROM PRESSURIZATION CYLINDER
32 4400-PSI NITROGEN GAS FROM PRESSURIZATION CYLINDER
33 PRESSURE RELIEF VALVE S-62
34 MANUAL RECHARGE SHUTOFF VALVE, FUEL PREPRESSURIZATION B
35 MANUAL RECHARGE SHUTOFF VALVE N-42, FUEL PREPRESSURIZATION A
36 MANUAL RECHARGE SHUTOFF VALVE N-3, FUEL TRANSFER PRESSURIZATION
37 MANUAL SHUTOFF VALVE N-77
38 AUTOMATIC VALVE N-30, FUEL STORAGE TANK PREPRESSURIZATION
39 PRESSURE RELIEF VALVE S-71
40 AUTOMATIC VALVE N-44, FUEL STORAGE TANK PRESSURIZATION A
41 PRESSURE RELIEF VALVE S-48
42 STRAINER N-25, NITROGEN PRESSURIZATION FUEL
43 GAGE P1-7-1
44 AUTOMATIC VALVE SN-16 STORAGE TANK BLANKET PRESSURE
45 PRESSURE REGUALTOR N-55, STORAGE TANK BLANKET PRESSURE SUPPLY
46 PRESSURE RELIEF VALVE S-48A
47 CHECK VALVE N-55A
48 MANUAL SHUTOFF VALVE N-71

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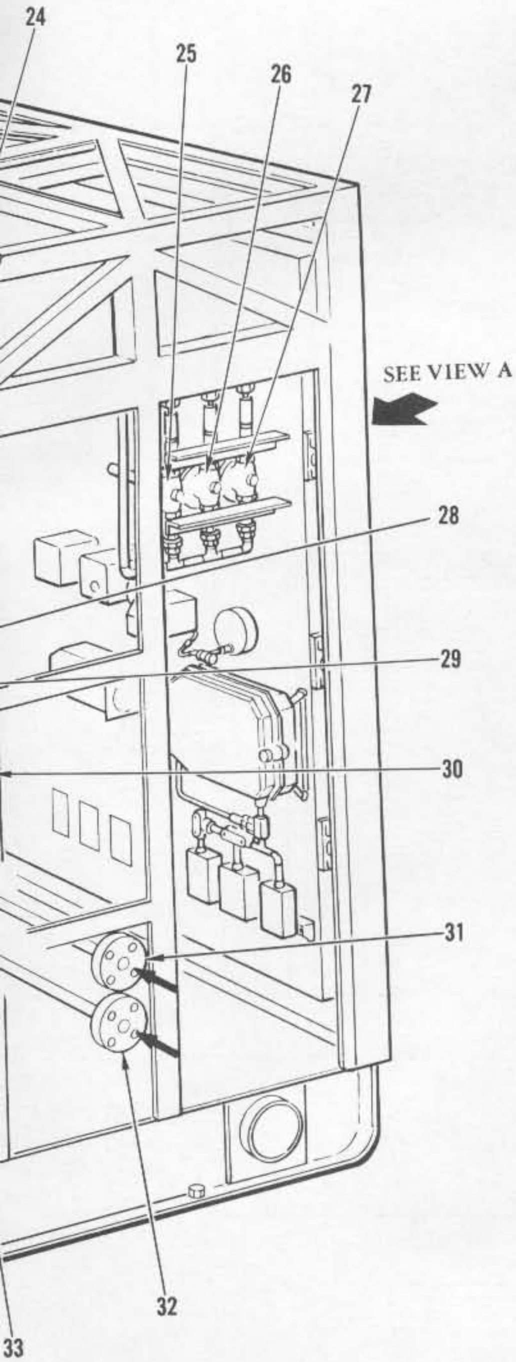
Figure 1-54. N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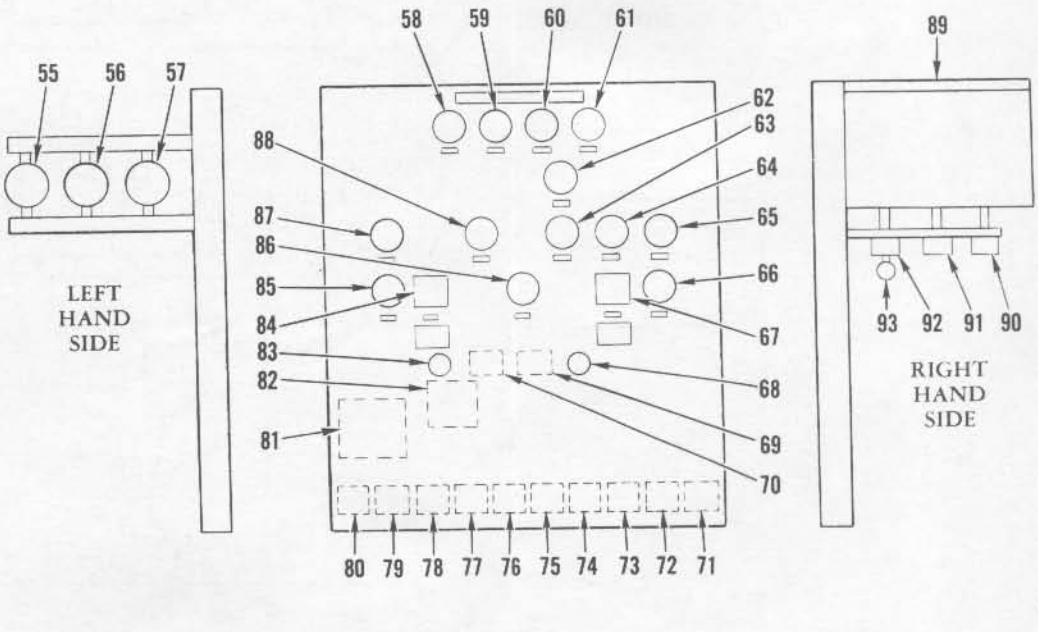
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LEFT HAND SIDE
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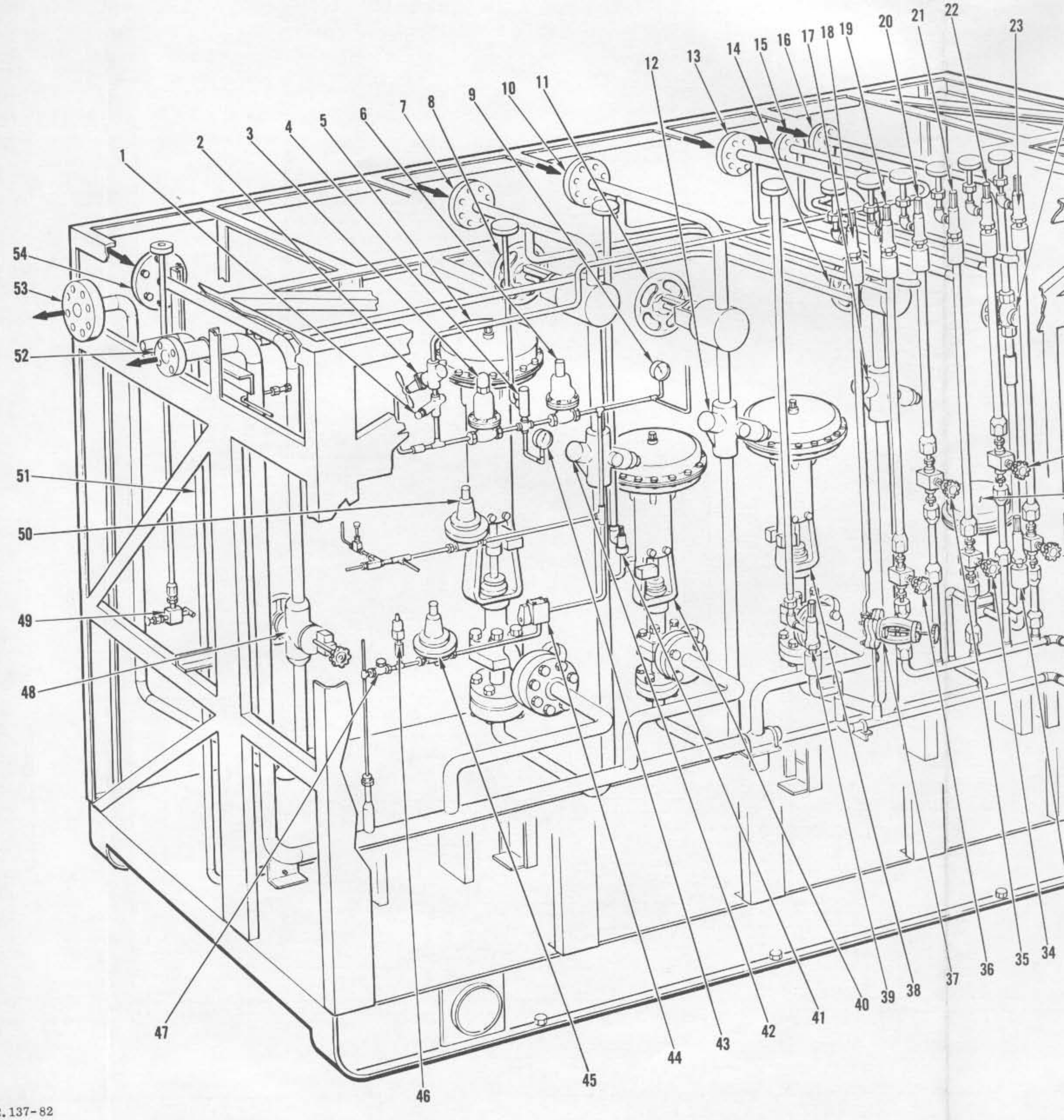
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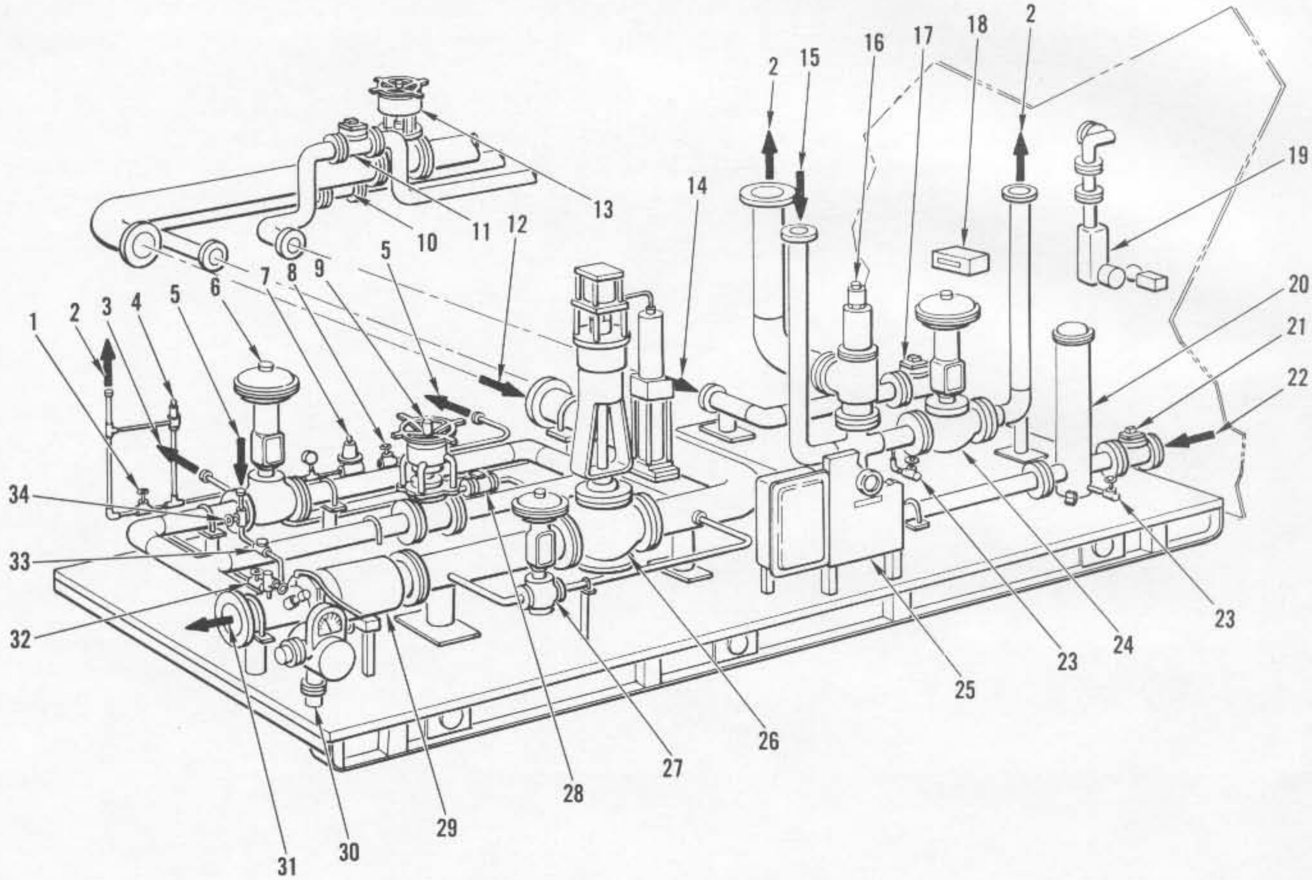

1 MANUAL VENT VALVE N-91, FUEL CATCH TANK
2 NITROGEN GAS TO ATMOSPHERE
3 NITROGEN GAS TO FUEL CATCH TANK
4 SAFETY RELIEF VALVE S-66, FUEL CATCH TANK
5 NITROGEN GAS FROM NITROGEN TRANSFER SKID NO. 1
6 MISSILE DRAIN VALVE F-13
7 PRESSURE REGULATOR N-90
8 MANUAL STOP VALVE N-89, FUEL CATCH TANK BLANKET PRESSURE
9 MANUAL FILL OR DRAIN VALVE F-10
10 MANUAL SUPPLY STOP VALVE F-16, FUEL STORAGE TANK
11 MANUAL RECIRCULATION STOP VALVE F-3
12 FUEL FROM STORAGE TANK
13 MANUAL FUEL TRANSFER STOP VALVE F-28
14 FUEL TANK RECIRCULATION OUTLET
15 NITROGEN GAS FROM FUEL TANK
16 RELIEF VALVE S-21, FUEL STORAGE TANK
17 MANUAL RECIRCULATION STOP VALVE F-26
18 FUEL TEMPERATURE INDICATOR
19 LIQUID LEVEL INDICATOR LLI-1
20 FUEL RESUPPLY FILTER F-1, POT TYPE
21 MANUAL SUPPLY STOP VALVE F-2, FUEL STORAGE TANK
22 STORAGE TANK FUEL SUPPLY
23 BLEED VALVE B-1
24 FUEL STORAGE TANK VENT VALVE N-18
25 INSTRUMENT PANEL LOCATION
26 FUEL RAPID LOAD VALVE F-7
27 FUEL FINE LOAD VALVE F-8
28 MANUAL LINE DRAIN VALVE F-30, TO FUEL CATCH TANK
29 FUEL TRANSFER FILTER F-29, IN LINE
30 DIFFERENTIAL PRESSURE UNIT DP-1-2
31 FUEL TO MISSILE
32 MANUAL FILTER DRAIN F-11, TO CATCH TANK
33 CHECK VALVE N-21, BLANKET PRESSURE
34 MANUAL STOP VALVE N-50, TRANSFER LINE BLANKET PRESSURE

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Figure 1-55. Fuel Control Valve Skid (NO. 2)

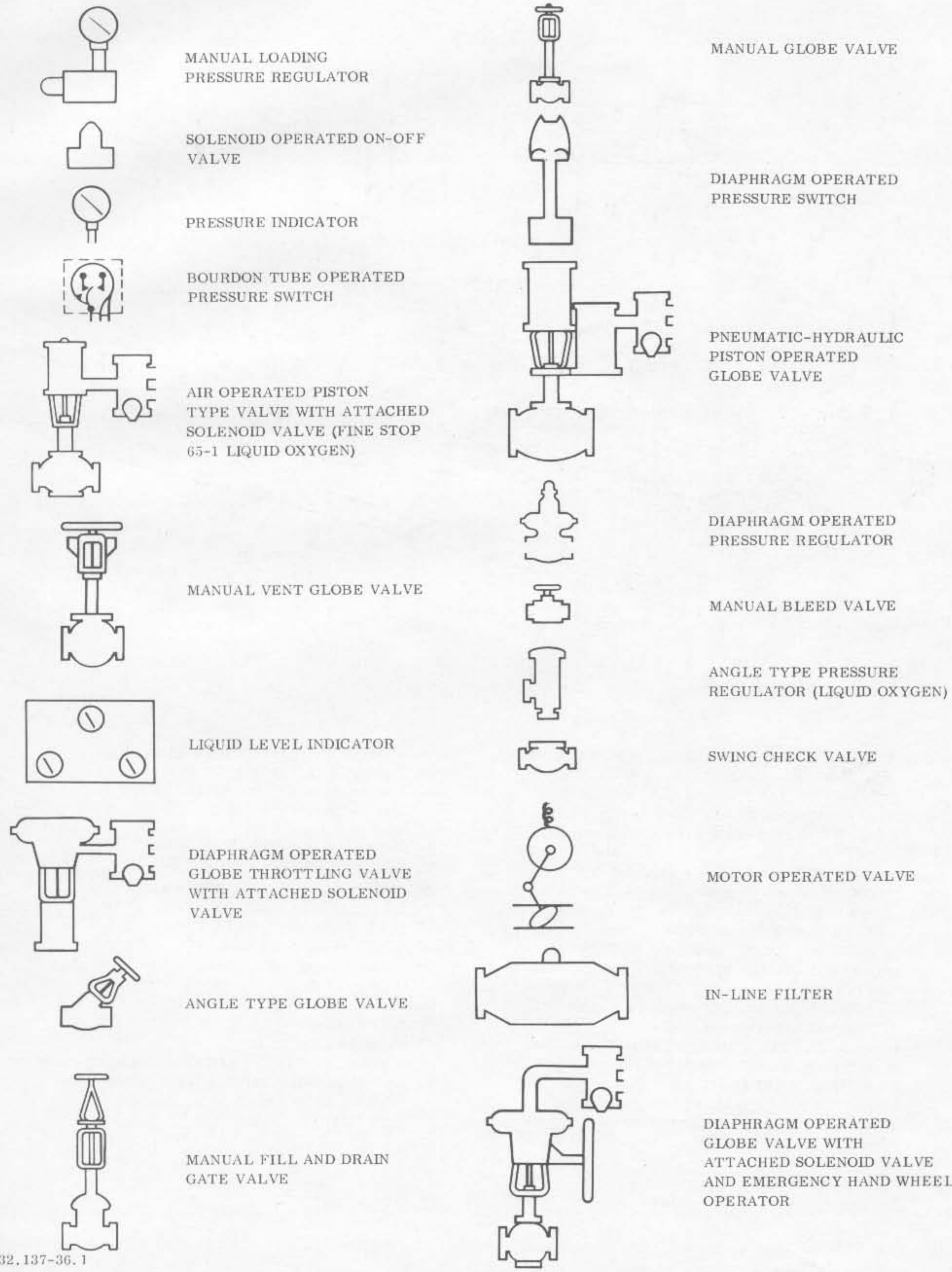


Figure 1-56. Liquid Oxygen Loading System (Sheet 1 of 2)

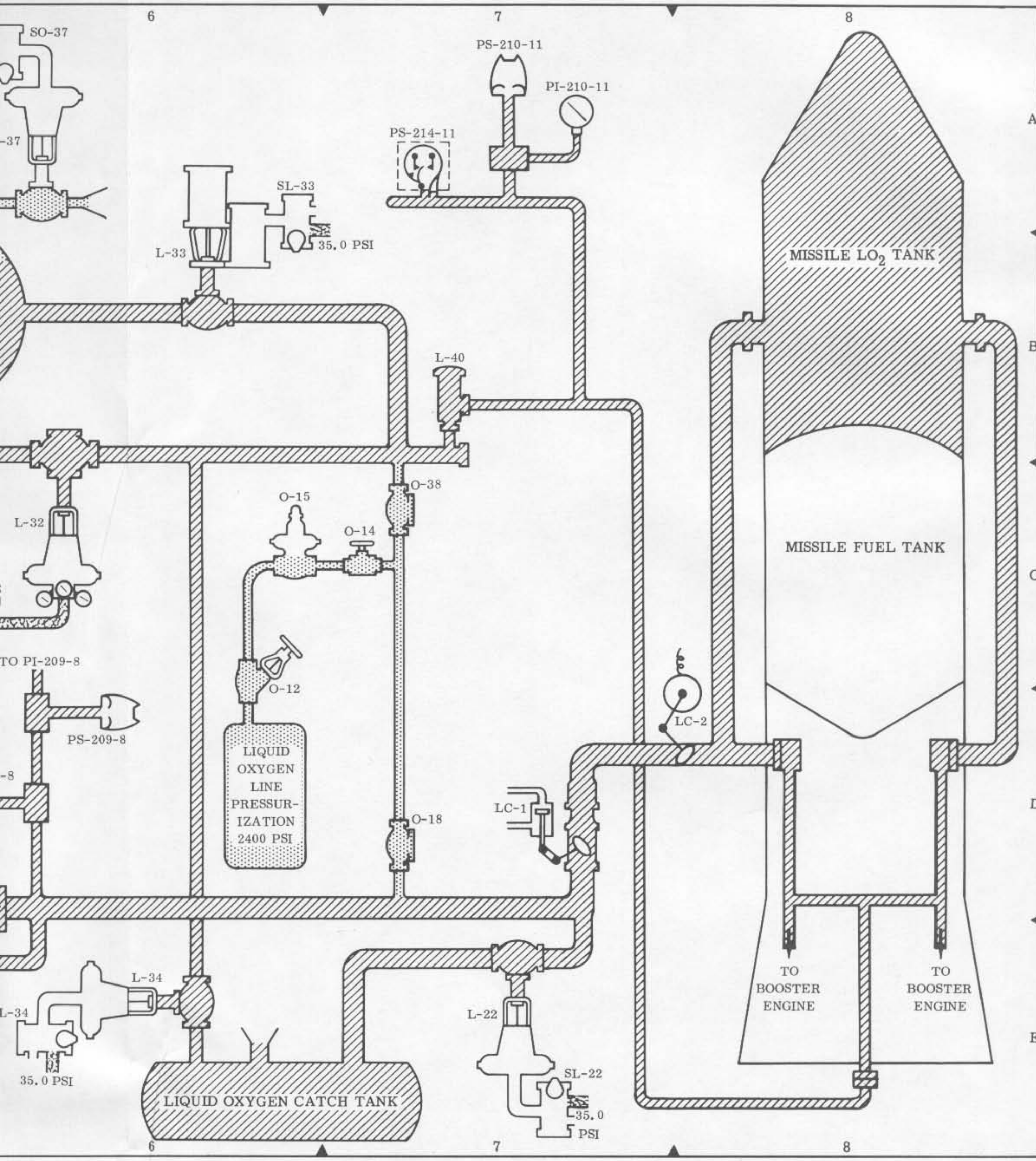
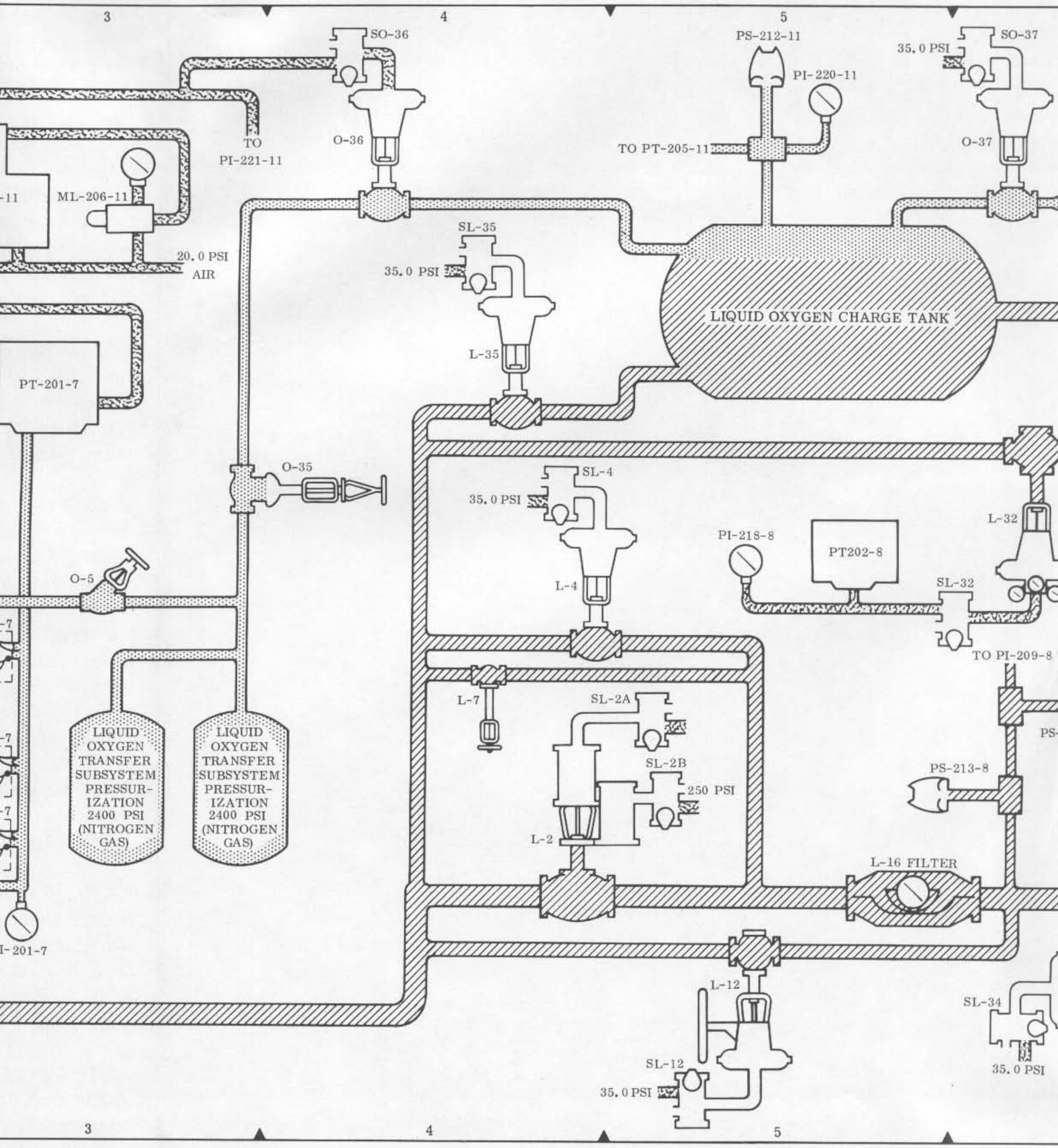


Figure 1-56. Liquid Oxygen Loading System (Sheet 2 of 2)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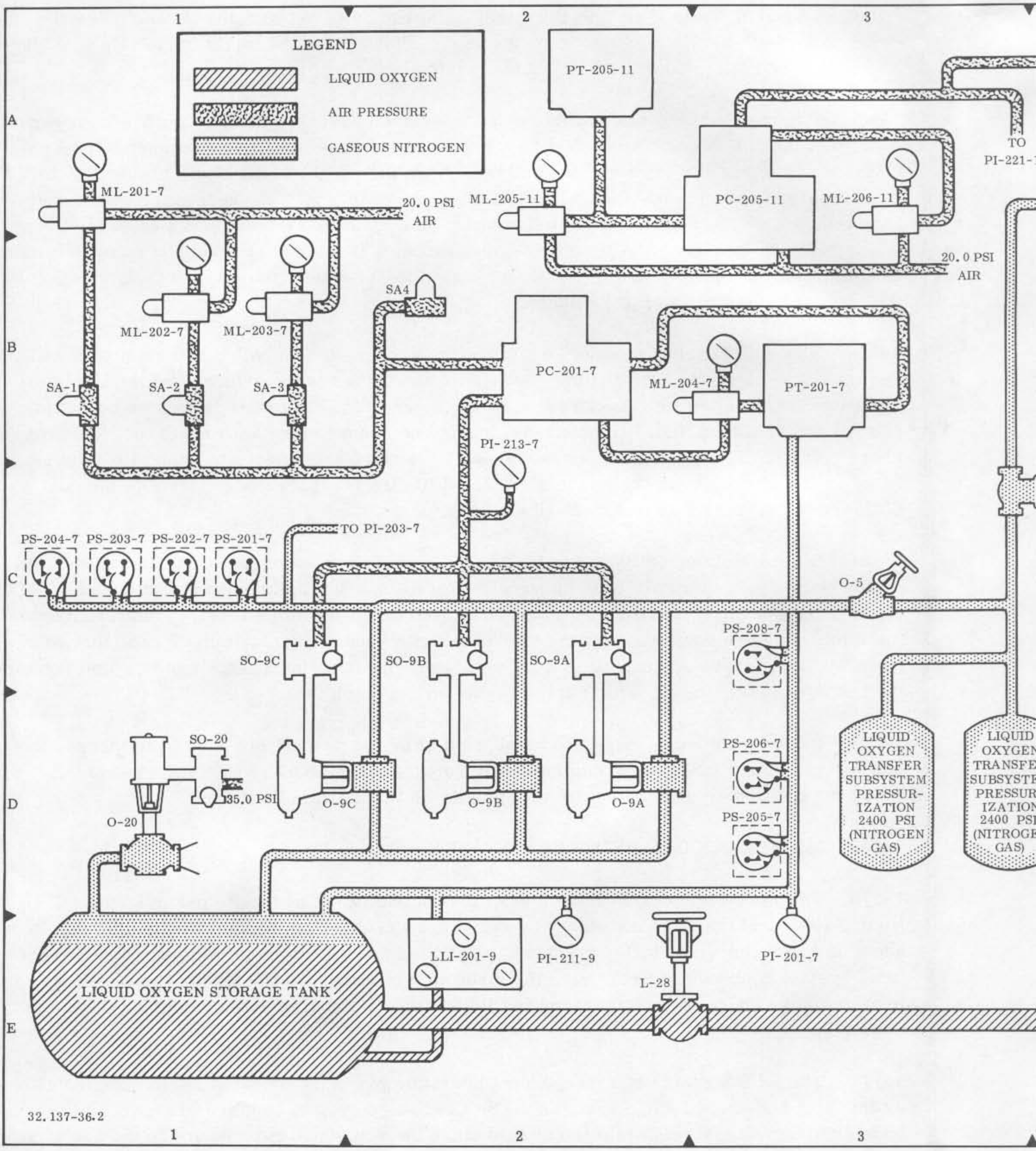
SO-36
PS-212-11
PI-220-11
35. 0 PSI
SO-37
TO
PI-221-11
O-36
TO PT-205-11
O-37
-11
ML-206-11
20. 0 PSI
AIR
SL-35
35. 0 PSI
LIQUID OXYGEN CHARGE TANK
L-35
PT-201-7
O-35
SL-4
35. 0 PSI
L-32
PI-218-8
PT202-8
O-5
L-4
SL-32
TO PI-209-8
L-7
SL-2A
LIQUID OXYGEN TRANSFER SUBSYSTEM PRESSUR-IZATION 2400 PSI (NITROGEN GAS)
LIQUID OXYGEN TRANSFER SUBSYSTEM PRESSUR-IZATION 2400 PSI (NITROGEN GAS)
SL-2B
250 PSI
PS-213-8
L-2
L-16 FILTER
I-201-7
L-12
SL-34
SL-12
35. 0 PSI
35. 0 PSI
3
4
5



LEGEND
LIQUID OXYGEN
AIR PRESSURE
GASEOUS NITROGEN
PT-205-11
PC-205-11
ML-205-11
ML-206-11
TO PI-221-
20.0 PSI AIR
ML-201-7
20.0 PSI AIR
ML-202-7
ML-203-7
SA4
SA-1
SA-2
SA-3
PC-201-7
ML-204-7
PT-201-7
PI-213-7
TO PI-203-7
PS-204-7
PS-203-7
PS-202-7
PS-201-7
O-5
PS-208-7
SO-9C
SO-9B
SO-9A
SO-20
35.0 PSI
O-20
O-9C
O-9B
O-9A
PS-206-7
PS-205-7
LIQUID OXYGEN TRANSFER SUBSYSTEM PRESSUR- IZATION 2400 PSI (NITROGEN GAS)
LIQUID OXYGEN TRANSFE SUBSYSTE PRESSUR IZATION 2400 PSI (NITROGE GAS)
LLI-201-9
PI-211-9
PI-201-7
L-28
LIQUID OXYGEN STORAGE TANK
A
B
C
D
E
1
2
3

32.137-36.2

balance a head of liquid oxygen in the missile lines midway between the ground fill-and-drain valve and missile liquid oxygen tank inlet. This allows the liquid oxygen lines, valves and tank to be chilled down while the fuel transfer is taking place.

1-165. The missile fuel tank is filled and pressurized with GN_2 during the chilldown period. After fuel tanking is completed, fuel tank pressure increases to flight pressure to prevent collapse of the missile intermediate bulkhead from the weight of the liquid oxygen. After fuel transfer is completed, the control-monitor group activates the necessary relays and flow regulating valves to accomplish the rapid, fine load, and topping transfer of liquid oxygen in a logical sequence. After liquid oxygen loading is completed and until missile launch is committed, boiloff liquid oxygen is replaced in the missile liquid oxygen tank to maintain the required mass ratio of propellants.

1-166. The liquid oxygen storage tank transfer pressure is controlled and monitored at oxygen transfer valve skid NO. 7 (figure 1-57), located adjacent to north wall of the liquid oxygen room. The liquid oxygen storage tank supply and vent equipment is located on liquid oxygen fill and vent skid NO. 9 (figure 1-58) located adjacent to the east wall of the liquid oxygen room. The liquid oxygen transfer valves and associated equipment are controlled and monitored on liquid oxygen control valve skid NO. 8 (figure 1-59) located adjacent to the east wall of the liquid oxygen room and south of skid NO. 9.

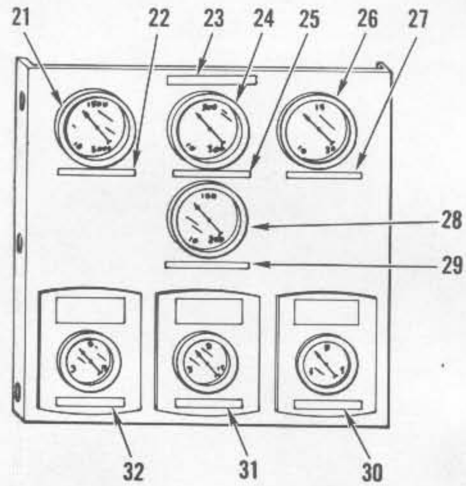
1-167. Immediately prior to engine ignition, the liquid oxygen charge tank (figure 1-60) is pressurized and a charge of liquid oxygen is forced into the liquid oxygen pumps and missile liquid oxygen tank, filling the liquid oxygen tank to the 100 percent level. Fuel transfer and the liquid oxygen stubup lines drain prior to missile launch as an automatic continuation of the propellant loading sequence. After the missile has been launched, liquid oxygen remaining in the transfer lines drains into the liquid oxygen catch tank.

1-168. If the launching is cancelled or aborted after the propellants have been loaded, the missile propellant tanks drain automatically as part of the abort sequence. The missile liquid oxygen tank is drained before the missile fuel tank drain is started.

1-169. MISSILE GROUND HYDRAULIC SYSTEM.

1-170. The missile ground hydraulic system consists of the hydraulic pumping unit (HPU) (figure 1-61) and the lines necessary to deliver hydraulic fluid to the missile. The system supplies hydraulic fluid, under pressure, for filling and bleeding the missile hydraulic system, system checkout, pressurizing the airborne systems until the airborne pumps take over, and to provide means of evacuating fluid from the airborne systems during the commit sequence.

1-171. The HPU contains two independent hydraulic pressure systems, which are identified as the first and second stage systems. The first stage system supplies pressure to the booster airborne system, while the second stage system supplies pressure to the sustainer-vernier airborne hydraulic system. The HPU is installed in the mechanical and equipment



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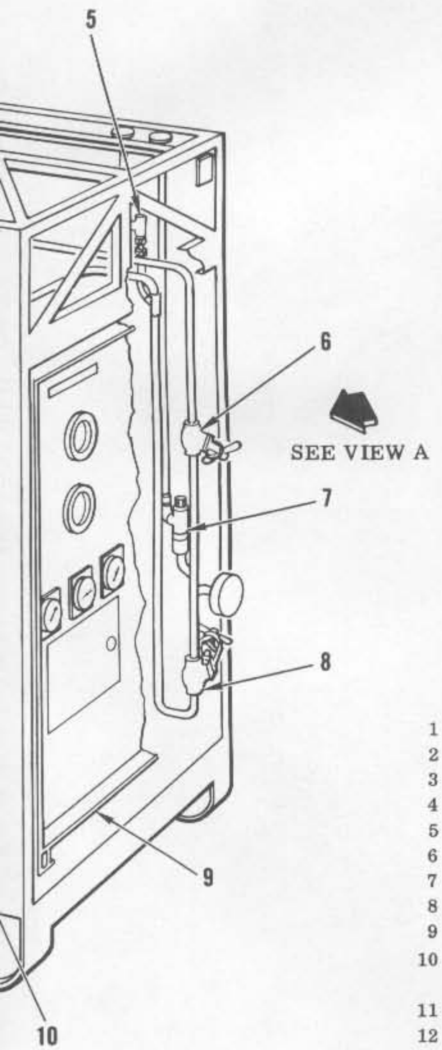
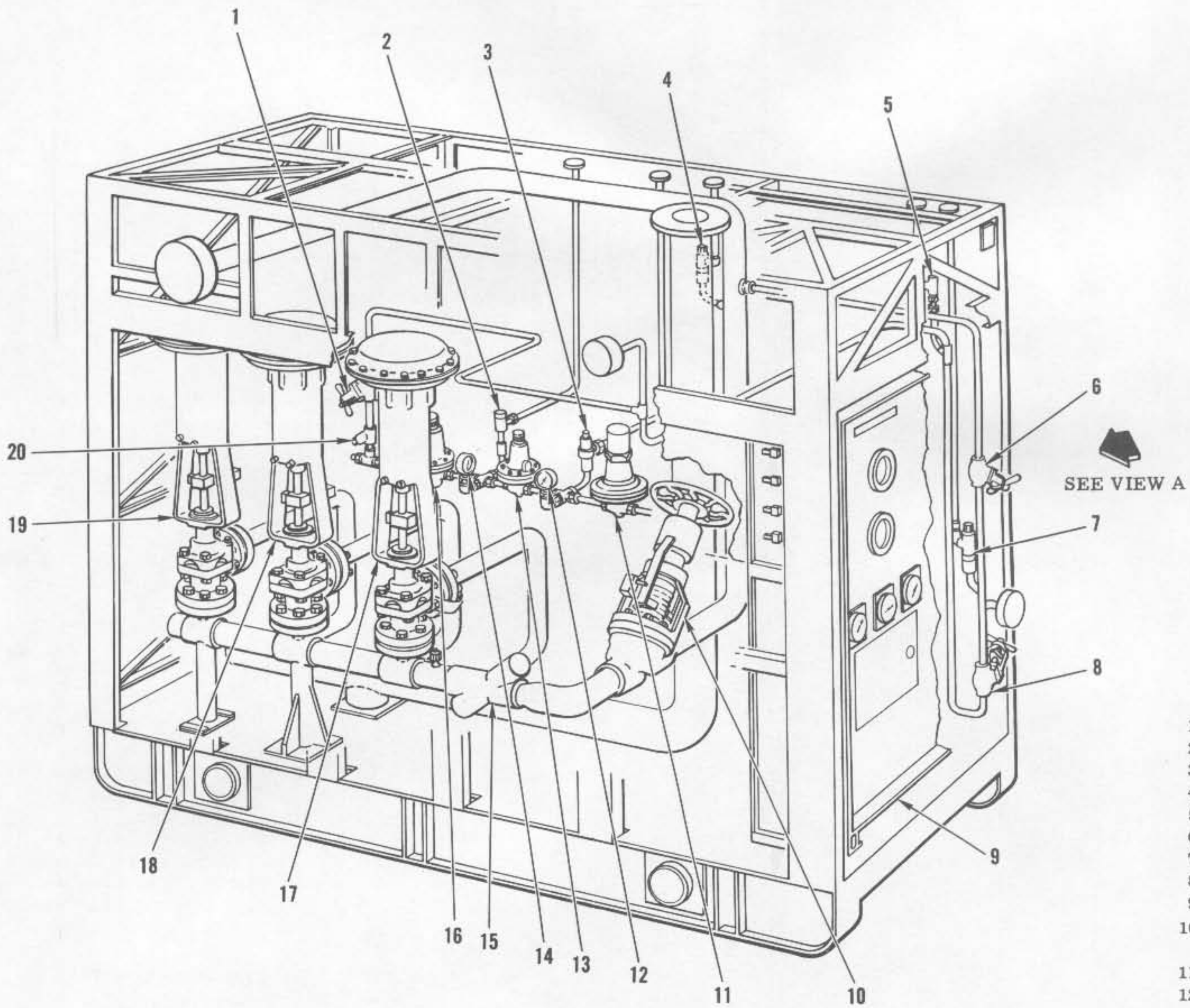


1 LINE BLANKET PRESSURE STOP VALVE O-12
2 PRESSURE RELIEF VALVE S-19
3 PRESSURE RELIEF VALVE S-49
4 PRESSURE RELIEF VALVE S-12
5 PRESSURE RELIEF VALVE S-14
6 NITROGEN GAS SUPPLY STOP VALVE O-2
7 PRESSURE RELIEF VALVE S-8
8 NITROGEN GAS SUPPLY STOP VALVE O-3
9 INSTRUMENT PANEL
10 STORAGE TANK TRANSFER PRESSURE STOP VALVE O-5
11 PRESSURE REGULATOR O-15
12 GAGE PI-206-7
13 PRESSURE REGULATOR O-22
14 GAGE PI-205-7
15 STRAINER O-8
16 PRESSURE REGULATOR O-13
17 STORAGE TANK TRANSFER PRESSURE CONTROL VALVE O-9A
18 STORAGE TANK TRANSFER PRESSURE CONTROL VALVE O-9B
19 STORAGE TANK TRANSFER PRESSURE CONTROL VALVE O-9C
20 STRAINER O-11
21 GAGE PI-203-7
22 LO_2 PRESSURE STORAGE
23 LO_2 TRANSFER
24 GAGE PI-204-7
25 BLANKET GN_2 STORAGE
26 GAGE PI-207-7
27 LO_2 LINE BLANKET SUPPLY
28 GAGE PI-201-7
29 LO_2 STORAGE TANK
30 TRANSFER PRESSURE SET POINT GAGE
31 INTERMEDIATE PRESSURE SET POINT GAGE
32 COOL DOWN PRESSURE SET POINT GAGE

Figure 1-57. Oxygen Transfer Valve Skid (NO. 7)



1 L
2 P
3 P
4 P
5 P
6 N
7 P
8 N
9 IN
10 ST
ST
11 PI
12 G.
13 PI
14 G.
15 ST
16 PI
17 ST
C

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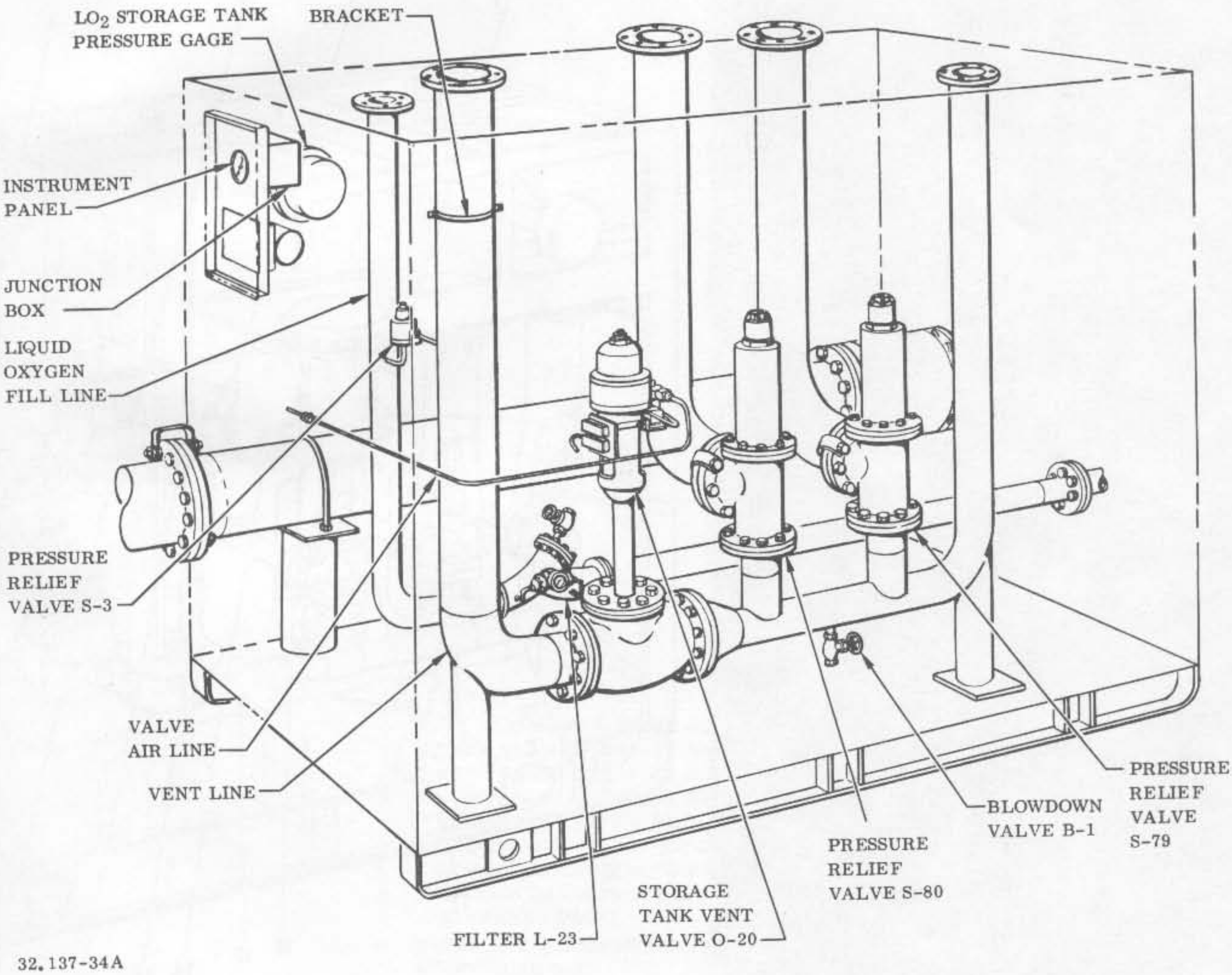


Figure 1-58. Liquid Oxygen Fill and Vent Valve Skid (NO. 9)

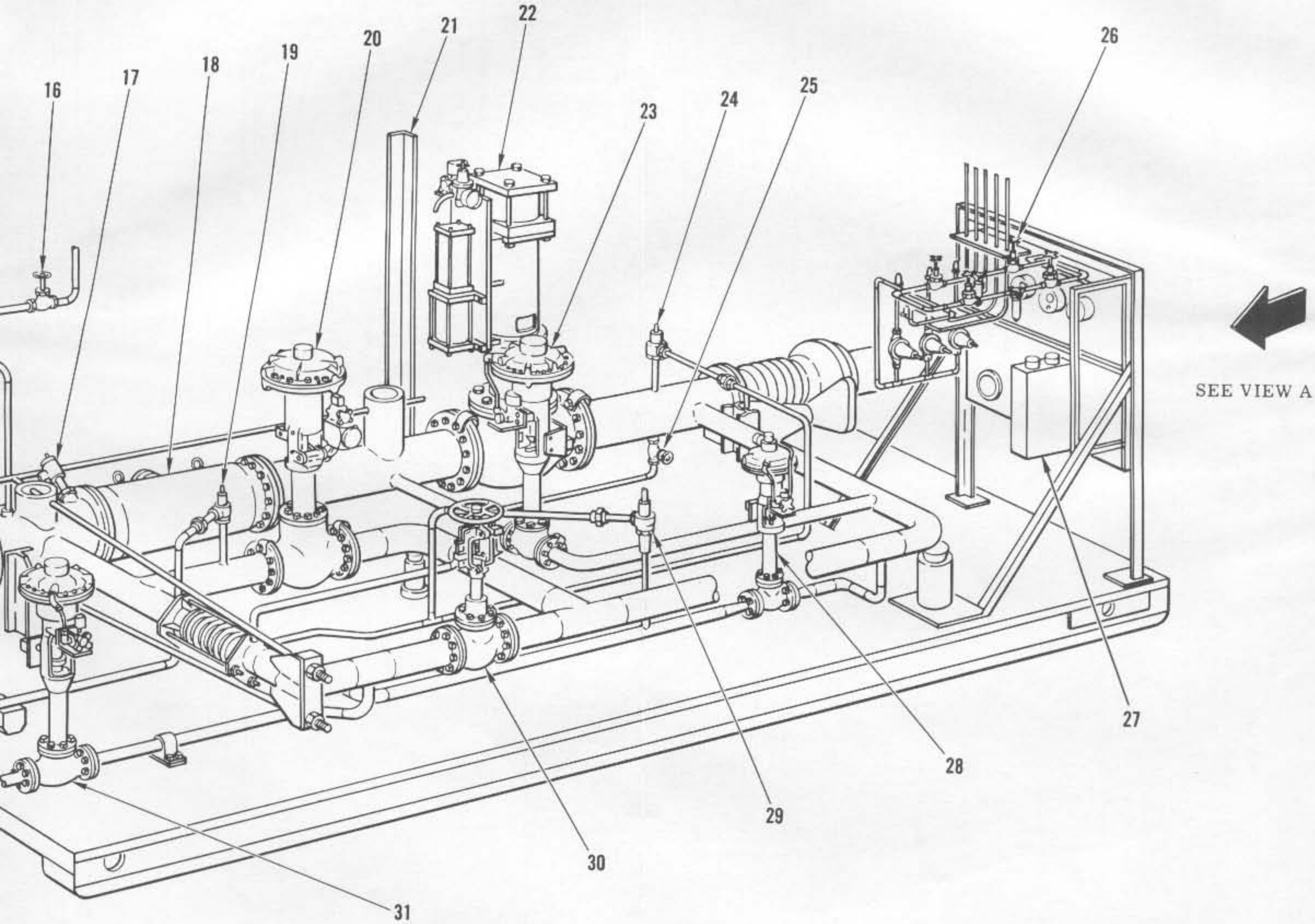
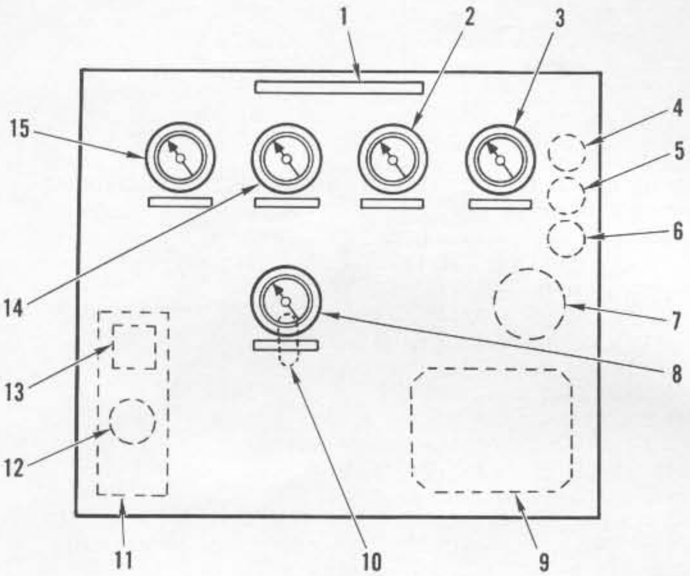


Figure 1-59. Liquid Oxygen Control Valve Skid (NO. 8)



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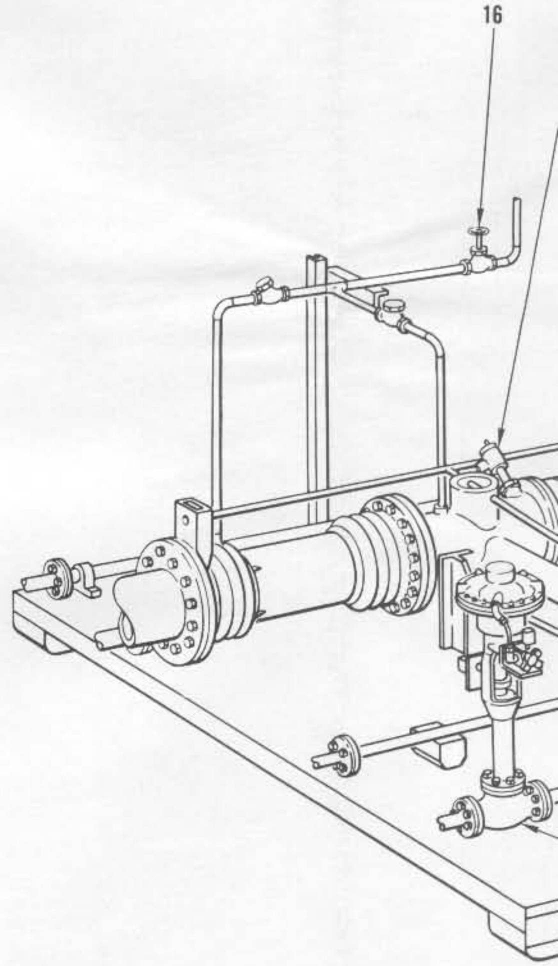
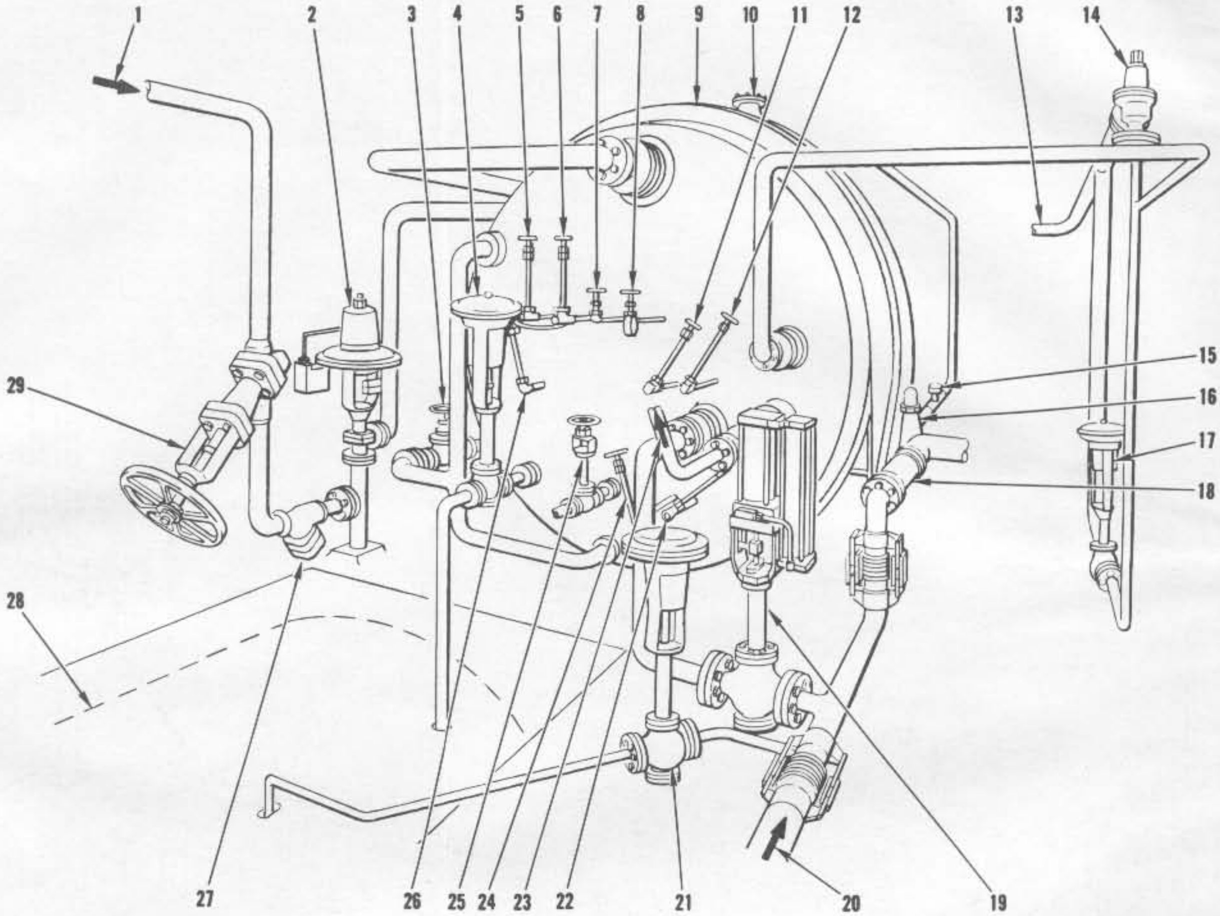


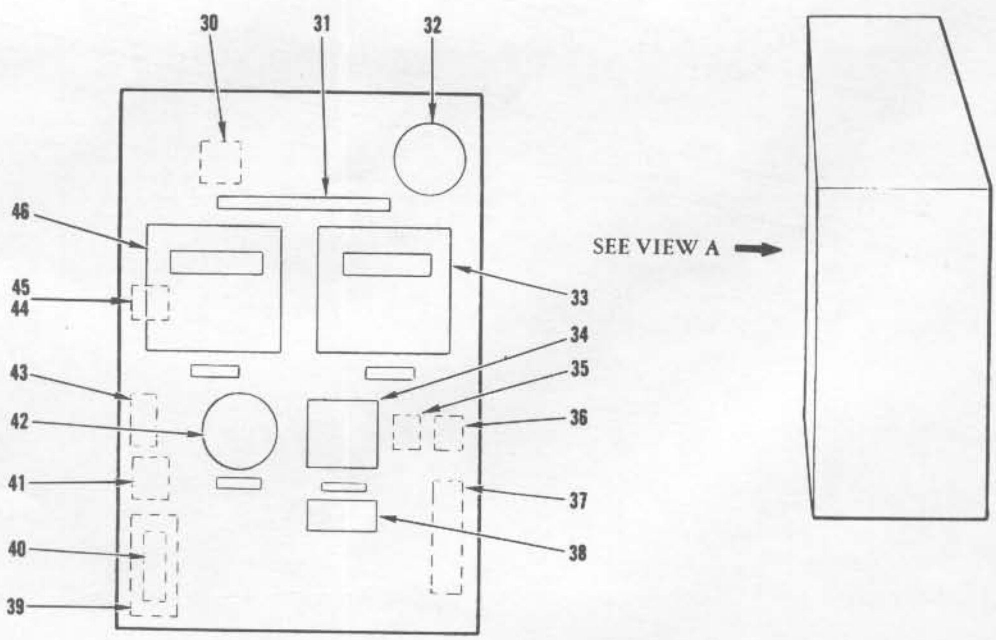
1 NAMEPLATE, LIQUID OXYGEN CONTROL
2 PRESSURE INDICATOR PI-215-8
3 PRESSURE INDICATOR PI-216-8
4 PRESSURE REGULATOR PR-203-8 250 PSI VALVE AIR
5 PRESSURE REGULATOR PR-202-8 35.0 PSI VALVE AIR
6 PRESSURE REGULATOR PR-201-8 20.0 PSI INSTRUMENT AIR
7 PRESSURE INDICATOR PI-218-8
8 PRESSURE INDICATOR PI-209-8
9 PRESSURE TRANSDUCER PT-202-8
10 GAGE SAVER GS-209-8
11 JUNCTION BOX JB-8
12 PRESSURE SWITCH PS-209-8
13 PRESSURE SWITCH PS-213-8
14 PRESSURE INDICATOR PI-217-8
15 PRESSURE INDICATOR PI-214-8
16 LINE BLANKET PRESSURE STOP VALVE 0-14
17 LIQUID SENSOR LS-201-8
18 FILTER L-16
19 PRESSURE RELIEF VALVE S-9
20 MISSILE TANK DRAIN VALVE L-12
21 SKID STRUCTURE
22 RAPID LOAD CONTROL VALVE L-2
23 FINE LOAD CONTROL VALVE L-4
24 PRESSURE RELIEF VALVE S-6
25 BLOWDOWN VALVE B-1
26 PNEUMATIC STOP VALVE
27 JUNCTION BOX
28 TOPPING CONTROL VALVE L-32
29 PRESSURE RELIEF VALVE S-91
30 MANUAL DRAIN VALVE L-7
31 TRANSFER LINE DRAIN VALVE L-22

32.137-19A

1 NITROGEN GAS FROM TRANSFER PRESSURIZATION CYLINDERS
2 AUTOMATIC VALVE 0-36, CHARGE TANK PRESSURIZATION STOP
3 MANUAL VALVE V-4, VACUUM
4 AUTOMATIC VALVE L-35, CHARGE TANK FILL
5 MANUAL VALVE L-38, LIQUID OXYGEN
6 MANUAL VALVE L-37, LIQUID OXYGEN
7 MANUAL VALVE LN-18, LIQUID OXYGEN
8 MANUAL VALVE LN-17, LIQUID OXYGEN
9 LIQUID OXYGEN CHARGE TANK
10 SAFETY RELIEF VALVE S-32
11 MANUAL VALVE L-36, LIQUID OXYGEN
12 MANUAL VALVE LN-15, LIQUID OXYGEN
13 NITROGEN GAS VENT TO ATMOSPHERE
14 SAFETY RELIEF VALVE S-89
15 SOLENOID VALVE SH-69, HELIUM BLANKET PRESSURIZATION
16 PRESSURE REGULATOR H-68 (REF)
17 AUTOMATIC VALVE 0-37, CHARGE TANK VENT
18 FILTER L-40, TOPPING AND CHARGE FILTER
19 AUTOMATIC VALVE L-33, CHARGE DELIVERY
20 LIQUID OXYGEN TOPPING TO MISSILE
21 AUTOMATIC VALVE L-34, TOPPING LINE DRAIN
22 MANUAL VALVE LN-16, LIQUID OXYGEN
23 MANUAL VALVE L-39, LIQUID OXYGEN
24 NITROGEN GAS VENT TO ATMOSPHERE
25 MANUAL VALVE LN-8, LIQUID OXYGEN FILL (INTERMEDIATE TANK)
26 MANUAL VALVE LN-4
27 STRAINER 0-39
28 LIQUID OXYGEN CATCH TANK
29 MANUAL VALVE 0-35, CHARGE PRESSURIZATION STOP
30 GAGE SAVER GS-210-11
31 NAME PLATE, CHARGE TANK PANEL
32 PRESSURE INDICATOR PI-210-11, LO_2 CHARGE (AND TOPPING) LINE
33 LIQUID LEVEL INDICATOR LLI-204-11, LO_2 CHARGE TANK LEVEL
34 MANUAL LOADER ML-205-11, (CHARGE) TRANSFER PRESSURE (SETPOINT)
35 PRESSURE INDICATOR PI-221-11, VALVE 0-36 CONTROL PRESSURE
36 PRESSURE CONTROLLER PC-205-11, CHARGE TANK
37 JUNCTION BOX JB-11
38 ACCESS DOOR
39 PRESSURE TRANSMITTER PT-205-11, CHARGE TANK
40 GAGE SAVER GS-212-11
41 PRESSURE SWITCH PS-214-11, TOPPING LINE BLANKET PRESSURE HIGH
42 PRESSURE INDICATOR PI-220-11, LO_2 CHARGE TANK
43 MANUAL LOADER ML-206-11, RESET PRESSURE SETPOINT
44 PRESSURE SWITCH PS-210-11, TOPPING LINE BLANKET PRESSURE CORRECT
45 PRESSURE SWITCH PS-212-11, CHARGE TANK ULLAGE PRESSURE 5 PSI
46 LIQUID LEVEL INDICATOR LLI-203-11, LO_2 CHARGE TANK (INTERMEDIATE) LEVEL

Figure 1-60. Liquid Oxygen Charge Tank Skid (NO. 11)





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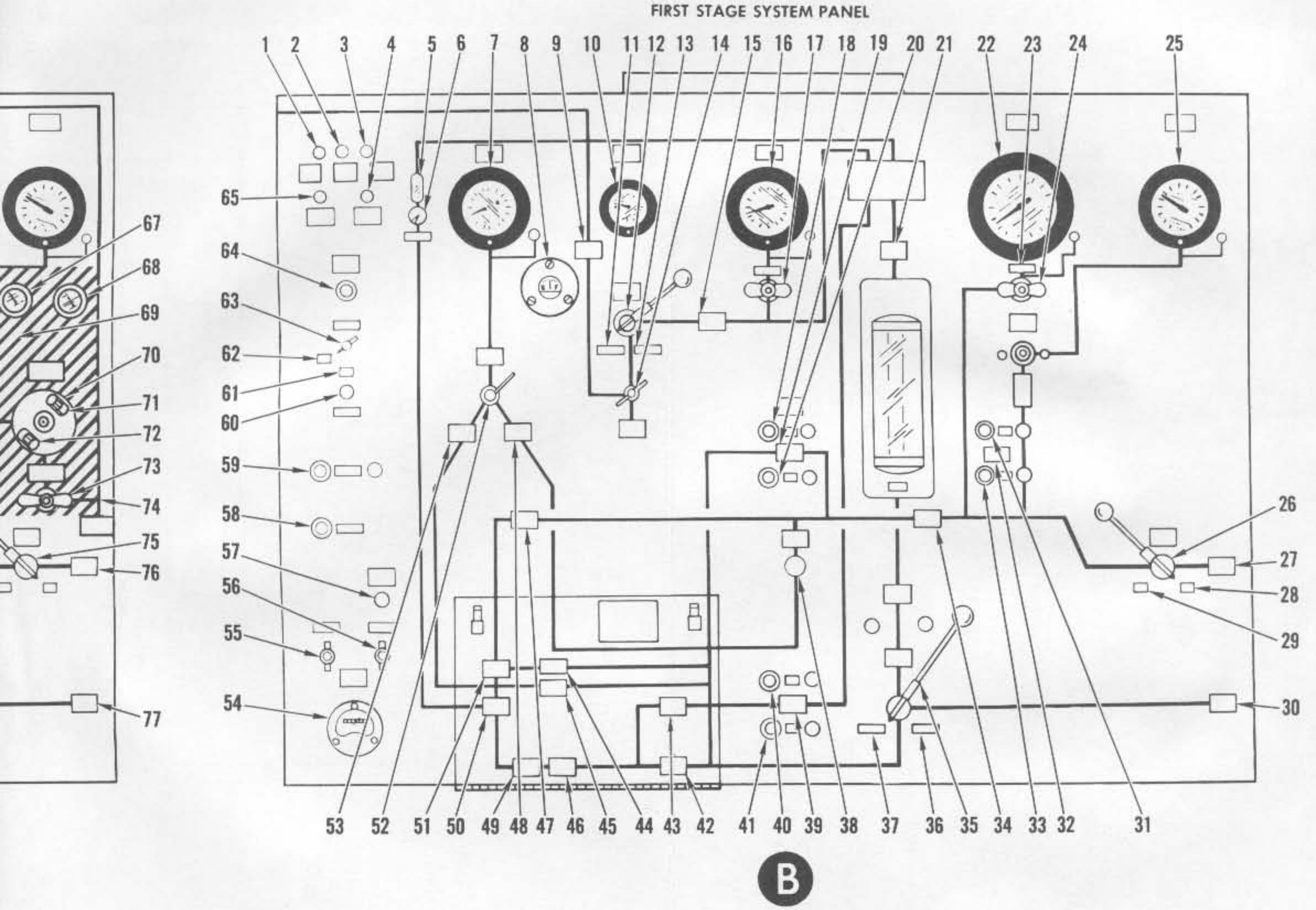


RGING (90)
UMATIC PRESSURE (35)
VE (V-1) (84)
(81)

(82)

LVE (58)

ALVE (12)

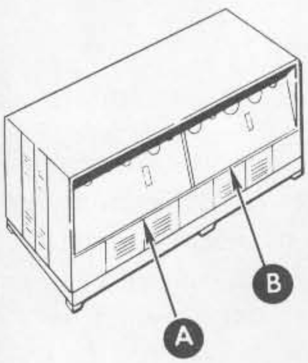
39 RESERVOIR SHUTOFF VALVE (55)
40 CONNECT (S-11)
41 DISCONNECT (S-10)
42 BOOST PUMP (2)
43 CHECK VALVE (56)
44 CHECK VALVE (5)
45 LOW PRESSURE RELIEF VALVE (16)
46 HEATER (18)
47 CHECK VALVE (44)
48 BOOST PUMP INLET PRESSURE
49 HEAT EXCHANGER (48)
50 LOW PRESSURE FILTER (21)
51 HIGH PRESSURE PUMP (1)
52 LOW PRESSURE SELECTOR VALVE (23)
53 HIGH PRESSURE PUMP INLET PRESSURE
54 ELAPSE TIME INDICATOR (80)
55 PANEL LIGHTS (S-16)
56 HEATER SWITCH (S-15)
57 HEATER OPERATING (DS-11)

58 PUMP STOP (S-2)
59 PUMP START (S-3)
60 POWER AVAILABLE (DS-1)
61 LOCAL
62 REMOTE
63 CONTROL STATUS (S-1)
64 PRESS TO TEST PANEL INDICATOR LIGHTS (S-14)
65 PRESSURE DROP EXCESSIVE-HIGH PRESSURE FILTER NO. 11 (DS-15)
66 REGULATED PNEUMATIC DISCHARGE OUTLET (88)
67 REGULATOR OUTLET PRESSURE GAUGE
68 REGULATOR INLET PRESSURE GAUGE
69 NITROGEN PRESSURE CONTROL PANEL
70 HIGH PRESSURE PNEUMATIC REGULATOR (41)
71 PNEUMATIC REGULATOR BLEED VALVE
72 PNEUMATIC REGULATOR LOAD KNOB
73 REGULATED PNEUMATIC DISCHARGE SHUTOFF VALVE (64)
74 GAS PRESSURIZATION OUTLET NO. 5 (83)
75 SECOND STAGE PRESSURE SHUTOFF VALVE V-3 (84)
76 SECOND STAGE PRESSURE OUTLET NO. 3 (81)
77 SECOND STAGE SUCTION OUTLET NO. 4 (82)

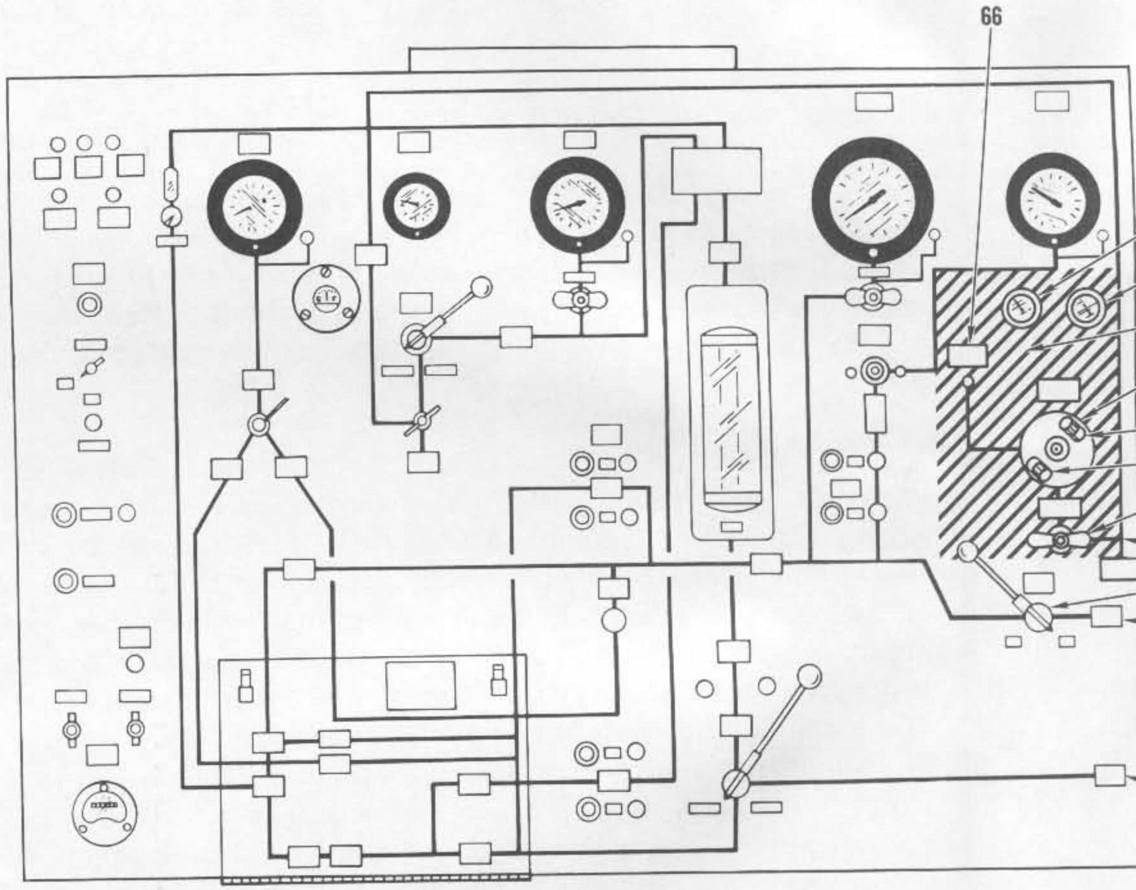
NOTE

EXCEPT AS INDICATED ALL CONTROLS AND INDICATORS ARE IDENTICAL FIRST AND SECOND STAGE PANELS

Figure 1-61. Hydraulic Pumping Unit First and Second Stage System Panels



SECOND STAGE SYSTEM PANEL



A

1 SOLENOID PNEUMATIC VALVE NO. 60 OPEN (DS-13)
2 HYDRAULIC FLUID OVER-HEATED (DS-14)
3 SOLENOID PNEUMATIC VALVE 60 CLOSED (DS-12)
4 PRESSURE DROP EXCESSIVE-LOW PRESSURE FILTER NO. 21 (DS-16)
5 SIGHT GLASS
6 BLEED VALVE (19)
7 GAUGE, LOW PRESSURE SYSTEM (24)
8 FLUID LEVEL INDICATOR
9 SOLENOID PNEUMATIC VALVE (60)
10 HYDRAULIC FLUID TEMPERATURE H.P. PUMP INLET GAUGE (28)
11 RESERVOIR VENTED
12 RESERVOIR PRESSURIZATION VALVE (39)
13 RESERVOIR PRESSURIZED
14 INC ◄► DEC RESERVOIR PRESSURE REGULATOR (40)
15 RESERVOIR PNEUMATIC FILTER (38)
16 GAUGE RESERVOIR PRESSURE (46)
17 GAUGE SHUTOFF (6A)
18 CLOSE (S-4)
19 BYPASS VALVE (13)
20 OPEN (S-5)
21 BACK PRESSURE VALVE (63)
22 GAUGE HIGH PRESSURE SYSTEM (10)
23 GAUGE SHUTOFF (6A)
24 OUTLET-EVACUATION CHAMBER CHARGING (90)
25 GAUGE EVACUATION CHAMBER PNEUMATIC PRESSU
26 FIRST STAGE PRESSURE SHUTOFF VALVE (V-1) (84)
27 FIRST STAGE PRESSURE OUTLET NO. 1 (81)
28 OPEN
29 CLOSE
30 FIRST STAGE SUCTION OUTLET NO. 2 (82)
31 CONNECT (S-12)
32 EVACUATION CHAMBER SHUTOFF VALVE (58)
33 DISCONNECT (S-13)
34 HIGH PRESSURE FILTER (11)
35 FLOWMETER SELECTOR VALVE (54)
36 NOT VIA FLOWMETER
37 VIA FLOWMETER
38 DEC ◄► INC HIGH PRESSURE RELIEF VALVE (12)

32.137-23A

area of the launch and service building. Permanently installed lines connect the HPU to the missile riseoff couplings located on the missile launcher. The HPU may be operated manually at the HPU control panels, or remotely from the HYDRAULICS panel of control-monitor group 1 of 4 (figure 1-24).

1-172. LAUNCH CONTROL SYSTEM.

1-173. The launch control system provides controls and indicators for continuously monitoring aerospace ground equipment and missile systems readiness, initiating or terminating the logic sequence required to launch a missile, and for performing the necessary maintenance operations during standby. Principal items of equipment in the launch control system are the launch control console, auxiliary control-monitor group, and the control-monitor group.

1-174. LAUNCH CONTROL CONSOLE. The launch control console (figure 1-62) is located at the northeast corner of the launch control center in the launch operations building. A panel on the console contains the controls and indicators necessary for the missile combat crew commander (MCCC) to initiate a countdown and launch the missile. Arranged in various functional patches, the indicators display the summary status of the aerospace ground equipment (AGE.) and missile systems at standby and during countdown. The panel indications enable the MCCC to monitor the progress of a countdown, maintain a safe missile condition, and make the required decisions in the event of a subsystem malfunction. A communication subpanel provides the various telephone line connections required by the MCCC. The connections to the communications patch will vary from squadron to squadron but will generally have the same direct line and intersite communications. There is no direct line to the Alternate Command Post at OSTF-1 and SMS 576-C.

1-175. AUXILIARY CONTROL-MONITOR GROUP (OSTF-1 AND SMS 576-C). The auxiliary control-monitor group consists of an auxiliary logic unit (figure 1-35) and an auxiliary launch console (figure 1-36). The auxiliary console provides control and monitoring of the water system and, in conjunction with the WATER SYSTEM panel on the auxiliary logic unit, provides automatic control of the water system during a missile launch. Controls for manual operation of the collimator gate are on the FACILITY CONTROL SYSTEM panel of the auxiliary logic unit.

1-176. CONTROL-MONITOR GROUP. During countdown, all relay logic systems are controlled remotely by the launch control console panel controls. Signals from the launch console energize the countdown control system. The countdown control system, in turn, energizes and controls circuits in the other relay logic systems. Control-monitor group 1 of 4 and 2 of 4 (figure 1-24), located in the mechanical and electrical equipment area of the LSB automatically sequence and monitor the operations of the missile and AGE. systems. The responses are interlocked in the relay logic as required for comparison and further sequencing. Certain critical status responses are displayed on the front panel of the systems logic chassis to provide information required for fault isolation and local control operations. Control-monitor group 1 of 4 and 2 of 4 send summary status signals to the launch control console for display.

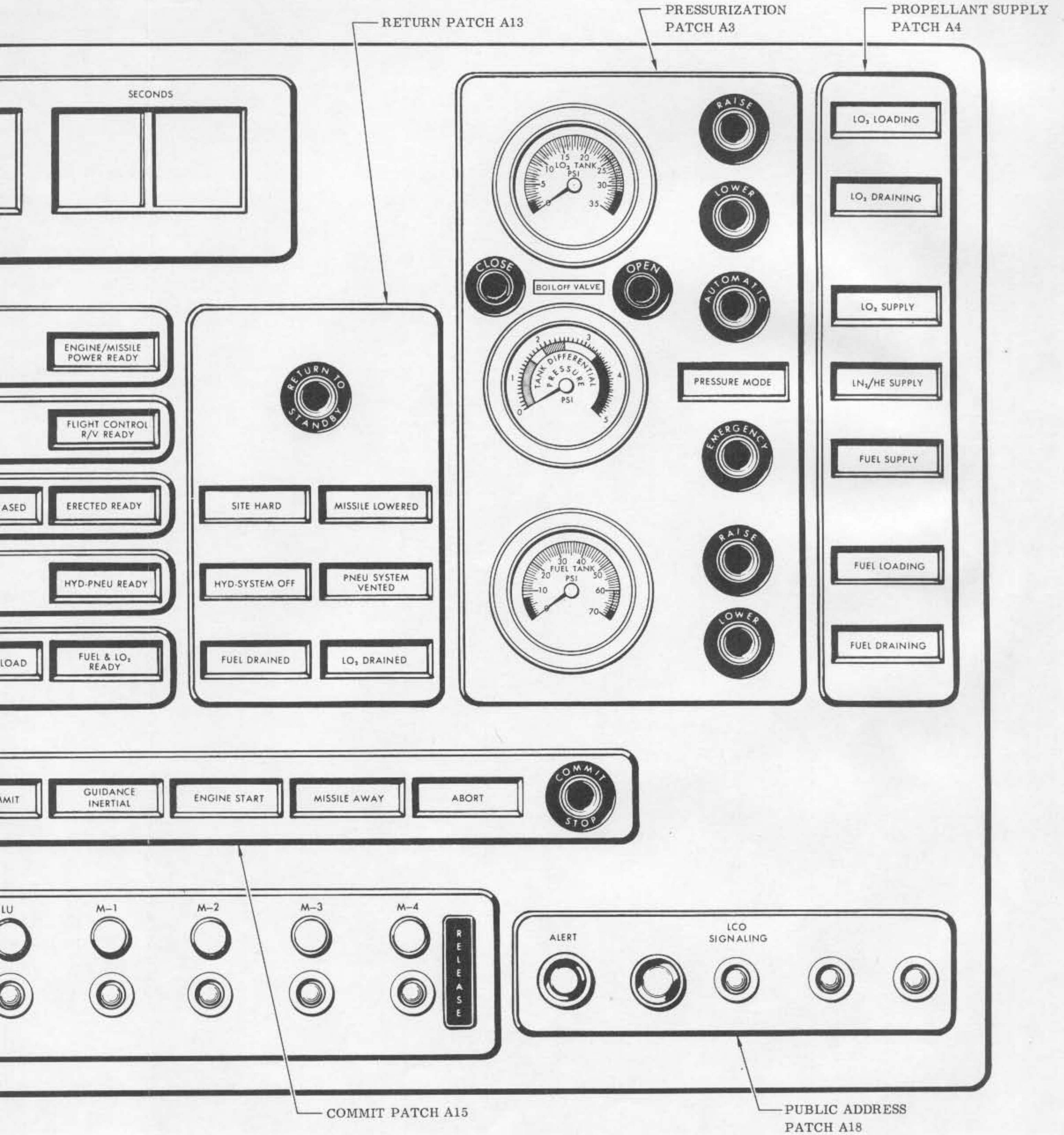
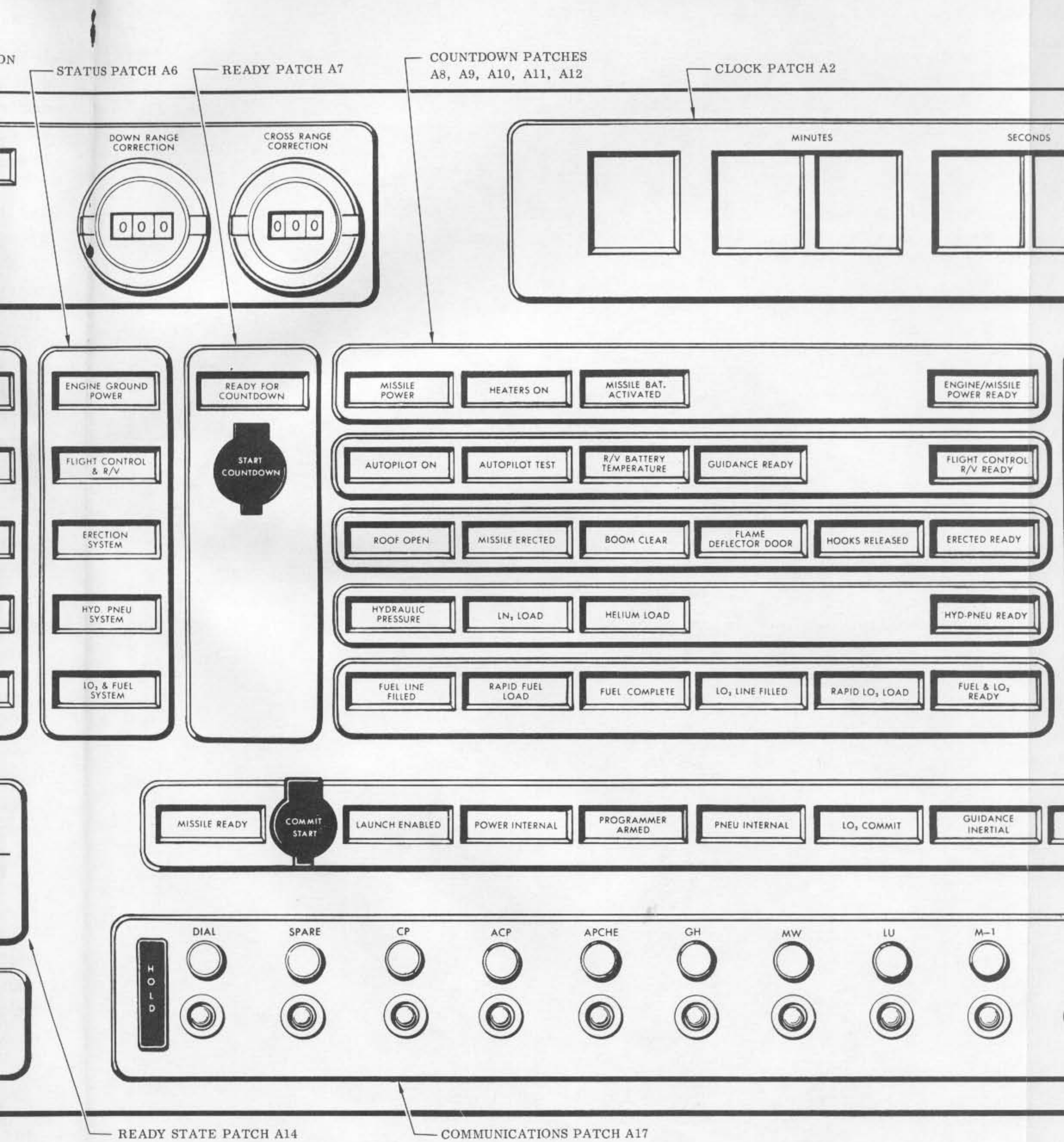
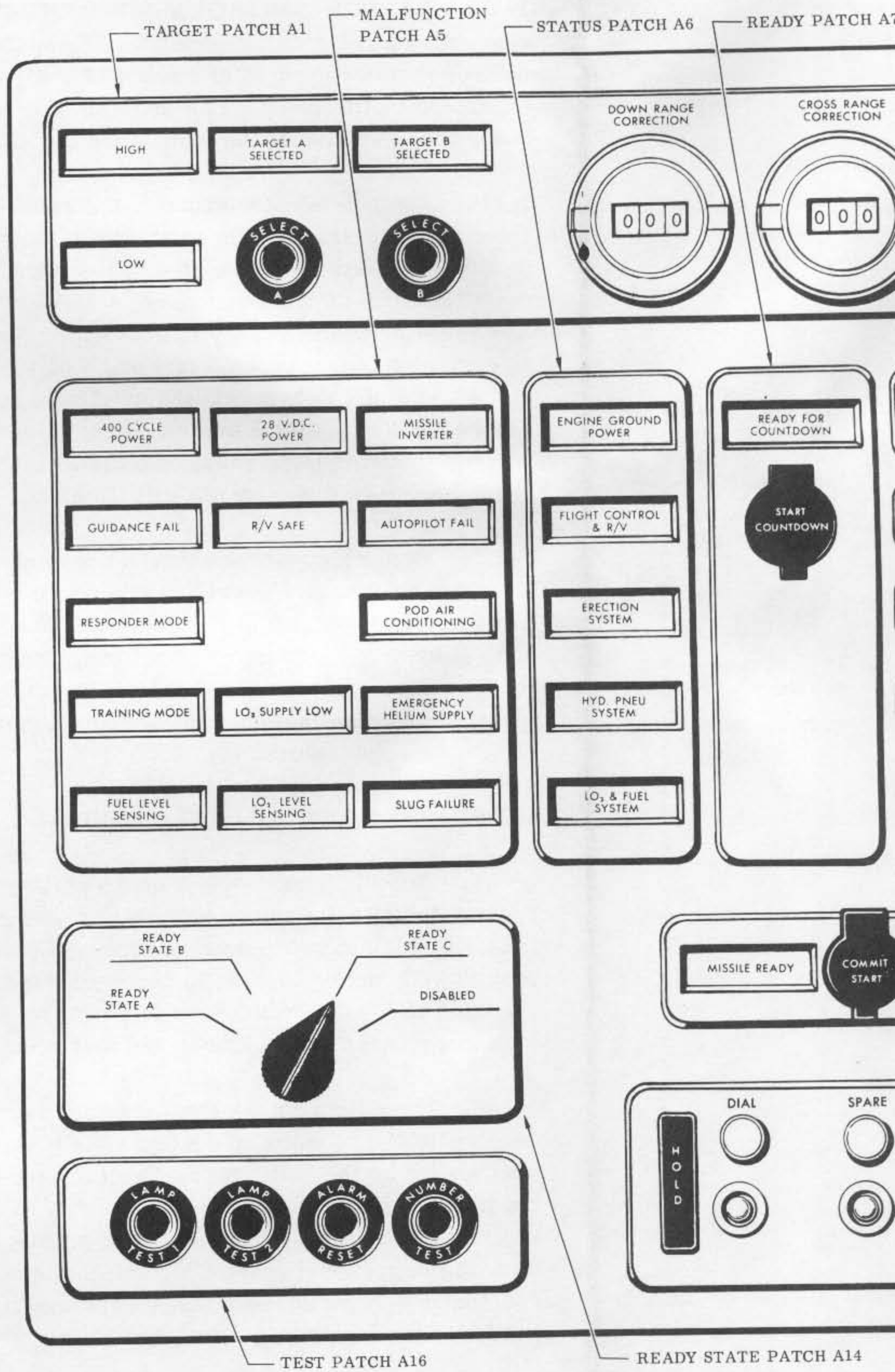


Figure 1-62. Launch Control Console Panel (Typical)


ON
STATUS PATCH A6
READY PATCH A7
COUNTDOWN PATCHES A8, A9, A10, A11, A12
CLOCK PATCH A2
DOWN RANGE CORRECTION
CROSS RANGE CORRECTION
000
000
MINUTES
SECONDS
ENGINE GROUND POWER
FLIGHT CONTROL & R/V
ERECTION SYSTEM
HYD PNEU SYSTEM
LO_2 & FUEL SYSTEM
READY FOR COUNTDOWN
START COUNTDOWN
MISSILE POWER
HEATERS ON
MISSILE BAT. ACTIVATED
ENGINE/MISSILE POWER READY
AUTOPILOT ON
AUTOPILOT TEST
R/V BATTERY TEMPERATURE
GUIDANCE READY
FLIGHT CONTROL R/V READY
ROOF OPEN
MISSILE ERECTED
BOOM CLEAR
FLAME DEFLECTOR DOOR
HOOKS RELEASED
ERECTED READY
HYDRAULIC PRESSURE
LN_2 LOAD
HELIUM LOAD
HYD-PNEU READY
FUEL LINE FILLED
RAPID FUEL LOAD
FUEL COMPLETE
LO_2 LINE FILLED
RAPID LO_2 LOAD
FUEL & LO_2 READY
MISSILE READY
COMMIT START
LAUNCH ENABLED
POWER INTERNAL
PROGRAMMER ARMED
PNEU INTERNAL
LO_2 COMMIT
GUIDANCE INERTIAL
HOLD
DIAL
SPARE
CP
ACP
APCHE
GH
MW
LU
M–1
READY STATE PATCH A14
COMMUNICATIONS PATCH A17

Ch


TARGET PATCH A1
MALFUNCTION PATCH A5
STATUS PATCH A6
READY PATCH A7
HIGH
TARGET A SELECTED
TARGET B SELECTED
LOW
SELECT A
SELECT B
DOWN RANGE CORRECTION
CROSS RANGE CORRECTION
000
000
400 CYCLE POWER
28 V.D.C. POWER
MISSILE INVERTER
GUIDANCE FAIL
R/V SAFE
AUTOPILOT FAIL
RESPONDER MODE
POD AIR CONDITIONING
TRAINING MODE
LO_2 SUPPLY LOW
EMERGENCY HELIUM SUPPLY
FUEL LEVEL SENSING
LO_2 LEVEL SENSING
SLUG FAILURE
ENGINE GROUND POWER
FLIGHT CONTROL & R/V
ERECTION SYSTEM
HYD. PNEU SYSTEM
LO_2 & FUEL SYSTEM
READY FOR COUNTDOWN
START COUNTDOWN
READY STATE B
READY STATE C
READY STATE A
DISABLED
MISSILE READY
COMMIT START
DIAL
SPARE
HOLD
LAMP TEST 1
LAMP TEST 2
ALARM RESET
NUMBER TEST
TEST PATCH A16
READY STATE PATCH A14

32.137-33B

1-177. LAUNCH CONTROL EQUIPMENT CHECKOUT. Checkout of the launch control console and control-monitor group 1 of 4 and 2 of 4 (figure 1-24) is accomplished by using control-monitor group 3 of 4 and 4 of 4 (figure 1-25) to simulate a tactical countdown. Control-monitor group 3 of 4 and 4 of 4 provide simulated missile and AGE. responses that check the operation of the launch control and monitoring system.

1-178. Control-monitor group 3 of 4 and 4 of 4 are located in the mechanical and equipment room of LSB. One or more chassis in the control-monitor group 3 of 4 and 4 of 4 are used to simulate a system connected to the launch control equipment. Prior to a simulated countdown, control-monitor group 3 of 4 and 4 of 4 are switched to control-monitor group 1 of 4 and 2 of 4 by appropriately interchanging plug connections and operating transfer switches on control-monitor group 3 of 4 and 4 of 4. (See figure 1-63.) With control-monitor group 3 of 4 and 4 of 4 connected, the method of controlling and indicating the status of the simulated countdown is the same as during a tactical countdown. When the responders are connected for a simulated countdown the RESPONDER MODE indicator on the malfunction patch of the launch control console will illuminate amber.

1-179. Each responder system is provided with a self-test feature, which permits testing for proper responder operation prior to a simulated countdown. Fault insertion switches on control-monitor group 3 of 4 and 4 of 4 provide a means of testing the ability of the launch control system to detect malfunctions. Normal indications are displayed on indicators on the launch control console panel and the control-monitor group panels. Faults deliberately inserted and malfunctions that actually occur during the simulated countdown are displayed on the same indicators.

1-180. CHECKOUT OF MISSILE GUIDANCE SYSTEM.

1-181. The alignment countdown group is used for control, alignment, checkout, and countdown of the missile guidance system. The group consists of the countdown group (figure 1-64), alignment group sensing platform (collimator), and an amplifier assembly. The countdown group is located in the mechanical and equipment area, the alignment sensing platform is located in the collimator pit in the missile bay, and the amplifier is located in the interconnecting box launch and test group.

1-182. The alignment countdown group has the function of keeping the missile inertial guidance system equipment in continuous alignment during standby and countdown. This is accomplished by the collimator, an electronic device that directs a thin beam of light through the inertial guidance sight tube assembly to the missile. If the reflected beam does not fall within certain limits, the collimator senses the error and transmits an electrical signal back to the guidance system to realign the sensing platform. In general, the alignment countdown group ensures a successful operation of the missile guidance set by performing the following functions:

a. Checkout of all missile guidance system and guidance aerospace ground equipment to ensure that they are within allowable limits.

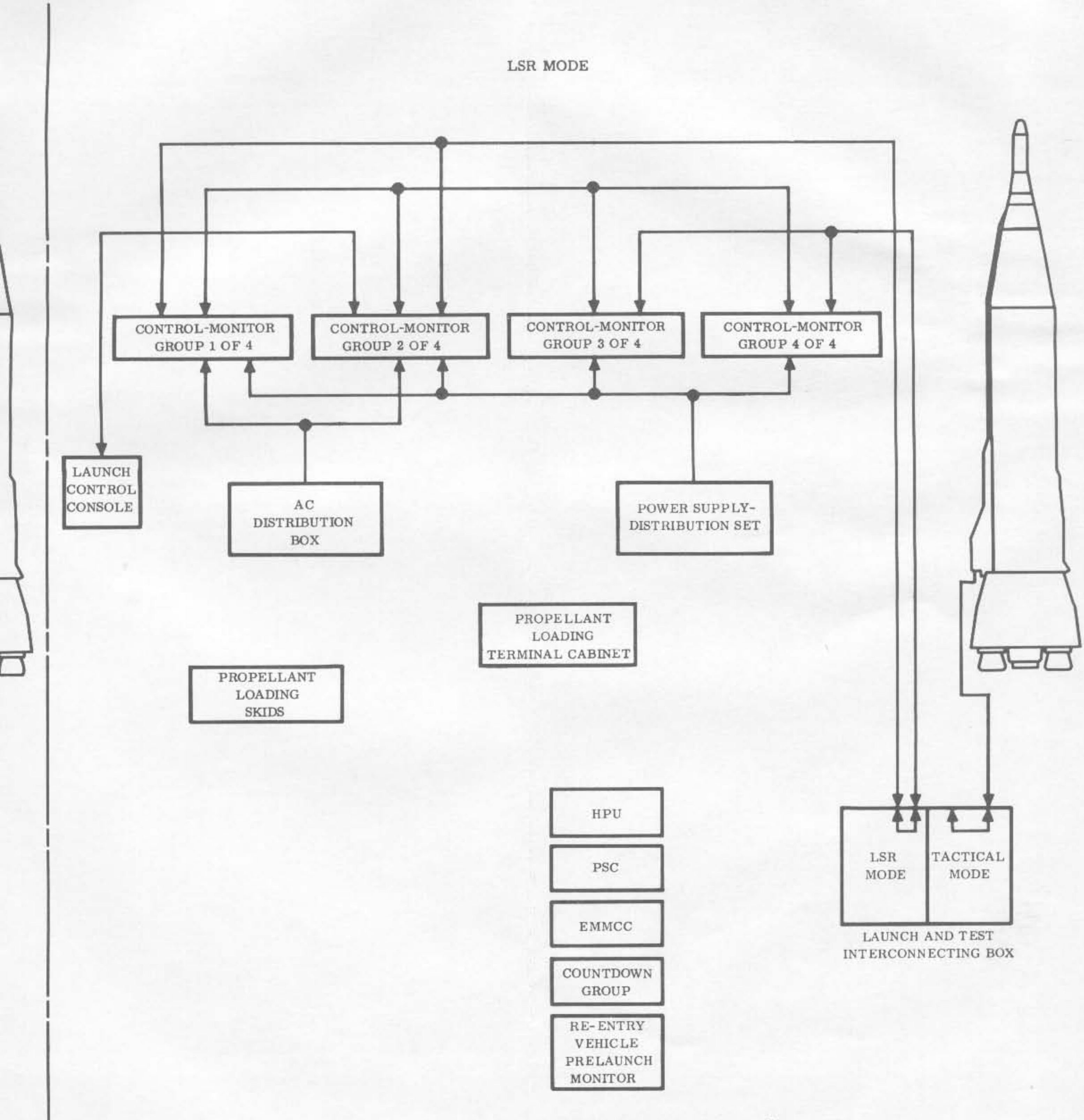
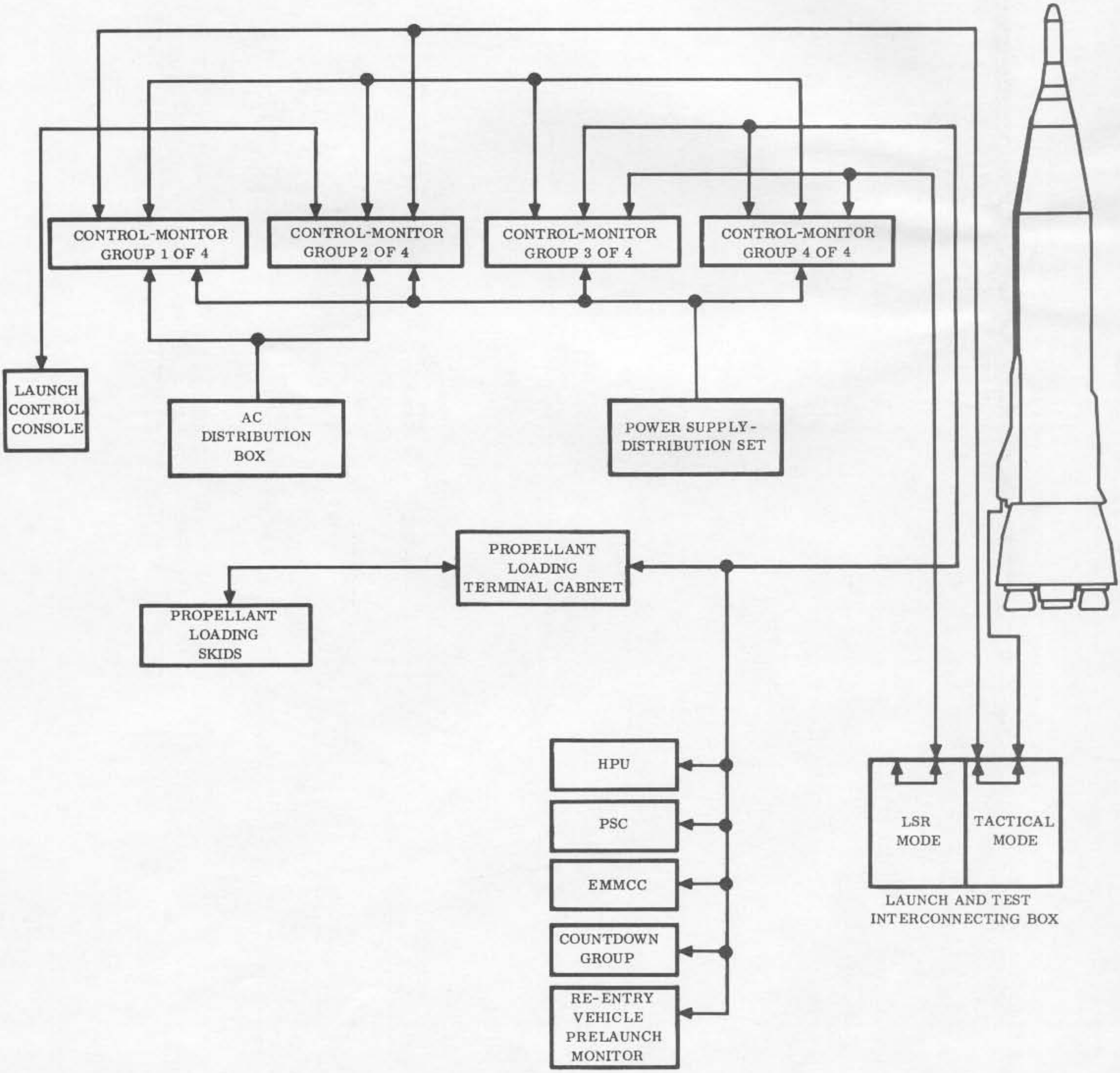


Figure 1-63. Control-Monitor Group Configurations

TACTICAL MODE



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COUNTDOWN GROUP

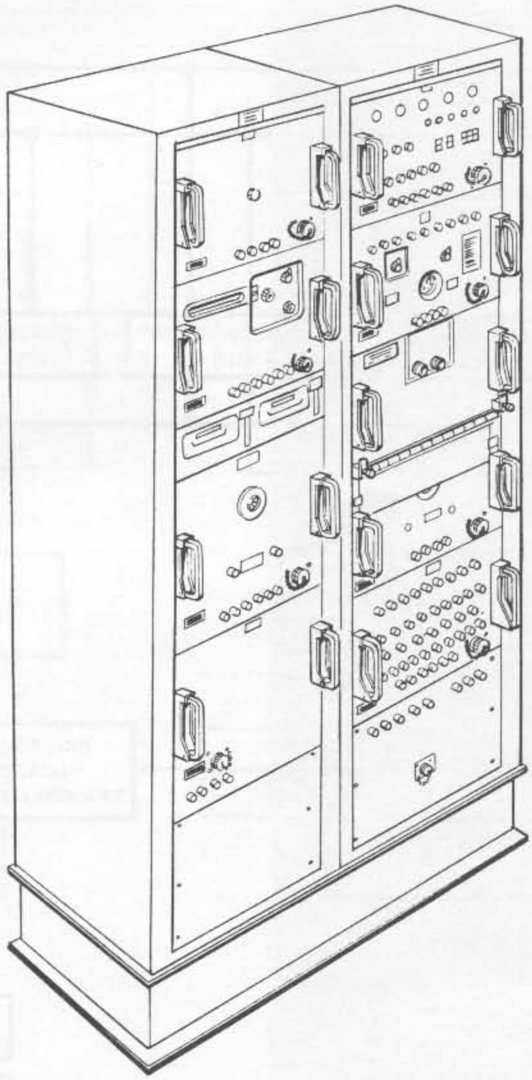

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Figure 1-64. Countdown Group

b. Countdown, alignment, test, and monitoring of the missile guidance system.

c. Calibration, alignment, and automatic fault isolation of major replaceable units on a system basic.

1-183. RE-ENTRY VEHICLE MONITORING AND CHECKOUT.

1-184. Re-entry vehicle monitoring and checks are accomplished by the re-entry vehicle prelaunch monitor (figure 1-65). This unit contains indicators to monitor re-entry vehicle status and controls to perform checks on the re-entry vehicle system. The monitor unit is checked by using a re-entry vehicle simulator which isolates malfunctions to the re-entry vehicle, the missile, or the monitor.

1-185. LAUNCH COMPLEX EMERGENCY EQUIPMENT.

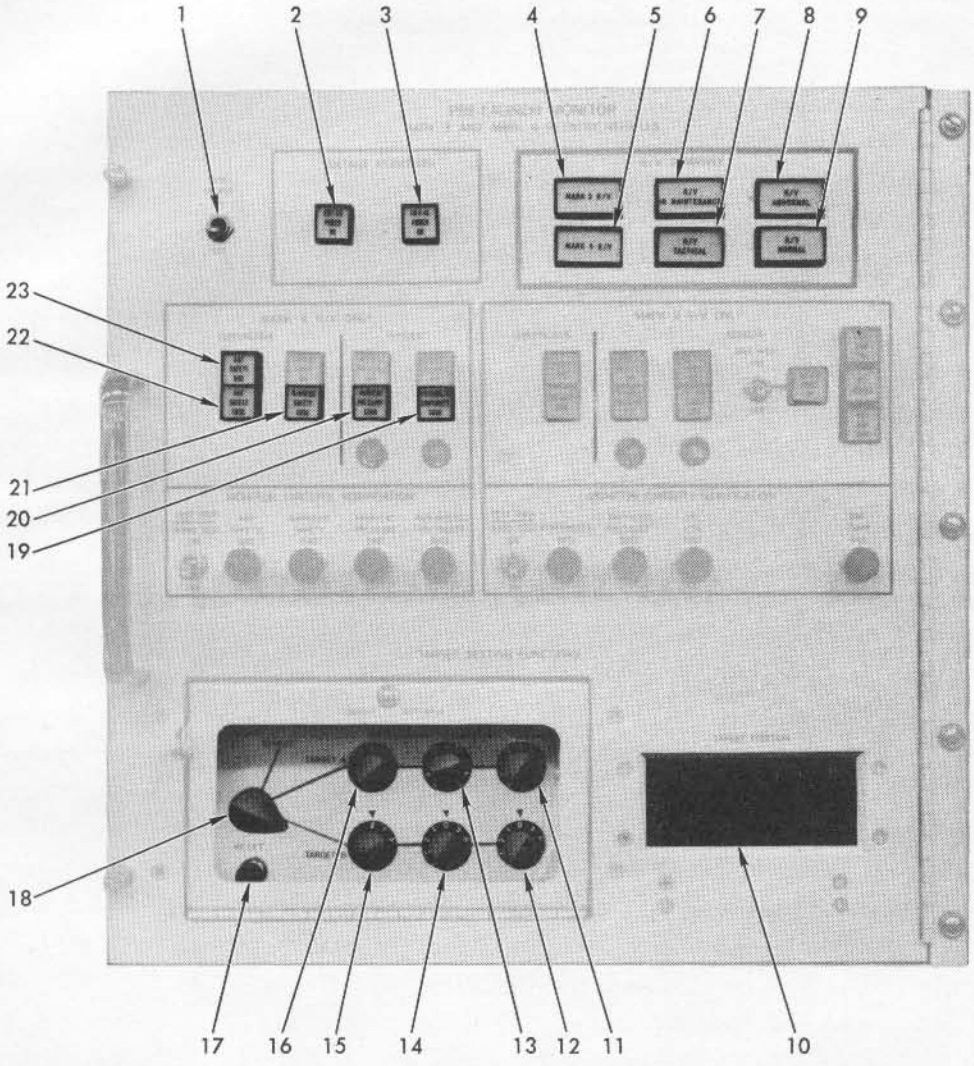
1-186. Launch complex equipment, provided for personnel safety and fire fighting, consists of the emergency shower system, the eye-wash system, portable fire extinguishers, the fire hose station system, personnel safety and emergency rescue equipment, and the emergency lighting system. At OSTF-1 and SMS 576-C, fire blanket stations are provided.

1-187. EMERGENCY SHOWER SYSTEM. The emergency shower system provides a quick water wash for personnel who have received harmful contaminants on their clothing or person. Two emergency showers are available, one being located in the liquid oxygen room and the other adjacent to skid NO. 6 in the launch and service building. Each emergency shower is equipped with a quick opening push type valve that remains open until manually closed. In addition, at SMS 548 complexes, a third shower is located topside near the liquid oxygen fill stubup. OSTF-1 and SMS 576-C have the two emergency showers inside the launch and service building, as at the operational sites, and an emergency shower on either side, west and east, externally at the launch and service building.

1-188. EMERGENCY EYEWASH SYSTEM. The eyewash system provides a quick water wash for personnel who have received harmful contaminants in or around their eyes. Each eyewash fountain is located next to an emergency shower at the station and is equipped with a quick opening push type valve that remains open until manually closed.

1-189. PORTABLE FIRE EXTINGUISHERS. Portable fire extinguishers are provided for immediate use by personnel in the event of fire. These extinguishers are located at appropriate areas around the sites. There are two types of extinguishers: the CO_2 portable type and the water hand pump type.

1-190. FIRE HOSE STATION SYSTEM. The fire hose station system furnishes water to the missile bay and the launch and service building in the event of fire. The system consists of two fire hose rack units, one located on the east wall of the missile bay and the other located on the outside east wall of the fuel room. A typical fire hose rack unit consists of a 6-pound valve, rack nipple, pin-type rack, drain and vent, 75 feet of linen hose, couplings, and a 1/2-inch by 10-inch hose nozzle.



1 PANEL POWER TOGGLE SWITCH
2 28 VDC POWER ON INDICATOR (GREEN)
3 115 VAC POWER ON INDICATOR (GREEN)
4 MARK 3 R/V INDICATOR (WHITE)
5 MARK 4 R/V INDICATOR (WHITE)
6 R/V IN MAINTENANCE INDICATOR (WHITE)
7 R/V TACTICAL INDICATOR (GREEN)
8 R/V ABNORMAL INDICATOR (RED)
9 R/V NORMAL INDICATOR (GREEN)
10 TARGET POSITION INDICATOR
11 TARGET A UNITS ROTARY SWITCH
12 TARGET B UNITS ROTARY SWITCH
13 TARGET A TENS ROTARY SWITCH
14 TARGET B TENS ROTARY SWITCH
15 TARGET B HUNDREDS ROTARY SWITCH
16 TARGET A HUNDREDS ROTARY SWITCH
17 RESET MOMENTARY PUSHBUTTON SWITCH
18 TARGET SELECT ROTARY SWITCH
19 ASSEMBLED CONTINUITY GOOD INDICATOR (GREEN)
20 WARHEAD PRESSURE GOOD INDICATOR (GREEN)
21 WARHEAD SAFETY GOOD INDICATOR (GREEN)
22 A&F SAFETY GOOD INDICATOR (GREEN)
23 A&F SAFETY BAD INDICATOR (RED)

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Figure 1-65. Prelaunch Monitor Controls and Indicators

1-191. PERSONNEL SAFETY AND EMERGENCY RESCUE EQUIPMENT. Personnel safety and emergency rescue equipment consists of protective clothing and emergency breathing apparatus. The protective clothing is centrally stored on the site and is used when working with cryogenic liquids or fuel or for emergencies. The breathing apparatus is stored at the entrance to the launch and service building and at other appropriate areas. It is used when a low concentration of oxygen is present or when entering sumps or pits where dangerous gases may have collected.

1-192. EMERGENCY LIGHTING SYSTEM. Emergency lights are located throughout the site. When loss of primary power occurs, an automatic changeover switch directs power to the emergency lighting system. Power is derived from emergency batteries.

1-193. MISSILE.

1-194. The SM-65E Strategic Missile (figure 1-66) is capable of delivering a thermonuclear warhead or other re-entry vehicle payloads to a target more than 5500 miles away. The missile consists of three major sections: nose section, tank section, and booster section.

1-195. The nose section consists of the re-entry vehicle and adapter. The adapter is a rigid conical structure attached to the forward end of the missile tank section. The re-entry vehicle, attached to the adapter, houses the payload and contains circuits and components required to accomplish re-entry vehicle separation and spin. If a warhead is installed, arming and fusing circuits are also provided. The re-entry vehicle release mechanism is built into its after section.

1-196. The tank section is a thin-walled stainless steel monocoque structure which is closed at the forward end by a domed bulkhead, and at the after end by a cone-shaped bulkhead. An insulated intermediate bulkhead divides the tank sections into a forward tank for liquid oxygen and an after tank for fuel. Equipment pods are located externally on the tank section and house missile electrical equipment (battery and inverter), flight control system equipment, retarding rockets, guidance system equipment, and instrumentation equipment, Two externally mounted ducts at the after end of the liquid oxygen tank supply the rocket engines and serve as ground fill connections. Two staging fuel valves and ducts that feed the two booster engine fuel pumps are mounted on the after bulkhead. A third outlet duct is routed to the sustainer engine fuel pump. Booster engine thrust is transmitted to the tank section through a thrust ring attached to the fuel tank. Sustainer engine thrust is transmitted to a thrust ring that forms the truncated end of the after bulkhead.

1-197. The tanks must be pressurized or missile in stretch at all times, to prevent collapse of the tank section. During standby and countdown, missile tank pressurization is maintained by supplying (or venting) GN_2 from a ground pressure system control. Airborne bottles which are filled during countdown provide inflight tank pressures.

1-198. The booster section, jettisoned at staging, contains subassemblies of the propulsion, pneumatic, electrical, and hydraulic systems used during booster stage. The booster separation mechanism consists of four stirrup and hook type latches that lock the booster

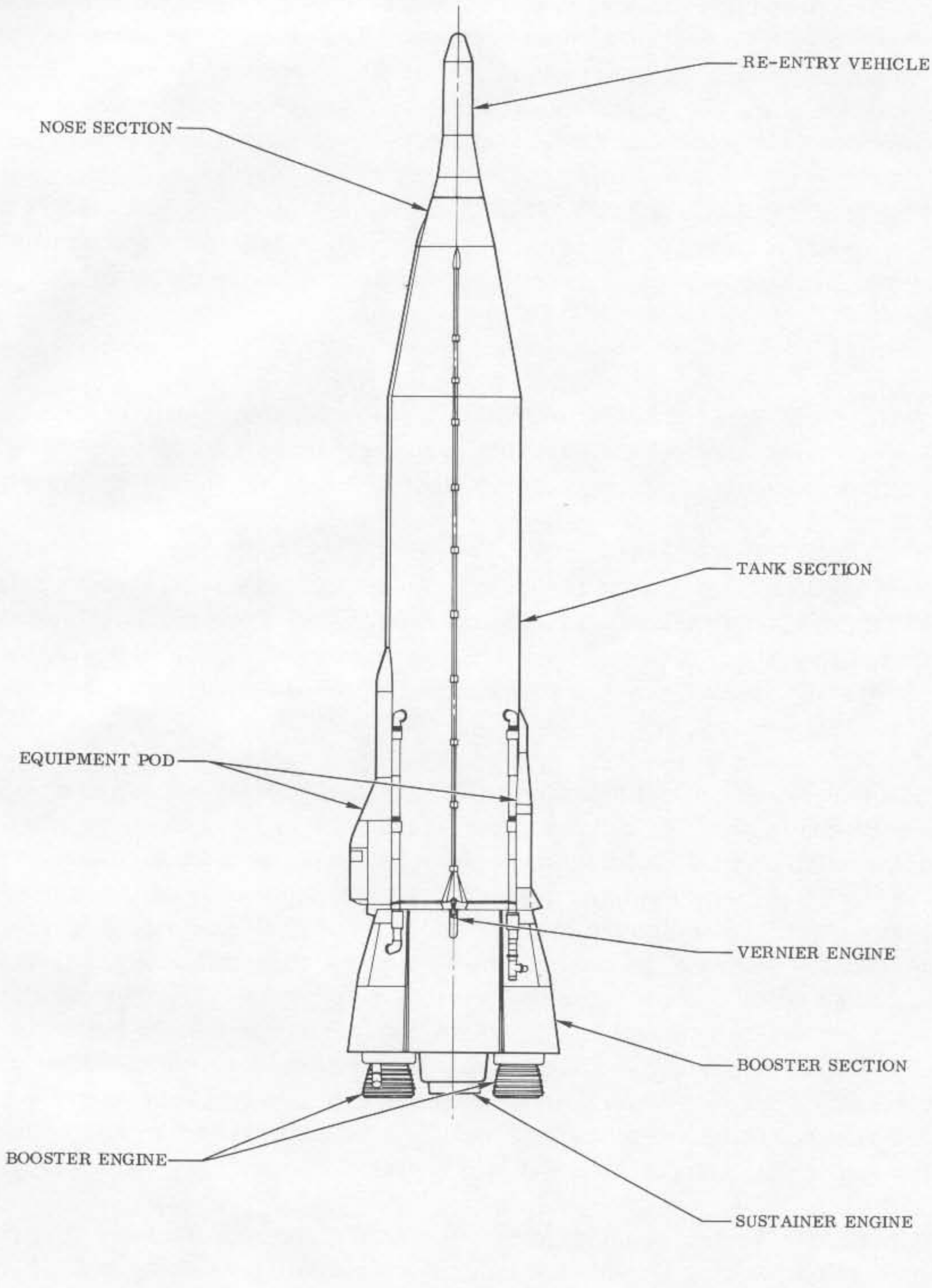

Figure 1-66. SM-65E Strategic Missile

section to the missile tank section. These latches are symmetrically located in the skin structure of the thrust cylinder, one in each of the four missile quadrants. The attachment and release hooks are installed on the booster section and mate with stirrups on the missile tank section. Helium pressure is directed through an explosive valve and distribution manifold to release the latches. At staging, the explosive valve opens, high-pressure helium gas is released, all latches open simultaneously, and the booster section separates from the missile. Jettison track guide slides, bolted to the inside of the thrust cylinder, engage the jettison tracks mounted on the after bulkhead and guide the booster section off during staging.

1-199. Four missile support longerons, located laterally along the exterior surface of the booster section, incorporate slots which are engaged by the launcher holddown hooks. Pins in the launcher pedestals mate with holes in the after ends of the support longerons. Quick disconnect fittings uncouple the hydraulic and pneumatic lines, the liquid oxygen lines, and the fuel lines at staging. Rise-off disconnect fittings connect the hydraulic and pneumatic lines on the missile to the ground supply lines. A radiation shield protects the engine compartment from rocket engine exhaust heat. A door in the shield can be removed for access to the engine compartment when the booster section is mated to the tank section.

1-200. PROPULSION SYSTEM.

1-201. The missile propulsion system (figure 1-67) propels the missile from the missile launcher through a desired ballistic trajectory. The system consists of two booster engines, two vernier engines, one sustainer engine, a vernier solo tank system and associated subsystems. All engines are of the single-start type and use RP-1 fuel and liquid oxygen. The combined thrust of the five engines at sea level totals approximately 389,000 pounds.

1-202. Engine start is accomplished during countdown by the launch control system. For starting and progression into mainstage operation, the following sequence of events occurs. The booster and sustainer engines each utilize a solid propellant gas generator and are controlled by a fuel pressure ladder sequence. During start, an engine start signal fires the solid propellant gas generator initiators forcing hot gases produced by the burning of the solid propellant to the turbopump turbines. This provides the initial drive to the turbopumps. The turbopumps force liquid propellants from the missile tanks directly to the thrust chambers and liquid propellant gas generators. Electrical signals and fuel pressure control the various propellant valves. Combustion is initiated by hypergolic combination in all thrust chambers. Pyrotechnic igniters, electrically fired, ignite the propellants as they flow into the liquid propellant gas generators. The hot gases produced by the liquid propellant gas generators sustain mainstage operation after starting and until the engines are shut down.

1-203. The vernier engines start shortly after the booster and sustainer engines reach mainstage (at approximately 3.5 seconds) and operate on propellants supplied from the sustainer engine.

1-204. During standby, the solid propellant gas generators are monitored and their status displayed on the launch control console by a summary signal from the engine subsystem

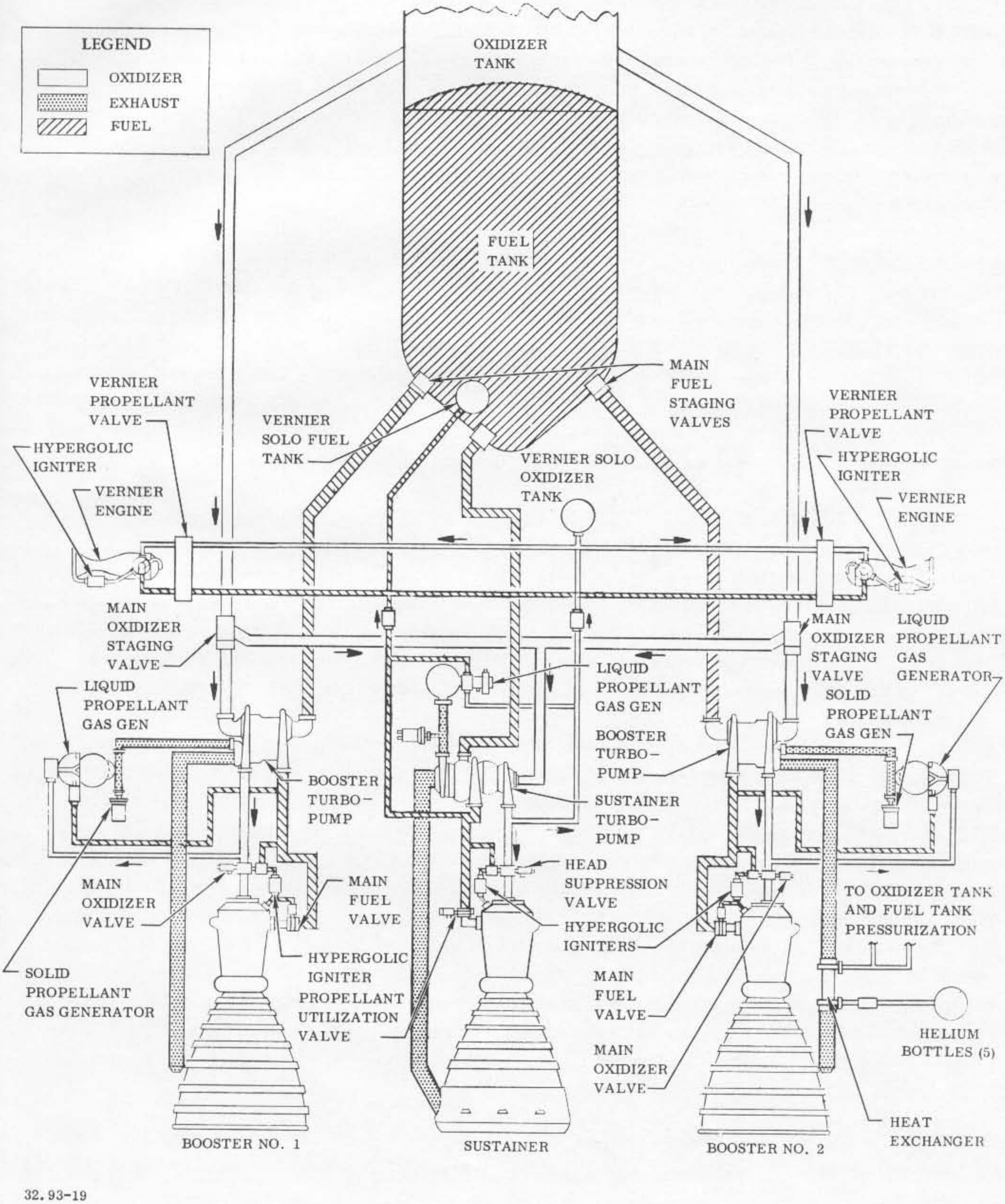

Figure 1-67. Missile Propulsion System

panels that illuminates the ENGINE GROUND POWER indicator. The only indicators on the launch control console directly related with the propulsion system during countdown but prior to commit are HEATERS ON and ENGINES/MISSILE POWER READY indicators in the countdown patch. When these indicators illuminate green and all of the other system conditions have been satisfied, the MISSILE READY indicator illuminates green. Turning the COMMIT START key switch starts the final sequence if the LAUNCH ENABLED indicator on the commit patch illuminates green. When the rocket engines enter the ignition stage, the ENGINE START indicator on the commit patch illuminates green. From this point, all sequencing and operation of the booster and sustainer engine components are governed by a fuel pressure sequence and, therefore, are independent of the launch control center. Upon receipt of the sustainer engine start signal and when sufficient thrust has developed to result in a one-inch rise-off of the missile from the launch pad, a signal ejects the umbilicals and illuminates the MISSILE AWAY indicator on the commit patch of the launch control console. If the missile engines fail to build up sufficient thrust for one-inch rise-off within five seconds after engine start, a time delay picks up and the engines are cut off.

1-205. After certain programmed flight conditions are met, signals from the missile guidance system cut off the booster engines and separate the booster section from the missile. The sustainer engine is similarly cut off at a later time but does not separate from the missile tank section. Vernier engines continue to operate on propellants from the vernier engine solo tanks, which have been filled and pressurized before sustainer cutoff. Upon completion of the vernier correction phase, the vernier engines are cut off and the missile tank section is separated from the re-entry vehicle by a signal from the missile guidance system.

1-206. MISSILE PROPELLANT UTILIZATION SYSTEM.

1-207. When the missile is launched, the propellant tanks contain liquid oxygen and fuel at a specified weight ratio. If the rocket engines burn the propellants in the proper mixture, the ratio of propellants remaining in the missile will not vary. However, because of accelerative forces, the missile turbopumps tend to feed the heavier (more dense) liquid oxygen at a faster rate than the lighter (less dense) fuel. During operation of the engines, the propellant utilization system (figure 1-68) continuously monitors the ratio of propellants remaining in the tanks and tends to maintain the proper ratio by regulating the flow ratio of propellants to the sustainer engine.

1-208. Ultrasonic sensors, installed on the still-wells in both the fuel and liquid oxygen tanks, provide indications of propellant consumption, These sensors change impedance as the propellant levels pass each sensor station. The stations are positioned so that similarly numbered sensors in both tanks are uncovered simultaneously when propellant flow ratio is within limits. Time differences in the signals received from a matching pair of sensors indicate a discrepancy in the volume of flow. The system computer receives the propellant level signals from the sensors, detects discrepancies between rates of propellant flow, and

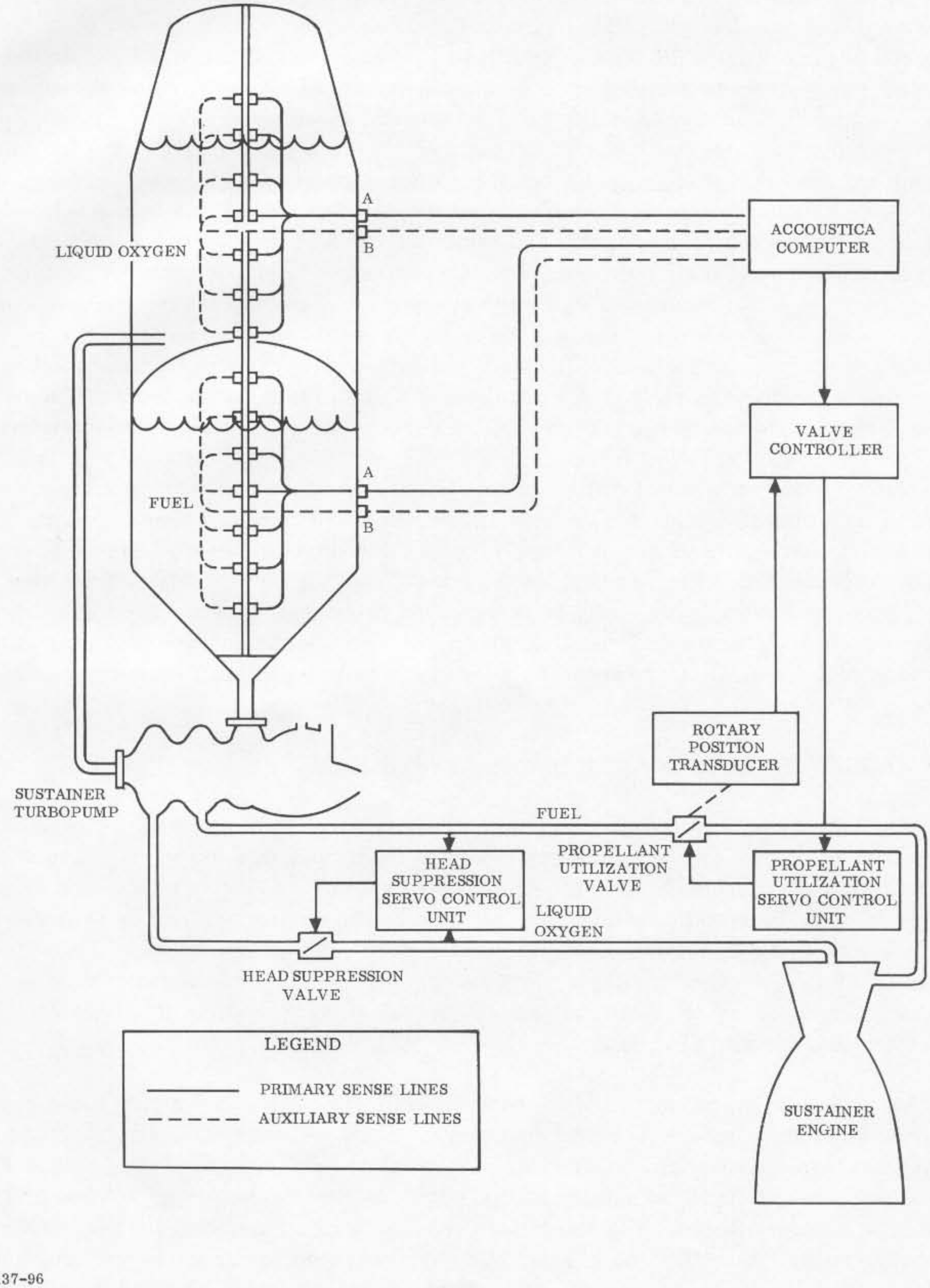

Figure 1-68. Missile Propellant Utilization System

generates correcting signals. The correcting signals are compared to servo feedback signals from the propellant utilization valve transducer, and the resulting control command signal controls the position of the propellant utilization valve, which regulates the flow of fuel to the sustainer engine. Each correction of rate of fuel flow by the fuel utilization valve is sensed by the head suppression servocontrol valve, which makes an opposite adjustment of the rate of flow of liquid oxygen to the sustainer engine.

1-209. FLIGHT CONTROL SYSTEM.

1-210. The missile flight control system (figure 1-69) consists of the inertial guidance subsystem and autopilot subsystem. It steers and stabilizes the missile during the powered portion of flight so that when the re-entry vehicle separates from the tank section and enters free fall, it will continue in a ballistic trajectory to intersect the designated target area. The autopilot controls missile attitude during flight by issuing steering commands to the servovalves of the engine thrust chamber hydraulic actuators. The hydraulic actuators, in turn, regulate the angular displacement of the thrust chambers, thereby controlling the direction of forces acting upon the missile.

1-211. The flight control system controls the booster, staging, sustainer, and vernier flight phases. During the first portion of this period, the inertial guidance subsystem supplies the roll voltage to the autopilot subsystem. The missile rotates about its roll axis to establish the yaw axis of the missile in a vertical plane through the desired cutoff trajectory. At the end of the roll maneuver, vernier engine NO. 2 is oriented on the side facing the target. A missile pitchover, which lasts until staging, is then programmed to direct the missile toward the target.

1-212. The inertial guidance subsystem continuously corrects missile flight attitude in order to select, incrementally, the optimum trajectory for successful accomplishment of the mission. Targets are preselected while the missile is on the ground by inserting specific target constants boards into the missile guidance subsystem computer.

1-213. The autopilot subsystem generates signals to control the programmed functions of missile flight, and to maintain correct flight attitude. Assisted in part by discrete commands from the inertial guidance subsystem, the preset switching circuits of the automatic pilot programmer control the sequencing of the following major inflight operations: booster engine cutoff and booster section jettison, sustainer and vernier engine cutoff, re-entry vehicle separation, and the firing of retarding rockets.

1-214. RE-ENTRY VEHICLE.

1-215. The Mark IV re-entry vehicle (figure 1-66) houses the missile payload, protects it during re-entry into the atmosphere, fuzes and arms the warhead, and transports the payload to the target area during the final portion of flight. It is of the ablative type, structurally consisting of a nose section, center section, and after section. Functional systems include a separation system and an arming-fuzing system. Prearming of the warhead occurs at a predetermined position during flight upon receipt of a signal from the flight control system. When the release point is reached, the re-entry vehicle separates from the missile tank section for its final plunge to the target.

1-216. The re-entry vehicle is held in place on the missile airframe by tension applied through the separation mechanism to a tension cone. The cone firmly grasps the flare of the re-entry vehicle and provides for electrical interface with the missile airframe. When the separation command is received, the separation mechanism releases the tension on the

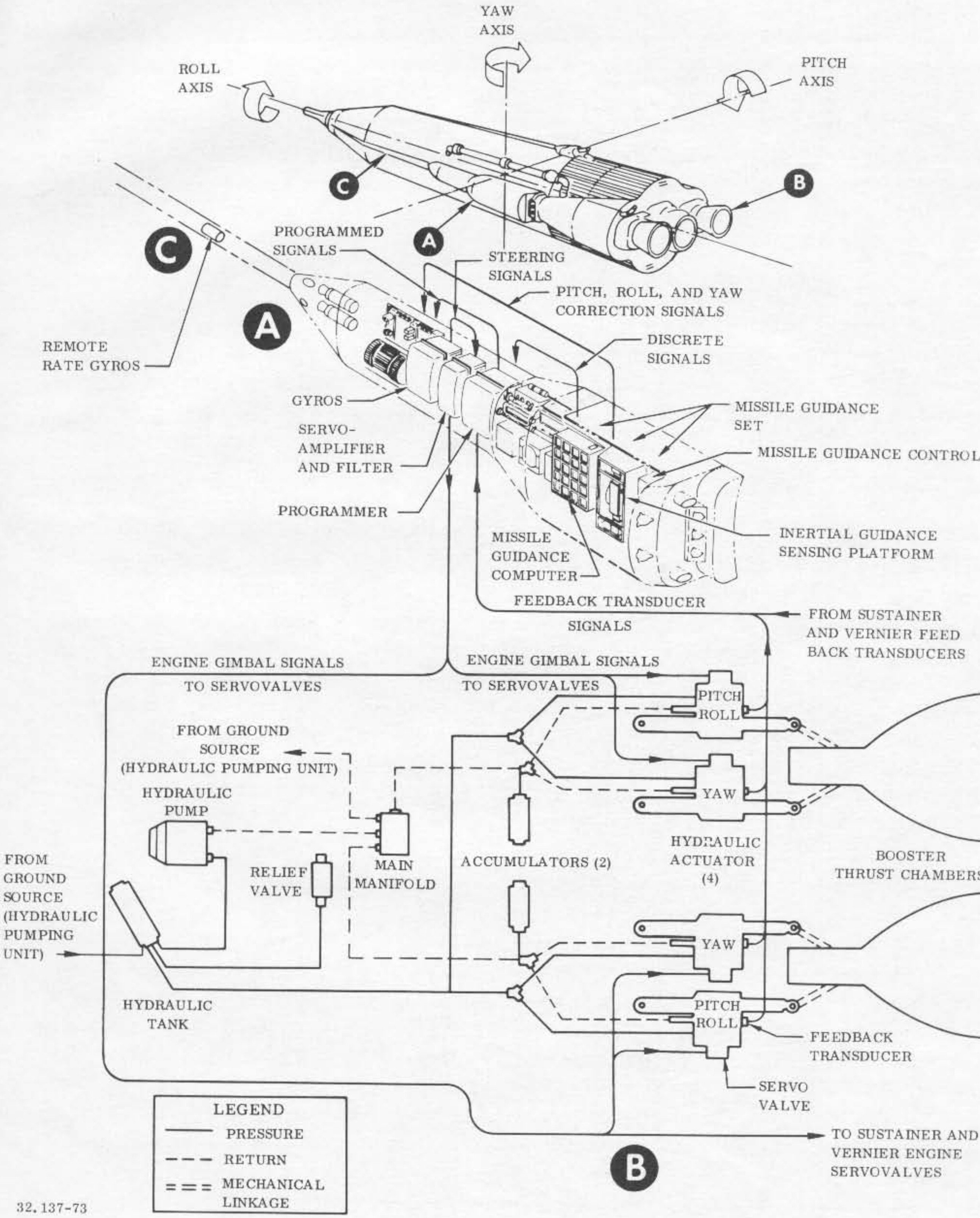

Figure 1-69. Missile Flight Control, Guidance, and Booster Hydraulic System

cone, causing it to spring apart and free the re-entry vehicle. The electrical interface is broken at this time.

1-217. At countdown start, the re-entry vehicle sequencer initiates a verification check of the re-entry vehicle prelaunch monitor and re-entry vehicle circuits. Since the Mark IV re-entry vehicle contains no battery heaters, the R/V BATTERY TEMPERATURE indicator on the launch control console illuminates green immediately when countdown is started. The FLIGHT CONTROL AND R/V indicator illuminates green when the re-entry system is ready for the final countdown commit sequence. No changes occur in the re-entry vehicle status during commit.

1-218. MISSILE HYDRAULIC SYSTEM.

1-219. The missile hydraulic system (figure 1-70) furnishes power to the engine thrust chamber gimballing actuators to provide pitch, roll, and yaw control of the missile during flight. Hydraulic pressure from the system is also used to operate the sustainer propellant valves and gas generator valves during sustainer engine operation. The booster, sustainer-vernier, and the vernier solo hydraulic subsystems are operational during the various flight phases.

1-220. The booster hydraulic subsystem provides hydraulic power to gimbal the two booster engine thrust chambers for pitch, yaw, and roll control from missile launch until staging. During this period the sustainer-vernier hydraulic subsystem provides power to gimbal the vernier engines for roll control only. Following booster engine cutoff, the sustainer engine is gimbaled briefly for pitch and yaw control, and then is locked on center to permit jettisoning of the booster section. The sustainer-vernier hydraulic subsystem is again enabled, after staging and until sustainer engine cutoff, to gimbal the sustainer engine for pitch and yaw control and the verniers for roll control. After sustainer engine cutoff the vernier solo subsystem supplies power to gimbal the vernier engines for the remaining seconds of powered flight.

1-221. Operation of the sustainer-vernier solo subsystems is similar. The booster and sustainer-vernier hydraulic pumps are driven by the booster and sustainer engine turbopumps respectively. Vernier solo hydraulic actuators are operated, after sustainer engine cutoff, by a hydraulic pneumatic accumulator pressurized with gaseous nitrogen. The hydraulic accumulator and hydraulic pumps supply hydraulic fluid to the servovalves and hydraulic pistons which gimbal the engine thrust chambers. Feedback transducers, physically connected to the hydraulic actuators, sense the amount of thrust chamber movement from the null position and feed back a cancellation signal to the flight control system. The hydraulic reservoir is pressurized with gaseous nitrogen prior to flight, and helium during flight, to supply a positive head for preventing system cavitation. Accumulators, pressurized with gaseous nitrogen, absorb pressure surges and prevent momentary line pressure drops in the event system demand exceeds pump capacity.

1-222. During standby, the status of the hydraulic, pneumatic, liquid nitrogen, and helium systems is monitored and displayed on the launch control console by a summary signal from

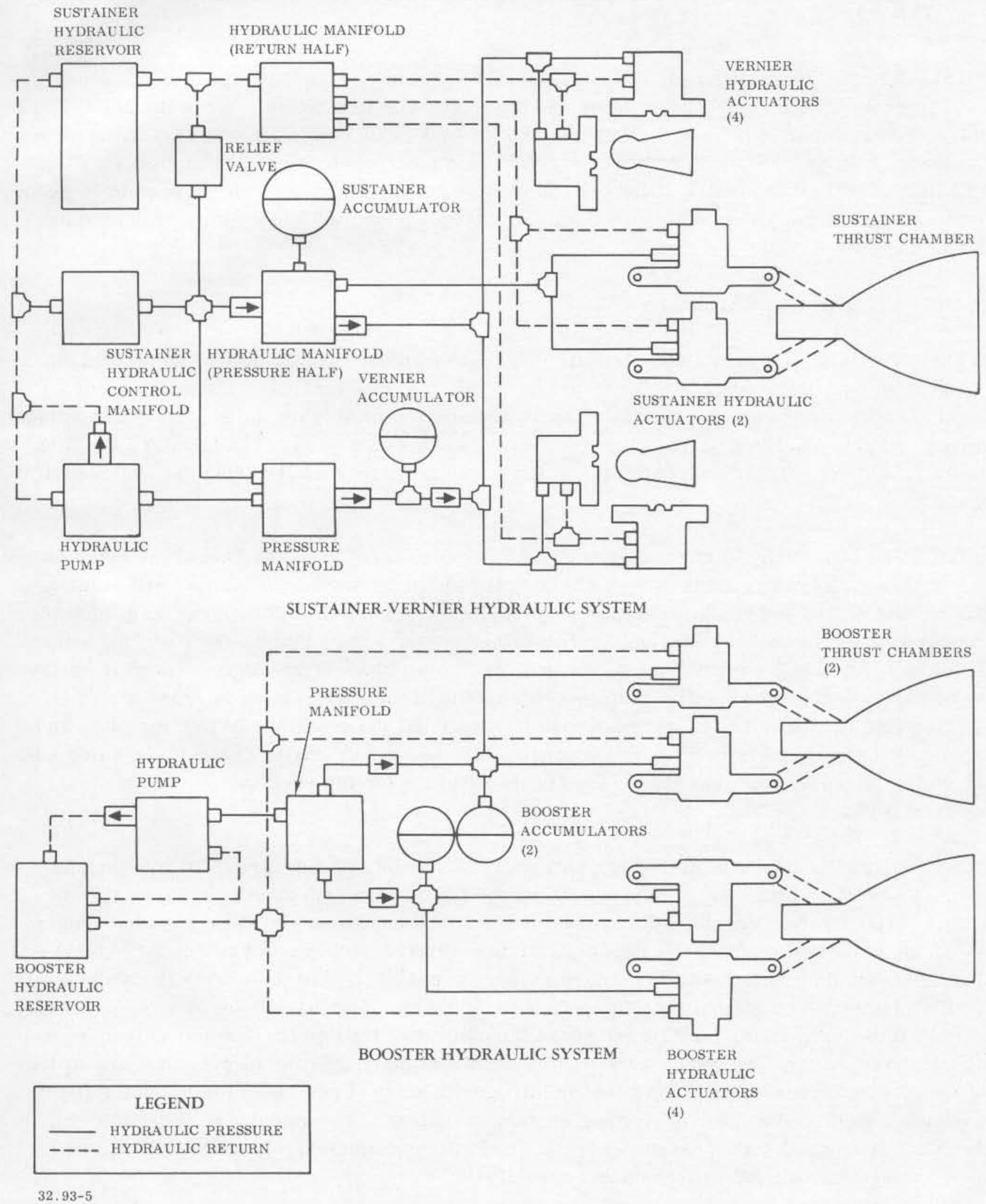

Figure 1-70. Missile Hydraulic System

the various subsystem panels that illuminate the HYD-PNEU SYSTEM indicator. The indicators directly related to the missile hydraulic system during countdown prior to commit are the HYDRAULIC PRESSURE and HYD-PNEU READY indicators in the countdown patch. These indicators illuminate green when hydraulic pressure is within limits and the pneumatic, liquid nitrogen, and helium systems are also ready.

1-223. Turning on the COMMIT START key switch on the launch control console initiates evacuation of the airborne hydraulic fluid tanks. The reservoir shutoff valves close and evacuation chamber shutoff valves open. The application of 2000-PSI hydraulic pressure forces the evacuation chamber piston to the nitrogen end of the chamber. This action draws approximately 65 cubic inches of fluid from each missile hydraulic fluid reservoir, providing space for fluid expansion. This hydraulic commit sequence is one of the summary conditions for GUIDANCE INERTIAL indicator illuminating green.

1-224. MISSILE PNEUMATIC SYSTEM.

1-225. The missile pneumatic system (figure 1-71) provides inflight pressurization for the fuel and liquid oxygen tanks from the time pressurization is transferred to internal during the commit sequence of countdown, through missile flight. Pressures in the propellant tanks are regulated and maintained at flight pressure by pressure regulators and the missile helium supply. The airborne pneumatic system is protected from overpressurizing by relief valves.

1-226. The missile pneumatic system contains two basic subsystems, a primary supply subsystem and a secondary supply subsystem. The primary supply subsystem consists of five shrouded helium bottles, control valves, and interconnecting tubing. It distributes helium at a regulated pressure to the propellant tanks during the booster stage only; and is jettisoned with the booster section at staging. The secondary supply subsystem, which consists of a single airborne ambient temperature helium bottle, valves, and interconnecting tubing, supplies helium to activate the vernier control valves.

1-227. At launch when the missile separates from ground connections, missile lines are sealed by spring-loaded valve in all but two of the missile halves of the connectors. The two liquid nitrogen connectors have no valves; consequently, these lines remain open allowing liquid nitrogen in the helium bottle shrouds to drain. After rise-off, the airborne helium supply furnishes inflight pressurization for the propellant tanks, airborne hydraulic fluid reservoirs, and the engine lubrication tanks. Airborne helium bottles are cooled by the liquid nitrogen filled shrouds prior to launch, permitting a greater volume of the gas to be contained in the bottles. An airborne heat exchanger, located in the booster engine NO. 2 turbine exhaust, heats and expands the chilled helium. The helium is then routed through regulators to the propellant tanks for pressurization.

1-228. The status of the missile pneumatic system is monitored and displayed on the launch control console during standby by a summary signal from the various subsystem

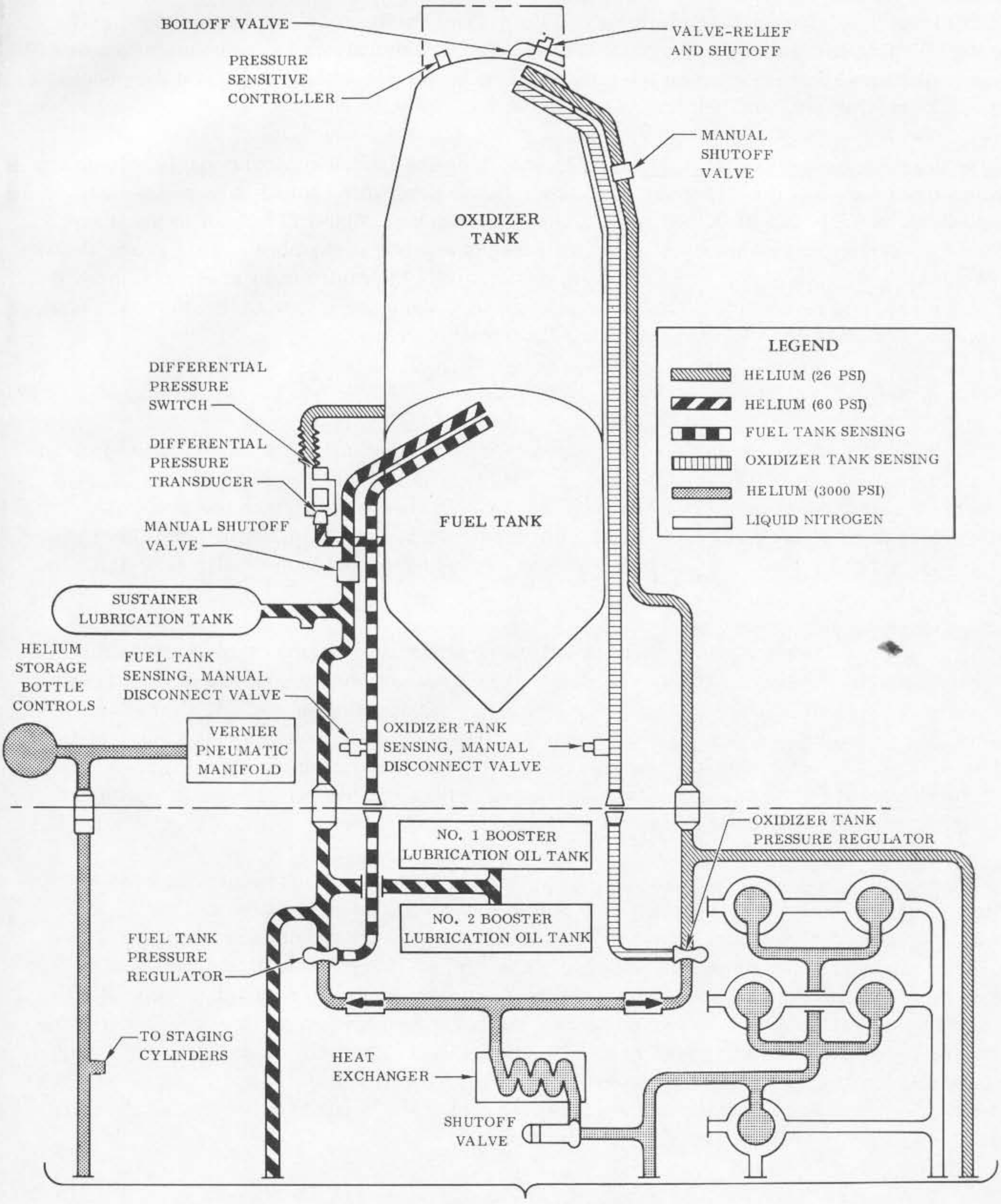

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Figure 1-71. Missile Pneumatic System

panels that illuminate the HYD-PNEU SYSTEM indicator in the status patch. Indicators directly related with the pneumatic system during countdown, but prior to commit, are the LN_2 LOAD, HELIUM LOAD, and HYD-PNEU READY indicators in the countdown patch. When system is ready for the commit sequence, the MISSILE READY indicator illuminates green.

1-229. The transfer of airborne pneumatics to internal control starts when the POWER INTERNAL indicator on the launch control console illuminates green. When the ground pressurization subsystem and the pressure system control complete their functions and missile pressurization components take over, the PNEUMATICS INTERNAL indicator in the commit patch illuminates green and the pneumatic system is ready for launch.

1-230. MISSILE ELECTRICAL SYSTEM.

1-231. The missile electrical system (figure 1-72) consists of the main missile battery, 400-CPS inverter, power changeover switch, and interconnecting cabling and harnesses. It distributes AC and DC power to the various missile systems during standby, countdown, and flight. During standby and the first part of countdown, the power required by the missile is supplied from ground sources (except power for the re-entry vehicle). The main missile battery is activated and the 400-CPS inverter is started during countdown. After the power changeover switch transfers power from ground to internal (airborne) during the commit sequence, the main missile battery provides DC power and the battery inverter combination provides AC power to missile systems. Both the battery voltage and the 400-CPS inverter output are checked prior to switching the missile to internal power.

1-232. The main missile battery consists of 20 silver-zinc oxide cells, a battery activation mechanism, and a thermostatically controlled heater. Enclosed in a rectangular canister, the battery is located in the B-2 equipment pod, along with the 400-CPS inverter and the power changeover switch. The battery is stored in a dry-charge state. It contains a squib activation circuit which permits remote energizing of the battery cells during countdown. Activation occurs when a signal from the launch control system is applied across the pins of the activation squib, resulting in the production of pressurized gas which ruptures two diaphragms, allowing the electrolyte to flow to the battery cells. The battery is capable of supplying 28 volts at 170 amperes for a maximum period of ten minutes.

1-233. The missile 400-CPS inverter is contained in a sealed canister and consists of a motor-driven inverter, a magnetic amplifier, a voltage regulator, and a frequency regulator. It converts 28 VDC from the ground source or the main missile battery to 115-VAC, 400-CPS, 3PH power.

1-234. The missile power changeover switch assembly is housed in a sealed canister and consists of a motor-driven switch and associated circuitry, seven receptacles, and a grounding plate. It distributes power to the airborne systems whether the source is from ground or missile generation equipment. The 28-VDC motor in the unit drives the switching mechanism to close make-before-break DC contacts and break-before-make AC contacts

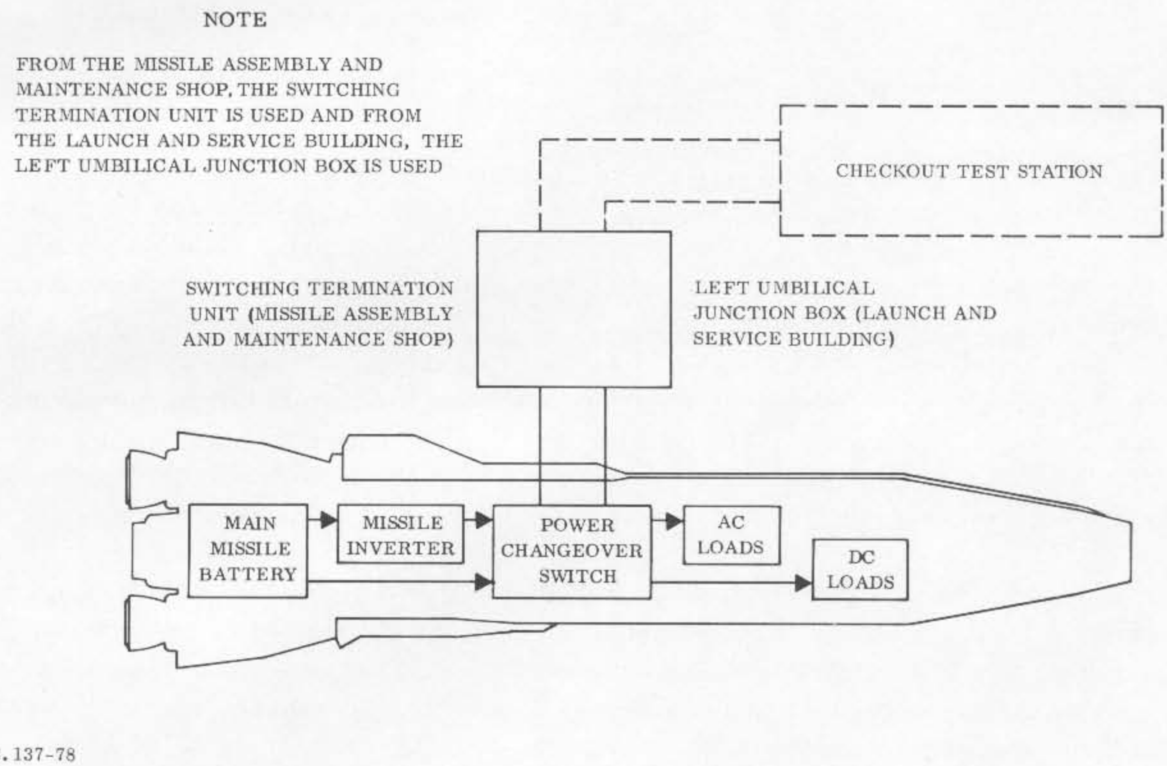


Figure 1-72. Missile Electrical System

on the switching mechanism, providing smooth transition from ground to missile electrical system power. Power transition takes place two seconds after start of the commit sequence.

1-235. Ground power is supplied to the missile power changeover switch assembly through an umbilical connector. The umbilical plug contains a solenoid actuated, spring-loaded ejector mechanism that ejects the plug from the missile receptacle at rise-off. Should this mechanism fail, a lanyard withdraws the plug from the receptacle as the missile rises.

1-236. The status of the missile power control subsystem, associated AC and DC ground power sources, and the missile engines, is monitored and displayed on the launch control console during standby by means of a summary signal from the various subsystem panels. This summary signal illuminates the ENGINE GROUND POWER indicator. During countdown but prior to commit, the electrical system indicators in the countdown patch are the MISSILE POWER, MISSILE BAT. ACTIVATED, ENGINE/MISSILE POWER READY, and the R/V BATTERY TEMPERATURE indicators. The MISSILE READY indicator illuminates green when these indicators have illuminated green and all other system conditions have been satisfied. Turning the COMMIT START key switch initiates the final automatic countdown sequence providing that the LAUNCH ENABLED indicator in the commit patch illuminates green. Two seconds after start of the commit sequence, a timer runs out causing a signal to be sent to enable the missile power changeover switch to transfer power to internal. The POWER INTERNAL indicator in the commit patch illuminates green when the missile inverter voltage and frequency are within tolerance and the internal power changeover signal is received from the missile. The missile electrical system is now ready for launch.

1-237. MISSILE EXPLOSIVES.

1-238. The missile is equipped with explosive and hypergolic devices (figure 1-73) to initiate various functions in a predetermined sequence during countdown, launch, and flight. These functions include activating the main missile battery, starting rocket engines, initiating booster separation, retarding the missile tank section after re-entry vehicle separation, and destroying the missile.

1-239. The main missile battery is energized by a squib at the start of liquid oxygen rapid load. Activation of the squib results in the production of gas, which expands and ruptures the plastic diaphragms containing the battery electrolyte, forcing the electrolyte under gaseous pressure into the cells. The gas then vents through a small orifice.

1-240. Four types of devices are used to start missile engines: solid propellant gas generators, solid propellant gas generator initiators, gas generator igniters, and hypergolic igniters. The solid propellant gas generators provide power to start the turbopumps supplying propellants to the booster and sustainer engines. Engine ignition occurs when an engine start command, sent from the launch control system, fires the solid propellant gas generator initiators. The gas generator initiators produce hot gases to fire solid propellant gas generators. The solid propellant gas generators, in turn, produce hot gas which drives the booster and sustainer turbopumps up to the speed and pressure required to feed liquid propellants to the engine thrust chambers and to the liquid propellant gas

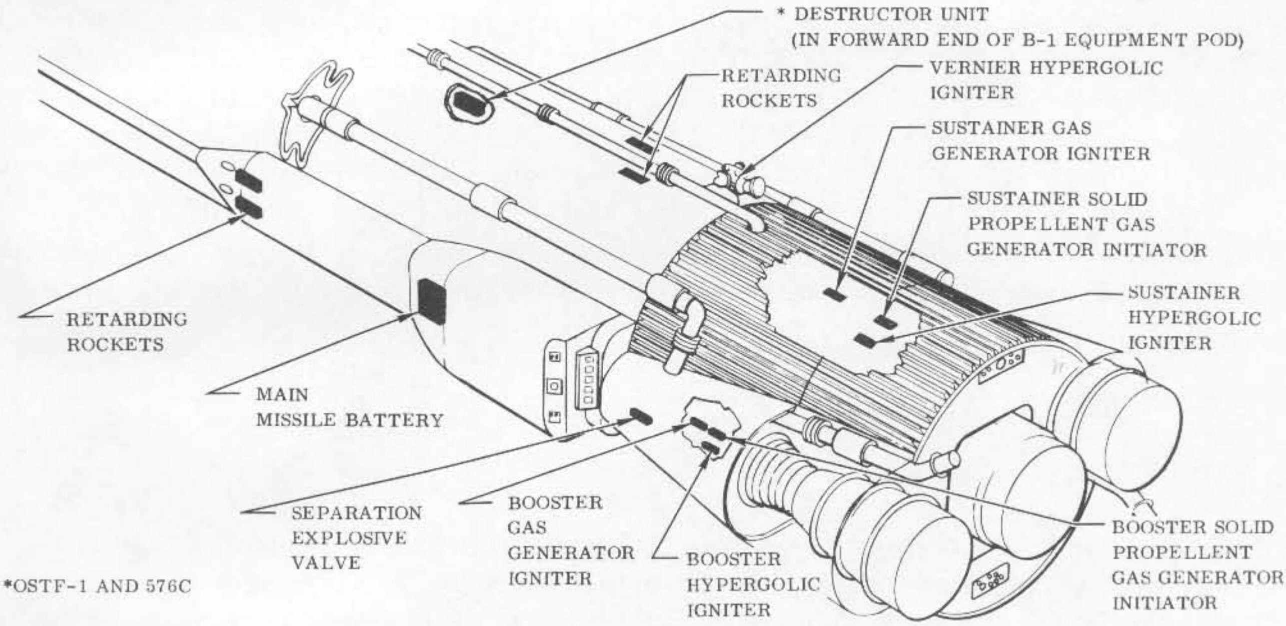


Figure 1-73. Missile Explosive and Hypergolic Igniter Location

generators. The liquid propellant gas generators power the engine turbopumps after the solid propellant gas generators have burned out.

1-241. Gas generator igniters are pyrotechnic devices that ignite propellant mixtures in the combustion chambers of the liquid propellant gas generators. Two igniters are installed in each liquid propellant gas generator. They are fired electrically by signals from the launch control system. Sustainer gas generator igniters are fired simultaneously with the sustainer engine lock-in signal, and the booster gas generator igniters are fired simultaneously with the solid propellant generators that start the booster turbopumps. The pyrotechnic material from the igniter cartridges is already burning when the gas generator propellant valves admit the flow of liquid propellants, causing immediate ignition.

1-242. Hypergolic igniters start combustion in the booster, sustainer, and vernier engine thrust chambers. Each igniter consist of a casing containing a slug of hypergolic fuel held in place by burst-diaphragms. The hypergolic fuel burns spontaneously upon contact with oxygen. When the turbopumps start, a portion of the fuel being pumped to the engines is sent through ignition fuel valves to the hypergolic igniters. There, fuel pressure ruptures the burst-diaphragms, forcing a slug of hypergol into each chamber. The hypergol combines with the liquid propellants which instantly ignite, starting the engines.

1-243. Booster section separation at staging is activated by the separation explosive valve assembly, consisting of two explosive valves mounted and wired in parallel. The firing of either valve activates the booster separation mechanism. The separation mechanism consists of four hook-type latches on the skin structure of the booster section that mate with four stirrups on the tank section. Beacon tracking signals, along with electronic (radar) surveillance data, are used by the range safety officer in reaching a missile destruct decision. Should the range safety officer decide to destroy the missile, a destruct pushbutton on the range safety officer console is depressed which causes the command destruct transmitter to send a coded signal to the missile, igniting primers of an explosive charge mounted near the fuel and missile, igniting primers of an explosive charge mounted near the fuel and liquid oxygen tank bulkhead. Detonation of this explosive charge destroys the missile. At staging an electrical impulse from the flight control automatic pilot subsystem programmer fires explosive charges, driving a plunger through a diaphragm and releasing pressurized helium gas through a manifold to the four latches. All latches open simultaneously and the booster section separates from the missile body. The booster engines are shut off just before actuation of the separation explosive valves.

1-244. There are four retarding rockets. Two rockets are located in the forward end of the B-2 equipment pod and two rockets are located on the X-axis, two feet ahead of V-1 engine. The thrust chambers are pointed toward the front of the missile. The thrust generated by the rockets decreases the velocity of the missile tank section, enabling the re-entry vehicle to move away without interference. At a predetermined time after re-entry vehicle separation, a signal from the flight programmer fires the retarding rockets.

1-245. A destructor unit, when installed in tactical missiles, provides the capability of exploding the sustainer stage to generate and disperse fragments. This destructor unit is ignited by a signal from the autopilot system. The destructor unit, when installed in training launch missiles, provides the capability of destroying the missile during flight for safety reasons. A destruct command radio frequency signal from the range safety officer fires the destructor unit. Detonation of the unit ruptures the intermediate bulkhead permitting the fuel to mix with the oxidizer. The resulting explosion destroys the missile.

1-246. MISSILE FLIGHT SAFETY SYSTEM (OSTF-1 and SMS 576-C).

1-247. A missile flight safety system is provided on training missiles for intentionally destroying the missile should the missile have an erratic flight. Transducers aboard the missile monitor critical pressures, temperatures, velocities, and attitudes. The output signals of the transducers are transmitted to ground control stations for evaluation. A command destruct radio frequency signal from the range safety officer can fire a destructor unit to destroy a faulty missile.

1-248. COUNTDOWN AND LAUNCH OPERATIONS.

1-249. Four types of countdowns may be performed at launch complexes: tactical launch countdowns, training launch countdowns, dual propellant loadings (DPL), and a simulated countdowns. Before a tactical or training launch countdown can be conducted, a valid launch order must have been received and coordination attained with the squadron command post. In a DPL, all steps in the tactical or training countdown are followed except that missile engines are not started. During a simulated countdown, no missile is required on the launch platform since control-monitor group 3 of 4 and 4 of 4 simulate the missile responses.

1-250. LAUNCH COUNTDOWN.

1-251. During ready for countdown (standby periods), the launch crew monitors the status of launch control equipment and the missile to ensure that all systems are in a ready for countdown condition. (See figure 1-74.) Daily ready state A verifications are performed throughout the launch complex, and service, repair, and replacement operations are accomplished as required. Any discrepancies beyond the capability of the launch crew are corrected by mobile crews from the missile assembly and maintenance shop (MAMS).

1-252. The launch system is in a ready for countdown condition when the READY FOR COUNTDOWN indicator in the ready patch of the launch control console panel is illuminated green. This indicator summarizes the standby readiness of the various subsystems displayed by the five indicators immediately to the left in the system status patch (figure 1-75). If the READY FOR COUNTDOWN indicator is not illuminated green, one or more of the system status patch indicators will be illuminated red, pointing out a malfunction. The system status patch indicators illuminate green, only when all SYSTEM IN STANDBY and the FACILITY SYSTEM POWER indicators located on control-monitor group 1 of 4 and 2 of 4 are illuminated green.

1-253. Additional malfunctions or status conditions are displayed in the malfunction patch of the launch control console panel. A red indication in the malfunction patch shows the existance of a critical malfunction and countdown cannot be started. Continuing the

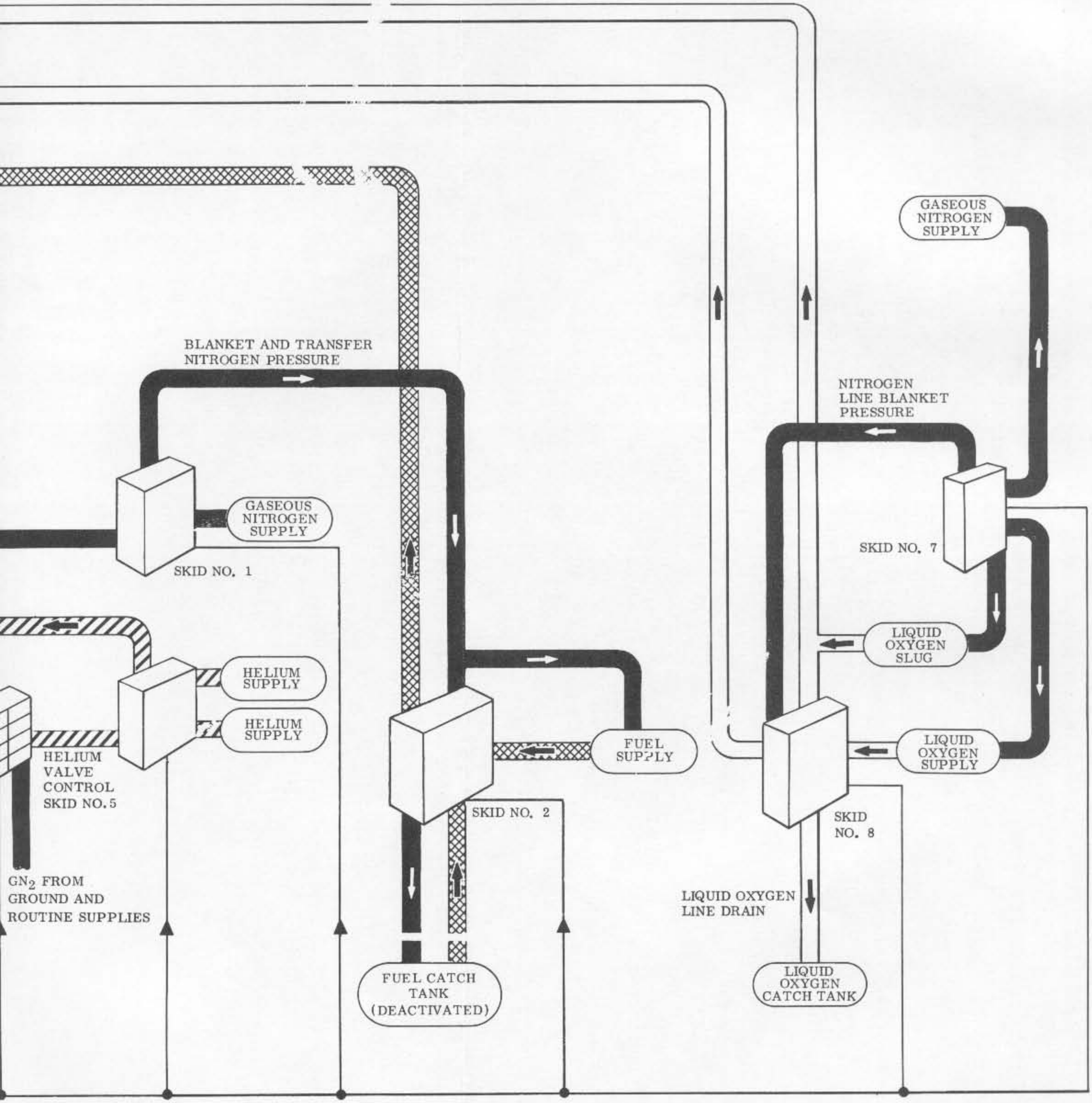
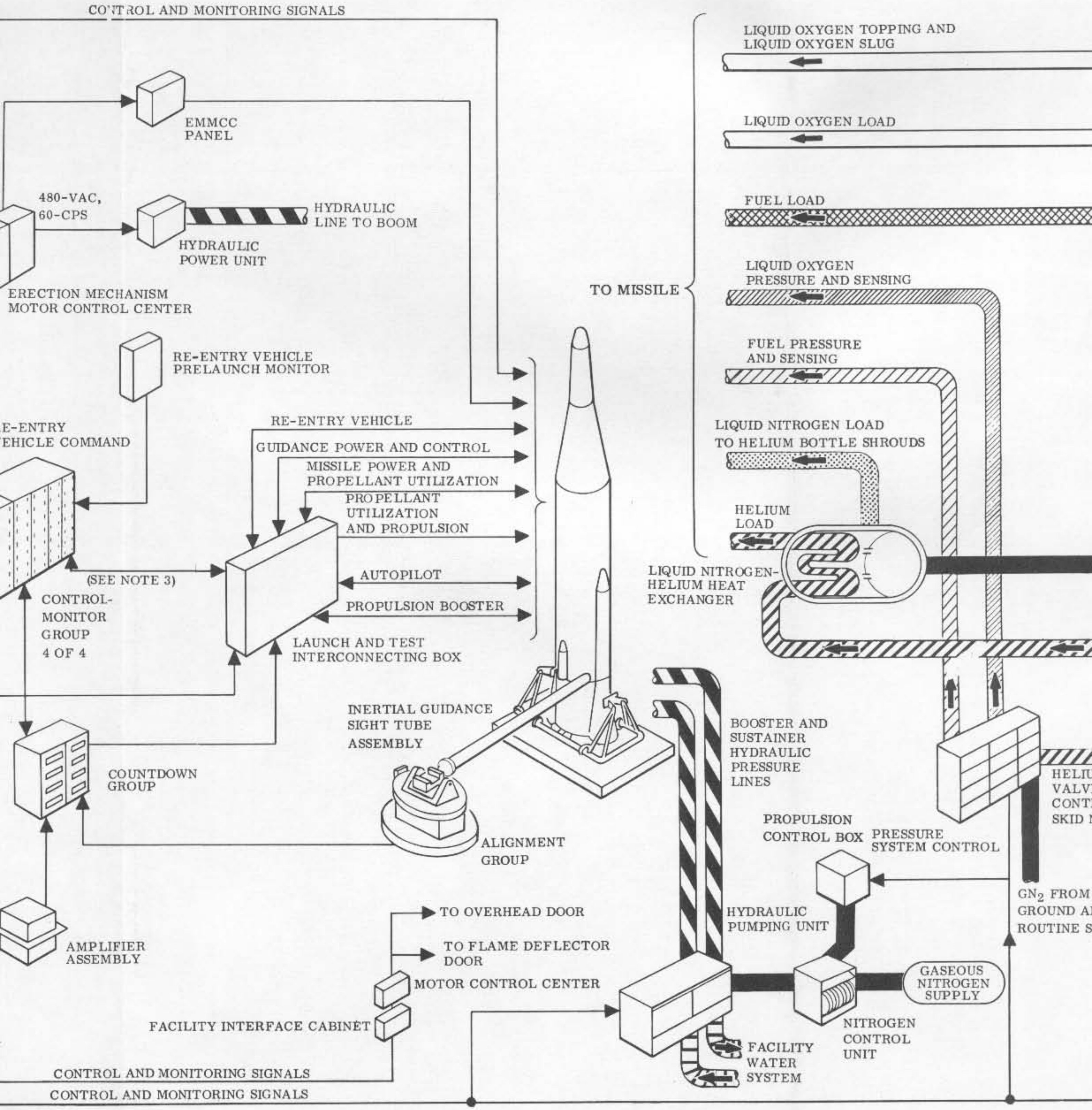


Figure 1-74. Tactical Launch, Data Flow Diagram



CONTROL AND MONITORING SIGNALS
EMMCC PANEL
480-VAC, 60-CPS
HYDRAULIC LINE TO BOOM
HYDRAULIC POWER UNIT
ERECTION MECHANISM MOTOR CONTROL CENTER
RE-ENTRY VEHICLE PRELAUNCH MONITOR
E-ENTRY
EHICLE COMMAND
RE-ENTRY VEHICLE
GUIDANCE POWER AND CONTROL
MISSILE POWER AND PROPELLANT UTILIZATION
PROPELLANT UTILIZATION AND PROPULSION
(SEE NOTE 3)
AUTOPILOT
PROPULSION BOOSTER
CONTROL-MONITOR GROUP 4 OF 4
LAUNCH AND TEST INTERCONNECTING BOX
INERTIAL GUIDANCE SIGHT TUBE ASSEMBLY
COUNTDOWN GROUP
ALIGNMENT GROUP
AMPLIFIER ASSEMBLY
TO OVERHEAD DOOR
TO FLAME DEFLECTOR DOOR
MOTOR CONTROL CENTER
FACILITY INTERFACE CABINET
CONTROL AND MONITORING SIGNALS
CONTROL AND MONITORING SIGNALS
TO MISSILE
LIQUID OXYGEN TOPPING AND LIQUID OXYGEN SLUG
LIQUID OXYGEN LOAD
FUEL LOAD
LIQUID OXYGEN PRESSURE AND SENSING
FUEL PRESSURE AND SENSING
LIQUID NITROGEN LOAD TO HELIUM BOTTLE SHROUDS
HELIUM LOAD
LIQUID NITROGEN-HELIUM HEAT EXCHANGER
BOOSTER AND SUSTAINER HYDRAULIC PRESSURE LINES
PROPULSION CONTROL BOX
PRESSURE SYSTEM CONTROL
HELIU
VALV
CONT
SKID
HYDRAULIC PUMPING UNIT
GASEOUS NITROGEN SUPPLY
NITROGEN CONTROL UNIT
FACILITY WATER SYSTEM
GN_2 FROM
GROUND A
ROUTINE S

E CON-
ONITOR

NCH AND TEST
E-ENTRY
UP, CONTROL-
NCH CONTROL
ISM MOTOR

P 3 OF 4 AND
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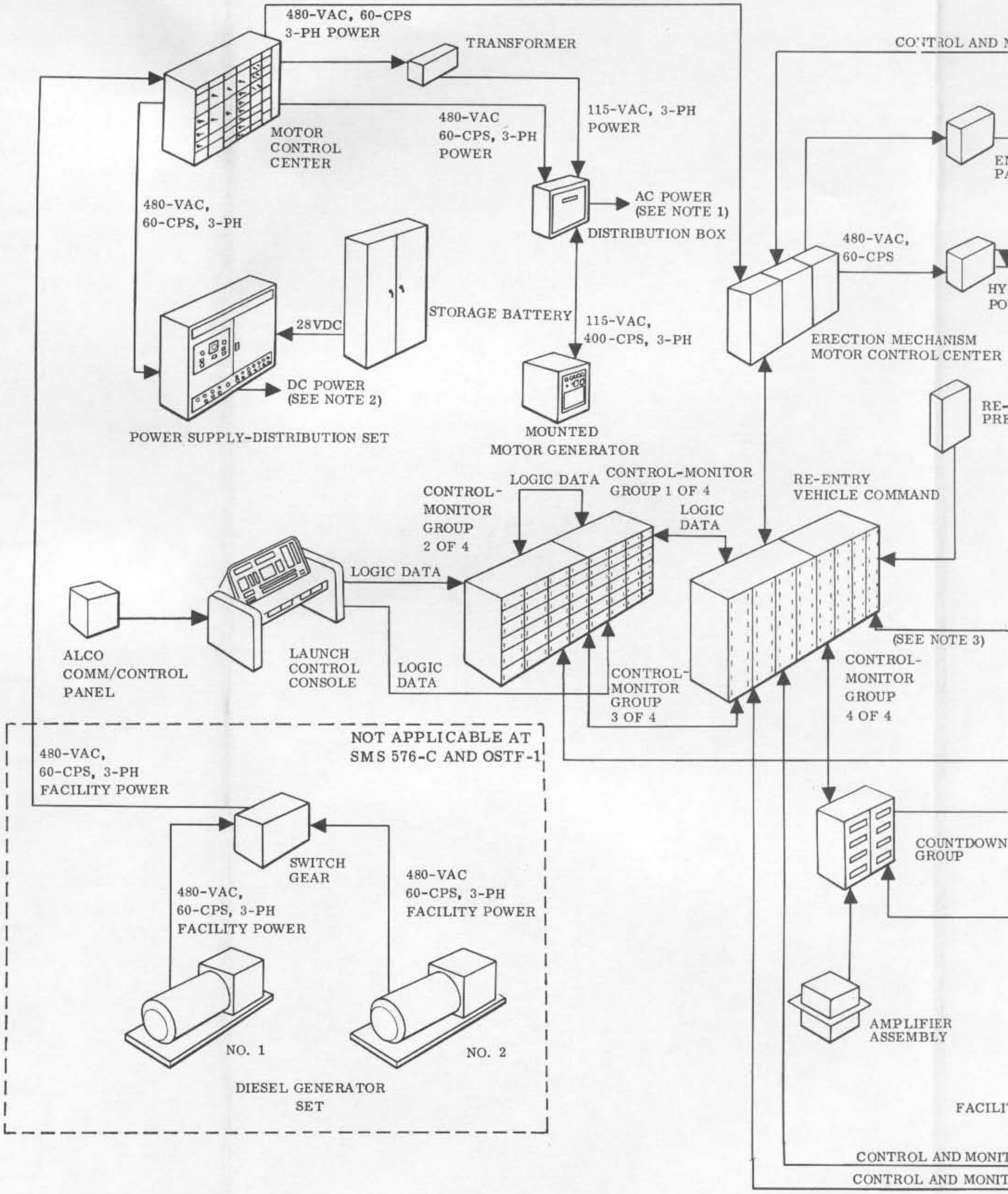
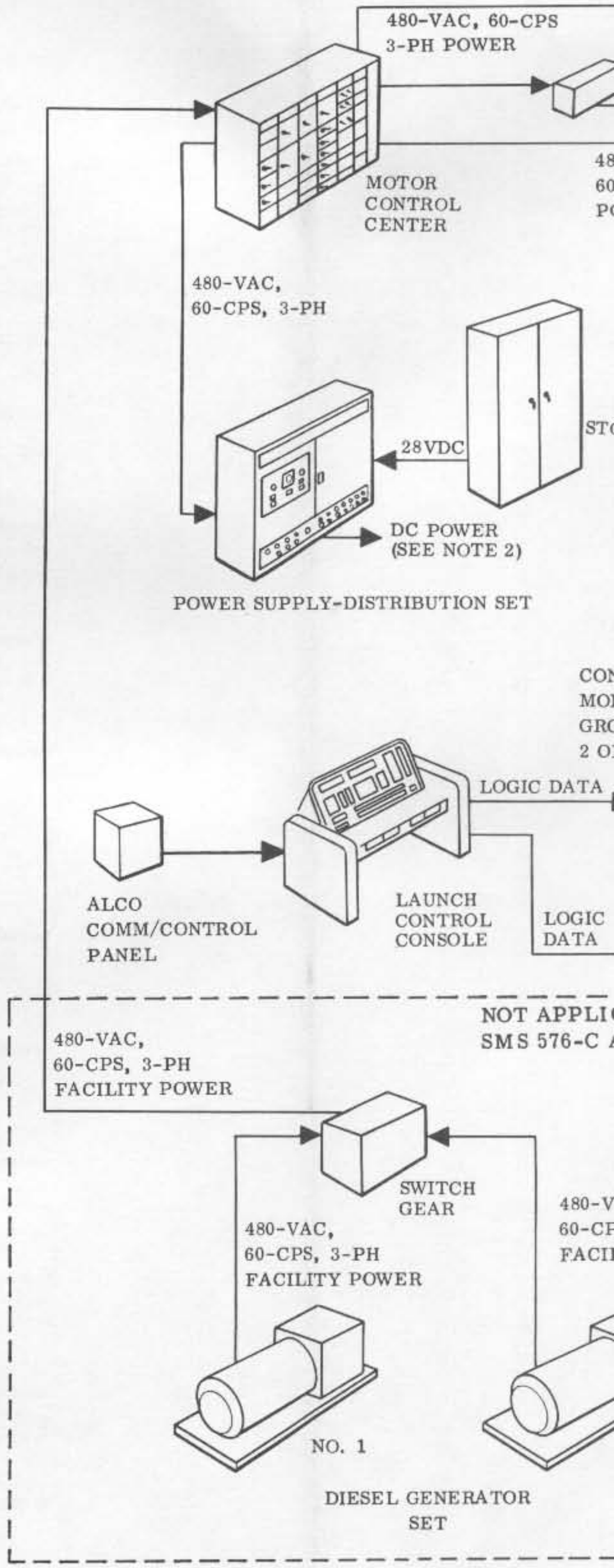


NOTE

1. 115-VAC, 400-CPS, 1-PH POWER SUPPLIED TO CONTROL-MONITOR GROUP 2 OF 4
   115-VAC, 400-CPS, 3-PH POWER SUPPLIED TO APCHE CONTROL UNIT, COUNTDOWN GROUP AND CONTROL-MONITOR GROUP 2 OF 4
   115-VAC, 60-CPS, 1-PH POWER SUPPLIED TO RE-ENTRY VEHICLE PRELAUNCH MONITOR AND THE COUNTDOWN GROUP
   115-VAC, 60-CPS, 3-PH POWER SUPPLIED TO RE-ENTRY VEHICLE PRELAUNCH MONITOR AND THE COUNTDOWN GROUP
2. 28 VDC SUPPLIED TO THE FOLLOWING UNITS: LAUNCH AND TEST INTERCONNECTING BOX, APCHE CONTROL UNIT, RE-ENTRY VEHICLE PRELAUNCH MONITOR, COUNTDOWN GROUP, CONTROL-MONITOR GROUP, HYDRAULIC PUMPING UNIT, LAUNCH CONTROL CONSOLE, STORAGE BATTERY, ERECTION MECHANISM MOTOR CONTROL CENTER AND DISTRIBUTION BOX.
3. CONNECTION BETWEEN CONTROL-MONITOR GROUP 3 OF 4 AND 4 OF 4 AND LAUNCH AND TEST INTERCONNECTING BOX DURING SIMULATED COUNTDOWN ONLY.

LEGEND

- LIQUID OXYGEN
- FUEL
- LIQUID OXYGEN PRESSURE AND SENSING
- FUEL PRESSURE AND SENSING
- HELIUM
- LIQUID NITROGEN
- GASEOUS NITROGEN
- ELECTRICAL CONNECTIONS
- HYDRAULIC PRESSURE
- WATER



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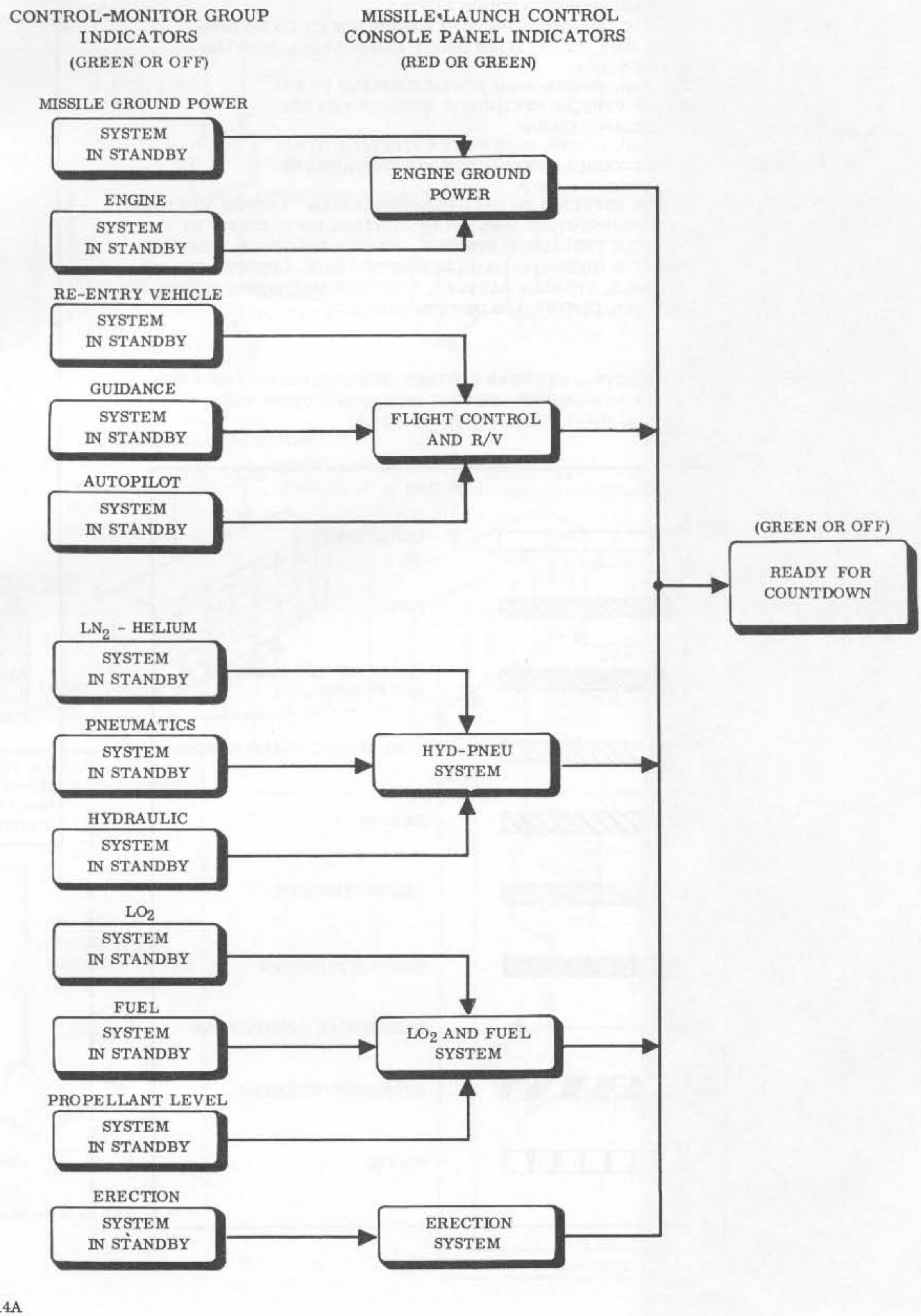

Figure 1-75. Ready for Countdown Indication, Block Diagram

countdown with an amber indication in the malfunction patch will depend upon the type of countdown being performed. An amber indication of the SLUG FAILURE indicator during a training launch would require depressing the COMMIT STOP pushbutton. An amber indication (except RESPONDER MODE and POD AIR CONDITIONING) will not prevent the initiation of a countdown. An amber RESPONDER MODE indicator indicates that all signal responder transfer switches on control-monitor group 3 of 4 and 4 of 4 (figure 1-25) are placed in the RESPONDER MODE position. The indicator extinguishes when all transfer switches are placed in the STANDBY MODE position. The indicator is illuminated red when all transfer switches are not in the same selected mode position. POD AIR CONDITIONING indicator illuminated amber, and FRCP MISSILE POD AIR HI TEMPERATURE and MISSILE POD AIR LO PRESSURE indicators red, requires troubleshooting before countdown can start.

1-254. Missile launchers are initiated, controlled, and monitored by the MCCC from the launch control console. A launch can be conducted only after a valid launch order has been received and authenticated. After the launch order (alert message) has been received and identified, the ALERT pushbutton is depressed causing an alert tone to sound over the public address system to warn all launch complex personnel of the impending launch operation. One of two preselected targets is next selected by depressing either the SELECT A or the SELECT B pushbutton. Corrections for atmospheric conditions prevailing over the selected target area are then made by adjusting the DOWN RANGE CORRECTION and CROSSRANGE CORRECTION dials.

1-255. After the missile has been launched, or if the ABORT indicator is illuminated red, the MCCC depresses the COMMIT STOP and RETURN TO STANDBY pushbuttons. A missile launch countdown sequence can be aborted any time prior to the presence of a commit lockup signal.

1-256. WET COUNTDOWN.

1-257. Wet countdowns (dual propellant loadings) are performed to ensure the functional capabilities of both the missile and launch systems. Wet countdowns also train missile combat crews without launching the missile or firing rocket engines. Before a wet countdown can be performed, the re-entry vehicle must be removed and an RV electric circuit simulator or a training re-entry vehicle installed (OSTF-1 and SMS 576-C). Dummy plugs must be substituted for all pyrotechnics as a safety precaution. A wet countdown may also be performed at specific sites using liquid nitrogen in place of liquid oxygen. When it is desired to conserve helium during a wet countdown, the mode switch on the propellant loading terminal cabinet must be positioned to TRAINING. The TRAINING MODE indicator on the launch control console will then illuminate amber.

1-258. The only difference on the launch control console between a wet and a tactical or training countdown is the ABORT indicator illuminates red at the end of the commit sequence instead of the MISSILE AWAY indicator illuminating green. At the conclusion of a wet countdown, return to standby procedures must be performed.

1-259. SIMULATED COUNTDOWN.

1-260. Simulated countdowns furnish a method of familiarizing the missile combat crews with the sequence of events that would take place during an actual countdown.

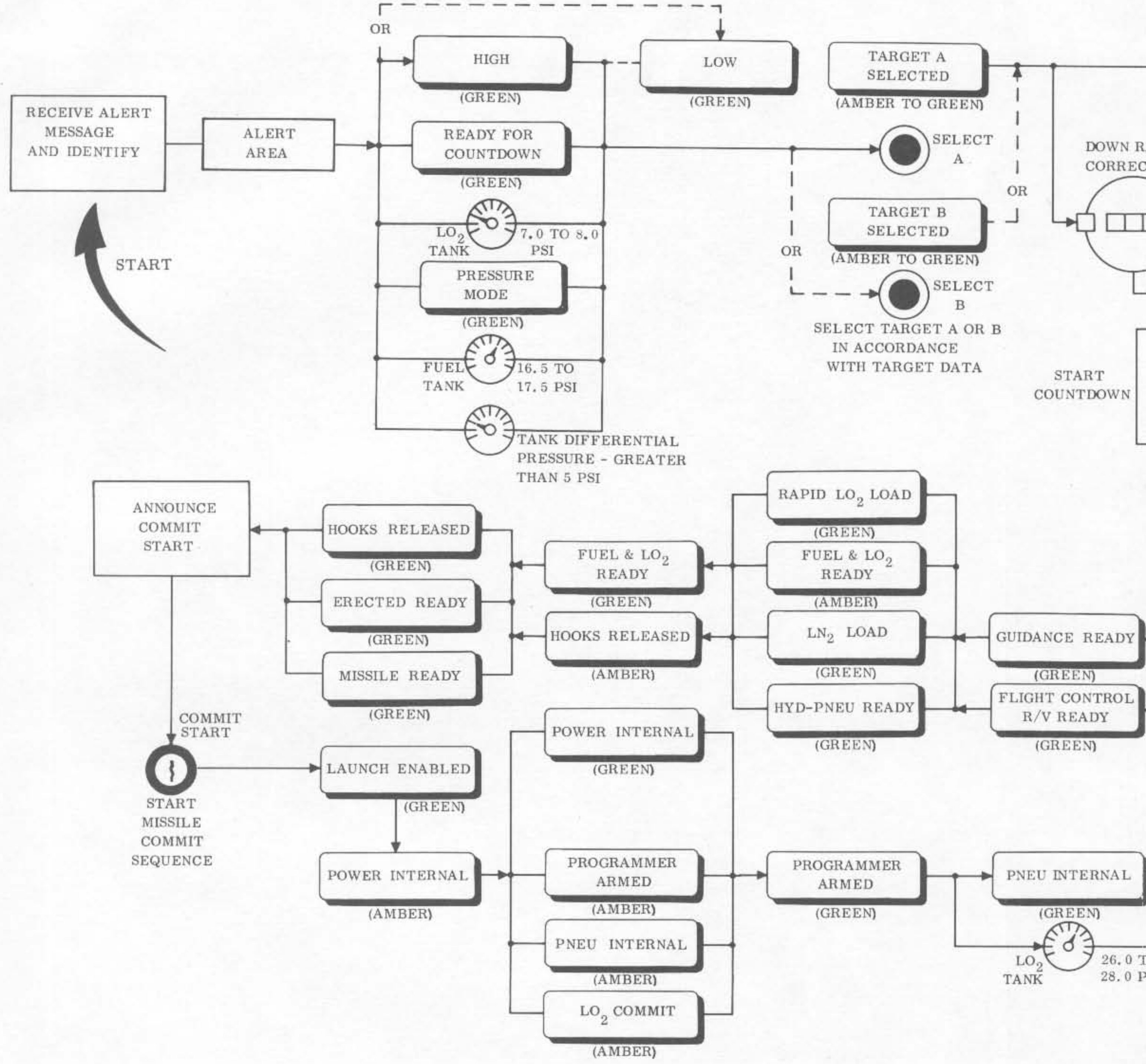

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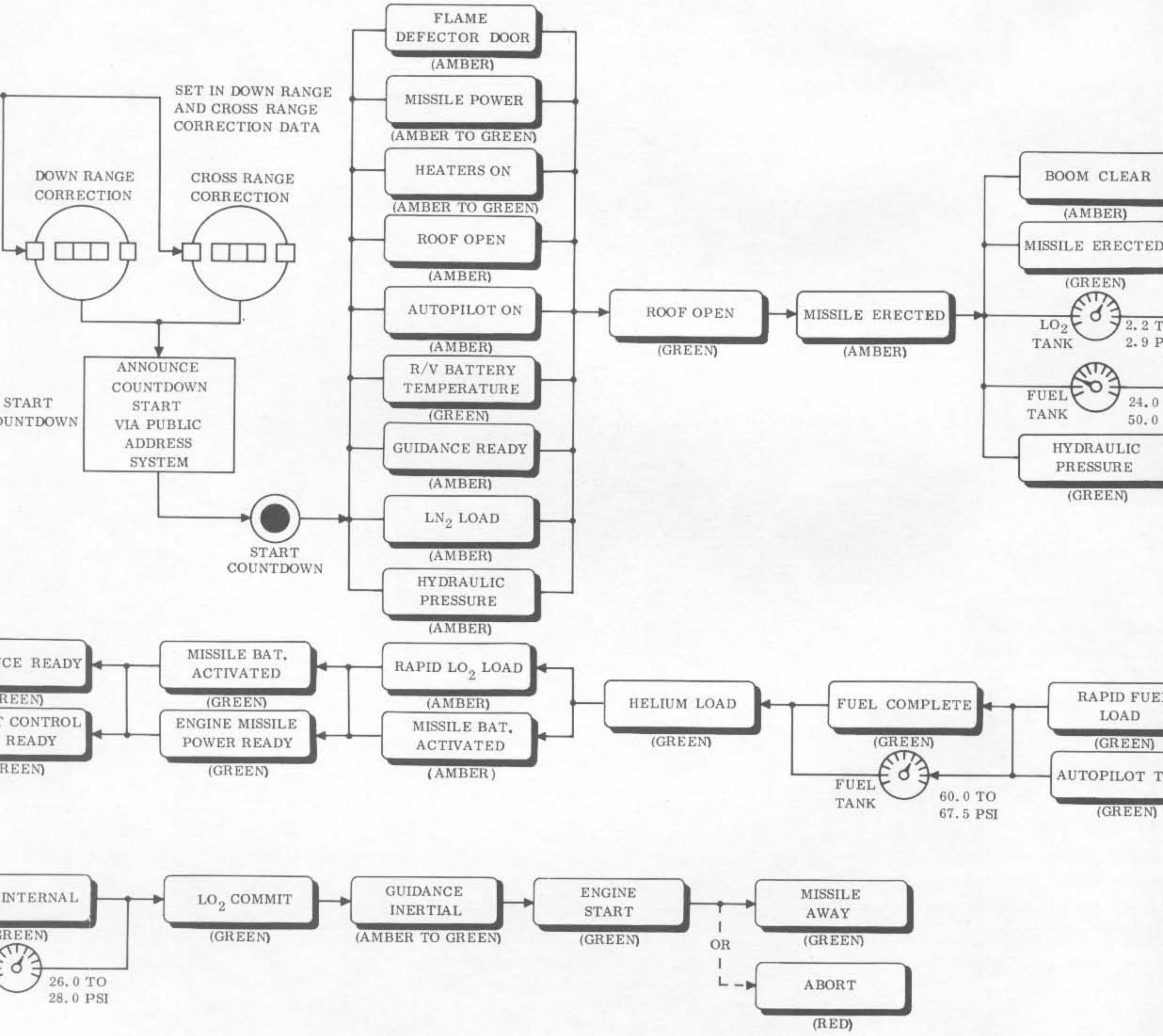
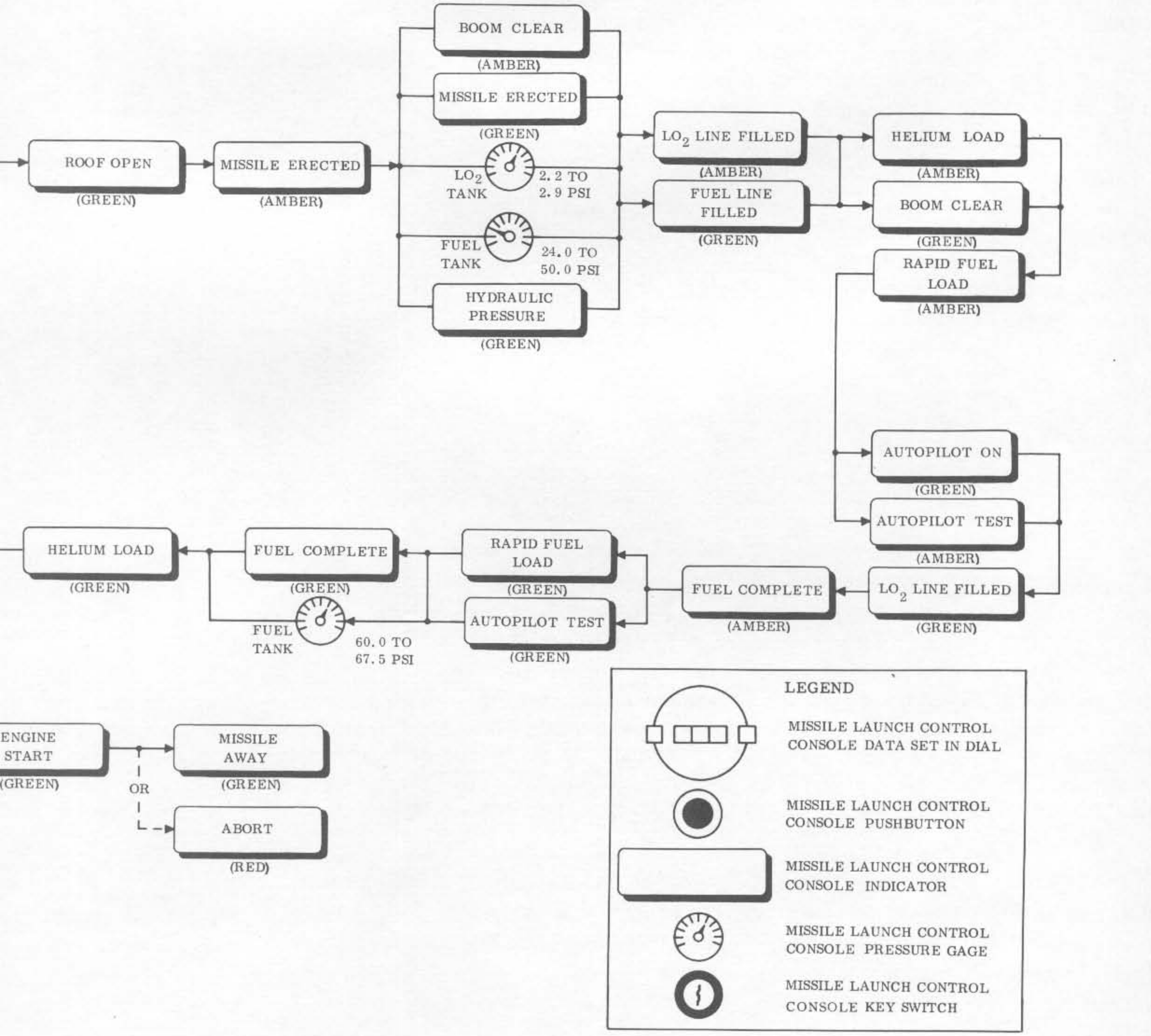
Figure 1-76. Countdown Sequence, Block Diagram (Typical)



SET IN DOWN RANGE AND CROSS RANGE CORRECTION DATA
DOWN RANGE CORRECTION
CROSS RANGE CORRECTION
ANNOUNCE COUNTDOWN START VIA PUBLIC ADDRESS SYSTEM
START COUNTDOWN
START COUNTDOWN
FLAME DEFECTOR DOOR
(AMBER)
MISSILE POWER
(AMBER TO GREEN)
HEATERS ON
(AMBER TO GREEN)
ROOF OPEN
(AMBER)
AUTOPILOT ON
(AMBER)
R/V BATTERY TEMPERATURE
(GREEN)
GUIDANCE READY
(AMBER)
LN2 LOAD
(AMBER)
HYDRAULIC PRESSURE
(AMBER)
ROOF OPEN
(GREEN)
MISSILE ERECTED
(AMBER)
BOOM CLEAR
(AMBER)
MISSILE ERECTED
(GREEN)
LO2 TANK
2.2 T
2.9 P
FUEL TANK
24.0
50.0
HYDRAULIC PRESSURE
(GREEN)
CE READY
REEN)
CONTROL READY
REEN)
MISSILE BAT. ACTIVATED
(GREEN)
ENGINE MISSILE POWER READY
(GREEN)
RAPID LO2 LOAD
(AMBER)
MISSILE BAT. ACTIVATED
(AMBER)
HELIUM LOAD
(GREEN)
FUEL COMPLETE
(GREEN)
FUEL TANK
60.0 TO 67.5 PSI
RAPID FUE LOAD
(GREEN)
AUTOPILOT T
(GREEN)
INTERNAL
REEN)
26.0 TO 28.0 PSI
LO2 COMMIT
(GREEN)
GUIDANCE INERTIAL
(AMBER TO GREEN)
ENGINE START
(GREEN)
OR
MISSILE AWAY
(GREEN)
ABORT
(RED)


BOOM CLEAR
(AMBER)
MISSILE ERECTED
(GREEN)
ROOF OPEN
(GREEN)
MISSILE ERECTED
(AMBER)
LO_2 TANK
2.2 TO 2.9 PSI
FUEL TANK
24.0 TO 50.0 PSI
HYDRAULIC PRESSURE
(GREEN)
LO_2 LINE FILLED
(AMBER)
FUEL LINE FILLED
(GREEN)
HELIUM LOAD
(AMBER)
BOOM CLEAR
(GREEN)
RAPID FUEL LOAD
(AMBER)
AUTOPILOT ON
(GREEN)
AUTOPILOT TEST
(AMBER)
LO_2 LINE FILLED
(GREEN)
FUEL COMPLETE
(AMBER)
RAPID FUEL LOAD
(GREEN)
AUTOPILOT TEST
(GREEN)
FUEL COMPLETE
(GREEN)
FUEL TANK
60.0 TO 67.5 PSI
HELIUM LOAD
(GREEN)
ENGINE START
(GREEN)
MISSILE AWAY
(GREEN)
OR
ABORT
(RED)
LEGEND
MISSILE LAUNCH CONTROL CONSOLE DATA SET IN DIAL
MISSILE LAUNCH CONTROL CONSOLE PUSHBUTTON
MISSILE LAUNCH CONTROL CONSOLE INDICATOR
MISSILE LAUNCH CONTROL CONSOLE PRESSURE GAGE
MISSILE LAUNCH CONTROL CONSOLE KEY SWITCH

1-261. COUNTDOWN SEQUENCE.

1-262. Depressing the START COUNTDOWN pushbutton initiates the sequence of events which ends in a MISSILE READY green indication (figure 1-76). During this sequence the missile is erected and fuel, liquid oxygen, liquid nitrogen, and helium are loaded aboard the missile. The guidance system countdown and tests are sequenced. The re-entry vehicle, flight control, pneumatic, hydraulic, fuel, and electrical systems are checked and prepared for launch. Five indicators, ENGINE/MISSILE POWER READY, FLIGHT CONTROL R/V READY, ERECTED READY, HYD-PNEU READY, and FUEL & LO_2 READY, illuminate green when all countdown patch indicators immediately to their left change from amber to green. When all five of these indicators are green, the MISSILE READY indicator illuminates green. The approximate sequence in which the countdown indicators illuminate amber and green, and missile tank pressure changes are shown in figure 1-76. Prior to starting countdown, the down range and cross range correction information is inserted and target A or target B is selected. Refer to table 1-4 for countdown indications and functions.

1-263. COMMIT SEQUENCE.

1-264. After the MISSILE READY indicator illuminates green, the missile is ready for the commit sequence. Before the commit sequence can start however, the launch disable signal must be removed by the Command Post and the COMMIT SWITCH on the ALCO COMM/CONTROL panel (figure 1-76A) must be turned fully clockwise within 3 seconds after the COMMIT START key switch on the launch control console has been turned clockwise. This will initiate a sequence of events which ends in a MISSILE AWAY green indication. The sequence in which the indicators change from amber to green is shown in figure 1-76. If a rise-off signal is not received within 5 seconds after engine start, a timer cuts off the engine. The ABORT indicator will then illuminate red. The ABORT indicator will also illuminate red if guidance does not transfer to inertial. (See table 1-5 for countdown indications and functions after commit start.)

1-265. RETURN TO STANDBY. The countdown sequence may be aborted by depressing the RETURN TO STANDBY pushbutton at any time prior to start of the commit sequence.

1-266. Figure 1-77 illustrates the return to standby sequence in block diagram form. A commit countdown sequence may be aborted by depressing the COMMIT STOP pushbutton any time prior to the time the GUIDANCE INERTIAL indicator illuminates green. After the GUIDANCE INERTIAL indicator has illuminated green, the countdown cannot be manually stopped by depressing the COMMIT STOP pushbutton. Shortly after the MISSILE AWAY indicator illuminates green or if the ABORT indicator illuminates red, the MCCC depresses the COMMIT STOP and RETURN TO STANDBY pushbuttons to return the site to a hard condition.

1-267. Depressing these pushbuttons before the GUIDANCE INERTIAL indicator illuminates green, or after the ABORT indicator illuminates red, starts the return to standby sequence. (See table 1-6 for return to standby indications and functions.)

1-268. POSTLAUNCH OPERATIONS.

1-269. Postlaunch operations are performed after missile launch. The missile bay equipment is inspected for damage and repaired or replaced. Checkout operations are performed to ensure the complex is ready to receive a missile. The missile is transported from the MAMS and installed in the launcher. Checkout, test, and setup operations are then performed to establish ready state A.

Table 1-4. Countdown Sequence (Prior to Commit Start)

LAUNCH CONTROL CONSOLE PANEL INDICATOR OR CONTROL	COLOR	INDICATED PROCEDURE OR CONDITION
READY FOR COUNT-DOWN indicator	Green	Missile and aerospace ground equipment and launch control equipment are ready for countdown
START COUNTDOWN pushbutton		Depressed
FLAME DEFLECTOR DOOR indicator	Amber	Facility control subsystem is not in local control and flame deflector door is unlatched, is opening, is not closing, or is not completely open
MISSILE POWER indicator	Amber	Countdown DC bus is energized and AC and DC missile load buses are not energized
	Green	Countdown DC bus is energized, and AC and DC missile load buses are energized
HEATERS ON indicator	Amber	Countdown bus is energized and thrust section heater blower, missile battery heater, and engine valve heaters are not energized
	Green	Facility control subsystem countdown power is on; thrust section heater blower, missile battery heater, and engine valve heaters are energized; heaters are not cut off; or during the commit sequence power changeover switch was transferred to internal
ROOF OPEN indicator	Amber	Facility control subsystem is not in local control and missile erection door is opening but is not completely open
AUTOPILOT ON indicator	Amber	AC and DC missile load buses are energized and less than 4 minutes have elapsed since countdown started
R/V BATTERY TEMPERATURE indicator	Green	Re-entry vehicle start countdown is verified by the prelaunch monitor

Table 1-4. Countdown Sequence (Prior to Commit Start) (Continued)

LAUNCH CONTROL CONSOLE PANEL INDICATOR OR CONTROL	COLOR	INDICATED PROCEDURE OR COUNTDOWN
GUIDANCE READY indicator	Amber	Airborne inertial guidance countdown is in progress and airborne inertial guidance is not ready
LN_2 LOAD indicator	Amber	Liquid nitrogen rapid load valve is open and liquid nitrogen loading is not completed

Table 1-4. Countdown Sequence (Prior to Commit Start) (Continued)

LAUNCH CONTROL CONSOLE PANEL INDICATOR OR CONTROL	COLOR	INDICATED PROCEDURE OR CONDITION
HYDRAULIC PRESSURE indicator	Amber	Hydraulic pressures are not within limits
ROOF OPEN indicator	Green	Facility control subsystem is not in local control, and missile erection door is completely open
MISSILE ERECTED indicator	Amber	Erection control subsystem is not returning to standby, boom is not at 0-degree position, and boom is not at 90-degree position
	Green	Boom is at 90-degree position
BOOM CLEAR indicator	Amber	Erection control subsystem is not returning to standby, boom is not at 100-degree position, and all hooks are latched
HYDRAULIC PRESSURE indicator	Green	Booster stage hydraulic pressure is greater than 1750 and less than 2250 PSI, booster stage return pressure is greater than 30.0 PSI, sustainer stage hydraulic pressure is greater than 1750 and less than 2250 PSI, and sustainer stage return pressure is greater than 30.0 PSI, hydraulics commit is started, and booster stage or sustainer stage evacuation chamber valve is closed
FUEL LINE FILLED indicator	Green	Fuel-load command is present and fuel is in transfer line, or fuel loading is completed
LO_2 LINE FILLED indicator	Amber	Ground liquid oxygen fill-and-drain valve is open, airborne liquid oxygen fill-and-drain valve is open, liquid oxygen is not in transfer line, and line chilldown is complete
HELIUM LOAD indicator	Amber	Helium loading is started but not completed and inert fluid injection is activated
BOOM CLEAR indicator	Green	Boom is at 100-degree position
RAPID FUEL LOAD indicator	Amber	Rapid fuel load valve is open

Table 1-4. Countdown Sequence (Prior to Commit Start) (Continued)

LAUNCH CONTROL CONSOLE PANEL INDICATOR OR CONTROL	COLOR	INDICATED PROCEDURE OR CONDITION
AUTOPILOT ON indicator	Green	AC and DC missile load buses are energized, more than 4 minutes have elapsed since countdown started
AUTOPILOT TEST indicator	Amber	AC and DC missile load buses are energized, more than 4.0 minutes have elapsed since countdown started, hydraulic pressures are satisfactory, and 2 minutes have not elapsed since automatic pilot test started
LO_2 LINE FILLED indicator	Green	Ground liquid oxygen fill and drain valve is open, airborne liquid oxygen fill and drain valve is open, and liquid oxygen is in the transfer line or liquid oxygen loading is started
FUEL COMPLETE indicator	Amber	Fuel-load command is present, rapid load is stopped, and fuel loading is not completed
RAPID FUEL LOAD indicator	Green	Fuel-load command is present, rapid fuel load valve is closed, stop rapid fuel load signal is present, or fuel loading is completed
AUTOPILOT TEST	Green	Two minutes have elapsed since automatic pilot test started, and engine position and gyroscope failure have not occurred during autopilot test
FUEL COMPLETE indicator	Green	Fuel loading complete summary is present
HELIUM LOAD indicator	Green	Helium load command is present, and airborne helium bottle pressures are above 3050 PSI
RAPID LO_2 LOAD indicator	Amber	Fuel loading is completed, rapid load valve is open, and liquid oxygen load is started
MISSILE BAT. ACTIVATED indicator	Amber	Battery-activate command is sent, and less than 2 minutes have elapsed since battery-activate command was sent. Or missile battery voltage not within limits

Table 1-4. Countdown Sequence (Prior to Commit Start) (Continued)

LAUNCH CONTROL CONSOLE PANEL INDICATOR OR CONTROL	COLOR	INDICATED PROCEDURE OR CONDITION
MISSILE BAT. ACTIVATED indicator	Green	More than 2 minutes have elapsed since battery-activate command was sent, missile battery voltage is within limits, and battery-activated signal is present
ENGINE/MISSILE POWER READY indicator	Green	Facility control subsystem countdown power is on, engine and missile power is ready, missile heaters and blowers are on, missile battery is activated, and missile power is on
GUIDANCE READY indicator	Green	Airborne inertial guidance-ready signal is present, and guidance ground control subsystem is in standby condition
FLIGHT CONTROL R/V READY indicator	Green	Target is selected, airborne inertial guidance-ready signal is present, automatic pilot has not failed, automatic pilot test has been performed, flight programmer is safe or flight programmer is commanded to arm, flight programmer is not in commit stop disarm sequence, re-entry vehicle in standby is satisfactory, re-entry vehicle start countdown is verified, re-entry vehicle battery temperature is within limits, automatic pilot ready condition is present
RAPID LO_2 LOAD indicator	Green	Fuel loading is completed, liquid oxygen loading is started, rapid liquid oxygen load valve is closed, 95-percent level is reached, and rapid loading is stopped
FUEL & LO_2 READY indicator	Amber	Liquid oxygen load is started, rapid liquid oxygen loading is stopped, and fine liquid oxygen is not stopped
FUEL & LO_2 READY indicator	Green	Fuel loading is completed, airborne liquid oxygen fill-and-drain valve is closed, liquid oxygen charge supply is satisfactory, liquid oxygen fine loading is stopped, and liquid oxygen topping is not stopped
HOOKS RELEASED indicator	Amber	Release hooks command is present

Table 1-4. Countdown Sequence (Prior to Commit Start) (Continued)

LAUNCH CONTROL CONSOLE PANEL INDICATOR OR CONTROL	COLOR	INDICATED PROCEDURE OR CONDITION
HOOKS RELEASED indicator	Green	All hooks are unlatched
ERECTED READY indicator	Green	Erection control subsystem is ready, all hooks are unlatched, and erection mechanism motor control center is ready
LN_2 LOAD indicator	Green	Liquid nitrogen loading is complete
HYD-PNEU READY indicator	Green	Hydraulic control subsystem standby status is satisfactory, hydraulic pressures are satisfactory, hydraulic commit stop is not in progress, helium loading is completed, and liquid nitrogen loading is completed
MISSILE READY indicator	Green	Launch control subsystems and missile are not in return to standby sequence, and five indicators in the right-hand column of countdown patches are green

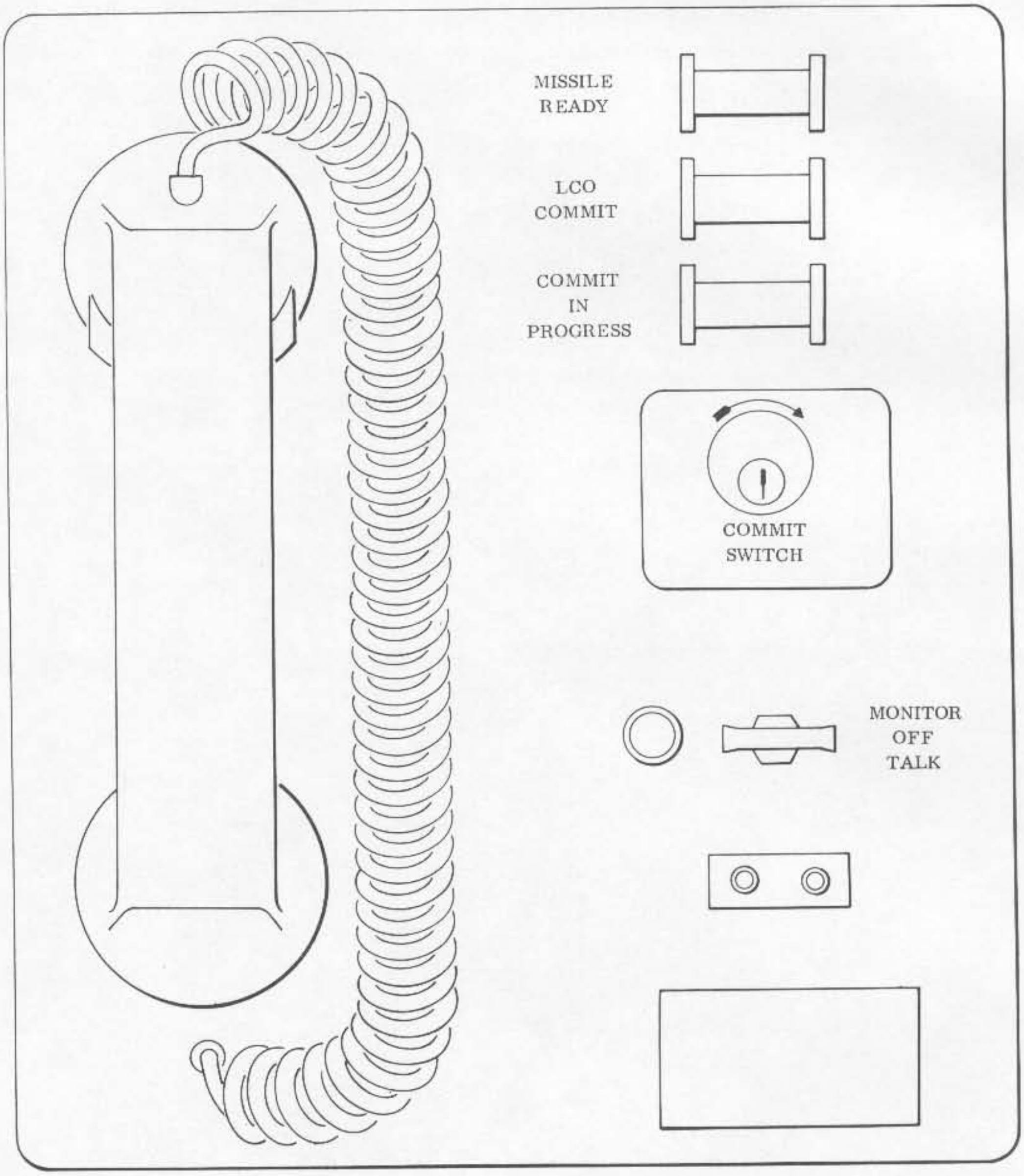


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Figure 1-76A. ALCO COMM/CONTROL Panel

Table 1-5. Countdown Sequence (After Commit Start)

LAUNCH CONTROL CONSOLE PANEL INDICATOR OR CONTROL	COLOR	INDICATED PROCEDURE OR CONDITION
COMMIT START key switch		Starts automatic commit sequence
LAUNCH ENABLED indicator	Green	Squadron command launch disable signal is removed
POWER INTERNAL indicator	Amber	Commit is started, airborne inverter is started, internal AC voltage and frequency are not within limits, internal AC sense lockout is absent or missile internal power is off and internal order is received
	Green	Commit is started, internal AC voltage and frequency are within limits, power changeover switch is transferred to internal, and internal power is on
PROGRAMMER ARMED indicator	Amber	Commit is started, and flight programmer is commanded to arm but is not yet armed
PNEU INTERNAL indicator	Amber	Commit is started, pneumatics are transferred to internal, and missile flight pressurization sequence in the missile is started but is not completed
LO_2 COMMIT indicator	Amber	Liquid oxygen slug delivery is not complete, or slug delivery valve or slug tank pressure valve is open, or liquid oxygen tanking control subsystem commit is not started. (Water is available at OSTF-1 and SMS 576-C.)
PROGRAMMER ARMED indicator	Green	Same conditions as in amber above except flight programmer is armed

Table 1-5. Countdown Sequence (After Commit Start) (Continued)

LAUNCH CONTROL CONSOLE PANEL INDICATOR OR CONTROL	COLOR	INDICATED PROCEDURE OR CONDITION
LO_2 COMMIT indicator	Green	Commit is started, transfer of slug is completed, and slug tank pressurization and delivery valves are closed
GUIDANCE INERTIAL indicator	Amber	Commit is started, all previous subsystems in commit sequence are committed, and airborne inertial guidance is not transferred to inertial
	Green	Same conditions as in amber above except airborne inertial guidance is transferred to inertial
ENGINE START indicator	Green	Commit is started, all previous subsystems in commit sequence are committed, engine-start and ignition-start commands are sent, and less than 1 second has elapsed since engine-start command was sent
MISSILE AWAY indicator	Green	Countdown bus is on, and missile-away signal is present
ABORT indicator	Red	Missile-away signal is not present 5 seconds after engines are started, and automatic-engine cutoff signal is present

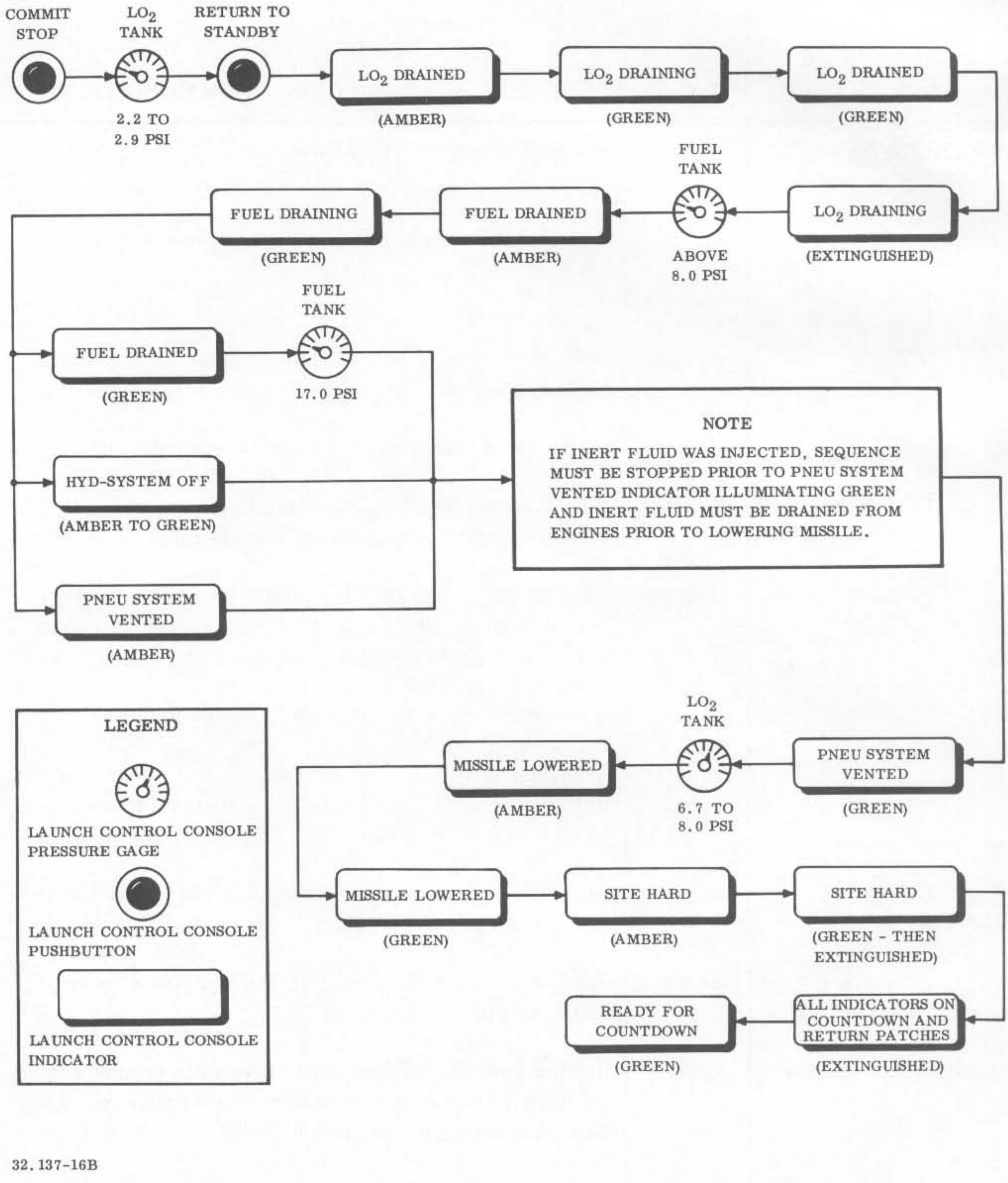


Figure 1-77. Return to Standby Sequence Block Diagram

Table 1-6. Return to Standby Sequence

LAUNCH CONTROL CONSOLE PANEL INDICATOR OR CONTROL	COLOR	INDICATED PROCEDURE OR CONDITION
COMMIT STOP pushbutton		Deenergizes the commit bus
RETURN TO STANDBY pushbutton		Initiates the return to standby sequence
LO_2 DRAINED	Amber	Return to standby bus is energized and LO_2 storage tank has vented
	Green	The loss of liquid in line, plus 90 seconds TDDO
FUEL DRAINED	Amber	LO_2 drainage is completed, fuel storage tank is vented, and fuel drain valve F-13 is open
	Green	Fuel is not in transfer line and the following valves are closed, N-18 storage tank vent valve, F-13 drain valve, and airborne and ground-fill and drain valves
HYD-SYSTEM OFF	Amber	2 seconds have elapsed since fuel draining was completed
	Green	Hydraulic pumps are stopped and hydraulic pressure is less then 1750 PSI
PNEU SYSTEM VENTED	Amber	Fuel draining is completed and inflight helium bottles are being vented
	Green	Inflight helium bottles are vented to approximately 750 PSI, plus a 40 second TDPU
MISSILE LOWERED	Amber	Helium venting is completed, hydraulic pumps are turned off and command is sent to lower boom. LO_2 tank pressure greater than 6.7 PSI
	Green	Boom is at zero-degree position

Table 1-6. Return to Standby Sequence (Continued)

LAUNCH CONTROL CONSOLE PANEL INDICATOR OR CONTROL	COLOR	INDICATED PROCEDURE OR CONDITION
SITE HARD	Amber	Erection boom is lowered and missile erection door and flame deflector door are closing but are not closed
	Green to extin-guished	Flame deflector door is closed and latched. Missile erection door is closed and latched
READY FOR COUNTDOWN	Green	Missile and associated aerospace ground equipment and launch control equipment are ready for countdown

1-270. POST-PROPELLANT LOADING EXERCISE OPERATIONS.

1-271. Post-propellant loading exercise operations are performed after the return to standby sequence is completed. Missile rocket engines are serviced, the missile is checked for leakages and other abnormal conditions, and the site liquid and gas supplies are replenished. Ready state A (tactical launch or training launch) is established by installing and checking the missile ordnance items.

1-272. MISSILE SEMITRAILER.

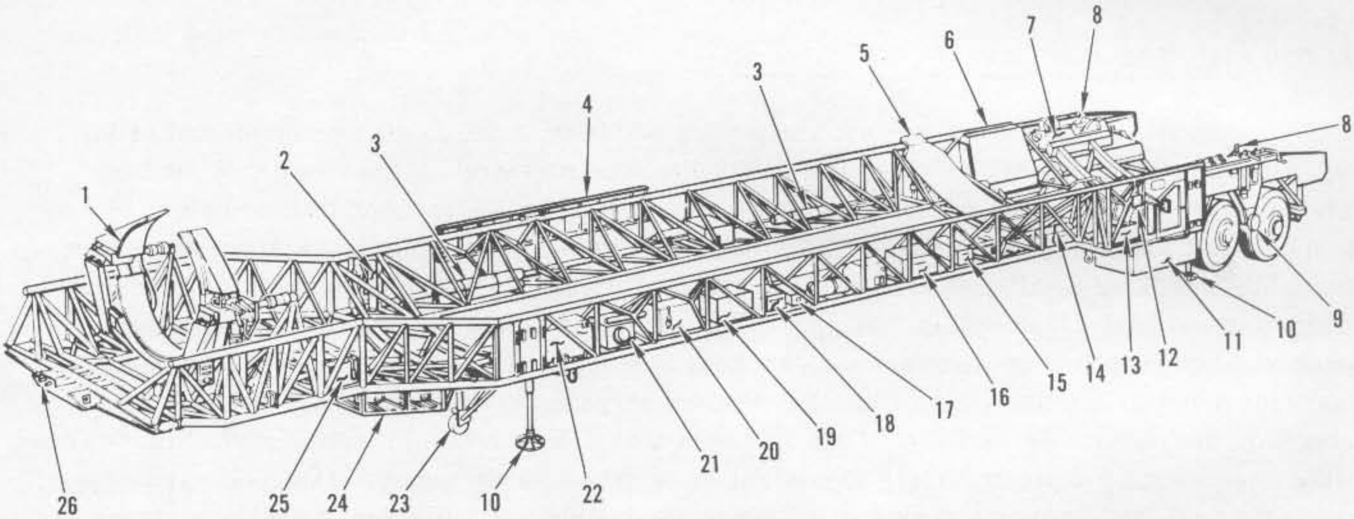
1-273. The missile semitrailer (figure 1-78) serves as a transport carriage for the missile during highway or air transit and as support for the missile during storage. The semitrailer has a trussed frame of welded steel pipe mounted on a detachable read bogie. The bogie consists of four tandem-mounted, power-steered wheels, controlled by either of two tillermen seated in cabs on opposite sides of the trailer. The steering mechanism is also equipped with a neutral position lock to permit a conventional semitrailer towing. An interphone system provides communication between the tractor driver and the tillermen. The left cab is equipped with an indicator panel and a warning horn linked to the missile trailer pressurization system. The warning horn sounds an alarm if the missile tank pressures are not within tolerances.

1-274. The transport pressure unit automatically pressurizes and maintains pressures, within tolerances in the missile fuel and liquid oxygen tanks during storage, maintenance, and ground or air transit. A separate system of manually controlled valves is used for routing emergency pressure from the supply bottles to the missile.

1-275. The forward and after missile supports are adjustable structures mounted on the trailer chassis, with provisions for vertical, lateral, and roll adjustments to allow precise missile-to-trailer and missile-to-launcher alignment. The forward support carries the forward end of the missile tank section and is capable, through use of appropriate controls, of transmitting a measured amount of stretch to the missile to prevent structural damage in the event of planned or accidental tank section depressurization. The after missile support points are located on the booster carriage, which is provided with vertical rollers at each corner. These rollers run on rails which are integral parts of the main trailer structure. Normally, the carriage is locked in the forward position, where it supports the after end of the assembled missile. When separated, the booster can be moved approximately 44.0 inches aft of the tank section. When the booster is to be demated from the tank section, the missile rear support band (5, figure 1-78) supports the after end of the tank section. The missile booster section can be completely removed from the semitrailer by coupling the rails of the booster handling trailer to the rails of the missile semitrailer and transferring the loaded booster carriage to the booster trailer.

1-276. RE-ENTRY VEHICLE HANDLING AND TRANSPORT.

1-277. Re-entry vehicle handling, transport, mating, and demating are accomplished with a re-entry vehicle trailer, cradle, and carriage assembly. The trailer is used to transport



1 FORWARD SUPPORT INSTALLATION
2 FORWARD STABILIZATION JACK INSTALLATION
3 PROTECTIVE COVER
4 LADDER
5 REAR SUPPORT BAND
6 RIGHT SEMITRAILER TILLERMAN POSITION
7 BOOSTER CARRIAGE ASSEMBLY
8 BOOSTER SECTION ATTACH FITTING
9 AFT CASTER ASSEMBLY
10 STABILIZATION JACKS
11 LEFT SEMITRAILER TILLERMAN POSITION
12 ALL INERTIAL GUIDANCE POD SUPPORT
13 PRESSURIZATION CONTROL UNIT
14 REAR BAND SUPPORT AND MATE-DEMATE CONTROL UNIT
15 ENGINE CONTROL PANEL
16 LEAD ACID BATTERIES
17 VOLTAGE REGULATORS AND RELAYS
18 GYRO HEATER CABLE STORAGE BOX D SERIES
19 GYRO HEATER CABLE STORAGE BOX E SERIES
20 STABILIZATION SYSTEM CONTROL UNIT
21 GAS ENGINE, GENERATOR-STARTER, AND HYDRAULIC PUMP
22 STABILIZATION SYSTEM HYDRAULIC RESERVOIR
23 FORWARD CASTER ASSEMBLY
24 GAS STORAGE BOTTLE INSTALLATION
25 FORWARD SUPPORT HYDRAULIC STRETCH SYSTEM CONTROL UNIT
26 PNEUMATIC SYSTEM QUICK-DISCONNECT COUPLINGS

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Figure 1-78. Missile Semitrailer

the re-entry vehicle to and from the munitions area. The cradle supports the re-entry vehicle and provides the means of handling the re-entry vehicle during assembly, transport, mating, and demating operations. The carriage is roller mounted and supports the cradle while mounted on the re-entry vehicle trailer or on a work stand. The re-entry vehicle is mated to the missile after the missile is mated to the missile launcher.

1-278. MISSILE CHECKOUT OPERATIONS.

1-279. Missile checkout operations are performed both at the launch complex and at the squadron maintenance area. The re-entry vehicle is received by the munitions section where assembly-checkout operations are performed. The basic missile is received and inspected at the MAMS where separately packaged items are installed. Inspections and a complete checkout of all missile systems are performed. The major portion of checkout operations are performed using the inertial guidance alignment countdown set and mobile checkout vehicles (pneumatic test set checkout test station). The checkout test station contains a major portion of the missile systems checkout equipment and is capable of checking the pneumatic test set. Data for each test is punched into business machine cards which are used by a programmer to control the entire test sequence. Punched card decks perform self-test, missile systems survey, and checkout of individual missile systems. The self-test deck verifies that the checkout equipment is operationally ready to perform missile systems test. Each system is verified by individual card decks which is capable of detailed malfunction analysis. Results of all tests are printed on paper tape and display (GO-NO-GO) on an indicator panel in the checkout test station. After completion of all missile systems checks, the missile and checkout equipment are secured and the trailer and missile are prepared for transport to the launch complex. The missile in its trailer is towed to the launch complex where the missile is mated to the launcher. The installed missile and support systems in the launch area are then validated, utilizing, in part, the mobile checkout vehicles. See figure 1-79 for a diagram of missile systems checkout vehicle location at a typical launch complex.

1-280. SQUADRON MAINTENANCE AREA.

1-281. The squadron maintenance area supporting the launch complex consists of the MAMS and a munitions section. Mobile checkout vehicles supporting the launch complex are dispatched from the MAMS as required. The major portion of organizational and field level maintenance activities are conducted at the squadron maintenance area. Additional maintenance area is provided by the parent air base or Air Force depots. Maintenance and modifications requiring special skills or facilities not available within the using command are performed, upon request, by contractor personnel and facilities.

1-282. MISSILE ASSEMBLY AND MAINTENANCE SHOP.

1-283. The major portion of inspection, checkout, and repair operations are accomplished at the missile assembly and maintenance shop (MAMS), located remotely from the launch complex. The MAMS is divided into various areas and rooms to perform aerospace ground equipment maintenance, missile maintenance, engine maintenance, guidance system

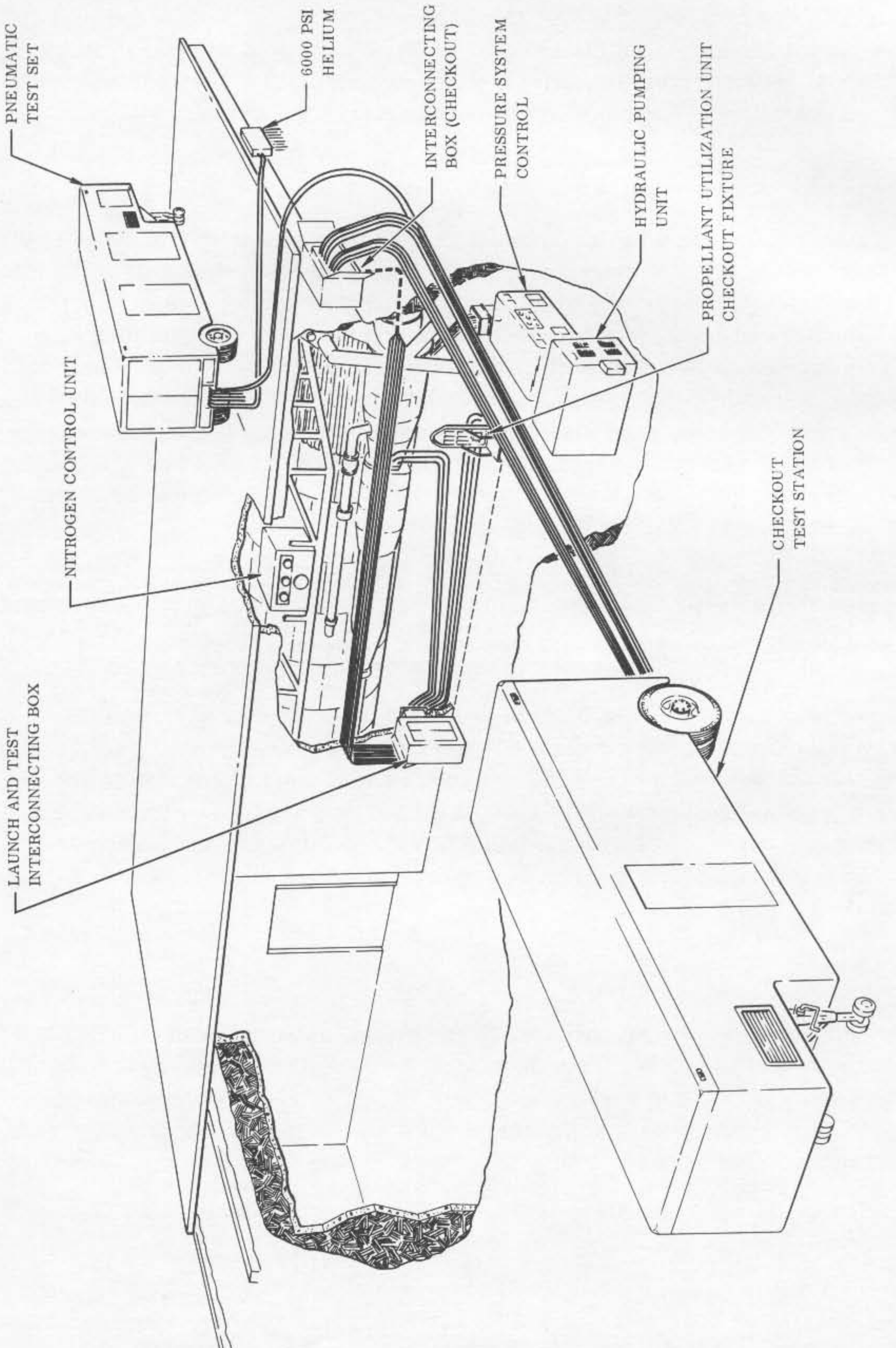

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Figure 1-79. System Checkout at Launch Complex maintenance, component checkout, calibration, and repair. Areas are also provided for administration and supply functions. The MAMS and associated personnel are capable of receiving the missile and performing all inspection, assembly, and checkout operations to determine if the missile is ready for transport to the launch site. The MAMS is also capable of repair and checkout of malfunctioning components or end items.

1-284. MUNITIONS SECTION.

1-285. The munitions section for a squadron complex is located remotely from the MAMS and consists of warehouses, storage magazines, and a sureveillance and inspection building. The surveillance and inspection building is divided into areas for administration functions; assembly, test, and checkout operations; and equipment and spares. This building also provides the facility for complete processing of the warhead, re-entry vehicle, and associated equipment. In addition, this building contains administrative offices, a briefing room, and a conference room. Storage areas are provided in the warehouses and storage magazines. The storage magazines contain the re-entry vehicle warheads and are constructed of reinforced concrete. Roof ventilators and louvered blowout panels provide ventilation for each storage compartment of the magazines.

1-286. MAINTENANCE PLAN.

1-287. MAINTENANCE INSPECTIONS.

1-288. Maintenance inspections are divided into two categories: preventive maintenance and control. Preventive maintenance consists of visual and servicing inspections, and generally requires no sequencing which will place equipment out of commission. Control inspections generally require that the status of missile or aerospace ground equipment be changed from in commission to out of commission. The control inspections involve operating equipment and thus must be sequenced to prevent damage to equipment or injury to personnel.

1-289. MAINTENANCE.

1-290. Requirements for two types of maintenance (scheduled and unscheduled) will be generated. Scheduled maintenance is that maintenance which must be performed at specific time intervals to ensure that weapon system equipment is maintained in operational condition. Unscheduled maintenance is that maintenance which cannot be specifically predicted, such as equipment malfunction or damage.

1-291. LEVELS OF MAINTENANCE.

1-292. Maintenance levels are divided into three categories: organizational, field, and depot. Maintenance functions beyond the capability of organizational or field level maintenance are normally performed at the depot level maintenance facilities. (Air Force depots, contractor facilities, if required, or depot maintenance teams)

1-293. Organizational or field level maintenance is performed at the launch complex missile assembly and maintenance shop, and the munitions section. Repair of end items, including the missile, at the launch complex will be determined by the test equipment and facilities required, dangers of contamination and damage, and time required. In general, organizational or field level maintenance at the various areas will include the following:

a. Launch complex:

(1) Missile installation, checkout, and prelaunch inspections.

(2) Daily monitoring and inspection of missile, aerospace ground equipment and real property installed equipment.

(3) Periodic and special inspections of missile, aerospace ground equipment, and real property installed equipment.

(4) Periodic functional checkout of missile and aerospace ground equipment.

(5) Malfunction correction.

(6) Servicing and calibration.

(7) Re-entry vehicle mating and demating.

(8) Missile removal.

b. Missile assembly and maintenance shop:

(1) Receiving inspection and assembly of missile as received from factory or launch complex.

(2) Missile processing (checkout).

(3) Periodic and special inspection of aerospace ground equipment and real property installed equipment.

(4) Functional checkout of aerospace ground equipment and real property installed equipment.

(5) Repair, checkout, and calibration of components and end items.

(6) Modification of missile, aerospace ground equipment, and real property installed equipment as required.

(7) Missile storage and monitoring.

c. Munitions section:

(1) Re-entry vehicle inspection, handling, and storage.

(2) Re-entry vehicle maintenance and checkout.

(3) Explosives inspection, handling, and storage.

1-294. PERSONNEL.

1-295. Operating, maintaining, and supporting the launch complex require a wide range of Air Force specialty codes and skill levels. Personnel required include surveillance and launch personnel, maintenance and checkout personnel, and support personnel. Surveillance and launch operations are performed by a missile combat crew consisting of the following members:

a. Missile Launch Officer (Missile Combat Crew Commander) (MCCC), Air Force Specialty Code (AFSC) 1825C.

b. Missile Launch Officer (Deputy Missile Combat Crew Commander) (DMCCC), AFSC 1825C.

c. Ballistic Missile Analyst Technician (BMAT), AFSC 312X4C.

d. Electrical Power Production Technician (EPPT), AFSC 543X0. (Not applicable OSTF-1 and SMS 576-C).

e. Missile Facilities Technician (MFT), AFSC 541X0A. (OSTF-1 and SMS 576-C.)

f. Missile Maintenance Technician (MMT), AFSC 443X0A. (Not applicable OSTF-1 and SMS 576-C.)

1-296. The missile combat crew commander (MCCC) is assigned the responsibility of ensuring that the launch site is maintained in emergency war order (EWO) readiness condition and implementing alert messages when received. The MCCC also ensures that missile combat crew proficiency is maintained in regards to safety, launch operations, and standby surveillance of equipment. It is the responsibility of the Sector Commander or his designated representative to ensure that all inspection, servicing, and checkout of equipment are performed as scheduled. The deputy missile combat crew commander (DMCCC) shall assist the MCCC in the assigned responsibilities.

1-297. The BMAT, EPPT, and MMT (MFT OSTF-1 and SMS 576-C) shall assist the MCCC and DMCCC in maintaining EWO readiness by monitoring, inspecting, checking, servicing, and repairing launch complex equipment. During launch operations, the BMAT, EPPT, and MMT (MFT OSTF-1 and SMS 576-C) shall assist by monitoring designated equipment and advising the MCCC of abnormal or hazardous conditions, and by performing emergency procedures when required and as directed by the MCCC.

1-298. Additional personnel required to support training launch operations at OSTF-1 and SMS 576-C include missile flight safety, Pacific Missile Range, command post, instrumentation personnel, launch complex safety officer, and missile accident and emergency team.

1-299. TECHNICAL ORDERS.

1-300. Technical orders (manuals) are provided to the using command to accomplish inspections, checkout, maintenance, and launch operations. Organizational maintenance manuals are provided to accomplish maintenance and checkout operations on individual systems such as hydraulic, pneumatic, guidance, and launch control. One organizational maintenance manual is provided for each system and contains the following information:

a. Description (physical and functional) of equipment within the system.

b. Checkout and maintenance procedures.

c. Trouble analysis.

d. Component removal and installation procedures.

1-301. Field maintenance and depot overhaul manuals are also provided for repair, reshipment, and checkout of individual equipment within a system, such as nitrogen control unit, pressure system control, helium charge unit, and air conditioner. These equipment-oriented manuals contain the following information:

a. Physical and functional description of components with the equipment.

b. Maintenance and reshipment procedures.

c. Theory of operations and system tie-in.

d. Field maintenance procedures (repair, replace, and checkout).

e. Depot level maintenance procedures.

f. Illustrated parts breakdown for equipment covered by manual.

1-302. Checklist manuals, inspection requirement manuals, and inspection work cards are also provided to implement the operational requirements at the missile assembly and maintenance shop and at the launch complex. These manuals present all tasks required in processing a missile from receipt by the squadron through launch of the missile and post-launch. The inspection work cards list all tasks involved in daily, periodic, and special inspections.

1-303. Manuals are also provided for operational use of the checkout test station. One manual is provided for each card deck. There are card decks for missile systems checkout, checkout test station self test, and hydraulic fill and bleed. Separate manuals are provided for the launch complex and for the missile assembly and maintenance shop. These manuals contain the following information:

a. Equipment required during checkout operations.

b. Preparation for checkout.

c. Card-by-card instructions (function of card, readout, manual actions required, and backout instructions).

d. Equipment shutdown procedures.

e. Troubleshooting procedures or procedure reference for malfunctions occurring during checkout.

1-304. Mobile maintenance teams from the squadron maintenance area support launch complex maintenance and checkout operations. Personnel specialties associated with the mobile maintenance teams and the squadron maintenance area include the following categories:

a. Ballistic Missile Inertial Guidance Technician, AFSC 312X2A.

b. Ballistic Missile Analyst Technician, AFSC 312X4C.

c. Nuclear Weapons Technician, AFSC 331X0B.

d. Missile Electrical Technician, AFSC 441X0A.

e. Missile Pneudraulic Repair Technician, AFSC 442X0A.

f. Missile Maintenance Technician, AFSC 443X0A.

g. Missile Engine Technician, AFSC 443X1A.

h. Missile Facilities Technician, AFSC 541X0A.

i. Electrical Technician, AFSC 542X0A.

j. Liquid Fuel Systems Maintenance Technician, AFSC 546X0A.

SECTION II

RECEIPT-THROUGH-LAUNCH OPERATION PLAN

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2-1. SCOPE.

2-2. This section contains the receipt-through-launch operation plan for the SM-65E Strategic Missile. The plan outlines the requirements which must be implemented to conduct checkout and launch operations. Procedures for accomplishing the operational requirements of the facility are not included in this section except in general flow diagram format. The operational plan presents both missile assembly and maintenance shop (MAMS) and launch complex responsibilities.

2-3. DESCRIPTION.

2-4. The operational plan (receipt-through-launch plan) consists of phases which include:

a. Missile unloading and transport.

b. Receiving inspection.

c. Real property installed equipment (RPIE) checkout.

d. Aerospace ground equipment (AGE) checkout.

e. Systems checkout.

f. Systems validation.

g. Missile ready storage.

h. Transport to launch area.

i. Missile installation.

j. Ready state B.

k. Ready state A.

l. Emergency war order (EWO).

m. Dual propellant loading (DPL).

n. EWO-DPL-EWO.

o. EWO-LSR-EWO.

p. Missile launch.

q. Postlaunch.

r. Periodic inspection functions.

2-5. Phases are defined as major operations within the receipt-through-launch plan. Each of the phases consists of a number of functions which must be performed to complete the phase. Each function consists of tasks required to complete the function. Figure 2-1 illustrates the overall receipt-through-launch plan in block diagram form. Each block in figure 2-1 represents a phase of the plan.

2-6. Scheduled maintenance inspections, scheduled replacement and calibration of equipment, and maintenance records applicable to the SM-65E Strategic Missile Weapon System are contained in the inspection requirements manual, T. O. 21-SM65E-6. The task requirements in figure 2-1 are arranged by sequence utilizing separate technical orders for requirements to be accomplished by each type of mechanic or specialist.

2-7. READY STATE B. Ready state B verifies the readiness of both the missile and site AGE. for tactical mode (ready for countdown) except for missile ordnance and the re-entry vehicle.

2-8. READY STATE A. Ready state A accomplishes the final on-EWO readiness requirements. This includes installation of missile ordnance, battery, and re-entry vehicle.

2-9. EWO TO LSR TO EWO. Figure 2-4 outlines the progression from an EWO-alert configuration through the launch signal responder (LSR) configuration and return to EWO-alert status. The flow provides for repeat simulated countdowns if required prior to returning the site to an EWO-alert configuration. The numerical figure above each function block references the appropriate section of T. O. 21-SM65E-CL-4-1.

2-10. EWO TO DPL TO EWO. Figure 2-5 outlines the progression from an EWO-alert configuration to ready state A (qualified) and a single or series of DPLs, and then the return to an EWO-alert configuration. The solid flow lines indicate the normal flow for a single DPL. Dash lines show the flow for a series of DPL's. The numerical figure above each function block references the appropriate section of T. O. 21-SM65E-CL-4-1.

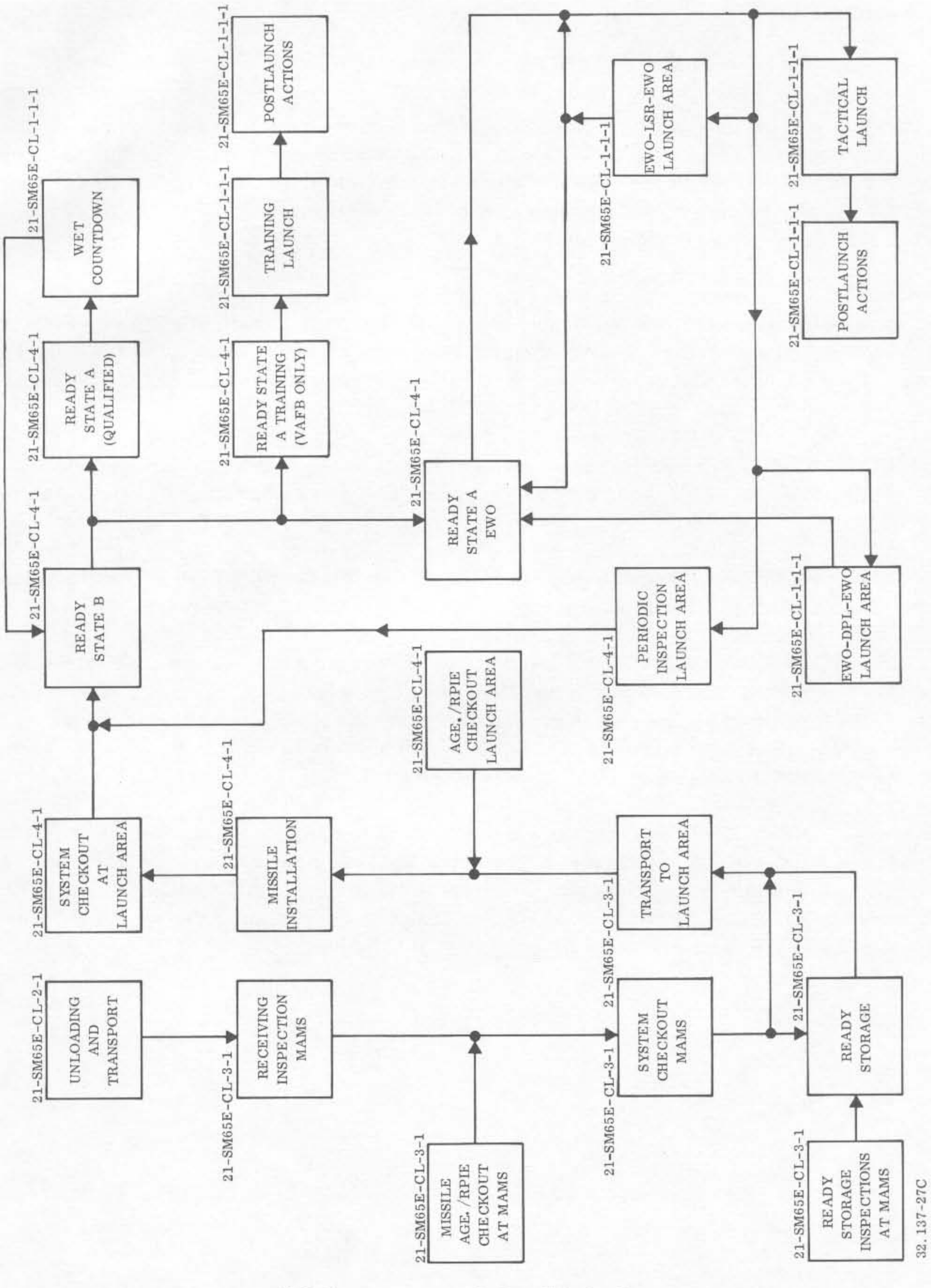

Figure 2-1. Receipt-Through-Launch Operation Plan Block Diagram

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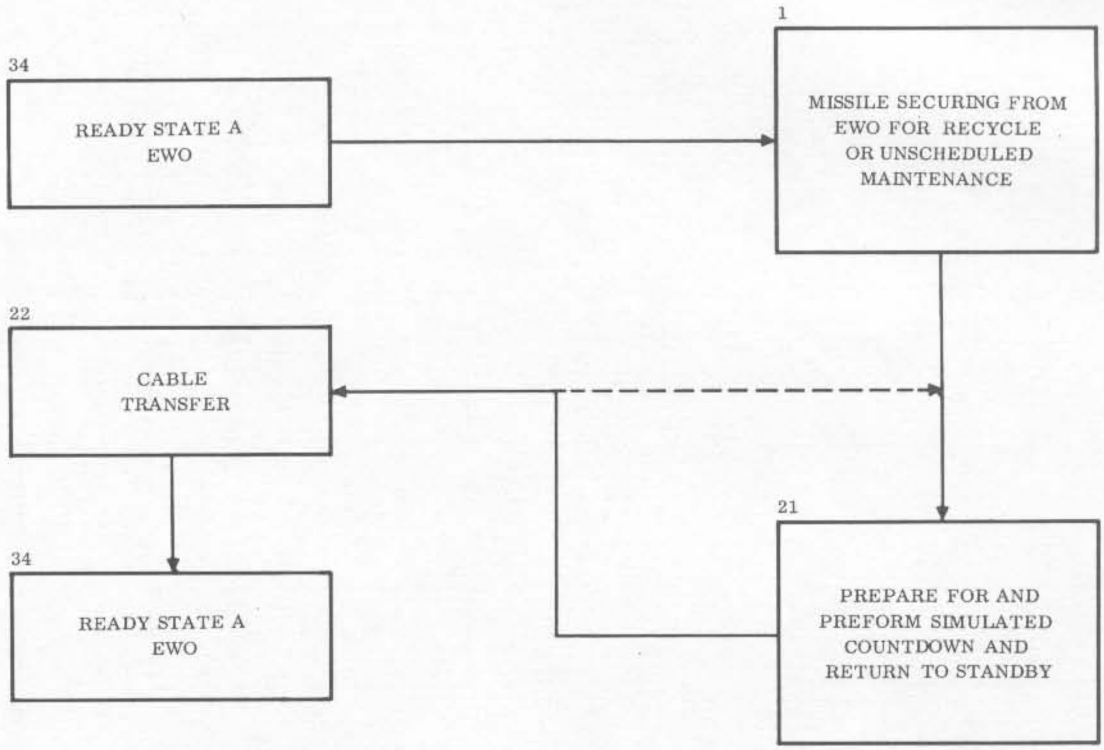

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Figure 2-4. EWO to LSR to EWO Function Flow Block Diagram

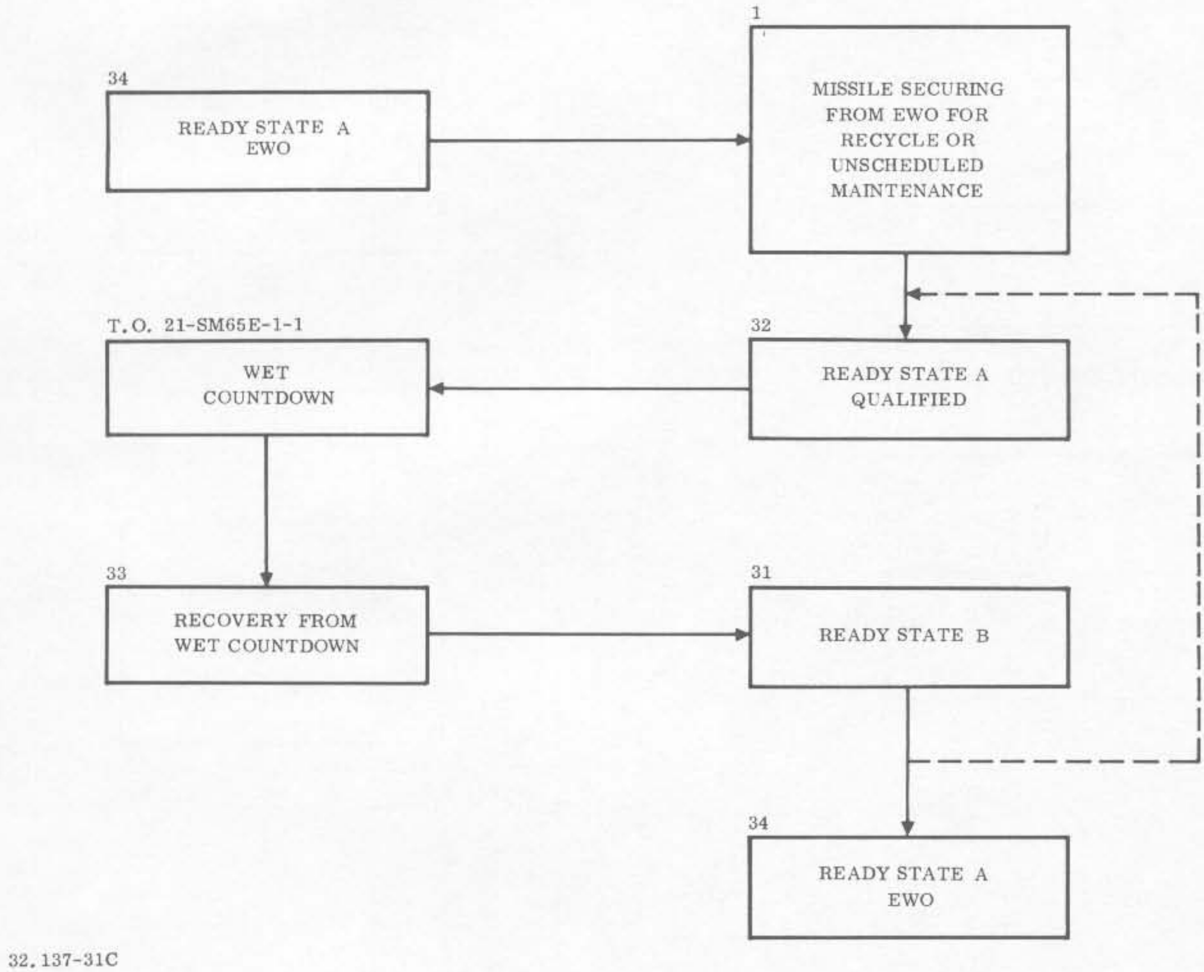

Figure 2-5. EWO to DPL to EWO Function Flow Block Diagram

a. Missile Combat Crew Commander (MCCC) 1825C.

b. Deputy Missile Combat Crew Commander (DMCCC) 1825C.

c. Ballistic Missile Analyst Technician (BMAT) 312X4C.

d. Missile Maintenance Technician (MMT) 443X0A.

e. Electrical Power Production Technician (EPPT) 543X0.

f. Missile Electrical Technician (MET) 441X0A.

g. Missile Engine Mechanic (MEM) 443X1A.

h. Additional maintenance personnel, as required, to remove and install the re-entry vehicle.

2-11. TRAINING LAUNCH. Figure 2-1 shows the sequence of operations required to perform a training launch from SMS 576-C and OSTF-1. It outlines the launch crew tasks required to perform a training launch from a training readiness condition.

2-12. PERIODIC INSPECTIONS. Periodic inspections are performed at 90-day, 180-day, 270-day, and 360-day intervals. The 90-day periodic inspection is used to perform preventive maintenance tasks, system calibrations, inspections, and checkouts at the launch area. After the 90-day periodic inspection is completed, a ready state B condition is established. The tasks are divided into three categories: on-EWO, delay-EWO, and off-EWO. On-EWO tasks do not affect the EWO readiness of the launch complex. Tasks performed under delay-EWO readiness conditions require a maximum of 45 minutes to restore on-EWO readiness. Tasks performed under off-EWO readiness conditions require more than 45 minutes to restore on-EWO readiness. Unscheduled operations from the on-EWO condition include the following: tactical launch; DPL to on-EWO readiness; simulated countdown to on-EWO readiness; and missile removal and installation to ready state B and back to ready state A, or through training launch.

2-13. At 180 days, a second periodic inspection is used to perform preventive maintenance tasks, calibration inspections, and checkout at the launch complex. The 180-day periodic inspection is similar to the 90-day periodic inspection with respect to performance of on-EWO, delay-EWO, and off-EWO readiness tasks and establishing ready state B. From ready state B, a DPL and recovery is performed to verify the missile and launch equipment as an integrated system. After completion of the DPL and recovery, a ready state A (EWO) condition is eatablished. At SMS 576-C and OSTF-1, the launch complexes and missiles may be prepared for training launch exercises instead of establishing the ready state A (EWO) readiness condition.

2-14. The 270-day and 360-day periodic inspections are similar to the 90-day and 180-day periodics respectively, except that a missile recycle is an integral part of the 360-day periodic. The missile, after being removed from the launch complex, is processed through the MAMS where a 360-day periodic inspection and checkout are performed. The processed missile is then placed in ready storage, or transported to a launch complex for reinstallation, as required.

2-15. TECHNICAL ORDER REFERENCE TABLE. Table 2-1 lists the phases of the receipt-through-launch plan. Also included in table 2-1 are the technical order checklist numbers applicable to each phase and the technical orders containing the detailed procedures for the performance of various functions. Unscheduled maintenance tasks are performed using organizational maintenance manuals and checkout manuals. These manuals also support the checklists as indicated in table 2-1. Table 2-1 presents the checklist title and number, the checklist section title, and the function that must be accomplished to perform the operational phases outlined in the receipt-through-launch plan.

2-16. USE.

2-17. The receipt-through-launch plan, as defined and presented in this manual, is designed to familiarize personnel with the requirements of the weapon system and to facilitate planning, scheduling, and operation of SM-65E complexes.

Table 2-1. Technical Order References

CHECKLIST TITLE AND NUMBER	CHECKLIST SECTION NUMBER AND TITLE	TECHNICAL ORDER (T.O.)REFERENCES FOR PROCEDURES
T.O. 21-SM65E-CL-2-1 Unload and Transport	1. Aircraft preparation for unloading	1C-133A-9
	2. Semi-trailer unloading preparation	1C-133A-9
	3. Semi-trailer removal from aircraft	1C-133A-9
	4. Restoring semi-trailer to land transport configuration	1C-133A-9 21-SM65E-2J-2-1
21-SM65E-CL-3-1 Missile Processing at Missile Assembly and Maintenance Shop	1. Semitrailer parking	21-SM65E-2FJ-2-1
	2. Loose item inventory	21-SM65E-2FJ-3-1 21-SM65E-2FJ-2-1 21-SM65E-2FJ-7-1 21-SM65E-2FJ-8-1 21-SM65E-2J-9-2, 21-SM65E-2J-6-1

Table 2-1. Technical Order References (Continued)

CHECKLIST TITLE AND NUMBER	CHECKLIST SECTION NUMBER AND TITLE	TECHNICAL ORDER (T. O.)REFERENCES FOR PROCEDURES
21-SM65E-CL-3-1 Missile Processing at Missile Assembly and Maintenance Shop (CONT)	3. Gimbaling tie-down installation	21-SM65E-2FJ-2-1
	4. Sustainer engine transport strut removal	21-SM65E-2FJ-2-1
	5. Maintenance platform positioning	21-SM65E-2FJ-2-1
	6. Missile airframe inspection	21-SM65E-2FJ-2-1
	7. Missile oxidizer tank dewpoint checkout	21-SM65E-2FJ-2-1
	8. Boiloff valve and differential pressure switch checkout	21-SM65E-2FJ-2-1
	9. Vernier engine installation	21-SM65E-2FJ-3-1
	10. Booster engine NO. 1 and NO. 2 aft nacelle installation	21-SM65E-2FJ-2-1
	11. Missile guidance system installation	21-SM65E-2J-4-3 21-SM65E-2FJ-2-1
	12. Propellant utilization sensor checkout	21-SM65F-2-26
	13. Staging disconnect plug checkout	21-SM65E-2FJ-2-1
	14. Deleted	
	15. Missile ordnance circuit resistance test	21-SM65E-2FJ-7-1
	16. Missile preparation	21-SM65E-2FJ-2-1
	17. Cable preparation	21-SM65E-2J-13-1
	18. Preparation and missile guidance system checkout	21-SM65E-2J-4-1

Table 2-1. Technical Order References (Continued)

CHECKLIST TITLE AND NUMBER	CHECKLIST SECTION NUMBER AND TITLE	TECHNICAL ORDER (T.O.)REFERENCES FOR PROCEDURES
21-SM65E-CL-3-1 Missile Processing at Missile Assembly and Maintenance Shop (CONT)	19. Checkout test station preparation for missile systems checkout	21-SM65E-2J-13-1
	20. Missile electrical system checkout	21-SM65E-2J-13-1
	21. Propulsion igniters and heaters continuity checkout	21-SM65E-2FJ-7-1
	22. Engine relay box checkout	21-SM65E-8-13-1
	23. Missile hydraulic accumulator gage calibration verification	21-SM65E-1J-1-1
	24. Hydraulic fill and bleed checkout	21-SM65E-8-1
	25. Missile pneumatic system checkout	21-SM65E-8-8-1
	26. Preparation and missile flight safety system checkout (OSTF-1 and SMS576-C)	21-SM65E-2J-25-1
	27. Deleted	
	28. Missile propellant utilization checkout	21-SM65E-8-12-2
	29. Missile flight control system checkout	21-SM65E-8-9-1
	30. Missile frequency response checkout	21-SM65E-8-3-1
	31. Integrated automatic pilot guidance checkout	21-SM65E-8-1-1
	32. Gimbaling tie-down removal	21-SM65E-2FJ-2-1

Table 2-1. Technical Order References (Continued)

CHECKLIST TITLE AND NUMBER	CHECKLIST SECTION NUMBER AND TITLE	TECHNICAL ORDER (T. O.) REFERENCES FOR PROCEDURES
21-SM65E-CL-3-1 Missile Processing at Missile Assembly and Maintenance Shop (CONT)	33. Missile pneumatic system preparation and manual static leak check	21-SM65E-2J-14-1
	34. Aerospace ground equipment and missile shutdown	21-SM65E-2J-14-1
	35. Missile transport or storage	21-SM65E-2FJ-2-1
	36. Missile stretch load application and removal	21-SM65E-2FJ-2-1
	37. Missile power on	21-SM65E-8-2-2
	38. Deleted	
	39. Daily shutdown	21-SM65E-2FJ-2-1
	40. Resume processing	21-SM65E-2FJ-2-1
	41. Pod air conditioning on	21-SM65E-4-3
	42. Pod air conditioning off	21-SM65E-4-3
	43. Missile and semitrailer hourly verification	21-SM65E-2FJ-2-1
	44. Missile and semitrailer daily verification	21-SM65E-2FJ-2-1
	45. Pressurizing missile fuel and oxidizer tanks and semitrailer transport bottles from the nitrogen control unit	21-SM65E-2FJ-3-1
	46. Checkout test station preparation for self test	21-SM65E-2J-13-1

Table 2-1. Technical Order References (Continued)

CHECKLIST TITLE AND NUMBER	CHECKLIST SECTION NUMBER AND TITLE	TECHNICAL ORDER (T. O.) REFERENCES FOR PROCEDURES
21-SM65E-CL-3-1 Missile Processing at Missile Assembly and Maintenance Shop (CONT)	47. Liquid nitrogen shroud system ambient leak test	21-SM65E-2J-9-2
21-SM65E-CL-4-1 Missile Processing at Launch and Service Installation	1. Missile securing from emergency war order for recycle or unscheduled maintenance	21-SM65E-2FJ-2-1 21-SM65E-2J-15-3
	2. Missile removal	21-SM65E-2FJ-2-1
	3. Instrument air system checkout	21-SM65E-2FJ-22-5
	4. Oxidizer system loop check	21-SM65E-2FJ-11-1
	5. Fuel system loop check	21-SM65E-2FJ-11-1
	6. Liquid nitrogen transfer system loop check	21-SM65E-2J-11-2
	7. Erection systems manual checkout without missile	21-SM65E-2FJ-10-1
	8. Erection systems automatic checkout from erection mechanism motor control center without missile	21-SM65E-2FJ-10-1
	9. Erection systems checkout from relay logic unit NO. 1 and NO. 2 without missile	21-SM65E-2FJ-10-1
	10. Thrust section heating unit checkout	21-SM65E-2FJ-19-5
	11. Ground pressurization loop check	21-SM65E-2J-9-2

Table 2-1. Technical Order References (Continued)

CHECKLIST TITLE AND NUMBER	CHECKLIST SECTION NUMBER AND TITLE	TECHNICAL ORDER (T. O.)REFERENCES FOR PROCEDURES
21-SM65E-CL-4-1 Missile Processing at Launch and Service Installation (CONT)	12. Pressure system control dynamic checkout	21-SM65E-2J-9-2
	13. Missile installation	21-SM65E-2FJ-2-1 21-SM65E-2FJ-10-1
	14. Umbilical cable ejection checkout	21-SM65E-2FJ-10-1 21-SM65E-2FJ-7-1
	15. Erection systems manual checkout with missile	21-SM65E-2FJ-10-1
	16. Missile hydraulic leak and entrapped air check	21-SM65E-2FJ-8-1
	17. Propellant level system integration	21-SM65E-2J-11-2
	18. Propellant utilization sensor checkout	21-SM65E-2J-11-2
	19. Preparation and missile guidance system checkout	21-SM65E-2J-4-1 21-SM65E-2J-4-3
	20. Missile pressurization transfer to pneumatic test set	21-SM65E-2J-14-3
	21. Prepare for and perform simulated countdown and return to standby	21-SM65E-2J-15-3
	22. Cable transfer	21-SM65E-2FJ-9-1 21-SM65E-2J-15-3
	23. Missile pressurization transfer from pneumatic test set	21-SM65E-2J-14-1
	24. Checkout test station securing and removal	21-SM65E-2J-13-1

Table 2-1. Technical Order References (Continued)

CHECKLIST TITLE AND NUMBER	CHECKLIST SECTION NUMBER AND TITLE	TECHNICAL ORDER (T.O.)REFERENCES FOR PROCEDURES
21-SM65E-CL-4-1 Missile Processing at Launch and Service Installation (CONT)	25. Engine start system checkout	21-SM65E-2J-15-3
	26. One-inch rise-off checkout (OSTF-1, SMS576-C)	21-SM65E-2J-15-3
	27. Oxidizer tank dewpoint checkout	21-SM65E-2FJ-9-1 21-SM65E-2J-11-2
	28. Boiloff valve, differential pressure switch, fuel and oxidizer airborne transducer checkout	21-SM65E-2J-15-4 21-SM65E-2FJ-9-1 21-SM65E-2J-6-1
	29. Hydraulic evacuation checkout	21-SM65E-2FJ-8-1
	30. Missile hydraulic fluid sampling	21-SM65E-2FJ-8-1
	31. Ready state B	21-SM65E-15-3
	32. Ready state A qualified	21-SM65E-2FJ-3-1 21-SM65E-2FJ-2-1 21-SM65E-2FJ-10-1
	33. Recovery from wet countdown	21-SM65E-2J-15-3
	34. Ready state A emergency war order	21-SM65E-2FJ-3-1 21-SM65E-2FJ-10-1 21-SM65E-2FJ-2-1
	35. Ready state A training (OSTF-1)	21-SM65E-2FJ-3-1 21-SM65E-2FJ-2-1 21-SM65E-2FJ-10-1
	36. Checkout test station positioning and preparation	21-SM65E-2J-13-1
	37. Communication system checkout	21-SM65E-2J-15-3
	38. Blast detection and vent system checkout (OB)	21-SM65E-2FJ-22-4

Table 2-1. Technical Order References (Continued)

CHECKLIST TITLE AND NUMBER	CHECKLIST SECTION NUMBER AND TITLE	TECHNICAL ORDER (T. O.) REFERENCES FOR PROCEDURES
21-SM65E-CL-4-1 Missile Processing at Launch and Service Installation (CONT)	39. Fluid sampling fuel, helium, and nitrogen	21-SM65E-2J-11-2
	40. Warning and alarm system checkout	21-SM65E-2FJ-22-5 21-SM65E-2FJ-21-5 21-SM65E-2FJ-19-5
	41. Fire protection checkout (OSTF-1, SMS 576-C)	21-SM65E-2FJ-22-5 21-SM65E-2FJ-21-5 21-SM65E-2FJ-19-5 21-SM65E-2FJ-22-4 21-SM65E-2FJ-21-4 21-SM65E-2FJ-19-4
	42. Signal responder unit NO. 1 and NO. 2 self-test	21-SM65E-2J-15-3
	43. Pneumatic test set checkout	21-SM65E-2FJ-9-2
	44. Alignment group checkout	21-SM65E-2J-4-1 21-SM65E-2J-4-3
	45. Alignment group with azimuth reference prisms calibration	21-SM65E-2J-4-1 21-SM65E-2J-4-3
	46. Erection systems automatic checkout from erection mechanism motor control center with missile	21-SM65E-2FJ-10-1
	47. Erection systems checkout from relay logic unit NO. 1 and NO. 2 with missile	21-SM65E-2FJ-10-1
	48. Power application to erection mechanism motor control center	21-SM65E-2FJ-10-1
	49. Open and close missile erection door	21-SM65E-2FJ-10-1

Table 2-1. Technical Order References (Continued)

CHECKLIST TITLE AND NUMBER	CHECKLIST SECTION NUMBER AND TITLE	TECHNICAL ORDER (T. O.)REFERENCES FOR PROCEDURES
21-SM65E-CL-4-1 Missile Processing at Launch and Service Installation (CONT)	50. Missile stretch load application and removal	21-SM65E-2J-2-9 21-SM65E-2FJ-2-1
	51. All inertial guidance sight tube installation and removal	21-SM65E-2FJ-10-1
	52. Oxidizer sampling	21-SM65E-2J-11-2
	53. Missile securing from launch attempt (OSTF-1)	21-SM65E-2FJ-11-1 21-SM65E-2J-4-1
	54. Charge tank drain	21-SM65E-2J-11-2
	55. Charge tank fill	21-SM65E-2J-11-2
	56. Deleted	
	57. Target board and constants boards installation and removal	21-SM65E-2J-4-3
	58. Fuel recirculation	21-SM65E-2J-11-2
	59. Missile pressurization transfer	21-SM65E-2J-14-1
	60. Manifold procedures for gas cylinders	21-SM65E-2J-11-2
	61. Fuel transfer line drain	21-SM65E-2J-11-2
	62. Servicing charge tank shroud	21-SM65E-2J-11-2
	63. Servicing helium system	21-SM65E-2J-11-2
	64. Servicing oxidizer storage tank	21-SM65E-2J-11-2
	65. Servicing fuel storage tank	21-SM65E-2J-11-2
	66. Servicing gaseous nitrogen systems	21-SM65E-2J-11-2

Table 2-1. Technical Order References (Continued)

CHECKLIST TITLE AND NUMBER	CHECKLIST SECTION NUMBER AND TITLE	TECHNICAL ORDER (T. O.) REFERENCES FOR PROCEDURES
21-SM65E-CL-4-1 Missile Processing at Launch and Service Installation (CONT)	67. Servicing liquid nitrogen and helium heat exchanger and storage tank	21-SM65E-2J-11-2
	68. Individual explosive assembly removal and replacement	21-SM65F-2-15
	69. Servicing inert injection storage bottle	21-SM65E-2FJ-3-1
	70. Depressurization of missile tanks and return to normal pressurization	21-SM65E-2FJ-2-1
	71. Missile secure from emergency war order for DPL	21-SM65F-2-15 11N-RV4E-CL-16-1

SECTION III

NORMAL OPERATING PROCEDURES

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3-1. SCOPE.

3-2. This section presents in detail the normal operating procedures to be used by the missile combat crew in operating the SM-65E Strategic Missile Weapon System at the launch complex in accordance with the receipt-through-launch plan described in section II. Each separate operational procedure is presented in the form of a table, which lists each of the discrete steps included in the procedure. The table format varies to present each type of procedure most effectively. Text describes when each of the procedures will be used. The normal operating procedures which a missile combat crew may be required to perform, from the time of their assumption of duty at crew changeover until they are relieved of duty at the next crew changeover, fall into three categories: procedures for crew changeover and standby monitoring, procedures for operating and exercising the weapon system, and procedures for operating certain of the component systems individually.

3-3. CHANGEOVER AND STANDBY MONITORING.

3-4. Tables 3-1 through 3-7 present those procedures which will be accomplished during each shift of duty by a combat crew. These tables are presented in essentially the same sequence as they will be accomplished, and include complex entry and exit procedures, missile combat crew changeover procedures, walkaround verification of emergency war order (EWO) status, positive control changeover, crew coordination briefing, complex ready state A verification procedures, and launch control center (LCC) alert readiness checkout.

3-5. WEAPON SYSTEM OPERATIONS AND EXERCISES.

3-6. Tables 3-8 through 3-16 present the procedures required to execute a launch and shutdown, and to conduct various system exercises and then return the weapon system to standby. These tables include preparation for tactical launch, preparation for training launch (SMS 576-C and OSTF-1), preparation for dual propellant loading (DPL), preparation for simulated countdown exercise, starting alternate diesel generator for immediate backup, starting and paralleling generators, amplified countdown procedures, amplified return to standby procedures, and shutdown after launch procedures. Return to standby procedures are included as normal procedures for returning the weapon system to a safe configuration following a DPL, or in the event a countdown is terminated prior to launch. Amplified countdown procedures, amplified return to standby (abort) procedures, and shutdown after launch procedures are presented in tables 3-14, 3-15, and 3-16, respectively. These tables specify, in sequence, the steps to be performed by each crew member. Entries in the three columns to the right of each step refer to the action to be taken if one of the following occurs at that step:

a. Loss of AC power.

b. (Deleted)

c. Other abnormal indications.

Use of these references is explained in detail in paragraphs 3-61 through 3-65. Nontactical exercises of the weapon system, such as simulated countdowns and DPL, will be initiated only when directed and in accordance with established procedures.

3-7. System Limitations. Variables such as weather and hold time impose corresponding peculiar limitations upon the operation and exercise of the weapon system. The missile combat crew should be familiar with these system limitations (section VI) prior to initiating operation or exercise of the weapon system.

3-8. OPERATION OF INDIVIDUAL SYSTEMS.

3-9. In addition to operation and exercise of the weapon system as a whole, the missile combat crew is required to operate individual systems for purposes such as verifying or maintaining the readiness of a portion of the weapon system. Tables 3-17 through 3-39 present procedures for operating individual systems.

3-10. ABBREVIATED CHECKLISTS.

3-11. Abbreviated normal operating procedures are provided in the following crew-member oriented checklists:

21-SM65E-CL-1-1-1	Missile Combat Crew Commander (MCCC) abbreviated checklist
21-SM65E-CL-1-1-2	Deputy Missile Combat Crew Commander (DMCCC) abbreviated checklist
21-SM65E-CL-1-1-3	Ballistic Missile Analyst Technician (BMAT) abbreviated checklist
21-SM65E-CL-1-1-4	Missile Maintenance Technician (MMT) abbreviated checklist
21-SM65E-CL-1-1-5	Electrical Power Production Technician (EPPT) abbreviated checklist

3-12. COMPLEX ENTRY AND EXIT PROCEDURES.

3-13. Procedures for monitoring complex entry and exit are presented in table 3-1. These procedures will be used for the entry and exit of crews at the time of crew changeover, and whenever personnel enter or leave the complex.

3-14. MISSILE COMBAT CREW CHANGEOVER PROCEDURES.

3-15. Procedures for performing crew changeover are presented in table 3-2. These procedures consist primarily of briefing the oncoming crew regarding the status of the weapon system.

3-16. WALKAROUND VERIFICATION OF EWO STATUS.

3-17. Procedures for walkaround verification of EWO status are presented in table 3-3. These procedures will be accomplished by the oncoming relief crew prior to positive control changeover.

3-18. POSITIVE CONTROL CHANGEOVER.

3-19. Procedures for positive control changeover are presented in table 3-4. Positive control changeover includes the physical transfer of classified materials from the duty MCCC to the relief MCCC, and constitutes changeover of control of the complex from the departing crew to the new duty crew.

3-20. CREW COORDINATION BRIEFING.

3-21. Items to be covered in both daily and maintenance crew coordination briefings are provided in table 3-5. Each new duty crew will hold a daily crew coordination briefing soon after assuming duty. Maintenance crew coordination briefings will be held prior to maintenance activities.

3-22. COMPLEX READY STATE A VERIFICATION.

3-23. Complex ready state A verification procedures provided in table 3-6 will be accomplished at the following times:

a. By the new duty crew, at the beginning of each shift, upon completion of daily crew coordination briefing.

b. Upon the completion of any maintenance which may have affected safety or ready state A (EWO) capabilities.

3-24. MAINTAINING ALERT PROCEDURES.

3-25. The launch control center (LCC) alert readiness checkout procedures in table 3-7 will be used after verifying ready state A, and will be periodically performed by the launch control monitors to insure immediate launch execution capability. There will be a minimum of two of the following crew members monitoring the launch control console (figure 1-62) at all times:

a. MCCC.

b. DMCCC.

c. BMAT.

This team will be responsible for monitoring the following items in addition to the launch control console:

a. All communication.

b. Facility remote control panel (FRCP) (figures 1-29 through 1-33).

c. Fire alarm terminal box.

d. Security gate and door panel (SMS 548, SMS 566, and SMS 567).

e. Closed circuit television displays.

Note

In the event of abnormal indications on the launch control console or FRCP, refer to corresponding emergency procedures in section IV.

Switch positions and indications required on the launch control console and the FRCP prior to starting countdown procedures are contained in table 3-7.

3-26. The MCCC will be responsible for maintaining a chronological log of all significant activities and events which occur during his tour of alert duty.

3-27. INTRACOMPLEX COMMUNICATION PROCEDURES.

3-28. Clear, precise, and correct voice communication must be used at all times to insure safe and reliable complex operations. Communication within the complex area will normally be by public address system and direct line or dial interphone. The public address system is actuated at the launch control console by depressing the appropriate pushbutton on the public address patch. Missile combat crew identifiers to be used in intracomplex communication are:

a. MCCC, COMMANDER.

b. DMCCC, DEPUTY.

c. BMAT, BMAT.

d. MMT, MMT.

e. MFT (SMS 576-C and OSTF-1), MFT.

f. EPPT, EPPT.

3-29. When testing an interphone circuit, this statement will be used: "Test 1...2...3...4...5."

3-30. CALL-IN PROCEDURES.

3-31. Contact will be established with the LCC immediately upon reaching a work station to insure that the MCCC has continuous knowledge of the location of all personnel within the complex. Initial call into the LCC may be made via any interphone network. Normally, if all networks are operating satisfactorily, network 3 will be reserved for the purpose of rapid contact with the LCC. Network 1 will be used for routine communication between stations and network 2 will provide a backup. Alternate assignments required by temporary deficiencies of particular networks will be announced in daily crew coordination briefing (table 3-5).

3-32. Calls from one interphone station to another must be made through the LCC. If it is desired to place a call, depress the appropriate line number on the interphone box. When the MCCC or DMCCC answers, the caller will identify himself, and briefly give his position and the purpose of the call, or a brief statement of action completed, being taken, requested, or other circumstances. For example: "Commander, BMAT in position at control-monitor group and beginning emergency checklist."

3-33. Initial contact from the LCC to personnel within the complex will normally be made via the public address system, and will include a request for the called personnel to call in by interphone. Personnel acknowledging a call will state their identity and location. For example: "MMT at skid 5." The word roger will be used when acknowledging the understanding of instructions or commands. For example: "MMT, roger."

3-34. SIGNOFF PROCEDURES.

3-35. When it is desired to sign off a line either to perform work or to proceed to another work station, the LCC monitor will be notified of new destination and reason for leaving the intracommunications net. For example: "MMT releasing the network and returning to LCC."

3-36. DEMAND - RESPONSE PROCEDURES.

3-37. When the demand-response technique is employed, the demand to accomplish an item will be repeated by the responder and then accomplished. For example, the demand may be: "Pressurization sequencer, system in standby switch - on." The response would be: "System in standby switch - on." If an indicator observation is required, the response will be the indication. For example, the demand may be: "System in standby indicator." If green, the response would be: "Green."

3-38. WEAPON SYSTEM CONFIGURATION FOR COUNTDOWN.

WARNING

Emergency procedures contained in section IV will be thoroughly understood prior to operating launch control equipment. Failure to comply may result in serious injury to personnel and damage to equipment.

3-39. Normal countdown procedures, provided in table 3-14, will be employed to execute tactical launches, training launches, simulated countdowns, and DPL. The type of operation executed will depend upon the configuration of the weapon system at the start of countdown. Tables 3-8 through 3-11, respectively, give the procedures to prepare the weapon system for tactical launch, training launch, DPL, and simulated countdown.

3-40. PREPARATION FOR TACTICAL LAUNCH.

3-41. Procedures to prepare the weapon system for a tactical launch are presented in table 3-8.

3-42. PREPARATION FOR TRAINING LAUNCH (SMS 576-C and OSTF-1).

3-43. Procedures to prepare the weapon system for a training launch are presented in table 3-9.

3-44. PREPARATION FOR DUAL PROPELLANT LOADING (DPL).

3-45. Procedures to prepare the weapon system for a DPL are presented in table 3-10. DPL's will be executed using normal countdown procedures (table 3-14). However, the commit sequence will end with ABORT indicator red, instead of MISSILE AWAY indicator green, because of the removal of pyrotechnics, and return to standby procedures (table 3-15) will be initiated at that time.

3-46. PREPARATION FOR SIMULATED COUNTDOWN.

3-47. Procedures to prepare the weapon system for a simulated countdown are presented in table 3-11. In simulated countdowns, control-monitor group (CMG) 3 of 4 and CMG 4 of 4 (figure 1-25) are used to simulate normal countdown responses of the missile and aerospace ground equipment (AGE.) to CMG 1 of 4 and CMG 2 of 4 (figure 1-24), which function as relay logic units, and to the launch control console. Known simulated system faults may be inserted into CMG 3 of 4 and CMG 4 of 4 during a simulated countdown to check operation of the launch control console and CMG 1 of 4 and CMG 2 of 4, and for training purposes.

3-48. DIESEL GENERATOR OPERATION (SMS 548, SMS 566, and SMS 567).

3-49. The standby diesel generator will be started and the generators put into parallel operation, whenever required by line load conditions and prior to countdown. Normally both generators will be on the line, operating in parallel, prior to start of countdown. However, the MCCC may elect to start a countdown with only one generator on the line in event one of the following conditions exists:

a. If waiting for the second diesel generator would delay the countdown.

b. If the second diesel generator has shown evidence of erratic operation such that it might drop off the line, and cause automatic shutdown of the other diesel generator and loss of AC power.

3-50. STARTING STANDBY DIESEL GENERATOR FOR IMMEDIATE BACKUP.

3-51. Procedures for starting the standby diesel generator and placing the generators in parallel operation when immediate backup is required are presented in table 3-12. These procedures will be employed when immediate backup is required due to line load conditions or other circumstances.

3-52. STARTING AND PARALLELING DIESEL GENERATORS.

3-53. Procedures for routine starting of the standby diesel generator and placing the generators into parallel operation are presented in table 3-13.

3-54. COUNTDOWN PREPARATIONS AND PROCEDURES.

3-55. Operations and exercises of the SM-65E Strategic Weapon System are accomplished by countdowns (table 3-14) controlled at the launch control console (figure 1-62) by the MCCC. Table 3-14 includes the actions required to operate the launch control equipment during a DPL, simulated countdown, training launch, or tactical launch. All such operations and exercises will be initiated only when directed, and after pre-countdown procedures (tables 3-7 through 3-13) have verified that the weapon system is in the appropriate configuration and ready for the planned operation or exercise. (Necessary coordination with other agencies on the equipment configuration for DPL prior to performing the countdown is outside the scope of this manual.) It is assumed that all prelaunch requirements in table 3-6 have been met during the routine verification of ready state A at each shift changeover. However, prior to start of countdown the MCCC will quickly scan the launch control console for abnormal indications. If the READY FOR COUNTDOWN indicator is green the countdown may be started regardless of other indications, except POD AIR CONDITIONING and RESPONDER MODE indicators illuminated amber. If any malfunction indication appears on the facilities remote control panel (figures 1-29 through 1-33) during countdown for a tactical launch, continue the countdown unless launch control console indications require returning the weapon system to standby. If a major malfunction occurs during countdown for other than a tactical launch, normally, return to standby (abort) procedures (table 3-15) will be employed to return the weapon system to a configuration safe for troubleshooting and maintenance. If malfunction occurs during a DPL, the decision to return to standby will rest with the MCCC and be based upon insuring the safety of equipment and personnel. Tactical trouble analysis and emergency procedures (section IV) will be used to circumvent malfunctions to continue a tactical countdown, or to return the weapon system to a safe configuration in the event a countdown cannot be continued or a malfunction prevents completion of the (automatic) return to standby sequence.

3-56. PREPARATIONS FOR COUNTDOWN.

3-57. Preparations for countdown include ensuring the weapon system is in the configuration appropriate for the planned operation or exercise (tables 3-8 through 3-11) and verifying proper indicator conditions and switch positions on equipment panels in the launch operations building (LOB) (table 3-7). Table 3-7 gives countdown-ready indications and switch positions on the launch control console (figure 1-62), the facilities remote control panel (figures 1-29, 1-32 and 1-33) and the fire alarm terminal box. If an abnormal indication appears, a lamp test shall be performed to ensure the indication does not result from a defective indicator lamp. If the abnormal indication is valid, a malfunction exists and should be corrected prior to start of countdown. If a switch position is not as specified, the MCCC will be notified prior to correcting the position.

3-58. COUNTDOWN PROCEDURES.

3-59. Weapon system countdowns are controlled by the MCCC from the launch control console (figure 1-62). For a description of the launch control console indicators, and of the conditions which cause the indicators to illuminate amber (event in progress) and green (event completed), refer to T. O. 21-SM65E-2J-15-9.

3-60. For timing critical sequence events, a countdown watch and three time stop watches are required. The countdown watch will be used for timing the complete countdown. Three stop watches will be used by the MCCC and the DMCCC. At the start of the countdown, the DMCCC will start the countdown watch. The MCCC will make note of time events which are not construed to be critical, but is not required to start watches for times that are not listed below. Critical timing sequences will be conducted by the following crew members in the following manner:

a. The MCCC and the DMCCC will start stop watches when RAPID FUEL LOAD indicator on the launch control console illuminates amber, and compare watches. The DMCCC will reset his watch and the MCCC will time the rapid fuel load sequence.

b. When the FUEL COMPLETE indicator illuminates amber, both the MCCC and DMCCC will start their stop watches. These watches provide a reference time base between RAPID FUEL LOAD indicator illuminating amber and RAPID FUEL LOAD indicator illuminating green at the launch control console.

c. The MCCC will stop the watch when RAPID FUEL LOAD indicator illuminates green.

d. (Deleted)

e. (Deleted)

eA. (Deleted)

f. The MCCC and the DMCCC will start their stop watches when RAPID LO_2 LOAD indicator illuminates amber. After comparison of stop watches, the MCCC will continue timing the rapid liquid oxygen (LO_2) sequence, and the DMCCC will reset his stop watch.

fA. (Deleted)

fB. The DMCCC will start his stop watch when the LO_2 storage tank LO_2 SUPPLY LOW indicator illuminates red.

g. The MCCC will start his stop watch when POWER INTERNAL indicator illuminates green and time the sequence from LO_2 COMMIT indicator illuminating amber to LO_2 COMMIT indicator illuminating green.

h. The DMCCC will start his stop watch when RETURN TO STANDBY pushbutton is depressed.

i. The MCCC will start his stop watch when LO_2 DRAINED indicator illuminates amber.

j. The MCCC will time the sequence from FUEL DRAINED indicator illuminating amber to FUEL DRAINED indicator illuminating green.

k. The MCCC will time the sequence from PNEU SYSTEM VENTED indicator illuminating amber to PNEU SYSTEM VENTED indicator illuminating green.

3-61. Amplified countdown procedures are presented in table 3-14. The table consists of numbered steps, each including the actions required and the normal indications for that step. Entries in the CREW POSITION column indicate the crew member who will perform each step (primarily the MCCC). Entries in the three columns to the right of each step refer to the action to be taken if one of the following occurs at that step:

a. Loss of AC power.

b. (Deleted)

c. Other abnormal indications.

3-62. Reference in the LOSS OF AC POWER column is applicable to SMS 548, SMS 566, and SMS 567 only upon loss of both diesel generators. When only one diesel generator is lost during parallel operation, no immediate action is required. The MCCC must decide, depending upon the circumstances involved and taking all variables into consideration, whether to place the second generator back on the line and restore parallel operation.

3-63. Entries in the three malfunction columns will be either the word abort, a dash, or a reference to a table in section IV or section V. The word abort indicates that the malfunction requires return to standby. A dash indicates that no emergency action is required and that countdown may continue unless subsequent abnormal indication occurs. References to tables in section V, Combat Crew Malfunction Isolation, indicate that return to standby is required; combat crew malfunction isolation procedures can be accomplished only after the weapon system is returned to a safe configuration.

Note

If POD AIR CONDITIONING (less than 2.5 minutes before commit), FUEL LEVEL SENSING. LO_2 LEVEL SENSING, EMERGENCY HELIUM SUPPLY, 28 V.D.C. POWER, GUIDANCE FAIL (with MISSILE POD HI HUMIDITY indicator illuminated), or AUTO-PILOT FAIL indicators on the launch control console (figure 1-62) illuminate amber during wet countdown, the countdown may continue. If any other malfunction indication is observed, the MCCC will refer to the abnormal indication column for reference to the required action. If a malfunction indication is observed during a tactical launch countdown, the MCCC will refer to the abnormal indication reference column.

WARNING

Any time the R/V SAFE indicator illuminates red, return the weapon system to standby and notify squadron maintenance. Failure to comply could result in loss of some safety features incorporated in re-entry vehicle.

WARNING

(For OSTF-1 and SMS 576-C) If a fire is observed in the missile or launch pad area, the MCCC will immediately depress the LAUNCH PAD COOLING CONTROL, ANTI-FIRE, FIRE PUMP, and MISSILE DELUGE pushbuttons on the facilities remote control panel (figure 1-32). When a fire has been extinguished, the MCCC will depress the LAUNCH PAD COOLING CONTROL, ANTI-FIRE, and FIRE PUMP (red) pushbuttons. Failure to comply could result in loss of the missile and injury or death to personnel.

3-64. EMERGENCY AND TACTICAL TROUBLE ANALYSIS PROCEDURES.

3-65. Section IV tables provide the procedures to be used, in the event of abnormal indications during countdown or standby, to circumvent the malfunction and continue a tactical countdown, or to return the weapon system from a hazardous condition to a condition safe for troubleshooting. Different tables provide the procedures to be used in the event of peculiar malfunctions. Emergency procedures corresponding to those in section IV are presented in abbreviated form in the following crew-member oriented checklists:

21-SM65E-CL-1-1-6	Missile Combat Crew Commander (MCCC) emergency abbreviated checklist
21-SM65E-CL-1-1-7	Deputy Missile Combat Crew Commander (DMCCC) emergency abbreviated checklist
21-SM65E-CL-1-1-8	Ballistic Missile Analyst Technician (BMAT) emergency abbreviated checklist
21-SM65E-CL-1-1-9	Missile Maintenance Technician (MMT) emergency abbreviated checklist
21-SM65E-CL-1-1-10	Electrical Power Production Technician (EPPT) emergency abbreviated checklist

References to tables in section IV are also references to corresponding sections of the emergency abbreviated checklists. For example, 4-8 would be a reference to table 4-8 and also to section 8 in each crew member's emergency abbreviated checklist.

3-66. Except for mandatory abort situations, the MCCC must use his own judgment in determining whether to continue the countdown or to abort. During a tactical countdown, the prime consideration is the successful launching of the missile. In a tactical situation, the sound judgment and systems knowledge of the missile combat crew will provide the basis for overcoming, circumventing, or disregarding malfunctions encountered during the countdown, and continuing to a successful launching of the missile. Sections IV and V contain many of the predictable or known malfunctions which may occur but are not to be construed as limiting factors during a tactical launch. The final responsibility for the successful launching of the missile rests with the MCCC; his judgment and crew control are the prime factors which will make possible a successful launch under adverse conditions.

3-67. For nontactical countdowns such as training launches and DPL normally the most advisable course of action if a major malfunction occurs is to return to standby and troubleshoot the malfunction. In performing trouble analysis, section V of this manual is the first reference for the missile combat crew, and appropriate maintenance manuals and documents constitute the second source of troubleshooting information. Precise knowledge of the sequence and timing of abnormal indications is of paramount importance in trouble analysis. Crew members should note, as precisely as possible, the sequence and timing of abnormal indications and record them as soon as time and operations permit.

3-68. RETURN TO STANDBY PROCEDURES.

3-69. A return to standby (abort) sequence may be initiated any time prior to commit start on the launch control console during a countdown by depressing the RETURN TO STANDBY pushbutton. To initiate the return to standby sequence after commit start has been initiated, it is necessary to depress the COMMIT STOP pushbutton and then the RETURN TO STANDBY pushbutton. Amplified return to standby procedures are contained in table 3-15.

3-70. MANUAL BACKOUT PROCEDURES.

3-71. Manual backout procedures, for use in the event the return to standby sequence does not start, or starts but does not automatically continue, are provided in section IV and are referenced in the ABNORMAL INDICATION REFERENCE columns of table 3-15. A dash in the reference column indicates that no immediate or emergency action other than standard operating practices are required. Prior to starting a countdown, return to standby procedures (table 3-15) and manual backout procedures (section IV) must be thoroughly understood. After SITE HARD indicator illuminates green, the complex will be inspected to determine if safe conditions (no abnormal indications) exist for maintenance.

3-72. SHUTDOWN AFTER LAUNCH PROCEDURES.

3-73. The amplified shutdown procedures in table 3-16 will be used to return to site hard condition, to shut down the second diesel generator (if in parallel operation), and to reestablish nonessential power and restart facility systems at the conclusion of a successful launch. Table 3-16 includes normal actions and indications to prepare for the performance of the postlaunch procedures.

3-74. POSTLAUNCH PROCEDURES.

3-75. Perform the following operations after missile launching:

a. Dispatch crew to launch and service building (LSB) to determine if conditions are safe for maintenance operations.

WARNING

No maintenance operations shall be performed until the LSB has been determined safe. Failure to comply may result in injury to personnel.

b. Inspect LSB equipment for damage and refurbish as required.

(Steps c and d deleted.)

e. Install missile in accordance with T. O. 21-SM65E-CL-4-1.

f. Establish ready state B in accordance with T. O. 21-SM65E-CL-4-1.

3-76. POST-DPL PROCEDURES.

3-77. Perform the following operations after completion of return to standby sequence after a DPL (table 3-15).

a. Dispatch crew to LSB to determine if conditions are safe for maintenance operations.

WARNING

No maintenance operations shall be performed until the LSB has been determined safe. Failure to comply may result in injury to personnel.

b. Recover from wet countdown in accordance with T. O. 21-SM65E-CL-4-1.

c. Re-establish ready state B or ready state A as applicable in accordance with T. O. 21-SM65E-CL-4-1.

3-78. REMOVAL OF GENERATOR FROM THE LINE (SMS 548, SMS 566, AND SMS 567).

3-79. Procedures for starting and paralleling the diesel generators are presented in tables 3-12 and 3-13. Procedures for removing a generator from the line and shutting down the engine are presented in tables 3-17 and 3-18.

3-80. PRECAUTIONARY REMOVAL OF GENERATOR FROM THE LINE AND ENGINE SHUTDOWN.

3-81. Procedures for rapid removal of a generator from the line and engine shutdown, for use when required to prevent damage to the equipment or as a precautionary measure, are presented in table 3-17.

3-82. ROUTINE REMOVAL OF GENERATOR FROM THE LINE AND ENGINE SHUTDOWN.

3-83. Procedures for routine removal of a generator from the line and engine shutdown are presented in table 3-18.

3-84. AIR DRYER OPERATION (SMS 548, SMS 566, and SMS 567).

3-85. Procedures for periodic changeover and reactivation of the air dryers, which are required to maintain continuous air drying at the launch complex, are presented in table 3-19. The table contains separate procedures applicable to operation and changeover of air dryer equipment.

3-86. HOT WATER BOILER STARTING PROCEDURES (SMS 566).

3-87. Procedures for starting hot water boiler, which is employed for heat generation, are presented in table 3-20.

3-88. DAY TANK SERVICING (SMS 548, SMS 566, and SMS 567).

3-89. Procedures for daily resupply of fuel oil day tank with diesel fuel from the main fuel oil storage tanks are presented in table 3-21.

3-90. EXHAUST STEAM GENERATOR OPERATION (SMS 548 and SMS 567).

3-91. Procedures for both dry operation and for wet operation (when more heat is required) of the exhaust steam generators are presented in table 3-22.

3-92. AIR SYSTEM OPERATION (SMS 548, SMS 566, and SMS 567).

3-93. Procedures for operation and shutdown of the instrument air systems are presented in table 3-23.

3-94. SPRAY POND OPERATION (SMS 548, SMS 566, and SMS 567).

3-95. Procedures for operation and regulation of spray pond system valves (figure 1-20) are presented in table 3-24.

3-96. POWER PLANT PERIODIC CHECK (SMS 548, SMS 566, and SMS 567).

3-97. Procedures for periodic checking of powerplant equipment are provided in table 3-25. The table includes a sequence of procedures applicable to equipment at SMS 566, and another sequence applicable to both SMS 548 and SMS 567.

3-98. FLOOR DRAIN SUMP PUMP OPERATIONAL CHECK (SMS 548, SMS 566, and SMS 567).

3-99. Procedures for operational checking of the floor drain sump pump are presented in table 3-26.

3-100. SEWAGE SUMP PUMPS OPERATIONAL CHECK (SMS 548, SMS 566, and SMS 567).

3-101. Procedures for operational checking of the sewage sump pumps are presented in table 3-27.

3-102. UTILITY WATER TANK WATER ADJUSTMENT (SMS 548, SMS 566, and SMS 567).

3-103. Procedures for filling, and correcting the water level in the utility water tank are presented in table 3-28.

3-104. SIDESTREAM WATER FILTER OPERATION (SMS 566).

3-105. Procedures for backwashing, rinsing and returning to service the sidestream water filter system (figure 1-21), are presented in table 3-29.

3-106. PUMP HOUSE OPERATIONAL CHECK (SMS 566).

3-107. Operational checks and procedures, applicable to pump house equipment are presented in table 3-30.

3-108. WATER SOFTENER REGENERATION (SMS 566).

3-109. Procedures for regeneration of the water softener system (figure 1-34) are presented in table 3-31.

3-110. IRON REMOVAL FILTER BACKFLUSHING (SMS 566).

3-111. Procedures for backflushing the iron removal filter (figure 1-34), are presented in table 3-32.

3-112. EMMCC OPERATION.

3-113. Procedures for operating the missile erection boom and shock mounts (figure 1-41) from the erection mechanism motor control center (EMMCC) (figures 1-42 and 1-43) and the missile transfer panel (figure 1-44) are presented in table 3-33. The table is divided into the following eight sections, which present separate procedures required to be accomplished by the missile combat crew:

a. LOCK OUT SHOCKMOUNTS.

b. SHOCKMOUNT.

c. MANUAL RAISE TO 90° FROM 0°.

d. MANUAL RAISE TO 100° FROM 90°.

e. MANUAL LOWER TO 90° FROM 100°.

f. MANUAL LOWER TO 0° FROM 90°.

g. AUTOMATIC TO 100°.

h. AUTOMATIC TO 0°.

Each section may be performed individually, or in sequence appropriate for the desired operation. All EMMCC operations will be performed only on direction of MCCC or DMCCC.

3-114. MISSILE STRETCH APPLICATION AND REMOVAL.

3-115. Table 3-34 is divided into two sections. Section one is MISSILE STRETCH APPLICATION and section two is MISSILE STRETCH REMOVAL. All crew members are expected to be proficient in the stretch load application and removal functions. Ensure minimum radiation period is in effect and EMMCC is in EMERGENCY STOP mode prior to applying or removing missile stretch.

3-116. MISSILE ERECTION DOOR AND FLAME DOOR OPERATION.

3-117. Table 3-35 presents procedures for opening and closing either the missile erection door or the flame door at the MISSILE ERECTION DOOR and FLAME DOOR control panel (figures 1-38, 1-39, and 1-40). It is divided into two sections. Section one is MISSILE ERECTION DOOR and FLAME DOOR OPENING, and section two is MISSILE ERECTION DOOR and FLAME DOOR CLOSING.

3-118. MISSILE GUIDANCE SET WARMUP.

3-119. Whenever the missile guidance set is to be checked out after a period of shutdown because of maintenance or malfunction, the set must be warmed-up prior to checkout. Procedures to complete the missile guidance set warmup sequence are presented in table 3-36.

3-120. RE-ENTRY VEHICLE PRELAUNCH MONITOR OPERATION.

3-121. Table 3-37 presents procedures for changing target settings in the re-entry vehicle prelaunch monitor (figure 1-65). Communication will be established between the launch control center and the re-entry vehicle prelaunch monitor area prior to starting the procedures in table 3-37.

3-122. MISSILE POD AIR CONDITIONING SYSTEM.

3-123. Procedures for starting, operation, and shutdown of the missile pod air conditioning system are presented in table 3-38.

3-124. ELECTRONIC CABINET AIR CONDITIONING SYSTEM.

3-125. Procedures for starting, operation, and shutdown of the electronic cabinet air conditioning system are presented in table 3-39.

Table 3-1. Complex Entry and Exit Procedures

STEP	ACTION
	Note Authority for complex entry and security checks must be in accordance with SAC unit security plans. MCCC will be notified in advance as to who will enter and why. Normal physical entry into the LCC can be accomplished only by the following complex entry procedures. MCCC, at his discretion, may designate a crew member as access controller. **WARNING** Except when directed, personnel will not approach within 1500 feet of complex area when personnel warning light is flashing red or klaxon is sounding, or if loudspeaker announcement has been made to clear the area. Failure to comply may result in injury or death to personnel.
	ENTRY PROCEDURE
1	Establish identity of personnel entering the complex, employing local directives. Note The remainder of table applies to operational bases only.
2	Monitor gate entry on television monitor: a. Gate opened

Table 3-1. Complex Entry and Exit Procedures (Continued)

STEP	ACTION
	ENTRY PROCEDURE (CONT)
2 (CONT)	b. Personnel enter c. Gate closed
3	The oncoming MCCC will designate crew members to verify the following prior to entering the entrapment area: a. LO_2 filler cap properly installed. b. GN_2 filler cap properly installed. c. GN_2 bleed valves closed. d. Slug tank shroud filler cap properly installed. e. No obstructions present which would prevent operation of missile erection door. f. No obstructions present which would prevent operation of flame door. g. Intercom box closed and secure. h. Fuel servicing inlet and recirculating inlet caps secure. i. Helium servicing inlet caps secure and valves closed. j. GN_2 servicing inlet caps secure and valves closed. k. Fire extinguisher seals intact and inspection current. l. General condition of single side-band antenna satisfactory. m. Exhaust stack guy wires installed and not broken. n. Clean spray of proper height, and water escaping from spray pond. o. Blast gates fully opened. p. Manhole covers secured.

Table 3-1. Complex Entry and Exit Procedures (Continued)

STEP	ACTION
	ENTRY PROCEDURE (CONT)
3 (CONT)	q. Area inspected for cleanness. r. At SMS 548 and SMS 567, steam condensing unit checked for cleanness and proper operation.
4	Observe MCCC or individual in charge of arriving group enters entrapment area.
5	Observe personnel entry door NO. 4 closed.
6	Establish identity of individual within entrapment area after closure of personnel entry door NO. 4, and ascertain that individual is not under duress.
7	Monitor personnel entry into tunnel: a. Personnel entry doors NO. 3 and NO. 4 opened. b. Personnel enter tunnel area.
8	Secure entrapment area by closing personnel entry doors NO. 3 and NO. 4.
9	All personnel report to launch control center.
	EXIT PROCEDURE
1	Party leaving requests permission from MCCC to depart.
2	Permission acknowledged by MCCC.
3	Monitor departure of personnel through entrapment area: a. Open personnel entry doors NO. 3 and NO. 4. b. Personnel depart through doors NO. 3 and NO. 4. c. Last individual departing closes entry door NO. 3. d. Last individual departing closes entry door NO. 4. e. Crew member monitoring exit of personnel will lock door NO. 3.

Table 3-1. Complex Entry and Exit Procedures (Continued)

STEP	ACTION
	EXIT PROCEDURE
4	Acknowledge report of personnel arrival at security gate and depress gate control button
5	Monitor exit of personnel through security gate: a. Security gate opened. b. Personnel depart through security gate. c. Security gate closed

Table 3-2. Missile Combat Crew Changeover Procedures

STEP	REQUIREMENTS	ACTION
1	The duty MCCC will ensure that the oncoming relief personnel are briefed on the following items:	
	a. Weather	Latest weather, wind velocity, and forecast for duration of shift
	b. EWO condition	Ready state A Ready state B Defense condition
	c. Complex status (1) LOB (2) Missile (3) LSB	Complex status boards will be maintained up to date. Subsystem equipment status, storage supply reservicing levels and current levels will be briefed at this time
	d. Maintenance	
	(1) Accomplished	Maintenance accomplished during shift and signed off
	(2) In progress	Maintenance in progress and estimated time of completion
	(3) Scheduled	Maintenance scheduled to be performed during shift

Table 3-3. Walkaround Verification of EWO Status

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
Note The relief missile combat crew will ensure the following conditions exist prior to assuming alert duty:	
Launch Control Console (figure 1-62)	
READY FOR COUNTDOWN indicator	Green if all systems are ready for countdown, extinguished if any system is out of standby
START COUNTDOWN pushbutton	Covered, safetywired, and sealed unless broken by proper authority
Malfunction patch indicators:	
TRAINING MODE	Extinguished
RESPONDER MODE	Extinguished
Status patch indicators:	
ENGINE GROUND POWER	Indications will be green if system is in standby, or red due to maintenance or malfunction
FLIGHT CONTROL & R/V	
ERECTION SYSTEM	
HYD PNEU SYSTEM	
LO_2 & FUEL SYSTEM	
Ready state switch	READY STATE A if in commission, DISABLED if out of commission
LO_2 TANK pressure	7.0 to 9.0 PSI
FUEL TANK pressure	16.0 to 18.0 PSI
TANK DIFFERENTIAL PRESSURE	Greater than 5.0 PSI
PRESSURE MODE indicator	Green if pressures are normal and pressure system control unit (PSC) is in automatic, red if in emergency pressurization

Table 3-3. Walkaround Verification of EWO Status (Continued)

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
Launch Control Console (CONT)	
Rear access door of launch control console	Closed and sealed with security seal unless removed by proper authority
COMMIT START key switch	Covered, safetywired, and sealed unless broken by proper authority
Facilities remote control panel (FRCP) (figures 1-29, 1-32, and 1-33)	
FRCP indications	Normal (table 1-3)
Security gate and entrapment door NO. 3 and NO. 4 indicators (SMS 548, SMS 566, and SMS 567)	Illuminated green if doors closed, and red if doors open
Communication console	As required by normal operation
Launch enable system control boxes in communication room (three each at SMS 548, SMS 566, and SMS 567, one each at SMS 576-C and OSTF-1)	Locked with a combination padlock and sealed with a security seal unless removed by proper authority
LAUNCH ENABLE switch (alternate command post only)	Safetywired and sealed with security seal in INHIBIT position unless broken by proper authority
ALCO COMM/CONTROL panel	Checked for security
Note Personnel will obtain permission from launch control center to enter missile bay.	
Control-monitor groups 1, 2, 3, and 4 of 4 (figure 1-24)	
Safetywire seals on front of all logic unit drawers	Safetywired except when removed by proper authority

Table 3-3. Walkaround Verification of EWO Status (Continued)

CONTROL OR INDICATOR	INDICATION CONDITION, CONTROL POSITION, OR ACTION
Countdown group (figure 1-64)	
Security seals on constants boards A and B	Sealed unless removed by proper authority
1A2A2 LOCAL-REMOTE switch access door seal	Secure
Rear access door seals of 1A1 and 1A2	Secure
Front drawers seals of 1A1 and 1A2	Secure
Prelaunch monitor (figure 1-65)	
Security seal on TARGET SETTINGS box cover	Sealed unless removed by proper authority
Security seals on front access doors	Secure
Security seal on rear access door	Secure
Settings A and B	Settings verified with target data
Control-monitor groups NO. 1 and NO. 2 of 4 (figure 1-24)	
Rear access panel security seals	Sealed unless removed by proper authority
Pressure system control (figure 1-48)	
Valves 27, 28, 29, 30, and 43	Closed
Valves 6 and 7	Open
Standby pressures	Verified
Auxiliary hydraulic pumping unit	
Bypass valve	Closed

Table 3-3. Walkaround Verification of EWO Status (Continued)

CONTROL OR INDICATOR	INDICATION CONDITION, CONTROL POSITION, OR ACTION
Missile B-2 pod	
All latches and security seal	Secure
MISSILE ERECTION DOOR and FLAME DOOR local control panel (figures 1-38 and 1-40)	
CLOSED, DOWN, and LATCH indicators	Illuminated
Other indicators	Extinguished
Emergency breathing apparatus	
Demand respirator	Checked
K bottle pressure 1500 to 2000 PSI	Checked
LSB	
Area for cleanness	Checked
Launch operations building	
Medical cabinet	Locked
Latrine	Clean
Kitchen	Clean
Floors	Inspected
Storage closet	Inspected
Emergency rations	Secured

Note

The remainder of this table consists of walkaround verification of EWO status in the power room.

Table 3-3. Walkaround Verification of EWO Status (Continued)

CONTROL OR INDICATOR	INDICATION CONDITION CONTROL POSITION, OR ACTION
Standby generator 480-volt switchgear panel (figures 1-16 and 1-17)	
Panel instruments and switches for damage	Checked
At SMS 548 and SMS 567, generator VOLTAGE REGULATOR CHANGE-OVER SWITCH to	AUTO
Water coolant area walkaround check	
At SMS 548 and SMS 567, condensate pump pressure	18.0 to 35.0 PSI
At SMS 548 and SMS 567, condensate make up water tank	1/3 to 1/2 full
At SMS 566, engine jacket water pump pressure	15.0 PSI minimum
At SMS 566, jacket water expansion tank	1/2 to 2/3 full
Hot water expansion tank	1/3 to 2/3 full
Hot water expansion tank pressure	10.0 to 16.0 PSI
Hot water pump operation	Checked
Utility water tank	1/2 to 2/3 full
Cooling water pressure	40.0 PSI minimum

Table 3-3. Walkaround Verification of EWO Status (Continued)

CONTROL OR INDICATOR	INDICATION CONDITION, CONTROL POSITION, OR ACTION
Water coolant area walkaround check (CONT)	
Cooling water temperature from spray pond	60° to 90° F (SMS 548 and SMS 567) 50° to 85° F (SMS 566)
Main water inlet line pressure	2.0 PSI minimum
At SMS 567, main water line pressure	3.0 PSI minimum
Air compressor	
At SMS 566, air compressor oil level	Full
At SMS 566, air compressor cylinder lubricator top sight glass	1/2-full minimum
At SMS 566, air compressor for cleanness	Checked
Standby engine	
Governor oil level	Checked
Oil level of engine	Checked
At SMS 548 and SMS 567, pedestal bearing oil level	Checked
At SMS 566, generator oil cup level	Checked
At SMS 548 and SMS 567, steam separator water level	Checked
Engine and generator for cleanness	Checked
Standby and running engine panels	
Instruments for damage and operation	Checked

Table 3-3. Walkaround Verification of EWO Status (Continued)

CONTROL OR INDICATOR	INDICATION CONDITION, CONTROL POSITION, OR ACTION
Running engine	
Governor oil level	Checked
Engine oil level	Checked
At SMS 548 and SMS 567, pedestal bearing temperature	200° F maximum
At SMS 566, generator oil cup level	Checked
Engine and generator for cleanness	Checked
Battery charger	
Battery charger for damage and operation	Checked
Battery bank	
Batteries for cleanness	Checked
Battery electrolite level	Checked
Motor control center	
All circuit breakers	On
At SMS 567, fire pump circuit breaker	Off
Fuel oil day tank	
Fuel oil day tank level	1/2-full minimum
Piping and tank for leaks	Checked
Air dryer	
Air dryer operating	Checked

Table 3-3. Walkaround Verification of EWO Status (Continued)

CONTROL OR INDICATOR	INDICATION CONDITION, CONTROL POSITION, OR ACTION
Air storage tanks	
Air storage tank pressure	270 to 300 PSI (SMS 548 and SMS 567) 280 to 300 PSI (SMS 566)
Chemical feeder (SMS 548)	
Motor and pump for operation	Checked
Power room	
Power room floor and office for cleanness	Checked
Forms and records for completeness	Checked

Table 3-4. Positive Control Changeover

STEP	ACTION
	Note Launch control console will be monitored during these changeover procedures. Relief and duty MCCC's and DMCCC's will accomplish the following:
1	Complete classified document inventory, excluding positive control changeover.
2	Accomplish classified document receipts. Note Relief MCCC will ensure following data is verified prior to starting duty tour and maintained on launch control console throughout his tour of duty.
3	Observe the following indications on launch control console: (figure 1-62) a. HIGH indicator illuminated green. b. TARGET A SELECTED or TARGET B SELECTED indicator illuminated as required. c. CROSSRANGE CORRECTION and DOWNRANGE CORRECTION dial settings as required.
4	Verify position of the following at launch control console. a. Fast reaction checklists. b. Copy formats. c. Authentication and decode materials.
5	Relief and duty MCCC and DMCCC accomplish positive control changeover.
6	Relief MCCC and DMCCC notify command post of positive control changeover and assumption of duty.

Table 3-4. Positive Control Changeover (Continued)

STEP	ACTION
7	New duty MCCC announces on public address system that his crew is on duty.
8	Offgoing missile combat crew released from complex

Table 3-5. Crew Coordination Briefing

STEP	REQUIREMENTS	ACTION
DAILY CREW COORDINATION BRIEFING		
	Note MCCC will ensure a daily briefing is completed after each crew changeover. After ensuring required personnel are present MCCC will brief them on the following items:	
1	Events scheduled for the shift	Include scheduled operations or exercises of weapons system and other events
2	Sequence of events	Present sequence to be followed in completing scheduled events
3	Crew coordination	Describe coordination among crew members required by the events planned for the shift
4	Intracomplex communications	Depending upon the status at the time of intracomplex communication networks, individual networks will be assigned for different types of communication. Specify which network is to be used for routine communication, which for emergency calls, and which for other purposes
5	Technical orders	Brief personnel on the full and proper use of appropriate checklists and other technical orders for actions planned for the shift
6	Emergency procedures	Brief personnel on required action to be taken in the event of various types of emergencies occurring
7	Console assignments	Make assignments as to which crew member will monitor the launch control console during different periods of the shift. Two of the following must monitor the launch control console at all times: MCCC DMCCC BMAT
8	EWO or no-notice exercise	Briefed

Table 3-5. Crew Coordination Briefing (Continued)

STEP	REQUIREMENTS	ACTION
	MAINTENANCE BRIEFING	
	Note Prior to planning maintenance actions, the MCCC will ensure a valid work order has been initiated for each task to be performed. Note Prior to starting maintenance action MCCC will ensure required personnel, qualified in their specialties, are present with adequate protective clothing and that equipment necessary to the planned action is available for their use. Personnel will be briefed on the following items:	
1	EWO or no-notice exercise	Personnel will be briefed on position assignments, responsibilities, and procedures to be used in the event of an EWO or a no-notice exercise under the following conditions: a. If during progress of a DPL or simulated countdown, ready state A will be re-established as rapidly as possible, utilizing appropriate checklists, and crew will then go to their countdown positions. b. If during progress of a maintenance task, the task will be completed or terminated, and complex returned to ready state A as soon as possible. All maintenance personnel will assemble in ready room upon completion of ready state A requirements
2	Maintenance to be performed	Discuss maintenance functions to be performed and the sequence
3	Pertinent technical orders	Ensure individuals, to perform maintenance, have required up-to-date checklists and other pertinent technical orders in their possession. Brief personnel on proper use of these technical orders. Ensure

Table 3-5. Crew Coordination Briefing (Continued)

STEP	REQUIREMENTS	ACTION
		MAINTENANCE BRIEFING (CONT)
3	Pertinent technical orders (CONT)	personal qualifications of individuals to perform required maintenance
4	Communication procedures	Interphone communication will be brief, concise, modulated, and slightly slower in speech rate than normal conversation. All calls will be promptly acknowledged. MCCC will be notified immediately when a crew member arrives at each position where a task is to be performed. New notification will be given whenever a crew member changes his work position
5	Safety precautions and equipment	Brief individuals on: a. Use of hand and guard rails b. Use of safety belts c. Use and location of emergency breathing apparatus d. Caution around high pressure lines and equipment e. Caution around supercooled equipment
6	Weather	Brief personnel on weather that may adversely effect operation or maintenance of task in progress, such as: a. High wind b. Hail, snow, rain c. Extremes in temperature
7	Crew coordination	Cover tasks to be performed by each crew member and coordination required among them

Table 3-5. Crew Coordination Briefing (Continued)

STEP	REQUIREMENTS	ACTION
MAINTENANCE BRIEFING (CONT)		
8	Emergency procedures	Cover backout and emergency actions to be taken in the event a malfunction or hazardous condition develops during maintenance action
9	Other remarks	Special tasks, requirements, or activities required by unit procedure will be briefed at this time

Table 3-6. Complex Ready State A Verification

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
Note MCCC or DMCCC will ensure the following:	
Launch control console (figure 1-62)	
Lamp test	Completed
WARNING If PRESSURE MODE indicator is illuminated red, a pressurization emergency exists and should be corrected immediately by depressing proper manual pressurization control pushbutton. Failure to comply may result in loss of missile and injury to personnel.	
PRESSURE MODE indicator	Green
LO_2 TANK pressure gage	7.0 to 9.0 PSI
FUEL TANK pressure gage	16.0 to 18.0 PSI
TANK DIFFERENTIAL PRESSURE gage	Greater than 5.0 PSI
Malfunction patch indicators	Extinguished
Standby status patch indicators	Green
READY FOR COUNTDOWN indicator	Green
Countdown status patch indicators	Extinguished
Commit patch indicators	Extinguished
Return to standby patch indicators	Extinguished
CROSS RANGE CORRECTION and DOWN RANGE CORRECTION dial settings	Checked
HIGH or LOW indicator	Green
TARGET A SELECTED or TARGET B SELECTED	Green

Table 3-6. Complex Ready State A Verification (Continued)

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
Launch control console (CONT)	
Alarm	Off
Commission status switch	READY STATE A
CAUTION Any interruption of primary AC power will cause an emergency condition and must be handled in accordance with loss of primary AC power emergency procedures in tables 4-3 through 4-8, as applicable. Failure to comply may result in damage to equipment.	
Standby diesel generator 480V switchgear panel (SMS 548 and SMS 567) (figure 1-16)	
GENERATOR MAIN BREAKER	OPEN
GENERATOR MAIN BREAKER indicator light	Green
Generator EXCITER FIELD rheostat	Resistance out
Generator CROSS CURRENT COMPENSATION control	Aligned with index mark
GENERATOR VOLTAGE ADJUSTMENT rheostat control	Aligned with index mark
Generator main breaker VOLTMETER switch	OFF
Generator main breaker FREQUENCY meter switch	OFF
Generator main breaker SYNCHRONIZING switch	OFF
Generator VOLTAGE REGULATOR CHANGEOVER switch	Automatic
GOVERNOR MASTER TRIMMER SELECTOR switch	Running engine

Table 3-6. Complex Ready State A Verification (Continued)

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
Standby diesel generator 480V switchgear panel (SMS 548 and SMS 567) (figure 1-16) (CONT)	
GENERATOR MAIN BREAKER CIRCUIT BREAKER indicator	Green
Water coolant area walkaround check (SMS 548 and SMS 567)	
CONDENSATE PUMP	18.0 to 35.0 PSI
Condensate make up water valve position	Checked
Condensate make up water	1/3- to 1/2-full
Hot water expansion tank	1/3- to 2/3-full
Hot water expansion tank pressure	15.0 PSI
Utility water tank water level	1/2- to 2/3-full
Utility water tank pressure	60.0 to 85.0 PSI
Cooling water temperature from pond	60° to 80° F (SMS 567) 60° to 90° F (SMS 548)
Cooling water pressure	Greater than 40.0 PSI
Cooling water spray pond inlet temperature	50° to 90° F
Main water inlet line (10-inch) pressure	Normal
Cooling water pump operating pressure	Above 40.0 PSI
Instrument air compressor (SMS 548 and SMS 567)	
Air compressor oil level	Full
Air compressor temperature	100° to 120° F
Air compressor cylinder lubricator (top sight glass)	2/3-full minimum
Inlet water valve intercooler	Open

Table 3-6. Complex Ready State A Verification (Continued)

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
Instrument air compressor (SMS 548 and SMS 567) (CONT)	
Outlet water valve intercooler	Open
Inlet water valve aftercooler	Open
Outlet water valve aftercooler	Open
Standby engine valves positioning (SMS 548 and SMS 567)	
All valves	Cycled
Fuel filter scraper handles	Rotated
Steam separator water level	Normal
Make up water valves	Open
Steam generator valves (if steam generator is used)	Open
a. Inlet valve	Normal operating position
b. Outlet valve	Normal operating position
Lube oil supply valve	Closed
Dirty lube oil return valve	Closed
Fuel oil supply valve	Open
Fuel oil return valve	Open
Jacket water valve	Open
Cooling water supply valve	Open
Cooling water return valve	Open
Starting air supply valve	Open
Standby engine oil levels (SMS 548 and SMS 567)	
Governor oil level in sight glass	Between the two marks
Engine oil level dipstick indication	Between normal and high mark
Pedestal bearing oil level gage indication	Between the two marks

Table 3-6. Complex Ready State A Verification (Continued)

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
Standby diesel generator walkaround check (SMS 548 and SMS 567)	
Under and around generator for obstructions and miscellaneous items	Checked
Standby engine instrument panel (SMS 548 and SMS 567)	
Instruments for correct indication	Checked
Check for dial glass breakage, stuck indicators, etc.	Checked
TEST ALARM pushbutton	Depressed
All warning indicators	Illuminated
Warning horn	Actuated
Depress ALARM CONTROL OFF pushbutton	Depressed
Standby engine governor (SMS 548 and SMS 567)	
SPEED DROOP control	As required
LOAD LIMIT control	Minimum position SEE SAFE. SUP. 1
SPEED control	As required
SEE SAFE SUP 1	
Running engine (SMS 548 and SMS 567)	
Fuel filter scraper handles	Rotated
Governor oil level	Between two marks on gage
Engine oil level	Normal
Pedestal bearing oil level	Between marks
Pedestal bearing temperature	Maximum 200° F

Table 3-6. Complex Ready State A Verification (Continued)

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
Battery charger (SMS 548 and SMS 567)	
Voltmeter	129 to 140 volts (SMS 548 and SMS 567)
Ammeter	0.1 to 12.0 amperes
Emergency lighting (SMS 548)	
Emergency lighting test transformer disconnect switch or pushbutton	Test position
Emergency lighting transformer disconnect switch or pushbutton	Normal position
Motor control center (SMS 548 and SMS 567)	
All circuit breakers (except fire pump circuit breaker at SMS 567)	On
Floor drain sump pump (SMS 548 and SMS 567)	
Valves in proper position	Checked
Pump for normal operation	Checked
Lube oil level	Operating level
Emergency fuel pressure regulator (SMS 548)	
Bypass valve	Closed
Inlet valve	Open
Outlet valve	Open
Emergency fuel oil pumps (SMS 548)	
Check for normal operation	Checked
Fuel oil transfer pump (SMS 548 and SMS 567)	
Check for normal operation	Checked

Table 3-6. Complex Ready State A Verification (Continued)

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
Fuel oil day tank (SMS 548 and SMS 567)	
Level indicator	1/2-full minimum
Air dryer (SMS 548 and SMS 567)	
Check for normal operation	Checked
Air storage tanks (SMS 548 and SMS 567)	
Drain condensation	Drained
Tank pressure	270 to 300 PSI
Sewage ejection pumps (SMS 548 and SMS 567)	
Check for normal operation	Checked
Battery bank (SMS 548 and SMS 567)	
Specific gravity reading of pilot cells	Checked
Exhaust fans E-1 and E-2 (SMS 548 and SMS 567)	
Check for normal operation	Checked
Air handling units S-1, S-2, and S-3 (SMS 548 and SMS 567)	
Check for normal operation	Checked
Freon compressor and condensor (SMS 548 and SMS 567)	
Oil level in sight glass	Approximately 1/2-full
Suction pressure	25.0 to 35.0 PSI
Head pressure	85.0 to 115 PSI

Table 3-6. Complex Ready State A Verification (Continued)

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
Chemical feeder (SMS 548)	
CAUTION Do not allow feeder to run dry. One full tank (100 gallons) every 24 hours is normal operation. Failure to comply may result in damage to equipment.	
Motor and pump operation	Checked
Pump feed operation	1 inch per hour on sight glass
Standby diesel generator switchgear panel (SMS 566) (figure 1-17)	
GENERATOR main breaker indicator	OPEN and GREEN
CIRCUIT BREAKER indicator	Green
Generator FIELD DISCHARGE SWITCH	Disengaged position
Generator FIELD RHEOSTAT	Full clockwise position
VOLTAGE CONTROL MANUAL-AUTO switch	MANUAL
LOCKOUT RELAY tripped position	Checked
Generator AMMETER SWITCH	OFF
OVERCURRENT RELAY 1, 2 and 3 flags indicating	Set
GROUND OVERCURRENT RELAY flag indicating	White
REVERSE POWER RELAY flag indicating	Set
MASTER SELECTOR SWITCH indicating	Running engine
All knobs and instruments for damage	Checked
Ground detector indicators	Illuminated

Table 3-6. Complex Ready State A Verification (Continued)

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
Standby engine control panel (SMS 566)	
Instruments for damage	Checked
LIGHT TEST pushbutton	Depressed
OS-HW-LO indicators	Illuminated
Note To ensure proper operation of governor solenoid actuate engine RESET OFF-ON selector switch and check proper positioning of solenoid plunger.	
Engine RESET OFF-ON selector switch	Checked
Engine RESET OFF-ON selector switch	ON
Oil emergency LUBE OFF-ON selector switch	OFF
Lube oil emergency indicator	Illuminated
Cooling water temperature in and out	Checked
Lube oil temperature in and out	Checked
Running engine control panel (SMS 566)	
Instruments for damage	Checked
TURBOCHARGER LUBE OIL PRESSURE gage	25.0 PSI minimum
LUBE OIL PRESSURE gage before strainer	Approximately 50.0 PSI
LUBE OIL PRESSURE gage before filter	Approximately 45.0 PSI
AIR DISCHARGE PRESSURE	Checked
FUEL SUPPLY PRESSURE	10.0 to 15.0 PSI
Engine LUBE OIL PRESSURE	45.0 to 60.0 PSI
ENGINE HOURS meter operation	Checked

Table 3-6. Complex Ready State A Verification (Continued)

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
Running engine control panel (SMS 566) (CONT)	
CAUTION Do not move RESET OFF-ON selector switch on operating unit. Operation of this switch will cause unit to shut down. Failure to comply may result in damage to equipment.	
Engine RESET OFF-ON selector switch	ON
PYROMETER indications	Within 40° F of each other
ENGINE RPM METER reading	Approximately 720 RPM
OS-HW-LO indicators	Extinguished
Lube oil emergency indicator	Extinguished
Emergency LUBE OFF-ON selector switch	ON
TEMP. COOLING WATER IN	140° to 170° F
TEMP. COOLING WATER OUT	150° to 185° F
TEMP. LUBE OIL IN	140° to 170° F
TEMP. LUBE OIL OUT	150° to 180° F
LIGHT TEST pushbutton	Depressed
OS-HW-LO indicators	Illuminated
LIGHT TEST pushbutton	Released
Running engine and governor (SMS 566)	
Governor oil level	Between marks on sight glass
SPEED DROOP control position	5
PERCENT LOAD control position	10 or 100 percent
VERNIER SPEED control position	Approximately 7
Throttle handle (in run position)	Checked

Table 3-6. Complex Ready State A Verification (Continued)

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
Running engine and governor (SMS 566) (CONT)	
Engine air starting air supply valve	Closed
Engine quick air start valve	Closed
Engine lube oil supply valves	Closed
Automatic fuel oil control box for contamination	Checked
Engine fuel supply valve	Open and checked
Turbo water flow indicator	Operating
Turbo temperature water out indicator	150° F minimum
Jacket water pump	15.0 PSI minimum
Lube oil level indication in sight glass	Normal level
Engine lube oil drain valve or valves	Closed
Intake air screen for cleanness	Checked
Automatic water temperature control valve and piping for leaks	Checked
Fuel injector return lines for leaks	Checked
Exhaust piping for leaks	Checked
Generator for obstructions and miscellaneous items	Checked
Generator end bearing oil cup for proper oil level	Checked
Exciter for obstructions and miscellaneous items	Checked
Exciter belts for looseness and fraying	Checked
Engine for leaks	Checked
Battery charger and battery bank (SMS 566)	
Voltmeter indication	125 (±5) volts
Ammeter indication	20 amperes maximum

Table 3-6. Complex Ready State A Verification (Continued)

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
Battery charger and battery bank (SMS 566) (CONT)	
TEST pushbutton	Depressed
Battery voltage	125 (±5) volts
NORM-BOOST switch position	NORMAL
NORM-BOOST HI-LO indicators	Checked
Ground indicators	Extinguished
Batteries for proper electrolyte level, excessive gassing, and cleanness	Checked
All electrical terminals for security	Checked
Floor drain sump pump (SMS 566)	
Valves in proper position	Checked
Motor and pump for proper operation	Checked
Electrical conduits for security	Checked
Spray pond cooling water pumps (SMS 566)	
Pump pressure	40.0 PSI minimum
Packing gland leakage	Checked (approximately 5 drops per minute)
Electrical conduit for security of mounting	Checked
Pump and motor for security and overheating	Checked
LOB motor control center (SMS 566)	
All circuit breakers	On
Circuit breakers for evidence of heating	Checked

Table 3-6. Complex Ready State A Verification (Continued)

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
Lube oil replenishing tank (SMS 566)	
Sight glass level	1/4-full minimum
Piping and tank for leaks	Checked
Refrigeration strainers (SMS 566)	
Strainer and piping for leaks	Checked
Strainer for cleanness (note when last changed and cleaned)	Checked
Fuel transfer pumps (SMS 566)	
Pump for leaks, security, and cleanness	Checked
Piping and emergency pump for leaks	Checked
Electrical conduits for security	Checked
Engine jacket water surge tank (SMS 566)	
Water level in sight glass	Approximately 1/2-full
Piping, heat exchanger and tank for security and leaks	Checked
Utility water pump (SMS 566)	
Pump and motor for temperature and vibration	Checked
Pump pressure (if operating)	60.0 to 80.0 PSI
Packing glands for excessive leakage	Checked
Electrical conduit for security and damage	Checked
Utility water storage tank (SMS 566)	
Water level	1/2-full
Tank pressure	60.0 to 80.0 PSI

Table 3-6. Complex Ready State A Verification (Continued)

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
Spray pond control valves (SMS 566)	
Inlet temperature	50° to 85° F
Automatic control valve (open when replenishing pond)	Checked
Main water line inlet pressure	2.0 PSI minimum
Flow meter indication	Approximately 1/3-scale
All piping, valves, and flow meter for leaks	Checked
Hot water boiler (SMS 566)	
Water and fuel piping for leaks	Checked
Boiler operation	Checked
Boiler water temperature	180° F minimum
Boiler water pressure	10.0 to 16.0 PSI
Tank sight glass water level	1/2- to 2/3-full
Hot water circulating pumps (SMS 566)	
Pump and motor for temperature and vibration	Checked
Packing gland for excessive leakage	Checked
Electrical conduits for security and damage	Checked
Pump pressure	40.0 PSI minimum
Sidestream filter (SMS 566)	
Filter condition	Checked
Gage differential pressure	5.0 PSI maximum
Accumulation of air removed by opening blow down valve	Removed

Table 3-6. Complex Ready State A Verification (Continued)

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
Iron removal filter (SMS 566)	
Filter condition (leaks, etc.)	Checked
Differential pressure	3.0 PSI maximum
Water softener (SMS 566)	
General condition of softener and components	Checked
Salt tank for correct salt and water level	Checked
Hardness content	15.0 PPM maximum
Air compressor (SMS 566)	
Compressor oil level and oil feeders	Checked
Oil feeder operation (if compressor is operating)	2 to 3 drops per minute
Compressor and motor for temperature and vibration	Checked
Belts condition (looseness and fraying)	Checked
Air dryer (SMS 566)	
Excessive air leakage	Checked
Air dryer tower pressure	300 PSI
Reactivating tower pressure	Approximately 0 PSI
Timer-stop set	3-1/2 hours (maximum 4)
Temperature of desiccant in reactivating tower (heating)	250° to 300° F
Instrument air and starting air receiver (SMS 566)	
Pressure of both tanks	280 to 300 PSI
Electrical conduits and electrical switches for security	Checked
Condensation	Removed

Table 3-6. Complex Ready State A Verification (Continued)

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
Freon compressor and condenser (SMS 566)	
Inlet water temperature	56° to 76° F
Outlet water temperature	76° to 110° F
Oil level in sight glass	Approximately 1/2-full
Suction pressure	25.0 to 35.0 PSI
Discharge pressure	85.0 to 115 PSI
Oil pressure 30.0 PSI greater than suction pressure	Checked
Sewage ejection pumps (SMS 566)	
Pump condition	Checked
Piping and electrical controls	Checked
Standby diesel generator check (SMS 566)	
Exciter belts for proper tension and excessive fraying	Checked
Standby diesel generator governor (SMS 566)	
SPEED DROOP indicator	5
SPEED indication	Approximately 4
PERCENT LOAD indication	5 or 50 percent
Standby engine (SMS 566)	
Automatic fuel oil control box for contamination	Checked
Fuel oil inlet valve	Open
TURBOCHARGER water flow meter	Checked
Jacket water pump pressure	15.0 PSI minimum
Air intake filter screen condition	Checked
All water valves to engine	Open

Table 3-6. Complex Ready State A Verification (Continued)

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
Standby engine (SMS 566) (CONT)	
All piping for security and leakage	Checked
Automatic water temperature control for leakage	Checked
Oil flow sight glasses	Full
All exhaust piping for leaks and security	Checked
Fuel injector return lines for leaks	Checked
Entire engine for water, fuel, oil and lube oil leaks	Checked
Engine lube oil and fuel oil prime system hand pumps	Checked
All indicator cocks	Opened
Starting air supply valve	Opened
Starting air condensation valve	Opened
Condensation	Expelled
Starting air condensation valve	Closed

Note

When engine is being rotated with air, observe indicator cocks for foreign material emission. Observe flywheel for hesitation or jerky motion. If engine has undergone maintenance, ensure freedom of movement of all moving parts, by rotating engine two turns by hand, before applying air.

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
Quick air starting valve (turn engine over 5 revolutions minimum)	Opened
Quick air starting valve	Closed
Indicator cocks	Closed

Table 3-6. Complex Ready State A Verification (Continued)

CONTROL OR INDICATOR	INDICATOR CONDITION CONTROL POSITION, OR ACTION
Air handling units S-1, S-2, and S-3 (SMS 566)	
Fans operation	Checked
Note Report to MCCC that checklist is complete.	
Facilities remote control panel (figure 1-29, 1-32, or 1-33)	
MMT and BMAT will ensure following:	
a. Alarm	Off
b. Trouble patch indicators	Extinguished
c. Ready status patch	No red indications
Fire alarm terminal box	
Alarm	Off
Zone indicators	Extinguished
Trouble indicator	Extinguished
Note MMT and BMAT will jointly accomplish the remainder of the steps in this table.	
Control-monitor groups NO. 1 and NO. 2 of 4 (figure 1-24)	
Indicator conditions proper for standby	Verified
Communications with launch control center	Checked
Control-monitor groups NO. 3 and NO. 4 of 4 (figure 1-25)	
All transfer switches	In STANDBY MODE
28-VDC rectifier	
Lamp test	Completed

Table 3-6. Complex Ready State A Verification (Continued)

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
28-VDC rectifier (CONT)	
COUNTDOWN BUS ON indicator	Extinguished
STANDBY BUS ON indicator	Green
POWER SUPPLY ON indicator	Green
COOLING AIR OFF indicator	Extinguished
BATTERY DISCHARGE indicator	Extinguished
BATTERY CONNECTED indicator	Green
POWER SUPPLY ON-OFF switch	ON
BATTERY ON-OFF switch	ON
Countdown group (figure 1-64)	
1A1 front and rear seals	Sealed
1A2 front and rear seals	Sealed
MGS POWER indicator	Illuminated
MGS CHECKOUT COMPLETE indicator	Green
28-VDC indicator	Illuminated
120-VAC, 60-CPS indicator	Illuminated
200/115V, 400-CPS, phase T1, T2, T3 indicator	Illuminated
All other indicators	Extinguished
Prelaunch monitor (figure 1-65)	
MARK 4 R/V indicator	Illuminated

Table 3-6. Complex Ready State A Verification (Continued)

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
Prelaunch monitor (figure 1-65) (CONT)	
R/V TACTICAL indicator	Green
R/V NORMAL indicator	Green
All other indicators	Extinguished
Propellant Loading Terminal Cabinet	
TRAINING DPL CONVERSION switch	OPERATIONAL
Skid NO. 6	
LN-4 manual valve	Open
Boom Hydraulics Power Section	
Erection HPU reservoir level gage	7/8 full

Table 3-6. Complex Ready State A Verification (Continued)

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
MISSILE ERECTION DOOR and FLAME DOOR panel (figures 1-38 and 1-40)	
MISSILE ERECTION DOOR patch	
Lamp test	Completed
LATCH indicator	Red
DOWN indicator	Red
CLOSED indicator	Red
All other indicators	Extinguished
FLAME DOOR patch	
LATCH indicator	Red
DOWN indicator	Red
CLOSED indicator	Red
All other indicators	Extinguished
Launch and test interconnecting box (left umbilical junction box)	
All cables connected in accordance with figure 1-63	Connected
Inert fluid injection stand (figure 1-50A)	
Inlet valve	Opened and safetywired
Vent valve	Closed and safetywired
Pressure system control (figure 1-48)	
Manual valves 27, 28, 29, 30, and 43	Closed
Manual valves 6 and 7	Open
LOX TANK PRESSURE gage	7.0 to 9.0 PSI
FUEL TANK PRESSURE gage	16.0 to 18.0 PSI
PRIMARY HELIUM SUPPLY gage	1175 (±25) PSI
REFRIGERATED HELIUM pressure gage	0 PSI
Hydraulic pumping unit (figure 1-61)	
Fluid level indicator	At least 3/4 full
Control status S-1 switches, first and second stages	Remote
SOLENOID PNEUMATIC VALVE 60 OPEN (DS-13) indicators	Illuminated

Table 3-6. Complex Ready State A Verification (Continued)

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
South side wall in LSB	
400-VAC switch	On
Erection mechanism motor control center (figures 1-42 and 1-43)	
LOCAL OPERATION SELECTOR switch	LOCK OUT SHOCK MOUNTS position
CONTROL STATION SELECTOR switch	LAUNCH CONTROL position
All indicators in proper condition for standby	Verified
Motor control center	
All circuit breakers positioned manually for standby	Verified
Panels	Sealed
Fuel room	
Skid 2, differential pressure indicator	Greater than 15 inches of water
Skid 1, valve N-71	Open
AC power distribution box (figure 1-23)	
BOOSTER NO. 1 SPGG HTR indicator	Illuminated green
BOOSTER NO. 2 SPGG HTR indicator	Illuminated green
Sustainer engine SPGG HTR indicator	Illuminated green
All other indicators	Extinguished
Missile bay	
Rear stretch arms stowed and secured	Verified
Front stretch links stowed and secured	Verified
Missile stretch control	Neutral
System selector handle	Normal

Table 3-6. Complex Ready State A Verification (Continued)

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
LO_2 room, LO_2 slug tank instrument panel	
LO_2 slug tank gage	At least 485 GAL
Switch LLS1-11	STANDBY
Switch LLS2-11	STANDBY

Note

When all crew members have reported completion of their portions of checklists, this table is completed.

Table 3-7. Launch Control Center Alert Readiness Checkout

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
Launch control console (figure 1-62)	
Lamp test	Completed
HIGH indicator	Green
TARGET A SELECTED or TARGET B SELECTED indicator (in accordance with current EWO requirements)	Green
DOWN RANGE CORRECTION and CROSS RANGE CORRECTION inserted and verified against target data sheet	Inserted and verified
Note Tactical countdown may be initiated with POD AIR CONDITIONING indicator on the launch control console illuminated amber, if MISSILE POD AIR HI TEMPERATURE and MISSILE POD AIR LO PRESSURE indicators on the FRCP are extinguished. Tactical countdown may also be initiated with any other indicator on the malfunction patch illuminated amber, except for TRAINING MODE and RESPONDER MODE which must be extinguished.	
Malfunction patch indicators	Extinguished
Status patch indicators	Green
READY FOR COUNTDOWN indicator	Green
Commit patch indicators	Extinguished
COMMIT START key switch	Sealed
Return patch indicators	Extinguished
Ready state patch switch	READY STATE A
CAUTION If tank pressures are not within prescribed limits, PRESSURE MODE indicator will illuminate red and an alarm will sound. Immediately operate appropriate RAISE or LOWER manual control pushbutton to prevent damage to missile and equipment.	

Table 3-7. Launch Control Center Alert Readiness Checkout (Continued)

CONTROL OR INDICATOR	INDICATOR CONDITION, CONTROL POSITION, OR ACTION
Launch control console (figure 1-62) (CONT)	
PRESSURE MODE indicator	Green (if red, emergency exists and tank pressures must be corrected immediately in accordance with table 4-1)
Note If tank pressures indicate outside of normal ranges, a malfunction should be suspected.	
LO_2 TANK pressure	7.0 to 9.0 PSI
FUEL TANK pressure	16.0 to 18.0 PSI
TANK DIFFERENTIAL PRESSURE	Greater than 5.0 PSI
Facilities remote control panel (figures 1-29 through 1-33)	
Refer to table 1-3 and verify correct standby indications	Verified
Perform lamp test periodically	Completed
Fire alarm terminal box	
Red trouble indicators	Extinguished

Table 3-8. Preparation for Tactical Launch

STEP	ACTION
1	Verify, through the procedures in table 3-6, complex is in ready state A configuration (as achieved through T.O. 21-SM65E-CL-4-1).
2	Continually monitor complex in accordance with table 3-7 to ensure ready state A is maintained.
3	Hold crew coordination briefing (table 3-5) in accordance with unit procedure.
4	Verify correct target selection, DOWN RANGE CORRECTION, and CROSS RANGE CORRECTION dial settings.
5	Verify indicator condition and control positions as specified in table 3-7 Note Tactical launch will be accomplished using table 3-14 and associated normal operating procedure abbreviated checklists.

Table 3-9. Preparation for Training Launch (SMS 576-C and OSTF-1)

STEP	ACTION
	Note A training launch or a system checkout countdown for a training launch shall be controlled by the instructor MCCC, and shall be accomplished only when directed by higher authority. Indications listed in this table are critical and are to be announced on occurrence. However, the instructor MCCC is responsible for monitoring all events and indications during countdown.
	MOD III F Beacon
1	Verify beacon is in readiness
	Test and Training Console
1	Verify auxiliary generator on standby at power station.
2	Accomplish safety check with safety officer to ensure area is clear and secure.
3	Announce forecasted countdown start time.
4	Announce no smoking in LOB.
5	Verify voice recorder is on.
6	A communication and systems ready check shall be accomplished with the following personnel: a. MCCC b. Telemetry operator c. Instrument observer d. Camera operators e. Complex safety officer

Table 3-9. Preparation for Training Launch (SMS 576-C and OSTF-1) (Continued)

STEP	ACTION
7	Accomplish the following on voice annotate tape: a. We will enter countdown on OSTF-1 b. Missile NO. _______ c. At _______ hours d. Date e. Countdown will be accomplished in accordance with table 3-14
	Auxiliary Launch Console Note For a training launch, perform steps 1 through 4. For a systems checkout countdown for a training launch, perform steps 5 through 8.
1	Position WATER SYSTEMS switch to NORMAL.
2	Observe WATER ON indicator extinguished.
3	Position MODE SWITCH selector key to LAUNCH.
4	Observe LAUNCH indicator illuminated green.
5	Position WATER SYSTEMS switch to OVERRIDE.
6	Observe WATER ON indicator extinguished.
7	Position MODE SWITCH selector key to TRAINING.
8	Observe TRAINING indicator illuminated amber
	Facilities Remote Control Panel
1	All indicators normal Note Perform step 2 and 3 only if TV floodlights are required due to insufficient exterior lighting.

Table 3-9. Preparation for Training Launch (SMS 576-C and OSTF-1) (Continued)

STEP	ACTION
2	Depress T.V. FLOODLIGHTS START pushbutton.
3	Observe T.V. FLOODLIGHTS indicator illuminates.
4	At OSTF-1, depress DANGER pushbutton.
5	At OSTF-1, observe DANGER indicator illuminated.
6	At OSTF-1, observe CAUTION indicator extinguished.
7	At SMS 576-C, depress PERSONNEL WARNING amber OFF pushbutton.
8	At SMS 576-C, observe PERSONNEL WARNING amber indicator extinguished.
9	At SMS 576-C, depress PERSONNEL WARNING red ON pushbutton.
10	At SMS 576-C, observe PERSONNEL WARNING red indicator illuminated
	Test and Training Console
1	Announce: "Countdown will start in 5 minutes."
2	Instruct that blockhouse vents to be closed.
3	Instruct TV camera operator when to operate cameras.
4	Instruct operator to turn on telemetry at R minus 30 seconds.
5	Instruct operator to turn on landline instrumentation at R minus 15 seconds.
6	Instruct photo operators to activate cameras at R minus 5 seconds.
7	Announce: "Countdown will start in 60 seconds."
8	Announce: "Countdown will start in 45 seconds."
9	Announce: "Countdown will start in 30 seconds."
10	Announce: "Countdown will start in 15 seconds."

Table 3-9. Preparation for Training Launch (SMS 576-C and OSTF-1) (Continued)

STEP	ACTION
11	Announce: "MCCC, start countdown on my mark, 5-4-3-2-1, mark." Note At this point the MCCC will continue countdown using procedures contained in table 3-14. Note After GUIDANCE READY indicator illuminates green, proceed to next step.
12	Notify operator to turnoff telemetry recorders, change tapes, and hold. Note After the MCCC announces MISSILE READY indicator has illuminated green, proceed to next step.
13	Verify telemetry instrumentation status.
14	Instruct operators to turn on telemetry and FM recorders 30 seconds prior to commit start.
15	Instruct operator to operate landline recorders at fast speed 30 seconds prior to commit start. Note RANGE READY indicator illuminated green is required only for a training launch.
16	Verify RANGE READY indicator illuminated green.
17	Announce: "Commit sequence will start in 60 seconds."
18	Announce: "Commit sequence will start in 45 seconds."
19	Announce: "Commit sequence will start in 30 seconds."
20	Announce: "Commit sequence will start in 15 seconds."

Table 3-9. Preparation for Training Launch (SMS 576-C and OSTF-1) (Continued)

STEP	ACTION
21	Announce: "MCCC, start commit sequence on my mark, 5-4-3-2-1, mark"
	Note After the MCCC announces POWER INTERNAL indicator has illuminated green, proceed to next step. Auxiliary Launch Console Note For a systems checkout countdown for a training launch, the WATER ON indicator will illuminate red.
1	Observe WATER ON indicator illuminated green
	Note After the MCCC depresses the COMMIT STOP pushbutton, perform the following four steps for a training launch only. CAUTION Ensure the RETURN TO STANDBY pushbutton is not depressed. Failure to comply will result in damage to equipment. Test and Training Console
1	Verify cameras and instrumentation have been turned off
	Auxiliary Launch Console CAUTION Use water system, as required, to control fires. Failure to comply may result in damage to equipment.
1	Observe WATER ON indicator extinguished

Table 3-9. Preparation for Training Launch (SMS 576-C and OSTF-1) (Continued)

STEP	ACTION
	Test and Training Console
1	Restrict personnel to LOB until completion of site safety inspection.
2	Verify voice recorder turned off.
	Note For a systems checkout countdown or abort, perform the following actions.
	Test and Training Console
1	Instruct operator to operate instrumentation recorders at slow speed
	Auxiliary Launch Console
1	Observe WATER ON indicator extinguished
	Test and Training Console
1	Announce: "MCCC, return to standby on my mark, 5-4-3-2-1, mark."
	CAUTION If an abort occurs after inert fluid injection and prior to engine start , direct BMAT to depress EMERGENCY STOP pushbutton on ERECTION panel of CMG 1 of 4. After PNEU SYSTEM VENTED indicator on the launch control console illuminates green, drain inert fluid in accordance with T.O. 21M-CGM16E-2-3-1. Following inert fluid drain, continue return to standby sequence by directing BMAT to depress SYSTEM RESET pushbutton on ERECTION panel. Failure to comply may result in damage to equipment.
	Blast Closure Panel
	Note After MCCC announces FUEL DRAINED indicator illuminated green, perform the following steps.
1	Depress VENT DAMPERS LOB OPEN pushbuttons (5).

Table 3-9. Preparation for Training Launch (SMS 576-C and OSTF-1) (Continued)

STEP	ACTION
2	Observe VENT DAMPERS LOB OPEN indicators (5) illuminated red.
	Test and Training Console
	Note
	After the MCCC announces, "Site hard," perform the following steps.

Table 3-9. Preparation for Training Launch (SMS 576-C and OSTF-1) (Continued)

STEP	ACTION
1	Verify all motion picture cameras, telemetry, instrumentation, and voice recorders turn off. Note TV floodlights may be turned off at this time.
2	Verify completion of complex safety officer's inspection. Note For an aborted launch, ensure the destruct package is removed.
3	Announce: "All areas except missile bay open"
	Facilities Remote Control Panel
1	At OSTF-1, depress personnel warning CAUTION OFF pushbutton.
2	At OSTF-1, observe personnel warning DANGER and CAUTION indication extinguished.
3	At SMS 576-C, depress PERSONNEL WARNING red OFF pushbutton.
4	At SMS 576-C, observe PERSONNEL WARNING red indicator extinguished.
5	At SMS 576-C, depress PERSONNEL WARNING green ON pushbutton.
6	At SMS 576-C, observe PERSONNEL WARNING green indicator illuminated.
	Test and Training Console
1	Notify power station that exercise is terminated
	Note The instructor MCCC shall ensure the following steps are accomplished after a training launch.

Table 3-9. Preparation for Training Launch (SMS 576-C and OSTF-1) (Continued)

STEP	ACTION
	Control-Monitor Groups 1 and 2 of 4
1	Verify all SYSTEM POWER switches, except LO_2 TANKING (PANEL 1) on control-monitor group 1 of 4, are positioned to OFF
	Control-Monitor Group 1 of 4, LO_2 TANKING (PANEL 1) and (PANEL 2)
1	Verify all valve switches in CLOSE position.
2	Verify REMOTE-LOCAL switch in LOCAL position.
3	Observe LOCAL CONTROL indicator illuminated amber
	Control-Monitor Group 4 of 4
1	Position SIGNAL RESPONDER TRANSFER SWITCH on panel A-42 to RESPONDER MODE.
2	Position SYSTEM POWER switch on COUNTDOWN RESPONDER (PANEL 1) to ON.
3	Position RETURN TO STANDBY switch on COUNTDOWN RESPONDER (PANEL 1) to ON.
4	Position RETURN TO STANDBY switch on COUNTDOWN RESPONDER (PANEL 1) to OFF.
5	Position SYSTEM POWER switch on COUNTDOWN RESPONDER (PANEL 1) to OFF.
6	Position SIGNAL RESPONDER TRANSFER SWITCH on panel A-42 to STANDBY MODE
	WARNING Announce LO_2 storage tank will be vented at this time. Personnel will remain clear of the east side of the building. Failure to comply may cause injury to personnel.

Table 3-9. Preparation for Training Launch (SMS 576-C and OSTF-1) (Continued)

STEP	ACTION
	Control-Monitor Group 1 of 4, LO_2 TANKING (PANEL 1)
1	Position valve switch 0-20 to OPEN
	Auxiliary Relay Logic Unit
1	Position all SYSTEM POWER switches to OFF
	NO. 2 Motor Control Center
1	Depress MISSILE POD COOLING A/C FAN START pushbutton. Note Allow approximately 5 minutes to permit water to be blown from lines before performing next step.
2	Depress MISSILE POD COOLING A/C FAN STOP pushbutton.
3	Depress THRUST SECTION HTG. SYSTEM BLOWER START pushbutton. Note Allow approximately 5 minutes to permit water to be blown from lines before performing next step.
4	Depress THRUST SECTION HTG. SYSTEM BLOWER STOP pushbutton. Note The responsibility of the complex is assumed by maintenance personnel.

Table 3-10. Preparation for Dual Propellant Loading (LO_2 or LN_2)

STEP	ACTION
1	Place complex in ready state B configuration for appropriate countdown, in accordance with T.O. 21M-CGM16E-4CL-1. **CAUTION** If wind velocity or wind gusts exceed training tolerances, or if thunder storms, tornadoes, or lightning are present or forecast for vicinity, do not start countdown sequence until approval is received from command post. (Refer to T.O. 21M-CGM16E-1-1A.) Velocity measurements are peak instantaneous readings of Anemometer AN/GMQ-11 in the vicinity of missile. Base weather information will be used if anemometer is not available. Failure to comply may result in structural damage to the missile.
2	Ensure following information is obtained prior to performing a DPL: a. (Deleted) b. Wind and gust velocity within tolerance. c. Weather forecast (no thunderstorms, tornadoes, lightning, or hail, within 10-mile radius).
3	Start alternate generator and place generators in parallel operation (except at SMS 576-C and OSTF-1) (table 3-13) prior to start of countdown.
4	Complete crew coordination briefing (table 3-5) for all personnel involved in the countdown. Note The inlet valve on the inert fluid injection stand must be in the closed position and safetywired and vent valve opened.

Table 3-10. Preparation for Dual Propellant Loading (LO_2 or LN_2) (Continued)

STEP	ACTION
	Note When system is converted for liquid nitrogen DPL exercise, the following steps must be performed.
5	At OSTF-1 or SMS 576-C, on the auxiliary launch console, position MODE SWITCH to TRAINING.
6	On propellant loading terminal cabinet, position TRAINING DPL CONVERSION SWITCH to TRAINING.
7	On liquid nitrogen-helium heat exchanger, skid NO. 6, close manual valve LN-4. Note During liquid nitrogen DPL exercise, there will be no automatic slug refill.
8	On liquid oxygen slug tank panel, position LLS2-11 switch to OVERFILLED. Note DPL will be accomplished using table 3-14 and associated normal operating procedures abbreviated checklists.

Table 3-11. Preparation for Simulated Countdown

STEP	ACTION
1	Verify complex is in proper configuration in accordance with applicable Emergency War Order to Launch Signal Responder to Emergency War Order (EWO-LSR-EWO) operational flow diagram (figure 2-4) and checklist T.O. 21-SM65E-CL-29-1.
2	Complete crew coordination briefing for all personnel involved in exercise (table 3-5).
3	MCCC will ensure following are accomplished on schedule: a. Launch enable system (LES) officer remove LES inhibit signal. b. Maintenance assistance as required.
4	At OSTF-1 or SMS 576-C, on the auxiliary launch console, position MODE SWITCH to LAUNCH.
5	On propellant loading terminal cabinet position TRAINING DPL CONVERSION switch to OPERATIONAL.

Table 3-12. Starting Standby Diesel Generator for Immediate Backup (SMS 548, SMS 566, and SMS 567)

STEP	ACTION
	Note This procedure will be used when immediate engine starting is necessary due to high line load conditions, or other circumstances requiring immediate generator backup.
	Standby Engine Governor
1	Ensure LOAD LIMIT indication is 5.
2	Ensure SPEED DROOP indication is 5
	Standby Engine
1	Operate fuel prime pump to 15.0 PSI.
2	At SMS 566, operate oil prime pump.
3	At SMS 566, open air supply valve.
	Note Air starting valve and engine throttle will be operated simultaneously. As soon as engine starts, release air starting valve and operate engine throttle until governor assumes control. Bring engine up to fast idle as quickly as possible. As engine RPM increases, watch oil pressure gage and tachometer. Lube oil pressure should rise within 10 seconds at SMS 548 and SMS 567, and within 30 seconds at SMS 566. If pressure does not rise, perform emergency stop procedure (table 4-17).
4	Operate air starting valve.
5	Open engine throttle.
6	At SMS 566, close air supply valve.

Table 3-12. Starting Standby Diesel Generator for Immediate Backup (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	Standby Engine (CONT)
7	Adjust engine speed (use either governor speed control or speed adjusting control on engine control panel) to 720 RPM.
8	At SMS 566, place emergency LUBE-OFF-ON selector switch to ON position
	Standby Engine Governor
1	Position LOAD LIMIT indicator control to 10 (or MAXIMUM)
	CAUTION
	Do not attempt to parallel generators if voltage regulators on both units are not stabilized. Failure to comply may result in damage to equipment.
	Standby 480V Switchgear Panel (figures 1-16 and 1-17)
	Note
	Ensure VOLTMETER SWITCH, FREQUENCY METER SWITCH, and SYNCHROSCOPE SWITCH knobs have been installed.
1	Position VOLTMETER SWITCH to ON.
2	Position FREQUENCY METER SWITCH to ON.
3	At SMS 566, engage FIELD DISCHARGE switch.
4	At SMS 566, adjust voltage on incoming generator to 450 volts.
5	Adjust frequency with SELECTOR switch to 60 CPS.
6	At SMS 548 and SMS 567, adjust voltage on incoming generator to 480 volts (use generator exciter field rheostat and voltage adjustment rheostat).

Table 3-12. Starting Standby Diesel Generator for Immediate Backup (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	Standby 480V Switchgear Panel (figures 1-16 and 1-17) (CONT)
7	At SMS 566, position VOLTAGE CONTROL MANUAL-AUTO to AUTO.
8	Position SYNCHRONIZING SWITCH to ON.
9	Position LOCKOUT RELAY knob to RESET.
10	Observe SYNCHROSCOPE pointer rotating slowly in fast direction at approximately 6 RPM. **CAUTION** Before GENERATOR MAIN BREAKER control switch is placed in CLOSED position, SYNCHROSCOPE pointer must be at approximately 12 o'clock position and, simultaneously, synchronizing indicators must be extinguished. Failure to comply will result in loss of AC power.
11	Position CIRCUIT BREAKER CONTROL SWITCH to CLOSED. **CAUTION** Ensure WATTMETERS on both generators indicate reasonable load division. Failure to comply may result in loss of AC power.
12	Use AMMETER switch to check load distribution in PHASES 1, 2, and 3.
13	At SMS 566, verify GENERATOR MAIN BREAKER indicator is red.
14	Position SYNCHRONIZING SWITCH to OFF.

Table 3-12. Starting Standby Diesel Generator for Immediate Backup (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	Standby 480V Switchgear Panel (figures 1-16 and 1-17) (CONT)
15	At SMS 566, check GENERATOR LOAD DIVISION switch Both 480 V Switchgear Panels **CAUTION** Load should be fairly evenly divided, but usually needs further adjustment. If time is critical, check kilowatt meter to determine if sufficient load is available to operate trimmer (20 percent). Run unit for 5 to 10 minutes to reach operating temperature. Position GENERATOR LOAD DIVISION SWITCH on incoming generator, and hold it to manual load division position for 5 to 10 seconds; then allow switch to return to normal position. Do not operate the GENERATOR LOAD DIVISION SWITCH on the lead engine. Care must also be observed when manually dividing load. Watch applicable instruments and adjust switches slowly to keep from dropping load on one or both units. Failure to comply may result in damage to equipment. **CAUTION** When load division is manually operated, ensure load is equally divided, and frequency is at 60 CPS. In the event the load is not divided or frequency indicated is not 60 CPS or both conditions exist simultaneously, adjust SELECTOR switches on both units until load is equally divided and frequency indicated is 60 CPS. Failure to comply may result in loss of AC power and damage to equipment. **CAUTION** Cross current correction will be accomplished on both units at the same time. To correct, move rheostats very slowly and stop after each short movement and check meters. With generators in parallel, perform the following visual steps. Failure to comply may result in damage to equipment.

Table 3-12. Starting Standby Diesel Generator for Immediate Backup (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	Both 480V Switchgear Panels (CONT)
1	At SMS 548 and SMS 567, ensure BUS VOLTAGE meter (phases 1, 2, and 3) indicates 480 volts.
2	At SMS 566, ensure BUS VOLTAGE meter indicates 450 volts.
3	Verify GENERATOR FREQUENCY meter indicates 60 CPS.
4	Verify WATTMETER indications for both generators are approximately the same.
5	Verify AMMETER indications on phases 1, 2, and 3 (for both generators) are approximately the same.
6	Verify WATTHOUR METER discs for both generators are rotating.
7	Verify DC ammeter indications for both generators are approximately the same.
8	At SMS 566, observe POWER FACTOR METER indications for both generators are approximately the same.
9	Ensure LOB and LSB AMMETER indications, phases 1, 2, and 3, are checked. Note Notify MCCC unit is on the line and ready for countdown. CAUTION Diesel engine will be operated for 30 minutes after starting, to allow engine to reach normal operating temperatures. Failure to comply may result in damage to equipment.

Table 3-13. Starting and Paralleling Diesel Generators (SMS 548, SMS 566, and SMS 567)

STEP	ACTION
	Note This table includes four parts: STANDBY ENGINE STARTING (SMS 548 and SMS 567); GENERATOR PARALLELING OPERATION (SMS 548 and SMS 567); STANDBY ENGINE STARTING (SMS 566); and GENERATOR PARALLELING OPERATION (SMS 566).
	STANDBY ENGINE STARTING (SMS 548 and SMS 567)
	Standby Engine
	Note Watch snifter valves for foreign material emission and flywheel for hesitation or jerky motion. If engine has undergone maintenance ensure freedom of movement of all moving parts, by rotating engine two turns by hand, before applying air.
1	Open snifter valves.
2	Open air starting valve and rotate flywheel through 5 turns.
3	Close air starting valve.
4	Close snifter valves
	Standby Engine Governor
1	Position LOAD LIMIT control knob to 5 or 50 percent
	Standby Engine
1	Operate fuel prime pump to 15.0 PSI

Table 3-13. Starting and Paralleling Diesel Generators (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	STANDBY ENGINE STARTING (SMS 548 and SMS 567) (CONT)
	Note Air starting valve and engine throttle will be adjusted simultaneously. As soon as engine starts, release air starting valve and adjust engine throttle until governor assumes control. Bring the engine up to 400 RPM as quickly as possible. As engine increases RPM watch oil pressure gage and tachometer. If oil pressure does not rise, perform emergency stop procedure.
2	Operate air starting valve.
3	Open engine throttle.
4	Adjust engine idling to approximately 400 RPM
	Standby Engine Control Panel
1	Verify lube oil pressure is approximately 35.0 PSI
	Standby Engine Walkaround Check
1	Verify governor oil level in sight gage is normal.
2	Ensure engine oil dipstick indication is normal.
3	Check pedestal bearing sight gages for normal oil level and evidence of leaks.
4	Check generator for vibration and bearing noise.
5	Check turbocharger for vibration, oil and water leaks.
6	Check exhaust and intake manifold for leaks.
7	Check oil cooler for oil or water leaks.
8	Check water jacket for leaks.

Table 3-13. Starting and Paralleling Diesel Generators
(SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	STANDBY ENGINE STARTING (SMS 548 and SMS 567) (CONT)
9	Check oil header and lines for leaks.
10	Check separator water for normal operating level
	Standby Engine Control Panel
1	Verify WATER TEMP. IN is rising.
2	Verify WATER TEMP. OUT is rising.
3	Verify FUEL OIL PRESS is 15.0 to 25.0 PSI.
4	Verify LUBE OIL PRESS is 20.0 to 40.0 PSI.
5	Verify STARTING AIR PRESS is 300 PSI.
6	Verify LUBE OIL TEMP. OUT is 100° to 170° F.
7	Adjust speed control or governor speed control to 720 RPM
	Standby Engine Governor
1	Adjust LOAD LIMIT control to 10 (or maximum)
	Standby 480V Switchgear Panel (figures 1-16 and 1-17)
	Note
	Ensure VOLTMETER, FREQUENCY meter, and SYNCHROSCOPE switch handles have been installed.
1	Position generator main breaker VOLTMETER switch to ON.
2	Position generator main breaker FREQUENCY meter switch to ON.
3	Adjust GENERATOR FREQUENCY with governor motor control to 60 CPS.

Table 3-13. Starting and Paralleling Diesel Generators (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	STANDBY ENGINE STARTING (SMS 548 and SMS 567) (CONT)
4	Adjust voltage with generator EXCITER FIELD rheostat and VOLTAGE ADJUSTMENT rheostat to 480 volts.
5	Position generator main breaker SYNCHRONIZING switch to ON.
6	Observe synchronizing indicators are most brilliant when the SYNCHROSCOPE pointer is at 6 o'clock.
7	Observe synchronizing indicators decrease in brilliance as the SYNCHROSCOPE pointer approached approximately 12 o'clock.
8	Verify SYNCHROSCOPE pointer is rotating slowly in the fast direction at approximately 6 RPM.
9	Verify EXCITER FIELD CURRENT is normal.
10	Verify GENERATOR FIELD CURRENT is normal.
11	Verify voltage regulator indication is no load.
12	Verify INCOMING GENERATOR and BUS VOLTAGE voltmeters (PHASE 1, 2, 3) indicate 480 volts.
13	Place LOCKOUT RELAY knob to RESET.
14	Verify SYNCHROSCOPE rotating slowly in fast direction at approximately 6 RPM.
15	Verify INCOMING GENERATOR and BUS VOLTAGE voltmeters indicate 480 volts.
16	Position GOVERNOR MASTER TRIMMER SELECTOR switch to engine on the line.

Table 3-13. Starting and Paralleling Diesel Generators (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	GENERATOR PARALLELING OPERATION (SMS 548 and SMS 567 only)
	CAUTION Do not attempt to parallel generators unless the voltages on both units are stabilized. Failure to comply may result in damage to equipment. **CAUTION** Before GENERATOR MAIN BREAKER control switch is placed in closed position, SYNCHROSCOPE pointer must be at approximately 12 o'clock position and, simultaneously, synchronizing indicators must be extinguished. Failure to comply may result in loss of AC power.
	Standby 480V Switchgear Panel (figure 1-16) **CAUTION** Ensure WATTMETERS on both generators indicate reasonable load division. Failure to comply may result in loss of AC power.
1	Close GENERATOR MAIN BREAKER control switch.
2	Using AC AMMETER, ensure normal load distribution on PHASE 1, 2, and 3.
3	Check GENERATOR LOAD DIVISION switch for normal operating position.
4	Verify GENERATOR MAIN BREAKER indicator is red.
5	Position SYNCHRONIZING switch to OFF

Table 3-13. Starting and Paralleling Diesel Generators (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	GENERATOR PARALLELING OPERATION (SMS 548 and SMS 567 only) (CONT)
	Both 480V Switchgear Panels
1	Verify WATTMETERS on both generators indicate normal load division.
	CAUTION The load should be fairly evenly divided but usually needs further adjustment. If time is not critical, check load indicator to determine if sufficient load is available to operate trimmer (20 percent). Run unit for 5 to 10 minutes to reach operating temperature. Position GENERATOR LOAD DIVISION SWITCH to incoming generator, hold it to manual position for 5 to 10 seconds, then return it to automatic position. Do not operate GENERATOR LOAD DIVISION SWITCH on lead engine. Failure to comply may result in damage to equipment.
	Manual Load Division
	CAUTION When load division is manually operated, ensure load is equally divided and frequency is at 60 CPS. If load is not divided or if frequency indicated is not 60 CPS, or both conditions exist simultaneously, adjust SELECTOR switches on both units until loads are equally divided and frequency indicated is 60 CPS. Failure to comply may result in loss of AC power and damage to equipment.

Table 3-13. Starting and Paralleling Diesel Generators (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	GENERATOR PARALLELING OPERATION (SMS 548 and SMS 567 only) (CONT)
	Standby 480V Switchgear Panel (figure 1-16)
	Cross Current Compensation
	Note
	Cross current compensation will be accomplished on both units at the same time. To correct, operate rheostats very slowly and stop after each short movement and check meters.
	Note
	With generators in parallel, perform following visual steps.
1	Verify BUS VOLTAGE meter (phases 1, 2, and 3) indicates 480 volts.
2	Verify GENERATOR FREQUENCY meter indicates 60 CPS.
3	Verify WATTMETER indications for both generators are approximately the same load.
4	Verify DC ammeters indications for both generators are approximately the same load.
5	Ensure LOB and LSB AMMETER indications, phases 1, 2, and 3, are checked.
	Note
	Enter time started in power generation logs and enter hourly readings for both units.
	CAUTION
	Diesel engine will be operated for 30 minutes after starting, to allow engine to reach normal operating temperatures. Failure to comply may result in damage to equipment
	STANDBY ENGINE STARTING (SMS 566)
	Standby Engine
1	Prime lube oil system
2	Prime fuel oil system

Table 3-13. Starting and Paralleling Diesel Generators (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	STANDBY ENGINE STARTING (SMS 566) (CONT)
3	Open indicator cocks.
4	Open starting air supply valve.
5	Open, then close starting air condensate valve to expel condensate. Note When engine is being rotated with air, observe indicator cocks for foreign material emission. Observe flywheel for hesitation or jerky motion. If engine has undergone maintenance, before applying air ensure freedom of movement of all moving parts, by rotating engine two turns by hand.
6	Open, then close quick air start valve to turn engine through 5 rotations.
7	Close indicator cocks
	Standby Engine Governor
1	Position LOAD LIMIT control to 5.
2	Position SPEED DROOP control to 5.
3	Position SPEED CONTROL indicator to approximately 4 CAUTION When engine starts, note lube oil pressure and turbo oil pressure. If pressure does not increase within 30 seconds shut down engine (table 4-17) and locate malfunction. Failure to comply may result in damage to engine.

Table 3-13. Starting and Paralleling Diesel Generators (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	STANDBY ENGINE STARTING (SMS 566) (CONT)
	Standby Engine
1	Operate engine throttle.
2	Operate quick air start valve.
3	Move engine throttle to run position.
4	Close starting air supply valve.
5	Adjust engine to idle at 540 RPM
	Standby Engine Control Panel
1	Position oil emergency LUBE OFF-ON selector switch to ON.
2	Ensure lube oil emergency indicator is extinguished.
3	Ensure TURBOCHARGER LUBE OIL PRESSURE is 25.0 PSI minimum.
4	Ensure LUB OIL PRESSURE BEFORE STRAINER is approximately 50.0 PSI.
5	Ensure LUBE OIL PRESSURE BEFORE FILTER is approximately 45.0 PSI.
6	Ensure AIR DISCHARGE PRESSURE gage reading is normal.
7	Ensure FUEL SUPPLY PRESSURE gage indicates 10.0 to 15.0 PSI.
8	Ensure LUBE OIL PRESSURE gage indicates 30.0 to 45.0 PSI.
9	Ensure PYROMETER indications on each cylinder are normal.
10	Ensure OS-HW-LO alarm indicators are extinguished.
11	Ensure TEMP. COOLING WATER IN is normal.
12	Close TEMP. COOLING WATER OUT is normal.

Table 3-13. Starting and Paralleling Diesel Generators
(SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	STANDBY ENGINE STARTING (SMS 566) (CONT)
13	Ensure TEMP. LUBE OIL IN is normal.
14	Ensure TEMP. LUBE OIL OUT is normal.
15	Examine engine for leaks and security of components.
16	Ensure engine crankcase oil level indication in sight glass is normal Note Water, lube oil, and pyrometer indications should rise toward normal temperatures. Oil pressure should drop slightly and stabilize.
17	Ensure engine is 720 RPM
	Standby Engine Governor
1	Position PERCENT LOAD limit control to 10 (or maximum).
2	Position SPEED DROOP control to 5.
3	Observe SPEED control indicator Note When TEMP. LUBE OIL OUT on standby engine control panel reaches approximately 100° F, the unit has warmed up sufficiently to put unit on line.
	Note Ensure VOLTMETER, FREQUENCY meter, and SYNCHROSCOPE switch handles have been installed in 480V switchgear panel.
	Standby 480V Switchgear Panel (figure 1-17)
1	Position VOLTMETER switch to ON.

Table 3-13. Starting and Paralleling Diesel Generators (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	STANDBY ENGINE STARTING (SMS 566) (CONT)
2	Position FREQUENCY METER switch to ON.
3	Turn FIELD RHEOSTAT fully clockwise.
4	Position VOLTAGE CONTROL MANUAL-AUTO SWITCH to MANUAL.
5	Engage FIELD DISCHARGE switch.
6	Adjust FIELD RHEOSTAT to approximate BUS VOLTAGE (450 volts).
7	Adjust GENERATOR FREQUENCY to 60 CPS.
8	Position VOLTAGE CONTROL MANUAL-AUTO SWITCH to AUTO.
9	Adjust automatic VOLTAGE CONTROL rheostat, if required.
10	Ensure MACHINE VOLTAGE meter indicates 450 volts.
11	Ensure GENERATOR FREQUENCY is 60 CPS.
12	Position SYNCHRONIZING switch to ON.
13	Place LOCKOUT RELAY switch to RESET position.
14	Observe SYNCHROSCOPE turning clockwise (in fast direction) at 6 RPM
	GENERATOR PARALLELING OPERATION (SMS 566 ONLY)
	CAUTION Before CIRCUIT BREAKER CONTROL SWITCH is placed in closed position, SYNCHROSCOPE pointer must be at approximately 12 o'clock position and, simultaneously, the SYNCHRONIZING indicators must be extinguished. Failure to comply may result in loss of AC power.

Table 3-13. Starting and Paralleling Diesel Generators (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	GENERATOR PARALLELING OPERATION (SMS 566 ONLY) (CONT)
	Standby 480V Switchgear Panel (figure 1-17)
1	Place CIRCUIT BREAKER CONTROL SWITCH to closed.
2	Ensure CIRCUIT BREAKER red indicator is illuminated.
3	Ensure GENERATOR indicator is red and CLOSED.
4	Position SYNCHRONIZING switch to OFF.
5	Observe LOAD DIVISION SWITCH.
6	Observe MASTER SELECTOR SWITCH position **CAUTION** The load should be fairly evenly divided but usually needs further adjustment. If time is not critical, check load indicator to determine if sufficient load is available to operate the trimmer (20 percent). Run unit for 5 to 10 minutes to reach operating temperature. Position LOAD DIVISION SWITCH to the incoming generator, hold switch to NO. 2 position for 5 to 10 seconds, then return it to NO. 1 position. **CAUTION** Do not operate LOAD DIVISION SWITCH on lead engine. Care must also be taken when manually dividing the load. Watch all involved instruments and move the switches slowly to keep from dropping load of one or both units. Failure to comply may result in damage to equipment.

Table 3-13. Starting and Paralleling Diesel Generators (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	GENERATOR PARALLELING OPERATION (SMS 566 ONLY) (CONT)
	480V Switchgear Panels (figure 1-17) Manual Load Division **CAUTION** **When load division is manually operated, ensure load is equally divided and frequency is at 60 CPS. If load is not divided, or if frequency does not indicate 60 CPS, or both conditions exist simultaneously, adjust selector switch on both units until load is equally divided and frequency indicated is 60 CPS. Failure to comply may result in loss of AC power and damage to equipment.** Note Cross current correction will be accomplished on both units at the same time. To correct, operate rheostats very slowly and stop after each short movement and check meters. Note With generators in parallel, perform the following visual steps:
1	Ensure BUSS VOLTAGE is 450 volts.
2	Ensure GENERATOR FREQUENCY is 60 CPS.
3	Ensure WATTMETERS on both generators are approximately even.
4	Ensure with AMMETER, normal and even load distribution on PHASES 1, 2, and 3 of both generators.

Table 3-13. Starting and Paralleling Diesel Generators (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	GENERATOR PARALLELING OPERATION (SMS 566 ONLY) (CONT)
5	Ensure WATTHOUR METER discs for both generators are rotating at equal speed.
6	Ensure POWER FACTOR METER indications for both generators are approximately the same.
7	Ensure LOB and LSB AMMETER indications, phases 1, 2, and 3, are checked. Note Enter time started in the power generation logs and enter hourly readings for both units. CAUTION Diesel engine will be operated for 30 minutes after starting, to allow engine to reach normal operating temperatures. Failure to comply may result in damage to equipment.

Table 3-14. Amplified Countdown Procedures

STEP	CREW POSI-TION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILI-CALS
			TABLE	ITEM		
		WARNING Emergency and tactical trouble analysis procedures (section IV) and combat crew malfunction isolation procedures (section V) shall be thoroughly understood prior to operating launch control equipment. Failure to comply may result in injury to personnel. **WARNING** Missile tank pressures shall be monitored at all times. Failure to comply may result in damage or loss of missile and equipment, and injury or death to personnel.				
1	MCCC and DMCCC	Launch preparation message identified	-	-	4-3	Not applicable
2	MCCC or DMCCC	Alert tone sounded	-	-	4-3	Not applicable
3	CREW	All crew members man their launch positions as soon as possible a. MCCC-LCC b. DMCCC - LCC	-	-	4-3	Not applicable

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE TABLE	ABNORMAL INDICATION REFERENCE ITEM	LOSS OF AC POWER	LOSS OF UMBILICALS
3 (CONT)		c. BMAT - control-monitor group 1 of 4 d. MMT - EMMCC e. EPPT - power room (SMS 548, SMS 566, and SMS 567)	-	-	4-3	Not applicable
4	EPPT	At operational bases only, start standby diesel (if in commission); synchronize and place generator on line as soon as possible. If unit has not been placed on line by the time MCCC requests crew report, EPPT will not place unit on line unless directed by MCCC. Continue to monitor power room equipment and report any abnormal indications	-	-	4-3	Not applicable
5	MCCC and DMCCC	Complete receipt of message. Refer to controller fast reaction checklist for required positive control procedures Note BMAT will monitor ERECTION panel on control-monitor group 1 of 4 until BOOM AT 100° indicator illuminates green; then monitor PROPELLANT LEVEL (PANEL 1) and FUEL TANKING (PANEL 2) and stand by for fuel loading.	-	-	4-3	Not applicable

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE TABLE	ABNORMAL INDICATION REFERENCE ITEM	LOSS OF AC POWER	LOSS OF UMBILICALS
6	MMT	Ensure the following: a. (Deleted) b. N-71 on skid NO. 1 is in OPEN position bA. Observe DP gage in fuel room and report to MCCC if less than 15 inches c. At LSB Motor Control Center, Hydraulic Pump Doors panel, position HAND-OFF-AUTO switch to AUTO	-	-	4-3	Not applicable

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILICALS
			TABLE	ITEM		
6 (CONT)		d. Verify bypass valve on erection boom hydraulic power section is in closed position e. (Deleted) f. (SMS 548 sites 4, 6, and 8 only) position thrust section heater element on the MCC to ON g. At PSC, valves 6 and 7 open. Valves 27, 28, 29, 30, and 43 closed h. At PSC, LOX TANK PRESSURE gage at 7.0 to 9.0 PSI, FUEL TANK PRESSURE gage 16.0 to 18.0 PSI i. For a launch, verify that inlet valve is opened and safetywired and vent valve is closed and safetywired at inert fluid injection stand. For a DPL, verify that inlet valve is closed and safetywired and vent valve is opened Stand by on headset at EMMCC for crew report	-	-	4-3	Not applicable
7	DMCCC	After authentication of launch execution message, turn on personnel warning light and actuate complex security gate. Position TV camera on missile erection door	-	-	4-3	Not applicable
8	MCCC	Verify all crew members and equipment are ready for countdown				

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILICALS
			TABLE	ITEM		
8 (CONT)		Note Any malfunctions or abnormal conditions will be reported at time of crew report.				
9	MCCC	Announce: "Crew report." At this time the crew will respond in the following manner and order:	-	-	4-3	Not applicable
10	DMCCC	"Go" or "hold" (explain reason for hold)	-	-	4-3	Not applicable
11	BMAT	"Go" or "hold" (explain reason for hold)	-	-	4-3	Not applicable
12	MMT	"Go" or "hold" (explain reason for hold)	-	-	4-3	Not applicable
13	EPPT	"Go" or "hold" (explain reason for hold)	-	-	4-3	Not applicable
14	MCCC	Announce on selected communications network: "Start countdown on my mark, 5, 4, 3, 2, 1, mark."	-	-	4-3	Not applicable
		Lift cover and depress START COUNTDOWN pushbutton	-	-	4-4	Not applicable

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSI-TION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILI-CALS
			TABLE	ITEM		
14 (CONT)		Note GUIDANCE FAIL indicator may illuminate red momentarily at target change, countdown start, GUIDANCE READY, or GUIDANCE INERTIAL. This is a normal indication. If GUIDANCE FAIL illuminates steady red, verify malfunction by a double target change. Select alternate target and await TARGET SELECTED green. (At complexes which have only one target assignment, the alternate TARGET SELECTED indicator will illuminate amber only. It is necessary to reselect original target within 23 seconds to prevent additional target selection malfunctions.) If GUIDANCE FAIL indicator again illuminates red, depress RETURN TO STANDBY pushbutton. (Refer to table 5-1, item 7.) If target reselection is made prior to approximately 6 minutes after start of coutdown, GUIDANCE READY and FLIGHT CONTROL R/V READY green indications will not be obtained until approximately 9 to 11				

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILICALS
			TABLE	ITEM		
14 (CONT)		minutes after reselection. If target reselection is made after 6 minutes of countdown, GUIDANCE READY, FLIGHT CONTROL R/V READY, and MISSILE READY will not be obtained until approximately 9 to 11 minutes after reselection. If target reselection is made during a hold (after MISSILE READY green) commit sequence will not be initiated until new target has been acquired and validated.			4-4	Not applicable
15	MCCC	Observe following indications on launch control console (figure 1-62): **CAUTION** If ROOF OPEN indicator illuminates green or fails to illuminate amber immediately after START COUNTDOWN pushbutton is depressed, immediately direct BMAT to depress EMERGENCY STOP pushbutton on ERECTION panel, control-monitor group 1 of 4 and refer to table 4-27. Failure to comply may result in damage to the missile and launcher.			4-4	Not applicable

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSI- TION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILI- CALS
			TABLE	ITEM		
15 (CONT)		Note The following nine indicators should illuminate as stated within 5 seconds after START COUNTDOWN pushbutton is depressed.			4-4	Not ap- plica- ble
		ROOF OPEN indicator - amber	4-27	-		
		MISSILE POWER indicator - amber to green	4-22	-		
		HEATERS ON indicator - amber to green	4-23	-		
		R/V BATTERY TEMPERATURE indicator - green	4-25	-		
		GUIDANCE READY indicator - amber	4-26	3		
		AUTOPILOT ON indicator - amber	4-24	1		
		HYDRAULIC PRESSURE indicator- amber	4-30	1		
		LN_2 LOAD indicator - amber	4-31	1, 3		
		FLAME DEFLECTOR DOOR indi- cator - amber (green at OSTF-1)	4-28	-		
16		(Deleted)				

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE TABLE	ABNORMAL INDICATION REFERENCE ITEM	LOSS OF AC POWER	LOSS OF UMBILICALS
17	MCCC	The following indications should appear approximately 30 seconds after ROOF OPEN indicator illuminates amber Note If MISSILE ERECTED indicator fails to illuminate amber after ROOF OPEN indicator illuminates green, observe on TV monitor if missile is erecting erratically, or has stopped between 0-degree and 90-degree positions. If this condition is present, direct BMAT to depress EMERGENCY STOP pushbutton on ERECTION panel of control-monitor group 1 of 4. If missile is at 0-degree position, direct BMAT to depress EMERGENCY STOP pushbutton, wait 10 seconds, then depress RESET pushbutton. If MISSILE ERECTED indicator fails to illuminate amber at this time, refer to table 4-29, item 1.			4-4	Not applicable
		ROOF OPEN indicator - green	4-27	-		
		MISSILE ERECTED indicator - amber	4-29	1		
		FLAME DEFLECTOR DOOR indicator (SMS 576-C) - green	4-28	-		

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILICALS
			TABLE	ITEM		
18	DMCCC	Position TV camera when MISSILE ERECTED indicator illuminates amber and return to launch control console	-	-	4-4	Not applicable
19	MCCC	Note MISSILE ERECTED indicator will normally illuminate green within 95 seconds after indicating amber. CAUTION If MISSILE ERECTED indicator fails to illuminate green and missile is observed to be erecting erratically or stopped at some position other than 90 degrees, direct BMAT to depress EMERGENCY STOP pushbutton on ERECTION panel of control-monitor group 1 of 4 (table 4-29). Failure to comply may result in damage to the missile.			4-4	Not applicable
		MISSILE ERECTED indicator - green	4-29	2, 6	4-5	Not applicable
		BOOM CLEAR indicator - amber	4-29	3, 6		

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE TABLE	ABNORMAL INDICATION REFERENCE ITEM	LOSS OF AC POWER	LOSS OF UMBILICALS
20	DMCCC	Note DMCCC will announce impending pressure phase changes prior to change occurring. Observe decrease on LO_2 TANK pressure gage from 7.0 to 9.0 PSI, to 2.0 to 4.0 PSI. Announce: "LO_2 tank pressure (actual pressure reading) PSI." Observe increase on FUEL TANK pressure gage. Announce: "Fuel tank pressure rising normally."			4-5	Not applicable
21	MCCC	Note HYDRAULIC PRESSURE indicator will illuminate green approximately 3 seconds after MISSILE ERECTED indicator illuminates green. HYDRAULIC PRESSURE indicator-green	4-30	1	4-5	Not applicable
21A	BMAT	At control-monitor group 1 of 4, FUEL TANKING (PANEL 2) observe: GROUND FILL & DRAIN OPENED indicator-amber MISSILE FILL & DRAIN OPENED indicator-amber	4-32	5	4-5	Not applicable
21B	MCCC	FUEL LINE FILLED indicator-green	4-32	1	4-5	Not applicable

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE TABLE	ABNORMAL INDICATION REFERENCE ITEM	LOSS OF AC POWER	LOSS OF UMBILICALS
21B (CONT)		Note If BOOM CLEAR indicator does not illuminate green 120 seconds after BOOM CLEAR indicator illuminates amber or if indicator returns from green to amber, direct BMAT to depress EMERGENCY STOP pushbutton on ERECTION panel of control-monitor group 1 of 4.			4-5	Not applicable
		BOOM CLEAR indicator - green	4-29	4, 6		
22	DMCCC	Observe FUEL LOADING indicator illuminates green and announce: "Fuel loading indicator green." Observe LO_2 tank pressure 2.0 to 4.0 PSI and fuel tank pressure 24.0 to 55.0 PSI and announce: "PSC is in phase 2F." Announce combat reports during rapid fuel load sequence	4-32	4	4-5	Not applicable
23	MCCC	Note HELIUM LOAD indicator will illuminate amber 2 minutes after START COUNTDOWN pushbutton is depressed.			4-5	Not applicable
		HELIUM LOAD indicator - amber	4-31	3		

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE TABLE	ABNORMAL INDICATION REFERENCE ITEM	LOSS OF AC POWER	LOSS OF UMBILICALS
21B (CONT)		Note If BOOM CLEAR indicator does not illuminate green 120 seconds after BOOM CLEAR indicator illuminates amber or if indicator returns from green to amber, direct BMAT to depress EMERGENCY STOP pushbutton on ERECTION panel of control-monitor group 1 of 4.			4-5	Not applicable
		BOOM CLEAR indicator - green	4-29	4,6		
		CAUTION If fuel tank pressure increases to 59 PSI in a DPL or training launch immediately return to standby in accordance with Table 3-15. In a tactical launch perform procedures in Table 4-32, Item 9. Failure to comply may result in damage to the equipment.				
22	DMCCC	Observe FUEL LOADING indicator illuminates green and announce: "Fuel loading indicator green." Observe LO2 tank pressure 2.0 to 4.0 PSI and fuel tank pressure 24.0 to 58 PSI and announce: "PSC is in phase 2F." Announce combat reports during rapid fuel load sequence.	4-32	4	4-5	Not applicable
23	MCCC	Note HELIUM LOAD indicator will illuminate amber 2 minutes after START COUNTDOWN pushbutton is depressed.			4-5	Not applicable
		HELIUM LOAD indicator - amber	4-31	3		

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Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILICALS
			TABLE	ITEM		
23 (CONT)		Note A fuel under fill may occur due to a single sensor failure at any level after sensor check. If underfill occurs, refer to table 4-32. CAUTION If FUEL COMPLETE indicator does not illuminate amber within 216 seconds after RAPID FUEL LOAD indicator illuminates amber, or valve F-7 has not started to close within 6 seconds after FUEL COMPLETE indicator illuminates amber, or RAPID FUEL LOAD indicator does not illuminate green within 13 seconds after FUEL COMPLETE indicator illuminates amber, in a DPL or training launch immediately return to standby in accordance with table 3-15. In a tactical launch perform procedures in table 4-32. Failure to comply may result in damage to the equipment.			4-5	Not applicable
		RAPID FUEL LOAD indicator - amber	4-32	5		

F5

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE TABLE	ABNORMAL INDICATION REFERENCE ITEM	LOSS OF AC POWER	LOSS OF UMBILICALS
23 (CONT)		Note RAPID FUEL LOAD indicator should illuminate amber immediately following BOOM CLEAR indicator illuminated green.			4-5	Not applicable
		LO_2 LINE FILLED indicator - amber	4-33	1		
		Note FLAME DEFLECTOR DOOR indicator should illuminate green within 2-1/2 to 5 minutes after START COUNTDOWN pushbutton is depressed.				
		FLAME DEFLECTOR DOOR indicator - green	4-28	1		
		Note AUTOPILOT ON indicator should illuminate green within 4 minutes after START COUNTDOWN pushbutton is depressed. AUTOPILOT TEST indicator should illuminate amber immediately thereafter.				
		AUTOPILOT ON indicator - green	4-24	1		
		AUTOPILOT TEST indicator - amber	4-24	2		

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSI-TION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILI-CALS
			TABLE	ITEM		
24	MMT	Proceed to skid NO. 1 and advise MCCC of the transfer pressure in fuel storage tank. Adjust to 100 PSI, if necessary. At skid NO. 6, observe LN_2 transfer pressure and adjust to 55 PSI if necessary. Proceed to skid NO. 2 to observe valve F-7 closing	-	-		Not applicable
25	MCCC	FUEL COMPLETE indicator - amber Start stop watch **CAUTION** If FUEL COMPLETE indicator does not illuminate green within 75 seconds after illuminating amber, immediately depress RETURN TO STANDBY pushbutton if in a DPL or training launch. If in a tactical countdown, refer to table 4-32, item 7. Failure to comply may result in fuel overfill, causing damage to equipment.	4-32	6	4-5	Not applicable

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE TABLE	ABNORMAL INDICATION REFERENCE ITEM	LOSS OF AC POWER	LOSS OF UMBILICALS
24	MMT	Proceed to skid NO. 1 and advise MCCC of the transfer pressure in fuel storage tank. At skid NO. 6, observe LN_2 transfer pressure and adjust to 55 PSI if necessary. Proceed to skid NO. 2 to observe valve F-7 closing.	-	-		Not applicable
25	MCCC	FUEL COMPLETE indicator - amber Start stop watch **CAUTION** If FUEL COMPLETE indicator does not illuminate green within 75 seconds after illuminating amber, immediately depress RETURN TO STANDBY pushbutton if in a DPL or training launch. If in a tactical countdown, refer to table 4-32, item 7. Failure to comply may result in fuel overfill, causing damage to equipment.	4-32	6	4-5	Not applicable

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE TABLE	ABNORMAL INDICATION REFERENCE ITEM	LOSS OF AC POWER	LOSS OF UMBILICALS
25A	BMAT	Note BMAT at PROPELLANT LEVEL (PANEL 1), control monitor group 1 of 4, shall notify the MCCC immediately when the following indicators illuminate green. Each indicator may illuminate green and extinguish several times before remaining green.				
		RAPID LOAD FUEL PRIMARY indicator - green	4-32	7		
		RAPID LOAD FUEL SECONDARY indicator - green	4-32	7		
26	MMT	Observe valve F-7 closing and announce: "F-7 closing." (Deleted)	-	-	4-5	Not applicable

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE TABLE	ABNORMAL INDICATION REFERENCE ITEM	LOSS OF AC POWER	LOSS OF UMBILICALS
27	MCCC	RAPID FUEL LOAD indicator - green	4-32	6	4-5	Not applicable
		Note AUTOPILOT TEST indicator should illuminate green 2 minutes after illuminating amber.				
		AUTOPILOT TEST indicator - green	4-24	2		
		Note HELIUM LOAD indicator should illuminate green approximately 6 to 10 minutes after START COUNTDOWN pushbutton is depressed.				
		HELIUM LOAD indicator - green	4-31	2, 3		
		LO_2 FINE FILLED indicator - green	4-33	1		
		Note BMAT at PROPELLANT LEVEL (PANEL 1) control-monitor group 1 of 4, shall notify the MCCC immediately				

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE TABLE	ABNORMAL INDICATION REFERENCE ITEM	LOSS OF AC POWER	LOSS OF UMBILICALS
27 (CONT)		when the following indicators illuminate green. Each indicator may illuminate green and extinguish several times before remaining green.			4-5	Not applicable
		FINE LOAD FUEL PRIMARY indicator - green	4-32	7		
		FINE LOAD FUEL SECONDARY indicator - green	4-32	7		
27A	MMT	Observe closing of valve F-8 and announce: "F-8 closing".	SEE	SUP	M	
28	BMAT	Observe and announce the following indications at PROPELLANT LEVEL (PANEL 1) of control-monitor group 1 of 4:			4-5	Not applicable
		RAPID LOAD FUEL PRIMARY indicator illuminated	4-32	7		
		Announce: "Rapid load fuel primary green."				
		RAPID LOAD FUEL SECONDARY indicator illuminated	4-32	7		

F5

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE TABLE	ABNORMAL INDICATION REFERENCE ITEM	LOSS OF AC POWER	LOSS OF UMBILICALS
27 (CONT)		when the following indicators illuminate green. Each indicator may illuminate green and extinguish several times before remaining green.			4-5	Not applicable
		FINE LOAD FUEL PRIMARY indicator - green	4-32		7	
		FINE LOAD FUEL SECONDARY indicator - green	4-32		7	
		CAUTION (Deleted)				
27A	MMT	Observe closing of valve F-8 and announce: "F-8 closing"				
28	BMAT	Observe and announce the following indications at PROPELLANT LEVEL (PANEL 1) of control-monitor group 1 of 4:			4-5	Not applicable
		RAPID LOAD FUEL PRIMARY indicator illuminated	4-32	7		
		Announce: "Rapid load fuel primary green."				
		RAPID LOAD FUEL SECONDARY indicator illuminated	4-32	7		

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Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE TABLE	ABNORMAL INDICATION REFERENCE ITEM	LOSS OF AC POWER	LOSS OF UMBILICALS
28 (CONT)		Announce: "Rapid load fuel secondary green."				
		FINE LOAD FUEL PRIMARY indicator illuminated	4-32	7		
		Announce: "Fine load fuel primary green."				
		FINE LOAD FUEL SECONDARY indicator illuminated.	4-32	7		
		Announce: "Fine load fuel secondary green."				
		Observe and announce the following indication at FUEL TANKING (PANEL 2) of control-monitor group 1 of 4:	4-32	7		
		MISSILE FILL & DRAIN CLOSED indicator - green				
		Announce: "Missile fill and drain closed indicator green."				
29	MCCC	FUEL COMPLETE indicator - green	4-32	7	4-5	Not applicable
		Note GUIDANCE READY indicator should illuminate green within 12 minutes after START COUNTDOWN pushbutton has been depressed.				
		GUIDANCE READY indicator - green	4-26	4		

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILICALS
			TABLE	ITEM		
29 (CONT)		FLIGHT CONTROL R/V READY indicator - green. Note RAPID LO_2 LOAD indicator will normally illuminate amber when fuel tank pressure reaches 53.0 PSI.	4-38	-	4-5	Not applicable
30	DMCCC	Announce: "Fuel tank pressure rising, fuel tank pressure greater than 53.0 PSI, and fuel tank pressure stable at (actual pressure) PSI."	-	-	4-5	Not applicable
31	MCCC	RAPID LO_2 LOAD indicator - amber. When missile tank pressures stabilize, announce: "Crew recall." CAUTION RAPID LO_2 LOAD indicator should illuminate green within 4 minutes. If RAPID LO_2 LOAD fails to illuminate green within 4 minutes and 13 seconds after RAPID LO_2 LOAD illuminates amber, return to standby immediately, if in DPL or training launch (table 3-15). If in tactical launch, position REMOTE-LOCAL switch on LO_2 TANKING (PANEL 1) to LOCAL and refer to table 4-33. Failure to comply may result in damage to equipment.	4-33	6	4-5	Not applicable

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSI-TION	ACTION AND NORMAL INDICATION SEE SS-4	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILI-CALS
			TABLE	ITEM		
32	MMT	Report: "Releasing net." Return to launch control center	-	-	4-5	Not applicable
32A	MCCC	NOTE: LOX AND FUEL SYSTEM INDICATOR WILL ILLUMINATE RED IF REMOTE/LOCAL SWITCH ON FUEL TANKING (PANEL 1) IS POSITIONED TO LOCAL DURING A PLX. DURING A PLX ONLY DIRECT BMAT TO POSITION REMOTE/LOCAL SWITCH ON FUEL TANKING (PANEL 1) TO LOCAL. WHEN DIRECTED [illegible] POSITION REMOTE/LOCAL SWITCH ON FUEL TANKING (PANEL 1) TO LOCAL. REPORT: "FUEL TANKING PANEL LOCAL."				
33	BMAT	Report: "Releasing net, area is clear." SEE SS-4 Return to launch control center With assistance of MMT close blast tunnel doors when departing LSB	-	-	4-5	Not applicable
34	MMT	Report to launch control center and monitor FRCP indications. Adjust TV camera when directed, and assist DMCCC with monitoring pressures on launch control console	- SEE	- SS-4	4-5	Not applicable
35	BMAT	Report to launch control center and follow countdown with MCCC emergency procedures checklist	-	-	4-5	Not applicable
36	MCCC	Note MISSILE BAT. ACTIVATED indicator should illuminate green within 2 minutes after MISSILE BAT. ACTIVATED indicator illuminates amber.			4-5	Not applicable

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE TABLE	ABNORMAL INDICATION REFERENCE ITEM	LOSS OF AC POWER	LOSS OF UMBILICALS
36 (CONT)		MISSILE BAT. ACTIVATED indicator - amber	4-35	-	4-5	Not applicable
		MISSILE BAT. ACTIVATED indicator - green	4-35	-		
		ENGINE/MISSILE POWER READY indicator - green	4-36	-		
		Note When RAPID LO_2 LOAD indicator illuminates green, TANK DIFFERENTIAL PRESSURE gage may momentarily go to 0 PSI, then return to greater than 5.0 PSI due to high load of missile inverter start.				
		RAPID LO_2 LOAD indicator - green	4-33	7		
		Note FUEL & LO_2 READY indicator will illuminate amber for approximately 30 seconds, extinguish for approximately 3 seconds, then illuminate green.				
		FUEL & LO_2 READY indicator - amber	4-34	1		
		FUEL & LO_2 READY indicator - extinguished	-	-		
37	DMCCC	LO_2 LOADING indicator - extinguished	-	-	4-5	Not applicable

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILICALS
			TABLE	ITEM		
38	MCCC	FUEL & LO_2 READY indicator - green	4-34	2	4-5	Not applicable
		Direct MMT to perform duties of DMCCC while DMCCC is dispatched to ALCO COMM/CONTROL panel				
		Direct DMCCC to ALCO COMM/CONTROL panel and observe the following indication:				
		MISSILE READY indicator - green				
		Note When HOOKS RELEASED indicator illuminates amber, tank DIFFERENTIAL PRESSURE gage may momentarily go to 0 PSI, then return to greater than 5.0 PSI.				
		HOOKS RELEASED indicator - amber	4-29	5		
		Note HOOKS RELEASED indicator will illuminate amber for approximately 5 seconds before illuminating green.				
		HOOKS RELEASED indicator - green	4-29	5		
		ERECTED READY indicator - green	4-37	-		

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSI-TION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE TABLE	ABNORMAL INDICATION REFERENCE ITEM	LOSS OF AC POWER	LOSS OF UMBILI-CALS
38 (CONT)		Note LN_2 LOAD indicator will normally illuminate green 13 minutes and 9 seconds after START COUNTDOWN pushbutton is depressed.			4-5	Not appli-cable
		LN_2 LOAD indicator - green	-	-		
		HYD-PNEU READY indicator - green	4-30	2		
		MISSILE READY indicator - green	4-39	-		
		Note In a tactical situation only, a second commit sequence may be initiated after COM-MIT STOP pushbutton has been depressed when the MISSILE READY indicator illuminates green and the 100-percent probe is veri-fied dry at the PLCU. The refill of the slug tank may be verified at the discre-tion of the MCCC by open-ing valve L-36 on the slug tank.				

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSI- TION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILI- CALS
			TABLE	ITEM		
38 (CONT)		**CAUTION** During a training launch if SLUG FAILURE indicator illuminates amber after POWER INTERNAL indicator illuminates green, depress COMMIT STOP pushbutton immediately. Failure to comply could result in loss of missile due to rough engine start.	4-33	7A	4-5	Not appli- cable
		Note At the time LO_2 SUPPLY LOW indicator illuminates amber there is sufficient LO_2 remaining to return to standby, reload, and launch without a hold.				
		CAUTION If LO_2 SUPPLY LOW indicator illuminates red, commit sequence or return to standby must be initiated within 2 minutes. Failure to comply will result in overpressurization and loss of missile.				

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE TABLE	ABNORMAL INDICATION REFERENCE ITEM	LOSS OF AC POWER	LOSS OF UMBILICALS
38 (CONT)		**WARNING** (Training launch only) Missile flight safety system instrumentation and range safety must be ready for commit sequence to start. Failure to comply may result in injury or death to personnel.			4-5	Not applicable

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE TABLE	ABNORMAL INDICATION REFERENCE ITEM	LOSS OF AC POWER	LOSS OF UMBILICALS
38 (CONT)		Note During tactical or training launch only, do not proceed with missile commit sequence without valid and authenticated launch order. Note COMMIT SWITCH key switch at ALCO COMM/CONTROL panel must be turned fully clockwise within 3 seconds of the COMMIT START key switch on the launch control console. Coordination must be effected between MCCC and DMCCC.			4-5	Not applicable
39	MCCC	Lift cover, insert COMMIT START key, and turn fully clockwise	-	-	4-6	Not applicable
39A	DMCCC	On ALCO COMM/CONTROL panel (figure 1-76A) observe the following indicator: LCO COMMIT indicator - illuminated On ALCO COMM/CONTROL panel turn COMMIT SWITCH key switch fully clockwise. Observe the following: COMMIT IN PROGRESS indicator - illuminated			4-6	Not applicable

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE TABLE	ABNORMAL INDICATION REFERENCE ITEM	LOSS OF AC POWER	LOSS OF UMBILICALS
39B	MCCC	Note The 28 VDC POWER indicator may illuminate red momentarily and alarm buzzer sound (depress ALARM RESET pushbutton.) Commit sequence will be extended 60 seconds to allow missile inverter to stabilize after restarting if commit sequence is not initiated within 5 minutes after RAPID LO_2 LOAD indicator illuminates green.				
		Observe the following indications:			4-6	Not applicable
		LAUNCH ENABLED indicator - green	4-40	-		
		POWER INTERNAL indicator - amber to green	-	-	4-6	Not applicable
		Start stopwatch				

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE TABLE	ABNORMAL INDICATION REFERENCE ITEM	LOSS OF AC POWER	LOSS OF UMBILICALS
39B (CONT)		☆ **CAUTION** If the LO_2 COMMIT indicator does not illuminate green within 52 seconds after POWER INTERNAL indicator illuminates green or missile LO_2 tank pressure exceeds 31.0 PSI, immediately depress COMMIT STOP pushbutton and refer to table 3-15. Failure to comply may result in LO_2 overfill. ☆ **CAUTION** If the PNEU INTERNAL indicator illuminates amber after illuminating green, depress COMMIT STOP pushbutton and refer to table 3-15. Failure to comply may result in damage to equipment. Note If the MISSILE INVERTER indicator illuminates red, the commit sequence will automatically stop. Depress COMMIT STOP pushbutton and refer to table 4-42.			4-6	Not applicable

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE TABLE	ABNORMAL INDICATION REFERENCE ITEM	LOSS OF AC POWER	LOSS OF UMBILICALS
39B (CONT)		**CAUTION** After an ABORT red indication, immediately depress COMMIT STOP pushbutton. Failure to comply will result in overpressurizing the missile LO_2 tank due to expansion.			4-6	Not applicable
		Note During final commit sequence, a required abort may not be performed after GUIDANCE INERTIAL indicator illuminates green, until ABORT indicator illuminates red.			4-7	Not applicable
		PNEU INTERNAL indicator - amber	4-41		4-7	Not applicable
		PROGRAMMER ARMED indicator - amber	4-41			
		LO_2 COMMIT indicator - amber	4-41			
40	DMCCC	Observe increase in LO_2 tank pressure Announce: "LO_2 tank pressure rising to flight pressure."	-		4-7	Not applicable
41	MCCC	PROGRAMMER ARMED indicator - green	4-41			Not applicable

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSI-TION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILI-CALS
			TABLE	ITEM		
41 (CONT)		PNEU INTERNAL indicator - green	4-41			Not applicable
42	DMCCC ★	Observe LO_2 TANK pressure gage 26.0 to 30.0 PSI and FUEL TANK pressure gage 60.0 to 64.0 PSI Announce: "Flight pressures and stable."	-	-	4-7	Not applicable
43	MCCC	LO_2 COMMIT indicator - green	4-41		4-7	Not applicable
		GUIDANCE INERTIAL indicator - amber then green	-	-		
		ENGINE START indicator - green	-	-		
		MISSILE AWAY indicator - green	-	-		
		or				
		ABORT indicator - red	ABORT		4-8	
		Note ABORT indicator illuminated red and MISSILE AWAY not illuminated are normal indications for a DPL. Table 3-15 lists procedures for return to standby after ABORT indicator illuminates red and MISSILE AWAY indicator is not illuminated. Alarm buzzer sounds (depress ALARM RESET pushbutton on test patch). Momentarily depress COMMIT STOP pushbutton.				

Table 3-14. Amplified Countdown Procedures (Continued)

STEP	CREW POSI-TION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILI-CALS
			TABLE	ITEM		
43 (CONT) 44		REMOVE COMMIT START KEY FROM LAUNCH CONTROL CONSOLE. Note If missile has been launched, perform procedures in table 3-16 (shutdown after launch procedures). IF IN A PEACETIME LAUNCH FOLLOW PROCEDURE AS DIRECTED BY INSTRUCTOR/MCCC (TABLE 3-9) Note If missile was not launched (ABORT indicator illuminated red due to a malfunction during tactical launch, or as normal completion of a DPL or simulated countdown) remove the COMMIT START key from the launch control console, and perform procedures in table 3-15 (amplified return to standby procedures). SEE SAFE. SUP. SS-3			4-8	

Table 3-15. Amplified Return to Standby Procedures

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILICALS
			TABLE	ITEM		
	SEE 55-4	NOTE → FSC WILL PHASE THE MISSILE FUEL TANK TO FUEL DRAIN PRESSURE WHEN [illegible] DRAIN COMPLETE OCCURS. FUEL TANKING (FILL[illegible]) REMOTE/LOCAL SWITCH ON LOCAL WILL NOT PREVENT A PRESSURE PHASE CHANGE. **CAUTION** When ABORT indicator illuminates red, immediately depress COMMIT STOP pushbutton. Failure to comply will result in overpressurizing the missile LO_2 tank due to expansion.	SEE	55-4		
1	MCCC	Observe ABORT indicator - red	-	-	4-8	Not applicable
2	MCCC	Depress COMMIT STOP pushbutton	-	-	4-8	Not applicable
3	MCCC	Verify: FLIGHT CONTROL R/V READY indicator - extinguished HYD-PNEU READY indicator - extinguished	 - -	 - -	4-8	Not applicable

Table 3-15. Amplified Return to Standby Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILICALS
			TABLE	ITEM		
3 (CONT)		FUEL & LO_2 READY indicator - extinguished. HYDRAULIC PRESSURE indicator - amber then green. HYD. PNEU SYSTEM indicator - red. FLIGHT CONTROL R/V READY indicator - green. HYD-PNEU READY indicator - green. ENGINE GROUND POWER indicator - red.				
4	MCCC	At SMS 576-C and OSTF-1, observe auxiliary launch control console WATER ON indicator - extinguished				
5	DMCCC	Verify on launch control console: FUEL TANK pressure gage - 63.0 PSI nominal. LO_2 TANK pressure gage - 2.7 PSI nominal TANK DIFFERENTIAL PRESSURE gage - above 5.0 PSI.			4-8	Not applicable

Table 3-15. Amplified Return to Standby Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILICALS
			TABLE	ITEM		
5 (CONT)		**CAUTION** If LO_2 DRAINED indicator does not illuminate amber within 126 seconds after RETURN TO STANDBY pushbutton has been depressed or LO_2 DRAINING indicator does not illuminate green within 75 seconds after LO_2 DRAINED indicator illuminated amber, refer to table 4-45. If LO_2 DRAINED indicator illuminating amber to illuminating green is less than 17 minutes, perform procedures in table 4-45. Failure to comply may result in damage to missile. Times given are based on FUEL & LO_2 READY indicator illuminated green plus 90 seconds.				
6	MCCC	On launch control console, depress RETURN TO STANDBY pushbutton				
7	MCCC	Verify LO_2 DRAINED indicator - amber and start stop watch	4-45			
8	DMCCC	Observe LO_2 DRAINING indicator - green Note When LO_2 DRAINING indicator extinguishes, dispatch BMAT and MMT to LSB.	4-45			
9	DMCCC	Observe LO_2 DRAINING indicator - extinguished	4-45		4-8	Not applicable

Table 3-15. Amplified Return to Standby Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILICALS
			TABLE	ITEM		
9 (CONT)		Note LO_2 LOADING or LO_2 DRAINING indicator may illuminate green momentarily at the end of LO_2 drain sequence.				
10	MCCC	Note If LO_2 DRAINED indicator does not illuminate green within 270 seconds after LO_2 DRAINING indicator is extinguished, direct BMAT to position REMOTE LOCAL switch on LO_2 TANKING (PANEL 1) to LOCAL. After 90 seconds when MCCC announces LO_2 DRAINED indicator illuminated green, direct BMAT to position REMOTE LOCAL switch on LO_2 TANKING (PANEL 1) to REMOTE.			4-8	Not applicable
		LO_2 DRAINED indicator - green	4-45			
SEE 10A	55-4	**CAUTION** If FUEL TANK pressure gage decreases to less than 8.0 PSI, direct BMAT to position REMOTE LOCAL switch on FUEL TANKING (PANEL 1) to LOCAL and refer to table 4-46. Failure to comply will result in damage to equipment.	DURING A PLX ONLY, DIRECT BMAT TO POSITION REMOTE/LOCAL SWITCH ON FUEL TANKING (PANEL 1) TO REMOTE.			

 SEE 55-4

Table 3-15. Amplified Return to Standby Procedures (Continued)

STEP	CREW POSI-TION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILI-CALS
			TABLE	ITEM		
10 (CONT)		FUEL TANK pressure gage decreases to 9.0 PSI nominal Note If FUEL DRAINED indicator does not illuminate amber within 2 minutes after LO_2 DRAINED indicator illuminates green, refer to table 4-46. **CAUTION** Time the interval from FUEL DRAINED indicator illuminated amber to green. If less than 6 minutes, perform procedures in table 4-46 to prevent damage to equipment. (Time given is based on full fuel tank.)				
11	DMCCC	FUEL TANK pressure gage - 9.0 PSI nominal LO_2 TANK pressure gage - 2.7 PSI nominal TANK DIFFERENTIAL PRESSURE gage - above 5.0 PSI	4-1	-	4-8	Not applicable
11A	BMAT	Observe and announce the following indications at FUEL TANKING (PANEL 2) of control-monitor group 1 of 4:	4-46		4-8	Not applicable

SEE SS-4

BMAT - When directed during & FLX only position REMOTE/LOCAL switch on FUEL TANKING (PANEL 1) to REMOTE. REPORT: "FUEL TANKING PANEL REMOTE."

SEE SS-4

Table 3-15. Amplified Return to Standby Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE TABLE	ABNORMAL INDICATION REFERENCE ITEM	LOSS OF AC POWER	LOSS OF UMBILICALS
10	MCCC	Note If LO_2 DRAINED indicator does not illuminate green within 270 seconds after LO_2 DRAINING indicator is extinguished, direct BMAT to position REMOTE LOCAL switch on LO_2 TANKING (PANEL 1) to LOCAL. After 90 seconds when MCCC announces LO_2 DRAINED indicator illuminated green, direct BMAT to position REMOTE LOCAL switch on LO_2 TANKING (PANEL 1) to REMOTE.			4-8	Not applicable
		LO_2 DRAINED indicator - green	4-45			
		Note If fuel tank pressure gage decreases to less than 8.0 PSI, the fuel draining will stop automatically by closing of the fuel fill & drain valves and valve F-13. Fuel draining will resume automatically when pressure returns to normal. CAUTION If the fuel fill and drain valves fail to close automatically as indicated by a tank differential pressure of less than 5 PSI, direct BMAT to position LOCAL-REMOTE switch on FUEL TANKING (PANEL 1) to LOCAL and refer to table 4-46. Failure to comply will result in damage to equipment.				

Table 3-15. Amplified Return to Standby Procedures (Continued)

STEP	CREW POSI-TION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILI-CALS
			TABLE	ITEM		
11A (CONT)		MISSILE FILL & DRAIN OPENED indicator-amber Announce: "Missile fill and drain opened indicator amber."				
12	MCCC	Note FUEL DRAINED indicator illuminated amber and FUEL DRAINING indicator illuminated green may extinguish due to fuel tank pressure less than 8.0 PSI during fuel draining. Direct BMAT to position REMOTE LOCAL switch on FUEL TANKING (PANEL 1) to LOCAL for 60 seconds, then to REMOTE. Minimum fuel drain time will be increased by 60 seconds. FUEL DRAINED indicator - amber (stop watch started)	4-46	-		
13	DMCCC	FUEL DRAINING indicator - green Note A decrease in fuel tank pressure will occur momentarily at completion of the drain sequence. FUEL LOADING or FUEL DRAINING indicators may illuminate green momentarily after drain sequence.	4-46	-	4-8	Not applicable

Table 3-15. Amplified Return to Standby Procedures (Continued)

STEP	CREW POSI-TION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILI-CALS
			TABLE	ITEM		
11A (CONT)		MISSILE FILL & DRAIN OPENED indicator - amber Announce: "Missile fill and drain opened indicator amber."				
12	MCCC	Note (Deleted) FUEL DRAINED indicator - amber (stop watch started)				
13	DMCCC	FUEL DRAINING indicator - green Note A decrease in fuel tank pressure will occur momentarily at completion of the drain sequence. FUEL LOADING or FUEL DRAINING indicators may illuminate green momentarily after drain sequence.	4-46	-	4-8	Not applicable

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Table 3-15. Amplified Return to Standby Procedures (Continued)

STEP	CREW POSI-TION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE TABLE	ABNORMAL INDICATION REFERENCE ITEM	LOSS OF AC POWER	LOSS OF UMBILI-CALS
14	DMCCC	FUEL DRAINING indicator - extinguished	4-46	-	4-8	Not appli-cable
15	MCCC	FUEL DRAINED indicator - green **CAUTION** If an abort occurs after inert fluid injection and prior to engine start, direct BMAT to depress EMERGENCY STOP pushbutton on ERECTION panel of CMG 1 of 4. After PNEU SYSTEM VENTED indicator on launch control console illuminates green, drain inert fluid in accordance with T.O. 21M-CGM16E-2-3-1. Following inert fluid drain, continue return to standby sequence by directing BMAT to depress SYSTEM RESET pushbutton on ERECTION panel. Failure to comply may result in damage to equipment.	4-46	-	4-8	Not appli-cable
15A	BMAT	At control-monitor group 1 of 4, FUEL TANKING (PANEL 2) observe: GROUND FILL & DRAIN CLOSED indicator - green MISSILE FILL & DRAIN CLOSED indicator - green	4-46	-	4-8	Not appli-cable

Table 3-15. Amplified Return to Standby Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILICALS
			TABLE	ITEM		
16	DMCCC	FUEL TANK pressure gage - 17.0 PSI nominal LO_2 TANK pressure gage - 2.7 PSI nominal TANK DIFFERENTIAL PRESSURE gage - above 5.0 PSI Announce, "Missile tank pressures normal."	4-1	-	4-8	Not applicable
17	MCCC	Note In a tactical situation, or if severe weather conditions are present, refer to table 4-49 for manual missile lowering.				
		Observe PNEU SYSTEM VENTED indicator - amber (stop watch started)	4-48	-	4-8	Not applicable
		Note During helium venting MMT will report refrigerated helium pressure at each 200-PSI interval down to 1200 PSI and then every 100-PSI interval until PNEU SYSTEM VENTED indicator illuminates green.				
		HYD - SYSTEM OFF indicator - amber	4-47	-		
		HYD - SYSTEM OFF indicator - green	4-47	-		
		HYDRAULIC PRESSURE indicator - amber	4-47	-		

Table 3-15. Amplified Return to Standby Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILICALS
			TABLE	ITEM		
17 (CONT)	MCCC	Note If communication is required in missile bay, it will be necessary to position COMMUNICATION KEY switch on communication disconnect panel to COMM OVERRIDE.				
18		(Deleted)				

Table 3-15. Amplified Return to Standby Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILICALS
			TABLE	ITEM		
19	MCCC	Observe PNEU SYSTEM VENTED indicator - green **CAUTION** Ensure LO_2 TANK pressure gage indicates greater than 6.7 PSI prior to MISSILE LOWERED indicator illuminating amber. Failure to comply may result in damage to missile.	4-48	-	4-8	Not applicable
20	MCCC	Direct MMT to EMMCC to monitor missile lowering			4-8	Not applicable
21	MCCC	Observe: MISSILE LOWERED indicator - amber. ERECTION SYSTEM indicator - red	4-49	-	4-8	Not applicable

Table 3-15. Amplified Return to Standby Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILICALS
			TABLE	ITEM		
22	MCCC	MISSILE LOWERED indicator - green. ERECTION SYSTEM indicator - green. SITE HARD indicator - amber. HEATERS ON indicator - amber.	4-49			
23	MCCC	SITE HARD indicator - green, then extinguished	4-27, 4-28			
24	MCCC	Observe all indicators in return and countdown patches extinguished. At SMS 548, sites 4, 6, and 8, direct MMT to position THRUST SECTION HEATING ELEMENT switch to OFF. **CAUTION** If LO_2 rapid load has started, missile battery has been activated and must be removed within 8 hours. Failure to comply will result in battery overheating and possible fire or explosion.	-	-	4-8	

Table 3-15. Amplified Return to Standby Procedures (Continued)

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILICALS
			TABLE	ITEM		
25	MCCC	Direct EPPT to shut down second diesel generator (if in parallel operation)	-	-		
26	EPPT	Shut down second diesel generator in accordance with table 3-18	-	-		

Table 3-16. Shutdown After Launch Procedures

STEP	CREW POSITION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE TABLE	ABNORMAL INDICATION REFERENCE ITEM	LOSS OF AC POWER	LOSS OF UMBILICALS
1	MCCC	Observe MISSILE AWAY indicator - green	-	-	-	-
2	MCCC	Depress COMMIT STOP pushbutton	-	-		
3	MCCC	Depress RETURN TO STANDBY pushbutton Note Return-to-site-hard sequence will be dependent on amount of damage sustained by launcher and boom.	-	-		
4		(Deleted)				
5	MCCC	Observe following indicators:				
		LO_2 DRAINED - extinguished	-	-	-	
		FUEL DRAINED - extinguished	-	-	-	
		PNEU SYSTEM VENTED - green	-	-	-	-
		HYD. SYSTEM OFF - amber	-	-		
		MISSILE LOWERED - amber	-	-		
		HYD. SYSTEM OFF - green	-	-		
		MISSILE LOWERED - green	4-49	-		

Table 3-16. Shutdown After Launch Procedures (Continued)

STEP	CREW POSI-TION	ACTION AND NORMAL INDICATION	ABNORMAL INDICATION REFERENCE		LOSS OF AC POWER	LOSS OF UMBILI-CALS
			TABLE	ITEM		
5 (CONT)	MCCC	SITE HARD - amber. SITE HARD - green, then extin-guished	-	-		
6	MCCC	Observe that all indicators on return to standby patch and countdown patch are extinguished			-	-
7	MCCC	Direct EPPT to shut down second diesel generator (if in parallel operation)				
8	EPPT	Shut down second diesel generator in accordance with table 3-18				

Table 3-17. Precautionary Removal of Generator from Line and Engine Shutdown (SMS 548, SMS 566, and SMS 567)

STEP	ACTION
	Note This procedure will be used when time permits, and shutdown action is necessary to prevent damage to equipment; for example, in event of noisy generator bearings, diesel exhaust smoking, or excessive oil or water jacket leakage.
	480V Switchgear Panels (figures 1-16 and 1-17)
1	Position GOVERNOR MASTER SELECTOR trimmer switch (SMS 566, MASTER SELECTOR switch) to unit remaining on line.
2	Position VOLTMETER control to unit remaining on line.
3	Position FREQUENCY control switch to unit remaining on line.
4	Position SYNCHRONIZING switch (for unit remaining on line) to OFF. Note Be prepared to control speed of lead engine with governor SPEED control.
5	Trip MAIN BREAKER CIRCUIT BREAKER control switch on outgoing engine.
6	Observe FREQUENCY meter of unit on line indicates 60 CPS.
7	At SMS 548 and SMS 567, observe BUS VOLTAGE meter indicates 480 volts.
8	At SMS 566, observe BUS VOLTAGE meter indicates 450 volts.
9	At SMS 566, position VOLTAGE CONTROL MANUAL - AUTO SWITCH to MANUAL
	Engine Control Panel
1	Depress both EMERGENCY STOP pushbuttons.
2	ALARM pushbutton depressed.
3	At SMS 548 and SMS 567, position governor LOAD LIMIT to MIN.

Table 3-18. Routine Generator Removal from Line (SMS 548, SMS 566, and SMS 567)

STEP	ACTION
	Note When changing engines, if the generator has less than 20 percent load, the governor MASTER TRIMMER SELECTOR switch will not be working. When load is applied the frequency will either increase or decrease, and it will be necessary to adjust the frequency with the governor SPEED control before tripping the GENERATOR MAIN BREAKER control.
	480V Switchgear Panels
1	Position GOVERNOR MASTER TRIMMER SELECTOR switch to engine to be kept on line (SMS 548 and SMS 567).
2	Position MASTER SELECTOR switch to engine to be kept on the line.
3	Install VOLTMETER control handle in control panel of generator to be kept on the line and turn handle to ON position.
4	Install FREQUENCY control handle in control panel of generator to be kept on the line and place in ON position.
5	Position SYNCHRONIZING switch (for unit remaining on the line) to OFF.
6	Place CIRCUIT BREAKER control switch to open position.
7	Observe FREQUENCY meter (for unit remaining on line) indicates 60 CPS.
8	At SMS 548 and SMS 567, observe BUS VOLTAGE meter indicates 480 volts.
9	At SMS 566, observe BUS VOLTAGE meter indicates 450 volts.
10	Observe flag in window of MAIN BREAKER indicates green and OPEN.
11	Observe flag in window of main CIRCUIT BREAKER is green.
12	Observe generator MAIN BREAKER indicator is green.

Table 3-18. Routine Generator Removal from Line (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	480V Switchgear Panels (CONT)
13	At SMS 566, position VOLTAGE CONTROL MANUAL - AUTO SWITCH to MANUAL.
14	At SMS 566, adjust EXCITER FIELD RHEOSTAT to 0 volts.
15	At SMS 566, disengage FIELD DISCHARGE SWITCH.
16	Use AMMETER to verify normal load distribution on PHASES 1, 2, and 3 of line unit.
17	Verify BUS VOLTAGE meter of line unit indicates: 480 volts (SMS 548 and SMS 567). 450 volts (SMS 566).
18	Verify FREQUENCY of line unit is 60 CPS
	Engine Control Panel (Off-Line Unit)
1	Adjust speed to approximately: 400 RPM (SMS 548 and SMS 567). 540 RPM (SMS 566).
2	Verify TEMP. LUBE OIL OUT indication drops slightly
	Engine Govenor (Off-Line Unit)
1	Adjust LOAD LIMIT control to: minimum fuel position (SMS 548 and SMS 567). 50 percent position (SMS 566)
	Engine (Off-Line Unit)
1	At SMS 566, close throttle
	Engine Control Panel (Off-Line Unit)
1	Depress STOP ALARM pushbutton.
2	At SMS 566, position emergency LUBE OFF-ON selector switch to OFF.

Table 3-18. Routine Generator Removal from Line (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	Engine Control Panel (Off-Line Unit) (CONT)
3	Depress ALARM CONTROL OFF pushbutton
	480V Switchgear Panel (On-Line Unit)
1	Verify VOLTMETER (PHASE 1, 2, 3) indicates: 480V (SMS 548 and SMS 567). 450V (SMS 566).
2	Verify FREQUENCY meter indicates 60 CPS.
3	Verify WATTMETER indication is normal.
4	Verify with AC AMMETER that load distribution is normal on PHASES 1, 2, 3.
	480V Switchgear Panel (Off-Line Unit)
1	Position AMMETER switch to OFF.

Table 3-19. Air Dryer Operation and Changeover (SMS 548, SMS 566, and SMS 567)

STEP	ACTION
	AIR DRYER OPERATION AND CHANGEOVER (SMS 567)
	Note Prior to interchanging one absorber from drying service to reactivation and the other absorber from reactivation to drying service, ensure following valve and control positions.
1	Ensure cutoff valve (bottom) is in closed (up) position.
2	Ensure bleed-off valve (top) is in closed position.
3	Ensure bleed-off valve (bottom) is in closed position.
4	Ensure cut-off valve (top) is in open (down) position.
5	Ensure operating lever is positioned to absorber which is in drying service.
6	Ensure blower and heater controls are in off position.
	Note When ready to place reactivated absorber into drying service and absorber presently in drying service into reactivation, complete following steps.
7	Place cutoff valve (top) to closed (up) position.
	Note Step 7 allows pressure on reactivated absorber to build up to equal pressure in absorber presently in drying service.

Table 3-19. Air Dryer Operation and Changeover (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	AIR DRYER OPERATION AND CHANGEOVER (SMS 567) (CONT)
	CAUTION Do not move operating lever to reactivated absorber before pressures are equal; the sudden surge of pressures could seriously damage elements in the reactivation system.
8	When pressures in both absorbers are equal, turn operating lever from absorber presently in service to absorber to be placed in service.
9	Open bleed-off valve (top).
10	Open bleed-off valve (bottom). Note Pressure will reduce to 0.0 PSI in absorber going on reactivation.
11	Open cut-off valve (bottom).
12	Open cut-off valve (top).
13	Close bleed-off valve (top).
14	Close bleed-off valve (bottom).
15	Set heating element control to 300° to 350° F.
16	Set timer to 4 hours.
17	Position blower and heater switch to on.

Table 3-19. Air Dryer Operation and Changeover (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	AIR DRYER OPERATION AND CHANGEOVER (SMS 567) (CONT)
	Note To secure unit after normal reactivation period of 4 hours, perform steps 18, 19, and 20.
18	Position heating element control to 0° F.
19	Position blower and heater switch to off.
20	Close cut-off valve (bottom).
	Note Do not close cut-off valve (top). Permit absorber to cool before air is submitted into absorber. A cool absorber bed is more efficient in water removal. The absorber changeover period is approximately 8 hours and the reactivation period is approximately 4 hours; therefore the cooling period will be approximately 4 hours. A typical reactivating - cooling schedule would be as follows: 0800-1200 reactivating first absorber. 1200-1600 cooling first absorber. 1600-2000 reactivating second absorber. 2000-2400 cooling second absorber. 2400-0400 reactivating first absorber. 0400-0800 cooling first absorber
	AIR DRYER CHANGEOVER (SMS 548)
1	Close bleed-off valve.
2	Observe pressure gages of both tanks equalize.

Table 3-19. Air Dryer Operation and Changeover (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	AIR DRYER CHANGEOVER (SMS 548) (CONT)
3	Move operating lever from tank presently in drying service to reactivated tank.
4	Open bleed-off valve.
5	Position flow meter control to 7.0 SCFM.
6	Position heater control on reactivating tank to 550°F.
7	Set timer to 8 hours.
	Note After 7 hours drying, turn off heater on drying unit. After 8 hours change tanks.
	AIR DRYER CHANGEOVER (SMS 566)
	Note To place reactivated absorber into drying service perform steps 1 through 7 at instrument air dryer system (figure 1-37).
1	Close buildup valve (7).
2	Close gate valves (10).
3	Open bypass valve (11).
4	Open bleed flow valve (13).
5	Ensure air pressure gages (6 and 20) of both tanks indicate same pressure.
6	Close bleed valve.
7	Position control lever (18) to the absorber to be placed in drying service.

Table 3-19. Air Dryer Operation and Changeover (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	AIR DRYER CHANGEOVER (SMS 566) (CONT)
	Note To place absorber tank into reactivation perform the following steps.
1	Open buildup valve (7).
2	Ensure pressure gage (6 or 20) of tank to be reactivated indicates 0.0 PSI.
3	Close bypass valve (11).
4	Open gate valve (10).
5	Adjust bleed flow valve (13) until flowmeter indicates 2 SCFM.
6	Open bypass valve.
7	Close gate valve.
8	Position selector switch on dryer control box (19) to tank to be reactivated.
9	Set timer to 3-1/2 hours.
10	Ensure heating indicator of tank to be reactivated is illuminated

Table 3-20. Hot Water Boiler Starting Procedures (SMS 566)

STEP	ACTION
1	Ensure boiler is full of water.
2	Ensure hot water circulating pump pressure is approximately 40.0 PSI.
3	Ensure boiler surge tank sight glass is approximately 1/2-full.
4	Ensure boiler pressure is approximately 10.0 to 16.0 PSI.
5	Open valve on boiler surge tank water line.
6	Open boiler hot water outlet valve.
7	Open boiler cool water return valve.
8	Ensure that boiler vent and safety valve are free of obstructions and closed.
9	Open water control inlet and outlet valves.
10	Open fuel supply valves.
11	Open fuel return valves.
12	Apply electrical power to boiler, by closing circuit breaker on 120/208-volt lighting distribution panel.
	Note If power house air intake or exhaust blastgate is closed, boiler will not start.
13	Ensure that power house air exhaust blastgate is open.
14	Position MANUAL-ON-OFF switch to ON.
15	Position HI-LO-AUTO switch to LO.
16	If boiler does not start depress RESET pushbutton.

Table 3-20. Hot Water Boiler Starting Procedures (SMS 566) (Continued)

STEP	ACTION
	Note It may be necessary to manually turn timer knob through a partial or complete cycle to start boiler.
17	Operate boiler 30 minutes on low fire.
18	Position HI-LO-AUTO switch to AUTO.
19	(Deleted)
20	Ensure water temperature on HI operation is 180° to 205° F.
21	Ensure fuel pressure is approximately 100 PSI

Table 3-21. Day Tank Servicing (SMS 548, SMS 566, and SMS 567)

STEP	ACTION
1	Determine quantity of fuel oil in main storage tank with manometer
	a. Open control valves.
	b. Pump air with hand pumps until liquid indicator rises to highest level in site glass.
	c. Check level of indicator (each mark indicates 100 gallons).
2	Prepare fuel oil storage day tank valves
	a. Open inlet valve at wall (where applicable).
	b. Open valve to electric transfer pump.
	c. Open outlet valve from electric transfer pump.
	d. Close inlet valve to hand transfer pump.
	e. Close outlet valve from hand transfer pump.
	f. Open pump pressure gauge valve.
	g. Observe amount of fuel in day tank.
3	Fill fuel oil storage day tank
	a. Position fuel oil transfer switch to ON.
	b. Monitor tank filling until 3/4-full.
	c. Position fuel oil transfer switch to OFF.
	d. Close fuel inlet valve at wall (where applicable).
	e. Determine amount of fuel serviced (if day tank sight gage is marked in inches use scale).
	f. Close manometer control valves

Table 3-22. Exhaust Steam Generator Operation (SMS 548 and SMS 567)

STEP	ACTION
	DRY OPERATION
1	Close water inlet valve to steam generator.
2	Attach drain hose.
3	Open drain valve.
	Note When water drain is complete accomplish steps 4 and 5.
4	Close outlet steam valve.
5	Close water valve from exhaust steam generator to separator.
	CAUTION Do not close inlet jacket water valve to engine, which would cause engine to overheat and result in damage to equipment.
6	Close drain valve.
7	Disconnect drain hose
	WET OPERATION
	Note Exhaust steam generators will be run wet only when additional steam is needed for heating purposes.
1	Open three makeup water valves.
2	Close bypass makeup water valves.

Table 3-22. Exhaust Steam Generator Operation (SMS 548 and SMS 567) (Continued)

STEP	ACTION
	WET OPERATION (CONT)
	CAUTION Monitor water levels on condensate return tanks and operating engine steam separator throughout operation of filling steam separator and exhaust steam generator. Failure to comply may result in water level drop in running engine and overheating.
3	Close valve on equalizer line between separators.
4	Ensure jacket temperature and water level of running engine are normal
	Note If exhaust steam generator is to be used on operating unit, complete steps 5 through 7.
5	Open return valve.
6	Open steam inlet valve slowly.
	CAUTION Monitor steam separator water level, pressure, and temperature of running engine. Failure to comply may result in overheating.
7	Open inlet valve slowly and regulate.
8	When jacket water reaches normal operating temperature open equalizing line.
	Note If exhaust steam generator is to be used on standby unit, perform steps 9 through 13.
9	Close equalizing line valve.

Table 3-22. Exhaust Steam Generator Operation (SMS 548 and SMS 567) (Continued)

STEP	ACTION
	WET OPERATION (CONT)
10	Open return valve.
11	Open steam generator inlet valve slowly.
	CAUTION Monitor steam separator water level, pressure, and temperature of the running engine. Failure to comply may result in overheating.
12	Open water inlet valve slowly and regulate.
13	When jacket water reaches normal operating temperature open equalizing line valve

Table 3-23. Air System Operation (SMS 548, SMS 566, and SMS 567)

STEP	ACTION
	Air Compressor Operation
1	Check crankcase oil level.
2	Ensure air compressor cylinder lubricator reservoir sight glasses are a minimum of 2/3-full.
3	Ensure cylinder lubricators are operating.
4	If compressor is running, observe cooling water flow meter indicates water is flowing.
5	Check motor for normal operation
	Air Dryer Operation
1	At SMS 566, position control box selector to reactivating tank.
1A	At SMS 548 and SMS 567, tank selector handle positioned to reactivated tank.
2	At SMS 567 only, place timer to 4 hours.
3	At SMS 566 only, place timer to 3 to 4 hours.
4	At SMS 548 only, place timer to 8 hours.
5	At SMS 548 only, regulate bleed flow line to 7 SCFM.
6	At SMS 566 only, regulate bleed flow line to 2 SCFM.
7	Observe reactivating tank pressure is 0.0 PSI.
8	Observe drying tank pressure is 280 to 300 PSI.
	Note (SMS 566 only) Reactivating tank will heat for approximately 3 to 4 hours, then cool to ambient temperature prior to being ready for drying service.

Table 3-23. Air System Operation (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	Air Dryer Operation (CONT)
	Note (SMS 548 and SMS 567 only)
	Reactivating tank will heat for 8 hours at SMS 548 and 4 hours at SMS 567. After 8 hours heating for SMS 548 and 4 hours at SMS 567, deenergize heater. After drying, change tanks in accordance with dryer changeover procedures (table 3-19).
	Air System Shutdown
	Compressor
1	Position HAND-OFF-AUTO selector switch to OFF.
	Motor-Control Center, LOB
1	Position air compressor circuit breaker to OFF
	Lighting Panel B
1	At SMS 548 position air dryer circuit breaker to OFF.
	Note
	Air system emergency shutdown procedure is identical to normal shutdown procedure.
	Compressor
1	Close cooling-water supply valves.
2	Close air compressor return line valves.
3	Close after-cooler return line valves SEE LOCAL TECH. DATA #188
	Motor Control Center, LOB
1	Position air dryer circuit breaker to OFF SEE LOCAL TECH DATA #129

Table 3-24. Spray Pond Operation (SMS 548, SMS 566, and SMS 567)

STEP	ACTION
	SPRAY POND WATER REPLENISHMENT (SMS 548 and SMS 567 ONLY)
1	Open main storage tank water valve NO. 8 (figure 1-20) Note Some sites have two manual valves. Both valves must be open
2	Position three-way valve No. 3 to extreme right position.
3	Ensure water flowing from high level drain.
4	Position three-way valve to extreme left position.
5	Close main storage tank water valve
	LOWERING SPRAY POND WATER LEVEL (SMS 548 and SMS 567 ONLY)
1	Close spray pond supply valve No. 1.
2	Ensure that no water is flowing from high level drain.
3	(Deleted)
4	Open spray pond supply valve NO. 1
	WATER STRAINER CLEANING
	Note Climatic conditions and amount of dirt in spray pond will determine intervals for cleaning of strainers.
1	Loosen strainer handle lock.
2	Position strainer selector handle.

Table 3-24. Spray Pond Operation (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	WATER STRAINER CLEANING (CONT)
3	Tighten strainer handle lock.
4	Remove strainer top.
5	Remove strainer basket.
6	Loosen particles and film with hot water.
	CAUTION Compressed air used in the following step shall not exceed 25.0 PSI, or damage to the strainer may result.
7	Blow excess water and loose particles from basket with compressed air.
8	Reinstall strainer basket.
9	Reinstall strainer cover.
	SPRAY POND OPERATION (SMS 566 ONLY)
	CAUTION Do not allow water from spray pond to exceed 85° F during this operation, or until water temperature has stabilized after completion of this operation. Failure to comply may result in damage to equipment.
	Engine NO. 1 and NO. 2
1	Verify water valves (three) are in open position
	Jacket Water Pump NO. 1 and NO. 2
1	Verify water valves (two) are in open position
	Spray Pond Cooling Water Pump NO. 1 and NO. 2
1	Verify water valves (two) are in open position

Table 3-24. Spray Pond Operation (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	SPRAY POND OPERATION (SMS 566 ONLY) (CONT)
	Power Room, North Wall
1	Adjust heat exchange return line valve (to lower spray).
2	Adjust sidestream filter flowmeter pressure control valve (to lower spray).
3	Adjust sidestream filter bypass valve until approximately 1/3-scale reading on flowmeter is obtained.
	Note Complete the following procedures only if further adjustment is necessary to obtain proper spray height and water temperature.
	Standby Heat Exchanger
1	Close cooling water inlet valve.
2	Close jacket inlet valve
	Operating Heat Exchanger
1	Adjust cooling water inlet valve (to lower spray)
	Power Room, North Wall
1	Adjust sidestream filter bypass valve until approximately 1/3-scale reading on flowmeter is obtained.
	Note Complete the next step only if spray from the three spray pond nozzles on the north side is higher.
	Tunnel Near Launch Control Office
1	Adjust valve on cooling water return line (from LSB)

Table 3-25. Power Plant Periodic Check (SMS 548, SMS 566, and SMS 567)

STEP	ACTION
	PERIODIC CHECK (SMS 548 and SMS 567 ONLY)
	Note This procedure will be used in conjunction with the applicable Air Force daily log form.
	Hot Water System
1	Check packing glands on both pumps for minimum permissible leakage of 5 drops per minute.
2	Check motors and pumps for normal temperature and noise.
3	At SMS 567 only, observe temperature of water outlet is 180° to 210° F.
4	Ensure operating pump pressure is 20.0 to 50.0 PSI.
5	Ensure hot water make-up tank water level is 1/2-to 2/3-full.
6	Ensure hot water make-up tank pressure is 15.0 PSI
	Note If condensate pump has mechanical seals, there will be no leakage.
	Condensate Pump
1	Check packing glands on both pumps.
2	Observe condensate receiver tank is 1/3-to 2/3-full.
3	Check pump and motor for normal temperature.
4	Observe pump pressure is 18.0 to 35.0 PSI
	Spray Pond Control Valves
1	Observe inlet temperature is: 60° to 80° F (SMS 567). 60° to 90° F (SMS 548)
	Note If cooling water pump has mechanical seals, there will be no leakage.

Table 3-25. Power Plant Periodic Check (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	PERIODIC CHECK (SMS 548 and SMS 567 ONLY) (CONT)
	Cooling Water Pump
1	Check packing gland.
2	Ensure pump pressure is 40.0 PSI minimum.
3	Check pump and motor for normal temperature
	Note If utility water pump has mechanical seals, there will be no leakage.
	Utility Water Pump
1	Check packing gland.
2	Check pump and motor for normal temperature and noise.
3	Ensure pressure is 60.0 to 85.0 PSI
	Utility Water Tank
1	Ensure level is 1/2-to 2/3-full.
2	Ensure pressure is 60.0 to 85.0 PSI
	Air Compressor
1	Ensure temperature is 100° to 120° F.
2	Check compressor and motor for abnormal noise.
	Note If drain traps are not operating properly, accomplish step 3 as required.
3	Blow down draintraps
	Steam Separator
1	Ensure water level indication in sight gage is 1/2-to 2/3-full.
2	Ensure steam pressure is 2.0 to 15.0 PSI (SMS 548 only)

Table 3-25. Power Plant Periodic Check (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	PERIODIC CHECK (SMS 548 and SMS 567 ONLY) (CONT)
	Operating Engine
1	Check drain lines.
2	Check left side of engine for oil leaks.
3	Ensure pedestal bearing oil level indication in sight gage is between 2 marks.
4	Ensure pedestal bearing temperature is 200° F maximum.
5	Check generator for normal temperature and noise level.
6	Ensure there is no grease leaking from generator rear bearing.
7	Check right side of engine for oil or water leaks.
8	Check engine plumbing for leaks
	Battery Charger
1	Ensure indicators illuminated bright.
2	Ensure green indicator is illuminated.
3	Ensure amber indicator is illuminated (if at high rate).
4	Ensure voltmeter indication (if at high rate) is approximately 140 volts.
5	Ensure voltmeter indication (if at normal operation) is 129 to 140 volts
	Chemical Feeder (SMS 548 only)
	CAUTION Do not allow chemical feeder to run dry. One full tank (100 gallons) every 24 hours is normal consumption. Failure to comply may result in damage to equipment.
1	Check motor and pump for normal operation.
2	Ensure pump feed indication in sight glass is 1 inch per hour.

Table 3-25. Power Plant Periodic Check (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	PERIODIC CHECK (SMS 566 ONLY)
	Engine Jacket Water System
1	Check packing glands on both pumps for minimum permissible leakage (5 drops per minute).
2	Check motors and pumps for normal temperature and noise level.
3	Ensure temperature of water outlet is 150° to 185° F.
4	Ensure operating jacket pump pressure is 15.0 PSI minimum.
5	Ensure engine jacket water make-up tank water level is 1/2-to 2/3-full
	Spray Pond Circulating Water Pump
1	Check that packing glands on both pumps are leaking at approximately 5 drops per minute.
2	Check pump and motor for normal temperature.
3	Ensure pump pressures are 40.0 PSI minimum
	Spray Pond Control Valves
1	Ensure inlet temperature is 50° to 85° F.
2	Ensure flow meter indication (normal operation) is approximately 1/3-scale
	Utility Water Pump
1	Check pump and motor for normal temperature and noise levels.
2	Ensure pressure is 60.0 to 85.0 PSI.
3	Ensure pump leakage is approximately 5 drops per minute
	Utility Water Tank
1	Ensure utility water tank is 1/2-to 2/3-full.
2	Ensure pressure is 60.0 to 80.0 PSI
	Air Compressor
1	Ensure oil feeders are operating
2	Ensure oil feeders level is 1/2-full minimum.

Table 3-25. Power Plant Periodic Check (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	PERIODIC CHECK (SMS 566 ONLY) (CONT)
3	Check compressor and motor for abnormal noise. Note If drain traps are not operating properly, accomplish step 4 as required.
4	Blow down drain traps
	Hot Water Boiler
1	Ensure surge tank water level in sight gage is 1/2-to 2/3-full.
2	Ensure water pressure is 10.0 to 16.0 PSI.
3	Ensure water temperature is 180° F minimum
	Hot Water Circulating Pumps
1	Check pump and motor for normal temperature and noise levels.
2	Ensure pump pressure is 40.0 to 60.0 PSI.
3	Ensure that pump packing glands are leaking at approximately 5 drops per minute.
	Sidestream Filter
1	Ensure differential pressure is 5.0 PSI maximum.
2	Check piping for leaks
	Iron Remover Filter
1	Ensure differential pressure is 3.0 PSI maximum.
2	Check piping for leaks
	Water Softener
1	Check tank and piping for leaks
	Air Conditioning Compressor
1	Ensure oil level is approximately 1/2-full.
2	Ensure suction and discharge pressure is 25.0 to 35.0 PSI.
3	Ensure that oil pressure is 30.0 PSI above suction pressure.

Table 3-25. Power Plant Periodic Check (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
	PERIODIC CHECK (SMS 566 ONLY) (CONT)
4	Ensure head pressure is 85.0 to 115 PSI.
5	Ensure that general condition of components is normal
	Operating Engine
1	Ensure engine governor oil level is normal.
2	Check left side of engine for oil leaks.
3	Ensure that governor bearing oil cup is full.
4	Ensure generator bearing temperature is normal.
5	Check generator for normal temperature and noise level.
6	Check generator rear bearing for leaks.
7	Check right side of engine for leaks.
8	Check engine plumbing for leaks
	Battery Charger
	CAUTION Illumination of either or both ground indicators indicates a fault in the 125-VDC supply circuits. This fault must be corrected immediately, or serious damage to batteries and to battery charger may result.
1	Ensure both ground indicators are extinguished.
2	Ensure green indicator is illuminated (at low rate).
3	Ensure amber indicator is illuminated (at high rate).
4	Ensure voltmeter indication is 125(±5) volts.
5	Ensure ammeter indication is 20 amperes maximum

Table 3-26. Floor Drain Sump Pump Operational Check
(SMS 548, SMS 566, and SMS 567)

STEP	ACTION
	Note To check operation and freedom of movement of float controls, pull float upward until pump starts, then lower float rod slowly until float settles. This also ensures pump will operate automatically.
1	Position floor drain sump pump circuit breaker on motor control center to ON.
2	Position HAND-OFF-AUTO selector switch to HAND.
3	Ensure pump shaft turning.
4	Position HAND-OFF-AUTO selector switch to OFF, then AUTO

Table 3-27. Sewage Sump Pumps Operational Check
(SMS 548, SMS 566, and SMS 567)

STEP	ACTION
	Note To check operation and freedom of float control, pull float upward until pump starts, then lower float rod slowly until float settles. This also ensures pump will operate automatically.
1	Position sewage sump pumps circuit breaker on motor control center to ON.
2	Position HAND-OFF-AUTO switch to HAND.
3	Ensure pump shaft is rotating.
4	Place HAND-OFF-AUTO selector switch to OFF, then AUTO

Table 3-28. Utility Water Tank Water Adjustment
(SMS 548, SMS 566, and SMS 567)

STEP	ACTION
	Initial Filling of Utility Water Tank
1	Position utility water pumps circuit breakers on motor control center to ON.
2	Position pump selector switch to desired pump (utility water pump NO. 1 or NO. 2).
3	Position water pump HAND-OFF-AUTO switch to HAND.
4	Ensure water tank water level is 1/2 full.
5	Position HAND-OFF-AUTO switch to OFF.
6	Open air gate valve slowly until pressure is 80.0 PSI.
7	Close air gate valve.
8	Position HAND-OFF-AUTO switch to AUTO.
9	At SMS 567 only, position HAND-OFF-AUTO switch to HAND
	Correction of High Level in Surge Tank
1	Position HAND-OFF-AUTO selector switch to OFF.
2	Open utility water drain valve.
3	Open air gate valve partially.
	Note Allow water to drain until desired water level is reached (1/2-full).
4	Close air valve and water valve.
5	Position HAND-OFF-AUTO selector switch to AUTO.
6	At SMS 567 only, position HAND-OFF-AUTO selector switch to HAND.

Table 3-28. Utility Water Tank Water Adjustment (SMS 548, SMS 566, and SMS 567) (Continued)

STEP	ACTION
7	Ensure pressure gage reads 60.0 to 80.0 PSI
	Correction of Low Water Level in Tank
1	Open relief valve.
2	Monitor water level rising to 1/2-full.
3	Close relief valve, when tank is 1/2-full.
	Note If pressure does not remain within limits, open air valve and adjust pressure to 60.0 to 80.0 PSI.
4	Ensure pressure gage indicates 60.0 to 80.0 PSI

Table 3-29. Sidestream Water Filter Operation (SMS 566)

STEP	ACTION
	Note Do not overrun sidestream water filter. Close all manually operated valves slowly. CAUTION When pressure differential builds up to 5.0 PSI, filter (figure 1-21) should be backwashed and rinsed. Observe sidestream flowmeter during opening or closing of flow control valves on unit. Failure to comply may result in abrupt change at flowmeter and cause damage to glass parts.
	Backwash
1	Close effluent valve (7, figure 1-21).
2	Turn two-way control valve (4) slowly to right position.
3	Open upper drain valve (3) slowly. CAUTION Ensure sidestream filter bypass valve is partially closed until flow indicator is at approximately 1/3 scale. Failure to comply may result in loss of the filtering agent and damage to flowmeter.
4	Allow unit to drain, making sure unit is thoroughly cleaned and backwash is clear (minimum time 12 to 15 minutes)
	Rinse
1	Close upper drain valve (3).
2	Turn two-way control valve (4) to left position

Table 3-29. Sidestream Water Filter Operation (SMS 566) (Continued)

STEP	ACTION
3	Open lower drain valve (5, figure 1-21) slowly. **CAUTION** Ensure sidestream filter bypass valve is partially closed until flow indicator is at approximately 1/3 scale. Failure to comply may result in loss of the filtering agent and damage to the flowmeter.
4	Allow unit to rinse until rinsing water is clear. Run for approximately 5 minutes
	Return to Service
1	When rinse has been completed, close drain valve.
2	Open effluent valve (7).
3	Close all other valves.
4	Adjust sidestream filter bypass valve.
5	Observe flow indicator in sight glass (2) is at 1/3 scale.
6	Open manual air vent (1).
7	Vent filter top.
8	Close manual air vent

Table 3-30. Pump House Operational Check and Procedures (SMS 566)

STEP	ACTION
	CHECKS AND PROCEDURES FOR SITES 1, 2, 3, 5, 6, 7, AND 8
	Chemical Feeder
1	Ensure chemical solution tanks are full.
2	Ensure chemical solution is dripping in chemical feeder sight glass during each pump stroke while pump is operating.
3	Ensure chemical feeder housing oil level covers half of chemical feeder rod
	Right-Angle Gear
1	Using dipstick, ensure right-angle gear drive oil level is at full mark.
2	Ensure cooling water is flowing through right-angle gear drive to drain during pump operations
	Emergency Standby Engine
1	Ensure oil in engine crankcase is at full mark.
2	Ensure cooling water is at proper level (full)
	Note To operate chemical feeder with emergency standby engine, proceed to next step. To operate emergency standby engine without pumping, do not turn disconnect switch to OFF and do not engage right-angle gear.
	Switch Panel
1	Place main disconnect switch to OFF
	Emergency Standby Engine
1	Disengage clutch

Table 3-30. Pump House Operational Check and Procedures (SMS 566) (Continued)

STEP	ACTION
	CHECKS AND PROCEDURES FOR SITES 1, 2, 3, 5, 6, 7, AND 8 (CONT)
	Pump
1	Engage right-angle gear drive by setting drive pins down into coupling holes and into clutch plate
	Emergency Standby Engine
1	Turn on fuel at sediment bowl.
2	Advance throttle approximately one-third.
3	Turn choke lever located on carburetor to closed position.
4	Pull ignition switch out to ON.
5	Pull starter rod located on instrument panel outward until engine starts.
6	Adjust choke when engine starts.
7	Advance throttle until engine operates smoothly.
8	Engage clutch by pushing lever forward until positive action is felt.
	Note To return to normal operation, proceed to steps 9 through 12. If emergency standby engine is not being used for pumping, shutdown may be accomplished by retarding throttle to 1/3-position, pushing in the ignition switch, and shutting off fuel at sediment bowl.
9	Disengage clutch.
10	Retard throttle one-third.
11	Push in ignition switch to OFF.
12	Shut off fuel by closing fuel valve at sediment bowl

Table 3-30. Pump House Operational Check and Procedures (SMS 566) (Continued)

STEP	ACTION
	CHECKS AND PROCEDURES FOR SITES 1, 2, 3, 5, 6, 7, AND 8 (CONT)
	Pump
1	Disengage right-angle gear by setting coupling into coupling holes
	Switch Panel
1	Position main disconnect switch to ON.
2	Turn pump control HAND-OFF-AUTO switch to HAND.
	Note A time delay of several seconds will occur prior to pump starting. Ensure pump is pumping water before performing next step.
3	Turn pump control HAND-OFF-AUTO switch to AUTO, making sure detent is engaged
	Switch Panel Heater
1	Check heater for proper operation.
	CHECKS AND PROCEDURES FOR SITES 4 AND 9
	Chemical Feeder (site 4 only)
1	Ensure chemical storage tanks are full.
2	Ensure chemical solution is dripping in chemical feeder sight glass during each pump stroke.
3	Ensure chemical feeder housing oil level covers half of chemical feeder push rod
	Booster pumps
1	Ensure booster pumps are running free of excessive vibration and noise.
2	Ensure water dripping from packing glands is sufficient for cooling and lubrication

Table 3-30. Pump House Operational Check and Procedures (SMS 566) (Continued)

STEP	ACTION
	CHECKS AND PROCEDURES FOR SITES 4 AND 9 (CONT)
	Pump House
1	Ensure pipe fittings and connections are not leaking
2	Check HEATER for proper operation
	Emergency Standby Generator (site 4 only)
1	Using dipstick, ensure crankcase oil level in emergency standby generator drive is at full mark.
2	Ensure coolant in engine cooling system is visible.
	Note Ensure emergency standby generator is in operation condition by performing following step.
3	Position emergency generator selector switch to CHECK position
	Note Placing automatic transfer selector switch to CHECK position will start emergency standby generator and drive. After emergency generator drive has operated 5 minutes perform following step.
	Heat Exchanger (site 4)
1	During operation of emergency standby generator, ensure cooling water is flowing in drain line from heat exchanger
	Note Operate emergency generator 15 minutes prior to performing following step.
	Emergency Generator Selector Switch
1	Position emergency generator selector switch to AUTO

Table 3-30. Pump House Operational Check and Procedures (SMS 566) (Continued)

STEP	ACTION
	CHECKS AND PROCEDURES FOR SITES 4 AND 9 (CONT)
	Emergency Standby Engine (site 9 only)
1	Ensure crankcase oil level in emergency standby engine is at full mark on dipstick.
2	Verify coolant tank is full.
3	Open fuel valve (at sediment bowl).
	Note At site 9, ensure emergency standby engine is in operating condition by performing steps 4 through 13.
4	Disengage clutch.
5	Advance the governor control lever about one-third.
6	Turn choke lever located on the carburetor to closed position.
7	Pull ignition switch out to ON.
8	Pull starter rod located on the instrument panel outward until engine starts.
9	Adjust choke lever as required.
10	When engine starts, adjust throttle to idle speed.
11	Allow engine to warm up to normal operating temperature.
12	Advance throttle until engine operates smoothly.
13	Ensure tachometer indicates 1400 to 1500 RPM.
	Note If pumping is required, perform step 14.

Table 3-30. Pump House Operational Check and Procedures (SMS 566) (Continued)

STEP	ACTION
	CHECKS AND PROCEDURES FOR SITES 4 AND 9 (CONT)
14	Engage clutch by pushing lever slowly forward until positive action is felt. Note Perform steps 15 through 18 to shut down standby engine.
15	Disengage clutch (if engaged).
16	Adjust governor control lever to reduce engine speed to approximately one-third. Note Run engine at 1/3-speed until temperatures decrease and stabilize. Then perform steps 17 and 18.
17	Push in ignition switch to OFF.
18	Close fuel valve (at sediment bowl)

Table 3-31. Water Softener Regeneration (SMS 566)

STEP	ACTION
	Note When water test results on the water softener at sites other than 2 and 9 exceeds 15 PPM of hardness, water softener unit should be regenerated. Before regeneration is accomplished, ensure salt tank is approximately 1/3-full or reads at least 80 percent on brine solution hydrometer. Open bypass valve if large amounts of water are being used during regeneration, then accomplish following steps.
1	Close water softener influent valve (6, figure 1-34).
2	Place water softener 3-position control valve (7) to BACKWASH.
3	Open water softener influent valve.
4	Allow softener to backwash to drain until water flow to drain is clear (approximately 5 minutes).
5	Close water softener influent valve.
6	Place water softener 3-position control valve to REGENERATE.
7	Open influent valve.
8	Open brine tank gate valve (8) and draw down brine solution 9 inches.
9	Close brine tank gate valve.
	Note Allow water to drain approximately 45 to 60 minutes, until water tastes salt-free and water test indicates less than 15 PPM. Use control water analysis set.
10	Close water softener influent valve.
11	Place water softener 3-position control valve (7) to RUN.

Table 3-31. Water Softener Regeneration (SMS 566) (Continued)

STEP	ACTION
12	Open water softener influent valve Note Softener is now in operating configuration. If the bypass valve was opened during regeneration process, close bypass valve after unit has been returned to softener position.

Table 3-32. Iron Removal Filter Backflushing (SMS 566)

STEP	ACTION
	Note At sites 2 and 8, ensure pressure differential is less than 3.0 PSI on pressure gages (1, figure 1-34) at iron removal filter. If pressure differential is greater than 3.0 PSI, backwash filter as follows. Note If large amounts of water are used during backflushing of iron removal filter, open iron removal bypass valve (13), then close after backflushing is complete. CAUTION Close influent valve before operating 3-position control valve. Failure to comply may result in damage to equipment.
1	Close iron removal influent valve (2).
2	Position iron removal 3-position control valve (10) to the backwashing position.
3	Open iron removal influent valve. Note Backwash filter approximately 20 to 30 minutes. When water flow to drain pipe is clear, perform steps 4 through 6.
4	Close iron removal influent valve (2).
5	Position iron removal 3-position control valve (10) to the rinse position.
6	Open iron removal influent valve.

Table 3-32. Iron Removal Filter Backflushing (SMS 566) (Continued)

STEP	ACTION
	Note Rinse for approximately 5 minutes. When water flow to drain pipe is clear, complete steps 7 through 9.
7	Close iron removal influent valve (2).
8	Return iron removal 3-position control valve (10) to RUN.
9	Open iron removal influent valve Note If the bypass valve has been opened during backflushing procedure, ensure valve is closed when returning to normal operation.

Table 3-33. EMMCC Operation

STEP	ACTION
	LOCK OUT SHOCKMOUNTS
	Note Communication will be established between MCCC at launch control console (figure 1-62) EPPT in the power room, and the BMAT at EMMCC (figure 1-42). All steps in this operation are performed at EMMCC.
1	Position CONTROL STATION SELECTOR switch through OFF to LOCAL.
2	Position LOCAL OPERATION SELECTOR switch to LOCK OUT SHOCK MOUNTS.
3	Actuate RESET switch.
4	Depress INITIATE OPERATION pushbutton and observe following indicators illuminate: a. RIGHT LAUNCHER PIVOT - LOCKED OUT. b. LEFT LAUNCHER PIVOT - LOCKED OUT. c. (Deleted) d. (Deleted) e. NOSE CLAMP CYLINDER - LOCKED OUT. f. NOSE CLAMP SHOCK MOUNT - RETRACTED.
5	Depress EMERGENCY STOP pushbutton and verify EMERGENCY STOP indicator is illuminated

Table 3-33. EMMCC Operation (Continued)

STEP	ACTION
	SHOCK MOUNT
	Note Communication will be established between MCCC at launch control console (figure 1-62) EPPT in the power room, and BMAT at EMMCC (figure 1-42). All steps in this operation are performed at EMMCC.
1	Position CONTROL STATION SELECTOR switch through OFF to LOCAL.
2	Position LOCAL OPERATION SELECTOR switch to SHOCK MOUNT.
3	Actuate RESET switch.
4	Depress INITIATE OPERATION pushbutton and observe following indicators illuminate: a. RIGHT LAUNCHER PIVOT - SHOCK MOUNTED. b. LEFT LAUNCHER PIVOT - SHOCK MOUNTED. c. (Deleted) d. (Deleted) e. NOSE CLAMP SHOCK MOUNT - CONTACTED. f. NOSE CLAMP CYLINDER - SHOCK MOUNTED.
5	Depress EMERGENCY STOP pushbutton and verify EMERGENCY STOP indicator is illuminated.
6	Position CONTROL STATION SELECTOR switch through OFF to LAUNCH CONTROL.
7	Actuate RESET switch and verify EMERGENCY STOP indicator is extinguished.
8	Verify REMOTE READY COMPLETE indicator is illuminated.

Table 3-33. EMMCC Operation (Continued)

STEP	ACTION
	MANUAL RAISE TO 90° FROM 0°
	Note Communication will be established between launch control console (figure 1-62), BMAT at EMMCC (figure 1-42), MMT at PSC (figure 1-48), EPPT in the power room, and MCCC or DMCCC, as applicable, monitoring the operation in missile bay. Steps 1 through 4 are performed at EMMCC. Note Prior to initiating the operation, verify missile erection door is open, nose clamp is closed and locked, shock mounts are locked out, and quadrant I and quadrant II hooks are latched. **WARNING** Do not raise the missile while in stretch. Failure to comply may result in injury to personnel or damage to equipment.
1	Position CONTROL STATION SELECTOR switch through OFF to LOCAL.
2	Position LOCAL OPERATION SELECTOR switch to MAN RAISE TO 90°.
3	Actuate RESET switch.
	CAUTION EMERGENCY STOP pushbutton will be depressed immediately if observer in missile bay does not call out creep speed at 87-degree missile erection boom position. Failure to comply will result in damage to missile.

Table 3-33. EMMCC Operation (Continued)

STEP	ACTION
	MANUAL RAISE TO 90° FROM 0° (CONT)
4	Depress INITIATE OPERATION pushbutton and observe that the following indicators illuminate in sequence: a. ABOVE 5° RIGHT and ABOVE 5° LEFT. b. ABOVE 9° RIGHT and ABOVE 9° LEFT. c. ABOVE 87° RIGHT and ABOVE 87° LEFT.
5	In missile bay, verify missile erection boom is in creep. Note If missile erection boom is in creep, proceed to step 6. If missile erection boom is not in creep, immediately complete step 7.
6	At EMMCC, verify that the following indicators are illuminated: a. ABOVE 90° RIGHT and ABOVE 90° LEFT. b. MISSILE VERTICAL. c. QUADRANT III LATCHED and QUADRANT IV LATCHED.
7	Depress EMERGENCY STOP pushbutton and verify EMERGENCY STOP indicator is illuminated
	MANUAL RAISE TO 100° FROM 90°
	Note Communication will be established between MCCC at launch control console (figure 1-62), BMAT at EMCCC, (figure 1-42 and 1-43) and MMT at missile transfer panel (NOSE CLAMP).

Table 3-33. EMMCC Operation (Continued)

STEP	ACTION
	MANUAL RAISE TO 100° FROM 90° (CONT)
1	At EMMCC place the CONTROL STATION SELECTOR switch to MISSILE TRANSFER.
2	At EMMCC actuate RESET switch.
3	At missile transfer panel (NOSE CLAMP) verify PANEL ENERGIZED indicator is illuminated.
4	At missile transfer panel (NOSE CLAMP) depress UNLOCK AND OPEN NOSE CLAMP pushbutton and visually observe nose clamp unlocked and open.
5	At EMMCC verify NOSE CLAMP CLOSED and LOCKED indicators are extinguished.
6	At EMMCC verify NOSE CLAMP UNLOCKED and OPEN indicators illuminated.
7	At missile transfer panel (NOSE CLAMP) depress RETRACT NOSE CLAMP pushbutton and visually observe nose clamp is retracted.
8	At EMMCC verify NOSE CLAMP RETRACTED indicator is illuminated.
9	At missile transfer panel (NOSE CLAMP) depress ROTATE NOSE CLAMP UP pushbutton and visually observe nose clamp is rotated up.
10	At EMMCC verify NOSE CLAMP ROTATED DOWN indicator is extinguished and NOSE CLAMP ROTATED UP indicator is illuminated.
11	At EMMCC depress EMERGENCY STOP pushbutton and verify EMERGENCY STOP indicator is illuminated.
12	At EMMCC position CONTROL STATION SELECTOR switch to LOCAL and LOCAL OPERATION SELECTOR switch to MAN. RAISE 100° FROM 90°.
13	At EMMCC actuate RESET switch.

Table 3-33. EMMCC Operation (Continued)

STEP	ACTION
	MANUAL RAISE TO 100° FROM 90° (CONT)
14	At EMMCC, depress INITIATE OPERATION pushbutton.
15	At EMMCC, verify ABOVE 95° RIGHT and ABOVE 95° LEFT indicators are illuminated.
16	(Deleted)
17	At EMMCC, verify AT 100° RIGHT and AT 100° LEFT indicators are illuminated.
18	At EMMCC, depress EMERGENCY STOP pushbutton and verify EMERGENCY STOP indicator is illuminated.
	MANUAL LOWER TO 90° FROM 100°
	Note Communication will be established between MCCC at launch control console (figure 1-62), EPPT in the power room, BMAT at EMMCC and MMT at missile transfer panel (nose clamp).
1	At EMMCC, position CONTROL STATION SELECTOR switch through OFF to LOCAL, and LOCAL OPERATION SELECTOR switch to MAN LOWER TO 90°
2	At EMMCC, actuate RESET switch.

Table 3-33. EMMCC Operation (Continued)

STEP	ACTION
	MANUAL LOWER TO 90° FROM 100° (CONT)
3	At EMMCC depress INITIATE OPERATION pushbutton.
4	At EMMCC verify AT 100° RIGHT and AT 100° LEFT indicators are extinguished, and ABOVE 95° RIGHT and ABOVE 95° LEFT indicators are extinguished.
5	(Deleted)
6	At EMMCC, verify BOOM TO LAUNCHER STRUT RETRACTED RIGHT #1, RETRACTED LEFT #1, RETRACTED RIGHT #2, and RETRACTED LEFT #2 indicators are illuminated.
7	In missile bay, visually verify that missile erection boom is at 90 degrees.
8	At EMMCC depress EMERGENCY STOP pushbutton, and verify EMERGENCY STOP indicator is illuminated.
9	At EMMCC position CONTROL STATION SELECTOR switch to MISSILE TRANSFER.
10	At EMMCC actuate RESET switch.
11	At missile transfer panel (nose clamp), verify PANEL ENERGIZED indicator is illuminated

Table 3-33. EMMCC Operation (Continued)

STEP	ACTION
	MANUAL LOWER TO 90° FROM 100° (CONT)
12	At missile transfer panel (NOSE CLAMP) depress ROTATE NOSE CLAMP DOWN pushbutton and visually observe nose clamp rotates down.
13	At EMMCC verify NOSE CLAMP ROTATED UP indicator is extinguished and NOSE CLAMP ROTATED DOWN indicator is illuminated.
14	At missile transfer panel (NOSE CLAMP) depress EXTEND NOSE CLAMP pushbutton, and visually observe nose clamp is extended.
15	At EMMCC verify NOSE CLAMP RETRACTED indicator is extinguished and MISSILE CONTACT SWITCH NO. 1 and SWITCH NO. 2 indicators are illuminated.
16	At missile transfer panel (NOSE CLAMP) depress CLOSE AND LOCK NOSE CLAMP pushbutton, and visually observe nose clamp is closed and locked.
17	At EMMCC verify NOSE CLAMP UNLOCKED and OPENED indicators are extinguished and NOSE CLAMP CLOSED and LOCKED indicators are illuminated.
18	At EMMCC depress the EMERGENCY STOP pushbutton and verify EMERGENCY STOP indicator is illuminated.
19	At EMMCC position CONTROL STATION SELECTOR switch to LOCAL
	MANUAL LOWER TO 0° FROM 90°
	Note Communication will be established between the launch control console (figure 1-62), BMAT at the EMMCC (figures 1-42 and 1-43), MMT at the PSC (figure 1-48), and the MCCC or DMCCC, as applicable, monitoring operation in missile bay. Steps 1 through 5 of this operation are performed at EMMCC.

Table 3-33. EMMCC Operation (Continued)

STEP	ACTION
	MANUAL LOWER TO 0° FROM 90° (CONT)
	CAUTION Missile may be lowered while in emergency pressurization by closing boiloff valve and maintaining LO_2 tank pressure greater than 6.7 PSI and fuel tank pressure at 17.0 PSI. Failure to comply will result in structural damage to missile.
1	Position CONTROL STATION SELECTOR switch through OFF to LOCAL and LOCAL OPERATION SELECTOR switch to MAN LOWER TO 0° FROM 90°.
2	Actuate RESET switch and verify EMERGENCY STOP indicator is extinguished.
	CAUTION EMERGENCY STOP pushbutton will be depressed immediately, if observer in missile bay does not call out creep speed at 9-degree missile erection boom position. Failure to comply will result in damage to missile.
3	Depress and hold INITIATE OPERATION pushbutton until BELOW 87° RIGHT and BELOW 87° LEFT indicators are illuminated.
4	Verify QUADRANT III UNLATCH and QUADRANT IV UNLATCH indicators illuminate.
5	Verify ABOVE 90° RIGHT and ABOVE 90° LEFT indicators extinguish and following indicators illuminate: a. BELOW 90° RIGHT and BELOW 90° LEFT. b. BELOW 87° RIGHT and BELOW 87° LEFT. c. BELOW 9° RIGHT and BELOW 9° LEFT.

Table 3-33. EMMCC Operation (Continued)

STEP	ACTION
	MANUAL LOWER TO 0° FROM 90° (CONT)
5 (CONT)	d. (Deleted)
6	In missile bay, verify missile erection boom goes into creep. Note If missile erection boom is in creep, proceed to step 7. If missile erection boom is not in creep, immediately complete step 8.
7	At EMMCC, verify following indicators illuminate: a. BELOW 5° RIGHT and BELOW 5° LEFT. b. AT 0° RIGHT and AT 0° LEFT.
8	At EMMCC, depress EMERGENCY STOP pushbutton and verify EMERGENCY STOP indicator illuminates. Note The missile must now be shock mounted if return to REMOTE READY COMPLETE condition at the EMMCC is desired.
	AUTOMATIC TO 100°
	Note Communication will be established between launch control console (figure 1-62), EPPT in the power room, BMAT at EMMCC (figure 1-42), MMT at PSC (figure 1-48), and MCCC or DMCCC, as applicable monitoring operation in missile bay. Steps 1 through 5 are performed at EMMCC.

Table 3-33. EMMCC Operation (Continued)

STEP	ACTION
	AUTOMATIC TO 100° (CONT)
	Note Prior to initiating the operation, verify missile erection door is open, nose clamp is closed and locked, and quadrant I and quadrant II hooks are latched. **WARNING** ★ Do not raise missile while in stretch. Failure to comply may result in injury to personnel or damage to equipment.
1	Position CONTROL STATION SELECTOR switch through OFF to LOCAL, and LOCAL OPERATION SELECTOR switch to AUTOMATIC TO 100°.
2	Actuate RESET switch and verify EMERGENCY STOP indicator is extinguished. ★ **CAUTION** EMERGENCY STOP pushbutton will be depressed immediately if observer in missile bay does not call out creep speed at 87-degree position of missile erection boom. Failure to comply may result in damage to missile.
3	Depress INITIATE OPERATION pushbutton and verify AT 0° RIGHT and AT 0° LEFT indicators are extinguished, and following indicators are illuminated: a. ABOVE 5° RIGHT and ABOVE 5° LEFT. b. ABOVE 9° RIGHT and ABOVE 9° LEFT. c. ABOVE 87° RIGHT and ABOVE 87° LEFT.
4	In missile bay, verify missile erection boom goes into creep.

Table 3-33. EMMCC Operation (Continued)

STEP	ACTION
	AUTOMATIC TO 100° (CONT)
	Note If missile erection boom is in creep, proceed to step 5. If missile erection boom is not in creep, immediately complete step 8.
5	At EMMCC, verify following indicators are illuminated: a. ABOVE 90° RIGHT and ABOVE 90° LEFT. b. MISSILE VERTICAL. c. QUADRANT III LATCHED and QUADRANT IV LATCHED. d. NOSE CLAMP UNLOCKED and OPENED. e. NOSE CLAMP RETRACTED. f. BOOM TO LAUNCHER STRUT UNLOCKED RIGHT and UNLOCKED LEFT. g. ABOVE 95° RIGHT and ABOVE 95° LEFT.
6	(Deleted)
7	At EMMCC, verify following indicators are illuminated: a. AT 100° RIGHT and AT 100° LEFT. b. NOSE CLAMP ROTATED UP.
8	At EMMCC, depress EMERGENCY STOP pushbutton and verify EMERGENCY STOP indicator is illuminated

Table 3-33. EMMCC Operation (Continued)

STEP	ACTION
	AUTOMATIC TO 0°
	Note Communication will be established between launch control console (figure 1-62), BMAT at EMMCC (figure 1-42), EPPT in the power room, MMT at PSC (figure 1-48), and MCCC or DMCCC, as applicable, monitoring operation in missile bay. Steps 1 through 3 are performed at EMMCC. CAUTION Missile may be lowered while in emergency pressurization by closing boiloff valve and maintaining LO_2 tank pressure greater than 6.7 PSI, and fuel tank pressure at 17.0 PSI. Failure to comply will result in structural damage to missile.
1	Position CONTROL STATION SELECTOR switch through OFF to LOCAL, and LOCAL OPERATION SELECTOR switch to AUTOMATIC TO 0°.
2	Actuate RESET switch and verify EMERGENCY STOP indicator is extinguished. CAUTION EMERGENCY STOP pushbutton will be depressed immediately if observer in missile bay does not call out creep speed at 9-degree position of missile erection boom. Failure to comply may result in damage to missile.
3	Depress INITIATE OPERATION pushbutton and verify AT 100° RIGHT and AT 100° LEFT indicators are extinguished, and BELOW 95° RIGHT and BELOW 95° LEFT indicators are illuminated.
4	(Deleted)

Table 3-33. EMMCC Operation (Continued)

STEP	ACTION
	AUTOMATIC TO 0° (CONT)
5	At EMMCC, verify following indicators are illuminated: a. BOOM TO LAUNCHER STRUT RETRACTED RIGHT #1, RETRACTED LEFT #1, RETRACTED RIGHT #2, and RETRACTED LEFT #2. b. NOSE CLAMP ROTATED DOWN. c. BOOM TO LAUNCHER STRUT LOCKED RIGHT and LOCKED LEFT. d. MISSILE CONTACT SWITCH NO. 1 and SWITCH NO. 2. e. NOSE CLAMP CLOSED and LOCKED. f. QUADRANT III UNLATCHED and QUADRANT IV UNLATCHED. g. BELOW 90° RIGHT and BELOW 90° LEFT. h. BELOW 87° RIGHT and BELOW 87° LEFT. i. BELOW 9° RIGHT and BELOW 9° LEFT. j. (Deleted)
6	In missile bay, verify missile erection boom goes into creep. Note If missile erection boom is in creep, proceed to step 7. If missile erection boom is not in creep, immediately perform step 9.

Table 3-33. EMMCC Operation (Continued)

STEP	ACTION
	AUTOMATIC TO 0° (CONT)
7	At EMMCC, verify following indicators illuminate: a. BELOW 5° RIGHT and BELOW 5° LEFT b. AT 0° RIGHT and AT 0° LEFT
8	At EMMCC, verify all SHOCK MOUNTED indicators are illuminated.
9	Depress EMERGENCY STOP pushbutton and verify EMERGENCY STOP indicator is illuminated.
10	Position CONTROL STATION SELECTOR switch through OFF to LAUNCH CONTROL.
11	Actuate RESET SWITCH and verify EMERGENCY STOP indicator is extinguished

Table 3-34. Missile Stretch Application and Removal

STEP	ACTION
	MISSILE STRETCH APPLICATION
	☆ **CAUTION** Do not apply a stretch load of more than 10,000 pounds (2050 to 2100 PSI on hydraulic unit gage) when missile is in launcher. Failure to comply may result in damage to missile.
	Rear Missile Area
	Note: Steps 1 through 3 shall be reviewed and accomplished without delay.
1	Support right and left stretch arm assemblies at hand wheel end.
2	Remove right and left stretch arm assembly quick-release pins.
3	Lower the right and left stretch arms and swing past missile longerons.
4	Insert right and left stretch hooks in longeron recesses.
5	Secure right and left stretch arms with pins.
6	Rotate right and left handwheels.
7	Align right and left spacer shaft grooves with ends of spring housings
	Missile Erection Boom Nose Clamp
1	Loosen right and left stretch link assembly knobs.
2	Remove links from stowage.
3	Insert links into R/V adapter fittings.
4	Tighten right and left stretch link assembly knobs

Table 3-34. Missile Stretch Application and Removal (Continued)

STEP	ACTION
	MISSILE STRETCH APPLICATION (CONT)
	Nose Clamp Hydraulic Control Unit
1	Position ladder at nose clamp hydraulic control unit.
2	Position SYSTEM SELECTOR to STRETCH.
3	Position MISSILE STRETCH CONTROL to STRETCH.
4	Open BYPASS VALVE.
	Note Do not exceed 100 PSI on hand pump pressure gage during hand pump operation.
5	Operate hand pump to bottom right and left stretch cylinders.
6	Close BYPASS VALVE.
7	Operate hand pump to maintain 2050 to 2100-PSI indication on pressure gage
	Nose Clamp
	Note Maintain pressure while accomplishing the following steps.
1	Remove locknut clamps (red area).
2	Install locknut clamp in telescope lock position (green area).
3	Turn screw jack locknuts toward stretch cylinders until locknut sleeves firmly contact stretch cylinders

Table 3-34. Missile Stretch Application and Removal (Continued)

STEP	ACTION
	MISSILE STRETCH APPLICATION (CONT)
	Nose Clamp Hydraulic Control Unit
1	Slowly position MISSILE STRETCH CONTROL to NEUTRAL.
2	Position SYSTEM SELECTOR to NORMAL.
3	Open BYPASS VALVE fully
	Sustainer Engine Support
	Note Perform following steps if missile fuel tank pressurization is lost and sustainer engine support is available.
1	Connect leg assemblies to booster fairing brackets.
2	Adjust leg assembly turnbuckles to fit yoke support to sustainer engine.
3	Secure yoke support to sustainer engine.
4	Adjust leg assembly turnbuckles to place weight of engine on sustainer engine support assembly
	MISSILE STRETCH REMOVAL
	CAUTION Do not apply a stretch load of more than 10, 000 pounds (2050 to 2100 PSI on hydraulic unit gage) when missile is in launcher. Failure to comply may result in damage to missile.
	Nose Clamp Hydraulic Control Unit
1	Position SYSTEM SELECTOR switch to STRETCH.

Table 3-34. Missile Stretch Application and Removal (Continued)

STEP	ACTION
	MISSILE STRETCH REMOVAL (CONT)
2	Position MISSILE STRETCH CONTROL to STRETCH.
3	Close BYPASS VALVE.
4	Operate hand pump to maintain 2050 to 2100 PSI on pressure gage
	Nose Clamp
1	Turn screw jack lock nuts counterclockwise until disengaged from threads
	Nose Clamp Hydraulic Control Unit
1	Slowly position MISSILE STRETCH CONTROL to RETRACT.
2	Operate hand pump to maintain 2050 to 2100-PSI on pressure gage
	EMMCC
1	Verify NOSE CLAMP ROTATED DOWN indicator is illuminated
	CAUTION **The following steps must be accomplished for all MISSILE STRETCH CONTROL positions other than STRETCH. Failure to comply may result in damage to the missile.**
	Nose Clamp Hydraulic Control Unit
1	Slowly position MISSILE STRETCH CONTROL to NEUTRAL.
2	Position SYSTEM SELECTOR to NORMAL.
3	Open BYPASS VALVE

Table 3-34. Missile Stretch Application and Removal (Continued)

STEP	ACTION
	MISSILE STRETCH REMOVAL (CONT)
	Nose Clamp
1	Remove right and left locknut clamps from telescope lock position (green area).
2	Install right and left locknut clamps in stowed locknut position (red area).
3	Loosen right and left stretch line assembly knobs.
4	Remove and stow links (two) on missile RV adapter.
5	Tighten (remove backlash) right and left stretch link assemblies knobs (two)
	Rear Missile Area
1	Rotate right and left hand wheels counterclockwise.
2	Support weight of right and left stretch arm assemblies at hand wheel end.
3	Remove right and left stretch arm assemblies quick-release pins from stretch arm bases.
4	Disengage right and left stretch hooks from missile longerons.
5	Rotate right and left stretch hooks up.
6	Rotate handwheel clockwise to secure right and left stretch hooks.
7	Rotate right and left stretch arm assemblies upward and secure by inserting quick release pins through stowed position holes

Table 3-34. Missile Stretch Application and Removal (Continued)

STEP	ACTION
	MISSILE STRETCH REMOVAL (CONT)
	Sustainer Engine Support
	Note Perform following steps if sustainer engine support is installed.
1	Adjust leg assembly turnbuckles to remove weight of engine from sustainer engine support assembly.
2	Loosen leg assembly turnbuckles to clear yoke support from sustainer engines.
3	Clear leg assemblies from booster fairing brackets.
4	Remove sustainer support from booster section

Table 3-35. Operation of Missile Erection Door and Flame Door Controls

STEP	ACTION
	Note Procedural steps in this table apply to operation of missile erection door if steps are performed at MISSILE ERECTION DOOR panel (at SMS 548, SMS 566, SMS 567, and SMS 576-C) (figures 1-38 and 1-40). The steps apply to operation of the flame door if performed at the FLAME DOOR panel (at SMS 548, SMS 566, and SMS 567) (figure 1-38). Local operation of the flame door at SMS 576-C is accomplished by performing appropriate steps at FLAME DOOR panel (figure 1-40). Local operation of the missile erection door at OSTF-1 is accomplished by performing appropriate steps at missile erection door controls (figure 1-39).
MISSILE ERECTION DOOR - FLAME DOOR OPENING	
	Note Perform operation at either MISSILE ERECTION DOOR panel, or FLAME DOOR panel, as applicable. The following operation may be stopped at any point by depressing the appropriate STOP pushbutton. Communication must be established between launch control center and BMAT or MMT and EPPT. **WARNING** Ensure all personnel are clear of MISSILE ERECTION DOOR, or FLAME DOOR, as applicable, prior to operation. Failure to comply may result in injury or death to personnel.

Table 3-35. Operation of Missile Erection Door and Flame Door Controls (Continued)

STEP	ACTION
	MISSILE ERECTION DOOR - FLAME DOOR OPENING (CONT)
	Motor Control Center LSB Hydraulic Pump Doors Panel
1	Position HAND-OFF-AUTO switch to HAND
	MISSILE ERECTION DOOR AND FLAME DOOR panel
1	Verify hydraulic pumping unit is running and normal operating pressure is available.
1A	Notify EPPT that the missile erection door or flame door will be actuated.
2	Depress UNLATCH pushbutton and verify LATCH indicator is extinguished and UNLATCH indicator is illuminated.
3	Depress UP pushbutton and verify DOWN indicator is extinguished and UP indicator is illuminated.
3A	Depress STOP pushbutton to preclude dumping the accumulators pressure into storage reservoir and allowing door to settle during opening.
4	Depress OPEN pushbutton and verify CLOSE indicator is extinguished and OPEN indicator is illuminated.
	Note If door is to be closed immediately, do not perform following step.
	Motor Control Center LSB Hydraulic Pump Doors Panel
1	Position HAND-OFF-AUTO switch to AUTO
	MISSILE ERECTION DOOR - FLAME DOOR CLOSING
	Note Perform operation at either MISSILE ERECTION DOOR panel, or FLAME DOOR panel, as applicable. Any of the following operations may be stopped at any point by depressing the appropriate STOP pushbutton.

Table 3-35. Operation of Missile Erection Door and Flame Door Controls (Continued)

STEP	ACTION
	MISSILE ERECTION DOOR - FLAME DOOR CLOSING (CONT)
	Note Communication must be established between launch control center and BMAT or MMT and EPPT. WARNING Ensure all personnel are clear of missile erection door, or flame door, as applicable, prior to operation. Failure to comply may result in injury or death to personnel.
	LSB Motor Control Center Hydraulic Pump Doors Panel
1	Position HAND-OFF-AUTO switch to HAND
	MISSILE ERECTION DOOR and FLAME DOOR Panel
1	Verify hydraulic pumping unit is running and normal operating pressure is available
2	Depress and hold UNLATCH pushbutton for 10 seconds
3	Verify UP indicator is illuminated
	CAUTION If door UP indicator is not illuminated, depress UP pushbutton and wait for indicator to illuminate before depressing CLOSE & JOG pushbutton. Failure to comply will cause damage to equipment.
4	Depress CLOSE & JOG pushbutton and verify OPEN indicator is extinguished and JOG indicator is illuminated

Table 3-35. Operation of Missile Erection Door and Flame Door Controls (Continued)

STEP	ACTION
	MISSILE ERECTION DOOR - FLAME DOOR CLOSING (CONT)
	MISSILE ERECTION DOOR and FLAME DOOR Panel (Continued)
	Note After JOG indicator illuminates amber, CLOSE & JOG pushbutton must be depressed and held until CLOSE indicator is illuminated.
5	Depress and hold CLOSE & JOG pushbutton, and verify CLOSE indicator is illuminated
6	Depress DOWN pushbutton and verify UP indicator is extinguished and DOWN indicator is illuminated
7	Depress LATCH pushbutton and verify UNLATCH indicator is extinguished and LATCH indicator is illuminated
	LSB Motor Control Center, Hydraulic Pump Doors Panel
1	Position HAND-OFF-AUTO switch to AUTO

Table 3-36. Missile Guidance Set Warmup

STEP	ACTION
	Note The following procedures will be followed when missile guidance set has been turned off due to malfunction or maintenance, and must be placed in a warm-up sequence prior to checkout. Note Communication must be established between launch control center and BMAT at the countdown group. CAUTION Check pod cooling temperature and ensure temperature is within allowable limits (45° to 51°F). Failure to comply may result in damage to equipment.
	Countdown Group (figure 1-64)
1	Position 200/115-V, 400-CPS switch to ON.
2	Position 120-V, 60-CPS switch to ON.
3	Position 28-VDC switch to ON.
4	Position CONTROL SELECTOR SWITCH to LOCAL AUTO.
5	Verify LOCAL CONTROL indicator is illuminated.
	Control-Monitor Group 2 of 4, Missile Ground Power Panel (14 and 15, figure 1-24)
1	Position guidance system power switch to ON.
2	Ensure GUIDANCE SYSTEM POWER indicator is illuminated
	Countdown Group (figure 1-64)
1	Position MGS power switch momentarily to ON.
2	Verify MGS POWER indicator is illuminated.
3	Verify MGS WARMUP indicator is illuminated

Table 3-36. Missile Guidance Set Warmup (Continued)

STEP	ACTION
	Note Approximately 2-1/2 to 3 hours must be allowed for warmup.
	Countdown Group (figure 1-64)
1	Observe MGS WARMUP indicator extinguished and READY FOR MGS CHECKOUT indicator is illuminated. Note Checkout of missile guidance set may be performed using procedures outlined in T.O. 21-SM65E-CL-4-1.

Table 3-37. Re-Entry Vehicle Prelaunch Monitor Operation

STEP	ACTION
	Note To change target settings on re-entry vehicle prelaunch monitor (figure 1-65) perform the following steps. Note Communication must be established between launch control center and prelaunch monitor.
1	Verify MARK 4 R/V indicator (5, figure 1-65) is illuminated white.
2	Verify R/V TACTICAL indicator (7) and R/V NORMAL indicator (9) are illuminated green.
3	Position PANEL POWER switch (1) to ON and verify following indicators are illuminated green: a. 28 VDC POWER ON (2). b. 115 VAC POWER ON (3). c. A & F SAFETY GOOD (22). d. WARHEAD SAFETY GOOD (21)
4	Verify TARGET POSITION indicators (10) are illuminated. Note Ensure TEST PWR/GOOD TEST switch is OFF.
5	Open TARGET SETTINGS cover and position rotary switch knobs (11 through 16) to desired target settings.
6	Position target select switch (18) to TARGET B, and depress RESET pushbutton (17).

Table 3-37. Re-Entry Vehicle Prelaunch Monitor Operation (Continued)

STEP	ACTION
7	Verify R/V TACTICAL indicator (7) is extinguished, and R/V IN MAINTENANCE indicator (5) is illuminated white.
8	Verify TARGET POSITION indication (10) is HOMING HOMING HOMING, and TARGET B setting is counted. Note If TARGET POSITION indicator fails to count to setting, depress RESET pushbutton and observe target B counted.
9	Position target select switch (18) to TARGET A, and depress RESET pushbutton (17).
10	Verify TARGET POSITION indication (10) is HOMING HOMING HOMING, and TARGET A setting is counted. Note If TARGET POSITION indicator fails to count to setting, depress RESET pushbutton and verify TARGET A counted.
11	Position target select switch (18) to REMOTE and verify R/V IN MAINTENANCE indicator (6) is extinguished and R/V TACTICAL indicator (7) is green. Note Within 15 seconds, TARGET POSITION indicator should step to setting for target selected on launch control console.
12	Position PANEL POWER switch (1) to OFF and verify following indicators are extinguished: a. 28 VDC POWER ON (2). b. 115 VAC POWER ON (3). c. A & F SAFETY GOOD (22).

Table 3-37. Re-Entry Vehicle Prelaunch Monitor Operation (Continued)

STEP	ACTION
12 (CONT)	d. WARHEAD SAFETY GOOD (21).
	e. TARGET POSITION (10)
13	Verify following indicators are illuminated:
	a. MARK IV R/V (5).
	b. R/V TACTICAL (7).
	c. R/V NORMAL (9)
14	Secure TARGET SETTINGS cover.
15	Report completion of target settings checkout to launch control center

Table 3-38. Missile Pod Air-Conditioning System Operation

STEP	ACTION
	STARTING OPERATION
	Motor Control Center LSB
1	Verify MISSILE POD COOLING BLOWER, MISSILE POD REFRIGERANT COMPRESSOR, DEHUMIDIFIER and REFRIGERANT PUMP circuit breakers are ON
	Missile Pod Cooling Blower Control Panel
1	Depress START pushbutton Note Cooling blower may also be started or stopped from FRCP in LOB.
	Missile Pod Refrigerant Compressor
1	At SMS 548, position OFF-AUTO switch to AUTO
2	Depress START pushbutton Note If compressor does not start, depress red reset button on control box located on compressor. If compressor stops 90 seconds after starting, oil supply is probably low. If compressor stops 20 minutes after starting, delivered air relative humidity has not gone below 50 percent.
	OPERATIONAL CHECK
1	Verify temperature gage located on missile pod blower filter housing or on east wall of mechanical and equipment room indicates 47 (±2)°F.
2	Verify draft gage located on missile pod blower filter housing indicates less than one inch of water.
3	If installed, verify pressure gage located below missile pod indicates 30 inches of water minimum.

Table 3-38. Missile Pod Air-Conditioning System Operation (Continued)

STEP	ACTION
	OPERATIONAL CHECK (CONT)
4	Observe on pod refrigerant compressor control panel the following indications: a. Suction pressure - 58.0 (±3) PSI. b. Discharge pressure - between 200 and 250 PSI. c. Oil pressure - at least 30.0 PSI greater than suction pressure
5	Verify oil covers 1/2 of sight glass located on compressor oil pan.
6	Verify cooling water inlet line temperature is 65° to 70°F.
7	Verify cooling water outlet line temperature is 75° to 110°F
	SHUTDOWN OPERATION
1	At SMS 548, place compressor OFF-AUTO switch to OFF position.
1A	Depress STOP pushbutton.
2	At cooling blower local control panel, depress STOP pushbutton Note Pod refrigerant compressor and dehumidifer will cease to operate, and an amber warning indicator in malfunction patch of launch control console will illuminate when missile pod blower is shut down. Note When compressor stops audible and visual warning indications will be given on facilities remote control panel in launch operations building.

Table 3-39. Electronic Cabinet Air-Conditioning System Operation

STEP	ACTION
	STARTING OPERATION
1	On LSB motor control center, verify electronic cabinet air conditioning fan and electronic cabinet refrigerant compressor circuit breakers are ON.
2	At electronic cabinet air conditioning fan local control panel, on wall near the mechanical and equipment room blast door, depress START pushbutton.
3	At SMS 548, at electronic cabinet air conditioning compressor, position OFF-AUTO switch to AUTO.
4	Depress START pushbutton Note If compressor does not start, depress red reset button on control box on compressor.
	OPERATIONAL CHECK
1	Verify thermometer on discharge duct near mechanical and equipment room entrance door indicates between 55° and 58°F.
2	Verify humidity indicator mounted beside thermometer indicates less than 50 percent relative humidity.
3	At electronic cabinet air conditioning compressor control panel observe following indications: a. Discharge pressure gage - 200 to 250 PSI. b. Suction pressure gage - 65.0 to 80.0 PSI
4	At condenser, located above electronic cabinet air conditioning compressor, observe following indications: a. Water inlet temperature - 65° to 80°F. b. Water outlet temperature - 80° to 110°F

Table 3-39. Electronic Cabinet Air-Conditioning System Operation (Continued)

STEP	ACTION
	SHUTDOWN OPERATION
1	At SMS 548, at electronic cabinet air conditioning compressor, position OFF-AUTO switch to OFF.
1A	Depress STOP pushbutton.
2	At electronic cabinet air conditioning fan local control panel, on wall near mechanical and equipment room blast door, depress STOP pushbutton. Note The NO AIR FLOW indicator on FRCP in LOB will illuminate when electronic cabinet air conditioning fan stops. The HIGH TEMPERATURE indicator on FRCP in LOB will illuminate when circulating air temperature exceeds 60°F.

SECTION IV

EMERGENCY AND TACTICAL TROUBLE ANALYSIS PROCEDURES

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4-1. SCOPE.

4-2. Table 4-1 through 4-49 contain procedures to be used by the missile combat crew in the event a malfunction occurs while monitoring an EWO standby configuration, DPL, or training launch, and to permit continuation of a tactical launch countdown. The procedures in these tables are supported by figures 4-1 through 4-26.

SEE SUP SS-2

4-3. EMERGENCY AND TACTICAL TROUBLE ANALYSIS PROCEDURES.

4-4. The emergency procedures define steps to be taken by the missile combat crew to safely shut down the weapon system from a hazardous condition. The tactical trouble analysis procedures define steps to be taken by the missile combat crew to correct or bypass malfunctions to permit continuation of a tactical launch countdown.

4-5. The procedures presented in this section are job and position oriented. Each table is designed to cover specific malfunctions and conditions. Abnormal indications are listed for the crew member normally monitoring the equipment displaying the abnormal indications. However, a crew member may be called upon to perform other than his normal tasks in the event of an emergency situation. In performing the procedures, many of the tasks may be performed simultaneously, while others must be coordinated by the MCCC. Emergency checklists are presented in T.O. 21M-CGM16E-1-1CL-6 through T.O. 21M-CGM16E-1-1CL-10. These checklists are crew-member oriented and are based on the procedures in this section.

4-5A. Figure 4-26 contains countdown continuation and backout flow charts which provide the launch crew with quickly accessible procedures in the event a malfunction occurs during countdown or return to standby. Sheet 1 contains a countdown sequence bar chart which shows the sequential relationship of the various major systems during countdown. The countdown sequence bar chart is used to tie together the following countdown continuation flow charts which are arranged by major systems. Also contained on sheet 1 is a legend explaining the function of the various elements appearing on sheets 2 through 5. The countdown continuation and backout flow charts on sheets 2 through 5 contain instructions for the action to be taken when one of the more common malfunctions occur. The tables in sections III and IV shall be used when more detailed procedures are required or when a less common malfunction, not covered in the charts, occurs.

4-6. Additional emergency procedures are presented in paragraphs 4-97 through 4-118. These procedures cover fires, first aid, miscellaneous hazards (fire equipment, missile explosives, missile re-entry vehicle accident or fire, liquid oxygen, liquid nitrogen and RP-1 fuel, pressurization, and electrical equipment), emergency breathing apparatus, warning signals, and evacuation procedures.

WARNING

☆

Certain emergency procedures presented in this manual require personnel to be sent to the launch and service building (LSB). An extremely hazardous condition exists when fuel and liquid oxygen are aboard the missile. Sending personnel to the LSB during hazardous conditions is left to the discretion of the missile combat crew commander (MCCC). Normally, no personnel shall be allowed in the LSB unaccompanied. However, due to the limited number of personnel assigned to a missile combat crew, it may not be possible to accomplish procedures specified in this section without violating this rule. In view of the above, the MCCC, at his discretion, will evaluate the emergency condition and attempt to direct personnel to the least hazardous areas. Communications shall be maintained, if possible, by crew members. Failure to comply may result in death or injury to personnel.

SEE SUP BD

ALSO AT THE DISCRETION OF THE MCCC PERSONNEL ENTERING THE LAUNCH + SERVICE BUILDING MAY BE REQUIRED TO WEAR PROTECTIVE CLOTHING AND/OR BREATHING APPARATUS.

SEE SUP BD

CAUTION

Remove main missile battery within 8 hours after activation in accordance with T.O. 21-SM65E-2FJ-7-1. Failure to comply will result in damage to equipment.

4-7. EMERGENCY MISSILE TANK PRESSURIZATION.

4-8. Under normal conditions, missile fuel and liquid oxygen tank (LO_2 tank) pressures are maintained automatically and no operator action is necessary. However, if the PRESSURE MODE indicator on the launch control console (figure 1-62) illuminates red, or if the automatic control system fails, see table 4-1 and perform manual actions as required.

4-9. Tank pressure gages and the PRESSURE MODE indicator shall be monitored at all times. Any time the missile tank pressures deviate from normal ranges as indicated by the gages in the pressurization patch, action will be taken to return the pressures to normal. If the pressures stabilize, the automatic pressurization mode will be selected.

4-10. The emergency circuit is automatically operated by pressure switches in the pressure system control which senses missile LO_2 tank and fuel tank pressures and by an airborne pressure switch which senses differential pressure. The pressure gage indications on the launch control console have no automatic function in relation to activation of the emergency circuits and are obtained from airborne pressure transducers. The TANK DIFFERENTIAL PRESSURE gage requires a missile-on-stand signal and 115-volt, 400-cycle power supply to operate an amplifier in the control-monitor group.

4-11. The PRESSURE MODE indicator illuminates red, indicating pressurization system is in emergency, when:

a. TANK DIFFERENTIAL PRESSURE gage indicates less than 2.3 PSI nominal.

b. LO_2 TANK pressure gage indicates less than 1.65 PSI nominal when missile is vertical or less than 6.7 PSI when the missile is horizontal or during the erection or lowering cycle.

c. Instrument air pressure drops to 27.0 (±1.0) PSI.

d. FUEL TANK pressure gage indicates less than 53.0 PSI after having been greater than 60.0 PSI.

e. EMERGENCY pushbutton on pressurization patch of launch control console panel has been depressed.

CAUTION

When pressurization system is in emergency, immediate action is required to maintain missile LO_2 and fuel tank differential pressure. Also, do not open boiloff valve while missile is horizontal unless RV is supported with cradle. Failure to comply will result in damage to missile.

Note

If PRESSURE MODE indicator illuminates red after GUIDANCE INERTIAL indicator illuminates green, no action is possible until COMMIT STOP pushbutton is depressed.

4-12. Under normal conditions, fuel and LO_2 tank pressures are maintained automatically and no operator action is necessary. If the pressure gages on the launch control console panel indicate pressures outside of the nominal operating bands, a malfunction will be suspected.

a. Standby through missile erected (phase 1), fuel tank pressure at 17.0 PSI, and LO_2 tank pressure at 8.0 PSI.

b. Fuel loading (phase 2F), fuel tank pressure at 24.0 to 55.0 PSI, and LO_2 tank pressure at 2.7 PSI.

c. LO_2 loading (phase 2L), fuel tank pressure at 63.0 PSI, and LO_2 tank pressure at 2.7 PSI.

d. Flight (phase 3), fuel tank pressure at 63.0 PSI, and LO_2 tank pressure at 26.0 PSI.

e. All missile tank pressurization values throughout section IV are nominal values.

4-12A. LO_2 BOILOFF VALVE MANUAL OPERATION.

4-12B. Manual operation of the boiloff valve is provided to aid in maintaining desired differential pressure between the LO_2 and the fuel tanks by affording direct control of LO_2 tank pressure. The BOILOFF VALVE OPEN and CLOSE pushbuttons are the press and hold type, and must be held to maintain the desired effect.

4-12C. The boiloff valve may be closed when the missile is in the vertical or horizontal position, or during the erection or lowering cycle. Normal valve opening may be accomplished when the missile is in the vertical position. To enable the BOILOFF VALVE OPEN pushbutton to open the valve when the missile is in the horizontal position, a low (below 2.3 PSI) differential pressure must exist. The boiloff valve cannot be opened during missile erection or lowering, or during commit lockup. Seven seconds after commit lockup and if missile has not been launched, the boiloff valve may be opened if required.

CAUTION

If the boiloff valve is opened when the missile is in the horizontal position, ensure that RV support cradle is installed to avoid structural damage to the missile.

4-12D. With the missile vertical, the boiloff valve will automatically close if the missile LO_2 tank pressure drops below 1.65 PSI. A differential pressure of less than 2.3 PSI will cause the boiloff valve to open automatically when the missile is vertical and not in commit lockup.

4-13. If the PRESSURE MODE indicator illuminates red during standby or countdown, the DMCCC will manually maintain missile fuel and LO_2 tank pressures by depressing the applicable RAISE or LOWER pushbutton on the pressurization patch on the launch control console panel. After bringing the LO_2 tank pressure to 2.7 PSI if the missile is vertical, or 6.7 PSI if the missile is horizontal, and the fuel tank pressure to the nominal pressure, the DMCCC will momentarily depress the AUTOMATIC pushbutton to return the pressure mode to automatic. If the system repeatedly reverts to emergency mode during countdown, maintain pressures manually and return to standby. The missile will not lower until the LO_2 tank pressure is 6.7 PSI or greater.

4-14. MINOR OR SLOW PRESSURE GAGE CHANGES.

4-15. A minor oscillating change of pressure above or below the nominal pressure is a normal condition. A continuing slow pressure change away from the nominal value indicates a malfunction. When this condition exists, the DMCCC will momentarily depress the EMERGENCY pushbutton on the pressurization patch and control pressures manually as described in paragraph 4-13. When pressures remain stable prior to commit start, the DMCCC will momentarily depress the AUTOMATIC pushbutton to switch the system to the automatic mode and continue the countdown.

4-16. RAPID PRESSURE GAGE CHANGES.

4-17. A rapid change in pressure gage indication is hazardous and immediate action will be taken. The DMCCC will immediately depress the EMERGENCY pushbutton, observe gages, and manually control pressures by depressing the applicable RAISE, LOWER, OPEN or CLOSE pushbuttons on the pressurization patch. If pressures do not stabilize during countdown, the MCCC will momentarily depress the RETURN TO STANDBY pushbutton on the return patch and refer to table 3-15.

4-18. The MCCC will order the missile maintenance technician (MMT) to the pressure system control (PSC) at the following times:

a. (Deleted)

b. When the LO_2 DRAINING indicator on the propellant supply patch extinguishes.

c. During emergency conditions specified in this section.

4-19. (Deleted)

4-20. (Deleted)

4-20A. BOILOFF VALVE FAILURE.

4-20B. A boiloff valve failure will be indicated by an increase or decrease of LO_2 tank pressure, depending upon whether the boiloff valve fails in an open or closed position.

4-20C. A boiloff valve failure in the closed position is indicated by a gradual increase in LO_2 tank pressure, except during LO_2 loading when a rapid pressure increase will occur as loading nears completion. The boiloff valve may be held in the regulating position during propellant loading by depressing and holding the BOILOFF VALVE OPEN pushbutton.

4-20D. A boiloff valve failure (in regulating position) during commit sequence is indicated by the PNEU INTERNAL indicator failing to illuminate green, and missile LO_2 tank pressure remaining at 2.7 PSI. The following procedures shall be performed if this malfunction occurs:

a. Depress BOILOFF VALVE CLOSE pushbutton and hold if necessary for launch. If this action does not close the boiloff valve, proceed to paragraph b.

b. Perform steps 2 through 23 of table 3-15, return to standby procedures.

4-20E. If the boiloff valve fails to close at fuel drained complete plus 30 minutes:

a. Perform steps 1b and 1g of table 4-49.

b. Depress and hold BOILOFF VALVE CLOSE pushbutton. If this action does not close the boiloff valve, proceed to paragraph e.

c. Raise LO_2 tank pressure to greater than 6.7 PSI and maintain pressure.

d. Lower missile manually in accordance with table 4-49.

e. Troubleshoot boiloff valve and correct malfunction in accordance with T.O. 21-SM65E-2J-9-1.

4-21. DISASTER SHUTDOWN PROCEDURES.

4-22. Table 4-2 provides procedures to be followed in the event of a missile explosion on or near the missile launcher. Personnel will not enter the launch and service building until it is deemed safe by the MCCC; however, the MCCC and EPPT will perform their portion of table 4-2 immediately.

4-23. LOSS OF AC POWER.

4-24. Loss of AC power is interpreted as total loss of AC power and is indicated by TANK DIFFERENTIAL PRESSURE gage going to 0 PSI, 400 CYCLE POWER, and ENGINE GROUND POWER indicators on the launch control console illuminating red. Tables 4-3 through 4-8 provide procedures to be followed in the event of loss of AC power at the following times:

a. During standby (table 4-3).

b. After countdown start and prior to MISSILE ERECTED indicator illuminating green (table 4-4).

c. After MISSILE ERECTED indicator illuminates green and prior to commit start (table 4-5).

d. After commit start and prior to GUIDANCE INERTIAL indicator illuminates green (table 4-6).

e. After GUIDANCE INERTIAL indicator illuminates green (table 4-7).

f. After ABORT indicator illuminates red (table 4-8).

(Paragraphs 4-25 through 4-28 deleted.)

4-29. SWITCHGEAR EMERGENCY OPERATION.

4-30. Table 4-16 provides procedures to be followed in the event that use of the CIRCUIT BREAKER control switch on the 480-volt switchgear panel fails to place the incoming generator on the line.

4-31. RUNAWAY ENGINE EMERGENCY STOP.

4-32. Table 4-17 provides procedures to be followed in the event that the engine tachometer on the engine control panel indicates high RPM.

4-33. INITIAL ENGINE START AFTER COMPLETE POWER FAILURE.

4-34. Table 4-18 provides procedures to be followed after correction of the malfunction resulting in complete loss of AC power and diesel engine stoppage.

4-35. FUEL OVERFILL PROCEDURES.

SEE SUP E

4-36. Table 4-19 provides procedures to be followed if the missile fuel tank is overfilled. Fuel tanking will stop automatically if missile fuel tank pressure exceeds 67.0 PSI. The fuel tank pressure may oscillate above or below 67.0 PSI, starting and stopping the fuel tanking sequence. The FUEL TANK pressure gage will probably indicate erratically and should not be relied upon.

CAUTION

If a fuel overfill occurs, the missile and PSC must be inspected for fuel contamination in regulators and other pressurization areas. Failure to comply may result in damage to the missile.

SEE SUP E

4-37. TACTICAL TROUBLE ANALYSIS, 400-CYCLE POWER SYSTEM MALFUNCTION.

4-38. Table 4-20 provides the procedures to be followed in the event the 400 CYCLE POWER indicator on the launch control console illuminates red after countdown start and prior to commit start.

4-39. TACTICAL TROUBLE ANALYSIS, 28-VDC POWER SYSTEM MALFUNCTION.

4-40. Table 4-21 provides procedures to be followed in the event the 28 VDC POWER indicator on the launch control console illuminates red after countdown start and prior to commit start.

4-41. TACTICAL TROUBLE ANALYSIS, MISSILE POWER SYSTEM MALFUNCTION.

4-42. Table 4-22 provides procedures to be followed in the event the MISSILE POWER indicator on the launch control console fails to illuminate amber or green within the allotted time.

4-43. TACTICAL TROUBLE ANALYSIS, HEATERS SYSTEM MALFUNCTION.

4-44. Table 4-23 provides procedures to be followed in the event the HEATERS ON indicator on the launch control console fails to illuminate green within the allotted time.

4-45. TACTICAL TROUBLE ANALYSIS, AUTOPILOT SYSTEM MALFUNCTION.

4-46. Table 4-24 provides procedures to be followed in the event the AUTOPILOT ON or AUTOPILOT TEST indicators on the launch control console fail to illuminate amber or green within the allotted time.

4-47. TACTICAL TROUBLE ANALYSIS, RV BATTERY TEMPERATURE MALFUNCTION.

4-48. Table 4-25 provides procedures to be followed in the event the RV BATTERY TEMPERATURE indicator on the launch control console fails to illuminate green immediately after countdown start.

4-49. TACTICAL TROUBLE ANALYSIS, GUIDANCE SYSTEM MALFUNCTION.

4-50. Table 4-26 provides procedures to be followed in the event the following malfunction indications occur on the launch control console:

a. TARGET A SELECTED and TARGET B SELECTED indicators extinguished (item 1).

b. TARGET A SELECTED or TARGET B SELECTED indicator illuminates amber but does not illuminate green (item 2).

c. GUIDANCE READY indicator does not illuminate amber within allotted time (item 3).

d. GUIDANCE READY indicator does not illuminate green within allotted time and GUIDANCE FAIL indicator is extinguished (item 4).

e. GUIDANCE FAIL indicator illuminates amber during commit sequence (item 5).

f. GUIDANCE FAIL indicator illuminates red prior to commit sequence (item 6).

g. GUIDANCE FAIL indicator illuminates amber prior to commit sequence (item 7).

h. GUIDANCE FAIL indicator illuminates red during commit sequence (item 8).

4-51. TACTICAL TROUBLE ANALYSIS, OVERHEAD DOOR SYSTEM MALFUNCTION.

4-52. Table 4-27 provides procedures to be followed in the event the ROOF OPEN indicator on the launch control console fails to illuminate amber or green as required.

4-53. TACTICAL TROUBLE ANALYSIS, FLAME DOOR SYSTEM MALFUNCTION.

4-54. Table 4-28 provides procedures to be followed in the event the FLAME DEFLECTOR DOOR indicator on the launch control console does not illuminate amber or green within approximately 5 minutes after countdown start.

4-55. TACTICAL TROUBLE ANALYSIS, ERECTION SYSTEM MALFUNCTION.

4-56. Table 4-29 provides procedures to be followed in the event the following malfunction indications occur on the launch control console:

a. MISSILE ERECTED indicator is extinguished after ROOF OPEN and BOOM AT 0° indicators on ERECTION panel of control-monitor group 1 of 4 are illuminated green (item 1).

b. MISSILE ERECTED indicator remains amber after ROOF OPEN indicator illuminates green (item 2), and missile is not erecting normally.

c. BOOM CLEAR indicator fails to illuminate amber when MISSILE ERECTED indicator illuminates green (item 3).

d. BOOM CLEAR indicator fails to illuminate green (item 4).

e. HOOKS RELEASED indicator fails to illuminate green after FUEL & LO_2 READY indicator illuminates green (item 5).

f. MISSILE ERECTED indicator fails to illuminate green or BOOM CLEAR indicator fails to illuminate amber or green (item 6).

4-57. HYDRAULIC SYSTEM MALFUNCTION.

4-58. Table 4-30 provides procedures to be followed in the event the following malfunction indications occur on the launch control console:

a. HYDRAULIC PRESSURE indicator fails to illuminate amber (item 1).

b. HYD-PNEU READY indicator fails to illuminate green after LN_2 LOAD indicator illuminates green (item 2).

4-59. TACTICAL TROUBLE ANALYSIS, LIQUID NITROGEN-HELIUM SYSTEM MALFUNCTION.

4-60. Table 4-31 provides procedures to be followed in the event the following malfunction indications occur on the launch control console:

a. LN_2 LOAD indicator fails to illuminate amber after countdown start (item 1).

b. HELIUM LOAD indicator fails to illuminate green approximately 3 minutes after RAPID FUEL LOAD indicator illuminates green (item 2).

c. LN_2 LOAD and HELIUM LOAD indicators fail to illuminate amber within allotted time (item 3).

d. LN_2/HE SUPPLY indicator illuminates red after countdown start (item 4).

e. EMERGENCY HELIUM SUPPLY indicator illuminates amber after countdown start (item 5).

4-61. TACTICAL TROUBLE ANALYSIS, FUEL SYSTEM MALFUNCTION.

4-62. Table 4-32 provides procedures to be followed in the event the following malfunction indications occur:

a. FUEL LINE FILLED indicator on launch control console fails to illuminate after MISSILE ERECTED indicator illuminates green (item 1).

b. FUEL LEVEL SENSING indicator on launch control console illuminates amber (item 2).

c. FUEL LEVEL SENSING indicator on launch control console illuminates red (item 3).

d. FUEL LOADING indicator on launch control console fails to illuminate green when FUEL LINE FILLED indicator illuminates green (item 4).

e. RAPID FUEL LOAD indicator on launch control console fails to illuminate amber approximately 1 minute after FUEL LINE FILLED indicator illuminates green (item 5).

f. RAPID FUEL LOAD indicator on launch control console remains amber for more than 10 seconds after FUEL COMPLETE indicator illuminates amber (item 6).

g. (Deleted)

h. FUEL SUPPLY indicator on launch control console illuminates red after countdown start (item 8).

i. Automatic fuel loading sequence fails (item 9).

j. FUEL DRAINING indicator on launch control console fails to illuminate green within 120 seconds after FUEL DRAINED indicator illuminates amber (item 10).

4-63. TACTICAL TROUBLE ANALYSIS, LIQUID OXYGEN SYSTEM MALFUNCTION.

4-64. Table 4-33 provides procedures to be followed in the event the following malfunction indications appear on the launch control console:

a. LO_2 LINE FILLED indicator fails to illuminate amber after HYDRAULIC PRESSURE indicator illuminates green (item 1).

b. LO_2 LINE FILLED indicator fails to illuminate green after FUEL COMPLETE indicator illuminates green (item 2).

c. LO_2 LEVEL SENSING indicator illuminates amber (item 3).

d. LO_2 LEVEL SENSING indicator illuminates red (item 4).

e. LO_2 LOADING indicator fails to illuminate green when LO_2 LINE FILLED indicator illuminates green (item 5).

f. RAPID LO_2 LOAD indicator fails to illuminate amber after FUEL COMPLETE indicator illuminates green (item 6).

g. RAPID LO_2 LOAD indicator fails to illuminate green (item 7).

h. LO_2 SUPPLY indicator illuminates red after countdown start (item 8).

i. LO_2 DRAINING indicator fails to illuminate green approximately 75 seconds after LO_2 DRAINED indicator illuminates amber (item 9).

4-65. TACTICAL TROUBLE ANALYSIS, FUEL AND LIQUID OXYGEN READY SYSTEM MALFUNCTION.

4-66. Table 4-34 provides procedures to be followed in the event the following malfunction indications occur on the launch control console:

a. FUEL & LO_2 READY indicator fails to illuminate amber immediately after RAPID LO_2 LOAD indicator illuminates green (item 1).

b. FUEL & LO_2 READY indicator fails to illuminate green (item 2).

c. FUEL & LO_2 READY indicator on launch control console not green after commit sequence has stopped, due to loss of slug capability (item 3).

4-67. TACTICAL TROUBLE ANALYSIS, MISSILE BATTERY ACTIVATED SYSTEM MALFUNCTION.

4-68. Table 4-35 provides procedures to be followed in the event the MISSILE BAT. ACTIVATED indicator fails to illuminate amber or fails to illuminate green 2 minutes after illuminating amber.

4-69. TACTICAL TROUBLE ANALYSIS, ENGINE MISSILE POWER READY SYSTEM MALFUNCTION.

4-70. Table 4-36 provides procedures to be followed in the event the ENGINE/MISSILE POWER READY indicator on the launch control console remains extinguished after the MISSILE POWER, HEATERS ON, and MISSILE BAT. ACTIVATED indicators have illuminated green.

4-71. TACTICAL TROUBLE ANALYSIS, ERECTED READY SYSTEM MALFUNCTION.

4-72. Table 4-37 provides procedures to be followed in the event the ERECTED READY indicator on the launch control console fails to illuminate green within the allotted time.

4-73. TACTICAL TROUBLE ANALYSIS, FLIGHT CONTROL AND RV SYSTEM MALFUNCTION.

4-74. Table 4-38 provides procedures to be followed in the event the FLIGHT CONTROL RV READY indicator fails to illuminate green within the allotted time.

4-75. TACTICAL TROUBLE ANALYSIS, MISSILE READY SYSTEM MALFUNCTION.

4-76. Table 4-39 provides procedures to be followed in the event the MISSILE READY indicator on the launch control console remains extinguished after the ENGINE/MISSILE POWER READY, FLIGHT CONTROL RV READY, ERECTED READY, HYD-PNEU READY, and FUEL & LO_2 READY indicators are illuminated green.

4-77. TACTICAL TROUBLE ANALYSIS, LAUNCH ENABLE SYSTEM MALFUNCTION.

4-78. Table 4-40 provides procedures to be followed in the event the LAUNCH ENABLED indicator on the launch control console fails to illuminate green after the COMMIT START key switch has been turned on.

4-79. TACTICAL TROUBLE ANALYSIS, COMMIT SYSTEM MALFUNCTION.

4-80. Table 4-41 provides procedures to be followed in the event any indicator in the commit patch on the launch control console fails to illuminate in the normal sequence within the allotted time.

4-81. TACTICAL TROUBLE ANALYSIS, MISSILE INVERTER SYSTEM MALFUNCTION.

4-82. Table 4-42 provides procedures to be followed in the event the MISSILE INVERTER indicator on the launch control console illuminates red.

4-83. TACTICAL TROUBLE ANALYSIS, MALFUNCTION PATCH TROUBLE INDICATION.

4-84. Table 4-43 provides procedures to be followed in the event the following malfunction indications occur in the malfunction patch on the launch control console:

a. The RV SAFE indicator illuminates red.

b. The AUTOPILOT FAIL indicator illuminates amber.

c. The AUTOPILOT FAIL indicator illuminates red.

d. The RESPONDER MODE indicator illuminates amber or red.

e. The POD AIR CONDITIONING indicator illuminates amber.

4-85. TACTICAL TROUBLE ANALYSIS, FRCP MALFUNCTION.

4-86. Table 4-44 provides procedures to be followed in the event that any indicator on the FRCP illuminates red.

4-87. TACTICAL TROUBLE ANALYSIS, LIQUID OXYGEN OR LIQUID NITROGEN MANUAL DETANKING.

4-88. Table 4-45 provides manual detanking procedures to be followed in the event the LO_2 DRAINED indicator on the launch control console fails to illuminate amber within the allotted time or illuminates green prematurely.

4-89. FUEL MANUAL DETANKING.

4-90. Table 4-46 provides manual detanking procedures to be followed in the event the FUEL DRAINED indicator on the launch control console fails to illuminate amber within the allotted time or illuminates green prematurely.

4-91. TACTICAL TROUBLE ANALYSIS, HYDRAULIC PUMPING UNIT FAILS TO SHUT DOWN AUTOMATICALLY.

4-92. Table 4-47 provides procedures to be followed in the event the HYD-SYSTEM OFF indicator on the launch control console remains amber after FUEL DRAINED indicator illuminates green.

4-93. TACTICAL TROUBLE ANALYSIS, AIRBORNE HELIUM MANUAL VENT.

4-94. Table 4-48 provides procedures to be followed in the event the PNEU. SYSTEM VENTED indicator on the launch control console fails to illuminate amber within allotted time.

4-95. TACTICAL TROUBLE ANALYSIS, MANUAL MISSILE LOWERING.

4-96. Table 4-49 provides procedures to enable the missile combat crew to manually return the complex to site hard condition when malfunctions have precluded an automatic erection system sequence. Peculiar situations may require the missile combat crew to select applicable portions of table 4-49.

4-97. FIRES.

4-98. There are basically three types of fires that can be encountered within a launch complex. Alarm and detector networks monitor the entire complex through numerous fire detectors installed at strategic points. The fire detectors combined rate-of-rise and fixed temperature units are actuated by either a temperature increase exceeding 15 degrees F per minute or by a temperature exceeding the fixed temperature. These detectors automatically initiate a fire alarm warning on the annunciator unit in the LCC, sound alarm bells, and illuminate red lights if a fire is detected.

4-99. Manually initiated fire alarm boxes are also provided. If personnel detect a fire which has not set off an automatic alarm system, notify the MCCC immediately, activate a manual fire box, and proceed to combat fire.

4-100. CLASS A FIRES. Class A fires are defined as wood, trash, paper, collimator housing insulating material, etc. These fires will be combated with fire hoses or portable CO_2 fire extinguishers depending on the size and location of the fire.

4-101. CLASS B FIRES. Class B fires are defined as hydraulic fluids, diesel oils, lubricants, RP-1 fuel and liquid oxygen. All class B fires will be combated with CO_2 fire extinguishers.

WARNING

Do not use water on Class B fires. Failure to comply may result in death or injury to personnel.

4-102. CLASS C FIRES. Class C fires are defined as those consisting of electrical motors, wiring, power panels, electronic cabinets, switch boxes and etc. All Class C fires shall be combated using CO_2 fire extinguishers.

WARNING

Do not use water on Class C fires. Failure to comply may result in death or injury to personnel.

4-103. FIRST AID.

4-104. If personnel have been exposed to burns, smoke inhalation, or shock, the injured person should be removed to a safe area. Apply portable oxygen and, if necessary, mouth-to mouth artificial respiration. Cover with warm materials (blankets, clothing etc.) to prevent or control shock, and notify the medical department immediately.

4-105. MISCELLANEOUS HAZARDS.

4-106. FIRE EQUIPMENT. The following hazards are to be avoided:

a. Sprinkler heads shall be kept free of paint or other coverings.

b. Sprinkler heads or piping shall not be used for supporting wires.

c. Material shall not be stacked within 18 inches of sprinkler heads.

d. Standpipe valves must be kept in a closed position and outlet caps must not be removed except for emergencies.

e. Standpipe valve connections and outlets must not be blocked or hidden from view.

f. Fire extinguishers shall not be moved or blocked from view or access.

g. If an extinguisher is used, request replacement immediately.

4-107. MISSILE EXPLOSIVES (ORDNANCE). The following explosive hazard precautions must be observed:

a. Pyrophoric rocket engine igniters must be handled with extreme care as they contain highly explosive materials. These materials, triethylaluminum (TEA) and triethylborane (TEB), are extremely destructive to living tissue, and, on contact with the skin, produce a combined effect of dehydration and thermal burn. If pyrophoric materials come in contact with the skin, flush the contact area with large amounts of water and administer medical treatment immediately. In the event a fire occurs, isolate the fire from its source if possible and control its spreading. CO_2 extinguishers and dry chemical extinguishers may be used to extinguish small fires; however, water spray should be used for large fires. Do not use carbontetrachloride (CCL_4) extinguishers, as violent reaction will result, and poisonous phosgene gas may be formed. After extinguishing fire, watch area closely for several hours as this type of fire may reignite.

b. Protective clothing must be worn at all times when handling expended or unexpended igniters.

c. Eye protection will be worn when handling missile rocket engine solid propellant gas generators and initiators.

4-108. MISSILE RE-ENTRY VEHICLE ACCIDENT OR FIRE. If the re-entry vehicle is involved in an accident or a fire occurs near or envelops the re-entry vehicle, danger from possible high explosive detonation and possible radioactive contamination exists. Proceed as follows:

a. If the re-entry vehicle is dropped during handling and its metal case is not visibly ruptured:

(1) Notify nuclear accident response team and other proper authorities and survey re-entry vehicle and area for possible radioactive contamination.

(2) If radioactive contamination is detected, take appropriate steps necessary for protection of personnel and decontamination of area.

(3) If radioactive contamination is not detected, reject re-entry vehicle to munitions section.

b. If the re-entry vehicle is dropped during handling, and its metal case is visibly ruptured:

(1) Immediately request assistance from the fire department, nuclear accident response team, and other proper authorities.

(2) Take immediate action to prevent sparks or fire from reaching the re-entry vehicle.

(3) Evacuate nonessential personnel to a minimum distance of 1500 feet.

(4) Survey re-entry vehicle and area for possible radioactive contamination. Take appropriate steps necessary for protection of personnel and decontamination of area.

c. If fire occurs near the re-entry vehicle:

(1) Immediately request assistance from fire department, nuclear accident response team, and other proper authorities.

(2) Take immediate action to prevent fire from reaching the re-entry vehicle and endeavor to extinguish the fire. (If possible, move re-entry vehicle away from fire.)

(3) Evacuate nonessential personnel to a minimum distance of 1500 feet.

d. If the re-entry vehicle becomes enveloped by fire:

(1) Immediately request assistance from fire department, nuclear accident response team, and other proper authorities. Note the exact time the re-entry vehicle was enveloped and advise fire-fighting supervisor and accident team chief of time factor and personnel safety distance.

(2) Take immediate action to extinguish fire.

(3) Evacuate nonessential personnel to a minimum distance of 1500 feet.

(4) Survey re-entry vehicle and area for possible radioactive contamination. Take appropriate steps necessary for protection of personnel and decontamination of area.

e. If the re-entry vehicle is involved in any other type of accident or is damaged in any way, perform procedures in steps a(1) through a(3).

4-109. LIQUID OXYGEN, LIQUID NITROGEN, AND RP-1 FUEL. The following chemical hazard precautions must be observed.

a. Liquid oxygen and liquid nitrogen freeze skin tissue on contact. Avoid direct contact with lines and equipment containing these fluids.

b. Liquid nitrogen is constantly changing into gas. High concentration of nitrogen gas in the atmosphere causes a displacement of oxygen, which may lead to suffocation. All work areas where nitrogen gas may accumulate must be adequately ventilated at all times.

c. RP-1 fuel is toxic if inhaled, and can be fatal if taken internally. It is insensitive to shock but will explode when heated and vaporized.

d. A hazardous condition may exist at the launch and service building when liquid oxygen and fuel are aboard the missile. Normally, personnel should not be allowed in the launch and service building when the above condition exists. Personnel may be required to perform emergency operations at the launch and service building during countdown, or return to site hard, to prevent possible damage or complete loss of the missile.

4-110. PRESSURIZATION. Do not attempt to tighten or loosen a fitting in pressurization line, or to connect test equipment to a system until the system is depressurized. Be certain that all lines containing pressurized fluids or gases are firmly supported, since they can whip violently if broken. Interconnecting lines and hoses, not otherwise supported, must be secured every 5 feet to prevent whipping. If no vent or safety valves are provided in transfer lines for liquid helium, nitrogen, or oxygen, disconnect transfer hoses as soon as the transfer is completed. These fluids will vaporize and create dangerous pressures if not vented.

4-111. ELECTRICAL EQUIPMENT. Hazardous conditions related to the operation of electrical equipment may result in shock to or electrocution of personnel and damage to equipment. When working with electrical equipment, observe the following precautions:

a. Prior to applying power to any system, ensure that personnel are adequately warned.

b. When launch equipment is installed in an operational environment, do not open access panels except for maintenance requirements. Opening of access panels can expose personnel to electrical shock.

c. Always use properly insulated tools and test equipment.

d. (Deleted)

e. Wherever possible, completely disconnect the primary power source from equipment and discharge all capacitors before performing maintenance.

f. Turn off power or use a nonconductive material, whichever can be accomplished first, when attempting to aid a person who has come into contact with a high voltage source.

4-112. EMERGENCY BREATHING APPARATUS.

4-113. Emergency breathing apparatus are of two types, a self contained unit using air under high pressure and a self generating chemical unit. They are strategically located throughout the launch operations building and the launch and service building. The compressed air unit supplies air to the user on demand. Its duration is dependent on the cylinder capacity and pressure. When the bypass valve is opened, air is constantly supplied. The self generating unit utilizes a canister containing chemicals to absorb CO_2 and moisture and generate oxygen.

4-114. WARNING SIGNALS.

4-115. Ensure that personnel are thoroughly familiar with launch complex warning signals. The personnel warning indicator (green, area safe; amber, caution required; or red, danger) shall reflect the status of the launch complex at all times.

4-116. EVACUATION PROCEDURES.

4-117. It is the responsibility of personnel to notify the MCCC of any emergency conditions and the responsibility of the missile combat crew commander to notify all personnel via the public address system when an emergency evacuation condition exists. Emergency evacuation of the launch and service building is to be conducted as follows:

a. The MCCC will announce via the public address system that the launch and service building is to be evacuated immediately, sound the alarm, notify squadron command post and activate area warning light to condition red.

b. All personnel will immediately report to the missile combat crew commander for accountability in order to avoid an unnecessary rescue operation.

c. The MMT will insure that the blast doors are closed as soon as the general evacuation of the launch and service building has been completed.

d. Disaster control shutdown procedures. Table 4-2, shall be implemented at the discretion of the MCCC.

4-118. To conduct emergency evacuation of the launch control center, MCCC will notify command post if practicable and announce evacuation of the launch control center and will instruct all personnel to evacuate.

Table 4-1. Pressurization System

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1
1	DMCCC	PRESSURE MODE indicator illuminates red and LO_2 TANK pressure gage indicates less than 6.7 PSI on launch control console (figure 1-62) during standby or prior to MISSILE ERECTED indicator illuminating green	a. Depress LO_2 RAISE pushbutton on launch control console until LO_2 TANK pressure gage indicates above 6.7 PSI, while maintaining fuel tank pressure at 17.0 PSI
	MCCC		b. Depress ALARM RESET pushbutton on launch control console. Note If this condition occurs prior to MISSILE ERECTED indicator illuminating green, allow sequence to continue and proceed to item 4.
	DMCCC		c. Depress AUTOMATIC pushbutton on launch control console. d. If system does not remain in automatic mode, depress LO_2 RAISE pushbutton to maintain LO_2 tank pressure at 8.0 PSI nominal, while maintaining fuel tank pressure at 17.0 PSI
	MCCC		e. Direct missile be placed in stretch in accordance with table 3-34. f. Direct troubleshooting of PSC in accordance with T.O. 21-SM65E-2J-9-1
			1
2	DMCCC	PRESSURE MODE indicator illuminates red and TANK DIFFERENTIAL PRESSURE gage indicates less than 2.3	CAUTION This condition presents an extreme hazard to the missile. Immediate action is required to correct this condition to prevent bulkhead reversal.

Table 4-1. Pressurization System (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1
2 (CONT)	DMCCC	PSI on launch control console during standby	a. Depress fuel tank RAISE pushbutton and BOILOFF VALVE OPEN pushbutton until differential pressure is above 5.0 PSI
	MCCC		b. Depress ALARM RESET pushbutton. If fuel tank pressure continues to drop, immediately proceed to action e
	DMCCC		c. Raise LO_2 tank pressure to 8.0 PSI nominal and depress AUTOMATIC pushbutton on launch control console (figure 1-62). d. If system does not remain in automatic mode, depress fuel tank RAISE pushbutton and BOILOFF VALVE OPEN pushbutton to maintain tank differential pressure greater than 5.0 PSI
	MCCC		e. Direct missile be placed in stretch in accordance with table 3-34. f. Direct troubleshooting of the PSC (figure 1-48) in accordance with T.O. 21-SM65E-2J-9-1
			1
3			All data in item 3 deleted
			1
4	DMCCC	PRESSURE MODE indicator illuminates red and LO_2 TANK pressure gage indicates less than 1.65 PSI after MISSILE	a. Depress LO_2 RAISE pushbutton on launch control console until LO_2 TANK pressure gage indicates more than 2.7 PSI; while maintaining fuel tank pressure at 28 PSI in phase 2F, or 63 PSI in phase 2L, depress AUTOMATIC pushbutton on launch control console
	MCCC		b. Depress ALARM RESET pushbutton on launch control console.

Table 4-1. Pressurization System (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1 (CONT)
4 (CONT)	DMCCC	ERECTED indicator illuminates green on launch control console and prior to commit sequence	c. (Deleted)
	MCCC		d. If automatic mode can be maintained, continue countdown
	DMCCC		e. If system does not remain in automatic mode, depress LO_2 RAISE and BOILOFF VALVE CLOSE pushbuttons and maintain LO_2 tank pressure at 2.7 PSI. If in phase 2F, maintain fuel tank pressure at 28.0 PSI. If in phase 2L, maintain fuel tank pressure at 63.0 PSI
	MCCC		f. At launch control console: (1) If in a DPL or training launch, perform action 2, item 4. (2) If in tactical launch, perform action 3, item 4
			2
	MCCC		a. At launch control console: (1) Depress RETURN TO STANDBY pushbutton. Note If drain sequence does not continue automatically when the PSC is in emergency pressure mode, a manual LO_2 and fuel detanking should be accomplished in accordance with tables 4-45 and 4-46. (2) Perform actions 1a through 1l (5) in table 4-19
	DMCCC		b. At launch control console: (1) Depress LO_2 RAISE pushbutton until LO_2 TANK pressure gage indicates 8.0 PSI nominal

Table 4-1. Pressurization System (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			2 (CONT)
4 (CONT)	DMCCC (CONT)		(2) Depress AUTOMATIC pushbutton. (Actions c through f deleted.)
			3
	DMCCC		a. Depress LO_2 RAISE and BOILOFF VALVE CLOSE pushbuttons and maintain LO_2 tank pressure at 2.7 PSI. If in phase 2F, maintain fuel tank pressure at 28.0 PSI. If in phase 2L, maintain fuel tank pressure at 63.0 PSI. b. After POWER INTERNAL indicator illuminates green, depress AUTOMATIC pushbutton. (Action c through f deleted.)
			1
5	DMCCC	PRESSURE MODE indicator illuminates red and TANK DIFFERENTIAL PRESSURE gage indicates below 2.3 PSI during countdown prior to FUEL COMPLETE indicator illuminating green	Note Do not depress BOILOFF VALVE OPEN pushbutton during erection. a. At launch control console: (1) Depress fuel tank RAISE and BOILOFF VALVE OPEN pushbuttons and increase differential pressure to above 5.0 PSI. (2) Depress AUTOMATIC pushbutton
	MCCC		b. If automatic mode can be maintained, continue countdown.
	DMCCC		c. If system does not remain in automatic mode, depress fuel tank RAISE and BOILOFF VALVE OPEN pushbuttons on the launch control console and maintain differential pressure above 5.0 PSI

(All data on page 4-28 deleted.)

Table 4-1. Pressurization System (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
5 (CONT)	MCCC		d. At launch control console: (1) If in DPL or training launch, perform action 2, item 4. (2) If in a tactical launch, perform action 2, item 5
			2
	MCCC	PSC controller 14, 15, or 16 has malfunctioned	a. Direct MMT to check controller 14, 15, or 16 on PSC for sticking
	MMT		b. Tap lightly on controller 14, 15, or 16 on PSC (figure 1-48)
	DMCCC		c. At launch control console (figure 1-62): (1) Depress AUTOMATIC pushbutton. (2) If automatic mode can be maintained, continue countdown. (3) If system does not remain in automatic mode, maintain differential pressure above 5.0 PSI and perform action 2, item 4
			1
6	MCCC	PRESSURE MODE indicator illuminates red, FUEL TANK pressure gage and TANK	a. Depress ALARM RESET pushbutton on the launch control console
	DMCCC		b. Depress AUTOMATIC pushbutton on the launch control console
	MCCC		c. If automatic mode can be maintained, continue countdown

Table 4-1. Pressurization System (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1 (CONT)
6 (CONT)	DMCCC	DIFFER-ENTIAL PRES-SURE gage indicate normal pressures, and LO_2 TANK pressure gage indicates 2.7 PSI during countdown	d. If system does not remain in automatic mode, depress LO_2 RAISE and BOILOFF VALVE CLOSE pushbuttons, and maintain LO_2 tank pressure at 2.7 PSI. If in phase 2F, maintain fuel tank pressure 28.0 PSI. If in phase 2L, maintain fuel tank pressure 63.0 PSI
	MCCC		e. At launch control console: (1) If in a DPL or training launch, perform action 2, item 4. (2) If in a tactical launch, perform action 2, item 6
			2
	MCCC	Malfunctioning regulator 47, or defective pressure switch 50 in PSC	a. Direct BMAT to control-monitor group 1 of 4
	BMAT		b. Observe INSTRUMENT AIR indicator on PRESSURIZATION (PANEL 1) (figure 4-2) and report condition to MCCC
	MCCC		c. At launch control console (figure 1-62): (1) If INSTRUMENT AIR indicator on PRESSURIZATION (PANEL 1) indicates red, perform action 3, item 6. (2) If INSTRUMENT AIR indicator on PRESSURIZATION (PANEL 1) is extinguished, perform action 6, item 6

Table 4-1. Pressurization System (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			3
6 (CONT)	MCCC		a. Direct MMT to observe pressure gage 49 on PSC for an indication greater than 27.0 (±1.0) PSI
	MMT		b. Observe gage 49 on the PSC (figure 1-48) and report condition to MCCC
	MCCC		c. At launch control console (figure 1-62): (1) If pressure gage 49 indicates greater than 27.0 (±1.0) PSI, perform action 4, item 6. (2) If pressure gage 49 indicates less than 27.0 (±1.0) PSI, perform action 5, item 6
			4
	MCCC		a. Direct MMT to TB-E on PSC
	MMT		b. Place jumper between pin 2 and pin 3 on TB-E on PSC (figure 1-48) and notify MCCC
	MCCC		c. Direct DMCCC to depress AUTOMATIC pushbutton
	DMCCC		d. Depress AUTOMATIC pushbutton on launch control console (figure 1-62)
	MCCC		e. At launch control console: (1) If system remains in automatic mode, continue countdown. (2) If system does not remain in automatic mode, direct MMT to remove jumper installed on TB-E

Table 4-1. Pressurization System (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			4 (CONT)
6 (CONT)	MMT		f. Remove jumper from between pin 2 and pin 3 on TB-E on PSC (figure 1-48) and notify MCCC of condition
	MCCC		g. Perform action 2, item 4
			5
	MCCC		a. Direct MMT to adjust regulator 47 until pressure gage 49 indicates 40.0 (±2.0) PSI
	MMT		b. Adjust regulator 47 until pressure gage 49 on PSC (figure 1-48) indicates 40.0 (±2.0) PSI and report condition to the MCCC
	MCCC		c. Direct DMCCC to depress AUTOMATIC pushbutton
	DMCCC		d. Depress AUTOMATIC pushbutton on launch control console (figure 1-62)
	MCCC		e. Continue countdown
			6
	MCCC	Pressure switch 51 or 55 malfunction in the PSC	a. Direct MMT to TB-H on PSC
	MMT		b. For pressure switch 55, place jumper between pin 18 and pin 19 on TB-H, (figure 1-48), and notify MCCC of condition
	MCCC		c. Direct DMCCC to depress AUTOMATIC pushbutton
	DMCCC		d. Depress AUTOMATIC pushbutton on launch control console (figure 1-62)

Table 4-1. Pressurization System (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 6 (CONT)
6 (CONT)	MCCC		e. At launch control console: (1) If system remains in automatic mode, continue countdown. (2) If system does not remain in automatic mode, direct MMT to remove jumper installed on TB-H

Table 4-1. Pressurization System (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 6 (CONT)
6 (CONT)	MMT		f. Remove jumper from between pin 18 and pin 19 on TB-H (figure 1-48) and notify MCCC of condition
	MCCC		g. Direct MMT to TB-C
	MMT		h. For pressure switch 51, place jumper between pin 4 and pin 5 on TB-C (figure 1-48) and notify MCCC of condition
	MCCC		i. Direct DMCCC to depress AUTOMATIC pushbutton
	DMCCC		j. Depress AUTOMATIC pushbutton on launch control console (figure 1-62)
	MCCC		k. At launch control console: (1) If system remains in automatic mode, continue countdown. (2) If system does not remain in automatic mode, direct MMT to remove jumper installed on TB-C
	MMT		l. Remove jumper between pin 4 and pin 5 on TB-C (figure 1-48) and notify MCCC of condition
	MCCC		m. Perform action 2, item 4

Table 4-1. Pressurization System (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1
7	DMCCC	FUEL TANK pressure gage on launch control console (figure 1-62) indicates 60.0 PSI with PS 51 sensing less than 53.0 PSI at PSC duct	**WARNING** This condition presents an extreme hazard. Immediate action is required to correct this condition as it occurs in order to prevent serious injury or death of personnel. a. At launch control console: (1) Depress fuel tank RAISE pushbutton and increase fuel tank pressure to 63.0 PSI. (2) If fuel tank pressure stabilizes at 63.0 PSI, depress AUTOMATIC pushbutton. (3) If system does not remain in automatic mode, depress fuel tank RAISE pushbutton and maintain fuel tank pressure at 63.0 PSI
	MCCC		b. At launch control console: (1) If system remains in automatic mode, continue countdown. (2) If system does not remain in automatic mode: (a) If in DPL or training launch, perform action 2, item 4. (b) If in a tactical launch, perform action 2, item 7

Table 4-1. Pressurization System (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			2
7	MCCC	PSC controller 16 has malfunctioned	a. Direct MMT to check controller 16 on PSC for sticking
	MMT		b. Tap lightly on controller 16 on PSC (figure 1-48)
	DMCCC		c. Depress AUTOMATIC pushbutton on launch control console (figure 1-62)
	MCCC		d. At launch control console: (1) If system remains in automatic mode, continue countdown. (2) If the system does not remain in automatic mode, perform action 2, item 4
			1
8	MCCCC	During return to standby LO_2 TANK pressure gage indicates 2.7 PSI and boiloff valve failed to close, or it is desired to close the boiloff valve	a. Direct MMT to PSC
	MMT		b. Close valves 6 and 7 on PSC (figure 1-48)
	MCCC		c. Direct BMAT to control-monitor group 4 of 4
	BMAT		d. At control-monitor group 4 of 4 (figure 1-25) (1) Position SIGNAL RESPONDER TRANSFER SWITCH on panel A42 (figure 4-23) to RESPONDER MODE (2) Position SYSTEM POWER switch on COUNTDOWN RESPONDER (PANEL 1) (figure 4-24) to ON (3) Position RETURN TO STANDBY switch on COUNTDOWN RESPONDER (PANEL 1) momentarily to ON

Table 4-1. Pressurization System (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1 (CONT)
8 (CONT)	BMAT (CONT)		(4) Position SYSTEM POWER switch on COUNTDOWN RESPONDER (PANEL 1) to OFF (5) Position SIGNAL RESPONDER TRANSFER SWITCH on panel A42 (figure 4-23) to STANDBY MODE
	MCCC		e. Direct BMAT to PRESSURIZATION (PANEL 1)
	BMAT		f. At PRESSURIZATION (PANEL 1) (figure 4-2) (1) Position SYSTEM POWER switch momentarily to OFF (2) Position SYSTEM POWER switch to ON (3) Depress STANDBY pushbutton (4) Observe SYSTEM IN STANDBY indicator illuminate green (5) Observe BOIL OFF VALVE CLOSED indicator illuminate green (6) Report conditions to MCCC
	MMT		g. At PSC (figure 1-48) (1) Open valve 6 slowly and adjust until FUEL TANK PRESSURE GAGE indicates 16 PSI to 18 PSI (2) Open valve 7 slowly and adjust until LOX TANK PRESSURE GAGE indicates 7 PSI to 9 PSI

Table 4-1. Pressurization System (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1 (CONT)
8 (CONT)	MCCC		h. At launch control console, return to standby in accordance with table 4-49
			1
9	MCCC	PRESSURE MODE indicator on launch control console is illuminated red, automatic pressurization cannot be obtained, and it is desired to revert to manual pressurization	a. At launch control console, direct BMAT to control-monitor group 1 of 4, ERECTION panel
	BMAT		b. At ERECTION panel (figure 4-1) position SYSTEM POWER switch to OFF and observe SYSTEM IN STANDBY indicator extinguished
	MCCC		c. At launch-control console (figure 1-62): (1) Depress AUTOMATIC pushbutton and verify PRESSURE MODE indicator is illuminated green. (2) Direct MMT to PSC
	MMT		d. At PSC (figure 1-48) close valves 6 and 7
	MCCC		e. At launch control console (figure 1-62) direct BMAT to PRESSURIZATION (PANEL 1)
	BMAT		f. At PRESSURIZATION (PANEL 1) (figure 4-2): (1) Position SYSTEM POWER switch to OFF and observe SYSTEM POWER indicator extinguished. (2) Position SYSTEM POWER switch to ON and observe SYSTEM POWER indicator illuminated green. (3) Position SYSTEM POWER switch to OFF and observe SYSTEM POWER indicator extinguished. (4) Report conditions to MCCC.

Table 4-2. Disaster Shutdown Procedures

CREW MEMBER	ABNORMAL INDICATION	ACTION 1
MCCCC	If a missile explosion occurs on or near the launcher, or any condition requiring immediate shutdown of all equipment	a. At launch control console (figure 1-62): (1) If in commit sequence, depress COMMIT STOP pushbutton and RETURN TO STANDBY pushbutton, and return to standby in accordance with table 3-15. (2) If not in commit sequence, depress RETURN TO STANDBY pushbutton (table 3-15)
EPPT		b. In LOB: (1) Position L & S BUILDING circuit breaker on 480-volt switchgear panel to OPEN (figure 1-16 or 1-17). (2) At SMS 548 and SMS 566 position circuit breakers NO. 1, NO. 2, and NO. 3 on 125 VDC power distribution panel to OFF. (3) At SMS 567 turn off circuit breakers as appropriate to remove 125-volt power to LSB
BMAT		c. At SMS 576-C, position L & S BUILDING H FDR circuit breaker on utility building 4160-volt substation (figure 1-28) to TRIP. d. At OSTF-1 in LOB, position LAUNCH & SERVICE BLDG circuit breaker to OFF
MMT		e. In fuel room close valve F-28 on skid NO. 2 (figure 1-55). f. Close following manual valves at skid NO. 1 (figure 1-54): (1) N-5 (fuel transfer). (2) N-29 (partial pressure B). (3) N-43 (partial pressure A)

Table 4-2. Disaster Shutdown Procedures (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION 1 (CONT)
MMT (CONT)		(4) N-71 (NCU supply). (5) N-27 (LN_2 pressure). (6) N-47 (fuel storage blanket pressure). g. Close following manual valves at skid NO. 5 (figure 1-47): (1) H-24 (in-flight helium supply B). (2) H-26 (in-flight helium supply A). (3) H-51 (routine use supply). (4) H-45 (ground pressurization). h. Close manual valve LN-4 at LN_2 transfer skid NO. 6 (figure 1-50). i. Close manual valve O-5 (LO_2 transfer pressure) at skid NO. 7 (figure 1-57). j. Close manual valve O-12 (LO_2 blanket pressure) at skid NO. 7. k. Close manual valve O-35 (slug tank pressure) at skid NO. 11 (figure 1-60). l. At LO_2 storage tank (figure 1-52), close valve L-28 after line 51 has warmed up (no LO_2 in line). m. At SMS 576-C, close the DELUGE, PAD COOLING, and ANTI-FIRE water valves near MPU in LSB

Table 4-3. Loss of AC Power in Standby

CREW MEMBER	ABNORMAL INDICATION	ACTION 1
MCCC	400 CYCLE POWER, and ENGINE GROUND POWER, indicators red, TANK DIFFERENTIAL PRESSURE 0 PSI, GUIDANCE FAIL and AUTOPILOT FAIL indicators red on launch control console (figure 1-62)	a. At launch control console: (1) Announce AC power failure. (2) Depress ALARM RESET pushbutton. Note Each crew member will accomplish his loss of AC power in standby emergency checklist, and report results to the MCCC. CAUTION If any irregularities are noted during the accomplishment of the loss of AC power procedures, the MCCC will be notified of the problem immediately. Failure to comply may result in damage to equipment.
DMCCC		b. In launch control center: (1) Depress FRCP ACKNOWLEDGE pushbutton (figures 1-29 through 1-33 as applicable). (2) Depress ACKNOWLEDGE pushbutton on fire alarm panel. (3) Depress acknowledge pushbutton on communications panel

Table 4-3. Loss of AC Power in Standby (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION 1 (CONT)
BMAT		c. At control monitor group 1 of 4 (figure 1-24): **CAUTION** Prior to proceeding with the action below, ensure that DC power (standby bus) has not been lost. Any time that DC power (standby bus) has been lost, RV must be electrically disconnected prior to placing AC power back on the line. Failure to comply may cause an unsafe RV condition. (1) Position TEST switch on PRESSURIZATION (PANEL 1) (figure 4-2) to ON. (2) Verify EMERGENCY STOP indicator on ERECTION panel (figure 4-1) is illuminated red. Note If EMERGENCY STOP indicator is not illuminated red, depress EMERGENCY STOP pushbutton and observe EMERGENCY STOP indicator illuminated red.
MMT		d. Ascertain PSC (figure 1-48) is in automatic mode by opening rear doors of PSC and verifiying that valves 40A and 41A are open, valves 40B and 41B are closed, and valves 38 and 39 are open

Table 4-3. Loss of AC Power in Standby (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION 1 (CONT)
EPPT		e. In power room: Note Prior to restoring power to LOB and LSB, isolate cause of power failure in accordance with applicable publications. (1) Position L.O. BUILDING circuit breaker (figure 1-16 or 1-17) to OPEN (2) Position L & S BUILDING circuit breaker (figure 1-16) to OPEN (3) Verify generator running or generator started in accordance with table 3-12. (3A) Reset lockout relay (figure 1-16). (4) Position generator CIRCUIT BREAKER (figure 1-16) to CLOSED in accordance with table 3-12. (5) Position L.O. BUILDING circuit breaker (figure 1-16 or 1-17) to CLOSED. (6) At SMS 548 and SMS 567, verify hot water circulating pump is operating. (7) At SMS 548 and SMS 567, verify condensate pump is operating

Table 4-3. Loss of AC Power in Standby (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION 1 (CONT)
EPPT (CONT)		(8) At SMS 548 and SMS 567, verify UTILITY WATER PUMP (figure 4-3) is operating. (9) Verify COOLING WATER PUMP (figure 4-3) is operating. (10) At SMS 566, verify engine JACKET WATER PUMP (figure 4-4) is operating. (11) Verify air compressor is operating. (12) Report to MCCC, ready to restore power to LSB
BMAT		f. In LSB: (1) Position MAIN DISCONNECT SWITCH (29, figure 4-5) to OFF. (2) Position MOTOR GENERATOR 400 CYCLE switch (figure 4-5) on MCC to OFF. (3) Close fuel room manual gate water shutoff valve. (4) Position RP-1 detector power switch to off. (5) Report to MCCC ready to restore power to LSB when directed
MCCC		g. Receive report from crew that all positions are ready to restore AC power. Note If cause of power loss is unknown, and power has been restored to the LOB without incident, proceed with restoration of power to the LSB.

Table 4-3. Loss of AC Power in Standby (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION 2
MCCC		a. At launch control console (figure 1-62): (1) Direct EPPT to perform duties in action 2b. **CAUTION** Immediately after action a(2) is completed, investigate all functioning systems for malfunction indications. When malfunctions are noted, MCCC will direct crew members to isolate malfunctioning equipment by opening the appropriate circuit breaker. Failure to comply may result in damage to equipment. (2) Direct the BMAT to perform duties in action 2c after action 2b is completed by the EPPT. Note Reactivate the systems individually by closing circuit breakers and check for malfunctions. If a malfunction is noted, immediately reopen circuit breaker on affected system and proceed with restoration of power. **CAUTION** If a second power loss is experienced simultaneously with restoration of power to the LSB, direct EPPT to perform action 1e and BMAT to perform action 1f. Failure to comply may result in damage to equipment.

Table 4-3. Loss of AC Power in Standby (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION 2 (CONT)
EPPT		b. In power room: (1) Close L & S BUILDING circuit breaker on 480-volt switchgear panel (figure 1-16). (2) Complete ready state A checklist. (3) Notify MCCC ready state A checklist completed
BMAT		c. In LSB: (1) Close MAIN DISCONNECT SWITCH on MCC (figure 4-5). (2) Check that pod air blower is operating. If blower is not operating, restart by depressing pushbutton on east wall of fuel room. (3) Check that pod air conditioning compressor is operating. If compressor is not operating, restart by depressing RESET and START pushbuttons. (3A) Restart cabinet air blower by depressing CABINET AIR BLOWER pushbutton. (4) Check that cabinet refrigerant compressor is operating. If not operating, restart by depressing RESET and START pushbuttons (figure 4-5). (5) Position MOTOR GENERATOR 400 CYCLE circuit breaker to ON. (5A) At motor generator, depress START pushbutton and wait 15 seconds. (6) Position TEST switch on PRESSURIZATION (PANEL 1) (figure 4-2) to OFF.

Table 4-3. Loss of AC Power in Standby (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION 2 (CONT)
BMAT (CONT)		(7) Check frequency and voltage of skid mounted motor generator (figure 1-23). (7A) Depress OUTPUT CONTACTOR ON pushbutton on skid mounted motor generator and observe GROUND A.C. VOLTAGE and GROUND FREQUENCY indicators on MISSILE GROUND POWER (PANEL 1) are illuminated green. (8) Check voltage on 28 VDC power supply-distribution set (figure 1-22). Note BMAT must depress and hold RESET and HORN pushbuttons while turning RP-1 detector power switch on and continue to hold RESET and HORN pushbuttons down until BRIDGE VOLTAGE indicator reads 2.5 volts. (9) Reset RP-1 detector. d. Open fuel room manual gate water shutoff valve outside of fuel room e. In LSB: (1) Depress SYSTEM RESET pushbutton on ERECTION panel (figure 4-1) and observe EMERGENCY STOP indicator is extinguished. (1A) Perform MGS checkout in accordance with T.O. 21-SM65E-CL-25-1, 2, 3, 4, or 5. (2) Notify MCCC when system is in ready state A

Table 4-4. Loss of AC Power After Countdown Start and Prior to Missile Erected Green

CREW MEMBER	ABNORMAL INDICATION	ACTION 1
MCCC	400 CYCLE POWER and ENGINE GROUND POWER indicators red, TANK DIFFERENTIAL PRESSURE gage 0 PSI, GUIDANCE FAIL and AUTO-PILOT FAIL indicators red on launch control console (figure 1-62)	a. At launch control console, depress RETURN TO STANDBY pushbutton and perform the following: (1) Announce AC power failure. (2) Depress ALARM RESET pushbutton. (3) Direct BMAT to perform action 1c. (4) Direct MMT to perform action 1d.
DMCCC		b. In launch control center: (1) Depress FRCP ACKNOWLEDGE pushbutton (figure 1-29, 1-32, or 1-33, as applicable). (2) Depress ACKNOWLEDGE pushbutton on fire alarm panel. (3) Depress acknowledge pushbutton on communications panel
BMAT		c. At control-monitor group 1 of 4: **CAUTION** Prior to proceeding with the following actions, ensure DC power has not been lost. Any time DC power is lost, RV must be electrically disconnected prior to placing AC power back on the line. Failure to comply may result in damage to equipment. (1) Depress EMERGENCY STOP pushbutton on ERECTION panel (figure 4-1) and observe EMERGENCY STOP indicator illuminated red

Table 4-4. Loss of AC Power After Countdown Start and Prior to Missile Erected Green (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION 1 (CONT)
BMAT (CONT)		(2) Position TEST switch on PRESSURIZATION (PANEL 1) (figure 4-2) to ON
MMT		d. Ensure PSC (figure 1-48) is in automatic mode by opening the rear doors of PSC and verifying that valves 40A and 41A are open, valves 40B and 41B are closed, and valves 38 and 39 are open. e. (Deleted) Note Each crew member will accomplish his loss of AC power emergency checklist and report results to MCCC. CAUTION If any irregularities are noted during accomplishment of the loss of AC power procedures, MCCC will be notified immediately. Failure to comply may result in damage to equipment. Note The MCCC will direct the crew to troubleshoot and restore AC power in accordance with actions 1e, 1f, and action 2, table 4-3.

Table 4-4. Loss of AC Power After Countdown Start and Prior to Missile Erected Green (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION 2
MCCC		a. Direct BMAT to return countdown group to ready state A
BMAT		b. At countdown group missile systems checkout programmer panel (figure 4-7); (1) Position CONTROL SELECTOR switch to LOCAL AUTO and observe CONTROL SELECTOR IN LOCAL indicator illuminates amber. (2) Depress RETURN TO READINESS pushbutton. Observe that counter steps to zero, and MGS CHECKOUT COMPLETE indicator illuminates green. (3) Perform MGS checkout in accordance with T.O. 21-SM65E-CL-25-1, 2, 3, 4, or 5
		3
		All data in action 3 deleted.

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Table 4-5. Loss of AC Power After Missile Erected Green and Prior to Commit Start

CREW MEMBER	ABNORMAL INDICATION	ACTION
		1
MCCC	400 CYCLE POWER and ENGINE GROUND POWER indicators red, TANK DIFFERENTIAL PRESSURE 0 PSI, 28 VDC POWER indicator amber, and READY FOR COUNTDOWN indicator extinguished on launch control console (figure 1-62)	a. At launch control console: (1) Announce AC power failure. (2) Depress ALARM RESET pushbutton. Note Each crew member will accomplish his loss of AC power emergency checklist and report results to the MCCC. (3) Direct EPPT to restore AC power to the LOB in accordance with table 4-3. **CAUTION** If any irregularities are noted during accomplishment of the loss of AC power procedures, MCCC will be notified immediately. Failure to comply may result in damage to equipment.
DMCCC		b. In launch control center: (1) Depress FRCP ACKNOWLEDGE pushbutton (figures 1-29 through 1-33 as applicable). (2) Depress ACKNOWLEDGE pushbutton on fire alarm panel. (3) Depress acknowledge pushbutton on communications panel

Table 4-5. Loss of AC Power After Missile Erected Green and Prior to Commit Start (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION 1 (CONT)
MCCC		c. At launch control console (figure 1-62): (1) Depress RETURN TO STANDBY pushbutton and observe the following: a. LO_2 DRAINING indicator green. b. LO_2 DRAINED indicator amber. c. LO_2 TANK pressure 2.7 PSI nominal. d. FUEL TANK pressure 63.0 PSI nominal. e. LO_2 DRAINING indicator extinguished. f. LO_2 DRAINED indicator green. Note Fuel drain will not start after LO_2 drain complete until AC power is restored and hooks are latched. (2) Direct BMAT to perform duties in action 1d. (3) Direct MMT to perform duties in action 1e
BMAT		d. At control-monitor group 1 of 4: (1) (Deleted) (2) Verify EMERGENCY STOP indicator on ERECTION panel (figure 4-1) illuminates red

Table 4-5. Loss of AC Power After Missile Erected Green and Prior to Commit Start (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION
		1 (CONT)
BMAT (CONT)		Note If EMERGENCY STOP indicator does not illuminate red, depress EMERGENCY STOP pushbutton and observe EMERGENCY STOP indicator illuminate red.
MMT		e. At PSC: (1) (Deleted) (2) Vent inflight helium bottles to 750 PSI by opening VALVE NO. 43 HELIUM DUMP VALVE and monitor REFRIGERATED HELIUM gage. Close VALVE NO. 43 HELIUM DUMP VALVE
MCCC		f. At launch control console (figure 1-62), direct restoration of AC power in accordance with table 4-3, actions 1e, 1f, 2a, 2b, 2c, and 2d
		2
MCCC		a. Direct BMAT to perform action 2b
BMAT		b. Depress SYSTEM RESET pushbutton on ERECTION panel, (figure 4-1) and observe EMERGENCY STOP indicator extinguished

Table 4-5. Loss of AC Power After Missile Erected Green and Prior to Commit Start (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION 2 (CONT)
BMAT (CONT)		Note With AC power restored and SYSTEM RESET pushbutton depressed, return to standby sequence will continue to completion automatically.
MCCC		c. Observe following indications at launch control console (figure 1-62): (1) FUEL TANK pressure 17.0 PSI nominal. (2) LO_2 TANK pressure 2.7 PSI nominal. (3) FUEL DRAINING indicator green. (4) FUEL DRAINED indicator amber. (5) FUEL DRAINING indicator extinguished. (6) FUEL DRAINED indicator green. (7) PNEU SYSTEM VENTED indicator amber. (8) FUEL TANK pressure 17.0 PSI nominal. (9) LO_2 TANK pressure 8.0 PSI nominal. (10) HYD-SYSTEM OFF indicator amber. (11) HYD-SYSTEM OFF indicator green. (12) PNEU SYSTEM VENTED indicator green. (13) MISSILE LOWERED indicator amber

Table 4-5. Loss of AC Power After Missile Erected Green and Prior to Commit Start (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION 2 (CONT)
MCCC (CONT)		(14) MISSILE LOWERED indicator green. (15) SITE HARD indicator amber. (16) SITE HARD indicator momentarily green then extinguished

Table 4-6. Loss of AC Power After Commit Start and Prior to Guidance Inertial Green

CREW MEMBER	ABNORMAL INDICATION	ACTION
		1
MCCC	400 CYCLE POWER and ENGINE GROUND POWER indicators red, TANK DIFFERENTIAL PRESSURE GAGE 0 PSI, GUIDANCE FAIL and AUTO-PILOT FAIL indicators red on launch control console (figure 1-62)	At launch control console: a. Depress COMMIT STOP pushbutton. b. Observe LO_2 TANK pressure gage drop to 2.7 PSI nominal. c. Observe FUEL TANK pressure gage remains at 63.0 PSI nominal. d. Depress RETURN TO STANDBY pushbutton. e. Direct crew to perform all actions in table 4-5

Table 4-7. Loss of AC Power After Guidance Inertial Green

CREW MEMBER	ABNORMAL INDICATION	ACTION 1
MCCC	400 CYCLE POWER and ENGINE GROUND POWER indicators red, TANK DIFFERENTIAL PRESSURE GAGE 0 PSI, GUIDANCE FAIL and AUTO-PILOT FAIL indicators red on launch control console (figure 1-62)	a. At launch control console: (1) Announce AC power failure. (2) Depress ALARM RESET pushbutton. (3) Observe MISSILE AWAY indicator illuminates green. (4) Depress COMMIT STOP pushbutton. (5) Depress RETURN TO STANDBY pushbutton. Note Each crew member will accomplish his loss of AC power emergency checklist and report results to MCCC. CAUTION If any irregularities are noted during accomplishment of the loss of AC power procedures, MCCC will be notified immediately. Failure to comply may result in damage to equipment. (6) Direct BMAT to accomplish action 1c. (7) Direct EPPT to accomplish action 1d
DMCCC		b. In launch control center: (1) Depress FRCP ACKNOWLEDGE pushbutton (figures 1-29 through 1-33 as applicable). (2) Depress ACKNOWLEDGE pushbutton on fire alarm panel

Table 4-7. Loss of AC Power After Guidance Inertial Green (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION
		1 (CONT)
DMCCC (CONT)		(3) Depress acknowledge pushbutton on communications panel
BMAT		c. Perform following steps at control-monitor group 1 of 4: (1) Depress EMERGENCY STOP pushbutton on ERECTION panel (figure 4-1) and observe EMERGENCY STOP indicator illuminated red. (2) Accomplish action 1f, table 4-3
EPPT		d. Accomplish actions 1e and 2b, table 4-3
		2
MCCC		a. At launch control console (figure 1-62): (1) Direct EPPT to perform duties in action 2b. **CAUTION** Immediately after action a(2) is completed, investigate all functioning systems for malfunction indications. When malfunctions are noted, isolate malfunctioning equipment by opening the appropriate circuit breaker. Failure to comply may result in damage to equipment. (2) Direct BMAT to perform duties in action 2c after action 2b is completed by EPPT

Table 4-7. Loss of AC Power After Guidance Inertial Green (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION 2 (CONT)
MCCC (CONT)		Note Reactivate the systems individually by closing circuit breakers and checking for malfunctions. If a malfunction is noted, immediately reopen circuit breaker on affected system and proceed with restoration of power. **CAUTION** If a second power loss is experienced simultaneously with restoration of power to the LSB, direct EPPT to perform action 1e, table 4-3; and BMAT to perform action 1f, table 4-3. Failure to comply may result in damage to equipment.
EPPT		b. In power room: (1) Close L & S BUILDING circuit breaker on 480 volt switchgear (figure 1-16 or 1-17). (2) Notify MCCC when power is restored
BMAT		c. In LSB: (1) Close MAIN DISCONNECT SWITCH on MCC (figure 4-5). (2) Check that cabinet refrigerant compressor is operating. If not operating, restart by depressing RESET and START pushbuttons. (3) Position MOTOR GENERATOR 400 cycle circuit breaker to ON (3A) Depress START pushbutton on 400 cycle MOTOR GENERATOR and wait 15 seconds

Table 4-7. Loss of AC Power After Guidance Inertial Green (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION
		2 (CONT)
BMAT (CONT)		(4) Check frequency and voltage of skid-mounted motor generator (figure 1-23). (4A) Depress output contactor on pushbutton and observe ground AC voltage and ground frequency on MISSILE GROUND POWER PANEL 1 are illuminated green (5) Check voltage on power supply-distribution set (figure 1-22 or figure 1-27). Note BMAT must depress and hold RESET and HORN pushbuttons while turning RP-1 detector power switch on and continue to hold RESET and HORN pushbuttons until BRIDGE VOLTAGE indicator reads 2.5 volts. (6) Reset RP-1 detector. (6A) Depress WATER VALVE control OFF pushbutton. (7) Open manual gate water shutoff valve outside of fuel room
MCCC		d. Direct BMAT to perform action 2e
BMAT		e. In LSB: (1) Depress SYSTEM RESET pushbutton on ERECTION panel (figure 4-1) and observe EMERGENCY STOP indicator extinguished
		3
MCCC		Observe following indications on the launch control console (figure 1-62): a. HYD-SYSTEM OFF green. b. MISSILE LOWERED amber. c. MISSILE LOWERED green

Table 4-7. Loss of AC Power After Guidance Inertial Green (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION
		3 (CONT)
MCCC (CONT)		d. SITE HARD amber.
		e. SITE HARD green.
		f. Return patch indicators extinguished.
		g. Countdown patch indicators extinguished.
		h. Status patch indicators illuminated red

Table 4-8. Loss of AC Power After Abort Red

CREW MEMBER	ABNORMAL INDICATION	ACTION 1
MCCC	400 CYCLE POWER, ENGINE GROUND POWER indicators red, TANK DIFFERENTIAL PRESSURE GAGE 0 PSI, GUIDANCE FAIL and AUTOPILOT FAIL indicators red on launch control console (figure 1-62)	At launch control console: a. Depress COMMIT STOP pushbutton. b. Observe LO_2 TANK pressure gage drop to 2.7 PSI nominal. c. Observe FUEL TANK pressure gage remains at 63.0 PSI nominal. d. Direct crew to perform all actions in table 4-5

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Table 4-16. Switchgear Emergency Operation

CREW MEMBER	ABNORMAL INDICATION	ACTION 1
EPPT	Use of CIRCUIT BREAKER control switch on 480V switchgear panel (figure 1-16) or 1-17) fails to place incoming generator on the line	a. Notify MCCC that CIRCUIT BREAKER control switch on 480V switchgear panel is inoperative and request permission to place incoming generator on the line, using the GENERATOR MAIN BREAKER handle, located on 480V switchgear panel
MCCC		b. Direct EPPT to place incoming generator on the line, using the GENERATOR MAIN BREAKER handle
EPPT		c. Position GENERATOR MAIN BREAKER handle to CLOSE d. Complete parallel operation checklist in accordance with table 3-12

Table 4-17. Runaway Engine Emergency Stop

CREW MEMBER	ABNORMAL INDICATION	ACTION 1
EPPT	Engine tachometer on engine control panel indicates that engine has exceeded high RPM stage (loss of overspeed control or 10 percent increase above normal operating speed of 720 RPM) because of engine oil sump overflow, malfunctioning of fuel rack, faulty turbocharger	a. Depress both EMERGENCY STOP psuhbuttons on engine control panel simultaneously. b. Perform following actions on the governor, engine control panel, engine, and S-2 fan, if the engine has not stopped after the EMERGENCY STOP pushbuttons have been depressed: (1) Position LOAD LIMIT indicator to 0 fuel. (2) At SMS 566 only, position OFF-ON RESET switch to OFF. (3) Close fuel inlet valve. (4) Break and plug crankcase breather pipe. (5) Cut off air supply at air intake. (6) Position S-2 fan switch to OFF
MCCC		c. Direct all personnel to evacuate power room. d. Depress BLAST DAMPERS pushbutton on FRCP

Table 4-18. Initial Engine Start After Complete Power Failure

CREW MEMBER	ABNORMAL INDICATION	ACTION 1
EPPT	Complete loss of AC power. Both engines are stopped because of low oil pressure, overheat, overspeed, overload, or other malfunction condition, which would result in loss of AC power and engines stopped	a. Trip LOB and L & S BUILDING circuit breaker on the 480V switchgear panel (figure 1-16 or 1-17). b. Perform following actions to bring one of the stopped engines up to speed: (1) Position LOAD LIMIT indication to 5. (2) At SMS 566, operate oil prime pump. (3) Operate fuel prime pump. (4) Operate air starting valve. (5) Operate engine throttle. (6) Increase engine RPM to 720. (7) Position LOAD LIMIT indication to 10 or maximum. c. Perform following actions at the 480V switchgear panel to bring the standby engine on the line: (1) Install VOLTMETER switch, FREQUENCY meter switch, and SYNCHRONIZING switch handles and position to ON. (2) At SMS 548 and SMS 567 only, adjust voltage to 480 volts. (a) SMS 566 FIELD DISCHARGE switch, closed. (3) At SMS 566 only, adjust voltage to 450 volts. (4) Adjust frequency to 60 cycles. (a) At SMS 566 MANUAL AUTO switch to AUTO (b) At SMS 566 adjust voltage to 450 volts; if required. (5) Position LOCKOUT RELAY control to RESET

Table 4-18. Initial Engine Start After Complete Power Failure (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION 1 (CONT)
EPPT (CONT)		Note If 125 VDC is available, position CIRCUIT BREAKER control switch to CLOSE. If 125 VDC is not available, position GENERATOR MAIN BREAKER handle on incoming generator to CLOSE. (6) Close LO BUILDING circuit breaker.
		d. Operate following facility equipment to keep incoming generator on the line: (1) Depress pond COOLING WATER PUMP pushbutton (figure 4-3) and ensure pressure is indicated. (2) At SMS 548 and SMS 567, depress CONDENSATE PUMP pushbutton (figure 4-3) and ensure pressure is indicated. (3) At SMS 566, depress JACKET WATER PUMP pushbutton and ensure pressure is indicated. (4) Depress VENT FAN S-2 ON pushbutton (figure 4-3) and ensure fan is operating.
		e. Notify MCCC that all essential engine support equipment has been placed in operation.
MCCC		f. On 480V switchgear panel (figure 1-16 or 1-17), direct EPPT to position L & S BUILDING circuit breaker to CLOSED.
EPPT		g. Perform ready state A verification procedures in accordance with table 3-6

Table 4-19. Fuel Overfill Procedures

CREW MEMBER	ACTION 1
MCCC	a. At launch control console (figure 1-62): **CAUTION** Due to the extremely small ullage space in the missile fuel tank, do not attempt to lower fuel tank pressure until nominal flow rates have been established. Failure to comply may result in damage to equipment. (1) Depress RETURN TO STANDBY and EMERGENCY pushbuttons simultaneously. (2) Dispatch DMCCC to skid NO. 2 (figure 1-55). (3) Dispatch MMT to fuel room
BMAT	b. At FUEL TANKING (PANEL 1) (figure 4-10), position REMOTE-LOCAL switch to LOCAL and observe LOCAL CONTROL indicator illuminates amber
DMCCC	c. At skid NO. 2, (figure 1-55), close valve F-28
MCCC	d. Observe the following on the launch control console (figure 1-62): (1) LO_2 DRAINING indicator - green. (2) LO_2 DRAINED indicator - amber. (3) LO_2 TANK pressure gage - 2.7 PSI. (4) LO_2 DRAINING indicator - extinguished. (5) LO_2 DRAINED indicator - green
BMAT	e. At FUEL TANKING (PANEL 1) (figure 4-10), position following switches to OPEN:

Table 4-19. Fuel Overfill Procedures (Continued)

CREW MEMBER	ACTION 1 (CONT)
BMAT (CONT)	(1) N18. Note Do not proceed until fuel storage tank blanket pressure is less than 10.0 PSI on gage PI-9-1 on skid NO. 1. (2) FC2. (3) FC1. (4) F13. eA. At FUEL TANKING (PANEL 2), observe that GROUND FILL & DRAIN OPENED and MISSILE FILL & DRAIN OPENED indicators illuminate amber
DMCCC	f. At skid NO. 2 (figure 1-55), open valve F-28 until audible fuel flow is detected in the line. Maintain this flow rate until ensured that PSC can control missile fuel tank pressure as indicated by pressure gages on launch control console (figure 1-62). Gradually increase flow rate while ensuring that PSC can continue to control missile fuel tank pressure
MCCC	g. Observe following on the launch control console: (1) FUEL DRAINING indicator - green. (2) FUEL DRAINED indicator - amber
MMT	h. Monitor fuel room DP-1 gage and inform BMAT of any increase in gage reading
BMAT	CAUTION When MMT reports an increase on DP-1 gage, perform action i. Failure to comply will result in damage to the missile.

Table 4-19. Fuel Overfill Procedures (Continued)

CREW MEMBER	ACTION 1 (CONT)
BMAT (CONT)	i. At FUEL TANKING (PANEL 1) (figure 4-10), position FC1 switch to CLOSE. Observe GROUND FILL & DRAIN CLOSED indicator illuminates green on FUEL TANKING (PANEL 2) j. Perform the following at FUEL TANKING (PANEL 1) and (PANEL 2) (figure 4-10): (1) Position switch FC2 to CLOSE (1A) Observe MISSILE FILL & DRAIN CLOSED indicator illuminates green. (2) Position switch F13 to CLOSE

Table 4-19. Fuel Overfill Procedures (Continued)

CREW MEMBER	ACTION 1 (CONT)
BMAT (CONT)	(3) N-18 - CLOSE (4) Position LOCAL - REMOTE switch to REMOTE and observe that LOCAL CONTROL indicator extinguishes
MCCC	k. Restore PSC to AUTOMATIC or MANUAL pressurization MODE **CAUTION** Ensure PSC can control pressures prior to lowering missile. Failure to comply will result in damage to the missile.
MCCC	l. Observe the following on launch control console (figure 1-62): (1) FUEL DRAINED indicator - green. (2) HYD-SYSTEM OFF indicator - amber. (3) PNEU SYSTEM VENTED indicator - amber. Note Complete the return to standby sequence in accordance with table 3-15. (Steps (4) through (9) deleted.) (Steps m through o deleted.)

Table 4-20. Tactical Trouble Analysis, 400 Cycle Power System Malfunction

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1
1	MCCC	400 CYCLE POWER indicator illuminates red on launch control console (figure 1-62) after countdown start and prior to commit start. Skid-mounted motor generator not running.	a. Direct BMAT to skid-mounted motor generator
	BMAT		b. Verify skid-mounted motor generator (figure 1-23) is not running. If running, proceed to action 2. If not running, nofity MCCC
	MCCC		c. If skid-mounted motor generator is not running, return to standby in accordance with table 3-15
			2
	BMAT	400 CYCLE POWER OUTPUT frequency 400 (±6) CPS or voltage 115 (±2) volts not within tolerance on skid-mounted motor generator	a. Check OUTPUT FREQUENCY meter and OUTPUT AC VOLTS meter at skid-mounted motor generator control panel (figure 1-23). If frequency is not within tolerance, proceed to action 2b. If voltage is not within tolerance (115(±2) volts) attempt to adjust by rotating ADJUST VOLTAGE screw. If voltage cannot be adjusted, return to standby in accordance with table 3-15. If both frequency and voltage are within tolerance, proceed to action 3
	MCCC		b. Direct EPPT to check GENERATOR FREQUENCY meter on 480V switchgear panel (figure 1-16 or 1-17)
	EPPT		c. Check GENERATOR FREQUENCY meter on 480V switchgear panel for 60 (±0.5) CPS. If frequency is not within tolerance, adjust to 60 (±0.5) CPS with speed SELECTOR. Notify MCCC that frequency has been adjusted.

Table 4-20. Tactical Trouble Analysis, 400 Cycle Power System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			2 (CONT)
1 (CONT)	MCCC		d. After EPPT had adjusted GENERATOR FREQUENCY to 60 (±0.5) CPS, observe that 400 CYCLE POWER indicator on the launch control console (figure 1-62) is extinguished. If extinguished, continue countdown. If not extinguished, return to standby in accordance with table 3-15
			3
	MCCC		If voltage and frequency are within tolerance, and all other indications on launch control console malfunction patch are normal, assume sensor failure and continue countdown

Table 4-21. Tactical Trouble Analysis, 28 VDC Power System Malfunction

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1
1	MCCC	28 VDC POWER indicator illuminates amber on launch control console (figure 1-62)	Continue countdown
			1
2	MCCC	28 VDC POWER indicator illuminates red on launch control console	a. Direct BMAT to power supply-distribution set (figure 1-22)
	BMAT		b. Observe that VOLTS D. C. meter on power supply-distribution set does not indicate within 28 (±2) volts. c. Rotate VOLTAGE ADJUST control on power supply-distribution set control panel as required to obtain specified voltage
	MCCC		d. If 28 VDC POWER indicator on the launch control console (figure 1-62) is extinguished, continue countdown. e. If 28 VDC POWER indicator remains red proceed to action 2
			2
	MCCC	Ground DC sensor adjustment marginal	a. Direct BMAT to control-monitor group 2 of 4
	BMAT		b. Observe GROUND D. C. VOLTAGE indicator on MISSILE GROUND POWER (PANEL 1) (figure 4-12) is illuminated red
	MCCC		c. Dispatch BMAT to power supply-distribution set

Table 4-21. Tactical Trouble Analysis, 28 VDC Power System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION (2 CONT)
2 (CONT)	BMAT		d. Observe VOLTS D.C. meter on power supply-distribution set (figure 1-22) indicates 28 (±2) volts. Note With voltage within tolerance, sensor adjustment may be marginal. Adjusting voltage may correct condition. e. Attempt to pick up sensor by rotating VOLTAGE ADJUST control (within tolerance) at power supply-distribution set
	MCCC		f. At the launch control console (figure 1-62): (1) If 28 V.D.C. POWER indicator extinguishes, continue countdown. (2) If 28 V.D.C. POWER indicator remains red, direct BMAT to position BATTERY switch to ON and POWER SUPPLY switch to OFF
	BMAT		g. At power supply-distribution set, position BATTERY switch to ON and POWER SUPPLY switch to OFF
	MCCC		h. At launch control console: (1) If 28 V.D.C. POWER indicator extinguishes, continue countdown. (2) If 28 V.D.C. POWER indicator remains red, return to standby in accordance with table 3-15

Table 4-22. Tactical Trouble Analysis, Missile Power System Malfunction

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1
1	MCCC	MISSILE POWER indicator does not illuminate amber within alloted time on launch control console (figure 1-62)	Observe other countdown patch indicators: a. If other countdown patch indicators are illuminated, continue countdown. b. If other countdown patch indicators remain extinguished, countdown sequence has not initiated. c. Depress START COUNTDOWN pushbutton again. d. If countdown patch indicators do not illuminate, troubleshoot launch control system in accordance with T. O. 21-SM65E-2J-15-9 and T. O. 21-SM65E-2J-15-3
			1
2	MCCC	MISSILE POWER indicator does not illuminate green and malfunction patch indicators are extinguished on launch control console	a. Direct BMAT to proceed to control-monitor group 2 of 4
	BMAT		aA. Verify plugs 600P116 and 600P119 are secured. b. Observe D. C. MISSILE LOAD and A. C. MISSILE LOAD indicators on MISSILE GROUND POWER (PANEL 1) (figure 4-12) and report conditions to the MCCC
	MCCC		bA. If indicators in step b are illuminated green, verify, at launch control console, that MISSILE BAT. ACTIVATED and HEATERS ON indicators are illuminated green. Direct BMAT to install jumper between terminal A34J1 pin 4 and terminal A34J2 pin 13 at rear of control monitor group 2 of 4, chassis A34.

Table 4-22. Tactical Trouble Analysis, Missile Power System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1 (CONT)
2 (CONT)	BMAT		bB. Install jumper at rear of control monitor group 2 of 4, chassis A34, between terminal A34J1, pin 4 and terminal A34J2, pin 13
	MCCC		bC. On launch control console, verify ENGINE/ MISSILE POWER READY indicator is illuminated green, and continue countdown. c. If ENGINE/MISSILE POWER READY indicator fails to illuminate green, return to standby in accordance with table 3-15
			1
3	MCCC	MISSILE POWER indicator does not illuminate green, and 400 CYCLE POWER or 28 V.D.C. POWER, or both, indicators are illuminated red on the launch control console (figure 1-62)	a. Refer to table 4-20 if 400 CYCLE POWER indicator illuminates red, or to item 2, table 4-21, if 28 VDC POWER indicator illuminates red b. If the malfunction cannot be corrected in action 1a, return to standby in accordance with table 3-15

Table 4-23. Tactical Trouble Analysis, Heaters System Malfunction

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1
	MCCC	HEATERS ON indicator on the launch control console (figure 1-62) does not illuminate green within allotted time or remains amber	a. Direct BMAT to observe THRUST SECTION HEATER BLOWER indicator on FACILITY panel, control-monitor group 1 of 4
	BMAT	Thrust section heater blower not started	b. At FACILITY panel (figure 4-6), observe that THRUST SECTION HEATER BLOWER indicator is illuminated red
	MCCC		c. Direct BMAT to M & E room to attempt to start thrust section heater blower
	BMAT		d. In M & E room, reset manual starters on air duct; then depress START pushbutton on TSB switch box on east side of fuel room wall
	MCCC		e. If HEATERS ON indicator on launch control console (figure 1-62) illuminates green, continue countdown. f. If HEATERS ON indicator does not illuminate green, direct BMAT to proceed to thrust section heater blower duct
	BMAT		g. Reset FST 4.
	MCCC		h. If HEATERS ON indicator illuminates green, continue countdown. i. If HEATERS ON indicator does not illuminate green, return to standby in accordance with table 3-15

Table 4-24. Tactical Trouble Analysis, Autopilot System Malfunction

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1
1	MCCC	AUTOPILOT ON indicator not illuminated amber immediately after START COUNTDOWN pushbutton is depressed or fails to illuminate green 4 minutes after illuminating amber, and MISSILE POWER indicator is illuminated green on launch control console (figure 1-62)	a. Allow erection sequence to continue until BOOM CLEAR indicator illuminates green. b. Return to standby in accordance with table 3-15
			1
2	MCCC	AUTOPILOT TEST indicator is not illuminated amber immediately after AUTOPILOT ON indicator illuminates green, or is not illuminated green 2 minutes after illuminating amber on launch control console	a. Verify HYDRAULIC PRESSURE indicator is illuminated green on launch control console (figure 1-62), and return to standby in accordance with table 3-15. b. If HYDRAULIC PRESSURE indicator is not illuminated green, refer to table 4-30, item 1

Table 4-25. Tactical Trouble Analysis, RV Battery Temperature Malfunction

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1
	MCCC	R/V BATTERY TEMPERATURE indicator does not illuminate green immediately after start countdown on launch control console (figure 1-62)	a. Allow countdown sequence to continue until FLIGHT CONTROL and R/V READY would normally illuminate green b. If FLIGHT CONTROL and R/V READY indicator does not illuminate green refer to table 4-38

Table 4-26. Tactical Trouble Analysis, Guidance System Malfunction

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1
1	MCCC	TARGET A SELECTED and TARGET B SELECTED indicators are extinguished on launch control console (figure 1-62)	a. Return to standby in accordance with table 3-15. b. Troubleshoot launch control equipment in accordance with T. O. 21-SM65E-2D-15-2 and T. O. 21-SM65E-2J-15-3
			1
2	MCCC	TARGET A SELECTED or TARGET B SELECTED indicator illuminates amber but does not illuminate green on launch control console	a. Direct BMAT to PRE-LAUNCH MONITOR (figure 1-65). DELETE Note SEE LOCAL TECH DATA #194 TARGET A SELECTED or TARGET B SELECTED indicators will not illuminate green if target CONSTANTS BOARD A or CONSTANTS BOARD B is not installed for target A or B, as applicable.
	BMAT		b. Depress RESET pushbutton on TARGET SETTINGS panel
	MCCC		c. If appropriate target selected indicator illuminates green, continue countdown. d. If appropriate target selected indicator fails to illuminate green, return to standby in accordance with table 3-15. e. Troubleshoot guidance system in accordance with T. O. 21-SM65E-2J-4-2

Table 4-26. Tactical Trouble Analysis, Guidance System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1
3	MCCC	GUIDANCE READY indicator does not illuminate amber within allotted time on launch control console (figure 1-62)	a. Perform double target change. b. If GUIDANCE READY indicator does not illuminate amber after original target selected indicator illuminates green, perform action c and d, item 3. c. Return to standby in accordance with table 3-15. d. Troubleshoot in accordance with T. O. 21-SM65E-2J-15-3, T. O. 21-SM65E-2D-15-2, and T. O. 21-SM65E-2J-4-2
			1
4	MCCC	GUIDANCE READY indicator does not illuminate green within allotted time, and GUIDANCE FAIL indicator is not illuminated on launch control console	a. Perform double target change. b. Direct BMAT to check position of sight tube
	BMAT		c. Report position of sight tube to MCCC
	MCCC		d. If sight tube is in place, and GUIDANCE READY indicator does not illuminate green within 15 minutes after double target change, return to standby in accordance with table 3-15. e. If sight tube is not in place, return to standby in accordance with table 3-15
			1
5	MCCC	GUIDANCE FAIL indicator illuminates amber during commit sequence on launch control console	Continue countdown

Table 4-26. Tactical Trouble Analysis, Guidance System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1
6	MCCC	GUIDANCE FAIL indicator illuminates red prior to commit sequence on launch control console	a. With two-target capability, verify GUIDANCE FAIL with double target change as follows: (1) Select alternate target. (2) Observe alternate target selected indicator is illuminated green. (3) Reselect original target. (4) If GUIDANCE FAIL indicator illuminates red, query command post for authority to launch on alternate target. (5) If authority not given, return to standby in accordance with table 3-15. b. With one-target-only capability: (1) Select alternate target. (2) Observe alternate target illuminates amber. (3) Wait 10 seconds, then reselect original target. (4) If GUIDANCE FAIL indicator illuminates red, return to standby in accordance with table 3-15
			1
7	MCCC	GUIDANCE FAIL indicator illuminates amber prior to commit sequence on launch control console	Continue countdown. If GUIDANCE FAIL indicator illuminates red after having been amber, perform double target change in accordance with action 1, item 6

Table 4-26. Tactical Trouble Analysis, Guidance System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1
8	MCCC	GUIDANCE FAIL indicator on launch control console illuminates red during commit sequence	a. Depress COMMIT STOP pushbutton. b. Verify malfunction by performing a double target change as follows: (1) Select alternate target and wait until TARGET SELECTED indicator illuminates green. (At complexes having only one target assignment, the alternate TARGET SELECTED indicator will illuminate amber only.) (2) Reselect original target within 23 seconds after TARGET SELECTED indicator illuminates green. c. Approximately 15 minutes after COMMIT STOP pushbutton was depressed, observe MISSILE READY indicator illuminates green. d. Reinitiate commit sequence. Note If MISSILE READY indicator fails to illuminate green, perform return to standby procedures in table 3-15.

Table 4-27. Tactical Trouble Analysis, Missile Erection Door System Malfunction

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1
1	MCCC	ROOF OPEN indicator on launch control console (figure 1-62) does not illuminate amber or green as required	**CAUTION** EMERGENCY STOP pushbutton on ERECTION panel (figure 4-1) must be depressed prior to any other action. Failure to comply may result in damage to the missile. a. Direct BMAT to depress EMERGENCY STOP pushbutton on ERECTION panel.
	BMAT		At control-monitor group 1 of 4: b. Depress EMERGENCY STOP pushbutton on ERECTION panel (figure 4-1) and observe EMERGENCY STOP indicator illuminates red. c. Position N-36 OPEN-CLOSE switch on LN_2 HELIUM TANKING panel (figure 4-17) to CLOSE. d. Position REMOTE-LOCAL switch on LN_2 HELIUM TANKING panel to LOCAL.
	MCCC		e. Direct BMAT to MISSILE ERECTION DOOR-FLAME DOOR control panel (figure 1-38)
	BMAT		At MISSILE ERECTION DOOR-FLAME control panel: f. Report light indications to MCCC.
	MCCC		g. Direct BMAT to missile erection door hydraulic power unit (figure 4-14)

Table 4-27. Tactical Trouble Analysis, Missile Erection Door System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
1 (CONT)	BMAT		At missile erection door hydraulic power unit: h. Manually actuate three-way solenoid control valves, as necessary, to unlatch and raise missile erection door Note If missile erection door opens after accomplishing action 1h proceed to action 1m. If the missile erection door did not open after step 1h in a DPL or training launch, return to standby using table 4-49. If in a tactical launch perform actions 1i through 1q.
	MCCC		i. Direct BMAT to MISSILE ERECTION DOOR-FLAME DOOR control panel (figure 1-38)
	BMAT		At MISSILE ERECTION DOOR-FLAME DOOR control panel: j. Depress UNLATCH, UP, and OPEN pushbuttons as necessary to complete the missile erection door opening sequence
	MCCC		Note If the ROOF OPEN indicator on the launch control console (figure 1-62) illuminates green, proceed to action 1m. If the ROOF OPEN indicator on the launch control console does not illuminate green and the BMAT reports that both the UP and DOWN indicators on the MISSILE ERECTION DOOR-FLAME DOOR control panel (figure 1-38) are extinguished, proceed to action 1k.

Table 4-27. Tactical Trouble Analysis, Missile Erection Door System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
1 (CONT)	MCCC (CONT)		k. Direct BMAT to MCC facilities terminal and relay cabinet
	BMAT		At facilities terminal and relay cabinet: l. On terminal board C-10, install jumper between terminals MD-4 and MD-5 and notify MCCC of condition
	MCCC		Note If ROOF OPEN indicator is not green, proceed to action 1e, item 2. m. Observe ROOF OPEN indicator illuminates green on launch control console (figure 1-62). n. Direct BMAT to control-monitor group 1 of 4
	BMAT		At control-monitor group 1 of 4: o. At LN_2 HELIUM TANKING panel (figure 4-17), position REMOTE LOCAL switch to REMOTE. oA. Position N-36 switch to OPEN. p. At ERECTION panel (figure 4-1), depress SYSTEM RESET pushbutton and observe EMERGENCY STOP indicator extinguishes
	MCCC		q. Continue countdown

Table 4-27. Tactical Trouble Analysis, Missile Erection Door System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1
2	MCCC	ROOF OPEN indicator on launch control console (figure 1-62) remains amber with roof open or partially open.	**CAUTION** EMERGENCY STOP pushbutton on ERECTION panel (figure 4-1) must be depressed prior to any other action. Failure to comply may result in damage to the missile. a. Direct BMAT to depress EMERGENCY STOP pushbutton on ERECTION panel.
	BMAT		At control-monitor group 1 of 4: b. Depress EMERGENCY STOP pushbutton on ERECTION panel (figure 4-1) and observe EMERGENCY STOP indicator illuminates red. c. Position N-36 OPEN-CLOSE switch on LN_2 HELIUM TANKING panel (figure 4-17) to CLOSE. d. Position REMOTE-LOCAL switch on LN_2 HELIUM TANKING panel to LOCAL.
	MCCC		e. Direct BMAT to missile bay to observe position of missile erection door.
	BMAT		At missile bay: f. Observe missile erection door and report position to MCCC.

Table 4-27. Tactical Trouble Analysis, Missile Erection Door System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
2 (CONT)	BMAT (CONT)		**CAUTION** If in a DPL or training launch, return to standby in accordance with table 4-49. If in a tactical launch and missile erection door is sufficiently open to allow erection, proceed to action 1g. If missile erection door is not sufficiently open to allow erection, return to standby in accordance with table 4-49. Failure to comply may result in damage to the missile.
	MCCC		g. Direct BMAT to MCC (figure 4-22)
	BMAT		h. At MCC, position MISSILE ERECTION AREA OVERHEAD DOOR switch to OFF
	MCCC		i. Direct BMAT to EMMCC (figure 1-45)
	BMAT		j. At EMMCC, safetywire ROOF FULLY OPENED switch on EMERGENCY BY PASS panel to actuated position
	MCCC		k. Direct BMAT to control-monitor group 1 of 4
	BMAT		At control monitor-group 1 of 4: l. At LN_2 HELIUM TANKING panel (figure 4-17) position REMOTE LOCAL switch to REMOTE lA. Position N-36 switch to OPEN

Table 4-27. Tactical Trouble Analysis, Missile Erection Door System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
2 (CONT)	BMAT (CONT)		m. At ERECTION panel (figure 4-1) depress SYSTEM RESET pushbutton and observe EMERGENCY STOP indicator extinguishes
	MCCC		n. Continue countdown

Table 4-28. Tactical Trouble Analysis, Flame Deflector Door System Malfunction

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1
1	MCCC	FLAME DEFLECTOR DOOR indicator on launch control console (figure 1-62) does not illuminate amber or green in approximately 5 minutes after start of countdown	Note SMS 576-C only: For a training launch or DPL, perform action 1d only. If action 1d does not give FLAME DEFLECTOR DOOR green indication on launch control console, continue countdown through FUEL & LO_2 READY indicator illuminated green, then return to standby in accordance with table 3-15. Note Operational bases: If during a DPL, perform action 1d only. If action 1d does not give FLAME DEFLECTOR DOOR green indication on the launch control console, return to standby in accordance with table 3-15. If during a tactical launch, proceed to action 1a.
	BMAT		a. At FACILITY panel (figure 4-6): (1) Position THRUST SECTION HEATER BLOWER switch to ON. (2) Place VENT switch to OPEN. (3) Place OVERHEAD DOOR switch to OPEN position. (4) Place F/D DOOR switch to OPEN position.

Table 4-28. Tactical Trouble Analysis, Flame Deflector Door System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
1 (CONT)	BMAT		(5) Place REMOTE-LOCAL switch to LOCAL position. b. Observe that FD OPEN indicator on FACILITY panel illuminates green after approximately 5 minutes
	MCCC		c. Observe FLAME DEFLECTOR DOOR indicator on launch control console (figure 1-62) illuminates green after approximately 5 minutes. If indicators do not illuminate green, dispatch BMAT to MISSILE ERECTION DOOR - FLAME DOOR control panel (figure 1-38)
	BMAT		d. On MISSILE ERECTION DOOR - FLAME DOOR control panel, if LATCH, DOWN, or CLOSED indicators are illuminated, attempt to unlatch, raise, or open flame deflector door by depressing appropriate pushbutton. If door does not open, depress STOP pushbutton and report conditions to the MCCC
	MCCC		e. Direct BMAT to topside
	BMAT		f. Observe flame door and report conditions to the MCCC
	MCCC		g. Direct BMAT to the MISSILE ERECTION DOOR - FLAME DOOR control panel Note If any of the conditions mentioned in actions 1h, 1i, and 1j exist, direct BMAT to the facility terminal and relay compartment.

Table 4-28. Tactical Trouble Analysis, Flame Deflector Door System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
1 (CONT)	BMAT		h. If door is not raised or open, proceed to actions 1k, 1n, and 1o. i. If door is raised but did not begin to open, proceed to actions 1l, 1n, and 1o. j. If door is unlatched, raised, and more than 80 percent open, perform actions 1m, 1n, and 1o. Note If jumper is installed in action 1k, flame deflector door will open. However, if any latches are still latched, they will be broken off. k. Install jumper between terminal E21 and E22 on TB-B1 inside facility terminal and relay compartment. Note If jumper is installed in action 1l, UP LIMIT switch will be bypassed and flame door will open. l. Inside facility terminal and relay compartment, install jumper between terminal E62 and E61 on TB-B3 m. At the facility terminal and relay compartment, install jumper between terminals E94 and E95 on TB-B4
	MCCC		mA. Dispatch BMAT to control-monitor group 1 of 4
	BMAT		n. Position REMOTE-LOCAL switch on FACILITY panel (figure 4-6) to REMOTE

Table 4-28. Tactical Trouble Analysis, Flame Deflector Door System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
1 (CONT)	MCCC		o. Continue countdown

Table 4-29. Tactical Trouble Analysis, Erection System Malfunction

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1
1	MCCC	MISSILE ERECTED indicator on launch control console (figure 1-62) extinguished after ROOF OPEN indicator illuminates green, and BOOM at 0° indicator on ERECTION panel (figure 4-1) is illuminated green	Note If a malfunction occurs in the missile erection sequence, action 1b (1) and 1b (2), item 1, will be accomplished before performing any other action. a. Direct BMAT to perform actions 1b (1) and 1b (2), item 1 at control-monitor group 1 of 4
	BMAT		b. At ERECTION panel (figure 4-1): Note If erection sequence does not continue automatically, repeat action 1b (1) and 1b (2). If erection sequence does not continue after performing the above action, during a DPL or training launch, return to standby in accordance with the applicable portions of table 4-49. During a tactical launch, proceed to action 1b (3). (1) Depress EMERGENCY STOP pushbutton and verify that EMERGENCY STOP indicator illuminates red. (2) Depress RESET pushbutton and observe EMERGENCY STOP indicator is extinguished. (3) Depress EMERGENCY STOP pushbutton and verify EMERGENCY STOP indicator illuminates red. Notify MCCC of conditions

Table 4-29. Tactical Trouble Analysis, Erection System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1 (CONT)
1 (CONT)	MCCC		c. Direct BMAT to the EMMCC
	BMAT		d. At EMMCC (figure 1-42): (1) Actuate RESET switch. (2) If erection sequence does not continue, position CONTROL STATION SELECTOR switch through OFF to LOCAL and observe that EMERGENCY STOP indicator illuminates red. Notify MCCC of conditions
			2
	MCCC		e. Direct BMAT to observe LOCKED OUT indicators
	BMAT	One or more shock mount LOCKED OUT indicators extinguished	f. At EMMCC (figure 1-42): (1) Observe LOCKED OUT indicators and notify MCCC of conditions. Note If one or more LOCKED OUT indicators are extinguished, perform the following actions. (2) Position LOCAL OPERATION SELECTOR switch to LOCK OUT SHOCK MOUNTS. Actuate RESET switch, depress INITIATE OPERATION pushbutton, and observe LOCKED OUT indicators illuminate

Table 4-29. Tactical Trouble Analysis, Erection System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 2 (CONT)
1 (CONT)	BMAT		Note If LOCKED OUT indicators are illuminated, perform action 2f (3). If LOCKED OUT indicators are not illuminated, proceed to action 2h. (3) Position CONTROL STATION SELECTOR switch through OFF to LAUNCH CONTROL position (4) Actuate RESET switch
	MCCC		g. Continue countdown
	BMAT		h. At EMMCC: (1) Depress EMERGENCY STOP pushbutton and observe EMERGENCY STOP indicator illuminated red. (2) Position LOCAL OPERATION SELECTOR switch to SHOCK MOUNT position. (3) Actuate RESET switch. (4) Depress INITIATE OPERATION pushbutton and observe SHOCK MOUNTED indicators illuminated. (5) Position LOCAL OPERATION SELECTOR switch to LOCK OUT SHOCK MOUNTS. (6) Actuate RESET switch. (7) Depress INITIATE OPERATION pushbutton and observe LOCKED OUT indicators illuminated.

Table 4-29. Tactical Trouble Analysis, Erection System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			2 (CONT)
1 (CONT)	BMAT		Note If LOCKED OUT indicators are illuminated, perform action h (8). If LOCKED OUT indicators are not illuminated, proceed to necessary action indicated by condition of LOCKED OUT indicator. (8) Position CONTROL STATION SELECTOR switch through OFF to LAUNCH CONTROL. (9) Actuate RESET switch
	MCCC		i. Continue countdown
			3
	BMAT	NOSE CLAMP CYLINDER LOCKED OUT indicator extinguished	a. At EMMCC: (1) Depress EMERGENCY STOP pushbutton and observe EMERGENCY STOP indicator illuminate red. (2) Report NOSE CLAMP CYLINDER LOCKED OUT indicator extinguished to MCCC
	MCCC		b. Direct BMAT to missile bay
	BMAT		c. In missile bay: (1) Verify nose clamp cylinder locking pin is in retracted position. If not in retracted position, place pin in retracted position
	MCCC		d. Direct BMAT to the EMMCC.

Table 4-29. Tactical Trouble Analysis, Erection System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			3 (CONT)
1 (CONT)	BMAT		e. At the EMMCC: (1) Safetywire SHOCK MOUNTED LOCKED OUT BYPASS switch to the actuate position. (2) Observe NOSE CLAMP CYLINDER LOCKED OUT indicator illuminated and report condition to MCCC. (3) Position CONTROL STATION SELECTOR switch through OFF to LAUNCH CONTROL
	MCCC		f. Direct BMAT to control-monitor group 1 of 4
	BMAT		g. Depress RESET pushbutton on ERECTION panel (figure 4-1) and observe EMERGENCY STOP indicator is extinguished
	MCCC		h. At launch control console (figure 1-62): (1) Observe MISSILE ERECTED indicator illuminate amber. (2) Continue countdown
			4
	BMAT	EMMCC RIGHT LAUNCHER PIVOT SHOCK MOUNTED and LEFT LAUNCHER PIVOT SHOCK MOUNTED indicators are illuminated	a. At EMMCC (figure 1-42): (1) Depress EMERGENCY STOP pushbutton and observe EMERGENCY STOP indicator illuminate red. (2) Position CONTROL STATION SELECTOR switch through OFF to LOCAL.

Table 4-29. Tactical Trouble Analysis, Erection System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 4 (CONT)
1 (CONT)	BMAT		(3) Position LOCAL OPERATION SELECTOR switch to LOCK OUT SHOCK MOUNTS. (4) Install jumper between terminal 311 on terminal board 34TB and BUS 1P. (5) Actuate RESET switch. (6) Observe LEFT and RIGHT LAUNCHER PIVOT LOCKED OUT indicators illuminated. Note If one or both LAUNCHER PIVOT LOCKED OUT indicators does not illuminate, proceed to action 4c, item 1. If both LAUNCHER PIVOT LOCKED OUT indicators does illuminate, proceed with action 4a (7), item 1 through 4b (2). (7) Depress EMERGENCY STOP pushbutton and observe EMERGENCY STOP indicator illuminates red. (8) Remove jumper between terminal 311 on terminal board 34TB and BUS 1P. (9) Position CONTROL STATION SELECTOR switch through OFF to LAUNCH CONTROL. (10) Actuate RESET switch

Table 4-29. Tactical Trouble Analysis, Erection System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 4 (CONT)
1 (CONT)	MCCC		b. At launch control console (figure 1-62): (1) Observe MISSILE ERECTED indicator illuminates amber. (2) Continue countdown. c. Direct BMAT and MMT to missile bay
	BMAT and MMT		d. In missile bay: (1) Remove inspection covers from right and left launcher pivot shock mounts. (2) Observe launcher pivot locking pins. Note If no pins are locked, return to site hard in accordance with table 4-49. If all pins or 1 pin in each shock mount are locked, proceed to action 4e, item 1.
	MCCC		e. Direct BMAT to EMMCC
	BMAT		f. At EMMCC (figure 1-42): (1) Remove safetywire from SHOCK MOUNTS LOCKED OUT switches in EMERGENCY BYPASS panel of EMMCC. (2) Safetywire SHOCK MOUNTS LOCKED OUT switches into the ACTUATE position.

Table 4-29. Tactical Trouble Analysis, Erection System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			4 (CONT)
1 (CONT)	BMAT		(3) Position CONTROL STATION SELECTOR switch through OFF to LAUNCH CONTROL. (4) Actuate RESET switch
	MCCC		g. At launch control console (figure 1-62): (1) Observe MISSILE ERECTED indicator illuminates amber. (2) Continue countdown
			1
2	MCCC	MISSILE ERECTED indicator on launch control console remains amber after ROOF OPEN indicator illuminates green and missile is not erecting normally	a. Direct BMAT to EMMCC to observe following indications: (1) CARRIAGE STRUTS BOTTOMED. (2) RIGHT CARRIAGE STRUT LOCKED. (3) LEFT CARRIAGE STRUT LOCKED
	BMAT		b. At EMMCC (figure 1-42), observe the following light indications: (1) RIGHT CARRIAGE STRUT BOTTOMED indicator illuminated. (2) RIGHT CARRIAGE STRUT LOCKED indicator illuminated. (3) LEFT CARRIAGE STRUT BOTTOMED indicator illuminated.

Table 4-29. Tactical Trouble Analysis, Erection System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
2 (CONT)	BMAT		(4) LEFT CARRIAGE STRUT LOCKED indicator illuminated. (5) Report conditions to MCCC
	MCCC		Note If during a DPL or training launch, perform a manual return to site hard in accordance with table 4-49. For a tactical launch, attempt a manual erection in accordance with table 3-33 and continue automatic countdown sequence after MISSILE ERECTED indicator illuminates green. If a manual erection cannot be accomplished, instruct BMAT to actuate the applicable BY PASS switch at the EMMCC.
	BMAT	One or more CARRIAGE STRUTS LOCKED indicators not illuminated	c. Remove safetywire from BY PASS switches on the EMMCC. (1) Actuate the CARRIAGE STRUTS LOCKED BY PASS switch (2) Observe the CARRIAGE STRUTS LOCKED indicator illuminates
	MCCC		d. At launch control console (figure 1-62): (1) Observe that MISSILE ERECTED indicator illuminates green after approximately 2 minutes. (2) Continue countdown

Table 4-29. Tactical Trouble Analysis, Erection System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1 (CONT)
2 (CONT)	MCCC		Note If MISSILE ERECTED indicator does not illuminate green after performing above actions, perform a manual return to site hard in accordance with table 4-49 and troubleshoot erection system.
			1
3	MCCC	BOOM CLEAR indicator does not illuminate amber when MISSILE ERECTED indicator illuminated green	Note For a DPL or training launch, return to standby in accordance with table 4-49. For a tactical launch, proceed to action 1a. a. Direct BMAT to EMMCC to observe indications
	BMAT	HOLD DOWN HOOKS QUADRANT III LATCHED and QUADRANT IV LATCHED indicators on EMMCC panel are extinguished	b. Observe following indications on the EMMCC (figure 1-42): (1) ABOVE 90° RIGHT indicator illuminated. (2) ABOVE 90° LEFT indicator illuminated. (3) NOSE CLAMP LOCKED indicator illuminated. (4) MISSILE VERTICAL indicator illuminated. (5) Report indications to MCCC
	MCCC		c. Dispatch BMAT to missile bay

Table 4-29. Tactical Trouble Analysis, Erection System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
3 (CONT)	BMAT		d. In missile bay: (1) Observe position of quad III and quad IV hooks. (2) Report conditions to MCCC. Note If QUAD III and QUAD IV hooks are latched, perform actions 1f and 1g. If hooks are not latched, and MISSILE VERTICAL indicator is extinguished, direct BMAT to perform actions 1h (4) through 1h (5).
	MCCC		e. Dispatch BMAT to EMMCC
	BMAT		f. At EMMCC: (1) Remove safetywire from QUAD III and QUAD IV HOOKS LATCHED switches. (2) Safetywire QUAD III and QUAD IV HOOKS LATCHED switches to ACTUATE position
	MCCC		g. At launch control console (figure 1-62): (1) Observe BOOM CLEAR indicator illuminated amber. (2) Continue countdown

Table 4-29. Tactical Trouble Analysis, Erection System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
3 (CONT)	MCCC		Note If QUAD III and QUAD IV HOOKS LATCHED BY PASS switches have been safetywired to ACTUATE position to illuminate QUADRANT III LATCHED and QUADRANT IV LATCHED indicators on EMMCC, the safetywire must be removed after FUEL & LO_2 READY indicator illuminates green, to enable HOOKS RELEASED indicator to illuminate green on the launch control console.
	BMAT	QUAD III and QUAD IV hooks are not latched	h. At EMMCC (figure 1-42): (Steps (1) through (3) deleted.) (4) Actuate MISSILE CONTACTOR SIMULATOR switch. (5) Observe that QUADRANT III LATCHED and QUADRANT IV LATCHED indicators illuminate. Note If indicators illuminate, proceed to action 1i. If indicators do not illuminate and hooks do not latch proceed to action 1h (6).

Table 4-29. Tactical Trouble Analysis, Erection System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
3 (CONT)	BMAT		(6) Position CONTROL STATION SELECTOR switch through OFF to LOCAL. (7) Install jumper between terminal 314 on terminal board 37TB and BUS 1P. (8) Actuate RESET switch. (9) Observe that QUADRANT III LATCHED and QUADRANT IV LATCHED indicators illuminate. If indicators illuminate, proceed to action 1h (10). If indicators do not illuminate, perform action 2. (10) Depress EMERGENCY STOP pushbutton. (11) Remove jumper between terminal 314 on terminal board 37TB and BUS 1P. (12) Position CONTROL STATION SELECTOR switch through OFF to LAUNCH CONTROL. (13) Actuate RESET switch. (14) Observe that EMERGENCY STOP indicator extinguishes
	MCCC		i. At launch control console (figure 1-62): (1) Observe that BOOM CLEAR indicator illuminates amber. (2) Continue countdown

Table 4-29. Tactical Trouble Analysis, Erection System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 2
3 (CONT)	MCCC	BOOM CLEAR indicator does not illuminate amber	Note If during tactical launch, and BOOM CLEAR indicator did not illuminate by performing action 1h and 1i, weather permitting, perform action 2. a. Direct BMAT to actuate BY PASS switches on EMMCC (figure 1-42)
	BMAT		b. At EMMCC: (1) Remove safetywire from QUAD III and QUAD IV HOOKS LATCHED bypass switches (2) Safetywire QUAD III and QUAD IV bypass switches in the ACTUATE position. (3) Observe that QUADRANT III LATCHED and QUADRANT IV LATCHED indicators illuminate
	MCCC		c. At launch control console (figure 1-62): Note If BOOM CLEAR indicator is not illuminated, return to standby in accordance with table 4-49. (1) Observe BOOM CLEAR indicator illuminated amber. (2) Continue countdown

Table 4-29. Tactical Trouble Analysis, Erection System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1
4	MCCC	BOOM CLEAR does not illuminate green	Note For DPL or training launch, return to standby in accordance with table 3-15. For a tactical launch, proceed with action 1, item 4. a. Instruct BMAT to observe the nose clamp indicators on EMMCC (figure 1-42)
	BMAT	NOSE CLAMP UNLOCKED or NOSE CLAMP OPENED indicator, or both, extinguished	b. Observe following indications on EMMCC: (1) NOSE CLAMP UNLOCKED indicator illuminated. (2) NOSE CLAMP OPENED indicator illuminated. Note If either or both indicators are extinguished, perform actions 1b (3) through 1f. (3) Position CONTROL STATION SELECTOR switch through OFF to MISSILE TRANSFER
	MCCC		c. Direct MMT to missile bay
	MMT		d. At missile transfer panel (nose clamp) (figure 1-44), depress UNLOCK AND OPEN NOSE CLAMP pushbutton
	BMAT		e. At EMMCC (figure 1-42): (1) Observe that NOSE CLAMP UNLOCKED and OPENED indicators are illuminated.

Table 4-29. Tactical Trouble Analysis, Erection System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1 (CONT)
4 (CONT)	BMAT		(2) Position CONTROL STATION SELECTOR switch through OFF to LAUNCH CONTROL. (3) Actuate RESET switch. (4) Observe EMERGENCY STOP indicator extinguishes
	MCCC		f. At launch control console (figure 1-62): (1) Observe BOOM CLEAR indicator illuminates green. (2) Continue countdown
			2
	MCCC		Note For a DPL or training launch, return to standby in accordance with table 3-15. For a tactical launch, proceed with action 2. a. Dispatch MMT to missile bay
	MMT		b. Inspect boom to determine if it is at 100 degree position and report condition to BMAT
	BMAT	100° BOOM POSITION indicators extinguished	c. At EMMCC (figure 1-42): (1) Observe 100° BOOM POSITION AT 100° RIGHT and AT 100° LEFT indicators are extinguished.

Table 4-29. Tactical Trouble Analysis, Erection System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 2 (CONT)
4 (CONT)	BMAT		Note If indicators are extinguished, and it has been determined by visual inspection that boom is at 100° position, perform action 2c (2) through 2c (5). (2) Remove safetywire from BOOM AT 100° switch on EMERGENCY BYPASS panel. (3) Actuate 100° BOOM POSITION BY PASS switch. (4) Observe that 100° BOOM POSITION AT 100° RIGHT and AT 100° LEFT indicators are illuminated. (5) Safetywire 100° BOOM POSITION BY PASS switch in ACTUATE position
	MCCC		d. At launch control console (figure 1-62): (1) Observe BOOM CLEAR indicator is illuminated. (2) Continue countdown
			3
	MCCC		Note For a DPL, return to standby in accordance with table 3-15. For a tactical launch, proceed with action 3. a. Direct BMAT to observe BOOM TO LAUNCHER STRUT indicators

Table 4-29. Tactical Trouble Analysis, Erection System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 3 (CONT)
4 (CONT)	BMAT	BOOM TO LAUNCHER STRUT UN-LOCKED indicator extinguished	b. At EMMCC (figure 1-42): (1) Observe UNLOCKED RIGHT and UN-LOCKED LEFT indicators are extinguished. (2) Position CONTROL STATION SELECTOR switch through OFF to LOCAL. (3) Remove safetywire from BOOM TO LAUNCHER STRUTS UNLOCKED BY PASS switch on EMERGENCY BY PASS panel. (4) Safetywire BOOM TO LAUNCHER STRUTS UNLOCKED BY PASS switch to the ACTUATE position. (5) Position LOCAL OPERATION SELECTOR switch to MAN. RAISE 100° FROM 90°. (6) Actuate RESET switch. (7) Depress INITIATE OPERATION pushbutton
	MCCC		c. Observe BOOM CLEAR indicator illuminated green on launch control console (figure 1-62)
	BMAT		d. At EMMCC (figure 1-42): (1) Position CONTROL STATION SELECTOR switch through OFF to LAUNCH CONTROL. (2) Depress RESET pushbutton
	MCCC		e. Continue countdown

Table 4-29. Tactical Trouble Analysis, Erection System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1
5	MCCC	HOOKS RELEASED indicator does not illuminate green after FUEL & LO_2 READY indicator illuminates green	Note For a training launch or DPL, return to standby in accordance with table 3-15. For a tactical launch, proceed with action 1, item 5.
	BMAT	NOSE CLAMP ROTATED UP indicator extinguished	At EMMCC: a. Observe NOSE CLAMP OPENED indicator illuminated. b. Observe that NOSE CLAMP ROTATED UP indicator is extinguished. c. If indicator is extinguished, perform the following actions: (1) Remove safetywire from NOSE CLAMP ROTATED UP BY PASS switch at EMERGENCY BY PASS panel. (2) Actuate NOSE CLAMP ROTATED UP BY PASS switch. (3) Observe that NOSE CLAMP ROTATED UP indicator illuminates. (4) Safetywire NOSE CLAMP ROTATED UP BY PASS switch in the ACTUATE position
	MCCC		d. At launch control console (figure 1-62): (1) Observe that HOOKS RELEASED indicator illuminates amber, then green.

Table 4-29. Tactical Trouble Analysis, Erection System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1 (CONT)
5 (CONT)	MCCC		(2) Continue countdown
			1
6	MCCC	MISSILE ERECTED indicator does not illuminate green or BOOM CLEAR indicator does not illuminate amber or green on launch control console	a. Direct BMAT to depress EMERGENCY STOP pushbutton on ERECTION panel (figure 4-1) and proceed to skids NO. 1, 5, and 6 to close LN_2/He transfer valves
	BMAT		b. Depress EMERGENCY STOP pushbutton on ERECTION panel (figure 4-1) and observe that EMERGENCY STOP indicator illuminates red. c. At skid NO. 5 (figure 1-47), close manual valve H-24 if valve H-8 is cycling, or valve H-26 if valve H-18 is cycling. d. At skid NO. 6 (figure 1-50), close manual valve LN-4. e. At skid NO. 1 (figure 1-54), close manual valve N-27 and notify MCCC of conditions
	MCCC		f. Direct BMAT to the EMMCC
	BMAT		g. At EMMCC (figure 1-42): (1) Observe all indicators on EMMCC and report conditions to MCCC

Table 4-29. Tactical Trouble Analysis, Erection System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
6 (CONT)	BMAT		Note If all indications are normal for the appropriate sequence, perform a manual missile raising in accordance with table 3-33, and continue countdown. If all indicators are not normal or a manual missile erection cannot be performed, return to standby in accordance with table 4-49.

Table 4-30. Hydraulic System Malfunction

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1
1	MCCC	HYDRAULIC PRESSURE indicator fails to illuminate green on launch control console (figure 1-62)	a. Direct MMT to HPU
	MMT		b. At the HPU (figure 4-11): (1) Verify that circuit breaker CB-2 is in the ON position on both stages. (2) Verify that PUMP START indicators are illuminated green. (3) Verify that HYDRAULIC PUMPING UNIT circuit breaker on LSB MCC (figure 4-5) is in ON position
			2
	MMT	Either or both GAUGE HIGH PRESSURE SYSTEM gage on HPU (figure 1-61) indicate output pressure is less than 1750 PSI or greater than 2250 PSI	Adjust pressure control knob(s) on HPU high-pressure pump (either or both systems as applicable) to obtain 2000 (±250) PSI as indicated on GAUGE HIGH PRESSURE SYSTEM gage
	MCCC		Note If during DPL or training launch and action 2a does not correct the malfunction, return to standby in accordance with table 3-15. If during a tactical launch, proceed to action 3.
			3
	MMT	HPU gages indicate normal pressures	a. Jump switches 49, 49A, and 51 in the HPU first-stage system, as follows: (1) Jump switch 49 by applying jumper between pins TB3 pin 9 and TB4 pin 23 in the HPU.

Table 4-30. Hydraulic System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			3 (CONT)
1 (CONT)	MMT		(2) Jump switch 49A by applying a jumper between TB3 pin 10 and TB4 pin 23 in the HPU. (3) Jump switch 51 by applying a jumper between TB3 pin 8 and TB4 pin 23 in the HPU. b. Jump switches 49, 49A, and 51 in the HPU second-stage system, as follows: (1) Jump switch 49 by applying a jumper between TB3 pin 9 and TB4 pin 23 in the HPU. (2) Jump switch 49A by applying a jumper between TB3 pin 10 and TB4 pin 23 in the HPU. (3) Jump switch 51 by applying a jumper between TB3 pin 8 and TB4 pin 23 in the HPU.
	MCCC		c. Observe that hydraulic pressure indicator illuminates green. If indicator does not illuminate green, return to standby in accordance with table 3-15
			4
	MMT	Either or both BYPASS VALVE OPEN indicator(s) is illuminated red or BYPASS VALVES CLOSED indicator(s) is extinguished on HPU	a. At HPU (figure 1-61), verify that GAUGE LOW PRESSURE SYSTEM (24) gage indicates approximately 100 PSI and GAUGE HIGH PRESSURE SYSTEM (10) gage indicates approximately 100 PSI (either or both systems as applicable)

Table 4-30. Hydraulic System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			4 (CONT)
1 (CONT)	MCCC		Note If condition in action 4a is verified while performing a DPL or training launch, return to standby in accordance with table 3-15. If during a tactical launch, proceed to action 4b.
	MMT		b. At the HPU, install jumper between terminal 42 on TB-8 and terminal 29 on TB10 (figure 4-15) (either or both systems as applicable). c. When BYPASS VALVES CLOSE indicator(s) is illuminated green, remove jumper(s) (within 15 seconds)
	MCCC		d. Observe that HYDRAULIC PRESSURE indicator on launch control console (figure 1-62) is illuminated green. Continue countdown
			5
	MCCC	Either or both GAUGE RESERVOIR PRESSURE gage on HPU indicates pressure is not within limits (100(±10) PSI)	Note If malfunction indication is verified during a DPL or training launch, return to standby in accordance with table 3-15. If during a tactical launch, proceed to action 4a.
	MMT		a. At HPU, by pass pressure switch NO. 51 by installing jumper between terminal 23 on TB4 and terminal 8 on TB3 (figure 4-15) (either or both system panels as applicable)
	MCCC		b. Observe that HYDRAULIC PRESSURE indicator illuminates green on launch control console (figure 1-62)

Table 4-30. Hydraulic System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1
2	MCCC	HYD-PNEU READY indicator does not illuminate green after LN_2 LOAD indicator illuminates green on launch control console. Either or both SOLENOID PNEUMATIC VALVE 60 CLOSED (DS-12) indicator(s) are illuminated red and GAUGE RESERVOIR PRESSURE gage indicates 120 PSI or more on HPU (figure 1-61)	a. Direct MMT to HPU
	MMT		b. At HPU (figure 1-61), perform following actions on either or both system panels as applicable: (1) Rotate INC. — DEC. RESERVOIR PRESSURE REGULATOR (40) handle fully counterclockwise toward DEC. (2) Position RESERVOIR PRESSURIZATION VALVE(S) (39) handle to RESERVOIR VENTED. (3) Observe that GAUGE RESERVOIR PRESSURE (46) gage indicates 100 PSI. (4) Position RESERVOIR PRESSURIZATION VALVE (39) handle to RESERVOIR PRESSURIZED. (5) Momentarily depress PRESSURE RESERVOIR SWITCH (59) RESET pushbutton(s) (S-17). (6) Observe that SOLENOID PNEUMATIC VALVE (60) OPEN indicator(s) is illuminated green. (7) Turn INC. -- DEC. RESERVOIR PRESSURE REGULATOR (40) handle clockwise toward INC. until GAUGE RESERVOIR PRESSURE (46) gage indicates 100 (±5.0) PSI
	MCCC		c. Observe that HYD-PNEU READY indicator illuminates green on launch control console (figure 1-62)

Table 4-30. Hydraulic System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1 (CONT)
2 (CONT)	MCCC		Note If during a DPL or training launch, the HYD-PNEU READY indicator fails to illuminate green as specified in action 1c, return to standby in accordance with table 3-15. If during a tactical launch, the RESERVOIR PRESSURE SWITCH (59) trips at 100 PSI or less, repeat actions 1a through 1c.
			2
	MMT	Either or both SOLENOID PNEUMATIC VALVE (60) CLOSED (DS-12) indicator(s) is illuminated red and GAUGE RESERVOIR PRESSURE gage indicates less than 120 PSI on HPU (figure 1-61)	a. Momentarily depress PRESSURE RESERVOIR SWITCH (59) RESET pushbutton (either or both system panels as applicable), located overhead inside doors at each end of HPU
	MCCC		b. Observe that HYD-PNEU READY indicator illuminates green on launch control console (figure 1-62). Note If PRESSURE RESERVOIR SWITCH (59) repeatedly extinguishes the HYD-PNEU READY indicator, perform item 2, action 1.

Table 4-31. Tactical Trouble Analysis, Liquid Nitrogen-Helium System Malfunction

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1
1	MCCC	LN_2 LOAD indicator on launch control console (figure 1-62) does not illuminate amber after start of count-down	a. Direct BMAT to skid NO. 6
	BMAT	Failure of microswitch MS-163-6 on LN_2 rapid load valve LN-3 in valve closed position or MS-164-6 on storage tank vent valve N-36 in valve open position	b. On skid NO. 6 (figure 1-50), observe valves LN-3 and N-36. If LN-3 is open and N-36 is closed, manually actuate microswitches MS-163-6 and MS-164-6 to attempt to eliminate a mechanical malfunction
	MCCC		c. If manual action of microswitches MS-163-6 and MS-164-6 fails to cause LN_2 LOAD indicator on launch control console (figure 1-62) to illuminate amber, proceed to action 2, item 1

Table 4-31. Tactical Trouble Analysis, Liquid Nitrogen-Helium System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 2
1 (CONT)	MCCC		Note If during a DPL or training launch, valve LN-3 is open, valve N-36 is closed, and manual actuation of microswitches fails to illuminate LN_2 LOAD indicator amber on the launch control console, return to standby in accordance with table 3-15. If in a tactical countdown, proceed with action 2a through 2c, item 1. a. Direct BMAT to the PLTC
	BMAT		b. At the PROPELLANT LOADING TERMINAL CABINET (figure 4-16): (1) Remove wire 379 from terminal 5 on terminal board TB2-6. (2) Momentarily connect a jumper between terminal 4 on terminal board TB2-6 and terminal 4 on terminal board TB6-1
	MCCC		c. Observe that LN_2 LOAD indicator on launch control console (figure 1-62) illuminates amber Note If the missile is not launched, direct BMAT to replace wire removed in step 2b (1) item 1. Initiate return to standby sequence in accordance with table 3-15.

Table 4-31. Tactical Trouble Analysis, Liquid Nitrogen-Helium System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 3
1 (CONT)	BMAT	Solenoid valve SLN3 on rapid load valve has failed in the deenergized position	a. At skid NO. 6 (figure 1-50), observe valve LN-3 closed and report condition to MCCC
	MCCC		Note If in DPL or training launch, return to standby in accordance with table 3-15. If in tactical countdown, direct BMAT to skid NO. 1, (figure 1-54), then to skid NO. 6.
	BMAT		b. At nitrogen transfer panel of skid NO. 1 (figure 1-54) increase set point of manual loader ML-106-1 to provide transfer pressure of 60.0 PSI as indicated on LN TRANSFER PRESSURE gage. c. At skid NO. 6 (figure 1-50), momentarily actuate microswitch MS-163-6 (valve open limit switch) on valve LN-3
	MCCC		d. Observe that LN_2 LOAD indicator on launch control console (figure 1-62) illuminates amber Note Ten minutes after BMAT performs action 3b, item 1, instruct BMAT to decrease set point of manual loader ML-106-1 to original setting.

Table 4-31. Tactical Trouble Analysis, Liquid Nitrogen-Helium System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 4
1 (CONT)	BMAT	Solenoid valve SN-36 on nitrogen storage tank vent valve N-36 has failed in de-energized position	a. At skid NO. 6 (figure 1-50), observe valve N-36 valve stem position indicator. If valve is open, notify MCCC. b. If in DPL or training launch, return to standby in accordance with table 3-15; if in a tactical countdown, proceed with action 4c through 4e, item 1. c. At skid NO. 6: disconnect and plug line from solenoid valve SN-36 to bypass line containing manual bypass valve. d. Open manual bypass valve and observe that valve N-36 closes. Verify with MCCC that LN_2 LOAD indicator on launch control console illuminates amber. e. After missile is launched and return to standby sequence has been initiated, close manual bypass valve opened in action 4d, item 1. Remove plug and connect line disconnected and plugged in action 4c, item 1.

Table 4-31. Tactical Trouble Analysis, Liquid Nitrogen-Helium System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1
2	MCCC	HELIUM LOAD indicator does not illuminate green approximately 8 minutes after start of countdown. Pressure switch PS-57, located in the pressure system control, has failed in the pressure less than 3050 PSI mode	Note During a DPL or training launch, perform return to standby procedures in table 3-15. For a tactical countdown, perform action 1, item 2. a. Direct MMT to PSC to observe readings on REFRIGERATED HELIUM gage (figure 1-48) and BMAT to CMG 1 of 4 to observe indications on LN_2 HELIUM TANKING panel (figure 4-17)
	BMAT		b. Observe IFH LINE PRESS NOT EXCESSIVE indicator on LN_2 HELIUM TANKING panel, and notify MCCC of conditions Note If IFH LINE PRESS NOT EXCESSIVE indicator is illuminated green, proceed to action 1c, item 2. If indicator is extinguished, proceed to action 2, item 2.
	MMT		c. At PSC (figure 1-48): (1) Verify that REFRIGERATED HELIUM indicator indicates refrigerated helium pressure is greater than 2900 PSI nominal. (2) Install jumper between terminals 9 and 10 on terminal board TB-F in pressure system control
	MCCC		d. Observe that HELIUM LOAD indicator on launch control console (figure 1-62) illuminates green and continue countdown

Table 4-31. Tactical Trouble Analysis, Liquid Nitrogen-Helium System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 2
2 (CONT)	BMAT	Pressure switch PS 104-5 has failed in the excess pressure mode	a. Observe IFH LINE PRESS NOT EXCESSIVE indicator on LN_2 HELIUM TANKING panel (figure 4-17) and notify MCCC of conditions
	MCCC		Note If IFH LINE PRESS NOT EXCESSIVE indicator is not illuminated green, dispatch BMAT to skid NO. 5 (figure 1-47) and proceed with action 2b, item 2.
	BMAT		b. Observe that pressure gage PI-104-5 on HELIUM TRANSFER PANEL of skid NO. 5 indicates less than 3000 PSI nominal
	MCCC		c. Dispatch BMAT to PLTC
	BMAT		d. Install jumper between terminal 3 on terminal board TB3-5 and terminal 16 on terminal board TB1-5 in PLTC (figure 4-16)
	MCCC		e. Observe that HELIUM LOAD indicator on the launch control console (figure 1-62) illuminates green and notify MMT of indication
	MMT		f. Observe REFRIGERATED HELIUM gage 42 on PSC (figure 1-48) and report to MCCC when pressure has stabilized and system is not cycling
	MCCC		Note Do not depress COMMIT START pushbutton on launch control console (figure 1-62) until MMT reports pressure has stabilized and system is not cycling.

Table 4-31. Tactical Trouble Analysis, Liquid Nitrogen-Helium System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1
3	MCCC	LN_2 LOAD and HELIUM LOAD indicators on launch control console fail to illuminate amber	Note This procedure may be used to load LN_2 and helium aboard the missile, using control-monitor group panel controls and indicators, in the event that a failure occurs in the automatic loading sequence. Depending upon specific time of fault occurrence in countdown, only portions of this procedure may be required. This procedure will be used for tactical countdowns only. **CAUTION** Prior to using this procedure, a thorough analysis of the effects of this procedure on other operations occurring in the countdown and the effects of the fault on the overall countdown must be made. Ensure particular fault has no detrimental effect upon required summary conditions, PSC unit phasing, and other necessary sequences. Failure to comply may result in loss of missile or damage to equipment.
	BMAT		a. At LN_2 HELIUM TANKING panel (figure 4-17): (1) Ensure that valve N-36, N-31, H-62, H-8, H-66, and H-18 OPEN-CLOSE switches are in CLOSE position.

Table 4-31. Tactical Trouble Analysis, Liquid Nitrogen-Helium System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
3 (CONT)	BMAT		(2) Position valve LN-3, LN-23, H-47, H-61, CYL. B, and H-65 OPEN switches to OPEN. (3) Position LOCAL-REMOTE switch to LOCAL. (4) Position valve N-31 OPEN-CLOSE switch to OPEN. (5) After 2 minutes, position valve H-8 OPEN-CLOSE switch to OPEN
	MCCC		b. At launch control console (figure 1-62): (1) Dispatch MMT to skid NO. 5. (2) Approximately 6 minutes after opening valve H-8, observe HELIUM LOAD indicator. (3) When indicator illuminates green, direct BMAT to position valve H-8 OPEN-CLOSE switch to CLOSE. **WARNING** If gage reading exceeds 3200 PSI prior to HELIUM LOAD indicator on launch control console illuminating green, notify BMAT of the condition. Failure to comply will result in damage to missile and equipment and injury or death to personnel.

Table 4-31. Tactical Trouble Analysis, Liquid Nitrogen-Helium System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
3 (CONT)	MMT		c. Observe INFLIGHT HELIUM SUPPLY PRESSURE gage PI-104-5 at skid NO. 5 (figure 1-47)
	BMAT		Note When MCCC notifies crew that HELIUM LOAD indicator is illuminated green, or when MMT reports INFLIGHT HELIUM SUPPLY PRESSURE gage PI-104-5 indicates in excess of 3200 PSI, perform action 1d, item 3. d. Position valve H-8 switch on LN_2 HELIUM TANKING panel (figure 4-17) to CLOSE immediately
	MCCC		e. Approximately 11.5 minutes after BMAT performs action 1a (5), item 3, observe that LN_2 LOAD indicator on launch control console (figure 1-62) illuminates green. Direct BMAT to position LN-3 switch to CLOSE
	BMAT		f. At LN_2 HELIUM TANKING panel (figure 4-17), position LN-3 switch to CLOSE
	MCCC		g. Dispatch MMT to the PSC
	MMT		h. Observe REFRIGERATED HELIUM pressure gage on PSC (figure 1-48). Note If gage indicates pressure decrease to less than 3050 PSI, notify BMAT.

Table 4-31. Tactical Trouble Analysis, Liquid Nitrogen-Helium System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1 (CONT)
3 (CONT)	BMAT		Note If notified by MMT that REFRIGERATED HELIUM gage is less than 3050 PSI, perform action i. i. Momentarily position H-8 OPEN-CLOSE switch to OPEN until REFRIGERATED HELIUM gage indicates greater than 3050 PSI
4	MCCC	LN_2/HE SUPPLY indicator on launch control console (figure 1-62) illuminates red during countdown. Possible cause: GN_2 transfer pressure falls to approximately 1500 PSI	Continue countdown
			1
5	MCCC	EMERGENCY HELIUM SUPPLY indicator on launch control console illuminates amber during countdown	At launch control console (figure 1-62): a. Continue countdown. b. If LO_2 RAPID LOAD has not started, direct MMT to skid NO. 5 to observe He pressure gages

Table 4-31. Tactical Trouble Analysis, Liquid Nitrogen-Helium System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
5 (CONT)	MMT	Possible cause: nonselected helium bottle pressure is below approximately 3100 PSI or supply at PSC is below approximately 800 PSI or PS 37 is defective	c. Report EMERGENCY HELIUM SUPPLY gage and nonselected INFLIGHT HELIUM STORAGE gage (figure 1-47) pressures to MCCC. d. Return to launch control center

Table 4-32. Tactical Trouble Analysis, Fuel System Malfunction

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1
1	MCCC	FUEL LINE FILLED indicator on launch control console (figure 1-62) does not illuminate green after MISSILE ERECTED indicator illuminates green	a. Direct MMT to skid NO. 2
	MMT		b. On skid NO. 2 (figure 1-55): (1) Observe valve F-8 valve stem position indicator. (2) If indicator shows valve F-8 is open, attempt to manually actuate microswitch on valve F-8, and notify MCCC
	MCCC	Faulty microswitch on valve F-8	c. At launch control console (figure 1-62): (1) Observe that FUEL LINE FILLED indicator illuminates green. Note If FUEL LINE FILLED indicator fails to illuminate green during DPL or training launch, return to standby in accordance with table 3-15. If during a tactical launch, proceed to action 1c (2), item 1. (2) Direct BMAT to PLTC
	BMAT		d. At PLTC (figure 4-16), remove wire from terminal 14 on terminal board TB2-2 and notify MCCC when accomplished

Table 4-32. Tactical Trouble Analysis, Fuel System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
1 (CONT)	MCCC		e. At launch control console (figure 1-62): (1) Observe that FUEL LINE FILLED indicator illuminates green, and note time. Note If FUEL LINE FILLED indicator is illuminated green, proceed to action 1e (2), item 1. If FUEL LINE FILLED indicator is not illuminated green, direct BMAT to perform action 1g, item 1. After BMAT has performed action 1g, item 1, proceed to action 2, item 1. (2) Notify MMT when approximately 5 minutes have elapsed after FUEL LINE FILLED indicator illuminates green
	MMT		f. When notified by MCCC that approximately 5 minutes have elapsed, observe that valve stem position indicator of valve F-8 skid NO. 2 (figure 1-55) moves to closed position and notify BMAT of condition
	BMAT		g. When notified that F-8 is closed, replace wire on terminal 14 (figure 4-16) of terminal board TB2-2 and notify MCCC that wire is replaced
	MCCC		h. Observe that FUEL COMPLETE indicator on launch control console (figure 1-62) illuminates green and continue countdown

Table 4-32. Tactical Trouble Analysis, Fuel System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 2
1 (CONT)	MMT	No 28 VDC at valve SF-8 solenoid	a. Observe valve stem position indicator on valve F-8 at skid NO. 2 (figure 1-55) and report condition to MCCC
	MCCC		Note If valve F-8 is closed proceed to action 2b, item 1. b. Direct BMAT to PLTC
	BMAT		c. At PLTC (figure 4-16): (1) Check for 28 VDC between terminal 4 of terminal board TB2-2 and terminal 6 of terminal board TB1-2. Note If 28 VDC is present, proceed to action 3, item 1. If 28 VDC is not present, proceed to action 2c (2), item 1. (2) Install jumper between terminal 4 of terminal board TB2-2 and terminal 18 of terminal board TB1-2, and notify MCCC when jumper is installed
	MCCC		d. At launch control console (figure 1-62): (1) Observe FUEL LINE FILLED indicator illuminated green, and continue countdown. (2) (Deleted)

Table 4-32. Tactical Trouble Analysis, Fuel System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 2 (CONT)
1 (CONT)	BMAT		**CAUTION** Step e shall be performed immediately if sensor FINE LOAD FUEL PRIMARY or FINE LOAD FUEL SECONDARY indicator illuminates green. Failure to comply will result in damage to missile. e. Remove jumper installed between terminal 4 of terminal board TB2-2 and terminal 18 of terminal board TB1-2 (figure 4-16)
			3
	MCCC	Valve SF-8 solenoid is faulty	Note If 28 VDC was present in action 2c (1), item 1, proceed with action 3a, item 1. a. Direct MMT to skid NO. 2
	MMT		b. At skid NO. 2 (figure 1-55): (1) Remove solenoid from valve SF-8 on valve F-8, and install spare solenoid. Note If spare solenoid is not available, remove solenoid from valve SF-13 on valve F-13, and install solenoid removed from valve SF-13 on valve SF-8. (2) (Deleted) (3) (Deleted)

Table 4-32. Tactical Trouble Analysis, Fuel System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			3 (CONT)
1 (CONT)	MCCC		c. Observe that FUEL LINE FILLED indicator on launch control console (figure 1-62) is illuminated green, and continue countdown
			4
	MCCC		Note If FUEL LINE FILLED indicator is not illuminated green after performing actions 1, 2, and 3, item 1, proceed with action 4, item 1. a. Direct MMT to skid NO. 1 (figure 1-54)
	MMT	Low instrument air pressure	b. At skid NO. 1: (1) If action 1b (1), item 1, shows valve F-8 closed, observe gage PI-15-1. (2) If gage does not indicate approximately 35.0 PSI, adjust pressure regulator PR-2-1 until gage PI-15-1 indicates approximately 35.0 PSI
	MCCC		c. Observe that FUEL LINE FILLED indicator on launch control console (figure 1-62) is illuminated green and continue countdown
			1
2	MCCC	FUEL LEVEL SENSING indicator on launch control console (figure 1-62) illuminates amber.	a. Direct BMAT at PROPELLANT LEVEL (PANEL 1) to observe all indicators
	BMAT		b. Observe all indicators on PROPELLANT LEVEL (PANEL 1) (figure 4-18) and notify MCCC which indicators are illuminated
	MCCC	A single SENSOR failure in one or more sets of FUEL SENSORS	c. Continue countdown

Table 4-32. Tactical Trouble Analysis, Fuel System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1 (CONT)
3	MCCC	FUEL LEVEL SENSING indicator on launch control console (figure 1-62) illuminates red.	a. Direct BMAT at PROPELLANT LEVEL (PANEL 1) to observe which pair of fuel sensor indicators have illuminated
	BMAT	FUEL SENSOR double failure	b. Observe which pair of fuel sensor indicators on PROPELLANT LEVEL (PANEL 1) (figure 4-18) are illuminated and report condition to MCCC
	MCCC		Note For DPL or TRAINING LAUNCH return to standby in accordance with table 3-15. If in tactical countdown, refer to item 9.
			1
4	MCCC	FUEL LOADING indicator does not illuminate green when FUEL LINE FILLED indicator illuminates green on launch control console (figure 1-62)	Continue countdown

Table 4-32. Tactical Trouble Analysis, Fuel System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1
5	MCCC	RAPID FUEL LOAD indicator on launch control console does not illuminate amber immediately after BOOM CLEAR indicator illuminates green.	Note If performing DPL or training launch, depress RETURN TO STANDBY pushbutton and return to standby in accordance with table 3-15. If during a tactical launch, proceed to step a. a. Direct MMT to skid NO. 2
	MMT	Faulty microswitch on valve F-7	b. At skid NO. 2 (figure 1-55): (1) Observe valve F-7 valve stem position indicator. (2) If indicator shows valve is open, attempt to manually operate microswitch on valve F-7 and notify MCCC
			2
	MCCC		Note If valve F-7 valve stem position indicator indicates valve F-7 is open, continue countdown. If valve F-7 valve stem position indicator indicates valve F-7 is closed, proceed to step a a. Direct BMAT to PLTC

Table 4-32. Tactical Trouble Analysis, Fuel System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 2 (CONT)
5 (CONT)	BMAT	No 28 VDC to solenoid or faulty solenoid on valve SF-7-A	b. At PLTC (figure 4-16): (1) Check for 28 VDC between terminal 3 on terminal board TB2-2 and terminal 1 on terminal board TB1-1. Note If 28 VDC is present, perform action 3, item 5. If 28 VDC is not present, perform action 2b(2), item 5. (2) Install a jumper between terminal 18 on terminal board TB1-2 and terminal 3 on TB2-2 and notify MCCC when jumper is installed
	MMT		c. Observe that valve F-7 valve stem position indicator on skid NO. 2 (figure 1-55) moves to open position
	MCCC		d. At launch control console (figure 1-62): (1) Observe RAPID FUEL LOAD indicator is illuminated amber. (2) Notify BMAT when 216 seconds have elapsed.
	BMAT		CAUTION When RAPID LOAD FUEL PRIMARY or RAPID LOAD FUEL SECONDARY indicator on PLCU illuminates green or when notified by MCCC that 216 seconds have elapsed after RAPID FUEL LOAD indicator illuminated amber, immediately perform action 2e, item 5. Failure to comply will result in damage to the missile.

Table 4-32. Tactical Trouble Analysis, Fuel System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 2 (CONT)
5 (CONT)	BMAT		e. Remove jumper between terminal 18 on terminal board TB1-2 and terminal 3 on TB2-2 (figure 4-16). Notify MCCC when jumper is removed.
	MCCC		f. Continue countdown
			3
	MCCC	Solenoid on solenoid valve SF-7-A has failed	a. Direct MMT to skid NO. 2
	MMT		b. At skid NO. 2 (figure 1-55): (1) Remove solenoid from solenoid valve SF-7-A, and install spare solenoid. Note If spare solenoid is not available remove solenoid from solenoid valve SF-7-B and install solenoid removed from solenoid valve SF-7-B on solenoid valve SF-7-A. (2) (Deleted) (3) (Deleted) (4) Observe valve F-7 valve stem position indicator. Notify MCCC when valve F-7 valve stem position indicator indicates OPEN
	MCCC		Note If valve F-7 opens, observe that RAPID FUEL LOAD indicator on launch control console (figure 1-62) is illuminated amber and continue countdown. If valve F-7 does not open, perform action 4, item 5.

Table 4-32. Tactical Trouble Analysis, Fuel System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			2 (CONT)
5 (CONT)	BMAT		e. Remove jumper between terminal 18 on terminal board TB1-2 and terminal 3 on TB2-2 (figure 4-16). Notify MCCC when jumper is removed.
	MCCC		f. Continue countdown
			3
			(ACTION 3 DELETED)

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Table 4-32. Tactical Trouble Analysis, Fuel System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 4
5 (CONT)	MCCC	No instrument air pressure to solenoid valves SF-7A and SF-7B	a. Direct MMT to skid NO. 1
	MMT		b. At skid NO. 1 (figure 1-54): (1) Observe pressure gage PI-17-1. (2) If gage indicates less than 200 PSI, adjust pressure regulator PR-3-1 to approximately 250 PSI as indicated on gage PI-17-1 and notify MCCC when 250 PSI is obtained
	MCCC		Note If RAPID FUEL LOAD indicator on launch control console (figure 1-62) illuminates amber, continue countdown. If RAPID FUEL LOAD indicator does not illuminate amber, fuel can be loaded through drain valve F-13 by performing action 5, item 5.
			5
	MCCC	Alternate procedure to load fuel through drain valve	Note This procedure is to be used when valve F-7 cannot be opened. a. Direct BMAT to control monitor group 1 of 4 and MMT to skid NO. 2 (figure 1-55)

Table 4-32. Tactical Trouble Analysis, Fuel System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 5 (CONT)
5 (CONT)	BMAT		b. At control-monitor group 1 of 4: (1) Position valve OPEN-CLOSE switches on FUEL TANKING (PANEL 1) (figure 4-10), as follows: N-6 - OPEN N-18 - CLOSED N-30 - CLOSED N-44 - CLOSED F-7 - OPEN F-8 - OPEN FC1 - OPEN FC2 - OPEN F-13 - CLOSED NC1 - CLOSED (2) Position REMOTE-LOCAL switch on FUEL TANKING (PANEL 1) to LOCAL and observe LOCAL CONTROL indicator illuminates amber. Note The MMT will observe F-7 valve stem indication at skid NO. 2. If valve does not move to open, MMT will direct BMAT to position F-7 OPEN-CLOSE switch to CLOSE and F-13 switch to OPEN. (3) Observe RAPID LOAD FUEL PRIMARY indicator on PROPELLANT LEVEL (PANEL 1).

Table 4-32. Tactical Trouble Analysis, Fuel System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			5 (CONT)
5 (CONT)	BMAT		(4) When RAPID LOAD FUEL PRIMARY indicator illuminates green, immediately position either F7 switch or F13 switch on FUEL TANKING (PANEL 1) (figure 4-10), as applicable, to CLOSE. (5) Ten seconds after positioning F13 switch or F7 switch to CLOSE, position FC1 switch to CLOSE and observe GROUND FILL & DRAIN CLOSED indicator illuminates green on FUEL TANKING (PANEL 2). (6) Position REMOTE LOCAL switch on FUEL TANKING (PANEL 1) to REMOTE and observe that LOCAL CONTROL indicator extinguishes
	MCCC		c. Observe that RAPID FUEL LOAD indicator on launch control console (figure 1-62) illuminates green and continue countdown. Note If valve F-13 or F-7 cannot be opened, perform action 6, item 5.
			6
	MCCC	Alternate procedure to be used if valve F-13 or F-7 cannot be opened from control-monitor group 1 of 4	a. Direct MMT to skid NO. 2
	MMT		b. Open manual fuel drain valve F-10 on skid NO. 2 (figure 1-55)
	MCCC		c. Depress ALARM RESET pushbutton when alarm buzzer on launch control console (figure 1-62) sounds and LO_2 & FUEL SYSTEM indicator on status patch illuminates red, and direct BMAT to control-monitor group 1 of 4

Table 4-32. Tactical Trouble Analysis, Fuel System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			6 (CONT)
5 (CONT)	BMAT		d. Observe RAPID LOAD FUEL PRIMARY indicator or RAPID LOAD FUEL SECONDARY indicator on PROPELLANT LEVEL (PANEL 1) (figure 4-18) illuminates, and notify MMT of condition
	MMT		e. Close manual fuel drain valve F-10 (figure 1-55)
	MCCC		f. Observe that RAPID FUEL LOAD indicator on launch control console (figure 1-62) illuminates green, and continue countdown
			1
6	MCCC	RAPID FUEL LOAD indicator on the launch control console remains amber for more than 13 seconds after FUEL COMPLETE indicator illuminates amber.	Note If performing DPL or training launch, depress RETURN TO STANDBY pushbutton and return to standby in accordance with table 3-15. If during tactical launch, proceed to step a. CAUTION Step b shall be performed immediately to prevent damage to missile due to fuel overfill.
		F-7 close microswitch failure (rapid load valve)	a. Direct BMAT to immediately position REMOTE LOCAL switch on FUEL TANKING (PANEL 1) to LOCAL

Table 4-32. Tactical Trouble Analysis, Fuel System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
6 (CONT)	BMAT		b. Position REMOTE-LOCAL switch on FUEL TANKING (PANEL 1) (figure 4-10) to LOCAL
	MCCC		bA. Direct BMAT to PLTC to install jumper from terminal 12 of TB2-2 to terminal 18 of TB1-2. c. Direct MMT to skid NO. 2
	MMT		d. At skid NO. 2 (figure 1-55): (1) Observe that valve F-7 valve stem position indicator indicates closed. (2) Observe that valve F-8 valve stem position indicator indicates closed, and report conditions to BMAT. (Actions e through g deleted.)
	BMAT		h. Position REMOTE-LOCAL switch on FUEL TANKING (PANEL 1) (figure 4-10) to REMOTE
	MCCC		hA. Observe RAPID FUEL LOAD indicator illuminates green
	MMT		hB. At skid NO. 2: (1) Observe that valve F-7 valve stem position indicator indicates closed. (2) Observe that valve F-8 valve stem position indicator indicates open, and report conditions to BMAT
	MCCC		i. Continue countdown

Table 4-32. Tactical Trouble Analysis, Fuel System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1
7	MCCC	FUEL COMPLETE indicator does not illuminate green within 75 seconds after illuminating amber, and a fuel underfill is not suspected	Note If performing DPL or training launch, depress RETURN TO STANDBY pushbutton and return to standby in accordance with table 3-15. If in tactical launch, proceed to step a. a. Upon expiration of 75 seconds, direct BMAT to immediately position REMOTE LOCAL switch on FUEL TANKING (PANEL 1) (figure 4-10) to LOCAL
	BMAT		b. Position REMOTE LOCAL switch on FUEL TANKING (PANEL 1) (figure 4-10) to LOCAL, and observe that LOCAL CONTROL indicator illuminates
	MCCC		c. Direct BMAT to rear of control-monitor group 1 of 4
	BMAT		d. Disconnect connectors 600P357 and 600P358 at lower rear of control-monitor group 1 of 4
	MCCC		e. At launch control console (figure 1-62): (1) Observe that FUEL COMPLETE indicator illuminates green. (2) Direct BMAT to return to front of control-monitor group 1 of 4
	BMAT		f. Position REMOTE LOCAL switch on FUEL TANKING (PANEL 1) (figure 4-10) to REMOTE
	MCCC		g. Continue countdown

(All data on page 4-161 deleted.)

Table 4-32. Tactical Trouble Analysis, Fuel System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1
8	MCCC	FUEL SUPPLY indicator on the launch control console (figure 1-62) illuminates red after START COUNTDOWN pushbutton has been depressed	Continue countdown
			1
9	MCCC	Automatic fuel loading sequence fails	Note This procedure may be used to load fuel aboard the missile, for tactical launch only, using control-monitor group 1 of 4 panel controls and indicators, in the event a failure occurs in the automatic loading sequence. Depending upon specific time of fault occurrence in countdown, only portions of this procedure may be required.

Table 4-32. Tactical Trouble Analysis, Fuel System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
9 (CONT)	MCCC		**CAUTION** Prior to using this procedure, a thorough analysis of the effects of this procedure on other operations required in the countdown and the effect of the particular fault on the overall countdown must be made. Ensure that particular fault has no detrimental effect upon required summary conditions, pressure system control phasing, and other necessary sequences. Failure to comply may result in loss of the missile or damage to equipment. a. At launch control console (figure 1-62): (1) Inform crew that manual fuel loading will be performed. (2) Direct MMT to skid NO. 1
	BMAT		b. At FUEL TANKING (PANEL 1) (figure 4-10), position REMOTE LOCAL switch to LOCAL and notify MCCC of conditions
	MCCC		c. Notify BMAT when MISSILE ERECTED indicator on launch control console (figure 1-62) is illuminated green
	BMAT		d. Position valve N-30 or N-44 OPEN CLOSE switch (figure 4-10) to OPEN

Table 4-32. Tactical Trouble Analysis, Fuel System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
9 (CONT)	MMT		e. Observe pressure indicator PI-9-1 on nitrogen transfer valve skid NO. 1 (figure 1-54). Notify BMAT when pressure indicator PI-9-1 reads 50 PSI or more
	BMAT		f. Position valve N30 or N44 switch on FUEL TANKING (PANEL 1) (figure 4-10) to CLOSE, and N6, F8, FC1, and FC2 switches to OPEN. fA. Observe GROUND FILL AND DRAIN OPENED and MISSILE FILL & DRAIN OPENED indicators, on FUEL TANKING (PANEL 2), illuminate amber
	MCCC		g. On launch control console (figure 1-62): (1) Observe that FUEL LINE FILLED and BOOM CLEAR indicators illuminate green. (2) Observe missile LO_2 TANK pressure gage change to 2.7 PSI and FUEL TANK pressure gage change to 28.0 PSI and notify BMAT of pressure changes
	BMAT		h. At control-monitor group 1 of 4: (1) One minute after being notified of pressure changes, position valve F7 switch on FUEL TANKING (PANEL 1) (figure 4-10) to OPEN

Table 4-32. Tactical Trouble Analysis, Fuel System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
9 (CONT)	BMAT		Note Approximately 3 minutes after performing action lh (1), RAPID LOAD FUEL PRIMARY indicator on PROPELLANT LEVEL (PANEL 1) (figure 4-18) will illuminate green. Perform following step immediately after indicator illuminates green. (2) Observe RAPID LOAD FUEL PRIMARY or RAPID LOAD FUEL SECONDARY indicator on PROPELLANT LEVEL (PANEL 1). When indicator illuminates green, immediately position valve F7 switch on FUEL TANKING (PANEL 1) (figure 4-10) to CLOSE. (3) Observe FINE LOAD FUEL PRIMARY and FINE LOAD FUEL SECONDARY indicators on PROPELLANT LEVEL (PANEL 1) (figure 4-18). When both indicators illuminate green (approximately 90 seconds after action 1h (2), item 9, immediately position valve F8 switch on FUEL TANKING (PANEL 1) (figure 4-10) to CLOSE. (4) After 5 seconds, position valve FC2 switch to CLOSE and observe MISSILE FILL & DRAIN CLOSED indicator illuminated green on FUEL TANKING (PANEL 2)

Table 4-32. Tactical Trouble Analysis, Fuel System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
9 (CONT)	MCCC		i. At launch control console (figure 1-62): (1) Observe that FUEL COMPLETE indicator illuminates green. (2) Observe LO_2 TANK pressure gage indicates 2.7 PSI and FUEL TANK pressure gage indication changes to 63.0 PSI. (3) Notify BMAT of pressure change
	BMAT		j. At FUEL TANKING (PANEL 1) and FUEL TANKING (PANEL 2) (figure 4-10): (1) After being notified of pressure change, position valve N6 switch to CLOSE. (2) Five seconds after positioning N6 switch to CLOSE, position N18 switch to OPEN. (3) Observe BLANKET PRESSURE indicator. When indicator extinguishes, position F13 and NC1 switches to OPEN. (4) After 2 minutes, position valve NC1, N18, F13, and FC1 switches to CLOSE and observe GROUND FILL & DRAIN CLOSED indicator illuminates green. (5) (Deleted) (6) Position REMOTE LOCAL switch to REMOTE. Observe that LOCAL CONTROL indicator extinguishes and notify MCCC of conditions
	MCCC		Continue countdown

Table 4-32. Tactical Trouble Analysis, Fuel System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1
10	MCCC	FUEL DRAINING indicator on launch control console (figure 1-62) does not illuminate green 120 seconds after FUEL DRAINED indicator illuminates amber	a. Continue return to standby sequence in accordance with table 3-15. b. Direct MMT to fuel room to audibly check that fuel is draining. If MMT reports fuel draining, continue return to standby. If MMT reports fuel not draining, perform manual detanking in accordance with table 4-46

Table 4-33. Tactical Trouble Analysis, Liquid Oxygen System Malfunction

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1
1	MCCC	LO_2 LINE FILLED indicator does not illuminate amber after HYDRAULIC PRESSURE indicator illuminates green on launch control console (figure 1-62)	a. Direct MMT to LO_2 room
	MMT		b. On skid NO. 9 (figure 1-58): (1) Observe valve O-20 valve stem position indicator. (2) If indicator shows valve O-20 is closed, attempt to manually operate microswitch on valve O-20
	MCCC	Valve O-20 not closed. Microswitch MS-238-9 on skid NO. 9 (figure 1-58) has failed in closed (valve O-20 open) position	c. At launch control console (figure 1-62): (1) Observe that LO_2 LINE FILLED indicator illuminates amber. Note If LO_2 LINE FILLED indicator does not illuminate amber, during a DPL or training launch, return to standby in accordance with table 3-15. If during a tactical launch, proceed to action 1c (2) item 1. (2) Direct BMAT to PLTC
	BMAT		d. At PLTC (figure 4-16): (1) If microswitch on valve 20 operates mechanically, check for 28 VDC between terminal 15 and terminal 6 on terminal board TB-1-9.

Table 4-33. Tactical Trouble Analysis, Liquid Oxygen System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1 (CONT)
1 (CONT)	BMAT		(2) If 28 VDC is not present, remove wire 783 from terminal 15 of terminal board TB-1-9
	MCCC		e. Observe that LO_2 LINE FILLED indicator on launch control console (figure 1-62) illuminates amber and then green. Note If missile is not launched, wire 783 which was removed in action 1d (2), item 1, must be replaced prior to initiating return to standby sequence.
			2
	MMT	Valve SO-20 solenoid valve has failed in closed position	a. On skid NO. 9 (figure 1-58), observe that valve O-20 valve stem position indicator shows valve is open and report condition to MCCC
	MCCC		b. If MMT reports valve O-20 is open, direct MMT to skid NO. 8
	MMT		c. At skid NO. 8 (figure 1-59): (1) Observe pressure gage PI-217-8. (2) If gage indicates less than 200 PSI, adjust regulator PR 203-8 behind instrument panel to obtain 250 PSI and notify MCCC when pressure is obtained
	MCCC		d. Direct MMT to skid NO. 9

Table 4-33. Tactical Trouble Analysis, Liquid Oxygen System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 2 (CONT)
1 (CONT)	MMT		e. On skid NO. 9 (figure 1-58), observe that valve O-20 closes and notify MCCC when valve is closed
	MCCC		f. At launch control console (figure 1-62): (1) Observe that LO_2 LINE FILLED indicator illuminates amber, and continue countdown. Note If LO_2 LINE FILLED indicator does not illuminate amber, during DPL or training launch, return to standby in accordance with table 3-15. If during a tactical launch, proceed to action 2f (2). (2) If MMT reported valve O-20 open in action 2e, item 1, proceed to action 4a
			g. (Steps g through n deleted.)
			3 (Deleted)

(All data on page 4-170 deleted.)

Table 4-33. Tactical Trouble Analysis, Liquid Oxygen System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 4
1 (CONT)	MCCC		a. Direct BMAT to PLTC
	BMAT		b. At PLTC (figure 4-16): (1) Check for 28 VDC between terminals 1 and 13 on terminal board TB1-9. (2) If 28 VDC is not present, install jumper between terminal 13 on terminal board TB1-9 and terminal 12 on terminal board TB1-8 and proceed to action 4i, item 1. Note If 28 VDC was present in action 4b (1), proceed to action 4c.
	MCCC		c. Direct BMAT to control-monitor group 1 of 4

Table 4-33. Tactical Trouble Analysis, Liquid Oxygen System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 4 (CONT)
1 (CONT)	BMAT		d. At control-monitor group 1 of 4: (1) Position LOCAL-REMOTE switch on LO_2 TANKING (PANEL 1) to LOCAL and observe that LOCAL control indicator illuminates. (2) Position O-20 OPEN-CLOSE switch on LO_2 TANKING (PANEL 1) (figure 4-9) to OPEN
	MCCC		e. Direct MMT to skid NO. 9
	MMT		f. At skid NO. 9 (figure 1-58): (1) Remove solenoid from solenoid valve SO-20 and install spare solenoid. Note If spare solenoid is not available, remove solenoid from solenoid valve SL-12 and install on solenoid valve SO-20. (2) (Deleted)
	BMAT		g. At LO_2 TANKING (PANEL 1) (figure 4-9): (1) Position O-20 OPEN-CLOSE switch to CLOSE. Note If valve O-20 closes, proceed to action 4i, item 1. If valve O-20 does not close, return to standby in accordance with table 3-15. (2) (Deleted)

Table 4-33. Tactical Trouble Analysis, Liquid Oxygen System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			4 (CONT)
1 (CONT)			h. (Deleted)
	BMAT		i. Position LOCAL-REMOTE switch on LO_2 TANKING (PANEL 1) (figure 4-9) to REMOTE
	MCCC		j. Observe that LO_2 LINE FILLED indicator on launch control console (figure 1-62) illuminates amber, then green, and continue countdown
			5
	MCCC	LO_2 fine load valve L-4 failed to open	a. At launch control console: (1) For DPL or training launch, depress RETURN TO STANDBY pushbutton and return to standby in accordance with table 3-15.

Table 4-33. Tactical Trouble Analysis, Liquid Oxygen System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 5 (CONT)
1 (CONT)	MCCC		(2) For tactical launch, direct MMT to skid NO. 8, BMAT to PLTC, and perform action 5b, item 1, through action 5i, item 1
	MMT		b. On skid NO. 8 (figure 1-59), observe that fine load valve L-4 valve stem position indicator shows valve is closed and report condition to MCCC
	BMAT		c. Remove wire 765 from terminal 8 on terminal board TB3-8 in PLTC (figure 4-16)
	MMT		d. On skid NO. 8 (figure 1-59), open manual valve L-7 half way
	MCCC		e. At launch control console (figure 1-62): (1) Alarm buzzer will sound. Depress alarm reset pushbutton. (2) Observe that LO_2 LINE FILLED indicator is illuminated green. (3) Observe that FUEL TANK pressure increases to 60.0 PSI, then direct MMT to close valve L-7
	MMT		f. Close valve L-7 on skid NO. 8 (figure 1-59) when gage indicates 60.0 PSI
	MCCC		g. Observe that RAPID LO_2 LOAD indicator on launch control console (figure 1-62) illuminates green and direct BMAT to reconnect wire 765

Table 4-33. Tactical Trouble Analysis, Liquid Oxygen System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			5 (CONT)
1 (CONT)	BMAT		h. Reconnect wire 765 to terminal 8 on TB3-8 in PLTC (figure 4-16)
	MCCC		i. Verify that FUEL & LO_2 READY indicator on launch control console (figure 1-62) is illuminated green
			6
	MMT	Microswitch MS-224-8 on fine load valve L-4 fails in closed position	a. On skid NO. 8 (figure 1-59): (1) Observe that fine load valve L-4 valve stem position indicator shows valve is open. (2) Manually actuate microswitch MS-224-8 on valve L-4 in an attempt to eliminate a mechanical malfunction and report conditions to MCCC
	MCCC		b. At launch control console (figure 1-62): (1) For DPL or training launch, depress RETURN TO STANDBY pushbutton if LO_2 LINE FILLED indicator does not illuminate green. (2) For tactical launch, direct BMAT to PLTC, MMT to skid NO. 8, and perform actions 6c, item 1, through action 6h, item 1
	BMAT		c. Remove wire 765 from terminal 8 on TB3-8 in PLTC (figure 4-16)

Table 4-33. Tactical Trouble Analysis, Liquid Oxygen System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			6 (CONT)
1 (CONT)	MCCC		d. Observe that FUEL & LO_2 READY indicator on launch control console (figure 1-62) changes from amber to extinguished
	MMT		e. Observe valve L-2 and L-4 valve stem position indicators on LO_2 control valve skid NO. 8 (figure 1-59) (valves should be closed) and report conditions to the MCCC
	MCCC		f. Direct BMAT to reconnect wire 765
	BMAT		g. Reconnect wire 765 to terminal 8 on TB3-8 in PLTC (figure 4-16)
	MCCC		h. At launch control console (figure 1-62): (1) Observe that LO_2 LINE FILLED indicator on launch control console is illuminated amber, then green. (2) Observe that FUEL & LO_2 READY indicator on launch control console is illuminated green
			1
2	MCCC	LO_2 LINE FILLED indicator on launch control console (figure 1-62) does not illuminate green after FUEL COMPLETE indicator illuminates green	a. At launch control console: (1) For DPL or training launch, depress RETURN TO STANDBY pushbutton and return to standby in accordance with table 3-15. (2) For a tactical launch, direct MMT to skid NO. 8 and BMAT to PLTC

Table 4-33. Tactical Trouble Analysis, Liquid Oxygen System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1 (CONT)
2 (CONT)	MMT	Pressure switch PS 213-8, (transfer line pressure excessive) failed in pressure not excess mode	b. On skid NO. 8 (figure 1-59), observe valve stem position indicator shows valve L-4 is open
	BMAT		c. Install a jumper between terminal 15 on terminal board TB3-8 and terminal 2 on terminal board TB2-8 in PLTC (figure 4-16)
	MCCC		d. Observe that LO_2 LINE FILLED indicator on launch control console (figure 1-62) is illuminated green
	MMT		e. Observe valve L-2 and L-4 valve stem position indicators on skid NO. 8 (figure 1-59). Note Valves should be closed after RAPID LO_2 LOAD and FUEL & LO_2 READY indicators on launch control console illuminate green. f. Observe valve L-22 on skid NO. 8. When valve L-22 valve stem position indicator shows valve is open, remove jumper installed in action 1c, item 2. g. Observe that valve L-22 closes
			1
3	MCCC	LO_2 LEVEL SENSING indicator on launch control console illuminates amber	a. Direct BMAT to control-monitor group 1 of 4
	BMAT		b. At PROPELLANT LEVEL (PANEL 1) (figure 4-18), observe all indicators and notify MCCC which indicators are illuminated

Table 4-33. Tactical Trouble Analysis, Liquid Oxygen System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1 (CONT)
3 (CONT)	MCCC	LO_2 sensor single failure at any level	c. Continue countdown
			1
4	MCCC	LO_2 LEVEL SENSING indicator illuminates red LO_2 rapid load sensor double failure in wet position	a. Dispatch BMAT to control-monitor group 1 of 4
	BMAT		b. At PROPELLANT LEVEL (PANEL 1) (figure 4-18), observe that RAPID LOAD LO_2 SECTION "A" and RAPID LOAD LO_2 SECTION "B" are illuminated amber
	MCCC		c. Countdown may be continued automatically by LO_2 loading through fine load valve L-4. However, countdown time will be extended by approximately 35 minutes until FUEL and LO_2 READY indicator illuminates green on launch control console (figure 1-62)
			2
	MCCC	LO_2 LEVEL SENSING indicator illuminated red Any set of sensors other than RAPID LOAD LO_2 has failed	a. Direct BMAT to control-monitor group 1 of 4
	BMAT		b. At PROPELLANT LEVEL (PANEL 1) (figure 4-18), observe that any set of LO_2 sensor indicators other than RAPID LOAD LO_2 SECTION "A" or RAPID LOAD LO_2 SECTION "B" has failed, and notify MCCC of conditions
	MCCC		c. Return to standby in accordance with table 3-15

Table 4-33. Tactical Trouble Analysis, Liquid Oxygen System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1
5	MCCC	LO_2 LOADING indicator does not illuminate green when LO_2 LINE FILLED illuminates green on the launch control console	Continue countdown
			1
6	MCCC	RAPID LO_2 LOAD indicator does not illuminate amber after FUEL COMPLETE indicator illuminates green on the launch control console (figure 1-67)	a. At launch control console: (1) During DPL or training launch, depress RETURN TO STANDBY pushbutton and return to standby in accordance with table 3-15. (2) For tactical launch, direct MMT to skid NO. 8
	MMT	LO_2 rapid load valve L-2 failed in closed position	b. Observe valves L-2 and L-4 valve stem position indicators on skid NO. 8 (figure 1-59). If valve L-2 is closed and valve L-4 is open, notify MCCC of conditions
	MCCC		c. Direct BMAT to control-monitor group 1 of 4

Table 4-33. Tactical Trouble Analysis, Liquid Oxygen System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
6 (CONT)	BMAT		d. On LO_2 TANKING (PANEL 1) (figure 4-9): (1) Place valve OPEN-CLOSE switches in the following positions: SA-1 CLOSE SA-2 CLOSE SA-3 OPEN SA-4 CLOSE O-20 CLOSE O-9A OPEN O-9B OPEN O-9C OPEN L-2 CLOSE L-4 OPEN L-32 OPEN LC-1 OPEN LC-2 OPEN L-12 CLOSE L-22 CLOSE (2) Position LOCAL-REMOTE switch to LOCAL. (3) Observe RAPID LOAD LO_2 SECTION "A" indicator on PROPELLANT LEVEL (PANEL 1) (figure 4-18). If indicator is not illuminated, position switch L-12 on LO_2 TANKING (PANEL 1) (figure 4-9) to OPEN. Note Ten seconds after performing action 1d(4), item 6, perform action 1d(5), item 6.

Table 4-33. Tactical Trouble Analysis, Liquid Oxygen System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1 (CONT)
6 (CONT)	BMAT		(4) Position switch L-12 (figure 4-9) to CLOSE immediately when RAPID LO_2 LOAD SECTION "A" indicator on PROPELLANT LEVEL (PANEL 1) (figure 4-18) illuminates green. Note Ten seconds after performing action 1d (5), item 6, perform action 1d (6), item 6. (5) Position LC-1 switch (figure 4-9) to CLOSE. (6) Position LOCAL-REMOTE switch on LO_2 TANKING (PANEL 1) to REMOTE
	MCCC		e. If RAPID LO_2 LOAD indicator fails to illuminate green, depress RETURN TO STANDBY pushbutton on launch control console (figure 1-62) and return to standby in accordance with table 3-15
			1
7	MCCC	RAPID LO_2 LOAD indicator on launch control console (figure 1-62) fails to illuminate green	Note This procedure may be used to load LO_2 aboard the missile, using control-monitor group 1 of 4 panel controls and indicators, in the event that a failure occurs in the automatic loading sequence during tactical launch only. Depending upon the specific time of fault occurrence in the countdown, only portions of this procedure may be required.

Table 4-33. Tactical Trouble Analysis, Liquid Oxygen System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
7 (CONT)	MCCC		**CAUTION** Prior to using this procedure, a thorough analysis of the effects of this procedure on other operations occurring in the countdown and the effect of the particular fault on the overall countdown must be made. Ensure that particular fault has no detrimental effect upon required summary conditions, pressure system control unit phasing, and other necessary sequences. Failure to comply may result in loss of the missile or damage to equipment. a. Direct BMAT to control-monitor group 1 of 4
	BMAT		b. At LO_2 TANKING (PANEL 1) (figure 4-9), position REMOTE-LOCAL switch to LOCAL, and valve SA-4 and O-20 OPEN-CLOSE switches to CLOSE
	MCCC		c. Observe that MISSILE ERECTED indicator on launch control console (figure 1-62) illuminates green and FUEL TANK pressure gage indicates 28 PSI nominal. Direct BMAT to perform action 1 (d), item 7
	BMAT		d. Position OPEN-CLOSE switches SA-1, O-9A, O-9B, O-9C, L-4, L-32, LC-1, and LC-2 on LO_2 TANKING (PANEL 1) (figure 4-9) to OPEN in that sequence

Table 4-33. Tactical Trouble Analysis, Liquid Oxygen System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
7 (CONT)	MCCC		e. At launch control console (figure 1-62): (1) Observe LO_2 LINE FILLED indicator illuminated amber. **WARNING** Ensure that FUEL COMPLETE indicator is illuminated green, FUEL TANK pressure gage indicates 55.0 PSI or greater, and 2 minutes (chilldown time) have elapsed since LO_2 LINE FILLED indicator illuminated amber, before continuing with this procedure. Failure to comply will result in loss of missile and possible injury or death to personnel. (2) Direct BMAT to perform action 1f, item 7
	BMAT		f. At LO_2 TANKING (PANEL 1) (figure 4-9): (1) Position valve SA-1 OPEN-CLOSE switch to CLOSE. (2) Position valve SA-2 OPEN-CLOSE switch to OPEN.

Table 4-33. Tactical Trouble Analysis, Liquid Oxygen System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
7 (CONT)	BMAT		Note After being notified by MCCC of conditions on the launch control console, and 30 seconds after positioning valve L-2 OPEN-CLOSE switch to OPEN, position valve SA-2 OPEN-CLOSE switch to CLOSE and valve SA-3 OPEN-CLOSE switch to OPEN. (3) Position valve L-2 OPEN-CLOSE switch to OPEN
	MCCC		g. Observe that RAPID LO_2 LOAD indicator on launch control console (figure 1-62) illuminates amber and notify BMAT of conditions
	BMAT		h. On LO_2 TANKING (PANEL 1) (figure 4-9), position valve SA-2 OPEN-CLOSE switch to CLOSE and valve SA-3 OPEN-CLOSE switch to OPEN. i. At PROPELLANT LEVEL (PANEL 1) (figure 4-16), observe RAPID LOAD LO_2 SECTION "A" indicator. When indicator illuminates green, immediately position valve L-2 OPEN-CLOSE switch on LO_2 TANKING (PANEL 1) (figure 4-9) to CLOSE
	MCCC		j. At launch control console (figure 1-62) observe that RAPID LO_2 LOAD indicator illuminates green and notify BMAT of conditions

Table 4-33. Tactical Trouble Analysis, Liquid Oxygen System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
7 (CONT)	BMAT		k. At PROPELLANT LEVEL (PANEL 1) (figure 4-18), observe FINE LOAD LO_2 SECTION "A" and FINE LOAD LO_2 SECTION "B" indicators. When both indicators illuminate green, position valve L-4 and LC-2 OPEN-CLOSE switches on LO_2 TANKING (PANEL 1) (figure 4-9) to CLOSE
	MCCC		l. At launch control console (figure 1-62), observe that FUEL & LO_2 READY indicator is illuminated green and notify BMAT of conditions
	BMAT		m. At LO_2 TANKING (PANEL 1) (figure 4-9), position valve L-22 OPEN-CLOSE switch to OPEN. n. At PROPELLANT LEVEL (PANEL 1) (figure 4-16), observe LO_2 TOPPING SECTION "B" indicators illuminated green. o. At LO_2 TANKING (PANEL 1) (figure 4-9): (1) When both indicators illuminate green, position valve L-32 OPEN-CLOSE switch to CLOSE. (2) Two minutes after placing L-22 OPEN-CLOSE switch to OPEN (action 1m, item 7), position valve L-22 OPEN-CLOSE switch to CLOSE and position REMOTE-LOCAL switch to REMOTE. LO_2 topping sequence will continue while in hold prior to commit sequence start

Table 4-33. Tactical Trouble Analysis, Liquid Oxygen System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1 (CONT)
7A	MCCC	SLUG FAIL indicator on launch control console illuminates amber 32 seconds after POWER INTERNAL indicator illuminates green	a. For tactical launch or DPL, continue countdown. b. For training launch, immediately depress COMMIT STOP pushbutton and return to standby in accordance with table 3-15
			1
8	MCCC	LO_2 SUPPLY indicator on launch control console (figure 1-62) illuminates red after START COUNTDOWN pushbutton has been depressed	a. Continue countdown. b. Refer to table 4-34 if FUEL & LO_2 READY indicator does not illuminate green
			1
9	MCCC	LO_2 DRAINING indicator on launch control console does not illuminate green approximately 75 seconds after LO_2 DRAINED indicator illuminates amber	Perform manual detanking in accordance with table 4-45.

Table 4-34. Tactical Trouble Analysis, Fuel and Liquid Oxygen Ready System Malfunction

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1
1	MCCC	FUEL & LO_2 READY indicator does not illuminate amber immediately after RAPID LO_2 LOAD indicator illuminates green on launch control (figure 1-62)	Continue countdown and proceed to item 2.
			1
2	MCCC	FUEL & LO_2 READY indicator on the launch control console does not illuminate green	a. At launch control console: (1) If performing DPL or training launch, depress RETURN TO STANDBY push-button and return to standby in accordance with table 3-15. NOTE If in a tactical launch, continue trouble analysis and perform action 1a(2), item 2. (2) Direct MMT to skid NO. 8
	MMT		b. At skid NO. 8 (figure 1-59), observe valve L-4 valve stem position indicator, and notify MCCC if valve L-4 is open or closed
	MCCC		c. At launch control console (figure 1-62): Direct BMAT to PLTC
	BMAT		d. At PLTC: (1) If notified that valve L-4 is open, remove wire from pin 13 on terminal board TB2-8. (2) Notify MCCC when wire is removed

Table 4-34. Tactical Trouble Analysis, Fuel and Liquid Oxygen Ready System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
2 (CONT)			(3) If notified that valve L-4 is closed, install jumper between pin 12 of terminal board TB1-8 and pin 8 of terminal board TB3-8. (4) Notify MCCC when jumper is installed
	MCCC		e. At launch control console: Note If FUEL & LO_2 READY indicator illuminates green, perform action 1e (1) and 1e (2). If FUEL & LO_2 READY indicator does not illuminate green, proceed to action 1e (3) and subsequent actions: (1) Observe FUEL & LO_2 READY indicator illuminates green. (2) Continue countdown. (3) Direct BMAT to remove jumper installed between pin 12 of terminal board TB1-8 and pin 8 of terminal board TB3-8
	BMAT		f. At PLTC: (1) Remove jumper between pin 12 of terminal board TB1-8 and pin 8 of terminal board TB3-8. (2) Notify MCCC when jumper is removed

Table 4-34. Tactical Trouble Analysis, Fuel and Liquid Oxygen Ready System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
2 (CONT)	MCCC		g. When notified that jumper is removed, return to standby in accordance with table 3-15
			1
3	MCCC	FUEL & LO_2 READY indicator on launch control console does not illuminate green 15 minutes after commit sequence has stopped, due to loss of slug capability	Note LO_2 slug tank must be refilled after stopping a commit sequence to permit a second commit sequence without a complete return to standby. If in a DPL or training launch, return to standby in accordance with table 3-15. a. Direct BMAT to control-monitor group 1 of 4
	BMAT		b. On LO_2 TANKING (PANEL 1) and (PANEL 2) (figure 4-9), perform the following: (1) Position switch 0-20 to CLOSE. (2) Position switch SA-4 to CLOSE. (3) Verify all other switches in standby. c. Position REMOTE LOCAL switch to LOCAL. d. Position switch O-37 to OPEN. e. Position switch L-35 to OPEN.
	MCCC		f. At launch control console (figure 1-62), observe LO_2 SUPPLY indicator illuminates green and notify BMAT of condition

Table 4-34. Tactical Trouble Analysis, Fuel and Liquid Oxygen Ready System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1 (CONT)
3 (CONT)	BMAT		g. When notified by MCCC that LO_2 SUPPLY indicator is illuminated green, position switch L-35 to CLOSE, then position switch O-37 to CLOSE. h. Position REMOTE LOCAL switch to REMOTE. hA. Position switches O-20 and SA-4 to OPEN. i. Verify all valve switches are in standby positions. j. At launch control console, observe that FUEL & LO_2 READY indicator illuminates green
			2
	MCCC	LO_2 SUPPLY indicator illuminated red on launch control console	Note If during a DPL or training launch, return to standby. a. Direct BMAT control-monitor group 1 of 4
	BMAT		b. Observe SLUG SUPPLY indicator on LO_2 TANKING (PANEL 1) (figure 4-9) not illuminated and proceed to action c
	MCCC		c. Direct BMAT to LO_2 slug tank
	BMAT		d. Open petcock on LO_2 slug tank to check liquid oxygen level.

Table 4-34. Tactical Trouble Analysis, Fuel and Liquid Oxygen Ready System Malfunction (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			2 (CONT)
3 (CONT)	BMAT		Note If LO_2 slug tank is not full, proceed to action e, then g. If LO_2 slug tank is full, proceed to action f. e. Position switch LLS1-11 on liquid oxygen slug tank panel (figure 4-18A) to NOT FILLED until slug tank is full. Then position switch LLS1-11 to STANDBY. f. Position switch LLS2-11 to OVER FILLED
	MCCC		g. Observe FUEL & LO_2 READY and LO_2 SUPPLY indicators illumunate green on launch control console and continue countdown

Table 4-35. Tactical Trouble Analysis, Missile Battery Activated System Malfunction

CREW MEMBER	ABNORMAL INDICATION	ACTION 1
MCCC	MISSILE BAT. ACTIVATED indicator does not illuminate amber after RAPID LO_2 LOAD indicator is illuminated amber, or MISSILE BAT. ACTIVATED indicator does not illuminate green 2 minutes after MISSILE BAT. ACTIVATED indicator illuminates amber on launch control console (figure 1-62)	a. Direct BMAT to control-monitor group 2 of 4
BMAT		b. At MISSILE GROUND POWER (PANEL 1) (figure 4-12), observe for any of the following conditions: (1) BATTERY ACTIVATE indicator illuminated green. (2) BATTERY ACTIVATE indicator is extinguished and INTERNAL D.C. indicator is illuminated green or is extinguished. c. At MISSILE GROUND POWER (PANEL 2): (1) Position 28 VOLT DC selector switch to INTERNAL. (2) VOLTS D.C. meter not within 28 (±2) VDC tolerance d. At MISSILE GROUND POWER (PANEL 1), observe that BATTERY ACTIVATE indicator is extinguished and INTERNAL D.C. indicator is illuminated red. e. Report conditions to MCCC
MCCC		f. Return to standby in accordance with table 3-15 if any of the conditions in action 1b, 1c, or 1d occur

Table 4-36. Tactical Trouble Analysis, Engine Missile Power Ready System Malfunction

CREW MEMBER	ABNORMAL INDICATION	ACTION 1
MCCC	ENGINE/MISSILE POWER READY indicator remains extinguished after MISSILE POWER, HEATERS ON, and MISSILE BAT. ACTIVATED indicators have illuminated green on launch control console (figure 1-62)	Note If ENGINE/MISSILE POWER READY indicator is extinguished and MISSILE READY indicator is illuminated green, continue countdown. If MISSILE READY indicator is extinguished, perform following action. Depress RETURN TO STANDBY pushbutton at launch control console, and return to standby in accordance with table 3-15

Table 4-37. Tactical Trouble Analysis, Erected Ready System Malfunction

CREW MEMBER	ABNORMAL INDICATION	ACTION 1
MCCC	ERECTED READY indicator does not illuminate green within allotted time on the launch control console (figure 1-62)	At launch control console: Note If ERECTED READY indicator is extinguished and MISSILE READY indicator is illuminated green, continue countdown. If MISSILE READY indicator is extinguished, perform action 1a. a. Return to standby in accordance with table 3-15. b. Troubleshoot launch control equipment in accordance with T.O. 21-SM65E-2J-15-3

Table 4-38. Tactical Trouble Analysis, Flight Control and RV Ready System Malfunction

CREW MEMBER	ABNORMAL INDICATION	ACTION
MCCC	FLIGHT CONTROL R/V READY indicator on launch control console (figure 1-62) does not illuminate green within allotted time	a. Record all indications on launch control console and on control-monitor group 2 of 4 AUTOPILOT (PANEL 1) (figure 4-19), GUIDANCE panel (figure 4-20), and RE-ENTRY VEHICLE panel (figure 4-21). Note If FLIGHT CONTROL R/V READY indicator is extinguished and MISSILE READY indicator is illuminated green, continue countdown. If MISSILE READY indicator is extinguished, perform action b. b. Return to standby in accordance with table 3-15

Table 4-39. Tactical Trouble Analysis, Missile Ready System Malfunction

CREW MEMBER	ABNORMAL INDICATION	ACTION 1
MCCC	MISSILE READY indicator on launch control console, (figure 1-62) is extinguished after ENGINE/MISSILE POWER READY, FLIGHT CONTROL R/V READY, ERECTED READY, HYD-PNEU READY, and FUEL & LO_2 READY indicators are illuminated green	At launch control console: a. Perform lamp test. b. Attempt to start commit sequence. If commit sequence starts, continue countdown. Note If commit sequence does not start during a tactical launch, DPL, or training launch, return to standby in accordance with table 3-15.

Table 4-40. Tactical Trouble Analysis, Launch Enable System Malfunction

CREW MEMBER	ABNORMAL INDICATION	ACTION 1
MCCC	LAUNCH ENABLED indicator on launch control console (figure 1-62) remains extinguished after COMMIT START key switch has been turned on	At launch control console: Oa. Verify that COMMIT SWITCH on ALCO COMM/CONTROL panel has been turned fully clockwise. a. Contact unit command post to determine if launch was disabled. b. If launch was disabled by command post, perform action 1d. c. If launch was not disabled by command post, direct crew to troubleshoot launch control equipment in accordance with T.O. 21-SM65E-2J-15-3. d. Return to standby in accordance with table 3-15

Table 4-41. Tactical Trouble Analysis, Commit System Malfunction

CREW MEMBER	ABNORMAL INDICATION	ACTION 1
MCCC	Any indicator in commit patch on launch control console (figure 1-62) indicates a malfunction	Note If any indicator in commit patch indicates a malfunction, depress COMMIT STOP pushbutton and, if in a DPL or training launch, return to standby in accordance with table 3-15. During a tactical launch, attempt to restart commit sequence.

Table 4-42. Tactical Trouble Analysis, Missile Inverter System Malfunction

CREW MEMBER	ABNORMAL INDICATION	ACTION 1
MCCC	MISSILE INVERTER indicator illuminates red on launch control console (figure 1-62)	Return to standby in accordance with table 3-15

Table 4-43. Tactical Trouble Analysis, Malfunction Patch Trouble Indications

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1
1	MCCC	R/V SAFE indicator illuminates red on launch control console (figure 1-62)	Return to standby in accordance with table 3-15
			1
2	MCCC	AUTOPILOT FAIL indicator illuminates amber on launch control console	Continue countdown
			1
3	MCCC	AUTOPILOT FAIL indicator illuminates red on launch control console	Note If AUTOPILOT FAIL indicator illuminates red without first illuminating amber, wait 5 minutes. If indicator extinguishes, continue countdown. If indicator remains red, perform following action. Return to standby in accordance with table 3-15
			1
4	MCCC	RESPONDER MODE indicator illuminates amber or red on launch control console	Return to standby in accordance with table 3-15

Table 4-43. Tactical Trouble Analysis, Malfunction Patch Trouble Indications (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1
5	MCCC	POD AIR CONDITIONING indicator illuminates amber and GUIDANCE FAIL indicator illuminates red on launch control console	a. At launch control console (figure 1-62): (1) Return to standby in accordance with table 3-15. (2) Direct BMAT to control-monitor group 2 of 4
	BMAT		b. At MISSILE GROUND POWER (PANEL 1) (figure 4-12), position GUIDANCE SYS. PWR switch to OFF and report condition to MCCC
	MCCC		c. Direct BMAT to missile systems checkout programmer panel
	BMAT		d. At missile systems checkout programmer panel (figure 4-7), position CONTROL SELECTOR switch to LOCAL MANUAL and MGS OFF-ON switch to OFF. Notify MCCC of condition
			1
6	MCCC	POD AIR CONDITIONING indicator on launch control console illuminates amber within 2-1/2 minutes before start of commit sequence	Note In a tactical or training launch, continue countdown. If in a DPL, perform the following steps. a. At launch control console (figure 1-62): (1) Return to standby in accordance with table 3-15. (2) Direct BMAT to control-monitor group 2 of 4.
	BMAT		b. At MISSILE GROUND POWER (PANEL 1) (figure 4-12), position GUIDANCE SYS. PWR switch to OFF and report condition to MCCC

Table 4-43. Tactical Trouble Analysis, Malfunction Patch Trouble Indications (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION
			1 (CONT)
6 (CONT)	MCCC		c. Direct BMAT to missile systems checkout programmer panel
	BMAT		d. At missiles systems checkout programmer panel (figure 4-7), position CONTROL SELECTOR switch to LOCAL MANUAL and MGS OFF-ON switch to OFF. Notify MCCC of condition
			1
7	MCCC	POD AIR CONDITIONING indicator on launch control console illuminates amber at any time prior to 2-1/2 minutes before start of commit sequence	a. Observe GUIDANCE FAIL indicator on the launch control console (figure 1-62). b. Observe the following indicators on the FRCP trouble section: (1) MISSILE POD AIR HI TEMPERATURE (2) MISSILE POD AIR LO PRESSURE (3) MISSILE POD HI HUMIDITY Note If GUIDANCE FAIL indicator is illuminated amber or extinguished, MISSILE POD HI HUMIDITY indicator is illuminated, and MISSILE POD AIR HI TEMPERATURE and MISSILE POD AIR LO PRESSURE indicators are extinguished, continue countdown and proceed to action 1c. If either or both MISSILE POD AIR HI TEMPERATURE or MISSILE POD AIR LO PRESSURE indicators are illuminated, proceed to action 1d (2).

Table 4-43. Tactical Trouble Analysis, Malfunction Patch Trouble Indications (Continued)

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1 (CONT)
7 (CONT)	MCCC		c. If refrigeration compressor is not running, direct MMT to the LSB motor control center.
	MMT		d. At the LSB motor control center (figure 4-5): (1) Position MISSILE POD REFRIGERANT COMPRESSOR control to RESET and then to CLOSE. Note If compressor starts, continue countdown. If compressor does not start, proceed with the following steps. (2) Position THRUST & POD BLOWER control to OPEN and notify MCCC of condition
	MCCC		e. When informed by MMT that THRUST & POD BLOWER control is positioned to OPEN: (1) Return to standby in accordance with table 3-15. (2) Direct BMAT to control-monitor group 2 of 4
	BMAT		f. At MISSILE GROUND POWER (PANEL 1) (figure 4-12), position GUIDANCE SYS. PWR switch to OFF and report condition to MCCC
	MCCC		g. Direct BMAT to missile systems checkout programmer panel
	BMAT		h. At missile systems checkout programmer panel (figure 4-7), position CONTROL SELECTOR switch to LOCAL MANUAL and MGS OFF-ON switch to OFF. Notify MCCC of condition

Table 4-44. Tactical Trouble Analysis, FRCP Malfunction

CREW MEMBER	ABNORMAL INDICATION	ACTION
		1
MCCC	Any malfunction is indicated on FRCP (figures 1-29 through 1-33)	Evaluate indicated malfunction on FRCP versus indications on launch control console (figure 1-62). If the malfunction indicated on FRCP is not verified by a malfunction indication on launch control console, continue countdown. If malfunction indicated on FRCP is verified by malfunction indication on launch control console, perform actions in table corresponding to malfunctions on launch control console

Table 4-45. Tactical Trouble Analysis, Liquid Oxygen or Liquid Nitrogen Manual Detanking

CREW MEMBER	ABNORMAL INDICATION	ACTION 1
DMCCC	LO_2 DRAINED indicator fails to illuminate amber or illuminates green prematurely on launch control console (figure 1-62)	Note If a manual detanking is required because of a premature drain sequence, proceed with action 1a. If manual detanking is required due to LO_2 DRAINED indicator failing to illuminate amber, proceed to action 1b. a. Depress EMERGENCY pushbutton and then depress RAISE pushbutton as required to maintain missile fuel tank pressure at 63.0 PSI
MCCC		Note If a premature drain sequence occurs, perform step b, and subsequent steps. b. Direct BMAT to control-monitor group 1 of 4
BMAT		c. At FUEL TANKING (PANEL 1) (figure 4-10), position REMOTE LOCAL switch to LOCAL and observe that local control indicator illuminates amber. Note If any of the valves fail to open by manual action at LO_2 TANKING (PANEL 1) (figure 4-9), detanking cannot progress until fault is corrected. If LC-1 or LC-2 is the failed valve, LO_2 drain cannot be initiated and only method of detanking LO_2 is by normal boiloff rate through boiloff valve. This process will require considerable time.

Table 4-45. Tactical Trouble Analysis, Liquid Oxygen or Liquid Nitrogen Manual Detanking (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION 1 (CONT)
BMAT (CONT)		d. At LO_2 TANKING (PANEL 1): (1) Position REMOTE-LOCAL switch to LOCAL and observe that LOCAL CONTROL indicator illuminates amber. (2) Position 0-20 OPEN-CLOSE switch to OPEN (vents LO_2 storage tank pressure to atmosphere). (3) Allow pressure to decrease to approximately 10 PSI. This requires approximately 90 seconds. (4) Position LC-2 OPEN-CLOSE switch to OPEN (opens airborne fill-and-drain valve). (5) Position LC-1 OPEN-CLOSE switch to OPEN (opens ground fill-and-drain valve). (6) Position L-12 OPEN-CLOSE switch to OPEN (opens drain valve). e. Drain LO_2 for approximately 25 minutes to ensure LO_2 is detanked
MCCC		Note Observe LO_2 TANK pressure indicator for a rapid pressure drop, and LO_2 DRAINING indicator to change from green to extinguished on launch control console (figure 1-62). If a rapid pressure drop is observed, or when LO_2 DRAINING indicator extinguishes, direct BMAT to perform actions f(1), f(2), f(3), and f(4) immediately.
BMAT		f. At LO_2 TANKING (PANEL 1): (1) Position LC-1 OPEN-CLOSE switch to CLOSE

Table 4-45. Tactical Trouble Analysis, Liquid Oxygen or Liquid Nitrogen Manual Detanking (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION 1 (CONT)
BMAT (CONT)		(2) Position LC-2 OPEN-CLOSE switch to CLOSE. (3) Position L-12 OPEN-CLOSE switch to CLOSE. (4) Position REMOTE-LOCAL switch to REMOTE on LO_2 TANKING (PANEL 1). g. At FUEL TANKING (PANEL 1), position REMOTE-LOCAL switch to REMOTE
MCCC		h. Observe that LO_2 DRAINED indicator on launch control console is illuminated green. Proceed to table 3-15

Table 4-46. Fuel Manual Detanking

CREW MEMBER	ABNORMAL INDICATION	ACTION 1
MCCC	FUEL DRAINED indicator does not illuminate amber or FUEL DRAINED indicator illuminates green prematurely on launch control console (figure 1-62) SEE SUP-E	a. Direct BMAT to control-monitor group 1 of 4
BMAT		b. At FUEL TANKING (PANEL 1) and FUEL TANKING (PANEL 2) (figure 4-10); SEE SUP - E (1) Position REMOTE LOCAL switch to LOCAL and observe LOCAL CONTROL indicator illuminates amber. (2) Position valve N18 switch to OPEN and wait 90 seconds for fuel storage tank to vent. (3) Position valve FC2 switch to OPEN and observe MISSILE FILL & DRAIN OPENED indicator illuminates amber. (4) Position valve FC1 switch to OPEN and observe GROUND FILL & DRAIN OPENED indicator illuminates amber. (5) Position valve F13 switch to OPEN
DMCCC		Note Fuel drain should continue for approximately 6 minutes (based on a full fuel tank). As fuel drain nears completion, a pressure decrease may be detected. Do not allow FUEL TANK pressure gage indication on launch control console (figure 1-62) to drop below 9.0 PSI.
BMAT		c. At FUEL TANKING (PANEL 1) and FUEL TANKING (PANEL 2) (figure 4-10): (1) Position valve FC1 switch to CLOSE and observe GROUND FILL & DRAIN CLOSED indicator illuminates green

Table 4-46. Fuel Manual Detanking (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION 1 (CONT)
BMAT (CONT)		(2) After 5 seconds, position valve FC2 switch to CLOSE, and observe MISSILE FILL & DRAIN CLOSED indicator illuminates green. (3) After 5 seconds, position valve FC1 switch to OPEN, and observe GROUND FILL & DRAIN OPENED indicator illuminates amber. (4) Position valve NC1 switch to OPEN. (5) After 30 seconds, position valve NC1 switch to CLOSE. (6) Position valve FC1 switch to CLOSE and observe GROUND FILL & DRAIN CLOSED indicator illuminates green. (7) Position F13 switch to CLOSE. (8) Position valve N18 switch to CLOSE. (9) Position REMOTE LOCAL switch to REMOTE
MCCC		d. Observe that FUEL DRAINED indicator on launch control console (figure 1-62) illuminates green and proceed to table 3-15

Table 4-47. Tactical Trouble Analysis, Hydraulic Pumping Unit Fails To Shut Down Automatically

ITEM	CREW MEMBER	ABNORMAL INDICATION & POSSIBLE CAUSE	ACTION 1
	MCCC	HYD-SYSTEM OFF indicator remains amber after FUEL DRAINED indicator illuminates green on launch control console (figure 1-62)	a. Dispatch MMT or BMAT to HPU.
	MMT or BMAT		b. At HPU (figure 1-61): (1) Position CONTROL STATUS (S-1) switches on the FIRST STAGE SYSTEM and SECOND STAGE SYSTEM panels to LOCAL. (2) Depress FIRST STAGE SYSTEM and SECOND STAGE SYSTEM PUMP STOP (S-2) pushbuttons and observe that PUMP START indicators are not illuminated
	MCCC		c. Observe that HYD-SYSTEM OFF indicator on launch control console (figure 1-62) is illuminated green
	MMT or BMAT		d. Position CONTROL STATUS (S-1) switches (figure 1-61) on FIRST STAGE SYSTEM and SECOND STAGE SYSTEM to REMOTE
	MCCC		e. After MMT has positioned FIRST STAGE SYSTEM and SECOND STAGE SYSTEM CONTROL STATUS (S-1) switches to REMOTE, return to table 3-15

Table 4-48. Tactical Trouble Analysis, Airborne Helium Manual Vent

CREW MEMBER	ABNORMAL INDICATION	ACTION 1
MCCC	PNEU SYSTEM VENTED indicator does not illuminate amber on launch control console (figure 1-62)	Actions a through c deleted d. Direct MMT to manually vent airborne helium bottles
MMT		e. At PSC (figure 1-48): (1) Manually vent the airborne helium bottles by opening VALVE NO. 43 HELIUM DUMP VALVE. (2) When REFRIGERATED HELIUM gage indicates 750 PSI, close VALVE NO. 43 HELIUM DUMP VALVE. Note If it is desired to vent airborne helium bottles to 0 PSI, allow VALVE NO. 43 HELIUM DUMP VALVE to remain open until REFRIGERATED HELIUM gage indicates 0 PSI.

Table 4-48. Tactical Trouble Analysis, Airborne Helium Manual Vent (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION
		1 (CONT)
MCCC		f. Approximately 40 seconds after MMT closes VALVE NO. 43, HELIUM DUMP VALVE, observe that PNEU SYSTEM vented indicator on launch control console is illuminated green. Note If during a return to standby sequence and missile has not been lowered, continue return to standby in accordance with table 3-15.

Table 4-49. Tactical Trouble Analysis, Manual Missile Lowering

CREW MEMBER	ABNORMAL INDICATION	ACTION 1
MCCC	Manual missile lowering and return to site hard has been necessitated by malfunctions	Oa. Depress the RETURN TO STANDBY pushbutton on the LCC. Note When it is necessary to expedite manual missile lowering, it is mandatory to de-energize the countdown bus and obtain standby pressures. Note If MISSILE ERECTED indicator has not illuminated amber, perform actions 1a through 1h then proceed to action 1o. If it is desired to lower missile before MISSILE ERECTED indicator illuminates green, proceed to action 1a. If it is desired to lower missile manually in a return to standby sequence after MISSILE ERECTED indicator illuminates green, proceed to action 1b then to 1g. a. Notify BMAT of intention to manually lower missile
BMAT		b. Depress EMERGENCY STOP pushbutton on control-monitor group 1 of 4 ERECTION panel (figure 4-1), and observe that EMERGENCY STOP indicator illuminates red. bA. At the FACILITY PANEL (figure 4-6) position REMOTE-LOCAL switch to LOCAL and observe that LOCAL CONTROL indicator illuminates
MCCC		c. (Deleted)
BMAT		(Actions d through f deleted.)

Table 4-49. Tactical Trouble Analysis, Manual Missile Lowering (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION 1 (CONT)
MCCC		g. Direct BMAT to the EMMCC
BMAT		h. Position CONTROL STATION SELECTOR switch on EMMCC (figure 1-40) through OFF to LOCAL

Table 4-49. Tactical Trouble Analysis, Manual Missile Lowering (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION 1 (CONT)
MCCC		Note If actions 1a through 1f were performed, proceed to action 1n(6). If actions 1a through 1f were not performed, proceed to action 1i. i. Direct MMT to missile bay
BMAT		j. At EMMCC: (1) Position LOCAL OPERATION SELECTOR switch to MAN. LOWER TO 90°. (2) Actuate RESET switch. (3) Depress INITIATE OPERATION pushbutton. (4) Observe that ABOVE 95° RIGHT and ABOVE 95° LEFT indicators are extinguished
MMT		k. Observe position of erection boom and report to BMAT when erection boom is at 90 degrees
BMAT		l. When MMT reports erection boom at 90 degrees, position CONTROL STATION SELECTOR switch on the EMMCC to MISSILE TRANSFER
MMT		m. Perform the following actions at MISSILE TRANSFER PANEL (NOSE CLAMP) (figure 1-44). (1) Observe that PANEL ENERGIZED indicator is illuminated. (2) Depress ROTATE NOSE CLAMP DOWN push-button and visually check that nose clamp is rotated down. (3) Depress EXTEND NOSE CLAMP pushbutton and visually check that nose clamp is extended

Table 4-49. Tactical Trouble Analysis, Manual Missile Lowering (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION 1 (CONT)
MMT (CONT)		(4) Depress CLOSE AND LOCK NOSE CLAMP pushbutton and visually check that nose clamp is closed and locked
BMAT		n. At EMMCC (figure 1-42): (1) Observe that MISSILE CONTACT SWITCH NO. 1 and SWITCH NO. 2 indicators are illuminated. (2) Observe that NOSE CLAMP ROTATED DOWN indicator is illuminated. (3) Observe that NOSE CLAMP CLOSED indicator is illuminated. (4) Observe that NOSE CLAMP LOCKED indicator is illuminated. (5) Position CONTROL STATION SELECTOR switch through LAUNCH CONTROL and OFF to LOCAL. (6) Position LOCAL OPERATION SELECTOR switch to MAN. LOWER TO 0° FROM 90°. (7) Actuate RESET switch. (8) Depress and hold INITIATE OPERATION pushbutton until BELOW 87° RIGHT and BELOW 87° LEFT indicators are illuminated. (9) Observe that 0° BOOM POSITION AT 0° RIGHT indicator and AT 0° LEFT indicator are illuminated
MMT		o. Visually check that boom is at 0 degrees and report position to BMAT

Table 4-49. Tactical Trouble Analysis, Manual Missile Lowering (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION 1 (CONT)
BMAT		p. At EMMCC: (1) Position LOCAL OPERATION SELECTOR switch to SHOCK MOUNT. (2) Actuate RESET switch. (3) Depress INITIATE OPERATION pushbutton. (4) Observe that all SHOCK MOUNTED indicators illuminate and notify MCCC of conditions. (5) Depress EMERGENCY STOP pushbutton. (6) Observe EMERGENCY STOP indicator illuminates red
MCCC		q. Direct BMAT to control-monitor group 1 of 4
BMAT		Note Whether or not the indicators in action 1r(3) illuminate, proceed with action 1s. r. At FACILITY panel (figure 4-6): (1) (Deleted) (2) Position OVERHEAD DOOR switch to CLOSE. (3) Position F/D DOOR switch to CLOSE and observe that F/D LATCHED and ROOF LATCHED indicators illuminate
MCCC		s. Direct BMAT to MCC
BMAT		t. At MCC: (1) Position MISSILE ERECTION AREA OVERHEAD DOOR switch (figure 4-5) to OFF. (2) Position FLAME DEFLECTOR DOOR switch (figure 4-22) to OFF and report action complete to MCCC

Table 4-49. Tactical Trouble Analysis, Manual Missile Lowering (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION 1 (CONT)
		u. (Deleted) uA. (Deleted) v. (Deleted) w. (Deleted)
BMAT		wA. Position REMOTE-LOCAL switch on FACILITY PANEL (figure 4-6) to REMOTE.
MCCC		wB. At launch control console (figure 1-62): Note If SITE HARD indicator illuminates amber and fails to illuminate green after positioning REMOTE-LOCAL switch on FACILITY PANEL to REMOTE or if SITE HARD indicator fails to illuminate green during a normal return to standby, due to the failure of overhead door or flame deflector door to close and latch, perform actions 1wB (4) through 1ah. (1) Observe SITE HARD indicator momentarily illuminated green. (2) Observe all indicators on countdown patch and return to standby patch are extinguished (3) (Deleted)

Table 4-49. Tactical Trouble Analysis, Manual Missile Lowering (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION 1 (CONT)
MCCC (CONT)		(4) Direct BMAT to control-monitor group 4 of 4
BMAT		x. At control-monitor group 4 of 4 (figure 1-25): (1) Position SIGNAL RESPONDER TRANSFER SWITCH on panel A-42 (figure 4-23) to RESPONDER MODE. (2) Position SYSTEM POWER switch on COUNTDOWN RESPONDER (PANEL 1) (figure 4-24) to ON. (3) Position RETURN TO STANDBY switch on COUNTDOWN RESPONDER (PANEL 1) to ON. (4) Position RETURN TO STANDBY switch on COUNTDOWN RESPONDER (PANEL 1) to OFF. (5) Position SYSTEM POWER switch on COUNTDOWN RESPONDER (PANEL 1) to OFF (6) Position SIGNAL RESPONDER TRANSFER SWITCH on panel A-42 to STANDBY MODE
MCCC		y. At launch control console (figure 1-62): (1) Observe that all indicators on countdown patch and return patch are extinguished.

Table 4-49. Tactical Trouble Analysis, Manual Missile Lowering (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION 1 (CONT)
MCCC (CONT)		Note If manual missile lowering was initiated before MISSILE ERECTED indicator illuminated green and REFRIGERATED HELIUM gage on PSC indicates air-borne helium bottles are pressurized, MMT must vent air borne helium bottles to 0 PSI in accordance with table 4-48. (2) Direct BMAT to control-monitor group 1 of 4
BMAT		z. (Deleted) aa. (Deleted)
MCCC		ab. Direct BMAT to MCC
BMAT		ac. At MCC: (1) Position MISSILE ERECTION AREA OVERHEAD DOOR switch to ON (figure 4-6)

Table 4-49. Tactical Trouble Analysis, Manual Missile Lowering (Continued)

CREW MEMBER	ABNORMAL INDICATION	ACTION 1 (CONT)
BMAT (CONT)		(2) Position FLAME DEFLECTOR DOOR switch to ON
MCCC		ad. Direct BMAT to FACILITY INTERFACE CABINET
BMAT		ae. At the FACILITY INTERFACE CABINET (figure 4-25): (1) Verify that relay D-4 in energized position. (2) Verify that relay D-8 is in deenergized position
MCCC		af. Direct BMAT to FACILITY TERMINAL and RELAY COMPARTMENT
BMAT		ag. At FACILITY TERMINAL and RELAY COMPARTMENT: (1) Verify that relay C-1 is in deenergized position. (2) Verify that relay C-6 is in deenergized position. ah. At countdown group guidance system checkout programmer panel (figure 4-7): (1) Position CONTROL SELECTOR switch to LOCAL AUTO and observe CONTROL SELECTOR IN LOCAL indicator illuminates amber. (2) Depress RETURN TO READINESS push-button. Observe that PROGRAMMER counter steps to zero, and MGS CHECKOUT COMPLETE indicator illuminates green. (3) Perform MGS checkout in accordance with T. O. 21-SM65E-CL-25-1, 2, 3, 4, or 5

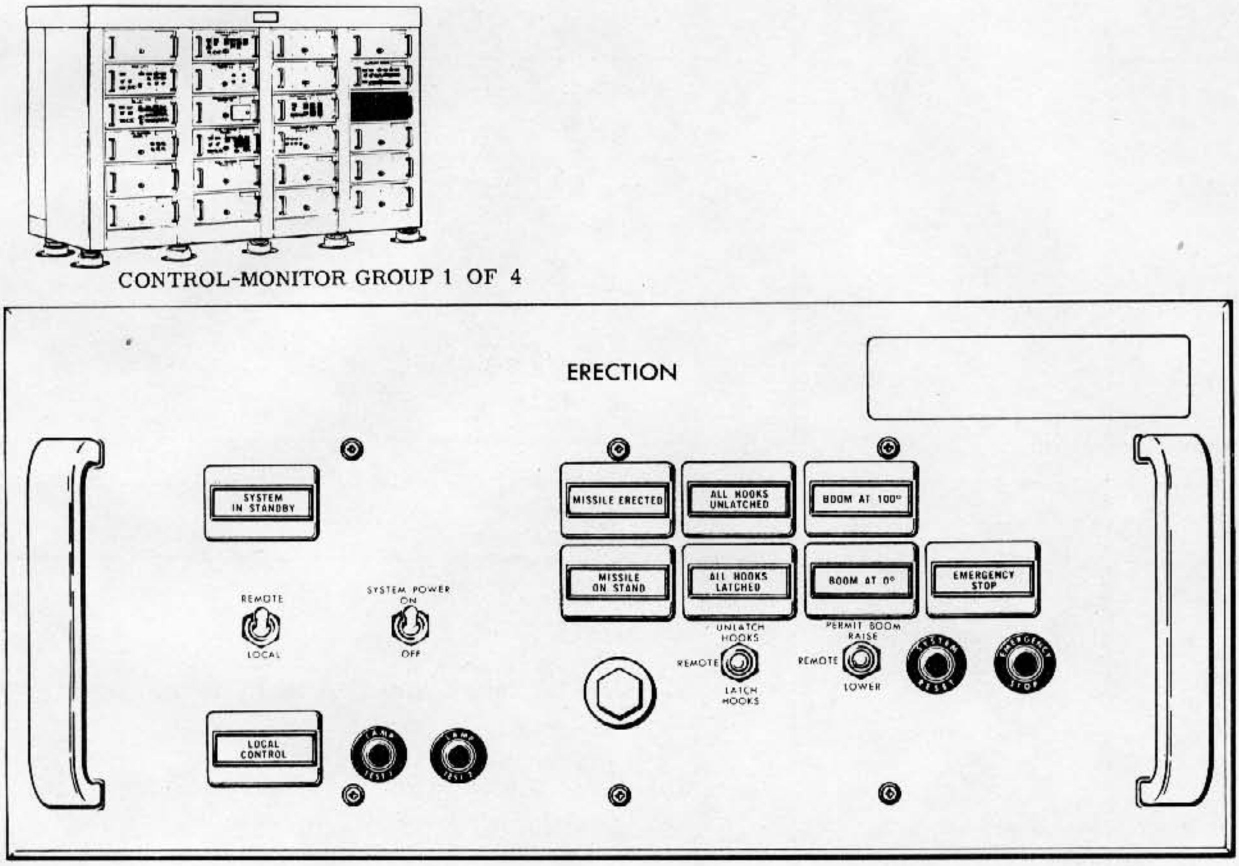

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Figure 4-1. Erection Panel

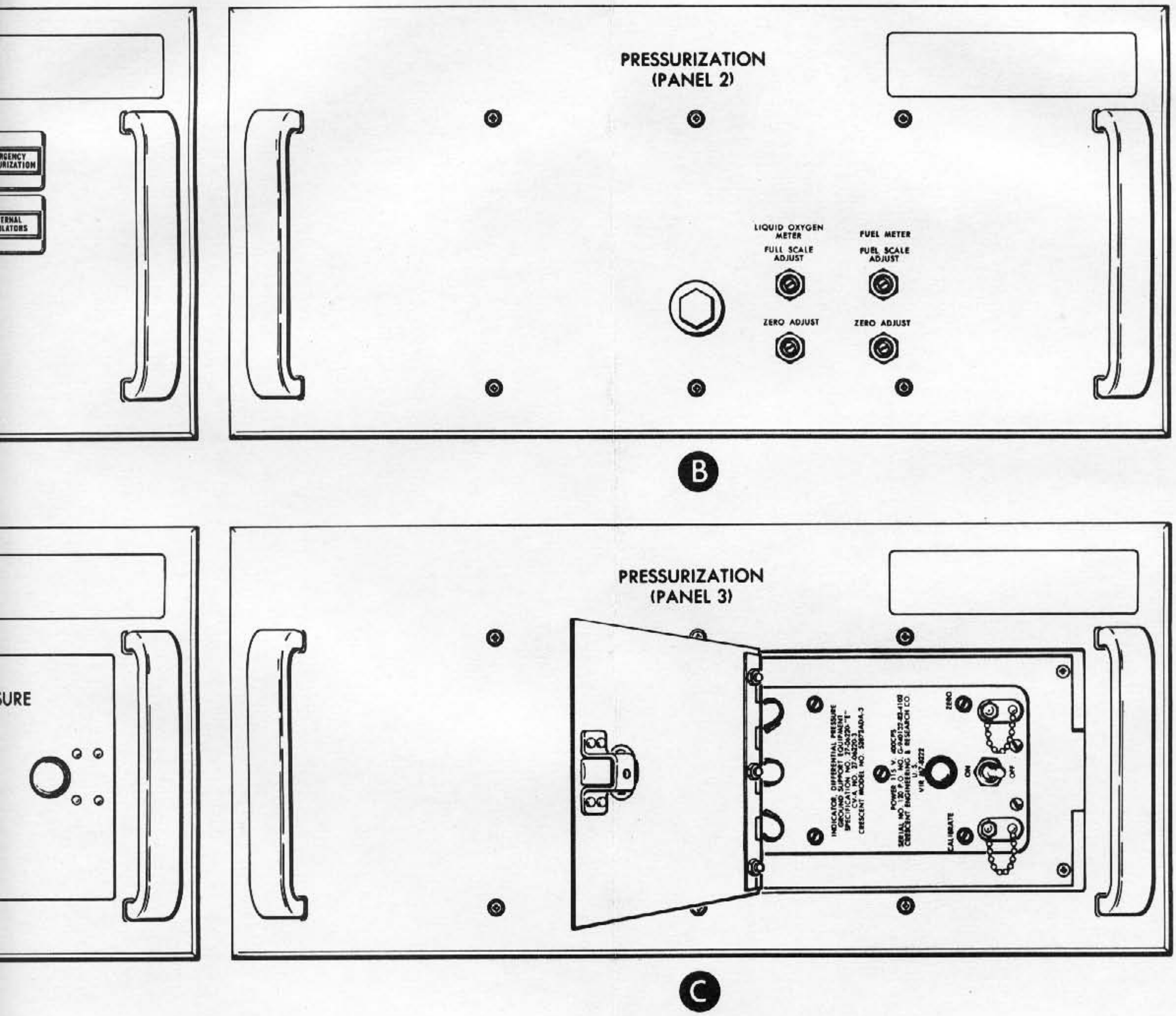
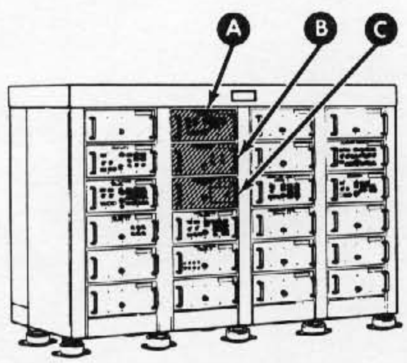
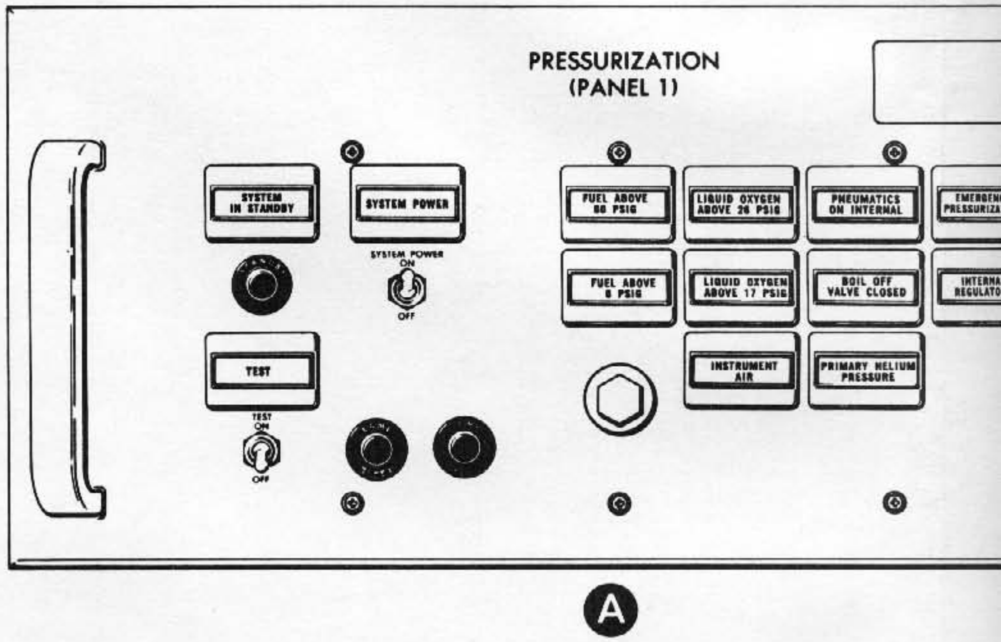
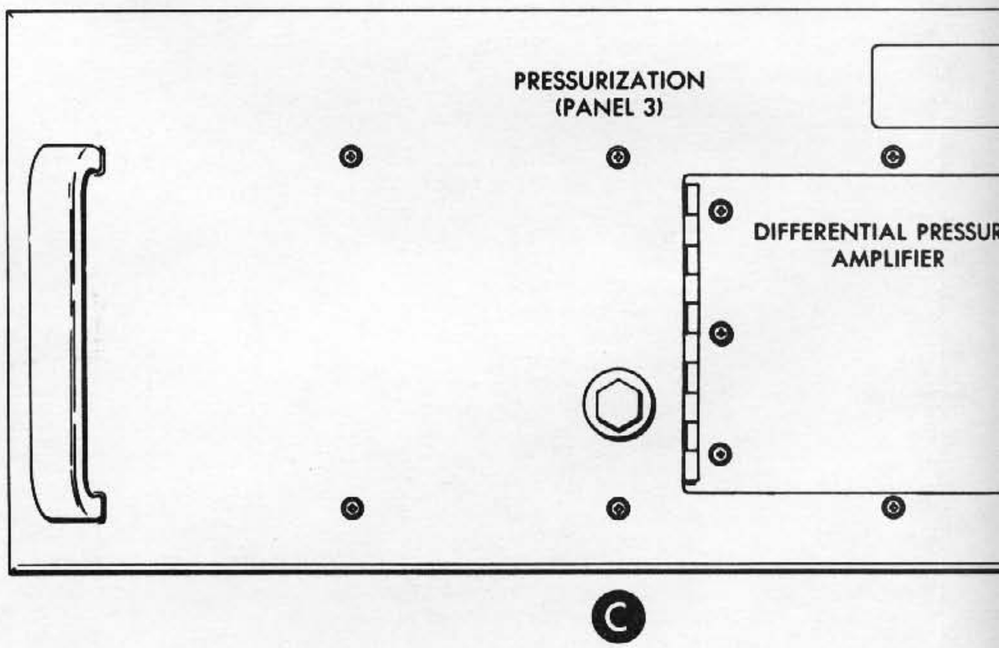


Figure 4-2. Pressurization Panels



CONTROL-MONITOR GROUP 1 OF 4





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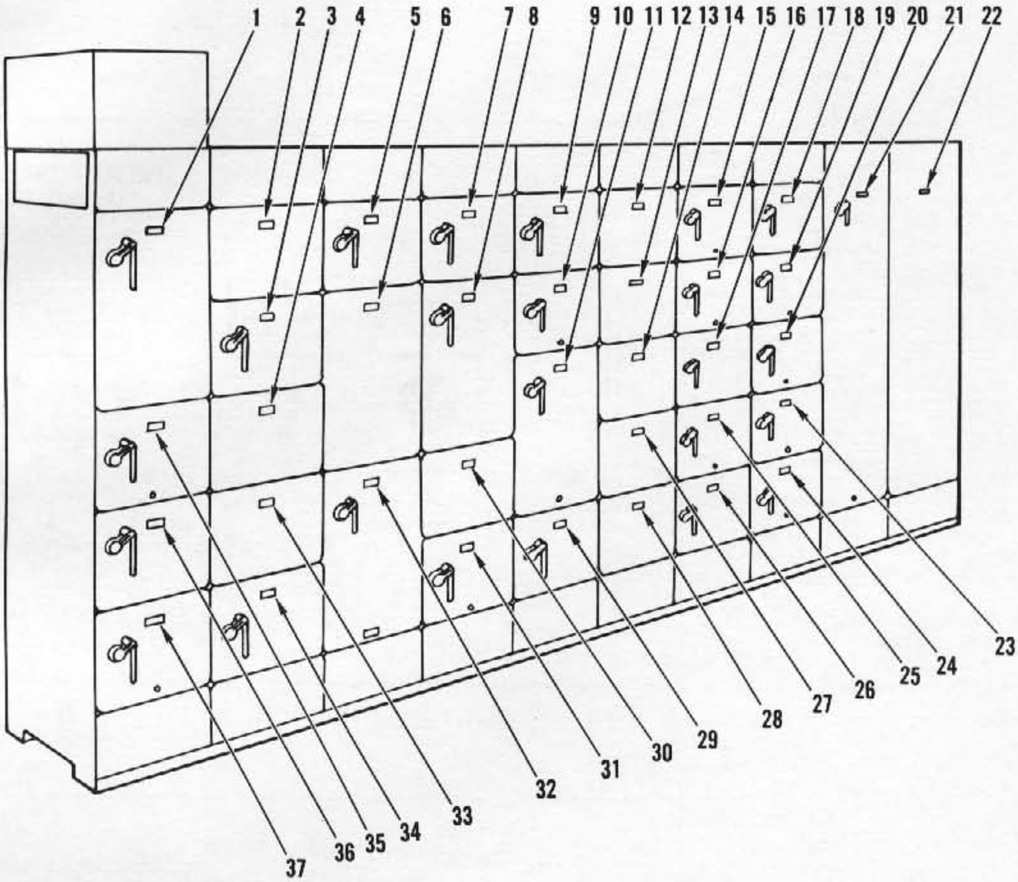

1	CONTROL TRANSFORMER	20	FUEL OIL TRANSFER PUMP
2	FEEDER CONTROL RELAY	21	FIRE WATER PUMP
3	SUB-DRAIN SUMP PUMP	22	FIRE WATER PUMP AUXILIARIES
4	SPACE	23	FUEL OIL SUPPLY PUMP
5	CONDENSATE PUMP	24	FUEL OIL SUPPLY PUMP SPARE
6	TRANSFER PANEL	25	COOLING WATER PUMP
7	CONDENSATE PUMP SPARE	26	COOLING WATER PUMP STANDBY
8	AIR COMPRESSOR	27	SPACE
9	A/C CONDENSING UNIT	28	SPACE
10	A/C FAN S-1	29	GATE MOTOR FEEDER
11	VENT FAN S-2	30	SPARE
12	SPACE	31	SUPPLY FAN S-3
13	SPACE	32	EMERGENCY LTG. DISCONNECT SW. EMERGENCY LTG. TRANSFORMER
14	SPACE	33	SPACE
15	UTILITY WATER PUMP	34	SEWAGE EJECTOR PUMP NO. 2
16	FLOOR DRAIN SUMP PUMP	35	125 VDC BATTERY CHARGER
17	DIRTY LUBE OIL PUMP	36	LTG. TRANSFORMER DISCONNECT SW.
18	HOT WATER CIRCULATING PUMP NO. 2	37	SEWAGE EJECTOR PUMP NO. 1
19	HOT WATER CIRCULATING PUMP NO. 1		

32.137-80

Figure 4-3. Motor Control Center, Launch Operations Building (Typical)

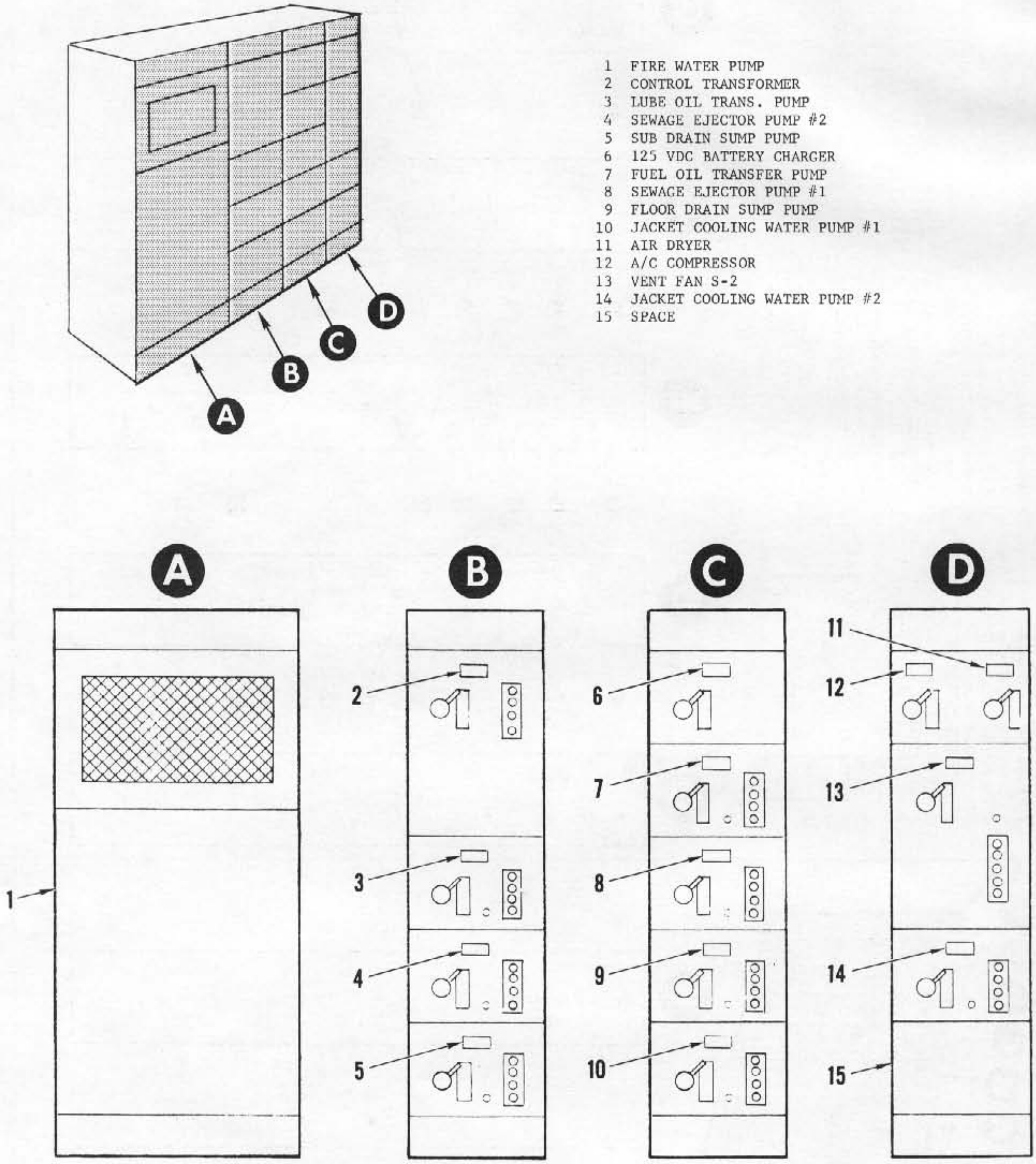

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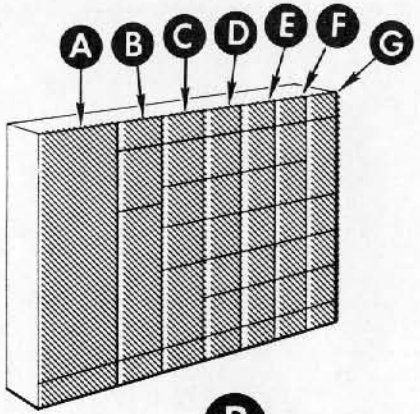
Figure 4-4. Motor Control Center, Launch Operations Building, Rear View (Typical)



1 FACILITY TERMINAL & RELAY COMPARTMENT
2 MISSILE ERECTION AREA OVERHEAD DOOR
3 UNIT HEATER BLOWER
4 THRUST & POD BLOWER
5 MISSILE AREA BLOWER
6 POWER SUPPLY RECTIFIER #1 28 VDC
7 SPARE
8 SPARE
9 MOBILE FUEL SEPARATOR
10 SPARE
11 MOTOR GENERATOR 400 CYCLE
12 MISSILE AREA AIR HANDLING FAN
13 HOT BUS INDICATION
14 APCHE CHECKOUT TRAILER
15 SPARE
16 ELECTRONIC CAB. REFRIGERANT COMPRESSOR
17 SPARE
18 480-120/208V DISTRIB. TRANSF. FEEDER
19 HYDRAULIC PUMPING UNIT
20 SPARE SPACE (COMPLEX 549-6)
21 MISSILE POD REFRIGERANT COMPRESSOR
22 ENGINE SERVICE TRAILER
23 DYNAMIC CHECKOUT TRAILER
24 SPARE
25 EMERG. LIGHTS DISCONNECT SWITCHES
26 RECHARGER O2N2
27 HELIUM COMPRESSOR
28 LO2 ROOM H & V BLOWER
29 MAIN DISCONNECT SWITCH
30 RECHARGER N2
31 ERECTION MECH. MOTOR CONTROL CENTER
32 SPARE

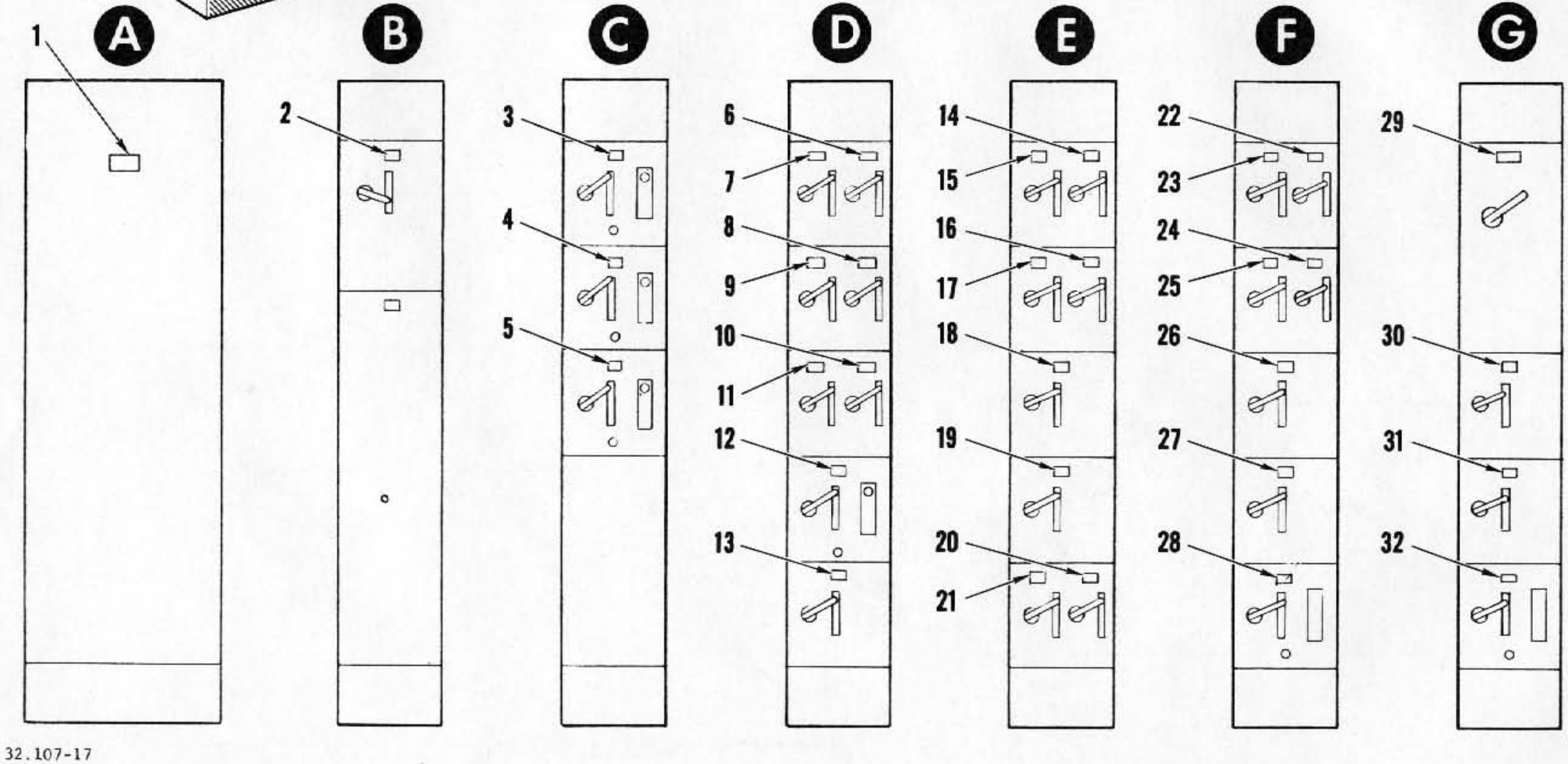


Figure 4-5. Motor Control Center, Launch and Service Building, Front View (Typical)

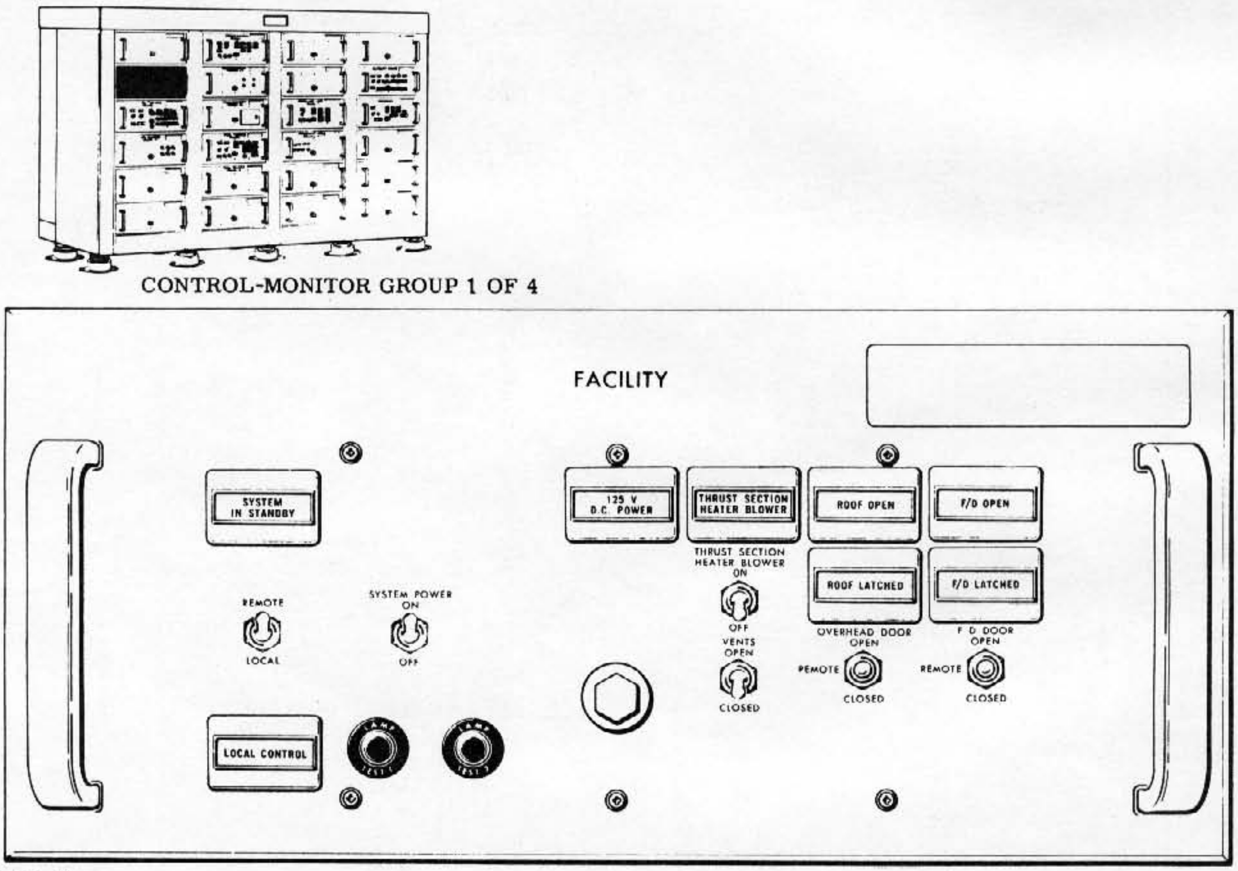


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Figure 4-6. Facility Panel

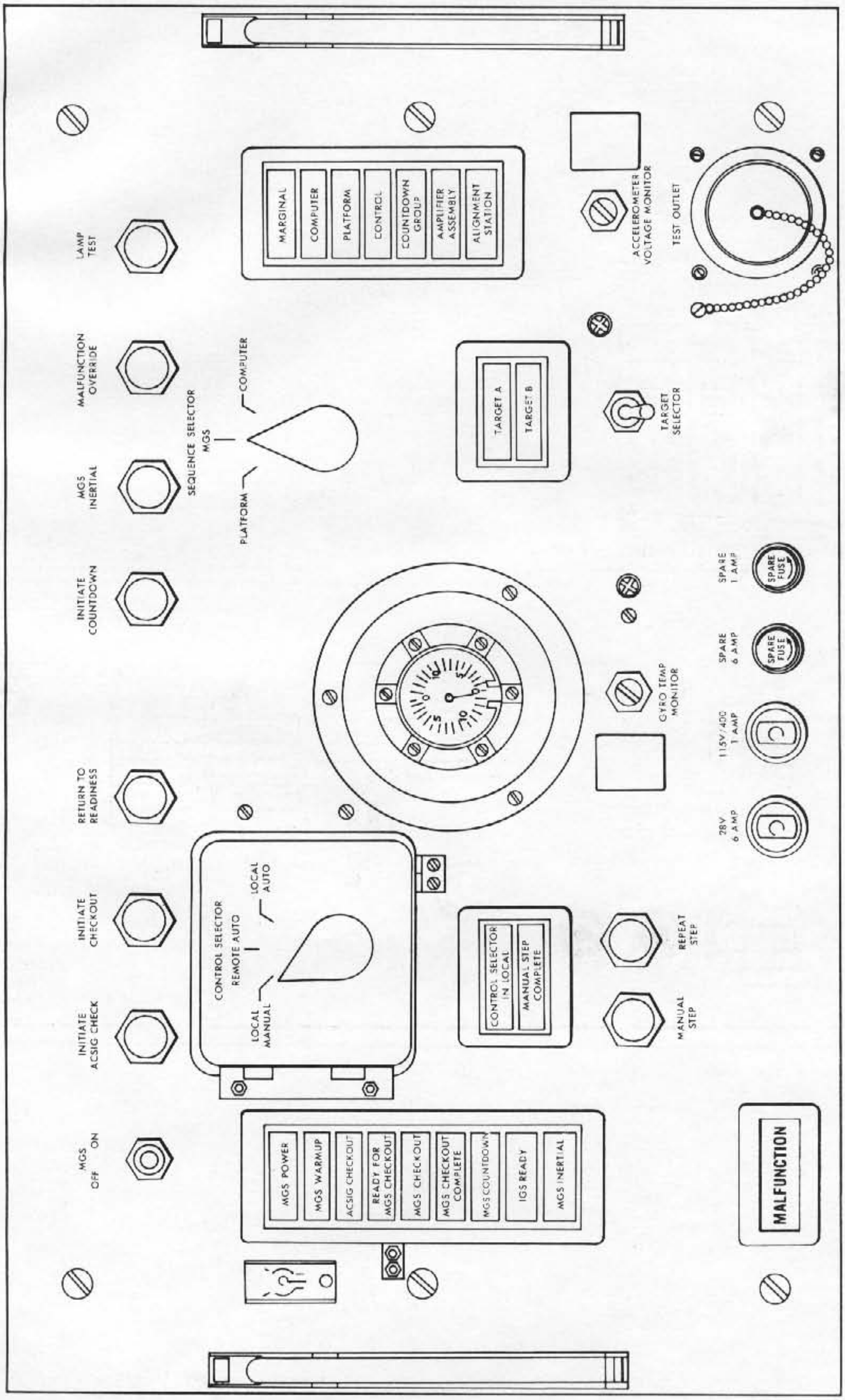

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Figure 4-7. Countdown Group Missile Systems Checkout Programmer Panel

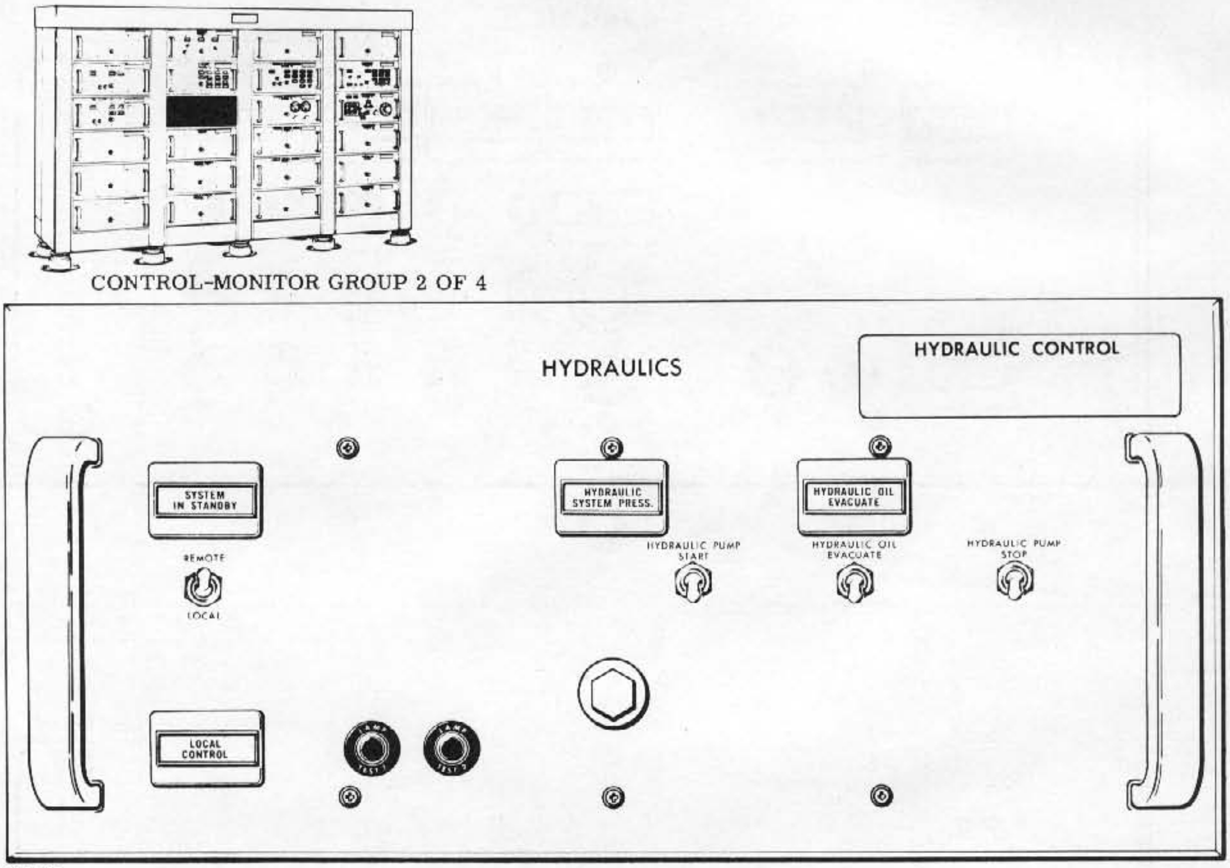

Figure 4-8. Hydraulics Panel

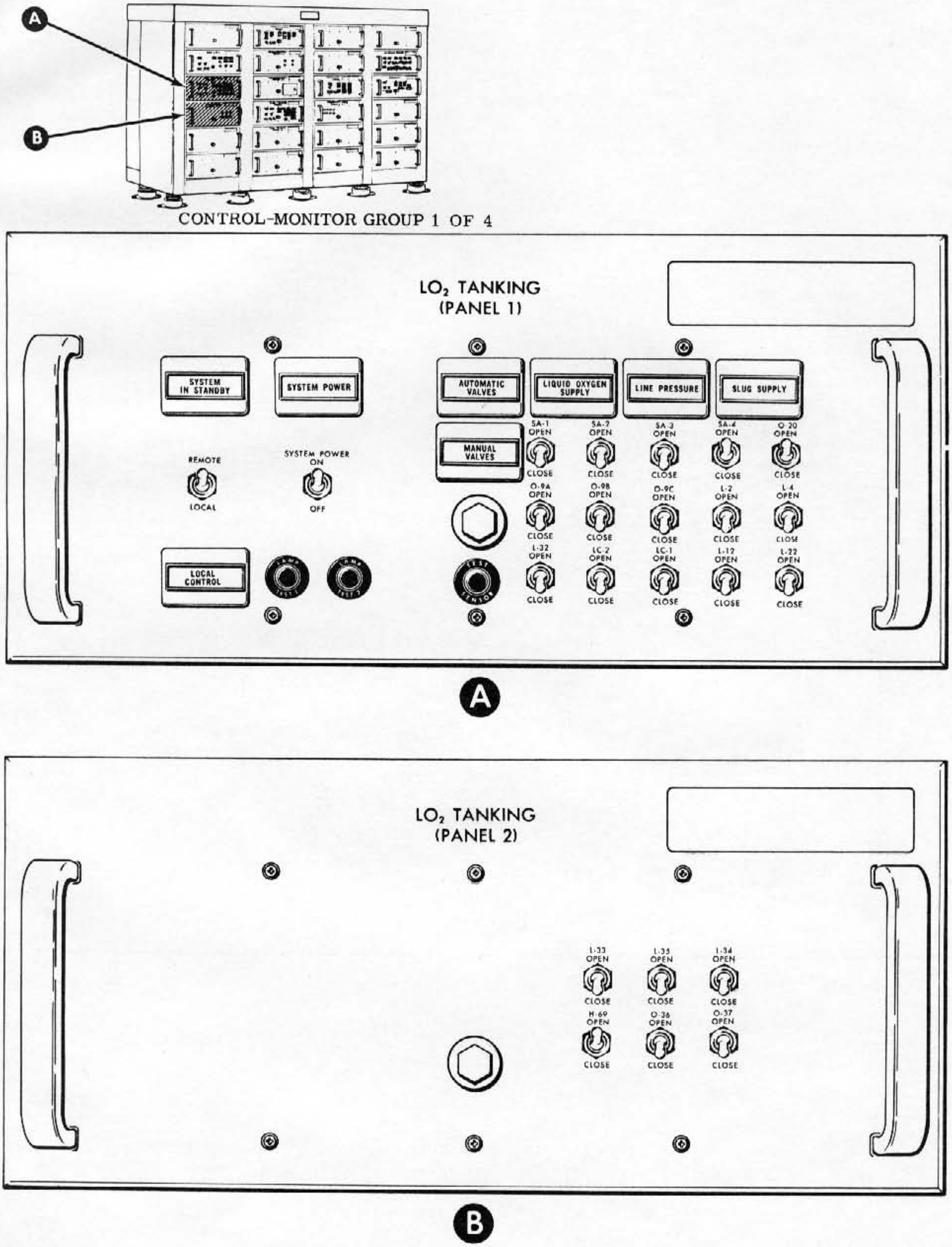

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Figure 4-9. LO_2 Tanking Panels

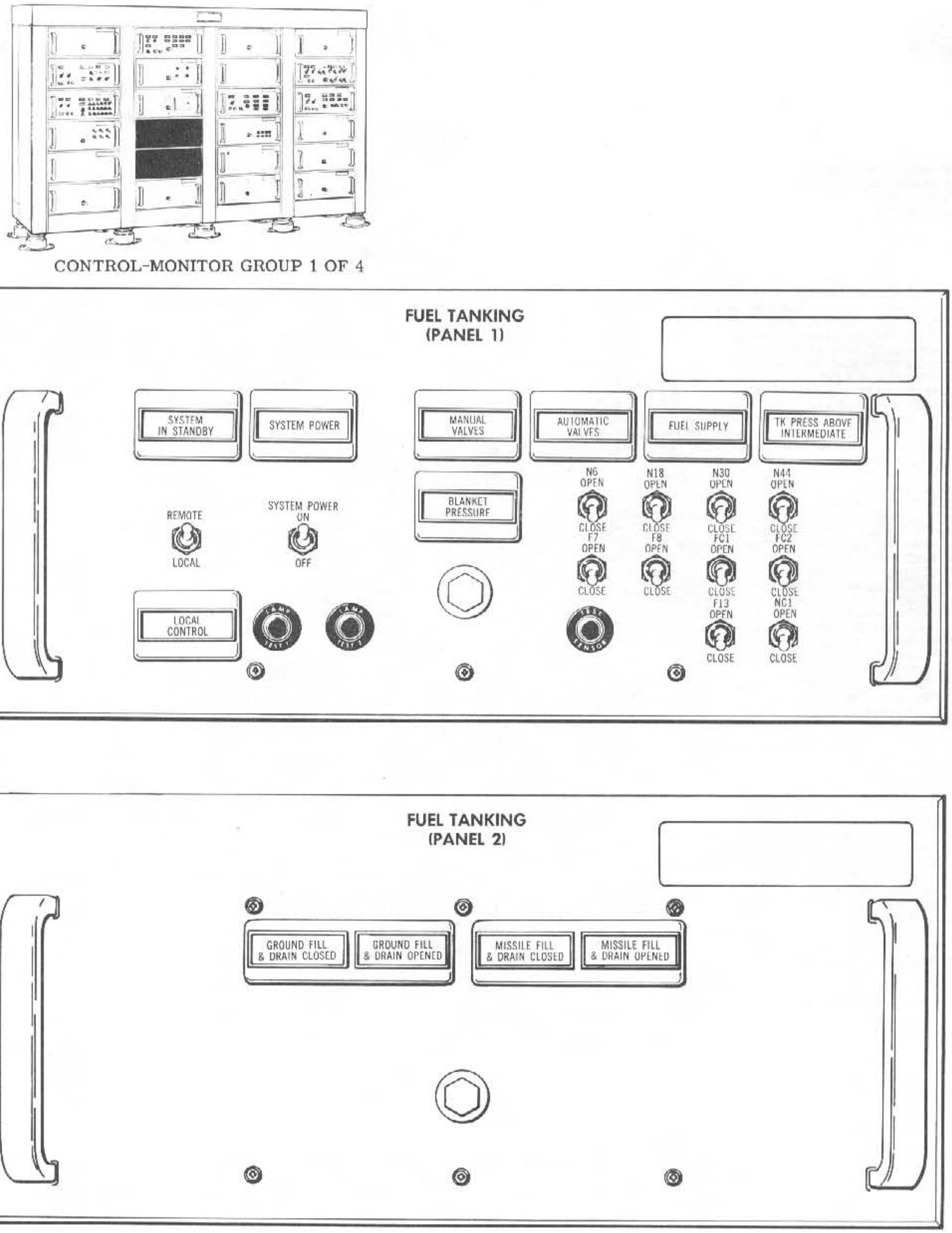

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Figure 4-10. Fuel Tanking Panels

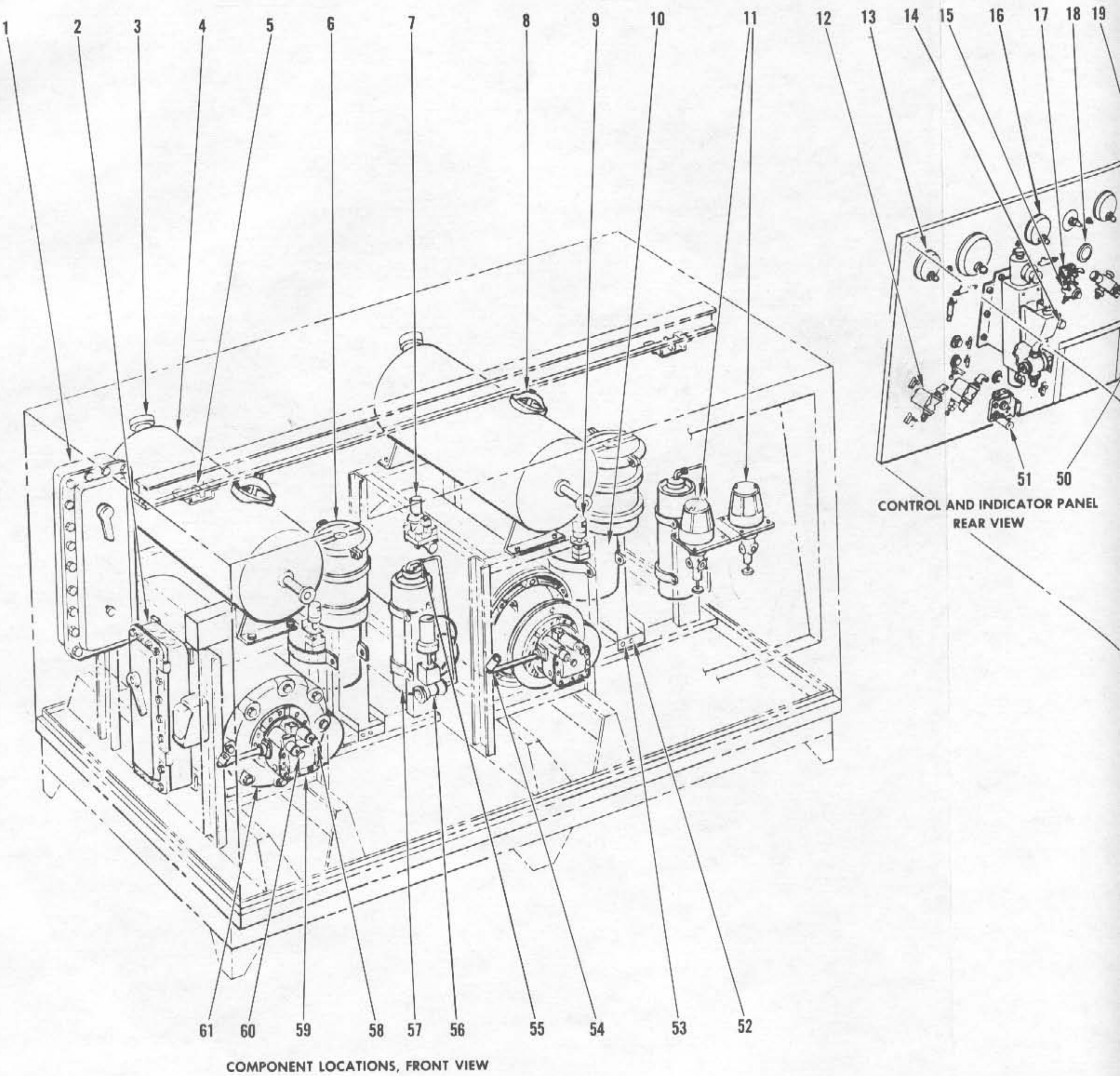
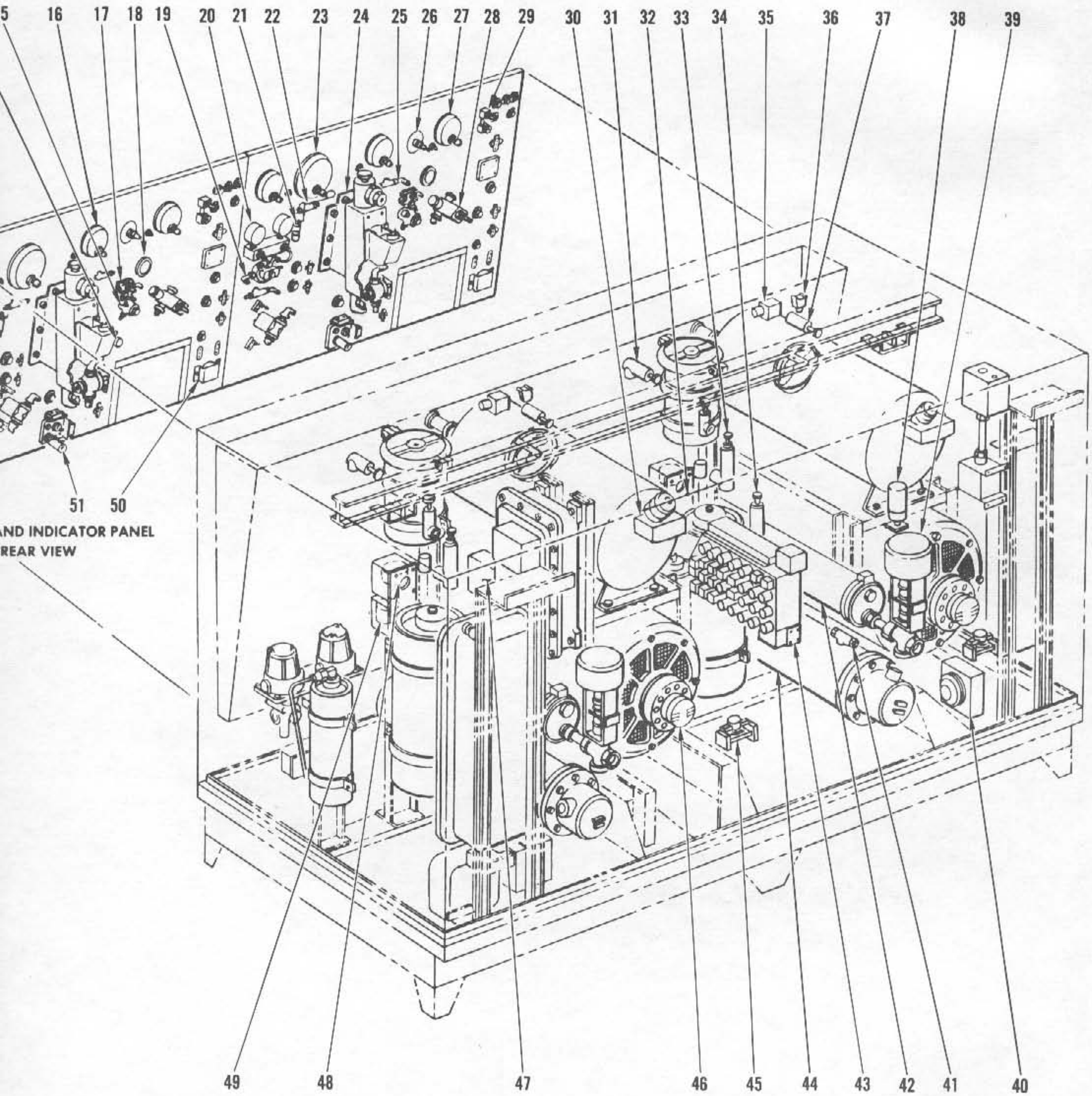


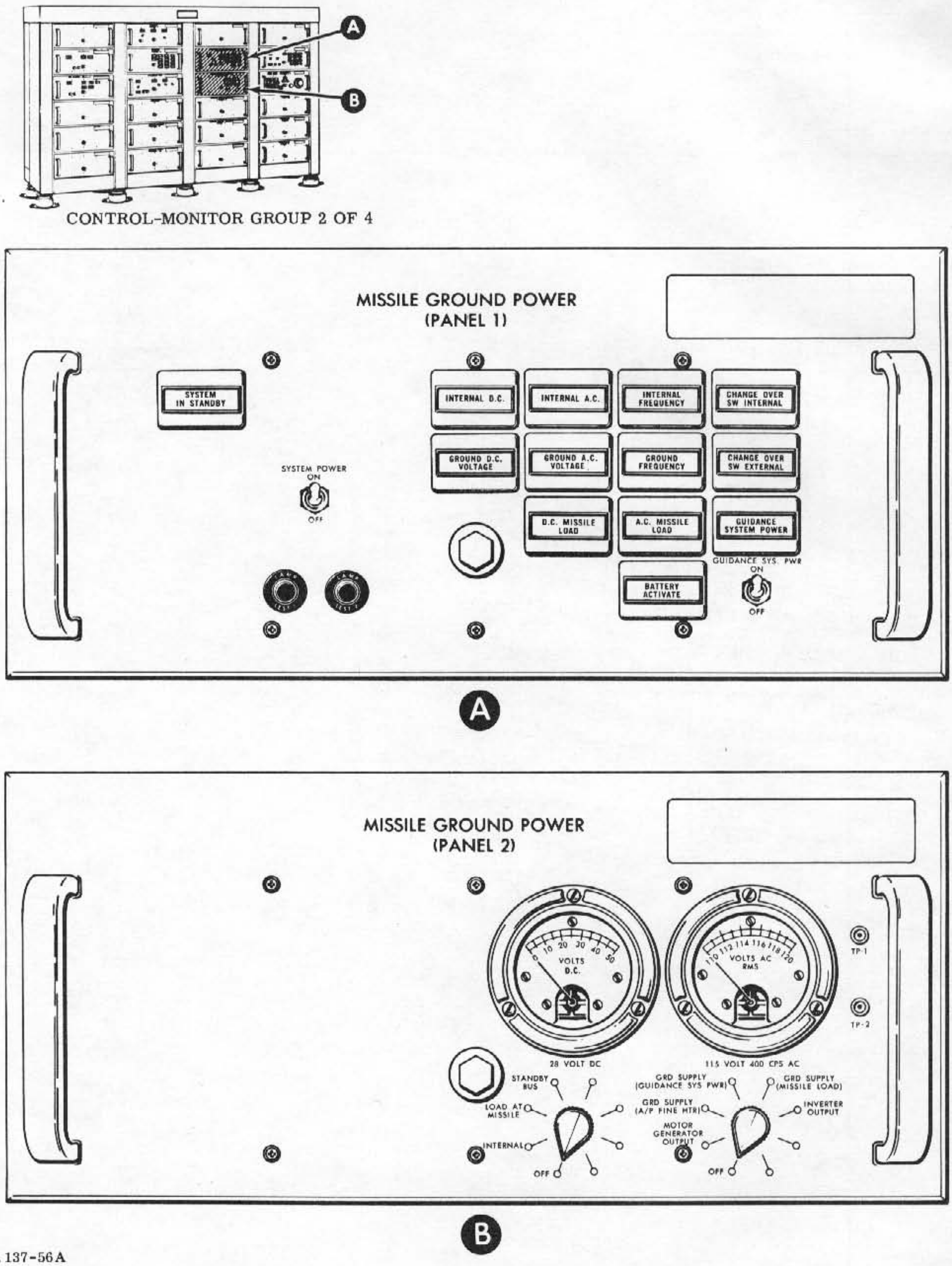
Figure 4-11. Hydraulic Pumping Unit Component Location



COMPONENT LOCATIONS, REAR VIEW

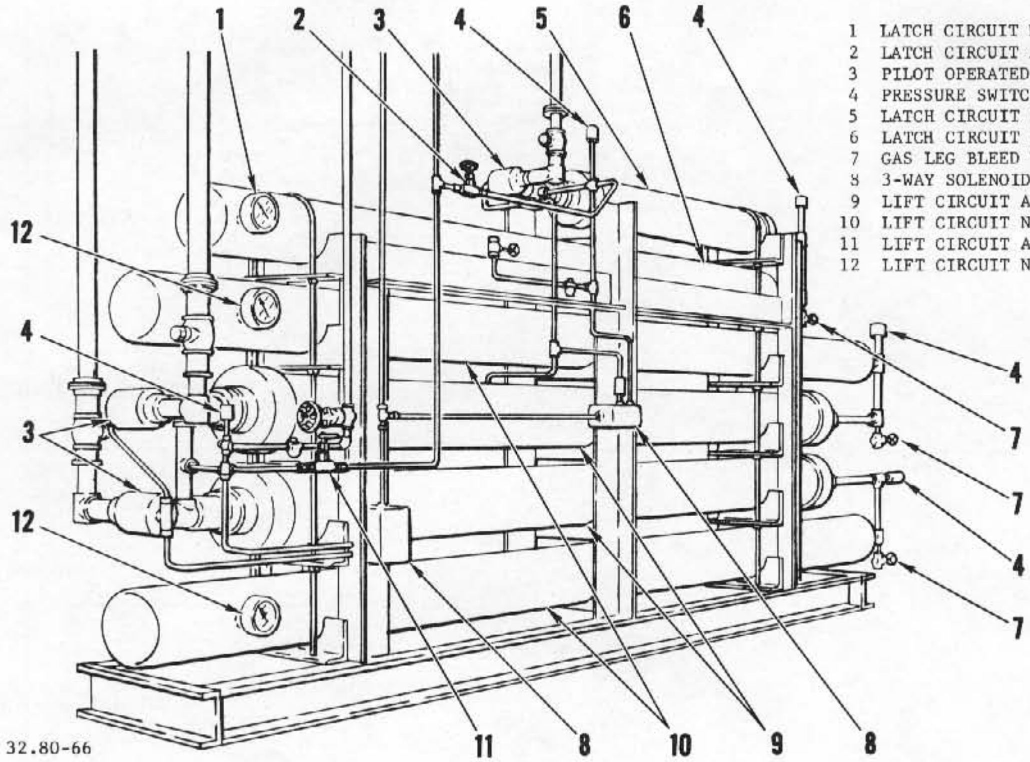
1 MOTOR CIRCU
2 HEATER CIRCU
3 FILLER CAP
4 RESERVOIR
5 RESERVOIR PR
6 LOW PRESSUR
7 RESERVOIR SH
8 RESERVOIR AC
9 BYPASS VALV
10 HIGH PRESSUR
11 SOLENOID PN
12 FIRST STAGE P
13 EVACUATION
14 HIGH PRESSUR
15 RESERVOIR PN
16 RESERVOIR PR
17 RESERVOIR PR
18 FLUID LEVEL IN
19 HIGH PRESSUR
20 REGULATOR O
21 REGULATOR IN
22 GAUGE SHUT
23 HIGH PRESSUR
24 FLOWMETER
25 SHUTOFF VALV
26 HYDRAULIC FL
27 LOW PRESSUR
28 LOW PRESSUR
29 BLEED VALVE
30 SCUPPER AND
31 BACK PRESSUR
32 TEMPERATURE
33 THERMAL RELIE
34 LOW PRESSUR
35 RESERVOIR PR
36 RESERVOIR PN
37 RELIEF VALVE
38 RESERVOIR DR
39 COOLANT FLO
40 REVERSE PHAS
41 TEMPERATURE
42 HEAT EXCHAN
43 CONTROL REL
44 HEATER (18)
45 WATER'SHUTO
46 LOW PRESSUR
47 HEATER SWITC
48 DIFFERENTIAL
49 DIFFERENTIAL
50 ELAPSED TIME
51 FLOWMETER SE
52 PRESSURE SWI
53 PRESSURE SWI
54 HIGH PRESSUR
55 RESTRICTOR
56 EVACUATION
57 EVACUATION
58 MAX VOLUME
59 HIGH PRESSUR
60 MAX PRESSUR
61 DRIVE MOTOR

1 MOTOR CIRCUIT BREAKER CB-2 (95)
2 HEATER CIRCUIT BREAKER CB-1 (96)
3 FILLER CAP
4 RESERVOIR
5 RESERVOIR PRESSURE SWITCH (59)
6 LOW PRESSURE FILTER (21)
7 RESERVOIR SHUTOFF VALVE (55)
8 RESERVOIR ACCESS PLATE
9 BYPASS VALVE (13)
10 HIGH PRESSURE FILTER (11)
11 SOLENOID PNEUMATIC SHUTOFF VALVE (60)
12 FIRST STAGE PRESSURE SHUTOFF VALVE V-1 (84)
13 EVACUATION CHAMBER PNEUMATIC PRESSURE GAUGE (35)
14 HIGH PRESSURE RELIEF VALVE (12)
15 RESERVOIR PNEUMATIC REGULATOR (40)
16 RESERVOIR PRESSURE GAUGE (46)
17 RESERVOIR PRESSURIZATION VALVE (39)
18 FLUID LEVEL INDICATOR
19 HIGH PRESSURE PNEUMATIC REGULATOR (41)
20 REGULATOR OUTLET PRESSURE GAUGE (41A)
21 REGULATOR INLET PRESSURE GAUGE (41A)
22 GAUGE SHUTOFF VALVE (6)
23 HIGH PRESSURE SYSTEM GAUGE (10)
24 FLOWMETER
25 SHUTOFF VALVE (6A)
26 HYDRAULIC FLUID TEMPERATURE H. P. PUMP INLET GAUGE (28)
27 LOW PRESSURE SYSTEM GAUGE (24)
28 LOW PRESSURE SYSTEM SELECTOR VALVE (23)
29 BLEED VALVE (19)
30 SCUPPER AND DRAIN
31 BACK PRESSURE VALVE (63)
32 TEMPERATURE SWITCH (43)
33 THERMAL RELIEF VALVE
34 LOW PRESSURE RELIEF VALVE
35 RESERVOIR PRESSURE SWITCH (59)
36 RESERVOIR PNEUMATIC FILTER (38)
37 RELIEF VALVE
38 RESERVOIR DRAIN SHUTOFF VALVE
39 COOLANT FLOW REGULATOR (93)
40 REVERSE PHASE RELAY (41)
41 TEMPERATURE SWITCH
42 HEAT EXCHANGER (48)
43 CONTROL RELAY PANEL
44 HEATER (18)
45 WATER SHUTOFF VALVE (87)
46 LOW PRESSURE BOOST PUMP (2)
47 HEATER SWITCH (S-15)
48 DIFFERENTIAL PRESSURE SWITCH
49 DIFFERENTIAL PRESSURE SWITCH
50 ELAPSED TIME INDICATOR (80)
51 FLOWMETER SELECTOR VALVE (54)
52 PRESSURE SWITCH (49A)
53 PRESSURE SWITCH (49)
54 HIGH PRESSURE CHECK VALVE (44)
55 RESTRICTOR
56 EVACUATION CHAMBER SHUTOFF VALVE (58)
57 EVACUATION CHAMBER
58 MAX VOLUME CONTROL
59 HIGH PRESSURE PUMP
60 MAX PRESSURE CONTROL (COMPENSATOR)
61 DRIVE MOTOR (SECOND STAGE)



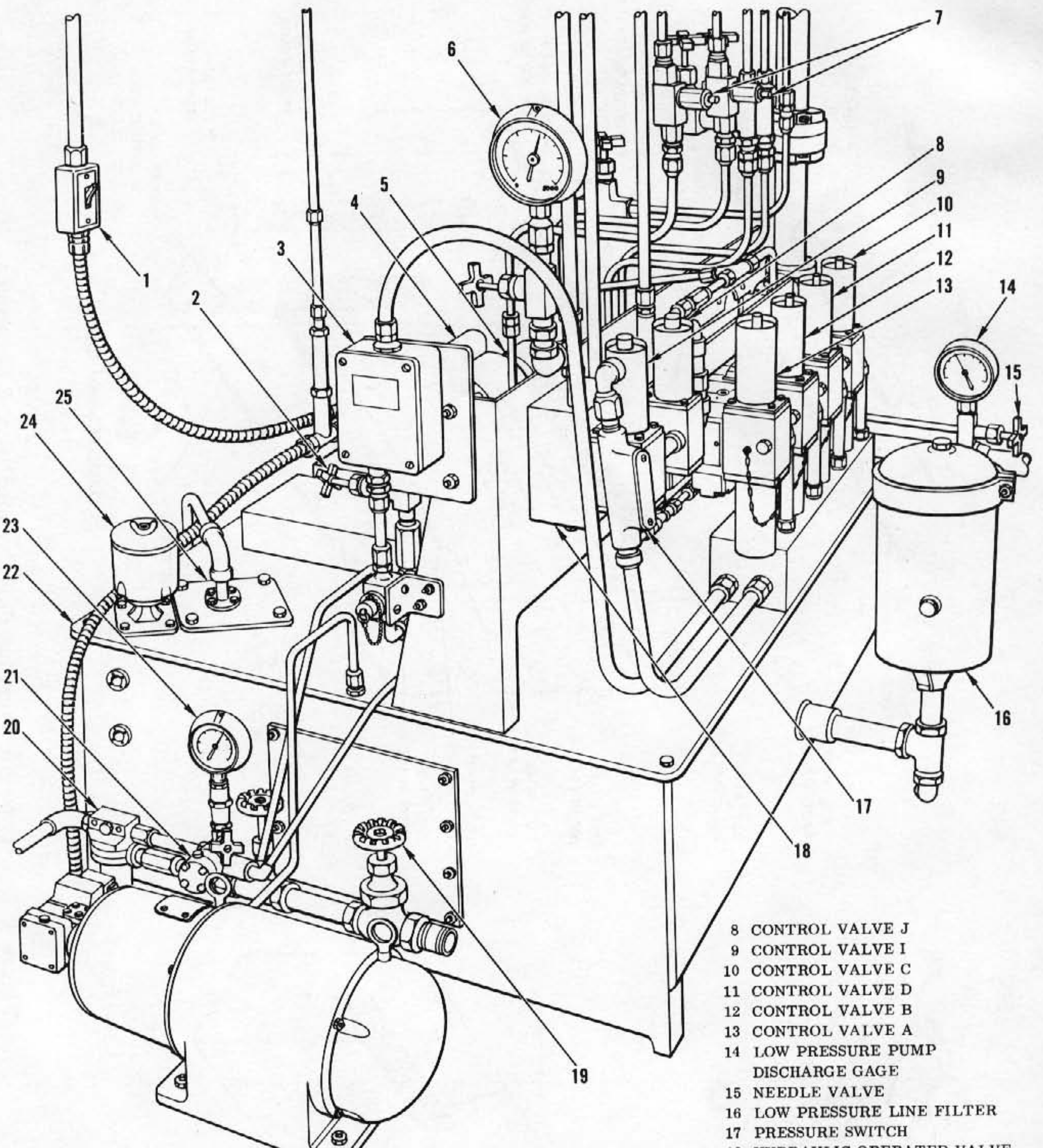
32.137-56A

Figure 4-12. Missile Ground Power Panels



1 LATCH CIRCUIT NITROGEN PRESSURE GAGE
2 LATCH CIRCUIT ACCUMULATOR DRAIN VALVE
3 PILOT OPERATED CHECK VALVE
4 PRESSURE SWITCH
5 LATCH CIRCUIT ACCUMULATOR
6 LATCH CIRCUIT NITROGEN BOTTLE
7 GAS LEG BLEED VALVE
8 3-WAY SOLENOID CONTROL VALVE
9 LIFT CIRCUIT ACCUMULATORS
10 LIFT CIRCUIT NITROGEN BOTTLE
11 LIFT CIRCUIT ACCUMULATOR DRAIN VALVE
12 LIFT CIRCUIT NITROGEN PRESSURE GAGE

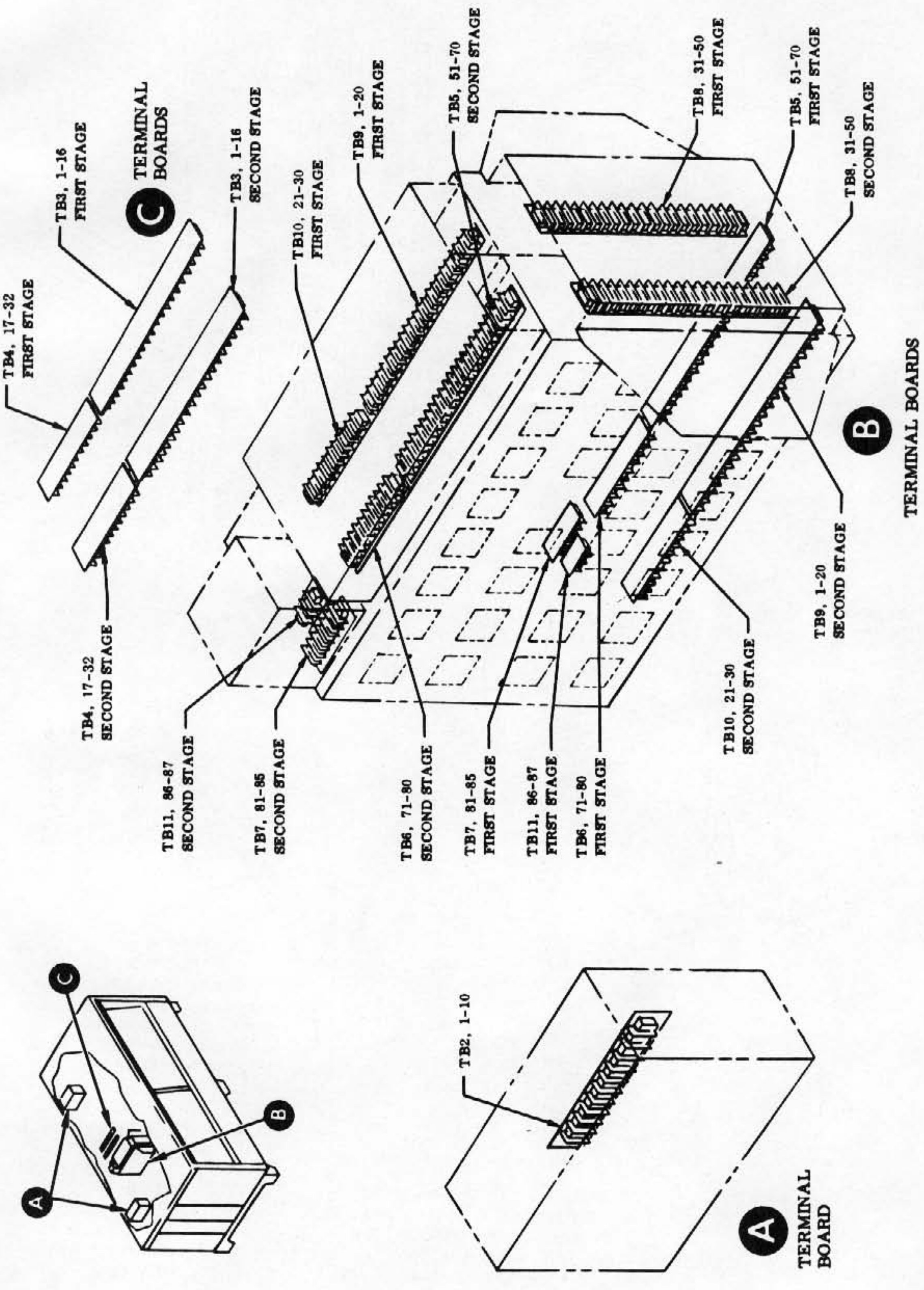
Figure 4-13. Missile Erection Door Accumulators (Typical)



1 SWITCH 1/4 HP ELECTRIC MOTOR
2 HIGH PRESSURE LINE RELIEF VALVE
3 PRESSURE ACTUATING SWITCH
4 1/4 HP ELECTRIC MOTOR
5 LOW PRESSURE HYDRAULIC PUMP
6 ACCUMULATOR PRESSURE GAGE
7 FLOW CONTROL VALVE
8 CONTROL VALVE J
9 CONTROL VALVE I
10 CONTROL VALVE C
11 CONTROL VALVE D
12 CONTROL VALVE B
13 CONTROL VALVE A
14 LOW PRESSURE PUMP DISCHARGE GAGE
15 NEEDLE VALVE
16 LOW PRESSURE LINE FILTER
17 PRESSURE SWITCH
18 HYDRAULIC OPERATED VALVE
19 DRAIN VALVE
20 HIGH PRESSURE HYDRAULIC PUMP
21 HIGH PRESSURE LINE FILTER
22 HYDRAULIC FLUID RESERVOIR
23 LEVEL INDICATOR
24 FILTER
25 FILTER ACCESS PLATE

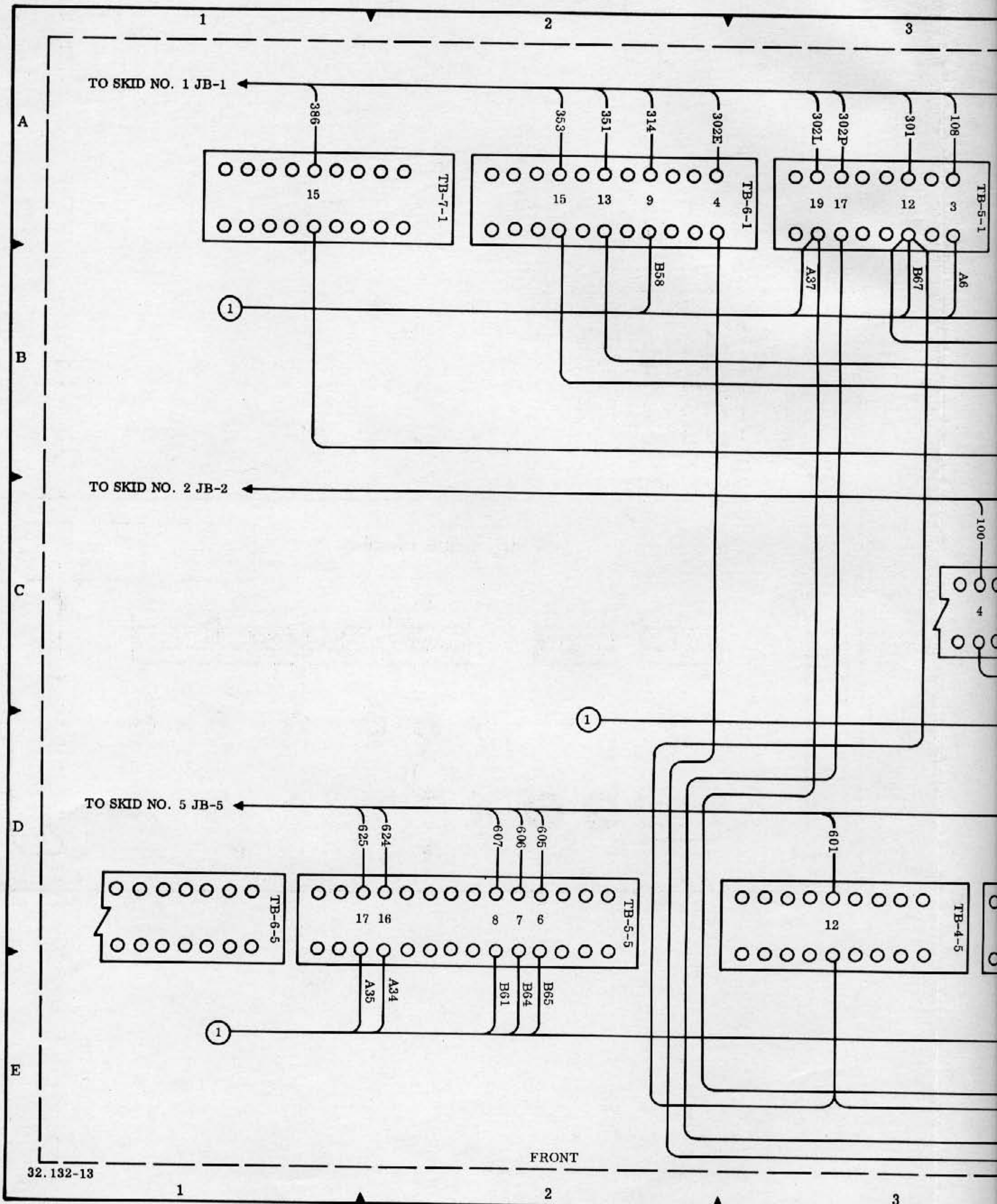
32.137-85A

Figure 4-14. Missile Erection Door Hydraulic Power Unit (Typical)

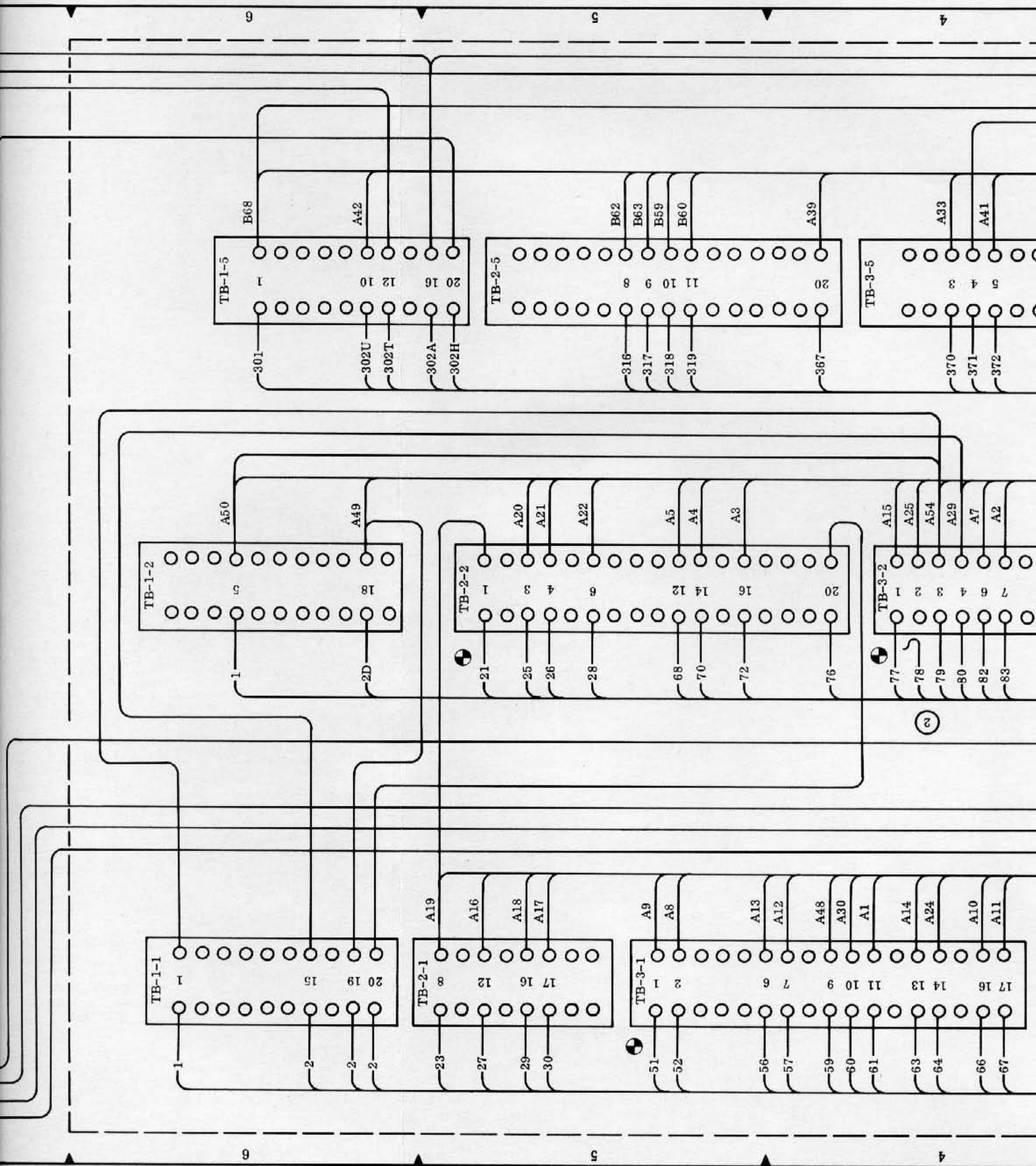


T1-32.17-5

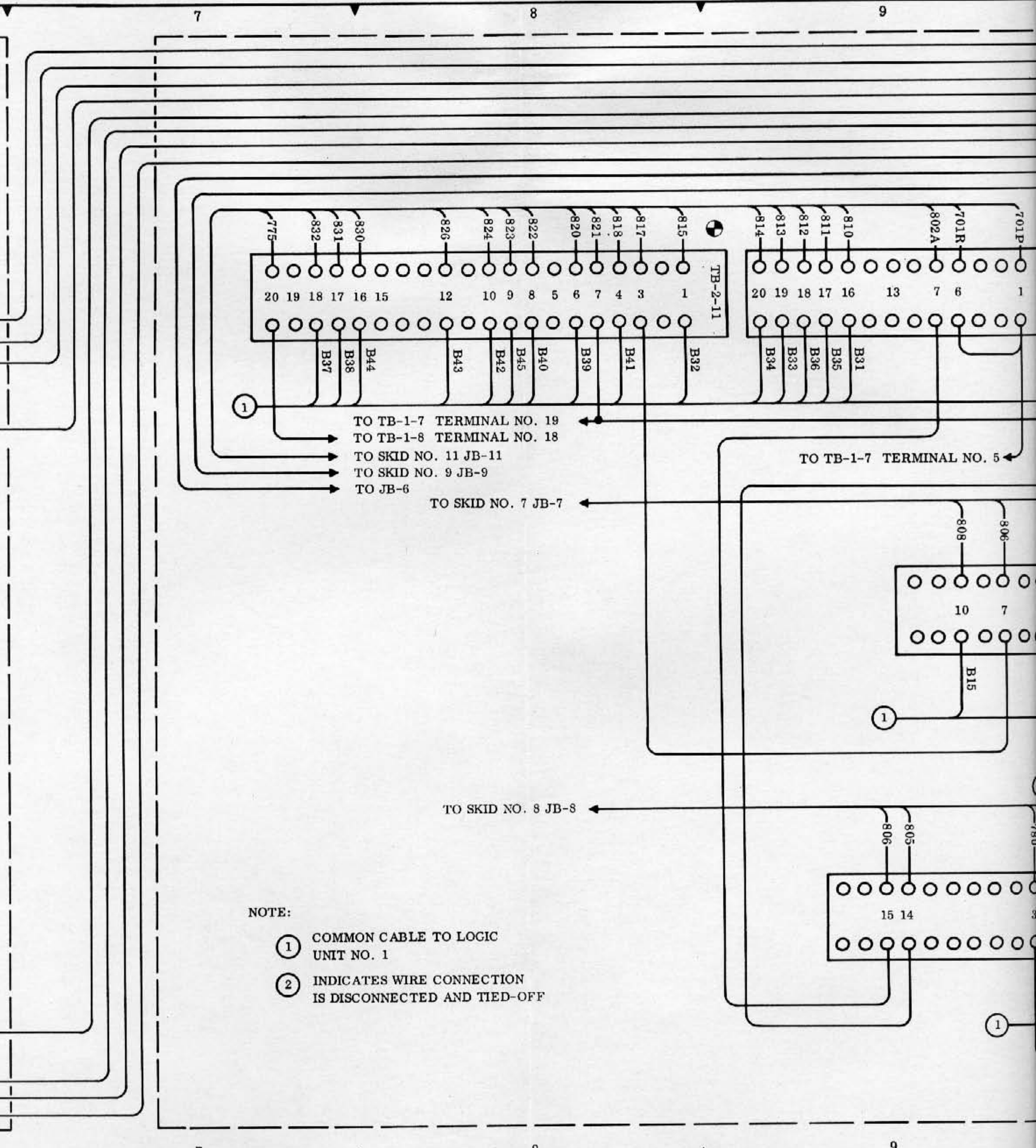
Figure 4-15. Hydraulic Pumping Unit Terminal Board Location



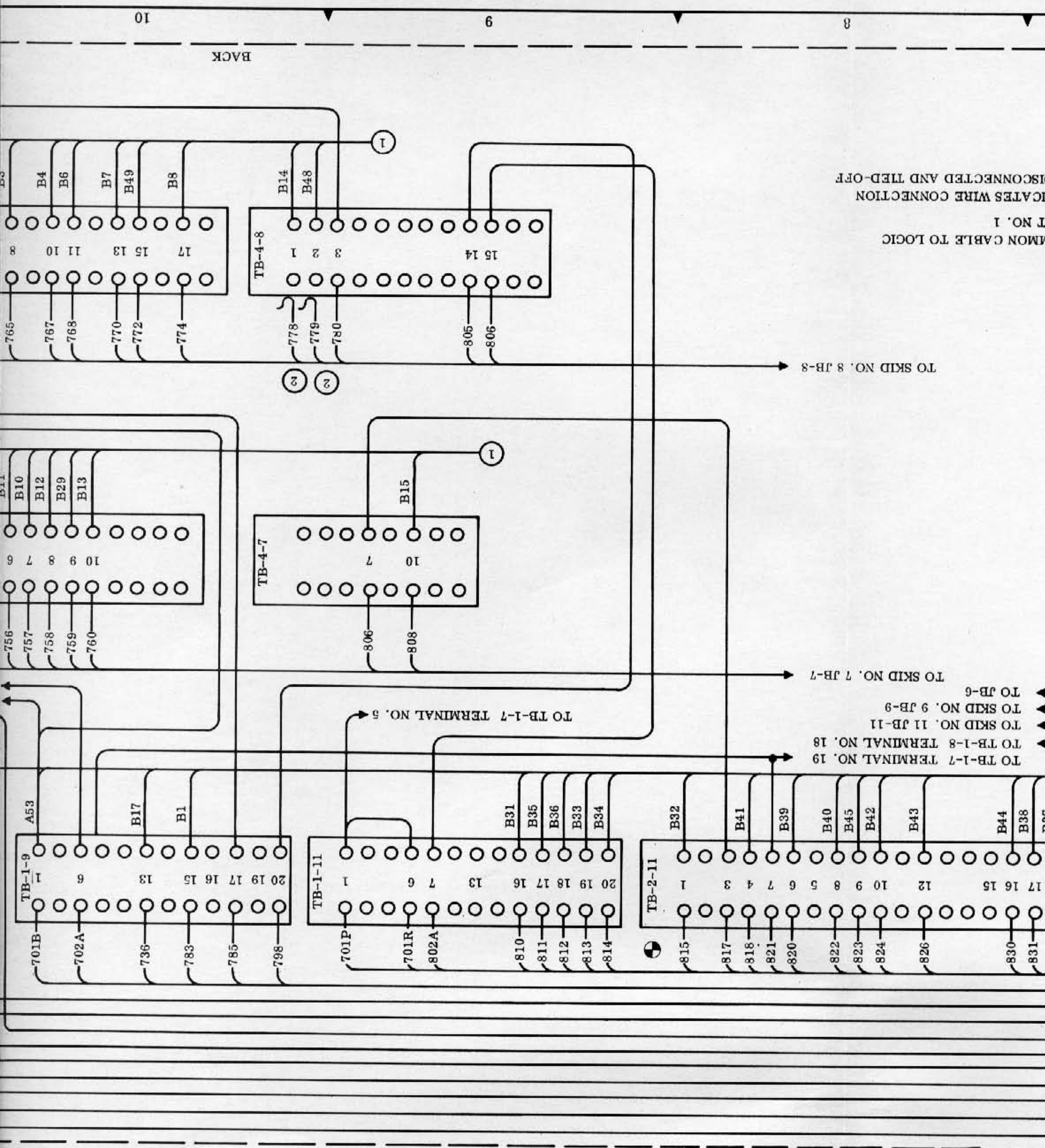
TO SKID NO. 1 JB-1
386
353
351
314
302E
302L
302P
301
108
TB-7-1
15
TB-6-1
15 13 9 4
B58
TB-5-1
19 17 12 3
A37
B67
A6
TO SKID NO. 2 JB-2
100
4
TO SKID NO. 5 JB-5
625
624
607
606
605
601
TB-6-5
TB-5-5
17 16 8 7 6
A35
A34
B61
B64
B65
TB-4-5
12
FRONT
32.132-13



6
5
4
TB-1-5
B68
A42
301
302U
302T
302A
302H
TB-2-5
B62
B63
B59
B60
A39
316
317
318
319
367
TB-3-5
A33
A41
370
371
372
TB-1-2
A50
A49
1
2D
TB-2-2
A20
A21
A22
A5
A4
A3
21
25
26
28
68
70
72
76
TB-3-2
A15
A25
A54
A29
A7
A2
77
78
79
80
82
83
TB-1-1
TB-2-1
A19
A16
A18
A17
23
27
29
30
TB-3-1
A9
A8
A13
A12
A48
A30
A1
A14
A24
A10
A11
51
52
56
57
59
60
61
63
64
66
67



7
8
9
TB-2-11
775
832
831
830
826
824
823
822
820
821
818
817
815
814
813
812
811
810
802A
701R
701P
20 19 18 17 16 15 12 10 9 8 5 6 7 4 3 1
20 19 18 17 16 13 7 6 1
B37
B38
B44
B43
B42
B45
B40
B39
B41
B32
B34
B33
B36
B35
B31
TO TB-1-7 TERMINAL NO. 19
TO TB-1-8 TERMINAL NO. 18
TO SKID NO. 11 JB-11
TO SKID NO. 9 JB-9
TO JB-6
TO SKID NO. 7 JB-7
TO TB-1-7 TERMINAL NO. 5
808
806
10 7
B15
TO SKID NO. 8 JB-8
806
805
15 14
NOTE:
1 COMMON CABLE TO LOGIC UNIT NO. 1
2 INDICATES WIRE CONNECTION IS DISCONNECTED AND TIED-OFF



BACK
TB-4-8
TB-4-7
TB-1-9
TB-1-11
TB-2-11
TO SKID NO. 8 JB-8
TO SKID NO. 7 JB-7
TO TB-1-7 TERMINAL NO. 5
TO JB-6
TO SKID NO. 9 JB-9
TO SKID NO. 11 JB-11
TO TB-1-8 TERMINAL NO. 18
TO TB-1-7 TERMINAL NO. 19

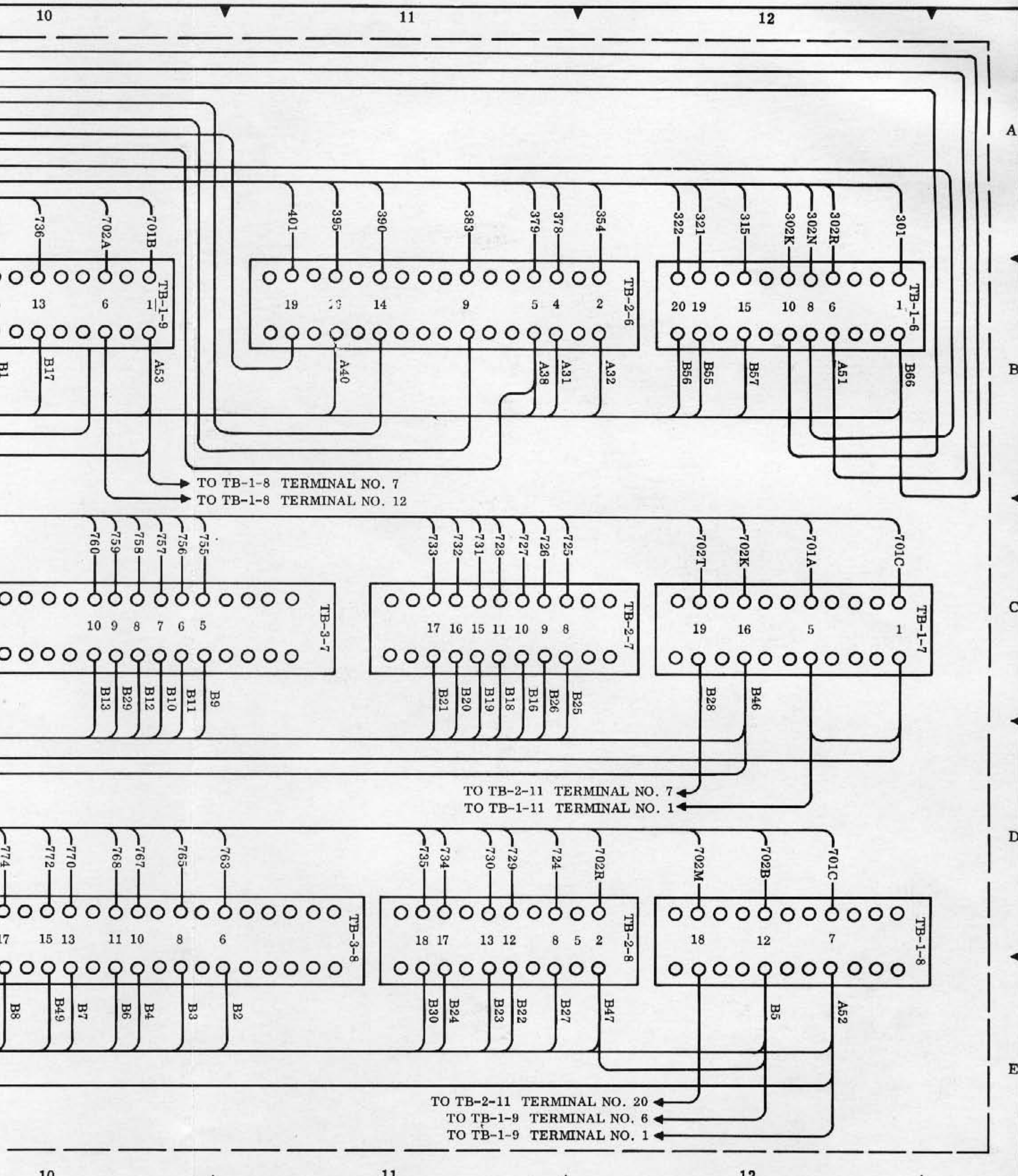
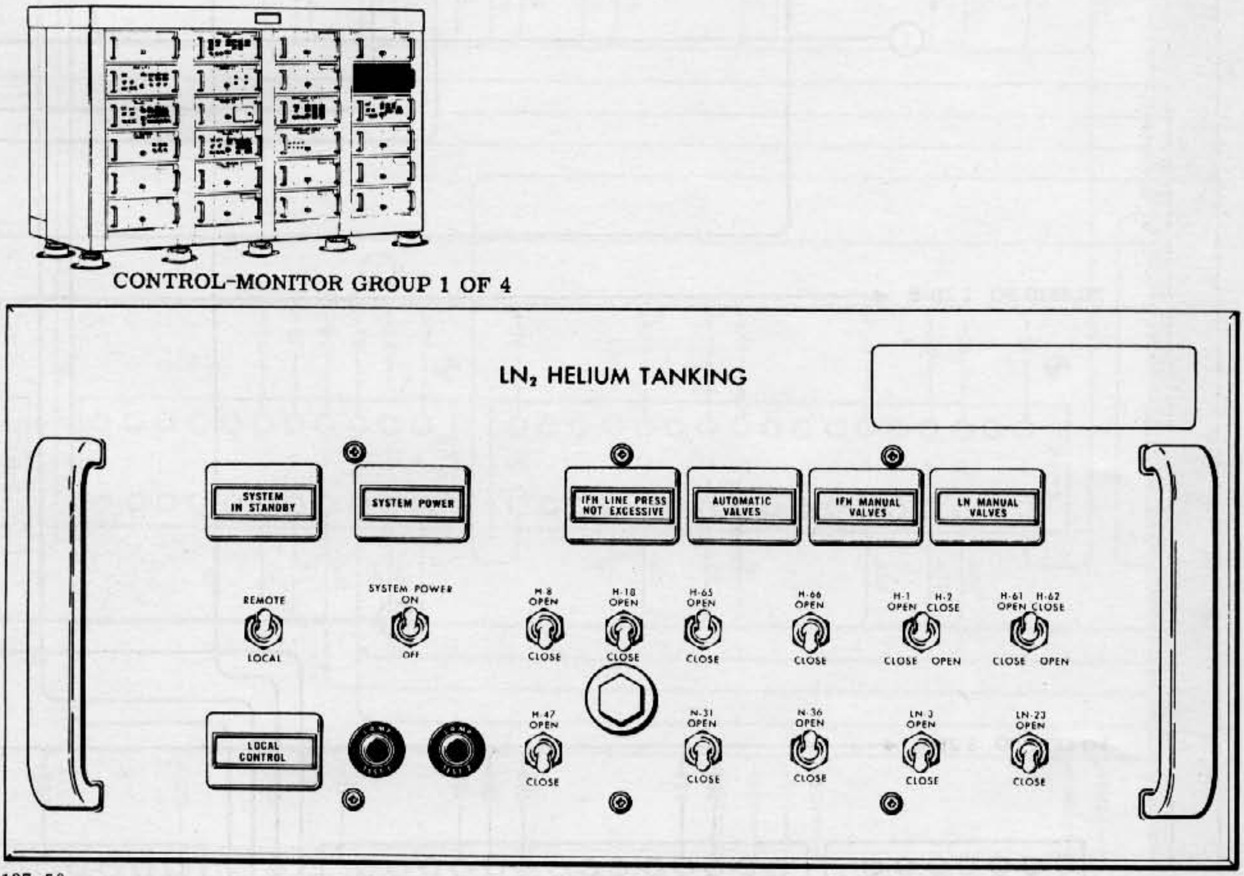
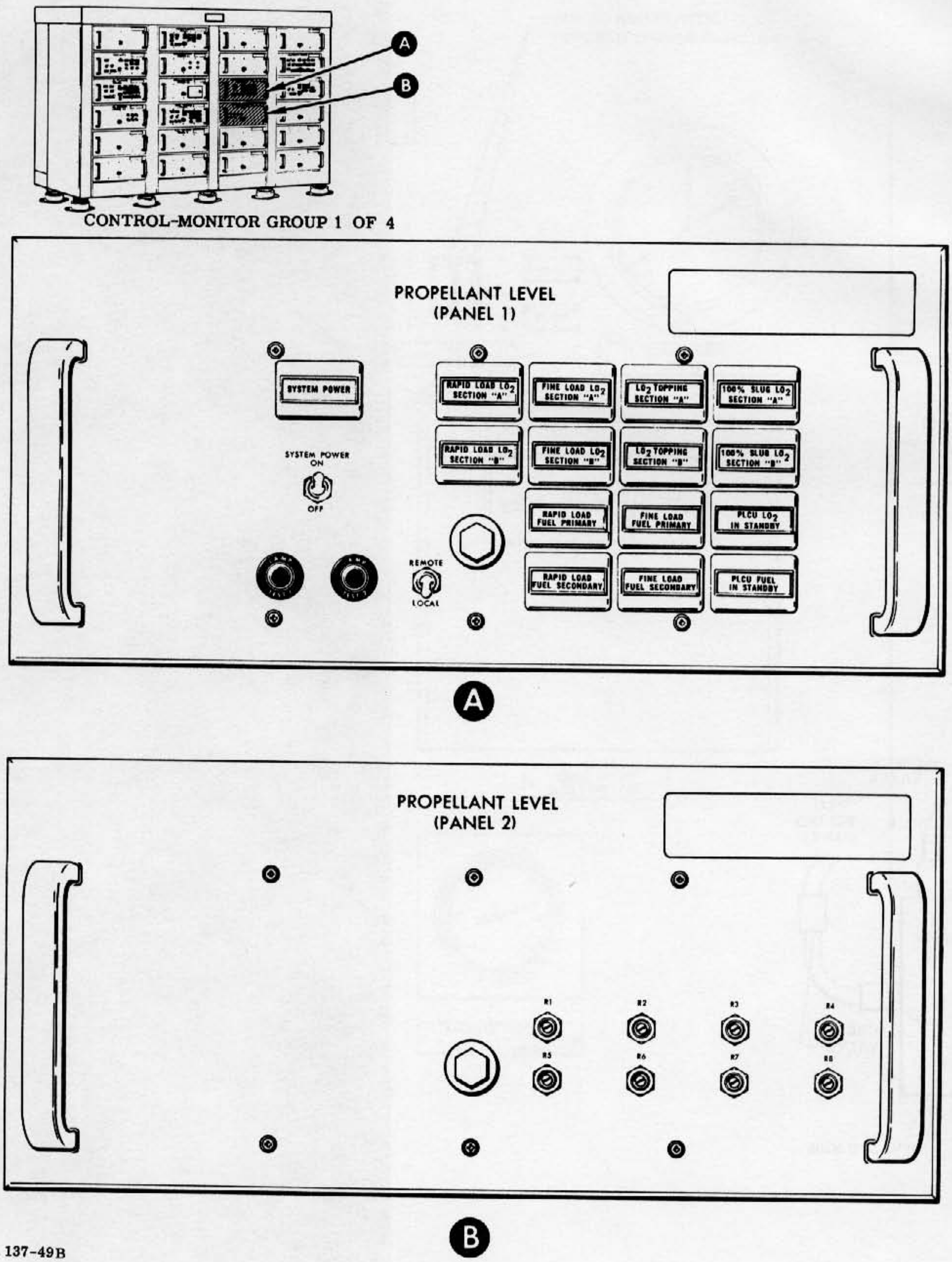


Figure 4-16. Propellant Loading Terminal Cabinet, Wiring Diagram



32.137-50

Figure 4-17. LN_2-Helium Tanking Panel



32.137-49B

Figure 4-18. Propellant Level Panels

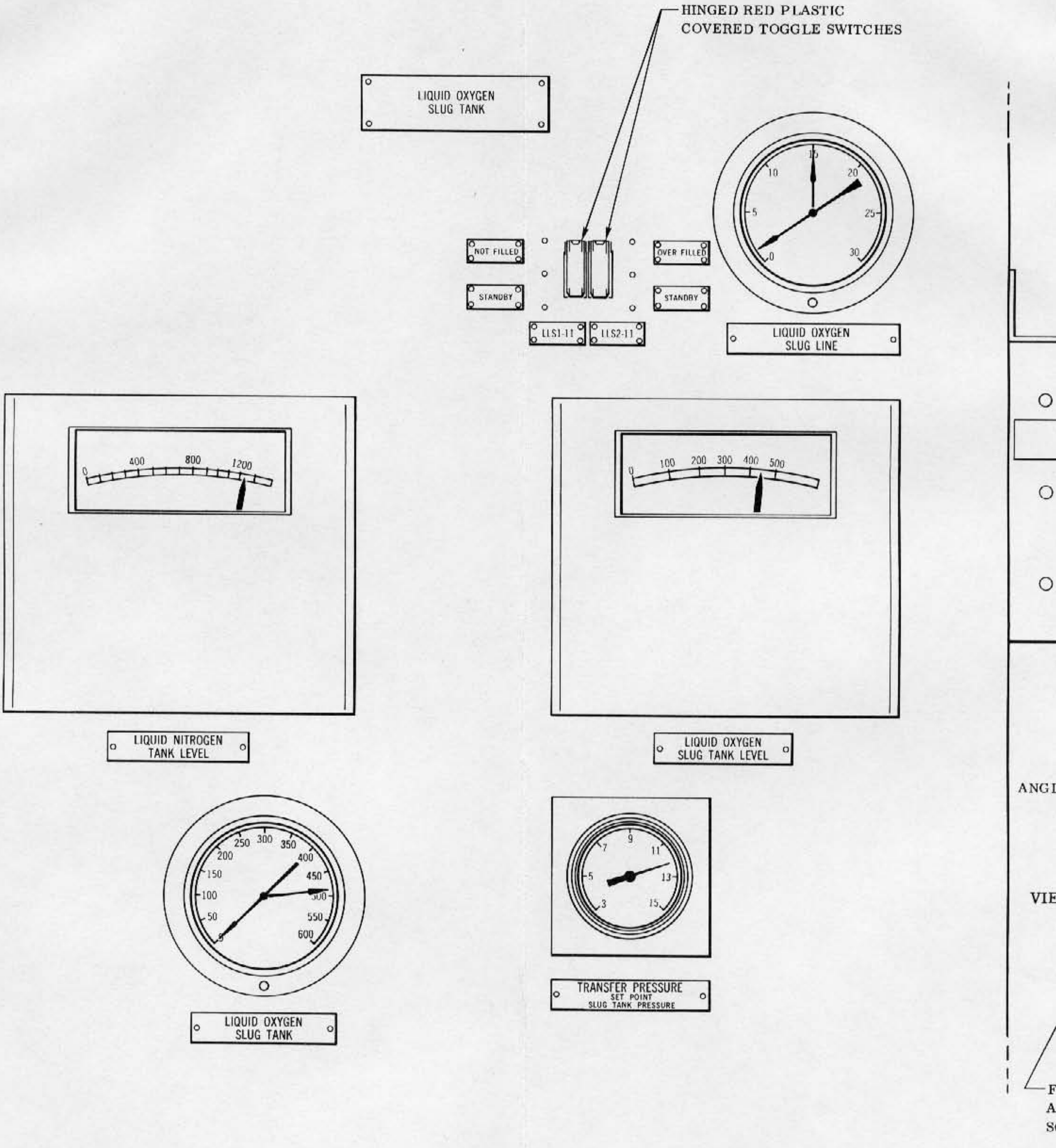
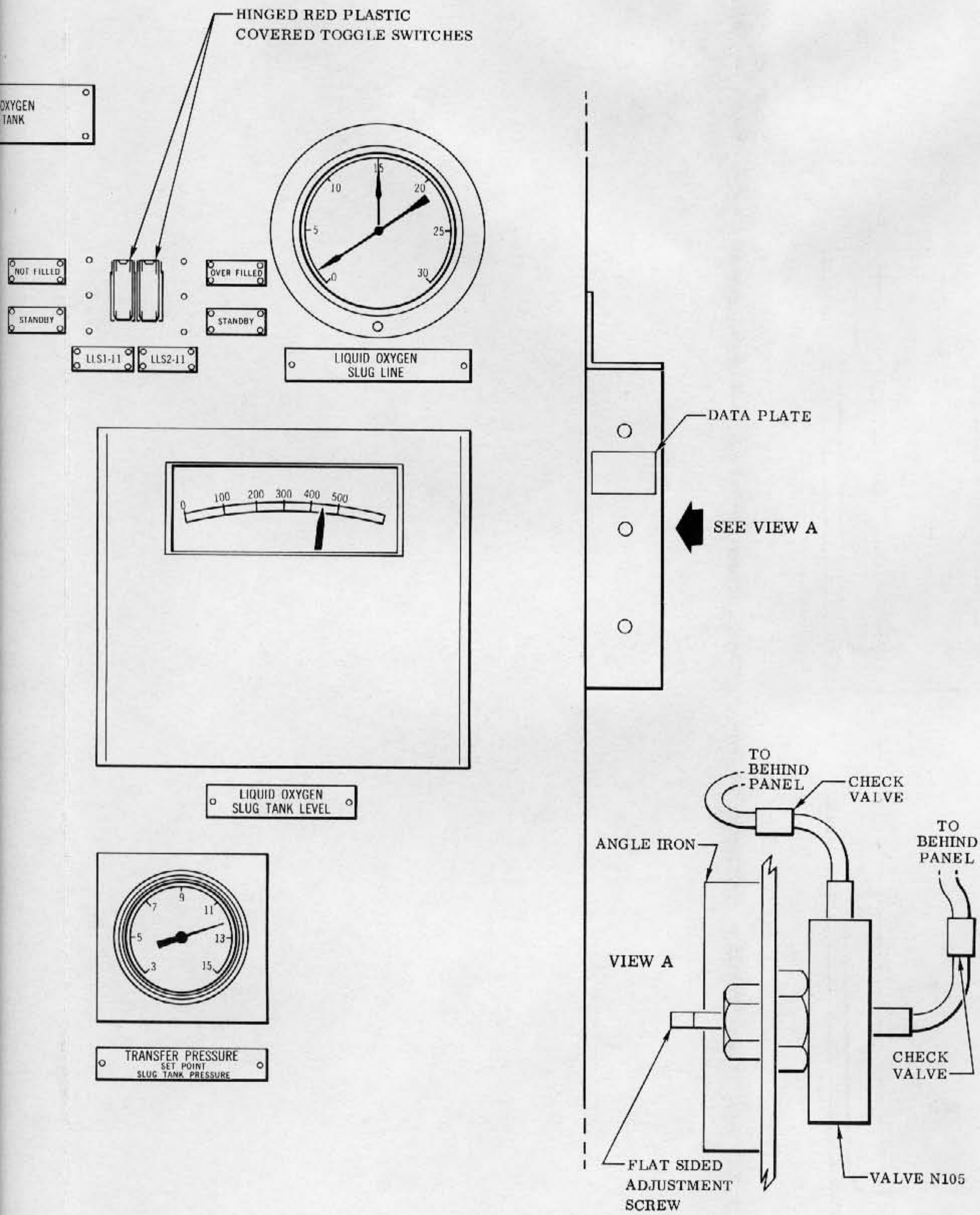
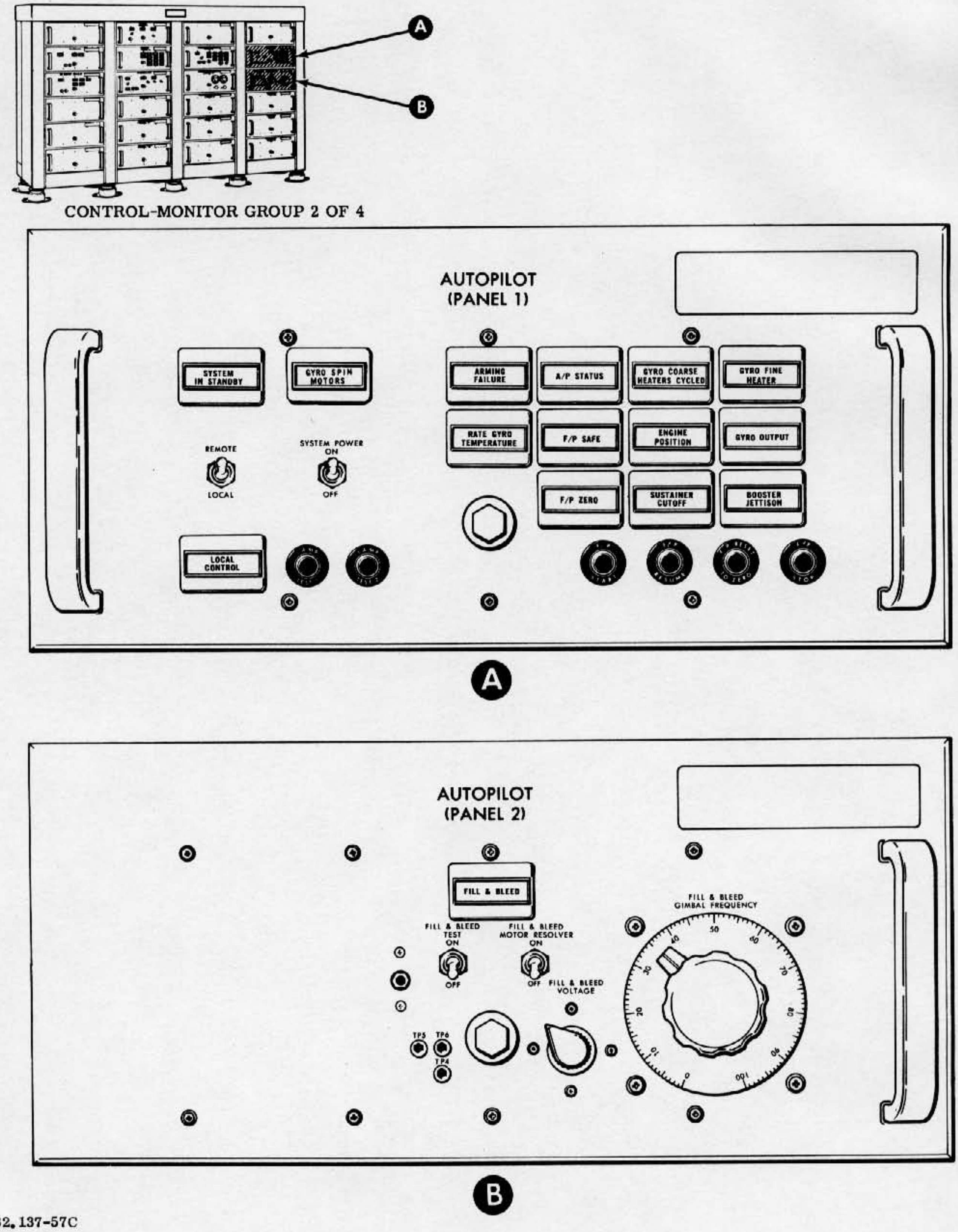


Figure 4-18A. Liquid Oxygen Slug Tank Panel

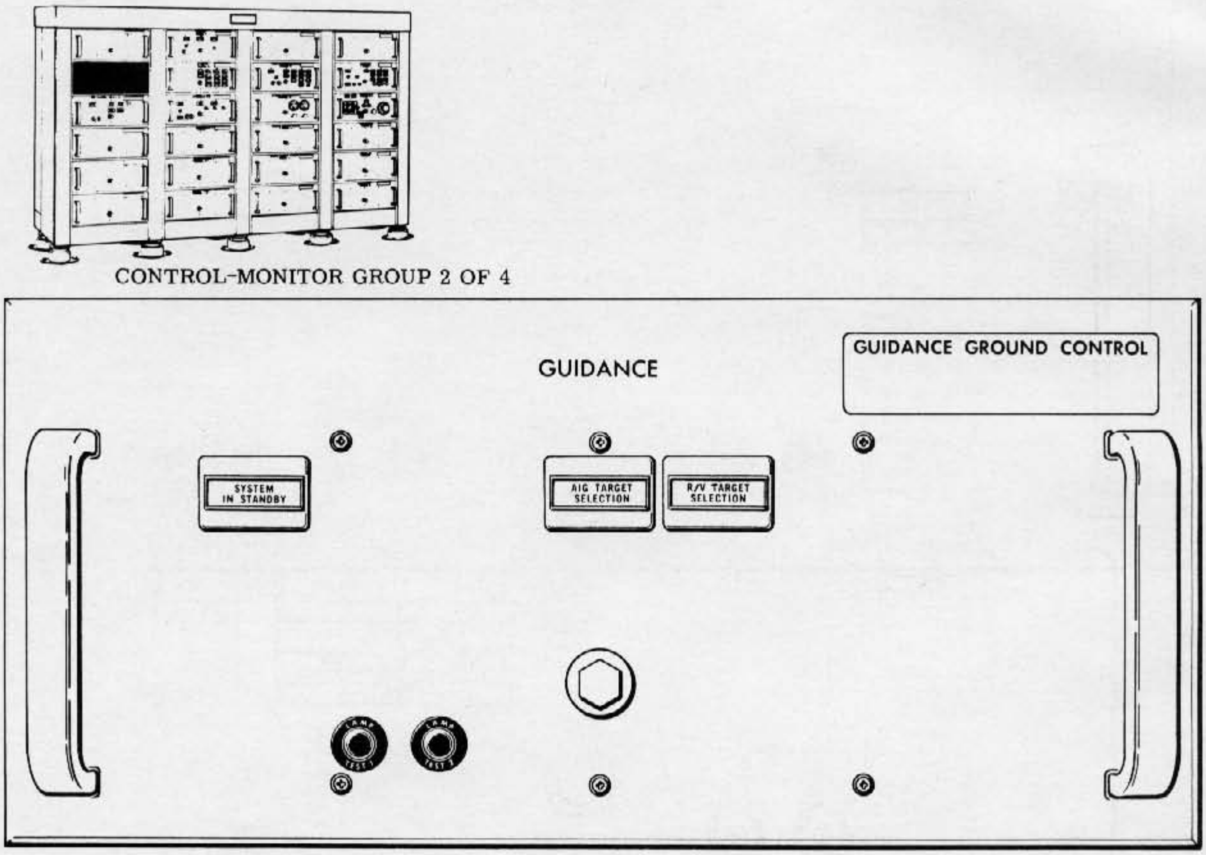


ygen Slug Tank Panel



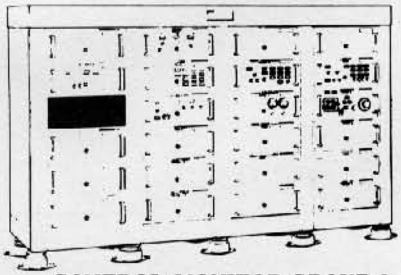
32.137-57C

Figure 4-19. Autopilot Panels

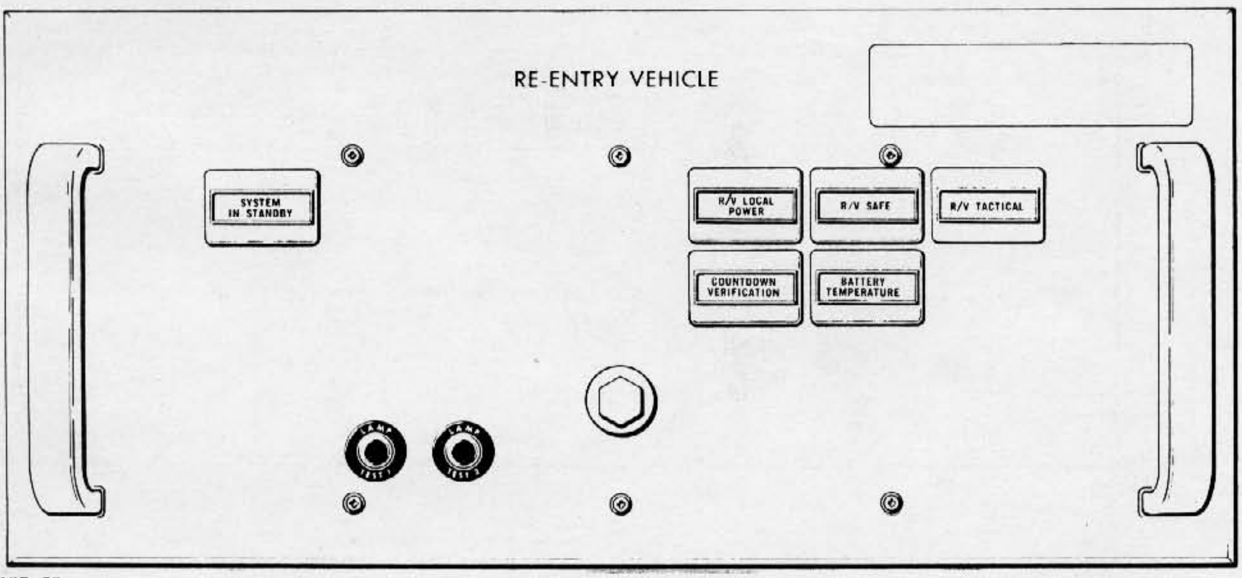


32.137-52

Figu 4-20. Guidance Panel



CONTROL-MONITOR GROUP 2 OF 4



32.137-53

Figure 4-21. Re-Entry Vehicle Panel

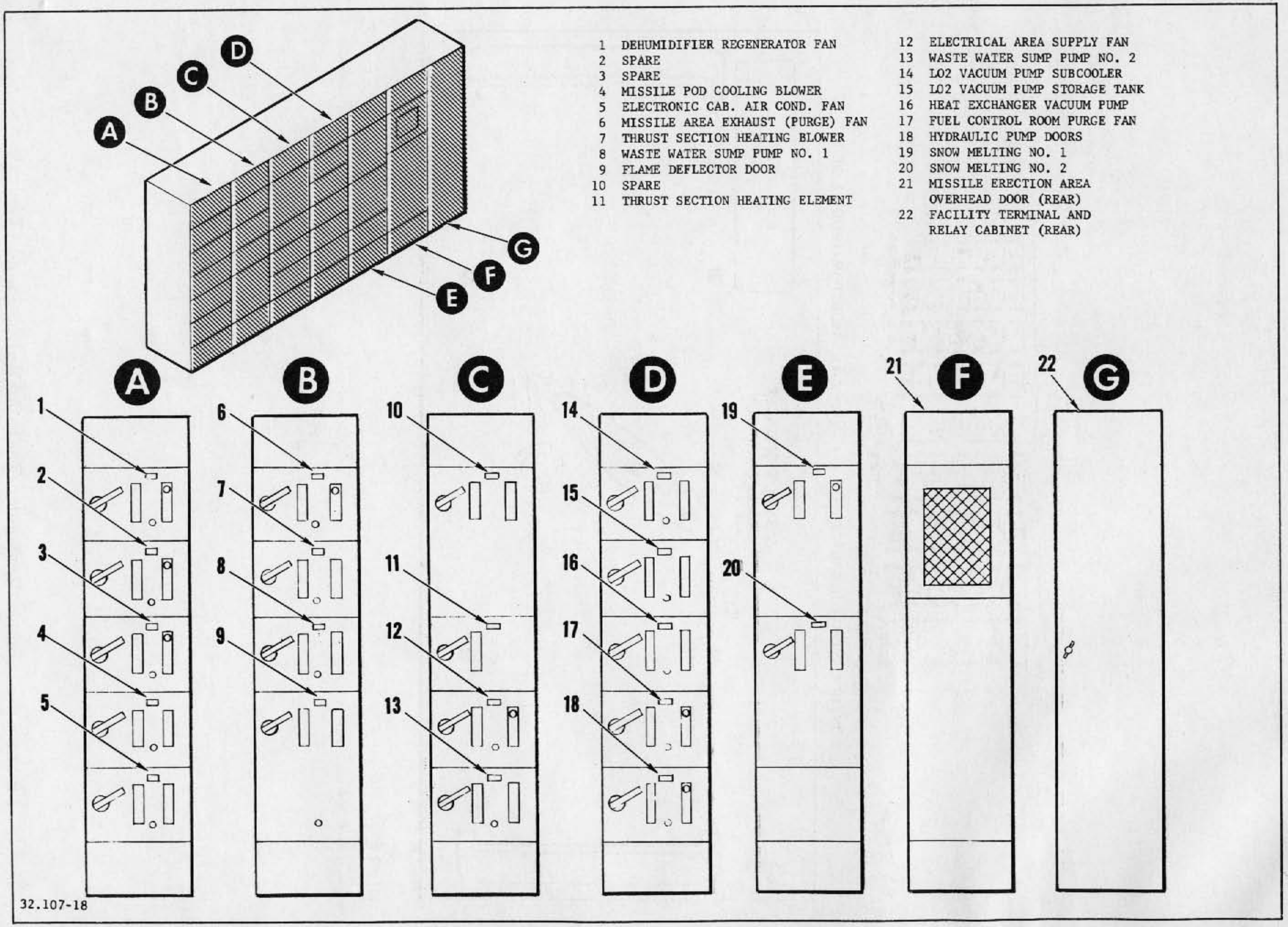
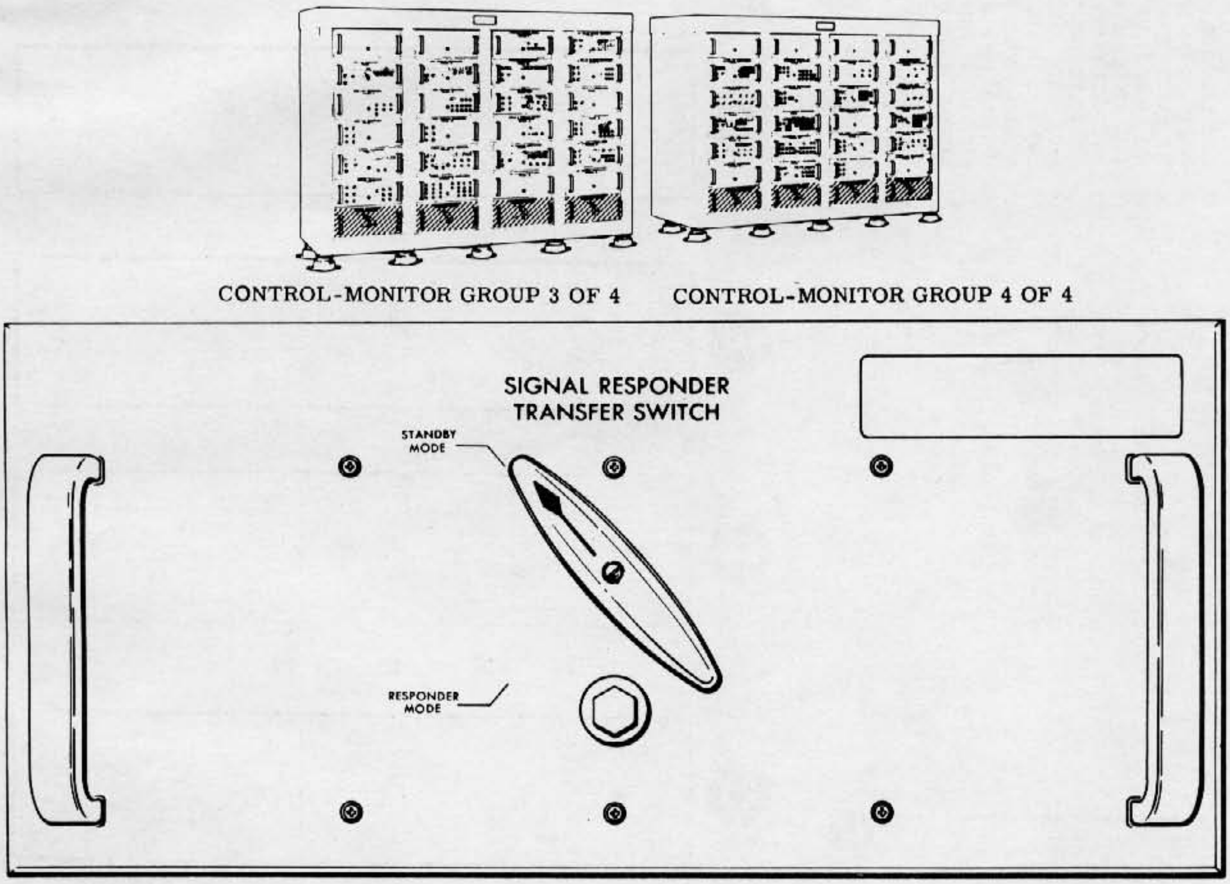
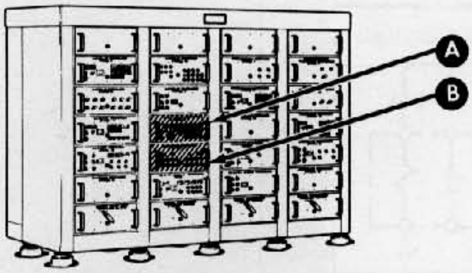


Figure 4-22. Motor Control Center, Launch and Service Building, Rear View (Typical)

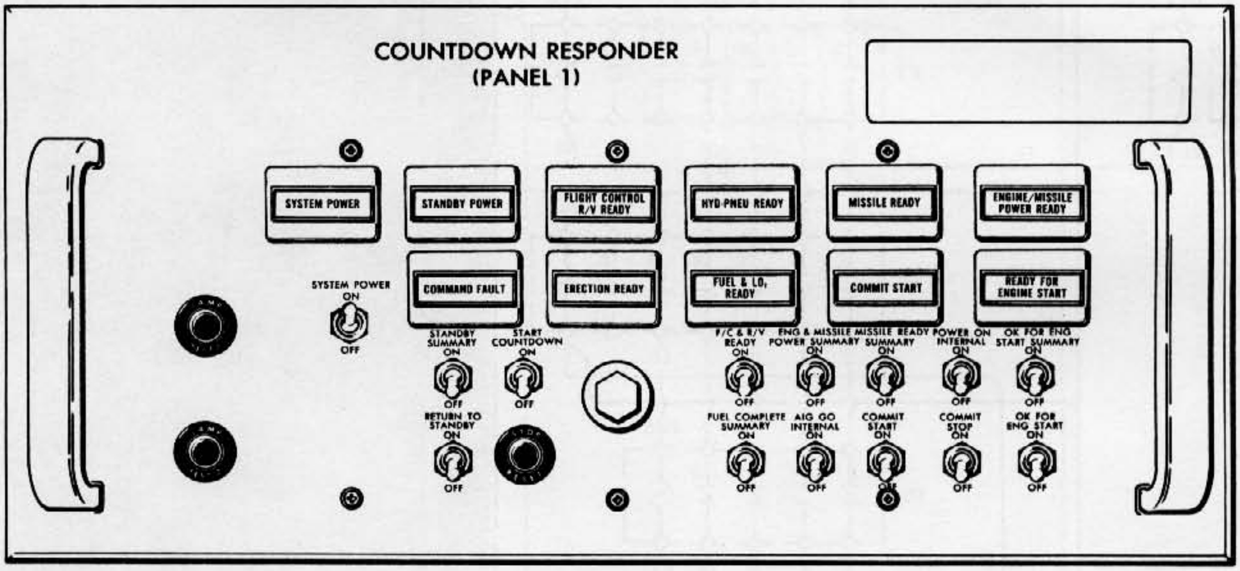


32.137-60

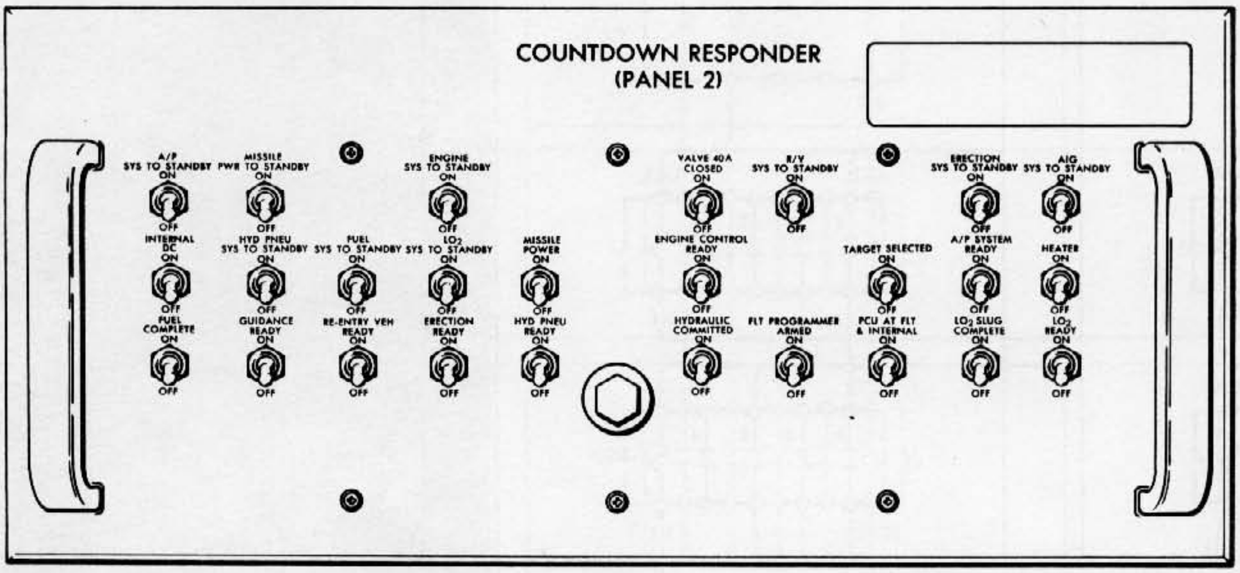
Figure 4-23. Signal Responder Transfer Switch Panel (Typical)



CONTROL-MONITOR GROUP 4 OF 4



A



B

32.137-61A

Figure 4-24. Countdown Responder Panels

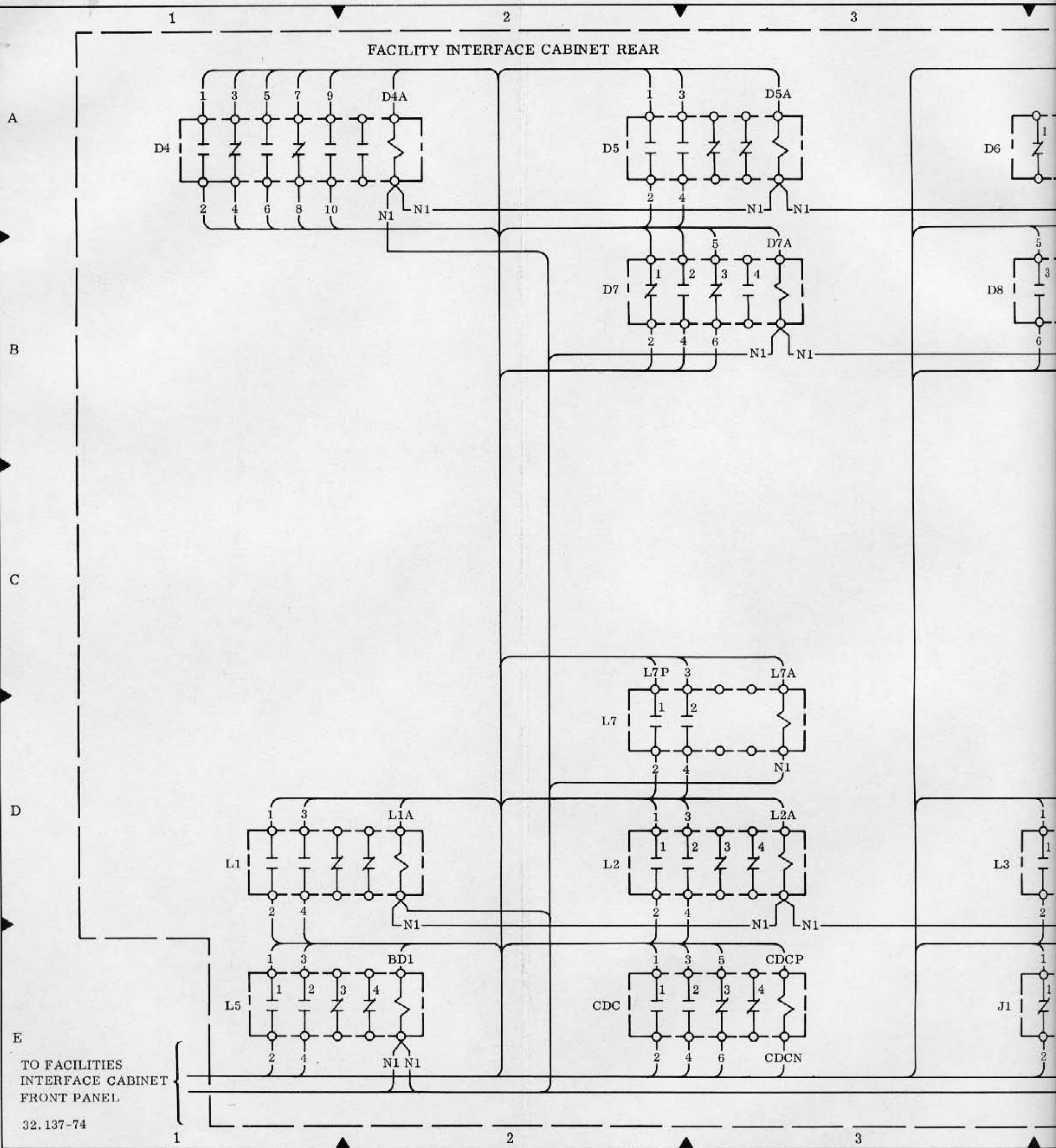
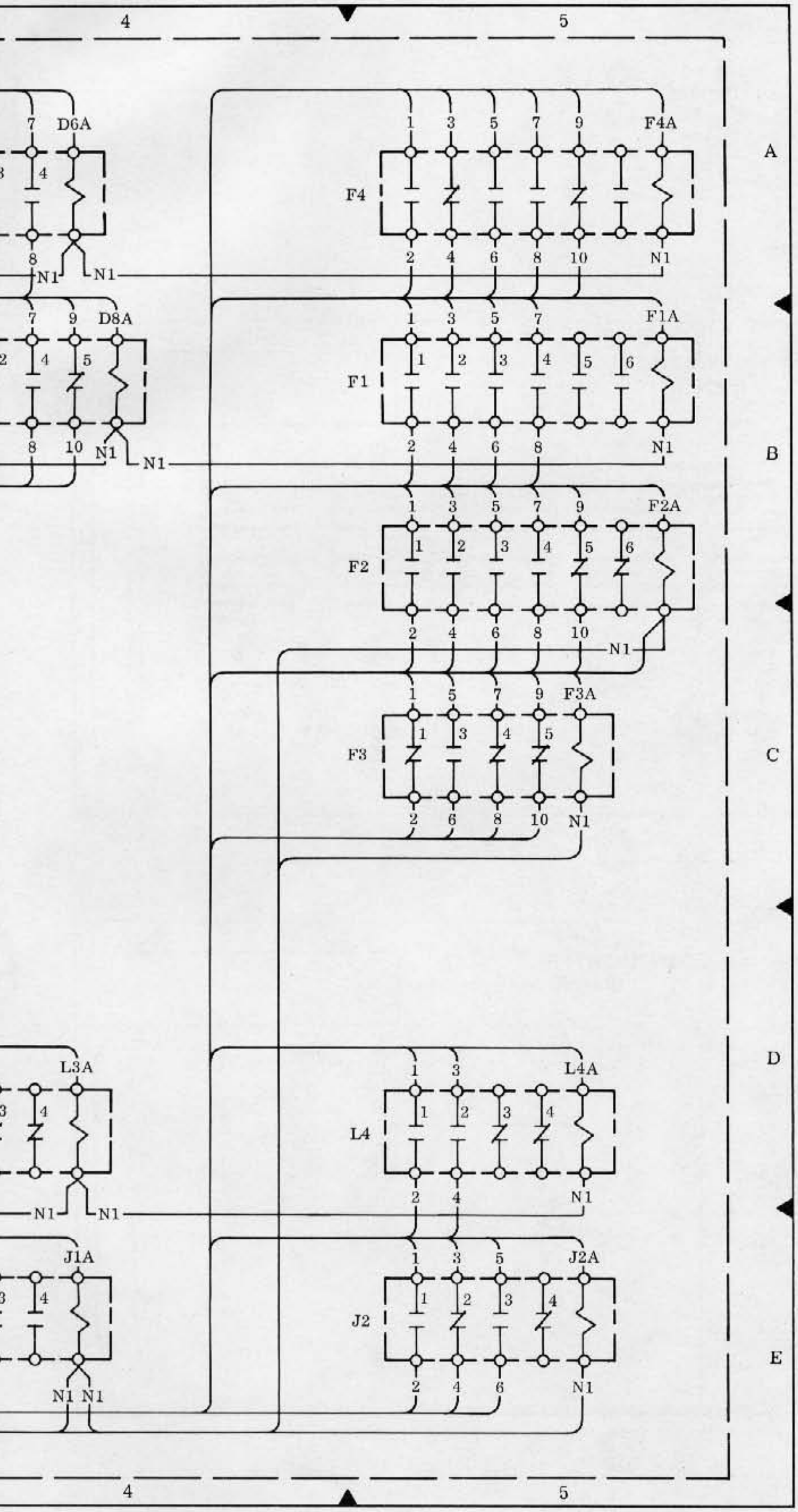


Figure 4-25. Facility Interface Cabinet, Rear Panel, Wiring Diagram



F4
F4A
D6A
F1
F1A
D8A
F2
F2A
F3
F3A
L4
L4A
L3A
J2
J2A
J1A
N1
A
B
C
D
E
4
5

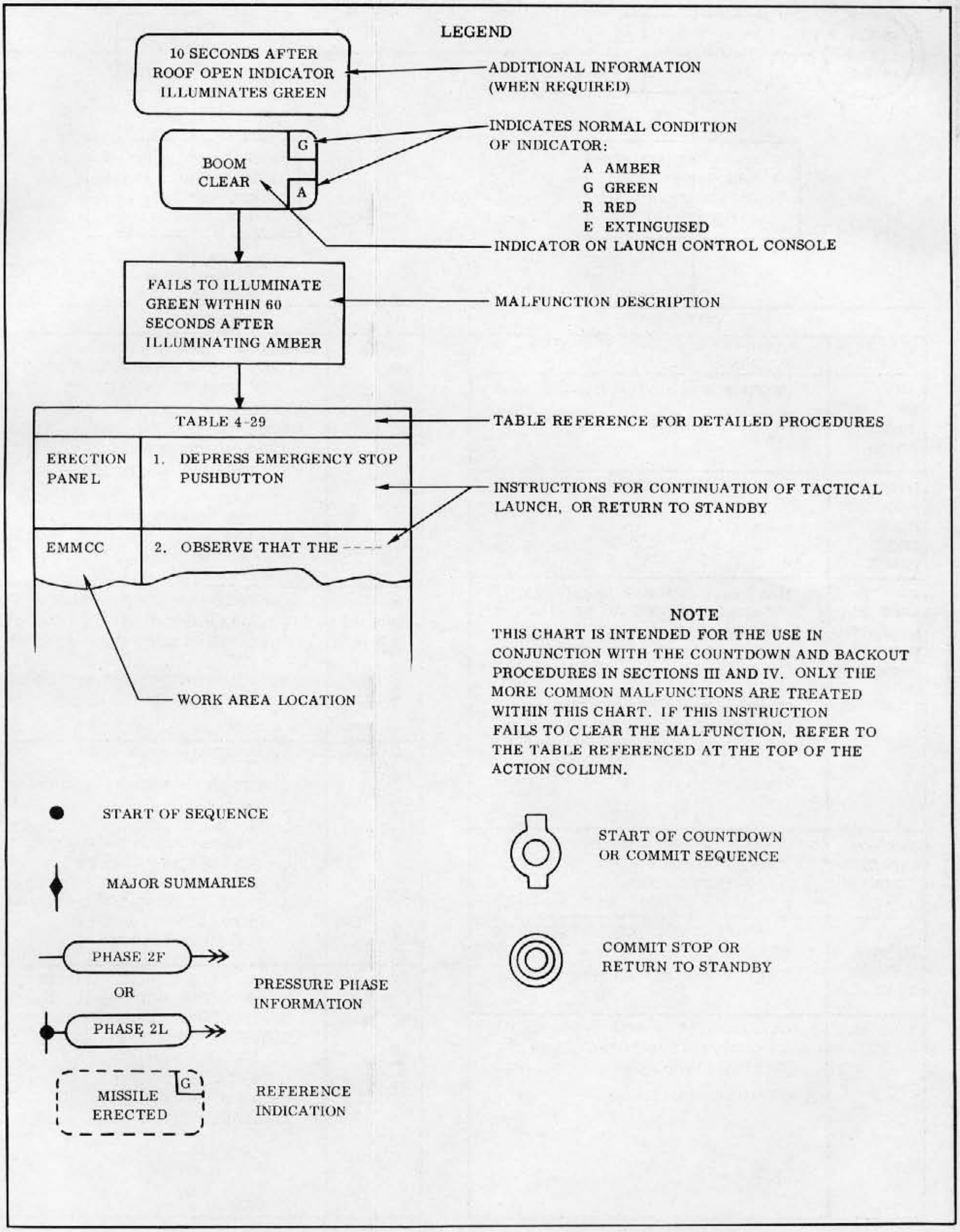
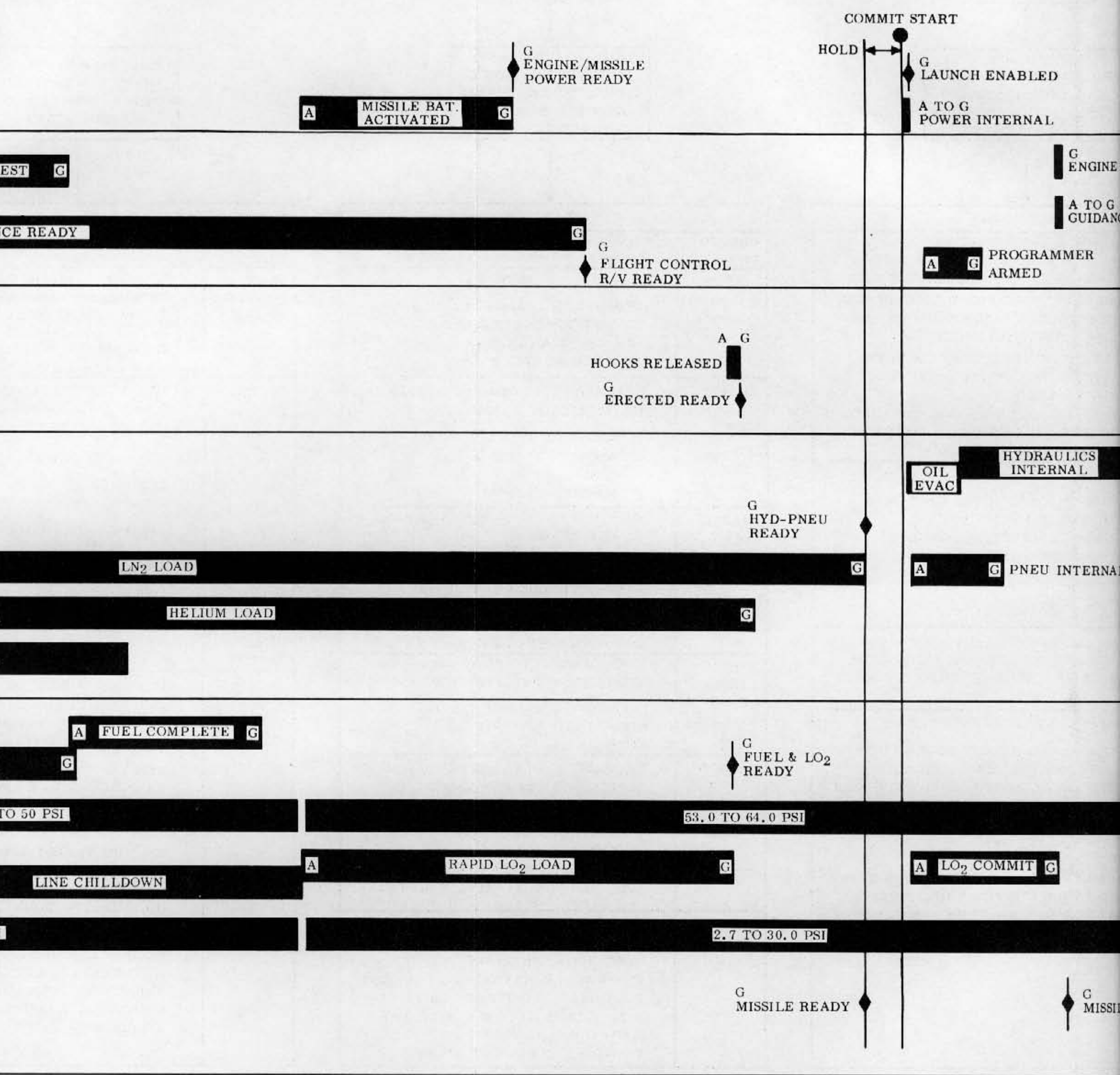
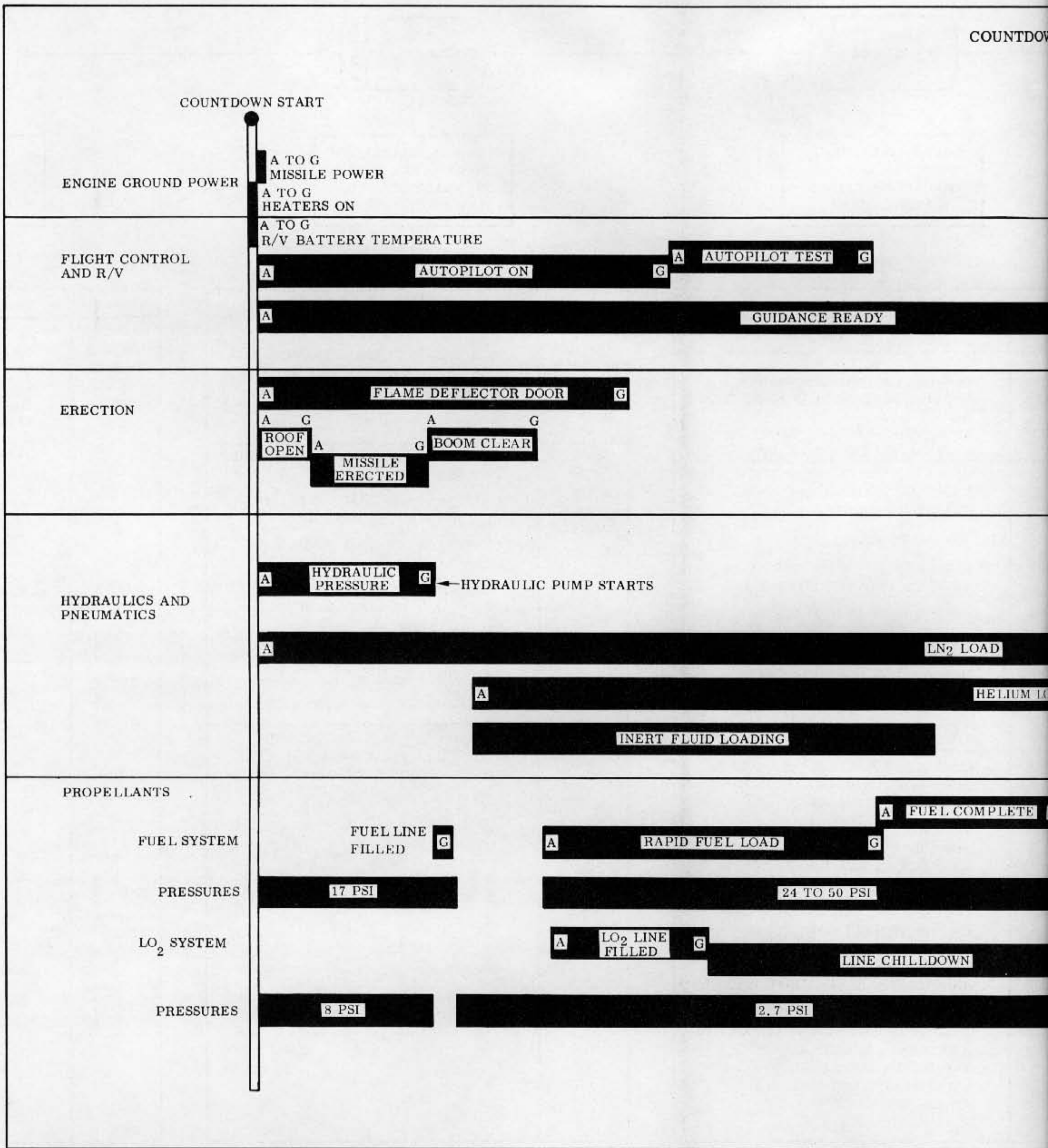


Figure 4-26. Countdown Continuation and Backout Flow Chart (Sheet 1 of 5)

COUNTDOWN SEQUENCE BAR CHART




COUNTDOW
COUNTDOWN START
ENGINE GROUND POWER
A TO G
MISSILE POWER
A TO G
HEATERS ON
FLIGHT CONTROL AND R/V
A TO G
R/V BATTERY TEMPERATURE
A
AUTOPILOT ON
G
A
AUTOPILOT TEST
G
A
GUIDANCE READY
ERECTION
A
FLAME DEFLECTOR DOOR
G
A G
ROOF OPEN
A
MISSILE ERECTED
G
A G
BOOM CLEAR
HYDRAULICS AND PNEUMATICS
A
HYDRAULIC PRESSURE
G
HYDRAULIC PUMP STARTS
A
LN2 LOAD
A
HELIUM L
INERT FLUID LOADING
PROPELLANTS
FUEL SYSTEM
FUEL LINE FILLED
G
A
RAPID FUEL LOAD
G
A
FUEL COMPLETE
PRESSURES
17 PSI
24 TO 50 PSI
LO2 SYSTEM
A
LO2 LINE FILLED
G
LINE CHILLDOWN
PRESSURES
8 PSI
2.7 PSI

32.137-104.1B

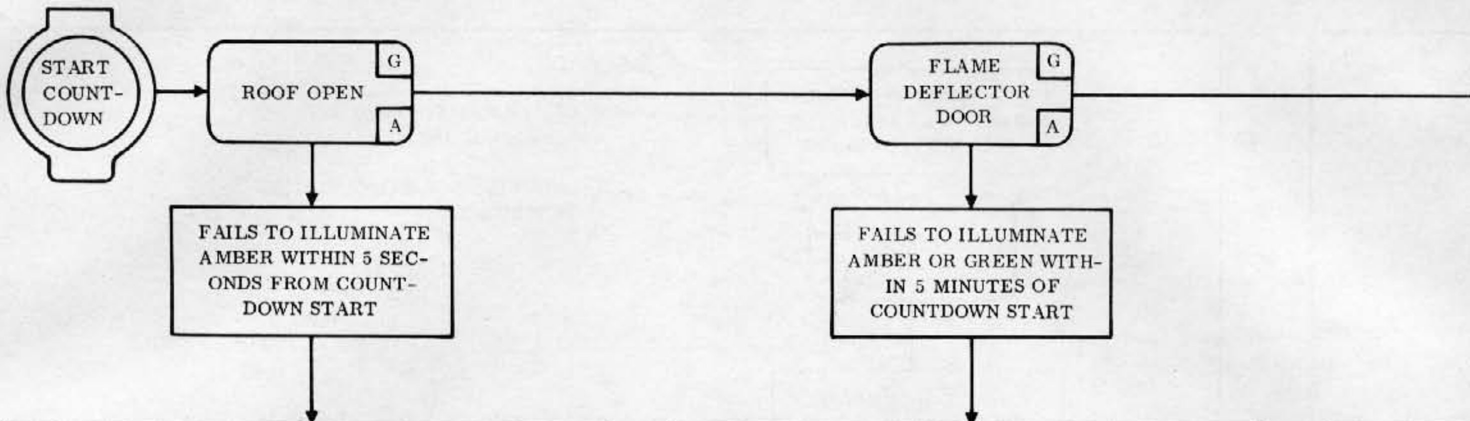


TABLE 4-27	
ERECTION PANEL	1. DEPRESS EMERGENCY STOP PUSHBUTTON
LN_2 HELIUM TANKING PANEL	2. POSITION N-36 SWITCH TO CLOSE 3. POSITION REMOTE LOCAL SWITCH TO LOCAL
MISSILE ERECTION DOOR CONTROL PANEL	4. OBSERVE AND NOTE ALL LIGHT INDICATIONS
MISSILE ERECTION DOOR HYDRAULIC POWER UNIT	5. MANUALLY ACTUATE THREE-WAY SOLENOID CONTROL VALVE AS NECESSARY TO UNLATCH AND RAISE MISSILE ERECTION DOOR NOTE IF STEP 5 FAILS TO OPEN MISSILE ERECTION DOOR IN A DPL OR TRAINING LAUNCH, RETURN TO STANDBY (TABLE 4-49). IN A TACTICAL LAUNCH REFER TO TABLE 4-27.
LAUNCH CONTROL CONSOLE	6. IF STEP 5 OPENS MISSILE ERECTION DOOR, OBSERVE ROOF OPEN INDICATOR ILLUMINATES GREEN
LN_2 HELIUM TANKING PANEL	7. POSITION REMOTE LOCAL SWITCH TO REMOTE 8. POSITION N-36 SWITCH TO OPEN
ERECTION PANEL	9. DEPRESS SYSTEM RESET PUSHBUTTON AND OBSERVE EMERGENCY STOP INDICATOR EXTINGUISHED 10. CONTINUE COUNTDOWN

TABLE 4-28	
FLAME DOOR CONTROL PANEL	1. ATTEMPT TO UNLATCH, RAISE, OR OPEN FLAME DOOR BY DEPRESSING APPROPRIATE PUSHBUTTON 2. IF STEP 1 FAILS TO OPEN FLAME DOOR, DEPRESS STOP PUSHBUTTON AND CONTINUE BELOW NOTE AT 576-C, FOR A DPL OR TRAINING LAUNCH, PERFORM STEP 3. AT OPERATIONAL BASES, FOR A DPL PERFORM STEP 4, AND FOR A TACTICAL LAUNCH PERFORM STEPS 5 AND 6.
LAUNCH CONTROL CONSOLE	3. CONTINUE COUNTDOWN THROUGH FUEL & LO_2 READY INDICATOR ILLUMINATED GREEN; THEN RETURN TO STANDBY 4. RETURN TO STANDBY IN ACCORDANCE WITH TABLE 3-15
FACILITY PANEL	5. FACILITY PANEL: a. THRUST SECTION HEATER BLOWER SWITCH ON b. VENTS SWITCH OPEN c. OVERHEAD DOOR SWITCH OPEN d. F/D DOOR SWITCH OPEN e. REMOTE LOCAL SWITCH LOCAL f. F/D OPEN INDICATOR ILLUMINATES GREEN 5 MINUTES AFTER STEP 5e COMPLETED
LAUNCH CONTROL CONSOLE	6. FLAME DEFLECTOR DOOR INDICATOR ILLUMINATES GREEN 5 MINUTES AFTER STEP 5e COMPLETED. CONTINUE COUNTDOWN NOTE IF INDICATORS DO NOT ILLUMINATE GREEN WITHIN 5 MINUTES, REFER TO TABLE 4-28, ACTION 1, STEP d.

ERECTION PANEL	
LAUNCH CONTROL CONSOLE	
ERECTION PANEL	
EMMCC	

32,137-104.2B ERECTION

OR
NG
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IG
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FORM
UNCH
H FUEL
NATED
BY
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EN
AL
NATES
ATOR
ATE
ER
d.

MISSILE ERECTED (G) (A)

FAILS TO ILLUMINATE AMBER 10 SECONDS AFTER ROOF OPEN INDICATOR GREEN AND BOOM AT 0° INDICATOR GREEN

TABLE 4-29

ERECTION PANEL	1. DEPRESS EMERGENCY STOP PUSH-BUTTON AND OBSERVE EMERGENCY STOP INDICATOR ILLUMINATES RED 2. DEPRESS SYSTEM RESET PUSHBUTTON AND OBSERVE EMERGENCY STOP INDICATOR EXTINGUISHED 3. IF ERECTION SEQUENCE FAILS TO CONTINUE AUTOMATICALLY, REPEAT STEPS 1 AND 2 4. IF STEP 3 IS PERFORMED AND AUTOMATIC SEQUENCE FAILS, CONTINUE BELOW
LAUNCH CONTROL CONSOLE	NOTE IN A DPL OR TRAINING LAUNCH, RETURN TO STANDBY (TABLE 4-49). IN A TACTICAL LAUNCH, PROCEED TO STEP 5.
ERECTION PANEL	5. DEPRESS EMERGENCY STOP PUSH-BUTTON AND OBSERVE EMERGENCY STOP INDICATOR ILLUMINATES RED
EMMCC	6. ACTUATE RESET SWITCH 7. IF ERECTION SEQUENCE DOES NOT CONTINUE, POSITION CONTROL STATION SELECTOR SWITCH THROUGH OFF TO LOCAL AND OBSERVE EMERGENCY STOP INDICATOR ILLUMINATES RED 8. OBSERVE ALL INDICATORS AND REFER TO TABLE 4-29 FOR APPROPRIATE ACTION TO CONTINUE COUNTDOWN

BOOM CLEAR (A)

120 SECONDS MAXIMUM

FAILS TO ILLUMINATE AMBER WHEN MISSILE IS ERECTED AND MISSILE ERECTED INDICATOR ILLUMINATES GREEN

TABLE 4-29

ERECTION PANEL	1. DEPRESS EMERGENCY STOP PUSH-BUTTON
LAUNCH CONTROL CONSOLE	NOTE IN A DPL OR TRAINING LAUNCH, RETURN TO STANDBY (TABLE 4-49). IN A TACTICAL LAUNCH, PROCEED TO STEP 2
EMMCC	2. OBSERVE FOLLOWING INDICATORS ARE ILLUMINATED: a. ABOVE 90° RIGHT b. ABOVE 90° LEFT c. NOSE CLAMP LOCKED d. MISSILE VERTICAL
MISSILE BAY	3. OBSERVE POSITION OF QUAD III AND QUAD IV HOOKS NOTE IF HOOKS ARE LATCHED, PERFORM STEPS 4 THROUGH 6. IF HOOKS ARE NOT LATCHED AND MISSILE VERTICAL INDICATOR IS EXTINGUISHED, PERFORM STEPS 7 THROUGH 9.
EMMCC EMERGENCY BY PASS PANEL	4. REMOVE SAFETYWIRE FROM QUAD III AND QUAD IV HOOKS LATCHED SWITCHES 5. SAFETYWIRE QUAD III AND QUAD IV HOOKS LATCHED SWITCHES TO ACTUATE
LAUNCH CONTROL CONSOLE	6. OBSERVE BOOM CLEAR INDICATOR ILLUMINATES AMBER AND CONTINUE COUNTDOWN
EMMCC	7. ACTUATE MISSILE CONTACTOR SIMULATOR SWITCH AND OBSERVE QUADRANT III LATCHED AND QUADRANT IV LATCHED INDICATORS ILLUMINATE
LAUNCH CONTROL CONSOLE	8. OBSERVE BOOM CLEAR INDICATOR ILLUMINATES AMBER AND CONTINUE COUNTDOWN 9. IF BOOM CLEAR INDICATOR DOES NOT ILLUMINATE AMBER, REFER TO TABLE 4-29, ITEM 3, ACTION 1, STEP h (6) AND ON FOR ADDITIONAL CONTINUATION INSTRUCTIONS

ERECTION PANEL
LAUNCH CONTROL CONSOLE
EMMCC
MISSILE TRANSFER PANEL (NOSE CLAMP)
EMMCC
LAUNCH CONTROL CONSOLE

OP PUSH-

AUNCH,
ABLE 4-49).

DICATORS ARE

D

UAD III AND

PERFORM
HOOKS ARE
SILE VERTI-
GUISHED,
UGH 9.
OM QUAD III
CHED SWITCHES
D QUAD IV
ES TO

NDICATOR
D

ACTOR SIMU-
ERVE QUAD-
UADRANT IV
LUMINATE

IDICATOR
D

OR DOES NOT
FER TO TABLE
STEP h (6)

IONS

E

120 SECONDS MAXIMUM → BOOM CLEAR (G)

FAILS TO ILLUMINATE GREEN WITHIN 120 SECONDS AFTER ILLUMINATING AMBER

TABLE 4-29		
ERECTION PANEL	1.	DEPRESS EMERGENCY STOP PUSHBUTTON
LAUNCH CONTROL CONSOLE		**NOTE** IN A DPL OR TRAINING LAUNCH, RETURN TO STANDBY IN ACCORDANCE WITH TABLE 3-15, OR TABLE 4-49, AS APPLICABLE. IN A TACTICAL LAUNCH, PROCEED TO STEP 2.
EMMCC	2.	OBSERVE NOSE CLAMP UNLOCKED AND NOSE CLAMP OPENED INDICATORS ILLUMINATED
		NOTE IF EITHER, OR BOTH, ARE EXTINGUISHED, PROCEED TO STEP 3.
	3.	POSITION CONTROL STATION SELECTOR SWITCH THROUGH OFF TO MISSILE TRANSFER
MISSILE TRANSFER PANEL (NOSE CLAMP)	4.	DEPRESS UNLOCK & OPEN NOSE CLAMP PUSHBUTTON
EMMCC	5.	OBSERVE NOSE CLAMP UNLOCKED AND NOSE CLAMP OPENED INDICATORS ILLUMINATED
	6.	POSITION CONTROL STATION SELECTOR SWITCH THROUGH OFF TO LAUNCH CONTROL AND ACTUATE RESET SWITCH
	7.	OBSERVE EMERGENCY STOP INDICATOR EXTINGUISHED
LAUNCH CONTROL CONSOLE	8.	OBSERVE BOOM CLEAR INDICATOR ILLUMINATES GREEN AND CONTINUE COUNTDOWN
	9.	IF BOOM CLEAR INDICATOR FAILS TO ILLUMINATE GREEN, REFER TO TABLE 4-29, ITEM 4, ACTION 2, FOR ADDITIONAL CONTINUATION INSTRUCTIONS

HOOKS RELEASED (G) (A)

FAILS TO ILLUMINATE GREEN AFTER FUEL & LO_2 READY INDICATOR ILLUMINATES GREEN

TABLE 4-29		
LAUNCH CONTROL CONSOLE		**NOTE** IN A DPL OR TRAINING LAUNCH, RETURN TO STANDBY (TABLE 3-15). IN A TACTICAL LAUNCH, PROCEED TO STEP 1.
EMMCC EMERGENCY BY PASS PANEL	1.	OBSERVE NOSE CLAMP OPENED INDICATOR ILLUMINATED
	2.	OBSERVE NOSE CLAMP ROTATED UP INDICATOR EXTINGUISHED
	3.	REMOVE SAFETYWIRE FROM NOSE CLAMP ROTATED UP SWITCH
	4.	ACTUATE NOSE CLAMP ROTATED UP SWITCH AND OBSERVE INDICATOR ILLUMINATED
	5.	SAFETYWIRE NOSE CLAMP ROTATED UP SWITCH IN THE ACTUATE POSITION
LAUNCH CONTROL CONSOLE	6.	OBSERVE HOOKS RELEASED INDICATOR ILLUMINATED AMBER, THEN GREEN, AND CONTINUE COUNTDOWN

Figure 4-26. Countdown Continuation and E

HOOKS RELEASED (G / A)

FAILS TO ILLUMINATE GREEN AFTER FUEL & LO_2 READY INDICATOR ILLUMINATES GREEN

TABLE 4-29	
LAUNCH CONTROL CONSOLE	**NOTE** IN A DPL OR TRAINING LAUNCH, RETURN TO STANDBY (TABLE 3-15). IN A TACTICAL LAUNCH, PROCEED TO STEP 1.
EMMCC EMERGENCY BY PASS PANEL	1. OBSERVE NOSE CLAMP OPENED INDICATOR ILLUMINATED 2. OBSERVE NOSE CLAMP ROTATED UP INDICATOR EXTINGUISHED 3. REMOVE SAFETYWIRE FROM NOSE CLAMP ROTATED UP SWITCH 4. ACTUATE NOSE CLAMP ROTATED UP SWITCH AND OBSERVE INDICATOR ILLUMINATED 5. SAFETYWIRE NOSE CLAMP ROTATED UP SWITCH IN THE ACTUATE POSITION
LAUNCH CONTROL CONSOLE	6. OBSERVE HOOKS RELEASED INDICATOR ILLUMINATED AMBER, THEN GREEN, AND CONTINUE COUNTDOWN

ERECTED READY (G)

FAILS TO ILLUMINATE GREEN WITHIN ALLOTED TIME

TABLE 4-37	
LAUNCH CONTROL CONSOLE	1. IF ERECTED READY INDICATOR IS EXTINGUISHED AND MISSILE READY INDICATOR IS ILLUMINATED GREEN, CONTINUE COUNTDOWN. IF MISSILE READY INDICATOR IS EXTINGUISHED, RETURN TO STANDBY AND TROUBLESHOOT LAUNCH CONTROL EQUIPMENT

Figure 4-26. Countdown Continuation and Backout Flow Chart (Sheet 2 of 5)

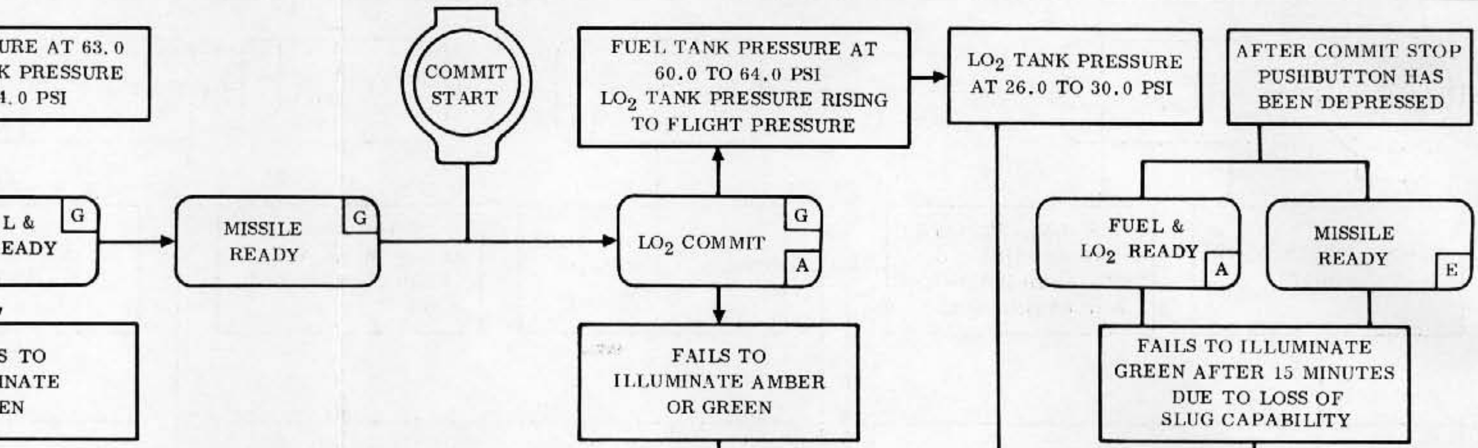


TABLE 4-34
NOTE IN A DPL OR TRAINING LAUNCH, RETURN TO STANDBY (TABLE 3-15). IN A TACTICAL LAUNCH, PROCEED TO STEP 1.
OBSERVE VALVE L-4 POSITION INDICATOR AND NOTE WHETHER L-4 IS OPEN OR CLOSED **NOTE** IF VALVE L-4 IS CLOSED, PROCEED TO STEP 3. IF VALVE L-4 IS OPEN, PROCEED TO STEP 2
REMOVE WIRE FROM PIN 13 ON TB-2-8 AND PROCEED TO STEP 4 JUMPER BETWEEN PIN 8 ON TB-3-8 AND PIN 12 OF TB-1-8
OBSERVE FUEL & LO_2 READY INDICATOR ILLUMINATES GREEN AND CONTINUE COUNTDOWN IF FUEL & LO_2 READY INDICATOR FAILS TO ILLUMINATE GREEN, REMOVE JUMPER AND RETURN TO STANDBY (TABLE 3-15)

TABLE 4-41	
LAUNCH CONTROL CONSOLE	**NOTE** IN A DPL OR TRAINING LAUNCH, DEPRESS COMMIT STOP PUSHBUTTON AND RETURN TO STANDBY (TABLE 3-15). IN A TACTICAL LAUNCH, PROCEED TO STEP 1. 1. DEPRESS COMMIT STOP PUSHBUTTON AND TAKE NECESSARY ACTION TO RESTART COMMIT SEQUENCE **NOTE** THE MISSILE READY INDICATOR WILL ILLUMINATE GREEN WITHIN 15 MINUTES AFTER DEPRESSING COMMIT STOP PUSHBUTTON IF THE LO_2 SLUG TANK HAS AUTOMATICALLY REFILLED AND THERE IS NO OTHER MALFUNCTION. 2. BEFORE ATTEMPTING TO RESTART COMMIT SEQUENCE, CHECK THE PLCU TO VERIFY THE 100 PERCENT PROBE IS DRY

TABLE 3-14	
LAUNCH CONTROL CONSOLE	1. IF LO_2 TANK PRESSURE EXCEEDS 31.0 PSI, IMMEDIATELY DEPRESS COMMIT STOP PUSHBUTTON AND RETURN TO STANDBY (TABLE 3-15)

TABLE 4-34	
LO_2 TANKING (PANEL 1) AND (PANEL 2)	1. POSITION O-20 AND SA-4 SWITCHES TO CLOSE AND VERIFY ALL OTHER SWITCHES ARE IN STANDBY 2. POSITION REMOTE LOCAL SWITCH TO LOCAL 3. POSITION O-37 AND L-35 SWITCHES TO OPEN
LAUNCH CONTROL CONSOLE	4. OBSERVE LO_2 SUPPLY INDICATOR ILLUMINATES GREEN
LO_2 TANKING (PANEL 1)	5. POSITION L-35 AND O-37 SWITCHES TO CLOSE 6. POSITION REMOTE LOCAL SWITCH TO REMOTE 7. VERIFY ALL SWITCHES ARE IN STANDBY POSITION
LAUNCH CONTROL CONSOLE	8. OBSERVE FUEL & LO_2 READY AND MISSILE READY INDICATORS ILLUMINATE GREEN 9. RESTART COMMIT SEQUENCE

PROPELLANTS

Figure 4-26. Countdown Continuation and Backout Flow Chart (Sheet 3 of 5)

LOAD INDICATOR SHOULD
IATE GREEN 4 MINUTES
ILLUMINATING AMBER

RAPID
LO_2 LOAD
G

LS TO ILLUMINATE
N WITHIN 4 MINUTES
13 SECONDS AFTER
UMINATED AMBER

ABLE 4-33
NOTE PL OR TRAINING LAUNCH DIATELY DEPRESS RETURN ANDBY PUSHBUTTON E 3-15). IN A TACTICAL CH, PROCEED TO STEP 1.
ION REMOTE LOCAL H TO LOCAL
Y FUEL COMPLETE ATOR IS ILLUMINATED N, FUEL TANK PRES- GAGE INDICATES E 55.0 PSI, AND 2- TE CHILLDOWN TIME LAPSED FROM LO_2 FILLED INDICATOR IL- IATED AMBER BEFORE EEDING TO STEP 3
ION SA-1 SWITCH TO CLOSE A-2 SWITCH TO OPEN ION L-2 SWITCH TO OPEN
VE RAPID LOAD LO_2 ON "A" INDICATOR INATES GREEN, IM- TELY POSITION L-2 H ON LO_2 TANKING L 1) TO CLOSE
VE RAPID LO_2 LOAD ATOR ILLUMINATES N
ON REMOTE LOCAL H TO REMOTE AND NUE COUNTDOWN

LO_2 SUPPLY
G

INDICATOR
ILLUMINATES RED

TABLE 4-33		
LAUNCH CONTROL CONSOLE		NOTE IN A DPL OR TRAINING LAUNCH, RETURN TO STANDBY (TABLE 3-15). IN A TACTICAL LAUNCH, PROCEED TO STEP 1.
LO_2 TANKING (PANEL 1)	1.	OBSERVE SLUG SUPPLY INDICATOR EXTINGUISHED
LO_2 SLUG TANK	2.	OPEN PETCOCK ON LO_2 SLUG TANK TO CHECK LIQUID OXYGEN LEVEL NOTE IF SLUG TANK IS NOT FULL, PROCEED TO STEP 3. IF SLUG TANK IS FULL, PROCEED TO STEP 4
	3.	POSITION LLS1-11 SWITCH TO NOT FILLED UNTIL SLUG TANK IS FULL, THEN RETURN SWITCH TO STANDBY POSITION AND PROCEED TO STEP 5
	4.	POSITION LLS2-11 SWITCH TO OVERFILLED
LAUNCH CONTROL CONSOLE	5.	OBSERVE LO_2 SUPPLY AND FUEL & LO_2 READY INDICATORS ILLUMINATED GREEN
	6.	CONTINUE COUNTDOWN

FUEL PRESSURE AT 63.0
PSI LO_2 TANK PRESSURE
2.0 TO 4.0 PSI

FUEL &
LO_2 READY
G

FAILS TO
ILLUMINATE
GREEN

TABLE 4-34		
LAUNCH CONTROL CONSOLE		NOTE IN A DPL OR TRAINING LAUNCH, RETURN TO STANDBY (TABLE 3-15). IN A TACTICAL LAUNCH, PROCEED TO STEP 1.
SKID NO. 8	1.	OBSERVE VALVE L-4 POSITION INDICATOR AND NOTE WHETHER L-4 IS OPEN OR CLOSED NOTE IF VALVE L-4 IS CLOSED, PROCEED TO STEP 3. IF VALVE L-4 IS OPEN, PROCEED TO STEP 2
PLTC	2.	REMOVE WIRE FROM PIN 13 ON TB-2-8 AND PROCEED TO STEP 4
	3.	JUMPER BETWEEN PIN 8 ON TB-3-8 AND PIN 12 OF TB-1-8
LAUNCH CONTROL CONSOLE	4.	OBSERVE FUEL & LO_2 READY INDICATOR ILLUMINATES GREEN AND CONTINUE COUNTDOWN
	5.	IF FUEL & LO_2 READY INDICATOR FAILS TO ILLUMINATE GREEN, REMOVE JUMPER AND RETURN TO STANDBY (TABLE 3-15)

MISSILE
READY
G

COMMIT
START

LAUNCH CONTROL CONSOLE

Figure 4-26. Co

LVE F-7 STARTS TO CLOSE
ITHIN 6 SECONDS AFTER
EL COMPLETE INDICATOR
ILLUMINATES AMBER

3 SECONDS MAXIMUM

HAS NOT CLOSING SECONDS COMPLETE TOR ES AMBER

RAPID FUEL LOAD (G)

EXCEEDS 13 SECONDS FROM FUEL COMPLETE INDICATOR ILLUMINATED AMBER

FUEL COMPLETE INDICATOR SHOULD ILLUMINATE GREEN 75 SECONDS AFTER ILLUMINATING AMBER

FUEL COMPLETE (G)

EXCEEDS 75 SECONDS FROM FUEL COMPLETE INDICATOR ILLUMINATED AMBER

FUEL TANK PRESSURE HAS REACHED 53.0 PSI

RAPID LO_2 LOAD (A)

FAILS TO ILLUMINATE AMBER AFTER FUEL COMPLETE INDICATOR ILLUMINATES GREEN

PHASE 2L

4 MINUTES 13 SECONDS MAXIMUM

RAPID LO_2 LOAD INDICATOR SHOULD ILLUMINATE GREEN 4 MINUTES AFTER ILLUMINATING AMBER

RAPID LO_2 LOAD (G)

FAILS TO ILLUMINATE GREEN WITHIN 4 MINUTES AND 13 SECONDS AFTER ILLUMINATED AMBER

ABLE 4-32

NOTE DPL OR TRAINING LAUNCH, JRN TO STANDBY LE 3-15). IN A TACTICAL NCH, PROCEED TO STEP 1.
TION REMOTE LOCAL CH TO LOCAL
ALL JUMPER FROM IINAL 12 OF TB-2-2 TO IINAL 18 OF TB-1-2
RVE VALVES F-7 AND LOSED
TION REMOTE LOCAL CH TO REMOTE
RVE RAPID FUEL LOAD ATOR ILLUMINATED GREEN
RVE VALVE F-7 CLOSED VALVE F-8 OPEN
INUE COUNTDOWN

BLE 4-32

NOTE DPL OR TRAINING LAUNCH, DIATELY DEPRESS RETURN ANDBY PUSHBUTTON LE 3-15). IN A TACTICAL CH, PROCEED TO STEP 1.
ION REMOTE LOCAL H TO LOCAL
NNECT 600P357 AND 600P358
VE FUEL COMPLETE ATOR ILLUMINATES GREEN
ION REMOTE LOCAL H TO REMOTE
INUE COUNTDOWN

TABLE 4-33

LAUNCH CONTROL CONSOLE	NOTE IN A DPL OR TRAINING LAUNCH, RETURN TO STANDBY (TABLE 3-15). IN A TACTICAL LAUNCH, PROCEED TO STEP 1.
SKID NO. 8	1. OBSERVE VALVES L-2 AND L-4. IF VALVE L-2 IS CLOSED AND VALVE L-4 IS OPEN PROCEED TO STEP 2
LO_2 TANKING (PANEL 1)	2. POSITION VALVE SWITCHES AS FOLLOWS SA-1 CLOSE — SA-3 OPEN SA-2 CLOSE — O-9A OPEN SA-4 CLOSE — O-9B OPEN O-20 CLOSE — O-9C OPEN L-2 CLOSE — L-4 OPEN L-12 CLOSE — L-32 OPEN L-22 CLOSE — LC-1 OPEN LC-2 OPEN 3. POSITION REMOTE LOCAL SWITCH TO LOCAL
PROPEL-LANT LEVEL (PANEL 1)	4. OBSERVE RAPID LOAD LO_2 SECTION "A" INDICATOR. IF NOT ILLUMINATED, POSITION L-12 SWITCH ON LO_2 TANKING (PANEL 1) TO OPEN. WHEN RAPID LOAD LO_2 SECTION "A" INDICATOR ILLUMINATES GREEN, IMMEDIATELY POSITION L-12 SWITCH TO CLOSE AND AFTER 10 SECONDS POSITION LC-1 SWITCH TO CLOSE 5. TEN SECONDS AFTER CLOSING LC-1 SWITCH, POSITION REMOTE LOCAL SWITCH TO REMOTE
LAUNCH CONTROL CONSOLE	6. IF RAPID LO_2 LOAD INDICATOR ILLUMINATES GREEN, CONTINUE COUNTDOWN. IF RAPID LO_2 LOAD FAILS TO ILLUMINATE GREEN, RETURN TO STANDBY (TABLE 3-15)

TABLE 4-33

LAUNCH CONTROL CONSOLE	NOTE IN A DPL OR TRAINING LAUNCH IMMEDIATELY DEPRESS RETURN TO STANDBY PUSHBUTTON (TABLE 3-15). IN A TACTICAL LAUNCH, PROCEED TO STEP 1.
LO_2 TANKING (PANEL 1)	1. POSITION REMOTE LOCAL SWITCH TO LOCAL
LAUNCH CONTROL CONSOLE	2. VERIFY FUEL COMPLETE INDICATOR IS ILLUMINATED GREEN, FUEL TANK PRESSURE GAGE INDICATES ABOVE 55.0 PSI, AND 2-MINUTE CHILLDOWN TIME HAS ELAPSED FROM LO_2 LINE FILLED INDICATOR ILLUMINATED AMBER BEFORE PROCEEDING TO STEP 3
LO_2 TANKING (PANEL 1)	3. POSITION SA-1 SWITCH TO CLOSE AND SA-2 SWITCH TO OPEN 4. POSITION L-2 SWITCH TO OPEN
PROPEL-LANT LEVEL (PANEL 1)	5. OBSERVE RAPID LOAD LO_2 SECTION "A" INDICATOR ILLUMINATES GREEN. IMMEDIATELY POSITION L-2 SWITCH ON LO_2 TANKING (PANEL 1) TO CLOSE
LAUNCH CONTROL CONSOLE	6. OBSERVE RAPID LO_2 LOAD INDICATOR ILLUMINATES GREEN
LO_2 TANKING (PANEL 1)	7. POSITION REMOTE LOCAL SWITCH TO REMOTE AND CONTINUE COUNTDOWN

LAUNC CONTR CONSO
LO_2 TANKIN (PANEL
LO_2 SL TANK
LAUNCH CONTRO CONSOL

VALVE F-7 STARTS TO CLOSE WITHIN 6 SECONDS AFTER FUEL COMPLETE INDICATOR ILLUMINATES AMBER

13 SECONDS MAXIMUM

E F-7 HAS NOT RTED CLOSING IN 6 SECONDS FUEL COMPLETE NDICATOR INATES AMBER

RAPID FUEL LOAD (G)

EXCEEDS 13 SECONDS FROM FUEL COMPLETE INDICATOR ILLUMINATED AMBER

FUEL COMPLETE INDICATOR SHOULD ILLUMINATE GREEN 75 SECONDS AFTER ILLUMINATING AMBER

FUEL COMPLETE (G)

EXCEEDS 75 SECONDS FROM FUEL COMPLETE INDICATOR ILLUMINATED AMBER

FUEL TANK PRESSURE HAS REACHED 53.0 PSI

RAPID LO_2 LOAD (A)

FAILS TO ILLUMINATE AMBER AFTER FUEL COMPLETE INDICATOR ILLUMINATES GREEN

PHASE 2L

4 MINUTES 13 SECONDS MAXIMUM

RAPID LO_2 LOAD INDICATOR SHOULD ILLUMINATE GREEN 4 MINUTES AFTER ILLUMINATING AMBER

RAPID LO_2 LOAD (G)

FAILS TO ILLUMINATE GREEN WITHIN 4 MINUTES AND 13 SECONDS AFTER ILLUMINATED AMBER

TABLE 4-32
NOTE IN A DPL OR TRAINING LAUNCH, RETURN TO STANDBY (TABLE 3-15). IN A TACTICAL LAUNCH, PROCEED TO STEP 1.
POSITION REMOTE LOCAL SWITCH TO LOCAL
INSTALL JUMPER FROM TERMINAL 12 OF TB-2-2 TO TERMINAL 18 OF TB-1-2
OBSERVE VALVES F-7 AND F-8 CLOSED
POSITION REMOTE LOCAL SWITCH TO REMOTE
OBSERVE RAPID FUEL LOAD INDICATOR ILLUMINATED GREEN
OBSERVE VALVE F-7 CLOSED AND VALVE F-8 OPEN
CONTINUE COUNTDOWN

TABLE 4-32
NOTE IN A DPL OR TRAINING LAUNCH, IMMEDIATELY DEPRESS RETURN TO STANDBY PUSHBUTTON (TABLE 3-15). IN A TACTICAL LAUNCH, PROCEED TO STEP 1.
POSITION REMOTE LOCAL SWITCH TO LOCAL DISCONNECT 600P357 AND 600P358
OBSERVE FUEL COMPLETE INDICATOR ILLUMINATES GREEN
POSITION REMOTE LOCAL SWITCH TO REMOTE
CONTINUE COUNTDOWN

TABLE 4-33

LAUNCH CONTROL CONSOLE	**NOTE** IN A DPL OR TRAINING LAUNCH, RETURN TO STANDBY (TABLE 3-15). IN A TACTICAL LAUNCH, PROCEED TO STEP 1.
SKID NO. 8	1. OBSERVE VALVES L-2 AND L-4. IF VALVE L-2 IS CLOSED AND VALVE L-4 IS OPEN PROCEED TO STEP 2
LO_2 TANKING (PANEL 1)	2. POSITION VALVE SWITCHES AS FOLLOWS SA-1 CLOSE — SA-3 OPEN SA-2 CLOSE — O-9A OPEN SA-4 CLOSE — O-9B OPEN O-20 CLOSE — O-9C OPEN L-2 CLOSE — L-4 OPEN L-12 CLOSE — L-32 OPEN L-22 CLOSE — LC-1 OPEN LC-2 OPEN 3. POSITION REMOTE LOCAL SWITCH TO LOCAL
PROPELLANT LEVEL (PANEL 1)	4. OBSERVE RAPID LOAD LO_2 SECTION "A" INDICATOR. IF NOT ILLUMINATED, POSITION L-12 SWITCH ON LO_2 TANKING (PANEL 1) TO OPEN. WHEN RAPID LOAD LO_2 SECTION "A" INDICATOR ILLUMINATES GREEN, IMMEDIATELY POSITION L-12 SWITCH TO CLOSE AND AFTER 10 SECONDS POSITION LC-1 SWITCH TO CLOSE 5. TEN SECONDS AFTER CLOSING LC-1 SWITCH, POSITION REMOTE LOCAL SWITCH TO REMOTE
LAUNCH CONTROL CONSOLE	6. IF RAPID LO_2 LOAD INDICATOR ILLUMINATES GREEN, CONTINUE COUNTDOWN. IF RAPID LO_2 LOAD FAILS TO ILLUMINATE GREEN, RETURN TO STANDBY (TABLE 3-15)

TABLE 4-33

LAUNCH CONTROL CONSOLE	**NOTE** IN A DPL OR TRAINING LAUNCH IMMEDIATELY DEPRESS RETURN TO STANDBY PUSHBUTTON (TABLE 3-15). IN A TACTICAL LAUNCH, PROCEED TO STEP 1.
LO_2 TANKING (PANEL 1)	1. POSITION REMOTE LOCAL SWITCH TO LOCAL
LAUNCH CONTROL CONSOLE	2. VERIFY FUEL COMPLETE INDICATOR IS ILLUMINATED GREEN, FUEL TANK PRESSURE GAGE INDICATES ABOVE 55.0 PSI, AND 2-MINUTE CHILLDOWN TIME HAS ELAPSED FROM LO_2 LINE FILLED INDICATOR ILLUMINATED AMBER BEFORE PROCEEDING TO STEP 3
LO_2 TANKING (PANEL 1)	3. POSITION SA-1 SWITCH TO CLOSE AND SA-2 SWITCH TO OPEN 4. POSITION L-2 SWITCH TO OPEN
PROPELLANT LEVEL (PANEL 1)	5. OBSERVE RAPID LOAD LO_2 SECTION "A" INDICATOR ILLUMINATES GREEN. IMMEDIATELY POSITION L-2 SWITCH ON LO_2 TANKING (PANEL 1) TO CLOSE
LAUNCH CONTROL CONSOLE	6. OBSERVE RAPID LO_2 LOAD INDICATOR ILLUMINATES GREEN
LO_2 TANKING (PANEL 1)	7. POSITION REMOTE LOCAL SWITCH TO REMOTE AND CONTINUE COUNTDOWN

NK PRESSURE:
TO 4.0 PSI
NK PRESSURE:
TO 55.0 PSI

UEL
DING G

PRESSURE MODE INDICATOR RED AND LO_2 TANK PRESSURE LESS THAN 1.65 PSI

BLE 4-1

SS BOILOFF VALVE
AND LO_2 RAISE
UTTONS UNTIL LO_2
PRESSURE IS ABOVE
I. MAINTAIN FUEL
PRESSURE AT 28.0 PSI

SS AUTOMATIC PUSH-
N. CONTINUE COUNT-
IF AUTOMATIC MODE
E MAINTAINED. IF
MATIC MODE CANNOT
INTAINED, PERFORM
OLLOWING

NOTE

PL OR TRAINING
H, DEPRESS RETURN TO
BY PUSHBUTTON AND
RM MANUAL FUEL
(TABLE 4-19 OR 4-46
QUIRED). IN A TACTI-
AUNCH, PROCEED TO
.

SS LO_2 RAISE AND
FF VALVE CLOSE PUSH-
NS TO MAINTAIN LO_2
PRESSURE AT 2.7 PSI.
AIN FUEL TANK PRES-
T 28.0 PSI

SS AUTOMATIC PUSH-
N AFTER POWER IN-
L INDICATOR ILLUMI-
GREEN AND CONTINUE
DOWN

PHASE 2F

RAPID FUEL LOAD A

FAILS TO ILLUMINATE AMBER IMMEDIATELY AFTER BOOM CLEAR INDICATOR ILLUMINATES GREEN

TABLE 4-32

LAUNCH CONTROL CONSOLE	NOTE IN A DPL OR TRAINING LAUNCH, RETURN TO STANDBY (TABLE 3-15). IN A TACTICAL LAUNCH, PROCEED TO STEP 1.
SKID NO. 2	1. OBSERVE VALVE F-7. IF OPEN, MANUALLY ACTUATE MICROSWITCH ON VALVE F-7 AND CONTINUE COUNTDOWN
PLTC	2. IF VALVE F-7 IS CLOSED, CHECK FOR 28 VDC BETWEEN TERMINAL 3 ON TB-2-2 AND TERMINAL 1 ON TB-1-1 3. IF 28 VDC IS NOT PRESENT, INSTALL JUMPER BETWEEN TERMINAL 18 ON TB-1-2 AND TERMINAL 3 ON TB-2-2
SKID NO.2	4. OBSERVE VALVE F-7 OPEN
LAUNCH CONTROL CONSOLE	5. OBSERVE RAPID FUEL LOAD INDICATOR ILLUMINATES AMBER AND TIME LOADING FOR 216 SECONDS
PLTC	6. WHEN 216 SECONDS HAVE ELAPSED OR WHEN RAPID LOAD FUEL PRIMARY OR RAPID LOAD FUEL SECONDARY INDICATOR AT PLCU ILLUMINATES GREEN, REMOVE JUMPER FROM TERMINAL 18 ON TB-1-2 AND TERMINAL 3 ON TB-2-2 AND CONTINUE COUNTDOWN 7. IF 28 VDC IS PRESENT IN STEP 3, CONTINUE CHECKOUT IN ACCORDANCE WITH TABLE 4-32, ITEM 5, ACTION 3

FUEL COMPLETE INDICATOR SHOULD ILLUMINATE AMBER WITHIN 216 SECONDS AFTER RAPID FUEL LOAD AMBER

LO_2 LINE FILLED A

FAILS TO ILLUMINATE AMBER AFTER HYDRAULIC PRESSURE INDICATOR ILLUMINATES GREEN

TABLE 4-33

SKID NO. 9	1. OBSERVE VALVE O-20. IF CLOSED, ATTEMPT TO ACTUATE MICROSWITCH ON VALVE O-20
LAUNCH CONTROL CONSOLE	2. OBSERVE LO_2 LINE FILLED INDICATOR ILLUMINATES AMBER AND CONTINUE COUNTDOWN NOTE IF LO_2 LINE FILLED INDICATOR DOES NOT ILLUMINATE AMBER DURING A DPL OR TRAINING LAUNCH, RETURN TO STANDBY (TABLE 3-15). IN A TACTICAL LAUNCH PROCEED TO STEP 3.
PLTC	3. CHECK FOR 28 VDC BETWEEN TERMINAL 15 AND TERMINAL 6 ON TB-1-9 4. IF 28 VDC IS NOT PRESENT, REMOVE WIRE 783 FROM TERMINAL 15 ON TB-1-9
LAUNCH CONTROL CONSOLE	5. OBSERVE LO_2 LINE FILLED INDICATOR ILLUMINATES AMBER, THEN GREEN, AND CONTINUE COUNTDOWN 6. IF LO_2 LINE FILLED INDICATOR DOES NOT ILLUMINATE, CONTINUE CHECKOUT WITH TABLE 4-33, ITEM 1

LO_2 LINE FILLED G

FAILS TO ILLUMINATE AMBER WITHIN 216 SECONDS AFTER RAPID FUEL LOAD INDICATOR ILLUMINATES AMBER

FUE
COMPL

LAUNCH CONTRO CONSOL
FUEL TANKIN (PANEL
PLTC
SKID NO. 2
FUEL TANKIN (PANEL
LAUNCH CONTRO CONSOL
SKID NO. 2
LAUNCH CONTRO CONSOL

LAUNCH CONTRO CONSOL
FUEL TANKIN (PANEL
LAUNCH CONTRO CONSOL
FUEL TANKIN (PANEL
LAUNCH CONTRO CONSOL

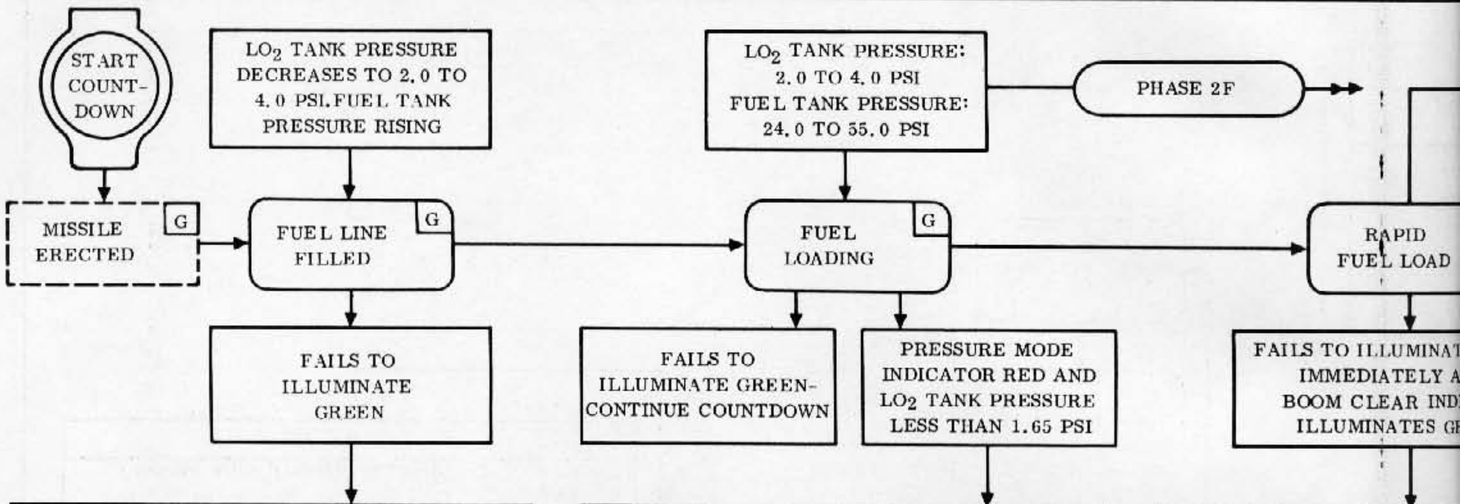


TABLE 4-32	
SKID NO. 2	1. OBSERVE VALVE F-8. IF OPEN, MANUALLY ACTUATE MICROSWITCH ON VALVE F-8
LAUNCH CONTROL CONSOLE	2. IF FUEL LINE FILLED INDICATOR ILLUMINATES GREEN, CONTINUE COUNTDOWN. IF FUEL LINE FILLED INDICATOR DOES NOT ILLUMINATE GREEN, PERFORM THE FOLLOWING NOTE IN A DPL OR TRAINING LAUNCH, RETURN TO STANDBY AND TROUBLESHOOT. IN A TACTICAL LAUNCH, PROCEED TO STEP 3.
PLTC	3. REMOVE WIRE FROM TERMINAL 14 ON TB-2-2
LAUNCH CONTROL CONSOLE	4. OBSERVE FUEL LINE FILLED INDICATOR ILLUMINATES GREEN AND NOTE TIME NOTE IF FUEL LINE FILLED INDICATOR DOES NOT ILLUMINATE GREEN, PROCEED TO STEP 5.
PLTC	5. AFTER 5 MINUTES, AND VALVE F-8 CLOSES, CONNECT WIRE ON TERMINAL 14 OF TB-2-2
LAUNCH CONTROL CONSOLE	6. OBSERVE FUEL COMPLETE INDICATOR ILLUMINATES GREEN AND CONTINUE COUNTDOWN
PLTC	7. IF FUEL LINE FILLED INDICATOR DID NOT ILLUMINATE GREEN, AND VALVE F-8 IS CLOSED, CONNECT WIRE ON TERMINAL 14 OF TB-2-2 AND REFER TO TABLE 4-32, ACTIONS 2 AND 3 FOR ADDITIONAL TROUBLE ANALYSIS

TABLE 4-1	
LAUNCH CONTROL CONSOLE	1. DEPRESS BOILOFF VALVE CLOSE AND LO_2 RAISE PUSHBUTTONS UNTIL LO_2 TANK PRESSURE IS ABOVE 2.7 PSI. MAINTAIN FUEL TANK PRESSURE AT 28.0 PSI 2. DEPRESS AUTOMATIC PUSHBUTTON. CONTINUE COUNTDOWN IF AUTOMATIC MODE CAN BE MAINTAINED. IF AUTOMATIC MODE CANNOT BE MAINTAINED, PERFORM THE FOLLOWING NOTE IN A DPL OR TRAINING LAUNCH, DEPRESS RETURN TO STANDBY PUSHBUTTON AND PERFORM MANUAL FUEL DRAIN (TABLE 4-19 OR 4-46 AS REQUIRED). IN A TACTICAL LAUNCH, PROCEED TO STEP 3. 3. DEPRESS LO_2 RAISE AND BOILOFF VALVE CLOSE PUSHBUTTONS TO MAINTAIN LO_2 TANK PRESSURE AT 2.7 PSI. MAINTAIN FUEL TANK PRESSURE AT 28.0 PSI 4. DEPRESS AUTOMATIC PUSHBUTTON AFTER POWER INTERNAL INDICATOR ILLUMINATES GREEN AND CONTINUE COUNTDOWN

TABLE 4-3	
LAUNCH CONTROL CONSOLE	NOT IN A DPL OR RETURN TO S (TABLE 3-15) LAUNCH, PR
SKID NO. 2	1. OBSERVE VA OPEN, MANU MICROSWITC AND CONTINU
PLTC	2. IF VALVE F- CHECK FOR 2 TERMINAL 3 TERMINAL 1 3. IF 28 VDC IS INSTALL JUM TERMINAL 18 TERMINAL 3
SKID NO.2	4. OBSERVE VA
LAUNCH CONTROL CONSOLE	5. OBSERVE RA INDICATOR I AMBER AND FOR 216 SEC
PLTC	6. WHEN 216 SE ELAPSED OR LOAD FUEL F RAPID LOAD ARY INDICAT ILLUMINATES REMOVE JUM TERMINAL 18 TERMINAL 3 CONTINUE CO 7. IF 28 VDC IS 3, CONTINUE ACCORDANCE 4-32, ITEM 5,

32.137-104.3A

START COUNT-DOWN → MISSILE POWER (G / A) → HEATERS ON (G / A) → R/V BATTERY TEMPERATURE (G) → GUIDANCE READY (A)

MISSILE POWER:

FAILS TO ILLUMINATE AMBER

TABLE 4-22	
LAUNCH CONTROL CONSOLE	1. OBSERVE OTHER COUNTDOWN PATCH INDICATORS 2. IF OTHER INDICATORS ARE ILLUMINATED, CONTINUE COUNTDOWN. IF OTHER INDICATORS ARE NOT ILLUMINATED, DEPRESS START COUNTDOWN PUSHBUTTON AGAIN 3. IF COUNTDOWN DOES NOT START, DEPRESS RETURN TO STANDBY PUSHBUTTON AND TROUBLESHOOT LAUNCH CONTROL SYSTEM

FAILS TO ILLUMINATE GREEN AND MALFUNCTION PATCH INDICATORS ARE EXTINGUISHED

TABLE 4-22	
MISSILE GROUND POWER (PANEL 1)	1. VERIFY PLUGS 600P116 AND 600P119 ARE SECURE 2. OBSERVE AND NOTE D.C. MISSILE LOAD AND A.C. MISSILE LOAD INDICATORS
LAUNCH CONTROL CONSOLE	3. IF INDICATORS IN STEP 2 ARE ILLUMINATED GREEN, VERIFY MISSILE BAT. ACTIVATED AND HEATERS ON INDICATORS ARE ILLUMINATED GREEN
COUNT-DOWN (PANEL 1)	4. AT CHASSIS A-34 JUMPER BETWEEN A34 J1, PIN 4 AND A34 J2, PIN 13
LAUNCH CONTROL CONSOLE	5. OBSERVE ENGINE/MISSILE POWER READY INDICATOR ILLUMINATES GREEN AND CONTINUE COUNTDOWN 6. IF ENGINE/MISSILE POWER READY INDICATOR FAILS TO ILLUMINATE GREEN, RETURN TO STANDBY

HEATERS ON:

FAILS TO ILLUMINATE GREEN. OR REMAINS AMBER

TABLE 4-23	
FACILITY PANEL	1. OBSERVE THRUST SECTION HEATER BLOWER INDICATOR ILLUMINATED RED
EAST SIDE FUEL ROOM	2. DEPRESS RESET THEN START PUSHBUTTON ON TSB SWITCH BOX
LAUNCH CONTROL CONSOLE	3. IF HEATERS ON INDICATOR ILLUMINATES GREEN. CONTINUE COUNTDOWN 4. IF HEATERS ON INDICATOR FAILS TO ILLUMINATE GREEN, RETURN TO STANDBY (TABLE 3-15)

R/V BATTERY TEMPERATURE:

FAILS TO ILLUMINATE GREEN IMMEDIATELY AFTER START COUNTDOWN

TABLE 4-25	
LAUNCH CONTROL CONSOLE	1. ALLOW SEQUENCE TO CONTINUE UNTIL FLIGHT CONTROL R/V READY INDICATOR WOULD NORMALLY ILLUMINATE GREEN 2. IF FLIGHT CONTROL R/V READY INDICATOR FAILS TO ILLUMINATE GREEN, PROCEED TO STEP 3 3. RECORD ALL INDICATORS ON LAUNCH CONTROL CONSOLE, AUTOPILOT (PANEL 1), GUIDANCE PANEL, AND RE-ENTRY VEHICLE PANEL NOTE IF FLIGHT CONTROL R/V READY INDICATOR IS EXTINGUISHED AND MISSILE READY INDICATOR IS ILLUMINATED GREEN, CONTINUE COUNTDOWN. IF MISSILE READY INDICATOR IS EXTINGUISHED, RETURN TO STANDBY (TABLE 3-15)

GUIDANCE READY:

FAILS TO IL... AM...

TABLE 4-26	
LAUNCH CONTROL CONSOLE	1. PERFORM DOUBLE TARGET CHANGE 2. IF GUIDANCE READY INDICATOR DOES NOT ILLUMINATE AMBER AFTER ORIGINAL TARGET SELECTED INDICATOR ILLUMINATES GREEN, RETURN TO STANDBY (TABLE 3-15)

LAUNCH CONTROL CONSOLE	

SKID NO. 6	
LAUNCH CONTROL CONSOLE	

32.137-104.4A

ENGINE GROUND POWER, HYDRAULICS AND PNEUMATICS

GUIDANCE READY (A) → AUTOPILOT ON (A) → HYDRAULIC PRESSURE (A) → LN_2 LOAD (A) → HYDRAULIC PRESSURE (G) → HELIUM LOAD (A)

GUIDANCE READY — FAILS TO ILLUMINATE AMBER

AUTOPILOT ON — FAILS TO ILLUMINATE AMBER IMMEDIATELY AFTER COUNTDOWN START

TABLE 4-24	
LAUNCH CONTROL CONSOLE	1. ALLOW ERECTION SEQUENCE TO CONTINUE UNTIL BOOM CLEAR INDICATOR ILLUMINATES GREEN, THEN RETURN TO STANDBY (TABLE 3-15)

LN_2 LOAD — FAILS TO ILLUMINATE AMBER

TABLE 4-31	
SKID NO. 6	1. OBSERVE VALVES LN-3 AND N-36. IF LN-3 IS OPEN AND N-36 IS CLOSED, MANUALLY ACTUATE MS-163-6 AND MS-164-6 MICROSWITCHES
LAUNCH CONTROL CONSOLE	2. OBSERVE LN_2 LOAD INDICATOR ILLUMINATED AMBER AND CONTINUE COUNTDOWN 3. IF STEP 1 FAILS TO CAUSE LN_2 LOAD INDICATOR TO ILLUMINATE AMBER, FOR TACTICAL LAUNCH REFER TO TABLE 4-31 ACTION 2; FOR A DPL OR TRAINING LAUNCH, RETURN TO STANDBY IN ACCORDANCE WITH TABLE 3-15

HYDRAULIC PRESSURE (G) — FAILS TO ILLUMINATE GREEN

TABLE 4-30	
HPU	1. VERIFY CB-2 IS IN THE ON POSITION ON BOTH STAGES 2. VERIFY PUMP START INDICATORS ARE ILLUMINATED GREEN 3. VERIFY HYDRAULIC PUMPING UNIT CIRCUIT BREAKER ON LSB MCC IS IN ON POSITION 4. OBSERVE GAUGE HIGH PRESSURE SYSTEM GAGE INDICATES BETWEEN 1750 AND 2250 PSI 5. ADJUST PRESSURE CONTROL KNOBS TO OBTAIN 2000 (±250) PSI (EITHER OR BOTH SYSTEMS)
LAUNCH CONTROL CONSOLE	6. OBSERVE HYDRAULIC PRESSURE INDICATOR ILLUMINATED GREEN AND CONTINUE COUNTDOWN **NOTE** IF STEPS 1 THROUGH 5 DO NOT CORRECT THE MALFUNCTION, IN A DPL OR TRAINING LAUNCH RETURN TO STANDBY (TABLE 3-15); IN A TACTICAL LAUNCH PROCEED TO TABLE 4-30, ACTION 3, ITEM 1

HELIUM LOAD — FAILS TO ILL[UMINATE] GREEN WITH[IN] MINUTES AF[TER] ILLUMINATIN[G] AND MISSILE INDICATOR IS ILLUMINATED

TABLE 4-24	
LAUNCH CONTROL CONSOLE	1. VERIFY BOOM CLEAR INDICATOR IS ILLUMINATED GREEN 2. RETURN TO STANDBY (TABLE 3-15)

LAUNCH CONTROL CONSOLE

LAUNCH CONTROL CONSOLE

LAUNCH CONTROL CONSOLE

MISSILE BAY

LAUNCH CONTROL CONSOLE

DRAULIC ESSURE (G) → HELIUM LOAD (A) → AUTOPILOT ON (G) → AUTOPILOT TEST (A) → AUTOPILOT TEST (G) → GUIDANCE READY (G) → FLIGHT CC R/V RE

O ILLUMINATE REEN

E ON POSITION

INDICATORS
REEN
UMPING UNIT
LSB MCC IS

PRESSURE
TES BETWEEN

NTROL KNOBS
) PSI (EITHER

PRESSURE IN-
D GREEN AND
N

5 DO NOT
UNCTION,
G LAUNCH
(TABLE 3-15);
CH PROCEED
ON 3, ITEM 1

INDICATOR IS

(TABLE 3-15)

AUTOPILOT ON: FAILS TO ILLUMINATE GREEN WITHIN 4 MINUTES AFTER ILLUMINATING AMBER, AND MISSILE POWER INDICATOR IS ILLUMINATED GREEN

AUTOPILOT TEST (A): FAILS TO ILLUMINATE AMBER IMMEDIATELY AFTER AUTOPILOT ON INDICATOR ILLUMINATES GREEN

TABLE 4-24, ITEM 2	
LAUNCH CONTROL CONSOLE	1. RETURN TO STANDBY (TABLE 3-15)

AUTOPILOT TEST (G): FAILS TO ILLUMINATE GREEN 2 MINUTES AFTER ILLUMINATING AMBER

TABLE 4-24, ITEM 2	
LAUNCH CONTROL CONSOLE	1. RETURN TO STANDBY (TABLE 3-15)

GUIDANCE READY: FAILS TO ILLUMINATE AMBER OR GREEN

TABLE 4-26	
LAUNCH CONTROL CONSOLE	1. VERIFY GUIDANCE FAIL INDICATOR IS NOT ILLUMINATED 2. PERFORM DOUBLE TARGET CHANGE
MISSILE BAY	3. OBSERVE SIGHT TUBE AND NOTE CONDITION
LAUNCH CONTROL CONSOLE	4. IF SIGHT TUBE IS NOT IN PLACE, RETURN TO STANDBY (TABLE 3-15) 5. IF SIGHT TUBE IS IN PLACE, WAIT 15 MINUTES AFTER DOUBLE TARGET CHANGE 6. IF GUIDANCE READY INDICATOR ILLUMINATES RED, OR FAILS TO ILLUMINATE GREEN WITHIN 15 MINUTES, RETURN TO STANDBY (TABLE 3-15)

FLIGHT CONTROL R/V READY: FAILS TO ILLUMIN[ATE] GREEN

TABLE 4-38	
LAUNCH CONTROL CONSOLE	NOTE IF FLIGHT CONTROL R/V READY INDICATOR IS EXTINGUISHED AND MISSILE READY INDICATOR IS ILLUMINATED GREEN, CONTINUE COUNTDOWN. IF MISSILE READY INDICATOR IS EXTINGUISHED, PROCEED TO STEP 1 1. RECORD ALL INDICATIONS ON LAUNCH CONTROL CONSOLE, AUTOPILOT (PANEL 1), GUIDANCE PANEL, AND RE-ENTRY VEHICLE PANEL 2. RETURN TO STANDBY (TABLE 3-15)

TABLE 4-35	
MISSILE GROUND POWER (PANEL 1)	1. OBSERVE FOR ANY OF THE FOLLOWING CONDITIONS: a. BATTERY ACTIVATE INDICATOR ILLUMINATED GREEN b. BATTERY ACTIVATE INDICATOR EXTINGUISHED, AND INTERNAL D.C. INDICATOR IS ILLUMINATED GREEN OR EXTINGUISHED
MISSILE GROUND POWER (PANEL 2)	2 POSITION 28 VOLT DC SELECTOR SWITCH TO INTERNAL 3. VOLTS D.C. METER NOT WITHIN 28 (±2) VDC TOLERANCE
MISSILE GROUND POWER (PANEL 1)	4. OBSERVE BATTERY ACTIVATE INDICATOR IS EXTINGUISHED AND INTERNAL D.C. INDICATOR IS ILLUMINATED RED
LAUNCH CONTROL CONSOLE	5. RETURN TO STANDBY (TABLE 3-15) IF ANY OF THE CONDITIONS IN STEPS 1, 3, OR 4 OCCUR.

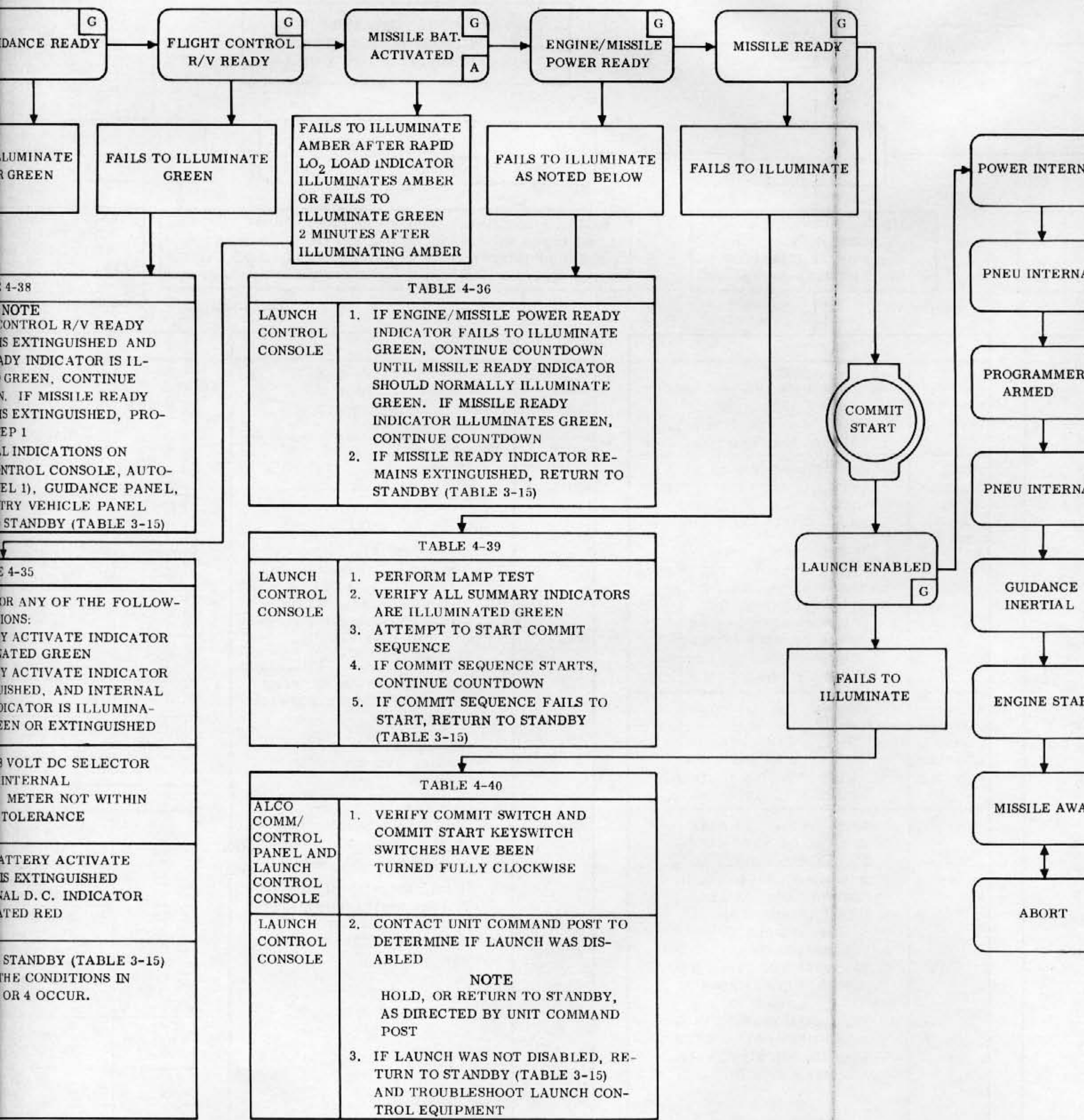


TABLE 4-36

LAUNCH CONTROL CONSOLE	1. IF ENGINE/MISSILE POWER READY INDICATOR FAILS TO ILLUMINATE GREEN, CONTINUE COUNTDOWN UNTIL MISSILE READY INDICATOR SHOULD NORMALLY ILLUMINATE GREEN. IF MISSILE READY INDICATOR ILLUMINATES GREEN, CONTINUE COUNTDOWN 2. IF MISSILE READY INDICATOR REMAINS EXTINGUISHED, RETURN TO STANDBY (TABLE 3-15)

TABLE 4-39

LAUNCH CONTROL CONSOLE	1. PERFORM LAMP TEST 2. VERIFY ALL SUMMARY INDICATORS ARE ILLUMINATED GREEN 3. ATTEMPT TO START COMMIT SEQUENCE 4. IF COMMIT SEQUENCE STARTS, CONTINUE COUNTDOWN 5. IF COMMIT SEQUENCE FAILS TO START, RETURN TO STANDBY (TABLE 3-15)

TABLE 4-40

ALCO COMM/ CONTROL PANEL AND LAUNCH CONTROL CONSOLE	1. VERIFY COMMIT SWITCH AND COMMIT START KEYSWITCH SWITCHES HAVE BEEN TURNED FULLY CLOCKWISE
LAUNCH CONTROL CONSOLE	2. CONTACT UNIT COMMAND POST TO DETERMINE IF LAUNCH WAS DISABLED NOTE HOLD, OR RETURN TO STANDBY, AS DIRECTED BY UNIT COMMAND POST 3. IF LAUNCH WAS NOT DISABLED, RETURN TO STANDBY (TABLE 3-15) AND TROUBLESHOOT LAUNCH CONTROL EQUIPMENT

Figure 4-26. C

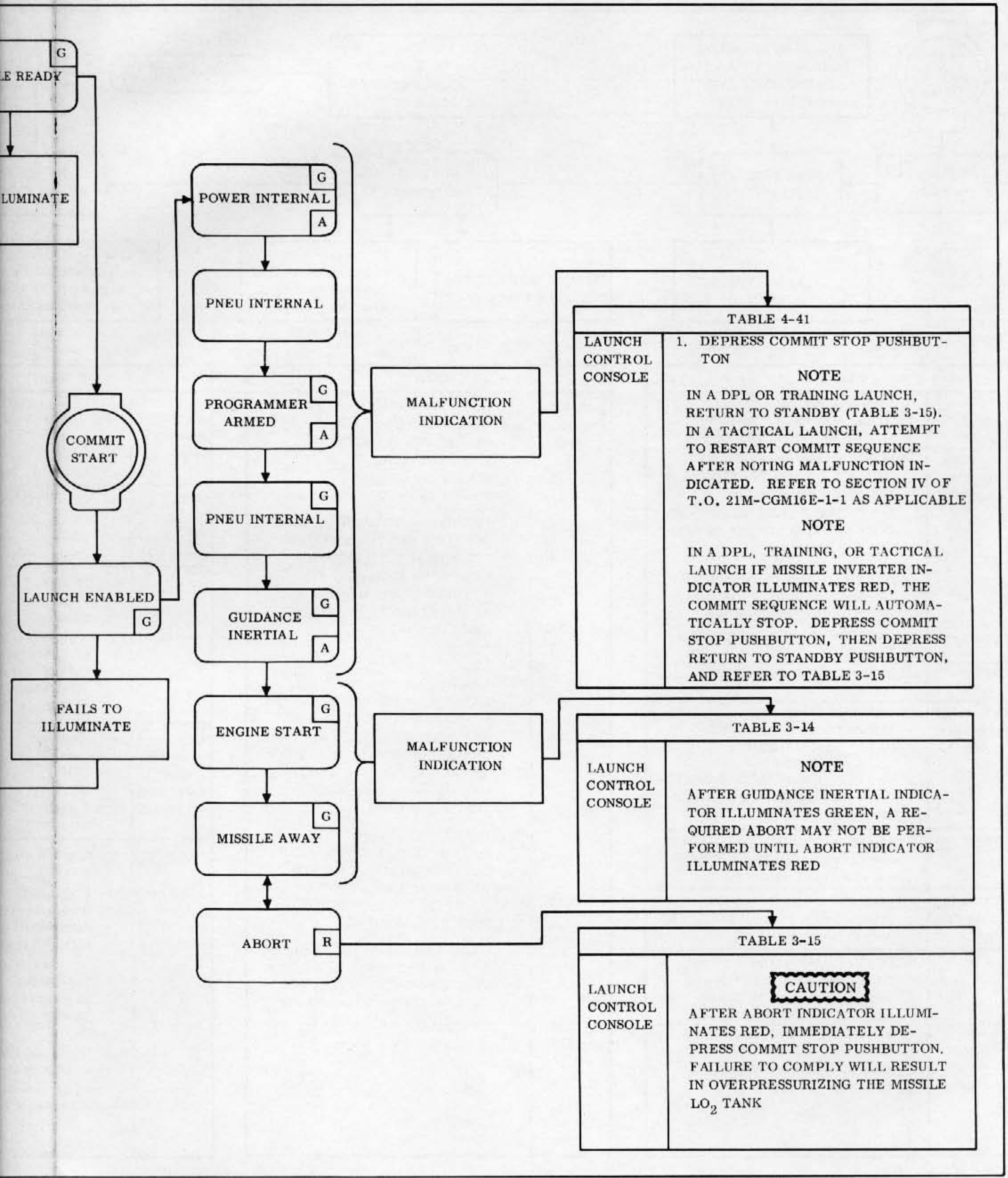
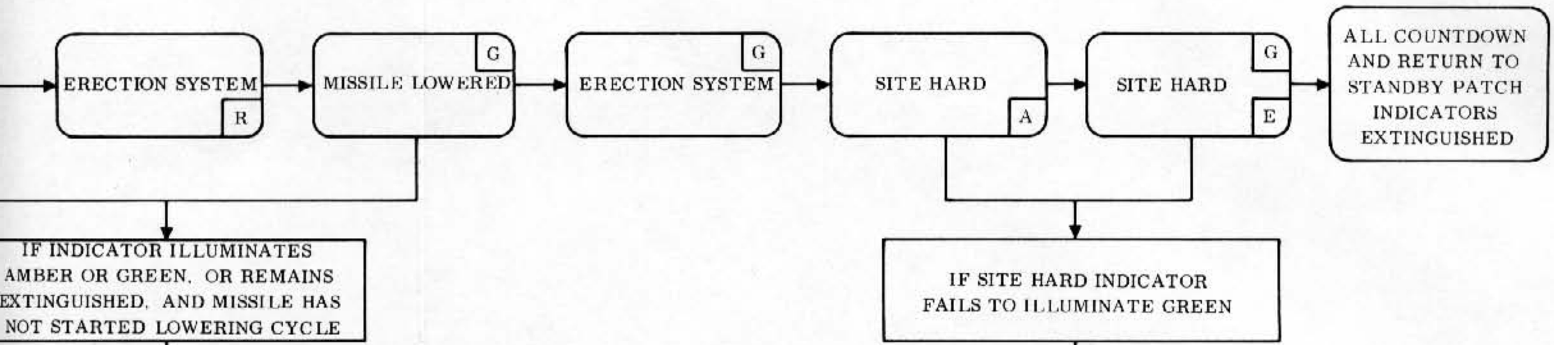


Figure 4-26. Countdown Continuation and Backout Flow Chart (Sheet 4 of 5)



BLE 4-49
SS EMERGENCY STOP PUSH- N AND OBSERVE EMERGENCY INDICATOR ILLUMINATES RED
ON REMOTE LOCAL SWITCH CAL ON CONTROL STATION TOR SWITCH THROUGH OFF CAL ON LOCAL OPERATION TOR SWITCH TO MAN. LOWER TE RESET SWITCH SS INITIATE OPERATION UTTON VE ABOVE 95° RIGHT AND 95° LEFT INDICATORS GUISHED BOOM IS AT 90 DEGREES, ON CONTROL STATION TOR SWITCH TO MISSILE FER
VE PANEL ENERGIZED TOR ILLUMINATED GREEN SS ROTATE NOSE CLAMP PUSHBUTTON SS EXTEND NOSE CLAMP UTTON SS CLOSE & LOCK NOSE PUSHBUTTON
VE MISSILE CONTACT SWITCH AND SWITCH NO. 2, NOSE ROTATED DOWN, NOSE CLOSED, AND NOSE CLAMP D INDICATORS ARE NATED ON CONTROL STATION SELEC- ITCH THROUGH OFF TO

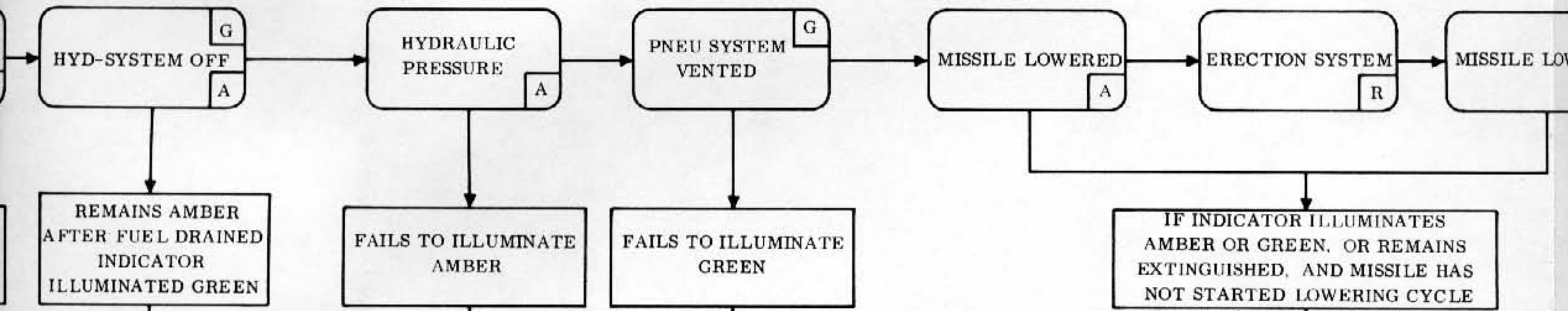
TABLE 4-49	
EMMCC (CONT)	15. POSITION LOCAL OPERATION SELECTOR SWITCH TO MAN. LOWER TO 0° FROM 90° 16. ACTUATE RESET SWITCH 17. DEPRESS AND HOLD INITIATE OPERATION PUSHBUTTON UNTIL BELOW 87° RIGHT AND BELOW 87° LEFT INDICATORS ARE ILLUMINATED 18. OBSERVE 0° BOOM POSITION AT 0° RIGHT AND AT 0° LEFT INDICATORS ILLUMINATED 19. POSITION LOCAL OPERATION SELECTOR SWITCH TO SHOCK MOUNT 20. ACTUATE RESET SWITCH 21. DEPRESS INITIATE OPERATION PUSHBUTTON 22. OBSERVE ALL SHOCK MOUNTED INDICATORS ILLUMINATED
FACILITY PANEL	23. POSITION OVERHEAD DOOR AND F/D DOOR SWITCHES TO CLOSE AND OBSERVE ROOF LATCHED AND F/D LATCHED INDICATORS ILLUMINATED
MCC	24. POSITION MISSILE ERECTION AREA OVERHEAD DOOR AND FLAME DEFLECTOR DOOR SWITCHES TO OFF
FACILITY PANEL	25. POSITION REMOTE LOCAL SWITCH TO REMOTE
LAUNCH CONTROL CONSOLE	26. OBSERVE SITE HARD INDICATOR IS MOMENTARILY ILLUMINATED GREEN, THEN EXTINGUISHED 27. OBSERVE ALL COUNTDOWN AND RETURN TO STANDBY PATCH INDICATORS ARE EXTINGUISHED

TABLE 4-49	
CMG 4 OF 4 CHASSIS A42	1. POSITION SIGNAL RESPONDER TRANSFER SWITCH TO RESPONDER MODE
COUNTDOWN RESPONDER (PANEL 1)	2. POSITION SYSTEM POWER SWITCH TO ON 3. POSITION RETURN TO STANDBY SWITCH TO ON THEN OFF 4. POSITION SYSTEM POWER SWITCH TO OFF
CMG 4 OF 4 PANEL A-42	5. POSITION SIGNAL RESPONDER TRANSFER SWITCH TO STANDBY MODE
LAUNCH CONTROL CONSOLE	6. OBSERVE ALL COUNTDOWN AND RETURN TO STANDBY PATCH INDICATORS ARE EXTINGUISHED
MCC	7. POSITION MISSILE ERECTION AREA OVERHEAD DOOR AND FLAME DEFLECTOR DOOR SWITCHES TO ON
FACILITY INTERFACE CABINET	8. VERIFY RELAY D-4 IS ENERGIZED AND RELAY D-8 IS DEENERGIZED
FACILITY TERMINAL AND RELAY COMPARTMENT	9. VERIFY RELAYS C-1 AND C-6 ARE DEENERGIZED
COUNTDOWN GROUP GUIDANCE SYSTEM CHECKOUT PROGRAMMER PANEL	10. POSITION CONTROL SELECTOR SWITCH TO LOCAL AUTO AND OBSERVE CONTROL SELECTOR IN LOCAL INDICATOR ILLUMINATES AMBER 11. DEPRESS RETURN TO READINESS PUSHBUTTON AND OBSERVE PROGRAMMER COUNTER STEPS TO ZERO AND MGS CHECKOUT COMPLETE INDICATOR ILLUMINATES GREEN
LAUNCH CONTROL CONSOLE	12. OBSERVE SITE HARD INDICATOR MOMENTARILY ILLUMINATED GREEN, THEN EXTINGUISHED

RETURN TO STANDBY SEQUENCE

Figure 4-26. Countdown Continuation and Backout Flow Chart (Sheet 5 of 5)

TE
R WILL ILLUMINATE GREEN
R COMMIT STOP PUSHBUTTON
' LO_2 SLUG TANK HAS AUTO-
ID THERE IS NO OTHER MAL-



E 4-1
VALVES 6 AND 7
N SIGNAL RESPONDER ER SWITCH TO RESPONDER
N SYSTEM POWER SWITCH N RETURN TO STANDBY TO ON N SYSTEM POWER SWITCH
N SIGNAL RESPONDER ER SWITCH TO STANDBY
N SYSTEM POWER SWITCH THEN ON STANDBY PUSHBUTTON ERVE BOILOFF VALVE INDICATOR ILLUMINATED
LVE 6 SLOWLY AND AD- TIL FUEL TANK PRESSURE O 18.0 PSI LVE 7 SLOWLY AND AD- TIL LO_2 TANK PRESSURE IS 0 PSI
D TO TABLE 4-49 FOR RE- R OF RETURN TO STANDBY URES

TABLE 4-48

PSC	1.	MANUALLY VENT AIRBORNE HELIUM BOTTLES BY OPENING VALVE NO. 43 HELIUM DUMP VALVE
	2.	CLOSE VALVE NO. 43 HELIUM DUMP VALVE WHEN REFRIGERATED HELIUM GAGE INDICATES 750 PSI NOTE IF IT IS DESIRED, AIRBORNE HELIUM BOTTLES MAY BE VENTED TO 0 PSI THROUGH VALVE 43 HELIUM DUMP VALVE
LAUNCH CONTROL CONSOLE	3.	OBSERVE PNEU SYSTEM VENTED INDICATOR ILLUMINATED GREEN
	4.	CONTINUE RETURN TO STANDBY (TABLE 3-15)

TABLE 4-47

HPU	1.	POSITION CONTROL STATUS (S-1) SWITCHES, FIRST AND SECOND STAGES, TO LOCAL
	2.	DEPRESS FIRST STAGE SYSTEM AND SECOND STAGE SYSTEM PUMP STOP (S-2) PUSHBUTTONS AND OBSERVE PUMP START INDICATORS EXTINGUISHED
LAUNCH CONTROL CONSOLE	3.	OBSERVE HYD. SYSTEM OFF INDICATOR ILLUMINATED GREEN AND HYDRAULIC PRESSURE INDICATOR ILLUMINATED AMBER
HPU	4.	POSITION CONTROL STATUS (S-1) SWITCHES, FIRST AND SECOND STAGES, TO REMOTE
LAUNCH CONTROL CONSOLE	5.	CONTINUE RETURN TO STANDBY (TABLE 3-15)

TABLE 4-49

ERECTION PANEL	1.	DEPRESS EMERGENCY STOP PUSHBUTTON AND OBSERVE EMERGENCY STOP INDICATOR ILLUMINATES RED
EMMCC	2.	POSITION REMOTE LOCAL SWITCH TO LOCAL
	3.	POSITION CONTROL STATION SELECTOR SWITCH THROUGH OFF TO LOCAL
	4.	POSITION LOCAL OPERATION SELECTOR SWITCH TO MAN. LOWER TO 90°
	5.	ACTUATE RESET SWITCH
	6.	DEPRESS INITIATE OPERATION PUSHBUTTON
	7.	OBSERVE ABOVE 95° RIGHT AND ABOVE 95° LEFT INDICATORS EXTINGUISHED
	8.	WHEN BOOM IS AT 90 DEGREES, POSITION CONTROL STATION SELECTOR SWITCH TO MISSILE TRANSFER
MISSILE TRANSFER PANEL	9.	OBSERVE PANEL ENERGIZED INDICATOR ILLUMINATED GREEN
	10.	DEPRESS ROTATE NOSE CLAMP DOWN PUSHBUTTON
	11.	DEPRESS EXTEND NOSE CLAMP PUSHBUTTON
	12.	DEPRESS CLOSE & LOCK NOSE CLAMP PUSHBUTTON
EMMCC	13.	OBSERVE MISSILE CONTACT SWITCH NO. 1 AND SWITCH NO. 2, NOSE CLAMP ROTATED DOWN, NOSE CLAMP CLOSED, AND NOSE CLAMP LOCKED INDICATORS ARE ILLUMINATED
	14.	POSITION CONTROL STATION SELECTOR SWITCH THROUGH OFF TO LOCAL

EMMCC (CONT)
FACILIT PANEL
MCC
FACILIT PANEL
LAUNCH CONTRO CONSOL

-PNEU READY (G)

ENGINE GROUND POWER (R)

FUEL TANK GAGE 63.0 PSI
LO_2 TANK GAGE 2.7 PSI
TANK DIFFERENTIAL PRESSURE GAGE ABOVE 5.0

NOTE

MISSILE READY INDICATOR WILL ILLUMINATE GREEN WITHIN 15 MINUTES AFTER COMMIT STOP PUSHBUTTON HAS BEEN DEPRESSED, IF LO_2 SLUG TANK HAS AUTOMATICALLY REFILLED AND THERE IS NO OTHER MALFUNCTION.

MINUTES
INIMUM

FUEL DRAINED (G)

IF AN EMERGENCY SITUATION REQUIRES FAST RETURN TO SITE HARD

PNEU SYSTEM VENTED (A)

HYD-SYSTEM OFF (G) (A)

HYDRAULIC
PRESSURE

RESSURE
8.0 PSI

FUEL DRAINING (E)

TIME LIMIT OUT OF SPECIFICATION

FAILS TO ILLUMINATE AMBER

REMAINS AMBER AFTER FUEL DRAINED INDICATOR ILLUMINATED GREEN

FAILS TO ILLUM
AMBER

PUSHBUTTON TANK PRES-
URE GAGE SI, DEPRESS TON
REMAIN IN EPRESS FUEL ND MAINTAIN .0 PSI
LY (TABLE

TABLE 4-46

FUEL TANKING (PANEL 1) AND FUEL TANKING (PANEL 2)	1. POSITION REMOTE LOCAL SWITCH TO LOCAL 2. POSITION N-18 SWITCH TO OPEN AND WAIT 90 SECONDS FOR VENTING 3. POSITION FC-1, FC-2, AND FC-13 SWITCHES TO OPEN AND OBSERVE THAT MISSILE FILL & DRAIN OPENED AND GROUND FILL & DRAIN OPENED INDICATORS ILLUMINATE AMBER 4. DRAIN FUEL FOR APPROXIMATELY 6 MINUTES NOTE DO NOT ALLOW FUEL TANK PRESSURE TO DECREASE TO BELOW 9.0 PSI 5. POSITION FC-1 SWITCH TO CLOSE, OBSERVE THAT GROUND FILL & DRAIN CLOSED INDICATOR ILLUMINATES GREEN, AND WAIT 5 SECONDS 6. POSITION FC-2 SWITCH TO CLOSE, OBSERVE THAT MISSILE FILL & DRAIN CLOSED INDICATOR ILLUMINATES GREEN, AND WAIT 5 SECONDS 7. POSITION FC-1 AND NC-1 SWITCHES TO OPEN, OBSERVE THAT GROUND FILL & DRAIN OPENED INDICATOR ILLUMINATES AMBER, AND WAIT 30 SECONDS 8. POSITION NC-1, FC-1, F-13, AND N-18 SWITCHES TO CLOSE AND OBSERVE THAT GROUND FILL & DRAIN CLOSED INDICATOR ILLUMINATES GREEN 9. POSITION REMOTE LOCAL SWITCH TO REMOTE
LAUNCH CONTROL CONSOLE	10. OBSERVE FUEL DRAINED INDICATOR ILLUMINATED GREEN 11. CONTINUE RETURN TO STANDBY (TABLE 3-15)

TABLE 4-1

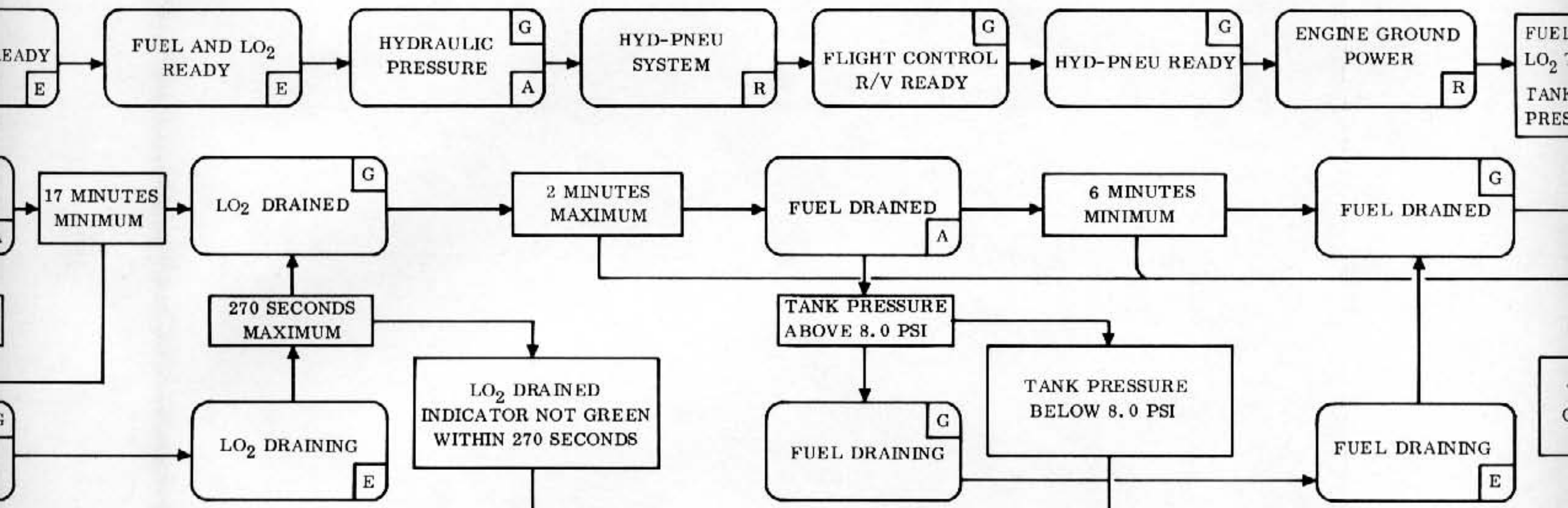
PSC	1. CLOSE VALVES 6 AND 7
CMG 4 OF 4 CHASSIS A42	2. POSITION SIGNAL RESPONDER TRANSFER SWITCH TO RESPONDER MODE
COUNTDOWN RESPONDER (PANEL 1)	3. POSITION SYSTEM POWER SWITCH TO ON 4. POSITION RETURN TO STANDBY SWITCH TO ON 5. POSITION SYSTEM POWER SWITCH TO OFF
CMG 4 OF 4 CHASSIS A42	6. POSITION SIGNAL RESPONDER TRANSFER SWITCH TO STANDBY MODE
PRESSURIZATION (PANEL 1)	7. POSITION SYSTEM POWER SWITCH TO OFF, THEN ON 8. DEPRESS STANDBY PUSHBUTTON AND OBSERVE BOILOFF VALVE CLOSED INDICATOR ILLUMINATED GREEN
PSC	9. OPEN VALVE 6 SLOWLY AND ADJUST UNTIL FUEL TANK PRESSURE IS 16.0 TO 18.0 PSI 10. OPEN VALVE 7 SLOWLY AND ADJUST UNTIL LO_2 TANK PRESSURE IS 7.0 TO 9.0 PSI
LAUNCH CONTROL CONSOLE	11. PROCEED TO TABLE 4-49 FOR REMAINDER OF RETURN TO STANDBY PROCEDURES

T

PSC	1. MA UM NO. 2. CLO VA UM IF I UM 0 PS DUM
LAUNCH CONTROL CONSOLE	3. OBS IND 4. CON (TA

T

HPU	1. POS SW STA 2. DE SEC (S- PU GU
LAUNCH CONTROL CONSOLE	3. OBS CA HY ILL
HPU	4. POS SW STA
LAUNCH CONTROL CONSOLE	5. CO (TA



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25 MIN-
L-12
WITCH
WITCH
DBY

TABLE 3-15	
LO_2 TANKING (PANEL 1)	1. POSITION REMOTE LOCAL SWITCH TO LOCAL
LAUNCH CONTROL CONSOLE	2. AFTER 90 SECONDS, OBSERVE LO_2 DRAINED INDICATOR ILLUMINATED GREEN
LO_2 TANKING (PANEL 1)	3. POSITION REMOTE LOCAL SWITCH TO REMOTE
LAUNCH CONTROL CONSOLE	4. CONTINUE RETURN TO STANDBY (TABLE 3-15)

TABLE 3-15	
LAUNCH CONTROL CONSOLE	1. DEPRESS FUEL RAISE PUSHBUTTON AND INCREASE FUEL TANK PRESSURE TO 9.0 PSI 2. IF FUEL TANK PRESSURE GAGE STABILIZES AT 9.0 PSI, DEPRESS AUTOMATIC PUSHBUTTON 3. IF SYSTEM DOES NOT REMAIN IN AUTOMATIC MODE, DEPRESS FUEL RAISE PUSHBUTTON AND MAINTAIN TANK PRESSURE AT 9.0 PSI 4. DRAIN FUEL MANUALLY (TABLE 4-46)

TABLE	
FUEL TANKING (PANEL 1) AND FUEL TANKING (PANEL 2)	1. POSITION TO LOCAL 2. POSITION AND WAIT 3. POSITION SWITCHES THAT MISS AND GROU INDICATO 4. DRAIN FU 6 MINUTE DO NOT A SURE TO PSI 5. POSITION OBSERVE DRAIN CL NATES GR 6. POSITION OBSERVE DRAIN CL NATES GR SECONDS 7. POSITION TO OPEN, FILL & DR ILLUMINA 30 SECON 8. POSITION N-18 SWIT SERVE TH CLOSED D GREEN 9. POSITION TO REMO
LAUNCH CONTROL CONSOLE	10. OBSERVE ILLUMINA 11. CONTINU (TABLE 3-

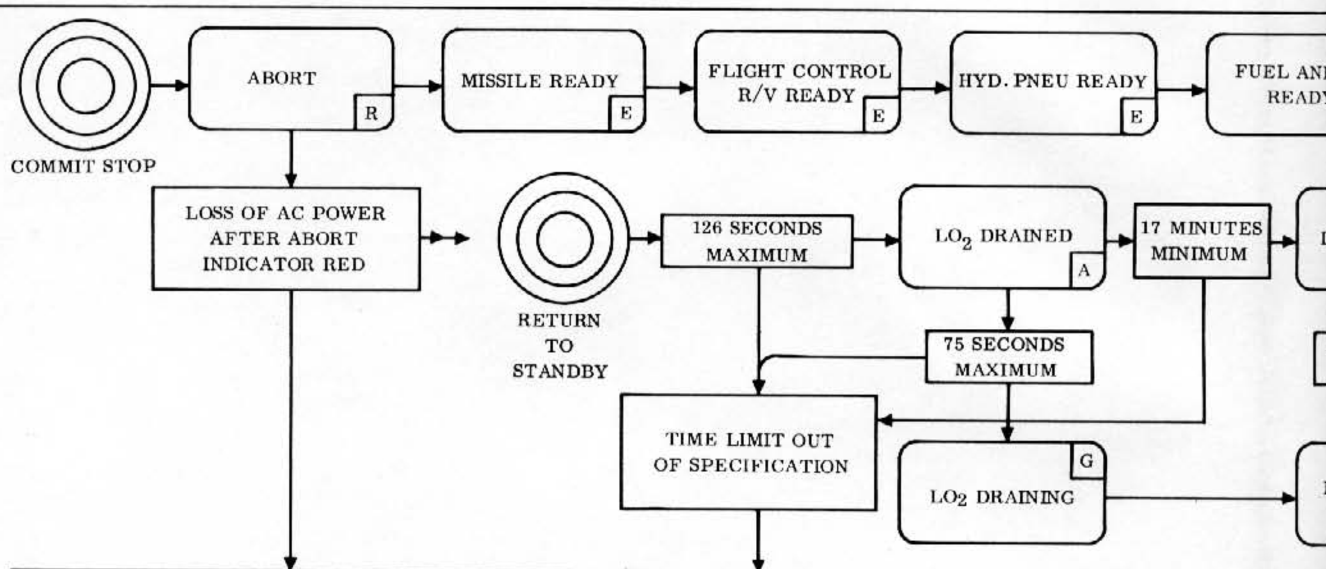

TABLE 4-8	
LAUNCH CONTROL CONSOLE	1. OBSERVE LO_2 TANK PRESSURE DECREASES TO 2.7 PSI, FUEL TANK PRESSURE REMAINS AT 63.0 PSI, AND TANK DIFFERENTIAL PRESSURE DECREASES TO 0 PSI 2. DEPRESS COMMIT STOP AND RETURN TO STANDBY PUSHBUTTONS 3. PERFORM LOSS OF AC POWER PROCEDURES IN TABLE 4-5

TABLE 4-45	
LAUNCH CONTROL CONSOLE	1. DEPRESS EMERGENCY PUSHBUTTON 2. MAINTAIN FUEL TANK PRESSURE AT 63.0 PSI
FUEL TANKING (PANEL 1)	3. POSITION REMOTE LOCAL SWITCH TO LOCAL NOTE IF ANY VALVE FAILS TO OPEN BY MANUAL ACTION AT LO_2 TANKING (PANEL 1), DETANKING CANNOT PROGRESS UNTIL FAULT IS CORRECTED. IF LC-1 OR LC-2 IS THE FAILED VALVE, BOILOFF IS THE ONLY METHOD OF DETANKING
LO_2 TANKING (PANEL 1)	4. POSITION REMOTE LOCAL SWITCH TO LOCAL 5. POSITION O-20 SWITCH TO OPEN AND ALLOW PRESSURE TO DECREASE TO 10 PSI 6. POSITION LC-2, LC-1, AND L-12 SWITCHES TO OPEN 7. DRAIN LIQUID OXYGEN FOR 25 MINUTES 8. POSITION LC-1, LC-2, AND L-12 SWITCHES TO CLOSE 9. POSITION REMOTE LOCAL SWITCH TO REMOTE
FUEL TANKING (PANEL 1)	10. POSITION REMOTE LOCAL SWITCH TO REMOTE
LAUNCH CONTROL CONSOLE	11. CONTINUE RETURN TO STANDBY (TABLE 3-15)

LO_2 TANK (PANEL 1)
LAUNCH CONTROL CONSOLE
LO_2 TANK (PANEL 1)
LAUNCH CONTROL CONSOLE

32.137-104.5B

SECTION V

COMBAT CREW MALFUNCTION ISOLATION

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LIST OF ILLUSTRATIONS

LIST OF TABLES

5-1. SCOPE.

5-2. This section contains the analysis procedures to be used by the missile combat crew to isolate malfunctions occurring to a specific subsystem during standby. This analysis is based on the following assumptions:

a. The complex and missile were in a ready state except for the malfunction noted.

b. All expendables (liquids, gases, etc) are at an acceptable level.

c. No maintenance is in progress on the system which could cause the malfunction noted.

5-2A. If this section is used to isolate a malfunction occurring during countdown, the weapon system will be returned to a standby configuration prior to a malfunction analysis. Normal missile combat crew action includes resetting, repositioning, and resupplying AGE systems required to maintain EWO alert status.

5-2B. Systems checkout, troubleshooting, and corrective action are maintenance functions and will be performed by maintenance personnel. However, missile combat crews shall observe and analyze monitor-light indicators, valve positions, switch positions, supply level indicators, gage indicators, and other information pertinent to the malfunction before performing any voltage or continuity checks directed in the tables. The malfunction analysis procedures are contained in tables 5-1 through 5-6 and are supported by figures 5-1 through 5-3.

5-3. MALFUNCTION ANALYSIS, LAUNCH CONTROL CONSOLE.

5-4. Table 5-1 presents the procedures to be used in analyzing malfunction indications which may appear on the launch control console. Since the launch control console indicators are mainly system summary indications, the malfunction analysis procedures also take into account primary indicators, such as those on the control-monitor group. Procedures for isolating the malfunction to a specific system are given, together with a reference to the appropriate technical order for detailed troubleshooting and corrective action. Table 5-6 provides the test points used when performing initiator and squib circuitry continuity checks during malfunction analysis in accordance with table 5-1.

5-5. MALFUNCTION ANALYSIS, FACILITIES REMOTE CONTROL PANEL.

5-6. Table 5-2 contains the procedures to be used in analyzing malfunction indications which may appear on the facilities remote control panel. Additional indications which aid in isolating the malfunction to a specific system are shown, together with test procedures and the required action. A reference to the appropriate technical order for detailed troubleshooting and corrective action is also presented.

5-7. MALFUNCTION ANALYSIS, DIESEL ENGINE CONTROL PANEL.

5-8. Table 5-3 provides procedures to be performed in the event the overspeed, high water temperature, or low lube oil pressure indicators on the diesel engine control panel illuminate. These procedures give the action required when it is possible to prevent loss of AC power and loss of missile pressurization, and reference appropriate emergency procedures when loss of AC power or pressurization is imminent.

5-9. HELIUM SYSTEM MALFUNCTIONS.

5-10. Table 5-4 presents the procedures used to correct a malfunction of helium valve H-56, H-63, H-64, or S-30. Venting of gas at skid NO. 5 indicates a possible failure of one of these valves. Further investigation utilizing the pressure gages on the PSC or on skid NO. 5 will isolate the malfunctioning valve.

5-11. MALFUNCTION ANALYSIS, FIRE ALARM MASTER CONTROL PANEL.

5-12. Table 5-5 lists the procedures to be performed in the event the TROUBLE or FIRE ALARM indicators on the fire alarm master control panel illuminate. These procedures provide the action required to determine whether a fire actually exists or if a malfunction has occurred in the fire alarm system itself.

5-13. PRESSURE SYSTEM CONTROL MALFUNCTIONS.

5-14. Table 5-6 provides procedures to convert the pressurization system control from automatic to manual and from manual to automatic mode.

Table 5-1. Malfunction Analysis, Launch Control Console

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
1	HIGH indicator extinguished	1	MARK IV indicator extinguished on prelaunch monitor (figure 1-65)	Request maintenance checkout re-entry vehicle in accordance with T.O. 21-SM65E-2J-5-1
2	TARGET A SELECTED indicator is illuminated amber and TARGET B SELECTED indicator is extinguished	1	TARGET A SET indicator on AUTOPILOT (PANEL 1), control-monitor group 2 of 4 (figure 4-19), is illuminated amber and AIG TARGET SELECTION indicator on GUIDANCE panel, control-monitor group 2 of 4 (figure 4-20), is illuminated green. TARGET A SET and AIG TARGET SELECTION indicators are illuminated green. TARGET A SET indicator is illuminated green and AIG TARGET SELECTION indicator is illuminated red	a. At the prelaunch monitor, position target select rotary switch to TARGET A and depress RESET pushbutton on target selection patch. b. If TARGET A SELECTED indicator is illuminated amber, a maintenance checkout will be required in accordance with T.O. 21-SM65E-2J-4-2.
3	TARGET A SELECTED indicator is extinguished and TARGET B SELECTED indicator is illuminated amber	1	TARGET B SET indicator on AUTOPILOT (PANEL 1) (figure 4-19) is illuminated amber and AIG TARGET SELECTION indi-	a. At the prelaunch monitor, position target select rotary switch to TARGET B and depress RESET pushbutton on target selection patch. b. If TARGET B SELECTED indicator is illuminated amber, a maintenance checkout will be required in accordance

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
3 (CONT)		1 (CONT)	cator on GUIDANCE panel (figure 4-20) is illuminated green. TARGET B SET and AIG TARGET SELECTION indicators are illuminated green. TARGET B SET indicator is illuminated green and AIG TARGET SELECTION indicator is illuminated red.	with T.O. 21-SM65E-2J-4-2
4	400 CYCLE POWER indicator is illuminated red	1	GROUND AC VOLTAGE indicator on MISSILE GROUND POWER (PANEL 1), control-monitor group 2 of 4 (figure 4-12), is illuminated red	a. At MISSILE GROUND POWER (PANEL 2), control-monitor group 2 of 4 (figure 4-12), set selector switch to MOTOR GENERATOR OUTPUT position and observe voltage on AC voltmeter. b. If voltage is correct, troubleshoot AC voltage sensor and control-monitor group in accordance with T.O. 21-SM65E-2J-15-3. c. If voltage is incorrect, proceed to skid-mounted motor generator (figure 1-23) and observe AC VOLT OUTPUT METER. d. A zero reading or incorrect voltage indicates a faulty skid-mounted motor generator. Troubleshoot in accordance with T.O. 35R1-231-1.

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
4 (CONT)		1 (CONT)		e. Verify presence of AC voltage between T1, T2, T3, and TO on output terminal board of motor generator. f. If voltage is present and correct, troubleshoot control-monitor group in accordance with T.O. 21-SM65E-2J-15-3. g. Zero or incorrect voltage indicates a malfunction in cabling between skid-mounted motor generator and control-monitor group. Troubleshoot in accordance with T.O. 21-SM65E-2J-15-3
		2	GROUND FREQUENCY indicator on MISSILE GROUND POWER (PANEL 1), control-monitor group 1 of 4 (figure 4-12), is illuminated red	a. Proceed to skid-mounted motor generator (figure 1-23) and observe FREQUENCY METER. aA. If incorrect at power generator room, verify that 60-CPS power output is within tolerance. b. If frequency is incorrect, troubleshoot skid-mounted motor generator in accordance with T.O. 21-SM65E-2FJ-20-1. c. If frequency is correct, troubleshoot AC frequency sensor and control-monitor group circuitry in accordance with T.O. 21-SM65E-2J-15-3.
		3	GROUND AC VOLTAGE AND GROUND FREQUENCY indicator on MISSILE	a. (Deleted)

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
4 (CONT)		3 (CONT)	GROUND POWER (PANEL 1) (figure 4-12) are both illuminated green	b. (Deleted) c. Troubleshoot in accordance with T.O. 21-SM65E-2J-15-3
		4	AC VOLTS INPUT and AC VOLTS OUTPUT meters at motor generator control panel (figure 1-23) indicate 0 volts	a. Ensure MOTOR GENERATOR disconnect switch (figure 1-23) is positioned to ON. b. Ensure MOTOR GENERATOR 400 CYCLE circuit breaker on launch and service building motor control center (figure 4-5) is positioned to ON. c. (Deleted) d. If voltage is not present, troubleshoot Cable, Part NO. 27-06946. e. If motor is not running, depress START pushbutton on motor generator control panel. If motor fails to start, troubleshoot in accordance with T.O. 35R1-231-1.

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
4 (CONT)		4 (CONT)		f. If motor starts, depress OUTPUT CONTACTOR ON pushbutton on control panel and observe OUTPUT AC VOLTS meter. If meter indicates 0 volts, troubleshoot in accordance with T.O. 35R1-231-1
		5	AC VOLTS OUTPUT METER at motor generator control panel (figure 1-23) indicates voltage out of tolerance	a. Set ADJUST VOLTAGE screwdriver adjustment on motor generator panel to provide 115 (±2) volts. b. If voltage cannot be adjusted, troubleshoot in accordance with T.O. 35R1-231-1
5	28 VDC POWER indicator is illuminated amber	1	COOLING AIR OFF indicator on power supply-distribution set (figure 1-27) is illuminated red	Oa. Physically check for cooling air. a. If cooling air is not present, position POWER SUPPLY ON-OFF switch on power supply-distribution set to OFF. b. Troubleshoot power supply-distribution set in accordance with T.O. 31X2-11-52-1
		2	BATTERY DISCHARGE indicator on power supply-distribution set is illuminated red	Observe AMPERE HOUR METER on power supply-distribution set (figure 1-27). If meter indicates that battery is depleted (40 AMP HR) replace battery in accordance with T.O. 21-SM65E-2FJ-20-6. If battery is not depleted, troubleshoot ampere hour meter and power supply-distribution set circuitry in accordance with T.O. 31X2-11-52-1

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
5 (CONT)		3	BATTERY DISCHARGE indicator on power supply-distribution set is extinguished	a. Troubleshoot power supply-distribution set circuits in accordance with T.O. 31X2-11-62-1. b. (Deleted) c. (Deleted)
6	28 VDC POWER indicator is illuminated red	1	GROUND D.C. VOLTAGE indicator on MISSILE GROUND POWER (PANEL 1), control-monitor group 2 of 4 (figure 4-12), is illuminated red	a. At MISSILE GROUND POWER (PANEL 2) (figure 4-12), position 28 VDC rotary switch to STANDBY BUS, and observe VOLTS DC meter and proceed as follows: (1) If meter indicates 0 volts proceed to step b. (2) If meter indicates voltage is out of tolerance, proceed to step d. (3) If meter indicates voltage is within tolerance, proceed to step e.

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
6 (CONT)		1 (CONT)		b. Observe STANDBY POWER indicator on power supply-distribution set (figure 1-27). If indicator is extinguished, troubleshoot rectifier in accordance with T.O. 31X2-11-52-1. If indicator is illuminated green, proceed to step c. c. Troubleshoot control-monitor group 2 of 4 and cabling between control-monitor group 2 of 4 and power supply-distribution set in accordance with T.O. 21-SM65E-2J-15-3. d. If voltage is present, but out of tolerance (±2 volts), troubleshoot rectifier in accordance with T.O. 31X2-11-52-1. e. If voltmeter indicates voltage is within tolerance, troubleshoot voltage sensor A41A1 and control-monitor group 2 of 4
		2	GROUND DC VOLTAGE indicator on MISSILE GROUND POWER (PANEL 1), control-monitor group 2 of 4 (figure 4-12),	Troubleshoot control-monitor group 2 of 4 and cabling from control-monitor group to launch control console.

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
6 (CONT)		2 (CONT)	is illuminated green	
7	GUIDANCE FAIL indicator illuminates red.	1	400 CYCLE POWER indicator on launch console (figure 1-62) is illuminated red	a. At MISSILE GROUND POWER (PANEL 1) (figure 4-12), position GUIDANCE SYSTEM POWER ON-OFF switch to OFF. b. At missile systems checkout programmer panel of countdown group (figure 4-7), position CONTROL SELECTOR switch to LOCAL-MANUAL and MGS ON-OFF switch to OFF. c. Refer to item 4 to restore 400-cycle power. d. When 400-cycle power is restored, position GUIDANCE SYSTEM POWER ON-OFF switch on MISSILE GROUND POWER (PANEL 1) (figure 4-12) to ON. e. Turn on inertial guidance system power and prepare for and perform checkout in accordance with T.O. 21-SM65E-2J-4-1
		2	28 VDC POWER indicator on launch control console (figure 1-62) is illuminated red	a. (Deleted)

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
7 (CONT)		2 (CONT)		b. Refer to item 6 to restore 28 VDC power. (Steps c through f deleted) g. Prepare for and perform checkout in accordance with T.O. 21-SM65E-2J-4-1
		3	POD AIR CONDITIONING indicator on launch control console (figure 1-62) illuminates amber	Oa. Attempt to restart pod compressor in accordance with table 3-38 a. At MISSILE GROUND POWER (PANEL 1), control-monitor group 2 of 4 (figure 4-12), position GUIDANCE SYSTEM POWER switch to OFF.

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
7 (CONT)		3 (CONT)		b. At countdown group missile systems checkout programmer panel (figure 4-7), position CONTROL SELECTOR switch to LOCAL-MANUAL and MGS ON-OFF switch to OFF. c. Check MISSILE POD HI-HUMIDITY, MISSILE POD AIR LO-PRESS, and HI-TEMP indicators on FRCP. Troubleshoot pod air-conditioning system in accordance with table 5-2, items 21, 22, and 23, T.O. 21-SM65E-2FJ-19. d. At MISSILE GROUND POWER (PANEL 1), control-monitor group 2 of 4, (figure 4-12), position GUIDANCE SYSTEM POWER switch to ON. e. Turn on inertial guidance system power, prepare for and perform checkout in accordance with T.O. 21-SM65E-2J-4-1
		4	ELECTRONIC CABINET AIR HI-TEMP indicator on FRCP (figure 1-29, 1-32, or 1-33) is illuminated	Oa. Attempt to restart ELECTRONIC CABINET compressor in accordance with table 3-39. a. At MISSILE GROUND POWER (PANEL 1), control-monitor group 2 of 4 (figure 4-12), position GUIDANCE SYSTEM POWER switch to OFF. b. At countdown group missile system checkout programmer panel (figure 4-7), position CONTROL SELECTOR switch to LOCAL-MANUAL and MGS ON-OFF switch to OFF.

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
7 (CONT)		4 (CONT)		c. At countdown group power distribution panel, position the 200/115V 400~, 120V 60~, and 28 VDC circuit breakers to OFF

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
7 (CONT)		4 (CONT)		d. Troubleshoot electronic cabinet air conditioning system in accordance with T.O. 21-SM65E-2FJ-19. e. Turn on inertial guidance system power and prepare for and perform checkout in accordance with T.O. 21-SM65E-2J-4-1
		5	120V 60~ indicator on power distribution panel of countdown group (figure 5-1) is extinguished	a. Observe 120V 60~ circuit breaker on power distribution panel of countdown group. b. Observe countdown group circuit breaker at power panel PA (GSE, 120/208 volt power) (figure 5-2). c. Troubleshoot countdown group in accordance with T.O. 21-SM65E-2J-4-2
		6	SYSTEM IN STANDBY indicator on GUIDANCE (PANEL 1) control-monitor group 2 of 4 (figure 4-20), is illuminated green	Troubleshoot launch control console in accordance with T.O. 21-SM65E-2J-15-3
		7	SYSTEM IN STANDBY indicator on GUIDANCE (PANEL 1) control-monitor group 2 of 4, is illuminated amber	a. Perform a responder test in accordance with T.O. 21-SM65E-2J-15-3 to isolate malfunction to control-monitor group or airborne part of inertial guidance system

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
7 (CONT)		7 (CONT)		b. If responder test indicates malfunction is in launch control equipment, troubleshoot guidance panels of control-monitor group in accordance with T.O. 21-SM65E-2J-15-3
8	R/V SAFE indicator illuminates red	1	SYSTEM IN STANDBY indicator on RE-ENTRY VEHICLE (PANEL 1), control-monitor group 2 of 4 (figure 4-21), indicator is illuminated green	At re-entry vehicle prelaunch monitor (figure 1-65), verify malfunction indications. If no malfunction indications exist, troubleshoot launch control console and cabling between console and control-monitor group in accordance with T.O. 21-SM65E-2J-15-3. If prelaunch monitor indicates a malfunction, troubleshoot in accordance with T.O. 11N-RV-4E-16
		2	SYSTEM IN STANDBY indicator is illuminated amber and R/V LOCAL POWER or R/V SAFE or R/V TACTICAL indicator is illuminated red on RE-ENTRY VEHICLE panel, control-monitor group 2 of 4 (figure 4-21)	Verify like malfunction indication appears on re-entry vehicle prelaunch monitor. If like indications exist, check out re-entry vehicle in accordance with T.O. 11N-RV-4E-16. If like indications do not exist, perform responder test of control-monitor group in accordance with T.O. 21-SM65E-2J-15-3 and electrical simulator checkout of prelaunch monitor in accordance with T.O. 11N-RV-4E-16

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
9	AUTOPILOT FAIL indicator is illuminated red. Note AUTOPILOT FAIL indicator illuminated amber indicates gyro fine heaters are out of tolerance. Within 10 minutes after illuminating amber, AUTOPILOT FAIL indicator will illuminate red unless the condition corrects itself.	1	SYSTEM IN STANDBY indicator on AUTOPILOT (PANEL 1), control-monitor group 2 of 4 (figure 4-19), is illuminated green	Check out launch control equipment in accordance with T.O. 21-SM65E-2J-15-3
		2	SYSTEM IN STANDBY indicator on AUTOPILOT (PANEL 1) is extinguished and RATE GYRO TEMPERATURE indicator is illuminated red	a. Perform a responder test in accordance with T.O. 21-SM65E-2J-15-3 to isolate malfunction to control-monitor group or airborne part of autopilot control system. b. If responder test indicates malfunction is in launch control equipment, troubleshoot autopilot control panels of control-monitor group in accordance with T.O. 21-SM65E-2J-15-3. c. If responder test indicates malfunction is not in launch control equipment, a malfunction exists in rate gyros of airborne part of autopilot system. Troubleshoot autopilot system in accordance with T.O. 21-SM65E-2D-6-1
		3	SYSTEM IN STANDBY indicator on AUTOPILOT (PANEL 1) is extinguished and GYRO FINE	Oa. At AUTOPILOT (PANEL 1), control-monitor group 2 of 4, attempt to recycle autopilot heaters by placing SYSTEM POWER switch OFF then ON. a. Perform a responder test in accordance with T.O. 21-SM65E-2J-15-3 to isolate malfunction to control-monitor group or airborne part of autopilot control system.

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
9 (CONT)		3 (CONT)	HEATER indicator is illuminated red	b. If responder test indicates malfunction is in launch control equipment, troubleshoot autopilot control panels of control-monitor group in accordance with T.O. 21-SM65E-2J-15-3. c. If responder test indicates malfunction is not in launch control equipment, a malfunction exists in displacement gyros of airborne portion of autopilot system. Troubleshoot autopilot system in accordance with T.O. 21-SM65E-2D-6-1
10	RESPONDER MODE indicator illuminates amber or red	1	None	Note Indicator will illuminate amber when all SIGNAL RESPONDER TRANSFER SWITCHES on control-monitor group are in RESPONDER MODE position. Indicator will illuminate red when all SIGNAL RESPONDER TRANSFER SWITCHES are not in the same selected mode position. Observe SIGNAL RESPONDER TRANSFER SWITCHES on control-monitor group 3 and 4 of 4 (figure 4-23) to ensure all switches are in STANDBY MODE position

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
11	POD AIR CONDITIONING indicator illuminates amber	1	On facilities remote control panel (figure 1-29, 1-32, or 1-33), MISSILE POD AIR HI-TEMP indicator, MISSILE POD AIR LO-PRESS indicator, or MISSILE POD HI-HUMIDITY indicator is illuminated, or MISSILE POD BLOWER indicator is extinguished	See table 5-2, item 21, 22, 23, or 47 as applicable
12	EMERGENCY HELIUM SUPPLY indicator is illuminated amber	1	Emergency helium supply gage on skid NO. 5 (figure 1-47) indicates less than APPROX 800 PSI or the inflight A or inflight B gage on skid NO. 5 indicates less than APPROX 3100 PSI	**CAUTION** Do not depress EMERGENCY pushbutton on launch control console (figure 1-62). Failure to comply could result in the inability to control missile tank pressures. a. Place missile in stretch in accordance with table 3-34. b. Check out emergency helium supply system in accordance with T.O. 21-SM65E-2J-9-1

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
13	ENGINE GROUND POWER indicator is illuminated red	1	400 CYCLE POWER or 28 VDC POWER indicator on launch control console (figure 1-62) is illuminated red	Proceed to item 4 or 6 as applicable
	(All data on pages 5-19 and 5-20, steps 2 through 4, deleted.)			

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Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
13 (CONT)		5	(Deleted)	
14	FLIGHT CONTROL R/V indicator is illuminated red	1	AUTOPILOT FAIL indicator on launch control console (figure 1-62) is illuminated red	Refer to item 9

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
14 (CONT)		2	R/V SAFE indicator on launch control console is illuminated red	Refer to item 8
		3	GUIDANCE FAIL indicator on launch control console is illuminated red	Refer to item 7
15	ERECTION SYSTEM indicator is illuminated red	1	SYSTEM IN STANDBY indicator on ERECTION panel, control-monitor group 1 of 4 (figure 4-1), is extinguished	Troubleshoot erection system in accordance with T.O. 21-SM65E-2J-10-1
		2	125 VDC POWER indicator on FACILITY panel, control-monitor group 1 of 4 (figure 4-6), is illuminated red	At facility interface cabinet (figure 4-25) terminal board C3, verify voltage at test points CDC5 and CDC6. If voltage is not present at test point CDC5 or if voltage is present at both test points, troubleshoot launch equipment in accordance with T.O. 21-SM65E-2J-15-3. If voltage is present at test point CDC5, troubleshoot 125 VDC power distribution system in accordance with T.O. 21-SM65E-2FJ-20-2

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
16	HYD-PNEU SYSTEM indicator is illuminated red	1	PRESSURE MODE indicator is illuminated red	See table 4-1
		2	PRESSURE MODE indicator is illuminated green but SYSTEM IN STANDBY indicator on HYDRAULICS panel, control-monitor group 2 of 4 (figure 4-8), is extinguished	a. Check missile for hydraulic leaks. If there are no leaks, the malfunction is in the ground hydraulic system. Check for leaks at all fittings of the HPU. Note All checks in the following steps will be applied to both stages of the HPU. Valve and switch numbers are the same for both stages. b. Observe position and indicators of valves 60, 58, 13, and 55. They should all indicate green and be OPEN, CLOSED, OPEN, OPEN, respectively. c. If any valve is in an incorrect position, the malfunction is within that valve. Troubleshoot in accordance with T.O. 21-SM65E-2J-8-1. (Steps d through f deleted)

(All data on page 5-24 deleted.)

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
16 (CONT)		4	PRESSURE MODE indicator is illuminated green but SYSTEM IN STANDBY and LN MANUAL VALVES indicators on LN_2 HELIUM TANKING panel, control-monitor group 1 of 4 (figure 4-17), are extinguished	a. Verify 28 VDC between test point 16 of terminal board TB2-6 and ground in the PLTC (figure 4-16). If 28 VDC is present, perform step b. If 28 VDC is not present, perform step c. b. Troubleshoot the launch control equipment in accordance with T.O. 21-SM65E-2J-15-3. c. Troubleshoot LN_2 manual valves in accordance with T.O. 21-SM65E-2J-9-2
		5	PRESSURE MODE indicator is illuminated green but SYSTEM IN STANDBY and AUTOMATIC VALVES indicators on LN_2 HELIUM TANKING panel, control monitor group 1 of 4 (figure 4-17), are extinguished	a. Verify 28 VDC between test point 20 of terminal board TB2-5 and ground in the PLTC. If 28 VDC is present, perform step b. If 28 VDC is not present, perform step c. b. Troubleshoot the launch control equipment in accordance with T.O. 21-SM65E-2J-15-3. c. Troubleshoot the automatic valves in accordance with T.O. 21-SM65E-2J-9-2
		6	PRESSURE MODE indicator is illuminated green but SYSTEM IN STANDBY and IFH MANUAL VALVES indicator on LN_2 HELIUM TANKING panel, control-monitor group 1 of	a. Verify 28 VDC between test point 7 or 17 as applicable of terminal board TB5-5 and ground in the PLTC (figure 4-16). If 28 VDC is present, perform step b. If 28 VDC is not present, perform step c. b. Troubleshoot the launch control equipment in accordance with T.O. 21-SM65E-2J-15-3

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
16 (CONT)		6 (CONT)	4 (figure 4-17), are extinguished	c. Troubleshoot the I.F.H. manual valves in accordance with T.O. 21-SM65E-2J-9-2
17	LO_2 & FUEL SYSTEM indicator is illuminated red	1	BLANKET PRESSURE and SYSTEM IN STANDBY indicators on FUEL TANKING (PANEL 1), control-monitor group 1 of 4 (figure 4-10), are extinguished	a. Verify 28 VDC between the following points and ground: (1) At propellant level terminal cabinet (figure 4-16), terminal 11 of terminal board TB3-1 (pressure switch PS-9-1, storage tank blanket pressure) (2) At PLTC, terminal 20 of terminal board TB2-2 (pressure switch PS-13-2, transfer line pressure) b. If voltage was present during step a(1) or if voltage was not present during step a(2), troubleshoot launch control equipment in accordance with T.O. 21-SM65E-2J-15-3. c. If voltage was present during step a(2) but was not present during step a(1), troubleshoot RPIE portion of fuel tanking system in accordance with T.O. 21-SM65E-2J-11-1
		2	FUEL MANUAL VALVES and SYSTEM IN STANDBY indicators on FUEL TANKING (PANEL 1), control-monitor group 1 of 4 (figure 4-10), are extinguished	a. Verify 28 VDC between the following points and ground: (1) At PLTC (figure 4-16), pin 3 of terminal board TB5-1 (microswitch MS-8-1, valve N-43 wide open) (2) At PLTC, terminal 18 of terminal board TB1-2

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
17 (CONT)		2 (CONT)		b. If voltage is present during step a(1) or if voltage is not present during step a(2), check out launch control equipment in accordance with T.O. 21-SM65E-2J-15-3. c. If voltage is present during step a(2) but was not present during step a(1), the malfunction is in the RPIE portion of the fuel tanking system. Proceed to step d. d. Verify 28 VDC at the following points. If voltage is not present, troubleshoot appropriate valve and associated microswitches. (1) At skid NO. 1, terminal 1 of terminal board TB5-1 (microswitch MS-6-1 valve N-29 wide open) (2) At skid NO. 1 junction box, terminal 19 of terminal board TB4-1 (microswitch MS-2-1 valve N-5 wide open) (3) At skid NO. 2 junction box, terminal 4 of terminal board TB4-2 (microswitch MS-44-2 valve F-28 wide open) (4) At skid NO. 2 junction box, terminal 2 of terminal board TB4-2 (microswitch 23-2-valve 10 closed)

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
17 (CONT)		2 (CONT)		(5) At skid NO. 2 junction box, terminal 8 of terminal board TB4-2 (microswitch MS-47-2-valve F-31 closed) (6) At skid NO. 2 junction box, terminal 6 of terminal board TB4-2 (microswitch MS-25-2-valve F-30 closed)
		3	AUTOMATIC VALVES and SYSTEM IN STANDBY indicators on FUEL TANKING (PANEL 1), control-monitor group 1 of 4 (figure 4-10), are extinguished	a. Verify 28 VDC between the following points and ground: (1) At PLTC (figure 4-16), terminal 1 of terminal board TB3-1 (microswitch MS-17-1-valve N-6 closed) (2) At PLTC, terminal 6 of terminal board TB3-2 (microswitch MS-53-2-valve N18 closed) (3) At PLTC, terminal 16 of terminal board TB2-2 (microswitch MS-31-2-valve F-13 closed) (4) At PLTC, terminal 14 of terminal board TB2-2 (microswitch MS-29-2-valve F-8 closed) (5) At PLTC, terminal 12 of terminal board TB2-2 (microswitch MS-27-2-valve F-7 closed) (a) (Deleted)

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
17 (CONT)		3 (CONT)		(b) (Deleted) (5A) At skid NO. 1, terminal 4 of TB3-1 (MS-21-1) N-44 closed. (5B) At skid NO. 1, terminal 2 of TB3-1 (MS-19-1) N-30 closed. (6) At PLTC, terminal 18 of terminal board TB1-2 b. If voltage is present in one or more of steps a(1) through a(5), or if no voltage is present dur- during step a(6), troubleshoot launch control equipment in accordance with T.O. 21-SM63E-2J-15-3. c. If voltage is not present during steps a(1) through a(5) but voltage is present at step a(6), troubleshoot fuel tanking system in accordance with T.O. 21-SM65E-2J-11-1
		4	FUEL SUPPLY and SYSTEM IN STANDBY indicators on FUEL TANKING (PANEL 1), control-monitor group 1 of 4 (figure 4-10), are extinguished	Refer to item 20

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
17 (CONT)		5	MANUAL VALVES and SYSTEM IN STANDBY indicators on LO_2 TANKING (PANEL 1), control-monitor group 1 of 4 (figure 4-9), are extinguished	a. Verify 28 VDC between the following points and ground: (1) At PLTC (figure 4-16), terminal 12 of terminal board TB1-8 (2) At PLTC, terminal 10 of terminal board TB4-7 (microswitch MS-201-7-valve O-5 wide open) b. If voltage is not present during step a(1) or if voltage is present during step a(2), troubleshoot launch control equipment in accordance with T.O. 21-SM65E-2J-15-3. c. If voltage is not present during step a(2), the malfunction is in the RPIE portion of the LO_2 tanking system. Proceed to step d to further isolate malfunction. d. Verify 28 VDC at the following points. If voltage is not present, troubleshoot applicable valve and associated microswitch. (1) At PLTC, terminal 3 of terminal board TB2-11 (microswitch MS-251-11-valve O-35 wide open) (2) At PLTC, terminal 15 of terminal board TB4-8 (microswitch MS-214-8-valve L-7 closed)

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
17 (CONT)		5 (CONT)		(3) At PLTC, terminal 20 of terminal board TB1-9 (microswitch MS-233-9-valve L-28 wide open)
		6	AUTOMATIC VALVES and SYSTEM IN STANDBY indicators on LO_2 TANKING (PANEL 1), control-monitor group 1 of 4 (figure 4-9), are extinguished	a. Verify 28 VDC between the following points and ground: (1) At PLTC (figure 4-16), terminal 2 of terminal board TB2-8 (2) At PLTC, terminal 7 of terminal board TB2-11 b. If voltage was not present during steps a(1) and a(2), troubleshoot in accordance with T.O. 21-SM65E-2J-15-3. If voltage was present proceed to step d. c. (Deleted)

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
17 (CONT)		6 (CONT)		d. Verify 28 VDC between the following points and ground. If voltage is not present at any one of the check points, troubleshoot applicable valve and associated components in accordance with T.O. 21-SM65E-2J-11-1. (1) (Deleted) (2) (Deleted) (3) At PLTC, terminal 10 of terminal board TB3-8 (microswitch MS-226-8-valve L-32 closed) (4) At PLTC, terminal 8 of terminal board TB3-8 (microswitch 224-8-valve L-4 closed) (5) At PLTC, terminal 6 of terminal board TB3-8 (microswitch MS-222-8-valve L-2 closed) (6) At PLTC, terminal 11 of terminal board TB3-8 (microswitch 228-8-valve L-12 closed) (7) At PLTC, terminal 13 of terminal board TB3-8 (microswitch MS-230-8-valve L-22 closed)

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
17 (CONT)		6 (CONT)		(8) At PLTC, terminal 15 of terminal board TB1-9 (microswitch MS-238-9-valve O-20 not closed) (9) At PLTC, terminal 10 of terminal board TB2-11 (microswitch MS-258-11-valve O-36 closed) (10) At PLTC, terminal 12 of terminal board TB2-11 (microswitch MS-260-11-valve O-37 closed) (11) At PLTC, terminal 6 of terminal board TB2-11 (microswitch MS-254-11-valve L-34 closed) (12) At PLTC, terminal 8 of terminal board TB2-11 (microswitch MS-256-11-valve L-35 closed) (13) At PLTC, terminal 4 of terminal board TB2-11 (microswitch MS-252-11-valve L-33 closed)
		7	LINE PRESSURE and SYSTEM IN STANDBY indicators on LO_2 TANKING (PANEL 1), control-monitor group 1 of 4 (figure 4-9), are extinguished	a. At PLTC (figure 4-16), verify 28 VDC between terminal 7 of terminal board TB2-11 and ground. If voltage is not present, troubleshoot launch control equipment in accordance with T.O. 21-SM65E-2J-15-3. If voltage is present, proceed to step b.

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
17 (CONT)		7 (CONT)		b. At PLTC, verify 28 VDC at terminal 17 of terminal board TB3-8 and ground (pressure switch PS-209-8-transfer line pressure). If voltage is present, troubleshoot launch control equipment in accordance with T.O. 21-SM65E-2J-15-3. If voltage is not present, the malfunction is in the RPIE portion of the LO_2 tanking system. Proceed to step c to further isolate the malfunction. c. At PLTC, verify 28 VDC between terminal 20 of terminal board TB2-11 and ground (pressure switch PS-210-11-topping line blanket pressure). If voltage is not present, troubleshoot LO_2 tanking system in accordance with T.O. 21-SM65E-2J-11-1
		8	SLUG SUPPLY and SYSTEM IN STANDBY indicators on LO_2 TANKING PANEL, control-monitor group 1 of 4 (figure 4-9), are extinguished	a. Verify 28 VDC between the following points and ground: (1) At PLTC (figure 4-16), terminal 7 of terminal board TB2-11 (28 VDC to pressure switch PS-210-11-topping line to blanket pressure) (2) At PLTC, terminal 16 of terminal board TB2-11 (charge tank liquid level indicator LLI-204-11)

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
17 (CONT)		8 (CONT)		b. If voltage is not present during step a(1), or if voltage is present during step a(2), troubleshoot launch control equipment in accordance with T.O. 21-SM65E-2J-15-3. c. (Deleted)
		9	LIQUID OXYGEN SUPPLY and SYSTEM IN STANDBY indicators on LO_2 TANKING (PANEL 1), control-monitor group 1 of 4 (figure 4-9), are extinguished	Refer to item 18
		10	LO_2 IN STANDBY and FUEL IN STANDBY indicators are extinguished and SYSTEM POWER indicator is illuminated green on PROPELLANT LEVEL (PANEL 1), control-monitor group 1 of 4 (figure 4-18)	Troubleshoot launch control equipment in accordance with T.O. 21-SM65E-2J-15-3

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
17 (CONT)		11	SYSTEM POWER indicator is extinguished and PLCU LO_2 IN STANDBY and PLCU FUEL IN STANDBY indicators are illuminated green on PROPELLANT LEVEL (PANEL 1), control-monitor group 1 of 4 (figure 4-18)	Troubleshoot launch control equipment in accordance with T.O. 21-SM65E-2J-15-3
18	LO_2 SUPPLY indicator is illuminated red	1	LIQUID OXYGEN SUPPLY and SYSTEM IN STANDBY indicators on LO_2 TANKING (PANEL 1), control-monitor group 1 of 4 (figure 4-9), are extinguished	a. At PLTC (figure 4-16), verify 28 VDC between terminal 12 of terminal board TB1-8 and ground. If voltage is not present, troubleshoot launch control equipment in accordance with T.O. 21-SM65E-2J-15-3. If voltage is present, proceed to step b. b. At PLTC, verify 28 VDC at terminal 5 of terminal board TB3-7 (pressure switch PS-202-7 - cylinder pressure sufficient for one load). If voltage is present, troubleshoot launch control equipment in accordance with T.O. 21-SM65E-2J-15-3. If voltage is not present, malfunction is in RPIE portion of LO_2 tanking system. Proceed to step c. c. At PLTC, verify 28 VDC at terminal 17 of terminal board

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
18 (CONT)		1 (CONT)		TB1-9 (liquid level indicator LLI-201-9 - storage tank level). If voltage is present, troubleshoot cylinder pressures. If voltage is not present, troubleshoot storage tank level area. (Refer to T.O. 21-SM65E-2J-11-1.)
19	LN_2/HE SUPPLY indicator illuminates red	1	HYD-PNEU SYSTEM indicator is illuminated red and SYSTEM IN STANDBY indicator on LN_2-HELIUM TANKING panel, control-monitor group 1 of 4 (figure 4-17), is extinguished	a. Ensure 28 VDC between terminal board test points TB3-5 terminal 8 and ground in the PLTC (figure 4-16). If 28 VDC is present, proceed to step b. If 28 VDC is not present, proceed to step c. b. Troubleshoot the launch control equipment in accordance with T.O. 21-SM65E-2J-15-3. c. Progressively verify 28 VDC between ground and the following test points in the PLTC. If 28 VDC is not present, troubleshoot indicated switches, associated valves and systems in accordance with T.O. 21-SM65E-2J-9-2 and T.O. 21-SM65E-2D-9-1. (1) Terminal 4 of test point TB3-5. Pressure switch PS-105-5 on helium control valve skid NO. 5 (figure 1-47). (Inflight helium cylinder A pressure)

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
19 (CONT)		1 (CONT)		(2) Terminal 15 of test point TB6-1. Pressure switch PS-102-1 on helium control valve skid NO. 5 (figure 1-47). (LN_2 transfer cylinder pressure) (3) Terminal 9 of test point TB2-6. Liquid level indicators LLI 101-6 and LLI 102-6 on LN_2 helium heat exchanger skid NO. 6 (figure 1-50). (LN_2 level and LN_2 heat exchanger level) (4) Terminal 8 of test point TB3-5. Pressure switch PS-111-5 on helium control valve skid NO. 5 (figure 1-47). (Ground pressurization cylinder pressure)
20	FUEL SUPPLY indicator is illuminated red	1	FUEL SUPPLY and SYSTEM IN STANDBY indicators on FUEL TANKING (PANEL 1), control-monitor group 1 of 4 (figure 4-10), are extinguished	a. Ensure voltage between the following points and ground: (1) At PLTC (figure 4-16), terminal 9 of terminal board TB3-1 (pressure switch PS-4-1 - cylinder pressure sufficient for one load) (2) At PLTC, terminal 4 of terminal board TB3-2 (liquid level indicator LLI-1-3-storage tank level) b. If voltage was present during step a(1) or if voltage was not present during step a(2), troubleshoot launch control

Table 5-1. Malfunction Analysis, Launch Control Console (Continued)

ITEM	MALFUNCTION INDICATION	STEP	OTHER INDICATIONS	ACTION AND REFERENCE FOR ABNORMAL INDICATIONS
20 (CONT)		1 (CONT)		system equipment in accordance with T.O. 21-SM65E-2J-15-3. c. If voltage was present during step a(2) and was not present during step a(1), troubleshoot RPIE portion of fuel tanking system in accordance with T.O. 21-SM65E-2J-11-1. d. (Deleted)
21	READY FOR COUNTDOWN indicator is extinguished	1	One or more status or malfunction patch indicators on launch control console (figure 1-62) illuminated red	Refer to items 1 through 20 as applicable

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	NOT AS SPECIFIED
1	MISSILE STORAGE AREA 20% RP1 (SMS 548, SMS 566, and SMS 567), MISSILE AREA 20% EXPLOSIVE RP1 (SMS 576-C), MISSILE ERECTION AREA 20% RP1 (OSTF-1), indicator illuminates and alarm sounds	1	Depress alarm ACKNOWLEDGE pushbutton on FRCP and proceed to missile erection area RP-1 detector located outside of the missile storage area. Observe that 20% L.E.L. indicator on the warning panel and one of the sampling station indicators on the station selector panel are illuminated and that 20% L.E.L. alarm is sounding	a. Depress ALARM SILENCER pushbutton on the RP-1 detector analyzer panel. b. Proceed to the sampling station indicated in the missile erection area. c. At the sampling station indicated, troubleshoot the fuel system in accordance with T.O. 21-SM65E-2J-11-1 and T.O. 21-SM65E-2J-11-2. d. At the RP-1 detector cabinet, depress the alarm SILENCE and detector RESET pushbuttons. e. At FRCP, observe that MISSILE STORAGE AREA 20% RP-1 indicator is extinguished	a. Depress DETECTOR FAILURE ALARM SILENCER pushbutton on RP-1 detector panel. b. Observe that one or more of the detector failure (timer, sample pump, and bridge power supply) indicators is illuminated. c. Troubleshoot the RP-1 detector in accordance with T.O. 21-SM65E-2FJ-22-1, -2, -3, -4, or -5
2	FUEL ROOM 20% EXPLOSIVE RP1 (SMS 548, SMS 566, SMS 567,	1	Depress alarm ACKNOWLEDGE pushbutton on FRCP and proceed to RP-1 detector	a. Depress ALARM SILENCER pushbutton on the RP-1 detector analyzer panel and the FUEL ROOM	a. Depress DETECTOR FAILURE ALARM SILENCER pushbutton on the RP-1 detector panel.

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS	
				AS SPECIFIED	NOT AS SPECIFIED
2 (CONT)	and SMS 576-C), FUEL RM. 20% EXPLOSIVE RP-1 (OSTF-1), indicator illuminates and alarm sounds	1 (CONT)	located outside the fuel control room. Observe that 20% L.E.L. indicator on the warning panel and one of the sampling station indicators on the station selector panel are illuminated and that 20% L.E.L. alarm is sounding	DOOR-LOCK BY-PASS pushbutton on the FRCP. b. Proceed to the sampling station indicated in the fuel control room. c. At the sampling station indicated troubleshoot the fuel system in accordance with T.O. 21-SM65E-2J-11-1 and T.O. 21-SM65E-2J-11-2. d. At the RP-1 detector cabinet, depress the alarm SILENCE and detector RESET pushbuttons. e. At FRCP, observe that FUEL ROOM 20% EXPLOSIVE RP1 indicator is extinguished	b. Observe that one or more of the detector failure (timer, sample pump, and bridge power supply) indicators is illuminated. c. Troubleshoot the RP-1 detector in accordance with T.O. 21-SM65E-2FJ-22-1, -2, -3, -4, or -5
3	FUEL ROOM 40% EXPLOSIVE RP1 (SMS 548, SMS 566, SMS 567 and	1	Depress alarm ACKNOWLEDGE pushbutton on FRCP and proceed to RP-1 detector	Proceed to step 2	a. Depress DETECTOR FAILURE ALARM SILENCER pushbutton on the RP-1 detector panel.

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
3 (CONT)	SMS 576-C), FUEL RM 40% EXPLOSIVE RP-1 (OSTF-1), indicator illuminates and alarm sounds	1 (CONT)	located outside the fuel control room. Observe that 40% L.E.L. indicator on the warning panel and one of the sampling station indicators on the station selector panel are illuminated and that 40% L.E.L. alarm is sounding		b. Observe that one or more of the detector failure (timer, sample pump, and bridge power supply) indicators is illuminated. c. Troubleshoot the RP-1 detector in accordance with T.O. 21-SM65E-2FJ-22-1, -2, -3, -4, or -5
		2	Depress the ALARM SILENCER pushbutton on the RP-1 detector analyzer panel and verify that the fuel control room fog system is operating and that no fires exist in the fuel control room	a. Depress the FUEL ROOM FOG SYSTEM OFF pushbutton located on outside wall of the fuel control room. b. Depress the FUEL ROOM DOOR-LOCK BY-PASS pushbutton on the FRCP, and proceed to the sampling station indicated in the fuel control room. c. At the sampling station indicated, troubleshoot the fuel system in accordance with T.O. 21-SM65E-2J-11-1 and T.O. 21-SM65E-2J-11-2.	If the fuel control room fog system is operating, but fire exists in the fuel control room, wait until the fire is extinguished, and then proceed with substeps a through e, AS SPECIFIED action. If the fuel control room fog system is not operating, but fire exists in the fuel control room, depress the FUEL ROOM FOG SYSTEM START pushbutton located on the outside wall of the fuel control room and wait until fire is extinguished,

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
3 (CONT)		2 (CONT)		d. At the RP-1 detector cabinet, depress the alarm SILENCE and detector RESET pushbuttons. e. At FRCP, observe that FUEL ROOM 40% EXPLOSIVE RP-1 indicator is extinguished	then proceed with substeps a through e, AS SPECIFIED action. If the fuel control room fog system is not operating, but no fire exists in the fuel control room, proceed with subsysteps b through e, AS SPECIFIED action and then troubleshoot the RP-1 detector fog activation system in accordance with T.O. 21-SM65E-2FJ-22-1, -2, -3, -4, or -5
4	LO_2 ROOM LIQUID OXYGEN OVER 23% (all complexes) indicator illuminates and alarm sounds	1	Depress alarm ACKNOWLEDGE pushbutton on FRCP and proceed to LO_2 detector located inside the LO_2 control room. Observe that HIGH OXYGEN CONCENTRATION indicator on the warning panel and one of the sampling station indicators on the station selector panel are	a. Depress ALARM SILENCER pushbutton on the LO_2 detector panel. b. Proceed to the sampling station indicated in the LO_2 control room. c. At the sampling station indicated, troubleshoot the LO_2 system in accordance with T.O. 21-SM65E-2J-11-1 and T.O. 21-SM65E-2J-11-2.	a. Depress the ALARM SILENCER pushbutton on the LO_2 detector panel. b. Observe that one or more of the detector failure (timer, sample pump, and exciter lamp) indicators is illuminated. c. Troubleshoot the LO_2 detector in accordance

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
4 (CONT)		1 (CONT)	illuminated and that alarm horn is sounding	d. At the LO_2 detector cabinet, depress the alarm SILENCE and detector RESET pushbuttons. e. At FRCP, observe that LO_2 ROOM LIQUID OXYGEN OVER 23% indicator is extinguished	with T.O. 21-SM65E-2FJ-22-1, -2, -3, -4, or -5
5	WASTE WATER SUMP HI-LEVEL (SMS 548, SMS 566, and SMS 567) indicator illuminates and alarm sounds	1	Depress alarm ACKNOWLEDGE pushbutton on FRCP and proceed to launch and service building waste water sump pump. Pump should be running	Troubleshoot waste water piping system in accordance with T.O. 21-SM65E-2FJ-21-1, -2, -3, -4, or -5	Proceed to step 2
		2	Ensure waste water sump pump motor circuit breaker on the MCC is closed	Troubleshoot the waste water sump pump float switches, pump motor start circuit, and wiring in accordance with T.O. 21-SM65E-2FJ-21-1, -2, -3, -4, or -5	If circuit breaker is open, close it and observe that waste water pump starts running. If it does not, troubleshoot the MCC in accordance with T.O. 21-SM65E-2FJ-20-2, -4, -6, -7, or -8

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	NOT AS SPECIFIED
6	WATER STORAGE TANK LO LEVEL (SMS 548, SMS 566, and SMS 567) indicator illuminates and alarm sounds	1	Depress alarm ACKNOWLEDGE pushbutton on FRCP and proceed to pressure indicator PI-6, located in the launch operations building water reservoir area. PI-6 should read within normal site limits	a. Troubleshoot the liquid level alarm, located inside the manhole on water storage tank NO. 1, in accordance with T.O. 21-SM65E-2FJ-21-1, -2, -3, -4, or -5. b. At FRCP, observe that WATER STORAGE TANK LO LEVEL indicator is extinguished. If it is not, troubleshoot the FRCP in accordance with T.O. 21-SM65E-2FJ-20-2, -4, -6, -7, or -8	Troubleshoot the wells and limit switches in accordance with T.O. 21-SM65E-2FJ-21-1, -2, -3, -4, or -5
7	WATER STORAGE TANK HI LEVEL (SMS 548, SMS 566, and SMS 567) indicator illuminates and alarm sounds	1	Refer to item 6	Refer to item 6	Refer to item 6
8	ELECTRONIC CABINET DUCT NO AIR FLOW (SMS 548, SMS 566, and SMS 567), ELECTRONIC	1	Depress alarm ACKNOWLEDGE pushbutton on FRCP. Proceed to electronic equipment cabinet fan. Fan should be running	Troubleshoot indicator circuits in accordance with T.O. 21-SM65E-2FJ-19-1, -2, -3, -4, or -5	Troubleshoot fan in accordance with T.O. 21-SM65E-2FJ-19-1, -2, -3, -4, or -5

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS	
				AS SPECIFIED	NOT AS SPECIFIED
8 (CONT)	CABINET DUCT AIR FLOW (SMS 576-C), indicator illuminates and alarm sounds	1 (CONT)			
9	ELECTRONIC CABINET AIR HI-TEMP (SMS 548, SMS 566, SMS 567, and SMS 576-C) indicator illuminates	1	Depress alarm ACKNOWLEDGE pushbutton on FRCP and observe ELECTRONIC CABINET DUCT NO AIR FLOW indicator located on trouble section of FRCP. Indicator should not be illuminated.	Troubleshoot the electronic cabinet air conditioning system dampers with DX coil in accordance with T.O. 21-SM65E-2FJ-19-1, -2, -3, -4, or -5	a. If ELECTRONIC CABINET DUCT NO AIR FLOW indicator is illuminated, perform procedures for item 8. b. (Deleted)

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS	
				AS SPECIFIED	NOT AS SPECIFIED
9 (CONT)		1 (CONT)		CAUTION A malfunction must be repaired within 20 minutes from malfunction indication. If the repair time exceeds 20 minutes, pressurization must be manually controlled from PSC, and 400-cycle power to guidance system at control-monitor group and countdown group, and all electronic equipment using cabinet air conditioning, must be shut down until repairs are accomplished. Failure to comply may result in damage to equipment.	
10	POD COOLING TEMP (SMS 576-C) indicator illuminates and alarm sounds	1	Depress alarm ACKNOWLEDGE pushbutton on FRCP and proceed to launch and service building motor control center (LSB-MCC). At LSB-MCC, reset and close MISSILE POD REFRIGERANT COMPRESSOR circuit breaker. At compressor, depress START pushbutton. At FRCP, observe that POD COOLING TEMP indicator is extinguished	Troubleshoot compressor control circuits in accordance with T.O. 21-SM65E-2FJ-19-1, -2, -3, -4, or -5	If circuit breaker at LSB-MCC repeatedly retrips or compressor cannot be started, troubleshoot the missile pod air-conditioning system in accordance with T.O. 21-SM65E-2FJ-19
				Note Troubleshooting may continue with weapon system in standby or EWO condition until GUIDANCE FAIL indicator on malfunction patch of launch control console illuminates red. At this time, estimate additional time to repair. If time is less than 3 minutes, proceed with repair. If time to repair exceeds 3 minutes, open MISSILE POD BLOWER circuit breaker at LSB-MCC, and shut off 400-cycle AC power to guidance system at control-monitor group until missile pod air conditioning is repaired.	

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	NOT AS SPECIFIED
11	(Deleted)				
12	GENERATOR #1 GROUND (SMS 548, SMS 566, and SMS 567) indicator illuminates and alarm sounds Note Other malfunction indications may appear at this time.	1	Depress alarm ACKNOWLEDGE pushbutton on FRCP. If loss of AC power has not occurred, (480 VOLT POWER ON indicator on status section of FRCP illuminated green), generator NO. 1 was not in use. Proceed to AS SPECIFIED action. If loss of AC power has occurred (480 VOLT POWER ON indicator on status panel of FRCP not illuminated), generator NO. 1 was in use. Proceed to NOT AS SPECIFIED action	Troubleshoot generator NO. 1 and electrical power generator system in accordance with T.O. 21-SM65E-2FJ-20-1, -3 or -5	Perform loss of AC power emergency procedures in tables 4-3 through 4-8. Note Concurrent with performance of above procedures at diesel engine control panel, stop generator NO. 1 by depressing both EMERGENCY STOP pushbuttons simultaneously.
13	GENERATOR #2 GROUND (SMS 548, SMS 566, and SMS 567) indicator	1	Depress alarm ACKNOWLEDGE pushbutton on FRCP. If loss of AC power has not occurred (480 VOLT	Troubleshoot generator NO. 2 and electrical power generation system in accordance with T.O. 21-SM65E-2FJ-20-1, -3 or -5	Perform loss of AC power emergency procedures in tables 4-3 through 4-8

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS: AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS: NOT AS SPECIFIED
13 (CONT)	illuminates and alarm sounds Note Other malfunction indications may appear at this time.	1 (CONT)	POWER ON indicator on status section of FRCP illuminated green), generator NO. 2 was not in use. Proceed to AS SPECIFIED action. If loss of AC power has occurred (480 VOLT POWER ON indicator on status panel of FRCP, not illuminated), generator NO. 2 was not in use. Proceed to NOT AS SPECIFIED action		Note Concurrent with performance of above procedures at diesel engine control panel, stop generator NO. 2 by depressing both EMERGENCY STOP pushbuttons simultaneously.
14	AIR INTAKE MECHANICAL ROOM LOB CLOSED (SMS 548, SMS 566, and SMS 567) indicator is illuminated red	1	Observe INSTRUMENT AIR ON indicator located on FRCP. Indicator should be illuminated green	Proceed to step 2	Proceed to item 19
		2	Observe 125 VDC POWER (P2-N2) BUS HOT indicator located on FRCP. Indicator should be illuminated green	Troubleshoot the blast closure system components, circuits and controls in accordance with T.O. 21-SM65E-2FJ-22-1, -2, -3, -4, or -5	Proceed to item 20

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
14 (CONT)	Note At this time, AIR INTAKE MECHANICAL ROOM LOB OPEN (SMS 548, SMS 566, and SMS 567) green indicator will not be illuminated.	2 (CONT)			
15	AIR EXHAUST MECHANICAL ROOM L.O.B. CLOSED (SMS 548, SMS 566, and SMS 567) indicator is illuminated red	1	Refer to item 14	Refer to item 14	Refer to item 14

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
15 (CONT)	Note At this time, AIR EXHAUST MECHANICAL ROOM L.O.B. OPEN (SMS 548, SMS 566, and SMS 567) green indicator will not be illuminated	1 (CONT)			
16	AIR EXHAUST READY ROOM L.O.B. CLOSED (SMS 548, SMS 566, and SMS 567) indicator is illuminated red	1	Refer to item 14	Refer to item 14	Refer to item 14

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
16 (CONT)	Note At this time, AIR EXHAUST READY ROOM L.O.B. OPEN (SMS 548, SMS 566, and SMS 567) green indicator will not be illuminated.	1 (CONT)			
17	AIR EXHAUST BATTERY ROOM L.O.B. CLOSED (SMS 548, SMS 566, and SMS 567) indicator is illuminated red	1	Refer to item 14	Refer to item 14	Refer to item 14

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
17 (CONT)	Note At this time, AIR EXHAUST BATTERY ROOM L.O.B. OPEN (SMS 548, SMS 566, and SMS 567) green indicator will not be illuminated.	1 (CONT)			
18	AIR EXHAUST SANITARY FACILITIES L.O.B. CLOSED (SMS 548, SMS 566, and SMS 567) indicator is illuminated red	1	Refer to item 14	Refer to item 14	Refer to item 14

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
18 (CONT)	Note At this time, AIR EXHAUST SANITARY FACILITIES L.O.B. OPEN (SMS 548, SMS 566, and SMS 567) green indicator will not be illuminated.	1 (CONT)			
19	INSTRUMENT AIR ON (SMS 548, SMS 566, and SMS 567), INSTRUMENT AIR (SMS 576-C), indicator is not illuminated Note Other malfunction indications may appear at this time.	1	Observe instrument (compressed) air system receiver tank pressure. Pressure should be 270 to 300 PSI	Troubleshoot indicator circuits in accordance with T.O. 21-SM65E-2FJ-22-1, -2, -3, -4, and -5	Proceed to step 2
		2	Observe instrument air compressor. Compressor should be running and discharge (output) pressure should be 285 (±15) PSI	Troubleshoot instrument (compressed) air system components, piping, valves, circuits, and controls for leaks or malfunctions in accordance with T.O. 21-SM65E-2FJ-22-3	Troubleshoot the instrument (compressed) air system compressor and controls in accordance with T.O. 21-SM65E-2FJ-22-3

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
20	125 VDC POWER (P2-N2) BUS HOT (SMS 548, SMS 566, and SMS 567), 125 V.D.C. P2N2 (SMS 576-C), indicator is not illuminated Note Other malfunction indications may appear at this time.	1	Observe BLAST DETECTOR POWER OFF indicator on FRCP (SMS 548, SMS 566, and SMS 567). Indicator should not be illuminated	Troubleshoot the 125-VDC distribution system (P2-N2 bus) and indicator circuits in accordance with T.O. 21-SM65E-2FJ-20-2, -4, -6, -7, or -8	Troubleshoot the entire 125-VDC distribution system, battery charger, and battery in accordance with T.O. 21-SM65E-2FJ-20-2, -4, -6, -7, or -8
21	MISSILE POD AIR HI TEMPERATURE indicator is illuminated amber	1	Observe air inlet temperature to missile pods at temperature indicator located on wall of equipment room directly below missile pod air conditioning unit. Temperature should not be lower than 44° F nor higher than 50° F	Troubleshoot ducting to missile pods for leaks, obstructions, clogged air filters, or closed dampers. If ducting is not cause, troubleshoot indicator circuits in accordance with T.O. 21-SM65E-2FJ-19-1, -2, -3, -4, or -5	Troubleshoot missile pod air conditioning system and ducting in accordance with T.O. 21-SM65E-2FJ-19-1, -2, -3, -4, or -5

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
21 (CONT)		1 (CONT)		Note Troubleshooting may continue with weapon system in standby/EWO condition until GUIDANCE FAIL indicator on malfunction patch of launch control console illuminates red. At this time, estimate additional time to repair. If time to repair is less than 3 minutes, proceed with repair. If time to repair exceeds 3 minutes, shut off 400-cycle AC power to guidance system at control-monitor group and countdown group until missile pod air conditioning system is repaired.	
22	MISSILE POD AIR LO-PRESS (OSTF-1, 566, 567, 548) indicator illuminates amber LO-PRESSURE (576-C)	1	Observe inlet air pressure to missile pods at pressure indicator located on wall of equipment room directly below missile pod air conditioning unit. Pressure indication should be 30 (±2) inches of water	Troubleshoot ducting to missile pods for leaks, obstructions or clogged air filters, or closed dampers. If ducting is not cause, troubleshoot indicator circuits in accordance with T.O. 21-SM65E-2FJ-19-1, -2, -3, -4, or -5	Troubleshoot missile pod air conditioning system and ducting in accordance with T.O. 21-SM65E-2FJ-19-1, -2, -3, -4, or -5

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	NOT AS SPECIFIED
22 (CONT)		1 (CONT)		Note Troubleshooting may continue with weapon system in standby/EWO condition until GUIDANCE FAIL indicator on malfunction patch of launch control console illuminates red. At this time, estimate additional time to repair. If time to repair is less than 3 minutes, proceed with repair. If time to repair exceeds 3 minutes, shut off 400-cycle AC power to guidance system at control-monitor group and countdown group until missile pod air conditioning system is repaired.	
23	MISSILE POD HI-HUMIDITY (all complexes) indicator is illuminated amber	1	Observe inlet air humidity to missile pods at humidity indicator located on wall of equipment room directly below missile pod air conditioning unit. Humidity should be less than 50 percent	Troubleshoot indicator circuits in accordance with T.O. 21-SM65E-2FJ-19-1, -2, -3, -4, or -5	Troubleshoot the missile pod air conditioning system dehumidifier and thermostat settings in accordance with T.O. 21-SM65E-2FJ-19-1, -2, -3, -4, or -5

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	NOT AS SPECIFIED
23 (CONT)		1 (CONT)		Note Troubleshooting may continue with weapon system in standby/EWO condition until GUIDANCE FAIL indicator on malfunction patch of launch control console illuminates red. At this time, estimate additional time to repair. If time to repair is less than 3 minutes, proceed with repair. If time to repair exceeds 3 minutes, shut off 400-cycle AC power guidance system at control-monitor group and countdown group until missile pod air conditioning system is repaired.	
24	RP1 FOG FUEL ROOM L.S.B. ON (SMS 548, SMS 566, and SMS 567), RP-1 FOG FUEL RM ON (SMS 576-C), indicator is illuminated red	1	Observe FUEL ROOM 40% EXPLOSIVE RP1 indicator on trouble section of FRCP. Indicator should be illuminated and FRCP trouble alarm should be sounding	Perform procedures for item 3	Proceed to step 2
		2	Observe fire alarm panel for fire in fuel control room	Extinguish fire and reset alarm system and fog system in accordance with T.O. 21-SM65E-2FJ-22-1, -2, -3, -4, or -5	Proceed to step 3

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
24 (CONT)	Note At this time RP1 FOG FUEL ROOM LSB OFF (SMS 548, SMS 566, and SMS 567), RP-1 FOG L&S BLDG. (SMS 576-C), green indicator is not illuminated.	3	Observe RP-1 detector for 40% L. E. L. indicator and alarm indication	a. Perform procedures for item 3. b. Troubleshoot the FRCP in accordance with T. O. 21-SM65E-2FJ-20-2, -4, -6, -7, or -8	Proceed to step 4
		4	Verify that fuel room fog system is operating and that no fire exists in fuel control room	Depress the fuel room fog system STOP pushbutton located on the wall outside of the fuel room and troubleshoot the fuel room fog system activation circuits in accordance with T. O. 21-SM65E-2FJ-22-1, -2, -3, -4, or -5 and the fuel room fog solenoid valve in accordance with T. O. 21-SM65E-2FJ-21-1, -2, -3, -4, or -5	If fog system is not operating, troubleshoot the FRCP. If fire exists, extinguish fire and reset alarm system and fog system. If fire does not exist, troubleshoot the alarm circuits in accordance with T. O. 21-SM65E-2FJ-22-1, -2, -3, -4, or -5 and the FRCP in accordance with T. O. 21-SM65E-2FJ-20-2, -4, -6, -7, or -8
25	(Deleted)				

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
26	MISSILE AREA EXHAUST FAN ON (SMS 548, SMS 566, and SMS 567), MISSILE AREA EXHAUST FAN L&S BLDG. (SMS 576-C), (on) indicator illuminates green	1	Observe missile area exhaust fan. Fan should not be running	Troubleshoot the indicator circuits in accordance with T. O. 21-SM65E-2FJ-19-1, -2, -3, -4, or -5 and T. O. 21-SM65E-2FJ-20-2, -4, -6, -7, or -8	Troubleshoot the missile area exhaust fan start circuit in accordance with T. O. 21-SM65E-2FJ-19-1, -2, -3, -4, or -5, T. O. 21-SM65E-2FJ-20-2, -4, -6, -7, or -8, and T. O. 21-SM65E-2FJ-22-1, -2, -3, -4, or -5

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
26 (CONT)	and missile storage area temperature is less than 90°F and MISSILE STORAGE AREA 20% EXPLOSIVE RP1 indicator is not illuminated	1 (CONT)			
27	MISSILE AREA EXHAUST FAN ON (SMS 548, SMS 566, and SMS 567), MISSILE AREA EXHAUST FAN L&S BLDG. (SMS 576-C) (on), green indicator is not illuminated and missile storage area temperature is greater than 90°F or MISSILE STORAGE AREA 20% RP1 indicator is illuminated	1	Observe missile area exhaust fan. Fan should be running	Refer to item 26	Refer to item 26

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS	
				AS SPECIFIED	NOT AS SPECIFIED
28	FUEL CONTROL ROOM PURGE FAN ON (SMS 548, SMS 566, and SMS 567), FUEL CONTROL RM, PURGE FAN L&S BLDG. (SMS 576-C) (on), indicator illuminates green, fuel control room temperature is less than 90°F and FUEL ROOM 20% EXPLOSIVE RP1 indicator is not illuminated	1	Observe fuel control room purge fan. Fan should not be running	Troubleshoot the indicator circuits in accordance with T.O. 21-SM65E-2FJ-19-1, -2, -3, -4, or -5 and T.O. 21-SM65E-2FJ-20-2, -4, -6, -7, or -8	Troubleshoot the fuel control room purge fan start circuit in accordance with T.O. 21-SM65E-2FJ-19-1, -2, -3, -4, or -5, T.O. 21-SM65E-2FJ-20-2, -4, -6, -7, or -8, and T.O. 21-SM65E-2FJ-22-1, -2, -3, -4, or -5
29	FUEL CONTROL ROOM PURGE FAN ON (SMS 548, SMS 566, and SMS 567), FUEL CONTROL RM. PURGE FAN L&S BLDG. (on), green indicator	1	Observe fuel control room purge fan. Fan should be running	Refer to item 28	Refer to item 28

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS	
				AS SPECIFIED	NOT AS SPECIFIED
29 (CONT)	is not illuminated and fuel control room temperature is greater than 90°F or FUEL ROOM 20% EXPLOSIVE RP1 indicator is illuminated	1 (CONT)			
30	480 VOLT POWER ON (SMS 548, SMS 566, and SMS 567), 480V, POWER L&S BLDG. (on) (SMS 576-C), green indicator is not illuminated Note Other malfunction indications may appear at this time.	1	Observe GENERATOR #1 GROUND and GENERATOR #2 GROUND indicators on FRCP. One of these indicators should be illuminated green	Proceed to step 2	Perform loss of AC power emergency procedures in table 4-3 through 4-8
		2	Observe FRCP for other malfunction indications (equipment using 480- or 120/208-volt AC power). All other indicators should be green or not illuminated	Troubleshoot indicator circuits in accordance with T.O. 21-SM65E-2FJ-20-2, -4, -6, -7, or -8	Perform loss of AC power emergency procedures in tables 4-3 through 4-8

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
31	MISSILE ENTRY DOOR OPEN (SMS 548, SMS 566, and SMS 567), MISSILE ENTRY DOOR L&S BLDG. (open) (SMS 576-C), indicator is illuminated red Note At this time MISSILE ENTRY DOOR CLOSED (SMS 548, SMS 566, and SMS 567), MISSILE ENTRY DOOR L&S BLDG. (closed) (SMS 576-C), green indicator will not be illuminated.	1	Observe position of door. Door should be closed	Troubleshoot the door microswitch and indicator circuits in accordance with T.O. 21-SM65E-2FJ-22-1, -2, -3, -4, or -5	If door is open and there is no authorization for door to be open, close door. If door is open and a door malfunction prevents closing, troubleshoot and repair door in accordance with T.O. 21-SM65E-2FJ-22-1, -2, -3, -4, or -5
32	FUEL ROOM OPEN (SMS 548, SMS 566, and	1	Refer to item 31	Refer to item 31	Refer to item 31

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
32 (CONT)	SMS 567), FUEL ROOM DOOR (open) (SMS 576-C) indicator is illuminated red Note At this time, FUEL ROOM CLOSED (SMS 548, SMS 566, and SMS 567), FUEL ROOM DOOR (closed) (SMS 576-C), green indicator will not be illuminated.	1 (CONT)			
33	MISSILE AREA PERSONNEL DOOR LO_2 OPEN (SMS 548, SMS 566, and SMS 567), MISSILE ERECTION DOOR LO_2 (SMS 576-C),	1	Refer to item 31	Refer to item 31	Refer to item 31

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
33 (CONT)	indicator is illuminated red Note At this time MISSILE AREA PERSONNEL DOOR LO_2 CLOSED (SMS 548, SMS 566, and SMS 567), MISSILE ERECTION DOOR LO_2 (SMS 576-C), green indicator will not be illuminated	1 (CONT)			
34	MISSILE AREA PERSONNEL DOOR M&E OPEN (SMS 548, SMS 566, and SMS 567), MISSILE ERECTION DOOR M&E (SMS 576-C), indicator is illuminated red	1	Refer to item 31	Refer to item 31	Refer to item 31

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	NOT AS SPECIFIED
34 (CONT)	Note At this time, MISSILE AREA PERSONNEL DOOR M&E CLOSED (SMS 548, SMS 566, and SMS 567), MISSILE ERECTION DOOR M&E (SMS 576-C), green indicator will not be illuminated.	1 (CONT)			
35	VENT DAMPERS L&S BUILDING CLOSED (SMS 548, SMS 566, and SMS 567) indicator is illuminated red	1	Refer to item 14	Refer to item 14	Refer to item 14

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	NOT AS SPECIFIED
35 (CONT)	Note At this time, VENT DAMPERS L.&S. BUILDING OPEN (SMS 548, SMS 566, and SMS 567) green indicator will not be illuminated.	1 (CONT)			
36	TUNNEL DOOR #1 OPEN (SMS 548, SMS 566, and SMS 567), TUNNEL DOOR NO. 1 (SMS 576-C), indicator is illuminated red.	1	Refer to item 31	Refer to item 31	Refer to item 31

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS	
				AS SPECIFIED	NOT AS SPECIFIED
36 (CONT)	Note At this time, TUNNEL DOOR #1 CLOSED (SMS 548, SMS 566, and SMS 567), TUNNEL DOOR NO. 1 (SMS 576-C), green indicator will not be illuminated.	1 (CONT)			
37	TUNNEL DOOR #2 OPEN (SMS 548, SMS 566, and SMS 567), indicator is illuminated red	1	Refer to item 31	Refer to item 31	Refer to item 31

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS	
				AS SPECIFIED	NOT AS SPECIFIED
37 (CONT)	Note At this time, TUNNEL DOOR #2 CLOSED (SMS 548, SMS 566, and SMS 567), green indicator is not illuminated.	1 (CONT)			
38	TUNNEL DOOR #3 OPEN (SMS 548, SMS 566, and SMS 567), indicator is illuminated red. Note At this time, TUNNEL DOOR #3 CLOSED (SMS 548, SMS 566, and SMS 567), green indicator is not illuminated.	1	Refer to item 31	Refer to item 31	Refer to item 31

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS	
				AS SPECIFIED	NOT AS SPECIFIED
39	TUNNEL DOOR #4 OPEN (SMS 548, SMS 566, and SMS 567) indicator is illuminated red. Note At this time, TUNNEL DOOR #4 CLOSED (SMS 548, SMS 566, and SMS 567), green indicator is not illuminated.	1	Refer to item 31	Refer to item 31	Refer to item 31
40	125 VDC P1 N1 (SMS 576-C)(on) green indicator is not illuminated.	1	Observe 125 VDC POWER P2 N2 indicator on FRCP. Indicator should be green	Troubleshoot the 125-VDC distribution system (P1-N1 bus) in accordance with T. O. 21-SM65E-2FJ-20-2, -4, -6, -7, or -8	Troubleshoot the entire 125-VDC distribution system, battery charger, and battery in accordance with T. O. 21-SM65E-2FJ-20-2, -4, -6, -7, or -8

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	NOT AS SPECIFIED
40 (CONT)	Note Other malfunction indications may appear at this time.	1 (CONT)			
41	GENERATOR #1 (SMS 548, SMS 566, and SMS 567) (on) green indicator is not illuminated	1	Observe GENERATOR #2 indicator also located on FRCP. Indicator should be illuminated green	Proceed to item 42	Proceed to item 42
42	GENERATOR #2 (SMS 548, SMS 566, and SMS 567) (on) green indicator is not illuminated	1	If GENERATOR #1 indicator is not illuminated, observe 480 VOLT POWER ON indicator also located on FRCP. Indicator should be illuminated green	Troubleshoot generator FRCP indicator circuits in accordance with T.O. 21-SM65E-2FJ-20-1, -3 or -5, and T.O. 21-SM65E-2FJ-20-2, -4, -6, -7, or -8	Perform loss of AC power emergency procedures in tables 4-3 through 4-8

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
43	EMERGENCY CUT-OFF L.O.B. & L.&S. LIGHTS (SMS 548, SMS 566, and SMS 567) indicator is illuminated green	1	Depress OFF pushbutton on FRCP located below indicator. Indicator should extinguish	Troubleshoot FRCP OFF and COUNTDOWN pushbutton switches and indicator circuits in accordance with T.O. 21-SM65E-2FJ-20-2, -4, -6, -7, or -8	Repair or replace OFF and COUNTDOWN pushbutton switches as required in accordance with T.O. 21-SM65E-2FJ-20-2, -4, -6, -7 or -8
44	CUT-OFF L.&S. BLDG. LIGHTS (SMS 548, SMS 566, and SMS 567) CUT-OFF L&S BLDG LTS (on) (SMS 576-C), indicator is illuminated red	1	Depress the OFF pushbutton on FRCP located below indicator. Red indicator should extinguish and green indicator should illuminate	Troubleshoot the ON and OFF pushbutton switches and indicator circuits in accordance with T.O. 21-SM65E-2FJ-20-2, -4, -6, -7, or -8	Troubleshoot the launch and service building lighting distribution panel and lighting distribution (non-essential bus) system in accordance with T.O. 21-SM65E-2FJ-20-2, -4, -6, -7, or -8

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
44 (CONT)	Note At this time, CUT-OFF L.&S. BLDG. LIGHTS (SMS 548, SMS 566, and SMS 567), CUTOFF L&S BLDG LTS (off) (SMS 576-C) green indicator will not be illuminated.	1 (CONT)			
45	FIRE PUMP (all complexes) (stop) green indicator is extinguished	1	Reset and close the FIRE WATER PUMP circuit breaker on launch operations building motor control center. Observe that red indicator is illuminated		Troubleshoot the fire water pump, controls, system, and indicator circuits in accordance with T.O. 21-SM65E-2FJ-21-1, -2, -3, -4, or -5
46	MISSILE AREA FAN (SMS 548, SMS 566, SMS 567, and SMS	1	Observe missile area fan. Fan should be running	Troubleshoot fan indicator circuits in accordance with T.O. 21-SM65E-2FJ-19-1, -2, -3, -4, or -5	Proceed to step 2

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
46 (CONT)	576-C) (on) green indicator does not illuminate after depressing MISSILE AREA FAN ON pushbutton	2	Reset and close the MISSILE AREA BLOWER circuit breaker on the launch and service building motor control center, and at FRCP depress the MISSILE AREA FAN ON pushbutton and observe that MISSILE AREA FAN (on) green indicator illuminates		Troubleshoot the missile area fan, system, and start circuits in accordance with T.O. 21-SM65E-2FJ-19-1, -2, -3, -4, or -5
47	MISSILE POD BLOWER (SMS 548, SMS 566, SMS 567 and SMS 576-C), MISSILE POD COOLING (OSTF-1), (on) green indicator is not illuminated	1	Observe MISSILE POD AIR HI-TEMP indicator on FRCP. Indicator should be extinguished	Proceed to step 2	Perform procedures for item 21

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
84 (CONT)	cooling control solenoid valve from FRCP, logic unit, or fire protection pushbutton station	1 (CONT)			
85	LAUNCH PAD COOLING CONTROL (OSTF-1) (open) red indicator remains illuminated after manual deactivation of launch pad cooling control solenoid valve from FRCP, logic unit, or fire protection pushbutton station	1	Troubleshoot in accordance with T. O. 21-SM65E-2FJ-21-5		
86	No LAUNCH PAD COOLING CONTROL (close) green indication	1	Troubleshoot in accordance with T. O. 21-SM65E-2FJ-21-5		

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
87	MISSILE DELUGE (OSTF-1) (open) red indicator is illuminated. Note At this time, MISSILE DELUGE (OSTF-1) (close) green indicator is not illuminated and FIRE PUMP (start) red indicator is illuminated.	1	Check missile deluge water nozzle. Water should not be flowing unless purposely manually activated at FRCP, logic unit, or fire protection push-button station	Troubleshoot the missile deluge indicator circuits in accordance with T.O. 21-SM65E-2FJ-21-5	If water is flowing from missile deluge nozzle and missile deluge solenoid valve was not manually activated, proceed to step 2
		2	At FRCP, depress the MISSILE DELUGE CLOSE and FIRE PUMP STOP push-buttons. Observe that red indicators are extinguished and green indicators are illuminated and that missile deluge water flow has stopped	Troubleshoot the missile deluge valve start circuits in accordance with T.O. 21-SM65E-2FJ-21-5	Close manual valve upstream of missile deluge solenoid valve and troubleshoot solenoid valve in accordance with T.O. 21-SM65E-2FJ-21-5 After malfunction has been corrected, depress the MISSILE DELUGE CLOSE and FIRE PUMP STOP pushbuttons on FRCP and observe that red indicators are extinguished and green indicators are illuminated, then reopen the manual valve upstream of the solenoid valve

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	NOT AS SPECIFIED
88	CAUTION (OSTF-1) (red) indicator does not illuminate when CAUTION pushbutton is depressed	1	Check AMBER warning light on roof of launch operations building. Light should be illuminated and flashing	Troubleshoot FRCP indicator in accordance with T. O. 21-SM65E-2FJ-22-5	Troubleshoot area warning system in accordance with T. O. 21-SM65E-2FJ-22-5
89	CAUTION (OSTF-1) (red) indicator remains illuminated after OFF pushbutton has been depressed	1	Check amber warning light on roof of launch operations building. Light should not be illuminated and green (clear) light should be illuminated and flashing	Troubleshoot FRCP indicator in accordance with T. O. 21-SM65E-2FJ-22-5	Troubleshoot area warning system in accordance with T. O. 21-SM65E-2FJ-22-5
90	DANGER (OSTF-1) (red) indicator does not illuminate when DANGER pushbutton is depressed	1	Check red warning light on roof of launch operations building. Light should be illuminated and flashing	Troubleshoot FRCP indicator in accordance with T. O. 21-SM65E-2FJ-22-5	Troubleshoot area warning system in accordance with T. O. 21-SM65E-2FJ-22-5
91	DANGER (OSTF-1) (red) indicator remains illuminated	1	Check red warning light on roof of launch operations building. Light should not be	Troubleshoot FRCP indicator in accordance with T. O. 21-SM65E-2FJ-22-5	Troubleshoot area warning system in accordance with T. O. 21-SM65E-2FJ-22-5

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
91 (CONT)	after OFF push-button has been depressed	1 (CONT)	illuminated and green (clear) light should be illuminated and flashing		
92	FIRE PUMP START (OSTF-1) red indicator fails to illuminate when FIRE PUMP START pushbutton is depressed	1	Check fire water pump. Pump should be running	Troubleshoot indicator and circuits in accordance with T.O. 21-SM65E-2FJ-21-5	Troubleshoot fire water pump and start circuits in accordance with T.O. 21-SM56E-2FJ-21-5
93	No FIRE PUMP· STOP (OSTF-1) green indication	1	Troubleshoot indicator and circuits in accordance with T.O. 21-SM65E-2FJ-21-5		
94	MISSILE POD COOLING STOP (OSTF-1) red indicator is illuminated	1	Check MISSILE POD AIR HI-TEMP indicator on FRCP. Indicator should be not illuminated	Proceed to step 2	Perform procedures for item 27
		2	Check MISSILE POD AIR LO-PRESS indicator on FRCP. Indicator should be not illuminated	Proceed to step 3	Perform procedures for item 28

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS: AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS: NOT AS SPECIFIED
94 (CONT)	Note At this time, MISSILE POD COOLING START (OSTF-1) green indicator is not illuminated.	3	Check MISSILE POD AIR HI-HUMIDITY indicator on FRCP. Indicator should be not illuminated	Proceed to step 4	Perform procedures for item 29
		4	Check missile pod blower and air conditioning unit. Blower and unit should be running	Troubleshoot the indicator circuits in accordance with T.O. 21-SM65E-2FJ-19-5	Proceed to step 5
		5	At launch and service building motor control center, reset and place MISSILE POD COOLING A/C FAN circuit breaker switch to the START position, and at FRCP, depress the MISSILE POD COOLING START pushbutton and observe that green indicator illuminates	Troubleshoot to determine cause of overload in accordance with T.O. 21-SM65E-2FJ-19-5	Troubleshoot the missile pod blower, air conditioning unit, and system in accordance with T.O. 21-SM65E-2FJ-19-5
				Note Troubleshooting may continue with weapon system in standby (EWO) condition until GUIDANCE FAIL indicator on malfunction patch of launch control console illuminates red. At this time, estimate additional time to repair. If time to repair is less than 3 minutes, proceed with repair. If time to repair exceeds 3 minutes, shutoff 400-cycle AC power to guidance system at logic unit and countdown group until missile pod air conditioning system is repaired.	

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
95	T.V. FLOODLIGHTS (SMS 576-C and OSTF-1) indicator fails to illuminate when T.V. FLOODLIGHTS START pushbutton is depressed	1	Check television floodlights. Floodlights should be illuminated	Troubleshoot indicator circuits in accordance with T.O. 21-SM65E-2FJ-22-5	Troubleshoot television floodlights, circuits, and controls in accordance with T.O. 21-SM65E-22-5
96	No green indications on FRCP (OSTF-1)	1	Troubleshoot the 125-volt DC power system in accordance with T.O. 21-SM65E-2FJ-20-8		

Table 5-3. Malfunction Analysis, Diesel Engine Control Panel

ITEM	MALFUNCTION INDICATION	STEP	REQUIRED ACTION
1	OS (overspeed alarm) indicator is illuminated and alarm is sounding	1	Depress HORN SILENCER pushbutton on diesel engine control panel.
		2	If diesel generator is not running, perform loss of AC power emergency procedures in tables 4-3 through 4-8.
		3	If diesel generator is still running, attempt to lower ENGINE RPM (tachometer) to 720 RPM by operating SPEED RAISE-LOWER control on engine control panel.
		4	If speed cannot be maintained at 720 RPM, send MMT to PSC to maintain missile pressures. Shut down diesel generator by depressing both EMERGENCY STOP pushbuttons simultaneously, and perform loss of AC power emergency procedures in tables 4-3 through 4-8.
		5	If speed can be stabilized below 720 RPM, perform step 6.
		6	Start alternate diesel generator, synchronize with operating generator, and place alternate generator in service.
		7	When alternate diesel generator is in service, stop malfunctioning diesel generator by depressing both EMERGENCY STOP pushbuttons simultaneously.
		8	Troubleshoot the malfunctioning diesel generator and speed control circuits
2	HW (high water temperature) ALARM indicator is illuminated and alarm is sounding (running temperature is above 252° F at SMS 548 and 567 or 190°F at SMS 566).	1	Depress HORN SILENCER pushbutton on diesel engine control panel.
		2	Check TEMP. JACKET WATER-OUT dial thermometer on diesel engine control panel.
		3	If TEMP. JACKET WATER-OUT dial thermometer indicates higher than 252°F at SMS 548 and 567 or 190°F at SMS 566, the jacket cooling system is malfunctioning. Proceed to steps 5 and 6

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	NOT AS SPECIFIED
47 (CONT)		2	Observe MISSILE POD AIR LO-PRESS indicator on FRCP. Indicator should be extinguished	Proceed to step 3	Perform procedures for item 22
		3	Observe MISSILE POD HI-HUMIDITY indicator on FRCP. Indicator should be extinguished	Proceed to step 4	Perform procedures for item 23
		4	Observe missile pod blower and air conditioning unit. Blower and unit should be running	Troubleshoot the indicator circuits in accordance with T. O. 21-SM65E-2FJ-19-1, -2, -3, -4, or -5	Proceed to step 5
		5	At launch and service building motor control center, reset and close the THRUST and POD BLOWER circuit breakers, and at FRCP, depress the MISSILE POD BLOWER START pushbutton and observe that green		Troubleshoot the missile pod blower, air conditioning unit and system in accordance with T. O. 21-SM65E-2FJ-19-1, -2, -3, -4, or -5

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
47 (CONT)		5 (CONT)	indicator illuminates	Note Troubleshooting may continue with weapon system in standby/EWO condition until GUIDANCE FAIL indicator on malfunction patch of launch control console illuminates red. At this time, estimate additional time to repair. If time to repair is less than 3 minutes, proceed with repair. If time to repair exceeds 3 minutes, shut off 400-cycle AC power to guidance system at control-monitor group and countdown group until missile pod air conditioning system is repaired.	
48	UNIT HEATERS (SMS 548, SMS 566, SMS 567, and SMS 576-C) (on) red indicator is not illuminated after UNIT HEATERS ON pushbutton has been depressed	1	At launch and service building lighting panel LA, reset and close circuit breaker. At FRCP, depress UNIT HEATERS ON pushbutton and observe that UNIT HEATERS (on) red indicator is illuminated		Troubleshoot unit heaters circuit breaker, magnetic contactor, indicator circuits, and controls in accordance with T.O. 21-SM65E-2FJ-19-1, -2, -3, -4, or -5
49	SNOW MELTING HEATERS (SMS 548, SMS 566, and SMS 567) (on) red	1	At launch and service building motor control center, reset and close the SNOW MELTING NO. 1 and		Troubleshoot the launch and service building motor control center circuit breaker, magnetic contactor, FRCP pushbutton

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
49 (CONT)	indicator is not illuminated after SNOW MELTING HEATERS ON pushbutton has been depressed	1 (CONT)	SNOW MELTING NO. 2 circuit breakers, and at FRCP, depress the SNOW MELTING HEATERS ON pushbutton and observe that SNOW MELTING HEATERS (on) red indicator is illuminated		switch, indicator, and wiring circuits in accordance with T. O. 21-SM65E-2FJ-20-2, -4, -6, -7, or -8
50	FUEL ROOM DOOR-LOCK BY-PASS (SMS 548, SMS 566, and SMS 567) pushbutton fails to unlock fuel control room door	1	Troubleshoot the FUEL ROOM DOOR-LOCK BY-PASS pushbutton, circuits and fuel control room door and lock in accordance with T. O. 21-SM65E-2FJ-22-1, -2, -3, -4, or -5		
51	PERSONNEL WARNING RED (SMS 548, SMS 566, and SMS 567), PERSONNEL WARNING (SMS 576-C), (on) indicator does not	1	Observe red warning light at security gate. Light should be illuminated and flashing, and horn should be sounding and amber or green warning light (which ever had been in use) is extinguished	Troubleshoot FRCP indicator circuits in accordance with T. O. 21-SM65E-2FJ-22-1, -2, -3, -4, or -5	Troubleshoot the area warning system in accordance with T. O. 21-SM65E-2FJ-22-1, -2, -3, -4, or -5

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	NOT AS SPECIFIED
51 (CONT)	illuminate when PERSONNEL WARNING RED ON pushbutton has been depressed				
52	PERSONNEL WARNING AMBER (SMS 548, SMS 566, and SMS 567), PERSONNEL WARNING (SMS 576-C), (on) indicator does not illuminate when PERSONNEL WARNING AMBER ON pushbutton has been depressed	1	Observe amber warning light at security gate. Light should be illuminated and flashing and red or green warning light (whichever had been in use) is extinguished	Refer to item 51	Refer to item 51
53	PERSONNEL WARNING GREEN (SMS 548, SMS 566, and SMS 567), PERSONNEL	1	Observe green warning light at security gate. Light should be illuminated and flashing and amber or red warning light	Refer to item 51	Refer to item 51

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	NOT AS SPECIFIED
53 (CONT)	WARNING (SMS 576-C), (on) indicator does not illuminate when PERSONNEL WARNING GREEN ON pushbutton has been depressed	1 (CONT)	(whichever had been in use) is extinguished		
54	Blast doors do not close (air intake and exhaust indicators on FRCP do not illuminate red) after BLAST DOOR TEST PUSHBUTTON (SMS 548, SMS 566, and SMS 567) has been depressed	1	Troubleshoot the blast protection and test system in accordance with T.O. 21-SM65E-2FJ-22-1, -2, -3, -4, or -5		

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
55	Fence security floodlights fail to illuminate when FENCE SECURITY LIGHTING ON (SMS 548, SMS 566, and SMS 567), FENCE SEC. LIGHTING ON (SMS 576-C), pushbutton is depressed	1	Reset and position to ON (close) GATE FLOODLIGHTS circuit breakers on lighting panel B, and at FRCP, depress FENCE SECURITY LIGHTING ON pushbutton and observe that fence floodlights are illuminated		Troubleshoot the fence security lighting system, start pushbutton, circuits and lighting panel B circuit breakers in accordance with T. O. 21-SM65E-2FJ-20-2, -4, -6, -7, or -8 and T. O. 21-SM65E-2FJ-22-1, -2, -3, -4, or -5
56	All indicators on FRCP extinguished (all complexes)	1	Troubleshoot the 125-volt DC power and distribution system bus in accordance with T. O. 21-SM65E-2FJ-20-2, -4, -6, -7, or -8		
57	BLAST DETECTOR POWER OFF (SMS 548, SMS 566, and SMS 567) indicator is illuminated	1	Troubleshoot the blast protection and test system in accordance with T. O. 21-SM65E-2FJ-22-1, -2, -3, -4, or -5		

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	NOT AS SPECIFIED
58	OVER HEAD DOOR OPEN (red) (SMS 548, SMS 566, and SMS 567) indicator is illuminated. Note At this time OVER HEAD DOOR CLOSED (green) indicator will not be illuminated.	1	Refer to item 31	Refer to item 31	Refer to item 31
59	FLAME DOOR OPEN (SMS 548, SMS 566, and SMS 567) indicator is illuminated.	1	Refer to item 31	Refer to item 31	Refer to item 31

Table 5-2. Malfunction Analysis, Facilities Remote Control (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
59 (CONT)	Note At this time FLAME DOOR CLOSED indicator will not be illuminated.				
60	COLLIMATOR PIT 20% EXPLOSIVE RP-1 (OSTF-1) drop indicator appears and alarm sounds	1	Depress alarm ACKNOWLEDGE pushbutton on FRCP. Proceed to RP-1 detector for missile area and observe HIGH RP-1 indicator on the warning panel and one of the sampling station indicators on the station selector panel is illuminated and alarm is sounding	a. Depress the HORN SILENCE pushbutton on the RP-1 detector panel. b. Proceed to the sampling station indicated in the missile area, and troubleshoot the fuel system in accordance with T. O. 21-SM65E-2FJ-11-1 and T. O. 21-SM65E-2FJ-11-2. c. At the RP-1 detector cabinet, depress the PROGRAM RESET pushbutton. d. At FRCP, turn DROP RESET and SIGNAL RESET handles to reset indicator and alarm	a. Depress the HORN SILENCE pushbutton on the RP-1 detector panel. b. Observe one or more of the detector failure (analyzer, sample, and sequence program failure) indicators is illuminated. c. Troubleshoot the RP-1 detector in accordance with T. O. 21-SM65E-2FJ-22-5

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
61	COLLIMATOR PIT LIQUID OXYGEN (OSTF-1) drop indicator appears and alarm sounds	1	Depress alarm ACKNOWLEDGE push-button on FRCP and proceed to LO_2 detector. Observe HIGH LO_2 indicator on warning panel and one of the sampling station indicators on selector panel are illuminated and alarm sounds	a. Depress the HORN SILENCE pushbutton on the LO_2 detector panel. b. Proceed to the sampling station indicated in the missile area, and troubleshoot the LO_2 system in accordance with T. O. 21-SM65E-2FJ-11-1, and -2 c. At the LO_2 detector depress the PROGRAM RESET pushbutton d. At FRCP, turn DROP RESET and SIGNAL RESET handles to reset indicator and alarm	a. Depress the HORN SILENCE pushbutton on the LO_2 detector panel. b. Observe that one or more of the detector failure (analyzer, sample, and sequence program failure) indicators is illuminated. c. Troubleshoot the LO_2 detector in accordance with T. O. 21-SM65E-2FJ-22-5
62	O_2 - 35% LO_2 ROOM 103 (OSTF-1) drop indicator appears and alarm sounds	1	Refer to item 61	Refer to item 61	Refer to item 61

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
63	FIRE IN L&S BLDG ZONE 1, or FIRE IN L&S BLDG ZONE 2, or FIRE IN L&S BLDG ZONE 3, or FIRE IN L&S BLDG ZONE 4, or MALFUNCTION IN L&S BLDG. FIRE ALARM SYSTEM (OSTF-1) drop indicator appears and alarm sounds	1	Depress alarm ACKNOWLEDGE pushbutton on FRCP		
		2	Perform procedures in table 5-5, item 2		
64	TUNNEL DOOR AT L&S BLDG. (OSTF-1) open indicator is illuminated red.	1	Refer to item 31	Refer to item 31	Refer to item 31

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	NOT AS SPECIFIED
64 (CONT)	Note At this time, TUNNEL DOOR AT L&S BLDG. (OSTF-1) closed (green) indicator is not illuminated.				
65	FUEL RM. DOOR (OSTF-1) open indicator is illuminated red. Note At this time, FUEL RM DOOR (OSTF-1) closed (green) indicator is not illuminated.	1	Refer to item 31	Refer to item 31	Refer to item 31

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	NOT AS SPECIFIED
66	MISSILE ERECTION DOOR (LO_2) (OSTF-1) open indicator is illuminated red. Note At this time, MISSILE ERECTION DOOR (LO_2) (OSTF-1), closed, (green) indicator is not illuminated.	1	Refer to item 31	Refer to item 31	Refer to item 31
67	MISSILE ERECTION DOOR (M&E) (OSTF-1) open indicator is illuminated red.	1	Refer to item 31	Refer to item 31	Refer to item 31

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
67 (CONT)	Note At this time, MISSILE ERECTION (M&E) (OSTF-1) close (green) indicator is not illuminated.				
68	BLAST DOOR LOB (DOOR NO. 9) TUNNEL (SMS 576-C), BLAST DOOR AT TUNNEL AT L. O. B. (OSTF-1), open indicator is illuminated red.	1	Refer to item 31	Refer to item 31	Refer to item 31

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	NOT AS SPECIFIED
68 (CONT)	Note At this time, BLAST DOOR LOB (DOOR NO. 9) (SMS 576-C), BLAST DOOR AT TUNNEL AT L. O. B. (OSTF-1) closed indicator is extinguished.				
69	BLAST DOOR LOB (DOOR NO. 10) TO GRADE (SMS 576-C) open indicator is illuminated red.	1	Refer to item 31	Refer to item 31	Refer to item 31

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
69 (CONT)	Note At this time, BLAST DOOR LOB (DOOR NO. 10) (SMS 576-C) closed indicator is extinguished.				
70	ESCAPE HATCH L. O. B. (OSTF-1) open indicator is illuminated red. Note At this time, ESCAPE HATCH L. O. B. (OSTF-1) closed (green) indicator is not illuminated.	1	Refer to item 31	Refer to item 31	Refer to item 31
71	MISSILE ENTRY DOOR (OSTF-1) open indicator is illuminated red	1	Refer to item 31	Refer to item 31	Refer to item 31

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	NOT AS SPECIFIED
71 (CONT)	Note At this time MISSILE ENTRY DOOR (OSTF-1) closed (green) indicator is not illuminated.				
72	FUEL RM. FOG HEAD SYSTEM (OSTF-1) on indicator is illuminated red.	1	Check FUEL RM. 40% EXPLOSIVE RP-1 drop indicator on FRCP. Indicator should be illuminated and trouble alarm sounding	Refer to item 3	Proceed to step 2
	Note At this time, FUEL RM. FOG HEAD SYSTEM (OSTF-1) off (green) indicator is not illuminated.	2	Check FIRE IN L&S BLDG ZONE 1 drop indicator on FRCP and FIRE ALARM indicator on fire alarm control unit panel. Indicator should be illuminated, trouble alarm should be sounding, and FIRE ALARM indicator on fire alarm control unit	Perform procedures in table 5-5, item 2	Proceed to step 3

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
72 (CONT)		2 (CONT)	panel should be illuminated red		
		3	Check MALFUNCTION IN L&S BLDG. FIRE ALARM SYSTEM drop indicator on FRCP. Indicator should be showing and trouble alarm sounding	a. Depress alarm ACKNOWLEDGE pushbutton on FRCP. b. Proceed to step 5	Proceed to step 4
		4	Check fuel room RP-1 detector HIGH RP-1 indicator. Indicator should be illuminated and alarm sounding	a. Perform procedures for item 2, step 2. b. Troubleshoot the FRCP in accordance with T. O. 21-SM65E-2FJ-22-5	Proceed to step 5
		5	Verify fuel room fog system is operating and no fire exists in fuel control room	Depress the fuel room fog system STOP pushbutton located on the wall outside of the fuel control room, and troubleshoot the fuel room fog system activation circuits and the RP-1 detector in accordance with T. O. 21-SM65E-2FJ-22-5, and the fuel room fog	a. If fuel room fog system is not operating, troubleshoot the FRCP and the fog system indicator in accordance with T. O. 21-SM65E-2FJ-22-5. b. If fuel room fog system is operating and fire does exist, extinguish fire,

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
72 (CONT)		5 (CONT)		solenoid valve in accordance with T.O. 21-SM65E-2FJ-21-5	repair cause, reset alarm circuits, and troubleshoot the fire alarm system in accordance with T.O. 21-SM65E-2FJ-22-5
73	ELECTRONIC CABINET COOLING (L&S) (OSTF-1) red indicator is illuminated. Note At this time, ELECTRONIC CABINET COOLING (L&S) (OSTF-1) green indicator is not illuminated.	1	Troubleshoot the launch and service building electronic cabinet air-conditioning compressor and system in accordance with T.O. 21-SM65E-2FJ-19-5	CAUTION A malfunction must be repaired within 20 minutes from malfunction indication. If the repair time exceeds 20 minutes, pressurization must be manually controlled from PSC, and 400-cycle power to guidance system at control-monitor group and countdown group, and all electronic equipment using cabinet air conditioning, must be shut down until repairs are accomplished. Failure to comply may result in damage to equipment.	
74	ELECTRONIC CABINET COOLING (L.O.B.) (OSTF-1) red indicator is illuminated	1	Troubleshoot the launch operations building electronic cabinet air-conditioning compressor and system in accordance	CAUTION A malfunction must be repaired within 20 minutes from the malfunction indication. If repair time exceeds 20 minutes, all electronic equipment using cabinet air conditioning must be shut down until repairs are accomplished. Failure to comply may result in damage to equipment.	

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
74 (CONT)		1 (CONT)	with T. O. 21-SM65E-2FJ-19-5		
75	INSTRUMENT AIR (L&S) (OSTF-1) indicator is illuminated red.	1	Check instrument (compressed) air system receiver tank pressure. Pressure should be running	Proceed to step 2	Troubleshoot the instrument (compressed) air system compressor in accordance with T. O. 21-SM65E-2FJ-22-5
	Note Other malfunction indications may appear at this time.	2	Check instrument air compressor discharge (output) pressure. Pressure should be 285 (±15) PSI	Troubleshoot instrument (compressed) air system components, piping, valves, circuits and controls for leaks or malfunctions in accordance with T. O. 21-SM65E-2FJ-22-3	Troubleshoot the instrument (compressed) air system compressor and controls in accordance with T. O. 21-SM65E-2FJ-22-3
76	480V BUS FAILURE (OSTF-1) indicator is illuminated green	1	Perform loss of AC Power emergency procedures in section IV, tables 4-3 through 4-8		
77	FUEL RM. EMERG. EXT. FAN EFF. (OSTF-1) red indicator fails to illuminate	1	Check fuel room emergency exhaust fan. Fan should be running at this time	Troubleshoot the indicator circuits in accordance with T. O. 21-SM65E-2FJ-22-5	Troubleshoot the fuel room emergency exhaust fan in accordance with T. O. 21-SM65E-2FJ-22-5

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	NOT AS SPECIFIED
77 (CONT)	after FUEL RM. 20% EXPLOSIVE RP-1 drop indicator appears and alarm sounds	1 (CONT)			
78	FUEL RM. EMERG. EXT. FAN EFF. (OSTF-1), red indicator remains illuminated after 20% explosive RP-1 condition has been corrected and RP-1 detector has been reset or after a 40% explosive RP-1 condition has been reached	1	Check fuel room emergency exhaust fan. Fan should not be running at this time	Troubleshoot the indicator circuits in accordance with T. O. 21-SM65E-2FJ-22-5	Troubleshoot the fuel room emergency exhaust fan in accordance with T. O. 21-SM65E-2FJ-22-5
79	AIR COND SUPPLY FAN AFC (OSTF-1) green indicator fails to illuminate within 30 minutes	1	Check launch and operations building comfort air conditioning supply fan. Fan should be running	Troubleshoot the indicator circuits in accordance with T. O. 21-SM65E-2FJ-19-5	Troubleshoot the launch operations building air conditioning system in accordance with T. O. 21-SM65E-2FJ-19-5

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
79 (CONT)	after last being illuminated	1 (CONT)			
80	LO_2 AREA EMERG. FAN EOF (OSTF-1) red indicator fails to illuminate after O_2 - 35% LO_2 ROOM 103 drop indicator appears and alarm sounds	1	Check LO_2 area emergency exhaust fan. Fan should be running at this time	Troubleshoot the indicator circuits in accordance with T. O. 21-SM65E-2FJ-22-5	Troubleshoot the LO_2 area exhaust fan in accordance with T. O. 21-SM65E-2FJ-22-5
81	LO_2 AREA EMERG. FAN EOF (OSTF-1) red indicator remains illuminated after O_2 - 35% condition has been corrected and LO_2 detector has been reset	1	Check LO_2 area emergency exhaust fan. Fan should not be running at this time	Troubleshoot the indicator circuits in accordance with T. O. 21-SM65E-2FJ-22-5	Troubleshoot the LO_2 area exhaust fan and control circuits in accordance with T. O. 21-SM65E-2FJ-22-5

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	REQUIRED ACTION IF TEST INDICATION WAS NOT AS SPECIFIED
82	INSTRUMENT AIR (L. O. B.) (OSTF-1) indicator is illuminated red.	1	Check instrument (compressed) air system compressor. Compressor should be running	Proceed to step 2	Troubleshoot the instrument (compressed) air system compressor in accordance with T. O. 21-SM65E-2FJ-22-5
	Note Other malfunction indications may appear at this time.	2	Check instrument air compressor discharge (output) pressure. Pressure should be 285 (±15) PSI	Troubleshoot instrument (compressed) air system components, piping, valves, circuits, and controls for leaks or malfunctions in accordance with T. O. 21-SM65E-2FJ-22-5	Troubleshoot the instrument (compressed) air system in accordance with T. O. 21-SM65E-2FJ-22-5
83	LAUNCH PAD COOLING CONTROL (OSTF-1) (open) red indicator is illuminated	1	Check launch pad cooling water nozzle. Water should not be flowing unless launch pad cooling control solenoid valve has been purposely manually activated at FRCP, logic unit, or fire protection pushbutton station	Troubleshoot the launch pad cooling control indicator circuits in accordance with T. O. 21-SM65E-2FJ-21-5	If water is flowing from launch pad cooling water nozzle and launch pad cooling control solenoid valve was not manually actuated, proceed to step 2
	Note At this time, LAUNCH PAD COOLING CONTROL (off) green indicator is not illuminated.	2	At FRCP, depress the LAUNCH PAD COOLING CONTROL CLOSE	Troubleshoot the launch pad cooling control valve start	If indicator remains red but water flow has stopped proceed to item 84. If

Table 5-2. Malfunction Analysis, Facilities Remote Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	TEST PROCEDURES AND INDICATION	REQUIRED ACTION IF TEST INDICATION WAS AS SPECIFIED	NOT AS SPECIFIED
83 (CONT)		2 (CONT)	pushbutton and observe that red indicator is extinguished and green indicator is illuminated and that launch pad cooling control water flow has stopped	circuits in accordance with T. O. 21-SM65E-2FJ-21-5	indicator remains red and water flow has not stopped, close manual valve upstream of launch pad cooling control solenoid valve and troubleshoot solenoid valve in accordance with T. O. 21-SM65E-2FJ-21-5. After malfunction has been corrected, depress the LAUNCH PAD COOLING CONTROL CLOSE pushbutton on FRCP and observe that red indicator is extinguished and green indicator is illuminated, then reopen the manual valve upstream of the solenoid valve
84	LAUNCH PAD COOLING CONTROL (open) red indicator fails to illuminate after manual activation of launch pad	1	Troubleshoot in accordance with T. O. 21-SM65E-2FJ-21-5		

Table 5-3. Malfunction Analysis, Diesel Engine Control Panel (Continued)

ITEM	MALFUNCTION INDICATION	STEP	REQUIRED ACTION
2 (CONT)			**CAUTION** Due to time required to place alternate generator on the line send MMT to PSC to perform procedures in tables 4-3 through 4-8 in the event loss of AC power occurs before alternate generator can be utilized. Failure to comply may result in damage to the missile.
		4	Place alternate diesel generator in service and stop the operating diesel generator.
		5	Troubleshoot the jacket cooling water system and temperature control valves.
		6	Troubleshoot the diesel engine, lube oil system and turbocharger
3	LO (low lube oil pressure) ALARM is illuminated and alarm is sounding (lube oil low pressure alarm below 15 PSI at SMS 548 and SMS 567 or 20 PSI at SMS 566)	1	Depress HORN SILENCER pushbutton on diesel engine control panel. **CAUTION** Send MMT to PSC to perform emergency procedures in tables 4-3 through 4-8 in the event that loss of AC power occurs. If lube oil pressure drops below 10 PSI at SMS 548 and SMS 567 or 15 PSI at SMS 566, the engine will shut down automatically. Failure to comply may result in damage to the missile.
		2	Place alternate diesel generator in service and stop the operating diesel generator.
		3	Troubleshoot the diesel engine lube oil system.

Table 5-4. Ground Pressurization System Malfunctions

ITEM	CREW MEMBER	ACTION
1		H-56 Fails to Regulate Note A failure of valve H-56 is indicated by excessive gas pressure (approximately 1500 PSI) at the PSC (figure 1-48). This failure is also indicated by an explosive sound of escaping gas from relief valve S-30 on skid NO. 5 (figure 1-47). This condition will result in a rapid depletion of routine use and ground pressurization nitrogen storage bottles.
	MCCC	a. Receive notification of failure from crew member or guard.
	MMT	b. Verify condition at skid NO. 5 (figure 1-47).
		c. Close valves H-45 and H-51 on skid NO. 5 and verify that gas escapage from S-30 ceases. Note When valves H-45 and H-51 are closed, the PSC has no primary gas supply other than trapped gas between skid NO. 5 and the PSC. When valve H-45 or H-51 is closed, the LN MANUAL VALVES and SYSTEM IN STANDBY indicators will be extinguished on the LN_2 HELIUM TANKING panel, control-monitor group 1 of 4 (figure 4-17). This will cause the HYD PNEU SYSTEM indicator on the launch control console (figure 1-62) to illuminate red and the READY FOR COUNTDOWN indicator on the launch control console to extinguish.
		d. Check the PSC at 20-minute intervals to verify that the PRIMARY HELIUM SUPPLY gage (figure 1-48) indicates in excess of 900 PSI.

Table 5-4. Ground Pressurization System Malfunctions (Continued)

ITEM	CREW MEMBER	ACTION
1 (CONT)	MMT (CONT)	Note Perform steps e and f if the primary gas supply pressure falls below 900 PSI.
	BMAT	e. Slightly open valve H-45 or H-51 at skid NO. 5 until MMT announces that primary gas pressure is above 1200 PSI, then close valve. Note The procedures in steps e and f enable normal missile pressures to be automatically maintained by the PSC. CAUTION The missile should be placed in stretch (table 3-34) as soon as possible. The MCCC shall stand by to place the missile on emergency pressurization as a last resort. Failure to comply may cause loss of missile. WARNING If RV is installed, do not place the pressurization system in emergency unless the RV support cradle is in place. Failure to comply may result in injury to personnel and damage to equipment.
	MMT	f. Observe PRIMARY HELIUM SUPPLY gage on the PSC and announce when pressure is above 1200 PSI. g. Troubleshoot in accordance with T.O. 21-SM65E-2J-9-1

Table 5-4. Ground Pressurization System Malfunctions (Continued)

ITEM	CREW MEMBER	ACTION
2		<u>H-63 Failure</u>
		Note
		A failure of valve H-63 is indicated by an excessive pressure reading on the emergency helium supply gage on skid NO. 5 (figure 1-47) or by venting from safety valve S-54.
	BMAT	a. At control-monitor group 1 of 4, LN_2 HELIUM TANKING panel (figure 4-17), position REMOTE-LOCAL switch to LOCAL.
		Note
		When system is placed in local control, the HYD PNEU SYSTEM indicator will illuminate red and the READY FOR COUNTDOWN indicator will extinguish on the launch control console (figure 1-62).
		b. Position H-65 switch to CLOSE on LN_2 HELIUM TANKING panel (figure 4-17).
		c. Position H-66 switch to OPEN on LN_2 HELIUM TANKING panel.
	MMT	d. At skid NO. 5 (figure 1-47), position the manual load valve for H-63 fully counterclockwise.
		e. At skid NO. 5, close manual valve H-26.
		f. Troubleshoot in accordance with T.O. 21-SM65E-2J-9-1.
		g. At control-monitor group 1 of 4, LN_2 HELIUM TANKING panel (figure 4-17), position REMOTE-LOCAL switch to REMOTE

Table 5-4. Ground Pressurization System Malfunctions (Continued)

ITEM	CREW MEMBER	ACTION
3		H-64 Failure Note If inflight helium bottle A is the source selected for inflight pressurization and inflight helium bottle B is the emergency supply, a failure of H-64 is indicated by an excessive pressure reading on the primary helium gage on skid NO. 5 (figure 1-47) or by venting from safety valve S-30.
	BMAT	a. At control-monitor group 1 of 4, LN_2 HELIUM TANKING panel (figure 4-17), position REMOTE-LOCAL switch to LOCAL. Note When system is placed in local control, the HYD PNEU SYSTEM indicator will illuminate red and the READY FOR COUNTDOWN indicator will extinguish on the launch control console (figure 1-62).
		b. Position H-65 switch to OPEN on LN_2 HELIUM TANKING panel (figure 4-17).
		c. Position H-66 switch to CLOSE on LN_2 HELIUM TANKING panel.
		d. At skid NO. 5, position manual load valve for H-64 fully counterclockwise.
		e. At skid NO. 5, close manual valve H-24.
		f. Troubleshoot in accordance with T.O. 21-SM65E-2J-9-1.
		g. At control-monitor group 1 of 4, LN_2 HELIUM TANKING panel, position REMOTE-LOCAL switch to REMOTE

Table 5-4. Ground Pressurization System Malfunctions (Continued)

ITEM	CREW MEMBER	ACTION
4		S-30 Failure Note A failure of relief valve S-30 is indicated by the sound of escaping gas at skid NO. 5 (figure 1-47) and the PRIMARY HELIUM SUPPLY gage on the PSC (figure 1-48) indicating 1175 PSI or less.
	MMT	a. Close manual valve H-51 at skid NO. 5.
		b. Close manual valve H-45 at skid NO. 5.
		c. Observe the stabilized pressure at the PSC after S-30 ceases to vent. Note If S-30 has not failed completely but is venting below the nominal pressure of 1175 PSI, perform steps d through g to restore automatic PSC operation.
	BMAT	d. Slowly position the manual valve for H-56 two turns counterclockwise.
	MMT	e. At the PSC (figure 1-48), lower missile LO_2 tank pressure to 7.0 PSI using manual valve 29.
	BMAT	f. Open manual valve H-51 on skid NO. 5.
		g. At the PSC, raise missile LO_2 tank pressure to 8.0 PSI using manual valve 27.
		h. If S-30 resumes venting repeat steps d through g.

Table 5-4. Ground Pressurization System Malfunctions (Continued)

ITEM	CREW MEMBER	ACTION
4 (CONT)		**CAUTION** Place missile in stretch using table 3-34 as soon as possible. Failure to comply may result in damage to missile or equipment. **CAUTION** When the PSC is restored to automatic operation there will be less than normal gas pressure available, consequently the PSC no longer has its normal pressure recovery rate. The DMCCC should carefully monitor missile tank pressures and be prepared to place the system in emergency pressurization as a last resort to maintain missile tank pressures and prevent loss of the missile. **WARNING** Do not place the PSC in emergency mode with an RV installed unless the RV support cradle is in plaçe. Failure to comply may result in injury to personnel and loss of the missile. i. (Deleted) j. Troubleshoot in accordance with T. O. 21-SM65E-2J-9-1.

Table 5-5. Malfunction Analysis, Fire Alarm Master Control Panel

ITEM	MALFUNCTION INDICATION	STEP	REQUIRED ACTION
1	TROUBLE indicator is illuminated amber and trouble buzzer sounds	1	Set TROUBLE SIGNAL toggle switch on fire alarm panel to alternate position and ensure buzzer is silenced.
		2	Troubleshoot the fire alarm power system in accordance with T.O. 21-SM65E-2FJ-22-1, -2, -3, -4 or -5.
		3	When cause of trouble is corrected, depress the RESET pushbutton and return the TROUBLE SIGNAL toggle switch to its original position
2	FIRE ALARM indicator is illuminated red and alarm horn is sounding	1	Check ZONE indicators on panel and observe that one or more are illuminated.
		2	Proceed to zone(s) indicated and verify that fire exists.
		3	a. If fire exists, extinguish fire and repair cause. b. If fire does not exist, troubleshoot the fire detection annunciator unit and alarm in accordance with T.O. 21-SM65E-2FJ-22-1, -2, -3, -4 or -5.
		4	When cause of alarm is corrected, depress the RESET pushbutton on the fire alarm master control panel

Table 5-6. Pressurization System Control Malfunctions

ITEM	CREW MEMBER	ACTION 1
1	MMT	Automatic to Manual Pressurization System Control (PSC) **CAUTION** Advise MCCC of intention to close valves 6 and 7. After valves 6 and 7 are closed the missile tank pressures must be controlled at the PSC (figure 1-48). Failure to comply may result in damage to missile. a. Close VALVE NO. 6 FUEL CONTROL. b. Close VALVE NO. 7 LOX CONTROL
	BMAT	At control-monitor group 1 of 4, PRESSURIZATION (PANEL 1) (figure 4-2): c. Position SYSTEM POWER switch to OFF. d. Position SYSTEM POWER switch to ON. e. Position SYSTEM POWER switch to OFF
	MMT OR BMAT	f. Maintain pressurization watch at PSC
2	MMT	Manual to Automatic Pressurization System Control (PSC) (figure 1-48): **CAUTION** Notify MCCC of intention to return the pressurization system control to automatic configuration. Failure to comply may result in damage to the missile.

Table 5-6. Pressurization System Control Malfunctions (Continued)

ITEM	CREW MEMBER	ACTION 1
2 (CONT)	MMT (CONT)	a. Verify manual VALVE NO. 6 FUEL CONTROL, VALVE NO. 7 LOX CONTROL, VALVE NO. 27 LOX TANK SUPPLY, VALVE NO. 28 FUEL TANK SUPPLY, VALVE NO. 29 LOX TANK EXHAUST, and VALVE NO. 30 FUEL TANK EXHAUST are closed
	BMAT	At control-monitor group 1 of 4, PRESSURIZATION (PANEL 1) (figure 4-2): b. Position SYSTEM POWER switch to ON. c. Perform lamp test. d. Depress STANDBY pushbutton. e. Verify TEST switch is in OFF position
	MMT	PSC (figure 1-48): **CAUTION** If fuel tank pressure exceeds 18.5 PSI or LO_2 tank pressure exceeds 9.0 PSI, immediately close manual VALVE NO. 6 FUEL CONTROL and manual VALVE NO. 7 LOX CONTROL to prevent damage to the missile. Troubleshoot PSC in accordance with T.O. 21-SM65E-2J-9-2. f. Fuel tank pressure vented to 16 PSI by use of VALVE NO. 30 FUEL TANK EXHAUST. g. Slowly crack VALVE NO. 6 FUEL CONTROL to ascertain PSC has assumed automatic control of fuel tank pressure. Pressure should stabilize at 16.9 PSI nominal. h. Fully open manual VALVE NO. 6 FUEL CONTROL.

Table 5-6. Pressurization System Control Malfunctions (Continued)

ITEM	CREW MEMBER	ACTION 1
2 (CONT)	MMT (CONT)	i. LO_2 tank pressure vented to 7.0 PSI by use of VALVE NO. 29 LOX TANK EXHAUST. j. Slowly crack VALVE NO. 7 LOX CONTROL to ascertain PSC has assumed automatic control of LO_2 tank pressure. Pressure should stabilize at 8.0 PSI nominal. k. Fully open manual VALVE NO. 7 LOX CONTROL
	BMAT	At control-monitor group 1 of 4, PRESSURIZATION (PANEL 1) (figure 4-2): l. Verify that SYSTEM POWER indicator is illuminated green. m. Verify that FUEL ABOVE 8.0 PSI indicator is illuminated green. n. Verify that PRIMARY HELIUM PRESSURE indicator is illuminated green. o. Verify that SYSTEM IN STANDBY indicator is illuminated green. p. Verify that BOIL OFF VALVE CLOSED indicator is illuminated green. q. Verify that all other indicators are extinguished
	MCCC	At launch control console (figure 1-62): r. Observe FUEL TANK pressure gage indicates 16.0 to 18.0 PSI. s. Observe LO_2 TANK pressure gage indicates 8.0 to 8.95 PSI. t. Relieve PSC tank watch

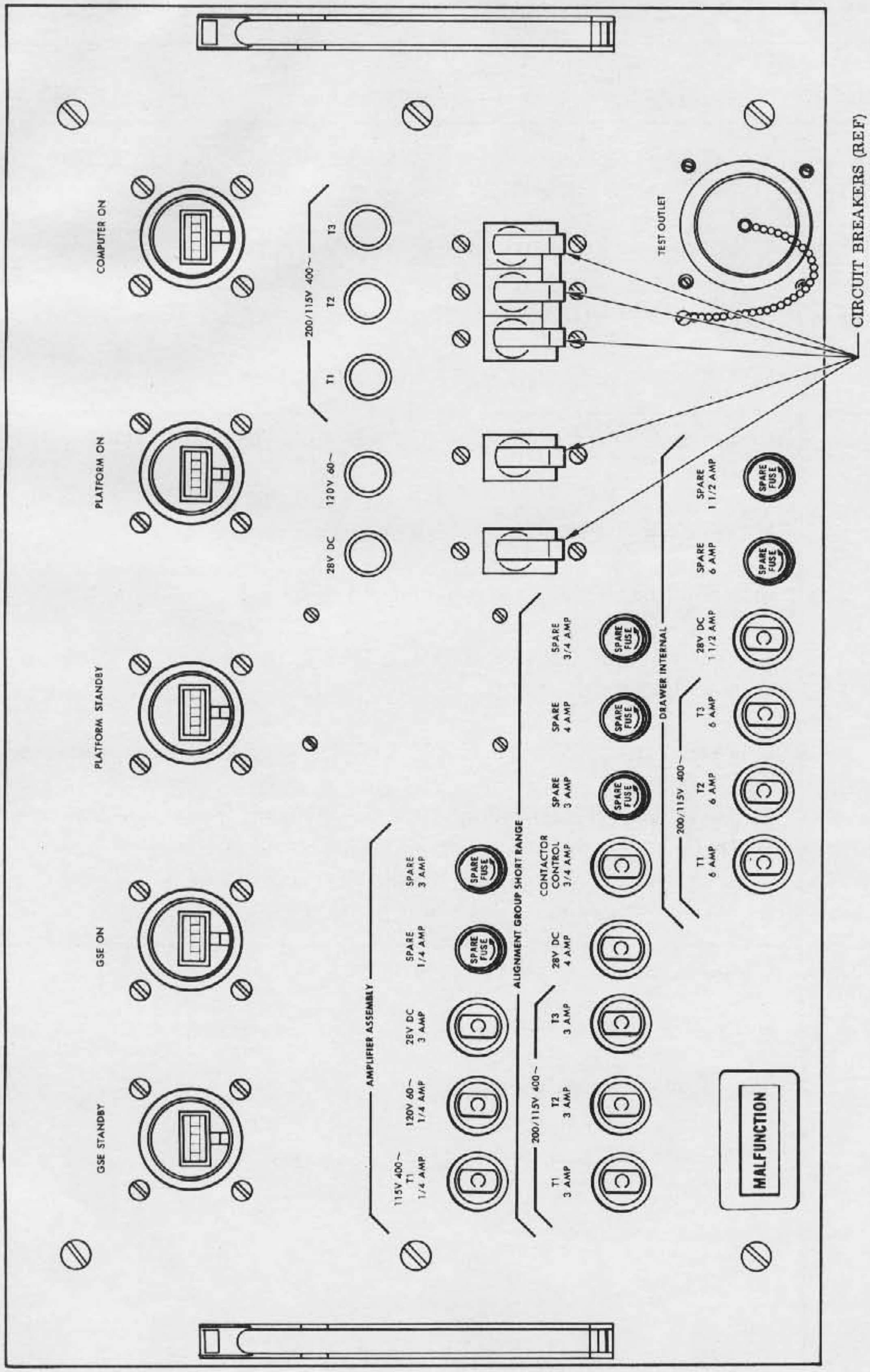
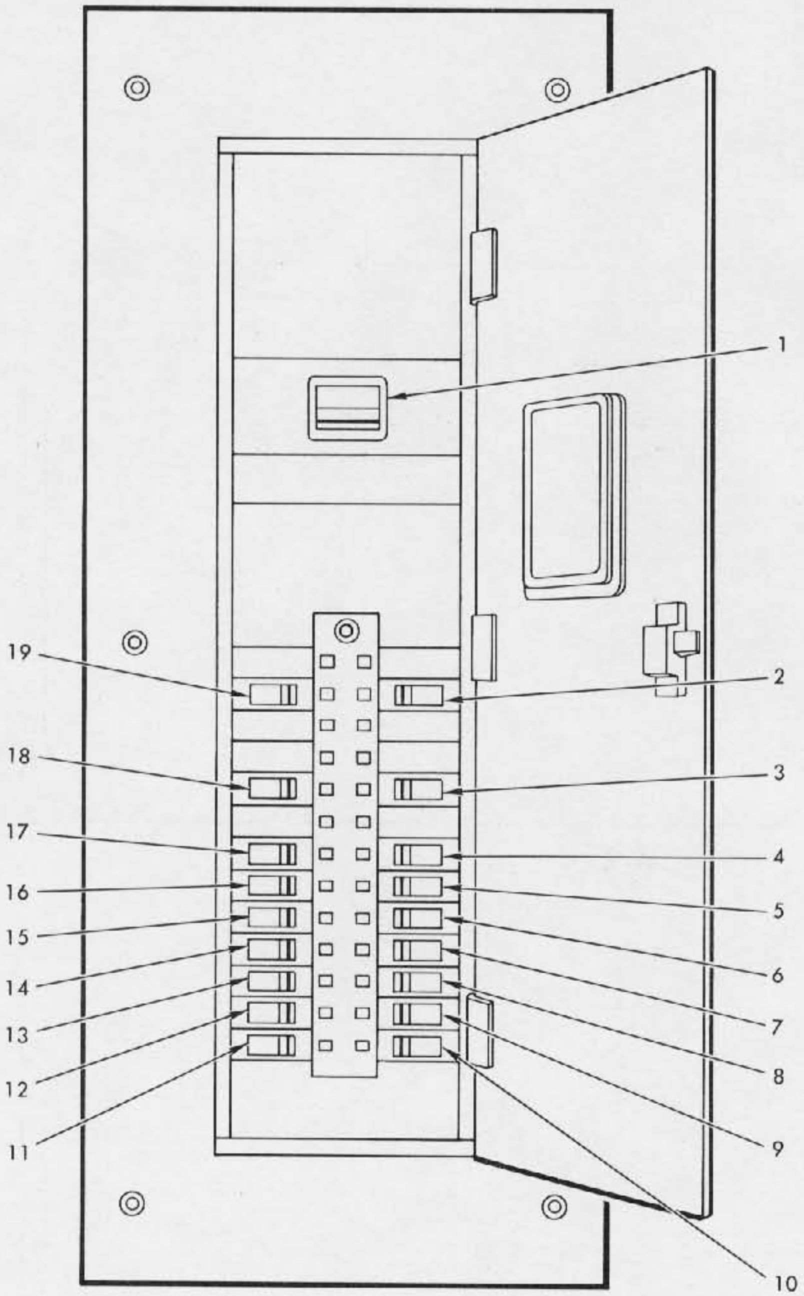


Figure 5-1. Countdown Group Power Distribution Panel



1 3P 200 AMP MAIN DISCONNECT CIRCUIT BREAKER
2 CB2, 3P 70 AMP
3 CB4, 3P 70 AMP
4 CB6, 1P 30 AMP
5 CB8, 1P 30 AMP
6 CB10, 1P 30 AMP
7 CB12, 1P 30 AMP
8 CB14, 1P 30 AMP
9 CB16, 1P 30 AMP
10 CB18, 1P 30 AMP
11 CB17, 1P 30 AMP
12 CB15, 1P 30 AMP
13 CB13, 1P 30 AMP
14 CB11, 1P 30 AMP
15 CB9, 1P 30 AMP
16 CB7, 1P 30 AMP
17 CB5, 1P 30 AMP
18 CB3, 3P 70 AMP
19 CB1, 3P 70 AMP

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Figure 5-2. Power Panel PA

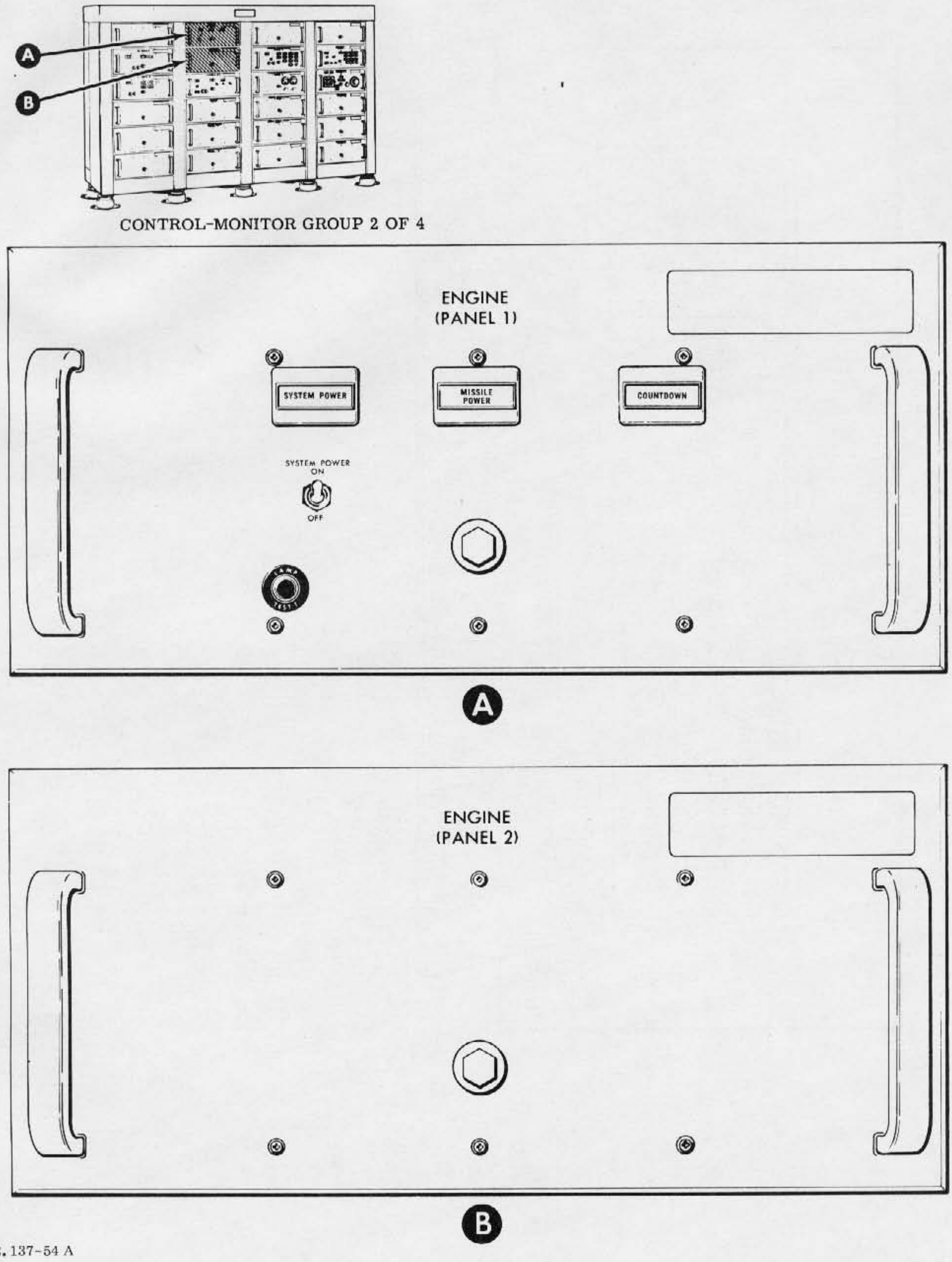

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Figure 5-3. Engine Panels

SECTION VI

OPERATING LIMITATIONS

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LIST OF ILLUSTRATIONS

6-1. LIQUID OXYGEN AND LIQUID NITROGEN BOILOFF TIME NOMOGRAMS.

6-2. Figures 6-1 and 6-2 graphically illustrate the time required for liquid oxygen and liquid nitrogen to boil off under different weather conditions when the missile is fully exposed. To calculate the boiloff time, the following information must be obtained.

a. Percent relative humidity.

b. Ambient temperature in degrees Fahrenheit.

c. Wind velocity in miles per hour.

6-3. To calculate the boiloff time for a fully exposed and full missile oxidizer tank, the following procedures shall be utilized:

a. Locate the percent relative humidity figure on percent relative humidity axis.

b. Draw a vertical line from the percent relative humidity figure located in step a to intersect with the proper ambient temperature curve.

c. Draw a horizontal line from the percent relative humidity located in step b to intersect with the proper wind velocity curve.

d. Draw a vertical line from the point of intersection created by step c to intersect with the boiloff time axis.

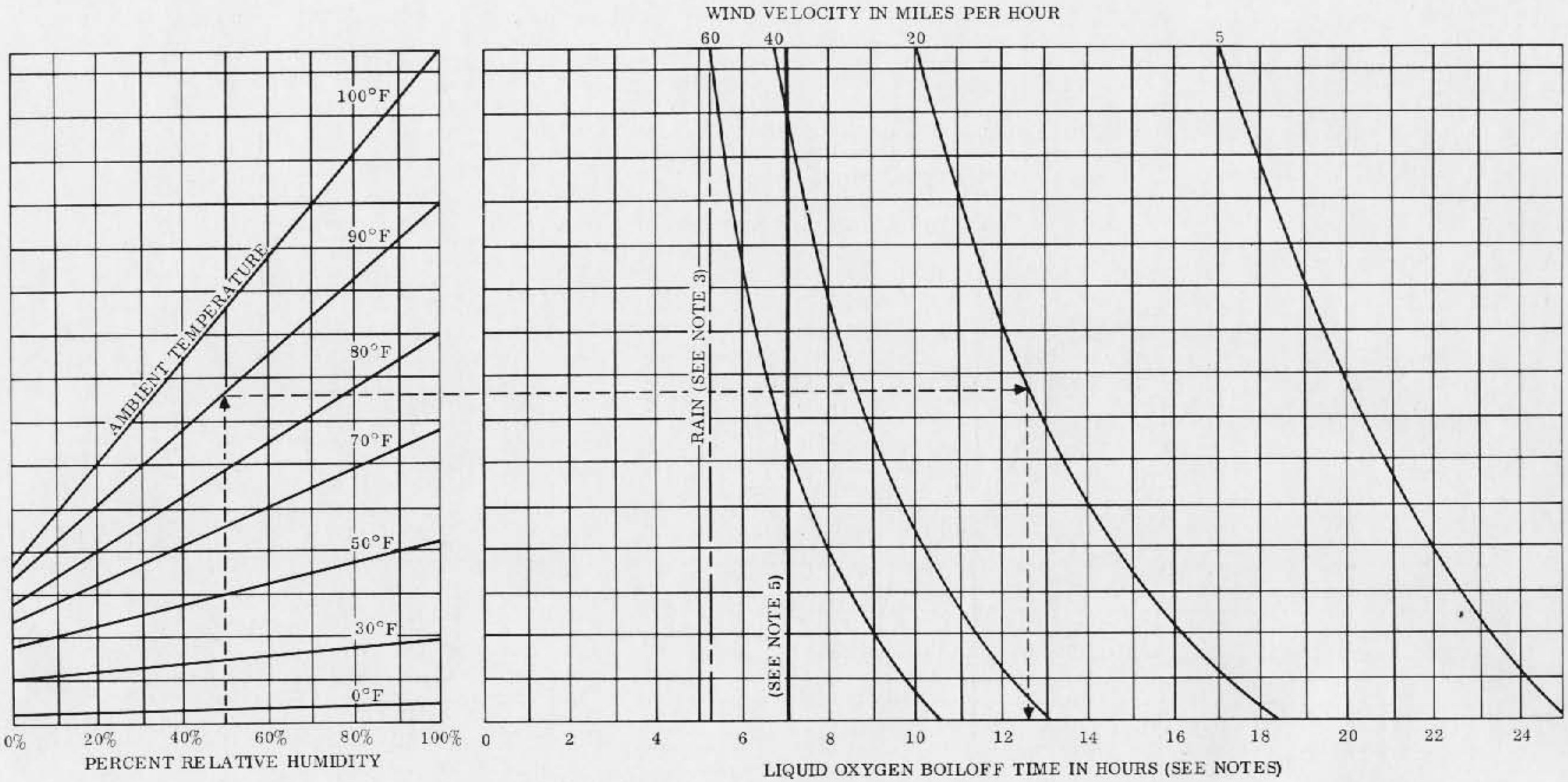
e. The point of intersection on the boiloff axis is the time required for complete boiloff.

6-4. MINIMUM CREW REQUIREMENTS.

6-5. The standard missile crew is composed of five members: two missile officers, a missile combat crew commander (MCCC), Air Force Specialty Code (AFSC) 1825C, and a deputy missile combat crew commander (DMCCC) AFSC 1825C, and three airmen consisting of a ballistic missile analyst/technician (BMAT) AFSC 312X4C, a missile maintenance technician (MMT), AFSC 443X0A (SMS 548, SMS 566, and SMS 567), an electrical power production technician (EPPT) AFSC 543X0 (SMS 548, SMS 566, and SMS 567), and a missile facility technician (MFT) AFSC 541X0A (OSTF-1 and SMS 576-C). These men comprise the minimum crew required to safely operate the weapon system. Additional crew members, as required, will be added at the discretion of the commander.

6-6. HEATING SOLID PROPELLANT GAS GENERATORS AFTER AC POWER INTERRUPTION.

6-7. Green and red indicators placarded BOOSTER NO. 1 SPGG HEAT, BOOSTER NO. 2 SPGG HEAT, and SUSTAINER SPGG HEAT are located on the AC power distribution panel.

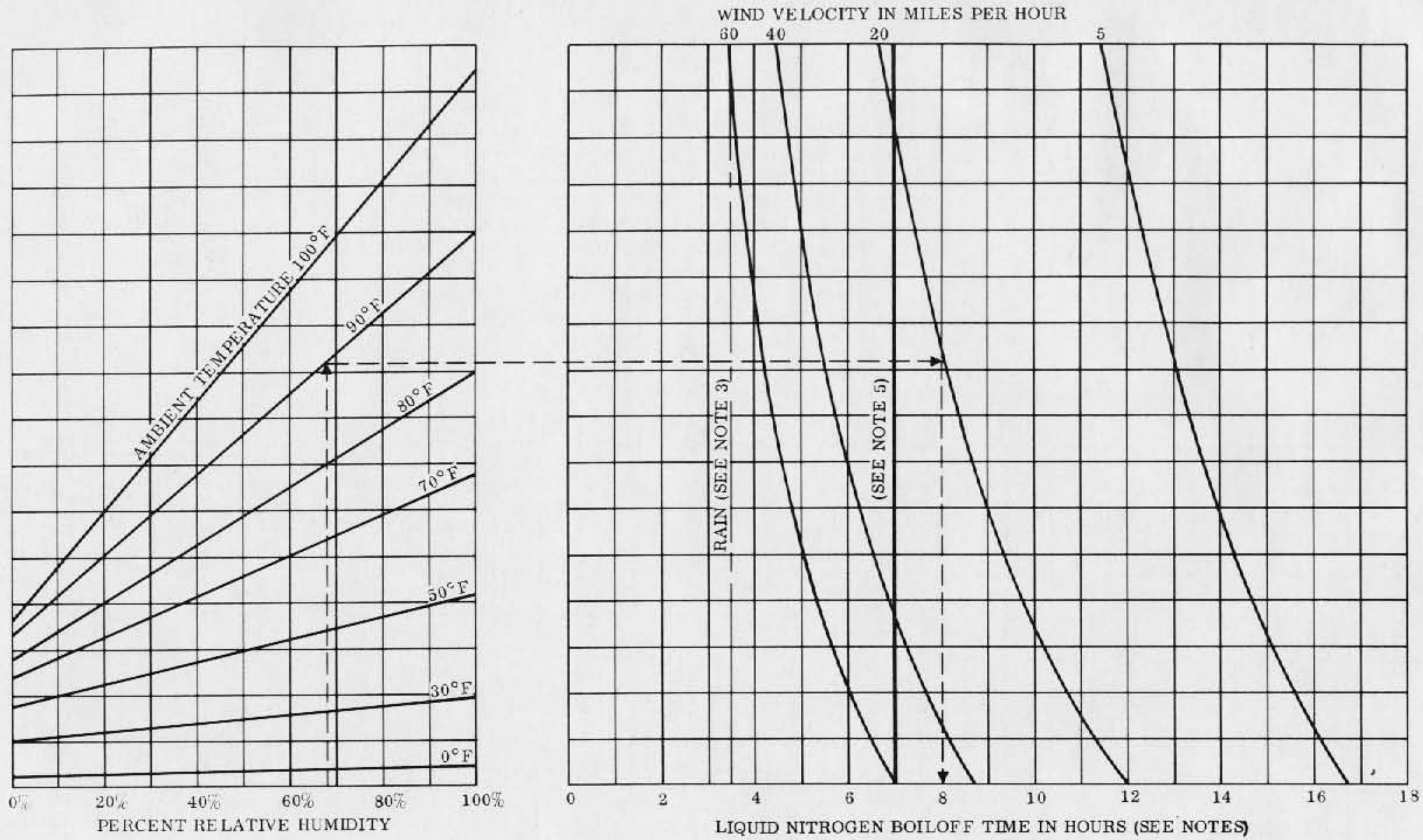


NOTES

1 ALL CONDITIONS FOR FULL OXIDIZER TANK EXPOSURE (MISSILE LIQUID OXYGEN TANK NOT IN SILO)
2 BOILOFF TIME BASED ON FULL OXIDIZER TANK
3 DURING RAIN CONDITIONS, BOILOFF TIME IS 5.3 HOURS
4 DOTTED LINE SHOWS SAMPLE CALCULATION OF BOILOFF TIME (12.6 HOURS BASED ON 50% RELATIVE HUMIDITY, 90°F AMBIENT TEMPERATURE, AND 20 MPH WIND VELOCITY)
5 DURING NO RAIN CONDITIONS, CONNECT PNEUMATIC TEST SET WITHIN 7 HOURS, EVEN IF CALCULATED BOILOFF TIME EXCEEDS 7 HOURS

40.10-29A

Figure 6-1. Liquid Oxygen Boiloff Time Nomogram



NOTES

1 ALL CONDITIONS FOR FULL OXIDIZER TANK EXPOSURE (MISSILE LIQUID OXYGEN TANK NOT IN SILO)
2 BOILOFF TIME BASED ON FULL OXIDIZER TANK
3 DURING RAIN CONDITION, BOILOFF TIME IS 3.5 HOURS
4 DOTTED LINE SHOWS SAMPLE CALCULATION OF BOILOFF TIME (8 HOURS BASED ON 68% RELATIVE HUMIDITY, 90°F AMBIENT TEMPERATURE, AND 20 MPH WIND VELOCITY)
5 DURING NO RAIN CONDITIONS, CONNECT PNEUMATIC TEST SET WITHIN 7 HOURS, EVEN IF CALCULATED BOILOFF TIME EXCEEDS 7 HOURS

40.10-30A

Figure 6-2. Liquid Nitrogen Boiloff Time Nomogram

These indicators are provided to furnish personnel with positive indication of the heat environment of the solid propellant gas generator (SPGG). The indications provided by the indicators are as follows:

a. When a red indicator is illuminated, an overtemperature environment exists around the applicable SPGG (launch cannot be achieved).

b. When green indicators are illuminated, the correct heat environment exists around the SPGG and a launch can be accomplished.

c. When one of the green indicators extinguishes, (undertemperature environment), the SYSTEM IN STANDBY indicator extinguishes on MISSILE GROUND POWER (PANEL 1), and the ENGINE GROUND POWER indicator illuminates red in the status patch.

6-8. If AC power has been off over 1 hour, the solid propellant gas generators will need to be replaced after AC power is restored. If the green indicators illuminate when power is restored, countdown may be continued without a delayed launch.

6-9. LIMITATION ON MISSILE BATTERY LIFE.

6-10. The missile battery may safely remain in the missile for a period of 8 hours after activation. Vents for escapage of gas have been provided and the case will prevent liquid spillage for a 10-hour period. Because of chemical deterioration of the elements within the battery, it must be removed within 8 hours after activation for the following reasons:

a. The design life of the battery is 10 hours (after activation), therefore a successful launch cannot be expected if this limit is exceeded.

b. Escapage of liquid may occur and cause corrosion in the area around the battery.

Note

Two DPL may be performed from a battery providing they occur within an 8-hour period.

6-11. LIMITATION ON START OF MISSILE COMMIT SEQUENCE.

6-12. To prevent structural damage to the missile, do not start a DPL if one of the following weather conditions exists or is forecast (Refer to T.O. 21M-CGM16E-1-1A):

a. Wind velocity or wind gusts exceeding tolerances. (Velocity readings are the peak instantaneous readings of Anemometer AN/GMQ-11 in the vicinity of the missile.)

b. Thunderstorms, hail, or lightning are present or forecast for the vicinity (within a 10-mile radius).

6-13. The only weather limitation for a tactical launch is an excessive wind velocity. However, final decision rests with the command post.

6-14. COUNTDOWN HOLD LIMITATIONS.

6-15. The system has been designed for a minimum one-hour hold capability during countdown. This hold capability is timed from MISSILE READY indicator; illuminates green until pod air conditioning or thrust section heaters go out of specification causing loss of guidance. These conditions are dependent upon the weather and therefore become variable. For planning purposes, a one-hour hold capability will be considered unless overruled by the command post due to a tactical situation.

SECTION VII

CREW DUTIES

TABLE OF CONTENTS

7-1. GENERAL. Each of the five crew members has certain specific duties to perform in maintaining and operating the launch complex. However, a crew member may be called upon to perform other than his normal tasks in the event a malfunction or an emergency situation should arise during standby, countdown, or abort, or if a malfunction occurs during a tactical countdown.

7-2. MISSILE COMBAT CREW COMMANDER.

7-3. The missile combat crew commander (MCCC), Air Force Specialty Code (AFSC) 1825C, mans the left seat of the launch control console during countdown and commands the crew during standby, training, and combat operations. He ensures that the launch complex is maintained in a readiness condition and conducts crew orientation, changeover, and safety briefings. The MCCC controls access to the launch operations building and launch and service building. In addition, the MCCC is reponsible for the following tasks:

a. Determine that the complex is in proper configuration.

b. Determine that the launch or exercise is authorized to proceed.

c. Ensure compliance with Joint Chiefs of Staff safety rules.

d. Coordinate checklist activities.

e. Ensure that countdown is started at proper time.

f. Make target selection.

g. Insert down range correction and cross range correction data.

h. Start countdown.

i. Start commit.

j. Start abort (if required).

k. Direct overall abort actions (if required).

l. Perform timing functions as required.

m. Accomplish command post communications.

7-4. DEPUTY MISSILE COMBAT CREW COMMANDER.

7-5. The deputy missile combat crew commander (DMCCC), AFSC 1825C, mans the right seat of the launch control console during countdown and assists the MCCC in the performance of his duties. The DMCCC is also responsible for the following tasks:

a. Determine if launch or exercise is authorized to proceed.

b. Monitor pressurization patch.

c. Control pressures manually as necessary.

d. Call out all normal pressure changes as they begin and stabilize.

e. Call out all abnormal pressure indications and state actions taken to correct them.

f. Perform timing functions in countdown.

g. Troubleshoot throughout complex as directed by MCCC.

h. Monitor television as required.

7-6. BALLISTIC MISSILE ANALYST TECHNICIAN.

7-7. The ballistic missile analyst technician (BMAT), AFSC 312X4C, monitors system operational readiness during standby. He assumes a position at control-monitor group 1 of 4 and monitors erection cycle and propellant loading until completion, then returns to the launch control center and mans a position directly behind the MCCC during countdown. He follows the countdown sequence and stands by to aid in malfunction analysis as required. The BMAT has the following responsibilities:

a. Observe countdown progress on launch control console.

b. Provide assistance to MCCC and DMCCC as required.

c. Copy fast reaction messages as required.

d. Monitor countdown with the countdown procedures contained in the MCCC emergency procedures checklist T. O. 21-SM65E-CL-1-1-6.

e. Monitor pressurization patch when required.

f. Troubleshoot in launch operations building and launch and service building as directed.

g. Perform timing functions in launch and service building as required.

h. Monitor television as required.

7-8. MISSILE MAINTENANCE TECHNICIAN/MISSILE FACILITIES TECHNICIAN.

7-9. Crews at operational bases have a missile maintenance technician (MMT), AFSC 443X0A. Crews at SMS 576-C and OSTF-1 have instead, a missile facilities technician (MFT), AFSC 541X0A. Duties assigned to the MMT throughout this manual will be accomplished by the MFT at SMS 576-C and OSTF-1. The MMT maintains and monitors ground support and facility equipment during standby and countdown. The MMT will monitor the EMMCC during the erection sequence of countdown and the lowering sequence of return to standby. Upon completion of fuel loading he returns to the launch control center and assumes a position behind the DMCCC and performs the following tasks:

a. Monitor tank pressures on launch control console.

b. Monitor and operate facilities remote control panel and keep the MCCC advised of abnormal conditions.

c. Troubleshoot in launch and service building as directed.

d. Monitor television as required.

7-10. ELECTRICAL POWER PRODUCTION TECHNICIAN.

7-11. The electrical power production technician (EPPT), AFSC 543X0 (SMS 548, SMS 566, and SMS 567), maintains and monitors electrical power generation and distribution during standby and countdown at operational bases. During countdown the EPPT performs the following tasks:

a. Monitor all electrical power generation equipment necessary for continuation of countdown.

b. Monitor and operate main switch gear and keep MCCC advised of abnormal indications.

c. Troubleshoot in power room as required.

LIST OF EFFECTIVE PAGES

INSERT LATEST CHANGED PAGES. DESTROY SUPERSEDED PAGES.

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TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 816 CONSISTING OF THE FOLLOWING:

Page No.	Issue	Page No.	Issue
*Title	10 Feb 64	1-55 thru 1-59	Original
*A thru F	10 Feb 64	1-60	1 Mar 63
G Blank	15 Nov 63	1-61	15 Mar 63
i	Original	1-62	Original
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iii thru iv	30 Jul 63	1-64B Blank	15 Mar 63
1-1	Original	1-65 thru 1-66	Original
*1-2	10 Feb 64	1-67	15 Mar 63
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1-54M Blank	15 Mar 63	1-101	15 Mar 63

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A-7
USAF

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TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 828 CONSISTING OF THE FOLLOWING:

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Title	Original	4-128 Blank	Original
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2-1 thru 2-16	Original	G-1 thru G-6	Original
3-1 thru 3-270	Original	1 thru 7	Original
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LIST OF ASSOCIATED CHECKLISTS

T.O. 21M-CGM16E-1-1CL-1
Issued: 22 May 1964
Changed: None

T.O. 21M-CGM16E-1-1CL-2
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T.O. 21M-CGM16E-1-1CL-3
Issued: 22 May 1964
Changed: None

T.O. 21M-CGM16E-1-1CL-4
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T.O. 21M-CGM16E-1-1CL-5
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B

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*3-64D-2 Blank	10 Feb 64

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4-166B Blank	15 Nov 63	*4-248 Blank	10 Feb 64
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Air start level (turn engine over three to six revolutions)	OPENED

NOTE

If excessive moisture is detected, inspect heat recovery silencer for possible tube leakage.

Snifter valves (8)	CLOSED
Fuel supply valves	OPENED

END

SAFETY SUPPLEMENT

OPERATION MANUAL

USAF SERIES

CGM-16E

MISSILE

THIS PUBLICATION SUPPLEMENTS T.O. 21M-CGM16E-1-1 DATED 15 NOV 1962 CHANGED 15 NOV 1963 (FOR UPDATED SITES) AND CHANGED 1 MAR 1963 (FOR PRE-UPDATED SITES) AND REPLACES INTERIM SUPPLEMENTS "P" AND "BE" DATED 21 MARCH 1964 WITH NO CHANGE IN TEXT. Reference to this supplement will be made on the title page of the basic publication by personnel responsible for maintaining the publication in current status.

COMMANDERS ARE RESPONSIBLE FOR BRINGING THIS SUPPLEMENT TO THE ATTENTION OF ALL AFFECTED AIR FORCE PERSONNEL.

PUBLISHED UNDER AUTHORITY OF THE SECRETARY OF THE AIR FORCE

21 MARCH 1964

Page 3-42, Table 3-6 Prior to "Running Engine (SMS 548 and SMS 567)" add the following:

Standby engine moisture check (SMS 548 and SMS 567)

Fuel supply valves	CLOSED
Snifter valves (8)	OPENED

NOTE

When engine is rotated by air, observe snifter valve ports for emission of moisture.

AF SBAMA APR 64 1800

SS SS FS SS SAFETY SUPPLEMENT SS SS SS SS

SAFETY SUPPLEMENT

OPERATION MANUAL

USAF SERIES

CGM-16E

MISSILE

THIS PUBLICATION SUPPLEMENTS T.O. 21M-CGM16E-1-1 DATED 15 NOV 1962 CHANGED 1 MARCH 1963 (PREUPDATE ONLY) OR CHANGED 10 FEBRUARY 1964 (UPDATE ONLY) AND REPLACES INTERIM SAFETY SUPPLEMENT T.O. 21M-CGM16E-1-1SS-2 DATED 30 APRIL 1964 WITH NO CHANGE IN TEXT. Reference to this supplement will be made on the title page of the basic publication by personnel responsible for maintaining the publication in current status.

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PUBLISHED UNDER AUTHORITY OF THE SECRETARY OF THE AIR FORCE

30 APRIL 1964

On page 4-6, immediately after paragraph 4-3, add the following warning:

WARNING

The intent of this section is to provide the combat crew with procedures required to handle emergency conditions which can occur during peacetime and tactical operations. However, during peacetime operations, bypassing of any signal or exposing personnel to undue hazards, such as requiring personnel to be in the LSB during an LO2 loading sequence is prohibited. Those procedures which do not dictate return to STANDBY when a malfunction occurs during a DPL (PLX) or peacetime launch operation, shall be used only to the extent that signals are not bypassed and personnel are not exposed to unwarranted hazards.

AF SBAMA MAY 64 2M

4. Change second note to read:

If missile was not launched (abort indicator illuminated red due to a malfunction during tactical launch, or as normal completion of ADPL) perform procedures in table 3-15 (amplified return to standby procedures).

SAFETY SUPPLEMENT

OPERATION MANUAL

USAF SERIES

CGM-16E

MISSILE

THIS PUBLICATION SUPPLEMENTS T.O. 21M-CGM16E-1-1 DATED 15 NOV 1962 CHANGED 10 FEB 1964 (UPDATE). Reference to this supplement will be made on the title page of the basic publication by personnel responsible for maintaining the publication in current status.

COMMANDERS ARE RESPONSIBLE FOR BRINGING THIS SUPPLEMENT TO THE ATTENTION OF ALL AFFECTED AIR FORCE PERSONNEL.

PUBLISHED UNDER AUTHORITY OF THE SECRETARY OF THE AIR FORCE

6 MAY 1964

Make the following changes to page 3-110:

1. In "STEP" column change "(43 CONT)" to "44".

2. In "ACTION AND NORMAL INDICATION" column, add the following step:

   Remove commit start key from launch control console.

3. Change first note to read:

   If missile has been launched in a tactical operation, proceed to table 3-16; if in a peacetime launch follow procedure as directed by Instructor/MCCC (Table 3-9).

AF SBAMA MAY 64 1800

When directed during a PLX only, position REMOTE-LOCAL switch on FUEL TANKING (PANEL 1) to LOCAL.

Report: "Fuel tanking panel local".

3. Page 3-111, table 3-15, add following note prior to existing caution in step 1:

NOTE

PSC will phase the missile fuel tank to fuel drain pressure when LO_2 drain complete occurs. FUEL TANKING (PANEL 1) REMOTE-LOCAL switch on LOCAL will not prevent the pressure phase change.

4. Page 3-114, Table 3-15, add following step after existing caution in step 10:

During a PLX only, direct BMAT to position REMOTE-LOCAL switch on FUEL TANKING (PANEL 1) to REMOTE.

5. Page 3-114A, Table 3-15, Step 11A, add the following prior to the first BMAT Step:

BMAT When directed during a PLX only, position REMOTE-LOCAL switch on FUEL TANKING (PANEL 1) to REMOTE.

Report: "Fuel tanking panel remote"

END

SAFETY SUPPLEMENT

OPERATION MANUAL

USAF SERIES

CGM-16E

MISSILE

THIS PUBLICATION SUPPLEMENTS T.O. 21M-CGM 16E-1-1 DATED 15 NOV 1962 CHANGED 10 FEB 1964. Reference to this supplement will be made on the title page of the basic publication by personnel responsible for maintaining the publication in current status.

COMMANDERS ARE RESPONSIBLE FOR BRINGING THIS SUPPLEMENT TO THE ATTENTION OF ALL AFFECTED AIR FORCE PERSONNEL.

PUBLISHED UNDER AUTHORITY OF THE SECRETARY OF THE AIR FORCE

4 JUNE 1964

1. Page 3-100B, table 3-14, Add note and step 32A:

32A MCCC NOTE

LO_2 and FUEL SYSTEM indicator will illuminate red if REMOTE-LOCAL switch on FUEL TANKING (PANEL 1) is positioned to LOCAL during a PLX.

During a PLX only, direct BMAT to position REMOTE-LOCAL switch on FUEL TANKING (PANEL 1) to LOCAL.

2. Page 3-100B, table 3-14, step 33, add the following step prior to existing first BMAT step:

AF SBAMA JUN 64 1600

SUPPLEMENT
TECHNICAL MANUAL

USAF MODEL
CGM-16E
MISSILE WEAPON SYSTEM

OPERATION MANUAL

SQUADRON COMPLEXES

548 567
566 576-C
OSTF-1

Commanders are responsible for bringing this publication to the attention of all Air Force personnel cleared for operation of subject missile weapon system.

THIS PUBLICATION SUPPLEMENTS T. O. 21M-CGM16E-1-1 DATED 15 NOV 1962 CHANGED 1 MARCH 1963 AND FORMALIZES INTERIM SUPPLEMENT T. O. 21M-CGM16E-1-1E DATED 30 MAR 1963 WHICH WILL BE REMOVED FROM ACTIVE FILES. A suitable reference to this supplement will be made on the title page of the basic publication.

PUBLISHED UNDER AUTHORITY OF THE SECRETARY OF THE AIR FORCE

AF SBAMA MAY 64 1800

30 MARCH 1963

1. Page 4-11, Paragraph 4-36. Add to first sentence in Paragraph 4-36 after the word "Overfilled"; "or if malfunctioning pressurization system or other conditions make it desirable to use emergency pressurization system and/or manual metering of the fuel drain rate."

2. Page 4-205, Paragraph 4-46. After action B(1) enter "MCCC" in the crew member block. Opposite this in the action block, after action B(1), insert the following new "NOTE":

NOTE

If malfunctioning pressurization system or other conditions make it desirable to use emergency pressurization system and/or manual metering of the fuel drain rate, refer to Table 4-19, FUEL OVERFILL PROCEDURES.

After new note and opposite action B(2), enter "BMAT" in the crew member block.

SUPPLEMENT TECHNICAL MANUAL

OPERATION

USAF MODEL

CGM-16E

MISSILE WEAPON SYSTEM

SQUADRON COMPLEXES

548 567
549 576-C
OSTF-1

OPERATION MANUAL

THIS PUBLICATION SUPPLEMENTS T.O. 21-SM65E-1-1 DATED 15 NOVEMBER 1962 AND FORMALIZES INTERIM SUPPLEMENT "BD" DATED 22 NOVEMBER 1963 WHICH WILL BE REMOVED FROM ACTIVE FILES. A SUITABLE REFERENCE TO THIS SUPPLEMENT WILL BE MADE OPPOSITE AFFECTED PARAGRAPHS AND ON THE TITLE PAGE OF THE BASIC PUBLICATION.

PUBLISHED UNDER AUTHORITY OF THE SECRETARY OF THE AIR FORCE

22 NOVEMBER 1963

1. On Page 4-6, Paragraph 4-6, prior to last sentence of warning add the following sentence.

Also, at the discretion of the MCCC, personnel entering the launch and service building may be required to wear protective clothing and/or emergency breathing apparatus.

END

FM SENSTA/CTOCU GENERAL DYNAMICS/ASTRONAUTICS SAN DIEGO CALIF

TO/RUWMELA/92 SAW FAIRCHILD AFB WASH
TO/RUWJELA/548SMS FORBES AFB KANS

UNCLAS SENSTA 76891 DATED 28 APRIL 1964 (CTOCU DETACHED GD/A)

FOR: 567SMS/QC&E; SMUG FOR TOCU (R. KASPER AND C.F. BROUGHTON)

SAC/DOOTM; 2AF, 8AF, 15AF/DM4C1: 1STRATAD/DMM; 389SMW, 548SMS/QC&E:

3901SMES/QCO/OPA: SBAMA/NSTA/NCTA/NSTW.

THIS MESSAGE IN III PARTS. PART I: EMERGENCY AFTO FORM 22 CONTROL NUMBER 567SMS-64-101E IS ACCEPTED FOR IMMEDIATE ACTION.

PART II: ALL SQUADRONS ARE AUTHORIZED TO RETAIN AND USE SUPPLEMENT "E" DATED 30 MARCH 1963 TO T.O. 21M-CGM16E-1-1 (FORMERLY SUPPLEMENT "E" DATED 30 MARCH 1963 TO T.O. 21-SM65E-1-1) UNTIL THE REWRITE OF T.O. 21M-CGM16E-1-1, CURRENTLY IN PROGRESS AT FAIRCHILD AFB, IS ISSUED. ON TITLE PAGE OF T.O. 21M-CGM16E-1-1 DATED 15 NOVEMBER 1962 AND CHANGED 10 FEBRUARY 1964 (UPDATE ONLY). THE REPLACEMENT NOTICE SHOULD READ AS FOLLOWS: THIS CHANGE INCORPORATES SUPPLEMENTS T.O. 21M-CGM16E-1-1H AND SUPERSEDES SUPPLEMENT T.O. 21M-CGM16E-1-1D, AND T.O. 21M-CGM16E-1-1F. THIS PUBLICATION IS INCOMPLETE WITHOUT SECRET SUPPLEMENT T.O. 21M-CGM16E-1-1A.

PART III: THIS IS CTOCU CLOSING ACTION ON EMERGENCY AFTO FORM 22 CONTROL NUMBER 567SMS 64-101E. SIGNED: WALTER W BROWN MAJOR, USAF - CHAIRMAN, CTOCU.

dk

T. O. 21M-CGM16E-1-1M
(FORMERLY T. O. 21-SM65E-1-1M)

SUPPLEMENT
TECHNICAL MANUAL

USAF MODEL
CGM-16E
MISSILE WEAPON SYSTEM

OPERATION MANUAL

SQUADRON COMPLEXES

548 567
549 576-C
OSTF-1

Commanders are responsible for bringing this publication to the attention of all Air Force personnel cleared for operation of subject missile weapon system.

This publication supplements T. O. 21-SM65E-1-1 dated 15 November 1962 and formalizes interim supplement M dated 22 January 1964 which will be removed from active files. A SUITABLE REFERENCE TO THIS SUPPLEMENT WILL BE MADE OPPOSITE AFFECTED PARAGRAPHS AND ON THE TITLE PAGE OF THE BASIC PUBLICATION.

PUBLISHED UNDER AUTHORITY OF THE SECRETARY OF THE AIR FORCE

AF SBAMA JAN 64 1900

22 JANUARY 1964

On Page 3-99, delete the caution and replace it as follows:

1. Under step column add "27A".

2. Under crew position column, adjacent to Step "27A" add "MMT".

3. Under action and normal indication column, adjacent to "MMT', add "Observe closing of Valve F-8 and announce: "F-8 closing."