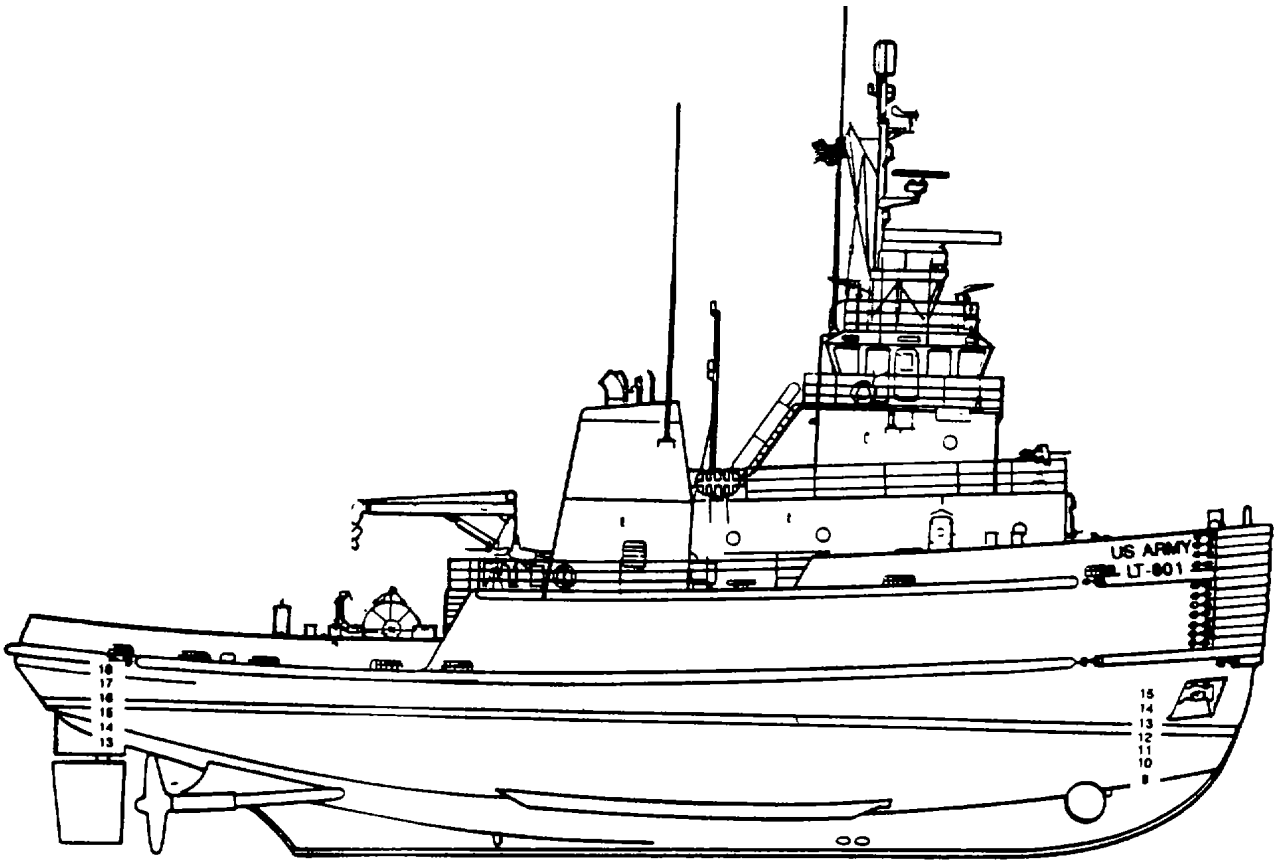
TECHNICAL MANUAL

OPERATOR'S MANUAL
FOR

INLAND
AND COASTAL
LARGE TUG (LT)
NSN 1925-01-247-7110



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for
INLAND AND COASTAL LARGE TUG (LT)

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for
INLAND AND COASTAL LARGE TUG (LT)

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Change 1 30 September 1994
Change 2 20 April 2002

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WARNING

MODIFICATION HAZARD

Unauthorized modifications, alterations or installations to this equipment are prohibited and are in violation of AR 750-10. Any such unauthorized modifications, alterations or installations could result in death, injury or damage to the equipment.

HIGH PRESSURE HYDRAULIC SYSTEM HAZARDS

Hydraulic systems can cause serious injuries if high pressure lines or equipment fail.

Never work on hydraulic systems or equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment, and who can give first aid. A second person should stand by controls to turn off hydraulic pumps in an emergency.

MOVING MACHINERY HAZARDS

Be very careful when operating or working near moving machinery. Running engine, rotating shafts, and other moving parts could cause personal injury or death.

ELECTRICAL HAZARDS

Do not be misled by the term “low voltage.” Potentials as low as 50 volts may cause death under adverse conditions. Be careful not to contact 115-Vac input connections when installing operating equipment. Whenever the nature of the operation permits, keep one hand away from the equipment to reduce the hazard of current flowing through the body.

FLAMMABLE LIQUID AND COMBUSTIBLE VAPOR HAZARDS

Gasoline, fuel oil, lubricating oil, grease, paint, paint thinner, cleaning solvents and other combustible liquids present a serious fire hazard. Always store combustible liquids in approved containers and in designated compartments or deck storage locations. Ensure exhaust and ventilation fans are operating while using cleaning solvents or paint products. Never store or charge batteries in a confined space without ventilation or near operating electrical equipment.

When refueling and defueling the vessel, ensure appropriate signs are posted in visible locations and warnings are announced over the vessel's public address system. Smoking, welding and any operation which involves open flames must be prohibited throughout the vessel.

CAUSTIC AND CORROSIVE CHEMICAL HAZARDS

Battery acid and water purification chemicals such as bromine and chlorine can cause serious burns to eyes or exposed areas of skin. Always wear eye protection and protective clothing when working with caustic and corrosive chemicals. If chemical accidentally contacts skin or eyes, immediately flush with large quantities of water and seek medical attention.

COMPRESSED AIR HAZARDS

High pressure compressed air tanks, piping systems and air operated devices possess potential for serious injury to eyes and exposed areas of skin due to escaping air pressure.

ELECTROMAGNETIC RADIATION HAZARDS

Electromagnetic radiation from the searchlight, radar, and radio antennas has the potential for serious radiation burns. Do not stand in the path of radiation emissions.

HIGH TEMPERATURE FLUID HAZARD

Hot fluids such as engine coolants, hot water, engine lubrication oil, and hot hydraulic fluid possess the potential for serious burns to personnel.

HIGH INTENSITY LIGHT HAZARDS

High intensity light from the searchlight and other flood lights possess the potential to shatter lens covers creating a danger from flying glass.

Never stand directly in front of the searchlight or other powerful lights. Allow elements and bulbs to cool prior to performing maintenance. If elements and bulbs must be replaced while hot, wear protective gloves.

HALON FIRE SUPPRESSANT HAZARDS

All personnel must immediately evacuate spaces when HALON fire suppressant systems are activated. HALON displaces oxygen to smother combustion. It can cause death by suffocation if personnel do not evacuate within 25 seconds after activating handle is pulled.

FM-200 FIRE SUPPRESSANT HAZARDS

In the event the FM-200 system electric horns/strobes or the warning lights (amber strobes) are activated always leave the protected space immediately. FM-200 is being released within 60 seconds.

FIRE SUPPRESSANT HAZARDS

Fire suppressant chemicals displace oxygen and can cause suffocation. Immediately evacuate areas where they will be used.

For Artificial Respiration, refer to FM 21-11.

INTRODUCTION

This manual is divided into two volumes:

Volume 1, TM 55-1925-207-10-1 consists of Chapters 1 and 2,
Volume 2, TM 55-1925-207-10-2 consists of Chapter 3 through Appendixes A through E.

The Appendixes in Volume 2 are applicable to both volumes.

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NO. 55-1925-207-10

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CHAPTER 1

INTRODUCTION

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SECTION I. GENERAL INFORMATION

1-1. Scope. This is an operator's manual for the Large Tug (LT) (Figure 1-1). The LT performs coastal and ocean towing, docking, and undocking operations with large ocean vessels. These vessels include the SL-7 (FSS) LASH and SEABEE vessels. The LT also handles barges in the open ocean. The LT can provide fire fighting, salvage, and rescue help to other ships and shore installations on a limited basis. The vessel operates in inland waterways, coastal waters, and the open ocean. It can deploy overseas under its own power.

1-2. Maintenance Forms and Records.
Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, The Army Maintenance Management System (TAMMS).

1-3. Reporting Equipment Improvement Recommendations (EIRs). If your LT needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about the equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Quality Deficiency Report). Mail it to us at: Commander, U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-LC-CIP-WT, Rock Island, IL 62199-7630. We'll send you a reply.

1-4. Nomenclature Cross Reference List.
a. CECOM Equipment. Table 1-1 is a list of electronic equipment. This list provides a cross reference from the equipment name used in this manual to both government nomenclature and commercial identification.

b. Non-CECOM Equipment. Table 1-2 is a list of names used in this manual and their official nomenclature. The official nomenclature is used throughout the manual if not listed.

1-5. List of Abbreviations. Special or unique abbreviations and acronyms used in this manual are listed below. Standard abbreviations and acronyms used are in MIL-STD-12.

ABS	American Bureau of Shipping
ADF	automatic direction finder
AFFF	aqueous film forming foam
AMDF	Army Master Data File
AMS	auxiliary machinery space
ARPA	automatic radar piloting aid
ASW	auxiliary sea water
BATTY	battery
BB	bilge and ballast
BOSUN	boatswains
BTTY	battery
CFW	cold fresh water
CH	central hydraulics
CHT	collection, holding, and transfer
CONV	convection
CRSR	crew stateroom
DE	diesel exhaust
DA	Department of the Army
DIST	distribution
DK	deck
DRINKG	drinking
EDG	emergency diesel generator
EDP	emergency distribution panel
EIR	equipment improvement recommendation
EL	emergency lighting
EMERG	emergency
EMG	emergency
EOS	enclosed operating station
EOT	engine order telegraph
FB	fuse box
FLDLTS	floodlights
FSS	fast support ship

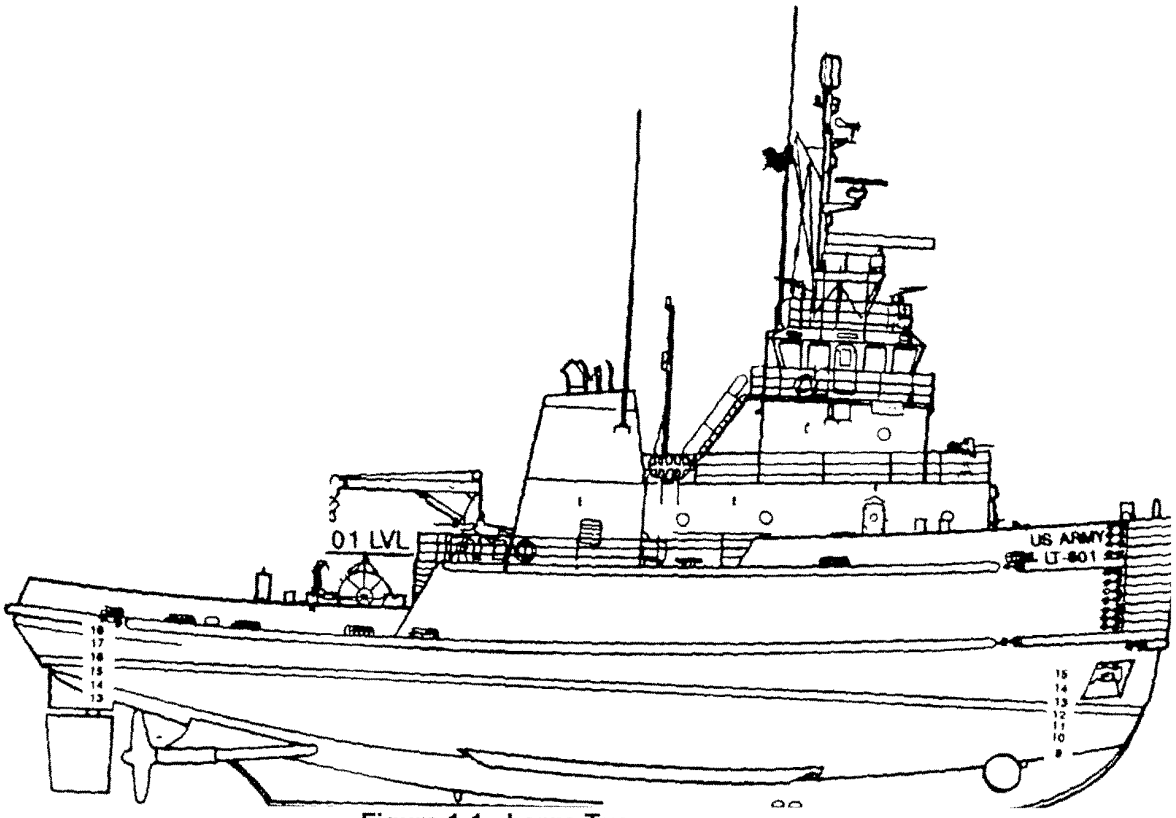


Figure 1-1. Large Tug.

FU	follow-up
FWC	fresh water cooling
GS	general service
HSLT	high speed, low torque
HVAC	heating, ventilation, and air conditioning
INFL	inflatable
KVA	kilovolt amperes
LO	lube oil
LSHT	low speed, high torque
LTS	lights
MACHRY	machinery
MKR	maker
MAD	marine sanitation device
NaCL	sodium chloride (salt)
NFU	non follow-up
OB	oily bilge
PASSWAY	passage way
PHC	pilothouse console
PMCS	preventive maintenance checks and services
PW	potable water
RCPTS	receptacles
RECIRCU	recirculating
REFRIG	refrigeration
REHTR	reheater
REV	reverse
RFAC	refrigeration - air conditioning
RFSS	refrigeration - ship stores
RHTR	reheater
SD	sanitary drain
SF	standard form
SH	steering hydraulics
SSDG	ship service diesel generator
SSDGJW	ship service diesel generator jacket water
STR	steering
TAMMS	The Army Maintenance Management System
TH	towing hydraulics
TLI	tank level indicator
TOWG	towing
TURB	turbocharger
TURBO	turbocharger
VCR	video cassette recorder
WDCM	washdown counter-measure
WTO	water tight door
XFER	transfer
XFMRS	transformers
XMTTR	transmitter

FITTING			FLANGED	SCREWED	WELDED	BELL AND SPIGOT	SOLDERED
BUSHING							
CAP							
CROSS	STRAIGHT SIZE						
ELBOW	45 DEGREE						
	90 DEGREE						
		TURNED DOWN					
		TURNED UP					
		LONG RADIUS					
		STREET					
JOINT (COUPLING)	CONNECTING PIPE						
LATERAL							
PLUG	PIPE PLUG						
REDUCER	CONCENTRIC						
	ECCENTRIC						
TEE	STRAIGHT						
	OUTLET UP						
	OUTLET DOWN						
UNION							
VALVES	CHECK	STRAIGHTWAY					
	GATE						
	GLOBE						
	ANGLE	GLOBE ELEVATION					
		GLOBE PLAN					

Graphic Symbols for Pipe Fittings

Table 1-1. Cross Reference List for CECOM Equipment

NO.	COMMON NAME	GOVERNMENT NOMENCLATURE	COMMERCIAL IDENTIFICATION
1.	Radar Set (3 cm) X-Band	AN/SPS-64M16	AS/SPS-640
2.	Radar Set (10 cm) S-Band	AN/SPS-64(V)17	AN/SPS-640
3.	Radar Interswitch Unit	SA-2308/SPS-64M .	SA 2308
4.	Automatic Radio Direction Finder	AN/SRD-26	4005A
5.	Sonar Sounding Set	AN/SQN-13	D600D
6.	Linear Amplifier	AM-7387/URC	MSR 1020
7.	Power Supply	PP-8236/URC	MSR 6212
8.	Antenna Coupler	CU-2417/URC	MSR 4030
9.	Facsimile Recorder-Reproducer	RD-605/UXH	TR-1
10.	Auxiliary Receiver-Transmitter	RT-1600/U	6100
11.	Alarm Signal Generator	SGA319/SRQ	MR 370-13A
12.	High Frequency Radio Telephone Distress Frequency Watch Receiver	R-2414/SRQ	M1511
13.	Telegraph Terminal	AN/SGC-14	3500 ARQ
14.	Radio Receiver	R-2408/URC	MSR 5050
15.	Radio Transmitter	T-1527/URC	MSR 6700
16.	Receiver-Transmitter	RT-1588/SRQ	403A
17.	Communication Modem	MD-1 255/URC	1280A
18.	Interface Unit	J-4795/U	6606
19.	Electronic Equipment Installation Kit	MK2453/G	MK-2453
20.	Doppler Speed Log	AN/SQN-20	DSL-150
21.	Radio Set	AN/PRC-129	RPX-150

Table 1-2. Cross Reference List for Non-CECOM Equipment

COMMON NAME	OFFICIAL NOMENCLATURE
Main Engine	Engine, Diesel
Ship Service Diesel Generator	Generator Set, Ship Service
Emergency Generator	Generator Set, Emergency
Pump Drive Engine	Engine Set, Pump Drive
Bow Thruster Engine	Engine Set, Bow Thruster
Lube Oil Purifier	Lube Oil Purification System
Reverse Osmosis Watermaker	Reverse Osmosis Fresh Water Desalinator
Fuel Oil Filter/Coalescer	Fuel Oil Coalescer
Machinery Plant Monitoring System Range	Engine Room Monitoring System Range, Electric, 480 V
Fryer	Deep Fat Fryer
Electric Griddle	Griddle, Self Heating
Toaster	Toaster, Electric
Dishwasher	Dishwashing Machine
Garbage Disposal	Food Waste Disposer

1-6. Glossary. Definitions for unique and unusual terms used in this manual are provided below.

AFFF- Aqueous film forming foam is a solution of 6% detergent and 94% water; is used as an extinguishing agent on flammable liquid fires.

Clinometer - Instruments for measuring the angles of roll and pitch.

Fresh Water - Desalinated water not fit for human consumption.

FM-200 - A compound of carbon, fluorine and hydrogen ($CF_3CHCFCF_3$). It is colorless, odorless and electrically non-conductive. It suppresses fire by a combination of chemical and physical mechanisms without affecting the available oxygen.

HALON - A halogenated fire extinguishing agent which leaves no corrosive or abrasive residue after use.

Hydropneumatic Tank - Compressed air pressurized water tank.

Potable Water - Desalinated water which has been further treated and is fit for human consumption.

Remote valve operator - device used for remote operation of valves.

Scope - amount of tow line streamed between towing vessel and towed vessel, less towed vessel's bridle and pendant.

Water Washdown System (WWS) – The WWS, built of all stainless steel components, is installed in the Engine Room and Auxiliary Machinery Space I (AMS I). The WWS is a hydrogen fluoride (HF) gas mitigating water washdown system (WWS) which provides general overhead coverage to the protected spaces. The WWS is a simple overhead sprinkler grid which is piped directly to the existing firemain. It receives seawater from the No. 1 Fire and General Service Pump which is powered electrically from the emergency bus:

WARNING

The WWS is not designed nor intended to be a stand alone fire extinguishing system. It is designed to be used in conjunction with the installed FM-200 fixed fire extinguishing system.
PURPOSE OF WWS:

The W W S, upon activation, serves to:

- Quickly reduce the temperature within the protected space.
- Minimize production of Hydrogen Fluoride (HF) Gas which is produced as a result of FM-200 agent decomposition in contact with hot surfaces and flame at temperatures above 1300°F.
- Aid scrubbing of any HF Gas generated.
- Expedite ventilation of the protected space.

SECTION II. EQUIPMENT DESCRIPTION

1-7. Equipment Characteristics, Capabilities, and Features.

a. Characteristics. The LT is used for coastal and ocean towing, docking and undocking operations with large ocean vessels such as the SL-7 (FFS), LASH, and SEABEE vessels. The LT is capable of producing 54 long tons of Bollard Pull. It can tow five 231 A type barges with a payload capacity of 733 long tons per barge or five 231 B type liquid cargo barges with a payload capacity of 578 long tons per barge. The LT can sustain a minimum speed of 5 knots in Sea State 4 when under full tow as described above.

b. Capabilities. The LT is capable of self-delivery to overseas locations. It has a maximum range of 5000 nautical miles with 25 percent fuel reserve. The LT can handle high side, high flare ships.

c. Features. The LT is capable of providing limited fire fighting, salvage, and rescue help to other ships and shore installations. The vessel has control stations in the pilothouse and enclosed operating stations located aft on the 01 Level (near the tow winch control station) and on the port and starboard bridge wings. Each auxiliary control station contains engine speed and steering controls, bow thruster controls, and rudder angle indicator. Included in each control station are the indicators necessary for the safe operation of the LT.

1-8. Location and Description of Major Components. Major components and compartments of the LT are discussed below.

a. Decks. LT decks shown in Figure 1-2 are described as follows:

(1) 04 Level. The Pilothouse Top (04 Level) contains radio antennas, fire monitors, binnacle, mast (supporting radar antennas, towing lights and masthead lights), and searchlights.

(2) 03 Level. The 03 Level contains the pilothouse, standard bearing repeaters, auxiliary control stations (port and starboard) and side lights (port and starboard).

(3) 02 Level. The 02 Level includes, but is not limited to, the damage control center, radio room, arms control room, medical locker, electronic stores, life rafts, machine gun mounts, and the aft mast.

(4) 01 Level. The 01 Level includes, but is not limited to, machine gun mounts (aft port and starboard), aft control station, workboat, boat handling crane, and port and starboard anchor windlasses. Interior features include the Chief Engineer's stateroom, Captain's stateroom, Officers' staterooms (port and starboard), NCO's stateroom, emergency generator room, fan room, and engine room air intake (port and starboard).

(5) Main deck. The Main Deck includes but is not limited to, boatswains store, crew's staterooms (port and starboard), galley (including chill, freeze, and thaw rooms), foul weather gear locker, fan room, mess/recreation space, life jacket locker, damage control locker, laundry space, and paint locker. The aft section contains the towing winch (port and starboard), capstan, tow bar, rudder motors, tow pins (port and starboard), tow rollers (port and starboard), NBC locker, and garbage can rack.

(6) Below main deck. Below the main deck are the fore peak, miscellaneous storeroom, auxiliary machinery spaces (fore and aft), workshop, engine room, dirty oil tank, fuel oil day tanks (port and starboard), potable water tanks (port and starboard), steering gear room, towing gear locker, tube oil tank, enclosed operating station, spare parts storeroom, bow thruster compartment, and chain locker.

b. External Features. External features are depicted in Figures 1-3 through 1-8.

(1) LT External features (Figure 1-3).

(a) ANIURC-92 Antenna (starboard), linear amplifier MSR 1020 antenna (port) (1).

(b) Aft mast (2). Structure for mounting pushing/towing lights.

(c) Automatic direction finder sense antenna (3).

(d) Distress transceiver antenna (4).

(e) Marine facsimile antenna (5).

(f) Omega set antenna (6).

(g) Bull nose (7). Fixture used to guide towing hawser.

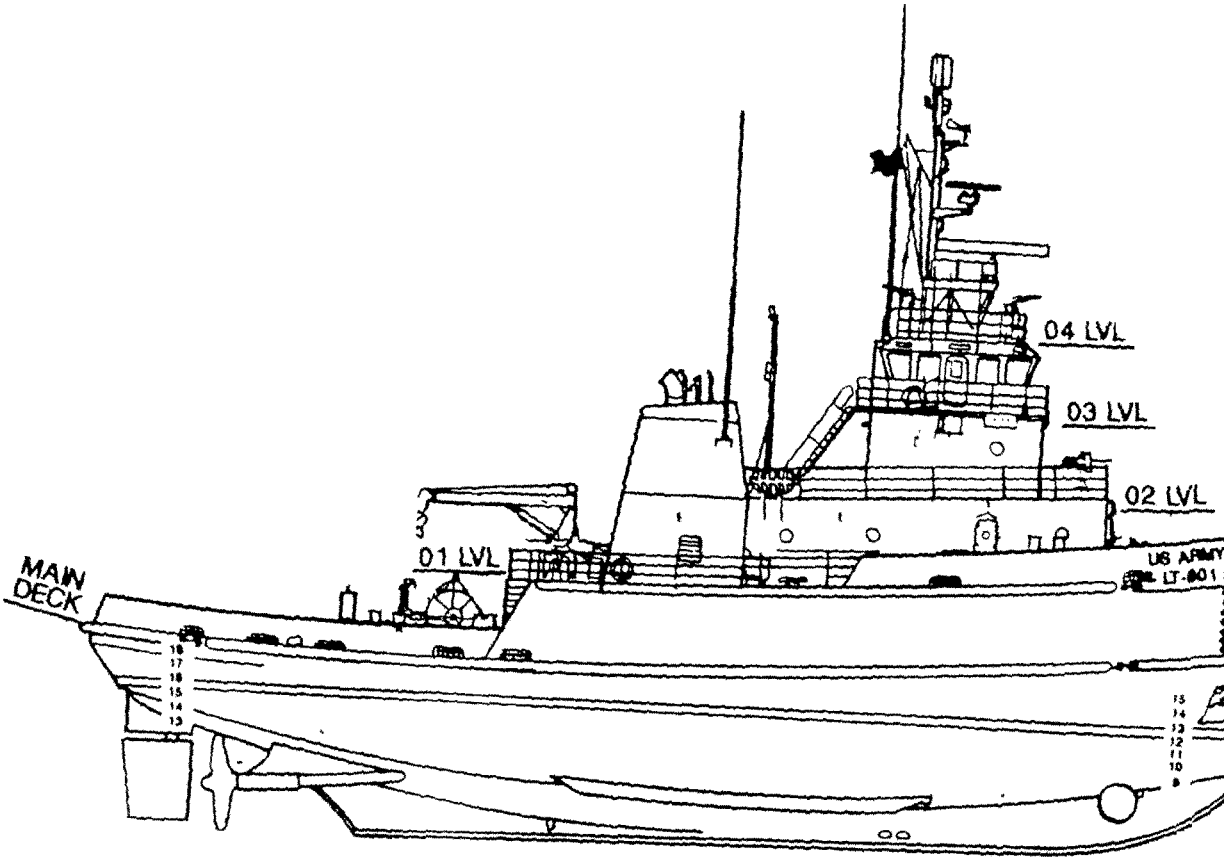


Figure 1-2. LT Decks.

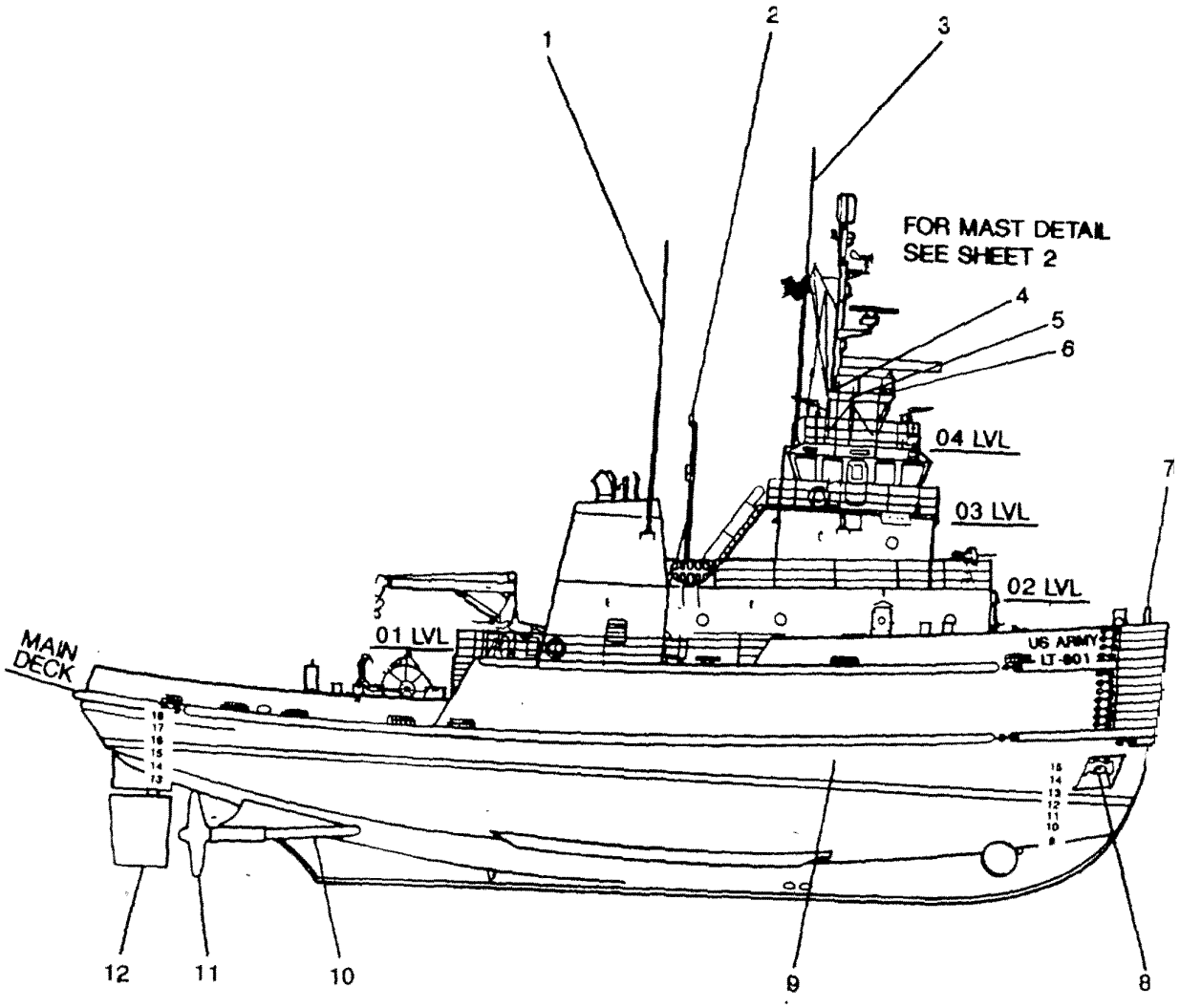


Figure 1-3. LT External Features (Sheet 1 of 4).

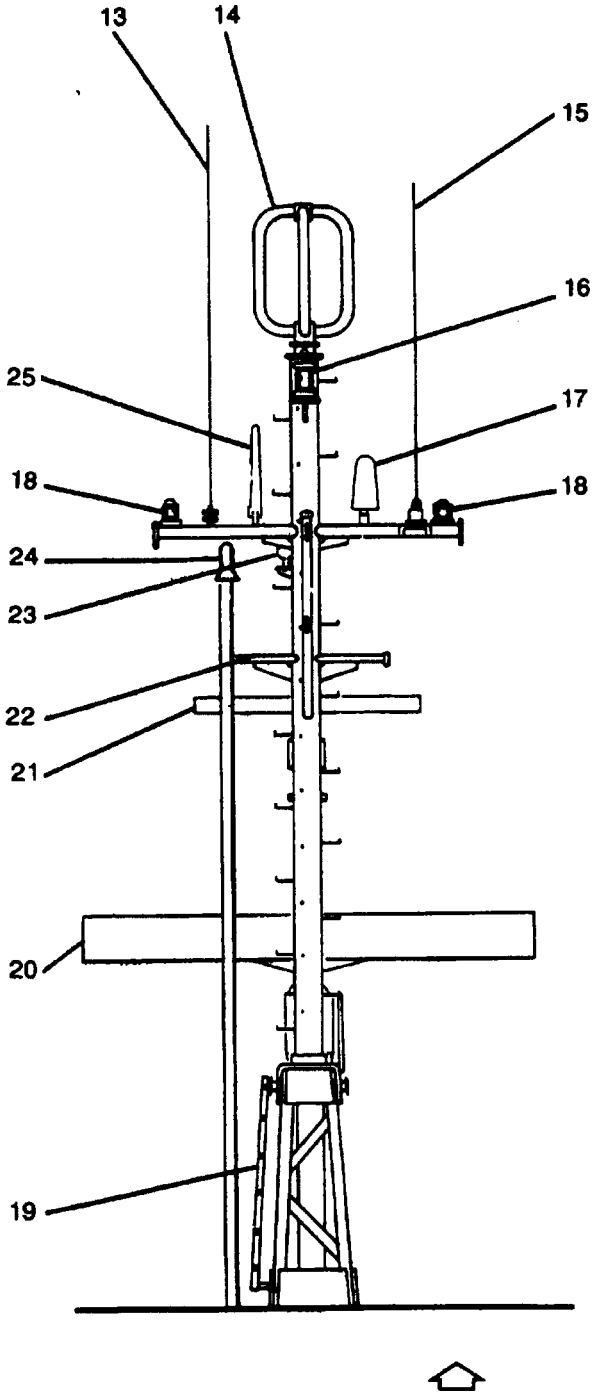


Figure 1-3. LT External Features (Sheet 2 of 4).

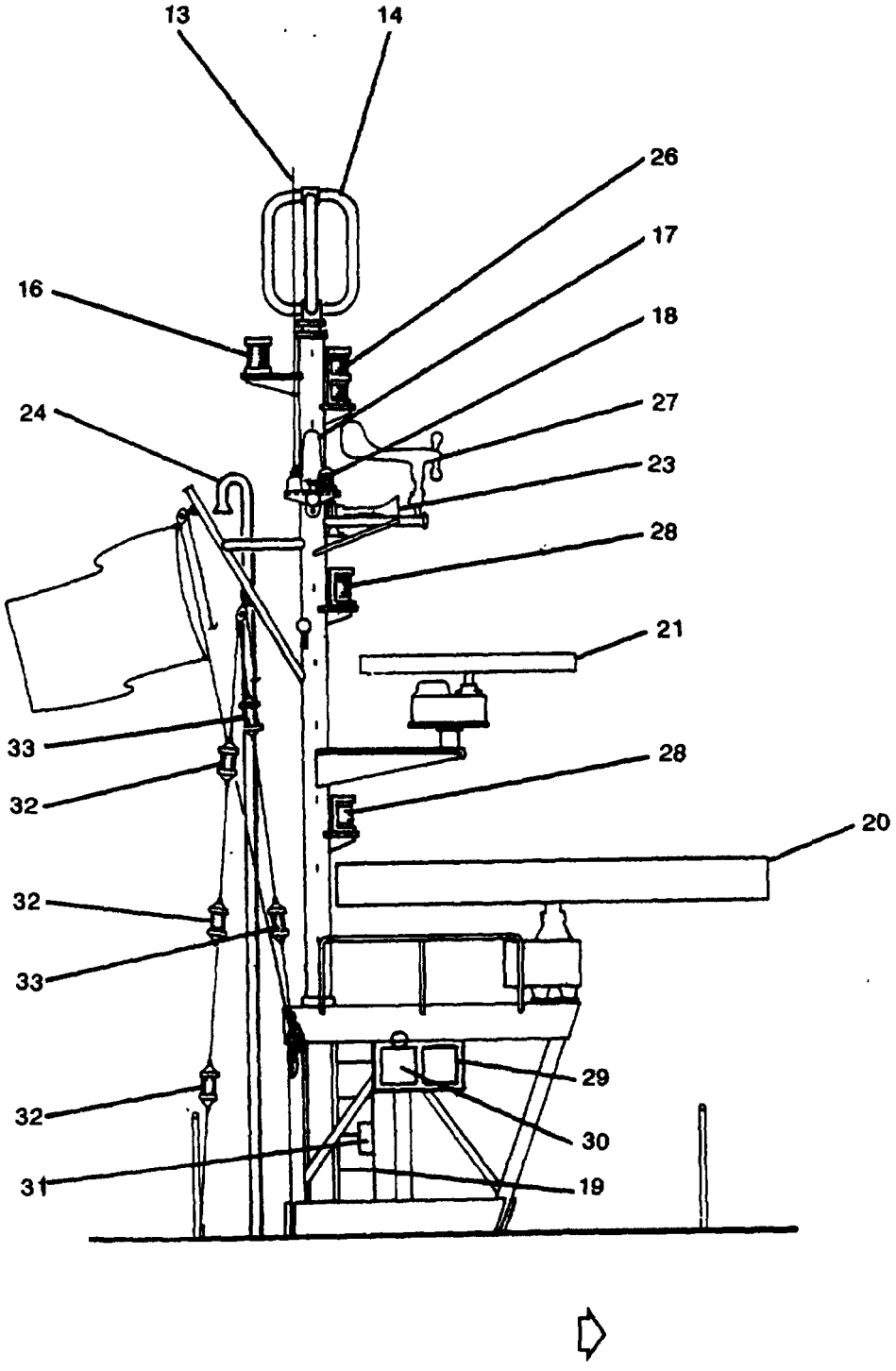


Figure 1-3. LT External Features (Sheet 3 of 4).

1. AN/URC-92 ANTENNA (STARBOARD) LINEAR AMPLIFIER MSR 1020 ANTENNA PORT
2. AFT MAST
3. AUTOMATIC DIRECTION FINDER SENSE ANTENNA
4. DISTRESS TRANSCEIVER ANTENNA
5. MARINE FACSIMILE ANTENNA
6. OMEGA SET ANTENNA
7. BULL NOSE
8. ANCHOR (PORT & STARBOARD)
9. HULL
10. SHAFT TUBE (PORT & STARBOARD)
11. PROPELLER (PORT & STARBOARD)
12. RUDDER (PORT & STARBOARD)
13. AN/URC-80 ANTENNA
14. AUTOMATIC DIRECTION FINDER LOOP ANTENNA
15. ANNRC-46 ANTENNA
16. ANCHOR LIGHT
17. IFF ANTENNA
18. BLINKER LIGHT
19. VERTICAL LADDER
20. S-BAND RADAR ANTENNA
21. X-BAND RADAR ANTENNA
22. FOOT RAIL
23. SHIP WHISTLE
24. WASHDOWN COUNTER-MEASURE SPRINKLER
25. SATELLITE NAVIGATION PREAMPLIFIER ANTENNA
26. MASTHEAD LIGHT
27. WINDSPEED AND DIRECTION TRANSMITTER
28. TOWING MASTHEAD LIGHTS
29. INTERCOM
30. SOUND POWERED TELEPHONE AND BELL
31. TELEPHONE STOWAGE BOX
32. NOT UNDER COMMAND LIGHTS
33. RESTRICTED ABILITY TO MANUEVER LIGHTS

Figure 1-3. LT External Features (Sheet 4 of 4).

(h) Anchor (port and starboard) (8). Two Navy stockless type anchors, each weighing 2100 pounds, are provided. Each anchor has a shackle, swivel and seven shots of 1 inch ABS grade 2 chain.

(i) Hull (9). The hull is all steel, having continuous sealtight welding with full continuity of structural members.

(j) Shaft Tube (port and starboard) (10). Housing for solid steel shafts that transfer power from the reduction gear to the propeller (11).

(k) Propeller (port and starboard) (11). Fixed pitch screw used to drive vessel.

(I) Rudder (port and starboard) (12). Rudders are welded steel, watertight, with drain and vent plugs for testing, preserving, and draining. The rudders are offset inboard of the propellers.

(m) ANIUURC-80Antenna (13).

(n) Automatic direction finder loop antenna (14).

(o) ANIVRC-46 Antenna (15).

(p) Anchor light (16). Light used to indicate LT at anchor.

(q) IFF Antenna (17).

(r) Blinker light (18). Signaling light mounted on yardarm. Controlled by blinker light key located in pilothouse.

(s) Vertical ladder (19). Provides access to mast.

(t) S-Band radar antenna (20). Antenna for the 10 cm radar (AN/SPS-64 (V) 17).

(u) X-Band radar antenna (21). Antenna for the 3 cm radar (AN/SPS-64 (V) 16).

(v) Foot rail (22). Provides foothold while working on equipment mounted on mast.

(w) Ship whistle (23). Signaling horn mounted on mast. Controlled from pilothouse.

(x) Washdown counter-measure sprinkler (24). Sprinkler using sea water, used to remove NBC contamination.

(y) Satellite navigation preamplifier antenna (25).

(z) Masthead light (26). Navigation light controlled from navigation lighting panel located in pilothouse.

(aa) Windspeed and direction transmitter (27). Sensor providing data to windspeed and direction display in pilothouse.

(ab) Towing masthead lights (28). Navigation lights controlled from navigation lighting panel located in pilothouse.

(ac) Intercom (29). Used for intraship communications.

(ad) Sound powered telephone and bell(30). Used for intraship communications.

(ae) Telephone stowage box (31).

(ae) Not under command fights (32). Navigation lights controlled from navigation lighting panel located in pilothouse.

(af) Restricted ability to maneuver lights (33). Navigation lights controlled from navigation lighting panel located in pilothouse.

(2) *04 Level (Figure* 1-4).

(a) Vertical ladder (1). Provides access to the 03 level.

(b) Automatic direction finder sense antenna (2).

(c) Countermeasure washdown sprinkler (3). Sprinkler using sea water, used to remove NBC contamination.

(d) Distress signal receiver antenna (4).

(e) TV and radio antenna (5). Antenna used in conjunction with the entertainment system.

(f) Emergency position indicator radio beacon (6).

(g) Magnetic compass (7). Magnetic compass installed on a periscope binnacle. Periscope provides display of compass heading in pilothouse.

(h) Fire monitor (8). Directs AFFF or seawater for use in fighting fires on the decks of the LT or another ship.

(i) Searchlight (9). Two searchlights are mounted on the pilothouse top, one port and one starboard. Each searchlight is remotely controlled from the pilothouse console.

(j) Omega set antenna (10).

(k) Marine facsimile antenna (11).

(l) Intercom (12). Used for intraship communications.

(m) Distress signal transceiver antenna (13).

(n) Sound powered telephone (14). Used for intraship communications.

(o) Mast (15). Used to support navigational lights, antennas, ship horn, signal flag and ensign hoists, and other navigational aids.

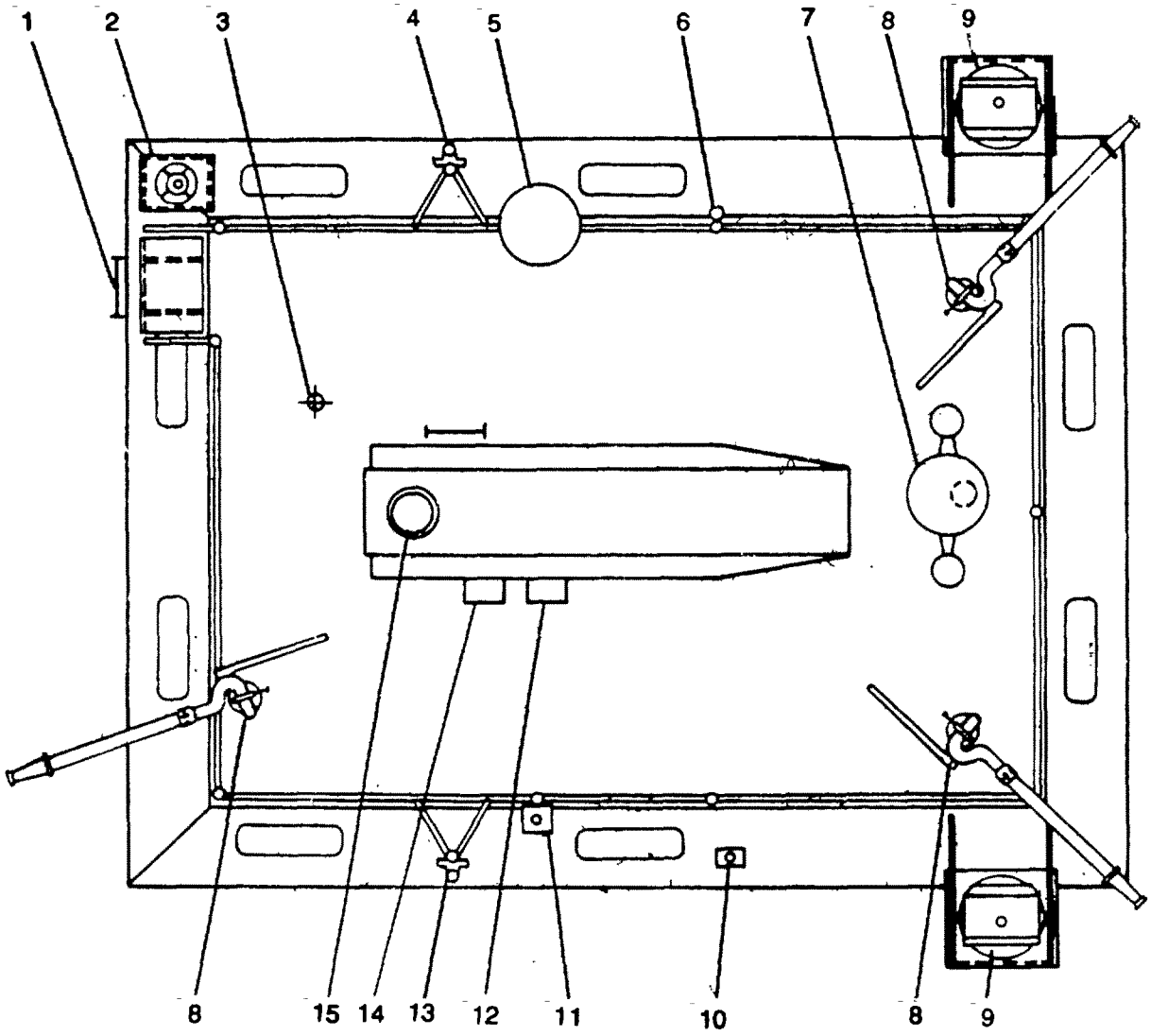


Figure 1-4. 04 Level External Features.

1. VERTICAL LADDER
2. AUTOMATIC DIRECTION FINDER SENSE ANTENNA
3. COUNTERMEASURE WASHDOWN SPRINKLER
4. DISTRESS SIGNAL RECEIVER ANTENNA
5. TV AND RADIO ANTENNA
6. EMERGENCY POSITION INDICATOR RADIO BEACON
7. MAGNETIC COMPASS
8. FIRE MONITOR
9. SEARCHLIGHT
10. OMEGA SET ANTENNA
11. MARINE FACSIMILE ANTENNA
12. INTERCOM
13. DISTRESS SIGNAL TRANSCEIVER ANTENNA
14. SOUND POWERED TELEPHONE
15. MAST

(3) 03 Level (Figure 1-5).

(a) Vertical ladder (1). Provides access to the 04 level.

(b) Sound powered telephone and bell (2). Used for intraship communications.

(c) Intercom (3). Used for intraship communications

(d) Life ring and light (4). Emergency personal flotation device with light adjacent.

(e) Auxiliary control station (5). Control station providing main engine, bow thruster, and rudder controls.

(f) Navigation light (6). Green (starboard) and red (port) lights used during night time and limited visibility to indicate side of vessel.

(g) Fire station #12 (7). Fire fighting station, using sea water, equipped with 50 feet of 1-1/2 inch hose and an all-purpose nozzle.

(h) Standard bearing repeater (8). Provides remote indication of ship's heading as relayed by the gyro compass.

(i) Telephone stowage box (9).

(4) 02 Level (Figure 1-6).

(a) Vertical ladder (1). Provides access to the 01 level.

(b) Aft mast (2). Structure for mounting pushing/towing lights.

(c) Countermeasure washdown sprinkler (3). Sprinkler, using sea water, used to remove NBC contamination.

(d) Life raft (4). Inflatable life saving craft of 25-person capacity self contained, to support life for limited time with stocks of food, water, first aid gear, solar still, repair gear, etc.

(e) Floodlight (5). Adjustable 200 Watt incandescent floodlight for illumination of life raft station.

(f) Fire station #10 (6). Fire fighting stations using sea water equipped with 50 feet of 1-1/2 inch hose with an all purpose nozzle.

(g) Ammo locker (7). Storage locker for ammunition for 7.62 mm machine gun (8).

(h) 7.62 mm machine gun mount (8). Mount for air cooled, belt fed, machine gun (M60) used for ship protection.

(i) Telephone stowage box (9).

(j) Sound powered telephone with bell (10). Used for intraship communications.

(5) 01 Level (Figure 1-7).

(a) Crane (1). Hydraulically powered crane used to deploy and recover the workboat and to install or stow the accommodation ladder.

(b) Accommodation ladder (2). When installed, provides easy access from shore or another ship.

(c) Floodlight (3). Halide floodlight for illumination of 01 level.

(d) .50 Cal. machine gun mount (4). Mount for air cooled, belt fed heavy machine gun (M2HB) used for ship protection.

(e) Life ring (5). Emergency personal flotation device

(f) Countermeasure washdown sprinkler (6). Sprinkler, using sea water, used to remove NBC contamination.

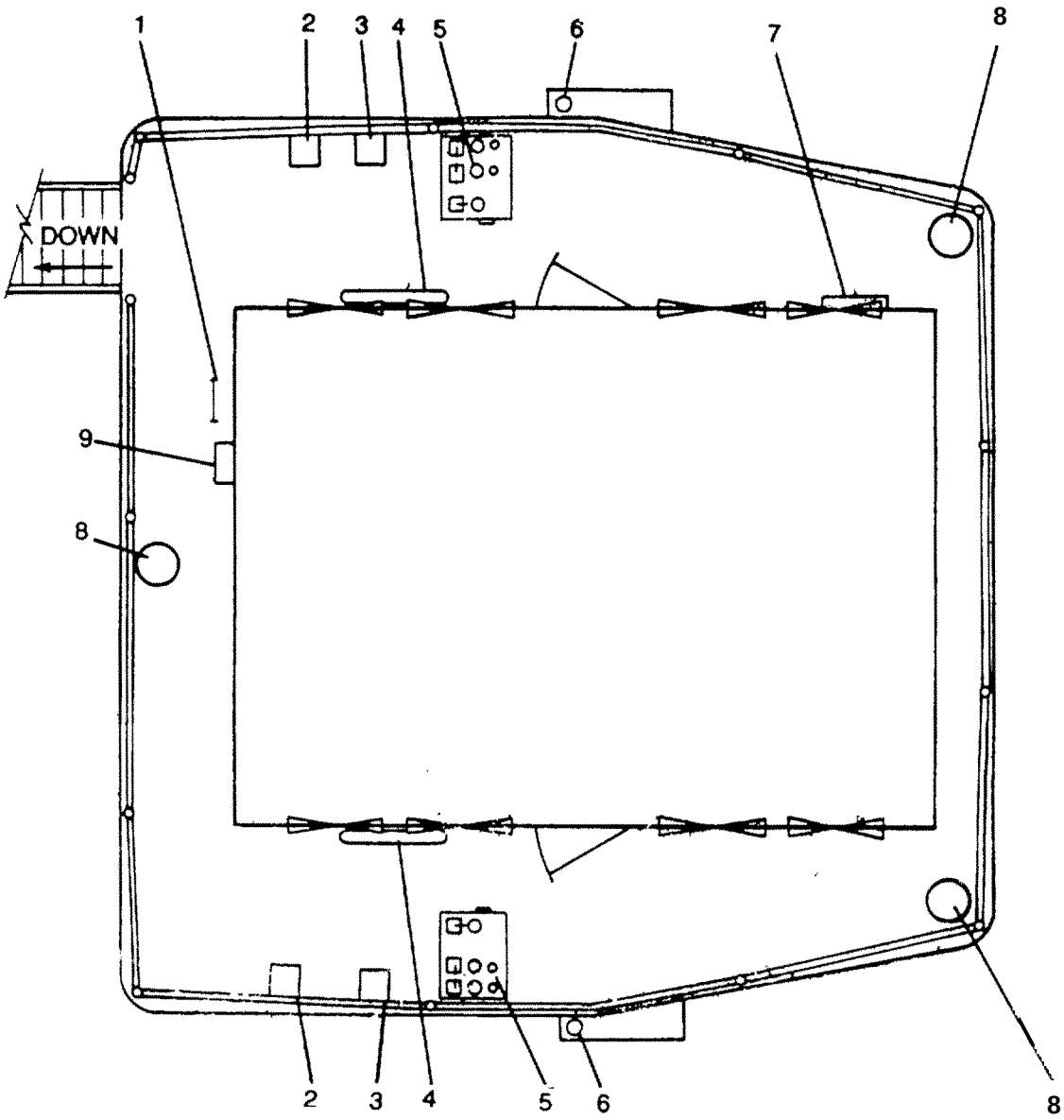
(g) Floodlight (7). Adjustable 200 Watt incandescent floodlight for illumination of aft 01 level weather deck.

(h) Fuel oil tank 3C and fuel oil day tank (port) vents and spill container (8).

(i) Cleat (9). Used to secure lines.

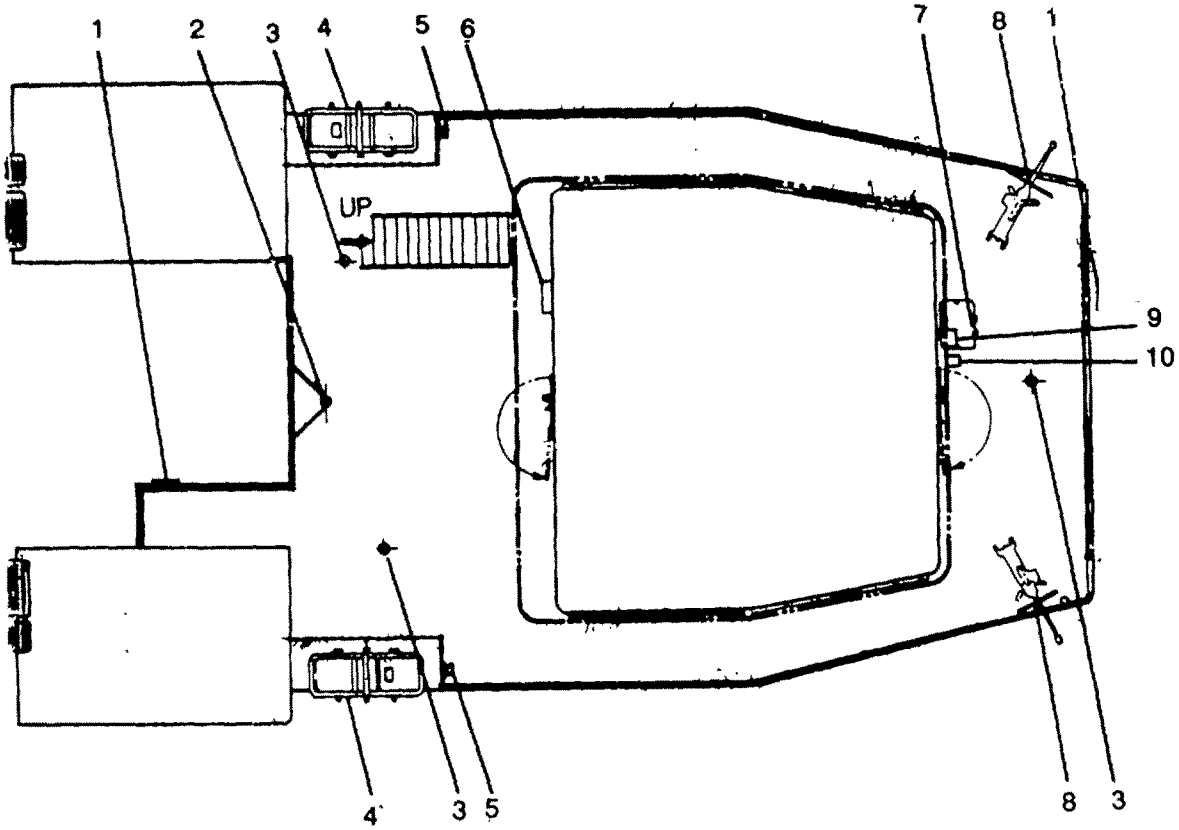
(j) Lube oil fill connection (10).

(k) Emergency generator day tank and fuel oil day tank (starboard) vents, spill container and fill connections (11).



1. VERTICAL LADDER
2. SOUND POWERED TELEPHONE AND BELL
3. INTERCOM
4. LIFE RING AND LIGHT
5. AUXILIARY CONTROL STATION
6. NAVIGATION LIGHT
7. FIRE STATION #12
8. STANDARD BEARING REPEATER
9. TELEPHONE STOWAGE BOX

Figure 1-5. 03 Level External Features.



1. VERTICAL LADDER
2. AFT MAST .
3. COUNTERMEASURE WASHDOWN SPRINKLER
4. LIFE RAFT
5. FLOODLIGHT
6. FIRE STATION #11
7. AMMO LOCKER
8. 7.62 MM MACHINE GUN MOUNT
9. TELEPHONE STOWAGE BOX
10. SOUND POWERED TELEPHONE WITH BELL

Figure 1-6. 02 Level External Features.

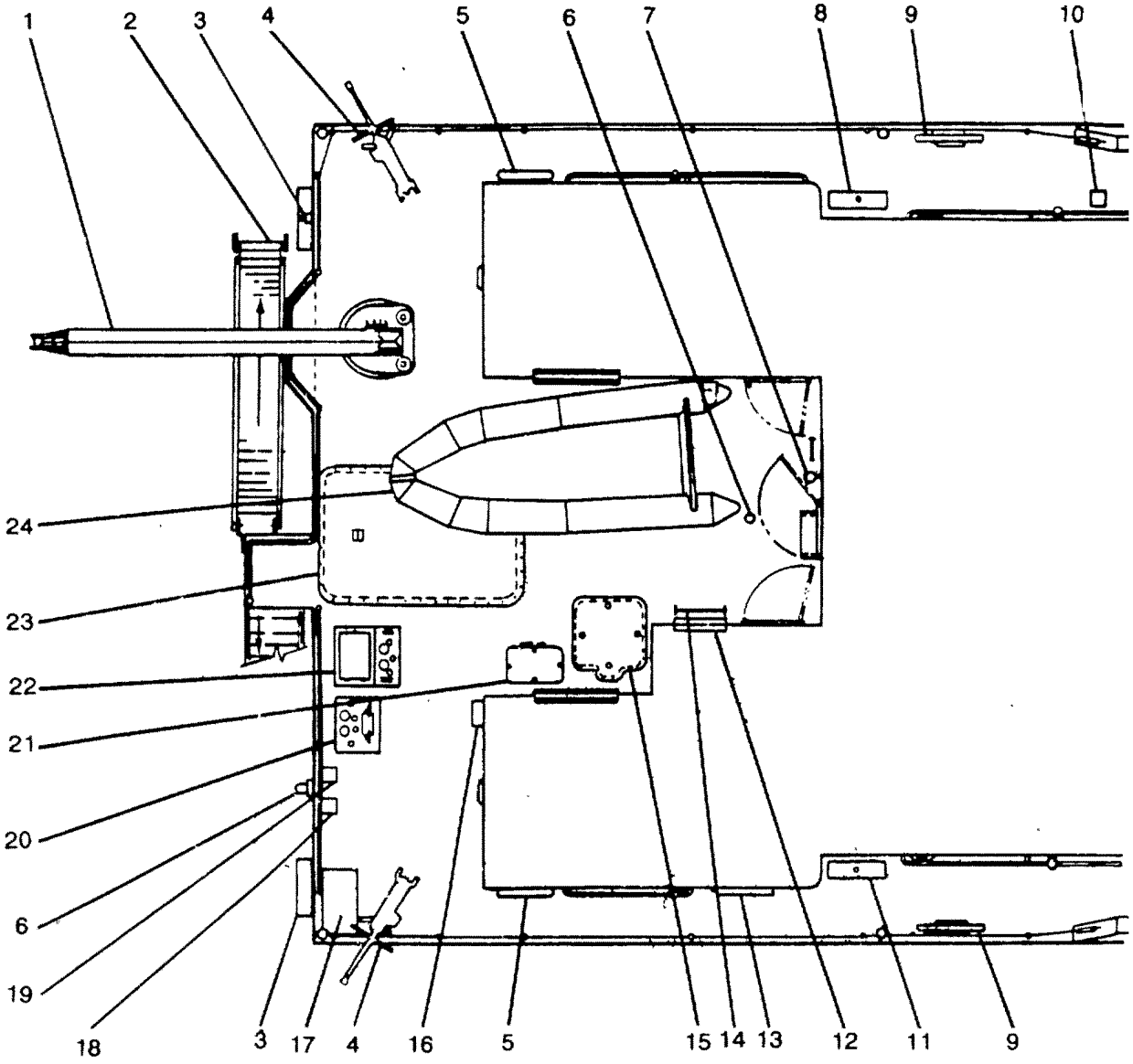


Figure 1-7. 01 Level Exterior Features (Sheet 1 of 3).

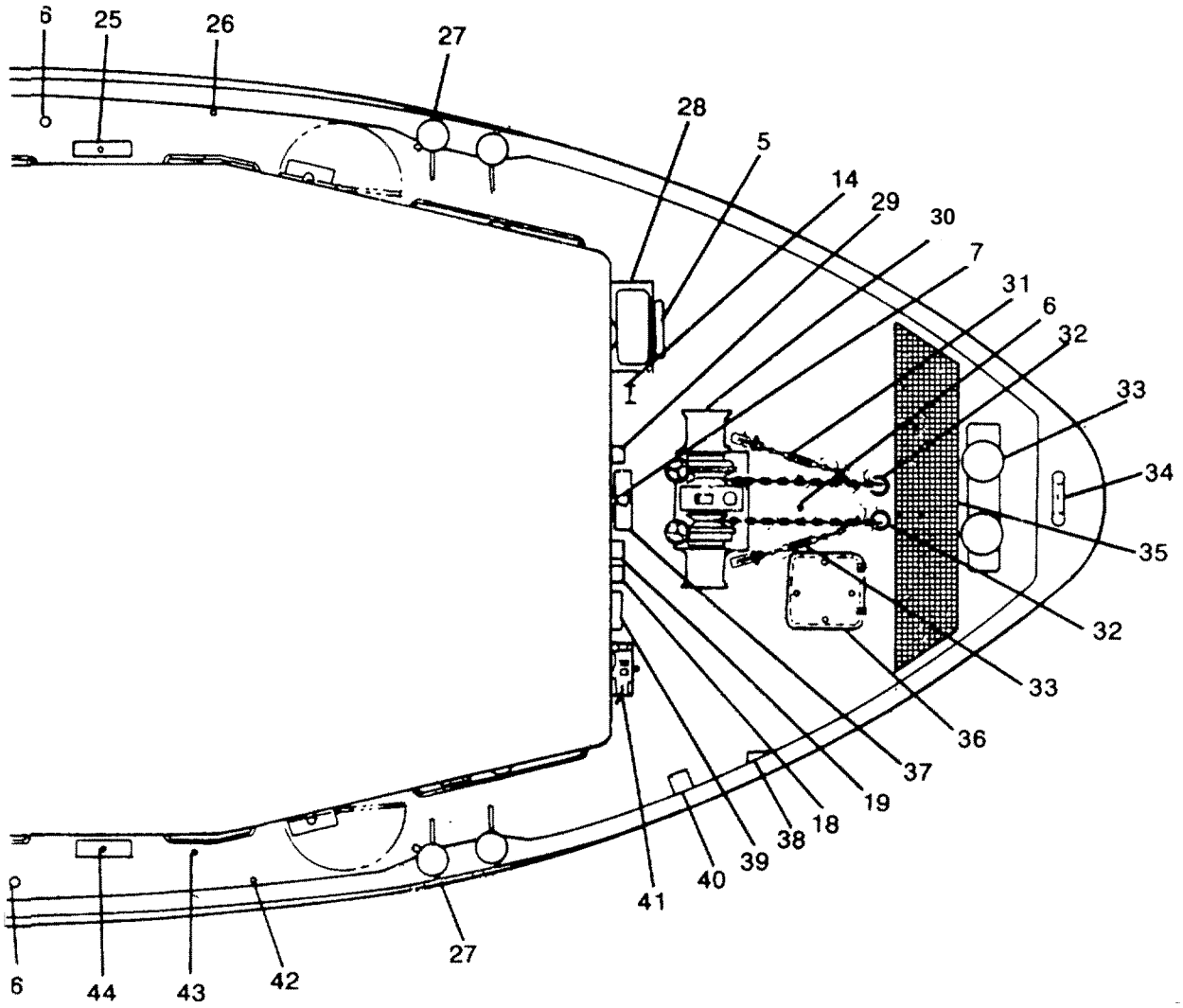


Figure 1-7. 01 Level Exterior Features (Sheet 2 of 3).

1. CRANE
2. ACCOMMODATION LADDER
3. FLOODLIGHT
4. .50 CAL MACHINE GUN MOUNT
5. LIFE RING
6. COUNTERMEASURE WASHDOWN SPRINKLER
7. FLOODLIGHT
8. FUEL OIL TANK 3C AND FUEL OIL DAY TANK (PORT) VENTS, SPILL CONTAINER, AND FILL CONNECTION
9. CLEAT
10. LUBE OIL FILL CONNECTION
11. EMERGENCY GENERATOR DAY TANK AND FUEL OIL DAY TANK (STARBOARD) VENTS, SPILL CONTAINER, AND FILL CONNECTION
12. LOUVER VENT
13. EMERGENCY GENERATOR ENGINE RADIATOR EXHAUST LOUVER
14. VERTICAL LADDER
15. FLUSH WATERTIGHT HATCH
16. FIRE STATION #7
17. GASOLINE CAN QUICK JETTISON RACK
18. SOUND POWERED TELEPHONE WITH BELL
19. INTERCOM
20. AFT AUXILIARY CONTROLSTATION
21. AMMO LOCKER
22. DOUBLE DRUM TOWING WINCH CONTROL STATION
23. SOFT PATCH
24. WORK BOAT
25. LOBE OIL TANK AND FUEL OIL TANK 2P VENTS AND SPILL CONTAINER
26. LUBE OIL TANK SOUNDING TUBE
27. DOUBLE BITT
28. DECK LOCKER
29. SHIP BELL
30. ANCHOR WINDLASS
31. CHAIN STOPPER
32. HAWSE PIPE
33. H-BITT
34. BULL NOSE
35. HAWSER DRYING RACK
36. WATERTIGHT HATCH
37. FUEL OIL TANK 1 P AND 1S VENTS AND SPILL CONTAINER
38. BALLAST TANK 1 VENT
39. FIRE STATION #9
40. TELEPHONE STOWAGE BOX
41. ANCHOR WINDLASSCONTROL STATION
42. OILY WASTE TANK SOUNDING TUBE
43. AFFF STORAGE TANK VENT
44. OILY WASTE TANK AND FUEL OIL TANKS 3C AND 2S VENTS AND SPILL CONTAINER

Figure 1-7. 01 Level Exterior Features (Sheet 3 of 3).

(1) Louver vent (12). Provides passive ventilation for emergency generator room.

(m) Emergency generator engine radiator exhaust louver (13). Provides air exhaust from engine radiator.

(n) Vertical ladder (14). Provides access to 01 level weather deck.

(o) Flush watertight hatch (15). Provides access to the galley.

(p) Fire station #7 (16). Fire fighting station using sea water, equipped with 50 feet of 1-1/2 inch hose with an all-purpose nozzle.

(q) Gasoline can quick jettison rack (17). Storage for 5 gallon gasoline cans.

(r) Sound powered telephone with bell (18). Used for intraship communications.

(s) Intercom (19). Used for intraship communications.

(t) Aft auxiliary control station (2J). Control station providing speed and directional control for main propulsion system.

(u) Ammolocker (21). Storage for .50 cal. machine gun ammunition.

(v) Double drum towing winch control station (22). Controls for tow winches and tow pins.

(w) Soft patch (23). Watertight bottled panel, can be removed to allow removal of large machinery.

(x) Work boat (24). A seven person rigid bottom inflatable boat, 13 feet long. The work boat is equipped with a console steering unit and a 40 hp outboard motor.

(y) Lube oil tank and fuel oil tank 2P *vents and spill container (25).*

(z) Lube oil tank sounding tube (26).

(aa) Double bitt (27). Used to secure (moor) the LT and for towing.

(ab) Deck locker (28). Locker for storage of boatswain's gear.

(ac) Ship bell (29).

(ad) Anchor windlass (30). Hydraulically powered windlass used to lower and raise anchor. An extended shaft drives the wildcat and gypsy.

(ae) Chain stopper (31). Used to secure anchor chain in place.

(af) Hawse pipe (32). A pipe through the deck and into anchor pocket which guides the anchor chain. When anchor is hawsed its shank is stored in the hawse pipe.

(ag) H-Bitt (33). Fixture used to secure towing hawser.

(ah) Bull nose (34). Metal fitting at bow used to guide towing hawser or mooring line.

(ai) Hawser drying rack (35).

(aj) Watertight hatch (36). Provides access to boatswain's store.

(ak) Fuel oil tank 1P and 1S vents and spill container (37).

(al) Ballast tank 1 vent (38).

(am) Fire station #9 (39). Fire fighting station using sea water equipped with *50* feet of 1-1/2 inch hose with an all-purpose nozzle.

(an) Sound powered telephone stowage box 40.

(ao) Anchor windlass control station (41). Controls for anchor windlass.

(ap) Oily waste tank sounding tube (42).

(aq) AFFF storage tank vent (43).

(ar) Oily waste tank and fuel oil tanks 3C and 2S vents and spill container (44)

(6) Main deck (Figure 1-8).

(a) Tow roller (1). Tow rollers used to reduce friction on towing hawsers.

(b) Retractable tow pins (2). Pins used to guide lines and hawsers to desired location.

(c) Life ring (3). Emergency personal flotation device

(d) Rudder motor with guard (4). Rudder motor attached to top of rudder post. Controlled by steering system. Guards protect rudder motors from damage by towing hawser.

(e) Fuel oil tank 4P sounding tube (5).

(f) Manhole (6). Removable plate providing access to spaces below.

(g) Fuel oil tank 4P vent and spill container (7).

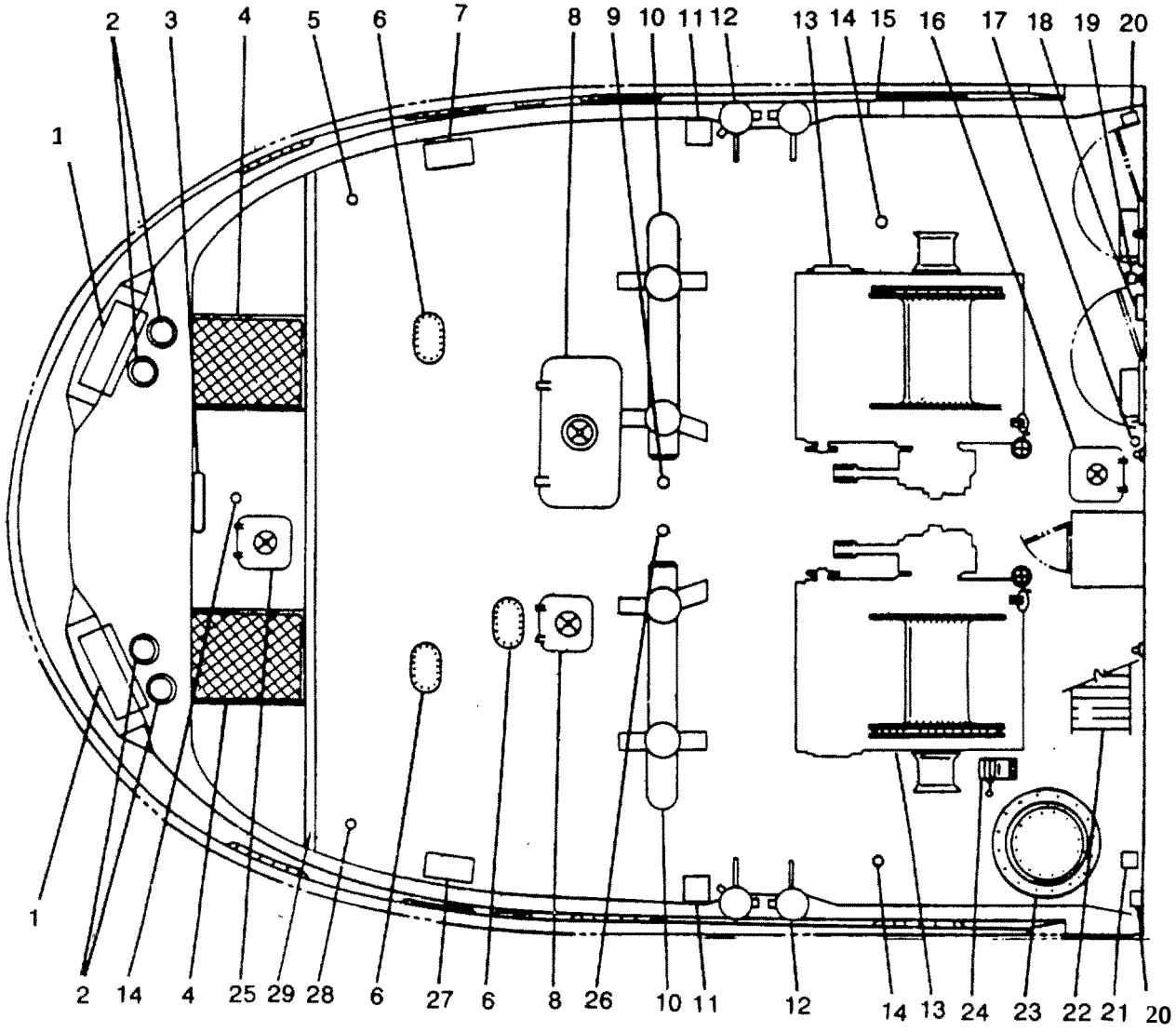


Figure 1-8. Main Deck External Features (Sheet 1 of 2).

1. TOW ROLLER
2. RETRACTABLE TOW PINS
3. LIFE RING
4. RUDDER MOTOR WITH GUARD
5. FUEL OIL TANK 4P SOUNDING TUBE
6. MANHOLE
7. FUEL OIL TANK 4P VENT AND SPILL CONTAINER
8. HATCH
9. POTABLE WATER TANK (PORT) VENT
10. H-BITT
11. TOW PIN CONTROL
12. DOUBLE BITT
13. TOWING WINCH
14. COUNTERMEASURE WASHDOWN SPRINKLER
15. SOUND POWERED TELEPHONE WITH STOWAGE BOX
16. ESCAPE HATCH
17. SEA CHEST VENT
18. FIRE STATION NO. 4
19. SHORE POWER CONNECTION
20. SEWAGE SHORE CONNECTION
21. OILY WASTE DISCHARGE SHORE CONNECTION
22. GARBAGE STOWAGE (UNDER)
23. CAPSTAN
24. CAPSTAN CONTROL STATION
25. HATCH
26. POTABLE WATER TANK (STARBOARD) VENT
27. FUEL OIL TANK 4S VENT AND SPILL CONTAINER
28. FUEL OIL TANK 4S SOUNDING TUBE
29. TOW BAR

Figure 1-8. Main Deck External Features (Sheet 2 of 2).

(h) Hatch (8). Provides access to towing gear locker.

(i) Potable water tank (port) vent (9).

(j) H-bitt (10). Fixture used to secure towing hawser.

(k) Towing pin control (11). Controls for raising and lowering tow pins.

(1) Double bitt (12). Used to secure (moor) the Lt and for towing

(m) Towing winch (13). Hydraulically powered tow winch used when rigging for and during tow.

(n) Countermeasure washdown sprinkler (14). Sprinkler, using sea water, used to remove NBC contamination.

(o) Sound powered telephone with stowage (15). Used for intraship communications.

(p) Escape Hatch (16). Escape hatch from AMS 2.

(q) Sea chest vent (17).

(r) Fire station #4 (18). Fire fighting station using sea water equipped with 50 feet of 1-1/2 inch hose with an all-purpose nozzle.

(s) Shorepower connection (19).

(t) Sewage shore connection (20).

(u) Only waste discharge shore connection (21).

(v) Garbage stowage (22). Stowage racks for garbage cans are provided beneath the ladder.

(w) Capstan (23). The hydraulically powered capstan is used to work lines.

(x) Capstan control station (24). Controls for the capstan.

(y) Hatch (25). Provides access to steering gear compartment.

(z) Potable water tank (starboard) vent (26).

(aa) Fuel oil tank 4S vent and spill container (27).

(ab) Fuel oil tank 4S sounding tube (28).

(ac) Tow bar (29).

c. Internal Features. Internal features are depicted in Figures 1-9 through 1-44. Each level/compartment is described below.

(1) 03 Level internal features (pilothouse) (Figure 1-9). The pilothouse is the command center of the vessel. The equipment located in the pilothouse includes:

(a) Coffee percolator (1).

(b) Drinking fountain (2). Provides cold potable water for personnel consumption.

(c) Wirewav and piping trunk (3).

(d) Exterior emergency lighting panel No. 2 (4).

(e) RPX-150 Radio set with charger (5). Holder and charger for walkie-talkie radios.

(f) Life jacket stowage (6).

(g) Fire axe (7).

(h) Radar indicator (8). Provides azimuth range indicator with RAYPATH Automatic Radar Piloting Aid (ARPA).

(i) Pilothouse console (9). Contains controls and indicators used in vessel operation including Bow Thruster Control Panel, Engine Order Telegraph, Port and Starboard Main Engine/Clutch Control, and Remote Propulsion Indicator Panel (RPIP).

(j) Ship whistle pull valve (overhead) (10). Overhead handle used to sound ship horn.

(k) Radar indicator (11). Provides azimuth range indicator with RAYPATH Automatic Radar Piloting Aid (ARPA).

(1) Log table (12). Table for various record keeping.

(m) Soundpowered telephones with headset chestsets below (13). Used for intraship communications. Two circuits are provided; one is a direct line to the radio room, the other allows communication throughout the vessel to other sound powered telephones.

(n) Binocular stowage (14).

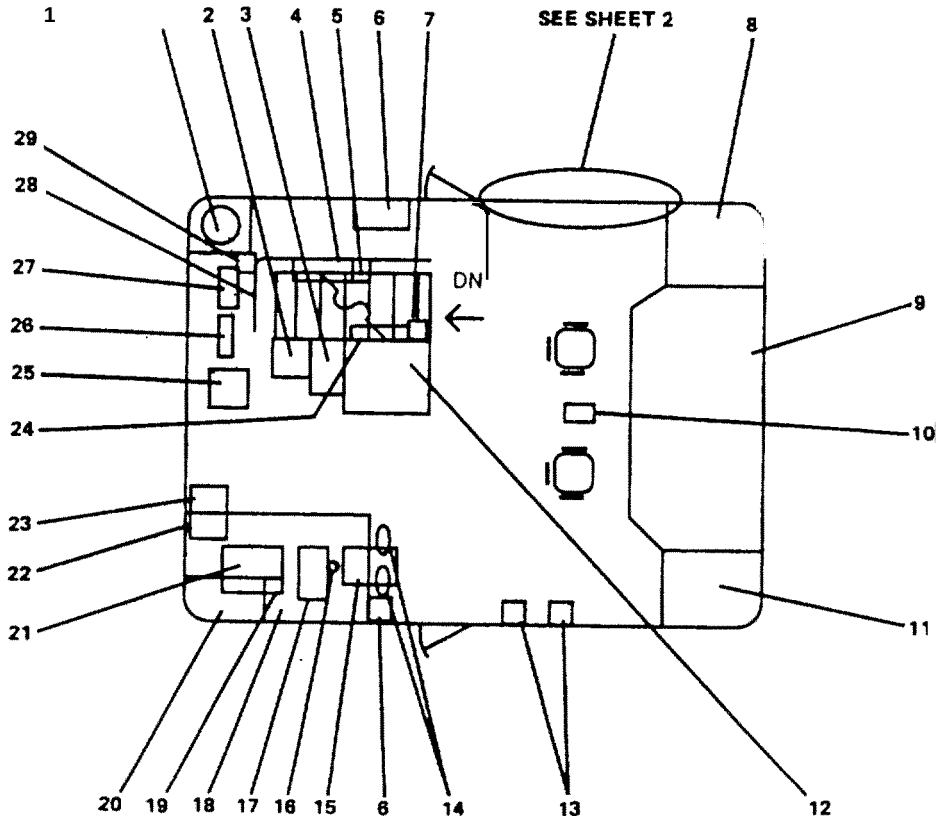
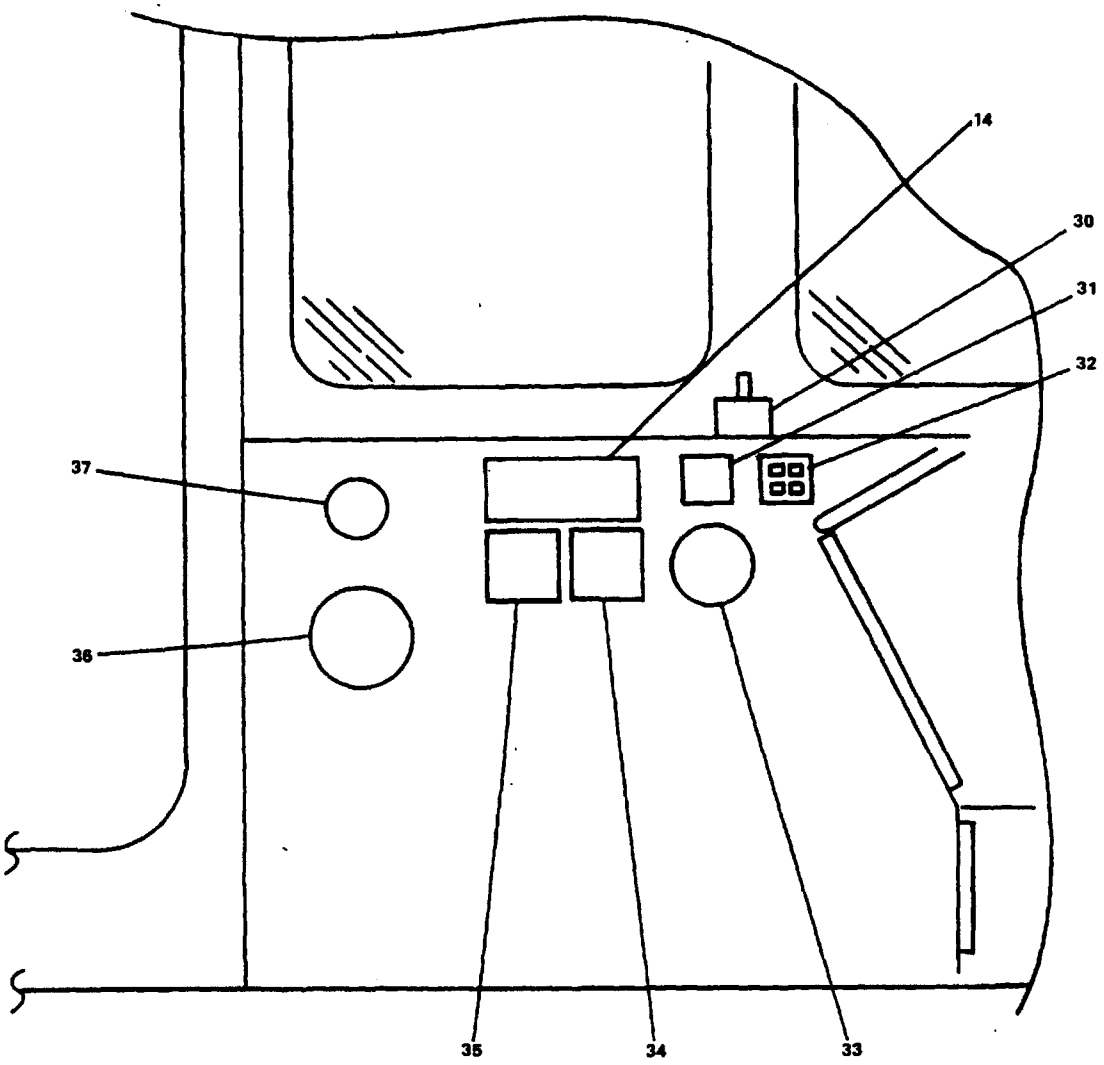
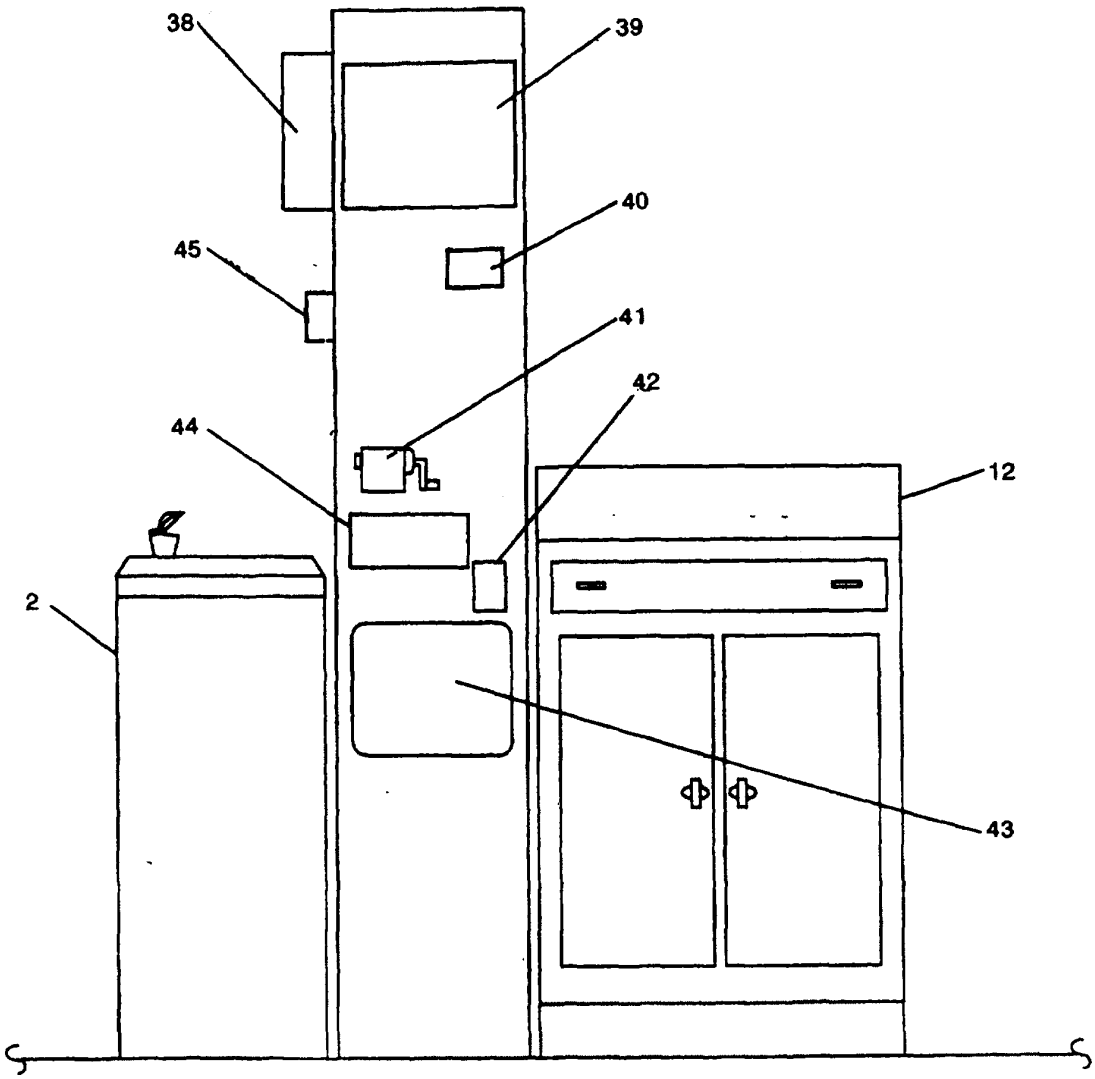


Figure 1-9. Pilothouse Internal Features (Sheet 1 of 6).



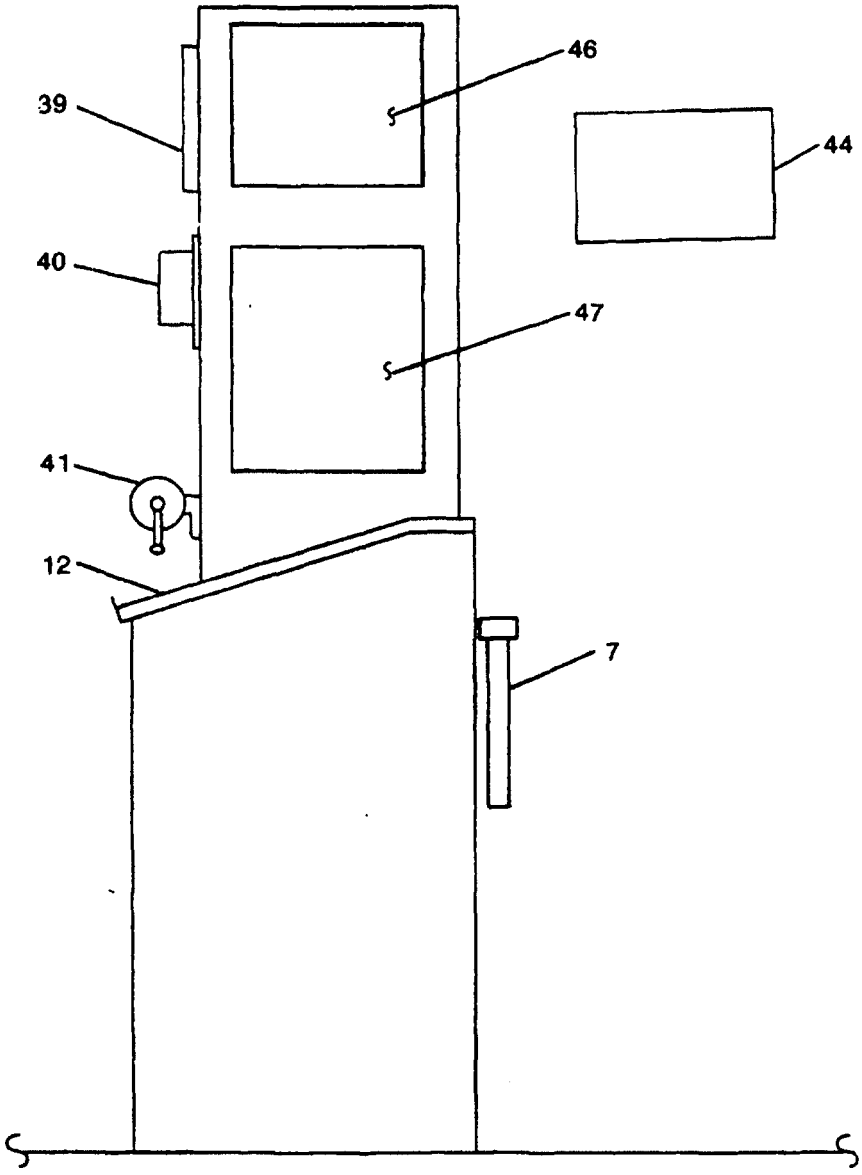
LOOKING TO PORT

Figure 1-9. Pilothouse Internal Features (Sheet 2 of 6).



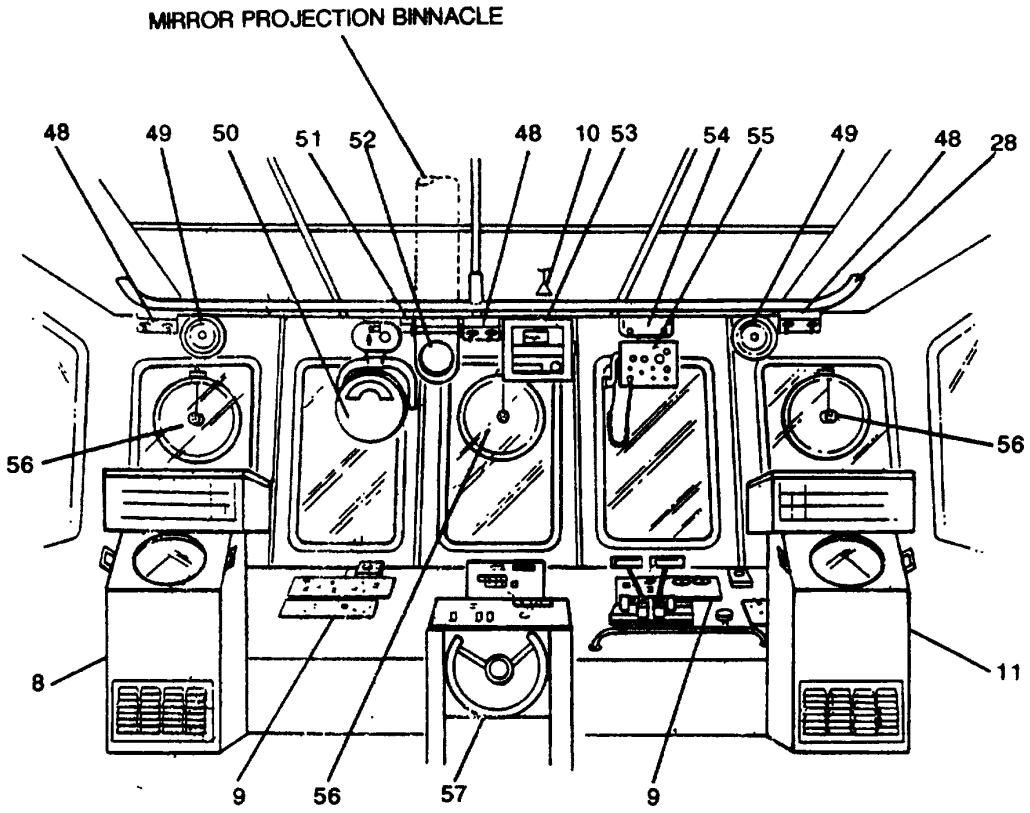
LOOKING TO PORT

Figure 1-9. Pilothouse Internal Features (Sheet 3 of 6).



LOOKING AFT

Figure 1-9. Pilothouse Internal Features (Sheet 4 of 6).



LOOKING FORWARD.

Figure 1-9. Pilothouse Internal Features (Sheet 5 of 6).

1. COFFEE PERCOLATOR
2. DRINKING FOUNTAIN
3. WIREWAY AND PIPING TRUNK
4. EXTERIOR EMER LIGHTING PANEL NO.2
5. RPX-150 RADIO SET WITH CHARGER
6. LIFE JACKET STOWAGE
7. FIRE AXE
8. RADAR INDICATOR
9. PILOTHOUSE CONSOLE
10. SHIP'S WHISTLE PULL VALVE (OVERHEAD)
11. RADAR INDICATOR
12. LOG TABLE
13. SOUND POWERED TELEPHONES WITH HEADSETS/CHESTSETS BELOW
14. BINOCULAR STOWAGE
15. WINDSPEED AND DIRECTION INDICATOR (OVERHEAD)
16. CHART TABLE NAVIGATION LIGHT
17. AUTOMATIC RADIO DIRECTION FINDER AN/SRD-26 (BULKHEAD)
18. CHART TABLE
19. WEATHER FACSIMILE AMPLIFIER (BULKHEAD)
20. WEATHER FACSIMILE
21. OMEGA SET AN/SRN-23 (OVERHEAD)
22. SATELLITE NAVIGATION SET (OVERHEAD)
23. SSM 6100 RECEIVER/TRANSMITTER (OVERHEAD)
24. ENCLOSED BULLETIN BOARD
25. DISTRESS FREQUENCY WATCH RECEIVER (OVERHEAD)
26. POWER SWITCH BOX FOR SSB 6100 (OVERHEAD)
27. POWER SUPPLY FOR SS13 6100 (OVERHEAD)
28. SAFETY RAIL
29. RADIO TELEPHONE ALARM GENERATOR (OVERHEAD)
30. BLINKER LIGHT KEY
31. FIRE PULL BOX
32. FIRE DETECTION REMOTE INDICATOR
33. FIRE DETECTION ALARM BELL
34. EMERGENCY STOP SWITCH FOR EXHAUST FAN E01-44-2
35. EMERGENCY STOP FOR RECIRCULATING FAN R01-32-2
36. GENERAL ALARM BELL
37. GENERAL ALARM CONTACT MAKER
38. ARTIFICIAL TEST ANTENNA FOR SSB 6100
39. CHART RECORDER
40. DEPTH SOUNDER SELECTOR SWITCH
41. PENCIL SHARPENER
42. ASH RECEIVER
43. FIRST AID KIT
44. SHIP CLINOMETER
45. THERMOSTAT
46. ALARM SWITCHBOARD
47. NAVIGATION LIGHTING PANEL
48. CLEARVIEW SCREEN CONTROL BOX
49. LS-609/UR LOUDSPEAKERS FOR AN/URC-80
50. GYRO REPEATER
51. BINNACLE CONTROL BOX
52. PERISCOPE BINNACLE
53. DIGITAL DEPTH INDICATOR
54. AN/URC-80 POWER SUPPLY
55. AN/URC-80 RADIO
56. CLEARVIEW SCREEN
57. HELM

Figure 1-9. Pilothouse Internal Features (Sheet 6 of 6).

(o) *Windspeed and direction indicator (overhead) (15).* Located above the chart table (17), this unit indicates the direction and speed of winds.

(p) *Chart table navigation light (16).*

(8) *Automatic radio direction finder ANISRD26 (bulkhead) (17).* Located above the chart table (17), the Automatic Direction Finder (ADF) (AN/SRD26) indicates the direction of received radio signals.

(r) *Chart table (18).* Table for plotting the LTs course on charts.

(s) *Weather facsimile amplifier (bulkhead) (19).*

(t) *Weather facsimile (20).* Receives radio facsimile weather charts from 45 military and civilian transmission sites in over 25 countries.

(u) *OMEGA Set AN/SRN-23 (overhead) (21).* Located above the chart table (17), the Omega set provides navigational information from the worldwide network of Omega transmitters.

(v) *Satellite navigation set (overhead) (22).* Provides navigation information from satellite transmissions.

(w) *SSB 6100 Receiver/transmitter (overhead) (23).* High frequency single sideband radio.

(x) *Enclosed bulletin board (24).*

(y) *Distress frequency watch receiver (overhead) (25).*

(z) *Power switch box for SSB 6100 (overhead) (26).*

(aa) *Power supplv for SSB 6100 (overhead) (26).*

(ab) *Safety rail (28).*

(ac) *Radio telephone alarm generator (overhead) (29).*

(ad) *Blinker light (30).*

(ae) *Fire pull box (31).* Provides activation of fire alarm bells.

(af) *Fire detection remote indicator (32).*

(ag) *Fire detector alarm bell (33).*

(ah) *Emergency stop switch for exhaust fan E01-44-2 (34).* Controls exhaust fan for sanitary spaces.

(ai) *Emergency stop switch for recirculating R01-32-2 (35).* Controls 01 level fan coil unit.

(aj) *General alarm bell (36).*

(ak) *General alarm contact maker (37).* Provides control of the general alarm system.

(al) *Artificial test antenna for SSB 6100 (38).*

(am) *Chart recorder (39).*

(an) *Depth sounder selector switch (40).*

(ao) *Pencil sharpener (41).*

(ap) *Ash receiver (42).*

(aq) *First aid kit (43).*

(ar) *Ship clinometer (44).*

(as) *Thermostat (45).*

(at) *Alarm switchboard (46).* Provides controls and indicators for arms stowage, main deck fan room door and radio room door alarms.

(au) *Navigation lighting panel (47).*

(av) *Clearview screen control box (48).* Controls operation of clearview screen (52).

(aw) *LS-600/UR loudspeakers for ANI URC-80 (49).*

(ax) *Gyro repeater (50).*

(ay) *Binnacle control box (51).* Controls illumination of binnacle light.

(az) *Periscope binnacle (52).* Displays compass heading from magnetic compass installed on 04 level.

(ba) *Digital depth indicator (53).*

(bb) AN/URC-80 Power supply (54)

(bc) AN/URC-80 Radio (55).

(bd) Clearview screen (56)

(be) Helm (57). Normal ship steering station.

(2) 02 Level internal features (Figure 1-10).

(a) General Internal features of the 02 level include:

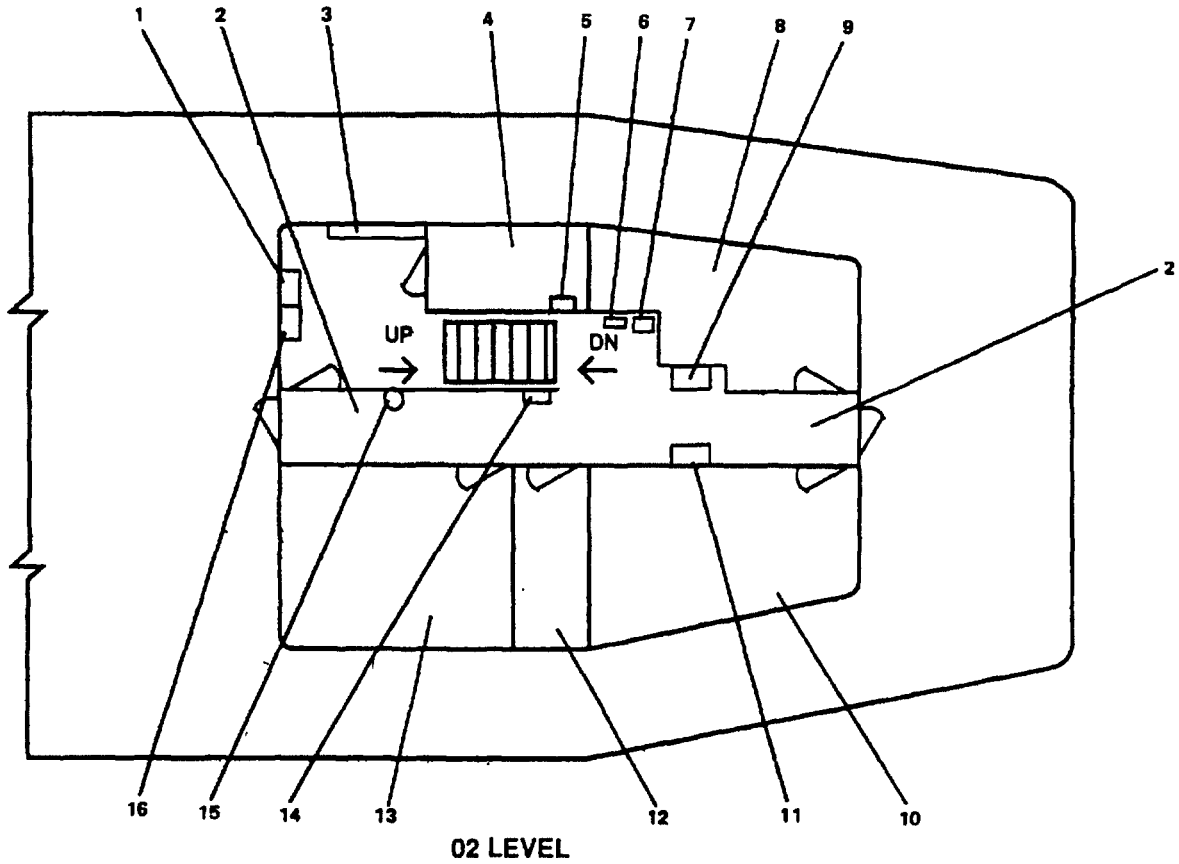
1 Search light power supply (1). Provides power for searchlights on 03 Level.

2 Passageway (2).

3 Medical locker (3). Provides power for searchlights on 03 level

4 Sanitary space (4). Contains one commode and wash basin.

5 Convection heater (5). Electric convection heater to heat sanitary space (4).



1. SEARCHLIGHT POWER SUPPLY
2. PASSAGEWAY
3. MEDICAL LOCKER
4. SANITARY SPACE
5. CONVECTION HEATER
6. FIRE PULL BOX
7. STOKES LITTER
8. DAMAGE CONTROL CENTER
9. DRINKING FOUNTAIN
10. RADIO ROOM
11. FIRE STATION #10
12. ELECTRONIC STORES
13. ARMS CONTROL ROOM
14. GENERAL ALARM BELL
15. FIRE EXTINGUISHER
16. PILOTHOUSE EMERGENCY DISTRIBUTION PANEL

Figure 1-10. 02 Level Internal Features.

6 *Fire pull box (6).*

7 *Stokes litter (7).* Rigid frame litter used to evacuate casualties**.**

8 *Damage control center (8).* See paragraph (b).

9 *Drinking fountain (9).* Provides cold potable water for personnel to consume**.**

10 *Radio room (10).* See paragraph (c) below.

11 *Firestation #10 (11).* Firefighting station using seawater. Equipped with 50 feet of 1-1/2 inch hose with an all-purpose nozzle.

12 *Electronic stores (12).* See paragraph (d) below.

13 *Arms control room (13).* See paragraph (e) below.

14 *General alarm bell (14).*

15 *Fire extinguisher (15).*

16 *Pilothouse emergency distribution panel (16).* Supplies power for various pilothouse equipment and lights.

(b) *Damage control center (Figure 1-11).*

1 *Damage control table (1).* Table for various record keeping.

2 *Sound powered telephone (2).* Used for intraship communication.

3 *Damage control desk (3).* Desk for various record keeping.

4 *Doppler speed log main electronics (4).* The unit (AN/SQN-20) generates and processes signals for speed log display unit (located in pilothouse).

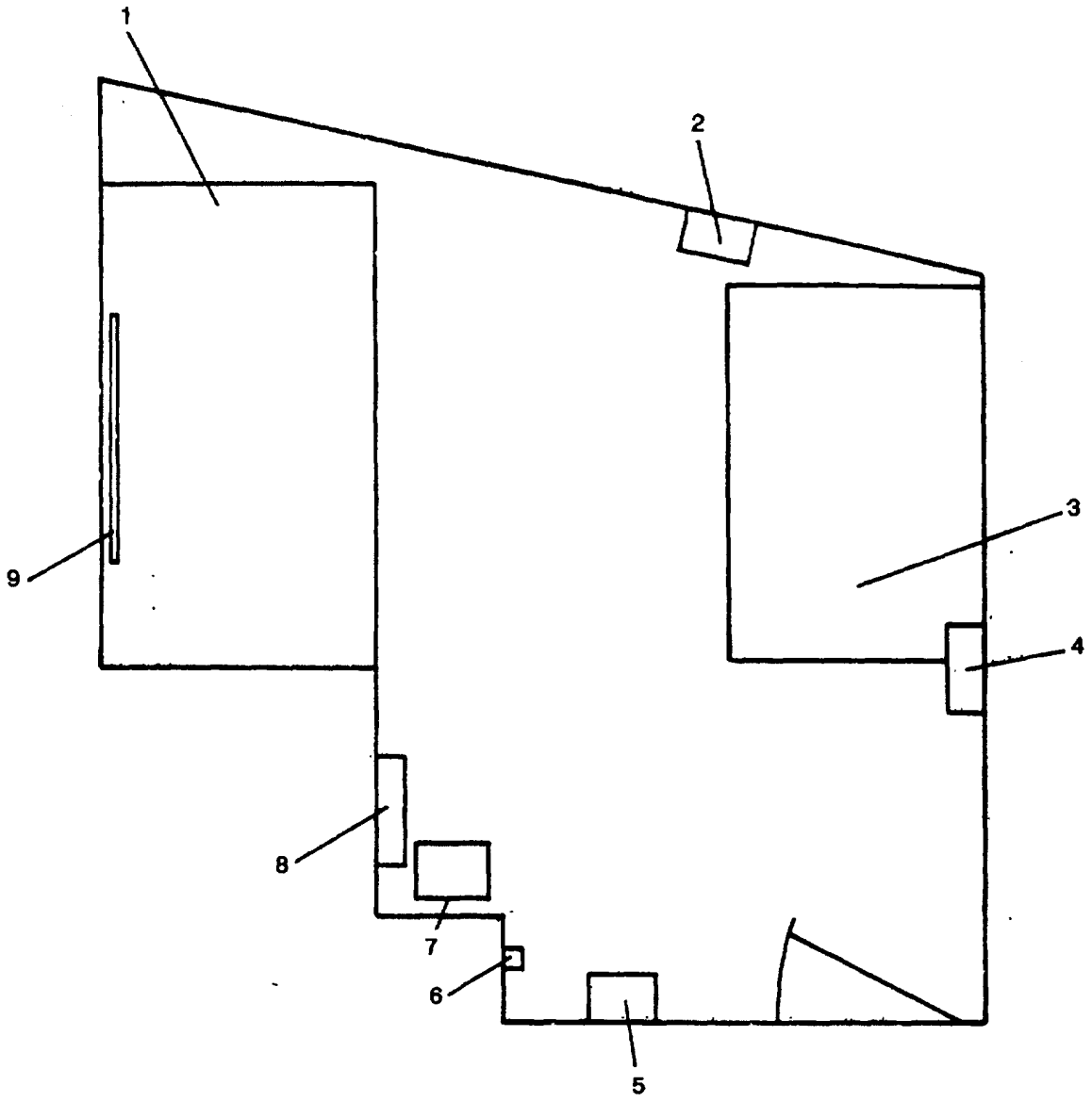
5 *Power failure alarm unit (over) power transfer unit (under) (5).*

6 *Thermostat (6).*

7 *Gyrocompass and electronics control panel (7).* Gyrocompass MK 27 Mod 1, indicates true ship's heading and provides controls for some electronic components.

8 *MK37 MOD E transmission unit (8).*

9 *Status board (9).*



1. DAMAGE CONTROL TABLE
2. SOUND POWERED TELEPHONE
3. DAMAGE CONTROL DESK
4. DOPPLER SPEED LOG MAIN ELECTRONICS UNIT
5. POWER FAILURE ALARM UNIT (OVER)
   POWER TRANSFER UNIT (UNDER)
6. THERMOSTAT
7. GYROCOMPASS AND ELECTRONICS
   CONTROL PANEL
8. MK 37 MOD E TRANSMISSION UNIT
9. STATUS BOARD

Figure 1-11. Damage Control Center.

(c) *Radio room (Figure 1-12)*. The radio room is the external communications center for the vessel. Equipment contained within the radio room is described below:

1 *Clock (1)*.

2 *Fire extinguisher (2)*.

3 *Thermostat (3).*

4 *Security curtain (4)*. Limits visibility when entering or leaving the radio room.

5 *Door alarm snap switch (5).*

6 *Electric typewriter (6)*.

7 *Bookshelf (7)*. Storage for unclassified publications.

8 *Desk (8)*. Used for various record keeping.

9 *Sound powered telephone (9)*. Provides dedicated communications circuit with pilothouse only.

10 *Pencil sharpener (10).*

11 *Mechanical clock (11).*

12 *TSEC/KG-84 (12)*. The TSEC/KG84 provides encryption of data and teletype transmissions from the AN/UGC-74 (25).

13 *J4243/U (13)*. Junction box (J4243) interfaces HF equipment for data transmission/ reception.

14 *KY-65 (14)*. Located above the HF rack, the KY-65 provides encryption of voice communications for the AN/URC-92 (29).

15 *Electronic distribution panel (15)*. Provides 120 Vac power distribution to communications equipment and battery charger.

16 *Safe (16)*. Provides secure storage of classified material.

17 *DC Distribution panel (17)*. Provides 24Vdc power distribution from batteries to communications equipment.

18 *File cabinet (with combination lock) (18)*. Provides storage for unclassified records.

19 *MSR 6212 (19)*. Power supply which feeds the MSR 1020 (20).

20 *MSR 1020 (20)*. The radio frequency amplifier is used with the AN/URC-92 radio set (29) to boost the output power.

21 *RF3500B (21)*. Provides audio tone interface with the AN/UGC-74 (27).

22 *MSR 1280A (22)*. Modem used with the AN/UGC-74 (27).

23 *MSR 6700 (23)*. The amplifier serves as a driver for the MSR 1020 HF power amplifier (20).

24 *MSR 5050 (24)*. The radio receiver is a high frequency single sideband (SSB) receiver.

25 *MSR 6606 (25)*. Interfere unit is used with the AN/URC 92 (29).

26 *KY-57 (26)*. Located above the HF rack, the KY-57 provides encryption of voice communications for the AN/VRC-46 (28).

27 *AN/UGC-74B(V)3 (27)*. The message communications terminal is used to prepare, edit, store, transmit, receive and print Army record traffic communications.

28 *AN/VRC-46 (28)*. Army tactical receiver-transmitter for voice communications.

29 *AN/URC-92 (29)*. Radio set is a single sideband transceiver used for voice communications.

30 *AN/APX-72 Transponder set (30)*. Identification Friend or Foe (IFF) transponder.

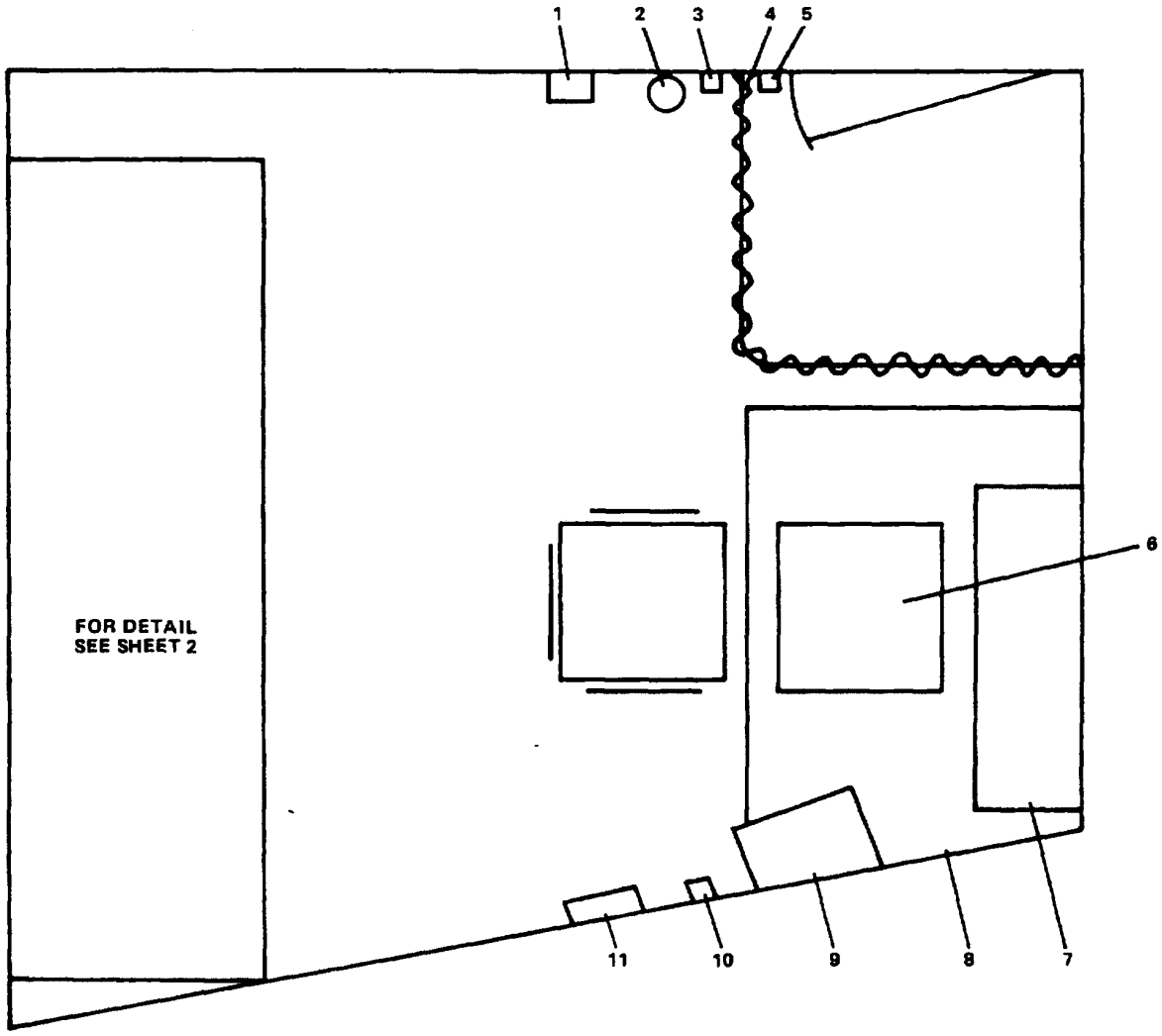


Figure 1- 12. Radio Room (Sheet 1 of 3).

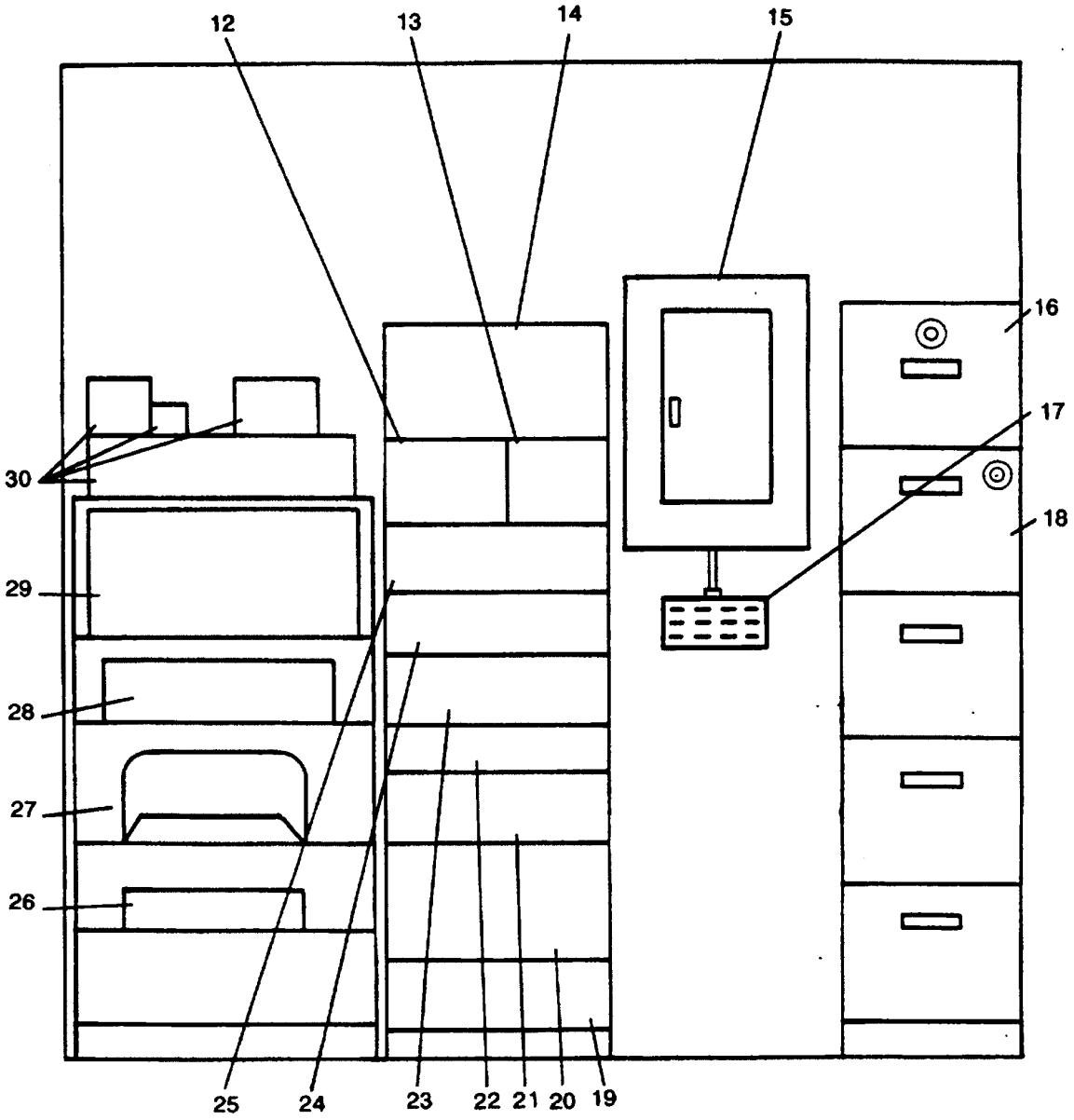


Figure 1-12. Radio Room (Sheet 2 of 3).

1. CLOCK
2. FIRE EXTINGUISHER
3. THERMOSTAT
4. SECURITY CURTAIN
5. DOOR ALARM SNAP SWITCH
6. ELECTRIC TYPEWRITER
7. BOOKSHELF
8. DESK
9. SOUND POWERED TELEPHONE
10. PENCIL SHARPENER
11. MECHANICAL CLOCK
12. TSEC/KG-84
13. J4243/U
14. KY-65
15. ELECTRONIC DISTRIBUTION PANEL
16. SAFE
17. DC DISTRIBUTION PANEL
18. FILE CABINET (WITH COMBINATION LOCK)
19. MSR 6212
20. MSR 1020
21. RF 3500B
22. MSR 1280A
23. MSR 6700
24. MSR 5050
25. MSR 6606
26. MSR KY-57
27. AN/UCG-74B(V)3
28. ANNRC-46
29. AN/URC-92
30. AN/APZ-72 TRANSPONDER SET

Figure 1-12. Radio Room (Sheet 3 of 3).

(d) Electronic stores (Figure 1-13).

1 *HVAC Duct (1).*

2 *Disconnect switch for general alarm batteries (2).* Service disconnect for battery power.

3 *Disconnect switch for radio room batteries (3).*

4 *Battery box (4).* Provides storage for DC DIST PANEL batteries (over) and general alarm batteries (under)

5 *Battery charger general alarm (5).* Used to charge general alarm batteries in battery box (4).

6 *Battery charger radio room do panel (6).* Used to charge radio room batteries in battery box (4).

7 *Radar transformer (7).* The isolation/stepdown transformer stabilizes ship power current to radar power distribution panel (9).

8 *S-Band radar transmitter (8).* The transmitter/receiver transmits and receives radar signals at 60kw in S-band.

9 *Radar power distribution panel (9).* Radar power distribution panel receives power from the radar transformer (7) and distributes to radar equipment.

10 *Radar interswitch unit (10).* Interswitch allows selection of either radar antenna for radar indicators in the pilothouse.

11 *X-Band radar transmitter (11).* The transmitter/receiver transmits and receives radar signals at 50kW in Xband.

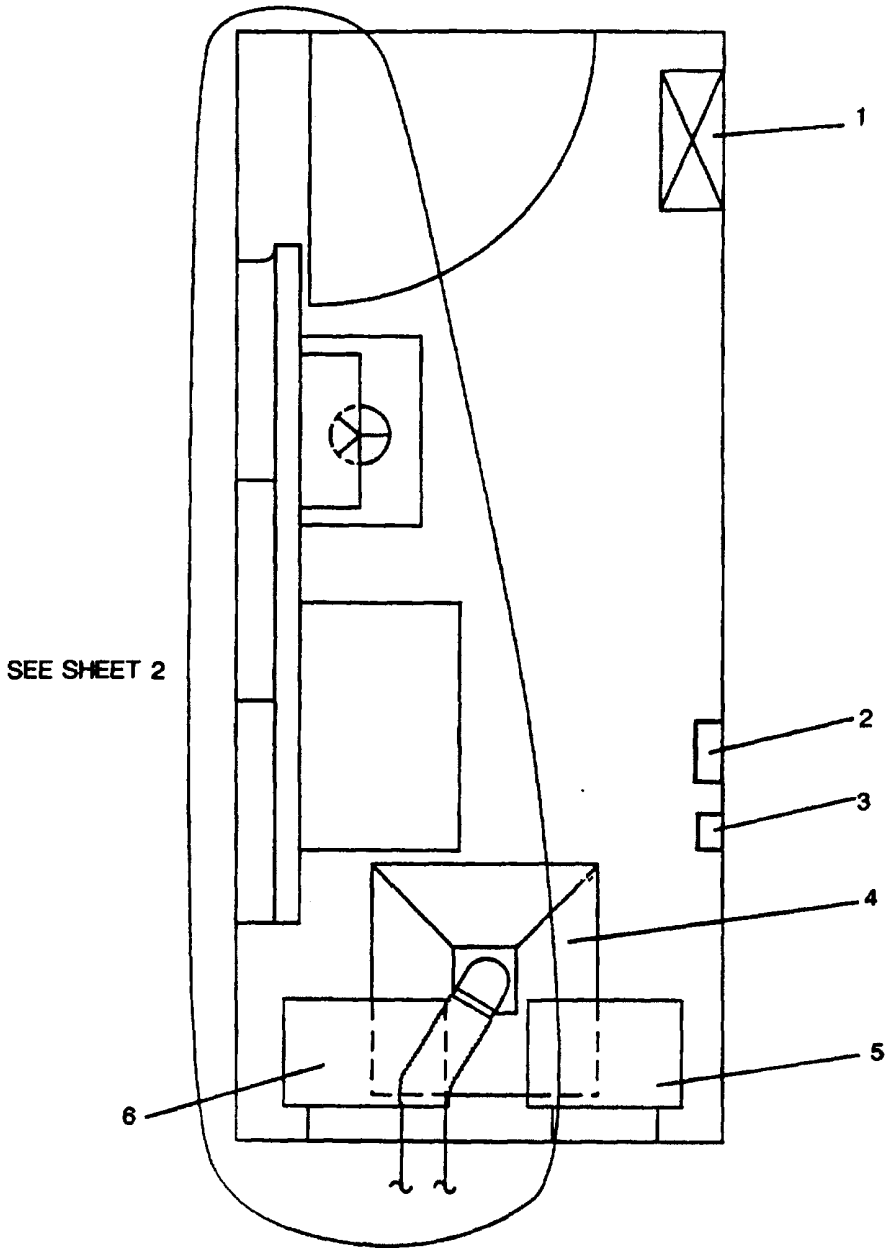
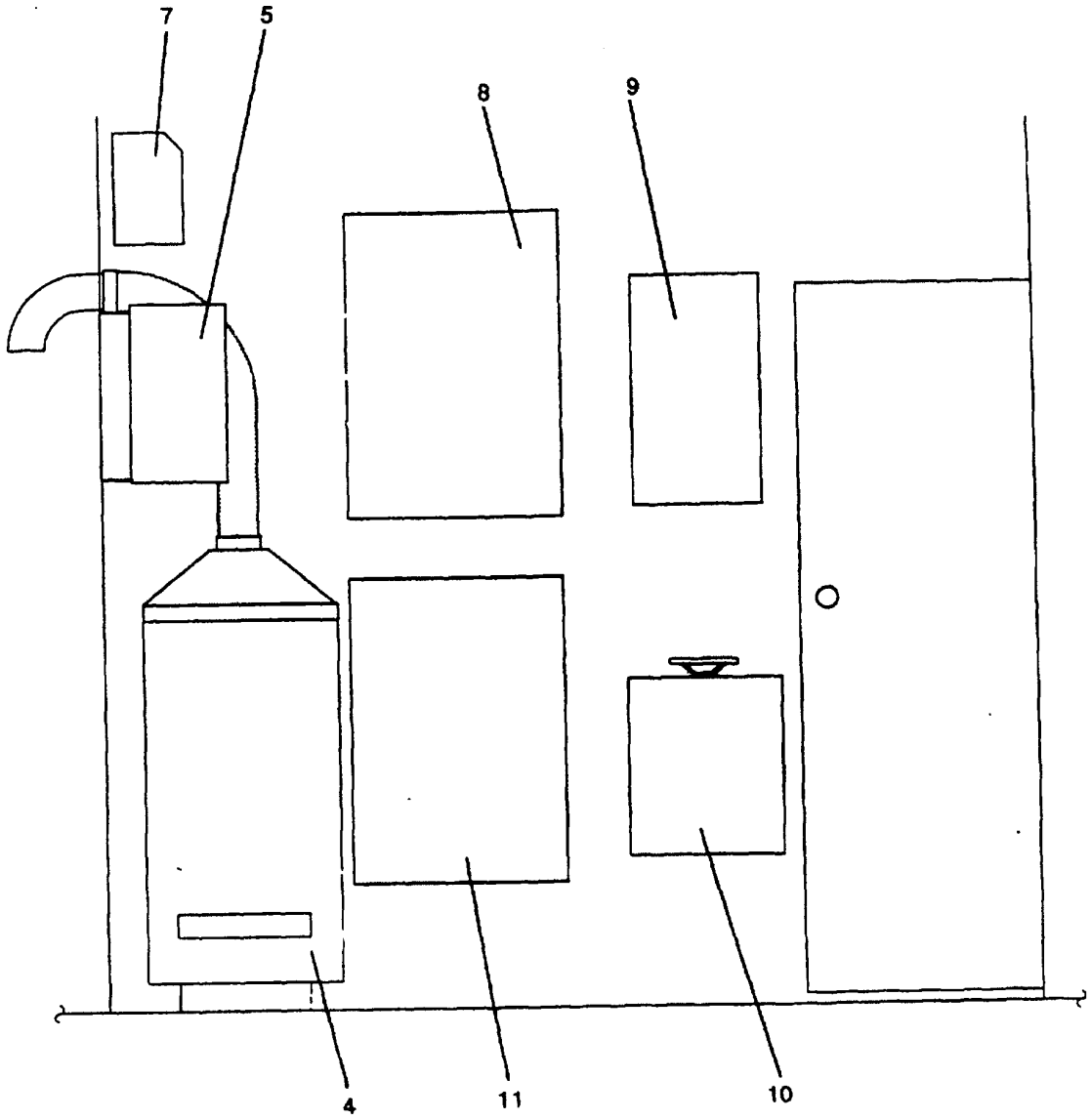


Figure 1-13. Electronic Stores (Sheet 1 of 3).



FWD LOOKING AFT

Figure 1-13. Electronic Stores (Sheet 2 of 3).

1. HVAC DUCT
2. DISCONNECT SWITCH FOR GENERAL ALARM BATTERIES
3. DISCONNECT SWITCH FOR RADIO ROOM BATTERIES
4. BATTERY BOX
5. BATTERY CHARGER GENERAL ALARM
6. BATTERY CHARGER RADIO ROOM DC PANEL
7. RADAR TRANSFORMER
8. S-BAND RADAR TRANSMITTER
9. RADAR POWER DISTRIBUTION PANEL
10. RADAR INTERSWITCH UNIT
11. X-BAND RADAR TRANSMITTER

Figure 1-13. Electronic Stores (Sheet 3 of 3).

(e) *Arms control room (Figure 1-14).* The arms control room is equipped with a fire sprinkler system which can be remotely operated from the pilothouse. A water switch is installed to alert the pilothouse when the sprinklers are operating. The arms control room contains the following:

1 *Ammunition locker (1).* Provides secure storage for 5. 56 ammunition.

2 *Small arms locker (2).* Provides secure storage for small arms.

3 *.50 Cal M2HB machine gun locker (3).* Provides secure storage for three .50 cal M2HB machine guns.

(3) 01 Level internal features (Figure 1-15).

(a) *General.* Internal features of the 01 level include:

1 *Stack 1 . Contains* engine exhaust and crankcase vents.

2 *Fan room (2).* See paragraph (b) below.

3 *Sanitary space (3).* Contains sanitary facilities.

4 *Officer's stateroom #2 (4).* See paragraph (c) below.

5 *Fire pull box (5).*

6 *Fan space (6).* See paragraph (d) below.

7 *01 & 02 LVL REHTR FUSE BOX NO. 2 (7).* Provides fused protection for 01 and 02 level convection heaters.

8 *01 &02 LVL REHTR FUSE BOX NO. 1 (8).* Provides fused protection for 01, 02. and 03 level reheaters.

9 *Chief engineer's stateroom (9).* See paragraph (e) below.

10 *Drinking fountain (10).* Provides cold potable water.

11 *Convection heater (11).* Electric convection heater to heat sanitary space.

12 *Fire station #8 (12).* Fire fighting station using seawater. Equipped with 50 feet of 1-1 /2 inch hose with an all-purpose nozzle.

13 *Captain's stateroom (13).* Seeparagraph (f) below.

14 *01 LVL DIST PNL NO. 2 (14).* Provides 120 Vac internal power distribution for the 01, 02, and 03 levels and supplies Fuse Box #2.

15 *Fire axe (15).*

16 *Fire extinguisher (16).*

17 *General alarm bell (17).*

18 *Officer's stateroom #1 (18).* See paragraph (g) below.

19 *Key cabinet (19).* Provides securestorage for up to 75 keys.

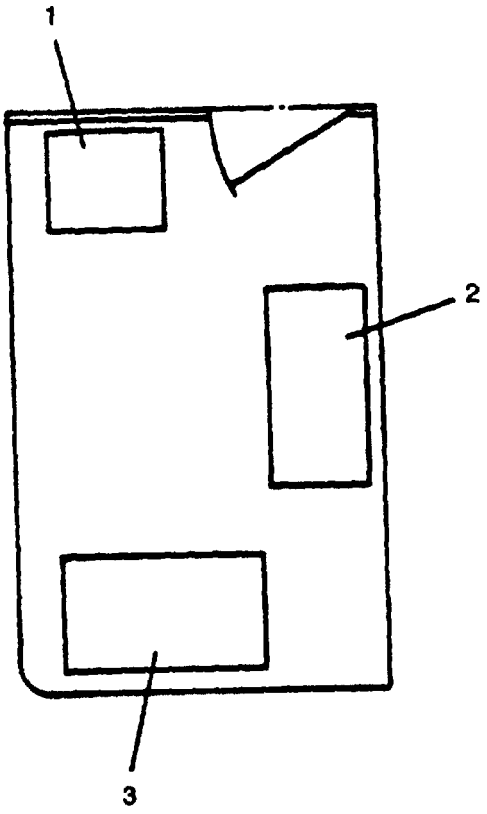
20 *General alarm system distribution panel (20).* Junction box used to interconnect general alarm system cables.

21 *NCO Stateroom (21).* See paragraph (h) below.

22 *General alarm contact maker (22).*

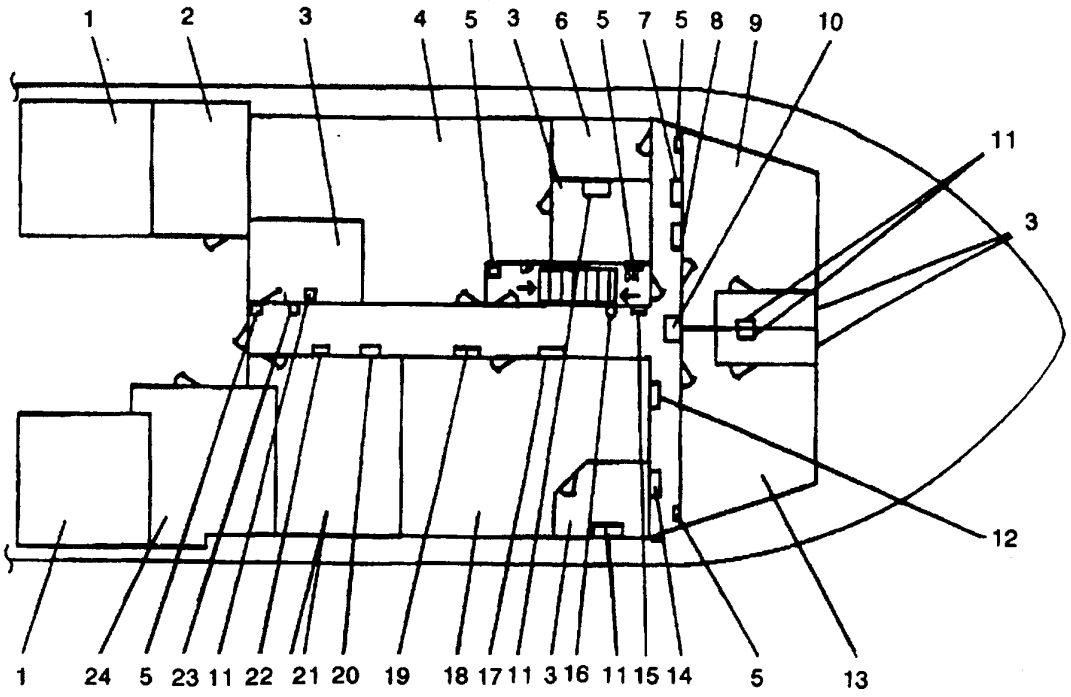
23 *Thermostat (23).*

24 *Emergency generator room (24). See* paragraph (i) below.



1. AMMUNITION LOCKER
2. SMALL ARMS LOCKER
3. .50 CAL M2HB MACHINE GUN LOCKER

Figure 1-14. Arms Control Room.



01 LEVEL

1. STACK
2. FAN ROOM
3. SANITARY SPACE
4. OFFICER'S STATEROOM #2
5. FIRE PULL BOX
6. FAN SPACE
7. 01 & 02 LVL CONVECTION HEATER FUSE BOX NO.2
8. 01 & 02 LVL REHTR FUSE BOX N0.1
9. CHIEF ENGINEER'S STATEROOM
10. DRINKING FOUNTAIN
11. CONVECTION HEATER
12. FIRE STATION #8
13. CAPTAIN'S STATEROOM
14. 01 LVL 02 DIST PHL N0.2
15. FIRE AXE
16. FIRE EXTINGUISHER
17. GENERAL ALARM BELL
18. OFFICER'S STATEROOM #1
19. KEY CABINET
20. GENERAL ALARM SYSTEM DISTRIBUTION PANEL
21. NCO STATEROOM
22. GENERAL ALARM CONTACT MAKER
23. THERMOSTAT
24. EMERGENCY GENERATOR ROOM

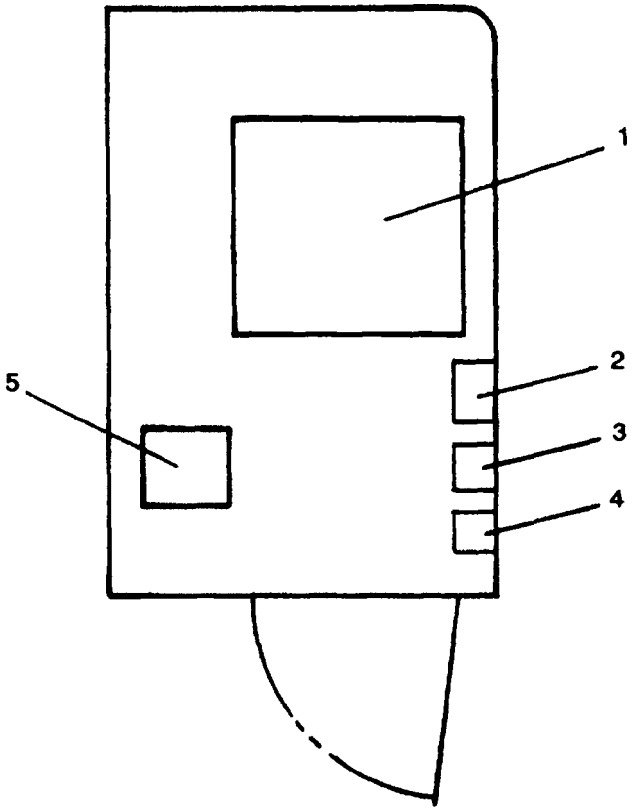
Figure 1-15. 01 Level Internal Features.

(b) *01 Level fan room (port) (Figure 1-16).* The 01 Level fan room contains the fan coil assemblies for the main deck (1), and the 01, 02, 03 levels (4) and the preheater (5) for the fan coil assembly (1). Controllers (2 and 3) provide control for this equipment and the galley preheater.

(c) *Officer's stateroom #2 (Figure 1-17).* Contains living accommodations for two officers, including two life jacket containers (1), refrigerator (3), intercom (above) with sound powered telephone (below) (4), clock (5), thermostat (6), and convection heater (2), providing heat in sanitary space.

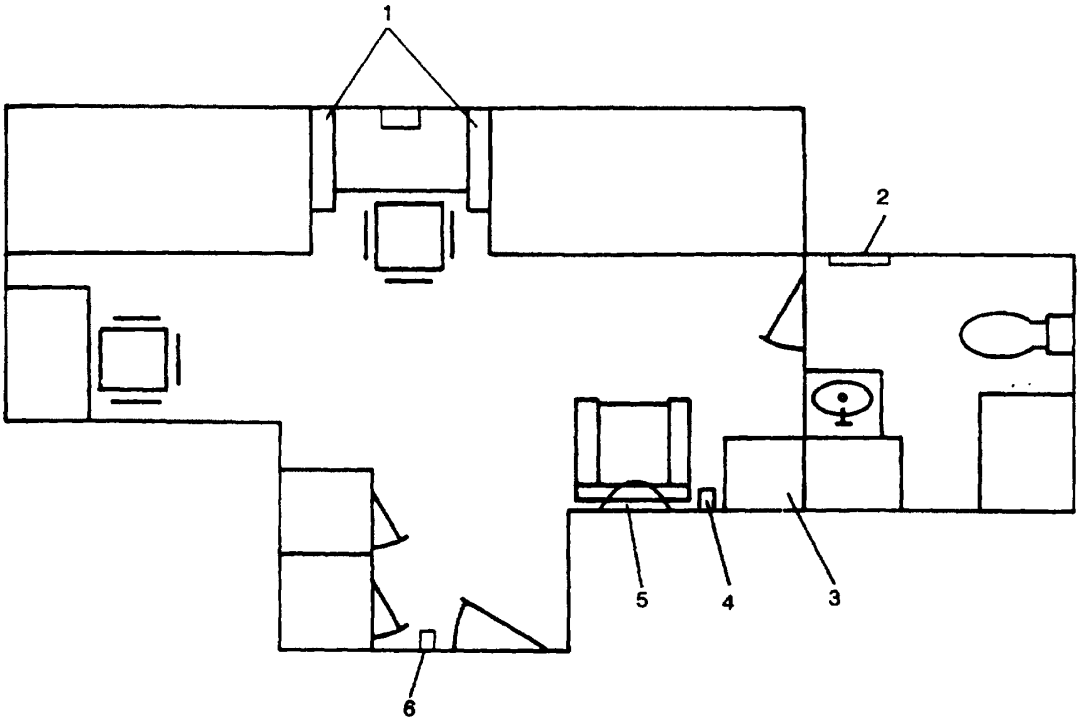
(d) *Fan space (Figure 1-18).* The fan space contains the supply fan for AMS 1 (1) and the exhaust fan for all sanitary spaces (2). The exhaust fan (4) controller and disconnect switch (3) are also provided.

(e) *Chief engineer's stateroom (Figure 1-19).* Contains living accommodations for the Chief Engineer including a sanitary space, refrigerator (above) with file cabinet with combination lock below (1), life jacket stowage (2), key cabinet (3), convection heater (4) intercom above with sound powered telephone below (5), thermostat (6) and clock (7).



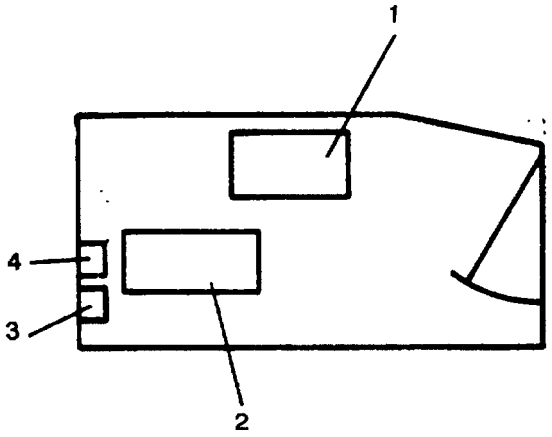
1. FAN COIL UNIT (R01-32-2)
2. HVAC SYSTEM CONTROLLER FOR RHTR 01-32-2
3. HVAC SYSTEM CONTROLLER FOR PREHTR 01-32-2
4. 01, 02 & 03 FAN COIL UNIT
5. PREHEATER

Figure 1-16. 01 Level Fan Room (Port).



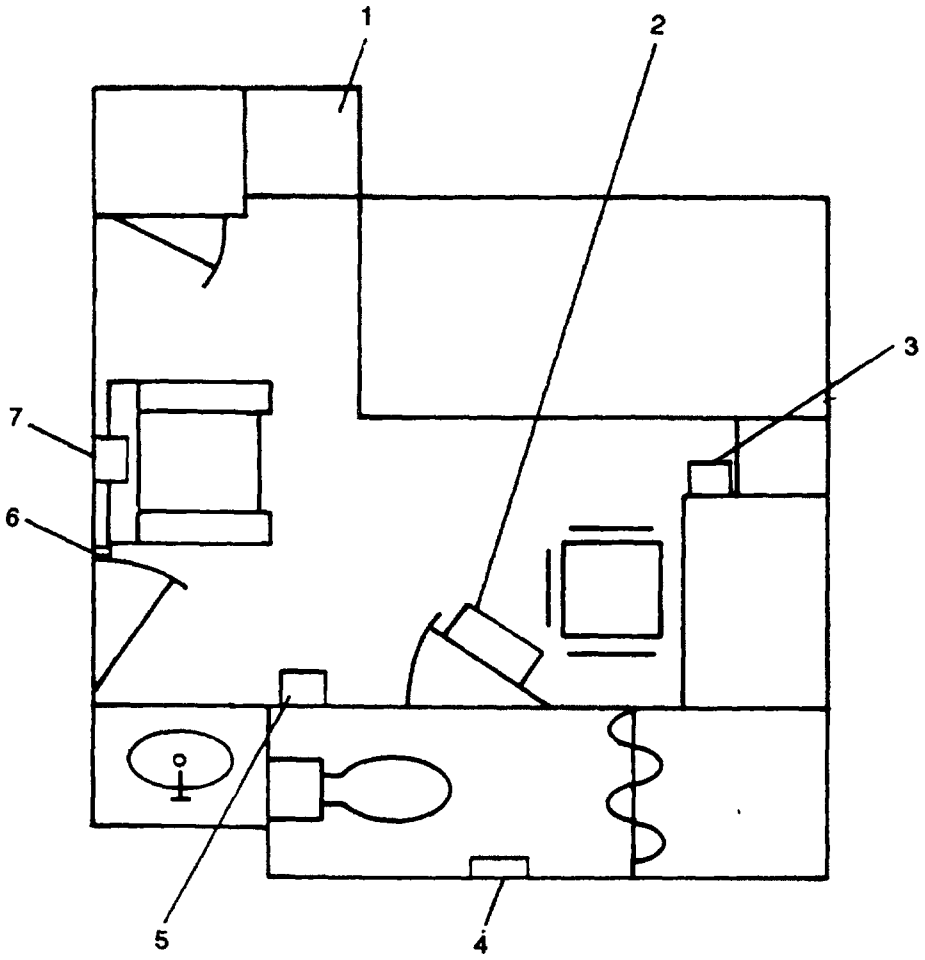
1. LIFE JACKET STOWAGE
2. CONVECTION HEATER
3. REFRIGERATOR (BULKHEAD)
4. INTERCOM (ABOVE) SOUND POWERED TELEPHONE (BELOW)
5. CLOCK
6. THERMOSTAT

Figure 1-17. Officers Stateroom #2.



1. AMS 1 SUPPLY FAN (S01-42-1)
2. SANITARY SPACES EXHAUST FAN (E01-44-2)
3. HVAC SYSTEM DISCONNECT SW FOR SUPPLY FAN 01-44-2
4. SANITARY SPACES EXHAUST FAN (E01-44-2) MOTOR CONTROLLER

Figure 1-18. Fan Space.



1. REFRIGERATOR (ABOVE) FILE CABINET WITH COMBINATION LOCK (BELOW)
2. LIFE JACKET STOWAGE
3. KEY CABINET
4. CONVECTION HEATER
5. INTERCOM (ABOVE) SOUND POWERED TELEPHONE (BELOW)
6. THERMOSTAT
7. CLOCK

Figure 1-19. Chief Engineer's Stateroom.

(f) *Captain's stateroom (Figure 1-20).* Contains living accommodations for the Vessel Master, including a sanitary space with convection heater (2), intercom with sound powered telephone below (1), life jacket container (3), key cabinet (4), refrigerator with file cabinet with combination lock below (5), clock (6), and thermostat (7).

(g) *Officer's stateroom #1 (Figure 1-21).* Contains living accommodations for two officers, including a sanitary space with convection heater (4), refrigerator (1), thermostat (2), clock (3), two life jacket stowage containers (5), and intercom with sound powered telephone below (6).

(h) *NCO Stateroom (Figure 1-22).* Contains living accommodations for two noncommissioned officers, including thermostat (1), clock (2), a life jacket container (3), and intercom (4).

(i) *Emergency generator room (Figure 1-23).*

1 *Natural vent louver (1).* Providesnatural air supply.

2 *Emergency switchboard (2).* Provides 450 Vac emergency power distribution.

3 *Fuel oil day tank (3).* Fuel oil day tank for emergency generator set (11).

4 *Intercom (above), with sound powered telephone (middle), telephone storage box (below) (4).*

5 *Battery box vent to atmosphere (5).*

6 *Emergency generator set (11).*

7 *Vent trunk (7).* Exhaust ducting from galley exhaust fan.

8 *Emergency diesel gen starting battery switch (8).* Provides convenient disconnect for emergency generator batteries.

9 *Battery charger (9).* Maintains chargeof emergency generator batteries.

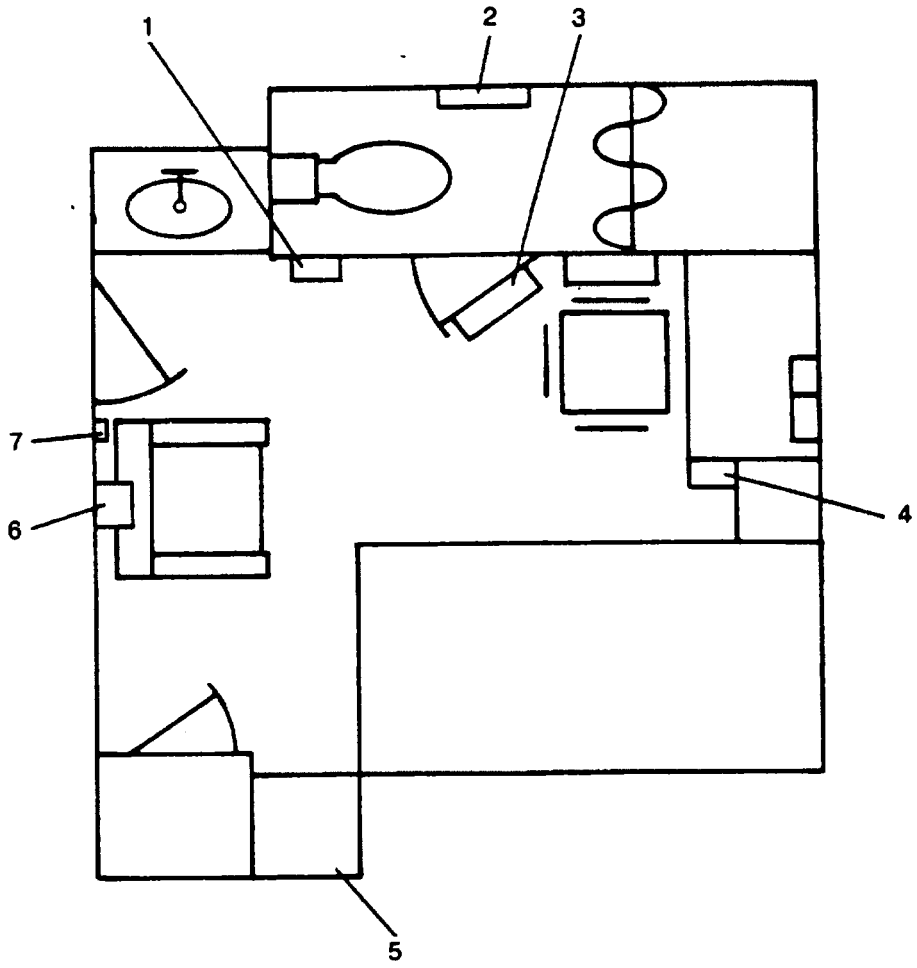
10 *Air intake supply vent (10).* Provides air intake for emergency generator set diesel engine radiator.

11 *Emergency generator set (11).* Battery started (24 Vdc), radiator cooled, diesel engine driven emergency generator provides emergency power to emergency switchboard (2).

12 *Transformers (overhead) (12).* Step down transformers provide 120 Vac power to emergency load center distribution panel (13).

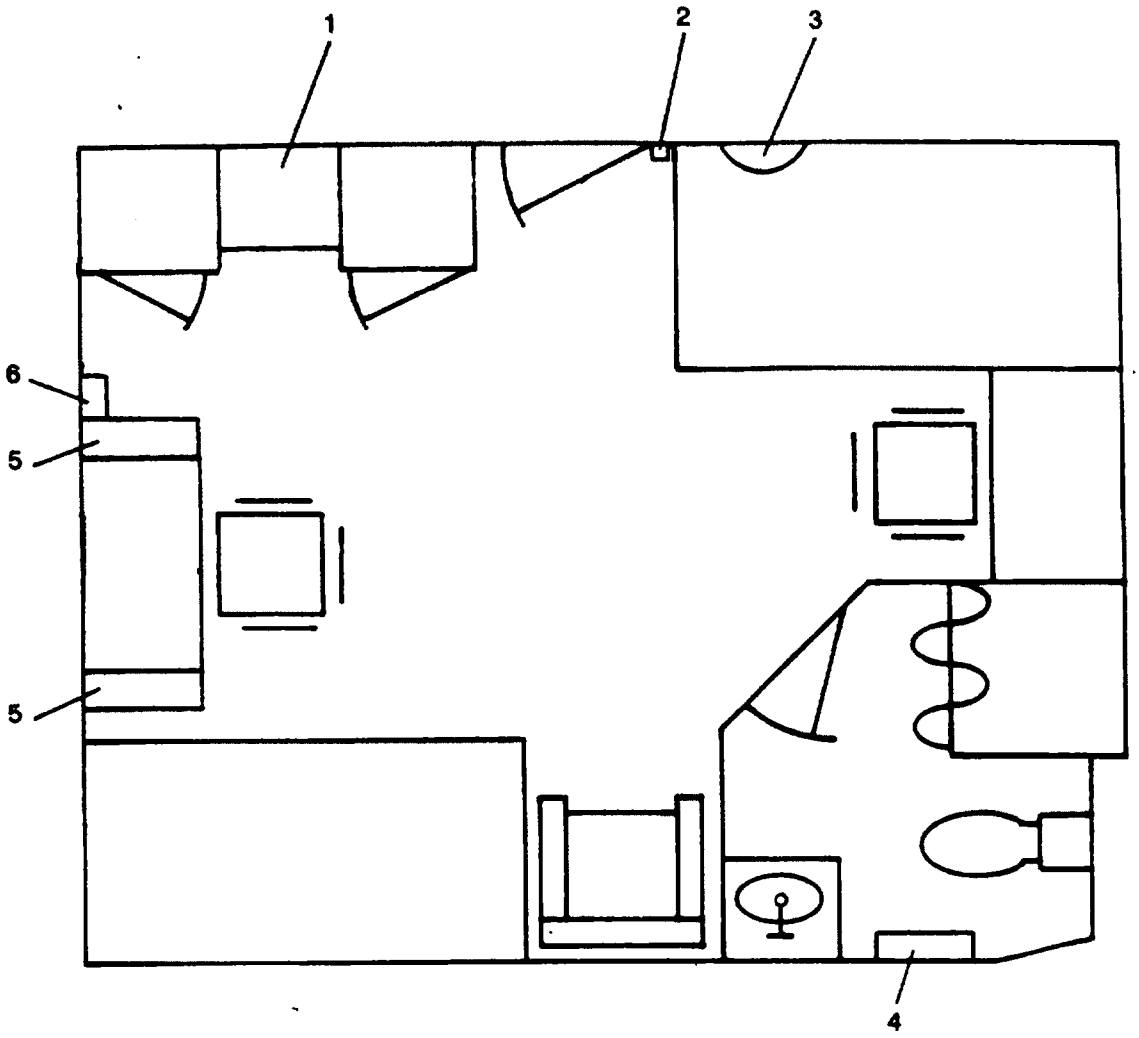
13 *EMER LOAD CTR DISTRIBUTION PANEL (13).* Provides 120 Vac emergency power distribution.

14 *Fire extinguisher (14).*



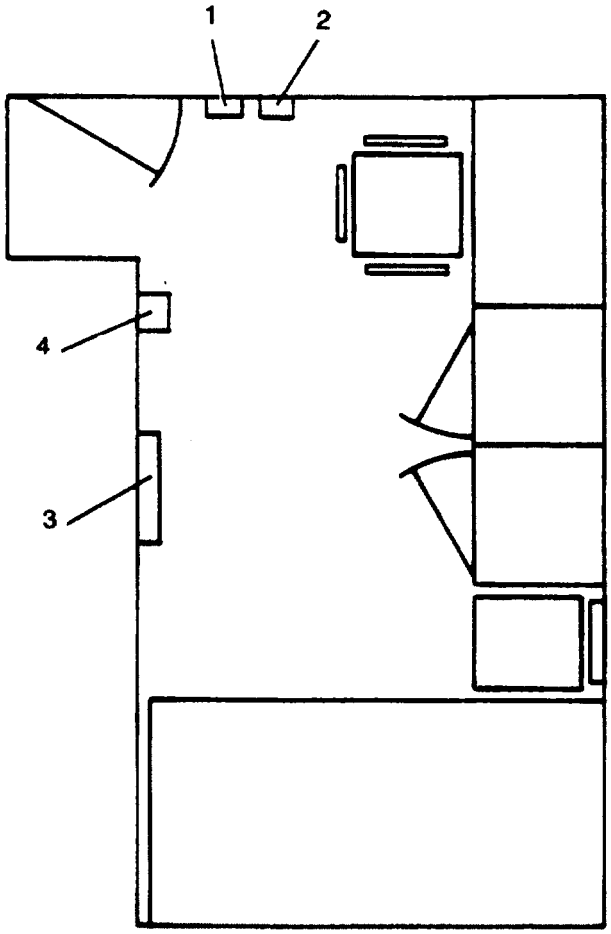
1. INTERCOM (ABOVE) SOUND POWERED TELEPHONE (BELOW)
2. CONVECTION HEATER
3. LIFE JACKET STOWAGE
4. KEY CABINET
5. REFRIGERATOR (ABOVE) FILE CABINET WITH COMBINATION LOCK (BELOW)
6. CLOCK
7. THERMOSTAT

Figure 1-20. Captain's Stateroom.



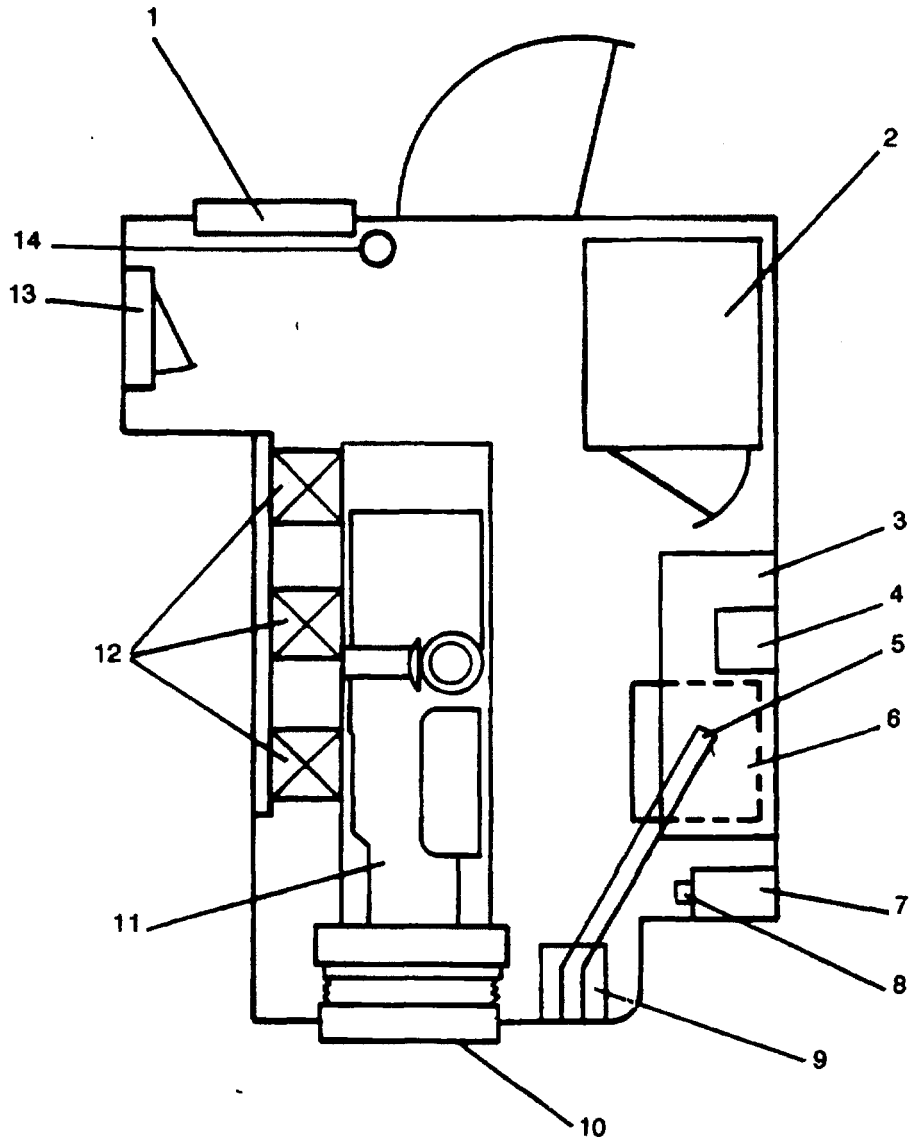
1. REFRIGERATOR (BULKHEAD)
2. THERMOSTAT
3. CLOCK
4. CONVECTION HEATER
5. LIFE JACKET STOWAGE
6. INTERCOM (ABOVE) SOUND POWERED TELEPHONE (BELOW)

Figure 1-21. Officer's Stateroom # 1.



1. THERMOSTAT
2. CLOCK
3. LIFE JACKET STOWAGE
4. INTERCOM

Figure 1-22. NCO Stateroom.



1. NATURAL VENT LOUVER
2. EMERGENCY SWITCHBOARD
3. FUEL OIL DAY TANK (OVERHEAD)
4. INTERCOM (ABOVE) SOUND POWERED TELEPHONE (MIDDLE) TELEPHONE STORAGE BOX (BELOW)
5. BATTERY BOX VENT TO ATMOSPHERE
6. BATTERY BOX
7. VENT TRUNK
8. EMERGENCY DIESEL GEN STARTING BATTERY SWITCH
9. BATTERY CHARGER
10. AIR INTAKE SUPPLY VENT
11. EMERGENCY GENERATOR SET
12. TRANSFORMERS (OVERHEAD)
13. EMER LOAD CTR DISTRIBUTION PANEL
14. FIRE EXTINGUISHER

Figure 1-23. Emergency Generator Room

(4) Main deck (Figure 1-24).

(a) General. Internal features of the main deck include:

1 Fan room (1). See paragraph (c) below

2 Foul weather gear locker (2). See paragraph (b) below.

3 Vestibule (3). Contains engine room halon pull boxes and HVAC and fuel oil transfer pumps emergency stops (36), shore power connection (37), and tow machinery control panel (38).

4 Stack (4). Contains engine exhaust and crankcase vents.

5 Mess/recreation space (5). See paragraph (d) below.

6 Sanitary space (61). Contains two sanitary facilities.

7 Convection heater (7) Electric heater to heat space.

8 Crew's stateroom #3 (8). See paragraph (e) below.

9 MN DK DIST PNL #3 (9). Provides power distribution for main deck interior lighting,receptacles, drinking fountain, Fuse Box-1, and Fuse Box-3.

10 MN DK HTR & REHTR FUSE BOX NO. 3 (10). Provides fuse protection for main deck reheaters.

11 Damage control locker (11). See paragraph (f) below.

12 Fire station no. 6 (12). Fire fighting station using seawater. Equipped with 50 feet of 1-1/2 inch hose with an all-purpose nozzle.

13 Laundry space (13). See paragraph (g) below.

14 Paint locker (14). See paragraph (g) below.

15 Boatswain's store (15). See paragraph (g) below.

16 Fire pull box (16).

17 Bosun store room/paint locker exhaust fans emergency stop 17).

18 Cleaning gear locker (18). See paragraph (g) below.

19 Linen locker (19). See paragraph (g) below.

20 Crew's stateroom no. 1 (20). See paragraph (h) below.

21 Crew's stateroom no. 2 (21). See paragraph (i) below.

22 Life jacket locker (22). Located under ladder, provides storage for life jackets.

23 Fire extinguisher (23).

24 Crew's stateroom #4 (24). See paragraph (j) below.

25 General alarm bell (25).

26 AMS # 1 Watertight door remote hand pump (bulkhead) (26). Hand pump to close AMS #1 watertight door.

27 Galley (27). See paragraph (k) below.

28 Scuttle (escape hatch) (28). Provides emergency escape from EOS.

29 Walk-in freezer (29). See paragraph (k) below.

30 Thaw room (30). See paragraph (k) below.

31 Chill box (31). See paragraph (k) below.

32 Fire axe (32).

33 First aid kit (33).

34 AMS #2 Watertight door remote handpump (bulkhead) (34). Hand pump to close AMS #2 watertight door.

35 Life iacket stowage (35).

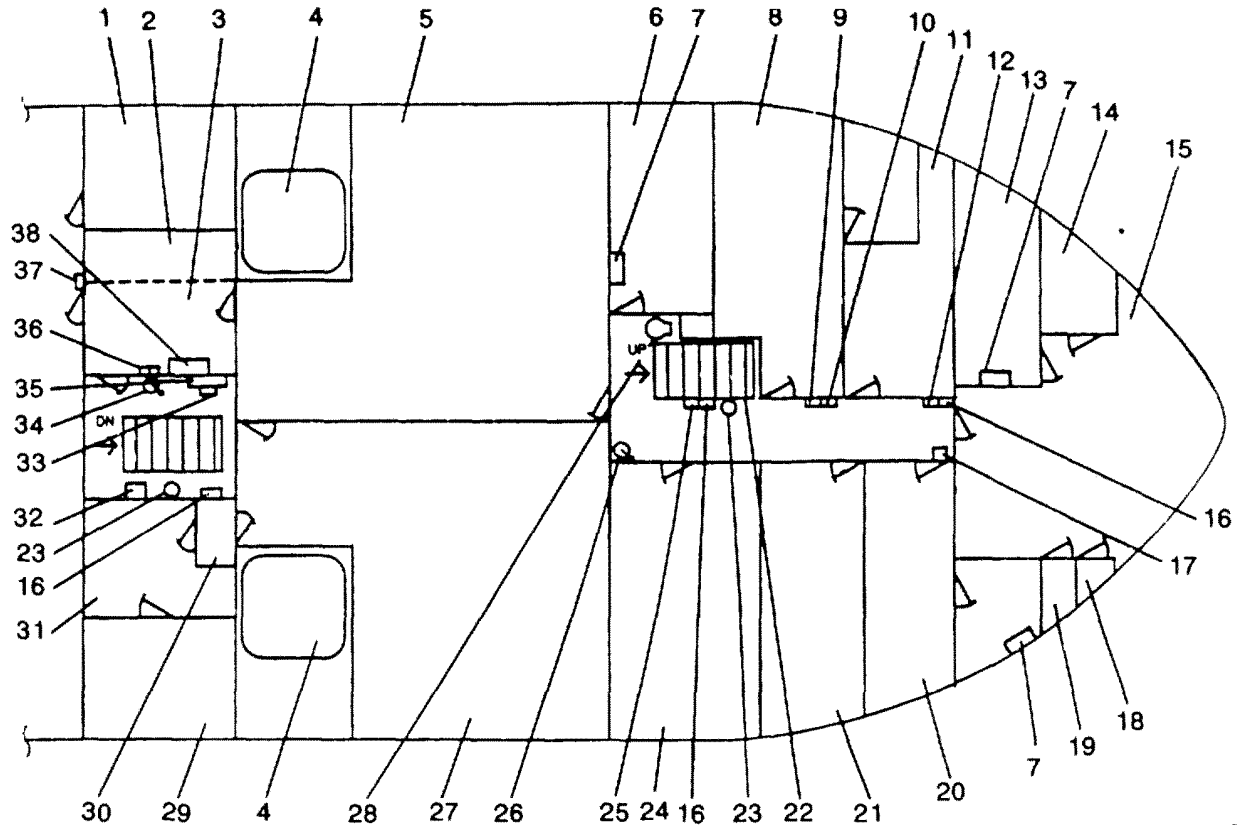
36 Engine room HALON pull boxes (above). HVAC System Emer. Stop. FO XFER Pump Emer Stop (below) (36). Remote pull boxes for activating engine room HALON system above and emergency stop boxes for engine room HVAC and fuel oil transfer pumps below.

NOTE

Not applicable to Hull No. LT801, LT804, LT805. Reference Para. 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment details and installation drawings.

37 Shore power connection (37).

38 Tow machinery control panel (38). Panel containing circuitry for tow machinery.



MAIN DECK

1. FAN ROOM
2. FOUL WEATHER GEAR LOCKER
3. VESTIBULE
4. STACK
5. MESS/RECREATION SPACE
6. SANITARY SPACE
7. CONVECTION HEATER
8. CREW'S STATEROOM NO. 3
9. MN DK DIST PNL #3
10. MN DK HTR & REHTR FUSE BOX NO. 3
11. DAMAGE CONTROL LOCKER
12. FIRE STATION NO. 6
13. LAUNDRY SPACE
14. PAINT LOCKER
15. BOATSWAIN'S STORE
16. FIRE PULL BOX
17. BOSUN STORE/PAINT LOCKER EXH FAN EMER STOP
18. CLEANING GEAR LOCKER
19. LINEN LOCKER
20. CREW'S STATEROOM NO. 1
21. CREW'S STATEROOM NO. 2
22. LIFE JACKET LOCKER
23. FIRE EXTINGUISHER
24. CREW'S STATEROOM NO. 4
25. GENERAL ALARM BELL
26. AMS NO. 1 WATERTIGHT DOOR REMOTE HAND PUMP (BULKHEAD)
27. GALLEY
28. SCUTTLE (ESCAPE HATCH)
29. WALK IN FREEZER
30. THAW ROOM
31. CHILL BOX
32. FIRE AXE
33. FIRST AID KIT
34. AMS NO. 2 WATERTIGHT DOOR REMOTE HAND PUMP (BULKHEAD)
35. LIFE JACKET STOWAGE
36. ENGINE ROOM HALON PULL BOXES (ABOVE), HVAC SYSTEM EMER STOP, FO XFER PUMP EMER STOP (BELOW)

NOTE

Not applicable to Hull No. LT801, LT804, LT805. Reference Para. 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment details and installation drawings.

37. SHORE POWER CONNECTION
38. TOW MACHINERY CONTROL PANEL

Figure 1-24. Main Deck Internal Features.

(b) Foul weather gear locker (Figure 1-25).

1 Foul weather rear stowage (1). Stowage for twenty foul weather gear suits.

2 Survival suit stowage (2). Stowage for twenty survival gear suits.

(c) Main deck fan room (PORT) (Figure 1-26).

1 Preheater (1). Electric preheater preheats outside air to fan coil unit (5) as required.

2 Reheater controller (2). Controller for preheater (9).

3 Preheater controller (1-23-2) (3). Controller for one preheater (1).

4 Preheater controller (1-23-4). Controller for one preheater (1).

5 Fan coil unit (R 1-25-2) (overhead) (51). Circulating fan for main deck spaces. Includes an air conditioning coil for cooling.

6 Crew's mess fan coil unit controller (R1-25-2) (6). Provides control of fan coil unit (5).

7 Galley supply fan motor controller (S1-22-4) (7). Motor controller for galley new supply fan (11).

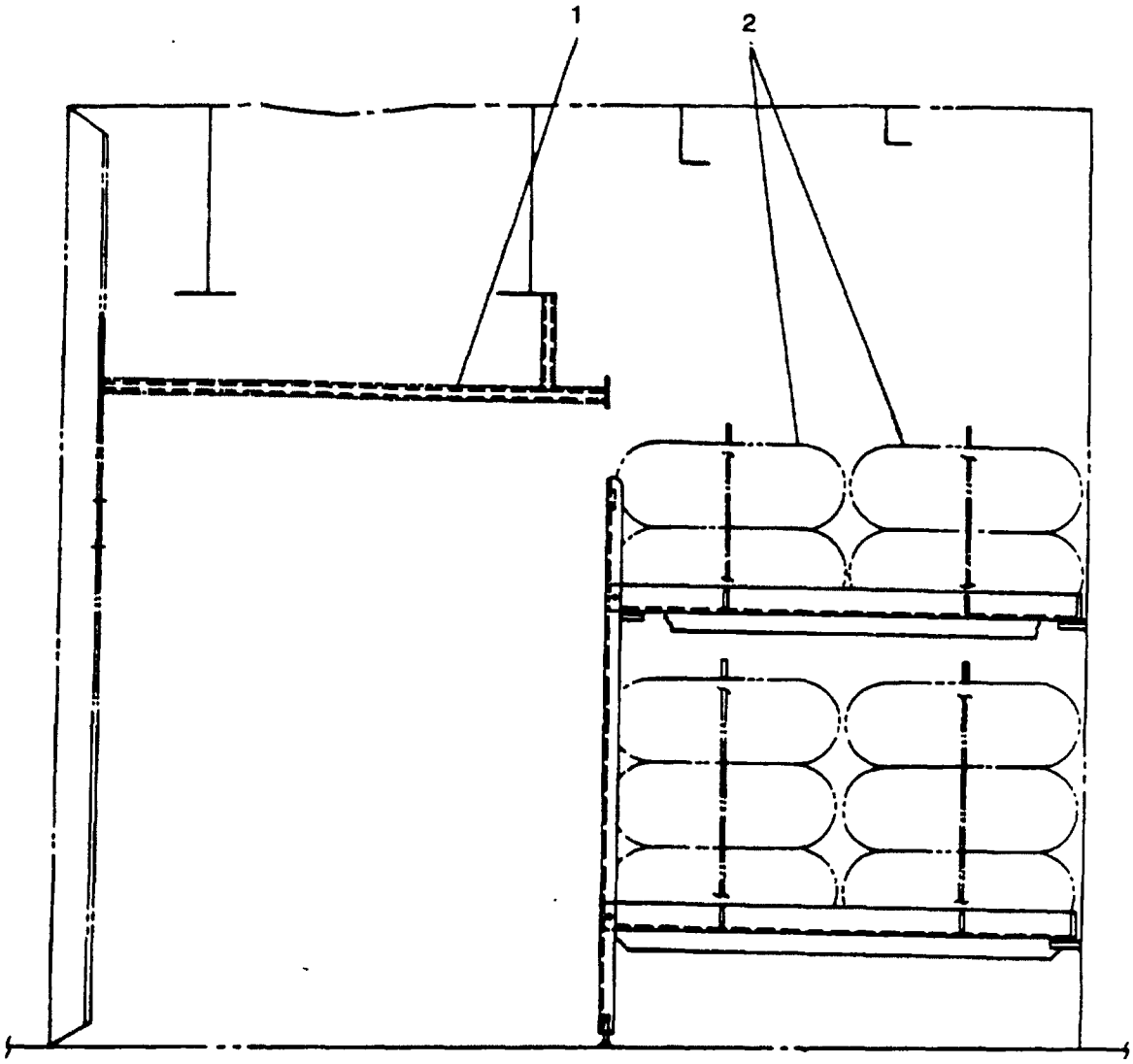
8 AMS 2 supply fan motor controller (S1-22-2) (8). Motor controller for AMS 2 supply fan (11).

9 Reheater (9). Reheats interior air recirculated to fan coil unit.

10 Galley ventilator supply fan (10). Vaneaxial fan providing makeup air for galley ventilator hood.

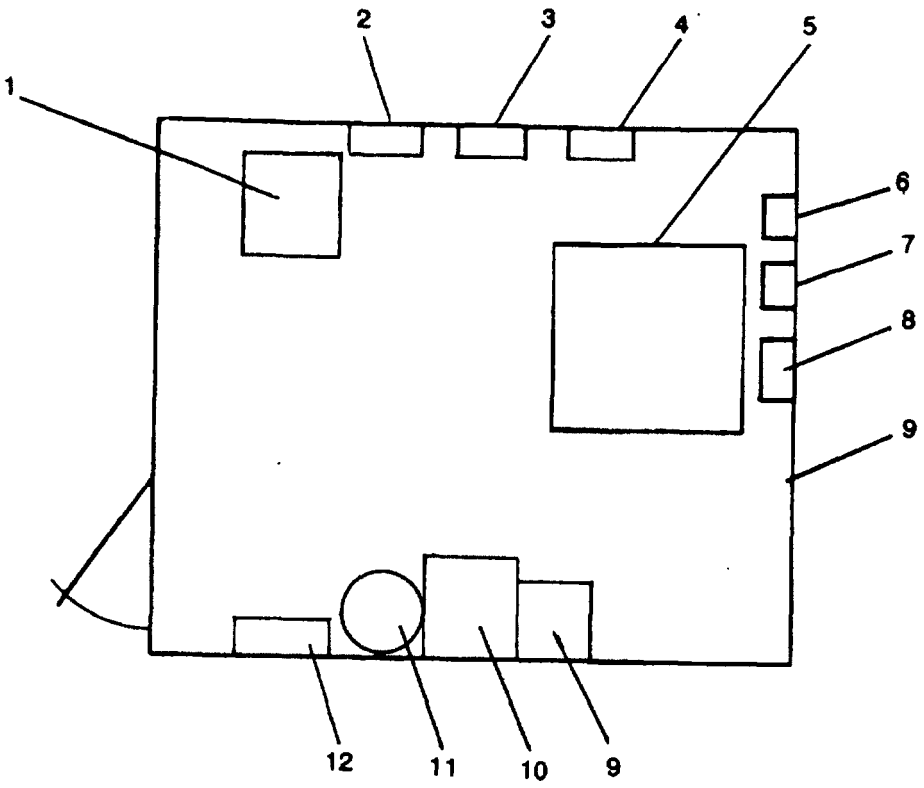
11 AMS 2 supply fan (S1-22-2) (11). Vaneaxial fan providing forced air supply for AMS 2

12 Steering gear oil reservoir (12). Reservoir (15.75 gal) with sight glass supplies steering gear hydraulic system.



1. FOUL WEATHER SUIT STOWAGE
2. SURVIVAL SUIT STOWAGE

Figure 1-25. Foul Weather Gear Locker.



1. PREHEATER (1-23-2) (overhead)
2. REHEATER CONTROLLER (1-25-2)
3. PREHEATER (1-23-2) CONTROLLER
4. PREHEATER (1-23-4) CONTROLLER
5. FAN COIL UNIT (1 -25-2) (OVERHEAD)
6. CREW'S MESS FAN COIL UNIT (R1-25-2) CONTROLLER
7. GALLEY SUPPLY FAN (S1-22-4) MOTOR CONTROLLER
8. AMS 2 SUPPLY FAN (S1-22-2) MOTOR CONTROLLER
9. REHEATER (1-23-4)
10. GALLEY SUPPLY FAN (S1-22-2)
11. AMS #2 SUPPLY FAN S1-22-2
12. STEERING GEAR OIL RESERVOIR

Figure 1-26. Main Deck Fan Room (Port).

1 01.01 & MN DK EMER LTG PANEL NO. 1 (1). Provides power distribution for main deck, 01, and 02 level emergency interior lighting and radio room and arms control room alarms.

2 Fire station #5 (2). Fire fighting station using seawater. Equipped with 50 feet of 1-1/2 hose with an all-purpose nozzle.

3 Thermostat (3).

4 Pencil sharpener (4).

5 Remote valve operator LO-15.

(5). Reach rod controller for LO-15. LUBO STOR. TK. OUT.

6 TV and VCR (6).

7 Bulletin board (7).

8 Thermostat (8).

9 Intercom (9). Used for intraship communication.

10 Sound powered telephone (10). Used for intraship communication.

11 Clock (11).

12 General alarm bell (above) and drinking fountain (below) (12).

13 Main deck ,cower panel # 3 (13). Provides power for main deck, 01, and 02 level HVAC equipment.

14 Galley supply fan and crews mess fancoil unit emergency stop (14).

15 Cutlery dispenser with cabinet (15).

16 Serving line (16). Adjacent to roll-up window, the serving line provides a tray rail for cafeteria style serving.

17 Mini refrigerator and with ice maker (under) (17).

18 Milk dispenser (18).

19 Beverage dispenser (19).

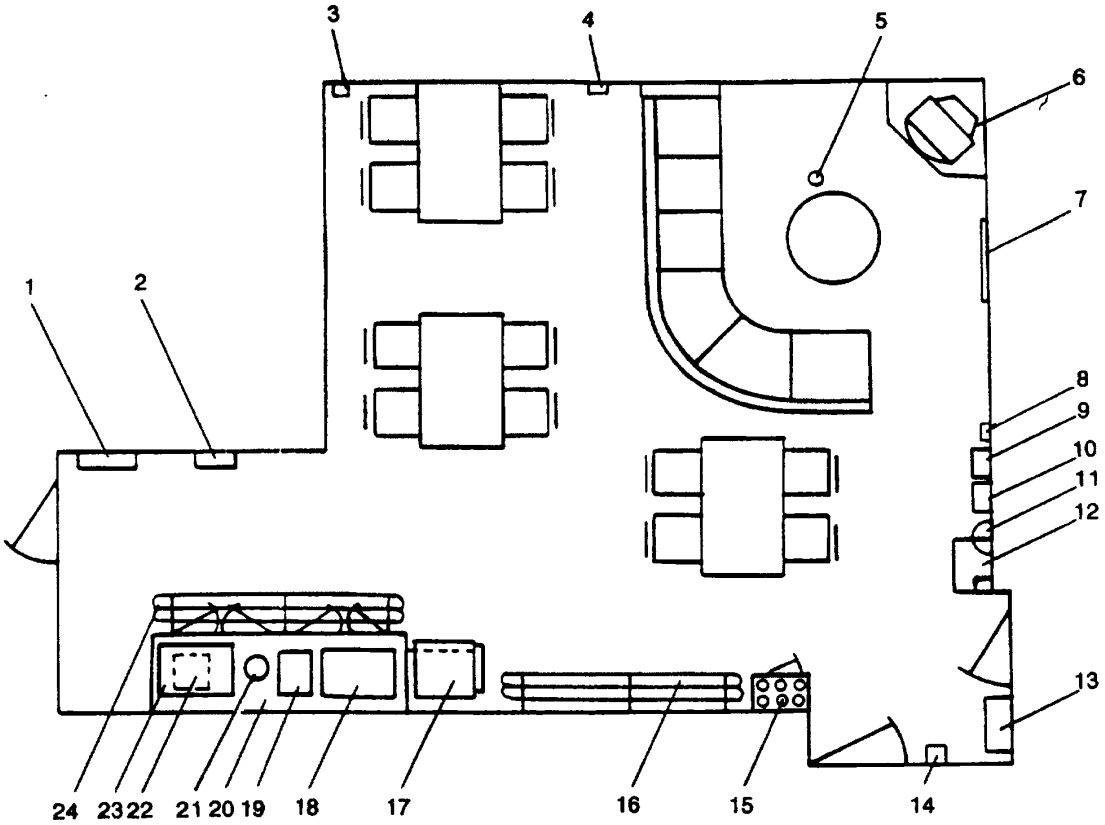
20 Cabinet (under) (20).

21 Coffee percolator (21).

22 Toaster (countertop) (22).

23 Microwave (over) (23).

24 Serving line (24). Provides tray rail in front of self-service beverage facilities.



1. 01, 02, AND MN DK EMER LTG PANEL NO. 1
2. FIRE STATION #5
3. THERMOSTAT
4. PENCIL SHARPENER
5. REMOTE VALVE OPERATOR - LO-15
6. TV WITH VCR (UNDER)
7. BULLETIN BOARD
8. THERMOSTAT
9. INTERCOM
10. SOUND POWERED TELEPHONE
11. CLOCK
12. GENERAL ALARM BELL (ABOVE) DRINKING FOUNTAIN (BELOW)
13. MAIN DECK POWER PANEL NO. 3
14. GALLEY SUPPLY FAN/CREW'S MESS FAN COIL UNIT EMER STOP
15. CUTLERY DISPENSER WITH CABINET (UNDER)
16. SERVING LINE
17. MINI-REFRIGERATOR WITH ICE MAKER (UNDER)
18. MILK DISPENSER
19. BEVERAGE DISPENSER
20. CABINET (UNDER)
21. COFFEE PERCOLATOR
22. TOASTER (COUNTER TOP)
23. MICROWAVE (OVER) (BULKHEAD)
24. SERVING LINE

Figure 1-27. Mess/Recreation Space.

(e) Crew's stateroom #3 (Figure 1-28). Contains living accommodations for four crew members including convection heater (1), intercom with sound powered telephone (below) (2), four life jacket containers (3), clock (4), and thermostat (5).

(f) Damage control locker (Figure 1-29). Internal arrangement of the damage control locker includes:

1 Shelves (1). Provides stowage for damage control lumber and equipment.

2 Sound cowered telephone system call terminal box (2).

3 Escape hatch (3). Provides emergency escape from AMS No. 1.

4 Fire axe (4).

5 Sound powered telephone (5). Used for intraship communications.

6 Desk (6).

(g) Main deck forward spaces (Figure 1-30).

1 Locker (1).

2 Laundry space (2).

3 Iron and ironing board (3).

4 Shelves (4).

5 Work table (5).

6 Paint locker (6).

7 Remote valve operator, BB-10 (7). Reach rod for operation of BB10, OVBD DISCH BILGE EDUC.

8 Paint locker HALON pull box (8). Provides manual activation of paint locker HALON system.

NOTE

Not applicable to Hull No. LT801, LT804, LT805. Reference Para. 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment details and installation drawings.

9 Paint locker HALON cylinders (9).

10 Fire extinguisher (10).

11 Paint locker exhaust fan E01-62-2 (11).

12 Hawse pipes (12). Guides chain from anchor windlass to anchor pocket.

13 Paint mixer (13).

14 General alarm bell (14).

15 Paint mixer switch (15).

16 Boatswain's store, paint locker, and laundry supply fan (S01-58-1) (16).

17 Cleaning gear locker (with shelves) (17). Locker for storage of cleaning supplies.

18 Remote valve operator. BB-12 (18). Reach rod for operation of BB12, BLST TK NO. 1 SUCT COV.

19 Linen locker (with shelves) (19). Locker for storage of clean linen.

20 Preheater switch 1-57-1 (overhead) (20).

21 Hatch (21). Provides exit to 01 level forward weather deck.

22 Fire axe (22).

23 Vertical ladder (23). Provides access to 01 level forward weather deck.

24 Ballast tank No. 11 and chain locker (24).

25 Bosun store room supper fan controller and HVAC control (25).

26 Quick action hatch (26). Provides access to bow thruster compartment.

27 Chain pipes (23). Guides chain from anchor windlass to chain locker.

28 Paintlocker exhaust fan controller (28).

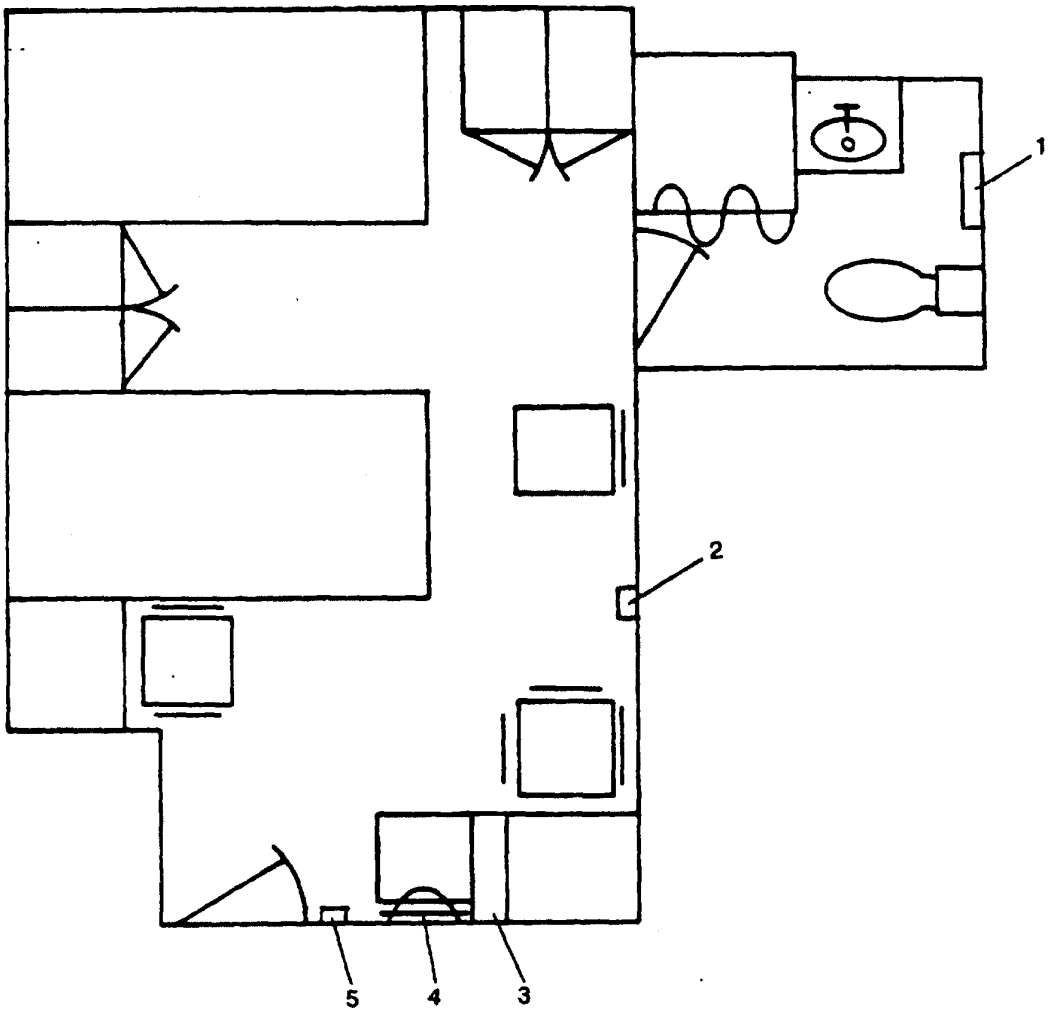
29 Space heater (29).

30 Laundry tubs (30).

31 Washer (31).

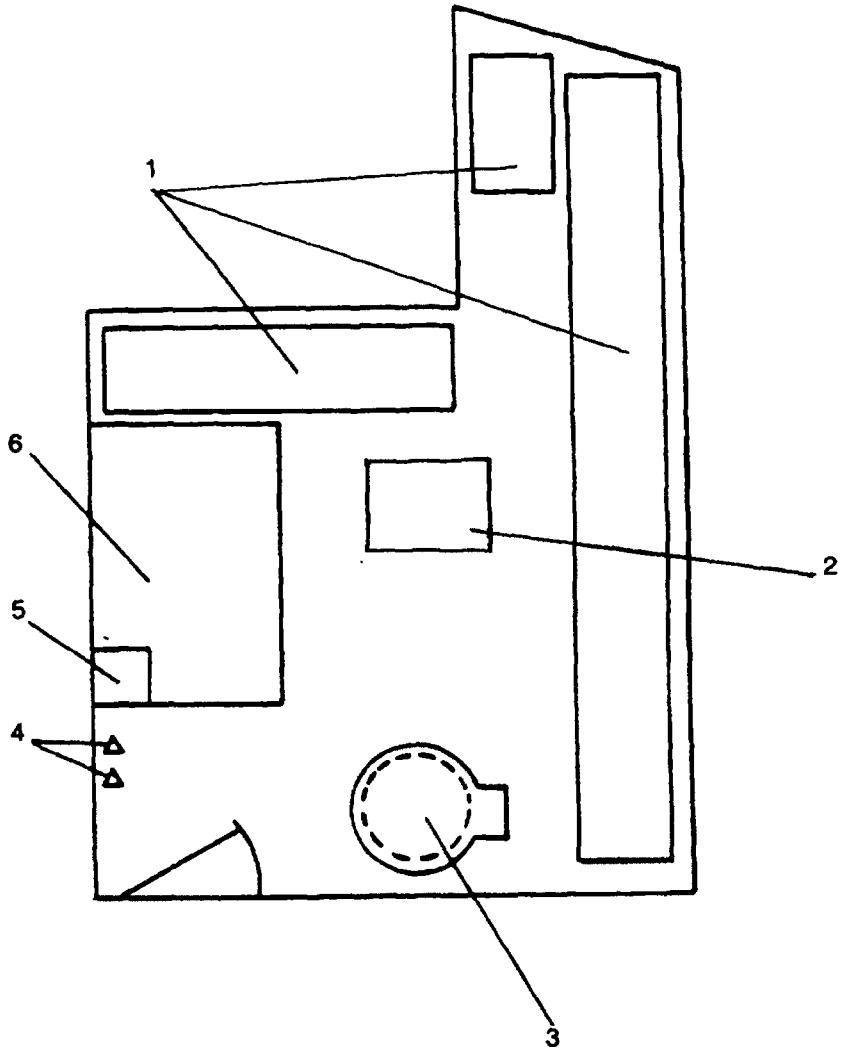
32 Dryer (32).

33 *Boatswain's locker (33).*



1. CONVECTION HEATER
2. INTERCOM (ABOVE) SOUND POWERED TELEPHONE (BELOW)
3. LIFE JACKET STOWAGE
4. CLOCK
5. THERMOSTAT

Figure 1-28. Crew's Stateroom #3.



1. SHELVES
2. SOUND POWERED TELEPHONE SYSTEM CALL TERMINAL BOX
3. ESCAPE HATCH
4. FIRE AXE
5. SOUND POWERED TELEPHONE
6. DESK

Figure 1-29. Damage Control Locker.

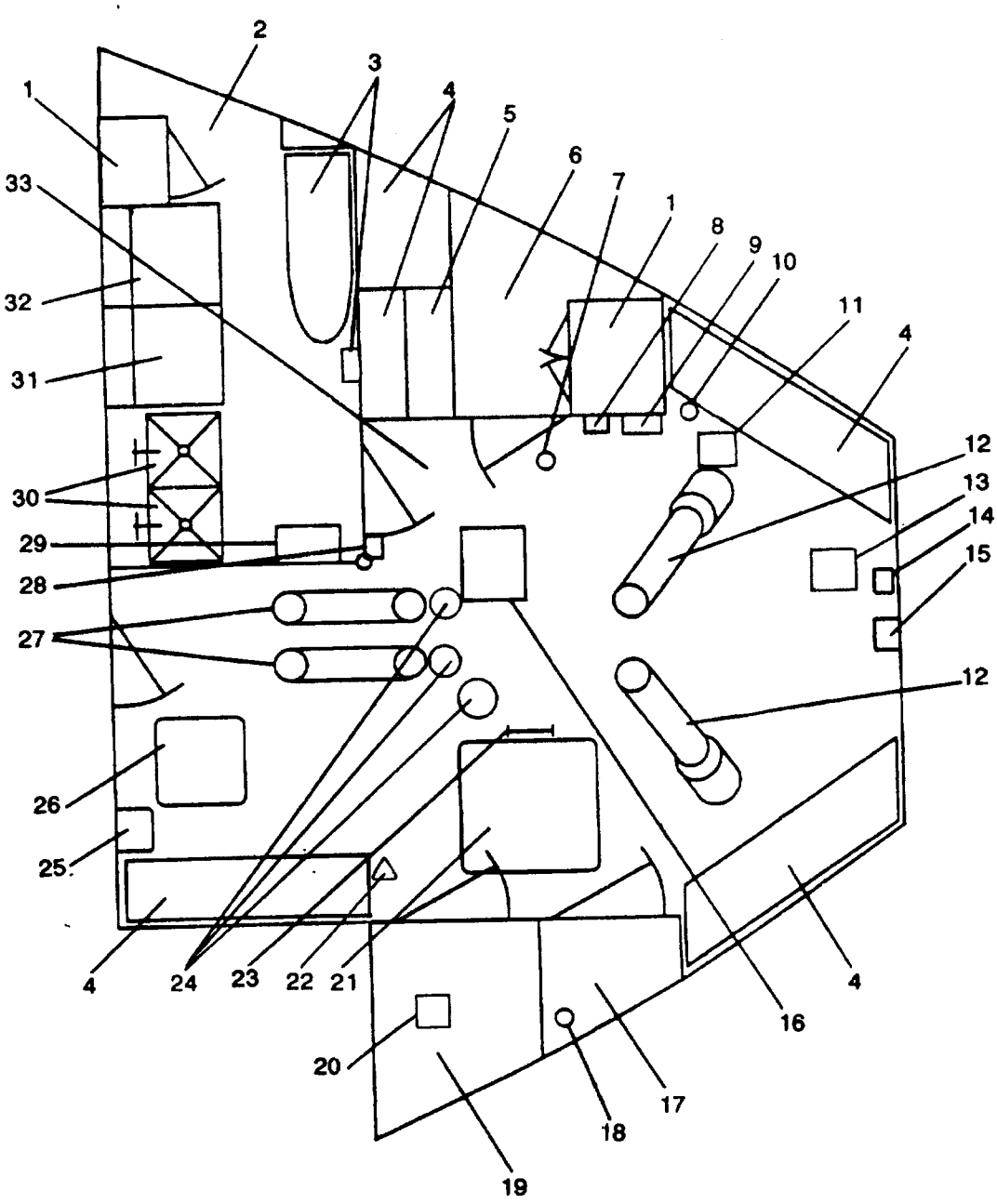


Figure 1-30. Main Deck Forward Spaces (Sheet 1 of 2).

1. LOCKER
2. LAUNDRY SPACE
3. IRON AND IRONING BOARD
4. SHELVES
5. WORK TABLE
6. PAINT LOCKER
7. REMOTE VALVE OPERATOR, BB-10
8. PAINT LOCKER HALON PULL BOX
9. PAINT LOCKER HALON CYLINDERS
10. FIRE EXTINGUISHER
11. PAINT LOCKER EXHAUST FAN E01-62-2
12. HAWSE PIPES
13. PAINT MIXER
14. GENERAL ALARM BELL
15. PAINT MIXER SWITCH
16. BOATSWAIN'S STORE, PAINT LOCKER, AND LAUNDRY SUPPLY FAN S01-58-1
17. CLEANING GEAR LOCKER (WITH SHELVES)
18. REMOTE VALVE OPERATOR, BB-12
19. LINEN LOCKER (WITH SHELVES)
20. PREHEATER SWITCH 1-57-1 (OVERHEAD)
21. HATCH(OVER)
22. FIRE AXE
23. VERTICAL LADDER
24. BALLAST TANK NO. 1 AND CHAIN LOCKER
25. BOSUN STORE ROOM SUPPLY FAN CONTROLLER (ABOVE), HVAC CONTROL (BELOW)
26. QUICK ACTION HATCH
27. CHAIN PIPES
28. PAINT LOCKER EXHAUST FAN CONTROLLER
29. SPACE HEATER
30. LAUNDRY TUBS
31. WASHER
32. DRYER
33. BOATSWAIN'S LOCKER

Figure 1-30. Main Deck Forward Spaces (Sheet 2 of 2).

(h) *Crew's stateroom #1 (Figure 1-31).* Contains living accommodations for two crew members, including sanitary space with convection heater (4), clock (1), thermostat (2), intercom (3), and two life jacket containers (5).

(i) *Crew's stateroom #2 (Figure 1-32).* Contains living accommodations for four crew members, including thermostat (1), clock (2), intercom (3), and four life jacket containers (4).

(j) *Crew's stateroom #4 (Figure 1-33).* Contains living accommodations for four crew members, including thermostat (1), clock (2), two life jacket containers (3), and intercom (4).

(k) *Galley (Figure 1-34).* Equipment contained within the galley includes:

1 *Fan coil unit (1).* One unit provides cooling capability for chill box (2) and a second for walkin freezer (47).

2 *Chill box (2).* Walk-in refrigerator.

3 *Shelves (3).* Used for storage.

4 *Thaw room (4).* Used to thaw frozen foods.

5 *Freezer alarm switch (5).*

6 *Freeze box alarm, freeze box timer, heater connector and disconnect switches (6).*

7 *Ships storage refrigerator freezer system defrost heater controller (7).*

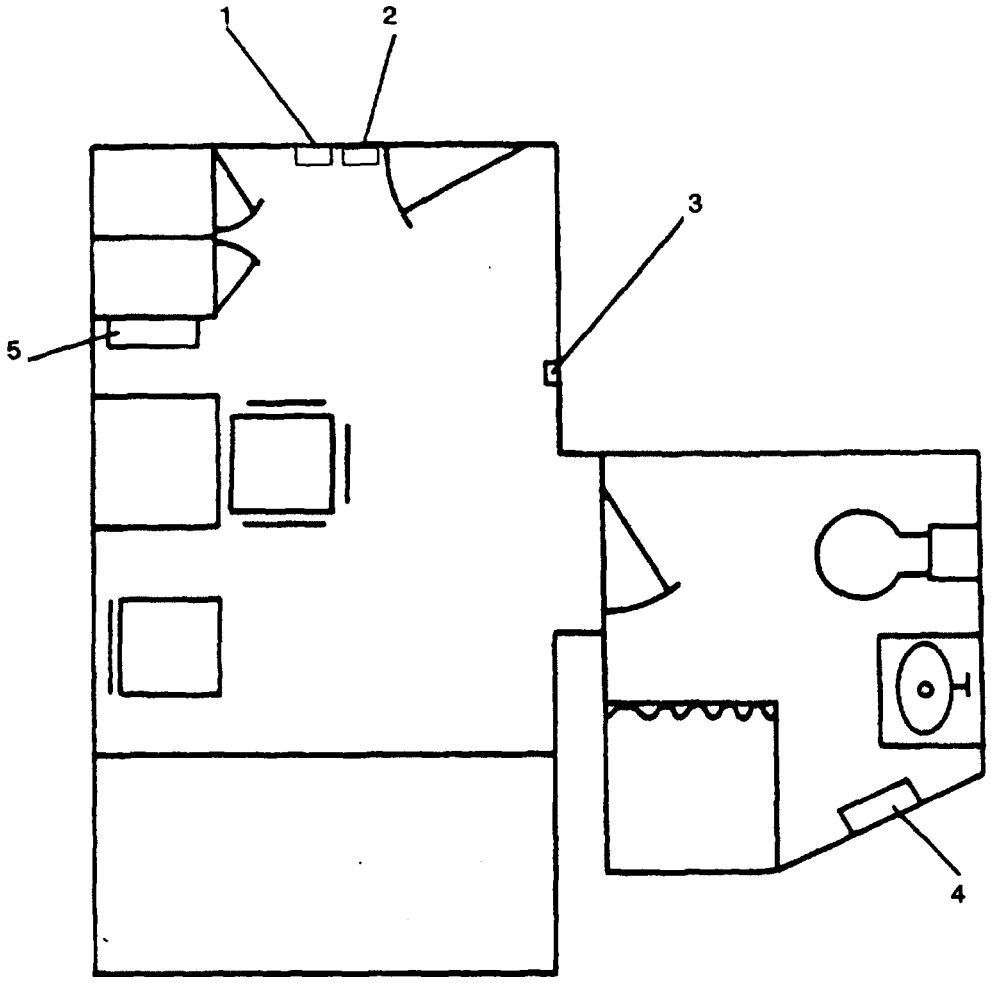
8 *Trash compactor and safe (above) (8).* Reduces volume of trash.

9 *Escape hatch (9).* Emergency escape from engine room.

10 *Freezer (10).* Used for frozen day stores.

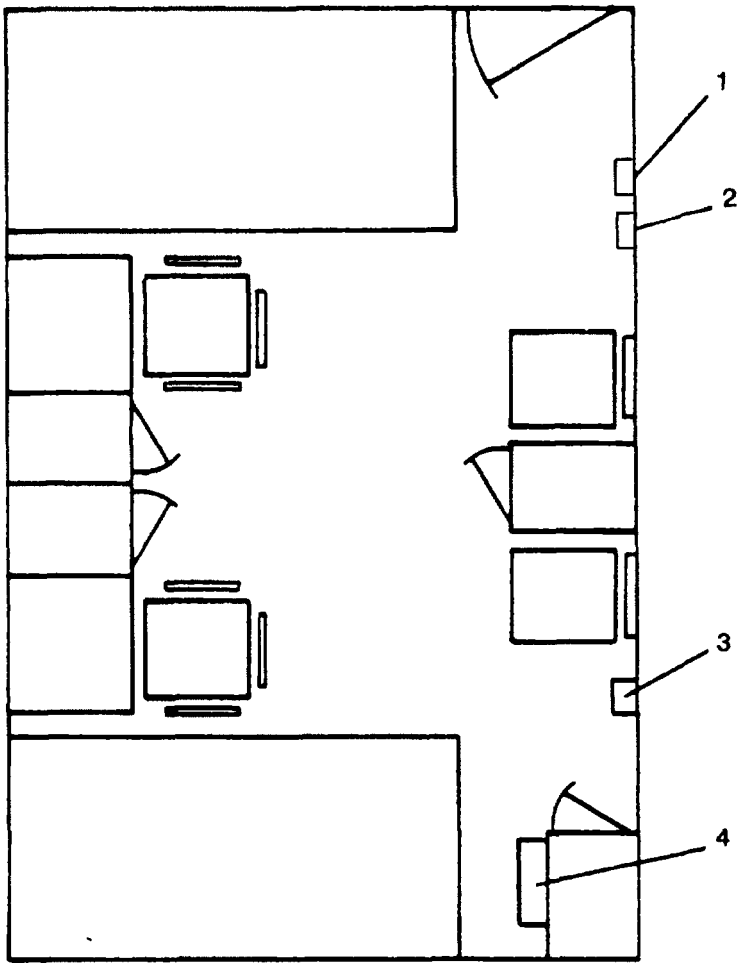
11 *Sound powered telephone and thermostat (above) and fire extinguisher(below) (11).*

12 *Refrigerator (12).* Used for day stores requiring refrigeration.



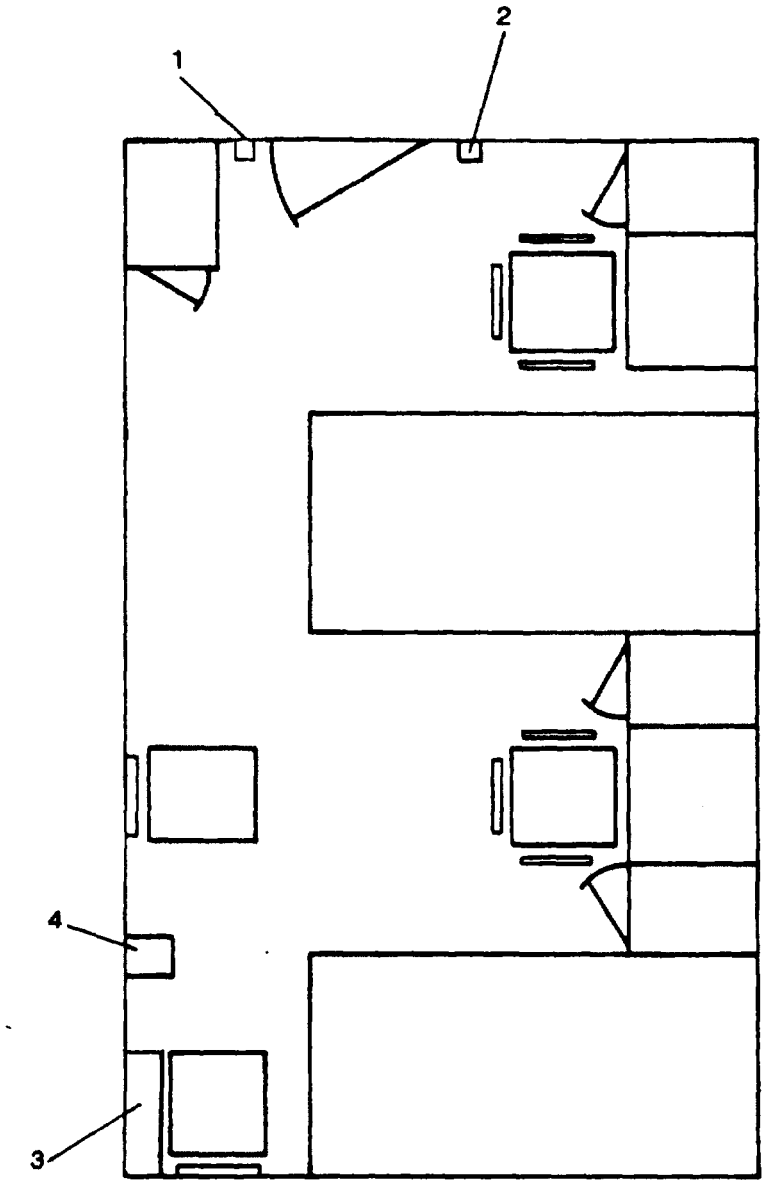
1. CLOCK
2. THERMOSTAT
3. INTERCOM
4. CONVECTION HEATER
5. LIFE JACKET STOWAGE

Figure 1-31 . Crew's Stateroom # 1.



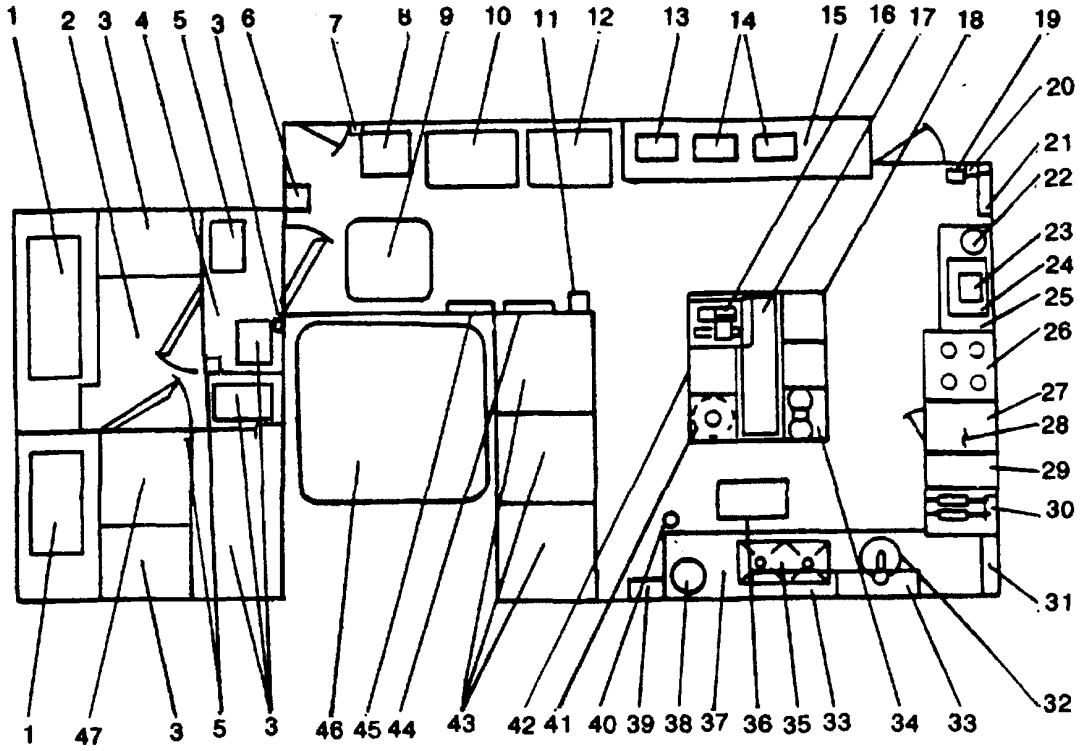
1. THERMOSTAT
2. CLOCK
3. INTERCOM
4. LIFE JACKET STOWAGE

Figure 1-32. Crew's Stateroom #2.



1. THERMOSTAT
2. CLOCK
3. LIFE JACKET STOWAGE
4. INTERCOM

Figure 1-33. Crew's Stateroom #4.



1. FAN COOL UNIT (SHELVES UNDER)
2. CHILL BOX
3. SHELVES
4. THAW ROOM
5. FREEZER ALARM SWITCH
6. FREEZE BOX ALARM, FREEZE BOX TIMER, HEATER CONNECTOR, AND DISCONNECT SWITCHES
7. SHIPS STORAGE REFRIGERATOR FREEZER SYSTEM DEFROST HT CONTROLLER
8. TRASH COMPACTOR, SAFE (ABOVE)
9. ESCAPE HATCH
10. FREEZER
11. SOUND POWERED TELEPHONE AND THERMOSTAT (ABOVE) FIRE EXTINGUISHER (BELOW)
12. REFRIGERATOR
13. COLD WELL
14. HOT WELL
15. STEAM TABLE
16. MEAT SLICER WITH SHELVES (UNDER)
17. SHELF (OVER)
18. COUNTER WITH DRAWERS/ CABINET (UNDER)
19. FIRE PULL BOX
20. PENCIL SHARPENER
21. GALLEY 460V POWER PNL NO. 2
22. COFFEE PERCOLATOR
23. TOASTER
24. MICROWAVE
25. DRESSER WITH CABINET (UNDER)
26. RANGE
27. GRIDDLE WITH CABINET (UNDER)
28. VENTILATOR HOOD (OVER)
29. COUNTER WITH DRAWERS
30. FRYER
31. VENTILATOR CONTROL CABINET WITH FIRE PULL BOX
32. MIXER
33. SHELF (OVER AND UNDER)
34. BAKER'S SCALE WITH DRAWERS (UNDER)
35. DOUBLE SINK WITH GARBAGE DISPOSER (UNDER)
36. VENTILATOR HOOD EXHAUST FAN (OVERHEAD)
37. DISHWASHER (UNDER)
38. PEELER
39. GALLEY EXHAUST FAN CONTROL PANEL
40. REMOTE VALVE OPERATOR - FO-15
41. COUNTER TOP WITH TRASH CAN (UNDER)
42. COUNTER TOP WITH SHELVES (UNDER)
43. DRY PROVISIONS STORAGE
44. 220/110V DISTRIBUTION PANEL
45. GALLEY 120V DIST PANEL NO. 1
48. STACK
47. WALK-IN FREEZER

Figure 1-34. Galley.

13 *Cold well (13).* Used when serving salads and other cold food.

14 *Hot well (14).* Used when serving hot foods.

15 *Steam table (15).* Provides controls for hot wells and dish storage (under).

16 *Meat slicer with shelves (under) (16).* Counter top mounted slicer used to slice food products. Storage shelves are provided below counter top.

17 *Shelf (over) (17).* Used for storage.

18 *Counter with drawers/cabinet (under).* Used for storage.

19 *Fire pull box (19).*

20 *Pencil sharpener (20).*

21 *Galley 460V power panel No. 2 (21).* Provides 440 Vac distribution for galley equipment.

22 *Coffee percolator (22).* Counter top mounted percolator.

23 *Toaster (23).* Counter top mounted four slice toaster.

24 *Microwave (over) (24).* Microwave oven mounted on shelf overhead.

25 *Dresser with cabinet (over) (25).* Used for storage.

26 *Range (26).* Electric range and oven used for food preparation.

27 *Griddle with cabinet (under) (27).* Electric griddle used for food preparation. Storage is provided below.

28 *Ventilator hood (over) (28).* Ventilator hood for cooking area containing automatic cleaning and fire protection.

29 *Counter with drawers (29).* Used for storage.

30 *Fryer (30).* Double basket, deep fat, electric fryer.

31 *Ventilator control cabinet with fire pull box (31).* Controls for ventilator hood.

32 *Mixer (32).* Counter top mounted electric mixer

33 *Shelf (over and under) (33).* Used for storage.

34 *Baker's scale with drawers (under 34).* Counter top mounted scale used when baking. Storage is provided below counter top.

35 *Double sink with garbage disposal under (35).* Double sink equipped with garbage disposal and spray unit.

36 *Ventilator hood exhaust fan (overhead) (36).*

37 *Dishwasher (under) (37).* Industrial type dishwasher used for sanitizing dishes and utensils.

38 *Peeler (8).* Counter top electric vegetable peeler.

39 *Galley exhaust fan control panel (39).* Control for ventilator hood exhaust fan (36).

40 *Remote valve operator FO-15 (40).* Deck operator for remote control of FO-15, F. O. SERV. SUCT. STBD.

41 *Counter top with trash can (under) (41).* Used for food preparation.

42 *Counter top with shelves (under) (42).* Used for food preparation. Storage is provided below counter top.

43 *Dry provisions storage (43).* Storage for dry provisions. Equipped with three sliding expanded metal doors.

44 *220/110V Distribution panel (44).* Provides power distribution for galley, crews mess, and laundry spaces.

45 *GALLEY 120V DIST PANEL NO. 1 (45).*

46 *Stack (46).* Contains engine exhaust and crankcase vents.

47 *Walk-in freezer (47).* Used for bulk frozen storage.

1 Stowage for Towing cable assemblies (1 and 2).

2 General alarm bell (3).

3 Space heater (4).

4 Shelving (5). Provides stowage for towing lights, batteries, pins, etc.

5 Chain bin (6). Provides stowage for towing chain.

6 Hatch (7). Provides access to fantail.

7 Vertical ladder (8).

8 Shore power cable stowage (9).

(d) Auxiliary machinery space #2 (AMS 2) (Figure 1-38). Auxiliary machinery space #2 (AMS 2) contains the following:

1 Bilge and ballast pumps (1). Electric motor driven pumps used to pump the bilges and fill or pump-out ballast tanks.

2 Bilge/ballast pumps' pressure gauges (2).

3 Firelgeneral service pumps' pressure gauges (3).

4 Ballast tanks tank level indicators (4). Indicators for three ballast tanks.

5 Ballast manifold (5). Duplex manifold providing centralized control of the fluid levels of the ballast tanks.

6 Reverse osmosis units (6). Two reverse osmosis units, one above the other, which convert seawater to fresh water at a rate of 25 to 42 GPH/ unit.

7 Access panel for shaft alley (7). Hinged deck plate providing access to shaft alleys.

8 AUX MACH SPACE NO. 2 POWER PANEL NO. 5 (8). Provides power distribution for AMS 2 equipment.

9 Scuttle (escape hatch) and ladder (9).

(5) *Below Main Deck (Figure 1-35).*

(a) General. Internal features below main deck include:

1 Steering gear compartment (1). See paragraph (b) below.

2 Towing gear locker (2). See paragraph (c) below.

3 Auxiliary machinery space #2 (3). See paragraph (d) below.

4 Engine room (4). See paragraph (f) below.

5 Void (5). Sealed empty compartment.

6 Auxiliary machinery space #1(AMS 1) (6). See paragraph (h) below.

7 Spare parts storeroom (7). See paragraph (i) below.

8 Bow thruster compartment (8). See paragraph (i) below.

9 Chain locker (port) (9). Stowage for port anchor chain.

10 Chain locker (starboard) (10). Stowage for starboard anchor chain.

11 Miscellaneous storeroom (11). See paragraph (i) below.

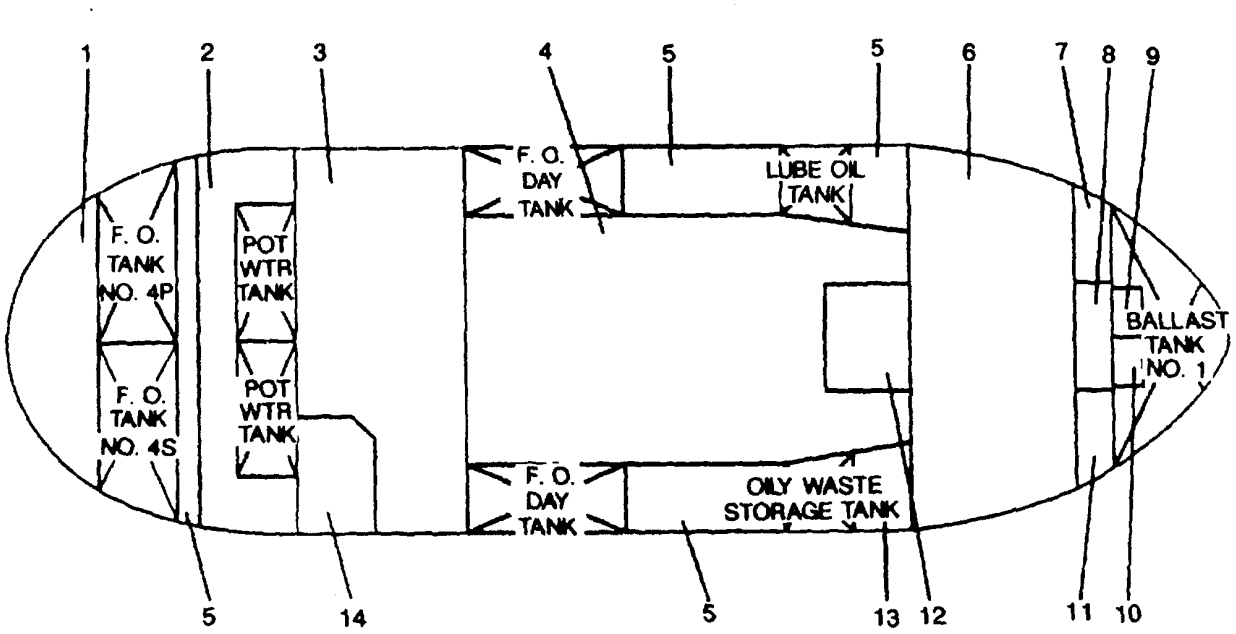
12 Enclosed operating station (12). See paragraph (g) below.

13 Void with AFFF tank under (13).

14 Workshop (14). See paragraph (e) below.

(b) Steering gear compartment (Figure 1-36). The steering gear compartment contains steering system rudder feedback unit (1), rudder stop (2), tiller arm (3), tie bar (4), rudder post (5), saltwater educter (6), scuttle with ladder (7), STBD tow pin control valve (8), and PORT tow pin control valve (9).

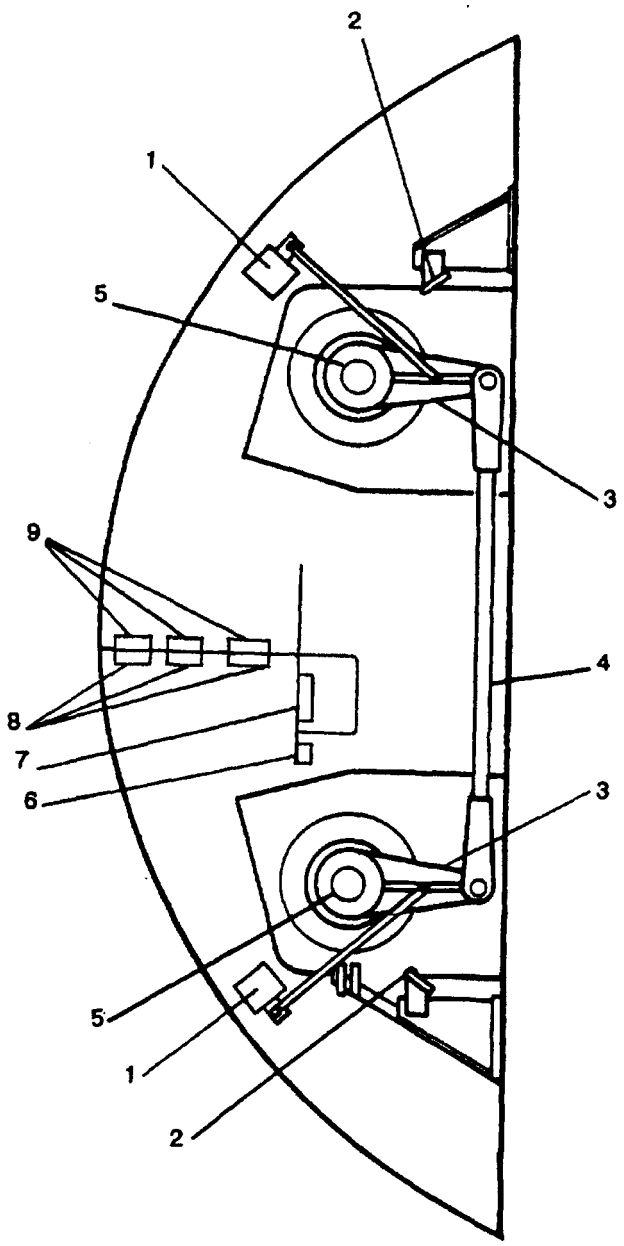
(c) Towing gear locker (Figure 1-37).



BELOW MAIN DECK

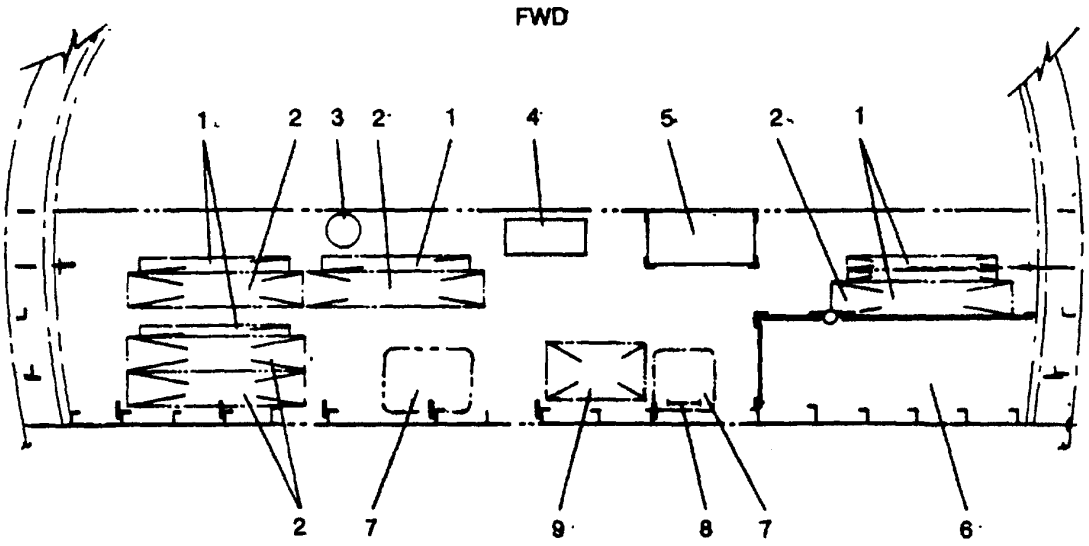
1. STEERING GEAR COMPARTMENT
2. TOWING GEAR LOCKER
3. AUXILIARY MACHINERY SPACE 2
4. ENGINE ROOM
5. VOID
6. AUXILIARY MACHINERY SPACE 1
7. SPARE PARTS STOREROOM
8. BOW THRUSTER COMPARTMENT
9. CHAIN LOCKER (PORT)
10. CHAIN LOCKER (STBD)
11. MISCELLANEOUS STOREROOM
12. ENCLOSED OPERATING STATION
13. VOID WITH AFFF TANK UNDER
14. WORKSHOP

Figure 1-35. Below Main Deck Features.



1. STEERING SYSTEM RUDDER FEEDBACK UNIT
2. RUDDER STOP
3. TILLER ARM
4. TIE BAR
5. RUDDER POST
6. SALTWATER EDUCTER GAUGE
7. SCUTTLE WITH LADDER
8. STBD TOW PIN CONTROL VALVE
9. PORT TOW PIN CONTROL VALVE

Figure 1-36. Steering Gear Compartment.



1. STOWAGE FOR CABLE ASSY (1 5/8" x 100')
2. STOWAGE FOR CABLE ASSY (1 5/8" x 100')
3. GENERAL ALARM BELL
4. SPACE HEATER
5. SHELVING
6. CHAIN BIN
7. HATCH
8. VERTICAL LADDER
9. SHORE POWER CABLE STOWAGE

Figure 1-37. Towing Gear Locker.

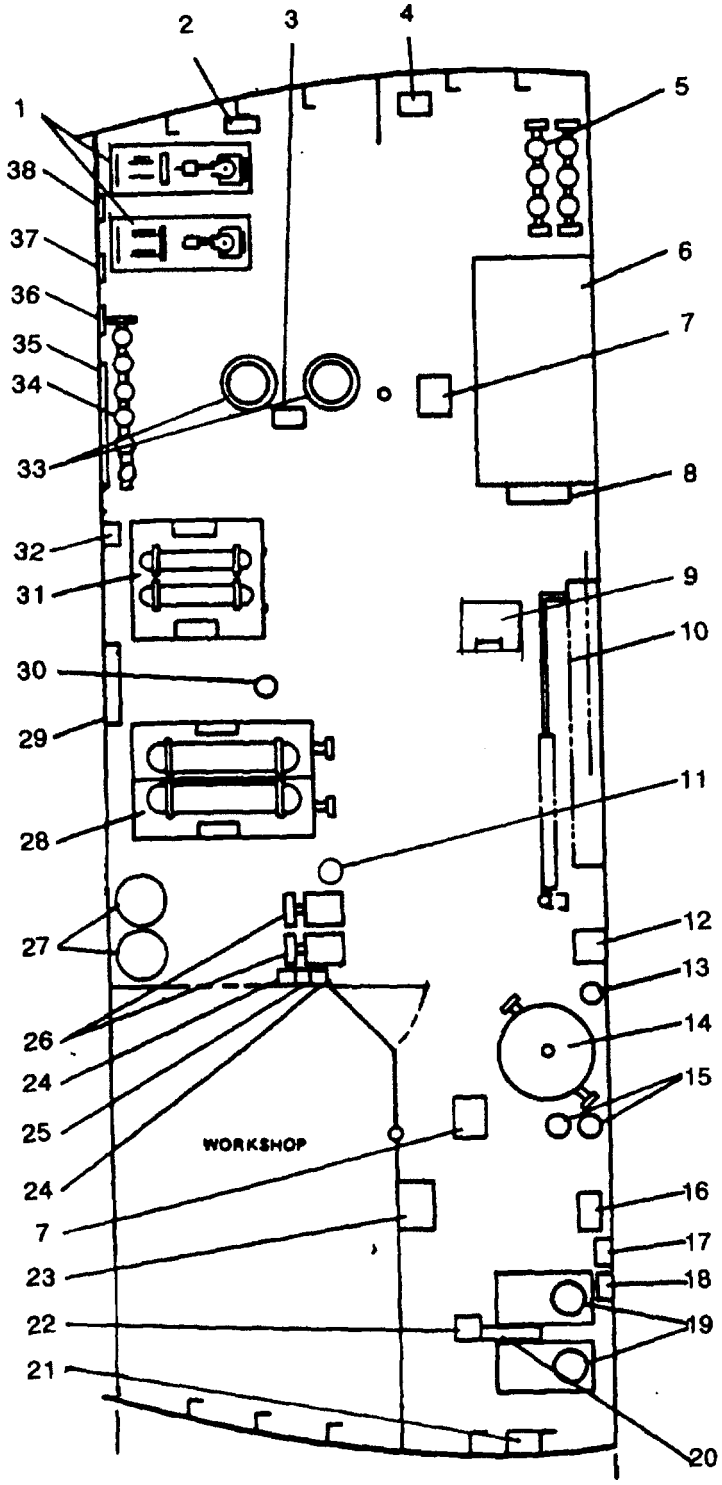


Figure 1-38. Auxiliary Machinery Space #2 (Sheet 1 of 2).

1. BILGE AND BALLAST PUMP
2. BILGE/BALLAST PUMPS PRESSURE GAUGES
3. FIRE/GENERAL SERVICE PUMPS PRESSURE GAUGES
4. BALLAST TANKS TANK LEVEL INDICATORS
5. BALLAST MANIFOLD
6. REVERSE OSMOSIS UNIT
7. ACCESS PANEL FOR SHAFT ALLEYS
8. AUX MATCH SPACE NO. 2 POWER PANEL NO. 5
9. SCUTTLE (ESCAPE HATCH) AND LADDER
10. HYDRAULIC SLIDING WATERTIGHT DOOR
11. GENERAL ALARM BELL (OVERHEAD)
12. WATERTIGHT DOOR HYDRAULIC HAND PUMP
13. HALON DELAY BYPASS CYLINDER (NOT APPLICABLE TO HULL NO. LT801, 804 AND 805)
14. POTABLE WATER HYDROPNEUMATIC TANK
15. CO2 BOTTLES (NOT APPLICABLE TO HULL NO. LT801, 804 AND 805)
16. GYRO COMPASS REPEATER
17. STEERING GEAR EMERGENCY HAND PUMP
18. RUDDER ANGLE INDICATOR
19. STEERING HYDRAULIC POWER PACK
20. STEERING HYDRAULIC POWER PACK MOTOR CONTROLLERS
21. WORKSHOP EXHAUST FAN
22. SOUND POWERED TELEPHONE AND STORAGE BARN
23. FIRE STATION #1
24. POTABLE WATER PUMP MOTOR CONTROLLER
25. POTABLE WATER TANKS TANK LEVEL INDICATORS AND POTABLE WATER PUMP GAUGES
26. POTABLE WATER PUMPS
27. HALON BOTTLES (NOT APPLICABLE TO HULL NO. LT801, 804 AND 805)
28. AIR CONDITIONING CONDENSING UNIT
29. CATHODIC PROTECTION CONTROL PANEL
30. GENERAL ALARM ROTATING BEACON
31. REFRIGERATOR CONDENSING UNIT
32. STERN TUBE SEALS PRESSURE GAUGES
33. FIRE AND GENERAL SERVICE PUMPS
34. BILGE MANIFOLD
35. #1 FIRE AND GENERAL SERVICE PUMP MOTOR CONTROLLER
36. #2 FIRE AND GENERAL SERVICE PUMP MOTOR CONTROLLER
37. #1 BILGE AND BALLAST PUMP MOTOR CONTROLLER
38. #2 BILGE AND BALLAST PUMP MOTOR CONTROLLER

NOTE

Items 13, 15 and 27 not applicable to Hull No. LT801, LT 804 and LT 805. Reference to Para. 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment details and installation drawings.

Figure 1-38. Auxiliary Machinery Space #2 (Sheet 2 of 2).

10 Hydraulic sliding watertight door (10). Hydraulically powered sliding watertight door.

11 General alarm bell (overhead).

12 Watertight door hydraulic hand pump (12).

13 HALON delay bypass cylinder (13).

NOTE

Items 13, 15 and 27 not applicable to Hull No. LT801, LT804, LT805. Reference Para. 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment details and installation drawings.

14 Potable water hydropneumatic tank (14). Provides water pressure to the cold potable water system.

15 CO2 Bottles (15). Two CO2 bottles used in the engine room HALON 1301 fire suppression system.

NOTE

Items 13, 15 and 27 not applicable to Hull No. LT801, LT804, LT805. Reference Para. 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment details and installation drawings.

16 Gyro compass repeater (16). Repeater for use during emergency steering operations.

17 Steering gear emergency hand pump (17). Hand pump to provide hydraulic pressure and directional control to steering gear in an emergency.

18 Rudder angle indicator (18).

19 Steering hydraulic power pack (19). Two power packs, each with one motor and onboard hydraulic pump provide hydraulic pressure to steering gear.

20 Steering hydraulic power pack motor controllers (20). Provide electrical protection and control to steering power pack motors.

21 Workshop exhaust fan (21).

22 Sound powered telephone (22). Used for intraship communication.

23 Fire station # 1 (23). Fire fighting station using sea water. Equipped with 50 feet of 1-1/2 inch hose with an all-purpose nozzle.

24 Potable water pump motor controllers (24). Provides control and circuit protection for potable water pumps (24).

25 Potable water tanks' tank level indicators and potable water pump gauges (25).

26 Potable water pumps (26). Pumps water into potable water hydropneumatic tank (12).

27 HALON bottles (27). Supplies HALON 1301 to engine room and AMS 1 HALON 1301 fire suppression system.

NOTE

Items 13, 15 and 27 not applicable to Hull No. LT801, LT804, LT805. Reference Para. 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment details and installation drawings.

28 Air conditioning condensing unit (28). Used with the HVAC system.

29 Cathodic protection control panel (29). Provides operator controls and indicators for the cathodic protection system.

30 General alarm rotating beacon (30).

31 Refrigeration condensing unit (3). Used with the fan coil units located in the walk-in freezer and chill box located aft of the galley.

32 Stern tube seals' pressure gauges (32).

33 Fire and General service pumps (33). Two pumps provide pressurized seawater to the firemain, general service system and washdown countermeasure system.

34 *Bilge manifold (34)*. Simplex manifold providing centralized control for bilge pumping operations.

35 *# 1 Fire and general service pump motor controller (35)*.

36 *#2 Fire and general service pump motor controller (36)*.

37 *#1 Bilge and ballast pump motor controller (37)*.

38 *#2 Bilge and ballast pump motor controller (38)*.

(e) *Workshop (Figure 1-39)*. Workshop provides work space and equipment necessary to make on-board repairs. Equipment contained within workshop includes:

1 *Lathe (1)*. Electric powered lathe used in machining operations.

2 *Intercom (2)*. Used for intraship communications.

3 *Hand truck (3).* Used to transport heavy items.

4 *Waste can (4).*

5 *Cutting_ torch outfit (5).* For metal cutting and shaping.

6 *Wall locker (6).*

7 *Microfiche reader (7).* Used to read AMDF and other microfiche.

8 *Cabinet (over) (8).* Provides storage space.

9 *Bench grinder (9).* Grinder for tool sharpening and equipment repairs.

10 *ARC Welder (below) (10).* ARC welder for repair of ship equipment.

11 *Drill press (11).*

12 *Workbench (12).* Sturdy bench for repair of defective units.

13 *Space heater (13).*

14 *Vent hood exhaust fan controller (14).*

15 *Pipe vise (freon bottles below) (15).* Hinged jaw pipe vise used for holding equipment being worked on.

16 *Vent hood (16).* Provides ventilation during welding operations.

17 *Bench vise freon bottles (below) (17).* For holding equipment being worked on.

(f) *Engine room (Figure 1-40).*

1 *Drinking fountain (1).*

2 *Lube oil purifier (2).* Purifies lubricating oil for main engines.

3 *Vertical ladder (3).*

4 *Central hydraulic system power packs (4).* Provides centralized control and monitoring for the central hydraulic power pack. Hydraulic power pack provides hydraulic power for the crane, capstan, anchor windlass, and tow pins. Can power tow winch when hydraulic piping is properly aligned.

5 *Transformers (over) (5).* Three 440V/120V transformers provide 120V power for the engine room load center.

6 *Lube oil transfer pump (6).* Electrically powered pump used to transfer lube oil within the LT.

7 *Lube oil manifold (7).* Provides centralized control of lube oil piping system.

8 *Lube oil transfer pump motor controller (8).*

9 *Lube oil tank level indicator (9)*

10 *Lube oil transfer pump pressure gauges and SSDG No. 2 starting air pressure gauge (10).*

11 *Ship service diesel generator no. 2 (11).* Air started, fresh water cooled, diesel engine driven service generator providing electric power to the main switchboard.

12 *Air receiver (above) (12).* Air receiver for control air system located overhead.

13 *Sewage discharge pump (13).* Electrically powered pump used to pump contents of sewage tank to sewage shore connection or overboard.

14 *Air dryer (14).*

15 *Sewage discharge pump motor controller (15).*

16 *Sewage discharge pump pressure gauge (16).*

17 *Engine room distribution panel #4 (17).* Provides power distribution for engine room equipment, welder, refrigerated stores controls, emergency generator strip heater and emergency switchboard heater.

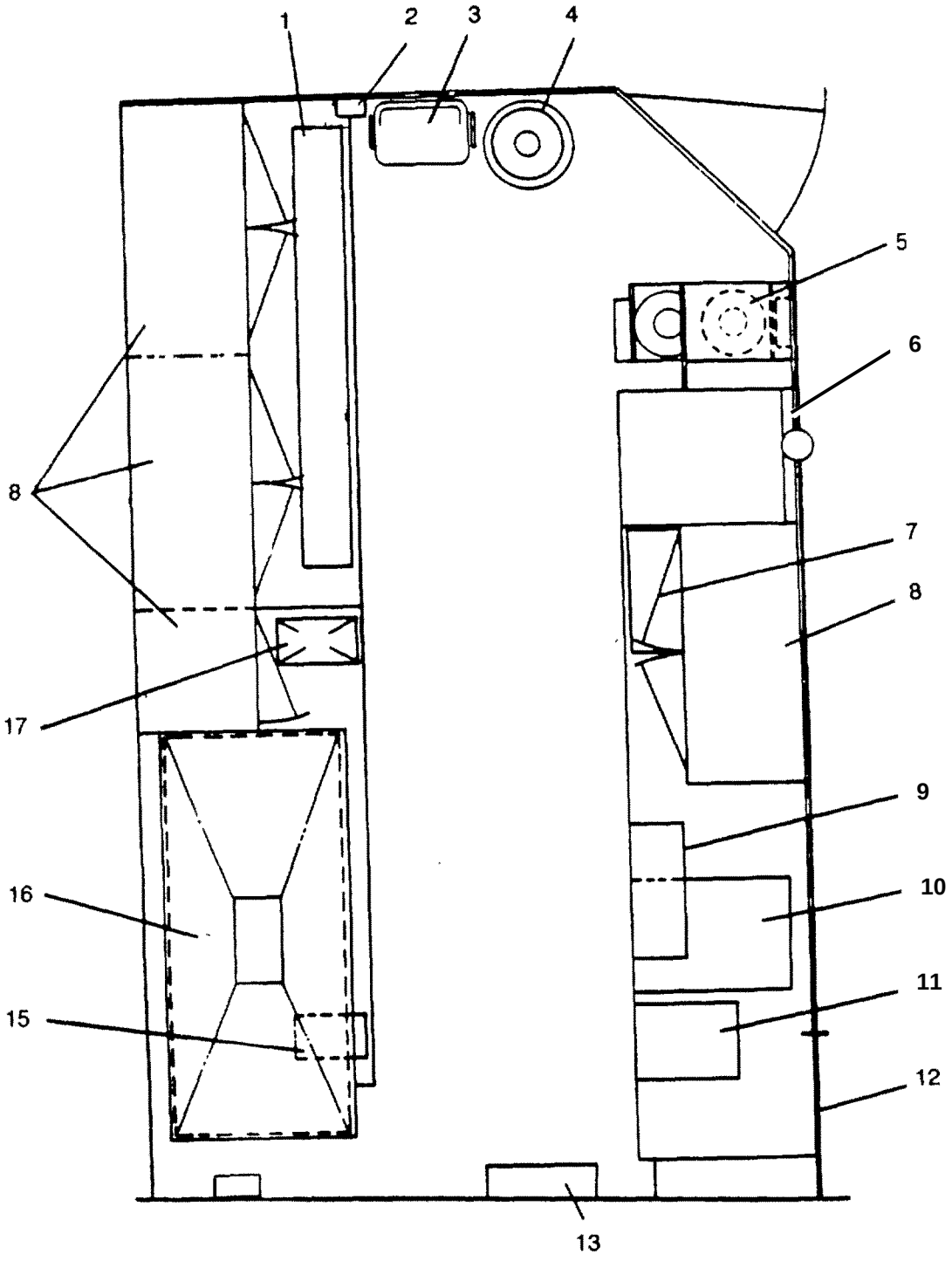


Figure 1-39. Workshop (Sheet 1 of 2).

1. LATHE
2. INTERCOM
3. HAND TRUCK
4. WASTE CAN
5. CUTTING TORCH OUTFIT
6. WALL LOCKER
7. MICROFICHE READER
8. CABINET (OVER)
9. BENCH GRINDER
10. ARC WELDER (BELOW)
11. DRILL PRESS
12. WORKBENCH
13. SPACE HEATER
14. VENT HOOD EXHAUST FAN CONTROLLER
15. PIPE VISE (FREON BOTTLES BELOW)
16. VENT HOOD
17. BENCH VISE (FREON BOTTLES BELOW)

Figure 1-39. Workshop (Sheet 2 of 2).

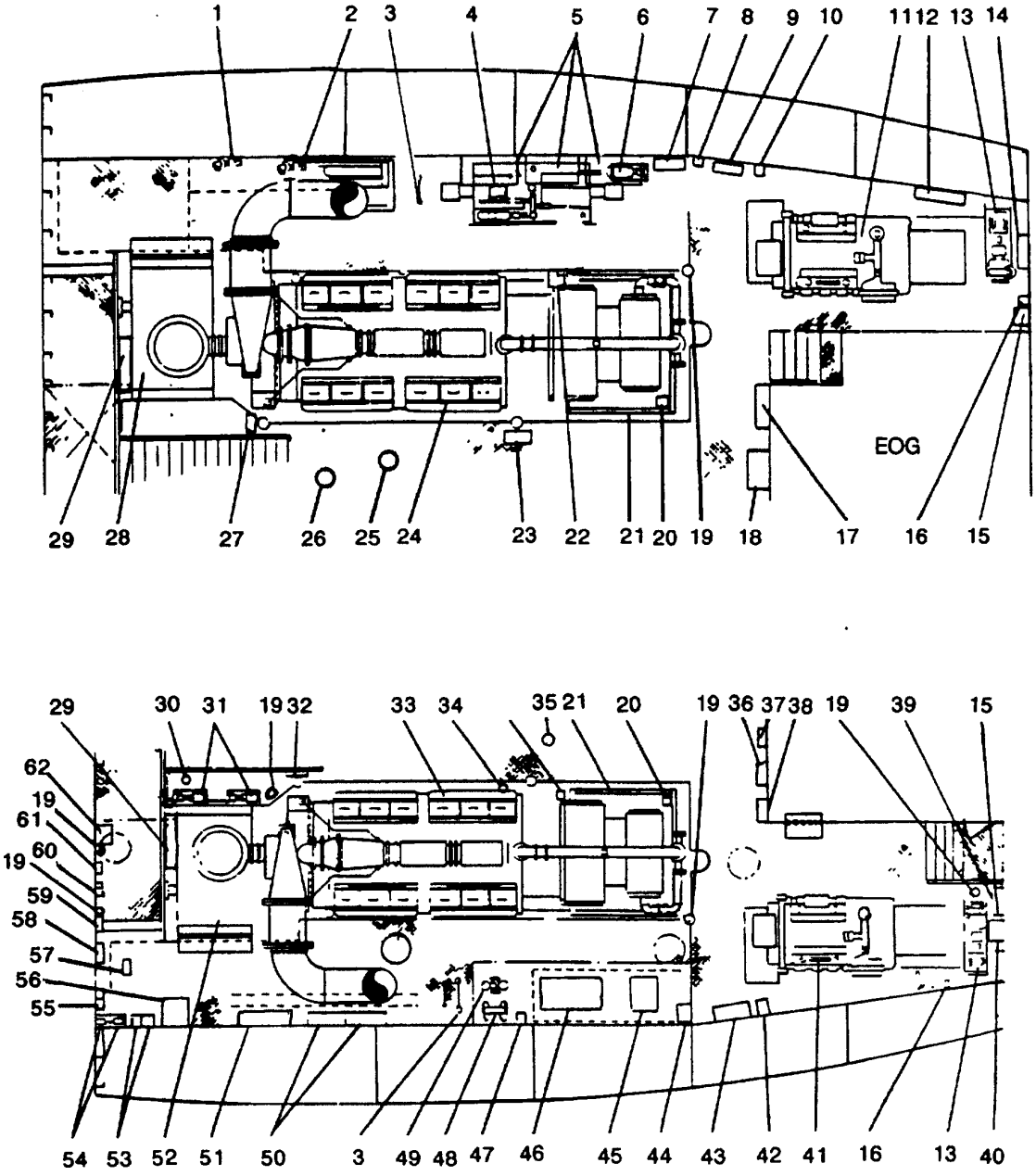


Figure 1-40. Engine Room (Sheet 1 of 2).

1. DRINKING FOUNTAIN
2. LUBE OIL PURIFIER
3. VERTICAL LADDER TO STACKS
4. CENTRAL HYDRAULIC SYSTEM POWER PACK
5. TRANSFORMERS (OVER)
6. LUBE OIL TRANSFER PUMP (UNDER)
7. LUBE OIL MANIFOLD
8. LUBE OIL TRANSFER PUMP MOTOR CONTROLLER
9. LUBE OIL TANK LEVEL INDICATOR
10. LUBE OIL TRANSFER PUMP PRESSURE GAUGES AND SSDG NO. 2 STARTING AIR PRESSURE GAUGES
11. SHIP SERVICE DIESEL GENERATOR NO. 2
12. AIR RECEIVER (ABOVE)
13. SEWAGE DISCHARGE PUMP
14. AIR DRYER (ABOVE)
15. SEWAGE DISCHARGE PUMP MOTOR CONTROLLER
18. SEWAGE DISCHARGE PUMP PRESSURE GAUGE
17. ENG RM DIST PNL #4
18. MONITORING SYSTEM CPU WITH 24 VDC DISTRIBUTION PANEL (BELOW)
19. FIRE EXTINGUISHER
20. ENGINE ALARM HORN
21. ENGINE CONTROL PANEL
22. LUBE OIL PRIME PUMP AND CONTROLLER
23. FIRE STATION NO. 2
24. MAIN ENGINE NO. 2
25. MACHINERY PLANT ALARM ROTATING BEACON (ABOVE)
28. GENERAL ALARM ROTATING BEACON (ABOVE)
27. AFT SEA CHEST STRAINER DIFFERENTIAL PRESSURE GAUGE
28. REDUCTION GEAR NO. 2
29. NO. 1 SHAFT BRAKE PANEL
30. LUBE OIL HAND PUMP
31. REDUCTION GEAR COOLING PUMP
32. FIRE PULL BOX (ABOVE), REDUCTION GEAR NO. 1 AND NO. 2 FW COOLING PUMP PRESSURE GAUGES (BELOW)
33. MAIN ENGINE NO. 1
34. GENERAL ALARM BELL
35. HALON ALARM BELL (OVER)
38. ENG RM LOAD CRT DIST PANEL
37. HORN (OVER) SPEAKER (UNDER)
38. ENGINE ROOM POWER PANEL NO.1
39. FIRE PULL BOX
40. AMS 1 WATERTIGHT DOOR HAND PUMP
41. SHIP SERVICE DIESEL GENERATOR NO. 1
42. OILY WASTE STORAGE TANK LEVEL INDICATOR
43. ENG RM EMER DIST PANEL NO. 1
44. BATTERY CHARGES
45. BATTERY BANK
46. OIL WATER SEPARATOR
47. OILY BILGE AND OIL WATER SEPARATOR PRESSURE GAUGES
48. OILY BILGE PUMP
49. OILY BILGE STRAINER
50. FUEL OIL TANK LEVEL INDICATORS
51. FUEL OIL MANIFOLD
52. REDUCTION GEAR NO. 1
53. NO. 1 AND 2 FUEL OIL TRANSFER PUMP MOTOR CONTROLLERS
54. FUEL OIL TRANSFER PUMPS
55. FUEL OIL TRANSFER FILTER AND PUMPS PRESSURE GAUGES
58. FUEL OIL COALESCER
57. SPACE HEATER
58. NO. 1 REDUCTION GEAR COOLING WATER PUMP MOTOR CONTROLLER
59. NO. 2 REDUCTION GEAR COOLING WATER PUMP MOTOR CONTROLLER
60. NO. 1 ENGINE ROOM EXHAUST FAN, NO. 1 ENGINE ROOM SUPPLY FAN (UNDER) MOTOR CONTROLLERS
81. NO. 2 ENGINE ROOM EXHAUST FAN, NO. 2 ENGINE ROOM SUPPLY FAN (UNDER) MOTOR CONTROLLERS
62. AMS 2 WATERTIGHT DOOR HAND PUMP

Figure 1-40. Engine Room (Sheet 2 of 2).

18 Monitoring system CPU with 24 Vdc panel (below) (18). Monitoring system cabinet contains central processor for the machinery plant monitoring system. A 24 Vdc MACHRY DC CONTROL DISTRIBUTION panel provides circuit protection for machinery monitoring, SSDG no. 2, HALON shutdown, rudder angle, steering gear alarm, pump drive engine, and bow thruster engine.

19 Fire extinguisher (19).

20 Engine alarm horn (20).

21 Engine control panel (21).

22 Lube oil prime pump and controller (22) .

23 Fire station no. 2 (23). Fire fighting station using sea water. Equipped with 50 feet of 1-1/2 inch hose with an all-purpose nozzle.

24 Main engine no. 2 (24). Air started, fresh water cooled, main propulsion engine. Engine rotation is counter clockwise when viewed from astern.

25 Machinery plant alarm rotating beacon (above) (25).

26 General alarm rotating beacon (above) (26).

27 Aft sea chest strainer differential pressure gauge (27).

28 Reduction gear no. 2 (28). Transfers power from main engine and provides directional control to the propeller shaft.

29 No. 1 shaft brake panel (29).

30 Lube oil hand pump (30).

31 Reduction gear cooling pump (31). Electric pump circulates cooling water for each reduction gear.

32 Fire pull box (above) and reduction gear no. 1 and no. 2 fresh water cooling pump pressure gauges (below) (32).

33 Main engine no. 1 (33). Air started, fresh water cooled main propulsion engine. Engine rotation is clockwise when viewed from astern.

34 General alarm bell (34).

35 Halon alarm bell (35).

NOTE

Not applicable to Hull No. LT801, LT804 and LT805. Reference Para. 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment details and installation drawings.

36 Engine room load center distribution panel (36). Supplies 120V to seven power panels, workshop and cathodic protection system.

37 Horn (37).

38 Engine room power panel no. 1 (38). Provides power distribution for engine room equipment.

39 Fire pull box (39).

40 AMS 1 watertight door hand pump (40). Hand pump used to open and close AMS 1 sliding watertight door.

41 Ship service diesel generator no. 1 (41). Battery started (24 Vdc), fresh water cooled, diesel engine driven service generator providing electric power to the main switchboard.

42 Oily waste storage tank level indicator (42).

43 Engine room emergency distribution panel no. 1 (43). Provides emergency power distribution for selected equipment.

44 Battery charger (44). Two battery chargers maintain charge of two battery banks (43). One charger is for SSDG no. 1, the other for the machinery plant monitoring system.

45 Battery bank (45). Two battery banks provide battery power to start SSDG no. 1 (39) and provide power for the machinery plant monitoring system and engine control.

46 Oil water separator (46). Separates oil and water for contents of oily waste storage tank. Water is discharged overboard.

47 Oily bilge and oil-water separator pressure gauges (47).

48 Oily bilge pump (48). Air powered pump for removing oily water from bilges and transferring contents of oily waste drain tank and oily waste storage tank to shore connection.

49 Oily bilge strainer (49). Protects oily bilge pump by removing sediment and debris from bilge water.

50 Fuel oil tank level indicators (50).

51 *Fuel oil manifold (51)*. Provides centralized control for the fuel oil piping system.

52 Reduction gear no. 1 (52). Transfers power from main engine and provides directional control to the propeller shaft.

53 No. 1 and 2 fuel oil transfer pump motor controllers (53).

54 Fuel oil transfer pumps (54). Two electrically powered pumps are used to transfer fuel within the fuel oil transfer piping system.

55 Fuel oil transfer filter and pump pressure gauges (55).

56 Fuel oil coalescer (56). Filter used to remove water from fuel oil.

57 Space heater (57). Heater provides heated air for engine room.

58 No. 1 reduction near cooling water pump motor controller (58).

59 No. 2 reduction gear cooling water pump motor controller (59).

60 No. 1 engine room exhaust fan, no.1 engine room supply fan (under) motor controllers (60). Controls ventilation fans for starboard side of engine room.

61 No. 2 engine room exhaust fan, no.2 engine room supply fan (under) motor controllers (61). Controls ventilation for port side of engine room.

62 AMS 2 watertight door hand pump (62). Hand pump used to open and close AMS 2 sliding watertight door.

(g) Enclosed operating station (EOS) space and special tools locker (below) (Figure 1-41).

1 Window (1). Allows observation of engine room.

2 Fire and smoke detection panel (over), fire alarm bell and key cabinet (below) (2). Fire and smoke detection panel provides controls and indicators necessary for the control and monitoring of the fire detection system.

3 Scuttle (escape hatch) (3). Emergency exit from enclosed room operating station

4 Vertical ladder (4).

5 Table/book rack (5). Used for record keeping and storage.

6 Tank level indicator receiver panel (6). Panel with seven meters for remote monitoring of tank levels for sewage holding tank, oily waste holding tank, potable water tanks, and ballast water tanks.

7 Main switchboard (7). The main switchboard includes facilities for the control of SSDGs, including paralleling and power distribution (450 Vac).

8 Ship clinometer (8).

9 Air conditioner unit (9). Provides air conditioning for enclosed operating station.

10 EOT Wrong direction bell (10). Indicates throttles not set to desired speed/ direction of pilothouse EOT.

11 File cabinet (11). Used for storage of records.

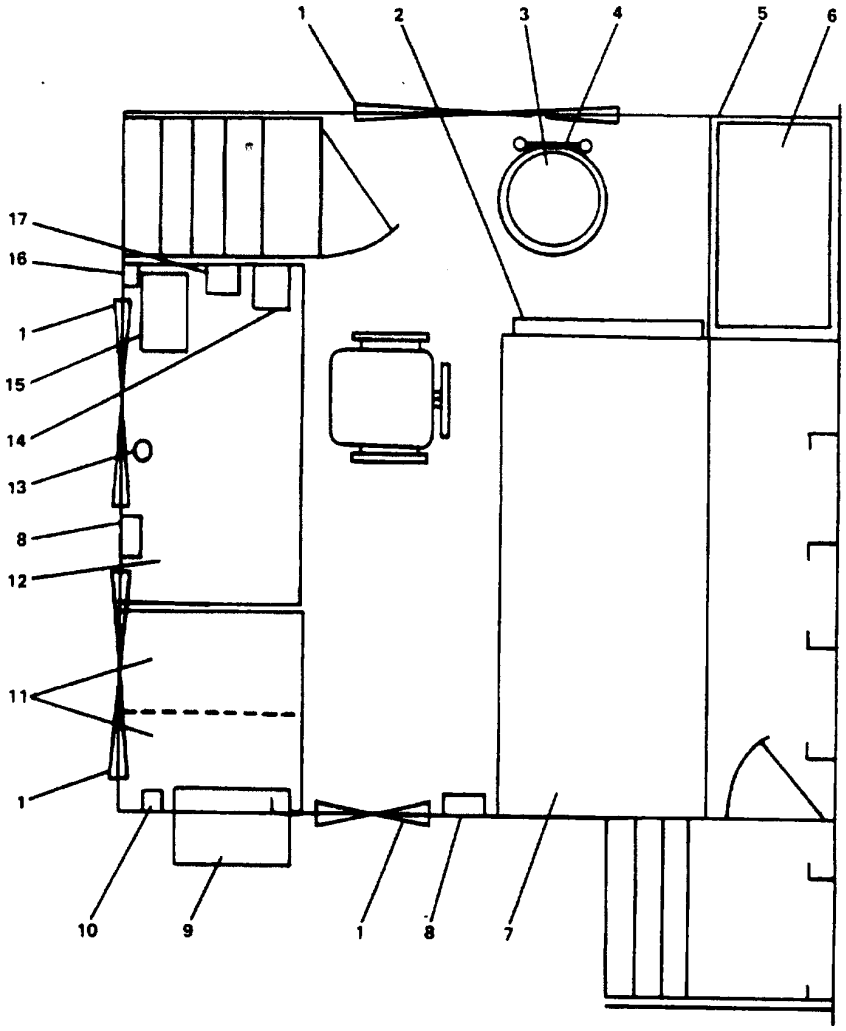
12 EOS Console (12). Central control for main engines and machinery plant monitoring system.

13 General alarm bell (13).

14 Sound powered telephone (14). Used for intraship communications.

15 Tank level indicator receiver panel (15). Panel with 11 meters for remote monitoring of tank levels for lube oil storage tank, fuel oil storage tanks, and fuel oil day tanks.

16 EOT Constant ring bell (16). Indicates pilothouse has changed desired speed/direction.



1. WINDOW
2. FIRE AND SMOKE DETECTION PANEL (OVER), FIRE ALARM BELL AND KEY CABINET (BELOW)
3. SCUTTLE (ESCAPE HATCH) (OVER)
4. VERTICAL LADDER
5. TABLE/BOOK RACK
6. MASTER TANK LEVEL INDICATOR PANEL
7. MAIN SWITCHBOARD
8. SHIP CLINOMETER
9. AIR CONDITIONER UNIT (OVER)
10. EOT WRONG DIRECTION BELL
11. FILE CABINET (UNDER)
12. EOS CONSOLE
13. GENERAL ALARM BELL
14. SOUND POWERED TELEPHONE
15. MASTER TANK LEVEL INDICATOR PANEL
16. EOT CONSTANT RING BELL
17. REMOTE LOUDSPEAKER STATION
18. SPECIAL TOOLS LOCKER
19. SHELVES
20. SWITCH

Figure 1-41. Enclosed Operating Station and Special Tools Locker (Sheet 1 of 2).

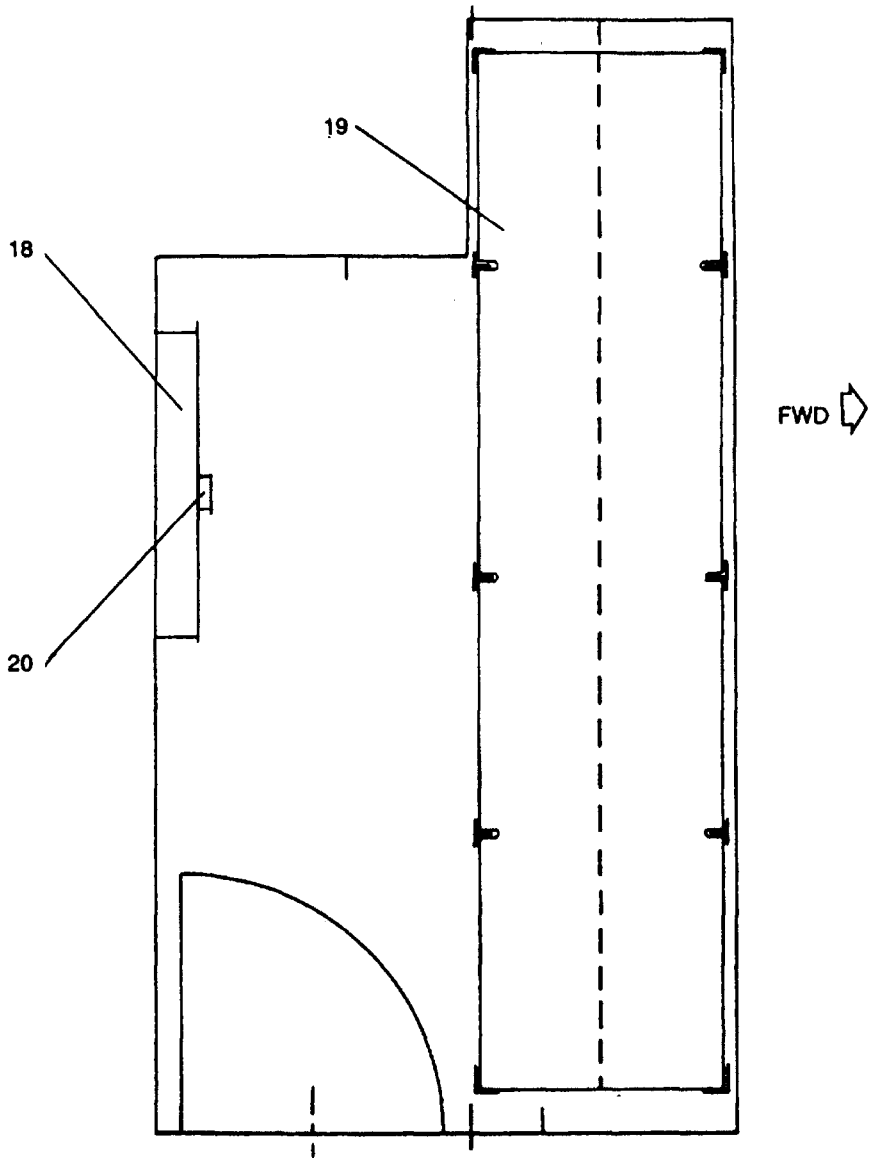


Figure 1-41. Enclosed Operating Station and Special Tools Locker (Sheet 2 of 2).

17 Remote loudspeaker station (17).

18 Special tools locker (18). Located below the engine room EOS, the special tools locker contains shelves (18) for storage of authorized special tools.

(h) Auxiliary machinery space AMS 1 (Figure 1-42).

1 Hot water recirculating pump (1). Provides continuous circulation of hot water in the hot potable water piping system.

2 Hot water heaters (2). Provides potable water, heated to the set point temperature, for the hot potable water piping system.

3 Air compressors (3). Provides compressed air to the air receivers.

4 Ship service control air pressure gauge (4).

5 Ship service air receiver (5). Storage tank for service air.

6 Air compressor 1 & 2 discharge pressure and shin service air pressure gauges (6).

7 Starting air receiver (7). Storage tanks for diesel engine starting air.

8 Diesel start air pressure gauge (8).

9 Auxiliary machinery space no. 1 power panel no. 4 (9). Provides power distribution for AIMS 1 equipment.

10 Scuttle (escape hatch) (10). Provides emergency escape from the AMS 1.

11 Vertical ladder (11).

12 AMS 1 supply fan motor controller (12).

13 Bow thruster brake panel (13). Brake panel for bow thruster shaft brake.

14 Bow thruster engine (14). Drives the bow thruster unit.

15 Fire station #3 (15). Fire fighting station using sea water. Equipped with 50 feet of 1-½ inch hose with an all-purpose nozzle.

16 Pump drive engine and bow thruster engine starting air pressure gauges and firemain pressure gauges (16).

17 Hydraulic oil pump (17). Provides pressurized hydraulic oil to power the tow winch can be aligned to power central hydraulic system. Driven by the pump drive engine.

18 Pump drive engine (18). Drives the hydraulic oil pump (17) and fire fighting pump (20).

19 Space heater (above) (19). Heater provides heated air for AMS 1.

20 Fire fighting pump (20). Provides pressurized seawater to the fire monitors located on the 04 level. Can also pressurize firemain.

21 General alarm bell (above) (21).

22 Low winch hydraulic oil sump (22). Oil reservoir providing hydraulic oil for the hydraulic oil pump (16).

23 AMS 1 Watertight door hand pump (23). Hand pump used to open and close AMS 1 sliding watertight door.

24 Sliding watertight door (24). Hydraulically powered sliding watertight door.

25 General alarm rotating beacon (25).

26 Halon alarm (26).

NOTE

Not applicable to Hull No. LT801, LT804 and LT805. Reference Para. 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment details and installation drawings.

27 Sewage holding tank level indicator (27).

28 Engine cooling strainer (28). Removes sediment and other large solids from raw seawater used to cool the bow thruster engine (13) and pump drive engine (17).

29 Sea water strain and AFFF proportioner pressure gauges (29).

30 MSD Aeration blower (over) (30).

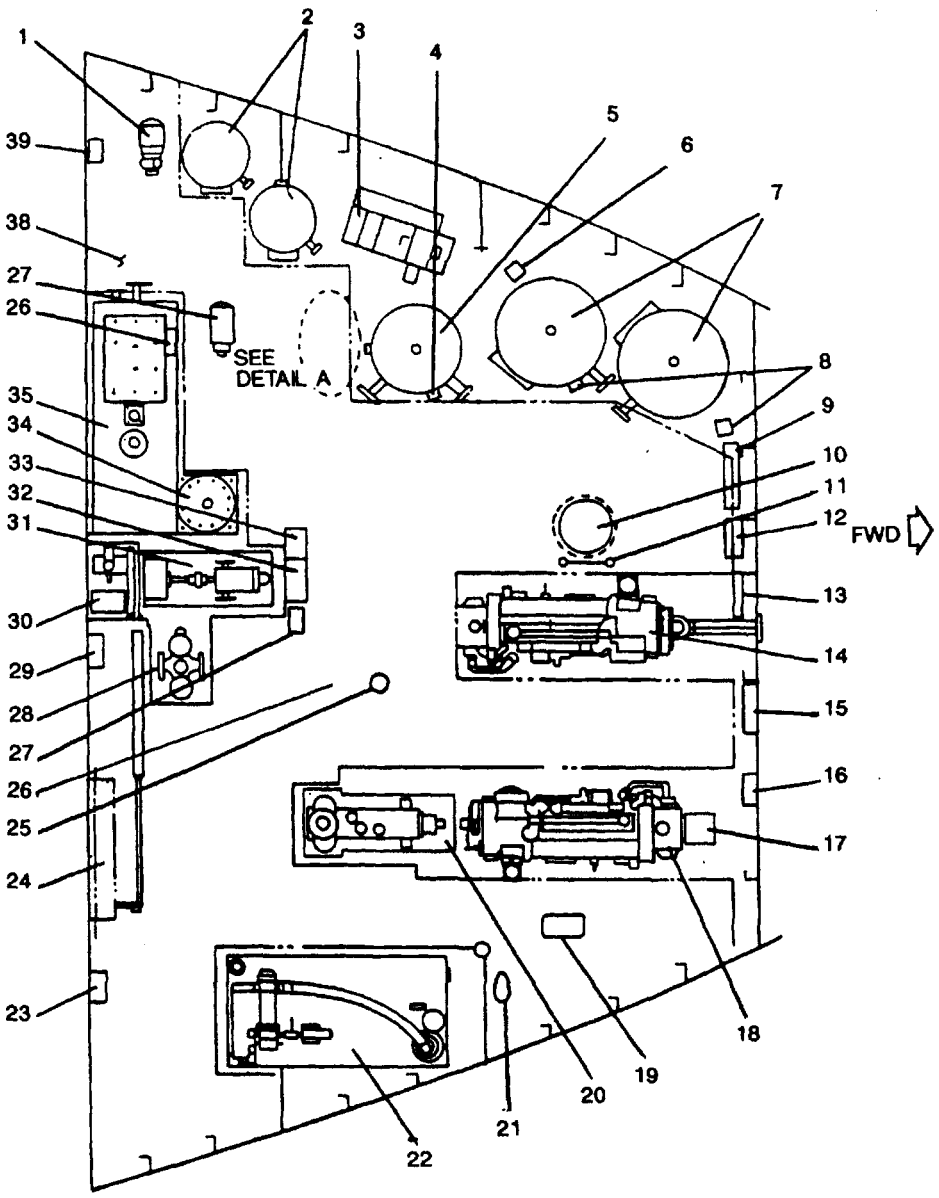
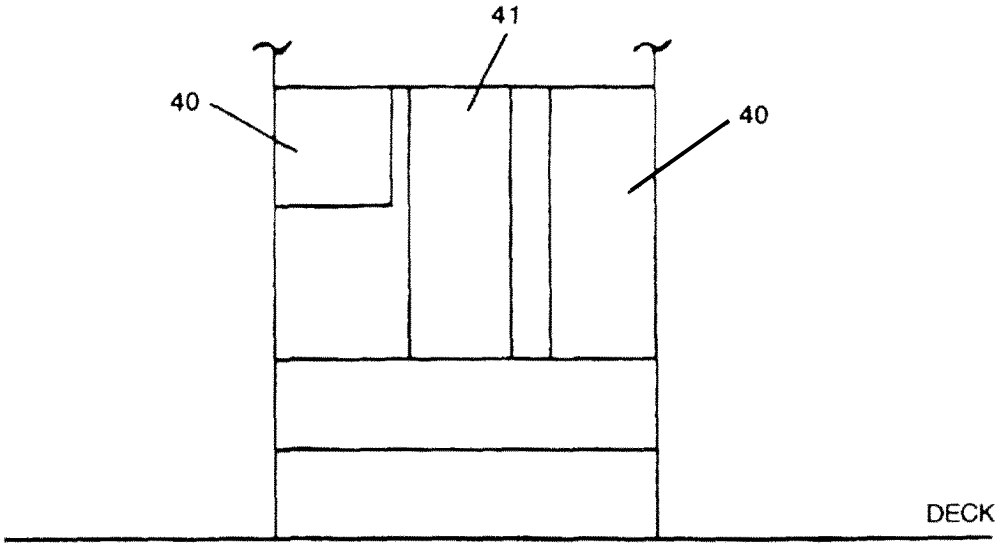


Figure 1-42. Auxiliary Machinery Space No. 1 (Sheet 1 of 2).



LOOKING FWD
DETAIL "A"

1. HOT WATER RECIRCULATING PUMP
2. HOT WATER HEATERS
3. AIR COMPRESSORS
4. SHIP SERVICE CONTROL AIR PRESSURE GAUGE
5. SHIP SERVICE RECEIVER
6. AIR COMPRESSOR 1 & 2 DISCHARGE PRESSURE AND SHIP SERVICE AIR PRESSURE GAUGES
7. STARTING AIR RECEIVER
8. DIESEL START AIR PRESSURE GAUGE
9. AUX MACH SPACE NO.1 POWER PANEL NO. 4
10. SCUTTLE (ESCAPE HATCH)
11. VERTICAL LADDER
12. AMS 1 SUPPLY FAN MOTOR CONTROLLER
13. BOW THRUSTER BRAKE PANEL
14. BOW THRUSTER ENGINE
15. FIRE STATION NO. 3
16. PUMP DRIVE ENGINE AND BOW THRUSTER ENGINE STARTING AIR PRESSURE GAUGES AND FIRE MAIN PRESSURE GAUGES
17. HYDRAULIC OIL PUMP
18. PUMP DRIVE ENGINE
19. SPACE HEATER (ABOVE)
20. FIRE FIGHTING PUMP
21. GENERAL ALARM BELL (ABOVE)
22. TOW WINCH HYDRAULIC OIL SUMP
23. AMS 1 WATERTIGHT DOOR HAND PUMP
24. SLIDING WATERTIGHT DOOR
25. GENERAL ALARM ROTATING BEACON
26. HALON ALARM

NOTE

Not applicable to Hull No. LT801, LT804 and LT805. Reference Para. 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment details and installation drawings.

27. SEWAGE HOLDING TANK LEVEL INDICATOR
28. ENGINE COOLING WATER STRAINER
29. SEAWATER STRAINER AND AFFF PROPORTIONER PRESSURE GAUGES
30. MSD AERATION BLOWER (OVER)
31. AFFF PUMP
32. MSD CONTROLLER (ABOVE), AFFF PUMP MOTOR CONTROLLER (BELOW)
33. INTERCOM (ABOVE), SOUND POWERED TELEPHONE, AND STORAGE BOX (BELOW)
34. MSD CONTACT TANK
35. MSD MEDIA TANK
36. MSD DISCHARGE PUMP PRESSURE GAUGE
37. MSD DISCHARGE PUMP
38. SEWAGE HOLDING TANK (BELOW TANK TOP)
39. HOT WATER RECIRCULATING PUMP DIFFERENTIAL PRESSURE GAUGE
40. HOT POTABLE WATER RECIRC.PUMP MOTOR CONTROLLER
41. AIR COMPRESSOR NO. 2 MOTOR CONTROLLER
42. AIR COMPRESSOR NO. 1 MOTOR CONTROLLER

Figure 1-42. Auxiliary Machinery Space No. 1 (Sheet 2 of 2).

31 *AFFF Pump (31)*. Supplies AFFF concentrate from AFFF storage tank to proportioner.

32 *MSD motor controller (above and AFFF pump motor controller (below) (32)*. Provides overload protection and control for the MSD and AFFF pumps.

33 *Intercom (above), sound powered telephone, and storage box (below)*.

34 *MSD Contact tank (34)*. Tank where the chlorine from the table chlorinator disinfects the effluent discharged from the media tank.

35 *MSD Media tank (35)*. Tank where sewage is biologically decomposed.

36 *MSD discharge pump Pressure gauge (36)*.

37 *MSD discharge pump (37)*. Discharges water from contact tank after treatment.

38 *Sewage holding tank (38)*. Tank located below tank top level holds sewage until processed by the marine sanitation device or pumped through shore connection.

39 *Hot water recirculating pump pressure differential gauge (39)*.

40 *Hot potable water recirculating pump motor controller (40)*.

41 *Air compressor No. 1 motor controller (42)*.

(i) *Bow thruster compartment, spare parts storeroom, and miscellaneous storeroom (Figure 1-43)*.

1 *Shelves (1)*. Used for storage.

2 *Sound powered telephone (2)*. Used for intraship communication.

3 *Intercom (3)*. Used for intraship communications.

4 *General alarm(4)*.

5 *Space heater (5)*. Provides heat for bow thruster compartment.

6 *Eductor pressure gauge (6)*.

7 *Hatch (7)*. Provides entrance/exit to compartment from boatman's locker.

8 *Vertical ladder (8)*.

9 *Bow thruster (9).*

10 *Lube oil reservoir (10)*. Oil reservoir (10.5 gallons) providing lube oil for bow thruster unit.

11 *Manhole cover (11).*

12 *Pressure to eductor gauge (12).*

(j) *Tank top level features (Figure 1-44)*. The tank top level are illustrated on Figure 1-44.

(k) *Tank location (Figure 1-45)*. Tank locations are illustrated on Figure 1-45.

1-9. DIFFERENCES BETWEEN MODELS.

(a) Model/Hull No. LT801, LT804 and LT805 have been modified. Halon Fire Suppression System has been replaced by FM-200 Fire Suppression System to include a water washdown system.

(b) References to halon components and/or operation are not applicable on these vessels.

(c) Reference Para. 2-65 for operation of FM-200 system and TM 55-1925-227-24&P Fire Fighting System for Large Tug (LT) for maintenance/repair/ installation details of FM-200 components.

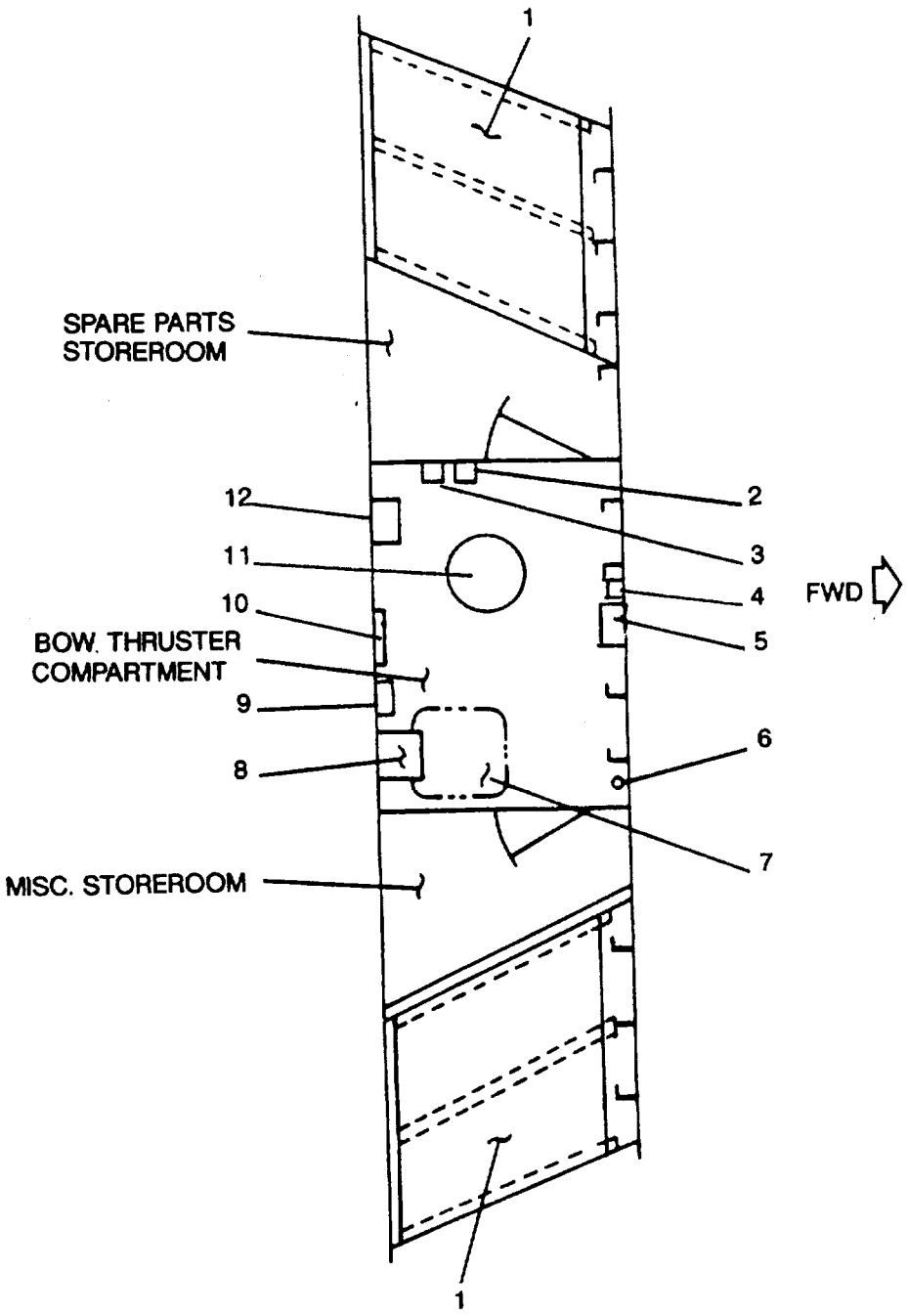
(d) FM-200 VESSEL SPECIFIC DESIGN CONFIGURATIONS. Due to differences in vessel configuration within the LT-128 Design, minor configuration changes to the Detailed Design/ Installation Drawings were made during each installation to accommodate the configuration of each vessel. The Detailed Design/Drawings have been revised to fully disclose the configuration of the FM-200 systems installed on your vessel. LT-801-5553-1, US Army LT-801 FM-200 System Piping Installation and Details; LT-801-5553-2, US Army LT-801 FM-200 System Miscellaneous Mods; LT-801-5553-3, US Army LT-801 FM-200 System Electrical Modifications; and LT-801-5553-4, US Army LT-801 FM-200 System Label Plates and Placards; are specific to your vessel and disclose the as-built configuration of the installed FM-200 systems. These drawings are provided as follows:

DRAWING TITLE	DRAWING NUMBER	LOCATION
US Army LT-801 FM-200 System Piping Installation and Details	LT-801-5553-1	TM 55-1925-227-24&P
US Army LT-801 FM-200 System Miscellaneous Mods	LT-801-5553-2	Same
US Army LT-801 FM-200 System Electrical Modifications	LT-801-5553-3	Same
US Army LT-801 FM-200 System Label Plates and Placards	LT-801-5553-4	Same

NOTE

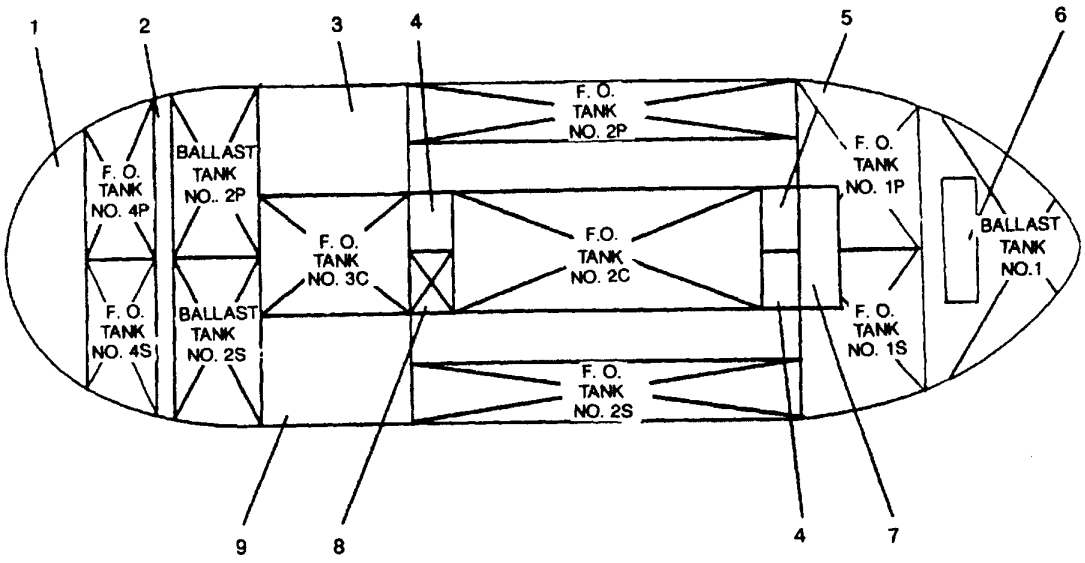
As stated above, differences in vessel configuration exist within LT-128 design. Major operation hardware and principles are the same. Differences consist of exact component locations, therefore, everyone should be familiar with vessel particulars.

e) WWS Vessel Specific Design Configurations. Due to differences in vessel configuration within LT-128 Design, minor configuration changes to Detailed Design/Installation Drawings were made during each installation to accommodate the configuration of each vessel. Detailed Design/ Installation Drawings have been revised to fully disclose WWS configuration installed on your vessel. Drawings LT-801-5231-1, US Army LT-801 Water Washdown System Piping Installation and Details and LT-801-5231-2, US Army LT-801 Water Washdown System Label Plates and Placards, which are specific to your vessel, disclose the as-built WWS configuration. Reference TM 55-1925-227-24&P Fire Fighting System for Large Tug (LT) for applicable installation drawing.



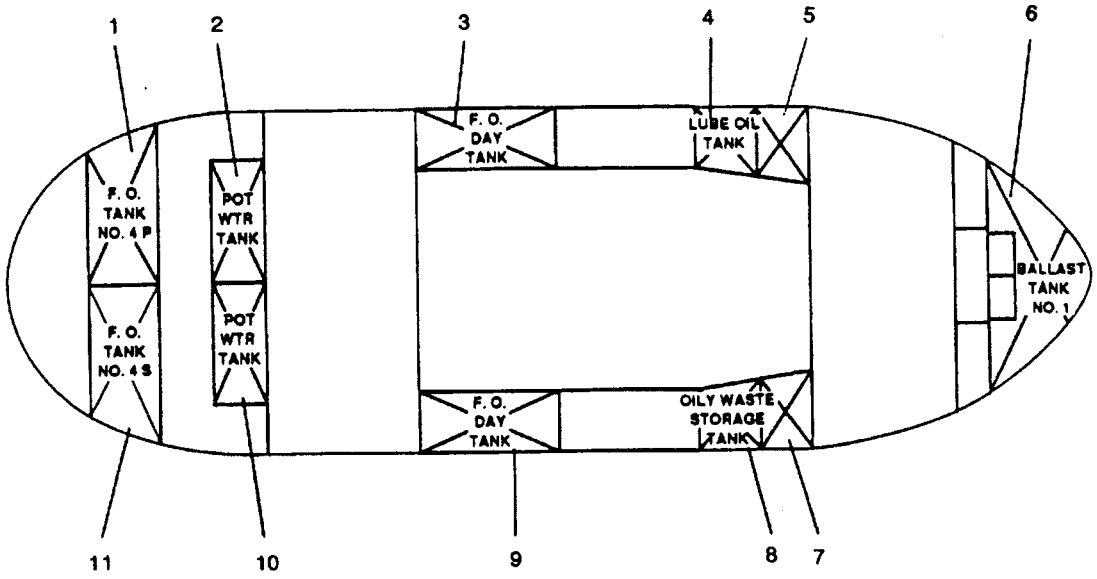
1. SHELVES
2. SOUND POWERED TELEPHONE
3. INTERCOM
4. GENERAL ALARM
5. SPACE HEATER
6. EDUCTOR PRESSURE GAUGE
7. HATCH
8. VERTICAL LADDER
9. BOW THRUSTER
10. LUBE OIL HEAD TANK
11. MANHOLE COVER
12. PRESSURE TO EDUCTOR GAUGE

Figure 1-43. Bow Thruster Compartment, Spare Parts Storeroom and Miscellaneous Storeroom.

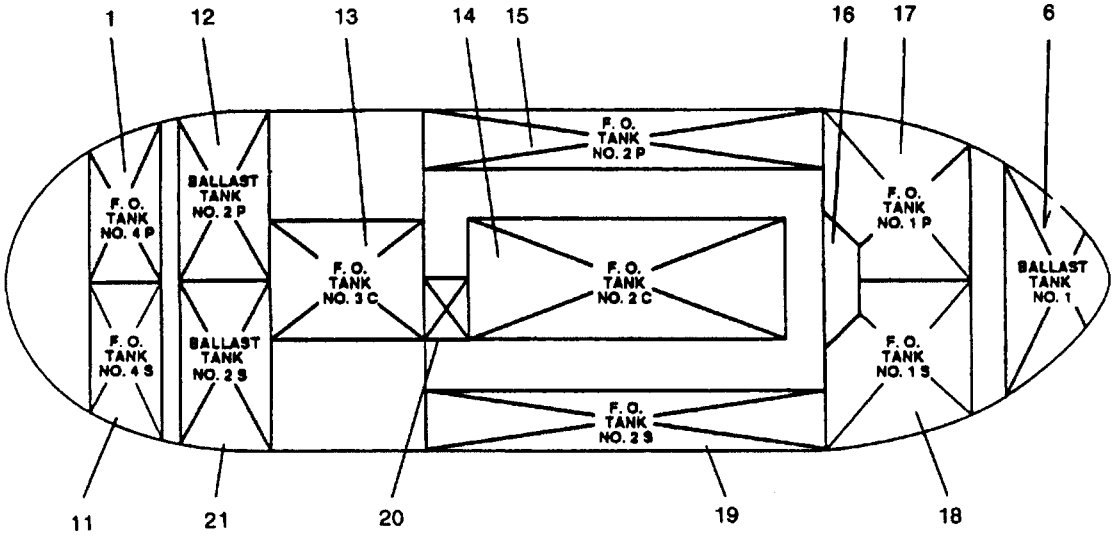


1. STEERING GEAR COMPARTMENT
2. VOID
3. SHAFT ALLEY (PORT)
4. SEA CHEST
5. TRANSDUCER WELL
6. CHAIN LOCKER
7. SEWAGE HOLDING TANK
8. OILY WASTE DRAIN TANK
9. SHAFT ALLEY (STARBOARD)

Figure 1-44. Tank Top Level Features.



ABOVE TANK TOP LEVEL



BELOW TANK TOP LEVEL

Figure 1-45. Tank Location (Sheet 1 of 2).

1. F.O. TANK NO. 4P
2. POTABLE WATER TANK, PORT
3. F.O. DAYTANK, PORT
4. LUBE OIL STORAGE TANK
5. HYDRAULIC OIL STORAGE TANK
6. BALLAST WATER TANK NO. 1
7. AFFF TANK
8. OILY WASTE STORAGE TANK
9. F.O. DAYTANK, STARBOARD
10. POTABLE WATER TANK, STARBOARD
11. F.O. TANK NO. 4S
12. BALLAST WATER TANK NO. 2 P
13. F.O. TANK NO. 3C
14. F.O. TANK NO. 2C
15. F.O. TANK NO. 2P
16. SEWAGE HOLDING TANK
17. F.O. TANK NO. 1P
18. F.O. TANK NO. 1S
19. F.O. TANK NO. 2S
20. OILY WASTE DRAIN TANK
21. BALLAST WATER TANK NO. 2S

Figure 1-45. Tank Location (Sheet 2 of 2).

1-10. Equipment Data.

Length overall	128 feet, 4 inches
Length between perpendiculars	123 feet, 4 inches
Beam, molded	36 feet, 0 inches
Depth, molded	19 feet, 10 inches
Draft, designed	15 feet, 6 inches
Light	14 feet 4 inches
60% Consumables	15 feet 11 inches
Max load	16 feet 10 inches
Displacement (long tons) designed draft	909 long tons
Light ship	786 long tons
60% Consumables	951 long tons
Max load	1057 long tons
Brake horsepower	51000 bhp
Speed, self delivery	12 knots
Self delivery without tow	13.5 knots @ 85% MCR
Sea state 2 @ max load	12 knots
Under maximum tow	5 knots
Max tow (50 long tons)	5 knots @ 85% MCR
Sea state @ max load	5 knots
Sea state 5 @ max load	maintain steerage-way
Minimum cruising range	500 nautical miles
Propeller	Twin, fixed pitch, 11 feet, 0 inches diameter
Bollard pull	54.6 long tons
Propulsion engines	2 each; type Turbo, each rated at 2550 BP @ 900 RPM
Reduction gears and clutch	2 each; two speed Ahead, one speed Astern
Crew	5 officers, 15 enlisted
Emergency generator	65KW AC
Bow thruster	Fixed pitch (tunnel type) reversible
Tow winch	Twin single drum, side-by-side, each drum fitted with 2500 ft of 2 1/4" wire, diesel/hydraulic driven
Cargo crane	360 degree rotation, telescoping boom, 1500 lb capacity @ max extension
Anchor windlass	Hydraulic powered
Capstan	36" diameter
Steering gear	Electro/hydraulic twin powered
Marine sanitation device	One self-contained system capable of supporting the ship's crew
Monitoring system	Computerized system to monitor major machinery and equipment
Pump drive engine	Diesel engine providing power to tow inch and pumps
Air compressors	Two electric powered compressors supply two starting receivers 400 gal)
Fire pumps & generator set pumps	Two electrically driven pumps @ gpms
Bilge and ballast pumps	Two electrically driven pumps @ 100 gpms @ 50 psi
Ship's Service Refrigeration	tons
HVAC machinery	tons
Desalination plant	Reverse osmosis type rated @ 25 to 42 gal
Auto-pilot	
Workboat	Inflatable ridged bottom with a 40hp engine
Life rafts	Two each, 25 man USCG approved inflatable with hydrostatic release
Tank capacities	See Table 1-3

Table 1-3. Tank Capacities.

Tank	Item No. (FIG 1-45)	Capacity (Gallons)	Capacity (Long Tons)
Fuel Oil			
FOT 1 P	17	9,422	29.29
FOT 1 S	18	9,422	29.29
FOT 2C	14	11,573	35.99
FOT 2P	15	5,209	16.20
FOT 2S	19	5,209	16.20
FOT 3C	13	9,127	28.38
FOT 4P	1	7,946	24.72
FOT 4S	11	7,946	24.72
FO DAYTANK P	3	4,344	13.51
FO DAYTANK S	9	4,344	13.51
EDG DAYTANK		100	
TOTAL		74,642	
Oily Waste			
Oily Waste Storage Tank	8	2,495	1.68
Oily Waste Drain Tank	20	513	8.14
TOTAL		3,008	9.82
Lube Oil Storage Tank	4	2,495	8.55
Potable Water			
Potable Water Tank P	2	3,864	14.35
Potable Water Tank S	10	3,864	4.35
TOTAL		7,728	28.70
Ballast Water			
Ballast Water Tank 1	6	11,858	45.30
Ballast Water Tank 2P	12	4,707	18.16
Ballast Water Tank 2S	21	4,707	18.16
TOTAL		21,272	81.62
Sewage Holding Tank	16	2,021	7.87
AFFF Tank	7	525	****
Tow Winch Hydraulic Oil Sump		300	****

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SECTION III.

TECHNICAL PRINCIPLES OF OPERATION

1-11. General. The following paragraphs provide technical principles of operation of the LT systems.

1-12. Machinery Plant Monitor and Control Systems. Machinery control and monitoring is accomplished trough several independent systems. An integrated machinery monitoring system is described in paragraph a., below. Paragraph b., below, describes the various machinery control systems.

a. Machinery Plant Monitoring System. The machinery plant monitoring system is a microcomputer based system which monitors vital machinery operating conditions. The system consists of a color video cathode ray tube (CRT) display and dot matrix printer both mounted on the enclosed operating station (EOS) console. The dot matrix printer produces only a printed record of all alarm messages. The CRT displays date and time, alarm messages, and monitored status. Each page of display provides a horizontal bar graph of the value with the numeric value to the right. The monitored status is presented in 12 pages of displays (see Table 1-4).

Table 1-4. Machinery Plant Monitoring System Displays.

Title	Page
Content	1
Main Propulsion Engines	2-6
Reduction Gears	7
Ship Service Generators	8-10
Bow Thruster Engine	11
Pump Drive Engine	11
Auxiliary Services	12

(1) Page 1 - CONTENTS. Provides a table of contents for the system.

(2) Page 2 - MAIN PROPULSION ENGINES Displays engine speed, air box pressure, lube oil pressure, and lube oil temperature (to cooler) for both port and starboard main engines.

(3) Page 3 - MAIN PROPULSION ENGINES (CONT). Displays jacket water temperature (to cooler) and jacket water temperature (from cooler) for both port and starboard main engines. Also displayed are jacket water pressure for the right and left banks of both main engines.

(4) Page 4 - MAIN PROPULSION ENGINES (CONT). Displays fuel oil pressure, starting air pressure, exhaust temperature (to turbo) and exhaust temperature (from turbo) for both main engines.

(5) Page 5 - MAIN PROPULSION ENGINES (CONT). Displays port engine cylinder temperatures for all 12 cylinders and provides the average temperature. Also displays the starboard engine average cylinder temperature for comparison.

(6) Page 6 - MAIN PROPULSION ENGINES (CONT). Displays starboard engine cylinder temperatures for all 12 cylinders and provides the average temperature. Also displays the port engine average cylinder temperature for comparison.

(7) Page 7 - REDUCTION GEARS. Displays lube oil pressure, lube oil temperature, and cooling water temperature for both port and starboard reduction gears.

(8) Page 8 - SHIP SERVICE GENERATORS. Displays generator engine speed, lube oil pressure, lube oil temperature and jacket water temperature for port and starboard ship service diesel generators (SSDGs).

(9) Page 9 - SHIP SERVICE GENERATORS (CONT.) Displays jacket water pressure, fuel oil pressure, and exhaust temperature for both SSDGs. Also displays starting air pressure for port SSDG.

(10) Page 10 - SHIP SERVICE GENERATORS CONT . Displays output voltage, load current and frequency for both SSDGs. Also indicates if emergency generator jacket water heater is on.

(11) Page 11 - BOW THRUSTER ENGINE AND PUMP DRIVE ENGINE. Displays engine speed, oil pressure, and cooling water temperature for bow thruster and pump drive engines.

(12) Page 12 - AUXILIARY SERVICES Displays pressures for firemain, fire and general service does not show on screen, bilge pump discharge, tow winch hydraulic system, and central hydraulic unit.

b. Control Systems. Control systems include control air system, machinery remote control system, and steering control system.

(1) Control air system (Figure 1-46). Compressed air (125 psi) is provided through an air dryer to control consoles and auxiliary control stations for control of main propulsion, SSDG #2, and bow thruster engines. The EOS console also contains controls for selection of reduction gear ratios. A system of pneumatic valves in each console and control station provides the necessary control of the system.

(a) Command transfer. Transfer of command to pilothouse console or auxiliary control stations may only be initiated from the EOS. When requested to do so, engine room watchstander positions EOS COMMAND TRANSFER control from EOS to REMOTE position. At the selected station, the operator pulls up and holds the COMMAND TRANSFER plunger until air pressure is indicated on the control air pressure gauge. When the gauge indicates air pressure, transfer is complete and all other control stations are disabled. Transfer between pilothouse console and an auxiliary control station is accomplished by pulling up the COMMAND TRANSFER plunger at the desired station until air pressure is indicated on the control air pressure gauge (approx. 110 - 120 psi). This also disables all other stations. EOS may regain control at any time by placing EOS COMMAND TRANSFER control to EOS position. Main engine starting circuits are disabled whenever a clutch is selected or command is at a station other than the EOS.

(b) Reduction gear ratio selection. A selector on EOS console allows selection of desired forward reduction gear ratio. Reduction gear selection will be disabled whenever the throttle control is not in the center (neutral) position or command is at a station other than the EOS.

(c) Clutch and throttle control. Movement of throttle control either 20 degrees AHEAD or ASTERN causes the shaft brake to immediately release and the clutch to engage the reduction gear. Continued movement of the throttle control will increase engine speed. The shaft brake will automatically reapply whenever the control station is positioned to neutral.

(2) Machinery remote control and indicator system. Machinery remote control and indicator system includes the engine order telegraph, remote propulsion indicator panel system, and machinery remote control system.

(a) Engine order telegraph. The engine order telegraph communicates desired engine speed and direction from pilothouse to EOS when EOS is in control. See paragraph 1-17 for a detailed description

(b) Remote Propulsion Indicator Panel (RPIP) svstem. RPIP panels at each control station provide indicators to monitor operation. Tachometer gauges are provided for port and starboard main engines and shafts at all RPIPs. Port and starboard engine failure lights are also provided at each station. Bow thruster shaft tachometer gauges are provided at all RPIPs except EOS. Indicators are provided to indicate clutch(es) selected. The pilothouse and EOS panels have indicators to show which of the five stations has command. The other three stations have a single indicator to show when that station is in command.

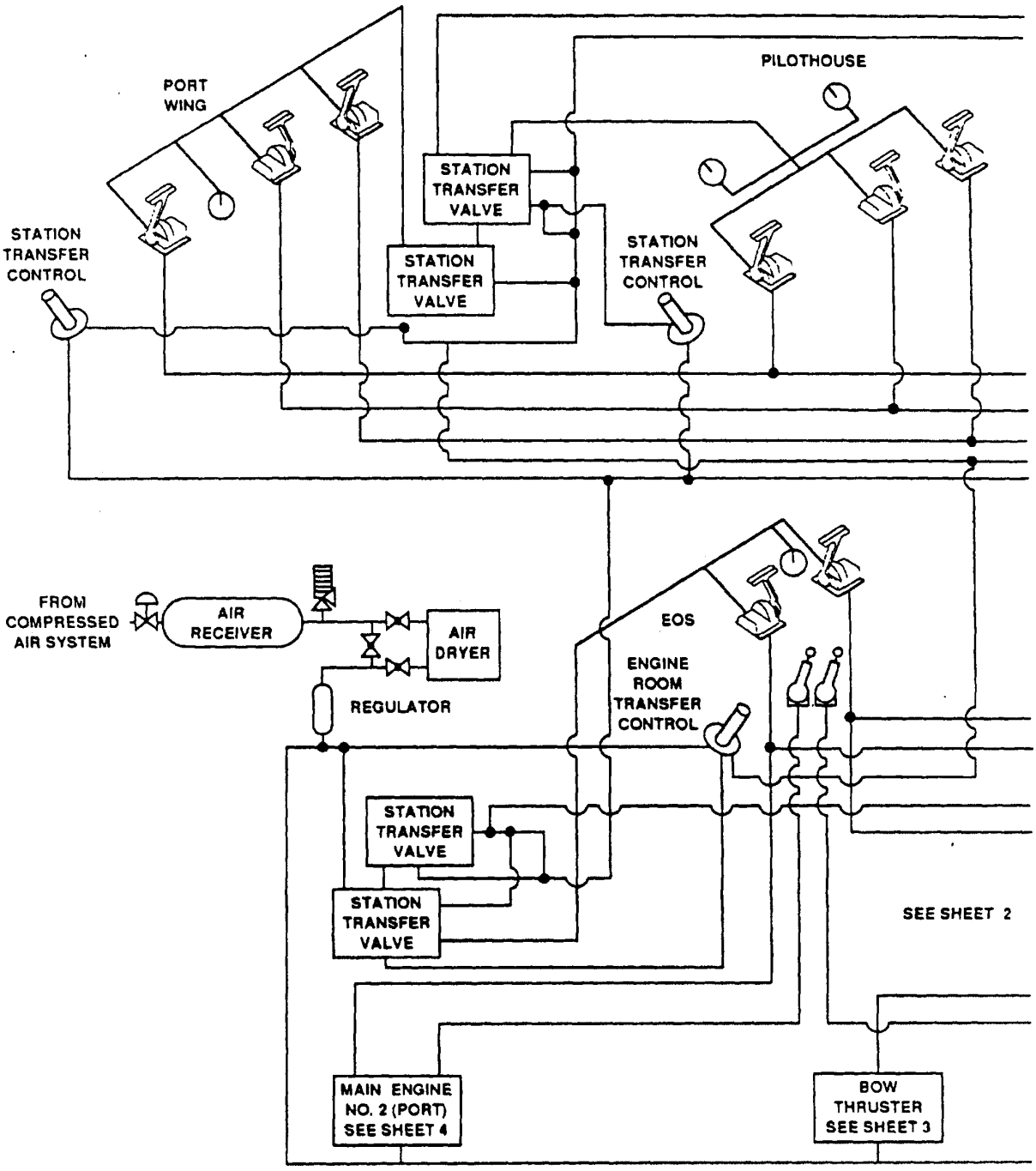


Figure 1-46. Control Air System (Sheet 1 of 4).

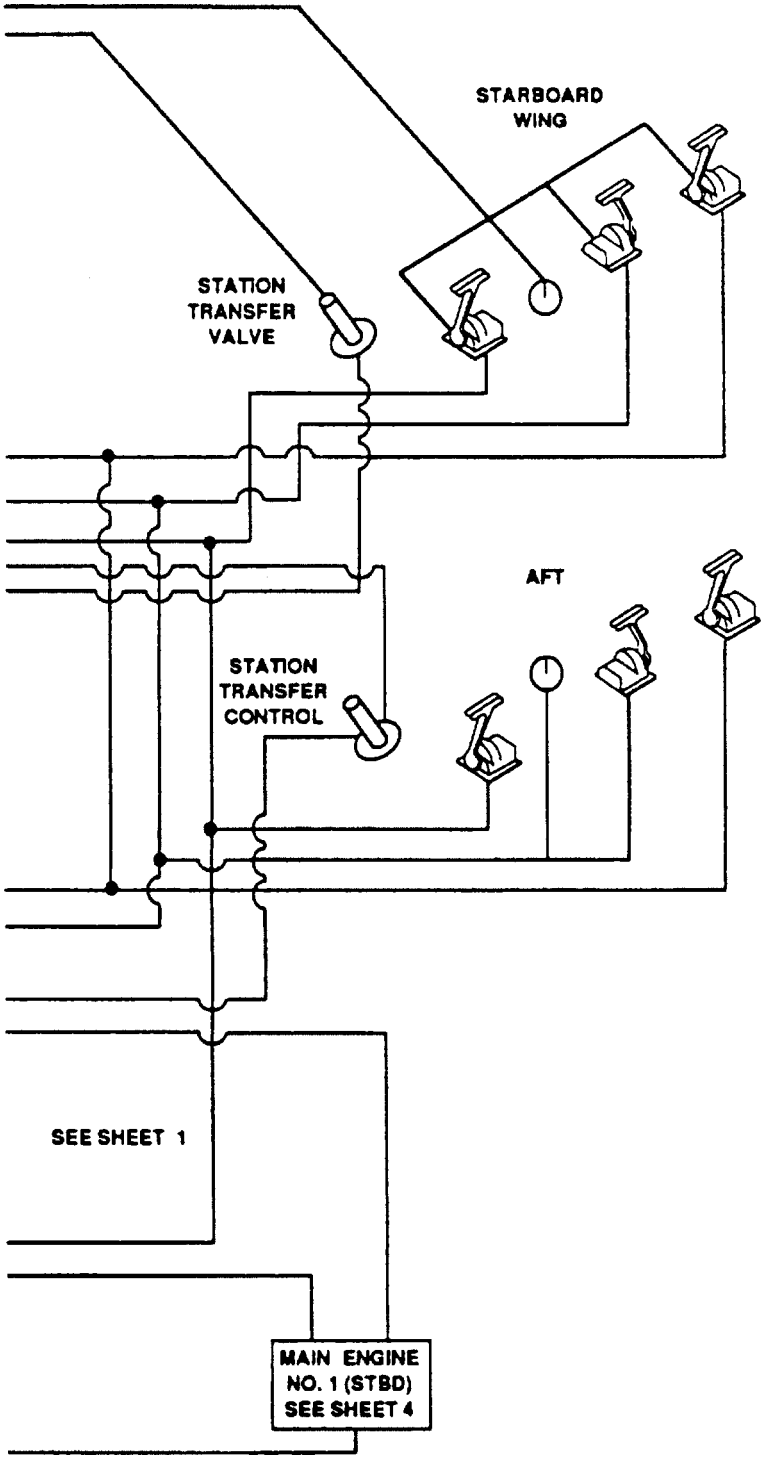


Figure 1-46. Control Air System (Sheet 2 of 4).

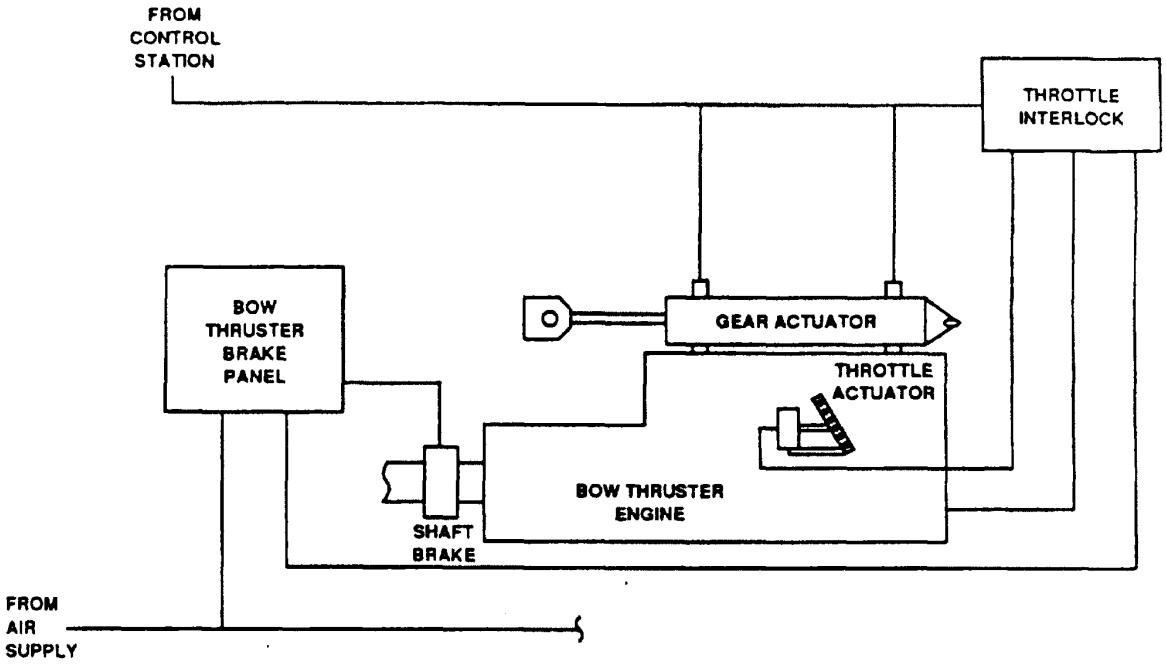


Figure 1-46. Control Air System (Sheet 3 of 4).

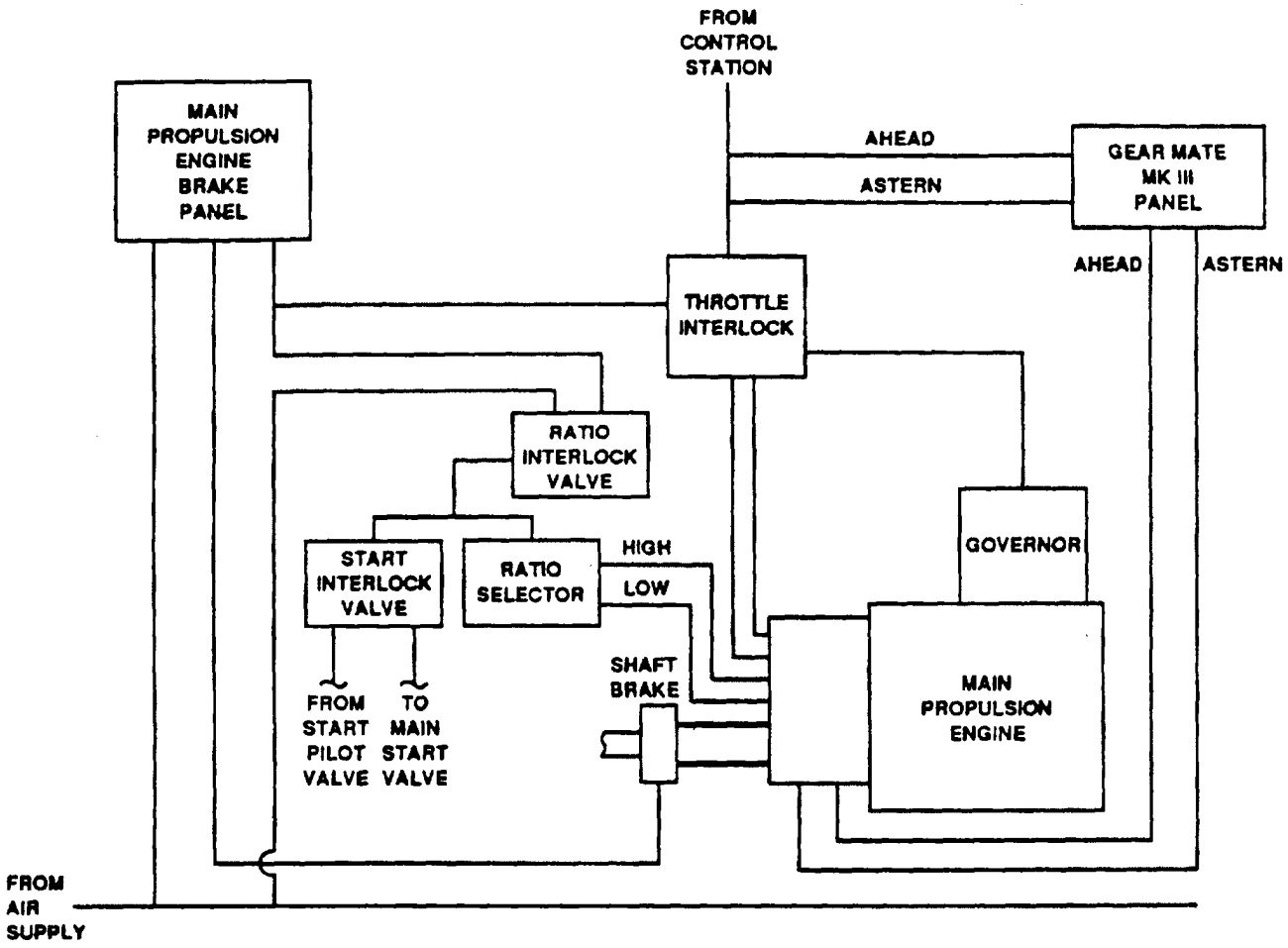


Figure 1-46. Control Air System (Sheet 4 of 4).

(c) *Machinery remote control system (Figure 1-47)*. Remote controls for starting and stopping selected machinery are provided in the pilothouse and EOS. Panels in the pilothouse console provide controls for fire and general service pumps and bow thruster engine. The machinery remote control panel, located on the EOS console, provides controls for fire pumps, main engines, SSDGs, pump drive engine and central hydraulic power unit.

(3) *Steering control system*. See paragraph 1-16 for a detailed description of the steering control system.

c. *Alarm Systems*. Alarm systems include general alarm system, freezer alarm, radio room door alarm, fan room door alarm, arms stowage room alarm, and fire detection system. A complete discussion of each of these alarm systems is provided in paragraph 1-17, except for fire detection which is provided in paragraph 1-19.

1-13. Electric Plant. The electric plant consists of the Power Generation System, Power Distribution System, and Storage Batteries.

a. *Power Generation System*. The power generation system (Figure 1-48) provides the LT with service (440 Vac, 3-phase, 60 Hz, 275 kW) and emergency (440 Vac, 3-phase, 60 Hz, 65 kW) electrical power. Service power is generated by one or both of the ship service diesel generator (SSDG) sets, which supply the main switchboard and the emergency switchboard through a bus tie circuit breaker from the main switchboard. Emergency power is generated by an emergency diesel generator set, which supplies the emergency switchboard for continued operation of vital systems and equipment during loss of service power.

A bus tie breaker transfer, located in the emergency switchboard, isolates the emergency switchboard from the main switchboard upon loss of service power and allows emergency power to be supplied through the emergency switchboard. In port, the LT is capable of receiving shore power (440 Vac) through a shore power cable terminating at a shore power connector.

(1) Ship service diesel generator set. Each service generator set consists of a diesel engine, which is directly coupled to its generator. The engine and generator are mounted on a common sub-base.

(a) *Ship service diesel generator engine*. A turbocharged V-8 diesel engine provides power to the generator. The port ship service diesel generator engine (No. 2) is air started (100 psi), the starboard (No. 1) is electrically started (24 Vdc). Engine control and monitoring is provided from the EVANS and local control panel.

1 *Engine instrument and control panel*. The engine control panel contains the controls and indicators necessary for operation of the engine. Gauges include oil pressure, coolant temperature, fuel pressure, ammeter (SEDGE #1) and service hour meter.

2 *Fuel system*. The fuel oil service system (Figure 1-49) consists of fuel oil day tanks, connecting lines, fuel injectors, fuel pump, engine mounted filter/coalescer, engine mounted fuel filter, and fuel supply and return manifolds Fuel room the day tank is drawn in by the fuel pump, through the engine mounted filter/coalescer and delivered to the engine mounted filters. Fuel passes through the filter elements to the fuel manifold of the fuel injection pump housing. Fuel n the manifold of the injection pump housing is the supply for the injection pumps. Injection pumps (one per cylinder) send fuel to the fuel injection nozzle. A small amount of fuel is pumped into the cylinder, at very high pressure, through the needle valve and spray tip of the injector. The quantity of fuel injected depends upon the position of the plunger, which is controlled by the injector rack and governor. Excess fuel flow through the fuel return manifold to the day tank.

3 *Air intake system*. Air entering the engine is thoroughly cleaned by passing through the air intake filter to protect the engine from abrasive materials as well as to protect the lubricating oil from contaminants. Clean inlet air from the air cleaner is pulled through the air inlet of the turbocharger by the turning compressor wheel. The compressor wheel causes a compression of the air. The air then goes to the aftercooler and then to the inlet manifold of the engine. When the intake valves open, the air goes into the engine cylinder and is mixed with the fuel for combustion.

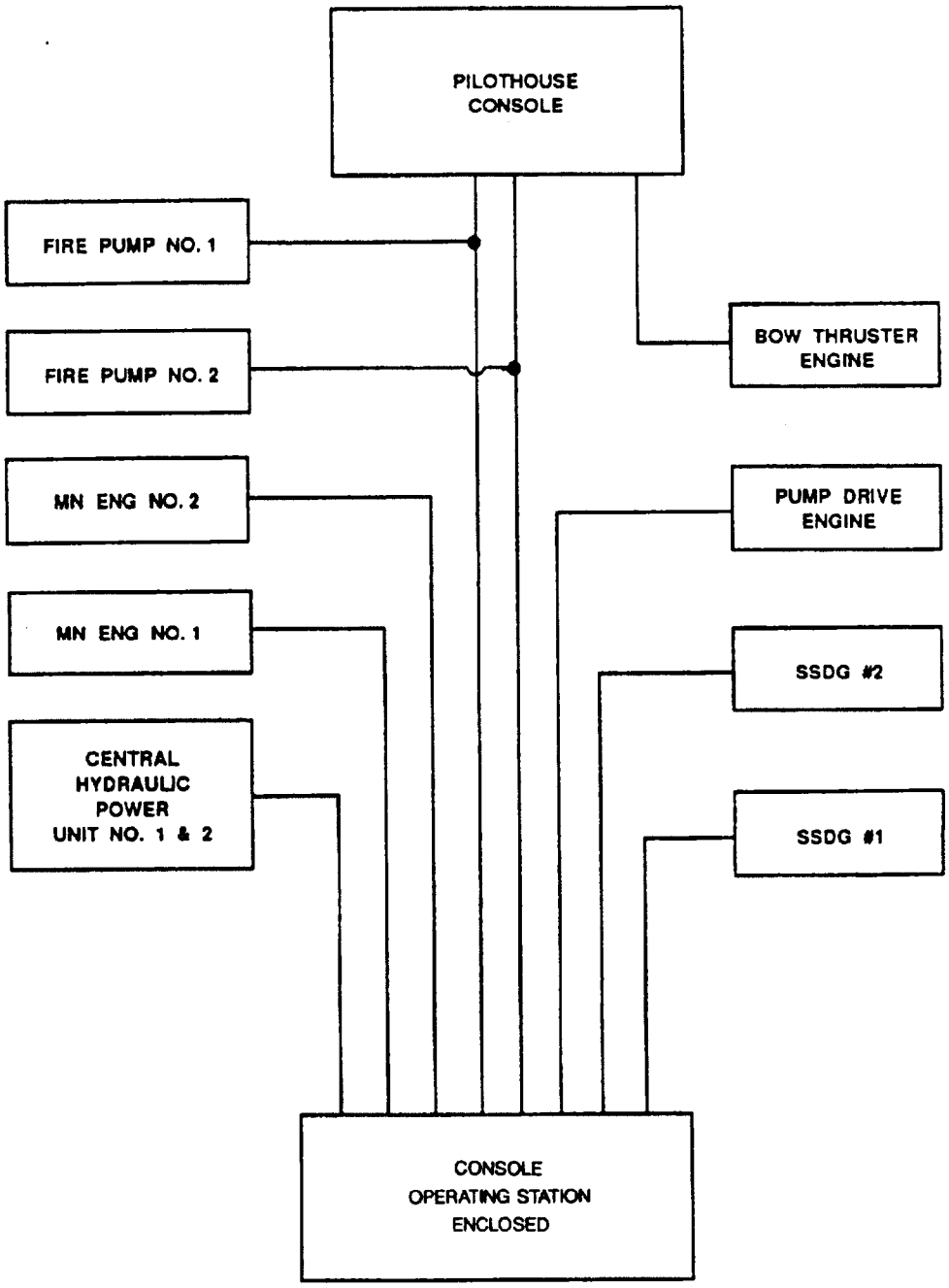


Figure 1-47. Machinery Remote Control System.

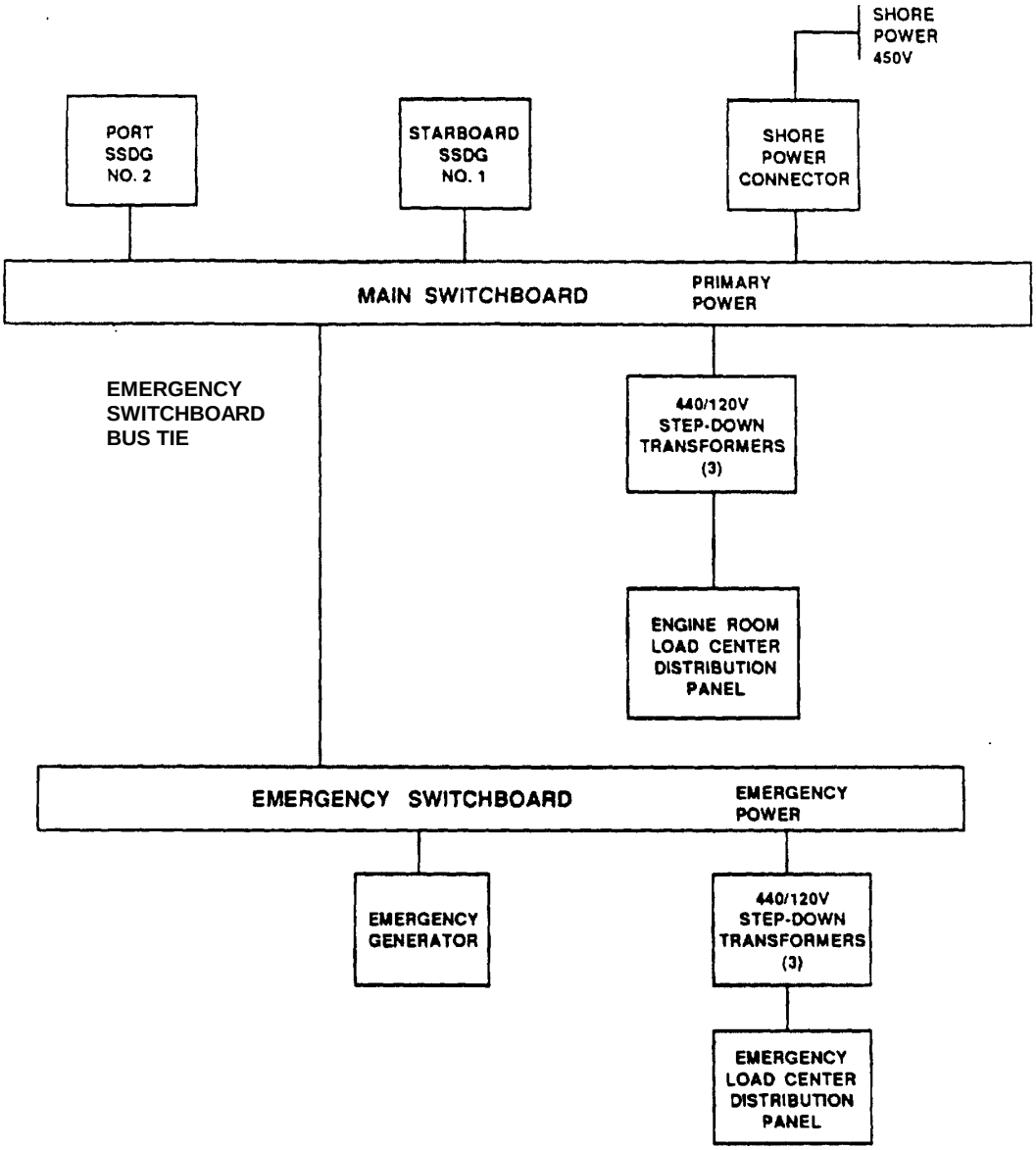


Figure 1-48. Power Generation System.

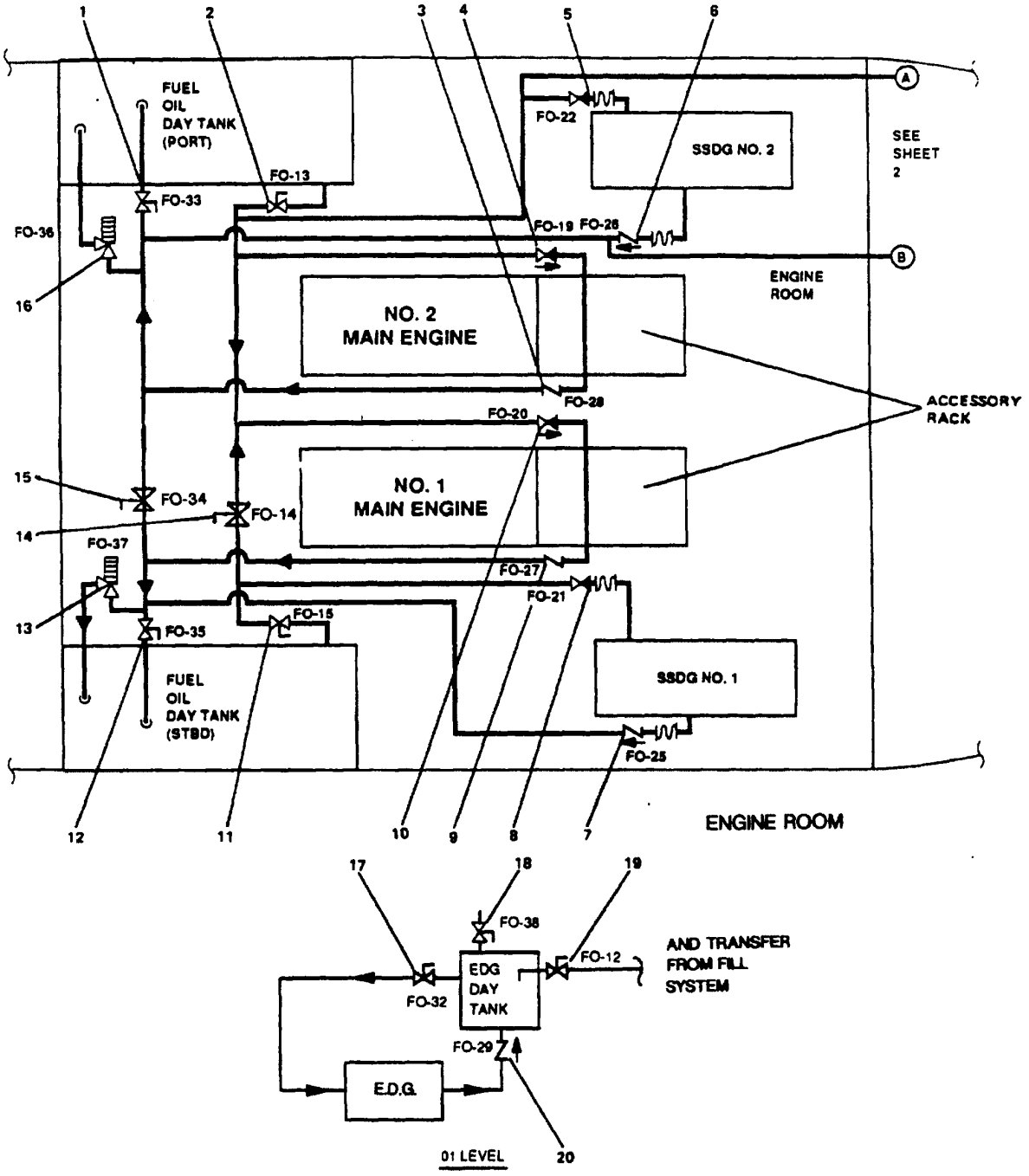
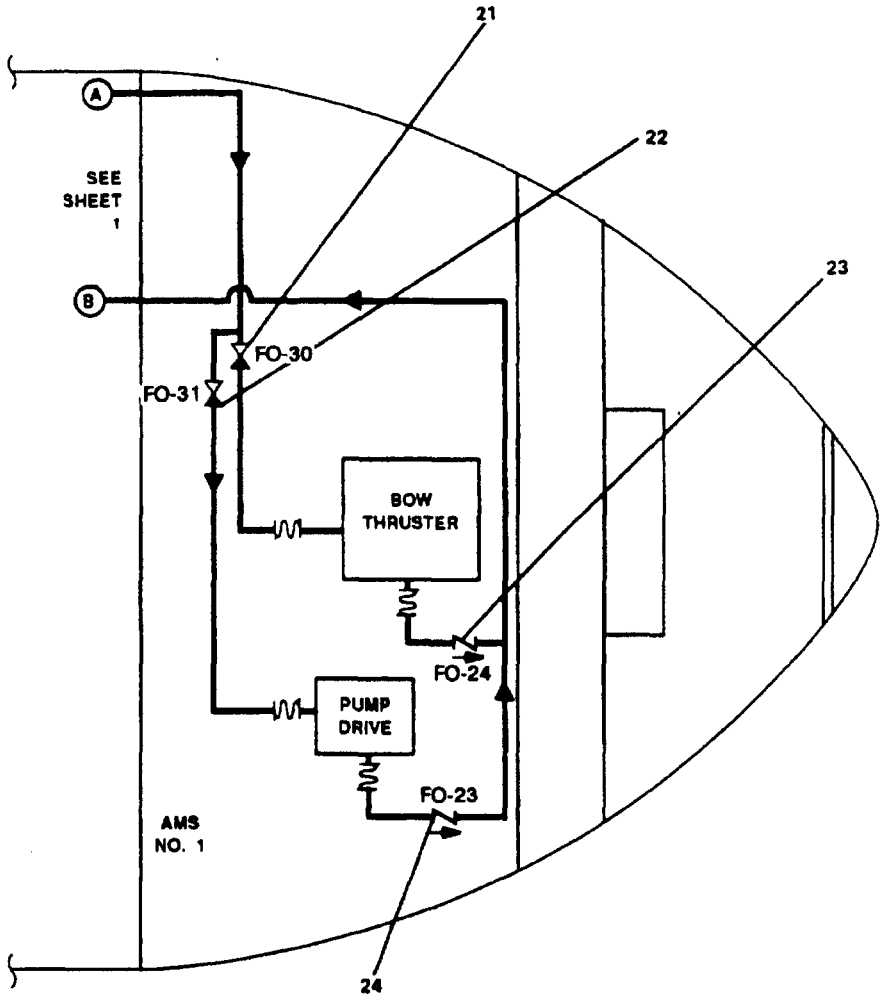


Figure 1-49. Fuel Oil Service System (Sheet 1 of 2).



1. FO-33, F.O. RTN. TODAY TK. PORT
2. FO-13, F.O. SERV. SUCT., PORT
3. FO-28
4. FO-19, F.O. SPLY TO M.E. NO. 2
5. FO-22, F.O. SPLY TO S.S.D.G. NO. 2
6. FO-26
7. FO-25
8. FO-21, F.O. SPLY TO S.S.D.G. NO. 1
9. FO-27
10. FO-20, F.O. SPLY TO M.E. NO. 1
11. FO-15, F.O. SERV. SUCT. STBD
12. FO-35, F.O. RTN TODAY TK. STBD
13. FO-37, F.O. RTN RLF -SET AT 10 P.S.I.
14. FO-14, F.O. SERV CRSVR
15. FO-34, F.O. RTN CRSVR
16. FO-36, F.O. RTN RLF. -SET AT 10 P.S.I.
17. FO-32, F.O. SPLY TO E.D.G.
18. FO-38, SIGHT GLASS
19. FO-12, E.D.G. DAY TK FIL
20. FO-29
21. FO-30, F.O. SPLY TO BOW THRUSTER ENG.
22. FO-31, F.O. SPLY TO PMP. DR. ENG.
23. FO-24
24. FO-23

Figure 1-49. Fuel Oil Service System (Sheet 2 of 2).

4 Engine exhaust system (Figure 1-50). When the exhaust valves open, the exhaust gases go out of the engine cylinder and into the exhaust manifold. From the exhaust manifold, the exhaust gases go through the blades of the turbine heel. This causes the turbine wheel and compressor wheel to turn. The exhaust gases then go out the exhaust outlet of the turbocharger and are expelled up the stack to the atmosphere. Engine exhaust lines also contain condensate drain lines and exhaust temperature sensors.

NOTE

Port SSDG is air started; starboard SSDG is electrically started.

5 Air starting system. The air starting system consists of an air starting motor, oiler, relay valve and starter control valve.

Air for the starting motor comes from the compressed air system (see paragraph 1-24) and is sent through a pressure regulator. From the pressure regulator, air goes to a relay valve. The flow of air is then stopped by the relay valve until the starter control valve is activated. When the starter control valve is activated, air is sent from the starter control valve to the starter. The air pressure engages the starter with the flywheel gear. When the starter is engaged, air then goes to relay valve. This air activates the relay valve and lets the main air supply from the tee goes through the lubricator and into the starting motor.

The air with lubrication oil goes into the air motor. The pressure of the air turns the starter which turns the engine flywheel. The air then goes out of the starting motor through an air silencer.

When the engine starts running, the flywheel will start to turn faster than the starter. The starter retracts under this condition. This prevents damage to the starter or flywheel gear.

When starter control valve is released, the air pressure and flow to starter is stopped, the starter disengages. The relay valve stops the flow of air to the airstarting motor.

6 Electric starting system. The starter motor is used to turn the engine flywheel fast enough to get the engine to start running. The starter motor has a solenoid. When the start switch is activated, the solenoid moves the starter pinion to engage it with the ring gear on the flywheel of the engine. The starter pinion engages with the ring gear before the electric contacts in the solenoid close the circuit between the battery and the starter motor. When the circuit between the battery and the starter motor is complete, the pinion turns the engine flywheel. A clutch gives protection for the starter motor so that the engine cannot turn the starter motor too fast. When the start switch is released, the starter pinion moves away from the ring gear.

7 Lubricating oil system. The engine lubricating oil (12 gal) which is cooled and filtered, is supplied by a gear-type pump. Bypass valves provide unrestricted flow of lubrication oil to the engine parts when oil viscosity is high, or if either oil cooler or the oil filter elements become clogged. Oil is pulled from the oil pan through the oil pump and to the oil cooler. Oil from the oil cooler passes through the oil filters then to the oil manifold. The oil manifold sends oil throughout the engine to lubricate parts. The oil then flows back to the pan.

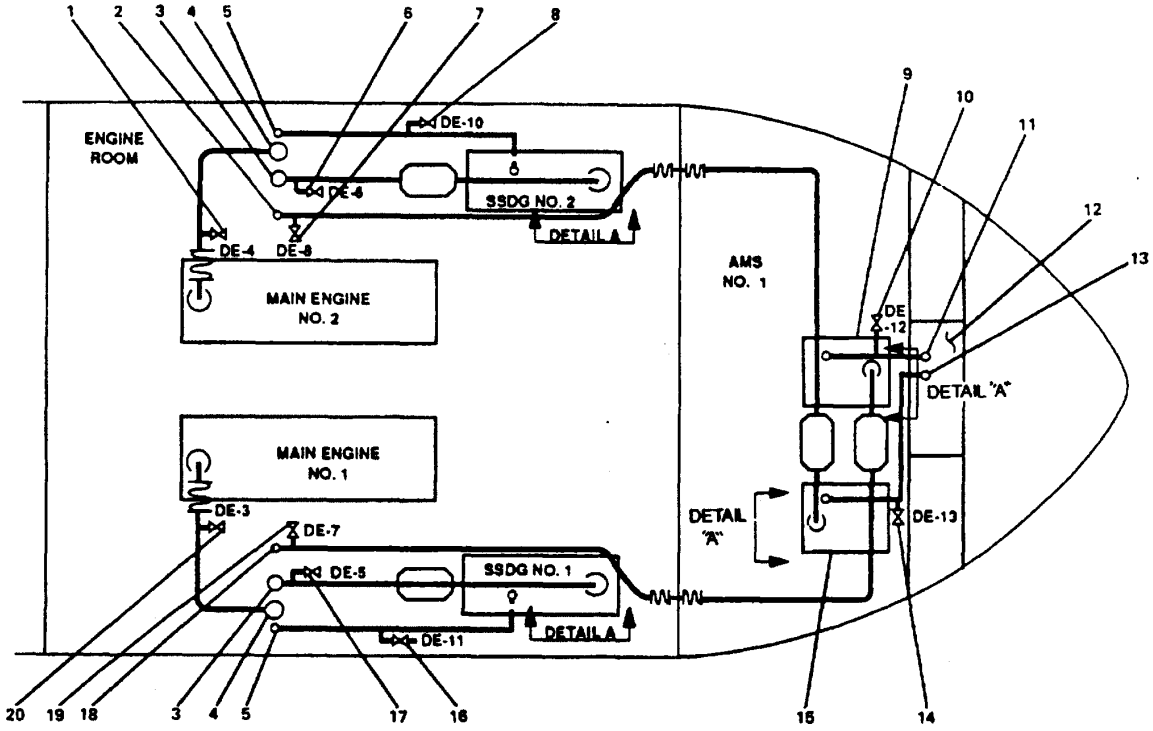


Figure 1-50. Engine Exhaust and Crankcase Vent System (Sheet 1 of 4).

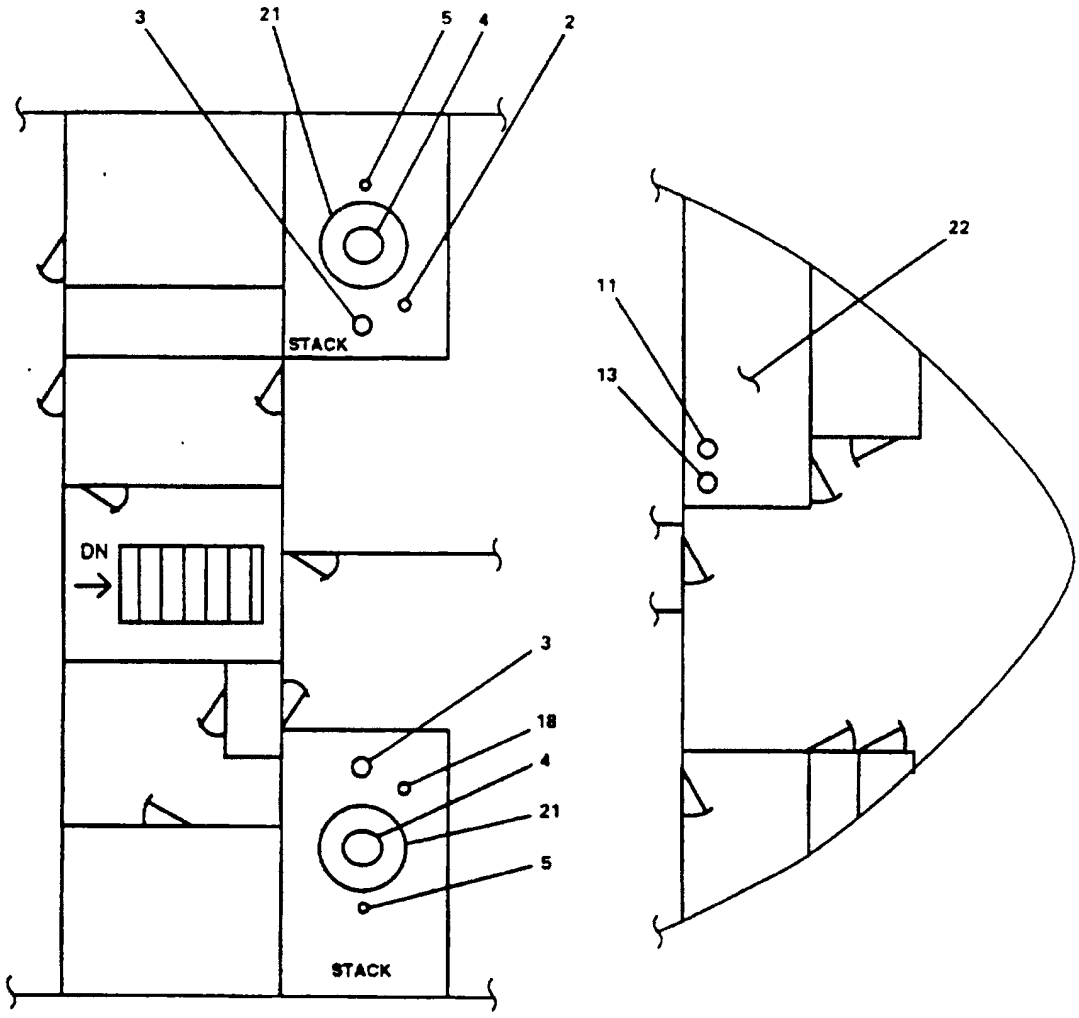


Figure 1-50. Engine Exhaust and Crankcase Vent System (Sheet 2 of 4).

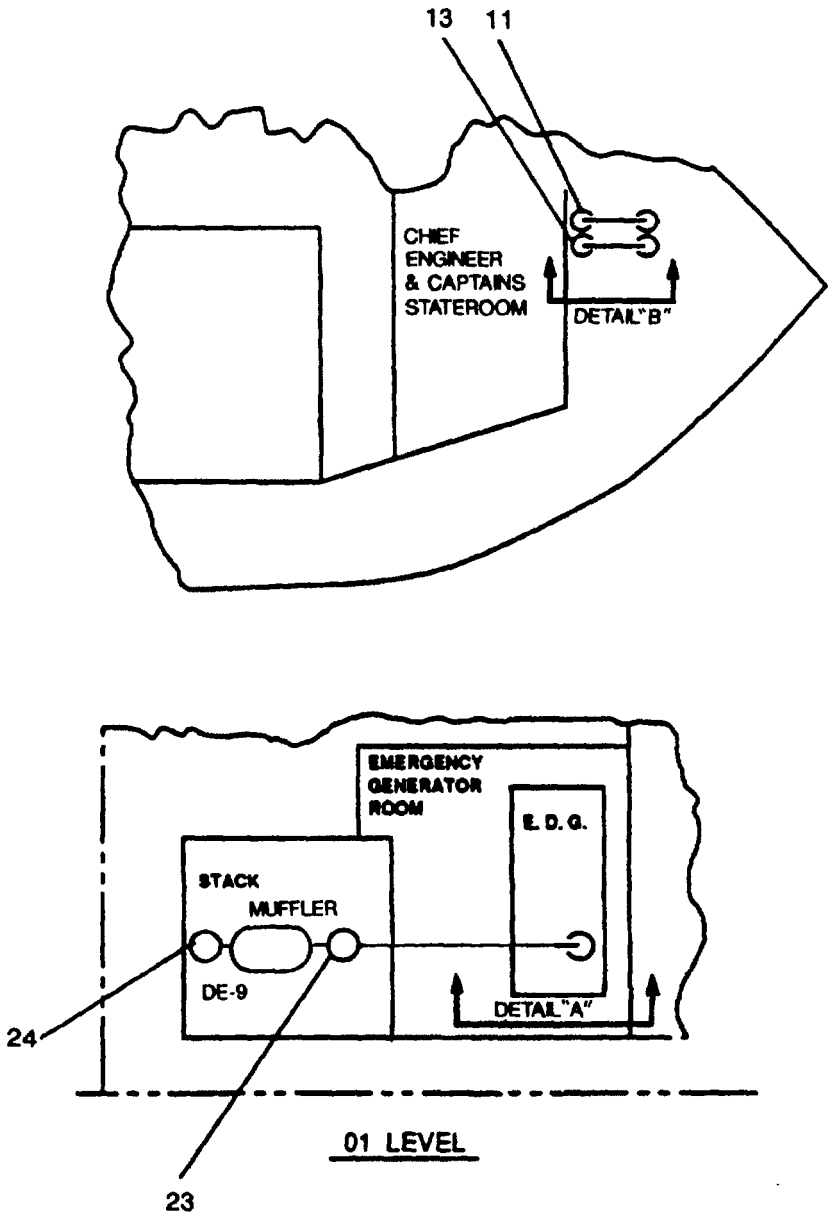
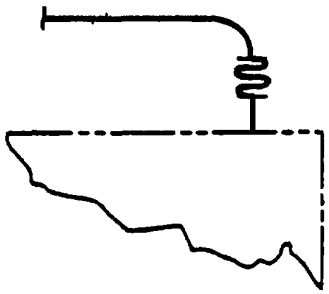
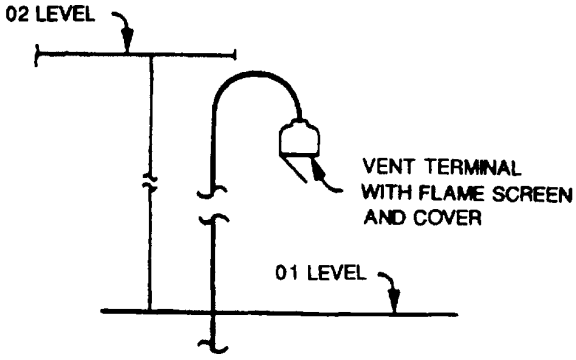


Figure 1-50. Engine Exhaust and Crankcase Vent System (Sheet 3 of 4).





DETAIL A

EXPANSION JOINT CONNECTION

DETAIL B

BOW THRUSTER PUMP DRIVE

1. DE-4, DR. M.E. NO. 2 EXH.
2. PUMP DRIVE ENGINE EXHAUST UP
3. SSDG ENGINE EXHAUST UP
4. MAIN ENGINE EXHAUST UP
5. SSDG ENGINE CRANKCASE VENT UP
6. DE-6, DR. S.S.D.G. N. 2 EXH.
7. DE-8, DR. PUMP DRIVE ENG. EXH.
8. DE-10
9. BOW THRUSTER ENGINE
10. DE-12
11. BOW THRUSTER ENGINE CRANKCASE VENT UP
12. BOW THRUSTER COMPATMENT
13. PUMP DRIVE ENGINE CRANKCASE VENT UP
14. DE-13
15. PUMP DRIVE ENGINE
16. DE-11
17. DE-5, DR. S.S.D.G. NO. 1 EXH.
18. BOW THRUSTER ENGINE EXHAUST UP
19. DE-7, DR. BOW THRUSTER ENG EXH.
20. DE-3, DR. M.E. NO. 1 EXH.
21. MAIN ENGINE MUFFLER
22. LAUNDRY SPACE
23. EDG ENGINE EXHAUST UP
24. DE-9, DR. EDG EXHAUST

Figure 1-50. Engine Exhaust and Crankcase Vent System (Sheet 4 of 4).

8 Cooling system. The engine (fresh water) cooling system (Figure 1-51) consists of a gear driven centrifugal water pump, an oil cooler, an expansion tank, and a keel cooler. Engine water is also circulated through each aftercooler located in the turbocharger air discharge duct, to cool the air before it enters the engine air box. The engine discharge water flows through an external piping arrangement to the keel cooler. The keel cooler dissipates heat from the engine cooling water to the sea. Jacket water heaters are provided for cold-weather starting.

(b) Ship service diesel generator. Two 275 kW brushless exciter generators provide 450 Vac, 3-phase, 60 Hz power to the main switchboard. Each generator is capable of providing 110 percent of the necessary at-sea load for the propulsion and safety of the ship under normal conditions. The generators may be operated in parallel; however, normal operation has one generator on line. For parallel operation, controls necessary to parallel the generators are provided on the main switchboard (in the EOS).

(2) Emergency generator set. The emergency generator set consists of a diesel engine which is directly coupled to the emergency generator. The engine and generator are mounted on a common sub-base.

(a) Emergency generator engine. An inline 4 cylinder diesel engine provides power to the emergency generator. The engine is electrically started (24 Vdc), has its own lubricating oil (5 gal), cooling, and fuel oil systems. The engine is cooled by a fresh water cooling system utilizing a radiator for heat transfer. Jacket water heater is provided for cold weather starting. Switchboard automatic bus transfer equipment automatically opens the bus tie circuit breaker, starts the engine, an closes the emergency generator breaker when power is lost from the main switchboard.

1 Engine instrument and control panel. The engine mounted control panel contains the controls and indicators necessary for operation of the engine. An AC meter module (digital liquid crystal) displays AC volts (V), Frequency (Hz), and AC amps (A). An Engine Control Module (ECM) displays service hours, engine speed, system battery voltage, engine oil pressure and engine coolant temperature sequentially in U.S. units and metric equivalents. A display hold switch allows selection of a single engine display.

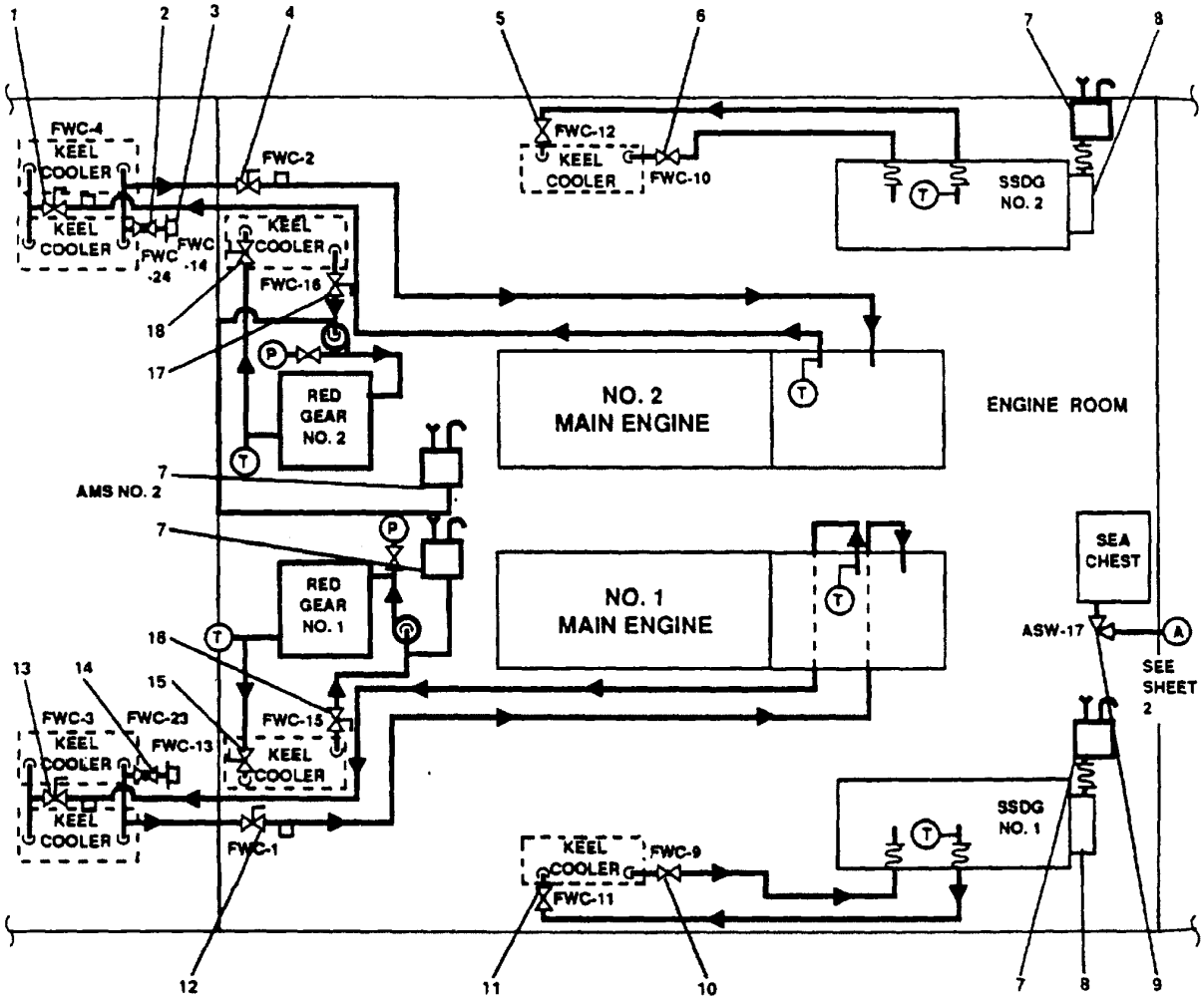
2 Fuel system. The fuel oil service system (Figure 1-49) consists of the emergency diesel generator day tank, connecting lines, fuel injectors, fuel pump, engine mounted fuel filter, and fuel supply and return manifolds. Fuel from the day tank is drawn in by the fuel pump to the engine mounted filters. Fuel passes through the filter elements to the fuel manifold in the injector pump housing. The injector pump pushes fuel at very high pressure to the injector. A small amount of fuel is pumped into the cylinder, at very high pressure, through the needle valve and spray tip of the injector. The quantity of fuel injected depends upon the position of the plunger which is controlled by the injector rack and governor. Excess fuel flows through the fuel return manifold to the day tank.

3 Air intake system. Air entering the engine is thoroughly cleaned by passing through he air intake filter to protect the engine from abrasive materials as well as protect the lubricating oil from contaminants. When the engine is running, each time a piston moves through the intake stroke, it pulls air into the cylinder. The air flow is through the air filter, inlet manifold, passages in the cylinder head and past the open intake valve into the cylinder.

4 Engine exhaust system (Figure 1-50). When the engine is running, each time a piston moves through the exhaust stroke, it pushes hot exhaust gases from the cylinder. The exhaust gas flow is out of the cylinder between the open exhaust valve and the exhaust valve seat. Then it goes through passages in the cylinder head, through the exhaust manifold, and out through the stack. The engine has an exhaust condensate drain.

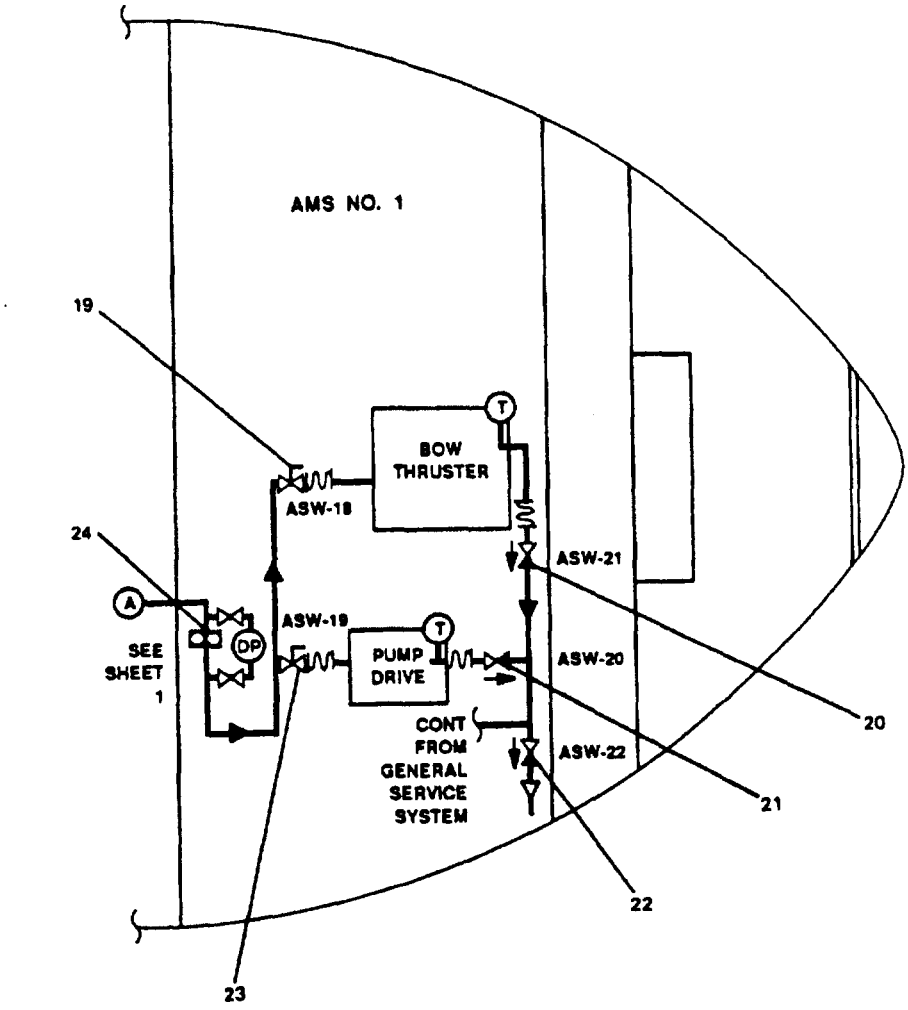
5 Electric starting system. The starter motor is used to turn the engine flywheel fast enough to get the engine to start running. The starter motor has a solenoid. When the start switch is activated, the solenoid moves the starter pinion to engage it with the ring gear on the flywheel of the engine. The starter pinion engages with the ring gear before the electric contacts in the solenoid close the circuit between the battery and the starter motor. When the circuit between the battery and the starter motor is complete, the pinion turns the engine flywheel. A clutch gives protection for the starter motor so that the engine cannot turn the starter motor too fast. When the start switch is released, the starter pinion moves away from the ring gear.

6 Lubricating oil system. The engine lubricating oil is supplied by a gear-type pump, which pulls oil from the oil pan and then pushes it to the oil cooler. Oil flows from the oil cooler to the oil filter and then to the oil manifold. Oil is routed from the manifold to bearings and piston surfaces and then back to the oil pan.



BELOW MAIN DECK

Figure 1-51. Main and Auxiliary Engine Water Cooling System (Sheet 1 of 3).



BELOW MAIN DECK

Figure 1-51. Main and Auxiliary Engine Water Cooling System (Sheet 2 of 3).

1. FWC-4, F.W. FR. M.E.NO. 2 TO KEEL CLR.
2. FWC-24, F.W. FILL CONN.
3. HOSE CONNECTION
4. FWC-2, F.W. FR. KEEL CLR. TO M.E. NO. 2
5. FWC-12, F.W. FR. S.S.D.G. NO. 2 TO KEEL CLR.
6. FWC-10, F.W. FR. KEEL CLR. TO S.S.D.G. NO. 2
7. FRESH WATER EXPANSION TANK
8. ENGINE MOUNTED EXPANSION TANK
9. ASW-17, SEA SUCTION S.W. COOLING
10. FWC-9, F.W. FR. KEEL CLR. TO S.S.D.G. NO. 1
11. FWC-11, F.W. FR. S.S.D.G. NO. 1 TO KEEL CLR.
12. FWC-1, F.W. FR. KEEL CLR. TO M.E. NO. 1
13. FWC-3, F.W. FR. M.E. NO. 1 TO KEEL CLR.
14. FWC-23, F.W. FILL CNN.
15. FWC-13, F.W. FR. RED. GEAR NO. 1 TO KEEL CLR.
16. FWC-15, F.W. FR. KEEL CLR. TO RED. GEAR NO. 1
17. FWC-16, F.W. FR. EEL CLR. TO RED. GEAR NO. 2
18. FWC-14, F.W. FR. RED. GEAR NO. 2 TO KEEL CLR.
19. ASW-18, S.W. TO BOW THRUSTER ENG.
20. ASW-21, S.W. FR. BOW THRUSTER ENG. TO OVBD. DISCH.
21. ASW-20, S.W. FR. PUMP DRIVE ENG. TO OVBD. DISCH.
22. ASW-22, OVBD. DISCH. S.W. COOLING
23. ASW-19, S.W. TO PMP DRIVE ENG.
24. STRAINER

NOTE:

T	TEMPERATURE GAUGE
P	PRESSURE GAUGE
DP	DIFFERENTIAL GAUGE

Figure 1-51. Main and Auxiliary Engine Water Cooling System (Sheet 3 of 3).

7 Cooling system. The engine cooling system consists of a gear driven centrifugal water pump, oil cooler, and a radiator. The water pump is driven by the timing gears. Coolant from the bottom of the radiator goes through the inlet line to the water pump inlet. The water pump pushes the coolant through the system to the oil cooler and then on to the cylinder block. Return lines direct the flow to the water temperature regulator.

When the coolant reaches operating temperature, the water temperature regulator opens and coolant flow is divided. Some goes through the inlet line to the radiator for cooling. The rest goes through the internal bypass (shunt) line to the water pump. The proportion of the two flows is controlled by the water temperature regulator.

(b) Emergency generator. The emergency generator provides power (450 Vac, 3-phase, 60 Hz, 65 kW) to the emergency switchboard within 20 seconds of a ship service power system failure.

(3) Shore power connector. A 450 Vac, 400A shoe power connector is located on the maindeck, aft exterior bulkhead. The shore power connector provides the capability of connecting the ship electrical system to a shore power source.

b. Power Distribution. The power distribution system consists f the ship service (main) switchboard, the instrument and control (emergency) switchboard, load centers, power panels, motor controllers, and related wiring. The system distributes 450 Vac, 120 Vac, and emergency power throughout the ship. Power (450 Vac, 3-phase, 60 Hz) is received from the power generation system and routed via the main switchboard and emergency switchboard to selected equipment and panels.

(1) Main switchboard. The main switchboard (Figure 1-52), located in the EOS, provides generator selection, shore power selection, and power distribution for ship service 450 Vac. Conversion from 450 Vac to 120 Vac is accomplished by ship three service stepdown transformers located in the engine room (port). The emergency switchboard bus tie provides 450 Vac to the emergency switchboard. Power monitoring is provided by ammeters, voltmeters, kilowatt meters, frequency meters, phase rotation meter, ad a synchronization meter. Controls are provided for automatic generator voltage regulation and generator engine speed regulation. The switchboard motorized bus tie breaker also serves as an emergency 450 Vac power feedback source for the main switchboard from the emergency switchboard, to power selected equipment systems during emergency power conditions. An interlock system is incorporated into the switchboard to prevent damage to the switchboard from applying power from two sources at the same time (see Table 1-5).

Table 1-5. Main Switchboard Interlocks.

CIRCUIT BREAKER CLOSED	CANNOT CLOSE
SSDG #1 or #2 or Shore Power Feeding Main Switchboard with Main Bus Tie Closed and FEEDBACK Switch on NORMAL Position	
SSDG #1 Circuit Breaker	Shore Power Circuit Breaker
SSDG #2 Circuit Breaker	Shore Power Circuit Breaker
Shore Power Circuit Breaker	SSDG #1 Circuit Breaker
Shore Power Circuit Breaker	SSDG #2 Circuit Breaker
Main Bus Tie Circuit Breaker (Emergency Switchboard)	EDG Circuit Breaker
1S/E Bus Tie Circuit Breaker	2S/E Bus Tie Circuit Breaker
2S/E Bus Tie Circuit Breaker	1S/E Bus Tie Circuit Breaker
Emergency Diesel Generator (EDG) Running with FEEDBACK Switch in NORMAL Position	
EDG Circuit Breaker (Emergency Switchboard)	Main Bus Tie Circuit Breaker
EDG Running With FEEDBACK Switch in FEEDBACK Position	
EDG & Main Bus Tie Circuit Breaker (Emerg Swbd)	SSDG #1 Circuit Breaker
EDG & Main Bus Tie Circuit Breaker (Emerg Swbd)	SSDG #2 Circuit Breaker
EDG & Main Bus Tie Circuit Breaker (Emerg Swbd)	Shore Power Circuit Breaker

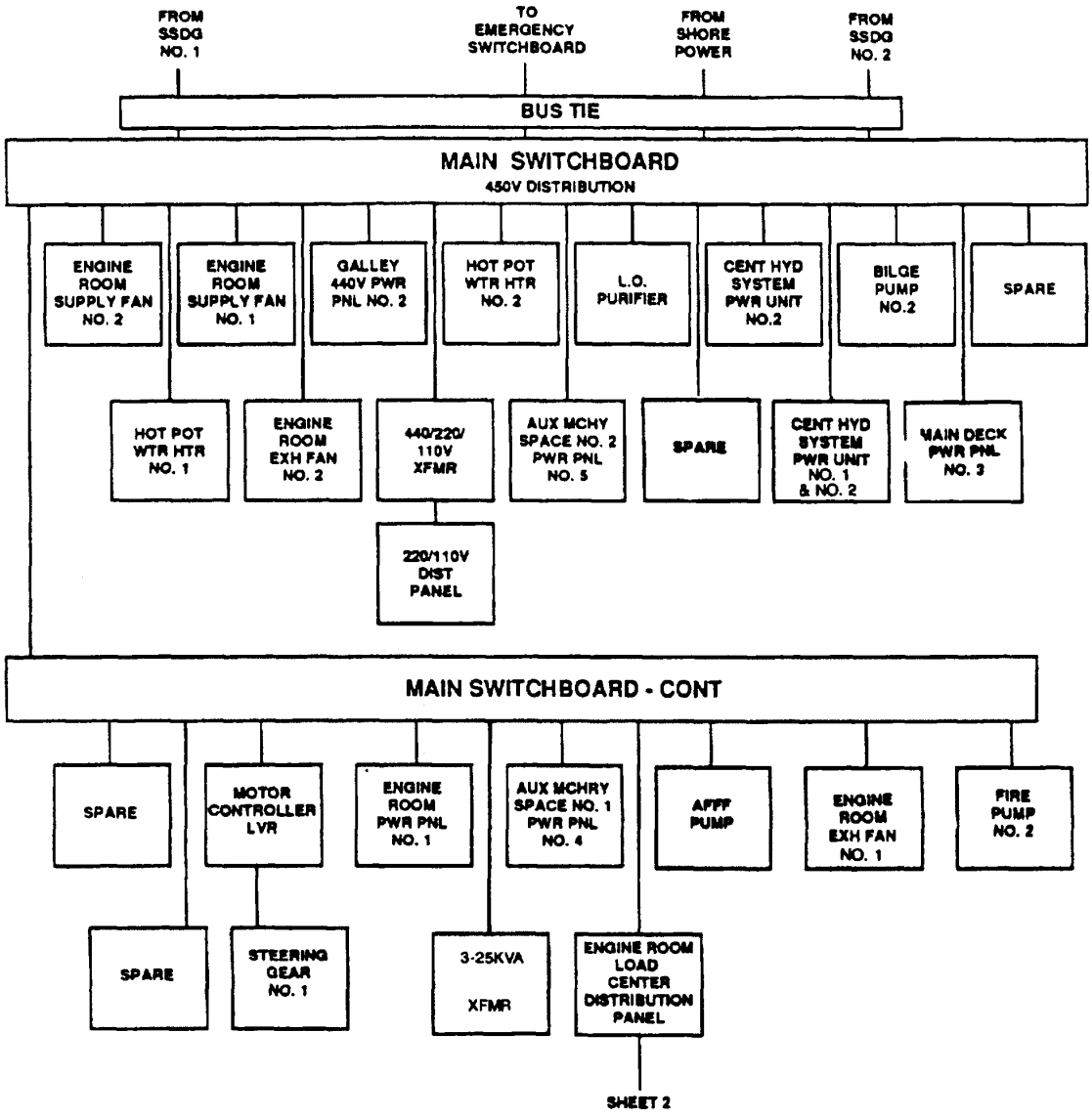


Figure 1-52. Main Switchboard (Sheet 1 of 2).

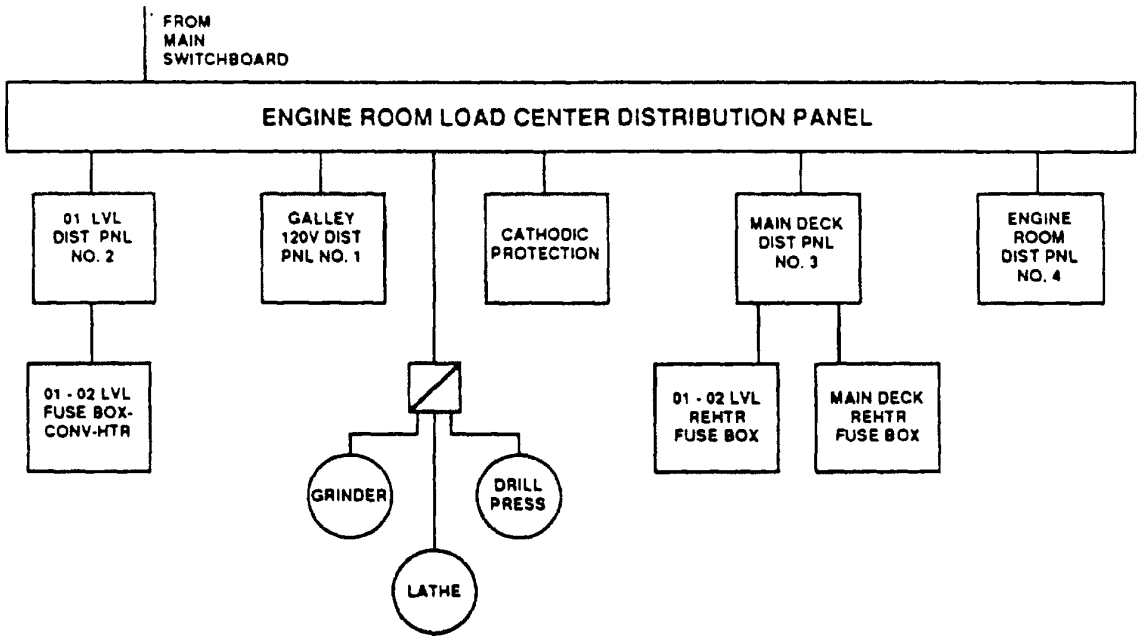


Figure 1-52. Main Switchboard (Sheet 2 of 2).

(2) Emergency switchboard. The emergency switchboard (Figure 1-53), located in the emergency generator room, normally receives 440 Vac primary power from the main switchboard through the bus tie. Upon loss of ship service power from the main switchboard, a bus tie breaker transfer within the emergency switchboard isolates the emergency switchboard and provides for automatic or manual starting of the emergency generator. Power monitoring is provided by a voltmeter, ammeter, and frequency meter. A main switchboard bus tie circuit breaker and feedback switch permits distribution of emergency power (440 Vac) to the main switchboard. The emergency generator circuit breaker is prevented from being closed by an interlock system when primary power is being closed by an interlock system when primary power is being provided through the bus tie. Power distribution (440 Vac) is accomplished through circuit breakers on the switchboard. A step-down transformer provides 120 Vac to the Emergency Load Center Distribution Panel.

c. Storage Batteries (Figure 1-54). Five independent 24 Vdc battery banks are provided. One set of batteries provides starting power for the emergency diesel generator engine. Another set provides starting power for the starboard SSDG (No. 1). The third set of batteries provides power for the general alarm system. The fourth set of batteries provides power to the radio room do panel, which supplies selected Communication, Electronic, and Navigation (CEN) equipment. The last set of batteries provides power (24 Vdc) for the machinery plant monitoring system and engine control.

Battery chargers for each battery bank are provided. The chargers are supplied from the emergency load center distribution panel (120 Vac) (Fig. 1-53).

1-14. Propulsion Plant. The propulsion plant consists of the main propulsion plants and bow thruster system. Two main propulsion plants are installed. Each plant consists of a main engine coupled to a two-speed reversing reduction gear. The output shaft of the reduction gear is coupled to the propulsion shafts. Each propulsion shaft is equipped with a pneumatically operated shaft brake. The shaft brake is designed to lock the shaft when the reduction gear is in neutral. The bow thruster is used in combination with the ship main propulsion system to give the LT added maneuverability. Monitoring of the propulsion plant is provided by the machinery plant monitoring system. Operational control is provided by a pneumatic control system (paragraph 1-12).

a. Main Propulsion Engines. Two main propulsion engines are provided. Each engine is a marine V-12, 2 cycle, diesel engine equipped with turbocharger and aftercooler. Both engines are air started using compressed air from the air starting system. The port engine is left-hand rotating, the starboard right-hand rotating.

(1) Engine instrument and control panel. The engine control panel contains indicators which monitor the operation of the engines. Gauges monitor oil pressure, fuel pressure, air pressure, engine speed, and hours of operation. Eight warning lights monitor selected engine parameters. Switches are provided for starting, stopping, and testing alarms.

(2) Governor. The operator sets the desired engine speed using throttle control at the station in command. The governor converts the air pressure from the throttle controls to the proper setting of the engine injector rack linkage which controls fuel to the cylinders. The governor also contains a manual shutdown button mounted on top for shutdown locally or in an emergency.

(3) Fuel system. The fuel oil service system (Figure 1-49) consists of day tanks, fuel suction strainer, connecting lines, fuel injectors, fuel pump, engine mounted fuel filter, and fuel supply and return manifolds. Fuel from the day tank is drawn in by the fuel pump through a suction strainer and to the engine mounted filters. Fuel passes through the filter elements to the supply manifold and through the injector inlet filter to the injector. A small amount of fuel is pumped into the cylinder, at very high pressure, through the needle valve and spray tip of the injector. The quantity of fuel injected depends upon the position of the plunger, which is controlled by the injector rack and governor. Excess fuel flows through the fuel return manifold to the day tank.

(4) Air intake and engine exhaust system.

(a) Air intake system. Air is ducted room the weather decks to the engine. The air is thoroughly cleaned by passing though the air intake filters to protect the engine from abrasive material a well as to protect the lubricating oil from contaminants. Filtered air is provided to the engine air box.

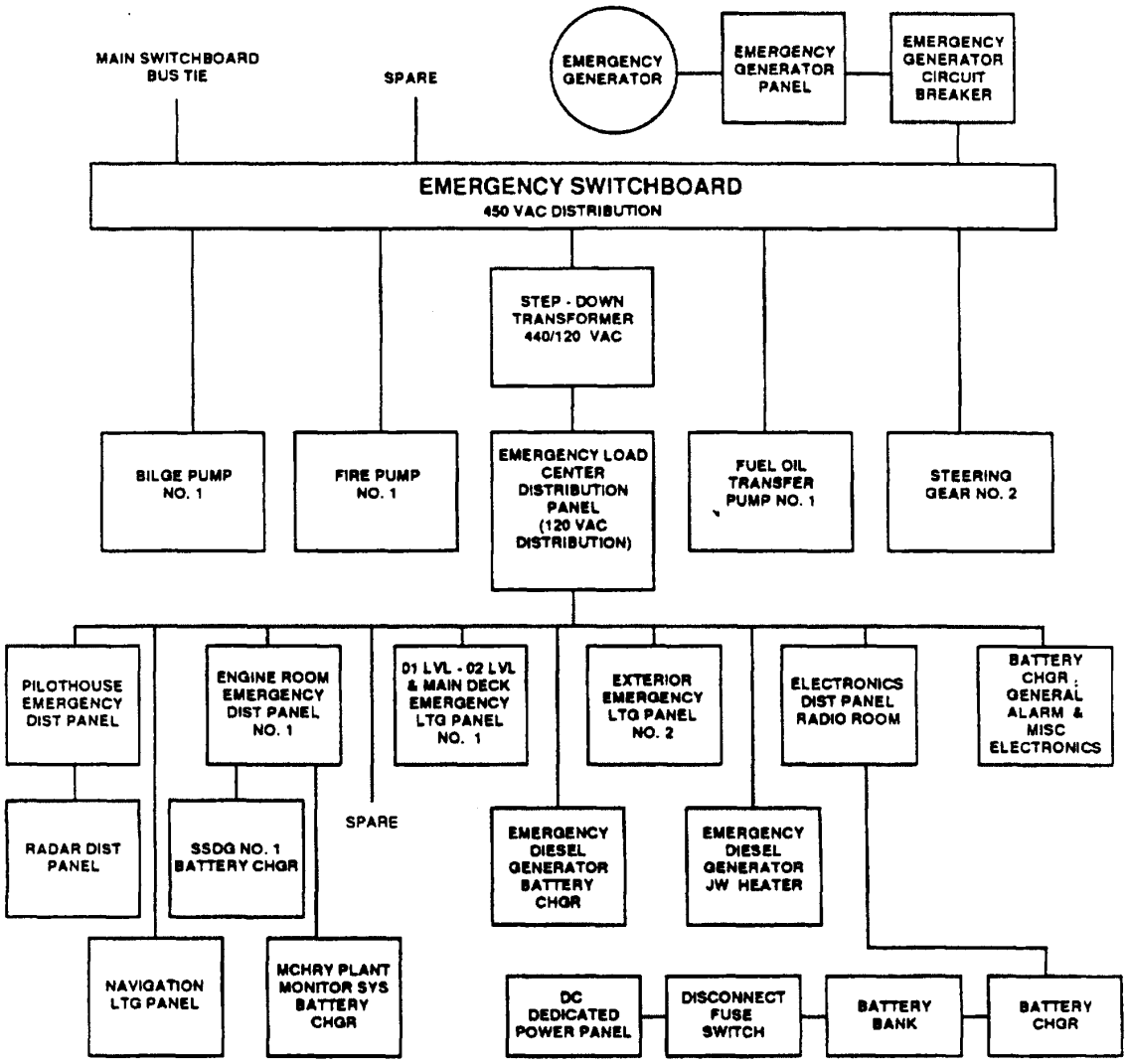


Figure 1-53. Emergency Switchboard.

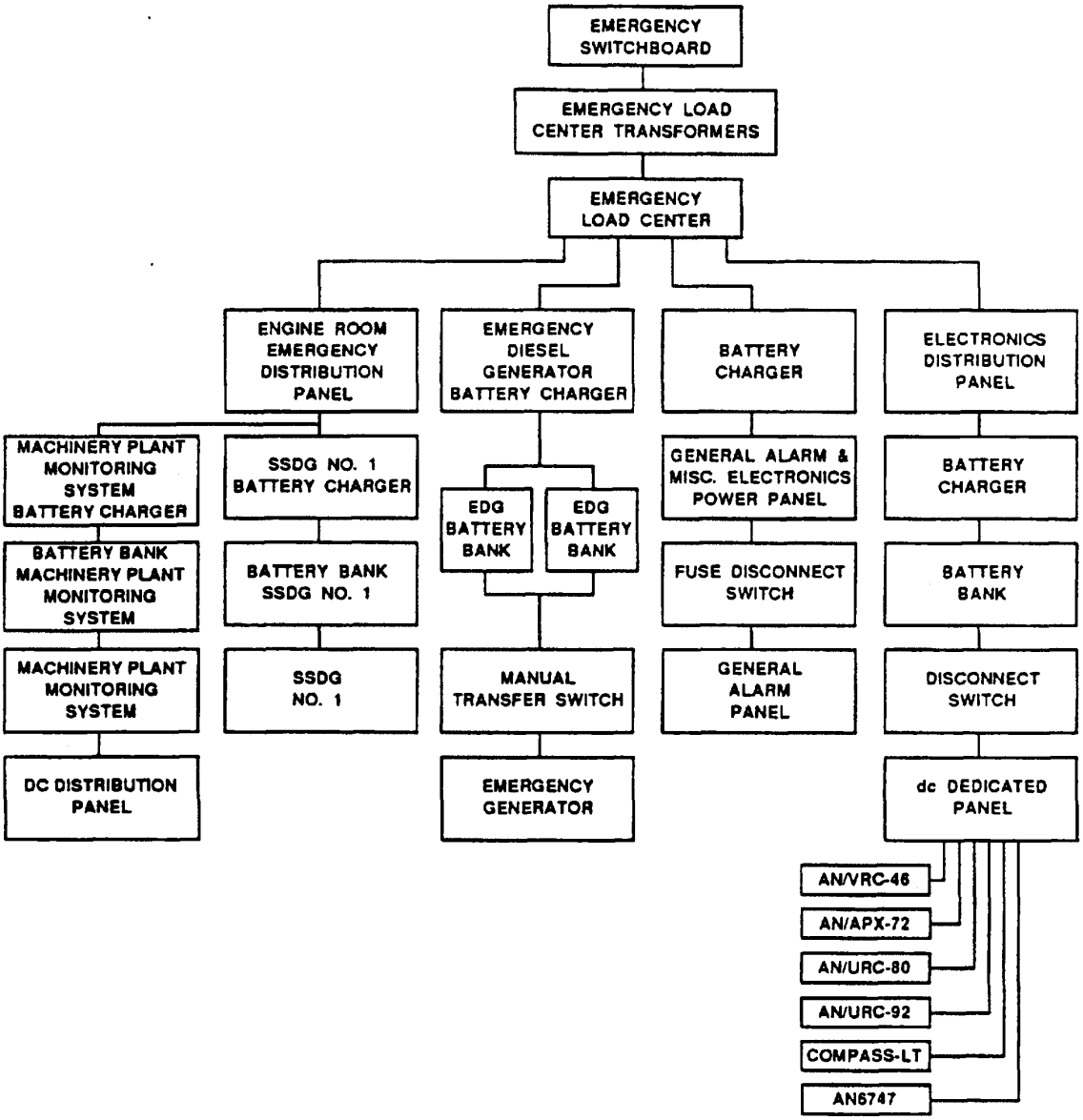


Figure 1-54. Battery Power Distribution System.

(b) Engine exhaust system (Figure 1-50). Exhaust gases from the engine cylinders are discharged from the cylinder heads into the exhaust manifold and turbocharger turbine. Going through the turbine, the gases pass through the turbocharger ducting, and up the stack to the atmosphere. Engine exhaust also has condensate drain lines and temperature sensors.

(5) Air starting system. The engine air starting system consists of two air starting motors, strainer, solenoid valve, air start valve, air line lubricator, shutoff valve, and a start button. Compressed air (200 psi) is supplied from the ship compressed air system. When the start button is depressed, the solenoid valve is energized, allowing air from the compressed air system to pass through the solenoid valve and strainer to the pinion gear end of the lower starting motor. A throttle interlock prevents starting of the engine if. the throttle is not in the NEUTRAL position. The entry of air moves the pinion gear forward to engage with the engine ring gear. Movement of the pinion gear uncovers a port, allowing air pressure to be released to the upper starting motor which, in turn, engages its pinion gear with the ring gear. Both pinion gears being engaged, the air is released from the uncovered port in the upper motor. In addition to maintaining gear engagement, the air opens the air start valve, releasing the main starting air supply. Starting air passes through the air start valve and into the flexible hose assembly attached to each air starting motor. The multivane motors drive the pinion gears, rotating the ring gear, and cranking the engine.

Unless both, pinion gears are engaged, the system is designed so that no attempt can be made to start the engine with one motor. There is also a manually operated shutoff valve in the system. When maintenance is being performed, the shutoff valve is closed to prevent inadvertent cranking of the engine.

CAUTION

In an extreme emergency, engine start-up can be made without control using the manual T-handle override on the air start solenoid valve. However, turbocharged engines started in this manner are not prelubricated and therefore risk damage to turbocharger bearings.

(6) Lubricating oil system. The complete engine lubricating oil system (125 gal) is a combination of five separate systems. These are the main lubricating system, piston cooling system, scavenging oil system, turbocharger lubrication (soakback) system, and prelube system. Each system has its own oil pump. The main lube oil pump and piston cooling oil pump, although individual pumps, are both contained in one housing and driven from a common drive shaft. The scavenging oil, soakback, and prelube pumps are separate pumps. All the pumps are driven from the accessory gear train at the front of the engine except for the soakback and prelube pumps which are electric. A safety interlock prevents increasing engine speed above idle until engine oil pressure rises.

(a) Main lubricating oil system. The main lubricating oil system supplies oil under pressure to most of the moving parts of the engine. The mainlube oil pump takes oil from the strainer housing at the right front of the engine. Oil from the pump goes into the main oil manifold which is located above the crankshaft, and extends the length of he engine.

Oil tubes at the center of each main bearing "A" frame conduct oil from the main manifold to the upper half of the crankshaft bearings. Drilled passages in the crankshaft supply oil to the connecting rod bearings, damper, and accessory drive gear at the front of the crankshaft. Leak-off oil from the adjacent main bearings lubricates the crankshaft thrust bearings.

Oil from the main lube oil manifold enters the gear train at the idler gear stubshaft bracket located at the rear of the engine. Oil passages in the stubshaft bracket distribute the oil. One passage conducts oil to both the right and left bank camshaft drive gear stubshaft brackets and to a manifold connected to the turbocharger oil filter. After passing through he filter, the oil enters the return line in the manifold and flows back to the idler gear stubshaft. A passage in the idler gear stubshaft bracket directs lube oil to the upper and lower stubshaft bearings. Filtered oil enters the turbocharger oil system from the upper idler gear stubshaft.

An oil passage in the turbocharger filter head, parallel to the filter output line, is connected to a passage in the turbocharger oil manifold. An oil pressure line is connected between the manifold passage and the low oil pressure device in the governor.

Oil enters the hollow bore camshafts from the camshaft drive stubshafts. Radial holes in the camshaft conduct oil to each camshaft bearing. An oil line from one camshaft bearing at each cylinder supplies oil to the rocker arm shaft, rocker arm cam follower assemblies, hydraulic lash adjuster, and the injector rocker arm button. Leak-off oil returns to the oil pan through passages between the top deck and the oil pan.

Passages in the turbocharger conduct oil to the turbocharger bearings, idler gear, planet gear assembly, and auxiliary drive bore.

Considerable heat will remain in the metal parts of the turbine when the engine is shut down, and if the oil supply to the turbocharger is shut off suddenly, this heat could penetrate the turbocharger bearing area. To prevent possible overheating of the turbocharger, oil is automatically supplied to the turbocharger after the engine is stopped.

(b) Piston cooling oil system. The piston cooling oil system pump receives oil from a common suction with the main lube oil pump and delivers oil to the two piston cooling oil manifolds extending the length of the engine, one on each side. A piston cooling oil pipe at each cylinder directs a stream of oil through the carrier to cool the underside of the piston crown and the ring belt. Some of this oil enters the oil grooves in the piston pin bearing and the remainder drains out through holes in the carrier crown to the sump.

(c) *Scavenging oil system*. The scavenging oil system pump takes oil through the scavenging oil strainer from the oil pan sump or reservoir. The pump then forces the oil through the oil filters and oil cooler which are located near the engine. Oil then returns to the strainer housing to supply the main lube oil pump and piston cooling oil pump with cooled and filtered oil. Excess oil spills over a dam in the strainer housing and returns to the oil pan.

(d) Turbocharger lubrication system. In operation, the turbocharger is lubricated by the main oil pressure pump through internal passages in the engine. Before entering the turbocharger, the oil passes through an engine mounted filter.

Prior to engine startup, a soakback pump lubricates the turbocharger. Oil is drawn from the engine oil pan and passes through a soakback pump filter. Oil is then supplied to the engine through external piping which is connected to the engine mounted filter housing. After engine shutdown, the same system removes residual heat from the turbocharger.

(e) *Prelube system*. The prelube system includes a prelube pump and related piping. The prelube system is used to circulate oil through the piston cooling and main lube oil systems before starting the engine after extended shutdowns or repairs. Oil for the prelube system is drawn from the oil pan.

(7) Cooling system (Figure 1-51). The main engine cooling system consists of engine driven centrifugal water pumps, replaceable inlet water manifolds with an Individual jumper line to each liner, cylinder head discharge elbows, an outlet manifold through which cooling water is circulated, and two keel coolers. The two centrifugal water pumps are mounted on the accessory drive housing and are driven by the governor drive gear. Engine water is also circulated through each aftercooler located in the turbocharger air discharge duct, to cool the air before it enters the engine air box. The cooling water flows through an external piping system to the keel coolers. The keel coolers transfer heat from the engine cooling water to the sea.

b. Reverse Reduction Gear. The reverse reduction gear reduces the engine output revolutions per minute (RPM) and reverses rotational direction (when required) to the propeller shaft. Gear ratios controlled only in the EOS are: Ratio for Ahead #14.677:1, Ratio for Ahead #2 and Astern 5.444:1. Direction of rotation and hydraulic clutch operation of each engine are controlled by a throttle control on the EOS console, pilothouse console, or auxiliary control stations.

(1) Lubrication system. A gear pump is driven at engine speed to provide oil (100 gal) for operation and lubrication of the reduction gear. Oil is cooled by a heat exchanger. A flow alarm switch is installed. Should oil flow cease, the flow alarm switch will sound an alarm and bring the engine to neutral.

(2) Cooling system (Figure 1-51). A fresh water cooling system transfers heat from the reduction gear lubricating oil through the heat exchanger. Water in the cooling system is cooled in turn through keel coolers. Water is circulated by an electric motor driven cooling water pump.

c. Shaft Brake. A pneumatically controlled disc brake (1200-1500 psi) locks the shaft when the propulsion system is in neutral to prevent the shaft from turning.

d. Bow Thruster System. The bow thruster system is composed of the bow thruster set, bow thruster engine, reduction gear, and shaft brake.

(1) Bow thruster set. The bow thruster is used in combination with the ship main propulsion system to give the LT added maneuverability. A fixed propeller is driven through a right angle reduction gearbox by the bow thruster diesel engine. The thruster is designed to operate in either a clockwise or counter-

clockwise direction, as selected by the operator on the control panel. Engine speed controls the thrust force. Displacement of seawater in a given direction generates an equal recoil force in the opposite direction, moving the bow of the LT as needed. Control of the bow thruster can be local or remote from the bow thruster control panel on the pilothouse console and auxiliary control stations.

(2) Bow thruster engine. The bow thruster engine is a turbocharged, 4-cycle, in-line 6-cylinder marine diesel engine. The engine is air started, has its own lubricating oil (7.25 gal), cooling, and fuel oil systems. Jacket water heater is provided for cold weather starting.

(a) Engine instrument and control panel. The engine control panel contains the controls and indicators necessary for operating and monitoring engine functions. Gauges include engine oil pressure, coolant temperature, tachometer, fuel pressure, service hour meter, and reduction gear oil pressure.

(b) Fuel system (Figure 1-49). The fuel system consists of the fuel oil day tank (port and starboard), connecting lines, fuel injectors, fuel pump, engine mounted fuel filter, and fuel supply and return manifolds. Fuel from the day tank is drawn in by the fuel pump to the engine mounted filters. Fuel passes through the filter elements to the fuel manifold in the injector pump housing. The injector pump pushes fuel at very high pressure to the injector. A small amount of fuel is pumped into the cylinder, at very high pressure, through the needle valve and spray tip of the injector. The quantity.of fuel injected depends upon the position of the plunger which is controlled by the injector rack and governor. Excess fuel flows through the fuel return manifold to the day tank.

(c) Air intake and engine exhaust system.

1 Air intake system. Air entering the engine is thoroughly cleaned by passing through the air intake filter to protect the engine from abrasive materials as well as to protect the lubricating oil from contaminants. When he engine is running, each time a piston moves through the intake stroke, it pulls air into the cylinder. The air flows through the air filter, inlet manifold, passages in the cylinder head and past the open intake valve into the cylinder. Too much restriction in the inlet air system lowers the efficiency of the engine.

2 Engine exhaust system (Figure 1-50). When the engine is running, each time a piston moves through the exhaust stroke, it pushes hot exhaust gases from the cylinder. The exhaust gas flows out of the cylinder between the open exhaust valve and the exhaust valve seat. Then it goes through passages in the cylinder head, through the exhaust manifold and out through the stack. Engine exhaust system also has exhaust temperature sensors.

(d) Air starting system. The air starting system consists of an air starting motor, oiler, starter control valve, and relay valve.

The air from the compressed air system (see paragraph 1-24) goes to the relay valve. The starter control valve is connected to the line before the relay valve. The flow of air is stopped by the relay valve until the starter control valve is activated. Then air from the starter control valve goes to the starter. The air pressure engages the starter with the flywheel gear. When the starter is engaged, air can go out through another line to the relay valve. The air activates the relay valve which opens the supply line to the air starting motor. The flow of air goes through the oiler where it picks up lubrication oil for the air starting motor.

The air with lubrication oil goes into the starter at the air inlet. The pressure of the air turns the starter which turns the engine flywheel.

When the engine starts running, the flywheel starts to turn faster than the starter. The starter retracts under this condition. This prevents damage to the starter or flywheel gear.

When the starter control valve is released, the air pressure and flow to the starter are stopped. The starter disengages. The relay valve stops the flow of air to the air starting motor.

(e) Lubricating oil system. The engine lubricating oil is supplied by a gear-type pump, which pulls oil from the oil pan and pushes it to the oil cooler. Oil flows from the oil cooler to the oil filter and then to the oil manifold. Oil is routed from the manifold to bearings and piston surfaces and then back to the oil pan.

(f) Cooling system. The bow thruster engine cooling system consists of the engine cooling system and the seawater cooling system.

1 Engine cooling system. The engine cooling system consists of a gear driven centrifugal water pump, an oil cooler, and an expansion tank. Engine water is also circulated through each aftercooler located in the turbocharger air discharge duct, to cool the air before it enters the engine air box. The engine cooling water flows through an external piping arrangement to a heat exchanger. The heat exchanger transfers heat from the engine cooling water to the seawater cooling system.

2 Seawater cooling system (Figure 1-51). The seawater cooling system consists of a horizontal centrifugal pump driven off the bow thruster engine, a duplex strainer, and a piping system. When the bow thruster engine is operating, the centrifugal pump draws seawater from the sea chest through a duplex strainer. This seawater is routed to the heat exchanger, where the heat from engine cooling water is transferred to the seawater. The heated seawater is then pumped overboard.

(3) Reverse reduction gear. The reverse reduction gear reduces the engine output resolutions per minute (RPM) and reverses rotational direction (when required) of the bow thruster propeller shaft. Direction of rotation and hydraulic clutch operations are controlled from the bow thruster control panel in either the pilothouse console or auxiliary control stations.

4 Shaft brake. A pneumatically controlled band brake locks the shaft when the bow thruster system control is in neutral to prevent the shaft from turning.

1-15. Navigation Systems. Navigation equipment includes navigation lights, blinker lights, XENON searchlights, magnetic compass, gyrocompass, and autopilot. The autopilot is interconnected to the gyrocompass.

a. Blinker Lights. Two clear 360 degree blinker lights are mounted on the mast yardarm. A blinker light key is provided in the pilothouse for control of these lights.

b. Navigation Lighting System. The navigation lighting system provides the appropriate exterior lights for safe navigation. The system is controlled from the navigation lighting panel located in the pilothouse.

c. XENON Searchlights. Two 500 watt XENON searchlights are mounted on the pilothouse top, port and starboard. Power supplies for searchlights are mounted in the 02 level. Power and directional control of searchlights is possible from either the searchlight or from the pilothouse console.

d. Magnetic Compass. The magnetic compass provides heading information to the pilothouse using a reflector compass mounted in a periscope binnacle. The binnacle is mounted on the pilothouse top with the periscope assembly extending down through the pilothouse top deck into the pilothouse just forward of the helm. A reflection of the compass card is projected through a series of lenses in the binnacle down to an adjustable mirror in the periscope assembly. The compass can be read directly at the binnacle through a viewing window or in the pilothouse via the mirror. A toggle switch and dimmer rheostat, located on the overhead of the pilothouse, control power to a lamp located in the binnacle hood.

e. Gyro Compass System. The gyrocompass, located in the damage control center, provides heading information to steering repeaters in the pilothouse, 03 level exterior, and AMS 2. The heading information is used for navigating the LT. Heading data is also sent to bearing repeaters on the port and starboard bridge wings and the pilothouse top; to the radio direction finder, omega navigational receiver, X-band and S-band radar units; and to the autopilot. The gyrocompass is provided with a viewing window and compass card (dial) for viewing ship heading. The gyro control and power assembly provides for control and monitoring of the gyrocompass and the routing of heading data. The outputs of the gyrocompass, with the gyro control and power assembly repeater switch on, are applied to a switch unit. The switch unit provides heading data and lamp voltage to the steering repeaters and an Mk 37 Mod E relay transmitter. The switch unit drives the step repeaters from heading data.

(1) Mk 37 Mod E relay transmitter. The relay transmitter receives heading data and lamp voltage from the switch unit, amplifies the data, and transmits the data and lamp voltage to bearing repeaters, and to other equipment. Each output on the relay transmitter is controlled by a toggle switch.

(2) Compass repeaters. The compass repeaters, steering and bearing, provide remote ship heading as determined by the gyrocompass. A do step motor responds to data signals transmitted from the gyrocompass switch unit and relay transmitter. The do step motor is geared to a compass card which is driven to a point corresponding with the gyrocompass heading. The repeaters contain synchronization knobs for

aligning the repeater card with the gyrocompass. Steering repeaters are mounted on bulkhead mounting brackets which contain a rheostat for varying repeater lamp current and a toggle switch for controlling power to the repeater.

Bearing repeaters are mounted on column bearing stands that contain a rheostat for varying lamp current. Power to the bearing repeaters is controlled by toggle switches in the relay transmitter. Toggle switches in the relay transmitter also control data information to other equipment.

(3) Power. The 120 Vac power is applied to the gyro control and power assembly through the power converter. The power converter also converts ac to do and applies 24 Vdc to the power transfer unit. Upon loss of ship service power, the power transfer unit applies ship emergency switchboard battery power to the gyro control and power assembly.

f. Autopilot. The autopilot is an automatic steering control system that uses heading information from the ship gyrocompass to control the ship steering gear. The autopilot energizes directional solenoids, part of the ship's steering gear, to maintain selected heading. The autopilot heading selector combines the functions of a heading selector with a gyrocompass repeater. The heading selector contains controls that permit the selection of operating mode and desired heading. The autopilot control amplifier processes signals from the autopilot heading selector and the rudder repeatback unit to develop steering signals that are sent to the steering gear solenoids. This provides rudder control. The autopilot rudder repeatback unit sends signals from the steering gear, providing rudder position information, back to the autopilot control amplifier.

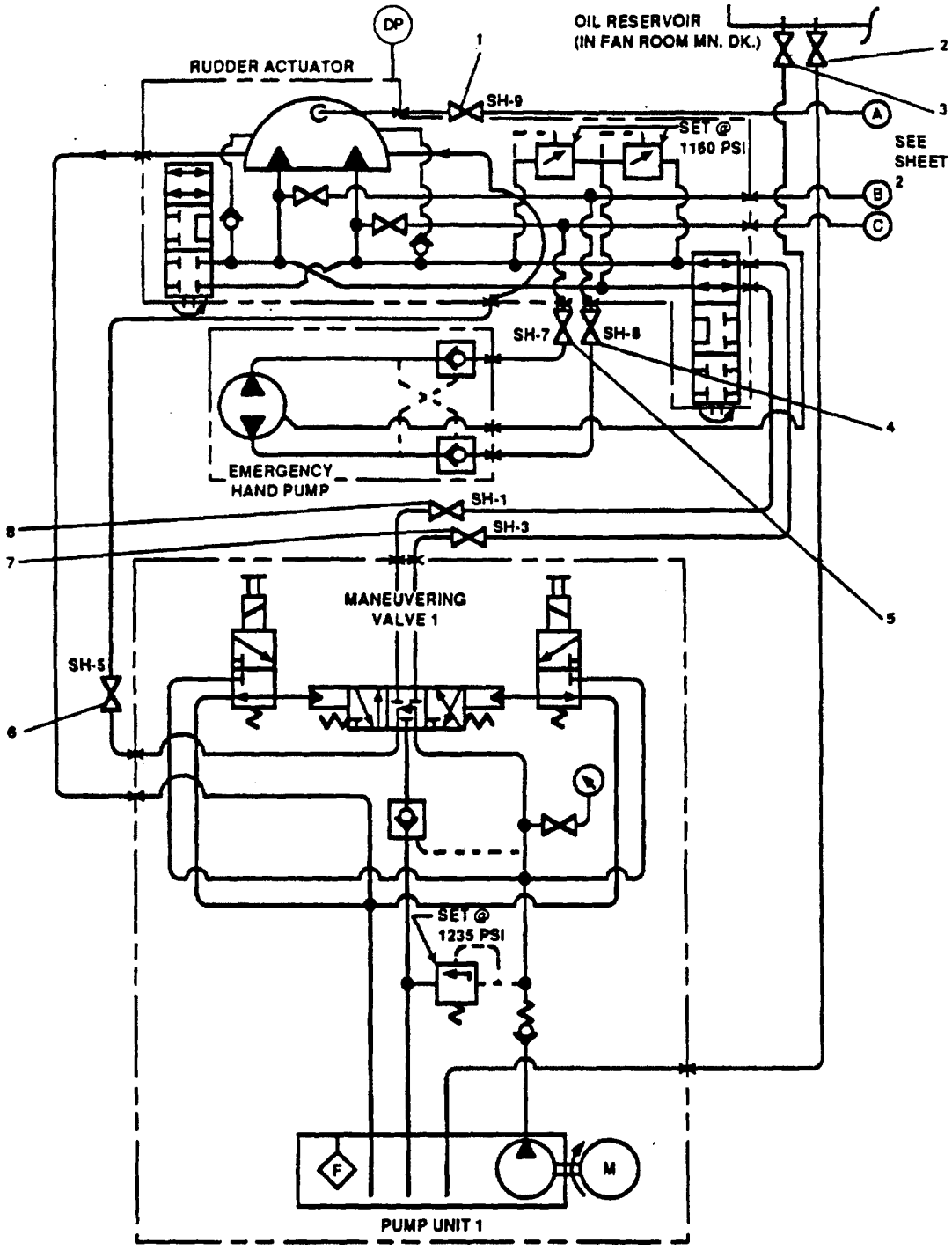
1-16. Steering System. The steering gear system is an electrically driven, hydraulically operated system (Figure 1-55) that positions the rudders in response to steering commands. Rudder position commands are input to the steering gear by the movement of the ship helm (wheel) or movement of the steering control at the auxiliary control stations to generate an electrical signal. The signal operates solenoid activated hydraulic control valves in the hydraulic power unit. The control valves direct the flow of hydraulic fluid from the hydraulic pump to power pistons in the rudder actuator which position the rudder. The hydraulic system consists of redundant electrical-hydraulic power units. Either unit can be selected from the pilothouse console steering control panel. If electric power is lost, a hand pump provides a backup steering system. The hand pump is a manually operated, reversible, positive displacement rotary pump used for emergency steering.

1-17. Interior Communications Systems.
The LT has six independent interior communication systems. The systems can be grouped into two types as follows:

- voice communications:
  - sound powered telephone system
  - intercommunication (intercom) systems
- non-voice communications:
  - general alarm system
  - engine order telegraph
  - radio room door, fn room door, and arms
  - stowage room alarm
  - freezer alarm

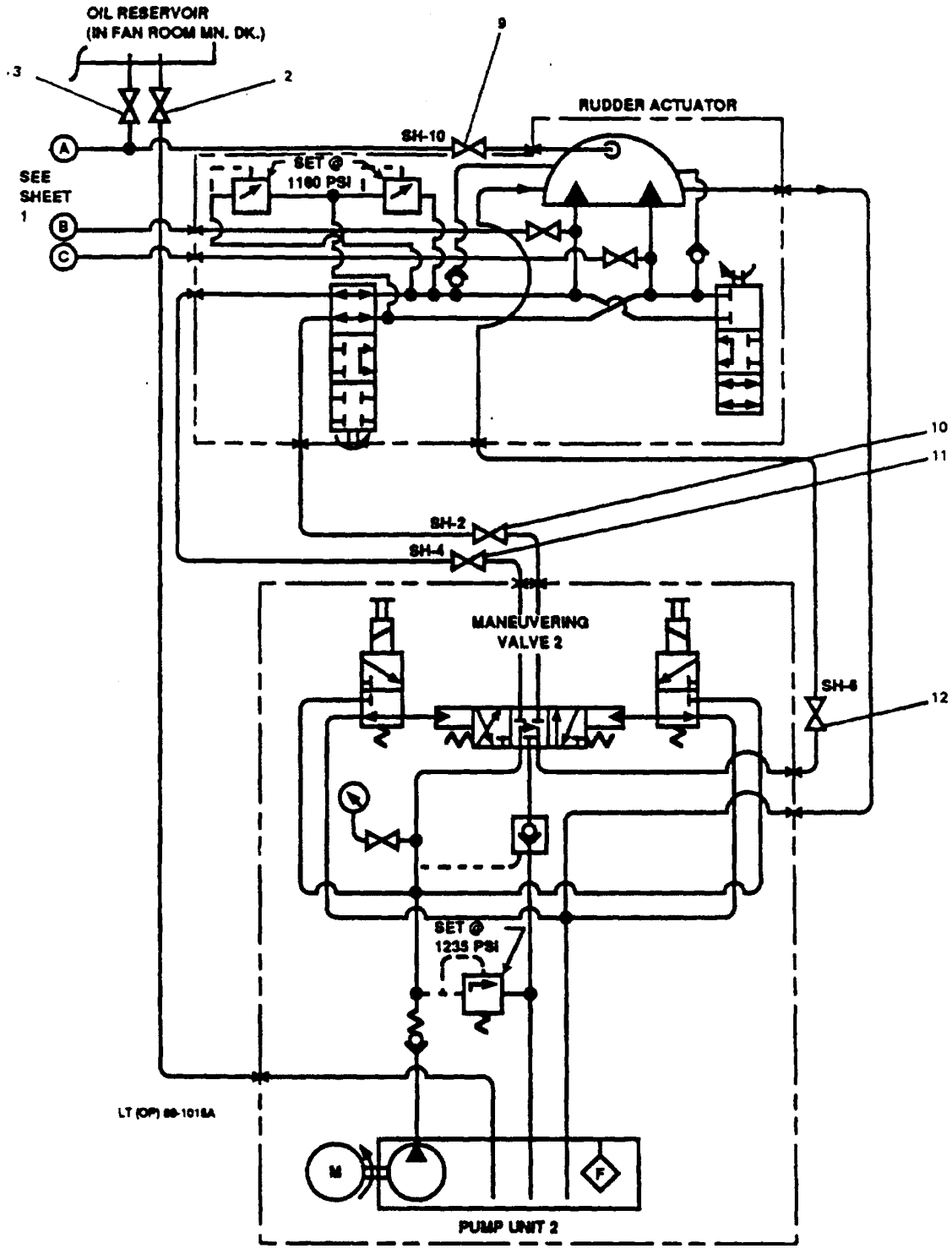
a. Sound Powered Telephone System. The sound powered telephone system provides voice communications throughout the ship by means of fixed phone stations and portable nits. Since the system is powered by voice only, it is functional even with the loss of ship power. There are two circuits within the sound powered telephone system. One circuit is a dedicated line between the pilothouse and the radio room. The other circuit provides communication throughout the LT. A simplified functional diagram of the system is provided (see Figure 1-56).

b. Intercommunication (Intercom) System. The Intercom system is a 20 station system which requires 110 Vac power. The 110 Vac power is provided from the pilothouse emergency distribution panel. The intercom system is a party-line type voice communication system. When in use, other stations may join the discussion but they cannot initiate a second discussion. A list of intercom stations is provided (see Table 1-6).



STARBOARD SIDE

Figure 1-55. Steering Gear Hydraulic System (Sheet 1 of 3).



PORT SIDE

Figure 1-55. Steering Gear Hydraulic System (Sheet 2 of 3).

1. SH-9, OIL TO RSVR
2. OIL RESERVOIR CUTOUT VALVE
3. OIL RESERVOIR CUTOUT VALVE
4. SH-8, HAND PUMP COV
5. SH-7, HAND PUMP COV
6. SH-5, RUD. MOT. NO. 1 SUMP
7. SH-3, C.O.V. - RUD. MOT. NO. 1 PRESS/RTN.
8. SH-1, C.O.V. - RUD. MOT. NO. 1 PRESS/RTN.
9. SH-10, OIL TO RSVR
10. SH-2, C.O.V. - RUD. MOT. NO. 2 PRESS/RTN.
11. SH-4, C.O.V. - RUD. MOT. NO. 2 PRESS/RTN.
12. SH-6, RUD. MOT. NO. 2 SUMP

NOTE:

DP DIFFERENTIAL PRESSURE GAUGE

Figure 1-55. Steering Gear Hydraulic System (Sheet 3 of 3).

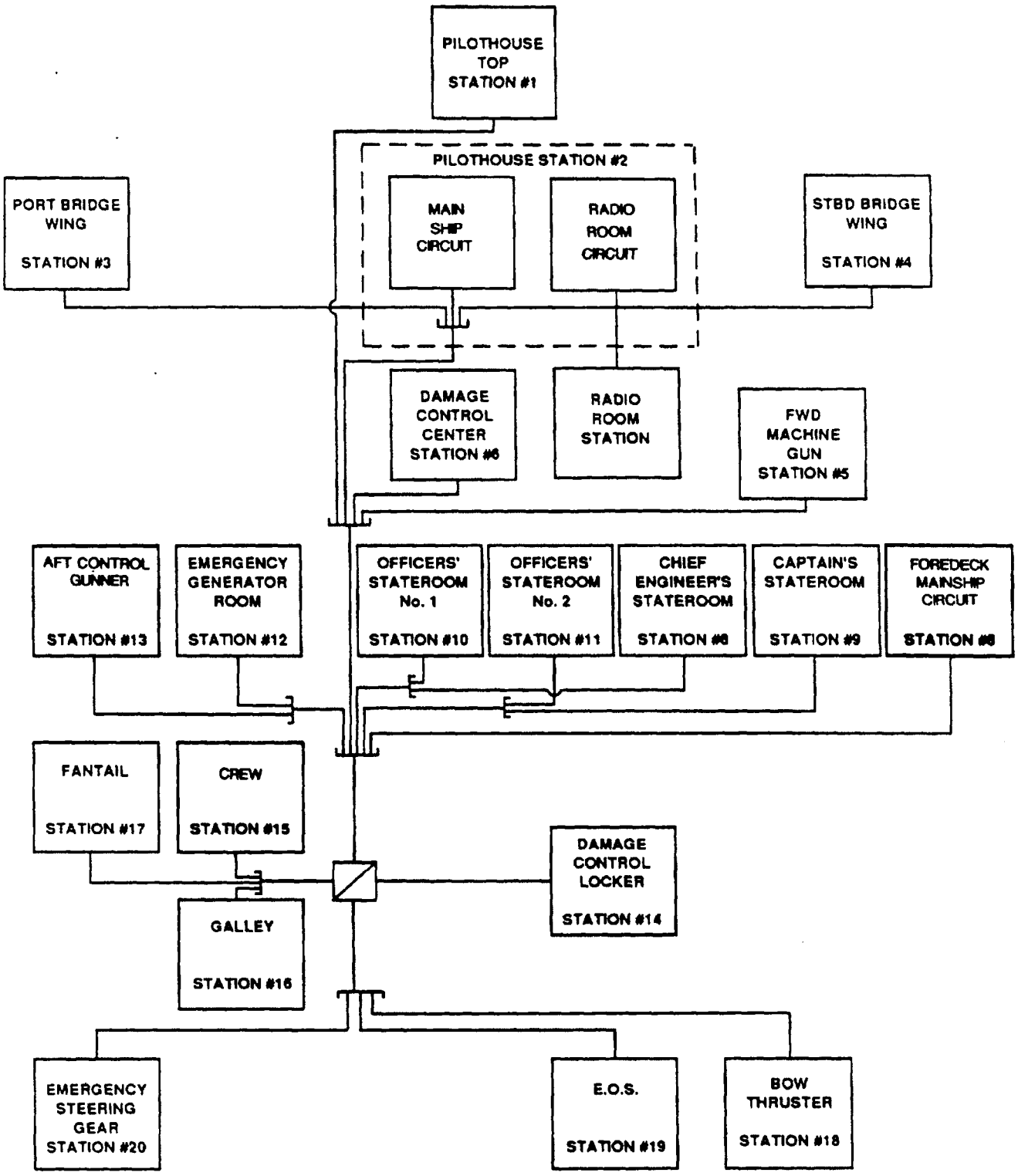


Figure 1-56. Sound Powered Telephone System.

c. General Alarm System. The general alarm system is a 24 Vdc system used to call the crew to general quarters. Power is supplied by the general alarm battery bank. The system is activated by contact makers located in the pilothouse and 01 Level passageway. Bells provide an audible alarm throughout the LT. In the auxiliary machinery spaces and engine room, the system is equipped with relays which provide 110 Vac to rotating lights during alarm conditions. A simplified block diagram is provided in Figure 1-57.

d. Engine Order Telegraph. The engine order telegraph (EOT) system is a 24 Vdc system used to transmit command from the pilothouse to the EOS. The EOT is used when the pilothouse is not in control of the propulsion plant. An alarm bell sounds to notify the operator if controls are not set to provide requested speed and direction. The power supply incorporates an internal battery charger and backup battery. A simplified block diagram is provided in Figure 1-58.

Table 1-6. Intercom Stations

STATION NO.	LOCATION
1	PLThse TOP
2	Pilothouse
3	PORT Brdge Wg
4	STBD Brdge Wg
5	FWD Gunner Sta.
6	DC Center
7	FORE Deck
8	CH Engr SR
9	Captains SR
10	Officers SR #1
11	Officers SR #2
12	Emer Gen Rm
13	AFT Ctl/Gunner
14	DC Locker
15	Crew Mess
16	Galley
17	Fantail
18	Bow Thruster
19	E.O.S.
20	Emer Strg Gr

e. Radio Room Door and Arms Stowage Alarm Systems. These alarms alert the pilothouse to entry to the radio room or fan room, high temperature in the arms stowage room, or activation of the arms stowage room sprinkler system. The alarm systems (Figure 1-59) are discussed below.

(1) Radio room door alarm system. This alarm system uses 110 Vac supplied from the 01, 02 & MN DK EMER LTG PANEL No. 1. When the door to the radio room is open, an alarm buzzer and indicator on the ALARM SWBD located in the pilothouse is activated. A manual rotary snap switch is provided inside the radio room to disable the radio room door alarm.

(2) Arms stowage alarm system. The arms stowage alarm system is a 110 Vac alarm system. Power is supplied from the 01, 02 & MN DK EMER LTG PANEL No. 1. Two sensors are provided, a high temperature sensor and a sprinkler sensor. The temperature sensor detects unusually high temperature in the arms stowage and activates the pilothouse sprinkler system alarms. The sprinkler sensor is a water flow switch which is installed on the downstream side of the sprinkler control valve. When the sprinkler control valve opens, water passes through the sprinkler control valve and through the water switch to the sprinklers. Water passing through the water switch activates the pilothouse alarms. Both audible and visual alarms are provided in the pilothouse at the ALARM SWBD.

(3) Main deck fan room alarm system. This alarm system is a 110 Vac alarm system. Power is supplied from 01, 02 & MN DK EMER LTG PANEL No. 1. When the main deck fan room door is open, an alarm buzzer and light on the ALARM SWBD in the pilothouse is activated. There is no local switch to disable the alarm.

(4) Freezer alarm system. The freezer alarm system consists of three pilot lights, switches, and a buzzer. The system power is supplied from 01, 02 & MN DK EMER LTG PANEL No. 1. The switches are located in the thaw room, vegetable storage room, and freezer room. When operated, the switches energize the buzzer in the galley to alert personnel that someone is trapped in the room.

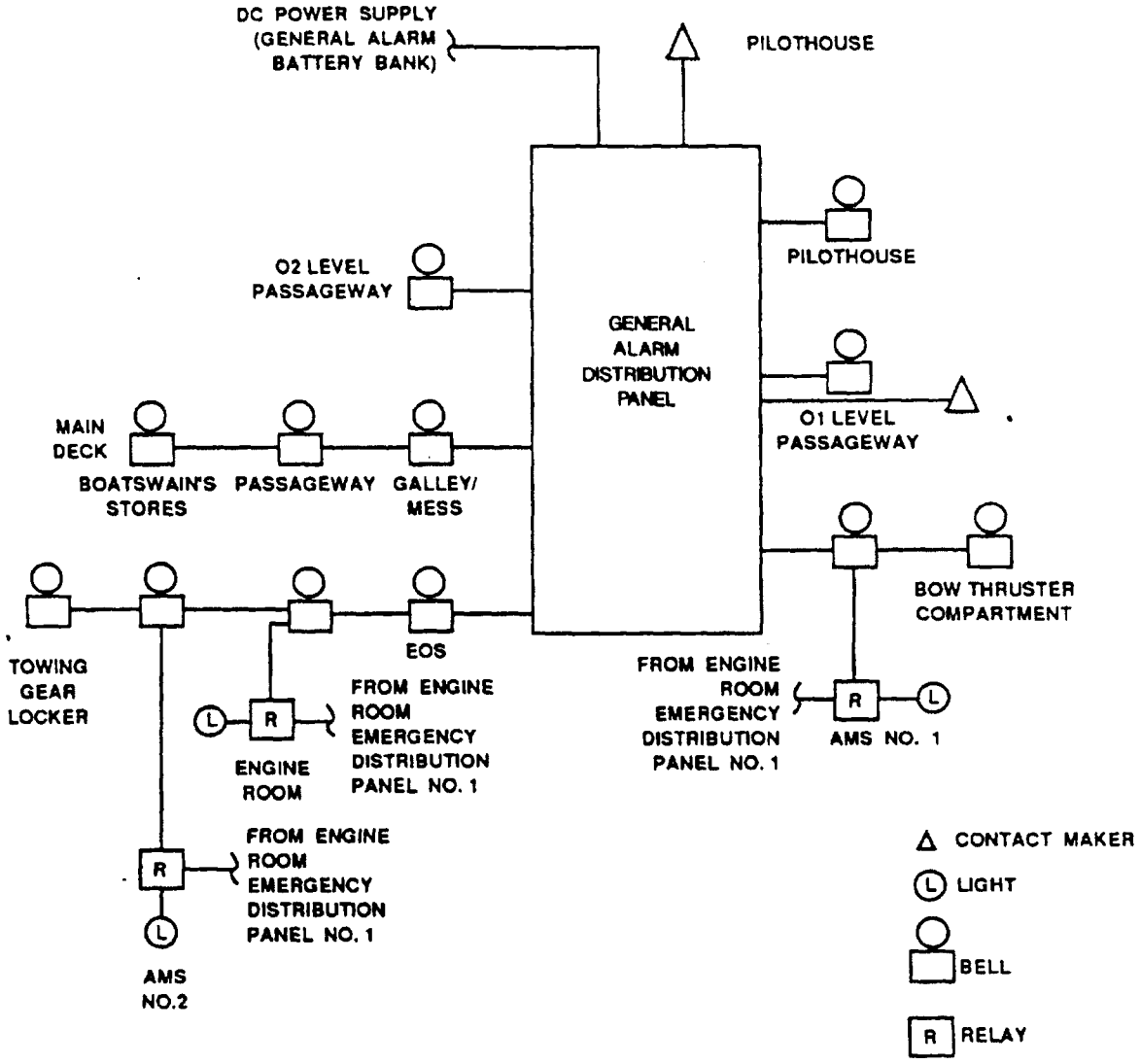


Figure 1-57. General Alarm System.

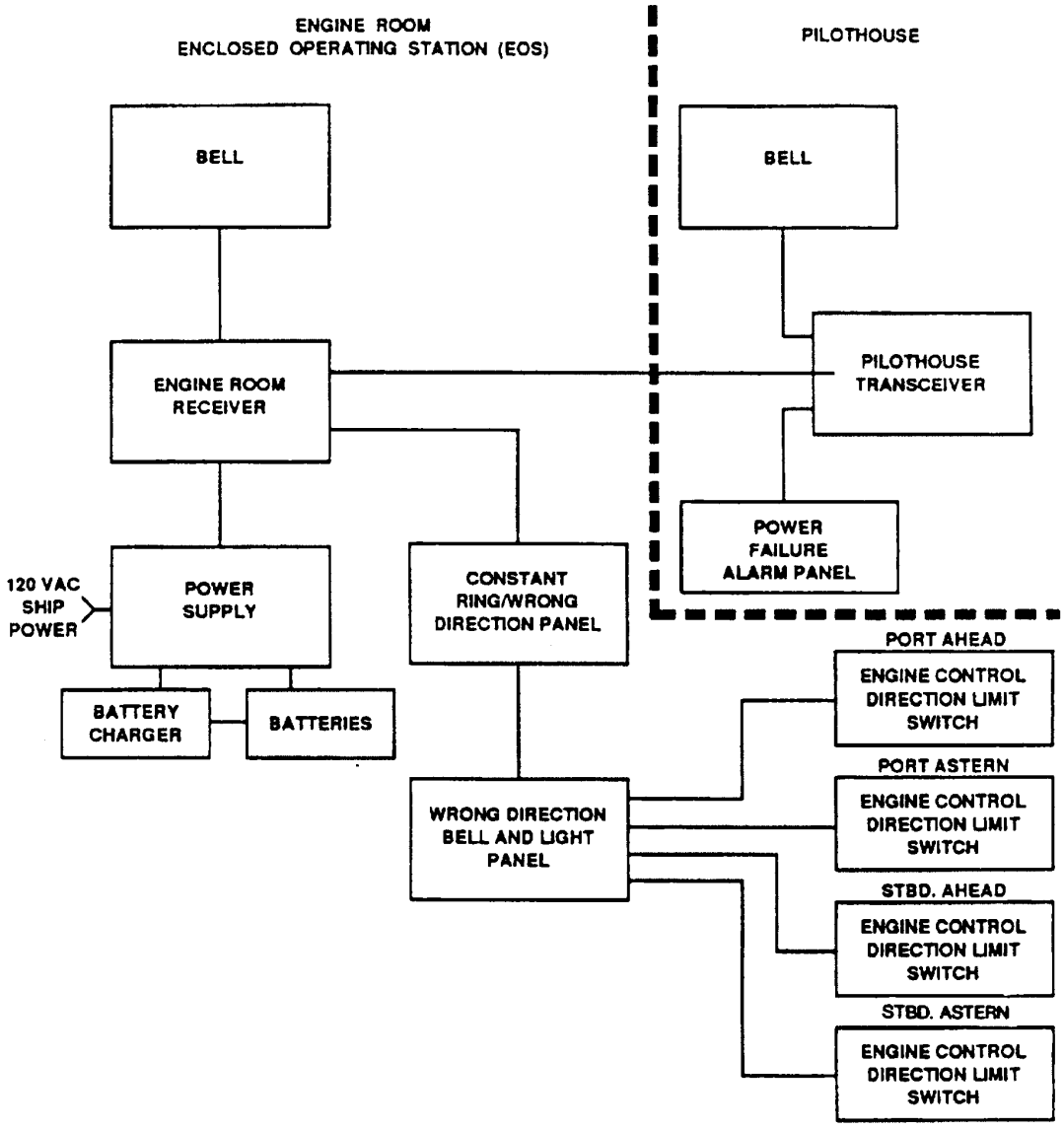


Figure 1-58. EOT.

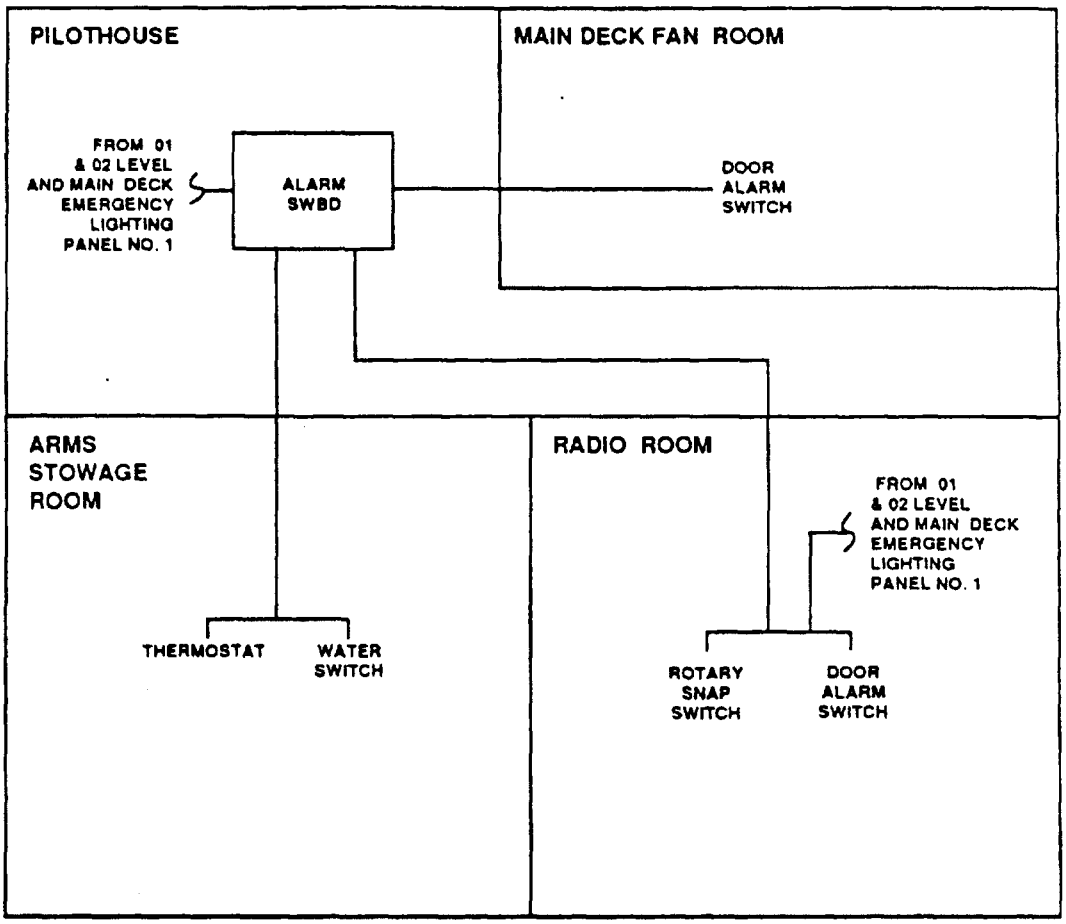
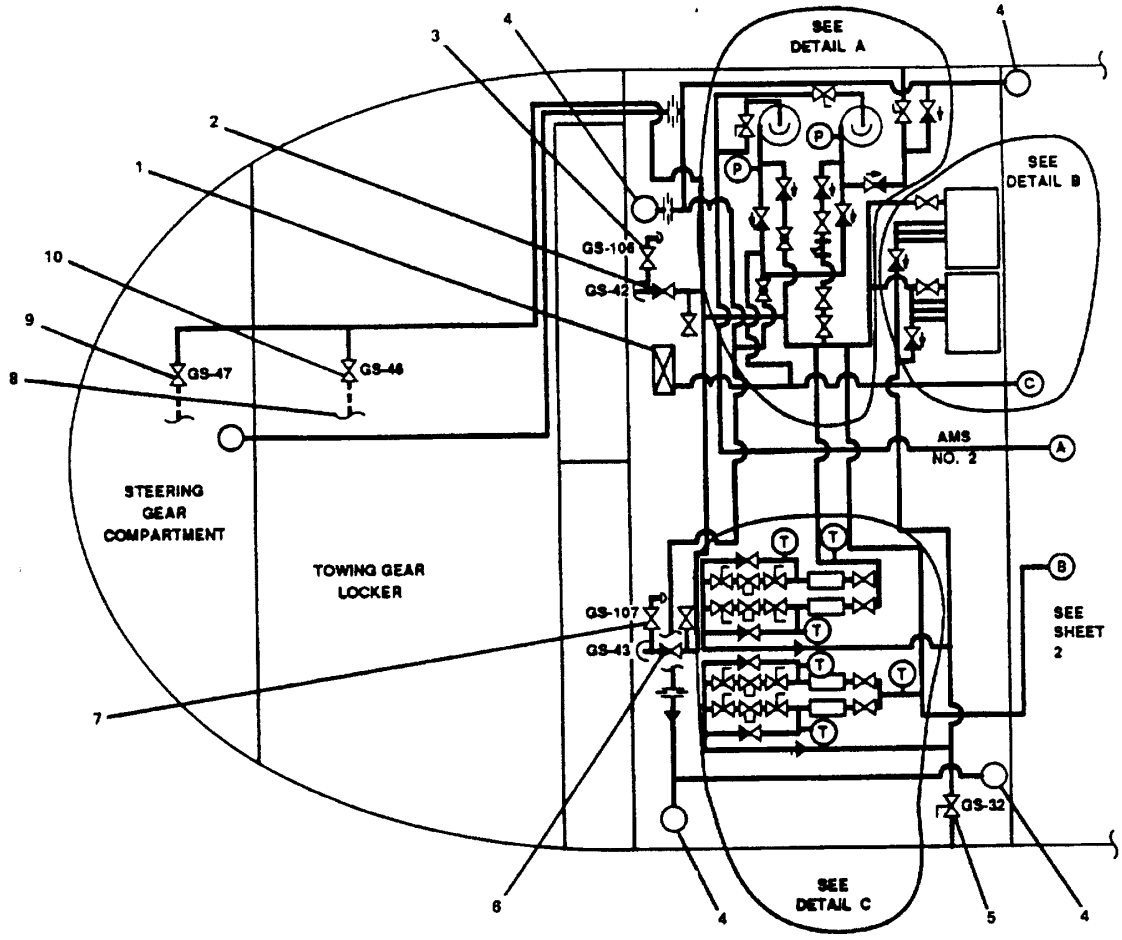


Figure 1-59. Radio Room Door, Arms Stowage and Main Deck Fan Room Alarms.

1-18. Firemain, Washdown Counter Measure, Arms Control Room Sprinkler, General Service and Fire Fighting System (Figure 1-60).

a. General. Two fire and general service pumps draw seawater from the sea chest, through a duplex strainer, to the general service and firemain system. Each fire and general service pump is a vertical centrifugal pump, with maximum output of 170 GPM at 125 psi. Each pump is driven by a 30 horsepower, single speed electric motor. Electric power for Pump No. 1 is supplied from the emergency switchboard and No. 2 is supplied from the main switchboard. The fire fighting system is pressurized by the diesel engine driven fire fighting pumps.

b. Firemain. The firemain is supplied by the fire and general service pumps and provides sea water to the fire stations, Washdown Counter Measure System, and Arms Stowage Sprinkler System. System control is maintained through a combination of valves as shown in Figure 1-60. Seawater for the Arms Stowage Sprinkling System is supplied from the firemain. Sprinkler heads located in the arms stowage room, provide a fixed firefighting capability for the arms storage area. Supply to the sprinklers is controlled from a valve remotely operated from the 02 level passageway.



BELOW MAIN DECK

Figure 1-60. Firemain, Washdown Counter-Measure, Sprinklers and General Service System (Sheet 1 of 12).

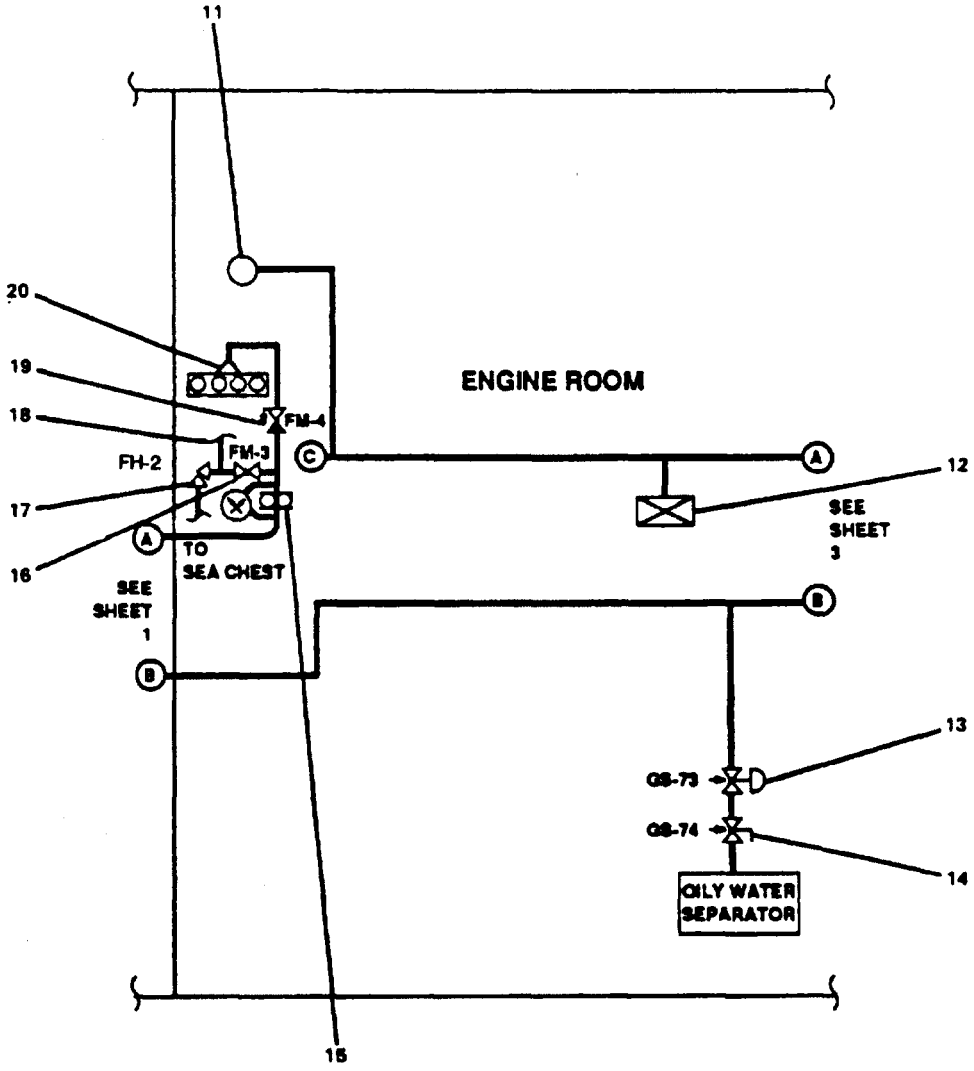
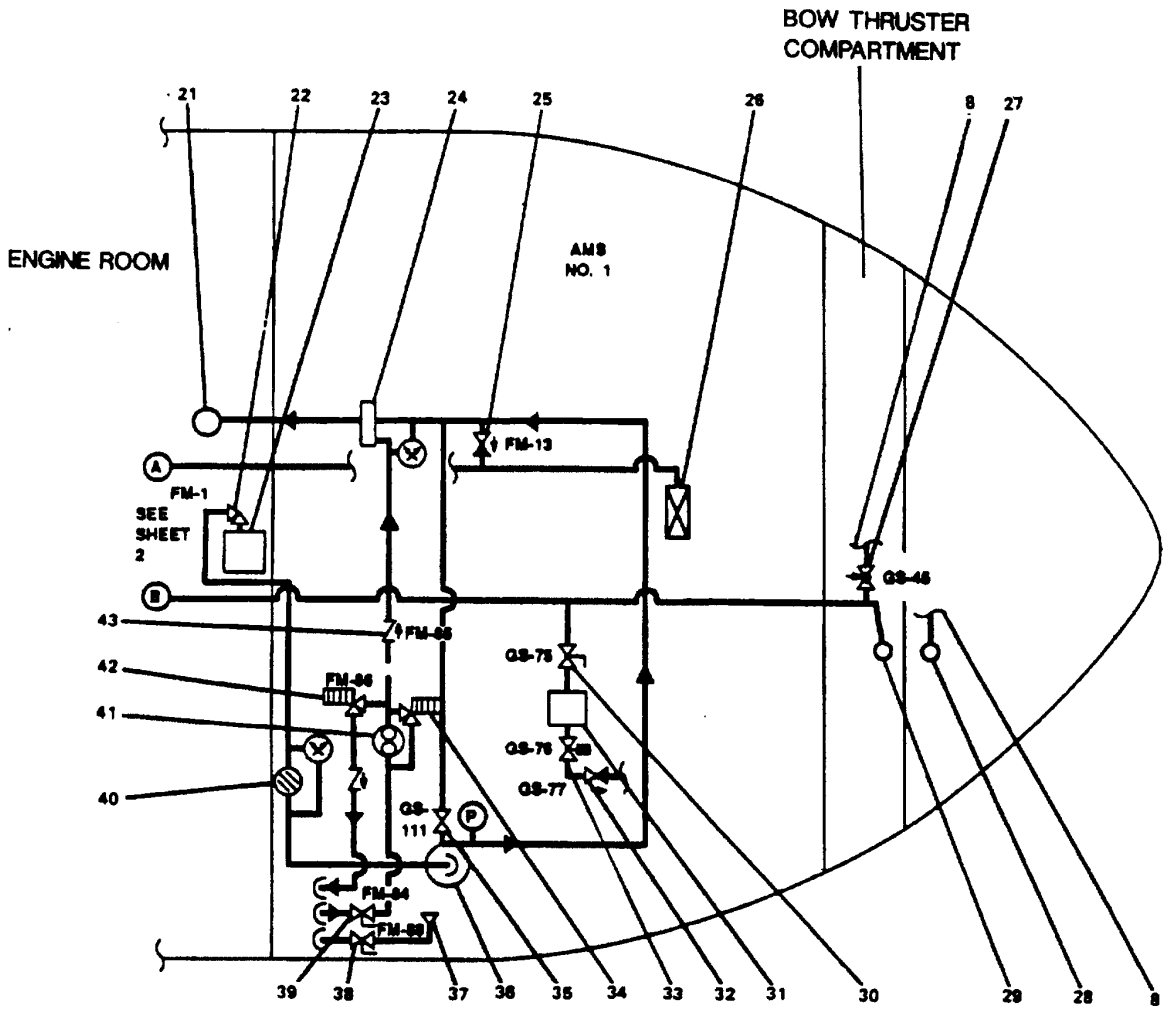


Figure 1-60. Firemain, Washdown Counter-Measure, Sprinklers and General Service System (Sheet 2 of 12).



BELOW MAIN DECK

Figure 1-60. Firemain, Washdown Counter-Measure, Sprinklers and General Service System (Sheet 3 of 12).

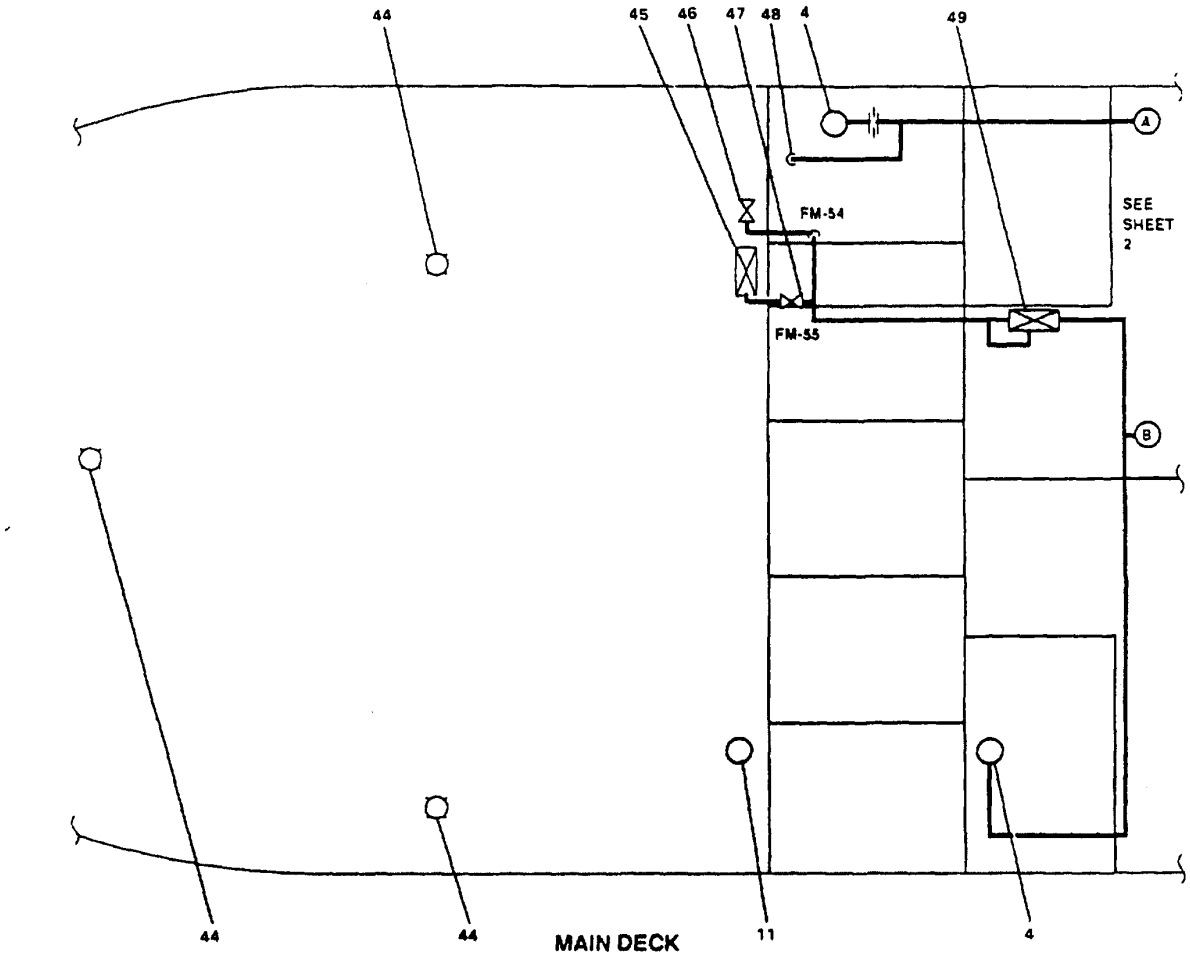


Figure 1-60. Firemain, Washdown Counter-Measure, Sprinklers and General Service System (Sheet 4 of 12).

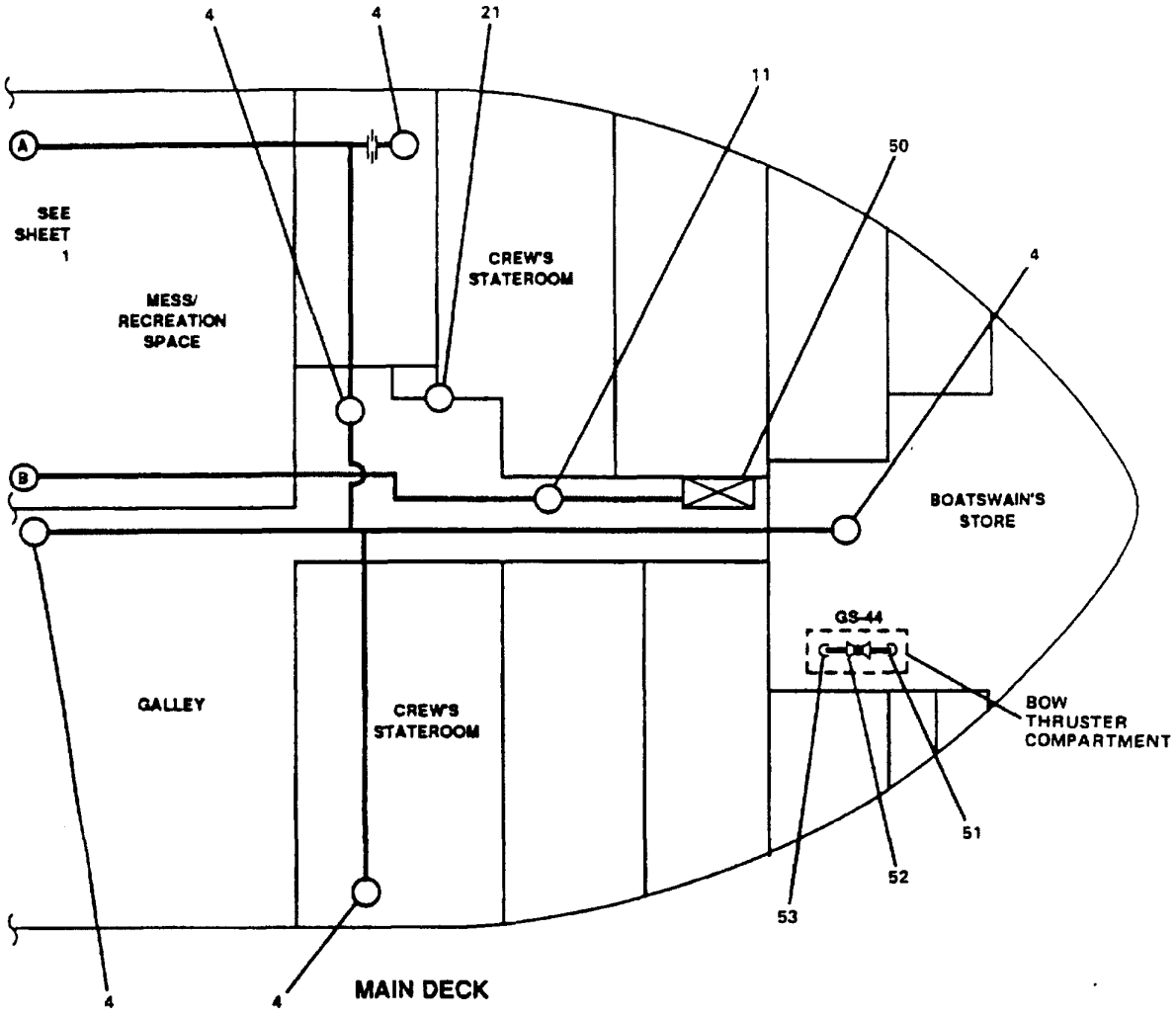


Figure 1-60. Firemain, Washdown Counter-Measure, Sprinklers and General Service System (Sheet 5 of 12).

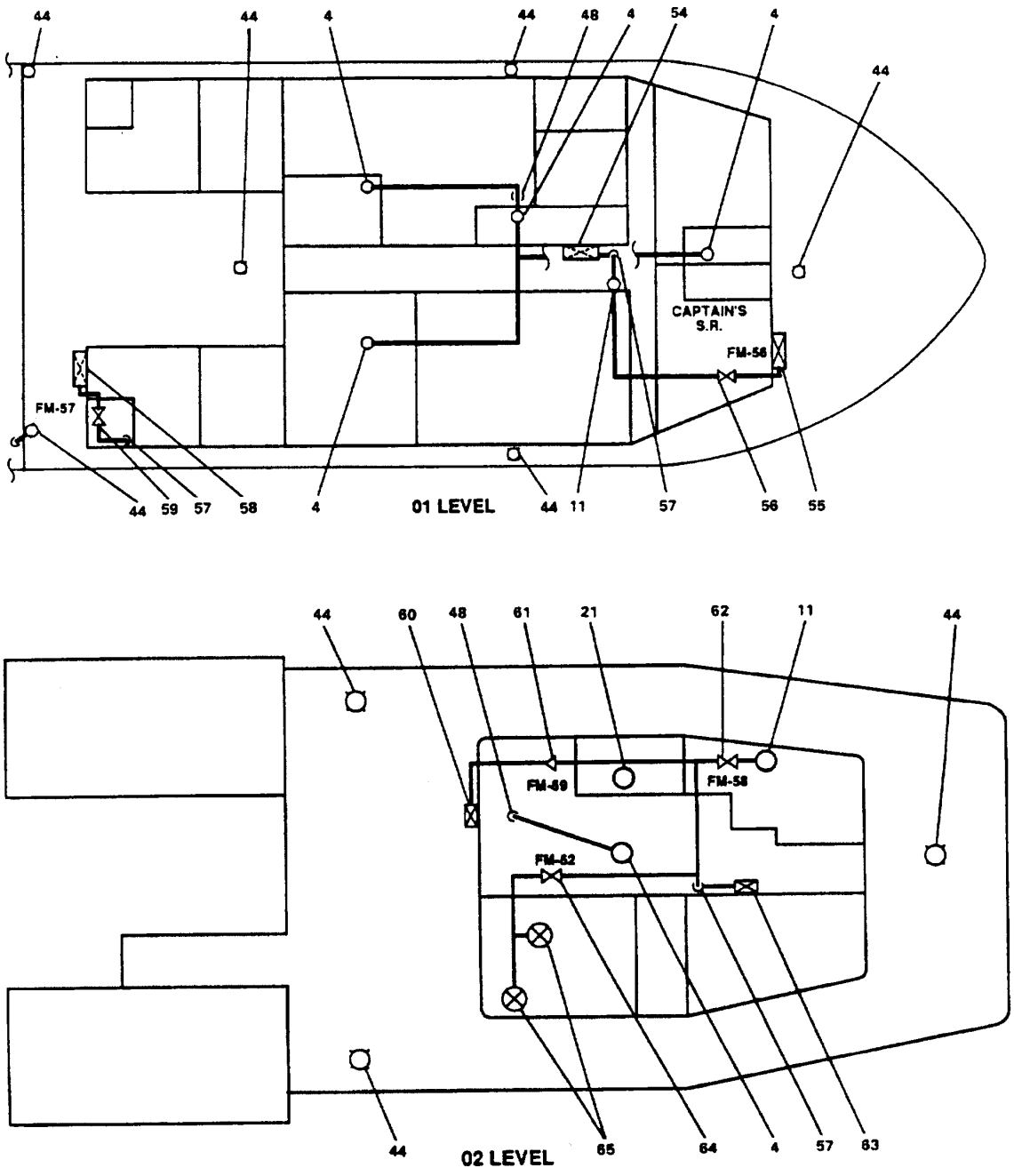


Figure 1-60. Firemain, Washdown Counter-Measure, Sprinklers and General Service System (Sheet 6 of 12).

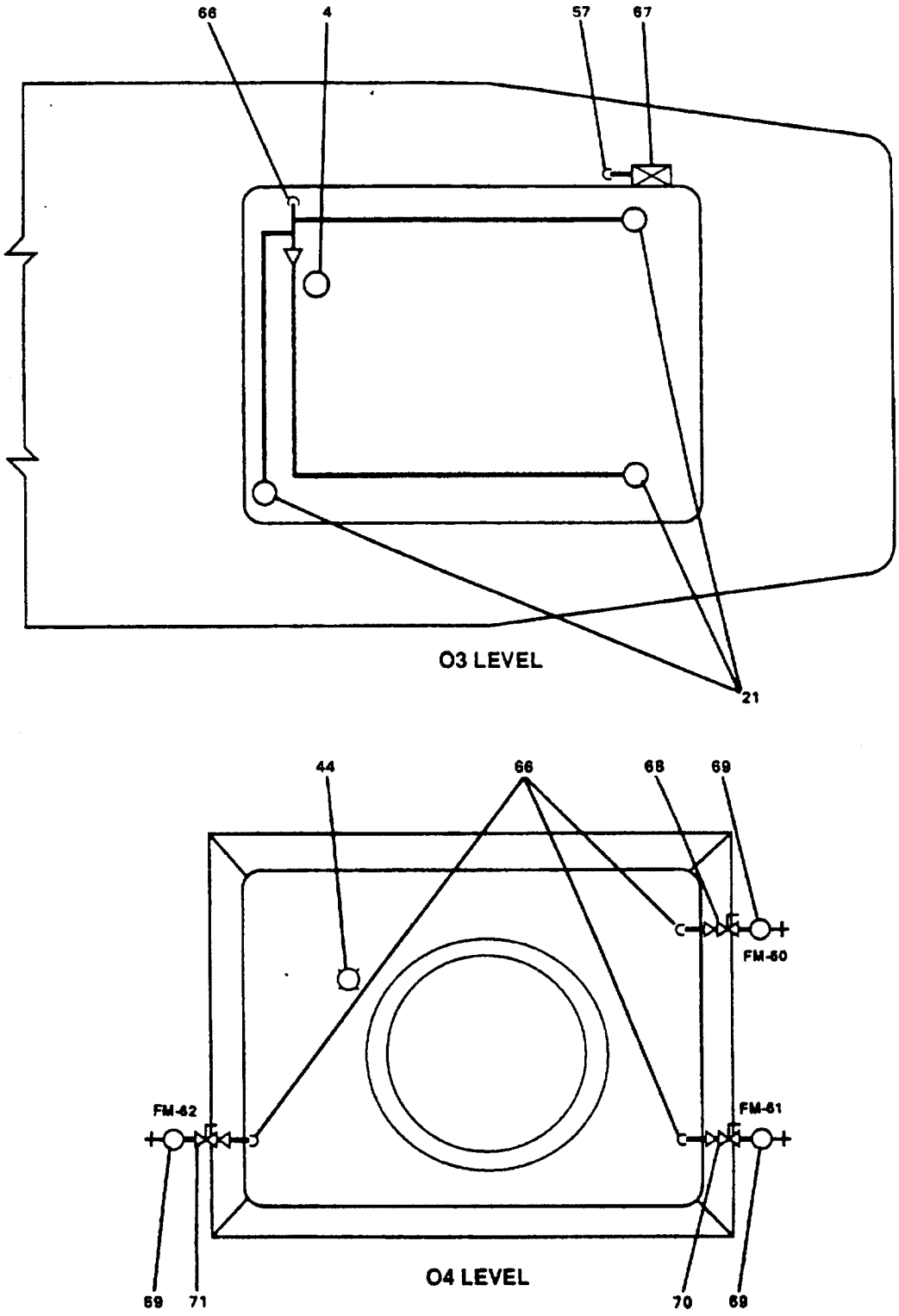
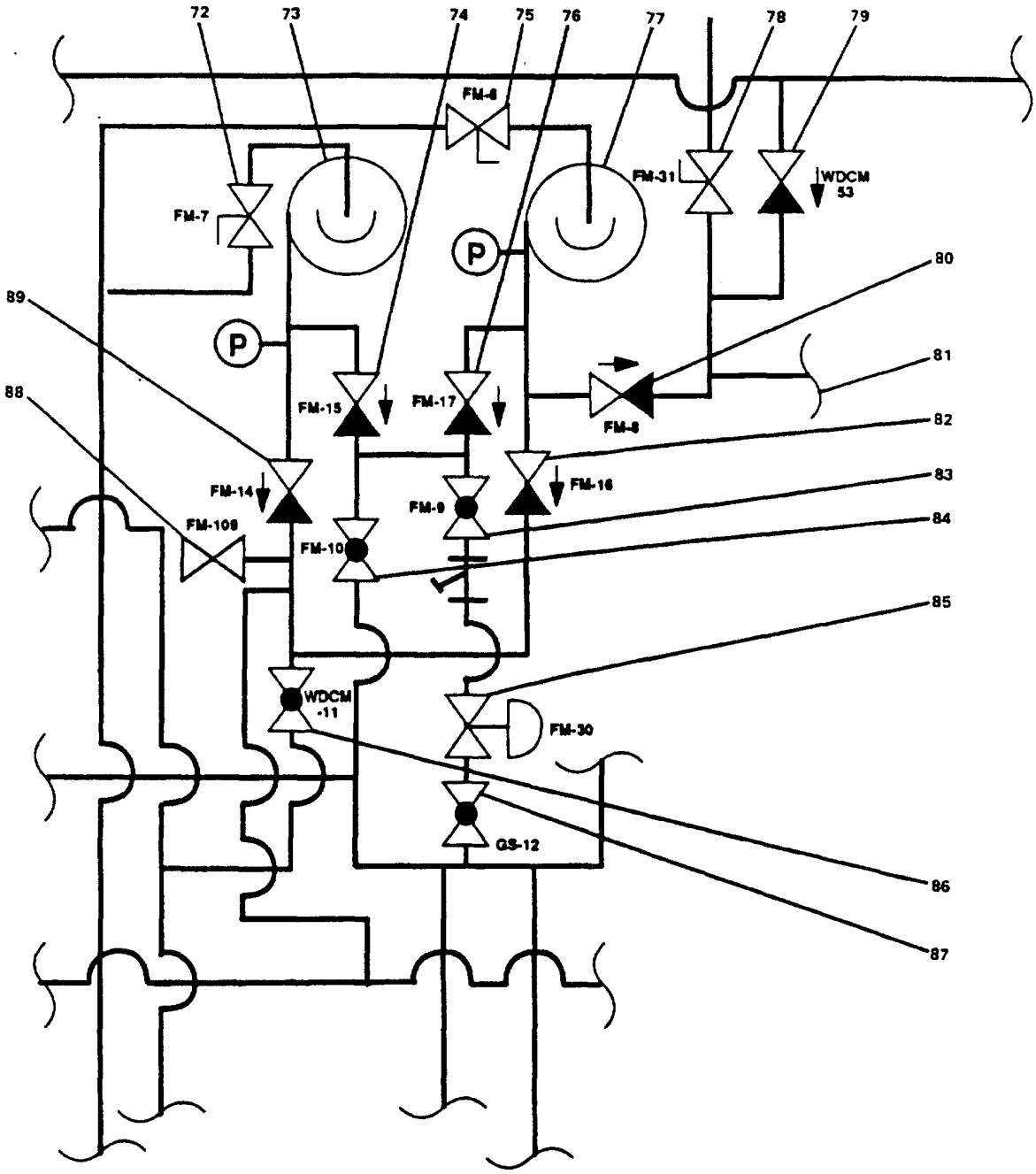
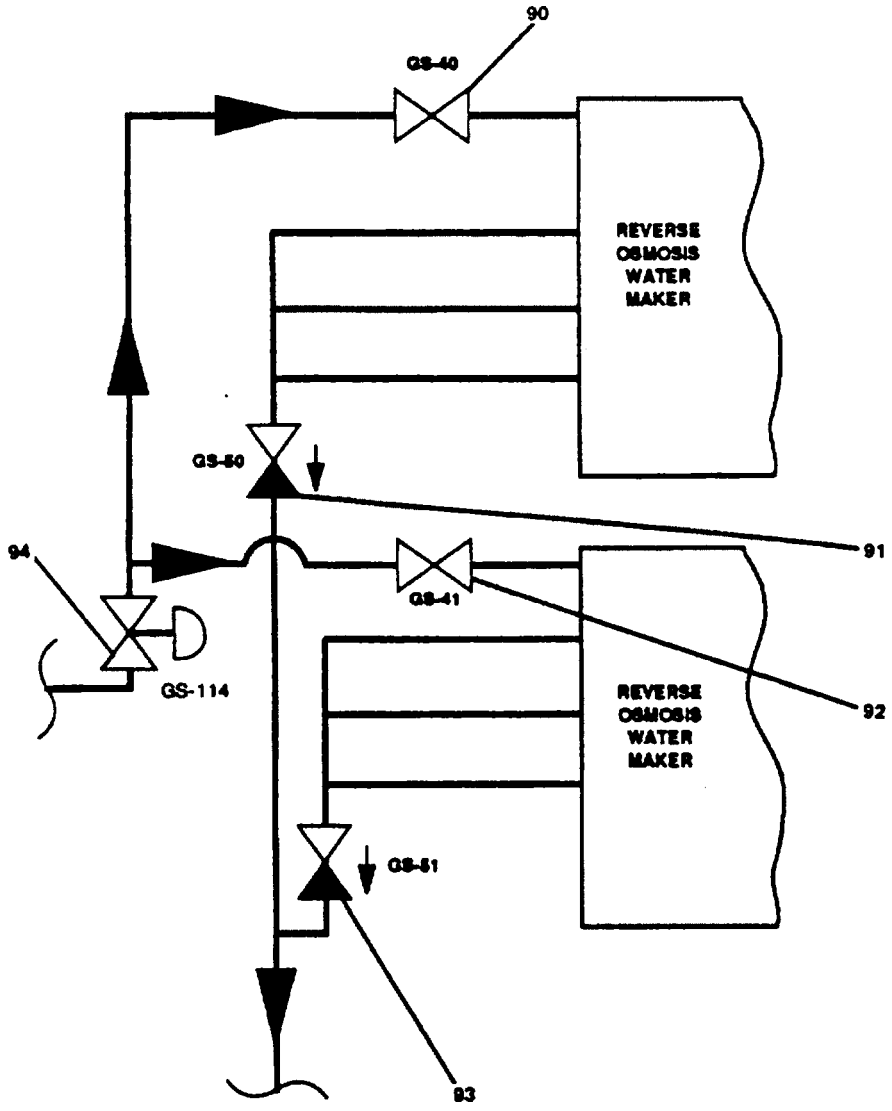


Figure 1-60. Firemain, Washdown Counter-Measure, Sprinklers and General Service System (Sheet 7 of 12).



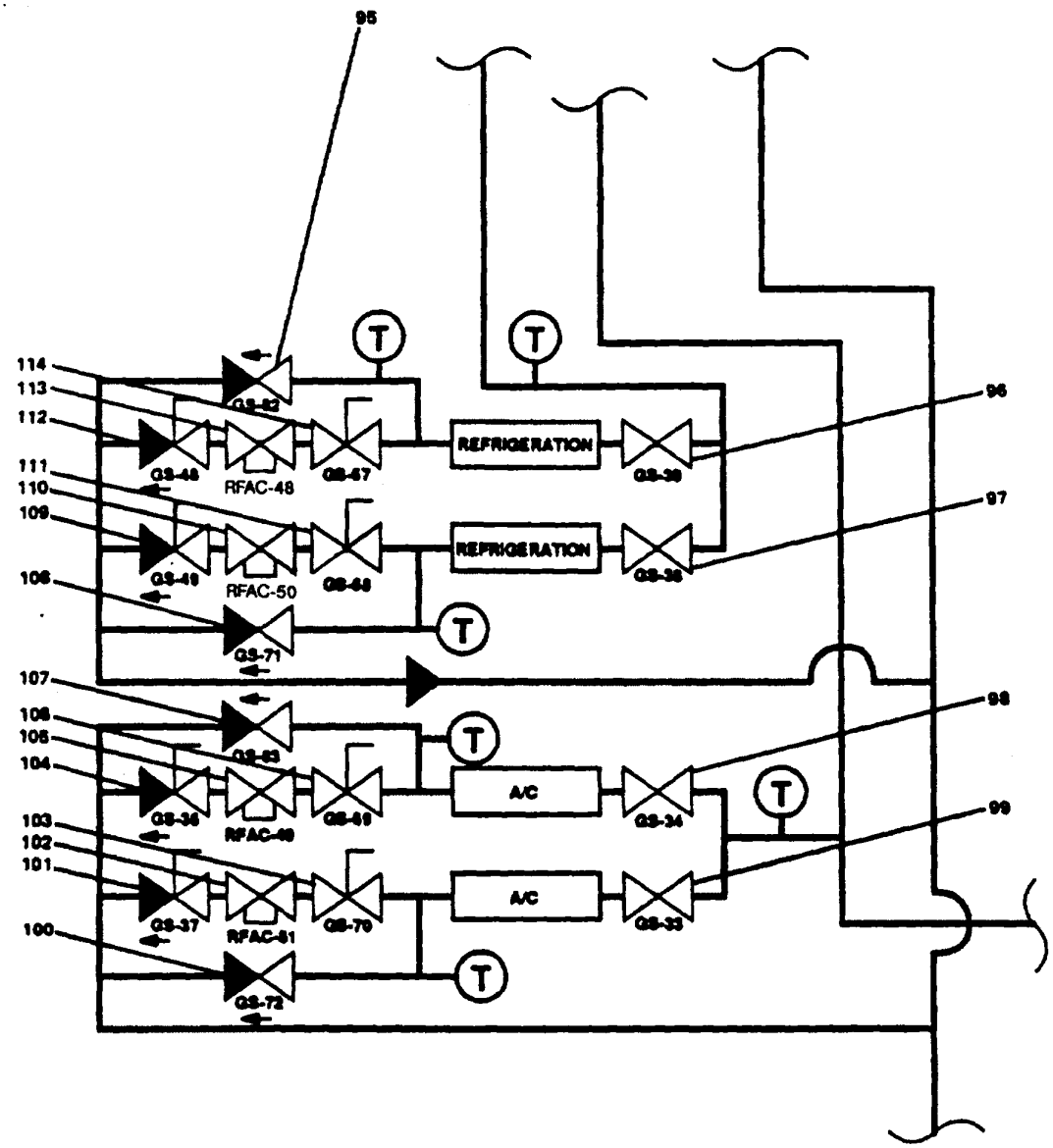
DETAIL A

Figure 1-60. Firemain, Washdown Counter-Measure, Sprinklers and General Service System (Sheet 8 of 12).



DETAIL B

Figure 1-60. Firemain, Washdown Counter-Measure, Sprinklers and General Service System (Sheet 9 of 12).



DETAIL C

Figure 1-60. Firemain, Washdown Counter-Measure, Sprinklers and General Service System (Sheet 10 of 12).

1. FIRE STATION #1
2. GS-42, COV - ST TUBE SEAL P
3. GS-106, DR ST TUBE SEAL
4. WDCM CONTINUED UP
5. GS-32, GS OVBD DISCH.
6. GS-43, COV TO ST TUBE SEAL S
7. GS-107, DR ST TUBE SEAL
8. TO BILGE EDUCTORS
9. GS-47, BILGE EDUC.
10. GS-46, BILGE EDUC.
11. FIREMAIN CONTINUED UP
12. FIRE STATION #2
13. GS-73, GEN SERV PRESS RED VLV SET AT 15 PSI
14. GS-74, OILY WTR SEP. SPLY
15. DUPLEX STRAINER
16. FM-3, S.W. TO FIRE PMPS.
17. FM-2, SEA SUCT. FIRE/G.S. AND BLST PMPS.
18. TO BILGE AND BALLAST SYSTEM
19. FM-4, EMER. BILGE SUCT.
20. EMERGENCY BILGE SUCTION WITH STRAINER
21. AFFF/FIRE FIGHTING SYSTEM CONTINUED UP
22. FH-1, SUCT. F.F.P
23. SEA CHEST
24. PROPORTIONER
25. FM-13, F.F. TO F. M. CRSVR
26. FIRE STATION #3
27. GS-45, BILGE EDUC.
28. FROM MAIN DECK
29. GENERAL SERVICE SYSTEM CONTINUED UP
30. GS-75, TOW WN HYD OIL CLR SPLY.
31. HYDRAULIC OIL COOLER
32. GS-77, HYD OIL CLR DISCH.
33. GS-76, SOL VLV-TOW WN HYD OIL CLR
34. INTERNAL RELIEF VALVE
35. GS-111, FF PMP PRM EDUCTOR DISCH.
36. FIREFIGHTING PUMP
37. FILL CONNECTION
38. FM-88, AFFF TK FILL
39. FM-84, AFFF TK SUCT.
40. STRAINER
41. AFFF PUMP
42. FM-86, RLF SET AT 180 PSI
43. FM-85
44. WDCM SPRINKLER HEAD
45. FIRE STATION #4
46. FM-54, FM DR
47. FM-55, F STA NO. 4
48. WDCM FROM BELOW
49. FIRE STATION #5
50. FIRE STATION #6
51. TO CHAIN LOCKER EDUCTOR
52. GS-44, BILGE EDUC.
53. GENERAL SERVICE SYSTEM FROM BELOW
54. FIRE STATION #8
55. FIRE STATION #9
56. FM-56, F STA NO. 9
57. FIREMAIN FROM BELOW

NOTE:
X DUPLEX PRESSURE GAUGE

Figure 1-60. Firemain, Washdown Counter-Measure, Sprinklers and General Service System (Sheet 11 of 12).

58. FIRE STATION #7
59. FM-57, F STA NO. 7 (OVER)
60. FIRE STATION #11
61. FM-59, F STA NO. 11 (OVER)
62. FM-58, F STA NO. 12 (OVER)
63. FIRE STATION #10
64. FM-52, FM TO ARMS CONT RM (OVER)
65. ARMS CONTROL ROOM SPRINKLERS
66. AFFF/FIREFIGHTING SYSTEM FROM BELOW
67. FIRE STATION #12
68. FM-60, COV AFFF MON
69. FIRE MONITOR
70. FM-61, COV AFFF MON
71. FM-62, COV AFF MON
72. FM-7, FIRE/G.S. PMP. NO. 2 SUCT.
73. FIRE AND GENERAL SERVICE PUMP NO. 2
74. FM-15, FIRE/G.S. PMP NO. 2 DISCH. TO G.S.
75. FM-6, FIRE/G.S. PMP NO. 1 SUCT.
76. FM-17, FIRE/G.S. PMP NO. 1 DISCH. TO G.S.
77. FIRE AND GENERAL SERVICE PUMP NO. 1
78. FM-31, OVBD. DISCH.
79. WDCM-53, DR WDCM
80. FM-8, EMG. BILGE OVBD
81. FROM BILGE AND BALLAST SYSTEM
82. FM-16, FIRE/PMP NO. 1 DISCH. TO FM
83. FM-9, GENL. SERV. PRESS RED. VLV. CO
84. FM-10, GENL. SERV. PRESS. RED. VLV. MAN. BYPASS
85. FM-30, GENL. SERV. PRESS. RED. VLV. SET AT 60 PSI
86. WDCM-11, WDCM SPLY
87. GS-12, GENL. SERV. PRESS. RED. VLV. CO
88. FM-109
89. FM-14, FIRE/G.S. PMP. NO. 2 DISCH TO FM
90. GS-40, SW TO RO NO. 1
91. GS-50, SW OUT RO NO. 1
92. GS-41, SW TO RO NO. 2
93. GS-51, SW OUT RO NO. 2
94. GS-114, RO SW SPLY PRS RED VLV SET AT 30 PSI
95. GS-82, BYP WTR RGLTR
96. GS-39, REFR COND NO. 1 SPLY
97. GS-38, REFR COND NO. 2 SPLY
98. GS-34, A/C COND NO. 1 SPLY
99. GS-33, A/C COND NO. 2 SPLY
100. GS-72, BYP WTR RGLTR
101. GS-37, WTR REGLTR COV
102. RFAC-51, WTR RGLTR
103. GS-70, WTR REGLTR COV
104. GS-36, WTR REGLTR COV
105. RFAC-49, WTR RGLTR
106. GS-69, WTR REGLR COV
107. GS-83, BYP WTR RGLTR
108. GS-71, BYP WTR RGLTR
109. GS-49, WTR REGLTR COV
110. RFAC-50 WTR RGLTR
111. GS-68, WTR REGLTR COV
112. GS-48, WTR REGLTR COV
113. FAC-48, WTR RGLTR
114. GS-67, WTR REGLTR COV

NOTE:
X DUPLEX PRESSURE GAUGE

Figure 1-60. Firemain, Washdown Counter-Measure, Sprinklers and General Service System (Sheet 12 of 12).

c. Washdown Counter-Measure (WDCM) system. Seawater for the WDCM is supplied from the firemain. Control of the WDCM is provided by a valve located in AMS 2. The WDCM System supplies sprinklers on the main deck and above which provide an umbrella of seawater to wet the entire exposed exterior of the LT to remove nuclear, biological, and chemical (NBC) contamination.

d. Fire fighting System. The fire fighting system supplies the three fire monitors, located on the pilot-house top. The fire fighting system can also supply the firemain through a stop-check valve located in AMS 1.

(1) Fire fighting pump. The fire fighting system is pressurized by the diesel engine driven fire fighting pump. The fire fighting pump, located in AMS No. 1, draws seawater from the seachest, through a simplex strainer, to pressurize the fire fighting system. This pump is a horizontal-centrifugal pump, with maximum output of 1,000 GPM at 170 psi. The fire fighting pump is driven by the ump drive diesel engine. Foam concentrate is supplied by an electric motor driven horizontal gear AFFF pump powered from the main switchboard.

(2) *Pump drive engine.* The pump drive engine is a turbocharged, 4 cycle, in-line 6 cylinder marine diesel engine. The engine is air started, and has its own lubricating oil (7.25 gal), cooling, and fuel oil systems. Jacket water heater is provided for cold weather starting.

(a) Engine instrument and control panel. The engine control panel contains the controls and indicators necessary for operating and monitoring of engine functions. Gauges include oil pressure, coolant temperature, tachometer, fuel pressure, and service hour meter.

(b) Fuel system (Figure 1-49). The fuel system consists of the fuel oil day tank (port and starboard), connecting lines, fuel injectors, fuel pump, engine mounted fuel filter, and fuel supply and return manifolds. Fuel from the day tank is drawn in by the fuel pump to the engine mounted filters. Fuel passes through the filter elements to the fuel manifold in the injector pump housing. The injector pump pushes fuel at very high pressure to the injector. A small amount of fuel is pumped into the cylinder, at very high pressure, through the needle valve and spray tip of the injector. The quantity of fuel injected depends upon the position of the plunger which is controlled by the injector rack and governor. Excess fuel flows through the fuel return manifold to the day tank.

(c) Air intake and engine exhaust system.

1 Air intake system. Air entering the engine is thoroughly cleaned by passing through the air intake filter to protect the engine from abrasive materials as well as to protect the lubricating oil from contaminants. When the engine is running, each time a piston moves through the intake stroke, it pulls air into the cylinder. The air flow is through the air filter, inlet manifold, passages in the cylinder head and past the open intake valve into the cylinder.

2 Engine exhaust system (Figure 1-50). When the engine is running, each time a piston moves through the exhaust stroke, it pushes hot exhaust gases from the cylinder. The exhaust gas flows out of the cylinder between the open exhaust valve and the exhaust valve seat. Then it goes through passages in the cylinder head, through the exhaust manifold and out through the stack. Engine exhaust line has exhaust temperature sensor.

(d) Air starting system. The air starting system consists of an air starting motor, oiler, starter control valve, and relay valve.

The air from the compressed air system (see paragraph 1-24) goes to the relay valve. The starter control valve is connected to the line before the relay valve. The flow of air is stopped by the relay valve until the starter control valve is activated. Then air from the starter control valve goes to the starter. The air pressure engages the starter with the flywheel gear. When the starter is engaged, air can go out through another line to the relay valve. The air activates the relay valve which opens the supply line to the air starting motor. The flow of air goes through the oiler where it picks up lubrication oil for the air starting motor.

The air with lubrication oil goes into the starter at the air inlet. The pressure of the air turns the starter which turns the engine flywheel.

When the engine starts running, the flywheel starts to turn faster than the starter. The starter retracts under this condition. This prevents damage to the starter or flywheel gear.

When the starter control valve is released, the air pressure and flow to the starter are stopped. The starter disengages. The relay valve stops the flow of air to the air starting motor.

(e) Lubricating oil system. The engine lubricating oil is supplied by a gear-type pump, which pulls oil from the oil pan and then pushes it to the oil cooler. Oil flows from the oil cooler to the oil filter and then to the oil manifold. Oil is routed from the manifold to bearings and piston surfaces and then back to the oil pan.

(f) Cooling system. The pump drive engine cooling system consists of the engine cooling system and the seawater cooling system.

1 Engine cooling system. The engine cooling system consists of a gear driven centrifugal water pump, an oil cooler, and an expansion tank. Engine water is also circulated through each after cooler located in the turbocharger air discharge duct, to cool the air before it enters the engine air box. The engine cooling water flows through an external piping arrangement to a heat exchanger. The heat exchanger transfers heat from the engine cooling water to the seawater cooling system.

2 Seawater cooling system (Figure 1-51). The seawater cooling system consists of a horizontal centrifugal pump driven off the pump drive engine, a duplex strainer, and a piping system. When the engine is operating, the centrifugal pump draws seawater from the sea chest through a duplex strainer. This seawater is routed to the heat exchanger, where the heat from engine cooling water is transferred to the seawater. The heated seawater is then pumped overboard.

e. General Service System. Seawater is supplied by the fire and general service pumps to the pressure reducing stations and then to various equipment. The General Service System provides seawater to the stem tube seals and oily water separator, bilge eductors, ship service refrigeration plant and air conditioning condensing units, reverse osmosis water makers, and hydraulic oil cooler. Output from the above is discharged overboard, except for potable water from the water-makers which is supplied to the potable water tanks. System control is maintained through a combination of valves as shown in Figure 1-60.

There are two pressure reducing stations. One, set for 60 psi, controls pressure for the entire general service system. The other, set for 15 psi, provides low pressure seawater for use in the oil/water separator.

The General Service System piping in the aft steering gear compartment, towing gear locker, bow thruster compartment, and chain locker supplies seawater to eductors to remove accumulated water. Output from eductors is discharged overboard.

1-19. Fire Extinguishing Systems. Fire extinguishing systems include portable fire fighting equipment, fixed HALON 1301 systems, and a fire detection system.

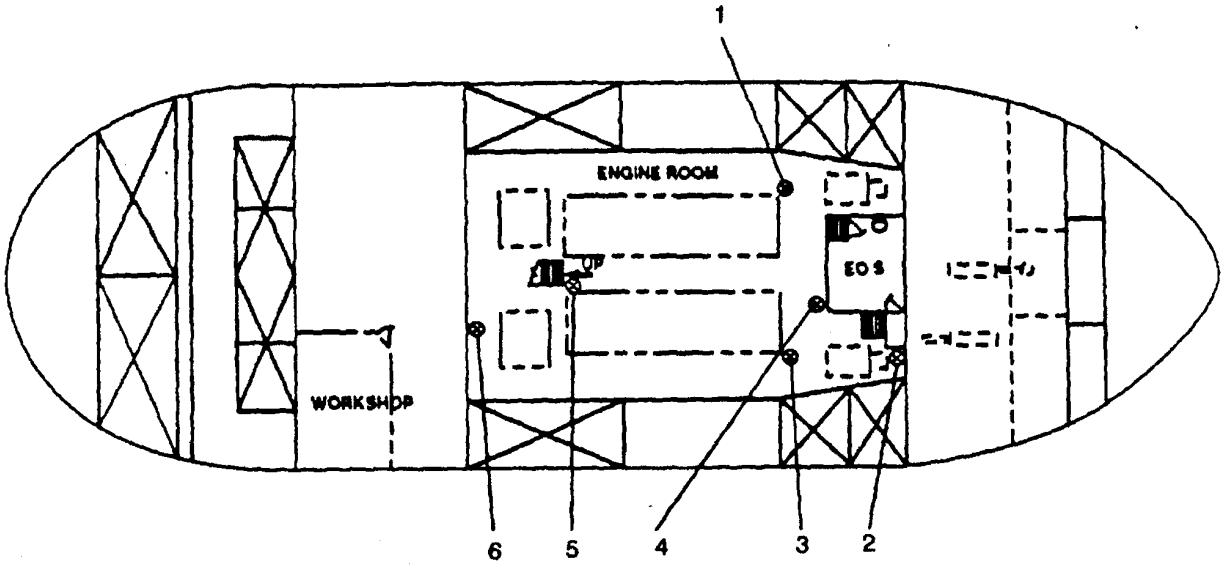
a. Portable Fire Fighting Equipment. Portable fire fighting equipment consists of six 6-lb. fire axes, 14 10-lb.dry chemical portable fire extinguishers, one gasoline engine driven portable fire fighting pump, and two portable electric pumps. Location of portable fire extinguishers and fire axes is shown in Figure 1-61.

b. Fixed HALON 1301 Systems. The two HALON systems provide fire suppression where highly flammable conditions exist. These areas are the main engine room and AMS 1 (Sheet 1, Figure 1-62) and the paint locker (Sheet 2). The system extinguishes fires in these spaces by totally flooding the space with HALON 1301 agent.

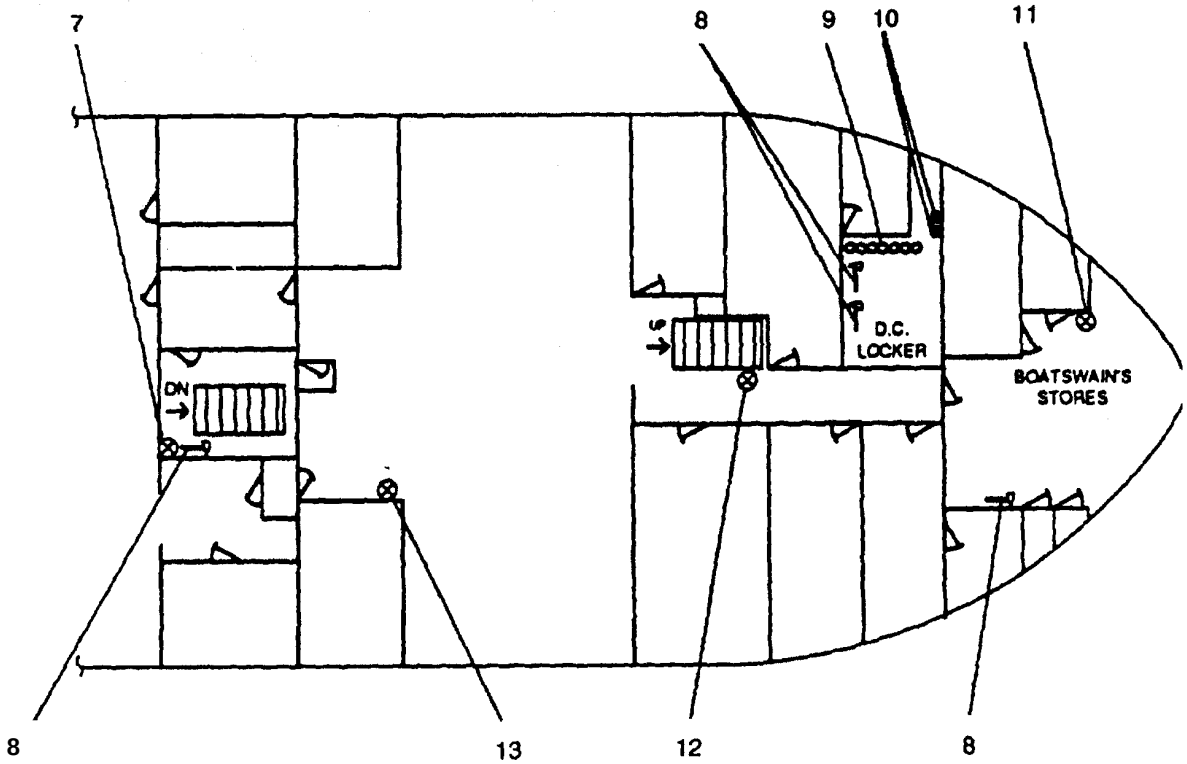
NOTE

Not applicable to Hull No. LT801, LT804 and LT805. Reference Para. 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment details and installation drawings.

(1) Operational description. The HALON 1301 is stored, in liquid form, in steel cylinders under nitrogen pressure. The content of the cylinder is controlled by a discharge control valve.

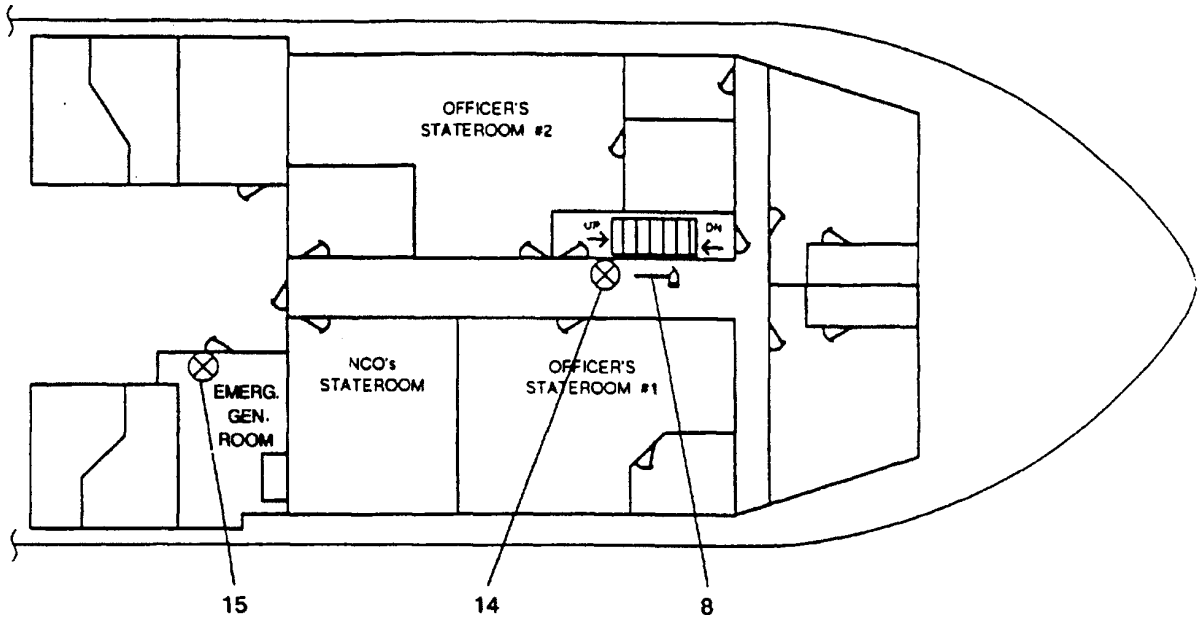


BELOW MAIN DECK

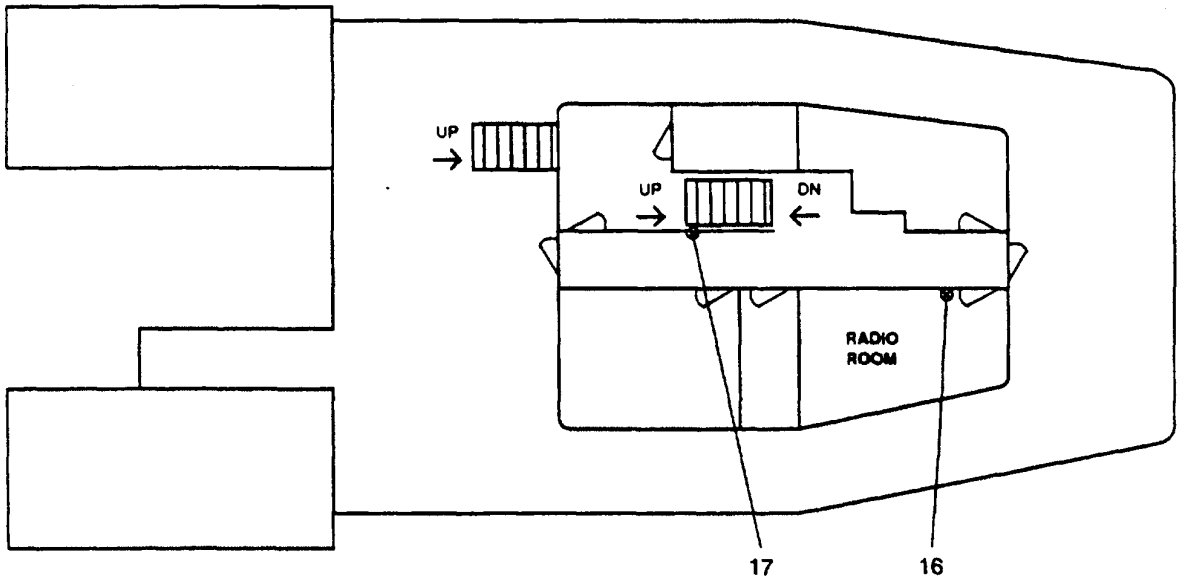


MAIN DECK

Figure 1-61. Portable Fire Fighting Equipment (Sheet 1 of 3).

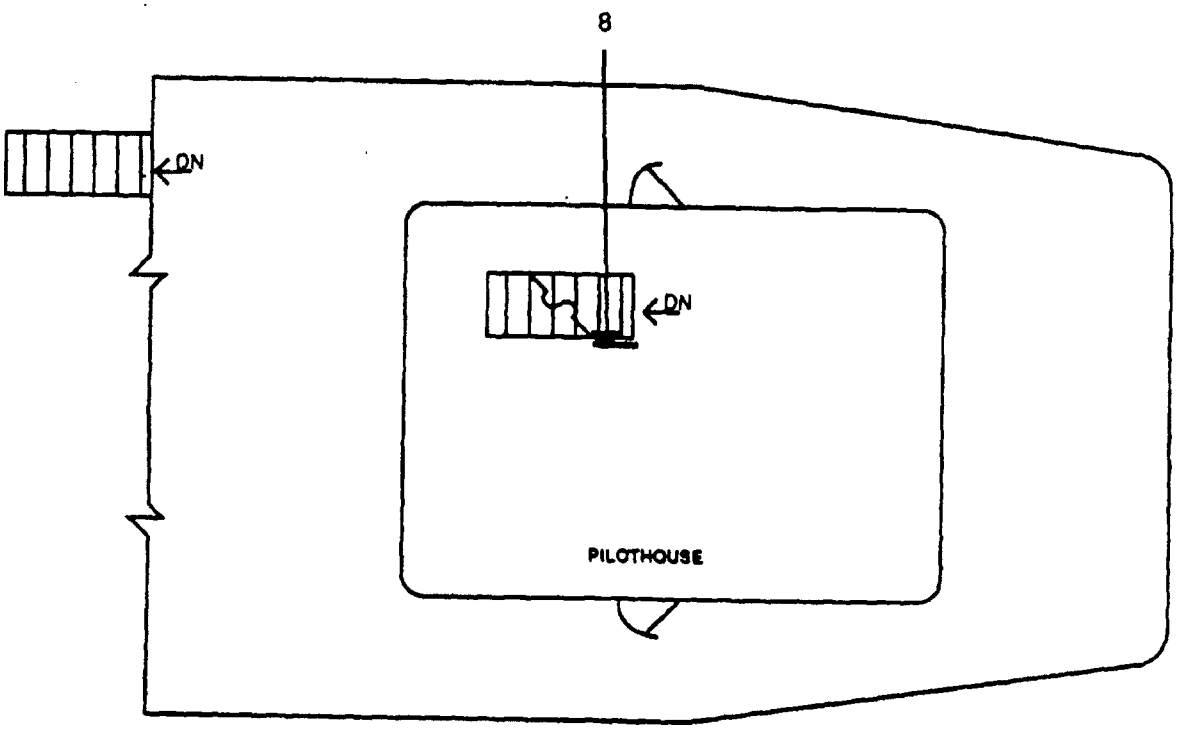


01 LEVEL



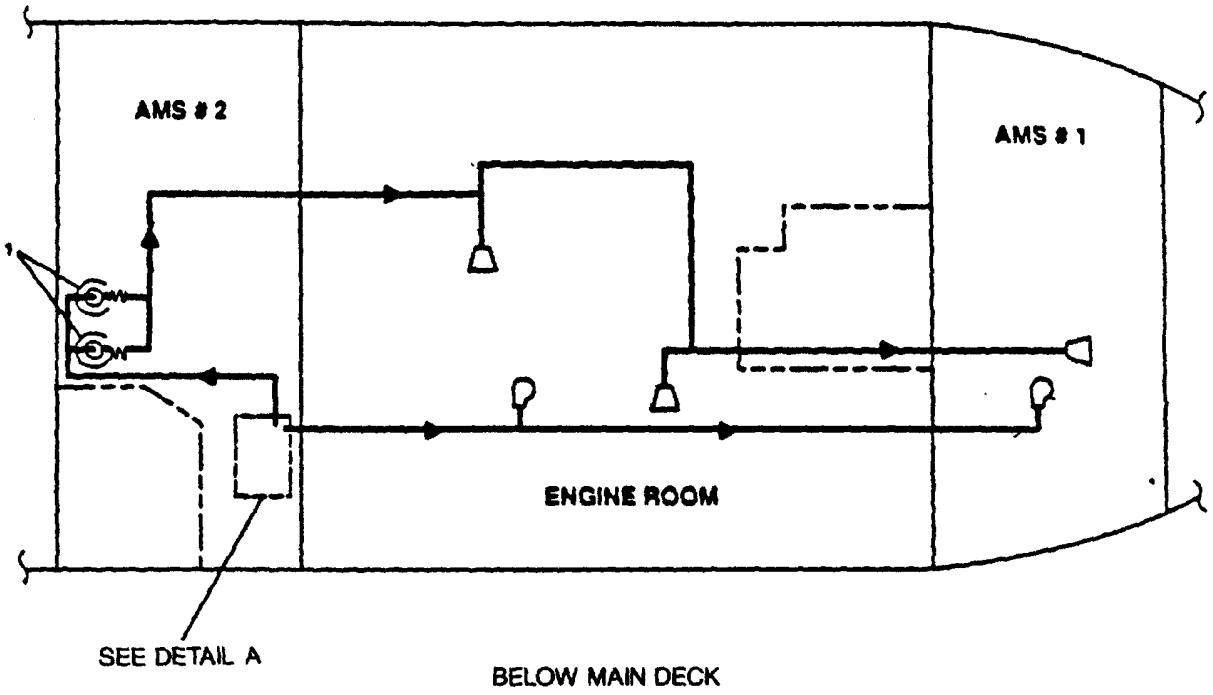
02 LEVEL

Figure 1-61. Portable Fire Fighting Equipment (Sheet 2 of 3).



1. PORTABLE FIRE EXTINGUISHER #3
2. PORTABLE FIRE EXTINGUISHER #6
3. PORTABLE FIRE EXTINGUISHER #4
4. PORTABLE FIRE EXTINGUISHER #5
5. PORTABLE FIRE EXTINGUISHER #2
6. PORTABLE FIRE EXTINGUISHER #1
7. PORTABLE FIRE EXTINGUISHER #7
8. FIRE AXE
9. SPARE CARTRIDGES FOR PORTABLE FIRE EXTINGUISHERS
10. PAIL OF ABC POWDER
11. PORTABLE FIRE EXTINGUISHER #10
12. PORTABLE FIRE EXTINGUISHER #9
13. PORTABLE FIRE EXTINGUISHER #8
14. PORTABLE FIRE EXTINGUISHER #12
15. PORTABLE FIRE EXTINGUISHER #11
16. PORTABLE FIRE EXTINGUISHER #14
17. PORTABLE FIRE EXTINGUISHER #13

Figure 1-61. Portable Fire Fighting Equipment (Sheet 3 of 3).



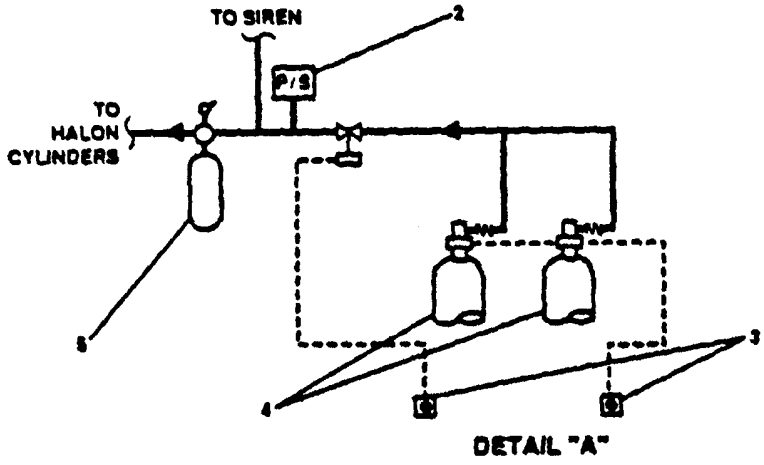
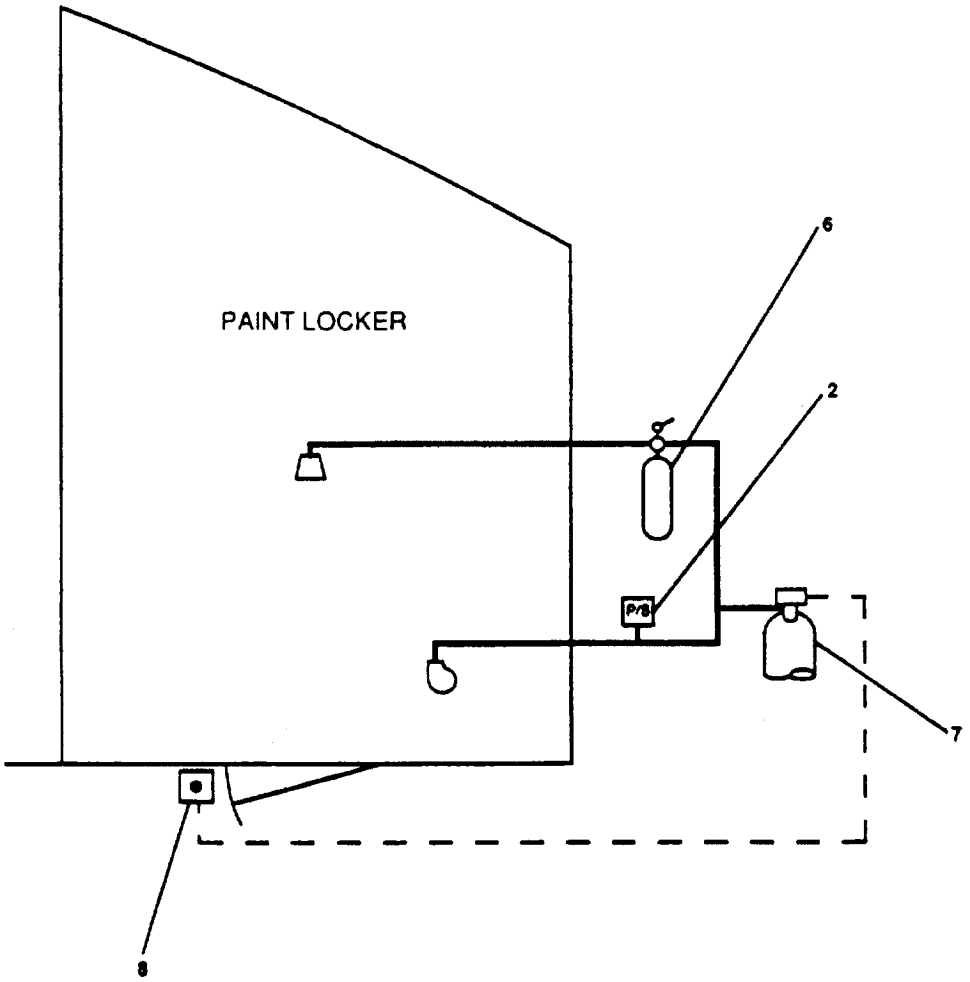


Figure 1-62. HALON 1301 Systems (Sheet 1 of 2).

NOTE

Not applicable to Hull No. LT801, LT804 and LT805. Reference Para. 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment details and installation drawings.



1. 350 LB HALON CYLINDER
2. VENTILATION SHUTDOWN PRESSURE SWITCH
3. VALVE CONTROL AND CYLINDER PULL BOXES (MAIN DECK VESTIBULE)
4. 50 LB CO2 CYLINDER
5. 60 SECOND DISCHARGE DELAY
6. 25 SECOND DISCHARGE DELAY
7. 20 LB HALON CYLINDER
8. CYLINDER CONTROL PULL BOX

Figure 1-62. HALON 1301 Systems (Sheet 2 of 2).

NOTE

Not applicable to Hull No. LT801, LT804 and LT805. Reference Para. 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment details and installation drawings.

(a) *Engine room and AMS 1 (Figure 1-62)*. Two pull boxes (3) located on main deck control system control operation. One pull box controls discharge valve located on two CO2 cylinders (4) located in AMS 2. This provides CO2 pressure up to a stop valve controlled by other pull box. When both pull boxes are pulled, CO2 passes through stop valve to a 60-second discharge delay cylinder. At the same time, a pressure switch is activated which shuts down all engine room supply and exhaust fans and fuel oil transfer pumps and CO2 is supplied to two sirens to alert personnel to evacuate. After 60-second discharge delay, CO2 passes on to HALON cylinders. HALON cylinders are equipped with pressure-operated control heads which discharge HALON through piping to three 360° discharge nozzles to flood the protected spaces.

NOTE

Not applicable to Hull No. LT801, LT804 and LT805. Reference Para. 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment details and installation drawings.

(b) *Paint locker*. Discharge control valve on 20-lb HALON cylinder (7, Figure 1-62, Sheet 2) is controlled by the cable from the pull box (8). Actuating the valve causes a siren to sound to alert personnel to evacuate the area. At the same time a pressure switch (2) is operated, causing the paint locker exhaust fan to shut down. HALON is provided to a 25 second discharge delay (6), after which it flows through piping to a single 360° discharge nozzle to flood the locker.

NOTE

Not applicable to Hull No. LT801, LT804 and LT805. Reference Para. 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment details and installation drawings.

(2) *Emergency (local) operation*.

(a) *Engine room and AMS 1*. System may be operated by manually operating the CO2 discharge valves and stop valves causing the system to operate as described above. Another option is to manually operate the control head on the HALON cylinders (1) causing protected areas to be immediately flooded with HALON without warning. In this case, all engine room supply and exhaust fans and AMS #1 supply fan must be manually shut down.

NOTE

Not applicable to Hull No. LT801, LT804 and LT805. Reference Para. 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment details and installation drawings.

b. *Paint locker*. System may be operated by manually operating 20 lb. HALON cylinder (7) control head. In this case system operates as described above. Discharge delay may be bypassed by manually opening valve, causing immediate flooding of paint locker with HALON. In either case, both warning and exhaust fan shutdown occurs automatically.

NOTE

Not applicable to Hull No. LT801, LT804 and LT805. Reference Para. 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment details and installation drawings.

c. *FM-200 Fire Suppression System Applicable to Hull No. LT801, LT804 and LT805*.

(1) FM-200 (1,1,1,2,3,3,3 - heptafluoropropane) is a compound of carbon, fluorine, and hydrogen (CF_3CHFCF_3). It is colorless, odorless, and electrically nonconductive. It suppresses fire by a combination of chemical and physical mechanisms without affecting available oxygen. FM-200 is clean, leaves no residue, thereby eliminating costly afterfire cleanup, and keeping “down time” to a minimum. FM-200 is stored in steel containers at 360 PSIG at 70°F (25 bars at 21°C), as a liquid, with nitrogen added to improve discharge characteristics. When discharged, FM-200 liquid vaporizes at discharge nozzles and is uniformly distributed as it enters fire area. FM-200 is approved for total flooding fire extinguishing applications in occupied spaces by the Environmental Protection Agency (EPA) and appears on the Significant New Alternatives Policy (SNAP) list of acceptable substances for ozone depleting substances. FM-200 is also on the clean halocarbon fire extinguishing agents listed in the National Fire Protection Agency (NFPA) 2001 Standard. Clean Agent Fire Extinguishing Systems and is approved for marine application by US Coast Guard (USCG).

(2) FM-200 Total Flooding Fire Extinguishing Systems on Large Tug, Design 128 (LT-801, 804 and 805) consists of two (2) manually actuated systems.

(3) *Engine Room and Auxiliary Machinery Space I (AMS I)*. Engine Room and AMS I FM-200 installation consists of a manually actuated system, designed and installed to protect the Engine Room, Frames 21 to 44, and the Auxiliary Machinery Space I (AMS I), Frames 44 to 54. The physical location of this system, less the FM-200 distribution piping and nozzles, Engine Room and AMS I FM-200 System Electric Horns/ robes, Engine Room and AMS I Warning Lights (Amber Strobe), is installed outside of the protected spaces in the AMS II, Frames 14 to 21, starboard side. The Engine Room and AMS I FM-200 installation includes an additional system, designed and installed to protect the Engine Room Bilge, Frames 21 to 44 and the AMS I Bilge, Frames 44 to 54. This system is actuated by the above system, allowing for concurrent discharge of FM-200 into the protected spaces. Actual location of components may vary slightly between vessels due to “as-built” configuration.

(4) *Paint Locker*. Paint Locker FM-200 installation consists of a manually actuated system, designed and installed to protect Paint Locker, main deck level, Frames 58 to 62. The physical location of this system, less FM-200 distribution piping, nozzle and siren, is installed outside of the protected space in Boatswain's Store Room, outboard side of Paint Locker bulkhead, Frame 60.

(5) *Related Installation*. Engine Room and AMS I FM-200 installation is supplemented by installation of a Water Washdown System (WWS). The manually activated system serves to quickly reduce compartment temperature prior to discharge of FM-200 agent, minimizes production of Hydrogen Fluoride (HF) gas generated as a result of FM-200 agent decomposition from contact with hot surfaces and flame at temperatures above 1300°F, aids in scrubbing of any HF Gas generated, and expedites ventilation of the compartment.

d. *Fire Detection System*. Fire detection system (Figure 1-63) sounds an alarm when fire is detected via sensors located throughout LT or when manually activated. The system consists of the fire detector panel located in the EOS; a remote panel located in the pilothouse; a terminal box; heat rise detectors (thermostats), infrared detectors, and smoke detectors located in various compartments; manual pull stations; and a 10-inch bell. Heat detectors are arranged in zones throughout the vessel. When a fire condition is detected, the associated sensor sends an alarm signal, via a zone module located in the fire control panel to the fire control panel indicators. When pulled, manual fire pull box also sends an alarm signal via zone module to fire detector panel indicators.

1-20. Bilge/Ballast System. Bilge/Ballast System is composed of the Bilge System and Ballast System.

a. *Bilge System*. Bilge System (Figure 1-64) transfers accumulated water from engine room, shaft alley (port and starboard), bow thruster compartment, chain locker, aft steering gear compartment, and towing gear locker overboard. The Bilge System is composed of three independent systems:

- Aft steering gear compartment and towing gear bilge system, and bow thruster compartment and chain locker bilge system.
- Engine room, shaft alley (port and starboard) and AMS 1 bilge system.
- Oily Bilge System.

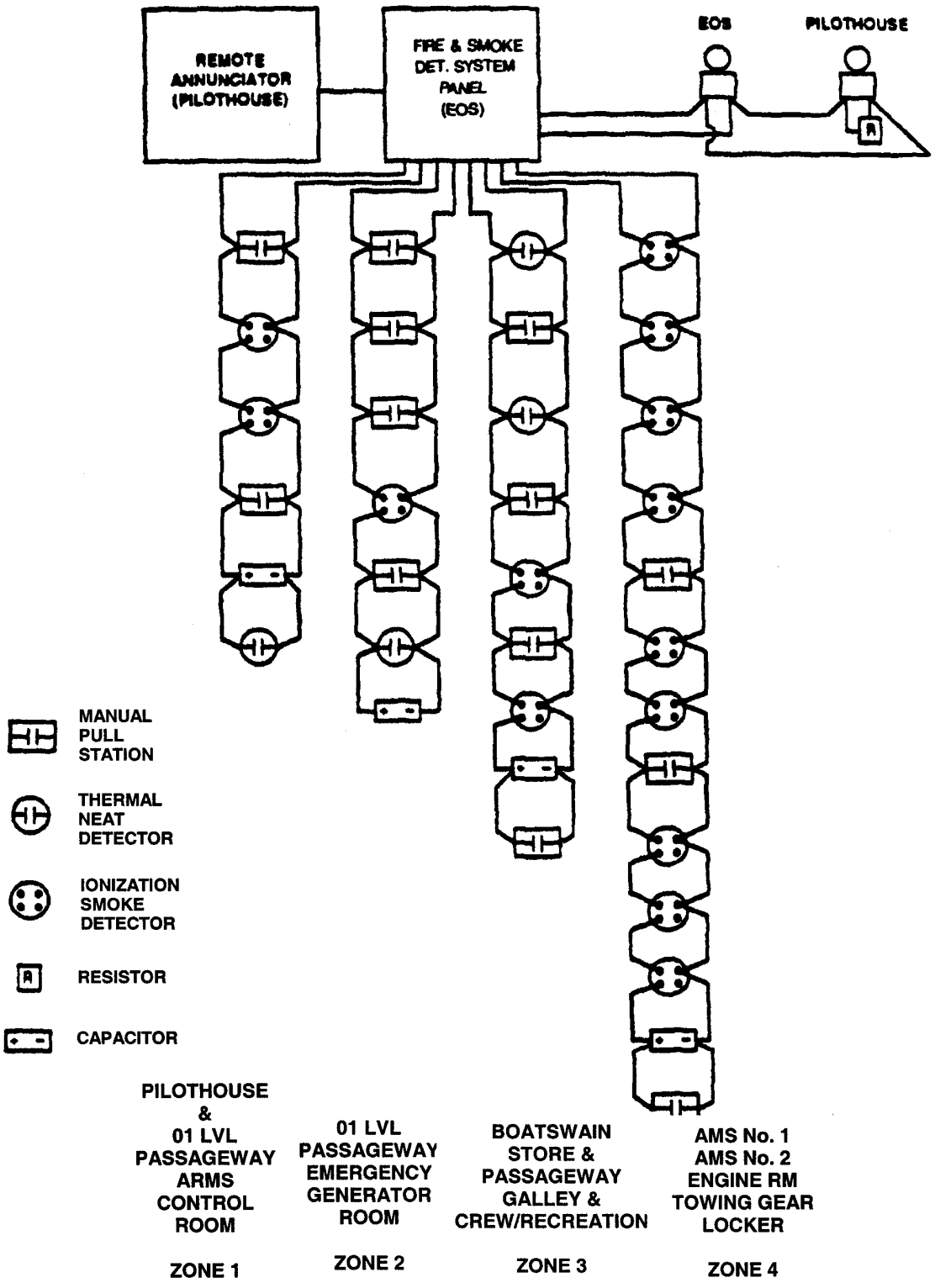
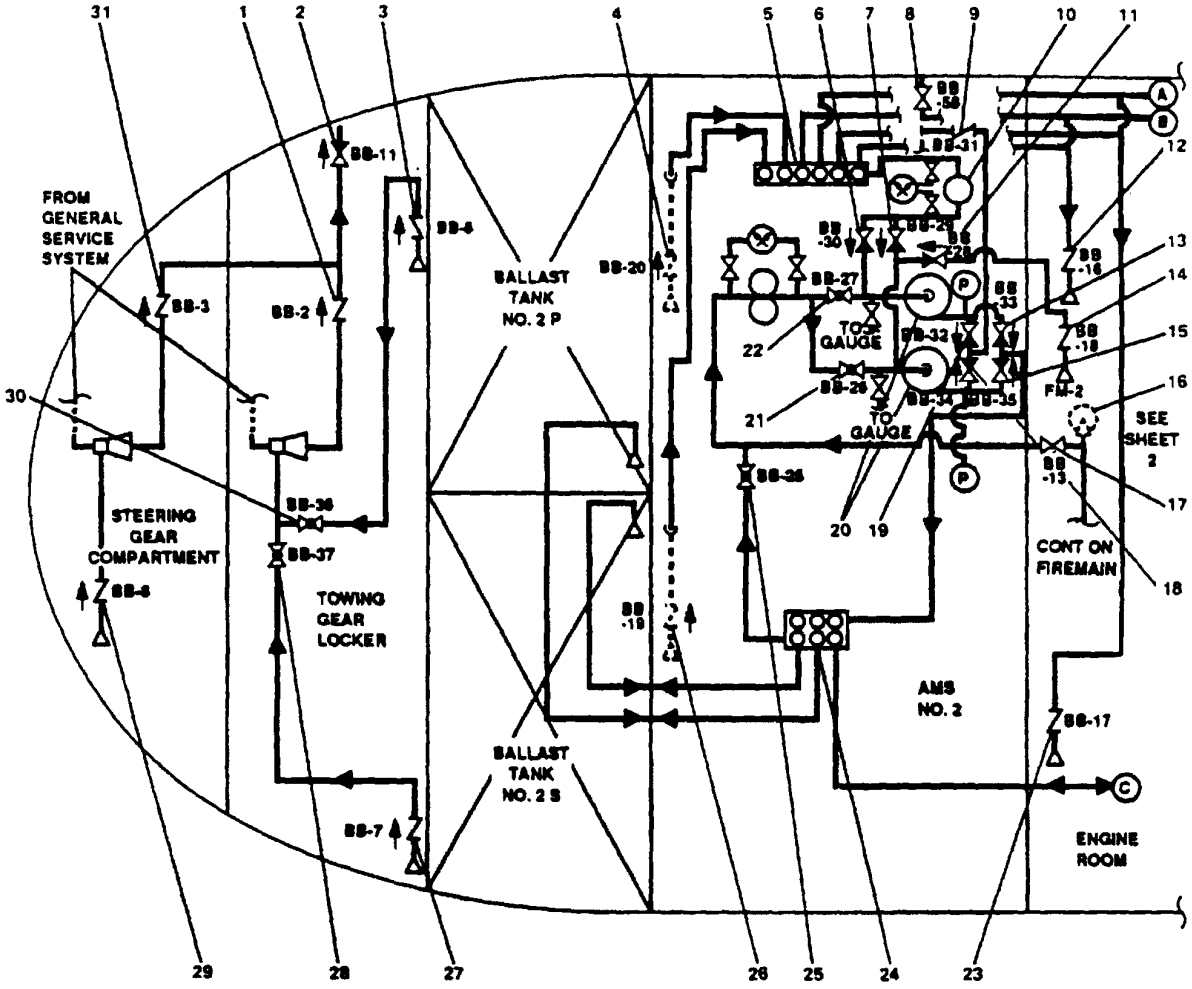


Figure 1-63. Fire Detection System.



BELOW MAIN DECK

Figure 1-64. Bilge and Ballast System (Sheet 1 of 3).

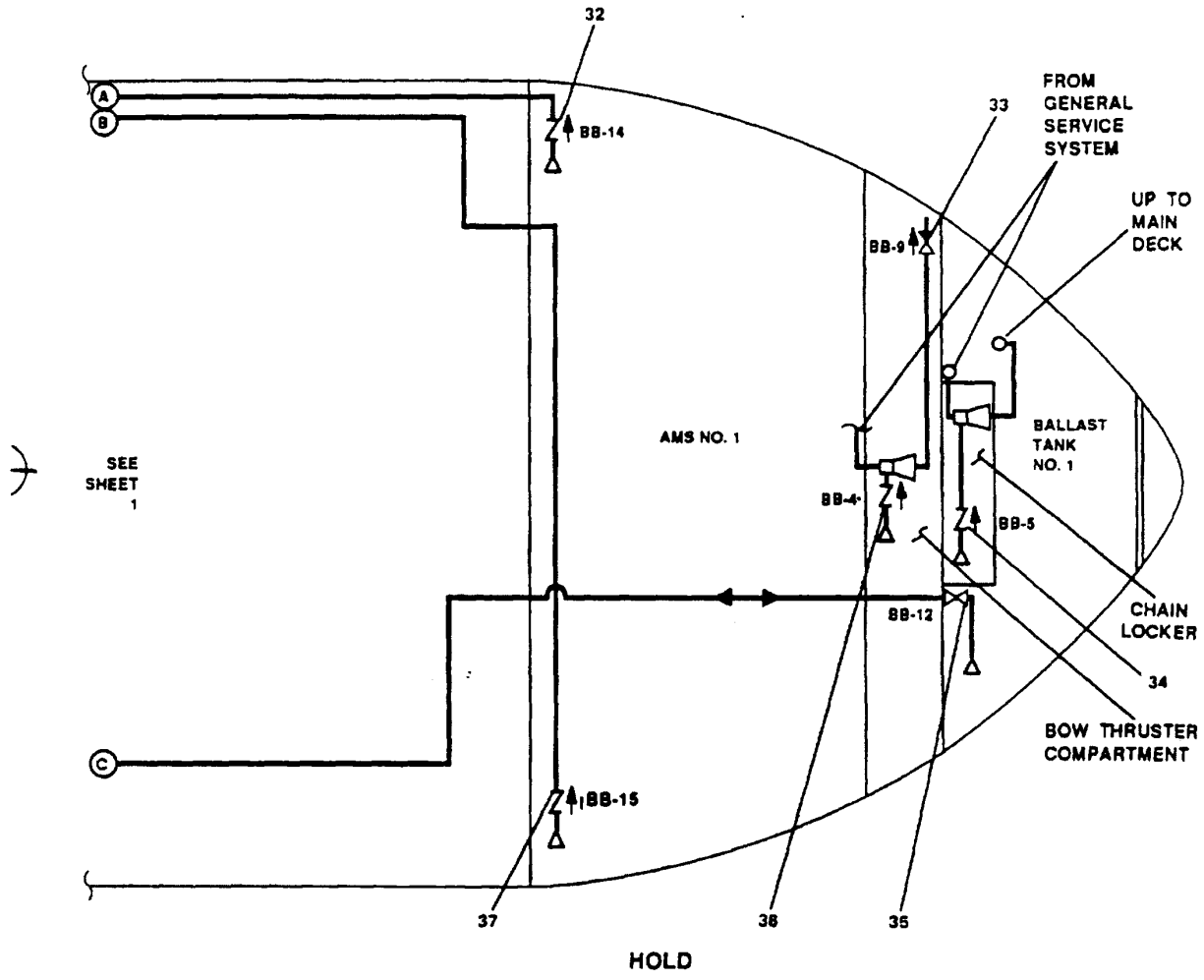
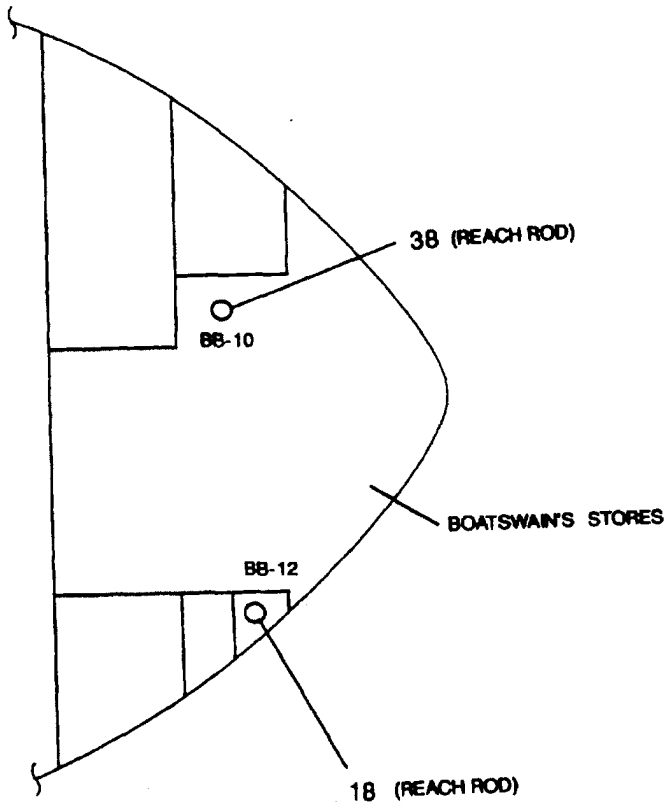


Figure 1-64. Bilge and Ballast System (Sheet 2 of 3).



MAIN-DECK

1. BB-2
2. BB-11, OVBD, DISCH. BILGE EDUC.
3. BB-6
4. BB-20
5. BILGE MANIFOLD
6. BB-30, BIB PMP. NO. 2 BILGE SUCT.
7. BB-29, B/B PMP. NO. 1 BILGE SUCT.
8. BB-58, BILGE & BALLAST OVBD. DISCH.
9. BB-31
10. STRAINER
11. BB-28, BILGE - ENG. RM. INDT. SUCT.
12. BB-16
13. BB-33, BIB PMP. NO. 2 BLST. TO MANF.
14. BB-18
15. BB-35, B/B PMP. NO. 1 BLST. TO MANF.
16. FM-2, SEA SUCT. FIREIG.S. AND BLST. PMPS.
17. BB-13, S.W. TO BLST. PMPS.
18. BB-34, B/B PM. NO. 1 OVBD. DISCH.
19. BB-32, B/B PMP. NO. 2 OVBD. DISCH.
20. BILGE & BALLAST PUMPS
21. BB-26, BIB PMP. NO. 1 BLST. SUCT.
22. BB-27, BIB PMP. NO. 2 BLST. SUCT.
23. BB-17
24. BALLAST MANIFOLD
25. BB-25, BLST. MANF. TO PMPS. OUTLT
26. BB-19
27. BB-7
28. BB-37, BILGE EDUCT. SUCT. C.O.V.
29. BB-8, SW PRESS TO EDUCTOR
30. BB-36, BILGE EDUCT. SUCT. C.O.V.
31. BB-3, BILGE EDUCTOR
32. BB-14
33. BB-9, OVBD. DISCH. BILGE EDUC.
34. BB-5
35. BB-12, BLST. TK. NO. 1 SUCT. C.O.V.
36. BB-4
37. BB-15
38. BB-10, OVBD. DISCH. BILGE EDUC.

Figure 1-64. Bilge and Ballast System (Sheet 3 of 3).

(1) Aft steering gear compartment and towing gear bilge system, and bow thruster compartment and chain locker bilge system.

(a) Aft steering gear compartment and towing Clear bilge system. General service system piping supplies pressurized seawater to eductors to remove accumulated water in these spaces. Output from eductors is discharged overboard.

(b) Bow thruster compartment and chain locker bilge system. General service piping supplies pressurized seawater to eductors to remove accumulated water in these spaces. Output from eductors is discharged overboard.

(2) Engine room, shaft alley (port and starboard) and AMS 1 bilge system. The engine room, shaft alley (port and starboard), and AMS 1 bilge system removes accumulated water for these spaces using suction. This system is comprised of two bilge and ballast pumps, bilge manifold, and bilge piping.

(a) Bilge and ballast pumps. The bilge and ballast pumps are horizontal self-priming centrifugal pumps, each with a rated output of 100 GPM at 50 psi. The pumps are driven by a 5 Hp electric motor. Electric power for bilge/ballast pump no. 1 is provided from the emergency switchboard and pump No. 2 from the main switchboard. Discharge from the pumps can be directed either overboard or to the ballast manifold.

(b) Bilge manifold. A manifold provides selection and control of piping alignment. The manifold is connected, through a strainer, to the suction side of the bilge and ballast pumps.

(c) Bilge piping. Six piping branches are provided from the bilge manifold, two each to the engine room, AMS 1, shaft alley (port) and shaft alley (starboard). Each piping branch is equipped with a check valve and bellmouth at its end.

(3) Oily bilge system. The Oily Bilge System (Figure 1-65) provides a means to remove accumulated oil water from the bilges in the engine room, AMS 1 and shaft alleys (port and starboard), and provides holding, separating, and discharge capabilities. The system is composed of a piping system, oily bilge pump, oily waste drain tank, oily waste storage tank, and oily water separator.

(a) Oily bilge piping system. The piping system is composed of six piping branches and pump tank - separator piping. Each piping branch terminates with a globe stop check valve and bellmouth. Branches are also equipped with hose connections and globe stop check valves for draining engine sumps. The piping system is connected, through a duplex strainer, to the oily bilge pump.

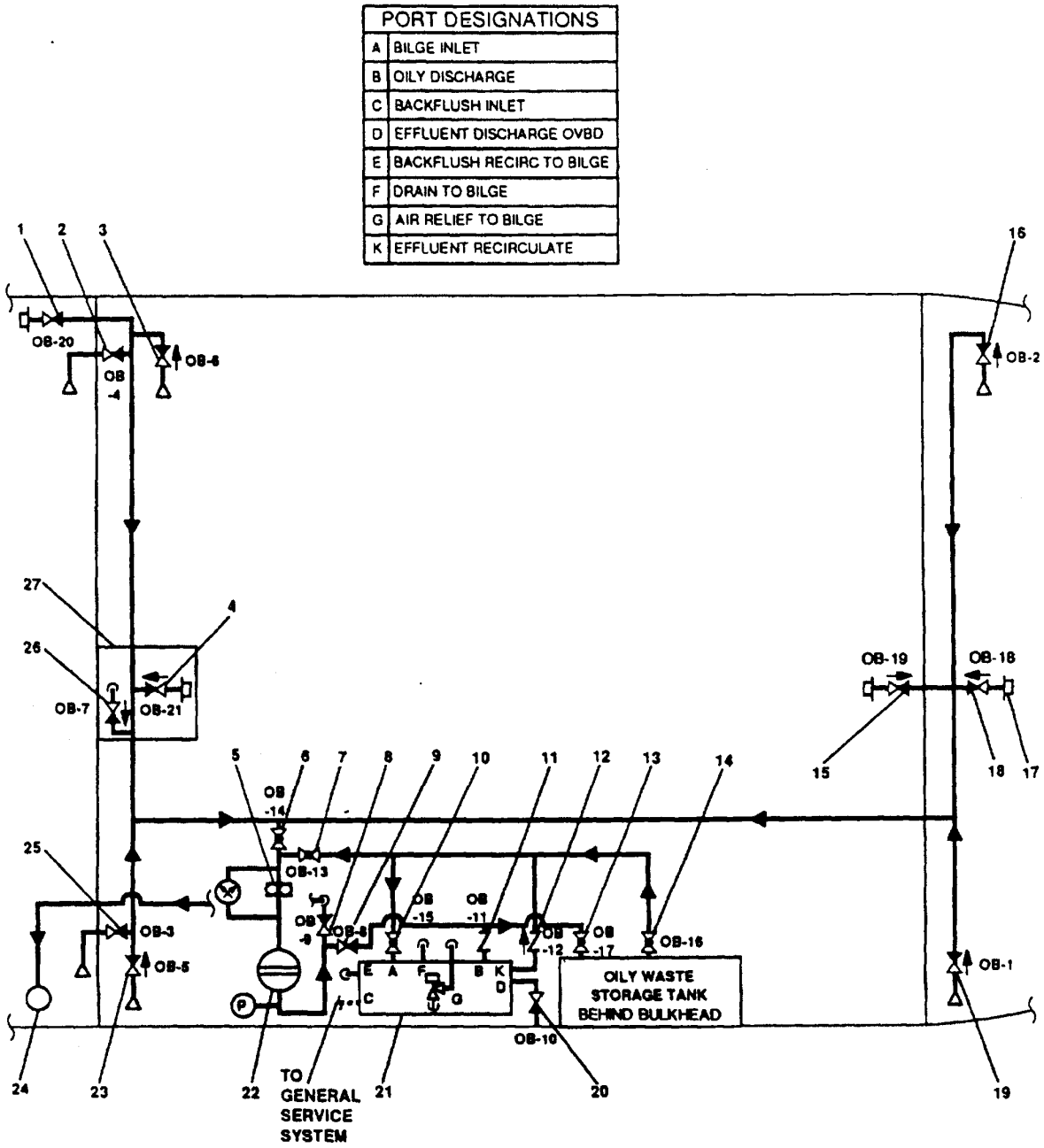
(b) Oily bilge pump. The oily bilge pump is an air driven diaphragm pump. Compressed air to drive the pump is provided by the ship service air system. Pump suction can be directed to either the piping system or the oily waste drain tank. Pump discharge can be directed to either the oily waste storage tank or shore connection.

(c) Oily waste drain tank. The oily waste drain tank receives and holds the waste discharge from the lube oil purifier and engine sumps. Oily waste is transferred via the oily bilge piping system to the oily waste storage tank.

(d) Oily waste storage tank. The oily waste storage tank provides a holding tank which supplies oily water to be processed by the oily waste separator. The tank also receives the oil output from the separator. When appropriate, the oily bilge pump can empty the tank through the shore connection.

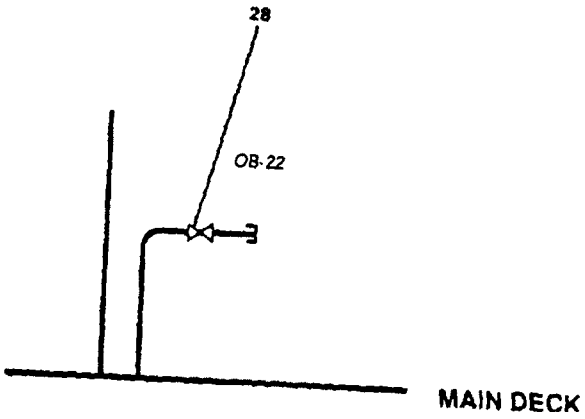
(e) Oily water separator. The oily water separator is a two-stag coalescer with self-contained pumps and motors. Power is supplied from the main switchboard. The system separates and removes oil from the bilge water. Two outputs from the separator are provided. Oily waste is pumped to the oily waste storage tank. Water is discharged overboard. An oil content monitor is provided in the water discharge line. When oil content in overboard discharge exceeds acceptable standards, the water discharge is automatically redirected to the oily waste storage tank.

(4) Emergency bilge suction. An emergency bilge suction with strainer, located in the engine room, is included in the Firemain and General Service System (Figure 1-60). The firemain and general service system valves can be aligned to connect the emergency bilge strainer to the suction side of the fire and general service pumps to pump engine room bilges in an emergency.



ENGINE ROOM

Figure 1-65. Oily Bilge System (Sheet 1 of 2).



1. OB-20, HOSE CONN - OILY BILGE SUCT.
2. OB-4, OILY BILGE SUCT. SFT ALY
3. OB-6, OILY BILGE SUCT. ENG. RM.
4. OB-21, HOSE CONN - OILY BILGE SUCT.
5. DUPLEX STRAINER
6. OB-14, C.O.V. - OILY BILGE PUMP SUCT.
7. OB-13, OILY WST. STOR. TK. TO OILY BILGE PMP. SUCT.
8. OB-9, OILY BILGE PMP. DISCH. TO SHORE
9. OB-8, OILY BILGE PMP DISCH. TO OILY WST. STOR. TK.
10. OB-15, OILY WTR. SEP. INLET
11. OB-11
12. OB-12
13. OB-17, OILY WASTE STOR. INLET
14. OB-16, OILY WASTE STOR. TK. SUCT.
15. OB-18, HOSE CONN. - OILY BILGE SUCT.
16. OB-2, OILY BILGE SUCT.
17. HOSE CONNECTION
18. OB-19, HOSE CONN. - OILY BILGE SUCT.
19. OB-1, OILY BILGE SUCT.
20. OB-10, OILY WTR. SEP. OVBD. DISCH.
21. OIL-WTR SEPARATOR
22. AIR DRIVEN PUMP
23. OB-5, OILY BILGE SUCT. ENG. RM.
24. UP TO SHORE CONNECTION
25. OB-3, OILY BILGE SUCT. SHAFT ALLEY
26. OB-7, OILY DR. TK. SUCT.
27. OILY WASTE DRAIN TANK
28. OB-22, C.O.V. SHORE CONN.

Figure 1-65. Oily Bilge System (Sheet 2 of 2).

b. Ballast System. The Ballast System (Figure 1-64) transfers seawater to and from ballast water tanks. The Ballast System consists of the bilge and ballast pumps, suction strainer ballast manifold, ballast piping, and the ballast tanks.

(1) Bilge and ballast pumps. The bilge and ballast pumps are horizontal self-priming centrifugal pumps, each with a rated output of 100 GPM at 50 psi. The pumps are driven by a 5 hp electric motor. Electric power for bilge/ballast pump No. 1 is provided from the emergency switchboard, and No. 2 from the main switchboard. Discharge from the pumps can b directed either overboard or to the ballast manifold.

(2) Ballast manifold. A duplex manifold provides selection and control of piping alignment. The manifold is connected through a strainer to the suction side of the bilge and ballast pumps.

(3) Ballast piping. Five piping branches are provided from the ballast manifold, one to the bilge and ballast pumps (suction side), one from the bilge and ballast pumps (discharge side), and one to each of the three ballast tanks. Valves are provided to isolate the forward ballast tank and the bilge and ballast pumps from the ballast manifold. Each branch which terminates in a ballast tank is equipped with a bellmouth.

1-21. Tank Level Indicator (TLI). The TLI system is used to provide an indication of the level of fluids in the ship tanks (Figure 1-66). Levels are continuously monitored. Besides indicating the fluid levels, the TLI system is used to determine alarm conditions for fuel oil day tanks (port and starboard) caused by fluid levels dropping too low (25%) or rising too high (95%). The detection of an alarm condition is indicated by the sounding of an alarm.

1-22. Fuel Oil Fill and Transfer Piping System. The fuel oil fill and transfer piping system replenishes the ship fuel oil tanks from deck discharge/fill connections. The system also replenishes fuel oil day tanks (port and starboard) and emergency diesel generator day tank, by transferring fuel oil from storage tanks. System control is maintained through a manifold and a combination of valves as shown in Figure 1-67. Fuel oil can be transferred from any storage tank to any day tank. Power to No. 1 fuel oil transfer pump is supplied by the emergency switchboard and controlled by a START/STOP pushbutton and an emergency STOP switch located outside the machinery space. Power to No. 2 fuel oil transfer pump is supplied by the main switchboard through engine room power panel No. 1 and is controlled by a local STAT/STOP pushbutton and an emergency stop pushbutton located outside the engine room. Each pump shuts down upon activation of any HALON pressure switch. Fuel oil purification is provided by the fuel oil filter/coalescer.

1-23. Lubricating Oil Fill and Transfer Piping System. The lubricating oil fill and transfer piping system supplies clean lubricating oil for proper operation of the main propulsion engines, SSDGs, and auxiliary engines. The system also transfers lubricating oil from the lube oil storage tank to the main engine, SSDG sumps, bow thruster engine sump, and pump drive engine sump. System alignment is maintained by a manifold and a combination of valves as shown in Figure 1-68. A fast lube oil drain system allows dirty oil and sludge to be discharged from the engine sumps to oily waste drain tank via gravity drains. Dirty oil from the port and starboard reduction gears is discharged to the oily waste drain tank using a hand pump. Power for the lube oil transfer pump is supplied from the main switchboard through engine room power panel no. 1. Power for the lube oil purifier is supplied from the main switchboard. Each unit has a START/STOP pushbutton adjacent to the unit. A lube oil purifier is also available for purification of the lube oil for the main engines. Major components of the system include the following: lube oil purifier, main engines lube oil transfer manifold (3-way manifold), lube oil transfer manifold, lube oil transfer pump, lube oil storage tank, oily waste drain tank, oily waste storage tank, and a hand pump.

a. Lube Oil Purifier. The lube oil purifier separates water from oil and simultaneously removes solids suspended in the oil. Clean oil is returned to the engine sump. Purifier waste products (water and solids) are pumped to the oily waste drain tank.

b. Main Engines Lube Oil Transfer Manifold. The main engines lube oil transfer manifold is a duplex manifold used to control the flow of lube oil to and from the main engines and lube oil purifier. Valves are interlocked so oil can only be drawn from one engine and returned to the same engine.

c. Lube Oil Transfer Manifold. The lube oil transfer manifold is a simplex manifold used to control the flow of lube oil to the SSDGs, main engines lube oil transfer manifold, bow thruster engine, and pump drive engine.

d. Lube Oil Transfer Pump. The rotary vane type lube oil transfer pump has a rated output of 15 GM at 25 psi. The pump is driven by a 1 hp electric motor. Power is supplied from the main switchboard, through engine room power panel No. 1, to the motor controller.

e. Hand Pump. A hand pump is provided to drain port and starboard reduction gear sumps.

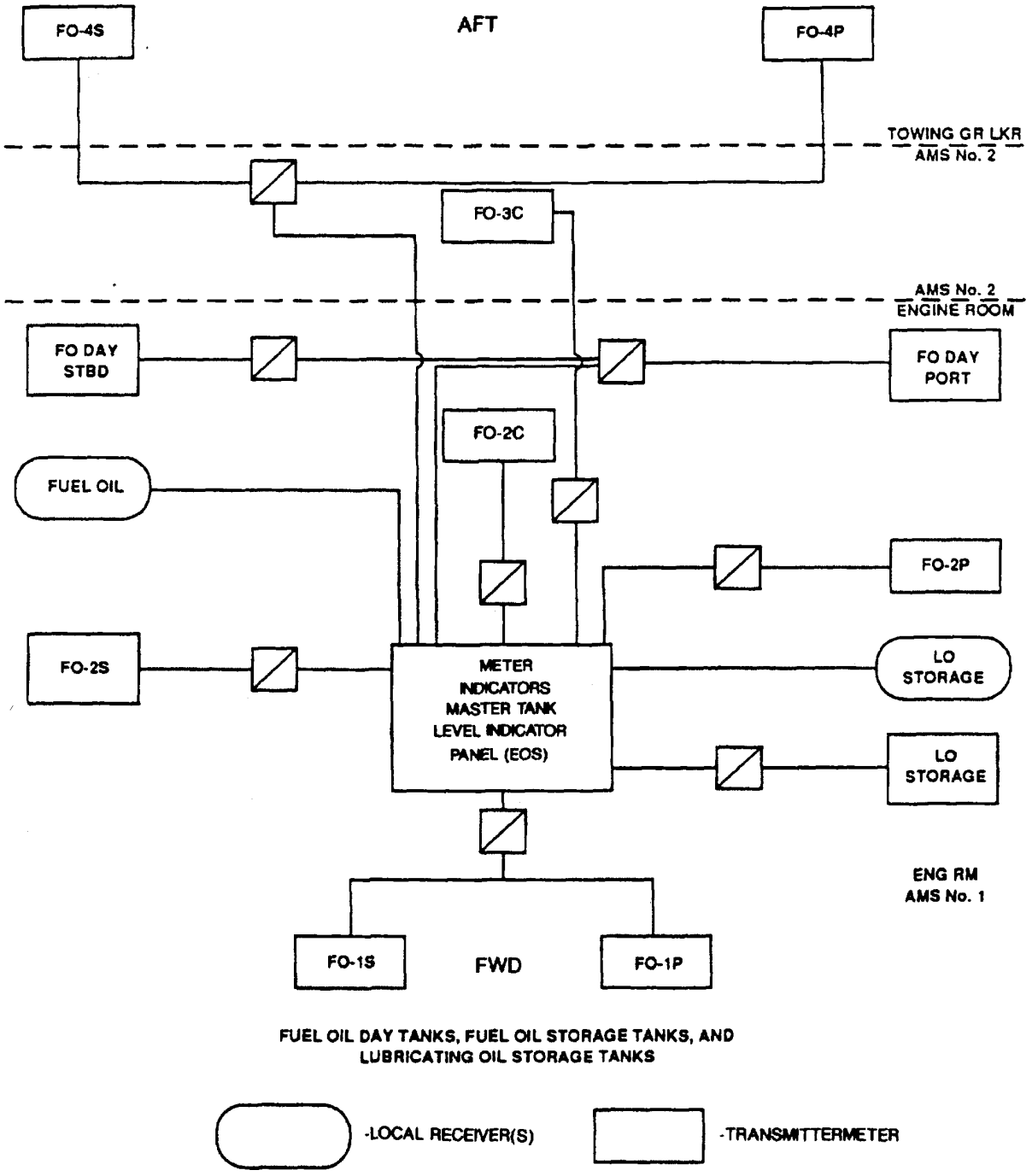


Figure 1-66. Tank Level Indicator System (Sheet 1 of 2).

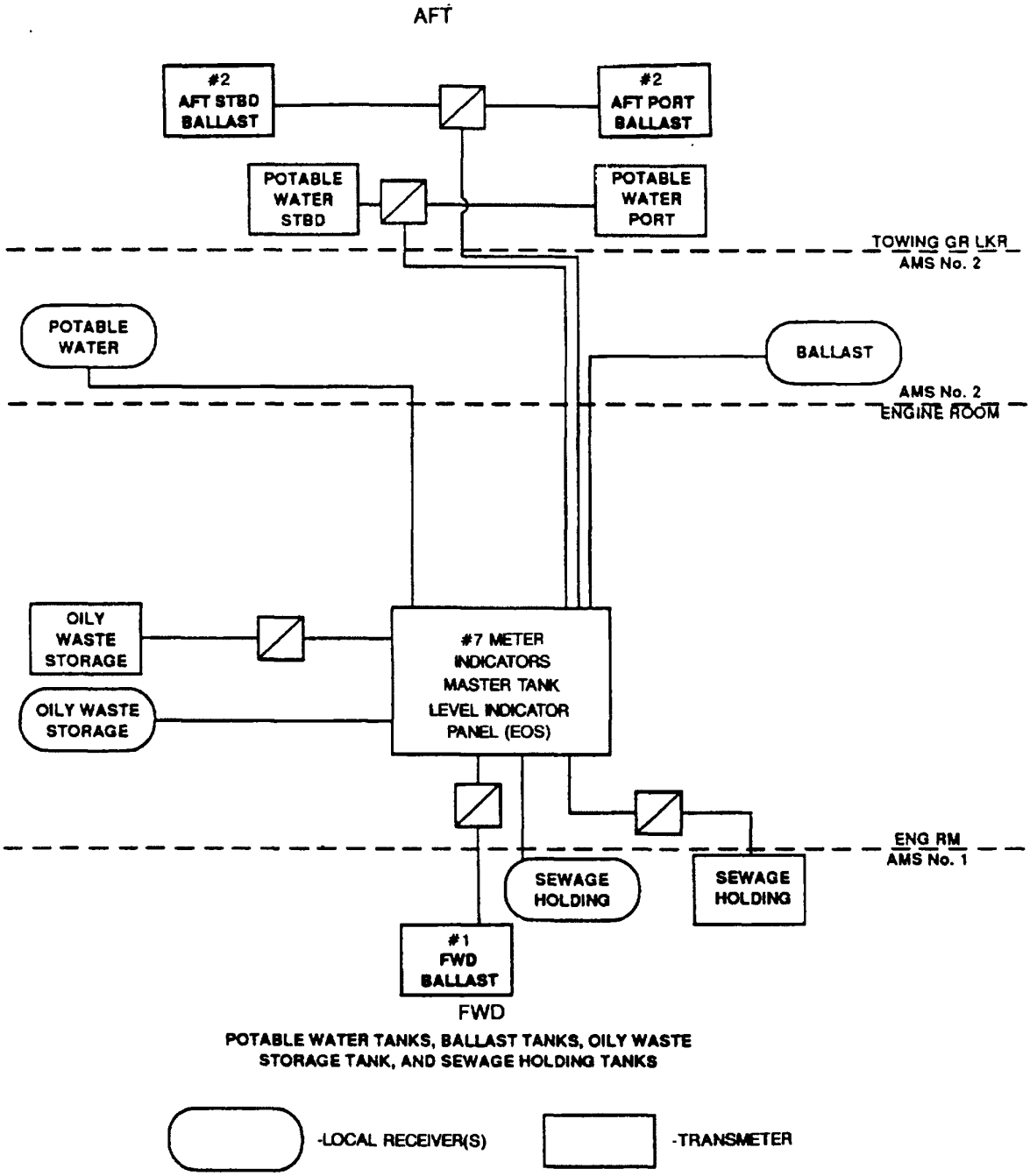


Figure 1-66. Tank Level Indicator System (Sheet 2 of 2).

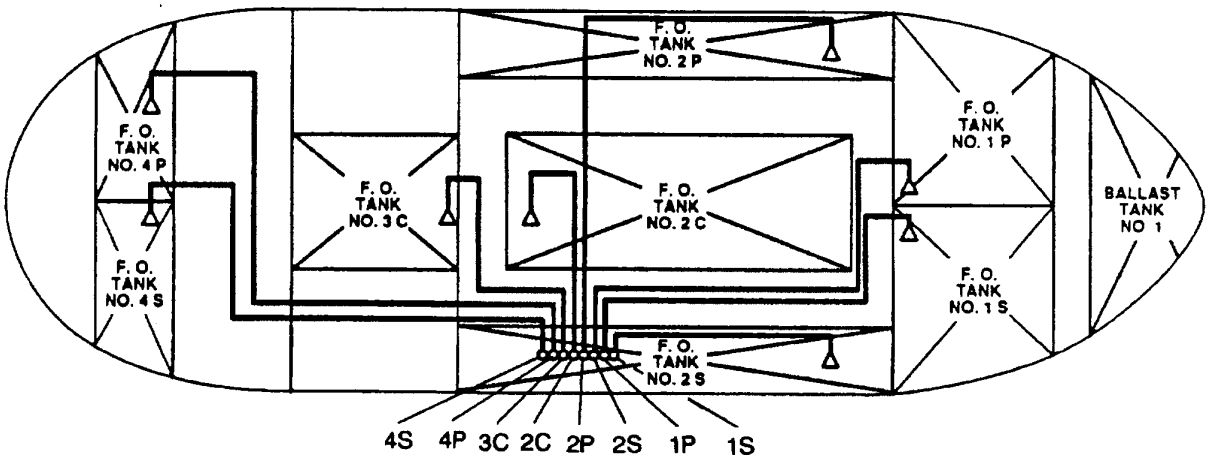
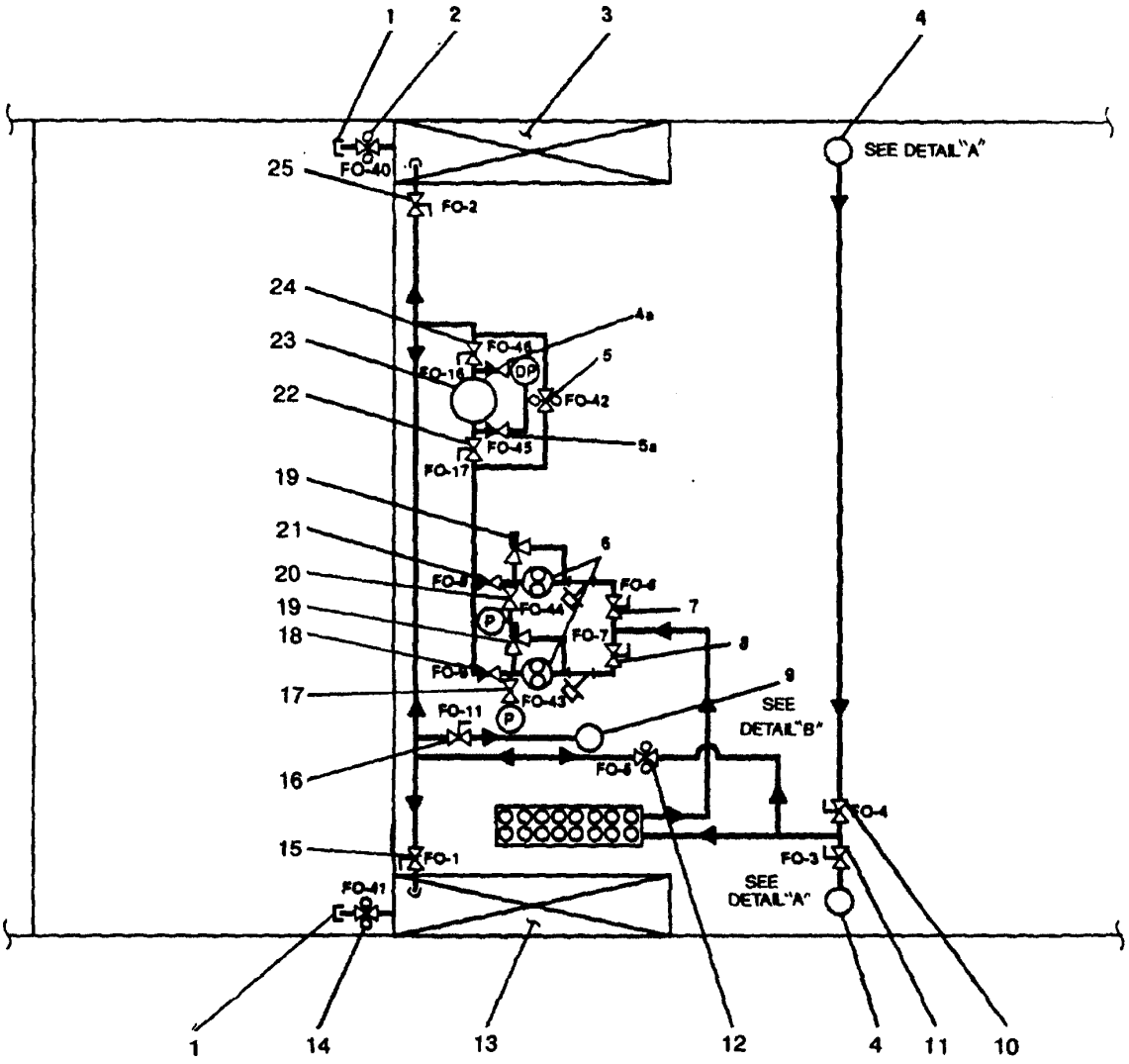
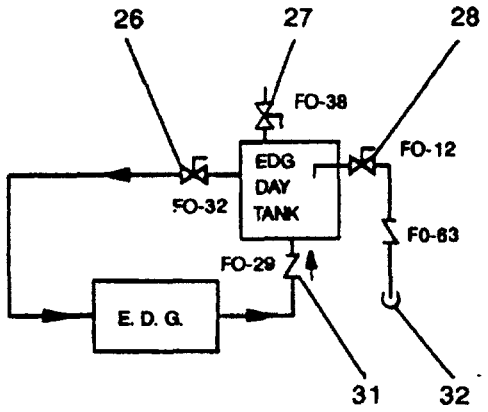


Figure 1-67. Fuel Oil Fill and Transfer System (Sheet 1 of 3).

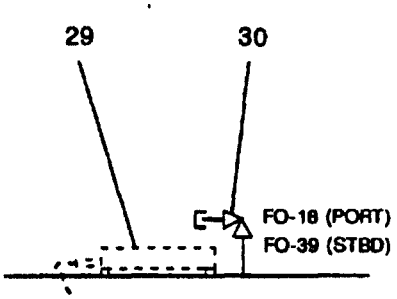


ENGINE ROOM

Figure 1-67. Fuel Oil Fill and Transfer System (Sheet 2 of 3).



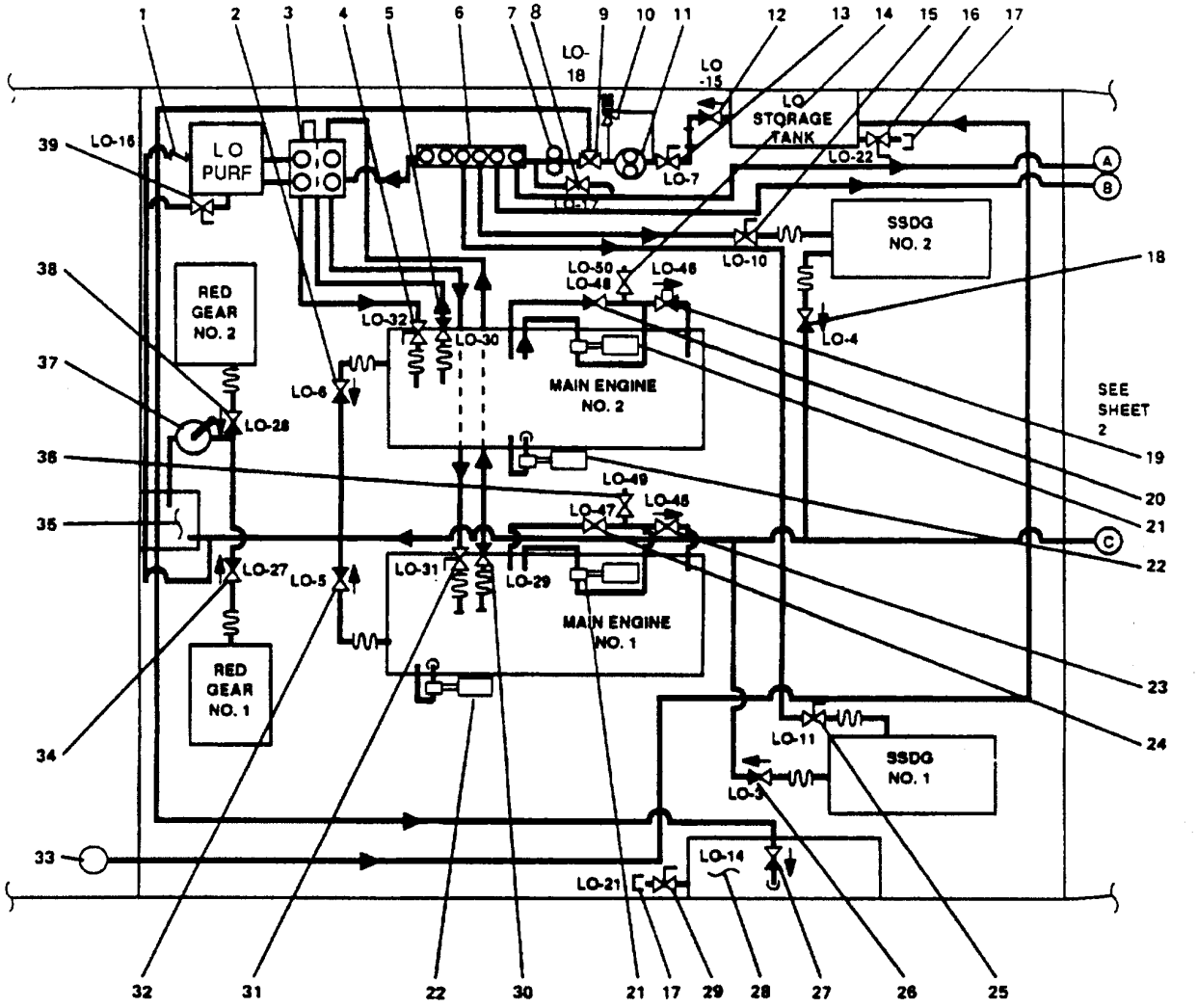
01 LEVEL
DETAIL B



DETAIL A
MAIN DECK FILL COW P/S

1. HOSE CONNECTION
2. FO-40, F.O. DAY TK. DR. PORT
3. FUEL OIL DAY TANK (PORT)
4. UP TO DECK FILL CONNECTION
5. FO-42, F.O. FLTR/CLSR BYPASS
6. FUEL OIL TRANSFER PUMPS
7. FO-6, C.O.V. - F.O. XFER PMP NO. 1 SUCTION
8. FO-7, C.O.V. - F.O. XFER PMP NO. 2 SUCTION
9. UP TO EMERGENCY GENERATOR DAYTANK
10. FO-4, DK. FILLCONN.
11. FO-3, DK. FILL CONN.
12. FO-5, F.O. DAY TK EMERG. FILL
13. FUEL OIL DAY TANK (STBD)
14. FO-41, F.O. DAY TK DR. STBD
15. FO-1, F.O. DAY TK. FILL
16. FO-11, F.O. TO E.D.G. DAY TK.
17. FO-43
18. **FO-9, C.O.V. - F.O. XFER PMP NO. 2 DISCHARGE**
19. **PUMP INTERNAL RELIEF VALVE**
20. **FO-4**
21. **FO-8, C.O.V. - F.O. XFER PMP NO. 1 DISCHARGE**
22. **FO-17, F.O. FLTR/CLSR INLET**
23. **FILTER/COALESCER**
24. **FO-16, F.O. FLTR/CLSR OUTLET**
25. **FO-2, F.O. DAY TK FILL**
26. **FO-32, F.O. PLY TO E.D.G.**
27. **FO-38**
28. **FO-12, E. D.G. DAY TK FILL**
29. **SPILL CONTAINER**
30. **FO-18, DK. FILL CONN. PORT**
    FO-39, DK, FILL CONN. STBD
31. **FROM BELOW**
32. **FO-29**

Figure 1-67. Fuel Oil Fill and Transfer System (Sheet 3 of 3).



ENGINE ROOM

Figure 1-68. Lube Oil Transfer and Storage System (Sheet 1 of 3).

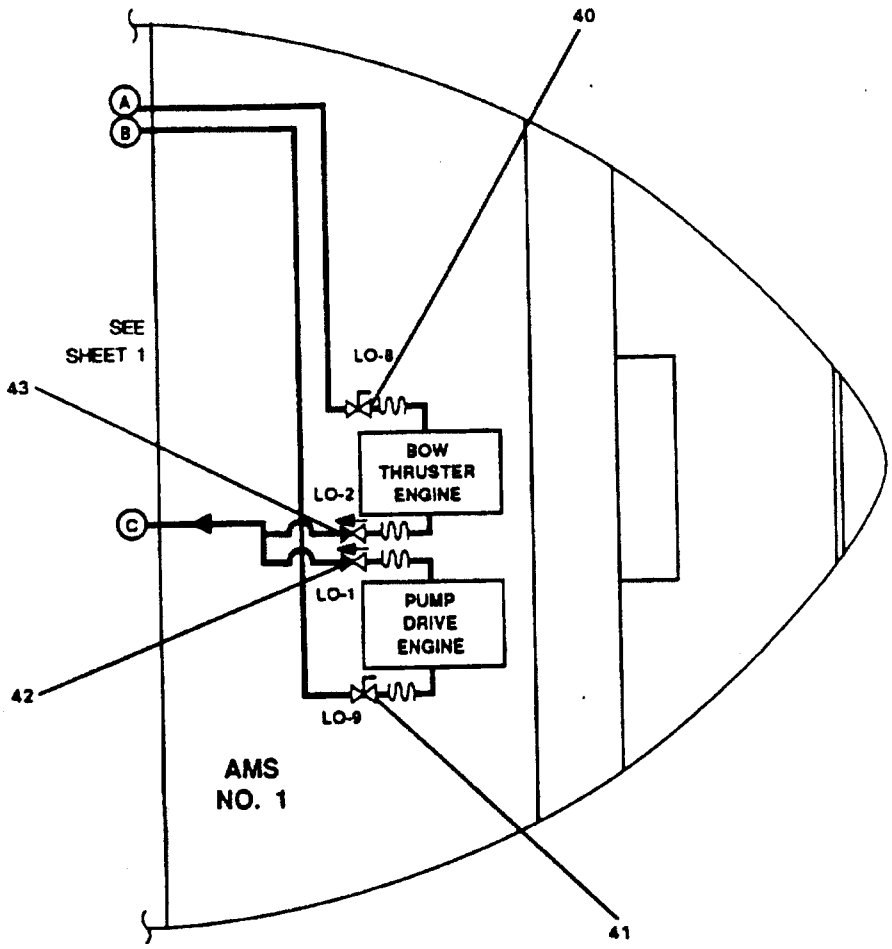


Figure 1-68. Lube Oil Transfer and Storage System (Sheet 2 of 3).

1. LO-16
2. LO-6, LUBO DR TO OILY DR TK.
3. 3 WAY MANIFOLD (LO-23, LO-24, LO-25, LO-26)
4. LO-32, M.E. NO. 2 - LUBO PUR. DISCH./FILL
5. LO-30, M.E. NO. 2 - LUBO PUR. SUCT.
6. LUBE OIL TRANSFER MANIFOLD
7. DUPLEX FILTER
8. LO-17, BKT, FILL CONN.
9. LO-18, LUBO SPLY.
10. RELIEF VALVE (INTERNAL TO PUMP)
11. LUBE OIL TRANSFER PUMP
12. LO-15, LUBO. STORAGE TANK OUT
13. LO-7, C.O.V. - LUBO XFER PMP SUCT.
14. LO-50
15. LO-10, LUBO TO S.S.D.G. NO. 2
16. LO-22, LUBO STOR. TK. DR
17. PIPE CAP
18. LO-4, LUBO DR. TO OILY DR. TK.
19. LO-46, RELIEF - SET AT 30 P.S.1.
20. LO-48, C.O.V. PRELUBE PMP. DISCH.
21. PRELUBE PUMP
22. SOAKBACK PUMP
23. LO-45, RELIEF - SET AT 30 P.S.I.
24. LO-47, C.O.V. PRELUBE PMP. ISCH.
25. LO-11, LUBO TO S.S.D.G. NO. 1
26. LO-3, LUBO DR. TO OILY DR. TK.
27. LO-14, LUBO XFER TO OILY WST. STOR. TK.
28. OILY WASTE STORAGE TANK
29. LO-21, OILY WST. STOR. TK. DR.
30. LO-29, M.E. NO. 1 - LUBO PUR. SUCT.
31. LO-31, M.E. NO. 1 - LUBO PUR. DISCH./FILL
32. LO-5, LUBO DR. TO OILY DK. TK.
33. UP TO MAIN DECK FILL CONNECTION
34. LO-27, LUBO DR. FR. RED GEAR NO. 1
35. OILY WASTE DRAIN TANK
36. LO-49
37. HAND PUMP
38. LO-28, LUBO DR. FR. RED. GEAR NO. 2
39. PURIFIER HEATER DRAIN VALVE
40. LO-8, LUBO TO BOW THRUSTER ENG.
41. LO-9, LUBO TO PUMP DRIVE ENG.
42. LO-1, LUBO DR. TO OIL DR. TK.
43. LO-2, LUBO DR. TO OILY DR. TK.

Figure 1-68. Lube Oil Transfer and Storage System (Sheet 3 of 3).

1-24. Compressed Air Piping System.
The compressed air piping system consists of three subsystems: air starting subsystem, service air subsystem, and control air subsystem. System control is maintained through a combination of valves as shown in Figure 1-69.

a. *Air Starting Subsystem*. The air starting subsystem consists of two compressors that deliver compressed air through moisture separators to two 400 gallon air starting receivers at 250 psi pressure. Air from the air starting receivers is provided to both main engines, SSDG No. 2 (port), bow thruster engine, and pump drive engine. Power for the air compressors is supplied from the main switchboard through auxiliary machine space AMS No. 1 power panel #4.

b. *Ship Service Air Subsystem*. Compressed air for the service air subsystem is supplied from the air starting subsystem via the pressure reducing valve. The pressure reducing valve receives the starting air at 250 psi and reduces the pressure to 125 psi which is supplied to the ship service air receiver. Service air pressure at 125 psi is supplied to the sea chest blowout connections, air tool connections in the AMS 1 and 2, oil bilge pump, and supply points above deck.

c. *Automatic Drains*. Each air stating receiver and the service air receiver is equipped with an automatic drain to prevent accumulation of moisture.

d. *Control Air Subsystem*. Compressed air for the control air subsystem is supplied from he air starting subsystem through an automatic air dryer. For additional discussion of the control air subsystem refer to paragraph 1-12, b., subparagraph (1).

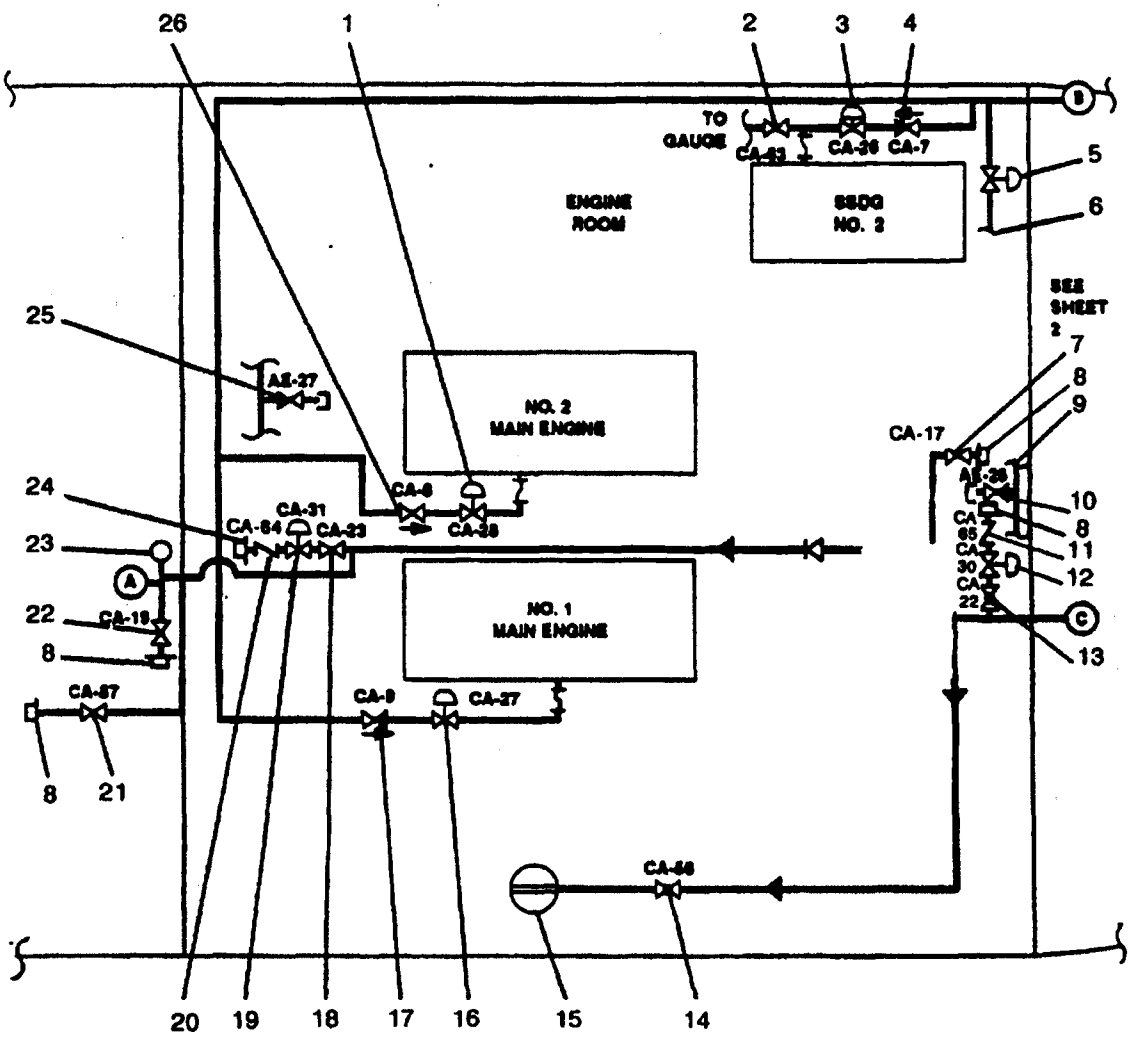


Figure 1-69. Compressed Air System (Sheet 1 of 8).

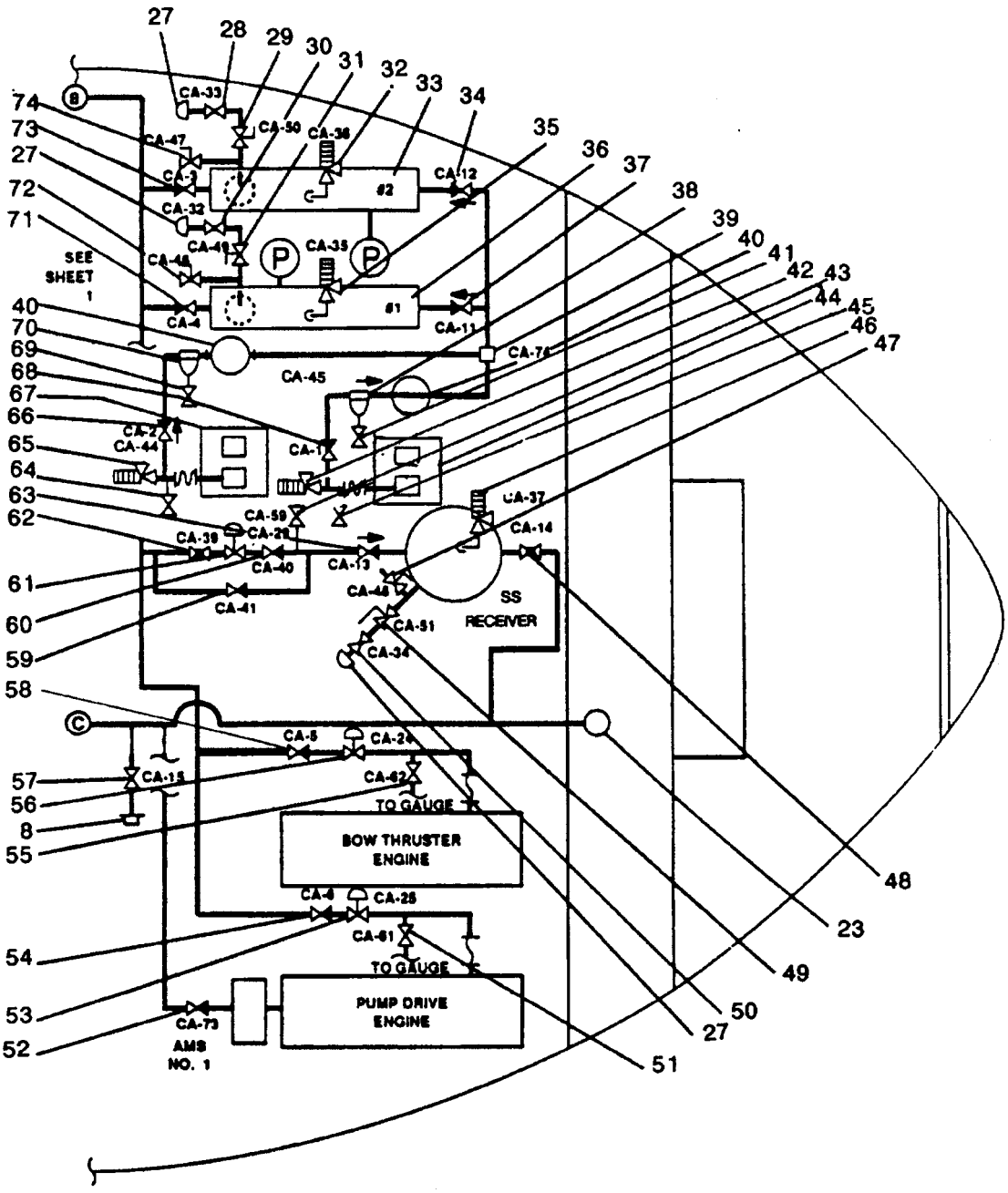


Figure 1-69. Compressed Air System (Sheet 2 of 8).

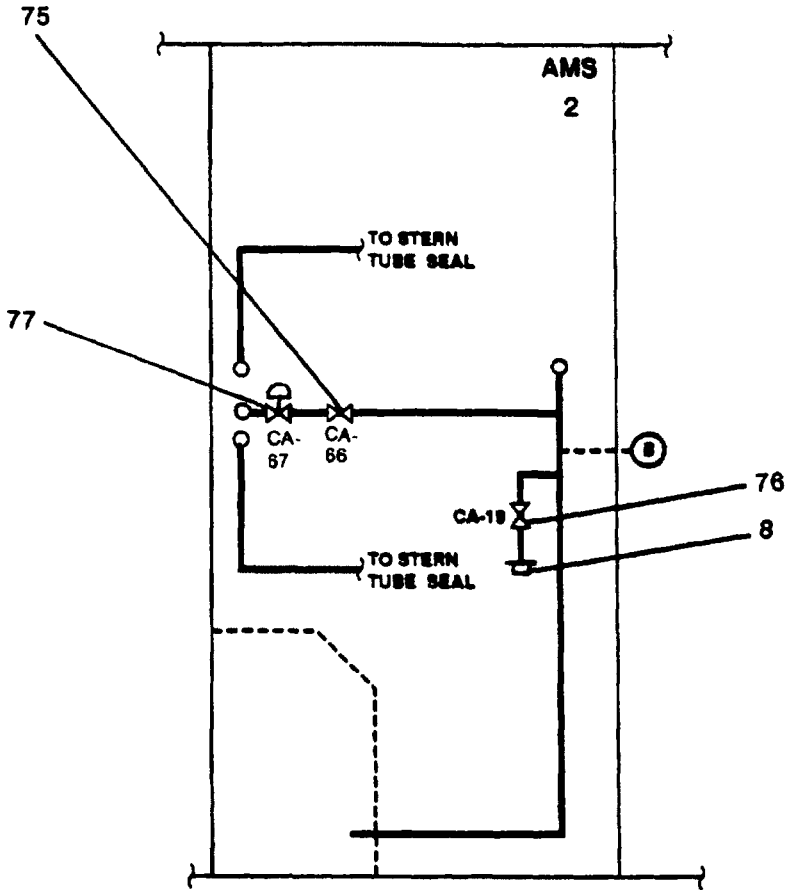


Figure 1-69. Compressed Air System (Sheet 3 of 8).

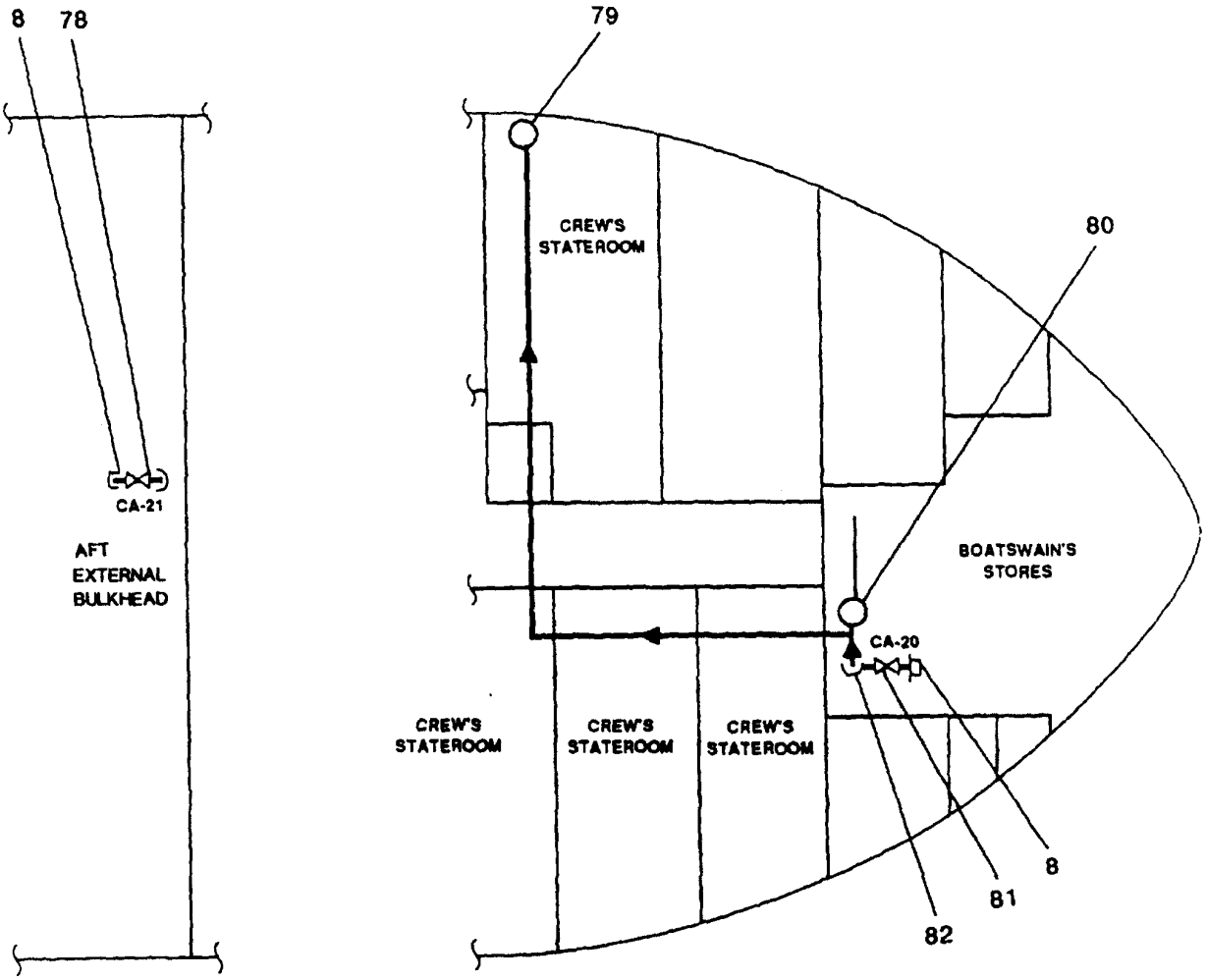
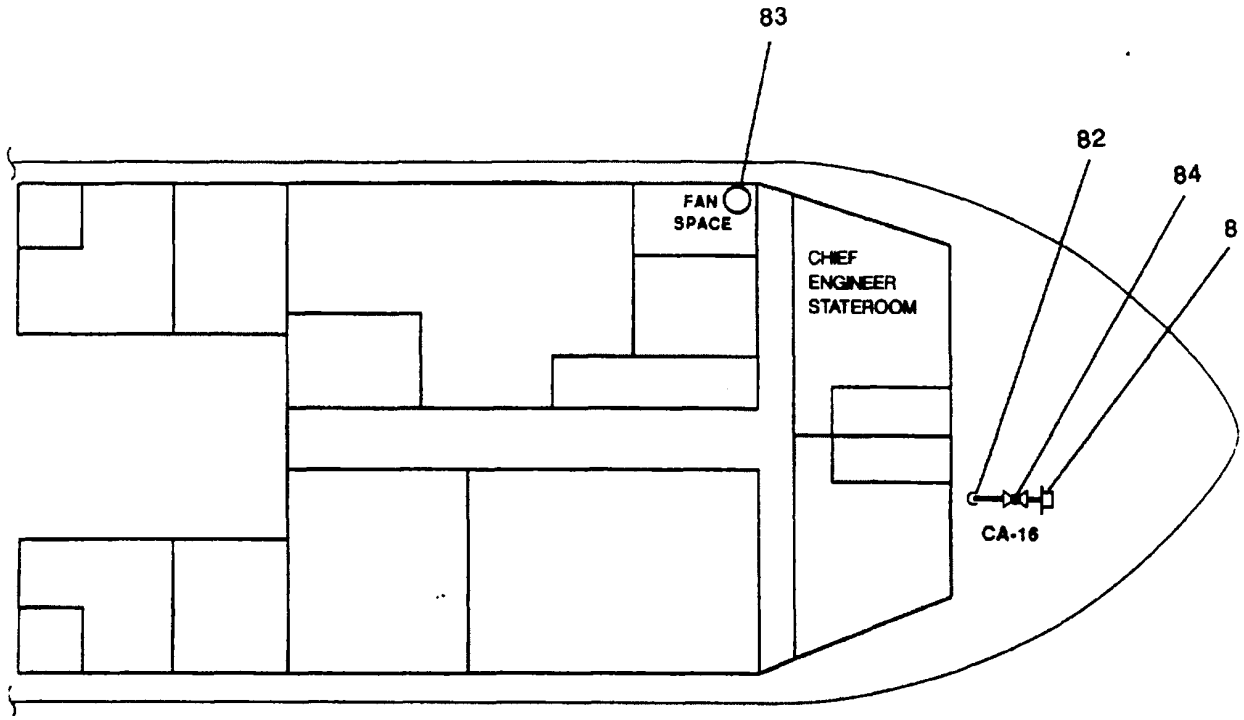
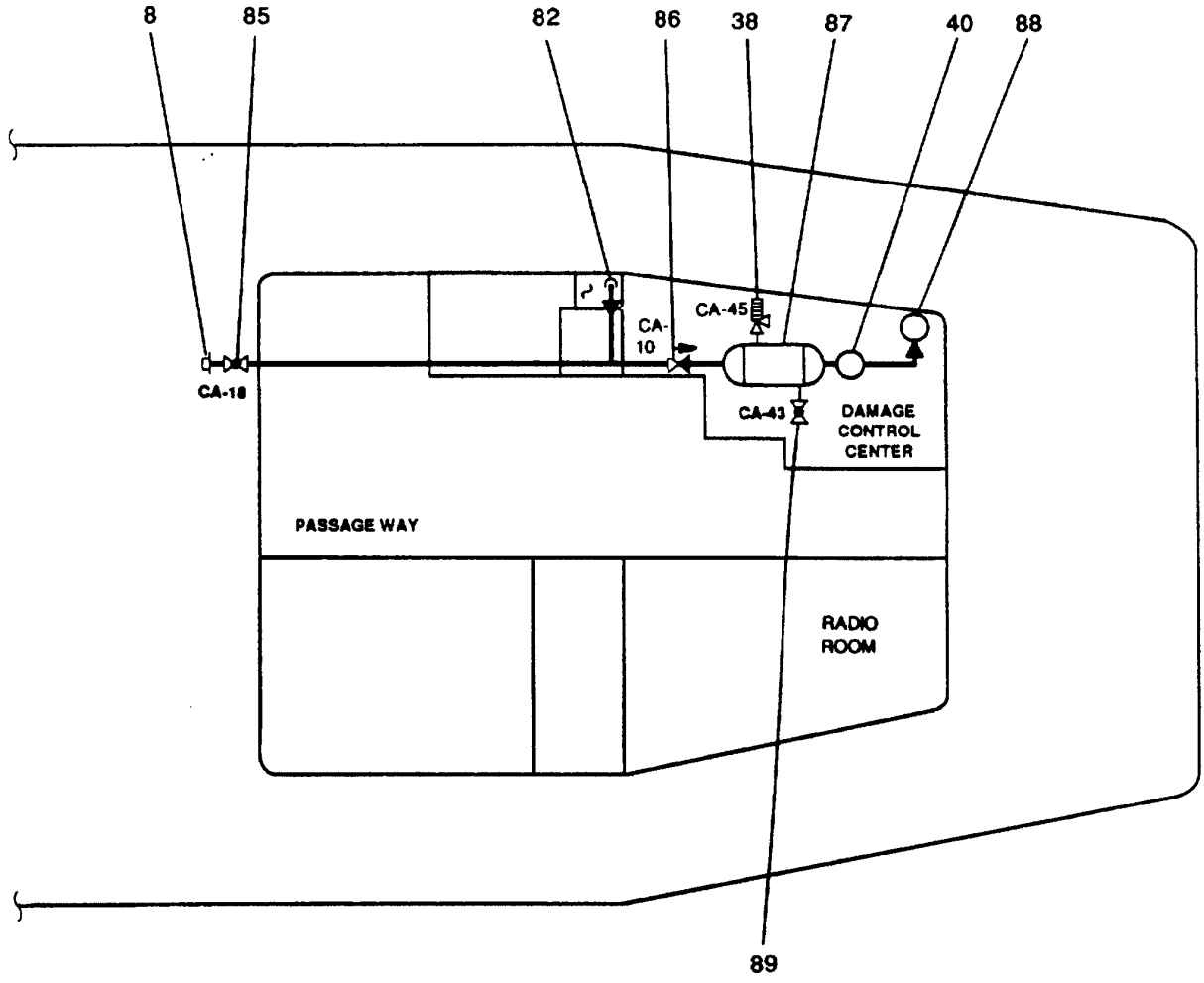


Figure 1-69. Compressed Air System (Sheet 4 of 8).



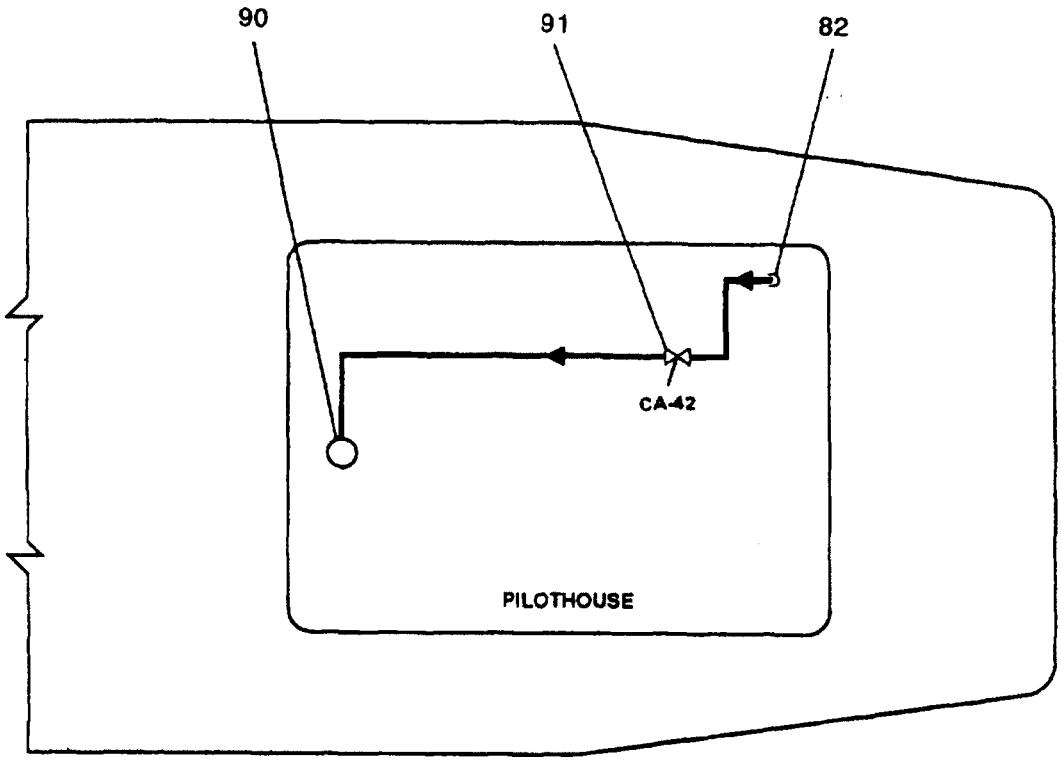
01 LEVEL

Figure 1-69. Compressed Air System (Sheet 5 of 8).



02 LEVEL

Figure 1-69. Compressed Air System (Sheet 6 of 8).



03 LEVEL

Figure 1-69. Compressed Air System (Sheet 7 of 8).

1. CA-28, PRV - SET AT 200 PSI
2. CA-63
3. CA-26, PRV - SET AT 125 PSI
4. CA-7, STG AIR TO DSL GEN
5. REDUCER
6. TO CONTROL AIR SYSTEM
7. CA-17, AIR TOOL CONN.
8. AIR TOOL CONNECTION
9. TO SEA CHEST
10. AE-26, SEA CHEST BLWDN
11. CA-65
12. CA-30, PRV - SET AT 25 PSI
13. CA-22, SEACHEST BLWT
14. CA-56, COV - OILY BILGE PMP SUCT
15. OILY BILGE PUMP
16. CA-27, PRV - SET AT 200 PSI
17. CA-9, STG AIR TO ME
18. CA-23, SEA CHEST BLWT
19. CA-31, PRV - SET AT 25 PSI
20. CA-64
21. CA-57, AIR TOOL CONN.
22. CA-19, AIR TOOL CONN.
23. UP TO MAIN DECK
24. SEA CHEST BLOW-OUT CONNECTION
25. AE-27, SEA CHEST BLWDN
26. CA-8, STG AIR TO ME
27. AUTOMATIC DRAIN
28. CA-33, AUTO DR - STG AIR TK
29. C-50, AUTO DR
30. CA-32, AUTO DR - STG AIR TK
31. CA-49, AUTO DR
32. CA-36, RLF - SET AT 275 PSI
33. AIR STARTING RECEIVER NO. 2
34. CA-12, STG AIR TK INL
35. CA-35, RLF - SET AT 275 PSI
36. AIR STARTING RECEIVER NO. 1
37. CA-11, STG AIR TK INL
38. CA-45, RELIEF VALVE
39. DRAIN
40. MOISTURE SEPARATOR
41. DRAIN
42. TO BE IDENTIFIED
43. CA-59
44. TO BE IDENTIFIED
45. AIR COMPRESSOR #1
46. CA-37, RLF - SET AT 137.5 PSI
47. CA-48, SVCE AIR TK DR
48. CA-14, SVCE AIR TK OUT
49. CA-51, AUTO DR
50. CA-341 AUTO DR - SVCE AIR TK
51. CA-61
52. CA-73
53. CA-25, PRV - SET AT 125 PSI
54. CA-6, STG AIR TO PMP DR ENG.
55. CA-62
56. CA-24, PRV - SET AT 125 PSI
57. CA-15, AIR TOOL CONN.
58. CA-5, STG AIR TO BOW THRUSTER ENG.
59. CA-4, BYP RDC STA
60. CA-40, SVCE AIR TK INL
61. CA-29, PRV - SET AT 125 PSI
62. CA-39, SVCE AIR TK IN L
63. CA-13, SVCE AIR TK INL
64. DRAIN
65. CA-44, RELIEF VALVE
66. CA-2, COV -COMPR DISCH.
67. AIR COMPRESSOR #2
68. CA-1, COV - COMPR DISCH.
69. DRAIN
70. RELIEF VALVE
71. CA-4, STG AIR TK OUT
72. CA-46, STG AIR TK DR
73. CA-3, STG AIR TK OUT
74. CA-47, STG AIR TK DR
75. CA-66, SVCE AIR TO STERN TUBE
76. CA-19, AIR TOOL CNN.
77. CA-67, SVCE AIR REGULATOR VALVE TO STERN TUBE
78. CA-21, WEA TOOL CONN.
79. UP TO 01 LEVEL
80. U TO 01 LEVEL
81. CA-20, AIR TOOL CONN.
82. FROM BELOW
83. UP T 02 LEVEL
84. CA-16, AIR TOOL CONN.
85. CA-18, AIR TOOL CONN.
86. CA-10 WSTL AIR RCVR
87. WHISTLE AIR RECEIVER
88. UP TO 03 LEVEL
89. CA-43, WSTL AIR RCVR DR
90. UP TO WHISTLE
91. CA-42, SVCE AIR TO WSTL

Figure 1-69. Compressed Air System (Sheet 8 of 8).

1-25. Potable Water System. The potable water piping system provides cold and hot potable water throughout the LT. System control is maintained through a combination of valves as shown in Figure 1-70. The system consists of two reverse osmosis watermakers, a proportioning bromine feeder, two potable water pumps, a hydropneumatic tank with pressure switches, two potable water heaters, and a hot potable water recirculating pump. The potable water tanks are filled and replenished from the reverse osmosis watermakers or the fill connections on the main deck. Each potable ater tank has a drain to the bilge. In addition to the potable water system, cold fresh water (CFW) is supplied to a hose connection used to replenish the fluid in the cooling piping systems.

a. Potable Water Pumps No. 1 and No. 2. Two horizontal centrifugal potable water pumps draw CFW from the port or starboard potable water tanks and route the CFW under pressure to the hydropneumatic tank, which maintains CFW pressure throughout the system. Each pump is rated for 15 gpm at 60 psi. Each pump is driven by a 3 hp electric motor and power supplied from the main switchboard through auxiliary machinery space No. 2 power panel No. 5 and controlled by a pressure switch. One pump (main) is on line.

b. Pressure Switch. The potable water pump pressure switch automatically turns on the pump in use when pressure drops to 40 psi in the hydropneumatic tank. Pressure switch for each pump deenergizes the pump in use when pressure reaches 60 psi.

c. Proportioning Bromine Feeder. The proportioning Bromine feeder treats distilled water by adding a predetermined quantity of bromine to disinfect the water (ensure that the water supplied to the portable water tanks is bacteriologically safe for human consumption) as the water is being discharged from the reverse osmosis watermakers to the potable water storage tanks. The quantity of bromine added depends on the seawater intake to the reverse osmosis watermakers. If the seawater is considered non-contaminated, a low feed rate is used. If the seawater is considered contaminated, a high feed rate is used. The feed rate is manually selected. The bromine feeder also injects bromine as water recirculates to and from the portable water tanks.

d. Hydropneumatic Tank. The hydropneumatic tank maintains CFW supply pressure for the system. Pressurized CFW is supplied from the tank to various points throughout the ship and to the potable water heaters. Initial charging of the hydropneumatic tank (60 psi) is accomplished by connecting a hose to the compressed air system. Once charged, the pressure switch (para. b above) controls pump operation to main pressure.

e. Potable Water Heaters. Two potable water heaters heat the CFW supply and maintain its setpoint temperature. Power for the hot water heat is supplied from the main switchboard.

f. Hot Potable Water Recirculating Pump. A horizontal centrifugal pump operates continuously to recirculate hot water throughout the potable water system. The pump is rated for 10 gpm at 20 psi and is driven by a 2 hp motor. Power (450 Vac) is supplied from the main switchboard through the auxiliary machinery space No. 1 power panel No. 4.

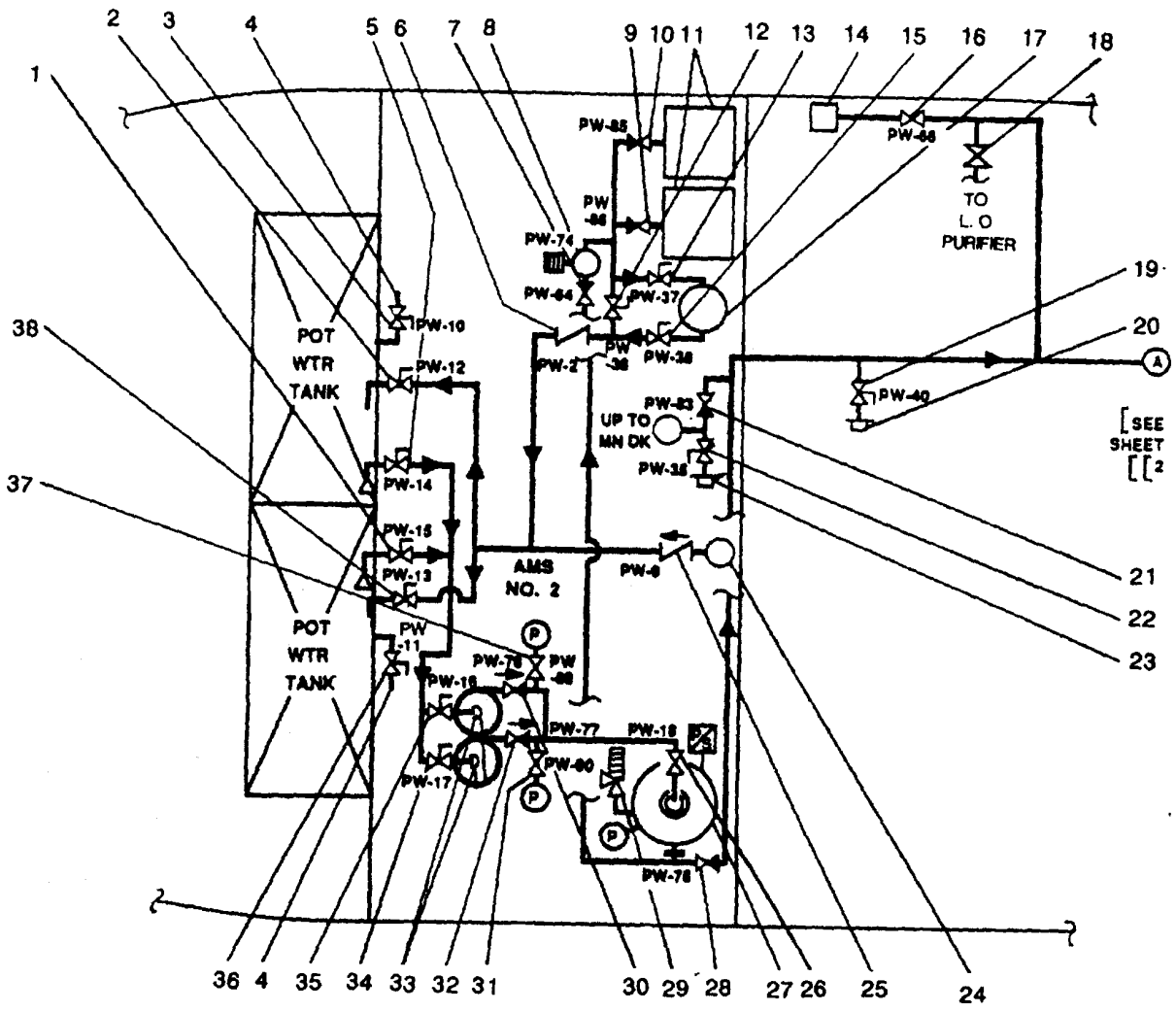
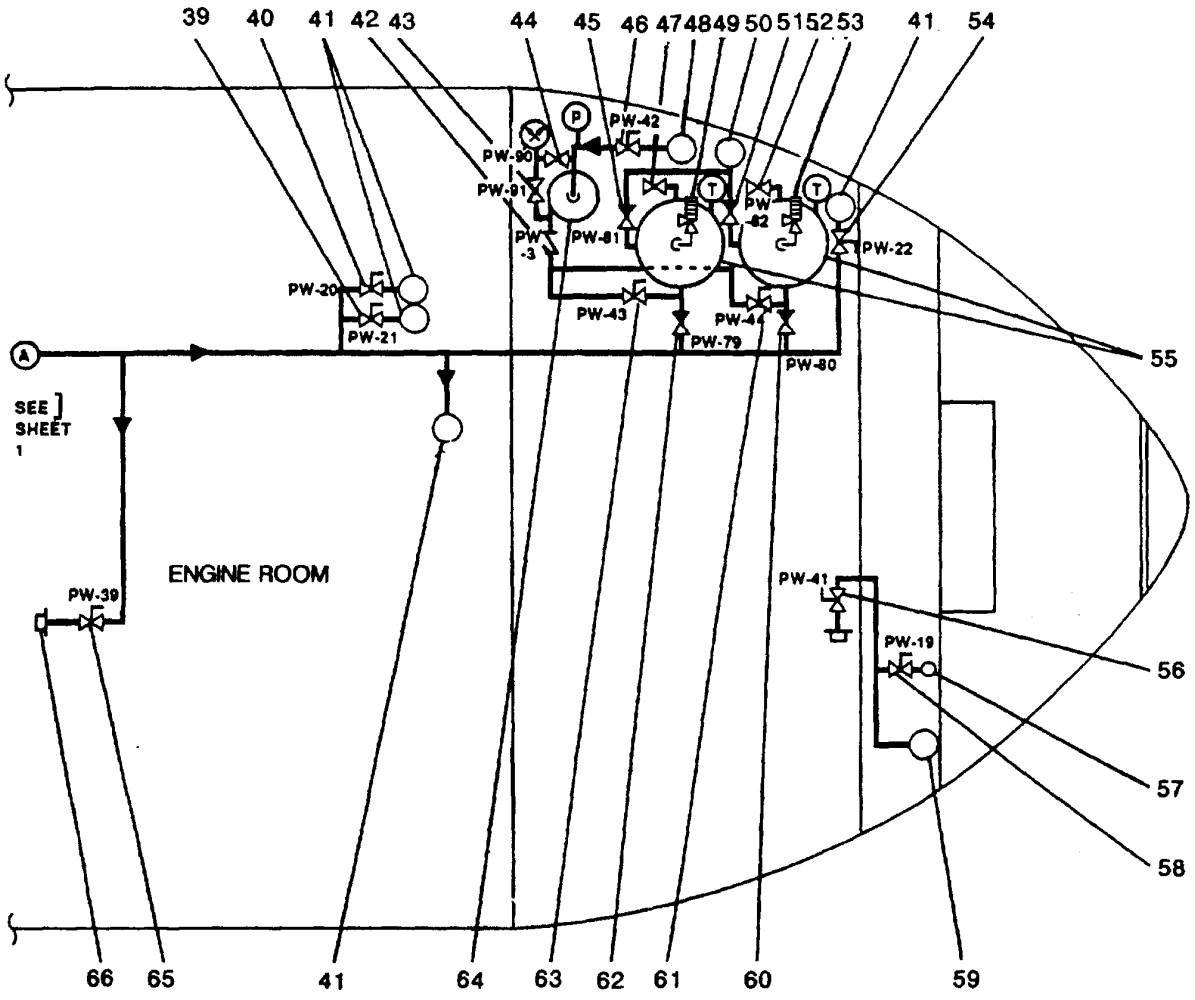


Figure 1- 70. Potable Water System (Sheet 1 of 9).



AMS 1

Figure 1-70. Potable Water System (Sheet 2 of 9).

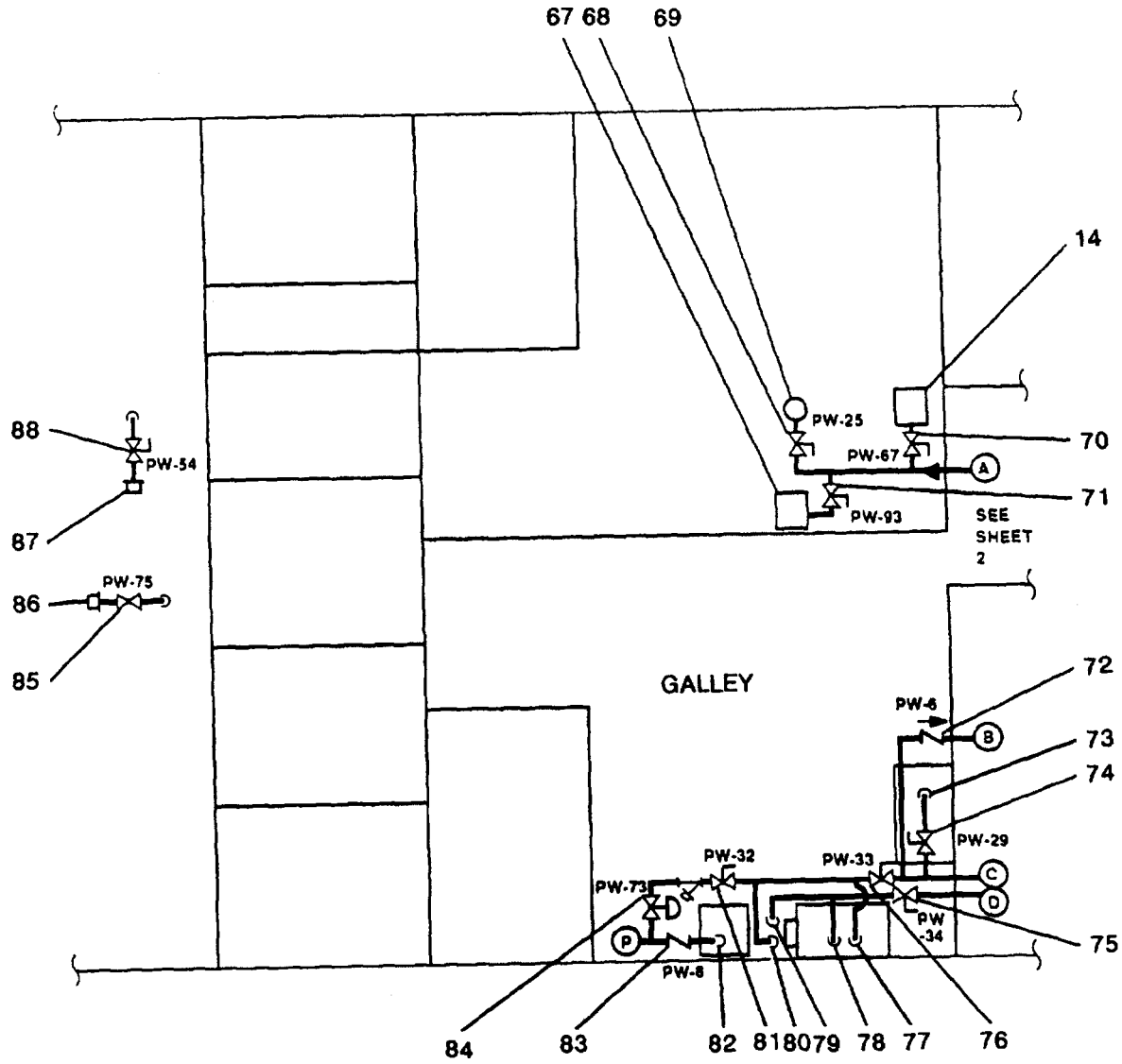
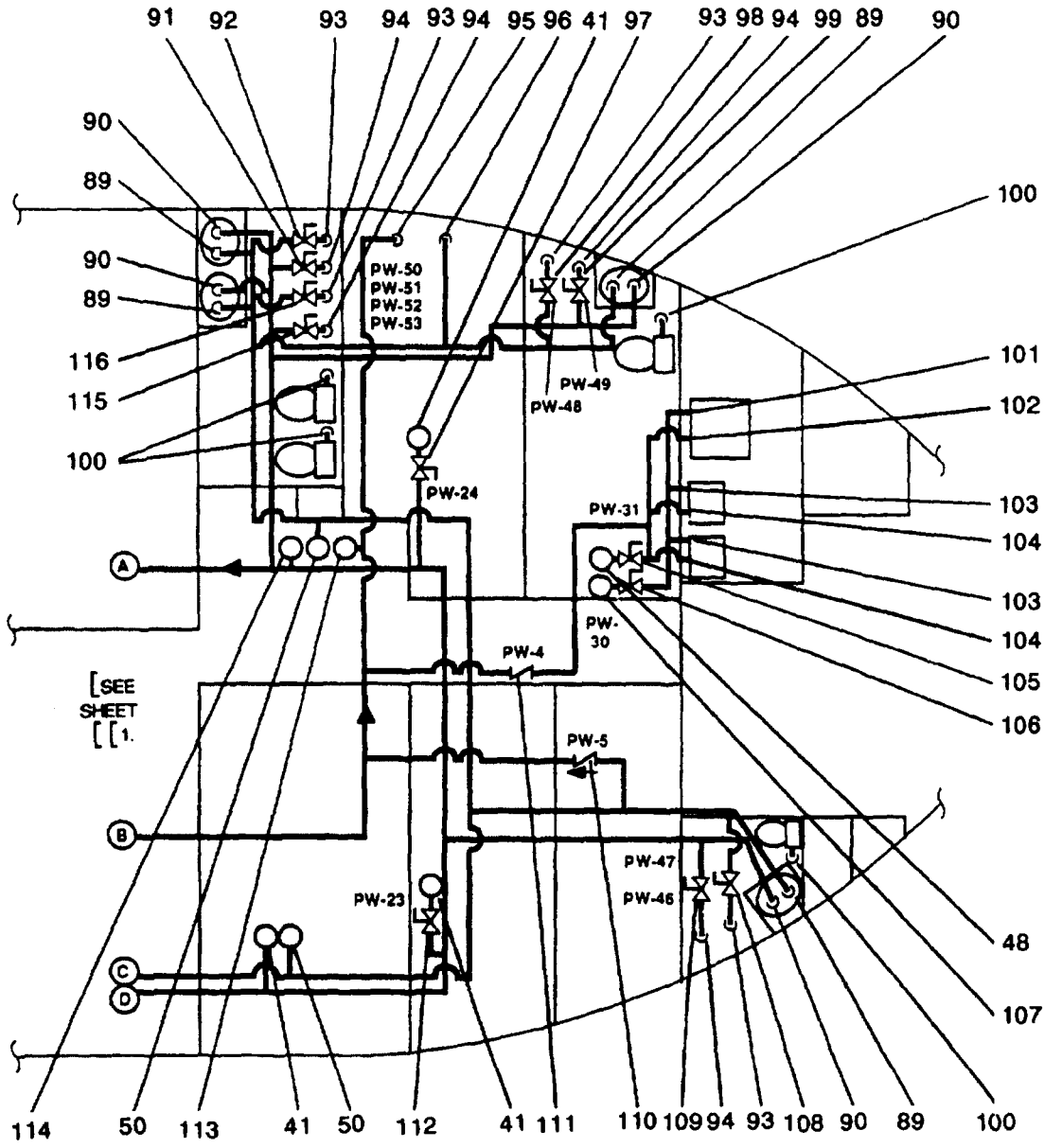
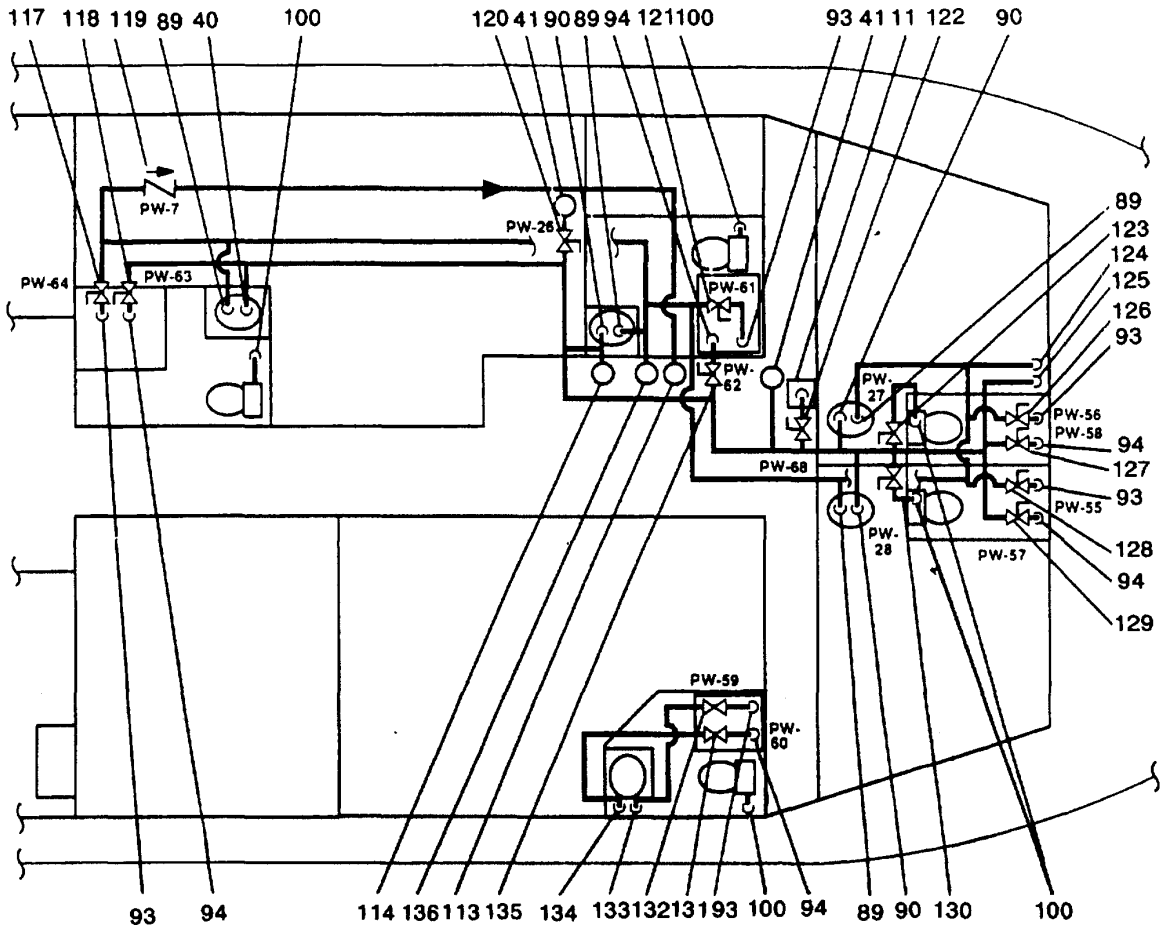


Figure 1-70. Potable Water System (Sheet 3 of 9).



MAIN DECK

Figure 1-70. Potable Water System (Sheet 4 of 9).



01 LEVEL

Figure 1-70. Potable Water System (Sheet 5 of 9).

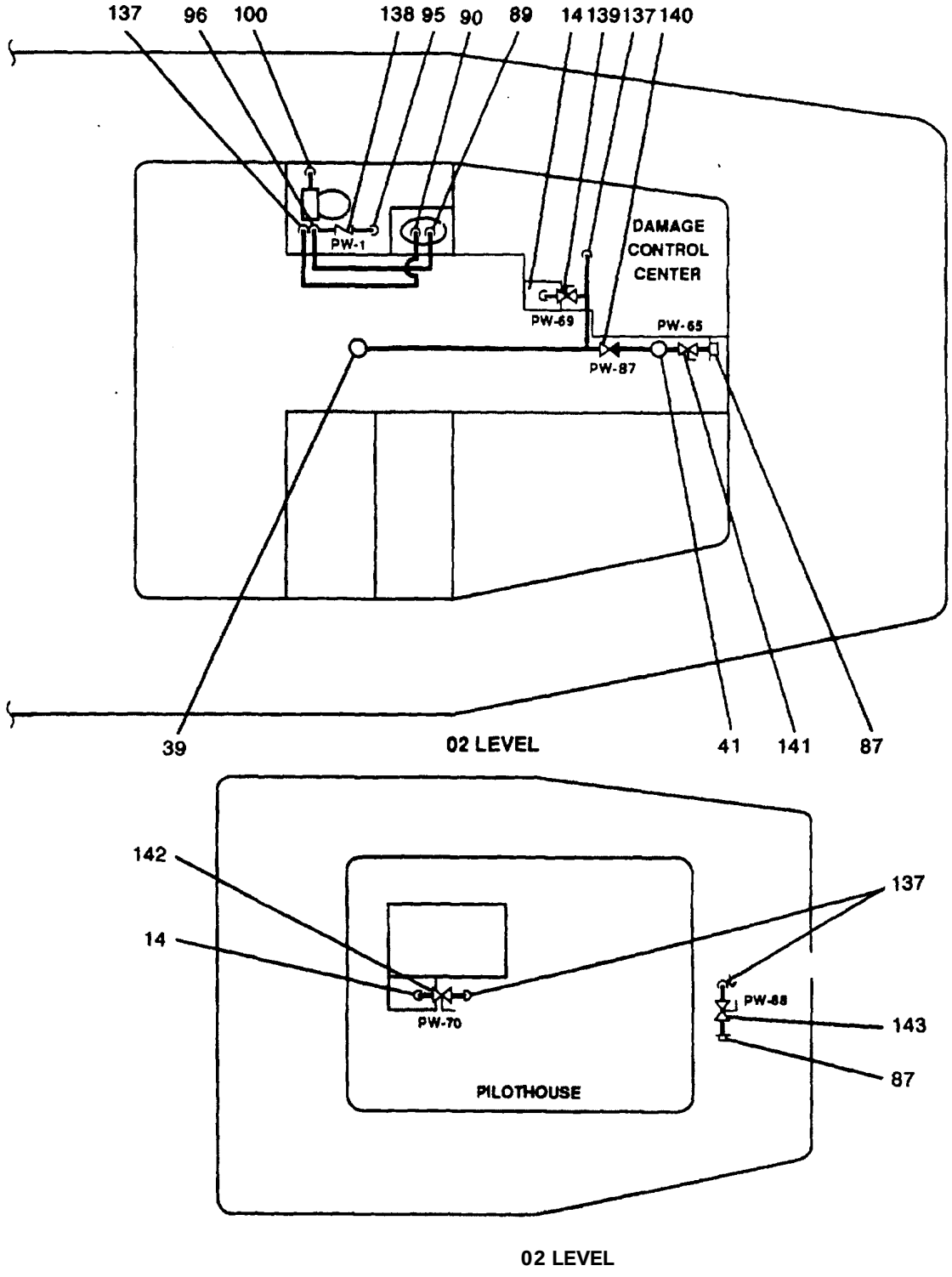


Figure 1-70. Potable Water System (Sheet 6 of 9).

1. PW-15, POT. WTR. TK. STBD SUCT.
2. PW-12, POT. WTR. TK. PORT FILL
3. PW-10, POT. WTR. TK. PORT DR.
4. DRAIN CONNECTION
5. PW-14, POT. WTR. TK. PORT SUCT.
6. PW-2
7. PW-84, POT. WTR. TO BROMINATOR
8. PW-74, FLOW CONT. - SET AT 1 G.P.M.
9. PW-86, C.O.V. - R.O. NO. 1 POT. WTR. DISCH.
10. PW-85, C.O.V. - R.O. NO. 2 POT. WTR. DISCH.
11. REVERSE OSMOSIS UNITS
12. PW-36, BYPASS - BROMINATOR
13. PW-37, BROMINATOR INLET
14. DRINKING FOUNTAIN
15. PW-38, BROMINATOR OUTLET
16. PW-66
17. BROMINATOR
18. PW-XX, TO BE IDENTIFIED
19. PW-40, ENG. FILL CONN. PORT
20. HOSE CONNECTION FOR PORT ENGINE & SSDG FILL
21. PW-83, POT. WTR. TO MN. DK. WSH. DN.
22. PW-35, M.E. KEEL CLR WTR FILL CONN.
23. MAIN ENGINE COOLING WTER FILL CONNECTION
24. DECK FILL FROM MAIN DECK
25. PW-9
26. PW-18, HYDRO. PNEU TK INLET
27. HYDRO PNEUMATIC TANK
28. PW-78, C.O.V. - HYDR. PNEU TK. OUTLET
29. TO BE IDENTIFIED
30. PW-76, C.O.V. - POT. WTR. PMP. NO. 1 DISCH.
31. PW-90
32. PW-77, C.O.V. - POT. WTR. PMP. NO. 2
33. POTABLE WATER PUMPS
34. PW-17, C.O.V. -POT. WTR. PMP. NO. 2 SUCT
35. PW-16, C.O.V. -POT. WTR. PMP. NO. 1 SUCT
36. PW-11, POT. WTR. TK. STBD. DR
37. PW-89
38. PW-13, POT. WTR TK. STBD. FILL
39. PW-21, C.W. TO W.C.
40. PW-20, C.W. TO W.C.
41. COLDUP
42. PW-3
43. PW-91
44. PW-90
45. PW-81, H.W. HTR. OUT
46. PW-42, H.W. RECIR. PMP. SUCT.
47. TO BE IDENTIFIED
48. HOT DOWN FROM ABOVE
49. TO BE IDENTIFIED
50. HOT WATER UP
51. PW-82, H.W. HTR. OUT
52. DRAIN CONNECTION
53. TO BE IDENTIFIED
54. PW-22, C.W. TO W.C.
55. HOT WATER HEATERS
56. PW-41, BOW THRUSTER PUMP DRIVE FILL CONN.
57. TO BE IDENTIFIED
58. PW-19, C.W. TO W.C.
59. COLD FROM ABOVE

Figure 1-70. Potable Water System (Sheet 7 of 9).

60. PW-80, POT. WTR. TO H.W. HTR.
61. PW-44, RECIRC TO H.W. HATER
62. PW-79, POT. WTR. TO H.W. HTR.
63. PW-43, RECIRC TO H.W. HEATER
64. HOT WATER RECIRCULATING PUMP
65. PW-39, ENG. FILL CONN. STBD
66. MAIN ENGINE NO. 1 AND SSDG NO. 1 HOSE FILL CONNECTION
67. ICEMAKER
68. PW-25, C.W. TO W.C.
69. UP TO 01 LEVEL
70. PW-67
71. PW-93, C.W. TO ICE MAKER
72. PW-6
73. TO VENTILATOR HOOD
74. PW-29
75. PW-34
76. PW-33
77. HOT TO SINK
78. COLD TO SINK
79. COLD TO PRERINSE SPRAY
80. HOT TO PRE-RINSE SPRAY
81. PW-32
82. HOT TO DISHWASHER
83. PW-8
84. PW-73, PRESS. RDC VLV. SET AT 20 P.S.I.
85. PW-75, POT. WTR. DK. FILL
86. DECK FILL CONNECTION
87. HOSE CONNECTION
88. PW-54, DK. WASH DN.
89. HOT TO LAVATORY
90. COLD TO LAVATORY
91. PW-51
92. PW-50
93. HOT TO SHOWER
94. COLD TO SHOWER
95. RECIRCULATION DOWN
96. HOT FROM BELOW
97. PW-24, C. W. TO W.C.
98. PW-48
99. PW-49
100. FROM BELOW TO WATER CLOSET
101. COLD TO WASHER
102. HOT TO WASHER
103. COLD TO LAUNDRY TUB
104. HOT TO LAUNDRY TUB
105. PW-31
106. PW-30
107. COLD FROM ABOVE
108. PW-47
109. PW-46
110. PW-5

Figure 1-70. Potable Water System (Sheet 8 of 9).

111. PW-4
112. PW-23, C.W. TO W.C.
113. RECIRCULATION FROM ABOVE
114. COLD WATER FROM BELOW AND UP
115. PW-53
116. PW-52
117. PW-64
118. PW-63
119. PW-7
120. PW-26, C.W. TO W.C.
121. PW-61
122. PW-68
123. PW-27
124. HOT DOWN
125. COLD DOWN
126. PW-56
127. PW-58
128. PW-55
129. PW-57
130. PW-28
131. PW-60
132. P W-59
133. HOT FROM BELOW TO SANITARY SPACE
134. COLD FROM BELOW T SANITARY SPACE
135. PW-62
136. HOT FROM BELOW AND UP
137. COLD FROM BELOW
138. PW-1
139. PW-69
140. PW-87, C.W. TO HOSE CONN.
141. PW-65, C.O.V. -HOSE CONN.
142. PW-70
143. PW-88, DK. WSH. DN.

Figure 1-70. Potable Water System (Sheet 9 of 9).

1-26. Sewage Collection, Holding, and Transfer (CHT) System. The sewage CHT system consists of a marine sanitation device (MSD), sewage holding tank, two sewage discharge pumps, and related piping. Piping system control is maintained through a combination of valves as shown in Figure 1-71.

a. Sewage Discharge Pumps. Two horizontal centrifugal non-clog pumps rated for 30 gpm at 40 psi are provided. Each pump is driven by a 5 hp electric motor. Power is supplied from the main switchboard through engine room power panel No. 1.

b. Marine Sanitation Device (MSD). The MSD consists of two tanks, a media tank and a contact tank. Raw sewage enters the media tank (5, Figure 1-72) through the sewage inlet (1) where natural bacteria (the media 11) treatment takes place.

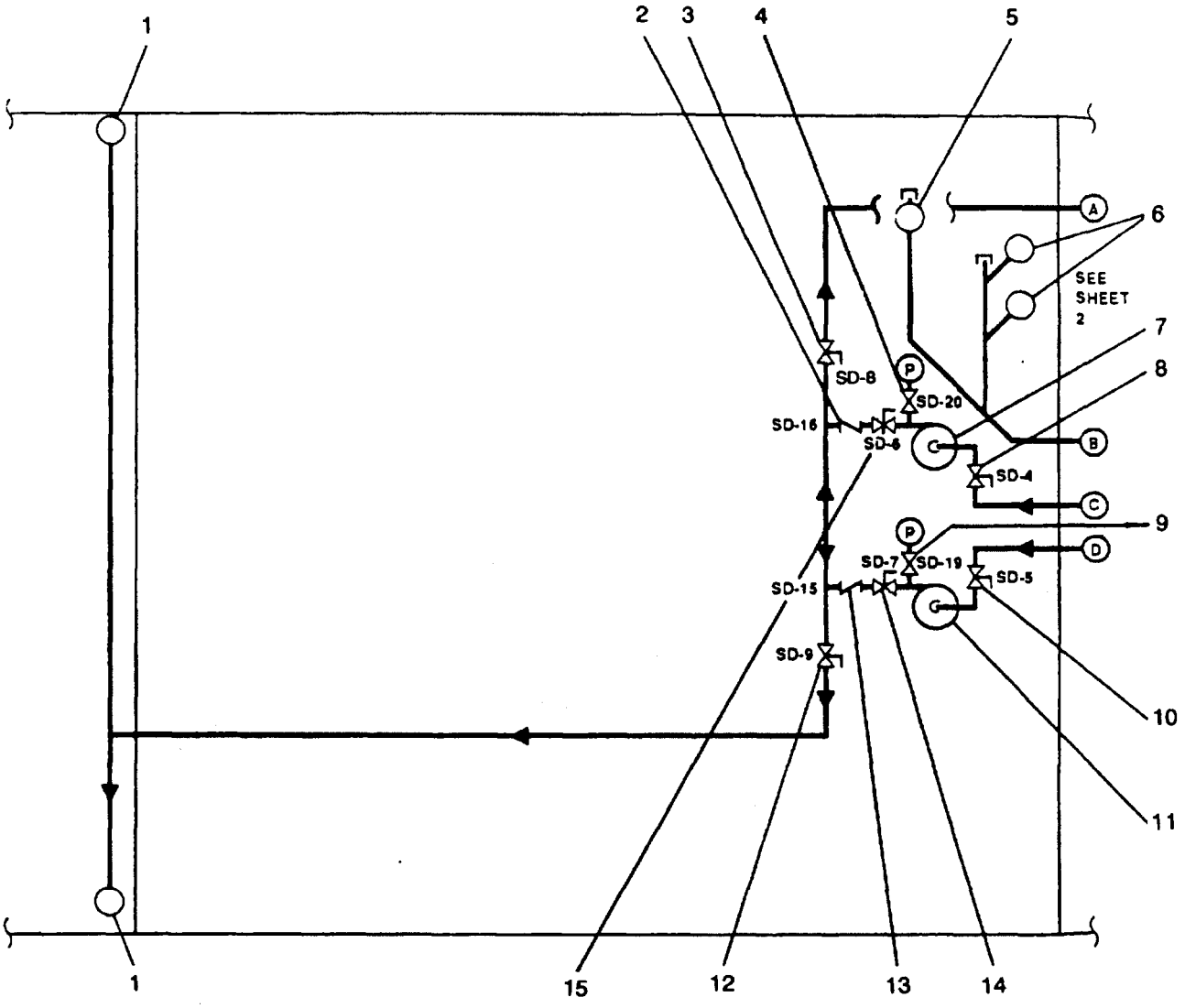
The water level in the media tank (5) is constant. As sewage enters, an equal volume of clear effluent discharges through the spillover (15) and passes through the trap (10) and the tablet chlorinator (6) into the wet well (8). The wet well (8) provides the detention time necessary for the clear effluent to be disinfected. When the treated and disinfected water reaches a preset level, the float switch (7) starts the MSD discharge pump (10) which pumps the treated water overboard. When the float switch (7) reaches the pump-off preset level, the MSD discharge pump (10) is stopped. Incorporated in the media tank (5) is an air lift (2) and air scour (12). The air lift (2) circulates and aerates the contents to improve treatment. The air scour (12) is a built-in cleaning system to prevent deposits from collecting on the bottom of the tank. Both the air lift (2) and air scour (12) use air from the blower (13). Power for the MSD is supplied from the main switchboard through auxiliary machinery space No. 1 power panel No. 4.

c. Modes of Operation. There are three modes of operation of the sewage system: shore connection, overboard discharge, and MSD processing.

(1) Shore connection. During the shore connection mode, waste water sewage is pumped from the sewage holding tanks by the sewage discharge pumps, through the shore connections to an appropriate receptacle on shore.

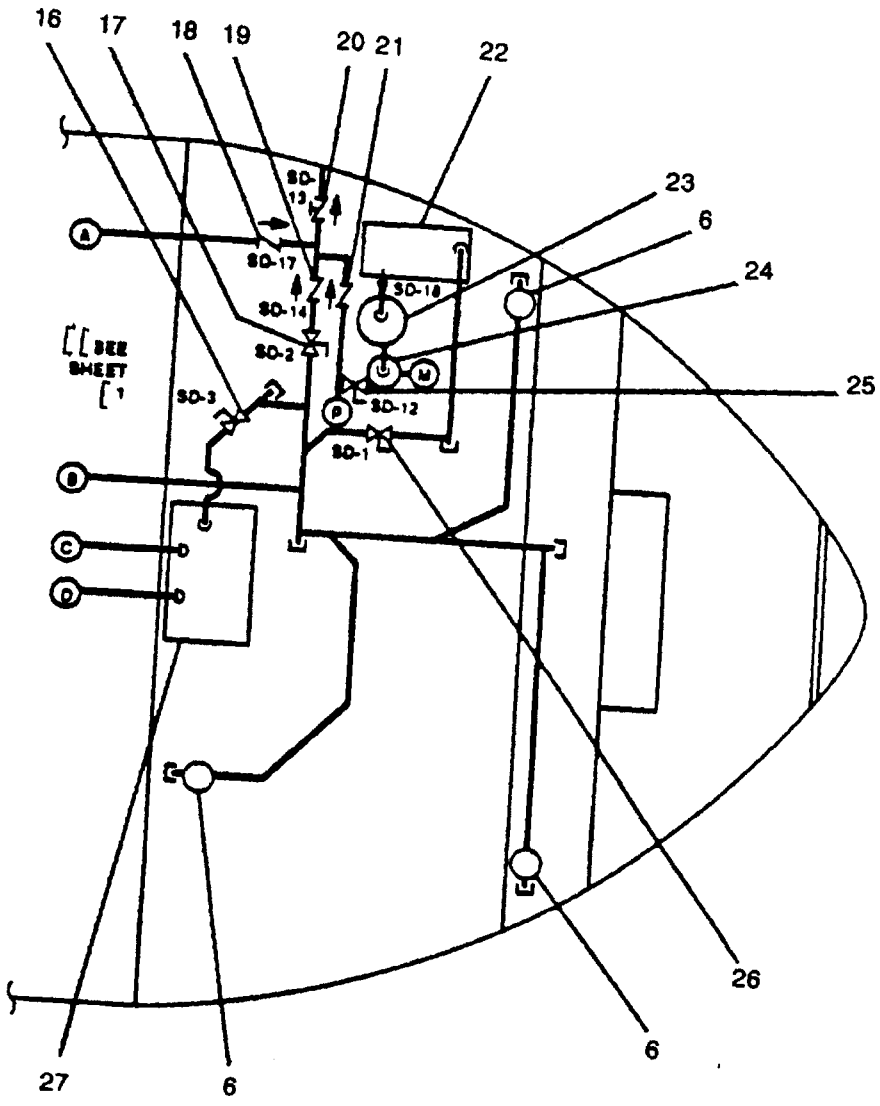
(2) Overboard discharge. The overboard discharge mode pumps waste water sewage from sewage holding tanks overboard. Valves alignment also allows sewage from the piping system to be discharged directly overboard without passing into the sewage holding tank.

(3) MSD processing. Raw sewage is processed by the MSD as described above.



ENGINE ROOM

Figure 1-71. Sewage Drain System (Sheet 1 of 5).



AMS 1

Figure 1-71. Sewage Drain System (Sheet 2 of 5).

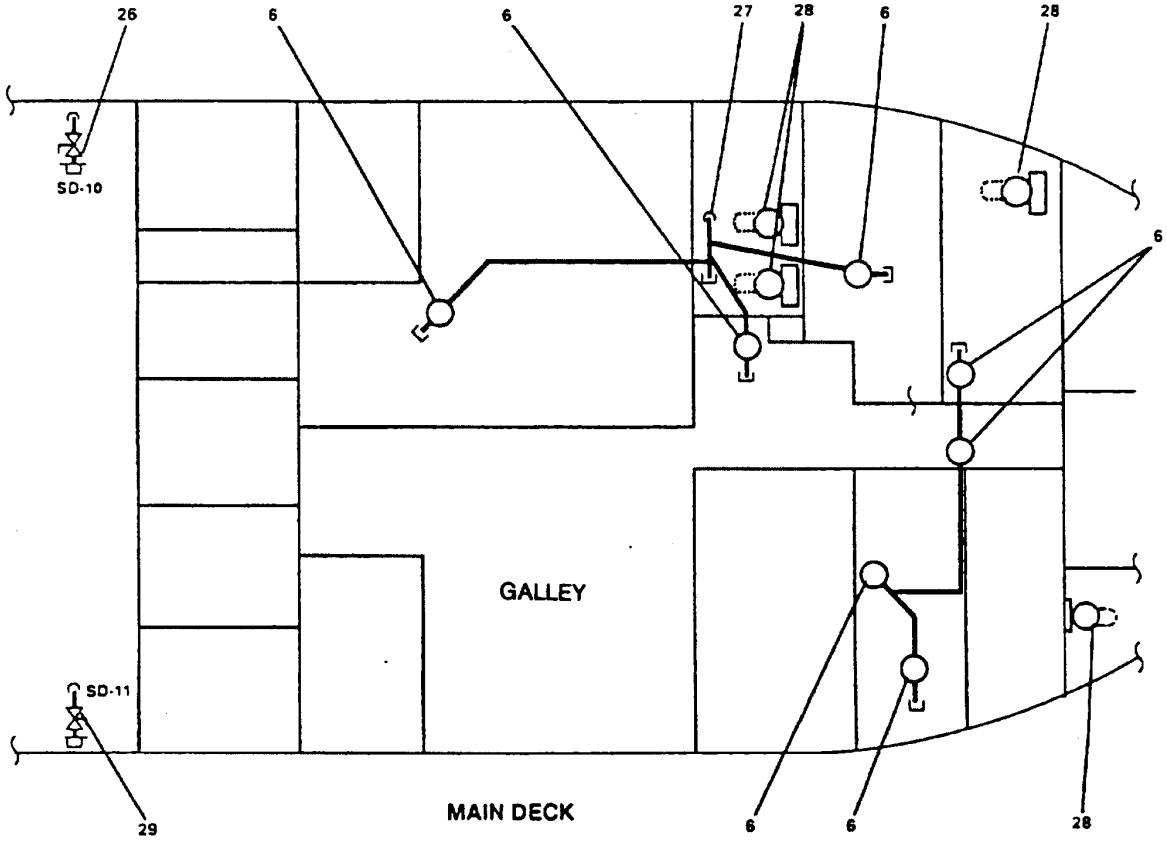
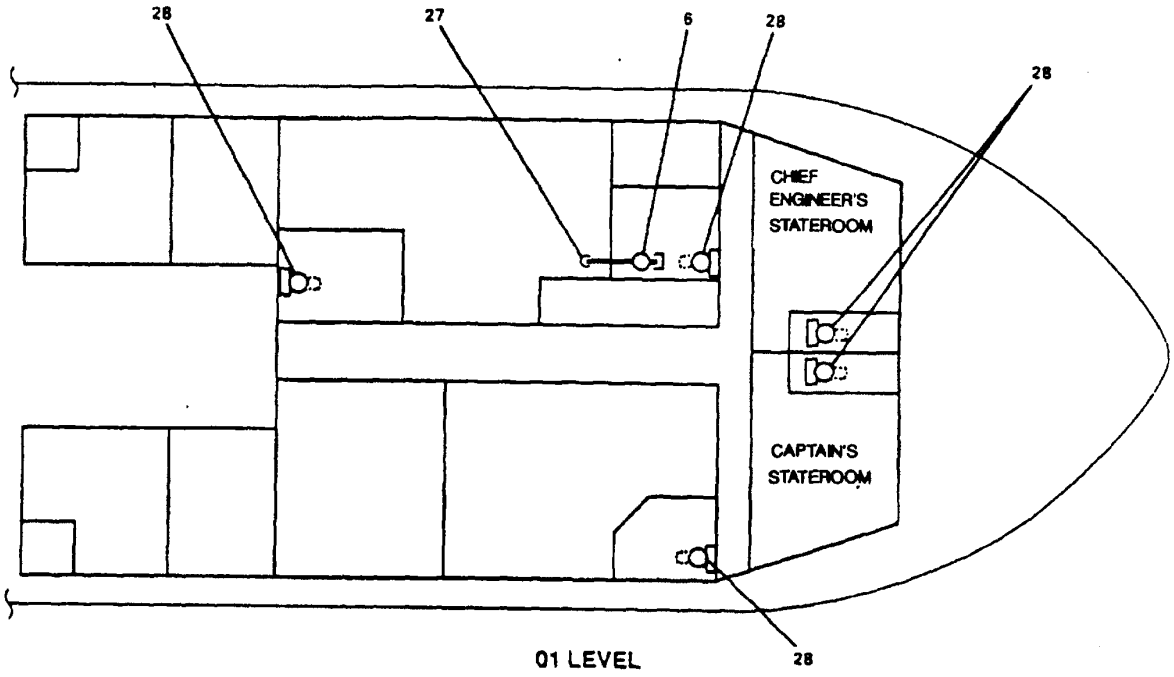


Figure 1-71. Sewage Drain System (Sheet 3 of 5).



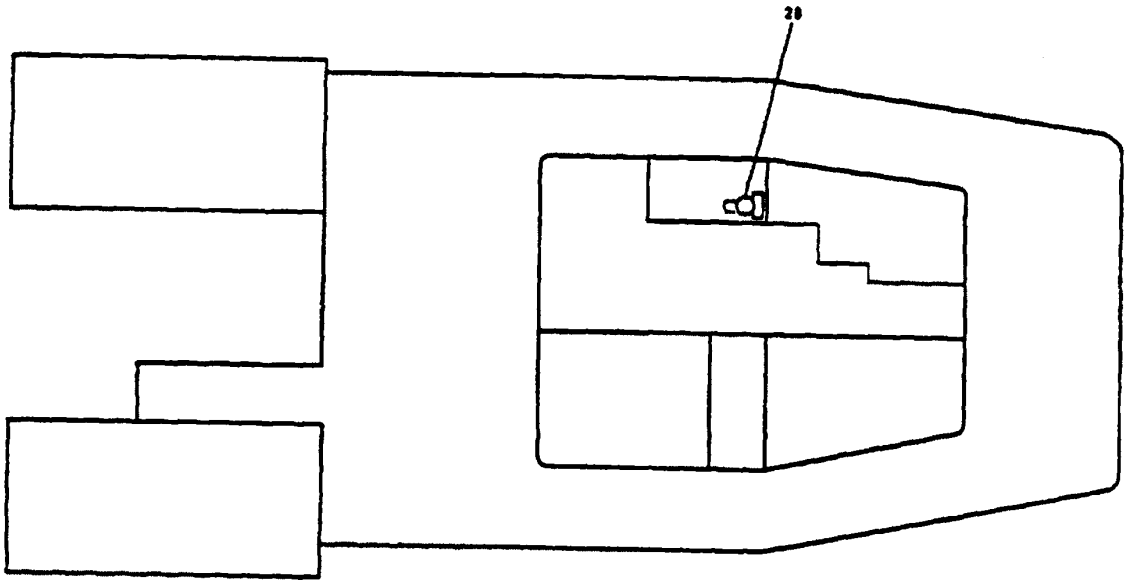


Figure 1-71. Sewage Drain System (Sheet 4 of 5).

1. UP TO SHORE CONNECTION
2. SD-16
3. SD-8, SEW. OVBD. DISCH.
4. SD-20
5. DRAIN FROM ABOVE
6. WATER CLOSET DRAIN FROM ABOVE
7. SEWAGE DISCHARGE PUMP NO. 2
8. SD-4, C.O.V. -SEW. DISCH. PMP. NO. 2 SUCT.
9. SD-19
10. SD-5, C.O.V. - SEW. DISCH. PMP. N. 1 SUCT.
11. SEWAGE DISCHARGE PUMP NO. 1
12. SD-7, C.O.V. - SEW. DISCH. PMP. NO. 1 DISCH.
13. SD-15
14. SD-9, SEW. TO SH. CONN.
15. SD-6, C.O.V. -SEW. DISCH. PMP. NO. 2 DISCH.
16. SD-3, SEW. DR. TO HOLD. TK.
17. SD-2, SEW. OVBD. DISCH.
18. SD-17
19. SD-14
20. SD-13, SEW. OVBD. DISCH.
21. SD-18
22. MSD MEDIA TANK
23. MSD CONTACT TANK
24. MSD SEWAGE DISCHARGE PUMP
25. SD-12, MSD OVBD. DISCH. PUMP DISCH.
26. SD-1, SEW. INLET TO MSD
27. SEWAGE HOLDING TANK
28. SD-10, SEW. SHORE CONN. PORT
29. DRAIN DOWN
30. WATER CLOSET DRAIN DOWN
31. SD-11, SEW. SHORE. CONN. STBD

Figure 1-71. Sewage Drain System (Sheet 5 of 5).

1. SEWAGE INLET
2. AIRLIFT
3. VENT
4. SPILLOVER
5. MEDIA TANK
6. TABLET CHLORINATOR
7. FLOAT SWITCH
8. WET WELL
9. MSD DISCHARGE PUMP
10. TRAP
11. MEDIA
12. AIR SCOUR
13. BLOWER

Figure 1-72. Marine Sanitation Device Operation.

1-27. Weather and Space Drains. The weather and space drains system is provided to prevent the accumulation of water on weather decks, in sanitary, in commissary, and in other spaces. System control is maintained through a combination of valves as shown in Figure 1-73. Output from the drains is either directed overboard or is routed to the sewage holding tank. The contents of the sewage holding tank are handled by the sewage CHT system as described in paragraph 1-26.

1-28. **Tank Vents, Sounding Tubes, and Overflows.** Tank vents (air escapes), sounding tubes, and overflows are provided for tanks as shown in Figure 1-74.

1-29. Heating, Ventilation, and Air Conditioning (HVAC) System. A general description of each subsystem is provided below. Following the general description, the HVAC system is described for each deck.

a. Heating. Heating is provided by electric heaters. Three types of heaters are used: duct heaters, convection heaters, and space heaters.

(1) Duct heaters. Duct heaters are flange mounted electric heaters installed in ducting. These heaters are referred to as preheaters, reheaters, or terminal reheaters, depending on their application.

(a) Preheater. Used to heat outside air before distribution.

(b) Reheaters. Heats recirculated air before distribution.

(c) Terminal reheaters. Ensures air supplied to a compartment is at the proper temperature.

(2) Convection heaters. These heaters are convection type electric space heaters. They are used in the laundry spaces and sanitary spaces.

(3) Space heaters. These heaters are forced air electric space heaters. They are used in machinery spaces, laundry spaces, and towing gear locker.

b. Ventilation. Ventilation is provided by natural supply and exhaust vents, fans, fan coil units, and a marine unit air conditioner.

(1) Natural supply and exhaust vents. Natural ventilation is provided to the towing gear locker, emergency generator room, and bow thruster compartment. Natural exhaust is provided in auxiliary machinery spaces.

(2) Fans. All fans (except the paint locker exhaust fan) are vaneaxial, direct drive, with electric motors that provide forced air ventilation. The paint locker exhaust fan is a direct drive centrifugal fan. The galley supply fan, galley ventilator hood exhaust fan, sanitary space exhaust fan, and workshop exhaust fan are single speed fans. All other work space fans are 2-speed fans.

(3) Fan coil units. Two horizontal fan coil units are provided. One unit serves the main deck spaces, the other serves the 01 level and above. Each unit contains a coil for cooling (air conditioning) and a single speed electric motor, belt driven centrifugal fan.

(4) Marine unit air conditioner. The unit air conditioner is a combination heater/air conditioner. Seawater provides the air conditioning source. An integral fan provides forced air. This unit is installed in the EOS.

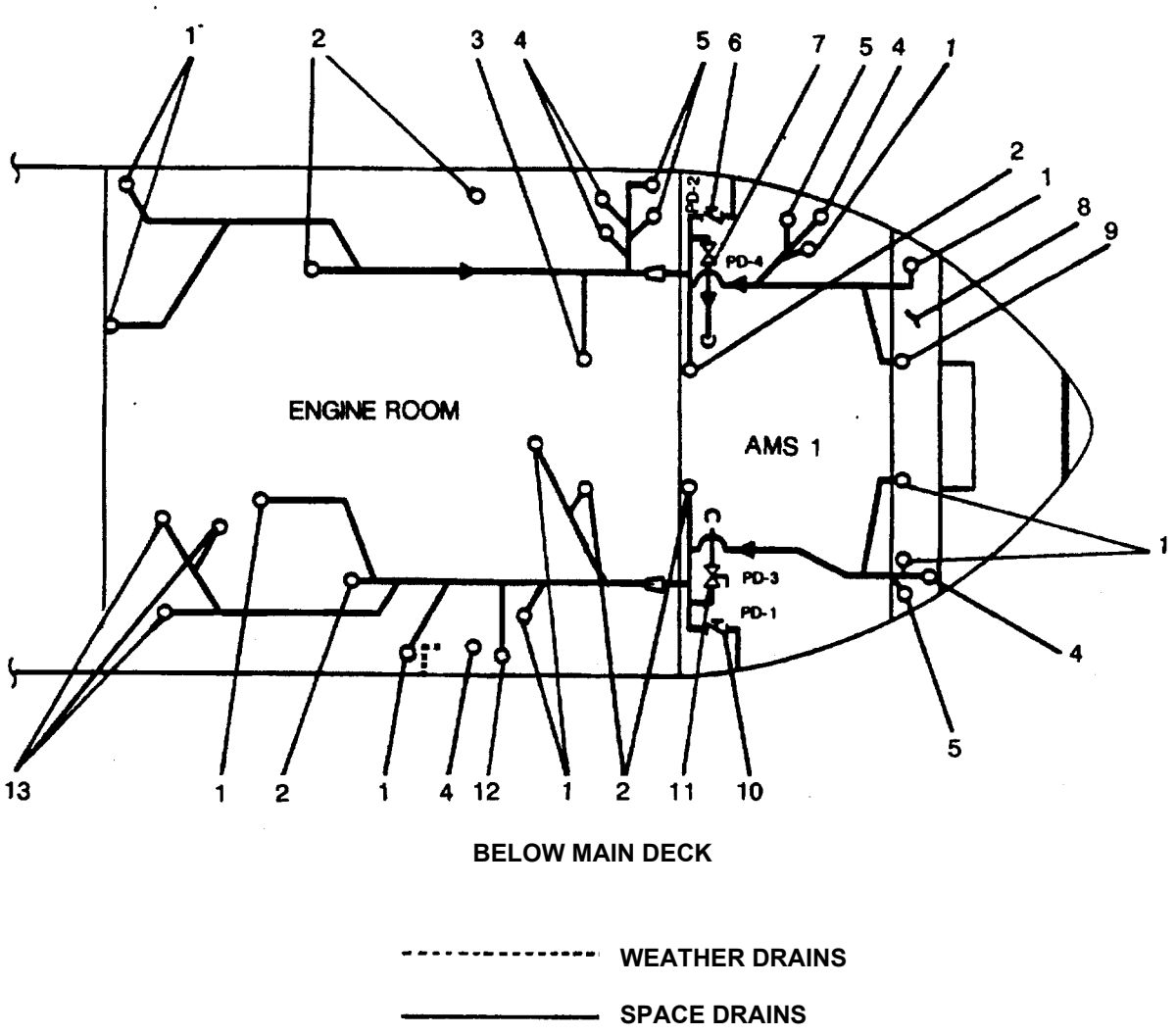
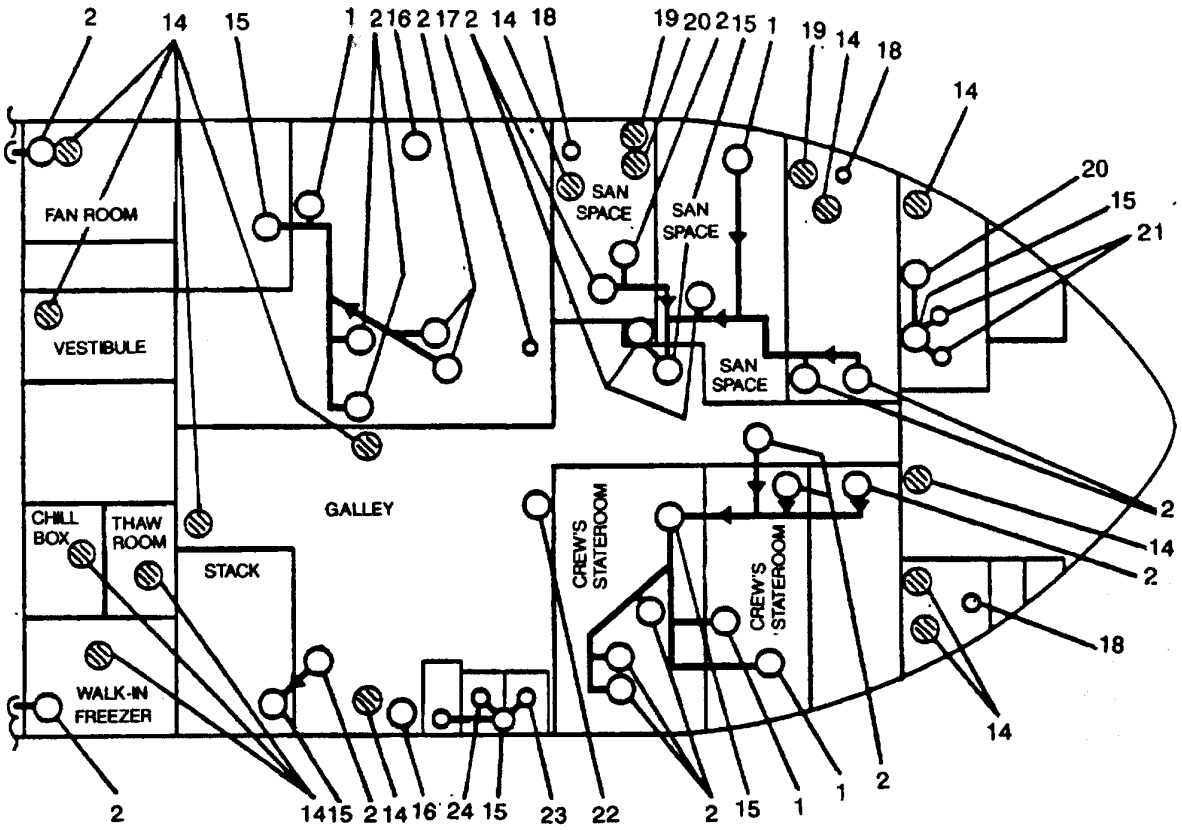
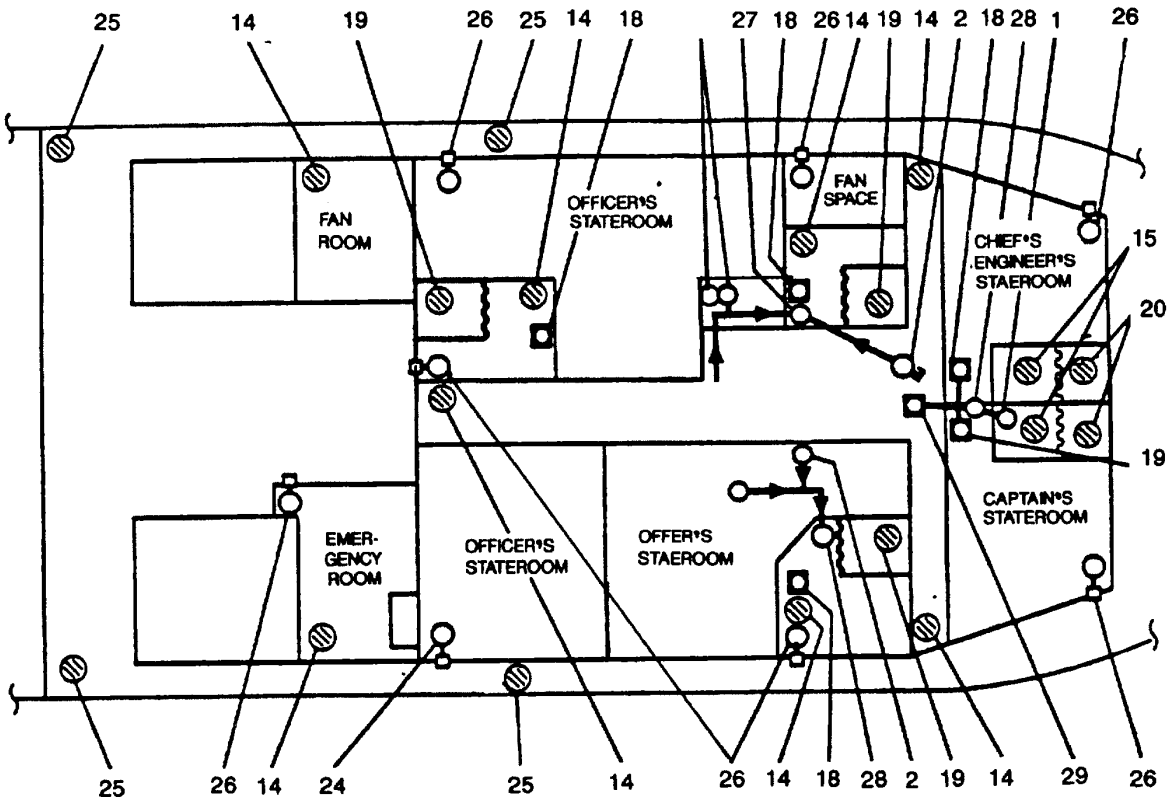


Figure 1-73. Weather and Space Drains System (Sheet 1 of 6).



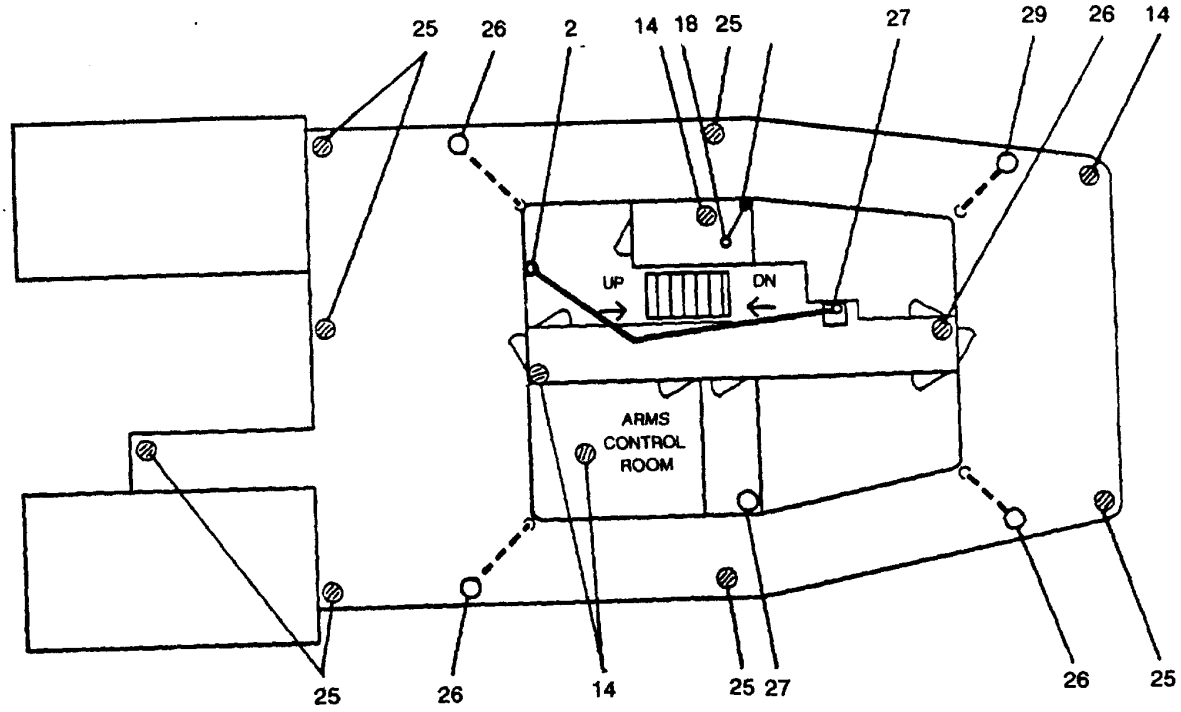
MAIN DECK

Figure 1-73. Weather and Space Drains System (Sheet 2 of 6).



01 LEVEL

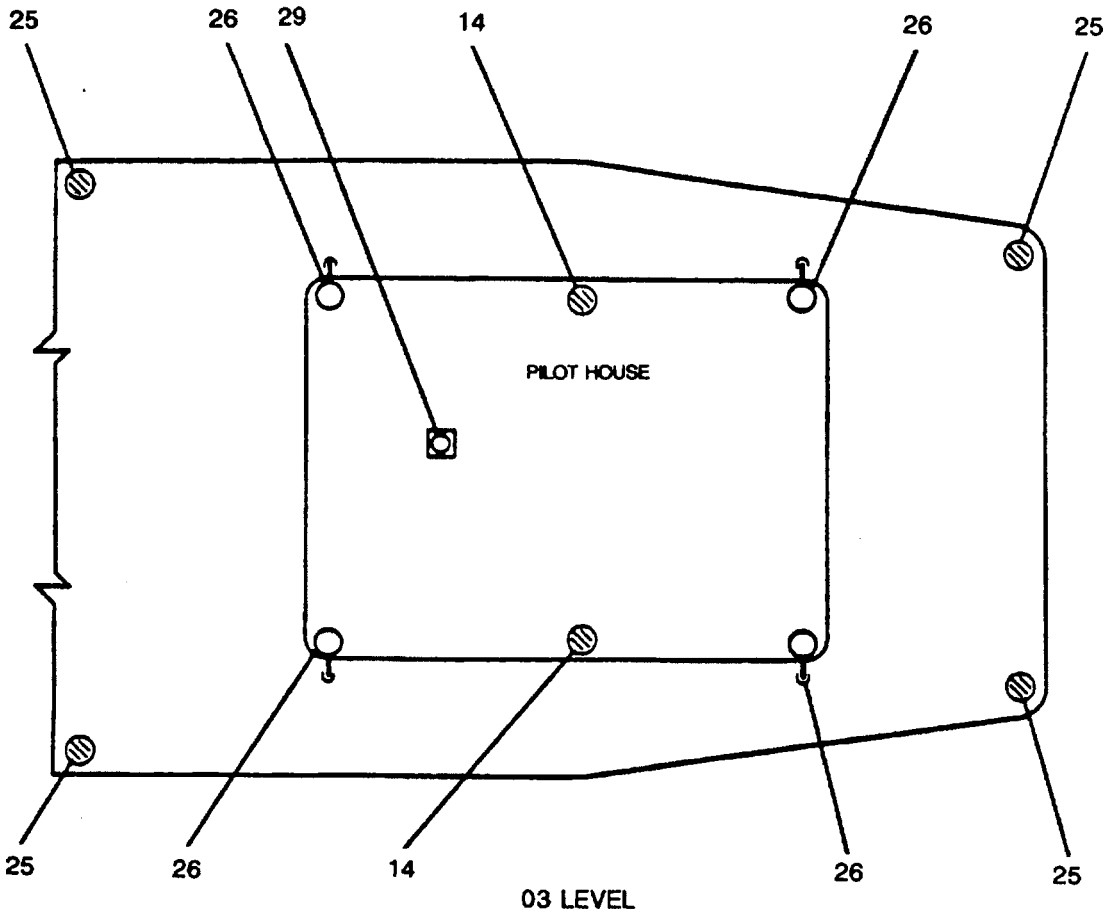
Figure 1-73. Weather and Space Drains System (Sheet 3 of 6).



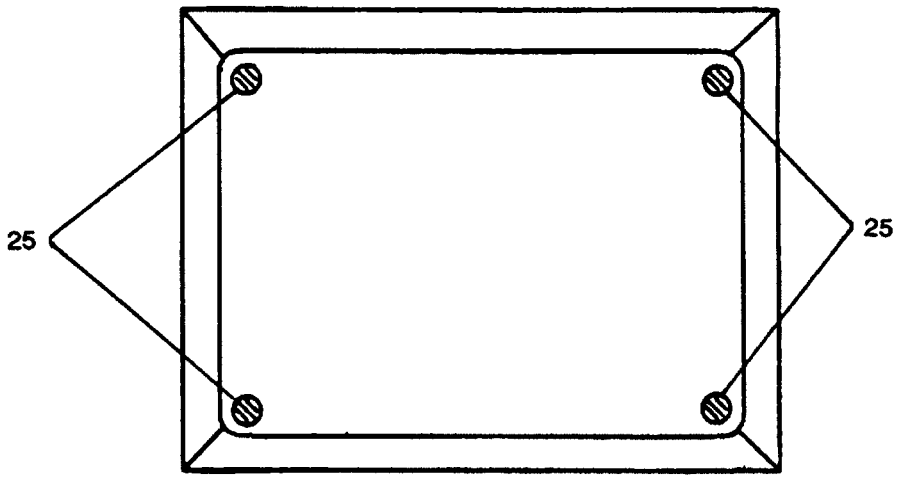
02 LEVEL

KEY:
WEATHER DRAINS
SPACE DRAINS

Figure 1-73. Weather and Space Drains System (Sheet 4 of 6).



03 LEVEL

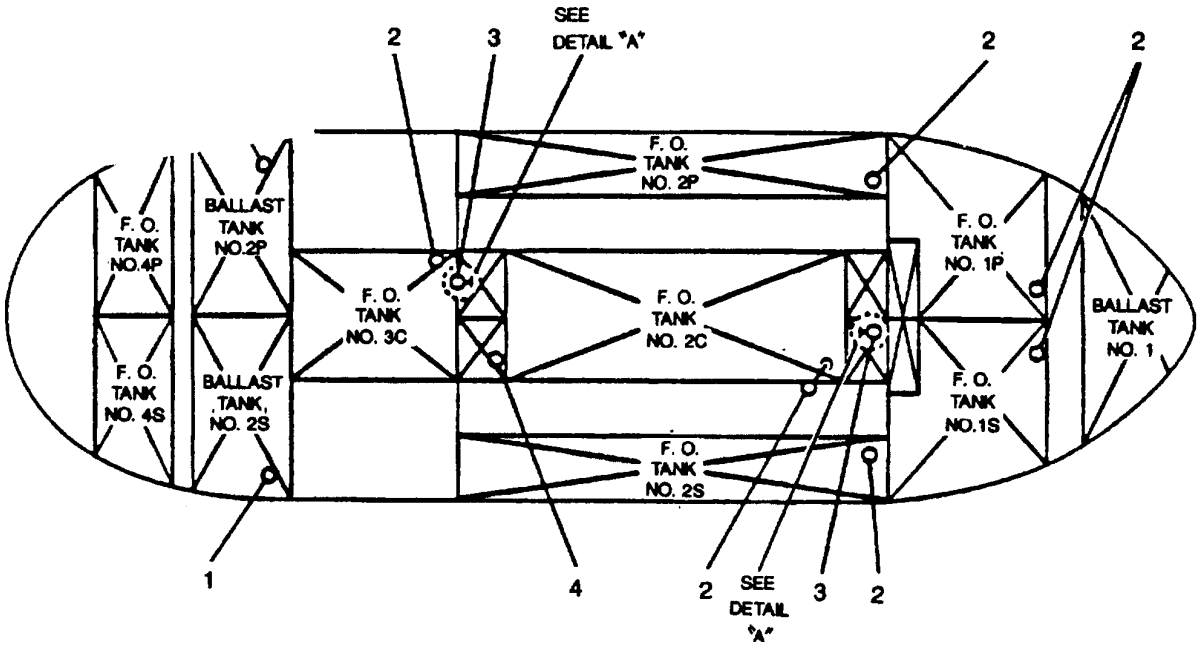


04 LEVEL

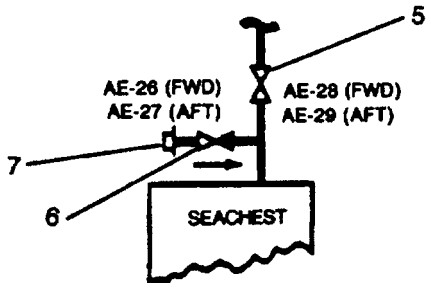
Figure 1-73. Weather and Space Drains System (Sheet 5 of 6).

1. SPACE DRAIN FROM ABOVE
2. DRAIN FROM ABOVE
3. DRINKING FOUNTAIN DRAIN FROM ABOVE
4. SINK DRAIN FROM ABOVE
5. SHOWER DRAIN FROM ABOVE
6. PD-2, WASTE WTR. OVBD
7. PD-4, WASTE WTR. TO SEW.HLD.TK.
8. BOW THRUSTER COMPARTMENT
9. DRAIN FROM WASHING MACHINE AND LAUNDRY TUBS
10. PD-1, WASTE WTR. OVBD
11. PD-3, WASTE WTR. TO SEW.HLD.TK.
12. DRAIN FROM GALLEY
13. DRAINS FROM REEFER SPACES
14. SPACE DRAIN DOWN
15. DOWN TO HOLD
16. WEATHER DRAIN FROM ABOVE AND DOWN
17. DRINKING FOUNTAIN DRAIN DOWN
18. SINK DRAIN DOWN
19. SHOWER DRAIN DOWN
20. WASHER DRAIN DOWN
21. LAUNDRY TUB DRAINS
22. VENTILATOR HOOD DRAIN DOWN
23. GARBAGE DISPOSAL DRAIN
24. SINK DRAIN
25. DECK DRAIN DOWN
26. WEATHER DECK DRAIN FROM ABOVE (SPILL ON DECK)
27. DRAIN FROM ABOVE AND DOWN
28. DOWN TO MAIN DECK
29. DRINKING FOUNTAIN DRAIN

Figure 1-73. Weather and Space Drains System (Sheet 6 of 6).



TANK TOP LEVEL



SEE DETAIL "A"

Figure 1-74. Air Escapes, Sounding Tubes, and Overflows System (Sheet 1 of 9).

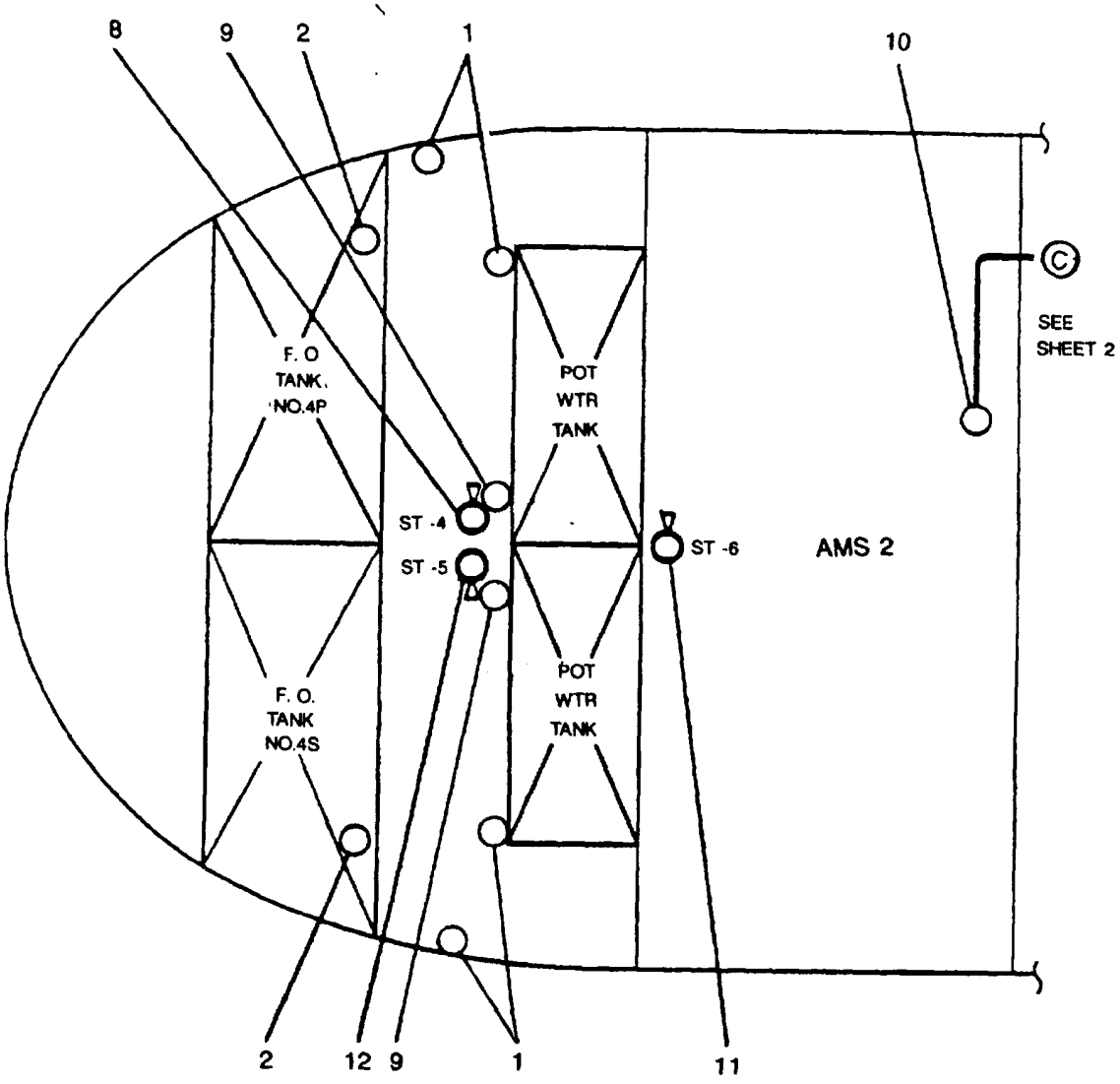
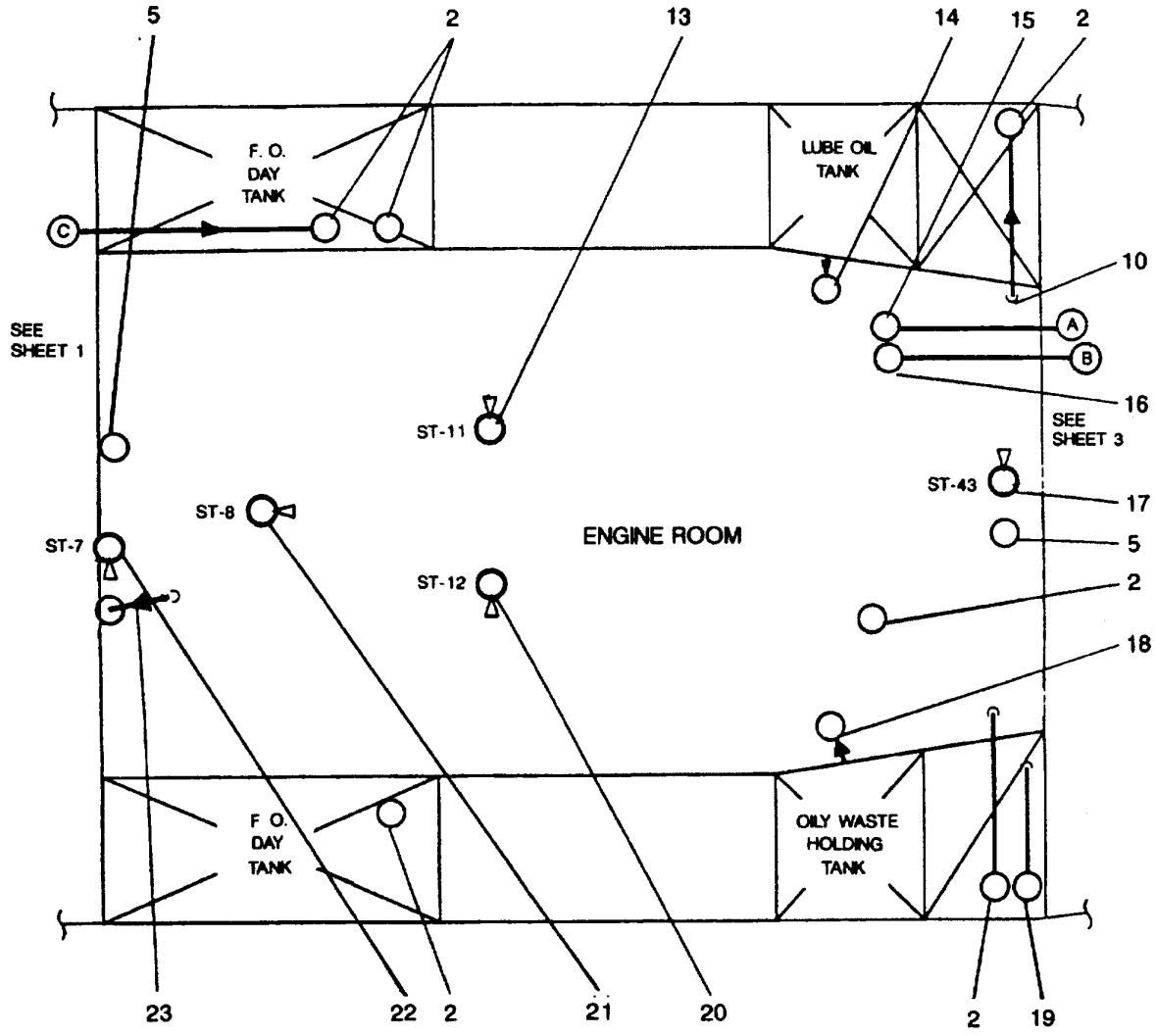


Figure 1-74. Air Escapes, Sounding Tubes, and Overflows System (Sheet 2 of 9).



BELOW MAIN DECK

Figure 1-74. Air Escapes, Sounding Tubes, and Overflows System (Sheet 3 of 9).

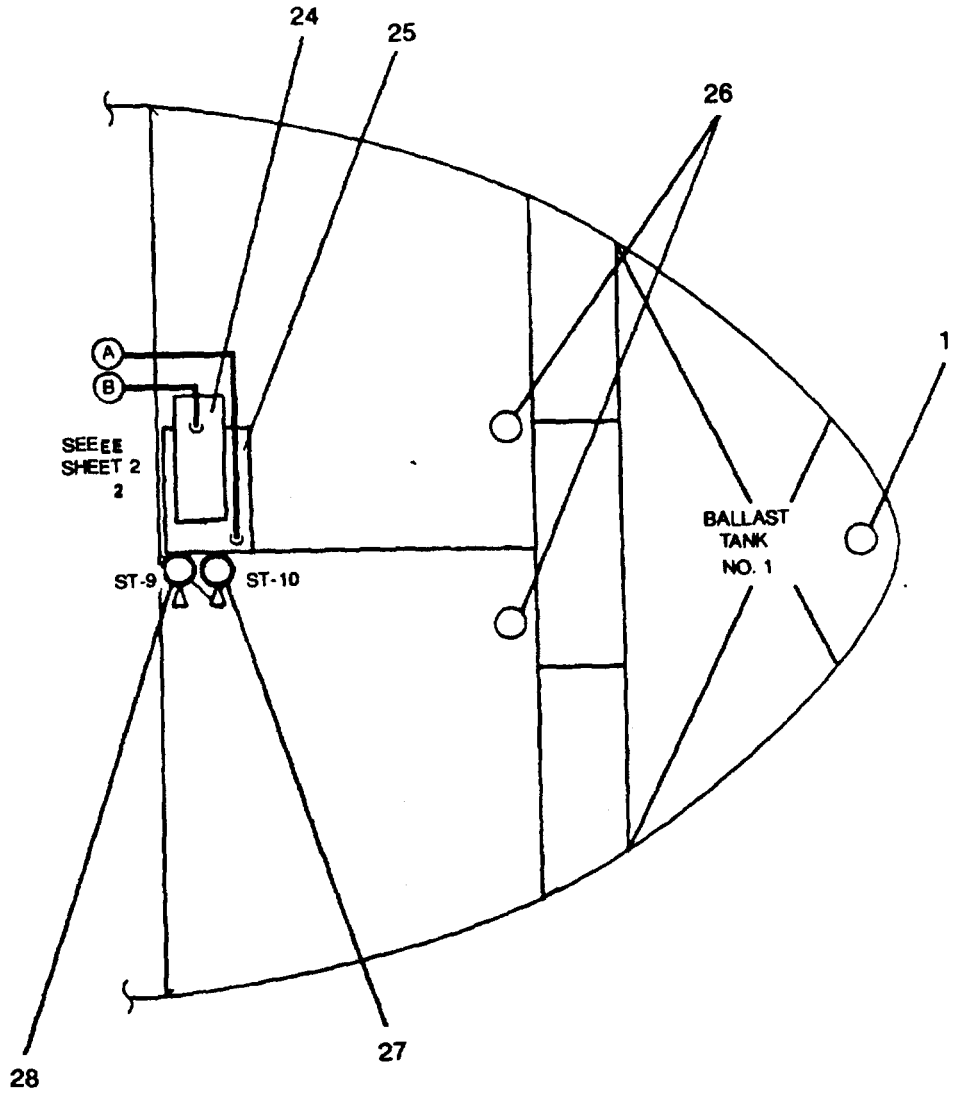


Figure 1-74. Air Escapes, Sounding Tubes, and Overflows System (Sheet 4 of 9).

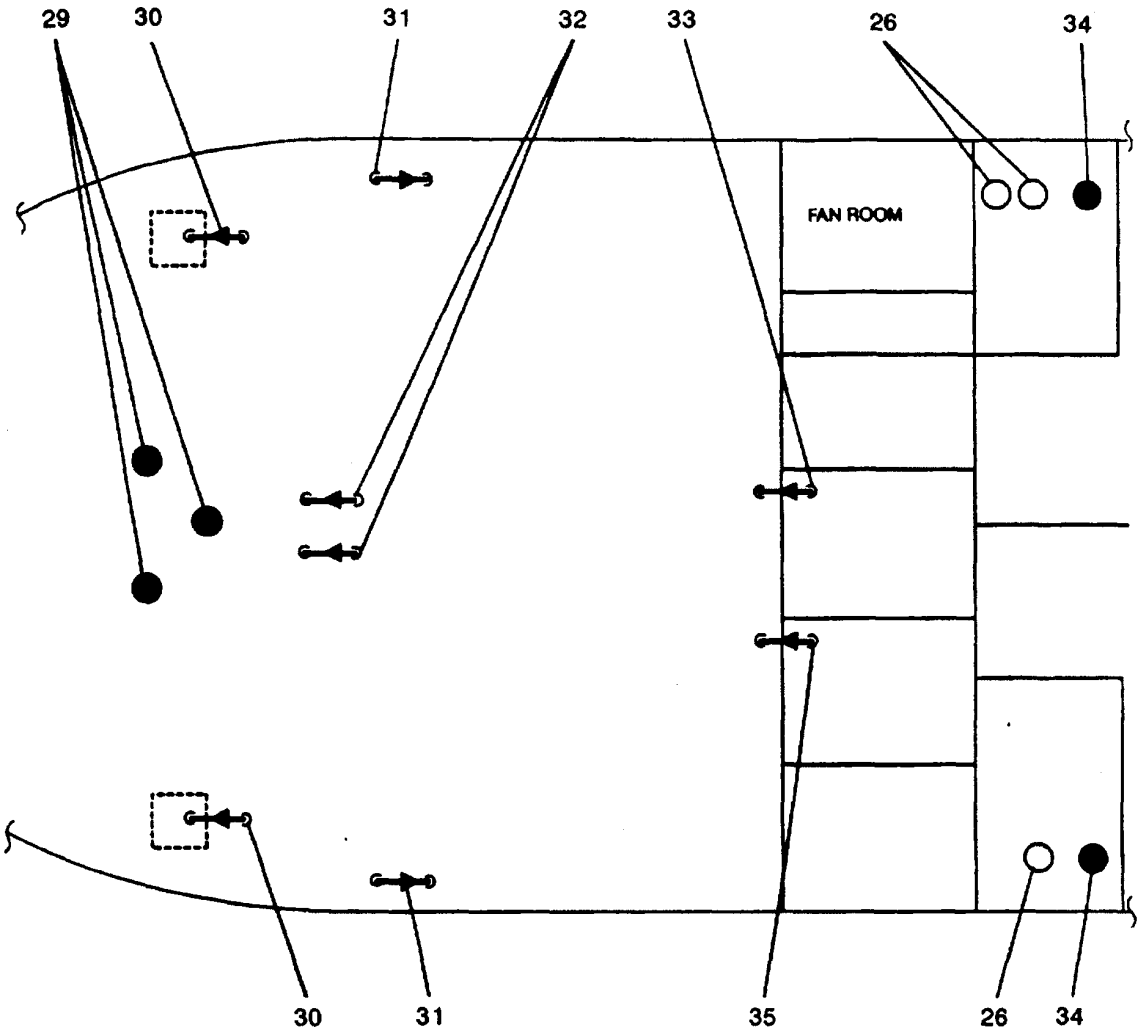
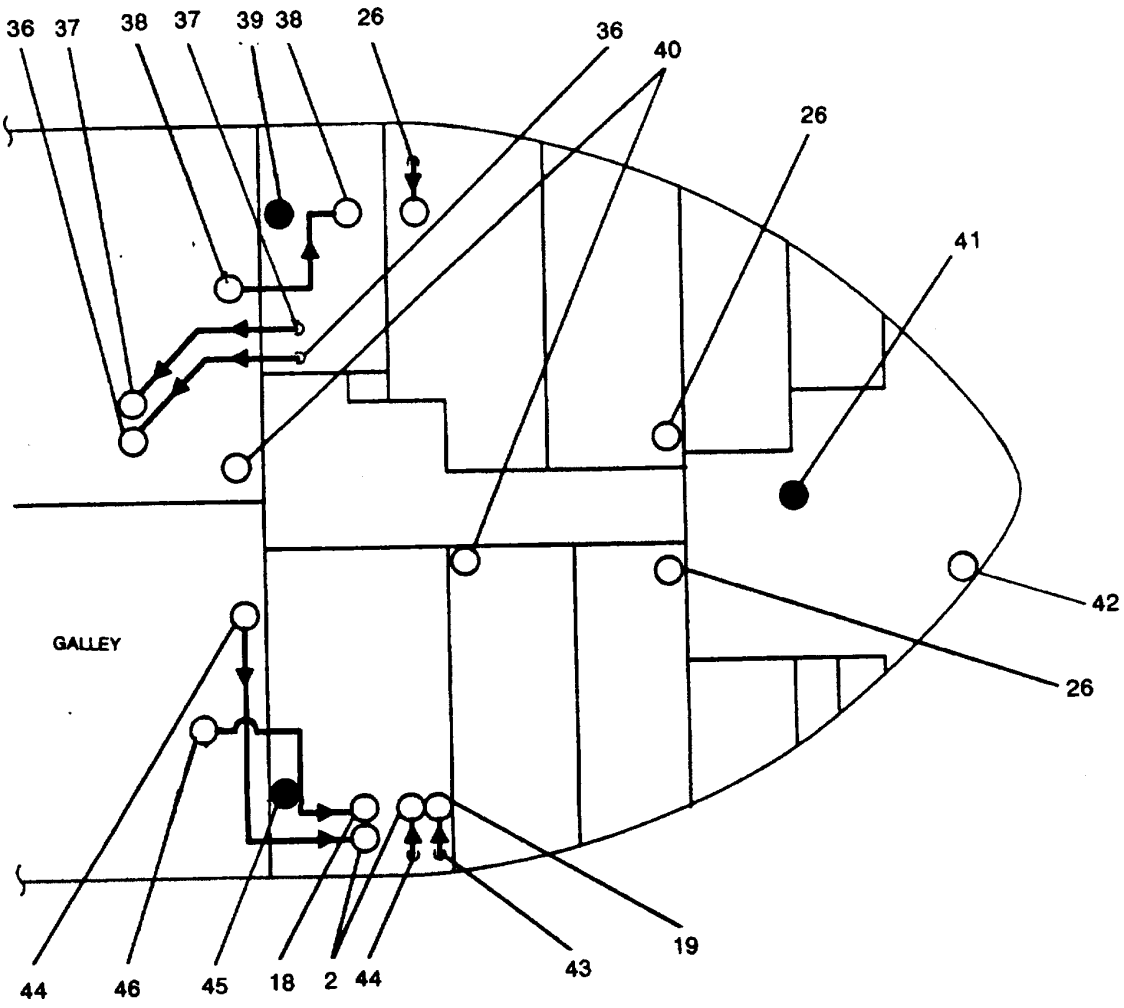
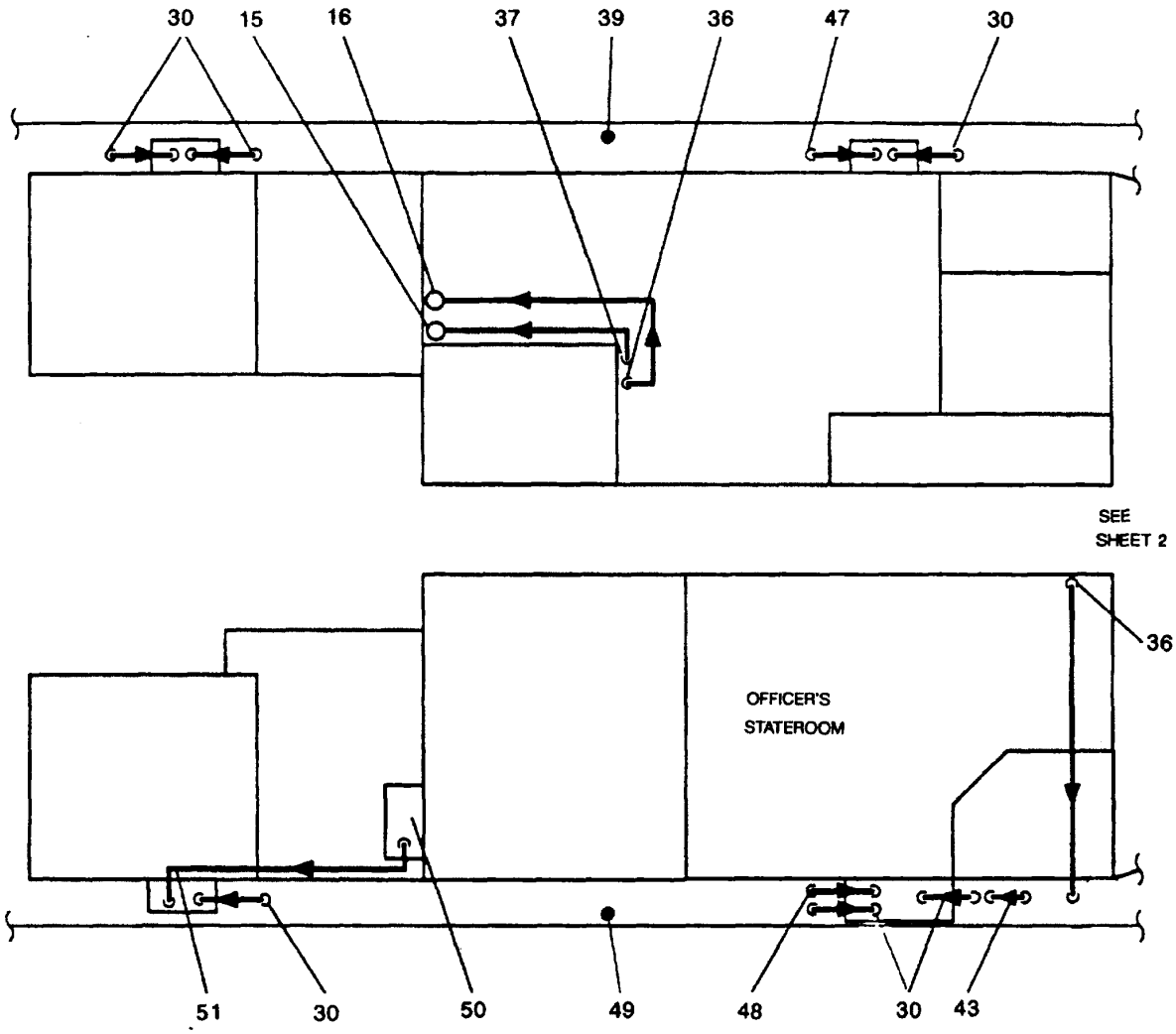


Figure 1-74. Air Escapes, Sounding Tubes, and Overflows System (Sheet 5 of 9).



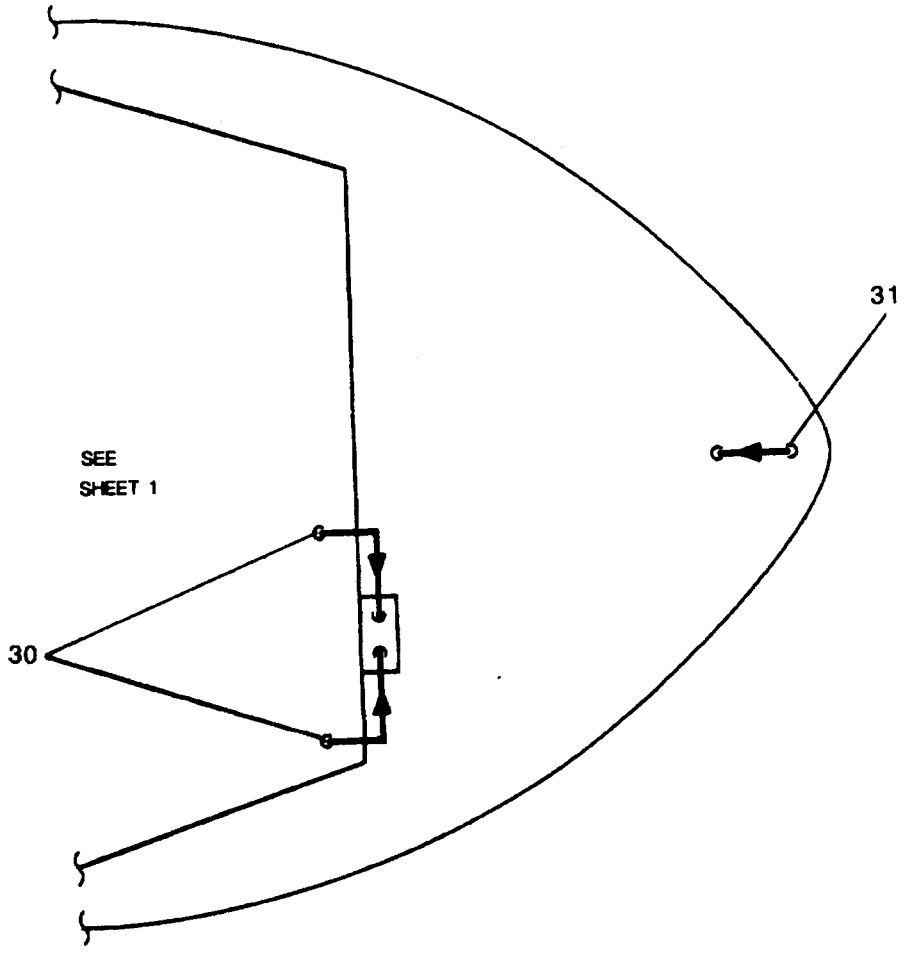
MAIN DECK

Figure 1-74. Air Escapes, Sounding Tubes, and Overflows System (Sheet 6 of 9).



01 LEVEL

Figure 1-74. Air Escapes, Sounding Tubes, and Overflows System (Sheet 7 of 9).



01 LEVEL

Figure 1-74. Air Escapes, Sounding Tubes, and Overflows System (Sheet 8 of 9).

1. BALLAST TANK VENT UP
2. FUEL OIL TANK VENT UP
3. SEA CHEST VENT UP
4. OILY WASTE DRAIN TANK VENT UP
5. AE-28 (FWD), SEA CHEST VENT
   AE-29 (AFT), SEA CHEST VENT
6. AE-26 (FWD), SEA CHEST BLWDN
   AE-27 (AFT), SEA CHEST BLWDN
7. SEA CHEST BLOWDOWN
8. ST-4, BLST.TK.2P SNDG.
9. POTABLE WATER TANK VENT
10. FUEL OIL VENT FROM BELOW
11. ST-6, F.O.TK.3C SNDG.
12. ST-5, BLST.TK.2S SNDG.
13. ST-11, F.O.TK.2P SNDG.
14. LURE OIL TANK VENT UP
15. SEWAGE HOLDING TANK VENT UP
16. MEDIA TANK VENT UP - ABOVE 02 LEVEL
17. ST-43, XDCR WELL SNDG - ABOVE 02 LEVEL
18. OILY WASTE TANK VENT UP
19. AFFF STORAGE TANK VENT UP
20. ST-12, F.O.TK.2S SNDG.
21. ST-8, F.O.TK.2C SNDG.
22. ST-7, OILY DR.TK.SNDG.
23. OILY WASTE DRAIN TANK VENT FROM BELOW AND UP
24. MSD MEDIA TANK
25. SEWAGE CHT TANK
26. FUEL OIL VENTS FROM BELOW AND UP
27. ST-10, F.O.TKA P SNDG.
28. ST-9, F.O.TK.1S SNDG.
29. TANK SOUNDING TUBES
30. FUEL OIL TANK VENT FROM BELOW TO SPILL CONTAINER
31. BALLAST TANK VENT FROM BELOW
32. POTABLE WATER TANK VENT FROM BELOW
33. SEA CHEST VENT FROM BELOW
34. FUEL OIL DAY TANK SOUNDING TUBE
35. OILY WASTE DRAIN TANK VENT FROM BELOW WITH FLAME SCREEN
36. MSD MEDIA TANK VENT FROM BELOW AND UP
37. SEWAGE CHT TANK VENT FROM BELOW AND UP
38. LUBE OIL TANK VENT FROM BELOW AND UP
39. LUBE OIL TANK SOUNDING TUBE
40. SEA CHEST VENT FROM BELOW AND UP
41. BALLAST TANK SOUNDING TUBE
42. BALLAST TANK VENT FROM BELOW AND UP
43. AFFF STORAGE TANK VENT FROM BELOW
44. FUEL OIL VENT FROM BELOW
45. AFFF TANK SOUNDING TUBE
46. OILY WASTE TANK VENT FROM BELOW
47. LUBE OIL TANK VENT FROM BELOW TO SPILL CONTAINER
48. OILY WASTE TANK VENT FROM BELOW TO SPILL CONTAINER
49. OILY WASTE TANK SOUNDING TUBE
50. EDG DAY TANK
51. EDG DAY TANK VENT TO SPILL CONTAINER

Figure 1-74. Air Escapes, Sounding Tubes, and Overflows System (Sheet 9 of 9).

c. Air Conditioning (Figure 1-75). Air conditioning (cooling) is provided by two condensing units located in AMS 2. Each condensing unit has a capacity of 14. 6 tons of refrigeration under operating conditions. Controls are provided for automatic operation and capacity variation for light loads. Major components of the system include the following:

(1) Expansion valve. The expansion valve controls the flow of refrigerant to the air handling unit. This valve operates based upon the pressure and temperature of the refrigerant leaving the fan coil unit, not room temperature.

(2) Air handling unit. The air handling unit contains coils for the absorption of heat from the air. A fan provides forced air across a coil to improve heat transfer and distribute cooled air through the ducting. Solenoid valves, controlled by thermostats, control the flow of refrigerant through the coils based on room temperature.

(3) Compressor. The compressor compresses the heated refrigerant to improve heat transfer in the condenser.

(4) Condenser. The condenser is the heat exchanger for the system. It transfers heat from the R22 refrigerant to sea water from the general service system. The heated sea water is discharged overboard. Cooled refrigerant, in liquid state, flows to the receiver.

(5) Receiver. The receiver serves as the liquid refrigerant reservoir. It receives the liquid refrigerant from the condenser and supplies it to the expansion valve.

(6) Control box. A control box, mounted on the condenser unit, provides the controls and indicators necessary for operation of the condenser unit.

d. Pilothouse (03 Level) (Figure 1-76). The HVAC system maintains room temperature as set at the thermostat (2). Supply air from the 02 level (1) is routed through ducting to two terminal reheaters (3 and 4).

e. 02 Level (Figure 1-77).

(1) Engine room ventilation. Exhaust fan (1) provides ventilation for the port side of the engine room. Exhaust fan (13) provides ventilation for the starboard side of the engine room. Each fan has a discharge duct connected through a louver (2) to the atmosphere.

(2) Sanitary space exhaust vent. A sanitary space vent (goose neck type vent) (3) allows discharge to the atmosphere of sanitary space exhaust from the 01 level.

(3) Interior spaces environmental control. A duct type forced air system is used to provide HVAC for most interior spaces. Forced air is supplied from the 01 level (11) and routed through ducts to various compartments and the 03 level (4). Thermostats (9) control terminal reheaters (8, 10, and 12) to provide warm air for the damage control center, radio room, and arms control room. An exhaust intake (5) is provided in the sanitary space and routed to the 01 level (7). A convection heater (6) provides heat in the sanitary space.

f. 01 Level (Figure 1-78).

(1) Engine room ventilation. Supply fan (1) provides forced air ventilation for the port side of the engine room. Supply fan (12) provides forced air ventilation for the starboard side of the engine room. Louver air intakes (13) are provided for both fans.

(2) 01 Level forward. Seven gooseneck type vents and one louvered vent are provided for natural or forced air venting to the atmosphere as described below.

(a) Dryer exhaust gooseneck vent (23).

(b) Washer natural exhaust gooseneck vent (24).

(c) Laundry space and bow thruster compartment natural exhaust gooseneck vent (25).

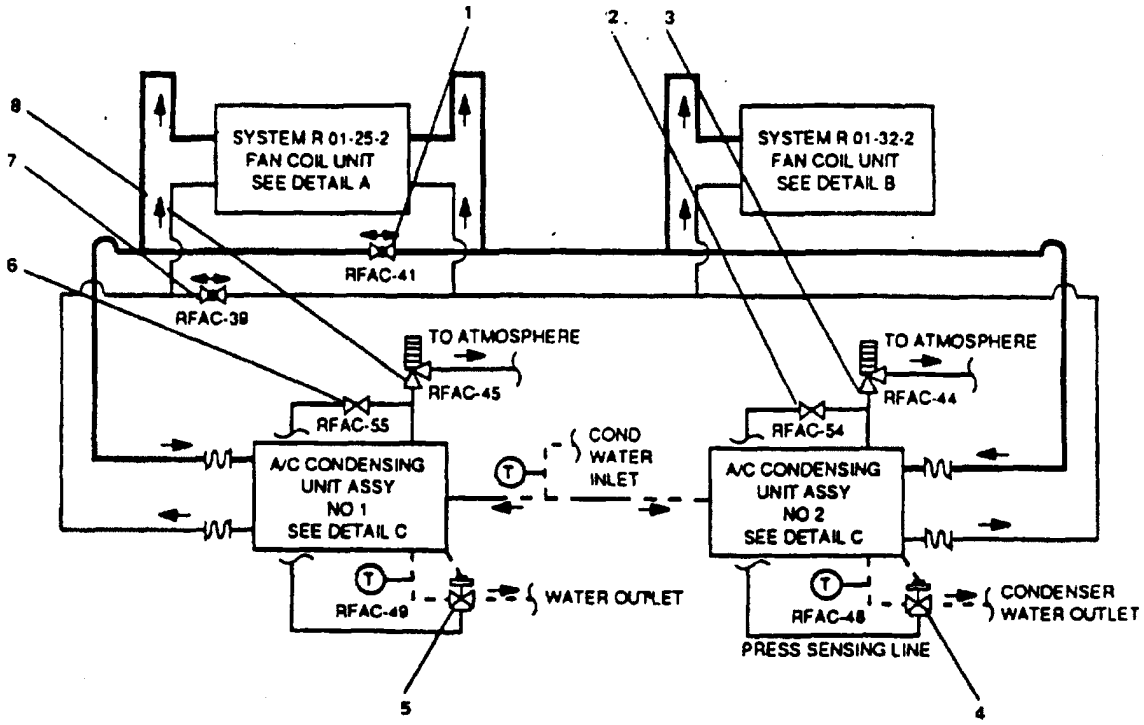
(d) Paint locker exhaust gooseneck vent (28).

(e) Boatswain's store natural exhaust vent (29).

(f) Supply for boatswain's store, paint locker, and laundry room fan gooseneck vent (30).

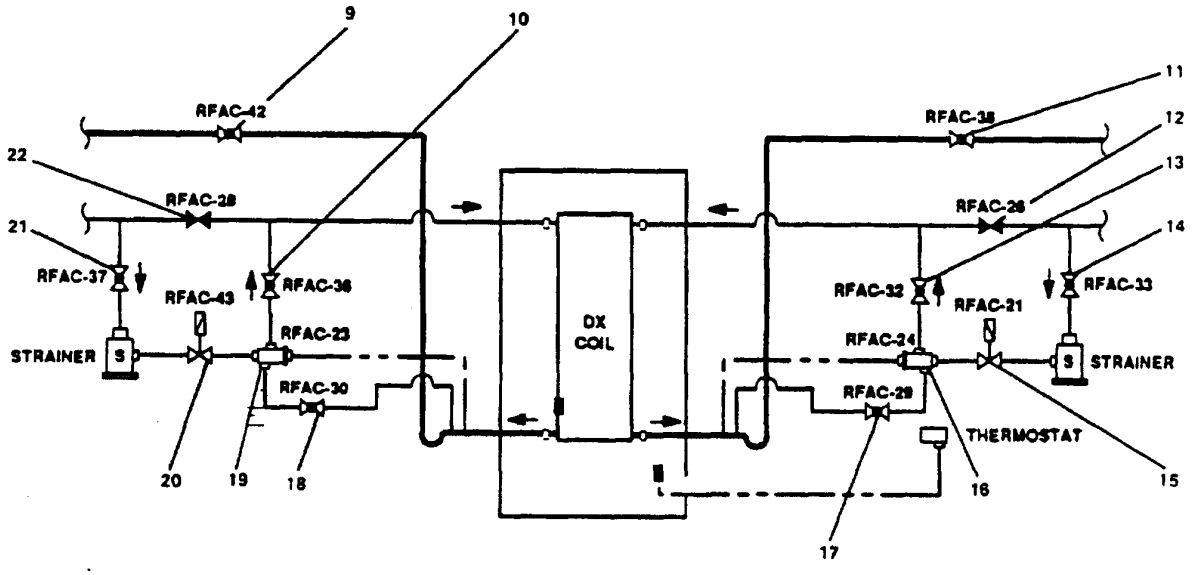
(g) Natural supply for main deck sanitary space (forward, starboard side) and bow thruster compartment gooseneck vent (31).

(h) Louvered natural exhaust from AS 1 (32).



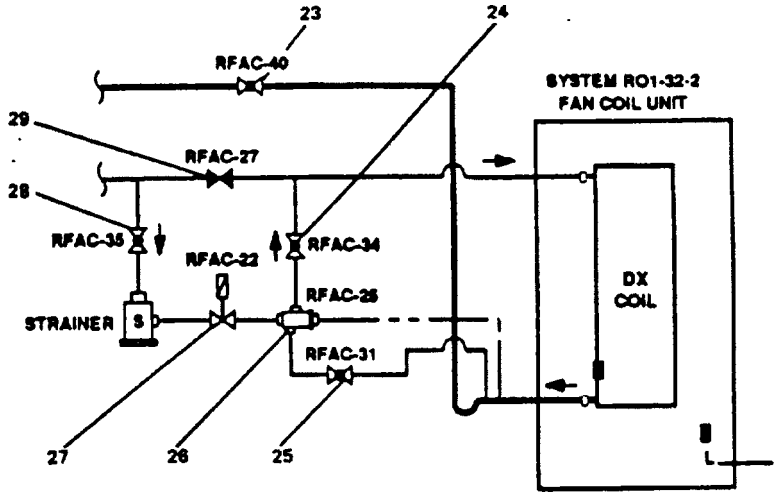
AMS-2

NOTE:
ITEMS 1 THRU 9 ARE IN AMS-2
ITEMS 10 THRU 22 ARE IN
THE MAIN DECK FAN ROOM.



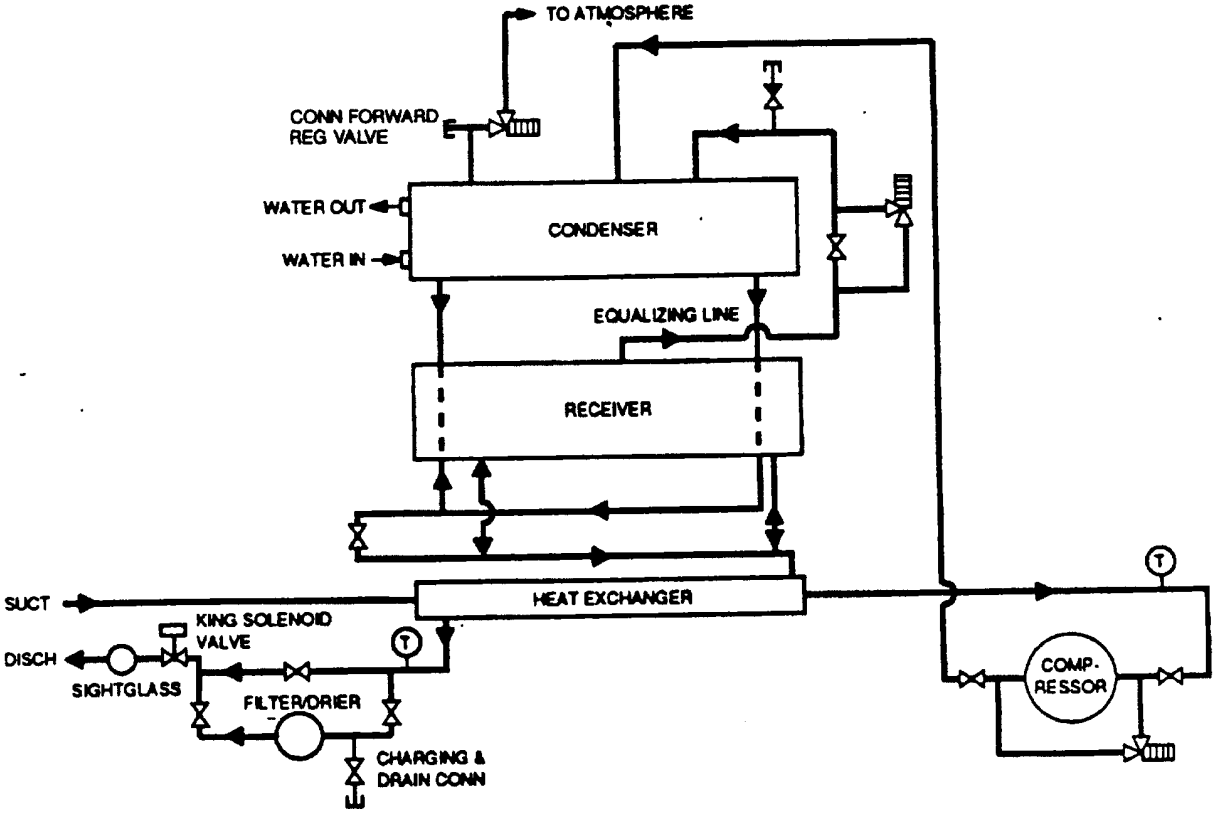
DETAIL A

Figure 1-75. Air Conditioning (Sheet 1 of 3).



01 LEVEL FAN ROOM
DETAIL B

NOTE: ITEMS 23 THRU 29 ARE IN 01 LEVEL FAN ROOM.



AMS-2

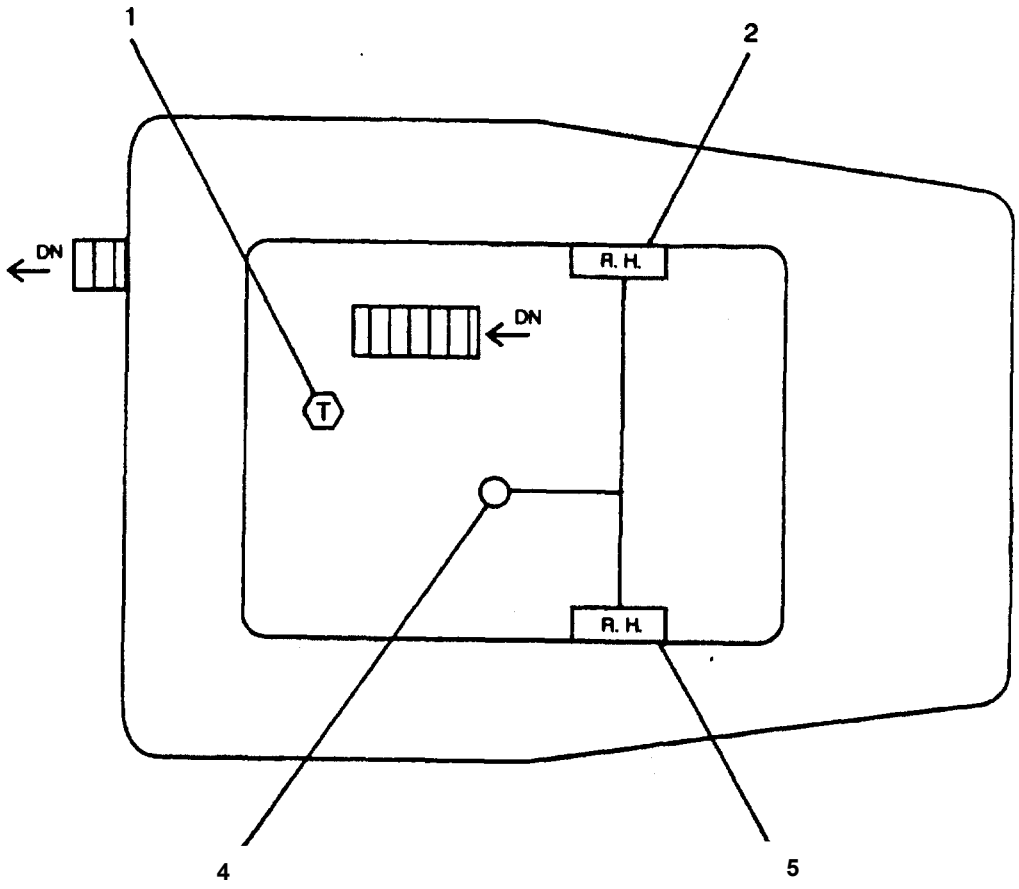
DETAIL C

Figure 1-75. Air Conditioning (Sheet 2 of 3).

1. RFAC-41, SUCT LINE CRSVR COV
2. RFAC-54, COV - WTR RGLTR FREON
3. RFAC-44, RLF - CONDSR
4. RFAC-48, WTR RGLTR
5. RFAC-49, WTR RGLTR
6. RFAC-55, COV - WTR RGLTR FREON
7. RFAC-39, LIQUID LINE CRSVR CO
8. RFAC-45, RLF - CONDSR
9. RFAC-42, 8 COIL SUCT COV, R1-25-2
10. RFAC-36, TXV/STNR/LLSV COV, R1-25-2, 8 COIL
11. RFAC-38, 4 COIL SUCT COV, R1 -25-2
12. RFAC-26, HAND EXP
13. RFAC-32, TXV/STNR/LLSV COV, R1-25-2, 4 COIL
14. RFAC-33, TXV/STNR/LLSV COV, Ri-25-2, 4 COIL
15. RFAC-21, COIL SOL VLV, R01-32-2, 4 COIL
15. RFAC-24, TXV, R1-25-2, 3.5 TON
17. RFAC-29, EQL LINE
18. RFAC-30, EQL LINE
19. RFAC-23, TXV, R1 -25-2, 10.2 TON
20. RFAC-43, LLSV, R1-25-2, 8 COIL
21. RFAC-37, TXV/STNR/LLSV COV, R1-25-2, 8 COIL
22. RFAC-28, HAND EXP
23. RFAC-40, COIL SUCT COV, R01-32-2
24. RFAC-34, TXV COV, R01-32-2
25. RFAC-31, EQL LINE
26. RFAC-25, TXV, R01-32-2
27. RFAC-22, COIL SOL VLV, R01-32-2
28. RFAC-35, TXV COV, R01 -32-2
29. RFAC-27, HAND EXP

NOTE: ITEMS 1 THRU 9 ARE IN AMS-2. ITEMS 10 THRU 22 ARE IN THE MAIN DECK FAN ROOM. ITEMS 23 THRU 29 ARE IN 01 LEVEL FAN ROOM.

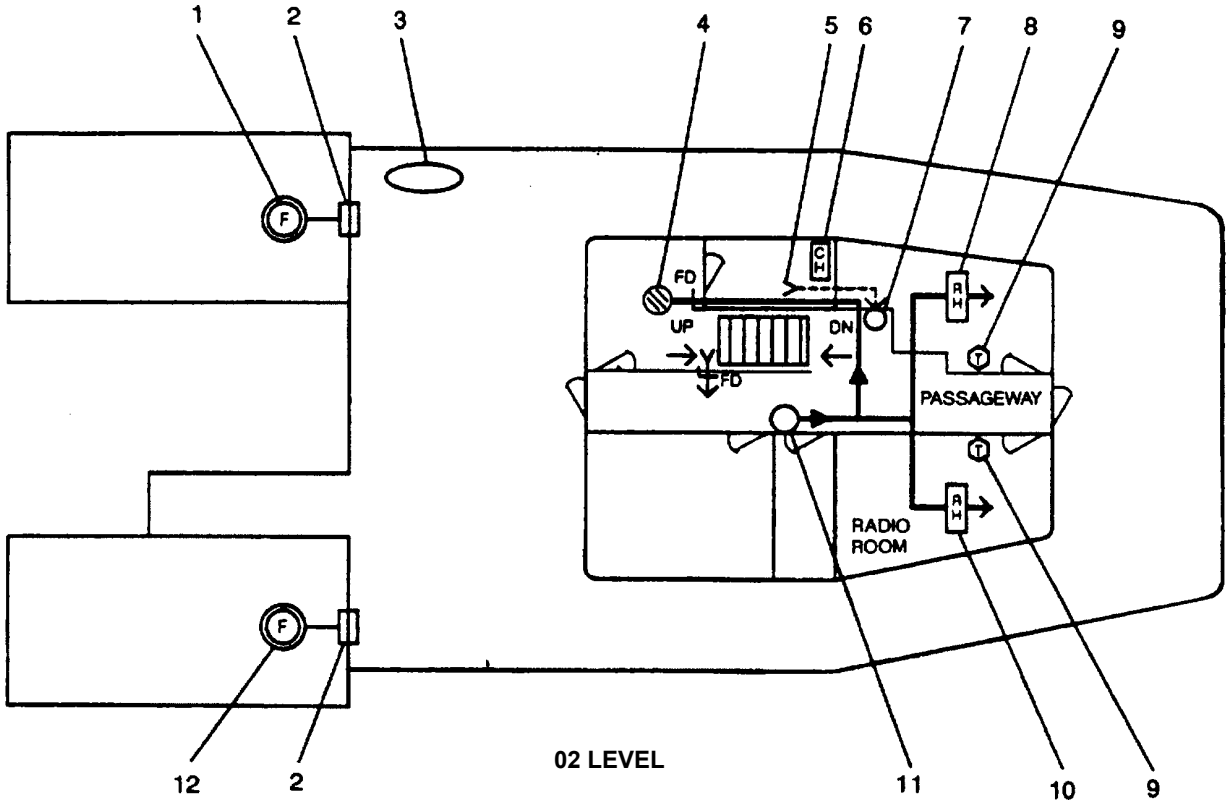
Figure 1-75. Air Conditioning (Sheet 3 of 3).



03 LEVEL

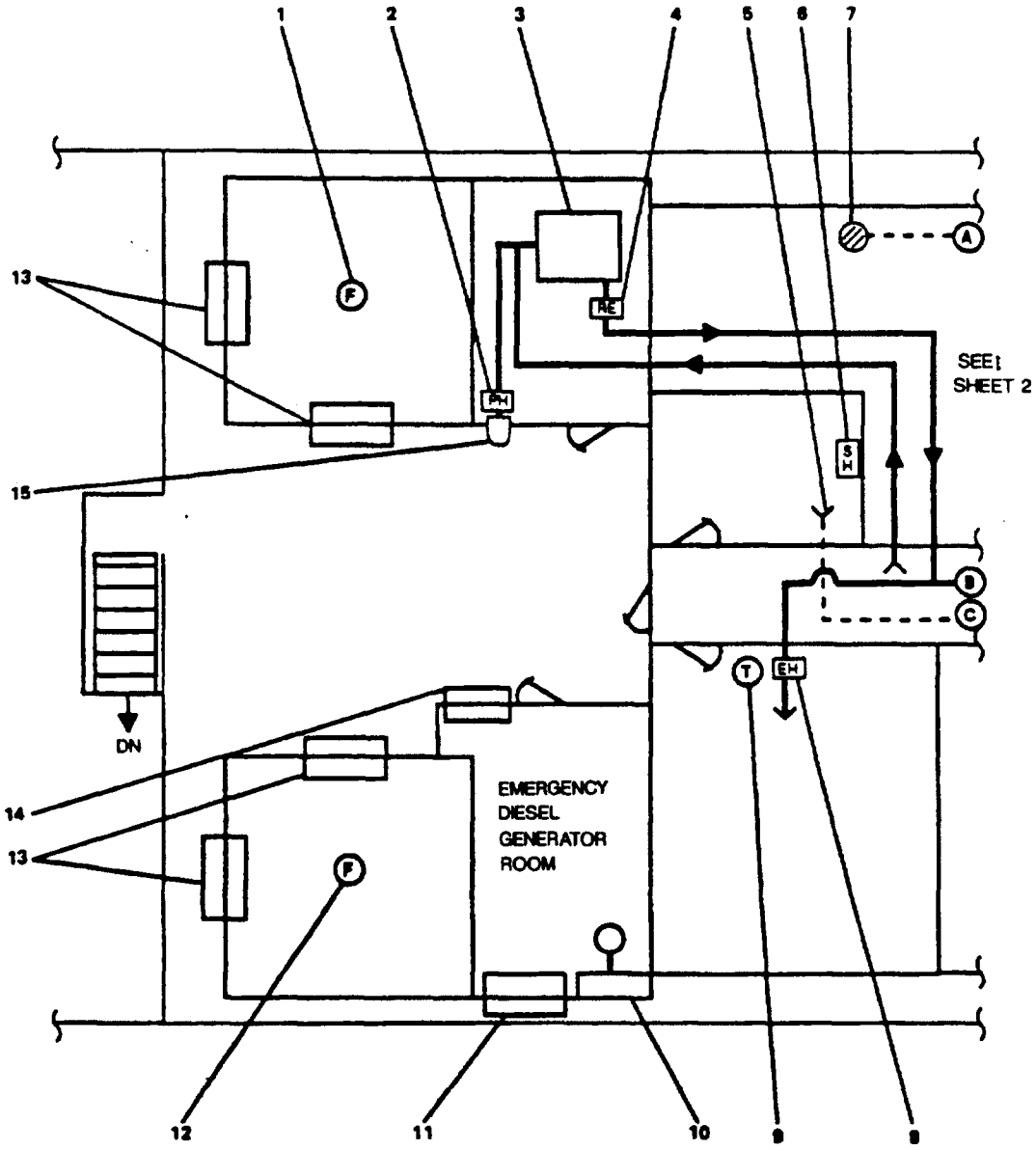
1. THERMOSTAT
2. TERMINAL REHEATER 03-46-2 (02 LEVEL OVERHEAD)
3. TERMINAL REHEATER 03-44-1 (02 LEVEL OVERHEAD)
4. FROM 02 LEVEL (OVERHEAD)

Figure 1-76. Pilothouse (03 Level).



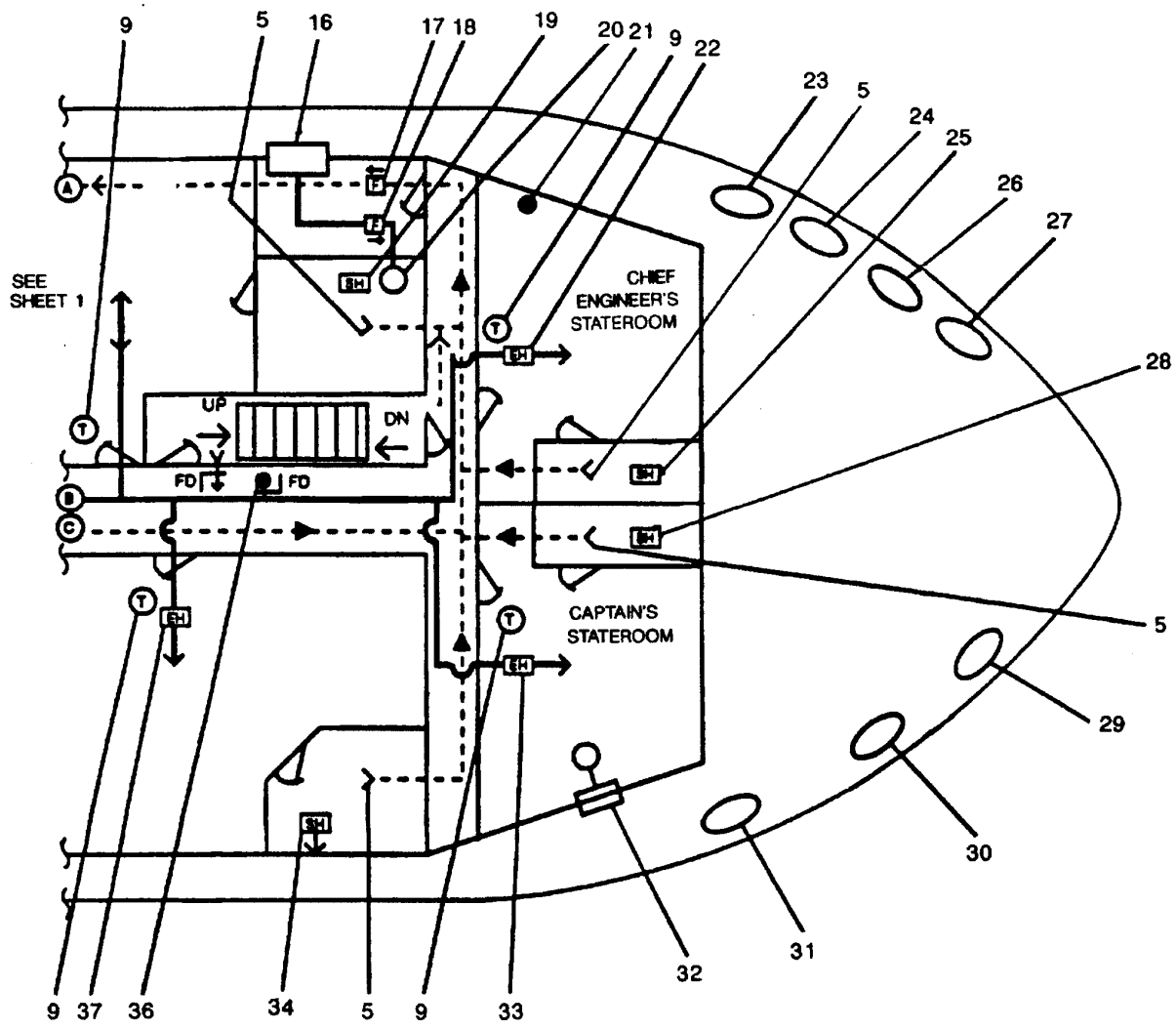
1. ENGINE ROOM EXHAUST FAN 02-27-2
2. LOUVER
3. SANITARY SPACE VENT
4. SUPPLY AIR TO 03 LEVEL
5. SANITARY SPACE EXHAUST INTAKE
6. CONVECTOR HEATER 02-44-2
7. SANITARY SPACE EXHAUST TO 01 LEVEL
8. TERMINAL REHEATER 02-47-2
9. THERMOSTAT
10. TERMINAL REHEATER 02-47-1
11. SUPPLY FROM 01 LEVEL
12. ENGINE ROOM EXHAUST FAN 02-27-1

Figure 1-77. 02 Level.



01 LEVEL

Figure 1-78. 01 Level (Sheet 1 of 3).



01 LEVEL

Figure 1-78. 01 Level (Sheet 2 of 3).

1. ENGINE ROOM SUPPLY FAN S01-27-2
2. PREHEATER 01-31-2
3. FAN COIL UNIT R01-32-2
4. REHEATER 01-32-2
5. SANITARY SPACE EXHAUST INTAKE
6. CONVECTION HEATER 01-36-2
7. SANITARY SPACE EXHAUST UP TO GOOSENECK
8. TERMINAL REHEATER 01-34-1
9. THERMOSTAT
10. GALLEY VENTILATOR HOOD EXHAUST
11. EDG RADIATOR AIR INTAKE
12. ENGINE ROOM SUPPLY FAN S01-27-1
13. LOUVER SCREEN INTAKE
14. NATURAL SUPPLY FOR EDG ROOM (WITH LOUVER)
15. VENT HOOD SUPPLY FOR FAN COIL UNIT
16. TERMINAL REHEATER 01-39-2
17. LOUVERED AIR INTAKE (AMS 1)
18. SANITARY SPACE EXHAUST FAN 01-44-2
19. SUPPLY FAN FOR AMS 1 01-45-2
20. SPACE HEATER 01-44-2
21. SUPPLY AIR DOWN TO AMS 1
22. TERMINAL REHEATER 01-50-2
23. DRYER EXHAUST GOOSENECK VENT
24. LAUNDRY SPACE NATURAL EXHAUST GOOSENECK VENT
25. BOW THRUSTER COMPARTMENT NATURAL EXHAUST GOOSENECK VENT
26. HEATER 01-51-2
27. HEATER 01-51-1
28. PAINT LOCKER EXHAUST GOOSENECK VENT
29. BOATSWAIN'S STORE NATURAL EXHAUST VENT
30. SUPPLY FOR BOATSWAIN'S STORE, PAINT LOCKER, AND LAUNDRY ROOM FAN GOOSENECK VENT
31. NATURAL SUPPLY FOR BOW THRUSTER COMPARTMENT GOOSENECK VENT
32. LOUVERED NATURAL EXHAUST FROM AMS 1
33. TERMINAL REHEATER 01-50-1
34. CONVECTION HEATER 01-45-1
35. SANITARY SPACE EXHAUST FROM MAIN DECK
36. SUPPLY TO 02 LEVEL
37. TERMINAL REHEATER 01-41-1

Figure 1-78. 01 Level (Sheet 3 of 3).

(3) 01 Level interior.

(a) General. A duct type forced air system is used to provide HVAC for most 01 level interior spaces. Outside air is drawn in through a vent hood (15), preheated by a preheater (9) and supplied to the fan coil unit (3). The air is conditioned by the fan coil unit (3) and passes through a reheater (4) before entering the main supply duct. Branch ducts off the main supply duct direct warm air to each 01 level stateroom. Each branch duct has a terminal reheater (8, 16 22, 33, and 37) which is controlled by the compartment thermostat (9). A branch duct provides conditioned air to the 02 level (36).

(b) Sanitary spaces. No forced air is supplied to sanitary spaces. The doors, fitted with a louver, provide natural air supply to each sanitary space. Convection heaters (6, 20, 26, 27, and 34) provide heated air for each sanitary space. An exhaust intake (5) in each space and from the main duck sanitary spaces is connected through a duct to an exhaust fan 18). Output from the exhaust fan is routed to the 02 level (7).

(c) Emergency diesel-generator room. Natural air supply is provided through a louver (14). Air exhaust is provided through the EDG radiator (11). The galley ventilator ducting connects to a louvered exterior vent (10).

(d) AMS 1 supply air. Air is drawn in through a louvered air intake (17) to a fan (19). The fan provides forced air through ducting (21) to AMS 1.

g. Main Deck (Figure 1-79).

(1) Main deck aft. Four gooseneck type vents provide natural and forced air ventilation to the atmosphere as described below.

(a) Natural supply for towing gear locker (1).

(b) Natural exhaust for AMS 2 (18).

(c) Workshop exhaust (19).

(d) Natural exhaust for towing gear locker (20).

(2) Main deck interior.

(a) General. A duct type forced air system is used to provide HVAC for most main deck interior spaces. Outside air is drawn in through a louvered vent (2) by a fan. It is preheated by a preheater (6) and supplied to the fan coil unit (5). The air, conditioned by the fan coil unit, passes through a reheater (7) o the main duct supplying the main deck staterooms. Forced air is distributed through branch ducts to each stateroom. Each branch duct is provided with a thermostat (9) controlled terminal reheater (10, 14, 23, 40, 41, and 42).

(b) Sanitary spaces. No forced air is supplied to sanitary spaces. The doors, fitted with a louver, provide natural air supply to each sanitary space. A natural supply (36) is also provided from the 01 level for the forward sanitary space. This vent also supplies the bow thruster compartment. Convection heaters (11, 25, and 38) provide heated air for each sanitary space. An exhaust intake in each space (21) is connected through a duct (24) to the exhaust fan on the 01 level.

(c) Galley ventilator hood. A separate forced air system supplies the galley ventilator hood. Outside air is drawn in through a louvered vent (2) by a fan (3). It then flows through a pre/reheater (4) to the ventilator hood (12). A fan (13) creates suction, drawing hot air out of the ventilator hood (13). This exhaust is routed through ducting (15) to the emergency generator room, where it is discharged to the atmosphere.

(d) Machinery space ventilators.

1 AMS 2. Outside air is drawn in through a louvered vent (2) by a fan (17). Ducts direct the air down to the engine room (16) and into AMS 2.

2 Engine room. Ducting (8) in the uptake space connects the engine room supply fans (1 and 12, Figure 1-78) to the ducting located in the engine room.

3 AMS 1. Supply ducting(21, Figure 1-78) from the 01 level passes through the main deck (22, Figure 1-79) down to AMS 1. Exhaust ducting (39) from the 01 level passes through the main deck down to AMS 1.

(e) Main deck forward spaces.

1 General. A separate forced air system supplies the boatswain's store. Outside air is drawn by a fan (34) from the 01 level (37), passes through a preheater (35), and is distributed to the boatswain's store, laundry space, and paint locker. A natural exhaust (33) is provided to the 01 level in the boatswain's store.

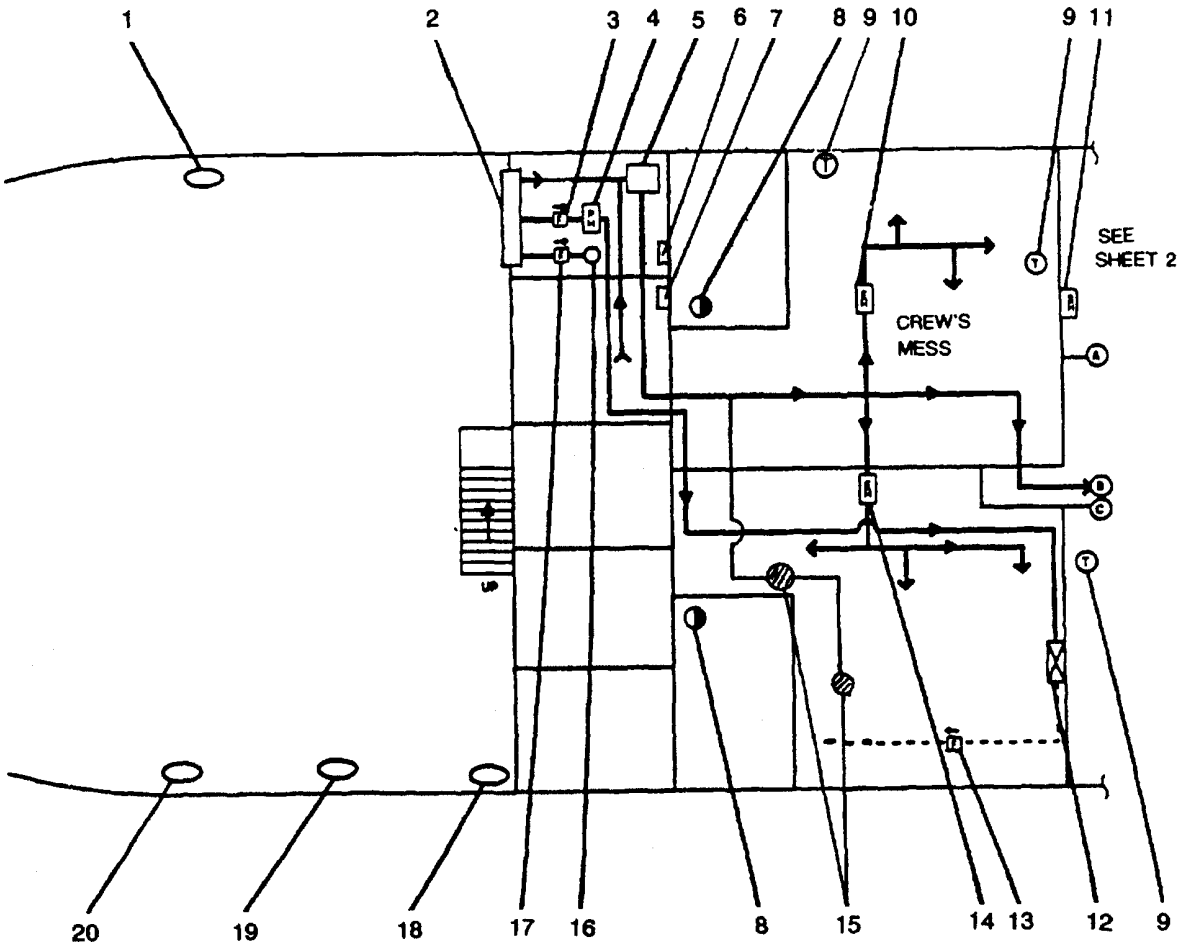


Figure 1-79. Main Deck HVAC (Sheet 1 of 3).

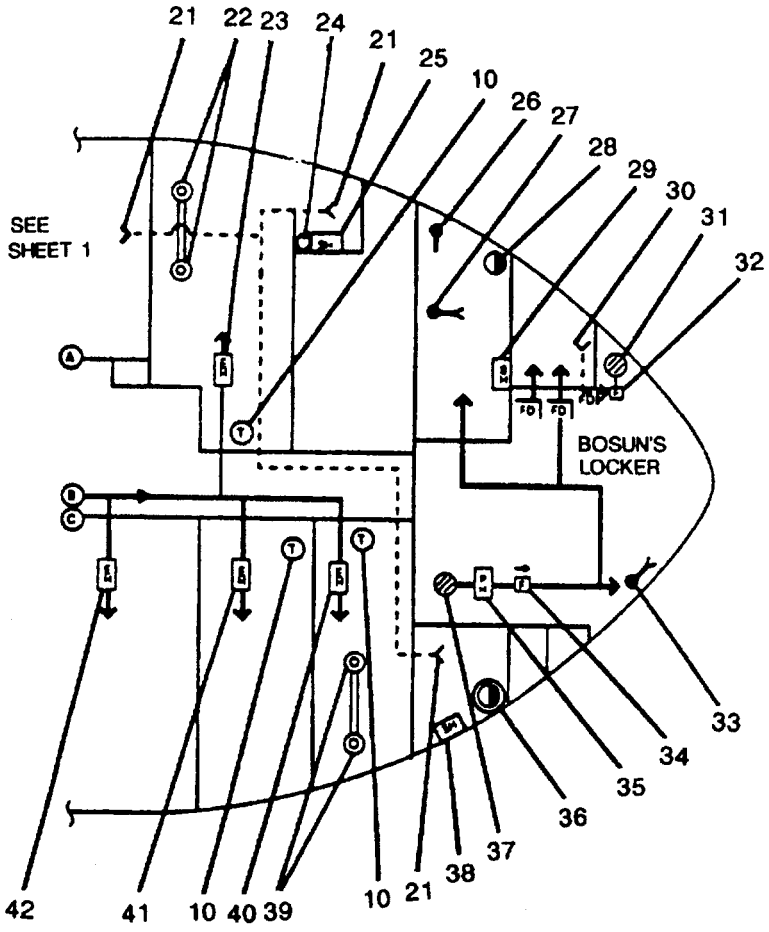


Figure 1-79. Main Deck HVAC (Sheet 2 of 3).

1. NATURAL SUPPLY FOR TOWING GEAR LOCKER
2. SUPPLY AIR INTAKE
3. FAN GALLEY S1-22-4
4. PRE/REHEATER 1-23-2
5. FAN COIL ASSEMBLY R1-25-2
6. PREHEATER 1-23-4
7. REHEATER 1-25-2
8. ENGINE ROOM SUPPLY AIR (FROM ABOVE CONTINUED DOWN)
9. THERMOSTAT
10. TERMINAL REHEATER 1-31-2
11. CONVECTION HEATER 1-40-2
12. MAKE-UP AIR FOR GALLEY VENTILATOR HOOD
13. GALLEY VENTILATOR HOOD EXHAUST FAN E1-37-1
14. TERMINAL REHEATER 1-31-1
15. GALLEY VENTILATOR EXHAUST UP
16. SUPPLY AIR DOWN TO ENGINE ROOM (FOR AMS NO. 2)
17. AMS NO. 2 SUPPLY FAN S1-22-2
18. NATURAL EXHAUST FOR AMS NO. 2 FROM BELOW
19. WELDING HOOD EXHAUST FROM BELOW
20. NATURAL EXHAUST FOR TOWING GEAR LOCKER FROM BELOW
21. SANITARY SPACE EXHAUST INTAKE
22. SUPPLY FOR AMS NO. 1 FROM 01 LEVEL CONTINUED DOWN
23. TERMINAL REHEATER 1-45-2
24. SANITARY SPACE EXHAUST UP
25. CONVECTION HEATER 1-50-2
26. DRYER EXHAUST UP
27. WASHER VENT UP
28. BOW THRUSTER COMPARTMENT NATURAL EXHAUST UP
29. SPACE HEATER 1-57-2
30. PAINT LOCKER EXHAUST INTAKE
31. PAINT LOCKER EXHAUST UP
32. PAINT LOCKER EXHAUST FAN E1-62-2
33. BOATSWAIN'S STORE NATURAL EXHAUST UP
34. BOATSWAIN'S STORE, PAINT LOCKER, AND LAUNDRY SUPPLY FAN S1-58-1
35. PREHEATER 1-57-1
36. NATURAL SUPPLY FOR BOW THRUSTER COMPARTMENT
37. AIR SUPPLY FROM ABOVE
38. CONVECTION HEATER 1-56-1
39. NATURAL EXHAUST FROM AMS NO. 1 CONTINUED UP
40. TERMINAL REHEATER 1-52-1
41. TERMINAL REHEATER 1-48-1
42. TERMINAL REHEATER 1-42-1

Figure 1-79. Main Deck HVAC (Sheet 3 of 3).

2 Laundry space. Dryer exhaust is vented to the 01 level (26) exterior. A natural exhaust is provided for the clothes washer (27). Natural exhaust fo the laundry space to the 01 level (28) is provided. This exhaust also provides natural exhaust for the bow thruster compartment A space heater (29) provides heat for the laundry space.

3 Paint locker. A non-sparking, motor driven centrifugal fan (32) removes fumes from the paintlocker. The fan (32) is connected to ducting which routes the fumes to the 01 level (31) for discharge to the atmosphere.

h. Below Main Deck (Figure 1-80).

(1) Towing gear locker. No forced air ventilation is provided. Natural supply (2) and exhaust (20) vents are connected to goosenecks on the main deck. A space heater (1) provides heat for the locker.

(2) AMS 2. A fan (17, Figure 1-79) on the main deck provides heated forced air through ducting to the engine room (4, Figure 1-80). Ducting routes and distributes this air to AMS 2. A space heater (18) supplements this heated air. A natural vent (16) to a gooseneck located on the main deck is provided. A fan (17) located in the workshop exhausts welding fumes from the weld hood (19) through ducting (15) to a gooseneck located on the main deck.

(3) Engine room. Unheated supply air is provided on port and starboard sides of the engine room (4) from the engine room supply fans. Ducting distributes this air throughout the engine room and to the EOS. One space heater (14) provides heated air for the engine room. Air intakes (13) provide exhaust ventilation through the engine room exhaust fans.

(4) EOS. A natural exhaust is provided through a louver panl on the port bulkhead. A sea water cooled/heated unit air conditioner (12) is provided on the strboard bulkhead.

(5) AMS 1. Unheated supply air (6) is provided by a fan (22, Figure 1-79) located in the 01 level fan space. Ducting routes this air to the port side of AMS 1. Natural air ventilation (10, Figure 1-80) is provided on the starboard side of AMS 1. One space heater (7) provides heat for AMS 1.

(6) Bow thruster compartment. No forced air system is provided. Natural air supply (9) is located on the starboard side, and natural air vent (8) on the port side. One space heater (7) provides heat for the bow thruster compartment.

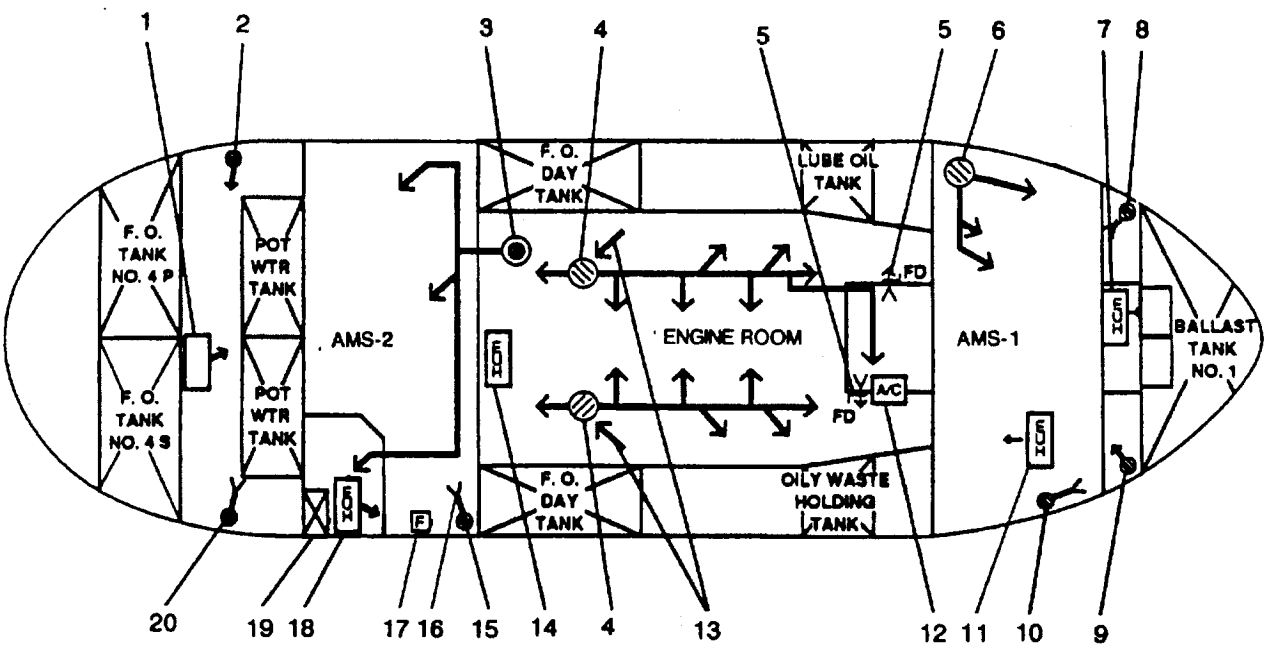
i. Fire Damper. Fire dampers are used to shut off the flow of air into a compartment in the event of fire. The galley ventilator hood system includes an automatic fire damper. Manual fire dampers are provided as described below:

(1) 02 Level (Figure 1-77). Two manual fire dampers are provided. One is located near the duct to the 03 level (4). A second fire damper is controlled from the port side of passageway, just aft of the ladder. This damper shuts off air flow from the ladder area to the passageway.

(2) 01 Level (Figure 1-78). Three manual fire dampers are provided. One is located at the top of the ladder to the main deck. This damper shuts off sanitary space exhaust from the main deck. A second damper is located in the port side of the passageway just aft of the ladder. This damper shuts off air from the ladder area to the passageway. The third damper is located forward of the second in the passageway. This damper shuts off air supply to the 02 level.

(3) Main deck (Figure 1-79). Three manual fire dampers are provided to control ventilation to the paint locker. One, located just aft of the entrance to the paint locker, shuts off the natural supply to the locker. One located above the entrance to the paint locker shuts off the forced air supply to the paint locker. The third, located in the boatswain's store forward of the paint locker, shuts off the paint locker exhaust system.

(4) EOS (Figure 1-80). Two manual fire dampers are provided (port and starboard) to control ventilation to the engine room.



1. SPACE HEATER 2-8-1
2. NATURAL SUPPLY FOR TOWING GEAR LOCKER FROM MAIN DECK
3. WATERTIGHT DUCT FROM MAIN DECK
4. DUCT FROM ENGINE ROOM SUPPLY FAN (01 LEVEL)
5. FIRE DAMPER
6. SUPPLY FROM 01 LEVEL FAN SPACE
7. SPACE HEATER 2-55-2
8. NATURAL VENT FOR BOW THRUSTER COMPARTMENT
9. NATURAL VENT FOR BOW THRUSTER COMPARTMENT
10. NATURAL VENT FOR AMS #1
11. SPACE HEATER 2-53-2
12. MARINE ROOM AIR CONDITIONING UNIT
13. ENGINE ROOM EXHAUST FAN INTAKE
14. SPACE HEATER 2-21-2
15. DUCT UP
16. NATURAL VENT FOR AMS #2
17. WELDING EXHAUST FAN
18. ELECTRIC UNIT HEATER 2-15-2
19. WELDING HOOD
20. NATURAL VENT FOR TOWING GEAR LOCKER

Figure 1-80. Below Main Deck.

1-30. Refrigeration System (Figure 1-81). The refrigeration system provides cooling for chill room, frozen stores, and thaw room. System consists of two condensing units and two unit coolers. Each condensing unit has a capacity of 0. 62 tons of refrigeration underoperating conditions. Controls are provided for automatic operation and capacity variation for light loads. Major components of system include:

a. Expansion Valve. Expansion valve controls flow of refrigerant to cooling coils. This valve operates based upon pressure and temperature of refrigerant leaving unit cooler, not room temperature.

b. Unit Cooler. Unit cooler contains coils for absorption of heat from air. Two fans circulate air across coils to improve heat transfer. A timer provides timed defrost cycles for freeze room unit to clear coils of frost buildup. This circuit is also fitted with a "fail safe" feature to prevent defrost cycle from running too long. Water generated from defrost cycle drains to a drip pan and into drain lines. Drain lines within refrigerated spaces are fitted with heat tape to prevent freezing.

c. Compressor. Compressor compresses heated refrigerant from unit coolers to improve heat transfer in condenser.

d. Condenser. Condenser is system heat exchanger. It transfers heat from R-12 refrigerant to sea water from general service system. Heated sea water is discharged overboard. Cooled refrigerant, in liquid state, flows to receiver.

e. Receiver. Receiver serves as liquid refrigerant reservoir. It receives liquid refrigerant from condenser and supplies it to expansion valve.

f. Control Box. A control box, mounted on condenser, provides controls and indicators necessary for operation of condenser unit.

g. Local Controls and Indicators. Local controls include a defrost timer for freezer room, thermostats for chill room and freeze room, and temperature gauges for chill room, freeze room, and thaw room.

1-31. Fenders and Mooring/Towing Fittings.

a. Fenders. LT has been equipped with fendering to provide necessary protection when working either head-on or stern-on. All fenders are of approved non-marking material.

b. Towing and Moorings Fittings. Towing and mooring fittings consist of bitts and chocks, towing winches, towing bar, and capstan towing winches, towing bar, and capstan are discussed in paragraph 1-32.

(1) Bitts and chocks. Bitts and chocks are fitted directly to deck plating. Insert plates and stiffening of deck has been provided to allow fittings to develop full strength.

(2) Towing bar. LT is equipped with a tow bar spanning breadth of LT stern working area. It is arranged to avoid interference with towing harness.

(3) H-bitt. Mooring and towing H-bitts are installed forward of the anchor windlass and aft of each tow winch.

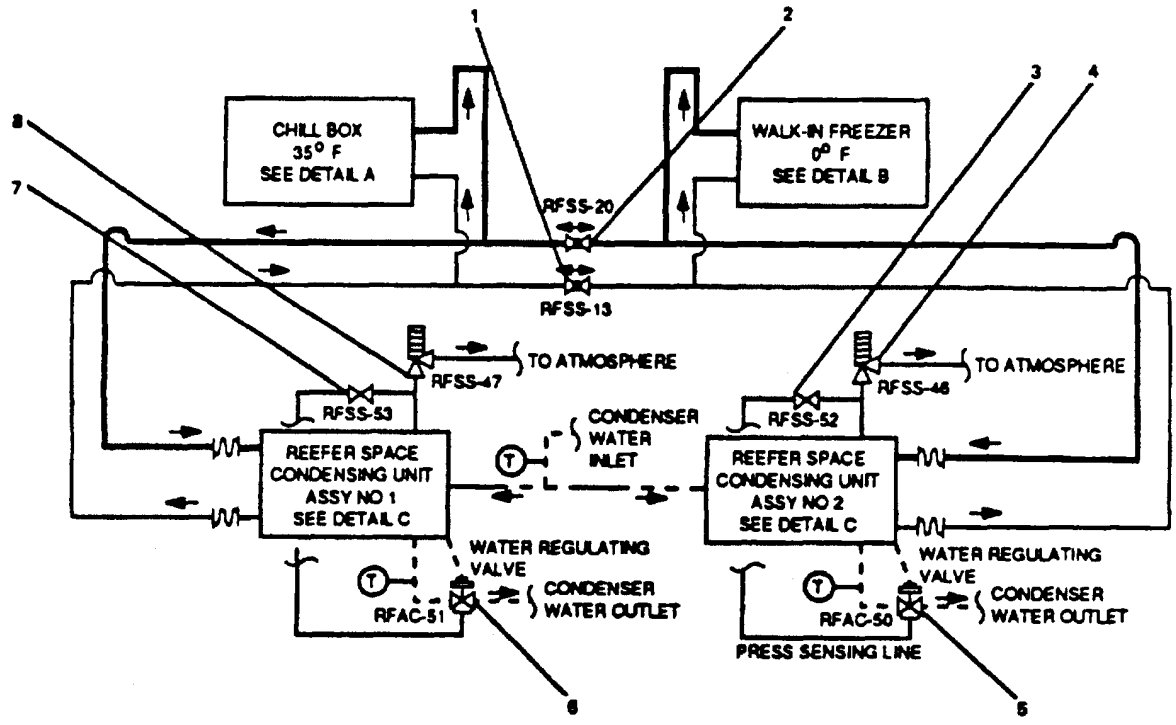
1-32. Deck Machinery. Deck machinery consists of double drum towing machine, tow pins, crane, capstan, and anchor windlass. Crane, capstan, tow pins, and anchor windlass are powered by central hydraulic power system. Double drum towing machine is powered by a dedicated hydraulic power pack. During an emergency, either hydraulic system can be used to power the deck machinery.

a. Double Drum Towing Machine. A dual drum, hydraulic powered towing machine is provided to facilitate handling of tow wire. System consists of two hydraulically powered tow winches, a diesel engine driven hydraulic pump, hydraulic reservoir with heat exchanger, and controls.

CAUTION

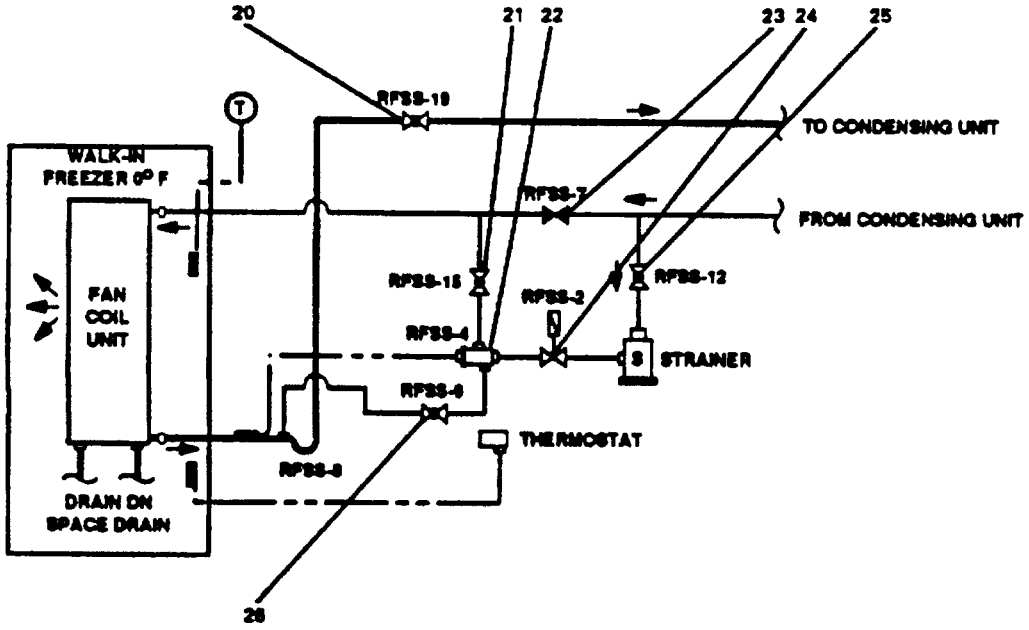
NOT TO EXCEED 80 FPM.

(1) Towing machine. Hydraulically driven towing machines are mounted on the aft main deck. Each drum holds 2,500 ft. of 2-1/4" diameter wire rope with a capability of 60,000 lbs. line pull at 50 FPM at the average (4th) layer. Maximum line pull is 150,000 lbs. at average (4th) layer.

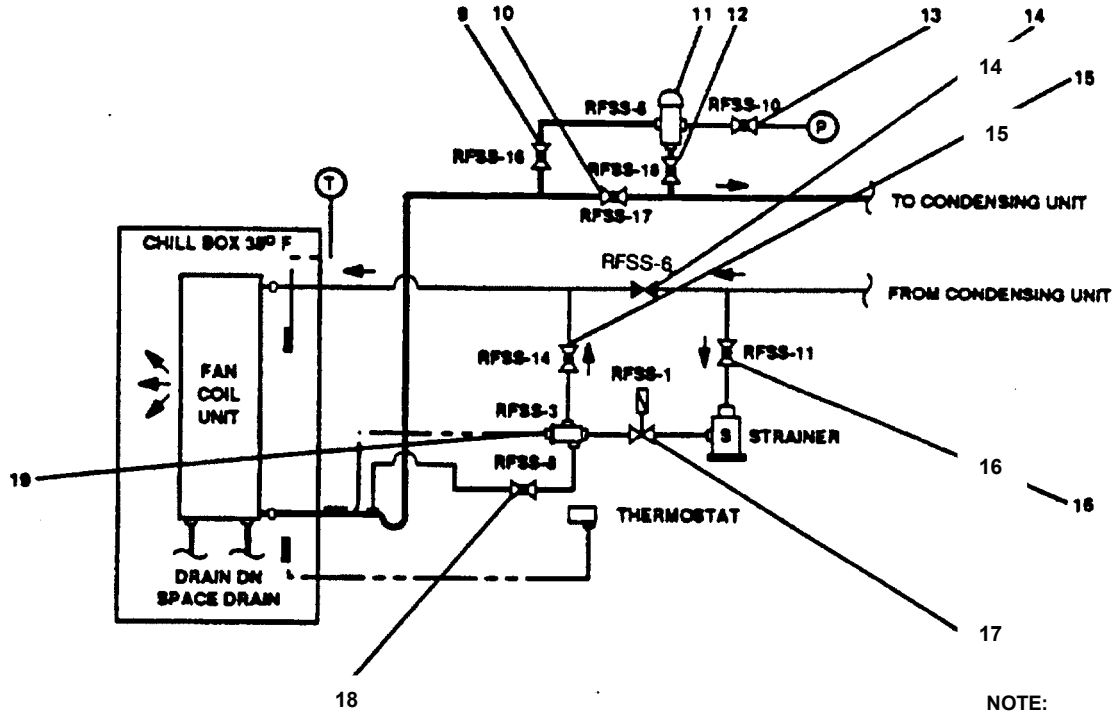


AMS-2

Figure 1-81. Refrigeration System (Sheet 1 of 3).



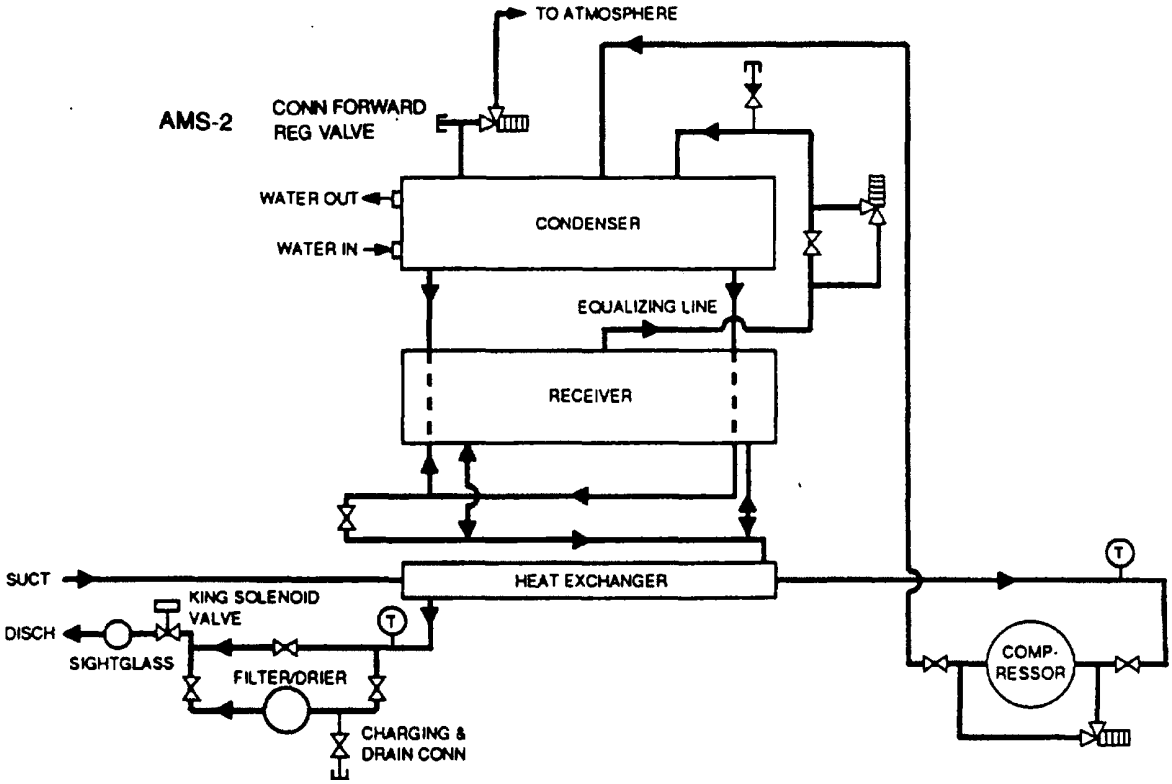
DETAIL A
CHILL B0X



DETAIL B
WALK-IN FREEZER

NOTE:
ITEMS 9 THRU 13 ARE IN AMS-2
ITEMS 14 THRU 28 ARE IN ENGINE ROOM, AFT BULKHEAD

Figure 1-81. Refrigeration System (Sheet 2 of 3).



DETAIL C

REEFER SPACE CONDENSING UNIT

1. RFSS-13, LIQUID LINE CRSVR CO
2. RFSS-20, SUCT LINE CRSVR COV
3. RFSS-52, COV - WTR RGLTR FREON
4. RFSS-46, RLF - CONDSR
5. RFAC-50, WTR RGLTR
6. RFAC-51, WTR RGLTR
7. RFSS-53, COV - WTR RGLTR FREON
8. RFSS-47, RLF - CONDSR
9. RFSS-16, EVAP PRESS RGLTR COV
10. RFSS-17, BYPASS - EVAP PRESS RGLTR
11. RFSS-5, EVAP PRESS RGLTR COV
12. RFSS-18, EVAP PRESS RGLTR COV
13. RFSS-10
14. RFSS-6, HAND EXP V
15. RFSS-14, TXV/STNR/LLSV COV
18. RFSS-11, TXV/STNR/LLSVCOV
17. RFSS-1, LLSV - CHILL BOX
18. RFSS-8, EOL LINE 19. RFSS-3, TXV - CHILL BOX
20. RFSS-19, COV - FRZ BOX COIL SUCT.
21. RFSS-15, TXV/STNR/LLSV COV
22. RFSS-4, TXV - FRZBOX
23. RFSS-7, HAND EXP V
24. RFSS-2, LLSV - FRZ BOX
25. RFSS-12, TXV/STNR/LLSV COV
26. RFSS-9, EQL LINE

Figure 1-81. Refrigeration System (Sheet 3 of 3).

Each drum can be operated from the aft control station located on the 01 deck directly above the machines or from local control stations located at each machine.

A gypsy head is mounted on the outboard end of each main shaft and gives a rope speed of 162 FPM when operated at full speed normal range or 81 FPM when driven at full speed low range.

Should the clutch-brake or motor brake fail to hold, a mechanical hook dog is provided to hold the drum from rotating in the payout direction. The dog is a ratchet type so that the drum can be rotated in the HEAVE direction with the hydraulic motor.

When the gypsy head is being used, the clutchbrake is loosened and the auxiliary brake is set so that the main drum does not rotate. The auxiliary brake is also set when the machines are not being used.

The clutch-brake is designed to release the drum from the drive gears and can be used to free-spool the towline off the drum at a maximum speed of 400 FPM. If in irons, the towline can be released from the tug by loosening the clutch-brake and allowing the line to be pulled off the drum. The inner end of the rope is clamped in such a way as to allow the rope to pull away at approximately 15,000 Ibs.

The clutch-brake is also intended to protect the machine from shock loads because it will slip under a shock load if properly tightened. A slip alarm will advise the crew if the clutch-brake is not tight enough and is excessively slipping and allowing towline to pay out. Occasional slippage in heavy seas are normal and means that the clutch-brake is operating properly.

CAUTION

Although the clutch-brake can be used to control the tension in the line when making up a tow, it must be carefully operated and observed to prevent overheating.

Also, it must never be tightened while the vessel is under full speed as the sudden shock load may damage the machine or even break the towline.

When the proper scope is established, the vessel must always be checked down or stopped and the clutch-brake tightened before proceeding to desired speed.

(2) Hydraulic drive (Figure 1-82). The dual pump, open-loop hydraulic power unit is driven by a diesel engine located in AMS 1 (starboard side). It is remotely operated from the machine with dual controls. The hydraulic reservoir has a nominal capacity of 300 gallons. The maximum flow, at 1,800 RPM, is 98 GPM (proportional to diesel engine speed). The flow is controlled b a proportional directional control valve mounted on the towing machine drive motor. The pilot signal to the directional control valve is from the remote control lever located on the operator's console.

The dual pump has a maximum flow of 98 GPM at 1,800 RPM and with the pump unloading, the maximum flow is 63 GPM at 1,800 RPM. The pump flow is proportional to the diesel engine speed and can be increased or decreased by adjusting the engine speed. The pumps have a displacement of 4.84 in. 3/ rev. and 8.89 in. 3/refv. , respectively, and will produce a maximum pressure of 3,500 psi continuous or 4,000 psi intermittent.

The towing machines are equipped with hydraulic motors having a displacement of 997.3 in. 3/rev. which will produce a torque of 13.27 ft.-lb./1,000 psi. Each motor is equipped with a 2-speed valve. When activated, the valve shifts the motor into half displacement and increases the speed by a factor of two which is the normal mode of the machine. The hydraulic motors are also equipped with spring set, hydraulic release brakes which produce a maximum braking torque of 66,300 ft.-Ibs. with the brakes at normal operating temperature.

The nominal line speed of 50 feet per minute on the average layer is achieved at flow of 64 GPM with the drive motor in half displacement. Normal operation of each machine is at 1,200 RPM diesel engine speed. If more speed is required or both machines are to be run at the same time, the diesel engine speed can be increased proportionately to the speed/flow required.

The controls on the hydraulic power unit are designed to automatically down shift the machine to a slower speed if the load is excessive. With the proportional control lever at the machine and the automatic down shift feature, the maximum horsepower can be set at the desired level and the machine will continue to pull up to the maximum horsepower or until the stall pull is reached (150,000 Ibs.).

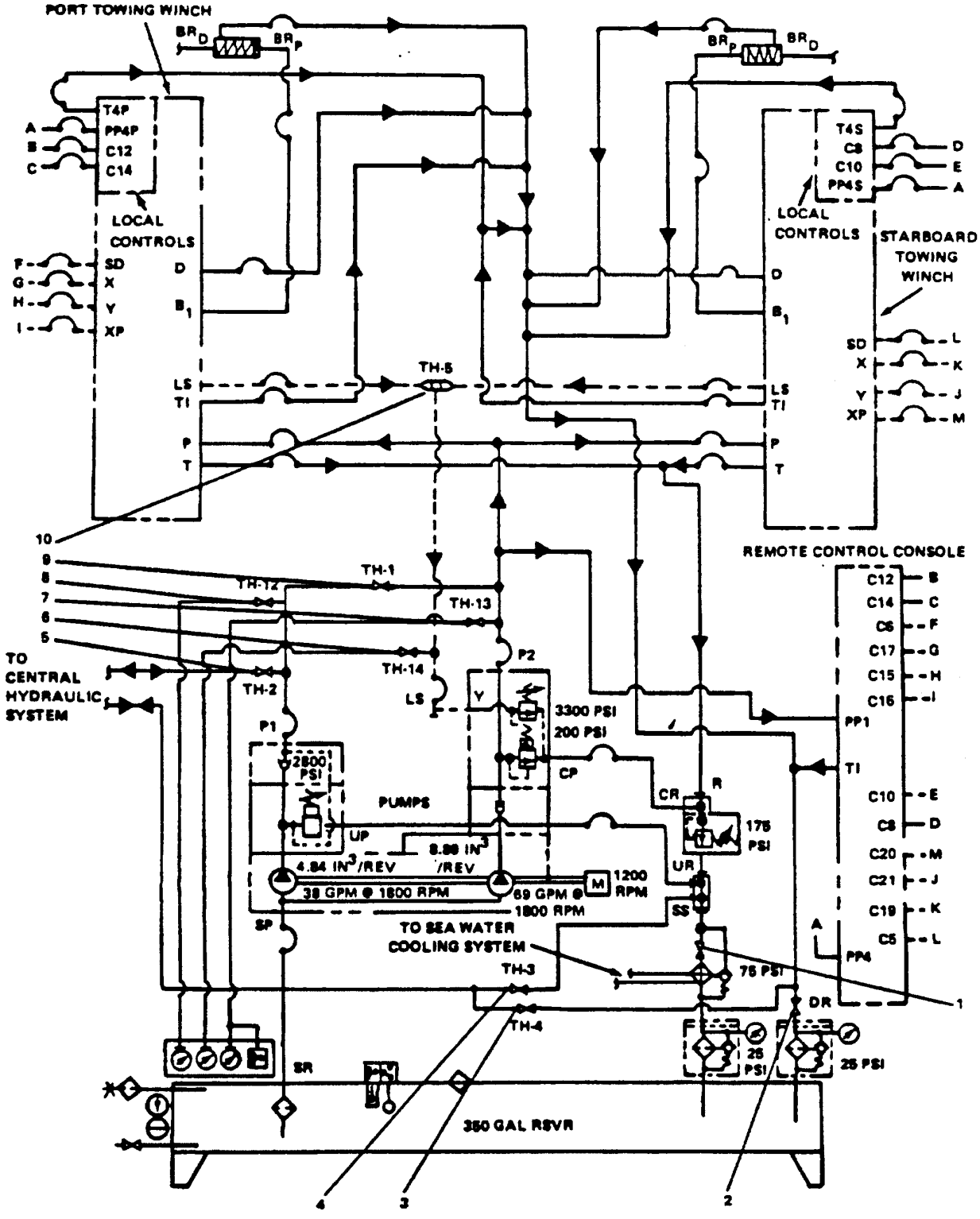


Figure 1-82. Tow Winch Hydraulic System (Sheet 1 of 2).

1. TO HYDRAULIC OIL COOLER
2. DRAIN CONNECTION WITH FILTER
3. TH-4, RTN CRSVR, TO CENT. HYD.
4. TH-3, PRESS./RTN. CRSVR. TO CENT. HYD.
5. TH-2, PRESS./RTN. CRSVR. TO CENT. HYD.
6. TH-14, CUT OUT C.O.V. TO PUMP SUPPLY
7. TH-13, GAUGE VALVE
8. TH-12, GAUGE VALVE
9. TH-1, C.O.V. - PMP DISCH. TO TOW WN. HYD. (BULKHEAD)
10. TH-5, (3-WAY DIRECTIONAL VALVE) (OVERHEAD)

NOTE:
ITEMS 1 THRU 9 ARE IN AMS-1
ITEM 10 IS IN AMS-2

Figure 1-82. Tow Winch Hydraulic System (Sheet 2 of 2).

The hydraulic reservoir is equipped with a salt water/oil heat exchanger which is controlled by a temperature switch in the reservoir. The water inlet valve will open when the temperature of the oil reaches 120°F.

Two return filters rated at 10 microns nominal are mounted in the reservoir. The large main filter cleans the full loop flow as it returns to the reservoir while the smaller, secondary filter cleans the motor flushing oil as well as the control drains. Low level float switches monitor the oil level in the reservoir.

(3) Diesel engine. The hydraulic drive is powered by the pump drive engine located in AMS 1. The hydraulic oil pump is directly coupled to the engine. For a complete discussion of the pump drive engine, see paragraph 1-18.

The oil level in the hydraulic reservoir is monitored by float switches which provide actual contact closure if the level is too low. The first closure activates a visual and audio alarm which gives the operator time to manually bring the system to a stop and shut down the diesel engine. In the event that a catastrophic loss of oil occurs, the second contact closure will automatically shut down the diesel engine.

(4) Controls. Controls provided with the machines consist of a programmable controller, peripherals, line tension indicator, and a cable-off indicator.

(a) Programmable controller. The programmable controller accepts input signals from input peripherals and produces output signals in accordance with program or controller logic. The program is stored in the programmable controlled battery back-up memory and is also stored in a separate program storage cartridge. The battery life expectancy without power on is approximately 3 years.

(b) Input peripherals. Input peripherals provide input signals to the programmable controller for annunciation of abnormal conditions and emergency shutdowns. Input peripherals are listed below:

1 Oil temperature switch. Located in the reservoir, this switch energizes the heat exchanger water supply solenoid when oil temperature reaches 121°F.

2 Oil temperature alarm switch. Located in the reservoir, this switch initiates hydraulic system fault alarm when oil temperature reaches 161°F.

3 Oil level alarm switch. Located in the reservoir, this switch initiates hydraulic system fault alarm when oil level is low.

4 Oil level shutdown switch. Located in the reservoir, this switch actuates hydraulic system fault alarm when oil level drops below alarm level and provides a signal for operator to shut down the diesel engine.

5 System pressure switch. This actuates a system pressure low alarm and provides a signal for operator to shut down the diesel engine.

6 Port (starboard) cable-off indicator meter relay. This actuates an alarm on corresponding machine when less than 300 feet of hawser is left on drum. The cable-off meter relay also initiates shutdown of corresponding towing machine when less than 200 feet of hawser is left on drum.

(c) Output peripherals. Output peripherals provide output signal (from the programmable controller) information to the towing machine operator about all abnormal conditions and malfunction of both towing machines and associated equipment.

(d) Line tension indicator (port and starboard). The line tension indicator consists of a load cell located under the hydraulic brake torque arm and a tension meter located at the remote operator console. When a load is applied to the towline of the machine, the load cell sends a signal to the tension meter which indicates the applied load on the machine (based on the average layer of the cable drum).

(e) Cable-off indicator (port and starboard). The able-off indicator consists of a transducer located on the machine in conjunction with. the cable-off meter located on the remote operator console. As the drum rotates and cable comes off the drum, the transducer sends a signal to the meter which indicates the amount of cable that has turned off the drum.

b. Central Hydraulic System (Figure 1-83). The central hydraulic system provides power for the crane, capstan, tow pins, and anchor windlass. It may also be aligned to power the towing winches. A cross-over allows the tow winch hydraulic power unit to power the central hydraulic system in the event of failure of the central hydraulic system power pack. The central hydraulic system is composed of a hydraulic fluid reservoir, two pump units, filters, control panel, and piping system.

(1) Pump units. The pump units are composed of a hydraulic pump driven by an electric motor. The hydraulic pump is an axial piston type pump, with a rated capacity of 32 gallons per minute at 2550 psi. The pump is driven by a 50 horsepower electric motor. Power (440 Vac) is supplied from the main switchboard.

(2) Control panel. The control panel provides operating controls and indicators.

(3) Operation. Pumps draw hydraulic fluid TM 55-1925-207-10 through a strainer and pressurize the hydraulic piping system. Return fluid flows through two return filters and back to the reservoir. A high temperature sensor and a low oil sensor are installed in the reservoir. Either a high temperature or low oil condition causes the control circuitry to stop pump operation.

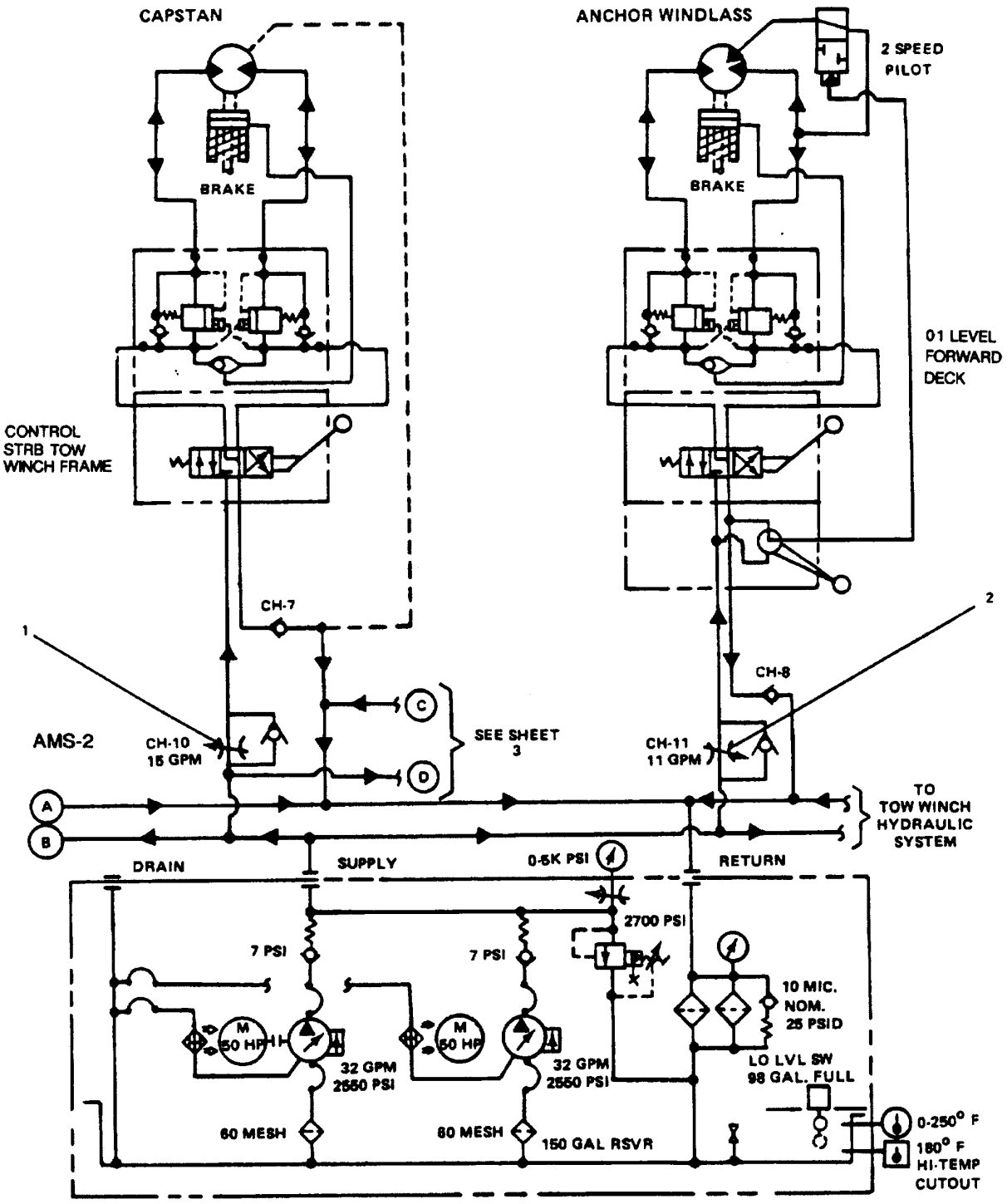
c. Crane. The crane is a pedestal mounted, extendible boom unit designed for weather deck mounting. Power for the unit is provided from the central hydraulic system. The crane is rated to handle 15,000 lbs. at minimum radius and 3,000 lbs. at a 35 foot radius. The unit is capable of operation with rated loads at list angles of up to 15 degrees.

(1) Boom. The booms are structural steel tubing. The heel of the main boom has bronze bearings which pivot on a hardened stainless steel pin. The extend booms ride on nylon slide pads. The telescope system is comprised of a single two stage cylinder which spans between the main boom section and the final extend section. The cylinder has an integral load holding valve to hold the load in the event of loss of hydraulic pressure. The telescope system extending speed ranges from 0 to 14. 5 feet per minute. Boom outreach is 15 feet retracted and 35 feet extended.

(2) Luffing system. The luffing system raises and lowers the angle of the boom. The luffing system consists of a 7inch bore cylinder which anchors on the spindle and lifts the main boom. The cylinder is equipped with an integral load holding valve to hold the load in the event of a loss of hydraulic pressure. The luffing system speed ranges from 0 to 3 degrees per second with a maximum boom angle of 80 degrees.

(3) Swing system. The crane swing system consists of dual planetary gear reducers powered by a hydraulic motor. The hydraulic motor circuit has a dual counterbalance valve. This valve provides dynamic braking for the swing system. The swing system is capable of 360° continuous rotation at speeds from 0 to 1 rpm.

(4) Hoisting system. The hoisting system consists of a hydraulically driven planetary winch and associated rigging. The winch is supplied with a brake valve to control and brake the winch. The winch is capable of 5,300 pound line pull at 60 feet per minute on a bare drum. The crane is equipped with 270 feet of 1/2 inch diameter wire rope. The crane has a load block and swivel hook which is rigged for 3 part line. The hoist system is capable of lifting 15,000 pounds at a block speed of 20 feet per minute.



POWER UNIT

Figure 1-83. Central Hydraulic System (Sheet 1 of 3).

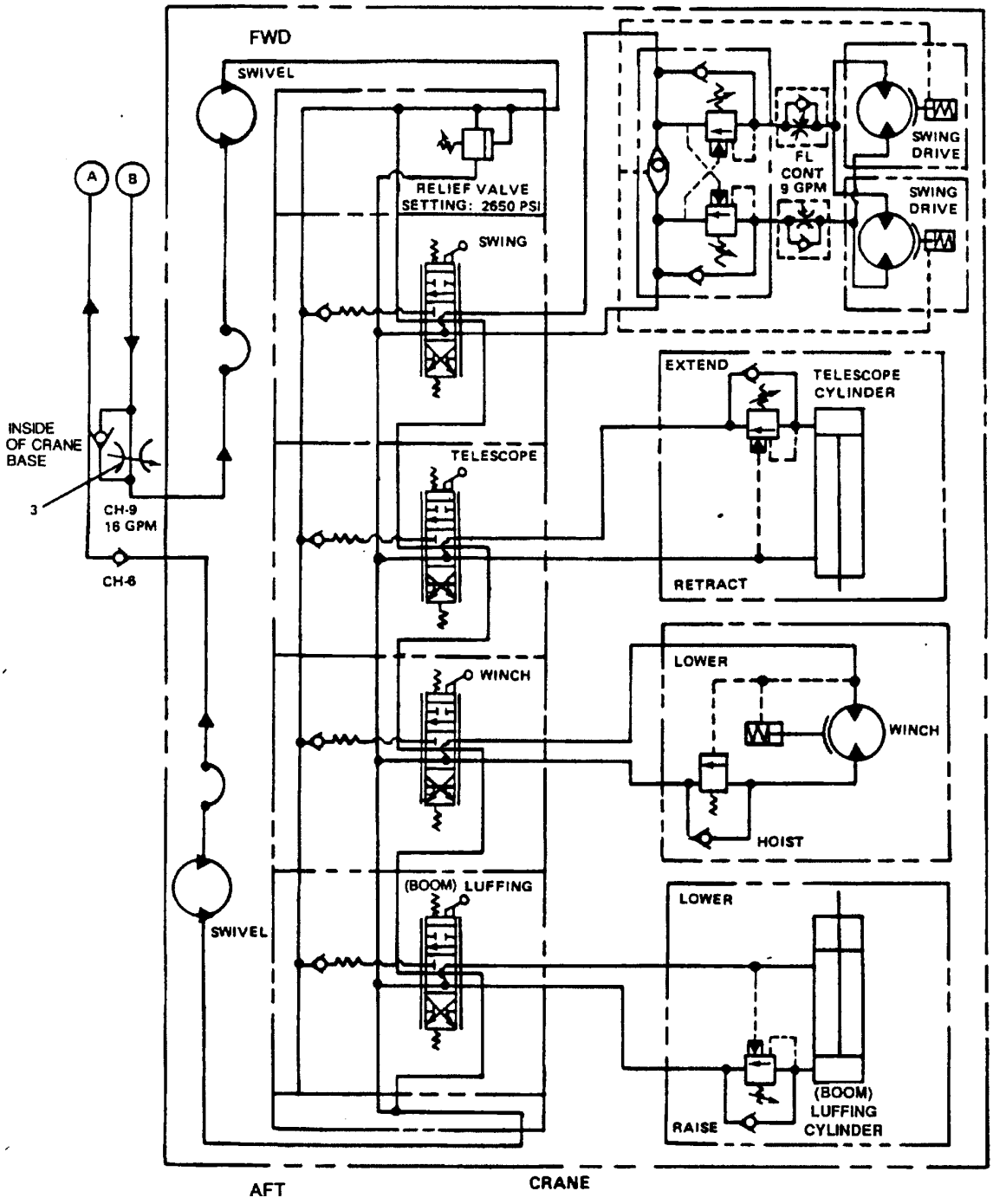
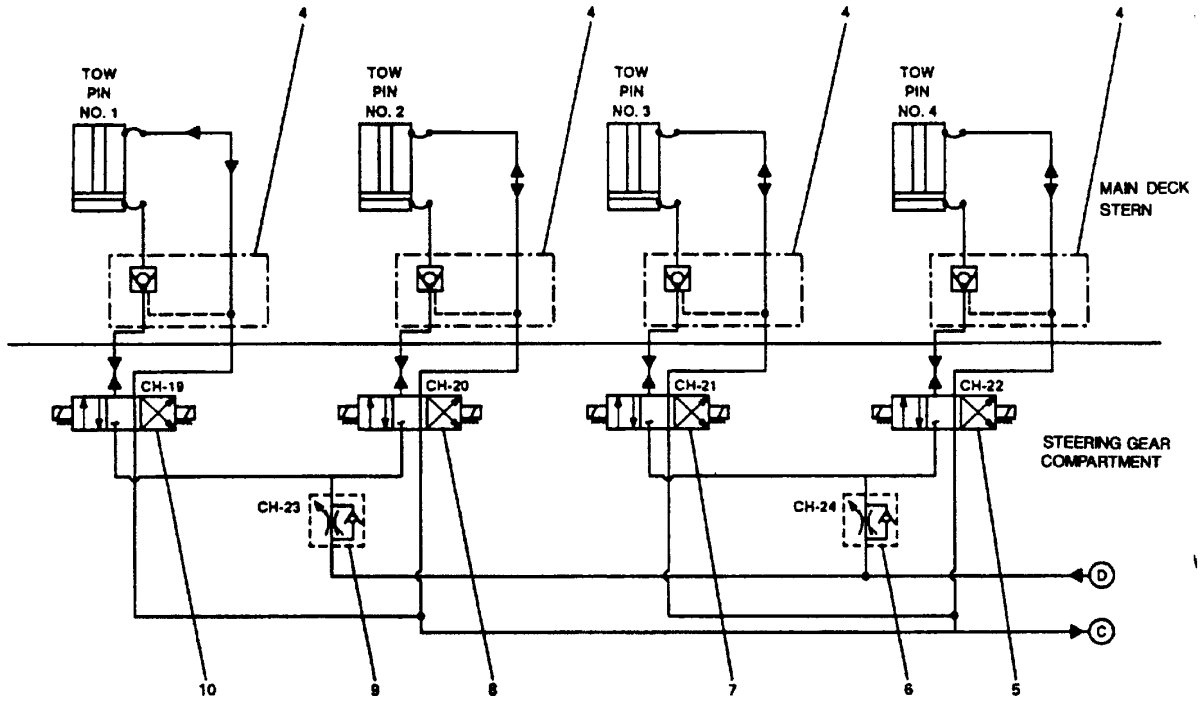


Figure 1-83. Central Hydraulic System (Sheet 2 of 3).



1. CH-10, FLW. CONT. -CAPSTAN
2. CH-11, FLW. CONT. - ANCH. WINDLASS
3. CH-9, FLW. CONT. -CRANE
4. CHECK VALVE
5. CH-22, DIR. CONT. - TW PIN NO. 4 (PORT)
6. CH-24, FLW. CONT. - TOW PIN 3 & 4 (PORT)
7. CH-21, DIR. CONT. - TOW PIN NO. 3 (PORT)
8. CH-20, DIR. CONT. - TOW PIN NO. 2 (STBD)
9. CH-23, FLW. CONT. - TOW PIN 1 & 2 (STBD)
10. CH-19, DIR. CONT. - TOW PIN NO. 1 (STBD)

Figure 1-83. Central Hydraulic System (Sheet 3 of 3).

d. Capstan. The capstan has a 30 inch barrel diameter which can handle an 8 inch circumference nylon hawser with a line pull of 15,000 pounds at 40 feet per minute or a light line pull of 5,000 pounds at 80 feet per minute. The capstan is statically rated to withstand the breaking strength of two 8-inch nylon ropes (294,000 pounds) when used as a bitt. The capstan is powered by a hydraulic motor driving through a planetary gear box. A directional control valve assembly is provided to control the capstan. The controls are equipped with an overcenter valve with a brake shuttle which actuates the hydraulic brake. The speed and direction of the capstan are controlled by the control valve (handle). The capstan is locked in place when the control handle is in the neutral position. The control handle is equipped with a spring to return it to the neutral position when released. The reverse compensation feature of the hydraulic motor slows the motor as hawser tension increases. This ensures that the horsepower remains constant.

e. Anchor Windlass. The anchor windlass features two wildcat for 1-inch stud link chain and two gypsy heads fitted to either end of the main shaft. The 18-inch diameter gypsy heads will handle 8-inch circumference mooring lines. The windlass is driven through a central worm gear with a fail-safe hydraulic disc brake and a two-speed hydraulic motor located below deck. Two speed ranges and variable speed control allow the windlass to be operated at a wide range of speed and torque.

The control for the windlass features a closed center, pressure compensated, directional control valve; a dual overcenter (counterbalance) valve with built in brake shuttle; and a manual two-speed valve for selecting high or low speed range. The manual control valve assembly is mounted in the local control panel. Hydraulic power is supplied from the central hydraulic system.

Each wildcat is equipped with a band brake which is capable of stopping and holding the anchor. A radial dog clutch engages the drive to each wildcat for raising or lowering the anchor at speeds up to 25 FPM. Disengaging the dog clutch and releasing the brake allows the wildcat to free wheel. With the clutch disengaged and the brake set, the gypsy heads can be operated independent of the wildcat. The anchor windlass will lift a 2,000 lb. anchor and 60 fathoms of 1 inch stud link chain at a minimum rate of 25 FPM and lift the anchor and 120 fathoms of chain at approximately 12 FPM. The gypsy heads will run at creep speed to 7.5 RPM which gives a mooring line speed of 40 FPM maximum. The two-speed hydraulic motor functions as a two speed transmission which gives two modes of operation. The low speed high torque (LSHT) is used for lifting both anchors simultaneously or one anchor from deeper levels. When the load has been sufficiently reduced, the motor can be shifted to half displacement (high speed low torque) (HSLT)) and the speed of retrieval doubled.

(1) Low speed, high torque (LSHT). In this mode, the motor is shifted by means of the remote speed control lever into full displacement. The motor then operates at half normal speed but with twice the torque.

(2) High speed, low torque (HSLT). In this mode, the motor is shifted by the same means into half displacement which doubles the speed (at the same flow) but halves the torque.

f. Tow Pins. Two sets of tow pins are provided on the main deck aft. The tow pins can be hydraulically raised or lowered as required for towing operations. Tow pin components consist of directional control, flow control and check valves located in the steering gear compartment. The valves supply hydraulic fluid to hydraulic cylinders on the main deck to raise and lower the tow pins. Each tow pin is controlled by toggle switches on the 01 level towing machine control station or toggle switches on local control stations on the port and starboard side of the main deck.

1-33. Workboat and Life Rafts. One workboat is provided for routine and emergency use and two life rafts are provided for emergency use.

a. Workboat. The workboat functions as the utility small craft for operations such as sea rescue, tending towing gear, and personnel transport. The rigid bottom, inflatable workboat has a 40 hp outboard motor. It is deployed and recovered using the crane (see paragraph 1-32.c.).

b. Life Raft. Two life rafts are provided for use in abandoning ship or other emergencies. The life rafts are designed for compact storage aboard ship and for quick inflation. They are installed on racks for quick deployment. The life raft is inflated by pulling on the "automatic painter." The life raft hydrostatic release mechanism will automatically actuate at a depth of 15 to 20 feet if the LT should sink. The container is inherently buoyant and will float to the surface.

1-34. Doors, Hatches, Scuttles, and Windows.

a. Doors. Hatches, and Scuttles. Doors, hatches, and scuttles provide access to spaces of either privacy, security, or watertight/firetight integrity. Interior doors primarily provide access between above main deck interior spaces where security of watertight integrity is not a concern. Watertight doors provide access to interior spaces from weather spaces and to compartments where watertight integrity is required. Hatches provide access to below deck areas. Hatches offer watertight integrity when closed and dogged. When open, hatches allow transfer of equipment and personnel between decks.

b. Sliding Watertight Doors (Figure 1-84). Two sliding watertight doors are provided, one between AMS 1 and the engine room, and another between AMS 2 and the engine room. These doors are used to seal off bulkheads in case of emergency. The doors are flametight and watertight. They can be operated from a remote location or from either side of the door. The door is powered by a hydraulic cylinder. Power is supplied by the hand pumps. The hand pumps located on either side of the door control the opening and closing of the door, depending on the direction the hand pump is rotated. The remote location hand pump (main deck) can only close the door. A supply tank is mounted on the bulkhead near each hand pump. This tank provides hydraulic fluid necessary for the system.

c. Windows. All glass on board the LT is heat treated and readily replaceable aboard ship. All windows, airports, fixed lights in exterior doors, and panels (except pilothouse windows), which cause light to reflect on the structure are provided with deadlight covers, light excluding shades, lined drapes, or other devices. Removable insert screens are provided for all airports. Screens are designed to insert into the airports from outside and fit airport dogs. The complete assembly is readily removable from the airport.

1-35. Cathodic Protection System. The cathodic protection system (Figure 1-85) eliminates the rusting or corrosion which occurs on metal immersed in water. This system is installed on the exterior wetted hull of the LT. The system eliminates corrosion on the hull, rudder, and propeller. Corrosion protection of hull openings and recesses such as sea chests and intake and discharge ports is provided only to a limited degree. The system has little affect on marine growth on the hull; however, the chlorine generated at the anodes is an effective sterilizing agent and will normally keep the hull areas in the immediate vicinity of the anode completely free of such growth.

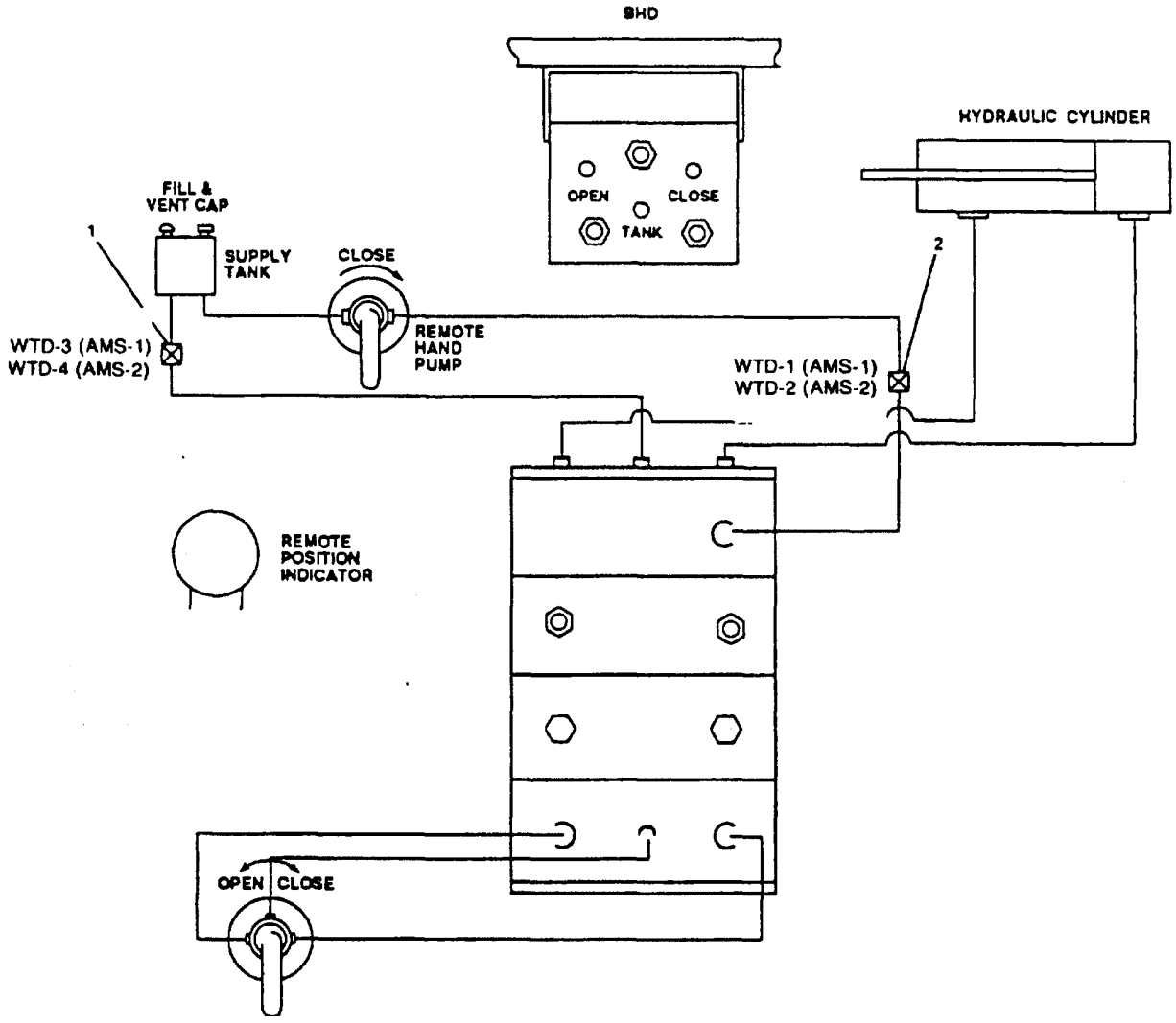
The corrosion of metal immersed in water is caused by a very small current flowing from one small area of the hull to another. The small areas where the current leaves the hull ad enters the water are called “anodic" while the small areas where the current enters the hull from the water are called “cathodic." Corrosion or rust occurs only at the anodic areas. When the entire hull area is considered, these small currents can add up to hundreds or even thousands of amperes.

The reference electrode (2) is mounted through the hull (3) of the ship and is exposed to the seawater. The anode (4) is also mounted through the hull and electrically insulated from it. A controller (1) is connected to the reference electrode (2). The controller (1) delivers a control signal to the power supply (5). The power supply creases do voltage which is connected to he anode (4) and hull (3), suppressing current flow from the small anodic areas, making the entire hull "cathodic," and stopping the corrosion on the hull.

Two reference electrodes (2) are insulated from the hull (3) and do not receive any anode current. They are used to determine how much cathodic protection is provided to the hull. The controller (1) uses the reference electrode (2) reference signal to determine whether the power supply (5) and anodes (4) should deliver more or less current.

1-36. Workshop. Workshop equipment provides for general machining, threading, grinding, drilling, and welding function. The shop contains an arc welder, drill press, lathe, vises, bench grinder and associated equipment.

1-37. Laundry Equipment. Laundry equipment is used by the LT crew to wash, dry, and maintain uniforms and linen. Laundry equipment consists of an electric automatic washer, electric dryer, iron, ironing board, clothes wringer, double sink, and storage cabinet. The automatic washer and double sink drain to the ship sewage drain system.



1. [AMS-1] WTD-3,
   [AMS-2] WTD-4,

2. [AMS-2] WTD-1,
   [AMS-2] WTD-2,

Figure 1-84. Hydraulic Sliding Door.

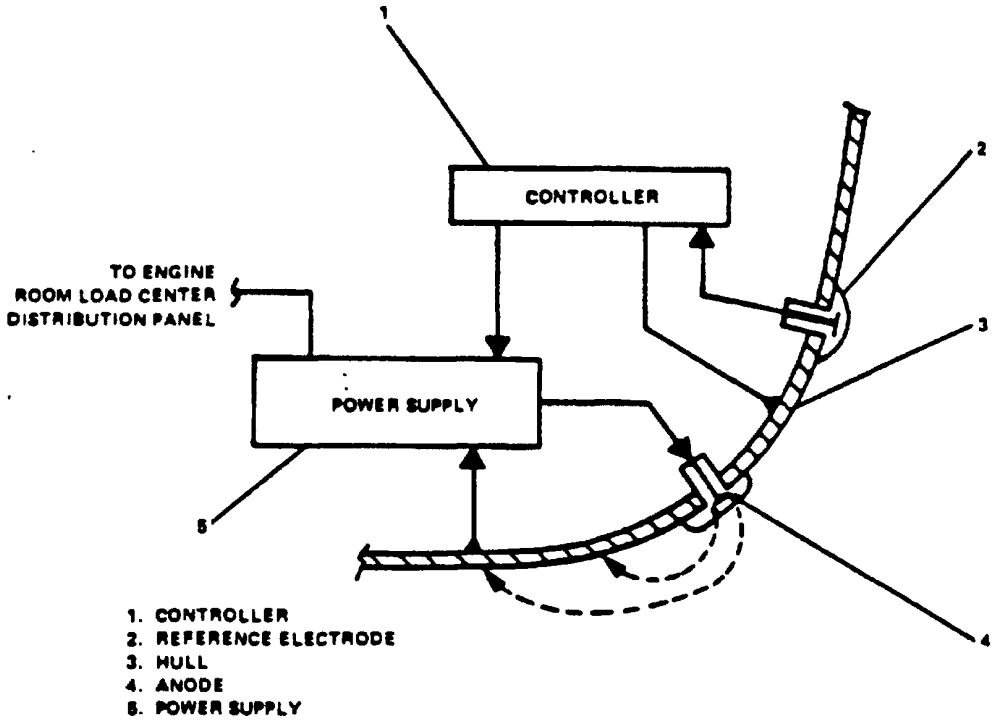


Figure 1-85. Cathodic Protection System Block Diagram.

1-38. Commissary Complex. The commissary complex is designed to provide cafeteria style service for the crew. The complex consists of the galley and messroom. Refrigerated and frozen storage for perishable provisions is provided by walk-in units located off the galley. Separate free-standing refrigerator and freezer are provided for day stores. Other galley equipment is listed in Table 1-7. The Gaylord hood includes quick release automatic fire damper and automatic hot water cleaning features.

1-39. Armament. Four machine gun mounts are provided, two for .50 Cal. (M2HB) machine guns and two for the 7.62 mm machine guns (M60). Two ammunition lockers are provided, one near each .50 Cal. mount.

1-40. Entertainment System. The entertainment system consists of a UHF/ VHF antenna, an antenna wiring system, television, and a video cassette recorder (VCR). The antenna, mounted on the 04 level, receives the signal. The signal is amplified and split as necessary to provide connections in the various staterooms and the mess/ recreation space. The television and VCR are installed in the mess/recreation space.

Table 1-7. Commissary Equipment.

ITEM	QTY	LOCATION
Electric Range	1	Galley
Electric Griddle	1	Galley
Electric Fry Kettle	1	Galley
Electric Mixer	1	Galley
Electric Slicer	1	Galley
Baker's Scale	1	Galley
Steam Table	1	Galley
Dishwasher	1	Galley
Garbage Disposal	1	Galley
Coffee Maker	2	Mess & Galley
Milk Dispenser	1	Mess
Beverage Dispenser	1	Mess
Microwave Oven	2	Mess & Galley
Electric Can Open	1	Galley
Trash Compactor	1	Galley
Toaster	2	Mess & Galley
Hood	1	Galley
Ice Maker	1	Mess

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CHAPTER 2

OPERATING INSTRUCTIONS

SECTION I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

Table of Contents

Compartment or Function/Figure Title – Continued | Fig. No.

NOTE

Not applicable to Hull No. LT 801, LT 804 and LT805. Reference Para. 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment details and installation drawings.

Compartment or Function/Figure Title - Continued — Fig. No.

2-1. General. Operator's controls and indicators are functionally explained in Table 2-1, Description of Operator's Controls and Indicators. Each control and indicator for the LT is listed. An associated illustration is given with callouts corresponding to the item number in Table 2-1. The control or indicator is described from the point of view of the operator. Names of items called out in the table correspond to labels that are located on the actual equipment. The exact words or numbers located on the gauge, dial, button or switch are illustrated where possible. This has been done to help the operator in locating and properly operating the equipment or system. However, the operator should understand that a vessel's life cycle is quite long. Normal replacement of controls or indicators may vary slightly from those originally installed. The FUNCTION column of this table briefly describes the functions of the control or indicator. Readings that an operator is likely to see are provided in Table 2-2, Section II of this chapter.

a. *Table Arrangement*. Table 2-1 is laid out in either space by space arrangement or function/equipment in the following order:

(1) Pilothouse
(2) 03 Level (Exterior)
(3) Enclosed Operating Station (EOS)
(4) General (Fire Fighting and Intercommunications Systems)
(5) Damage Control Center
(6) 02 Level (Exterior)
(7) Heater Controls
(8) Emergency Generator Room
(9) 01 Level (Exterior) (Forward)
(10) 01 Level (Exterior) (Aft)
(11) Main Deck (Exterior)
(12) Galley
(13) Mess/Recreation Room
(14) Boatswain's Stores
(15) Laundry Space
(16) Bow Thruster Compartment
(17) Auxiliary Machinery Space 2
(18) Workshop
(19) Engine Room
(20) Auxiliary Machinery Space 1
(21) Electrical Power Distribution
(22) Machinery monitoring

The electrical power distribution panels listed will help the operator locate panels to perform PMCS and Operating Procedures provided later in this chapter.

b. *Locating Controls and Indicators*. There are two methods to locate a particular control or indicator. (1) Go to the section table of contents, find the compartment where the control or indicator is located. The specific piece of equipment and the associated figure number will be listed. Figures and associated tabular information are located together. (2) Go to the alphabetical index located at the back of this manual. The specific piece of equipment will be listed. Subordinate headings for controls and indicators will list the figure number for that specific piece of equipment. Figures and associated tabular information are located together.

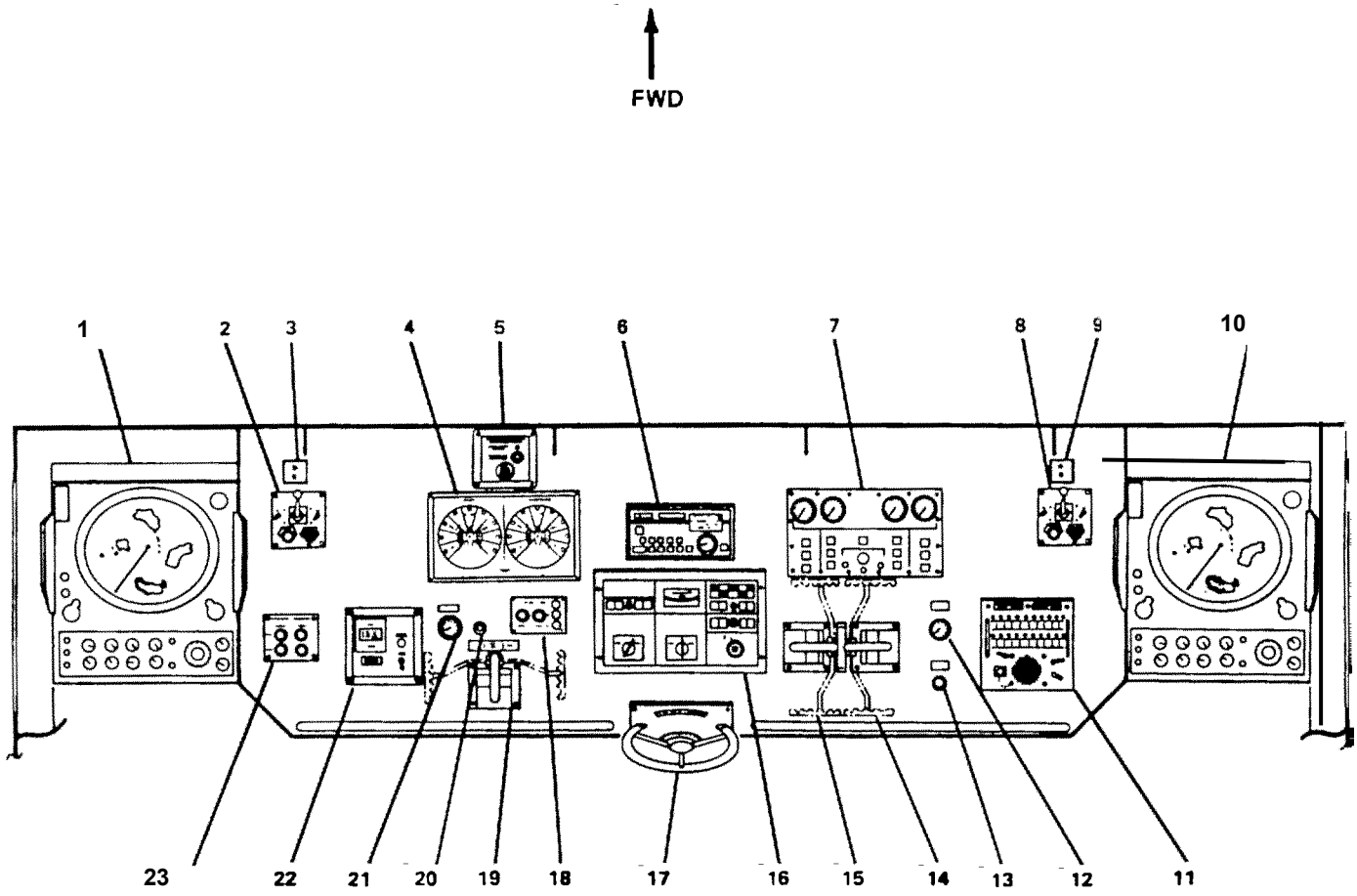

Figure 2-1. Pilothouse Console.

Table 2-1. Description of Operator's Controls and Indicators

Key	Control or Indicator	Function
Pilothouse Console (Figure 2-1)		
1	S-Band Radar Indicator	Provides azimuth range indicator with RAYPATH Automatic Radar Piloting Aid (ARPA).
2	SEARCHLIGHT Panel	Provides controls for port searchlight (see Figure 2-12).
3	S-BAND ANTENNA DISCONNECT IND PNL	RED light indicates S-band antenna radar disconnected from indicator (1). GREEN light indicates S-band antenna connected to indicator (1).
4	Engine Order Telegraph	Indicates desired speed and directional signals to EOS (see Figure 2-2).
5	ENGINE ORDER TELEGRAPH POWER FAILURE ALARM	This panel provides an alarm in event of power loss (see Figure 2-2).
6	Autopilot Control Panel	Provides control of vessel autopilot system (see Figure 2-3).
7	Remote Propulsion Indicator Panel	Provides indicators for propulsion machinery (see Figure 2-4).
8	SEARCHLIGHT Panel	Provides controls for starboard searchlight (see Figure 2-12).
9	X-BAND ANTENNA DISCONNECT IND PNL	RED light indicates X-band antenna is disconnected from indicator (10). GREEN light indicates X-band antenna connected to indicator (10).
10	X-Band Radar Indicator	Provides AZIMUTH range indicator with RAYPATH Automatic Radar Piloting Aid (ARPA).
11	LS-519A/SIC INTERCOMMUNICATION STATION	Provides station-to-station shipboard communications (see Figure 2-31).
12	CONTROL AIR PRESSURE Gauge	Gauge indicates command transfer control air pressure in psi.
13	COMMAND TRANSFER Plunger	Acknowledges control air transfer at pilothouse.
14	STBD MN ENG THROTTLE/CLUTCH	Controls speed of starboard main engine and direction of starboard shaft.

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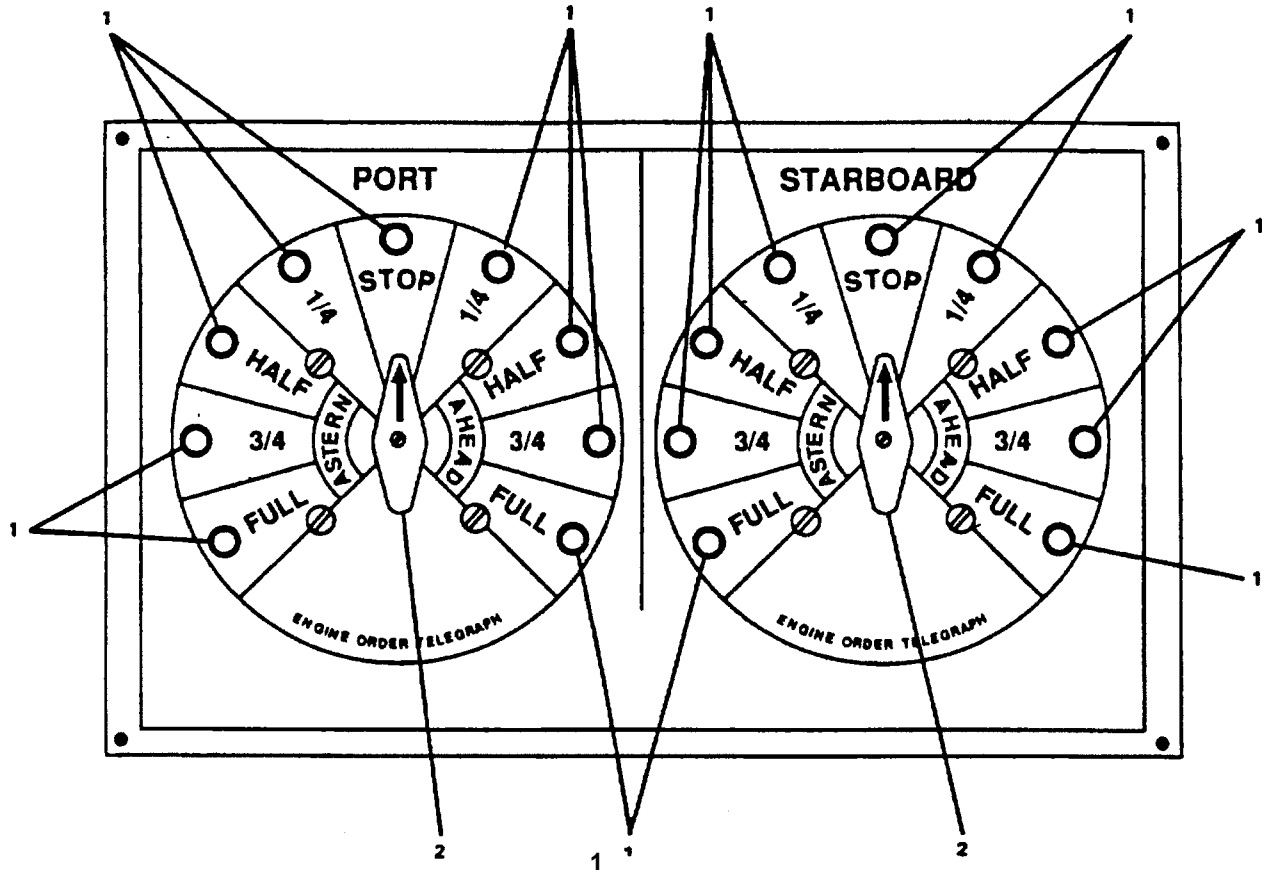
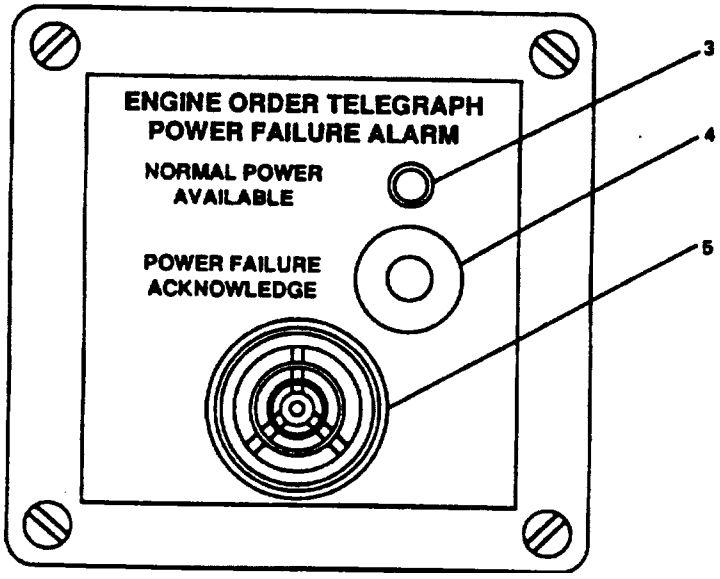
Table 2-1. Description of Operator's Controls and Indicators

Key	Control or Indicator	Function
Pilothouse Console (Figure 2-1) (Continued)		
15	PORT MN ENG THROTTLE/CLUTCH	Controls speed of port main engine and direction of port shaft.
16	Steering Gear Control Panel	Provides control of steering system (see Figure 2-5).
17	Helm	Turning helm causes rudder directional change proportional to and in same direction as helm travel.
18	Bow Thruster Control Panel	Provides control of Bow Thruster system (see Figure 2-6).
19	BOW THRUSTER THROTTLE/CLUTCH	Provides control of bow thruster engine speed and directional control for bow thruster.
20	Dimmer Control for Bow Thruster RPM	Controls lighting level of bow thruster RPM (18) gauge.
21	SHAFT RPM BOW THRUSTER Meter	Indicates bow thruster engine speed.
22	DOPPLER SPEED LOG REMOTE DISPLAY	Displays vessel speed in knots.
23	FIRE PUMP REMOTE CONTROL Panel	Provides remote control for fire pumps (see Figure 2-7).





EOT POWER FAILURE ALARM

Figure 2-2. Engine Order Telegraph.

Table 2-1. Description of Operator's Controls and Indicators

Key	Control or Indicator	Function
Engine Order Telegraph (Figure 2-2)		
1	LEDs	LED indicates selected speed and direction.
2	Selector Knob	Knob used to select desired speed and direction.
3	NORMAL POWER	Indicates EOT is operating on ship power. AVAILABLE Indicator
4	POWER FAILURE ACKNOWLEDGE Indicator	Acknowledges POWER FAILURE ALARM.
5	Horn	Audible alarm indicates power failure.

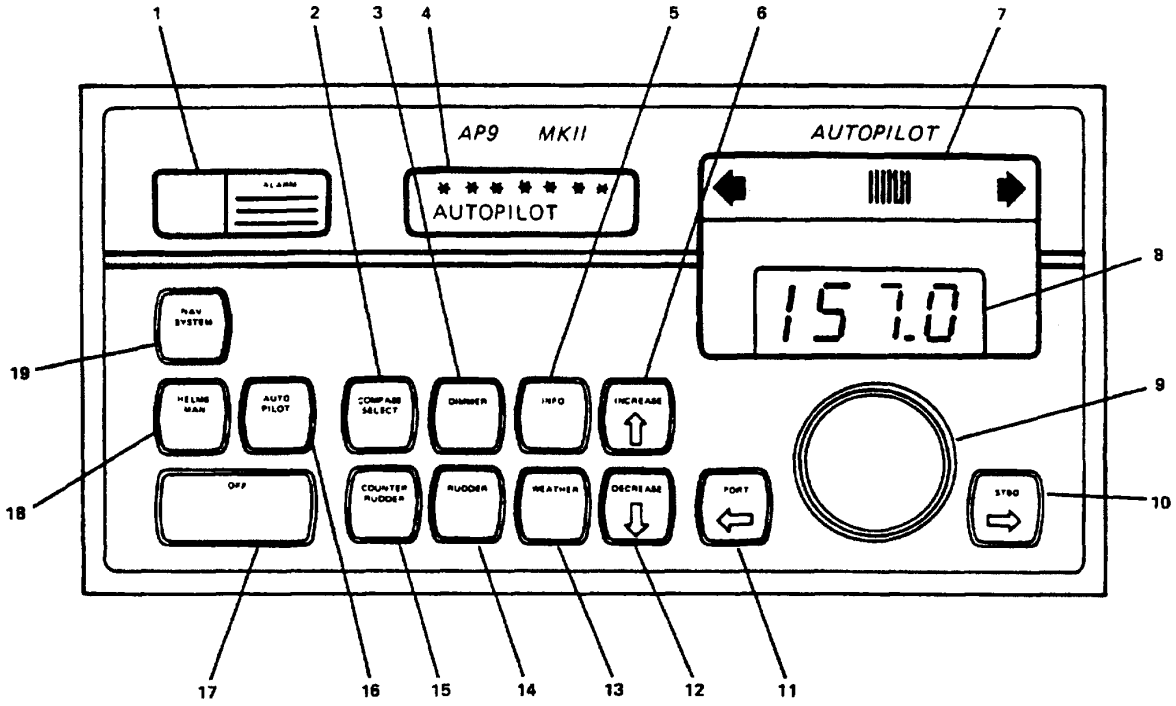


Figure 2-3. Autopilot Control Panel.

Table 2-1. Description of Operator's Controls and Indicators

Key	Control or Indicator	Function
Autopilot Control Panel (Figure 2-3)		
1	ALARM	Silences audible alarm.
2	COMPASS SELECT Button	Used to select Steering Compass by pressing once; twice to select Off Course Compass. Information Display (4) shows Compass selected. Selected compass changed using INCREASE AND DECREASE buttons.
3	DIMMER Button	Used to adjust illumination of displays and indicators. Illumination adjusted using INCREASE and DECREASE buttons. Brightness level displayed in Bar Graph Display and Information Display (0-0.8).
4	Information Display	Normally provides readout of selected mode. When any of the eight buttons directly below it are pressed, shows button pressed and provides a readout for adjustments.
5	INFO Button	Used to modify autopilot parameters.
6	INCREASE Button	Used to adjust various settings. Each time pressed, value in Information Display is increased by one. The value is also displayed as bar graph. If button depressed more than two seconds, value automatically increased until button released.
7	Bar Graph Display	In AUTOPILOT or NAV SYSTEM mode, displays difference between actual vessel heading and course to steer to in degrees. Each vertical bar represents one degree. Does not operate in HELMSMAN mode.
8	Heading Display	HELMSMAN mode: provides digital display of actual ship heading. AUTOPILOT mode: provides digital display of course to steer. NAV. SYSTEM mode: provides digital display of course to steer.
9	Course Selector Control	When pressed down and turned within 10 seconds, course to steer is changed.

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Table 2-1. Description of Operator's Controls and Indicators

Key	Control or Indicator	Function
Autopilot Control Panel (Figure 2-3) (Continued)		
10	STBD Button	Provides one degree course adjustment to standard in AUTOPILOT mode only. Not active except in AUTOPILOT mode.
11	PORT Button	Provides one degree course adjustment to port in AUTOPILOT MODE only. Not active except in AUTOPILOT mode.
12	DECREASE Button	Used to adjust various settings. Each time pressed, value in Information Display is decreased by one. The value is also displayed as bar graph. If button depressed more than 2 seconds, value automatically decreased until button released.
13	WEATHER Button	Used to adjust the WEATHER parameter.
14	RUDDER Button	Used to adjust the RUDDER parameter.
15	COUNTER RUDDER Button	Used to adjust the COUNTER-RUDDER parameter.
16	AUTO PILOT Button	Used to select AUTOPILOT mode.
17	OFF Button depressed.	Used to switch OFF autopilot by depressing for 2 seconds. Alarm will sound while If released before 2 seconds have elapsed, autopilot will continue to operate in mode previously selected.
18	HELMSMAN Button	Used to switch on autopilot and select HELMSMAN mode.
19	NAV. SYSTEM Button	Not used.

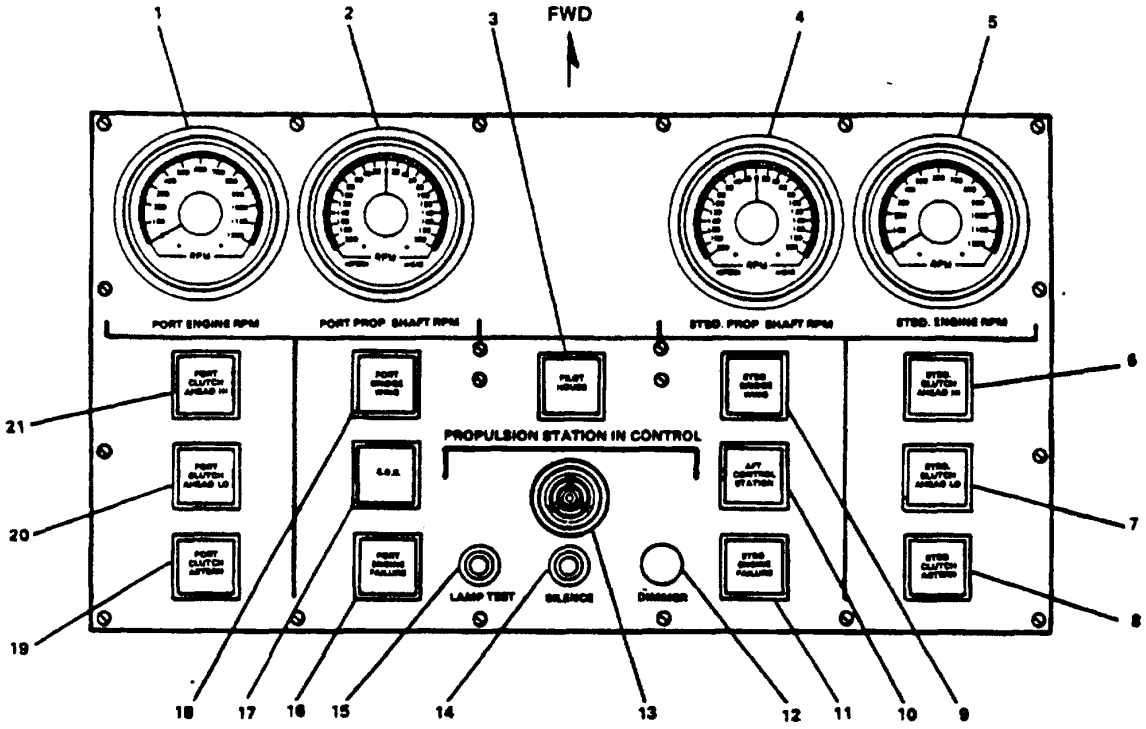

Figure 2-4. Remote Propulsion Indicator Panel.

Table 2-1. Description of Operator's Controls and Indicators

Key	Control or Indicator	Function
Remote Propulsion Indicator Panel (Figure 2-4)		
1	PORT ENGINE RPM Meter	Indicates port main engine RPM.
2	PORT PROP. SHAFT RPM Meter	Indicates port propeller shaft RPM.
3	PILOT HOUSE Indicator	Indicates pilothouse console is in control.
4	STBD. PROP. SHAFT RPM Meter	Indicates starboard propeller shaft RPM.
5	STBD. ENGINE RPM Meter	Indicates starboard main engine RPM.
6	STBD. CLUTCH AHEAD HI Indicator	Indicates starboard reduction gear ratio selected in EOS is HI and starboard throttle is in AHEAD position.
7	STBD. CLUTCH AHEAD LO Indicator	Indicates starboard reduction gear ratio selected in EOS is LO and starboard throttle is in AHEAD position.
8	STBD. CLUTCH ASTERN Indicator	Indicates starboard reduction gear ratio selected in EOS is LO and starboard throttle is in ASTERN position.
9	STBD. BRIDGE WING Indicator	Indicates starboard bridge wing station is in control.
10	AFT. CONTROL STATION Indicator	Indicates aft control station is in control.
11	STBD. ENGINE FAILURE Indicator	Indicates starboard engine is not operating.
12	DIMMER Indicator	Controls illumination level of indicators on panel.
13	HORN	Audible alarm alerts operator that a failure has occurred.

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Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Remote Propulsion Indicator Panel (Figure 2-4)-Continued		
14	SILENCE Button	Silences audible alarm (Item 13).
15	LAMP TEST Pushbutton	Tests panel lights.
16	PORT ENGINE FAILURE Indicator	Indicates port main engine is not operating.
17	E.O.S. Indicator	Indicates EOS (Enclosed Operating Station) is in control.
18	PORT BRIDGE WING Indicator	Indicates port bridge wing station is in control.
19	PORT CLUTCH ASTERN Indicator	Indicates port reduction gear ratio selected in EOS is LO and port throttle is in ASTERN position.
20	PORT CLUTCH AHEAD LO Indicator	Indicates port reduction gear ratio selected in EOS is LO and port throttle is in AHEAD position.
21	PORT CLUTCH AHEAD HI Indicator	Indicates port reduction gear ratio selected in EOS is HI and port throttle is in AHEAD position.

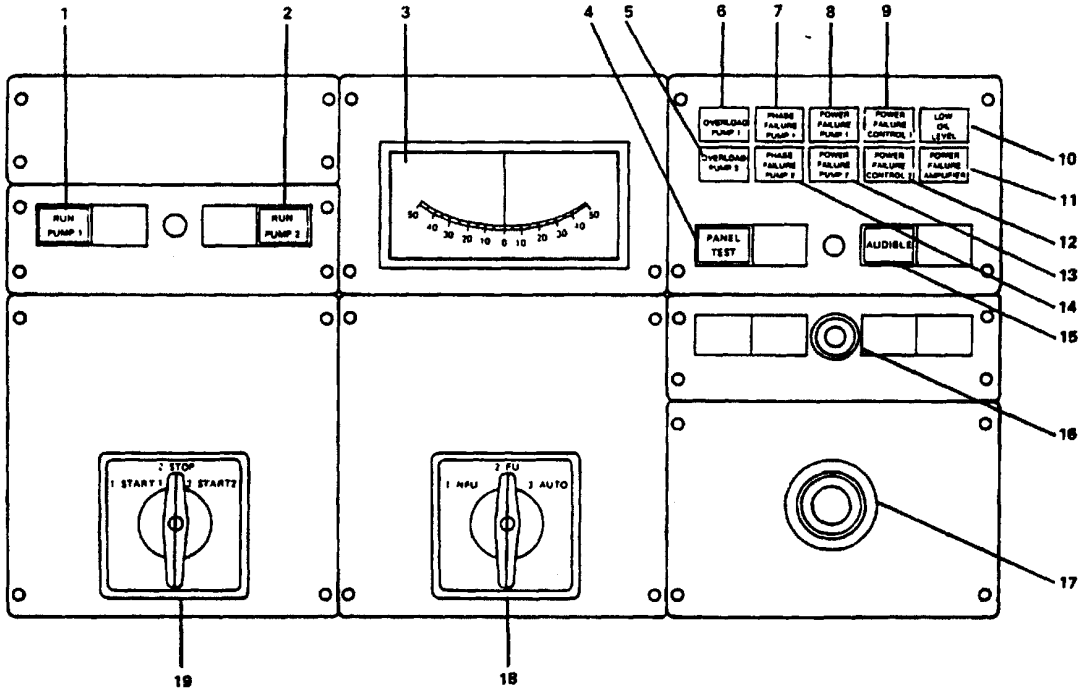

Figure 2-5. Steering Control Panel.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Steering Control Panel (Figure 2-5)	
1	RUN PUMP 1 Indicator	Indicates pump number 1 is operating (GREEN).
2	RUN PUMP 2 Indicator	Indicates pump number 2 is operating (GREEN).
3	Rudder Angle Indicator Meter	Indicates position of rudder in relation to centerline of ship.
4	PANEL TEST Pushbutton	Provides a push to test capability for panel lamps (BLUE).
5	OVERLOAD PUMP 2 Indicator	Overload on electric motor for pump 2 (ORANGE).
6	OVERLOAD PUMP 1 Indicator	Overload on electric motor for pump 1 (ORANGE).
7	PHASE FAILURE PUMP 1 Indicator	Phase failure in power supply for pump 1 (ORANGE).
8	POWER FAILURE PUMP 1 Indicator	Indicates power loss to pump 1 electric motor (RED).
9	POWER FAILURE CONTROL1 Indicator	Indicates loss of control for pump 1 (RED).
10	LOW OIL LEVEL Indicator	Indicates low oil level in expansion tank (ORANGE).
11	POWER FAILURE AMPLIFIER Indicator	Indicates power loss to amplifier (RED).
12	POWER FAILURE CONTROL 2 Indicator	Indicates loss of control for pump 2 (RED).
13	POWER FAILURE PUMP 2 Indicator	Indicates power loss to pump 2 electric motor (RED).

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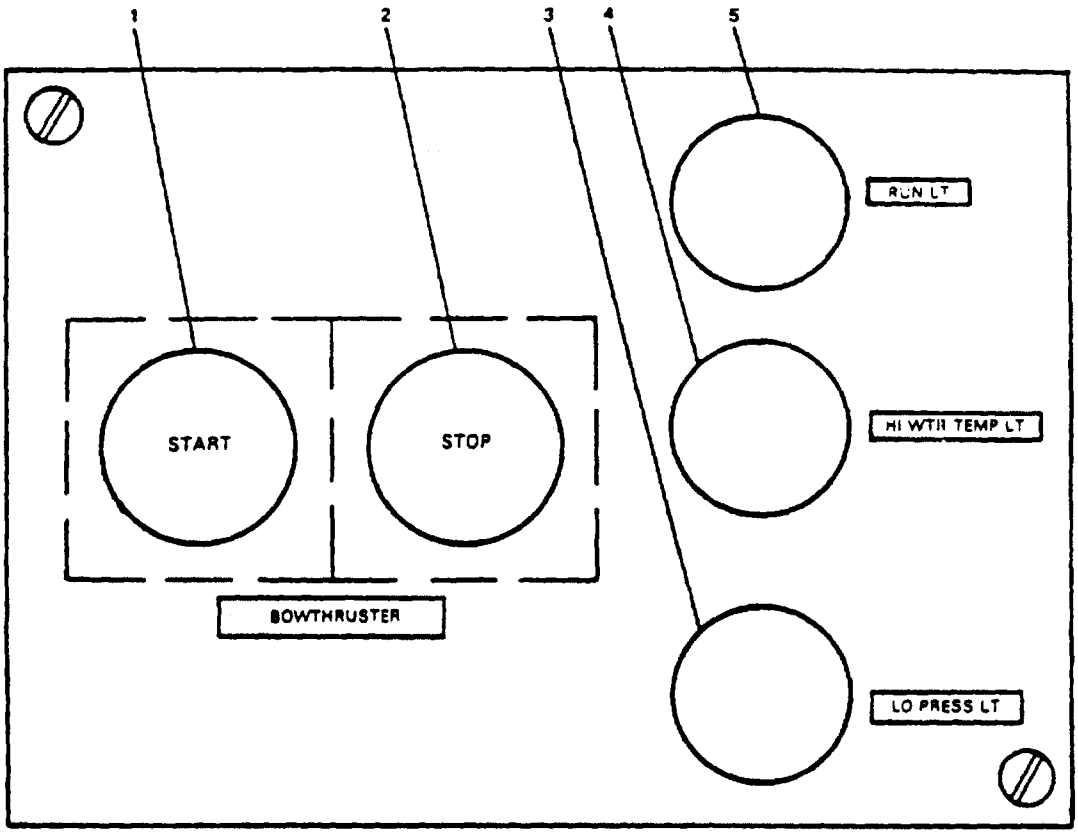
Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Steering Control Panel (Figure 2-5)-Continued	
14	PHASE FAILURE PUMP 2 Indicator	Phase failure in power supply for pump 2 (ORANGE).
15	AUDIBLE Pushbutton	Silences audible alarm (BLUE).
16	Dimmer Control	Adjusts intensity of panel lamps.
17	Joystick	Changes rudder position in relation to centerline of vessel.
18	Selector Switch 1. NFU 2. FFU 3. AUTO	Selects steering mode NFU [Non-Follow-up], FFU [Full-Follow-up], or AUTO [Autopilot].
19	Selector Switch 1. START 1 2. STOP 3. START 2	Selects either pumpset 1 or pumpset 2. When in OFF position, both pumpsets are turned off.

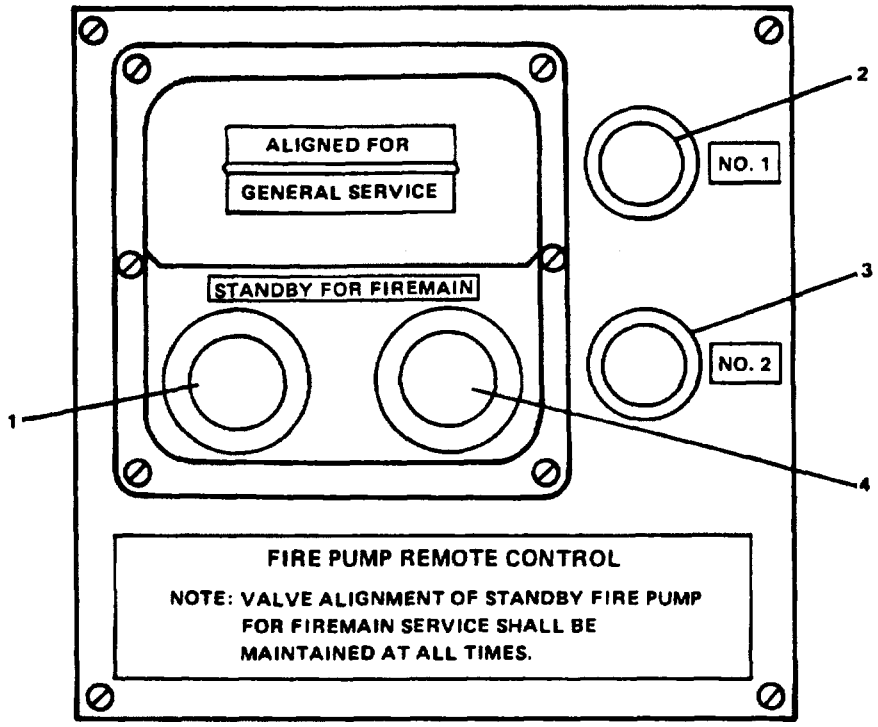


PILOT HOUSE STATION

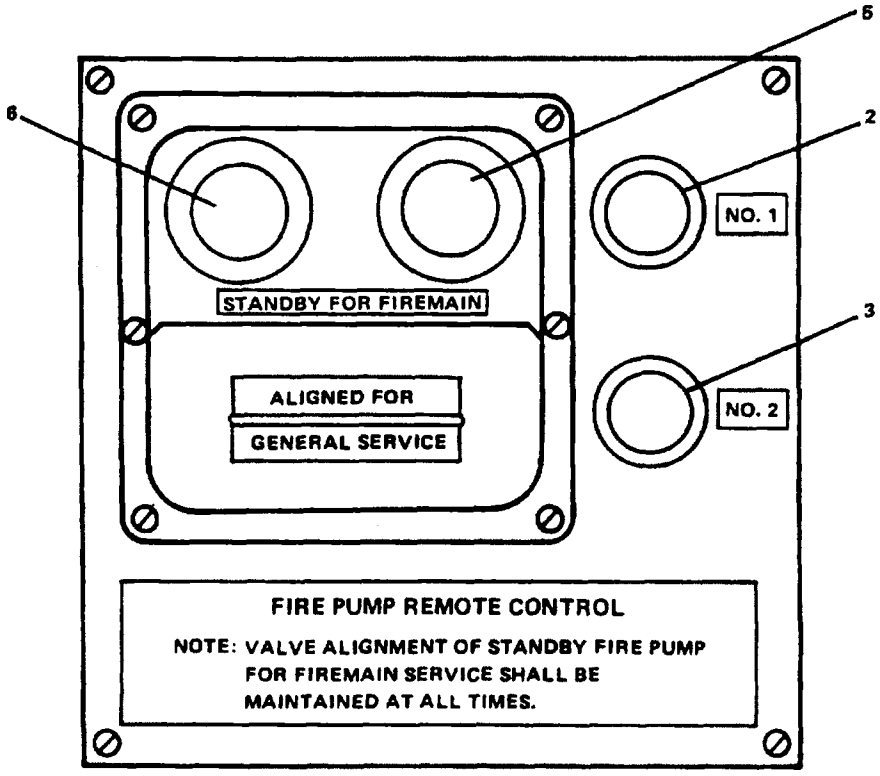
Figure 2-6. Bow Thruster Control Panel.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Bow Thruster Control Panel (Figure 2-6)		
1	START Pushbutton	Starts bow thruster engine (GREEN).
2	STOP Pushbutton	Stops bow thruster engine (RED).
3	LO PRESS LT Indicator	Indicates low oil pressure in bow thruster engine (RED).
4	HI WTR TEMP LT Indicator	Indicates high cooling water temperature in bow thruster engine (RED).
5	RUN LT Indicator	Indicates bow thruster engine is operating (GREEN).



PILOT HOUSE STATION



PILOT HOUSE STATION

Figure 2-7. Fire Pump Remote Control Panel.

Table 2-1. Description of Operator's Controls and Indicators – CONT

Key	Control or Indicator	Function
	Fire Pump Remote Control Panel (Figure 2-7)	
1	Start Pushbutton	Starts fire and general service pump No. 2.
2	NO. 1 Indicator	Indicates fire and general service pump No. 1 is operating (GREEN).
3	NO. 2 Indicator	Indicates fire and general service pump No. 2 is operating (GREEN).
4	Stop Pushbutton	Stops fire and general service pump No. 2.
5	Stop Pushbutton	Stops fire and general service pump No. 1.
6	Start Pushbutton	Starts fire and general service pump No. 1.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Magnetic Compass (Figure 2-8)	
1	Viewing Window	Window for viewing compass.
2	Door Knob	Knob to open door.
3	Mirror Adjustment Knob	Adjusts reflector mirrors (pilothouse).
4	Reflector Mirror	Provides magnetic compass face viewing from pilothouse.
5	Rheostat Knob	Adjusts magnetic compass illumination level (on overhead of pilothouse).
6	Toggle Switch	Controls binnacle light (on overhead of pilothouse).
7	Screws	Access cover securing screws.
8	Flinders Bar	Adjusts vertical magnetic field.

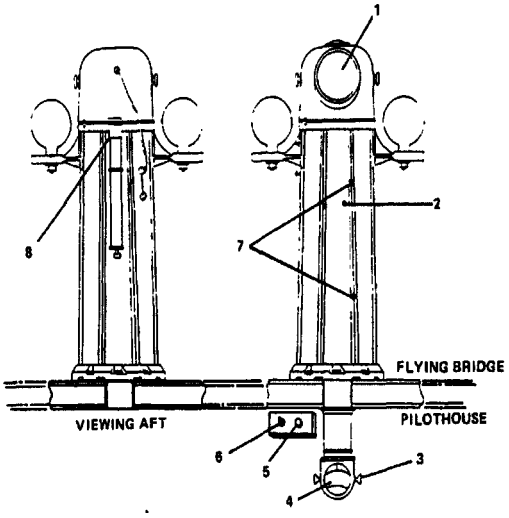


Figure 2-8. Magnetic Compass.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Open Scale Compass Repeater (Figure 2-9)		
1	Dimmer Control	Controls illumination level of compass repeater.
2	Toggle Switch	ON-OFF control for synchronizer.
3	Cover over ON-OFF switch	Protects compass synchronizer control ON-OFF switch.
4	Synchronizer Knob	Synchronizes repeater reading manually, when synchronizer control is OFF.
5	Repeater Card	Read directly against lubber line to indicate heading.
6	Lubber Line	Indicates heading when read against repeater card.
7	Mask	Has cutouts for ten degree repeater card markings and notches for five degree repeater card markings.

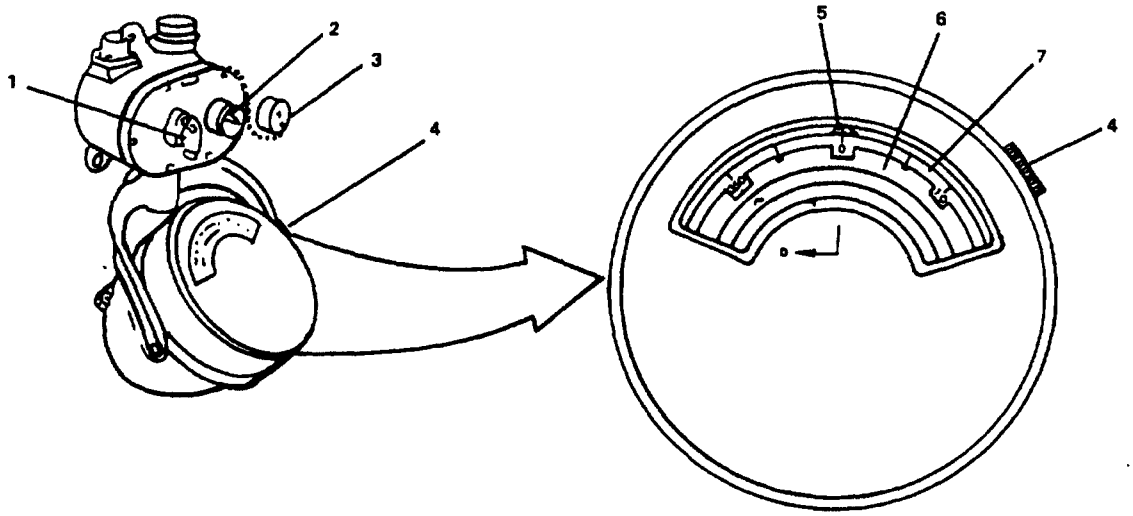


Figure 2-9. Open Scale Compass Repeater.

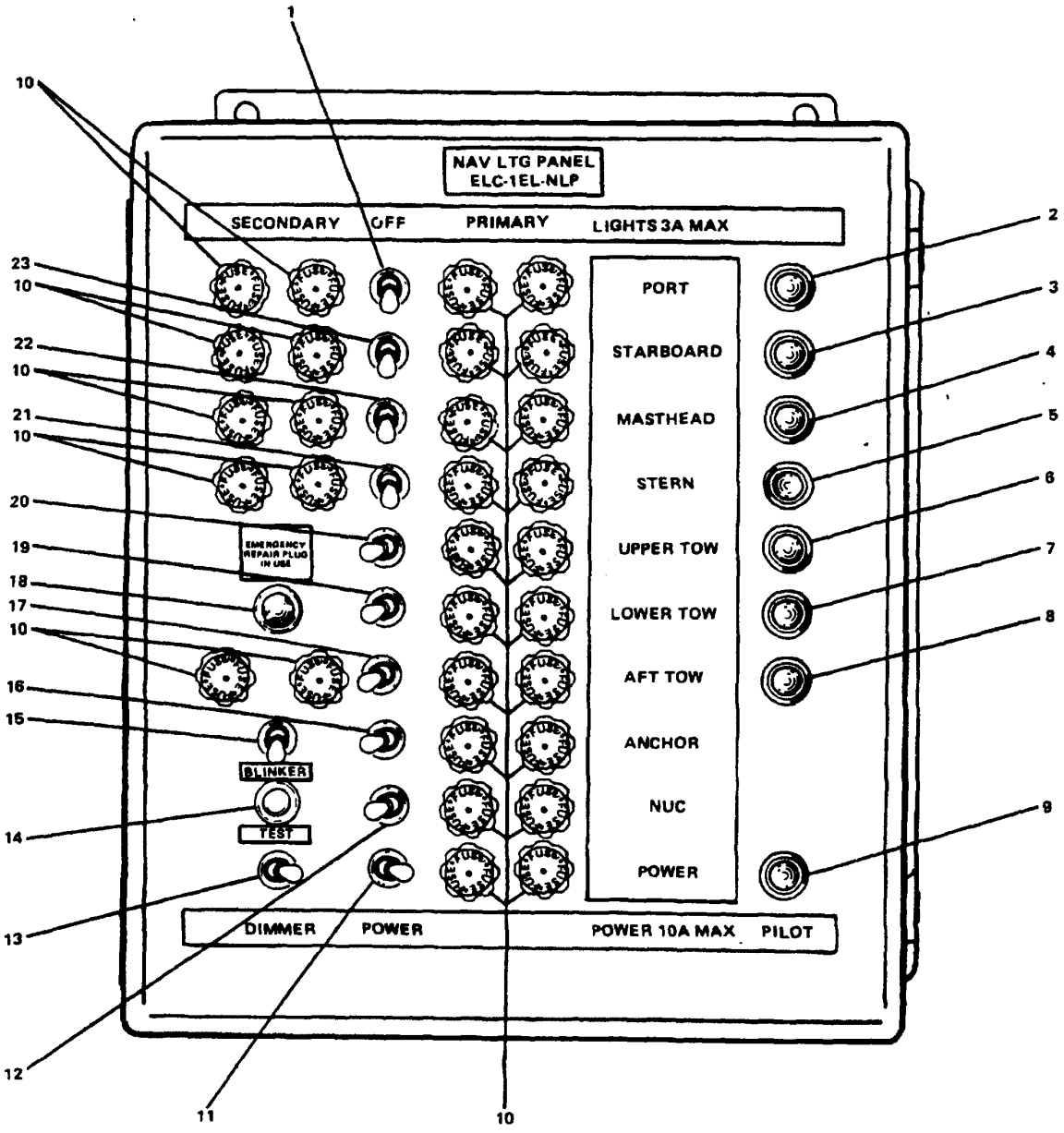


Figure 2-10. Navigation Lighting Panel.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Navigation Lighting Panel (Figure 2-10)		
1	Toggle Switch	Controls port sidelight.
2	Port Indicator	Indicates port sidelight alarm (RED).
3	STARBOARD Indicator	Indicates starboard sidelight alarm (RED).
4	MASTHEAD Indicator	Indicates masthead light alarm (RED).
5	STERN Indicator	Indicates stern light alarm (RED).
6	UPPER TOW Indicator	Indicates upper tow light alarm (RED).
7	LOWER TOW Indicator	Indicates lower tow light alarm (RED).
8	AFT TOW Indicator	Indicates aft tow light alarm (RED).
9	POWER Indicator	Indicates Navigation Lighting Panel is turned ON.
10	Fuse	Provides primary and secondary circuit protection.
11	POWER Switch	Controls power to Navigation Lighting Panel.
12	Toggle Switch	Controls Not Under Command (NUC) light.
13	Dimmer Switch	Two-position switch controls brightness of lights.
14	Test Switch	Allows testing of Panel. Setting switch to ON should light all indicators.
15	BLINKER Switch	Controls blinker light.
16	Toggle Switch	Controls anchor light.
17	Toggle Switch	Controls AFT TOW light.
18	EMERGENCY REPAIR PLUG IN USE Indicator	Indicates emergency repair plug (inside panel) in use.
19	Toggle Switch	Controls LOWER TOW light.
20	Toggle Switch	Controls UPPER TOW light.
21	Toggle Switch	Controls STERN light.
22	Toggle Switch	Controls MASTHEAD light.
23	Toggle Switch	Controls STARBOARD sidelight.

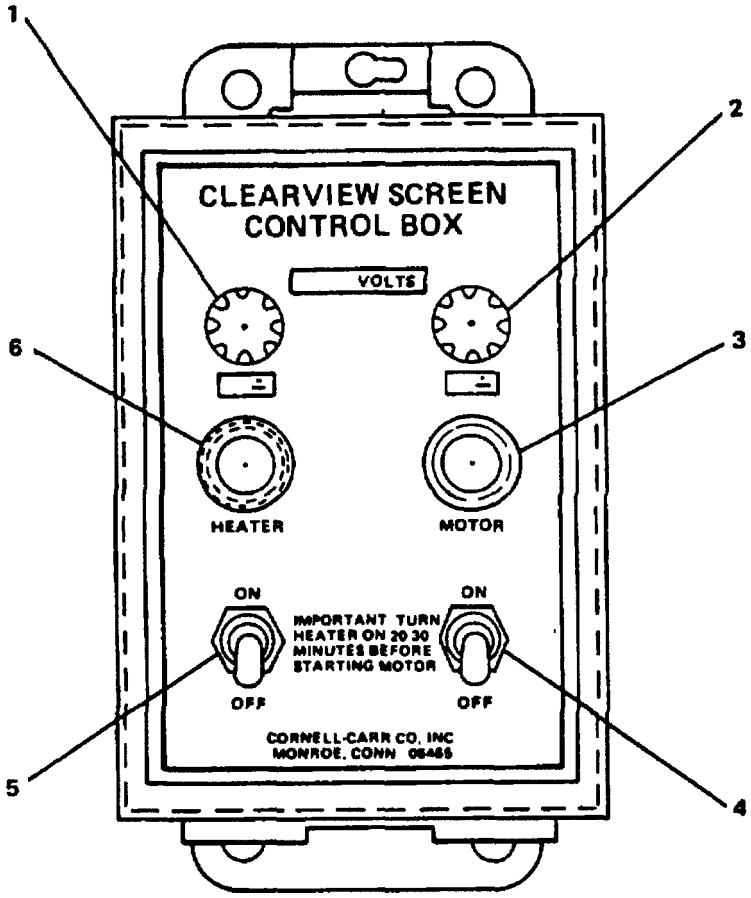


Figure 2-11. Clearview Screen.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Clearview Screen (Figure 2-11)		
1	Heater Fuse	Fuse protects heater circuit.
2	Motor Fuse	Fuse protects motor circuit.
3	MOTOR Indicator	Indicates motor is operating.
4	ON-OFF Switch	ON-OFF control for motor.
5	ON-OFF Switch	ON-OFF control for heater.
6	HEATER Indicator	Indicates heater is operating.

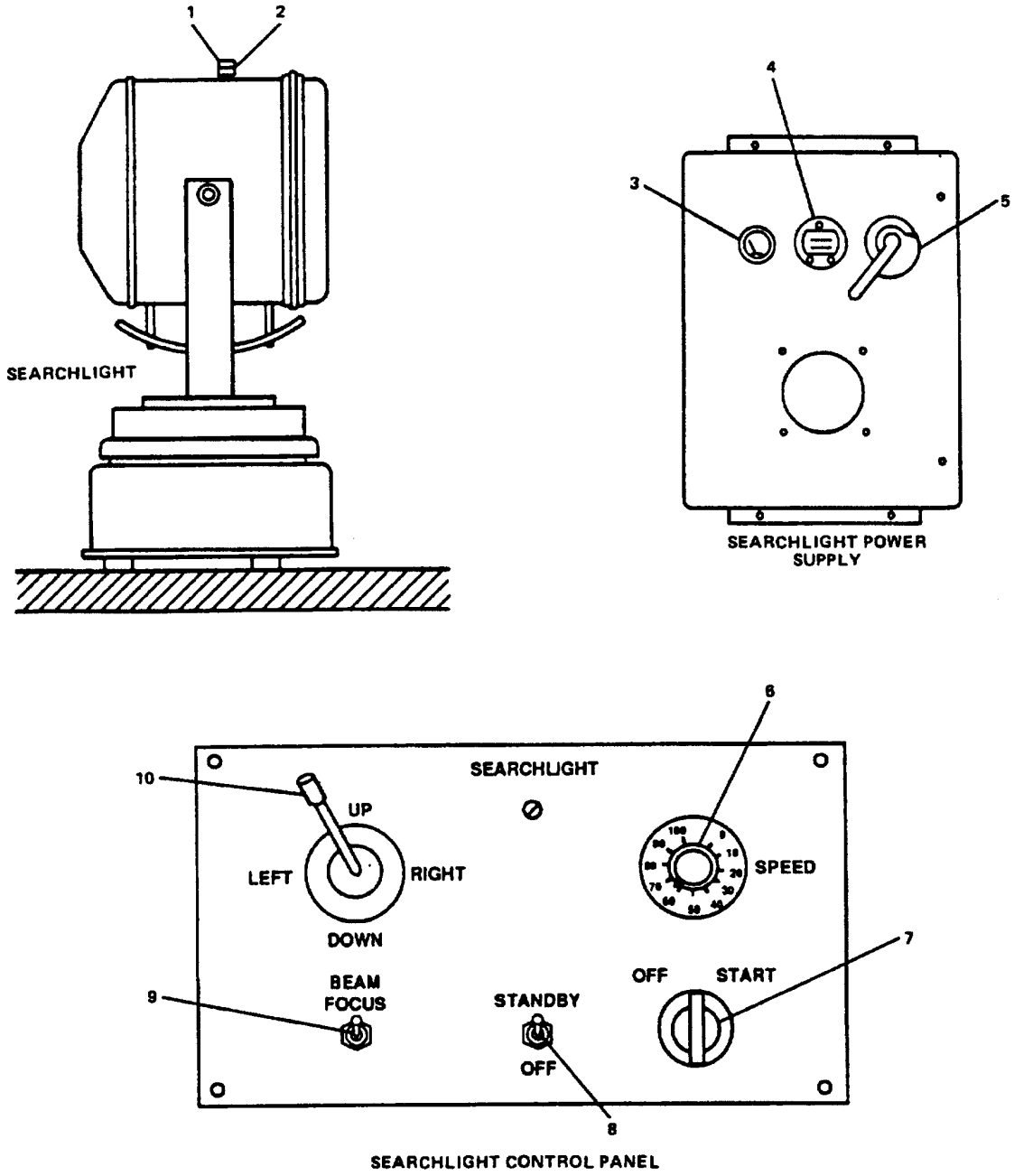


Figure 2-12. 500 Watt Xenon Searchlight.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
500 Watt Xenon Searchlight (Figure 2-12)		
1	Manual Focus Knob	Focuses FORE and AFT along the axis of the reflector by means of the manual focus knob on top of the drum without the use of tools.
2	Lock Knob	Locks manual focus knob in place.
3	AMPERES Meter	Indicates lamp current.
4	HOURS Meter	Indicates lamp elapsed burning time.
5	ON-OFF OPEN COVER RESET Switch	Controls electrical power to searchlight and provides power for control functions.
6	SPEED Control	Selects speed of searchlight when directional control is changed using joystick (10).
7	OFF START Switch	Turn searchlight on by positioning switch to START momentarily to start lamp and release. Set switch to OFF to turn light off.
8	STANDBY OFF Switch	Turn STANDBY switch to OFF if searchlight is not going to be used for several hours; otherwise, leave it in STANDBY.
9	BEAM FOCUS Switch	Hold switch in BEAM or FOCUS position until beam is desired diameter. Switch returns to neutral and beam diameter remains "as is" when switch is released.
10	Joystick	Provides directional control of searchlight beam.

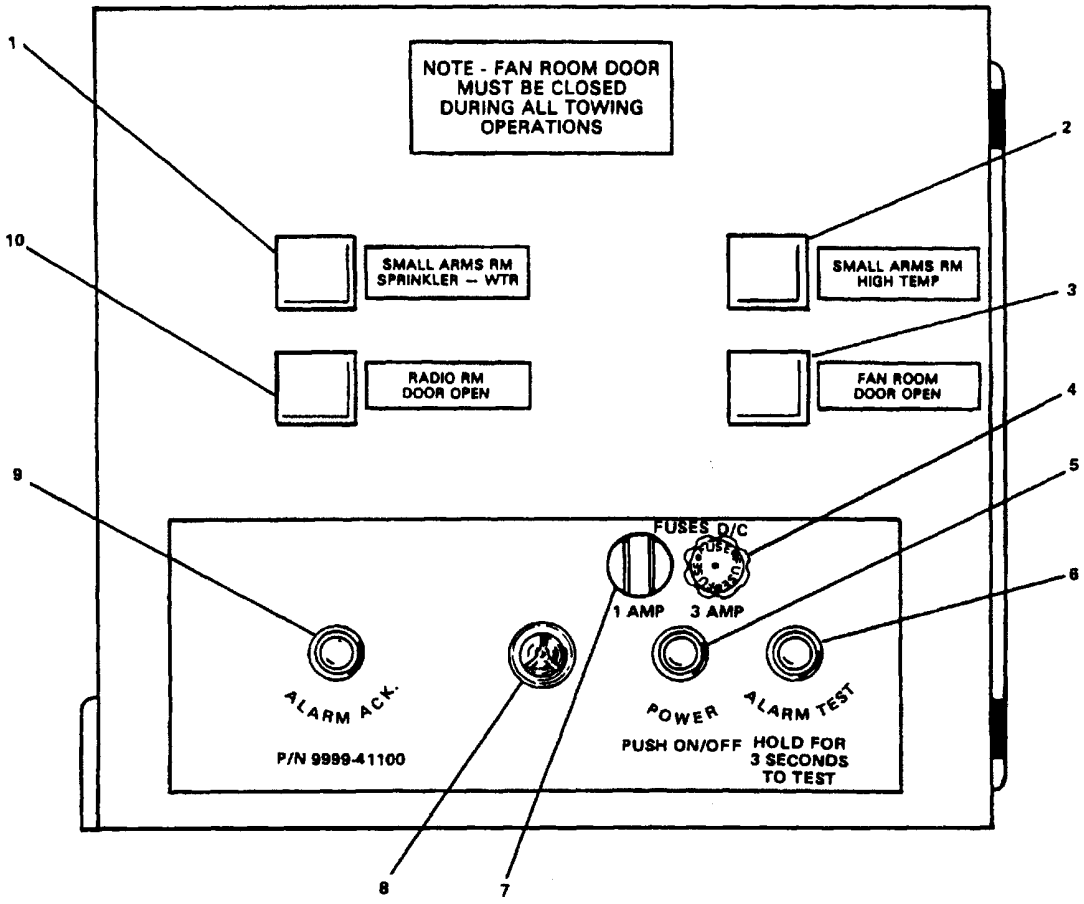
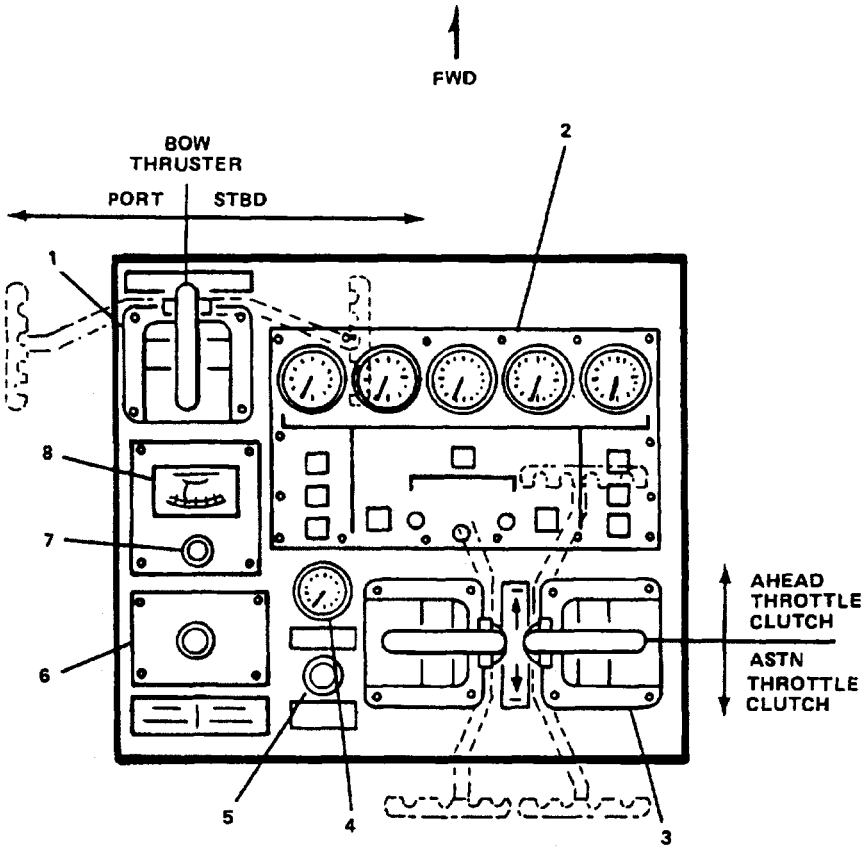


Figure 2-13. Alarm Panel.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Alarm Panel (Figure 2-13)	
1	SMALL ARMS RM SPRINKLER-WTR Indicator	Indicates sprinkler system in small arms room is activated.
2	SMALL ARMS RM HIGH TEMP Indicator	Indicates high temperature condition in small arms room.
3	FAN ROOM DOOR OPEN Indicator	Indicates main deck fan room door is open.
4	3 AMP Fuse	3 AMP fuse provides circuit protection for DC circuit.
5	POWER PUSH ON/OFF Pushbutton	Pushbutton switch controlling input power to panel. Lights when power is ON.
6	ALARM TEST Pushbutton	When pressed, sounds audible alarm and lights indicators (1, 2, 3, and 10).
7	1 AMP Fuse	1 AMP fuse provides circuit protection for AC circuit.
8	Buzzer	Provides audible alarm.
9	ALARM ACK. Pushbutton	When pressed, silences audible alarm.
10	RADIO RM DOOR OPEN Indicator	Indicates radio room door has been opened.



TYPICAL (PORT STATION SHOWN)

Figure 2-14. Bridge Wing Control Station.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Bridge Wing Control Station (Figure 2-14)	
1	BOW THRUSTER PORT STBD Engine Throttle Control	Provides control of bow thruster engine speed and directional control for bow thruster.
2	Remote Propulsion Indicator Panel	Provides indicators for propulsion machinery (see Figure 2-15).
3	PORT MN ENG and STBD MN ENG THROTTLE CLUTCH	Controls speed of main engines and direction of shafts.
4	CONTROL AIR PRESSURE Gauge	Indicates control air pressure in psi.
5	COMMAND TRANSFER Plunger	Acknowledges control air transfer to bridge wing control station.
6	Non-Follow-Up Steering Control (Joystick)	Provides NFU rudder (directional) control.
7	Dimmer Control	Controls intensity of illumination in rudder angle indicator (8).
8	Rudder Angle Indicator Meter	Indicates position of rudder in relation to centerline of LT.

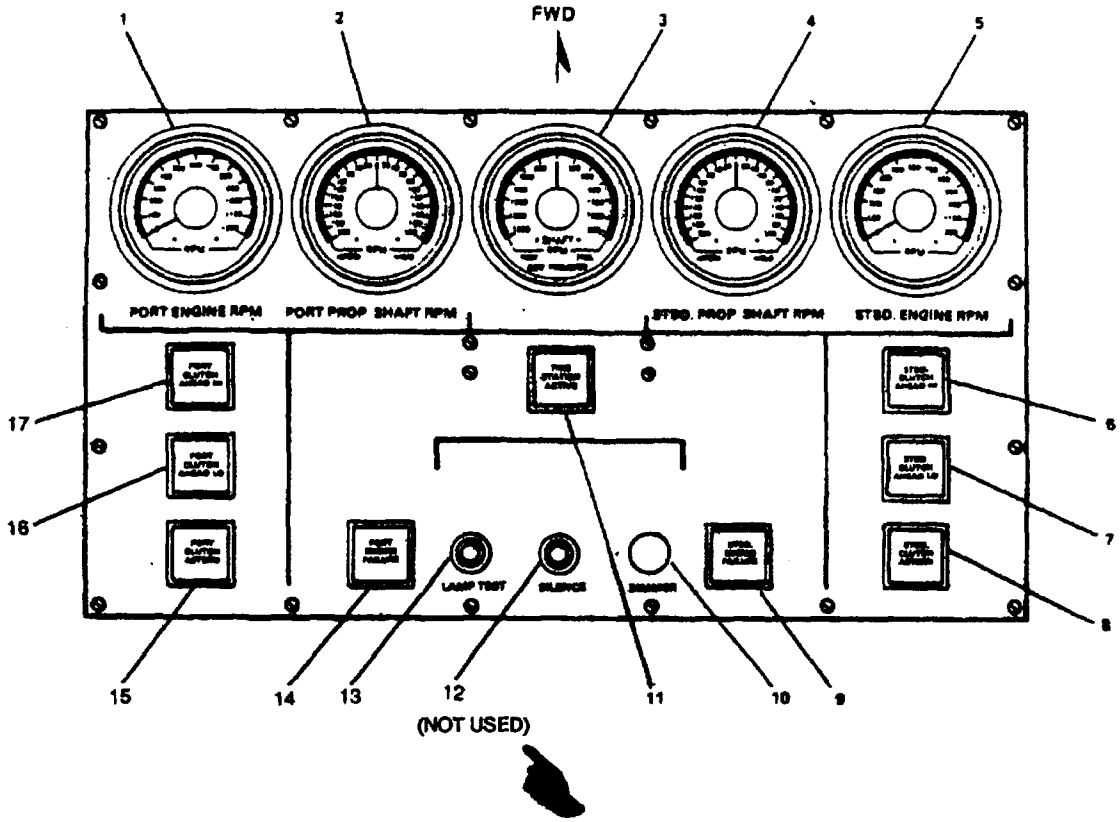


Figure 2-15. Remote Propulsion indicator Panel.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Remote Propulsion Indicator Panel (Bridge Wing) (Figure 2-15)		
1	PORT ENGINE RPM Tachometer	Indicates port main engine RPM.
2	PORT PROP. SHAFT RPM Tachometer	Indicates port propeller shaft RPM.
3	SHAFT RPM BOW THRUSTER Tachometer	Indicates bow thruster shaft RPM.
4	STBD. PROP. SHAFT RPM Tachometer	Indicates starboard propeller shaft RPM.
5	STBD. ENGINE RPM Tachometer	Indicates starboard main engine RPM.
6	STBD. CLUTCH AHEAD HI Indicator	Indicates starboard reduction gear ratio selected in EOS is HI and starboard throttle is in AHEAD position.
7	STBD. CLUTCH AHEAD LO Indicator	Indicates starboard reduction gear ratio selected in EOS is LO and starboard throttle is in AHEAD position.
8	STBD. CLUTCH ASTERN Indicator	Indicates starboard reduction gear ratio selected in EOS is LO and starboard throttle is in ASTERN position.
9	STBD. ENGINE FAILURE Indicator	Indicates starboard engine is not operating.
10	DIMMER Control	Controls illumination level of indicators on panel.
11	THIS STATION ACTIVE Indicator	Indicates console is operational.
12	SILENCE (Not used)	Silences alarm horn (12). (Not used)
13	LAMP TEST Pushbutton	Tests panel lights.
14	PORT ENGINE FAILURE Indicator	Indicates port main engine in not operating.
15	PORT CLUTCH ASTERN Indicator	Indicates port reduction gear ratio selected in EOS is LO and port throttle is in ASTERN position.
16	PORT CLUTCH AHEAD LO Indicator	Indicates port reduction gear ratio selected in EOS is LO and port throttle is in AHEAD position.
17	PORT CLUTCH AHEAD HI Indicator	Indicates port reduction gear ratio selected in EOS is HI and port throttle is in AHEAD position.

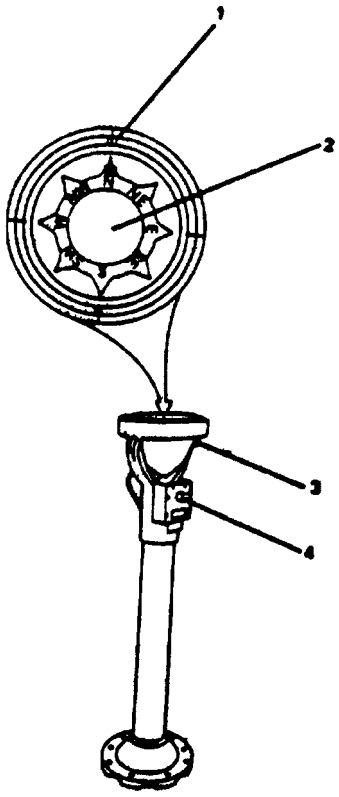


Figure 2-16. Standard Bearing Repeater.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or indicator	Function
Standard Bearing Repeater (Figure 2-16)		
1	Lubber Line	Indicates heading when read against repeater card.
2	Repeater Card	Read against lubber line to indicate heading.
3	Synchronizer Knob	Synchronizes repeater with master gyrocompass.
4	Dimmer Control	Controls illumination of compass repeater.

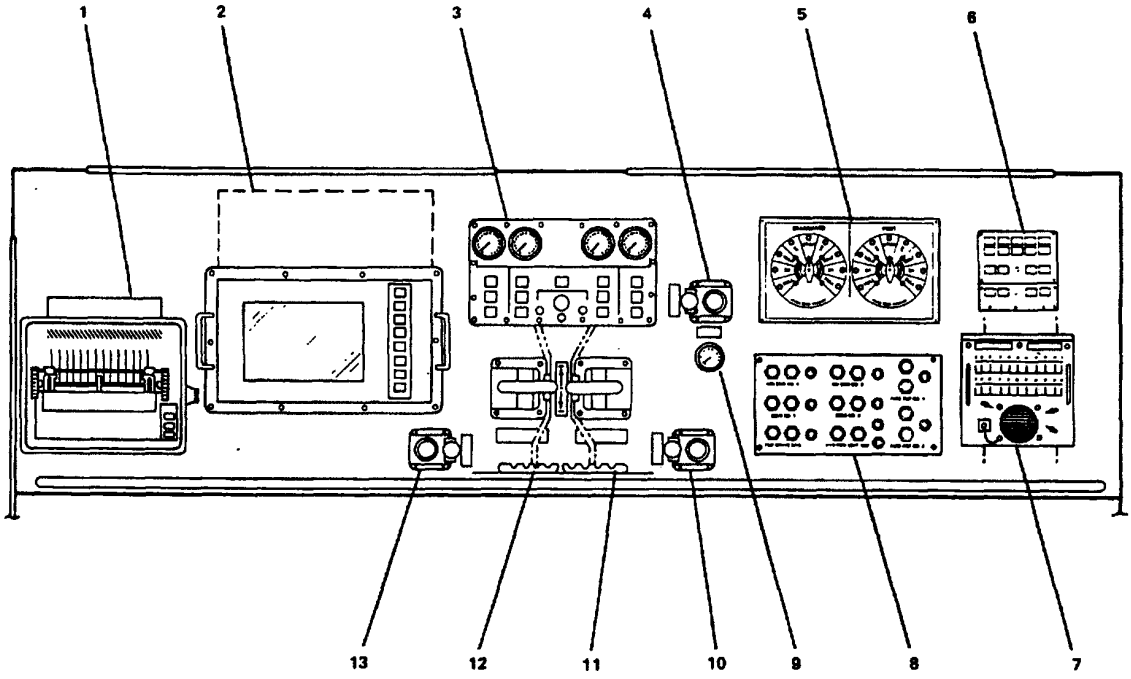


Figure 2-17. Enclosed Operating Station Console.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	EOS Console (Figure 2-17)	
1	Machinery Plant Monitoring System Printer	Provides hard copy of machinery plant monitoring system data.
2	Machinery Plant Monitoring System Display	Displays status of machinery as monitored by machinery plant monitoring system (see Figure 2-18).
3	Remote Propulsion Indicator Panel	Provides indicators for propulsion machinery (see Figure 2-19).
4	COMMAND TRANSFER Control	Transfers control air from EOS console to remote console (pilothouse, aft control station, or either bridge wing control station.
	E.O.S.	Transfers control air to EOS.
	REMOTE	Transfers control air to remote stations.
5	Engine Order Telegraph Panel	Indicates desired speed and directional signals from pilothouse (see Figure 2-2).
6	STEERING CONTROL ALARM PANEL	Provides remote indicators for steering gear system (see Figure 2-25).
7	LS-519A/SIC INTERCOMMUNICATIONS STATION	Provides station-to-station shipboard communications (see Figure 2-31).
8	Machinery Remote Control Station	Provides controls and indicators for machinery (see Figure 2-20).
9	CONTROL AIR PRESSURE Gauge	Gauge indicates control air pressure in psi.
10	PORT AHD SELECTOR	Selects port reduction gear ratio.
11	PORT MN ENG THROTTLE/CLUTCH	Controls speed of port main engine and direction of port shaft.
12	STBD MN ENG THROTTLE/CLUTCH	Controls speed of starboard main engine and direction of starboard shaft.
13	STBD AHD SELECTOR	Selects starboard reduction gear ratio.

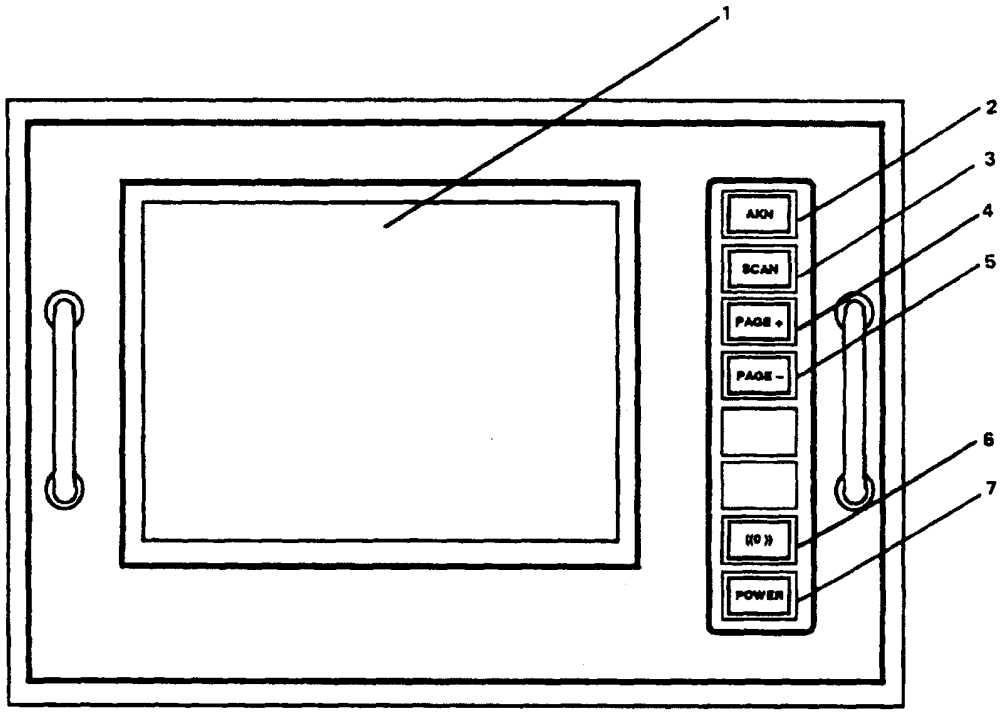


Figure 2-18. Machinery Plant Monitoring System Display.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Machinery Plant Monitoring System Display (Figure 2-18)		
1	Screen	CRT display screen.
2	AKN Pushbutton	Pushbutton to turn OFF alarm.
3	SCAN Pushbutton	Pushbutton cause alarm messages to be displayed on CRT display (1) in reverse order.
4	PAGE + Pushbutton	Pushbutton moves CRT display (1) forward one page.
5	PAGE - Pushbutton	Pushbutton moves CRT display (1) back one page.
6	Alarm Indicator	Provides audible alarm signal.
7	POWER Pushbutton	Turns on CRT display (1).

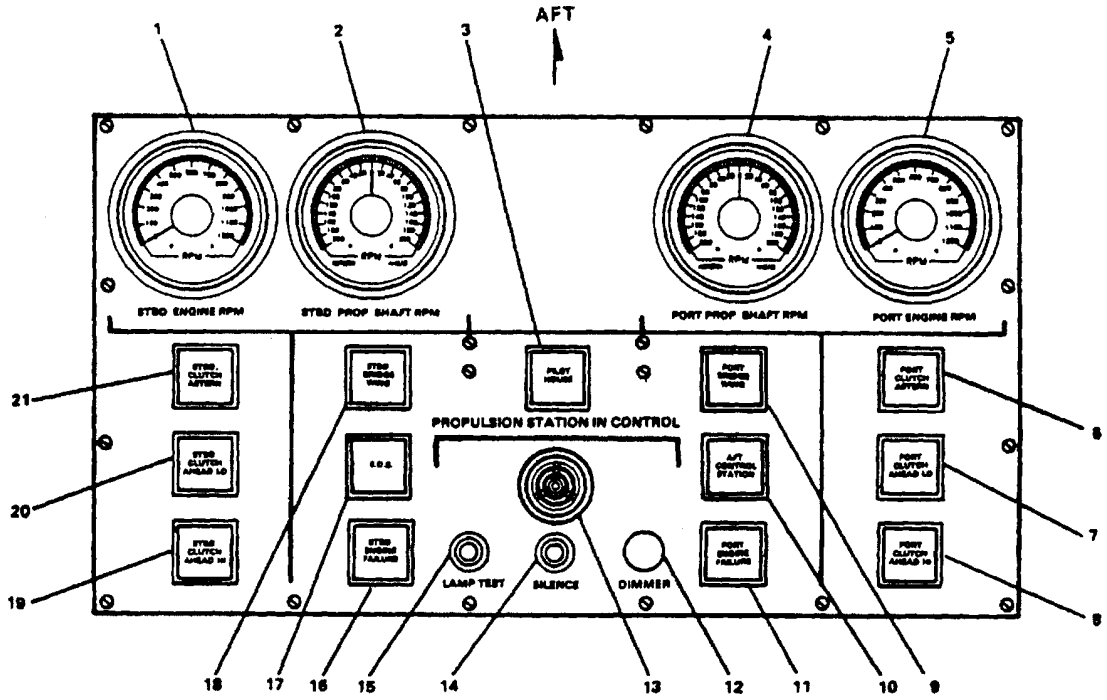


Figure 2-19. Remote Propulsion Indicator Panel (EOS).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Remote Propulsion Indicator Panel (Figure 2-19)		
1	STBD.ENGINE RPM Tachometer	Indicates starboard main engine RPM.
2	STBD.PROP. SHAFT RPM Tachometer	Indicates starboard propeller shaft RPM.
3	PILOT HOUSE Indicator	Indicates pilothouse console is in control.
4	PORT PROP. SHAFT RPM Tachometer	Indicates port propeller shaft RPM.
5	PORT ENGINE RPM Tachometer	Indicates port main engine RPM.
6	PORT CLUTCH ASTERN Indicator	Indicates port reduction gear ratio selected in EOS is LO and port throttle is in ASTERN position.
7	PORT CLUTCH AHEAD LO Indicator	Indicates port reduction gear ratio selected in EOS is LO and port throttle is in AHEAD position.
8	PORT CLUTCH AHEAD HI Indicator	Indicates port reduction gear ratio selected in EOS is HI and port throttle is in AHEAD position.
9	PORT BRIDGE WING Indicator	Indicates port bridge wing station is in control.
10	AFT. CONTROL STATION Indicator	Indicates aft control station is in control.
11	PORT ENGINE FAILURE Indicator	Indicates port main engine is not operating.
12	DIMMER Control	Controls illumination level of indicators on panel.
13	Horn	Audible alarm alerts operator that a failure has occurred.
14	SILENCE Pushbutton	Silences alarm horn (13).

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Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Remote Propulsion Indicator Panel (Figure 2-19)-Continued		
15	LAMP TEST Pushbutton	Tests panel lights.
16	STBD. ENGINE FAILURE Indicator	Indicates starboard engine is not operating.
17	E.O.S. Indicator	Indicates EOS is in control.
18	STBD. BRIDGE WING Indicator	Indicates starboard bridge wing station is in control.
19	STBD. CLUTCH AHEAD HI Indicator	Indicates starboard reduction gear ratio selected in EOS is HI and starboard throttle is in AHEAD position.
20	STBD. CLUTCH AHEAD LO Indicator	Indicates starboard reduction gear ratio selected in EOS is LO and starboard throttle is in AHEAD position.
21	STBD. CLUTCH ASTERN Indicator	Indicates starboard reduction gear ratio selected in EOS is LO and starboard throttle is in ASTERN position.

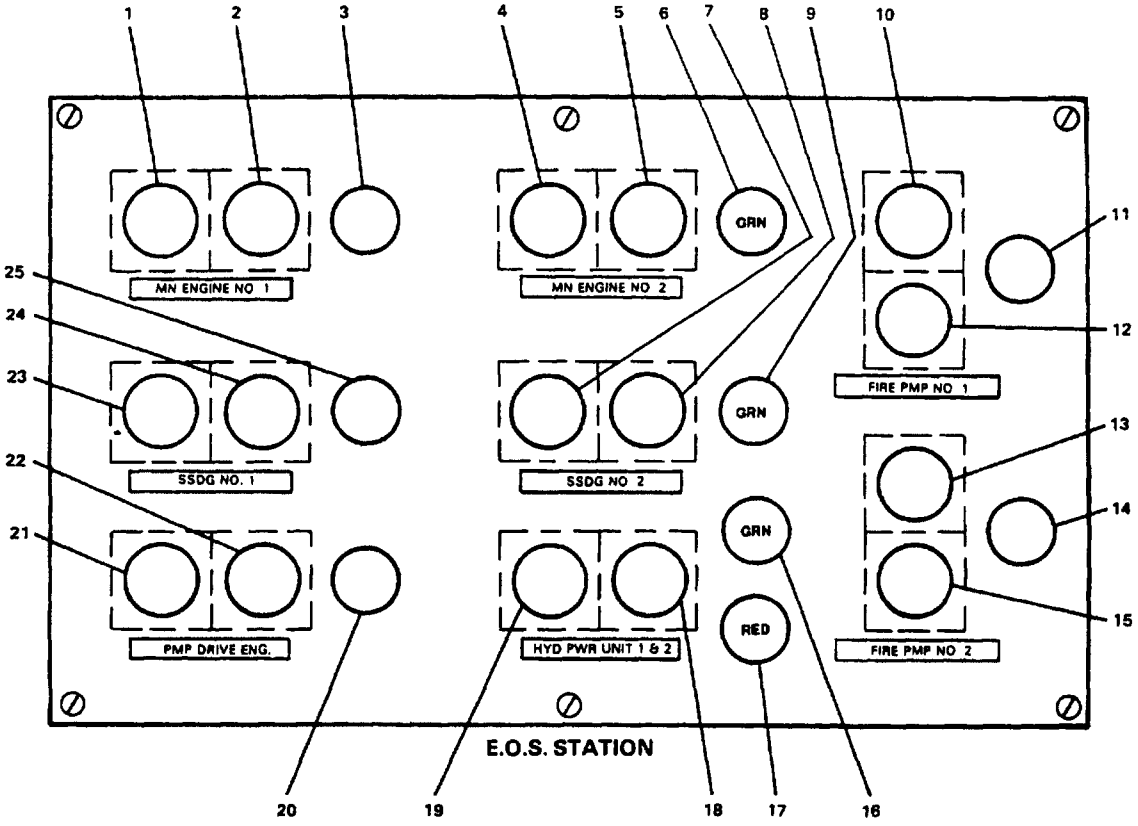

Figure 2-20. Machinery Remote Control Station.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Machinery Remote Control Station (Figure 2-20)		
1	MN ENG NO. 1 START Pushbutton	Starts starboard main engine.
2	MN ENG NO. 1 STOP Pushbutton	Shuts down starboard main engine.
3	Indicator	Indicates starboard main engine is operating.
4	MN ENG NO. 2 START Pushbutton	Starts port main engine.
5	MN ENG NO. 2 STOP Pushbutton	Stops port main engine.
6	Indicator	Indicates port main engine is operating.
7	SSDG NO. 2 START Pushbutton	Starts SSDG No. 2 engine.
8	SSDG NO. 2 STOP Pushbutton	Shuts down port SSDG No. 2 engine.
9	Indicator	Indicates port SSDG No. 2 engine is operating.
10	FIRE PMP NO. 1 STOP Pushbutton	Stops fire and general service pump No. 1.
11	Indicator	Indicates fire and general service pump No. 1 is operating.
12	FIRE PMP NO. 1 START Pushbutton	Starts fire and general service pump No. 1.
13	FIRE PMP NO. 2 STOP Pushbutton	Stops fire and general service pump No. 2.
14	Indicator	Indicates fire and general service pump No. 2 is operating.
15	FIRE PMP NO. 2 START Pushbutton	Starts fire and general service pump No. 2.
17	Indicator	Indicates power failure of central hydraulic system.

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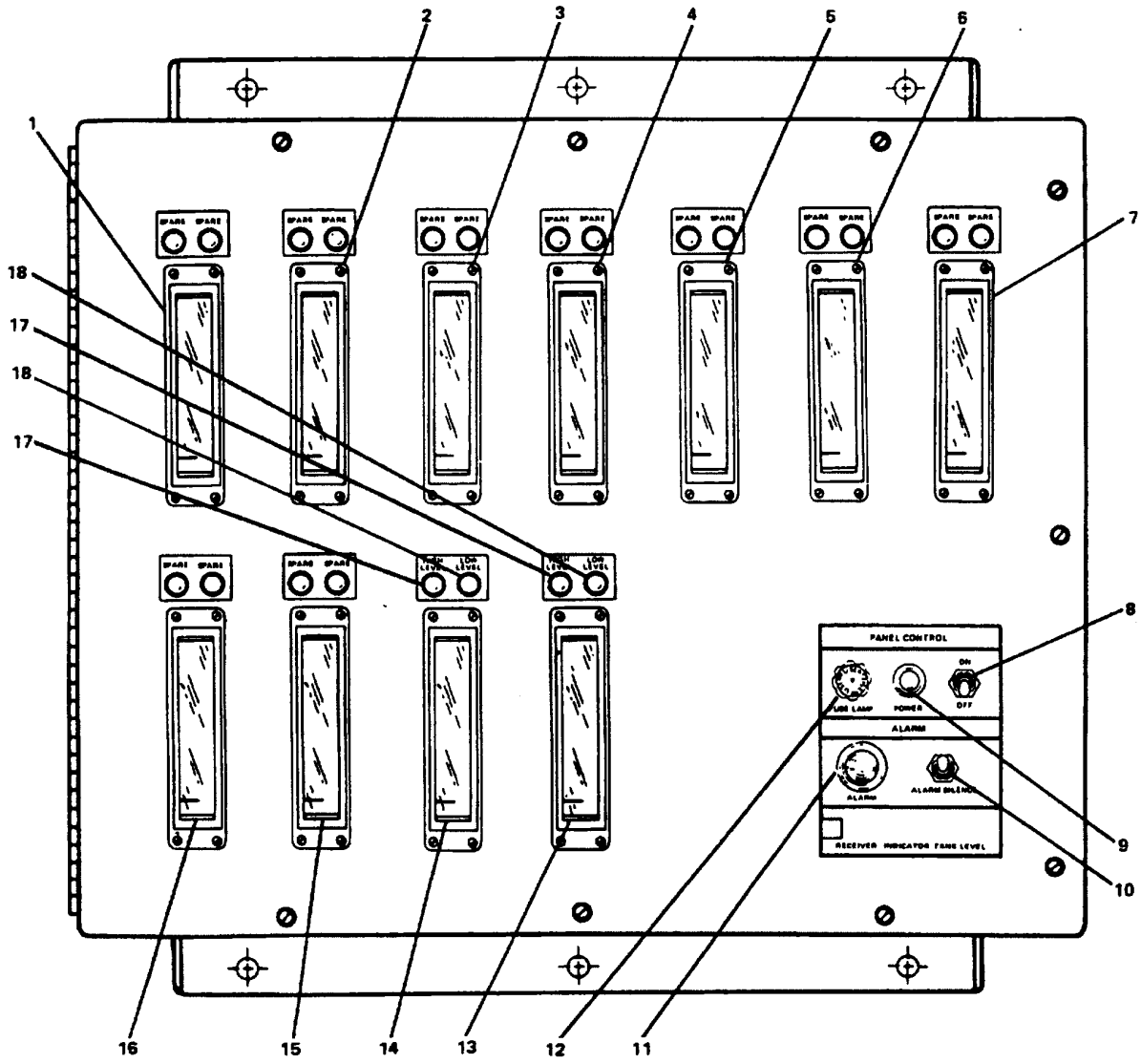
Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Machinery Remote Control Station (Figure 2-20) - Continued		
18	HYD PWR UNIT 1 & 2	Shuts down central hydraulic power unit. STOP Pushbutton
19	HYD PWR UNIT 1 & 2	Starts central hydraulic power unit. START Pushbutton
20	Indicator	Indicates pump drive engine is operating.
21	PMP DRIVE ENG.START	Starts pump drive engine. Pushbutton
22	PMP DRIVE ENG. STOP	Shuts down pump drive engine. Pushbutton
23	SSDG NO. 1 START	Starts starboard SSDG No. 1 engine. Pushbutton
24	SSDG NO. 1 STOP	Shuts down starboard SSDG No.2 engine. Pushbutton
25	Indicator	Indicates starboard SSDG No. 1 engine is operating.

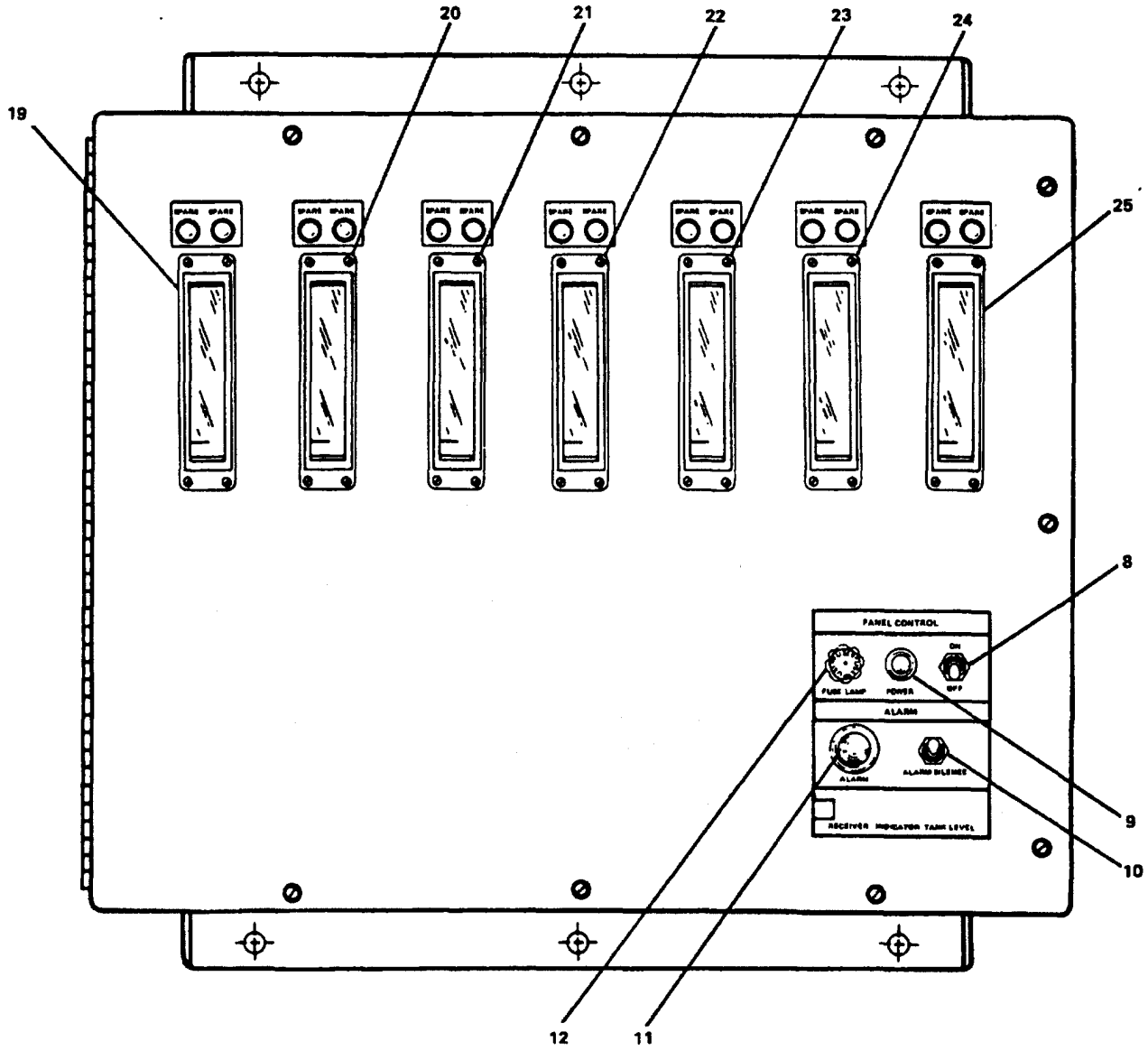


11 CHANNEL

Figure 2-21. Master Tank Level Indicator Receiver Panel, 11 Channel and 7 Channel (Sheet 1 of 2).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Tank Level Indicator Receiver Panel, 11 Channel and 7 Channel (Figure 2-21)		
1	Meter	Indicates lube oil storage tank level.
2	Meter	Indicates F.O. tank #4 port level.
3	Meter	Indicates F.O. tank #4. starboard level.
4	Meter	Indicates F.O. tank #2 port level.
5	Meter	Indicates F.O. tank #2 starboard level.
6	Meter	Indicates F.O. tank #2 center level.
7	Meter	Indicates F.O. tank #3 center level.
8	ON-OFF Switch	Switch controls power to tank level indicator panel.
9	POWER Indicator	Indicates power (AMBER) to tank level indicator panel.
10	ALARM SILENCE	Silences alarm signal. Switch
11	Alarm	Activated by tank level indicator alarm system.
12	FUSE LAMP	Provides circuit protection for indicator lights (17 and 18).
13	Meter	Indicates F.O. day tank, starboard level.
14	Meter	Indicates F.O. day tank, port level.
15	Meter	Indicates F.O. tank #1, port level.
16	Meter	Indicates F.O. tank #1, starboard level.
17	High Alarm	Indicates high tank level (RED).
18	Low Alarm	Indicates low tank level (RED).



7 Channel

Figure 2-21. Master Tank Level Indicator Receiver Panel, 11 Channel and 7 Channel (Sheet 2 of 2).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Tank Level Indicator Receiver Panel, 11 Channel and 7 Channel (Figure 2-21) - Continued		
19	Meter	Indicates sewage holding tank level.
20	Meter	Indicates oily waste holding tank level.
21	Meter	Indicates potable water tank starboard level.
22	Meter	Indicates potable water tank port level.
23	Meter	Indicates ballast water tank #1 level.
24	Meter	Indicates ballast water tank #2 port level.
25	Meter	Indicates ballast water tank #2 starboard level.

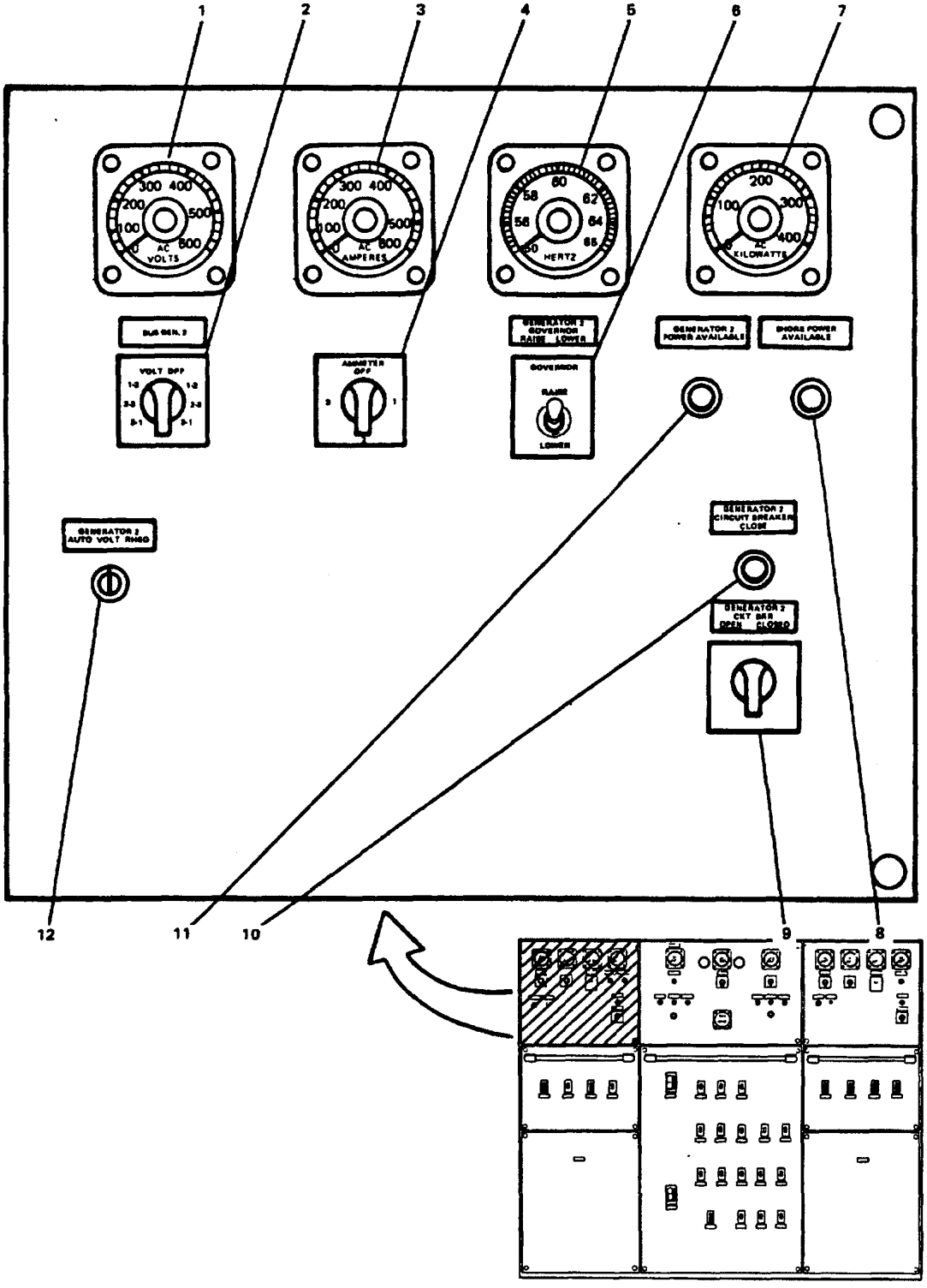


Figure 2-22. Main Switchboard (Sheet 1 of 7).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Main Switchboard (Figure 2-22)	
1	A-C VOLTS	Indicates BUS GEN 2 voltage. Meter
2	VOLT OFF Switch	Selects phases for reading on voltmeter (1).
3	A-C AMPERES Meter	Indicates SSDG #2 amperage.
4	AMMETER OFF Switch	Selects phases for reading on ammeter (3).
5	HERTZ Meter	Indicates SSDG #2 frequency.
6	GENERATOR 2 GOVERNOR RAISE LOWER Switch	Controls engine speed.
7	A-C KILOWATTS Meter	Indicates SSDG #2 kilowatts.
8	SHORE POWER AVAILABLE Indicator	Indicates shore power is supplying switchboard.
9	GENERATOR 2 CKT.BKR. OPEN CLOSED	Switch controlling SSDG #2 circuit breaker.
10	GENERATOR 2 CIRCUIT BREAKER CLOSED	Indicates SSDG #2 circuit breaker is closed.
11	GENERATOR 2 POWER AVAILABLE Indicator	Indicates SSDG #2 is generating power.
12	GENERATOR 2 AUTO. VOLT. RHEO. Rheostat	Voltage adjustment for SSDG #2.

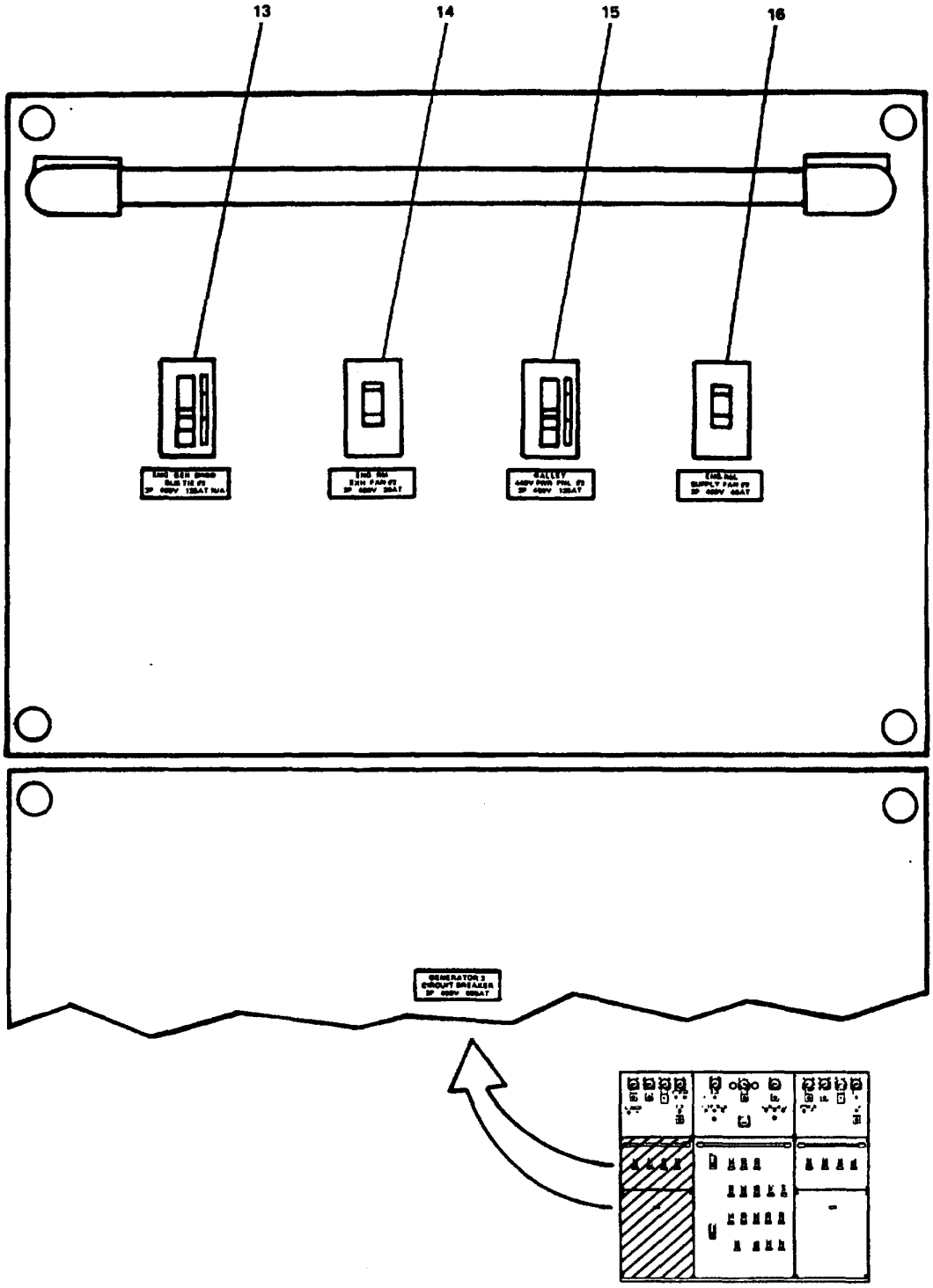


Figure 2-22. Main Switchboard (Sheet 2 of 7).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Main Switchboard (Figure 2-22) (Continued)	
13	EMG. BUS TIE #2 3P 450V 125AT N/A	GEN. SWBD. Provides circuit protection for bus tie #2 to emergency switchboard.
14	ENG. EXH. 3P 450V 30AT	RM. Provides circuit protection for engine room FAN #2 exhaust fan #2.
15	GALLEY 440V PWR. 3P 450V 125AT	Provides circuit protection for galley 440 V PNL. #2 power panel #2.
16	ENG. SUPPLY FAN #2 3P 450V 40AT	RM. Provides circuit protection for engine room supply fan #2.

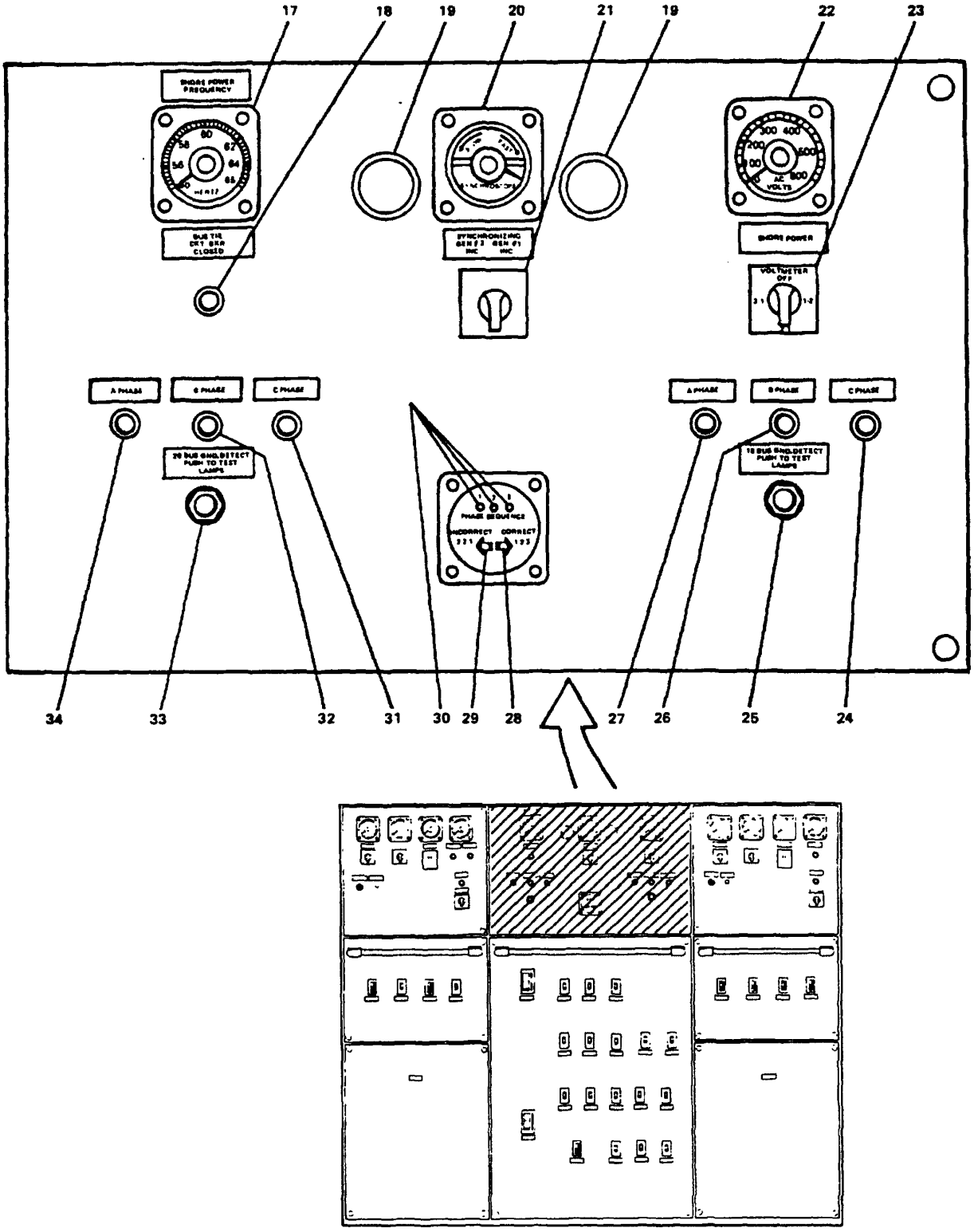


Figure 2-22. Main Switchboard (Sheet 3 of 7)

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Main Switchboard (Figure 2-22) (Continued)	
17	SHORE POWER FREQUENCY HERTZ Meter	Indicates shore power frequency.
18	BUS TIE CKT. BKR. CLOSED Indicator	Indicates main switchboard bus tie to emergency switchboard is closed.
19	Synchronizing Lights	Indicate when generators are in parallel.
20	SYNCHROSCOPE	Indicates synchronization of generators.
21	SYNCHRONIZING GEN #2 GEN #1 INC. INC. Switch	Selects generator to be paralleled.
22	SHORE POWER A-C VOLTS Meter	Displays shore power voltage.
23	VOLTMETER OFF Switch	Selects shore power phases to be displayed on voltmeter (22).
24	C PHASE Indicator	Indicates ground fault condition.
25	1S BUS GND. DETECT PUSH TO TEST LAMPS Pushbutton	Pushbutton switch to test lights (24, 26, and 27).
26	B PHASE Indicator	Indicates ground fault condition.
27	A PHASE Indicator	Indicates ground fault condition.
28	CORRECT 123	Indicates phase sequence is correct.

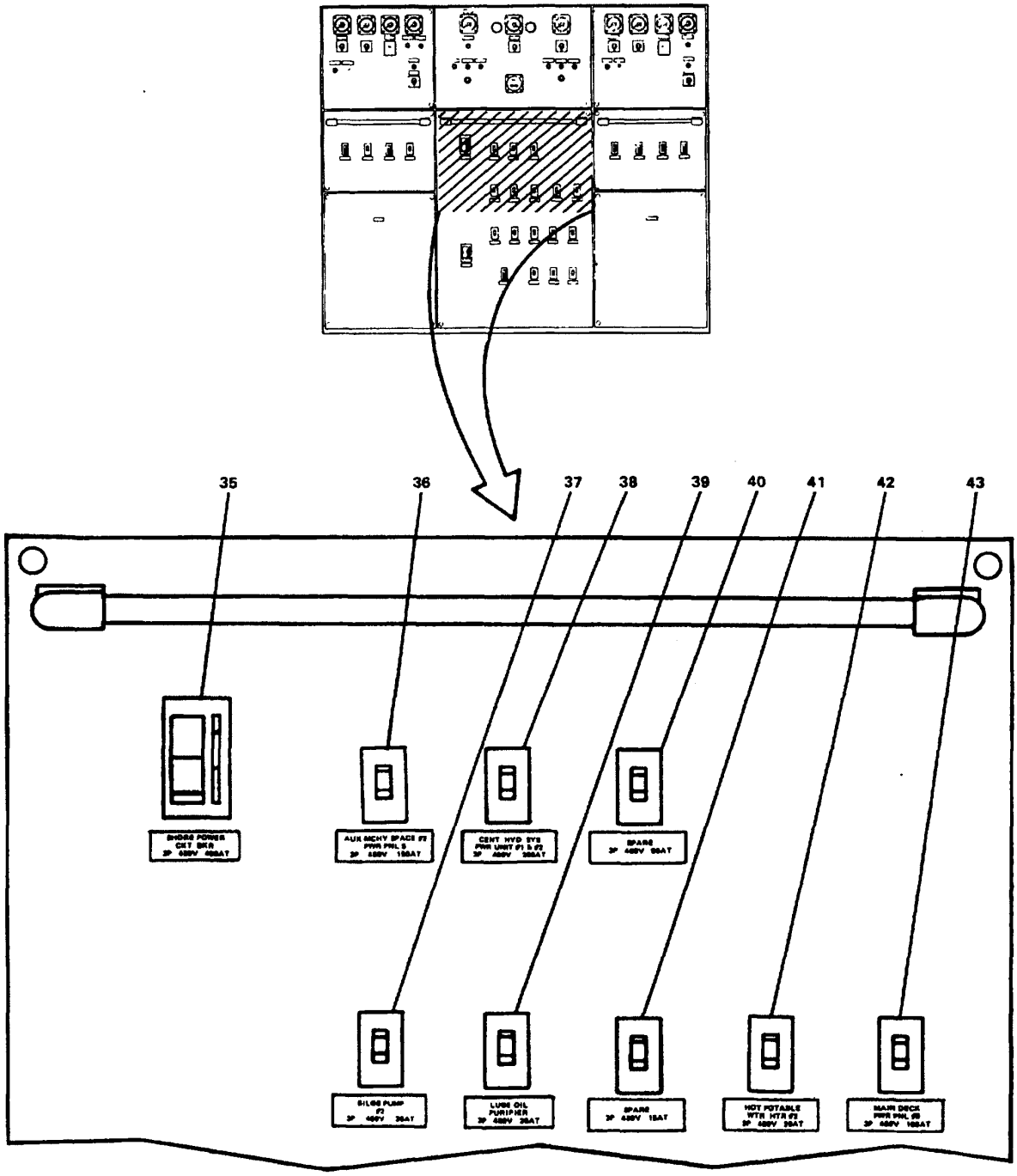


Figure 2-22. Main Switchboard (Sheet 4 of 7).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Main Switchboard (Figure 2-22) (Continued)	
29	INCORRECT 321	Indicates phase sequency is incorrect.
30	PHASE SEQUENCE	Flashing LEDs indicate phase sequence.
31	C PHASE Indicator	Indicates ground fault condition.
32	B PHASE Indicator	Indicates ground fault condition.
33	2S BUS GND. PUSH TO TEST LAMPS Pushbutton	DETECT Pushbutton switch to test lights (31, 32, and 34).
34	A PHASE Indicator	Indicates ground fault condition.
35	SHORE POWER CKT. BRK. 3P 450V 150AT Circuit Breaker	Provides circuit protection for shore power circuits.
36	AUX MCHY SPACE #2 PWR PNL 5 3P 450V 150AT Circuit Breaker	Provides circuit protection for auxiliary machinery spare #2 power panel #5.
37	BILGE PUMP #2 3P 450V 30AT Circuit Breaker	Provides circuit protection for bilge pump no. 2.
38	CENT. PWR UNIT #1 & #2 3P 450V 200AT Circuit Breaker	HYD. SYS Provides circuit protection for central hydraulic system power pack.
39	LUBE OIL PURIFIER 3P 450V 20AT Circuit Breaker	Provides circuit protection for lube oil purifier.

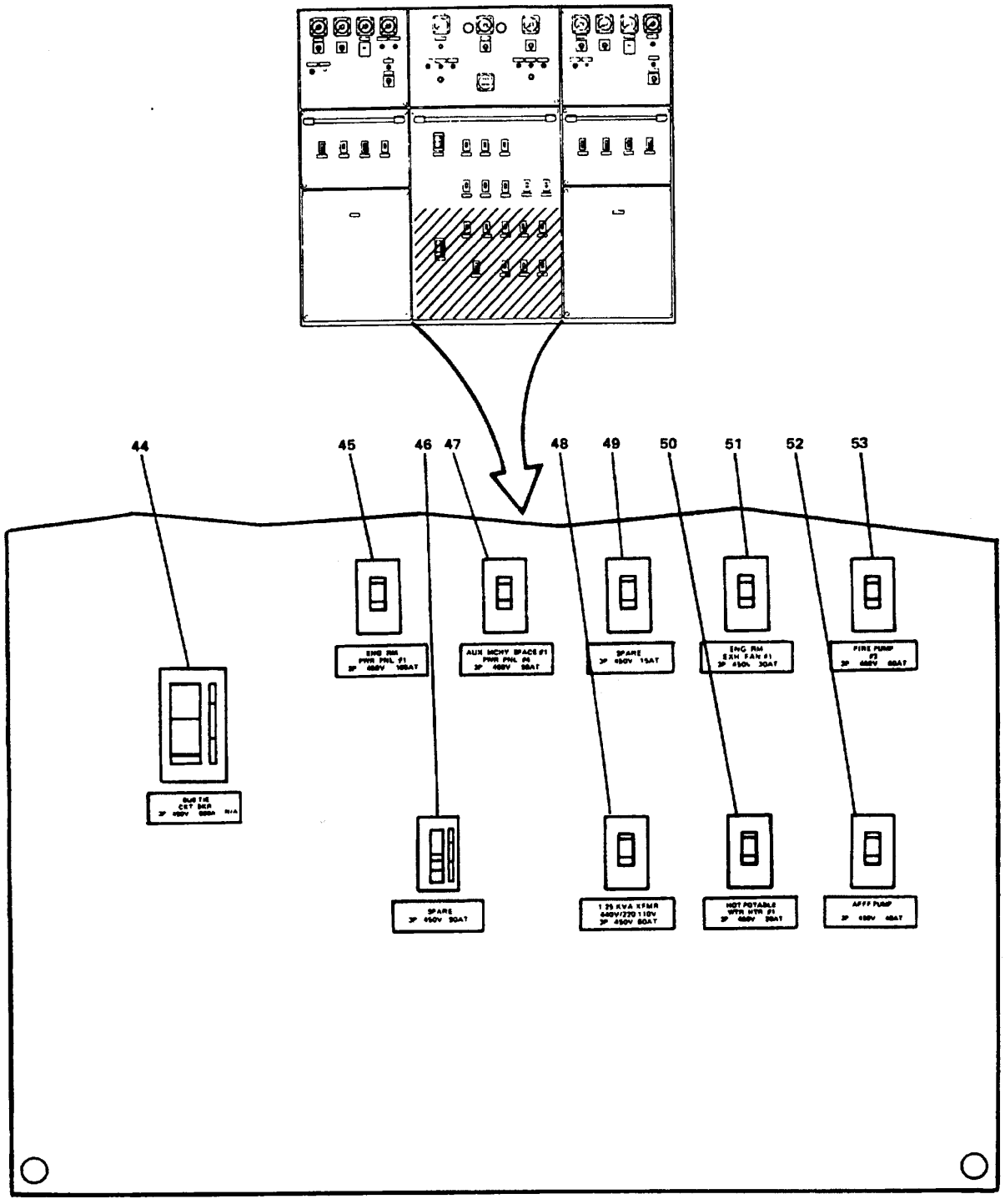


Figure 2-22. Main Switchboard (Sheet 5 of 7)

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Main Switchboard (Figure 2-22) (Continued)	
40	SPARE 3P 450V 90AT Circuit Breaker	Spare.
41	SPARE 3P 450V 15AT Circuit Breaker	Spare.
42	HOT POTABLE WTR HTR #2 3P 450V 20AT Circuit Breaker	Provides circuit protection for hot water heater #2.
43	MAIN DECK PWR PNL #3 3P 450V 100 AT Circuit Breaker	Provides circuit protection for main deck power panel No. 3.
44	BUS TIE CKT. BKR. 3P 450V 800A N/A Circuit Breaker	Provides circuit protection for bus tie.
45	ENG.RM. PWR.PNL #1 3P 450V 1 OOAT Circuit Breaker	Provides circuit protection for power panel No. 1.
46	SPARE 3P 450V 90AT Circuit Breaker	Spare.
47	AUX. MCHY. PWR. PNL. #4 3P 450V 50AT Circuit Breaker	SPACE #1 Provides circuit protection for power panel No. 4.
48	1-25 KVA XFMR 440/220/11 OV 3P 450V 60AT Circuit Breaker	Provides circuit protection for 220/110 V distribution panel.

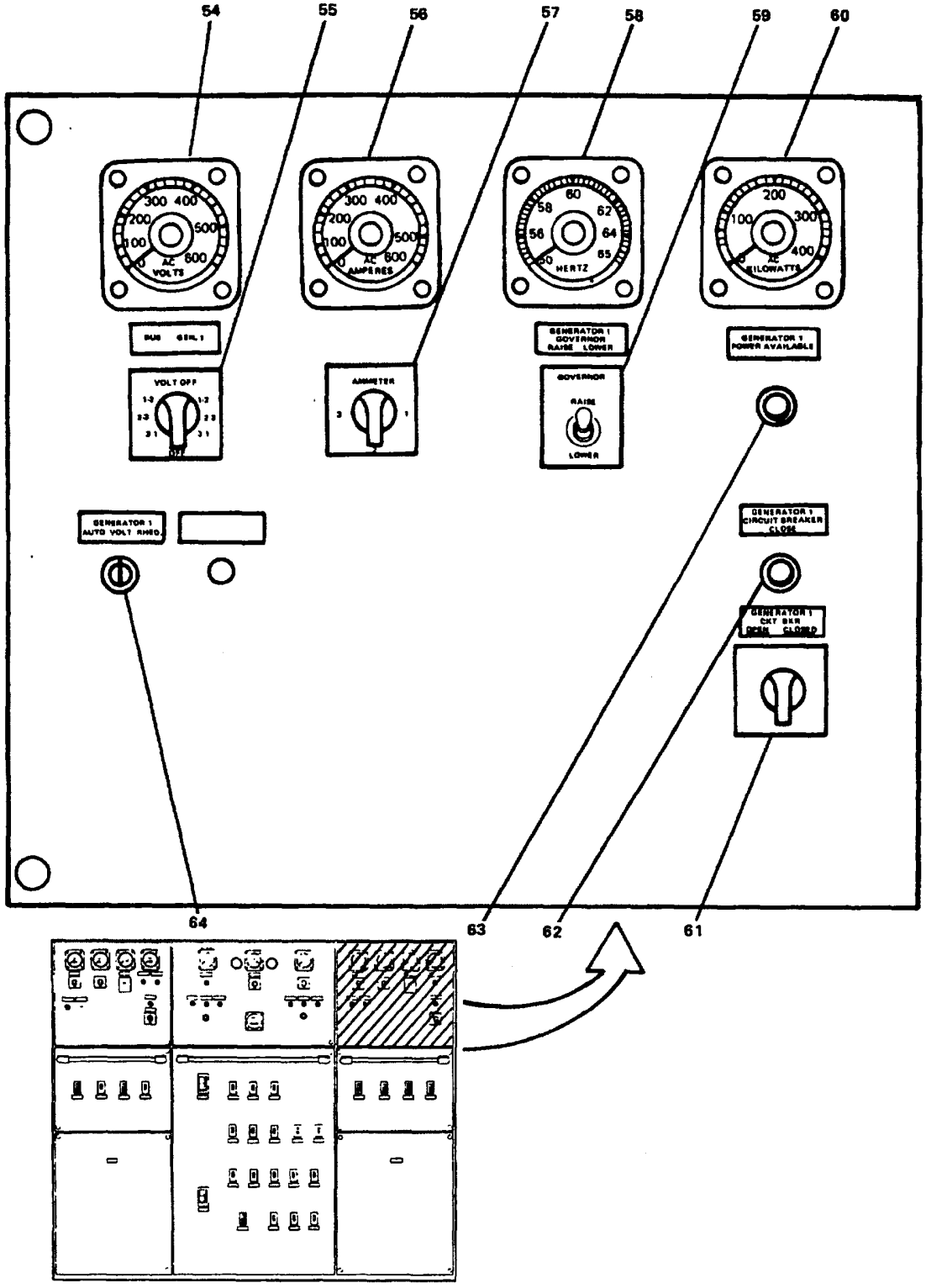


Figure 2-22. Main Switchboard (Sheet 6 of 7).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Main Switchboard (Figure 2-22) (Continued)	
49	SPARE 3P 450V 15AT Circuit Breaker	Spare.
50	HOT POTABLE WTR. HTR #1 3P 450V 20AT Circuit Breaker	Provides circuit protection for hot water heater #1.
51	ENG. EXH. FAN #1 3P 450V 30AT Circuit Breaker	RM. Provides circuit protection for engine room exhaust fan #1.
52	AFFF PUMP 3P 450V 40AT Circuit Breaker	Provides circuit protection for AFFF pump.
53	FIRE PUMP #2 3P 450V 60AT Circuit Breaker	Provides circuit protection for fire pump #2.
54	A-C VOLTS Meter	Indicates BUS GEN. 1 voltage.
55	VOLT OFF Switch	Selects phases for reading on voltmeter (54).
56	A-C AMPERES Meter	Indicates SSDG #1 amperage.
57	AMMETER Switch	Select phases 1, 2, or 3 for reading on ammeter (56).
58	HERTZ Meter	Indicates SSDG #1 frequency.
59	GENERATOR 1 GOVERNOR RAISE LOWER Switch	Controls engine speed.

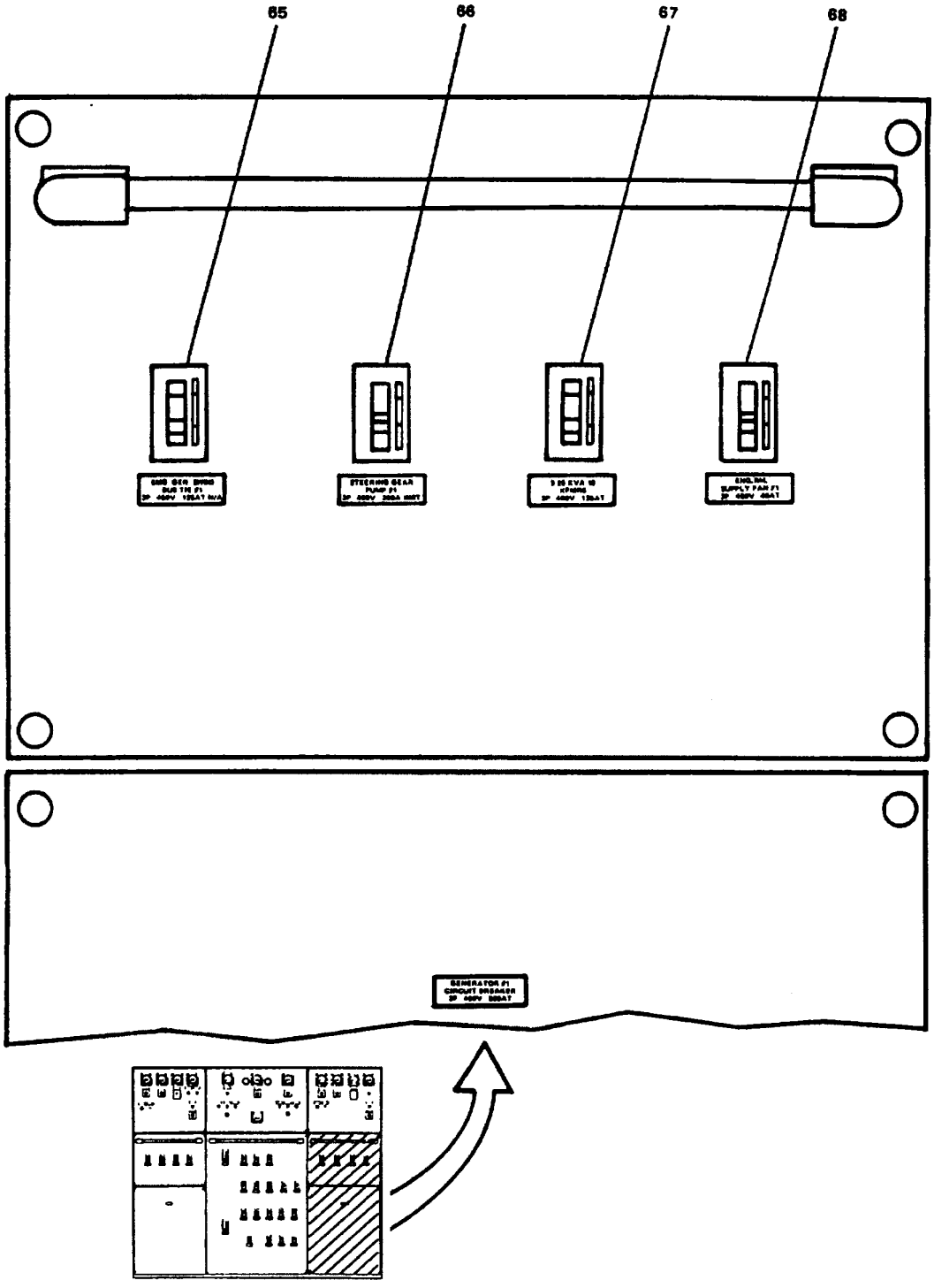


Figure 2-22. Main Switchboard (Sheet 7 of 7).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Main Switchboard (Figure 2-22) (Continued)	
60	A-C KILOWATTS Motor	Indicates SSDG #1 kilowatts.
61	GENERATOR 1 CKT. BKR. OPEN CLOSED Switch	Switch controlling SSDG #1 circuit breaker.
62	GENERATOR I CIRCUIT BREAKER CLOSE Indicator	Indicates SSDG #1 circuit breaker is closed.
63	GENERATOR 1 POWER AVAILABLE Indicator	Indicates SSDG #1 is generating power.
64	GENERATOR 1 AUTO. VOLT.	Voltage adjustment for SSDG #1. RHEO.
65	EMG. BUS TIE #1 3P 450V 125AT N/A Circuit Breaker	GEN. SWBD Provides circuit protection for emergency switchboard bus tie #1.
66	STEERING CLEAR PUMP #1 3P 450V 300A INST Circuit Breaker	Provides circuit protection for steering gear pump #1.
67	3-25 KVA 10 XFMRS 3P 450V 125AT Circuit Breaker	Provides circuit protection for power transformers mounted on engine room port bulkhead.
68	ENG. RM. SUPPLY FAN #1 3P 450V 40AT Circuit Breaker	Provides circuit protection for engine room supply fan #1.

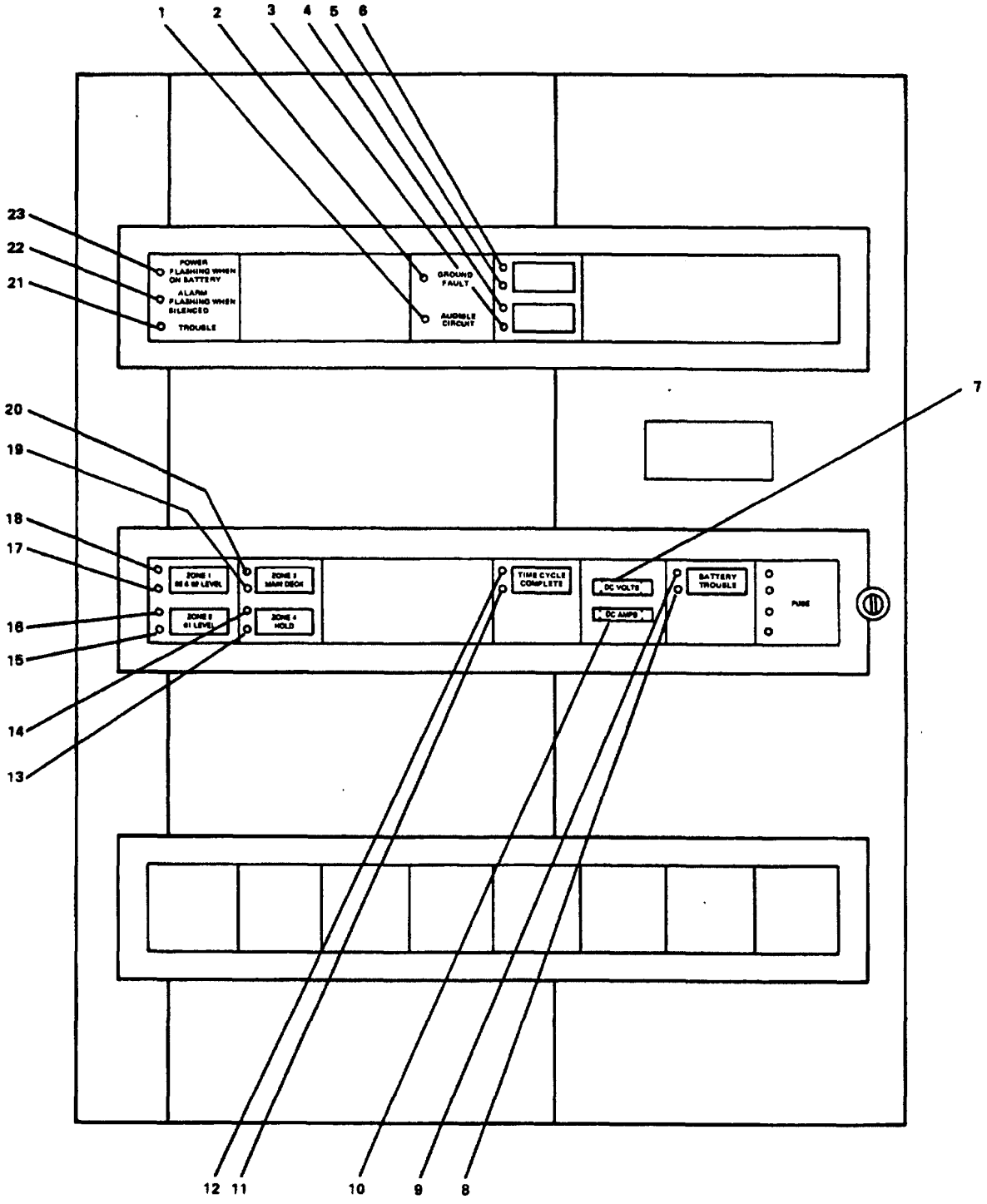


Figure 2-23. Marine Fire Detection Panel.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Marine Fire Detection Panel (Figure 2-23)	
1	AUDIBLE CIRCUIT Indicator	Indicates a fault in fire detector audible alarm circuit (AMBER).
2	GROUND FAULT Indicator	Indicates ground fault in fire detection system (AMBER).
3	LED Indicator	Not used.
4	LED Indicator	Not used.
5	LED Indicator	Not used.
6	LED Indicator	Not used.
7	DC VOLTS Meter	Indicates fire detection system do voltage.
8	BATTERY TROUBLE Indicator	Indicates low charge in battery system (AMBER).
9	LED Indicator	Not used.
10	DC AMPS Meter	Indicates fire detection system do amperage.
11	LED Indicator	Not used.
12	LED Indicator	Indicates alarm condition has been received and time cycle complete (RED).
13	LED Indicator	Indicates ZONE 4 HOLD operational (AMBER).
14	LED Indicator	Indicates alarm from ZONE 4 HOLD (RED).
15	LED Indicator (AMBER).	Indicates ZONE 2 01 LEVEL operational
16	LED Indicator	Indicates alarm from ZONE 2 01 LEVEL (RED).
17	LED Indicator (AMBER).	Indicates ZONE 1 03 & 02 LEVEL operational
18	LED Indicator (RED).	Indicates alarm from ZONE 1 03 & 02 LEVEL
19	LED Indicator (AMBER).	Indicates ZONE 3 MAIN DECK operational
20	LED Indicator	Indicates alarm from ZONE 3 MAIN DECK (RED).
21	TROUBLE Indicator	Indicates fault in fire detection system (AMBER).
22	ALARM FLASHING WHEN SILENCED Indicator	Indicates alarm for one or more zones (RED). Flashes after audible alarm has been silenced.
23	POWER FLASHING WHEN ON BATTERY Indicator	Indicates power is being supplied to fire detection panel (GREEN). Flashes when on battery power.

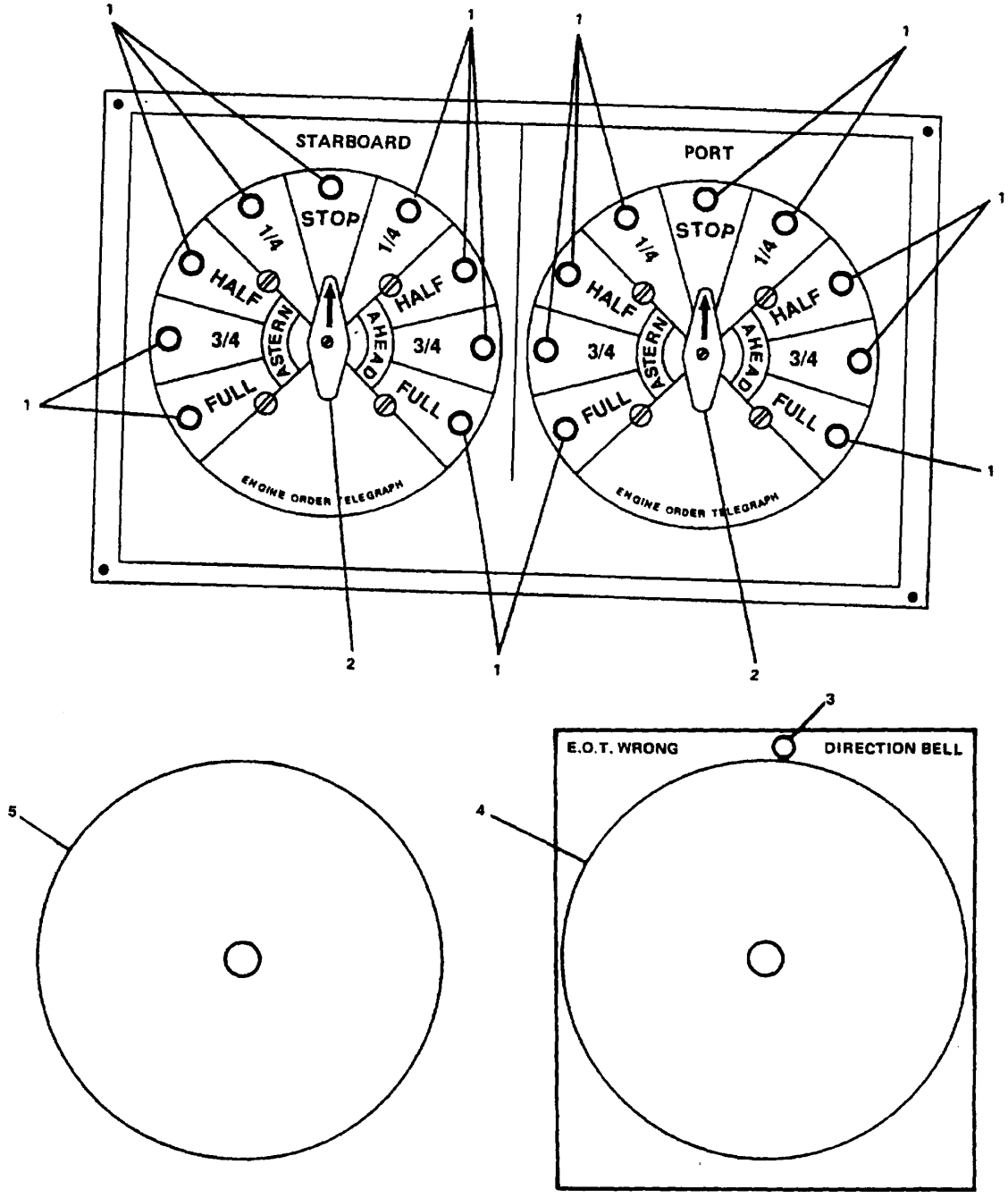


Figure 2-24. Engine Order Telegraph and Wrong Direction Bell.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Engine Order Telegraph and Wrong Direction Bell (Figure 2-24)		
1	LEDs	LED indicates selected speed and direction.
2	Selector Knob	Knob used to select desired speed and direction.
3	LED Indicator	Indicates EOS has wrong direction selected.
4	Bell	Bell sounds when EOS has wrong direction selected.
5	Bell	Bell sounds when change has been ordered.

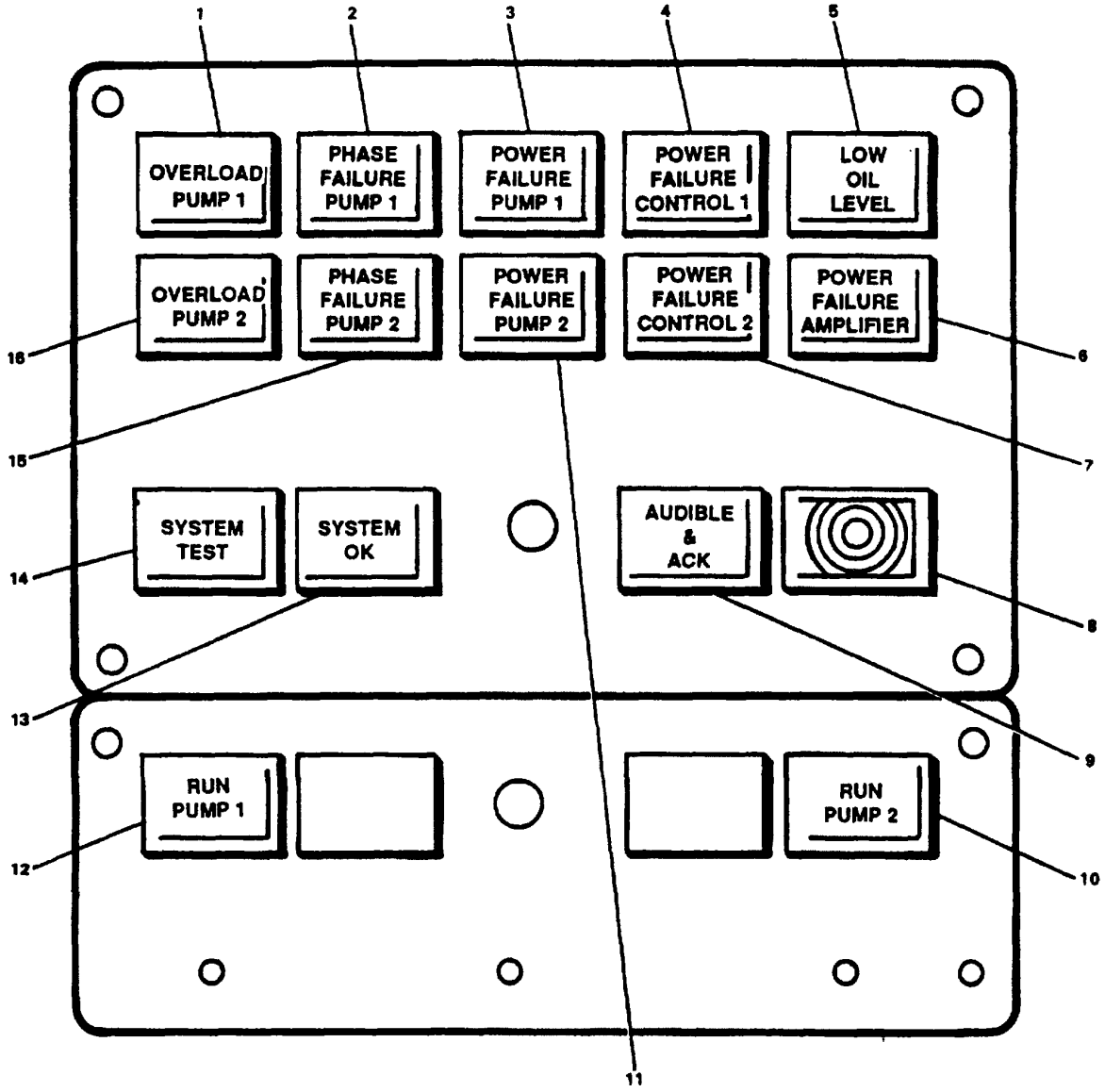


Figure 2-25. Steering Control Alarm Panel.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Steering Control Alarm Panel (Figure 2-25)		
1	OVERLOAD PUMP 1 Indicator	Overload on electric motor for pump 1 (ORANGE).
2	PHASE FAILURE PUMP 1 Indicator	Indicates phase failure in electrical supply to pump 1 (ORANGE).
3	POWER FAILURE PUMP 1 Indicator	Indicates loss of power to pump 1 (RED).
4	POWER FAILURE CONTROL 1 Indicator	Indicates loss of power for control circuit for pump 1 (RED).
5	LOW OIL LEVEL Indicator	Indicates low oil level in expansion tank (ORANGE).
6	POWER FAILURE AMPLIFIER Indicator	Indicates power loss to amplifier (RED).
7	POWER FAILURE CONTROL 2 Indicator	Indicates loss of power for control circuit for pump 2 (RED).
8	Audible Alarm	Indicates a failure has occurred.
9	AUDIBLE & ACK Indicator (Pushbutton)	Acknowledges and silences audible alarm (pushbutton) (BLUE).
10	RUN PUMP 2 Indicator	Indicates pump 2 is operating (GREEN).
11	POWER FAILURE PUMP 2 Indicator	Indicates loss of power to pump 2 (RED).
12	RUN PUMP 1 Indicator	Indicates pump 1 is operating (GREEN).
13	SYSTEM OK Indicator	Indicates no faults in system (BLUE).
14	SYSTEM TEST (Pushbutton)	Used to test indicators and related circuits (pushbuttons) (BLUE).
15	PHASE FAILURE PUMP 2 Indicator	Indicates phase failure in electrical supply to pump 2 (ORANGE).
16	OVERLOAD PUMP 2 Indicator	Overload on electric motor for pump 2 (ORANGE).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Fire Pull Box (Figure 2-26)	
1	Handhold	Pull down to sound alarm.

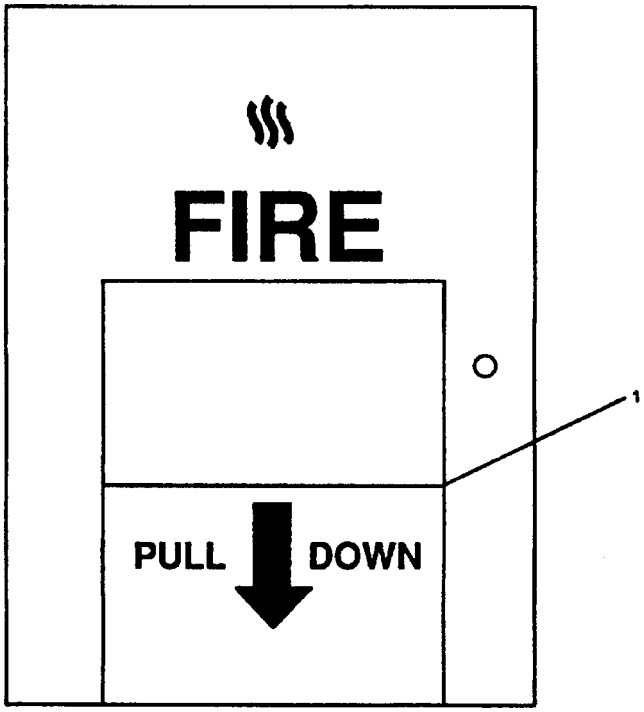


Figure 2-26. Fire Pull Box.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Fire Station (Figure 2-27)		
1	Valve	Turns pressurized water ON or OFF.
2	Nozzle	Directs water by spray or stream to fire.

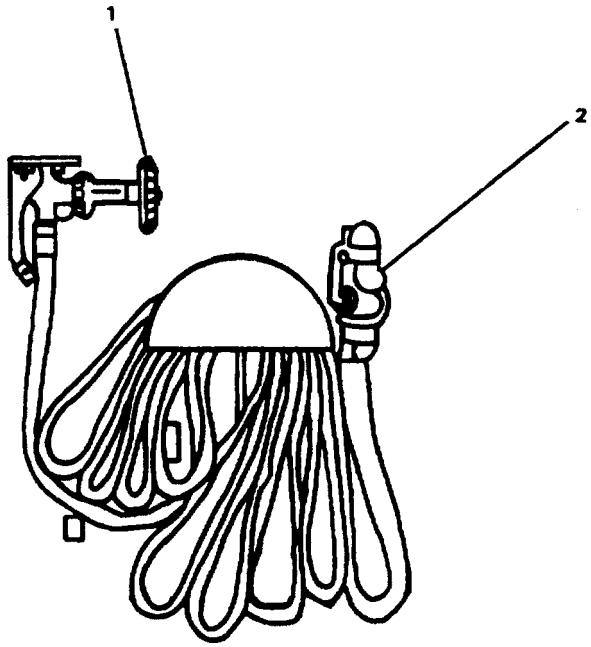


Figure 2-27. Fire Station.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Firemain and Accessories Controls (Figure 2-28)		
1	Nozzle Valve	Shut - stops flow of water. Fog - directs water to fog jet. Open directs water to single stream outlet.
2	Fog Outlet Plug	Provides outlet for attaching 4-foot and 12-foot applicators.

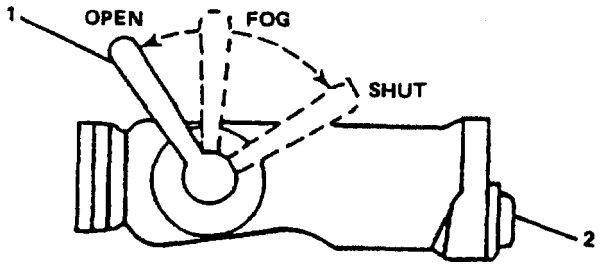


Figure 2-28. Firemain and Accessories Controls.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Fire Monitors (Figure 2-29)	
1	Traverse Lock Handle	Controls traverse lock which controls direction of fire monitor.
2	Directional Control Handle	Allows directional control of monitor by operator.
3	Elevation Lock Handle	Controls elevation lock.
4	Stream Control Handle	Adjusts jaws at tip of monitor to control width of stream output.
5	Cutout Valve monitors.	Controls flow of water and AFFF to fire

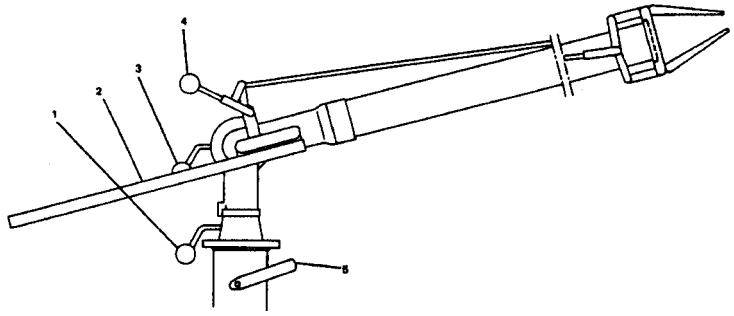


Figure 2-29. Fire Monitors.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Dry Chemical Fire Extinguisher (Figure 2-30)		
1	Pull/Pin Visual Seal	Prevents accidental discharge. Visual seal missing or broken indicates tampering.
2	Handle	Push handle down.

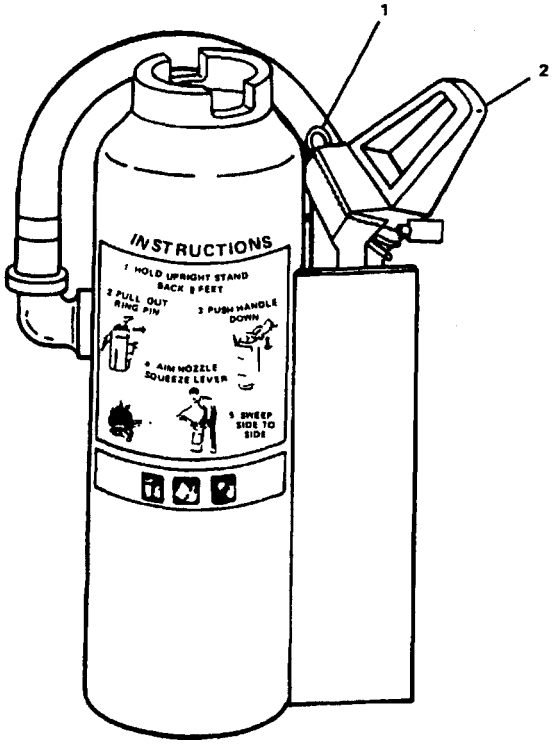


Figure 2-30. Dry Chemical Fire Extinguisher.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Intercom, LS-519A/SIC(U) (Figure 2-31)		
1	REL Indicator	Indicates release of system is needed (RED).
2	Station Pushbuttons	Connect unit to selected station.
3	CALL Indicator	Indicates incoming call (RED).
4	BUSY Indicator	Indicates system is in use (RED).
5	DIMMER Control	Controls illumination level of intercom panel.
6	HANDS FREE Control	Provides hands free or press to talk transmission modes.
7	MIC. OR HANDSET Plug	Jack plug for external microphone/handset.
8	VOLUME Control	Controls sound level of intercom.
9	PRESS TO RELEASE	Releases station pushbuttons.

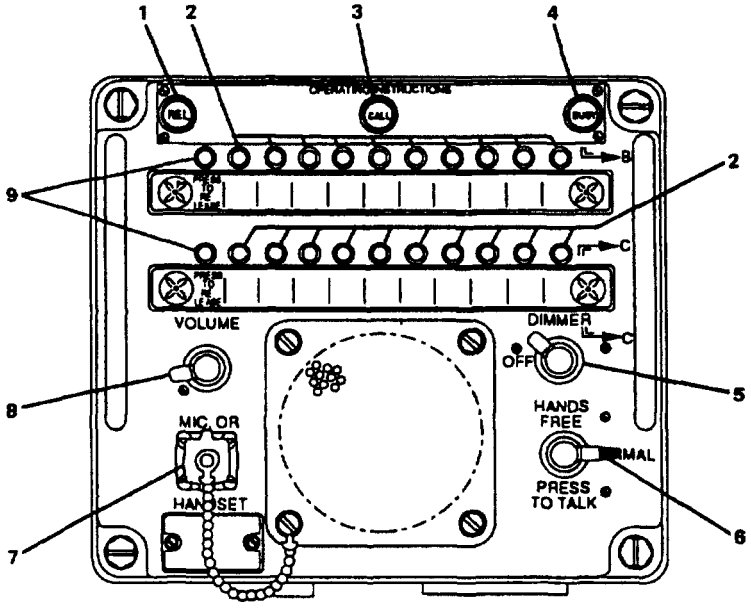


Figure 2-31. Intercom, LS-519A/SIC(U).

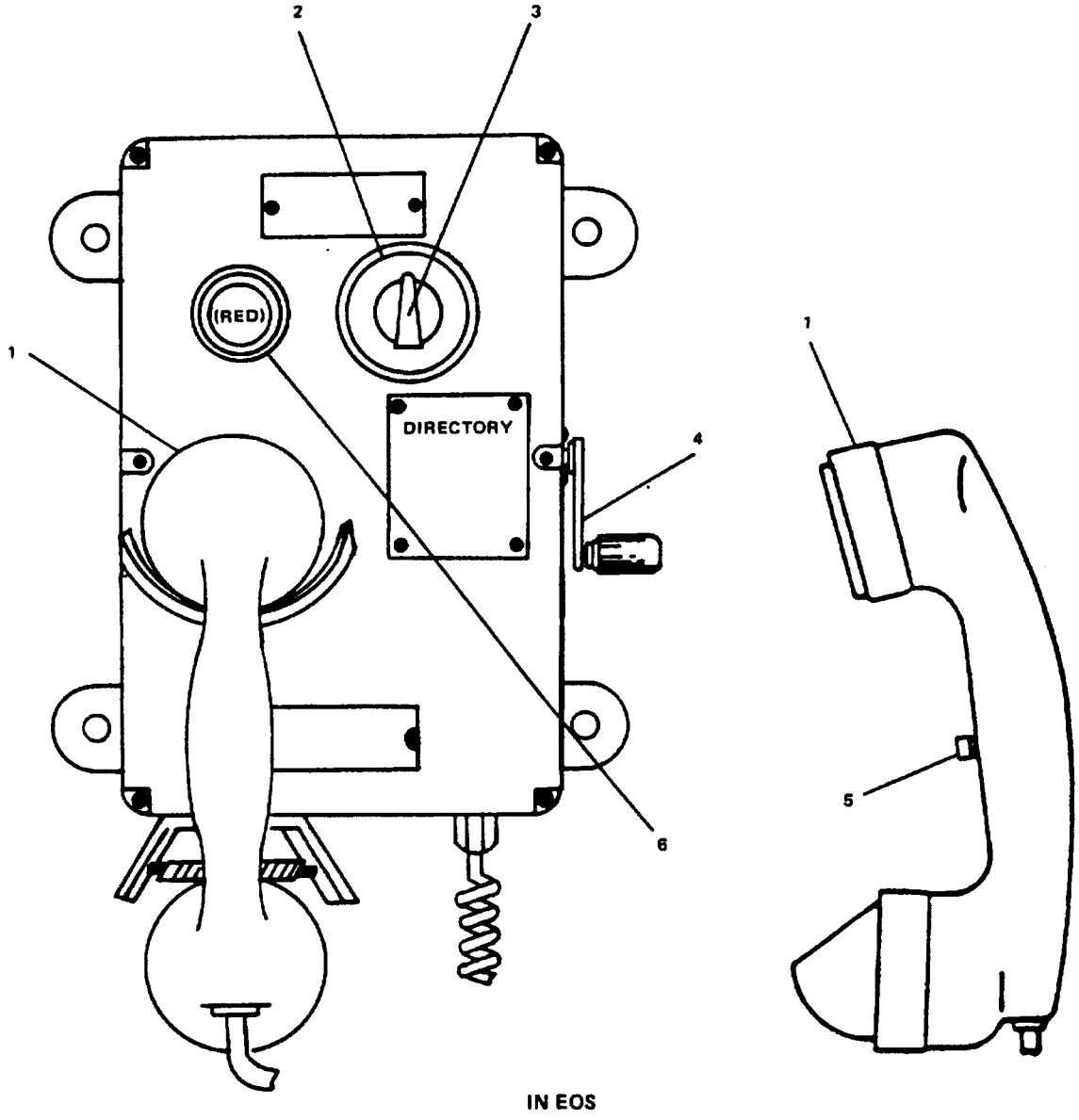


Figure 2-32. Sound Powered Telephone, Model SWLR-243.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Sound Powered Telephone, Model SWLR-243 (Figure 2-32)		
1	Handset	Communication instrument.
2	Selector Dial	Outlines available stations.
3	Selector Knob	Selects station to be called.
4	Magneto Handle	Crank handle to call selected station.
5	Pushbutton	Press to transmit.
6	DIRECTORY Plate	Lists shipboard telephone stations.
7	Indicator Light (RED)	Indicates incoming call.

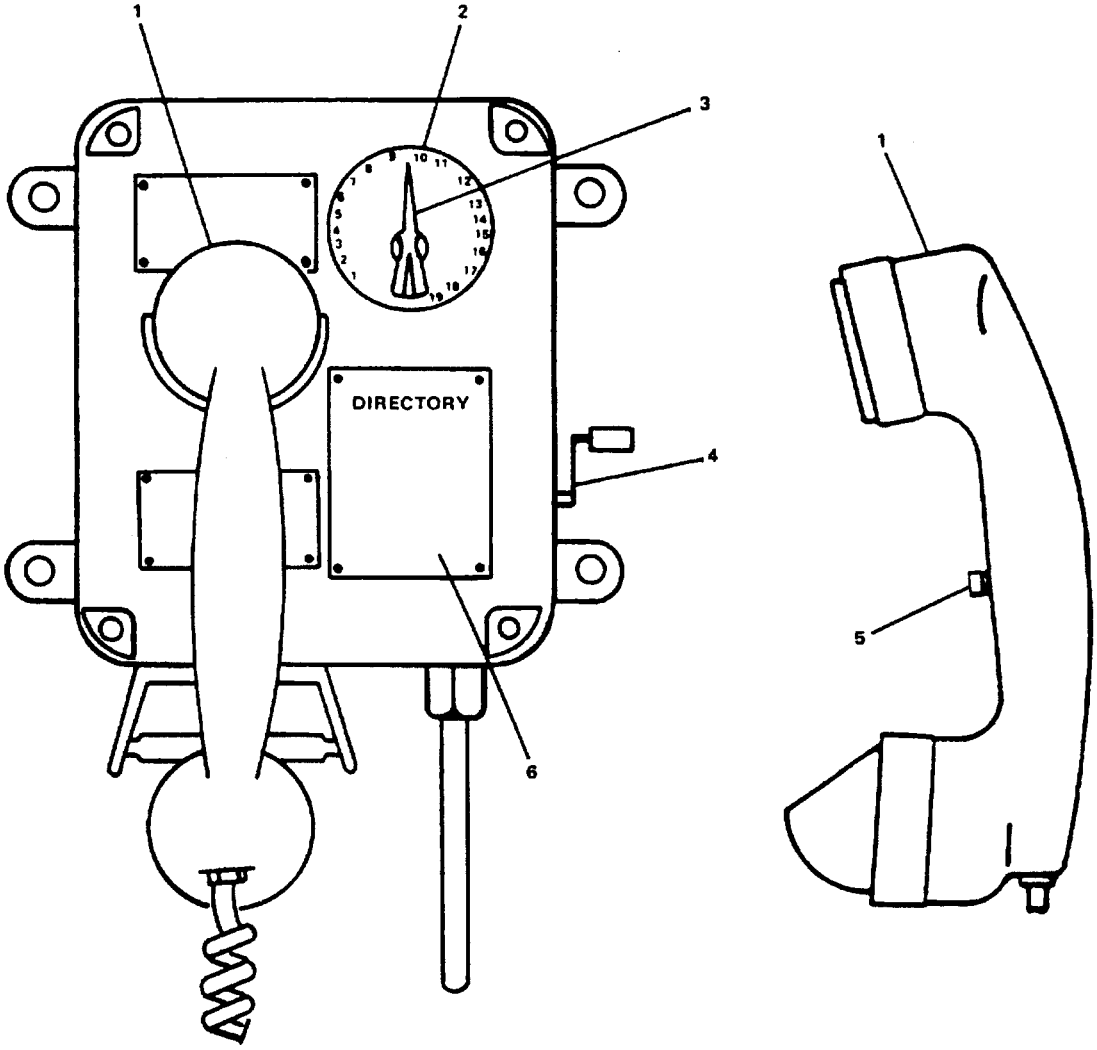


Figure 2-33. Sound Powered Telephone, Model SW-23/SW-243.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Sound Powered Telephone, Model SW-23/SW-243 (Figure 2-33)		
1	Handset	Communication instrument.
2	Selector Dial	Outlines available stations (SW-243 only).
3	Selector Knob	Selects station to be called (SW-243 only).
4	Magneto Handle	Crank handle to call a station.
5	Pushbutton	Press to transmit.
6	DIRECTORY Plate	Lists shipboard telephone stations. NOTE SW-23 in pilothouse and radio room only.

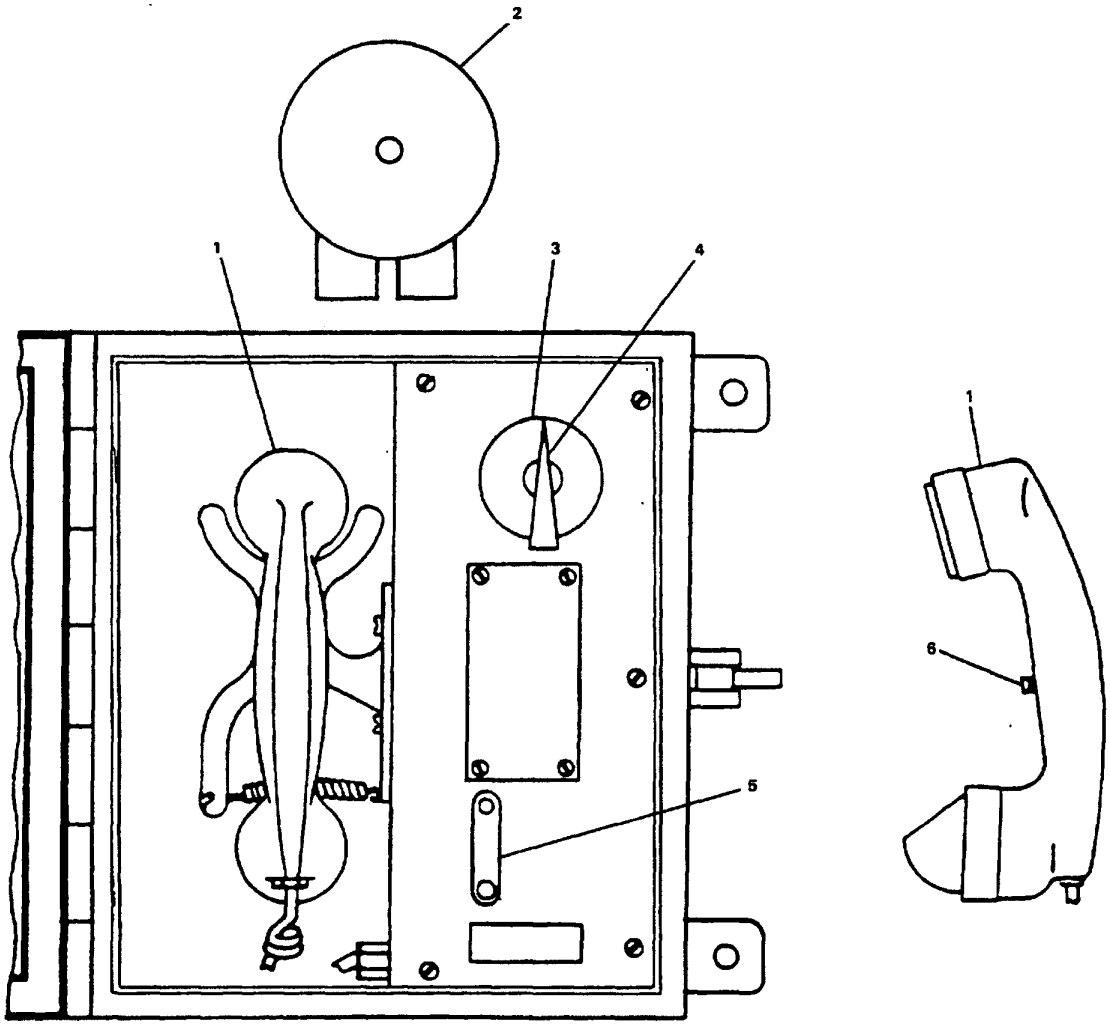


Figure 2-34. Sound Powered Telephone, Model MWT-246.

Table 2-1. Description of Operator's Controls and Indicators – CONT

Key	Control or Indicator	Function
Sound Powered Telephone, Model MWT-246 (Figure 2-34)		
1	Handset	Communication Instrument.
2	Bell	Indicates incoming call.
3	Selector Dial	Outlines available stations.
4	Selector Knob	Selects station to be called.
5	Magneto Handle	Crank handle to call a station.
6	Pushbutton	Press to transmit.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Sound Powered Telephone, Head Set - Chest Set (Figure 2-35)		
1	Hook	Fastener for web strap.
2	Pushbutton	Keys microphone.
3	Mouth Piece	Holder for transmitter.
4	Headset	Contains headphone type receiver.
5	Support Bracket	Provides chest support for sound powered head set - chest set telephone.
6	Jack Plug	Connects head set - chest set to jack box.

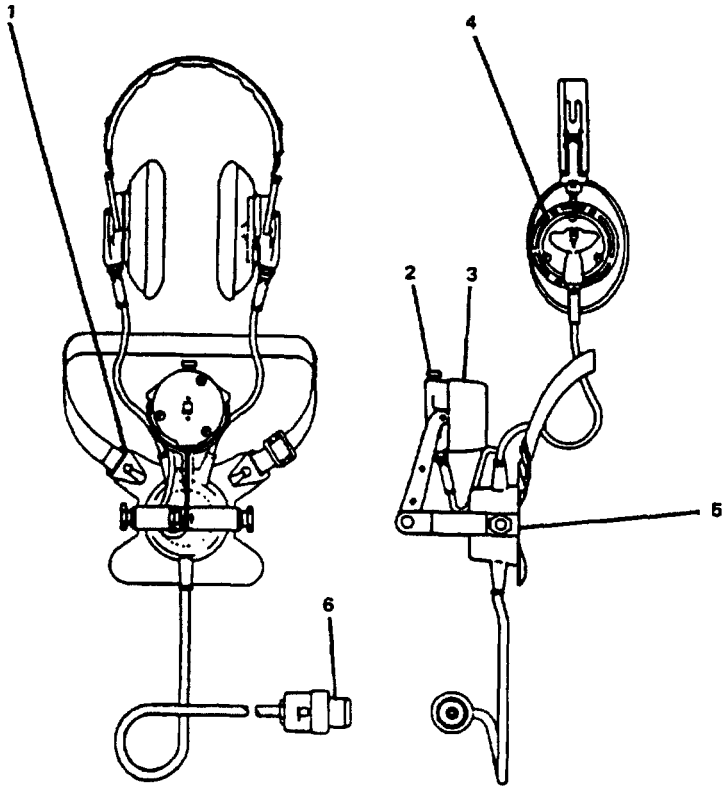


Figure 2-35. Sound Powered Telephone, Head Set - Chest Set.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Sound Powered Telephone, Jack Box (Figure 2-36)		
1	Jack Box	Watertight jack box for use with sound powered telephone instruments.
2	Jack Box Cover	Accommodates the jack plug connection for handset-chestset.

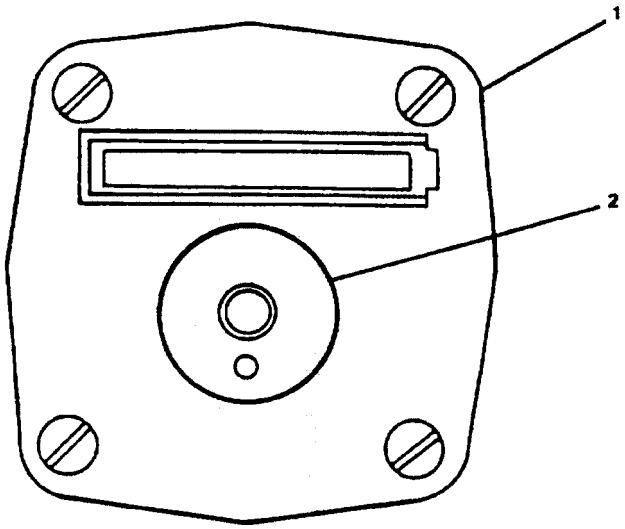


Figure 2-36. Sound Powered Telephone, Jack Box.

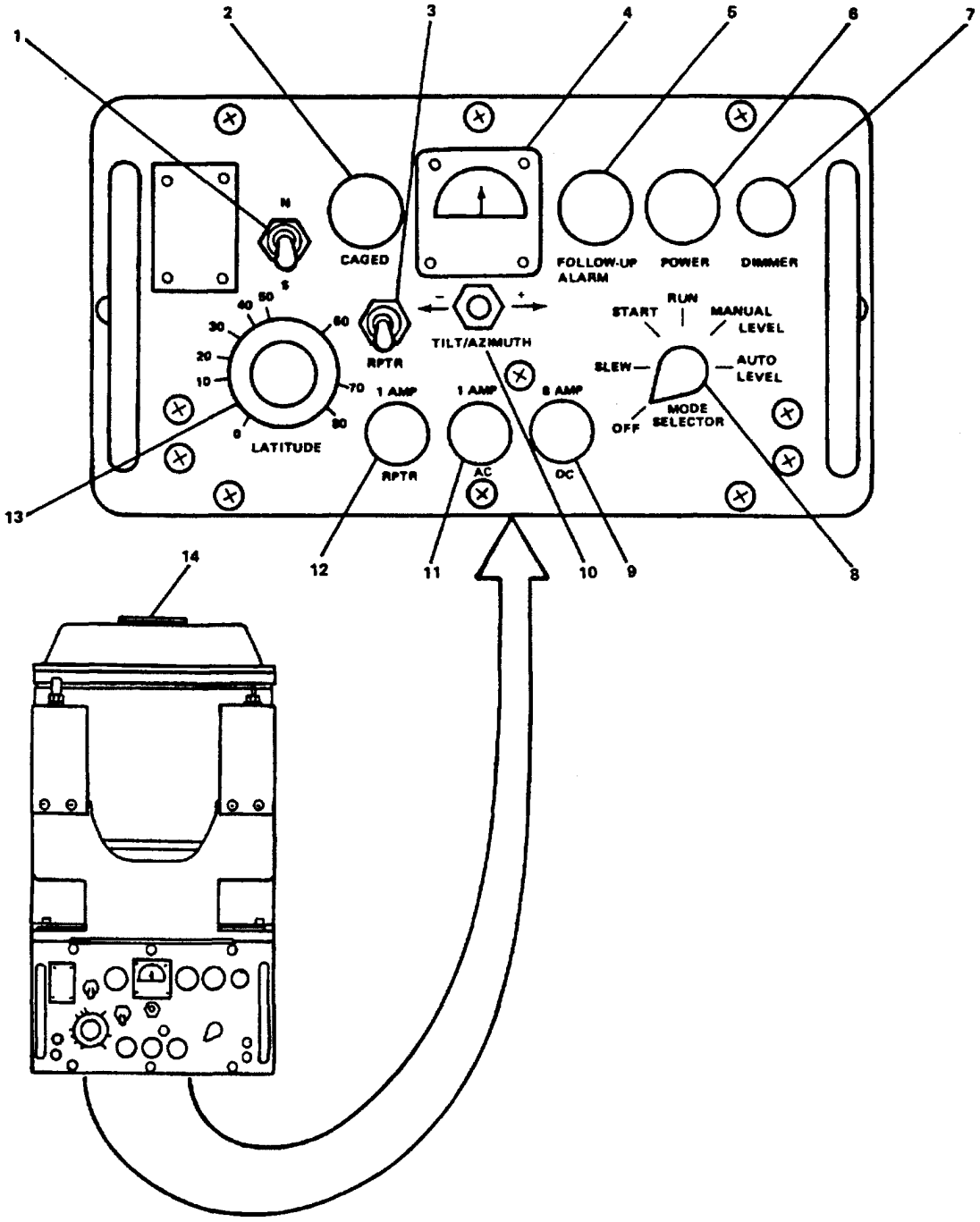


Figure 2-37. Gyrocompass Mk 27 Mod 1 Electronic Control Panel.

Key	Control or Indicator	Function
Gyrocompass Mk 27 Mod 1 Electronic Control Panel (Figure 2-37)		
1	N - S Switch	Set for north or south latitude depending upon ship's location.
2	CAGED Indicator	Indicates gyroscope is caged (RED).
3	RPTR Switch	Applies power to repeaters.
4	Level Meter	Indicates tilt of gyroscope spin axis; 2 minutes per division.
5	FOLLOW-UP ALARM Indicator	Illuminated, the gyrocompass would lose one axis of freedom and could no longer be considered a gyroscope.
6	POWER Indicator	Indicates power available to circuits (RED).
7	DIMMER Indicator	Controls illumination level of compass card on master compass.
8	MODE SELECTOR Switch	SLEW position energizes all circuits except gyroscope motor and repeaters; in START position, gyroscope is brought up to speed; in RUN position, TILT/AZIMUTH switch is not energized; in MANUAL LEVEL position, TILT/ AZIMUTH switch is energized; in AUTO LEVEL position, gyroscope is brought to approximate level position. OFF position turns system off.
9	8 AMP DC Fuse	Fuse protects internal power supply.
10	TILT/AZIMUTH Switch	Controls gyro compass direction of rotation and supplies tilt signal.
11	1 AMP AC Fuse	Fuse protects 120 volt ac circuit.
12	1 AMP RPTR Fuse	Fuse protects repeater internal power supply.
13	LATITUDE	Compensates for ship's latitude.
14	Caged Button	Pushbutton cages gyrocompass.

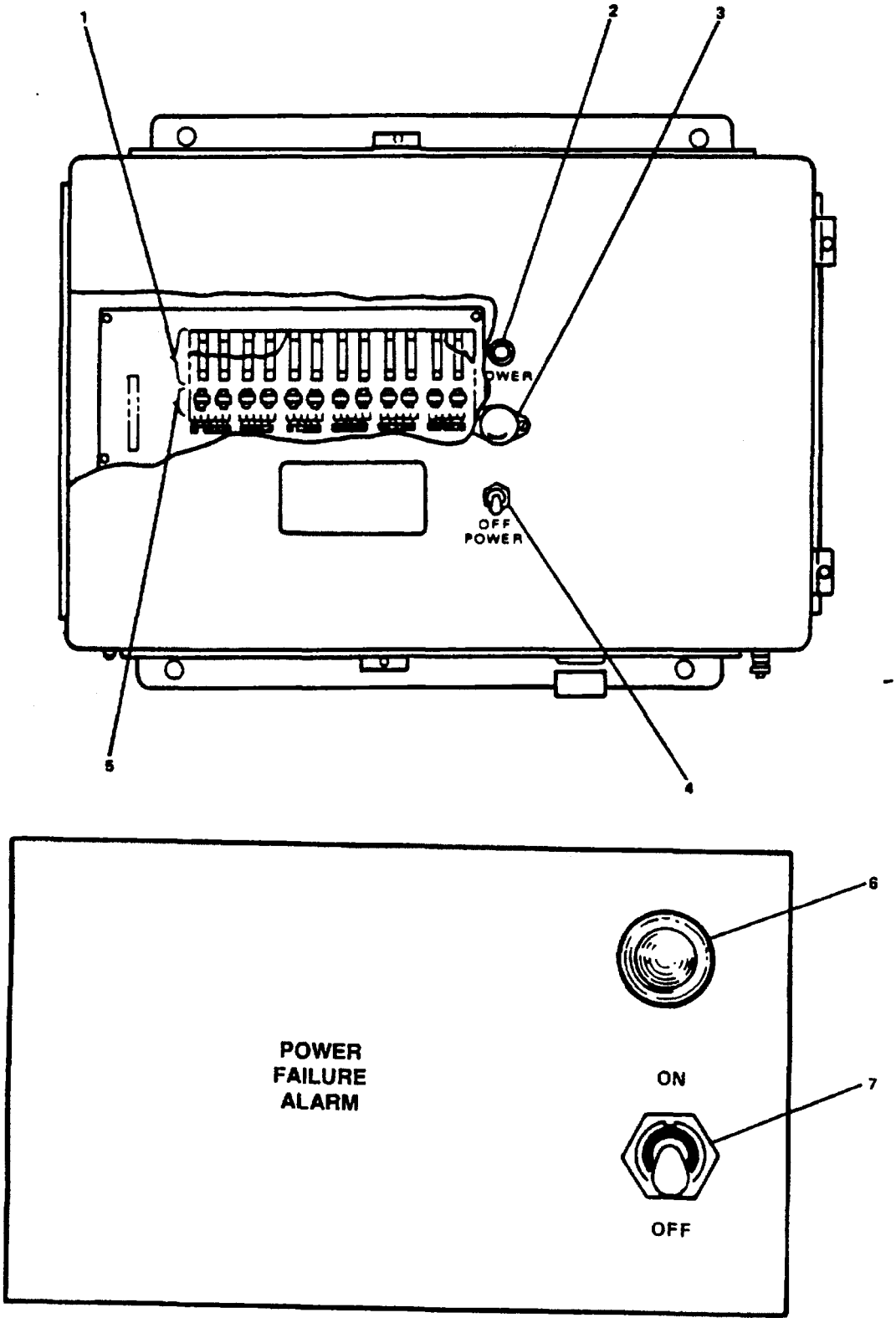


Figure 2-38. Mk 37 Mod E Transmission Unit.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Mk 37 Mod E Transmission Unit (Figure 2-38)		
1	Repeater Fuses A2F1 Through A2S12	Protects B + power circuit to each repeater load.
2	POWER Indicator ac power is turned on.	Illuminates to indicate transmission unit
3	Fuse (F1) input circuit.	Fuse (8 amp) protects transmission unit ac
4	OFF POWER Switch	Controls ac power to transmission circuit.
5	Repeater Switches A2S1 Through A2S12	Controls do (B +) power to each step repeater load.
6	Indicator Light ac power is turned on.	Illuminates to indicate power failure unit
7	ON/OFF Toggle Switch	Controls ac power to alarm circuits.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Life Raft (Figure 2-39)	
1	Life Raft Container	Contains life raft and CO2 bottle.
2	Pressure Release Strap	Releases top and bottom halves of container when life raft inflates.
3	Retainer Strap	Holds life raft in place on cradle.
4	Locking Ring	Holds pelican hook in closed position.
5	Pelican Hook	Attaches hook at end of retaining strap to cradle.
6	Hydrostatic Release	Causes automatic inflation of life raft in container when submerged.
7	Cradle	Secure platform for life raft.
8	Painter Line	Attached to launch ramp, causes automatic life raft inflation.

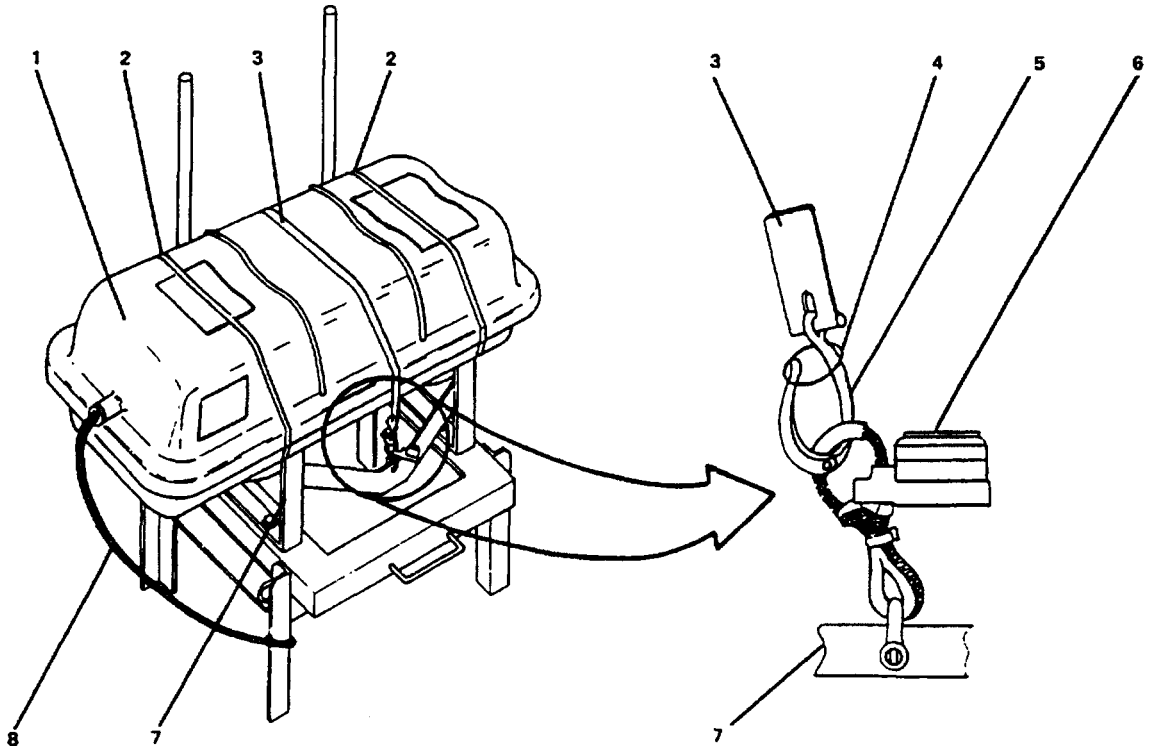


Figure 2-39. Life Raft.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Reheater (Figure 2-40)		
1	ON-OFF POWER CIRCUIT Switch	Switch controls power to reheater.

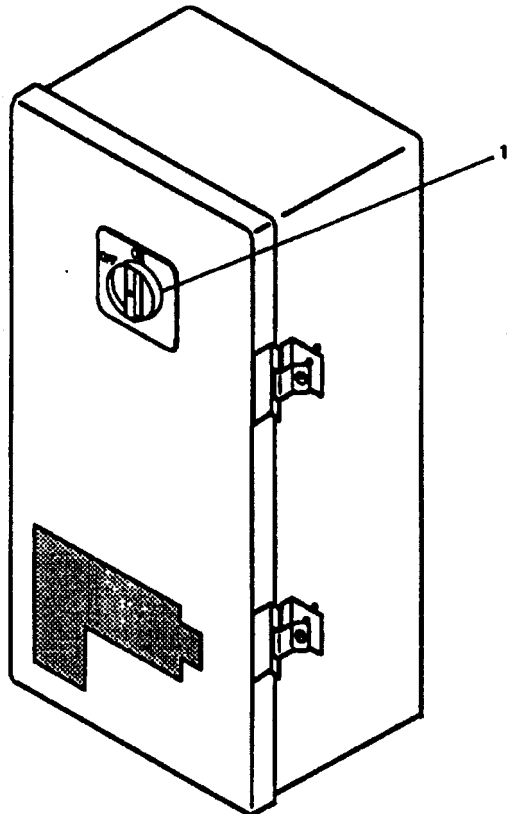


Figure 2-40. Reheater.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Electric Unit Heater (Figure 2-41)		
1	Thermostat	Controls temperature setting for heater.
2	ON-OFF Switch	Controls power to heater.

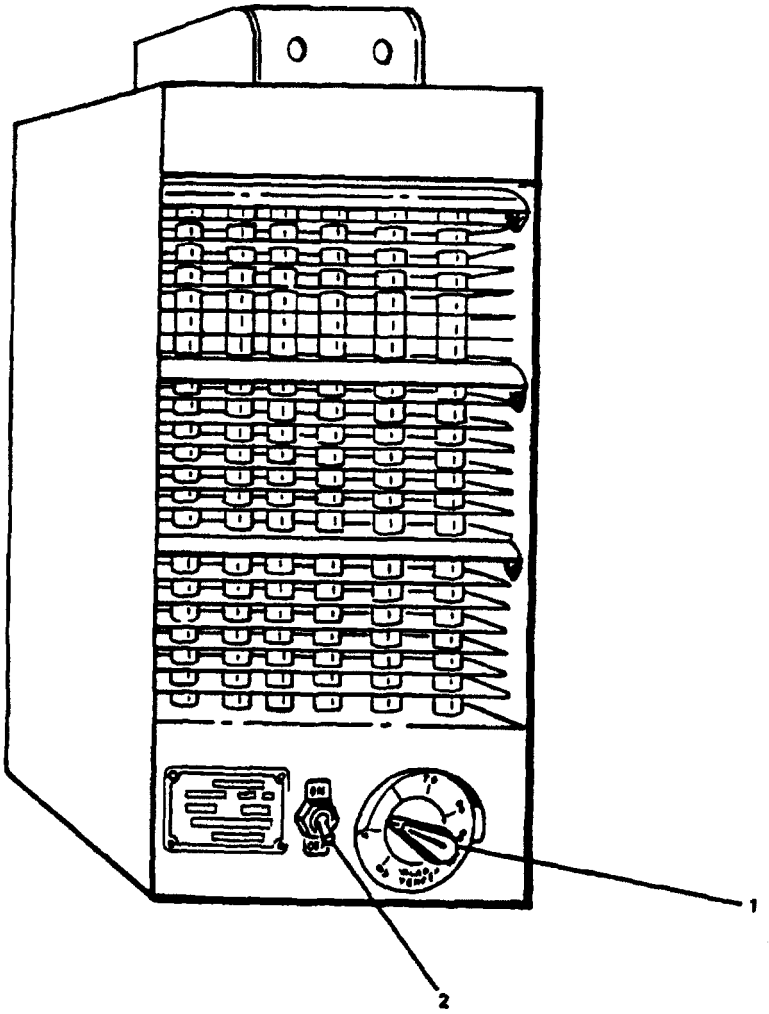


Figure 2-41. Electric Unit Heater.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Preheater (Figure 2-42)		
1	ON-OFF Switch	Controls power to reheater.

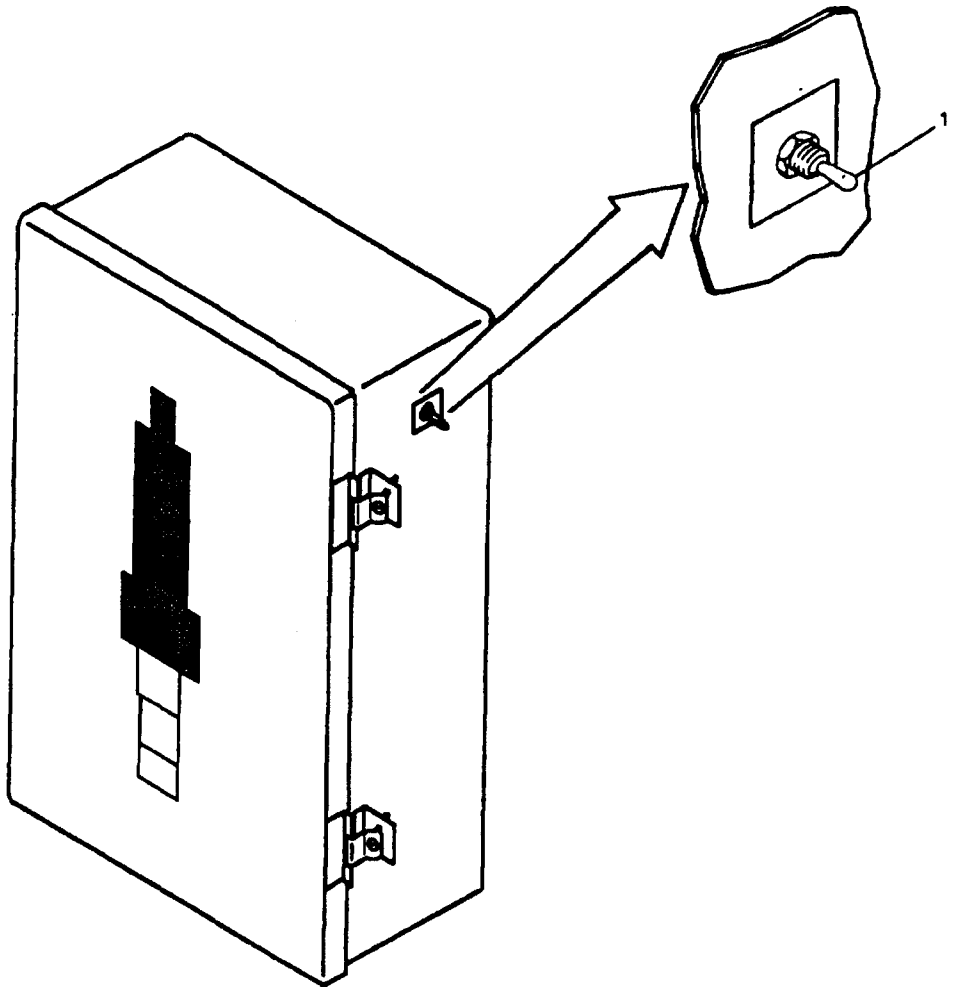


Figure 2-42. Preheater.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Pre/Reheater (Figure 2-43)		
1	OFF-ON Switch	Controls power to pre/reheater.

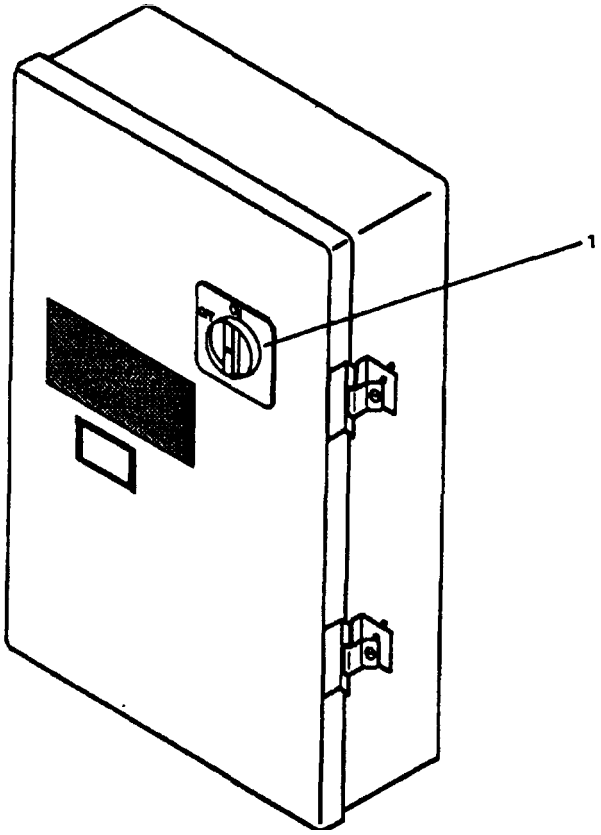


Figure 2-43. Pre/Reheater.

Key	Control or Indicator	Function
Convection Heater (Figure 2-44)		
1	Manual Hi-Limit Switch	Sets temperature at which heater will cut out. Overrides thermostat setting.
2	ON-OFF Switch	Controls power to heater.
3	Thermostat	Controls temperature setting for heater.

Table 2-1. Description of Operator's Controls and Indicators - CONT

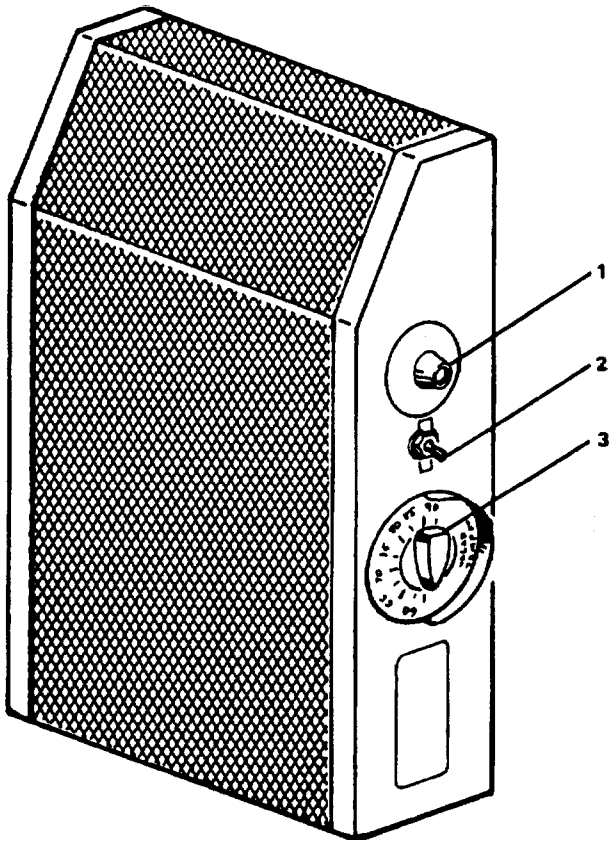


Figure 2-44. Convection Heater.

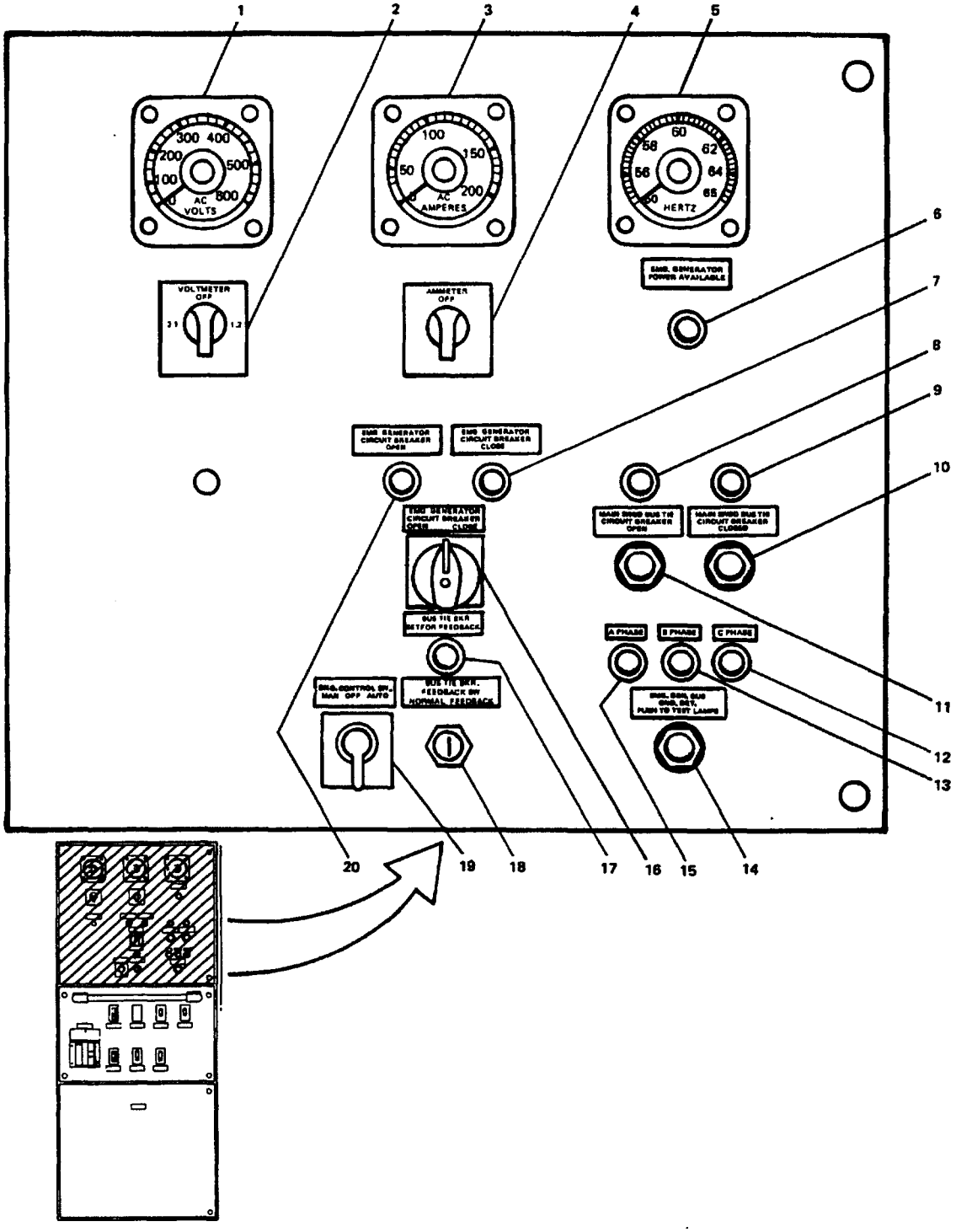


Figure 2-45. Emergency Switchboard (Sheet 1 of 2).

Table 2-1. Description of Operator's Controls and Indicators – CONT

Key	Control or Indicator	Function
Emergency Switchboard (Figure 2-45)		
1	A-C Volts Meter	Indicates emergency generator voltage.
2	VOLTMETER OFF Switch	Selects phase 3-1 or 1-2 for reading on voltmeter (1).
3	A-C AMPERES Meter	Indicates emergency generator amperage.
4	AMMETER OFF Switch	Selects phases for reading on ammeter (3).
5	HERTZ Meter	Indicates emergency generator frequency.
6	EMG. GENERATOR POWER AVAILABLE Indicator	Indicates emergency generator is supplying power to switchboard.
7	EMG. GENERATOR CIRCUIT BREAKER CLOSED Indicator	Indicates circuit breaker is in closed position.
8	MAIN SWBD. BUS TIE CIRCUIT BREAKER OPEN Indicator	Indicates circuit breaker is in open position.
9	MAIN SWBD. BUS TIE CIRCUIT BREAKER CLOSED Indicator	Indicates circuit breaker is in closed position.
10	Pushbutton	Closes MAIN SWBD. BUS TIE CKT BKR.
11	Pushbutton	Opens MAIN SWBD. BUS TIE CKT BKR.
12	C PHASE Indicator	Indicates ground fault on C phase bus.

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Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Emergency Switchboard (Figure 2-45) - Continued		
13	B PHASE Indicator	Indicates ground fault on B phase bus.
14	EMG. GEN, BUS GND. DET. PUSH TO TEST LAMPS Pushbutton	Provides test of ground detection lights.
15	A PHASE Indicator	Indicates ground fault on A phase bus.
16	EMG. GENERATOR CIRCUIT BREAKER OPEN CLOSE Circuit Breaker	Selects OPEN or CLOSED position for emergency generator circuit breaker.
17	BUS. TIE BKR. SET FOR FEEDBACK Indicator	Indicates feedback switch (18) has been set to FEEDBACK position.
18	BUS. TIE BKR. FEEDBACK SW. NORMAL FEEDBACK Key Switch emergency switchboard.	Key lock switch to select FEEDBACK SWITCH in. NORMAL position power is supplied from main switchboard. In FEEDBACK position, power may be supplied to main switchboard from
19	ENG. CONTROL SW. MAN. OFF AUTO. Switch	Selects mode of operation.
20	EMG. GENERATOR CIRCUIT BREAKER OPEN Indicator	Indicates circuit breaker is in open position.

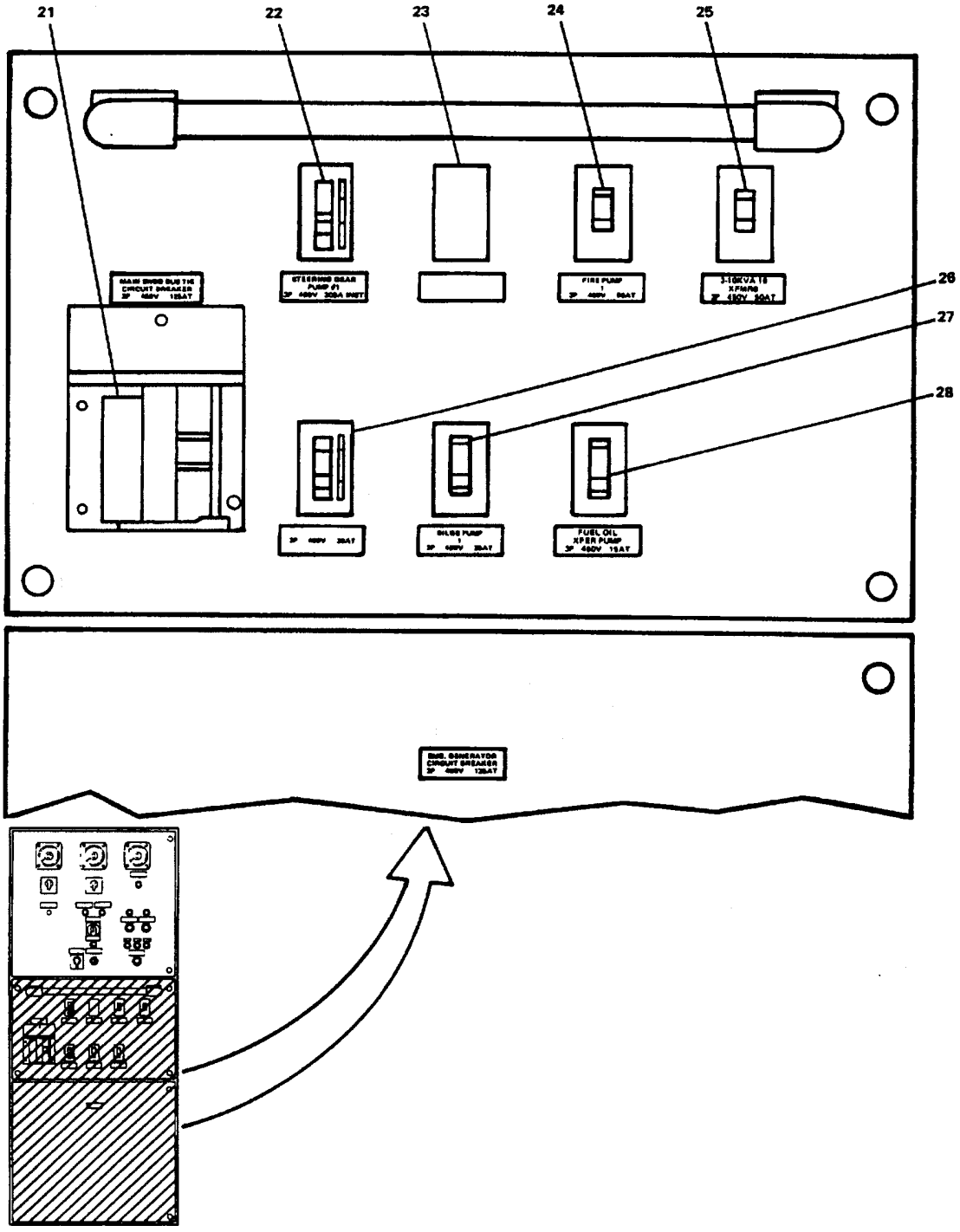

Figure 2-45. Emergency Switchboard (Sheet 2 of 2).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Emergency Switchboard (Figure 2-45) - Continued		
21	MAIN SWBD BUS TIE CIRCUIT BREAKER 3P 450V 125AT Circuit Breaker	Provides 3 phase 450 volt with 125-ampere automatic trip circuit protection.
22	STEERING GEAR PUMP #1 3P 450V 300A INST Circuit Breaker	Provides circuit protection for steering gear pump #1.
23		Blank.
24	FIRE PUMP 1 3P 450V 60AT Circuit Breaker	Provides circuit protection for fire pump #1.
25	3-10 KVA 10 XFMRS 3P 450V 50AT Circuit Breaker	Provides circuit protection for transformers located in emergency generator room.
26	3P 450V 30AT Circuit Breaker	Spare circuit breaker.
27	BILGE PUMP 1 3P 450V 25AT Circuit Breaker	Provides circuit protection for bilge pump #1.
28	FUEL OIL XFER PUMP 3P 450V 15AT Circuit Breaker	Provides circuit protection for fuel oil transfer pump.

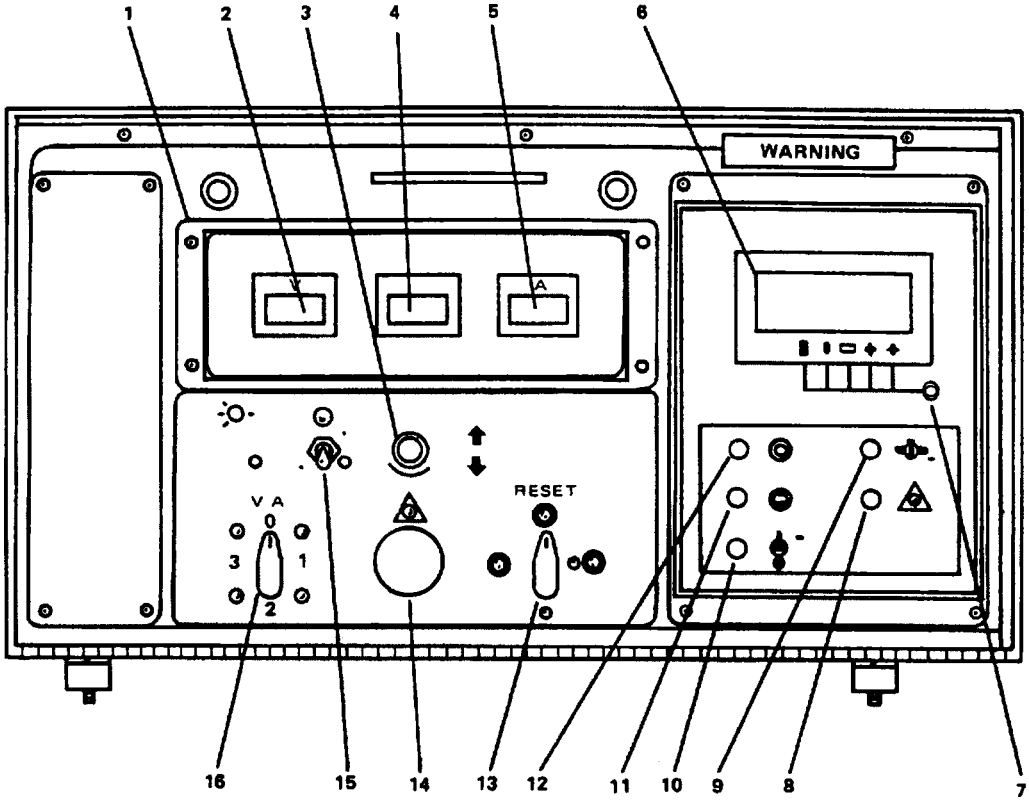

Figure 2-46. Emergency Diesel Generator (Sheet 1 of 2).

Table 2-1. Description of Operator's Controls and Indicators – CONT

Key	Control or Indicator	Function
Emergency Diesel Generator (Figure 2-46)		
1	AC Meter Model	Contains meters measuring generator output.
2	V	Generator output voltage digital display.
3	V	Voltage adjust rheostat.
4	Hz	Generator output frequency digital display.
5	A	Generator output amperage digital display.
6	Engine Control Module	Provides digital display of parameter selected by switch (7).
7	Pushbutton Switch	Switch used to select and hold display of desired reading.
8	Emergency Stop Indicator	When lit, indicates emergency stop circuit has not been reset.
9	Low Oil Pressure Indicator	When lit, indicates low oil pressure.
10	High Coolant Temperature Indicator	When lit, indicates high coolant temperature.
11	Overspeed Indicator	Indicates engine RPM too high.
12	System Not in Automatic Start-Stop	When lit, indicates generator set is in MANUAL mode.
13	RESET Switch	Reset switch for indicated mode.
14	Start/Stop Pushbutton	OUT position - completes starting circuit. IN position - shuts down engine in emergency.
15	Lamp/Display Test Switch	Used to test indicators and panel lights.
16	Ammeter-Voltmeter Phase Selector Switch	Selects phase for reading on voltage digital display (2) and amperage digital display (5).

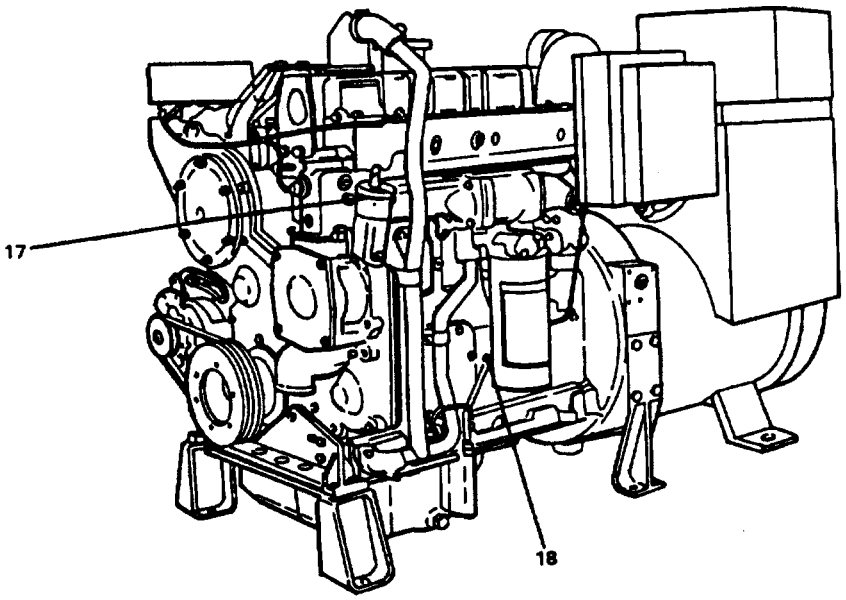

Figure 2-46. Emergency Diesel Generator (Sheet 2 of 2).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Emergency Diesel Generator (Figure 2-46) - Continued		
17	Oil Fill	Used to add lubricating oil.
18	Dipstick	Indicates lubrication oil level.

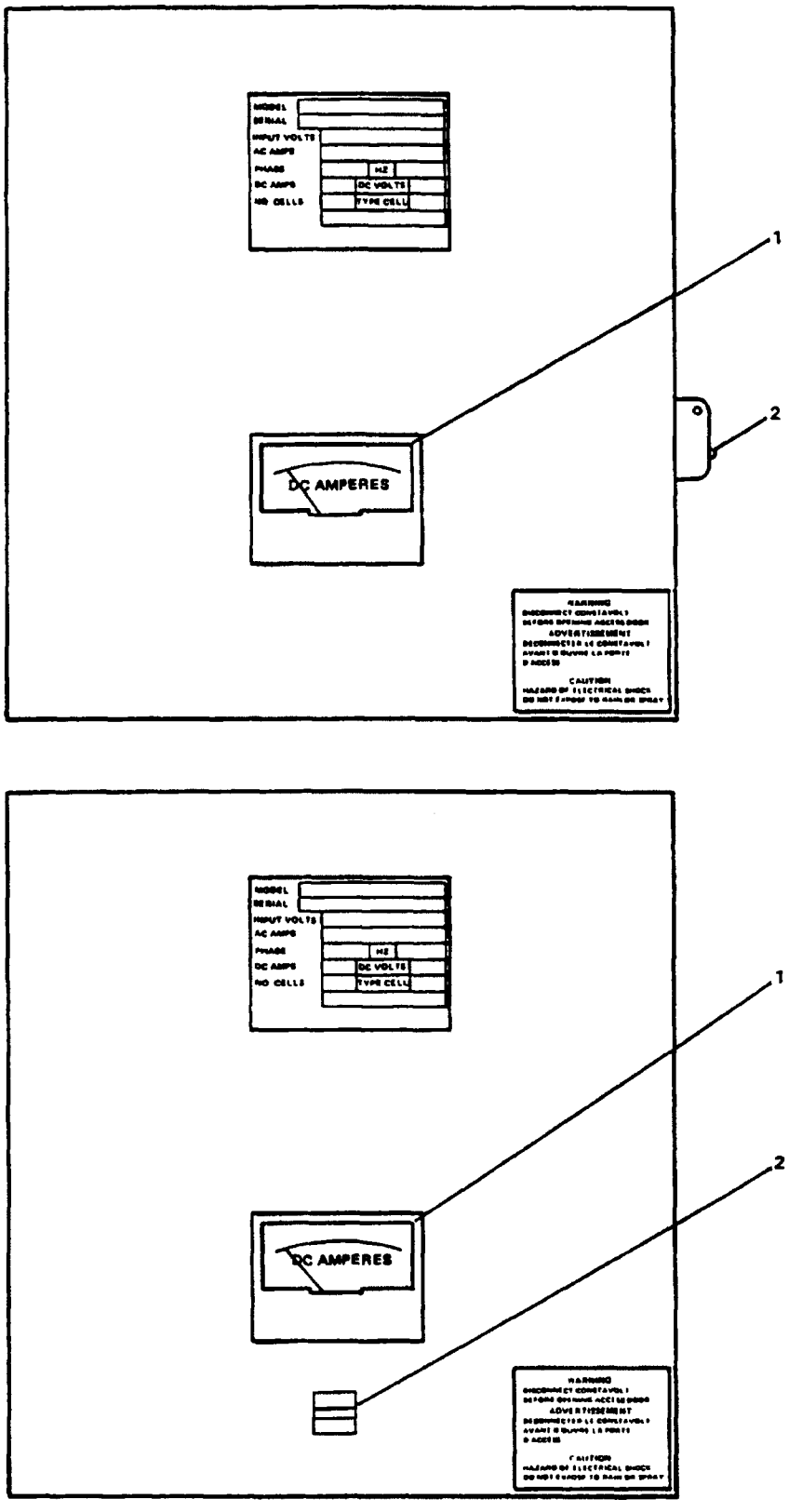

Figure 2-47. Battery Chargers.

Table 2-1. Description of Operator's Controls and Indicators - Cont

Key	Control or Indicator	Function
	Battery Chargers (Figure 2-47)	
1	DC AMPERES METER	Indicates charge supplied to batteries.
2	A.C. SWITCH Circuit Breaker	Turns charger ON and OFF.

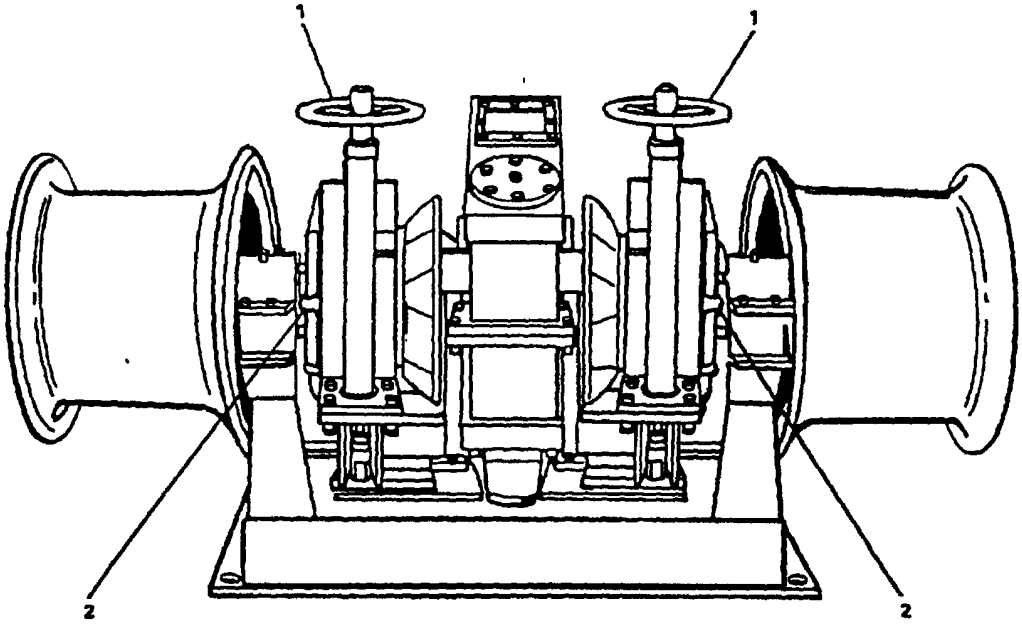

Figure 2-48. Anchor Windlass (Sheet 1 of 2).

Table 2.1 Description of Operator's Controls and Indicators - Cont

Key	Control or Indicator	Function
	Anchor Windlass (Figure 2-48)	
1	Brake Handwheel	Controls mechanical brake.
2	Wing Nut	Secures shifter ring to clutch shifter plate. Keeps clutch engaged/disengaged depending on clutch shifter plate position.

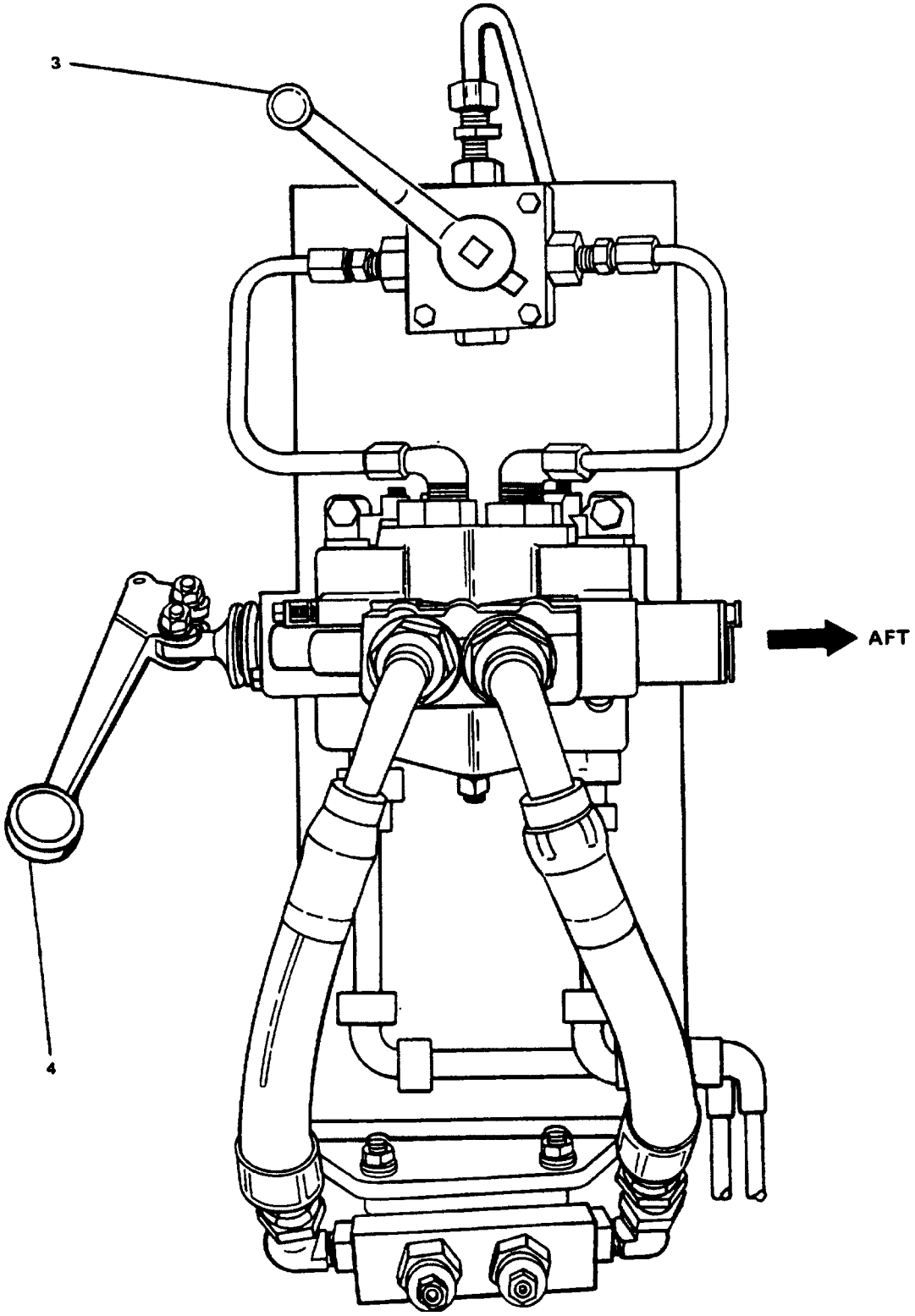

Figure 2-48. Anchor Windlass (Sheet 2 of 2).

Table 2-1. Description of Operator's Controls and Indicators - Cont

Key	Control or Indicator	Function
Anchor Windlass (Figure 2-48) - continued		
3	Handle, Speed Control Valve	Selects either LOW or HIGH motor speed range.
4	Handle, Direction and Speed Control	Controls speed and direction of rotation of windlass.

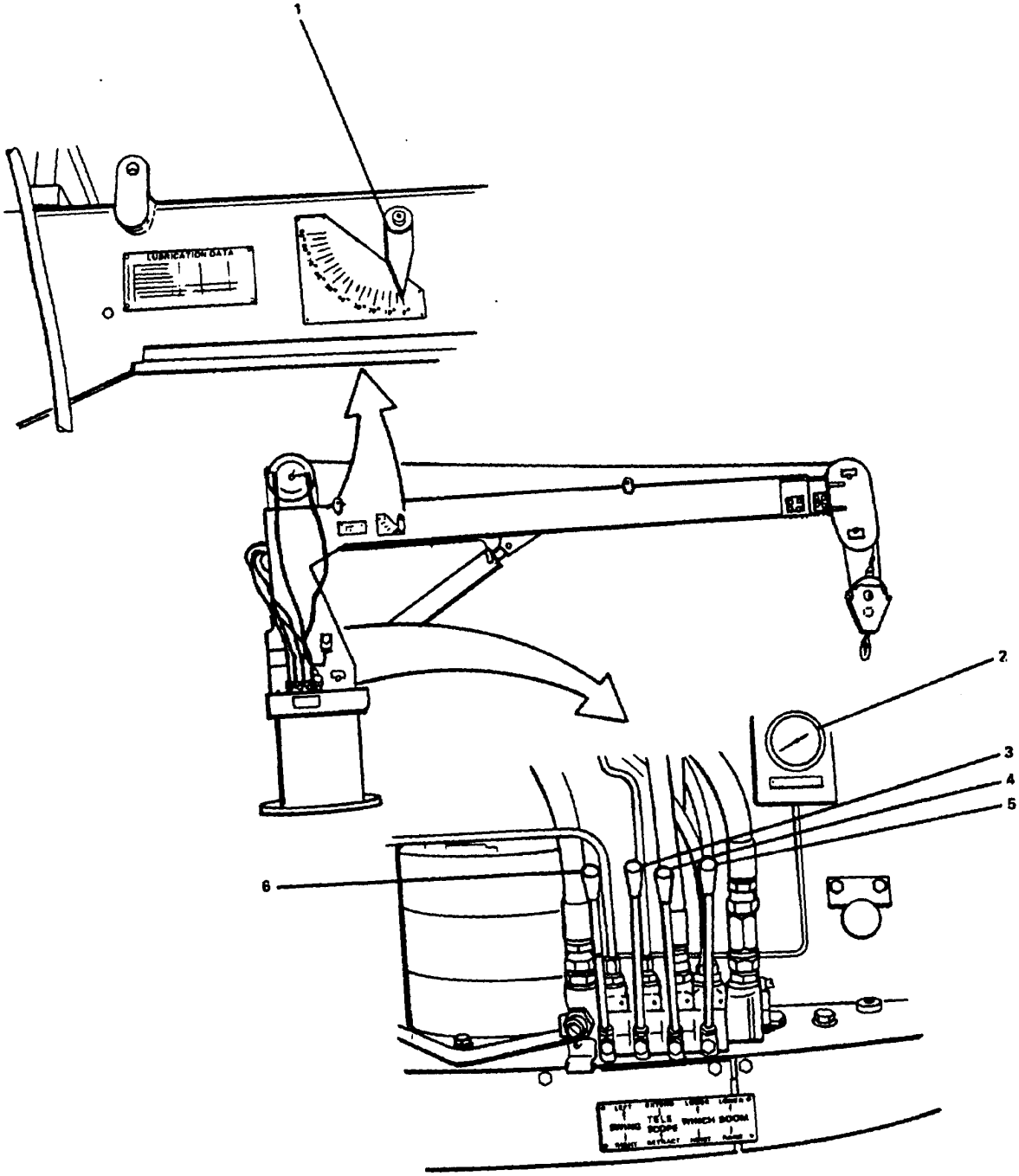

Figure 2-49. Workboat Crane.

Table 2-1. Description of Operator's Controls and Indicators - Cont

Key	Control or Indicator	Function
Workboat Crane (Figure 2-49)		
1	Angle Indicator	Indicates angle of elevation of boom from horizontal position.
2	PRESSURE Indicator	Indicates operating pressure of hydraulic system.
3	TELESCOPE Control	Extends or retracts boom extension, adjusting length of boom.
4	WINCH Control	Pays out or hauls in winch cable.
5	BOOM Control	Raises or lowers angle of elevation of boom.
6	SWING Control	Rotates boom left or right.

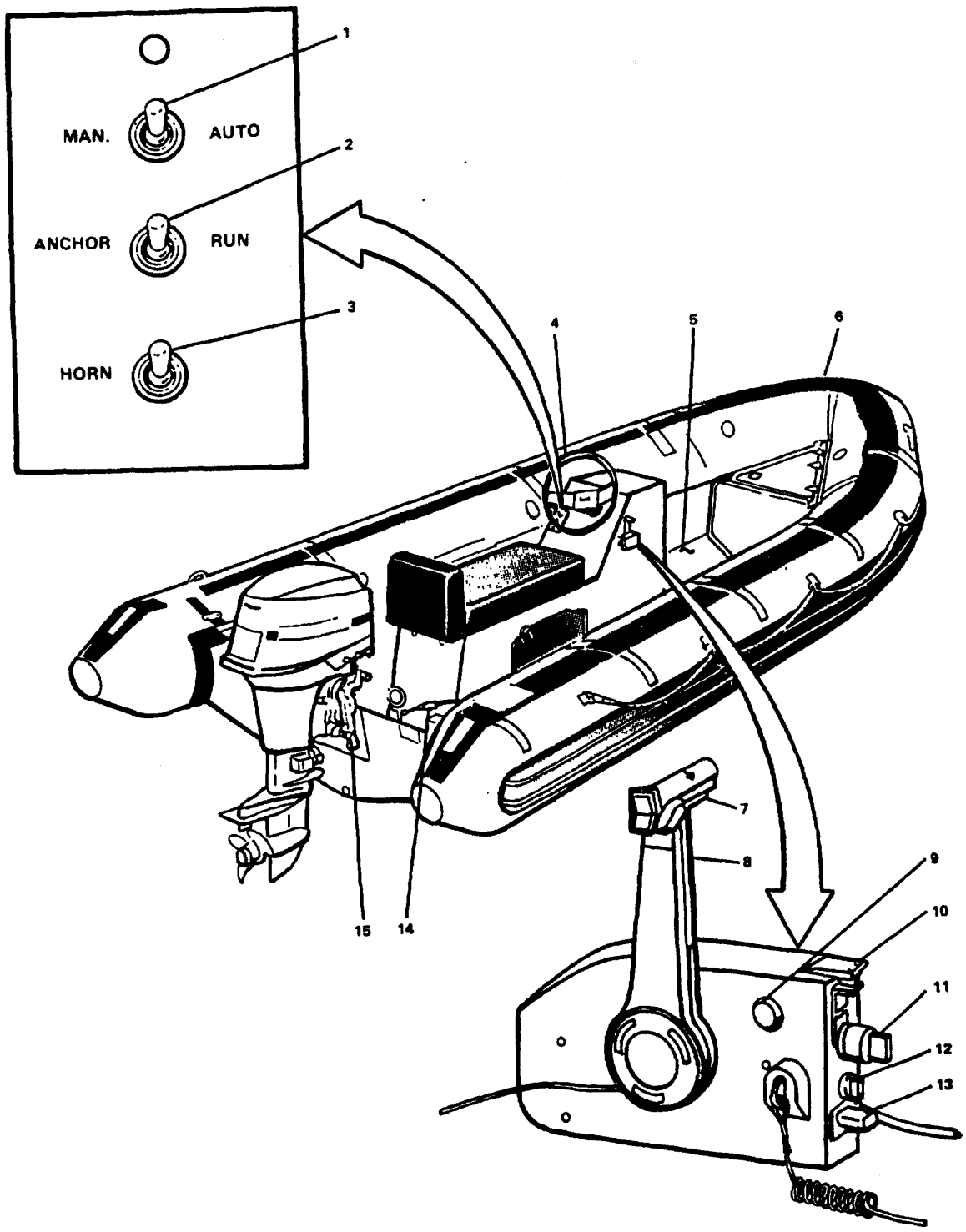

Figure 2-50. Workboat and Outboard Motor.

Table 2-1. Description of Operator's Controls and Indicators - Cont

Key	Control or Indicator	Function
Workboat and Outboard Motor (Figure 2-50)		
1	MAN.AUTO Switch.	Select either manual or automatic bilge pump operation.
2	ANCHOR RUN Switch	Controls boat lights.
3	HORN Switch	Used to sound warning horn.
4	Helm	Used to steer boat.
5	Fiberglass Molded Bottom	Ridged bottom of boat.
6	Inflated Chamber	Inflatable chamber for stability.
7	Neutral Lockout Control	Prevents accidental positioning of control handle to either AHEAD or ASTERN positions.
8	Control Handle	Controls engine direction of thrust and speed.
9	Warning Horn	Alerts operator to critical operating conditions: OVERHEAT - continuous tone NO OIL - continuous short tones LOW OIL - short tones every 20 seconds FUEL RESTRICTION - continuous tone at or near throttle.
10	Fast Idle Lever	Controls engine speed when control handle (8) is in NEUTRAL.
11	Key Switch and Primer	Three position key switch (Off - Accessories - Start). Pushing key in at Accessories or Start position operates fuel priming system.
12	Throttle Friction Adjustment	Controls friction on control handle. Clockwise increases friction; counterclockwise decreases friction.
13	Accessory Connector	Allows connection of engine accessories.
14	Sling	Device to lift rescue/workboat.
15	Motor Mount Bracket	Secures motor to the boat transom.

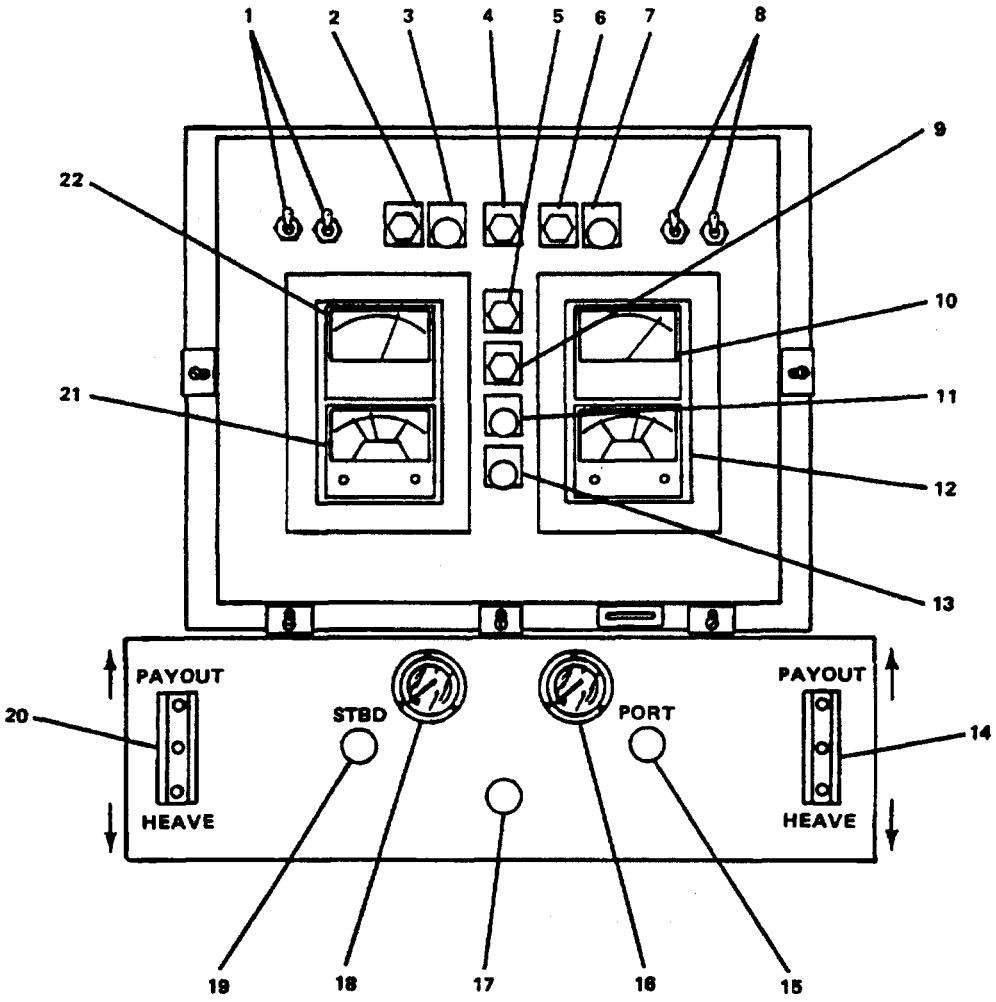

Figure 2-51. Tow Winch Control Station.

Table 2-1. Description of Operator's Controls and Indicators - Cont

Key	Control or Indicator	Function
Tow Winch Control Station (Figure 2-51)		
1	Starboard Tow Pin. Toggle Switches	Raise and lower controls for two starboard tow pins.
2	STBD MACH. CLUTCH/ BR SLIPPAGE Indicator	Light comes on when starboard winch clutch-brake slippage occurs.
3	STBD MACH. MAX. CABLE-OFF BYPASS Pushbutton Indicator	Light/pushbutton switch indicates less than 300 feet of cable left on starboard winch. Depressing pushbutton overrides cable-off automatic shutdown.
4	System Ready Indicator	Light indicates system is ready to operate and no fault conditions exist.
5	HYDRAULIC SYSTEM FAILURE Indicator	Light indicates low oil level and/or high oil temperature.
6	PORT MACH. MAX CABLE-OFF BYPASS Pushbutton Indicator	Light/pushbutton switch indicates less than 300 feet of cable left on port winch. Depressing pushbutton overrides cable-off automatic shutdown.
7	PORT MACH. CLUTCH/ BR SLIPPAGE Indicator	Light comes on when port winch clutch-brake slippage occurs.
8	Port Tow Pin Toggle Switches	Raise and lower controls for two port tow pins.
9	Low Pressure Indicator	Light indicates low hydraulic oil pressure.
10	Line Pull Indicator Meter	Indicates load applied on the port winch.
11	Alarm Reset Pushbutton	Silences alarm horn.
12	Cable-Off Indicator Meter	Meter indicates amount of cable payed out from port winch.
13	Alarm Reset Pushbutton	Pushbutton to reset fault lights when malfunction corrected.

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Table 2-1. Description of Operator's Controls and Indicators - Cont

Key	Control or Indicator	Function
Tow Winch Control Station (Figure 2-51) (continued)		
14	Control Lever	Controls speed and direction of port winch.
15	Two Speed Lever	Selects either HIGH or LOW SPEED mode for motor.
16	SYSTEM PRESSURE Gauge	Provides pilot line operating pressure.
17	Remote-Local	Selects control station in command of winch.
18	PILOT PRESSURE Gauge	Displays hydraulic pressure within control system.
19	Two Speed Lever	Selects either HIGH or LOW SPEED mode for motor.
20	Control Lever	Controls speed and direction of starboard winch.
21	CABLE-OFF INDICATOR Meter	Indicates amount of cable payed out from starboard winch.
22	Line Pull Indicator Meter	Indicates load applied on the starboard winch.

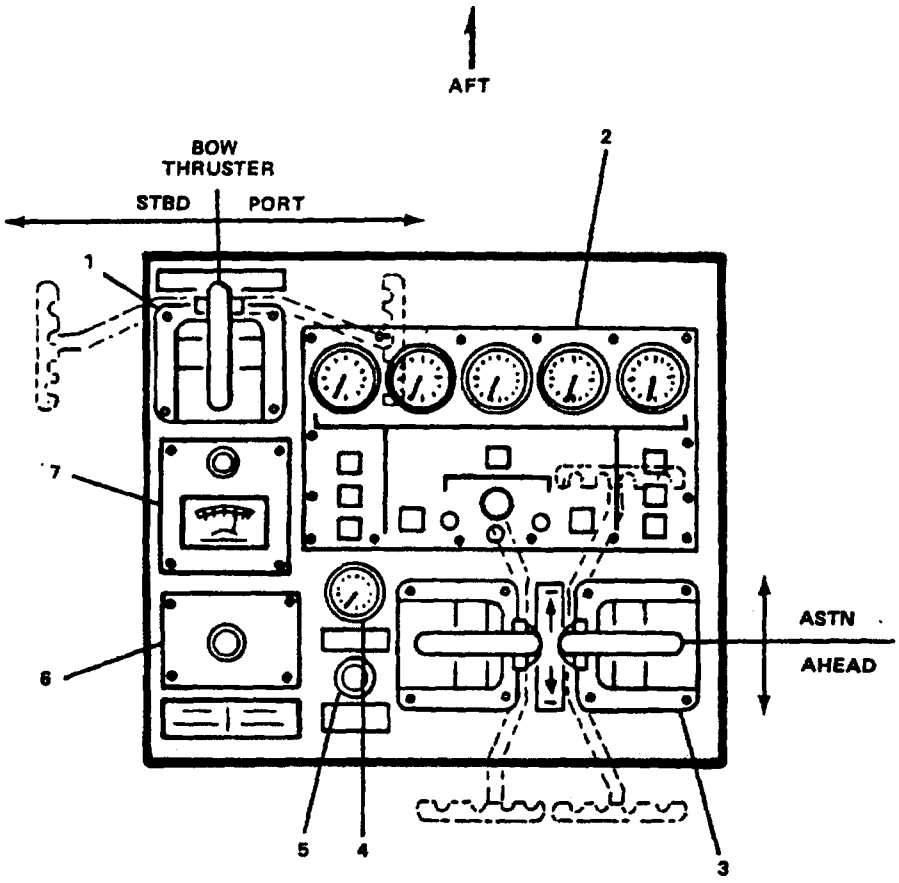

Figure 2-52. Aft Control Station.

Table 2-1. Description of Operator's Controls and Indicators - Cont

Key	Control or Indicator	Function
	Aft Control Station (Figure 2-52)	
1	BOW THRUSTER. Controls	Provides control of bow thruster engine speed and directional control for bow thruster.
2	Remote Propulsion Indicator Panel	Provides indicators for propulsion machinery (see Figure 2-53).
3	Main Engines Throttle Controls	Controls speed of main engines and direction of shafts.
4	CONTROL AIR PRESSURE Gauge	Indicates control air pressure in psi.
5	COMMAND TRANSFER Plunger	Transfers control air to bridge wing control station.
6	Joystick	Provides NFU rudder (directional) control.
7	Rudder Angle Indicator Meter	Indicates position of rudder in relation to centerline of LT.

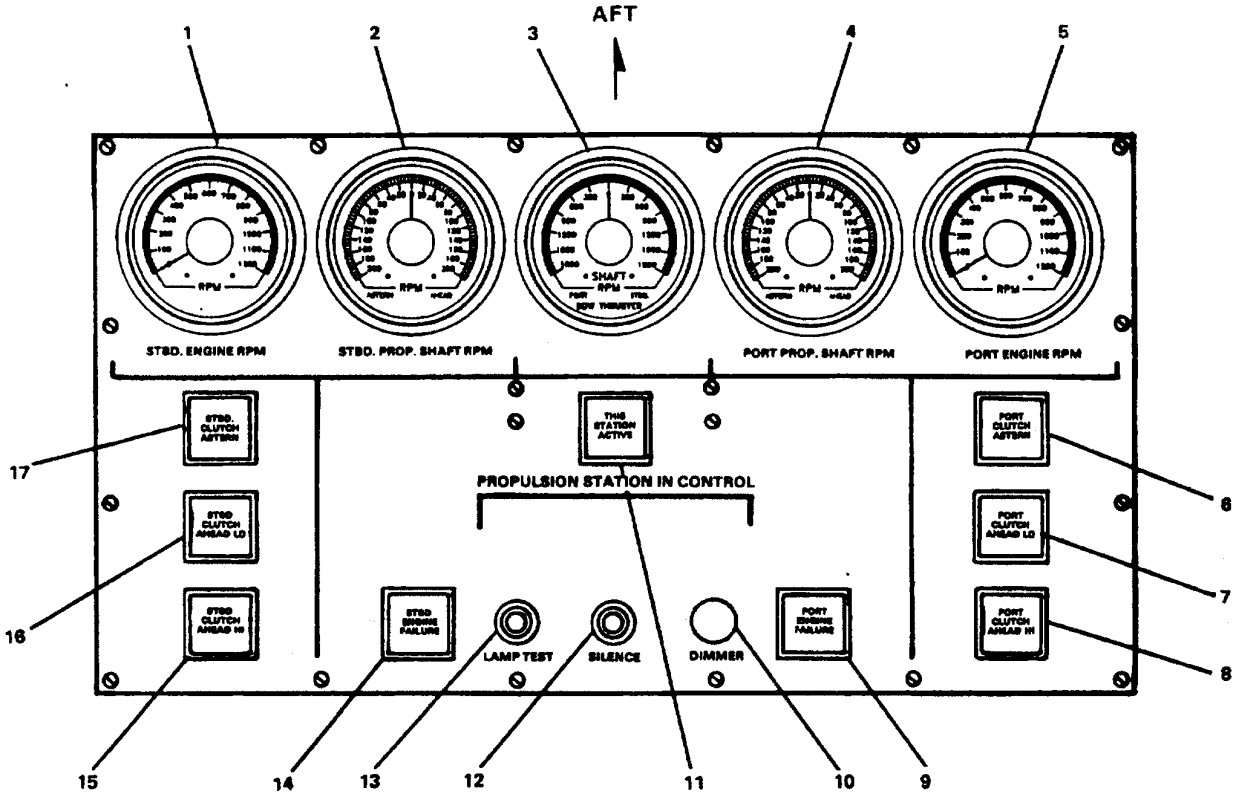

Figure 2-53. Remote Propulsion Indicator Panel (Aft Control).

Table 2-1. Description Of Operator's Controls and Indicators - Cont

Key	Control or Indicator	Function
Remote Propulsion Indicator Panel (Aft Control) (Figure 2-53)		
1	STBD. ENGINE RPM Tachometer	Indicates starboard main engine RPM.
2	STBD. PROP. SHAFT RPM Tachometer	Indicates starboard propeller shaft RPM.
3	SHAFT RPM BOW THRUSTER Tachometer	Indicates bow thruster shaft RPM.
4	PORT PROP. SHAFT RPM Tachometer	Indicates port propeller shaft RPM.
5	PORT ENGINE RPM Tachometer	Indicates port main engine RPM.
6	PORT CLUTCH ASTERN Indicator	Indicates port reduction gear ratio selected in EOS is LO and port throttle is in ASTERN position.
7	PORT CLUTCH AHEAD LO Indicator	Indicates port reduction gear ratio selected in EOS is LO and port throttle is in AHEAD position.
8	PORT CLUTCH AHEAD HI Indicator	Indicates port reduction gear ratio selected in EOS is HI and port throttle is in AHEAD position.
9	PORT ENGINE FAILURE Indicator	Indicates port main engine is not operating.
10	DIMMER Control	Controls illumination level of indicators on panel.
11	THIS STATION ACTIVE Indicator	Indicates aft control station is in control.
12	SILENCE Pushbutton	Not used.
13	LAMP TEST Pushbutton	Tests panel lights.
14	STBD. ENGINE FAILURE Indicator	Indicates starboard engine is not operating.
15	STBD. CLUTCH AHEAD HI Indicator	Indicates starboard reduction gear ratio selected in EOS is HI and starboard throttle is in AHEAD position.
16	STBD. CLUTCH AHEAD LO Indicator	Indicates starboard reduction gear ratio selected in EOS is LO and starboard throttle is in AHEAD position.
17	STBD. CLUTCH ASTERN Indicator	Indicates starboard reduction gear ratio selected in EOS is LO and starboard throttle is in ASTERN position.

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Table 2-1. Description of Operator's Controls and Indicators - Cont

Key	Control or Indicator	Function
Gasoline Storage Rack (Figure 2-54)		
1	Release	Provides control of web strap and allows jettison of gasoline can in emergency.

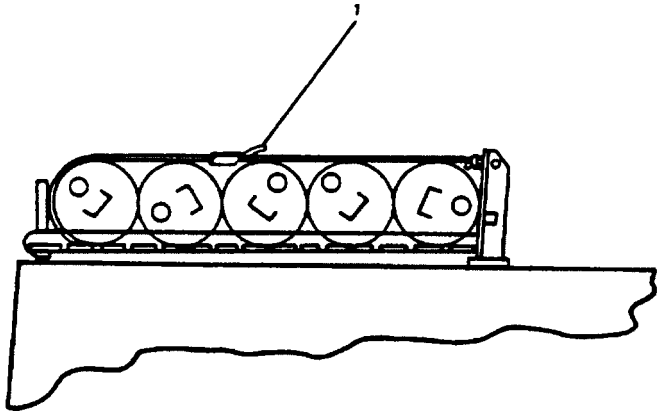
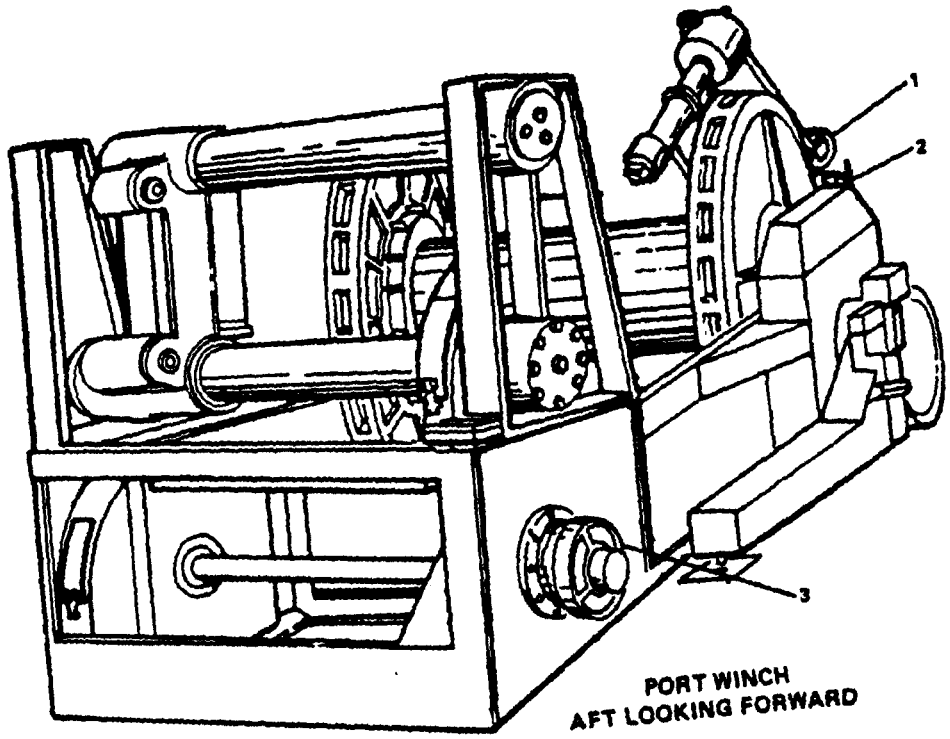
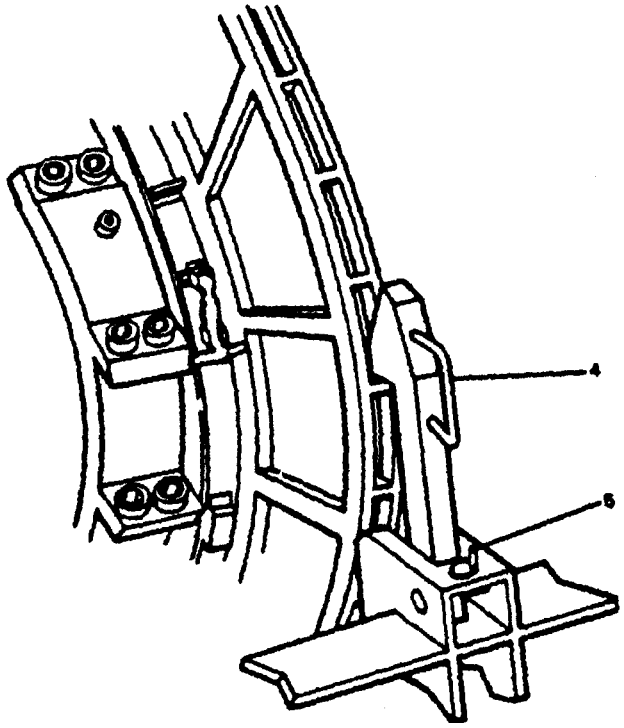


Figure 2-54. Gasoline Storage Rack.





PORT WINCH FORWARD LOOKING AFT

Figure 2-55. Double Drum Towing Machine (Sheet 1 of 2)

Table 2-1. Description of Operator's Controls and Indicators-Cont

Key	Control or Indicator	Function
Double Drum Towing Machine (Figure 2-55)		
1	Auxiliary Brake Handwheel	Controls auxiliary (mechanical) brake.
2	Clutch Brake Handwheel	Engages hydraulic motor drive assembly to the drum assembly.
3	Spooling Device Handwheel	Controls spooling device clutch. Used in realignment of cable.
4	Dog Handle	Engages and disengages dog.
5	Keeper Pin	Secures dog in disengaged position.
6	Local Control	Provides local control for used during maintenance or in an emergency.

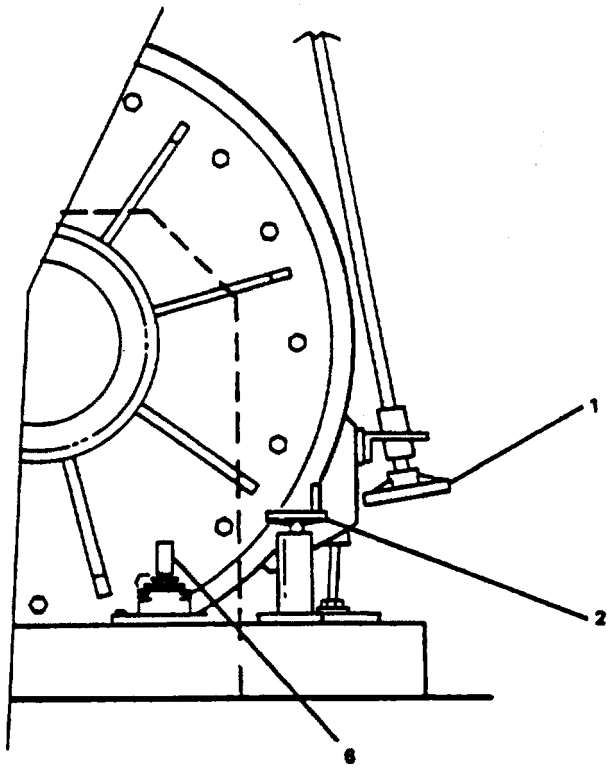


Figure 2-55. Double Drum Towing Machine (Sheet 2 of 2).

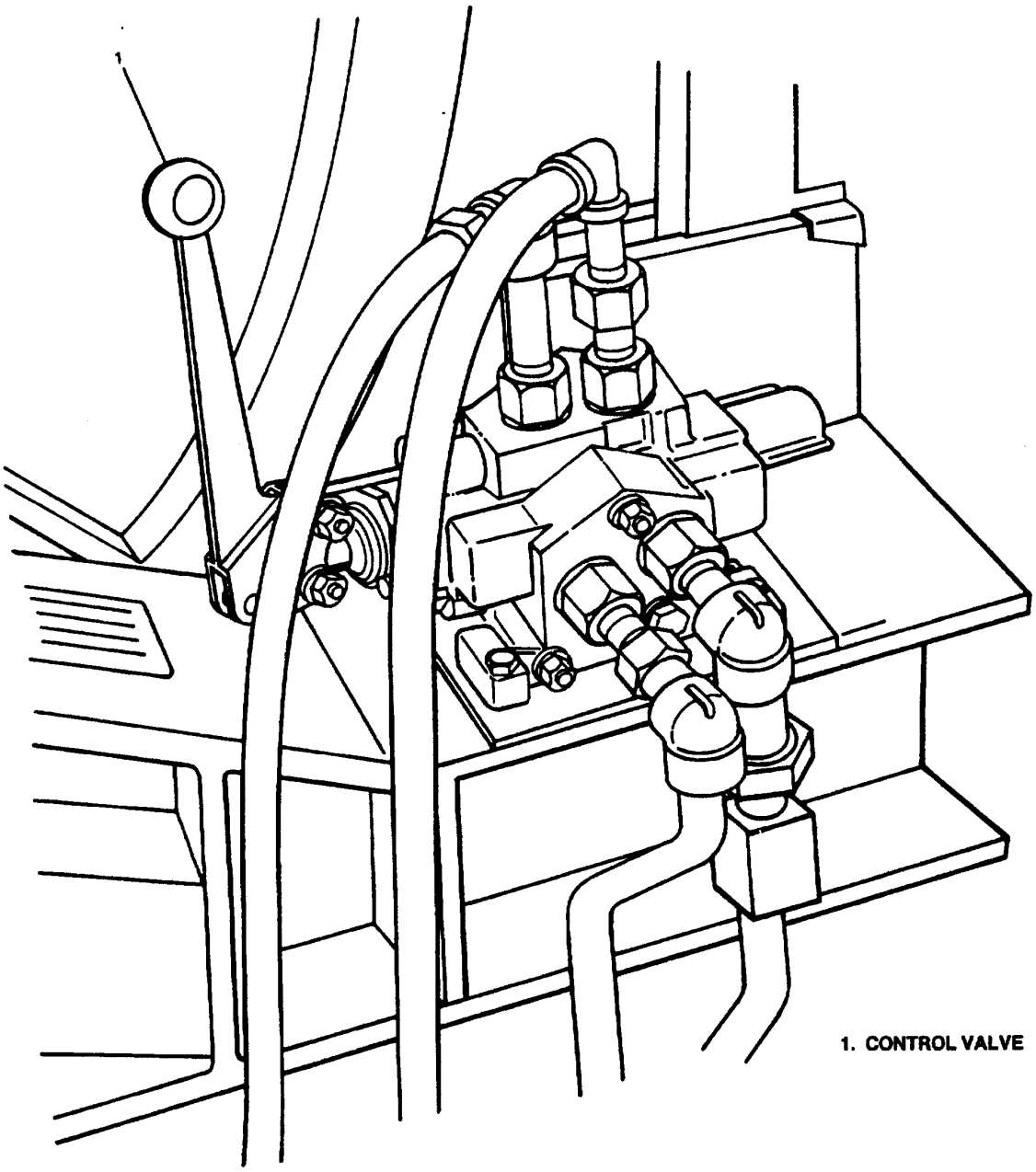


Figure 2-56. Capstan.

Table 2-1. Description of Operator's Controls and Indicators-Cont

Key	Control or Indicator	Function
	Capstan (Figure 2-56)	
1	Control Handle	Controls speed and direction of rotation of capstan.

Table 2-1. Description of Operator's Controls and Indicators-Cont

Key	Control or Indicator	Function
Tow Pin and Control Panel (Figure 2-57)		
1	Toggle Switch	Controls raising/lowering of tow pins.

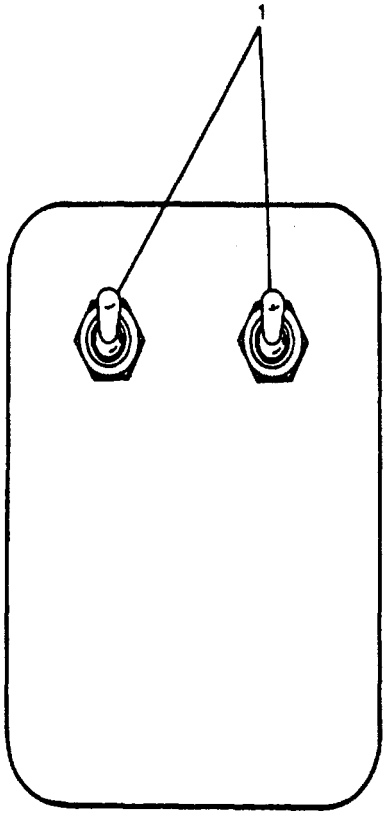


Figure 2-57. Tow Pin Control Panel.

Table 2-1. Description of Operator's Controls and Indicators-Cont

Key	Control or Indicator	Function
Shore Power Connector (Figure 2-58)		
1	Handle	Locks/unlocks watertight cover (3).
2	Receptacle	Used to connect shore power cable to ship's electrical system.
3	Cover	Watertight cover protects receptacle from weather.

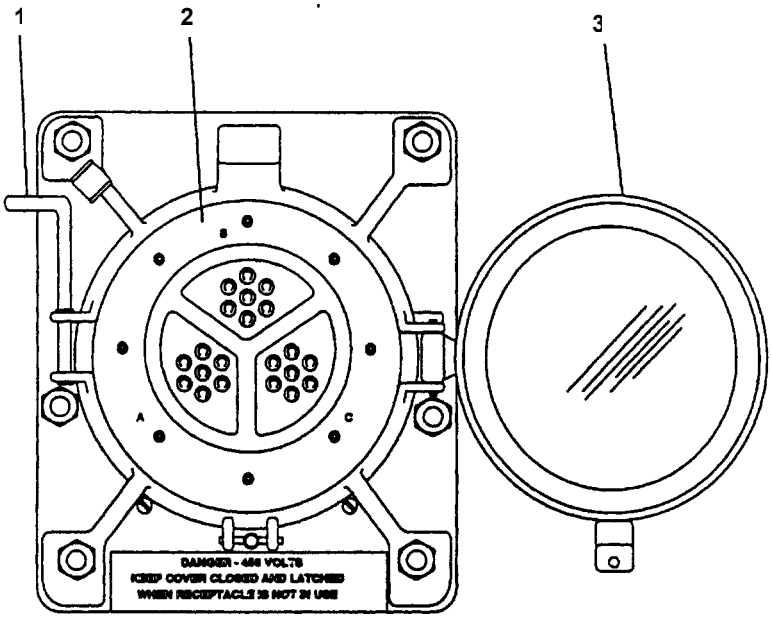
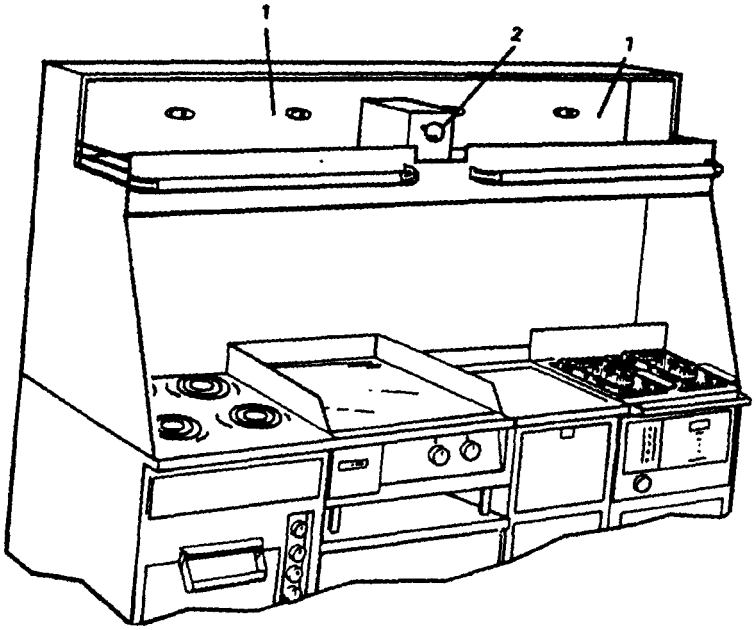


Figure 2-58. Shore Power Connector.



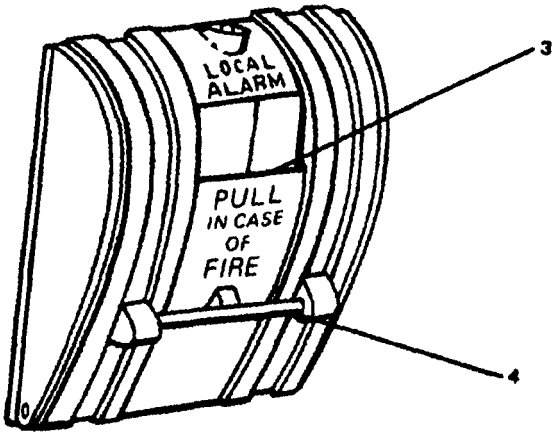


Figure 2-59. Galley Ventilator and Control Cabinet (Sheet 1 of 3).

Table 2-1. Description of Operator's Controls and Indicators-Cont

Key	Control or Indicator	Function
Galley Ventilator and Control Cabinet (Figure 2-59)		
1	Access Doors	Provide means to visually inspect internal components of hood.
2	Damper Control	Controls exhaust damper.
3	Handhold	Used to pull DOWN lever to activate alarm.
4	Glass Rod	Acts as a seal to indicate if alarm has been activated.

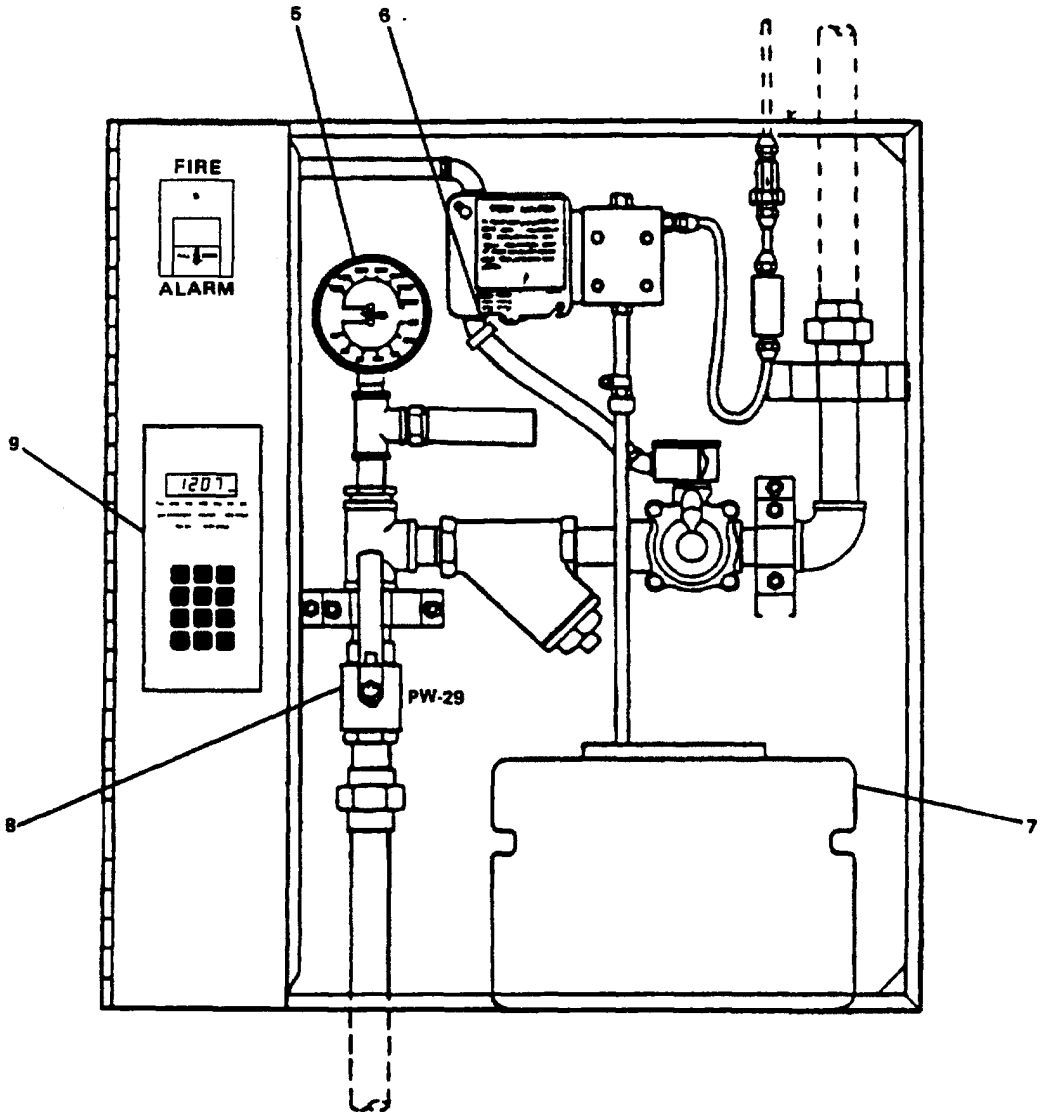


Figure 2-59. Galley Ventilator and Control Cabinet (Sheet 2 of 3).

Table 2-1. Description of Operator's Controls and Indicators-Cont

Key	Control or Indicator	Function
Galley Ventilator and Control Cabinet (Figure 2-59) (Continued)		
5	Pressure/Temperature Gauge	Provides system pressure/temperature reading.
6	TEST SWITCH	Momentary switch used to test detergent pump.
7	Soap Container	Soap supply for hood system.
8	Shut-Off Valve	Controls water supply to system (PW-29).
9	Control Center	Provides keybuttons/indicators for operation of ventilator system. **NOTE** Several keypads are used only during programming. Refer to unit maintenance for programming in accordance with TM 55-1925-226-24&P.

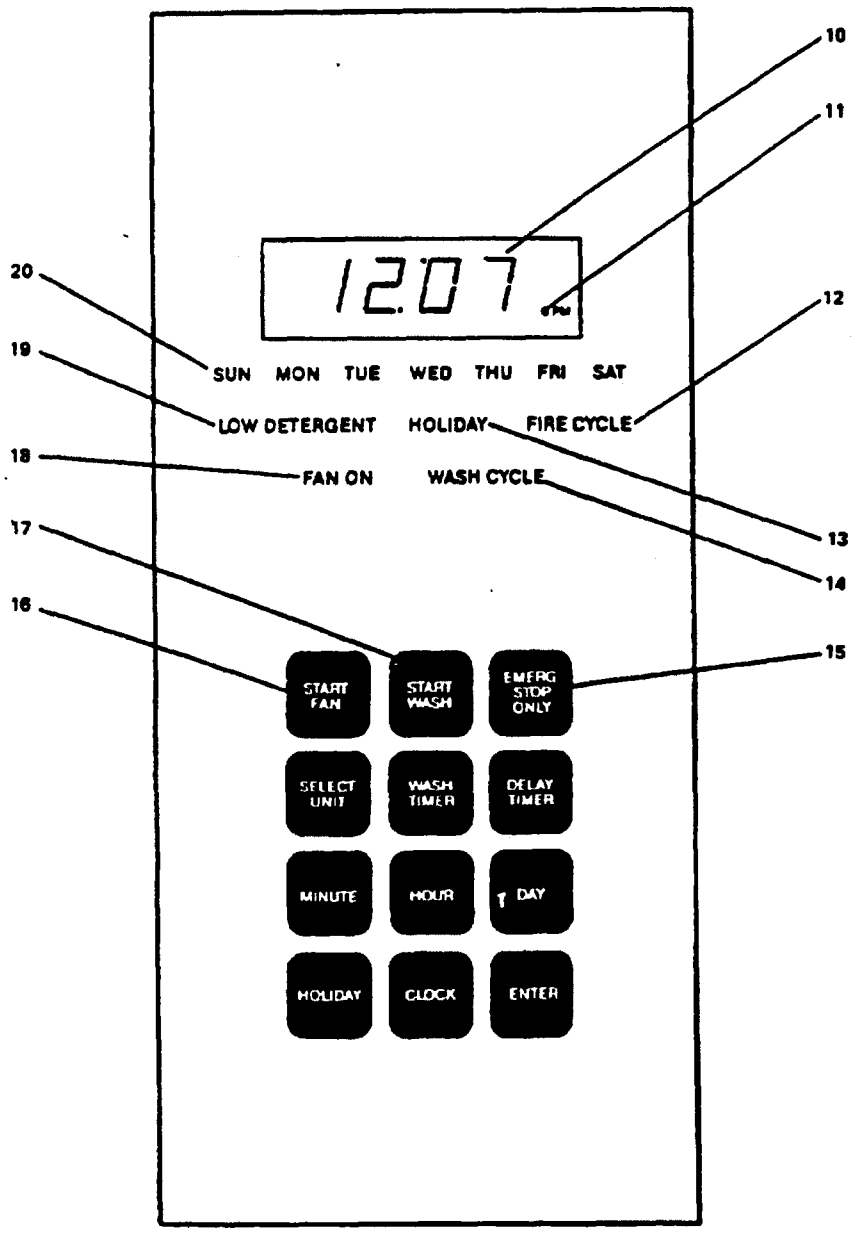


Figure 2-59. Galley Ventilator and Control Cabinet (Sheet 3 of 3).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Galley Ventilator and Control Cabinet (Figure 2-59) (Continued)		
10	Clock	Digital clock providing the time of day as set in microprocessor.
11	PM Indicator	Indicates afternoon/night.
12	FIRE CYCLE	Indicates fire switch has been pulled or thermostat activated.
13	HOLIDAY	Indicates no wash programmed for that day.
14	WASH CYCLE	Indicates wash cycle in progress.
15	EMERG. STOP ONLY Keybutton	Emergency stop for exhaust fan or wash cycle in emergency situation.
16	START FAN Keybutton	Manually starts exhaust fan.
17	START WASH Keybutton	Manually starts wash cycle.
18	FAN ON Indicator	Indicates exhaust fan is operating.
19	LOW DETERGENT Indicator	Indicates detergent reservoir empty or detergent pump not pumping.
20	SUN MON etc. Indicator	Indicates day of week.

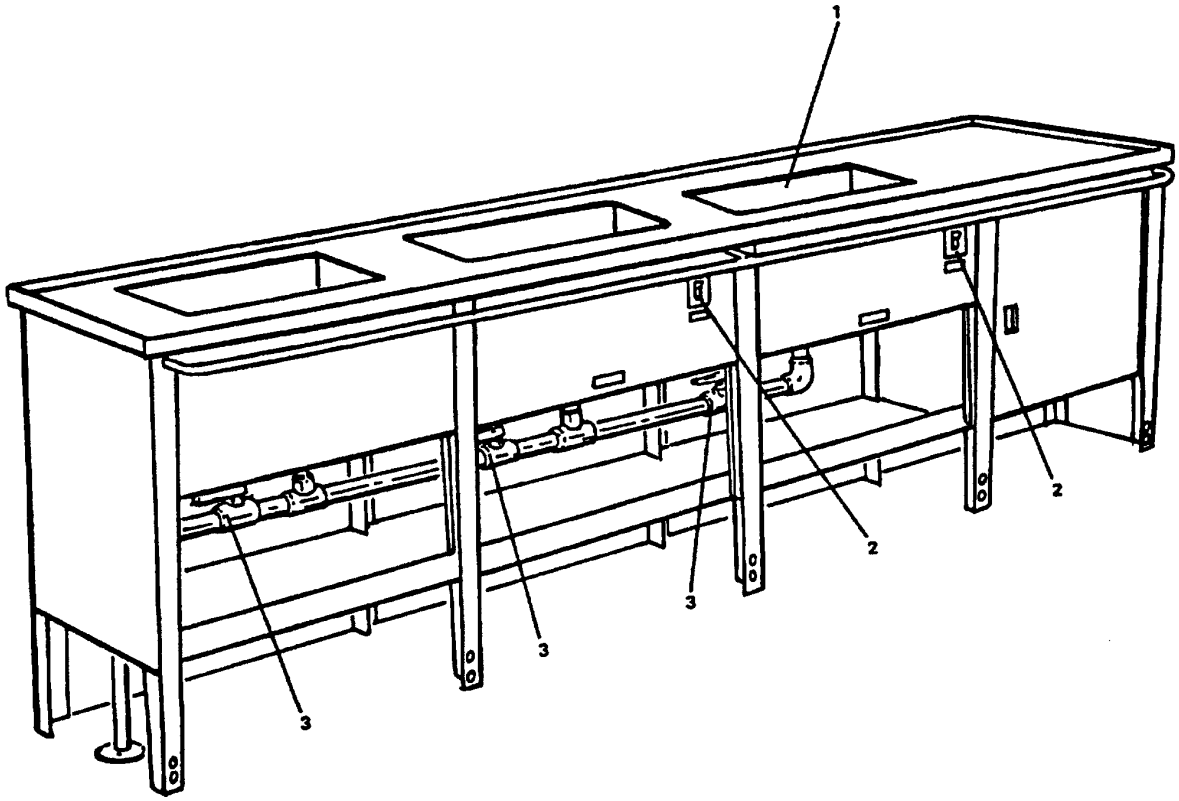


Figure 2-60. Serving Line/Steam Table.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Serving Line/Steam Table (Figure 2-60)		
1	Well	Holds water.
2	Power Switches	Maintains water temperature.
3	Drain Valves	Allow water to drain out.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Coffee Percolator (Figure 2-61)		
1	Cover	Sprays water from pump tube.
2	Tabs	Secure cover in place.
3	Basket	Holds coffee grounds.
4	Spring	Maintains proper alignment of basket.
5	Pump Tube	Pumps water to cover.
6	Washer	Acts as seal for pump tube.
7	Power Cord	Connects to power supply.
8	Spigot	Dispenses beverage.
9	Indicator Light	Indicates beverage is ready.
10	Body	Container holding beverage.
11	Handles	Used to carry percolator.

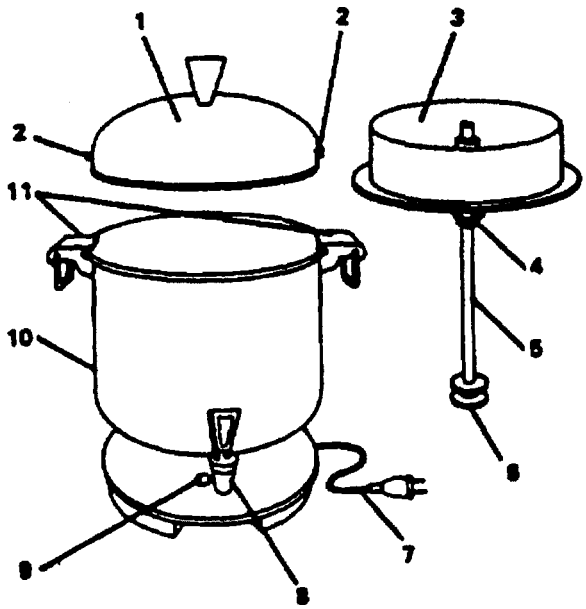


Figure 2-61. Coffee Percolator.

Table 2-1. Description of Operator's Controls and Indicators – CONT

Key	Control or Function	Function
Toaster (Figure 2-62)		
1	Operating Lever	When depressed, activates toaster heating elements while lowering product for toasting.
2	Color Selection Knob	Knob to adjust from light to dark to determine color of toast desired.
3	Crumb Tray	The crumb tray is removed for cleaning by pulling straight out.

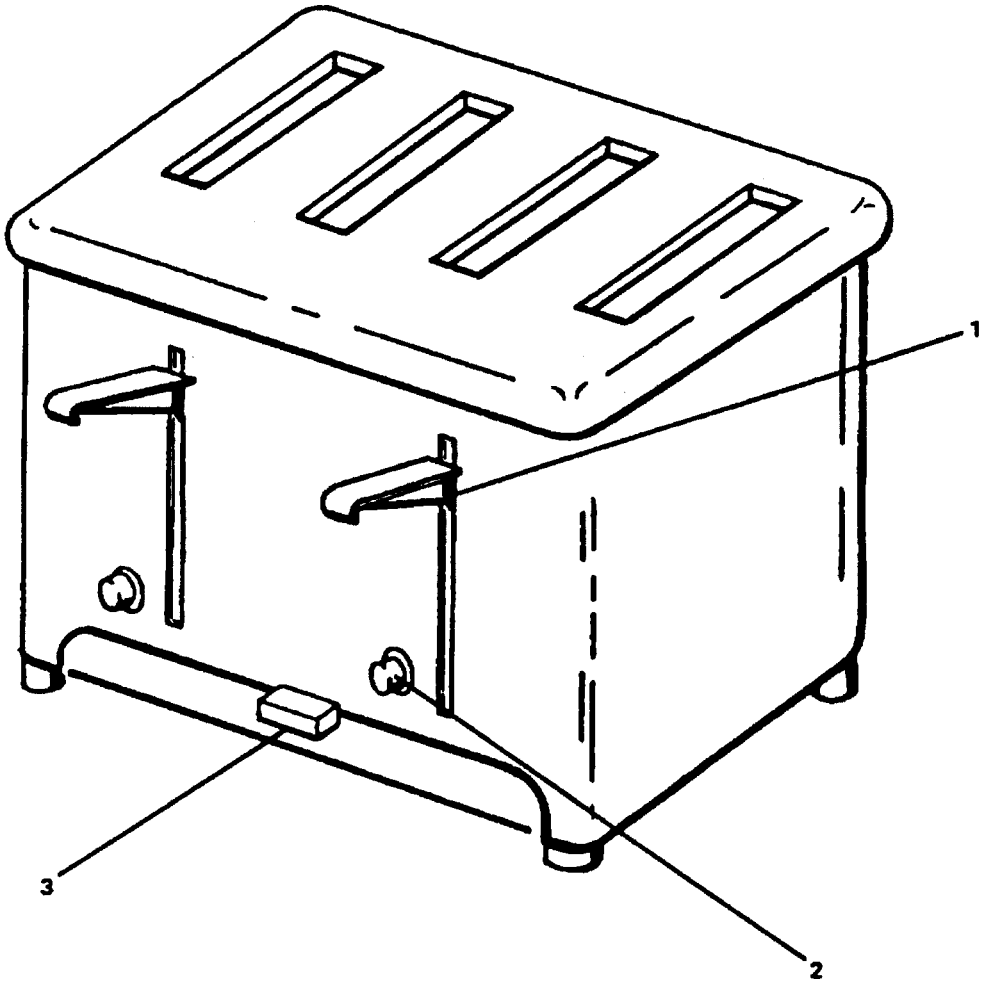


Figure 2-62. Toaster.

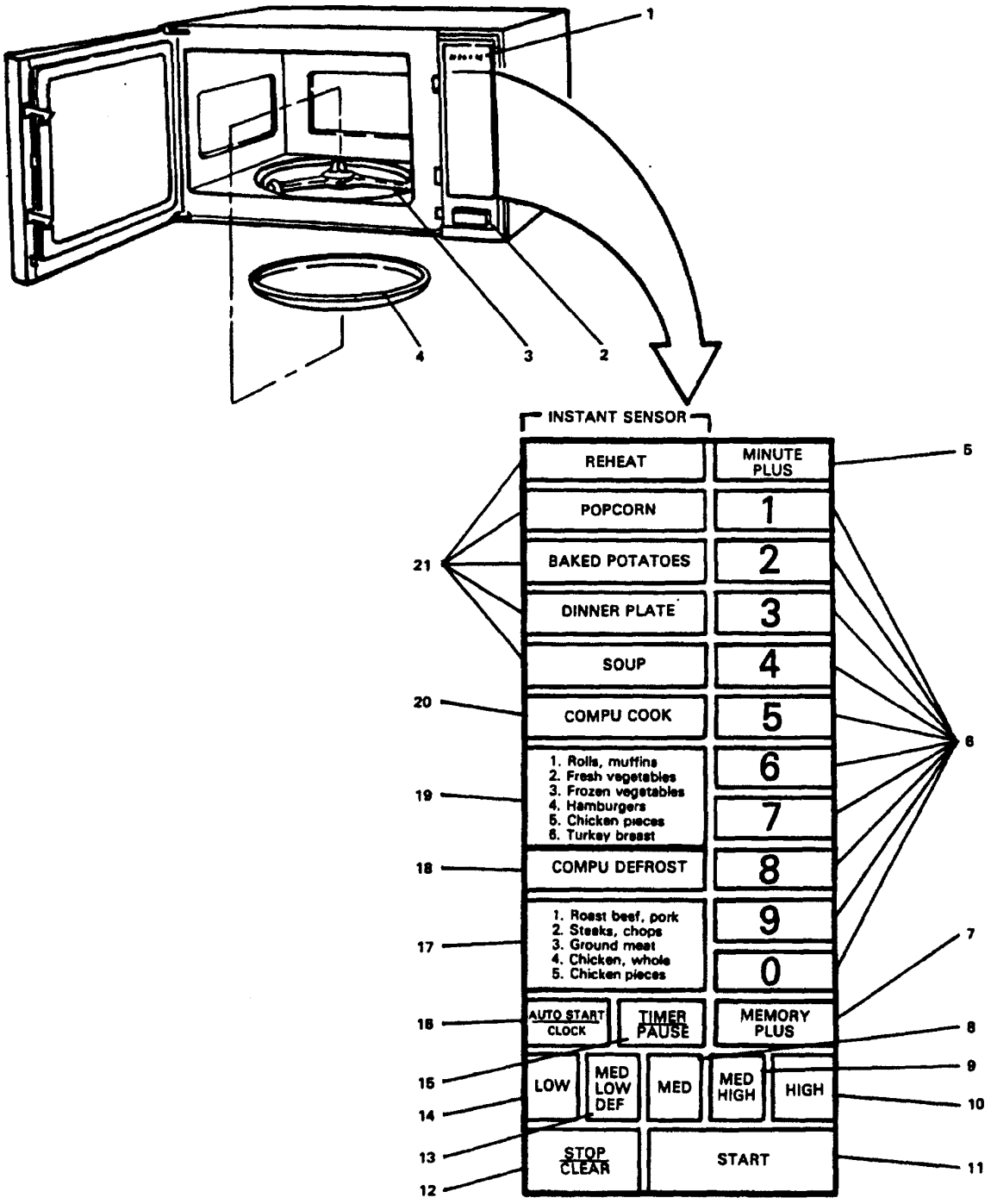


Figure 2-63. Microwave Oven

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Microwave Oven (Figure 2-63)		
1	Time Display time	Displays time of day or remaining cooking
2	Door Open Button	Releases and opens door.
3	Removable Turntable Support	Support for turntable.
4	Turntable	Rotates to provide even cooking of food.
5	MINUTE PLUS Display	Pressing once automatically sets power level to HIGH and time to one minute. Pressing MINUTE PLUS during cooking increases time by one minute.
6	Number Pads	Used during programming and selecting features.
7	MEMORY PLUS Pad	Used to enter/recall one cooking sequence into memory.
8	MED Pad	Selects medium (50%) power level for cooking.
9	MED HIGH Pad	Selects medium high (70%) power level for cooking.
10	HIGH Pad	Selects high (100%) power level for cooking.
11	START Pad	Starts oven operation.
12	STOP CLEAR Pad	Stops the oven temporarily during cooking. Erases a mistake during programming and cancels the minute timer. Pressing twice during cooking cancels program.
13	MED LOW DEF Pad	Selects medium-low/defrost (30˚/a) power level for cooking.
14	LOW Pad	Selects low (10%) power level for cooking.

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Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Microwave Oven (Figure 2-63) (Continued)		
15	TIMER PAUSE Pad	Used to set timer without cooking involved.
16	AUTO START CLOCK Pad	Used to set time of day.
17	Compu Defrost Guide Pad	Provides guide to Compu Defrost options.
18	COMPU DEFROST Pad	Selects COMPU DEFROST mode and starts operating procedure.
19	Compu Cook Guide	Provides guide to Compu Cook options.
20	COMPU COOK Pad	Selects COMPU COOK mode and starts operating procedure.
21	Instant Sensor Pads	Select preprogram cooking controlled by an internal sensor.

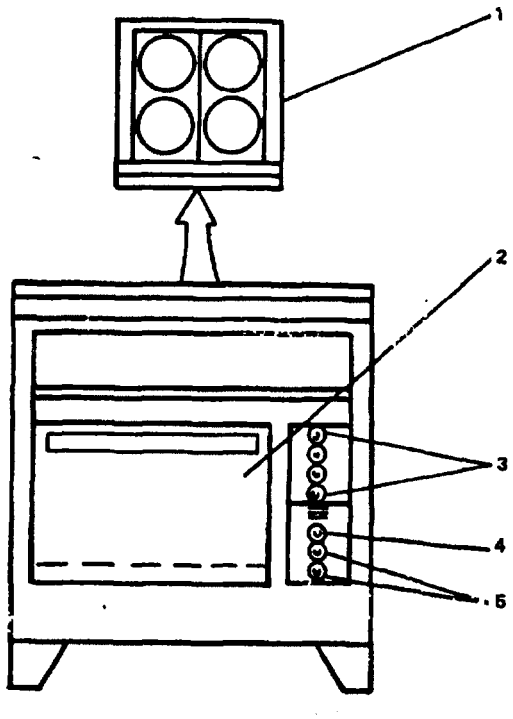

Figure 2-64. Range.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Range (Figure 2-64)	
1	Range Top Heating Element	Provides four separate heating elements for light duty sauce pans and small stock pots. Temperature range 0-800 degrees F.
2	Oven Unit	The range is provided with an upper heating unit and a lower heating unit separated by a metal deck.
3	Range Top Controls elements.	Controls temperature range of top heating
4	Thermostat	Controls oven temperature.
5	Temperature-Heating Control	Provides selection of Low-Med-High temperature control for range oven.

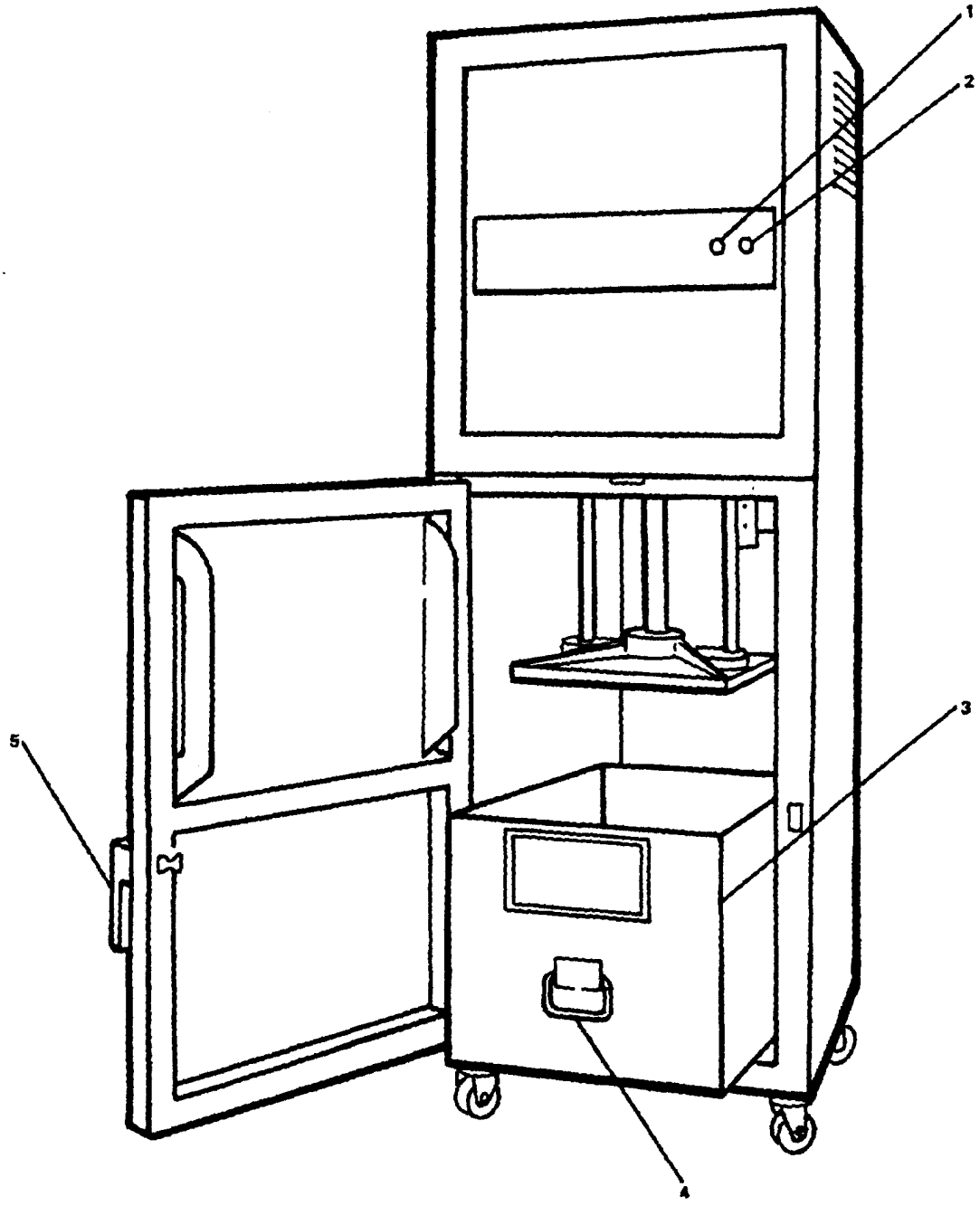

Figure 2-65. Trash Compactor.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Trash Compactor (Figure 2-65)	
1	On/Off Key Switch	Turns unit ON and OFF.
2	Start/Stop Pushbutton Switch	Controls operation of compactor.
3	Box	Receptacle for trash.
4	Box Handle	Provides convenient hand-hold for chute.
5	Handle	Secures/opens compactor door.

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Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Griddle (Figure 2-66)	
1	Heating Indicators powered (RED).	Indicates left or right heating elements are
2	Right Side Temperature Control	Controls right side grill temperature.
3	Left Side Temperature Control	Controls left side grill temperature.

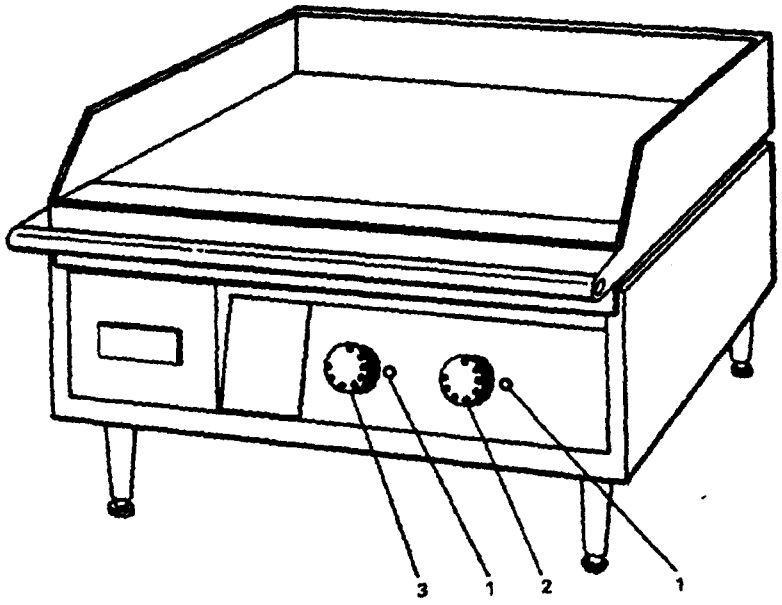

Figure 2-66. Griddle.

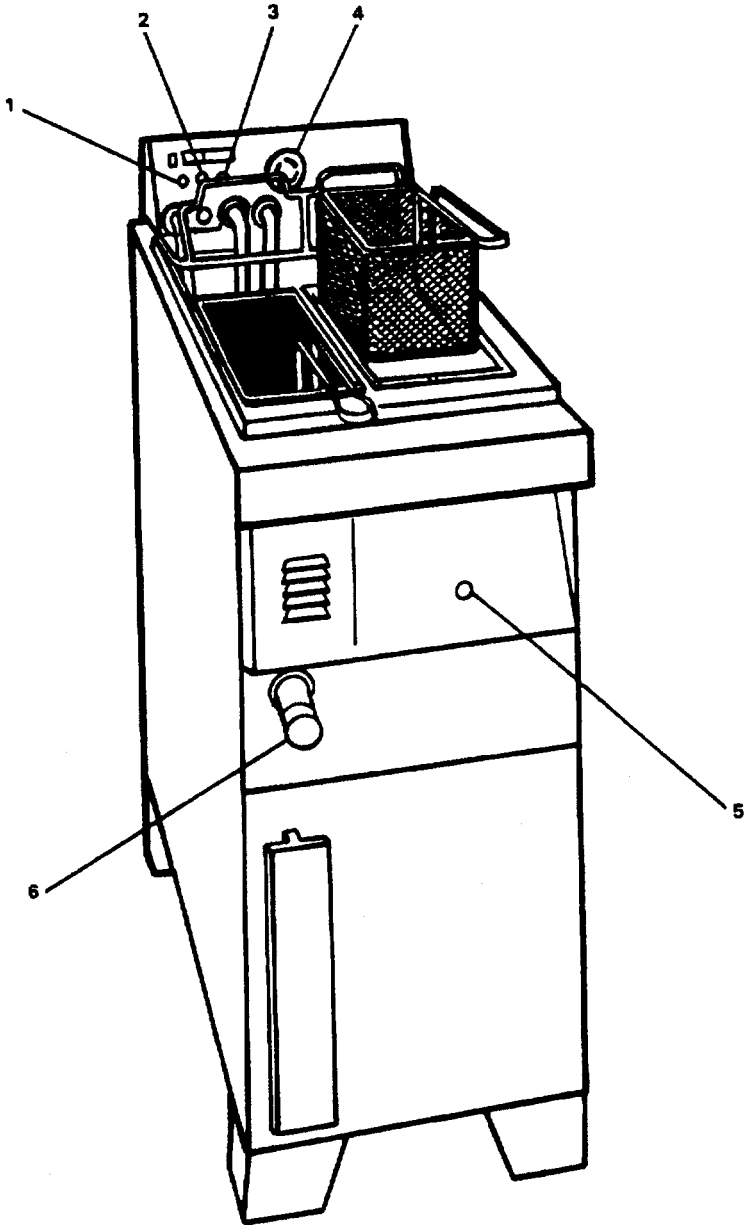

Figure 2-67. Fryer.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Fryer (Figure 2-67)	
1	Power Indicator	Lights (RED) when power is ON.
2	Heat Indicator	Lights (RED) indicating power is applied to heating elements.
3	Overtemp Indicator	Lights (RED) if oil reaches over-temperature condition.
4	Thermostat	Used to select desired temperature setting, 200°F to 400°F (settings in 25°F increments).
5	ON-OFF POWER Switch	Energizes control circuits.
6	Front Oil Drain	Quarter turn of ball valve (inside) allows oil to be drained.

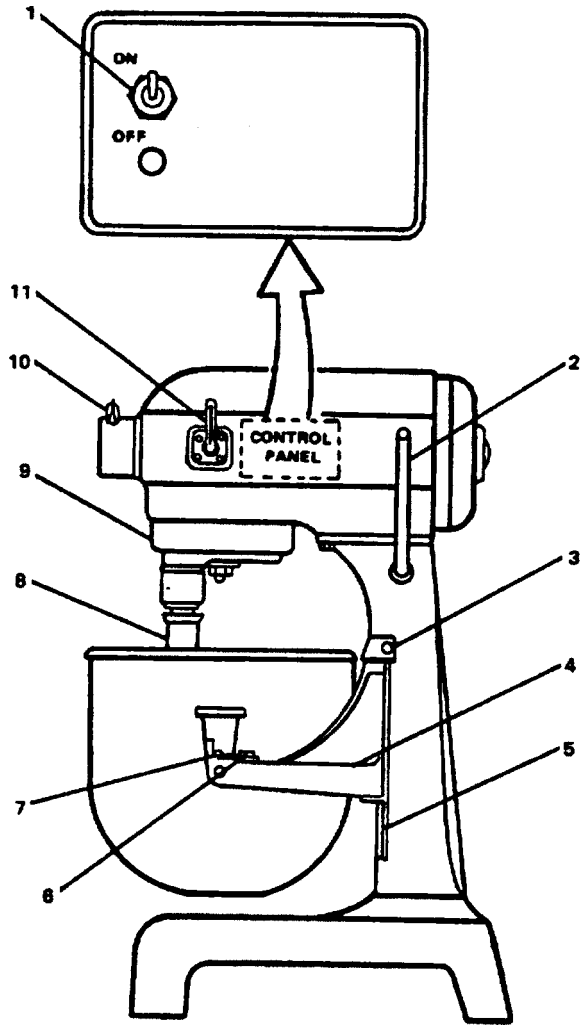

Figure 2-68. Mixer.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Mixer (Figure 2-68)	
1	ON-OFF Switch	Controls power to mixer.
2	Bowl Lift Handle	Used to raise or lower bowl.
3	Apron	Provides upper splash shield.
4	Bowl Support	Provides base for mounting bowl.
5	Bowl Lift Slideways	Provides channel for raising and lowering bowl.
6	Bowl Clamps	Bowl is locked in place by rotating bowl clamps over ears of bowl.
7	Alignment Pins	Used to properly set bowl on bowl support.
8	Agitator	Agitator reaches every part of batch, rotating on its axis opposite the direction that it moves around the bowl.
9	Drip Cup	Collects any lubricants from motor.
10	Attachment Hub Thumb Screw	Secures attachments in the attachment hub.
11	Gear Shift Lever	Provides three mixer speeds: speed 1 (low), speed 2 (medium), and speed 3 (high).

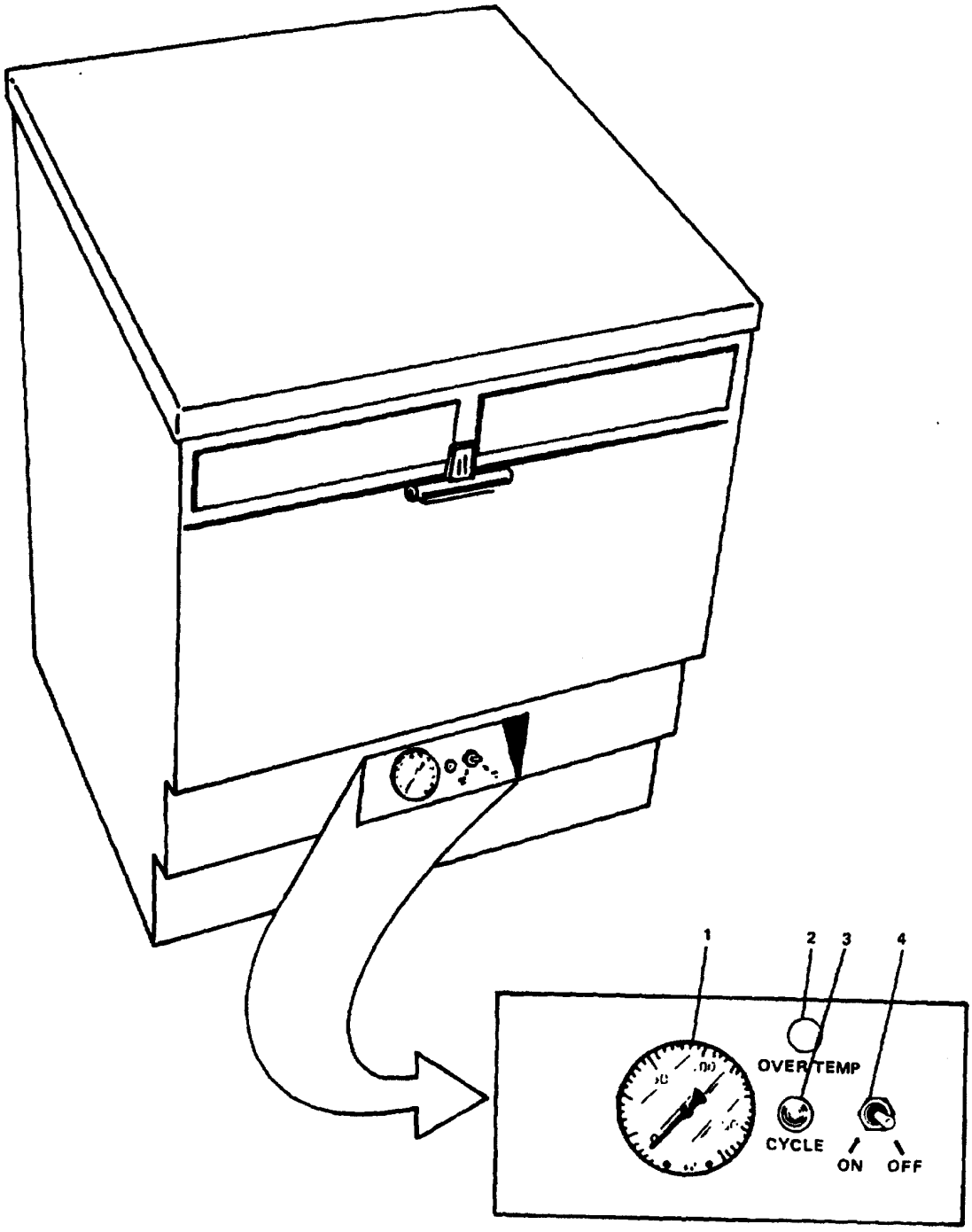

Figure 2-69. Dishwasher.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Dishwasher (Figure 2-69)	
1	Water Temperature Gauge	Used to measure the temperature of the wash water.
2	OVER TEMP Indicator	Indicates an over temperature condition.
3	CYCLE Indicator	Indicates that the power is in cycle.
4	ON OFF Toggle Switch	Used to turn the equipment ON and fill the sump tank at the start of the day and to drain the sump tank and turn the equipment OFF at the end of the day.

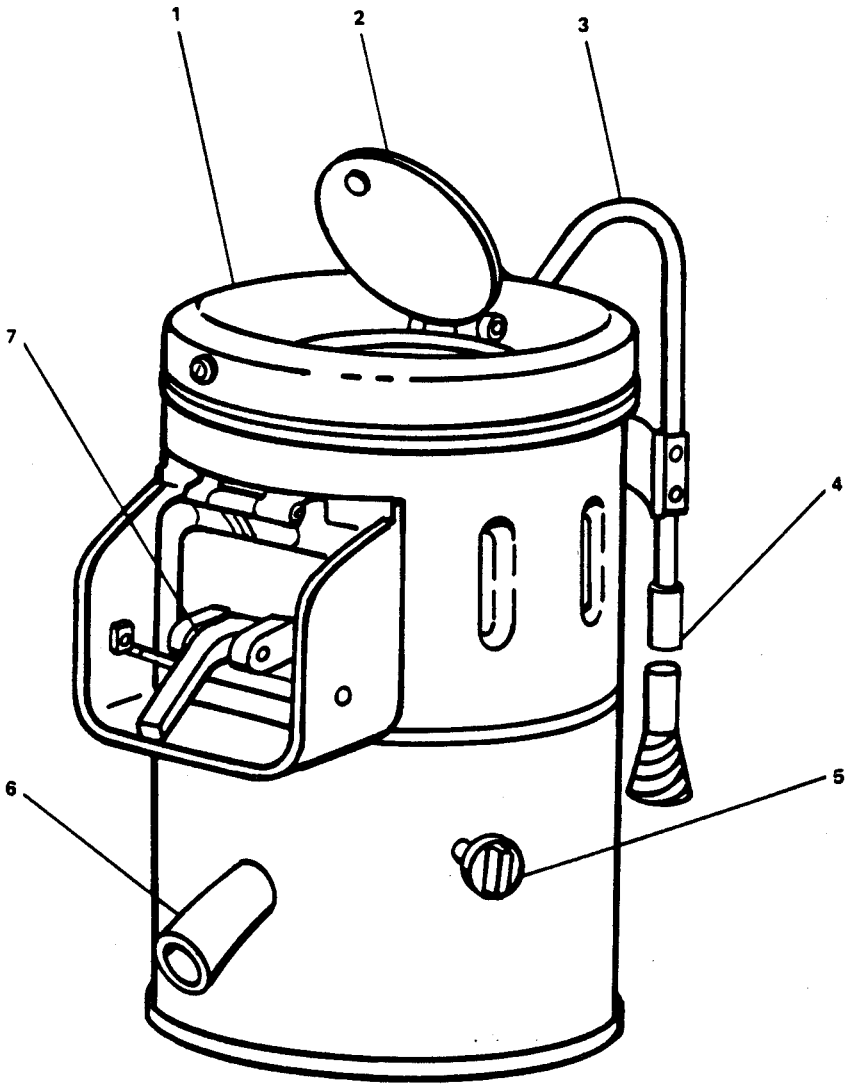

Figure 2-70. Peeler.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Peeler (Figure 2-70)	
1	Cover	Prevents splashing during operation.
2	Lid	Allows input of unpeeled vegetables.
3	Water Supply Pipe	Provides cold fresh water supply to flush out peelings.
4	Flexible Hose and Faucet Coupling	Used to connect water supply pipe (3) to faucet.
5	Timer	Controls peeler operation. Also acts as ON/OFF switch.
6	Water Discharge Hose	Water and peeling outlet. Should empty into sink with garbage disposal.
7	Discharge Door	Provides access for removal of peeled vegetables.

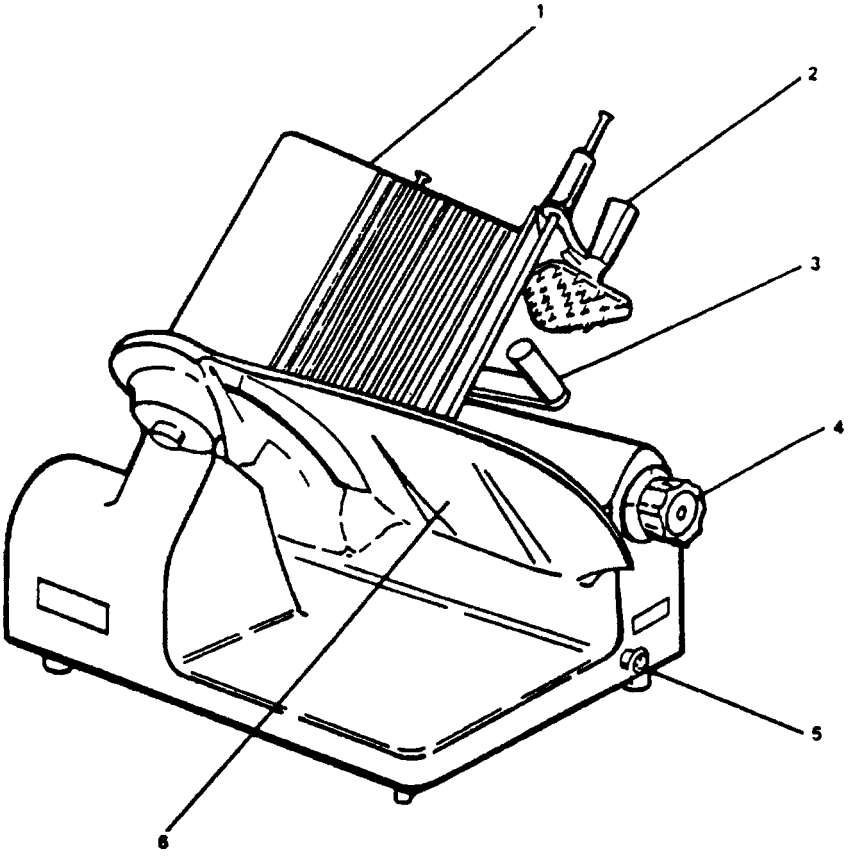

Figure 2-71. Meat Slicer.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Meat Slicer (Figure 2-71)	
1	Carriage	Holds product during slicing.
2	Meat Grip	Used for holding odd shapes or short end pieces.
3	Carriage Handle	Used to move carriage back and forth.
4	Slice Adjusting Dial	Dial to adjust thickness of slices cut. Number on dial indicates actual measurements in 0.010. For example, when setting dial at 25, the slice would be 1/4" thick.
5	PULL TO START-PUSH TO STOP Switch	Controls power to slicer.
6	Sharpener Slot	Provides a mounting position for slicer knife sharpener.

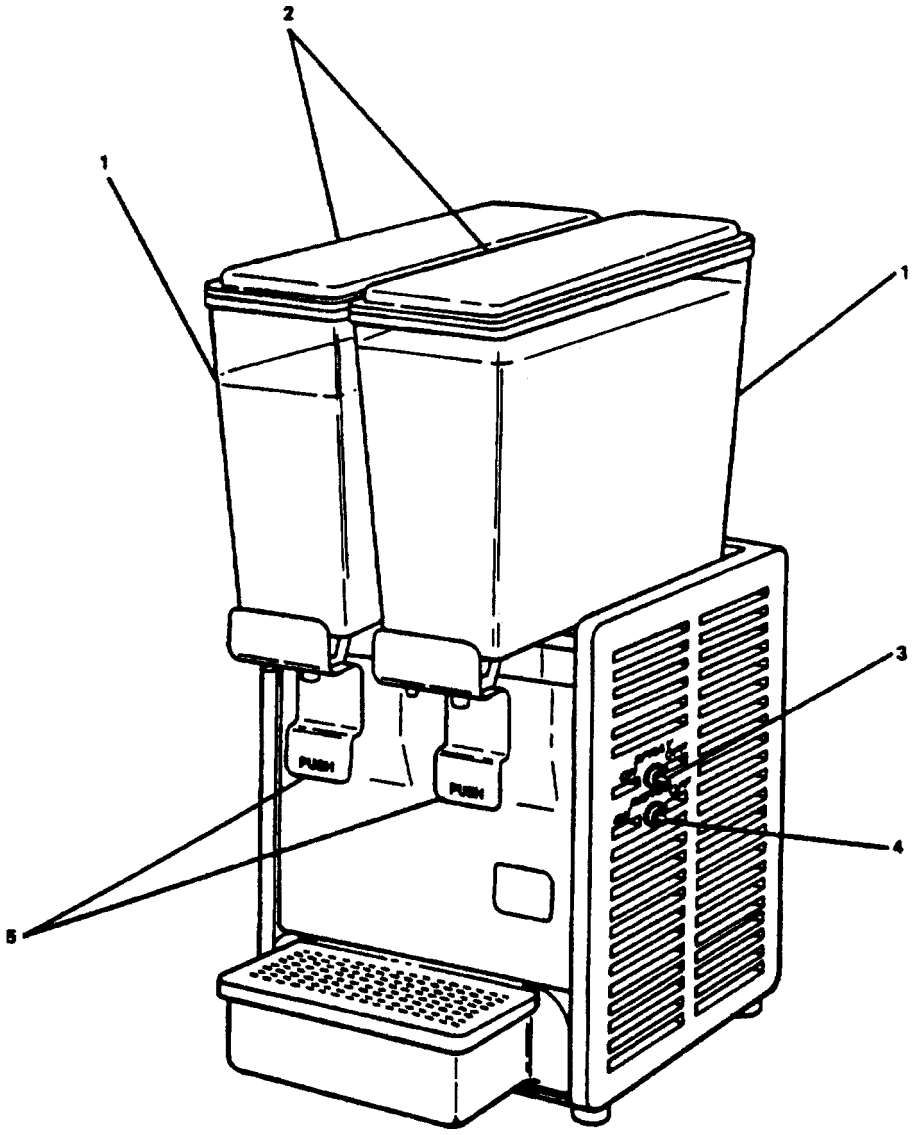

Figure 2-72. Beverage Dispenser.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Beverage Dispenser (Figure 2-72)		
1	Bowl	Reservoir for drink.
2	Lids	Provide access for refilling bowl.
3	ON SPRAY OFF Switch	Controls pump operation.
4	ON REFRIG OFF Switch	Controls refrigeration system operations.
5	Dispensing Valves	Control dispensing of drink.

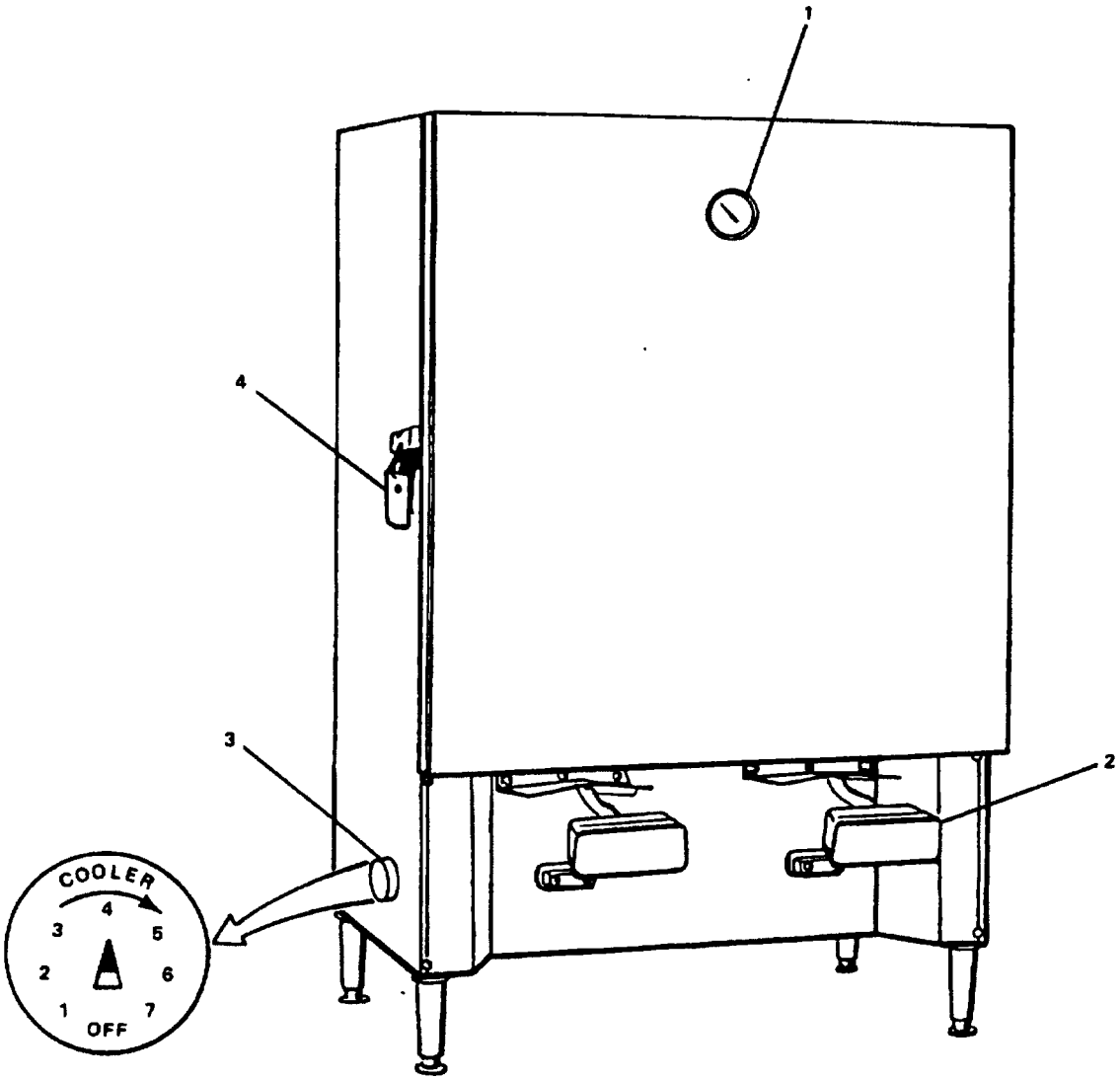

Figure 2-73. Milk Dispenser.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Milk Dispenser (Figure 2-73)	
1	Thermometer	Gives a continuous reading of temperature in the dispenser.
2	Dispensing Valve	Movement of the dispensing valve will discharge milk from the holding container.
3	Temperature Control	Controls temperature inside of milk dispenser.
4	Latch	Used to open door for access to milk containers.

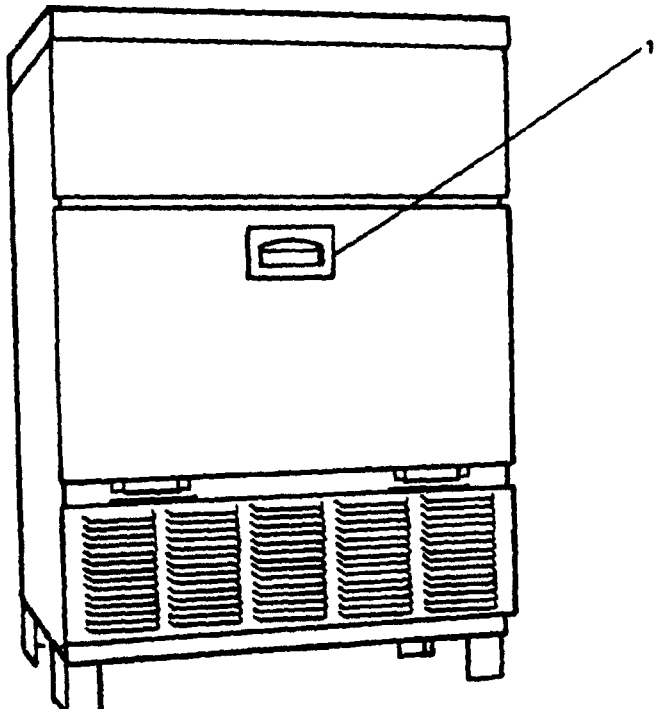

Figure 2-74. Ice Maker.

Table 2-1. Description of Operator's Controls and Indicators - CONT.

Key	Control or Indicator	Function
Ice Maker (Figure 2-74)		
1	Handle	Used to open door for access to ice storage.

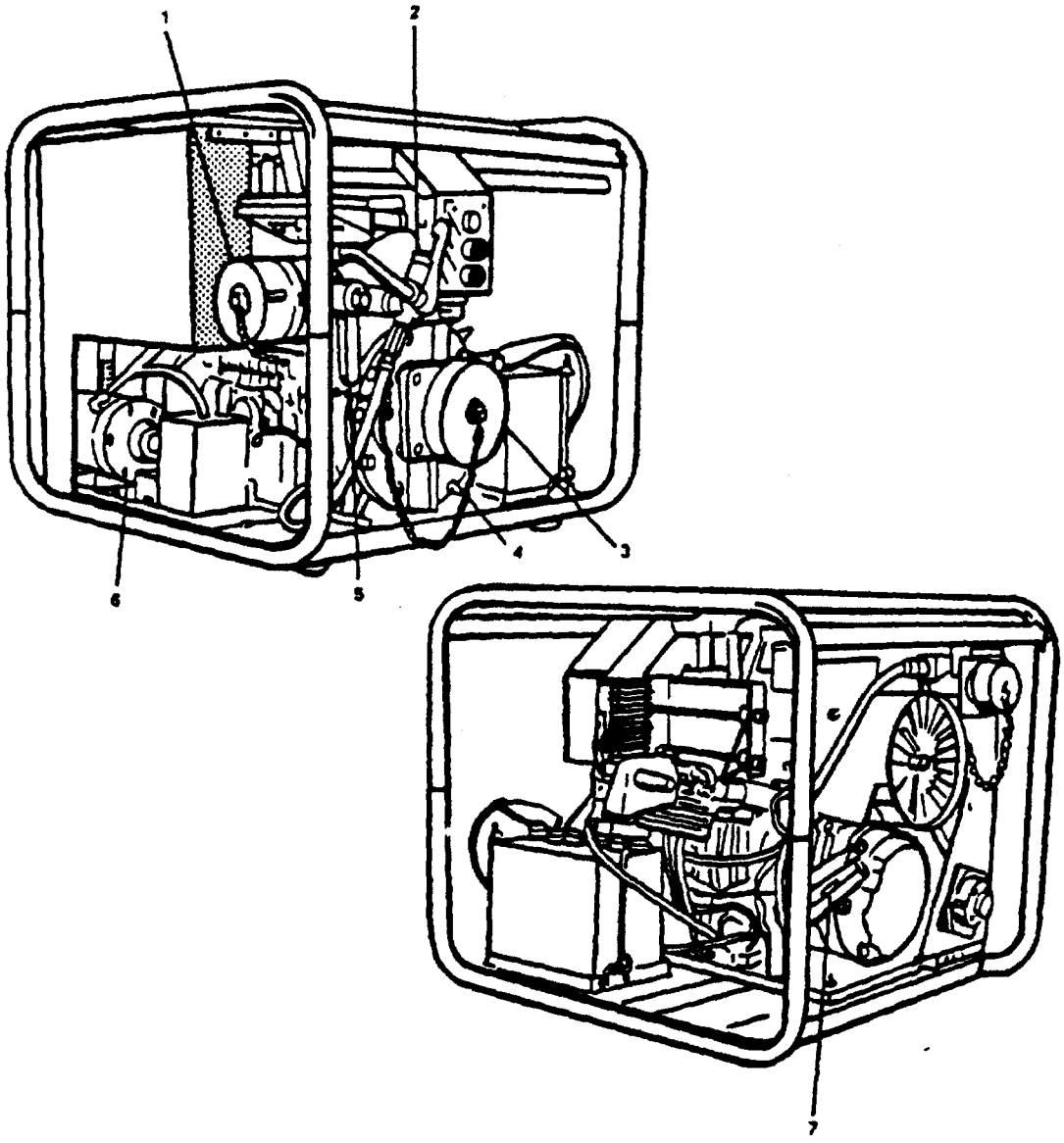

Figure 2-75. Portable Fire Fighting Pump (PE-250) (Sheet 1 of 2).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Portable Fire Fighting Pump (PE-250)(Figure 2-75)		
1	Discharge Hose Connection with Cover	Provides connection for discharge hose.
2	Manual Priming Inlet Plug	To manually prime pump when lift is greater than 20 feet.
3	Suction Hose Connection with Cover	Provides connection for suction hose.
4	Pump Drain Plug	When removed, water drains from pump.
5	Water Discharge Valve	In closed position and PRIME pushbutton depressed, pump is in priming mode. In open position, pump can discharge water.
6	Priming Pump Discharge Port	Discharges output of pump.
7	Manual Start Pull Cord	Provides manual engine starting.

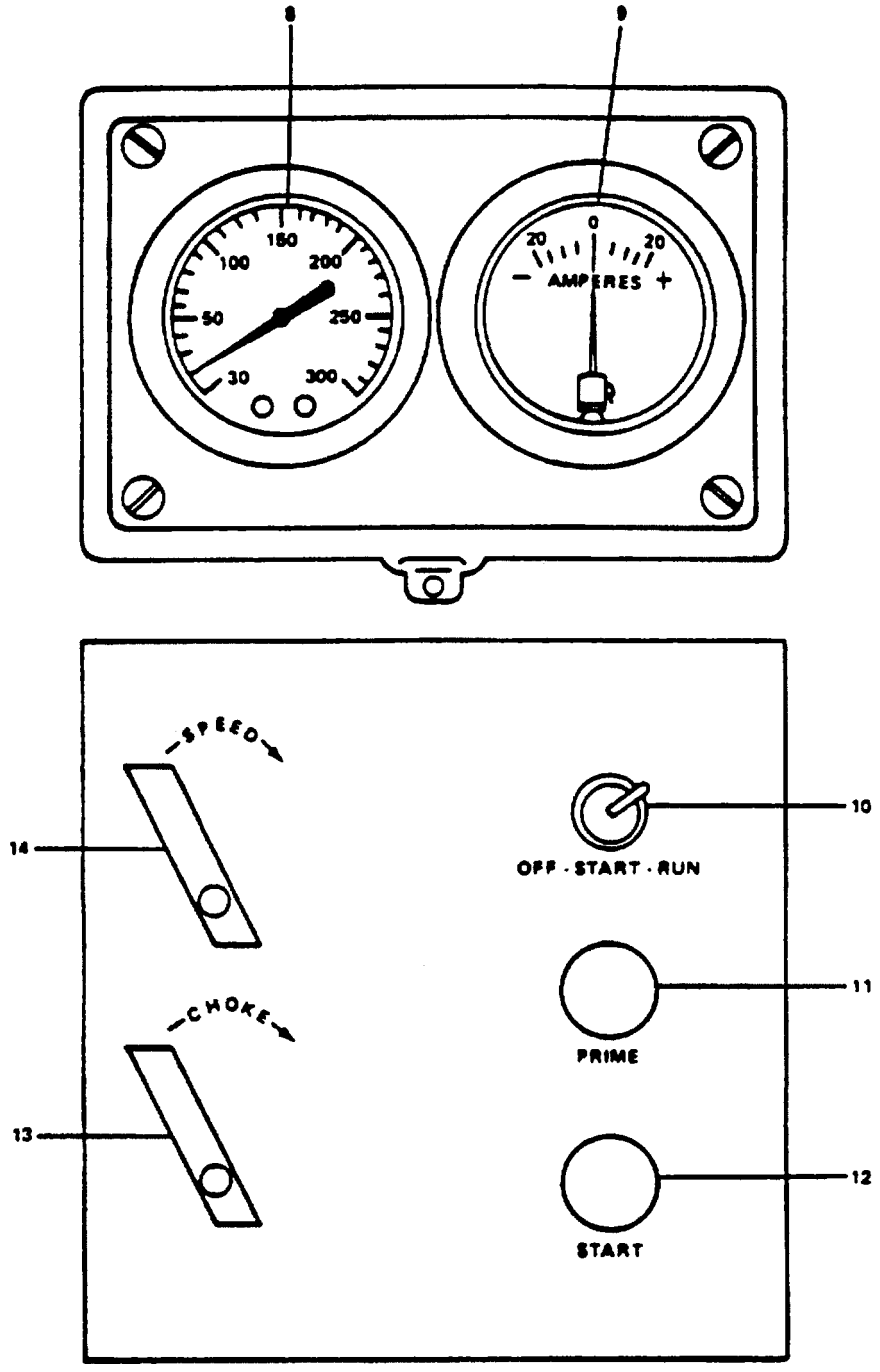

Figure 2-75. Portable Fire Fighting Pump (PE-250) (Sheet 2 of 2).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Portable Fire Pump (PE-250)(Figure 2-75) - Continued		
8	Pressure Gauge	Indicates pump pressure, or pump vacuum when priming.
9	AMPERES Gauge	Indicates if alternator is charging or discharging.
10	OFF-START-RUN Switch	Turns engine off in OFF, allows engine to start in START, and allows engine to run in RUN position and prevents over speed of engine if prime is lost.
11	PRIME Pushbutton	Puts pump in priming mode.
12	START Pushbutton	Cranks engine with OFF-START-RUN switch in start position.
13	CHOKE	Controls carburetor fuel air mixture.
14	SPEED	Controls speed of engine.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Electric Fire And Salvage Pump (Figure 2-76)		
1	Suction Hose Inlet	Connects suction hose.
2	Discharge Hose Outlet	Connects discharge hose.
3	Power Cord	Connects pump motor to power supply. Used to start and stop pump.

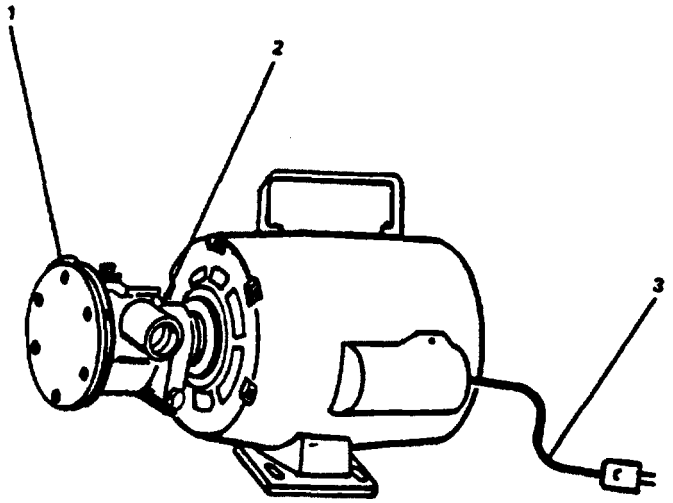

Figure 2-76. Electric Fire and Salvage Pump.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Electrical Submersible Pump (Figure 2-77)		
1	Handle	Lowers and raises pump.
2	Power Cord	Connects pump motor to power supply. Used to start and stop pump.
3	Strainer	Protects pump from foreign matter.
4	Discharge Hose Outlet	Connects discharge hose.

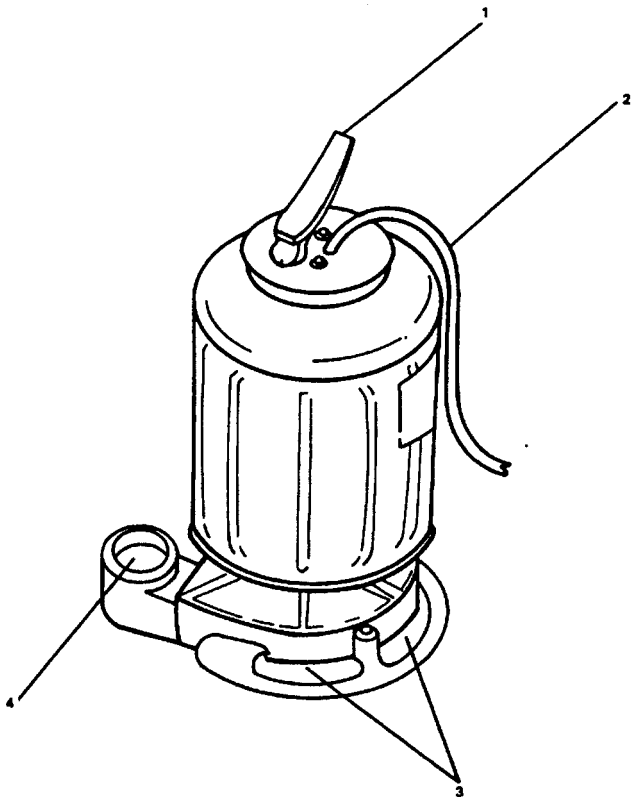

Figure 2-77. Electric Submersible Pump.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Washer (Figure 2-78)	
1	WATER TEMP Control	Controls water temperature.
2	WATER LEVEL Control	Controls water level.
3	OFF and Selector Control	Selects washer cycle. Pulling knob starts operation and depressing knob stops operation.

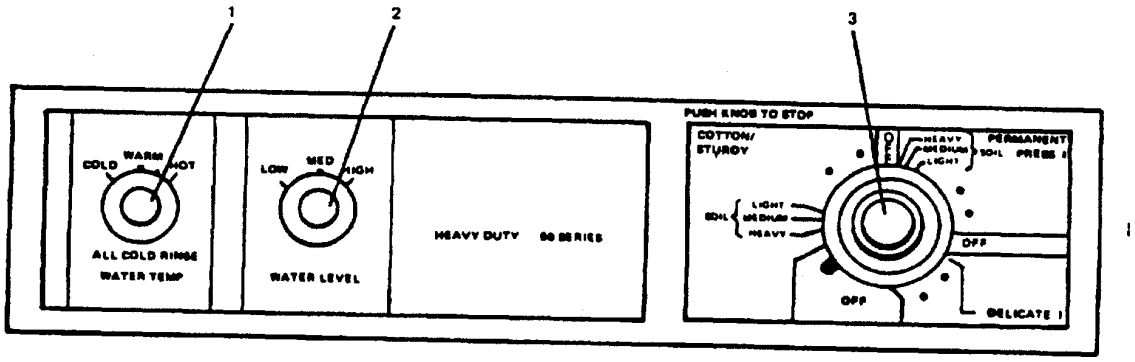

Figure 2-78. Washer.

Table 2-1. Description of Operator's Controls and Indicators – CONT

Key	Control or Indicator	Function
Dryer (Figure 2-79)		
1	Selection Knob	Selects dryer time and load selection.
2	PUSH TO START Button	Pushbutton starts dryer.

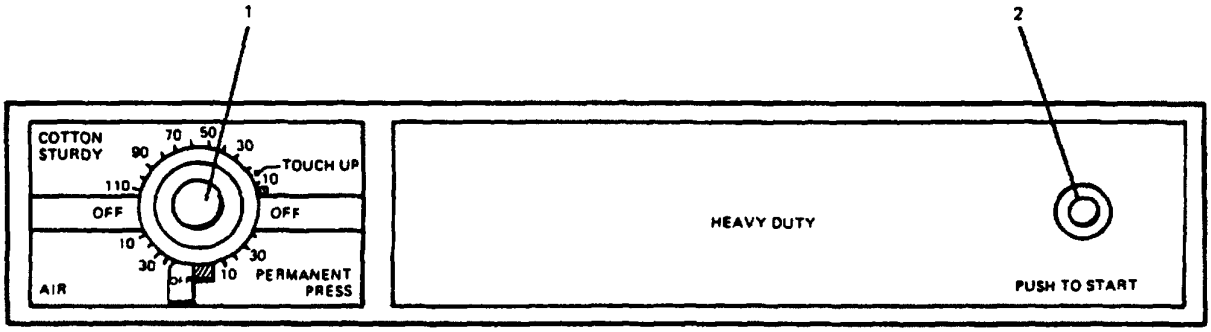

Figure 2-79. Dryer.

Table 2-1. Description of Operator's Controls and Indicators – CONT

Key	Control or Indicator	Function
Bow Thruster Unit Oil Tank (Figure 2-80)		
1	Sight Glass	Indicates oil level in reservoir.

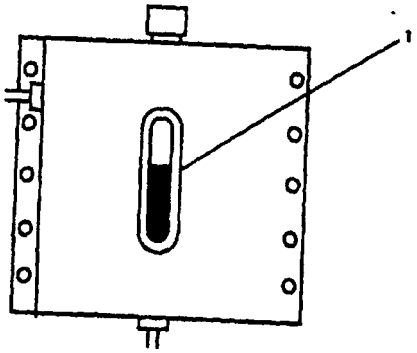

Figure 2-80. Bow Thruster Unit Oil Tank.

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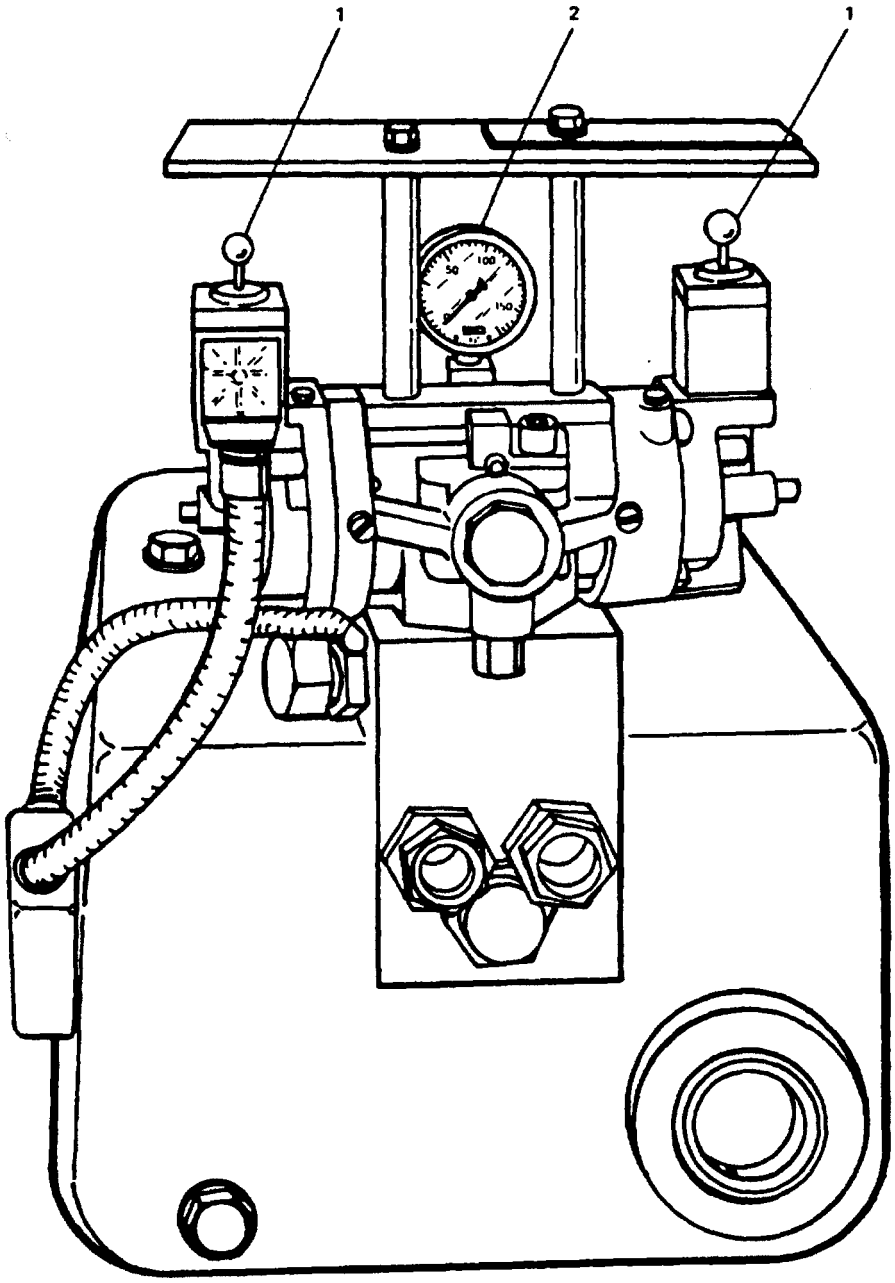


Figure 2-81. Steering Hydraulic Power Pack.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Steering Hydraulic Power Pack (Figure 2-81)	
1	Hand Levers	Used during manual-powered emergency steering. Port lever moves rudder to PORT; starboard lever moves rudder to STARBOARD.
2	Pressure Gauge	Indicates operating pressure of oil.

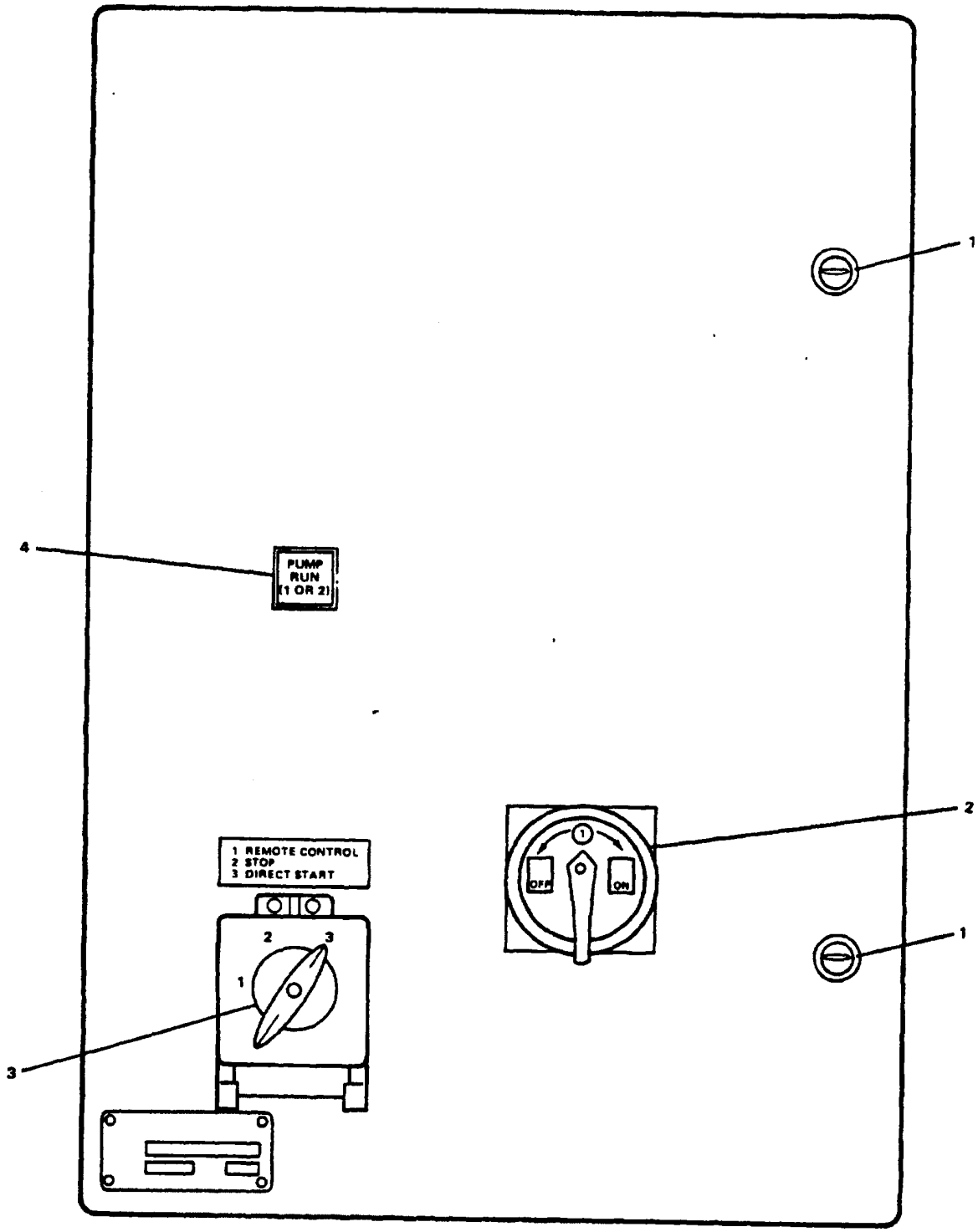
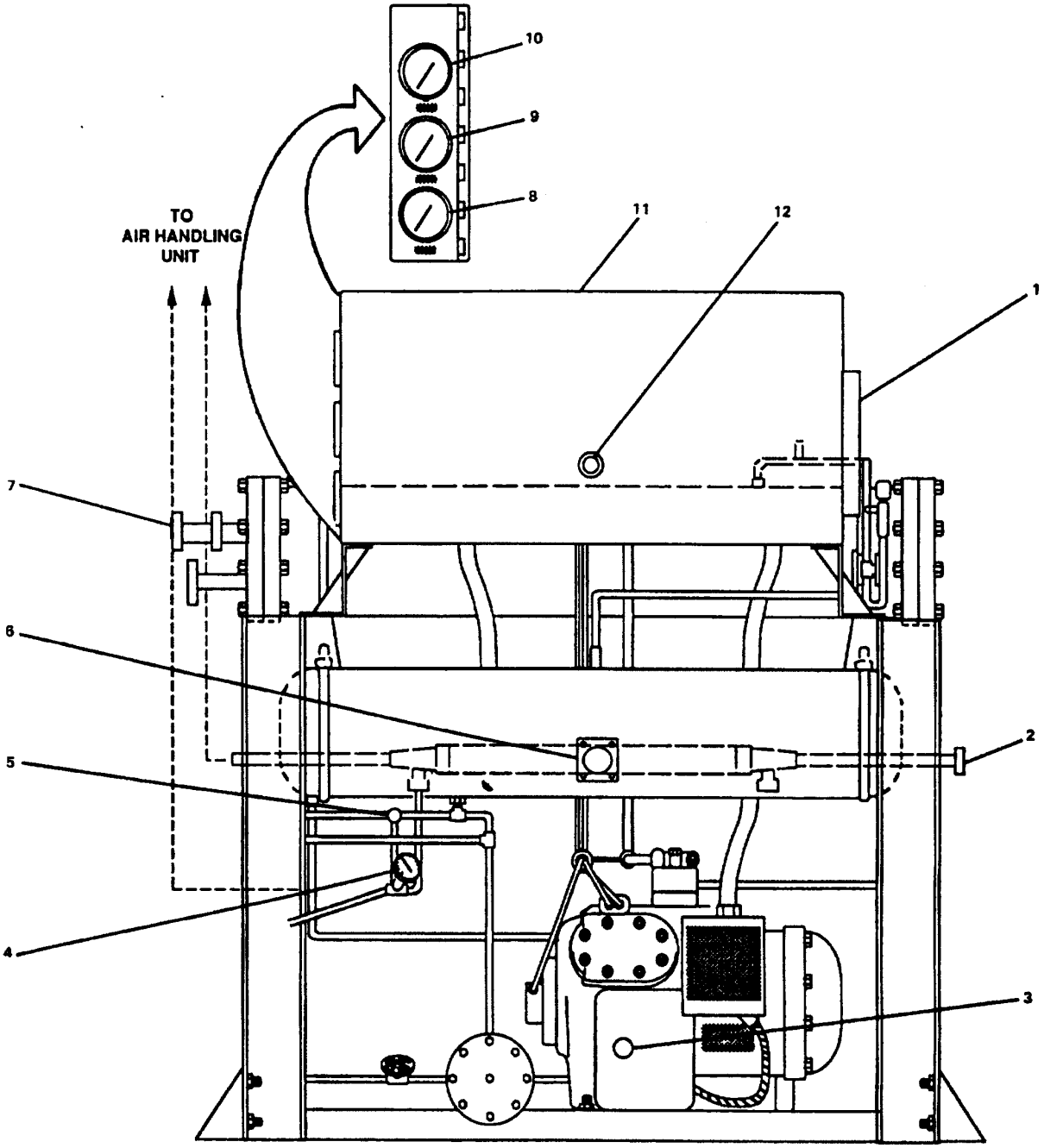


Figure 2-82. Steering Hydraulic Power Pack Motor Controllers.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Steering Hydraulic Power Pack Motor Controllers (Figure 2-82)	
1	Latches	Secure door in closed position.
2	OFF-ON Switch	Controls powers to motor controller.
3	Selector Switch	Selects mode of operation or shuts down system.
4	PUMP RUN (1 or 2) Indicator	Indicates system is operating in REMOTE CONTROL (GREEN) mode.



Packaged Condensing Unit
(Typical)

Figure 2-83. Air Conditioning Condensing Unit.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Air Conditioning Condensing Unit (Figure 2-83)		
1	ON-OFF Circuit Breaker	Controls power to condensing unit.
2	SUCTION Gas Thermometer	Provides temperature of refrigerant in suction line.
3	Oil Level Sight Glass	Indicates oil level in compressor.
4	Liquid Thermometer	Indicates temperature of refrigerant being pumped to coil.
5	Moisture Indicator	Indicates moisture level in pressure line.
6	LIQUID LEVEL Indicator	Indicates level of liquid refrigerant in receiver.
7	Water Outlet Connection	Connection for cooling water outlet to General Service System.
8	OIL Pressure Gauge	Indicates compressor oil pressure.
9	SUCTION Pressure Gauge	Indicates compressor suction pressure.
10	DISCHARGE Pressure Gauge	Indicates compressor discharge pressure.
11	Control Box	Enclosure for mounting gauges (8, 9, and 10) and reset pushbutton (12).
12	RESET Button	Resets compressor electrical circuit.

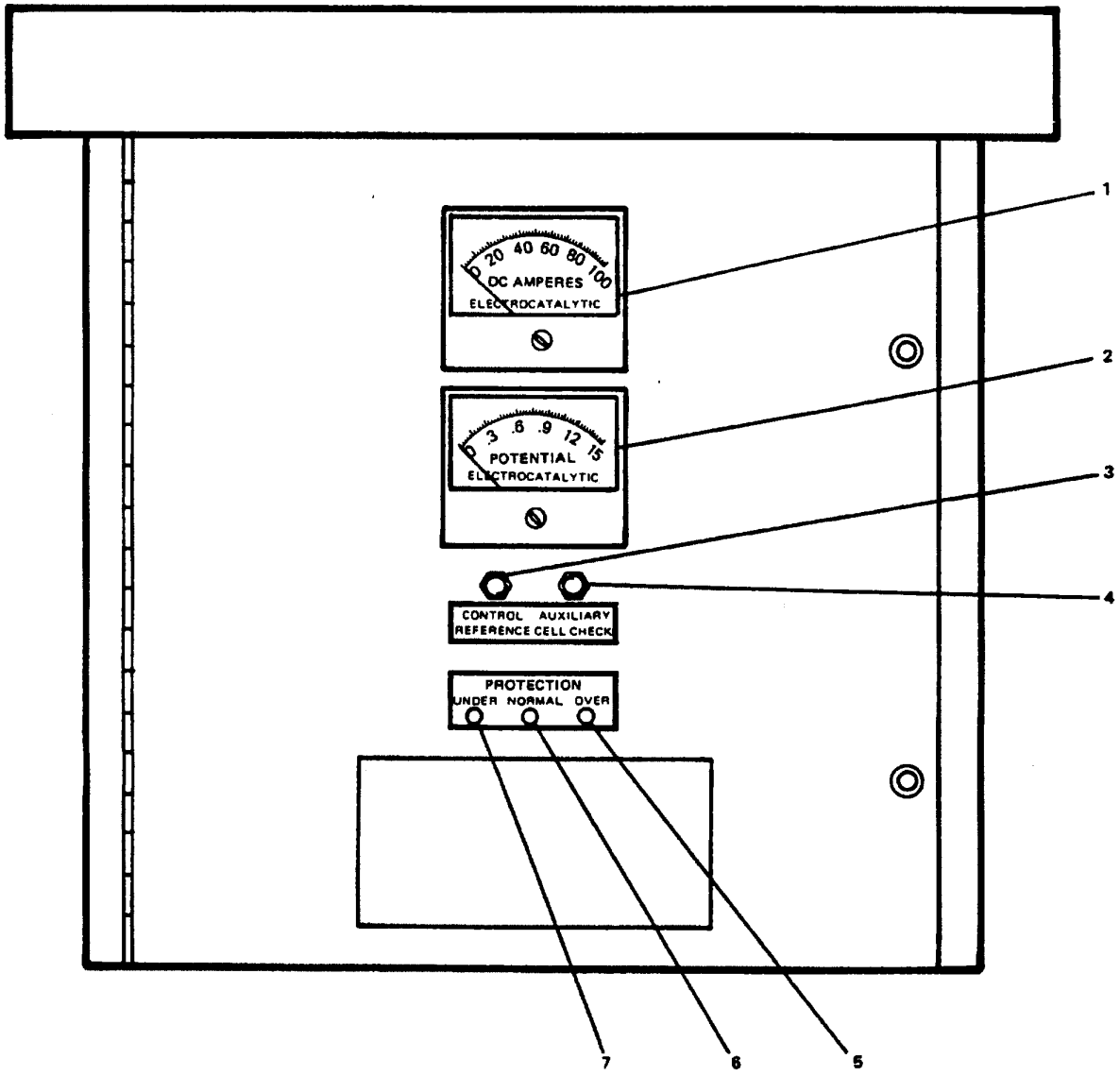
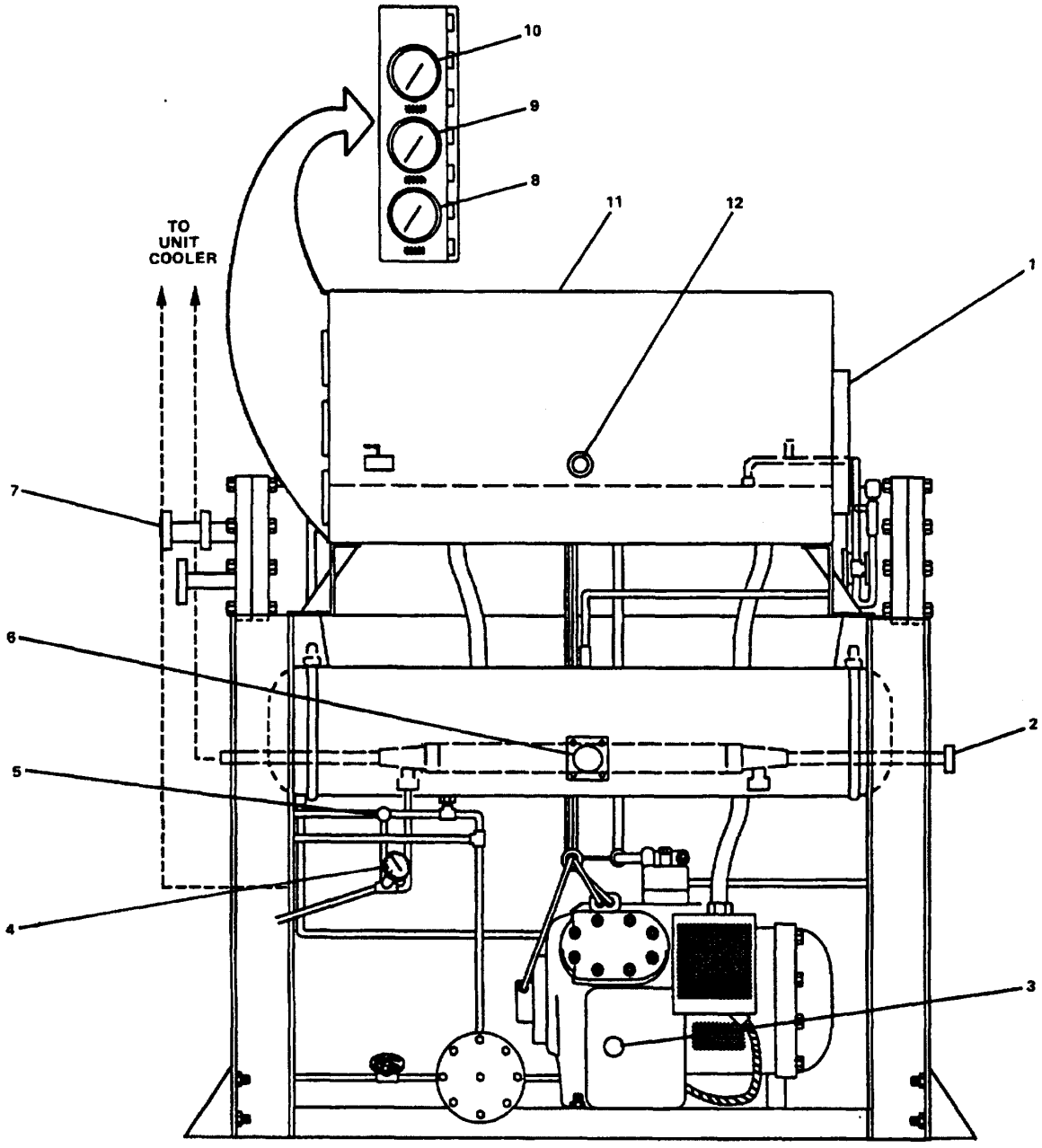


Figure 2-84. Cathodic Protection System Control Panel.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Cathodic Protection System Control Panel (Figure 2-84)	
1	DC AMPERES Meter	Indicates total current delivered to anodes.
2	POTENTIAL Meter	Voltmeter displaying automatic control setting. When CONTROL pushbutton (3) is pressed, voltmeter indicates control reference cell voltage. When AUXILIARY pushbutton (4) is depressed, voltmeter indicates voltage of auxiliary reference cell.
3	CONTROL Pushbutton	Controls display function of POTENTIAL meter (2).
4	AUXILIARY Pushbutton	Controls display function of POTENTIAL meter (2).
5	OVER Indicator	Indicates control reference electrode potential is over set limit (RED).
6	NORMAL Indicator	Indicates power is ON and protection level is within normal range (GREEN).
7	UNDER Indicator	Indicates control reference electrode potential is below set limit (RED).



Packaged Condensing Unit
(Typical)

Figure 2-85. Refrigeration Condensing Unit.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Refrigeration Condensing Unit (Figure 2-85)		
1	ON-OFF Circuit Breaker	Controls power to condensing unit.
2	SUCTION Gas Thermometer	Provides temperature of refrigerant in suction line.
3	Oil Level Sight Glass	Indicates oil level in compressor.
4	LIQUID Thermometer	Indicates temperature of refrigerant being pumped to coil.
5	Moisture Indicator	Indicates moisture level in pressure line.
6	LIQUID LEVEL Indicator	Indicates level of liquid refrigerant in receiver.
7	Water Regulating Valve	Regulates cooling water supply to condenser.
8	OIL Pressure Gauge	Indicates compressor oil pressure.
9	SUCTION Pressure Gauge	Indicates compressor suction pressure.
10	DISCHARGE Pressure Gauge	Indicates compressor discharge pressure.
11	Control Box	Enclosure for mounting gauges (8, 9, and 10) and reset pushbutton (12).
12	RESET Button	Resets compressor electrical circuit.

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Table 2-1. Description of Operator's Controls and Indicators – CONT

Key	Controls and Indicators	Function
Tank Level Indicator Receiver (Figure 2-86)		
1	Edgeview Meter	**NOTE** A bank of three receivers is shown. Quantity may vary depending on function and equipment group. Indicates tank level.

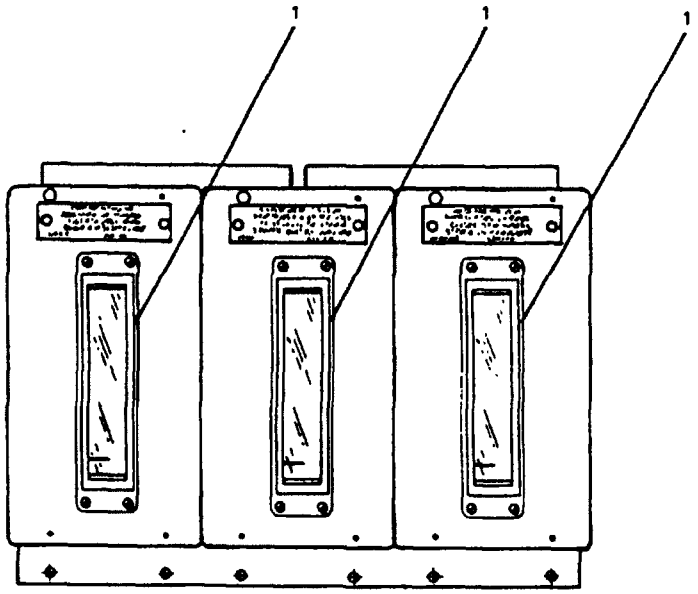

Figure 2-86. Typical Bank of Three Tank Level Indicator Receivers.

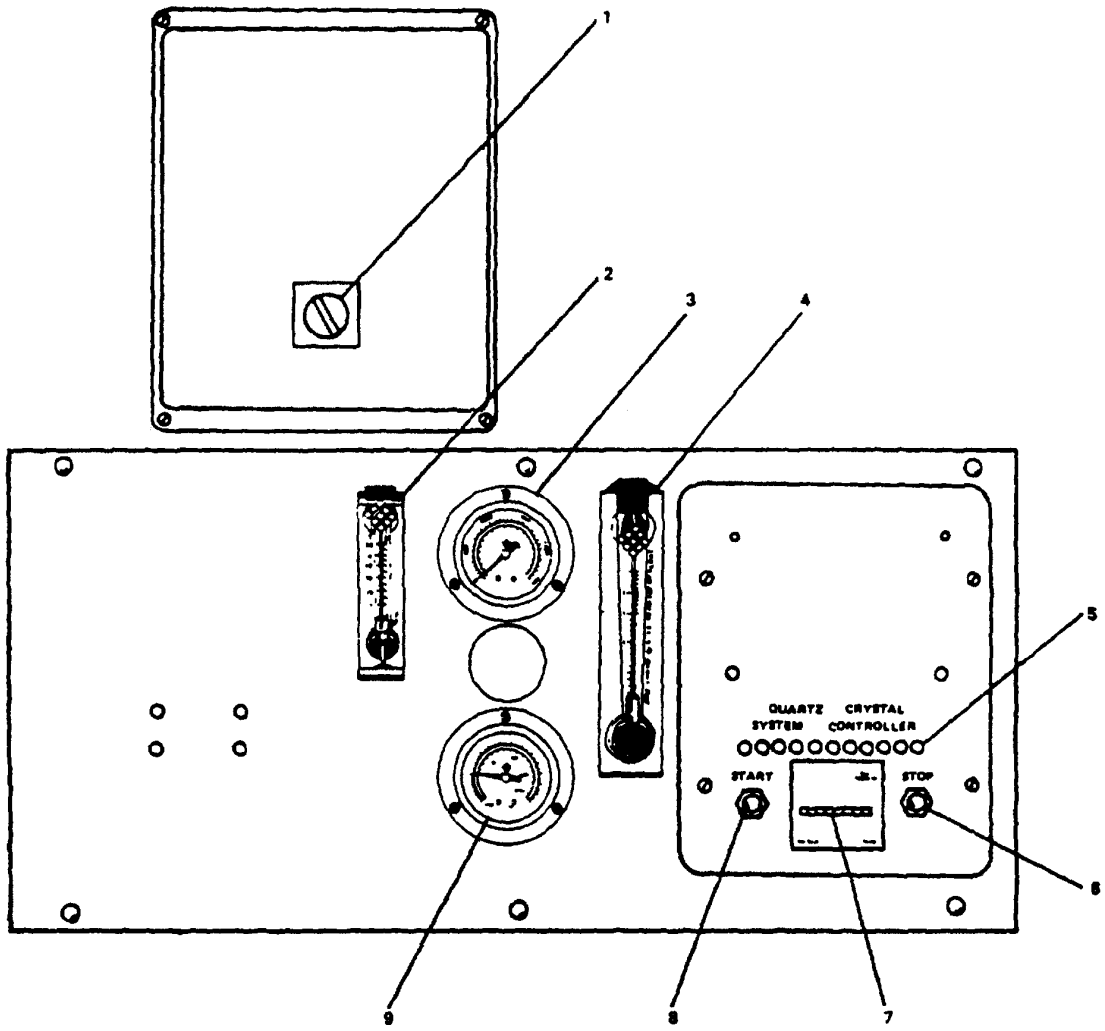

Figure 2-87. Reverse Osmosis Watermaker.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Reverse Osmosis Watermaker (Figure 2-87)		
1	ON-OFF Switch	Main electrical disconnect for system.
2	Feed Water Sight Glass GPH	Indicates rate of feed water progress through system.
3	High Pressure Gauge	Indicates pressure within membrane.
4	Product Water Sight Glass GPM	Indicates product water output in GPM.
5	LEDs	First GREEN light indicates POWER ON. Each remaining LED (7 GREEN, 2 YELLOW, and 1 RED) represents 1/10th of full scale of product water salinity.
6	STOP Pushbutton	Stops system operation.
7	Hour Meter	Registers total system use in hours.
8	START Pushbutton	Starts system operation.
9	Low Pressure Gauge	Indicates pre-filtration operation.

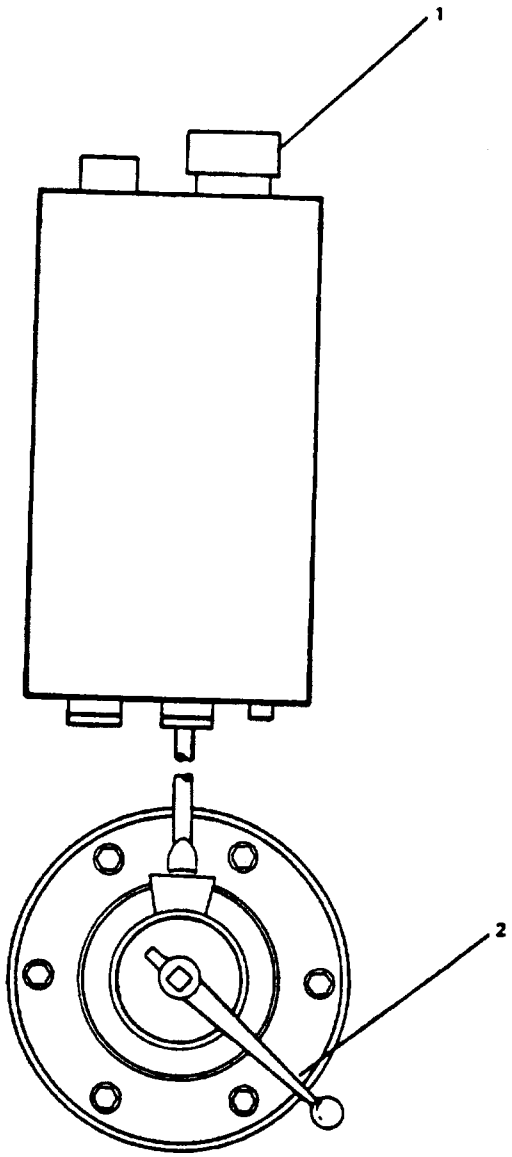

Figure 2-88. Sliding Hydraulic Watertight Door.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Sliding Hydraulic Watertight Door (Figure 2-88)	
1	Reservoir Fill Cap	Has dipstick to check oil level and when cap is removed provides a fill tube to replenish oil supply.
2	Crank Handle	Used to turn hand pump to OPEN and CLOSE door.

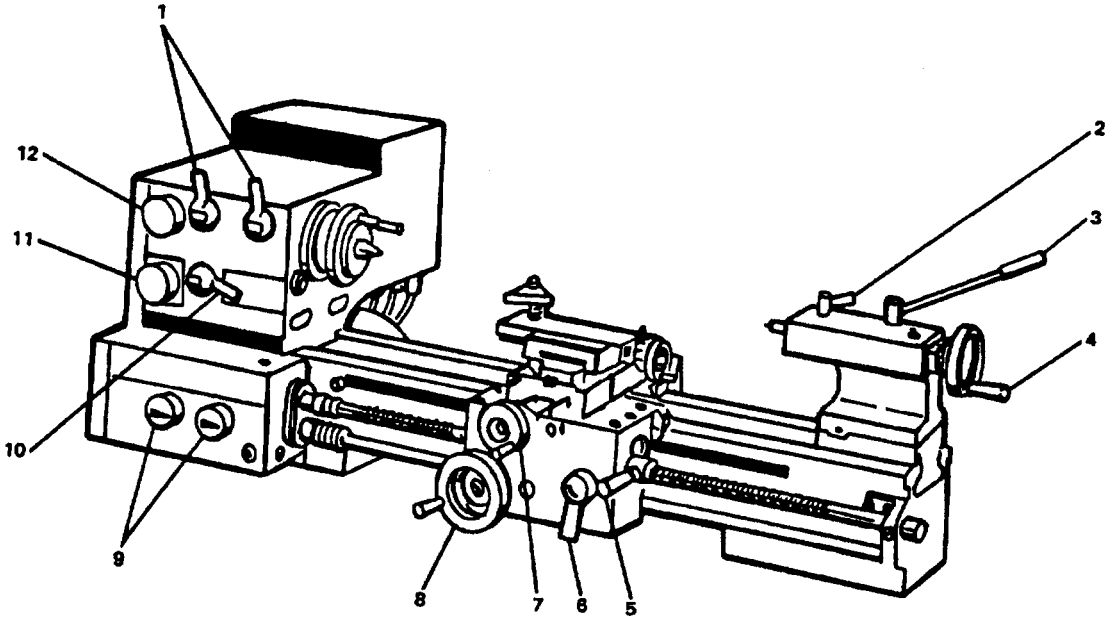

Figure 2-89. Lathe.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Lathe (Figure 2-89)	
1	Spindle Speed Selector	Selects desired spindle speed.
2	Lever	Clamping lever for tailstock ram.
3	Lever	Convertible clamping lever for tailstock.
4	Handwheel	Controls tailstock ram.
5	Lever	Feed lever for longitudinal and cross feed.
6	Lever	Controls half-nut.
7	Handwheel	Controls cross slide.
8	Handwheel	Controls longitudinal slide.
9	Feed Pitch Selectors	Knobs for selecting feed pitches.
10	Handle	Selects reversing gear.
11	Switch	Selects motor speed and direction.
12	Main Switch	Lockable main switch turns lathe ON and OFF.

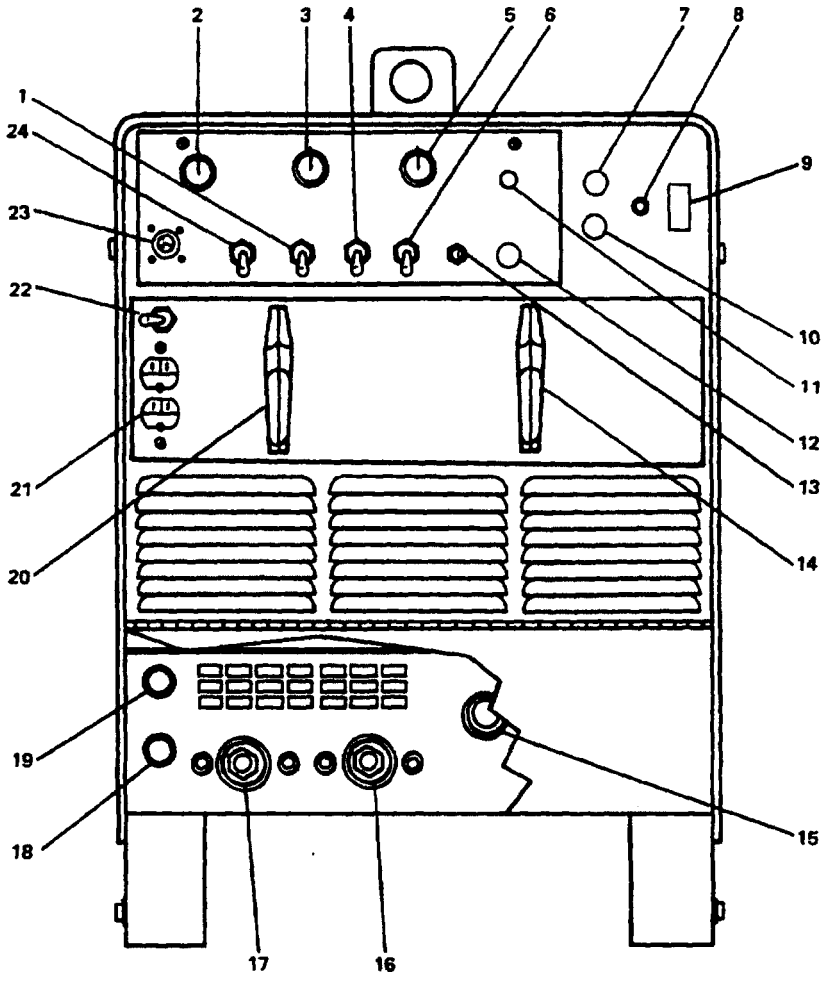

Figure 2-90. Arc Welder.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Arc Welder (Figure 2-90)	
1	START AMPERAGE OFF-ON Control switch (3) is in ON position.	Provides adjustment of start amperage when START AMPERAGE ADJUSTMENT control
2	POSTFLOW TIME	Not used.
3	START AMPERAGE ADJUSTMENT Control Switch	Selects whether start amperage will be used for arc initiation or not.
4	OUTPUT/CONTACTOR ON Switch	Must be in ON position.
5	AMPERAGE ADJUSTMENT Control	Provides fine amperage adjustment within range selected on GTAW RANGE switch (19).
6	AMPERAGE PANEL Switch	Must be in PANEL position.
7	POWER ON Pushbutton	Turns welder On.
8	Indicator Light	Indicates welder is ON.
9	OVERLOAD Switch circuit.	Provides overload protection for welding
10	POWER OFF Pushbutton	Turns welder OFF.
11	SPOT TIME	Not used.
12	Blank	Not used.
13	CB1 Circuit Breaker circuitry.	Provides overload protection for control
14	OUTPUT SELECTOR Switch	Selects mode of operation without changing welding cables.
15	Door	Protects internal components from dirt.
16	ELECTRODE Weld Output Terminal	Connector for attachment of electrode cable.
17	WORK Weld Output Terminal	Connector for attachment of work cable.

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Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Arc Welder (Figure 2-90)	
18	Gas In Fitting	Not used.
19	Gas Out Fitting	Not used.
20	RANGE SELECTOR Switch	Selects amperage range.
21	Duplex Receptacle other equipment.	Provides up to 15A 115 Vac for accessory or
22	Circuit Breaker receptacle.	Provides overload protection for duplex
23	REMOTE	Not used.
		WARNING Using high frequency with shielded metal arc welding process can result in serious electrical shock.
24	HIGH FREQUENCY Switch	Three position switch. In START position, high frequency present until arc is established. In OFF position, high frequency is not present. In CONTINUOUS position, high frequency is always present.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Drill Press (Figure 2-91)		
1	Top Cover	Provides access to belts and pulleys to change speed of drill press.
2	Cam Handle	Engages/disengages drive train.
3	Handle	Controls height of spindle.
4	Table Crank	Handle used to raise or lower table.
5	Chuck	Used to secure drill bits.
6	ON-OFF	Power switch used to turn drill press ON and OFF.

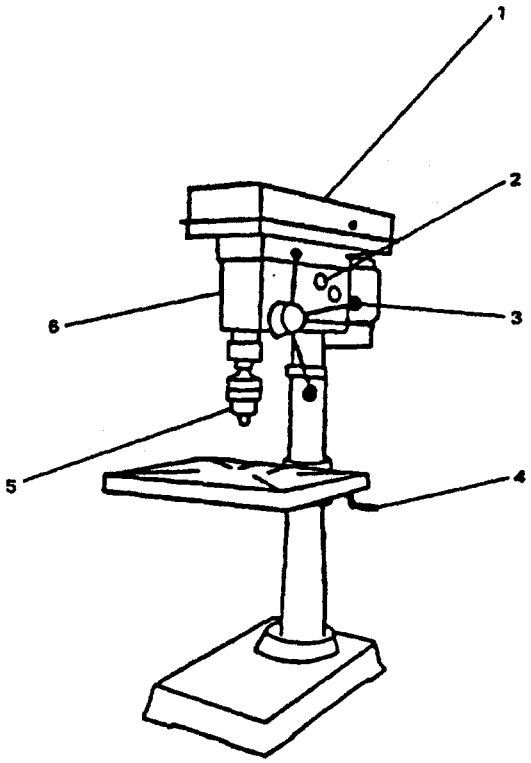


Figure 2-91. Drill Press.

Table 2-1. Description of Operators Controls and Indicators – CONT

Key	Control or Indicator	Function
Bench Grinder (Figure 2-92)		
		WARNING **Eye protection shield does NOT replace the face-eye protection; operator MUST wear eye protection while using this equipment. Serious eye injury could result.**
1	Eye Protection Shield	Protects operator from sparks and debris while allowing observation of grinding.
2	Grinder Wheel	Rotating grinder disk.
3	Tool Rest	Supports tool or item being worked on.
4	ON-OFF Switch	Controls electric power to unit.
5	Water Cup	Used to store water to cool items being worked on.

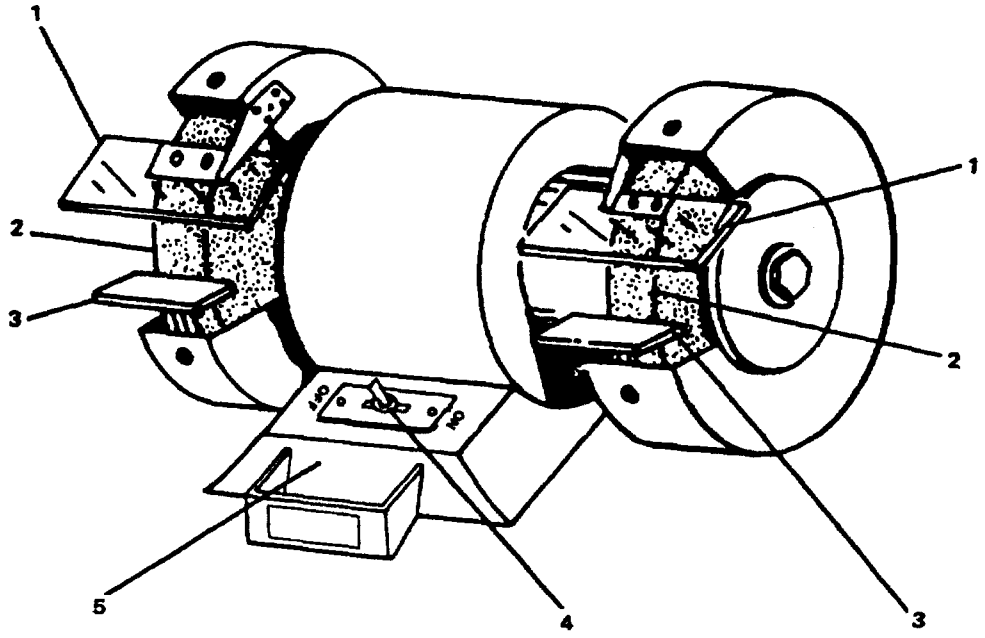
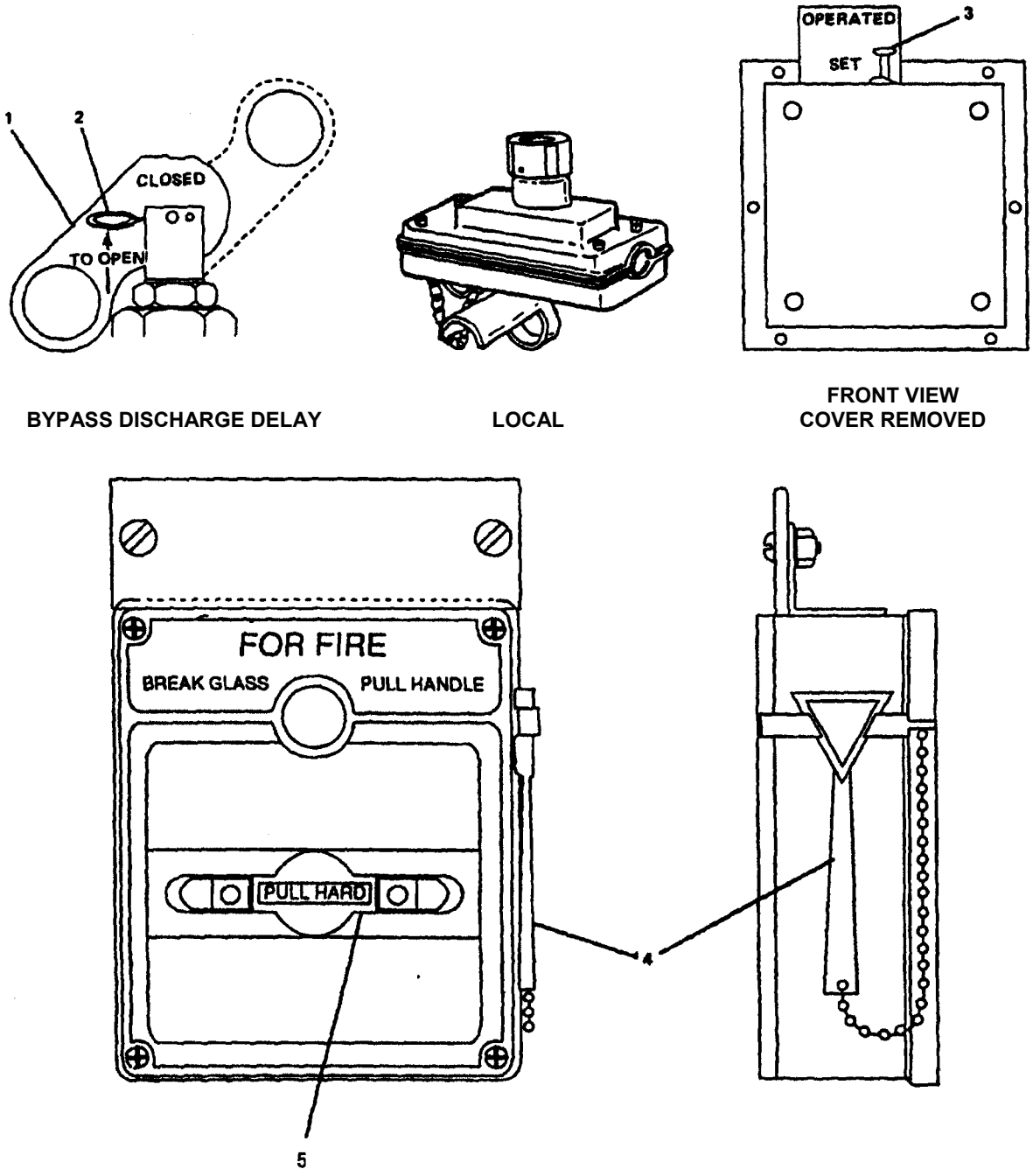


Figure 2-92. Bench Grinder.



BYPASS DISCHARGE DELAY

LOCAL

FRONT VIEW
COVER REMOVED

Figure 2-93. HALON System.

NOTE

Not applicable to Hull No. LT801, LT804 and LT805. Reference Para. 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment details and installation drawings.

Table 2-1. Description of Operator's Controls and Indicators – CONT

Key	Control or Indicator	Function
	HALON System (Figure 2-93)	
1	Operating Lever	Used to manually operate valve.
2	Locking Pin	Secures operating lever (1) to prevent inadvertent opening.
3	Reset Plunger	Resets system after use.
4	Hammer	Used to break glass on front of box.
5	Remote Operating Handle	Used to actuate valves from remote location.
		NOTE Not applicable to Hull No. LT801, LT804 and LT805. Reference Para. 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment details and installation drawings.

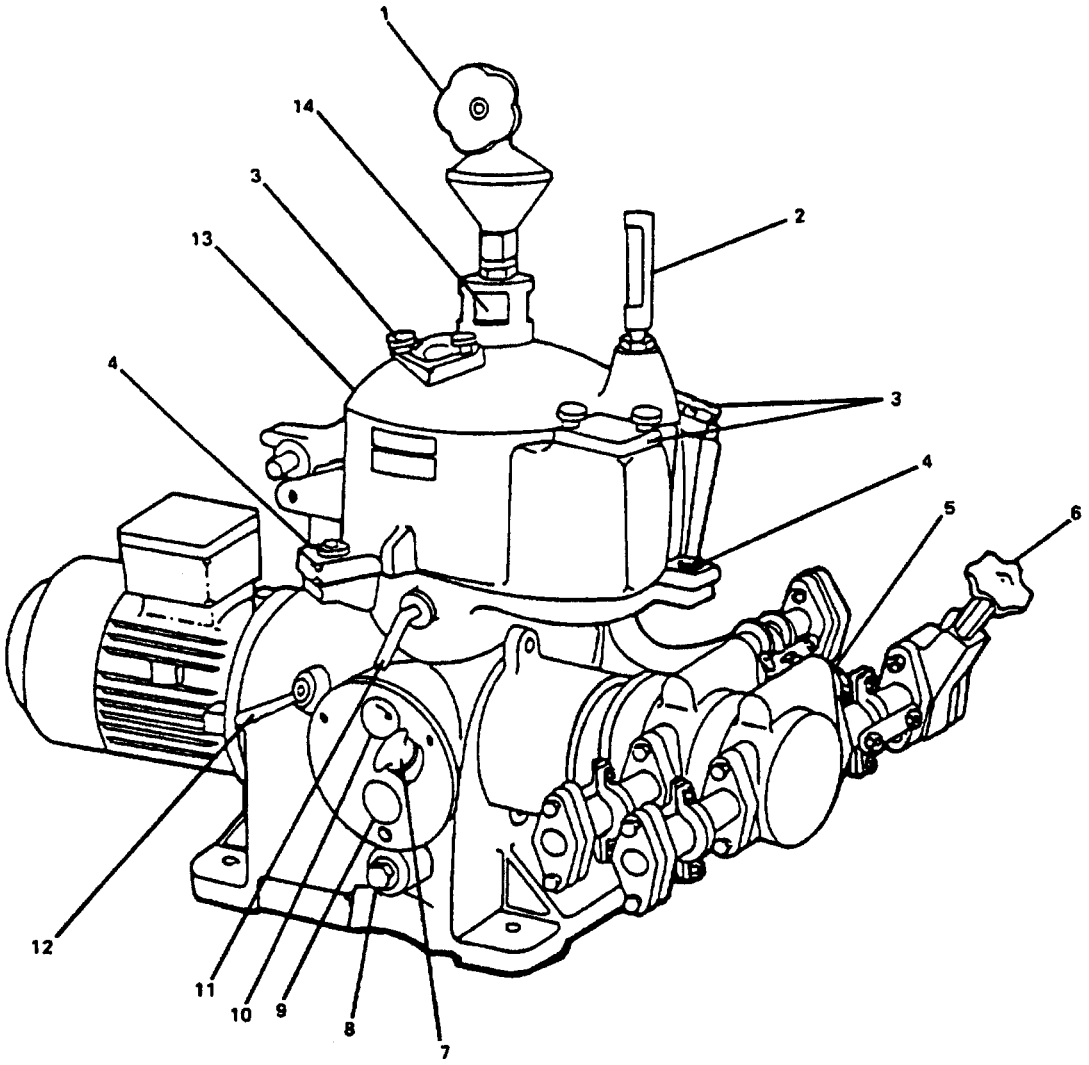


Figure 2-94. Lube Oil Purifier.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Lube Oil Purifier (Figure 2-94)		
1	Needle Valve	Provides opening for filling bowl and throttle for amount of makeup water required for type of oil.
2	Thermometer	Indicates temperature of dirty oil.
3	Inspection Covers (3)	Removed, allows observation of dirty water and clean oil discharges.
4	Hood Retaining Screws	Secures hood in closed position.
5	Drain Cock	Drains oil from feed channel of hood.
6	Valve	Adjusts dirty oil feed line capacity.
7	Oil Fill Screw	Open, allows gear oil replenishment.
8	Drain Plug	Drains oil from gear sump.
9	Gear Oil Sight Glass	Indicates oil level in gear chamber; should be up to upper third of sight glass.
10	Revolution Indicator Disk	Indicates direction and speed of bowl rotation. Bowl must rotate in clockwise direction.
11	Lock Screw	Locks bowl in stationary position.
12	Brake Handle	Provides braking of motor driven gear train. Release brake by turning handle clockwise.
13	Hood	Provides access to bowl.
14	Dirty Oil Sight Glass	Indicates dirty oil going to oil pre-heater.

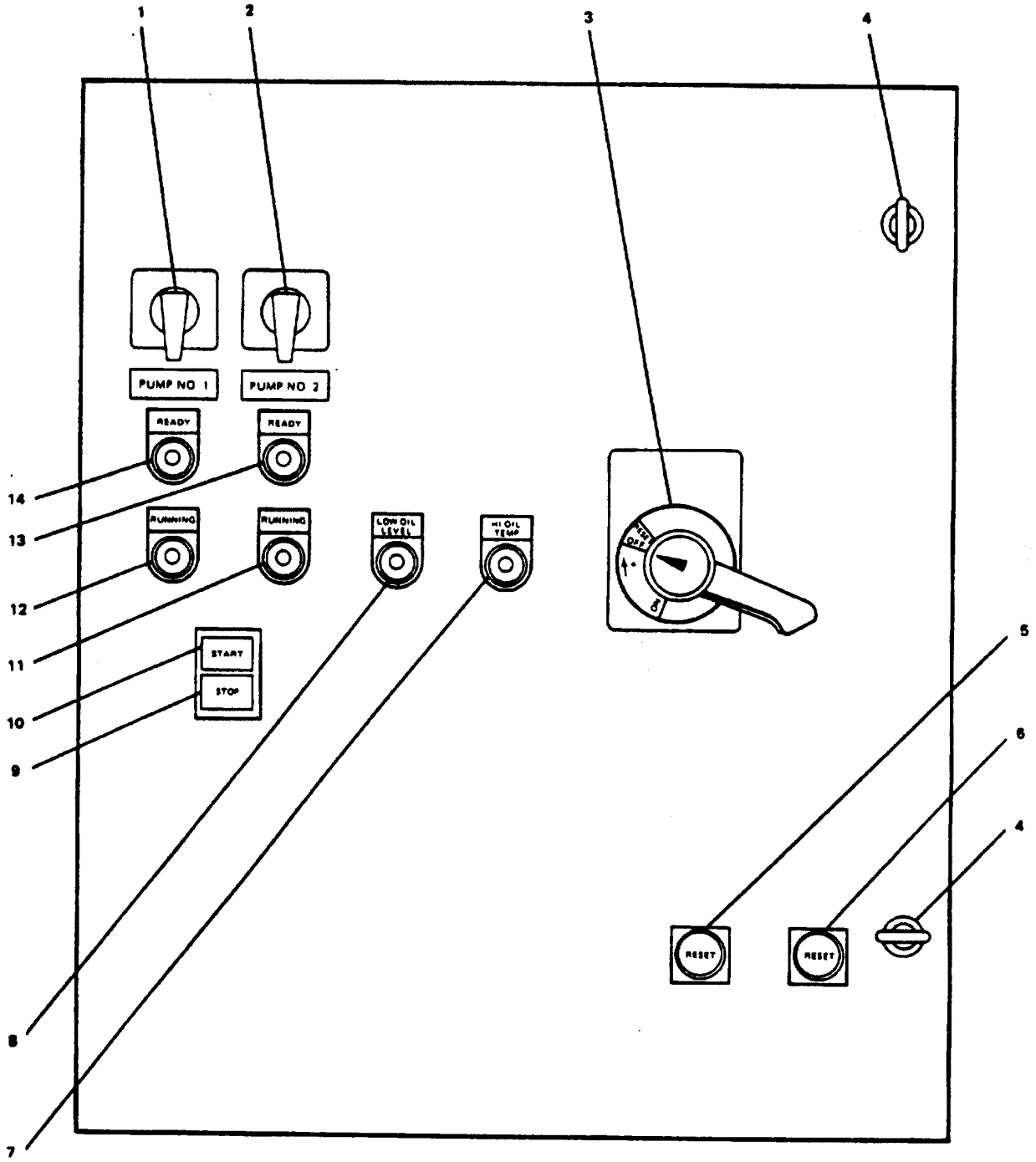


Figure 2-95. Central Hydraulic System (Sheet 1 of 2).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Central Hydraulic System (Figure 2-95)	
1	Mode Select Switch	Switch used to select local or remote operation.
2	Pump Select Switch	Switch used to select pump No. 1, No. 2, or both.
3	Main Switch	Used to turn on power to system.
4	Panel Latches	Secure front panel in closed position.
5	RESET Pushbutton	Resets pump No. 1.
6	RESET Pushbutton	Resets pump No. 2.
7	HI OIL TEMP Indicator	indicates oil in system is too hot.
8	LOW OIL LEVEL Indicator	Indicates system oil level is low.
9	STOP Pushbutton	Stops selected pump.
10	START Pushbutton	Starts selected pump.
11	RUNNING Indicator	Indicates pump No. 2 is operating.
12	RUNNING Indicator	Indicates pump No. 1 is operating.
13	READY Indicator	Indicates pump No. 2 is ready to operate.
14	READY Indicator	Indicates pump No. 1 is ready to operate.

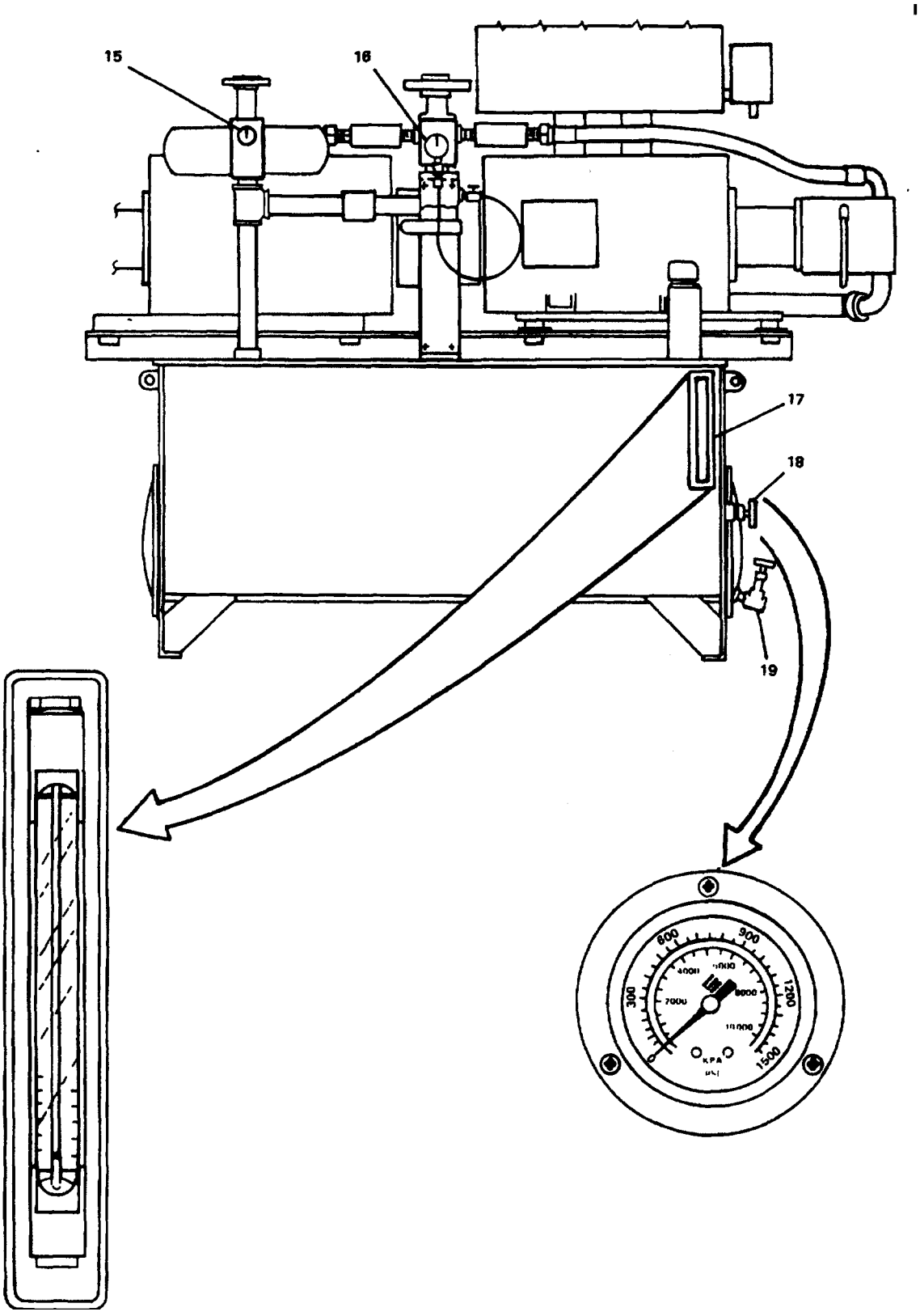


Figure 2-95. Central Hydraulic System (Sheet 2 of 2).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Central Hydraulic System (Figure 2-95) (Continued)	
15	Pressure Gauge	Gauge indicates pressure in low pressure return line.
16	Pressure Gauge	Gauge indicates pressure in high pressure supply line to pump.
17	Sight Glass	Indicates oil level in reservoir.
18	Temperature Gauge	Indicates temperature of oil in reservoir.
19	Drain Valve	Used to drain reservoir.

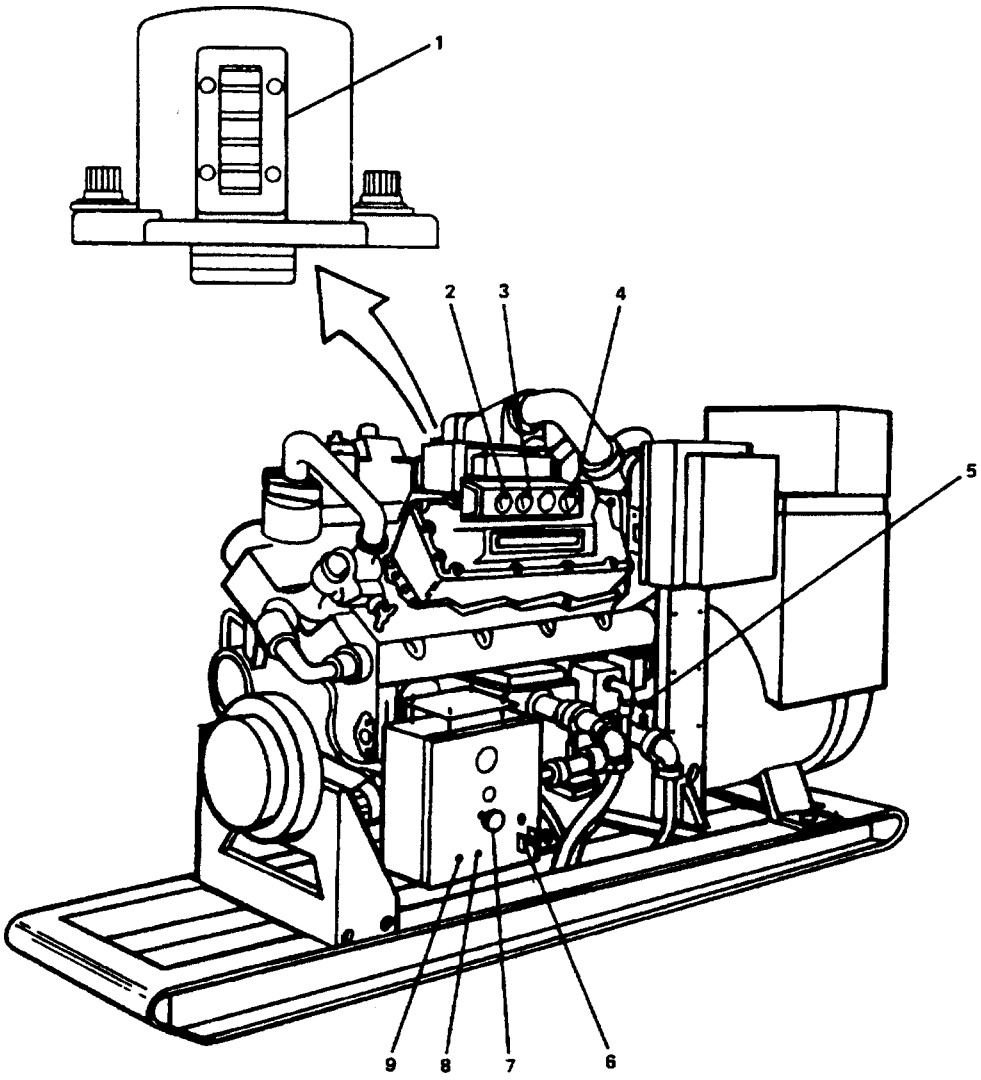


Figure 2-96. Ship Service Diesel Generator (PORT).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Ship Service Diesel Generator (PORT) (Figure 2-96)		
1	Hour Meter	Provides total hours of operation of engine.
2	Fuel Pressure Gauge	Indicates fuel pressure.
3	Water Temperature Gauge	Indicates engine cooling water temperature.
4	Oil Pressure Gauge	Indicates engine oil pressure.
5	Air Start Valve starter motor.	Solenoid valve controlling compressed air to Controlled by start switch (5).
6	Start Switch	Starts engine.
7	Start/Stop Pushbutton	IN position - used to stop engine in emergency.
8	10 (Pushbutton Circuit Breakers)	OUT position - completes starting circuit. Provides circuit protection for engine control circuit.
9	20 (Pushbutton Circuit Breakers)	Provides circuit protection for starter solenoid circuit.

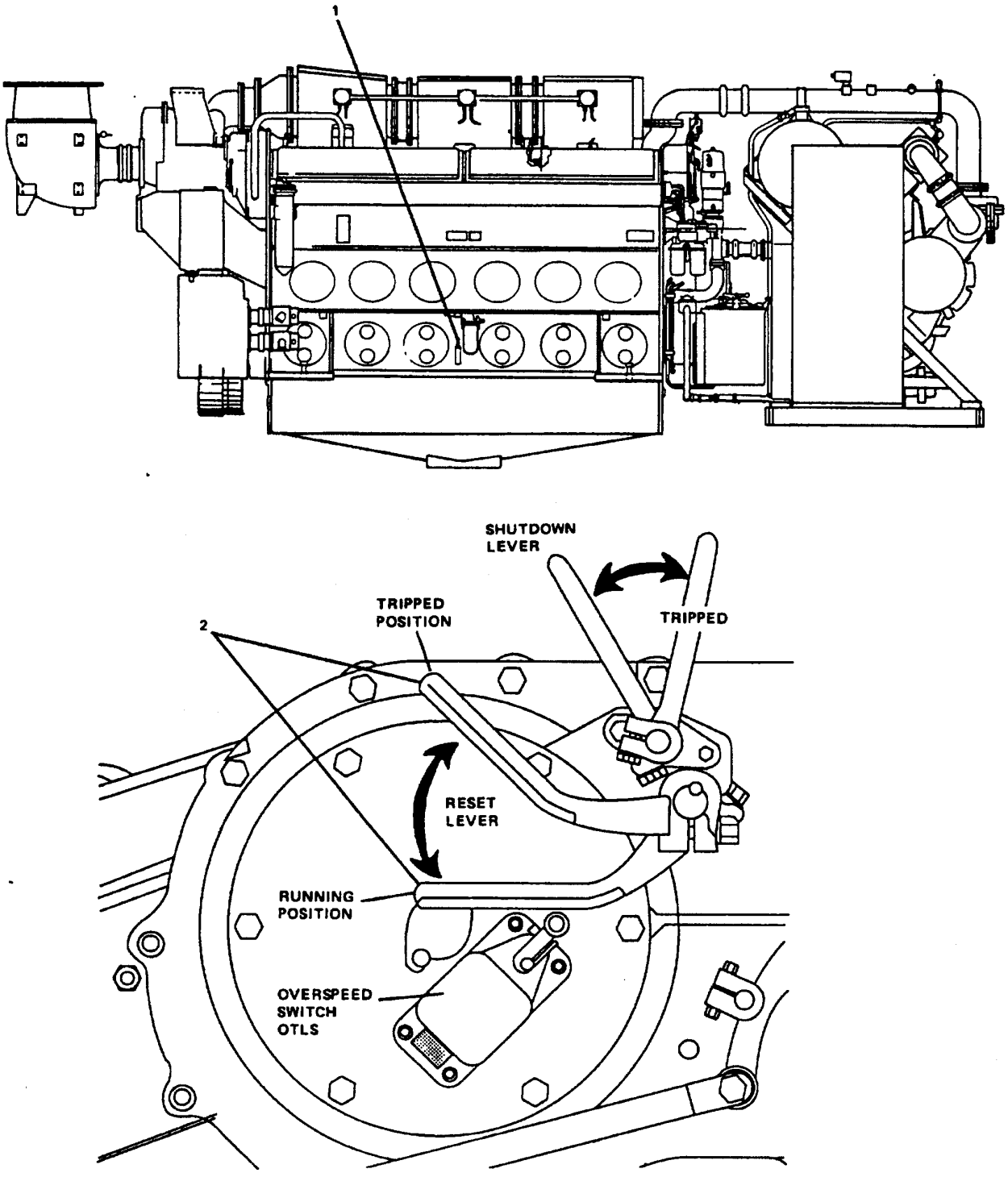


Figure 2-97. Main Engine (Sheet 1 of 2).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Main Engine (Figure 2-97)	
1	Dipstick	Indicates engine oil level.
2	Overspeed Trip Lever	Prevents overspeeding of engine.
3	ENGINE RPM Meter	Indicates engine speed.
4	TOTAL HOURS Meter of engine.	Hourmeter records total hours of operation
5	IMMR HEATER ON Pushbutton Indicator	Indicates jacket water heater is ON.
6	ENGINE START Pushbutton Indicator	When momentarily depressed, starts turbo lube oil pump. When held for more than 2 seconds, starts engine.
7	CONTROL POWER Pushbutton Indicator	Indicates power to control system is ON when lit.
8	ON and OFF Pushbuttons	Turns control power ON and OFF.
9	ON Pushbutton Indicator	Turns control power ON.
10	ENGINE STOP Pushbutton Indicator	Shuts down engine.
11	IMMR HEATER OFF Pushbutton Indicator	Indicates jacket water heater is OFF.
12	ALARM TEST	Used to check all lights to ensure they are operational.

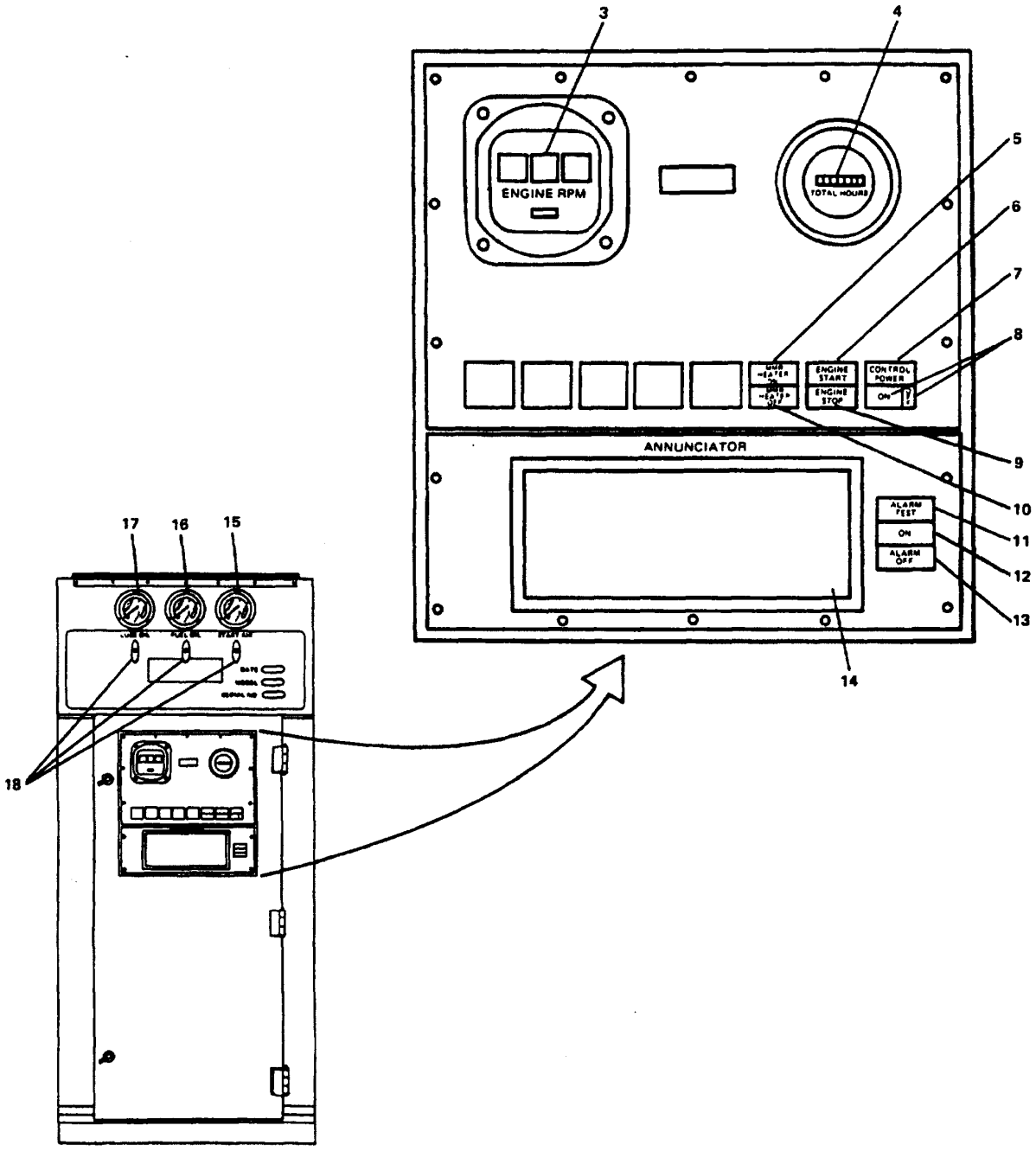


Figure 2-97. Main Engine (Sheet 2 of 2).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Main Engine (Figure 2-97) (Continued)	
12	ON	Indicates power to alarm test switch.
13	ALARM OFF	Turns OFF alarm.
14	ANNUNCIATOR Display	Panel with lights indicating various fault conditions.
15	START AIR Gauge	Indicates starting air pressure.
16	FUEL OIL Gauge	Indicates fuel oil pressure.
17	LUBE OIL Gauge	Indicates lubricating oil pressure.
18	VALVES	Control for pressure gauges (15, 16 and 17).

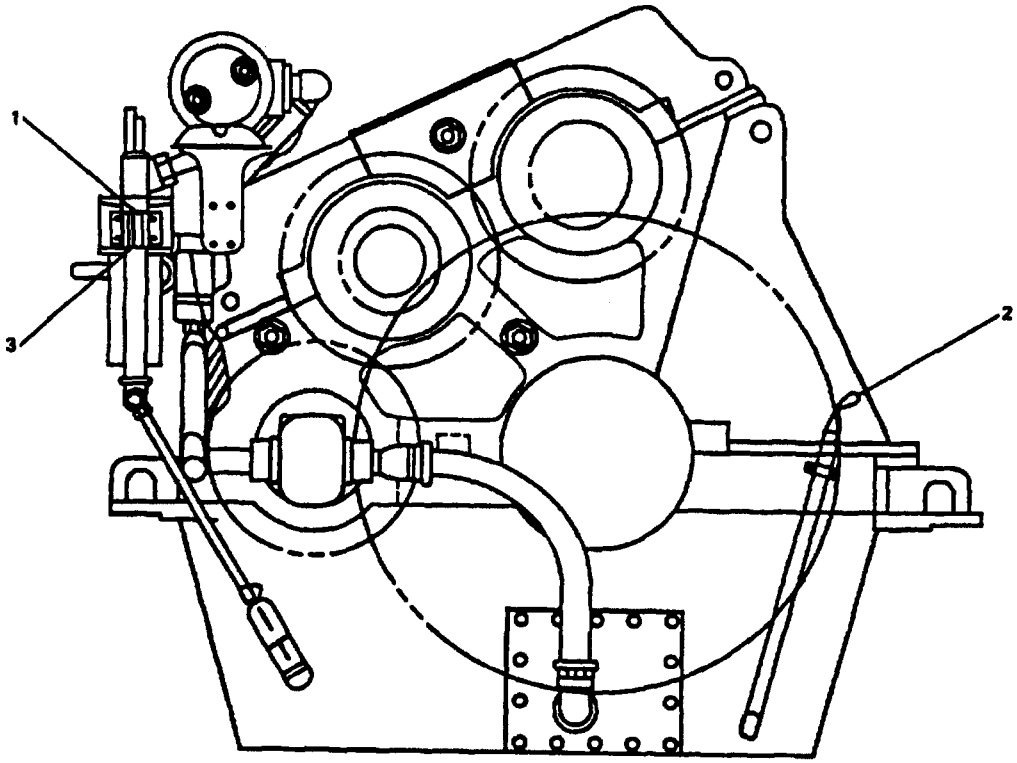


Figure 2-98. Reduction Gear.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Reduction Gear (Figure 2-98)	
1	Pressure Gauge pressure.	Indicates control (low) circuit oil
2	Dipstick	Indicates gear oil level.
3	Pressure Gauge pressure.	Indicates operating (high) circuit oil

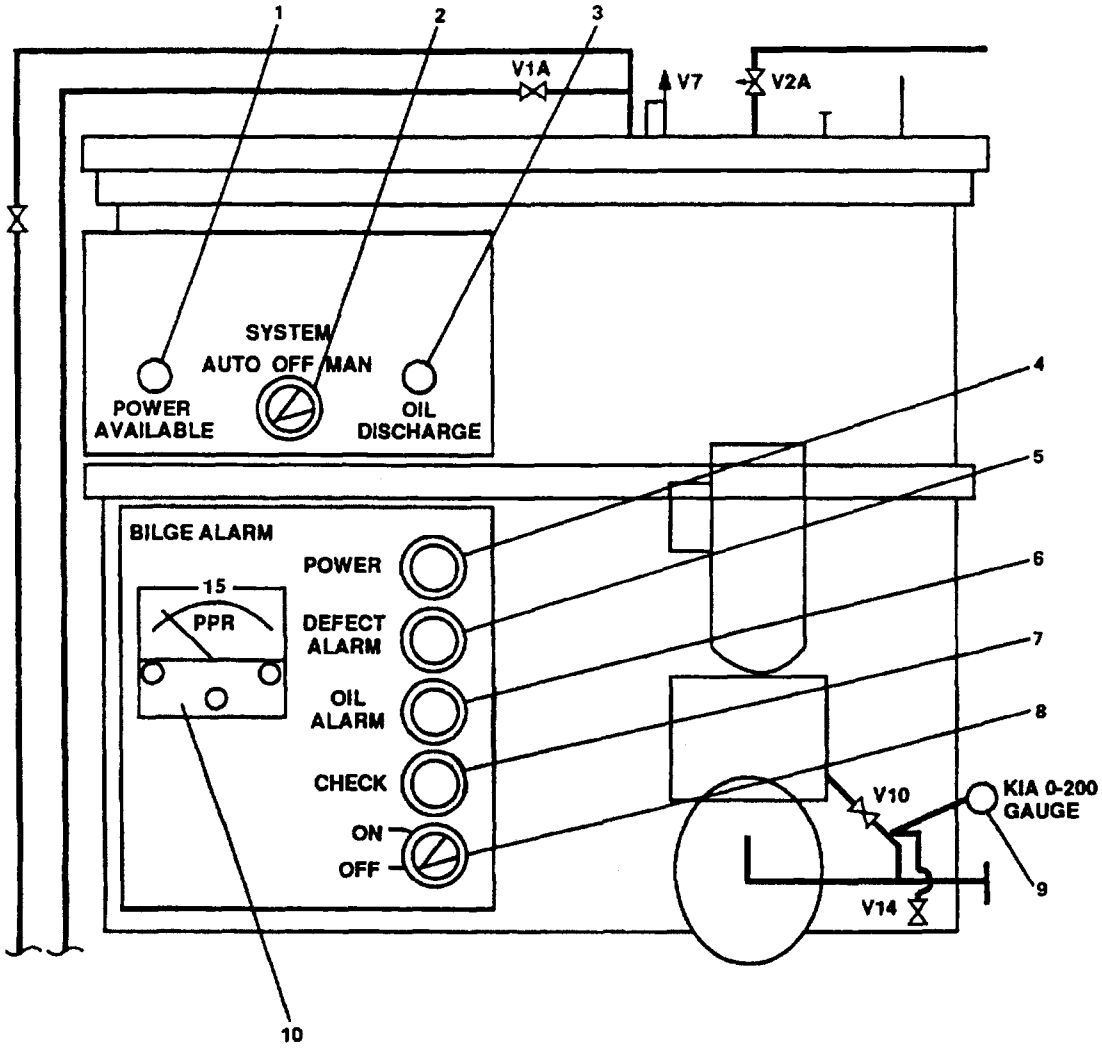


Figure 2-99. Oil Water Separator.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Oil Water Separator (Figure 2-99)	
1	POWER AVAILABLE Indicator	Indicates power is available for system operation (GREEN).
2	SYSTEM AUTO-OFF-MAN Switch	AUTO mode not used. OFF shuts down system. MAN (manual) provides continuous system operation, discharging accumulated oil to storage tank.
3	OIL DISCHARGE Indicator	Indicates that oil discharge operation is in progress (AMBER).
4	POWER Indicator	Indicates power is applied to oily water separator suction pump (WHITE).
5	DEFECT ALARM Indicator	Indicates a malfunction in the system (AMBER).
6	OIL ALARM Indicator	Indicates an excessive oil level (RED).
7	CHECK Pushbutton indicator light 6 will light.	Press to check solenoid valves operating
8	ON-OFF Switch	Controls system suction pump.
9	Gauge	Indicates pressure ranging from 0 lbs psi to 200 lbs psi.
10	Flowmeter	Measures amount of effluent discharge overboard.

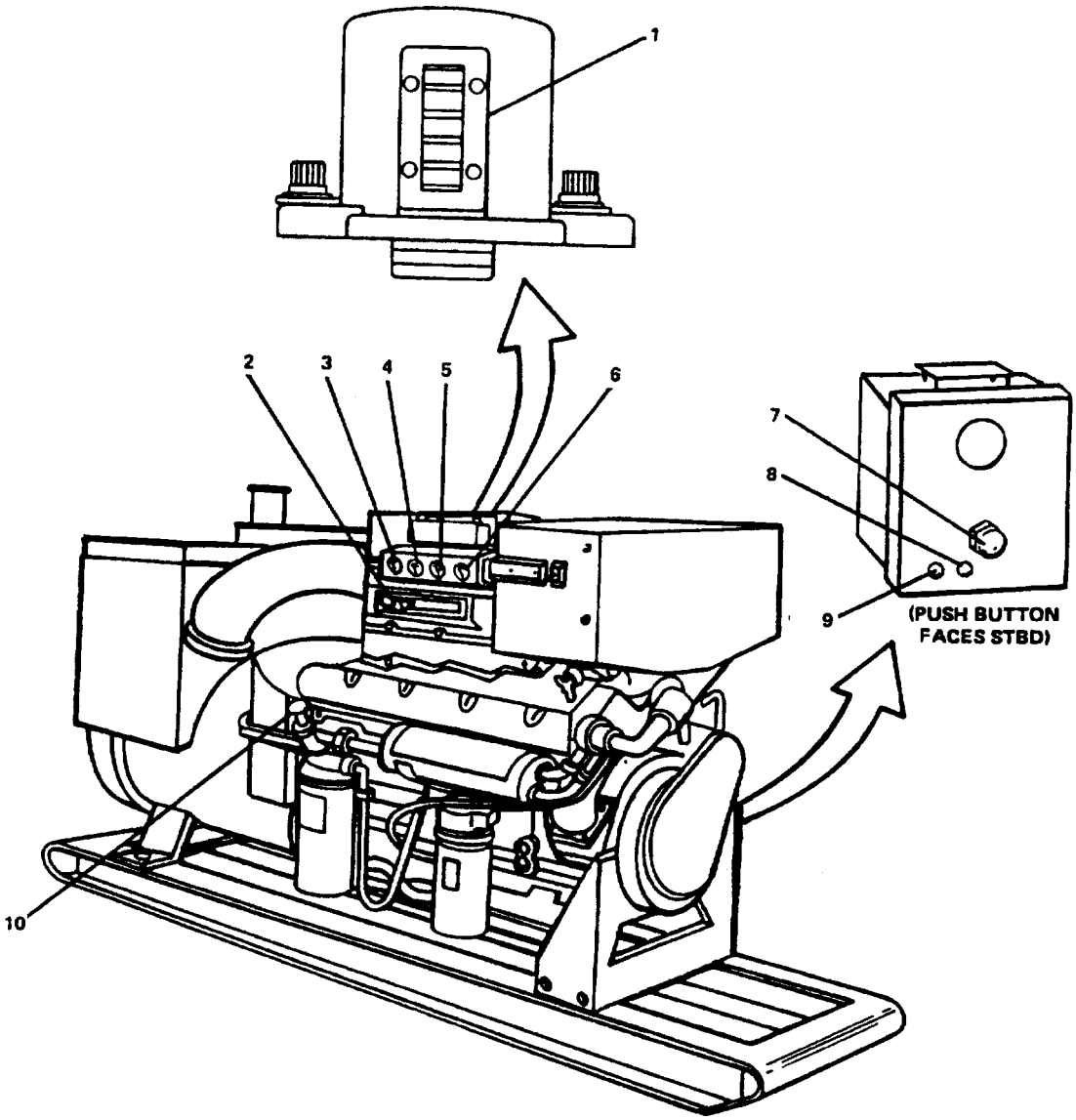


Figure 2-100. Ship Service Diesel Generator (STBD).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Ship Service Diesel Generator (STBD) (Figure 2-100)		
1	Hour Meter	Provides total hours of operation of engine.
2	Starter Switch	Cranks engine to start.
3	Fuel Pressure Gauge	Indicates fuel pressure.
4	Water Temperature Gauge	Indicates engine cooling water temperature.
5	Ammeter	Measures electrical current.
6	Oil Pressure Gauge	Indicates engine oil pressure.
7	Start/Stop Pushbutton	IN position - used to stop engine in emergency.
8	10 (Pushbutton Circuit Breaker)	OUT position - completes starting circuit. Provides circuit protection for engine control circuit.
9	20 (Pushbutton Circuit Breaker)	Provides circuit protection for starter circuit.
10	Fuel Priming Pump	Hand pump used to pressurize fuel system.

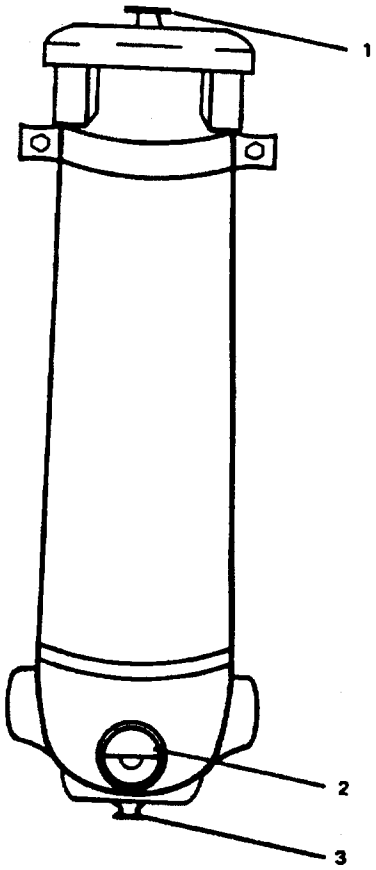


Figure 2-101. Fuel Oil Filter Separator.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Fuel Oil Filter Separator (Figure 2-101)	
1	Petcock	Used to bleed air from housing.
2	Sight Glass	Indicates water level within filter separator.
3	Petcock	Used for draining.

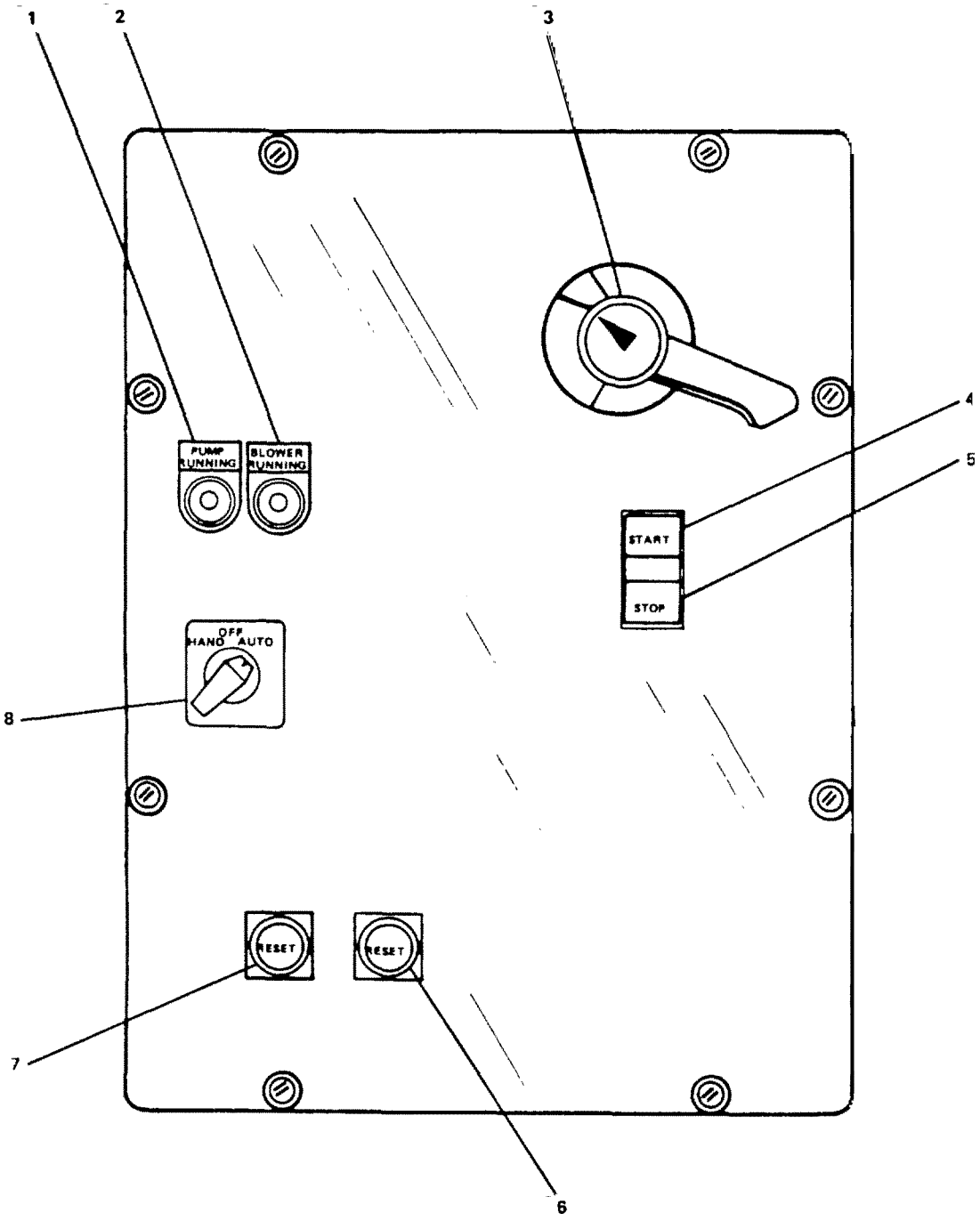


Figure 2-102. Marine Sanitation Device.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Marine Sanitation Device (Figure 2-102)	
1	PUMP RUNNING Indicator	Indicates MSD pump is operating.
2	BLOWER RUNNING Indicator	Indicates MSD blower is operating.
3	Main Switch	Controls power to system.
4	START Pushbutton	Starts system operation.
5	STOP Pushbutton	Stops system operation.
6	RESET Pushbutton	Resets MSD blower motor.
7	RESET Pushbutton	Resets MSD pump motor.
8	OFF HAND AUTO	Used to select mode of operation.

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Table 2-1. Description of Operator's Controls and Indicators – CONT

Key	Control or Indication	Function
	Air Compressor (Figure 2-103)	
1	Dipstick	Indicates level of oil in compressor sump.
2	Pressure Relief Valve	Prevents excessive build-up of pressure within compressor.
3	Oil Pressure Gauge	Indicates pressure of compressor oil.

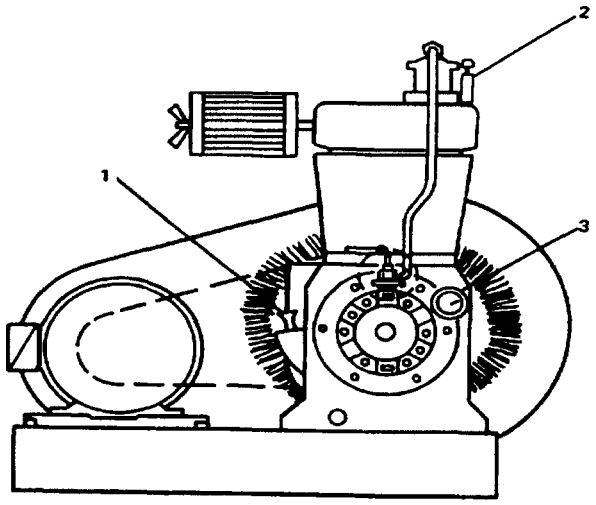

Figure 2-103. Air Compressor.

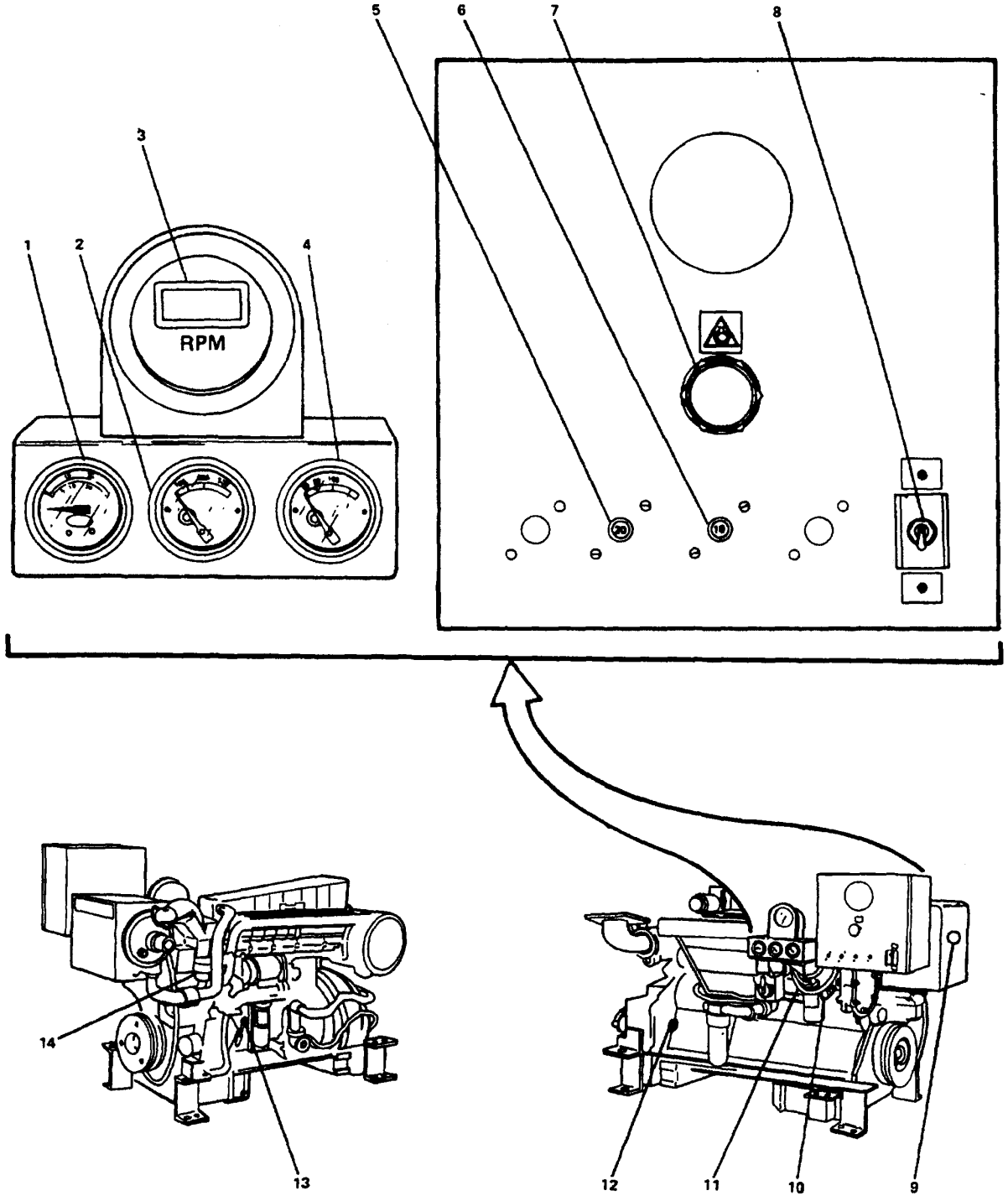

Figure 2-104. Bow Thruster Engine.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Bow Thruster Engine (Figure 2-104)	
1	Oil Pressure Gauge	Indicates marine gear oil pressure.
2	Oil Pressure Gauge	Indicates engine lube oil pressure.
3	RPM Tachometer	Indicates engine speed.
4	Water Temperature Gauge	Indicates engine cooling water temperature.
5	20 (Pushbutton Circuit Breaker)	Provides circuit protection for starter solenoid circuit.
6	10 (Pushbutton Circuit Breaker)	Provides circuit protection for engine control circuits.
7	Start/Stop Pushbutton	IN position - used to stop engine in emergency. OUT position - completes starting circuit.
8	Start Switch	Starts engine.
9	Switch Gauge	Measures water level in expansion tank.
10	Fuel Priming Pump	Pressurizes engine fuel system.
11	Fuel Pressure Gauge	Indicates normal fuel pressure (GREEN), (RED) indicates low fuel pressure.
12	Air Start Solenoid Valve With Manual Override	Allows manual override of solenoid to crank engine.
13	Dipstick	Indicates engine oil level.
14	Oil Fill Cap	Remove to add engine oil.

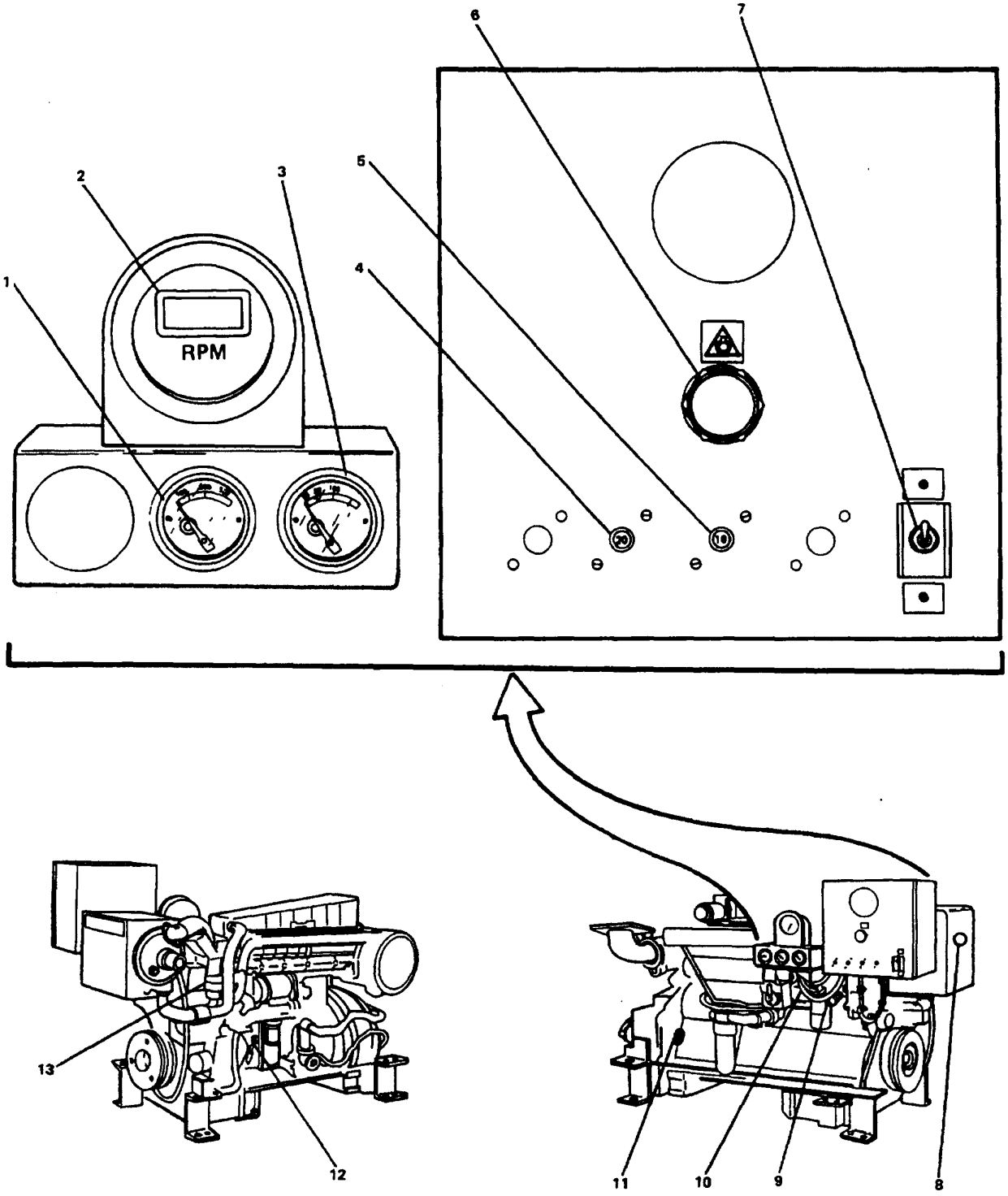

Figure 2-105. Pump Drive Engine.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Pump Drive Engine (Figure 2-105)	
1	Water Temperature Gauge	Indicates engine cooling water temperature.
2	RPM Tachometer	Indicates engine speed.
3	Oil Pressure Gauge	Indicates engine oil pressure.
4	20 (Pushbutton Circuit Breaker)	Provides circuit protection for starter solenoid circuit.
5	10 (Pushbutton Circuit Breaker)	Provides circuit protection for engine control circuits.
6	Start/Stop Pushbutton	IN position - used to stop engine in emergency. OUT position - completes starting circuit.
7	Start Switch	Starts engine.
8	Switch Gauge	Measures water level in engine expansion tank.
9	Fuel Priming Pump	Pressurizes engine fuel system.
10	Fuel Pressure Gauge	Indicates normal fuel pressure (GREEN), (RED) indicates low fuel pressure.
11	Air Start Solenoid Valve With Manual Override	Allows manual override of solenoid valve to crank engine.
12	Dipstick	Indicates engine oil level.
13	Oil Fill Cap	Remove to add engine oil.

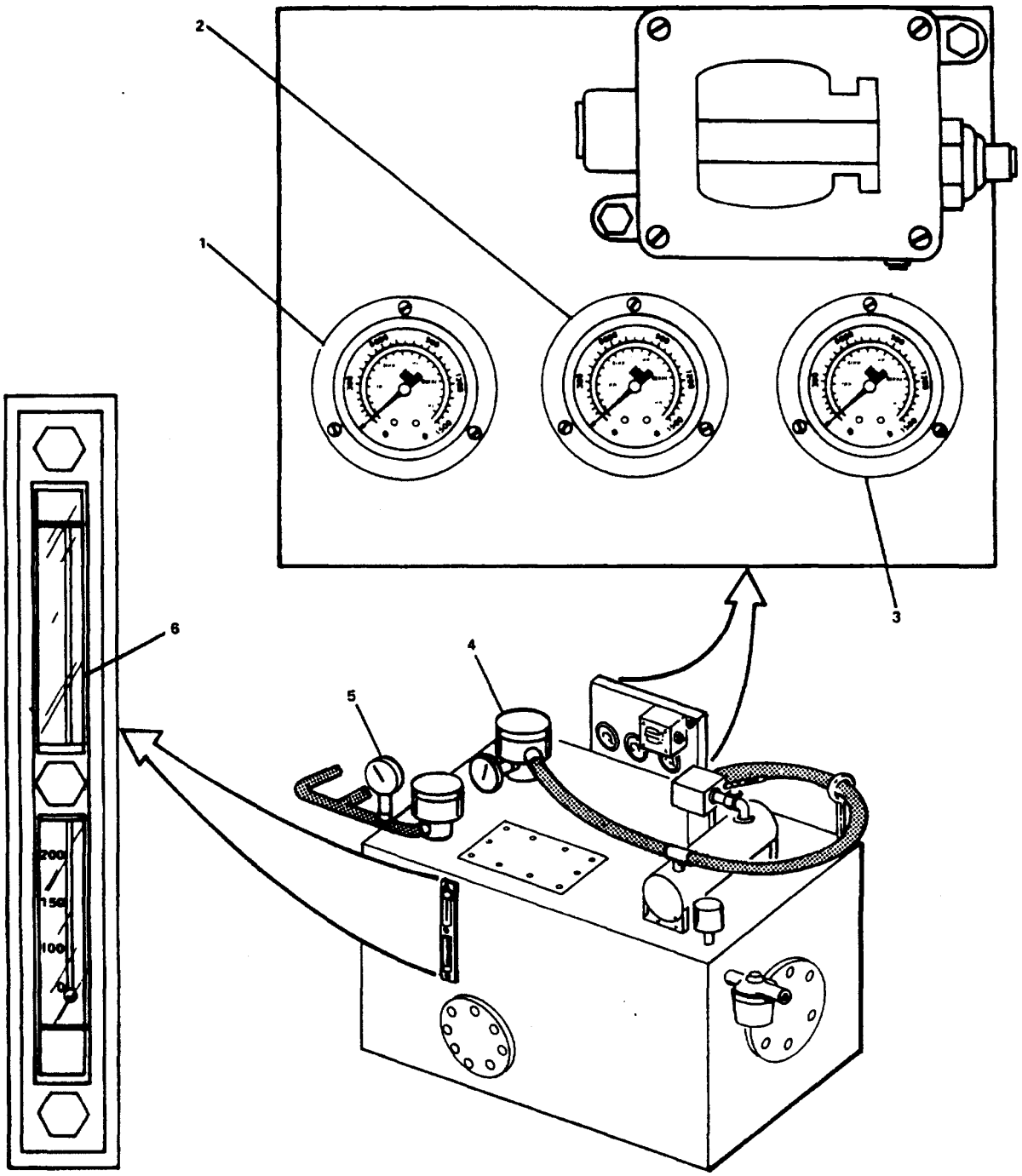

Figure 2-106. Tow Winch Hydraulic Oil Sump.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Tow Winch Hydraulic Oil Sump (Figure 2-106)	
1	Gauge	Indicates pump output pressure.
2	Gauge	Indicates load sense pressure.
3	Gauge	Indicates pump unloading pressure.
4	Filter Pressure Gauge	Indicates condition of filter; OK (GREEN), change (RED).
5	Filter Pressure Gauge	Indicates condition of filter; OK (GREEN), change (RED).
6	Sight Glass	Indicates oil level and temperature.

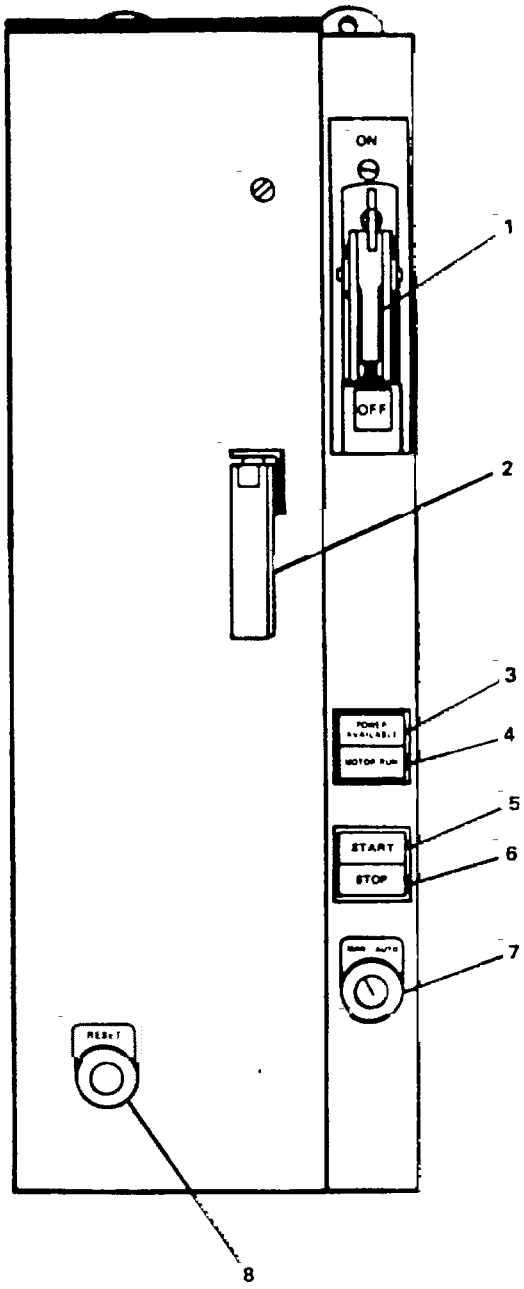

Figure 2-107. Motor Controller (Type I).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Motor Controller (Type I) (Figure 2-107)	
1	ON OFF Switch	Provides ON-OFF control with circuit breaker protection.
2	Handle	Used to open door.
3	POWER AVAILABLE Indicator	Indicates power is supplied to motor controller (GREEN).
4	MOTOR RUN Indicator	Indicates motor is operating (RED).
5	START Pushbutton	Used to start motor (GREEN).
6	STOP Pushbutton	Used to stop motor (RED).
7	RESET Pushbutton	Resets motor controller.

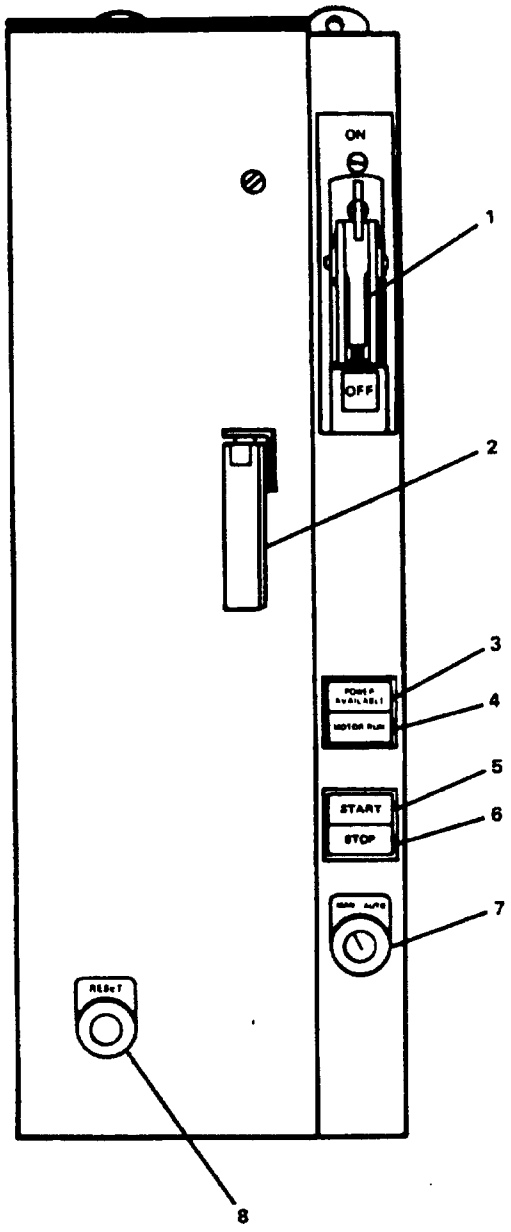

Figure 2-108. Motor Controller (Type 11).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Motor Controller (Type II) (Figure 2-108)		
1	ON OFF Switch	Provides ON-OFF control with circuit breaker protection.
2	Handle	Used to open door.
3	POWER AVAILABLE Indicator	Indicates power is supplied to motor controller (GREEN).
4	MOTOR RUN Indicator	Indicates motor is operating (RED).
5	START Pushbutton	Used to start motor (GREEN).
6	STOP Pushbutton	Used to stop motor (RED).
7	MAN AUTO Switch	MAN provides manual control of motor; AUTO allows automatic operation of motor.
8	RESET Pushbutton	Resets the motor controller.

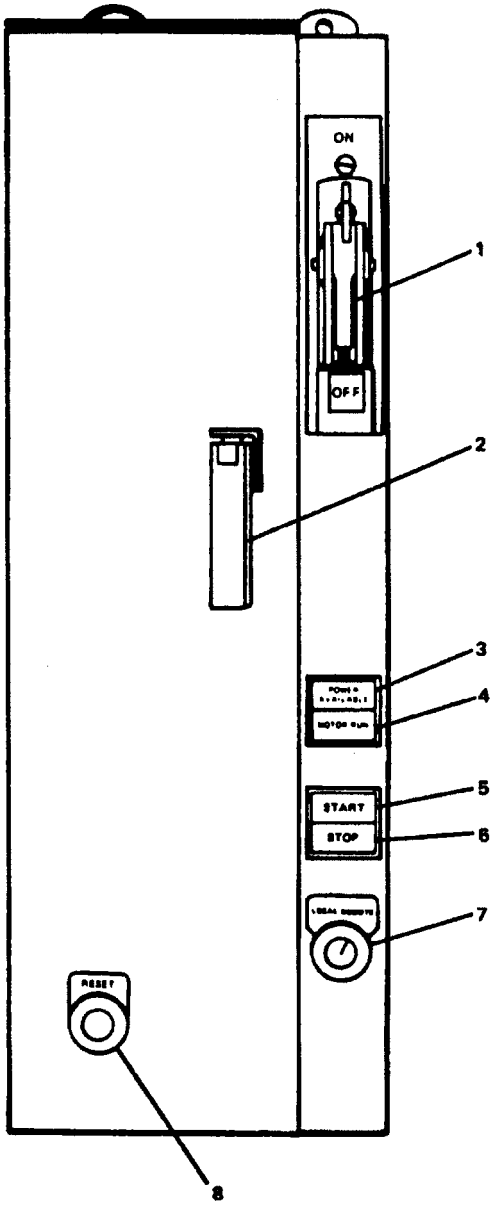

Figure 2-109. Motor Controller (Type III).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Motor Controller (Type III) (Figure 2-109)	
1	ON OFF Switch	Provides ON-OFF control with circuit breaker protection.
2	Handle	Used to open door.
3	POWER AVAILABLE Indicator	Indicates power is supplied to motor controller (GREEN).
4	MOTOR RUN Indicator	Indicates motor is operating (RED).
5	START Pushbutton	Used to start motor (BLACK).
6	STOP Pushbutton	Used to stop motor (RED).
7	LOCAL REMOTE Switch	LOCAL provides control of motor from local controls. REMOTE allows control to be exercised from control panels located elsewhere in vessel.
8	RESET Pushbutton	Resets motor controller.

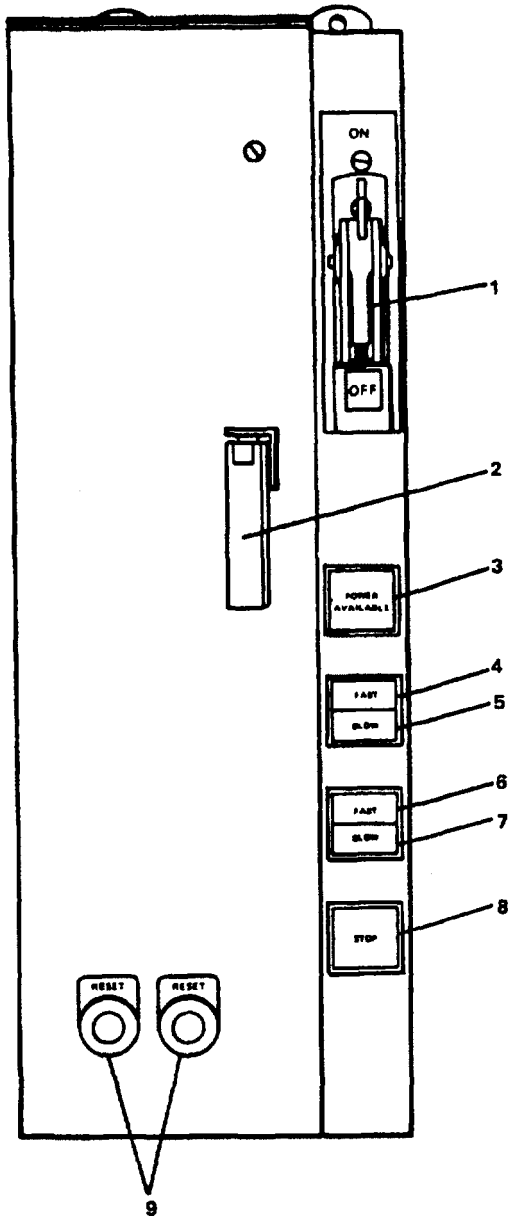

Figure 2-110. Motor Controller (Type IV).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Motor Controller (Type IV) (Figure 2-110)	
1	ON OFF Switch	Provides ON-OFF control with circuit breaker protection.
2	Handle	Used to open door.
3	POWER AVAILABLE Indicator	Indicates power is supplied to motor controller (GREEN).
4	FAST Pushbutton	Pushbutton to operate motor at FAST speed (RED).
5	SLOW Pushbutton	Pushbutton to operate motor at SLOW speed (YELLOW).
6	FAST Indicator	Indicates motor is operating at FAST speed.
7	SLOW Indicator	Indicates motor is operating at SLOW speed.
8	STOP Pushbutton	Pushbutton to stop motor (RED).
9	RESET Pushbutton	Resets motor controller. Engine Room Exhaust Fan Engine Room Supply Fan

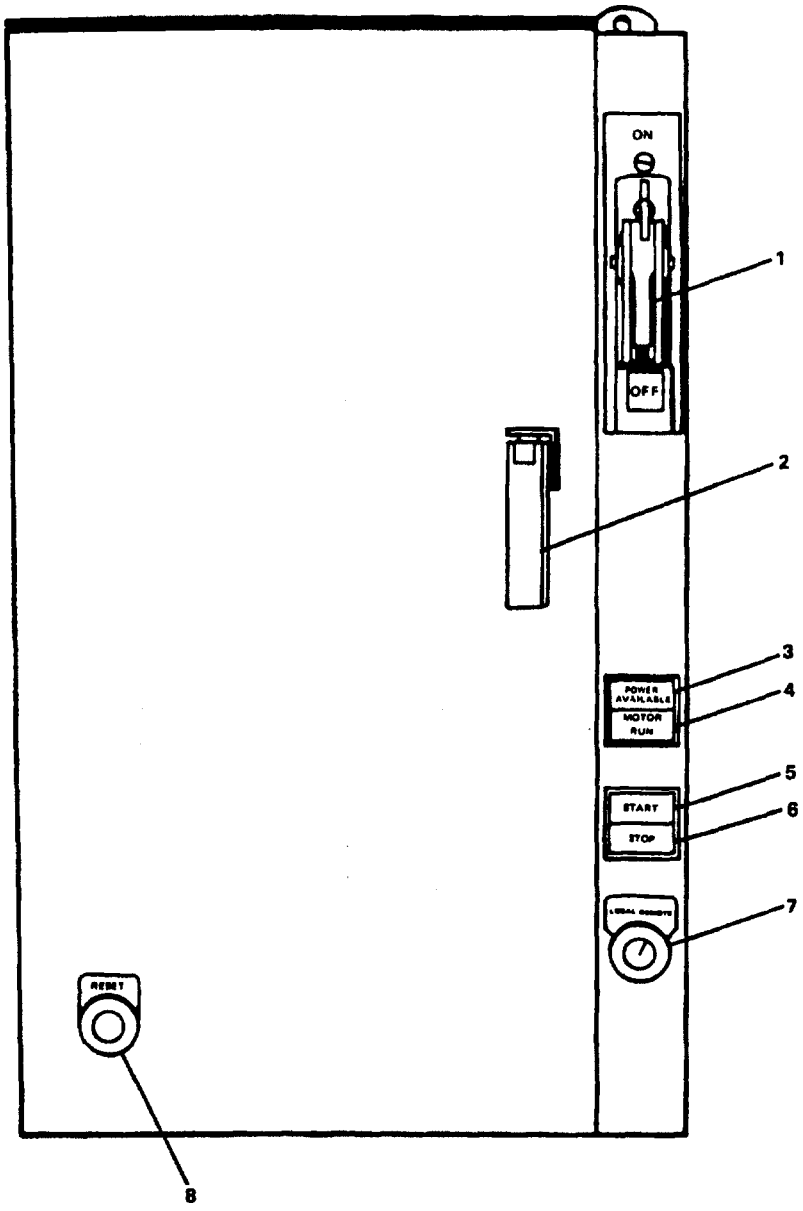

Figure 2-111. Motor Controller (Type V).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Motor Controller (Type V) (Figure 2-111)	
1	ON OFF Switch	Provides ON-OFF control with circuit breaker protection.
2	Handle	Used to open door.
3	POWER AVAILABLE Indicator	Indicates power is supplied to motor controller (GREEN).
4	MOTOR RUN Indicator	Indicates motor is operating (RED).
5	START Pushbutton	Used to start motor (GREEN).
6	STOP Pushbutton	Used to stop motor (RED).
7	LOCAL REMOTE Switch	LOCAL provides control of motor from local controls. REMOTE allows control to be exercised from control panels located in pilothouse.
8	RESET Pushbutton	Resets motor controller. #1 Fire and General Service Pump

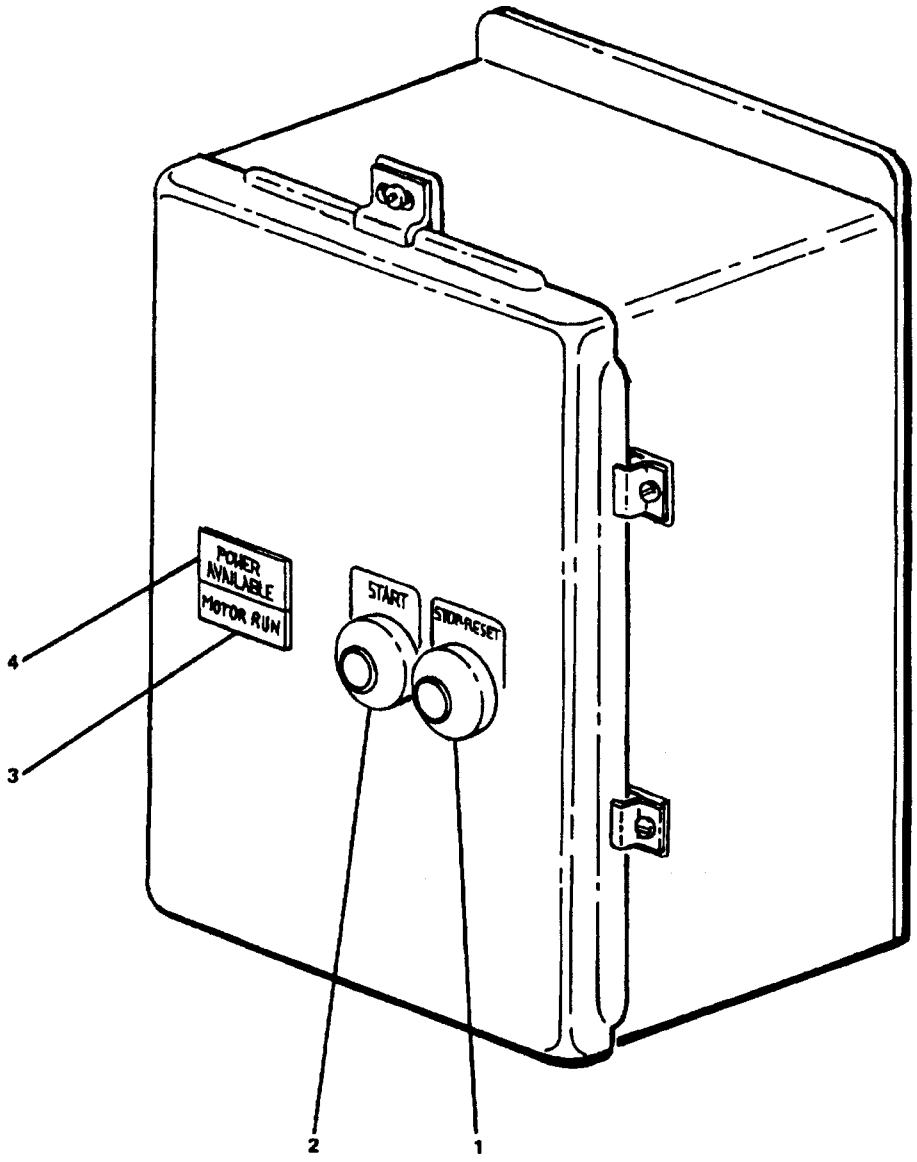

Figure 2-112. Motor Controller (Type VI).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Motor Controller (Type VI) (Figure 2-112)	
1	STOP - RESET Pushbutton	Used to stop motor and reset.
2	START Pushbutton	Used to start motor.
3	MOTOR RUN Indicator	Indicates motor is operating (RED).
4	POWER AVAILABLE Indicator	Indicates power is supplied to motor controller (GREEN). Main Engine L.O. Priming PMP No. 1 &No. 2

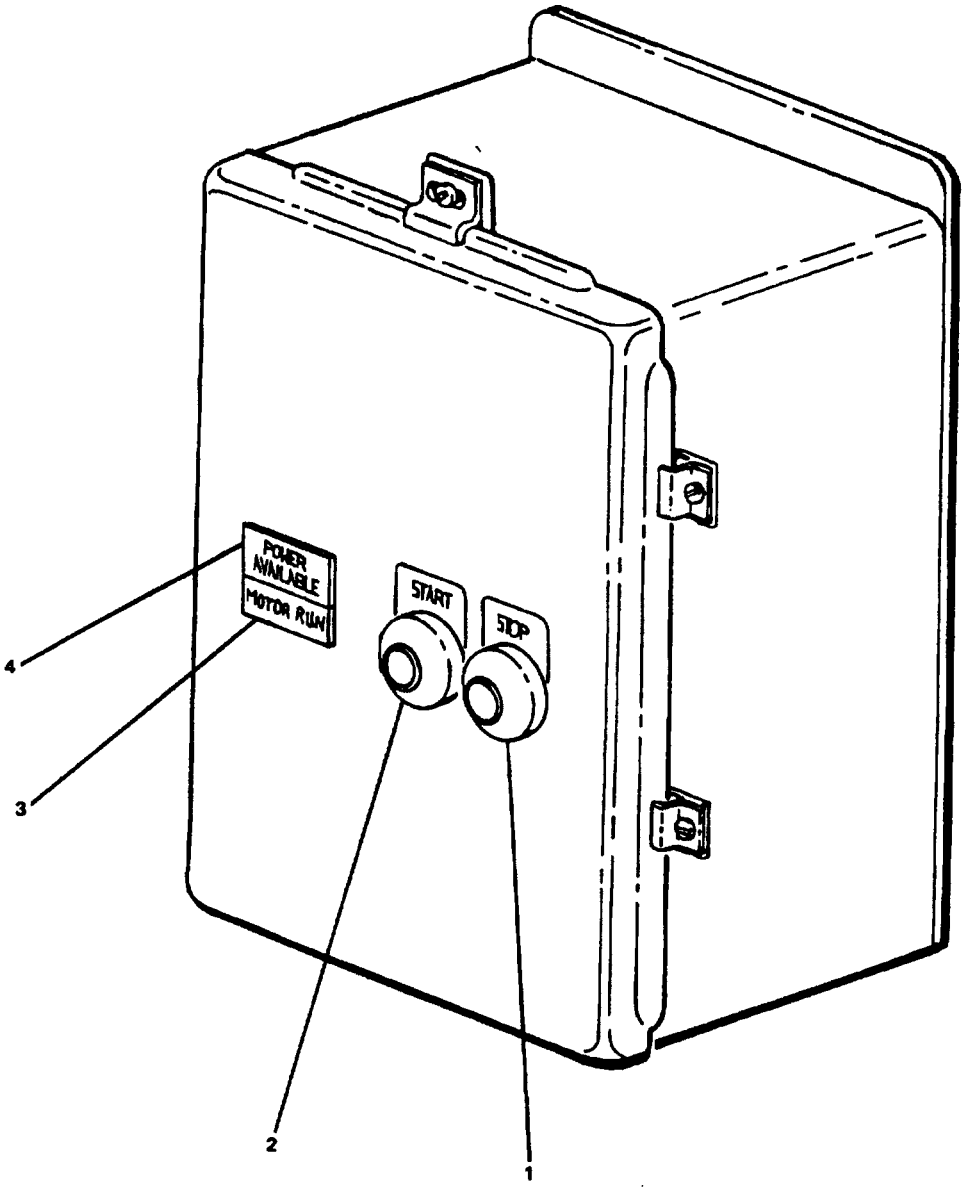

Figure 2-113. Motor Controller (Type VII)

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Motor Controller (Type VII) (Figure 2-113)		
1	STOP Pushbutton	Used to stop motor.
2	START Pushbutton	Used to start motor.
3	MOTOR RUN Indicator	Indicates motor is operating (RED).
4	POWER AVAILABLE Indicator	Indicates power is supplied to motor controller (GREEN).

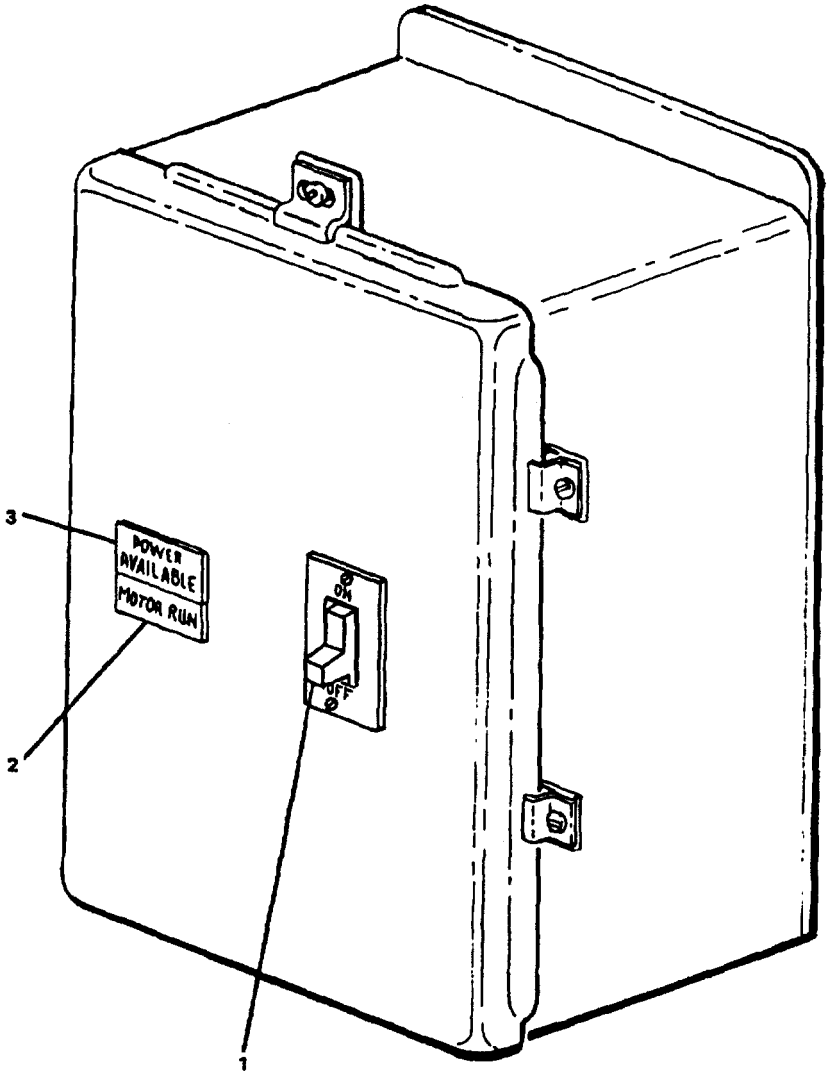

Figure 2-114. Motor Controller (Type VIII).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Motor Controller (Type VIII) (Figure 2-114)		
1	ON-OFF Switch	Starts/stops fan motor.
2	MOTOR RUN Indicator	Indicates motor is operating (RED).
3	POWER AVAILABLE Indicator	Indicates power is supplied to motor controller (GREEN).

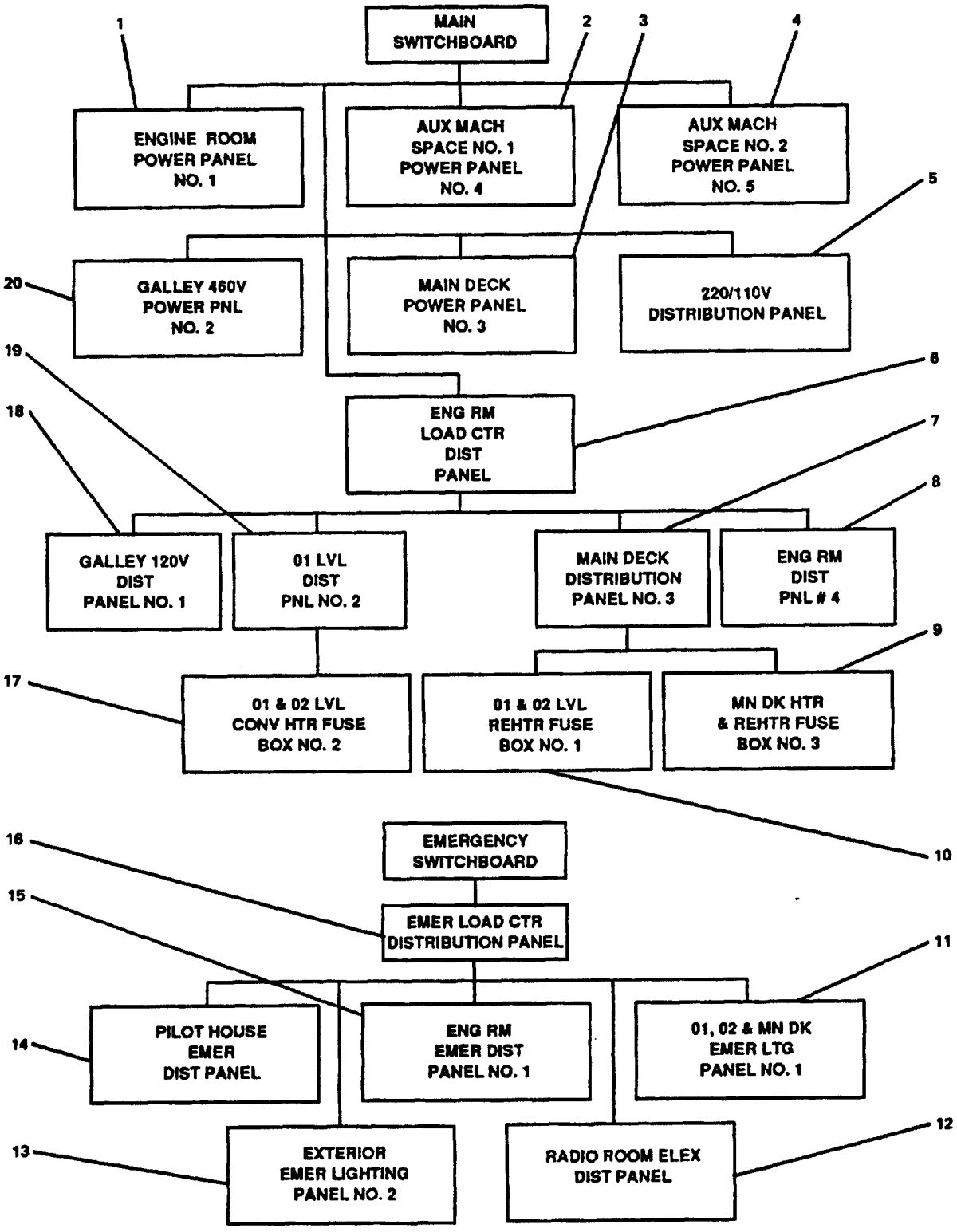

Figure 2-115. Power Distribution system.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Power Distribution System (Figure 2-115)	
1	ENGINE ROOM POWER PANEL NO. 1	Provides protection for and control of panel and circuits shown on Figure 2-116.
2	AUX MACH SPACE NO. 1 POWER PANEL NO. 4	Provides protection for and control of panel and circuits shown on Figure 2-117.
3	MAIN DECK POWER PANEL NO. 3	Provides protection for and control of panel and circuits shown on Figure 2-118.
4	AUX MACH SPACE NO. 2 POWER PANEL NO. 5	Provides protection for and control of panel and circuits shown on Figure 2-119.
5	220/110V DISTRIBUTION PANEL	Provides protection for and control of panel and circuits shown on Figure 2-120.
6	ENG RM LOAD CTR DIST PANEL	Provides protection for and control of panel and circuits shown on Figure 2-121.
7	MAIN DECK DISTRIBUTION PANEL NO. 3	Provides protection for and control of panel and circuits shown on Figure 2-122.
8	ENG RM DIST PNL #4.	Provides protection for and control of panel and circuits shown on Figure 2-123.
9	MN DK HTR REHTR FUSE BOX NO. 3	Provides protection for and control of panel and circuits shown on Figure 2-124.
10	01 & 02 LVL REHTR FUSE BOX NO. 1	Provides protection for and control of panel and circuits shown on Figure 2-125.
11	01, 02 & MN DK EMER LTG PANEL NO. 1	Provides protection for and control of panel and circuits shown on Figure 2-126.

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Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Power Distribution System (Figure 2-115) (Continued)	
12	RADIO ROOM ELEX DIST PANEL	Provides protection for and control of panel and circuits shown on Figure 2-127.
13	EXTERIOR EMER LIGHTING PANEL NO. 2	Provides protection for and control of panel and circuits shown on Figure 2-128.
14	PILOTHOUSE EMER DIST PANEL	Provides protection for and control of panel and circuits shown on Figure 2-129.
15	ENG RM EMER DIST PANEL NO. 1	Provides protection for and control of panel and circuits shown on Figure 2-130.
16	EMER LOAD CTR DISTRIBUTION PANEL	Provides protection for and control of panel and circuits shown on Figure 2-131.
17	01 & 02 LVL CONY HTR FUSE BOX NO. 2	Provides protection for and control of panel and circuits shown on Figure 2-132.
18	GALLEY 120V DIST PANEL NO. 1	Provides protection for and control of panel and circuits shown on Figure 2-133.
19	01 LVL DIST PNL NO. 2	Provides protection for and control of panel and circuits shown on Figure 2-134.
20	GALLEY 460V POWER PNL NO. 2	Provides protection for and control of panel and circuits shown on Figure 2-135.

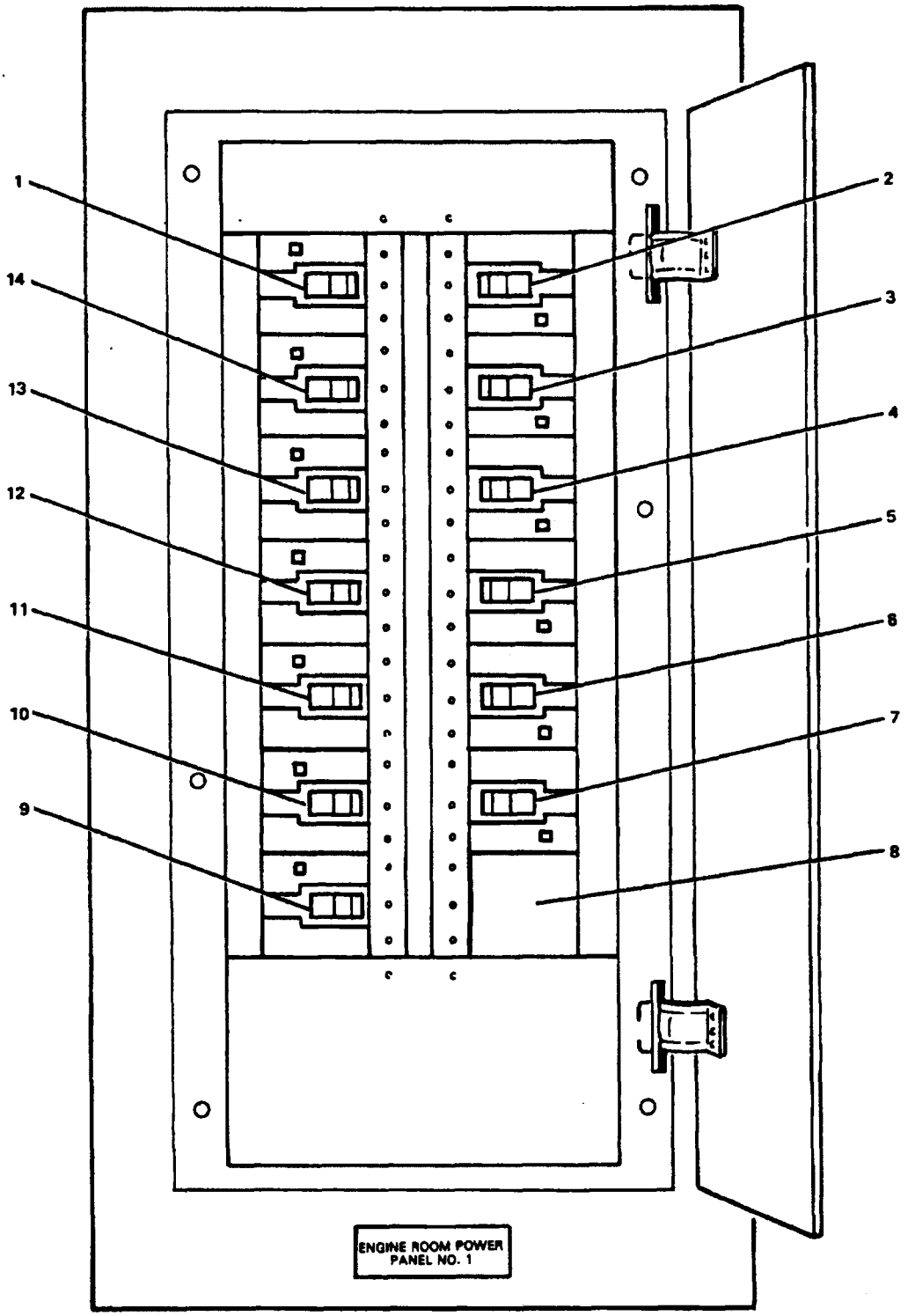

Figure 2-116. Engine Room Power Panel No. 1.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Engine Room Power Panel No. 1 (Figure 2-116)		
1	L.O.XFER PUMP PP1-4P-A	Provides control of and protection for lube oil transfer pump.
2	ENG.RM UNIT HTR PP1-4P-B	Provides control of and protection for engine room unit heater.
3	#2 RED GR CLG PUMP PP1-4P-D	Provides control of and protection for port reduction gear cooling water pump.
4	#1 M.E.L.O.PRIME PUMP PP1-4P-F	Provides control of and protection for starboard main engine lube oil priming pump.
5	SPARE PP1-4P-H spare circuit breaker for future use.	Provides control of and protection for
6	SPARE PP1-4--K spare circuit breaker for future use.	Provides control of and protection for
7	#1 SEWAGE DISCH PUMP PP1-4P-M	Provides control of and protection for starboard sewage discharge pump.
8	Blank	Not used.
9	#2 SEWAGE DISCH PUMP PP1-4P-N	Provides control of and protection for port sewage discharge pump.
10	FO XFER PUMP PP1-4P-L	Provides control of and protection for fuel oil transfer pump.
11	#2 M.E.CONTROL PUMP PP1-4P-J	Provides control of and protection for port main engine control panel.
12	#2 M.E.L.O.PRIME PUMP PP1-4P-G	Provides control of and protection for port main engine lube oil priming pump.
13	#1 M.E.CONTROL PANEL PP1-4P-E	Provides control of and protection for starboard main engine control panel.
14	#1 RED GR CLG PUMP PP1 -4.P-C	Provides control of and protection for starboard reduction gear cooling water pump.

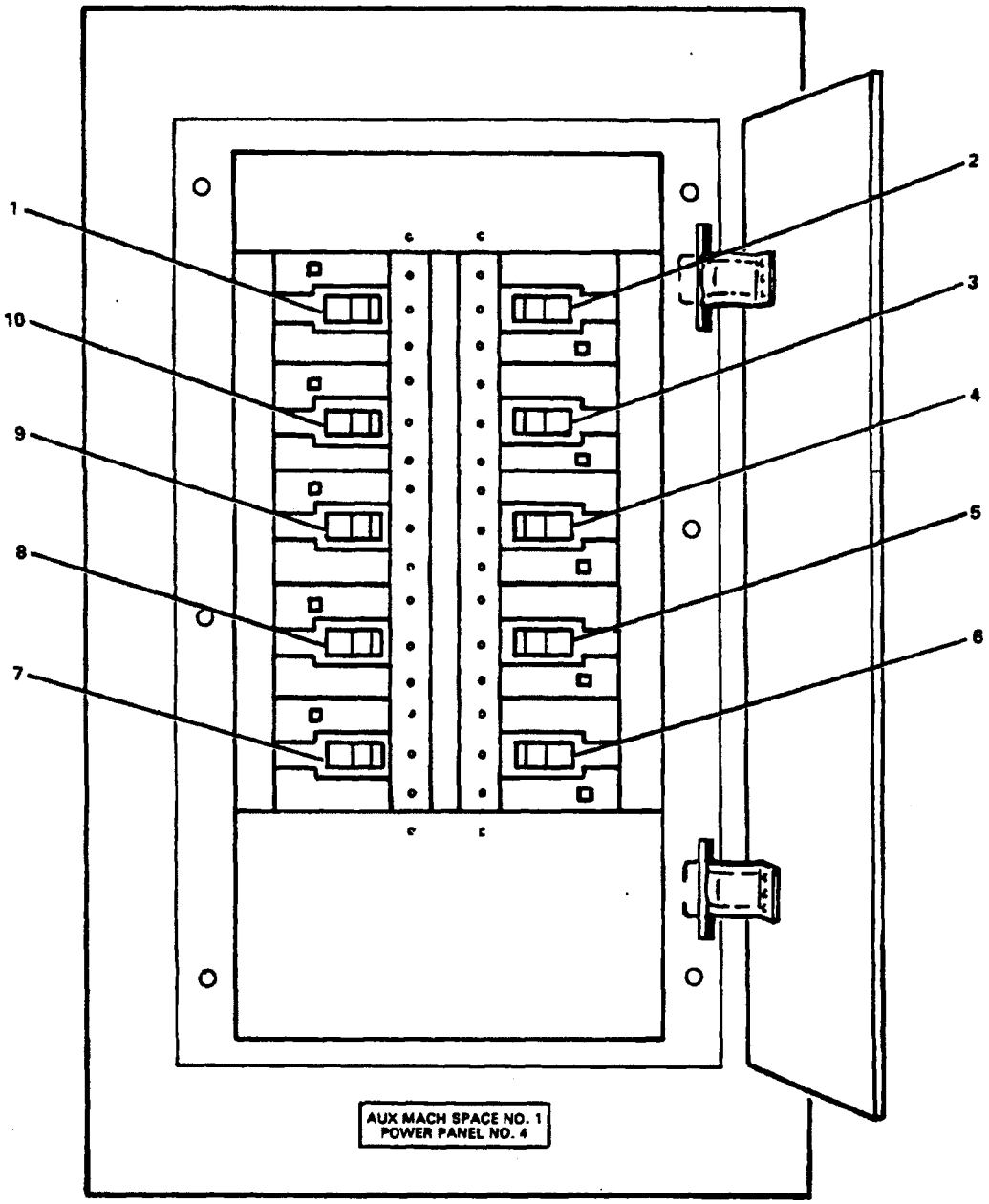

Figure 2-117. Auxiliary Machinery Space No. 1 Power Panel No. 4.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Auxiliary Machinery Space No. 1 Power Panel No. 4 (Figure 2-117)		
1	#1 AIR COMP. PP4-4P-A	Provides control of and protection for air compressor #1.
2	#2 AIR COMP. PP4-4P-B	Provides control of and protection for air compressor #2.
3	SPARE PP4-4P-D	Spare circuit breaker for future use.
4	BOW THRUSTER ROOM UNIT HTR PP4-4P-F	Provides control of and protection for bow thruster compartment unit heater.
5	AMS I UNIT HTR PP4-4P-H	Provides control of and protection for auxiliary machinery space I unit heater.
6	SPARE PP4-4P-K	Spare circuit breaker for future use.
7	SPARE PP4-4P-J	Spare circuit breaker for future use.
8	AMS I SUPPLY FAN (S01-45-2) PP4-4P-G	Provides control of and protection for auxiliary machinery space I supply fan.
9	HOT POT WTR REC PUMP PP4-4P-E	Provides control of and protection for hot potable water recirculating pump.
10	MSD POWER PP4-4.P-C	Provides control of and protection for MSD control panel.

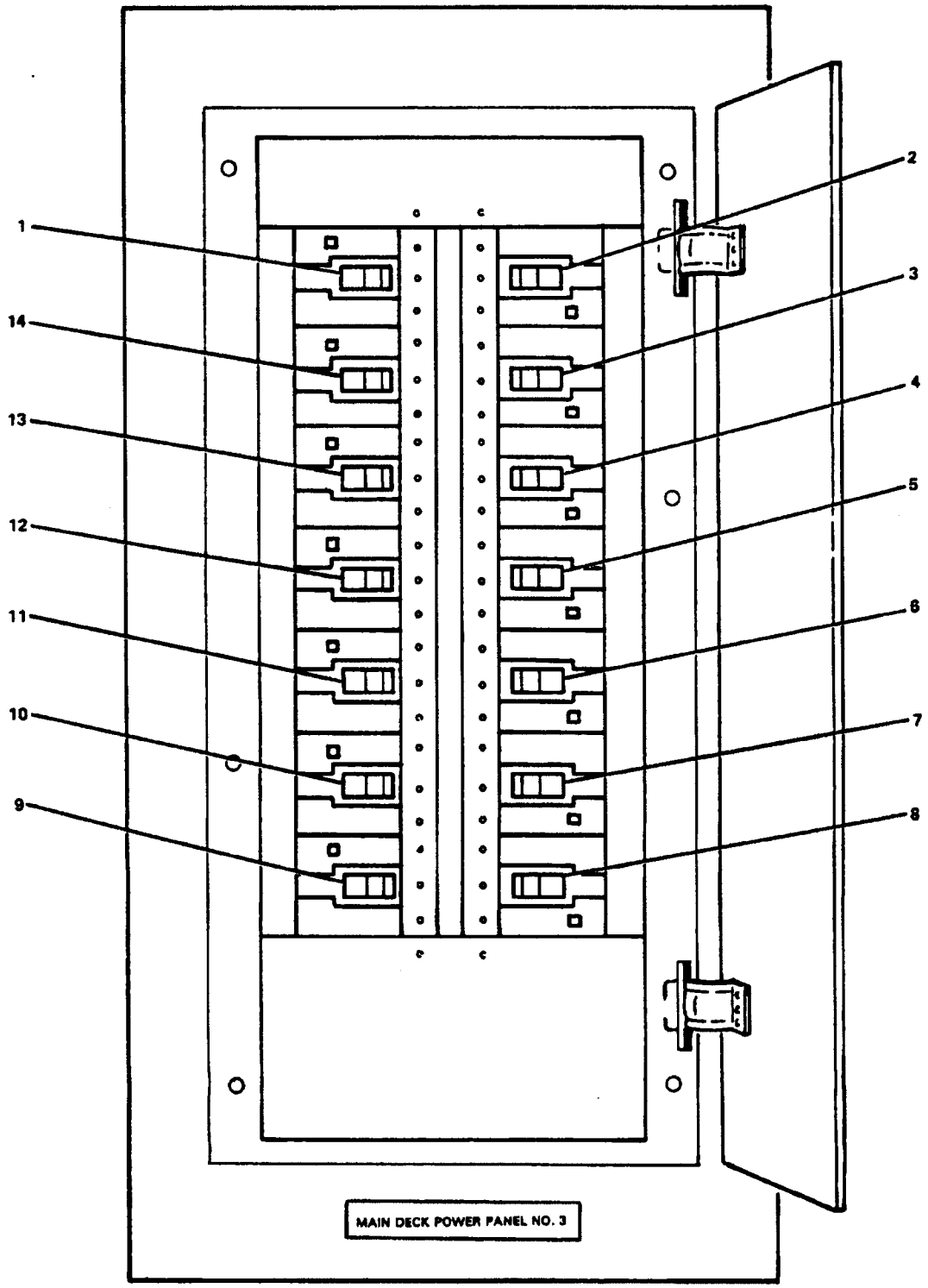

Figure 2-118. Main Deck Power Panel No. 3.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Main Deck Power Panel No. 3 (Figure 2-118)		
1	PREHTR 1-23-4 PP3-4P-A	Provides control of and protection for preheater for main deck fan coil unit.
2	PREHTR 1-25-2 PP3-4P-B	Provides control of and protection for preheater for galley make-up air.
3	RHTR 01-32-2 PP3-4P-D	Provides control of and protection for reheater connected to 01 level fan coil output.
4	RHTR 01-32-2 PP3-4P-F	Provides control of and protection for reheater for 01 level fan coil unit intake.
5	CREWS MESS FAN COIL UNIT (R1-25-2) PP3-4P-H	Provides control of and protection for main deck fan coil unit.
6	PAINT LOCKER EXHAUST FAN (E1-62-2) PP3-4P-K	Provides control of and protection for paint locker exhaust fan.
7	SANITARY SPACE EXHAUST FAN (E01 - 44-2) PP3-4P-N	Provides control of and protection for sanitary spaces exhaust fan.
8	SPARE	Spare circuit breaker for future use.
9	SPARE PP3-4P-P	Spare circuit breaker for future use.
10	SPARE PP3-4P-L	Spare circuit breaker for future use.
11	01, 02&03 LEVEL FAN COIL UNIT (R01-32-2) PP3-4P-J	Provides control of and protection for 01 level fan coil unit.
12	BOSUN STOREROOM SUPPLY FAN (S1-58-1) PP3-4P-G	Provides control of and protection for boatswain's storeroom supply fan.
13	PRHTR D1-31-2 PP3-4P-E	Provides control of and protection for preheater for 01 level fan coil unit.
14	AMS II SUPPLY FAN (1-22-2) PP3-4P-C	Provides control of and protection for auxiliary machinery space II supply fan.

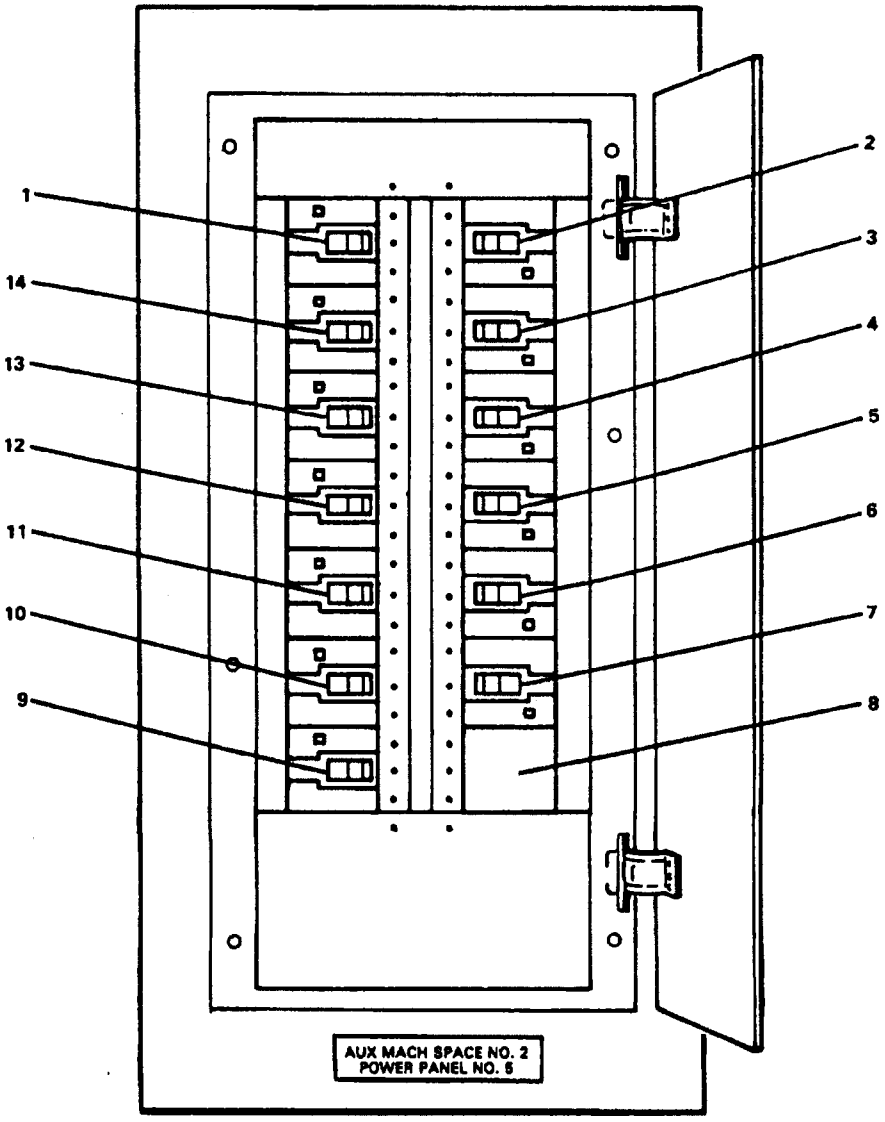

Figure 2-119. Auxiliary Machinery Space No. 2 Power Panel No. 5.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Auxiliary Machiner Space No. 2 Power Panel No. 5 (Figure 2-119)		
1	AMS II UNIT HTR PP5-4P-A	Provides control of and protection for auxiliary machinery space No. 2 unit heater.
2	#1 POT WTR PUMP PP5-4P-B	Provides control of and protection for #1 potable water pump.
3	#1 REVERSE OSMOSIS UNIT PP5-4P-D	Provides control of and protection for reverse osmosis watermaker #1.
4	WELDING MACHINE PP5-4P-F	Provides control of and protection for welding machine.
5	#2 AIR CONDITIONING CONDENSING UNIT PP5-4P-H	Provides control of and protection for air conditioning condensing unit #2.
6	#2 STORES REFRIGERATION CONDENSING UNIT PP5-4P-K5	Provides control of and protection for stores refrigeration condensing unit #2.
7	SPARE PP5-4P-M	Spare circuit breaker for future use.
8	Blank	Not used.
9	SPARE PP5-4P-N	Spare circuit breaker for future use.
10	TOW GEAR LKR UNIT HTR PP5-4P-J	Provides control of and protection for tow gear locker unit heater.
11	#1 STORES REFRIGERATION CONDENSING UNIT PP5-4P-L	Provides control of and protection for stores refrigeration condensing unit #1.
12	#1 AIR CONDITIONING' CONDENSING UNIT PP-5-4P-G	Provides control of and protection for air conditioning condensing unit #1.
13	#2 REVERSE OSMOSIS UNIT PP5-4P-E	Provides control of and protection for reverse osmosis watermaker #2.
14	#2 POT WTR PUMP PP5-4P-C	Provides control of and protection for #2 potable water pump.

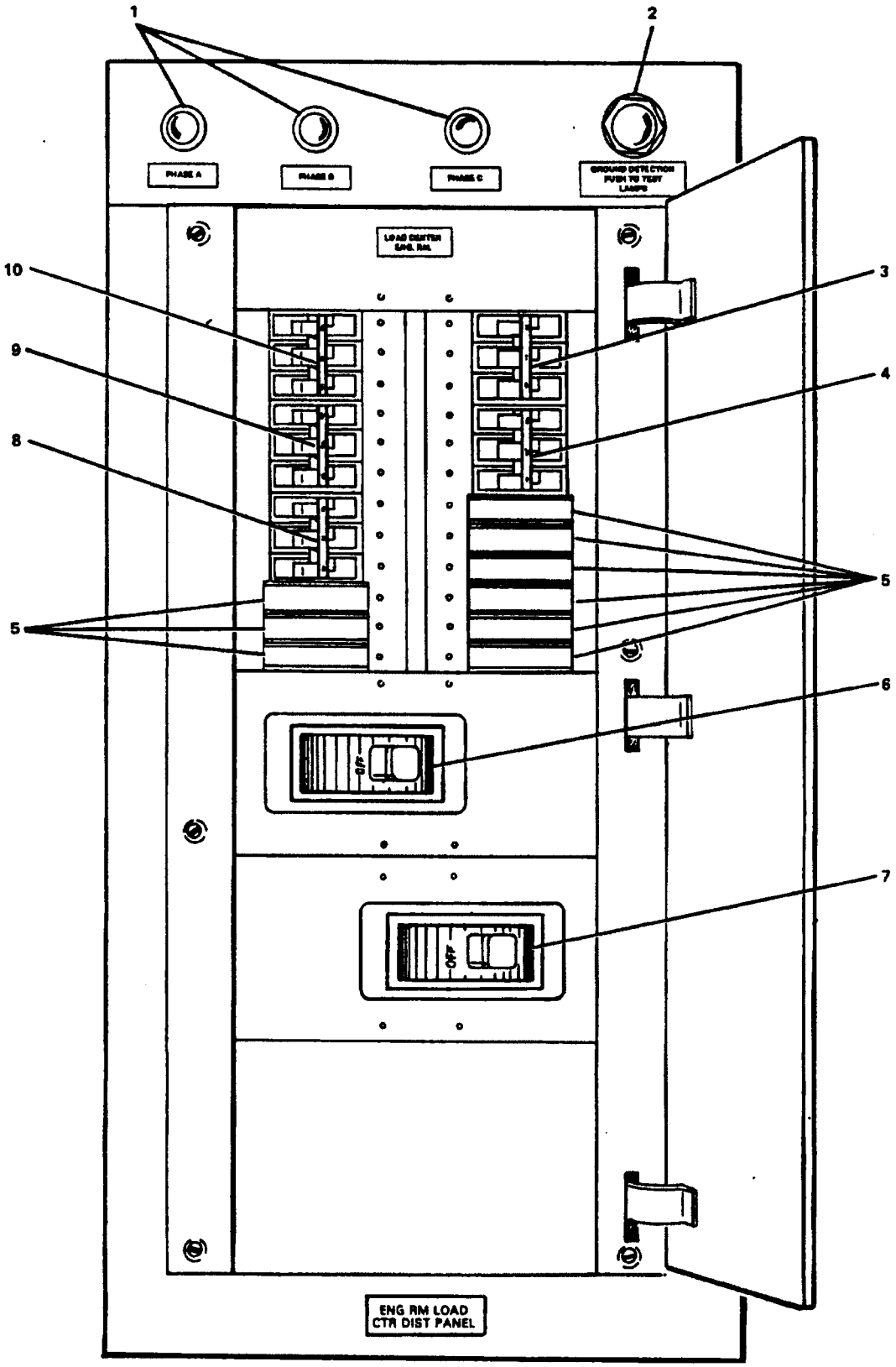

Figure 2-120. 120/110V Distribution Panel.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Distribution Panel 220/110V (Figure 2-120)	
1	LINE 1, LINE 2 Lamps	Used to indicate ground fault condition.
2	GROUND DETECTION PUSH TO TEST LAMPS Pushbutton	Push to test lamps (1).
3	GARBAGE DISPOSAL 1 S-2P/1 P-B	Provides control of and protection for garbage disposal circuit.
4	LAUNDRY RM WASHER 1 S-1 P-D	Provides control of and protection for clothes washer circuit.
5	CREW MESS TOASTER 1 S-2P-F	Provides control of and protection for toaster circuit in mess/recreation room.
6	BEVERAGE DISPENSER 1 S-1 P-H	Provides control of and protection for beverage dispenser circuit.
7	SPARE 1 S-1 P-K	Spare circuit breaker for future use.
8	Blank	Not used.
9	ICE MAKER 1 S-1 P-J ice maker circuit.	Provides control of and protection for
10	TRASH COMPACTOR 1 S-1 P-G	Provides control of and protection for trash compactor circuit.
11	GALLEY TOASTER 1S-2P-E	Provides control of and protection for toaster circuit in galley.
12	LAUNDRY RM DRYER 1 S-2P/1 P-C	Provides control of and protection for clothes dryer circuit.
13	DISHWASHER BOOSTER HTR 1 S-2P/1 P-A	Provides control of and protection for dishwasher booster heater circuit.

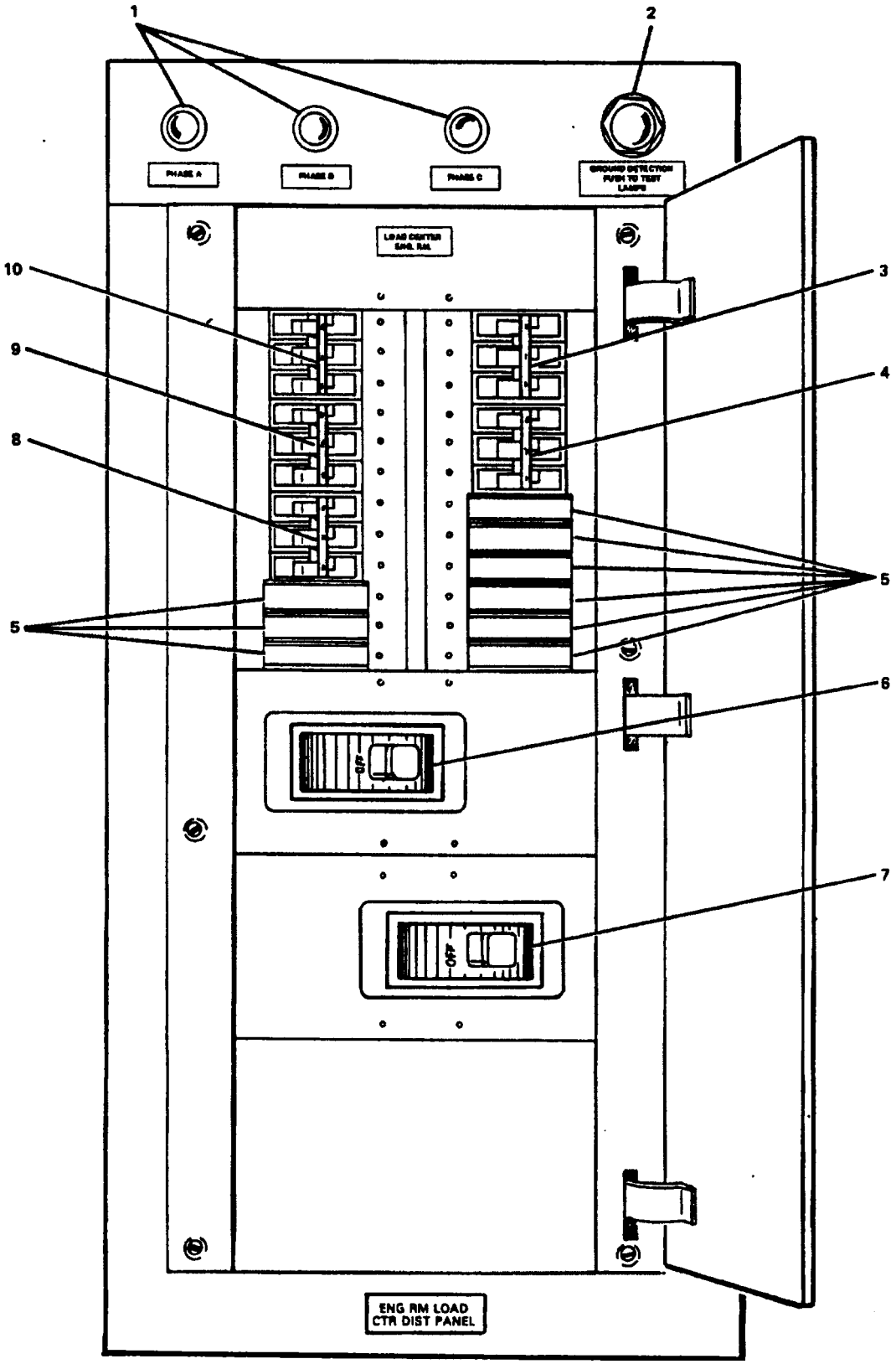

Figure 2-121. Engine Room Load Center Distribution Panel.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Engine Room Load Center Distribution Panel (Figure 2-121)	
1	PHASE A, PHASE B, PHASE C Lamps	Used to indicate ground fault conditions.
2	GROUND DETECTION PUSH TO TEST LAMPS Pushbutton	Push to test lamps (1).
3	WORKSHOP EQPT LC-1 P-B	Provides control of and protection for workshop equipment.
4	GALLEY DIST. PNL NO. 1 LC-1P-DP1	Provides control of and protection for galley distribution panel No. 1.
5	Blank	Not used.
6	ENG. PNL NO. 4 LC-1 P-DP4	ROOM DIST Provides control of and protection for engine room distribution panel No. 4.
7	MN DK DIST PNL LC-1 P-DP3	Provides control of and protection for main deck distribution panel.
8	01 LVL DIST PNL NO. 2 LC-1 P-DP2	Provides control of and protection for 01 level distribution panel No. 2.
9	SPARE	Spare breaker.
10	CATHODIC PROTECTION LC-1 P-A	Provides control of and protection for cathodic protection system.

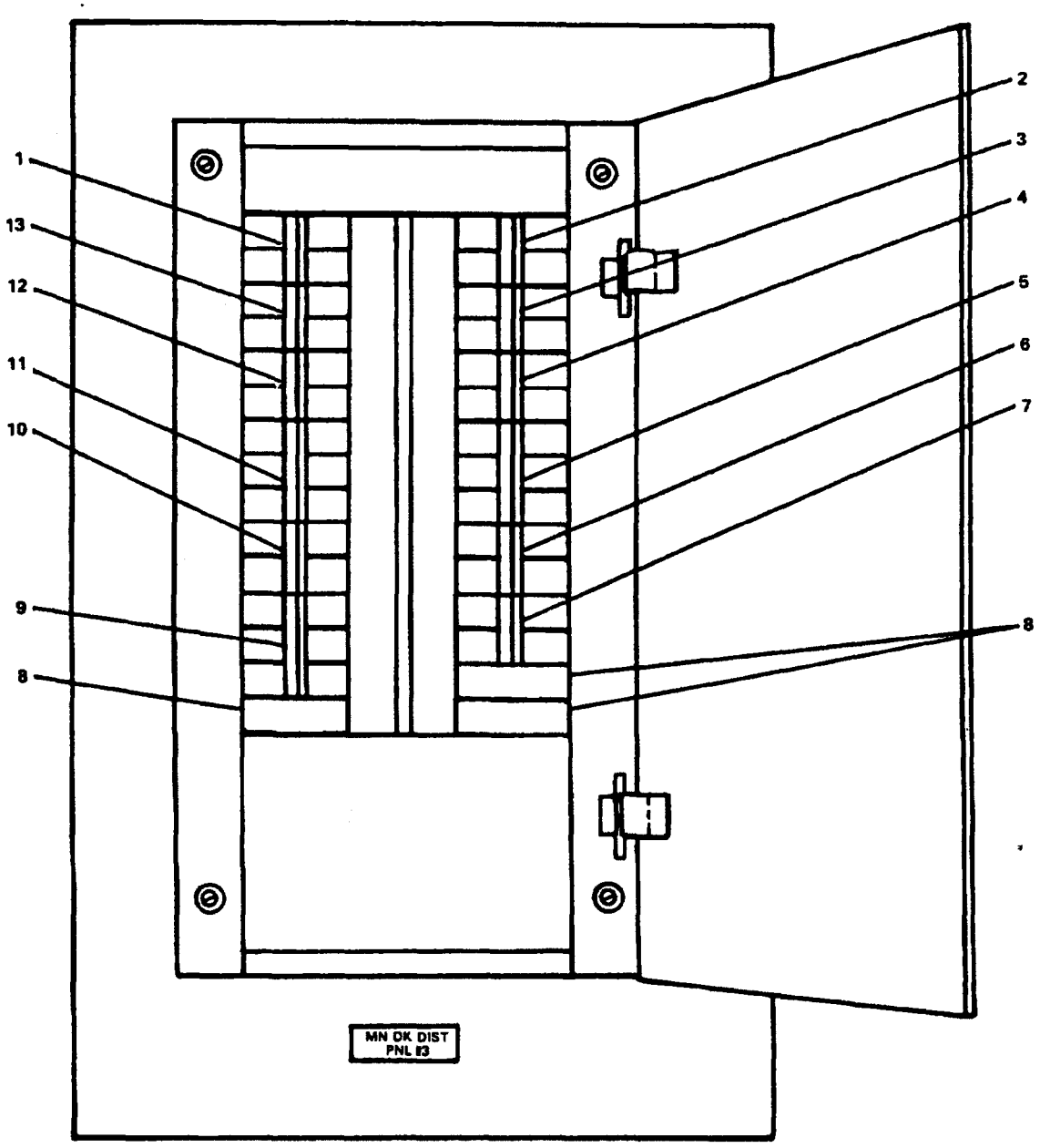

Figure 2-122. Main Deck Distribution Panel No. 3.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Main Deck Distribution Panel No. 3 (Figure 2-122)	
1	MAIN DECK DRINKING FOUNTAIN DP3-1 L-A	Provides control of and protection for main deck drinking fountain.
2	MAIN DECK INT LIGHTS - STBD DP3-1 L-B	Provides control of and protection for starboard side main deck interior lights.
3	MAIN DECK RCPT PORT DP3-1 L-D	Provides control of and protection for port side main deck receptacles.
4	CREWS MESS LIGHTING DP3-1 L-F	Provides control of and protection for lighting in mess/recreation room.
5	FUSE BOX NO. 1 01-02 LVL REHTRS	Provides control of and protection for fuse box No. 1 and 01 and 02 level reheaters.
6	SPARE DP3-1 P-K	Spare circuit breaker for future use.
7	SPARE DP3-1 P-M	Spare circuit breaker for future use.
8	Blank	Not used.
9	SPARE DP3-1 P-L	Spare circuit breaker for future use.
10	MAIN DECK RCPT STBD DP3-1 L-J	Provides control of and protection for starboard side receptacles on main deck.
11	FUSE BOX NO. 3 MN DK REHTRS DP3-1 P-G	Provides control of and protection for fuse box No. 3 and main deck reheaters.
12	MAIN DECK PASSAGEWAY LIGHTS DP3-1 L-E	Provides control of and protection for main deck passageway lights.
13	MAIN DECK INT LIGHTS - PORT DP3-1 L-C	Provides control of and protection for port side main deck interior lights.

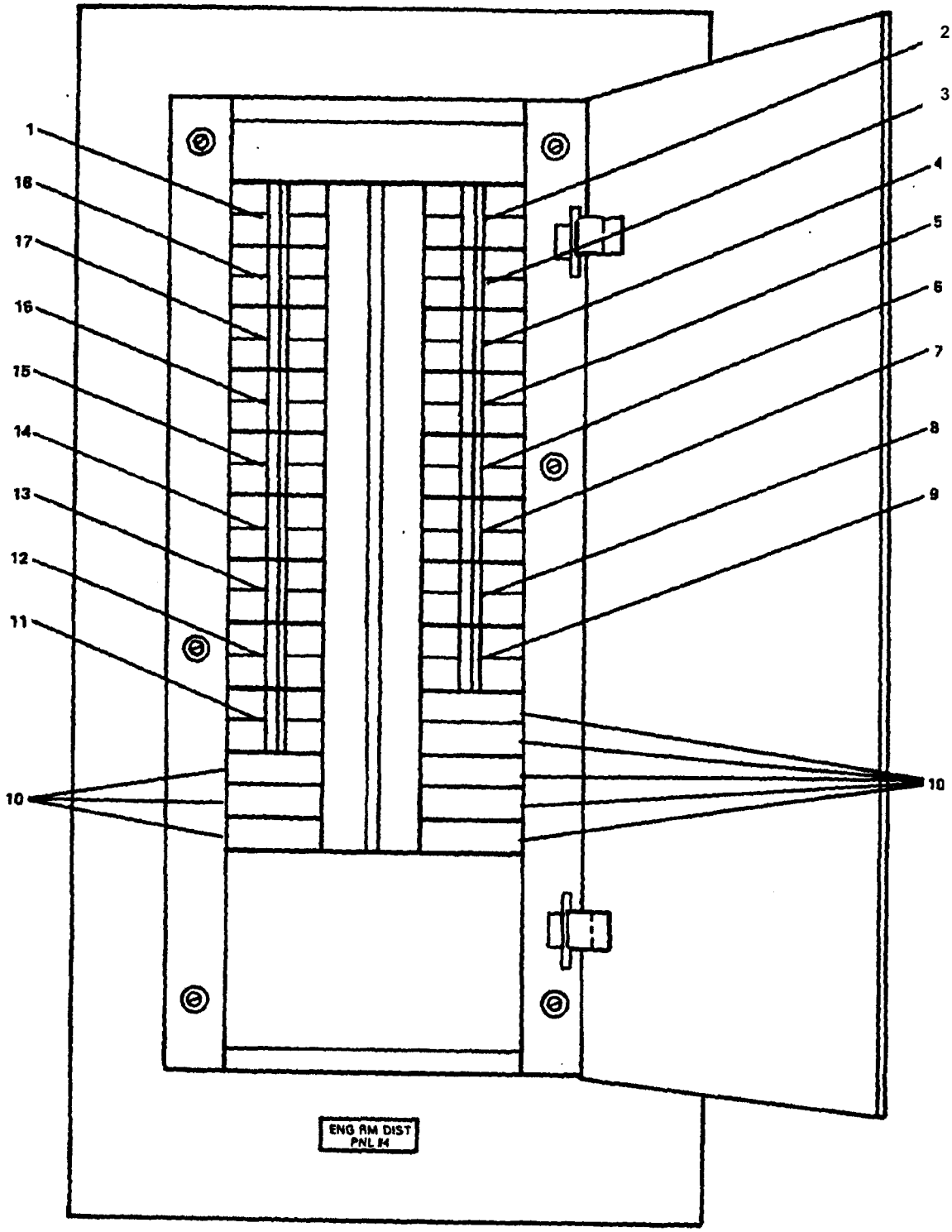

Figure 2-123. Engine Room Distribution Panel #4.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Engine Room Distribution Panel #4 (Figure 2-123)	
1	ENG.RM LIGHTS DP4-1 L-A	Provides control of and protection for engine room lights.
2	BOW THRUSTER COMPT AMS I & II LIGHTS DP4-1L-B	Provides control of and protection for lights for bow thruster compartment, and auxiliary machinery space 1 and 2.
3	UNIT AIR CONDITIONER R2-40-1 E.O.S. DP4-1 P-F	Provides control of and protection for EOS unit air conditioner.
4	EMER SWBD HEATER EMER GEN SPACE HTR DP4-1 L-H	Provides control of and protection for emergency switchboard heater and emergency generator room space heater.
5	HOLD LEVEL AND FANTAIL RECEPTACLES DP4-1 L-H	Provides control of and protection for receptacles on hold level and fan tail.
6	#2 SSDG JACKET WATER HEATER DP4-1 P-K	Provides control of and protection for SSDG No. 2 jacket water heater.
7	BOW THRUSTER ENG JACKET WATER HTR DP4-1 P-M	Provides control of and protection for bow thruster engine jacket water heater.
8	WORKSHOP EXHAUST FAN E2-16-1 DP4-1 P-P	Provides control of and protection for workshop exhaust fan.
9	NO. 1 & NO. 2 SHIPS STORES REFR CONTROL POWER DP4-1 P-S	Provides control of and protection for control power for ship refrigerator system.
10	Blank	Not used.
11	AIR RCVR AUTO DRN/ CONTROL AIR DRYER DP4-1 P-T	Provides control of and protection for air receiver's automatic condensation drains and control air dryer.
12	NO. 1 & NO. 2 A/C REFRIGERATION CONTROL POWER DP4-1 P-R	Provides control of and protection for air conditioning control power.

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Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Engine Room Distribution Panel DP-4 (Figure 2-123) (Continued)		
13	ENGINE ROOM DRINKING FOUNTAIN DP4-1 L-N	Provides control of and protection for engine room drinking fountain.
14	PUMP DRIVE ENG. JACKET WATER HTR DP4-1 P-L	Provides control of and protection for pump drive engine jacket water heater.
15	#2 SSDG SPACE HEATER DP4-1 P-J	Provides control of and protection for SSDG No. 2 space heater.
16	#1 SSDG JACKET WATER HEATER DP4-1 P-G	Provides control of and protection for SSDG No. 1 jacket water heater.
17	OILY WATER SEPARATOR DP4-1 L-E	Provides control of and protection for oil water separator.
18	#1 SSDG SPACE HEATER DP4-1 P-C	Provides control of and protection for SSDG No. 1 space heater.

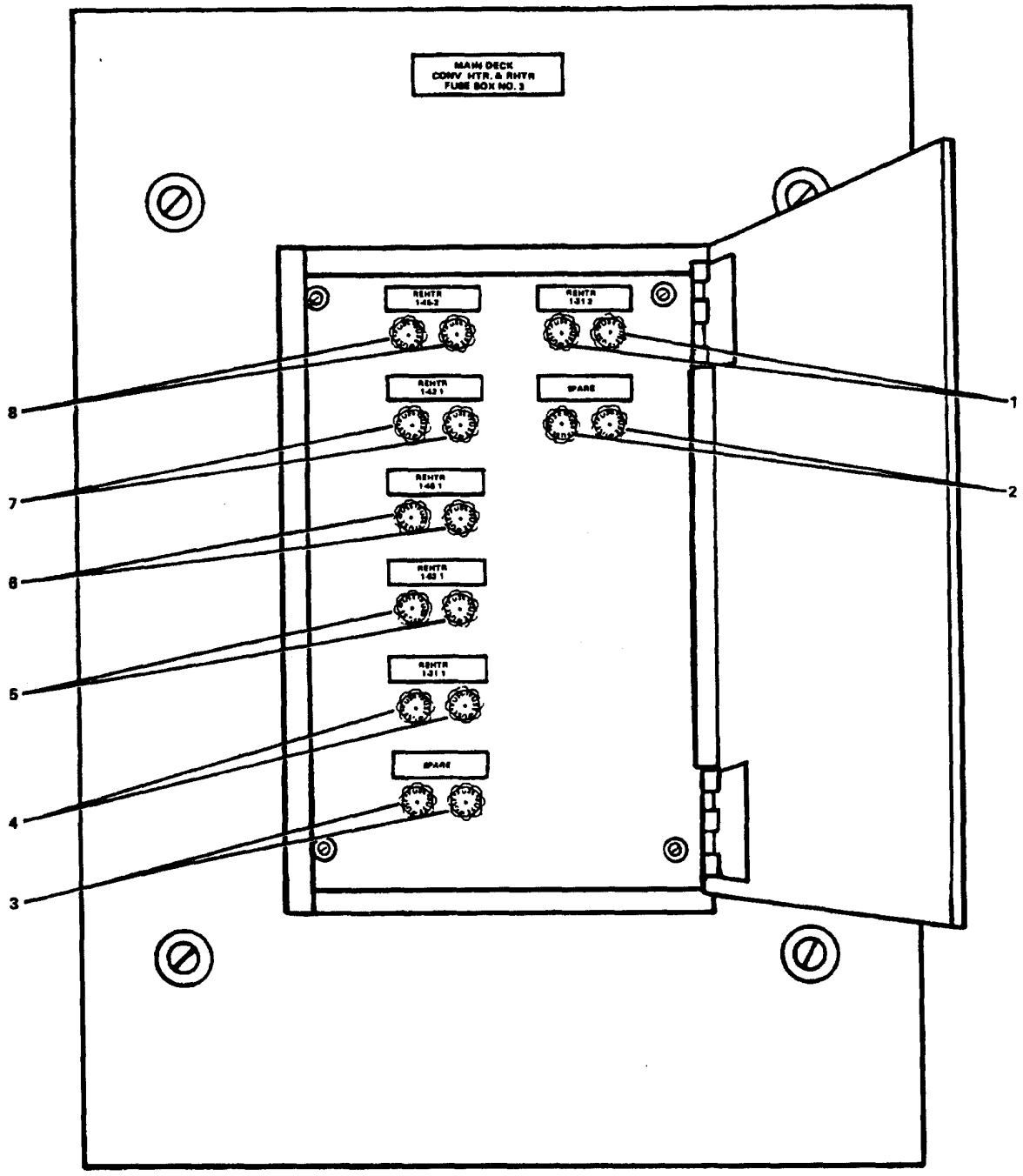

Figure 2-124. Main Deck Heater & Reheater Fuse Box No. 3.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Main Deck Convection Heater & Reheater Fuse Box No. 3 (Figure 2-124)		
1	REHTR 1-31-2	Provides fuse protection for terminal reheater for mess/recreation space.
2	SPARE	Spare circuit for future use.
3	SPARE	Spare circuit for future use.
4	REHTR 1-31-1	Provides fuse protection for terminal reheater for galley.
5	REHTR 1-52-1	Provides fuse protection for terminal reheater for crew stateroom #1.
6	REHTR 1-48-1	Provides fuse protection for terminal reheater for crew stateroom #2.
7	REHTR 1-42-1	Provides fuse protection for terminal reheater for crew stateroom #4.
8	REHTR 1-45-2	Provides fuse protection for terminal reheater for crew stateroom #3.

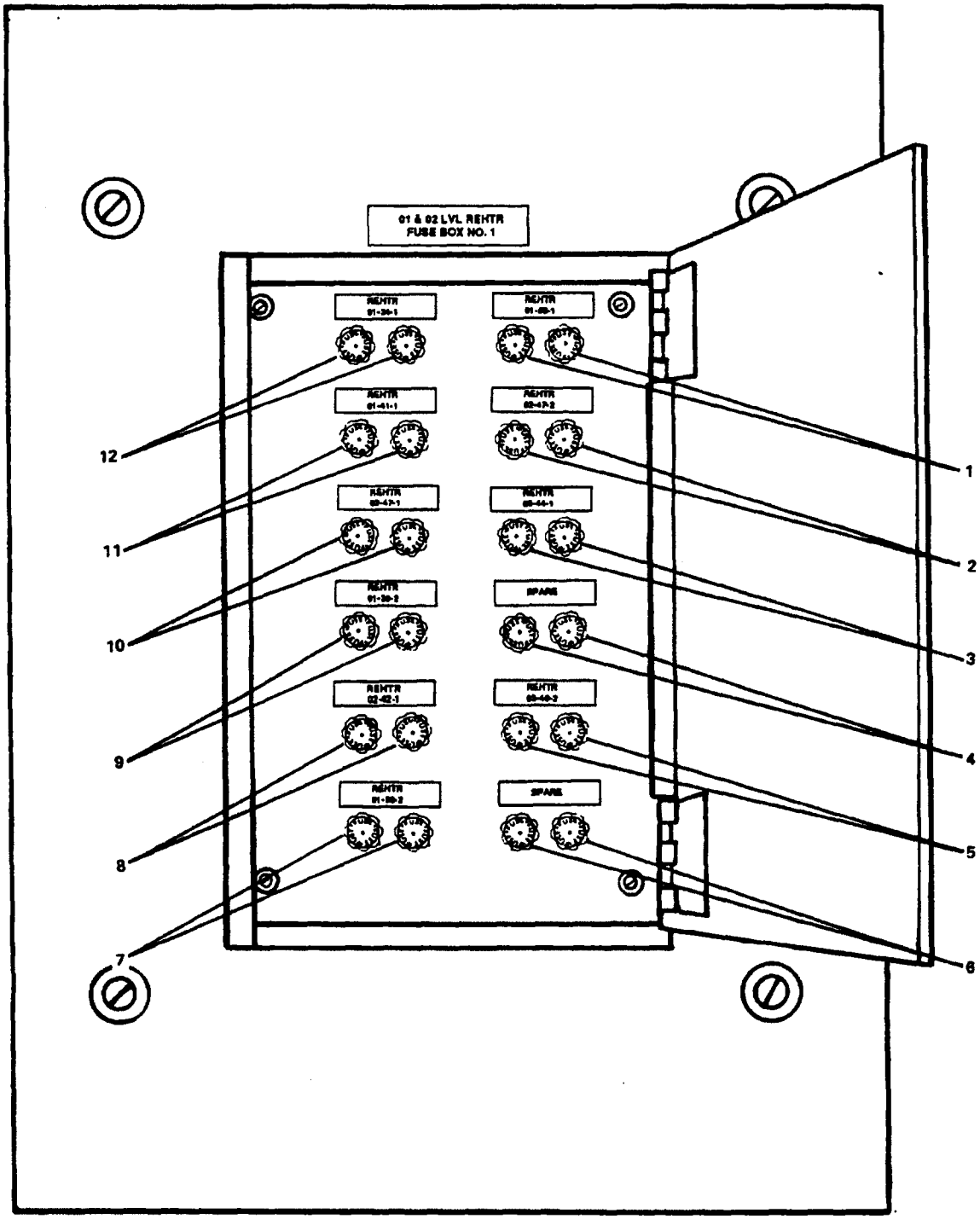

Figure 2-125. 01 & 02 Level Reheater Fuse Box No. 1.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
01 & 02 Level Reheater Fuse Box No. 1 (Figure 2-125)		
1	RHTR 01-50-1 FB1-1 P-E	Provides fuse protection for terminal reheater for captain's stateroom.
2	RHTR 02-47-2 FBI-1 P-F	Provides fuse protection for terminal reheater for damage control center.
3	RHTR 03-44-1 FB1-1 P-L	Provides fuse protection for terminal reheater for pilothouse.
4	SPARE FBI-1 P-M	Spare circuit for future use.
5	RHTR 03-4.6-2 FB1-1 P-J	Provides fuse protection for terminal reheater for pilothouse.
6	SPARE FB1-1 P-C	Spare circuit for future use.
7	RHTR 01-50-2 FB1-1 P-D	Provides fuse protection for terminal reheater for chief engineer's stateroom.
8	RHTR 02-42-1 FB1-1 P-K	Provides fuse protection for terminal reheater.
9	RHTR 01-39-2 FB1-1 P-H	Provides fuse protection for terminal reheater for officer's stateroom No. 2
10	RHTR 0247-1 FB1-1 P-G	Provides fuse protection for terminal reheater for radio room.
11	RHTR 01-41-1 FB1-1 P-B	Provides fuse protection for terminal reheater for officer's stateroom No. 1
12	RHTR 01-34-1 FB1-1P-A	Provides fuse protection for terminal reheater for NCO stateroom.

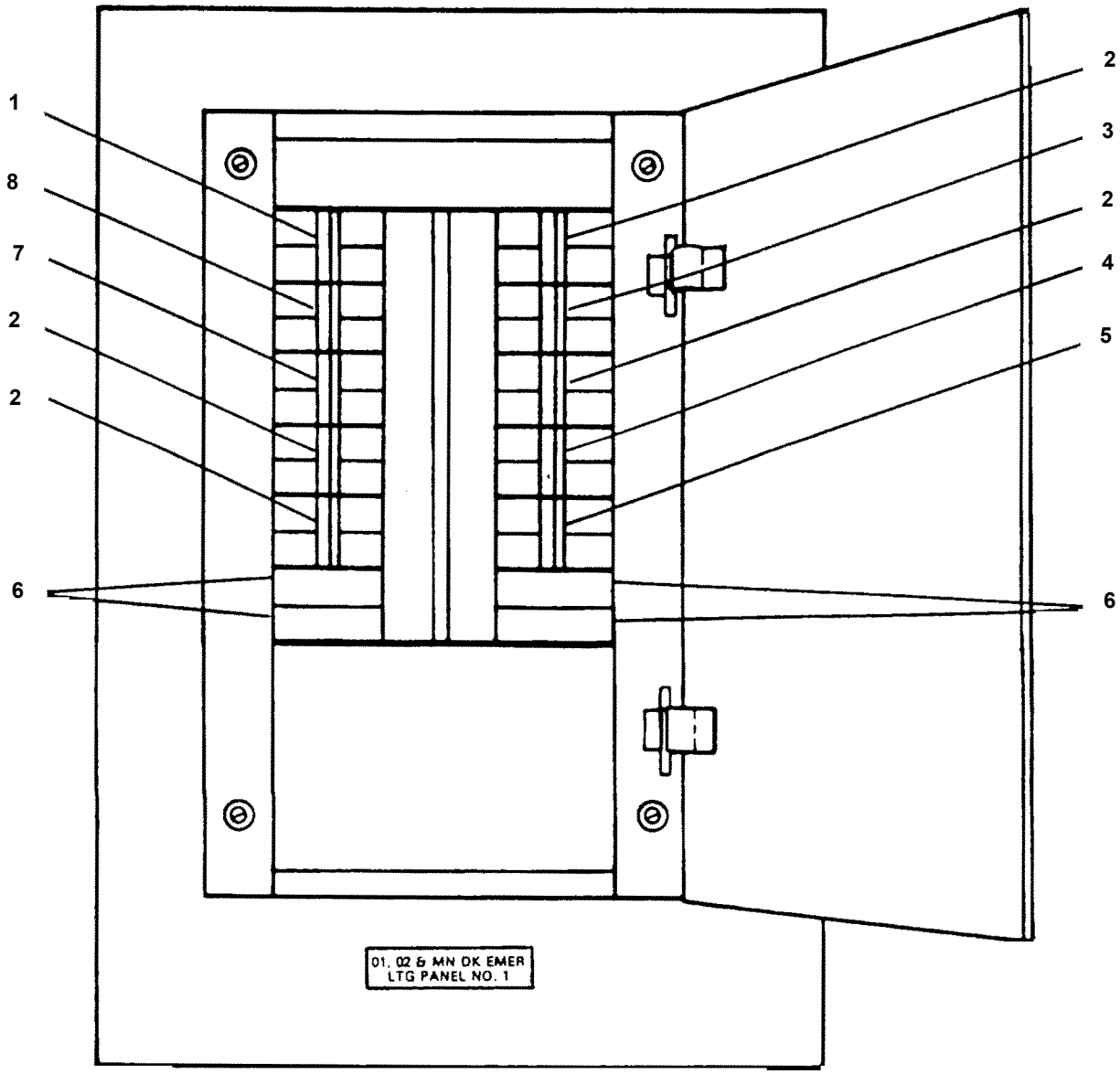

Figure 2-126. 01, 02, & Main Deck Emergency Lighting Panel No. 1.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
01, 02, & Main Deck Emergency Lighting Panel No. 1 (Figure 2-126)		
1	MAIN DECK EMERGENCY LIGHTS ELI-1 EL-A	Provides control of and protection for main deck emergency lights.
2	SPARE	Spare circuit breaker for future use.
3	01 LEVEL EMERGENCY LIGHTS EL1-1 EL-D	Provides control of and protection for 01 level emergency lights.
4	02 LEVEL EMERGENCY LIGHTS EL1-1 EL-H	Provides control of and protection for 02 level emergency lights.
5	PILOTHOUSE ALARM SWBD EL1-1 EL-K	Provides control of and protection for pilothouse alarm switchboard.
6	Blank	Not used.
7	CHILL/FREEZE BOX LIGHTS EL1-1EL-E	Provides control of and protection for chill/freeze box lights.
8	FREEZER ALARM EL1-1 EL-C	Provides control of and protection for freezer alarm.

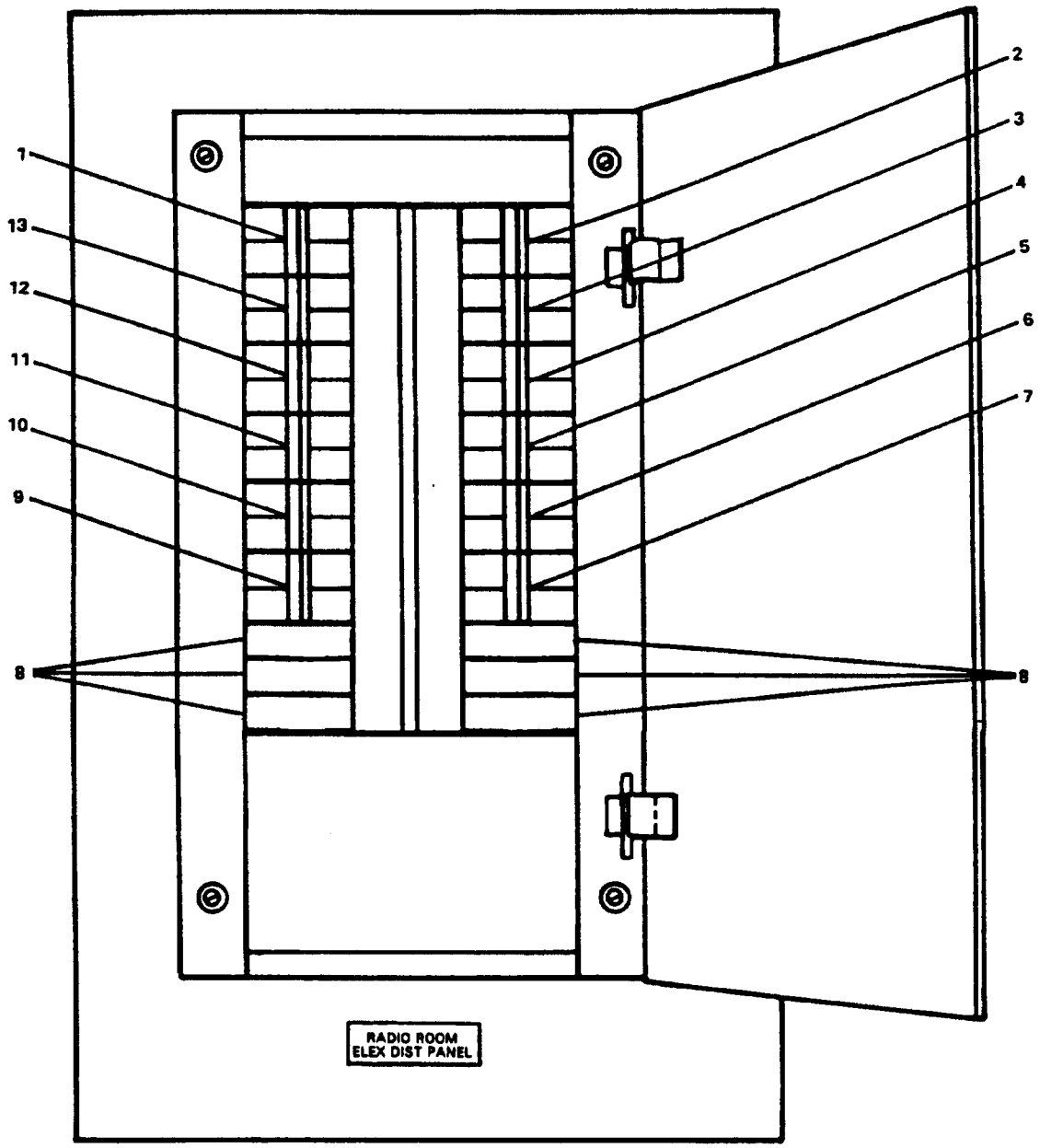

Figure 2-127. Radio Room - Electronics Distribution Panel.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Radio Room - Electronics Distribution Panel (Figure 2-127)	
1	BATTERY CHARGER RADIO RM SC PANEL EXDP-1 EP-A	Provides control of and protection for battery charger.
2	HF 6700, 5050, 3500 & 1280 RADIO RM EXDP-1 EP-B	Provides control of and protection for various radio equipment.
3	KY-57 SECURITY EQUIPMENT EXDP-1 EP-D	Provides control of and protection for speech security equipment (KY-57) used with AN/VRC-46.
4	J4243/U JUNCTION BOX EXDP-1 EP-F	Provides control of and protection for junction box used with data communication equipment.
5	KG-84 SECURITY EQUIPMENT DP-1 EP-H	Provides control of and protection for data encryption device (KY-84).
6	SPARE EXDP-1 EP-K	Spare circuit breaker for future use.
7	SPARE EXDP-1 EP-M	Spare circuit breaker for future use.
8	Blank	Not used.
9	LINEAR AMP EXDP-1 EP-L	Provides control of and protection for URC-92 output power amplifier.
10	SPARE EXDP-1 EP-J	Spare circuit breaker for future use.
11	URC-92 RADIO SET EXDP-1 EP-G	Provides control of and protection for single-side-band radio (URC-92).
12	UGC-74 COMM. TERMINAL EXDP-1 EP-E	Provides control of and protection for radio teletype.
13	KY-65 SECURITY EQUIPMENT EXDP-1 EP-C	Provides control of and protection for secure radio transmission device.

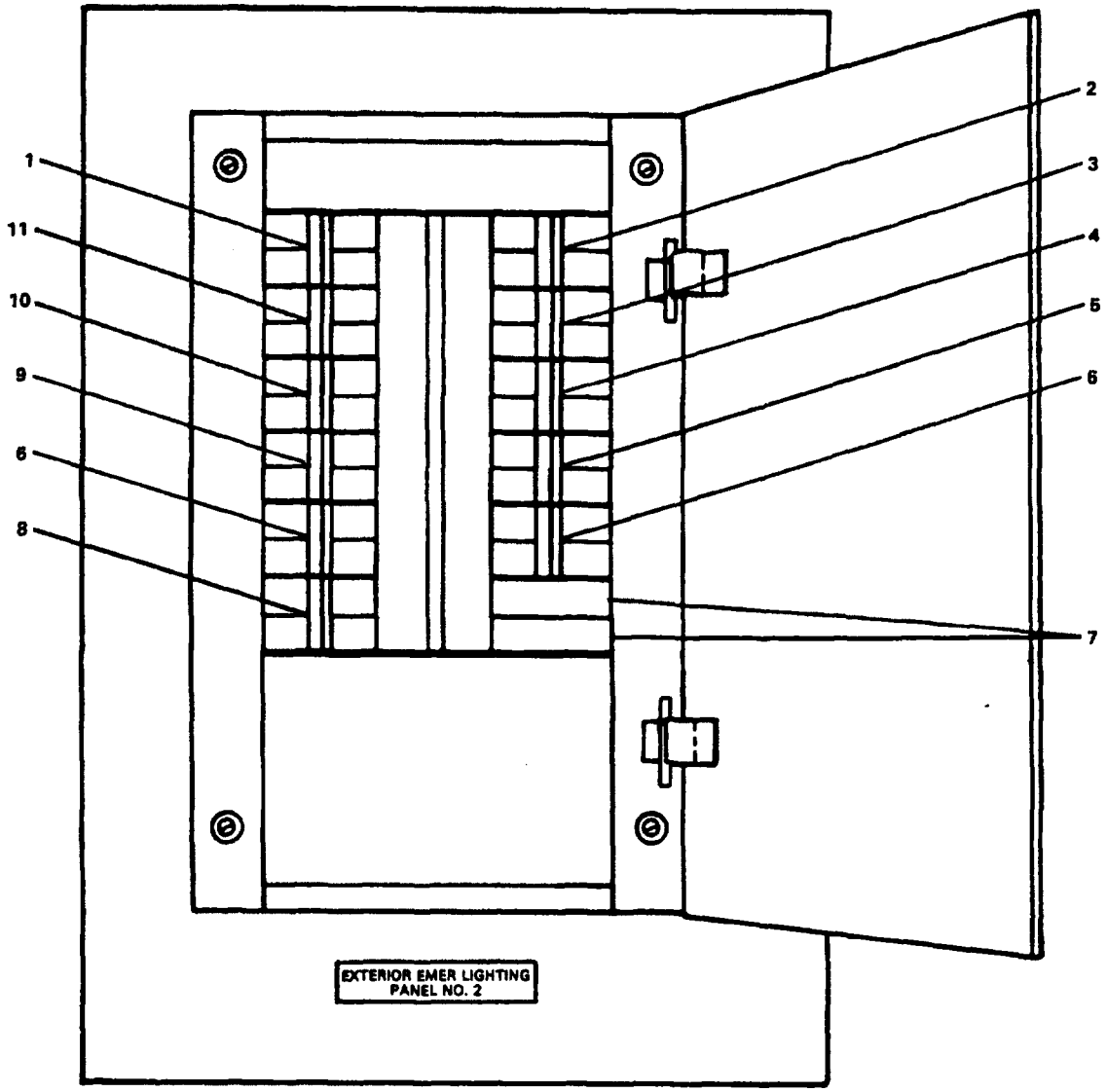

Figure 2-128. Exterior Emergency Lighting Panel No. 2.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Exterior Emergency Lighting Panel No. 2 (Figure 2-128)		
1	INFLATABLE WORK BOAT FLOODLIGHT EL2-1 EL-A	Provides control of and protection for 01 level aft weather deck.
2	01 LVL WEATHER DECK LIGHTS EL2-1 EL-B	Provides control of and protection for 01 level port and starboard weather deck lights.
3	ROTARY CLEAR VIEW SCREEN & HEATER EL2-1 EL-D	Provides control of and protection for rotary clear view screen circuit.
4	01 LVL FWD FLOODLIGHTS EL2-1 EL-F	Provides control of and protection for forecastle deck floodlights.
5	LIFE RAFT FLOODLIGHT PORT EL2-1 EL-H	Provides control of and protection for 02 level weather deck (port) lights.
6	SPARE	Spare circuit breaker for future use.
7	Blank	Not used.
8	LIFE RAFT FLOODLIGHT STBD EL2-1 EL-L	Provides control of and protection for 02 level weather deck (starboard) lights.
9	PLT/HS WEATHER DECK LIGHTS EL2-1 EL-G	Provides control of and protection for 03 level weather deck lights.
10	02 LVL WEATHER DECK LIGHTS EL2-1 EL-E	Provides control of and protection for 02 level weather deck lights.
11	MN DECK AFT FLOODLIGHTS EL2-1 EL-C	Provides control of and protection for lights on main deck weather deck.

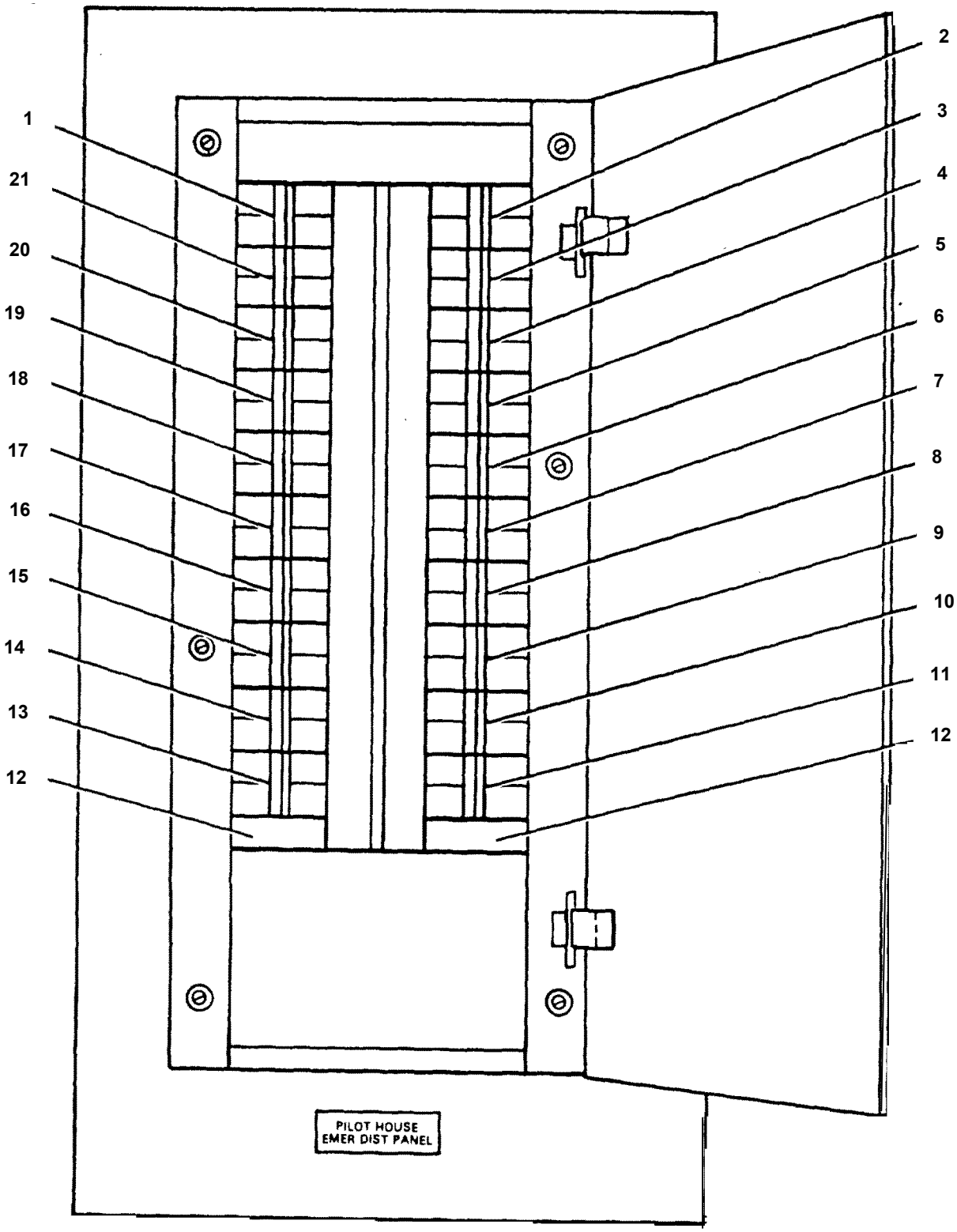

Figure 2-129. Pilothouse Emergency Distribution Panel.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	Pilothouse Emergency Distribution Panel (Figure 2-129)	
1	PILOTHOUSE LTS PEDP-1 EL-A	Provides control of and protection for pilothouse lighting circuit.
2	PORT SEARCH LT PEDP-1 EL-B	Provides control of and protection for port searchlight circuit.
3	4005 AUTO DIR FINDER PEDP-1 EP-D	Provides control of and protection for automatic direction finder circuit.
4	DOPPLER SPEED LOG PEDP-1 EP-F	Provides control of and protection for doppler speed log circuit.
5	STBD SEARCH LT PEDP-1 EL-H	Provides control of and protection for starboard searchlight circuit.
6	MK-37 GYRO XMTR PEDP-1 EP-K	Provides control of and protection for gyrocompass transmitter circuit.
7	AN/SRN-23 OMEGA SET PEDP-1 EP-M	Provides control of and protection for omega set circuit.
8	1511 WATCH RECEIVER PEDP-1 EP-P	Provides control of and protection for water receiver circuit.
9	SSB 610 - AUX RCVR-XMTTR PEDP-1 EP-S	Provides control of and protection for single side band radio circuit.
10	AN/URC-80 RADIO PEDP-1 EP-V	Provides control of and protection for the URC-80 radio circuit.
11	LS-519A/SIC INTERCOM PEDP-1 EP-X	Provides control of and protection for intercom circuit.
12	Blank	Not used.
13	MK 27 GYRO COMPASS PEDP-1 EP-W	Provides control of and protection for gyrocompass circuit.
14	KM 370-13A RADIO TEL ALARM GEN PEDP-1 EP-T	Provides control of and protection for radio telephone alarm generator circuit.
15	AN/SON SONAR SOUNDING PEDP-1 EP-R	Provides control of and protection for sonar sounding set circuit.

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Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Pilothouse Emergency Distribution Panel (Figure 2-129) (Continued)		
16	WEATHER FACSIMILE PEDP-1 EP-N	Provides control of and protection for weather facsimile circuit.
17	"X" BAND MTR PEDP-1 EP-L	Provides control of and protection for "x" band radar receiver transmitter circuit.
18	RADAR DISTRIBUTION PNL PEDP-1 EP-J	Provides control of and protection for radio distribution panel circuit.
19	AUTO PILOT SYSTEM PEDP-1 EP-G	Provides control of and protection for autopilot circuit.
20	"S" BAND MTR PEDP-1 EP-E	Provides control of and protection for "s" band radar receiver transmitter circuit.
21	WIND SPEED & DIRECTION INDICATOR PEDP-1 EP-C	Provides control of and protection for wind speed and direction indicator circuit.

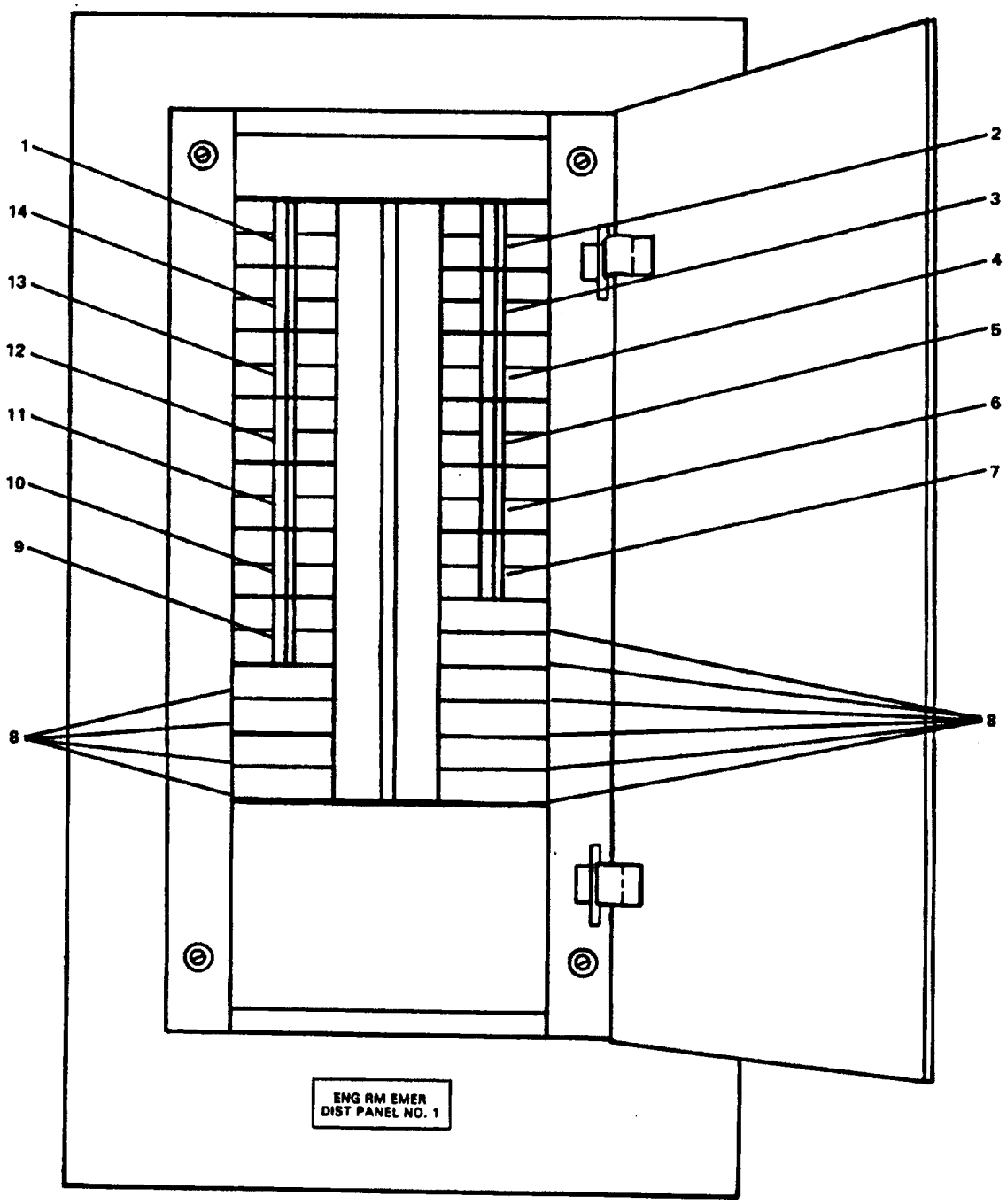

Figure 2-130. Engine Room Emergency Distribution Panel No. 1.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Engine Room Emergency Distribution Panel No. 1 (Figure 2-130)		
1	ENG RM EMER LIGHTS PORT EDP1-1 EL-A	Provides control of and protection for engine room emergency lights (port).
2	ENG RM EMER LIGHTS STBD EDP1-1 EL-B	Provides control of and protection for engine room emergency lights (starboard).
3	AMS II EMER LTS EDP1-1 EL-D	Provides control of and protection for auxiliary machinery space II emergency lights.
4	TLI SYSTEM EDP1-1 EP-H	Provides control of and protection for tank level indicator system.
5	FIRE DETECTION SYS EDP1-1EP-H	Provides control of and protection for fire detection system.
6	ENGINE ORDER TELEGRAPH SYS EDPL-1 EP-K	Provides control of and protection for engine order telegraph system.
7	BATTERY CHARGER MACH DC CONTROL EDP1-1 EP-M	Provides control of and protection for battery charger for the machinery plant monitoring system.
8	Blank	Not used.
9	Monitoring SYS CRT EDP1-1 EP-N	Provides control of and protection for machinery plant monitoring system display.
10	BATTERY CHARGER SSDG EDP1-1 EP-L	Provides control of and protection for battery charger for SSDG No. 1 batteries.
11	REMOTE PROPULSION INDICATING PANEL SYS EDPL-1 EP-J	Provides control of and protection for battery charger for SSDG No. 1 batteries.
12	TOWING MACHINE CONTROL POWER EDP1-1 EP-G	Provides control of and protection for control power circuits for towing machine.
13	STRG GEAR RM & TOW GEAR LKR LTS EDP1-1 EL-E	Provides control of and protection for lights in steering gear room and towing gear locker.
14	BOW THRUSTER & AMS I EMER LTS EDP1-1 EL-C	Provides control of and protection for lights in auxiliary machinery space I and bow thruster compartment.

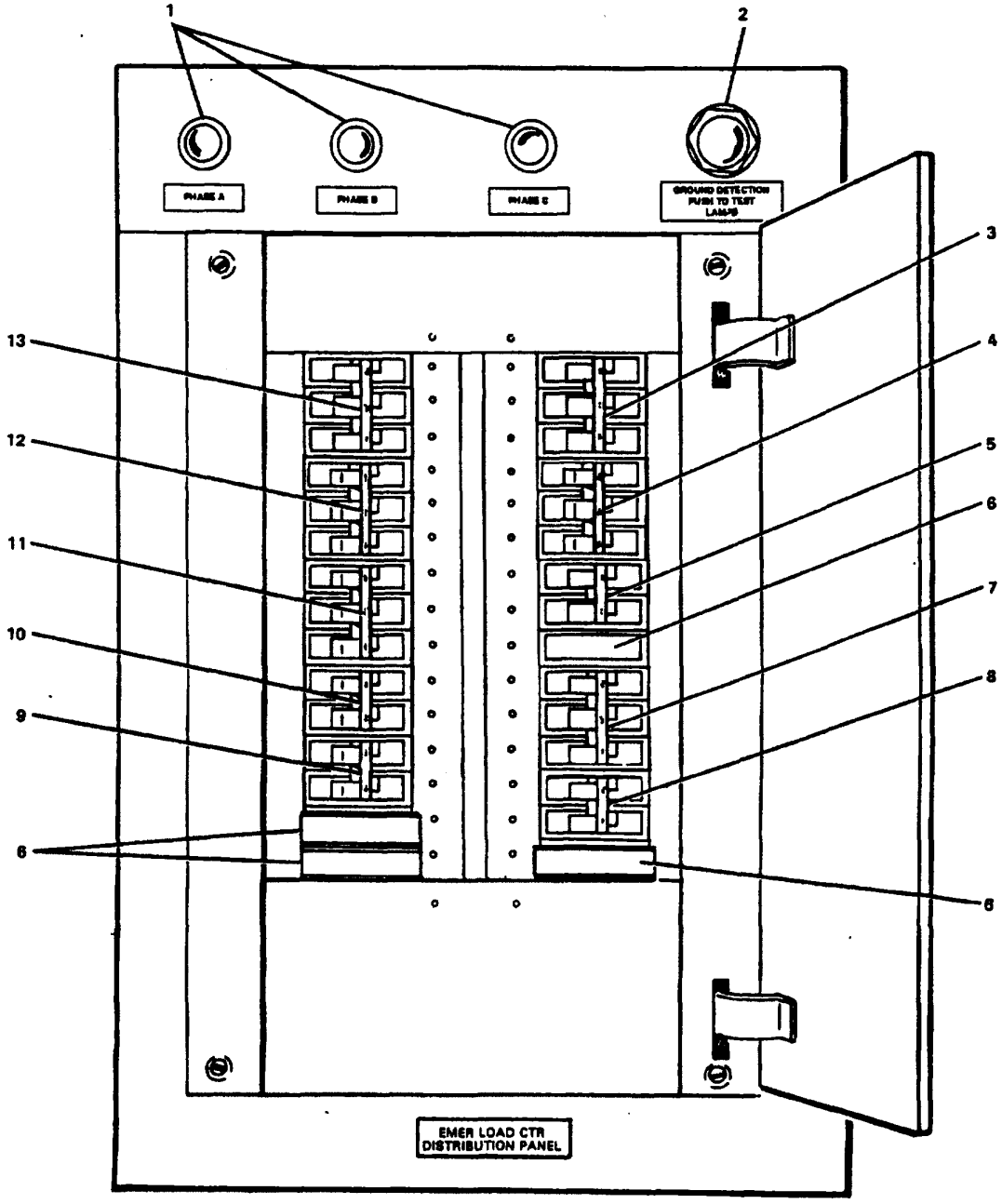

Figure 2-131. Emergency Load Center Distribution Panel.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or indicator	Function
	Emergency Load Center Distribution Panel (Figure 2-131)	
1	PHASE A, PHASE B, PHASE C Lamps	Used to indicate ground fault conditions.
2	GROUND DETECTION PUSH TO TEST LAMPS Push-button	Push to test lamps (1).
3	EMER DIST PNL #1 ELC-1 EL-EDP1	Provides control of and protection for emergency distribution panel No. 1 (Figure 2-130).
4	PILOT HOUSE EMER DIST PNL ELC-1 EP-PEDP	Provides control of and protection for pilothouse emergency distribution panel (Figure 2-129).
5	BATTERY CHARGER EMRG DIESEL GEN ELC-1 EP-B	Provides control of and protection for battery charger.
6	Blank	Not used.
7	NAVIGATION PNL ELC-1 EL-NLP	Provides control of and protection for navigation lighting panel.
8	Spare	Spare circuit breaker for future use.
9	EMERG DIESEL GEN JACKET WTR HEATER ELC-1 EP-C	Provides control of and protection for jacket water heater.
10	BATTERY CHARGER GENERAL ALARM ELC-1 EP-A	Provides control of and protection for general alarm system battery charger.
11	RADIO RM ELEX DIST PNL ELC-1 EP-EXDP	Provides control of and protection for radio room electronics distribution panel (Figure 2-127).
12	EXTERIOR EMER LTG PNL #2 ELC-1 EL-EL2	Provides control of and protection for exterior emergency lighting panel No. 2 (see Figure 2-128).
13	EMER LTG PNL #1 ELC-1 EL-EL1	Provides control of and protection for interior emergency lighting (Figure 2-126).

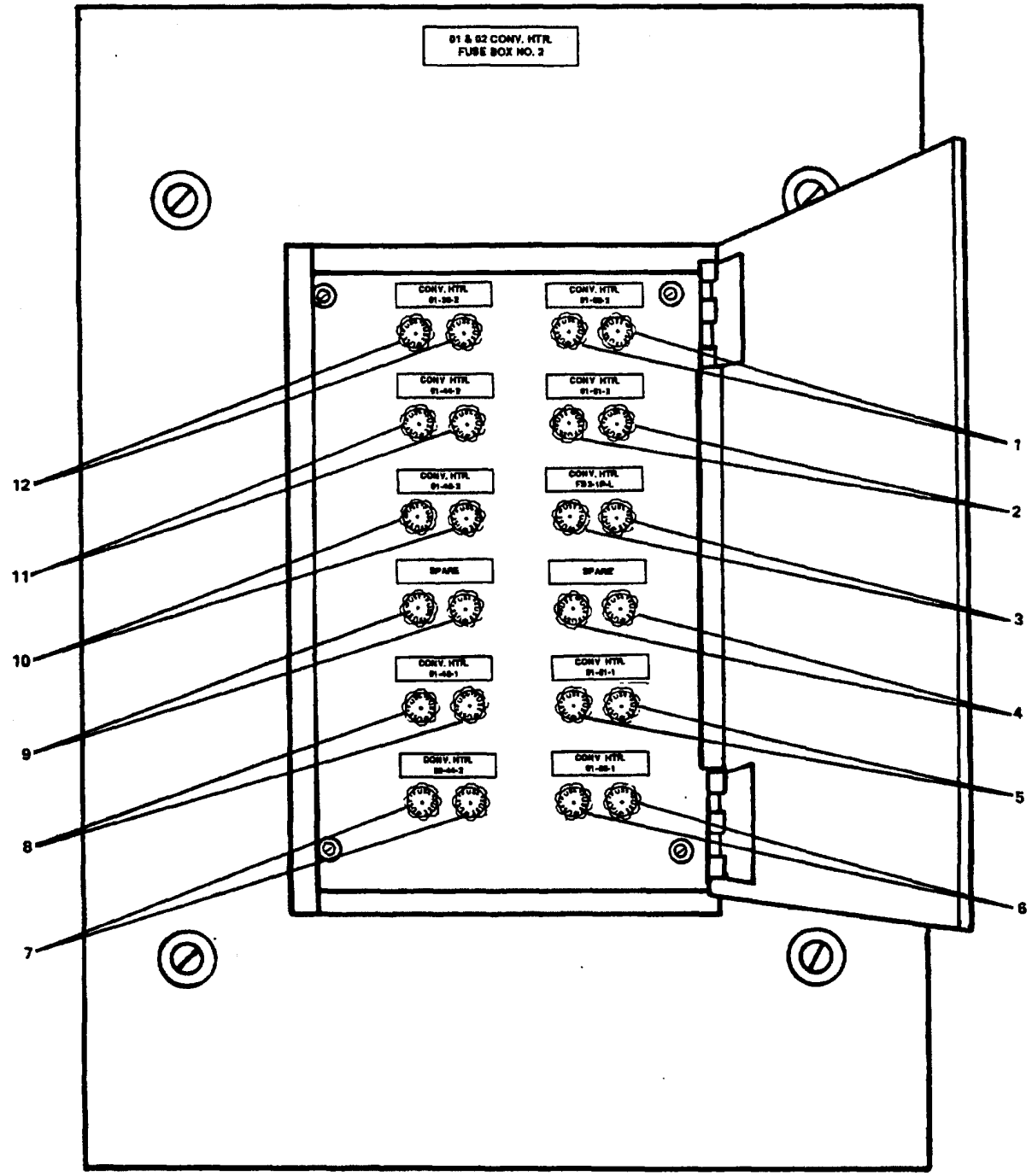

Figure 2-132. 01 & 02 Convection Heater Fuse Box No. 2.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
	01 & 02 Convection Heater Fuse Box No. 2 (Figure 2-132)	
1	CONV. HTR. 1-50-2	Provides fuse protection for convection heater for crews stateroom #3 sanitary space.
2	CONV. HTR. 01-51-2	Provides fuse protection for convection heater for chief engineer's stateroom sanitary space.
3	CONV. HTR. 1-57-2	Provides fuse protection for convection heater for laundry space.
4	SPARE FB2-1 P-M	Spare circuit for future use.
5	CONV. HTR. 01-51-1	Provides fuse protection for convection heater for captain's stateroom sanitary space.
6	CONV. HTR. 1-56-1	Provides fuse protection for convection heater for crews stateroom #1 sanitary space.
7	CONV. HTR. 02-44-2	Provides fuse protection for convection heater for 02 level sanitary space.
8	CONV. HTR. 01-45-1	Provides fuse protection for convection heater for officer stateroom #1 sanitary space.
9	SPARE FB2-1 P-H	Space circuit for future use.
10	CONV. HTR. 1-40-2 FB2-1 P-G	Provides fuse protection for convection heater for main deck passageway sanitary space.
11	CONV. HTR. 01-44-2 FB2-1 P-B	Provides fuse protection for convection heater for officer's stateroom #2 sanitary space.
12	CONV. HTR. 01-36-2 FB2-1 P-A	Provides fuse protection for convection heater for 01 level passageway sanitary space.

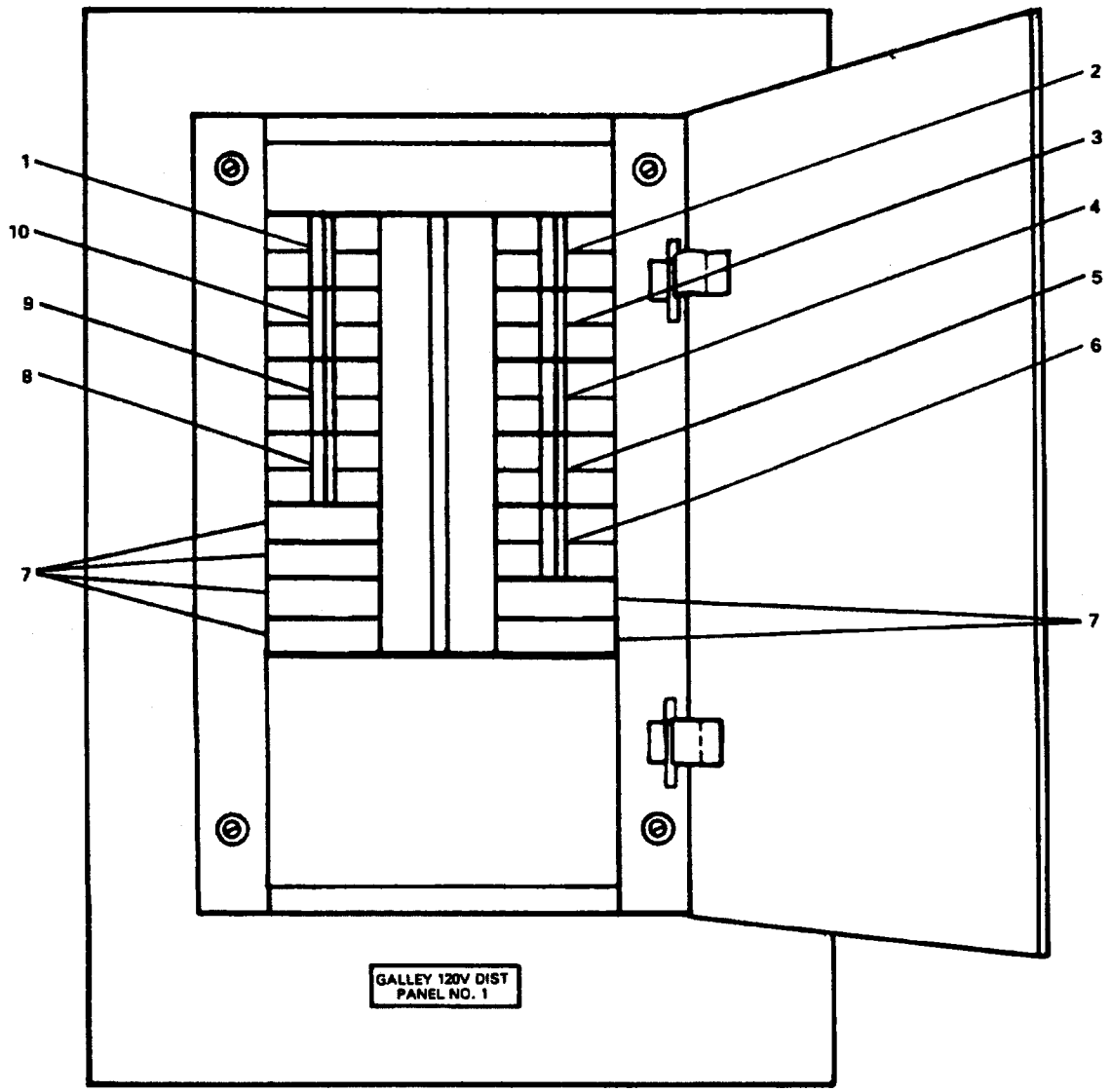

Figure 2-133. Galley 120V Distribution Panel No. 1.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Galley 120V Distribution Panel No. 1 (Figure 2-133)		
1	GALLEY RCPT DP1-1 L-A	Provides control of and protection for galley receptacles.
2	GALLEY REFRIGERATOR DP1-1 P-B	Provides control of and protection for galley refrigerator.
3	GALLEY LIGHTS DP1-1 L-D	Provides control of and protection for galley lights.
4	STEAM TABLE NO. 1 STEAM TABLE NO. 2 DP1-1 P-F	Provides control of and protection for steam tables.
5	MICROWAVE RECEPTACLES (2) DP1-1 P-H	Provides control of and protection for microwave ovens.
6	GAYLORD CONT. DP1-1 P-L	CAB. Provides control of and protection for galley ventilator hood control circuits.
7	Blank	Not used.
8	MEAT SLICER/ FOOD MIXER DP1-1 P-G	Provides control of and protection for meat slicer and food mixer.
9	GALLEY FREEZER DP1-1 P-E	Provides control of and protection for galley freezer.
10	GALLEY COFFEE POT RCPT DP1-1 P-C	Provides control of and protection for galley coffee percolator.

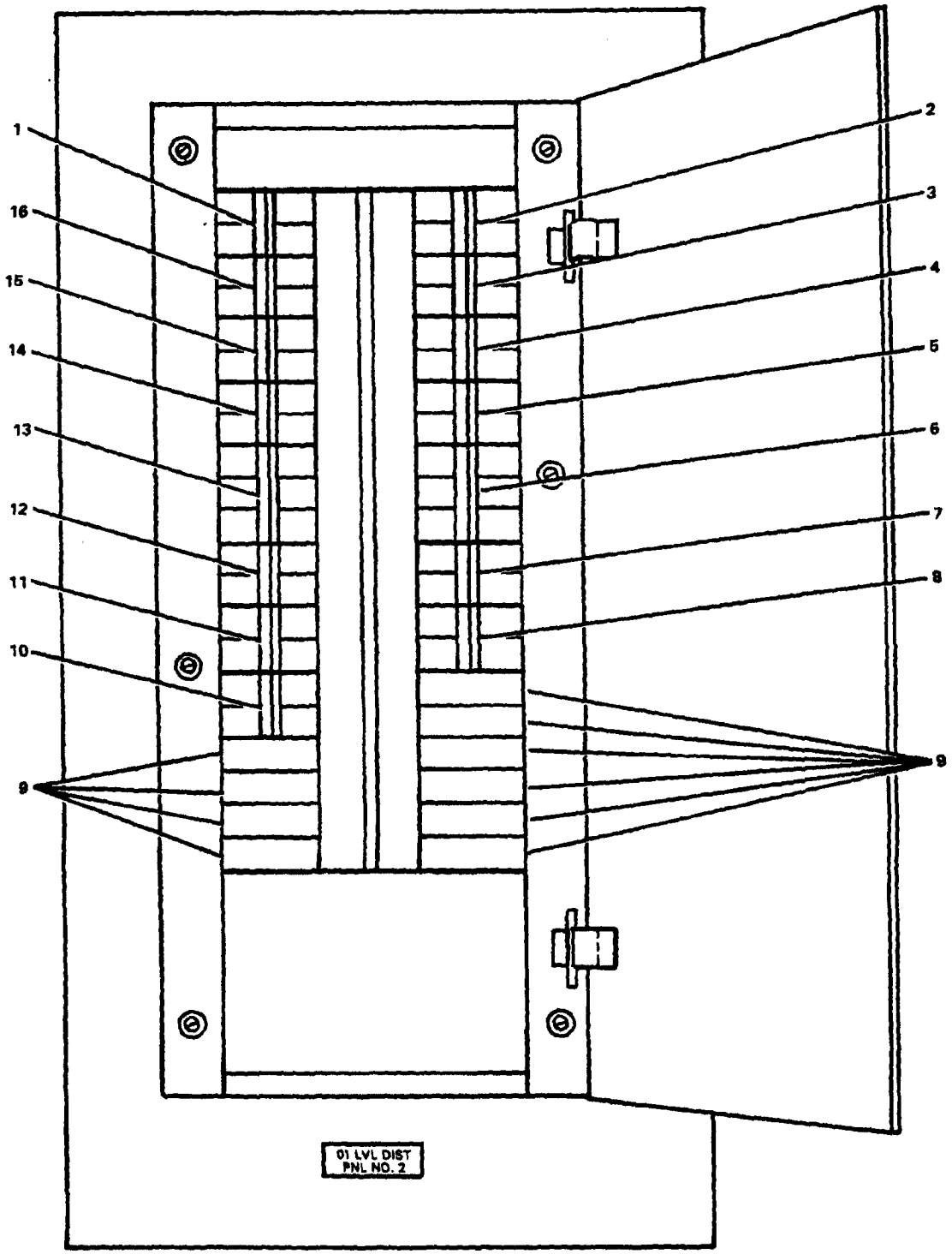

Figure 2-134. 01 Level Distribution Panel No. 2.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
01 Level Distribution Panel No. 2 (Figure 2-134)		
1	01 LEVEL INT LIGHTS PORT DP2-1 L-A	Provides control of and protection for port side 01 level interior lights.
2	02 LEVEL INT. LIGHTS DP2-1 L-B	Provides control of and protection for 02 level interior lights.
3	01 LEVEL RCPT STBD DP2-1 L-D	Provides control of and protection for starboard side 01 level receptacles.
4	02 LEVEL DRINKING FOUNTAIN DPI-1 L-F	Provides control of and protection for 02 level passageway drinking fountain.
5	SPARE DP2-1 L-H	Spare circuit breaker for future use.
6	SPARE DP2-1 L-K	Spare circuit breaker for future use.
7	01 LEVEL RCPT PORT DP2-1 L-M	Provides control of and protection for port side 01 level receptacles.
8	PILOTHOUSE DRINKING FOUNTAIN DP2-1 L-P	Provides control of and protection for pilothouse drinking fountain.
9	Blank	Not used.
10	2 LVL RCPTS DP2-1 L-R	Provides control of and protection for 02 level receptacles.
11	PILOTHOUSE RCPTS DP2-1 L-N	Provides control of and protection for pilothouse receptacles.
12	SPARE DP2-1 P-L	Spare circuit breaker for future use.
13	FUSE BOX NO. 2 01-02 LVL CONV HTR DP2-1 P-J	Provides control of and protection for fuse box No. 2.
14	01 LEVEL INT. STBD LIGHTS DP2-1 L-G	Provides control of and protection for starboard side 01 level interior lights.
15	01 LEVEL DRINKING FOUNTAIN DP2-1 L-E	Provides control of and protection for 01 level passageway drinking fountain.
16	01 LEVEL PASSAGEWAY LTS DP2-1 L-C	Provides control of and protection for 01 level passageway lights.

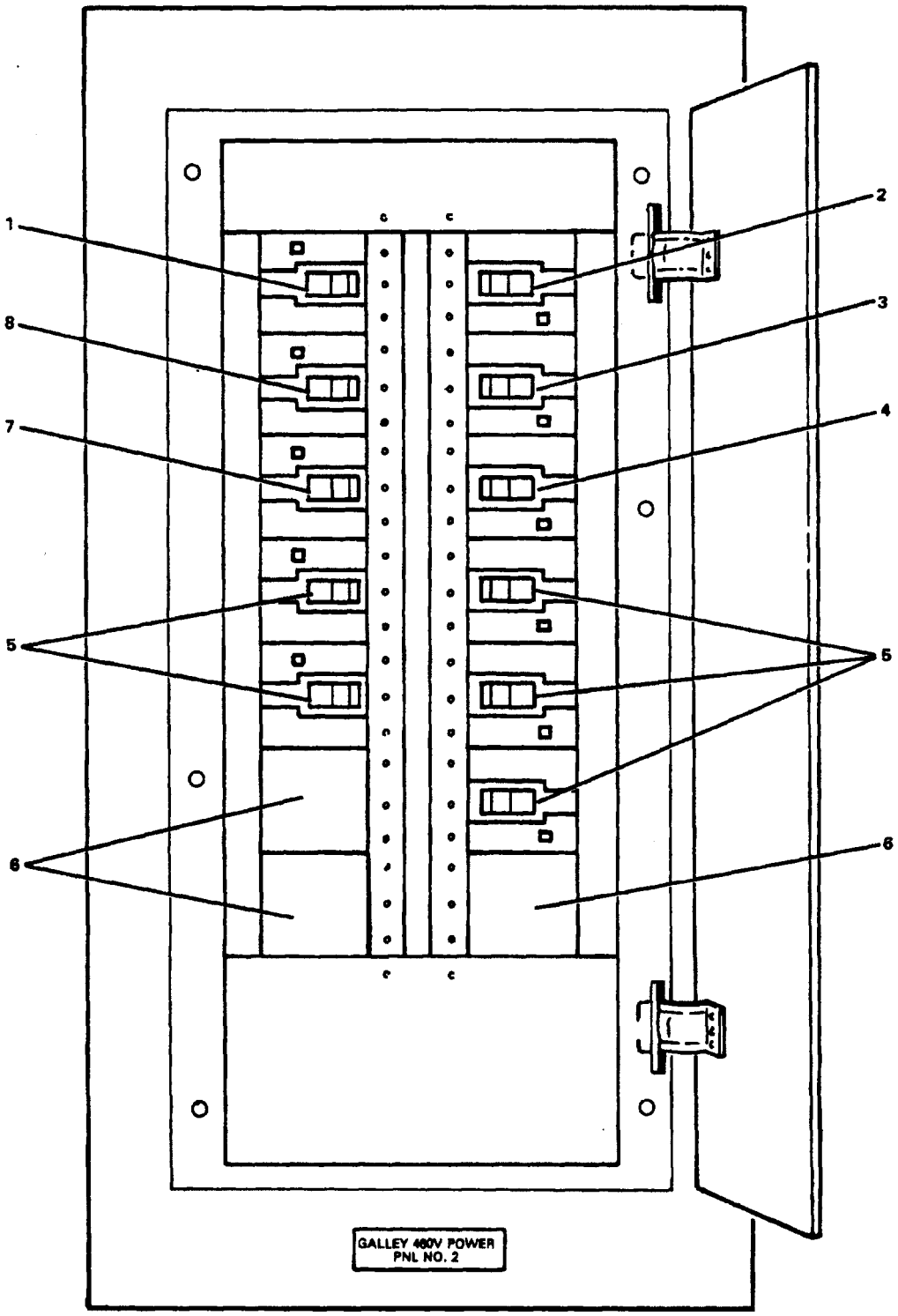

Figure 2-135. Galley 460V Power Panel No. 2.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Galley 460V Power Panel No. 2 (Figure 2-135)		
1	RHTR 1-23-2 PP2-4P-A	Provides control of and protection for galley supply reheater.
2	GALLEY SUPPLY FAN (S1-22-4) PP2-4P-B	Provides control of and protection for galley supply fan.
3	GRIDDLE PP2-4P-D	Provides control of and protection for griddle.
4	GALLEY EXHAUST FAN (E1-37-1) PP2-4P-F	Provides control of and protection for galley exhaust fan.
5	SPARE PP2-4P-H	Spare circuit breaker for future use.
6	SPARE PP2-4P-J	Not used.
7	DEEP FAT FRYER PP2-4P-E	Provides control of and protection for deep fat fryer.
8	RANGE PP2-4P-C	Provides control of and protection for range.

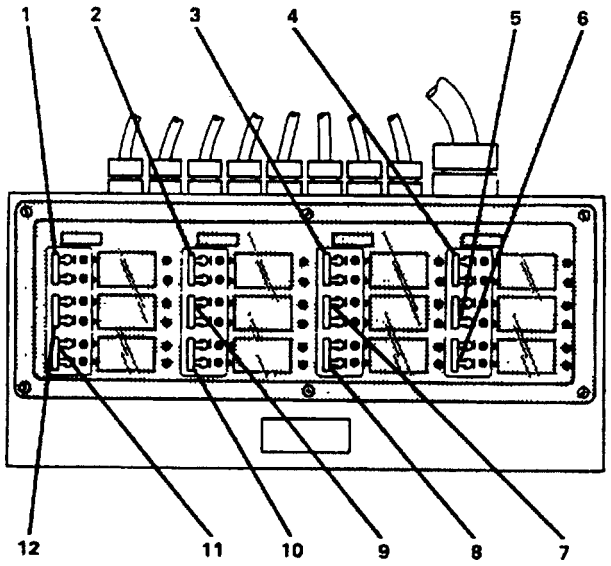

Figure 2-136. Machinery DC Control Distribution Panel.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Machinery DC Control Distribution Panel (Figure 2-136)		
1	HALON SHUTDOWN	Provides control of and protection for system. **NOTE** **Not applicable to Hull No. LT801, LT804 and LT805. Reference Para. 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment details and installation drawings.**
2	MACHY MNTR SYS	Provides control of and protection for machinery monitoring system.
3	RUDDER ANGLE	Provides control of and protection for rudder angle.
4	Spare	Not used.
5	Spare	Not used.
6	Spare	Not used.
7	STRG GR ALARM	Provides control of and protection for steering gear alarm circuit.
8	SSDG NO. 2	Provides control of and protection for SSDG NO. 2 monitoring circuit.
9	PMP DR ENG	Provides control of and protection for drive engine monitoring circuit.
10	BOWTHRSTR DR ENG	Provides control of and protection for thruster drive engine monitoring circuit.
11	Spare	Not used.
12	Spare	Not used.

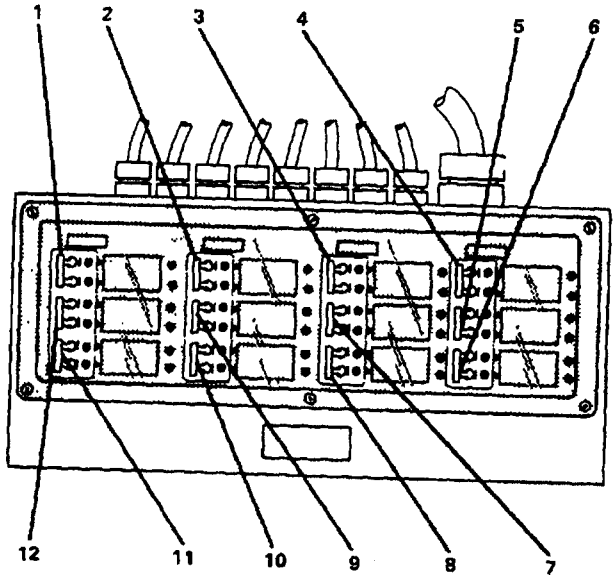

Figure 2-137. Radio Room DC Control Distribution Panel.

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
Radio Room DC Distribution Panel (Figure 2-137)		
1	AN/URC-92	Provides control of and protection of AN/URC-92 do circuit.
2	AN/VRC46	Provides control of and protection of machinery monitoring system.
3	AN/URC-80	Provides control of and protection of AN/URC-46 do circuit.
4	AN/APX-72	Provides control of and protection of AN/APX-72 do circuit.
5	STEERING DIMMER MODULE	Provides control of and protection of steering dimmer module do control circuit.
6	Spare	Not used.
7	GYRO	Provides control of and protection for gyrocompass do circuit.
8	Spare	Not used.
9	BINNACLE LT	Provides control of and protection for binnacle light circuit.
10	Spare	Not used.
11	Spare	Not used.
12	AUDIOAMP AN/6747/V	Provides control of and protection for the AN/6747N do circuit.

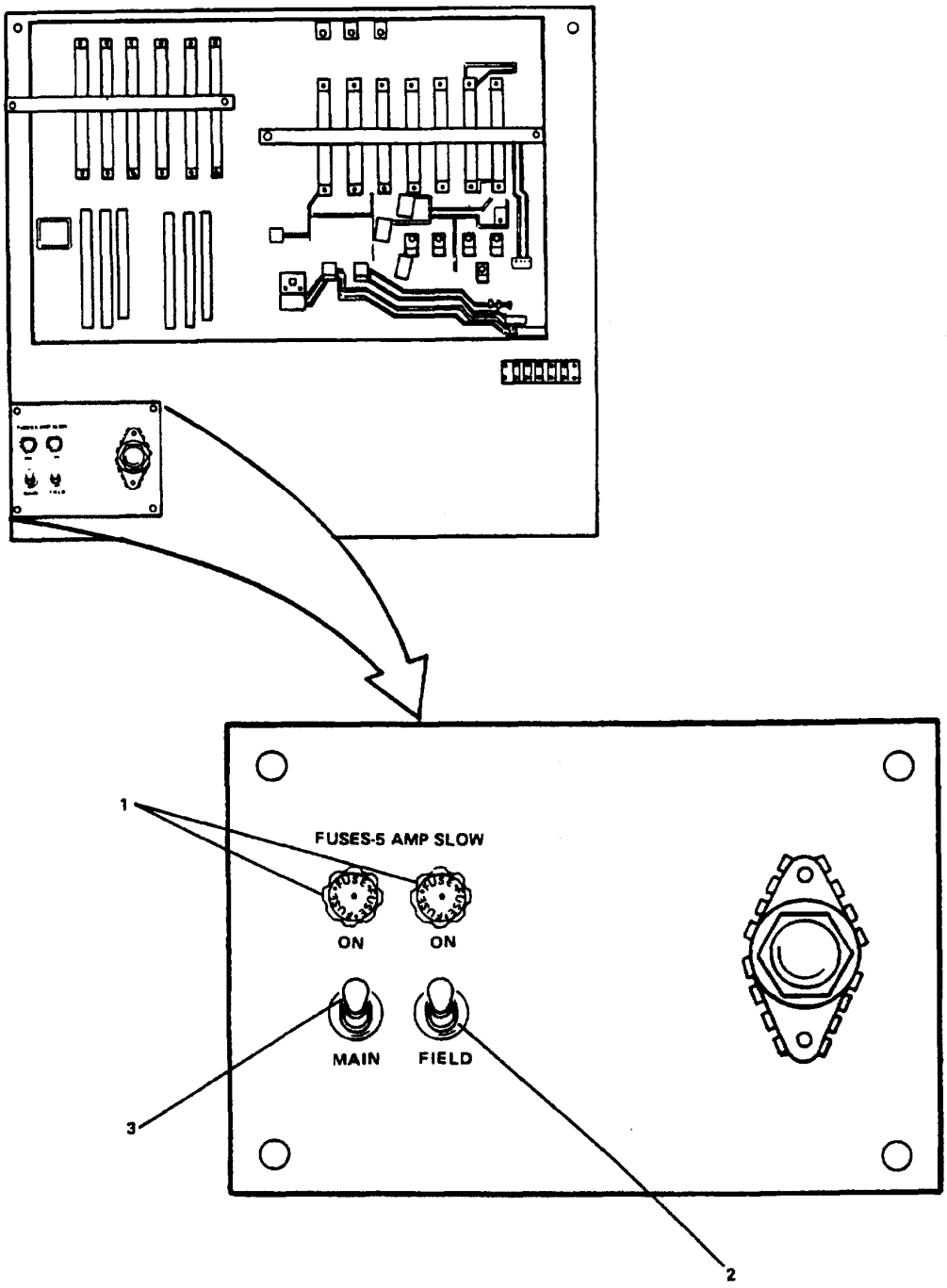

Figure 2-138. MACHY Monitoring SYS (CPU Multi-Remote) EDP1-24EP-M (7).

Table 2-1. Description of Operator's Controls and Indicators - CONT

Key	Control or Indicator	Function
MACHY Monitoring SYS (CPU Multi-Remote) EDP1-24EP-M (Figure 2-138)		
1	FUSES 5 AMP SLOW	Protects engine efficiency panel from amperage overload.
2	FIELD Switch	Provides ON-OFF control of power to the remote modules.
3	MAIN Switch	Provides ON-OFF control of power for the entire system and feeds power to the field power switch. **CAUTION** **Operator must not touch the keyboard since it is possible to erase or damage the computer program. Only contractor to use the keyboard or program the computer.**

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2-2. PMCS Introductory Material.

a. General. To keep the LT ready for operation, it must be systematically inspected so defects may be discovered and corrected, preventing serious damage or failure. DA Form 2404 (Equipment Inspection and Maintenance Worksheet) will be used for the PMCS. All corrected faults will be recorded on DA Form 55-40 (Deck Department Log) and DA Form 55-44 (Engine Department Log). All uncorrected faults will be transcribed to DA Form 2407 (Maintenance Request) and the appropriate log. PMCS will be accomplished as outlined in Table 2-2. The LT will be serviced by the intervals outlined in the PMCS table.

(1) Before You Operate. Required preventive maintenance services will be performed before (B) operating, Any deficiencies noted will be corrected before equipment operation. Observe all WARNINGS and CAUTIONS.

(2) While you operate. During (D) operation services are the checks on the vessel's performance. If any deficiencies are noted that will result in damage to the equipment, operation of that equipment should be stopped. Observe all WARNINGS and CAUTIONS.

(3) After you operate. After (A) operation services (A) are the basic preventive maintenance services. Services will be performed at intervals based on normal operation of the equipment. Observe all WARNINGS and CAUTIONS.

(4) If your equipment fails to operate. Report any deficiencies using the proper forms. See DA Pam 738-750.

b. PMCS Procedures. The PMCS table entries are Item No., Interval, Item to be inspected, Procedures, and Equipment Not Ready/Available If.

(1) Item no. column. Checks and services shall be numbered in chronological order, regardless of interval.

(2) Interval column. This column indicates when to do a certain check or service.

(3) Item to be inspected. This column lists the equipment or item to be checked or serviced

(4) Procedure column. This column contains a brief description of how to perform the checks and services. Carefully follow the instructions. If the necessary tools are not available, or if the procedure tells you to, have organizational maintenance do the work.

(5) Equipment /does not perform. If the equipment does not perform as required, refer the problem to organizational maintenance. Report any malfunctions or failures on the proper DA Form 2404, or refer to DA Pam 738-750.

(6) First time operator. Perform weekly as well as before operations PMCS if:

(a) You are the assigned operator and have not operated the item since the last weekly check.

(b) You are operating the item for the first time.

(7) Equipment is not ready/available if: column. This column tells you when and why your equipment cannot be used.

NOTE

The terms "ready/available" and "mission capable" refer to the same status: Equipment is on hand and can perform its combat mission (See DA Pam 738-750).

(8) Leakage classifications. Leakage definitions for operator/crew PMCS shall be classified as follows:

(a) Class I. Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.

(b) Class II. Leakage of fluid great enough to form drops but not enough to cause drops to drip from the item being checked/inspected.

(c) Class III. Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

CAUTION

- **Equipment operation is allowable with minor leakages (Class I or II). Of course, you must consider the fluid capacity in the item/system being checked/ inspected. When in doubt, ask your supervisor.**
- **When operating with Class I or Class II leaks, continue to check fluid levels as required in your PMCS.**
- **Class III leaks should be reported to your supervisor or organizational maintenance.**

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

NOTE
If the equipment must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
	B	D	A	W	M			
							WARNING **Electrical Hazards. The electrical system and the pneumatic equipment system are dangerous when performing maintenance or Inspections. Be sure to observe all warnings to prevent injury or possible death of personnel.** **CAUTION** **Equipment operation is allowable with minor leakages (Class I or II). Consider the fluid capacity in the item/system being checked/inspected. When in doubt, notify the section supervisor.** **When operating with Class I or Class II leaks, continue to check fluid levels as required in the PMCS.** **Class II leaks should be reported to your supervisor or unit maintenance.** **Operating the equipment contrary to published instructions will cause damage and possible destruction of the equipment. Always be sure the equipment is operated properly.** **NOTE** Before performing preventive maintenance checks and services, review appropriate procedures to ensure that necessary tools, spare parts and equipment are on-hand.	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
1			•	•		General Craft Cleanliness	Inspect glass, frames, and brackets for damage; clean windows, vents and ports. Inspect entire craft for cleanliness.	
2						Life Lines and Stanchions	Ensure life lines are in good condition, and are secured in place. Visually inspect safety chains for wear and corrosion. Ensure safety chains are utilized where required.	
3						Life Jackets	Inspect jackets for rips, oil stains, broken straps, fiber deterioration, and hull marking of vessel.	Life jackets are unserviceable.
	•						Check that light attached to jacket operates and that case is not damaged.	
4						Life Rings	Inspect for damage and proper marking. Check that marker lights function when casing is turned upright.	
5						Fire Pull Boxes	Inspect box and pull handles for damage. Document all defects and discrepancies and refer to unit maintenance.	Damage or condition exists which makes Fire Pull Box inoperable.
6						Fire Stations	**WARNING** **During inspections, immediately report any defects to your supervisor and correct without delay or refer to unit maintenance.**	
			•				Inspect fire hose in the hose rack for tears, fraying or cuts. Check nozzle and nozzle handle for proper operation.	
					•		Check hose connections for tightness.	Hoses are defective or connections will not attach properly.
7						Heat Sensors and Smoke Detectors	Inspect heat sensors and smoke detectors for damage.	Damage or condition which makes detector inoperable.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Services-CONT

B - Before D - During A - After W - Weekly M - Monthly

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
	B	D	A	W	M			
8	•			•		Portable Fire Extinguishers	Inspect for tight mounting, full charge, corroded nozzles, and closed valves with untampered seals, and certification. Direct particular attention to extinguisher lines and nozzles in the engine room, checking for damage.	Extinguisher is damaged or seal is broken. Certification is out of date.
9	•			•		Doors, Hatches, Covers, and Scuttles	Inspect for proper installation, missing/defective fasteners. Also check gasket for proper seal.	Watertight integrity or operation capability is impaired.
10						Intercom		
	•				•	Exterior	Visually inspect exterior for damage, water accumulation, or dirt build-up. Clean using a soft cloth.	
	•				•	Hardware	Inspect mounting hardware for tightness. Tighten as necessary.	
		•			•	Rotary switches	Check mechanical operation of each rotary switch. Replace any worn or incorrectly operating parts.	Damaged or defective parts.
		•			•	Unit performance	Check the two-way voice capability of the master station. Select other stations on the system and conduct a two-way conversation.	
		•		•			a. Transmissions and receptions should be clear, undistorted, and easily understood.	
		•		•			b. Check the indicator lamps. The CALL lamps at the called station(s) should be lit. The REL lamp at the calling station should be lit. If called station is busy, the BUSY light should be lit.	
		•		•			c. Check the control switches. Vary position of the dimmer control switch and observe intensity of the panel illumination. Vary VOLUME control switch during reception and verity intensity of the received speech is controlled.	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
10		•		•		Intercom-continued	d. Check the hands free capability by operating hands free with another station in the system. Document all observed unit malfunctions and refer to unit maintenance.	One or more unit malfunctions occur.
11						Sound Powered Telephones		
	•	•		•		Head Set-Chest Set	Visually inspect head set connections to the chest set for frayed wiring or loose connections. Inspect ear cups for tears and cleanliness. Inspect neck straps for fraying or missing fasteners. Press push-button on mouthpiece and release. Observe push-button goes in and out. Visually inspect wire from chest set to jack plug for loose connections, cracks or damaged insulation.	
		•		•			Check the two-way voice capability of the headset. Select another station on the system and conduct a two-way conversation. Transmission and receptions should be clear, undistorted, and easily understood. Document all observed discrepancies or unit malfunctions and refer to unit maintenance.	
		•			•	Handsets Exterior	Visually inspect the handset and wiring for loose connections. Tighten as necessary. Visually inspect exterior for damage, water accumulation, or dirt buildup. Clean using a soft, clean cloth.	
					•	Hardware	Inspect mounting hardware for tightness. Tighten as necessary.	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Services-CONT

B - Before D - During A - After W - Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
11						Sound Powered Telephones - continued		
		•			•	Rotary Switches	Check mechanical operation for each rotary switch. Document any worn part or incorrectly operating parts and refer to unit maintenance.	
		•			•	Operation	Check the two-way voice capability of the unit. Select other stations and conduct a two-way conversation.	
		•					a. Transmissions and receptions should be clear, undistorted and easily understood.	
		•					b. Check the audible alarms and indicators, where applicable. On model SWLR the indicator light should light along with the calling signal. Document all observed unit malfunctions and refer to unit maintenance.	
12	•	•	•		•	Power Distribution System (including 24 VDC panels)	**WARNING** **Electrical wiring, panels, and components contain high voltages that can cause severe injury or death.** **NOTE** **Electrical wiring checks and services consist of visual inspections only. Observe all CAUTION and WARNING labels on electrical equipment.**	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Services-CONT

B - Before D - During A - After W - Weekly M - Monthly

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
	B	D	A	W	M			
12						Power Distribution System – continued		
					•	Wiring	Visually inspect all accessible wiring, fuse terminal blocks, and connections. Ensure hardware and connections are securely supported, clean and undamaged. Visually inspect cables and wiring insulations. Ensure insulation is not worn, chafed or damaged. Visually inspect conduits and shielding. Ensure conduits are securely supported and undamaged; shielding is unfrayed and properly grounded.	
		•			•	Panels	Inspect power and lighting panels, motor controllers, and other electrical panels for secure mounting. Visually inspect panel surface for damage. Check operation of indicators and ground detection circuit.	Panel is not securely mounted or has damage which could affect operation. Indicators or ground detection circuits do not operate.
		•			•	Interior and Exterior Lighting	Inspect lighting fixtures for secure mountings and obvious damage. Ensure fixtures operate when turned on.	Lighting fixtures do not operate when turned on.
13						HVAC Equipment		
		•			•	Supply and Exhaust Fans	Check units for unusual noises or excessive vibration. Intake/exhaust screens are clean and free of debris.	Unusual noise or excessive vibration.
		•			•	Thermostats	Visually check thermostats for signs of wear, dirt buildup, damage and corrosion.	
		•			•	Unit Heaters	Check heater mountings are secure and obvious damage. Ensure heaters operate when turned on.	Heaters do not operate when turned on.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Services-CONT

B - Before D - During A - After W - Weekly M - Monthly

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
	B	D	A	W	M			
14						Piping Systems		
		•			•	Piping	Visually inspect all piping for leaks. Pay particular attention to all valves, connections, joints, etc. Correct all leaks or document and report discrepancies/damage/Class III leakage to engineer on watch and unit maintenance.	Class III leaks. Any fuel leaks or other liquid.
		•			•	Pressure Reducing Valves	Inspect pressure reducing valves for proper operation. Report discrepancies/damage to engineer on watch and unit maintenance.	Pressure reducing valve inoperative.
	•	•	•		•	Sanitary Spaces	Visually inspect all faucets on wash basins and showers for leaks. Inspect all commodes for leaks and stoppage. Inspect shower and wash basin drains to ensure they are unstopped. If Class III leakage is observed or if drains or commodes are stopped, refer to supervisor and unit maintenance.	Class III leaks or commodes or drains are stopped.
					•	Drinking Fountains	Visually inspect fountains for damage or missing parts. Operate water valve and observe drain flow.	Unit damaged, missing parts, or drain sluggish or plugged.
						Pilothouse Top		
15	•	•	•	•		Magnetic Compass	When underway check heading against gyro on two known courses. Check deviation whenever metal structural changes are made to vessel; or when electronic equipment is added/removed. Check that deviation card is current and annual deviation card is located in immediate vicinity of compass. Check compensating magnets. If damage is found, refer to unit maintenance.	Magnetic compass is inoperative. Compass will not swing freely in gimbal.
16	•			•		Mast and Yardarm	Inspect for mechanical damage to navigational equipment and ensure lights are functional.	Mast is damaged to extent that navigational systems are not properly supported.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Services-CONT

B - Before D - During A - After W - Weekly M - Monthly

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
	B	D	A	W	M			
17	•	•			•	Fire Monitors	Inspect for secure mounting. Inspect exterior for damage, corrosion or rust. Ensure traversing lock locks monitor in place.	Not securely mounted. Excessive corrosion. Traversing lock does not secure monitor.
		•			•		Ensure valve operates smoothly.	Valve does not operate.
		•					Observe pedestal, swivel, and monitor for leaks.	Class III leaks.
18						500 Watt Xenon Searchlights (PORT and STBD)	**WARNING** • High pressures exist Inside lamp, especially when hot, and under certain conditions it could explode. Handle lamp only In its protective cover. • Remove protective cover from lamp before energizing circuits. Protect the eyes and wear gloves when removing cover from lamp. An industrial type face mask is recommended for eye and face protection. • Avoid direct exposure from the powerful direct and reflected radiations given off by the lamp. The front cover glass provides protection from these radiations. • Do not stand too close to searchlight front cover glass when lamp Is lighted. In the event of lamp explosion the front cover glass could break. **CAUTION** Operation of lamp with finger marks or grease on the surface will cause deterioration of the quartz tube.	

Table 2-2. Preventive Maintenance Checks and Service - CONT

B - Before D - During A - After W - Weekly M - Monthly

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
	B	D	A	W	M			
18						500 Watt Xenon Searchlight (PORT and STBD) - continued		
	•					Lamp	Visually inspect lamp for blackening. If black, refer to unit maintenance for repair.	
	•						Visually inspect for crack in the quartz. If a crack is detected, refer corrective action to unit maintenance.	
				•		Reflector	Visually inspect for tarnishing, dirt buildup, or corrosion. Refer cleaning requirements to unit maintenance.	
				•		Front Cover Glass	Visually inspect glass for defects or dirt buildup. Refer corrective action to unit maintenance.	
				•		Searchlight	Visually inspect the case for damage, dirt buildup, or corrosion. Refer corrective action to unit maintenance.	
						03 Level Exterior		
19						Standard Bearing Repeaters (AFT, PORT and STBD)		
	•			•		External	Visually inspect exterior surfaces for cleanliness. If dirty, clean with soft cloth and soapy water.	
	•			•		Card Window	Check for cleanliness and broken glass. If glass is broken, refer to unit maintenance.	Glass broken.
	•			•	•	Binnacle and Shock Mount	Check that binnacle moves freely in its shock mount. If binnacle binds, refer to unit maintenance.	Binnacle does not move freely in shock mount.
		•		•		Dimmer	Check dimmer control of illumination level.	Dimmer inoperative.
	•					Synchronizer Knob	Turn synchronizer knob for card rotation.	If card does not rotate.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
20	•			•		Control Station (PORT and STBD)	Inspect control station for cleanliness; clean as required. Look for any loose, missing, or broken switches or controls, gauges, indicator lights, or obvious damage. Ensure panel cover is tight. Ensure throttle, command transfer, and non- follow up controls operate smoothly and do not bind.	Any control or indicator unserviceable.
	•			•		Rudder Angle Indicator	Ensure dimmer is able to adjust intensity of lights.	Light intensity cannot be adjusted.
	•	•					Ensure needle moves when joystick is moved.	Needle does not move.
	•			•		Remove Propulsion Indicator Panel	Press and hold LAMP TEST button. All lights should light. Adjust intensity of lights using DIMMER control.	Any light does not light. Light intensity cannot be adjusted.
		•		•		Control Station	Observe lights and gauges to ensure proper operation.	Lights and gauges do not operate properly.
						<u>Pilothouse</u>		
21						Binocular Storage Boxes	Inspect storage box for secure mounting.	Box not securely mounted.
22						Chart Table	Inspect table for secure mounting.	Table mounting not secure.
23	•	•		•		Navigation Lighting Panel	Visually inspect to ensure that all navigation lights operate properly when the respective light switches on the navigation lighting panel are in the primary and secondary position. Refer corrective actions to unit maintenance.	Lights are inoperative. Circuits are defective.
	•			•			Remove fuse. Ensure alarm sounds.	Alarm inoperative.
24				•		General Alarm	Sound alarm. Ensure all bells and lights operate in all compartments.	Bell or light does not operate.
25				•		Fire & Detection System Remote Indicator Panel C-SM29	Inspect panel for obvious damage. Test operation at main fire detection indicator panel.	Obvious damage. Does not operate when tested.

Table 2-2. Preventive Maintenance Checks and Service - CONT

B - Before D - During A - After W - Weekly M - Monthly

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
	B	D	A	W	M			
26			•			Emergency Stop Switches (Exhaust and Recirculation Fan	Inspect panels for obvious damage or missing or broken switches or indicators.	Obvious damage or missing or broken switches or indicators.
27		•				Clinometer, Trim	Inspect for obvious damage and secure mounting.	Not securely mounted or obvious damage.
28						Open Steering Compass Repeater		
				•		External	Visually inspect exterior surfaces for dirt. If dirty, clean with soft cloth.	
				•		Card Window	Check for cleanliness and broken glass. If glass is broken, refer to unit maintenance.	
				•		Dimmer	Check dimmer control illumination of repeater.	
	•					Synchronizer Knob	Turn synchronizer knob for card rotation.	If card does not turn.
				•		On-Off Switch	Ensure switch operates properly.	
29	•			•		Helm	Visually inspect helm for obvious damage.	Any damage which could effect operation.
	•	•				Operation	Ensure helm operates smoothly and does not bind. Ensure helm and rudder indicator are synchronized.	Any binding or unusual operation.
30		•				Ship Whistle Pull Valve	Observe valve operates smoothly and closes when released.	Valve does not operate smoothly or shut off horn when released.
31	•			•		Alarm Switchboard (ELI -1 EL-K)	Visually inspect for obvious damage. Press ALARM TEST button. Verify alarm indications.	Obvious damage. Alarms do not occur.

Table 2-2. Preventive Maintenance Checks and Service - CONT

B - Before D - During A - After W - Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
32	•			•		Pilothouse Console	Inspect console for cleanliness; clean as required. Look for any loose, missing, or broken switches or controls, gauges, indicator lights, or obvious damage. Ensure throttle controls operate smoothly and do not bind.	Any control or indicator unserviceable.
	•			•		Engine Order Telegraph	Conduct test with Enclosed Operating Station (EOS) to ensure communication. Move selector through each position ensuring corresponding indicator lights.	No communication with EOS.
	•			•		Autopilot Control Panel	Ensure dimmer controls intensity of display.	
		•					Ensure autopilot tracks heading when engaged.	Does not maintain heading.
	•			•		Remote Propulsion Indicator Panel	press and hold LAMP TEST button. All lights should light. Adjust intensity of lights using DIMMER control.	Any light does not light. Light intensity cannot be adjusted.
	•			•		Steering Control Panel	Press PANEL TEST pushbutton. All lights should light. Using dimmer adjust intensity of indicator lights.	One or more panel lights do not light.
		•				Bow Thruster Control Panel	RUN LT should be lit. HI WTR TEMP LT and LO PRESS LT should not light. Verify operation of start/stop controls and RPM indicator. Adjust intensity of lights using DIMMER control.	HI WTR TEMP LT or LO PRESS LT illuminates. Controls inoperative.
		•				Fire Pump Remote Control Panel	One run light should be lit.	Neither run light is lit.
	•	•				Searchlight Control Panel	Have another soldier observe searchlight. Operate joystick to ensure searchlight moves in desired direction. Change SPEED control and operate joystick to ensure SPEED control operates properly. Operate focus switch to ensure searchlight can be focused.	Searchlight cannot b directed from control panel.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
	B	D	A	W	M			
32						Pilothouse Console – cont.		
		•				Control Air Pressure Gauge	With pilothouse console in command gauge should read 125 psi.	Reading below 110 or above 140 psi.
					•	Command Transfer	Test command transfer operation. Ensure control operates smoothly. Verify ability to transfer control.	Unable to transfer control.
33						Clearview Screens		
	•			•		Windows	Visually inspect windows for obvious damage and secure mounting.	Window broken or not securely mounted. Motor is loose.
	•			•		Control Box Exterior	Visually inspect exterior for obvious damage and secure mounting.	Control Box damage or not securely mounted.
		•				Operation	a. Turn on MOTOR switch; ensure MOTOR indicator is lit and screen spins.	Window does not spin.
							b. Turn on heater switch; ensure HEATER indicator is lit. After 5 minutes place hand near but not on screen; warmth should be felt.	Heater does not work.
34						<u>02 Level Passageway</u> Searchlight Power Supply (located on bulkhead at bottom of pilothouse ladder)	**WARNING** **On initial startup, DO NOT energize circuit before first checking to ensure that the protective lamp cover has been removed. Use extreme care when performing maintenance work, making adjustments or operating the searchlight. Dangerously high voltage over 50,000 Vac) radio frequency power Is used in the lamp starting circuit. Be sure to observe all WARNINGS to prevent injury or possible death of personnel.**	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M – Monthly

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
	B	D	A	W	M			
34						Searchlight Power Supply – cont.		
		•				Fan	Check for airflow at exhaust opening when searchlight is turned ON. If airflow is not detected, notify corrective action to unit maintenance.	Fan is not operating.
		•				Ammeter	Check ammeter for correct current reading (22 amps). If adjustments are required, notify unit maintenance.	Lamp current is not correct.
			•			Power Supply Case	Visually inspect case for damage, wear, or dirt buildup. Notify unit maintenance of damage or cleaning requirements.	
					•	Elapsed Time Meter	Check to determine if lamp should be replaced. (Recommended replacement time is 1500 to 1600 hrs elapsed time.) Notify unit maintenance to replace lamp. **NOTE** A used lamp should be considered for use in emergency situations. Properly protect, store, and identify lamp as a spare.	
35	•				•	First Aid and Medical Supplies	Inspect and check contents in the first aid kits (with itemized list of contents in container) for completeness and serviceability. Check for shortage or damage to items and replace. Inventory medical supplies.	Short medical supplies.
						<u>Damage Control Center</u>		
36						Gyrocompass	Check that light is OFF.	
		•				Follow-up Alarm Lamp		Power loss to compass.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
36						Gyrocompass-continued		
		•				Caged Lamp	Check that light is OFF.	
	•	•				Latitude Control	Check that control is set at local latitude.	
	•	•				North-South (N-S) Switch	Check that switch is set at proper latitude.	
	•	•				Level Meter	Normal settled tilt indication.	
	•	•				Azimuth Card Reading	Check that azimuth reading is within 2 degrees when settled.	
	•			•		Card Window	Check for cleanliness.	
	•			•		Fluid Level Viewed in Window	Check that fluid has no bubbles present. If bubbles present, refer to unit maintenance.	Bubbles present.
		•		•		Master Compass	Check for oil seepage around any seam or seal. Report any leakage to unit maintenance.	Any class of oil leakage.
		•		•		Shock Mounts and Binnacle	Check that binnacle moves freely in its shock mount. If binnacle binds or does not move, refer to unit maintenance.	Binnacle does not move freely in shock mount.
		•		•		Alarm Unit	Visually inspect for damaged or missing indicators and controls.	Unit damaged or missing or broken indicators and controls.
		•		•		Transmission Unit	Visually inspect for damaged or missing indicator and controls.	Unit damaged or missing or broken indicators and controls.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
						Radio Room		
37					•	Radio Room Door Alarm	**NOTE** **Notify pilothouse that alarm is to be tested.**	
							Open door; contact pilothouse to ensure both alarms (buzzer and light) operated.	Either alarm does not operate.
							Set rotary snap switch to OFF position. Contact pilothouse to ensure alarms are silenced.	Switch does not silence alarm.
							Secure alarm or door, as appropriate.	
38					•	Curtain	Inspect track for secure mounting.	Track is not securely mounted.
							Inspect curtain for serviceability.	Curtain has large tears or holes.
						Electronic Stores		
39	•	•	•		•	Battery Chargers	**NOTE** **Top cover of battery box must be removed to check batteries.**	
							Check battery charger for proper connections to battery. Ammeter should read near 0 for a trickle charge. If the reading is above 3 AMPS, refer to unit maintenance.	
							NOTE **A high reading indicates the batteries are weak and are being recharged or that one or more batteries are unserviceable.**	
40					•	Battery Box	Visually inspect battery box for obvious damage.	Vent is obstructed. Ensure vent is not obstructed.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
41						Batteries	**WARNING** **Do not smoke when observing battery electrolyte level. Batteries give off fumes that can explode. Electrolyte is an acid and can cause personal Injury if it contacts skin or eyes. Wear approved goggles, gloves, and apron.** **NOTE** **Top Cover of battery box must be removed to check batteries.**	
	•		•	•		Batteries, Cables and Terminals	Inspect batteries, terminals, connections, cables and vent caps for cleanliness and tightness. Clean or tighten terminal connections as required. Clean battery as required.	
					•	Electrolyte	Check electrolyte level and check specific gravity of electrolyte with hydrometer.	
						<u>Arms Stowage Room</u>		
42				•		Arms Stowage High Temperature Sensors and Alarm	Visually inspect high temp. alarm circuit for obvious damage.	
43				•		Sprinkler Heads	Visually inspect for corrosion or damage. Refer to unit maintenance if unserviceable.	Sprinkler heads are corroded or damaged enough to affect operation.
44					•	Storage Lockers	Inspect lockers for secure mounting. Inspect lockers to ensure they can be adequately secured to protect contents.	Lockers not securely mounted or cannot adequately secure contents.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
						02 Level Exterior		
45				•		Life Raft	**WARNING** • **During inspection, immediately report noted defects to your supervisor.** • **Your life and that of the crew may depend on this equipment working in an emergency.** • **Use caution when Inspecting cylinder lanyard connected to eye bolt on deck. Accidentally pulling this cable will cause liferaft to inflate which could injure personnel or damage raft assembly.** **NOTE** **Servicing must be carried out every 12 months at a USCG approved facility and comply with requirements of USCG Specifications. Crew servicing is limited to visual inspections only.**	Labels are missing or unreadable.
46	•			•		Life Raft Container Exterior, Seals, Cables, Lanyards, Hydrostatic Release Retainer Clips and Pins	Visually inspect container for dents or cracks which could leak water. Check cables and lanyards for chafing, cuts, or loose connectors. Document and report all defects and discrepancies to unit maintenance.	Damage or defect of seals, hydrostatic release, or retainer clips and pins which could cause life raft to malfunction during emergency.
47					•	Pyrotechnic Signal Locker, Ammo Locker, Grenade MK3A1 Locker, and Grenade Fuse M206A1 Locker	Visually inspect lockers for damage or missing parts.	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
48					•	Aft Mast	Inspect mast foundation for damage or cracks. Inspect navigation lights for mechanical damage.	Structural cracks present or navigator lights damage.
49					•	Vent Cover Gaskets 01 Level Fan Room	Check that gaskets are clean and serviceable.	
50					•	Reheater	Inspect unit for obvious damage.	Unit damaged or missing or broken switches.
51		•			•	Fan Coil Unit	Observe unit for unusual noises or excessive vibration.	Unusual noises or excessive vibration.
52					•	Preheater	Inspect unit for obvious damage.	Unit damaged or missing or broken switches.
53					•	Refrigeration Piping Emergency Generator Room	Inspect refrigeration piping for leaks.	Class III leaks.
54	•			•		Emergency Switchboard	Visually inspect exterior of switchboard for damaged or missing circuit breakers, meters, controls or lights.	Any part is missing or meters are unserviceable.
55	•	•	•		•	Battery Charger	Check battery charger for proper connections to battery. Ammeter should read near 0 for trickle charge. If reading is above 3 AMPS, refer to unit maintenance. **NOTE** **A high reading indicates the batteries are weak and are being recharged or that one or more batteries are unserviceable.**	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
56					•	Battery Box	Visually inspect battery box for obvious damage. Ensure vent is not obstructed.	Vent is obstructed.
57					•	Batteries	**WARNING** **Do not smoke when observing battery electrolyte level. Batteries give off fumes that can explode. Electrolyte is an acid and can cause personal Injury if it contacts skin or eyes. Wear approved goggled, gloves, and apron.** **NOTE** **Top cover of battery box must be removed to check battery.**	
	•		•	•		Batteries, Cables and Terminals	Inspect batteries, terminals, connections, cables and vent caps for cleanliness and tightness. Clean or tighten terminal connections are required. Clean battery as required.	
					•	Electrolyte	Check electrolyte level and check specific gravity of electrolyte with hydrometer.	
58				•		Fuel Oil Day Tank	Visually inspect tank for leaks. Check fuel oil level using sight glass.	Any leaks.
59					•	Natural Vent Louver (PORT)	Ensure vent is not obstructed and screen is in place and serviceable.	Vent obstructed. Screen unserviceable.
60						Emergency Diesel Generator		
	•					Engine Accessories and Connections	Inspect engine, fuel injection pumps, and cooling pumps for loose or damaged connections or mountings. Inspect fluid lines and joints for leaks. Inspect engine for loose, broken, or missing belts, fittings, or guards.	Any leaks or damaged connectors likely to leak. Unserviceable or missing belts or guards.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
60						Emergency Diesel Generator – continued		
	•		•	•		Engine Crankcase Oil	Check oil level at dipstick. Level should be between ADD and FULL marks on ENGINE STOPPED side of dipstick. Add oil as required.	Low oil level.
	•			•		Cooling System	Check radiator coolant level.	
61						Emergency Diesel Generator - Engine Control Monitor (ECM) Display		
		•				Oil Pressure Gauge	240 to 480 kPa (35 to 70 psi) Range.	
		•				Coolant Temperature	70°C to 90°C (170°F to 195°F) Range.	
		•				Tachometer	Engine speed (600 to 2000 RPM).	
62	•				•	Radiator Intake Louver (STBD)	Ensure vent is not obstructed and screen is in place and serviceable.	Vent obstructed. Screen unserviceable.
63	•			•		Load Center	Inspect for secure mounting and obvious damage.	Mounting not secure or obvious damage.
		•					Ensure indicator lights, except GND FAULT, are lit.	One or more indicate lights not lit or GND FAULT indicator lit.
64				•		Transformers	Inspect for secure mounting and obvious damage.	Mounting not secure or obvious damage.
						01 Level Passageway		
65				•		Key Cabinet	Inspect for secure mounting and obvious damage.	
						Fan Space		
66		•				Sanitary Spaces Exhaust Fan	Observe fan for unusual noise or vibration.	Unusual noise or excessive vibration.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
						01 Level Exterior (FWD)		
67	•			•		External Structures	Inspect for structural damage.	Watertight integrity or operational capability is impaired.
68					•	Vent Cover Gaskets	Check that gaskets are clean and serviceable.	
69					•	Double Bitt	Inspect double bitt for secure mounting.	Structural cracks in foundation or damage to vents.
70					•	Deck Locker	Visually inspect locker for damage or missing parts. Check that gasket is clean and serviceable.	
71	•	•				Anchor Windlass	Check spools, gears, and clutches for foreign objects.	Foreign objects are wedged or lodged in assemblies.
	•		•	•		Hydraulic Lines	Check hydraulic lines, fittings, and controls for leaks. **WARNING** **Refer Class III leaks to your supervisor and unit maintenance.**	Class III leaks.
72		•				Pelican Hook Chain Stopper (PORT)	Observe operation of chain stopper. Look for obvious damage (e.g., cracks or broken parts).	
73					•	H-Bitt	Inspect H-bitt for secure mounting and damage.	Structural cracks in foundation or damage to vents.
74					•	Bull Nose	Inspect bull nose for secure mounting. Ensure no sharp edges are present which could chaff line.	Structural cracks in foundation or sharp edges present.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
75		•				Pelican Hook Chain Stopper (STBD)	Observe operation. Look for binding operation or obvious damage (e.g., cracks, or broken parts).	Chain stopper unserviceable.
76					•	Ship's Bell	Inspect for secure mounting and obvious damage.	If clapper is missing.
77		•			•	Floodlights	Inspect for secure mounting and proper operation.	Floodlights do not operate.
78						Anchor Windlass Controls		
	•			•		Control Station	Visually inspect control station for obvious damage. Ensure control handle is securely mounted.	Not securely mounted or obvious damage.
	•			•		Boot	Inspect rubber boot for serviceability.	
	•	•				Controls	Observe that controls operate smoothly, do not bind, and return to NEUTRAL (center) position when released.	Controls bind, do not operate smoothly or do not return to NEUTRAL.
79					•	Double Bitt (01) Level Exterior (AFT)	Inspect double bitt for secure mounting and damage.	Structural cracks in foundation or damage.
80					•	Workboat Crane	Inspect entire crane assembly for deterioration or visible defects. If damage is found or conditions appear questionable, report defects and discrepancies to unit maintenance.	
	•	•				Operation	During operation, check crane for unusual sounds or malfunctioning. Report problems to unit maintenance.	
					•	Exterior	Visually inspect the exterior of the crane. If dirty, clean with rag and solvent.	
					•	Hook	Check hook for loose connection to wire cable. Tighten connection if needed.	
		•			•	Cable	Check cable for frays and corrosion.	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
81						Workboat		
	•				•	Exterior Hull	Inspect exterior hull for damage.	
	•				•	Inflatable Collar	Check for underinflation.	
	•				•		Ensure valve caps are in place.	
			•		•		Check scuff or abrasion marks to ensure HYPALON coating is not damaged.	
			•		•		Wash collar with diluted bilge soap.	
					•		Wax collar with ultraviolet resistant wax (e.g., car wax).	
			•		•		Inspect inflatable collar for wear, puncture, attachment or other damage.	
	•				•	Steering System	Inspect steering cable and cable guides for wear and security.	
	•	•		•			Inspect steering controls for freedom of movement.	
	•	•				Bilge Pump	Check bilge pump for proper operation.	
	•		•			Loose Gear	Secure or stow all loose gear.	
					•	Batteries	**WARNING** **Do not smoke when observing battery electrolyte level. Battery gives off fumes that can explode. Electrolyte is an acid and can cause personal injury if it contacts skin or eyes. Wear approved goggles, gloves, and apron.**	
	•		•	•		Battery, Cables and Terminals	Inspect battery, terminals, connections, cables and vent caps for cleanliness and tightness. Clean or tighten terminal connections as required. Clean battery as required.	
					•	Electrolyte	Check electrolyte level and check specific gravity of electrolyte with hydrometer.	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
82					•	Workboat Outboard Motor	Visually inspect exterior for cleanliness. If dirty, clean with clean soft cloth.	
	•	•			•		a. Check tiller arm and throttle for loose fittings. Tighten loose fittings.	
		•			•		b. Check gear lever. Shift gears into forward and reverse. If gear shift lever does not operate properly, refer to unit maintenance.	
	•	•			•		c. Check propeller for debris, foreign objects and loose or broken fittings, bent or broken blades. Refer problems to unit maintenance.	Debris, foreign objects wedged or lodged on propeller. Broken or bent propeller blade.
83				•		Ammo Locker	Visually inspect locker for damage or missing parts.	
84	•					Double Drum Tow Winch Control Station	Visually inspect control station for damage or missing parts.	Unit damaged or missing parts.
		•				Line Tension Indicators	Meters should read no more than 3/4 on scale. Exercise care or shift to low speed to prevent damage to winch.	With line under tension, meter does not move.
		•				Cable-off Indicators	Meters indicates amount of cable payed-out. Exercise care when cable approaches right index mark.	With line payed-out, meter does not move.
		•				System Pressure Gauge	Gauge should read 3300 to 3700 psi.	Reading not in range.
		•				Pilot Pressure Gauge	Gauge should read 500 to 600 psi.	Reading not in range.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
85	•			•		Aft Control Station	Inspect control station for cleanliness; clean as required. Look for any loose, missing, or broken switches or controls, gauges, indicator lights, or obvious damage. Ensure panel cover is tight. Ensure throttle, command transfer, and non- follow up controls operate smoothly and do not bind.	Any control or indicator unserviceable.
	•	•		•		Rudder Angle Indicator	Ensure dimmer is able to adjust intensity of lights.	Light intensity cannot be adjusted.
	•	•					Needle moves in the direction of joystick.	If needle does not track with joystick.
	•				•	Remote Propulsion Indicator Panel	Press and hold LAMP TEST button All lights will light. Adjust intensity of lights using DIMMER control.	Any light does not light. Light Intensity cannot be adjusted.
		•		•		Control Station	Observe lights and gauges to ensure proper operation.	Lights and gauges do not operate properly.
						Main Deck (Exterior)		
86	•			•		External Structure	Inspect for structural damage.	Watertight Integrity o operational capability is impaired.
87				•		Hatch and Vent Cover Gaskets	Check that gaskets are clean and serviceable.	
88						Capstan Control Station		
	•			•		Control Station	Visually inspect control station for obvious damage. Ensure control handle is securely mounted.	Not securely mounted or obvious damage.
	•			•		Boot	Inspect rubber boot for serviceability.	
	•	•				Controls	Observe that control operates smoothly, does not bind, and returns to NEUTRAL (center) position when released.	Control binds, does not operate smoothly or does not return to NEUTRAL.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before **D – During** **A – After** **W – Weekly** **M – Monthly**

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
	B	D	A	W	M			
89	•					Capstan	Visually inspect capstan and foundation for damage.	Structural cracks in foundation or damage to capstan which would impair operation.
	•	•				Operation	Observe capstan to ensure capstan responds to control.	Capstan response to control is sluggish.
90					•	Double Bitt (STBD)	Inspect double bitt for secure mounting and damage.	Structural cracks or damage in foundation.
91					•	H-Bitt (STBD)	Inspect H-bitt for secure mounting and damage.	Structural cracks or damage in foundation.
92	•	•			•	Tow Pins	Observe tow pin operation for binding or sluggish operation. With tow pins in UP position, inspect pins for damage. Ensure tow pin controls operate smoothly and do not bind.	Tow pins do not operate properly.
93					•	H-Bitt (PORT)	Inspect H-bitt for secure mounting and damage.	Structural cracks or damage in foundation.
94					•	Double Bitt (PORT)	Inspect double bitt for secure mounting and damage.	Structural cracks or damage in foundation.
95						Shore Power Connector	**WARNING** **Defer PMCS when shore power operation is in progress. High voltages could case injury or death.**	
	•		•		•		Visually check terminal box (exterior) for damage and corrosion. Ensure receptacle is securely fastened.	
	•						Visually check cable connectors (internal) for damage and corrosion.	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before **D – During** **A – After** **W – Weekly** **M – Monthly**

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
	B	D	A	W	M			
96						Shore Power Cable	**WARNING** **Defer PMCS when shore power operation is in progress. High voltages could cause injury or death.**	
	•				•		Visually check condition of cable. Check for cracked or damaged insulation.	
	•				•		Check condition of cable connection. Ensure connector is protected from moisture, dirt buildup, and corrosion.	
97	•	•				Double Drum Towing Winch	Check spools, gears, controls, and clutches for foreign objects.	Foreign objects are wedged or lodged in assemblies.
							WARNING **Refer Class III leaks to your supervisor and unit maintenance.**	
98	•		•	•		Steering/Hydraulic Lines	Check hydraulic lines, fittings, and controls for leaks.	Class III leaks.
99	•	•	•			Wire Rope	Check cable for damage or corrosion.	
						Vestibule	**NOTE** Not applicable to Hull No. LT801, LT804, and LT805. Reference para 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment details and installation drawings.	
100					•	HALON Pull Boxes	Visually inspect pull boxes for damage. Visually inspect panel exterior for obvious damage.	Boxes are damaged to extent operation is impaired.
101					•	Tow Machinery Control Panel	Check gauges for moisture buildup.	Damage which could affect internal components is found.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
102						AMS No. 2 Watertight Door Remote Hand Pump		
	•			•		Hand Pump and Reservoir	Inspect for leaks and secure mounting.	Class III leaks or components not securely mounted.
		•				Hand Pump	Observe hand pump for smooth operation.	Hand pump does not operate smoothly.
				•		Emergency Stop Switches (Fuel Oil Pumps, Engine roon AMS 1 and AMS 2 Fans)	Inspect panels for obvious damage or missing or broken switches.	Any damage which could effect operation.
						Main Deck Fan Room		
103		•				Supply and Exhaust Fans	Check units for unusual noises or excessive vibrations.	Unusual noise or excessive vibration.
104					•	Room Door Alarm	**NOTE** **Notify pilothouse that alarm is to be tested.**	
							Open door, contact pilothouse to ensure both alarms (buzzer and light) operated.	Either alarm does no operate.
							Secure alarm or door, as appropriate.	
105					•	Preheater	Inspect unit for obvious damage.	Unit damaged or missing or broken switches.
106		•			•	Fan Coil Unit	Observe unit for unusual noises or excessive vibration.	Unusual noise or excessive vibration.
107		•			•	Refrigeration Piping	Inspect refrigeration piping for leaks.	Class III leaks.
108	•	•			•	Steering Gear Head Tank	Visually inspect tank for leaks.	Class III leaks.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
						Galley		
109	•					Trash Compactor	Visually inspect compactor for damaged or missing parts.	Unit damaged or missing parts.
110						Marine Freezer		
				•		Freezer and Thaw Room Alarms	Visually inspect for damage or missing parts.	Unit damaged or missing or broken parts.
				•		Condenser Coil	Inspect condenser coil to make certain that air flow is not hampered and that it is clear of dust and debris.	
				•		Drain Line	Inspect and check that drain line is unstopped.	
		•				Temperature Gauge	Check the temperature gauge to ensure the interior temperature is -10°F.	
					•	Interior Liner	Check that interior liner is clean and dry.	
				•		Condenser and Evaporator Fan	Check both the condenser fan motor and the evaporator fan motor to make Motors certain that they are operational and that the fans are tight and secure.	Unusual noise or vibration.
					•	Door Gaskets	Check that door gaskets are clean and serviceable.	
					•	Exterior Surfaces	Check that exterior surfaces are clean and dry.	
111						Marine Refrigerator		
				•		Refrigerator Alarm	Visually inspect for damage or missing parts.	Unit damaged or missing or broken parts.
				•		Condenser Coil	Inspect condenser coil to make certain that air flow is not hampered and that it is clear of dust an debris.	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
111						Marine Refrigerator - continued		
				•	•	Drain Line	Inspect and check that drain line is unstopped.	
			•			Temperature Gauge	Check the temperature gauge to ensure the interior temperature is 35°F.	
						Interior Liner	Check that interior liner is clean and dry.	
				•		Condenser and Evaporator Fan	Check both the condenser fan motor and the evaporator fan motor to make Motors certain that they are operational an that the fans are tight and secure.	
					•	Door Gaskets	Check that door gaskets are clean and serviceable.	
					•	Exterior Surfaces	Check that exterior surfaces are clean and dry.	
112		•				Walk-in Freezer	Check room temperature at thermostat. Temperature should be –4°F to 0°F.	Temperature out of range.
113		•				Chill Box	Check room temperature at thermostat. Temperature should be 33°F to 37°F.	Temperature out of range.
114					•	Unit Coolers	Check coils for cleanliness, clean as required.	
115	•					Serving Line/Steam Table	Visually inspect unit for damage.	Unit is damaged.
	•		•			Exterior Surfaces	Inspect exterior for cleanliness. Clean exterior using warm soapy water and clean cloth. Wipe dry with clean soft cloth.	
			•			Sink Wells	Open drain valves and drain wells.	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
115						Serving Line/Steam Table – continued	**WARNING** **Ensure heating element switches have been turned off and element is cool to prevent Injury.** Clean interior of sinks using warm soapy water. Rinse with cool clean water.	
116						Coffee Percolator		
	•				•	Power Cord	Inspect power cord and plug for cracks in insulation or other damage. **CAUTION** **Do not immerse percolator. Damage to unit will result.**	Bare wires are exposed or plug is damaged.
	•				•	Pump Tube	Ensure washer in base of pump tube remains loose. Remove coffee grounds using running water or toothpick.	
	•					Exterior	Clean exterior using warm soapy water and clean cloth. Wipe dry with clean soft cloth.	
117	•					Toaster	Visually inspect exterior for damage or missing parts. **WARNING** **Unplug toaster before cleaning. Electrocution could result.**	Unit damaged or missing parts.
			•			Exterior Surface	Inspect exterior for cleanliness. Wipe off exterior using damp rag.	
			•			Crumb Tray	Remove crumb tray, empty, and replace.	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M – Monthly

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
	B	D	A	W	M			
118						Microwave Oven	**CAUTION** **Never use abrasive or harsh cleaners or scouring pads. Damage to oven will result.**	
			•			Exterior Surfaces	Clean outside of the oven of grease and soil buildup with mild soap and water; rinse and dry with a soft cloth. Do not use any type of household or abrasive cleaner.	
			•			Interior Surfaces	Check interior surfaces for grease and soil buildup, wipe with soft cloth and warm water. Wipe wave guide cover in ceiling of oven with soft damp cloth to remove food. For heavier soil, use baking soda or mild soap; rinse thoroughly with hot water and wipe dry.	
			•			Oven	Check for odors. Odors can be eliminated from inside of the oven by boiling a solution of one cup of water and several tablespoons of lemon juice in the oven for 5 to 7 minutes. Wipe out excess moisture after every use.	
			•			Turntable/ Turntable Support	**CAUTION** **Handle turntable support carefully. If dropped, damage to turntable support will result.** Remove turntable and turntable support for cleaning. Clean floor of oven with mild soap and water; rinse an dry with a soft cloth. Clean turntable and support in mild sudsy water or in dishwasher. Dry with a soft cloth.	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M – Monthly

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
	B	D	A	W	M			
			•			Touch Control Panel	**CAUTION** **Oven door must be open when cleaning Touch Control Panel to prevent oven operation. Oven operation without contents results in permanent damage to oven.**	
			•				Open oven door. Wipe panel with a water-dampened cloth and dry with soft cloth. Avoid use of excess water.	
				•		Vents	Clean vents by wiping with soft cloth.	
119	•					Range	Visually inspect range for damage or missing parts.	Unit damaged or missing parts.
			•			Top Surface	Clean range surfaces daily using soapy water and clean cloth; wipe dry.	
			•			Exterior Surface	Thoroughly clean range using soapy water and clean cloth; wipe dry.	
							CAUTION **Any oven cleaner used must be marked "SAFE ON ALUMINUM" or damage to range will result.**	
			•			Oven/Racks	When cleaning oven/racks, observe all safety precautions and follow label directions.	
120	•					Ventilator Hood	Visually inspect hood for damage or missing parts.	Hood damaged or missing parts.
							CAUTION **Use of other detergents could cause damage to O-rings, seals, diaphragms, washers, or tubing.**	
				•		Detergent Tank	Check level. Refill as required. Use only Gaylord formula G-510 detergent.	
				•		Detergent System Fittings	Using fingers, ensure there are no loose fittings.	Any fitting is loose.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
120						Ventilator Hood - continued		
			•			Interior	Open inspection doors; ensure interior is clean and free of grease, lint and dust. If interior is dirty, refer to unit maintenance.	Interior dirty.
			•			Main Grease Gutter	Check main grease gutter and remove any foreign material.	
121	•					Griddle	Visually inspect griddle for damage or missing parts.	Unit damaged or missing parts.
			•			Top Surface	Use spatula to remove fat and food from griddle surface; scrape down waste hole into grease bucket. Wipe all other surfaces with damp cloth and dry. Remove and empty grease bucket, wash in hot soapy water, and rinse with cool clean water. **WARNING** **Griddle surface must be warm to properly clean. Exercise care to avoid skin contact with griddle surface and possible injury.**	
			•			Top Surface	While griddle surface is WARM, apply griddle stone to clean. Wipe residue with damp cloth. Season griddle surface.	
122	•					Fryer	Visually inspect fryer for damage or missing parts. **WARNING** **Hot surfaces! Exercise care to avoid skin contact with hot surfaces and possible injury.**	Unit damaged or missing parts.
			•			Exterior Surface	Clean all exterior surfaces using hot soapy water and clean rag. Wipe dry with clean soft cloth.	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
							WARNING	
123	•					Mixer	**Unplug mixer before cleaning. Electrocution could result.**	
							Visually inspect unit for damage or missing parts.	Unit damaged or missing parts.
			•			Exterior Surface	Clean exterior using hot, soapy water and clean cloth. Wipe dry with clean soft cloth.	
124				•		Spray Unit	Inspect nozzle for sediment and scale build-up.	
				•		Hose	Inspect hose for damage or fraying.	Hose leaks.
125						Garbage Disposal		
							WARNING	
							Never reach inside disposal. Remove foreign matter using tongs. Serious injury could result.	
							CAUTION	
							Never use chemical solvents or drain cleaning compounds in disposal. Disposal will be damaged.	
		•				Sounds	Observe disposal during operation for unusual sounds.	Unusual sounds.
				•		Light Cleaning	Place four ice cubes and one lemon in disposal and operate.	
							NOTE	
							This will help clean disposal and remove odors.	
					•	Heavy Cleaning (as required)	Clean using a stiff brush and strong soap and hot water solution to remove accumulated food buildup.	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

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ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
126						Dishwasher		
			•			Exterior	Inspect for cleanliness. Clean as required.	
			•			Interior	Inspect for cleanliness. Clean as required.	
	•					Detergent Tank	Check that detergent tank is full. Add detergent as required. **NOTE** **Detergent residue may build up in detergent tank. Clean as required and refill with detergent.**	
						Detergent System Fittings	Check that all fittings are airtight.	
	•					Interior	At the conclusion of a wash cycle, check to ensure that the interior has been cleaned of grease, dust, and lint. With a damp cloth wipe the interior of the machine.	
			•			Wash Arms	**CAUTION** **Do not grasp wash arms at ends. Hold at hub, damage to wash arms could result.**	
				•			Remove lower wash arm by grasping it by the hub and pull up and out of the machine. Remove upper wash arm by carefully loosening the retaining screw. Wash thoroughly in hot soapy water in sink. Clean strainer in bottom of dishwasher before installing wash arms.	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

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ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
127	•					Peeler	Visually inspect unit for damage or missing parts. **CAUTION** **Washing peeler disc with hot water could damage disc.**	
			•			Cover and Interior	Remove cover and peeling disc, wash Peeling Disc thoroughly with cold water only.	
			•				Wash inside of peeler thoroughly and rinse with warm water using flexible hose.	
			•			Discharge Door	Store peeler with discharge door open. This will prolong life of peeler.	
			•			Grease Cups	Remove cover and peeling disc. Turn grease cups 1/4 turn. Replace peeling disc and cover.	
128	•					Baker's Scale	Visually inspect scale for damage or missing parts.	
	•					Balance	Set weights to 0, scale should balance. If not, adjust using adjusting screw.	Scale will not balance.
129	•					Meat Slicer	Visually inspect slicer for damage or missing parts.	
			•			Cleaning	**WARNING** • **Disconnect power source before cleaning. Electrocution or serious Injury could occur.** • **Use care when cleaning near slicer knife. Serious personal injury could result.** **CAUTION** • **Never wash any slicer component in dishwasher. Components could be permanently damaged.** • **Never use steel pads to clean knife. Knife would be damaged.**	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
129						Meat Slicer – continued	Use a mild soap and hot water solution and clean cloth. Thoroughly clean slicer. Rinse using another clean cloth and clean water.	
						Mess/Recreation Room		
130	•					Toaster	Visually inspect exterior for damage or missing parts.	Unit damaged or missing parts.
							WARNING **Unplug toaster before cleaning. Electrocution could result.**	
			•			Exterior Surface	Inspect exterior for cleanliness. Wipe off exterior using damp rag.	
			•			Crumb Tray	Remove crumb tray, empty, and replace.	
						Microwave Oven	**CAUTION** **Never use abrasive or harsh cleaners or scouring pads. Damage to oven will result.**	
131			•			Exterior Surfaces	Clean the outside of the oven of grease and soil build-up with mild soap and water; rinse and dry with a soft cloth. Do not use any type of household or abrasive cleaner.	
			•			Interior Surfaces	Check the interior surfaces for grease and soil build-up, wipe with soft cloth and warm water. Wipe wave guide cover in ceiling of oven with soft damp cloth to remove food. For heavier soil, use baking soda or mild soap; rinse thoroughly with hot water and wipe dry.	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
131						Microwave Oven -continued		
			•			Oven	Check for odors. Odors can be eliminated from the inside of the oven by boiling a solution of one cup of water and several tablespoons of lemon juice in the oven for 5 to 7 minutes. Wipe out excess moisture after every use. **CAUTION** **Handle turntable support carefully. If dropped, damage to turntable support will result.**	
			•			Turntable/ Turntable Support	Remove turntable and turntable support for cleaning. Clean floor of oven with mild soap and water; rinse and dry with a soft cloth. Clean turntable and support in mild sudsy water or in dishwasher. Dry with a soft cloth.	
			•			Touch Control Panel	**CAUTION** **Oven door must be open when cleaning Touch Control Panel to prevent oven operation. Operation of oven without any contents will result in permanent damage to oven.**	
			•				Open oven door. Wipe panel with a cloth dampened slightly with water only and dry with a soft cloth. Avoid use of excess water.	
						Vents	Clean vents by wiping with soft cloth.	
						Coffee Percolator		
	•				•	Power Cord	Inspect power cord and plug for cracks in insulation or other damage.	Bare wires are exposed or plug is damaged.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
132						Coffee Percolator –continued	**CAUTION** **Do not immerse percolator. Damage unit will result.**	
	•				•	Pump Tube remains loose.	Ensure washer in base of pump tube. Remove coffee grounds using running water or toothpick.	
	•					Exterior	Clean exterior using warm soapy water and clean cloth. Wipe dry with clean soft cloth.	
	•					Beverage Dispenser	Visually inspect unit for damage.	Unit is damaged.
133			•			Clean Bowl	Wash bowl in soapy water. Rinse with clean water and wipe dry with soft cloth.	
							WARNING Hazard of electrical shock. Shut off power before proceeding. Electrocution could result.	
				•		Condenser	Remove front and side panels from unit. Clean condenser fins using a vacuum cleaner. Install front and side panels.	
			•			Exterior	Clean exterior using clean cloth and soapy water. Wipe dry with clean soft cloth.	
						Milk Dispenser		
		•				Exterior	Check cabinet each day for cleanliness.	
134		•				Dispenser Valve	Inspect valves to ensure they are secure on valve holders.	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
134		•				Milk Dispenser – continued		
						Compressor	Inspect for proper operation of compressor. Report abnormal compressor noises to unit maintenance.	Unusual noise or vibration.
				•		Duct Panel	Inspect air duct panel and beneath unit for restrictions.	
				•		Condenser	Remove rear panel and clean condenser area.	
135	•			•		Mini-Refrigerator	Visually inspect refrigerator for damage or missing parts.	Unit damaged or missing parts.
				•			Inspect interior and exterior for cleanliness. Clean using clean rag and soapy water. Rinse with clear water and wipe dry with clean soft cloth.	
136						Ice Maker	Visually inspect unit for damage or missing parts. Verify that exterior panels are installed. **CAUTION** **Icemaker must not be operated without exterior panels installed. Damage to unit could result.**	
				•		Exterior Surface	Clean exterior of unit using soapy water and clean rag. Rinse with clear water and wipe dry with clean soft cloth.	
					•	Air Filter	Remove lower front panel by removing two screws and pulling out on bottom of panel. Remove condenser air filter. Wash in soapy water, rinse, and shake out excess water and replace. Replace cover and secure with two screws.	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

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ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
	B	D	A	W	M			
137					•	Television and VCR Main Deck Passageway	Inspect for secure mounting and obvious damage.	
138					•	Life Jacket Locker	Inspect locker for secure mounting and obvious damage.	Locker damage could damage life jackets.
139						AMS No. 1 Watertight Door Remote Hand Pump		
	•			•		Hand Pump and Reservoir	Inspect for leaks and secure mounting.	Class III leaks, components not securely mounted.
		•				Hand Pump Boatswain's Store	Observe pump for smooth operation.	Pump is not smooth.
140		•			•	Ventilation System	Check unit for unusual noises. Ensure damper operates properly.	Unusual noises.
141	•					Paint Mixer	Inspect mixer for secure mounting and obvious damage.	
142						HALON 1301 System	**NOTE** Not applicable to Hull No. LT801, LT804, and LT805. Reference para 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment, details, and installation drawings.	
				•		Pull Box	Inspect box for structural damage. Ensure box is securely mounted.	Pull box damage prevents alarm use.
				•		HALON Cylinder Bottles	Inspect cylinders for structural damage and leaks at connectors. Ensure cylinders are securely mounted in retaining brackets.	Any damage.
				•		Pressure Reset Switch Box	Inspect switch box for structural damage. Ensure switch is not tripped (up position).	Switch is tripped.
				•		Delay Canister	Inspect delay canister for structural damage and leaks at connections. Ensure canister is securely mounted.	Any damage.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

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ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
142						HALON 1301 System – continued		
				•		Manual Activation Handles	Ensure that manual activation handles are secured with retaining pins.	Handles are not secured with pins.
				•		Piping	Inspect all associated piping for leaks. Ensure all connections are tight.	Any leaks.
				•		Pressure Operated Switch	Inspect switch for damage. Ensure switch does not stick.	Switch is damaged or sticks.
				•		Delay Canister Switch	Inspect switch for damage. Ensure switch works properly.	Switch is damaged.
						Paint Locker		
143					•	Cabinet	Inspect locker for secure mounting and obvious damage.	Cabinet not securely mounted or doors damaged and will not close securely.
						Laundry Space		
144						Washer		
	•				•	Hoses	Inspect hoses for serviceability.	Hose unserviceable.
		•			•		Inspect hose connections for leaks.	Class III leaks.
	•				•		Ensure drain connection is secure.	Drain connection unserviceable.
	•				•	Power Cord	Inspect power cord for serviceability.	Power cord unserviceable.
	•				•	Ground	Ensure ground wire connections are secure and ground wire is serviceable.	Ground wire or connections are unserviceable.
			•		•	Filter	Clean filter, if applicable.	Filter missing or unserviceable.
	•				•	Control Panel	Inspect for obvious damage or missing controls or indicators.	Any control or indicator missing or damaged.
							Listen for unusual sounds.	Unusual sounds are heard.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

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ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
145						Dryer		
	•				•	Power Cord	Inspect power cord for serviceability.	Power cord unserviceable.
	•				•	Ground	Ensure ground wire connections are secure and ground wire is serviceable.	Ground wire or connections are unserviceable.
			•		•	Filter	Clean filter.	Filter missing or unserviceable.
	•				•	Control Panel	Inspect for obvious damage or missing controls or indicators.	Any control or indicator missing.
		•				Control Panel	IN USE indicator should be lit.	
146							Listen for unusual sounds.	Unusual sounds are heard.
	•	•			•	Ironing Board/Iron	Check ironing board for secure mounting to bulkhead.	Not securely mounted.
			•		•		Check hinge and latch for proper operation.	Latch does not hold board in vertical position.
	•				•		Check condition of ironing board cover.	
	•					Iron	Check for damage to handle, controls, power cord, and broken plug.	
147						Laundry Tub		
					•	Tub	Inspect for secure mounting.	Not securely mounted.
		•			•	Faucet	Inspect for secure mounting and leaks.	Class III leaks or not securely mounted.
		•			•	Drain	Plug drain; fill tub with 2 inches of water. Remove drain plug.	Water drains slowly or not at all.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

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ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
	B	D	A	W	M			
						Bow Thruster Compartment		
148						Bow Thruster		
	•				•	Oil Level	Check oil level sight gauge in lube oil tank. Level should be between high and low level marks.	Low oil level.
					•	Leaks	Inspect for oil leaks.	Class III leaks.
149		•				Eductor Pressure Gauges	Check gauges for loose connections and damage.	Gauge inoperative.
150				•		Spring Return Sounding Valves	Ensure valves operate smoothly and do not bind.	Valves binding.
151						AMS No. 2		
					•	Potable Water Hydropneumatic Tank	Inspect tank, pressure gauge, pressure switches and relief valve for leaks, damage, and secure mounting.	Class III leaks, damage, or not securely mounted.
152					•	Steering Gear Emergency Hand Pump	Inspect pump for secure mounting and leaks. Observe hand pump for smooth operation.	Class III leaks; not securely mounted. Pump does not operate smoothly.
153				•		Rudder Angle Indicator	Ensure dimmer is able to adjust light intensity. Rudder angle must align with wheel direction.	Light intensity cannot be adjusted.
154						Steering Hydraulic Power Pack		
	•					Hydraulic Pump Unit	Check hydraulic pump unit for leaks, loose connections, or damage.	
		•				Hydraulic Pump Unit	Check pump unit for unusual sounds or malfunctioning.	
	•					Rudder	Rudder operates full port to starboard.	
		•				Gauges	Check gauges for damage and proper operation.	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

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ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
155	•				•	Steering Hydraulic Power Pack Motor Controllers	Inspect motor controller for obvious damage or missing or broken switches.	Obvious damage or missing or broken switches.
156		•				Tank Level Indicator Receivers	Observe level at local receiver. Compare reading with receiver panel in EOS. Report any differences to unit maintenance.	Reading is different for same tank between local and remote meters.
157		•		•		Potable Water Pumps	Visually inspect pumps for leaks, loose connections and damage. Check discharge pressure gauges for normal readings (0 to 60 psi).	
158					•	Capstan Hydraulic Lines	Inspect hydraulic lines in overhead for leaks.	Class III leaks.
159						Air Conditioning Condensing Units		
	•	•				Liquid Level - Refrigerant	Level in sight glass should be 1/8 to 1/2 full.	Level below 1/8 or above 1/2.
	•	•	•			Oil Level Sight Glass	Level in sight glass should be 1/4 to 3/4 full.	Level below 1 /4 or above 3/4.
	•	•	•			Moisture Indicator	Moisture indicator should show BLUE.	Moisture indicator not BLUE.
		•				Discharge Pressure Gauge	Gauge should read 120 to 130 psig.	Reading out of range.
		•				Suction Pressure Gauge	Gauge should read 1 to 3 in/hg.	Reading out of range.
		•				Oil Pressure Gauge	Reading should be 45 to 55 psig above suction pressure.	Reading out of range.
		•				Inlet Water Temperature	Gauge should read 80 to 90°F.	Reading out of range.
		•				Outlet Water Temperature	Gauge should read 90 to 100 °F.	Reading out of range.
		•				Suction Gas Temperature	Gauge should read 15 to 25F.	Reading out of range.
		•				Liquid Line Temperature	Gauge should read 100 to 110 °F.	Reading out of range.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

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ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
160	•				•	Cathodic Protection System Control Panel	Visually inspect control panel for damage or missing parts. Check cable connections for loose connections.	Panel is damaged or missing parts.
	•					Automatic Control	Read POTENTIAL meter. Reading Setting should be 0.85.	Reading below 0.80 or above 0.95.
	•					Control Reference Cell Check	Depress CONTROL switch, read POTENTIAL meter and record reading on log sheet (REF ELEC. CONT.).	Reading below 0.80 or above 0.95.
						Auxiliary Reference Cell Check	Depress AUXILIARY switch, read POTENTIAL meter.	Reading below 0.80 or above 0.95.
				•		Analysis	It is normal for readings to increase month to month as paint wears.	
161						Refrigeration Condensing Units		
	•	•				Liquid Level - Refrigerant	Level in sight glass should be 1/8 to 1/2 full.	Level below 1/8 or above 1/2.
	•	•	•			Oil Level Sight Glass	Level in sight glass should be 1/4 to 3/4 full.	Level below 1 /4 or above 3/4.
	•	•	•			Moisture Indicator	Moisture indicator should show BLUE.	Moisture indicator no BLUE.
		•				Discharge Pressure Gauge	Gauge should read 120 to 130 psig.	Reading out of range.
		•				Suction Pressure Gauge	Gauge should read 1 to 3 in/hg.	Reading out of range.
		•				Oil Pressure Gauge suction pressure.	Reading should be 16 to 22 psig above	Reading out of range.
		•				Inlet Water Temperature	Gauge should read 80 to 90°F.	Reading out of range.
		•				Outlet Water Temperature	Gauge should read 90 to 100°F.	Reading out of range.
		•				Suction Gas Temperature	Gauge should read -15 to -25°F.	Reading out of range.

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ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
161						Refrigeration Condensing Units-continued		
		•				Liquid Line Temperature	Gauge should read 100 to 110°F	Reading out of range.
		•				Walk-in Freezer	Check room temperature at temperature gauge.	Temperature out of Temperature range, should be -4 to 0°F.
		•				Chill Box	Check room temperature at temperature gauge.	Temperature out of Temperature range, should be 30 to 37°F.
		•				Thaw Room	Check room temperature at temperature gauge.	Temperature out of Temperature range, should be 38 to 42°F.
162	•	•			•	Bilge Manifold	Visually inspect manifold for cracks, leaks, and secure mounting.	Class III leaks or loose mounting.
163		•			•	Fire and General Service Pumps	Check pumps, couplings and sea chest valves for proper operation. Check gauges for normal readings: (discharge pressure: 10 to 20 psi if overboard, 50 to 90 psi if via firemain, suction pressure: less than 50 psi).	Discharge pressure greater than 90 psi or suction pressure greater than 50 psi.
164	•	•	•			Bilge/Ballast Pump	Visually check oil level sight gauge (1/2 full). Inspect pumps, couplings for leaks, loose connections and damage. Check bilge/ballast pumps gauges for normal readings (discharge: 20-40 psi, suction: less than 10 psi). If suction is greater than 10 psi, refer to unit maintenance.	Pump is defective or pressure readings are not within range.
165		•				Tank Level Indicator Receivers	Observe level at local receiver. Compare reading with receiver panel in EOS. Report any differences to unit maintenance.	Reading is different for same tank between local and remote meters.
166		•			•	Ballast Manifold	Visually inspect manifold for cracks, leaks, and secure mounting.	Class III leaks or loose mounting.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

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ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
167						Reverse Osmosis Units		
	•					Pump, High Pressure	Check oil.	Low oil level.
		•				High Pressure Gauge	Check gauge pressure (600 to 800 psi).	Reading is not within range.
		•				Water Meter	Check that meter is operating.	Meter not operating.
							WARNING **Do not come in contact with water from the Bromide Feeder. Burns or serious injury could occur.**	
	•	•				Bromide Feeder Piping	Inspect for leaks and broken, loose or missing parts.	Leaks, broken, loose or missing parts.
		•				Cartridge Change Indicator	Check that cartridge change indicator is out. If indicator is lit, refer to unit maintenance to replace cartridge.	Cartridge change indicator lit.
168						Sliding Hydraulic Watertight Door	**CAUTION** **Do not operate door with pressure shutoff valves closed as this will back pressure the local hand pump and cause the seals to rupture.**	
					•	Bleed Off	Check that hydraulic system is bled at all high points to remove trapped air. Turn bleeder valve handle to release trapped air.	Bleeder valve missing or unserviceable.
					•	Oil Level	Check oil level dipstick in expansion tank. Add oil as required.	Low oil level.
					•	Leaks	Check hydraulic system for leaks.	Class III leaks.
					•	Tracks	Visually inspect tracks for secure mounting and damage.	Tracks damaged or not mounted securely.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

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ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
	B	D	A	W	M			
168						Sliding Hydraulic Watertight Door – cont.	**NOTE** Local hand pump may have to be operated quickly to break door loose when initially opened.	
					•	Local Hand Pump	Inspect local hand pump for secure mounting and damage.	
		•					Check that hand crank operates door to full open/closed position.	Door will not open and/or close fully.
169						Engine Room HALON 1301 Fire Suppression System	**NOTE** The system is located in AMS No. 2 and in the Engine Room. **NOTE** Not applicable to Hull No. LT801, LT804, and LT805. Reference para 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment, details, and installation drawings.	
				•		System Components	Check system components for equipment damage.	Ensure cylinder straps are securely mounted.
				•		CO_2 Bottles	Inspect for secure mounting and damage.	Damage or insecure mounting.
				•		Bypass Valve	Inspect for secure mounting and damage.	Damage or insecure mounting.
				•		HALON Bottles	Inspect for secure mounting, damage, or leaking valve.	Leakage, not secured mounting, or damage.
				•		Access and Control Boxes	Access to extinguisher assembly and all control pull boxes are unobstructed.	
				•		Pressure Gauges	Check extinguisher assembly pressure gauges for proper operating pressure (340 to 380 psi).	
				•		Pull Box	Inspect box for structural damage. Ensure box is securely mounted.	Pull Box damage prevents alarm use.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M – Monthly

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
	B	D	A	W	M			
169						Engine Room HALON 1301 Fire Suppression System – cont.	**NOTE** Not applicable to Hull No. LT801, LT804, and LT805. Reference para 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment, details, and installation drawings.	
				•		HALON Cylinder Bottles	Inspect cylinders for damage and leaks at connectors. Ensure cylinders are securely mounted in retaining brackets.	Any damage is found.
				•		Pressure Reset Switch Box	Inspect box for damage. Ensure switch is not tripped (up position).	Switch is tripped.
				•		Delay Canister	Inspect canister for damage and leaks at connectors. Ensure canister is securely mounted.	Any damage is found.
				•		Manual Activation Handles	Ensure activation handles are secured with retaining pins.	Handles are not secured with pins.
				•		Piping	Inspect all associated piping for leaks. Ensure all connections are tight.	Any leaks exist.
				•		Pressure Operated Switch	Inspect switch for damage. Ensure switch does not stick.	Switch is damaged or sticks.
				•		Delay Canister Switch	Inspect switch for damage. Ensure switch works properly.	Switch is damaged.
						<u>Workshop</u>		
170					•	Tools and Associate Equipment	Ensure all tools, spare parts, and equipment belonging to the craft are available, clean, serviceable, and properly mounted or stowed.	
							WARNING **NEVER wear loose clothing while operating lathe. Loose clothing may get caught in lathe, causing serious personal injury.**	
171	•		•			Lathe	Ensure safety glasses and dust mask are available and serviceable.	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
171						Lathe - continued General Inspection	**WARNING** • **ALWAYS wear protective eye wear to prevent injury.** • **ALWAYS securely lock cutting tools in position. Tools could fly off lathe and injure operator.** • **DON'T change gears or belts while spindle is turning. Personal injury or damage to lathe could result.** • **DON'T overload the machine with too heavy a cut. Overloading lathe could cause kickback and possible personal injury.** • **DON'T attempt to change feed ranges or chucks or perform maintenance on the lathe unless the spindle is stopped. Serious personal injury could result.** • **DON'T clear chips with the fingers. Use a chip hook to prevent injury.** • **Use chuck guard whenever possible. Chuck guard will provide additional operator protection.** **NOTE** **Lathe housing cover must be removed.**	
	•						Check for worn or frayed belts and electrical wiring, loose connections, missing bits and pieces, dirt buildup and corrosion.	Belts worn or frayed or electrical connections/wiring unserviceable.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
171						Lathe - continued		
	•	•				General Inspection - continued	Visually check that controls are in their detent hole. **CAUTION** **Clean off all metal chips from all oil points before adding oil. Metal chips could contaminate oil and damage lathe.**	
	•		•			Oil Level	Visually check headstock and carriage oil sight gauges for oil level in middle of sight gauge.	Low oil level.
						Vent Hood		
172					•	Hood	Inspect hood for cleanliness. Clean as required.	
					•	Hood Mounting	Inspect hood for secure mounting.	Hood not securely mounted.
173						Arc Welder	**WARNING** **Allow cooling period before servicing. Hot surfaces can cause severe burns.**	
	•				•	Labels	Inspect labels on unit for legibility. All warning labels must be clearly readable. Refer damaged or unreadable labels to unit maintenance.	Any label missing or unreadable.
						Weld Cables	**WARNING** **Danger of electrical shock. Shut OFF power supply before removing covers. Electric shock can kill.**	
	•				•		Inspect cables for breaks in insulation. Repair or replace damaged cables. Clean and tighten connections.	Cracked or worn insulation or damage connectors.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
173						Arc Welder – continued		
					•	Internal Cleaning	Vacuum dust and dirt from inside of welding machine. If dirty or dusty conditions are present, clean more frequently.	
174	•					Drill Press	Check that safety glasses and dust mask are available and serviceable. **WARNING** • **DO NOT USE HAND BITS WHICH HAVE A SCREW TIP. AT DRILL PRESS SPEEDS THEY TURN INTO THE WOOD SO RAPIDLY AS TO LIFT THE WORK OFF THE TABLE AND WHIRL IT.** • **In changing the speed, turn off the switch and wait until the machine has completely stopped.** • **Remove the chuck key before starting the motor.** • **Never use your hand to hold the object while drilling, always screw the object tight on the work table or use the drill press vise to prevent an accident or injury.** • **Keep your hand off the drill bit while drilling.** **NOTE** **Drill press housing cover must be removed.**	Required safety equipment is not available.
	•			•		Belt and Pulley	Check for worn or frayed belts, frayed electrical wiring or power cord, loose connections, missing bits and pieces, worn or damaged pulleys, dirt buildup and corrosion.	Belts worn or frayed or electrical connections/wiring unserviceable.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
174						Drill Press - continue		
	•					Belt and Pulley -continued	Check that drive belt tension is correct. If loose, refer to unit maintenance.	
	•						Check that spindle and motor pulleys are tight and secure.	
	•					Table/Crank	Check that table vertical travel is smooth and unobstructed.	
	•						Check that 360° table swing is unobstructed.	
	•						Check that table tilts in either direction.	
	•					Spindle	Check that spindle vertical travel is smooth and unobstructed.	
175						Bench Grinder		
	•		•			Associated Equipment	Check that face shields and dust masks are available and serviceable.	Safety equipment no available.
	•					Wheels	Visually check that grinding wheels are serviceable.	
	•					Tool Rest	Visually check that tool rest is in correct position and is securely mounted.	
	•					Spark Guard	Visually check that spark guard is clear, undamaged and securely mounted.	
176	•				•	Microfiche Reader	Inspect power cord for fraying or damage.	Power cord or plug damaged or frayed.
		•				Screen	Observe screen for scratches	Scratches impair readability.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
177	•				•	Wet/Dry Vacuum	Visually check vacuum unit for signs of wear, dirt buildup, damage and corrosion.	
	•						Check accessories kit for worn and broken attachments.	
	•						Check extension wands for signs of wear, damage and corrosion.	
	•						Check hose for wear and serviceability.	
178	•					Cutting Torch Outfit (Oxy-Act)	Check that safety glasses are available and serviceable.	Required safety equipment is not available.
	•				•		Inspect cylinders, regulator valves, and gauges for obvious damage.	Obvious damage affecting equipment operation.
		•					Regulator valves operate smoothly.	Regulator valves bind.
						Shaft Alley (PORT and STBD)		
179		•		•		Seals	Inspect stern tube and bulkhead seals for leaks.	Class III leaks.
						Engine Room		
180						Engine Room and Interior Structures	**WARNING** **Operate the ventilators to ensure hull compartments and engine room are clear of fuel fumes. Operate the blowers for at least 5 minutes before starting any engine.**	
	•	•	•	•			Inspect the engine room and interior structures for leaks.	Engine room is taking on water or Class III leaks.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
181	•	•	•		•	Lube Oil Purifier	Inspect the lubricating oil purifier for secure mountings and tight frame covers.	Class III leaks.
	•					Oil Level	Oil level in sight glass must be at least 2/3 full. **CAUTION** **During operation, oil level must not be below 1/2 full in sight glass. Damage will result.**	Oil level below 2/3 full.
		•					Oil level in sight glass must be at least 1/2 full.	Oil level below 1/2 full.
				•		Oil Check	Loosen drain plug and allow a small amount of oil to drain. Oil should be clear.	Oil is a milky color.
182	•					Central Hydraulic System Power Pack	Visually inspect power pack and control panel for damage or missing parts.	Either unit is damaged or missing parts.
		•				Gauges	Check gauges for damage and proper readings.	
	•	•	•			Leaks	Visually inspect power pack and related piping for leaks.	Class III leaks.
		•				Reservoir Sight Glass	Check sight glass for fluid level.	Fluid level below minimum level marks.
183		•				Tank Level Indicator Receivers	Observe level at local receiver. Compare reading with receiver panel in EOS. Report any differences to unit maintenance.	Reading is different for same tank between local and remote meters.
184		•	•	•	•	Lube Oil Transfer Pump	Visually inspect pumps for leaks, loose connections, and damage. Check gauges for normal readings (30 psi).	Pumps are defective.
185	•	•			•	Lube Oil Manifold	Visually inspect manifold for cracks, leaks, and secure mounting.	Class III leaks or loose mounting.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
186	•			•		Ship Service Diesel Generator Set (PORT)	Check the engine and generator for debris, foreign objects, leaks, loose or broken fittings, guards and components.	
	•			•		Expansion Tank	Check coolant level (11.5 gal). Inspect tank cap seal.	Low coolant level. Class III leaks.
	•			•		Air Cleaner Indicator	Check indicator range.	Indicator in RED.
	•			•		Oil Level	With engine turned off, check oil dipstick. Oil level should be between ADD and FULL marks on the dipstick.	Oil level below ADD or above FULL.
		•					While engine is running at low idle, check oil dipstick. Oil level should be between ADD and FULL marks on the dipstick.	Oil level below ADD or above FULL.
	•			•		Fuel System	Check for fuel leaks.	Any fuel leaks.
				•			Drain water separator.	
	•			•		Gauges	Check condition of all gauges.	Damaged or missing gauges.
	•	•				Fuel Pressure	Check gauge. Gauge should read in NORMAL (GREEN) range.	Reading in RED range.
	•	•		•		Water Temperature	Check gauge. Gauge should read near top of WHITE range.	No reading or low enc of WHITE range.
		•				Oil Pressure	Check gauge. Gauge should read in GREEN range.	Reading in RED range.
		•				Noises	Check for unusual noises.	Unusual noises are heard.
		•	•			Leaks	Check for leaks.	Class III leaks.
						Main Switchboard in EOS		
		•				Hertz Meter	Check meter reading. Reading should be 60 Hz.	Reading not 60 Hz.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
186						Ship Service Diesel Generator Set (PORT) – continued		
						Main Switchboard in EOS – continued		
		•				A-C Volts Meter	Check meter reading. Reading should be 450 ±5.	Reading out of range.
187	•	•	•			Sewage Discharge Pump (PORT)	Visually inspect pump for leaks, loose connections and damage.	Class III leaks.
188	•	•	•			Control Air Dryer	Check dryer for loose connections and damage.	
189	•	•	•			Control Air Receiver	Check receiver for loose connections and damage.	
190						Reduction Gear (PORT)		
	•					Bayonet Gauge	Oil level should be between ADD and FULL. Add oil as required.	Oil level below ADD or above FULL.
		•				Shaft Brake Pressure Gauge	Gauge should read 1200 to 1500 psi, **NOTE** **Gauge located inside No. 2 SHAFT BRAKE PANEL.**	
	•	•				Air Pressure Gauge	Gauge should read 100 to 125 psi.	Reading not in range.
		•				Lube Oil Pressure Gauge	Gauge should read at least 350 psi,	Reading below 350 psi.
		•				Oil Temperature Gauge	Gauge should read 120° to 150°F.	Reading not in range.
		•				Clutch Oil Pressure Gauge	Gauge should read 170 to 175 psi with clutch disengaged and 350 to 360 psi with clutch engaged.	Reading not in range.
		•				Operation	Observe reduction gear for excessive vibration or unusual noise.	Excessive vibration or unusual noise.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
191		•				Shaft Brake	Inspect shaft brake for proper operation.	Brake inoperative.
192		•			•	Bulkhead Seal	Inspect seal for over or under lubrication.	
193	•	•				Lube Oil Hand Pump	Inspect pump for leaks, loose connections and damage.	Pump inoperative or leaking.
194	•			•		Main Propulsion Engine (PORT)	Check the engine for debris, foreign objects and loose or broken fittings.	Debris, foreign objects wedged or lodged in components.
	•	•	•			Engine Accessories and Connections	Inspect engine, fuel injection pumps and cooling pumps for loose or damaged connections or mountings. Inspect fluid lines and joints for leaks.	Class III leaks, fuel leaks, or any other fluid leaks. Damaged connections likely to leak.
	•		•			Air Line Lubricator	Check oil level in air line lubricator. Should be over half full. Add oil as required.	Oil bowl less than hall full.
						Control Panel		
	•					Control Power	Press CONTROL POWER switch.	ENGINE RPM does not read 000.
	•					ALARM TEST	Press ALARM TEST switch. Fault messages are displayed on ANNUNCIATOR panel. Siren sounds and BLUE light is activated.	Any fault message is not displayed.
	•					Start Air	Check starting air pressure gauge for 125 psi reading.	Low air pressure.
	•			•		Governor	Check oil level in sight glass. Add oil if required.	Oil level not between, ADD and FULL index lines.
	•					Oil Level	Check oil level with engine at idle speed and engine HOT. Oil level should be between LOW and FULL.	Oil level below LOW or above FULL mark.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
194						Main Propulsion Engine (PORT) – continued		
	•					Cooling System	Check coolant level at expansion tank.	Coolant level is low.
	•					Fuel Oil System	Check engine fuel supply.	
	•						Prime fuel system.	
	•	•				Leaks	Inspect engine for leaks.	Class III leaks. Fuel leaks or any other fluid leaks.
						Control Panel		
		•				ENGINE RPM	Tachometer should read 725 to 775.	Idle speed below 725 or above 775.
		•				ANNUNCIATOR	Observe ANNUNCIATOR panel for alarm messages.	Any alarm message.
		•				LUBE OIL	Check gauge for proper oil pressure (60 to 100 psi).	Oil pressure less than 60 or more than 100 psi.
		•				FUEL OIL	Check gauge for proper oil pressure (35 to 50 psi).	Fuel pressure less than 35 or more than 50 psi.
		•		•		Lube Oil Level	Check lube oil level with engine at idle. Oil level should read between LOW and FULL marks on dipstick.	Oil level below LOW or above FULL on dipstick.
		•		•		Pyrometer	Check meter for proper temperature	High temperature reading (200°F and above).
							NOTE **Filters are located in each stack.**	
		•		•		Engine Air Filters	Check filter condition for cleanliness and build-up of salt.	
		•				Hour Meter	Check that meter is operating.	Meter inoperative.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
194						Main Propulsion Engine (PORT)		
						Engine		
		•		•		Cylinder Test Valves	Check cylinder test valves for leakage. Tighten if required.	Class III leaks.
		•		•		Handhole Covers	Check handhole covers for leakage. Tighten if required.	Class III leaks.
		•		•		Air Box Drains	Check air box drains for proper operation and clean if necessary. **NOTE** **If air box drains are kept closed, drain after every 4 hours of operation.**	Drains do not operate.
		•				Unusual Sounds	Check for unusual noises or sounds.	Any unusual noise or sound.
					•	Block Heater	Check for proper operation. Place hand near, but not on block. Warmth should be felt.	No warmth felt.
195		•				Prelube Pump	Inspect pump for leaks, loose connections and damage.	Pump is defective.
196		•			•	Propeller Shafts	Check for unusual vibrations.	Shaft is misaligned or bent, or bearing is excessively worn.
197		•	•	•	•	Reduction Gear Cooling Pumps	Visually inspect pumps for leaks, loose connections, and damage. Check gauges for normal readings (30 psi).	Class III leaks. Pumps are defective.
198						Reduction Gear (STBD)		
	•					Bayonet Gauge	Oil level should be between ADD and FULL. Add oil as required.	Oil level below ADD or above FULL.
		•				Shaft Brake Pressure Gauge	Gauge should read 1200 to 1500 psi. **NOTE** **Gauge located in No. 1 SHAFT BRAKE PANEL.**	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
198						Reduction Gear (STBD) – continued		
	•	•				Air Pressure Gauge	Gauge should read 100 to 125 psi.	Reading not in range.
		•				Lube Oil Pressure Gauge	Gauge should read at least 350 psi.	Reading below 350 psi.
		•				Oil Temperature Gauge	Gauge should read 120° to 150°F.	Reading not in range.
		•				Clutch Oil Pressure Gauge	Gauge should read 170 to 175 psi with clutch disengaged and 350 to 360 psi with clutch engaged.	Reading not in range.
		•				Operation	Observe reduction gear for excessive vibration or unusual noise.	Excessive vibration or unusual noise.
199		•				Shaft Brake	Inspect shaft brake for proper operation.	Brake inoperative.
200		•			•	Bulkhead Seal	Inspect seal for over or under lubrication.	
201	•			•		Main Propulsion Engine (STBD)	Check the engine for debris, foreign objects and loose or broken fittings.	Debris, foreign objects wedged or lodged in components.
	•	•	•			Engine Accessories and Connections	Inspect engine, fuel injection pumps and cooling pumps for loose or damaged connections or mountings. Inspect fluid lines and joints for leaks.	Class III leaks, fuel leaks or any other fluids, or damaged connections likely to leak.
	•		•			Air Line Lubricator	Check oil level in air line lubricator. Level should be over half full.	Oil bowl less than half full. Add oil as required.
	•					Control Power	Press CONTROL POWER switch.	ENGINE RPM does not read 000.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
201						Main Propulsion Engine (STBD) – continued Control Panel-continued		
	•					ALARM TEST	Press ALARM TEST switch. Fault messages are displayed on ANNUNCIATOR panel. Siren sounds and BLUE light activated.	Any fault message is not displayed.
	•					Start Air	Check starting air pressure gauge for minimum of 125 psi reading.	Low air pressure.
	•			•		Governor	Check oil level. Add oil if required. Refer to Chapter 3.	Oil level not between
	•					Oil Level	Check oil level with engine hot and at IDLE speed. Oil level should be between LOW and FULL.	ADD and FULL index lines.
	•					Cooling System	Check coolant level at expansion tank. Add coolant as required.	Oil level below LOW or above FULL mark.
	•					Fuel Oil System	Check engine fuel supply.	Coolant level is low.
	•						Prime fuel system.	
	•	•				Leaks Control Panel	Inspect engine for leaks.	Class III leaks, fuel leaks or any other fluid leaks.
		•				ENGINE RPM	Tachometer should read 725 to 775.	Idle speed below 725 or above 775.
		•				ANNUNCIATOR	Observe ANNUNCIATOR panel for alarm messages.	Any alarm message.
		•				LUBE OIL	Check gauge for proper oil pressure (60 to 100 psi).	Oil pressure less than 60 or more than 100 psi.
						FUEL OIL	Check gauge for proper fuel pressure (35 to 50 psi).	Fuel pressure less than 35 or more than 50 psi.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
201						Main Propulsion Engine (STBD) – continued		
		•		•		Lube Oil Level	Check lube oil level with engine at idle speed and engine hot. Oil level should be between LOW and FULL.	Oil level below LOW or above FULL on dipstick.
		•		•		Pyrometer	Check meter for proper temperature. **NOTE** **Filters are located in each stack.**	High temperature reading (2001F or higher).
		•		•		Engine Air Filters	Check filter condition for cleanliness or salt build-up.	
		•				Hour Meter	Check that meter is operating.	Meter inoperative.
						Engine		
		•		•		Cylinder Test Valves	Check cylinder test valves for leakage. Tighten if required.	Class III leaks.
		•		•		Handhole Covers	Check handhole covers for leakage. Tighten if required.	Class III leaks.
		•		•		Air Box Drains	Check air box drains for proper operation and clean if necessary. **NOTE** **If air box drains are kept closed, drain after every 4 hours of operation.**	Drains do not operate.
		•				Unusual Sounds	Check for unusual noises or sounds.	Any unusual noise or sound.
					•	Block Heater	Check for proper operation. Place hand near, but not on block. Warmth should be felt.	No warmth felt.
202		•		•		Fuel Oil Transfer Pumps	Visually inspect pumps and gauges for leaks, loose connections and damage.	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
203						Fuel Oil Filter/Coalescer		
	•				•	Exterior	Visually inspect exterior for obvious damage or leaks.	Any fuel leaks or damage.
		•				Differential Pressure	Check differential pressure gauge. Reading should be less than 18 psi.	Differential pressure above 18 psi.
		•				Water Level	Inspect water level sight gauge. Drain water whenever sight ball is observed to be floating.	
				•		Water Separator Level	Drain water from separator.	
204						Tank Level Indicators		
	•	•	•	•		Fuel Day Tanks	Check the amount of fuel in the day tanks. Note any evidence of fuel leaks. Add fuel to top off tanks as necessary.	Any fuel leaks.
205	•	•		•		Fuel Oil Manifold	Visually inspect manifold for cracks, leaks, and secure mounting.	Any fuel leaks or loose mounting.
206	•	•			•	Oily Bilge Pump	Visually inspect pump for leaks, loose connections and damage. Inspect air filter.	Class III leaks. Clogged air filter.
207					•	Oily Bilge Strainer	Remove top. Inspect basket.	Strainer is unserviceable.
208						Oily Water Separator		
	•				•	Exterior	Visually inspect unit for leaks, loose connections, and damage.	Class III leaks.
		•				Backflush Pressure Gauge	Gauge should read less than 15 psi.	Gauge reads 16 psi or higher.
		•				Operating Vacuum Gauge	Gauge should read less than 25 in/hg.	Gauge reads 25 in/hg or higher.
	•					Oil Content Monitor	Visually inspect unit for broken or missing indicators.	Broken or missing indicators.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
209	•	•	•	•		Battery Chargers	Check battery chargers for proper connections to battery. Ammeter should read near 0 for a trickle charge. If the reading is above 3 AMPS, refer to unit maintenance. **NOTE** **A high reading indicates the batteries are weak and are being recharged or that one or more batteries are unserviceable.**	
210				•		Battery Box	Visually inspect battery box for obvious damage. Ensure vent is not obstructed.	Vent is obstructed.
211						Batteries	**WARNING** **Do not smoke when observing battery electrolyte level. Batteries give off fumes that can explode. Electrolyte is an acid and can cause personal Injury if it contacts skin or eyes. Wear approved goggles, gloves, and apron.** **NOTE** **Top cover of battery box must be removed to check batteries.**	
	•		•	•		Batteries, Cables and Terminals	Inspect batteries, terminals, connections, cables and vent caps for cleanliness and tightness. Clean or tighten terminal connections as required. Clean battery as required.	
					•	Electrolyte	Check electrolyte level and check specific gravity of electrolyte with hydrometer.	
212	•			•		Ship Service Diesel Generator Set (STBD)	Check the engine and generator for debris, foreign objects, leaks, loose or broken fittings, guards and components.	
	•	•		•		Expansion Tanks	Check coolant level with sight glass. Inspect tanks, tank caps, and seals for leaks or other damage.	Low coolant level. Class III leaks.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
212						Ship Service Diesel Generator Set STBD) – continued		
	•			•		Air Cleaner	Check indicator. Indicator should read Indicator in GREEN range.	Indicator in RED range.
	•			•		Oil Level	Check oil dipstick. Oil level should be between ADD and FULL marks on ENGINE STOPPED side of dipstick.	Oil level below ADD or above FULL.
		•					Check oil dipstick. Oil level should be between ADD and FULL marks on ENGINE RUNNING side of dipstick.	Oil level below ADD or above FULL.
	•			•		Fuel System	Check for fuel leaks.	Class III leaks.
	•			•			Drain water separator.	
	•			•		Gauges	Check condition of all gauges.	Damaged or missing gauges.
		•				Fuel Pressure	Check gauge. Gauge should read in NORMAL (GREEN) range.	Reading in RED range.
	•			•		Water Temperature	Check gauge. Gauge should read near top of WHITE range.	No reading or low end of WHITE range.
		•				Ammeter	Check gauge. Gauge should read at 0 or on positive (+) side.	Reading on negative (-) side of gauge.
		•				Oil Pressure	Check gauge. Gauge should read in GREEN range.	Reading in RED range.
		•				Noises	Check for unusual noises.	Unusual noises are heard.
		•	•			Leaks	Check for leaks.	Class III leaks.
						Main Switchboard in EOS		
		•				Hertz Meter	Check meter reading. Reading should be 60 Hz.	Reading not 60 Hz.
		•				A-C Volts Meter	Check meter reading. Reading should be 450 ± 5.	Reading out of range.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
213	•	•	•			Sewage Discharge Pump (STBD) Enclosed Operating Station	Visually inspect pump for leaks, loose connections and damage.	Class III leaks.
214	•			•		EOS Console	Inspect console for cleanliness, clean as required. Look for any loose, missing, or broken switches or controls, gauges, indicator lights, or obvious damage. Ensure throttle controls operate smoothly and do not bind.	
	•			•		Engine Order Telegraph	Conduct test with pilothouse to ensure communication. Move selector through each position ensuring corresponding indicator lights.	No communication with pilothouse.
	•			•		Steering Gear Alarm Panel	Press SYSTEM TEST pushbutton. All lights should light.	One or more lights do not light.
	•			•		Remote Propulsion Indicator Panel	Press and hold LAMP TEST button. All lights should light. Adjust intensity of lights using dimmer control.	One or more lights do not light. Light intensity cannot be adjusted.
		•				Machinery Plant Monitoring System Display	Using PAGE + pushbutton, page through each screen to ensure each display is readable.	Any display unreadable or "scrambled."
215	•	•		•		Main Switchboard	Visually inspect exterior of switchboard for damaged or missing circuit breakers, meters, controls, indicators, or lights.	Any part is missing, or meters are unserviceable.
216	•					Coffee Maker	Visually inspect coffee maker for damage.	Switch is damaged or missing.
		•					Inspect for leaks.	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
217						Tank Level Indicator Receiver Panel		
		•			•		Set ON-OFF switch on Master Unit to ON position. POWER lamp will light.	POWER lamp does not light.
		•			•		Alarm will sound. Pull out and press down the ALARM SILENCE switch and release. Alarm will silence.	Alarm does not sound or is not silenced by ALARM SILENCE switch.
	•	•			•		Set ON-OFF switch to OFF position until all fluid level meters read zero.	One or more meters do not read zero.
218				•		Marine Fire Detector Panel	Push RESET-LAMP TEST pushbutton. All lamps should light.	One or more lamps do not light.
		•				DC VOLTS	Voltmeter should read 24 to 30 V.	
		•				DC AMPERES	Ammeter should read near 0.	
219		•			•	Unit Air Conditioner	Inspect for secure mounting. Listen for unusual sounds.	Unusual sounds.
						AMS No. 1	**NOTE**	
220						MSD Aeration Blower	**Blower cover plate must be removed.**	
				•		Gearbox Oil Level	Check sight glass, where possible. Sight glass should show full.	Sight glass not full of oil or oil contaminated.
		•		•		Pressure Gauge	Check pressure gauge. Reading should be 5 to 7 psi.	Reading is greater than 7 psi.
	•			•		V-Belt	Inspect V-belt for serviceability.	V-belt unserviceable.
221		•		•		AFFF Pump	Visually inspect pump and coupling for leaks, loose connections and damage.	Class III leaks.
222						MSD Contact Tank		
	•				•	Exterior	Visually inspect exterior for leaks or obvious damage.	Class III leaks.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
222						MSD Contact Tank – continued		
		•		•		Sight Glass	Observe sight glass. Glass should be about 1/2 full.	Sight glass shows fluid level less thanl/4 or more than 3/4 full.
223	•				•	Media Tank	Visually inspect tank for leaks or obvious damage.	Class III leaks.
						Tablet Chlorinator	**WARNING** **• Do not allow chlorine tablet to come in contact with fluid.** **• Chlorinator feed tubes contain toxic fumes. Ensure adequate ventilation before removing feed tube covers. Personal injury could result.** **• Wear rubber or plastic gloves (not cloth) when handling chlorine tablet to prevent burns.**	
							Remove feed tube cup. Observe level of chlorine tablets. Refill as required.	All tablets have been expended.
				•			**CAUTION** **If all tablets have been expended, shut down MSD and notify unit maintenance. System will not function properly until recharged and damage to equipment could result.**	
224		•				MSD Discharge Pump (under deck)	Visually inspect pump for leaks, loose connections and damage.	Class III leaks.
225		•	•			Sewage Holding Tank Level Receiver	Observe level at local receiver. Compare reading with receiver panel in EOS. Report any differences to unit maintenance.	Reading is different for same tank between local and EOS meters.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
226		•		•		Hot Water Recirculating Pump	Visually inspect pumps and gauges for leaks, loose connections and damage.	Class III leaks.
227		•			•	Hot Water Heaters	Visually inspect heaters and temperature gauges for leaks or obvious damage.	Class III leaks or damage which could affect serviceability.
228						Compressed Air System		
	•	•	•	•		Air Compressors	Check oil level. Maintain between high and low level marks on dipstick gauge. **CAUTION** **Do not overfill or equipment damage may occur.**	Low oil level.
	•	•	•	•			**Check for oil leaks.**	**Class III leaks.**
	•		•		•		**Perform an overall visual inspection and ensure safety guards are in place.**	
		•					**Check for any unusual noise or vibration.**	
	•	•	•				**Check for dirty air and oil filters. Filters are dirty or damaged.**	
	•		•	•		Air Receivers	Check air receivers for moisture accumulation by slightly opening drain valve. Drain until water no longer comes out.	
		•		•		Compressed Air Piping System	Check safety valves for proper operation.	
				•			Check drop legs and traps in air distribution system for moisture and sediment accumulation.	
		•				AIR RCVR NO. 2 PRESS Gauge	Gauge should read 220 to 250 psi.	Pressure greater than 250 or less than 220 psi.
		•				AIR RCVR NO. 1 PRESS Gauge	Gauge should read 220 to 250 psi.	Pressure greater than 250 or less than 220 psi.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
228						Compressed Air System – continued		
		•				SYSTEM PRESS Gauge	Gauge should read 125 psi.	
		•				CPRSR DISCH PRESS Gauge	Gauge should read 240 to 260 psi.	
				•		Moisture Separators	Check for leaks, loose connections and damage.	Unit inoperable.
				•		Automatic Drain	Check for leaks, loose connections and damage.	Unit inoperable.
229						Bow Thruster Engine and Marine Gear		
	•					Air Starter Oiler Bowl	Visually inspect sight glass. If oil level is one-half or below remove oil filler plug and fill bowl with clean oil.	Oil level is low.
	•		•	•		Engine Crankcase Oil	Check oil level at dipstick. Level should be between LOW and FULL marks on dipstick. Add oil as required.	Low oil level.
	•			•		Cooling System	Check coolant level at expansion tank.	
		•				Oil Pressure Gauge	240 to 480 kPa (35 to 70 psi) (GREEN Range).	Readings out of range.
		•				Coolant Temperature	70°C to 90°C (170°F to 195°F) (GREEN Range).	Readings out of range.
		•				Tachometer	Engine RPM between 600 (idle) and 2200 (full speed).	Readings out of range.
		•	•			Fuel Pressure	In GREEN Range.	
		•				Reduction Gear Oil Pressure Gauge	NEUTRAL 50 to 85 psi @ 1800 RPM; ENGAGED 175 to 200 psi @ 1800 RPM.	Readings out of range.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
229						Bow Thruster Engine and Marine Gear – continued		
	•			•		Mounting Fixtures	Inspect for damaged or missing parts.	
	•			•		Heat Exchanger Connecting Lines	Inspect for leaks, sponginess, or other damage.	
	•			•		Flexible Hose	Inspect for leaks, sponginess, or other damage.	
	•			•		Pressure Gauge	Inspect pressure gauge and connecting lines for damage.	
						Twin Disc Transmission		
	•		•	•		Oil Level	Oil level should be between LOW and FULL marks on dipstick. Low oil level.	
230		•		•		Hydraulic Oil Pump	Visually inspect pump for leaks, loose connections and damage.	Class III leaks,
231						Pump Drive Engine		
	•					Air Starter Oiler Bowl	Visually inspect bowl.	If oil level is less than one-half, remove oil filler plug and fill bowl.
	•		•	•		Engine Crankcase Oil	Check oil level at dipstick. Level should be between LOW and FULL marks on dipstick. Add oil as required.	Low oil level.
	•			•		Cooling System	Check coolant level. Gauge level should read full or within 1 inch below filler cap.	
		•				Oil Pressure Gauge	240 to 480 kPa (35 to 70 psi) (GREEN Range).	Readings out of range.
		•				Coolant Temperature	70°C to 90°C (170°F to 195°F) (GREEN Range).	Readings out of range.
		•				Tachometer	Engine RPM between 600 (idle) and 2200 (full speed).	Readings out of range.
		•	•			Fuel Pressure	In GREEN Range.	

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
232	•				•	Fire Fighting Pump	Visually inspect pump and coupling for leaks, loose connections, and damage.	Any fluid leaks.
		•					Check pump and power takeoff clutch for any unusual noise or vibration.	Any unusual noise or excessive vibration.
		•					Monitor fire main pressure gauge. Pressure should be maintained by speed of pump drive engine.	Pressure cannot be maintained.
233						Tow Winch Hydraulic Oil Sump		
	•	•				Sight Glass	Oil level should be at or near top of sight glass.	Low oil level.
						Idle		
	•					C Pump Pressure	Gauge should read 200 psi.	Readings less than 200 psi.
	•					D Pump Pressure	Gauge should read 200 psi.	Readings less than 200 psi.
	•					Load Pressure	Gauge should read 0 psi.	Readings more than 0 psi.
	•	•				Dirty Filter Indicator	Gauge should read between 10 to 20 psi (GREEN Range).	Gauge above 20 (in RED Range).
	•	•	•			Leaks	Visually inspect oil sump and related piping for leaks.	Class III leaks.
						Running		
	•					C Pump Pressure	Gauge should read 0 to 2800 psi.	Reading not in range.
	•					D Pump Pressure	Gauge should read 500 to 3500 psi.	Reading not in range.
	•					Load Pressure	Gauge should read 175 to 3300 psi.	Reading not in range.

Table 2-2. Operator/Crew Preventive Maintenance Checks and Service – CONT

B – Before D – During A – After W – Weekly M - Monthly

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
234						Sliding Hydraulic Watertight Door	**CAUTION** **Do not operate door with pressure shutoff valves closed as this will back-pressure the local hand pump and cause the seals to rupture.**	
					•	Bleed Off	Check that hydraulic system is bled at all high points to remove trapped air. Turn bleeder valve handle to release trapped air.	Bleeder valve missing or unserviceable.
					•	Oil Level	Check oil level dipstick in expansion tank. Add oil as required.	Low oil level.
					•	Leaks	Check hydraulic system for leaks.	Class III leaks exist.
					•	Tracks	Visually inspect tracks for secure mounting and damage.	Tracks damaged or not mounted securely.
							NOTE **Local hand pump may have to be operated very fast to break door loose when initially opened.**	
					•	Local Hand Pump	Inspect local hand pump for secure mounting and damage.	
		•			•		Check hand crank operated door to full open/closed position.	Door will not open and/or close fully.
						<u>Steering Gear Compartment</u>		
235	•			•		Steering Gear Rudder Motors	Visually inspect unit for damaged, loose, or missing parts or leaks.	Class III leaks or damaged or missing parts.
236	•		•	•		Tow Pin Valves	Check hydraulic connections for leaks and check lines for damage.	
						Main Deck		
237	•	•	•	•		Tow Pin Cylinders	Check for visible damage and hydraulic leaks.	

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Table 2-2.1 Operator/Crew Preventive Maintenance Checks and Service

SA – Semi-annually PSA - Post system activation Q – Quarterly W – Weekly M – Monthly

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
	SA	PSA	Q	W	M			
238					•	Pressure, FM-200 Cylinders	Procedure check pressure gauge for proper operating pressure; if pressure gauge indicator is not in green, submit Work Order to General Support (GS) maintenance to have cylinder recharged.	
					•	Liquid Level, FM-200 Cylinders	Take liquid level reading in accordance with instructions contained in TM LT801-97-5553. If liquid level is low, submit Work Order to GS maintenance to have cylinder recharged.	
					•	Complete FM-200 System	Inspect system components in accordance with instructions contained in TM LT801-97-5553. If any component is damaged, submit Work Order to GS maintenance.	
			•			Ventilation Dampers and Closures	Operate and service Engine room intake dampers (port and starboard). Install and service the following manual closures: AMS I exhaust fan hinged cover, AMS I supply fan hinged cover, Engine room exhaust fan outlet cover (port and starboard).	
			•			Engine Room/AMS II Sliding Watertight Door	Operate door to verify operation in accordance with manufacturer's manual. Perform maintenance in accordance with manufacturer's instructions.	
	•					FM-200 Pressure Switches	Ensure all engines (excluding main engines) and powered ventilation system shutdowns are in operation. Manually raise plunger on pressure switches. Verify automatic shutdown of operating engines and ventilation systems. Verify activation of warning lights, electric horns/strobes, and warning bell. Reset plunger on pressure switches. If any engine or ventilation systems fail to shut down automatically, submit Work Order to GS maintenance.	

Table 2-2.1 Operator/Crew Preventive Maintenance Checks and Service

SA – Semi-annually PSA – Post system activation Q –Quarterly W – Weekly M – Monthly

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
	SA	PSA	Q	W	M			
239					•	Pressure, FM-200 Cylinders	Check pressure gauge for proper operating pressure; if pressure gauge indicator is not in green, submit Work Order to GS maintenance to have cylinder recharged.	
					•	Complete FM-200 System	Inspect system components in accordance with instructions contained in TM LT801-97-5553. If any component is damaged, submit Work Order to GS maintenance.	
			•			Ventilation Dampers	Operate and service paint locker ventilation dampers.	
	•					FM-200 Pressure Switch	Ensure both powered ventilation systems are in operation. Manually raise plunger on pressure switch. Verify automatic shutdown of powered ventilation systems and activation of warning bell. Reset plunger on pressure switch. If either powered ventilation system fails to shut down automatically, submit Work Order to GS maintenance.	

Table 2-2.1 Operator/Crew Preventive Maintenance Checks and Service

SA – Semi-annually PSA – Post system activation Q –Quarterly W – Weekly M – Monthly

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
	SA	PSA	Q	W	M			
240				•		Control Valve	Charge fire main to operating pressure; perform a visual inspection to verify WWS if free of leaks. If leaks are discovered, repair control valve.	
					•	Control Valve	Verify fire main is not charged. Inspect control vale handle locking mechanism to ensure it is free and operates properly. Exercise WWS control valve by unlocking valve handle and operating control valve through two (2) openings and closings. Close valve and verify lock is engaged. If control valve fails to operate, repair or replace.	
					•	Strainer Blow Off	Verify fire main is not charged. Exercise WWS strainer blow off procedure through two (2) openings and closings. Leave WWS strainer blow off valve in closed position. If valve fails to operate, replace valve.	
		•				Strainer	Remove, clean, and reinstall strainer basket.	

SECTION III. OPERATION UNDER USUAL CONDITIONS

2-3. General. The following data is provided for the use of personnel in operating the LT. It is important for the operator/crew to know how to perform every operation of which the equipment is capable. Basic motions associated with operations must be coordinated to perform the specific tasks for which the LT was designed. The operator may have to vary given procedures to fit the individual job.

2-4. Preparation for Use.

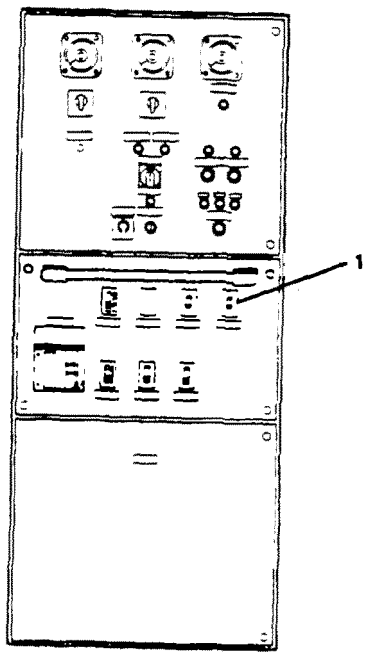
a. Ship connected to shore power.

NOTE

These operating procedures assume all circuit breakers/switches on power distribution panels, lighting panels, load center panels, switchboards, and equipment are in the OFF position, and the ship is connected to shore power.

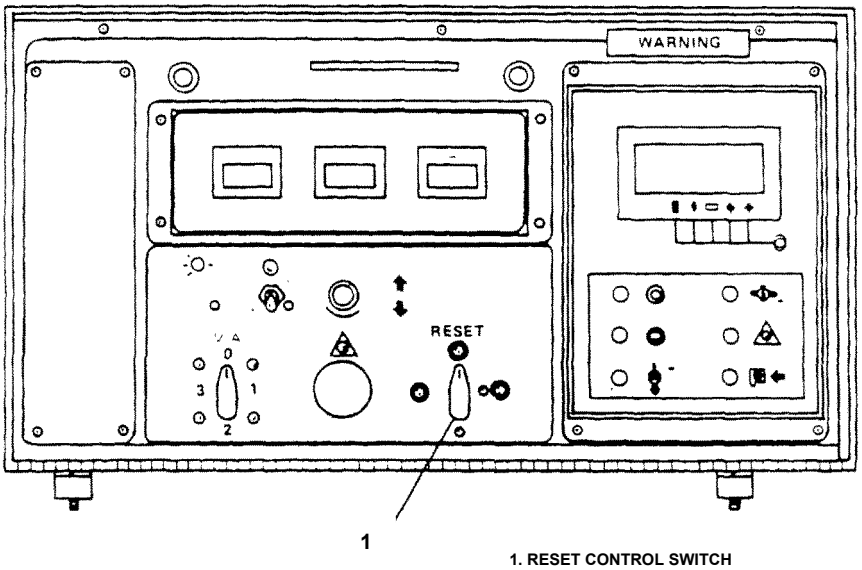
b. Emergency Switchboard (Figure 2-139). Set 310 KVA 10 XFMRS circuit breaker (1) to ON position.

c. Emergency Generator Diesel Control Panel (Figure 2-140). Set RESET control switch (1) to OFF position.



1. 3-10KVA 10 XFMRS

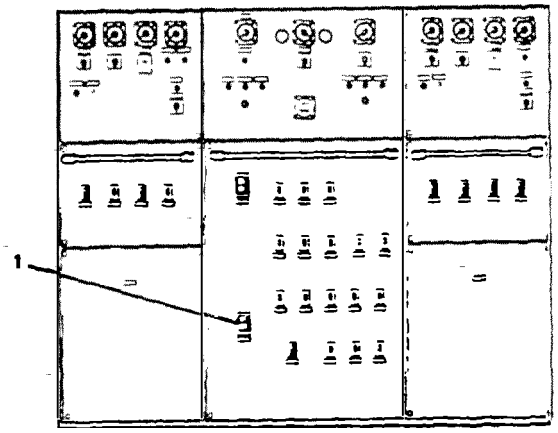
Figure 2-139. Emergency Switchboard



1. RESET CONTROL SWITCH

Figure 2-140. Emergency Generator Diesel Control Panel.

d. Main Switchboard (Figure 2-141). Set all circuit breakers to OFF position except BUS TIE CKT. BKR. circuit breaker (1) set to ON position.



1. BUS TIE CKT. BKR.

Figure 2-141. Main witchboard.

NOTE

Circuit breakers for equipment vital to the LT operation are located on the emergency switchboard bus. They are electrically powered from the main switchboard bus tie. These systems operate on normal ship power and/or emergency power.

2-5. Before You Operate This Equipment

The following operating procedures are in part sequential and in part parallel to allow any crew member to bring the LT from a condition of being connected to shore power to a full ship power operating condition. Instructions are provided to systematically bring each subsystem/equipment into operation. Each subsystem equipment will have the required preventive maintenance services performed by operator/crew before (B) operating. The preventive maintenance checks and services (PMCS) are performed as the vessel is prepared for operation. See Table 2-2 in Section II of this chapter. Shutdown procedures take the vessel from full power to dead in the water.

2-6. Power Generation.

a. Set Up Switchboards and Lighting Panels.

(1) Pilothouse emergency distribution panel (Figure 2-142). Set PILOT HOUSE LTS circuit breaker (1) to ON position.

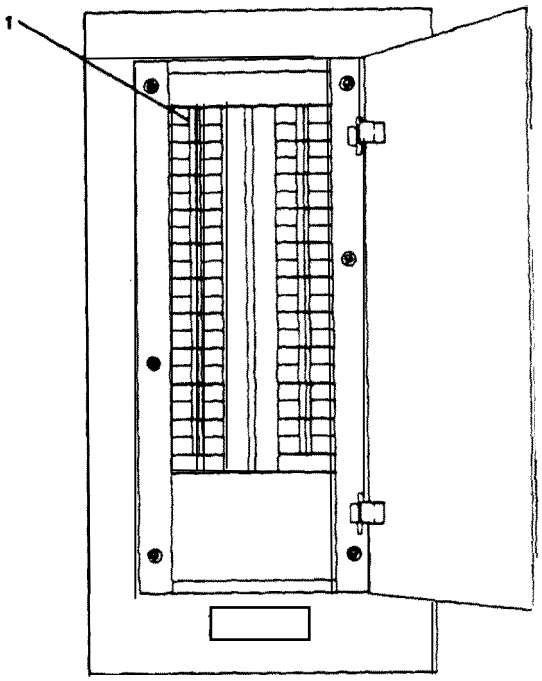


Figure 2-142. Pilothouse Emergency Distribution Panel.

(2) Radio room - electronics distribution panel (Figure 2-143). Set BATTERY CHARGER RADIO RM SC PANEL circuit breaker (1) to ON position.

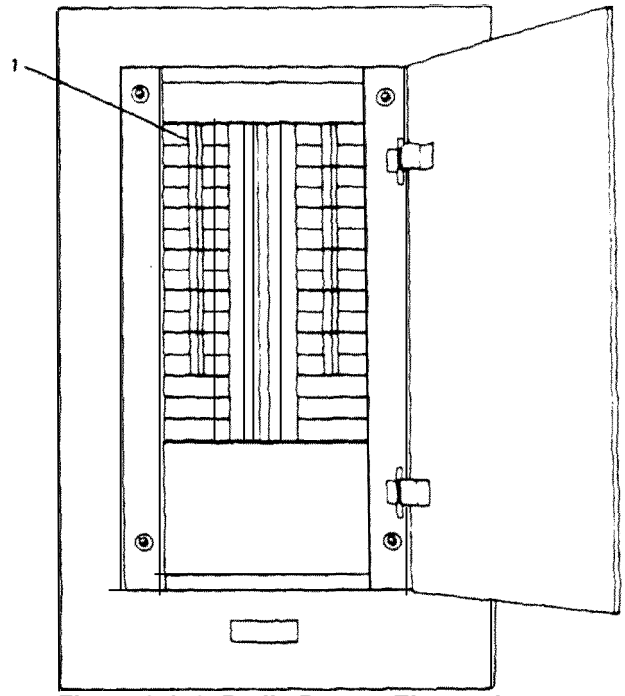


Figure 2-143. Radio Room - Electronics Distribution Panel.

(3) 01 level, 02 level, and main deck emergency lighting panel no. 1 (Figure 2-144). Set following circuit breakers to ON position.

(a) MAIN DECK EMERGENCY LIGHTS (1).

(b) 01 LEVEL EMERGENCY LIGHTS (2).

(c) 02 LEVEL EMERGENCY LIGHTS (3).

(d) CHILL/FREEZE BOX LIGHTS (5).

(e) FREEZER ALARM (6).

(f) PILOTHOUSE ALARM SWBD (4).

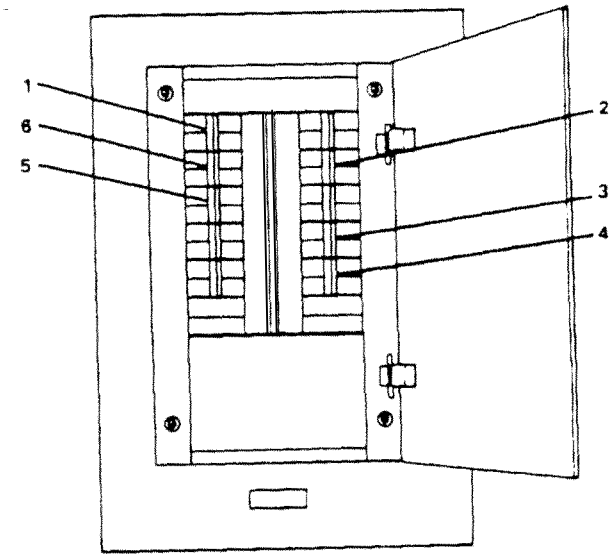


Figure 2-144. 01, 02, and Main Deck Emergency Lighting Panel No. 1.

(4) Exterior emergency lighting panel no. 2 (Figure 2-145). Set following circuit breakers to ON position:

(a) INFLATABLE WORK BOAT FLOOD LIGHT (1).

(b) 01 LVL WEATHER DECK LIGHTS(2).

(c) MN DECK AFT FLOODLIGHTS.

(d) ROTARY CLEARVIEW SCREEN (3).

(e) 02 LVLWATHER DECK LIGHTS (8).

(f) 01 LVL FWD FLOODLIGHTS (4).

(g) PLT/HS WEATHER DECK LIGHTS (7).

(h) LIFE RAFT FLOODLIGHT PORT (5).

(i) LIFE RAFT FLOODLIGHT STBD.

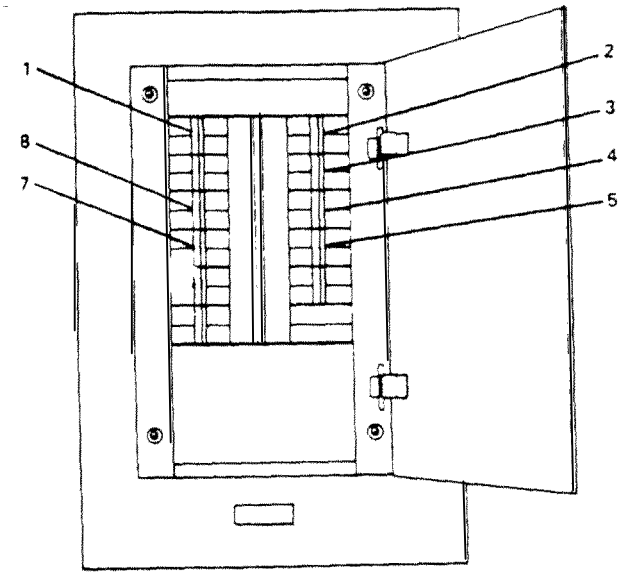


Figure 2-145. Exterior Emergency.

(5) Engine room emergency distribution panel no. 1 (Figure 2-146). Set following circuit breakers to ON position:

(a) ENG RM EMER LIGHTS PORT (1).

(b) ENG RM EMER LIGHTS STBD (2).

(c) BOW THRUSTER & AMS I EMER LTS (9).

(d) AMS II EMER LTS (3).

(e) STRG GEAR RM & TOW GEAR LKR LTS (8).

(f) BATTERY CHARGER SSDG (6).

(g) BATTERY CHARGER MACH DC CONTROL (4).

(h) REMOTE PROPULSION INDICATING PANEL SYS (7).

(i) MONITORING SYS CRT (5).

NOTE

Ensure battery chargers are turned ON.

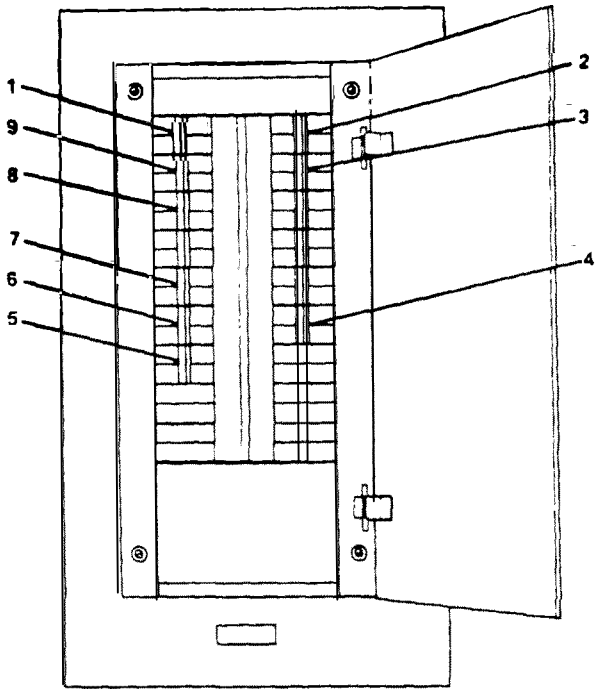


Figure 2-146. Emergency Distribution Panel No. 1.

(6) 01 level distribution panel no. 2 (Figure 2 147). Set following circuit breakers to ON position.

(a) 01 LEVEL INT. LIGHTS PORT (1).

(b) 02 LEVEL INT. LIGHTS (2).

(c) 01 LEVEL PASSWAY LTS (8).

(d) 01 LVL RCPT STBD (3).

(e) 01 LEVEL INT. STBD LIGHTS (7).

(f) 01 LEVEL RCPT PORT (4).

(g) PILOTHOUSE RCPTS (6).

(h) 02 LVL RCPTS (5).

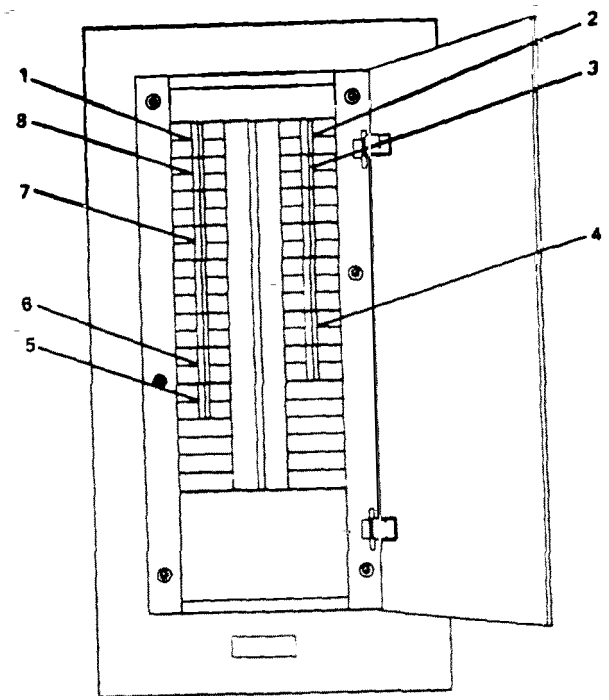


Figure 2-147. Level Distribution Panel No. 2.

(7) Main deck distribution panel no. 3 (Figure 2-148). Set following circuit breakers to ON position:

(a) MAIN DECK INT LIGHTS - STBD (1).

(b) MAIN DECK INT LIGHTS - PORT (6).

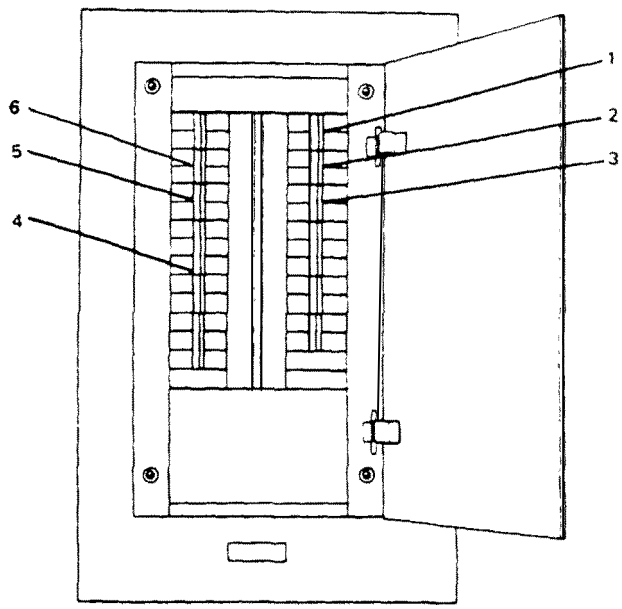


Figure 2-148. Main Deck Distribution Panel No. 3.

(c) MAIN DECK RCPTS PORT (2).

(d) MAIN DECK PASSWAY LIGHTS (5).

(e) CREWS MESS LIGHTING (3).

(f) MAIN DECK RCPTS STBD (4).

(8) Galley 120V distribution panel no. 1 (Figure 2-149). Set following circuit breakers to ON position:

(a) GALLEY RCPT (1).

(b) GALLEY LIGHTS (2).

(c) GAYLORD CONT CAB (3).

(9) Engine room distribution panel no. 4 (Figure 2-150). Set following circuit breakers to ON position:

(a) ENG. RM LIGHTS (1).

(b) BOW THRUSTER COMPT AMS & II LIGHTS (2).

(c) #1 SSDG JACKET WATER HEATER (7).

(d) HOLD LEVEL AND FANTAIL RECEPTACLES (3).

(e) #2 SSDG JACKET WATERHEATER (4).

(f) PUMP DRIVE ENG JACKET WATER HEATER (6).

(g) BOW THRUSTER ENG JACKET WATER HTR (5).

(10) Engine room power panel No. 1 (Figure 2-151). Set following circuit breakers to ON position:

(a) #1 M.E. CONTROL PANEL (2).

(b) #2 M.E. CONTROL PANEL (1).

(11) Machinery DC distribution control panel (Figure 2-152). Set MACHY MNTR SYS circuit breaker (1) to ON position.

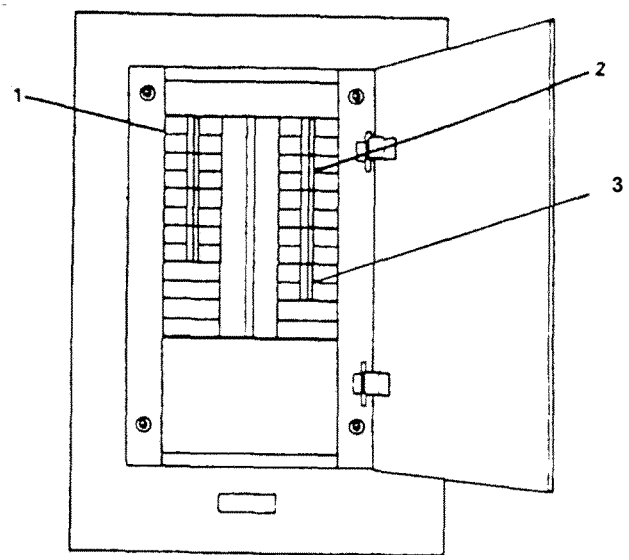


Figure 2-149. Galley 120V Distribution Panel No. 1

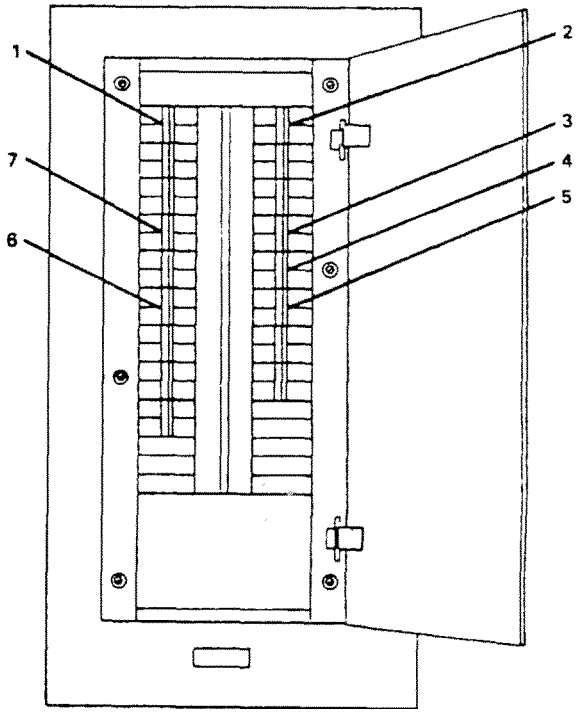


Figure 2-150. Engine Room Distribution Panel No. 4.

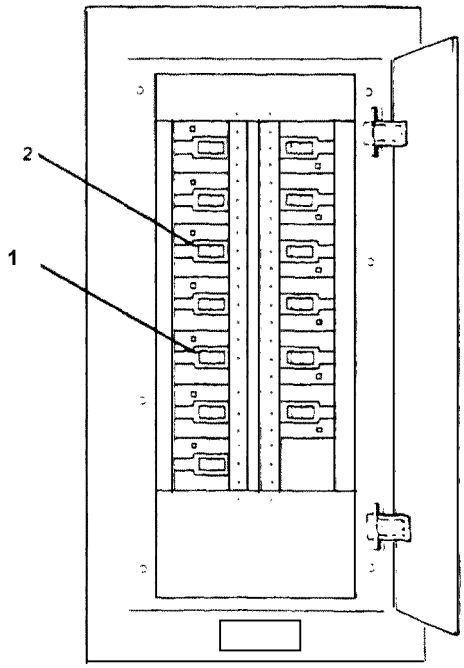


Figure 2-151. Engine Room Power Panel No. 1.

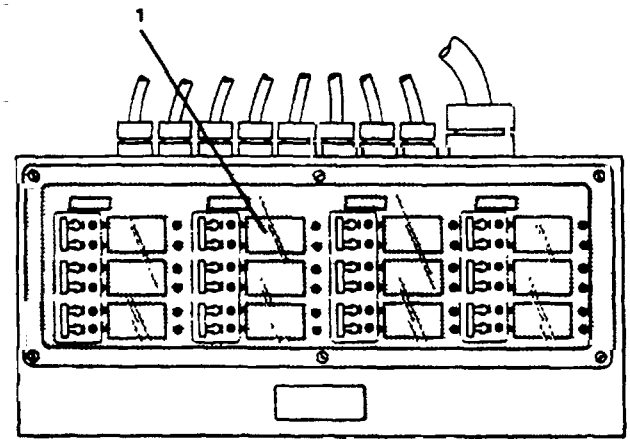


Figure 2-152. Machinery DC Distribution Control Panel.

(12) Machinery monitoring system CPU multiremote panel (Figure 2-153).

(a) Set FIELD switch (1) to ON position.

(b) Set MAIN switch (2) to ON position.

b. Align Fuel Oil Service System (Figure 2-154).

(1) Open FO-15, F.O. SERV. SUCT. STBD (6).

(2) Open FO-21, F.O. SPLY TO S.S.D.G NO. 1 (1).

(3) Open fuel oil filter inlet valve (2).

(4) Open fuel oil filter outlet valve (3).

(5) Open FO-35, F.O. RTN. TO DAY TK. STBD (7).

c. Align Fresh Water Cooling System (Figure 2-154).

(1) Open FWC-9, F.W. F.R KEEL CLR. TO S.S.D.G. NO. 1 (4).

(2) Open FWC-11, F.W. FR. S.S.D.G. NO. 1 TO KEEL CLR. (5).

d. Start Generator Engine.

NOTE

Perform Step (1) if engine has not been run for several weeks or all the fuel has been used.

(1) Flood the Ship Service Diesel Generator (SSDG) engine fuel system by pumping the hand--operated fuel oil priming pump (located on top of engine fuel filter) until a slight pressure is indicated on the engine fuel pressure gauge (3, Figure 2-155).

(2) ON SSDC #1 generator, turn pushbutton (1) clockwise to release pushbutton to OUT position.

NOTE

Check engine lube oil sump level. Check cooling water in sight glass of head tank.

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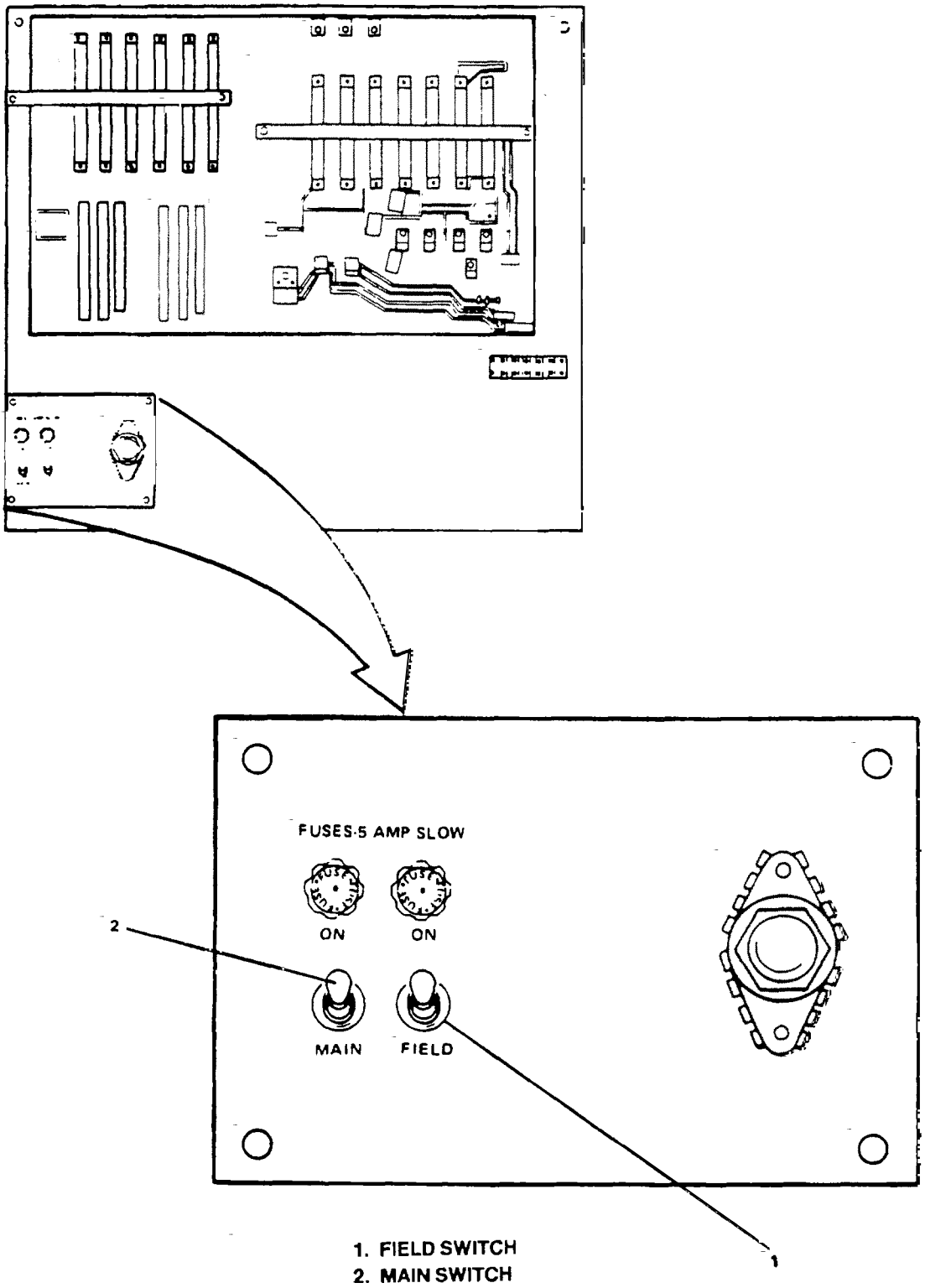


Figure 2-153. Machinery Monitoring System.

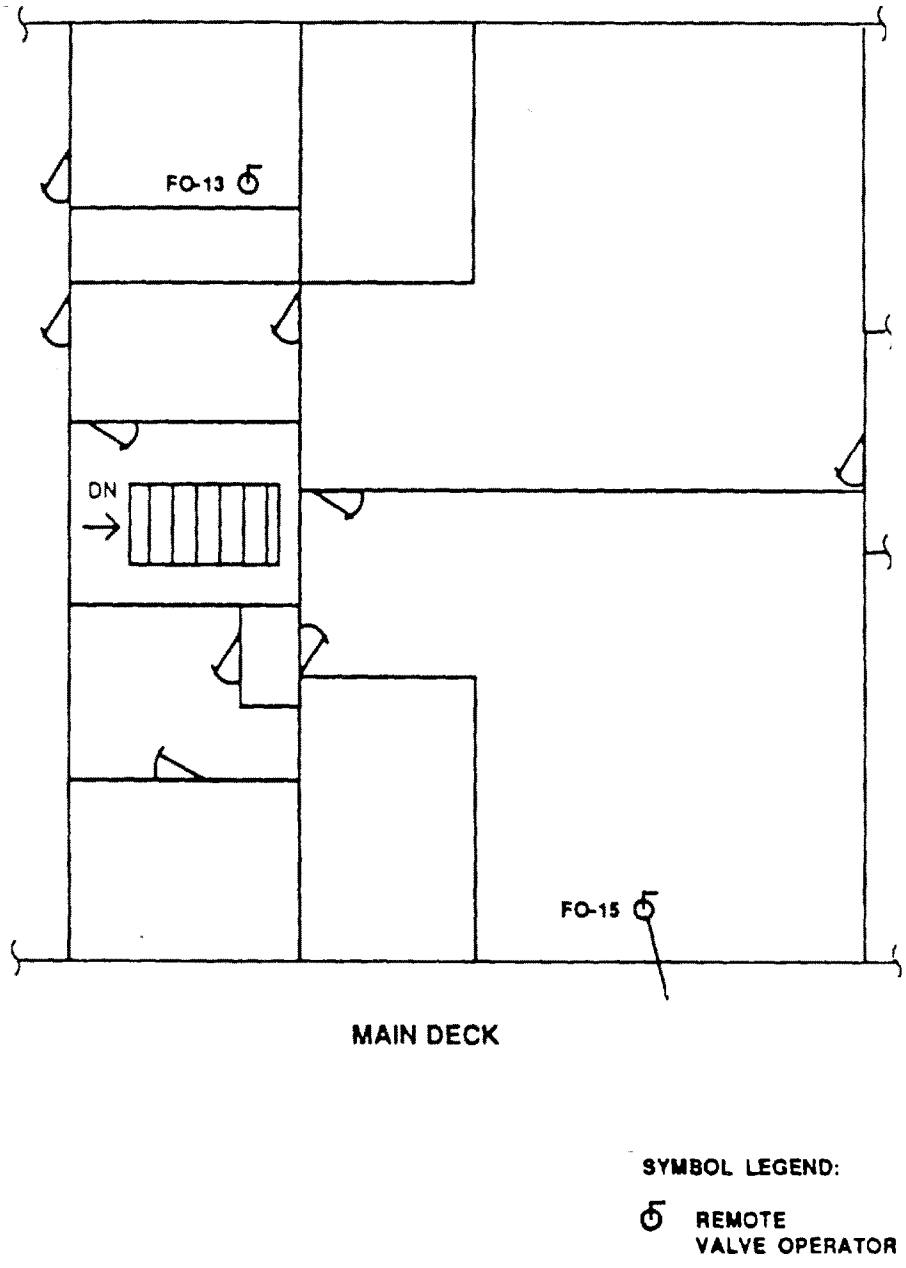
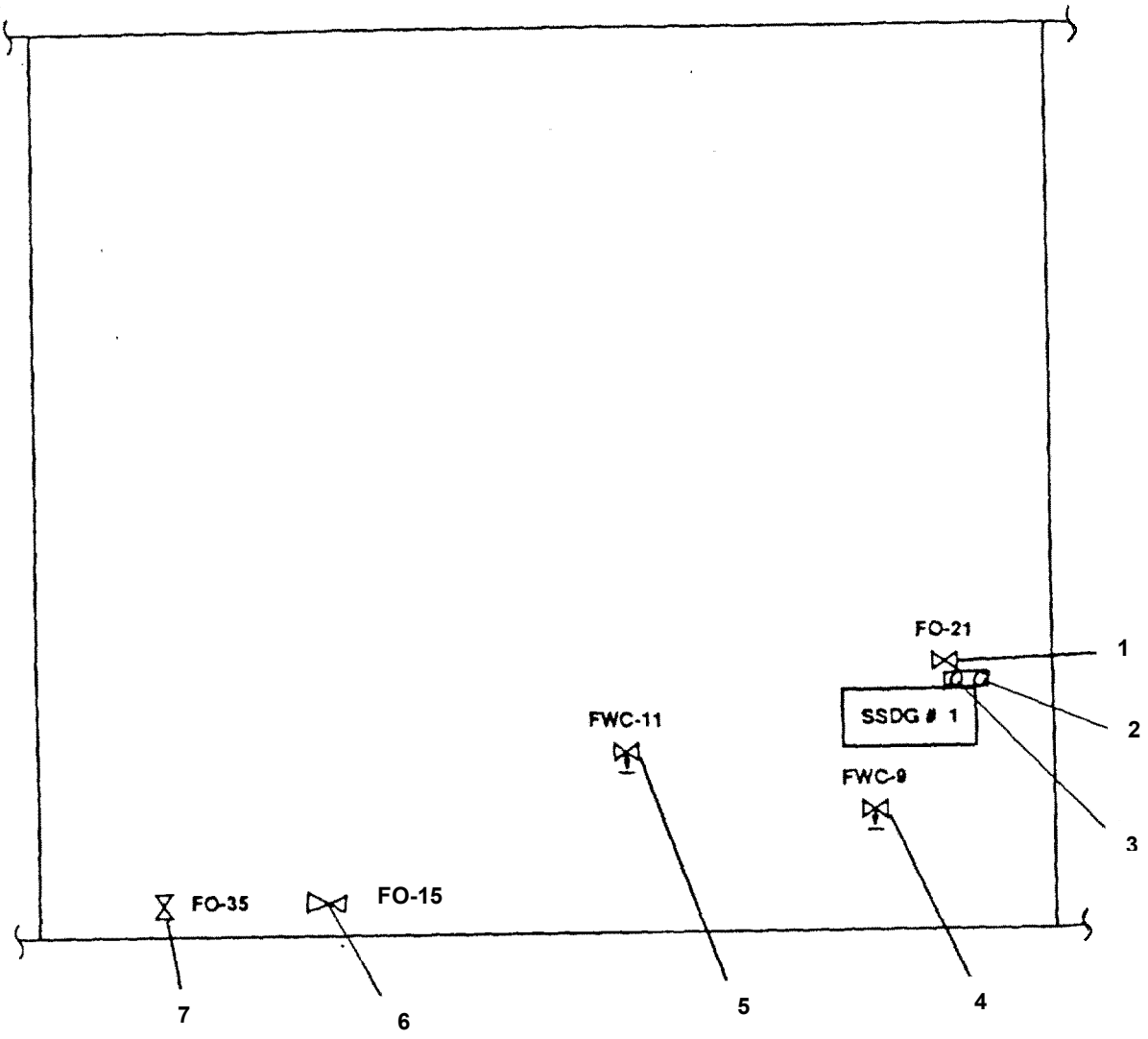


Figure 2-154. Electric Start Generator Valve Locations (Sheet 1 of 2).



1. FO-21, F.O. SPLY TO S.S.D.G. NO. 1
2. INLET FILTER
3. OUTLET FILTER
4. FWC-9, F.W. F.R. KEL CLR. TO S.S.D.G. NO. 1
5. FWC-11, F.W. FR. S.S.D.G. NO. 1 TO KEEP CLR.
6. FO-15, F.O. SERV. SUCT. STBD
7. FO-35, F.O. RTN. TO DAY TK. STBD

Figure 2-154. Electric Start Generator Valve Locations (Sheet 2 of 2).

CAUTION

- **Do not engage the starter when the flywheel is moving.**
- **If oil pressure does not rise to 45 psi within 15 seconds, stop engine using the start/stop switch. Damage to equipment could result.**

(3) Turn START switch (2) to START position to crank the engine. When engine starts, release START switch (2).

NOTE

As soon as the engine starts and the engine speed reaches 600 RPM and oil pressure is approximately 22 psi, the starter motor will automatically disengage.

CAUTION

If engine fails to start within 30 seconds, release the START switch. Wait 2 minutes to allow the starter motor to cool before using it again.

NOTE

- **Prolonged cranking at low oil pressure can activate the mechanical safety shut-off. If the reset lever is in the shutoff position, reset the mechanical shut-off control.**
- **RPM on the CRT display in EOS.**

(4) Before putting load on engine, allow engine to idle (725 to 775 RPMs) 3 to 5 minutes or until water temperature gauge (4, Figure 2-155) begins to rise.

(5) During normal operation, ensure gauges read in NORMAL range.

e. Bring Generator On-Line.

(1) Main switchboard (EOS) (Figure 2-156).

(a) Set AMMETER switch (4) to position 1.

(b) Increase GENERATOR 1 GOVERNOR speed control (6) until HERTZ meter (5) reads 60.

(c) Turn BUS GEN. 1 VOLT OFF switch (2) to read phase phase 1-2.

(d) Adjust GENERATOR 1 AUTO. VOLT. RHEO. (1) to read 450 on A-C VOLTS meter (3).

(2) Emergency Switchboard (02 Level).

(a) Turn engine control switch (19) to the MANUAL position.

(b) Push main switchboard bustie circuit breaker (18) to the CLOSED position.

NOTE

Opening shore power circuit breaker and closing generator 1 circuit breaker are done quickly.

(3) Main switchboard (EOS)

(a) Set SHORE POWER CKT. BKR. (15) to OFF position.

(b) Set GENERATOR 1 CKT. BKR. (7) to ON position.

NOTE

Ensure fuel valve FO-32 (FO SPLY TO EDG) and FO-12 are open (located in EDG room).

(c) Set the following circuit breakers to ON position:

1 ENG. RM. SUPPLY FAN #1 (9).

2 ENG. RM. EXH. FAN #1 (12).

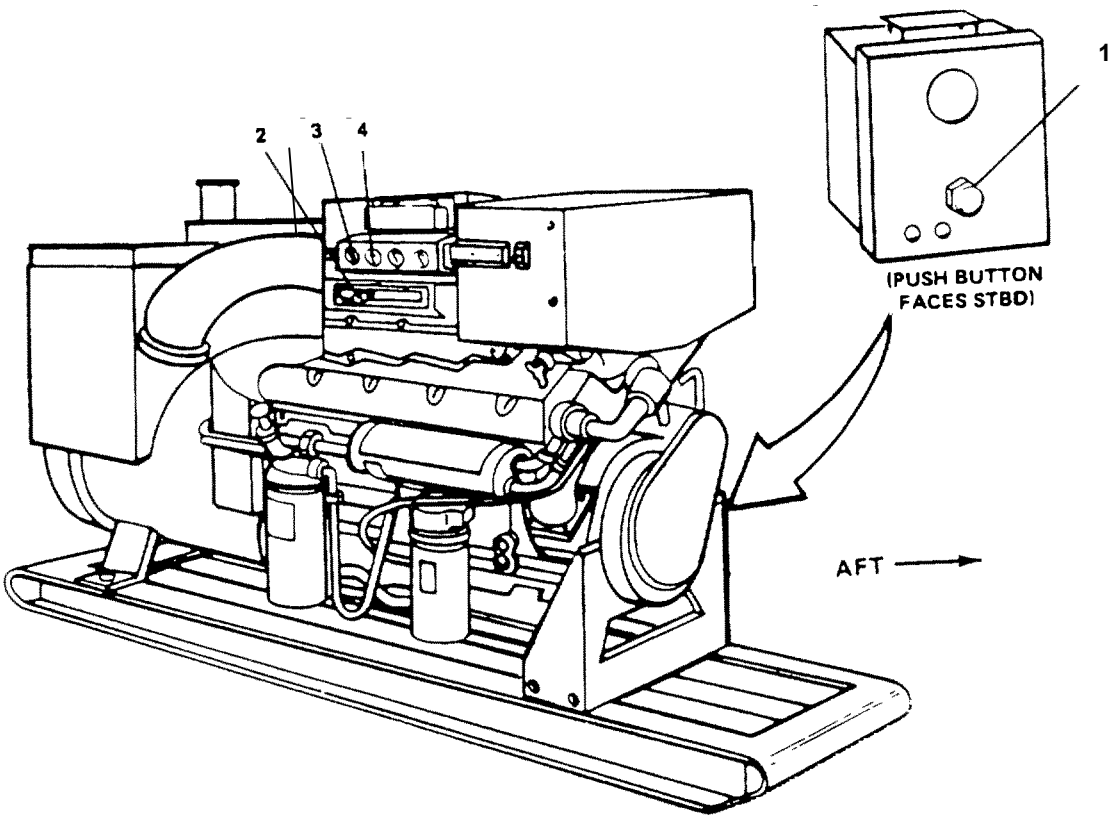
3 3-25 KVA XFMRS (8).

4 ENG. ROOM. SUPPLY FAN #2 (16).

5 ENG. RM. EXH. FAN #2 (17).

6 BUS TIE CKT. BKR. (14).

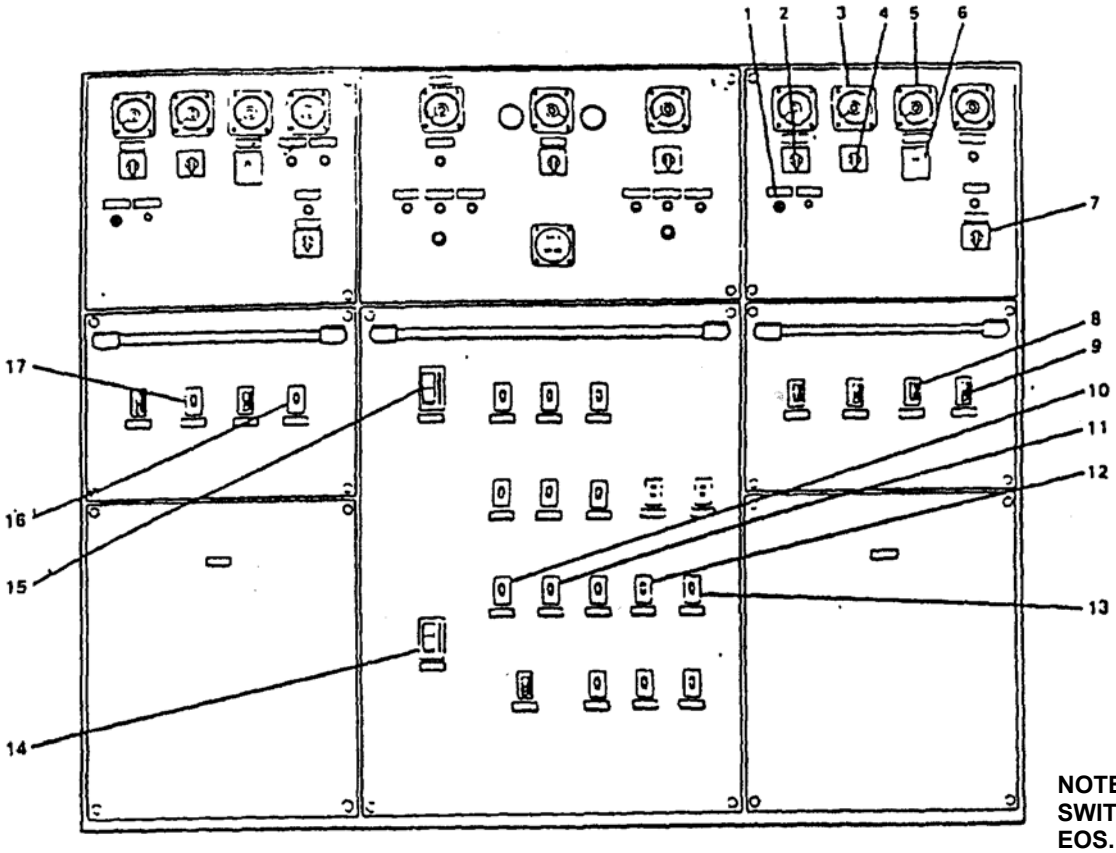
7 ENG. RM PWR PANEL #1 (10).



STARBOARD

1. START/STOP PUSHBUTTON
2. START SWITCH
3. FUEL PRESSURE GAUGE
4. WATER TEMPERATURE GAUGE

Figure 2-155. Ship Service Diesel Generator Controls.



NOTE: MAIN SWITCHBOARD IS IN EOS. EMERGENCY SWITCHBOARD IS IN THE EMERGENCY GENERATOR ROOM, 02 LEVEL.

1. GENERATOR 1 AUTO. VOLT RHEO.
2. BUS GEN. 1 VOLT OFF SWITCH
3. AC VOLTS METER
4. AMMETER SWITCH
5. HERTZ METER
6. GENERATOR 1 GOVERNOR
7. GENERATOR 1 CKT. BKR.
8. 3-25 KVA (0) XFMRS
9. ENG. RM. SUPPLY FAN# 1
10. ENG. RM. PWR. PANEL# 1
11. AUX. MCHRY. SPACE #1 PWR. PNL. #4
12. ENG. RM. EXH. FAN #1
13. FIRE PUMP #2
14. BUS TIE. CKT. BKR.
15. SHORE POWER CKT. BKR.
16. ENG. RM. SUPPLY FAN #2
17. ENG. RM. EXH. FAN #2
18. MAIN SWBD BUSTIE CIRCUIT BREAKER
19. ENG CONTROL SW

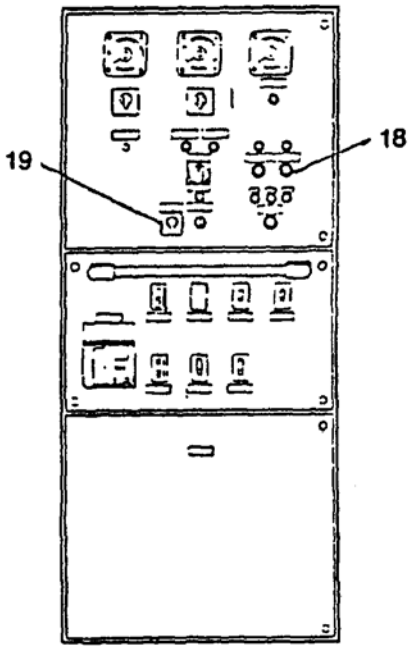


Figure 2-156. Main Switchboard and Emergency Switchboard.

(4) Engine Room Load Center Distribution Panel (Figure 2-157). Set following circuit breakers to ON position:

(a) GALLEY DIST. PNL NO. 1 (1).

(b) 01 LVL DIST PNL NO. 2 (4).

(c) MN DK DIST PNL (3).

(d) ENG RM DIST PNL NO. 4 (2).

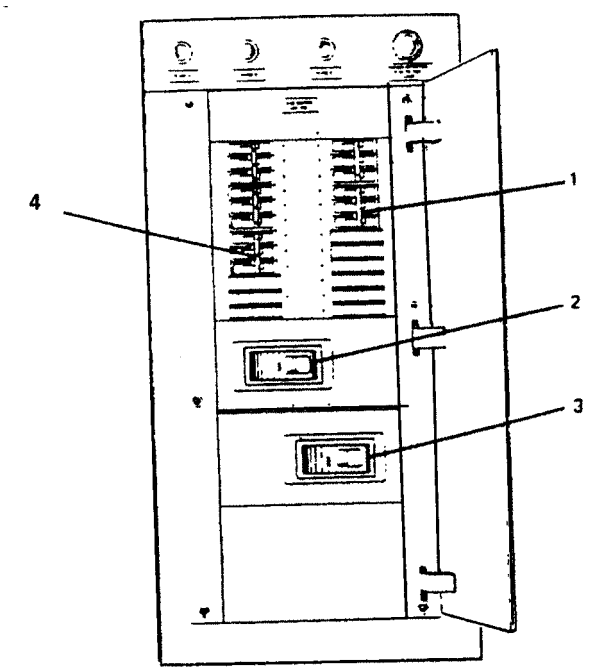


Figure 2-157. Engine Room Load Center Distribution Panel.

(5) Emergency Load Center Distribution Panel (Figure 2-158). Set following circuit breakers to ON position:

(a) EMER DIST PNL #1 (2).

(b) RADIO RM ELEX DIST PNL (7).

(c) EMER LTG PNL #1 (1).

(d) EXTERIOR EMER LTG PNL #2.

(e) PILOT HOUSE EMER DIST PNL NO. (3).

(f) EMERG DIESEL GEN JACKET WTR HEATER (5).

(g) BATTERY CHARGER EMRG DIESEL GEN (4).

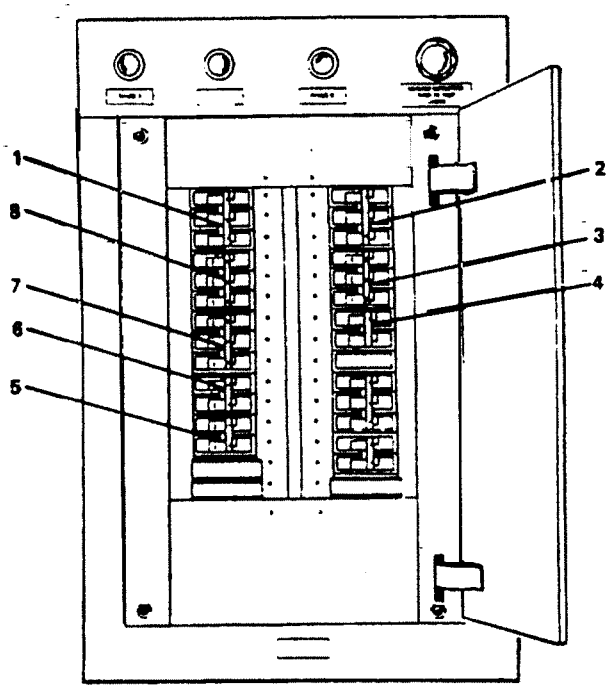


Figure 2-158. Emergency Load Center Distribution Panel.

(6) Engine Room Supply Fans Motor Controllers (Figure 2-159). On No. 1 and No. 2 motor controllers:

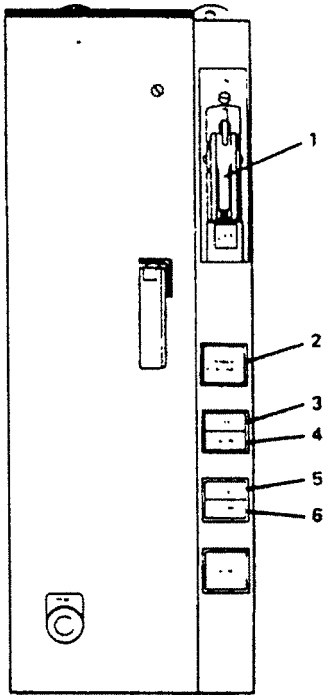


Figure 2-159. Engine Room Supply and Exhaust Fans Motor Controllers.

(h) BATTERY CHARGER GENERAL ALARM (6).

(a) Set ON-OFF switch (1) to ON position.

(b) POWER AVAILABLE indicator (2) will light.

(c) Press FAST pushbutton (5).

(d) FAST indicator (3) will light.

(7) Engine Room Exhaust Fans Motor Controllers (Figure 2-159). On No. 1 and No. 2 motor controllers:

(a) Set ON-OFF switch (1) to ON position.

(b) POWER AVAILABLE indicator (2) will light.

(c) Press FAST pushbutton (5).

(d) FAST light (3) will light.

f. Alignment for emergency diesel generator automatic start (Figure 2-160).

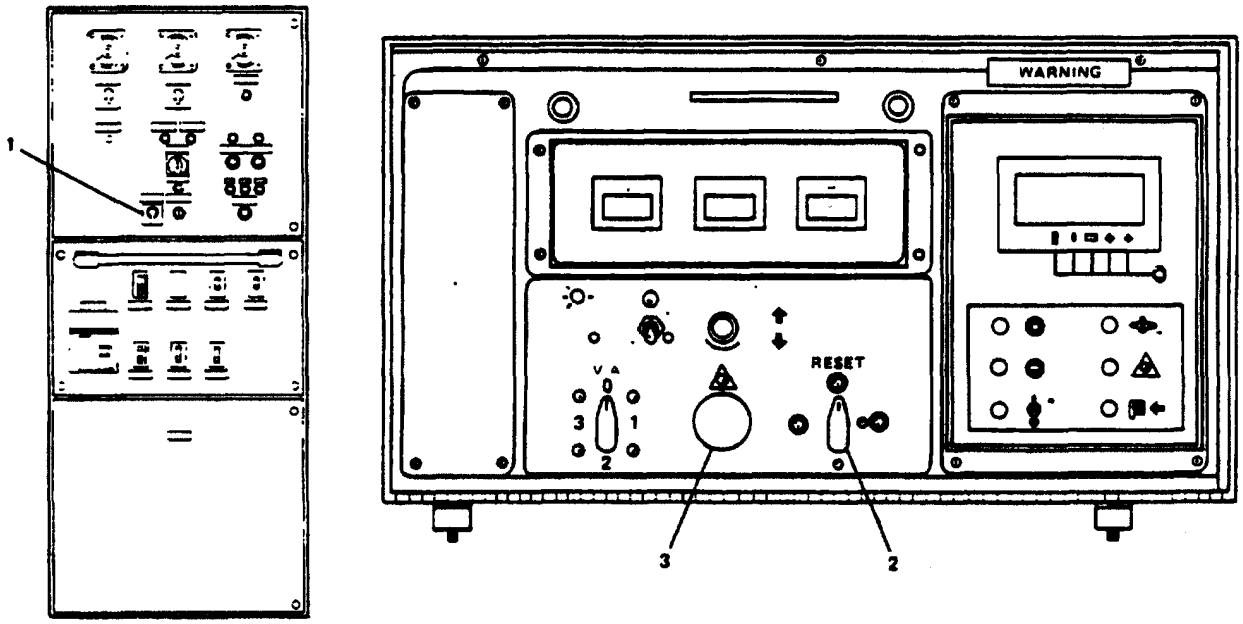
(1) Emergency switchboard. Set ENG. CONTROL SW (1) to AUTO position.

(2) Emergency diesel generator control panel.

(a) Turn red start/stop pushbutton (3) clockwise to release pushbutton to out position.

(b) Set control switch (2) to auto start position.

(3) Valve Alignment. Open FO-32 (FO SPLY TO EDG) located in the EDG room overhead outboard.



1. ENG. CONTROL SW SWITCH
2. RESET CONTROL SWITCH
3. START/STOP PUSHBUTTON

Figure 2-160. Emergency Diesel Generator Automatic Start.

2-7. Compressed Air Piping System.

a. Align Starting Air System (Figure 2-161).

(1) Open CA-1, COV-COMPR DISCH (4).

(2) Open CA-2, COV-COMPR DISCH (4).

(3) Open CA-11, STG AIR TK INL (5).

(4) Open CA-12, STG AIR TK INL (5).

(5) Open CA-3, STG AIR TK OUT (2).

(6) Open CA-4, STG AIR TK OUT (1).

(7) Open CA-50, AUTO DR (6).

(8) Open CA-49 AUTO DR (6).

b. Start Air Compressors.

(1) Main switchboard (Figure 2-156). Set AUX. MCHRY. SPACE #1 PWR. PNL. #4 circuit breaker (11 to ON position.

(2) Auxiliary machinery space I power panel no. 4 (Figure 2-162).

(a) Set #1 AIR COMP. circuit breaker (1) to ON position.

(b) Set #2 AIR COMP. circuit breaker (2) to ON position.

(3) Air compressor motor controllers (Figure 2-163).

(a) Air compressor no. 1 motor controller,

1 Set MAN-AUTO switch (3) to AUTO position.

2 Set ON-OFF switch (1) to ON position.

3 POWER AVAILABLE light (2) will light.

NOTE

Compressor will start automatically unless pressure is above 210 psi.

(b) Air compressor no. 2 motor controller.

1 Set MAN-AUTO switch (3) to AUTO position.

2 Set ON-OFF switch (1) to ON position.

NOTE

- **POWER AVAILABLE light will light.**
- **Compressor will start automatically unless pressure is above 210 psi.**

c. Activate Ship's Service Air (Figure 2-161).

(1) Open CA-39, SVCE AIR TK INL (7).

(2) Open CA-40, SVCE AIR TK INL (8).

(3) Open CA-13, SVCE AIR TK INL (5).

(4) Open CA-51, AUTO DR (6).

(5) Open CA-14, SVCE AIR TK OUT (3)

(6) In damage control center, open CA-10, WSTL AIR RCVR (9).

d. Activate Controlled Air System (Figure 2-161).

(1) Align piping.

(a) Open air dryer inlet valve (10).

(b) Open air dryer outlet valve (14).

(c) Open transducer valve (13).

(d) Open filter valve (12).

(e) Close bypass (11).

(2) Start air dryer.

(a) Engine room distribution panel no. 4. Set AIR RCVR AUTO DRN/CONTROL AIR DRYER circuit breaker (1, Figure 2-164) to ON position.

(b) Air dryer. Monitor air dryer gauge (1, Figure 2-165).

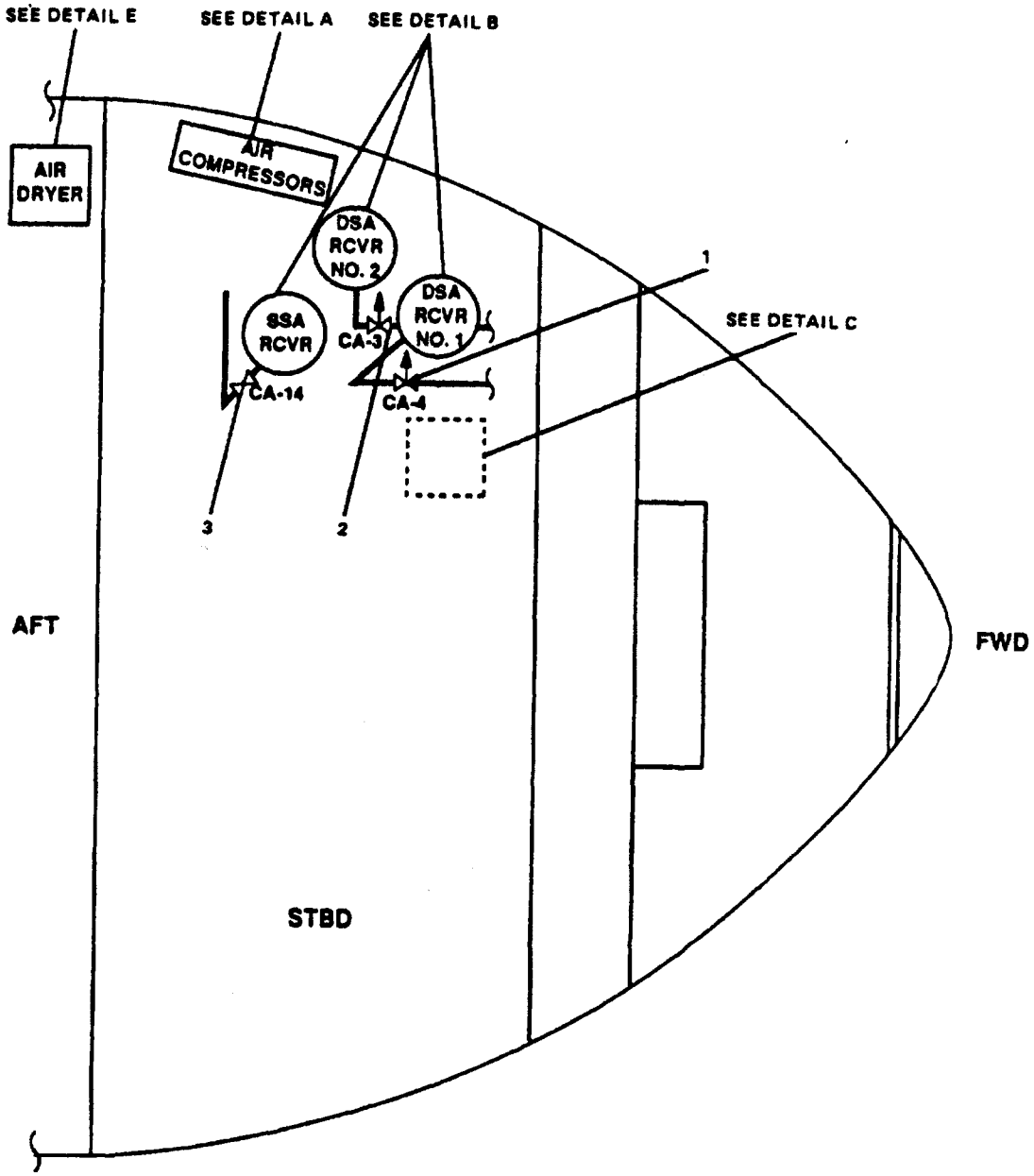
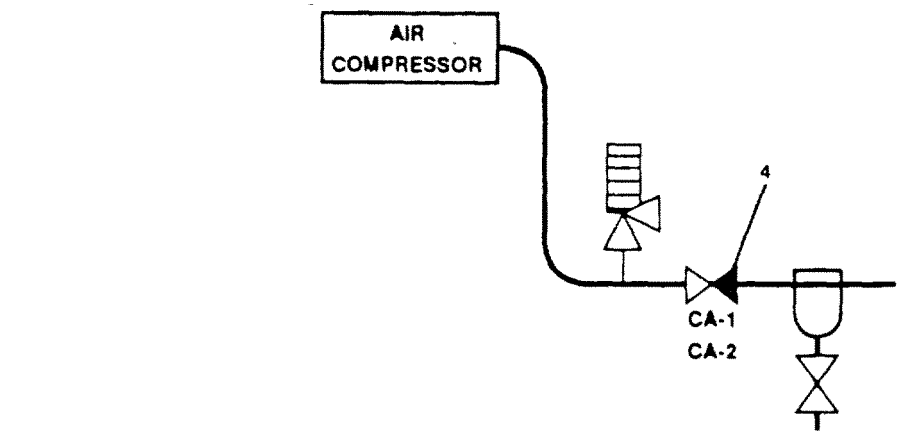
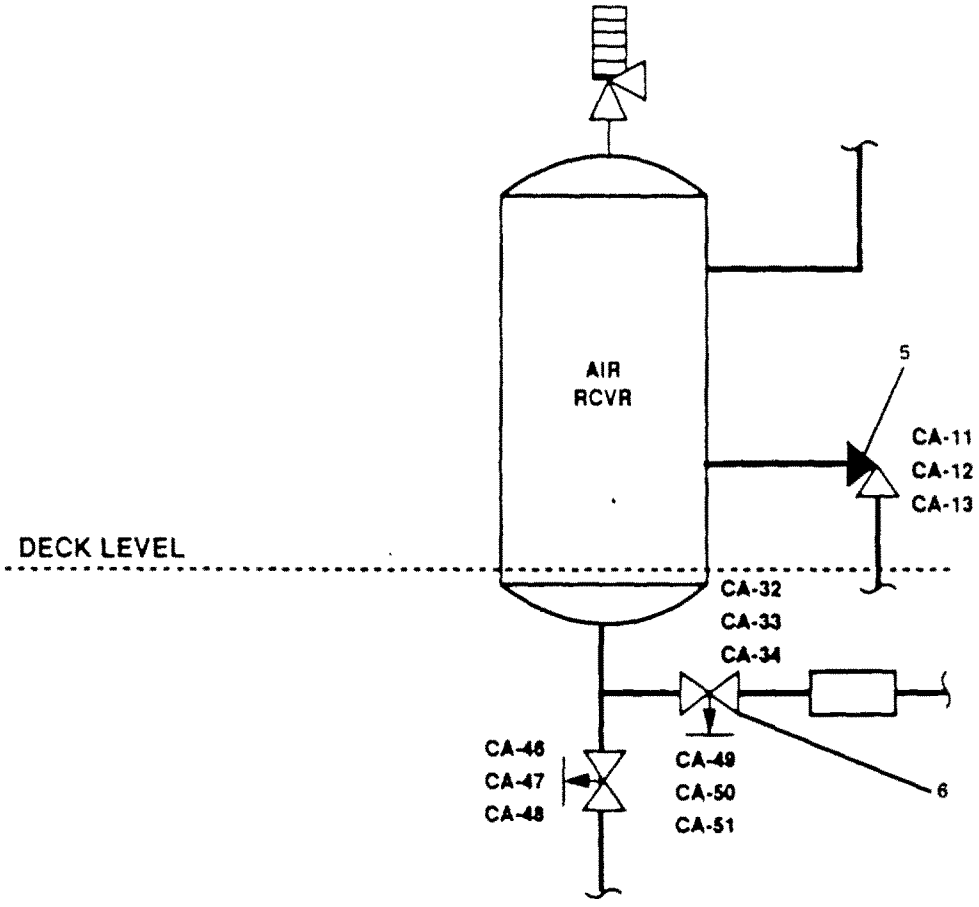


Figure 2-161. Compressed Air System Valve Locations (Sheet 1 of 5).

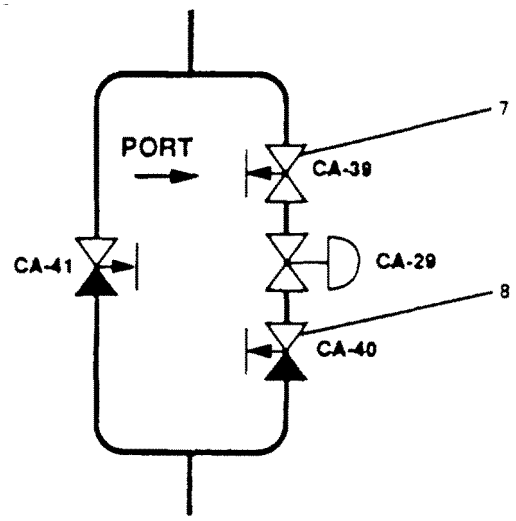


AIR COMPRESSOR OUTLET VALVE LOCATION
DETAIL A

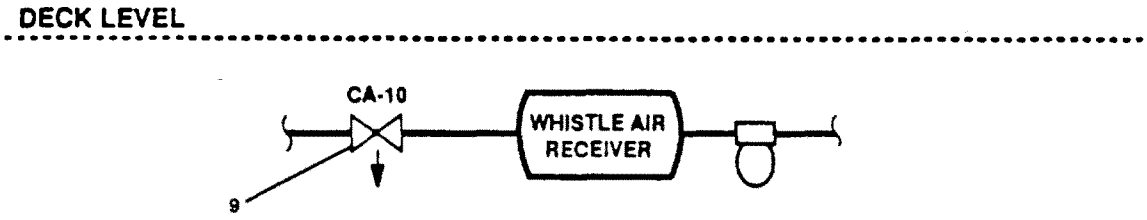


DETAIL B

Figure 2-161. Compressed Air System Valve Locations (Sheet 2 of 5).

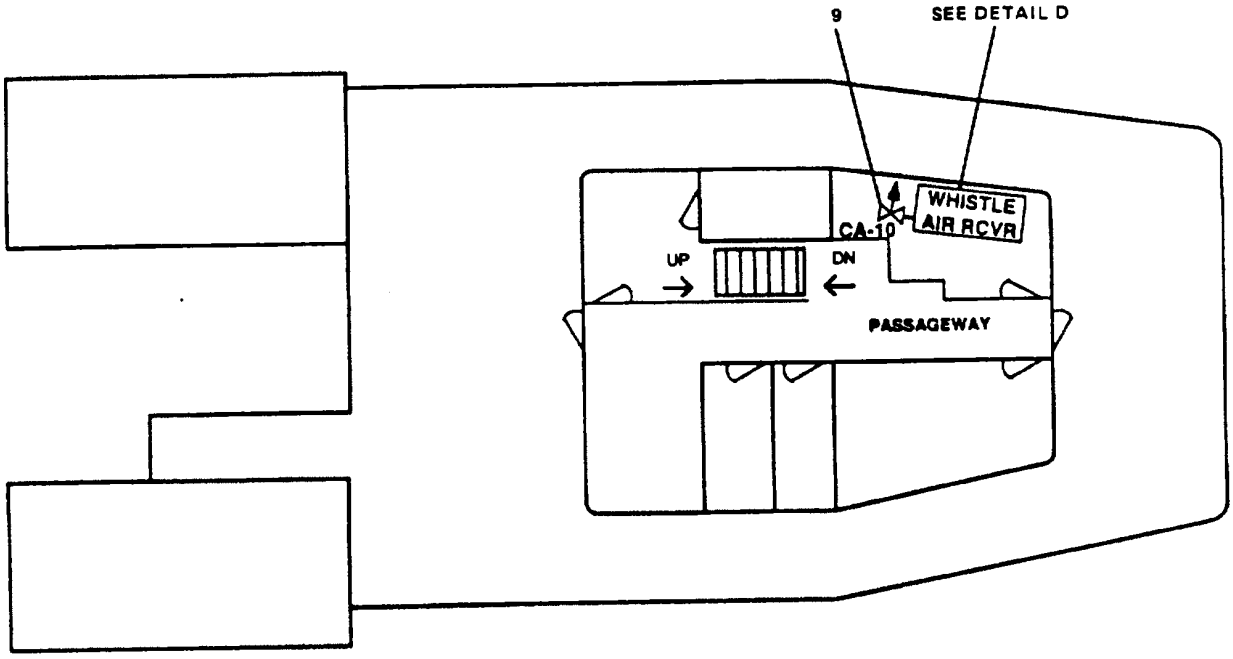


DETAIL C



DETAIL D

Figure 2-161. Compressed Air System Valve Locations (Sheet 3 of 5).



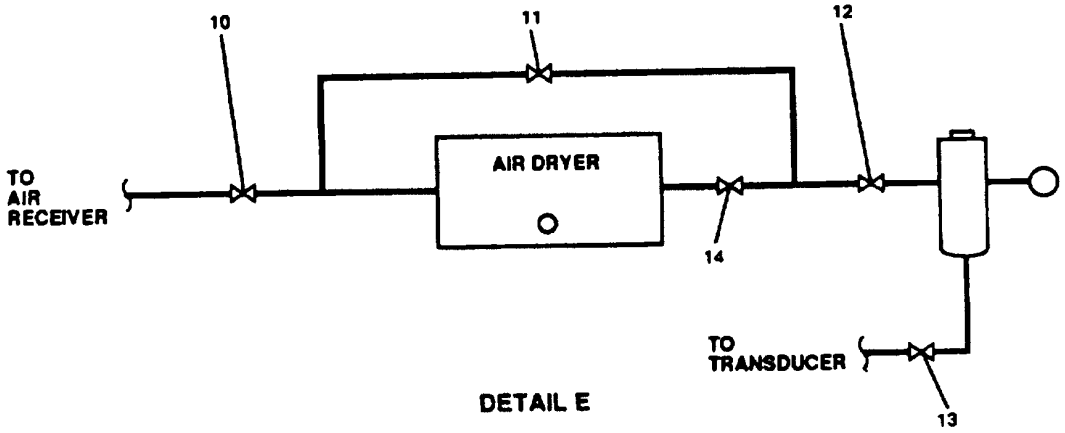


Figure 2-161. Compressed Air System Valve Locations (Sheet 4 of 5).

1. CA-4, STG AIR TK OUT
2. CA-3, STG AIR TK OUT
3. CA-14, SSA RCVR OUTLET
4. (AIR COMPRESSOR NO. 1) CA-1, COV - COMPR DISCH
   (AIR COMPRESSOR NO. 2) CA-2, COV - COMPR DISCH
5. (DSA RCVR NO. 1) CA-11, STG AIR TK INL
   (DSA RCVR NO. 2) CA-12, STG AIR TK INL
   (DSA RCVR) CA-13, SVCE AIR TK IN.
6. (DSA RCVR NO. 1) CA-49, AUTO DR
   (DSA RCVR NO. 2) CA-50, AUTO DR
   (SSA RCVR) CA-51, AUTO DR
7. CA-39, SVCE AIR TK INL
8. CA-40, SVCE AIR TK INL
9. CA-10, WSTL AIR RCVR

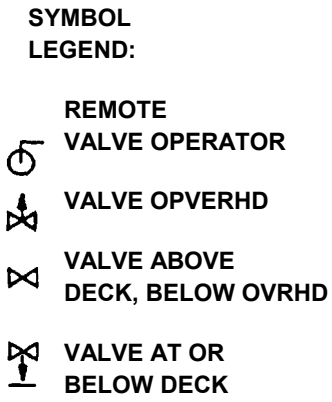


Figure 2-161. Compressed Air System Valve Locations (Sheet 5 of 5).

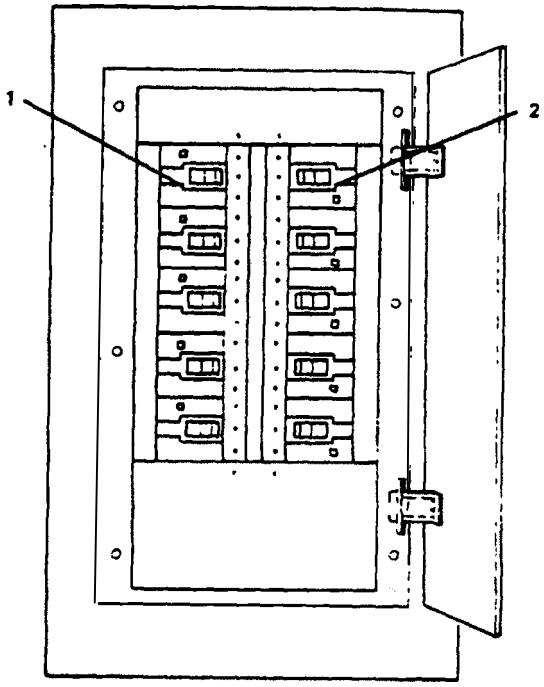


Figure 2-162. Auxiliary Machinery Space 1, Power Panel No. 4.

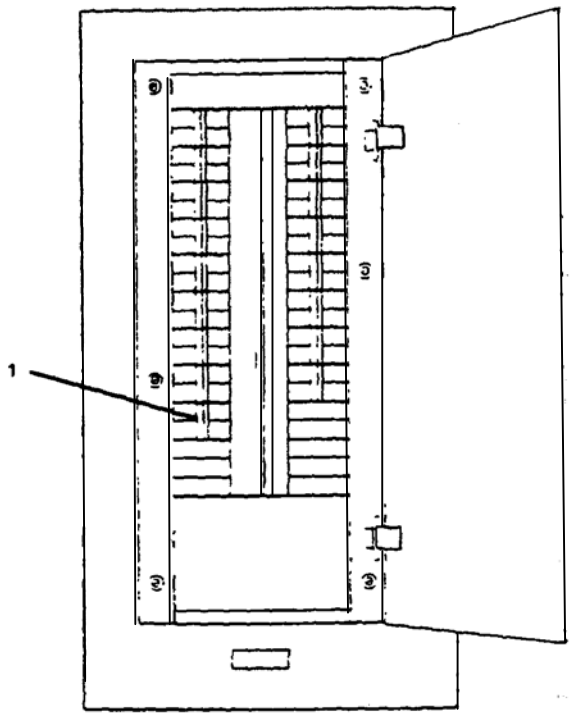
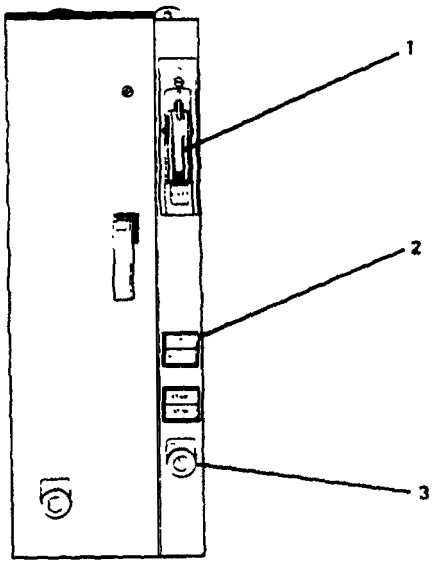


Figure 2-164. Engine Room Distribution Panel No. 4.



1. ON-OFF SWITCH
2. POWER AVAILABLE LIGHT
3. MAN-AUTO SWITCH

Figure 2-163. Air Compressor Motor Controller.

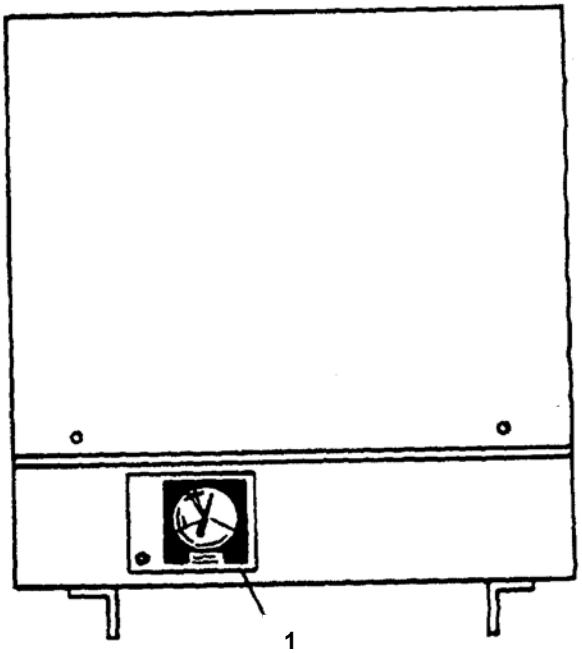


Figure 2-165. Air Dryer.

2-8. Firemain General Service Foam, and Wash Down Counter Measure System.

a. Firemain sea water).

(1) Firemain activation.

(a) Ensure the following valves (Figure 2-166) are closed:

1 FM-8, EMG. BILGE OVBD (12).

2 FM-17, FIRE/G.S. PMP. NO. 1 DISCH. TO G.S. (13).

3 FM-15, FIRE/G.S. PMP. NO. 2 DISCH. TO G.S. (15).

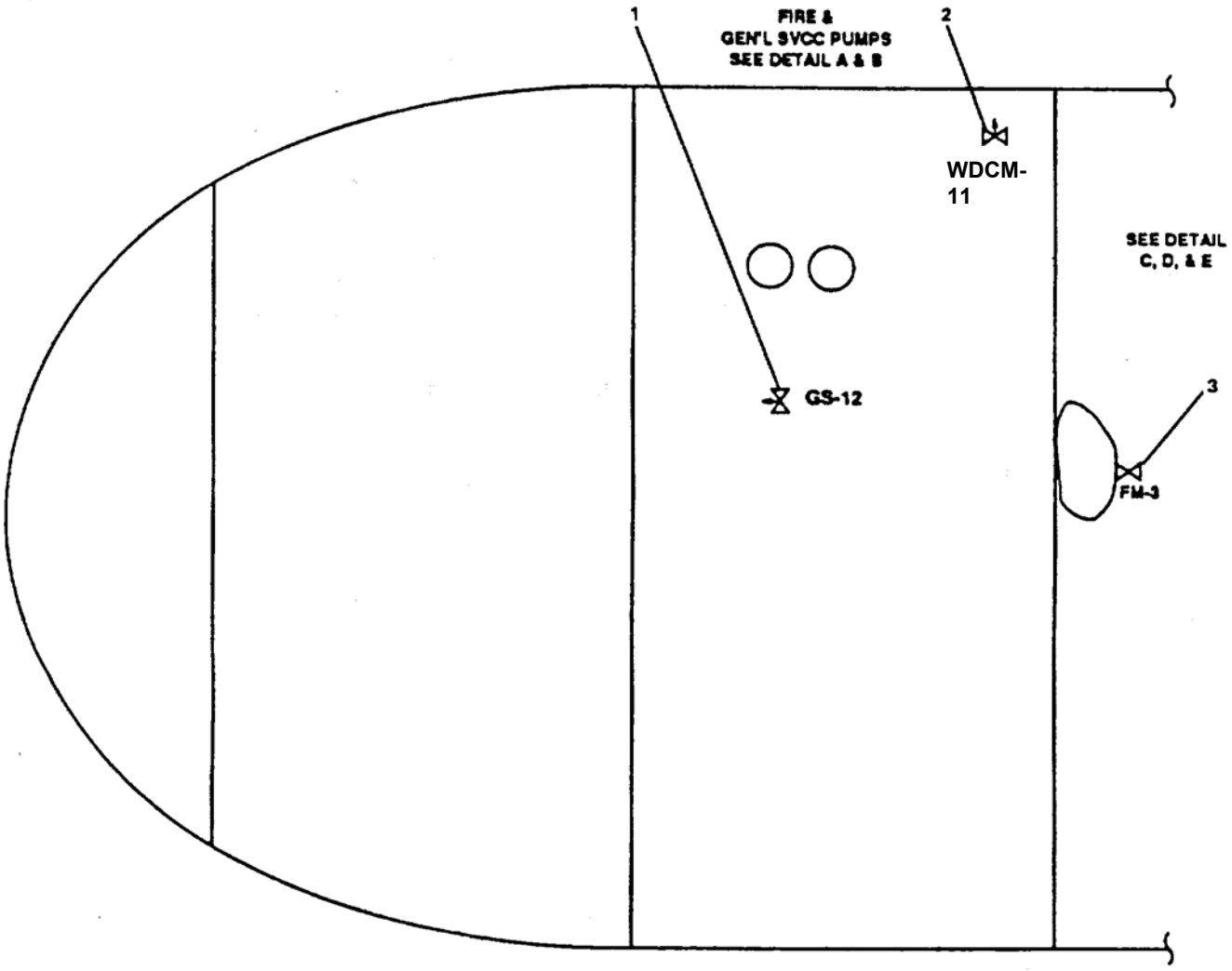
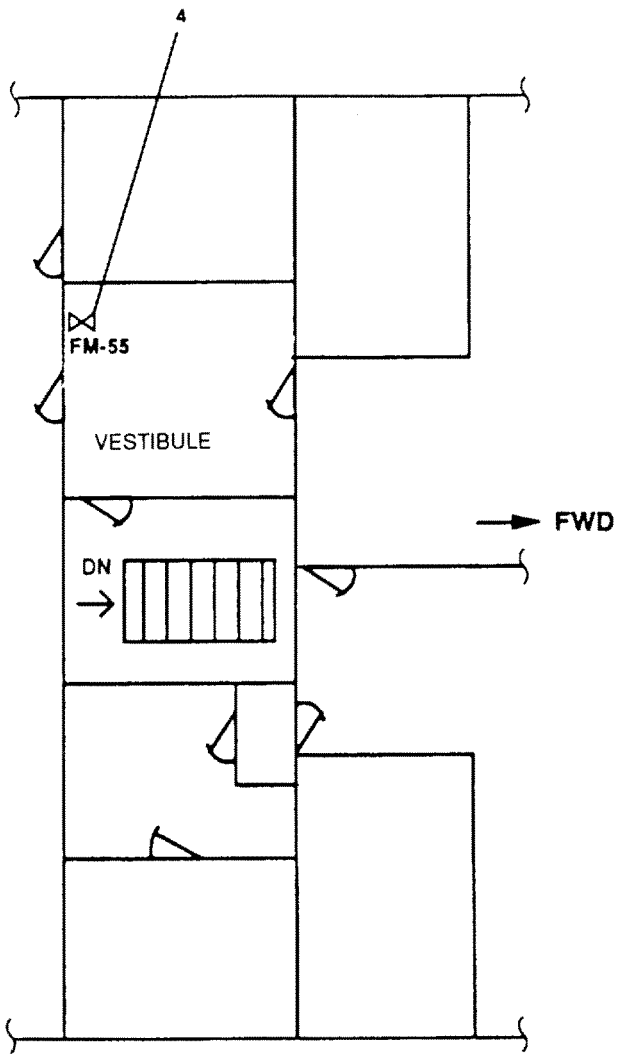
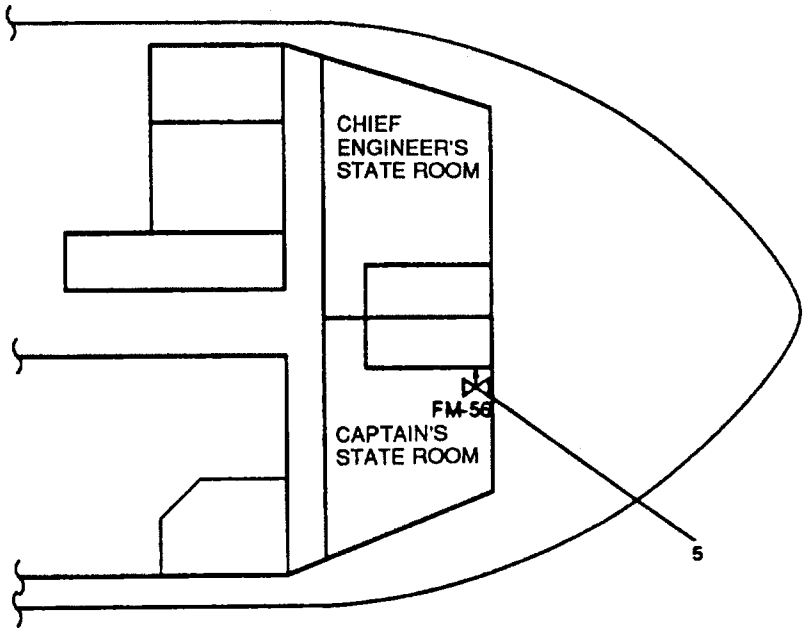


Figure 2-166. Firemain Valve Locations (Sheet 1 of 6).

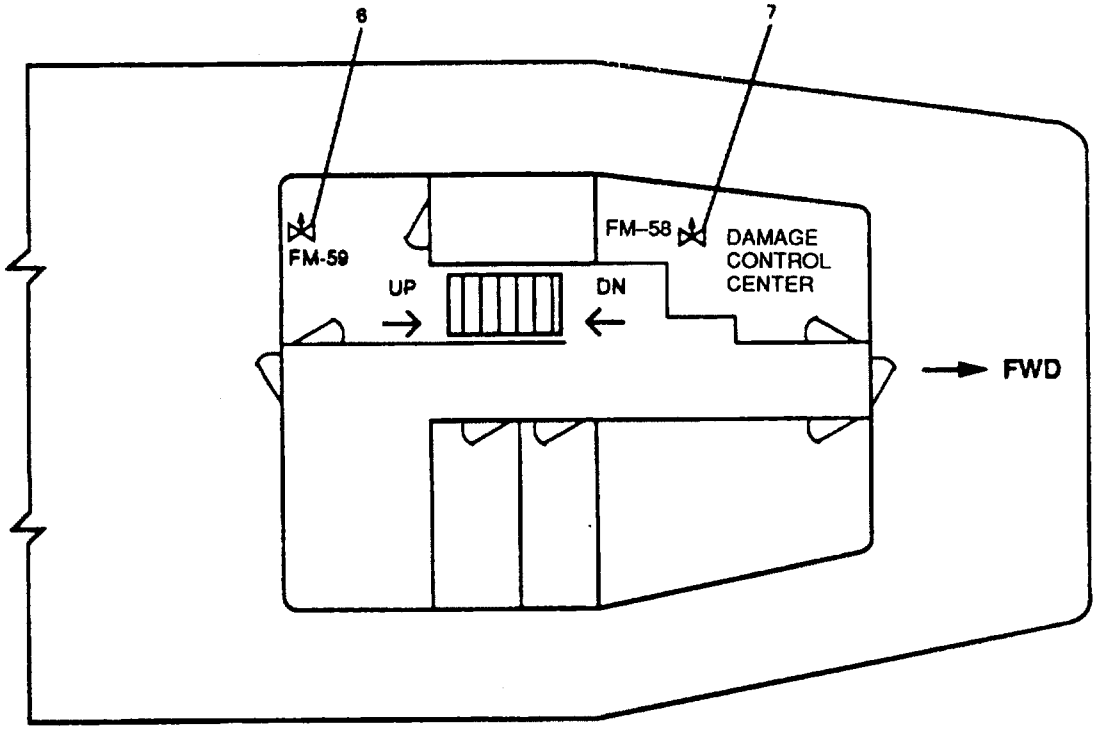


MAIN DECK

Figure 2-166. Firemain Valve Locations (Sheet 2 of 6).

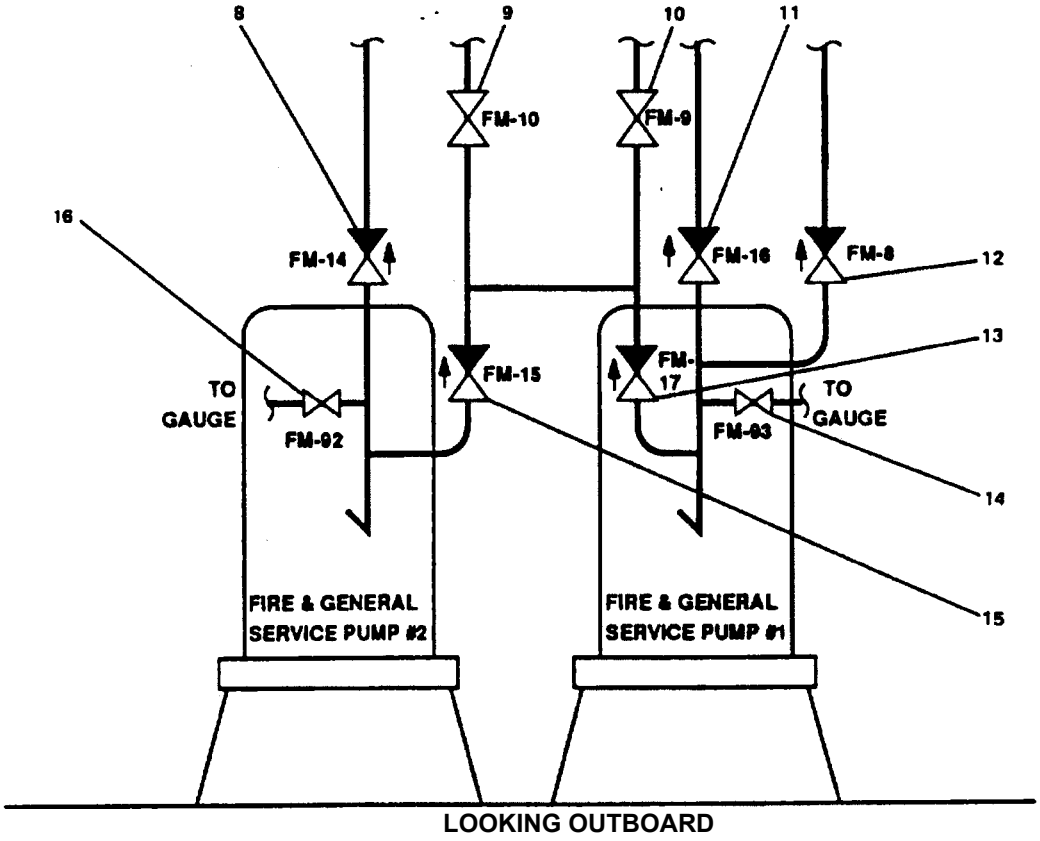


01 LEVEL

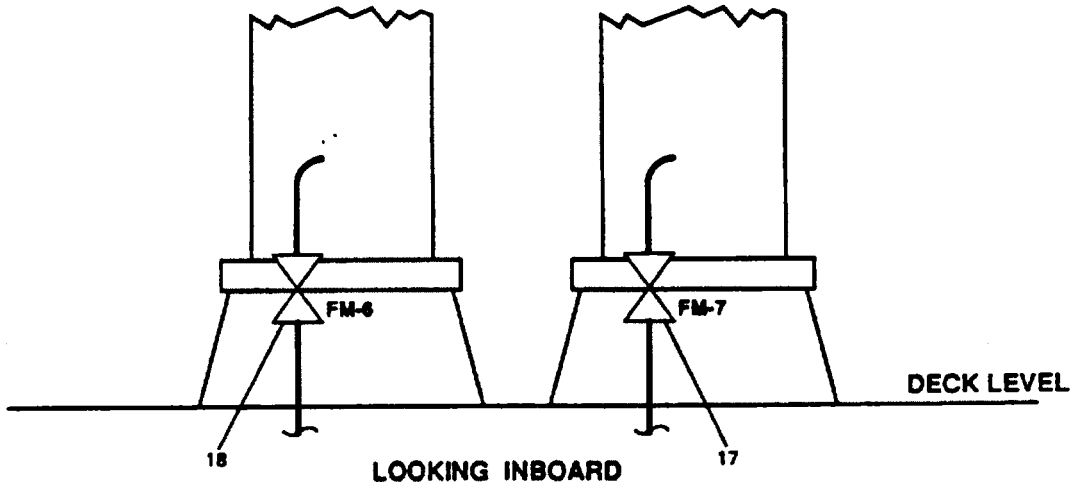


02 LEVEL

Figure 2-166. Firemain Valve Locations (Sheet 3 of 6)

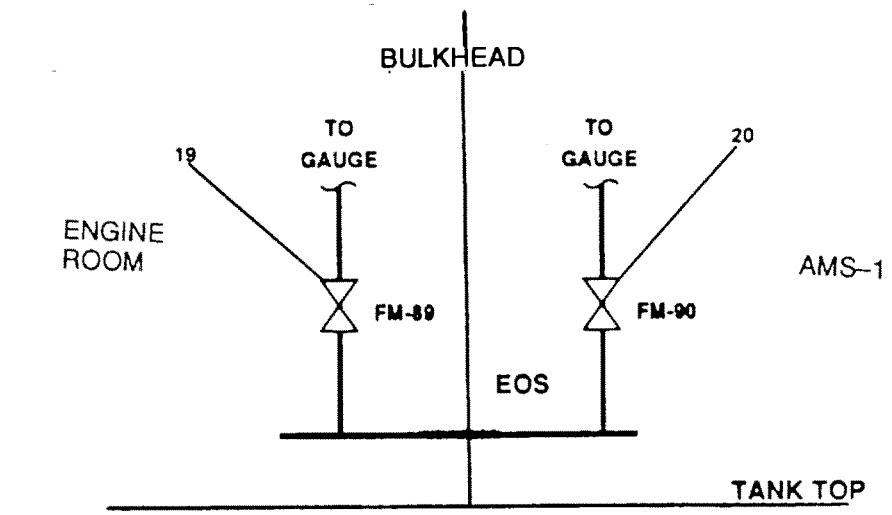


DETAIL A

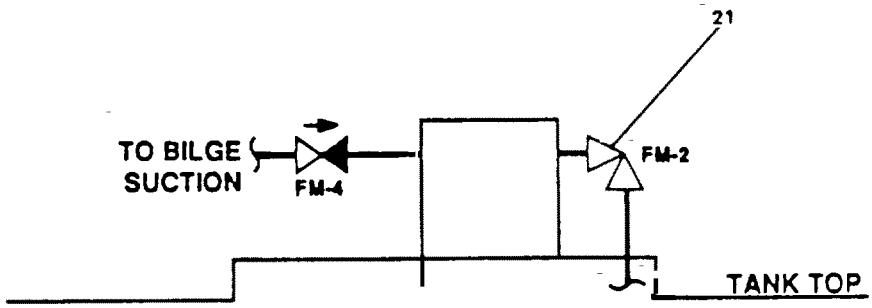


DETAIL B

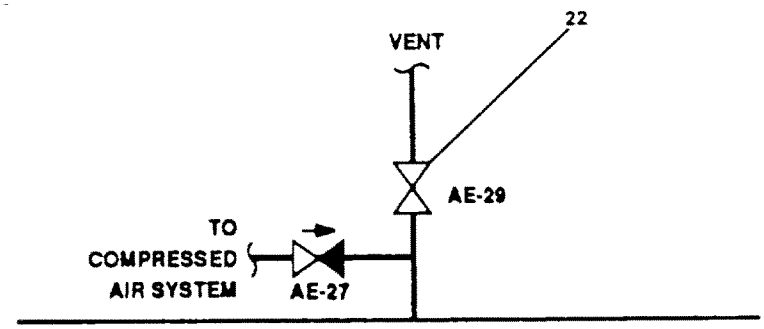
Figure 2-166. Firemain Valve Locations (Sheet 4 of 6).



STBD SIDE
LOOKING INBOARD
DETAIL C



LOOKING AFT
DETAIL D



DETAIL E

Figure 2-166. Firemain Valve Locations (Sheet 5 of 6).

1. GS-12, GENL SERV PRESS RED VLV CO
2. WDCM-11, WDCM SPLY
3. FM-3, S.W. TO BILGE/BLST. PMPS.
4. FM-55, F STA NO. 4
5. FM-56, F STA NO. 9
6. FM-59. F STA NO. 10
7. FM-58, F STA NO.12
8. FM-14, FIRE/GS PMP NO. 2 DISCH TO FM.
9. FM-10, GENL. SERV. PRESS. RED. VLV. MAN. BYPASS
10. FM-9, GENL. SERV. PRESS. RED. VLV. CO
11. FM-16, FIRE/G.S. PMP. NO. 1 DISCH TO FM.
12. FM-8, EMG. BILGE OVBD
13. FM-17, FIRE/G.S. PMP. NO. 1 DISCH. TO G.S.
14. FM-93, #1 FIRE/GEN SVCE PUMP PRESSURE DSCH GAUGE.
15. FM-15, FIRE/G.S. PMP. NO. 2 DISCH. TO G.S.
16. FM-92, #2 FIRE/GEN SVCE PUMP PRESSURE DSCH GAUGE.
17. FM-7, FIRE/G.S. PMP. NO. 2 SUCT.
18. FM-6, FIRE/G.S. PMP. NO. 1 SUCT.
19. FM-89, FF PUMP SUCT STRNR DIFF PRESSURE
20. FM-90, FF PUMP SUCT STRNR DIFF PRESSURE
21. FM-2, SEA SUCT. FIRE/G.S. AND BLST. PMPS.
22. AE-29, SEA CHEST VENT

Figure 2-166. Firemain Valve Locations (Sheet 6 of 6).

(b) Open the following valves:

1 AE-29, SEA CHEST VENT (22).

2 FM-2, SEA SUCT. FIRE/G.S. AND BLST. PMPS. (21).

3 FM-3, S.W. TO FIRE PMPS. (3).

4 FM-7, FIRE/G.S. PMP. NO. 2 SUCH. (17).

5 FM-6, FIRE/G.S. PMP. NO. 1 SUCT. (18).

6 FM-16, FIRE/G.S. PMP. NO. 1 DISCH TO FM (11).

7 FM-14, FIRE/G.S. PMP. NO. 2 DISCH. TO FM (8).

8 FM-92 (16).

9 FM-93 (14).

10 FM-89, FF PUMP SUCT STRNR DIFF PRESSURE (19).

11 FM-90, FF PUMP SUCT STRNR DIFF PRESSURE (20).

(c) Main deck. Inside aft watertight door, open FM-55, FSTA No. 4 (4).

(d) Captain's stateroom. Open FM-56, FSTA No. 9 (5).

(e) Damage control center. Open FM58, FSTA No. 12 (7).

(f) 02 level passageway. Open FM-59. FSTA No. 10 (6).

(g) Align switchboard.

NOTE

Firemain is activated by one pump only.

1 Emergency switchboard (Figure 2-167). Set FIRE PUMP NO. 1 circuit breaker (1) to ON position.

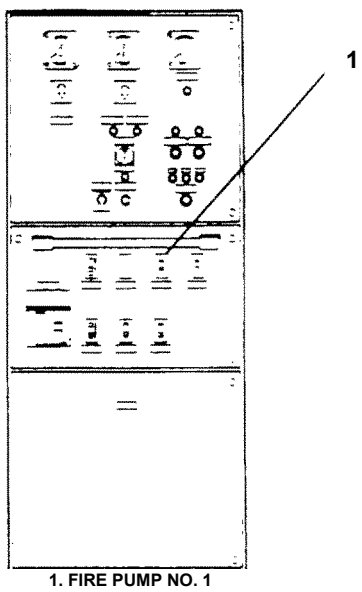
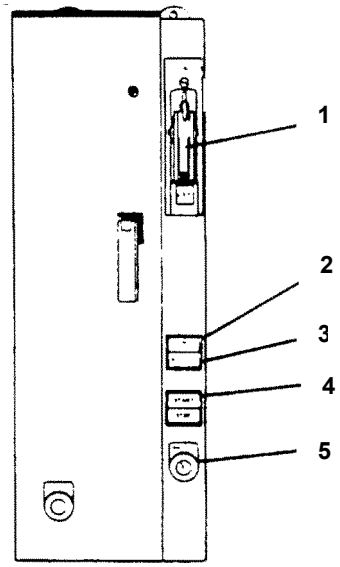


Figure 2-167. Emergency Switchboard.



1. ON-OFF SWITCH
2. POWER AVAILABLE INDICATOR
3. MOTOR RUN INDICATOR
4. START PUSHBUTTON
5. LOCAL-REMOTE SWITCH

Figure 2-168. Fire Pump Motor Controller.

2 *Main switchboard (Figure 2-156)*. Set FIRE PUMP #2 circuit breaker (13) to ON position.

(h) Fire pump motor controllers (Figure 2-169).

1 Set LOCAL-REMOTE switch (5) on each controller to LOCAL position.

2 Set ON-OFF switch (1) on each controller to ON position.

3 POWER AVAILABLE light (2) will light.

4 Press START pushbutton (4) on each fire pump.

5 MOTOR RUN light (3) will light.

(2) Fire station operation. At fire station selected, perform the following:

(a) Ensure hose is connected to fire station cutout valve.

(b) Remove fire hose from hose storage rack.

(c) Extend hose to its full length.

(d) Ensure nozzle valve is closed.

WARNING

Hold nozzle using a firm grip. If not held firmly, the nozzle will thrash about and may cause serious personal injury.

(e) Open fire station cutout valve.

(f) Direct nozzle at fire.

(g) Open nozzle valve.

(3) Fire station shutdown. At fire station selected, perform the following:

(a) Close nozzle valve.

(b) Close fire station cutout valve.

(c) Open nozzle valve to relieve pressure in fire hose.

(d) Disconnect hose from fire station cutout valve.

(e) At nozzle end, raise hose and walk back, continuing to raise hose.

(f) Connect hose to fire station cutout.

(g) Close nozzle valve.

(h) Stow hose on the hose storage rack.

b. General Service System.

(1) Firemain. Ensure firemain is operating (refer to paragraph a, above).

(2) Align piping system (Figure 2-166).

(a) Open the following valves:

1 FM-9, GENL. SERV. PRESS. RED. VLV. CO (10).

2 GS-12, GENL SERV PRESS RED VLV CO (1).

3 GS-91, GENL SVCE HEADER PRESSURE GAUGE NEAR GS-12 IN OVERHEAD.

4 GS-104 SW TO STERN TUBE SEAL PRESS (PORT).

5 GS-105 SW TO STERN TUBE SEAL PRESS (STBD).

6 GS-42, COY-ST TUBE SEAL P.

7 GS-43, COY-ST TUBE SEAL S.

(b) Close FM-10, GENL. SERV. PRESS. RED. VLV. MAN. BYPASS (9).

c. Foam System.

(1) Foam system activation.

(a) Align firefighting system piping (Figure 2-169).

1 Open AE-28, SEACHEST VENT (11).

2 Open FM-1, SEA SUCT, F.F. PMP (10).

NOTE

VALVE SYMBOL LEGEND IS LOCATED
AT THE FRONT OF THIS MANUAL.

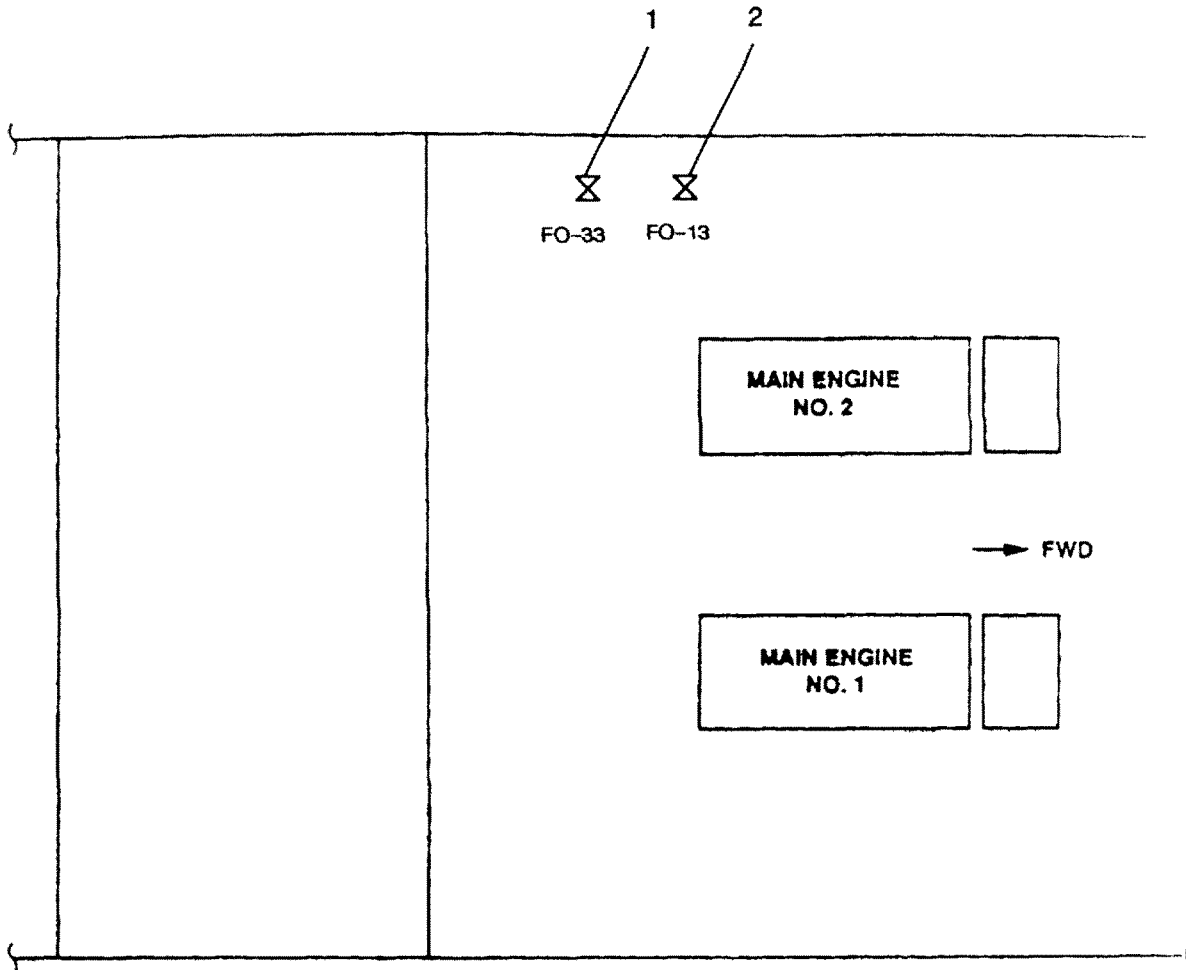
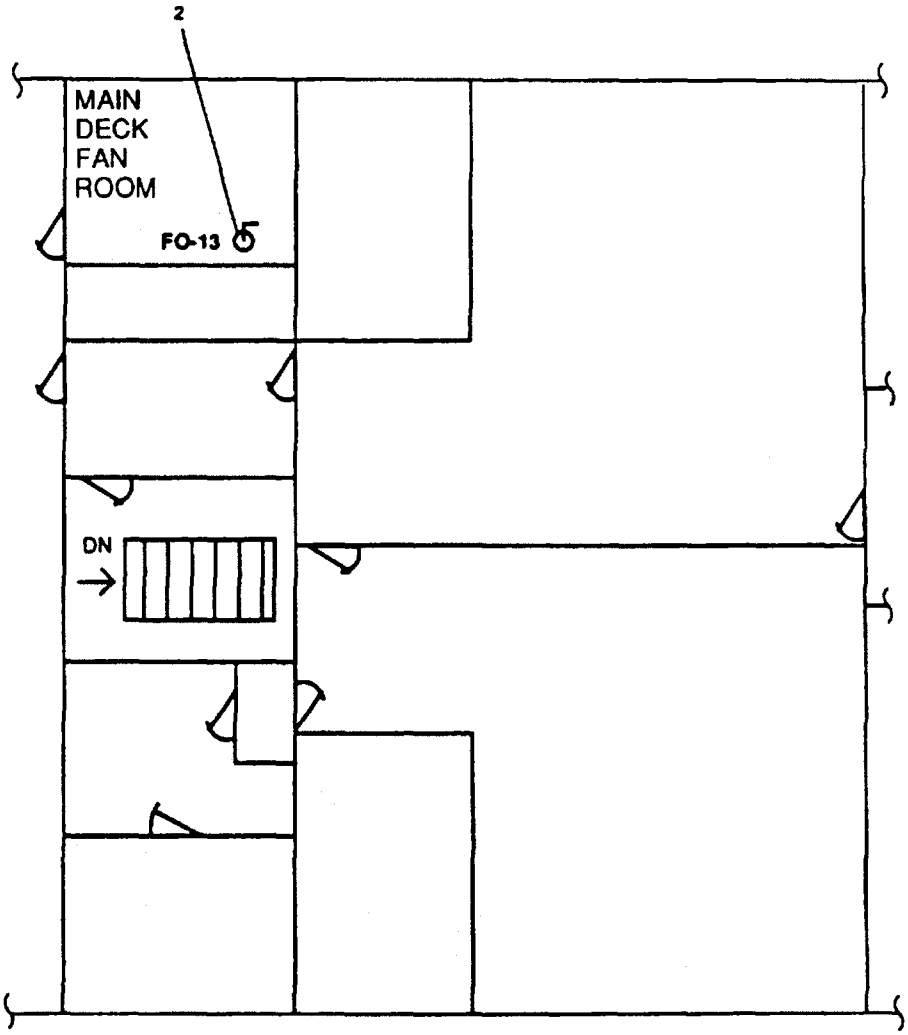


Figure 2-169. Firefighting System Valve Location (Sheet 1 of 5).



MAIN DECK

Figure 2-169. Firefighting System Valve Location (Sheet 2 of 5).

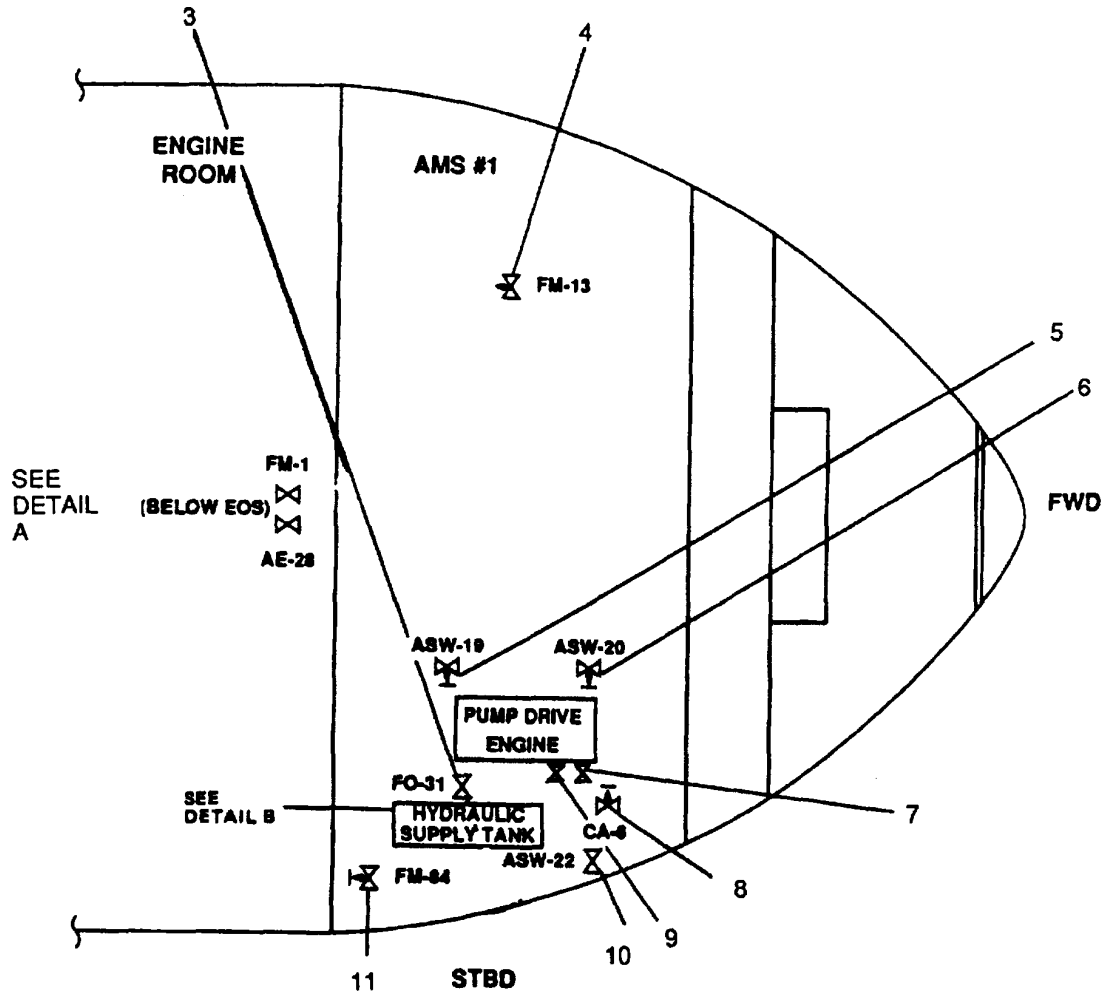
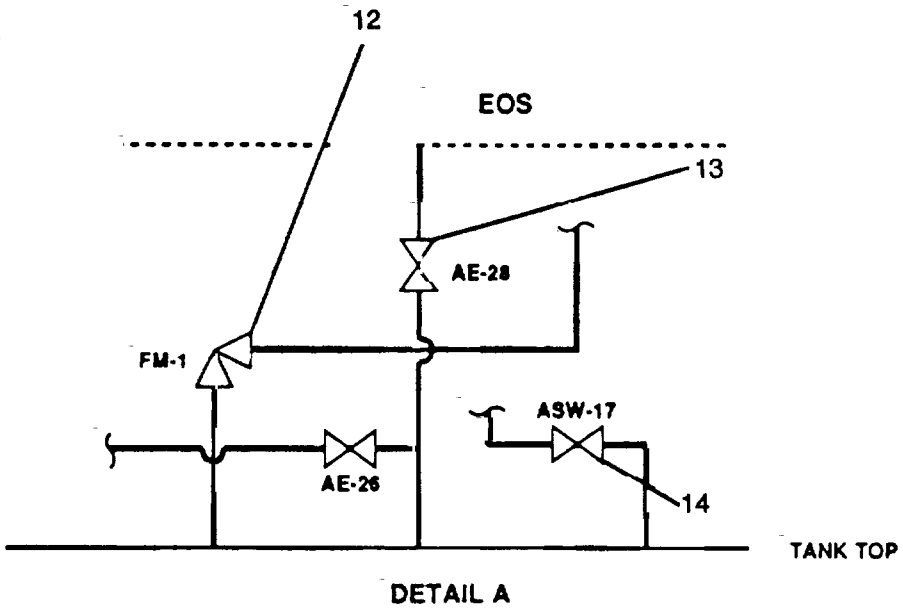


Figure 2-169. Firefighting System Valve Location (Sheet 3 of 5).



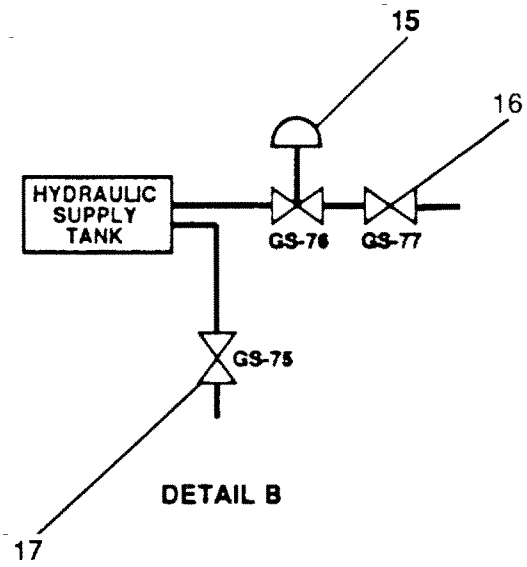


Figure 2-169. Firefighting System Valve Location (Sheet 4 of 5).

1. FO-33, F.O. RTN. TO DAY TK. PORT
2. FO-13, F.O. SERV. SUCT., PORT
3. FO-31, F.O. SPLY TO PMP. DR. ENG.
4. FM-13, F.F. TO F.M. CRSVR (OVERHEAD)
5. ASW-19, S.W. TO PUMP DRIVE ENG.
6. ASW-20, S.W. FR PUMP DRIVE ENG. TO OVBD. DISCH.
7. OUTLET FUEL OIL FILTER VALVES
8. CA-8, STG AIR TO PMP DR ENG.
9. INLET FUEL OIL FILTER VALVES
10. ASW-22, OVBD DISCH., S.W. COOLING
11. FM-84, AFFF TK SUCT
12. FM-1, SEA SUCT., F.F. PMP.
13. AE-28, SEA CHEST VENT
14. ASW-17, SEA SUCTION S.W. COOLING
15. GS-78
16. GS-77
17. GS-75

Figure 2-169. Firefighting System Valve Location (Sheet 5 of 5).

3 Open FO-31, F.O. SPLY TO PMP. DR. ENG. (3).

4 Open fuel oil filter inlet and outlet valves (7,9).

5 Open FO-13, F.O. SERV. SUCT., PORT (2).

6 Open FO-33, F.O. RTN. TO DAY TK. PORT (1).

7 Open ASW-19, S.W. TO PUMP DRIVE ENG. (5).

8 Open ASW-20, S.W. FR PUMP DRIVE ENG. TO OVBD. DISCH. (6).

9 Open ASW-22, OVBD DISCH., S.W. COOLING (10).

10 Close FM-13, F.F, TO F. M. CRSVR (4).

11 Open ASW-17, SEA SUCTION S.W. COOLING (14).

12 Open FM-94 and FM-95 SW STRN DIFF PRESSURE GAUGE, located below deck on each side of AFFF strainer in AMS-1.

13 Open FM-96 FIREMAIN PRESS GAUGE, located on FWD BULKHEAD of AMS-1 near PUMP DRIVE ENGINE.

14 Open FM-97 and FM-99 AFFF PROPORTIONER DIFF PRESS GAUGE, located overhead on AFFF/PROPORTIONER line in AMS-1.

15 Open GS-75, TOW WN HYD OIL CUR SPLY (17).

16 Open GS-77, HYD OIL CUR DISCH (16).

17 Open the following valves:
CH-26, DRN COY-TOW WN HYD.
CH-27, RTN COY-TOW WN HYD.
TH-1, C.O.V.-PMP DISCH. TO TOW WN, HYD.
TH-14.

18 Close the following valves: TM-3, TO CENT, HYD. TH4, DRN CRSVR. TO CENT. HYD.

(b) Machinery DC Control Distribution Panel

Set PMP OR ENG circuit breaker (1, Figure 2-170) to ON position.

(c) Fire fighting Pump.

1 Open GS-111, FF PMP PRM Eductor Disch.

2 Open CA-73, SVCE AIR TO FF PMP PRM Eductor.

NOTE

Pump is primed when water discharges from overflow lines.

3 Close CA-73, SVCE AIR TO FF PMP PRM Eductor.

4 Close GS-111, FF PMP PRM Eductor Disch I.

(d) Pump drive engine.

1 Open CA-6, STG AIR TO PMP DR ENG. (6, Figure 2-169).

2 Place POWER TAKE-OFF CONTROL lever (1, Figure 2-171) in disengaged (aft) position.

3 Move the mechanical governor control lever (5, Figure 2-172) to half engine speed position (approximately straight up).

4 Check the air supply pressure gauge. The air start pressure must have 100 psi to operate properly.

5 On pump drive engine control panel, turn start/stop pushbutton (3) clockwise to release pushbutton to the OUT position.

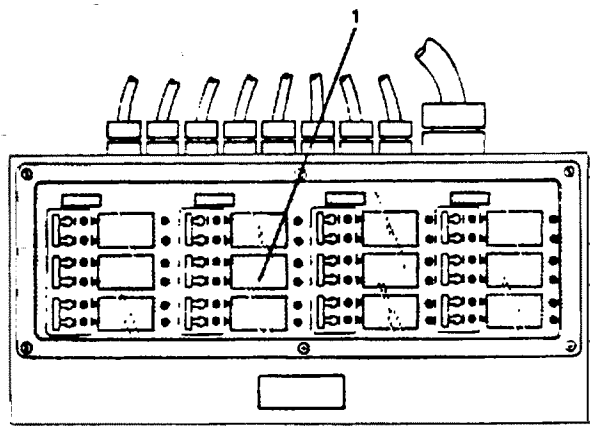
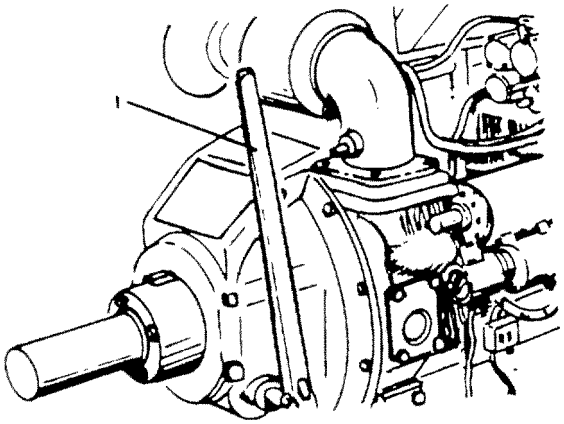


Figure 2-170. Machinery DC Control Distribution Panel.



1. POWER TAKE-OFF CONTROL LEVER

Figure 2-171. Pump Drive Power Take-off.

CAUTION

Do not crank engine for more than 30 seconds. Allow 2 minutes for starter motor to cool before cranking again. Engine damage could result.

6 Push off-run-start toggle switch (4) up to START position to crank engine. As soon as engine starts, release toggle switch (switch is spring-loaded and will return to RUN position).

CAUTION

Oil pressure should rise within 15 seconds after engine starts. If oil pressure does not rise, stop the engine. Immediately push toggle switch to down position (STOP) to prevent damage and refer program to unit maintenance.

7 Allow engine to idle 3 to 5 minutes, or until water temperature gauge (2) begins to rise.

8 Operate engine at low load until all systems reach operating temperatures. Check gauges (1 and 2) during the warm-up period.

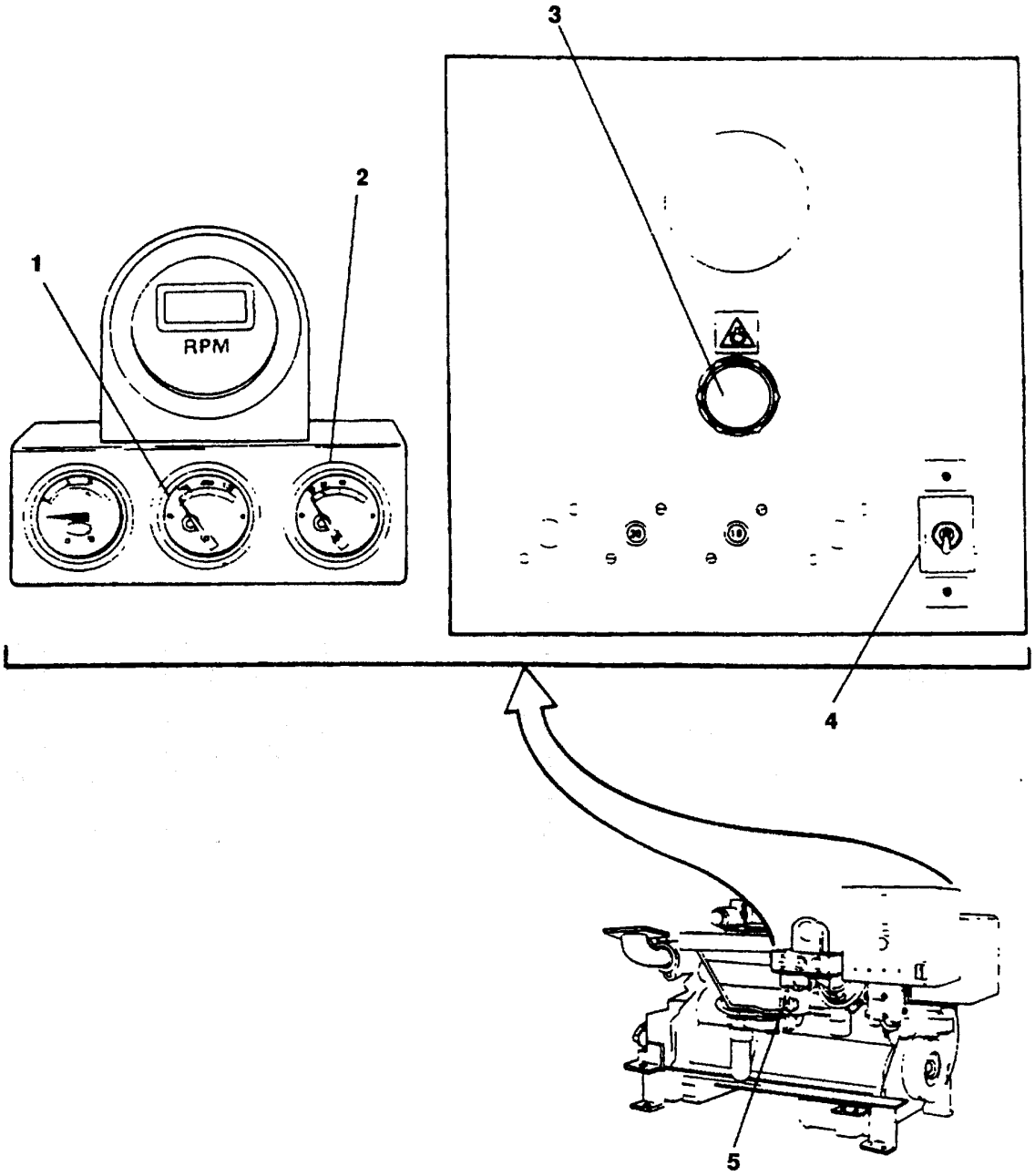
CAUTION

Ensure engine is at low idle before engaging POWER TAKE-OFF lever.

9 Place POWER TAKE-OFF CONTROL LEVER (1, Figure 2-171) in Engaged (forward) position.

10 Check the engine gauges (1 and 2, Figure 2-172) for readings in the GREEN range.

11 Move mechanical GOVERNOR CONTROL lever (4) to high idle (full load) position (aft position).



1. OIL PRESSURE GAUGE
2. WATER TEMPERATURE GAUGE
3. RED START/STOP PUSHBUTTON
4. OFF-RUN START TOGGLE SWITCH
5. GOVERNOR CONTROL LEVER

Figure 2-172. Pump Drive Engine Controls.

11 Observe FIREMAIN PRESS prep sure gauge to ensure firefighting pump is delivering liquid.

(e) Align AFFF supply system valves (Figure 2-169). Open FM-84, AFFF TK SUCT (11).

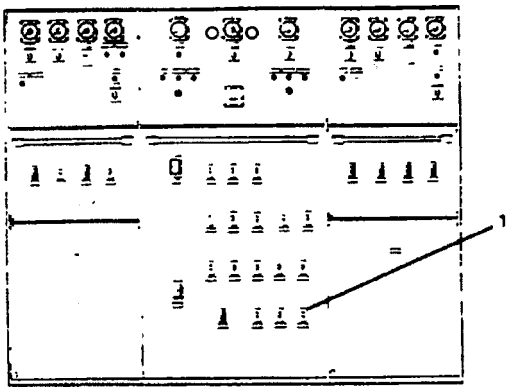
(f) Start AFFF Pump.

1 Main switchboard (Figure 2-173). Set AFFF PUMP circuit breaker (1) to ON position.

2 AFFF Sump motor controller (Figure 2-174). Set ON-OFF switch (1) to ON Position.

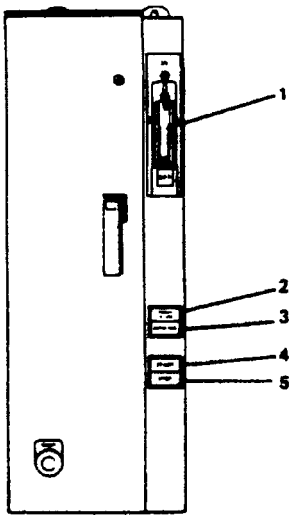
3 POWER AVAILABLE LIGHT (2) will light.

4 Press START pushbutton (4).



1. AFFF PUMP

Figure 2-173. Main Switchboard.



1. ON-OFF SWITCH
2. POWER AVAILABLE LIGHT
3. MOTOR RUN LIGHT
4. START SWITCH
5. STOP SWITCH

Figure 2-174. AFFF Pump Motor Controller.

5 MOTOR RUN light (3) will light.

6 Ensure pump is delivering foam concentrate.

(2) Fire monitor operation (AFFF).

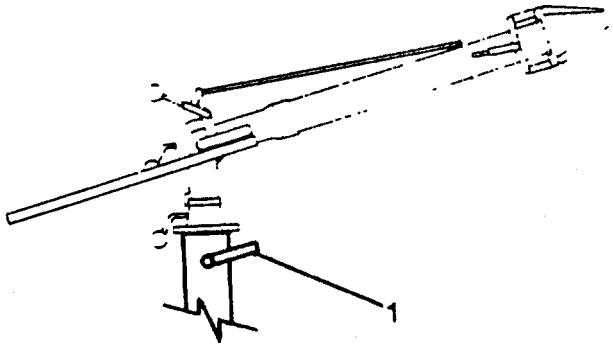
(a) Direct monitor (Figure 2-175) at fire.

(b) Open cutout valve (1) for desired monk.

(3) Foam system shutdown.

(a) AFFF Pump. On AFFF pump motor controller (Figure 2-174):

1 Press STOP pushbutton (5).



1. FIRE MONITOR CUTOUT VALVE.

Figure 2-175. Fire Monitor.

2 MOTOR RUN light (3) will go out.

3 Set ON-OFF switch (1) to OFF position.

4 POWER AVAILABLE light (2) will go out.

5 On main switchboard (Figure 2-173) set AFFF PUMP circuit breaker (1) to OFF position.

(b) AFFF piping shutdown (Figure 2-169).

1 Close FM-4, AFFF TK SUCT.

2 FM-99.

(c) Fire monitor shutdown.

1 Observe output flow until clear sea water only is being discharged.

2 Close cutout valve (1, Figure 2-175) for desired monitor.

(d) Pump drive engine.

1 Move GOVERNOR CONTROL lever (5, Figure 2-172) to half engine speed position (slow idle).

2 Place POWER TAKE-OFF CONTROL lever (1, Figure 2-171) in disengaged (aft) position.

CAUTION

Stopping without engine cool down period may cause accelerated wear of engine components. Follow the stopping procedure below to avoid damage to the engine.

3 Allow engine to idle with no load for 5 minutes.

4 Pull upward on GOVERNOR CONTROL lever (5, Figure 2-172), move GOVERNOR CONTROL lever to OFF position.

5 Push OFF-RUN-START toggle switch (4) down to OFF position (3).

6 Push in START/STOP pushbutton (3).

(e) *Firefighting system piping shutdown (Figure 2-169).*

1 Open FM-13, F.F. TO F.M. CRSVR (3).

2 Close FM-1, SEA SUCT, F.F. PMP.

3 Close ASW-19, S. W. TO PUMP DRIVE ENG. (4).

4 Close ASW-20, S.W. FR PUMP DRIVE ENG. TO OVBD. DISCH. (5).

5 Close FO-31, F.O. SPLY TO PMP DR. ENG. (8).

6 Close ASW-17, SEA SUCTION S.W. COOLING (12).

d. Wash Down Counter Measure System.

(1) Firemain. Ensure firemain is operating (refer to paragraph a, 1, above).

(2) WDCM. Activate WDCM system by opening WDCM-11, WDCM SPLY (2, Figure 2-166).

e. Fire Detection System.

(1) Engine room emergency distribution panel no. 1 (Figure 2-176). Set FIRE DETECTION SYS circuit breaker (2) to ON position.

(2) *Silence alarm (Figure 2-177).* Obtain key, unlock panel, and press ALARM SILENCE.

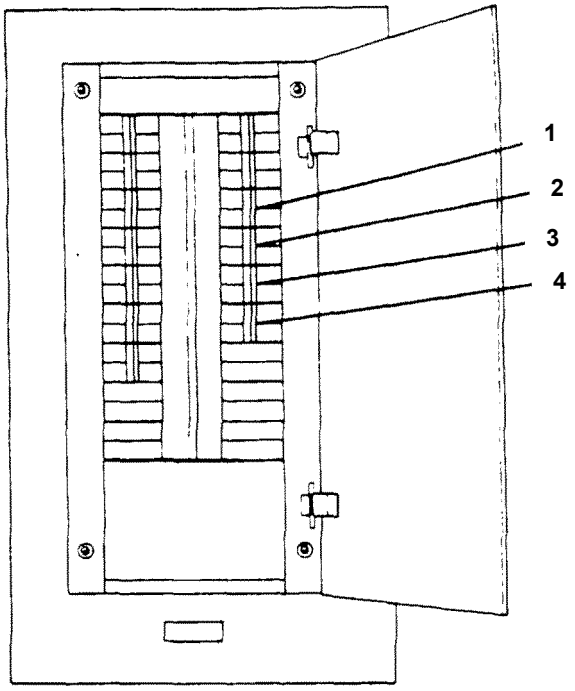


Figure 2-176. Engine Room Emergency Distribution Panel No. 1.

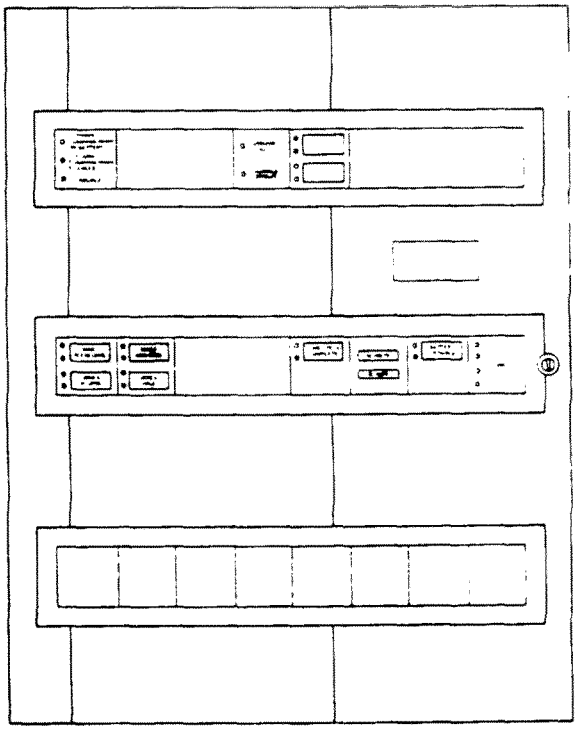


Figure 2-177. Marine Fire Detection Panel.

2-9. Life Support Systems.

a. Potable Water System Operation.

(1) Align potable water system valves (Figure 2-178) .

(a) PW-14, POT. WTR. TK. PORT SUCT.

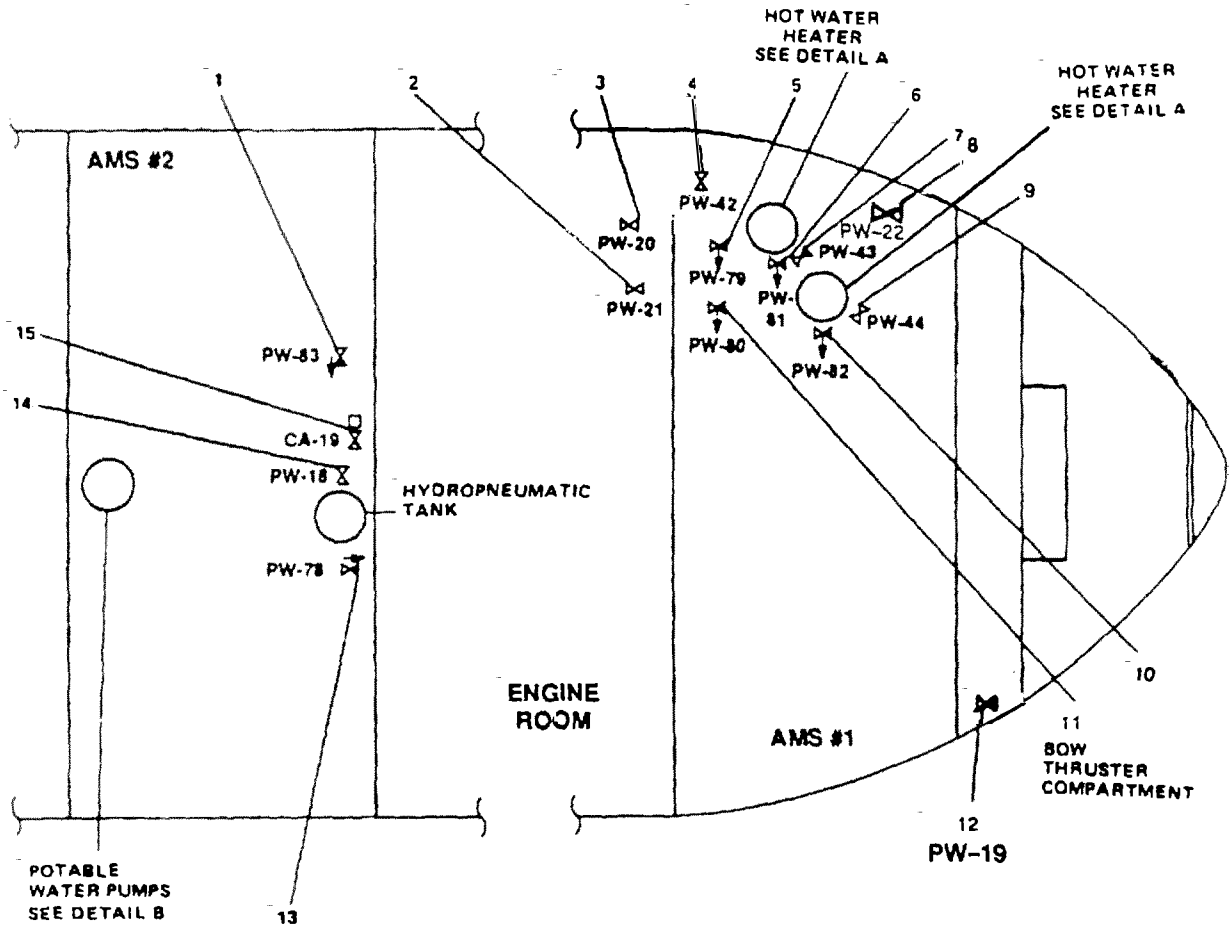
(b) PW-15, POT. WTR. TK. STBD SUCT.

(c) PW-16, C.O.V. -POT. WTR. PMP. NO, 1 SUCT (53).

(d) PW-17 C.O.V. - POT. WTR. PMP. NO. 2 SUCT (54).

(e) PW-76, C.O.V. - POT. WTR. PMP. NO. 1 DISCH. (51).

(f) PW-77, C.O.V. - POT. WTR. PMP. NO. 2 (55).



NOTE

VALVE SYMBOL LEGEND IS LOCATED AT THE FRONT OF THIS MANUAL

Figure 2-178. Potable Water System Locations (Sheet 1 of 6).

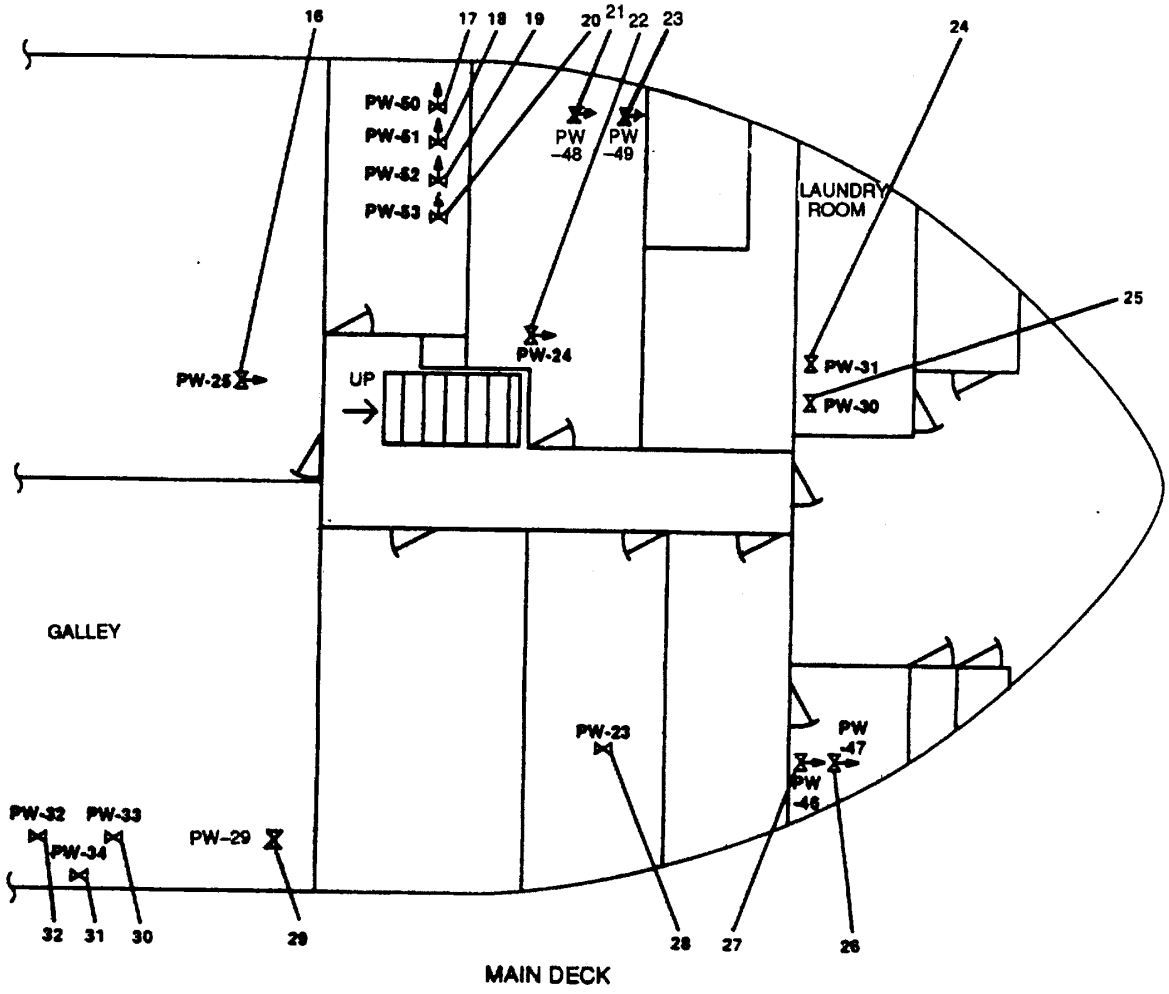


Figure 2-178. Potable Water System Locations (Sheet 2 of 6).

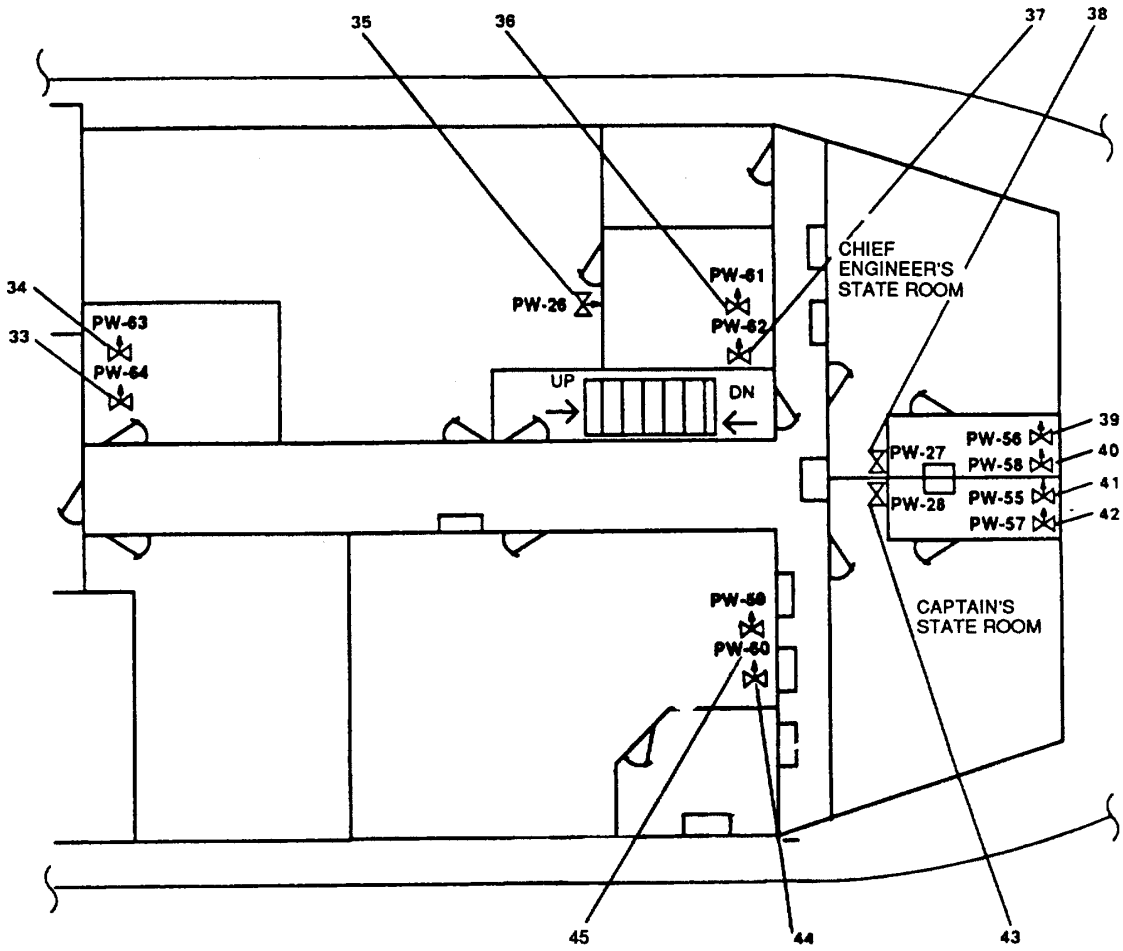
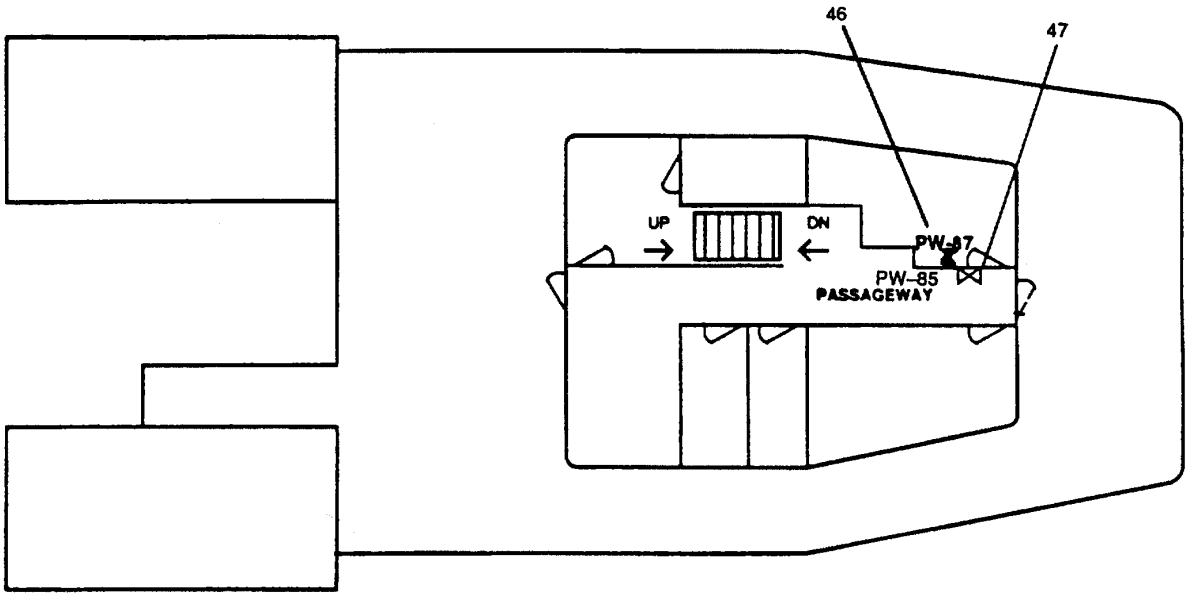
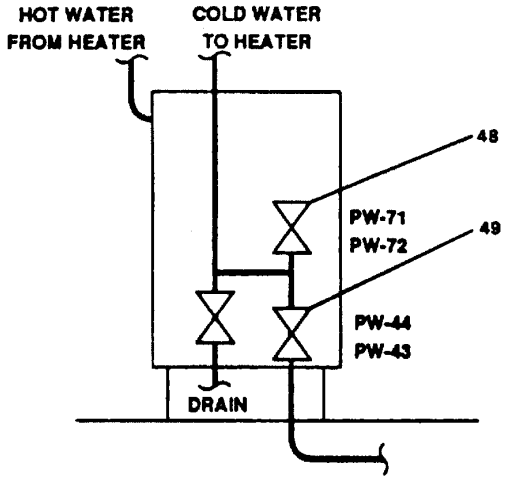


Figure 2-178. Potable Water System Locations (Sheet 3 of 6).



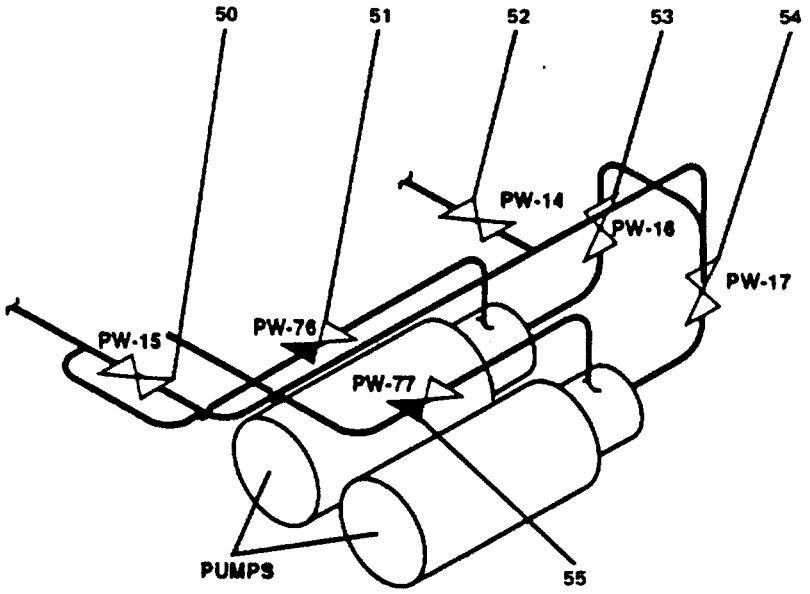
02 LEVEL



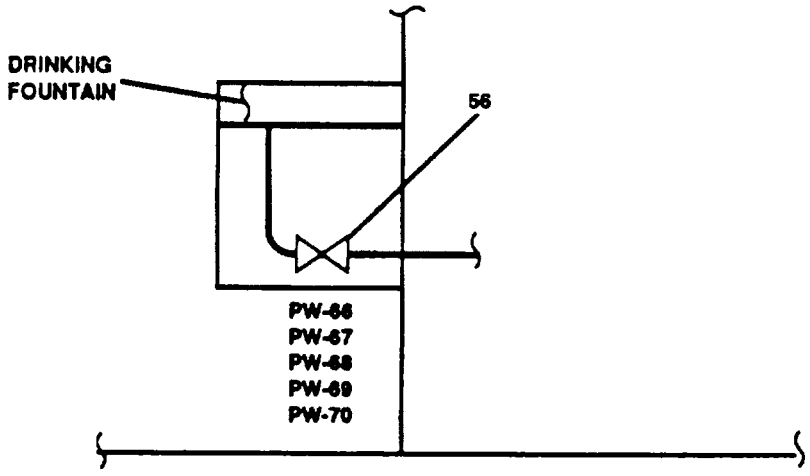
HOT WATER HEATER

DETAIL A

Figure 2-178. Potable Water System Locations (Sheet 4 of 6).



DETAIL B



DRINKING FOUNTAINS (TYPICAL)

Figure 2-178. Potable Water System Locations (Sheet 5 of 6).

1. PW-83, POT. WTR. TO MN. DK. WSH. DN. (OVER WATERTIGHT DOOR)
2. PW-21, C.W. TO W.C.
3. PW-20, C.W. TO W.C. (OVERHEAD)
4. PW-42, H.W. RECIRC. PMP. SUCT.
5. PW-79, POT. WTR. TO H.W. HTR. (OVERHEAD)
6. PW-81, H.W. HTR OUT
7. PW-43, RECIRC TO H.W. HEATER
8. PW-22, C.W. TO W.C.
9. PW-44, RECIRC TO H.W. HEATER
10. PW-82, H.W. HTR. OUT
11. PW-80, POT. WTR. TO H.W. HTR. (OVERHEAD)
12. PW-19. C.W. TO W.C.
13. PW-78, C.O.V. - HYDR. PNEY. TK. OUTLET
14. PW-18, HYDR. PNEY. TK. INLET
15. CA-19, AIR TOOL CONN.
16. PW-25, C.W. TO W.C. (IN DRINKING FOUNTAIN)
17. PW-50, SHOWER (OVERHEAD)
18. PW-51, SHOWER (OVERHEAD)
19. PW-52, SHOWER (OVERHEAD)
20. PW-53, SHOWER (OVERHEAD)
21. PW-48, SHOWER
22. PW-24, C.W. TO W.C.
23. PW-49, SHOWER
24. PW-31
25. PW-30
26. PW-47, SHOWER
27. PW-46, SHOWER
28. PW-23, C.W. TO W.D.
29. PW-29
30. PW-33, H.W. SUPPLY
31. PW-34
32. PW-32
33. PW-64
34. PW-63
35. PW-26, C.W. TO W.C.
36. PW-61, SHOWER
37. PW-62, SHOWER
38. PW-27
39. PW-56, SHOWER
40. PW-58, SHOWER
41. PW-55, SHOWER
42. PW-57, SHOWER
43. PW-28
44. PW-60, SHOWER
45. PW-59, SHOWER
46. PW-87, C.W. TO HOSE CONN.
47. PW-85, C.O.V. HOSE CONN.
48. (FORWARD HEATER) PW-71
    (AFT HEATER) PW-72
49. (FORWARD HEATER) PW-44, RECIRC TO H.W. HEATER
    (AFT HEATER) PW-43, RECIRC TO H.W. HEATER
50. PW-15, POT. WTR. TK. STBD SUCT.
51. PW-76, C.O.V. - POT. WTR. PMP. NO. 1 DISCH.
52. PW-14, POT. WTR. TK. PORT SUCT.
53. PW-16, C.O.V. - POT. WTR. PMP. NO. 1 SUCT
54. PW-17, C.O.V. - POT. WTR. PMP. NO. 2 SUCT
55. PW-77, C.O.V. - POT. WTR. PMP. NO. 2
56. (ENGINE ROOM) PW-66
    (MESS/RECREATION) PW-67
    (01 LEVEL) PW-68
    (02 LEVEL) PW-69
    (PILOTHOUSE) PW-70

Figure 2-178. Potable Water System Locations (Sheet 6 of 6).

(2) Align electrical system.

(a) Engine room emergency distribution panel no. 1 (Figure 2-176). Set TLI SYSTEM circuit breaker (1) to ON position.

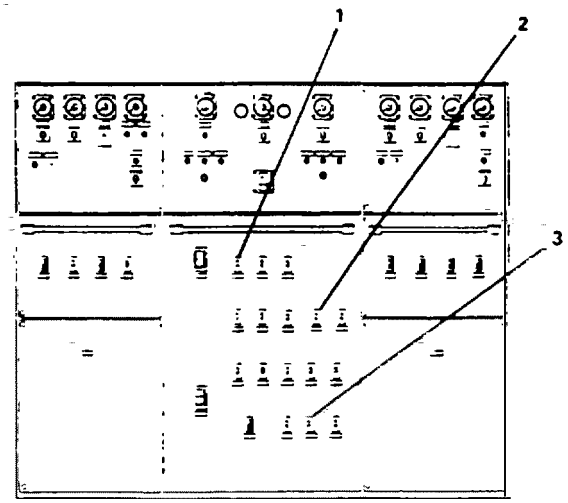
(b) Main switchboard (Figure 2-179). Set AUX MCHY SPACE #2 PWR PNL 5 circuit breaker 91 to ON position.

(c) Auxiliary machinery space no. 2 power panel no. 5 (Figure 2-180). Set following circuit breakers to ON position:

1 #1 POT WTR PUMP (1).

2 #2 POT WTR PUMP (4).

(3) Charge potable water hydropneumatic tank



1. AUX MCHY SPACE #2 PWR PNL 5
2. HOT POTABLE WTR. HTR #2
3. HOT POTABLE WTR. HTR #1

Figure 2-179. Main Switchboard.

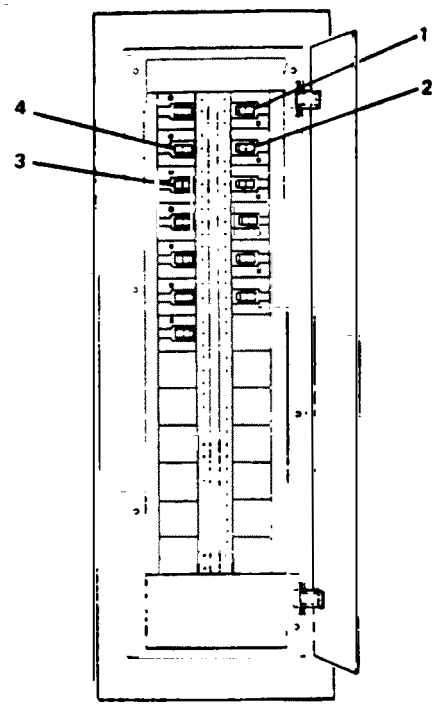


Figure 2-180. Auxiliary Machinery Space No. 2 Power Panel No. 5.

(a) Connect air hose.

1 Connect air hose to hose connection at CA-19, AIR TOOL CONN. (15, Figure 2-178).

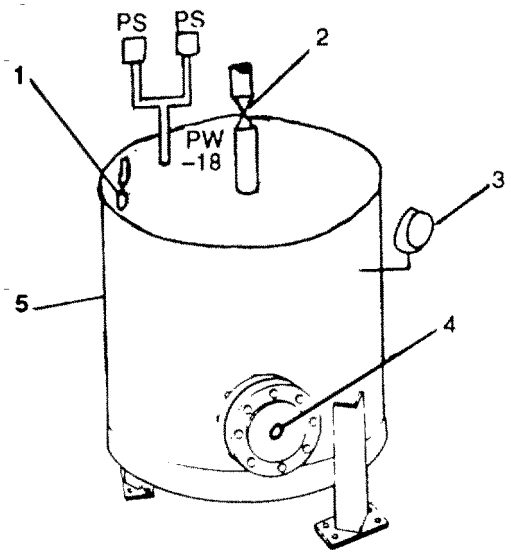
2 Connect other end of air hose to hose fitting at air charging connection (1, Figure 2-181) on hydropneumatic tank.

(b) Fill hydropneumatic tank with water.

1 Open vent valve (2) on hydropneumatic tank.

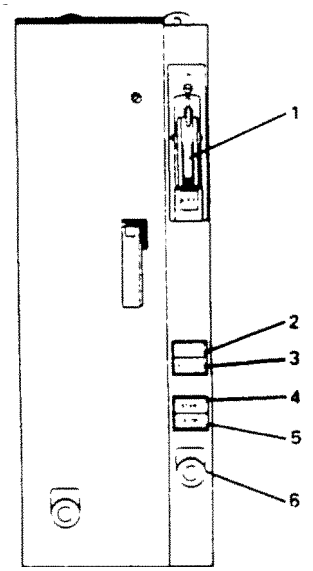
2 Open PW-18, HYDRO. PNEY. TK. INLET (2).

3 On potable water pump no. 1 motor controller (Figure 2-182) set ON-OFF switch (1) to ON position.



1. AIR CHARGING CONNECTION.
2. PW-18, HYDRO. PNEU. TK. INLET
3. PRESSURE GAUGE
4. VENT VALVE
5. SIGHT GLASS (NOT SHOWN)

Figure 2-181. Hydropneumatic Tank.



1. ON-OFF SWITCH
2. POWER AVAILABLE LIGHT
3. MOTOR RUN LIGHT
4. START SWITCH
5. STOP SWITCH
6. MAN-AUTO SWITCH

Figure 2-182. Potable Water Pump No. 1 Motor Controller.

4 POWER AVAILABLE light (2) will light.

5 Set MAN-AUTO switch (6) to MAN position.

6 Press START pushbutton (4).

7 MOTOR RUN light (3) will light.

8 Observe hydropneumatic tank sight glass (5, Figure 2-181). When water level is approximately one-half in sight glass, proceed.

9 Press STOP pushbutton (5, Figure 2-182).

10 MOTOR RUN light (3) will go out.

11 Close vent valve (4, Figure 2-181) on hydropneumatic tank.

(c) Pressurize hydropneumatic tank

1 Open air charging connection isolation valve (1).

2 Slightly open CA-19,AIR CONIC-15, Figure 2-178).

3 Observe hydropneumatic pressure gauge (3, Figure 2-181).

4 When gauge (3) indicates 60 psi, close air charging connection isolation valve (1).

5 Close CA-19 (15, Figure 2-178).

6 Disconnect air hose from hose connection at CA-19 (15) and hydropneumatic tank.

(4) Bring pump on-line. On potable water pump no. 1 motor controller (Figure 2-182) set MAN-AUTO switch (6) to AUTO position.

NOTE

Both potable water pumps may be operated at the same time; however, normal operation is one pump on-line.

(5) Bring hot water heaters on-line.

(a) *Fill hot water heaters (Figure 2-178)*.

1 Open PW-78, C.O.V. - HYDR. PNEY. TK. OUTLET (13).

2 Open PW-79, POT. WTR TO H.W. HTR. (5).

3 Open PW-80, POT. WTR. TO H.W. HTR. (11).

4 Open PW-81, H.W. HTR OUT (6).

5 Open PW-82, H.W. HTR. OUT (12).

6 In galley, open the hot water supply valve to sink, PW-33 (30).

7 Turn on hot water faucet at sink. Allow water to run until air has been purged from piping.

(b) Align electrical system. On main switchboard (Figure 2-179) set the following circuit breakers to ON position:

1 HOT POTABLE WTR. HTR #1 (3).

2 HOT POTABLE WTR. HTR #2 (2).

(6) Bring hot water recirculating pump on-line.

(a) Align valves. Open the following valves (Figure 2-178):

1 PW-42, H.W. RECIRC. PMP. SUCT. (4).

2 PW-43, RECIRC TO H.W. HEATER (7).

3 PW-44, RECIRC TO H.W. HEATER (9).

(b) Align electrical system.

1 On auxiliary machinery space no. 1 power panel no. 4 (Figure 2-183), set HOT POT WTR REC; PMP circuit breaker (1) to ON position.

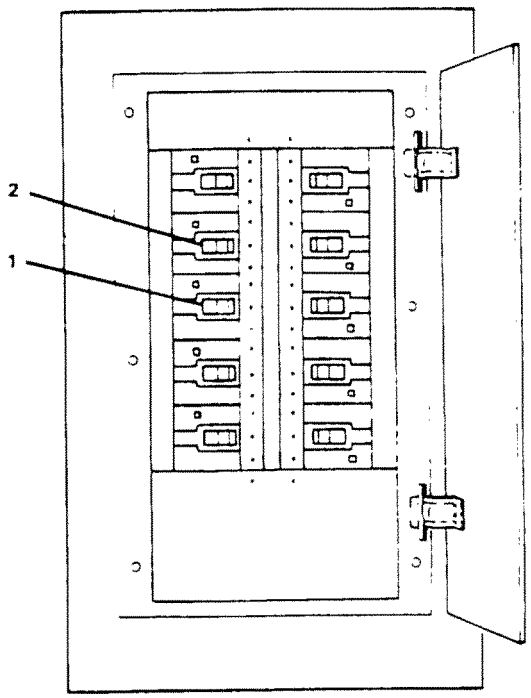


Figure 2-183. Auxiliary Machinery Space No. 1 Power Panel No. 4.

2 POWER AVAILABLE indicator (3, Figure 2-184) will light on hot potable water recirculating pump motor controller.

(c) Start pump. On hot potable water recirculating pump motor controller, press START pushbutton (1).

1 MOTOR RUN indicator (2) will light.

(7) Align piping system (Figure 2-178).

(a) *Below main deck*. Open the following valves:

1 PW-22, C.W. TO W.C. (8)

2 PW-21, C.W. TO W.C. (2)

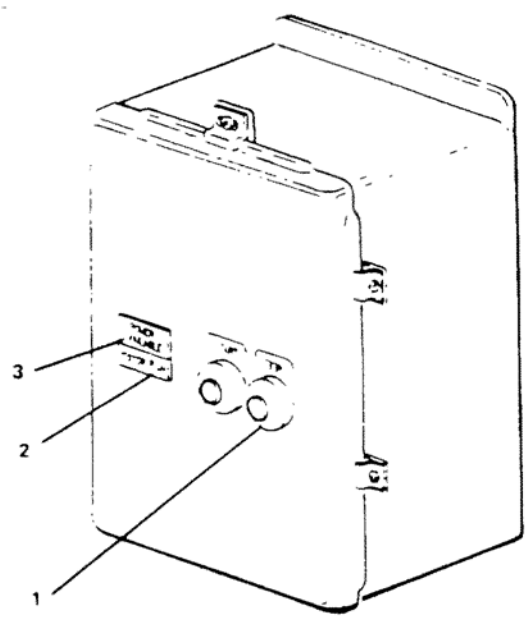
3 PW-20, C.W. TO W.C. (3).

4 PW-66 (56).

5 PW-83, POT. WTR. TO MN. DK. WSH. DN (1).

(b) Main deck. Open the following valves:

1 PW-32 (32).



1. START PUSHBUTTON
2. MOTOR RUN INDICATOR
3. POWER AVAILABLE INDICATOR

Figure 2-184. Hot Potable Water Recirculating Pump Motor Controller.

2 PW-34 (31).

3 PW-29 (29).

4 PW-25, C.W. TO W.C. (16).

5 PW-67 (56).

6 PW-50 (17).

7 PW-51(18).

8 PW-52 (19).

9 PW-53 (20).

10 PW-24,C.W.TO W.C. (22).

11 PW-48 (21).

12 PW-49 (23).

13 PW-31 (24)

14 PW-30 (25).

15 PW-46 (27)

16 PW-47 (26).

17 PW-23,C.W.TO W.C. (28).

(c) Bow thruster compartment. Open PW19, C.W. TO W.C. (12).

(d) 01 Level. Open the following valves:

1 PW-56 (39).

2 PW-58 (40).

3 PW-55 (41).

4 PW-57 (42).

5 PW-28 (43).

6 PW-27 (38).

7 PW-68 (56).

8 PW-62 (37).

9 PW-61 (36).

10 PW-26, C.W.TO W.C. (35).

11 PW-63 (34).

12 PW-64 (33).

13 PW-60 (44).

14 PW-59 (45).

(e) 02 Level. Open the following valves:

1 PW-87,C.W.TO HOSE CONN. (46).

2 PW-69 (56).

3 Close PW-87 C.O.V. HOSE CONN. (47).

(f) 03 Level.

1 Open PW-70 (56).

2 Operate drinking fountain until air has been purged from piping.

(g) 02 Level. Operate all plumbing fixtures until air has been purged from piping.

(h) 01 Level. Operate all plumbing fixtures until air has been purged from piping.

(i) Main deck. Operate all plumbing fixtures until air has been purged from piping.

(8) Set up drinking fountains.

(a) 01 Level distribution panel no. 2 (Figure 2-185). Set the following circuit:

1 01 LEVEL DRINKING FOUNTAIN (3).

2 02 LEVEL DRINKING FOUNTAIN (1).

3 PILOTHOUSE DRINKING FOUNTAIN (2).

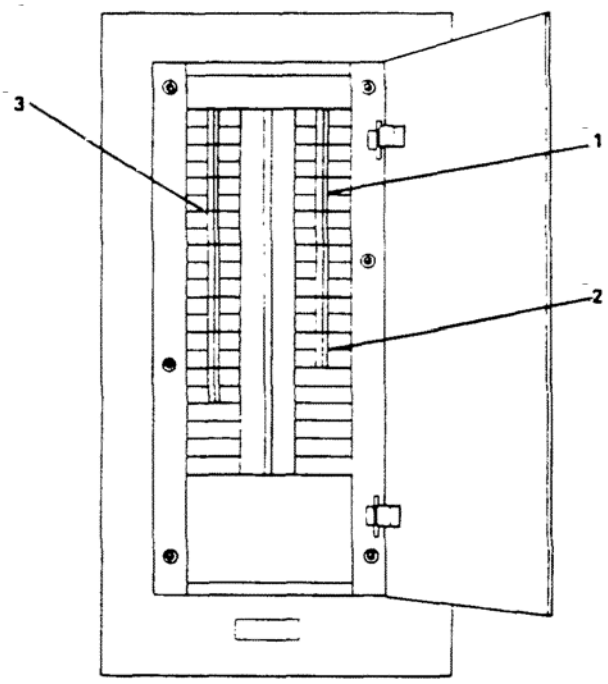


Figure 2-185. 01 Level Distribution Panel No. 2.

(b) Main deck distribution panel no. 3 (Figure 2-186). Set MAIN DECK DRINKING FOUNTAIN circuit breaker (1) to ON position.

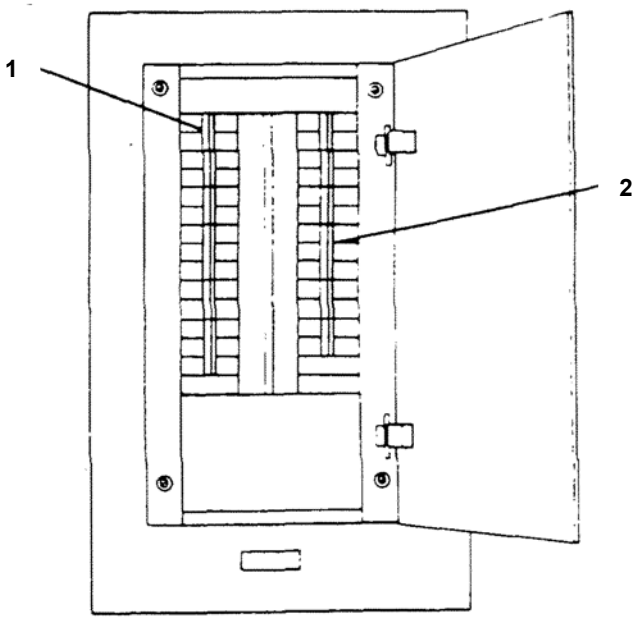


Figure 2-186. Main Deck Distribution Panel No. 3.

(c) Engine room distribution panel no. 4 (Figure 2-187). Set ENGINE ROOM DRINKING FOUNTAIN circuit breaker (3) to On position.

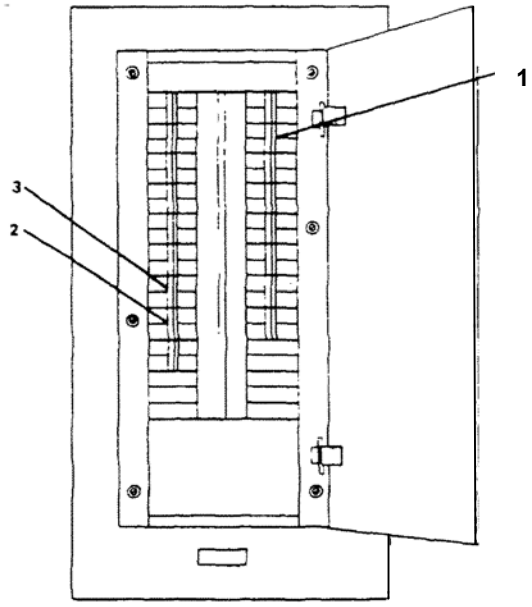


Figure 2-187. Engine Room Distribution Panel No. 4.

(9) *Start reverse osmosis watermakers*.

(a) Align general service piping system (Figure 2-188).

Ensure firemain is operating (refer to paragraph 2-8a). Open the following valves:

1 GS-32, GS OVBD DISCH. (9).

2 GS-50, S.W. OUT R.O. NO. 1 (16).

3 GS-51, S.W. OUT R.O. NO. 2 (17).

4 FM-15, FIRE/G.S. PMP. NO. 2 DISCH. TO G.S. (15).

5 FM-17, FIRE/G.S. PMP. NO. 1 DISCH. TO G.S. (12).

6 FM-10, GENL. SERV. PRESS. RED. VLV. MAN. BYPASS (10).

7 FM-9, GENL. SERV. PRESS. RED. VLV. CO (11).

8 GS-12, GENL. SERV. PRESS. RED. VLV. CO (1).

9 GS-41, SW TO RO NO. 2 (18).

10 GS-40, SW TO RO NO. 1 (19).

11 FM-92, FIRE/G.S. PMP. NO. 2 DISCH. PRESS. GAUGE (14).

12 FM-93, FIRE/G.S. PMP. NO, 1 DISCH. PRESS. GAUGE (13).

(b) Align potable water piping system (Figure 2-188). Open the following valves:

1 PW-12, POT WTR TK PORT FILL (7).

2 PW-13, POT WTR TK STBD FILL (8).

3 PW-38, BROMINATOR OUTLET (6).

4 PW-37, BROMINATOR INLET (5).

5 Close PW-36, BYPASS BROMINATOR.

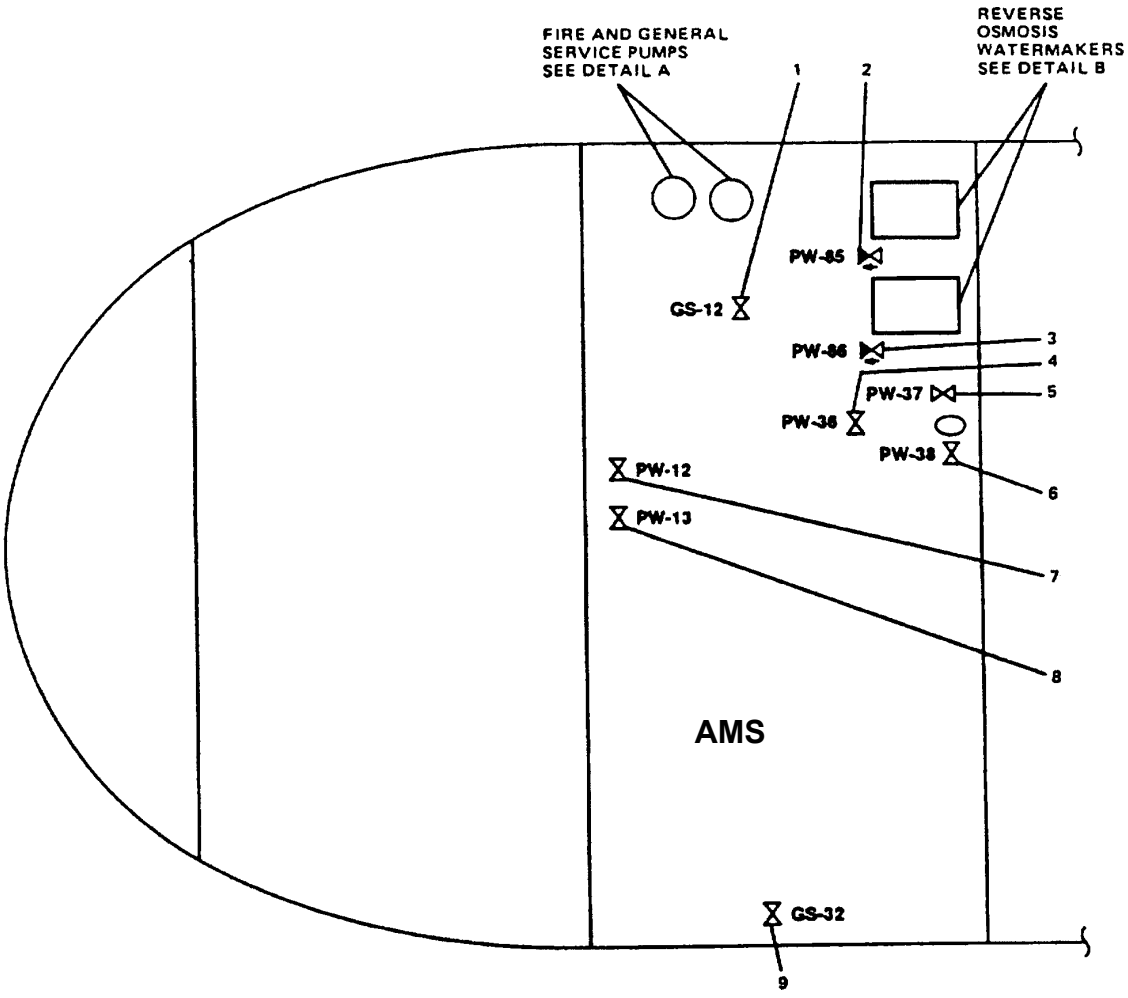
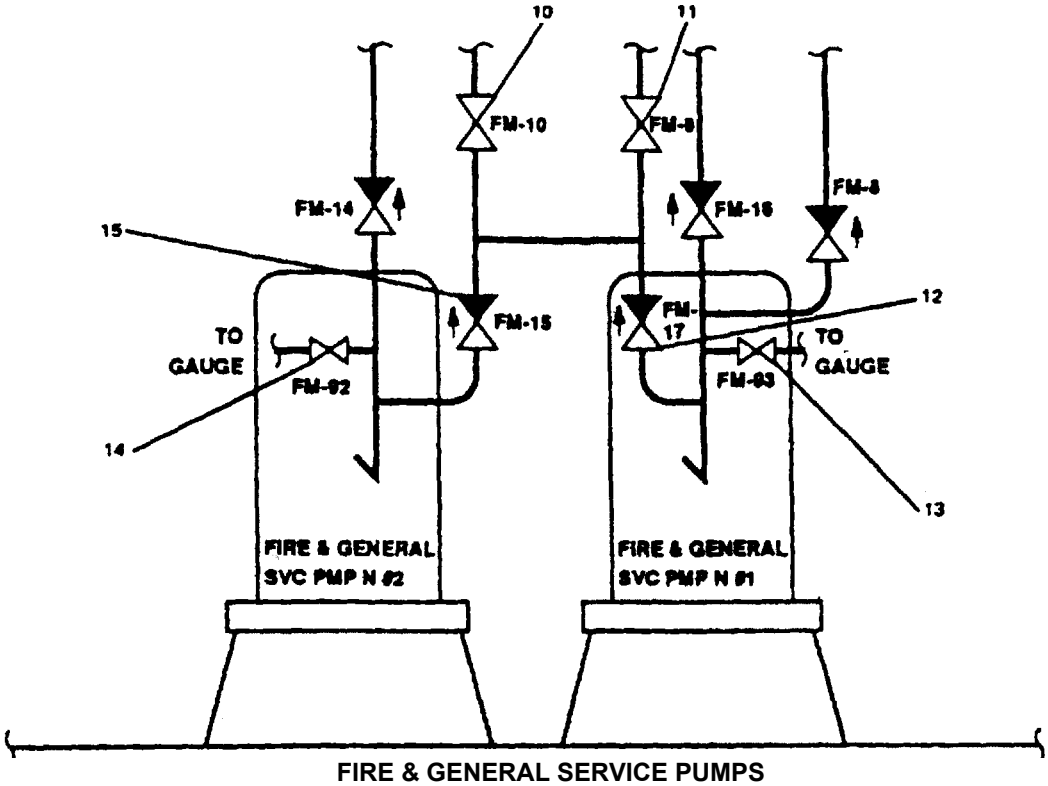
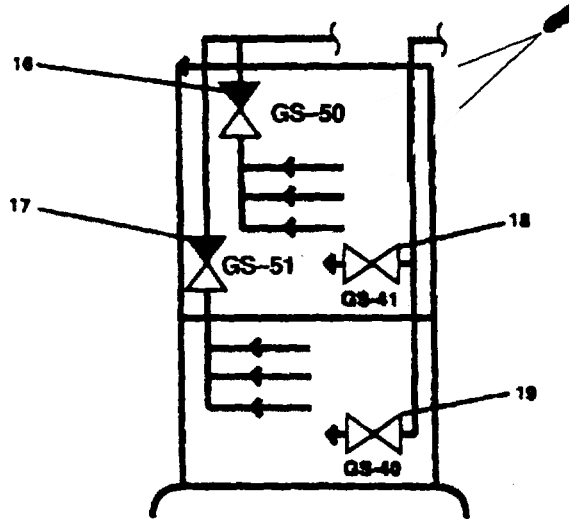


Figure 2-188. Reverse Osmosis System Valve Locations (Sheet 1 of 3).



FIRE & GENERAL SERVICE PUMPS
LOOKING OUTBOARD

DETAIL A



NOTE

VALVE SYMBOL LEGEND IS LOCATED AT THE FRONT OF THIS MANUAL

REVERSE OSMOSIS WATERMAKERS
(LOOKING INBOARD)

DETAIL B

Figure 2-188. Reverse Osmosis System Valve Locations (Sheet 2 of 3).

1. GS-12, GENL SERV PRESS RED VLV CO
2. PW-85, C.O.V. - R.O. NO. 2 POT. WTR. DISCH.
3. PW-86, C.O.V. - R.O. NO. 1 POT. WTR. DISCH.
4. PW-36, BYPASS - BROMINATOR
5. PW-37, BROMINATOR INLET
6. PW-38, BROMINATOR OUTLET
7. PW-12, POT WTR TK P FILL
8. PW-13, POT WTR TK S FILL
9. GS-32, GS OVBD DISCH.
10. FM-10, GENL. SERV. PRESS. RED. VLV. MAN. BYPASS
11. FM-9, GENL. SERV. PRESS. RED. VLV. CO
12. FM-17, FIRE/G.S. PMP. NO. 1 DISCH. TO G.S.
13. FM-93, FIRE/G.S. PMP. NO. 1 DISCH. PRESS. GAUGE
14. FM-92, FIRE/G.S. PMP. NO. 2 DISCH. PRESS. GAUGE
15. FM-15, FIRE/G.S. PMP. NO. 2 DISCH. TO G.S.
16. GS-50, S.W. OUT R.O. NO. 1
17. GS-51, S.W. OUT R.O. NO. 2
18. GS-41, SW TO RO NO. 2
19. GS-40, SW TO RO NO.1

Figure 2-188. Reverse Osmosis System Valve Locations (Sheet 3 of 3).

(c) Start reverse osmosis watermaker (Figure 2-189).

CAUTION

Failure to follow these procedures exactly could lead to system failure and damage to components.

1 Position MEDIA FILTER BACK-FLUSH valve (3) to full “up" (normal filter) position by gently lifting and turning handle counterclockwise.

2 Close SYSTEM STORE & RINSE valve (2).

3 Position 3-WAY FILTER/CLEAN valve (4) towards flowmeter (8) (normal operating position).

4 Close CHEMICAL CIRCULATION PUMP valve (5).

5 Position 3-WAY BRINE & RINSE/ CLEAN & STORE valve (1) towards through hull overboard discharge brine connector (9).

6 Open BACK PRESSURE REGULATOR valve (14) fully (turn fully counter-clockwise).

7 Open PW-86, C.O.V. - R.O. NO. 1 POT. WTR. DISCH. (3, Figure 2-188).

8 Open PW-85, C.O.V. - R.O.N0.2 POT. WTR. DISCH. (2).

CAUTION

Ensure product water discharge valve line-up is open to tank. Damage to unit could occur.

NOTE

Ensure general - service system is operating.

9 Open GS-41, SW TO RO NO. 2 (18).

10 Open GS-40, SW TO RO NO. 1 (19).

CAUTION

Observe feed water pressure on pressure gauge does not exceed 40 psi. If 40 psi is exceeded, damage to unit will result. Refer to unit maintenance.

11 On auxiliary machinery space no. 2 power panel no. 5 (Figure 2-180) set #1 REVERSE OSMOSIS UNIT circuit breaker (2) to ON position.

12 Set #2 REVERSE OSMOSIS UNIT circuit breaker (3) to ON position.

13 Press START switch (12, Figure 2-189) momentarily for about 2 seconds.

NOTE

GPM FEED WATER FLOW meter will allow observation of water passing through it. Any air passing through meter will cause flow reading to fluctuate. Once all air is bled and eliminated from system, meter readings will be reliable.

14 GREEN indicator (9) light and RED indicator (10) light. Located on top of housing until stream of water flows out of valve.

15 Check for air suction leaks or water leaks throughout entire system.

16 Slowly increase system operating pressure by turning BACK PRESSURE REGULATOR valve (14) clockwise until 600 psi is indicated on high pressure gauge (7).

NOTE

If leaks develop, decrease pressure by turning back pressure regulator valve counterclockwise full open, then pressing STOP pushbutton.

CAUTION

Refer leaks or problems to unit maintenance for corrective action. Continued operation of unit could cause damage.

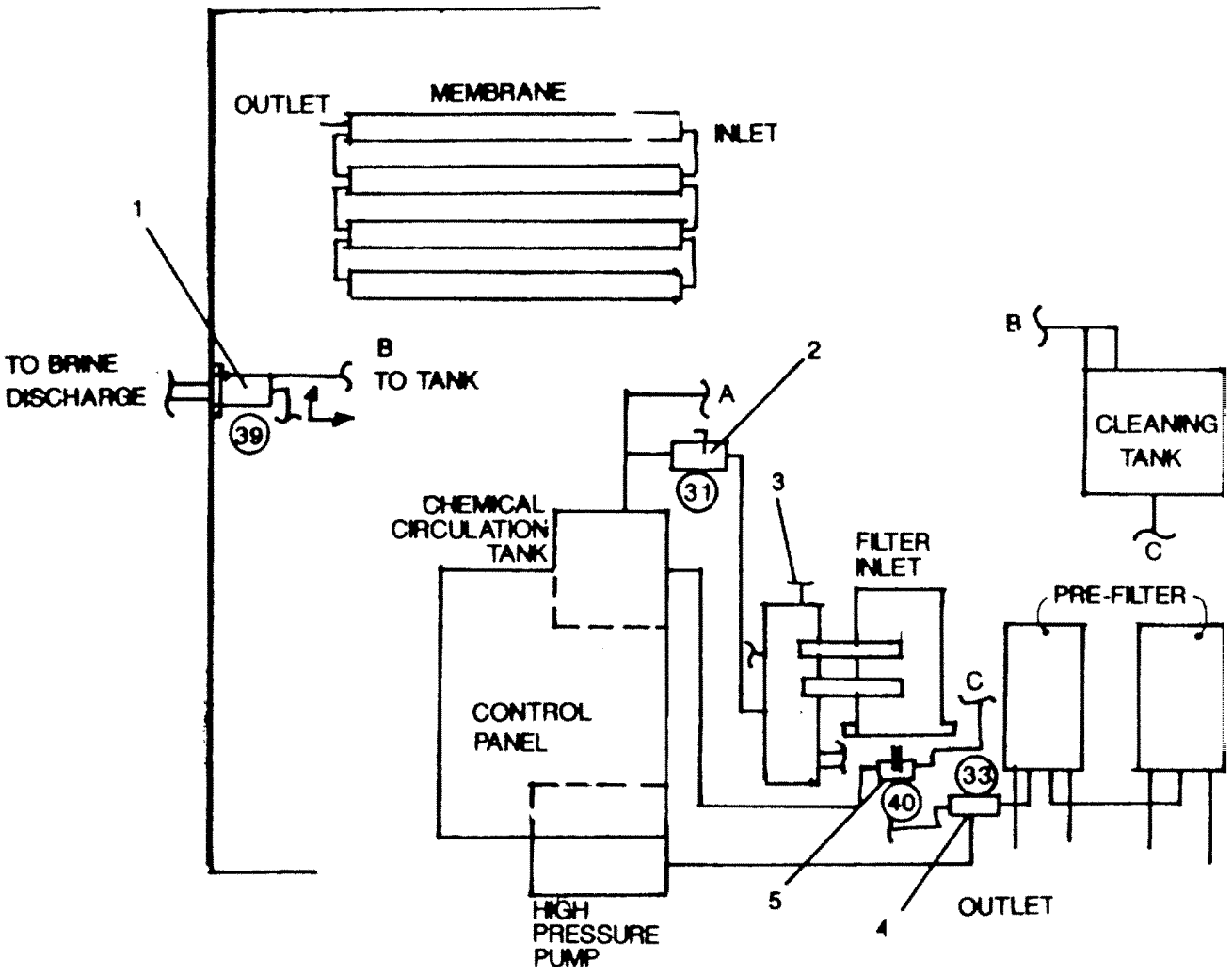
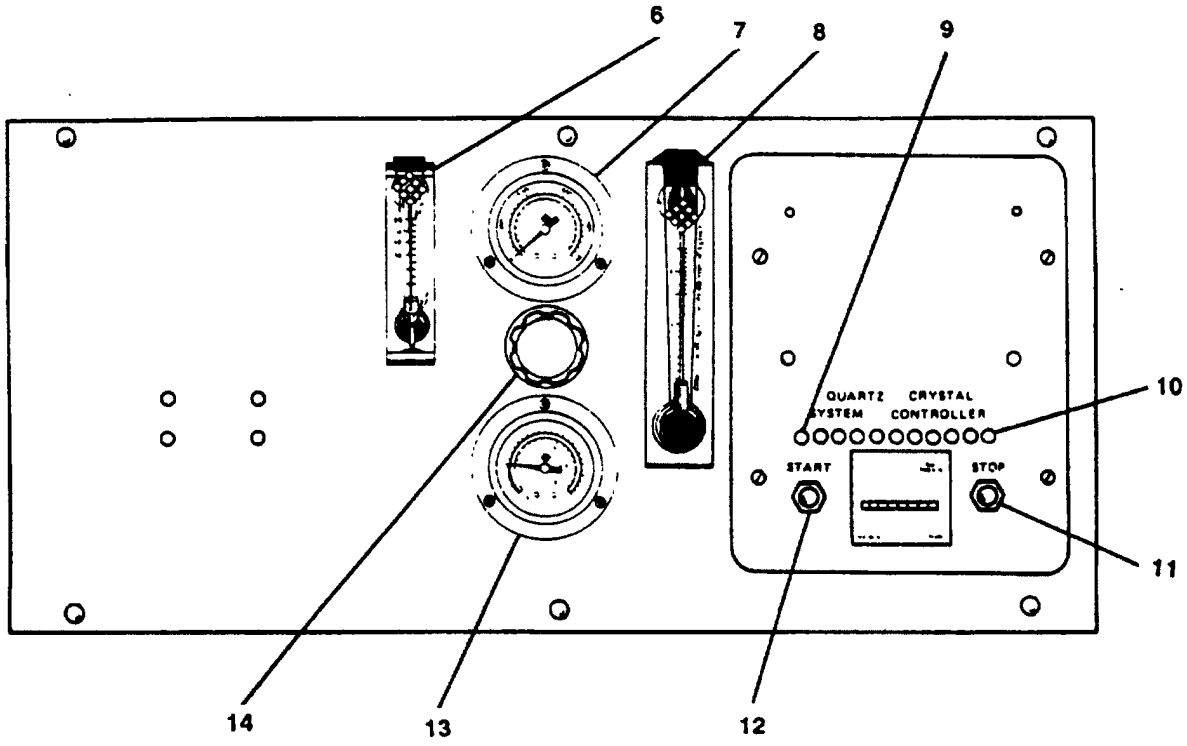


Figure 2-189. Reverse Osmosis Watermaker (Sheet 1 of 2).



1. BRINE & RINSE, CLEAN & STORE VALVE
2. STORE AND RINSE VALVE
3. MEDIA FILTER BACKFLUSH VALVE
4. FILTER CLEAN VALVE
5. CHEMICAL CIRCULATION PUMP VALVE
6. PRODUCT WATER FLOW METER
7. HIGH PRESSURE GAUGE
8. FEED WATER FLOW METER
9. GREEN INDICATOR LIGHT
10. RED INDICATOR LIGHT
11. STOP PUSHBUTTON
12. START PUSHBUTTON
13. PRESSURE GAUGE
14. BACK PRESSURE REGULATOR VALVE

Figure 2-189. Reverse Osmosis Watermaker (Sheet 2 of 2).

17 If feed source is inland waterway or other brackish water area, raise pressure slowly to point at which system produces product water quantity within specifications (between 25 and 42 gph) on product water flow meter (8).

CAUTION

Permanent damage to reverse osmosis membrane element will result if product water flow specifications are exceeded.

18 Check unit for leaks.

19 Ensure water flow is noticeable through the GPH product water flow meter (8).

NOTE

System may require up to 30 minutes to produce potable water.

The system produces potable water when the red indicator light goes out; and as salinity decreases, each succeeding indicator will light as the previous indicator goes out. Proceed to step 20 when the GREEN indicator light is on.

CAUTION

Do not produce greater than specified amount of product water.

Do not operate system with sea water above 800 psi.

Do not operate system with brackish water above 500 psi.

Have unit maintenance determine proper performance readings based upon current operating conditions.

20 Adjust BACK PRESSURE REGULATOR valve (14) slowly clockwise until 800 psi is indicated on high pressure gauge (7) or until 42 GPH is indicated on product water flow meter (6), whichever occurs first.

b. *Marine Sanitation Device Operation*.

(1) *Auxiliary machinery space no. 1 power panel no. 4 (Figure 2-183)*. Set following circuit breaker to ON position:

(a) MSD POWER (2).

(2) *Fill media tank*.

(a) Connect hose to potable water connection in AMS 1 (PW-41).

(b) On media tank (Figure 2-190) removing hex nuts, open inspection cover (1).

(c) Insert hose into media tank inspection opening.

(d) Open PW-41, BOW THRUSTER PUMP DRIVE FILL CONN (2, Figure 2-191).

(e) On wet well, observe sight gauge (3, Figure 2-192).

(f) When water level is approximately halfway up the sight gauge (3), close PW-41, BOW THRUSTER PUMP DRIVE FILL CONN (2, Figure 2-191).

(3) *Set up for operation*.

(a) Open SD-12, MSD OVBD DISCH, PUMP DISCH. (4).

(b) Open CONTACT TANK DISCHARGE valve (2, Figure 2-192).

(c) Open AIR LIFT valve (2, Figure 2-190).

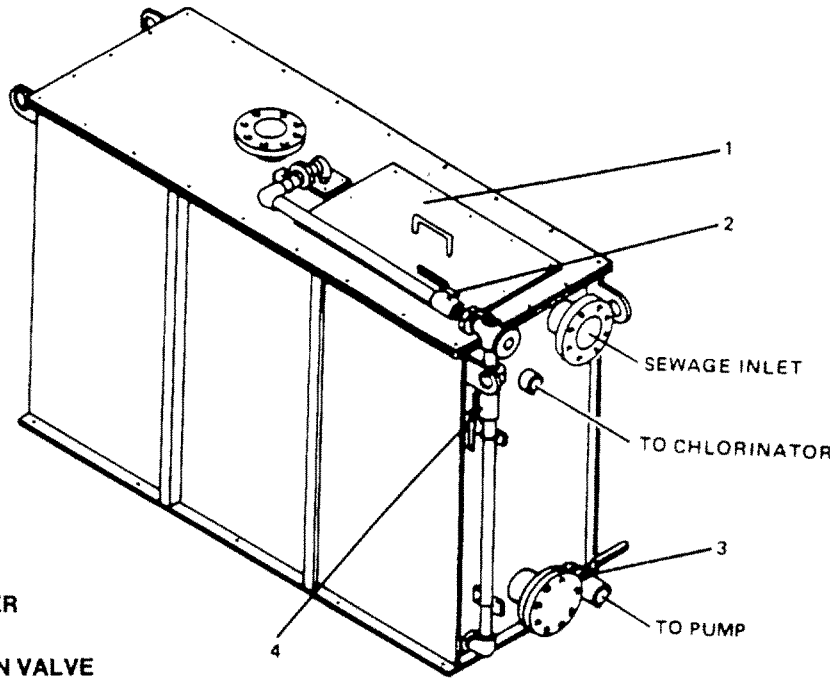
(4) *Start blower*. On MSD control panel (Figure 2-193):

(a) Set HAND-OFF-AUTO switch (6) to AUTO position.

(b) Press START pushbutton (4).

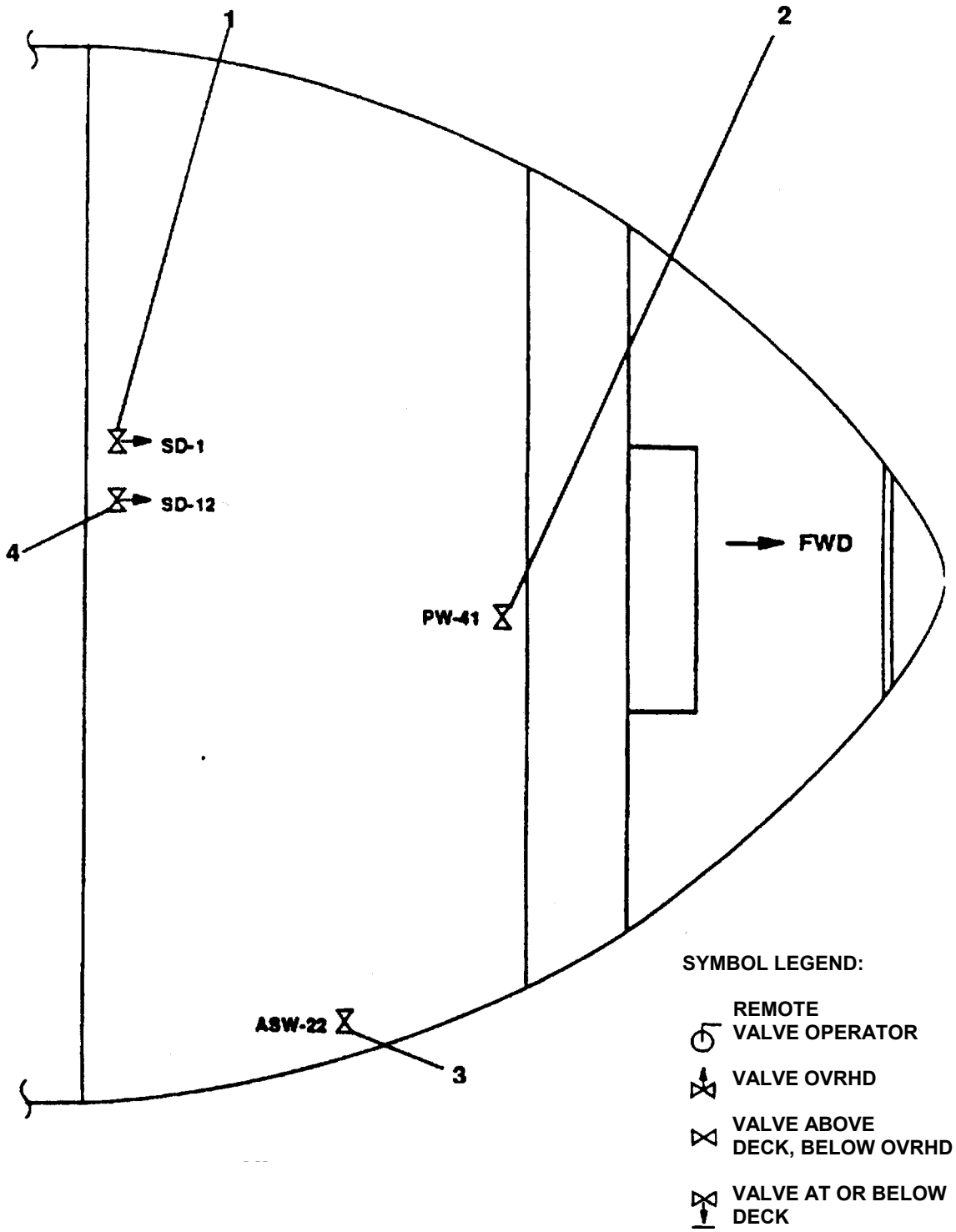
NOTE

BLOWER RUNNING light (2) will light.



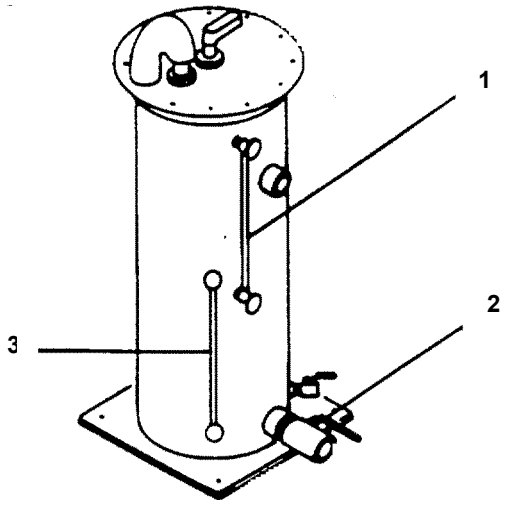
1. INSPECTION COVER
2. AIR LIFT VALVE
3. MEDIA TANK DRAIN VALVE
4. AIR SCOUR

Figure 2-190. Media Tank.



1. SD-1, SEW. INLET TO MSD
2. PW-41, BOW THRUSTER PUMP DRIVE
3. ASW-22, OVBD. DISCH. S.W. COOLING
4. SD-12, MSD OVBD. DISCH. PUMP DISCH.

Figure 2-191. Valve Locations.



1. SIGHT GAUGE
2. CONTACT TANK DISCHARGE VALVE
3. SIGHT GAUGE

Figure 2-192. Wet Well.

(5) Check pump operation.

(a) Gradually add water to media tank by opening PW41 BOW THRUSTER PUMP DRVE FILL CONN (2, Figure 2-191).

(b) Observe PUMP RUNNING light is lit (1, Figure 2-193) and monitor sight gauges (1 and 3, Figure 2-192) to ensure pump maintains level at approximately half of sight gauge (1).

NOTE

PUMP automatically discharges water overboard depending on the level in the wet tank.

(c) Close PW 41, BOW THRUSTER PUMP DRIVE FILL CONN (2, Figure 2-191).

(6) Charge downstream feedtube of tablet chlorinator.

WARNING

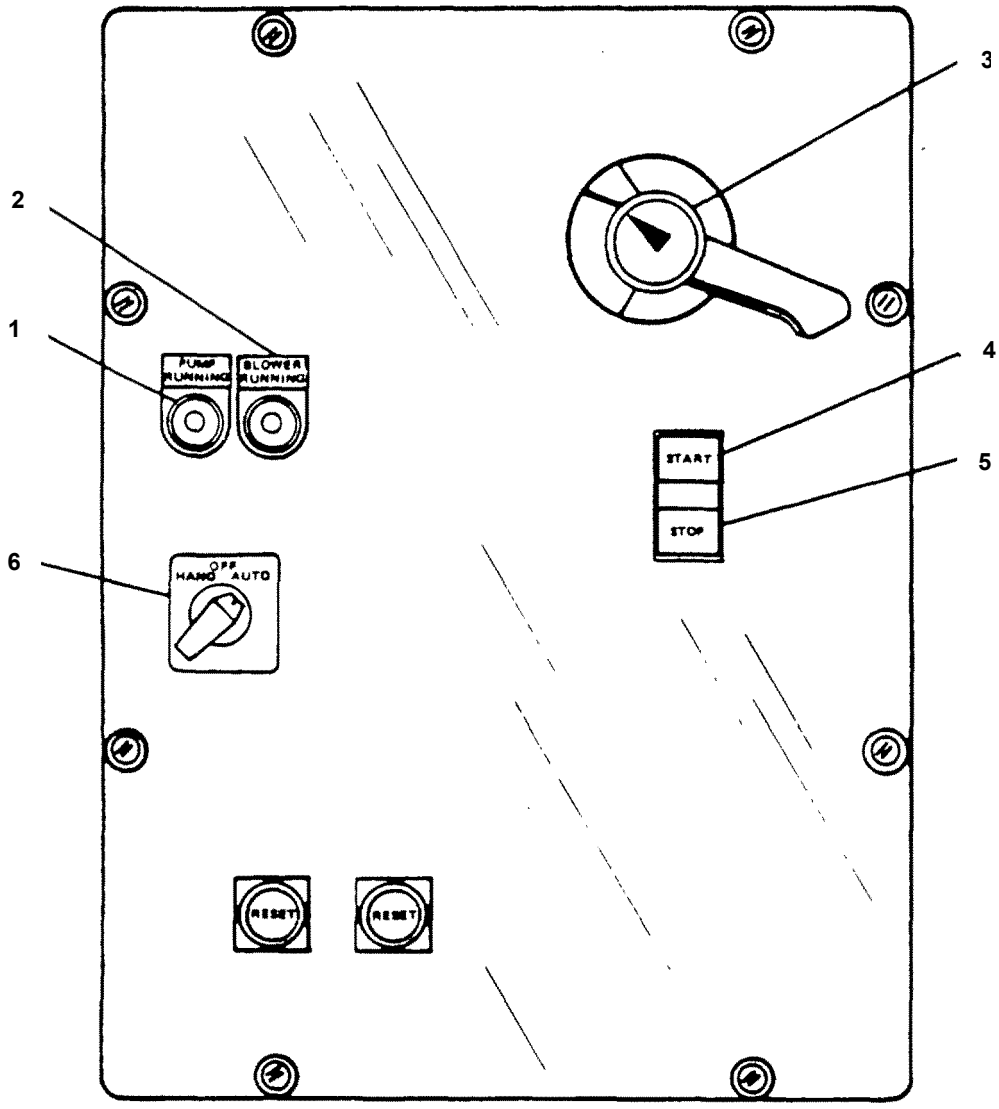
- **Ensure AMS 1 is properly ventilated before removing feedtubes. Chlorine fumes can cause serious injury or death.**
- **Wear rubber or plastic (not cloth) gloves to protect your hands and prevent burns.**

(a) Remove downstream feedtube by twisting feedtube (1, Figure 2-194).

(b) Fill feedtube (1) with chlorine tablets.

(c) Insert feedtube (1), slotted end down through collar (2) into chlorinator.

(d) Feedtube (1) must be pushed down until seated against bottom of chlorinator.



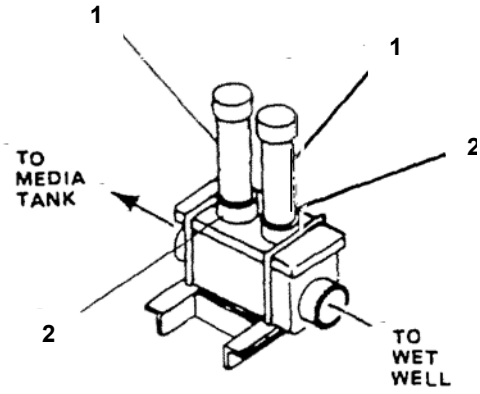
1. PUMP RUNNING INDICATOR
2. BLOWER RUNNING INDICATOR
3. ON-OFF SWITCH
4. START SWITCH
5. STOP SWITCH
6. HAND-OFF-AUTO SWITCH

Figure 2-193. Marine Sanitation Device Control Panel.

(7) *Disconnect Hose*.

(a) Remove hose from media tank.

(b) Disconnect hose from hose connection. Stow hose.



1. FEED TUBE
2. COLLAR

Figure 2-194. Chlorinator.

(8) *Start sewage processing*. Open SD-1, SEW. INLET TO MSD (1, Figure 2-191).

NOTE

It will take about 2 weeks for bacterial culture to grow to normal operating strength. During this period, system effluent may change from clear to cloudy. If bacterial culture has started properly, it will revert to clear.

(9) *Replace inspection cover*. Replace inspection cover (1, Figure 2-190) and secure with hex nuts.

c. Forced Air Environmental Control System

(1) *Enclosed operating station space*.

(a) *Engine room distribution panel no. 4 (Figure 2-187)*. Set UNIT AIR CONDITIONER R2-401 E.O.S. circuit breaker (1) to ON position.

(b) *Piping system (Figure 2-195)*.

1 Open GS-108, SW SPLY TO EOS AIR COND. (1).

2 Open ASW-22, OVBD DISCH. S.W COOLING (2).

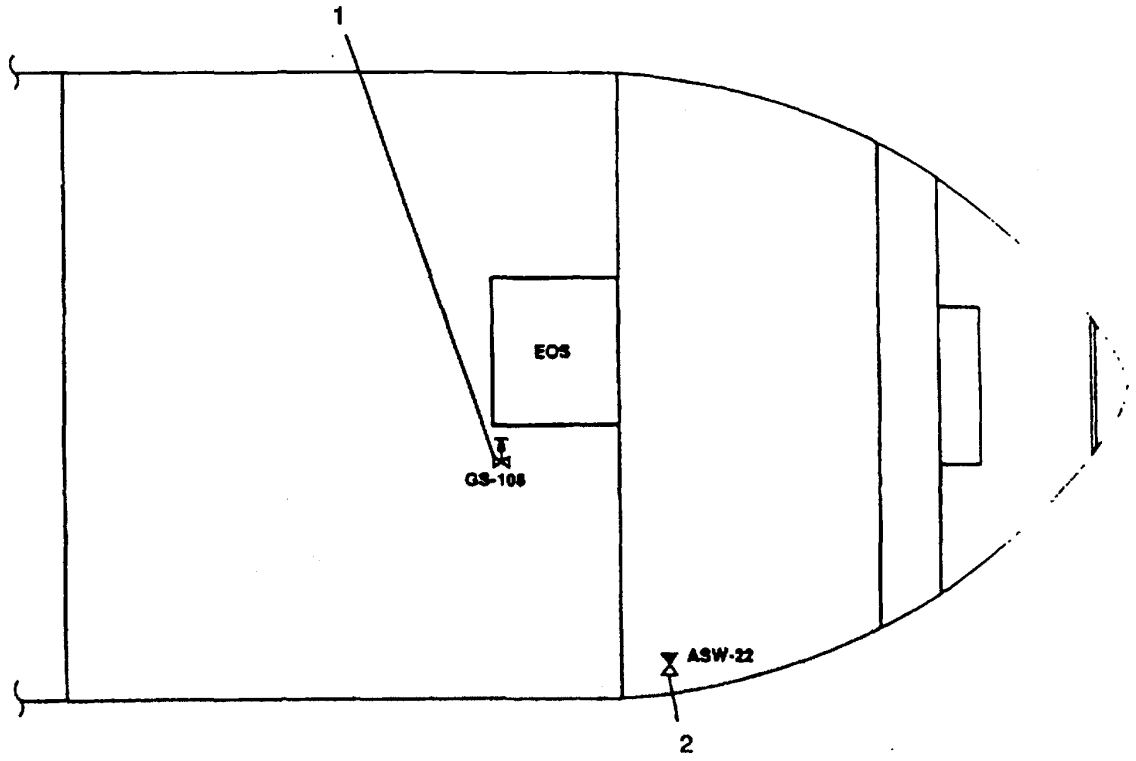
(c) *Marine room air conditioning unit (Figure 2-196)*.

1 Set THERMOSTAT (2) to desired setting.

2 Set FAN SPEED switch (3) to desired position.

3 Set CONTROL switch (1) to desired position.

(2) *Main switchboard*.



BELOW MAIN DECK

SYMBOL LEGEND:

REMOTE VALVE OPERATOR

VALVE OVRHD

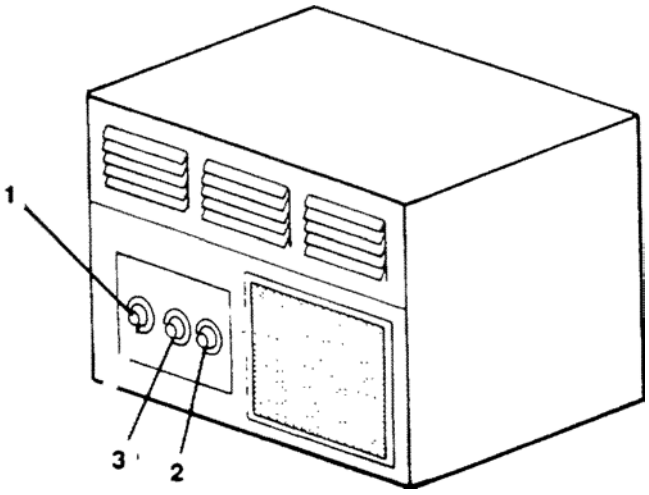
VALVE ABOVE DECK, BELOW OVRHD

VALVE AT OR BELOW DECK

1. GS-108, SW SPLY TO EOS AIR COND.
2. ASW-22, OVBD DISCH. S.W. COOLING

VALVE SYMBOL LEGEND IS LOCATED AT THE FRONT OF THIS MANUAL.

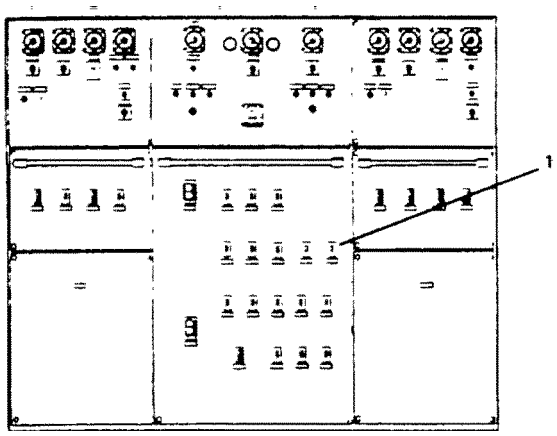
Figure 2-195. HVAC Valve Locations.



1. CONTROL SWITCH
2. THERMOSTAT
3. FAN SPEED SWITCH

Figure 2-196. Marine Room Air Conditioning Unit.

(a) Set MAIN DECK PWR. PNL. #3 circuit breaker (1, Figure 2-197) to ON position.



1. MAIN DECK PWR. PNL #3

Figure 2-197. Main Switchboard.

(3) Main deck.

(a) *Main deck power panel no. 3 (Figure 2-198)*. Set following circuit breakers to ON position.

1 PREHTR 1-23-4 (1)

2 PREHTR 1-25-2 (2)

3 CREW'S MESS FAN COIL UNIT R1-25-2 (4)

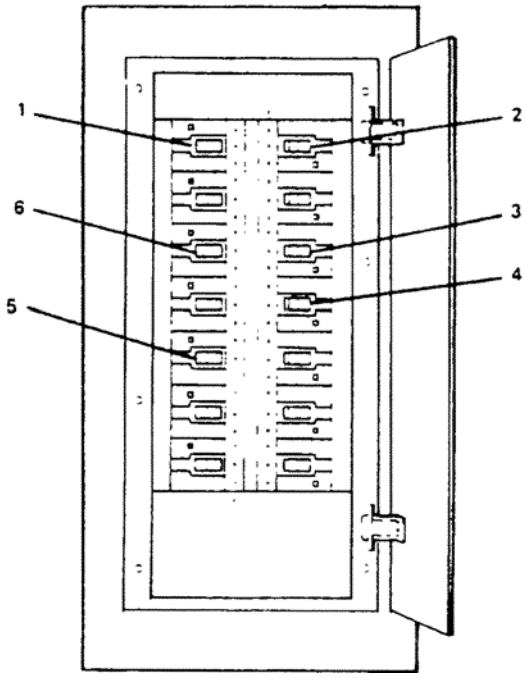


Figure 2-198. Main Deck Power Panel No. 3

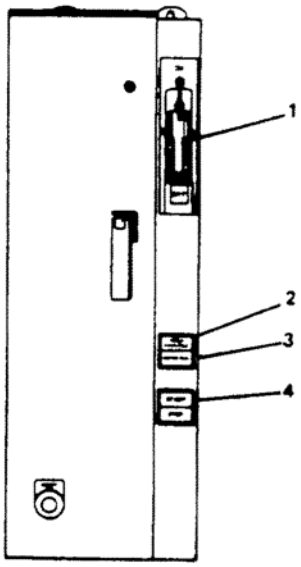
(b) *Crews mess - fan coil motor controller R1-25-2 (Figure 2-199)*.

1 Set ON-OFF switch (1) to ON

2 POWER AVAILABLE light (2) will light.

3 Press START switch (4).

4 MOTOR RUN light (3) will light.



1. ON-OFF SWITCH
2. POWER AVAILABLE LIGHT
3. MOTOR RUN LIGHT
4. START SWITCH

Figure 2-199. Fan Coil Motor Controller.

(c) Preheater (Figure 2-200). Set ON-OFF switch (1) to ON position.

(d) Reheater (Figure 2-201). Set ON-OFF switch (1) to ON position on all reheaters.

(4) 01 Level, 02 level, and pilothouse

(a) Main deck distribution panel no. 3 (Figure 2-186). Set FUSE BOX NO. 1 01 02 LVL REHTRS circuit breaker (2) to ON position.

(b) Main deck power panel no. 3 (Figure 2-198). Set the following circuit breakers to ON position:

1 PRHTR 01-31-2(6)

2 RHTR 01-32-2(3)

3 01, 02 & 03 LEVEL FAN COIL UNIT R01-32-2 (5).

(c) 01, 02. and 03 Level fan coil R01-32-2 motor controller (Figure 2-199).

1 Set ON-OFF switch (1) to ON position.

2 POWER AVAILABLE indicator (2) will light.

3 Press START switch (4).

4 MOTOR RUN indicator (3) will light.

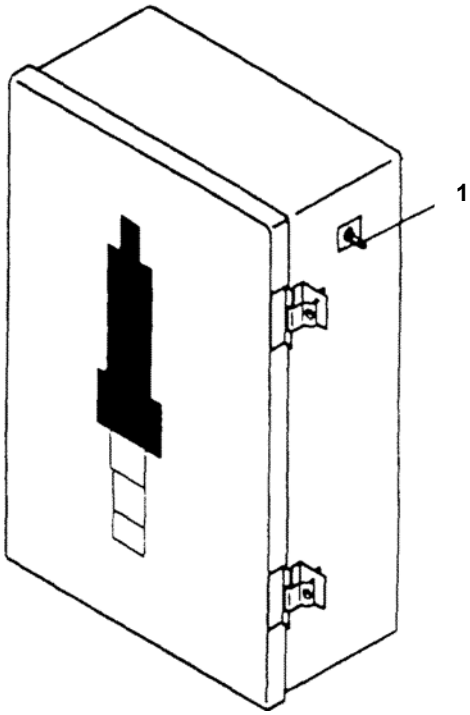
(d) Preheater (Figure 2-200). Set ON-OFF switch (1) to ON position.

(e) Reheater (Figure 2-201). Set ON-OFF switch (1) to ON position on all reheaters.

d. Air Conditioning Condensing Unit Operation

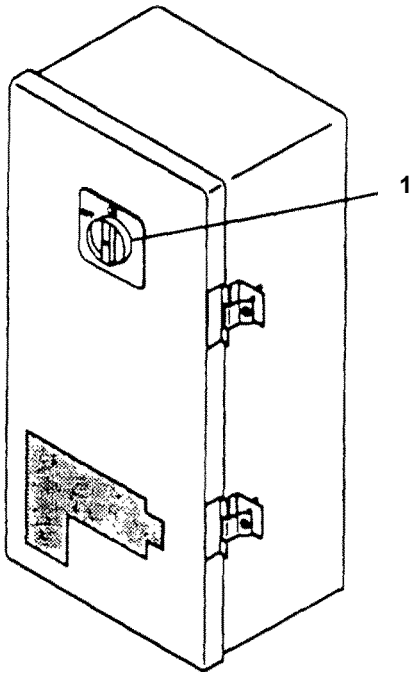
(1) Align electric system.

(a) Main power disconnect switch (Figure 2-202). Set main power disconnect (1) and power switch (3) to ON position on both condensing units.



1. ON-OFF SWITCH

Figure 2-200. Preheater.



1. ON-OFF SWITCH

Figure 2-201. Reheater.

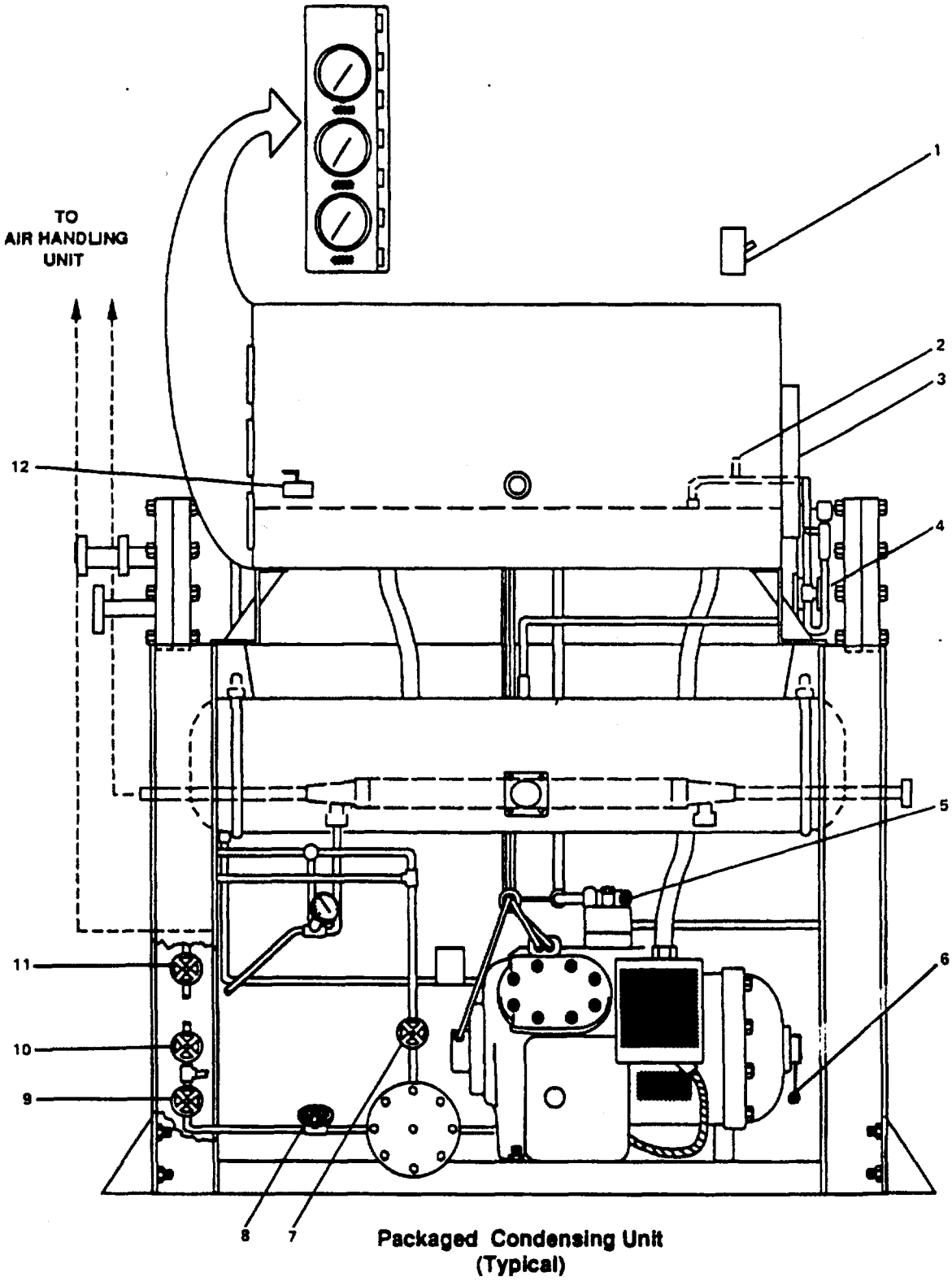


Figure 2-202. Air Conditioning Condensing Unit (Sheet 1 of 2).

1. MAIN POWER DISCONNECT
2. PURGE
3. POWER SWITCH
4. EQUALIZING LINE VALVE
5. COMPRESSOR DISCHARGE
6. COMPRESSOR SUCTION
7. DEHYDRATOR OUTLET
8. CHARGE AND DRAIN
9. DEHYDRATOR INLET
10. DEHYDRATOR BY-PASS
11. CONDENSER OUTLET
12. WATER REGULATOR VALVE ACTUATING LINE

Figure 2-202. Air Conditioning Condensing Unit (Sheet 2 of 2).

(b) *Auxiliary machinery space no. 2 power panel no. 5* (Figure *2-203)*. Set circuit breaker, corresponding to condensing unit selected, to ON:

1 #1 AIR CONDITIONING CONDENSING UNIT (4).

2 #2 AIR CONDITIONING CONDENSING UNIT (2).

(c) *Engine room distribution panel no. 4 (Figure 2-187)*. Set No. 1 & No. 2 A/C REFRIGERATION CONTROL POWER circuit breaker (2) to ON.

CAUTION

Align condenser cooling water piping system before starting refrigeration plant. Damage to the plant can occur.

(2) *Align general service piping system (Figure 2-204)*. Open/close the following valves:

(a) GS-33, A/C COND NO. 1 SPLY and GS-34, A/C COND NO. 2 SPLY (4).

(b) GS-36 and GS-37, WTR RGLTR COV (5).

(c) GS-69 and GS-70, WTR RGLTR COV (3).

(d) Close GS-72 and GS-83, BYP WTR RGLTR (1).

NOTE

Before starting compressor, crankcase heater must be energized for 24 hours. Energizing heater for this period of time should drive all refrigerant from oil.

CAUTION

When starting compressor, avoid rapid pump-down to ensure oil is not carried off with refrigerant. If oil is pulled from sump, ensure oil pressure is a minimum of 16 psig above suction pressure. If pressure drops below, stop compressor and add oil temporarily. Added oil must be later removed when oil in sight glass is too high. If this situation occurs, refer to unit maintenance. Low oil pressure or low oil level could damage compressor.

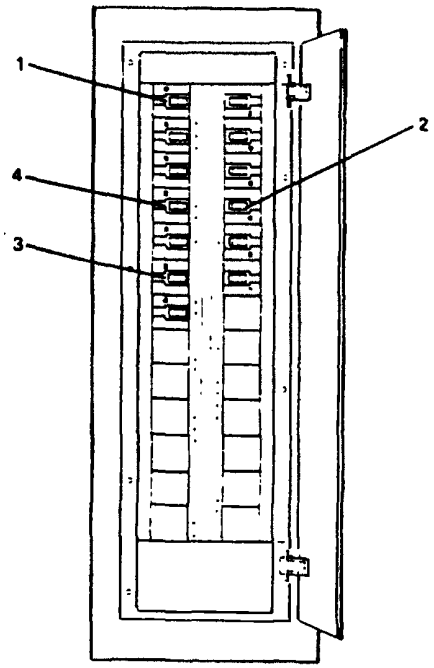


Figure 2-203. Auxiliary Machinery Space No. 2 Power Panel No. 5.

(3) *Align refrigerant piping system (Figure 2-202)*.

NOTE

Use refrigeration ratchet wrench to open/close valves.

(a) Open COMPRESSOR DISCHARGE valve (5).

(b) Close COMPRESSOR SUCTION valve (6).

(c) Open CONDENSER OUTLET valve (11).

(d) Open DEHYDRATOR OUTLET valve (7).

(e) Close DEHYDRATOR BYPASS valve (10).

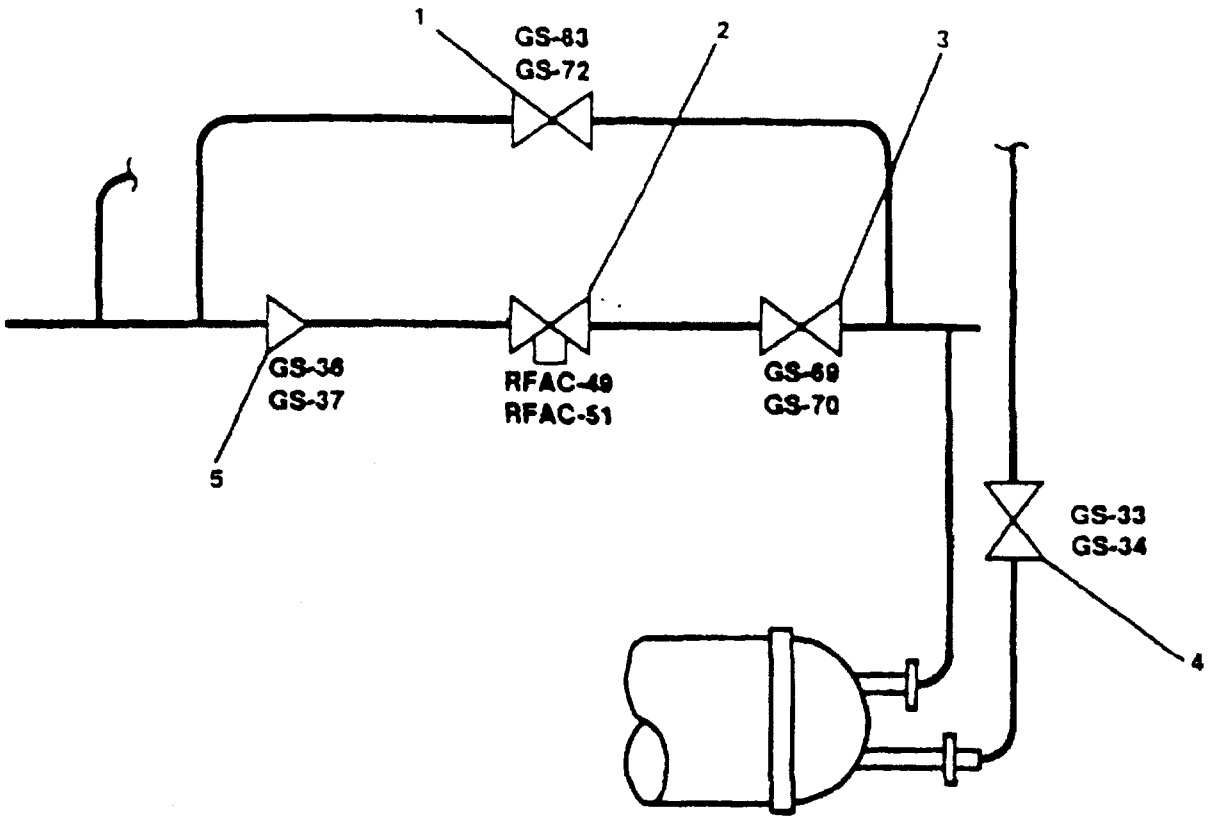
(f) Open DEHYDRATOR INLET valve (9).

(g) Open EQUALIZING LINE valve (4).

(h) Close PURGE valve (2).

(i) Close CHARGE AND DRAIN valve (8).

(j) Open WATER REGULATOR VALVE ACTUATING LINE valve (12).



SYMBOL LEGEND:

REMOTE VALVE OPERATOR

VALVE OVRHD

VALVE ABOVE DECK, BELOW OVRHD

VALVE AT OR BELOW DECK

1. GS-83, BYP WTR RGLTR NO. 2
   GS-72, BYP WTR RGLTR NO. 1
2. RFAC-49, WTR RGLTR
   RFAC-51, WTR RGLTR
3. GS-69, WTR RGLTR COV NO. 2
   GS-70, WTR RGLTR COV NO. 1
4. GS-33, A/C COND NO. 1 SPLY
   GS-34, A/C COND NO. 2 SPLY
5. GS-36, WTR RGLTR CVR NO. 2
   GS-37, WTR RGLTR CVR NO. 1

Figure 2-204. Condensing Cooling Water Valve Locations.

(4) *Align refrigerant piping system (Figure 2-205).*

(a) Close RFAC-39, LIQUID LINE CRSVR CO (12).

(b) Close RFAC-41 SUCT. LINE CRSVR CO (11).

NOTE

Ensure fan coil units are running.

(c) Open RFAC-29, EQL LINE (5).

(d) Open RFAC-30, EQL LINE (6).

(e) Open RFAC-33 and RFAC-32, TXV/STNR/LLSV COV (1 and 4).

(f) Open RFAC-36 and RFAC-37, TXV/ STNR/LLSV COV (7 and 9).

(g) Open RFAC-38, 4 COIL SUCT. COV (3).

(h) Open RFAC-42, 8 COIL SUCT. COV (10).

(i) Open RFAC-34 and RFAC-35, TXV COV (17 and 13).

(j) Open RFAC-60, EQL LINE (16).

(k) Open RFAC-40, COIL SUCT COV (18).

CAUTION

If condenser water cooling system has been drained, have unit maintenance purge air from system. Air in cooling system will reduce cooling efficiency and could result in damage to compressor.

To prevent oil return problems and possible damage to compressor, do not operate both condensing units at the same time with RFAC-39, LIQUID LINE CRSVR CO and RFAC-41, SUCT. LINE CRSVR COV valves open.

(5) *Start compressor (Figure 2-202).*

(a) Open COMPRESSOR SUCTION valve (6) approximately one full turn.

(b) Immediately slowly continue to open COMPRESSION SUCTION valve (6) as suction pressure is reduced.

CAUTION

Open COMPRESSION SUCTION valve slowly to prevent rapid pumping down of suction pressure side which could cause oil foaming and result in pumping of oil from compressor crankcase. Damage to compressor could result from lack of lubrication.

CAUTION

Condenser water temperature should read in NORMAL operating range.

The following gauges should also be in the NORMAL operating range:

Liquid line temperature gauge
Suction pressure gauge
Suction temperature gauge
Discharge pressure gauge
Oil pressure gauge

NOTE

Oil pressure MUST be 20 psi above suction pressure.

(c) Observe compressor operation for 5 minutes.

(d) If there is no evidence of liquid refrigerant, return to compressor, open COMPRESSOR SUCTION valve (6) wide.

(e) When there is evidence of liquid refrigerant, return to compressor, adjust COMPRESSOR SUCTION valve (6) until proper suction pressure (2.3 to 2.4 psig) is indicated on SUCTION gauge.

NOTE

Liquid refrigerant return to compressor will be indicated by a sudden drop in suction temperature and rapid fluctuation in suction pressure.

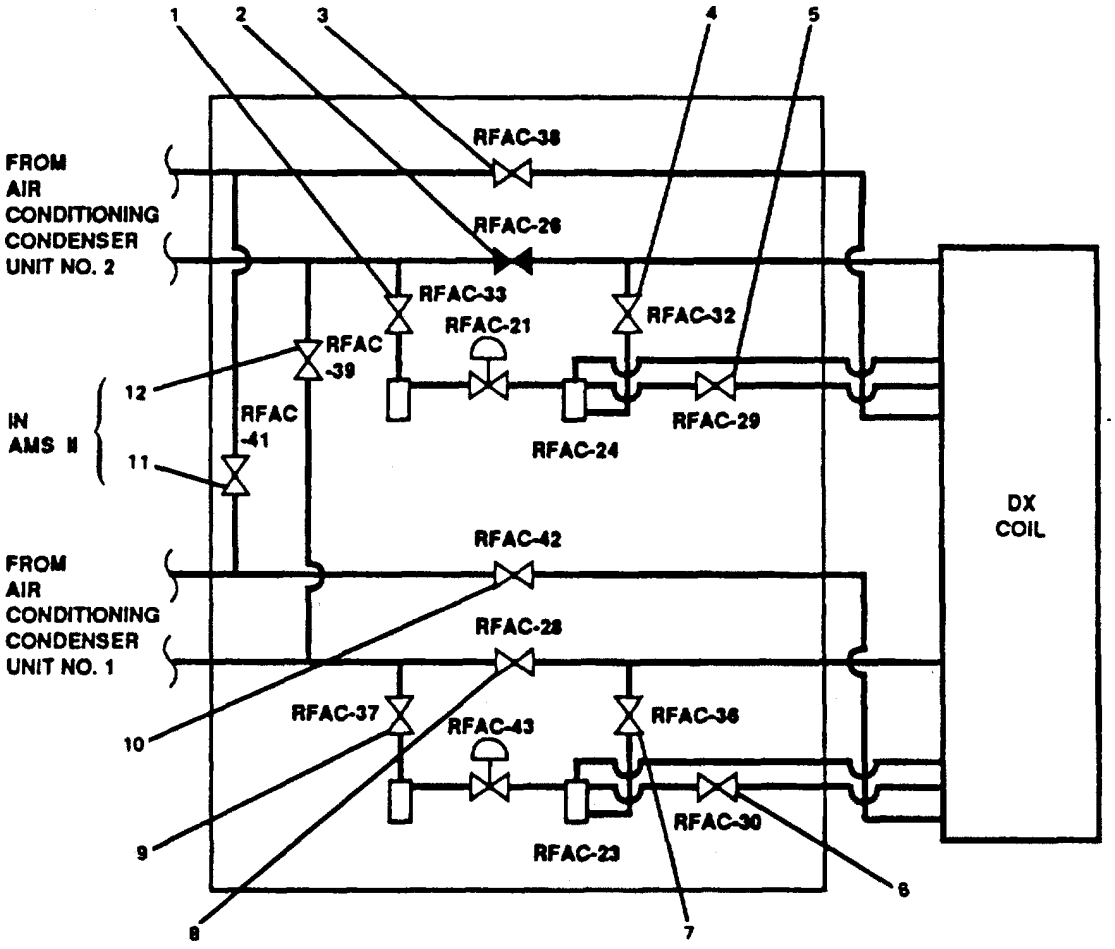
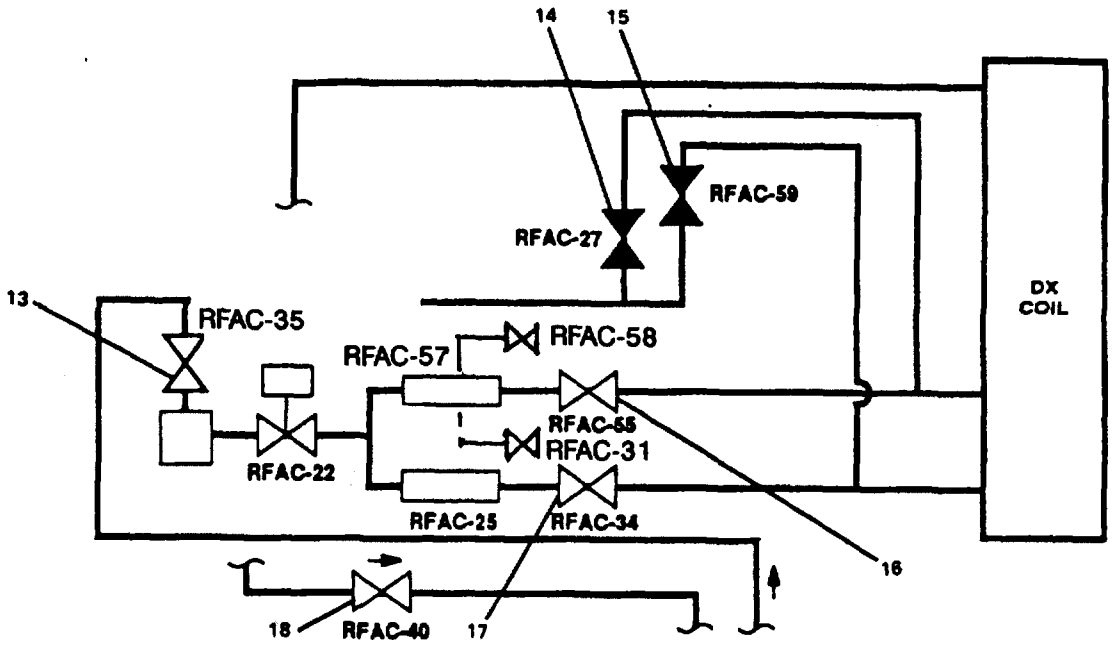


Figure 2-205. Air Condition Refrigerant Piping Valve Locations (Sheet 1 of 2).



01 LVL FAN ROOM

SYMBOL LEGEND:

REMOTE VALVE OPERATOR

VALVE OVRHD

VALVE ABOVE DECK, BELOW OVRHD

VALVE AT OR BELOW DECK

1. RFAC-33, TXV/STNR/LLSV COV, R1-25-2,4 COIL
2. RFAC-26, HAND EXP
3. RFAC-38, 4 COIL SUCT. COV, R1-25-2
4. RFAC-32, TXV/STNR/LLSV COV, R1-25-2, 4 COIL
5. RFAC-29, EQL LINE
6. RFAC-30, EQL LINE
7. RFAC-36, TXV/STNR/LLSV COV, R1-25-2, 8 COIL
8. RFAC-28, HAND EXP
9. RFAC-37, TXV/STNR/LLSV COV, R1-25-2, 8 COIL
10. RFAC-42, 8 COIL SUCT. COV, R1-25-2 (OVERHEAD)
11. RFAC-41, SUCT. LINE CRSVR CO
12. RFAC-39, LIQUID LINE CRSVR CO
13. RFAC-35, TXV COV, R01-32-2
14. RFAC-27, HAND EXP
15. RFAC-59, HAND EXP
16. RFAC-55, EQL LINE
17. RFAC-34, TXV COV, R01-32-2
18. RFAC-40, COIL SUCT.COV, R01-32-2

Figure 2-205. Air Condition Refrigerant Piping Valve Locations (Sheet 2 of 2).

CAUTION

If the suction temperature and oil pressure do not stabilize or if compressor develops a knock, stop compressor by placing power switch in OFF position and notify unit maintenance. Continued operation could damage compressor.

(6) *Set thermostats*. Set thermostat in each compartment to desired setting.

e. *Convection Heaters*.

(1) *01 level distribution panel no. 2 (Figure 2-206)*. Set FUSE BOX NO. 2 01-02 LVL CONVHTR circuit breaker (1) to ON position.

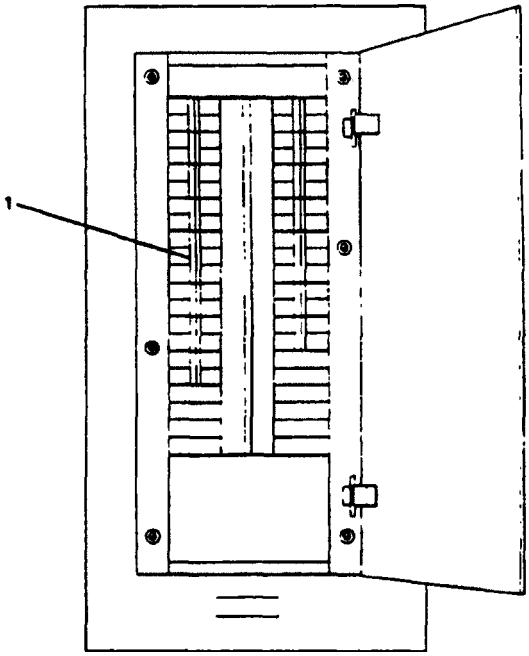


Figure 2-206. 01 Level Distribution Panel No. 2.

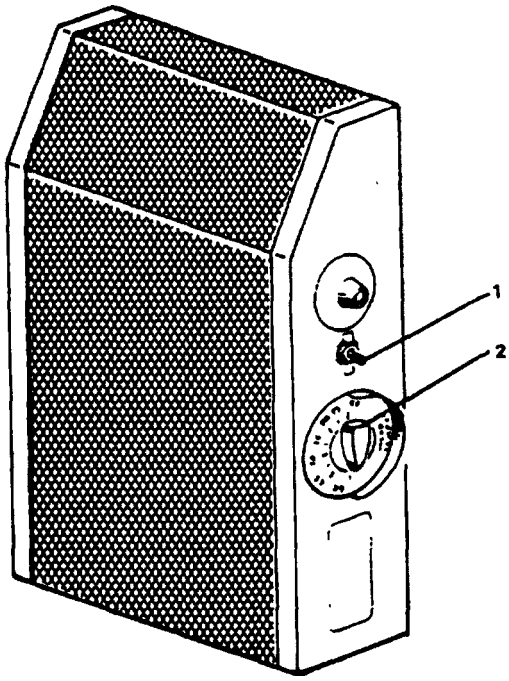
(2) *Start convection heaters (Figure 2-207)*.

(a) Set power switch (1) to ON position.

(b) Set thermostat (2) to desired temperature.

NOTE

Heater will cycle automatically to maintain temperature set on thermostat.



1. POWER SWITCH
2. THERMOSTAT

Figure 2-207. Convection Heater.

f. *Space Heaters*.

(1) Engine room distribution panel no. 4 (Figure 2-208). Set following circuit breakers to ON position:

(a) #1 SSDG SPACE HEATER (3).

(b) #2 SSDG SPACE HEATER (2).

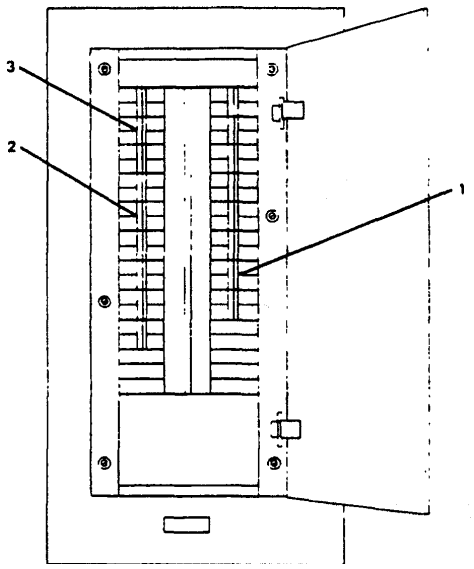


Figure 2-208. Engine Room Distribution Panel No. 4.

(2) *Engine room power panel no. 1 (Figure 2-209)*. Set ENG. RM UNIT HTR circuit breaker (1) to ON position.

(3) *Auxiliary machinery space no. 1 power panel no. 4 (Figure 2-210)*. Set following circuit breakers to ON position:

(a) BOW THRUSTER ROOM UNIT HTR (1).

(b) AMS-1 UNIT HTR (2).

(4) Auxiliary machinery space no. 2 power panel no. 5 (Figure 2-203). Set following circuit breakers to ON position:

(a) AMS II UNIT HTR (1).

(b) TOW GEAR LKR UNIT HTR (3).

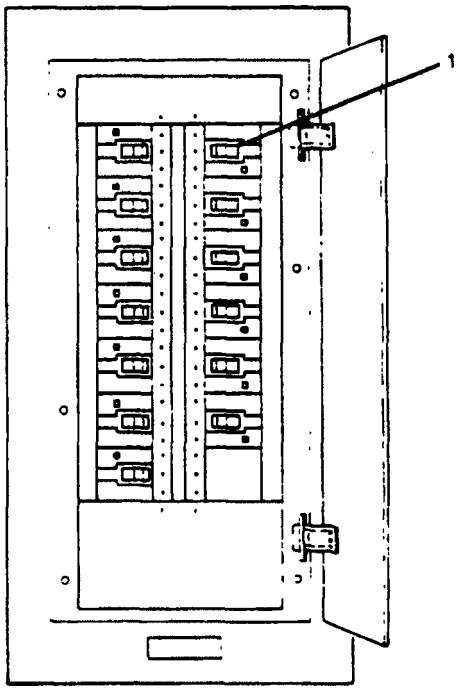


Figure 2-209. Engine Room Power Panel No. 1.

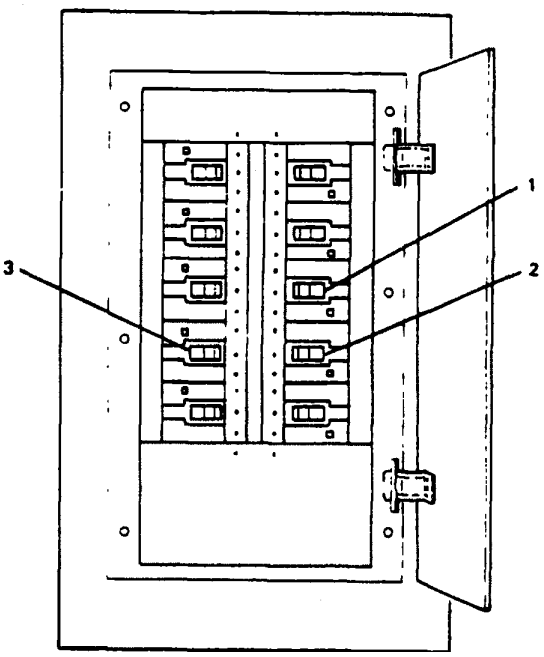


Figure 2-210. Auxiliary Machinery Space No. 1 Power Panel No. 4.

(c) Start space heaters (Figure 2-211).

1 Set thermostat (2) to desired temperature.

NOTE

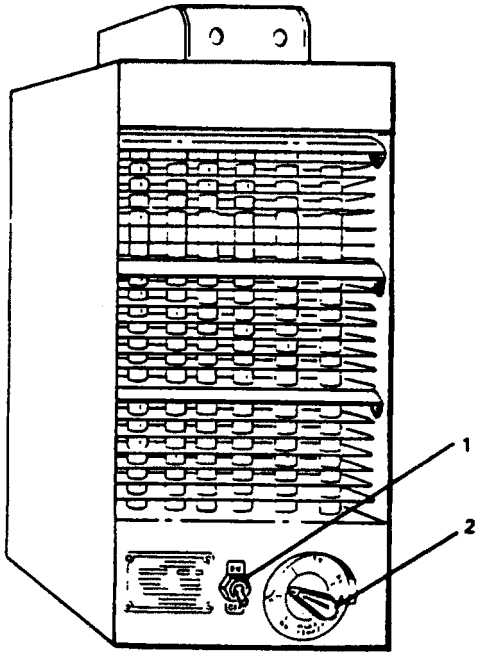
Heater will cycle automatically to maintain temperature set on thermostat.

2 Set ON-OFF switch (1) to ON position.

g. *Ventilation.*

NOTE

Operating instructions for galley ventilator hood and associated equipment is contained in paragraph 2-33.



1. ON-OFF SWITCH
2. THERMOSTAT

Figure 2-211. Space Heater.

(1) Boatswain's storeroom, paint locker and laundry.

(a) *Main switchboard (Figure 2-212).* Set MAIN DECK PWR PNL #3 circuit breaker (1) to ON position.

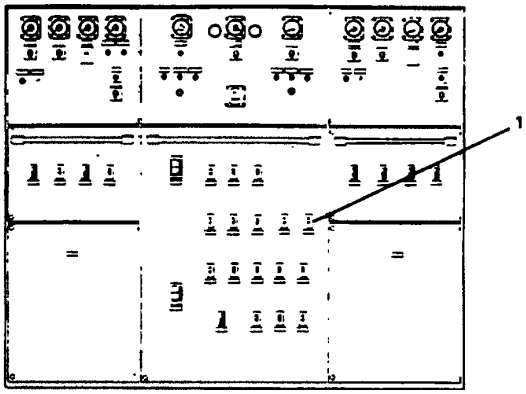


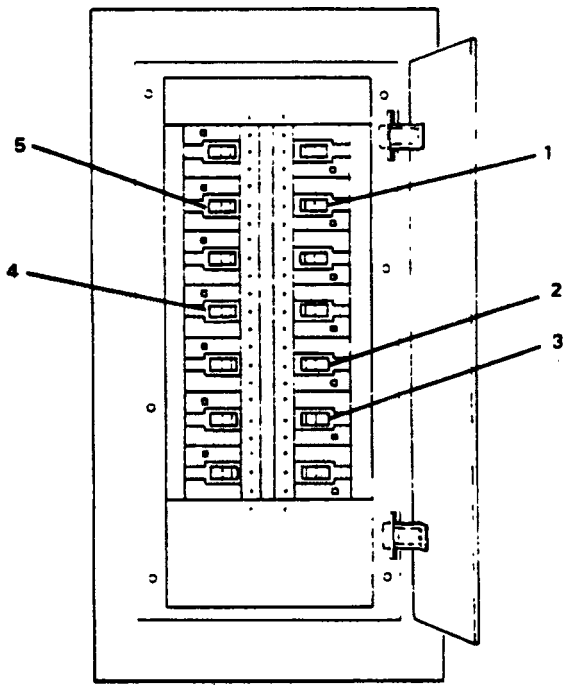
Figure 2-212. Main Switchboard.

(b) *Main deck power panel no. 3 (Figure 2-213).* Set following circuit breakers to ON position:

1 PREHTR 1-57-1 (1).

2 PAINT LOCKER EXHAUST FAN(2).

3 BOSUN STORE ROOM SUPPLY FAN S1-58-1 (4).



1. MAIN DECK PWR PNL #3

Figure 2-213. Main Deck Power Panel No. 3.

(c) *Bosun store room supply fan motor controller (Figure 2-214)*.

1 Set ON-OFF switch (1) to ON position.

2 POWER AVAILABLE indicator (2) will light.

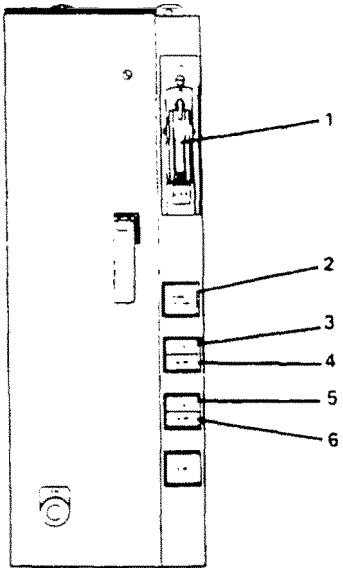
3 To select desired speed, press either FAST (5) or SLOW (6) switch.

4 Depending on speed selected, either FAST (3) or SLOW (4) indicator will light.

(d) *Paint locker and storeroom exhaust fan motor controller (Figure 2-214)*.

1 Set ON-OFF switch (1) to ON position.

2 POWER AVAILABLE indicator (2) will light.



1. ON-OFF SWITCH
2. POWER AVAILABLE INDICATOR
3. FAST SWITCH
4. SLOW SWITCH
5. FAST INDICATOR
6. SLOW INDICATOR

Figure 2-214. Supply and Exhaust Fan Motor Controller.

3 To select desired speed, press either FAST (5) or SLOW (6) switch.

4 Depending on speed selected, either FAST (3) or SLOW (4) indicator will light.

(e) *Boatswain's storeroom preheater*.

1 Set ON-OFF switch (1, Figure 2-200) to ON position.

2 Set ON-OFF switch (1, Figure 2-201) to ON position.

(2) *Auxiliary machinery space no. 1*.

(a) *Auxiliary machinery space no. 1 power panel no. 4 (Figure 2-210)*. Set AMS I SUPPLY FAN (S01-45-2) circuit breaker (3) to ON position.

(b) *Auxiliary machinery space no. 1 supply fan motor controller (Figure 2-214)*.

1 Set ON-OFF switch (1) to ON position.

2 POWER AVAILABLE indicator (2) will light.

3 To select desired speed, press either FAST (5) or SLOW (6) switch.

4 Depending on speed selected, either FAST (3) or SLOW (4) indicator will light.

(3) *Auxiliary machinery space no. 2*.

(a) *Main deck power panel no. 3 (Figure 2-213)*. Set AMS II SUPPLY FAN (1-22-2) circuit breaker (5) to ON position.

(b) *Auxiliary machinery space no. 2 supply fan motor controller (Figure 2-214)*.

1 Set ON-OFF switch (1) to ON position.

2 POWER AVAILABLE indicator (2) will light.

3 To select desired speed, press either FAST (5) or SLOW (6) switch.

4 Depending on speed selected, either FAST (3) or SLOW (4) indicator will light.

(4) *Workshop exhaust fan.*

(a) *Engine room distribution panel no. 4 (Figure 2-208).*

1 Set WORKSHOP EXHAUST FAN E2-16-1 circuit breaker (1) to ON position.

2 POWER AVAILABLE indicator (3, Figure 2-215) will light.

(b) *Workshop exhaust fan motor controller (Figure 2-215).*

1 Set ON-OFF switch (1) to ON position.

2 MOTOR RUN indicator (2) will light.

(5) Sanitary spaces exhaust fan.

(a) *Main deck power panel no. 3 (Figure 2-213).* Set SANITARY SPACE EXHAUST FAN (E01-442) circuit breaker (3) to ON position.

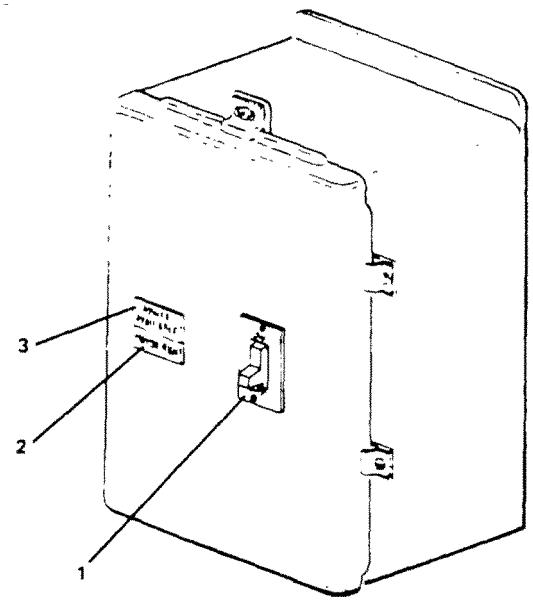
(b) *Sanitary space exhaust fan motor controller (Figure 2-216).*

1 Set ON-OFF switch (1) to ON position.

2 POWER AVAILABLE indicator (2) will light.

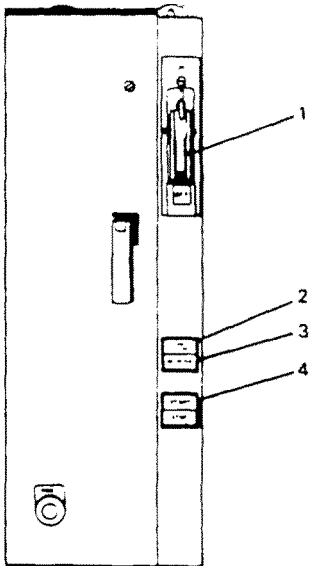
3 Press START switch (4).

4 MOTOR RUN indicator (3) will light.



1. ON-OFF SWITCH
2. MOTOR RUN INDICATOR
3. POWER AVAILABLE INDICATOR

Figure 2-215. Workshop Exhaust Fan Motor Controller.



1. ON-OFF SWITCH
2. POWER AVAILABLE INDICATOR
3. MOTOR RUN INDICATOR
4. START SWITCH

Figure 2-216. Sanitary Space Exhaust Fan Motor Controller.

2-10. Gyrocompass System.

a. *Align Electrical System*. On pilothouse emergency distribution panel (Figure 2-217), set following circuit breakers to ON position:

(1) MK 37 GYRO XMTR (1).

(2) MK 27 GYRO COMPASS (2).

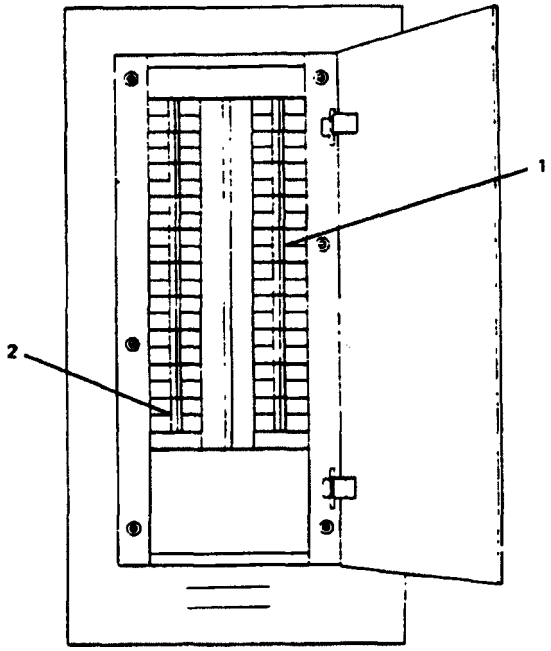


Figure 2-217. Pilothouse Emergency Distribution Panel.

b. *Gyrocompass Mk 27 Mod 1*.

NOTE

Gyrocompass startup procedure should begin at least 2 hours before the compass is to be used to allow proper settling. The compass should also have been stopped for a minimum of 1/2 hour before restarting.

(1) *Gyrocompass Mk 27 Mod 1 electronic control panel (Figure 2-218)*.

(a) Set RPTR switch (3) to OFF position.

NOTE

Compass will slew rapidly if the gyro is uncaged.

(b) Set SELECTOR switch (6) to SLEW position.

NOTE

Compass will slew rapidly if the gyro is uncaged.

(c) Observe if CAGED indicator (2) is lit. If not lit, press CAGED BUTTON (9) on top of binnacle to cage gyro, and wait 5 minutes for ballistic fluid to stabilize.

NOTE

In the (+) position, the card rotates counterclockwise; in the (-) position, the card rotates clockwise.

(d) To slew heading, use TILT/AZIMUTH switch (7) to rotate the compass card to approximate ship heading.

(e) Set SELECTOR switch (6) to START position. Wait 10 minutes before proceeding.

(f) Press CAGED BUTTON (9) on top of binnacle. CAGED indicator (2) will go out.

(g) Set SELECTOR switch (6) to MANUAL LEVEL position.

(h) Use TILT/AZIMUTH switch (7) to level gyro. Gyro is level when LEVEL METER (4) indicates zero.

(i) Set SELECTOR switch (6) to RUN position.

(j) Set N-S switch (1) as required.

(k) Set LATITUDE control (8) to ship latitude.

(l) Set POWER FAILURE ALARM UNIT ON-OFF switch to ON position.

NOTE

Compass repeaters are located above the pilothouse console, starboard wing of pilothouse, port wing of pilothouse, flying bridge of pilothouse, and steering compartment.

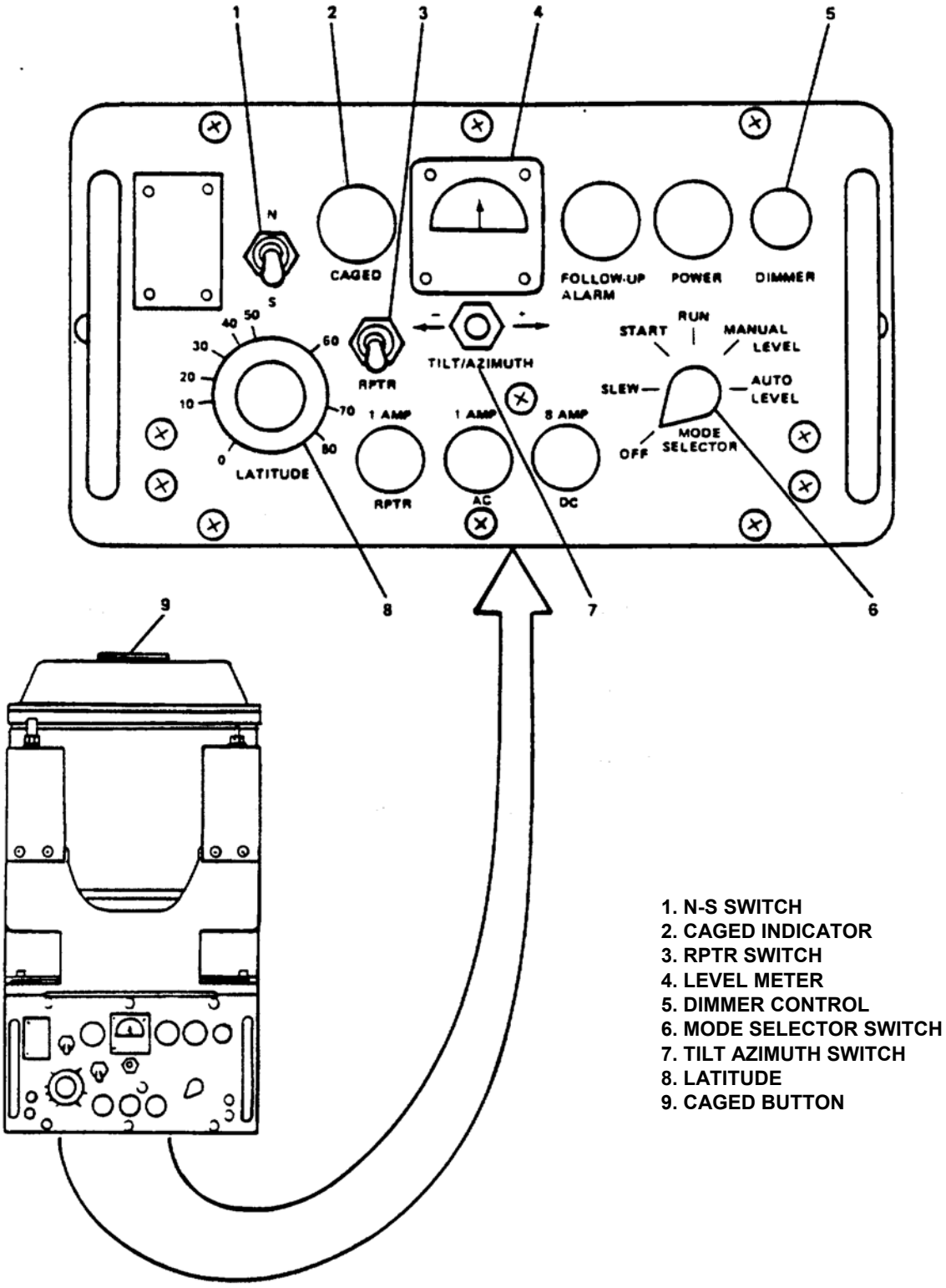


Figure 2-218. Gyrocompass Mk 27 Mod 1 Electronic Control Panel.

(2) *Standard bearing repeaters (Figure 2-219)*.

CAUTION

Do not operate SYNCHRONIZER KNOB when MK 37 MODE TRANSMISSION UNIT is energized. Damage to the repeater could result.

NOTE

Repeat for all REPEATERS.

(a) Press and hold SYNCHRONIZER KNOB (2) to engage gear train.

(b) Rotate REPEATER CARD (1) to gyro compass heading.

(c) Release SYNCHRONIZER KNOB (2).

(3) *Open scale compass repeater (Figure 2-220)*.

CAUTION

Do not operate SYNCHRONIZER KNOB when ON-OFF switch is in ON position. Damage to the repeater could result.

NOTE

Repeat for all repeaters.

(a) Place ON-OFF switch (3) in OFF position.

(b) Press and hold SYNCHRONIZER KNOB (1) to engage gear train.

(c) Rotate REPEATER CARD (2) to gyrocompass heading.

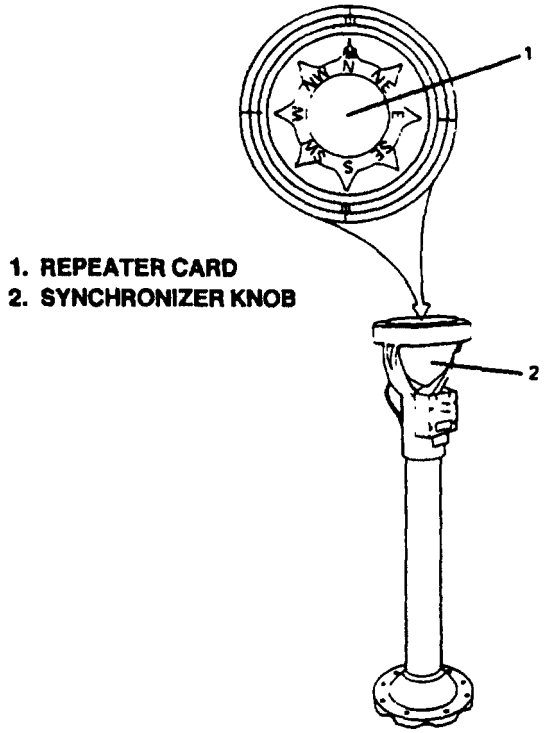
(d) Release SYNCHRONIZER KNOB (1).

(e) Set ON-OFF switch (3) to ON position.

(4) *Gyrocompass Mk 27 Mod 1 electronic control panel (Figure 2-218)*.

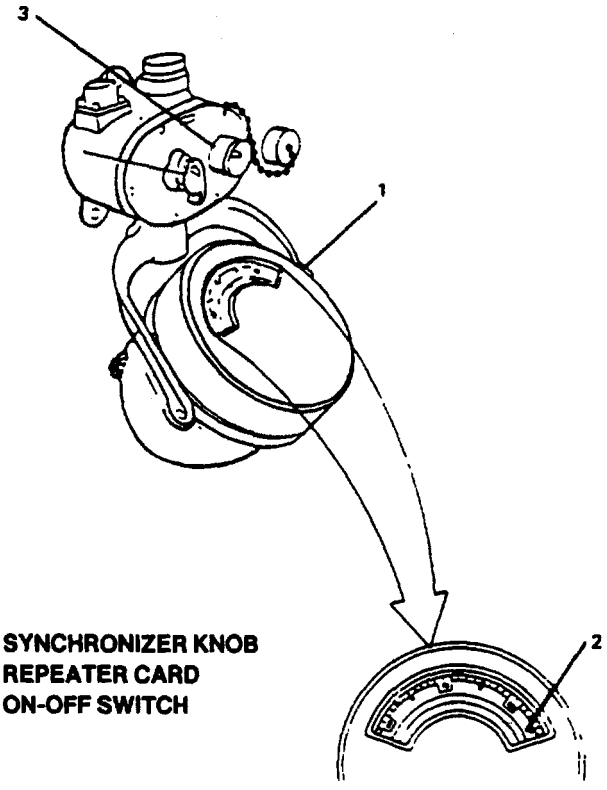
(a) Set RPTR switch (3) to ON position.

(b) Adjust DIMMER control (5) as required.



1. REPEATER CARD
2. SYNCHRONIZER KNOB

Figure 2-219. Standard Bearing Repeater.



1. SYNCHRONIZER KNOB
2. REPEATER CARD
3. ON-OFF SWITCH

Figure 2-220. Open Scale Compass Repeater.

c. *Mk 37 Mod E Transmission Unit (Figure 2-221).*

WARNING

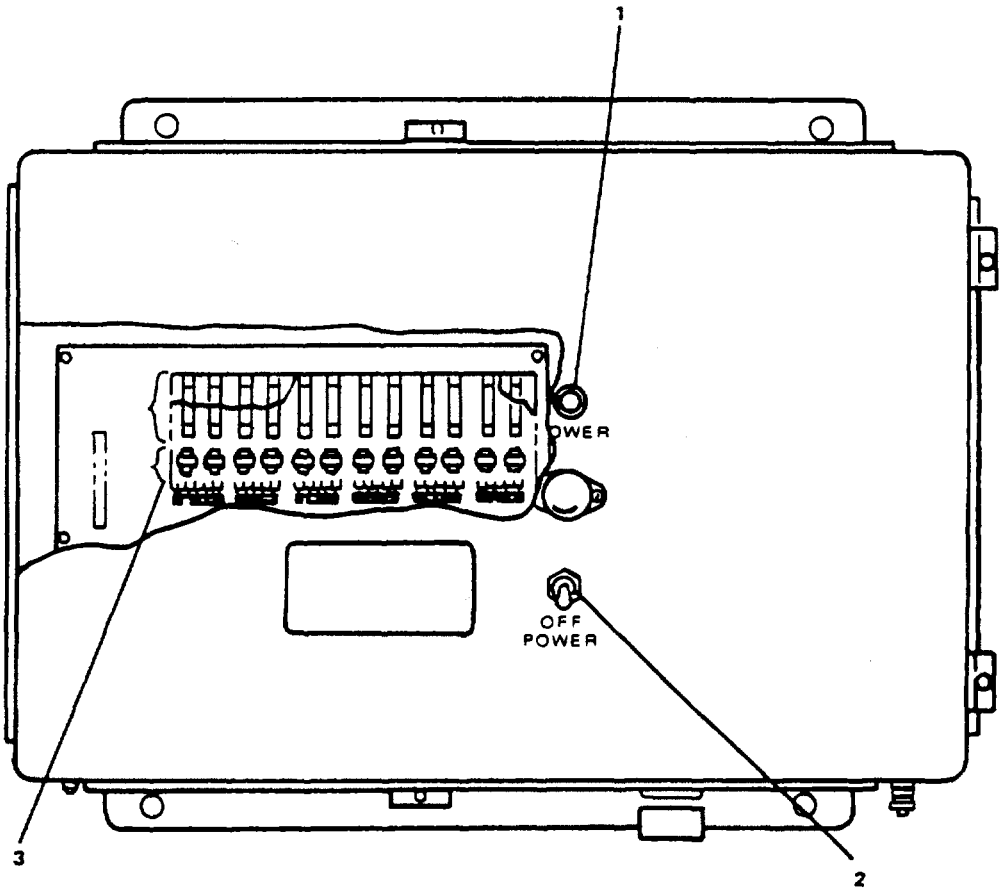
High voltage is present at fuse FI and power switch S1 terminals on inside of cabinet cover, even when unit is turned OFF. THESE VOLTAGES ARE DANGEROUS. Use extreme care when servicing or operating unit with front cover open. Personal injury could result.

(1) Ensure OFF POWER switch (2) is OFF.

(2) Open front cover and set appropriate REPEATER switches (3) A2S1 to ON position.

(3) Close front cover.

(4) Set POWER switch (2) to ON. Verify POWER INDICATOR (1) is ON.



1. POWER INDICATOR
2. OFF POWER
3. REPEATER SWITCHES

Figure 2-221. Mk 37 Mod E Transmission

d. *Synchronize Compass Repeaters After Ship Service Power Failure*.

NOTE

The master compass and electronic control of the Mk 27 Mod 1 gyrocompass operate directly from an external 24 VDC power source. A ship service power failure will not affect the gyrocompass, but compass repeaters must be reset.

(1) *Gyrocompass Mk 27 Mod 1 electronic control panel (Figure 2-218)*. Set RPTR switch (3) to OFF position.

CAUTION

Do not operate synchronizer knob when repeater switch is energized.

(2) *Open scale compass repeater (Figure 2-220)* .

(a) Press and hold SYNCHRONIZER KNOB (1) to engage gear train.

(b) Rotate REPEATER CARD (2) to gyrocompass heading.

(c) Release SYNCHRONIZER KNOB (1).

(3) *Standard bearing repeater (Figure 2-219)*.

(a) Press and hold SYNCHRONIZER KNOB (2) to engage gear train.

(b) Rotate REPEATER CARD (1) *to* gyrocompass heading.

(c) Release SYNCHRONIZER KNOB (2).

(4) *Gyrocompass Mk 27 Mod 1 electronic control panel (Figure 2-218)*. Set RPTR switch (3) to ON position.

2-11. Air Start Main Generator.

NOTE

The machinery plant monitoring system provides values for important engine operating parameters.

a. *Monitoring Systems.*

(1) Ensure MONITORING SYS CRT and REMOTE PROPULSION INDICATING PANEL SYS circuit breakers are ON and system is operating before proceeding.

b. *Machinery DC Control Distribution Panel (Figure 2-222).*

(1) Set SSDG No. 2 circuit breaker (1) to ON position.

c. *Align Fuel Oil Service System (Figure 2-223).*

(1) Open FO-13, F.O. SERV. SUCT. PORT (2).

(2) Open FO-22, F.O. SPLY TO S.S.D.G. NO. 2 (5).

(3) Open FO-33, F.O. RTN. TO DAY TK. PORT (1).

d. *Align Fresh Water Cooling System (Figure 2-223).*

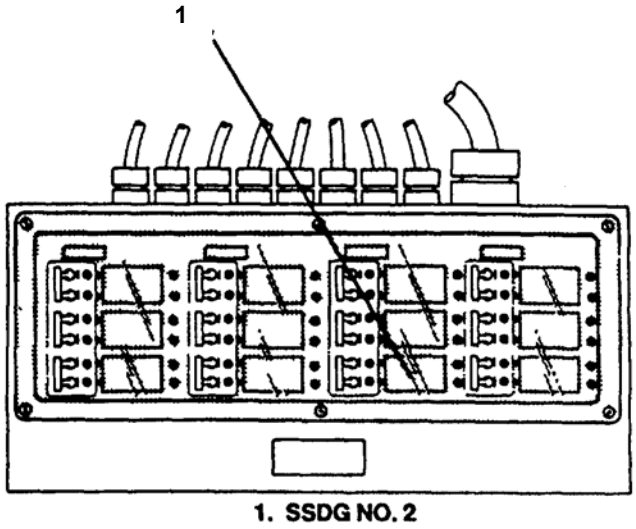
(1) Open FWC-10, F. W. FR. KEEL CLR. TO S.S.D.G. NO. 2 (4).

(2) Open FWC-12, F.W. FR. S.S.D.G. NO. 2 TO KEEL CLR. (3).

e. *Start Generator Engine.*

(1) Open CA-7, STG AIR TO DSL GEN (6).

(2) Turn START/STOP pushbutton (5, Figure 2-224) and turn clockwise to release pushbutton to OUT position.



1. SSDG NO. 2

Figure 2-222. Machinery DC Control Distribution Panel.

NOTE

Ensure auto drain valve on air receiver solenoid valve is operating.

- **Check engine lube oil sump level.**
- **Check cooling water in sight glass of head tank.**

(3) Check SSDG No. 2 STG AIR PRESS gauge. The air start must be 100 to 120 psi to operate properly.

(4) Push OFF-RUN-START toggle switch up (4) to START position to crank engine. As soon as engine starts, release switch (4) (switch is springloaded and will return to RUN position).

CAUTION

Oil pressure at gauge should rise within 15 seconds after engine starts. If oil pressure does not rise, stop the engine immediately by flipping toggle switch in the down (STOP) position to prevent damage and refer problem to unit maintenance.

NOTE

Governor controls speed of engine.

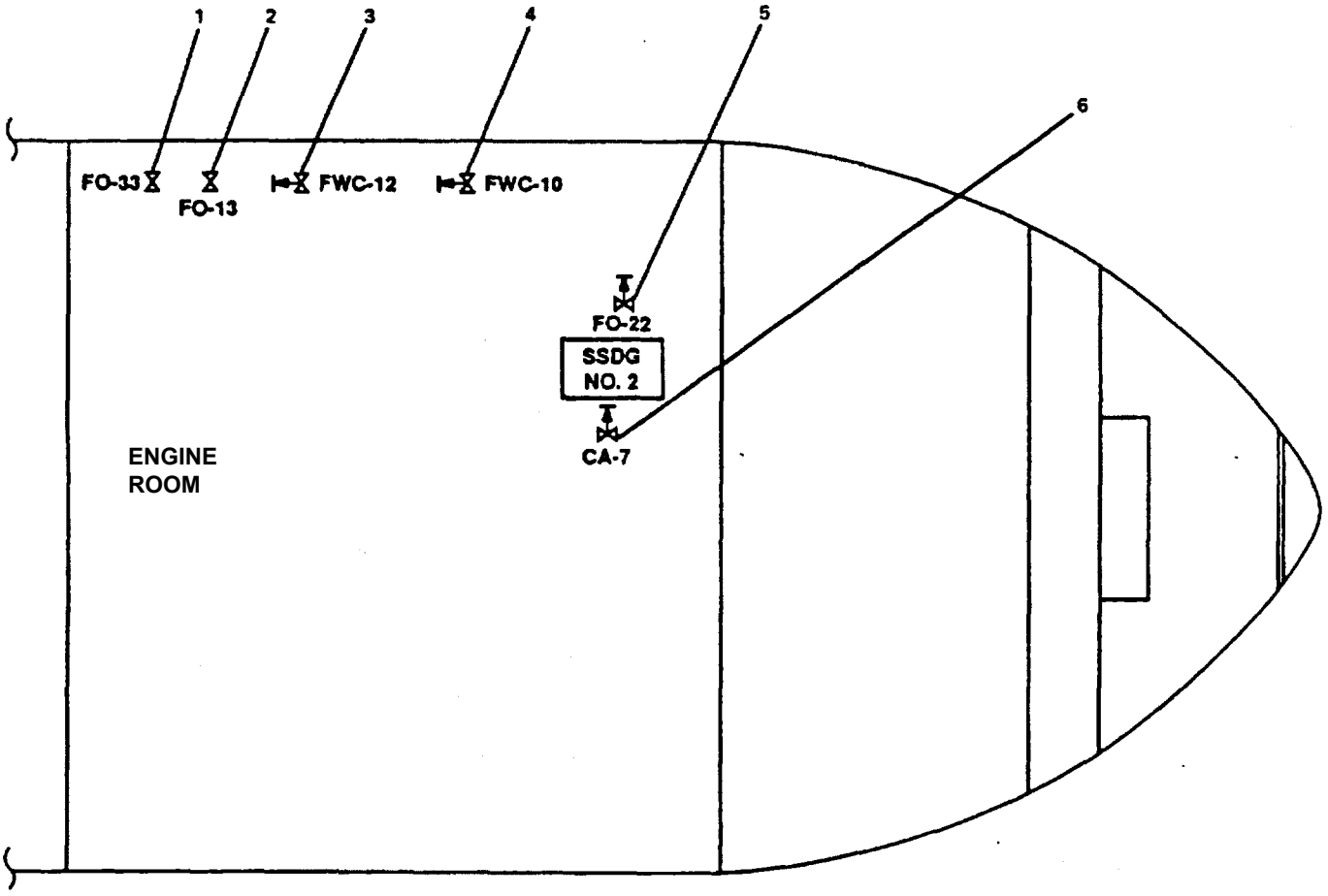
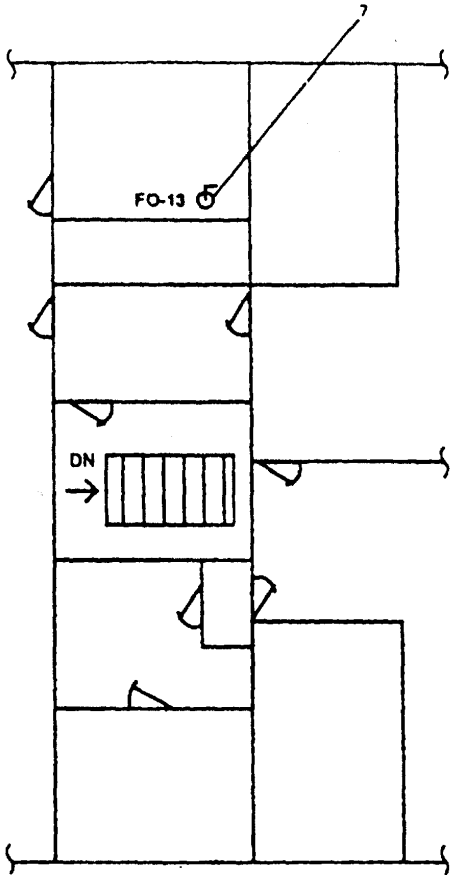


Figure 2-223. Air Start Main Generator Valve Locations (Sheet 1 of 2).



MAIN DECK

SYMBOL LEGEND:

REMOTE VALVE OPERATOR

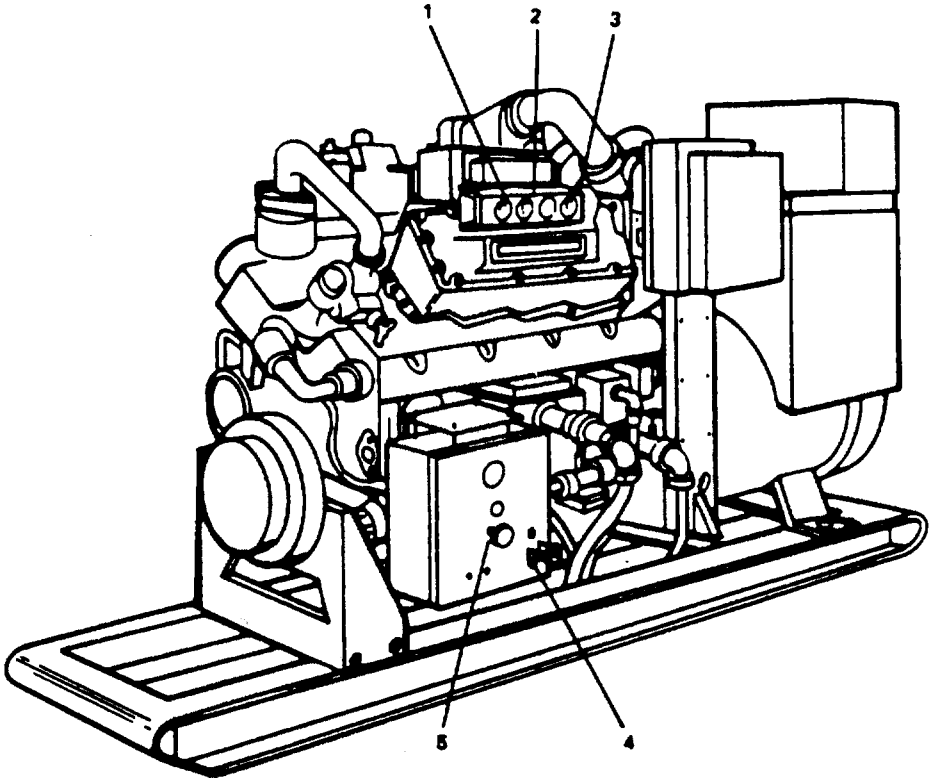
VALVE OVERHD

VALVE ABOVE DECK, BELOW OVERHD

VALVE AT OR BELOW DECK

1. FO-33, F.O. RTN. TO DAY TK. PORT
2. FO-13, F.O. SERV. SUCT. PORT
3. FWC-12, F.W. FR. S.S.D.G. NO. 2 TO KEEL CLR.
4. FWC-10, F.W. FR. KEEL CLR. TO S.S.D.G. NO. 2
5. FO-22, F.O. SPLY TO S.S.D.G. NO. 2
6. CA-7, STG AIR TO DSL GEN (OVERHEAD)
7. REMOTE OPERATOR FOR FO-13

Figure 2-223. Air Start Main Generator Valve Locations (Sheet 2 of 2).



1. FUEL PRESSURE GAUGE
2. WATER TEMPERATURE GAUGE
3. OIL PRESSURE GAUGE
4. TOGGLE SWITCH (START)
5. START/STOP PUSHBUTTON

Figure 2-224. Ship Service Generator Controls.

(5) Before putting load on engine, allow engine to idle (725 to 775 RPMs) 3 to 5 minutes or until water temperature begins to rise.

NOTE

SSDG No. 2 can be started or stopped from remote SSDG No. 2 START or STOP pushbuttons on EOS console.

f. *Parallel Generator 2 to Generator 1*.

(1) *SSDG no. 1 on-line providing ship power.*

(2) *Set up instrumentation.*

(a) Set VOLT switch (1) to 1-2 position

(b) Set AMMETER switch (3) to position.

(3) *Adjust voltage*. Using GENERATOR 2 AUTO. VOLT. RHEO. control (21), adjust voltage to read 450 on AC VOLTS meter (2).

(4) *Adjust frequency*. Using GENERATOR 2 governor control (4), adjust frequency to read 60 on HERTZ meter (5).

NOTE

As SSDG No. 2 frequency approaches the frequency of SSDG No. 1, synchronizing lights will begin to blink and SYNCHROSCOPE will move toward top dead center.

(5) *Synchronizing*. On main switchboard, set SYNCHRONIZING switch (9, Figure 2-225) to GEN 2 position.

(6) *Bring SSDG no. 2 on-line*.

NOTE

As SYNCHROSCOPE approaches top dead center, synchronizing lights will blink slower.

(a) When lights are off, quickly set GENERATOR 2 circuit breaker (19) to CLOSED position.

(b) Observe GENERATOR 2 CIRCUIT BREAKER CLOSED light (20) is lit.

(7) *Balance load*. Use GENERATOR 1 governor control (14) and GENERATOR 2 governor control (4) to balance the load. Load is indicated on AC KILOWATTS meters (6 and 15).

(a) *Generator 1*.

1 Adjust voltage to 450 volts using AUTO. VOLT RHEO switch (18).

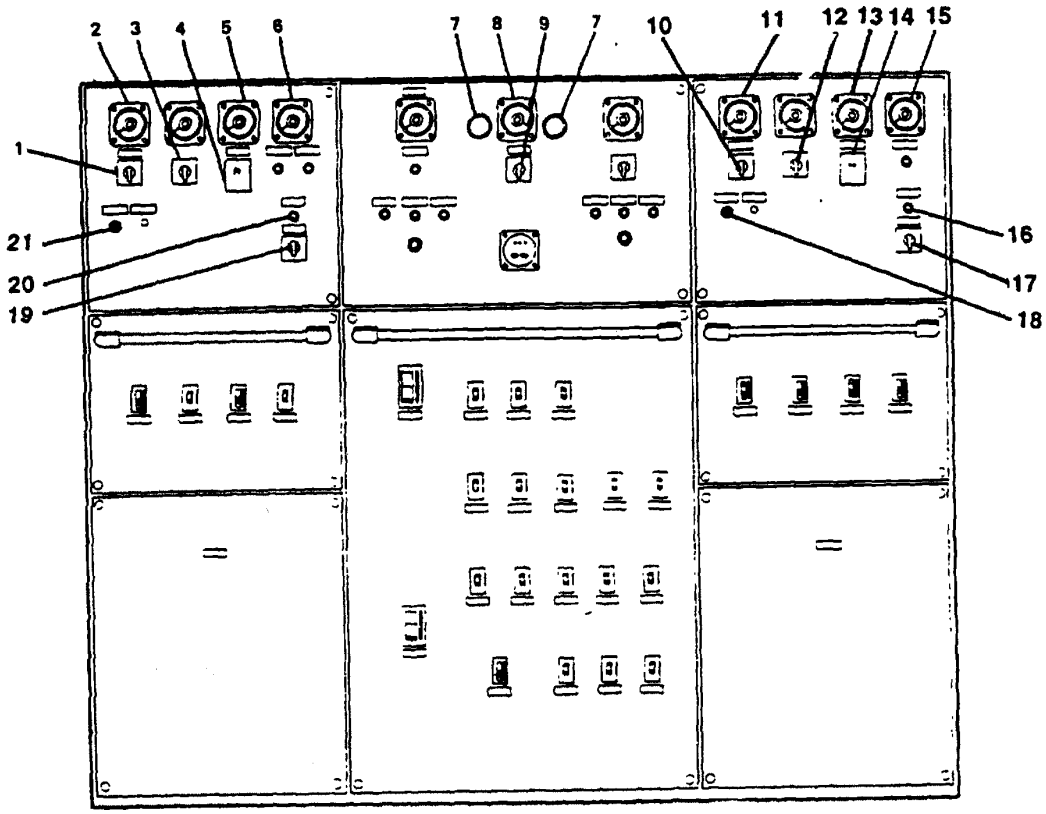
2 Adjust frequency to 60 Hz using GOVERNOR CONTROL (14).

(b) *Generator 2*.

1 Adjust voltage to 450 volts using AUTO. VOLT. RHEO. switch (2).

2 Adjust frequency to 60 Hz using GOVERNOR CONTROL (4).

(8) Turn off SYNCHRONIZING SWITCH (9).



1. GENERATOR 2 VOLT SWITCH
2. GENERATOR 2 AC VOLTMETER
3. GENERATOR 2 AMMETER SWITCH
4. GENERATOR 2 GOVERNOR CONTROL
5. GENERATOR 2 HERTZ METER
6. GENERATOR 2 AC KILOWATTS
7. SYNCHRONIZING LIGHTS
8. SYNCHROSCOPE
9. SYNCHRONIZING SWITCH
10. GENERATOR 1 VOLT SWITCH
11. GENERATOR 1 AC VOLTMETER
12. GENERATOR 1 AMMETER SWITCH
13. GENERATOR 1 HERTZ METER
14. GENERATOR 1 GOVERNOR CONTROL
15. GENERATOR 1 AC KILOWATTS
16. GENERATOR 1 CIRCUIT BREAKER
17. GENERATOR 1 CIRCUIT BREAKER CLOSED LIGHT
18. GENERATOR 1 AUTO. VOLT. RHEO.
19. GENERATOR 2 CIRCUIT BREAKER
20. GENERATOR 2 CIRCUIT BREAKER CLOSED LIGHT
21. GENERATOR 2 AUTO. VOLT. RHEO.

Figure 2-225. Main Switchboard.

2-12. Main Propulsion System.

a. *Starboard Propulsion Plant*.

(1) *Align electrical system*.

(a) *Engine room power panel no. 1 (Figure 2-226)*. Set the following circuit breakers to the ON position:

1 #1 RED OR CLG PUMP (6).

2 #1 M.E. L.O. PRIME PUMP (2).

3 #1 M.E. CONTROL PANEL (5)

(b) *Engine room emergency distribution panel no. 1 (Figure 2-227)*. Set ENGINE ORDER TELEGRAPH SYS circus breaker (3) to ON position.

(2) *Monitoring system*. Ensure REMOTE PROPULSION INDICATING PANEL SYS (1) and MONITORING CRT SYS (2) circuit breaker are ON and system - operating before proceeding.

(3) *Align fuel oil service system (Figure 2-228)*.

(a) Open FO-20, F.O. SPLY TO M.E. NO. 1 (9).

(b) Open FO-15, F.O. SERV SUCT. STBD (14).

(c) Open FO-35, F.O, RTN.TO DAY TK STBD (15).

(d) Open FO-14, F.O SERV. CRSVR (13).

(e) Open FO-34, F.O. RTN CRSVR (17)

4) *Align fresh water cooling system (Figure 2-228)*.

(a) Open FWC-3, F.W. FR. M.E. NO. 1TO KEEL CLR (18).

(b) Open FWC-1, F.W. FR. KEEL CLR TO M. E. No. 1 (16).

(c) Open FWC-15, F.W. FR. KEEL CLR TO RED. GEAR NO. 1 (10).

(d) Open FWC-13, F.W. FR. RED. GEAR NO. 1 TO KEEL CLR (12).

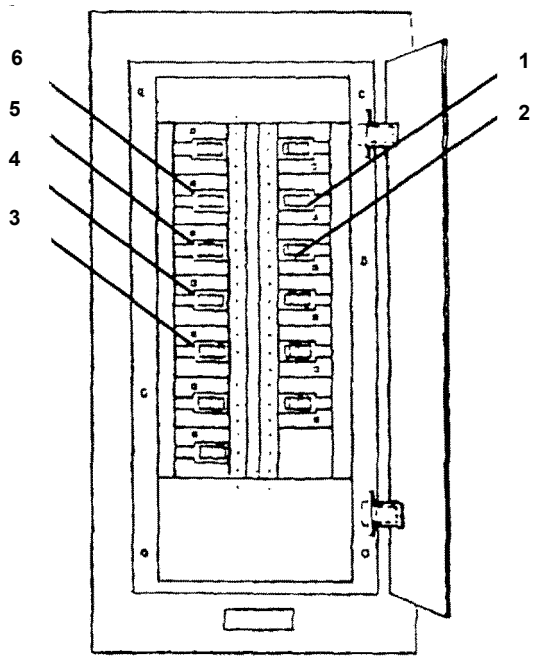


Figure 2-226. Engine Room Power Panel No. 1.

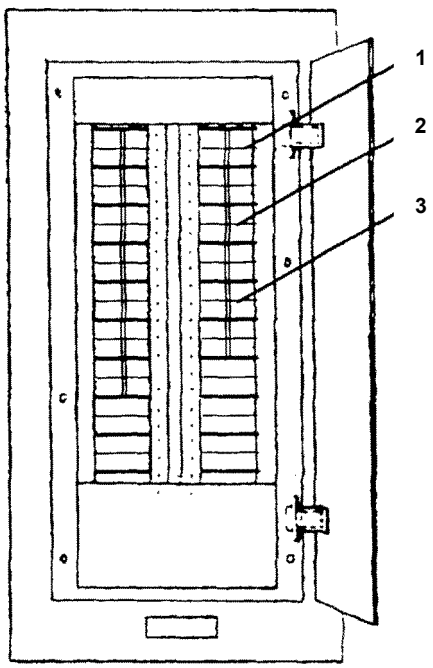


Figure 2-227. Engine Room Emergency Distribution Panel No. 1.

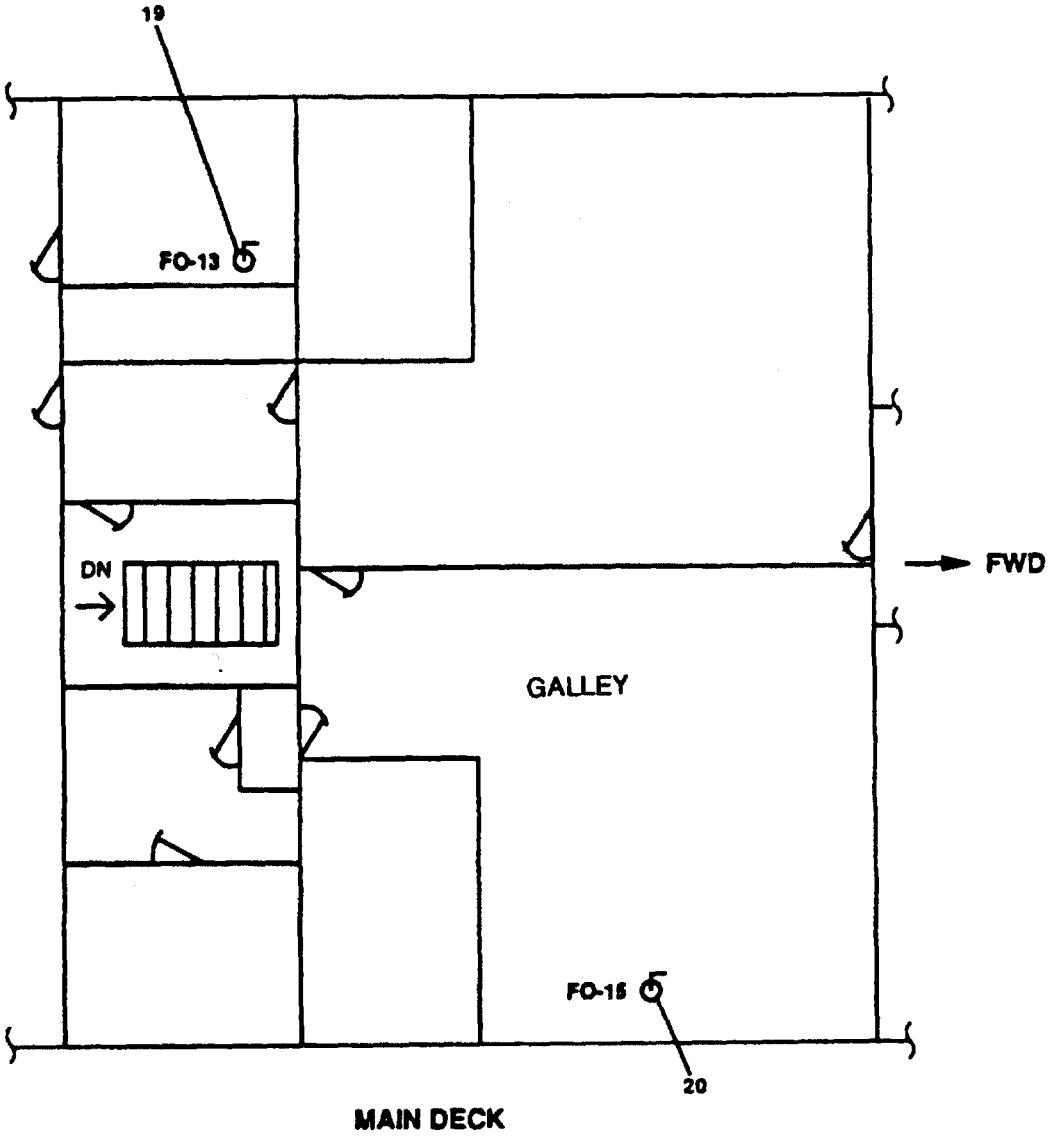


Figure 2-228. Main Propulsion System Valve Locations (Sheet 1 of 3).

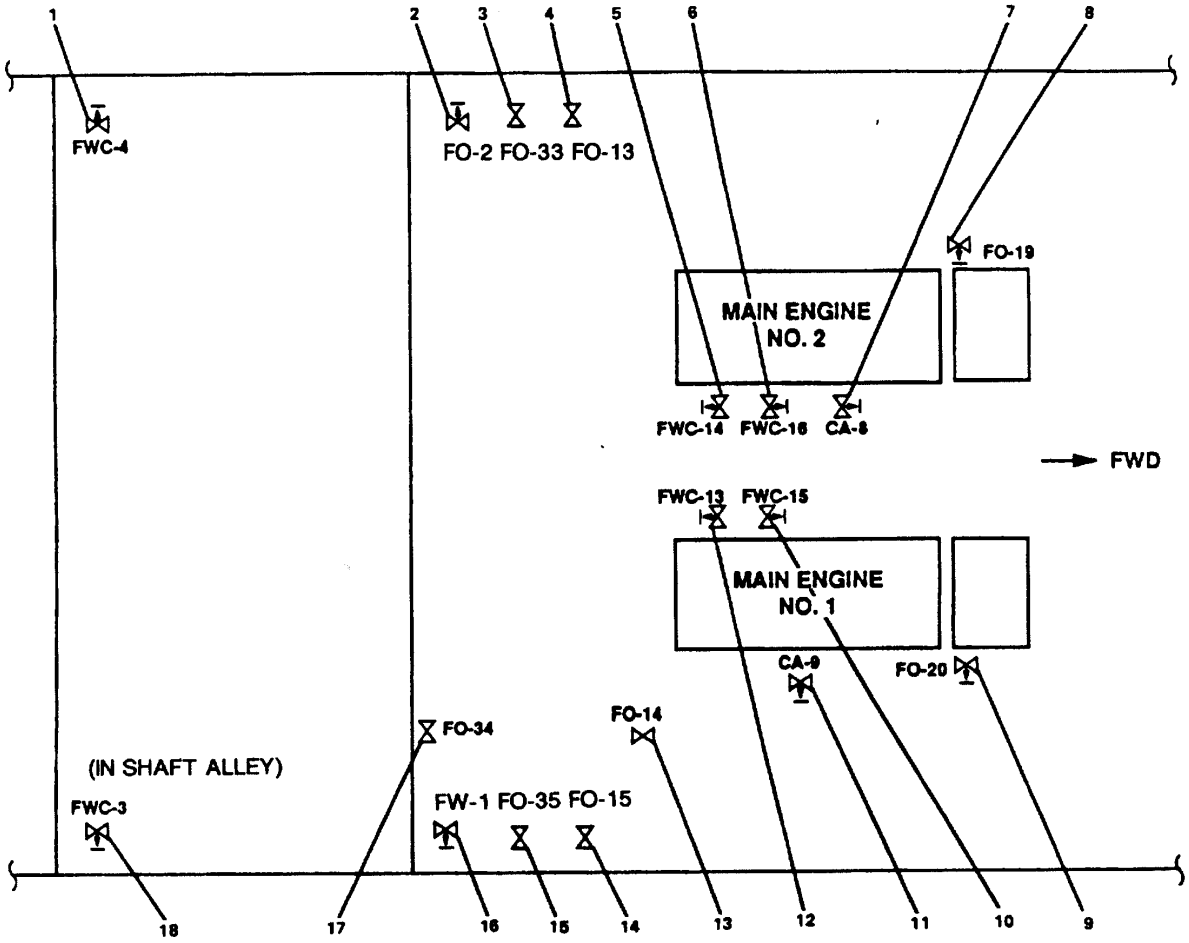


Figure 2-228. Main Propulsion System Valve Locations (Sheet 2 of 3).

1. FWC-4, F.W. FR. M.E. NO. 2 TO KEEL CLR.
2. FO-2, F.W. FR. KEEL CLR. TO M.E. NO. 2
3. FO-33, F.O. RTN TO DAY TK, P
4. FO-13, F.O. SERV SUCT, P
5. FWC-14, F.W. FR. RED. GEAR NO. 2 TO KEEL CLR.
6. FWC-18, F.W. FR. KEEL CLR. TO RED. GEAR NO. 2
7. CA-8, DSA TO M.E. NO. 2
8. FO-19, F.O. SPLY TO M.E. NO. 2
9. FO-20, F.O. SPLY TO M.E. NO. 1
10. FWC-15, F.W. FR. KEEL CLR. TO RED. GEAR NO. 1
11. CA-9, DSA TO M.E. NO. 1
12. FWC-13, F.W. FR. RED. GEAR NO.1 TO KEEL CLR.
13. FO-14, F.O. SERV CRSVR
14. FO-15, F.O. SERV.SUCT.STBD
15. FO-35, F.O. RTN TO DAY TKS
16. FW-1, F.W. FR. KEEL CLR.TO M.E. NO. 1
17. FO-34, F.O. RTN. CRSVR
18. FWC-3, F.W. FR. M.E. NO.1TO KEEL CLR
19. REMOTE VALVE OPERATOR FOR FO-13
20. REMOTE VALVE OPERATOR FOR FO-15

Figure 2-228. Main Propulsion System Valve Locations (Sheet 3 of 3).

(e) *Fresh water no. 1 reduction gear cooling pump motor controller (Figure 2-229).*

1. Set ON-OFF switch (1) to ON position.

2. POWER AVAILABLE indicator (2) will light.

3. Press START pushbutton (4).

4. MOTOR RUN indicator (3) will light.

(5) *Pressure and coolant checks.* Check RED GR #1 FW COOLING POP DISCH PRESS gauge (approx. 20 psi) and coolant level in forward expansion tank sight glass.

NOTE

Air compressors are running and air pressure is 250 psi in air receivers.

(6) *Align compressed air pining system (Figure 2-228).* Open CA-9, STG AIR TO ME (13) and in-line ball valve.

(7) *Start starboard main engine.*

CAUTION

Prelubrication of a new or overhauled engine or an engine which has been inoperative for more than 48 hours is necessary to prevent engine damage. Prelubrication protects otherwise unlubricated engine parts while the lube oil pump is filling the passages with oil. See paragraph 2-55 for prelubrication procedures.

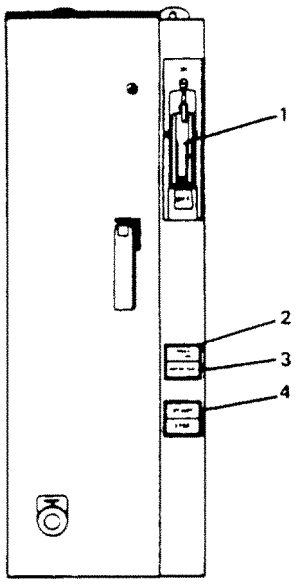
(a) *Engine control panel (Figure 2-230).*

1 Press CONTROL POWER ON pushbutton (5). CONTROL POWER indicator (5) will light and POWER ON indicator (6) (ALARM TEST ALARM OFF) will light.

(b) *Prepare engine for starting.*

1 On engine control panel, check START AIR pressure gauge (3) (approx. 200 psi).

2 Check EOS control air pressure gauge (125 psi).



1. ON-OFF SWITCH
2. POWER AVAILABLE INDICATOR
3. MOTOR RUN INDICATOR
4. START PUSHBUTTON

Figure 2-229. Fresh Water Reduction Gear Cooling Pump Motor Controller.

NOTE

Ensure shaft brake pressure gauge on AFT end of reduction gear indicates 1200 to 1500 psi.

(c) Blow down engine.

1 Open test valves on both sides of engine 1/2 inch (Figure 2-232).

2 Close CA-9, DSA TO ME NO. 1 (11, Figure 2-228).

NOTE

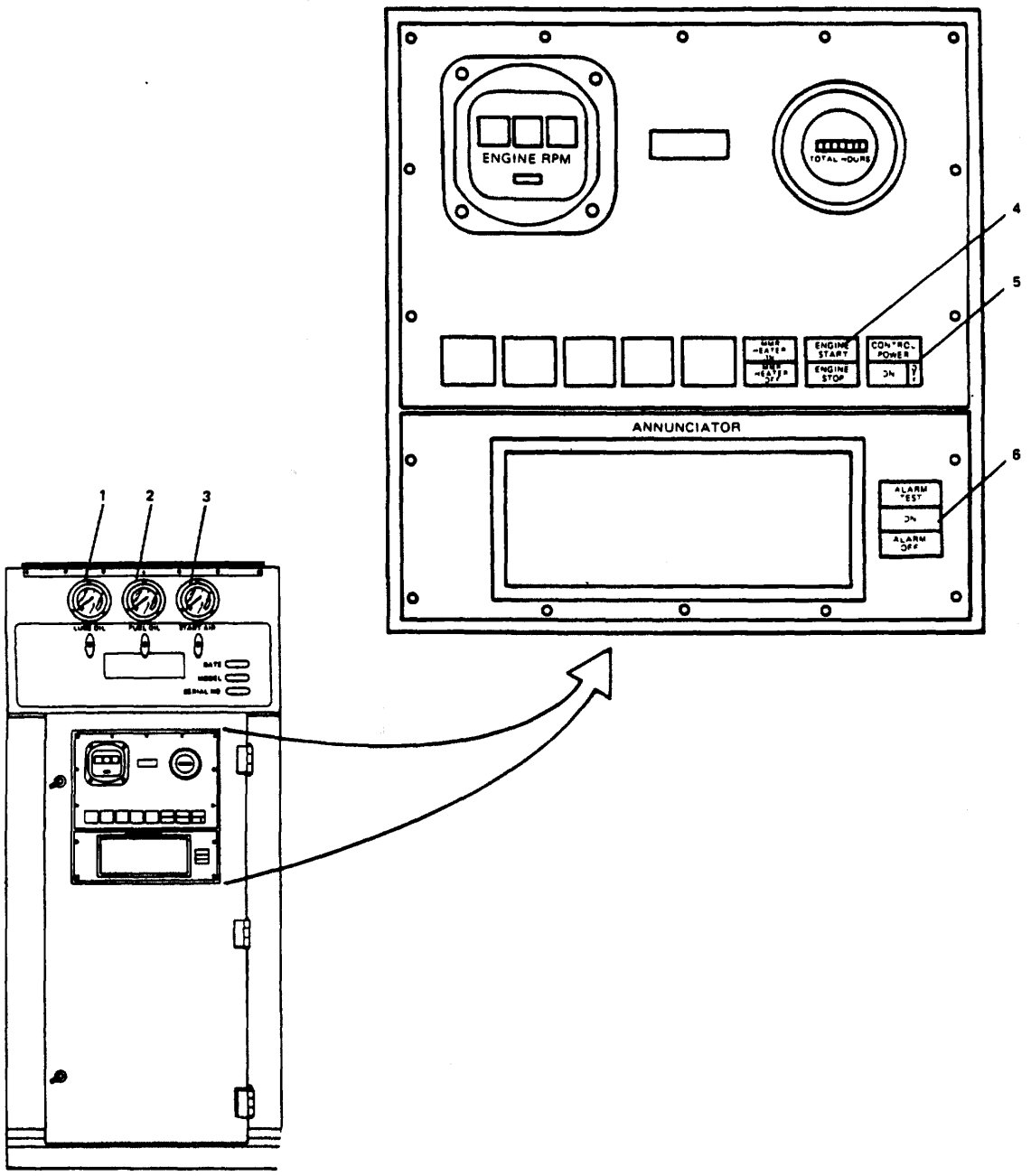
The following steps require two soldiers.

3 Press and hold T-handle (1, Figure 2-234) in to engage starter drive pinions.

4 Remove barring hole end plugs (1, Figure 2-234) from barring holes.

5 Insert 5/16-inch Allen wrench in end plug opening of barring hole (1).

6 Turn one revolution.



1. LUBE OIL PRESSURE GAUGE
2. FUEL OIL PRESSURE GAUGE
3. START AIR PRESSURE GAUGE
4. ENGINE START PUSHBUTTON
5. CONTROL POWER INDICATOR/PUSHBUTTON
6. POWER ON INDICATOR (ALARM)

Figure 2-230. Engine Control Panel.

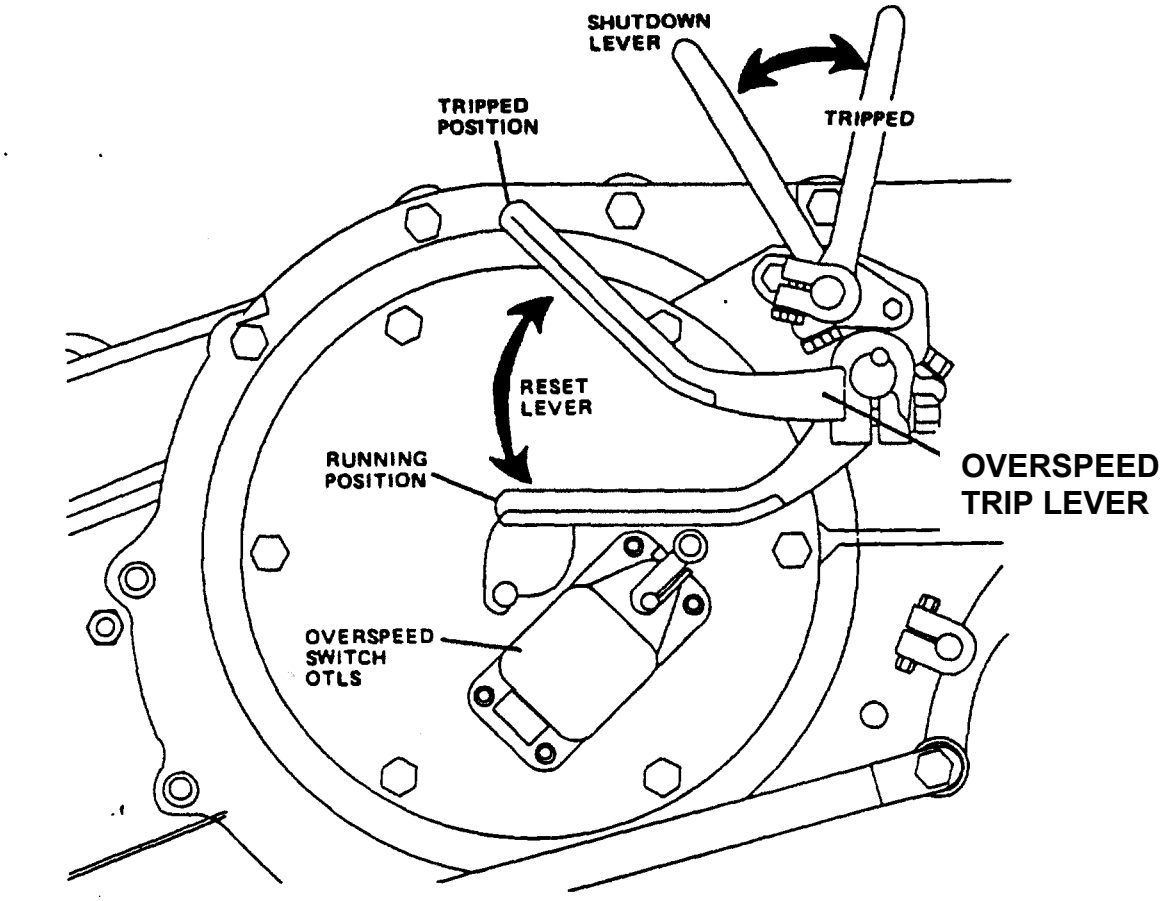


Figure 2-231. Overspeed Trip Lever.

Figure 2-232. Test Valve.

WARNING

Use eye protection when checking test valves. Severe eye damage or blindness could occur.

7 Check test valves and air box blow down valve for oil and/or water. Close test valves (Figure 2-232).

8 Remove barring tool and release T handle (1, Figure 2-233).

9 Install end plugs (1, Figure 2-234) into barring holes.

10 Ensure overspeed trip lever (Figure 2-231) is in RUNNING (latched position).

11 Open CA-9, DSA TO ME NO. 1 (11, Figure 2-228).

NOTE

Once idle RPM has been set, it is not necessary to adjust manual speed control knob each time engine is started.

12 Ensure governor manual speed adjusting knob (1, Figure 2-235) is set to MIN.

13 Operate hand crank fuel priming pump on forward STBD side of engine until pressure is indicated on the engine control cabinet FUEL OIL pressure gauge (2, Figure 2-230).

NOTE

Check L.O. level and gear box oil level.

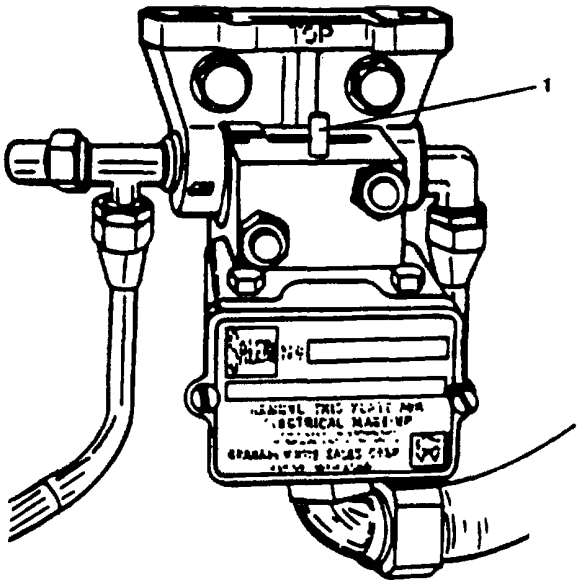
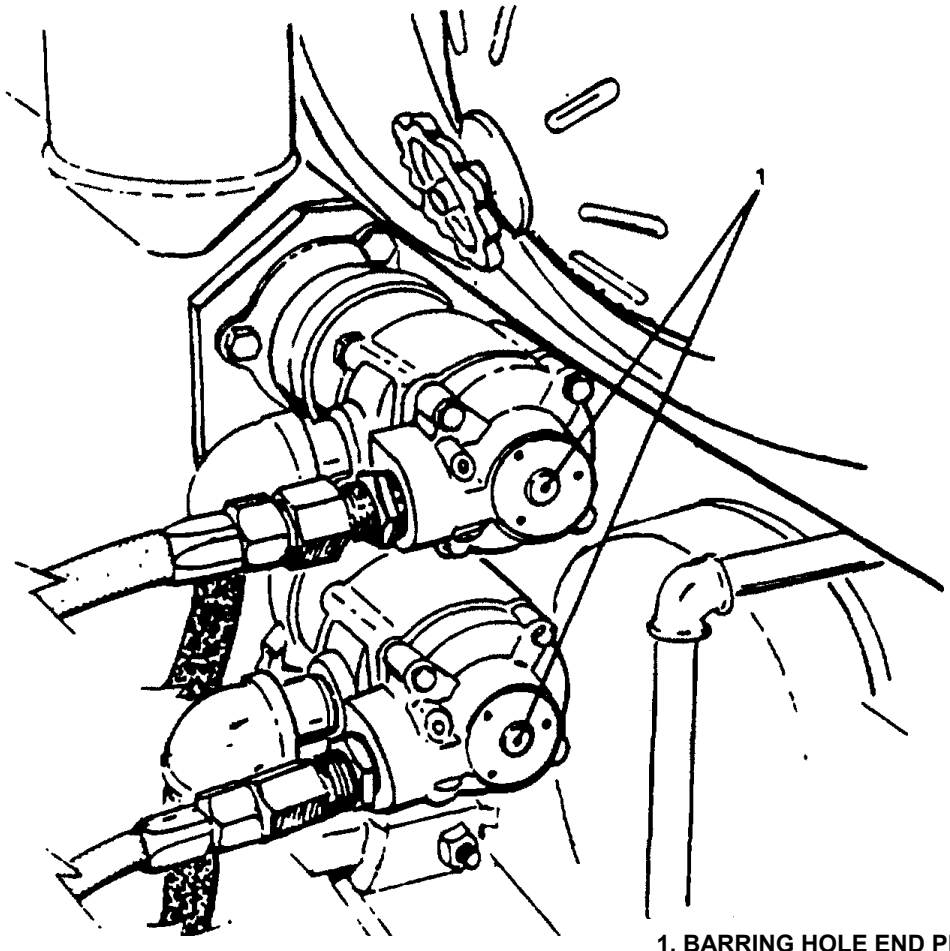


Figure 2-233. Air Start Solenoid Valve



1. BARRING HOLE END PLUGS

Figure 2-234. Barring Hole

14 On EOS console, place STBD MN ENG THROTTLE CLUTCH control (3, Figure 2-237) in NEUTRAL position (straight up).

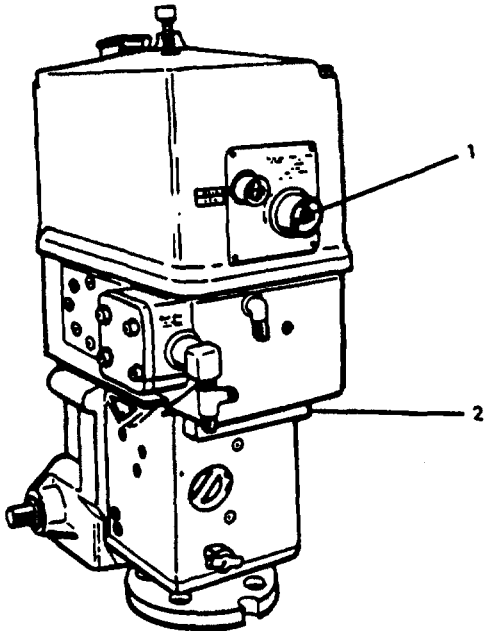
15 Place COMMAND TRANSFER valve (1) in E.O.S. position.

16 On engine control cabinet (Figure 2-230), momentarily press ENGINE START pushbutton (4) and release. This starts the turbocharger lube oil pump. Allow pump to run for a minimum of 30 seconds before proceeding.

NOTE

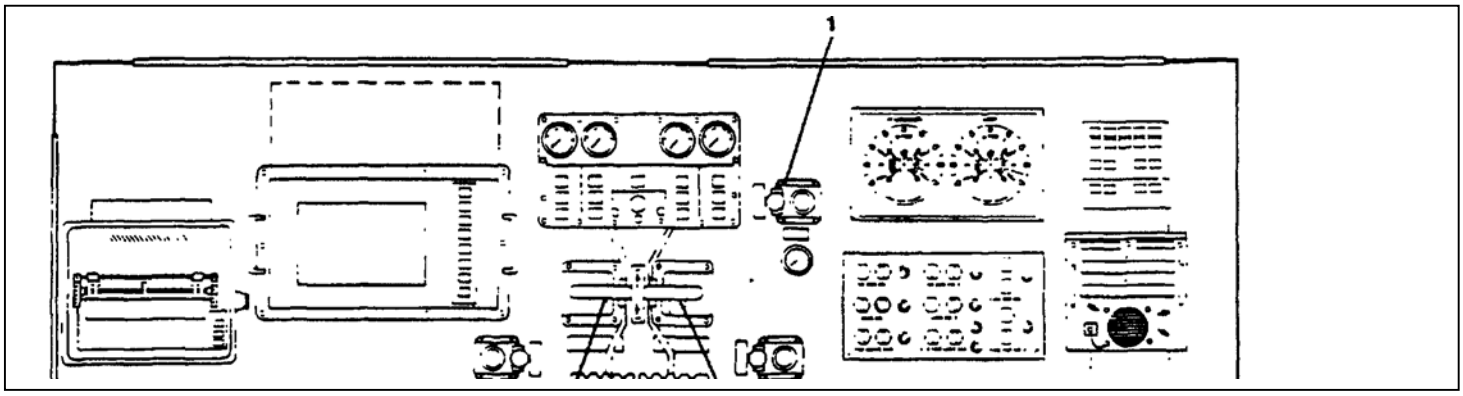
Perform steps 17 through 19 only after rebuild or prolonged layup.

17 Remove rear oil pan handhold cover and confirm that oil is flowing from the gear train.



1. MANUAL SPEED ADJUSTING KNOB
2. OIL LEVEL SIGHT GAUGE (NOT SHOWN)

Figure 2-235. Governor.



1. **COMMAND TRANSFER**
2. **PORT MN ENG THROTTLE CLUTCH**
3. **STBD MN ENG THROTTLE CLUTCH**

Figure 2-236. EOS Console

NOTE

A normal engine start should include the 60-second operation of the turbo lube pump (soak back pump) prior to starting the engine. However, in an emergency situation, engine may be started without the delay.

18 Check for fluid discharge at cylinder test valves.

CAUTION

If there is any sign of water or oil being ejected at the cylinder test valves, or any indication of obstruction while rotating the engine, refer to unit maintenance. Do NOT attempt to start the engine until the problem has been corrected. Serious damage to the engine could result.

19 Replace and secure all handhold covers and engine top deck covers.

(d) *Start starboard main engine*.

NOTE

Starboard main engine can also be started by pressing MN ENG NO. 1 GREEN pushbutton on EOS console.

1 On engine control cabinet (Figure 2-230), press and hold ENGINE START pushbutton (4) until engine starts.

NOTE

Engine should start within 10 seconds.

2 Release ENGINE START pushbutton (4).

3 Check LUBE OIL PRESSURE gauge (1). If pressure is not indicated on the gauge within 30 seconds, stop the engine and determine cause.

4 Check gearbox bearing oil pressure (32 psi) as soon as engine starts; also check gauges and flow switch indicators.

5 Check water level in expansion tank.

6 Check governor oil (2, Figure 2-235) for proper level on sight gauge.

7 Check engine oil level on dipstick.

CAUTION

Do not increase engine speed above idle until fresh water temperature gauge above governor indicates 49°C (120°F).

CAUTION

Engine operation at less than 50% load increases turbocharger gear train wear and adds to maintenance requirements.

8 Check engine operating conditions on machinery monitoring system.

b. *Port Propulsion Plant*.

(1) Align electrical system - engine room power panel no. 1 Figure 2-226). Set the following circuit breakers to the ON position.

(a) #2 RED GR CLG PUMP (1).

(b) #2 M.E. L.O. PRIME PUMP (4).

(c) #2 M.E. CONTROL PANEL (3).

NOTE

Ensure monitoring system is operating.

(2) *Align fuel oil service system (Figure 2-228)*.

(a) Open FO-19, F.O. SPLY TO M.E. NO. 2 (8).

(b) Open FO-13, F.O. SERV. SUCT. PORT (4).

(c) Open FO-33, F.O. RTN. TO DAY TK. PORT (3).

(d) Open FO-14, F.O. SERV. CRSVR (13).

(e) Open FO-34, F.O. RTN. CRSVR (17).

(3) *Align fresh water cooling system (Figure 2-228).*

(a) Open FWC-4, F.W. FR. M.E. NO. 2 TO KEEL CLR. (1).

(b) Open FWC-2, F.W. FR. KEEL CLR. TO M.E. NO. 2 (2).

(c) Open FWC-16, F.W. FR. KEEL CLR. TO RED. GEAR NO. 2 (6).

(d) Open FWC-14, F.W. FR. RED. GEAR NO. 2 TO KEEL CLR. (5).

(e) *Fresh water no. 2 reduction gear cooling pump motor controller (Figure 2-229).*

1 Set ON-OFF switch (1) to ON position.

2 POWER AVAILABLE indicator (2) will light.

3 Press START pushbutton (4).

4 MOTOR RUN indicator (3) will light.

(4) *Pressure and coolant checks.* Check RED GR #2 FW COOLING PMP DISCH PRESS discharge pressure gauge (approx. 20 psi) and coolant level in expansion tank sight glass.

(5) *Align compressed air piping system (Figure 2-228).* Open CA-8, STG AIR TO ME (7) and in-line ball valve.

(6) *Start port main engine.*

CAUTION

Prelubrication of a new or overhauled engine or an engine which has been inoperative for more than 48 hours is necessary to prevent engine damage. Prelubrication protects otherwise unlubricated engine parts while the lube oil pump is filling the passages with oil. See paragraph 2-55 for prelubrication procedures.

(a) *Engine control cabinet (Figure 2-230).*

1 Press CONTROL POWER pushbutton indicator (5). CONTROL POWER pushbutton indicator (5) will light and POWER ON indicator (6) (ALARM TEST - ALARM OFF) will light.

(b) *Prepare engine for starting.*

1 On engine control cabinet (Figure 2-230), check START AIR PRESSURE gauge (3) (approx. 200 psi).

2 Check EOS control air pressure gauge (approx. 125 psi).

NOTE

Ensure shaft brake pressure gauge on AFT end of reduction gear indicates 1200 to 1500 psi.

(c) *Blow down engine.*

1 Open test valves on both sides of engine 1/2 inch (Figure 2-232).

2 Close CA-8, STG AIR TO ME (7, Figure 2-228).

NOTE

The following steps require two soldiers.

3 Push and hold T-handle (1, Figure 2-233) in to engage starter drive pinions.

4 Remove barring hole end plugs (1, Figure 2-234) from barring holes.

5 Insert 5/16-inch Allen wrench in end plug opening barring hole (1).

6 Turn one revolution.

WARNING

Use eye protection when checking test valves. Severe eye damage or blindness may occur.

7 Check test valves for oil and/or water. Close test valves (Figure 2-232).

8 Remove barring tool and release T handle (1, Figure 2-234).

9 Install end plugs (1, Figure 2-234) into barring holes.

10 Ensure overspeed trip lever (Figure 2-231) is in RUNNING (latched position).

11 Open CA-8, STG AIR TO ME (7, Figure 2-228).

NOTE

Once idle RPM has been set, it is not necessary to adjust manual speed control knob each time engine is started.

12 Ensure governor manual speed adjusting knob (1, Figure 2-235) is not set to MIN position.

13 Operate hand crank fuel priming pump on forward PORT side of engine until pressure is indicated on the engine control cabinet FUEL OIL PRESSURE gauge (2, Figure 2-230).

NOTE

Check L.O. level and gear box oil level.

14 On EOS console, place PORT MN ENG THROTTLE CLUTCH control (2, Figure 2-236) in NEUTRAL position (straight up).

15 Place COMMAND TRANSFER valve (1) in E.O.S. position.

16 On engine control cabinet (Figure 2-230), momentarily press ENGINE START pushbutton (4) and release. This starts the turbocharger lube oil pump. Allow pump to run for a minimum of 30 seconds before proceeding.

NOTE

Perform steps 17 through 19 only after rebuild or prolonged layup.

17 Remove rear oil pan handhold cover and confirm that oil is flowing from the gear train.

NOTE

A normal engine start should include the 60-second operation of the turbo lube pump (soak back pump) prior to starting the engine. However, in an emergency situation, engine may be started without the delay.

18 Check for fluid discharge at cylinder test valves.

CAUTION

If there is any sign of water or oil being ejected at the cylinder test valves, or any indication of obstruction while rotating the engine, refer to unit maintenance. Do NOT attempt to start the engine until the problem has been corrected. Serious damage to the engine could result.

19 Replace and secure all handhold covers and engine top deck covers.

(d) *Start port main engine.*

NOTE

Port main engine can also be started by pressing MN ENG NO. 2 GREEN pushbutton on EOS console.

1 On engine control cabinet (Figure 2-230), press and hold ENGINE START pushbutton (4) until engine starts.

NOTE

Engine should start within 10 seconds.

2 Release ENGINE START pushbutton (4).

3 Check LUBE OIL PRESSURE gauge (1). If pressure is not indicated on the gauge within 30 seconds, stop the engine and determine cause.

4 Check gearbox bearing oil pressure (32 psi) as soon as engine starts; also check gauges and flow switch indicators.

5 Check water level in expansion tank,

6 Check governor oil (2, Figure 2-235) for proper level on gauge.

CAUTION

Do not increase engine speed above idle until fresh water temperature gauge above generator indicates 49°C (120°F).

7 Check engine oil level on dipstick.

CAUTION

Engine operation at less than 50% load increases turbocharger gear train wear and adds to maintenance requirements.

8 Check engine operating conditions on machinery monitoring system.

2-13. Steering System.

a. Align Steering Hydraulics System (Figure 2-237).

NOTE

One pump is on line, other pump is on standby.

(1) *On oil reservoir (in fan room main deck).*

(a) Check oil level in hydraulic reservoir sight glasses by pushing in and holding knobs at bottom of sight glasses until fluid levels out.

(2) *Ensure the following valves are closed.*

(a) SH-7, HAND PMP COV (3).

(b) SH-8, HAND PMP COV (4),

(3) *Open the following valves.*

(a) SH-5, RUD MOT NO. 1 SUMP (2),

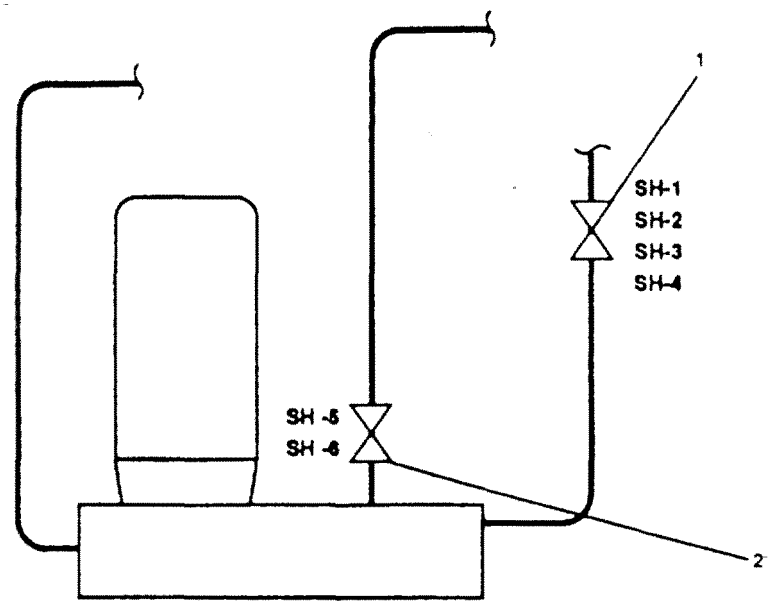
(b) SH-6, RUD MOT NO. 2 SUMP (2).

(c) SH-1, COV RUD MOT NO. 1 PRESS/RTN (1).

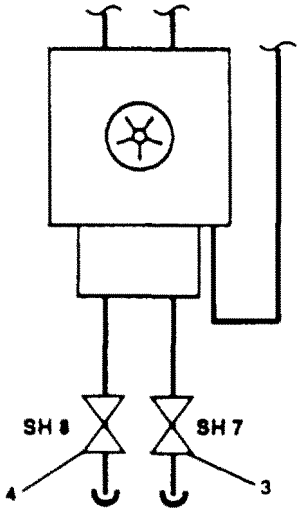
(d) SH-2, COV RUD MOT NO. 2 PRESS/RTN (1).

(e) SH-3, COV RUD MOT NO. 1 PRESS/RTN (1).

(f) SH-4, COV RUD MOT NO. 2 PRESS/RTN (1).



STEERING HYDRAULIC PUMP
(AMS #2)



EMERGENCY
STEERING HYDRAULIC PUMP
(AMS #2)

SYMBOL LEGEND:

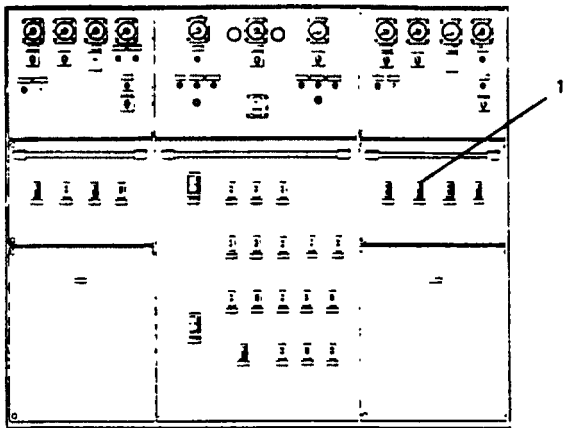
- REMOTE VALVE OPERATOR
- VALVE OVRHD
- VALVE ABOVE DECK, BELOW OVRHD
- VALVE AT OR BELOW DECK

1. [PUMP UNIT NO. 1] SH-1, COV-RUD MOT NO. 1 PRESS/RTN
   [PUMP UNIT NO. 1] SH-3, COV-RUD MOT NO. 1 PRESS/RTN
   [PUMP UNIT NO. 2] SH-2, COV-RUD MOT NO. 2 PRESS/RTN
   [PUMP UNIT NO. 2] SH-4, COV-RUD MOT NO. 2 PRESS/RTN
2. [PUMP UNIT NO. 1] SH-5, RUD MOT NO. 1 SUMP
   [PUMP UNIT NO. 2] SH-6, RUD MOT NO. 2 SUMP
3. SH-8, HAND PMP COV
4. SH-7, HAND PMP COV

Figure 2-237. Steering Hydraulics Valve Locations.

b. *Align Electrical System*.

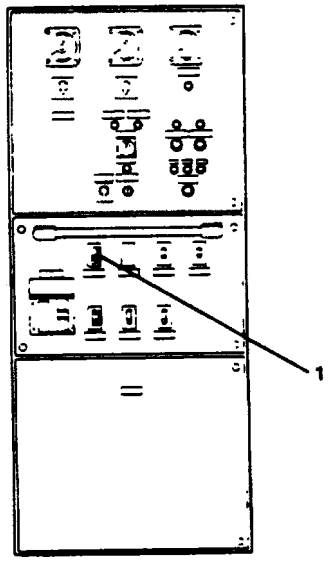
(1) Main switchboard (Figure 2-238). Set STEERING GEAR PUMP NO. 1 circuit breaker (1) to ON position.



1. STEERING GEAR PUMP NO. 1

Figure 2-238. Main Switchboard.

(2) Emergency switchboard (Figure 2-239). Set STEERING GEAR PUMP NO. 2 circuit breaker (1) to ON position.



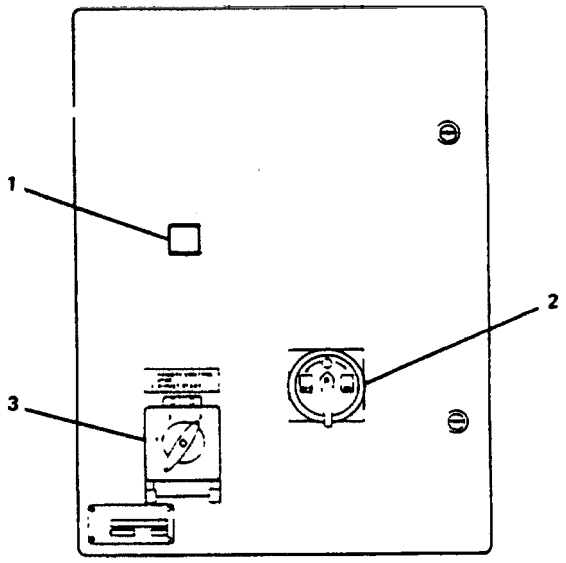
1. STEERING GEAR PUMP NO. 2

Figure 2-239. Emergency Switchboard.

(3) Steering gear motor controllers (Figure 2-240).

(a) Set each ON-OFF POWER switch (2) to ON position.

(b) Set each of the change-over switches (3) to REMOTE CONTROL (position 1) position.



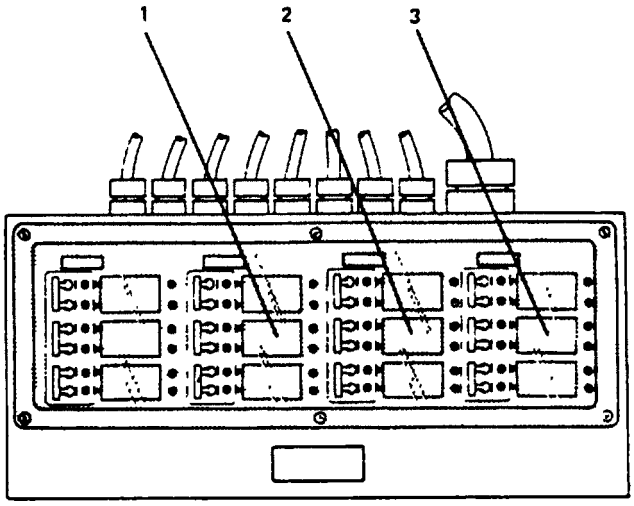
1. RUN INDICATOR
2. ON-OFF POWER SWITCH
3. CHANGE-OVER SWITCH

Figure 2-240. Steering Gear Motor Controller.

(4) Machinery DC control distribution panel (Figure 2-241).

(a) Set RUDDER ANGLE circuit breaker (1) to ON position.

(b) Set STG GR ALARM circuit breaker (2) to ON position.



1. BINNACLE LT
2. GYRO
3. STEERING DIMMER CONTROL

Figure 2-241. Machinery DC Control Distribution.

(5) Pilothouse emergency distribution panel *(Figure 2-242)*. Set AUTO PILOT SYSTEM circuit breaker (1) to ON position.

NOTE

RUN indicator (1, Figure 2-240) is NOT lit.

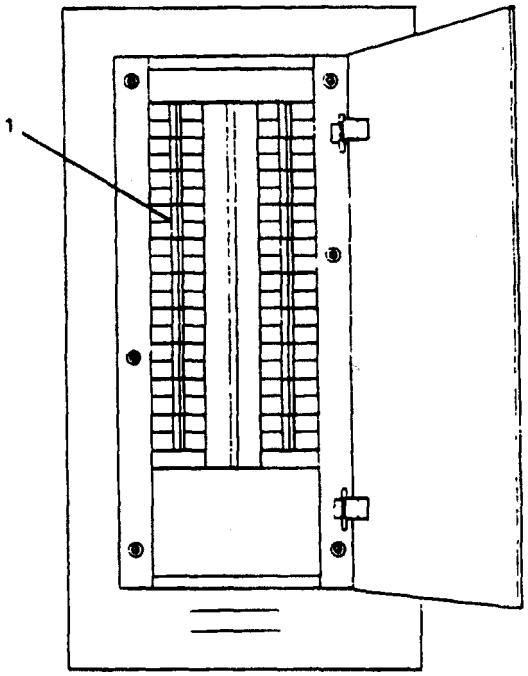


Figure 2-242. Pilothouse Emergency Distribution Panel.

c. *Steering Control Panel (Figure 2-243)*.

(1) Press PANEL TEST pushbutton (4).

(2) Indicators (1, 2, and 5 through 14) will light and audible alarm (15) will sound.

NOTE

If alarm fails to sound or if any indicator fails to light, refer system to unit maintenance.

(3) Release PANEL TEST pushbutton (4) to silence alarm and turn off indicators.

(4) On radio room DC control distribution panel (Figure 2-241), set to ON position:

1 BINNACLE LT (1).

2 GYRO (2).

3 STEERING DIMMER CONTROL (3).

(5) Adjust DIMMER control (16, Figure 2-243) to best reading level.

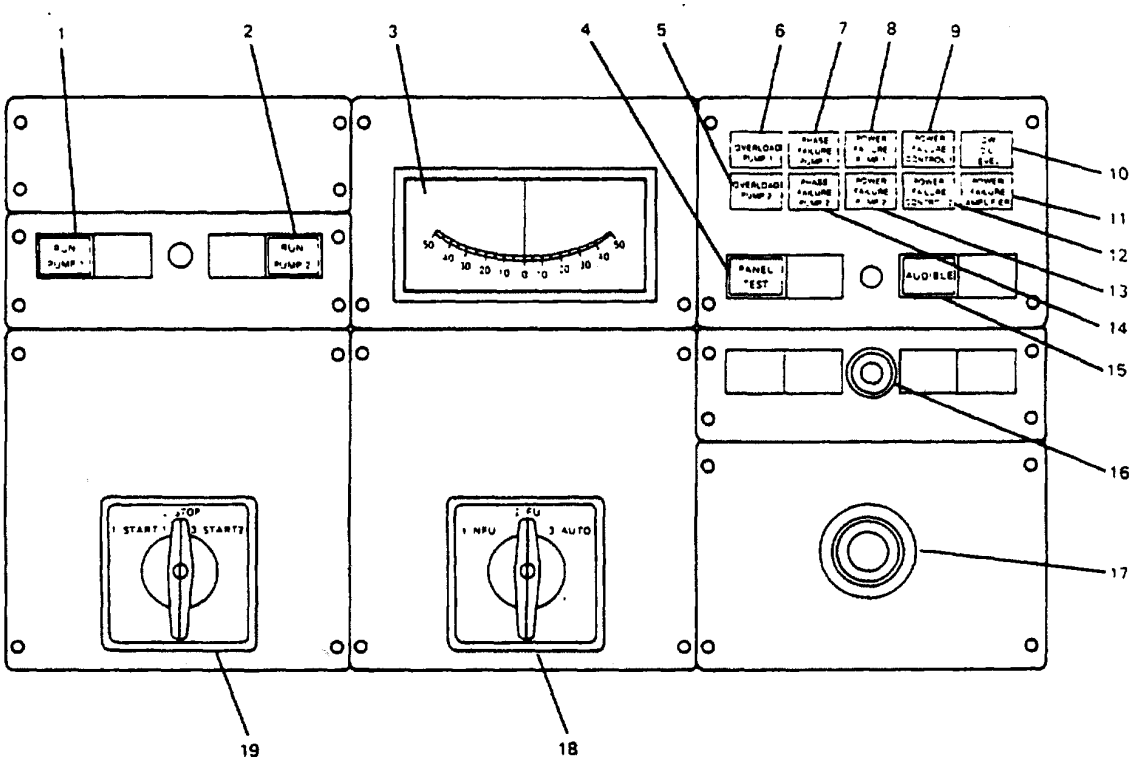
(6) Set START 1-STOP-START 2 switch (19) to START 1 or START 2 position.

1 The RUN PUMP 1 indicator (1) will light.

CAUTION

If any red indicator lights, or if alarm horn sounds, immediately shut down system and notify unit maintenance.

(7) Set NFU-FU-AUTO switch (18) to NFU position.



1. RUN PUMP 1 INDICATOR
2. RUN PUMP 2 INDICATOR
3. RUDDER ANGLE INDICATOR
4. PANEL TEST PUSHBUTTON
5. OVERLOAD PUMP 2 INDICATOR
6. OVERLOAD PUMP 1 INDICATOR
7. PHASE FAILURE PUMP 1 INDICATOR
8. SUPPLY BROKEN POWER 1
9. SUPPLY BROKEN CONTROL 1
10. LOW OIL LEVEL
11. SUPPLY BROKEN AMPLIFIER
12. SUPPLY BROKEN CONTROL 2
13. SUPPLY BROKEN POWER 2
14. PHASE FAILURE PUMP 2
15. AUDIBLE HORN
16. DIMMER CONTROL
17. COURSE SELECTOR
18. NFU-FU-AUTO SWITCH
19. START 1-STOP-START 2 SWITCH

Figure 2-243. Steering Control Panel.

WARNING

Do not operate rudders without obtaining proper authority. Ensure all personnel and equipment are clear of rudder areas and moving parts.

(8) Observe rudder operation as follows:

(a) Move COURSE SELECTOR joystick (17) to the left. Rudder will move to Port as shown on RUDDER ANGLE indicator (3).

(b) Move joystick (17) to the right. Rudder will move to Starboard as shown on RUDDER ANGLE indicator (3).

(9) *Set NFU-FFU-AUTO switch (18) to FFU position*. Observe rudder operation as follows:

(a) Turn helm (3, Figure 2-245) counter-clockwise. The rudders will move to Port as shown on RUDDER ANGLE indicator (3, Figure 2-243).

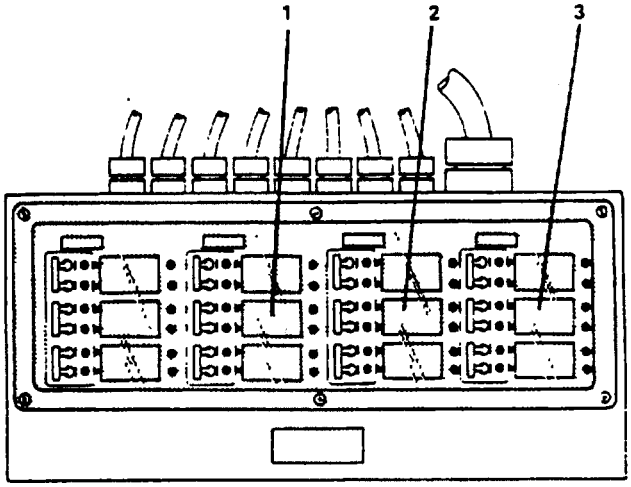
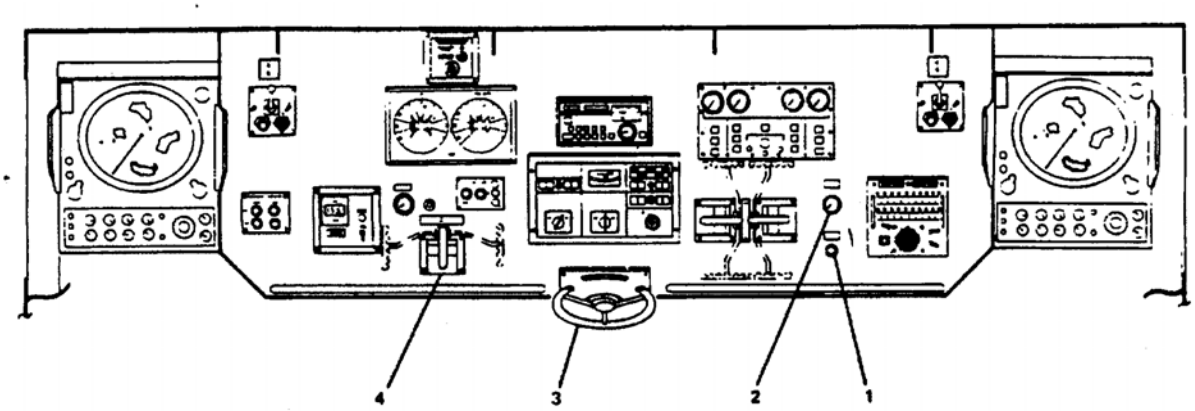


Figure 2-244. Radio Room DC Distribution Panel.

(b) Turn helm (3, Figure 2-245) clockwise. The rudder will move to Starboard as shown on RUDDER ANGLE indicator (3, Figure 2-243).



1. **CONTROL TRANSFER PLUNGER**
2. **CONTROL AIR PRESSURE GAUGE**
3. **HELM**
4. **BOW THRUSTER ENGINE THROTTLE**

Figure 2-245. Pilothouse Console

NOTE

Gyrocompass (paragraph 2-10) must be operational for autopilot operations.

d. *Autopilot Operation Set-Up*.

(1) *Alien electrical system*.

(a) *Autopilot control panel (Figure 2-246)*. Press HELMSMAN button (18).

NOTE

The information display will show INITIATION with the software version for 2 to 3 seconds, then the actual status.

(2) *Set autopilot parameters*.

(a) *Select steering compass and off course compass*.

1 Press COMPASS SELECT button (2) once.

2 Information display (4) shows currently selected steering compass.

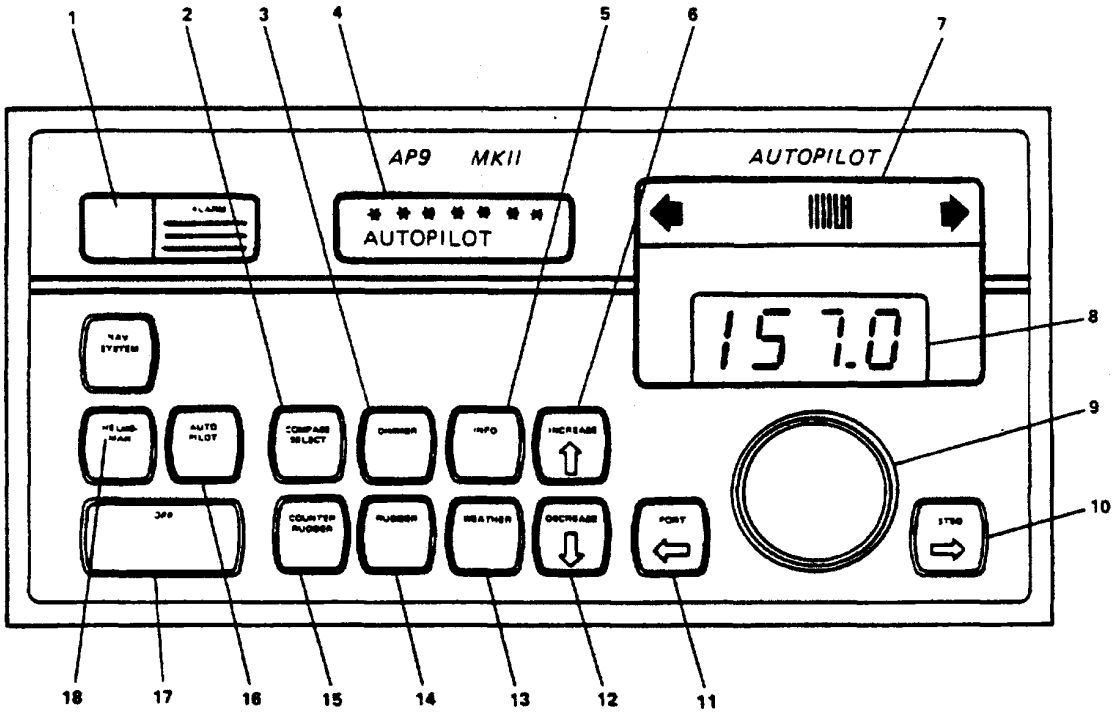
3 Press INCREASE (6) or DECREASE (12) button to select new steering compass.

4 Press COMPASS SELECT button (2) a second time.

5 Information display (4) shows currently selected off course compass.

6 Press INCREASE (6) or DECREASE (12) button to select new off course compass.

(b) *Adjust illumination of buttons and displays*.



1.	ALARM RESET	7.	BAR GRAPH DISPLAY	13.	WEATHER
2.	COMPASS SELECT	8.	HEADING DISPLAY	14.	RUDDER
3.	DIMMER	9.	COURSE SELECTOR	15.	COUNTER RUDDER
4.	INFORMATION DISPLAY	10.	STBD	16.	AUTOPILOT
5.	INFO	11.	PORT	17.	OFF
6.	INCREASE	12.	DECREASE	18.	HELMSMAN

Figure 2-246. Autopilot Control Panel

1 Press DIMMER button (3).

2 Press INCREASE button (6) or DECREASE button (12) as needed.

NOTE

In the information display the brightness level is represented by a number (0 to 0.8) in the heading display and also by a bar graph display.

(c) *Adjust RUDDER setting*.

1 Press RUDDER button (14).

2 Press INCREASE button (6) or DECREASE button (12) as needed.

NOTE

The RUDDER setting is dependent upon the size of tows (if any) and speed of vessel. Usually RUDDER setting increases with size of tows, and decreases as vessel speed increases.

(d) *Adjust COUNTER RUDDER setting*.

1 Press COUNTER RUDDER button (15).

2 Press INCREASE button (6) or DECREASE button (12) as needed.

CAUTION

A COUNTER RUDDER setting which is too high results in frequent adjustments (over-active rudder). Damage to autopilot system could result.

(e) *Adjust WEATHER setting*.

1 Press WEATHER button (13).

2 Press INCREASE button (6) or DECREASE button (12) as needed.

NOTE

- **WEATHER is a damping function which minimizes the influence of wave induced oscillations and yaw of the rudder command. In calm weather the value should be as low as possible, and should be increased with increasing wind/wave conditions.**
- **An increase of the WEATHER function decreases the COUNTER RUDDER function. Therefore, in the case of a following sea condition, where a quick and large COUNTER RUDDER function is necessary to keep the vessel on heading, the WEATHER value should be decreased to allow the autopilot to have the appropriate COUNTER RUDDER control.**

(f) *Adjust RUDDER LIMIT setting*.

CAUTION

The RUDDER LIMIT should always be set lower than the mechanical operating range of steering gear to avoid damage to steering gear.

1 Press INFO button (5). Current setting is shown in information display (4).

2 Press INCREASE button (6) or DECREASE button (12) as needed.

NOTE

- **RUDDER LIMIT setting determines the maximum limits of rudder movement in degrees from the midships position. The range of the setting is ± 3 to ± 55 degrees. From 3 to 20 degrees, the adjustments are in steps of 1 degree, and from 20 to 55 degrees, in steps of 5 degrees.**
- **As the autopilot has a rate of turn control that controls the rudder during major course changes, the RUDDER LIMIT setting should not be too low since this will influence the rate of turn function.**

- **Selected rudder limits also apply if a handsteering system, e.g., FU-steering levers, operates via the control unit.**

(g) *Adjust TURN RATE setting.*

1 Press INFO button (5). Current setting is shown in information display (4).

2 Press INCREASE button (6) or DECREASE button (12) as needed.

NOTE

The autopilot has an automatic rate of turn function that controls the vessel's rate of turn in degrees per second when a course change of more than 10 degrees is made by using the course selector. The turn rate is adjusted in steps of 0.2 degrees per second by pressing the INCREASE or DECREASE button. Range of settings is from 0.2 to 6.6 degrees.

(h) *Adjust OFFCOURSE LIMIT setting.*

1 Press INFO button (5). Current setting is shown on information display (4).

2 Press INCREASE button (6) or DECREASE button (12) as needed.

NOTE

The OFFCOURSE LIMIT setting determines the point at which an acoustic alarm sounds. The adjustable range is ± 3 to ± 35 degrees from midships position. From 3 to 10 degrees the adjustments are in steps of 1 degree, and from 10 to 35 degrees, in steps of 5 degrees.

(i) Adjust AUTOTRIM setting.

1 Press INFO button (5). Current setting is shown on information display (4).

2 Press INCREASE button (6) or DECREASE button (12) as needed.

NOTE

- **Where the vessel has a constant course error, due to external forces such as weather or drag, the AUTOTRIM function takes account of this by building up a constant rudder offset.**
- **The time factor that is selected when the AUTOTRIM parameter is adjusted is the time it takes to build up the rudder offset.**
- **The AUTOTRIM parameter is reset every time the AUTO PILOT button is pressed.**
- **When a course change is made, the AUTOTRIM function is disabled but Is automatically enabled when the vessel is within 10 degrees of the new course to steer.**
- **The AUTOTRIM parameter can be varied from 0 to 256 seconds, in steps of 8 seconds.**

(j) *Adjust GYRO ADJUST setting.*

NOTE

- **GYRO ADJUST will only appear in this info loop when a geared synchro or stepper gyro has been selected as steering compass using the COMPASS SELECT button.**
- **Check the calibration everytime the autopilot/gyro is turned on to match the autopilot heading and the gyro heading.**

1 Press INFO button (5). Current setting is shown on information display (4).

2 Press INCREASE button (6) or DECREASE button (12) as needed.

(k) *Adjust COMP DIFF and OFFCOURSE LIMIT settings.*

1 Press INFO button (5). The current compass difference is shown on information display (4).

2 Press INCREASE button (6) to cancel any difference between compass readings.

3 Press INCREASE button (6) or DECREASE button (12) as needed to set OFFCOURSE LIMIT.

NOTE

- **When two compasses are used, there is almost always a difference between the readings. This difference can vary with the vessel's heading and from one to another while underway.**
- **The difference between the two compass readings is automatically reset when the COMP DIFF alarm is given and the ALARM RESET button is pressed.**

e. *HELMSMAN Mode Operation*.

NOTE

- **In HELMSMAN mode, the autopilot operates as a compass repeater, giving a digital display of actual heading on information display.**
- **In this mode, the vessel is steered manually, using the helm, to the desired course heading.**

f. *Autopilot Mode Operation*.

(1) On steering control panel (Figure 2-243), set NFU-FU-AUTO switch (18) to AUTO position.

(a) Information display (4, Figure 2-246) displays AUTOPILOT.

NOTE

Autopilot automatically selects actual HEADING as course to steer.

(2) Course-to-steer is displayed digitally on HEADING display (8).

(3) If minor adjustment (1 to 5 degrees) of course-to-steer is required, press PORT button (11) or STBD button (10) as needed.

(4) If major adjustment (6 or more degrees) of course-to-steer is required, press down and turn COURSE SELECTOR (9) in desired direction until desired course-to-steer is displayed on HEADING display (8).

g. *Remote Station Operations*.

(1) *Autopilot control panel*. The autopilot control panel must be turned on and parameters set in accordance with paragraph d, Autopilot Operation Set-up, above.

NOTE

If a fault occurs in the remote station while the remote station is in command, control is transferred to the autopilot control panel by turning the autopilot control panel OFF and then ON.

(2) *Remote station control*.

(a) Set NFU-FFU-AUTO switch (18, Figure 2-243) to NFU position to enable transfer command to remote station.

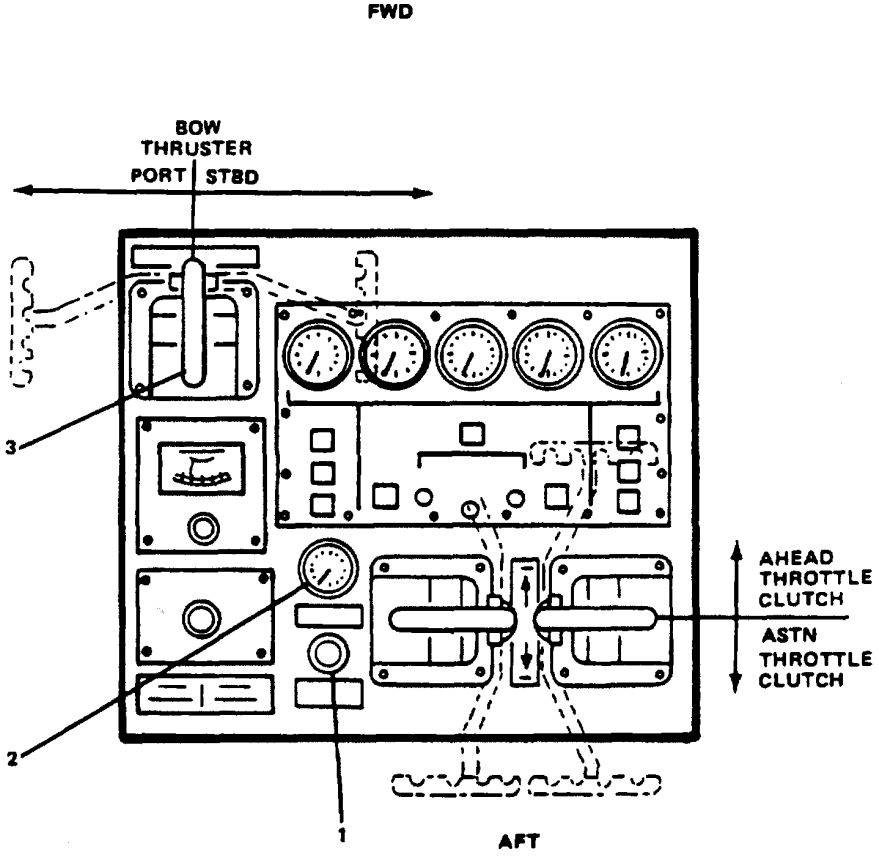
(b) On autopilot control panel in pilot-house console, the information display (4, Figure 2-246) will display STAND BY and the HEADING display (8) will display actual ship heading.

NOTE

The WEATHER setting selected from any control unit is transferred to all control units.

(c) To take command at an auxiliary control station (Figure 2-247) pull up on station COMMAND TRANSFER plunger (1) until CONTROL AIR PRESSURE gauge (2) indicates 100 psi. Release transfer switch (1); command is transferred to that station.

h. *Remote Station Shutdown*. Control is transferred to pilothouse by pulling up on station COMMAND TRANSFER plunger (1) until CONTRL AIR PRESSURE gauge (2) indicates 100 psi. Release COMMAND TRANSFER plunger (1); command is transferred to pilothouse.



1. COMMAND TRANSFER PLUNGER
2. CONTROL AIR PRESSURE GAUGE
3. BOW THRUSTER ENGINE THROTTLE

Figure 2-247. Auxiliary Control Station.

2-14. Bow Thruster.

a. *Align Fuel Oil Service System (Figure 2-248)*. Open the following valves:

(1) FO-13, F.O. ERV. SUCT., PORT (9).

(2) FO-30, F.O. PLY TO BOW THRUSTER ENG, (3).

(3) FO-33, F.O. RTN. TO DAY TK. PORT (1).

(4) Fuel oil filter inlet and outlet valves.

b. *Align Cooling Water System (Figure 2-248)*. Open the following valves:

(1) AE-28, SEA CHEST VENT (2).

(2) ASW-17, SEA SUCT S.W. COOLING (8).

(3) ASW-18, S.W. TO BOW THRUSTER ENG. (5).

(4) ASW-21, S.W. FR. BOW THRUSTER ENG. TO OVBD DISCH. (6).

(5) ASW-22, OVBD DISCH., S.W. COOLING (7).

c. *Align Compressed Air System (Figure 2-248)*. Open the following valves:

(1) CA-5, STG AIR TO BOW THRUSTER ENG. (4).

(2) CA-62 gauge valve.

d. *Set Controls for Starting Engine*.

(1) *Pilothouse console (Figure 2-245).*

(a) Ensure BOW THRUSTER ENGINE throttle (4) is in NEUTRAL (CENTER) position (straight up).

(b) Ensure COMMAND TRANSFER plunger (1 Figure 2-247) is in disengaged (DOWN) position.

(2) *Auxiliary control stations (Figure 2-247).*

(a) Ensure BOW THRUSTER ENGINE throttle (3) is in NEUTRAL (CENTER) position (straight up).

(b) Ensure COMMAND TRANSFER plunger (1) is in disengaged (DOWN) position.

(3) *Enclosed operating station (EOS) console (Figure 2-249)*. Ensure CONTROL AIR TRANSFER valve (1) is in REMOTE (DOWN) position.

(4) *Machinery DC Control Distribution Panel (Figure 2-250)*.

1 Set BOW THRSTR DR ENG circuit breaker (1) to ON position.

e. *Start Bow Thruster Engine*.

(1) Check engine oil and heat exchanger water.

(2) Turn START/STOP pushbutton (4, Figure 2-251) clockwise to release pushbutton to OUT position.

(3) In local (locked) position, move governor control lever (6) to about half engine speed position (approximately straight up).

NOTE

On BOW THRUSTER ENG STG AIR PRESS gauge, air pressure must be 100 to 120 psi to operate properly.

CAUTION

Do not crank engine for more than 30 seconds. Damage to starter motor and/or engine could result.

(4) Push OFF-RUN-START toggle switch (5) to start (UP) position.

(5) As soon as engine starts, release start switch (5) (switch is spring loaded and will return to RUN position).

CAUTION

Oil pressure should rise within 15 seconds after engine starts. If oil pressure does not rise, stop the engine immediately to prevent damage and refer problem to unit maintenance.

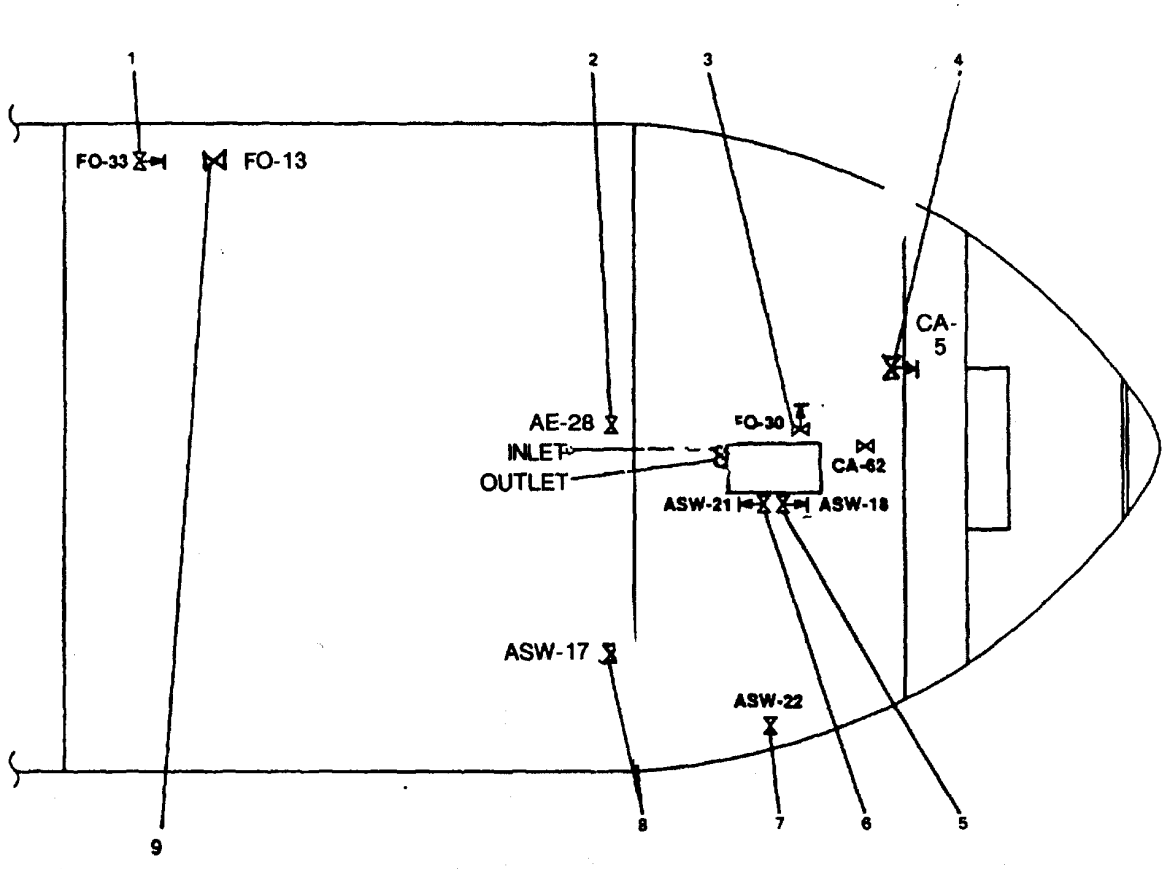
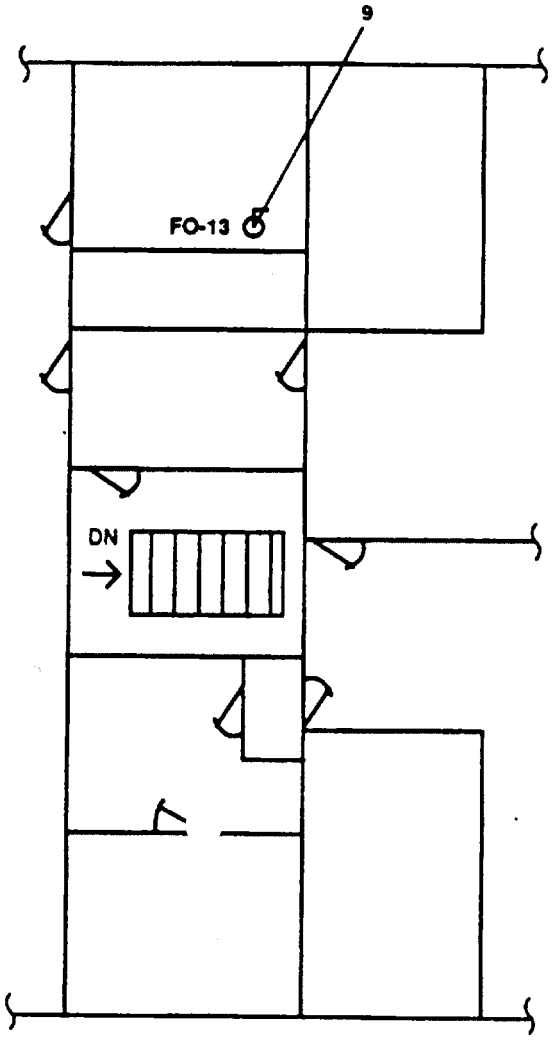


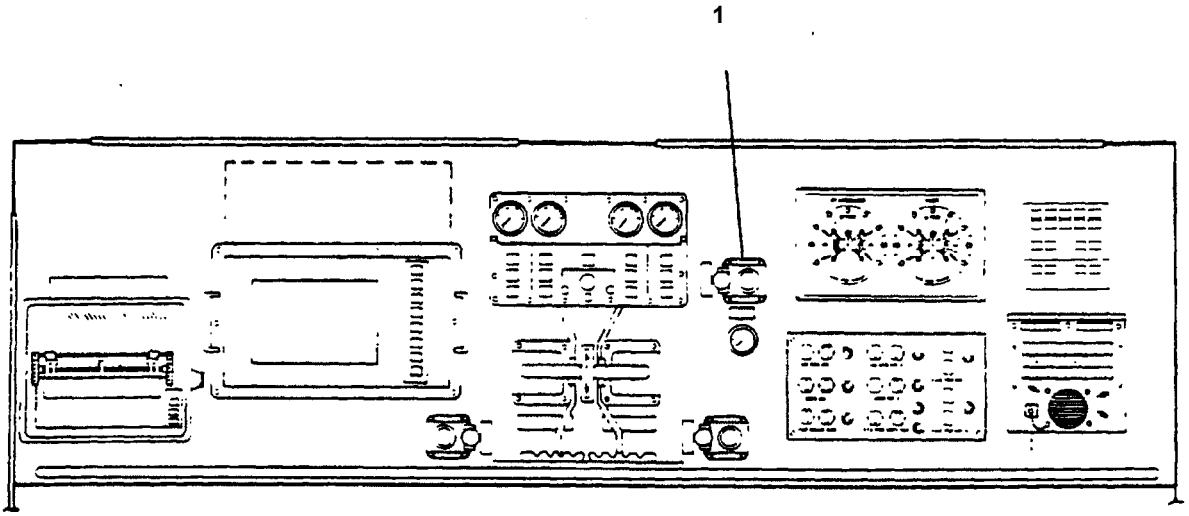
Figure 2-248. Bow Thruster Valve Locations (Sheet 1 of 2).



MAIN DECK

1. FO-33, F.O. RTN. TO DAY TK. PORT
2. AE-28, SEA CHEST VENT
3. FO-30, F.O. PLY TO BOW THRUSTER ENG.
4. CA-5, STG AIR BOW THRUSTER ENG.
5. ASW-18, S.W. TO BOW THRUSTER ENG.
6. ASW-21, S.W. FR. BOW THRUSTER ENG. TO OVRBD DISCH.
7. ASW-22, OVBD DISCH. S.W. COOLING
8. ASW-17, SEA SUCT, S.W. COOLING
9. FO-13, F.O. SERV. SUCT., PORT

Figure 2-248. Bow Thruster Valve Locations (Sheet 2 of 2).



1. CONTROL AIR TRANSFER

Figure 2-249. Enclosed Operating Station (EOS) Console.

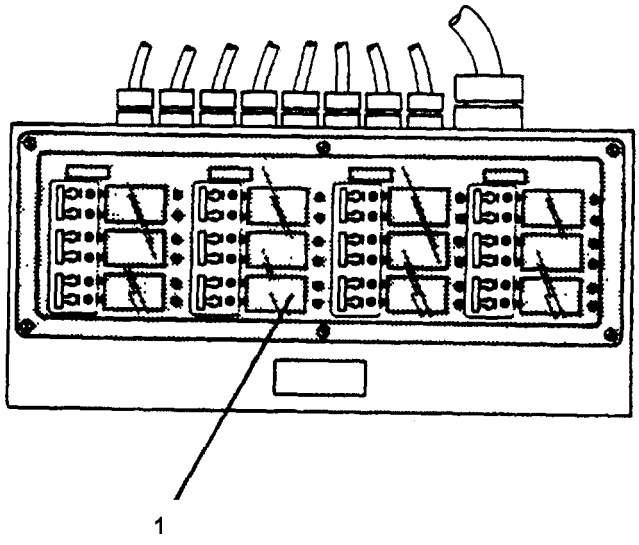


Figure 2-250. Machinery DC Control Distribution Panel.

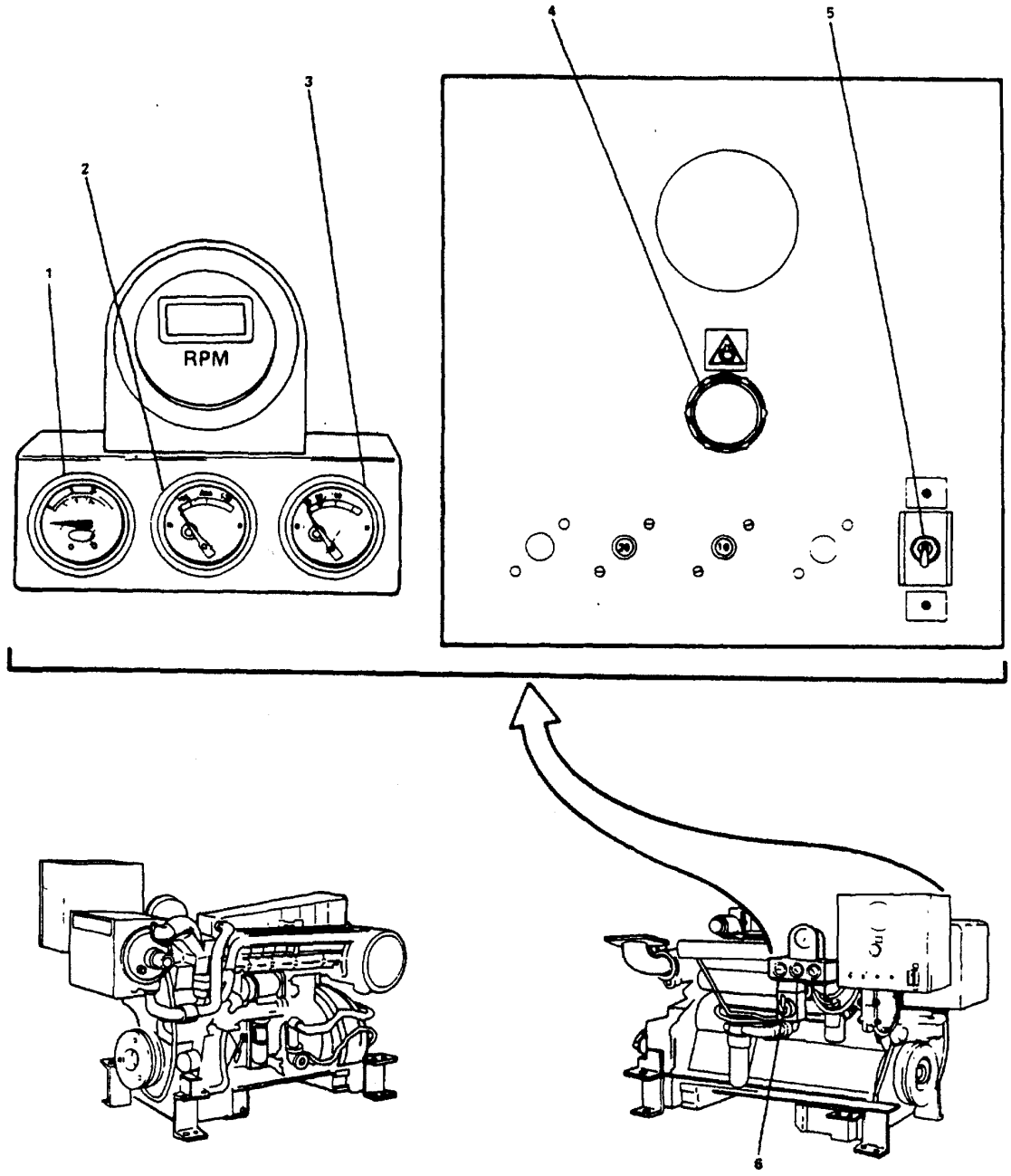


Figure 2-251. Bow Thruster Engine Controls.

(6) Allow engine to idle 3 to 5 minutes, or until LUBE OIL PRESSURE gauge (2) indicates 35 to 70 psi.

(7) Operate engine at low load until all systems reach operating temperatures. Check all gauges (1, 2, and 3) during the warm-up period.

(8) Position shaft brake plunger to down position to engage brake.

(9) Pull shaft brake plunger up to rotate shaft freely.

f. *Operate Bow Thruster (from Local Controls)*. Position governor control lever throttle (6) for local or remote operation.

g. *Shut Down Bow Thruster*.

(1) Place governor control lever (6) in idle position (local control and locked).

(2) Operate engine at low idle for 5 minutes.

(3) Set OFF-RUN-START switch (5) to OFF position or push governor control lever (6) (aft direction) until engine stops.

(4) Push in START/STOP pushbutton (4).

2-15. Tank Level Indicator System.

a. *Align Electrical System.*

(1) On engine room emergency distribution panel no. 1 (Figure 2-252). Set TLI SYSTEM circuit breaker (1) to ON position.

(2) On master tank level indicator receiver panels (Figure 2-254). Set ON-OFF switch (4) to ON position.

NOTE

POWER indicator will light.

b. *Fluid Level Monitoring Procedures.*

(1) Monitoring at primary receiver modules (Figure 2-253) . Observe fluid level meter (1) to determine fluid level.

(2) Monitoring at receiver panels (Figure 2-254).

(a) Locate fluid level meter (1) of tank to be monitored.

(b) Observe fluid level meter (1) to determine fluid level.

c. Alarm Monitoring Procedure at Receiver Panel. When alarm sounds:

(1) On receiver panel (Figure 2-254), pull out and press down ALARM SILENCE switch (5) and release.

(2) Observe indicator lights (2) and (3) to determine cause of alarm.

NOTE

Indicators will remain lit until alarm condition is corrected.

(3) Take necessary action in accordance with this section to correct the condition.

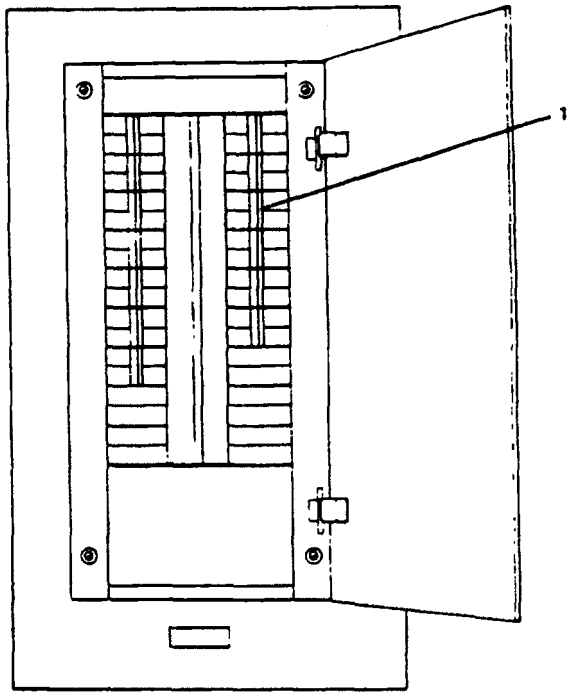
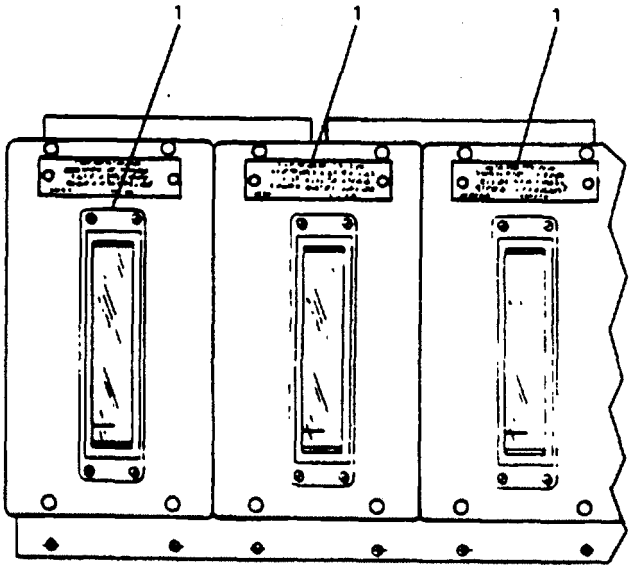


Figure 2-252. Engine Room Emergency Distribution Panel No. 1.



1. EDGEVIEW METER

Figure 2-253. Receiver Module.

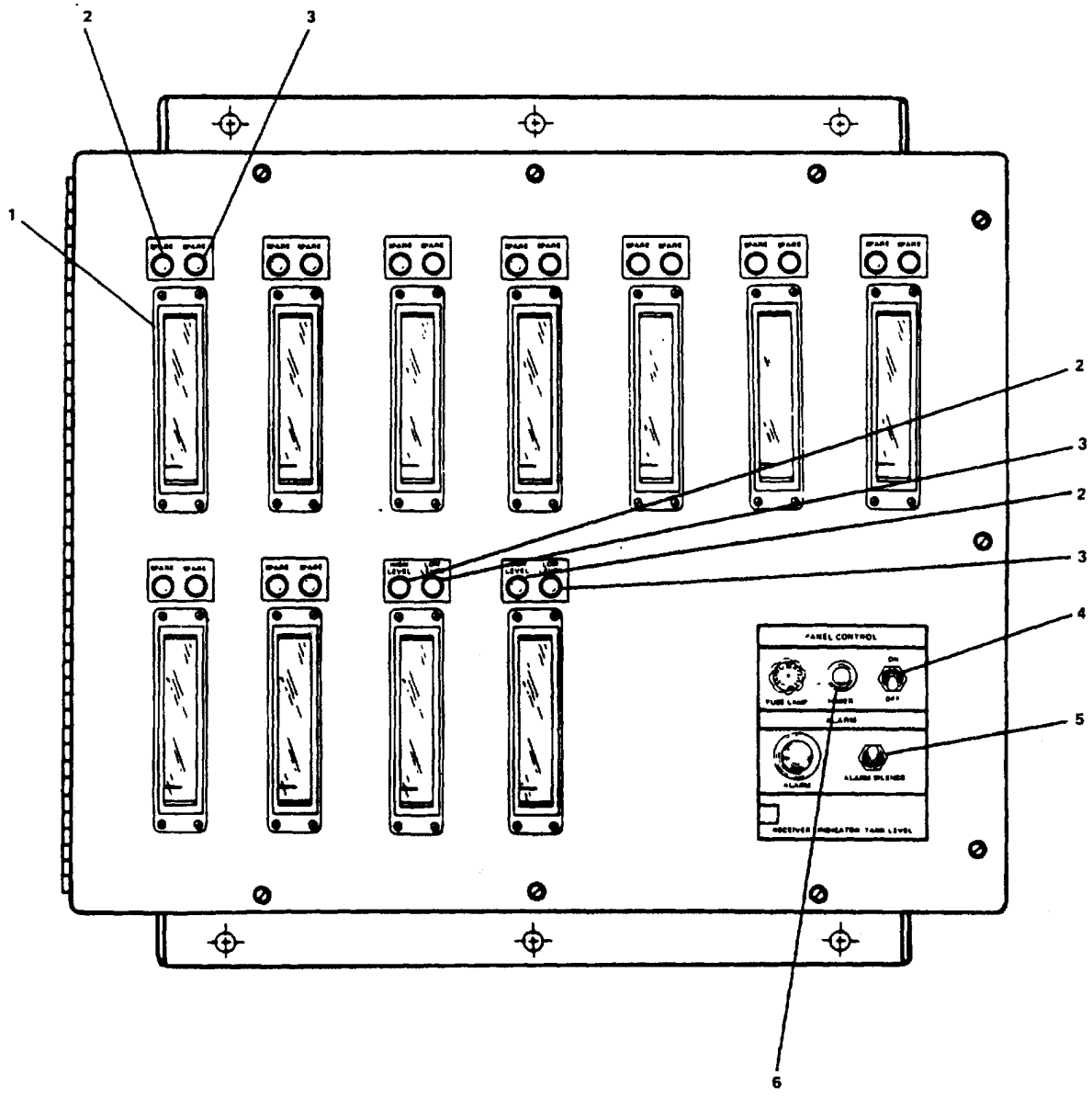


Figure 2-254. Master Tank Level Indicator Receiver Panel.

2-16. Bilge/Ballast Piping System.

a. *Fill Ballast Tanks.*

(1) Align electrical system.

(a) Main switchboard (Figure 2-255). Set BILGE PUMP #2 circuit breaker (1) to ON position.

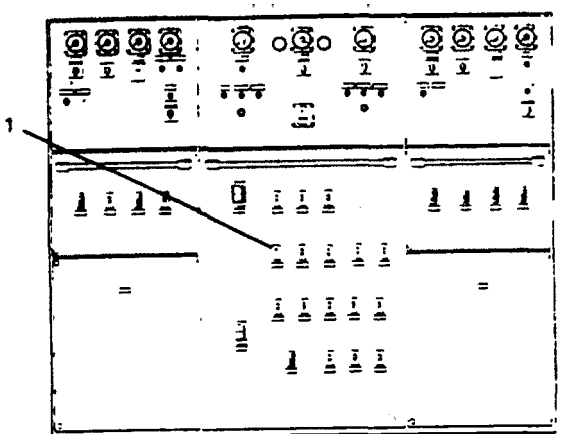


Figure 2-255. Main Switchboard.

(b) *Emergency switchboard (Figure 2-256).* Set BILGE PUMP #1 circuit breaker (1) to ON position.

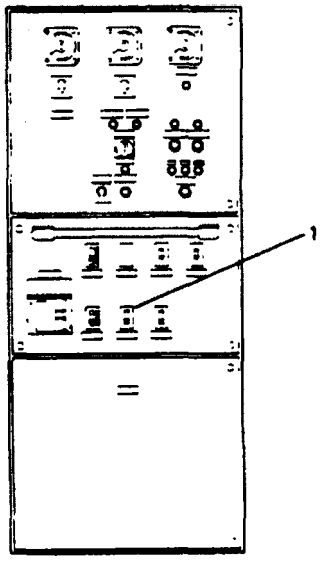
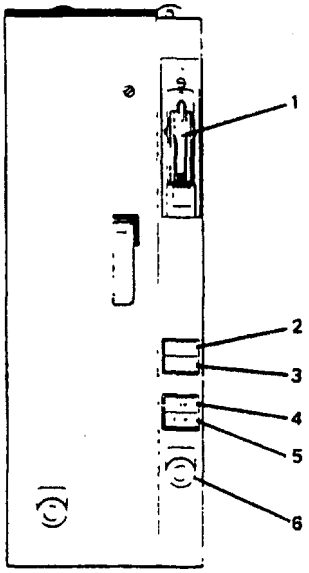


Figure 2-256. Emergency Switchboard.

(c) *Bilge pump no. 1 and no. 2 motor controllers (Figure 2-257).*

1 Set ON-OFF switch (1) to ON position on each motor controller.

2 POWER AVAILABLE indicator (2) will light.



1. ON-OFF SWITCH
2. POWER AVAILABLE INDICATOR
3. MOTOR RUN INDICATOR
4. START PUSHBUTTON
5. STOP PUSHBUTTON
6. LOCAL-REMOTE SWITCH

Figure 2-257. Bilge Pump Motor Controller.

(d) *Tank level indicators.* Ensure tank level indicator receiver modules are operational (see paragraph 2-15).

(2) *Align piping system (Figure 2-258).*

(a) Open AE-29, SEACHEST VENT (28).

(b) Open FM-2, SEA SUCT. FIRE/G.S. AND BLST PMPS. (29).

(c) Open FM-3, S.W. TO BILGE/BLST. PMPS. (4).

(d) Close BB-25, BLST. MANE. TO PMPS. OUTLT (3).

(e) Open BB-26, B/B PMP. NO. 1 BLST. SUCT. (18).

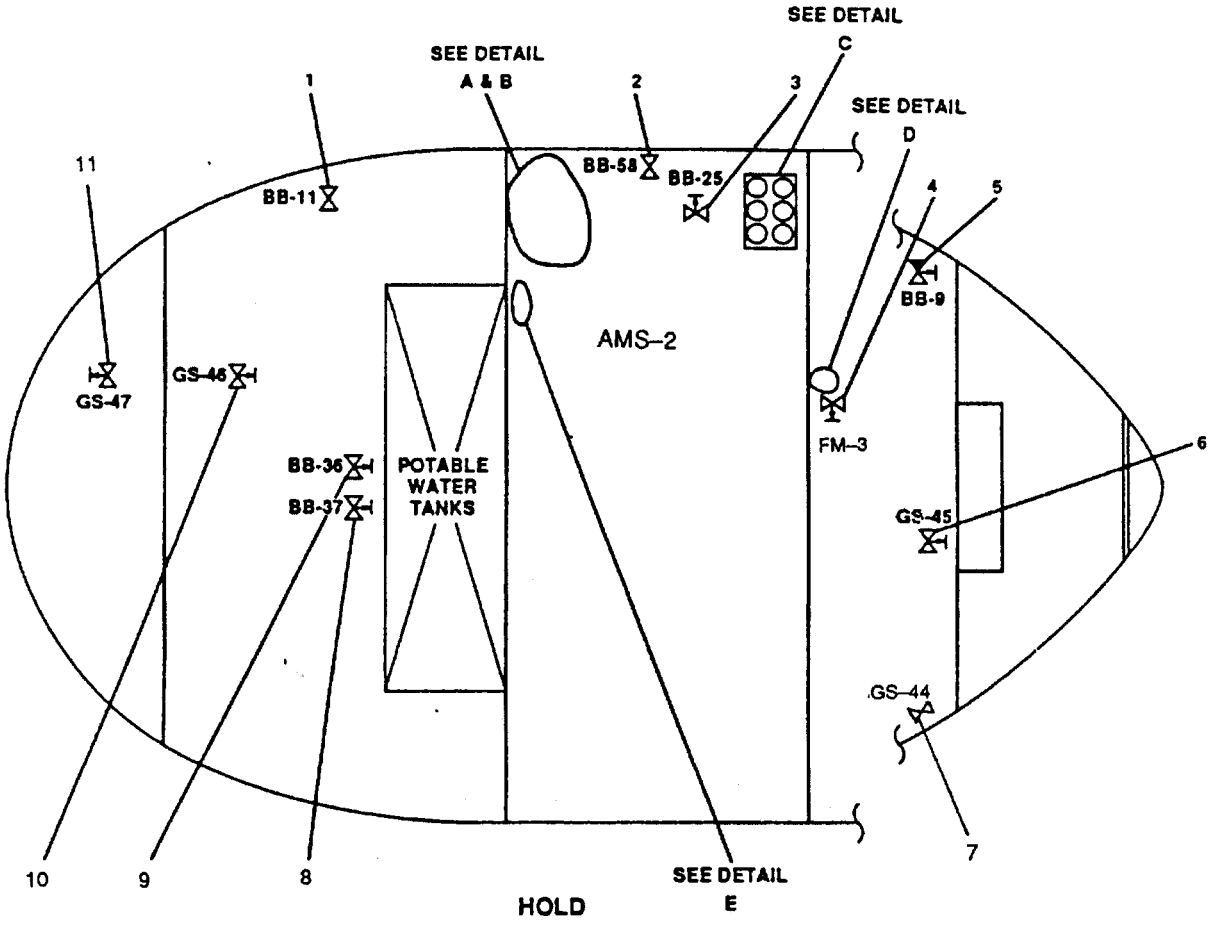
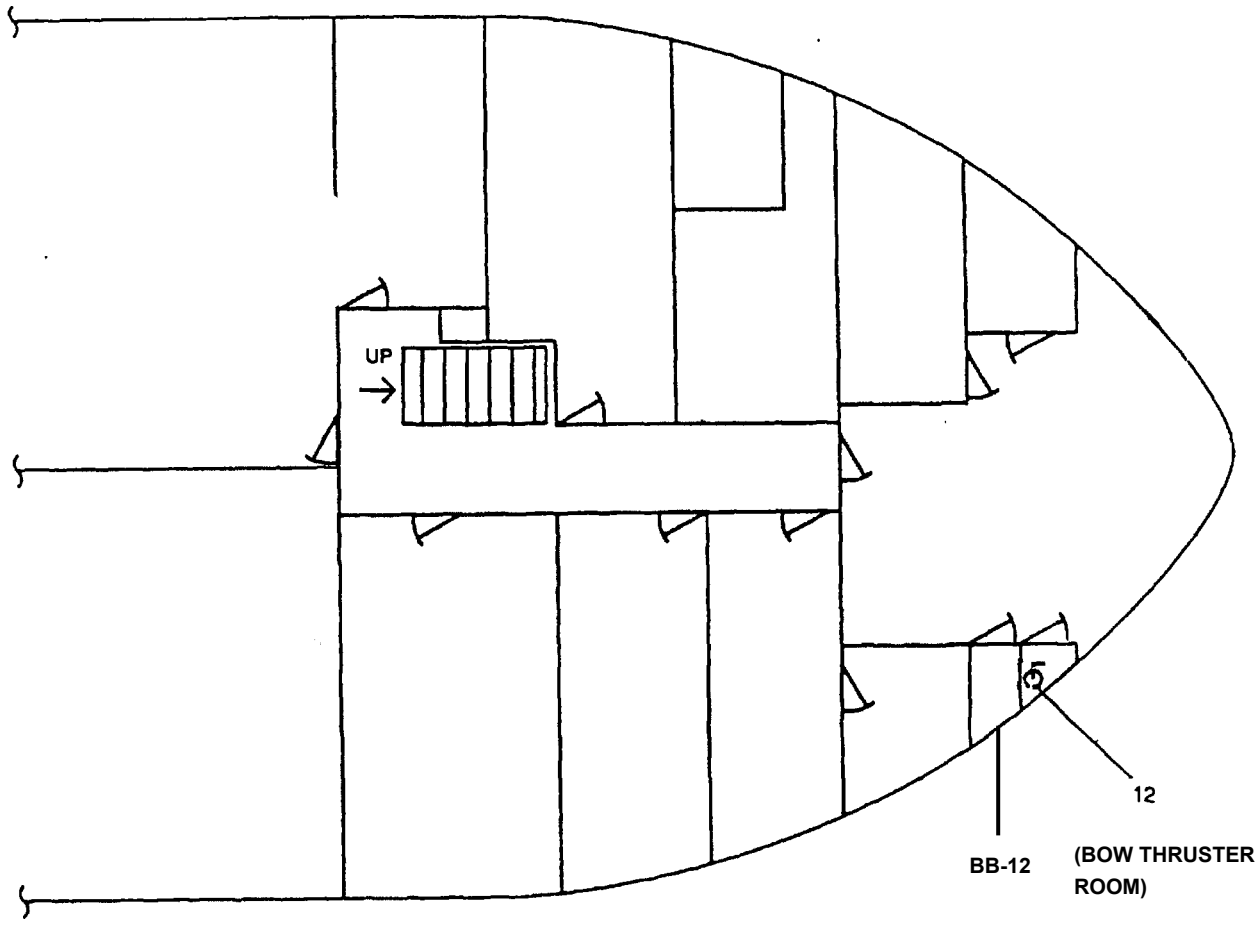
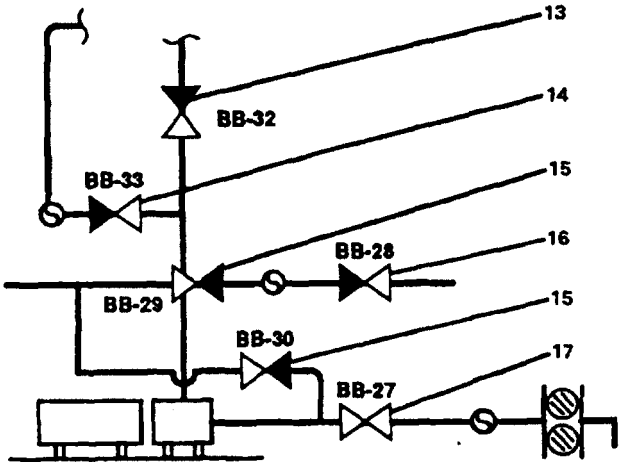


Figure 2-258. Bilge/Ballast System Valve Locations (Sheet 1 of 6).



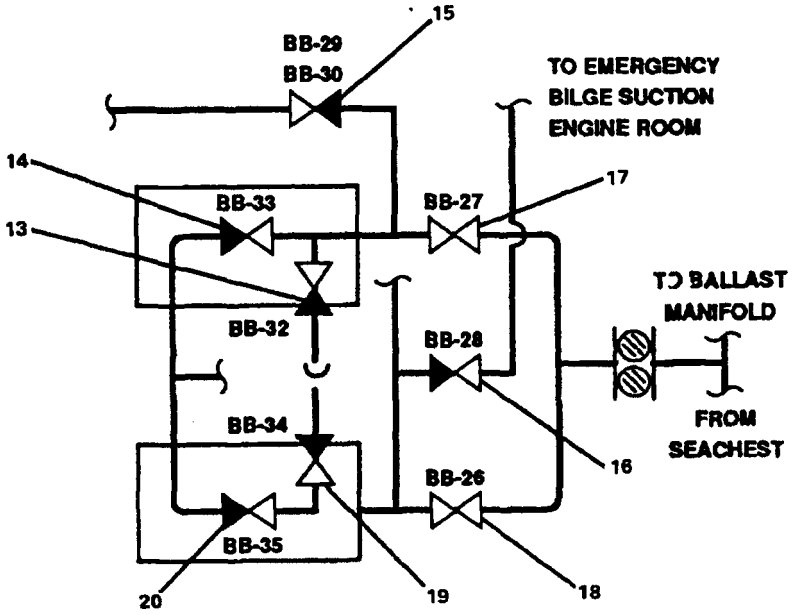
MAIN DECK

Figure 2-258. Bilge/Ballast System Valve Locations (Sheet 2 of 6).



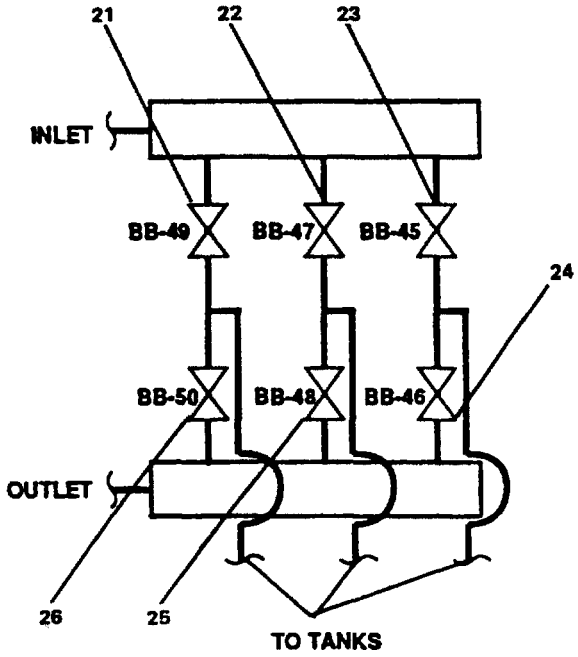
DECK LEVEL

DETAIL A

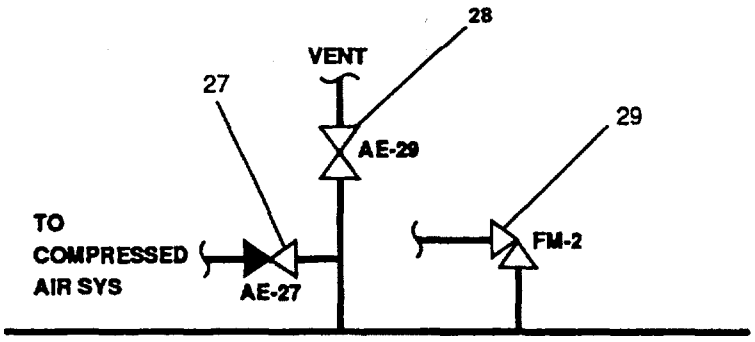


DETAIL B

Figure 2-258. Bilge/Ballast System Valve Locations (Sheet 3 of 6).

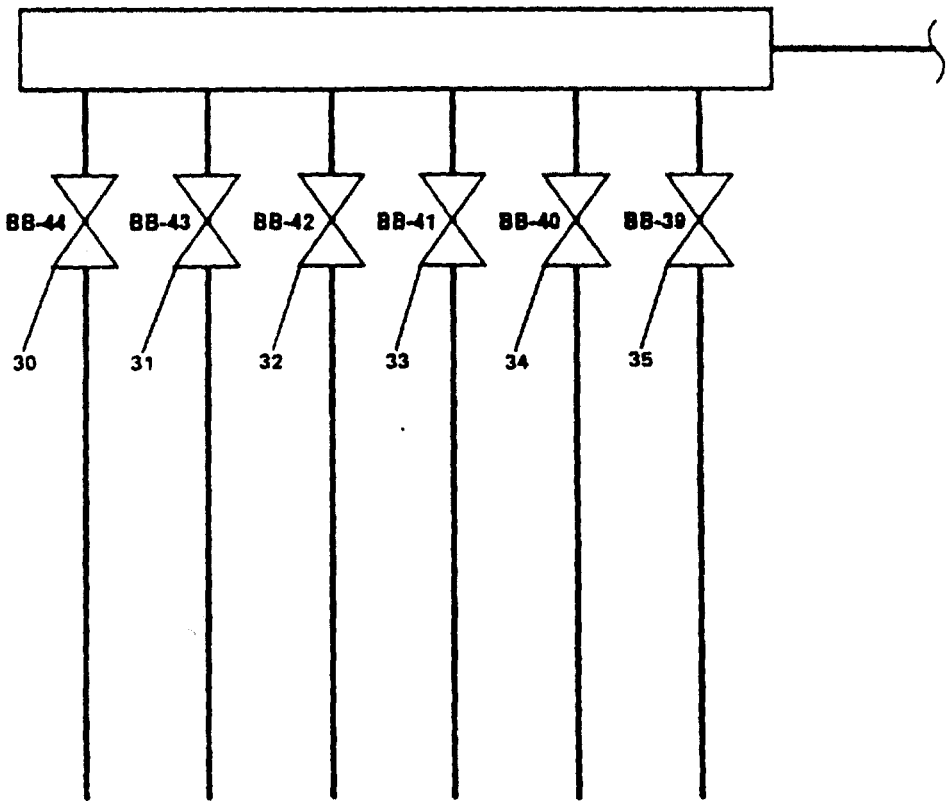


BALLAST MANIFOLD
(LOOKING AFT)
DETAIL C



DETAIL D

Figure 2-258. Bilge/Ballast System Valve Locations (Sheet 4 of 6).



BILGE MANIFOLD

DETAIL E

Figure 2-258. Bilge/Ballast System Valve Locations (Sheet 5 of 6).

1. BB-11, OVBD. DISCH BILGE EDUC.
2. BB-58, BILGE/BALLAST OVBD DISCH
3. BB-25, BLST MANF TO PMPS OUTLT
4. FM-3, SW TO BLST PMPS
5. BB-9, OVBD DISCH BILGE EDUC
6. GS-45, BILGE EDUC
7. GS-44, BILGE EDUC.
8. BB-37, BILGE EDUCT SUCT COV
9. BB-36, BILGE EDUCT SUCT COV
10. GS-46, BILGE EDUC
11. GS-47, BILGE EDUC
12. BB-12, BLST TK NO. 1 SUCT COV
13. BB-32, B/B PMP NO. 2 OVBD DISCH
14. BB-33, B/B PMP NO. 2 BLST TO MANF
15. (ABOVE) BB-29, B/B PMP NO. 1 BILGE SUCT
    (BELOW) BB-30, B/B PMP NO. 2 BILGE SUCT
16. BB-28, BILGE - ENG RM INDT SUCT.
17. BB-27, B/B PMP NO. 2 BLST SUCT
18. BB-26, B/B PMP NO. 1 BLST SUCT
19. BB-34, B/B PMP NO. 1 OVBD DISCH
20. BB-35, B/B PMP NO. 1 BLST TO MANF
21. BB-49, BLST. TK. NO. 1 FILL
22. BB-47, BLST. TK. NO. 2P FILL
23. BB-45, BLST. TK. NO. 2S FILL
24. BB-46, BLST. TK. NO. 2S SUCT.
25. BB-48, BLST. TK. NO. 2P SUCT.
26. BB-50, BLST. TK. NO. 1 SUCT.
27. AE-27
28. AE-29, SEA CHEST VENT
29. FM-2, SEA SUCT, FF PMP
30. BB-44, BILGE SUCT. - STBD SHAFT ALLEY
31. BB-43, BILGE SUCT. - PORT SHAFT ALLEY
32. BB-42, BILGE SUCT. - ENG. RM. STBD.
33. BB-41, BILGE SUCT. - ENG. RM. PORT
34. BB-40, BILGE SUCT. - A.M.S. NO. 1 STBD
35. BB-39, BILGE SUCT. - A.M.S. NO. 1 PORT

Figure 2-258. Bilge/Ballast System Valve Locations (Sheet 6 of 6).

(f) Open B/B-27, B/B PMP. NO. 2 BLST. SUCT. (17).

(g) Close B/B-30, B/B PMP. NO. 2 BILGE SUCT. (15, BELOW).

(h) Close B/B-29, B/B PMP NO. 1 BILGE SUCT. (15, ABOVE).

(i) Close B/B-34, B/B PMP. NO. 1 OVBD. DISCH. (19).

(j) Close B/B-32, B/B PMP NO. 2 OVBD. DISCH. (13).

(k) Open B/B-33, B/B PMP. NO. 2 BLST. TO MANF. (14).

(l) Open B/B-35, B/B PMP. NO. 1 BLST. TO MANF. (20).

(3) *Select tanks to be filled*.

(a) *SW-1*.

1 Open B/B-12, BLST. TK. NO. 1 SUCT. COV (12).

2 Open B/B-49, BLST. TK. NO. 1 FILL (21).

(b) *SW-2P*. Open B/B-47, BLST. TK. NO. 2P FILL (22).

(c) *SW-2S*. Open B/B-45, BLST. TK. NO. 2S FILL (23).

(4) *Start pumps*.

(a) On bilge pumps no. 1 and no. 2 motor controllers, set LOCAL-REMOTE switch (6, Figure 2-257) to LOCAL position.

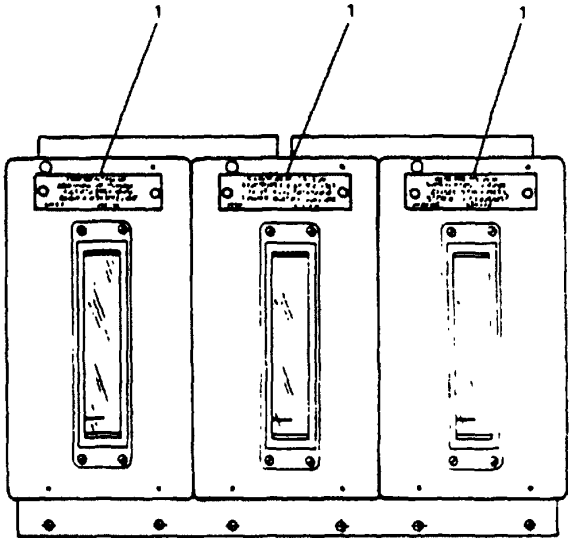
(b) On bilge pumps no. 1 and no. 2 motor controllers, press START pushbutton (4) and release.

(c) MOTOR RUN indicator (3) will light.

(5) *Observe pump discharge pressure gauges*. Observe pump discharge pressure gauges.

NOTE

On BILGE/BALLAST PMP #1 and #2 DISCH PRESS gauges, reading should be 10 to 20 psi.



1. EDGEVIEW METER

Figure 2-259. TLI Receiver Module.

(6) *Observe level meter*. On TLI receiver module (Figure 2-259) of tank being filled, observe edgeview level meter (1). When tank reaches desired level, proceed.

(7) *Stop pumps*. On bilge pumps no. 1 and no. 2 motor controllers (Figure 2-257), press STOP pushbutton (5) and release.

(a) MOTOR RUN indicator (3) will go out.

(8) Secure piping system (Figure 2-258).

(a) On ballast manifold, close all valves (21 through 26).

(b) If SW-1 was filled, close BB-12 (12).

(c) Close the following valves:

1 B/B-35, B/B PMP. NO. 1 BLST. TO MANF. (20).

2 B/B-33, B/B PMP. NO. 2 BLST. TO MANF. (14).

3 B/B-27, B/B PMP. NO. 2 BLST. SUCT. (17).

4 FM-3, SW TO BILGE/BLST. PMPS. (4).

5 FM-2, SEA SUCT. FIRE/G. S. AND BLST. PMPS. (29).

(9) *Secure electrical system*.

(a) *Bilge pumps no. 1 and no. 2 motor controllers (Figure 2-257)*.Set ON-OFF switch (1) to OFF position on motor controller.

(b) POWER AVAILABLE indicator (2) will go out.

(c) *Main switchboard (Figure 2-255)*. Set BILGE PUMP #2 circuit breaker (1) to OFF position.

(d) *Emergency switchboard (Figure 2-256)*. Set BILGE PUMP #1 circuit breaker (1) to OFF position.

b. *Deballast Ballast Tanks.*

(1) *Align electrical system*.

(a) *Main switchboard (Figure 2-255)*. Set BILGE PUMP #2 circuit breaker (1) to ON position.

(b) *Emergency switchboard (Figure 2-256)*. Set BILGE PUMP #1 circuit breaker (1) to ON position.

(c) *Bilge pumps no. 1 and no. 2 motor controllers (Figure 2-257)*. Set ON-OFF switch (1) to ON position. Set LOCAL-REMOTE switch (6) to LOCAL position.

(d) POWER AVAILABLE indicator (2) will light.

(e) *Tank Level indicators*. Ensure tank level indicators are operational (see paragraph 2-15).

(2) *Align piping system (Figure 2-258)*.

(a) Close FM-3, SW TO BILGE/BLST. PMPS. (4).

(b) Open B/B-25, BLST. MANF. TO PMPS. OUTLT (3).

(c) Open B/B-26, B/B PMP NO. 1 BLST. SUCT. (18).

(d) Open B/B-27, B/B PMP. NO. 2 BLST. SUCT. (17).

(e) Open B/B-34, B/B PMP. NO. 1 OVBD. DISCH. (19).

(f) Open B/B-32, B/B PMP. NO. 2 OVBD. DISCH. (13).

(g) Close B/B-33, B/B PMP. NO. 2 BLST. TO MANF. (14).

(h) Close B/B-35, B/B PMP. NO. 1 BLST. TO MANF. (20).

(i) Open B/B-58, BILGE/BALLAST OVBD DISCH (2).

(3) *Select tank to be deballasted*

(a) *SW-1*.

1 Open B/B-12, BLST. TK. NO. 1 SUCT. COV (12).

2 Open B/B-50, BLST. TK. NO. 1 SUCT. (26).

(b) *SW-2P*. Open B/B-48, BLST. TK. NO. 2P SUCT. (25).

(c) *SW-2S*. Open B/B-46, BLST. TK. NO. 2S SUCT. (24).

(4) *Start pumps*. On bilge pumps no. 1 and no. 2 motor controllers (Figure 2-257), press START pushbutton (4) and release.

(a) MOTOR RUN light (3) will light.

(5) *Observe pump discharge pressure gauges*. Observe pump discharge pressure gauges.

NOTE

On BILGE/BALLAST PMP #1 and #2 DISCH PRESS gauges, reading should be 10 to 20 psi.

(6) *Observe level meter*. On TLI receiver module (Figure 2-259) of tank being emptied, observe edgeview level meter (1). When tank reaches desired level, proceed.

(7) *Stop pumps*. On bilge pumps no. 1 and no. 2 motor controllers (Figure 2-257), press STOP pushbutton (5) and release.

(a) MOTOR RUN light (3) will go out.

(8) *Secure piping system (Figure 2-258)*.

(a) On ballast manifold, close all valves.

(b) If SW-1 was deballasted, close B/B-12, BLST. TK. NO. 1 SUCT. COV (12).

(c) Close the following valves:

1 B/B-32, B/B PMP. NO. 2 OVBD. DISCH. (13).

2 B/B-34, B/B PMP. NO 1 OVBD. DISCH. (19).

3 B/B-27, B/B PMP. NO 2 BLST, SUCT. (17).

4 B/B-26, B/B PMP. NO. 1 BLST. SUCT. (18).

5 B/B-25, BLST. MANF TO PMPS. OUTLT (3).

(9) *Secure electrical system*.

(a) *Bilge pump no. 1 and no. 2 motor controllers (Figure 2-257)*. Set ON-OFF switch (1) to OFF position on each motor controller.

NOTE

POWER AVAILABLE light will go out.

(b) *Emergency switchboard (Figure 2-256)*. Set BILGE PUMP #1 circuit breaker (1) to OFF position.

(c) *Main switchboard (Figure 2-257)*. Set BILGE PUMP #2 circuit breaker (1) to OFF position

c. Bilge System Operations.

(1) *AFT steering compartment (Figure 2-258)*.

(a) Pressurize fire main and general service system (see paragraph 2-8).

(b) Open GS-47, BILGE EDUC. (11)

(c) Ensure B/B-11, OVBD. DISCH. BILGE EDUC. (1) is open.

(d) When bilge pumping is complete, close GS-47, BILGE EDUC. (11).

(2) *Towing gear locker (Figure 2-258)*.

(a) Pressurize fire main and general service system (see paragraph 2-8).

NOTE

Open on one BILGE EDUCT. at a time.

(b) Open B/B-36 (PORT), BILGE EDUCT. SUCT. COV (9).

(c) Open B/B-37 (STBD), BILGE EDUCT. SUCT. COV (8).

(d) Open B/B-11, OVBD. DISCH BILGE EDUC. (1).

(e) Open GS-46, BILGE EDUC. (10).

(f) When bilge pumping is complete:

1 Close GS-46, BILGE EDUC. (10).

2 Close B/B-11, OVBD. DISCH BILGE EDUC. (1).

3 Close B/B-37, BILGE EDUCT. SUCT. COV (8).

4 Close B/B-36, BILGE EDUCT. SUCT. COV (9).

(3) *Bow thruster compartment (Figure 2-258)*.

(a) Pressurize fire main and general service system (see paragraph 2-8).

(b) Open B/B-9, OVBD. DISCH. BILGE EDUC. (5).

(c) Open GS-45, BILGE EDUC. (6).

(d) When bilge pumping is complete, close GS-45, BILGE EDUC. (6).

(4) *Chain locker (Figure 2-258)*.

(a) Pressurize fire main and general service system (see paragraph 2-8).

(b) Open GS-44, BILGE EDUC. (7).

(c) Open B/B-9, OVBD. DISCH. BILGE EDUC. (5).

(d) When chain locker pumping is complete, close GS-44, BILGE EDUC. (7).

(5) *Machinery spaces bilge system*. To pump clear (not containing oil) water from bilges of engine room and AMS 1 and 2, proceed as follows:

CAUTION

Pumping oily water overboard could result in fines and/or legal action. When in doubt, follow the procedures for oily bilge water in paragraph d, Oily Bilge Water Pumping below.

(a) *Align electrical system*.

1 *Main switchboard (Figure 2-255)*. Set BILGE PUMP #2 circuit breaker (1) to ON position.

2 *Emergency switchboard (Figure 2-256)*. Set BILGE PUMP #1 circuit breaker (1) to ON position.

3 *Bilge pumps no. 1 and no. 2 motor controllers (Figure 2-257)*. Set ON-OFF switch (1) to ON position.

4 POWER AVAILABLE indicator (2) will light.

(b) *Align piping system (Figure 2-258)*.

1 Close B/B-26, B/B PMP NO. 1 BLST. SUCT. (18).

2 Close B/B-27, B/B PMP. NO. 2 BLST. SUCT. (17).

3 Close B/B-33, B/B PMP. NO. 2 BLST. TO MANF. (14).

4 Close B/B-35, B/B PMP. NO. 1 BLST. TO MANF. (20).

5 Open B/B-34, B/B PMP. NO. 1 OVBD. DISCH. (19).

6 Open B/B-32, B/B PMP. NO. 2 OVBD. DISCH. (13).

7 Open /BB-29, B/B PMP. NO. 1 BILGE SUCT. (15, ABOVE).

8 Open B/B-30, B/B PMP. NO. 2 BILGE SUCT. (15, BELOW).

9 Open B/B-58, BILGE/BALLAST OVBD DISCH (2).

10 On bilge manifold, open valve(s) (30 through 35) for bilge(s) to be pumped.

NOTE

Prime BILGE/BALLAST and pumps before starting pumps.

11 Open priming eductor discharge valve (1).

12 Open air supply valve to eductor.

NOTE

Observe vacuum bilge suction strainer diff pressure gauge (approx. 5-10 inches). Shut down when reading on discharge pressure gauge is steady.

(c) *Start pumps*. On bilge pumps no. 1 and no. 2 motor controllers (Figure 2-257), press START pushbutton (4) and release.

1 MOTOR RUN indicator (3) will light.

(d) *Observe strainer differential pressure gauge*. Reading should be between 0 and 10 psi.

(e) *Observe pump discharge pressure gauges*. Reading should be 10 to 40 psi.

(f) *Stop pumps*. When bilge pumping is complete, on bilge pumps no. 1 and no. 2 motor controllers (Figure 2-257), press STOP pushbutton (5) and release.

1 MOTOR RUN indicator (3) will go out.

(g) *Secure piping system (Figure 2-258)*.

1 On bilge manifold, close all valves (30 through 35).

2 Close B/B-58, BILGE/BALLAST OVBD DISCH (2).

3 Close B/B-32, B/B PMP. NO. 2 OVBD. DISCH. (1-3).

4 Close B/B-34, B/B PMP. NO. 2 OVBD DISCH. (19).

5 Close B/B-29, B/B PMP. NO. 1 BILGE SUCT. (15, ABOVE).

(h) *Secure electrical system*.

1 Bilge pumps no. 1 and no. 2 motor controllers (Figure 2-257). Set ON-OFF switch (1) to OFF position.

2 POWER AVAILABLE indicator (2) will go out.

3 Emergency switchboard (Figure 2-256). Set BILGE PUMP #1 circuit breaker (1) to OFF position.

4 Main switchboard (Figure 2-255). Set BILGE PUMP #2 circuit breaker (1) to OFF position.

d. Oily Bilge Water Pumping. To pump water from bilge of engine room and AMS 1, proceed as follows:

(1) *Align compressed air system*. Ensure compressed air system is operational; if not, refer to paragraph 2-7.

(2) *Align piping system (Figure 2-260)*. Select bilges to be pumped as follows:

(a) *AMS 1*.

NOTE

SUCT BELL MOUTH must be below liquid level in bilge that suction is taken. Only open bilge valve that suction is to be taken from.

1 Open OB-1, OILY BILGE SUCT (4).

2 Open OB-2, OILY BILGE SUCT (3).

(b) *Engine room*.

1 Open OB-5, OILY BILGE SUCT. ENG. RM. (8).

2 Open OB-6, OILY BILGE SUCT. ENG. RM. (1).

(c) *AMS 2*.

1 Open OB-3, OILY BILGE SUCT. SFT ALY (9).

2 Open OB-4, OILY BILGE SUCT. SFT ALY (2).

(d) *Isolate shore connection*. Close OB-9, OILY BILGE PMP. DISCH TO SHORE (14).

(e) *Select bilge pumping*.

1 Close OB-13, OILY WST. STOR. TK. TO OILY BILGE PMP. SUCT. (17).

2 Open OB-14, COV OILY BILGE PMP (16).

3 Open OB-8, OILY BILGE PMP DISCH. TO OILY WST. STOR. TK. (15).

4 Open OB-17, OILY WST STOR. INLET (19).

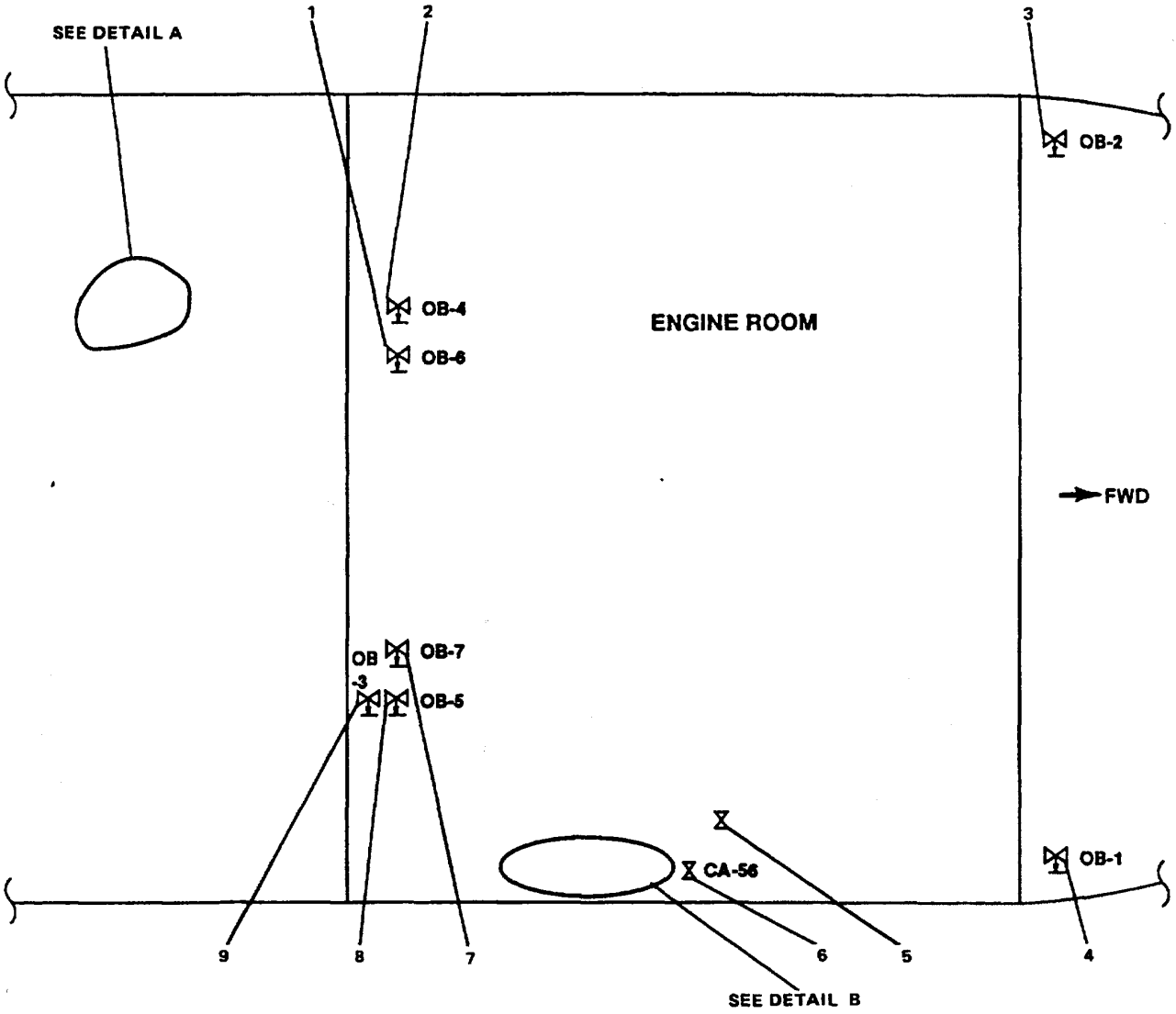


Figure 2-260. Oily Bilge Piping System Valve Locations (Sheet 1 of 4).

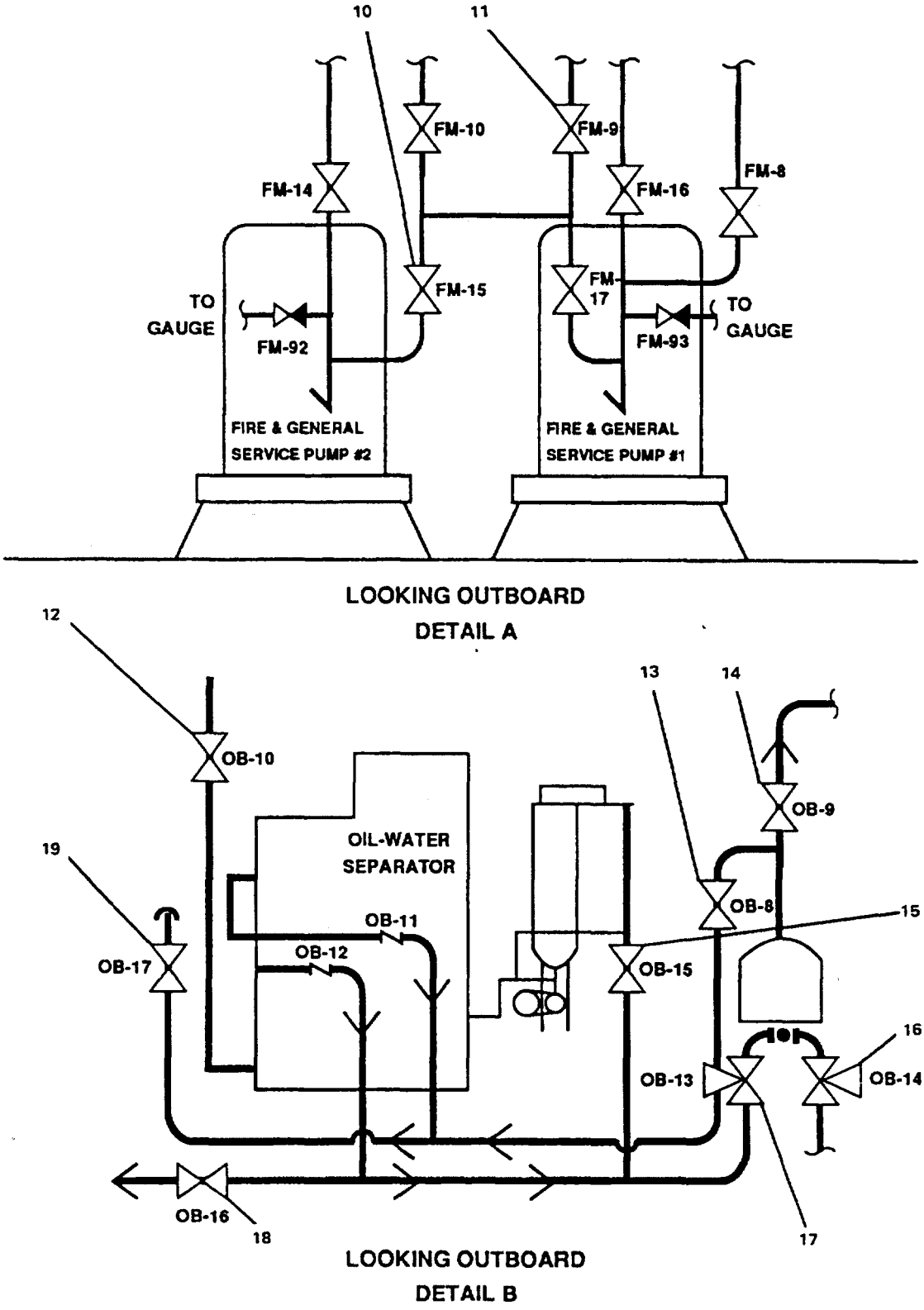
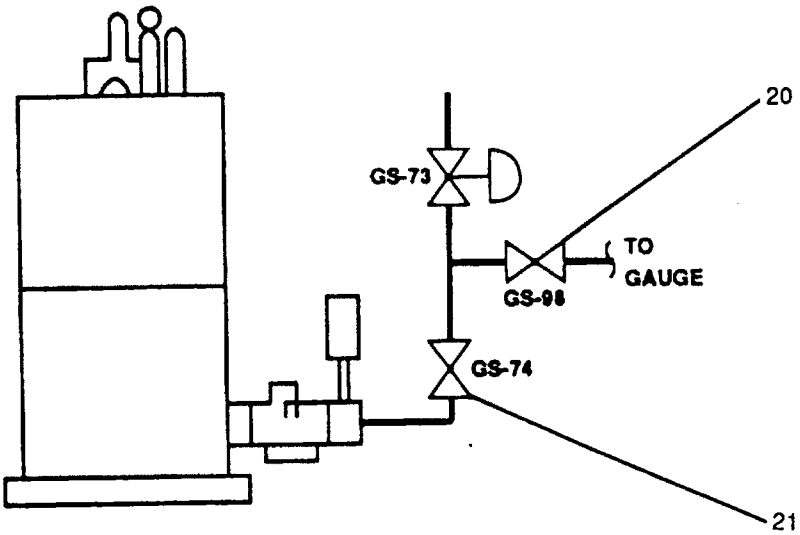
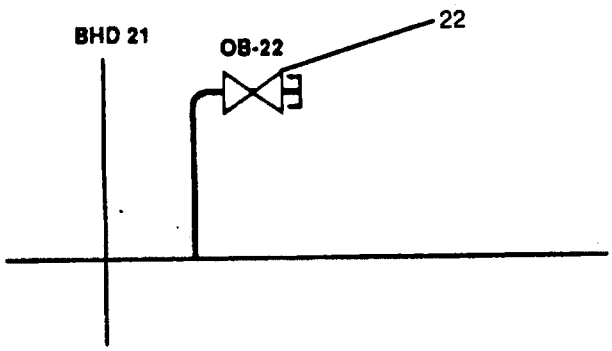


Figure 2-260. Oily Bilge Piping System Valve Locations (Sheet 2 of 4).



ENGINE ROOM

DETAIL C



MAIN DECK

DETAIL D

Figure 2-260. Oily Bilge Piping System Valve Locations (Sheet 3 of 4).

1. OB-6, OILY BILGE SUCT ENG RM
2. OB-4, OILY BILGE SUCT SFT ALY
3. OB-2, OILY BILGE SUCT
4. OB-1, OILY BILGE SUCT
5. AIR SUPPLY REGULATOR PRESS GAUGE
6. CA-56, SSA TO OILY BILGE PMP COV
7. OB-7, OILY DR TK SUCT
8. OB-5, OILY BILGE SUCT ENG RM
9. OB-3, OILY BILGE SUCT SFT ALY
10. FM-15, FIRE/GS PMP NO. 2 DISCH TO GS
11. FM-9, GENL SERV PRESS RED VLV MAN BYPASS
12. OB-10, OILY WTR SEP OVBD DISCH
13. OB-8, OILY BILGE PMP DISCH TO OILY WST STOR TK
14. OB-9, OILY BILGE PMP DISCH TO SHORE
15. OB-15, OILY WTR SEP INLET
16. OB-14, COV - OILY BILGE PMP
17. OB-13, OILY WST STOR TK TO OILY BILGE PMP SUCT
18. OB-16, OILY WST STOR TK SUCT
19. OB-17, OILY WST STOR INLET
20. GS-98
21. GS-74, OILY WTR SEP SPLY
22. OB-22, COV - SHORE CONN

Figure 2-260. Oily Bilge Piping System Valve Locations (Sheet 4 of 4).

(3) *Start pump*. Open CA-56, COV OILY BILGE PMP SUCT (5).

CAUTION

Air supply regulator pressure gauge should not read above 90 psi.

(4) *Observe OILY BILGE XFR PMP STRNR DIFF PRESS gauge*. Differential reading should be between 0 and 15 psi.

(5) *Observe OILY BILGE XFR PMP DISCH PRESS gauge*. Discharge reading should be between 0 and 20 psi.

(6) *Stop pump*. When bilge pumping is complete, close CA-56 (6).

(7) *Secure piping system*. Close the following valves:

(a) OB-17, OILY WST STOR. INLET (19).

(b) OB-8, OILY BILGE PMP DISCH. TO OILY WST. STOR. TK. (13).

(c) OB-14, COV-OILY BILGE PMP. (16).

(d) OB-4, OILY BILGE SUCT SFT ALY (2).

(e) OB-3, OILY BILGE SUCT. SHAFT ALLEY (9).

(f) OB-6, OILY BILGE SUCT, ENG RM.

(g) OB-5, OILY BILGE SUCT. ENG RM. (8)

(h) OB-2, OILY BILGE SUCT (3).

(i) OB-1, OILY BILGE SUCT (4).

e. *Transfer Oily Water from Drain Tank to Storage Tank*.

(1) *Align compressed air system*. Ensure compressed air system is operational; if not, refer to paragraph 2-7.

(2) *Align piping system (Figure 2-260)*. Align valves as follows:

(a) Open OB-7, OILY DR. TK. SUCT. (7).

(b) Open OB-14, COV OILY BILGE PMP.

(c) Close OB-13, OILY WST, STOR. TK. TO OILY BILGE PMP. SUCT. (17).

(d) Close OB-9, OILY BILGE PMP DISCH TO SHORE (14).

(e) Open OB-8, OILY BILGE PMP DISCH. TO OILY WST. STOR. TK. (13).

(f) Open OB-17, OILY WST STOR. INLET (19).

(3) *Tank level indicators*. Ensure tank level indicators in EOS and engine room tanks are operational (refer to paragraph 2-15).

(4) *Start pump*. Open CA-56, COV OILY BILGE PMP SUCT (6).

CAUTION

Air supply regulator pressure gauge should not read above 90 psi.

(5) *Observe OILY BILGE XFR PMP STRNR DIFF PRESS gauge*. Differential reading should be between 0 and 15 psi.

(6) *Observe OILY BILGE XFR PMP DISCH PREP gauge*. Discharge reading should be between zero and 20 psi.

(7) *Stop pump*. When oily waste storage tank reaches desired level, close CA-56, COV OILY BILGE PMP SUCT (6).

(8) *Secure piping system*. *Close* the following valves:

(a) OB-17, OILY WST STOR. INLET (19).

(b) OB-8, OILY BILGE PMP DISCH. TO OILY WST STOR TK (13).

(c) OB-14, COV OILY BILGE PMP (16).

(d) OB-7, OILY DR. TK. SUCT. (7).

f. *Pump Contents of Tanks to Shore*.

(1) *Align compressed air system*. Ensure compressed air system is operational; if not, refer to paragraph 2-7.

(2) *Align Piping system (Figure 2-260)*. Align valves as follows:

(a) Make connection to shore facility at oily waste shore connection.

(b) Open OB-22, COV SHORE CONN. (22).

(c) Open OB-9, OILY BILGE PMP. DISCH TO SHORE (14).

(d) Close OB-8, OILY BILGE PMP DISCH. TO OILY WST. STOR. TK. (13).

(e) Oily *waste drain tank*. To pump out oily waste drain tank proceed as follows:

1 Open OB-7, OILY DR. TK. SUCT. (7).

2 Open OB-14, COV-OILY BILGE PMP (16).

3 Close OB-13, OILY WST. STOR, TK. TO OILY BILGE PMP. SUCT. (17).

(f) Oily *waste storage tank*. To pump out oily waste storage tank proceed as follows:

1 Close OB-14, COV OILY BILGE PMP (16).

2 Open OB-13, OILY WST. STOR. TK. TO OILY BILGE PMP. SUCT. (17).

3 Open OB-16, OILY WST STOR, TK. SUCT. (18).

(3) *Tank level indicators*. Ensure tank level indicators are operational (refer to paragraph 2-15).

(4) *Start pump (Figure 2-260)*. Open CA-56, COV OILY BILGE PMP SUCT (6).

CAUTION

Air supply regulator pressure gauge should not read above 90 psi.

(5) *Observe OILY BILGE XFR PMP STRNR DIFF PRESS gauge*. Differential reading should be between 0 and 15 psi.

(6) *Observe OILY BILGE XFR PMP DISCH PRESS gauge*. Discharge reading should be between 0 and 20 *psi.*

(7) *Stop pump*. When selected tank is empty, proceed as follows:

(a) Close CA-56, COV OILY BILGE SUCT (6).

(b) Close OB-22, COV SHORE CONN. (22).

(8) *Secure piping system*. Close the following valves:

(a) If oily waste storage tank was pumped out:

1 OB-16, OILY WST STOR. TK. SUCT. (18).

2 OB-13, OILY WST. STOR. TK. TO OILY BILGE PMP. SUCT. (17).

(b) If oily waste drain tank was pumped out:

1 OB-14, COV OILY BILGE (16).

2 OB-7, OILY DR. TK. SUCT. (7),

(c) OB-9, OILY BILGE PMP. DISCH TO SHORE (14).

(d) Disconnect hose at oily waste shore connection.

g. *Oily Water Separator*.

(1) *Normal operation*.

(a) *Align electrical system*. On engine room distribution panel no. 4 (Figure 2-261), set OILY WATER SEPARATOR circuit breaker (1) to ON position.

(b) *Align piping system*. (Figure 2-260).

1 Open OB-16, OILY WST STOR. TK. SUCT. (17).

2 Close OB-13, OILY WST. STOR. TK. TO OILY BILGE PMP. SUCT. (16).

3 Open OB-15, OILY WTR. SEP. INLET (14).

4 Open OB-10, OILY WTR. SEP. OVBD. DISCH. (11).

5 Open OB-17, OILY WST. STOR. INLET (18).

(c) *Setup oily water separator*.

1 Close VIA, INLET BYPASS (3, Figure 2-263).

2 Open V2A, OIL DISCHARGE ISOLATION (4).

3 Open V8, ISOLATION/FLOW CONTROL (12).

4 Close V14, SAMPLE PETCOCK (9).

5 Close V11, OIL CONTENT MONITOR FLUSHING INLET (10).

6 Open GS-74, OILY WATER SEP. SPLY. (21).

7 Open OB-7, OILY DR. TK. SUCT. (7).

NOTE

S. W. to OILY WATER SEP. PRESS GAUGE should indicate 15 psi.

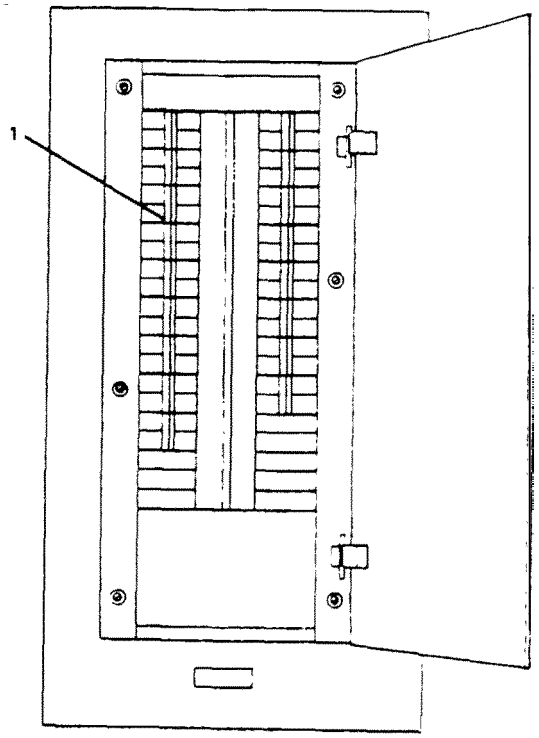


Figure 2-261. Engine Room Distribution Panel No. 4.

(d) *Operate separator (Figure 2-262).*

1 Set SYSTEM AUTO-OFF-MAN switch (2) to MAN position.

2 POWER indicator (1) will light.

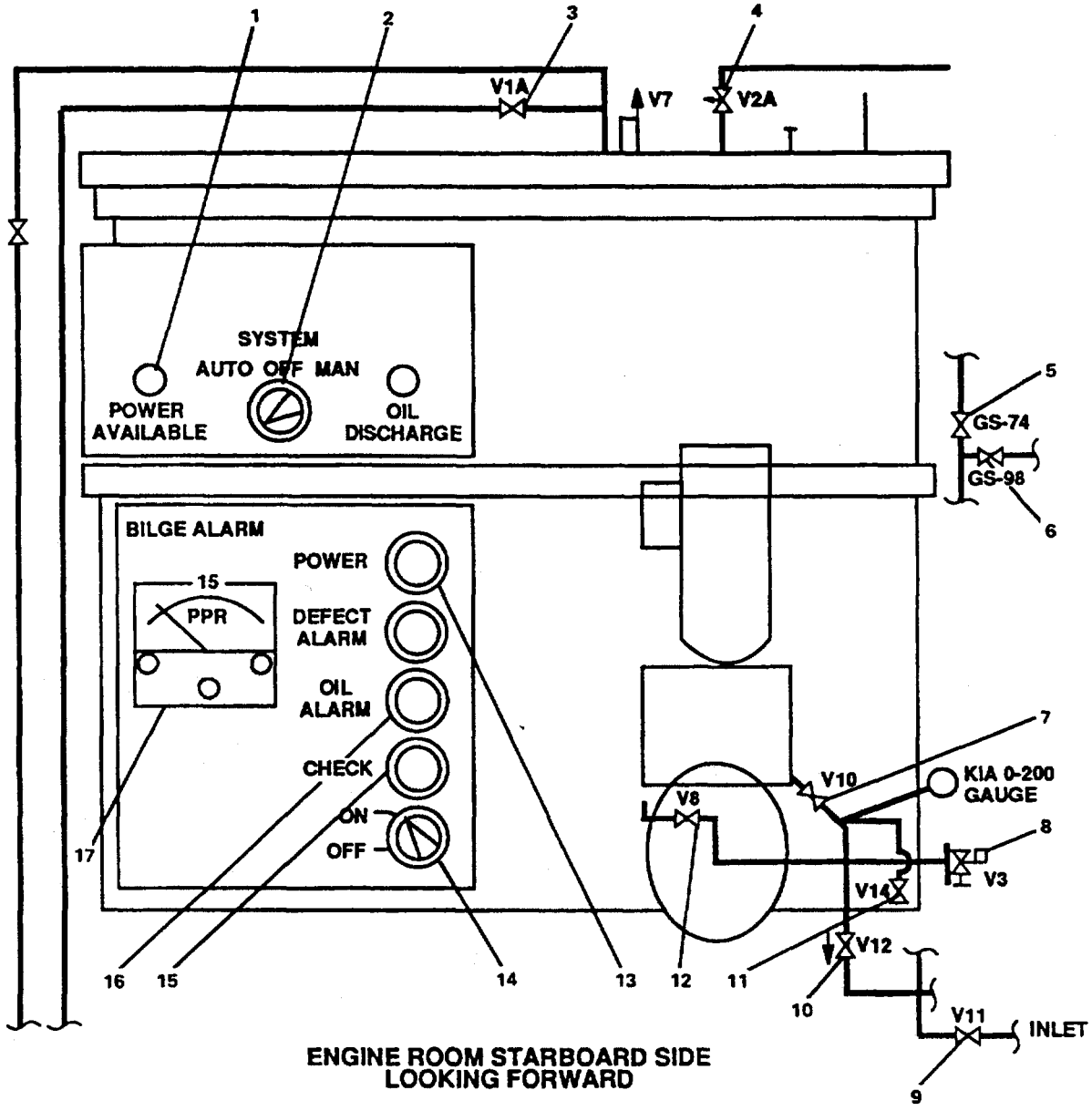
3 Set ON-OFF switch (16) to ON position.

NOTE

POWER indicator may not illuminate immediately. When system reaches correct operating pressure, POWER indicator will light.

CAUTION

If DEFECT ALARM indicator lights, shut down system and refer to unit maintenance. Continued operation could result in damage to the equipment.



1. POWER AVAILABLE LIGHT
2. AUTO-OFF-MAN SWITCH
3. VALVE V1A
4. VALVE V2A
5. GS-74
6. GS-98
7. VALVE V10
8. VALVE V3
9. VALVE V11
10. VALVE V12
11. VALVE V14
12. VALVE V8
13. POWER INDICATOR
14. ON-OFF SWITCH
15. CHECK PUSHBUTTON
16. OIL ALARM INDICATOR
17. PPR METER

Figure 2-262. Oil-Water Separator.

NOTE

Observe tank gauge. Should read between 0 to 10 inches of vacuum.

4 CHECK pushbutton (15) and OIL ALARM (14) will light and PPR meter (17) will indicate 15 psi.

(e) *Shut down separator.*

1 Set AUTO-OFF-MAN switch (2) to OFF position.

2 POWER indicator (13) will go out.

3 Set ON-OFF switch (16) to OFF position.

4 POWER indicator (13) will go out.

5 Close V10, ISOLATION (7).

6 Close V8, ISOLATION/FLOW CONTROL (12).

7 Close V2A, OIL DISCHARGE ISOLATION (4).

8 Close V1A, INLET BYPASS (3).

(f) *Secure piping system (Figure 2-260).*

1 Close OB-10 (12).

2 Close OB-15 (15).

3 Close OB-16 (16).

4 Close OB-17 (19).

(g) *Secure electrical system*. On engine room distribution panel no. 4 (Figure 2-261), set OILY WATER SEPARATOR circuit breaker (1) to OFF position. POWER AVAILABLE indicator light (1) should go out.

(2) *Backflush operation*.

(a) Set AUTO-OFF-MAN switch (2, Figure 2-262) to OFF position.

(b) Ensure fire main and general service system is operational (see paragraph 2-8).

(c) Open following valves (Figure 2-260):

1 FM-15, FIRE/GS PMP NO. 2 DISCH. TOGS (10).

2 FM-9, GENL SERV PRESS RED VLV MAN BYPASS (11).

3 V8, ISOLATION/FLOW CONTROL (12, Figure 2-262).

4 GS-74, OILY WTR SEP SPLY (21).

(d) Close V2A, OIL DISCHARGE ISOLATION (4).

(e) Open V1A, INLET BYPASS (3).

(f) Turn solenoid of manually operated V3, BACKFLUSH INLET SOLENOID backflush valve (8) hand wheel (looking from below) in a clockwise direction. Hand wheel is located on bottom of solenoid valve.

(3) *Backflush shutdown*.

(a) Turn solenoid of manually operated V3, BACKFLUSH INLET SOLENOID backflush valve (8) hand wheel (looking from below) in a counterclockwise direction. Hand wheel is located on bottom of solenoid valve.

(b) Close V1A, INLET BYPASS (3).

(c) Close GS-74, OILY WTR SEP SPLY (21).

(d) Close V8, ISOLATION/FLOW CTRL (12).

2-17. Lube Oil Purification and Transfer Piping System.

a. *Drain Engine Sumps*.

(1) *Prepare to drain engine sump*.

(a) Tag start control "Do Not Operate Out of Service".

(b) Disable starter of engine to be drained.

(2) *Align piping system (Figure 2-263)*. Align piping system in accordance with Table 2-3.

(3) *Drain selected engine sump*.

(4) *Secure valves (Figure 2-263)*. Close the following valves:

(a) LO-1, LUBO DR. TO OILY DR. TK. (11).

(b) LO-2, LUBO DR. TO OILY DR. TK. (8).

(c) LO-3, LUBO DR. TO OILY DR. TK. (12).

(d) LO-4, LUBO DR. TO OILY DR. TK. (7).

(e) LO-5, LUBO DR. TO OILY DR. TK. (15).

(f) LO-6, LUBO DR. TO OILY DR. TK. (4).

(g) LO-27, LUBO DR. FR. RED. GEAR NO. 1 (18).

(h) LO-28, LUBO DR. FR. RED. GEAR NO. 1 (2).

(5) *Fill engine sump*. Fill engine sump in accordance with paragraph b below.

Table 2-3. Engine Sump Drainage Valve Alignment.

SUMP	OPEN	ITEM NO.*	CLOSE	ITEM NO.*
BOW THRUSTER ENGINE	LO-2	9	LO-8	8
PUMP DRIVE ENGINE	LO-1	10	LO-9	11
SSDG NO. 1	LO-3	12	LO-11	13
SSDG NO. 2	LO-4	7	LO-10	6
ME NO. 1	LO-5 16	15	LO-29 LO-31	17
ME NO. 2	LO-6 5	4	LO-30 LO-32	3
RED GR NO. 1	LO-27	18	LO-13	19
RED GR NO. 2	LO-28	2	LO-12	1

* Refer to Figure 2-263 for valve locations.

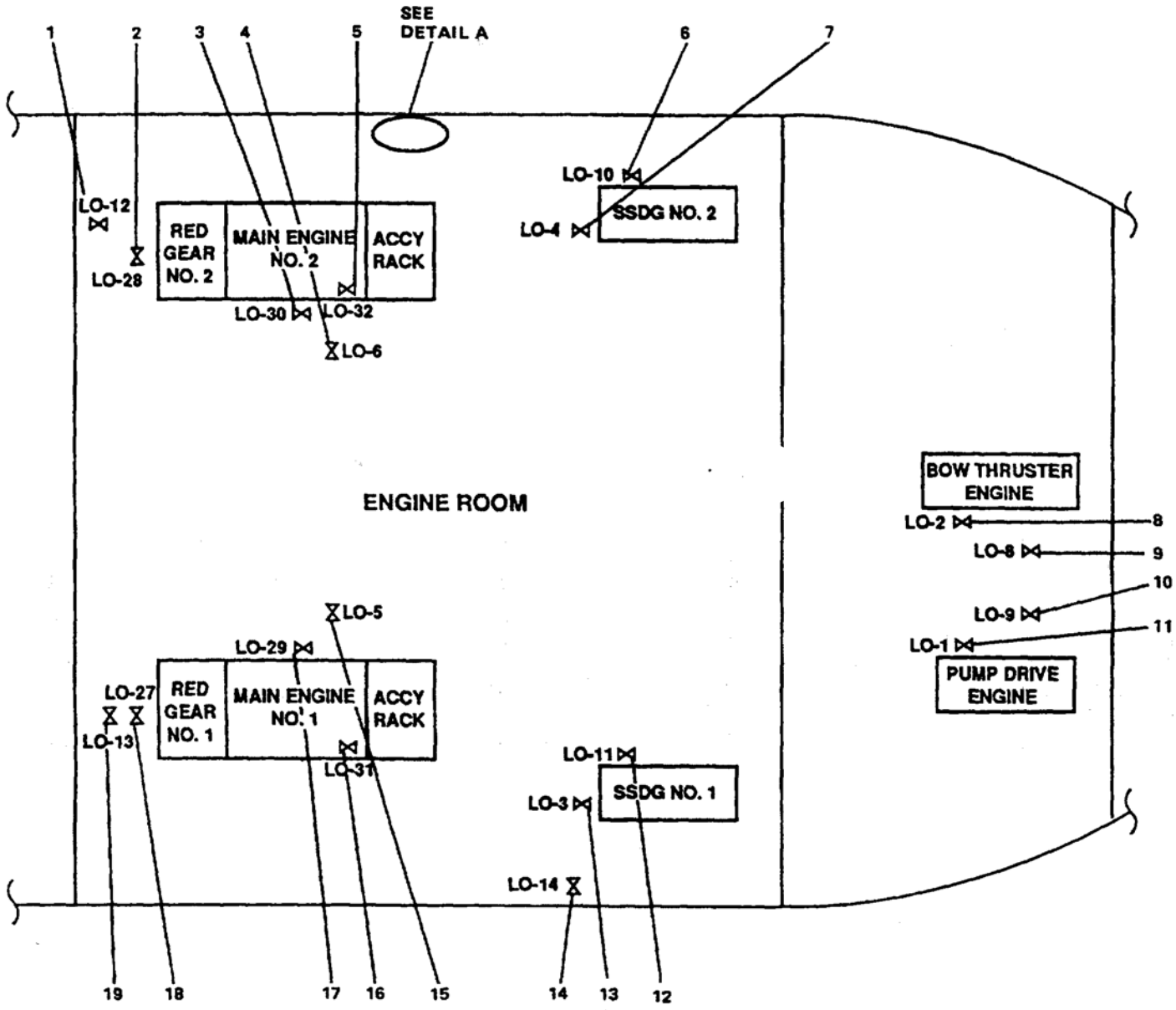
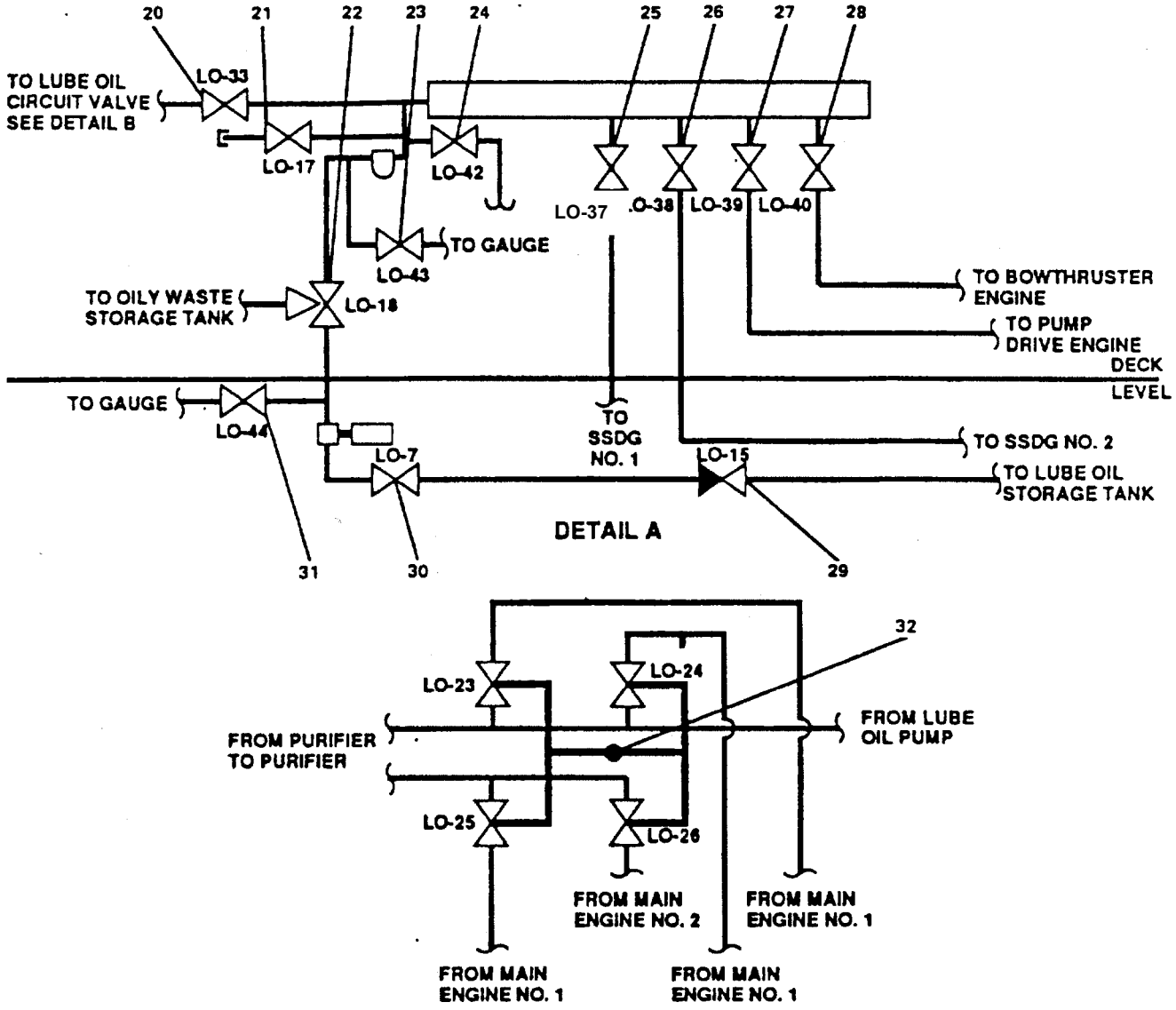


Figure 2-263. Lube Oil System Valve Locations (Sheet 1 of 3).



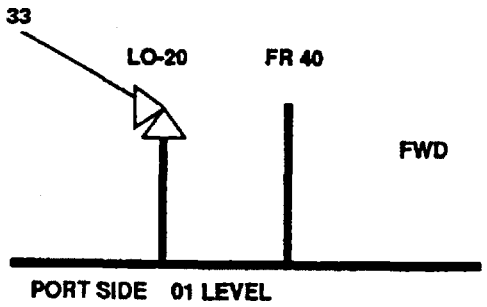
LUBE OIL CIRCUIT VALVE

DETAIL B

NOTE

CIRCUIT VALVE MECHANICALLY INTERLOCKED TO PREVENT PURIFYING ONE ENGINE'S OIL AND SENDING OIL TO THE OTHER ENGINE.

Figure 2-263. Lube Oil System Valve Locations (Sheet 2 of 3).



DETAIL

1. LO-12
2. LO-28, LUBO DR. FR. RED. GEAR NO. 1
3. LO-30, M.E. NO. 2 - LUBO PUR. SUCT.
4. LO-6, LUBO DR TO OILY DR. TK.
5. LO-32, M.E. NO. 2 - LUBO PUR. DISH./FILL
6. LO-10, LUBO TO S.S.D.G. NO. 2
7. LO-4, LUBO DR. TO OIL DR. TK.
8. LO-2, LUBO DR TO OILY DR. TK.
9. LO-8, LUBO TO BOW THRUSTER ENG.
10. LO-9, LUBO TO PUMP DRIVE ENG.
11. LO-1, LUBO DR TO OILY DR. TK.
12. LO-3, LUBO DR TO OILY DR. TK.
13. LO-11, LUBO TO S.S.D.G. NO. 1
14. LO-14, LUBO XFER. TO OILY WST. STOR. TK.
15. LO-5, LUBO DR TO OILY DR. TK.
16. LO-31, M.E. NO. 1 - LUBO PUR. DISCH/FILL
17. LO-29, M.E. NO. 1 - LUBO PUR. SUCT.
18. LO-27, LUBO DR. FR. RED. GEAR NO. 1
19. LO-13
20. LO-33, LUBO TO MAIN ENGS.
21. LO-17, BKT. FILL CONN.
22. LO-18, LUBO SPLY.
23. LO-43
24. LO-42
25. LO-37, LUBO TO S.S.D.G. NO. 1
26. LO-38, LUBO TO S.S.D.G. NO. 2
27. LO-39, LUBO TO PUMP DRIVE ENG.
28. LO-40, LUBO TO BOW THRUSTER ENG:
29. LO-15, LUBO STOR. TK. OUT
30. LO-7, C.O.V. - LUBO XFER PMP SUCT.
31. LO-44
32. LUBE OIL CIRCUIT VALVE
33. LO-20, LUBO MN. DK. FILL CONN.

Figure 2-263. Lube Oil System Valve Locations (Sheet 3 of 3).

b. *Fill Engine Sumps*.

(1) *Align electrical system*.

(a) *Engine room power panel no. 1 (Figure 2-264)*. Set L.O. XFER PUMP circuit breaker (1) to ON position.

(b) *Lube oil transfer pump motor controller (Figure 2-265)*. Set ON-OFF switch (1) to ON position.

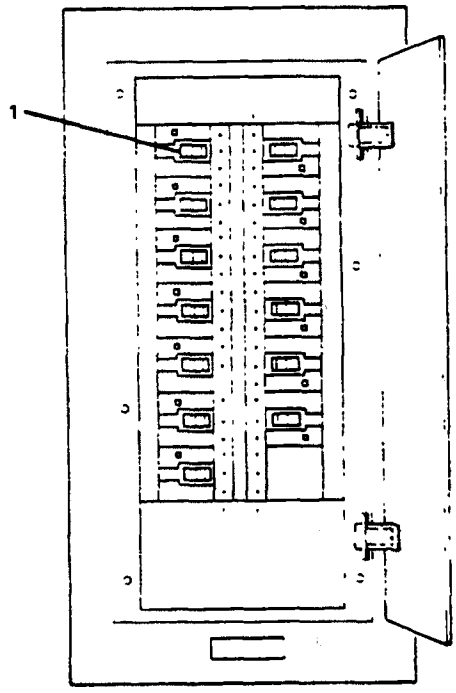


Figure 2-264. Engine Room Power Panel No. 1.

1 POWER AVAILABLE indicator (2) will light.

(2) *Align Piping system (Figure 2-263)*.

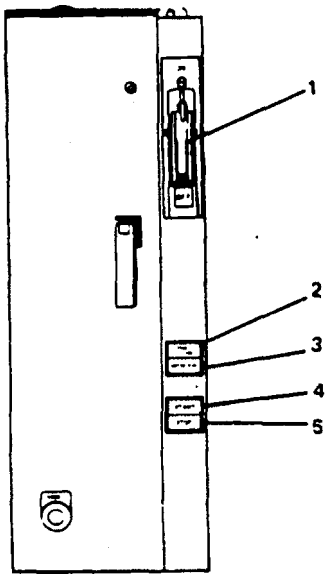
(a) Align pump piping as follows:

1 Open LO-15, LUBO STOR. TK OUT. (29).

2 Open LO-7, C. O. V. LUBO XFER PMP SUCT. (30).

3 Select lube oil manifold (move to manifold position) on LO-18, LUBO SPLY. (22).

4 Close LO-17, BKT. FILL CONN (21).



1. ON-OFF SWITCH
2. POWER AVAILABLE INDICATOR
3. MOTOR RUN INDICATOR
4. START PUSHBUTTON
5. STOP PUSHBUTTON

Figure 2-265. Lube Oil Transfer Pump Motor Controller.

5 Open valve for sump to be filled on lube oil manifold.

(b) Align sump piping in accordance with Table 2-4.

CAUTION

Do not overfill engine oil sump. Overfilling can damage engine oil seals.

(3) *Start pump (Figure 2-265)*. On lube oil transfer pump motor controller, press START pushbutton (4).

(a) MOTOR RUN light (3) will light.

(4) *Monitor fill level*. Frequently check engine oil level at dipstick. When oil level is above ADD mark and below FULL mark on ENGINE STOPPED side of dipstick, proceed.

Table 2-4. Engine Sump Fill Valve Alignment.

SUMP	OPEN	ITEM NO.*	CLOSE	NO.*
BOW THRUSTER ENGINE	LO-8	8	LO-2	9
PUMP DRIVE ENGINE	LO-9	11	LO-1	10
SSDG NO. 1	LO-11	13	LO-3	12
SSDG NO. 2	LO-10	6	LO-4	7
ME NO. 1	LO-31 15	16	LO-29 LO-5	17
ME NO. 2	LO-32 4	5	LO-30 LO-6	3
RED GR NO. 1	LO-13	19	LO-27	18
RED GR NO. 2	LO-12	1	LO-28	2
* Refer to Figure 2-263 for valve locations.				

(5) *Stop pump (Figure 2-265)*. On lube oil transfer pump motor controller, press STOP pushbutton (5).

(a) MOTOR RUN indicator (3) will go out.

(6) *Secure piping system (Figure 2-263)*. Close the following valves:

(a) LO-15, LUBO STOR. TK. OUT. (29).

(b) LO-7, C.O.V. LUBO XFER PMP SUCT. (30).

(c) Close all valves on lube oil manifold.

(d) LO-8, LUBO TO BOW THRUSTER ENG. (9).

(e) LO-9, LUBO TO PUMP DRIVE ENG. (10).

(f) LO-10, LUBO TO S. S. D. G. NO. 2 (6).

(g) LO-11, LUBO TO S. S. D. G. NO. 1 (13).

(h) LO-12, LUBO TO RED GEAR NO. 2 (1).

(i) LO-13, LUBO TO RED GEAR NO. 1 (19).

(j) LO-31, M.E. NO. 1 LUBO PUR. DISCH./FILL (16).

(k) LO-32, M.E. NO. 2 LUBO PUR. DISCH./FILL (5).

(7) *Secure electrical system*.

(a) *Lube oil transfer pump motor controller (Figure 2-265)*. Set ON/OFF switch (1) to OFF position.

1 POWER AVAILABLE indicator (2) will go out.

(b) *Engine room power panel no. 1 (Figure 2-264)*. Set L.O. XFER PUMP circuit breaker (1) to OFF position.

c. *Purify Main Engine Oil.*

(1) *Align electrical system*. On main switchboard (Figure 2-266), set LUBE OIL PURIFIER circuit breaker (2) to ON position.

(2) *Align Piping system (Figure 2-263)*.

(a) *Purifier heater drain valve*. Ensure drain valve (2) is closed.

(b) *Main engine no. 1 (starboard)*. If starboard main engine oil is to be purified, proceed as follows:

1 Close LO-5, LUBO DR. TO OILY DR. TK. (15).

2 Open LO-31, M.E. NO. 1 LUBO PUR. DISCH./FILL (16).

3 Open LO-29, M.E. NO. 1 LUBO PUR. SUCT. (17).

4 Position LUBE OIL CIRCUIT VALVE (32) to OPEN position.

(c) *Main engine no. 2 (port)*. If port main engine oil is to be purified, proceed as follows:

1 Close LO-6, LUBO DR. TO OILY DR. TK. (4).

2 Open LO-30, M.E. NO. 2 LUBO PUR. SUCT. (3).

3 Open LO-32, M.E. NO. 2 LUBO PUR. DISCH./FILL (5).

4 Position LUBE OIL CIRCUIT VALVE (32) to CLOSED position.

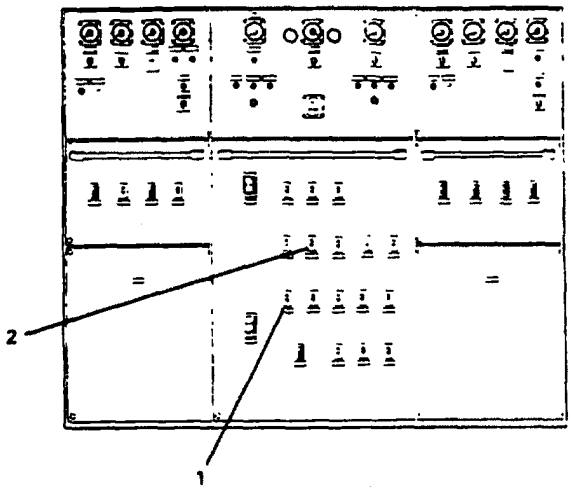
(3) *Start Purifier.*

(a) *Lube oil Purifier control panel (Figure 2-267)*.

1 Set circuit breaker (1) to ON position.

2 Set CONTROL POWER switch (4) to ON position.

(b) *Lube oil purifier (Figure 2-268)*.



1. ENG. RM. PWR. PANEL #1
2. LUBE OIL PURIFIER

Figure 2-266. Main Switchboard.

1 Release bowl brake by turning handle (9) clockwise.

2 Loosen bowl lock screws (8) by turning clockwise.

3 Unfasten three hood securing bolts (3).

4 Open hood (10).

5 Ensure bowl can be turned by hand.

6 Close hood (10).

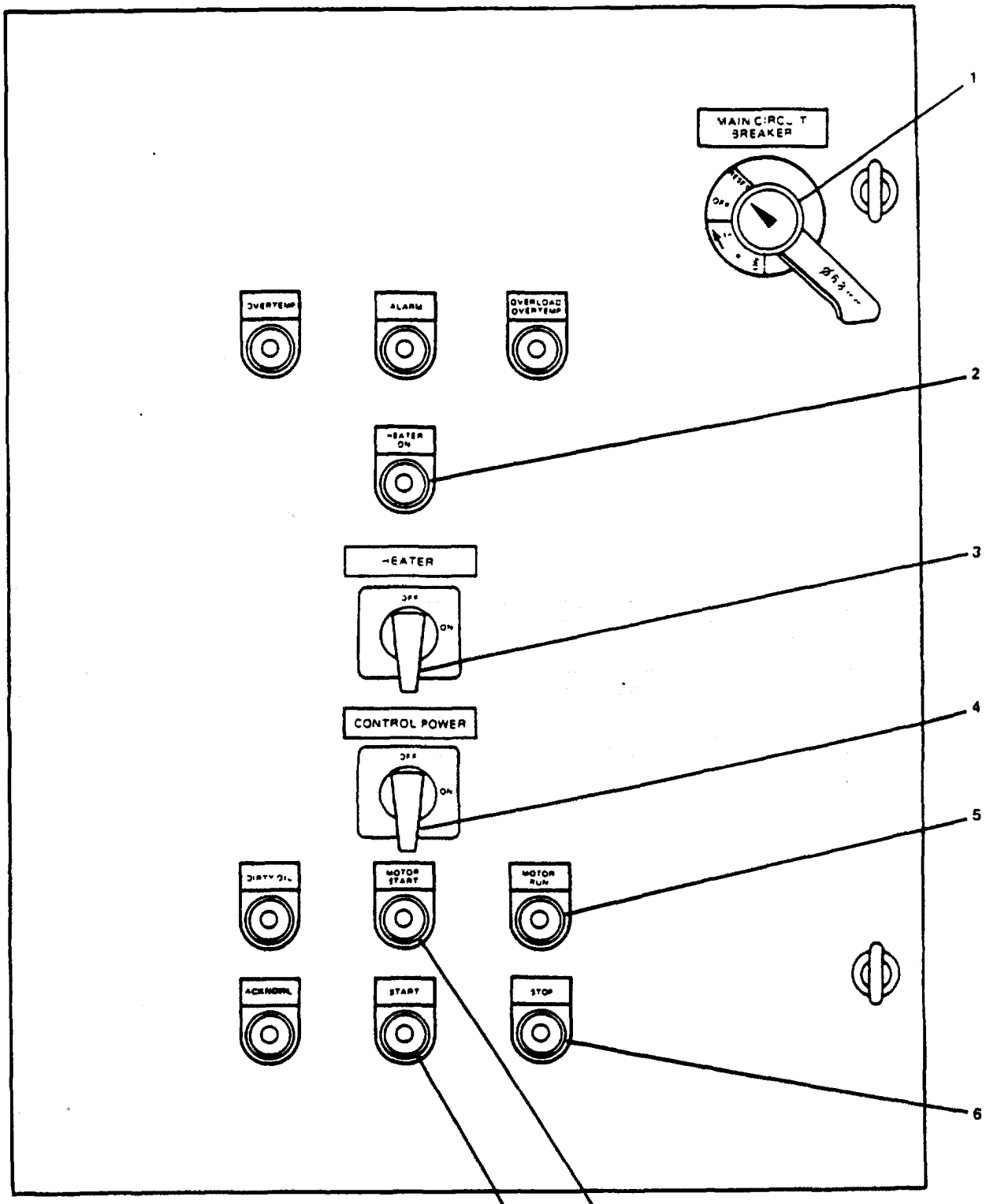
7 Fasten three hood securing bolts (3).

8 Observe gear oil level in sight glass (6).

CAUTION

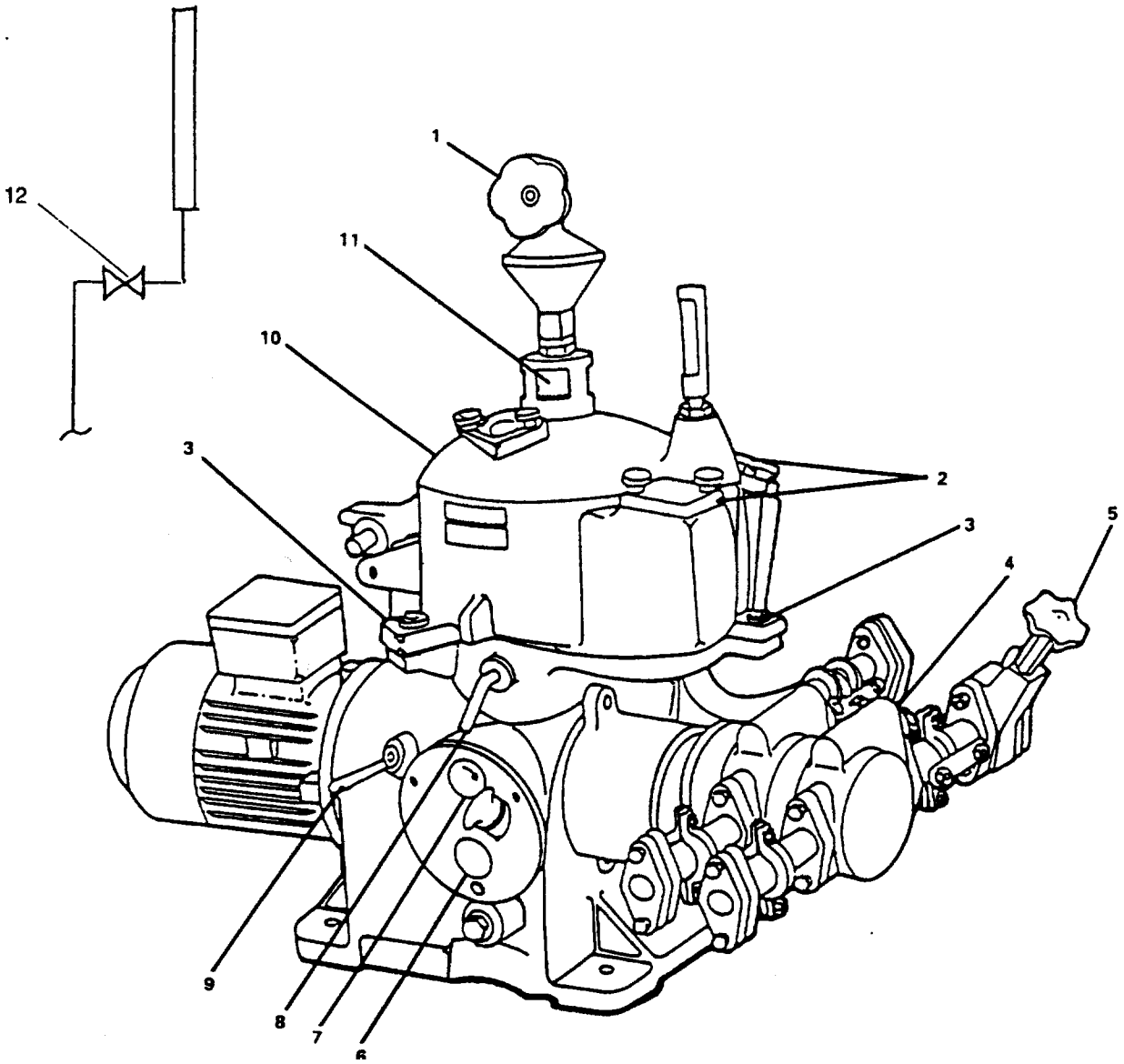
Sight glass must be two-thirds full. Operation with low gear oil level could damage purifier.

9 On purifier control panel, press START pushbutton (8, Figure 2-267); MOTOR START indicator (7) will light.



1. CIRCUIT BREAKER
2. HEATER ON INDICATOR
3. HEATER SWITCH
4. CONTROL POWER SWITCH
5. MOTOR RUN INDICATOR
6. STOP PUSHBUTTON
7. MOTOR START INDICATOR
8. START PUSHBUTTON

Figure 2-267. Lube Oil Purifier Control Panel.



1. NEEDLE VALVE
2. INSPECTION COVER
3. HOOD SECURING BOLTS
4. DIRTY OIL DRAIN
5. SHUTOFF VALVE
6. GEAR OIL SIGHT GLASS
7. REVOLUTION INDICATOR DISC
8. BOWL LOCK SCREWS
9. BRAKE HANDLE
10. HOOD
11. SIGHT GLASS
12. PURIFIER HEATER DRAIN VALVE

Figure 2-268. Lube Oil Purifier.

NOTE

It takes 3 to 4 minutes for the bowl to, reach its rated speed. When bowl has reached rated speed, MOTOR RUN indicator will light and MOTOR START indicator will go out.

10 Check revolution indicator disc (7, Figure 2-268).

NOTE

Reading should be (65 to 78 rpm) as stamped on data plate.

11 Open needle valve (1) to fill bowl with water. Open inspection cover (2) to verify bowl is filling with water.

NOTE

Bowl is full when water enters and drains from discharge chamber, as observed through opened inspection cover.

12 When bowl is filled, adjust needle valve (1) to 1 to 3 drops/sec of make-up water required for oil to be processed.

NOTE

The seal formed by the fresh water will prevent oil from escaping through the water outlet.

13 Open shutoff valve (5) to feed dirty oil to oil pre-heater.

14 As soon as oil can be seen in sight glass (11), close shutoff valve (5).

15 Set HEATER switch (3, Figure 2-267) to ON position. HEATER ON indicator (2) will light.

NOTE

Heat oil to separating temperature of 70° to 80°C (150° to 176°F).

16 Slowly open shutoff valve (5, Figure 2-268) in oil supply line to separator. Adjust flow to proper hourly capacity.

NOTE

Purifier hourly capacity is variable depending on oil temperature, grade, and amount of impurities. If unsure, have unit maintenance adjust in accordance with TM 55-1925-213-24&P.

17 Observe through opened inspection covers (2) (both dirty water discharge and clean oil discharge) to ensure purifier is operating properly.

(4) Stop purifier.

(a) Set HEATER switch (3, Figure 2-267) to OFF position.

CAUTION

Allow oil to continue flowing for a few minutes to cool heater elements. Shutting off oil before elements are cooled could cause damage to heater.

(b) Close shutoff valve (5, Figure 2-268) to shut off dirty oil supply.

(c) Close needle valve (1) to shut off makeup water.

(d) Press STOP pushbutton (6, Figure 2-267) to stop motor.

1 MOTOR RUN indicator (5) will go out.

(e) Observe revolution indicator disc (7, Figure 2-268) to ensure bowl has stopped.

WARNING

Do not loosen or remove any parts or apply brake before bowl comes to a complete stop. Serious personal injury or damage to equipment could result.

(f) Apply brake by turning handle (9) counterclockwise.

(g) Open dirty oil drain (4) to drain feed channel of hood.

(h) Close dirty oil drain (4).

(i) Open hood (10) by removing the three hood securing bolts (3).

(j) Clean bowl (refer to TM 55-1925-213-24&P).

(k) Secure bowl lock screws (8) by turning counterclockwise.

(l) Close hood (10).

(m) Fasten three hood securing bolts (3).

(n) Set CONTROL POWER switch (4, Figure 2-267) to OFF position.

(o) Set circuit breaker (1) to OFF position.

(p) On main switchboard (Figure 2-266) set LUBE OIL PURIFIER circuit breaker (1) to OFF position.

d. *Fill Lube Oil Tank*.

(1) *Tank level indicator*. Ensure tank level indicator is operational (if not, refer to paragraph 2-15).

(2) *Make supply connection*. Connect the lube oil supply hose at lube oil deck fill valve connection LO-20 (33, Figure 2-263).

(3) *Align piping*. Open LO-20, LUBO MN. DK FILL CONN. (33).

(4) *Fill tank*. Direct supplier to begin pumping.

(5) *Monitor tank level (Figure 2-269)*. On TLI receiver module, observe fluid level meter (1). When tank is full, direct supplier to stop pumping.

(6) *Secure piping system (Figure 2-263)*.

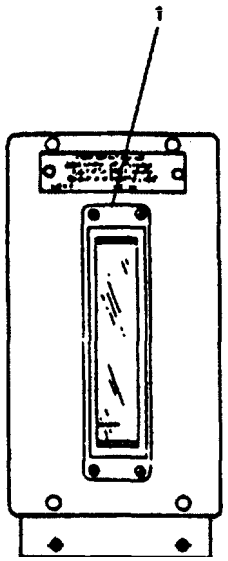
(a) Close LO-20, LUBO MN DK FILL CONN (33).

(b) Disconnect supply hose.

e. *Pump Lube Oil Tank to Oily Water Storage Tank*.

(1) *Align electrical system*.

(a) *Main switchboard (Figure 2-266)*. Set ENG. RM. PWR. PANEL #1 circuit breaker (1) to ON position.



1. EDGEVIEW METER

Figure 2-269. Receiver Module.

(b) *Engine room power panel no. 1 (Figure 2-264)*. Set L. O. XFER PUMP circuit breaker (1) to ON position.

(c) *Lube oil transfer pump motor controller (Figure 2-265)*. Set ON-OFF switch (1) to ON position.

1 POWER AVAILABLE indicator (2) will light.

(d) *Tank level indicators*. Ensure tank level indicators are operational (if not, refer to paragraph 215).

(2) *Align piping system (Figure 2-263)*.

(a) Open LO-15, LUBO STOR. TK. OUT. (29).

(b) Open LO-7, C.O.V. LUBO XFER PMP SUCT. (30).

(c) Select oily waste storage tank position on LO-18, LUBO SPLY. (22).

(d) Open LO-14, LUBO XFER. TO OILY WST. STOR. TK. (14).

(3) *Start pump (Figure 2-265)*. On lube oil transfer pump motor controller, press START pushbutton (4).

(a) MOTOR RUN indicator (3) will light.

(4) *Monitor tank levels (Figure 2-269)*. Observe fluid level meter (1). When lube oil tank is near empty, proceed.

(5) *Stop pump (Figure 2-265)*. On lube oil transfer pump motor controller, press STOP pushbutton (5).

(a) MOTOR RUN indicator (3) will go out.

(6) *Secure piping system (Figure 2-263)*. Close the following valves:

(a) LO-15, LUBO STOR. TK. OUT. (29).

(b) LO-7, C. O. V. LUBO XFER PMP SUCT. (30).

(c) Select (move to AFT) LO-18, LUBO SPLY. (22).

(d) LO-14, LUBO XFER TO OILY WST. STOR. TK. (14).

(7) *Secure electrical system*.

(a) *Lube oil transfer pump motor controller (Figure 2-265)*. Set ON-OFF switch (1) to OFF position.

(b) POWER AVAILABLE indicator (2) will go out.

(c) *Engine room power panel no. 1 (Figure 2-264)*. Set L. O. XFER PUMP circuit breaker (1) to OFF position.

2-18. Fuel Oil Fill, Transfer, and Supply Piping System.

a. *Fill Day Tanks*.

(1) *Align electrical system*.

(a) *Emergency switchboard (Figure 2-270)*, Set FUEL OIL XFER PUMP circuit breaker (1) to ON position.

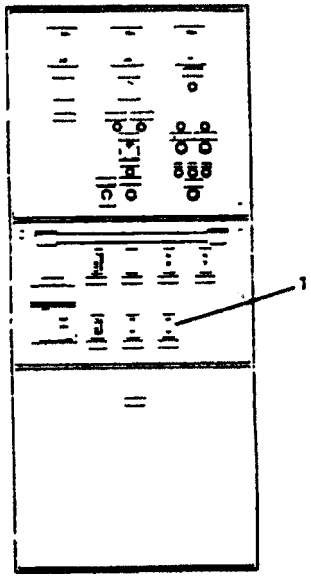


Figure 2-270. Emergency Switchboard.

(b) *Engine room power panel no. 1 (Figure 2-271)*. Set #2 F. O. XFER PUMP circuit breaker (1) to ON position.

(c) *Fuel oil transfer pump motor controllers (Figure 2-272)*. Set ON-OFF switch (1) to ON position on each motor controller.

1 POWER AVAILABLE indicator (2) will light.

(d) *Tank level indicators*. Ensure tank level indicator system is operational (refer to paragraph 2-15).

(2) *Align piping system (Figure 2-273)*.

(a) Close FO-3, DK. FILL CONN. (18).

(b) Close FO-4, DK. FILL CONN. (19).

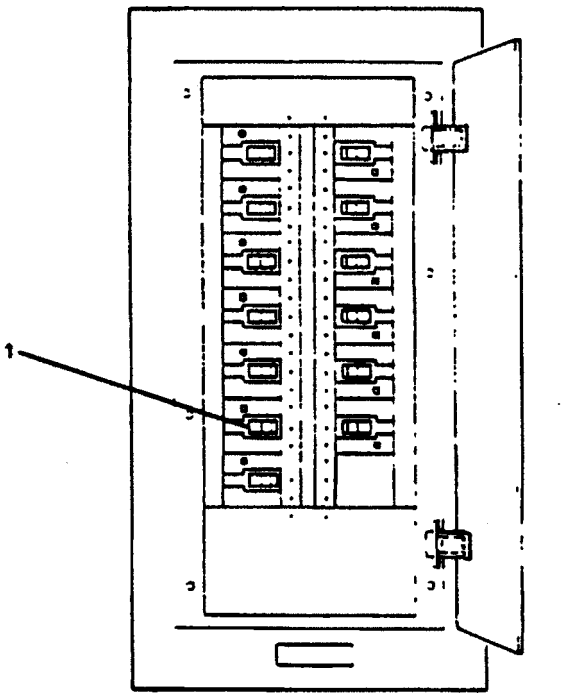
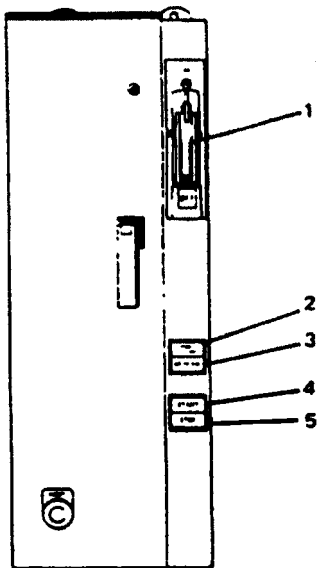


Figure 2-271. Engine Room Power Panel No. 1.



1. ON-OFF SWITCH
2. POWER AVAILABLE INDICATOR
3. MOTOR RUN INDICATOR
4. START PUSHBUTTON
5. STOP PUSHBUTTON

Figure 2-272. Fuel Oil Transfer Pump Motor Controller.

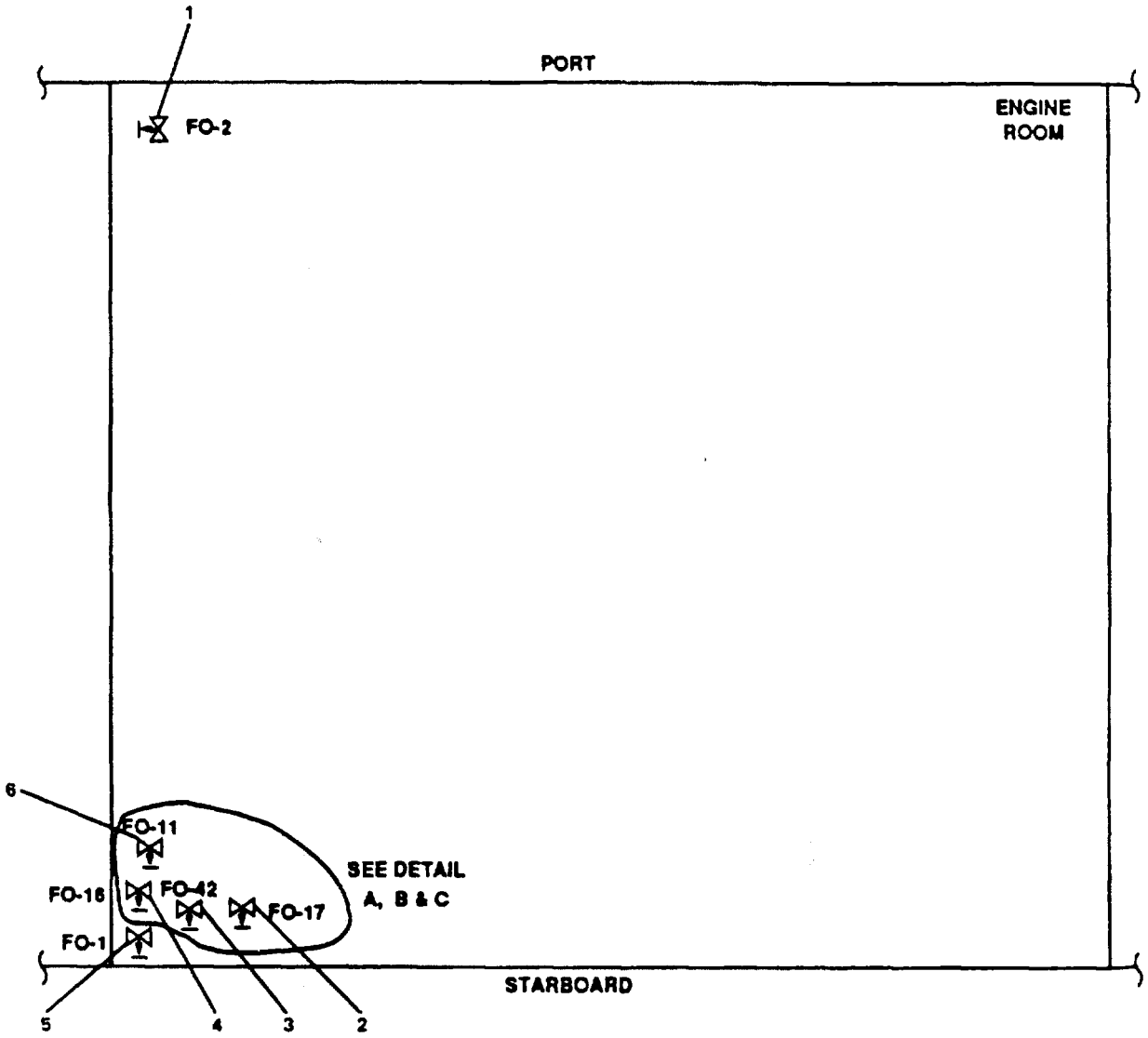


Figure 2-273. Fuel Oil Fill, Transfer, and Supply Piping System Valve Locations (Sheet 1 of 4).

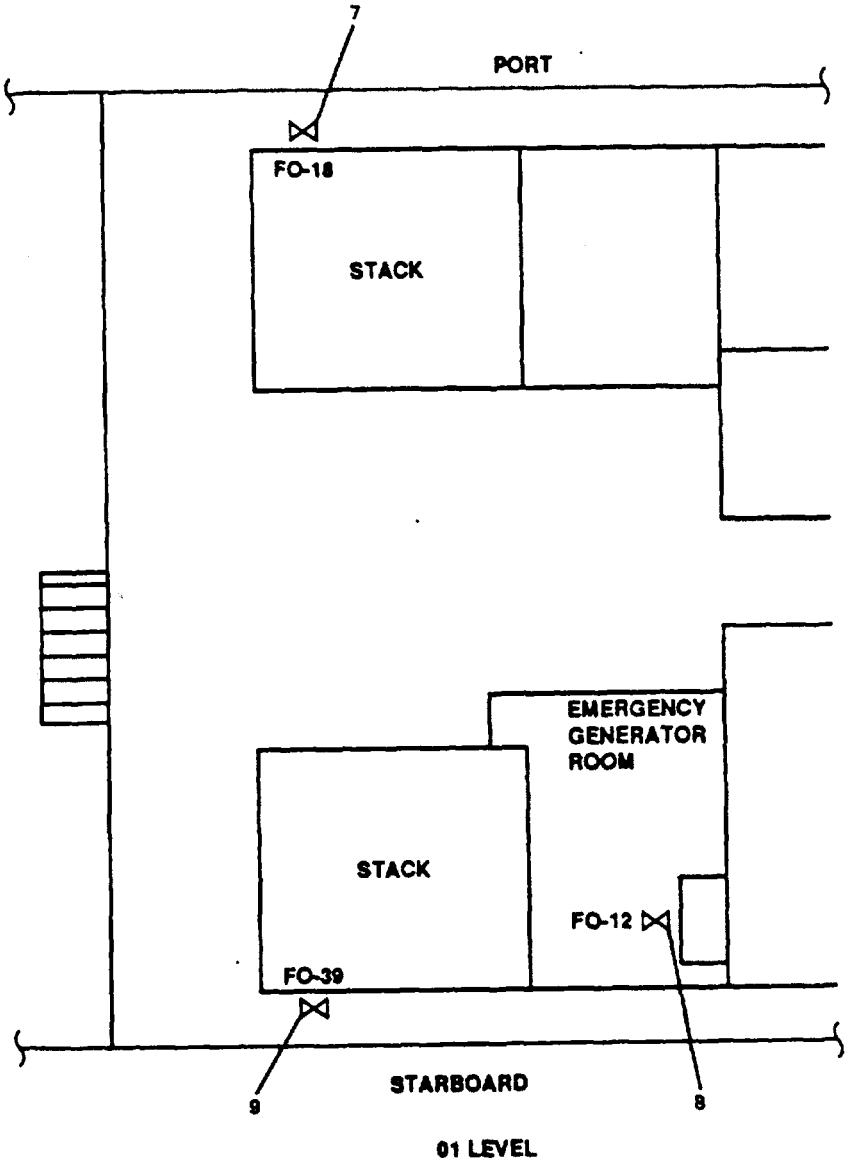
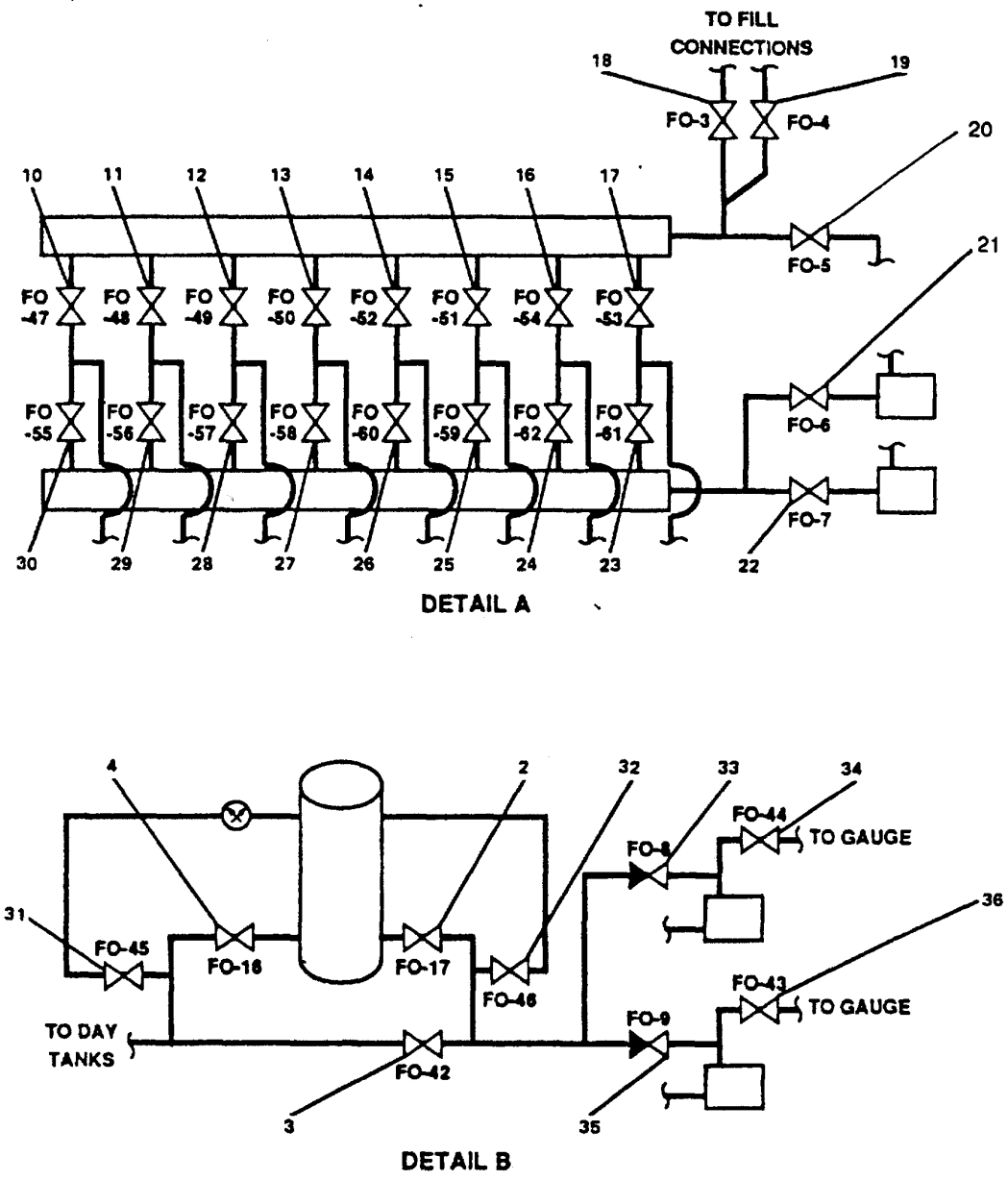


Figure 2-273. Fuel Oil Fill, Transfer, and Supply Piping System Valve Locations (Sheet 2 of 4).



STARBOARD - ENGINE ROOM

Figure 2-273. Fuel Oil Fill, Transfer, and Supply Piping System Valve Locations (Sheet 3 of 4).

1. FO-2, F.O. DAY TK FILL
2. FO-17, F.O. FLTR/CLSR INLET
3. FO-42, F.O. FLTR/CLSR BYPASS
4. FO-16, F.O. FLTR/CLSR OUTLET
5. FO-1, F.O. DAY TK FILL
6. FO-11, F.O. TO E.D.G. DAY TK
7. FO-18, DK FILL CONN. PORT
8. FO-12, E.D.G. DAY TK FILL
9. FO-39, DK. FILL CONN. STBD
10. FO-47, F.O. TK 1 S FILL
11. FO-48, F.O. TK 1 P FILL
12. FO-49, F.O. TK 2S FILL
13. FO-50, F.O. TK 2P FILL
14. FO-52, F.O. TK 2C FILL
15. FO-51, F.O. TK 3C FILL
16. FO-54, F.O. TK 4P FILL
17. FO-53, F.O. TK 4S FILL
18. FO-3, DK. FILL CONN.
19. FO-4, DK. FILL CONN.
20. FO-5, F.O. DAY TK EMERG. FILL
21. FO-6, C.O.V.-F.O. XFER PMP NO. 1 SUCTION
22. FO-7, C.O.V.-F.O. XFER PMP NO. 2 SUCTION
23. FO-61, F.O. TK 4S SUCT.
24. FO-62, F.O. TK 4P SUCT.
25. FO-59, F.O. TK 3C SUCT.
26. FO-60, F.O. TK 2C SUCT.
27. FO-58, F.O. TK 2P SUCT.
28. FO-57, F.O. TK 2S SUCT.
29. FO-56, F.O. TK 1 P SUCT.
30. FO-55, F.O. TK 1 S SUCT.
31. FO-45
32. FO-46
33. FO-8, C.O.V.-F.O. XFER PMP NO. 1 DISCHARGE
34. FO-44
35. FO-9, C.O.V.-F.O. XFER PMP NO. 2 DISCHARGE
36. FO-43

Figure 2-273. Fuel Oil Fill, Transfer, and Supply Piping System Valve Locations (Sheet 4 of 4).

(c) Close FO-5, F.O. DAY TK EMERG. FILL (20).

(d) Open FO-6, C.O.V. - F.O. XFER PMP NO. 1 SUCTION (21).

(e) Open FO-7, C.O.V. - F.O. XFER PMP NO. 2 SUCTION (22).

(f) Open FO-8, C.O.V. - F.O. XFER PMP NO. 1 DISCHARGE (33).

(g) Open FO-9, C.O.V. - F.O. XFER PMP NO. 2 DISCHARGE (35).

(h) Open FO-43 (36).

(i) Open FO-44 (34).

(j) If fuel oil filter/coalescer is to be used, proceed as follows:

1 Open FO-17, F.O. FLTR/CLSR INLET (2).

2 Open FO-16, F.O. FLTR/CLSR OUTLET (4).

3 Close FO-42, F.O. FLTR/CLSR BYPASS (3).

4 Open FO-45 (31).

5 Open FO-46 (32).

(k) If fuel oil filter/coalescer is NOT to be used, proceed as follows:

1 Close FO-17, F.O. FLTR/CLSR INLET (2).

2 Close FO-16, F.O. FLTR/CLSR OUTLET (4).

3 Open FO-42, F.O. FLTR/CLSR BYPASS (3).

(l) If emergency generator day tank is to be filled, proceed as follows:

1 Open FO-11, F.O. TO E.D.G. DAY TK (6).

2 In emergency generator room, open FO-12, E.D.G. DAY TK FILL (8).

(m) If fuel oil day tank (port) is to be filled, open FO-2, F.O. DAY TK FILL (1).

(n) If fuel oil day tank (starboard) is to be filled, open FO-1, F.O. DAY TK FILL (5).

CAUTION

Avoid overfilling any tank. Overfilling may result in a fuel spill and fire hazard.

Ensure vent caps are open on oil fuel vents.

(o) On fuel oil manifold, open valve for tank to be filled.

(3) *Start Pump*. On fuel oil transfer pump motor controllers, press START pushbutton (4, Figure 2-272).

(a) MOTOR RUN indicator (3) will light.

(4) *Observe gauges*.

(a) *FO XFR PMP # 1 and #2 DISCH PRESS gauges (Figure 2-273)*. Observe gauges for readings.

(b) *FO XFR FILTER DIFF PRESS gauge*. Observe gauge for readings.

(5) *Observe tank level*. On tank level indicator receiver module, observe fluid level edgeview meter (1, Figure 2-274).

(6) *Stop pump*. When desired level has been reached on level meter (1), press STOP pushbutton (5, Figure 2-272) on each fuel oil transfer pump motor controller.

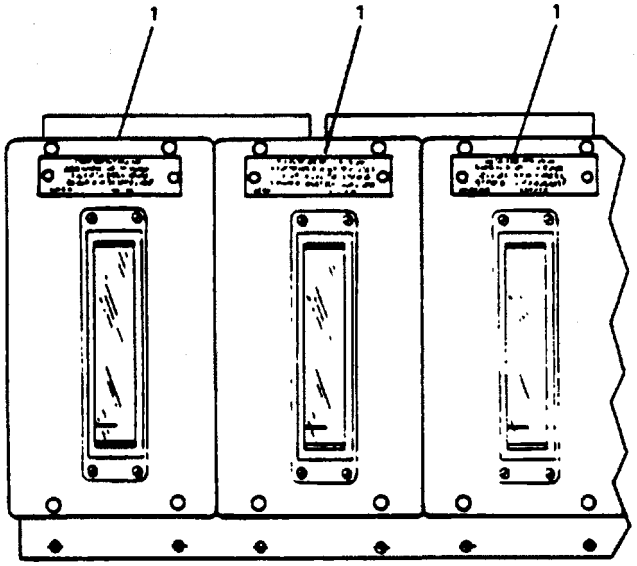


Figure 2-274. Tank Level Indicator Receiver Module.

(a) MOTOR RUN indicator (3) will go out.

(7) *Secure piping system (Figure 2-273)*. Close the following valves:

(a) *Fuel oil manifold*. Close all valves.

(b) FO-1, F.O. DAY TK FILL (5).

(c) FO-2, F.O. DAY TK FILL (1).

(d) FO-12, EDG DAY TK FILL (8).

(e) FO-11, F.O. TO EDG DAY TK (6).

(f) FO-42, F.O. FLTR/CLSR BYPASS (3).

(g) FO-16, F.O. FLTR/CLSR OUTLET (4).

(h) FO-17, F.O. FLTR/CLSR INLET (2).

(i) FO-9, C.O.V. -F.O. XFER PMP NO. 2 DISCHARGE (35).

(j) FO-8, C.O.V. -F.O. XFER PMP NO. 1 DISCHARGE (33).

(k) FO-7, C.O.V. -F.O. XFER PMP NO. 2 SUCTION (22).

(l) FO-6, C.O.V. -F.O. XFER PMP NO. 1 SUCTION (21).

(m) FO-3, DK. FILL CONN (18).

(n) FO-4, DK. FILL CONN (19).

(o) FO-5, F.O. DAY TK EMERG. FILL (20).

(8) *Secure electrical system.*

(a) *Fuel oil transfer pump motor controllers (Figure 2-272)*. Set ON-OFF switch (1) to OFF position on motor controllers.

1 POWER AVAILABLE indicator (2) will go out.

(b) *Engine room power panel no. 1 (Figure 2-271)*. Set #2 F.O. XFER PMP No. 2 circuit breaker (1) to OFF position.

(c) *Emergency switchboard (Figure 2-270)*. Set FUEL OIL XFER PUMP NO. 1 circuit breaker (1) to OFF position.

b. *Take on Fuel.*

WARNING

• During fueling operation, close coordination is required between crew and fuel oil supplier to prevent spills or overfilling tanks.

• Fueling operations present a serious fire hazard. Ensure NO SMOKING signs are placed at appropriate locations throughout the LT and/or decks. Make announcements that fueling operations are in progress. Take other precautions as required by U. S. Army regulations.

• Static electricity can cause a spark when connecting hose from fuel source to LT. Ensure all grounding connections are made prior to connecting fuel hose.

• The wake of passing watercraft can cause the LT to move sufficiently to separate fuel hose. Ensure that the BRAVO flag is hoisted by day and a RED LIGHT is lit by night to alert passing watercraft to pass with minimum wake action.

• Do not exceed LT fill rate of 250 GPM.

CAUTION

Prior to starting refueling operation, ensure drip pans are in place at each connection and that scuppers are plugged to prevent accidental spillage from flowing into waters.

(1) *Tank level indicators.* Ensure tank level indicator is operational (refer to paragraph 2-15).

(2) *Align piping (Figure 2-273)*.

(a) If fuel is to be taken on from port side, perform the following:

1 Open FO-4, DK. FILL CONN. (19).

2 Close FO-3, DK. FILL CONN. (18).

(b) If fuel is to be taken on from starboard side, perform the following:

1 Open FO-3, DK. FILL CONN. (18).

2 Close FO-4, DK. FILL CONN. (19).

(c) Close FO-6, C.O.V. - F.O XFER PMP NO. 1 SUCTION (21).

(d) Close FO-7, C.O.V. - F.O XFER PMP NO. 2 SUCTION (22).

(3) *Select tanks to be filled.*

(a) *Day tanks*. If day tanks are to be filled directly from shore connection, proceed as follows:

1 Close all valves on fuel oil manifold.

2 Open FO-5, F.O. DAY TK EMERG FILL (20).

3 Emergency generator day tank, open FO-11, F.O. TO EDG DAY TK (6) and FO-12, EDG DAY TK FILL (8).

4 Fuel oil day tank (port), open FO-2, F.O. DAY TK FILL (1).

5 Fuel oil day tank (starboard), open FO-1, F.O. DAY TK FILL (5).

(b) *Storage tanks*. If storage tanks are to be filled, open fuel oil manifold fill valve for selected tank.

(c) *Make shore connection*. Attach supply line from fuel pumper and proceed as follows:

1 *Port side*. If fuel supply line was connected to port fuel oil deck connection, open FO-18, DK FILL CONN. PORT (7).

2 *Starboard side*. If fuel supply line was connected to starboard fuel oil deck connection, open FO-39, DK FILL CONN. STBD (9).

(d) *Start fueling operation*. Direct supplier to begin pumping.

(e) *Monitor tank level*. Observe tank level indicator receiver module (1, Figure 2-274) for appropriate tank(s).

(f) *Control filling (1, Figure 2-274) operation*. *As* each tank approaches 3/4 full, open supply valve for next tank to be filled and "throttle down" supply valve of tank almost full, until all tanks are full.

(g) *Stop fueling operation*. Direct supplier to cease pumping.

(h) *Disconnect shore connection*.

1 Close deck fill connection valve (FO-18, DK FILL CONN. PORT (7, Figure 2-273) for port; FO-39, DK. FILL CONN. STBD (9) for starboard.

2 Disconnect supply line from shore connection.

(i) *Secure Piping system (Figure 2-273)*.

1 Close FO-4, DK. FILL CONN (19).

2 Close FO-3, DK. FILL CONN (18).

3 Close all valves on fuel oil manifold.

4 Close FO-5, F.O. DAY TK EMERG FILL (20).

5 Close FO-11, F.O. TO E.D.G. DAY TK (6).

6 Close FO-1, F.O. DAY TK FILL (5).

7 Close FO-2, F.O. DAY TK FILL (1).

8 Close FO-12, E.D.G. DAY TK FILL (8).

2-19. Engine Order Telegraph. The engine order telegraph is used when pilothouse is not in control of propulsion plant. Orders are issued by pilothouse to engine room Enclosed Operating Station (EOS) to change engine speed or direction. The EOS must acknowledge order and make necessary changes to speed/direction.

a. *Align Electrical System.* On engine room emergency distribution panel no. 1 (Figure 2-275), set ENGINE ORDER TELEGRAPH SYS circuit breaker (1) to ON position.

b. *Operation.*

(1) *Pilothouse.* Order desired speed and direction for each engine by rotating EOT selector (2, Figure 2-276) to appropriate position.

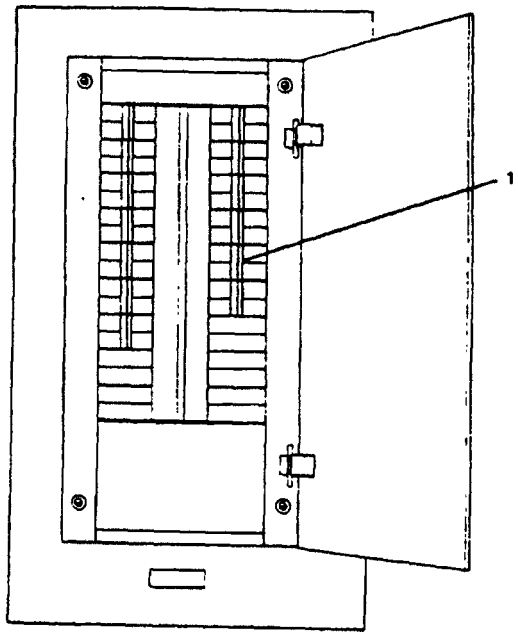


Figure 2-275. Engine Room Emergency Distribution Panel No. 1.

NOTE

• The EOT system constant ringing bell (mounted under the console) will sound.

• When EOS selects correct speed and direction on EOS EOT panel, bell will silence, and LED will continue to flash.

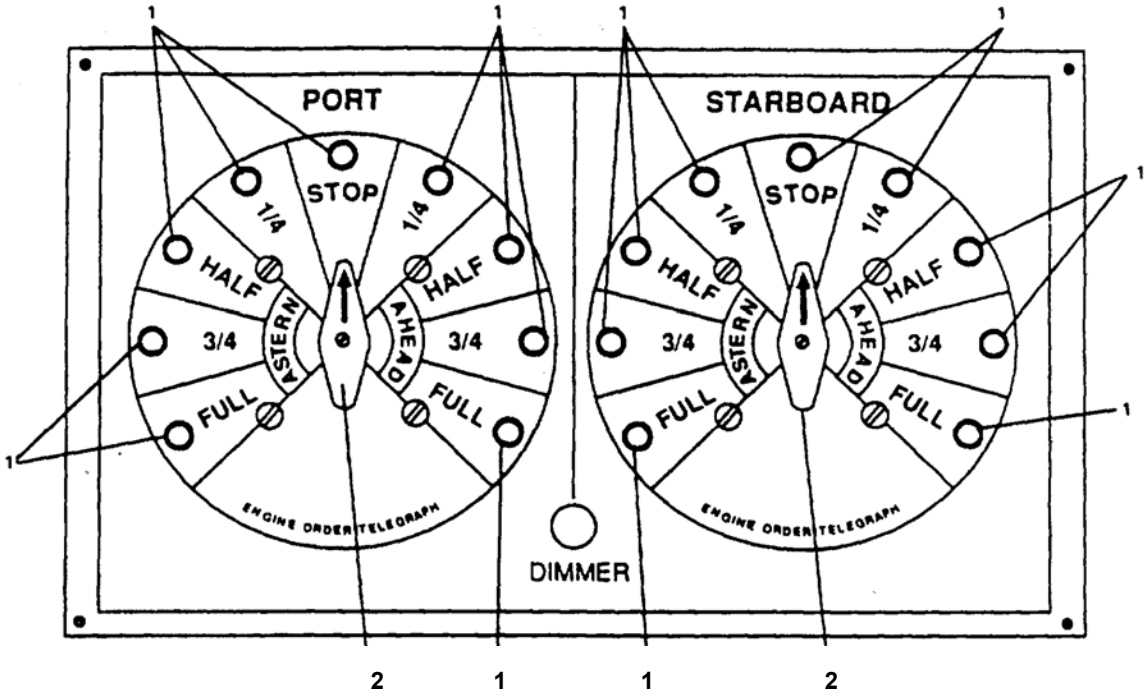


Figure 2-276. EOT Panel.

NOTE

When EOS has made appropriate throttle adjustments, LED (1) will remain lit.

(2) *EOS*.

NOTE

• Bell (Figure 2-277) will sound and LED will light signifying a change has been ordered.

• LED (Figure 2-276) will flash indicating desired speed and direction.

(a) Acknowledge order by rotating selector(s) (2) to appropriate position.

NOTE

• Bell (Figure 2-277) will silence and LED will go out.

• LED (Figure 2-276) will continue to flash.

(b) Make throttle adjustment(s) as required.

NOTE

• LED will stop flashing and remain lit.

• If incorrect throttle adjustments are made, bell (Figure 2-277) will sound and LED will light in both pilothouse and EOT until throttles correspond with EOT ordered direction.

c. Secure EOT. On engine room emergency distribution panel no. 1 (Figure 2-275), set ENGINE ORDER TELEGRAPH SYS circuit breaker (1) to OFF position.

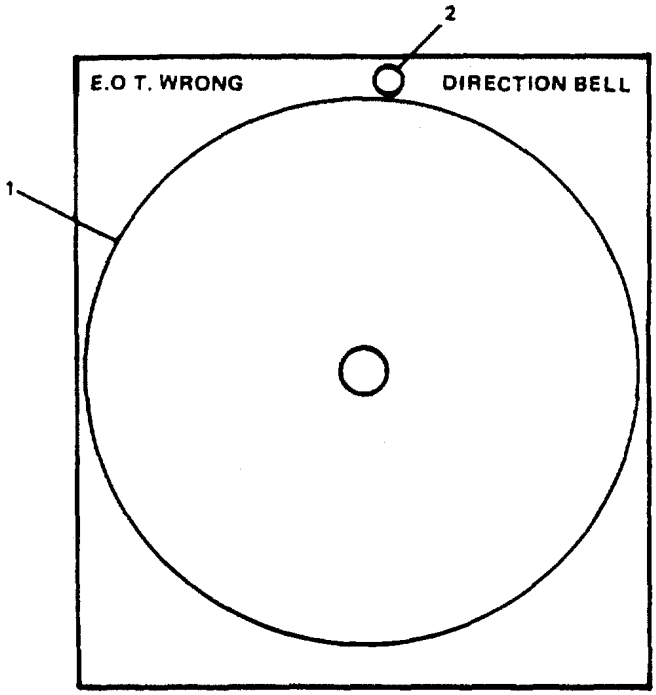


Figure 2-277. E.O.T. Wrong Direction Bell

2-20. Sound Powered Telephone System.

NOTE

There are four models of sound powered telephones used on LT. Models SW-243, SWLR-243, and MWT-246 all operate in the same way and an overall method of operation will be used. Model SW-23 (not shown) provides direct communication between the pilothouse and the radio room. There is also a sound powered head set chest set used on LT and it is covered separately.

a. *Answering a Call (Figures 2-278, 2-279, and 2-280).* Pick up HANDSET (1) and press HANDSET pushbutton (5) in middle of handset to answer call.

b. *Placing a Call.*

(1) Turn SELECTOR KNOB (3) to desired station number on SELECTOR DIAL (2).

(2) Turn MAGNETO HANDLE (4) clockwise 3 or 4 times. This will signal the station being called.

(3) Pick up HANDSET (1) and press HANDSET pushbutton (5) to receive.

NOTE

Handset pushbutton(s) must be depressed to talk or listen.

c. *Audible Devices and Light Operation (Figure 2-279).* On Model SWLR INDICATOR LIGHT (7) will light with calling signal. When HANDSET (1) is raised, the INDICATOR LIGHT (7) will go out.

NOTE

In noisy spaces such as engine room emergency generator room and bow thruster compartment, sound powered telephones have audible horns and light indicators to attract attention.

d. *H200/U Head Set - Chest Set Operation (Figure 2-281).*

(1) Remove head set - chest set from storage box.

(2) Remove jack cover (8) from telephone jack box (7) by turning counterclockwise.

(3) Insert jack plug (6) into socket.

(4) Disconnect HOOK (1) from SUPPORT BRACKET (5). Place strap around neck and reconnect HOOK (1).

(5) Place HEADSET (4) over head with ear cups covering ears.

(6) Adjust MOUTHPIECE (2) 3 inches in front of your mouth and *2* inches below your lips.

(7) Press PUSHBUTTON (3) located on top of mouthpiece to answer instructions or pass information.

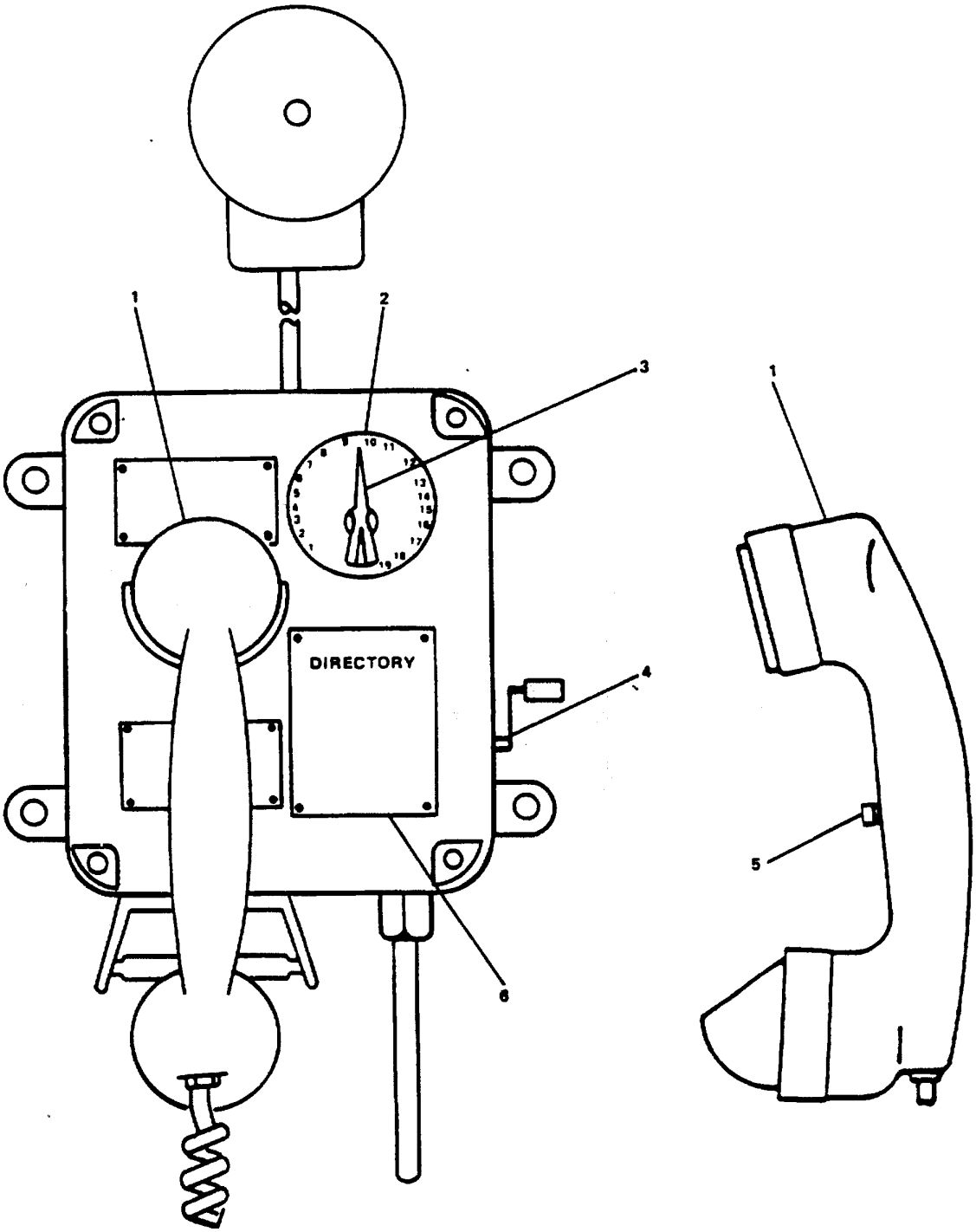
NOTE

The head set will receive the other party even when pushbutton is pressed.

(8) When instructions have been finished and you are advised to discontinue operation, remove HEADSET (4) and place around SUPPORT BRACKET (5). Disconnect HOOK (1) from SUPPORT BRACKET (5), remove strap from around neck and reconnect HOOK (1).

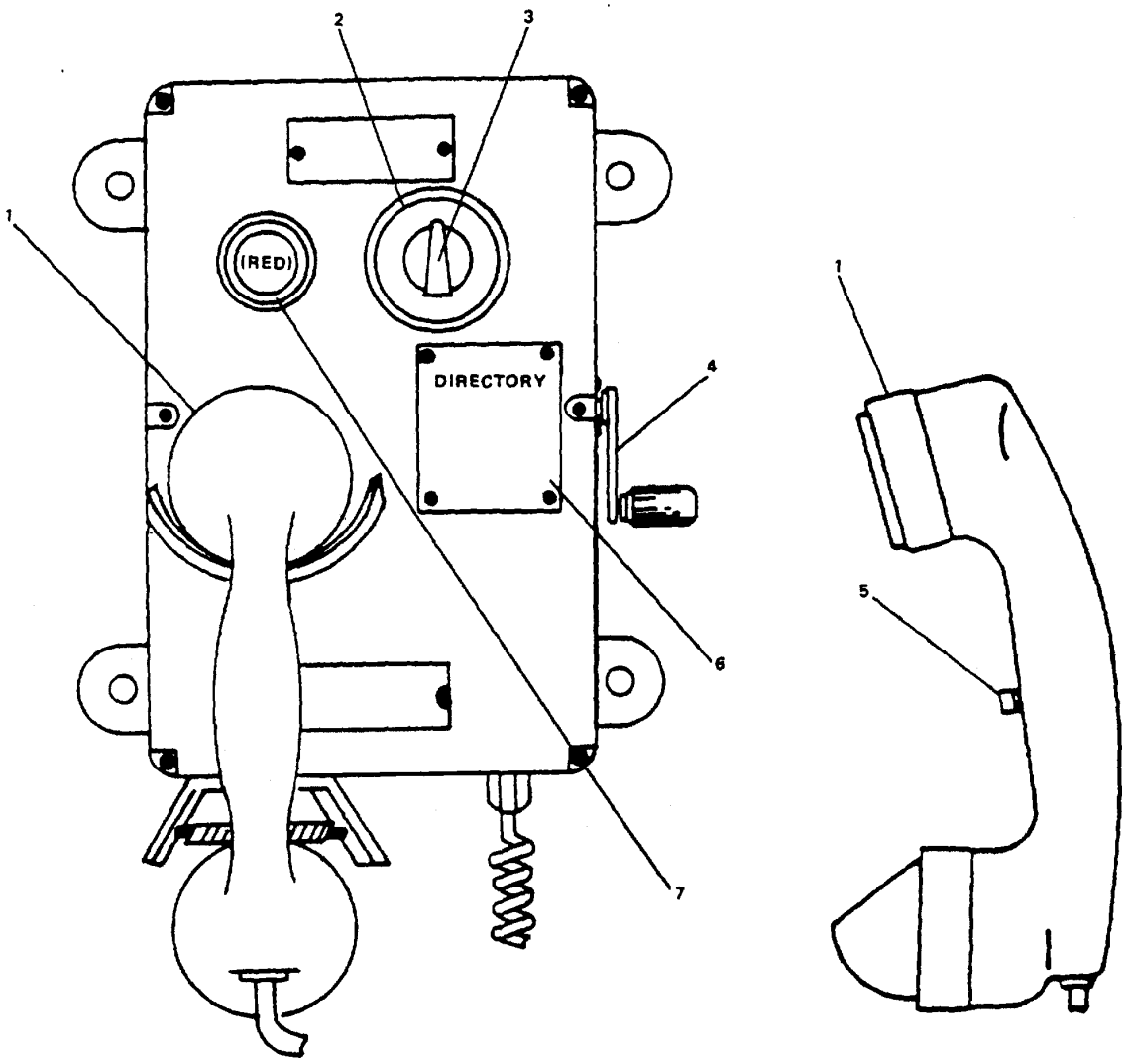
(9) Disconnect JACK PLUG (6) from TELEPHONE JACK BOX *(7)* and replace JACK COVER (8) by turning clockwise to keep it waterproof.

(10) Replace head set - chest set in storage box and secure cover.



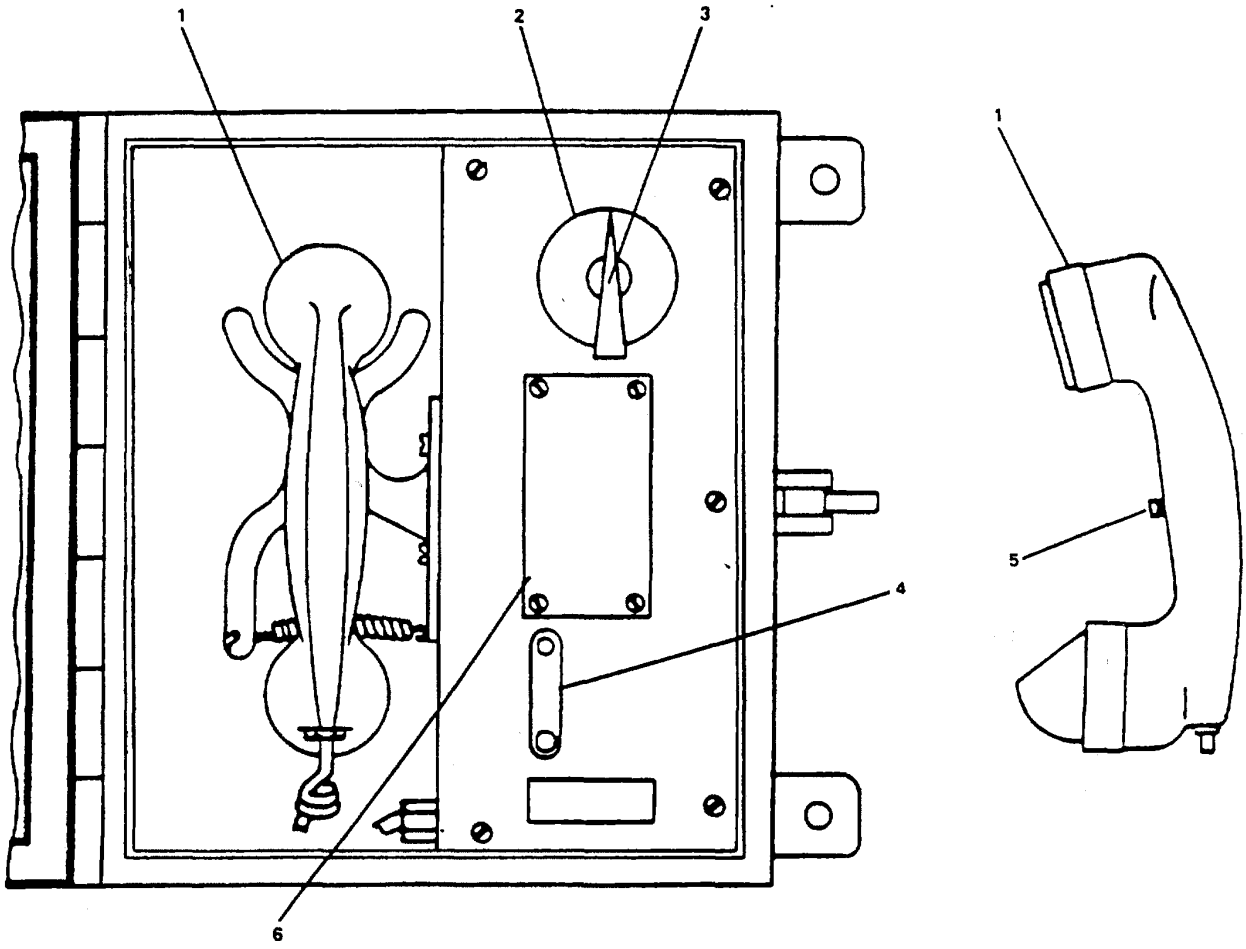
1. HANDSET
2. SELECTOR DIAL
3. SELECTOR KNOB
4. MAGNETO HANDLE
5. HANDSET PUSHBUTTON
6. DIRECTORY

Figure 2-278. Sound Powered Telephone Model SW-243.



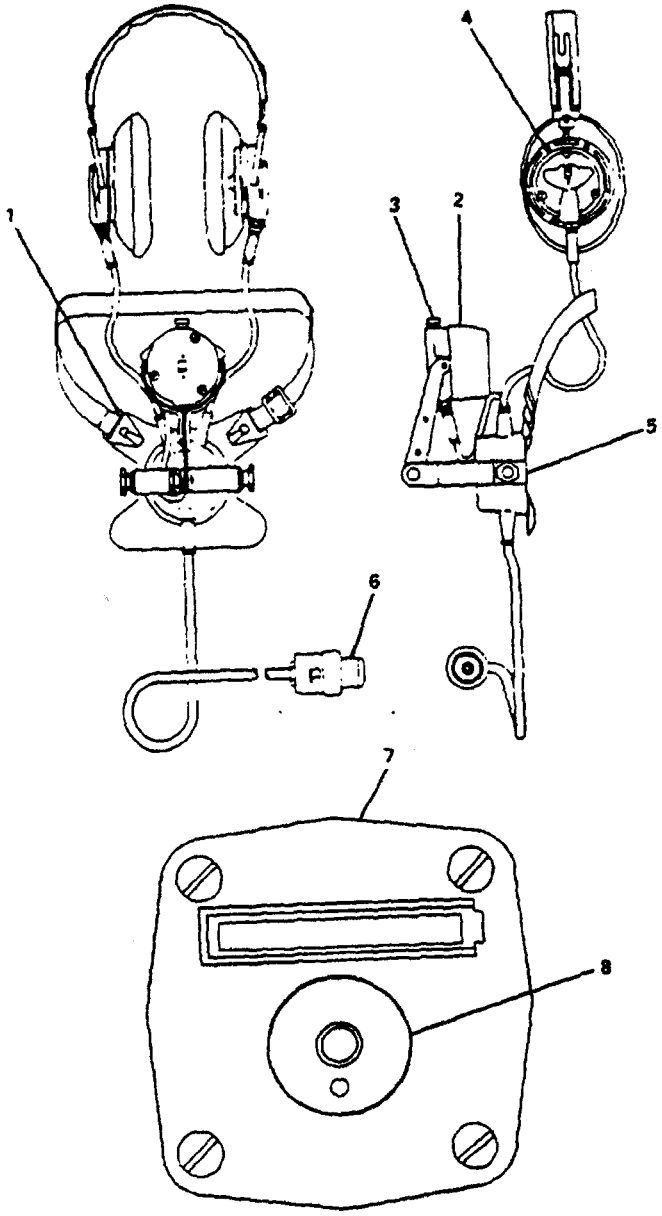
1. HANDSET
2. SELECTOR DIAL
3. SELECTOR KNOB
4. MAGNETO HANDLE
5. HANDSET PUSHBUTTON
6. DIRECTORY
7. INDICATOR LIGHT

Figure 2-279. Sound Powered Telephone Model SWLR-243.



1. HANDSET
2. SELECTOR DIAL
3. SELECTOR KNOB
4. MAGNETO HANDLE
5. HANDSET PUSHBUTTON
6. DIRECTORY

Figure 2-280. Sound Powered Telephone Model MWT-246.



1. HOOK
2. MOUTHPIECE
3. PUSHBUTTON
4. HEADSET
5. SUPPORT BRACKET
6. JACK PLUG
7. TELEPHONE JACK BOX
8. JACK COVER

Figure 2-281. H200/U Head Set - Chest Set.

2-21. Intercom.

a. *Align electrical system*. On pilothouse emergency distribution panel (Figure 2-282), set LS-519A/ SIC INTERCOM circuit breaker (1) to ON position.

b. *Answering a call*.

(1) When call is received on LS-519A (Figure 2-283), your compartment name will be called.

(2) To answer, turn down and hold INTERCOM CONTROL lever (2) to PRESS TO TALK position. Speak into the LS-519A directly. Acknowledge call by giving your name and release the INTERCOM CONTROL lever (2).

(3) Each time you answer or pass information you must turn down and hold INTERCOM CONTROL lever (2) to PRESS TO TALK position.

(4) Adjust VOLUME CONTROL (4) to desired level when other party is speaking.

c. *Placing a call*.

(1) Press STATION pushbutton (1, Figure 2-283) of desired station to be called.

(2) Turn down and hold INTERCOM CONTROL lever (2) to PRESS TO TALK, and call station; release INTERCOM CONTROL lever (2) to hear answer.

(3) When call is finished, press PRESS TO RELEASE pushbutton (5).

d. *Making an Announcement*.

(1) Press STATION pushbutton (1) of selected stations or all stations.

(2) Turn up INTERCOM CONTROL lever (2) to HANDS FREE position.

(3) To make the announcement with a microphone, do the following:

(a) Turn MIC OR HANDSET socket (3) cover counterclockwise and remove.

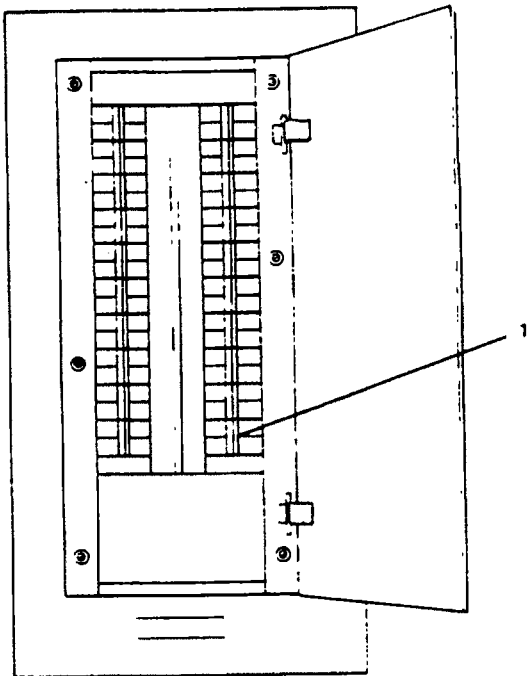


Figure 2-282. Pilothouse Emergency Distribution Panel.

(b) Connect a microphone plug to socket (3).

NOTE

If announcement is made without a microphone, speak directly into LS-519A.

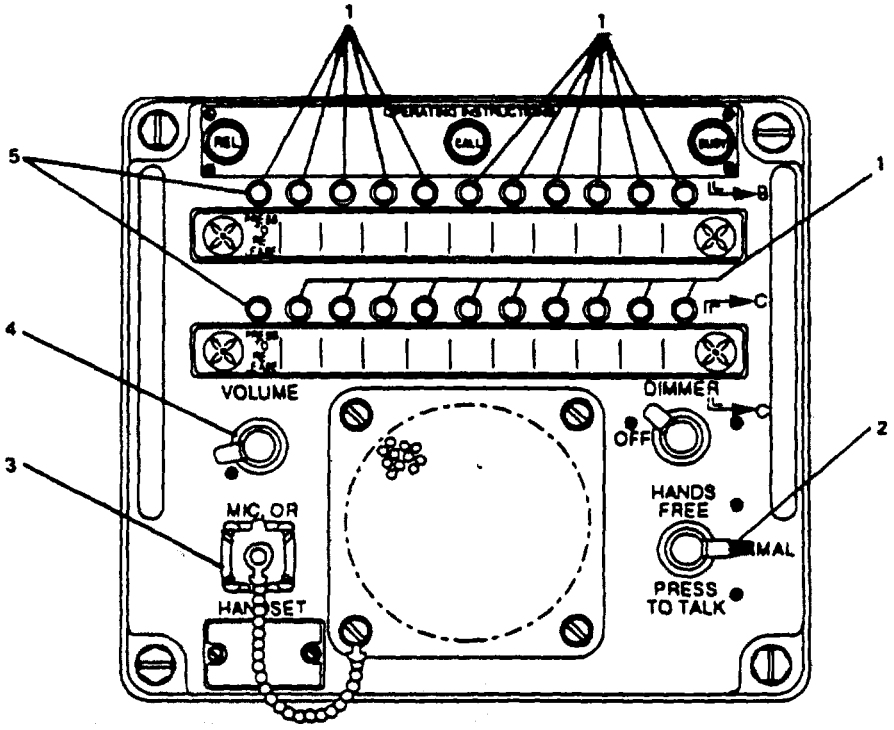
(4) Make announcement.

(5) When announcement is finished, turn down INTERCOM CONTROL lever (2) to center position.

(6) Press PRESS TO RELEASE pushbutton (5).

NOTE

If microphone was used, remove microphone plug and secure socket cover.



1. STATION PUSHBUTTON
2. INTERCOM CONTROL
3. MIC OR HANDSET
4. VOLUME CONTROL
5. PRESS TO RELEASE

Figure 2-283. Intercom.

2-22. Clearview Screen.

a. *Start-Lip.*

(1) *Exterior emergency lighting panel no. 2 (Figure 2-284)*. Set ROTARY CLEAR VIEW SCREEN & HEATER circuit breaker (1) to ON position.

(2) *Clearview screen control box (Fioure 2-285)*.

(a) Set heater ON-OFF switch (3) to ON position.

NOTE

For best results, the heater should be turned on at least 20 to 30 minutes before the motor to remove any ice that may prevent the motor from turning. The heater may be left on continuously to prevent fogging of the air chamber.

(b) HEATER indicator (4) will light.

CAUTION

Do NOT leave motor ON-OFF switch in the ON position if the screen is not turning. Damage to the motor could result.

(c) Set motor ON-OFF switch (2) to ON position.

(d) MOTOR indicator (1) will light.

b. *Shutdown.*

(1) *Clearview screen control box (Figure 2-285)*.

(a) Set motor ON-OFF switch (2) to the OFF position.

(b) MOTOR indicator (1) lamp will go out.

(c) Set heater ON-OFF switch (3) to OFF position.

(d) HEATER indicator (4) will go out.

(2) *Exterior emergency lighting panel no. 2 (Figure 2-284)*. Set ROTARY CLEAR VIEW SCREEN & HEATER circuit breaker (1) to OFF position.

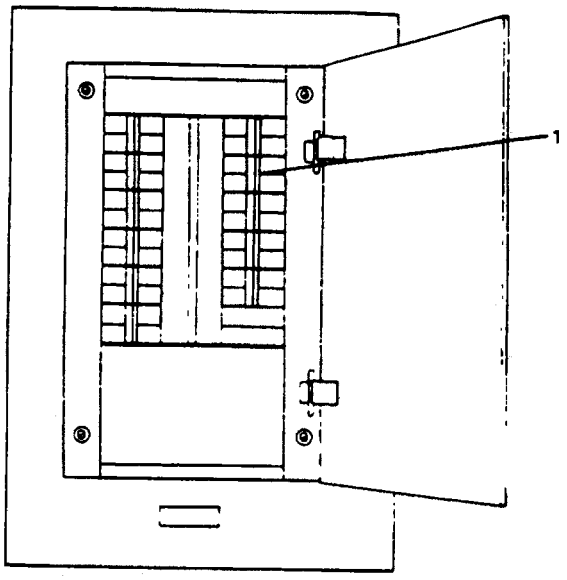


Figure 2-284. Exterior Emergency Lighting Panel No. 2.

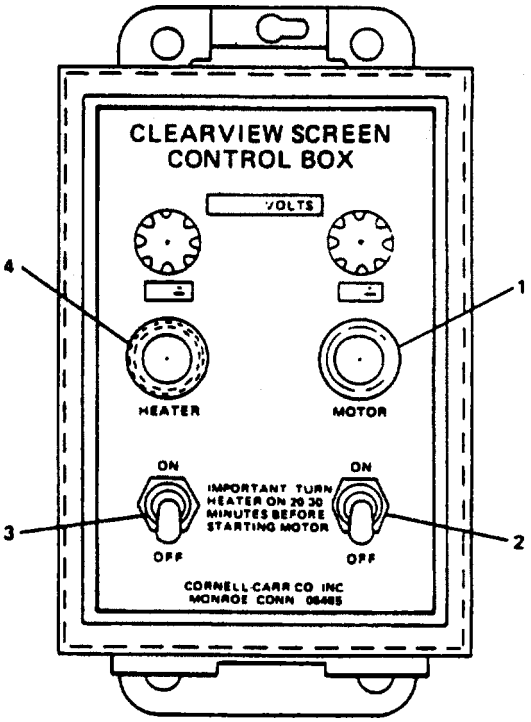


Figure 2-285. Clearview Screen Control Box.

2-23. Sliding Watertight Door.

a. *Local Hand Pump Operation*. Rotate hand pump in desired direction as shown on rotation plate.

NOTE

It may be necessary to rotate hand crank very fast to "break" door loose from the closed position. Local hand pumps are located on bulkhead next to watertight door.

b. *Remote Hand Pump Operation*. Rotate hand pump in CLOSE direction shown on rotation plate. Actual door position will show on door position indicator mounted above the pump.

NOTE

Door cannot be opened using remote hand pump. AMS 1 remote hand pump is located in main deck passageway forward of galley. AMS 2 remote hand pump is located on main deck at top of engine room ladder.

2-24. 500 Watt XENON Searchlight.

WARNING

• High pressures exist inside lamp, especially when hot, and under certain conditions lamp could explode. Handle lamp only in its protective cover.

• Remove protective cover from lamp before energizing circuits. Protect the eyes and wear gloves when removing cover from lamp. An industrial type face mask is recommended for eye and face protection.

• Avoid direct exposure from powerful direct and reflected radiations given off by lamp. The front cover glass provides protection from these radiations.

• Do not stand close in front of the searchlight front cover glass when lamp is lighted. In the event of lamp explosion, the front cover glass could break, causing serious personal injury.

CAUTION

Operation of lamp with finger marks or grease on the surface will cause deterioration of the quartz arc tube.

a. *Lighting Lamp.*

(1) *Searchlight.* Remove protective cover from lamp.

(2) *Pilothouse emergency distribution panel (Figure 2-286).* Set following circuit breakers to ON position.

(a) PORT SEARCH LT (1).

(b) STBD SEARCH LT (2).

(3) *02 level passageway.* On searchlight power supply, turn ON-OFF- RESET switch (3, Figure 2-287) counterclockwise to ON position.

(4) *Searchlight control panel (on pilothouse console).*

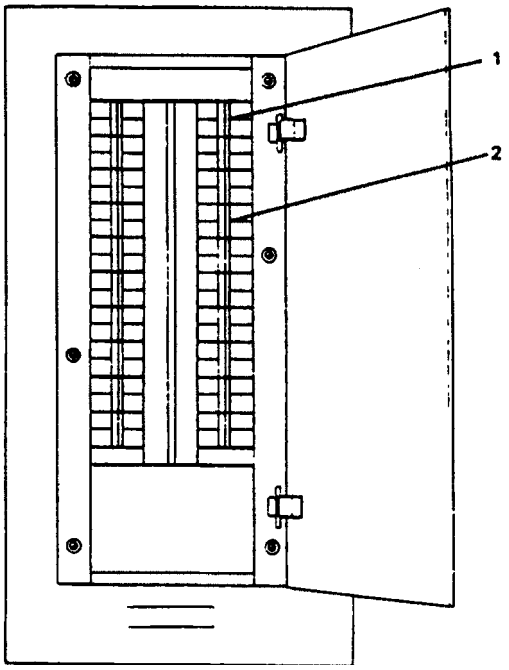


Figure 2-286. Pilothouse Emergency Distribution Panel.

(a) Set STANDBY OFF switch (5) to STANDBY position.

CAUTION

Holding OFF-START switch in START position longer than necessary may shorten lamp life by unnecessary applications of high starting voltage to lamp.

(b) Turn OFF-START switch (4) clockwise to START position; hold until lamp lights.

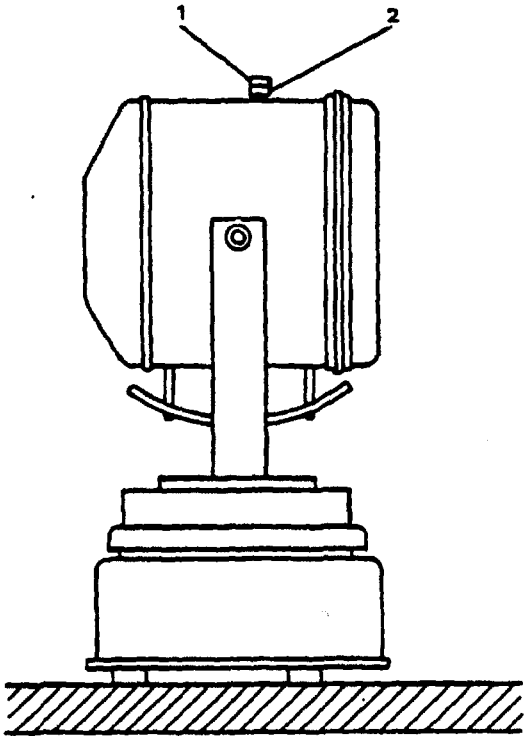
CAUTION

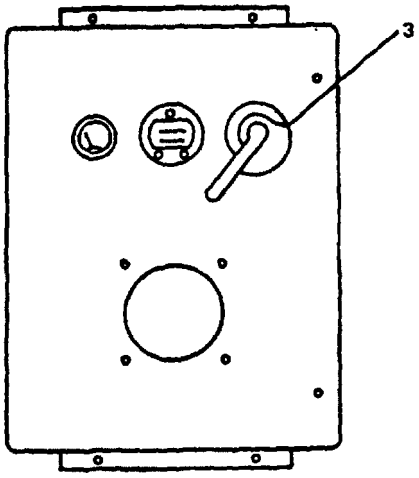
Holding joystick after searchlight has reached end of travel could create unnecessary wear or damage on motor or drive train.

b. *Directing Beam.*

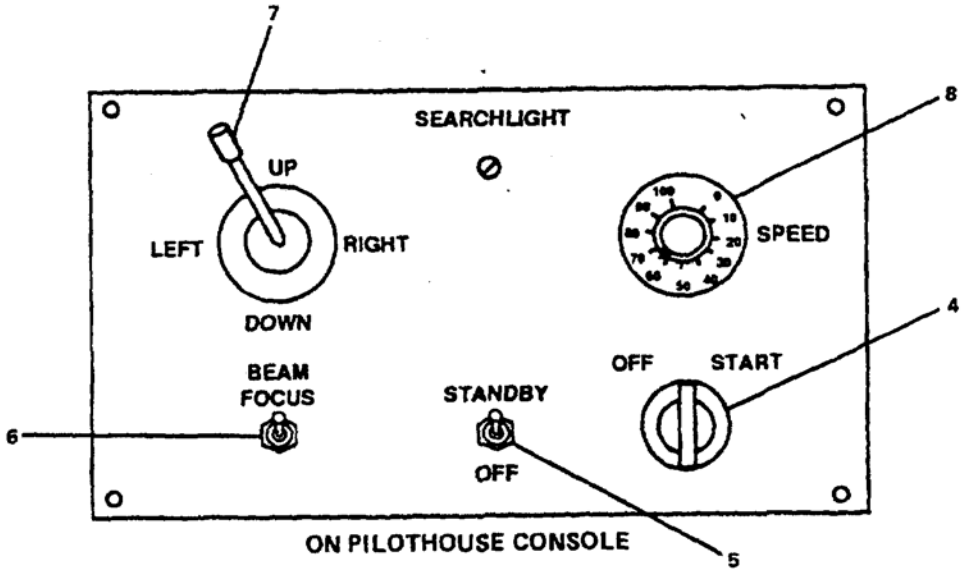
(1) Set SPEED control (8) to desired position.

(2) Move joystick (7).





02 LEVEL PASSAGEWAY
(AT BOTTOM OF PILOTHOUSE LADDER)



1. MANUAL FOCUS KNOB
2. LOCK KNOB
3. ON-OFF-RESET
4. OFF START
5. STANDBY OFF
6. BEAM FOCUS
7. JOYSTICK
8. SPEED CONTROL

Figure 2-287. 500 Watt Xenon Searchlight

NOTE

Motors in searchlight base drive drum in direction selected until joystick is released or until end of travel is reached. Motion stops when lever is released.

c. *Focusing Beam from Pilothouse.*

(1) Searchlight drum. Ensure LOCK KNOB (2) on the MANUAL FOCUS KNOB (1) is unlocked.

(2) Searchlight control panel.

(a) Move BEAM FOCUS switch (6) to BEAM or FOCUS position to adjust diameter of beam and intensity.

(b) Release BEAM FOCUS switch (6).

d. *Focusing Beam From Searchlight Drum.*

WARNING

• High pressures exist inside lamp, especially when hot, and under certain conditions lamp could explode. Handle lamp only in its protective cover.

• Avoid direct exposure from powerful direct and reflected radiations given off by lamp. The front cover glass provides protection from these radiations.

• Do not stand close in front of the searchlight front cover glass when lamp is lighted. In the event of lamp explosion, the front cover glass could break, causing serious personal injury.

WARNING

Searchlight drum gets hot after lamp has been operating for a short time. Avoid bodily contact with drum and wear gloves when handling focus knob.

(1) On top of searchlight drum loosen LOCK KNOB (2).

(2) Turn MANUAL FOCUS KNOB (1) either clockwise or counterclockwise to adjust diameter of beam and its intensity.

(3) Tighten LOCK KNOB (2).

e. *Shutdown.*

(1) *Searchlight to be used within 3 hours.*

(a) Set OFF-START switch (4) to OFF position.

(b) Set STANDBY-OFF switch (5) to STANDBY position.

(2) *Searchlight NOT to be used within 3 hours.*

(a) *Control panel.*

1 Set OFF-START switch (4) to OFF position.

2 Set STANDBY-OFF switch (5) to OFF position.

(b) 02 *Level passageway*. On selected PORT or STBD SEARCH LT SPLY power supply, set ON-OFF-RESET switch (3, Figure 2-287) to OFF position.

(c) *Pilothouse emergency distribution panel (Figure 2-286)*. Set PORT SEARCH LT and STBD SEARCH LT circuit breakers (1, 2) to OFF position.

2-25. Portable Fire Pumps.

a. *Portable Fire Fighting Pump (PE-271).*

(1) *Suction and discharge hose attachment and fuel line connection.*

(a) Unscrew and remove caps (Figure 2-288) from water suction (3) and water discharge (1) openings.

(b) Connect suction hose fitting to suction coupling and place suction hose with foot valve and strainer into water supply.

(c) Connect discharge hose fitting to discharge coupling. Ensure discharge hose is manned.

(d) Connect fuel line to carburetor fuel supply line coupler located below carburetor on mounting plate.

(2) *Automatic priming startup.*

(a) Clear discharge port (7) of priming pump.

(b) Connect red battery cable to (+) positive pole next to carburetor and black cable to (-) negative pole next to main pump suction inlet.

(c) Place OFF-START-RUN switch (2, Figure 2-289) in START position.

(d) Advance SPEED control (6) in clockwise direction, to one quarter of full throttle.

NOTE

If engine is cold, advance CHOKE control fully clockwise (closed), then half open as engine starts. As engine warms up, fully open choke for running.

(e) Press and hold START pushbutton (4) until engine starts. Adjust CHOKE and SPEED controls as required.

CAUTION

Do not allow pump to run more than 2 minutes without water flowing. Lack of cooling water could cause severe damage to the impeller and exhaust system.

(f) Turn water discharge valve (5, Figure 2-288) counterclockwise to fully CLOSED position.

NOTE

If suction lift is 20 feet or less, push in and keep firm continuous pressure on PRIME pushbutton until pump is primed.

(g) Push in PRIME pushbutton (3, Figure 2-289) until pump is primed.

NOTE

Primer pump should evacuate air from impeller housing and suction hose in approximately 60 seconds.

(h) Slowly turn water discharge valve (5, Figure 2-288) clockwise until pressure is indicated on gauge (1, Figure 2-289) and advance speed control (6) as required.

(i) Release PRIME pushbutton (3) after priming pump.

(j) Place OFF-START-RUN switch (2) in RUN position.

(k) Rotate CHOKE control (5) to full counterclockwise, OFF position.

(3) *Manual priming startup.*

(a) Unscrew and remove manual prime inlet plug (2, Figure 2-288) from priming inlet.

(b) Fill pump with water until filler cap is full; replace plug (2) in priming inlet.

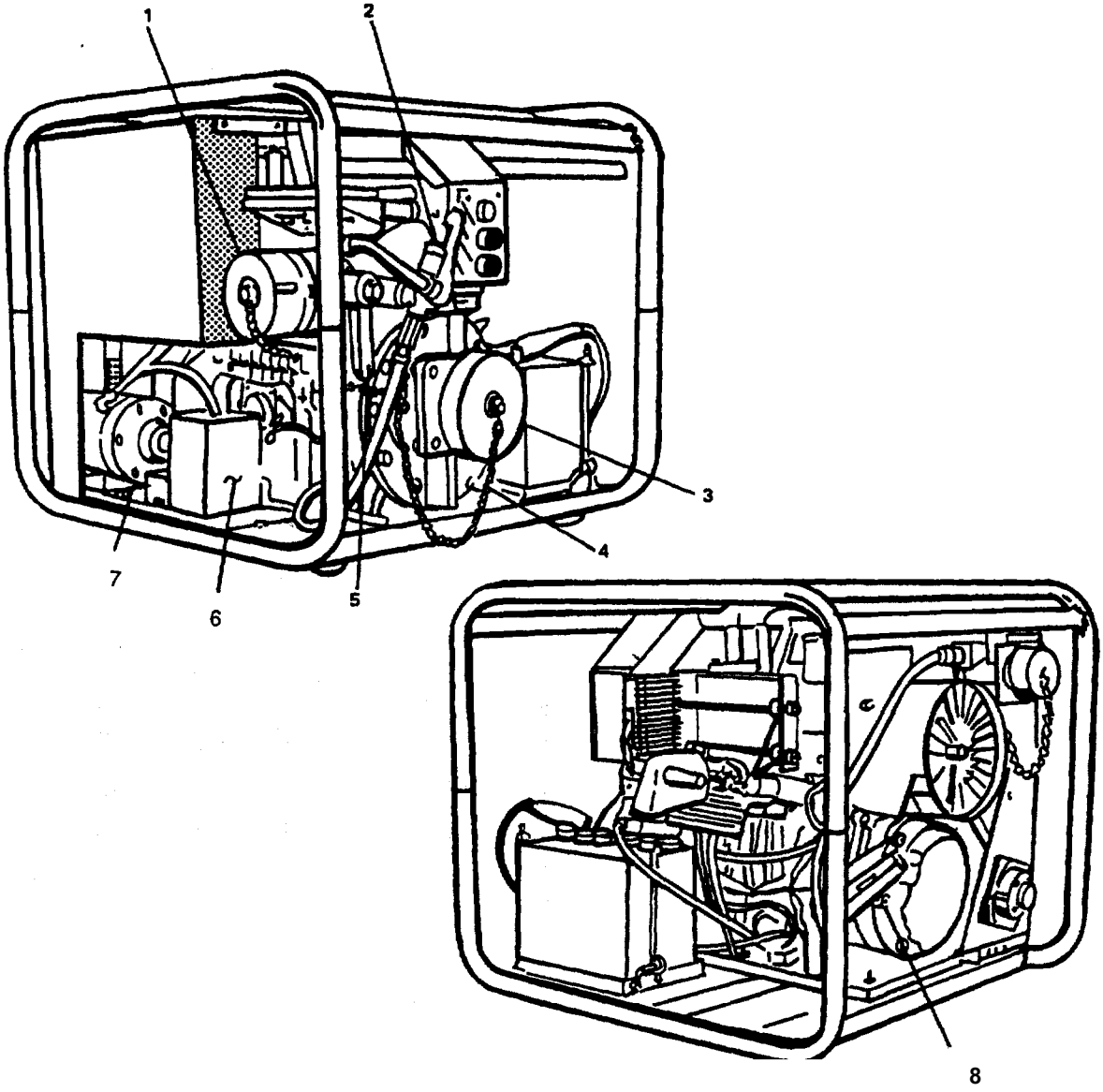
(c) Place OFF-START-RUN switch (2, Figure 2-289) to START position.

(d) Advance SPEED control (6) in clockwise direction to one quarter of full throttle.

(e) Press and hold START pushbutton (4) until engine starts. Adjust CHOKE (5) and SPEED (6) controls as required.

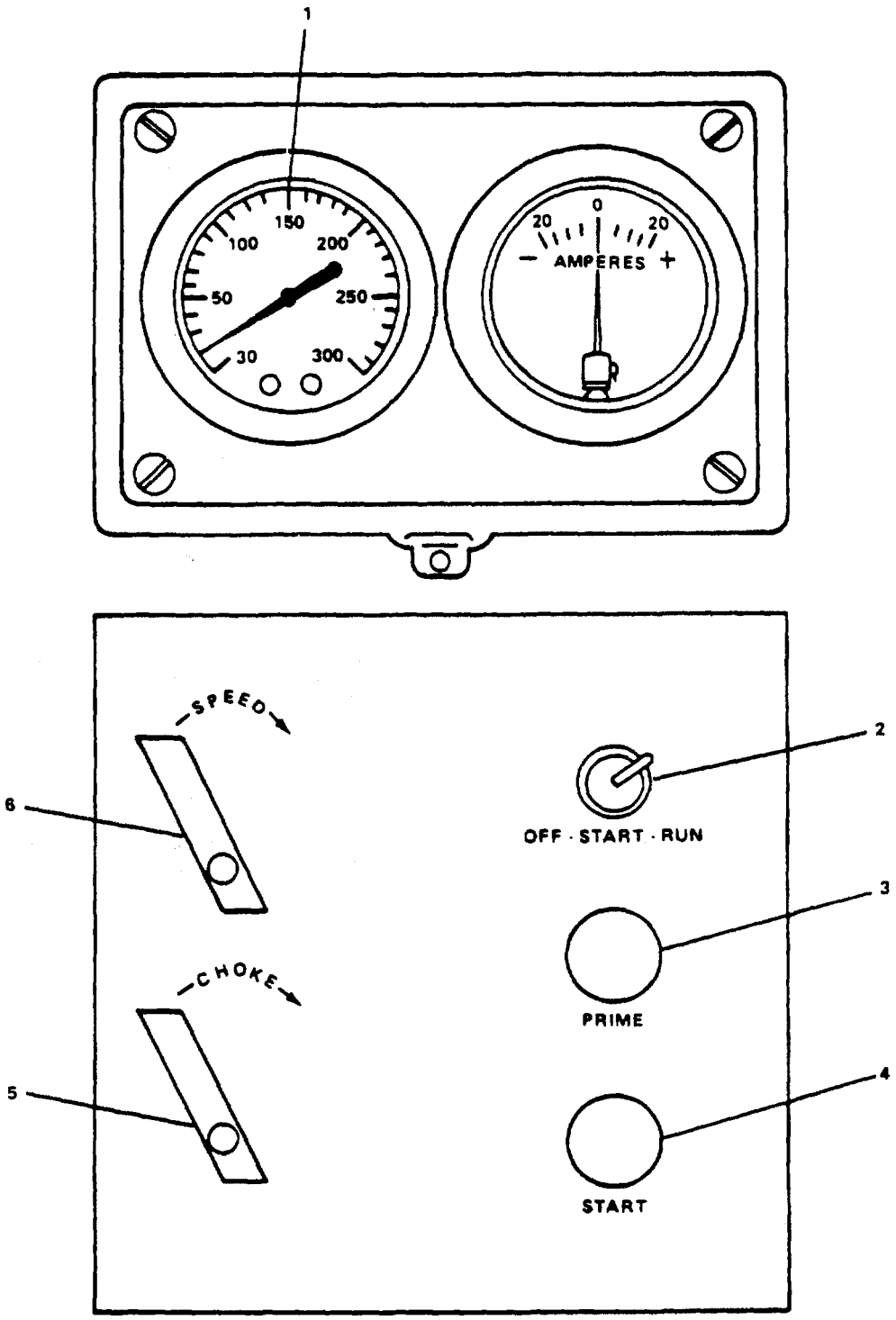
CAUTION

Do not allow pump to run more than 2 minutes without water flowing. Lack of cooling water could cause severe damage to impeller and exhaust system.



1. DISCHARGE OUTLET & CAP
2. MANUAL PRIMING INLET PLUG
3. SUCTION INLET & CAP
4. DRAIN PLUG
5. DISCHARGE VALVE
6. PRIMING PUMP OILER
7. PRIMING PUMP DISCHARGE PORT
8. MANUAL START PULL CORD

Figure 2-288. Portable Firefighting Pump, Gasoline Engine Driven.



1. PRESSURE GAUGE
2. OFF-START-RUN
3. PRIME
4. START
5. CHOKE
6. SPEED

Figure 2-289. Portable Fire Fighting Pump Control Panel.

(f) Open water discharge valve (5, Figure 2-289) slowly and advance engine SPEED control (6, Figure 2-289) as required to attain 100 psi pumping pressure.

(g) Place OFF-START-RUN switch (2) in RUN position.

(h) Rotate CHOKE control (5) to full counterclockwise, OFF position.

(4) *Manual startup with automatic priming*.

(a) Clear discharge port of priming pump (7, Figure 2-288).

(b) Connect red battery cable to (+) positive pole next to carburetor and black cable to (-) negative pole next to main pump suction inlet.

(c) Place OFF-START-RUN switch (2, Figure 2-289) in START position.

(d) Advance SPEED control (6) in clockwise direction, to one quarter of full throttle.

NOTE

If engine is cold, advance CHOKE control fully clockwise (closed), then half open as engine starts, and fully open for running.

(e) Pull manual start pull cord (8, Figure 2-288) in a quick steady motion until engine starts.

CAUTION

Do not allow pump to run more than 2 minutes without water flowing. Lack of cooling water could cause severe damage to the impeller and exhaust system.

(f) Turn water discharge valve (5) counterclockwise to fully CLOSED position.

NOTE

If suction lift is 20 feet or less, push in and keep firm continuous pressure on PRIME pushbutton (Figure 2-289) until pump is primed.

(g) Push in PRIME pushbutton (3) until pump is primed

NOTE

Primer pump should evacuate air from impeller housing and suction hose in approximately 60 seconds.

(h) Slowly turn water discharge valve (5, Figure 2-288) clockwise until pressure is indicated on gauge (1, Figure 2-289) and advance SPEED control (6) as required.

(i) Release PRIME pushbutton (3) after priming pump.

(j) Place OFF-START-RUN switch (2) in RUN position.

(k) Rotate CHOKE control (5) to full counterclockwise, OFF position.

(5) *Manual startup with manual priming*.

(a) Unscrew and remove manual priming inlet plug (2, Figure 2-288) from priming inlet.

(b) Fill pump with water until filler inlet is full; replace plug (2) in filler inlet.

(c) Place OFF-START-RUN switch (2, Figure 2-289) in START position.

(d) Advance SPEED control (6) in clockwise direction, to one quarter of full throttle.

NOTE

If engine is cold, advance CHOKE control fully clockwise (closed), then half open as engine starts, and fully open for running.

(e) Pull manual start pull cord (8, Figure 2-288) in a quick steady motion until engine starts.

CAUTION

Do not allow pump to run more than 2 minutes without water flowing. Lack of cooling water could cause severe damage to the impeller and exhaust system.

(f) Slowly turn water discharge valve (5) clockwise until pressure is indicated on gauge (1, Figure 2-289) and advance SPEED control (6) as required.

(g) Place OFF-START-RUN switch (2) in RUN position.

(h) Rotate CHOKE control (5) to full counterclockwise, OFF position.

(6) *Shutdown procedures*.

(a) *Stop engine*.

1 Rotate SPEED control (6) to full counterclockwise idle position.

2 Place OFF-START-RUN switch (2) to OFF position.

(b) *Drain pump*.

1 Remove pump drain plug (4, Figure 2-288). Keep open until drained.

2 Replace pump drain plug (4).

(c) *Flush pump with fresh water*.

1 Place suction hose with foot valve and strainer into fresh water supply.

2 Close discharge valve (5).

WARNING

Ensure exhaust gases discharge to outside atmosphere. Carbon monoxide in exhaust gases could cause illness or death.

3 Place OFF-START-RUN switch (2, Figure 2-289) in START position.

4 Advance SPEED control (6) in clockwise direction, to one quarter of full throttle.

NOTE

If engine is cold, advance CHOKE control fully clockwise (closed), then half open as engine starts, and fully open for running.

5 Press and hold START pushbutton (4) until engine starts. Adjust CHOKE (5) and SPEED (6) controls as required.

CAUTION

Do not allow pump to run more than 2 minutes without water flowing. Lack of cooling water could cause severe damage to the impeller and exhaust system.

6 Turn water discharge valve (5, Figure 2-288) counterclockwise to fully CLOSED position.

NOTE

If suction lift is 20 feet or less, push in and keep firm continuous pressure on PRIME pushbutton until pump is primed.

7 Push in PRIME pushbutton (3, Figure 2-289) until pump is primed.

NOTE

Primer pump should evacuate air from impeller housing and suction hose in approximately 60 seconds.

8 Slowly turn water discharge valve (5, Figure 2-288) clockwise until pressure is indicated on gauge (1, Figure 2-289) and advance SPEED control (6) as required.

9 Release PRIME pushbutton (3) after priming pump.

10 Place OFF-START-RUN switch (2) in RUN position.

11 Rotate CHOKE control (5) to full counterclockwise, OFF position.

12 Adjust SPEED control (6) to obtain 100 psi discharge pressure.

13 Operate pump for 1 minute; inspect for leaks, unusual noises and vibrations.

14 Adjust SPEED control (6) to idle and push PRIME pushbutton (3). Observe discharge at primer pump. Allow primer pump to run for 30 to 45 seconds to flush out.

15 Release PRIME pushbutton (3).

16 Shut discharge valve (5, Figure 2-288).

17 Stop engine by disconnecting fuel line and allowing engine to run until excess fuel is burned off.

18 Depressurize and remove fuel tank.

19 Check oil level in priming pump oiler (6); fill if necessary.

20 Set engine OFF-START-RUN switch (2, Figure 2-289) control to OFF position.

21 Push both START (4) and PRIME (3) pushbuttons to oil priming pump for storage. Hold both buttons for approximately 5 seconds.

22 Release buttons.

23 Disconnect hoses and fittings.

24 Drain pump by removing pump drain plug (4, Figure 2-288).

25 Dry unit, replace caps on all openings, and replace pump drain plug (4).

26 Stow pump, hoses, and accessories.

b. *Centrifugal Pump Unit.*

(1) *Suction and discharge hose attachment.*

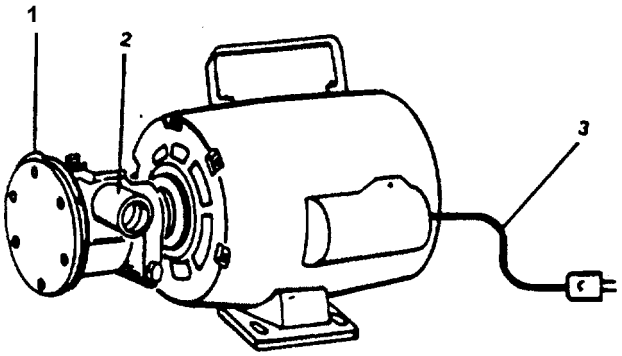
(a) Connect suction hose to suction port (1, Figure 2-290).

(b) Place suction hose with strainer into water supply.

(c) Connect discharge hose to discharge port (2).

(d) Place discharge hose to discharge overboard.

(2) *Start pump.* Connect power cord plug (3) to power supply.



1. SUCTION PORT
2. DISCHARGE PORT
3. POWER CORD

Figure 2-290. Centrifugal Pump Unit.

(3) *Shutdown.*

(a) *Stop pump.* Disconnect power cord plug (3) from power supply.

(b) *Flush Pump.*

1 Place suction hose with strainer into bucket of clean fresh water.

2 Connect power cord plug (3) to power supply.

CAUTION

Do not allow pump to operate without water flowing. Damage to the pump could result.

(c) *Disconnect suction and discharge hose.*

1 Disconnect suction hose from suction port (1).

2 Disconnect discharge hose from discharge port (2).

c. Electric Submersible Pump.

(1) *Operation.*

(a) *Discharge hose attachment (Figure 2-291).* Connect discharge hose to discharge port (3).

(b) *Attach handling line*. Secure handling line to handle (1).

WARNING

Secure plug to prevent it from getting wet. A wet plug could result in electrical shock and injury or death.

(c) *Lower pump into water*. Lower pump into water using handling line.

(d) *Position discharge hose*. Position discharge hose to discharge overboard.

(e) *Start pump*. Connect power cord plug (2) to power supply.

(2) *Shutdown*.

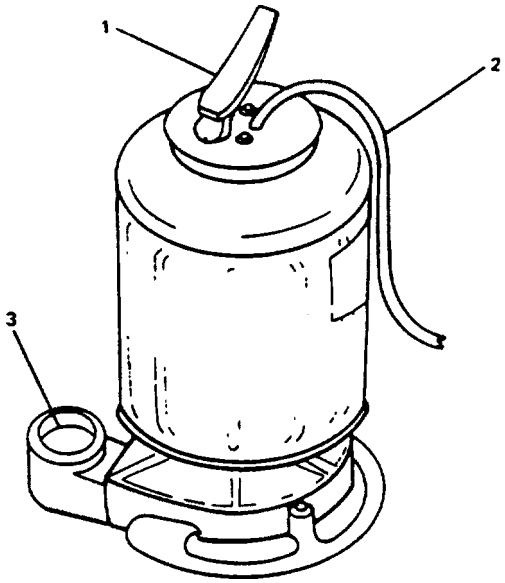
(a) *Stop pump*. Disconnect power cord plug (2) from power supply.

(b) *Flush pump*. Lower pump into bucket of clean fresh water.

CAUTION

Do not allow pump to operate without fluid. Damage to pump could result.

(c) *Start pump*. Connect power cord plug (2) to power supply.



1. HANDLE
2. POWER CORD
3. DISCHARGE PORT

Figure 2-291. Electric Submersible Pump.

(d) *Stop pump*. Disconnect power cord plug (2) from power supply.

(e) *Disconnect discharge hose*. Disconnect discharge hose at discharge port (3).

2-26. Life Rafts.

a. *Pre-operation*. Secure life raft painter line (8, Figure 2-292) to life raft launching ramp.

b. *Manual Life Raft Launch*. Proceed as follows:

(1) Open pelican hook (5) by prying locking ring (4) up and over end of hook

(2) Retainer strap (3) is released.

(3) Remove two retaining pins (9).

(4) Two crew members tilt life raft frame (7) to launch.

NOTE

Life raft frame tilts outboard.

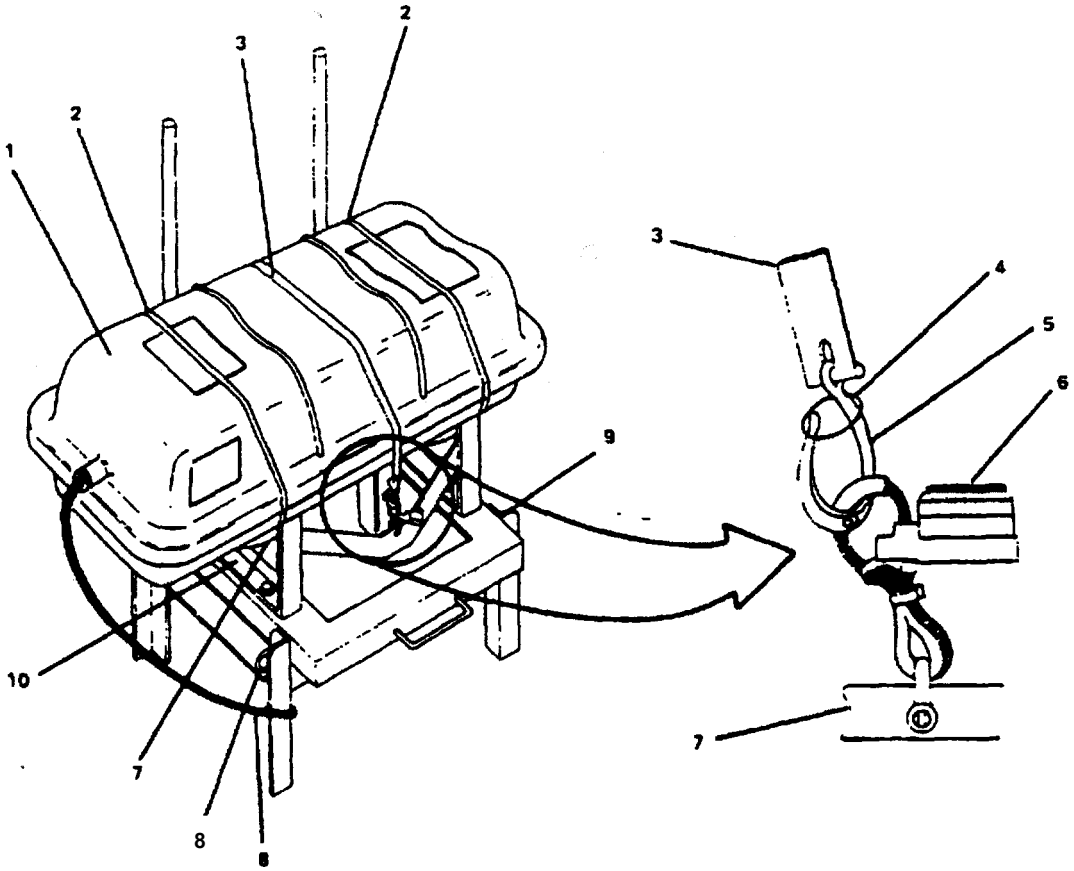
NOTE

• If life raft does not inflate after hitting water, pull sharply on painter line.

• Three straps secured around life raft container will release as life raft inflates.

(5) After boarding life raft, cut painter line (8).

c. *Automatic Life Raft Launch*. Life rafts are equipped with hydrostatic releases (6) designed to release life raft when submerged.



1. LIFE RAFT CONTAINER
2. LIFE RAFT CONTAINER STRAPS
3. RETAINER STRAP
4. LOCKING RING
5. PELICAN HOOK
6. HYDROSTATIC RELEASE
7. LIFE RAFT RAMP
8. LIFE RAFT PAINTER LINE
9. RETAINING PIN
10. CRADLE

Figure 2-292. Life Raft

2-27. Central Hydraulic System.

a. *Operate Central Hydraulic System.*

(1) *Align electrical system.*

(a) *Main switchboard (Figure 2-293).* Set CENT. HYD. SYS. POWER UNIT #1 & #2 circuit breaker (1) to ON position.

(b) *Central hydraulic system power pack control panel (Figure 2-294).*

1 Set ON-OFF switch (3) to ON position.

2 READY indicators (10 and 11) will light.

(2) *Align piping system (Figure 2-295).*

(a) Close TH-2, PRESS. CRSVR. HYDR. TO TOW WINCH HYDR (1).

(b) Close TH-3, RETURN CRSVR TO CENT HYDR (2).

(c) Close TH-4, DRAIN CRSVR TO CENT HYDR (3).

(d) Verify proper level of fluid in tank sight glass.

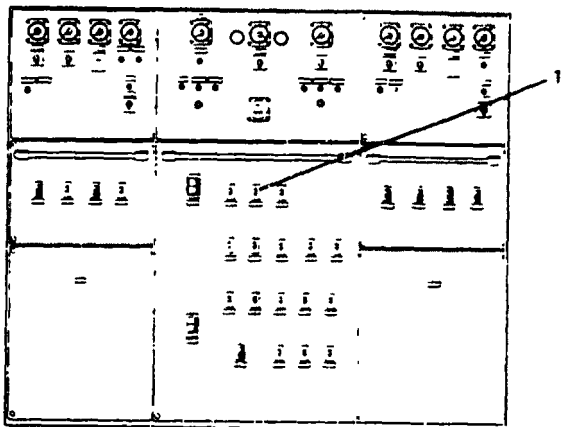
(3) *Start power pack (7, Figure 2-294).*

CAUTION

Normally only one pump is used to operate the power pack. Both pumps may be operated at the same time; however, the reservoir temperature must be checked frequently. If temperature exceeds 180°F, shut system down immediately and allow to cool before operating. Operating the pumps with hot oil (above specifications) could damage equipment.

(a) *Select pump(s).* Select pump(s) desired.

1 Set MODE SELECT switch (1) to ON position.



1. CENT. HYD. SYS. POWER UNIT #1 & #2

Figure 2-293. Main Switchboard.

2 Set PUMP SELECT switch (2) to P1, P2 or P1 & P2 position.

(b) *Start pump(s).*

CAUTION

If LOW OIL LEVEL indicator or HI-OIL TEMP. indicator lights at any time, stop pump(s). Continued operation could result in damage to equipment.

1 Press START pushbutton (7).

2 RUNNING indicators (8 and/or 9) will light depending on pump(s) selected.

(c) *Stop pump(s).*

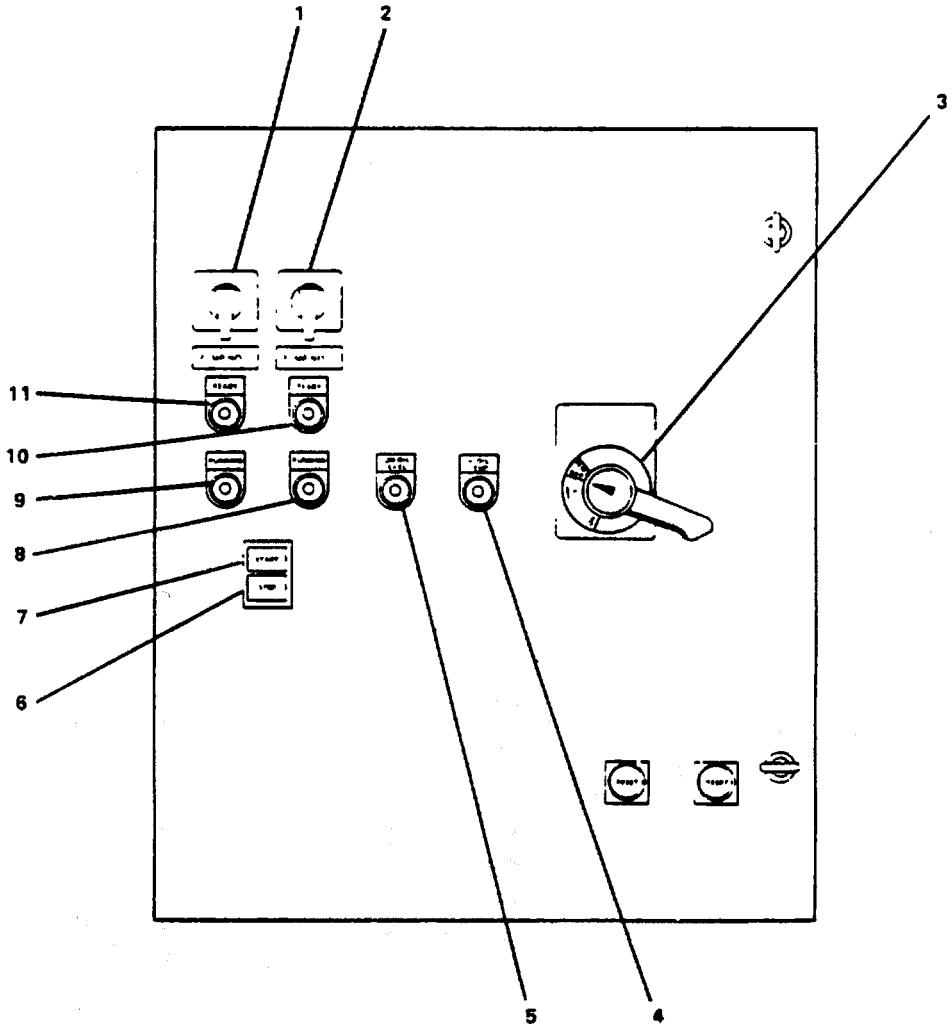
1 Press STOP pushbutton (6).

2 RUNNING indicators (8 and/or 9) will go out.

(d) *Remote start.*

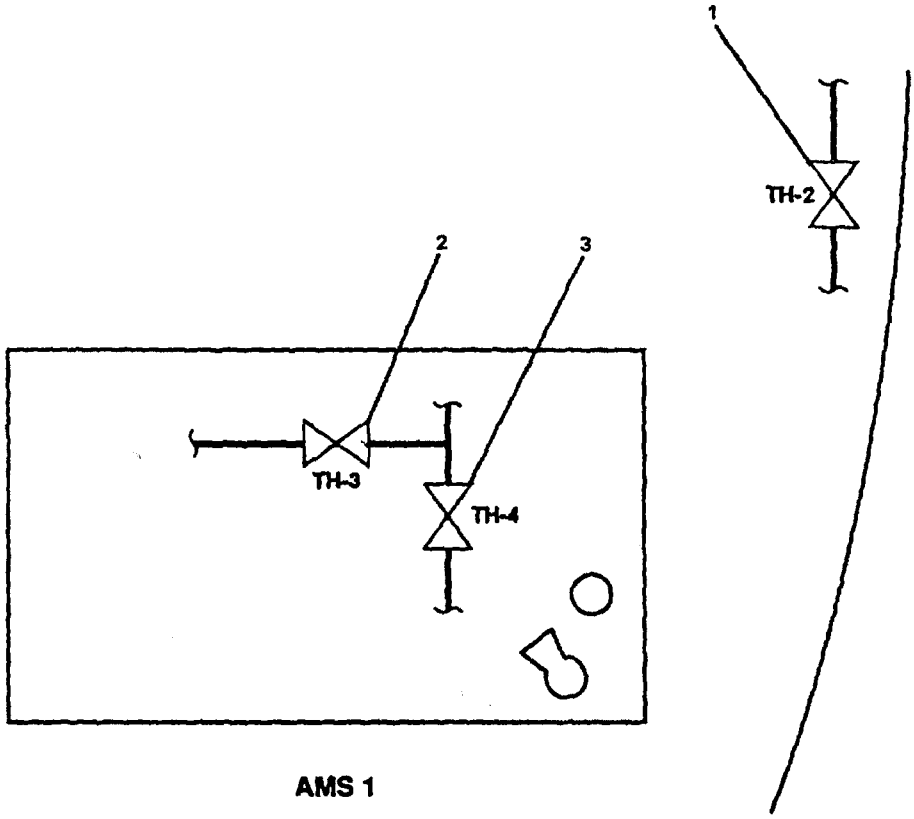
1 Set MODE SELECT switch (1) to REMOTE position.

2 Set PUMP SELECT switch (2) to P1, P2, or P1 & P2 position.



1. MODE SELECT SWITCH
2. PUMP SELECT SWITCH
3. ON-OFF SWITCH
4. HI-OIL TEMP INDICATOR
5. LOW OIL LEVEL INDICATOR
6. STOP PUSHBUTTON
7. START PUSHBUTTON
8. RUNNING INDICATOR
9. RUNNING INDICATOR
10. READY INDICATOR
11. READY INDICATOR

Figure 2-294. Central Hydraulic System Power Pack Control Panel.



1. TH-2, PRESS. CRSVR. HYDR. TO TOW WINCH HYDR.
2. TH-3, RETURN CRSVR. TO CENT. HYDR.
3. TH-4, DRAIN CRSVR. TO CENT. HYDR.

Figure 2-295. Piping System (AMS 11).

(e) *Start pump(s)*.

1 Press HYD PWR UNIT 1 & 2 push-button on EOS console.

2 RUNNING indicators (8 and/or 9) will light, depending on pump(s) selected. Green running lights on EOS console will light.

(f) *Stop pump(s)*.

1 Press HYD PWR UNIT 1 & 2 push-button on EOS console.

2 RUNNING indicators (8 and/or 9) will go out.

b. *Shut Down Central Hydraulic System*.

(1) Set MODE SELECT switch (1) to REMOTE position.

(2) *Secure electrical system*.

(a) *Central hydraulic system power pack control panel*. Set ON-OFF switch (3) to OFF position.

(b) *Main switchboard (Figure 2-293)*. Set CENT. HYD. SYS. POWER UNIT #1 & #2 circuit breaker (1) to OFF position.

2-28. Workboat/Workboat Crane.

a. Workboat Crane.

WARNING

- **Never use crane for any type of human support or transportation.**
- **Operator will never lift a load over other personnel.**
- **Personnel will not walk under a hoisted load.**
- **Operator will not attempt to hoist load until conditions allow safe operation.**
- **Failure to observe these warnings could result in death or severe injury.**
- **Ensure load comes to complete stop and is stable before changing direction of travel of crane boom.**

(1) *Prepare for operation*. Start central hydraulic system (see paragraph 2-27).

(2) *Launch workboat*.

(a). Position boom (Figure 2-296).

CAUTION

Control handles should be moved smoothly and deliberately, NOT with a jerking motion. Damage to the crane could result.

NOTE

- **Moving control handles progressively away from the neutral position in either direction will increase the rate of movement.**
- **When handle is released, the control will automatically return to the neutral position.**

1 *Swing*. Move SWING control handle (5) in desired direction and release.

NOTE

To swing crane to right, pull control handle backward. To swing crane to left, push control handle forward.

2 *Telescope*. Move TELESCOPE control handle (2) in desired direction and release.

NOTE

To extend boom, push the control handle forward. To retract boom, pull control handle backward.

3 *Main boom*. Move BOOM control handle (4) in desired direction and release.

WARNING

Maintain AT LEAST five dead wraps of wire rope on the drum at all times. Serious personal injury or damage to crane could result.

4 *Winch*. Move WINCH control handle (3) in desired direction and release.

NOTE

To lower the hook, push the control lever forward. To hoist the hook, pull the control handle backward.

(b) *Rig workboat (Figure 2-297)*.

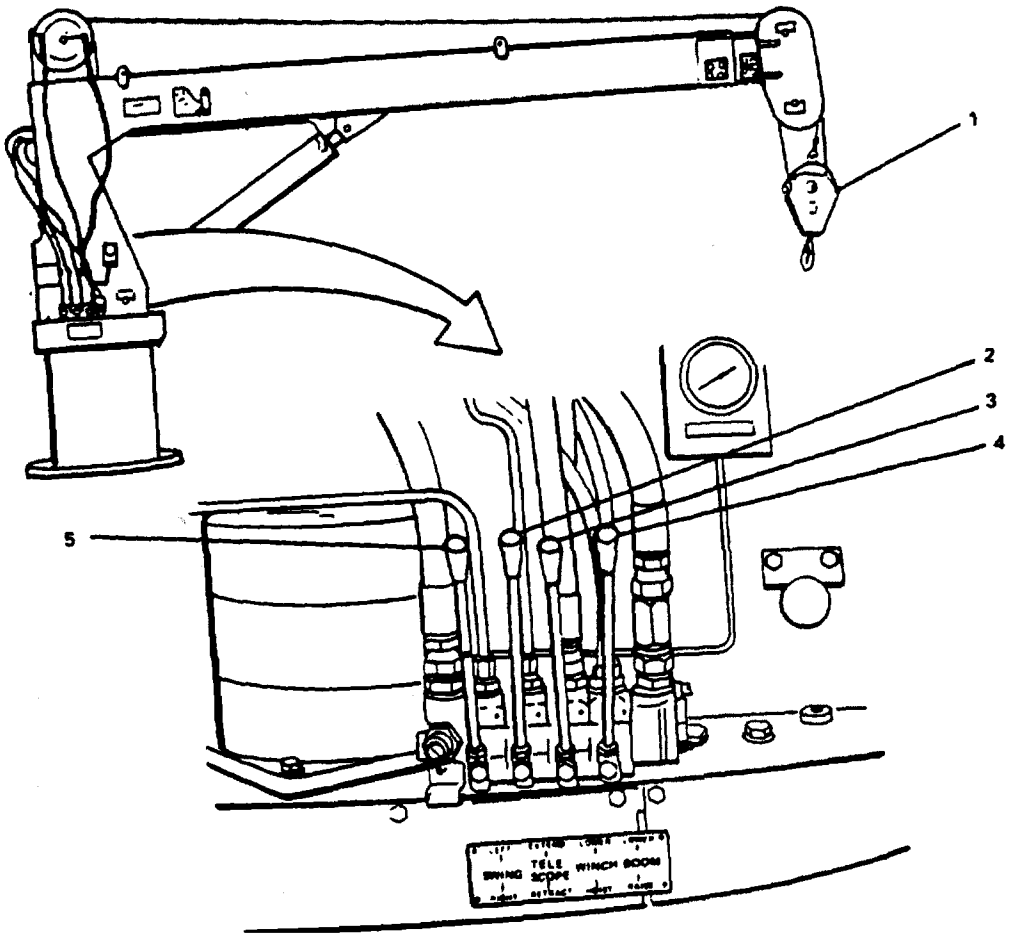
1 Ensure lifting sling (1) is securely attached at lift points.

2 Ensure crane hook (1, Figure 2-296) is attached to sling lifting ring (2, Figure 2-297).

3 Ensure sling lifting ring (2) is in the UP position.

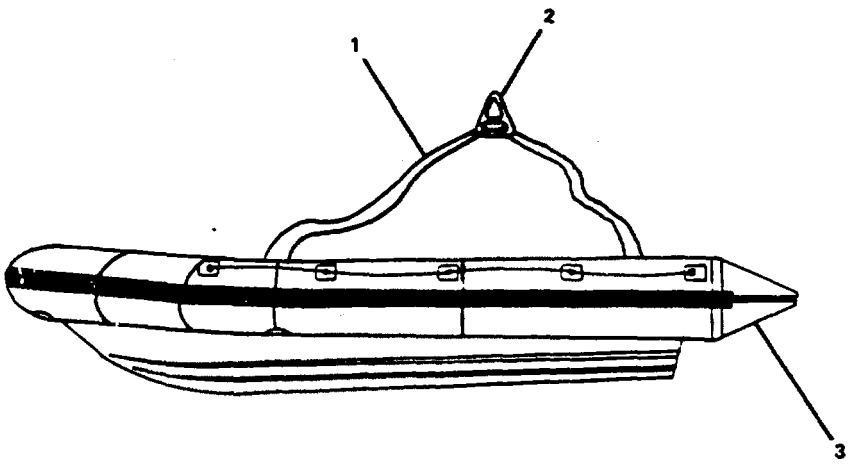
4 Move WINCH control handle (3, Figure 2-296) back to raise crane hook until sling (1, Figure 2-297) is almost tight.

5 Remove tie down straps holding workboat to deck cradle.



1. CRANE HOOK
2. TELESCOPE CONTROL
3. WINCH CONTROL
4. BOOM CONTROL
5. SWING CONTROL

Figure 2-296. Workboat Crane.



1. SLING
2. SLING LIFTING RING
3. WORKBOAT

Figure 2-297. Workboat.

(c) Deploy workboat (Figure 2-297).

1 Move WINCH control handle (3, Figure 2-296) back to raise workboat until clear of cradle, handrails, or other obstructions.

2 Release WINCH control handle (3).

3 Position workboat over side using SWING control handle (5).

4 Lower workboat by pushing WINCH control handle (3) forward until workboat is in water.

5 Release WINCH control handle (3).

6 Have personnel man workboat.

7 Push WINCH control handle (3) forward to lower hook until sling can be removed.

8 Remove sling lifting ring (2, Figure 2-297) from crane hook (1, Figure 2-296).

9 Move WINCH control handle (3) back to raise hook.

(3) *Retrieve workboat*.

(a) *Position workboat*. Direct personnel manning workboat to bring workboat along port side.

(b) *Position boom*. Position boom over workboat (see paragraph a, above).

(c) *Rig workboat*.

1 Push WINCH control handle (3, Figure 2-296) forward to lower hook.

2 Connect crane hook (1) to sling lifting ring (2, Figure 2-297).

3 Ensure sling lifting ring (2) is in the UP position.

4 Move WINCH control handle (3, Figure 2-296) back to remove slack in rigging.

(d) *Recover workboat*.

1 Move WINCH control handle (3) back to raise workboat.

2 Move SWING control handle (5) to position workboat over cradle.

3 Push WINCH control handle (3) forward to lower workboat until just resting on cradle.

(e) *Secure workboat*.

1 Secure tie down straps holding workboat to deck cradle.

2 Push WINCH control handle (3) forward to lower hook until sling can be removed from crane hook (1).

3 Stow sling (1, Figure 2-297) in workboat.

4 Pull WINCH control handle (3, Figure 2-296) until hook is clear of workboat.

5 Install workboat cover.

(4) *Shut down*.

(a) *Secure crane*.

CAUTION

DO NOT allow LIFTING HOOK HEAD to come in contact with the BOOM HEAD.

1 Pull WINCH control handle (3) back until hook is near end of boom.

2 Position boom to aft position using SWING control handle (5).

(b) *Secure central hydraulic system (see paragraph 2-27)*.

b. *Workboat.*

(1) *Operate workboat*.

(a) *Start outboard motor (Figure 2-298)*.

NOTE

Ensure emergency ignition cutoff switch cap is installed. Engine will not start without cap installed.

1 Lower motor into water.

2 Place control handle (3) in NEUTRAL (center) position.

3 Raise fast idle lever (4) approximately 1/3 of its travel.

4 Turn key switch (5) to right to crank engine. When engine starts release key.

(b) *Start bilge pump*. Set bilge pump switch (1) to AUTO position.

NOTE

Speed and direction of boat are controlled by control handle and helm.

(2) *Secure workboat.*

(a) Stop *outboard motor (Figure 2-298)*.

1 Place control handle (3) in NEUTRAL (center) position.

2 Adjust fast idle lever (4) to allow engine to operate at slow idle.

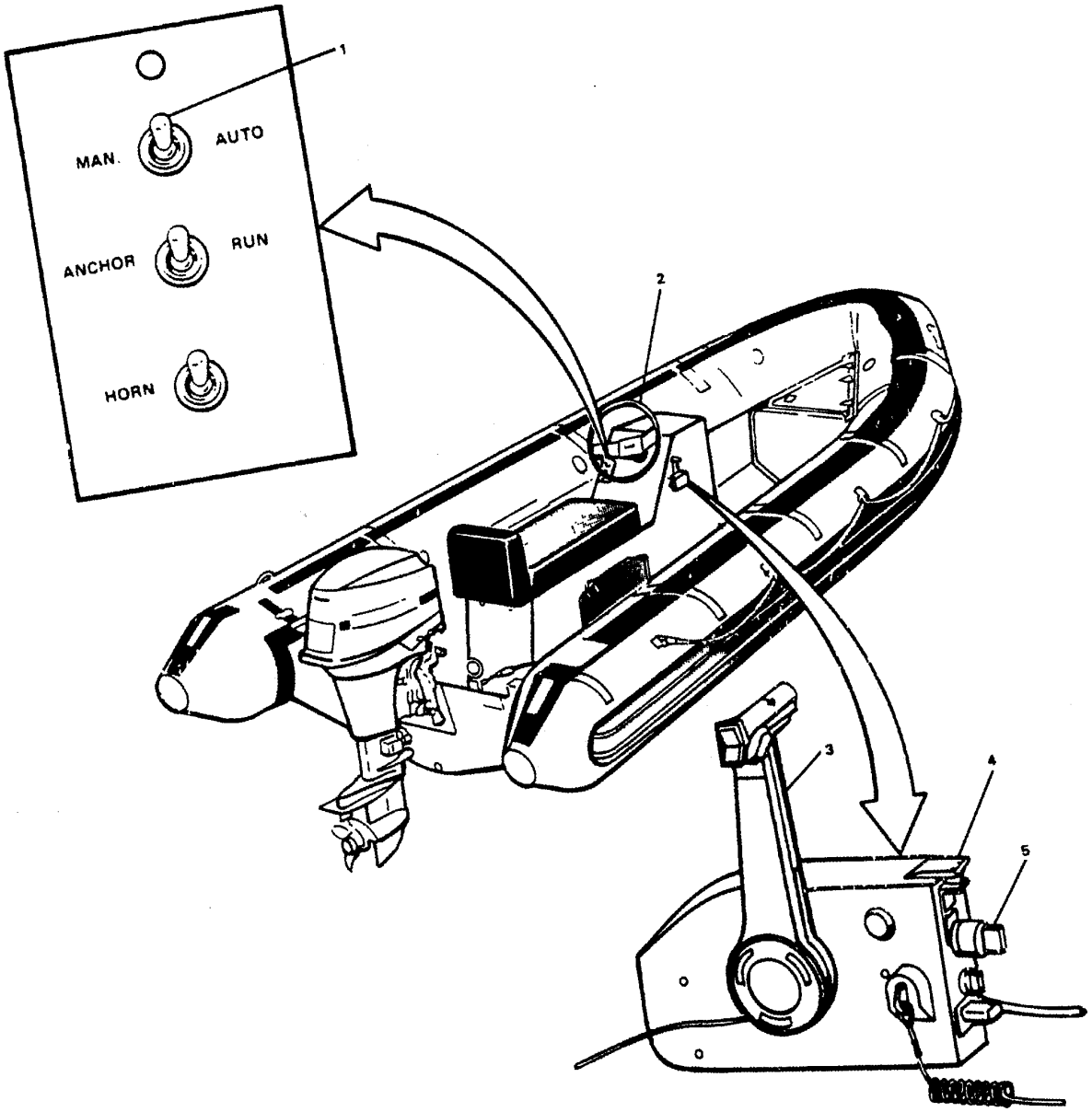
CAUTION

Allow engine to idle 3 to 5 minutes. If engine is not allowed to idle, excess heat could damage engine.

3 Lower fast idle lever (4) to DOWN position.

4 Turn key switch (5) fully counterclockwise to stop engine.

(b) *Stop bilge pump*. Set bilge pump switch (1) to OFF position.



1. MAN-AUTO SWITCH
2. STEERING WHEEL
3. CONTROL HANDLE
4. IDLE LEVER
5. KEY SWITCH

Figure 2-298. Workboat Controls.

2-29. Bow Anchor Windlass.

NOTE

Three modes of operation of the bow anchor windlass are provided: powered wildcat, free wheeling, and gypsy only. Operating procedures for each mode follow pre-operation procedures.

a. *Pre-operation.*

(1) *Set brake (Figure 2-299).* Set both brakes by turning brake handwheels (1) fully clockwise.

(2) *Central hydraulic system.* Start central hydraulic system (see paragraph *2-27).*

b. *Powered Wildcat Operation.*

NOTE

- **Wildcats can be operated together or separately as dictated by the torque limitations and load. Each wildcat is equipped with a dog clutch and hand brake. Engaging the dog clutch and releasing the brake allows wildcat to be driven in direction and at speed by controls.**
- **For normal speeds and loads, the two-speed lever will be in HIGH SPEED position. Chain can be lowered or raised at variable speed from creep to approximately 25 feet/minute. For heavy loads, two speed lever should be in LOW SPEED mode. LOW SPEED doubles the torque and allows the chain to be lowered or raised at variable speed from creep to approximately 12 feet/minute.**

(1) *Engage dog clutch (Figure 2-299).*

(a) *Get dog clutch tool.* Remove tool from frame mounted bracket.

(b) *Loosen wing nuts (2).* Loosen both wing nuts (2) on the face of shifter ring.

CAUTION

Maneuvering the main shaft may be necessary (with the brake set) to engage the dogs with the clutch jaws on the wildcat. Attempting to engage dogs and clutchjaws when not properly aligned could damage the windlass.

(c) *Align dogs with clutch jaws.*

1 Ensure brake (1) is set (handwheel fully clockwise).

2 Set SPEED control (3) to LOW SPEED.

3 Operate RAISE-LOWER control (4) until dogs are aligned with slots in jaws.

(d) *Engage clutch.*

1 Insert tool in nearest slot in clutch shifter plate.

2 Push tool forward to engage clutch.

NOTE

A 50 degree movement of clutch shifter ring is required to fully engage or disengage dogs.

LSHT - Low speed high torque for heavy loads.

HSLT - High speed low torque for normal loads and speed.

(e) *Tighten wing nuts.* Tighten both wing nuts (2) on face of shifter ring.

(2) *Select speed.* Set two-speed lever (3) to desired speed.

(3) *Release brake.* Release brake(s) by turning brake handwheels (1) fully counterclockwise.

(4) *Operate windlass.* Raise or lower chain, as desired, by operating RAISE-LOWER control (4).

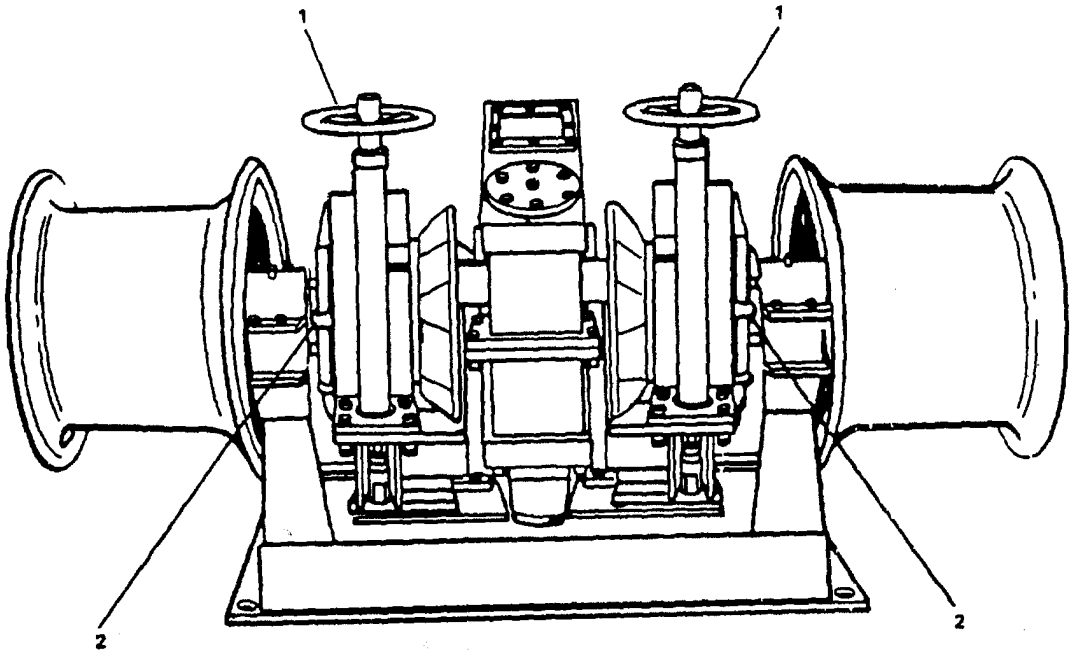
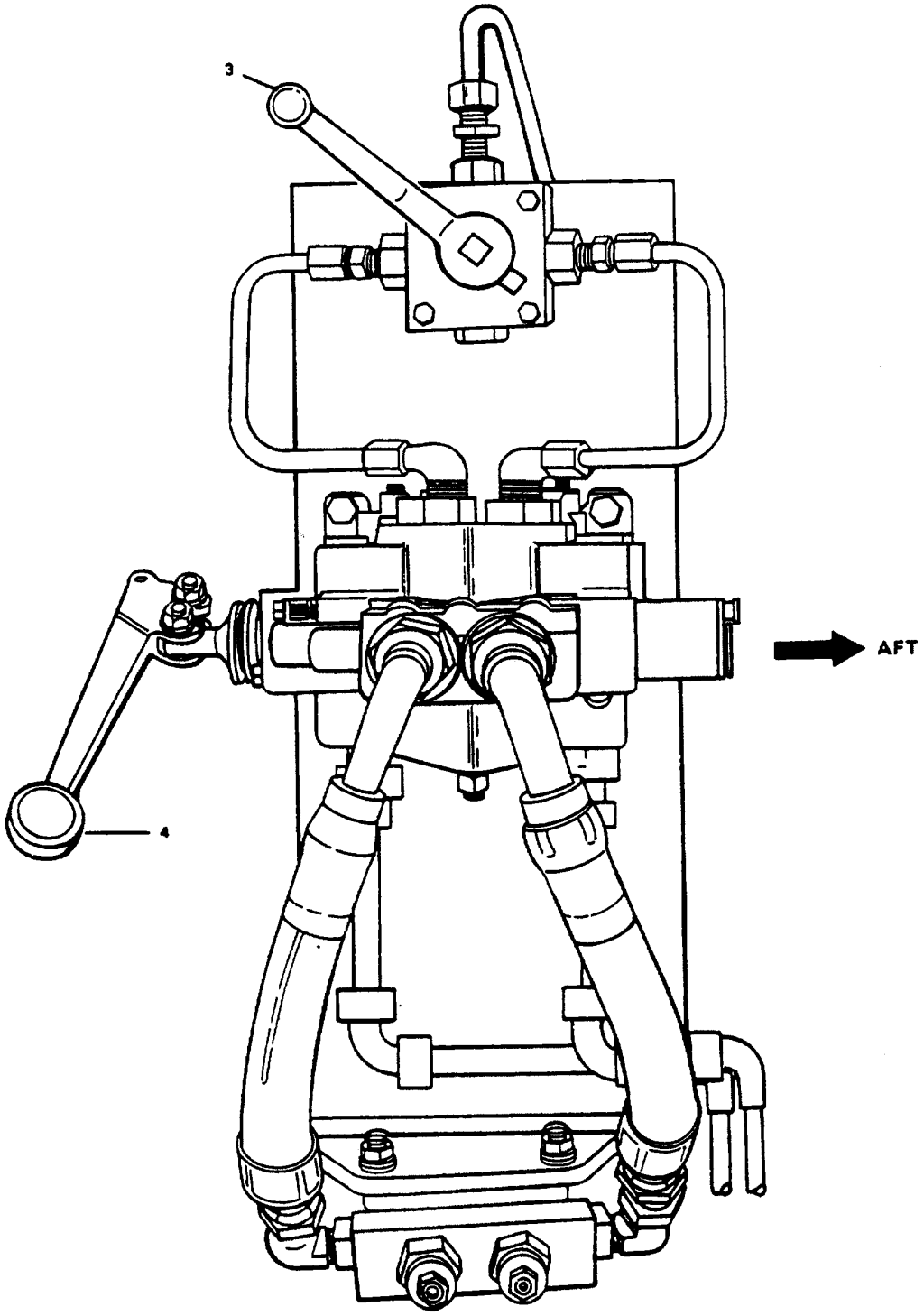


Figure 2-299. Bow Anchor Windlass (Sheet 1 of 2).



1. BRAKE HANDWHEEL
2. SHIFTER RING WING NUTS
3. TWO-SPEED LEVER
4. RAISE-LOWER-CONTROL

Figure 2-299. Bow Anchor Windlass (Sheet 2 of 2).

c. Free Wheeling Operation.

NOTE

With dog clutch disengaged and brake released, wildcat will free wheel, allowing anchor to free fall. Manipulating brake slows or stops anchor as desired.

CAUTION

When operating windlass in this mode, windlass must be carefully observed and controlled to ensure speed of windlass does not cause chain to "jump the cat" and damage windlass.

(1) Disengage dog clutch.

(a) Get dog clutch tool. Remove tool from frame mounted bracket.

(b) Loosen wing nuts. Loosen both wing nuts (2) on face of shifter ring.

(c) Disengage clutch.

1 Insert tool in nearest slot in clutch shifter plate.

2 Pull tool aftward to disengage.

NOTE

A 50 degree movement of clutch shifter ring is required to fully engage or disengage dogs.

(d) Tighten wing nuts. Tighten both wing nuts (2) on face of shifter ring.

CAUTION

Observe windlass and control speed using brake to ensure windlass speed does not cause chain to "jump the cat" and damage windlass.

(2) Release brake. Slowly release brake by turning brake handwheel (1) counterclockwise.

(3) Set brake. When desired amount of chain has been paid out, set brake by turning brake handwheel (1) fully clockwise.

d. Gypsy Only Operation.

NOTE

Gypsies turn whenever unit is being operated. For gypsy only operation, dog clutch is disengaged and brake is set. Main shaft can be driven with wildcats held stationary.

(1) Set brake. Set both brakes by turning brake handwheels (1) fully clockwise.

(2) Disengage dog clutch.

(3) Select speed. Set two-speed lever (3) to desired speed.

(4) Operate gypsies. Haul in (raise) or pay out, as desired, by operating RAISE-LOWER control (4).

e. Secure Anchor Windlass.

(1) Set brake. Set both brakes by turning brake handwheels (1) fully clockwise.

(2) Engage dog clutch.

(a) Get dog clutch tool. Remove tool from frae mounted bracket.

(b) Loosen wind nuts. Loosen both wing nuts (2) on face of shifter ring.

CAUTION

Maneuvering the main shaft may be necessary (with the brake set) to engage the dogs with the clutch jaws on the wildcat. Attempting to engage dogs and clutch jaws not properly aligned could damage the windlass.

(c) Align dogs with clutch jaws.

1 Ensure brake (1) is set.

2 Set SPEED control (3) to LOW SPEED.

3 Operate RAISE-LOWER control (4) until dogs re aligned with slots in jaws.

(d) *Engage clutch.*

1 Insert tool in nearest slot in clutch shifter plate.

2 Push tool forward to engage clutch.

NOTE

A 50 degree movement of clutch shifter ring is required to fully engage or disengage dogs.

(e) *Tighten wing nuts.* Tighten both wing nuts (2) on face of shifter ring.

(3) *Secure central hydraulic system.* Secure Central Hydraulic System (see paragraph 2-27).

2-30. Capstan.

a. *Operation*.

(1) *Start central hydraulic system (see paragraph 2-27)*.

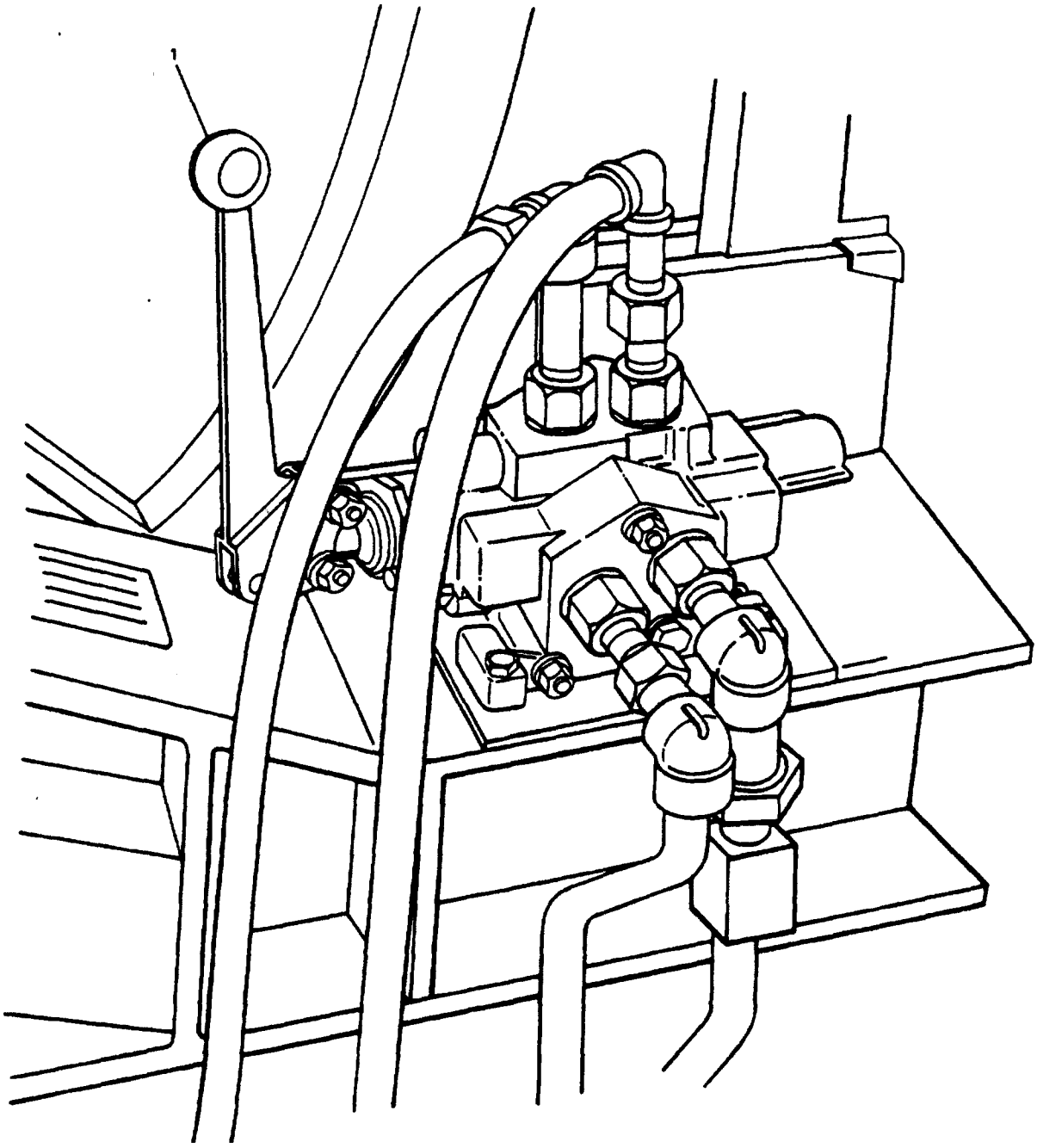
(2) *Operate capstan (Figure 2-300)*. Move directional control valve handle (1) by pushing or pulling in desired HEAVE or PAYOUT direction.

NOTE

Directional control valve is equipped with a spring which will return handle to NEUTRAL position when handle is released.

(3) Speed is controlled by throttling directional control valve (1).

b. *Shutdown*. Secure central hydraulic system (see paragraph *2-27)*.



1. CONTROL VALVE

Figure 2-300. Capstan Control Valve.

2-31. Hydraulic Tow Pins. The hydraulic tow pins are used in conjunction with the double drum towing winch. Refer to paragraph 2-32.

2-32. Double Drum Towing Winch. The double drum towing winch features four modes of usual operations:

• Payout.

• Heave.

• Free Spooling.

• Gypsy Head.

Payout, heave, and gypsy head modes can be operated in either the normal or low speed ranges. Operating instructions for each mode are given following the general start-up procedure.

a. *Start-up*.

(1) *Align electrical system*.

(a) *Engine room distribution panel no. 4 (Figure 2-301)*. Set PUMP DRIVE ENGJACKET WATER HTR circuit breaker (1) to ON position.

(b) *Engine room emergency distribution panel no. 1 (Figure 2-302)*. Set TOWING MACHINE CONTROL POWER circuit breaker (1) to ON position.

CAUTION

Never use a lever or wrench to tighten clutch-brake. Overtightening clutch-brake will damage mechanism.

(2) *Align piping systems (Figure 2-303)*.

(a) *Align piping for tow winch power unit*.

1 Ensure general service system is operational (refer to paragraph 2-28).
2 Close TH-2, PRESS./RTN. CRSVR. TO CENT. HYD. (9).
3 Open TH-13 (10).
4 Open TH-1, C.O.V. PMP DISCH. TO TOW WN. HYD (11).
5 Open TH-14 (8).
6 Open GS-75, TOW WN HYD OIL CLR SPLY. (13).
7 Open GS-77, HYD OIL CLR DISCH. (14).
8 Close TH-3, PRESS./RTN. CRSVR. TO CENT. HYD. (15).

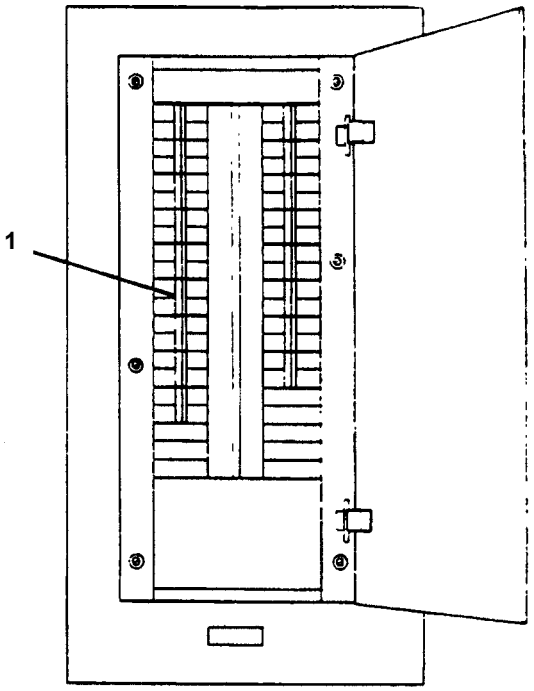


Figure 2-301. Engine Room Distribution Panel No. 4.

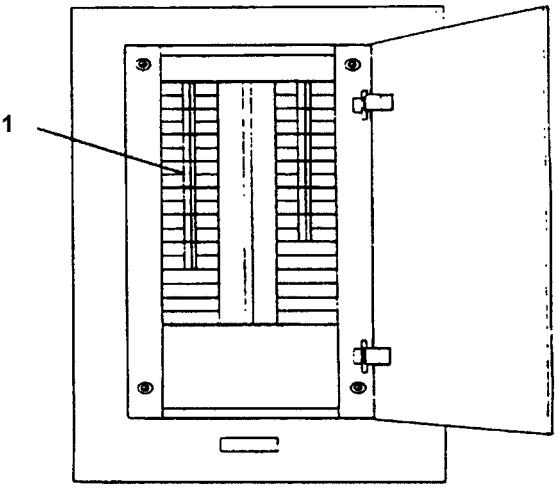


Figure 2-302. Engine Room Emergency Distribution Panel No. 1.

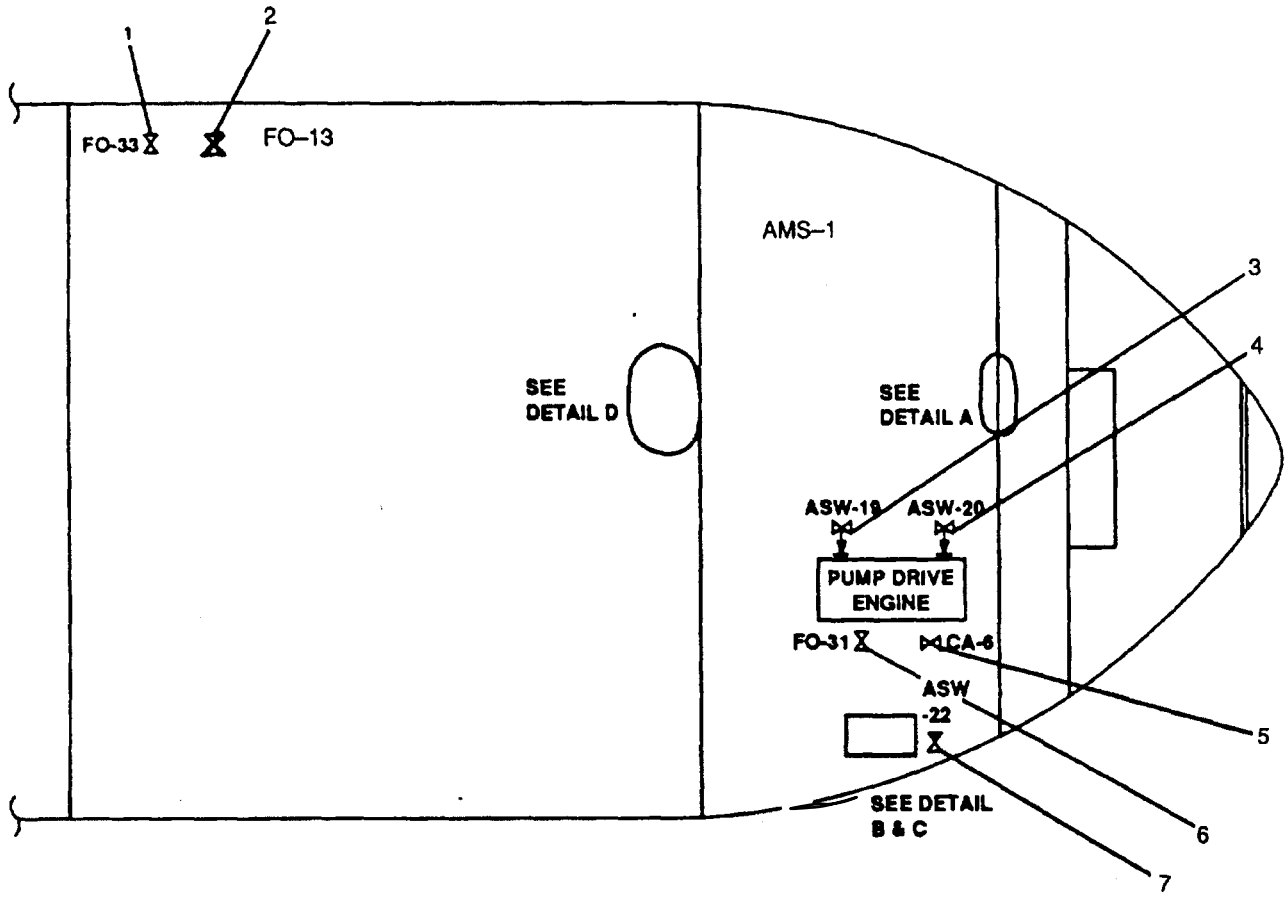
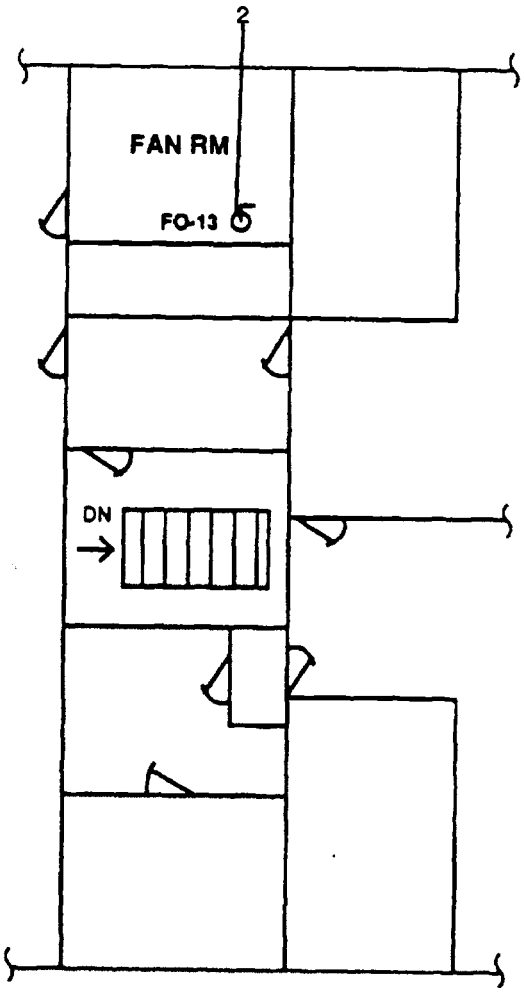


Figure 2-303. Valve Locations (Sheet 1 of 5).



MAIN DECK

Figure 2-303. Valve Locations (Sheet 2 of 5).

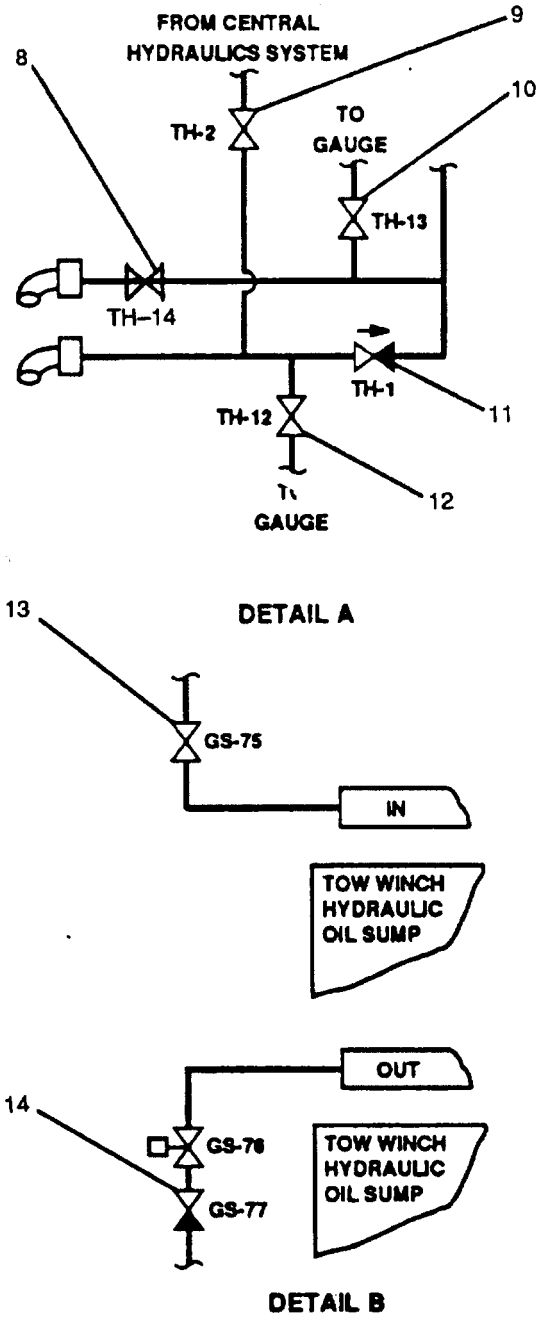
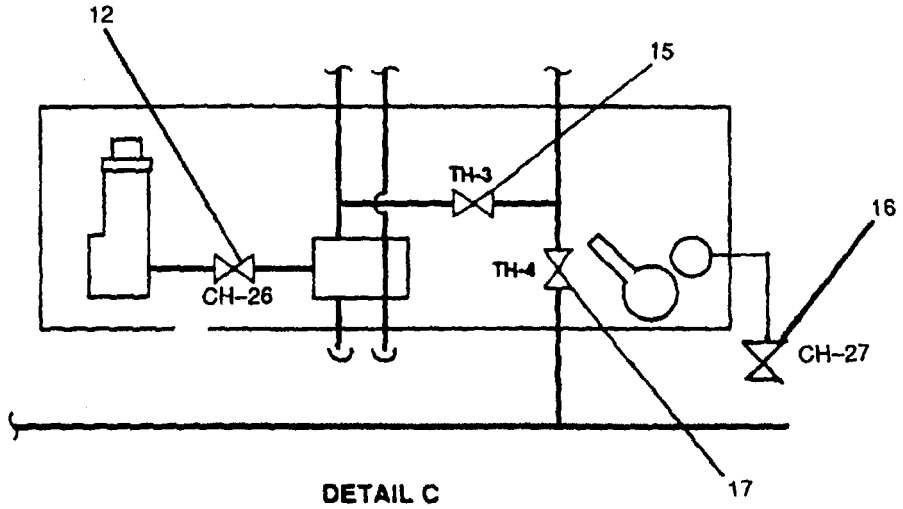
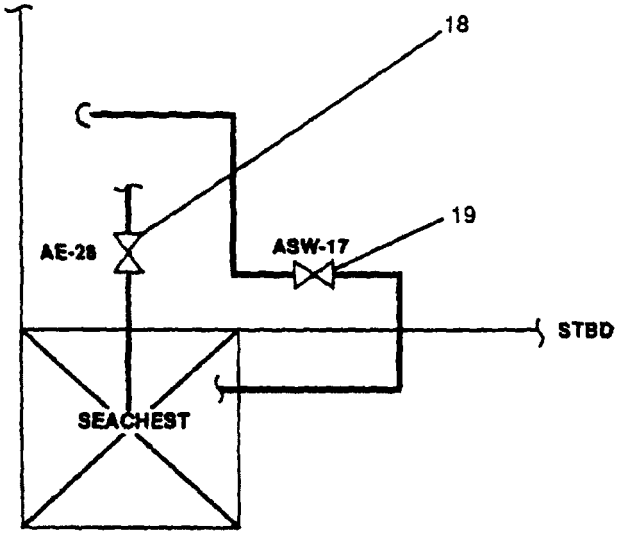


Figure 2-303. Valve Locations (Sheet 3 of 5).



DETAIL C



DETAIL D

Figure 2-303. Valve Locations (Sheet 4 of 5).

1. FO-33, F.O. RTN. TO DAY TK. PORT
2. FO-13, F.O. SERV. SUCT., PORT
3. ASW-19, S.W. TO PUMP DRIVE ENG.
4. ASW-20, S.W. FR. PMP DRIVE ENG. TO OVBD DISCH.
5. CA-6, STG AIR TO PMP DR ENG.
6. FO-31, F.O. SPLY TO PMP. DR. ENG.
7. ASW-22, OVBD DISCH, S.W. COOLING
8. TH-14
9. TH-2, PRESS./RTN CRSVR TO CENT HYD
10. TH-13
11. TH-1, C.O.V. - PMP DISCH. TO TOW WN. HYD.
12. CH-26, DRN CUT-OUT TOW WN. HYD.
13. GS-75, TOW WN HYD OIL CLR SPLY.
14. GS-77, HYD OIL CLR DISCH.
15. TH-3, PRESS./RTN. CRSVR. TO CENT. HYD.
16. CH-27, RTN. CUT-OUT TOW WN. HYD.
17. TH-4, TRN. CRSVR. TO CENT. HYD.
18. AE-28, SEA CHEST VENT
19. ASW-17, SEA SUCTION S.W. COOLING

Figure 2-303. Valve Locations (Sheet 5 of 5).

10 Close TH-4, RTN. CRSVR. TO CENT. HYD. (17).

11 Open CH-27, RTN. CUT-OUT TOW WN. HYD. (16).

12 Open CH-26, DRN. CUT-OUT TOW WN. HYD (12).

(b) *Align piping for pump drive engine.* Open the following valves:

1 AE-28, SEACHEST VENT (18).

2 FO-31, F.O. SPLY TO PMP. DR. ENG. (6).

3 FO-13, F.O. SERV SUCT., PORT (2).

4 FO-33, F.O. RTN. TO DAY TK. PORT (1).

5 ASW-19, S.W. TO PUMP DRIVE ENG. (3).

6 ASW-20, S.W. FR. PUMP DRIVE ENG. TO OVBD DISCH. (4).

7 ASW-22, OVBD DISCH. S.W. COOLING (7).

8 ASW-17, SEA SUCTION S.W. COOLING (19).

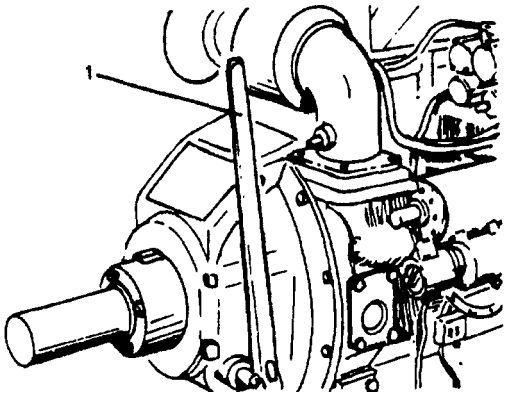
(3) *Start pump drive engine.*

(a) Place firefighting pump power take-off control lever (1, Figure 2-304) in disengaged (aft) position.

(b) Move the governor control lever (6, Figure 2-305) to half engine speed position (approximately straight up).

(c) Check PMP DR ENG STG AIR PRESS air supply pressure gauge. The air start must be 100 to 120 psi to operate properly.

(d) Open CA-6, STG AIR TO PMP DR ENG. (5, Figure 2-303).



1. POWER TAKE-OFF CONTROL LEVER

Figure 2-304. Pump Drive Engine Power Take-off.

CAUTION

Do not crank the engine for more than 30 seconds. Allow 2 minutes for the starter motor to cool before cranking again. Damage to the starter motor could occur.

(e) Turn START/STOP pushbutton (4, Figure 2-305) clockwise to release pushbutton to OUT position.

(f) Push OFF-RUN-START toggle switch (5) up to START position to crank the engine. As soon as the engine starts, release toggle switch (5) (switch is spring loaded and will return to the RUN position center).

CAUTION

Oil pressure should rise within 5 seconds after engine starts. If oil pressure does not rise, stop the engine, immediately push toggle switch down to stop engine to prevent damage, and refer problem to unit maintenance.

(g) Allow engine to idle 3 to 5 minutes, or until oil pressure gauge (1) indicates 35 to 70 psi.

(h) Operate engine at low load until all systems reach operating temperatures. Check all gauges during the warm-up period.

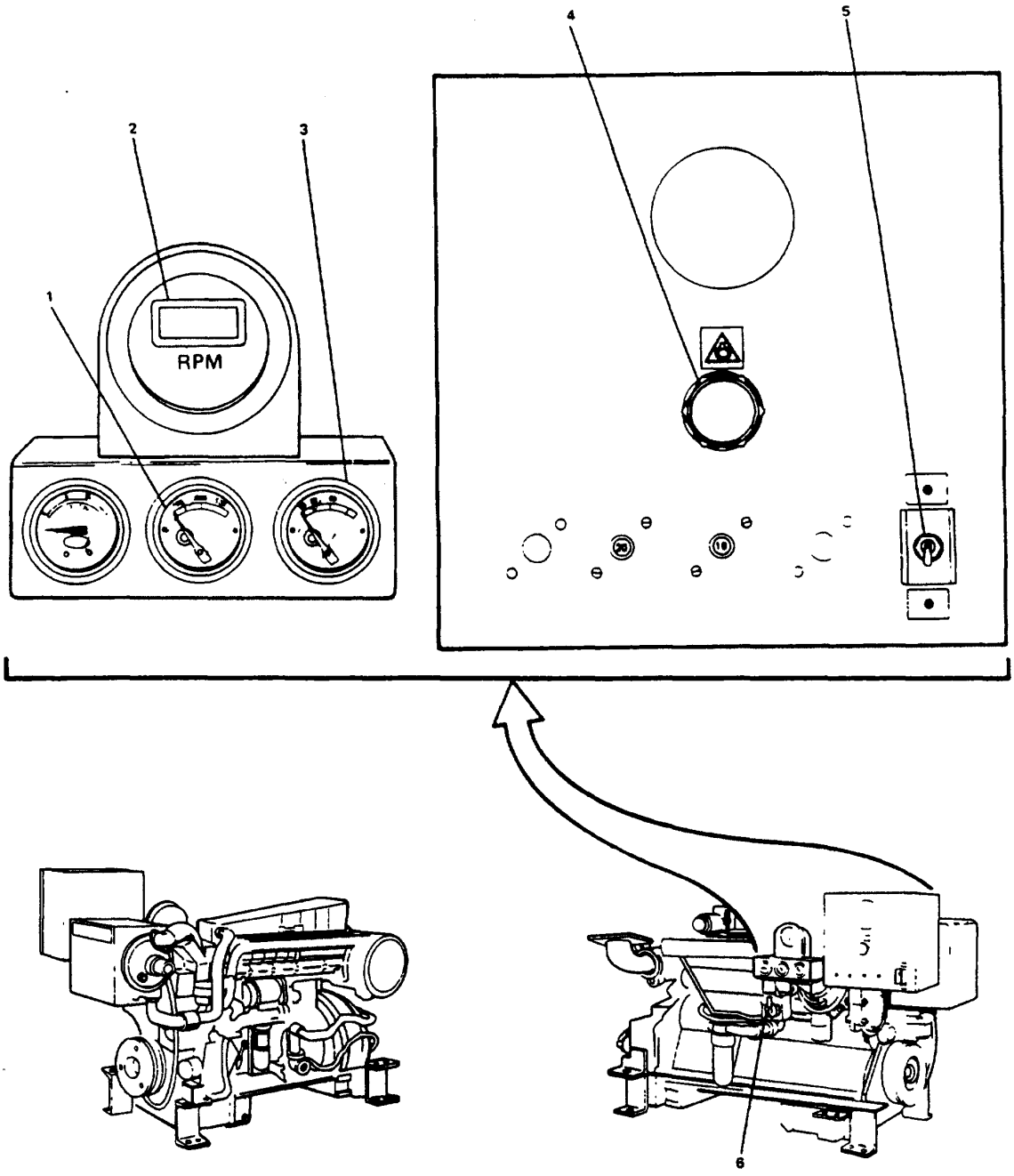


Figure 2-305. Pump Drive Engine Control.

(i) Check the engine gauges (1 and 3).

(j) Move the GOVERNOR CONTROL (6) to high idle (1800 RPMs) position.

(4) *Set up clutch-brake*. Tighten clutch-brake by turning handwheel (1, Figure 2-306).

NOTE

A force of about 25 pounds on the handwheel is usually sufficient to provide enough friction in clutchbrake to drive machine under normal loads.

(5) *Set up auxiliary brake*. Loosen auxiliary brake handwheel (2) to allow free rotation of drum.

(6) *Set up dog position*. Pull dog (4) away from drum and insert keeper pin (5).

WARNING

Never engage dog while drum is rotating in PAYOUT direction. Doing so will usually break dog mounting hardware, bend the dog and/or shear the dog mounting pin. Failure could also cause serious personal injury.

(7) *Set up tow pins*. Raise tow pins by placing associated tow pin control switch (1, Figure 2-307) in upper position.

NOTE

Tow pins can also be raised or lowered by associated switches on tow pin control panels located port and starboard main deck aft.

(8) *Set up spooling device*.

WARNING

Do not disengage clutch if there is heavy quartering load on towline as the towline may drive the handwheel at rapid speed until spooling rollers align themselves with wire rope. Always make sure there is light line pull or small misalignment before disengaging clutch. Rapidly turning handwheel could cause personal injury.

(a) *Observe spooling device alignment*. Observe spooling device alignment to make sure wire rope is passing through rollers more or less perpendicular to drum and in line with previous wrap.

NOTE

For tight spooling, the rollers should have a slight lead on the previous wrap. This is more important during respooling than paying out.

(b) *Realign spooling device*. If there is severe misalignment (more than 3 inches), realign by turning spooling device handwheel (3) in desired direction.

b. *PAYOUT Mode*.

NOTE

Shifting the two-speed valve must always be done with the control lever in NEUTRAL position. The knob may be shifted at any time, but the control circuit will prevent a speed range shift while the machine is moving. Once the machine stops, the speed range shift will automatically occur to correspond with the current position of the speed range selector knob valve.

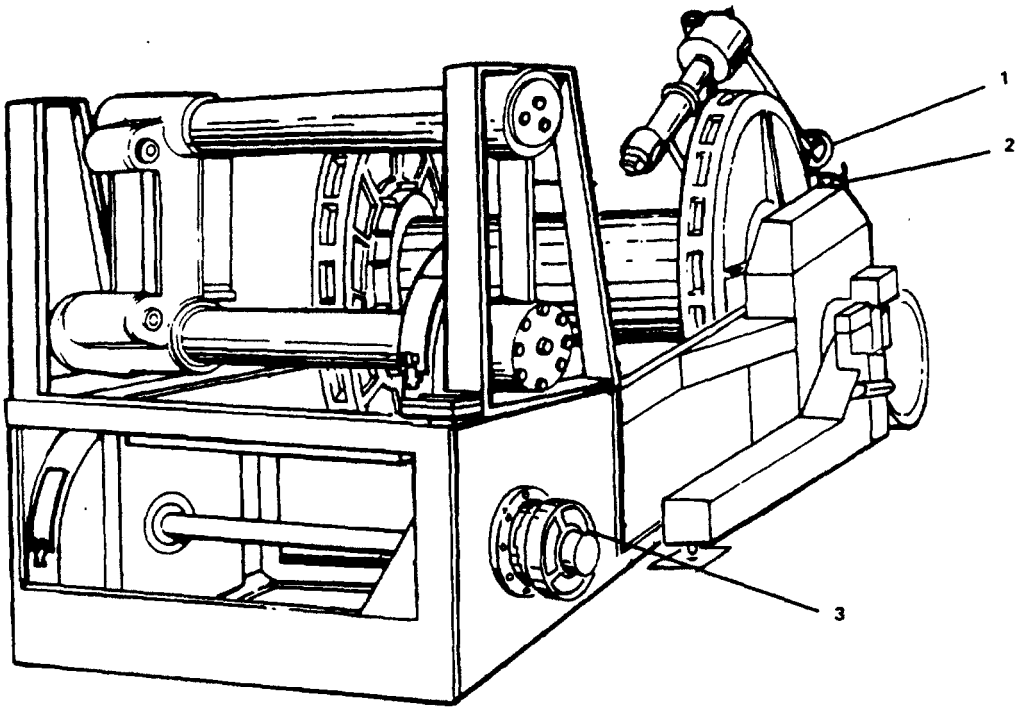
(1) *PAYOUT, normal speed range*.

(a) Ensure control lever (2, Figure 2-307) is in NEUTRAL position.

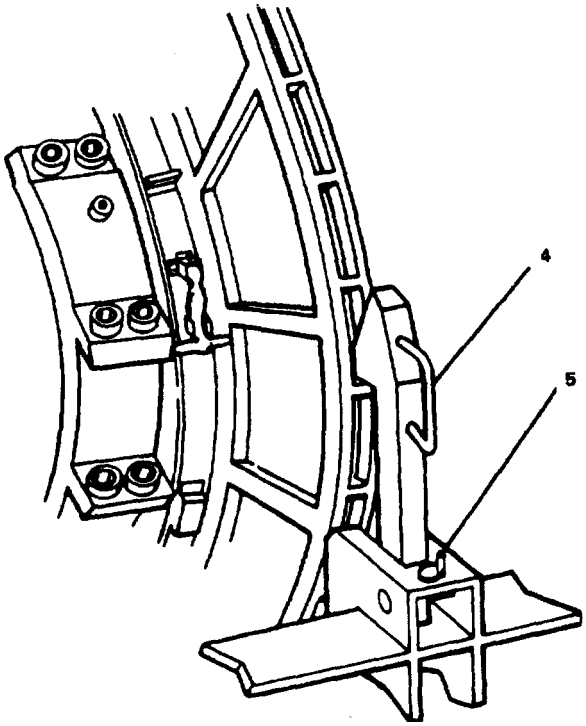
(b) Push speed range selector (3) down to lowest point.

CAUTION

- **It is advisable to free-spool after making up the tow and establishing desired scope.**
- **LT speed must be carefully controlled while powering out the line. LT could overpower towing machine motor causing severe damage to motor.**



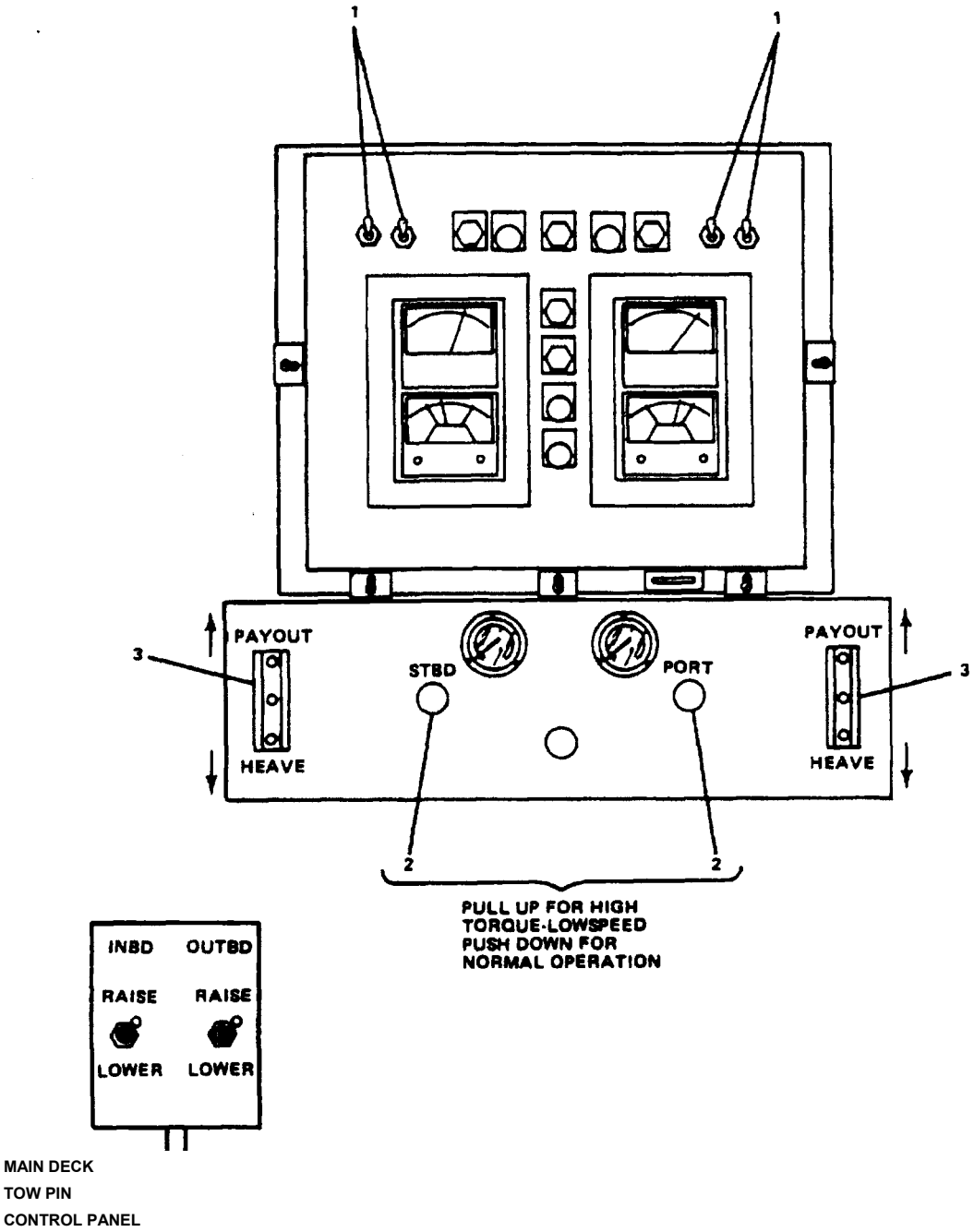
PORT WINCH
AFT LOOKING FORWARD



PORT WINCH
FORWARD LOOKING AFT

1. CLUTCH BRAKE
2. AUXILIARY BRAKE
3. SPOOLING DEVICE HANDWHEEL
4. DOG
5. KEEPER PIN

Figure 2-306. Double Drum Towing Winch.



1. TOW PIN CONTROL SWITCH
2. CONTROL LEVER
3. SPEED RANGE SELECTOR

Figure 2-307. Tow Winch Control Station.

(c) Push control lever (2) in PAYOUT direction.

NOTE

Machine will operate at a speed proportional to lever movement.

(2) *PAYOUT, low speed range*.

NOTE

Operation in this mode will seldom be required or desired, but if it is necessary to pay out a small amount of line to "freshen the nip" under heavy load, use this mode.

(a) Place control lever (2) in NEUTRAL position.

(b) Pull speed range selector (3) up to its upper detented position.

(c) Push control lever (2) in PAYOUT direction.

NOTE

- **Machine will pay out line at half normal speed and at a rate proportional to lever movement.**
- **This mode develops twice the normal torque at half the normal speed.**

c. *HEAVE Mode.*

NOTE

Shifting the two-speed valve must always be done with the control lever in NEUTRAL position. The knob may be shifted at any time, but the control circuit will prevent a speed range shift while the machine is moving. Once the machine stops, the speed range shift will automatically occur to correspond with the current position of the speed range knob.

(1) *HEAVE, normal speed range*.

(a) Place control lever (2) in NEUTRAL position.

(b) Push speed range selector (3) down to lowest point.

CAUTION

LT speed must be carefully controlled while heaving in the line. LT could overpower towing machine motor causing severe damage to motor.

(c) Pull control lever (2) in HEAVE direction.

NOTE

Machine will operate at a speed proportional to lever movement.

(2) *HEAVE, low speed range*.

(a) Place control lever (2) in NEUTRAL position.

(b) Pull speed range selector (3) up to its upper detented position.

(c) Pull control lever (2) in HEAVE direction.

NOTE

- **Machine will heave at half normal speed and at a rate proportional to lever movement.**
- **This mode develops twice the normal torque at half the normal speed**.

d. *Free Spooling*.

NOTE

- **This mode is used to rapidly deploy the towline after the tow has been made up and sufficient line (usually 200 to 300 feet) has been payed out to safely free spool to the desired scope.**
- **Power is necessary for this mode of operation, hydraulic power unit should be in operation in case power is needed due to sudden change in operating condition.**

(1) With towline under light tension, slowly release the clutch brake by loosening handwheel (1, Figure 2-306) until line begins to pull out.

(2) Accelerate LT to allow towline to be pulled out at a speed of up to 400 feet per minute (approximately 4 knots). Tension can be maintained on towline by adjusting handwheel (3) to achieve slight braking action on rotating drum.

CAUTION

- **This procedure produces heat in the clutch-brake band. Carefully observe brake for overheating. If brake overheats, release clutch-brake using handwheel and/or slow down LT. Failure to do so will result in damage to brakelining.**
- **In the event of overheating and subsequent tightening of clutch-brake, there may be a tendency for the clutch-brake to freeze or cement to the drum surface if left tight for long periods of time. It is good practice to loosen the clutchbrake at earliest opportunity to prevent damage to brake.**

(3) When the desired scope is achieved, check down LT speed.

CAUTION

Severe shock loading can occur if the clutch-brake is tightened while the line is being pulled out at full speed. Depending on the size of the tow, speed should be no higher than creep speed when clutchbrake is tightened. Tightening clutchbrake with LT speed too fast can cause severe damage to the towing machine.

(4) Tighten clutch-brake by turning handwheel (3) clockwise until clutch-brake is properly adjusted for tow size, sea conditions, and speed of LT.

CAUTION

Do not overtighten the clutch-brake. The clutch-brake provides shock protection for the towing machine and should be loose enough to slip under a sudden shock load due to heavy seas or other reason.

(5) Towing operation can commence when clutch-brake is properly tightened.

WARNING

Clutch-brake should not slip excessively. Slip alarm will activate if it does. Continuous slipping will cause an undesirable increase in scope to the point where the towline could be lost. Severe personal injury or death could result from towline whip if the towline is lost.

NOTE

Occasional slippage, during heavy seas, indicates the clutch-brake is doing its job and it is necessary to heave in occasionally to maintain desired scope. Towing on smooth or moderate seas should not cause clutch-brake slippage.

e. Gypsy *Head Mode*.

(1) *Set up for gypsy head use*.

(a) *Clutch-brake*. Loosen clutch-brake handwheel (1) to allow free rotation of ring gear.

CAUTION

Never use a lever or wrench to tighten the auxiliary brake. Damage to the mechanism will occur.

(b) *Auxiliary brake*. Tighten auxiliary brake handwheel (2) by hand.

NOTE

A force of about 25 lbs on the handwheel is usually sufficient to provide enough friction on the band to hold the drum.

(2) *Operate -gypsy head HEAVE mode.*

NOTE

Shifting the two-speed valve must always be done with the control lever in NEUTRAL position. The knob may be shifted at any time, but the control circuit will prevent a speed range shift while the machine is moving. Once the machine stops, the speed range shift will automatically occur to correspond with the current position of the speed range selector knob.

(a) *HEAVE, normal speed range.*

1 Place control lever (2, Figure 2-307) in NEUTRAL position.

2 Push speed range selector (3) down to lowest point.

3 Pull control lever (2) in HEAVE direction.

NOTE

Machine will operate at a speed proportional to lever movement.

(b) *HEAVE, low speed range.*

1 Place control lever (2) in NEUTRAL position.

2 Pull speed range selector (3) up to its upper detented position.

3 Pull control lever (2) in HEAVE direction.

NOTE

- **Machine will pay out line at half normal speed and at a rate proportional to lever movement.**
- **This mode develops twice the normal torque at half the normal speed.**

(3) *Operate gypsy head PAYOUT mode.*

NOTE

Shifting the two-speed valve must always be done with the control lever in NEUTRAL position. The knob may be shifted at any time, but the control circuit will prevent a speed range shift while the machine is moving. Once the machine stops, the speed range shift will automatically occur to correspond with the current position of the speed range select knob.

(a) *PAYOUT, normal weed range.*

1 Place control lever (3) in NEUTRAL position.

2 Push speed range selector (3) down to lowest point.

CAUTION

- **It is advisable to free-spool after making up the tow and establishing desired scope.**
- **LT speed must be carefully controlled while powering out the line. LT could overpower towing machine motor causing severe damage to motor.**

3 Push control lever (2) in PAYOUT direction.

NOTE

Machine will operate at a speed proportional to lever movement.

(b) *PAYOUT*, low speed range.

NOTE

Operation in this mode will seldom be required or desired, but if it is necessary to pay out a small amount of line to "freshen the nip" under heavy load, use this mode.

1 Place control lever (2) in NEUTRAL position.

2 Pull speed range selector (3) up to its upper detented position.

3 Push control lever (2) in PAYOUT direction.

NOTE

- **Machine will pay out line at half normal speed and at a rate proportional to lever movement.**
- **This mode develops twice the normal torque at half the normal speed.**

f. *Tow Winch Shutdown*.

(1) Tow winch control station.

(a) Place both control levers (2, Figure 2-307) in NEUTRAL (center) position.

(b) Lower tow pins by placing associated tow pin control switch (1) in lower position.

(2) *Set auxiliary brake*. Tighten auxiliary brake handwheel (2, Figure 2-306) by hand.

(3) *Set clutch brake*. Tighten clutch-brake handwheel (1) by hand.

(4) *Shut down pump drive engine*.

(a) Move governor control lever (6, Figure 2-305) to half engine speed position.

CAUTION

Stopping the engine immediately after it has been under load can result in overheating and accelerating wear of engine components. Follow the stopping procedure below to avoid damage to the engine.

(b) Operate the engine at low idle, with no load for 5 minutes.

(c) Pull upward on governor control lever (6) and move governor control lever to OFF position.

(d) Push in START/STOP pushbutton (4).

(5) *Secure piping systems (Figure 2-303)*.

(a) *Secure piping for tow winch power unit*. Close the following valves:

1 TH-13 (10).

2 TH-1, C.O.V.-PMP DISCH. TO TOW WN. HYD. (11).

3 TH-14 (8).

4 GS-75, TOW WN HYD OIL CLR SPLY. (13).

5 GS-77, HYD OIL CLR DISCH. (14).

(b) *Secure piping for pump drive engine*. Close the following valves:

1 AE-28, SEA CHEST VENT (18).

2 FO-31, F.O. SPLY TO PMP. DR. ENG. (6).

3 FO-13, F.O. SERV. SUCT. PORT (2).

4 FO-33, F.O. RTN. TO DAY TK. PORT (1).

5 ASW-19, S.W. TO PUMP DRIVE ENG. (3).

6 ASW-20, S.W. FR. PUMP DRIVE ENG. TO OVBD DISCH. (4).

7 ASW-22, OVBD DISCH. S.W. COOLING (7).

8 ASW-17, SEA SUCTION, S.W. COOLING (19).

(6) *Secure electrical system*.

(a) On engine room emergency distribution panel no. 1 (Figure 2-302), set TOWING MACHINE CONTROL POWER circuit breaker (1) to OFF position.

(b) On engine room distribution panel no. 4 (Figure 2-301), set PUMP DRIVE ENG. JACKET WATER HTR circuit breaker (1) to OFF position.

2-33. Commissary Equipment.

a. *Galley Ventilator Hood.*

(1) *Preparation for use.*

(a) *Main switchboard (Figure 2-308).* Set GALLEY 440 V PWR. PNL. #2 cicuit breaker (1) to ON position.

(b) *Galley 440 V power panel no. 2 (Figure 2-309).* Set the following circuit breakers to ON position.

1 RHTR 1-23-2 (1).

2 GALLEY SUPPLY FAN (S1-22-4) (2).

3 GALLEY EXHAUST FAN (E1-37-1) (4).

(c) *Motor controllers (Figure 2-310).* Perform the following on galley supply and galley exhaust fan motor controllers.

1 Set ON-OFF switch (1) to ON position.

2 POWER AVAILABLE indicator (2) will light.

3 Press START pushbutton (4).

4 MOTOR RUN indicator (3) will light.

(d) *Galley 120V distribution panel no. 1 (Figure 2-311).* Set GAYLORD CONT. CAB. circuit breaker (5) to ON position.

NOTE

PW-29 is located in ventilator control cabinet.

(e) *Align potable water system (Figure 2-312).* Open PW-29 (1).

(f) *Galley ventilator and control cabinet (Figure 2-313).*

1 Observe pressure-temperature gauge (2).

NOTE

Pressure should be between 40 and 80 psi. Temperature should be between 140°F and 180°F. If readings are out of range, refer to unit maintenance.

(2) *Programming for Automatic Operation.*

NOTE

Panel must be opened to operate key pad pushbuttons 10 through 13.

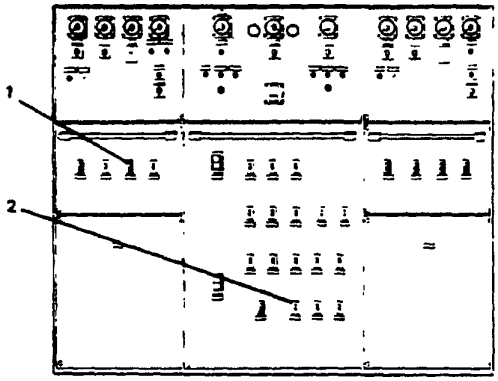
(a) Press ENTER pushbutton (10) and hold for 5 seconds until "1" appears.

CAUTION

The wash cycle should be programmed to come on during a time when the cooking equipment is either off or turned to low to avoid high heat buildup that could set off the surface fire protection system.

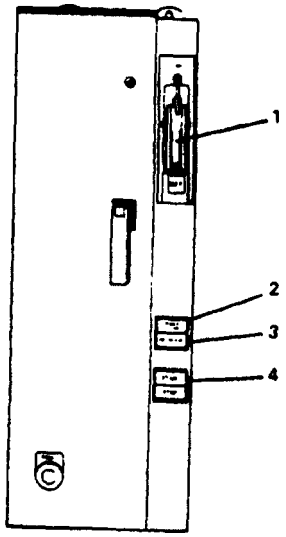
(b) Press START FAN pushbutton (8) to program exhaust fan or START WASH pushbutton (9) to program wash cycle.

(c) Press HOUR pushbutton (13) and hold down until desired hour appears.



1. GALLEY 440V PWR. PNL #2
2. 1-25 KVA XFMR 440V/220V/110V

Figure 2-308. Main Switchboard.



1. ON-OFF SWITCH
2. POWER AVAILABLE INDICATOR
3. MOTOR RUN INDICATOR
4. START PUSHBUTTON

Figure 2-310. Motor Controllers.

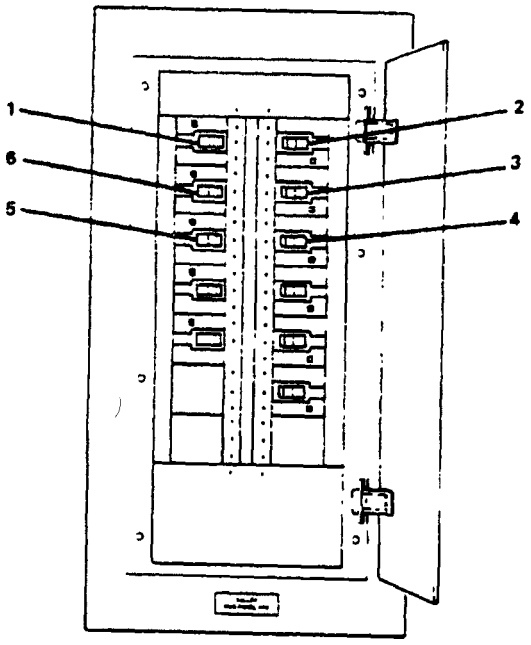


Figure 2-309. Galley 440V Power Panel No. 2.

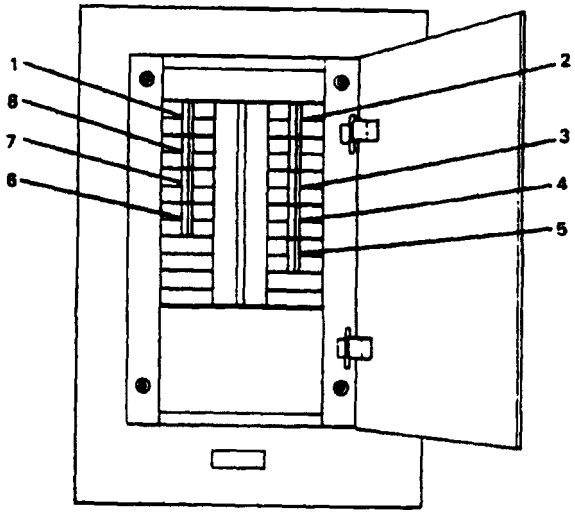
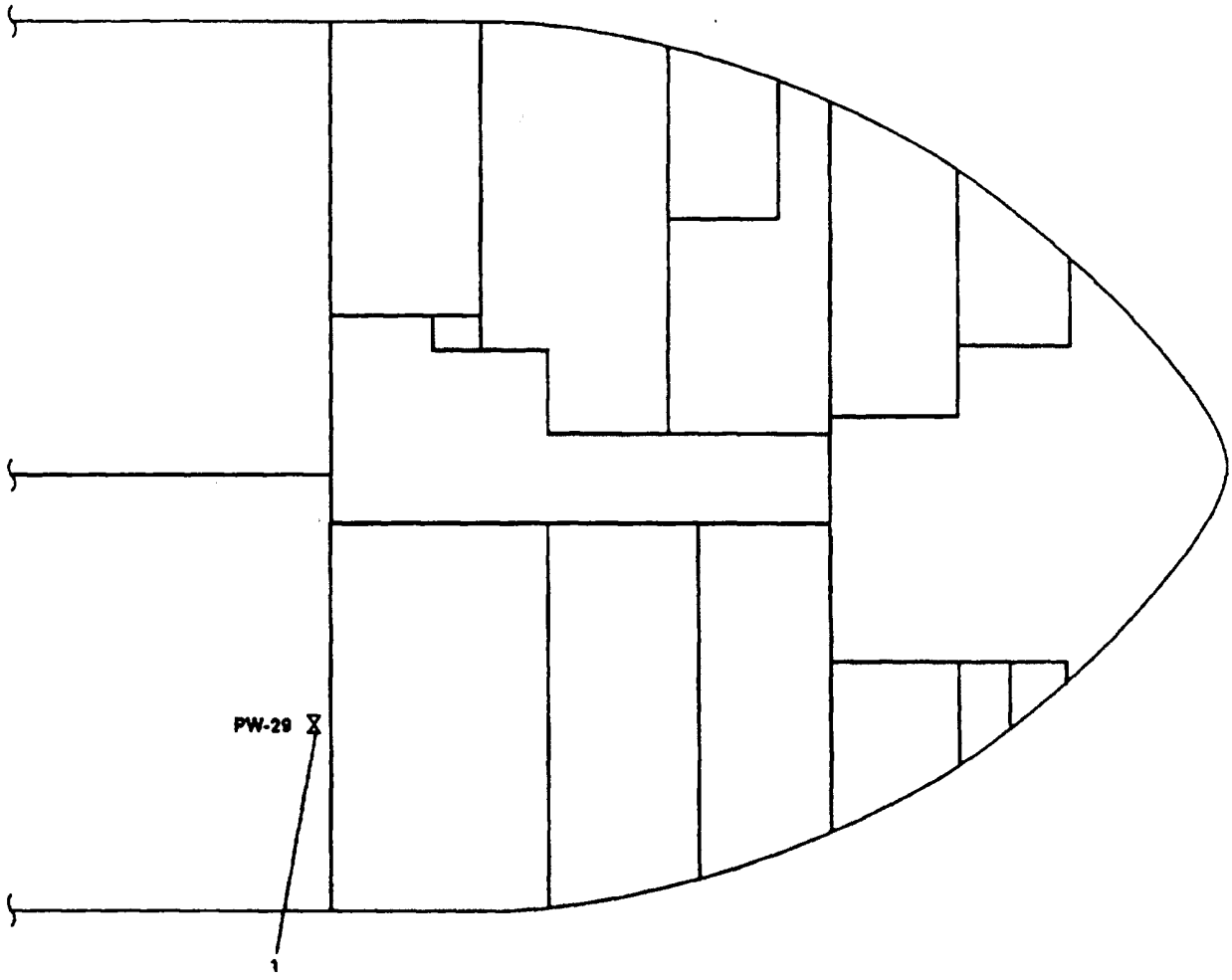


Figure 2-311. Galley 120V Distribution Panel No. 1



MAIN DECK

1. PW-29 (LOCATED IN VENTILATOR CONTROL CABINET)

Figure 2-312. Potable Water System Valve Locations.

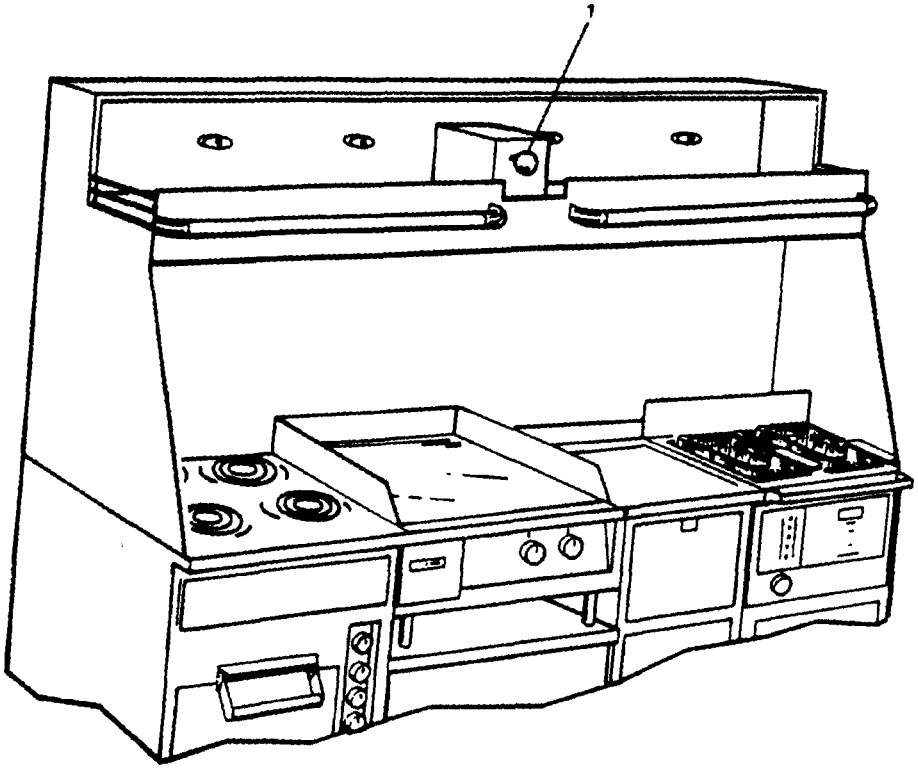


Figure 2-313. Galley Ventilator and Control Cabinet (Sheet 1 of 3).

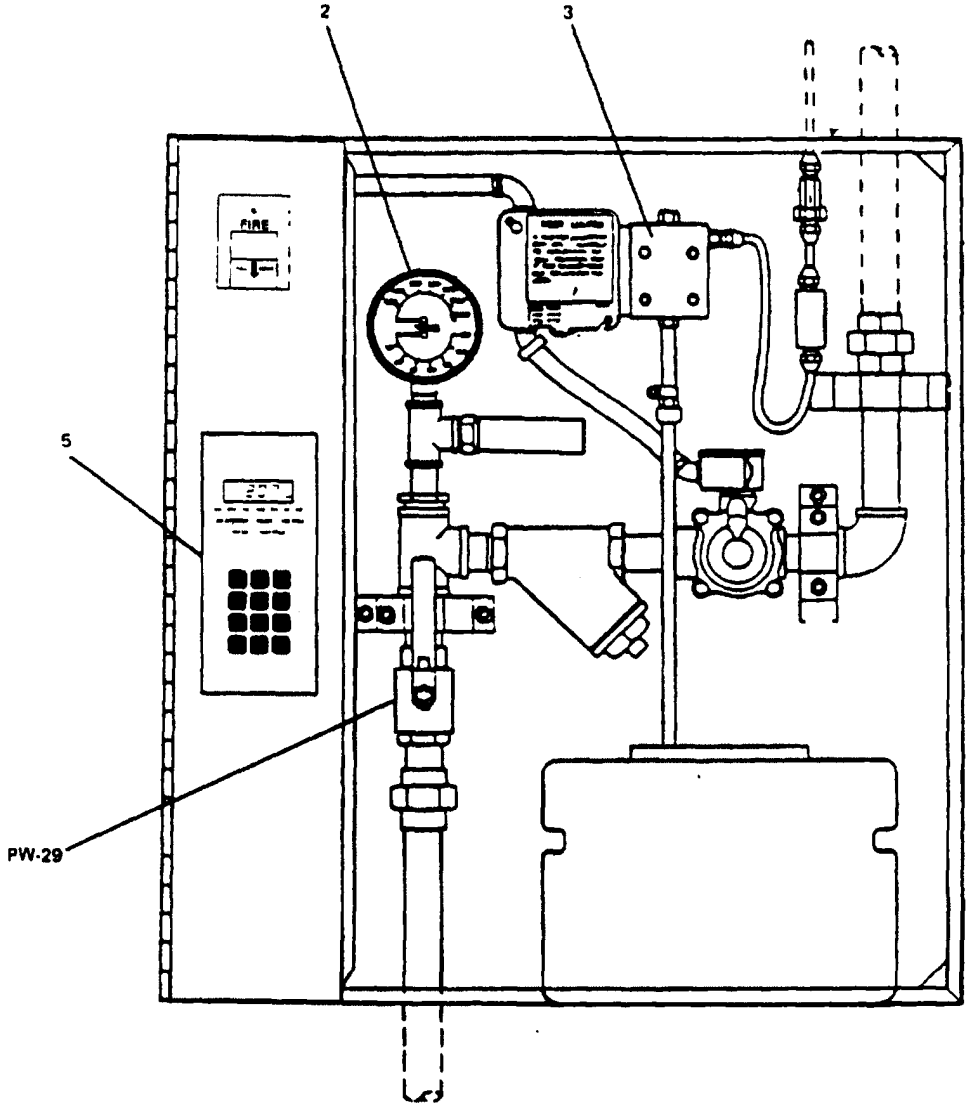
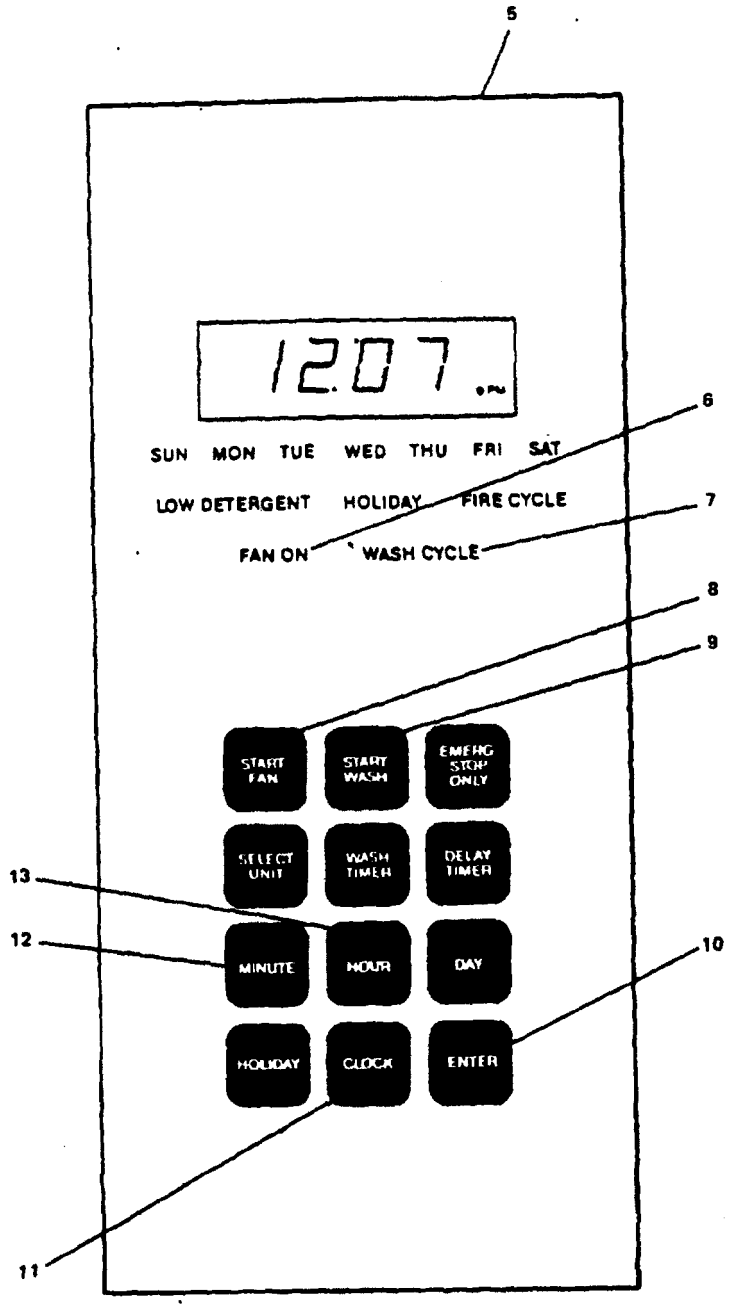


Figure 2-313. Galley Ventilator and Control Cabinet (Sheet 2 of 3).



1. DAMPER CONTROL
2. PRESSURE-TEMPERATURE GAUGE
3. DETERGENT PUMP
4. BALL VALVE
5. CONTROL CENTER
6. FAN ON INDICATOR
7. WASH CYCLE INDICATOR
8. START FAN SWITCH
9. START WASH SWITCH
10. ENTER PUSHBUTTON
11. CLOCK PUSHBUTTON
12. MINUTE PUSHBUTTON
13. HOUR PUSHBUTTON

Figure 2-313. Galley Ventilator and Control Cabinet (Sheet 3 of 3).

(d) Press MINUTE pushbutton (12) and hold down until desired minute appears.

(e) Press ENTER pushbutton (10).

(f) Press CLOCK pushbutton (11).

(3) *Exhaust fan operation*.

(a) Ensure damper control switch (1) is in OPEN position (pushed in).

(b) On control center (5), press START FAN pushbutton (8).

NOTE

FAN ON indicator (6) will light and exhaust fan will operate.

(4) *Wash mode operation*.

(a) With exhaust fan operating, press START WASH pushbutton (9).

NOTE

Exhaust fan will stop. FAN ON indicator will go out. WASH CYCLE indicator will light and water will begin spraying inside hood.

(b) At control cabinet, check pressure - temperature gauge (2).

NOTE

• Pressure should be between 40 psi and 80 psi. Temperature should be between 140°F and 180°F. If readings are out of range, refer to unit maintenance.

• Liquid detergent pump (3) should be operating.

(c) When wash cycle is complete:

1 Detergent pump (3) will stop.

2 Water will stop spraying insidehood.

3 WASH CYCLE indicator (7) will go out.

NOTE

If cooking operations are to continue, or ventilator is to be operational, the exhaust fan must be manually restarted by pressing START FAN pushbutton (8).

b. Range.

(1) *Galley 440 V power panel no. 2 (Figure 2-309)*. Set RANGE circuit breaker (6) to ON position.

(2) *Range top operation (Figure 2-314)*.

(a) Set appropriate LEFT-CENTER-RIGHT control (1) to desired temperature and preheat for 10 minutes.

(b) When desired heat setting has been reached, place pot on range and cook.

(3) *Range top shutdown*.

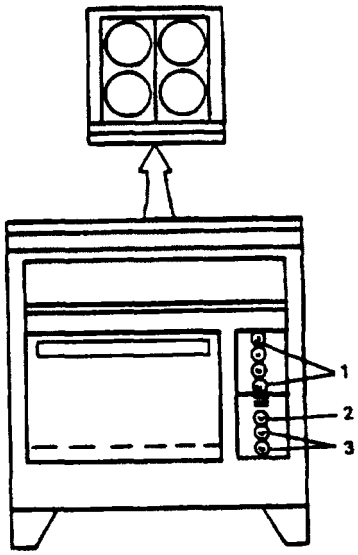
(a) Shut down range by setting selected LEFT-CENTER-RIGHT control (1) to OFF position.

(4) *Oven operation*.

(a) Set oven TEMPERATURE-HEATING control (2) to 50 degrees above desired temperature.

(b) Set oven LOW-MED-HIGH element control (3) to ON position.

(c) Allow oven to preheat until the signal light goes out.



1. RANGE TOP CONTROLS
2. OVEN TEMPERATURE-HEATING CONTROL
3. OVEN HEATING ELEMENT CONTROL

Figure 2-314. Marine Electric Range.

(d) Place pans containing food in oven.

(e) Set oven TEMPERATURE-HEATING control (2) to desired temperature.

WARNING

Use pot holders or heat-proof glove when removing pans to prevent burns.

(f) When cooking is complete, remove food pans.

(5) *Oven shutdown*. Shut down oven by setting oven TEMPERATURE-HEATING control (2) to OFF and oven LOW-MED-HIGH element control (3) to OFF position.

(a) On galley 440 power panel no. 2, set RANGE circuit breaker (6, Figure 2-310) to OFF position.

c. *Griddle*.

(1) *Galley 440 V power panel no. 2 (Figure 2-309)*. Set GRIDDLE circuit breaker (3) to ON position.

(2) *Seasoning the griddle (Figure 2-315)*.

NOTE

Unless product to be cooked contains sufficient fat, griddle surface must be seasoned before each cooking operation.

(a) Set LEFT SIDE temperature control (3) and RIGHT SIDE temperature control (2) to 400°F.

WARNING

Hot surface may cause serious bums and injury.

(b) When HEATING indicator lights (1) go out, use a clean cloth to spread light film of unsalted cooking oil or fat over cooking surface.

(c) Wait 3 to 5 minutes and wipe excess oil off cooking surface with clean cloth.

(d) Apply a second coat of oil or fat.

(e) Wait 3 to 5 minutes and wipe excess oil off cooking surface with clean cloth.

(3) *Operation*.

(a) Set LEFT SIDE temperature control (3) and RIGHT SIDE temperature control (2) to desired temperature. When HEATING indicator lights (1) go out, griddle is ready.

(b) Use metal spatula to turn food being cooked and use it to push excess oil or grease into the grease drawer (4). This will reduce smoking.

(c) Set LEFT SIDE temperature control (3) and RIGHT SIDE temperature control (2) to 200°F during idle periods.

(4) *Shutdown*.

(a) Set LEFT SIDE temperature control (3) and RIGHT SIDE temperature control (2) to OFF position.

(b) HEATING indicator lights (1) will go out.

(c) Slide grease drawer (4) out and empty into an approved container after each shift and wash it with washing detergent. Rinse and dry with soft cloth. Replace drawer.

(d) On galley 440 V power panel no. 2 (Figure 2-309), set GRIDDLE circuit breaker (3) to OFF position.

d. *Fryer*.

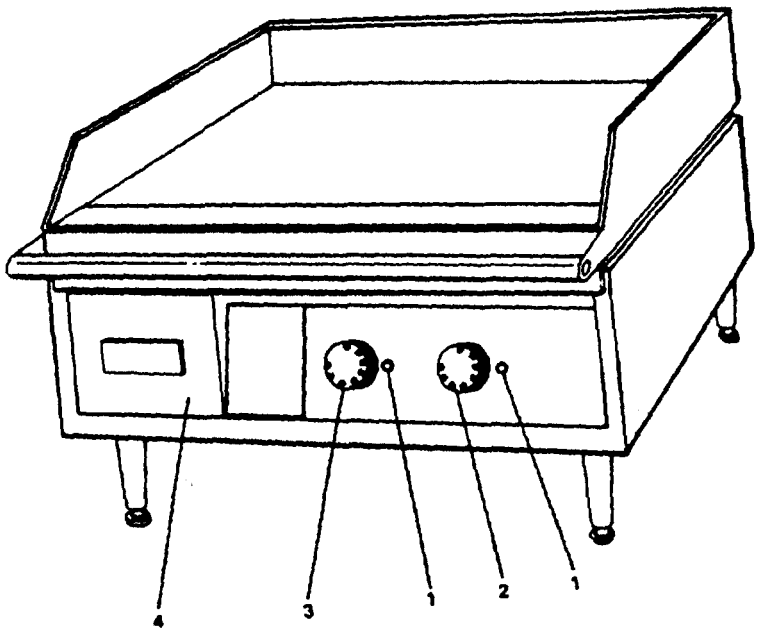
(1) *Galley 440 V power panel no. 2 (Figure 2-309)*. Set DEEP FAT FRYER circuit breaker (5) to ON position.

WARNING

Overfilling fryer oil container with cooking oil may result in oil spilling onto deck causing slippery conditions. Overfilling may also present a fire hazard.

NOTE

There are two fill marks on oil container. Oil level should be maintained between upper and lower marks.



1. HEATING INDICATOR LIGHTS
2. RIGHT SIDE CONTROL
3. LEFT SIDE CONTROL
4. GREASE DRAWER

Figure 2-315. Electric Griddle.

(2) *Operation (Figure 2-316)*.

(a) Fill fryer oil container with cooking oil until level is between fill marks.

(b) Set ON-OFF POWER switch (4) to ON position. POWER indicator (1) will light.

WARNING

Failure to keep oil level above top of heating element will result in overheating of elements, and a possible flash fire if oil is splashed on them.

(c) Set THERMOSTAT (3) to desired temperature. Observe heating indicator (2) is lit.

NOTE

When cooking oil reaches desired temperature, indicator (2) will go out.

WARNING

When fry kettle is in operation, an attendant must always be present.

(d) Place food in wire-mesh type cooking basket and place basket in hot cooking oil.

(e) When food is cooked, remove basket and hang it on support to allow excess oil to drain off.

(3) *Shutdown*.

(a) Set THERMOSTAT (3) to OFF position.

(b) Set ON-OFF POWER switch (4) to OFF position. POWER indicator (1) will go out.

WARNING

Allow heating elements to cool down before raising heating elements from cooking oil. The hot elements and hot cooking oil may cause severe burns.

(c) When cooking oil has cooled down, open drain (5) and allow oil to drain into bucket.

(d) On galley 440 V power panel no. 2 (Figure 2-309), set DEEP FAT FRYER circuit breaker (5) to OFF position.

e. *Toaster*.

NOTE

There are two toasters, one in the galley and the other in the mess/recreation space. Both are operated the same except for the supplying circuit breaker.

(1) *Main switchboard (Figure 2-308)*. Set 1-25 KVA XFMR 440V/220V/110V circuit breaker (2) to ON position.

(2) *220/110V distribution panel (Figure 2-317)*.

(a) *Mess/recreation space toaster*. Set CREW MESS TOASTER circuit breaker (3) to ON position.

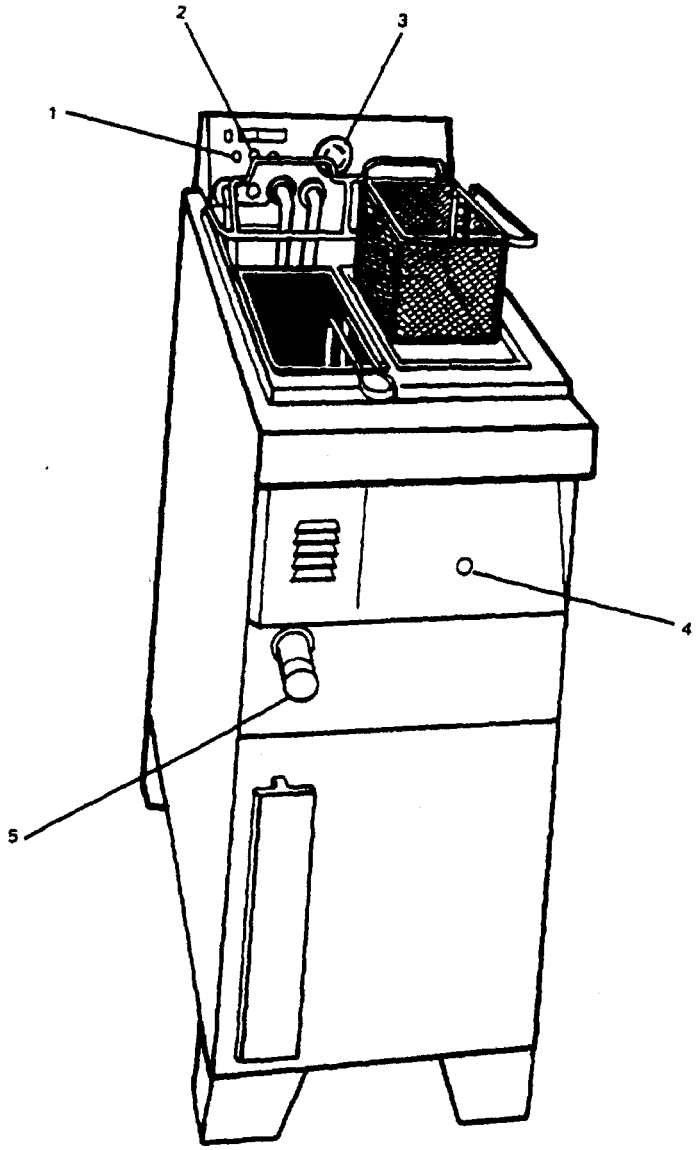
(b) *Galley toaster*. Set GALLEY TOASTER circuit breaker (7) to ON position.

(3) *Operation (Figure 2-318)*.

(a) *Set adjustment knob*. Set adjustment knob (2) about halfway between LIGHTER and DARKER.

(b) *Load bread*. Drop bread slices into toaster wells.

(c) *Start operation*. Press down front handle (1) as far as it will go.



1. POWER INDICATOR
2. HEATING INDICATOR
3. THERMOSTAT
4. POWER SWITCH
5. DRAIN

Figure 2-316. Fryer.

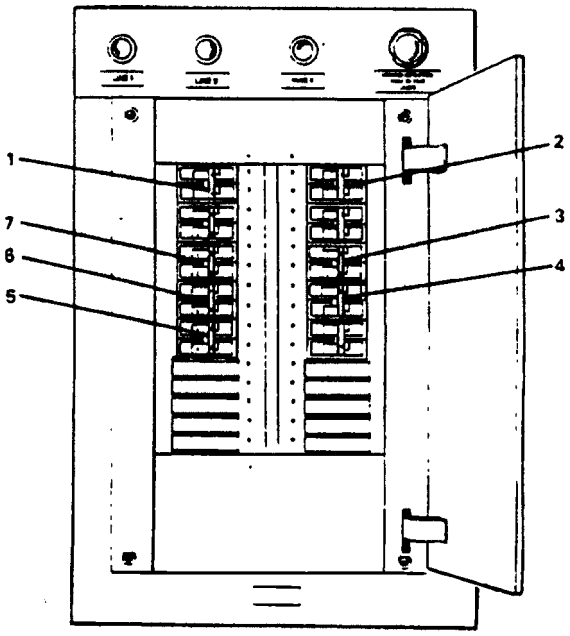
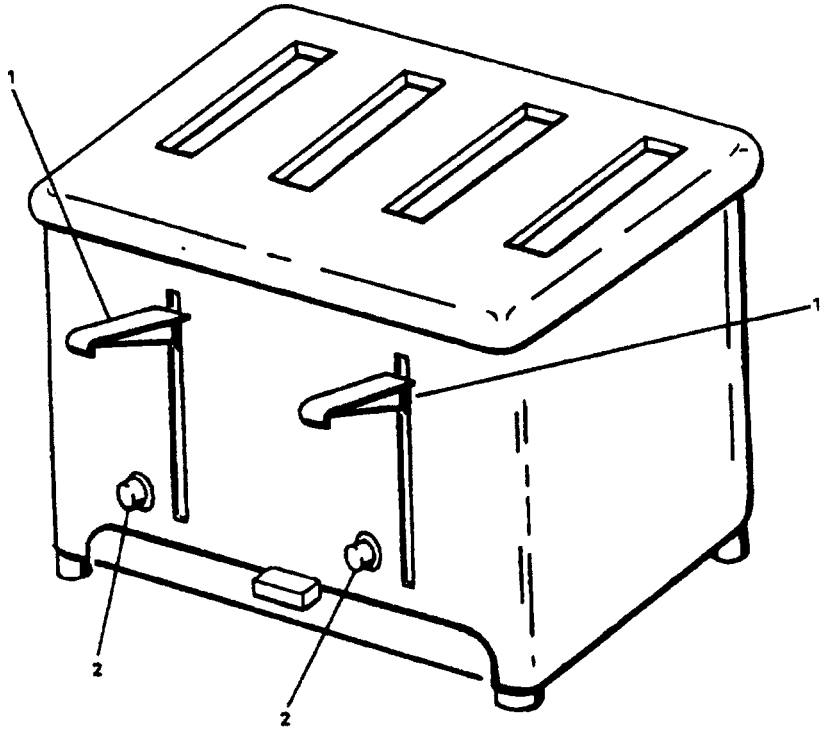


Figure 2-317. 220/110V Distribution Panel.



1. HANDLE
2. ADJUSTMENT KNOB

Figure 2-318. Toaster.

NOTE

Front handle lowers bread and starts toasting cycle. When cycle is complete, bread will automatically pop up and toasting elements will be turned off.

(d) *Adjust toasting level*. Move adjustment knob (2) towards LIGHTER or DARKER as desired.

(e) *Repeat operation*. Insert bread slices and toast again. Once desired toasting level is reached, no further adjustment is required.

(4) *Shutdown (Figure 2-317)*.

(a) Set CREW MESS TOASTER circuit breaker (3) to OFF position.

(b) Set GALLEY TOASTER circuit breaker (7) to OFF position.

f. Microwave Oven.

(1) *Galley 120 V distribution panel no. 1 (Figure 2-311)*. Set MICROWAVE RECEPTACLES (2) circuit breaker (4) to ON position.

(2) *Operation (Figure 2-319)*.

CAUTION

DO NOT place non-microwave items in microwave (e.g. aluminum foil).

(a) Press DOOR OPEN button (2) until door (1) opens.

(b) Place food in microwave oven and close door (1).

(c) Select desired setting on control panel (3).

(d) Press START button (4).

(e) When cooking is complete, press DOOR OPEN button (2) until door (1) opens.

(f) Remove food and close door (1).

(3) *Shutdown*. On galley 120 V distribution panel no. 1 (Figure 2-311), set MICROWAVE circuit breaker (4) to OFF position.

g. *Peeler*.

(1) *Preparation for use*.

(a) On galley 120 V distribution panel no. 1, set GALLEY RCPT circuit breaker (1, Figure 2-311) to ON position.

(b) Place peeler on sink well cover next to sink with garbage disposal.

(c) Turn peeler so water and peelings will discharge (6, Figure 2-320) into sink.

(d) Place water inlet tube (3) into position. Water must flow into top of peeler without obstructing cover (1).

(e) Place small end of flexible hose (4) over intake end of water inlet tube (3).

(f) Place large end of flexible hose (4) over cold water faucet.

(g) Close and latch discharge door (7).

(h) Plug power cord into outlet.

(2) *Operation*.

(a) Adjust cold water faucet for small flow of water to flush away peelings.

(b) Turn on garbage disposal.

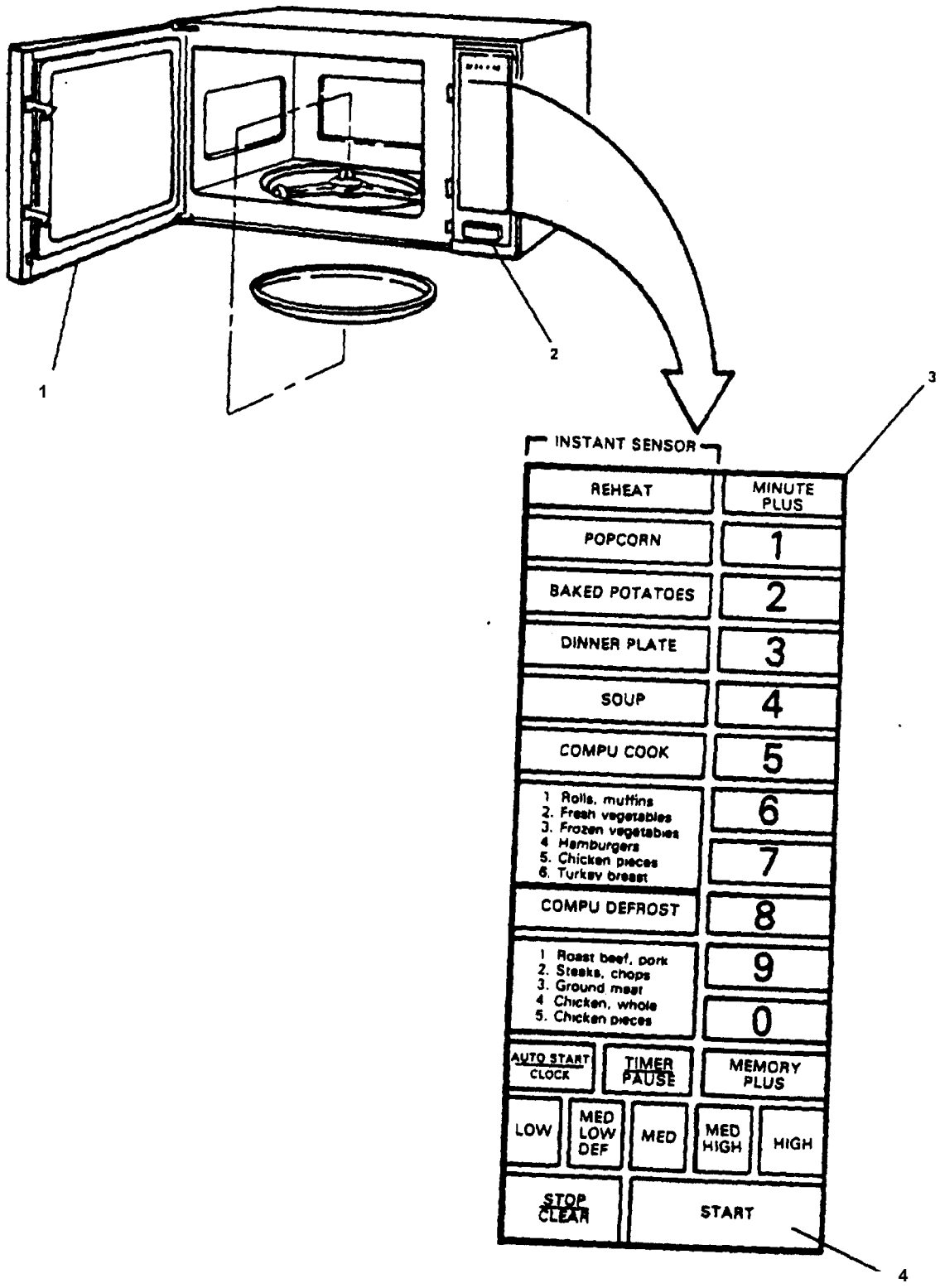
CAUTION

Start peeler before loading.

(c) Turn timer knob (5) beyond desired time; then turn back to 1 minute mark.

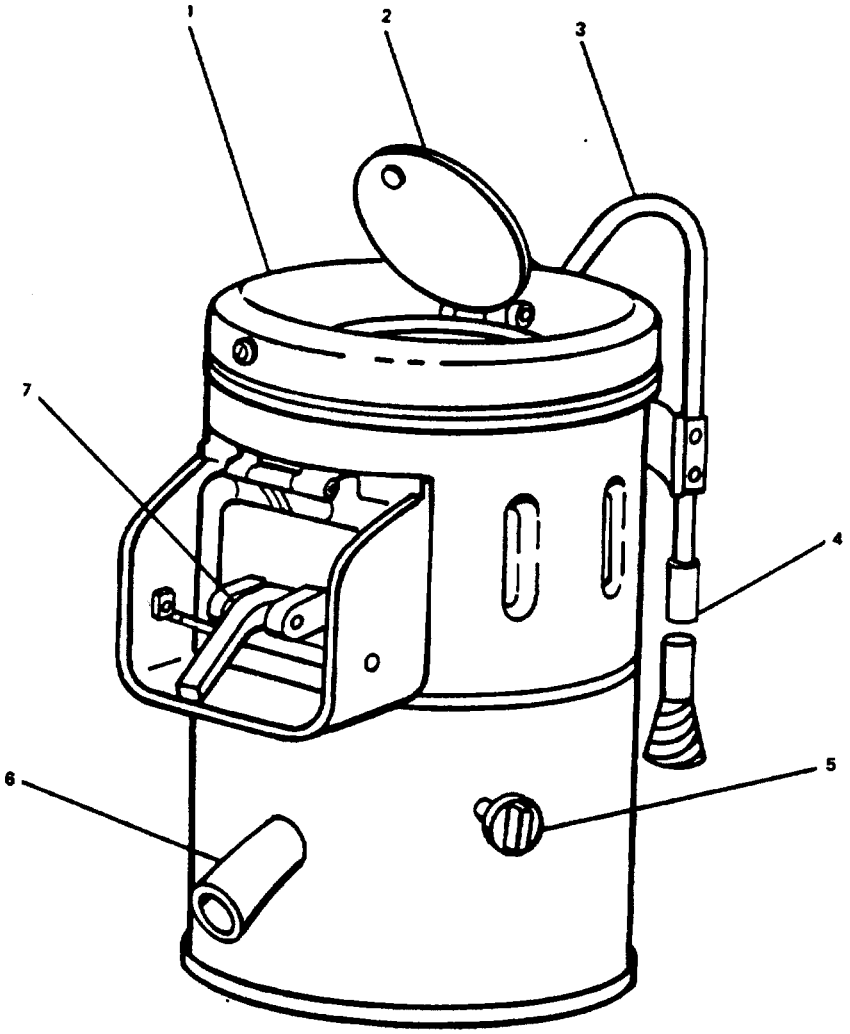
NOTE

The average time to peel a 20-pound load is 1 minute.



1. DOOR
2. DOOR OPEN BUTTON
3. CONTROL PANEL
4. START BUTTON

Figure 2-319. Microwave Oven.



1. PEELER COVER
2. HINGED SPLASH LID
3. WATER INLET TUBE
4. FLEXIBLE HOSE
5. TIMER KNOB
6. DRAIN OUTLET
7. DISCHARGE DOOR

Figure 2-320. Peeler.

(d) Open lid (2) and insert vegetables.

(e) Close lid (2) to prevent splashing.

NOTE

Timer will automatically stop unit.

(f) Open lid (2) and inspect vegetables.

(g) If satisfied with peeling, place container under discharge door (7).

(h) Unlatch discharge door (7).

(i) To eject vegetables:

1 Release door latch and hold discharge door (7) partially open with container below.

NOTE

Timer may be turned OFF and ON without damage.

2 Set timer (5) on and off for short intervals.

NOTE

Rotation of peeling disc will eject load.

3 When peeler is empty, turn timer (5) to OFF position.

(3) *Shutdown*.

(a) Allow water to flow for 2 to 3 minutes to clear disposal.

(b) Turn OFF garbage disposal.

(c) Shut off faucet.

(d) Remove flexible hose (4) from faucet and water inlet tube (3) and stow.

(e) Place water inlet tube (3) in stowed (down) position.

(f) Latch discharge door (7).

(g) Close lid (2).

(h) Unplug power cord.

h. Meat Slicer.

(1) *Galley 120 V distribution panel no. 1 (Figure 2-311)*. Set MEAT SLICER/FOOD MIXER circuit breaker (6) to ON position.

WARNING

Rotating knife blade is extremely sharp and may cause serious personal injury. Keep fingers and hands clear of rotating knife blade when in use. Use caution when cleaning knife blade.

(2) *Operation (Figure 2-321)*.

(a) Plug power cord into outlet.

(b) Pull carriage handle (3) towards you until carriage reaches its stop.

(c) With meat grip (2) out of the way, place product to be sliced on carriage tray (1).

(d) Set meat grip (2) against product.

(e) Adjust slice adjusting dial (4) for desired thickness.

(f) Place tray on tray shelf (6) to receive slices.

(g) Pull PULL TO START PUSH STOP switch (5) to OUT position.

(h) Move carriage handle (3) back and forth with right hand to slice product.

(3) *Shutdown*.

(a) Push PULL TO START PUSH STOP switch (5) to IN position.

(b) Set slice adjusting dial (4) to minimum setting.

WARNING

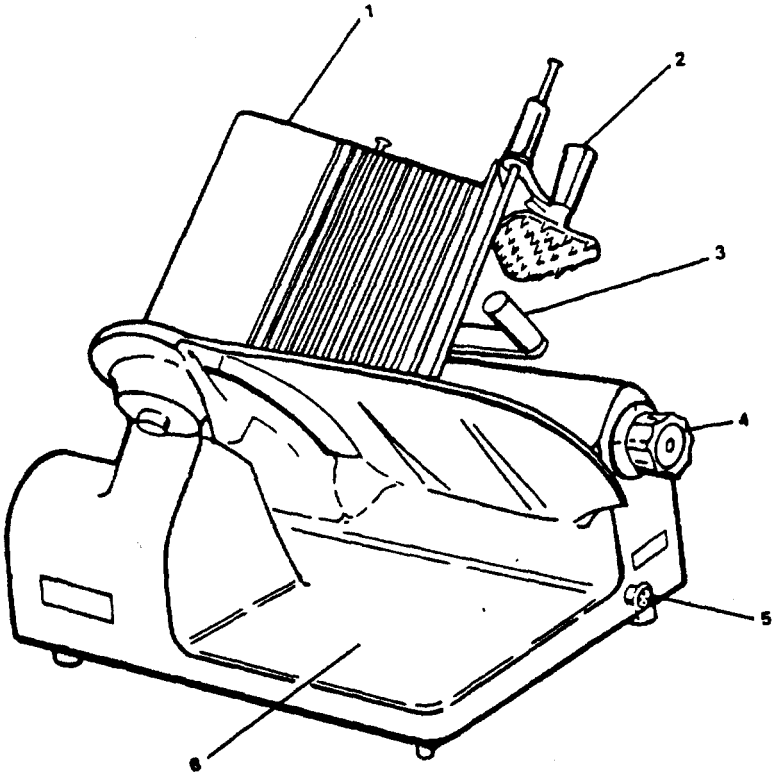
• Set slice adjusting dial to minimum setting; place the gauge plate over slice knife. This prevents accidentally cutting yourself.

• Unplug power cord before cleaning, servicing, or removing guards.

(c) Unplug power cord.

(d) Clean meat slicer after use.

(e) On galley 120 V distribution panel no. 1 (Figure 2-311), set MEAT SLICER/FOOD MIXER circuit breaker (6) to OFF position.



1. CARRIAGE TRAY
2. MEAT GRIP
3. CARRIAGE HANDLE
4. SLICE ADJUSTING DIAL
5. ON-OFF SWITCH
6. TRAY SHELF

Figure 2-321. Meat Slicer.

i. *Electric Mixer*.

(1) *Galley 120 V distribution panel no. 1 (Figure 2-311)*. Set MEAT SLICER/FOOD MIXER circuit breaker (6) to ON position.

(2) *Operation (Figure 2-322)*.

(a) Lower bowl lift hand lever (2) to down position.

(b) Select desired attachment; line up slots in attachment spindle (6) with the pins on the beater shaft (5).

(c) Raise the attachment on the beater shaft (5) and twist clockwise. When released, attachment will drop slightly into full locked position.

NOTE

Ensure bowl retainer latches are clear of bowl support guide pins.

(d) Place bowl (4) on bowl support (3). Lock bowl in place with bowl retainer latches.

(e) Place ingredients in bowl (4).

(f) Raise bowl lift hand lever (2) to UP position.

(g) Select desired speed on gear shift lever (9).

(h) Set ON-OFF power switch (1) to ON position.

(i) When mixing is complete, set ON-OFF power switch (1) to OFF position.

(j) Lower bowl lift hand lever (2) to the down position.

NOTE

Unlock bowl retainer latches.

(k) Remove bowl (4) from bowl support (3).

(l) Remove attachment from beater shaft (5) by holding near top, raising slightly while twisting counterclockwise, and sliding downward.

(3) *Mounting of accessories*.

(a) Turn thumb screw (8) counterclockwise so that it does not extend into auxiliary drive socket.

(b) Remove cover plate (7) from auxiliary drive socket.

(c) Insert hub of attachment into auxiliary drive socket, rotating slightly until it slides into place against mixer housing.

(d) Turn thumb screw (8) clockwise to lock attachment in place.

(4) *Shutdown*.

(a) Set ON-OFF switch (1) to OFF position.

(b) On galley 120 V distribution panel no. 1, set MEAT SLICER/FOOD MIXER circuit breaker (6, Figure 2-311) to OFF position.

j. *Coffee Percolator*.

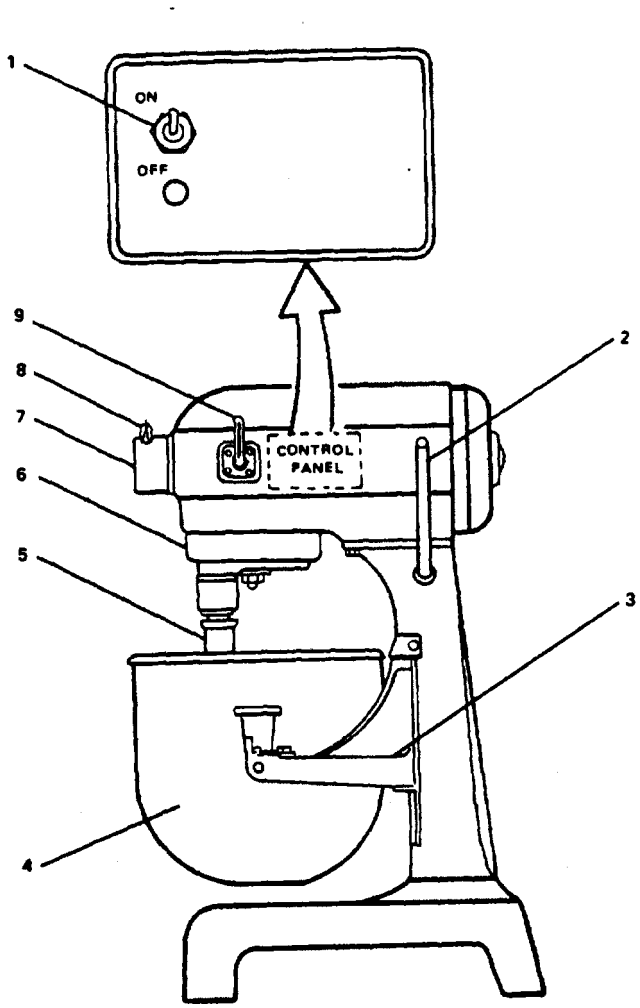
(1) *Galley 120 V distribution panel no. 1 (Figure 2-311)*. Set GALLEY COFFEE POT RCPT circuit breaker (8) to ON position.

WARNING

• Do not touch hot surfaces. Use handles or knobs. Contact with hot surfaces will cause personal injury.

• Do not immerse cord, plugs, or base in water or other liquid. Damage to the percolator and possible electrical hazard could cause personal injury.

• Personal injury (scalding) may occur if lid is removed during brewing cycle.



1. ON-OFF SWITCH
2. BOWL LIFT HAND LEVER
3. BOWL SUPPORT
4. BOWL
5. BEATER SHAFT
6. ATTACHMENT SPINDLE
7. COVER PLATE
8. THUMB SCREW
9. GEAR SHIFT LEVER

Figure 2-322. Electric Mixer.

(2) Prepare percolator (Figure 2-323).

(a) Remove cover (1) by turning counter-clockwise until cover lock tabs (2) clear handle slots (11).

(b) Lift out basket (3) and pump tube (5).

(c) Fill percolator body (10) with cold potable water.

NOTE

The automatic brewing cycle is timed to begin with a cold water start.

(d) Wet coffee basket (3) with cold potable water.

NOTE

Wetting basket keeps small particles of coffee from sifting through basket.

(e) Add desired amount of coffee grinds to basket (see Table 2-5).

(f) Insert pump tube (5) with washer (6) installed into well in urn.

(g) Place spring (4) and basket (3) on pump tube (5) inside percolator body (10).

(h) Replace cover (1) and secure by turning cover clockwise until tabs (2) are in handle slots (11).

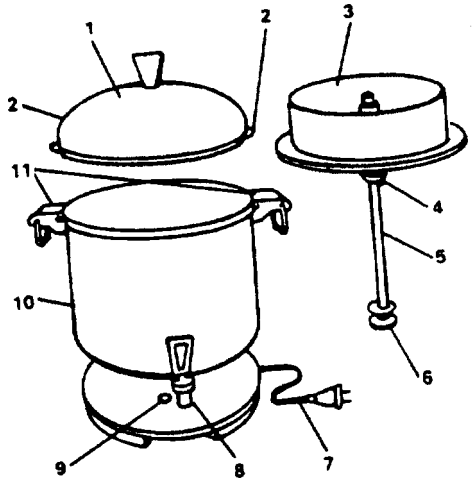
(i) Plug power cord (7) into receptacle.

(j) When coffee brewing is complete, percolating will stop and red indicator light (9) will light.

NOTE

Percolator will automatically switch to warm mode to maintain coffee at serving temperature.

- For best flavor, remove coffee basket and tube when brewing is complete.



1. COVER
2. TABS
3. BASKET
4. SPRING
5. PUMP TUBE
6. WASHER
7. CORD
8. SPIGOT
9. INDICATOR LIGHT
10. BODY
11. HANDLES

Figure 2-323. Coffee Percolator.

Table 2-5. Amount of Coffee Grinds to Use

CUPS TO BE BREWED	AMOUNT OF COFFEE GRINDS
12	1 1/2 cups
18	1 3/4 cups
24	2 1/2 cups
30	3 cups
36	3 1/2 cups
42	4 cups
48	4 1/2 cups
55	1 pound can

WARNING

Remove parts carefully. Coffee percolator and parts will be hot and could cause burns.

CAUTION

Unplug coffee percolator when only 1 or 2 cups of coffee remain. Excessive heat may damage coffee percolator.

(3) *Shutdown*. On galley 120 V distribution panel no. 1 (Figure 2-311), set GALLEY COFFEE POT RCPT circuit breaker (8) to OFF position.

k. *Steam Table*.

(1) *Operation.*

(a) *Galley 120 V distribution panel no. 1 (Figure 2-311)*. Set STEAM TABLE NO. 1-STEAM TABLE NO. 2 circuit breaker (3) to ON position.

(b) *Valves*. Close drain valves (3, Figure 2-324).

(c) *Fill well with water*. Fill well (1) with water to 1 inch above heating elements.

(d) *Operate units*. Set POWER switches (2) to ON position.

(2) *Shutdown*.

(a) *Turn off units*. Set POWER switches (2) to OFF position.

(b) *Galley 120 V distribution panel no. 1 (Figure 2-311)*. Set STEAM TABLE NO. 1-STEAM TABLE NO. 2 circuit breaker (3) to OFF position.

WARNING

Heating elements are very hot. Use extreme care to avoid contact with elements. Allow water to cool before draining and cleaning wells. Serious burns or scalding could result.

(c) *Empty well*. Open drain valves (3). After water has drained, use sponge or clean rag to clear wells (1). Wipe dry with clean soft cloth.

l. *Garbage Disposal*.

(1) *220/110 V Distribution panel (Figure 2-317)*. Set GARBAGE DISPOSAL circuit breaker (2) to ON position.

WARNING

• Never use your hand to check rotation of flywheel or to remove foreign matter from disposal. Use a stick or similar object to turn flywheel. Foreign matter should be removed using tongs or pliers. Use of hands could result in serious personal injury.

• Never reach inside disposal while it is operating. Serious personal injury will result.

(2) *Operation*.

(a) Turn on cold water.

(b) Set GARBAGE DISPOSAL SW to ON position.

(c) Feed food waste into disposal.

WARNING

Do NOT feed china, metal, rags, clam shells, etc. into disposal. Damage to blades will result.

CAUTION

Do NOT put grease or oil in disposal. Drain may become clogged.

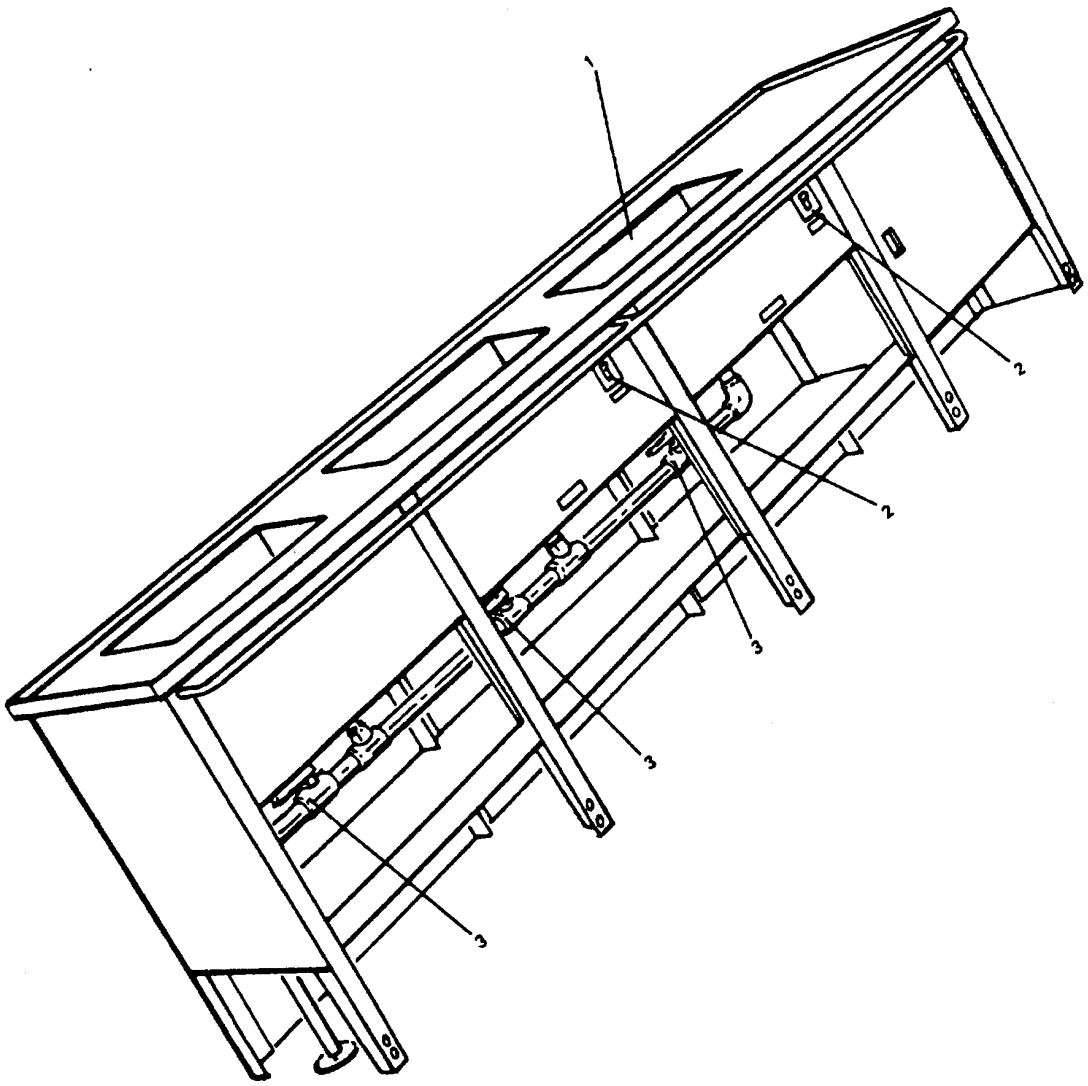
(d) Allow disposal to run 2 minutes after grinding is complete to allow proper flushing of disposal and drain line.

(3) *Shutdown*.

(a) Set GARBAGE DISPOSAL SW to OFF position.

(b) Turn off cold water.

(c) On 220/110 V distribution panel, set GARBAGE DISPOSAL circuit breaker (2, Figure 2-317) to OFF position.



1. WELL
2. POWER SWITCHES
3. DRAIN VALVES

Figure 2-324. Steam Table.

m. *Dishwasher*.

(1) Preparation for use.

(a) *220/110 V distribution panel (Figure 2-317)*. Set DISHWASHER/BOOSTER HTR circuit breaker (1) to ON position.

(b) Close and latch door.

(c) Set selector switch (4, Figure 2-325) to ON position.

(d) Allow machine to cycle through three wash cycles to fill booster heater.

NOTE

It will be necessary to open door between each cycle. Open door, observe cycle indicator. When cycle indicator goes out, close door to start next cycle.

(2) *Operation*.

(a) Dishes must be scraped and rinsed to remove food particles/debris.

(b) Place dishes in rack.

(c) Open door.

NOTE

When door is opened, cycle indicator will light during reset period (approximately 8 seconds).

(d) Slide rack of dishes into dishwasher.

(e) Add detergent.

(f) Ensure cycle indicator (3) is OFF.

(g) Close and latch door.

CAUTION

If OVER TEMP indicator lights during any operation cycle, turn off unit to prevent damage and refer to unit maintenance.

NOTE

Wash cycle will begin automatically. Cycle indicator will be ON.

(h) Observe water temperature gauge (1) during rinse cycle. Temperature should be 180° F (82°C), minimum.

NOTE

When cycle indicator (3) goes OFF, cycle is complete.

(3) *Shutdown*.

(a) Set selector switch (4) to OFF position.

(b) On 220/110 V distribution panel, set DISHWASHER/BOOSTER HTR circuit breaker (1, Figure 2-317) to OFF position.

n. *Trash Compactor*.

(1) Operation.

(a) 220/110 V *distribution panel (Figure 2-317)*. Set TRASH COMPACTOR circuit breaker (6) to ON position.

(b) *Load Compactor*. Pull handle (3, Figure 2-326), and open load door (4). Load compactor with trash.

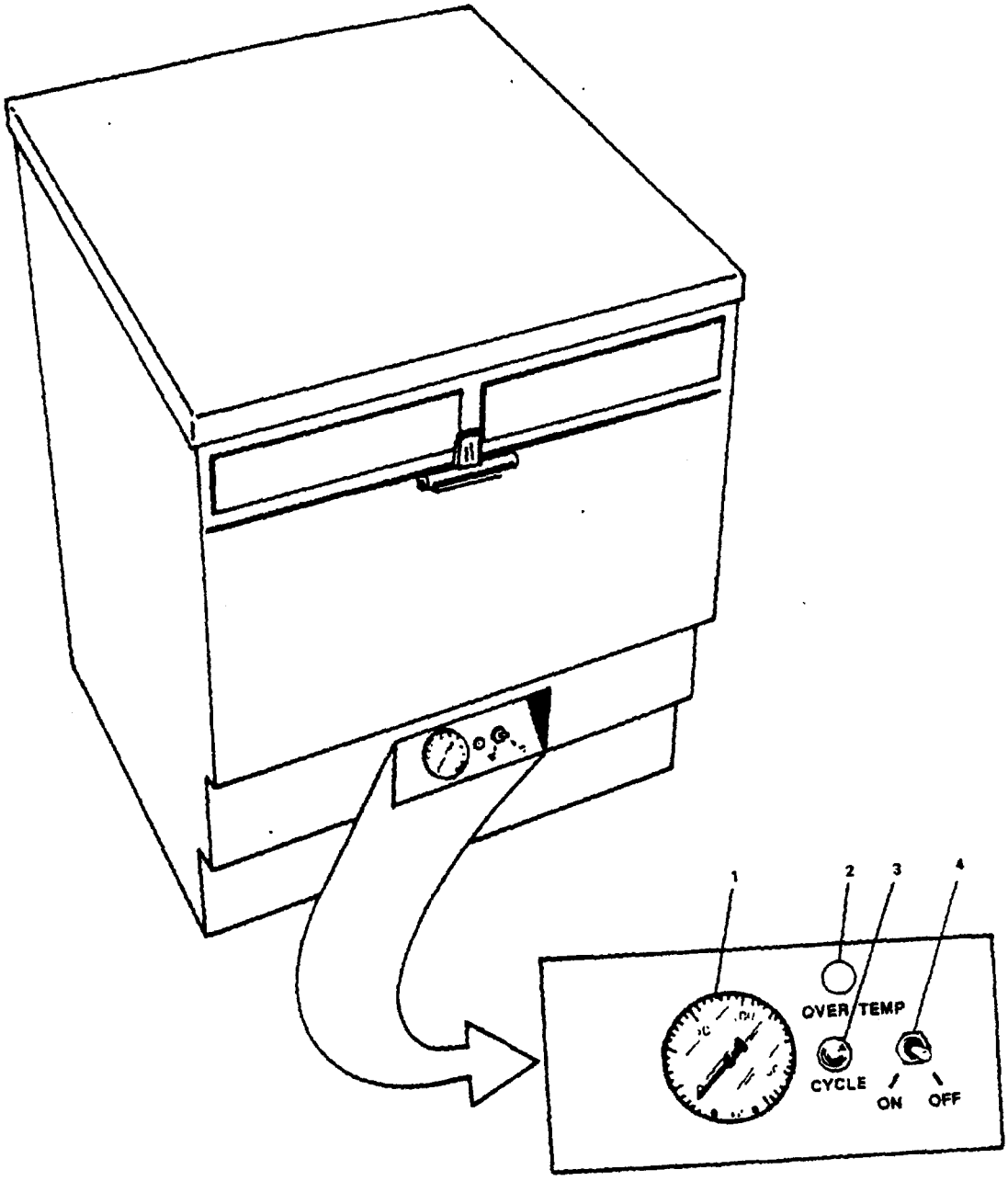
(c) *Key switch*. Insert key and turn key switch (1) to ON position.

(d) *Start compactor*. Press START push-button (2) and release.

NOTE

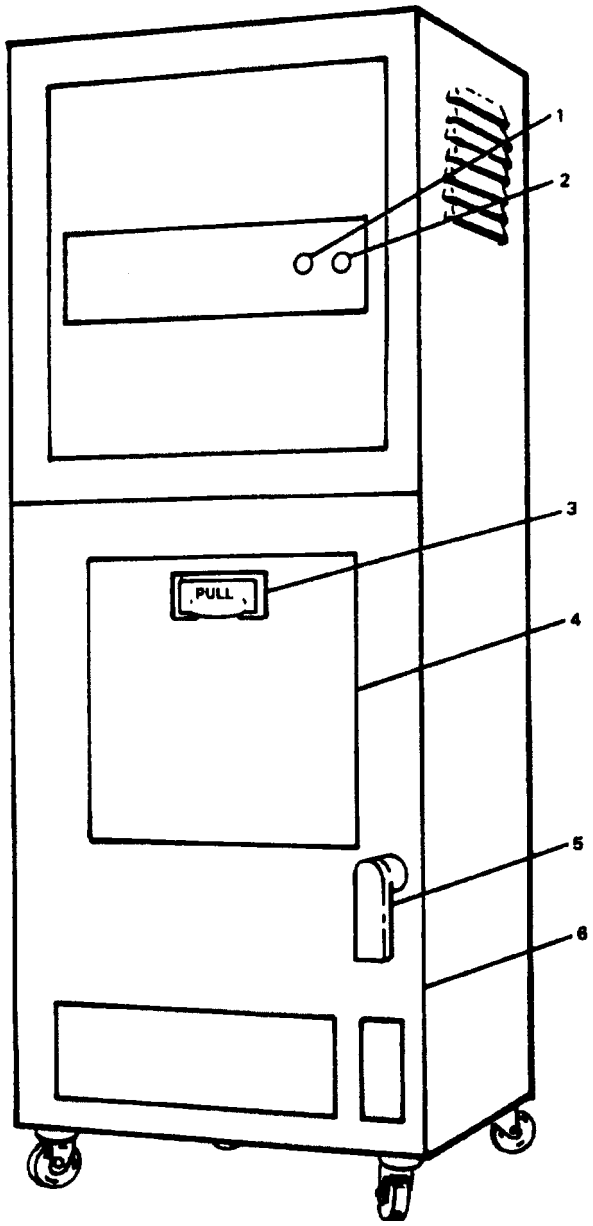
Compactor will operate automatically, compacting trash and returning compactor mechanism to the ready (UP) position.

(e) *Empty Compactor*. Pull up and turn handle (5). Open door (6) and empty compactor.



1. WATER TEMPERATURE GAUGE
2. OVER TEMP INDICATOR
3. CYCLE INDICATOR
4. SELECTOR SWITCH

Figure 2-325. Dishwasher.



1. KEY SWITCH
2. START PUSHBUTTON
3. PULL HANDLE
4. LOAD DOOR
5. HANDLE
6. DOOR

Figure 2-326. Trash Compactor.

(2) *Shutdown*.

(a) *Key switch*. Turn key switch (1) to OFF position. Remove key.

(b) *220/110 V distribution panel (Figure 2-317)*. Set TRASH COMPACTOR circuit breaker (6) to OFF position.

o. *Beverage dispenser*.

(1) *220/110 V distribution panel (Figure 2-317)*. Set BEVERAGE DISPENSER circuit breaker (4) to ON position.

(2) Set up beverage dispenser (Figure 2-327).

(a) *Install drip pan*.

1 Place drip pan cover on top of each drip pan.

2 Place top edge of drip pan under lip on front panel.

3 Lower each drip pan enough that alignment tab goes into tab slot and locks pan in place.

(b) *Assemble bowl*.

1 Place bowl (1) upside down on counter.

NOTE

Both bowl and gasket must be dry. If wet, beverage could leak out.

2 Place bowl gasket over neck of large opening on bottom of bowl (1).

3 Place bowl (1), rightside up, with bowl gasket centered on cooling plate and guide pin.

4 Grasp bowl (1) by opposite corners and with downward pressure and twisting motion, set bowl (1) into position.

NOTE

• Ensure bowl is square to front of unit, with handle bracket in front over drip pan.

• If necessary, use a touch of cornstarch to lubricate gasket for easier assembly.

5 Place bearing sleeve over guide pin in middle of cooling plate.

NOTE

• There are flat surfaces on guide pin. Turn bearing sleeve until sleeve aligns with guide pin and drops into place.

• Flange on bearing sleeve must rest flush on cooling plate.

6 Place impeller on bearing sleeve (fin side up).

7 Press spray tube into sleeve on top of pump cover.

8 Place pump cover over guide pin, keeping spray tube toward front of unit and centered in bowl.

NOTE

• Top of spray tube is "pinched" and bent. The "pinched" and bent top end of tube is to be pointed toward front of bowl.

• 3/8-inch tab on front of pump cover, near spray tube sleeve, goes between two locator notches on bowl.

9 Install lockwasher on guide pin head until guide pin neck is completely in keyway.

(c) *Assemble valve and handle*.

1 Place handle (5) in two "V" notches in front of handle bracket.

2 While holding handle in place and pushed back, lower valve down through valve hole and through hole in handle (5).

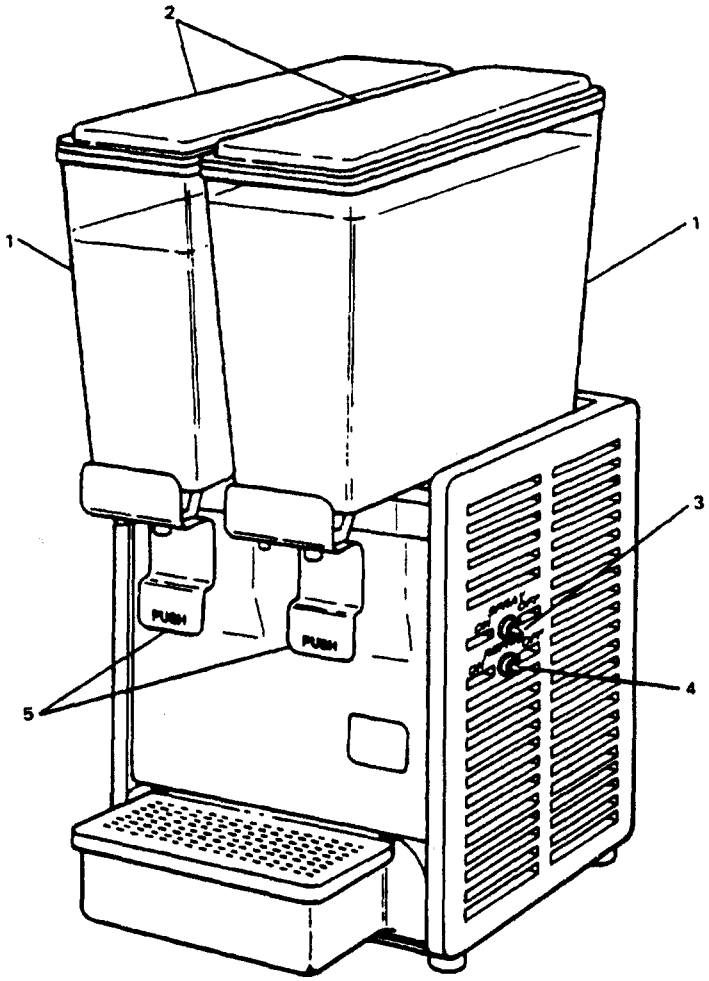
3 When valve is seated on O-ring, release handle.

4 Push handle (5) in and release it several times to make sure the valve moves up and down freely.

5 To seat O-ring, press down on valve and twist.

(d) *Starting the dispenser*.

1 Fill bowl (1) with desired beverage.



1. BOWL
2. COVER
3. SPRAY SWITCH
4. REFRIG. SWITCH
5. HANDLE

Figure 2-327. Beverage Dispenser.

2 Install cover (2).

NOTE

Ensure cover is well down over bowl edge, not resting on lip. Improperly installed cover will leak.

3 Set SPRAY switch (3) to 1/ON position.

4 Set REFRIG. switch (4) to 1/ON position.

(3) *Dispense beverage*.

(a) Place glass against handle (5).

(b) Press handle (5) rearward to dispense beverage. Release handle (5) when glass has been filled to desired level.

(4) *Shutdown*.

(a) Set SPRAY switch (3) to O/OFF position.

(b) Set REFRIG. switch (4) to OFF position.

(c) *220/110 V distribution panel (Figure 2-317)*. Set BEVERAGE DISPENSER circuit breaker (4) to OFF position.

p. *Milk Dispenser*.

(1) *Preparation for use*.

(a) *Galley 120 V distribution panel no. 1 (Figure 2-311)*. Set GALLEY RCPT circuit breaker (1) to ON position.

NOTE

During initial start-up (after unit has been inoperative for some time), unit should operate for at least 1 hour to obtain operating temperature.

(b) *Ensure unit is at operating temperature (Figure 2-328)*. Observe thermometer (1) reading; it should be in the GREEN (safe) zone.

(c) Set temperature control switch (3) to maintain temperature in GREEN (safe) zone.

(d) Open door by disengaging latch (4) and pulling on door edge.

(e) Place milk container over dispensing valve (2).

(f) Lift dispensing valve (2) and feed tube from milk container through tube passage in dispensing valve (2).

CAUTION

Do not stretch tube. Pulling on tube may cause the tube to pull loose from milk container, causing milk container to drain.

(g) Remove polyethylene film covering tube.

(h) Lower dispensing valve (2).

(i) Remove plug from feed tube.

NOTE

If feed tube is too long, cut off 1/2 inch below valve.

(j) Close door, and secure latch (4).

(2) *Operation*.

(a) Hold container under feed tube of selected dispensing valve (2).

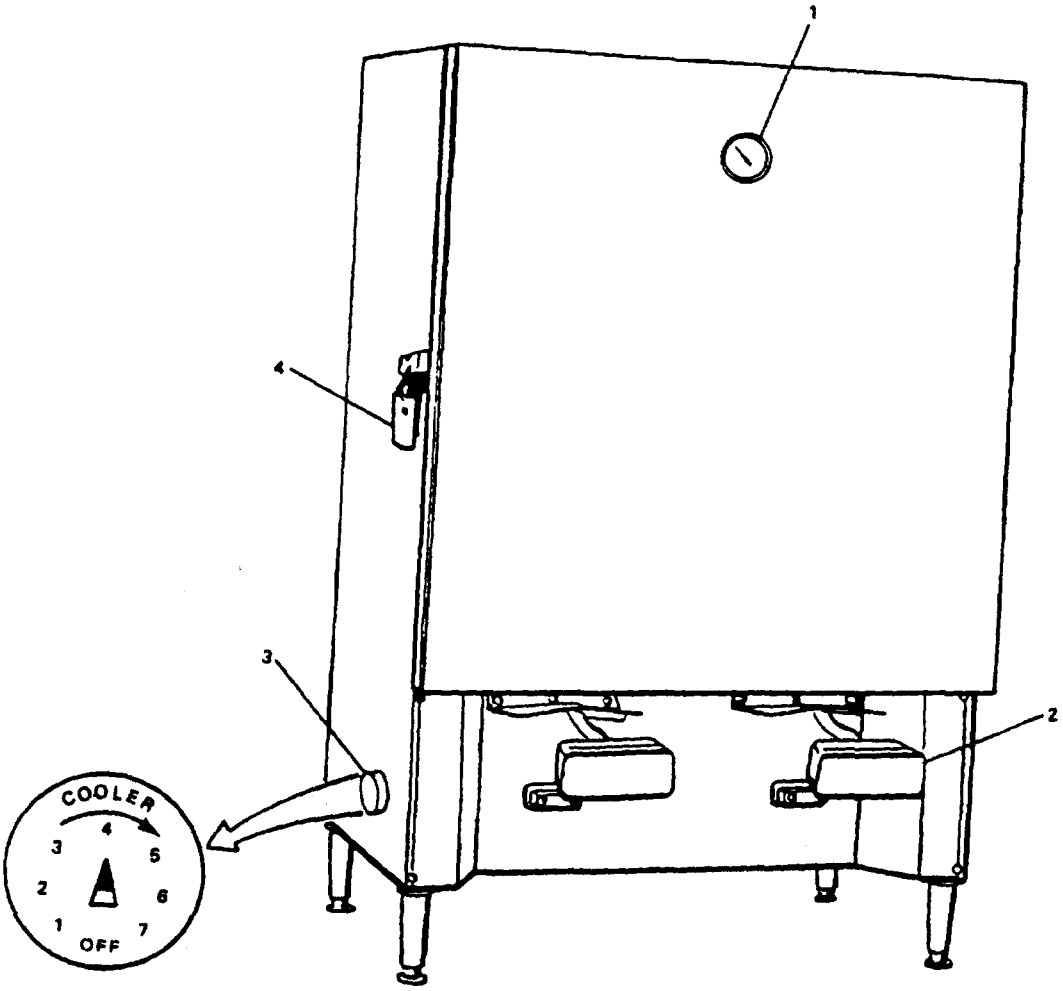
(b) Raise dispensing valve (2) so that milk will flow into container.

(c) When container is filled to desired level, lower dispensing valve (2).

(3) *Shutdown*.

(a) *Galley 120 V distribution panel no. 1 (Figure 2-311)*. Set GALLEY RCPT circuit breaker (1) to OFF position.

(b) *Block door open*. If milk dispenser is not to be used for an extended period, rig door to remain open to allow air to circulate inside.



1. THERMOMETER
2. DISPENSING VALVE
3. TEMPERATURE CONTROL SWITCH
4. LATCH

Figure 2-328. Milk Dispenser.

q. *Ice Maker*.

(1) *Operation*.

(a) *220/110 V distribution panel (Figure 2-317)*. Set ICE MAKER circuit breaker (5) to ON position.

(b) *Open water supply valve (Figure 2-329)*. Open PW-93, CW TO ICEMAKER (1).

NOTE

Ice maker operates automatically. Refer problems to unit maintenance.

(2) *Shutdown*.

(a) *Close water supply valve*. Close PW93, CW TO ICEMAKER (1).

(b) *220/110 V distribution panel (Figure 2-317)*. Set ICE MAKER circuit breaker (5) to OFF position.

r. *Refrigerator*.

(1) *Operation*.

(a) *Galley 120 V distribution panel no. 1 (Figure 2-311)*. Set GALLEY REFRIGERATOR circuit breaker (2) to ON position.

NOTE

• All controls are factory set for proper operation. If thermometer reads below 37°F or above 43°F refer to unit maintenance.

• It is important that refrigerator not be loaded with perishables until inside temperature has reached operating level. This will take approximately 3 hours.

(b) *Loading*. Allow space for air to circulate within refrigerator for maximum efficiency.

(2) *Shutdown*.

(a) *Galley 120 V distribution panel no. 1 (Figure 2-311)*. Set GALLEY REFRIGERATOR circuit breaker (2) to OFF position.

(b) *Block door open*. If refrigerator is not to be used for an extended period, rig door to remain open to allow air to circulate inside.

s. *Freezer*.

(1) *Galley 120 V distribution panel no. 1 (Figure 2-311)*. Set GALLEY FREEZER circuit breaker (7) to ON position.

NOTE

• All controls are factory set for proper operation. If thermometer reads below 5°F or above 0°F refer to unit maintenance.

• It is important that freezer not be loaded with perishables until inside temperature has reached operating level. This will take approximately 3 hours.

(a) *Loading*. *Allow* space for air to circulate within freezer for maximum efficiency.

(2) *Shutdown*.

(a) *Galley 120 V distribution panel no. 1 (Figure 2-311)*. Set GALLEY FREEZER circuit breaker (7) to OFF position.

(b) *Block door open*. If freezer is not to be used for an extended period, rig door to remain open to allow air to circulate inside.

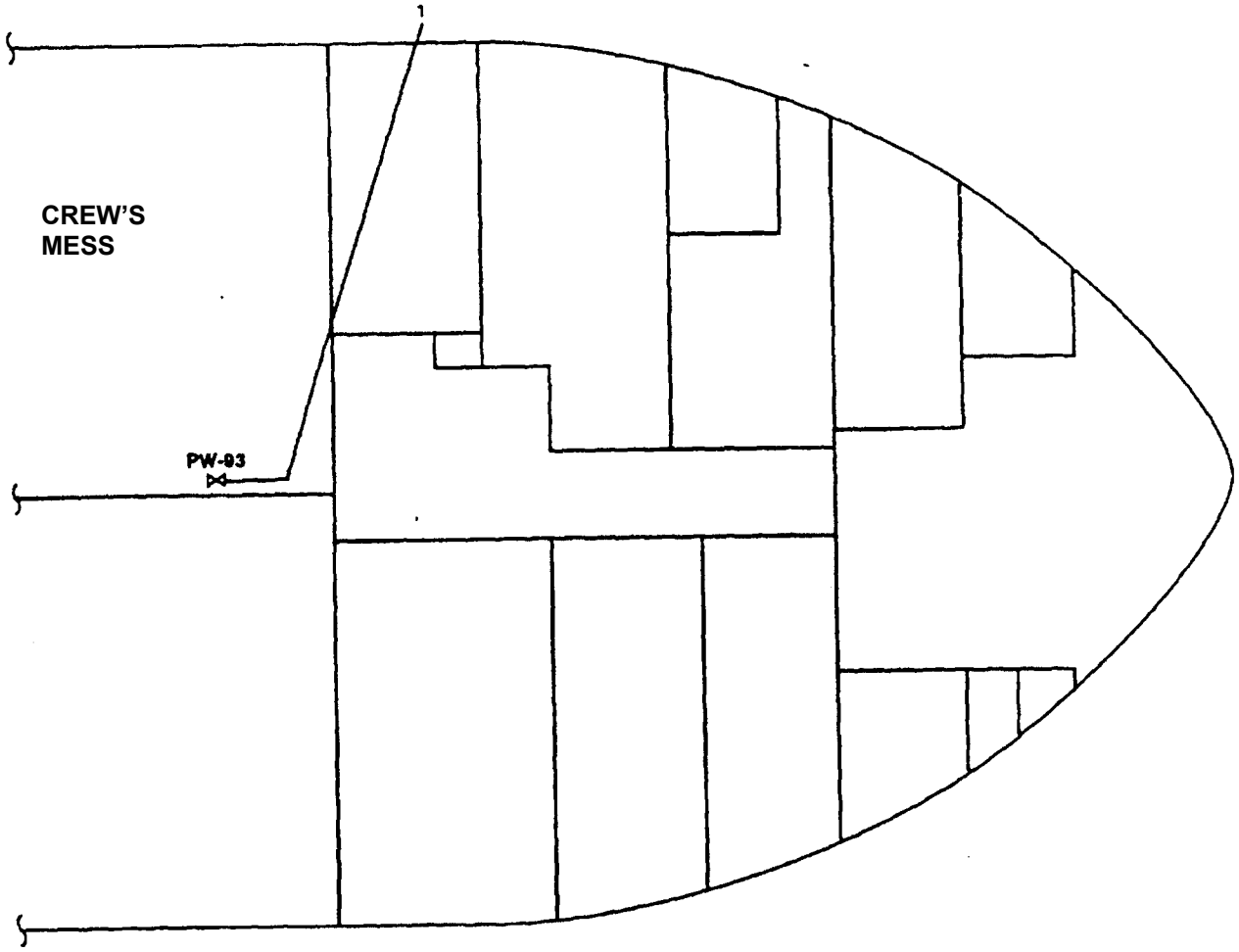
t. *Ship Stores Refrigeration (Walk-in Freezer and Refrigerator) Room*.

CAUTION

Align condenser cooling water piping system before starting refrigeration plant. Damage to plant can occur.

NOTE

Normally one condenser unit is operating at a time.



MAIN DECK

1. PW-93, CW TO ICEMAKER
(LOCATED NEXT TO ICE MAKER AT DECK LEVEL)

Figure 2-329. Ice Maker Valve Location.

(1) Align electrical system.

(a) *Main power disconnect switch (Figure 2-330)*. *Set* main power disconnect (3) and power switch (1) to ON position on both refrigeration condensing units.

(b) *Auxiliary machinery space 2 power panel no. 5 (Figure 2-331)*. Set the circuit breaker, corresponding to the condensing unit selected, to the ON position:

1 #1 STORES REFRIGERATION CONDENSING UNIT (3).

2 #2 STORES REFRIGERATION CONDENSING UNIT (2).

(c) *Engine room distribution panel no. 4 (Figure 2-332)*. Set No. 1 & No. 2 SHIP STORES REFR CONTROL POWER circuit breaker (1) to ON position.

(2) *Align condenser cooling water piping system for selected condenser (Figure 2-333)*.

(a) Open GS-38, AC/COND NO. 1 SPLY or GS-39, NO. 2 SPLY (4).

(b) Open GS-67 or GS-68, WTR RGLTR COV (3).

(c) Open GS-48 or GS-49, WTR RGLTR COV (5).

(d) Close GS-82 and GS-71, BYP WTR RGLTR (1).

NOTE

Before starting compressor, crankcase heater must be energized for 24 hours. Energizing heater for this period of time should drive all refrigerant from oil.

CAUTION

When starting compressor, avoid rapid pumpdown to ensure oil is not carried off with refrigerant. If oil is pulled from sump, ensure oil pressure is a minimum of 16 psig above suction pressure. If pressure drops below this, stop the compressor and add oil temporarily. The added oil must later be removed when oil in sight glass is too high. If this situation occurs, refer to unit maintenance. Low oil pressure or low oil level could damage compressor.

(3) *Align refrigerant piping system*.

(a) *Condenser unit (Figure 2-330)*.

NOTE

Use refrigeration ratchet wrench to open/close the following valves (5,6,2).

1 Open COMPRESSOR DISCHARGE valve (5).

2 Close COMPRESSOR SUCTION valve (6).

3 Open CONDENSER OUTLET valve (11).

4 Open DEHYDRATOR OUTLET valve (7).

5 Close DEHYDRATOR BYPASS valve (10).

6 Open DEHYDRATOR INLET valve (9).

7 Open RELIEF VALVE BY-PASS valve (4).

8 Close PURGE valve (2).

9 Close CHARGE AND DRAIN valve (8).

10 Open WATER REGULATOR VALVE ACTUATING LINE valve (12).

(b) *Chill box fan coil unit (Figure 2-334)*.

1 Open RFSS-16, EVAP PRESS RGLTR COV (9).

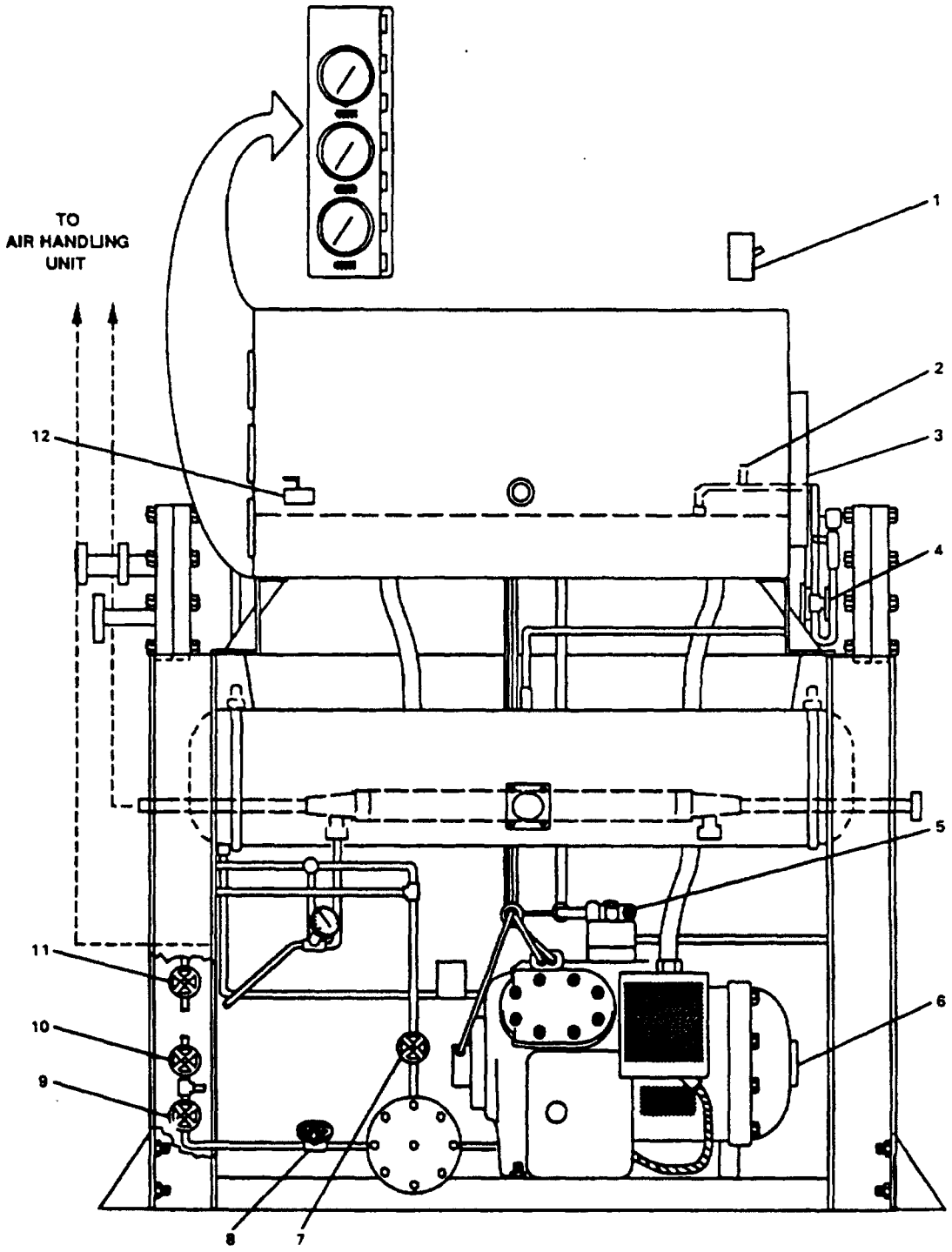
2 Open RFSS-10, EVAP RGLTR PRESSURE GAUGE COV (14).

3 Open RFSS-18, EVAP PRESS RGLTR COV (12).

4 Close RFSS-17, BYPASS EVAP PRESS RGLTR (10).

5 Open RFSS-20, SUCT LINE CRSVR COV (13).

6 Close RFSS-6, HAND EXP V (2).



Packaged Condensing Unit
(Typical)

Figure 2-330. Refrigeration System (Sheet 1 of 2).

1. POWER SWITCH
2. PURGE
3. MAIN POWER DISCONNECT
4. RELIEF VALVE BY-PASS
5. COMPRESSOR DISCHARGE
6. COMPRESSOR SUCTION
7. DEHYDRATOR OUTLET
8. CHARGE AND DRAIN
9. DEHYDRATOR INLET
10. DEHYDRATOR BY-PASS
11. CONDENSER OUTLET
12. WATER REGULATOR VALVE ACTUATING LINE VALVE

Figure 2-330. Refrigeration System (Sheet 2 of 2).

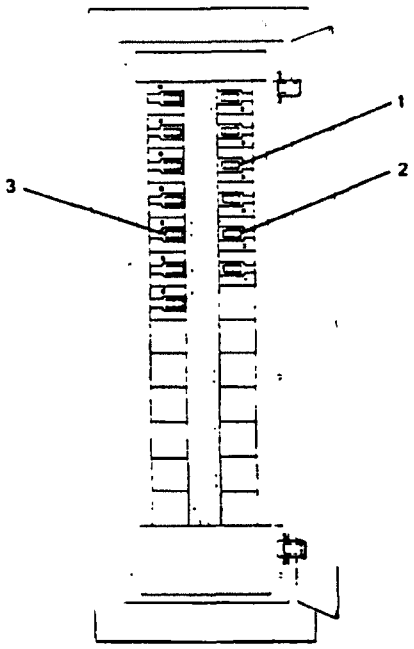


Figure 2-331. Auxiliary Machine Space 2 Power Panel No. 5.

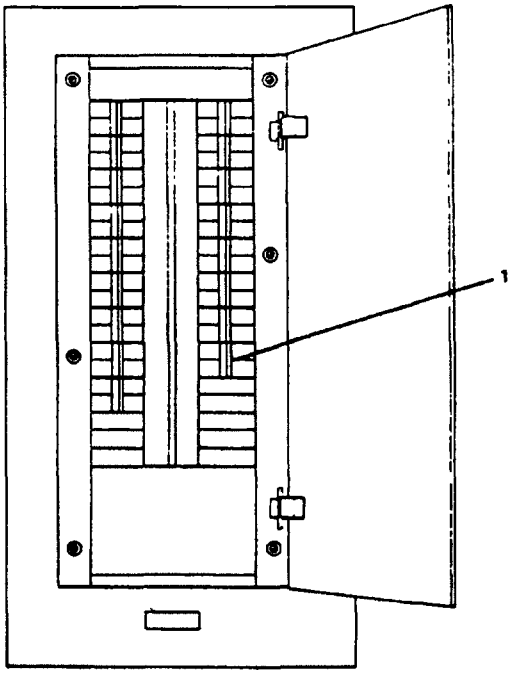
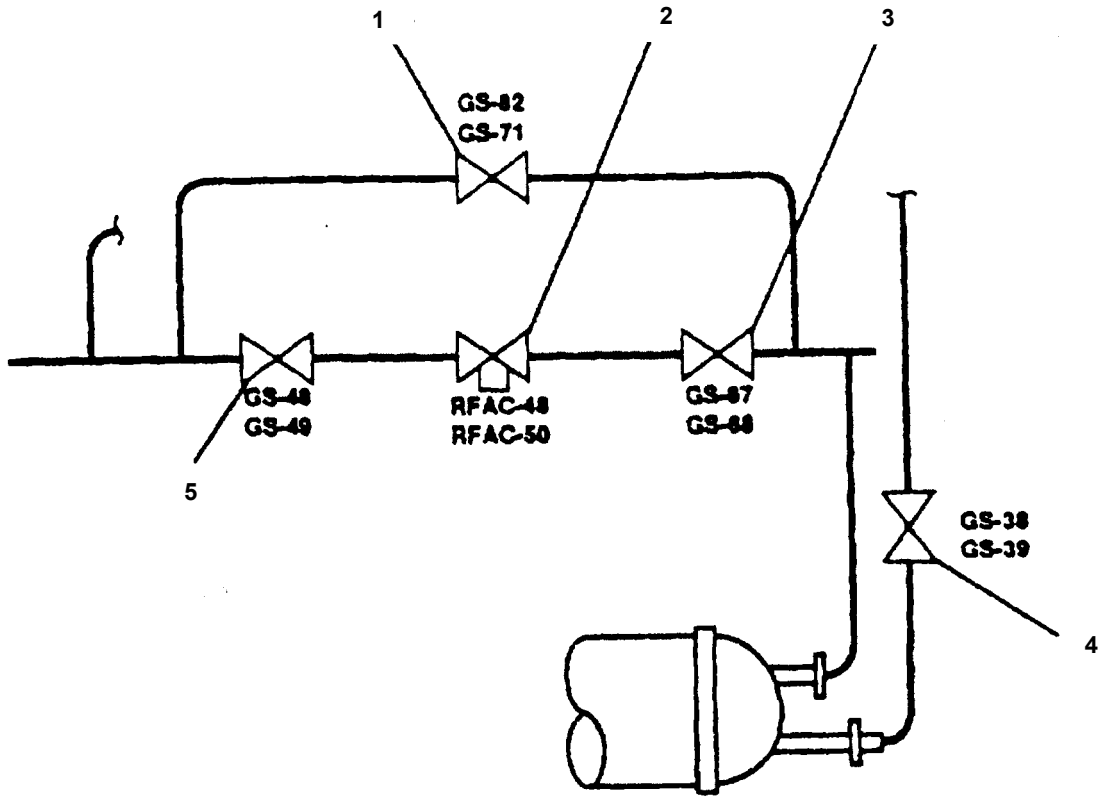


Figure 2-332. Engine Room Distribution Panel No. 4.



NOTE

VALVE SYMBOL LEGEND IS LOCATED AT THE FRONT OF THIS MANUAL

SYMBOL LEGEND:

REMOTE VALVE OPERATOR

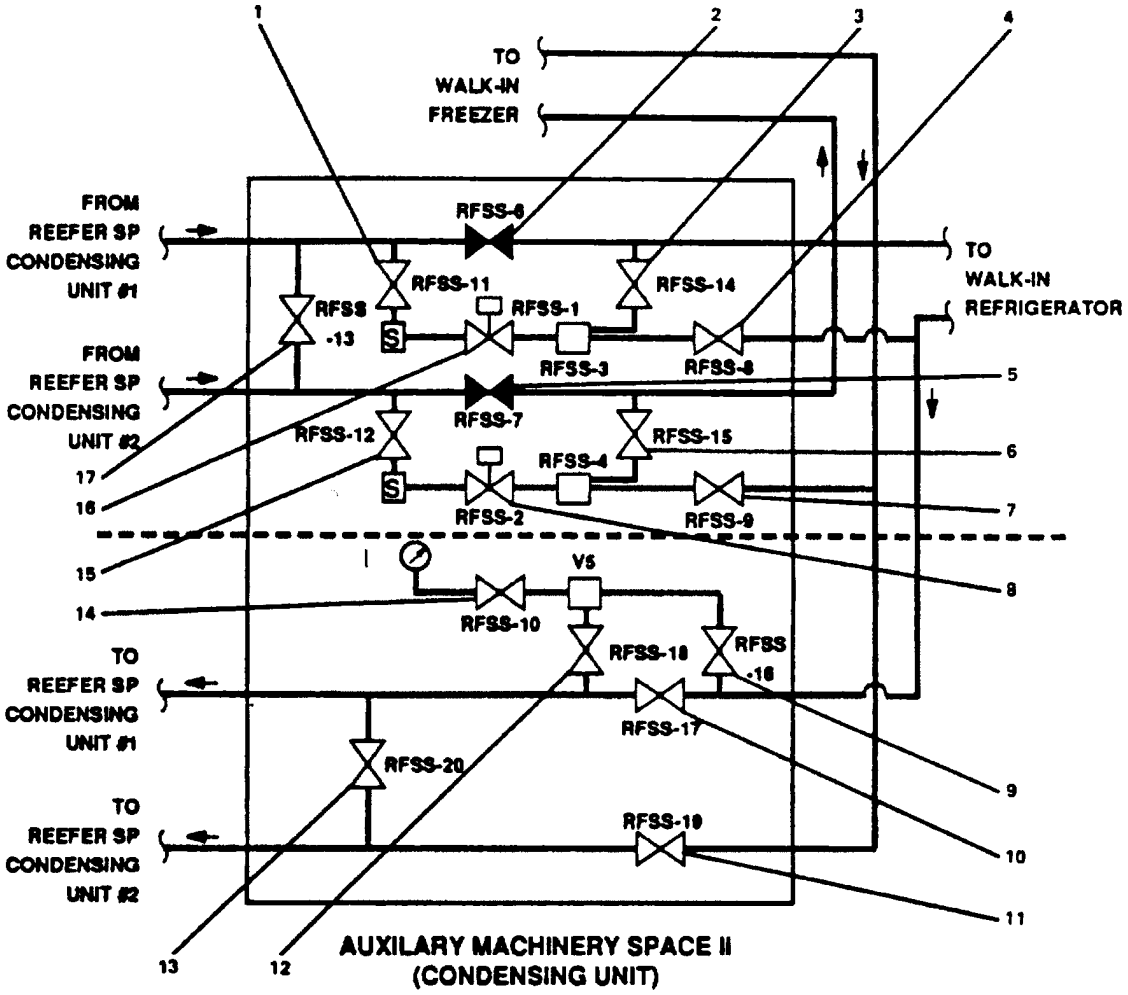
VALVE OVRHD

VALVE ABOVE DECK, BELOW OVRHD

VALVE AT OR BELOW DECK

1. GS-82, BYP WTR RGLTR
   GS-71, BYP WTR RGLTR
2. RFAC-48, WTR RGLTR
   RFAC-50, WTR RGLTR
3. GS-67, WTR RGLTR COV
   GS-68, WTR RGLTR COV
4. GS-38, A/C COND NO.1 SPLY
   GS-39, A/C COND NO. 2 SPLY
5. GS-48, WTR RGLTR COV
   GS-49, WTR RGLTR COV

Figure 2-333. Condensing Cooling Water Valve Locations.



1. RFSS-11, TXV/STNR/LLSV COV
2. RFSS-6, HAND EXP V
3. RFSS-14, TXV/STNR/LLSV COV
4. RFSS-8, EQL LINE
5. RFSS-7, HAND EXP V
6. RFSS-15, TXV/STNR/LLSV COV
7. RFSS-9, EQL LINE
8. RFSS-2, LLSV-FRZ BOX
9. RFSS-16, EVAP PRESS RGLTR COV
10. RFSS-17, BY-PASS - EVAP PRESS RGLTR
11. RFSS-19, COV - FRZ BOX COIL SUCT.
12. RFSS-18, EVAP PRESS RGLTR COV
13. RFSS-20, SUCT LINE CRSVR COV
14. RFSS-10, EVAP RGLTR PRESSURE GAUGE COV
15. RFSS-12, TXV/STNR/LLSV COV
16. RFSS-1, LLSV - CHILL BOX
17. RFSS-13, LIQUID LINE CRSVR CO

Figure 2-334. Freeze and Chill Room Refrigerant Valve Locations.

7 Open RFSS-14, TXV/STNR/LLSV COV (3) (condenser no. 1) or RFSS-15, TXV/STNR/ LLSV COV (6) (condenser no. 2).

8 Open RFSS-11, TXV/STNR/LLSV COV (1) (condenser no. 1) or RFSS-12, TXV/STNR/LLSV COV (15) (condenser no. 2).

9 Open RFSS-8, EQL LINE (4) (condenser no. 1) or RFSS-9, EQL LINE (7) (condenser no. 2).

10 Open RFSS-13, LIQUID LINE CRSVR COV (17).

11 Open RFSS-19, COV-FRZ BOX COIL SUCT (11).

12 Close RFSS-7, HAND EXP V (5).

CAUTION

- **If condenser water cooling system has been drained, have unit maintenance purge air from system. Air in cooling system will reduce cooling efficiency and could result in damage to compressor.**
- **To prevent oil return problems and possible damage to compressor, do not operate both condensing units at the same time with RFSS-13, LIQUID LINE CRSVR COV and RFSS-20, SUCT LINE CRSVR COV valves open.**

(4) Start compressor (Figure 2-331).

(a) Open COMPRESSOR SUCTION valve (6) approximately one full turn.

(b) Immediately, slowly continue to open COMPRESSOR SUCTION valve (6) as suction pressure is reduced.

CAUTION

- **Open COMPRESSOR SUCTION valve slowly to prevent rapid pumping down of suction pressure side, which could cause oil foaming and result in pumping of oil from compressor crankcase. Damage to compressor could result from lack of lubrication.**
- **Condenser water temperature should read in NORMAL operating range.**

CAUTION

The following gauges should also be in the NORMAL operating range: Liquid line temperature gauge, suction pressure gauge, suction temperature gauge, discharge pressure gauge, oil pressure gauge

NOTE

Oil pressure MUST be 20 psi above suction pressure.

(c) Observe compressor operation for 5 minutes.

(d) If there is no evidence of liquid refrigerant returned to compressor, open COMPRESSOR SUCTION valve (6) wide.

(e) When there is evidence of liquid refrigeration returned to compressor, adjust COMPRESSOR SUCTION valve (6) until proper suction pressure (2.3 to 2.4 psig) is indicated on suction guage.

NOTE

Liquid refrigerant return to compressor will be indicated by a sudden drop in suction temperature and rapid fluctuation in suction pressure.

CAUTION

If the suction temperature and pressure do not stabilize or if compressor develops a knock, stop compressor by placing main power disconnect switch in OFF position and notify unit maintenance. Continued operation could damage compressor.

NOTE

Change over to standby equipment every 7 days (see paragraph 2-64).

(5) Set thermostats.

(a) Chill room. Set thermostat between 33°F and 37°F.

(b) Freeze room. Set thermostat between -4°F and 0°F.

2-34. Workshop Equipment.

a. ARC Welder.

WARNING

- **Electric shock can kill. Electrodes and work area (or ground) is "hot" when welder is on. Never touch electrodes to body or clothing. Wear dry gloves. Never weld in wet or damp areas. Ensure all connections are tight and clean.**

- **Fumes and gases can be dangerous. Keep away from fumes. Work in well ventilated area. Welding on galvanized steel, lead or cadmium produces toxic fumes. Ensure adequate ventilation. DO NOT weld in areas where chlorinated hydrocarbon vapors from degreasing, cleaning or spraying chemicals are present. These are highly toxic gases. Death could result.**

- **Arc rays can injure eyes and burn skin. Wear proper protection for eyes and skin to prevent injury.**

- **Wearing of contact lenses during welding can fuse the eye and lens when welding. DO NOT wear contact lenses when welding. Serious eye injury could result.**

- **Welding produces heat and sparks; keep a fire extinguisher at hand in the event of a fire during welding.**

- **Welder and electrodes are "live" when the power switch is ON. Observe safety precautions or injury could result.**

(1) Operation.

(a) Align electrical system. On auxiliary machinery space 2 power panel no. 5 (Figure 2-331), set WELDING MACHINE circuit breaker (1) to ON position.

(b) Prepare to weld (Figure 2-336).

1 Set RANGE SELECTOR switch (10) to desired position.

2 Set OUTPUT SELECTOR switch (9) to DC position.

WARNING

Use of AC output requires use of remote controls not provided. Serious personal injury or death could result.

3 Set OUTPUT/CONTACTOR ON switch (3) to ON position.

4 Set HIGH FREQUENCY switch (11) to OFF position.

5 Set AMPERAGE PANEL switch (5) to PANEL position.

6 Set AMPERAGE ADJUSTMENT control (4) to desired position.

7 Set START AMPERAGE ADJUST MENT OFF-ON switch (1) to desired position.

8 If START AMPERAGE OFF-ON switch (1) was set to ON position, set START AMPERAGE ADJUSTMENT control (2) to desired position.

WARNING

Wear dry insulating gloves and clothing, and wear welding helmet with properly fitting lens to prevent serious personal injury.

9 Connect work clamp to clean, bare metal at workpiece.

10 Select and obtain proper electrode; insert electrode into electrode holder.

11 Press POWER ON pushbutton (6).

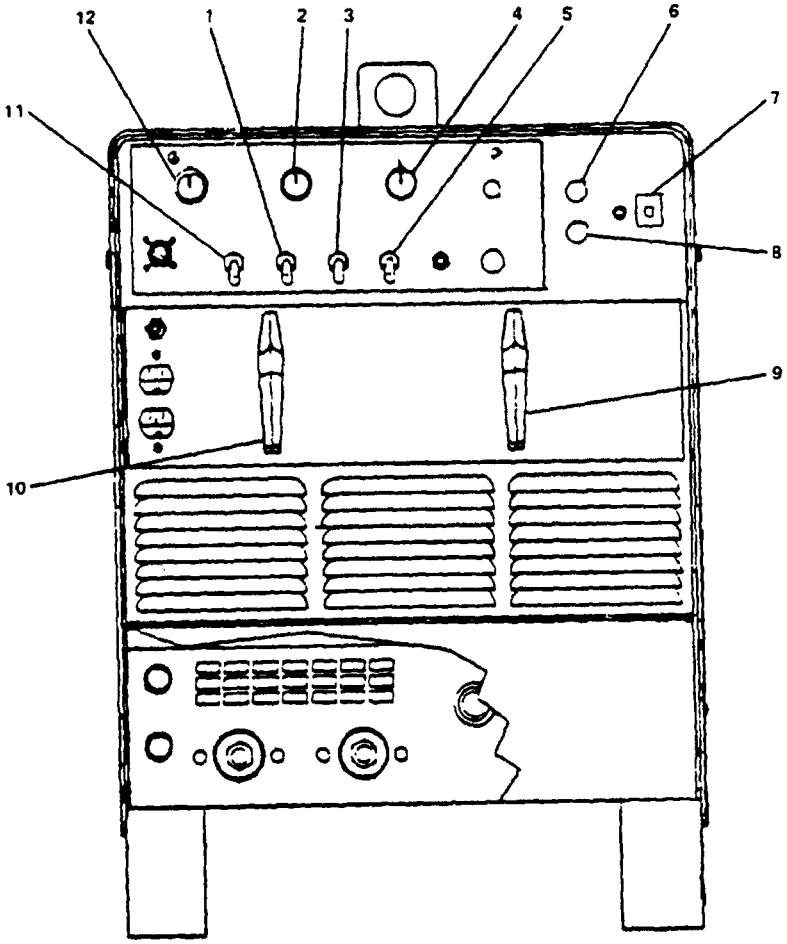
(c) Weld.

(2) Shutdown.

(a) Stop welding.

(b) Press POWER OFF pushbutton (8).

(c) On auxiliary machinery space 2 power panel no. 5 (Figure 2-331), set WELDING MACHINE circuit breaker (1) to OFF position.



1. START AMPERAGE OFF-ON SWITCH
2. START AMPERAGE ADJUSTMENT CONTROL
3. OUTPUT/CONTACTOR ON SWITCH
4. AMPERAGE ADJUSTMENT CONTROL
5. AMPERAGE PANEL SWITCH
6. POWER ON PUSHBUTTON
7. OVERLOAD SWITCH
8. POWER OFF PUSHBUTTON
9. OUTPUT SELECTOR
10. RANGE SELECTOR
11. HIGH FREQUENCY
12. POSTFLOW TIME CONTROL

Figure 2-336. ARC Welder.

b. Drill Press.

WARNING

- **Always wear eye protection when operating drill press to prevent eye injury.**
- **Never operate drill press while wearing jewelry or loose clothing. Serious personal injury could result.**
- **Always remove chuck key before starting drill press. Personal injury could result.**

(1) Align electrical system. On engine room load center distribution panel (Figure 2-337) set WORKSHOP EQPT breaker (1) to ON position.

(2) Operate drill press (Figure 2-338).

(a) Install drill bit.

(b) Select correct drilling speed.

CAUTION

Always ensure drill press has completely stopped before changing speeds. Damage to the drill press could result.

1 Loosen slide bar bolts.

2 Pull cam handle (2) toward front of drill press.

3 Open top cover (1).

4 Relocate belts on appropriate pulley rings for desired spindle speed. Refer to diagram attached to top cover (1).

5 Close top cover (1).

6 Push cam handle (2) toward motor.

7 Tighten slide bar bolts.

CAUTION

Always place a piece of scrap material below work to protect table from damage.

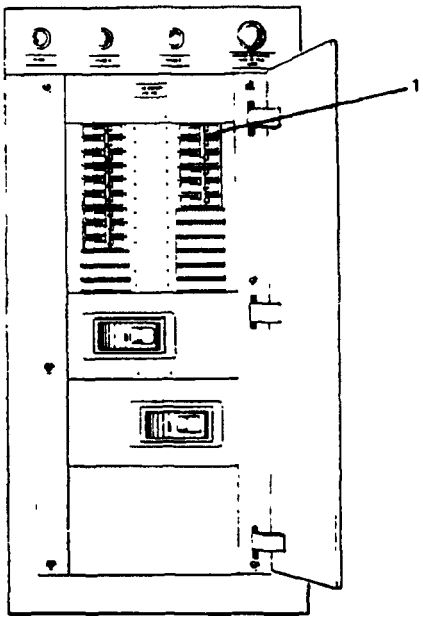
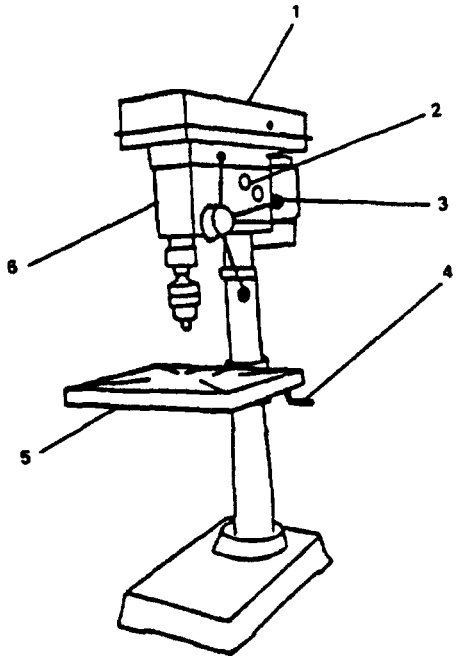


Figure 2-337. Engine Room Load Center Distribution Panel.



1. COVER
2. CAM HANDLE
3. HANDLE
4. TABLE CRANK
5. TABLE
6. ON-OFF SWITCH (ON SIDE)

Figure 2-338. Drill Press

(c) Clamp work to table. Block and clamp securely to table.

WARNING

Work should never be held by hand. Force of drill bit could "throw" work and injure operator.

(d) Adiust table height.

1 Loosen column lock handle.

2 Turn crank handle (4) to desired height.

3 Tighten column lock handle.

(e) Operate drill press.

1Set M (motor) power switch (6)to ON position.

2 Set L (light) switch (6) to ON position.

3 Turn handle (3) to lower bit and drill hole.

(3) Secure drill press.

(a) Raise spindle. Raise spindle to UP position by turning handle (3).

(b) Turn off drill press. Set M and L power switch (6) to OFF position.

c. Lathe.

WARNING

•Always wear eye protection when operating lathe to prevent eye injury.

•Ensure chuck guard is in place before operating lathe. Serious personal injury could result.

• Never operate lathe while wearing jewelry or loose clothing. Serious personal injury could result.

(1) Operate lathe (2-339).

(a) Select stock/material to be worked and desired tool and mount.

(b) Select main spindle speed and set selectors (1) in accordance with data plate.

(c) Select motor direction and set using reversing gear lever (10).

(d) Select motor speed and set using selector (11).

(e) Set power switch (12) to ON position.

(f) Select feed direction and sizes and set selectors (9) in accordance with data plate.

(g) Set controls (2 through 8) as required.

(2) Secure lathe.

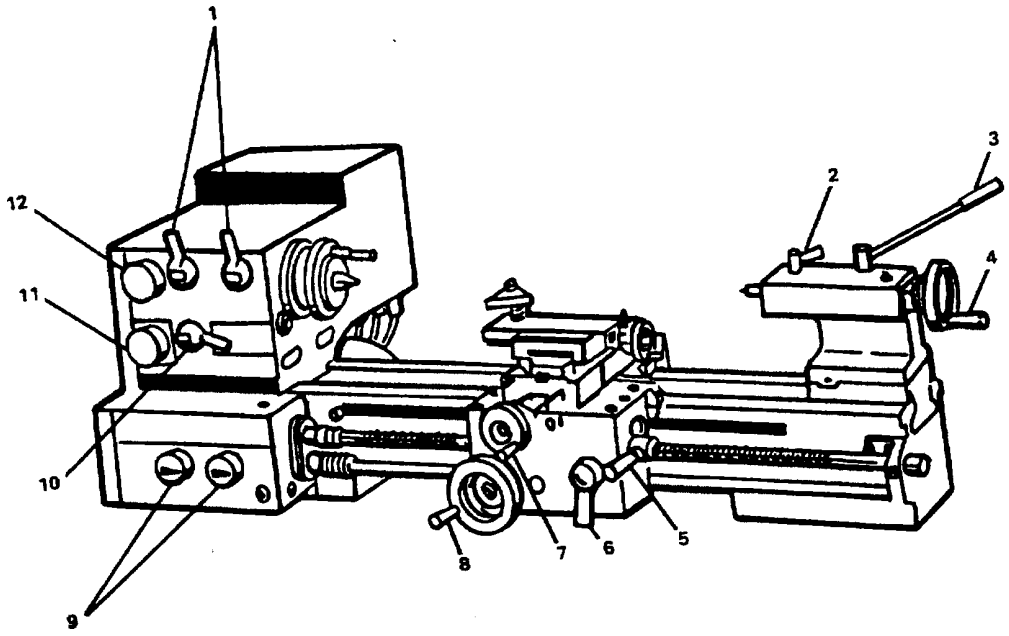
(a) Set power switch (12) to OFF position.

(b) Remove stock/material.

CAUTION

• Clean dust and chips frequently. Stop machine and clean using a rag or chip hook. Do NOT use compressed air, damage to guideways and bearings will result.

• Lubricate frequently during use in accordance with LO 55-1925-207-12.



1. SPINDLE SPEED SELECTORS
2. TAILSTOCK RAM LOCKING LEVER
3. TAILSTOCK CONVERTIBLE CLAMPING LEVER
4. TAILSTOCK RAM HANDWHEEL
5. LONGITUDINAL AND CROSS-FEED LEVER
6. HALF-NUT CONTROL LEVER
7. CROSS-SLIDE HANDWHEEL
8. LONGITUDINAL SLIDE HANDWHEEL
9. FEED PITCH SELECTORS
10. REVERSING GEAR LEVER
11. MOTOR SPEED SWITCH
12. POWER SWITCH

Figure 2-339. Lathe.

d. Bench Grinder (Figure 2-340).

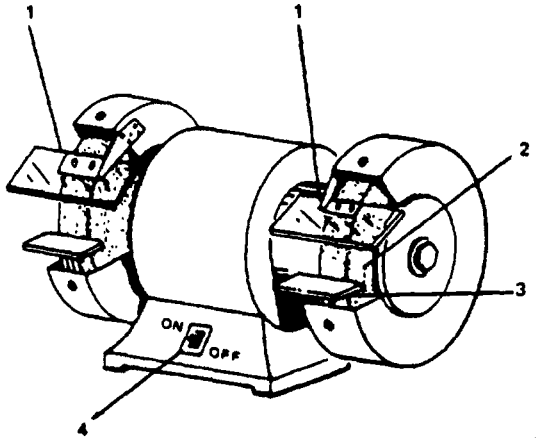
CAUTION

- **Keep guards in place and in working order.**
- **Remove adjust keys and wrenches. Ensure these items are removed from the grinder before turning it on.**
- **Keep the work area clean.**
- **Avoid a dangerous environment. Do not use power tools in a wet location. Keep work area well lit.**
- **Use the right tool. Do not force tools or attachments to do a job for which they are not designed.**
- **Wear appropriate apparel. Do not wear loose clothing or jewelry, which can get caught in moving parts. Rubber-soled foot wear is recommended for best footing.**
- **Use safety glasses.**
- **Secure material. Use clamps or a vise to hold work at all times.**
- **Do not overreach. Keep proper footing and balance at all times.**
- **Disconnect tools before servicing.**
- **Avoid accidental starting. Ensure switch is in OFF position before plugging in.**
- **Use only recommended accessories.**
- **Check for damaged parts before using.**

(1) Check that ON-OFF switch (4) is in OFF position and that grinder wheel (2) rotates freely.

(2) Check that eye shield (1) is in place.

(3) Check that tool rest (3) has 1/16-inch clearance from grinder wheel (2).



1. EYE SHIELD
2. GRINDER WHEEL
3. TOOL REST
4. ON-OFF SWITCH

Figure 2-340. Bench Grinder.

(4) Set ON-OFF switch (4) to ON position.

NOTE

Allow grinder to reach full running speed before starting to grind.

(5) Hold the piece being ground firmly against the grinder wheel (2) with a light but steady pressure.

CAUTION

Excessive or sudden pressure slows grinding action, overloads the motor and puts dangerous stresses on wheel, besides gouging wheel and causing rough grinding with reduced accuracy.

(6) Keep tool rest (3) adjusted to within 1/16 inch of grinder wheel (2).

(7) When job is finished, set ON-OFF switch (4) to OFF position.

2-35. External Communications Equipment Operation. Operating instructions for each equipment are in the related technical manuals. Appendix A lists these manuals. Power distribution alignment is provided in Table 2-6.

Table 2-6. CEN Equipment Power Line-up.

EQUIPMENT	POWER PANEL(S)	CIRCUIT BREAKER
Alarm Generator	Pilothouse Emergency Distribution Panel	MK 370-13A RADIO TEL ALARM GEN
AN 6747	Radio Room - DC Distribution Panel	AUDIO AMP AM-6747N
AN/APX-72	Radio Room DC Distribution Panel	AN/APX72 XPNDR
AN/URC-80	Radio Room DC Distribution Panel	AN/URC 80 RADIO
AN/URC-92	Radio Room DC Distribution Panel	AN/URC 92 RADIO
URC-92	Radio Room - Electronic Distribution Panel	URC 92 RADIO SET
AN/VRC-46	Electronic Distribution Panel - Radio Room DC Distribution Panel	ANNRC-46 RADIO
Automatic Direction Finder	Pilothouse Emergency Distribution Panel	4005 AUTO DIR FINDER
Auxiliary Receiver Transmitter	Pilothouse Emergency Distribution Panel	SSB 61 00-AUX RCVR-XMTR
Communications Modem, MD-1255/URC	Radio Room - Electronic Distribution Panel	HF6700, 5050, 3500 & 1280 RADIO RM
Doppler Speed Log	Pilothouse Emergency Distribution Panel	DOPPLER SPEED LOG
Facsimile Recorder-Reproducer	Pilothouse Emergency Distribution Panel	WEATHER FACSIMILE
HF Distress Watch Receiver	Pilothouse Emergency Distribution Panel	1511 WATCH RCVR
Binnacle lights	Radio Room DC Distribution Panel	BINNACLE LT
Gyrocompass	Radio Room DC Distribution Panel	GYRO

Table 2-6. CEN Equipment Power Line-up - CONT

EQUIPMENT	POWER PANEL(S)	CIRCUIT BREAKER
Steering Gear	Radio Room DC Distribution Panel	STEERING DIMMER MODULE
J4243	Radio Room - Electronic Distribution Panel	J4243/U JUNCTION BOX
KG-84	Radio Room - Electronic Distribution Panel	KG-84 SECURITY EQUIPMENT
KY-65	Radio Room - Electronic Distribution Panel	KY-65 SECURITY EQUIPMENT
KY-57	Radio Room - Electronic Distribution	KY-57 SECURITY EQUIPMENT
Linear Amplifier AM-7387/URC	Radio Room - Electronic Distribution Panel	LINEAR-AMP
Omega Set	Pilothouse Emergency Distribution Panel	AN/SRN-23 OMEGA SET
Radar Power Distribution Panel	Pilothouse Emergency Distribution Panel	RADAR DISTRIBUTION PNL
Radio Receiver, R-2408/URC	Radio Room - Electronic Distribution Panel	HF6700, 5050, 3500 & 1280 RADIO RM
Radio Set, AN/URC-80	Pilothouse Emergency Distribution Panel	AN/URC-80 RADIO
Radio Transmitter, T-1 527/URC	Radio Room - Electronic Distribution Panel	HF6700, 5050, 3500 & 1280 RADIO RM
S-Band Radar Antenna	Pilothouse Emergency Distribution Panel	"S" BAND MTR
Sonar Sounding Set	Pilothouse Emergency Distribution Panel	AN/SON SONAR SOUNDING
Telegraph Terminal, AN/SGC-14	Radio Room - Electronic Distribution Panel	HF6700, 5050, 3500 & 1280 RADIO RM
UGC-74	Radio Room - Electronic Distribution Panel	UGC-74 COMM. TERMINAL
Windspeed and Direction Finder	Pilothouse Emergency Distribution Panel	WINDSPEED AND DIRECTION INDICATOR
X-Band Radar	Pilothouse Emergency Distribution Panel	"X" BAND MTR

2-36. Shore Connections.

a. Shore Power Cable Connection.

WARNING

Ensure power cable does not enter water. Electrocution, serious injury, or equipment damage can occur during connection if cable connector gets wet.

(1) Remove power cable from stowage rack.

(2) Position cable end through bottom section of hand rail.

(3) Tie one end of heaving line to cable end.

(4) Throw heaving line to dockside facilities.

(5) Release waterproof covers from cable connectors.

NOTE

There are 75 feet of cable; direct attention to amount of cable remaining on the deck. There should be a sufficient amount of cable on deck to prevent it from paying out completely. Attach a preventer line to prevent complete cable runoff.

(6) Coordinate cable payout between onboard and dockside crew.

(7) Connecting cables:

WARNING

Ensure electrical power is OFF at dock shore power panel prior to connecting shore power cable. Electrocution could result.

(a) At dock shore power panel connect ship shore power cable.

(b) At ship shore power connector (Figure 2-341), turn handle (1) to port and open cover (4).

(c) Align cable connector and insert slot over tongue (3).

(d) Secure cable clamp (5) on bottom of cable connector with shore power connector.

(8) At dock shore power panel, set power switch to ON position.

b. Shifting to Shore Power.

(1) Main and emergency switchboards (Figure 2-342).

NOTE

Place all electronic and unnecessary equipment on standby while shifting from ship power to shore power.

(a) Ensure PHASE ROTATION METER (2) indicates correct phase of shore power.

CAUTION

If shore power phase meter indicates phase of shore power is incorrect, equipment will be damaged. Refer to unit maintenance.

NOTE

Ensure ship shore power indicator light is ON, shore power frequency meter indicates 60 Hz, and shore power voltmeter indicates 450 volts.

(b) Set GENERATOR 1 CKT. BKR. (3) or GENERATOR 2 CKT. BKR. (4) to OPEN position.

(c) Quickly set SHORE POWER CKT. BKR. (1) to ON position energizing switchboards.

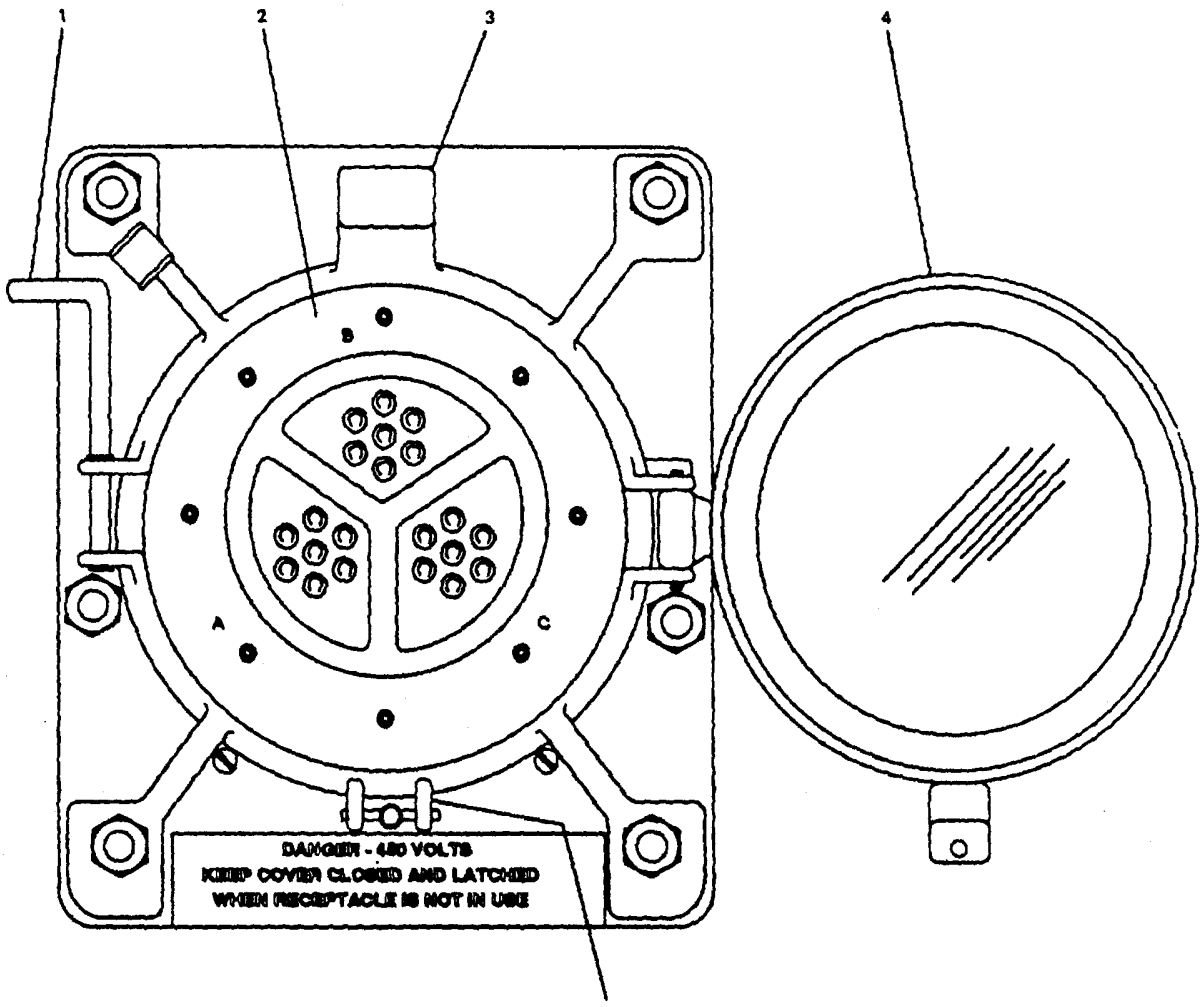
(d) Ensure that MAIN SWBD BUS TIE CKT. BKR. CLOSED indicator (6) is ON.

(e) Emergency switchboard.

1 Turn ENGINE CONTROL SW. MAN. OFF AUTO. switch (9) to the MAN. position.

2 Push MAIN SWBD BUS TIE CKT. BKR. CLOSED pushbutton (7) to the CLOSED position.

3 Ensure that MAIN SWBD BUS TIE CKT. BKR. CLOSED indicator (6) is ON.



1. HANDLE
2. RECEPTACLE
3. TONGUE
4. COVER
5. CLAMP

Figure 2-341. Shore Power Connector.

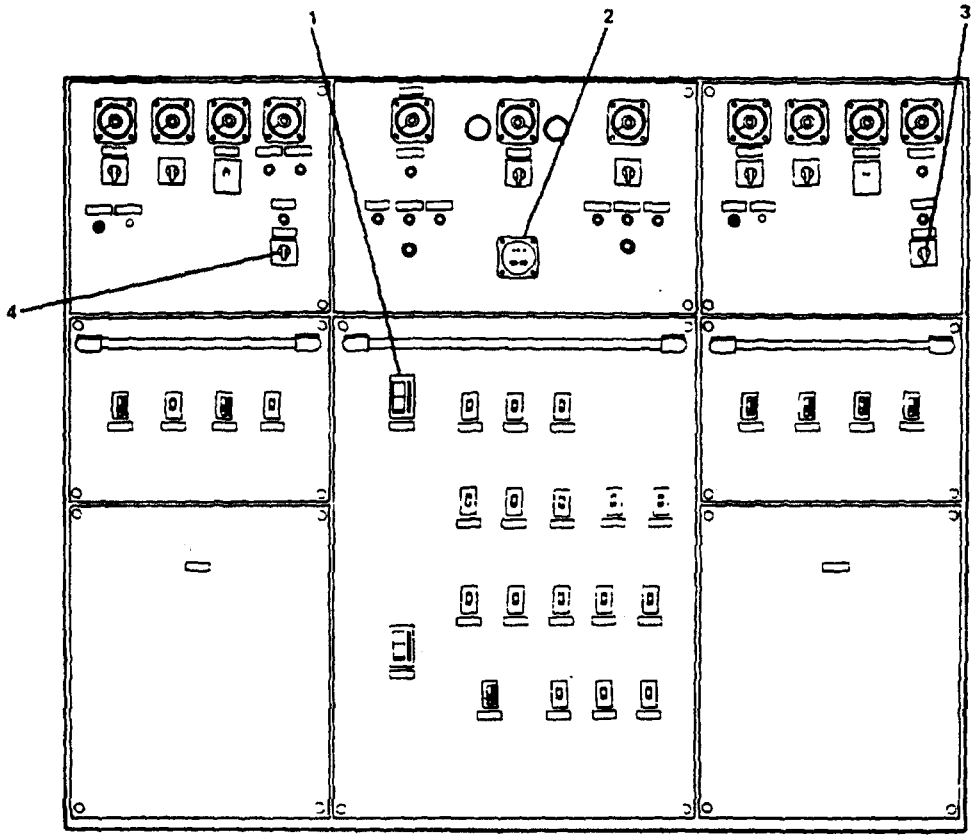
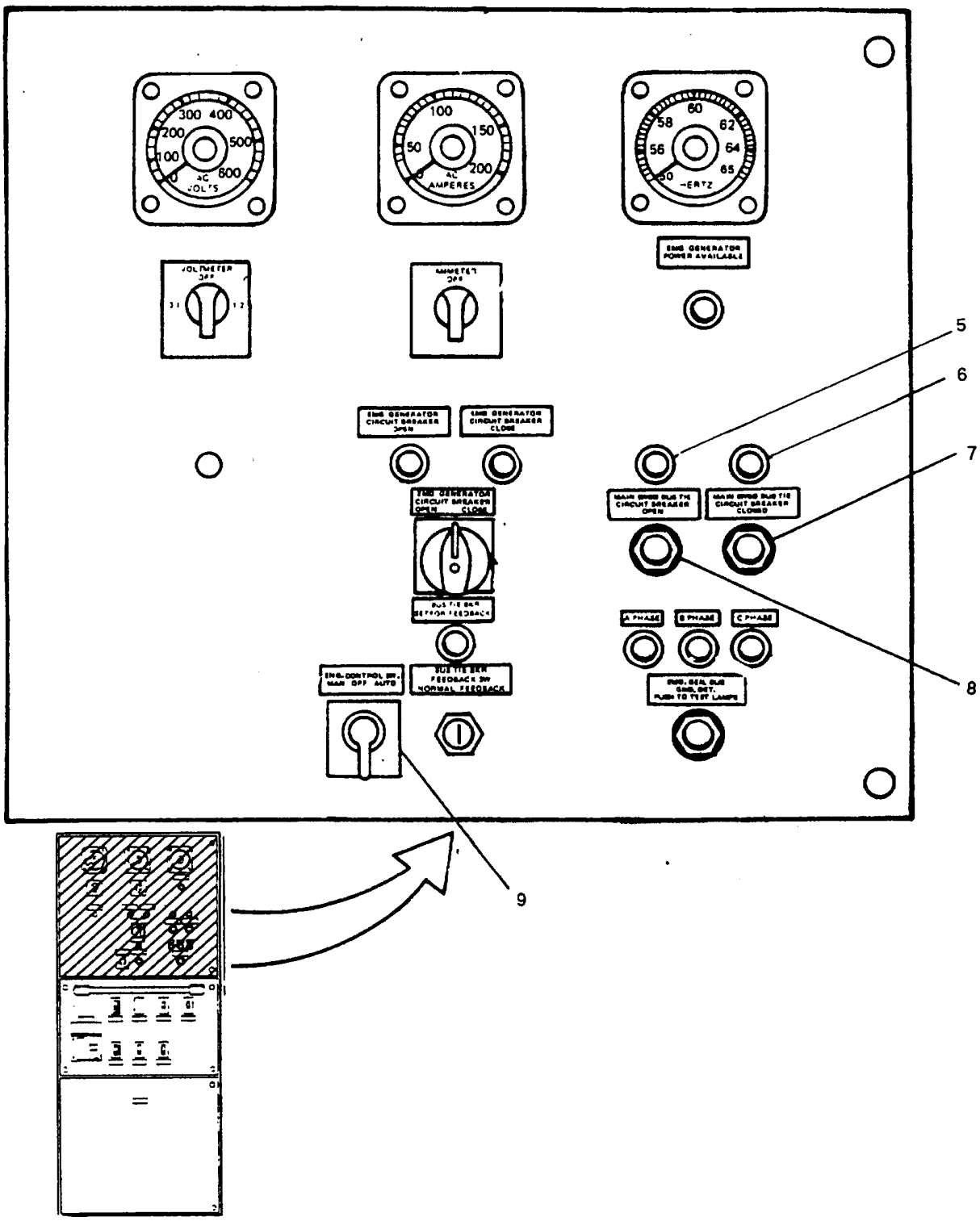


Figure 2-342. Main and Emergency Switchboards (Sheet 1 of 2).



1. SHORE POWER CKT. BKR.
2. PHASE ROTATION METER
3. GENERATOR 1 CKT. BKR.
4. GENERATOR 2 CKT. BKR.
5. MAIN SWBD. BUS TIE CKT. BKR. OPEN INDICATOR
6. MAIN SWBD. BUS TIE CKT. BKR. CLOSED INDICATOR
7. MAIN SWBD. BUS TIE CKT. BKR. CLOSED PUSHBUTTON
8. MAIN SWBD. BUS TIE CKT. BKR. OPEN PUSHBUTTON
9. ENGINE CONTROL SW. MAN. OFF AUTO. SWITCH

Figure 2-342. Main and Emergency Switchboards (Sheet 2 of 2).

c. *Shore Power Disconnection.*

WARNING

Ensure that power cable does not enter water. Electrocution, serious injury, or equipment damage can occur during connecting or disconnecting if cable connector gets wet.

NOTE

- Place all electronic and unnecessary electrical equipment in standby while shifting from shore power to ship power.
- Ensure selected SSDG (#1 or #2) is operating (refer to paragraph 2-11 for staring engine) and ready to accept electrical load.

(1) Shift from shore to ship power.

(a) On main switchboard, set the following circuit breakers:

1 Set SHORE POWER CKT. BKR. (1) to OFF position and quickly set GENERATOR 1 CKT. BKR (3) or GENERATOR 2 CKT. BKR. (4) to CLOSED position.

2 Ensure that MAIN SWBD BUS TIE CKT. BKR. OPEN indicator (5) is ON.

(b) *Emergency switchboard.*

1 Turn ENGINE CONTROL SW. MAN. OFF AUTO. switch (9) to the MAN. position.

2 Push the MAIN SWBD BUS TIE CKT. BKR. OPEN pushbutton (8) to the CLOSED position.

3 Ensure that MAIN SWBD BUS TIE CKT. BKR. OPEN indicator (5) is ON.

(2) *Disconnect power cable.*

(a) At dock shore power panel, set power switch to OFF position.

WARNING

Ensure electrical power switch is OFF at dock shore power panel. Serious electrical shock or death could result.

(b) Disconnect shore power cable at dock shore power panel.

(c) Stop-off one end of heaving line to cable end at dockside.

(d) Disconnect cable from shipboard shore power connector (Figure 2-341).

(e) Close and secure shore power connector.

(f) Coordinate cable haul-in between onboard and dockside crew.

(g) Stow shore power cable in stowage rack.

d. *Rigging Gangplank.*

WARNING

- **Never use crane for any type of human support or transportation.**
- **Operator will never lift a load over other personnel.**
- **Personnel will not walk under a hoisted load.**
- **Operator will not attempt to hoist load until conditions allow safe operation.**
- **Failure to observe these warnings could result in death or severe injury.**
- **Ensure load comes to complete stop and is stable before changing direction of travel of crane boom.**

(1) *Prepare for operation*. Start central hydraulics system (see paragraph 2-27).

(2) *Emplace gangplank*

(a) *Position boom (Figure 2-343)*.

CAUTION

Control handles should be moved smoothly and deliberately, NOT with a jerking motion. Damage to the crane could result.

NOTE

- Moving control handles progressively away from the neutral position in either direction will increase the rate of movement.
- When handle is released, the. control will automatically return to the neutral position.

1 *Swing*. Move SWING control handle (5) in desired direction and release.

NOTE

To swing crane to right, pull control handle backward. To swing crane to left, push control handle forward.

2 *Telescope*. Move TELESCOPE control handle (2) in desired direction and release.

NOTE

To extend boom, push control handle forward. To retract boom, pull control handle backward.

3 *Main boom*. Move BOOM control handle (4) in desired direction and release.

WARNING

Maintain AT LEAST five dead wraps of wire rope on the drum at all times. Serious personal injury or damage to crane could result.

4 Move WINCH control handle (3) in desired direction and release.

NOTE

To lower the hook, push WINCH control lever forward. To hoist the hook, pull the control handle backward.

(b) *Rig gangplank (Figure 2-344)*.

1 Ensure lifting sling (3) is securely attached at lift points (1).

2 Ensure crane hook (1, Figure 2-343) is attached to sling lifting ring (2, Figure 2-344).

3 Move WINCH control handle (3, Figure 2-343) back to raise crane hook (1) until sling (3, Figure 2-344) is almost tight.

(c) *Emplace gangplank (Figure 2-343)*.

1 Move WINCH control handle (3) back to raise gangplank until clear of brackets, handrails, or other obstructions.

2 Release WINCH control handle

3 Position gangplank over bracket using SWING control handle (5).

4 Lower gangplank by pushing WINCH control handle (3) forward until gangplank is near deck level.

5 Release WINCH control handle (3).

6 Have personnel guide gangplank into position.

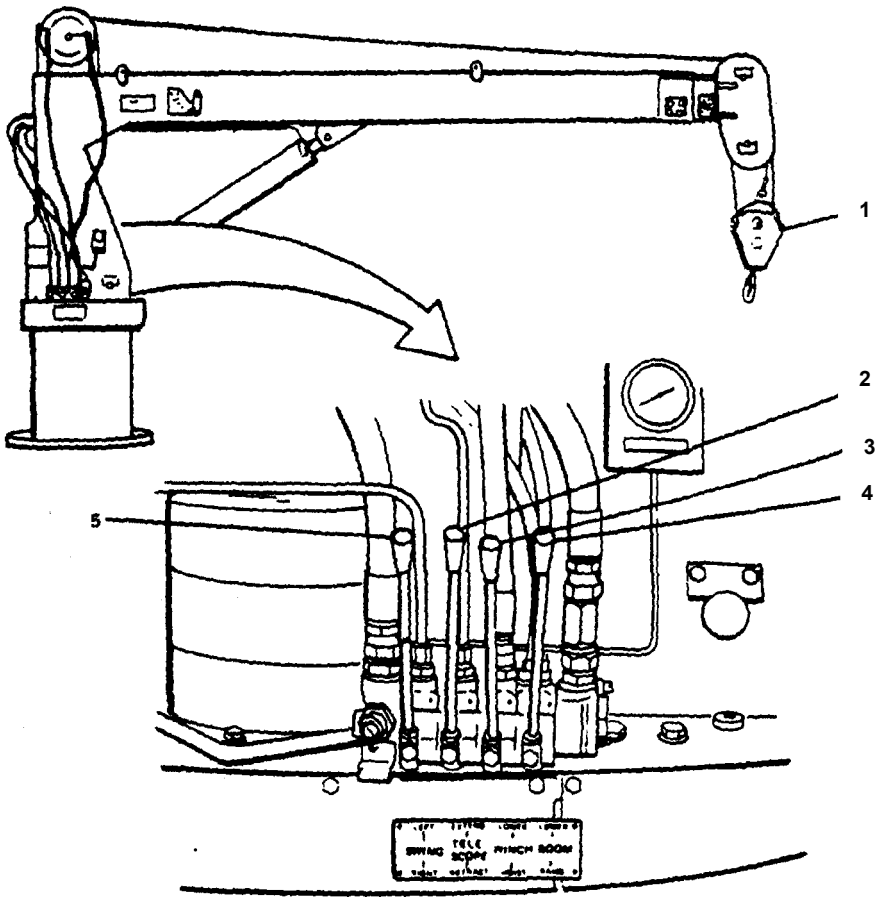
7 Install siderails.

8 Push WINCH control handle (3) forward to lower hook until sling can be removed.

9 Remove sling (3, Figure 2-344) from gangplank (4).

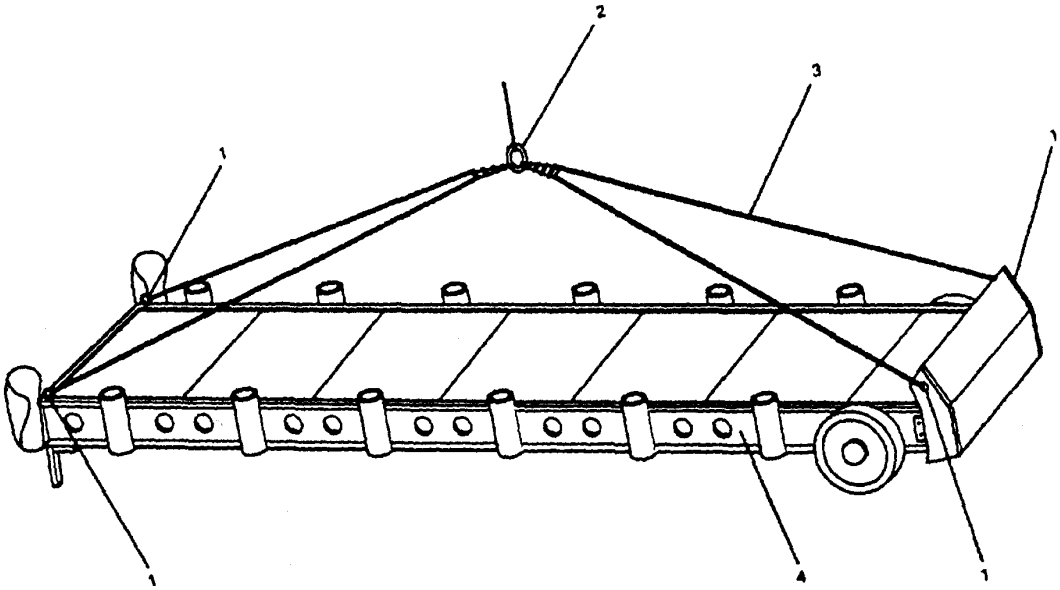
10 Move WINCH control handle (3, Figure 2-343) back to raise hook and sling.

11 Remove sling and stow.



1. CRANE HOOK
2. TELESCOPE CONTROL
3. WINCH CONTROL
4. BOOM CONTROL
5. SWING CONTROL

Figure 2-343. Crane.



1. LIFT POINTS
2. SLING LIFTING RING
3. SLING
4. GANGPLANK

Figure 2-344. Rigging Gangplank.

(d) *Secure gangplank*. Secure gangplank by placing lines through each end slot and securing each line to LT railing.

(3) Shutdown.

(a) *Secure crane*.

CAUTION

DO NOT allow hook block to come in contact with boom head.

1 Pull WINCH control handle (3, Figure 2-343) back until hook is near end of boom.

2 Position boom to aft position using SWING control handle (5).

(b) *Secure central hydraulics system (see Paragraph 2-27).*

e. Removing Gangplank.

WARNING

- **Never use crane for any type of human support or transportation.**
- **Operator will never lift a load over other personnel.**
- **Personnel will not walk under a hoisted load.**
- **Operator will not attempt to hoist load until conditions allow safe operation.**
- **Failure to observe these warnings could result in death or severe injury.**
- **Ensure load comes to complete stop and is stable before changing direction of travel of crane boom.**

(1) *Prepare for operation*. Start central hydraulics system (see paragraph *2-27).*

(2) *Remove gangplank*.

(a) *Position boom (Figure 2-343)*.

CAUTION

Control handles should be moved smoothly and deliberately, NOT with a jerking motion. Damage to the crane could result.

NOTE

- **Moving control handles progressively away from the neutral position in either direction will increase the rate of movement.**
- **When handle is released, the control will automatically return to the neutral position.**

1 *Swing*. Move SWING control handle (5) in desired direction and release.

NOTE

To swing crane to right, pull control handle backward. To swing crane to left, push control handle forward.

2 *Telescope*. Move TELESCOPE control handle (2) in desired direction and release.

NOTE

To extend boom, push the control handle forward. To retract boom, pull control handle backward.

3 *Main boom*. Move BOOM control handle (4) in desired direction and release.

WARNING

Maintain AT LEAST five dead wraps of wire rope on the drum at all times. Serious personal injury or damage to crane could result.

4 *Winch*. Move WINCH control handle (3) in desired direction and release.

NOTE

To lower the hook, push the control lever forward. To hoist the hook, pull the control handle backward.

(b) *Remove handrails*.

(c) *Rig gangplank (Figure 2-344)*.

1 Ensure lifting sling (3) is securely attached at lift points (1).

2 Ensure crane hook (2, Figure 2-343) is attached to sling lifting ring (2, Figure 2-344).

3 Move WINCH control handle (3, Figure 2-343) back to raise crane hook (1) until sling (3, Figure 2-344) is almost tight.

(d) *Prepare gangplank*. Remove lines securing gangplank to LT.

(e) *Remove gangplank*.

1 Move WINCH control handle (3, Figure 2-343) back to raise gangplank clear of brackets, handrails, and other obstructions.

2 Release WINCH control handle (3).

3 Position gangplank over storage brackets using SWING control handle (5).

4 Lower gangplank by pushing WINCH control handle (3) forward until gangplank is resting on brackets.

NOTE

Additional crew members will be required to guide gangplank into position.

5 Release WINCH control handle (3).

6 Secure gangplank in stowed position.

7 Push WINCH control handle (3) forward to lower hook until sling can be removed.

8 Remove sling (3, Figure 2-344) from gangplank (4).

9 Move WINCH control handle (3, Figure 2-343) back to raise hook and sling.

10 Remove sling and stow.

(3) *Shutdown*.

(a) Secure crane.

CAUTION

DO NOT allow hook block to come in contact with boom head.

1 Pull WINCH control handle (3) back until hook is near end of boom.

2 Position boom to aft position using SWING control handle (5).

(b) Secure central hydraulic system (see paragraph 2-27).

f. Pumping Sewage Holding Tank.

(1) Align piping system (Figure 2-345).

(a) Make shore connection.

1 Make hose connection at appropriate shore facility.

2 Connect hose from shore facility to shore connection SD-10, SEW. SHORE CONN. PORT (2) or SD-11, SEW. SHORE CONN. STBD (3) on main deck.

(b) Align piping at pump to be used. Select pump to be used.

1 Sewage discharge pump no. 1. Open SD-5, C.O.V. - SEW. DISCH. PMP. NO. 1 SUCT. (7) and SD-7, C.O.V. - SEW. DISCH. PMP. NO. 1 DISCH. (8).

2 Sewage discharge pump no. 2. Open SD-4, C.O.V. - SEW. DISCH. PMP. NO. 2 SUCT. (6) and SD-6, C.O.V. - SEW. DISCH. PMP. NO. 2 DISCH. (5).

(c) *Align piping to shore connection*

1 Close SD-8, SEW. OVBD. DISCH. (4).

2 Open SD-9, SEW. TO SH. CONN. (1).

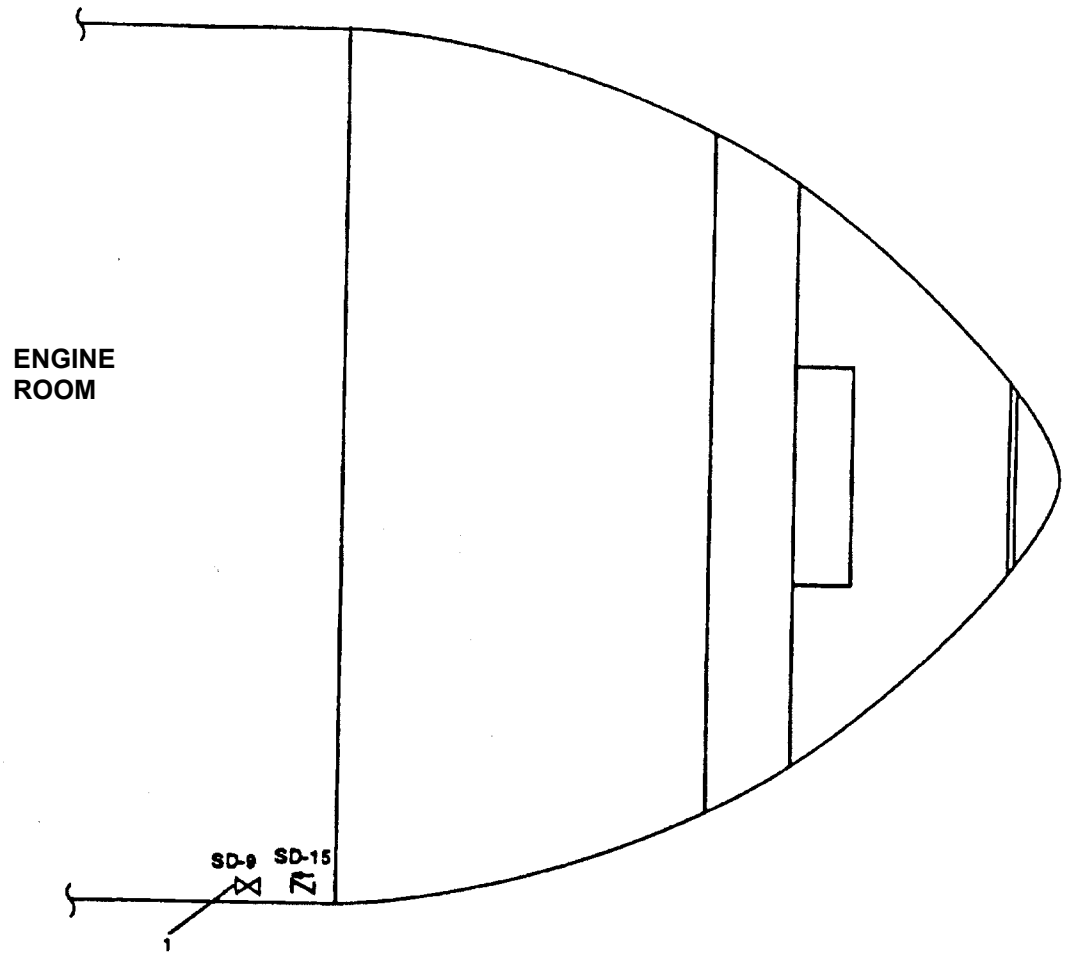


Figure 2-345. Sewage System Valve Locations (Sheet 1 of 3).

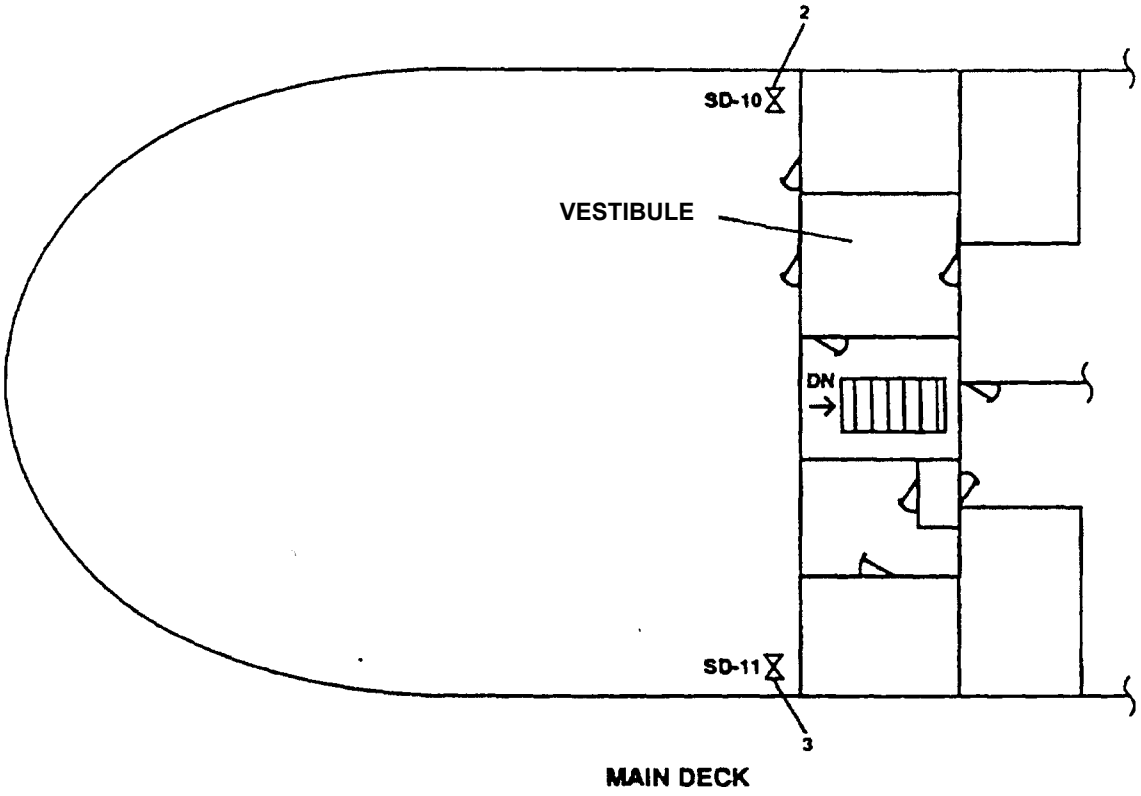
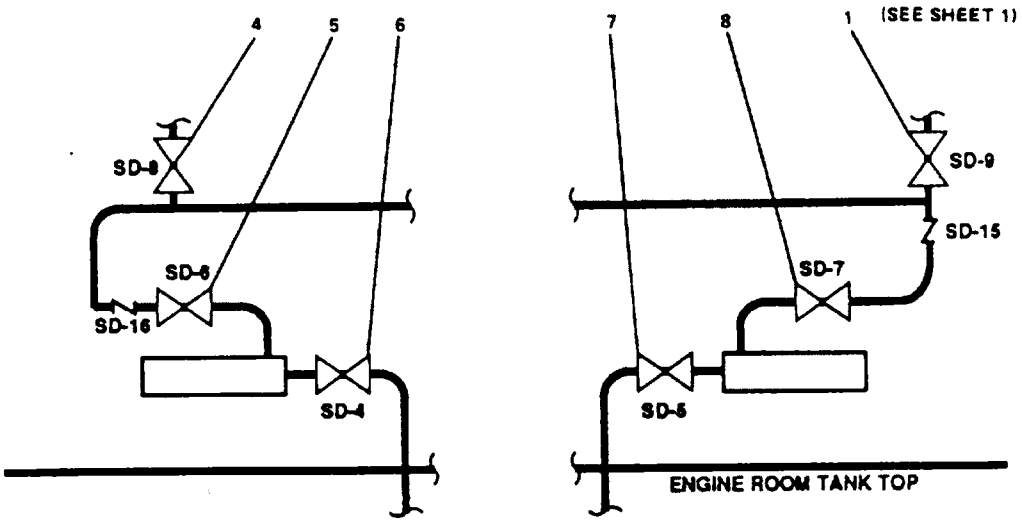


Figure 2-345. Sewage System Valve Locations (Sheet 2 of 3).



SYMBOL LEGEND:

REMOTE VALVE OPERATOR	1. SD-9, SEW. TO SH. CONN.
VALVE OVRHD	2. SD-10, SEW. SHORE CONN. PORT
VALVE ABOVE DECK, BELOW OVRHD	3. SD-11, SEW. SHORE CONN. STBD
VALVE AT OR BELOW DECK	4. SD-8, SEW. OVBD. DISCH.
	5. SD-6, C.O.V. SEW. DISCH. PMP. NO. 2 DISCH.
	6. SD-4, C.O.V. SEW. DISCH. PMP. NO. 2 SUCT.
	7. SD-5, C.O.V. SEW. DISCH. PMP. NO. 1 SUCT.
	8. SD-7, C.O.V. SEW. DISCH. PMP. NO. 1 DISCH.
	SD-15 AND SD-16, SWING CHECK VALVES

Figure 2-345. Sewage System Valve Locations (Sheet 3 of 3).

3 If port shore connection is used, open SD-10, SEW. SHORE CONN. PORT (2).

4 If starboard shore connection is used, open SD-11, SEW. SHORE. CONN. STBD (3).

(2) Align electrical system. On engine room power panel no. 1 (Figure 2-346), set following circuit breakers:

(a) Sewage discharge pump no. 1. If sewage discharge pump no. 1 is to be used, set #1 SEWAGE DISCH PUMP circuit breaker (1) to ON position.

(b) Sewage discharge pump no. 2. If sewage discharge pump no. 2 is to be used, set #2 SEWAGE DISCH PUMP circuit breaker (2) to ON position.

(3) Pump sewage holding tank.

(a) Start pump. On sewage discharge pump motor controller (Figure 2-347):

1 Set ON-OFF switch (1) to ON position.

2 POWER AVAILABLE indicator (2) will light.

3 Press START pushbutton (4).

4 MOTOR RUN indicator (3) will light.

(b) Observe tank level. Observe meter (1, Figure 2-348) on tank level indicator receiver module in EOS. When tank is almost empty, proceed.

CAUTION

Stop pump before sewage tank is completely empty. Operation of pump without fluid will damage pump.

(c) Stop pump. On sewage discharge pump motor controller (Figure 2-348):

1 Press STOP pushbutton (5).

2 MOTOR RUN indicator (3) will go out.

3 Set ON-OFF switch (1) to OFF position.

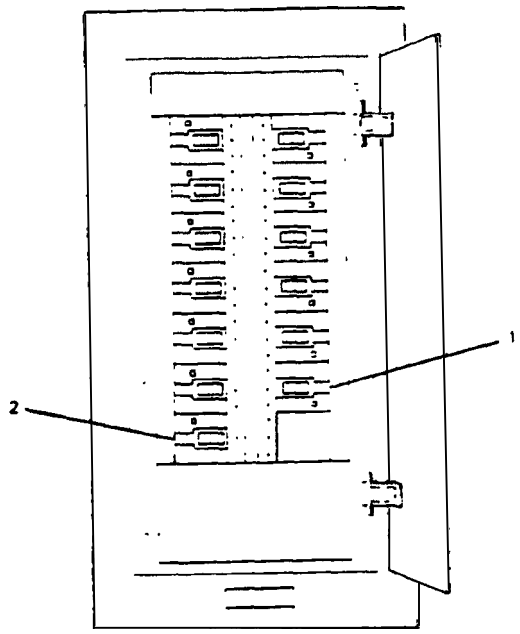
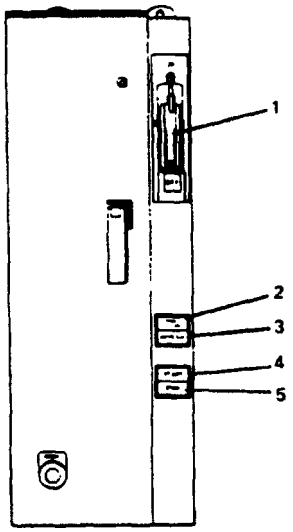


Figure 2-346. Engine Room Power Panel No. 1.



1. ON-OFF SWITCH
2. POWER AVAILABLE INDICATOR
3. MOTOR RUN INDICATOR
4. START PUSHBUTTON
5. STOP PUSHBUTTON

Figure 2-347. Sewage Discharge Pump Motor Controllers.

4 POWER AVAILABLE indicator (2) will go out.

(d) *Close shore connection valve.*

1 If port shore connection was used, close SD-10, SEW. SHOR CONN. PORT (2, Figure 2-345).

2 If starboard shore connection was used, close SD-11, SEW. SHORE CONN. STBD (3).

(4) *Secure electrical system.* On engine room power panel no. 1 (Figure 2-346), set the following circuit breakers to OFF position:

(a) #1 SEWAGE DISCH. PUMP(1).

(b) #2 SEWAGE DISCH. PUMP(2).

(5) *Secure piping system.*

(a) *Secure piping to shore connection.*

1 Close SD-9, SEW. TO SH. CONN. (1, Figure 2-345).

2 Open SD-8, SEW. OVBD. DISCH. (4).

(b) *Secure piping at pump.*

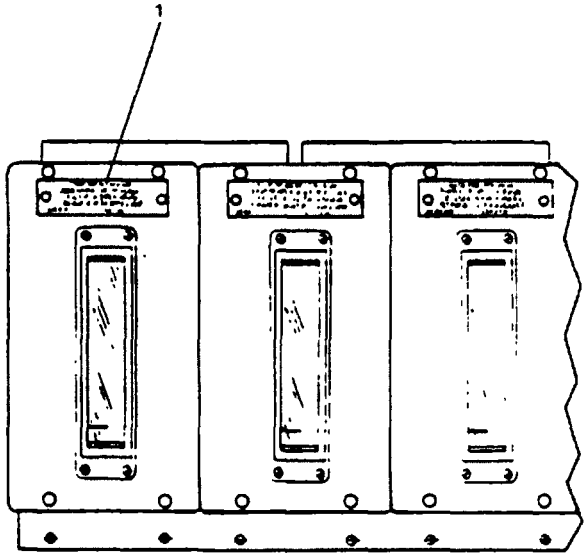
1 *Sewage discharge pump no. 1.* Close SD-5, C.O.V.- SEW. DISCH. PMP. NO. 1 SUCT. (7) and SD-7, C.O.V. - SEW. DISCH. PMP. NO. 1 DISCH. (8).

2 *Sewage discharge pump no. 2.* Close SD-4, C.O.V. - SEW. DISCH. PMP. NO. 2 SUCT. (6) and SD-6, C.O.V. - SEW. DISCH. PMP. NO. 2 DISCH. (5).

(c) *Disconnect shore connection.*

1 Disconnect hose at main deck shore connection (2 or 3).

2 Disconnect hose at shore facility.



1. EDGEVIEW METER

Figure 2-348. Tank Level Indicator Receiver Module.

2-37. Equipment Condition Prior to Getting Underway. ALL Large Tug equipment MUST be operational. Perform essential checklist in accordance with AR 56-9.

2-38. Main Engine Shutdown.

a. Remove Load From Engine.

(1) On EOS console (Figure 2-349), place CONTROL AIR TRANSFER switch (1) in the E.O.S. position.

(2) Place engine throttle (2 or 3) in the NEUTRAL (CENTER - straight UP) position.

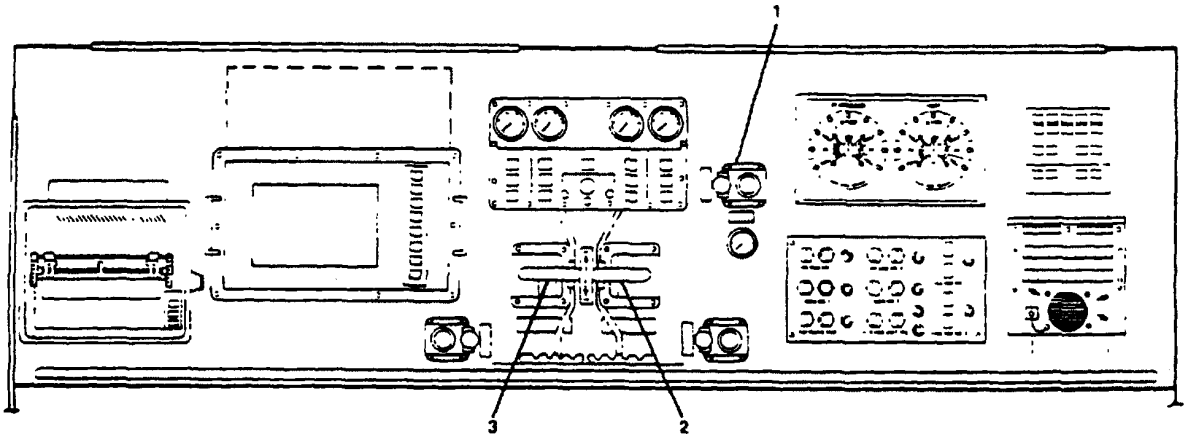
b. Cool Down Engine.

(1) Governor (Figure 2-350) maintains engine at idle speed.

(2) Let engine idle for at least 17 minutes to allow cooling water to remove excess heat.

CAUTION

Stopping engine without proper cooldown can result in damage to engine.



1. CONTROL AIR TRANSFER
2. PORT MN ENG THROTTLE CLUTCH
3. STBD MN ENG THROTTLE CLUTCH

Figure 2-349. EOS Console.

c. Stop Engine.

CAUTION

- **If turbo lube pump fails to operate when engine is shut down, the LOW TURBO OIL PRESSURE ALARM will sound.**
- **Restart the engine immediately. Allow engine to idle 15 minutes at no load to prevent damage to turbo charger.**
- **If unable to restart the engine within 2 minutes, DO NOT restart the engine until turbo lube pump operation has been restored and engine has been allowed to cool. Damage to the turbocharger could result.**

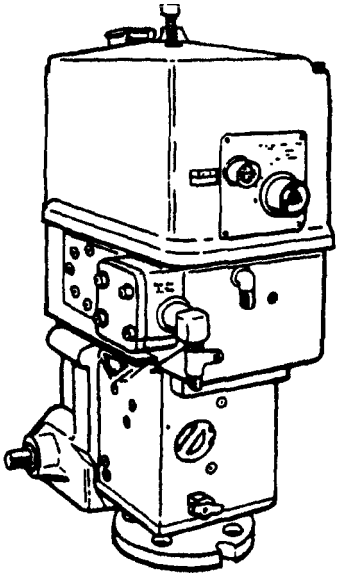
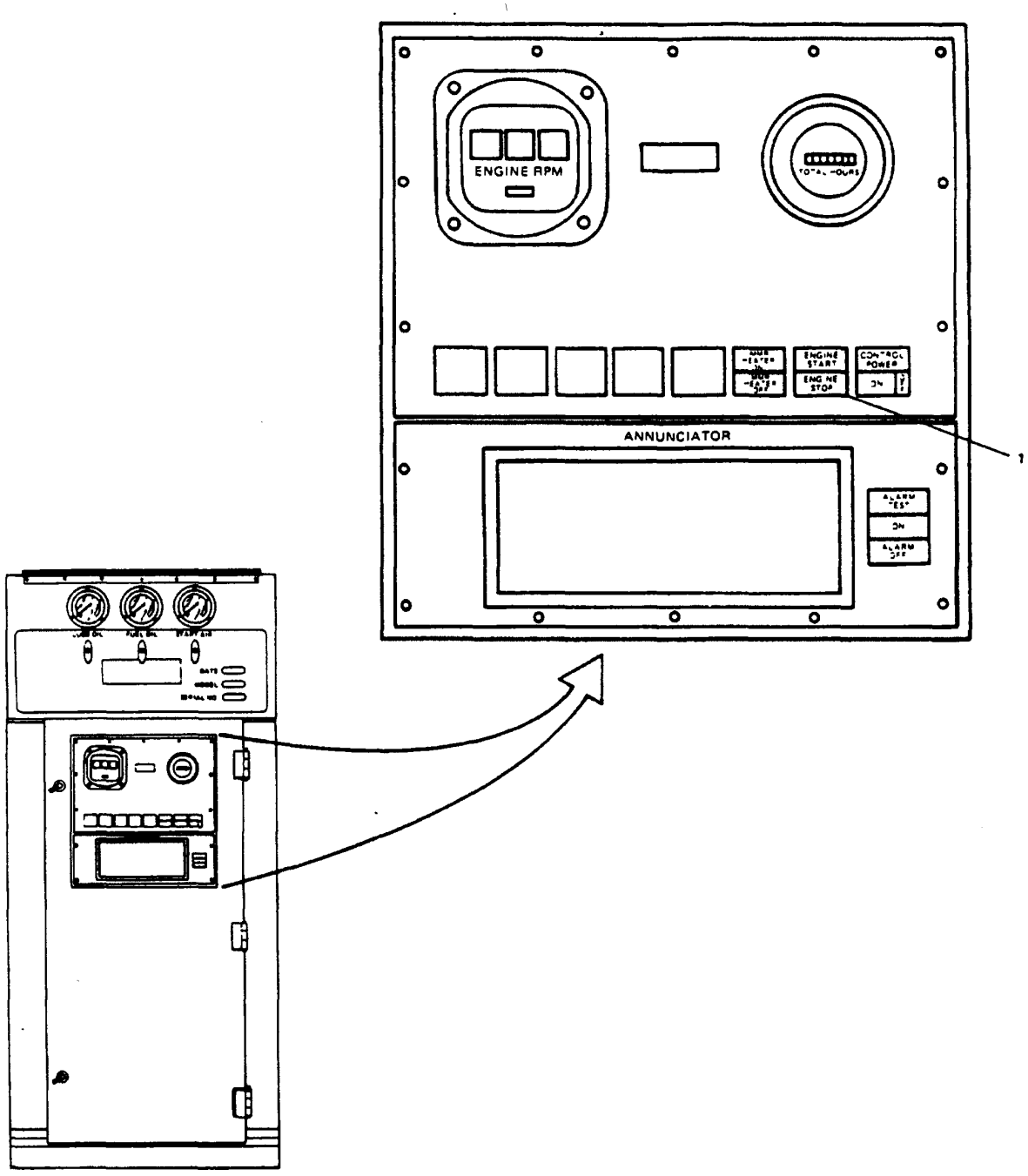


Figure 2-350. Governor.

(1) Stop engine by pressing ENGINE STOP pushbutton (1, Figure 2-351). Main engine can also be stopped by pressing either PORT MN ENG No. 2 or STBD MN ENG No. 1 STOP pushbutton on EOS control panel.



1. ENGINE STOP PUSHBUTTON

Figure 2-351. Main Engine Control Panel.

d. *Secure Compressed Air Piping System*.

(1) *Port Engine*. Close CA-8, STG AIR TO M.E. and in-line ball valve (7, Figure 2-352).

(2) *Starboard engine*. Close CA-9, STG AIR TO M.E. and in-line ball valve (13).

e. *Secure Fresh Water Cooling System*.

(1) *Port Engine*.

(a) *Reduction gear fresh water pump motor controller (Figure 2-353)*.

1 Press STOP pushbutton (4). MOTOR RUN indicator (3) will go out.

2 Set ON-OFF switch (1) to OFF position. POWER AVAILABLE indicator (2) will go out.

(b) *Valves (Figure 2-352)*. Close the following valves:

1 FWC-14, F.W. FR. RED. GEAR NO. 2 TO KEEL CLR. (5).

2 FWC-16, F.W. FR. KEEL CLR TO RED. GEAR NO. 2 (6).

3 FWC-2, F.W. FR. KEEL CLR TO M.E. NO. 2 (2).

4 FWC-4, F.W. FR. M.E. NO. 2 TO KEEL CLR (1).

(2) *Starboard engine*.

(a) *Reduction gear fresh water pump motor controller (Figure 2-353)*.

1 Press STOP pushbutton (4). MOTOR RUN indicator (3) will go out.

2 Set ON-OFF switch (1) to OFF position. POWER AVAILABLE indicator (2) will go out.

(b) *Valves (Figure 2-352)*. Close the following valves:

1 FWC-13, F.W. FR. RED GEAR NO. 1 TO KEEL CLR. (14).

2 FWC-15, F.W. FR. KEEL CLR.TO RED. GEAR NO. 1 (12).

3 FWC-1, F.W. FR. KEEL CLR. TO M.E. NO. 1 (18).

4 FWC-3, F.W. FR. M.E. NO. 1 TO KEEL CLR. (20).

f. *Secure Fuel Oil Service System (Figure 2-352)*.

(1) *Port engine*.

(a) Close FO-19, F. O. SPLY. TO M.E. NO. 2 (8).

(b) Close FO-33, F. O. RTN. TO DAY TK. PORT (3).

(c) Close FO-13, F. O. SERV. SUCT. PORT (4).

(2) *Starboard engine*.

(a) Close FO-20, F. O. SPLY TO M.E. NO. 1 (11).

(b) Close FO-35, F. O. RTN. TO DAY TK. STBD (17).

(c) Close FO-15, F. O. SERV. SUCT. STBD (16).

(3) Close FO-14, F. O. SERV CRSVR (15).

(4) Close FO-34, F. O. RTN. CRSVR (19).

g. *Secure Electrical System.*

(1) *Port engine*. Engine room power panel no. 1 (Figure 2-354). Set the following circuit breakers to OFF position:

(a) #2 RED GR. CLG. PUMP (1).

(b) #2 M. E. L. O. PRIME PUMP (4).

(c) #2 M. E. CONTROL PUMP (3).

(2) *Starboard engine*. Engine room power panel no. 1 (Figure 2-354). Set the following circuit breakers to OFF position:

(a) #1 RED GR. CLG. PUMP (6).

(b) #1 M. E. L. O. PRIMING PUMP (2).

(c) #1 M. E. CONTROL PANEL (5).

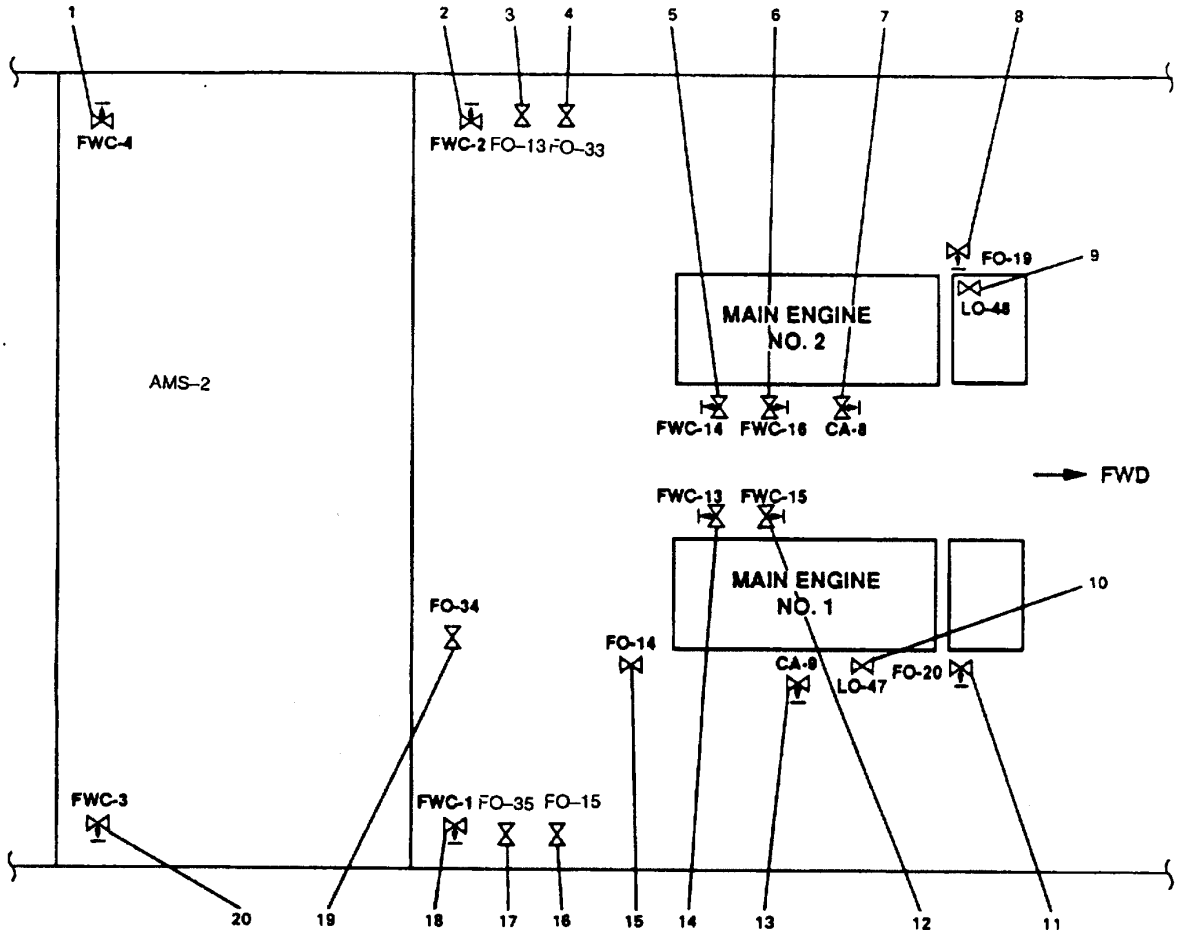
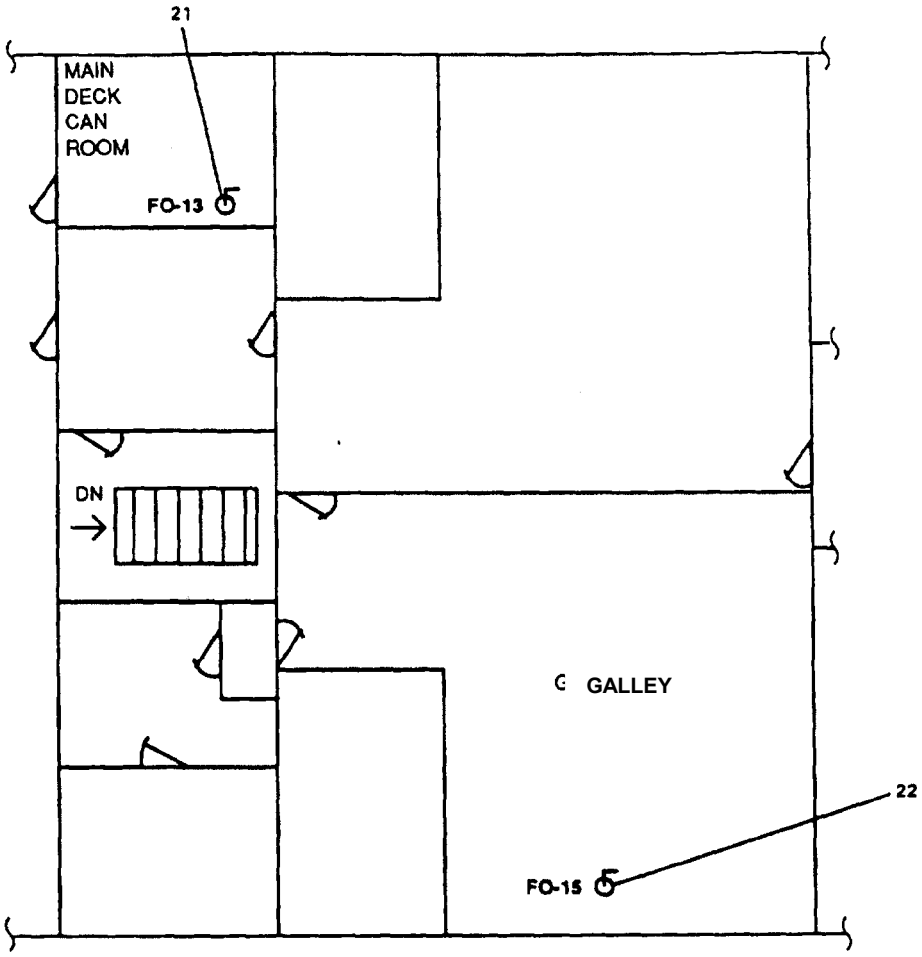


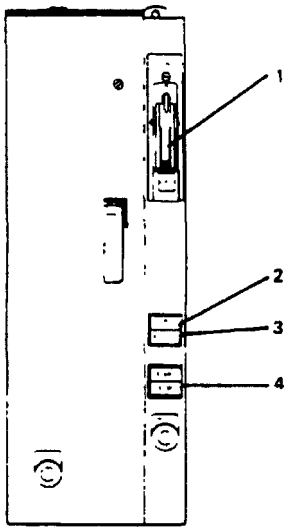
Figure 2-352. Main Engine Valve Locations (Sheet 1 of 2).



MAIN DECK

1. FWC-4, FW. FR. M.E. NO. 2 TO KEEL CLR
2. FWC-2, FW. FR. KEEL CLR TO M.E. NO. 2
3. FO-13, F.O. RTN TO DAY TK. PORT
4. FO-33, F.O. SERV. SUCT., PORT
5. FWC-14, FW. FR RED. GEAR NO. 2 TO KEEL CLR
6. FWC-16, FW. FR KEEL CLR TO RED. GEAR NO. 2
7. CA-8, STG AIR TO M.E.
8. FO-19, F.O. SPLY TO M.E. NO. 2
9. LO-48, C.O.V. PRELUBE PMP. DISCH.
10. LO-47, C.O.V. PRELUBE PMP. DISCH.
11. FO-20, F.O. SPLY TO M.E. NO. 1
12. FWC-15, F.W. FR. KEEL CLR TO RED. GEAR NO. 1
13. CA-9, STG. AIR TO M.E.
14. FWC-13, F.W. FR. RED GEAR NO. 1 TO KEEL CLR.
15. FO-14, F.O. SERV CRSRV
16. FO-15, F.O. SERV. SUCT. STBD
17. FO-35, F.O. RTN TO DAY TK. STBD
18. FWC-1, F.W. FR. KEEL CLR TO M.E. NO. 1
19. FO-34, F.O. RTN. CRSVR
20. FWC-3, F.W. FR. M.E. NO. 1 TO KEEL CLR
21. FO-13, REMOTE VALVE OPERATOR FOR
22. FO-15, REMOTE VALVE OPERATOR FOR

Figure 2-352. Main Engine Valve Locations (Sheet 2 of 2).



1. ON-OFF SWITCH
2. POWER AVAILABLE INDICATOR
3. MOTOR RUN INDICATOR
4. STOP PUSHBUTTON

Figure 2-353. Reduction Gear No. 2 Fresh Water Pump Motor Controller.

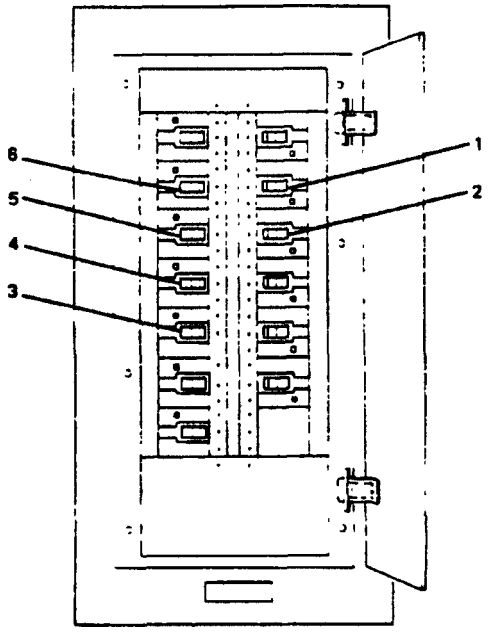


Figure 2-354. Engine Room Power Panel No. 1.

2-39. Gyrocompass Shutdown.

a. *Gyrocompass Mk 27 Mod 1 (Figure 2-355)*.

(1) Set SELECTOR switch (1) to SLEW position.

(2) Press CAGED button (2) on top of binnacle.

(3) Set SELECTOR switch (1) to OFF position.

b. *Mk 27 Mod E Transmission Unit (Figure 2-356)*. Set OFF POWER switch (1) to DOWN position.

c. *Pilothouse Emergency Distribution Panel (Figure 2-357)*. Set the following circuit breakers to OFF position:

(1) MK 37 GYRO XMTR (1).

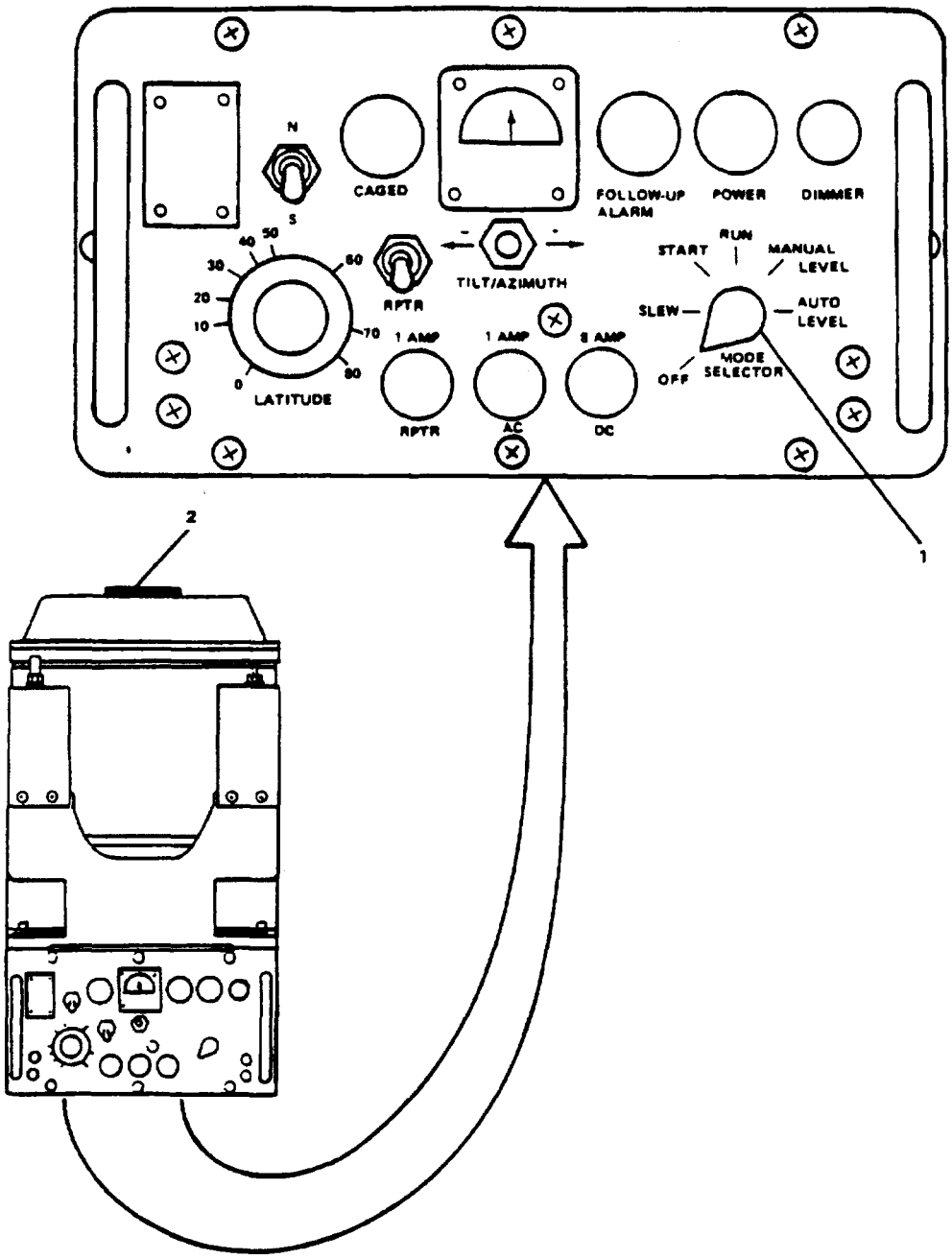
(2) MK 27 GYRO COMPASS (2).

d. *Radio Room DC Distribution Panel (Figure 2-358)*. Set the following circuit breakers to the OFF position:

(1) Binnacle lights (1).

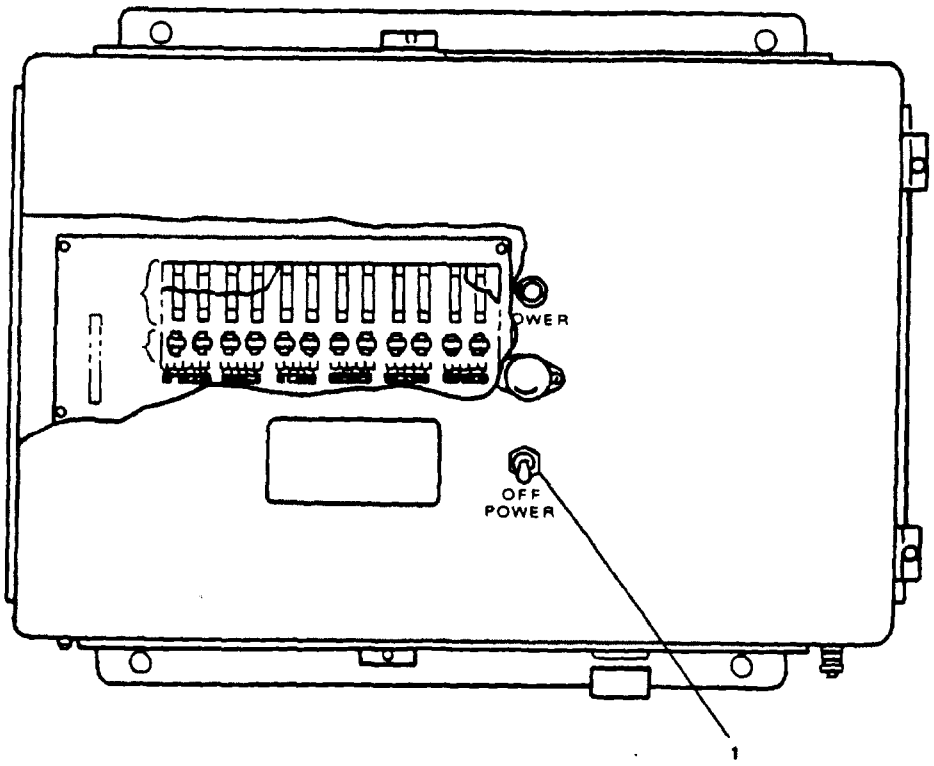
(2) Gyro (2).

(3) Steering dimmer module (3).



1. SELECTOR
2. CAGED BUTTON

Figure 2-355. Gyrocompass Mk 27 Mod 1.



1. OFF POWER

Figure 2-356. Mk 27 Mod E Transmission Unit.

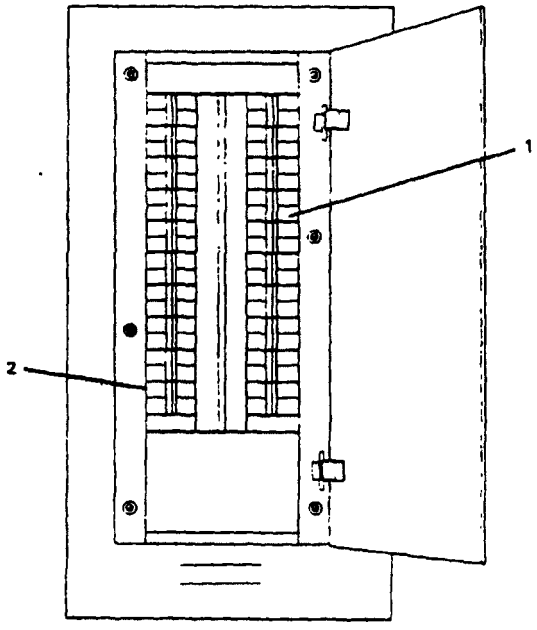
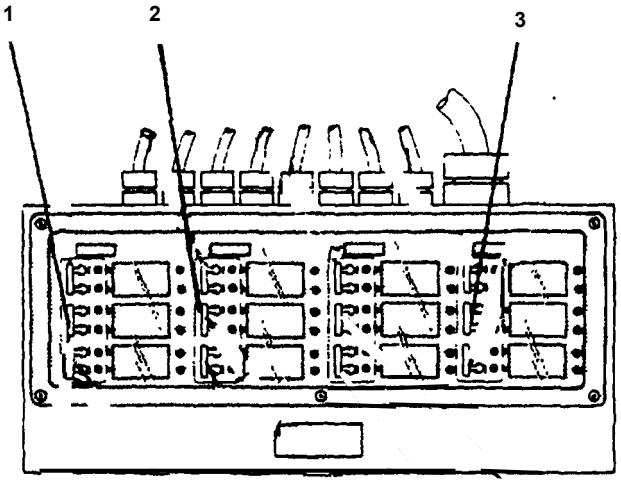


Figure 2-357. Pilothouse Emergency Distribution Panel.



1. BINNACLE LIGHTS
2. GYRO
3. STEERING DIMMER MODULE

Figure 2-358. Radio Room DC Control Distribution Panel.

2-40. Life Support System Shutdown.

a. Potable Water System Shutdown.

(1) Reverse osmosis watermaker shutdown (Figure 2-359).

(a) Reverse osmosis watermaker no. 1.

1 Open BACK PRESSURE REGULATOR valve (3) by turning counterclockwise.

CAUTION

Opening BACK PRESSURE REGULATOR valve will protect the membrane elements from possible damage due to high temperature or pressure while system is shut down. Additionally, at the next startup, new water will enter and cool the system while it is unpressurized. Failure to open BACK PRESSURE REGULATOR valve could cause damage to the system.

2 Momentarily press STOP pushbutton (2).

3 Ensure high pressure pump has stopped and POWER indicator (1) is OFF.

4 Close GS-40, SW. to RO. NO. 1 POT. WTR. DSCH. (7).

5 Close PW-86, C.O.V. RO. NO. 1 POT. WTR. DSCH. (5).

6 Close GS-50, SW. OUT. RO. NO. 1 (9).

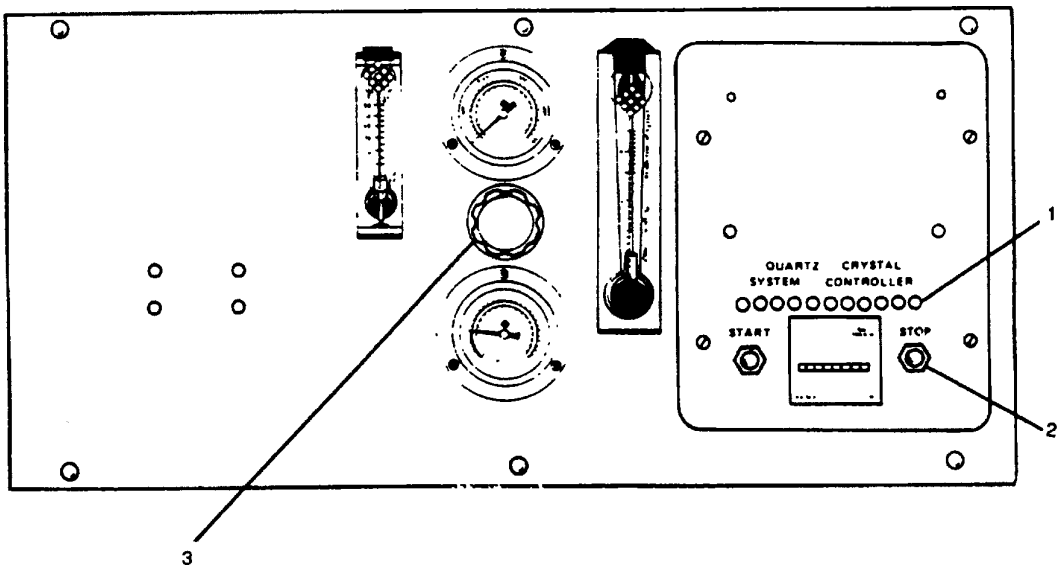
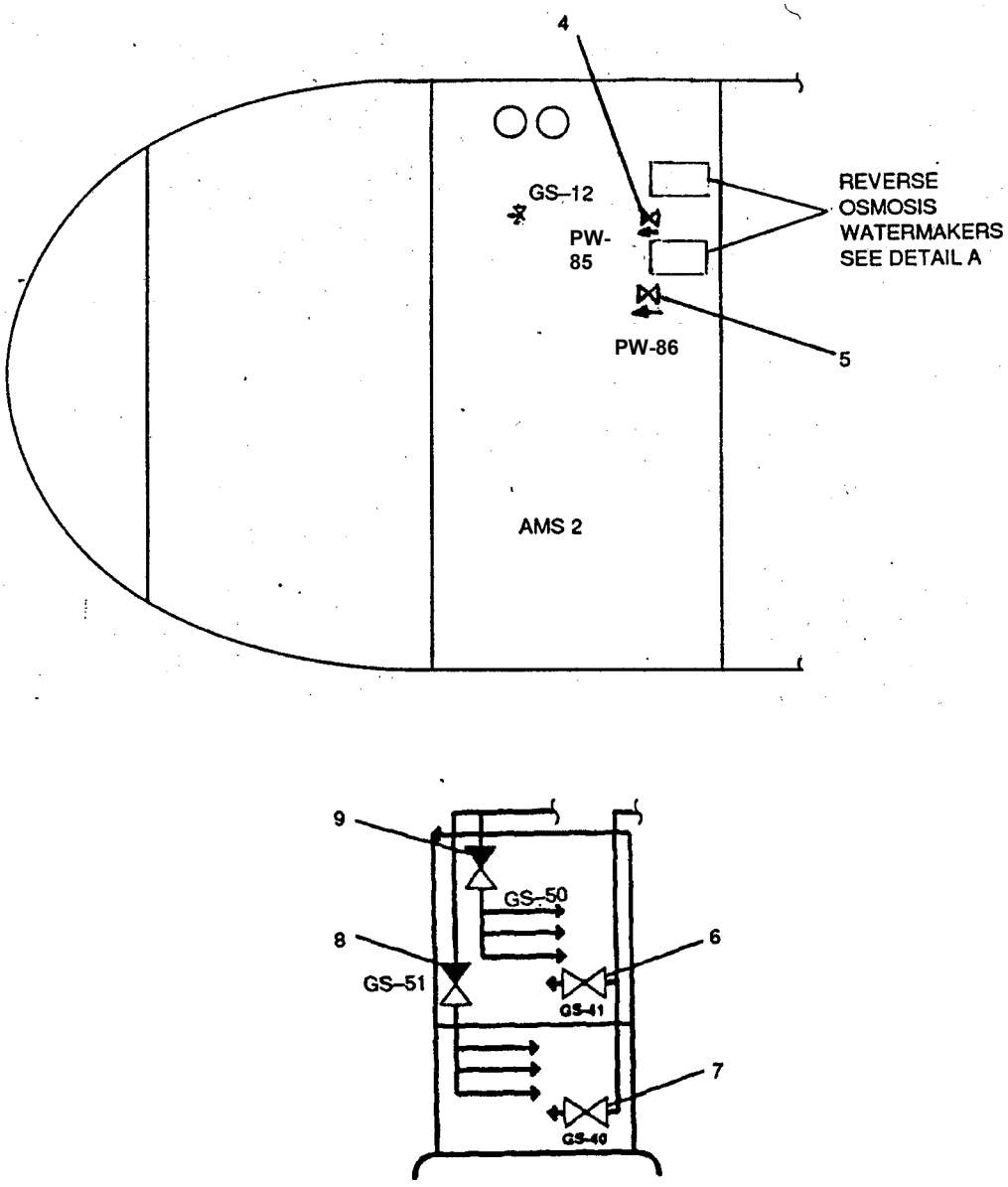


Figure 2-359. Reverse Osmosis Watermaker (Sheet 1 of 2).



1. RED INDICATOR
2. STOP PUSHBUTTON
3. BACK PRESSURE REGULATOR VALVE
4. PW-85, C.O.V. RO. NO. 1 POT. WTR. DSCH.
5. PW-86, C.O.V. RO. NO. 1 POT. WTR. DSCH.
6. GS-41, SW. TO RO. NO. 2 POT. WTR. DSCH.
7. GS-40, SW. TO RO. NO. 1 POT. WTR. DSCH.
8. GS-51, SW. OUT. RO. NO. 2
9. GS-50, SW. OUT. RO. NO. 1

Figure 2-359. Reverse Osmosis Watermaker (Sheet 2 of 2).

(b) *Reverse osmosis watermaker no. 2.*

1 Open BACK PRESSURE REGULATOR valve (3) by turning counterclockwise.

CAUTION

Opening BACK PRESSURE REGULATOR valve will protect the membrane elements from possible damage due to high temperature or pressure while system is shut down. Additionally, at the next startup, new water will enter and cool the system while it is unpressurized. Failure to open BACK PRESSURE REGULATOR valve could cause damage to the system.

2 Momentarily press STOP pushbutton (2).

3 Ensure high pressure pump has stopped and POWER indicator (1) is OFF.

4 Close GS-41, SW. to RO. NO. 2 POT. WTR. DSCH. (6).

5 Close PW-85, C.O.V. RO. NO. 1 POT. WTR. DSCH. (4).

6 Close GS-51, SW. OUT. RO. NO. 2 (8).

(c) *Auxiliary machinery space 2 power panel no. 5 (Figure 2-360).* Set following circuit breakers to OFF position:

1 #1 REVERSE OSMOSIS UNIT (1).

2 #2 REVERSE OSMOSIS UNIT (2).

(2) *Shut down drinking fountains.*

(a) *01 level distribution panel no. 2 (Figure 2-361).* Set the following circuit breakers to OFF position:

1 01 LEVEL DRINKING FOUNTAIN (3).

2 02 LEVEL DRINKING FOUNTAIN (1).

3 PILOTHOUSE DRINKING FOUNTAIN (2).

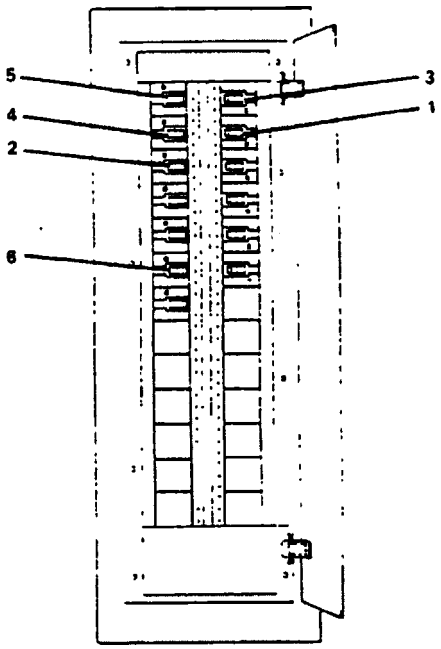


Figure 2-360. Auxiliary Machinery Space 2 Power Panel No. 5.

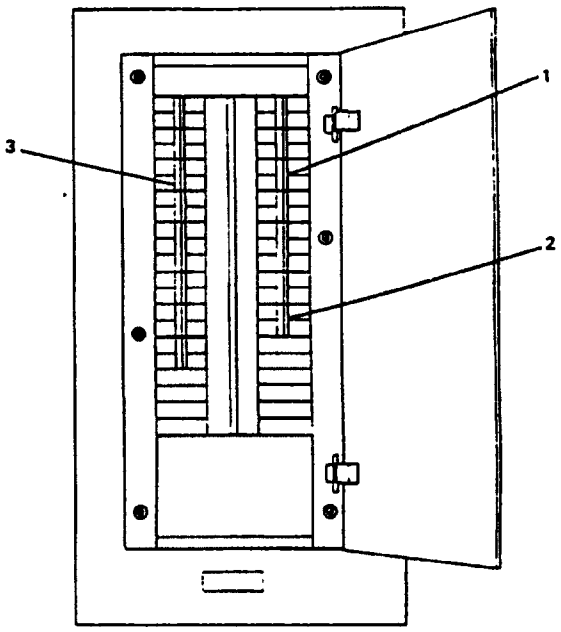


Figure 2-361. 01 Level Distribution Panel No. 2.

(b) *Main deck distribution Panel no. 3 (Figure 2-362)*. Set MAIN DECK DRINKING FOUNTAIN circuit breaker (1) to ON position.

(c) *Engine room distribution panel no. 4 (Figure 2-363)*. Set ENGINE ROOM DRINKING FOUNTAIN circuit breaker (1) to ON position.

(3) *Secure hot water heaters*. On main switchboard (Figure 2-364), set the following circuit breakers to OFF position:

(a) HOT POTABLE WTR HTR #1 (2).

(b) HOT POTABLE WTR HTR #2 (1).

(4) *Stop pumps*.

(a) *Hot potable water recirculating pump*. On hot potable water recirculating pump motor controller (Figure 2-365), press STOP pushbutton (1).

1 MOTOR RUN indicator (2) will go out.

(b) *Potable water pumps*. On each potable water pump motor controller (Figure 2-366), proceed as follows:

1 Press STOP pushbutton (4).

2 MOTOR RUN indicator (3) will go out.

3 Set ON-OFF switch (1) to OFF position.

4 POWER AVAILABLE indicator (2) will go out.

(5) *Secure electrical system*.

(a) *Auxiliary machinery space no. 1 power panel no. 4 (Figure 2-367)*. Set HOT POT WTR REC PUMP circuit breaker (1) to OFF position.

(b) POWER AVAILABLE indicator (3, Figure 2-365) will go out.

(c) *Auxiliary machinery space 2 power panel no. 5 (Figure 2-360)*. Set the following circuit breakers to OFF position:

1 #1 POT WTR PUMP (3).

2 #2 POT WTR PUMP (4).

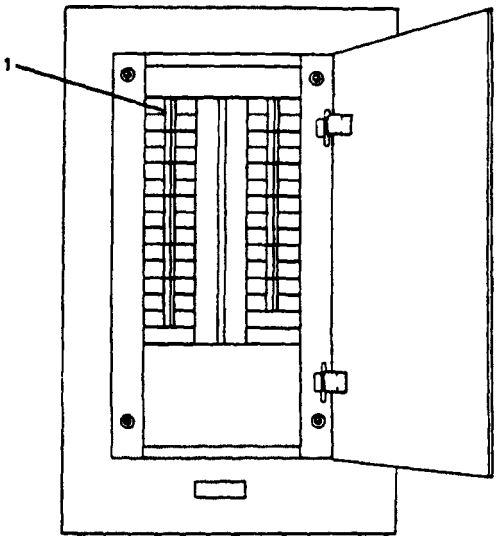


Figure 2-362. Main Deck Distribution Panel No. 3.

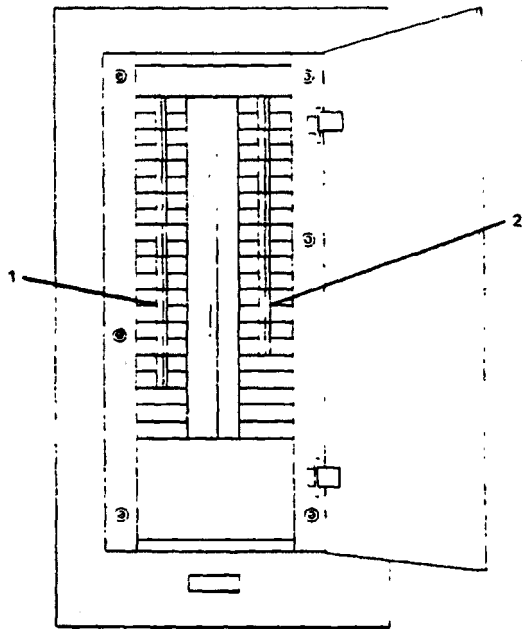


Figure 2-363. Engine Room Distribution Panel No. 4.

(6) *Secure piping system*.

(a) *Potable water system (Figure 2-368)*. Close the following valves:

1 PW-78, C. O. V. HYDR. PNEU. TK. OUTLET (3).

2 PW-48, HW RECIRC. PMP. SUCT. (4).

3 PW-43, RECIRC TO H.W. HEATER (1).

4 PW-44, RECIRC TO H.W. HEATER (2).

b. *Marine Sanitation Device Shutdown*.

NOTE

- **If crew will be off LT for 2 weeks or less, system should be left operational with blower operating.**
- **If crew will be off LT for more than 2 weeks, refer to unit maintenance for long-term layup.**

c. *Air Conditioning Condensing Unit Shutdown*.

(1) Close DEHYDRATOR INLET valve (9, Figure 2-369) on both condensing units.

(2) Allow compressors to run until automatically shut down by suction pressure switch.

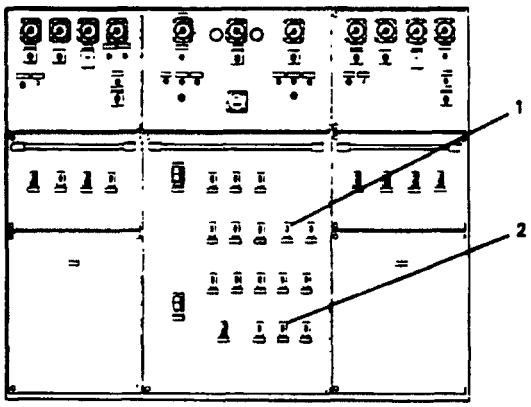
(a) Set power switch (1) and main power disconnect (3) to OFF position.

WARNING

Tag power switch and service valves "DO NOT OPERATE OUT OF SERVICE." Serious compressor damage and possible injury to personnel will result if discharge service valve is not opened before compressor is started.

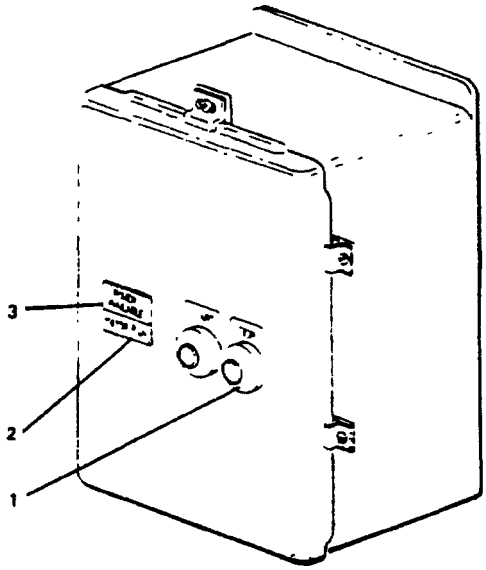
(b) Close COMPRESSOR DISCHARGE valve (5).

(c) Close COMPRESSOR SUCTION valve (6).



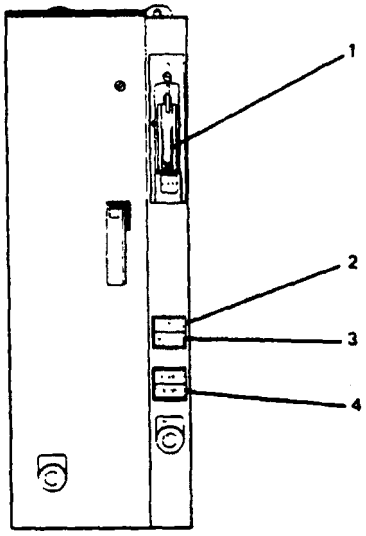
1. HOT POTABLE WTR. HTR. #2
2. HOT POTABLE WTR. HTR. #1

Figure 2-364. Main Switchboard.



1. STOP
2. MOTOR RUN INDICATOR
3. POWER AVAILABLE INDICATOR

Figure 2-365. Hot Potable Water Recirculating Pump Motor Controller.



1. ON-OFF SWITCH
2. POWER AVAILABLE LIGHT
3. MOTOR RUN LIGHT
4. STOP SWITCH

Figure 2-366. Potable Water Pump Motor Controllers.

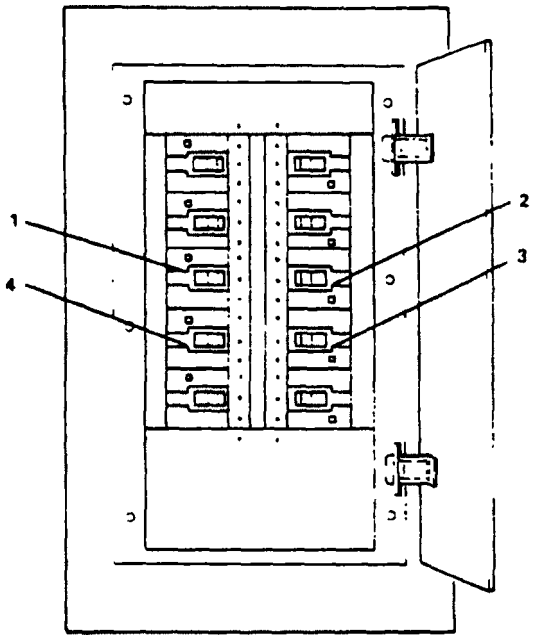


Figure 2-367. Auxiliary Machinery Space No. 1 Power Panel No. 4.

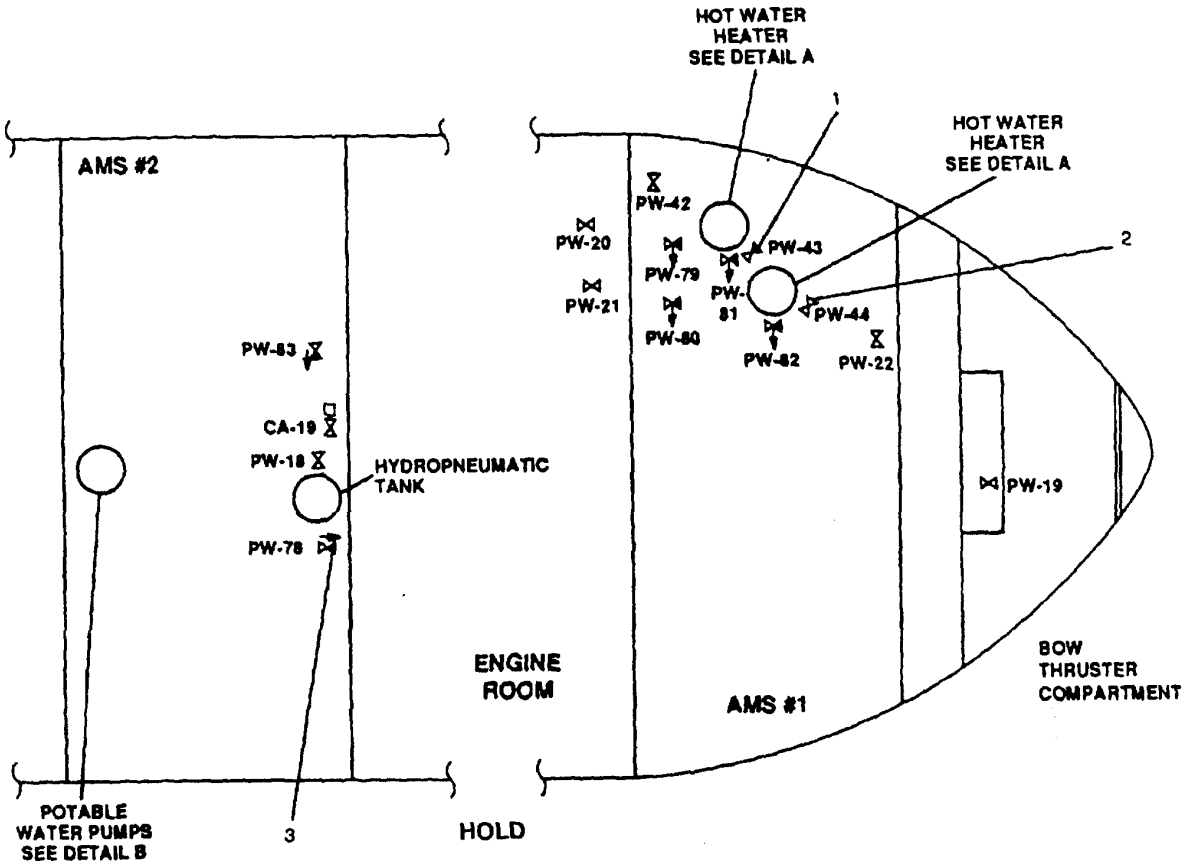
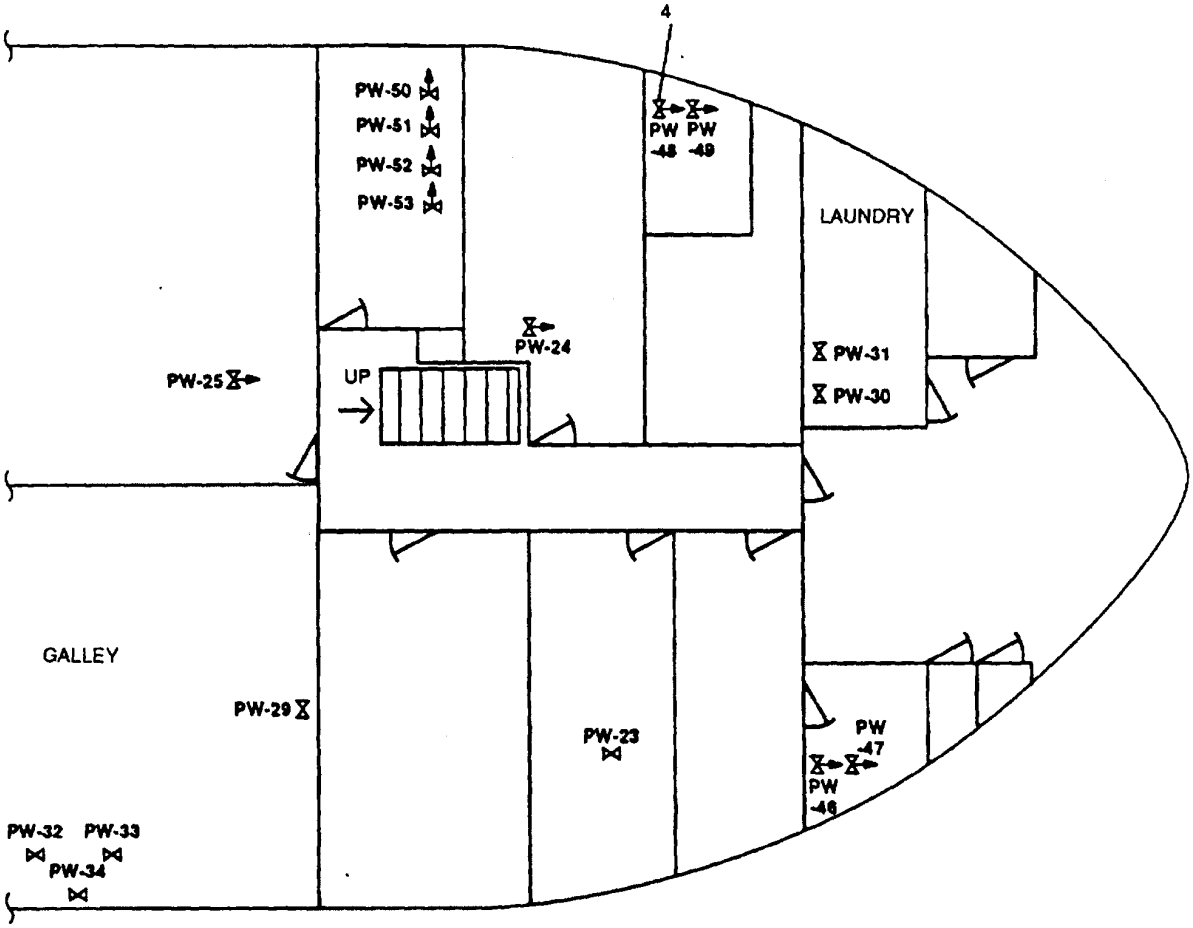


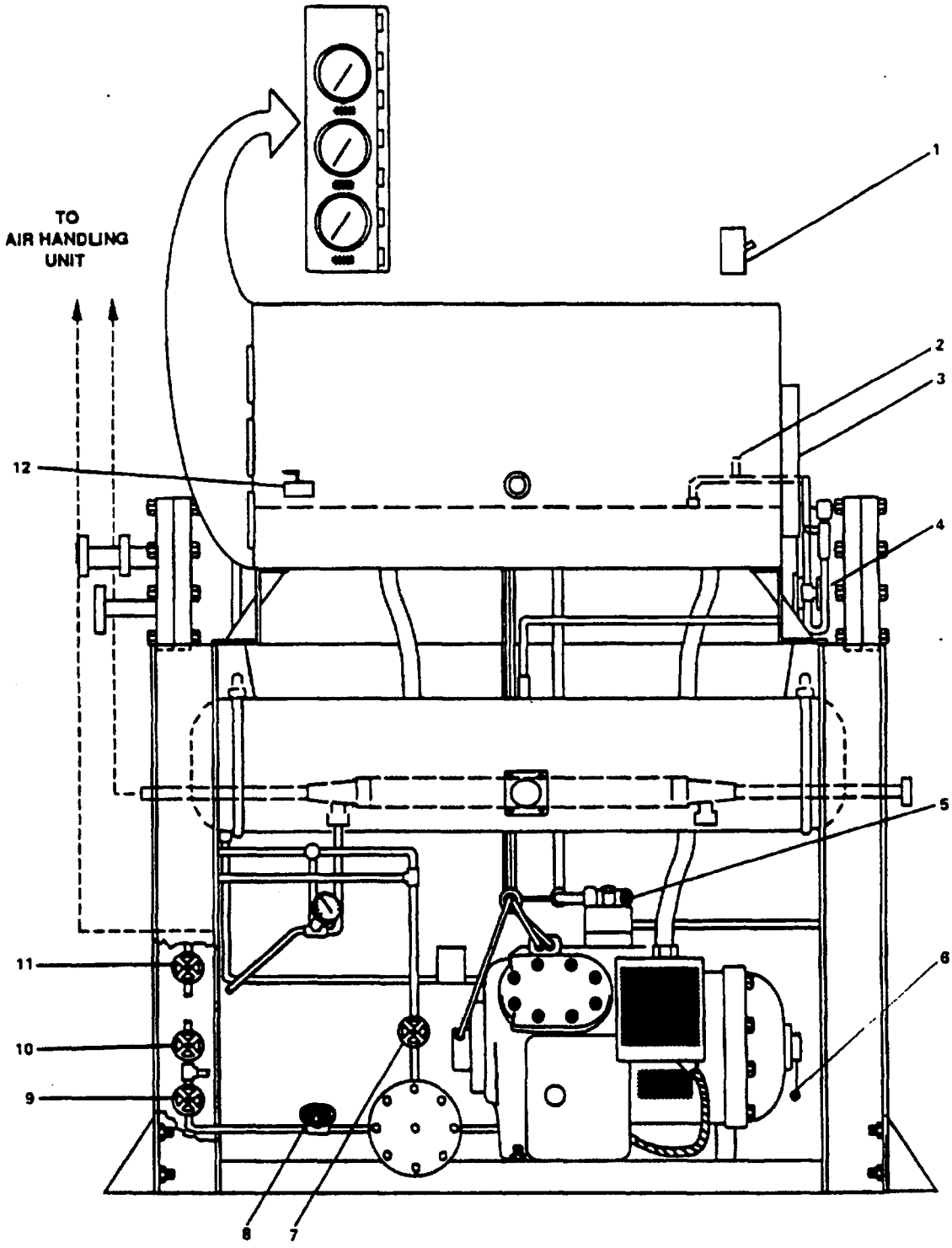
Figure 2-368. Potable Water System Valve Locations (Sheet 1 of 2).



MAIN DECK

1. PW-43, RECIRC TO H.W. HEATER
2. PW-44, RECIRC TO H.W. HEATER
3. PW-78, C.O.V. - HYDR. PNEU. TK. OUTLET
4. PW-48, RECIRC. PMP. SUCT.

Figure 2-368. Potable Water System Valve Locations (Sheet 2 of 2).



Packaged Condensing Link
(Typical)

Figure 2-369. Air Conditioning Condensing Unit (Sheet 1 of 2).

1. POWER SWITCH
2. PURGE
3. MAIN POWER DISCONNECT
4. RELIEF VALVE BY-PASS
5. COMPRESSOR DISCHARGE
6. COMPRESSOR SUCTION
7. DEHYDRATOR OUTLET
8. CHARGE AND DRAIN
9. DEHYDRATOR INLET
10. DEHYDRATOR BY-PASS
11. CONDENSER OUTLET
12. WATER REGULATOR VALVE ACTUATING LINE VALVE

Figure 2-369. Air Conditioning Condensing Unit (Sheet 2 of 2).

(d) Close all valves on condensing unit.

(e) Close all refrigerant piping valves (Figure 2-370).

(3) *Secure condenser cooling water piping (Figure 2-371).*

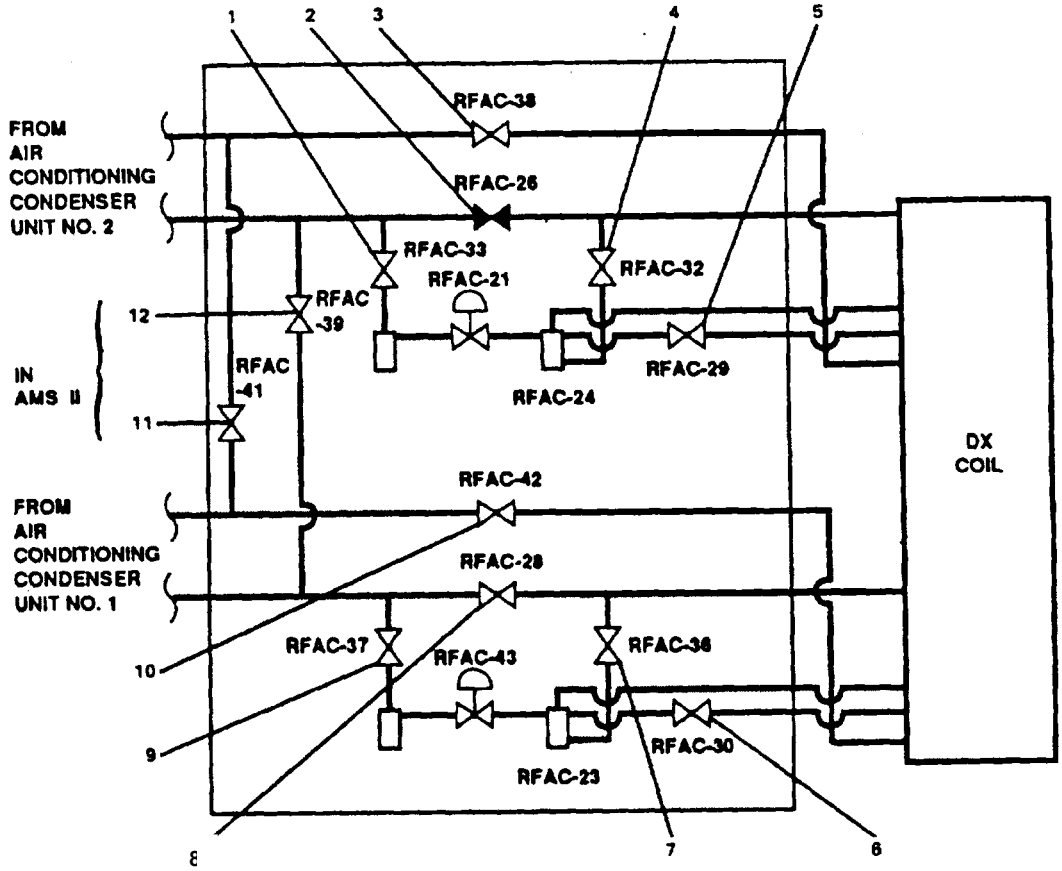
(a) Close GS-33, A/C COND NO. 1 SPLY and GS-34, A/C COND NO. 2 SPLY (4).

(b) Close GS-36 and GS-37, WTR REGLTR COV (5).

(c) Close GS-69 and GS-70, WTR REGLTR COV (3).

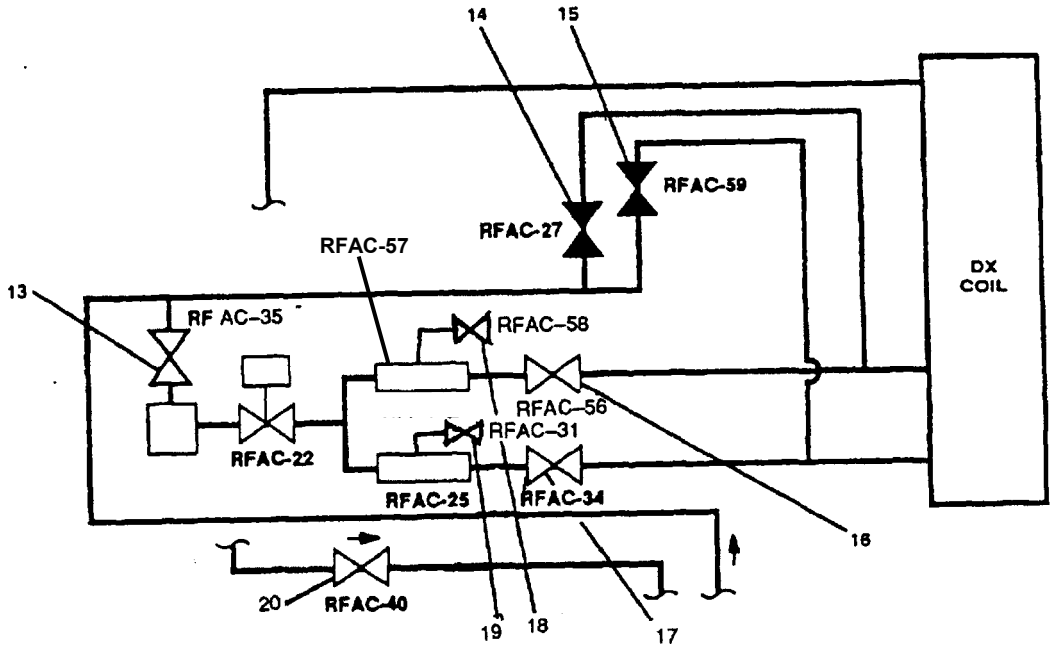
(d) Close RFAC-49, SW OUT RO NO. 1 and RFAC-51, SW OUT RO NO. 2 (2).

(e) Close GS-83, BYP WTR REGLTR and GS-72, BYP WTR REGLTR (1).



MAIN DECK FAN ROOM

Figure 2-370. Air Conditioning Refrigerant Piping Valve Locations (Sheet 1 of 2).



01 LVL FAN ROOM

SYMBOL LEGEND

REMOTE VALVE OPERATOR

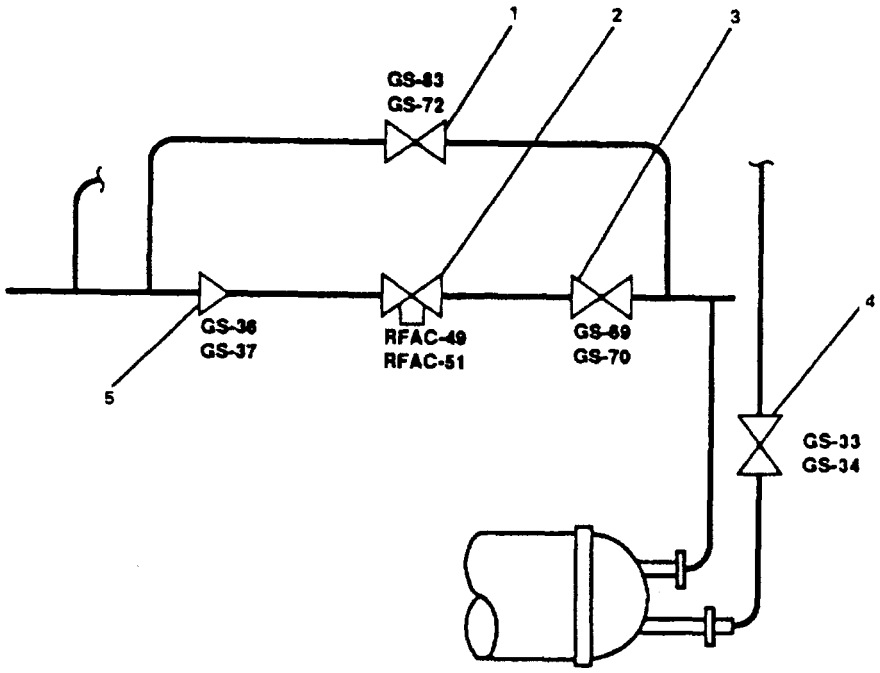
VALVE OVRHD

VALVE ABOVE DECK, BELOW OVRHD

VALVE AT OR BELOW DECK

1. RFAC-33, TXV/STNR/LLSV COV, R1-25-2, 4 COIL
2. RFAC-26, HAND EXP
3. RFAC-38, 4 COIL SUCT. COV, R1-25-2
4. RFAC-32, TXV/STNR/LLSV COV, R1-25-2, 4 COIL
5. RFAC-29, EQL LINE
6. RFAC-30, EQL LINE
7. RFAC-36, TXV/STNR/LLSV COV, R1-25-2, 8 COIL
8. RFAC-28, HAND EXP
9. RFAC-37, TXV/STNR/LLSV COV, R1-25-2, 8 COIL
10. RFAC-42, 8 COIL SUCT. COV, R1-25-2
11. RFAC-41, SUCT. LINE CRSVR CO
12. RFAC-39, LIQUID LINE CRSVR CO
13. RFAC-35, TXV COV, R01-32-2
14. RFAC-27, HAND EXP
15. RFAC-59, HAND EXP
16. RFAC-56, TXV COV
17. RFAC-34, TXV COV, R01-32-2
18. RFAC-58, EQL LINE
19. RFAC-31, EQL LINE
20. RFAC-40, COIL SUCT. COV, R01-32-2

Figure 2-370. Air Conditioning Refrigerant Piping Valve Locations (Sheet 2 of 2).



SYMBOL LEGEND:

- REMOTE VALVE OPERATOR
- VALVE OVRHD
- VALVE ABOVE DECK, BELOW OVRHD
- VALVE AT OR BELOW DECK

1. GS-83, BYP WTR RGLTR
   GS-72, BYP WTR RGLTR
2. RFAC-49, SW OUT RO NO. 1
   RFAC-51, SW OUT RO NO. 2
3. GS-69, WTR REGLTR COV
   GS-70, WTR REGLTR COV
4. GS-33, A/C COND. NO. 1 SPLY
   GS-34, A/C COND. NO. 2 SPLY
5. GS-36, WTR REGLTR COV
   GS-37, WTR REGLTR COV

Figure 2-371. Air Conditioning System Service Valve Locations.

d. *Forced Air Environmental Control System.*

(1) *Engine operating space.*

(a) *Marine room air conditioning unit (Figure 2-372)*. Set CONTROL switch (1) to OFF.

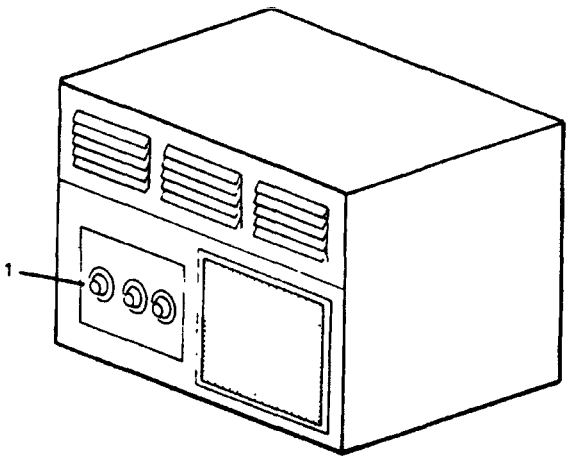
(b) *Piping system (Figure 2-373)*. Close GS-108 SW SPLY TO EOS AIR COND (1).

(c) *Engine room distribution panel no. 4 (Figure 2-374)*. Set UNIT AIR CONDITIONER R2-401 E.O.S. circuit breaker (1) to OFF position.

(2) *Main deck*.

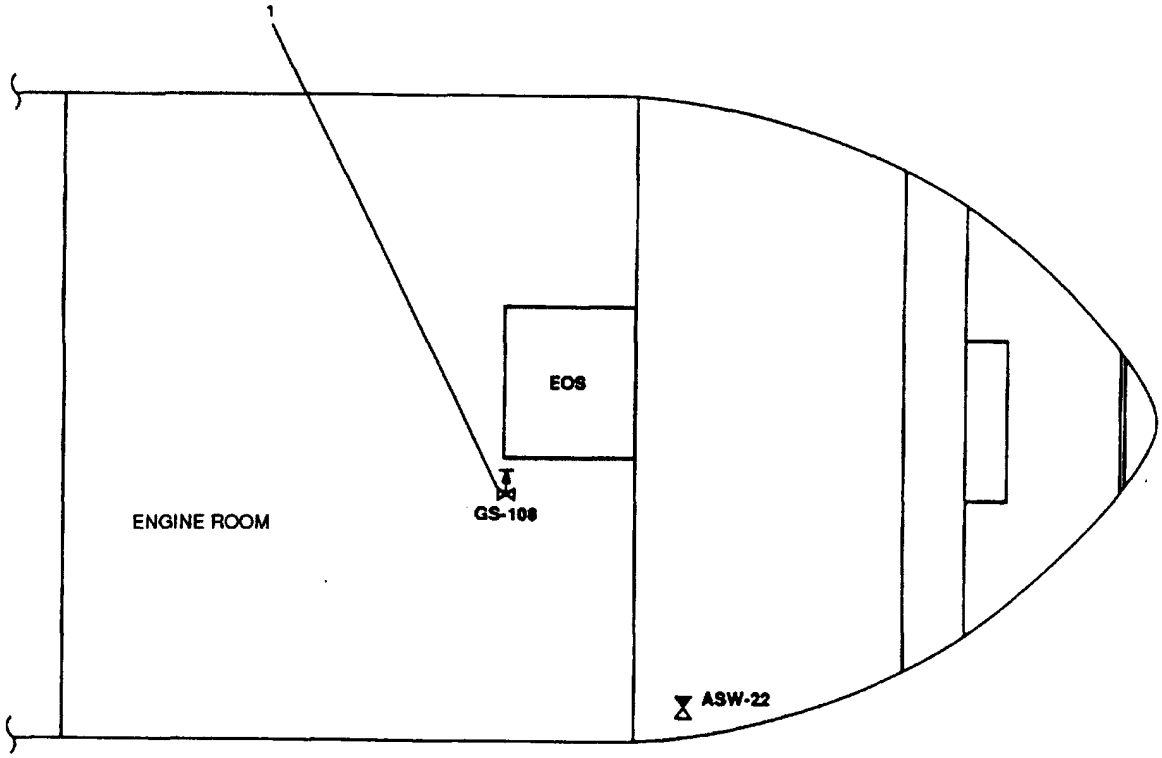
(a) *Reheater (Figure 2-375)*. Set ON-OFF switch (1) to OFF position on all reheaters.

(b) *Preheater (Figure 2-376)*. Set ON-OFF switch (1) to OFF position on all preheaters.



1. CONTROL SWITCH

Figure 2-372. Marine Room Air Conditioning Unit.



1. GS-108, SW SPLY TO EOS AIR COND (OVERHEAD)

Figure 2-373. EOS Air Conditioning System General Service Valve Locations.

(c) *Crew's mess fan coil unit R1-25-2 motor controller (Figure 2-377).*

1 Press STOP pushbutton (4).

2 MOTOR RUN indicator (3) will go out.

3 Set ON-OFF switch (1) to OFF position.

4 POWER AVAILABLE indicator (2) will go out.

(d) *Main deck power panel no. 3 (Figure 2-378). Set following circuit breakers to OFF position:*

1 PREHTR 1-23-4 (1).

2 PREHTR 1-25-2 (2).

3 CREWS MESS FAN COIL UNIT R1-25-2 (10).

(3) *01 level. 02 level. and pilothouse.*

(a) *Reheater (Figure 2-375).* Set ON-OFF switch (1) to OFF position on all reheaters.

(b) *Preheater (Figure 2-376).* Set ON-OFF switch (1) to OFF position.

(c) *01, 02 level, and pilothouse fan coil R01-32-2 motor controller (Figure 2-377).*

1 Press STOP pushbutton (4).

2 MOTOR RUN indicator (3) will go out.

3 Set ON-OFF switch (1) to OFF position.

4 POWER AVAILABLE indicator (2) will go out.

(d) *Main deck power panel no. 3 (Figure 2-378).* Set the following circuit breakers to OFF position:

1 RHTR 01-31-2 (9).

2 RHTR 01-32-2 (4).

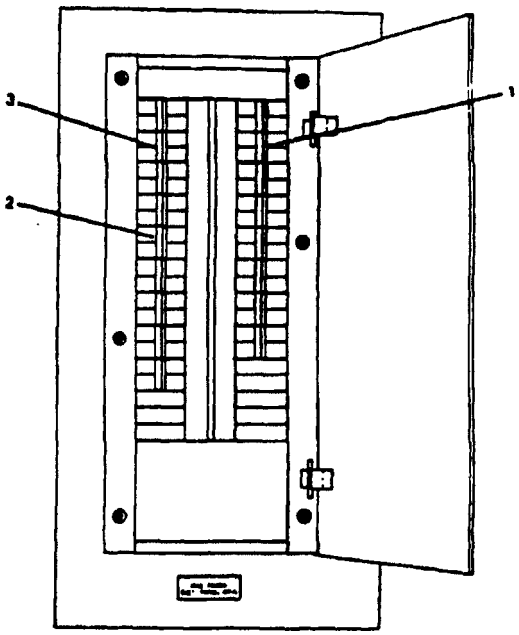
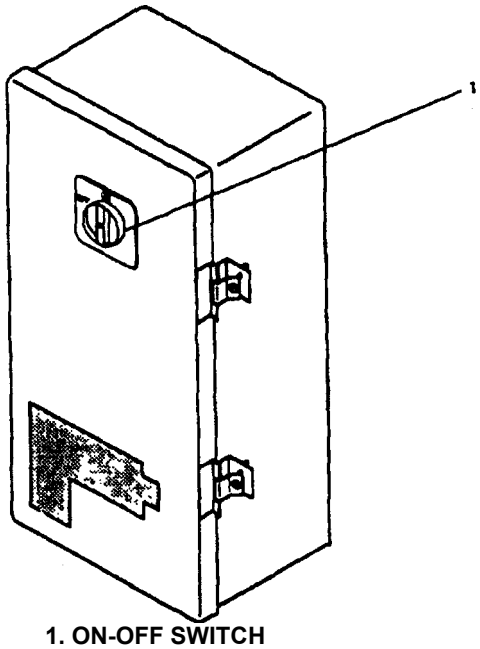


Figure 2-374. Engine Room Distribution Panel No. 4.



1. ON-OFF SWITCH

Figure 2-375. Reheater.

3 01,02 & 03 LEVEL FAN COIL UNIT (R01-32-2) (8).

(e) *Main deck distribution panel no. 3 (Figure 2-379)*. Set FUSE BOX NO. 1 01-02 LVL RHTRS circuit breaker (1) to OFF position.

e. *Convection Heaters Shutdown*.

(1) *Stop convection heaters (Figure 2-380)*. On each convection heater, set POWER switch (1) to OFF.

(2) *01 level distribution paneling. 2 (Figure 2-381)*. Set FUSE BOX NO. 2 01-02 LVL CONV HTR circuit breaker (1) to OFF position.

f. *Electric Unit Heaters*.

(1) *Stop heater (Figure 2-382)*. On each electric unit heater, set ON-OFF switch (1) to OFF.

(2) *Auxiliary machinery space 2 power panel no. 5 (Figure 2-360)*. Set the following circuit breakers to OFF position:

(a) AMS II UNIT HTR (5).

(b) TOW GEAR LKR UNIT HTR (6).

(3) *Auxiliary machinery space no. 1 power panel no. 4 (Figure 2-367)*. Set the following circuit breakers to OFF position:

(a) BOW THRUSTER ROOM UNIT HTR (2).

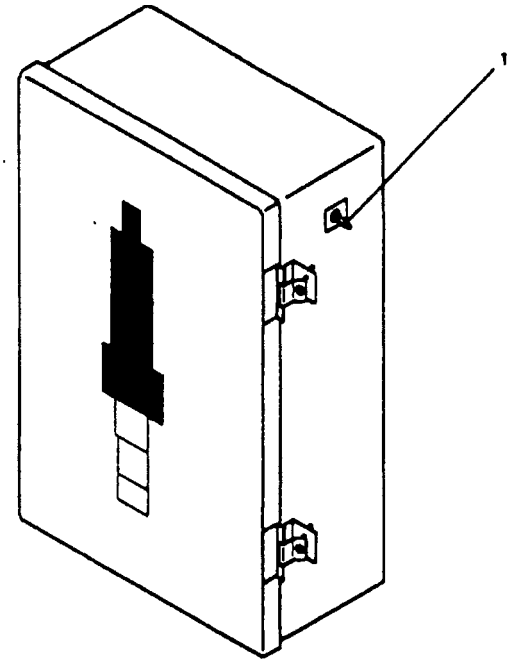
(b) AMS-1 UNIT HTR (3).

(4) *Engine room power panel no. 1 (Figure 2-383)*. Set ENG. RM UNIT HTR circuit breaker (1) to OFF position.

(5) *Engine room distribution panel no. 4 (Figure 2-374)*. Set the following circuit breakers to OFF position:

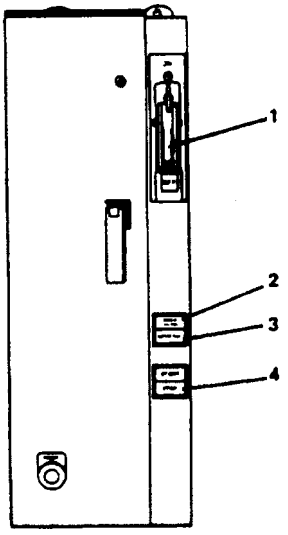
(a) #1 SSDG SPACE HEATER (3).

(b) #2 SSDG SPACE HEATER (2).



1. ON-OFF SWITCH

Figure 2-376. Preheater.



1. ON-OFF SWITCH
2. POWER AVAILABLE INDICATOR
3. MOTOR RUN INDICATOR
4. STOP PUSHBUTTON

Figure 2-377. Motor Controller.

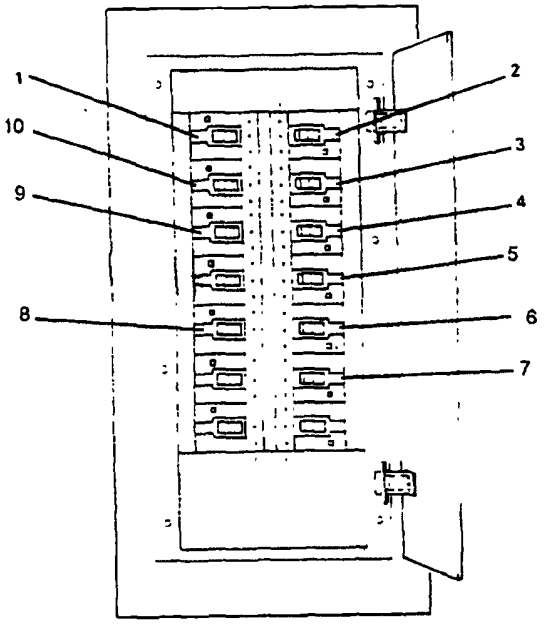
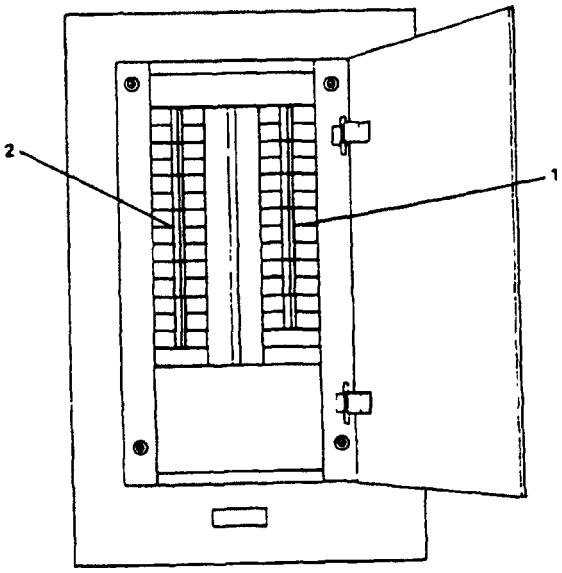


Figure 2-378. Main Deck Power Panel No. 3.



1. POWER SWITCH

Figure 2-380. Convection Heater.

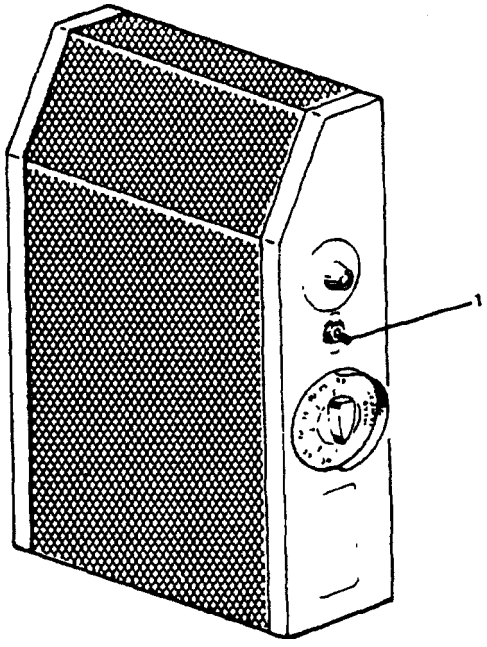


Figure 2-379. Main Deck Distribution Panel No. 3.

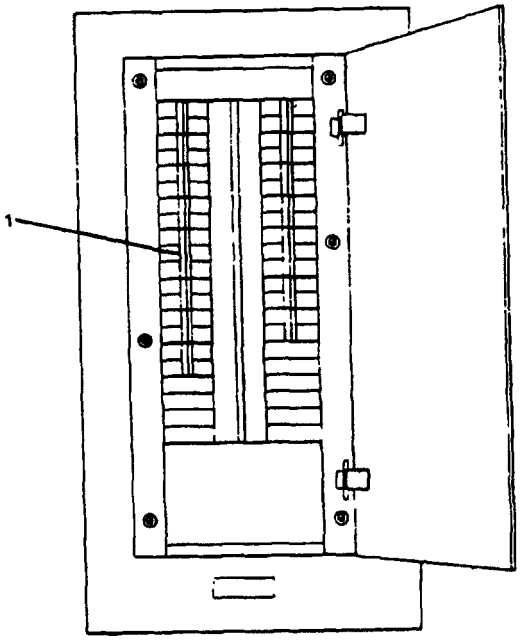


Figure 2-381. 01 Level Distribution Panel No. 2.

g. *Ventilation Shutdown*.

(1) *Sanitary spaces exhaust fan*.

(a) *Sanitary space exhaust fan motor controller (Figure 2-377)*.

1 Press STOP switch (4).

2 MOTOR RUN indicator (3) will go out.

3 Set ON-OFF switch (1) to OFF position.

4 POWER AVAILABLE indicator (2) will go out.

(b) *Main deck power panel no. 3 (Figure 2-378)*. Set SANITARY SPACE EXHAUST FAN (E01-442) circuit breaker (7) to OFF position.

(2) *Workshop exhaust fan*.

(a) *Workshop exhaust fan motor controller E02-16-1 (Figure 2-384)*. Set ON-OFF switch (1) to OFF position.

(b) MOTOR RUN indicator (2) will go out.

(c) *Engine room distribution panel no. 4 (Figure 2-363)*. Set WORKSHOP EXHAUST FAN E216-1 circuit breaker (2) to OFF position.

(d) POWER AVAILABLE indicator (3, Figure 2-384) will go out.

(3) *Auxiliary machinery space no. 2*.

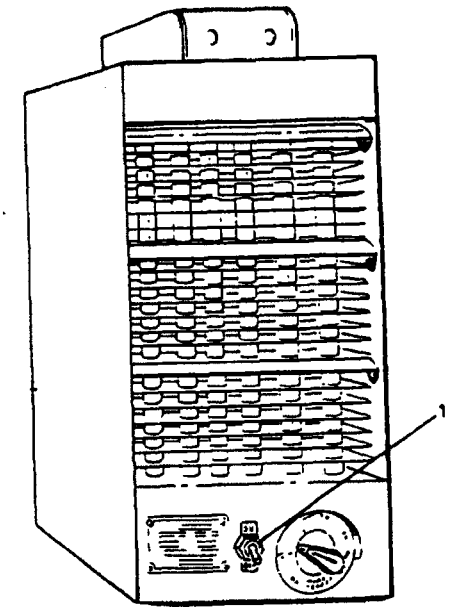
(a) *Auxiliary machinery space 2 supply fan motor controller (Figure 2-385)*.

1 Press STOP pushbutton (5).

2 FAST (3) or SLOW (4) indicator will go out.

3 Set ON-OFF switch (1) to OFF position.

4 POWER AVAILABLE indicator (2) will go out.



1. ON-OFF SWITCH

Figure 2-382. Electric Unit Heater.

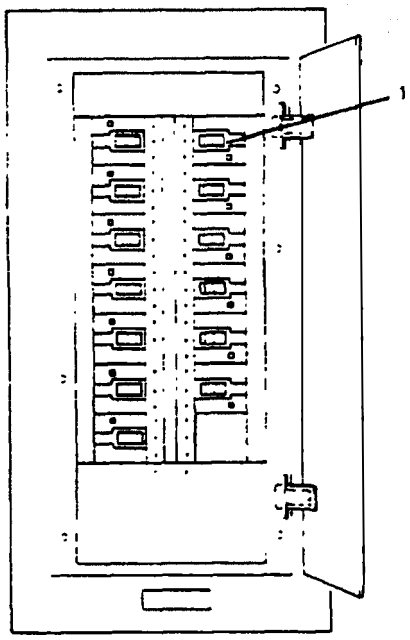


Figure 2-383. Engine Room Power Panel No. 1.

(b) *Main deck power panel no. 3 (Figure 2-378)*. Set AMS II SUPPLY FAN (1-22-2) circuit breaker (10) to OFF position.

(4) *Auxiliary machinery space no. 1*.

(a) *Auxiliary machinery space no. 1 suppler fan motor controller (Figure 2-385)*.

1 Press STOP pushbutton (5).

2 FAST (3) or SLOW (4) indicator will go out.

3 Set ON-OFF switch (1) to OFF position.

4 POWER AVAILABLE indicator (2) will go out.

(b) *Auxiliary machinery space 1 power panel no. 4 (Figure 2-367)*. Set AMS I SUPPLY FAN (S0145-2) circuit breaker (4) to OFF position.

(5) *Boatswain's storeroom, paint locker, and laundry*.

(a) *Boatswain's storeroom heater (Figure 2-376)*. Set ON-OFF switch (1) to OFF position.

(b) *Paint locker and storeroom exhaust fan motor controller (Figure 2-385)*.

1 Press STOP pushbutton (5).

2 FAST (3) or SLOW (4) indicator will go out.

3 Set ON-OFF switch (1) to OFF position.

4 POWER AVAILABLE indicator (2) will go out.

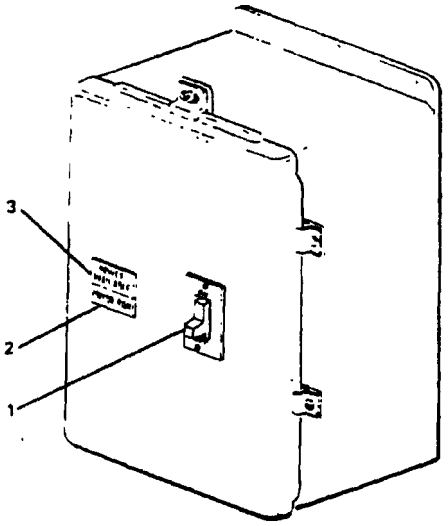
(c) *Main deck power panel no. 3 (Figure 2-378)*. Set the following circuit breakers to OFF position:

1 RHTR 01-32-2 (PP3-4P-D) (3).

2 BOSUN STORE ROOM SUPPLY FAN (S1-58-1) (9).

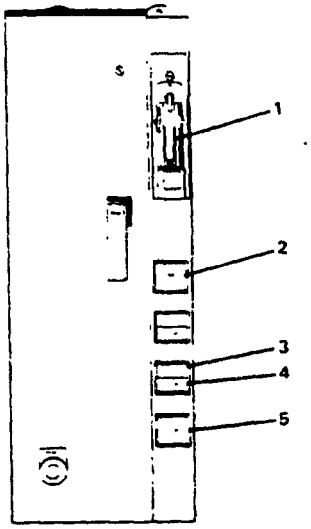
3 PAINT LKR STORE (6).

(d) *Main deck distribution panel no. 3 (Figure 2-379)*. Set FUSE BOX NO. 3 MAIN DECK REHTRS circuit breaker to OFF position.



1. ON-OFF SWITCH
2. MOTOR RUN INDICATOR
3. POWER AVAILABLE INDICATOR

Figure 2-384. Workshop Exhaust Fan Motor Controller.



1. ON-OFF SWITCH
2. POWER AVAILABLE
3. FAST LIGHT
4. SLOW LIGHT
5. STOP SWITCH

Figure 2-385. Supply and Exhaust Fan Motor Controller.

2-41. Compressed Air System Shutdown.

a. *Secure Air Compressors*.

(1) *Air compressors*. On each air compressor motor controller (Figure 2-386), proceed as follows:

(a) Press STOP pushbutton (4).

(b) MOTOR RUN indicator (3) will go out.

(c) Set ON-OFF switch (1) to OFF position.

(d) POWER AVAILABLE indicator (2) will go out.

b. *Secure Valves (Figure 2-387)*. Close the following valves:

(1) CA-39, SVCE AIR TK INL (7).

(2) CA-40, SVCE AIR TK INL (8).

(3) CA-13, SVCE AIR TK INL (5).

(4) CA-51, AUTO DR-SSA RCVR (6).

(5) CA-1, COV-COMPR DISCH (4).

(6) CA-2, COV-COMPR DISCH (4).

(7) CA-14, SSA RCVR OUTLET (3).

(8) CA-4, STG AIR TK OUT (1).

(9) CA-3, SYG AIR TK INL (2).

(10) In damage control center, close CA-10, WSTL AIR RCVR (9).

(11) Close air dryer valves (10 through 13).

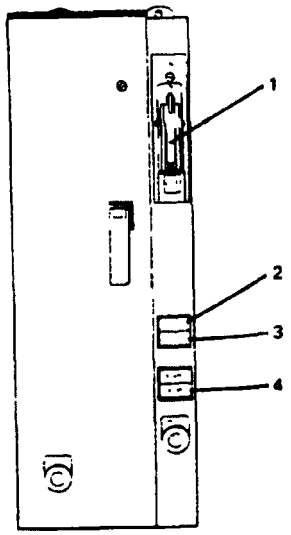
c. *Secure Electrical System*.

(1) On auxiliary machinery space no. 1 power panel no. 4 (Figure 2-388), set the following circuit breakers to the OFF position.

(a) #1 AIR COMPR. (1).

(b) #2 AIR COMPR. (2).

(2) On engine room distribution panel no. 4 (Figure 2-389), set AIR RCVR AUTO DRN/CONTROL AIR DRYER circuit breaker (1) to OFF position.



1. ON-OFF SWITCH
2. POWER AVAILABLE LIGHT
3. MOTOR RUN LIGHT
4. STOP SWITCH

Figure 2-386. Air Compressor Motor Controllers.

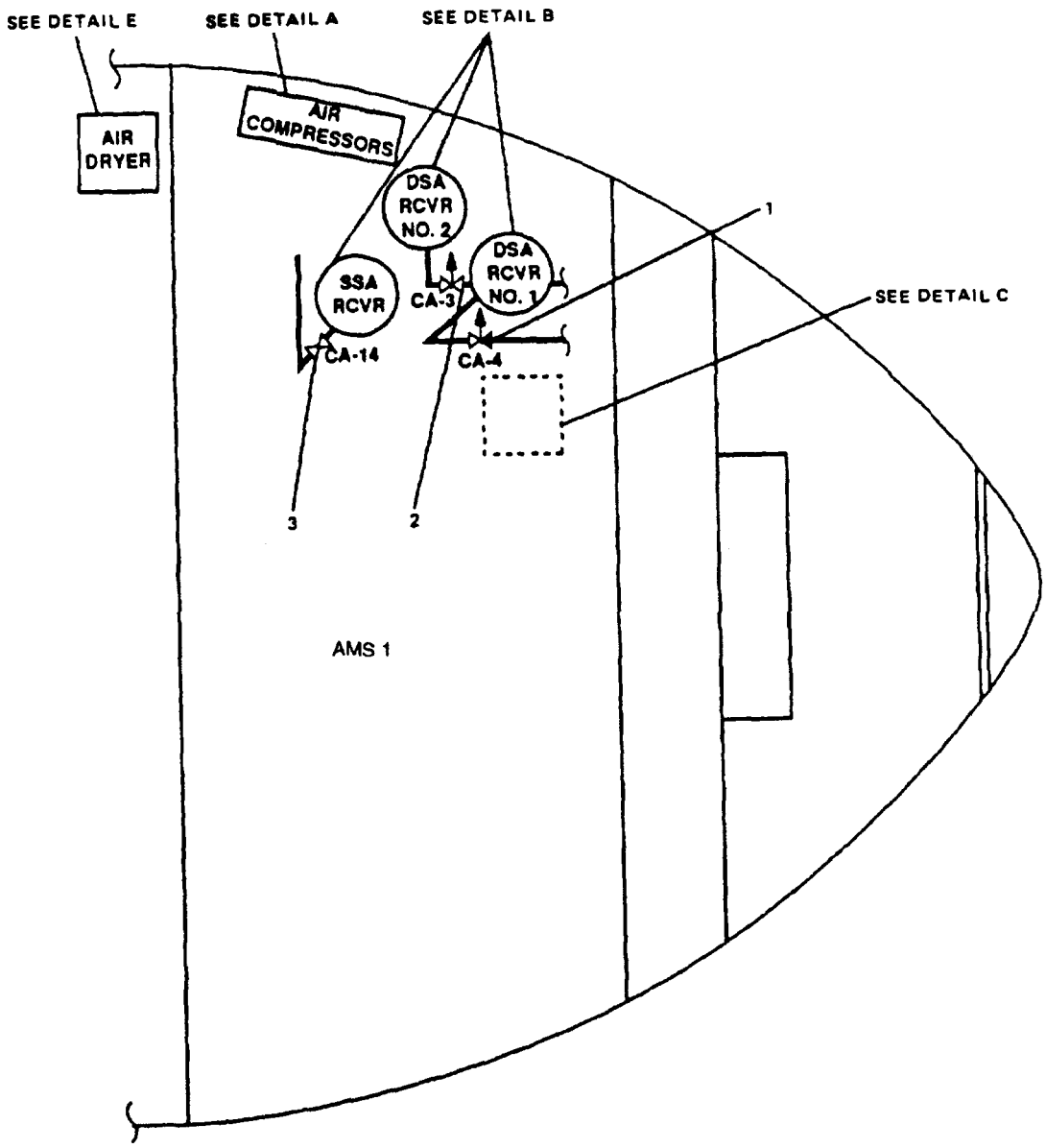
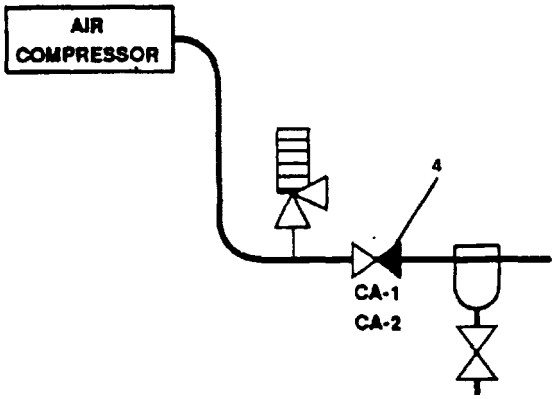
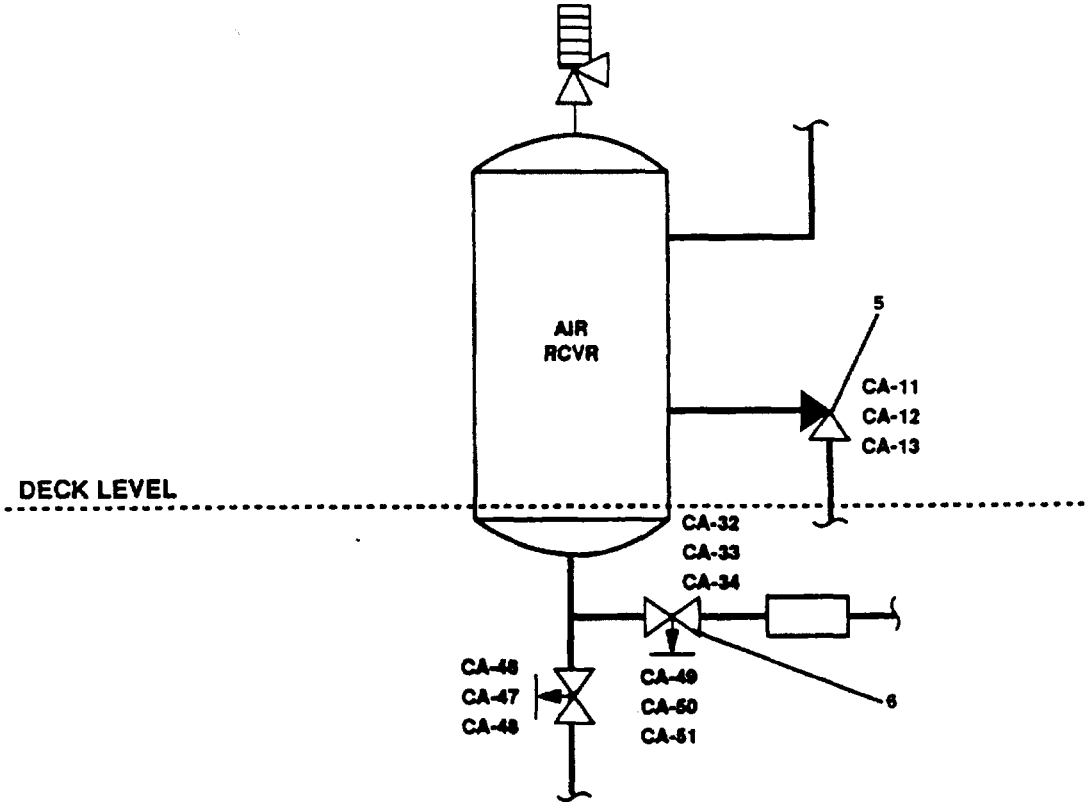


Figure 2-387. Compressor Air Valve Locations (Sheet 1 of 5).

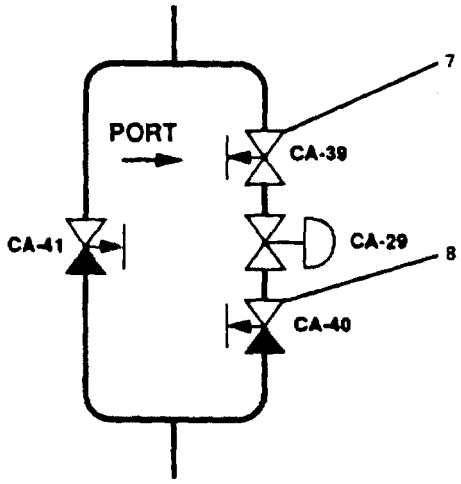


AIR COMPRESSOR OUTLET VALVE LOCATION
DETAIL A

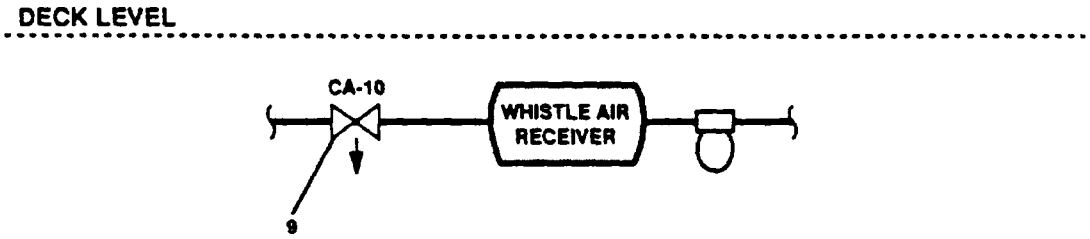


DETAIL B

Figure 2-387. Compressor Air Valve Locations (Sheet 2 of 5).



DETAIL C



DETAIL D

Figure 2-387. Compressor Air Valve Locations (Sheet 3 of 5).

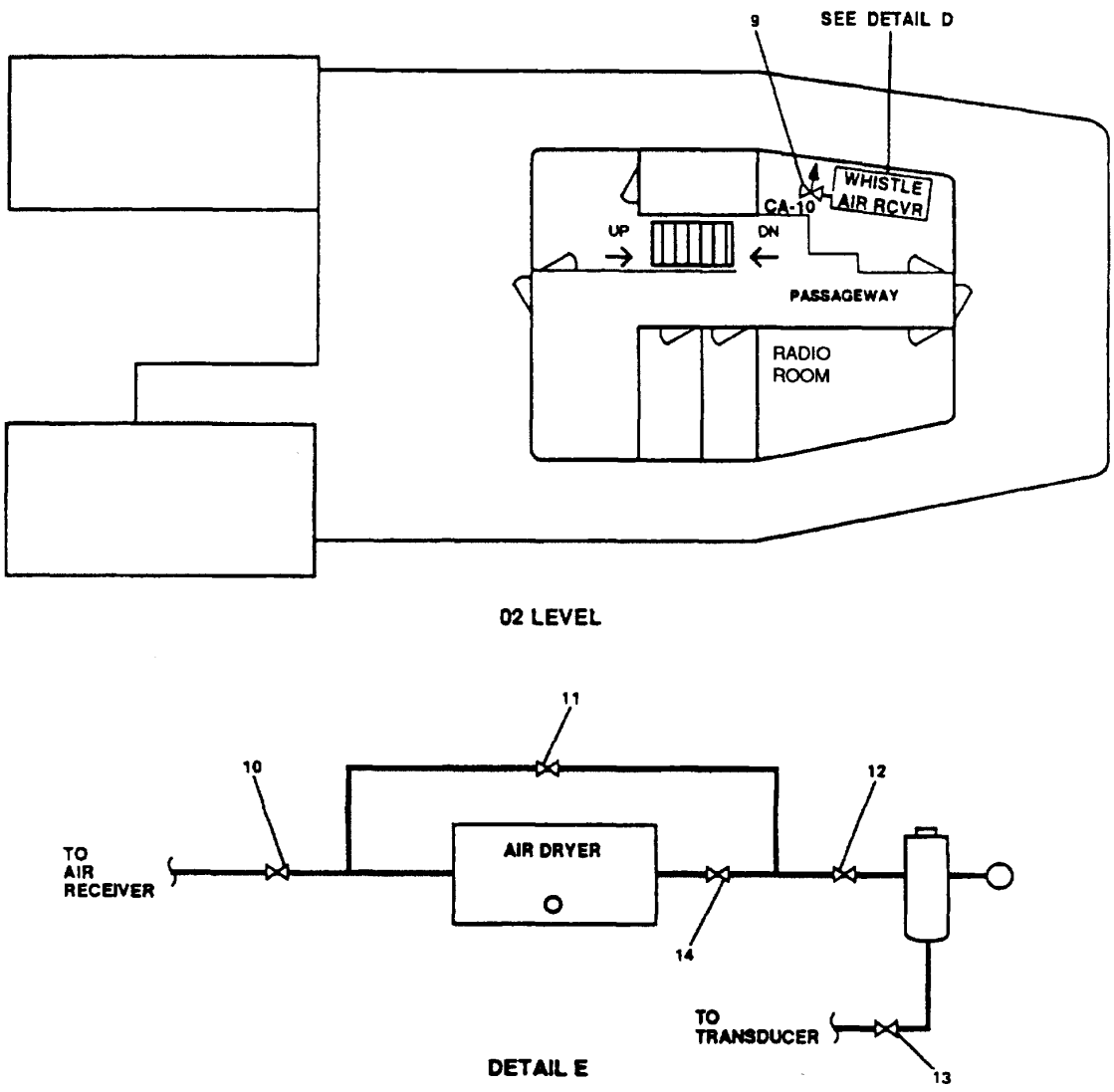


Figure 2-387. Compressor Air Valve Locations (Sheet 4 of 5).

SYMBOL LEGEND:

REMOTE VALVE OPERATOR

VALVE OVRHD

VALVE ABOVE DECK, BELOW OVRHD

VALVE AT OR BELOW DECK

1. CA-4, STG AIR TK OUT
2. CA-3, STG AIR TK OUT
3. CA-14, SSA RCVR OUTLET
4. [AIR COMPRESSOR NO. 1] CA-1, COV - COMPR DISCH
   [AIR COMPRESSOR NO. 2] CA-2, COV - COMPR DISCH
5. [DSA RCVR NO. 1] CA-11, STG AIR TK INL
   [DSA RCVR NO. 2] CA-12, STG AIR TK INL
   [SSA RCVR] CA-13, SVCE AIR TK INL
6. [DSA RCVR NO. 1] CA-49, AUTO DR
   [DSA RCVR NO. 2] CA-50, AUTO DR
   [SSA RCVR] CA-51, AUTO DR
7. CA-39, SVCE AIR TK INL
8. CA-40, SVCE AIR TK INL
9. CA-10 WSTL AIR RCVR
10.
11. } AIR DRYER VALVES
12.
13.

Figure 2-387. Compressor Air Valve Locations (Sheet 5 of 5).

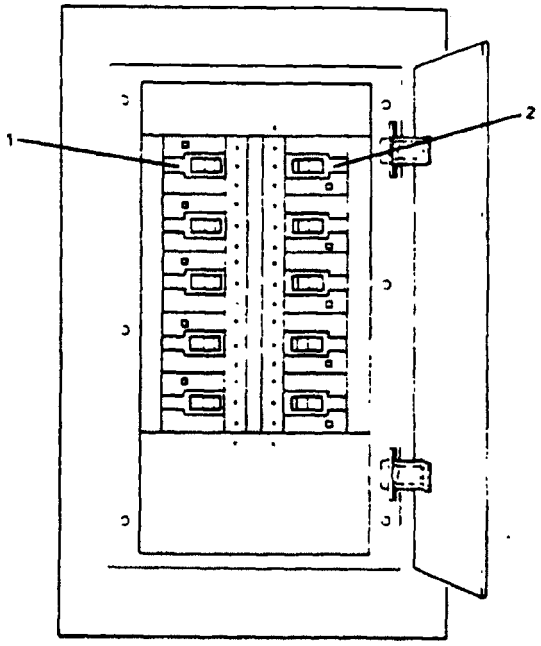


Figure 2-388. Auxiliary Machinery Space No. 1 Power Panel No. 4.

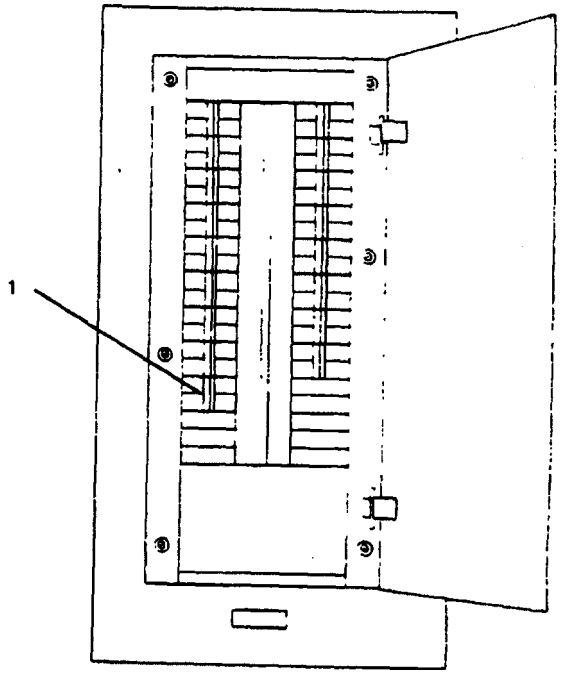


Figure 2-389. Engine Room Distribution Panel No. 4.

2-42. Firemain and General Service System Shutdown.

a. *Secure Electrical System.*

(1) *Fire and general service pump motor controllers (Figure 2-390).*

(a) Press STOP pushbutton (4).

(b) MOTOR RUN indicator (3) will go out.

(c) Set ON-OFF switch (1) to OFF position.

(d) POWER AVAILABLE indicator (2) will go out.

(2) *Main switchboard (Figure 2-391).* Set FIRE PUMP NO. 2 circuit breaker (1) to OFF position.

(3) *Emergency switchboard (Figure 2-392).* Set FIRE PUMP NO. 1 circuit breaker (1) to OFF position.

b. *Secure Piping System (Figure 2-393).* Close the following valves:

(1) FM-58, F STA NO. 12 (8).

(2) FM-14, FIRE/G.S. PMP NO. 2 DISCH. TO FM (9).

(3) FM-17, FIRE/G.S. PMP NO. 1 DISCH. TO G. S. (14).

(4) FM-93, NO. 1 FIRE/G.S. PMP. PRESS. DISCH. GAUGE (15).

(5) FM-16, FIRE/G.S. PMP NO. 1 DISCH. TO FM (12).

(6) FM-15, FIRE/G.S. PMP NO. 2 DISCH TO G. S. (16).

(7) FM-92, NO. 2 FIRE/G.S. PMP. PRESS. DISCH. GAUGE (17).

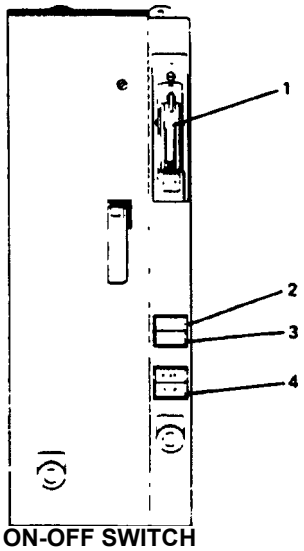
(8) FM-6, FIRE/G.S. PMP NO. 1 SUCT. (19).

(9) FM-7, FIRE/G.S. PMP NO. 2 SUCT. (18).

(10) FM-89, FF PMP. SUCT. STRNR. DIFF. PRESS. (20).

(11) FM-90, FF PMP. SUCT. STRNR. DIFF. PRESS. (21).

(12) FM-8, EMG. BILGE OVBD (13).



1. ON-OFF SWITCH
2. POWER AVAILABLE INDICATOR
3. MOTOR RUN INDICATOR
4. STOP PUSHBUTTON

Figure 2-390. Fire and General Service Pump MotorControllers.

(13) FM-2, SEA SUCT. FIRE/G.S. AND BLST. PMPS. (22).

(14) AE-29, SEA CHEST VENT (23).

(15) FM-3, S.W. TO BILGE/BLST. PMPS. (3).

(16) FM-55, F STA NO. 4 (5).

(17) FM-56, F STA NO. 9 (6).

(18) FM-59, F STA NO. 10 (7).

(19) FM-9, GENL. SERV. PRESS. RED. VLV. CO (11).

(20) GS-12, GENL. SERV. PRESS. RED. LV. CO (1).

(21) FS-91, GENL. SERV. PRESS. GAUGE located near GS-12 (1) in overhead.

(22) FM-10, GENL. SERV. PRESS. RED. VLV. MAN. BYPASS (10).

(23) GS-104, S.W. TO STERN TUBE SEAL (PORT).

(24) GS-105, S.W. TO STERN TUBE SEAL PRESS (STBD).

(25) GS-42, COV-ST TUBE SEAL P (2).

(26) GS-43, COV-ST TUBE SEAL S (4).

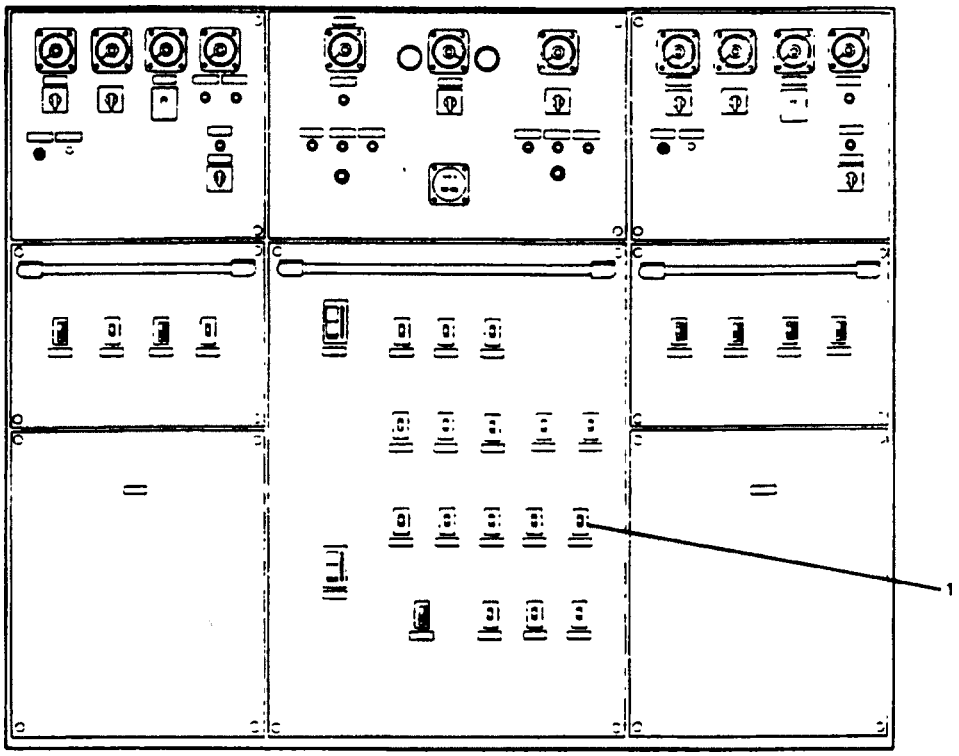
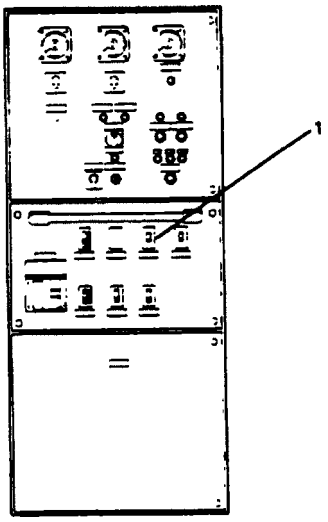


Figure 2-391. Main Switchboard.



1. FIRE PUMP NO. 1

Figure 2-392. Emergency Switchboard.

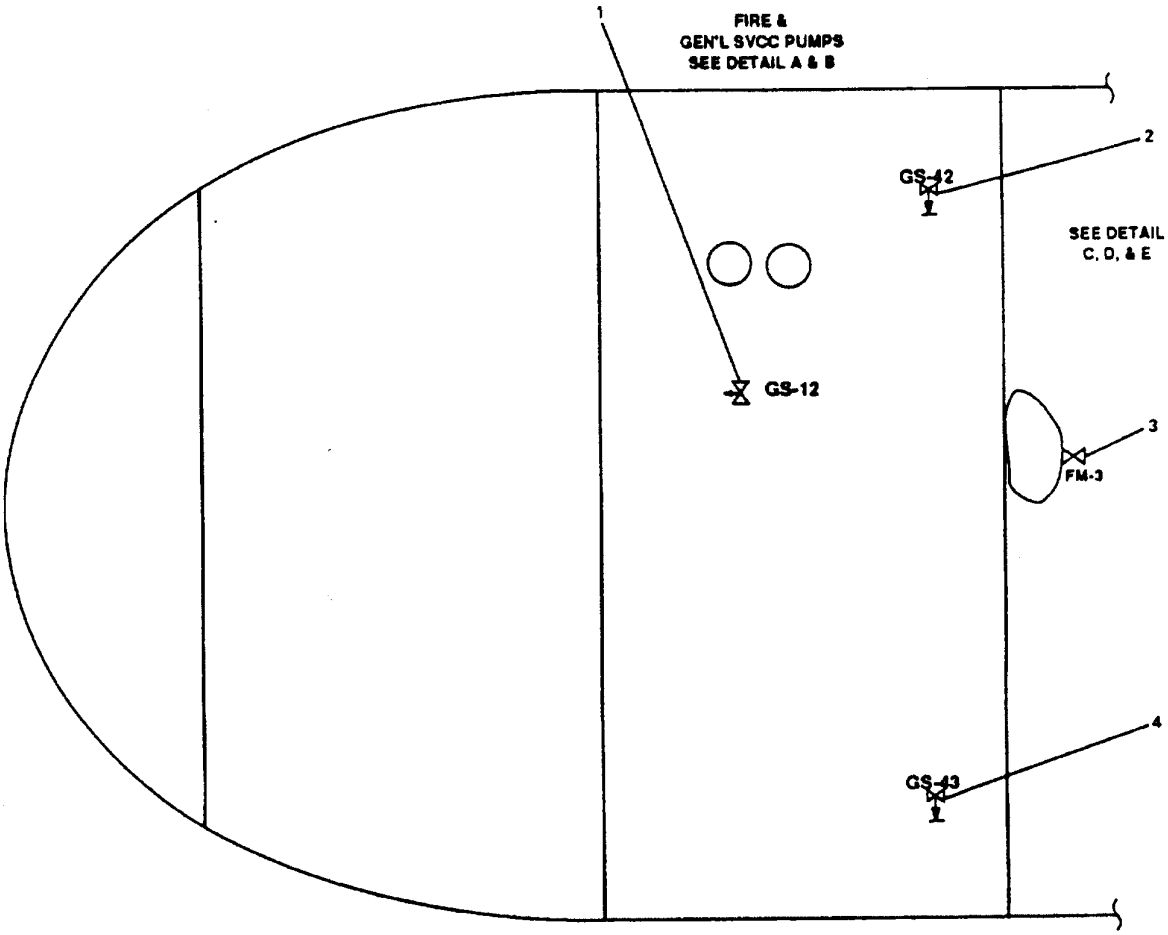
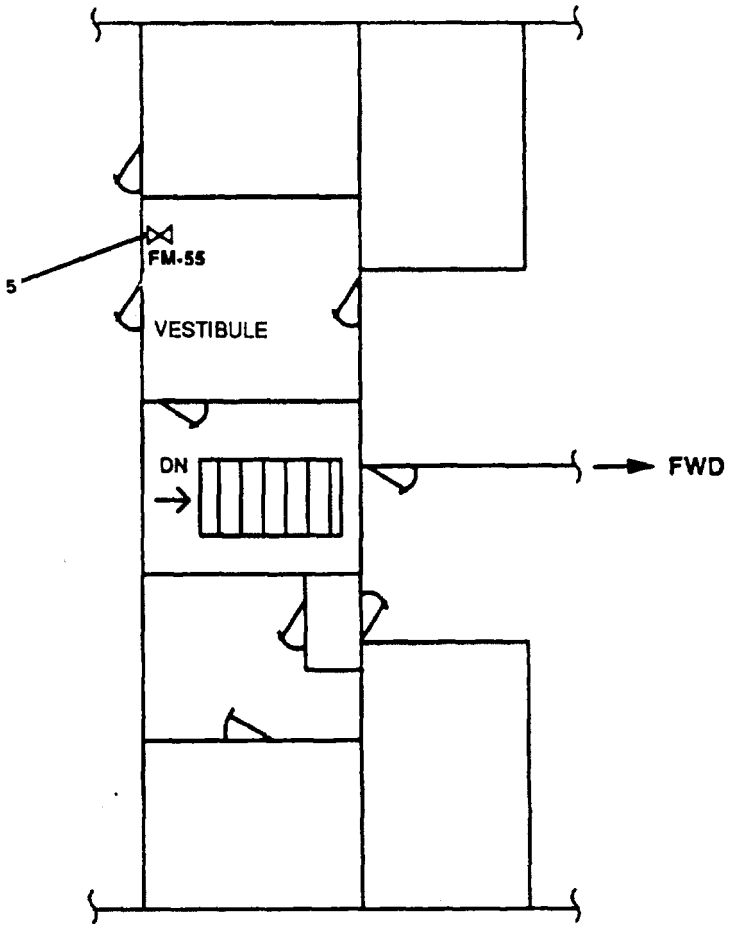


Figure 2-393. Fire and General Service System Valve Locations (Sheet 1 of 6).



MAIN DECK

Figure 2-393. Fire and General Service System Valve Locations (Sheet 2 of 6).

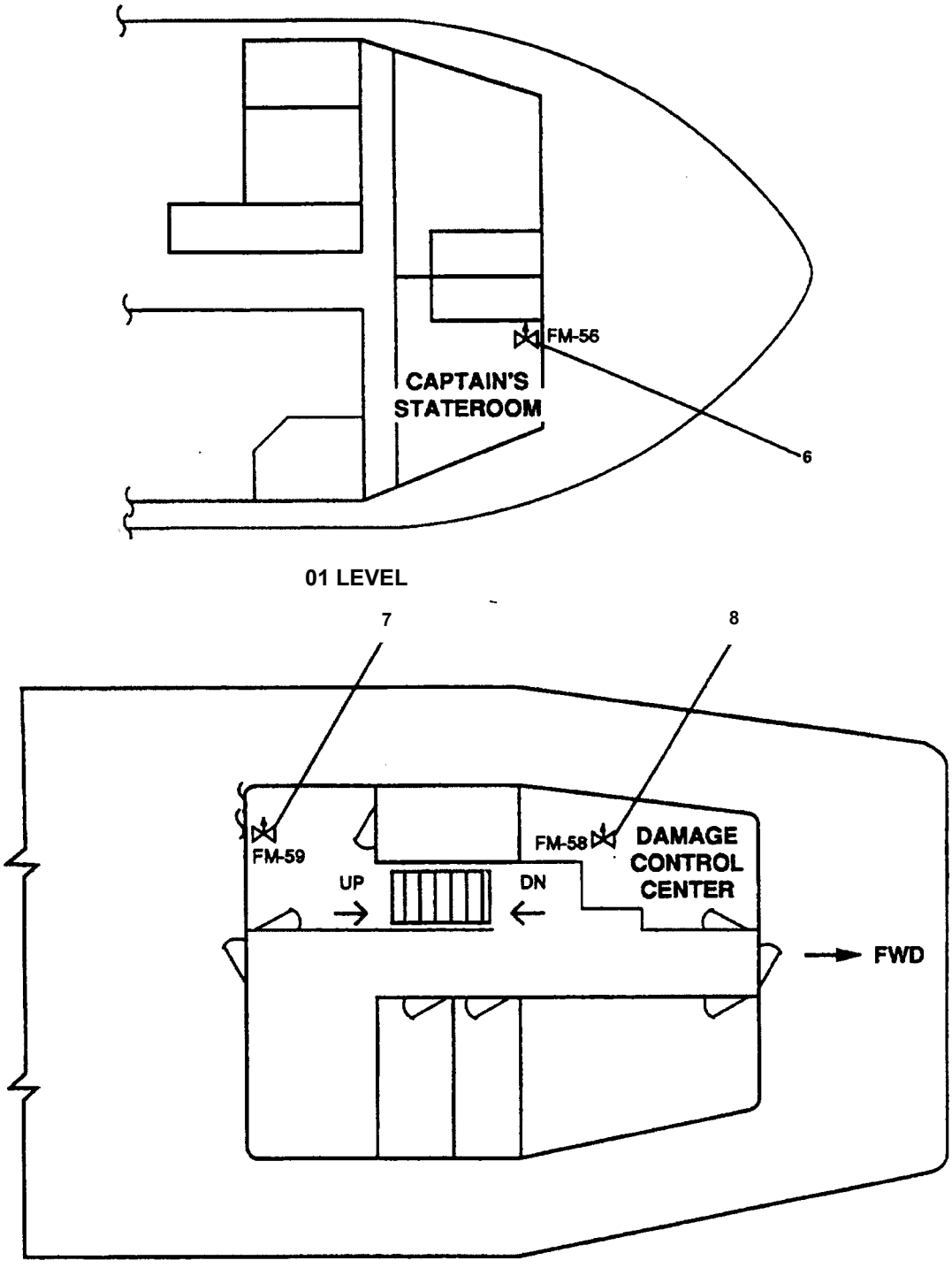


Figure 2-393. Fire and General Service System Valve Locations (Sheet 3 of 6).

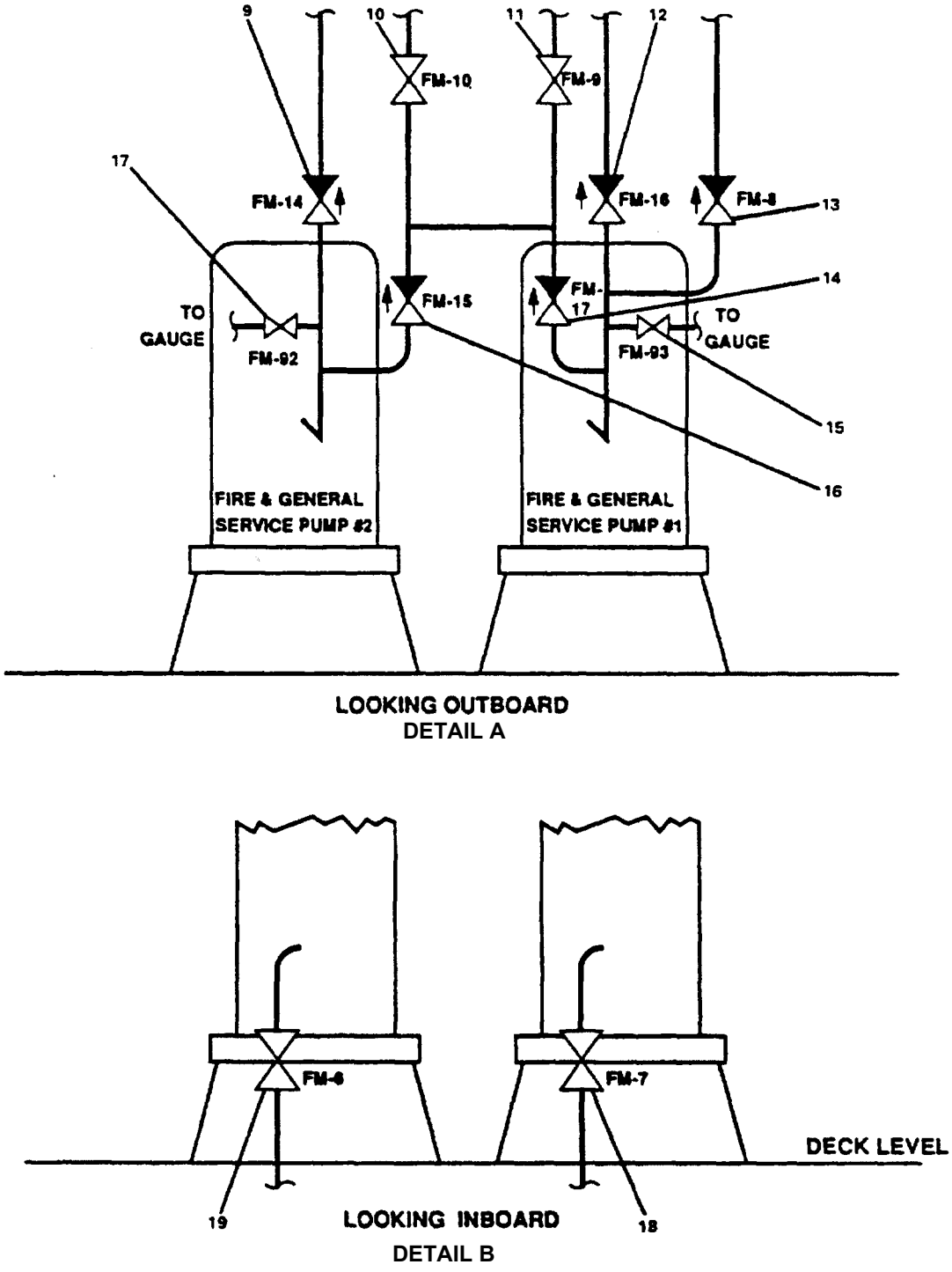
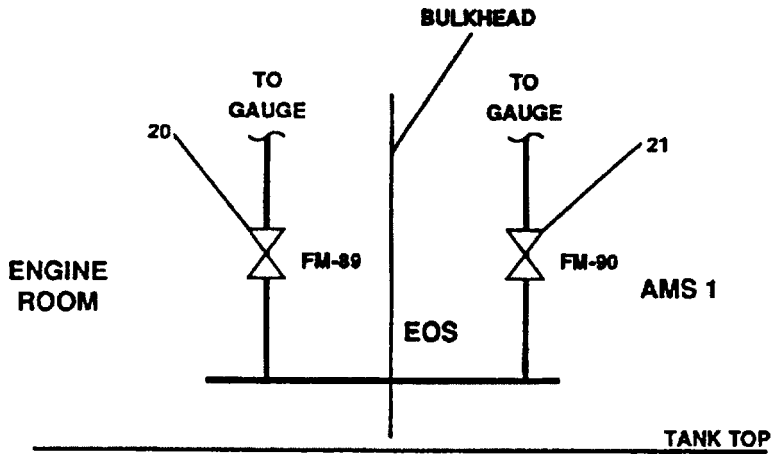
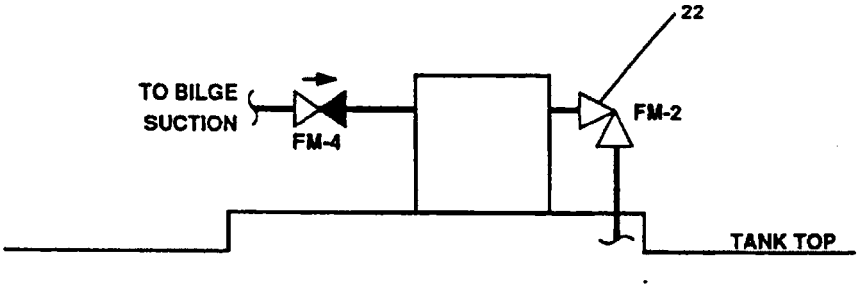


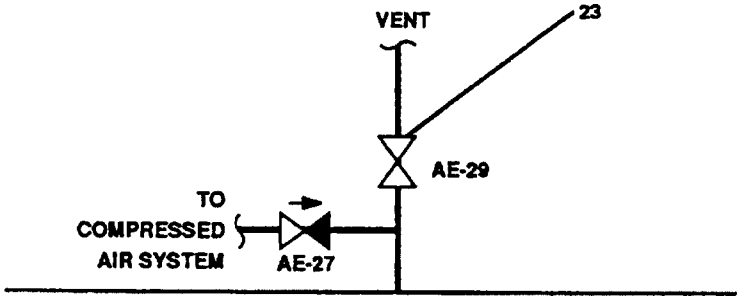
Figure 2-393. Fire and General Service System Valve Locations (Sheet 4 of 6).



LOOKING INBOARD
DETAIL C



LOOKING AFT
DETAIL D



DETAIL E

Figure 2-393. Fire and General Service System Valve Locations (Sheet 5 of 6).

1. GS-12, GENL SERV PRESS RED VLV CO
2. GS-42, COV - ST TUBE SEAL P
3. FM-3, S.W. TO BILGE/BLST. PMPS.
4. GS-43, COV - ST TUBE SEAL S
5. FM-55, F STA NO 4
6. FM-56, F STA NO 9
7. FM-59, F STA NO 10
8. FM-58, F STA NO 12
9. FM-14, FIRE/G.S. PMP. NO. 2 DISCH TO FM.
10. FM-10, GENL. SERV. PRESS. RED. VLV. MAN. BYPASS
11. FM-9, GENL. SERV. PRESS. RED. VLV. CO
12. FM-16, FIRE/G.S. PMP. NO 1 DISCH TO FM.
13. FM-8, EMG. BILGE OVBD
14. FM-17, FIRE/G.S. PMP. NO 1 DISCH. TO G.S.
15. FM-93, NO 1 FIRE/G.S. PMP. PRESS. DISCH. GAUGE
16. FM-15, FIRE/G.S. PMP. NO. 2 DISCH. TO G.S.
17. FM-92, NO 2 FIRE/G.S. PMP. PRESS. DISCH. GAUGE
18. FM-7, FIRE/G.S. PMP. NO 2 SUCT.
19. FM-6, FIRE/G.S. PMP. NO 1 SUCT.
20. FM-89, FF PMP. SUCT. STRNR. DIFF. PRESS.
21. FM-90, FF PMP. SUCT. STRNR. DIFF. PRESS.
22. FM-2, SEA SUCT. FIRE/G.S. AND BLST. PMPS.
23. AE-29, SEA CHEST VENT

Figure 2-393. Fire and General Service System Valve Locations (Sheet 6 of 6).

2-43. Emergency Generator and Switchboard Shutdown.

a. *Emergency Switchboard Shutdown.*

(1) On emergency switchboard (Figure 2-394) perform the following:

NOTE

Emergency generator should be in standby (AUTO) mode.

(a) Set ENG. CONTROL switch (4) to OFF position.

(b) Set EMG GENERATOR circuit breaker (3) to OPEN position.

(c) Set AMMETER switch (2) to OFF position.

(d) Set VOLTMETER switch (1) to OFF position.

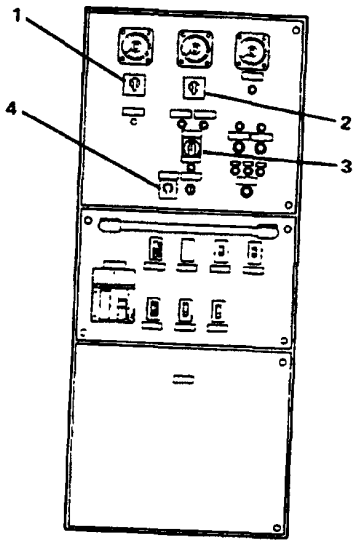
(e) Set all circuit breakers to OFF position.

b. *Emergency Diesel Generator Shutdown (Figure 2-395).*

(1) Push in START/STOP pushbutton (1).

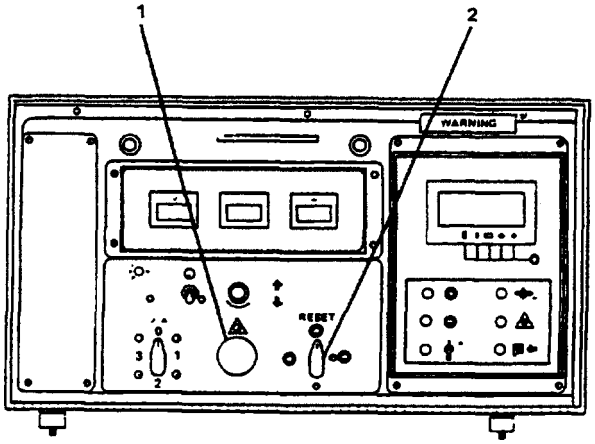
(2) Set RESET control switch (2) to RESET position.

(3) Close FO-12 and FO-32 (located on EDG room).



1. VOLTMETER SWITCH
2. AMMETER SWITCH
3. EMG GENERATOR CKT BKR
4. ENG. CONTROL SWITCH

Figure 2-394. Emergency Switchboard.



1. START/STOP PUSHBUTTON
2. RESET CONTROL SWITCH

Figure 2-395. Emergency Diesel Generator Control Panel.

2-44. Ship Service Diesel Generator Shutdown.

NOTE

This procedure assumes both SSDGs are operating in parallel. Select either subparagraphs a. or b. to remove the desired SSDG from load. If only one generator is operating, skip subparagraphs a. and b. below and proceed starting with subparagraph c. Shutdown SSDGs with no-load as described in subparagraph d. below.

a. *Remove SSDG # 1 from load.*

CAUTION

Ensure the total load does not exceed the capacity of SSDG #2. Damage to SSDG #2 could result.

(1) *Reduce the load.* Set all non-essential circuit breakers to OFF position.

(2) *Transfer the load.*

(a) *Set-up instrumentation (Figure 2-396).*

1 Set BUS GENERATOR 1 switch (11) to 1-2, 2-3, or 3-1 position.

2 Set AC AMMETER switch (9) to 1, 2, or 3 position.

3 Set BUS GENERATOR 2 switch (1) to 1-2, 2-3, or 3-1 position.

4 Set AC AMMETER switch (16) to 1, 2, or 3 position.

(b) *Transfer the load.*

CAUTION

Do not make one large adjustment to load sharing; instead make several small adjustments. Transferring too large a load could cause power failure or damage to SSDG #2.

1 Position GENERATOR 2 GOVERNOR control (14) towards RAISE position.

2 Position GENERATOR 1 GOVERNOR control (8) towards LOWER position.

NOTE

This will increase the load on SSDG #2 and reduce the load on SSDG #1.

3 Adjust voltage shown on AC VOLTS (2), as necessary, using GENERATOR 2 AUTO. VOLT. RHEO. control (15).

4 Adjust voltage shown on AC VOLTS (5), as necessary, using GENERATOR 1 AUTO. VOLT. RHEO. control (12).

5 Repeat steps 1 through 4 above until AC AMPERES meter (6) reads at or near 0.

NOTE

Amperage may never go to 0 due to circulating current.

(c) *Take SSDG # 1 off-line.*

CAUTION

AC AMPERES meter must read at or near 0. Damage to SSDG #2 could result.

1 Set GENERATOR 1 CIRCUIT BREAKER (10) to OPEN position.

2 Observe AC VOLTS meter (2). Adjust voltage to 450 using GENERATOR 2 AUTO. VOLT. RHEO. (15).

3 Observe HERTZ meter (4). Adjust frequency to 60 using GENERATOR 2 GOVERNOR control (14).

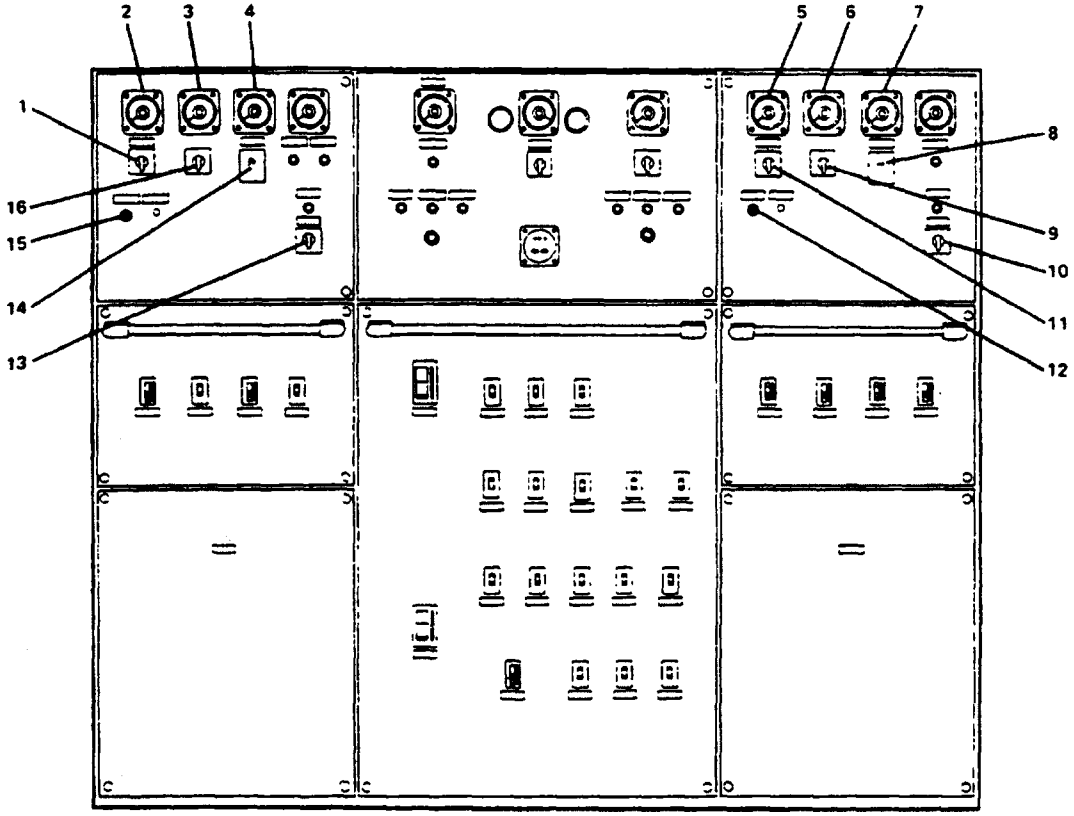
b. *Remove SSDG #2 from load.*

(1) *Reduce the load.* Set all non-essential circuit breakers to OFF position.

(2) *Transfer the load.*

CAUTION

Ensure the total load does not exceed the capacity of SSDG #1. Damage to SSDG # 1 could result.



1. BUS GENERATOR 2
2. AC VOLTS
3. AC AMPERES
4. HERTZ
5. AC VOLTS
6. AC AMPERES
7. HERTZ
8. GENERATOR 1 GOVERNOR
9. AMMETER
10. GENERATOR 1 CIRCUIT BREAKER
11. BUS GENERATOR 1
12. GENERATOR 1 AUTO. VOLT RHEO.
13. GENERATOR 2 CIRCUIT BREAKER
14. GENERATOR 2 GOVERNOR
15. GENERATOR 2 AUTO. VOLT RHEO.
16. AMMETER

Figure 2-396. Main Switchboard.

(a) *Set up instrumentation*.

1 Set BUS GENERATOR 1 switch (11) to 1-2, 2-3, or 3-1 position.

2 Set AC AMPERES switch (6) to 1, 2, or 3 position.

3 Set BUS GENERATOR 2 switch (1) to 1-2, 2-3, or 3-1 position.

4 Set AC AMMETER switch (16) to 1, 2, or 3 position.

(b) *Transfer the load*.

CAUTION

Do not make one large adjustment to load sharing; instead make several small adjustments. Transferring too large a load could cause power failure or damage to SSDG # 1.

1 Position GENERATOR 1 GOVERNOR control (8) towards RAISE position.

2 Position GENERATOR 2 GOVERNOR control (14) towards LOWER position.

NOTE

This will increase the load on SSDG #1 and reduce the load on SSDG #2.

3 Adjust voltage shown on AC VOLTS (5), as necessary, using GENERATOR 1 AUTO. VOLT. RHEO. control (12).

4 Adjust voltage shown on AC VOLTS (2), as necessary, using GENERATOR 2 AUTO. VOLT. RHEO. control (15).

5 Repeat steps 1 through 4 above until AC AMPERES meter (3) reads at or near 0.

NOTE

Amperage may never go to 0 due to circulating current.

(c) *Take SSDG #2 off-line*.

CAUTION

AC AMPERES meter must read at or near 0. Damage to SSDG # 1 could result.

1 Set GENERATOR 2 CIRCUIT BREAKER (13) to OPEN position.

2 Observe AC VOLTS meter (5). Adjust voltage to 460 using GENERATOR 1 AUTO. VOLT. RHEO. (12).

3 Observe HERTZ meter (7). Adjust frequency to 60 using GENERATOR 1 GOVERNOR control (8).

c. *Shut Down Single Generator*.

(1) *Reduce the load*. Reduce the load gradually by setting circuit breakers to OFF position.

(2) *Shift to shore power (paragraph 2-36)*.

(3) *Remove the load*.

(a) SSDG #1. Set GENERATOR 1 CIRCUIT BREAKER (10) to OPEN position.

(b) SSDG #2. Set GENERATOR 2 CIRCUIT BREAKER (13) to OPEN position.

d. Shutdown SSDG Engine (Figure 2-397).

CAUTION

Stopping engine without proper cooldown can result in damage to engine.

(1) *Cool down engine*. Allow engine to idle for at least 17 minutes to allow cooling water to remove excess heat.

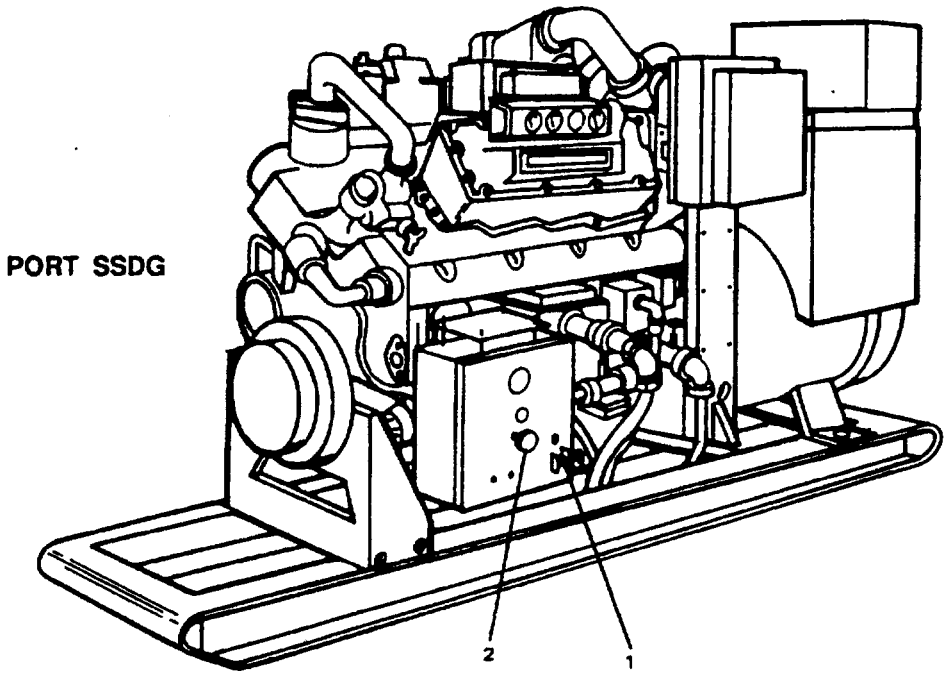
NOTE

SSDGs can be stopped remotely by pressing SSDG No. 1 or SSDG No. 2 stop pushbutton on the EOS console.

(2) *Stop engine*.

(a) Move toggle switch (1) to off (DOWN) position (port SSDG).

(b) Turn start/stop switch (3) to OFF position (STBD SSDG).



1. TOGGLE SWITCH (START)
2. PORT START/STOP PUSHBUTTON
3. START/STOP SWITCH
4. STBD START/STOP PUSHBUTTON

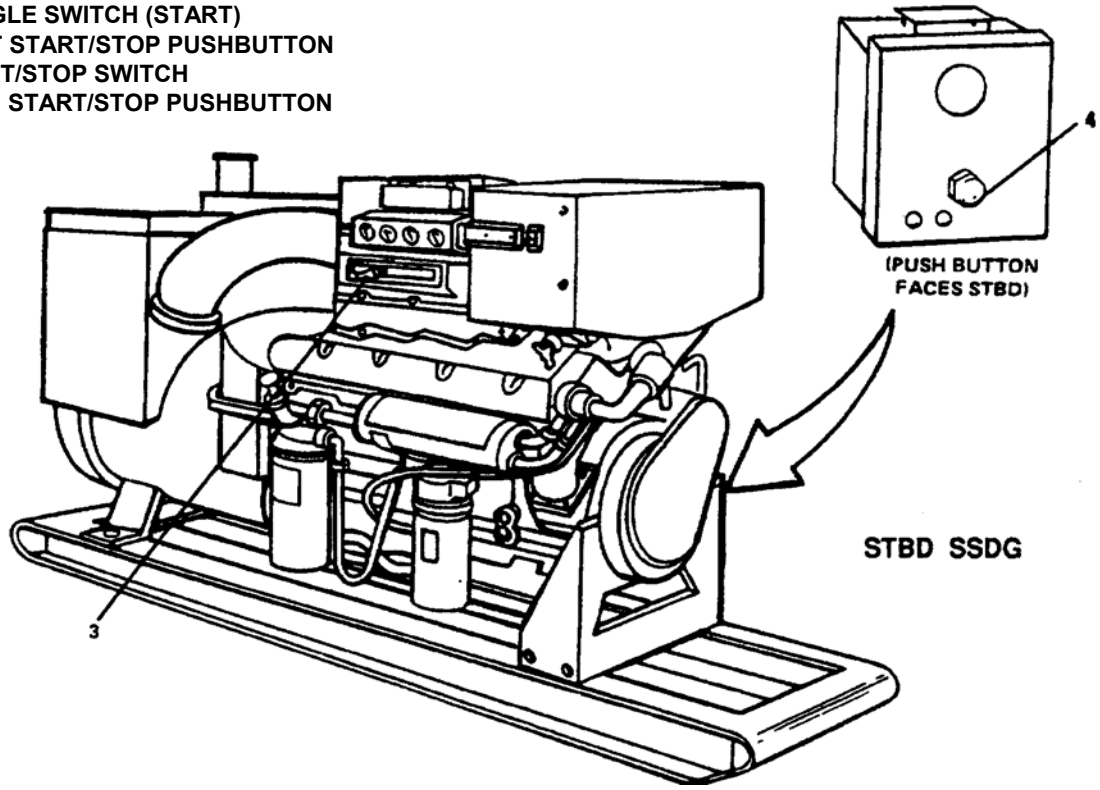


Figure 2-397. SSDG Engine Controls.

(3) Push in START/STOP pushbutton (PORT S.S.D.G.) (2).

(4) Push in START/STOP pushbutton (STBD S.S.D.G.) (4).

(5) Secure fuel oil system (Figure 2-398).

CAUTION

Follow procedures below for engines which are shut down. Severe damage could result if engine has not been shut down.

(a) *SSDG engine #1*. Close the following valves:

1 Fuel oil filter outlet valve.

2 Fuel oil filter inlet valve.

3 FO-35, F.O. RTN. TO DAY TK. STBD (11).

4 FO-21, F.O. SPLY TO S.S.D.G. NO. 1 (7).

5 FO-15, F.O. SERV. SUCT. STBD (10).

(b) *SSDG engine #2*. Close the following valves:

1 Fuel oil filter outlet valve.

2 Fuel oil filter inlet valve.

3 FO-22, F.O. SPLY TO S.S.D.G. NO. 2 (5).

4 FO-13, F.O. SERV. SUCT. PORT (2).

5 FO-33, F.O. RTN. TO DAY TK. PORT (1).

(5) *Secure fresh water cooling system*.

(a) *SSDG engine # 1*. Close the following valves:

1 FWC-11, F.W. FR. S.S.D.G. NO. 1 TO KEEL CLR. (9).

2 FWC-9, F.W. FR. KEEL CLR. TO S.S.D.G. NO. 1 (8).

(b) *SSDG engine #2*. Close the following valves:

1 FWC-12, F.W. FR. S.S.D.G. NO. 2 TO KEEL CLR. (3).

2 FWC-10, F.W. FR. KEEL CLR. TO S.S.D.G. NO. 2 (4).

(6) *Secure compressed air piping system*. Close CA-7, STG AIR TO DSL GEN (6).

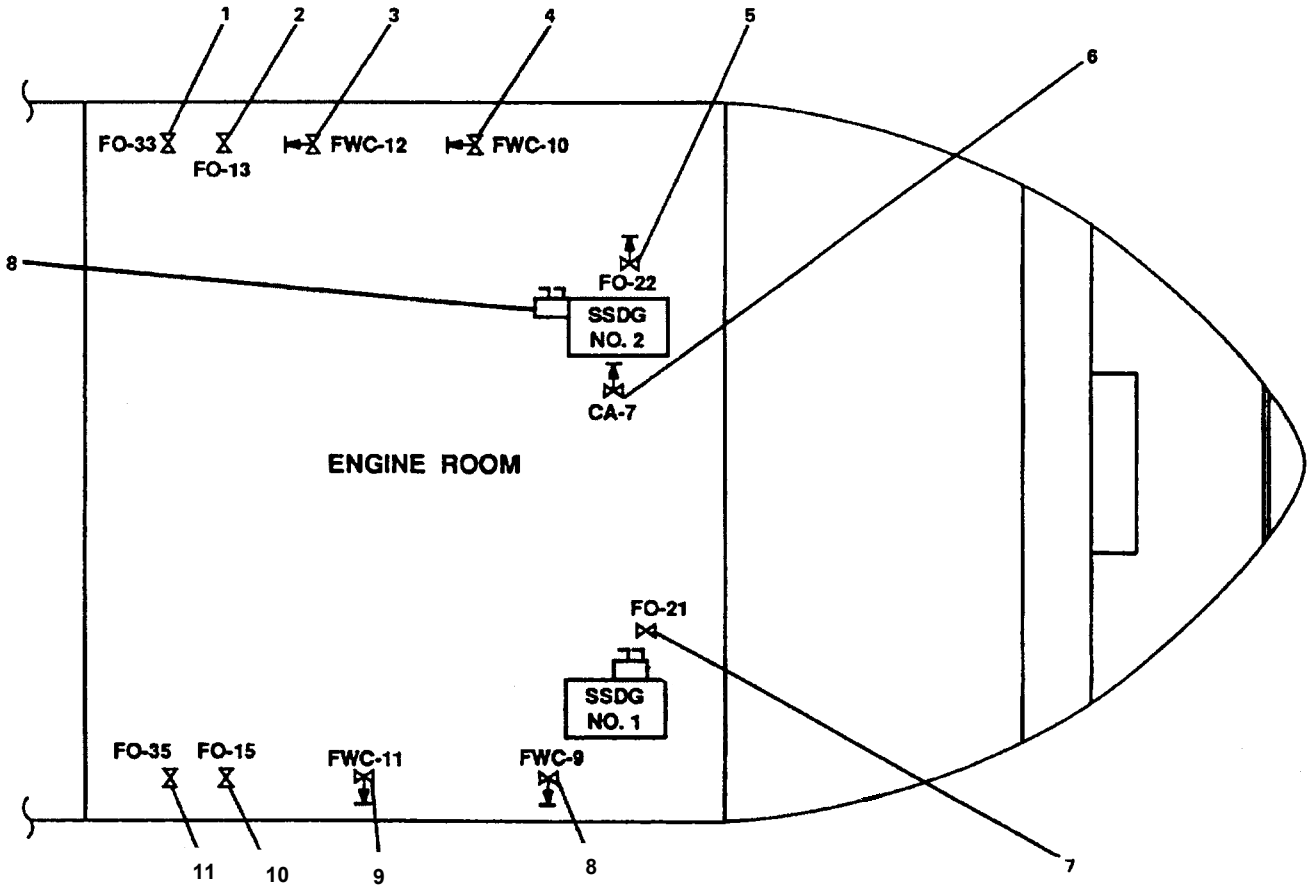
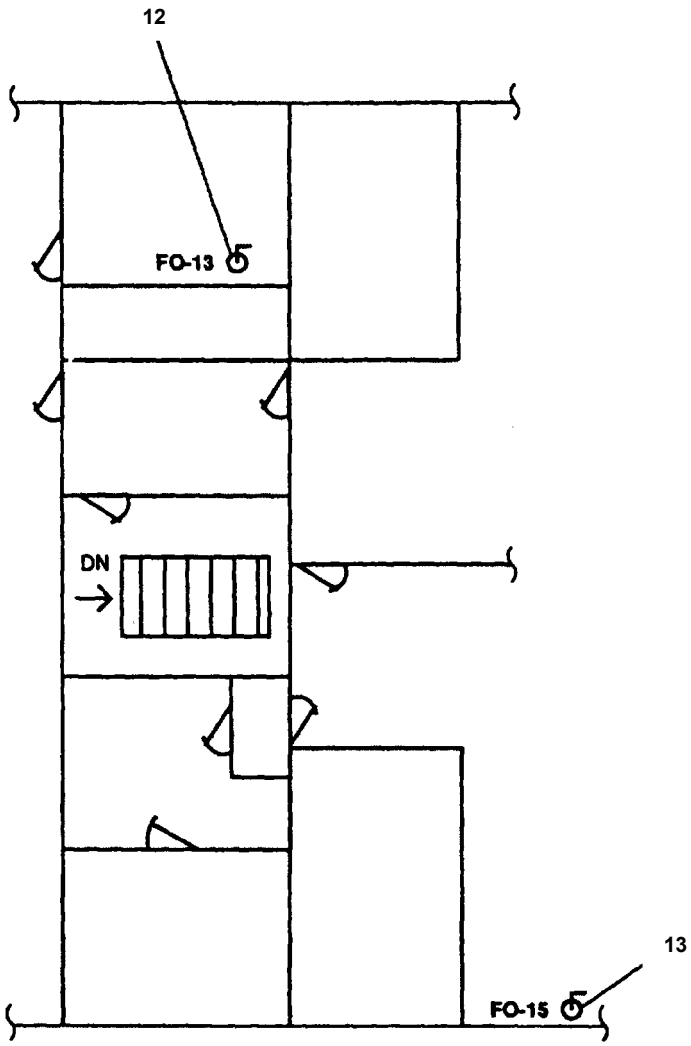


Figure 2-398. SSDG Valve Locations (Sheet 1 of 2).



MAIN DECK

SYMBOL LEGEND:

REMOTE VALVE OPERATOR

VALVE OVRHD

VALVE ABOVE DECK, BELOW OVRHD

VALVE AT OR BELOW DECK

1. FO-33, F.O. RTN. TO DAY TK. PORT
2. FO-13, F.O. SERV. SUCT. PORT
3. FWC-12, F.W. FR. S.S.D.G. NO. 2 TO KEEL CLR.
4. FWC-10, F.W. FR. KEEL CLR. TO S.S.D.G. NO. 2
5. FO-22, F.O. SPLY TO S.S.D.G. NO. 2
6. CA-7, STG AIR TO DSL GEN
7. FO-21, F.O. SPLY TO S.S.D.G. NO. 1
8. FWC-9, F.W. FR. KEEL CLR. TO S.S.D.G. NO. 1
9. FWC-11, F.W. FR. S.S.D.G. NO. 1 TO KEEL CLR.
10. FO-15, F.O. SERV. SUCT. STBD
11. FO-35, F.O. RTN TO DAY TK, STBD
12. REMOTE OPERATOR FOR FO-13
13. REMOTE OPERATOR FOR FO-15

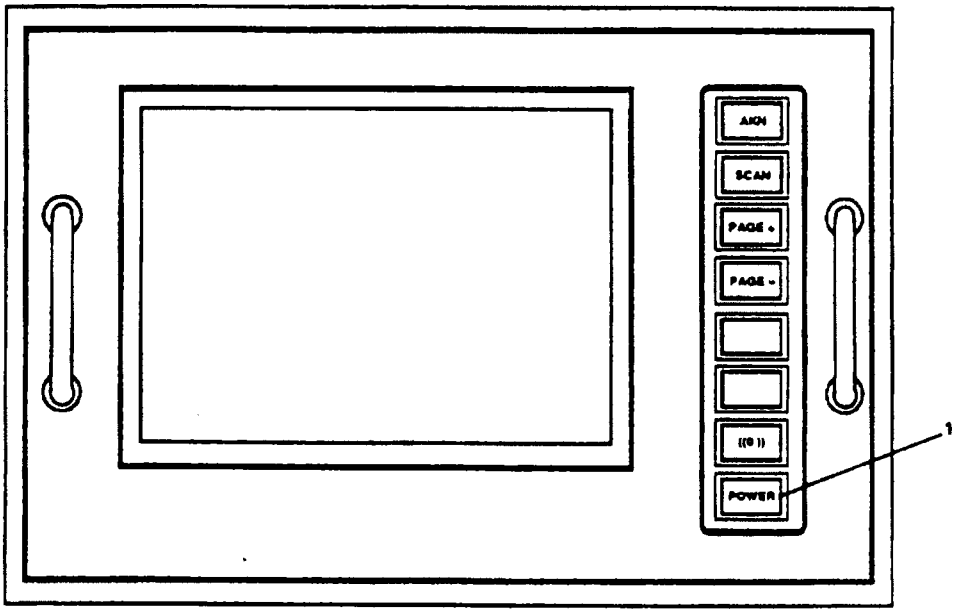
Figure 2-398. SSDG Valve Locations (Sheet 2 of 2).

2-45. Final Shutdown.

a. *Machinery Plant Monitor Panel (Figure 2-399)*. Set POWER switch (1) to OFF position.

b. *Main Switchboard (Figure 2-400)*. Set all circuit breakers to OFF position.

c. *Power Panels and Load Centers*. Set all circuit breakers to OFF position.



1. POWER SWITCH

Figure 2-399. Machinery Plant Monitor Panel.

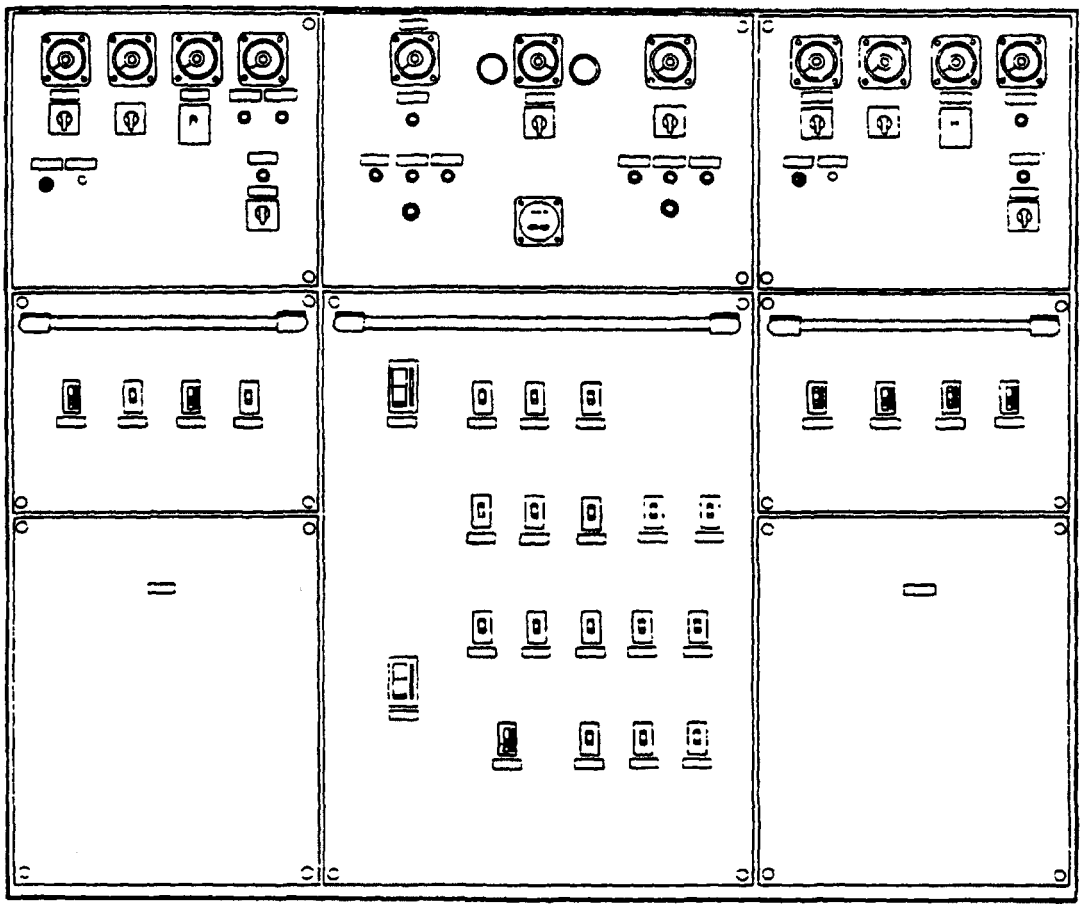


Figure 2-400. Main Switchboard.

2-46. Rigging the LT to Tow.

a. Refer to paragraph 2-32 for double drum tow winch operating procedures.

b. Refer to paragraph 2-28 for crane operating procedures.

c. Refer to US NAVY Towing Manual SL740-AAMAN-010 to rig the LT for tow.

SECTION IV. OPERATION UNDER UNUSUAL CONDITIONS

NOTE

Not applicable to Hull No. LT801, LT804 and LT805. Reference Para. 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment details and installation drawings.

2-47. General. This section contains operating procedures for individual equipment. Some procedures cover periods of partial or complete equipment failure; some cover periods of unusual weather conditions.

2-48. Power Generation. Normal power from the ship service diesel generator, through the main switchboard, keeps main and emergency switchboard bus tie circuit breakers closed. An interlock prevents the emergency generator circuit breaker from being closed. In the event of ship service power failure, the main switchboard and emergency switchboard bus tie circuit breakers will open. Simultaneously, several actions take place with the emergency diesel generator (EDG) aligned for automatic start:

A mechanical timer will start the emergency generator.

After the timer has delayed 20 seconds, emergency generator circuit breaker will close and power will be supplied to the emergency switchboard only.

a. *Alignment for Emergency Diesel Generator Auto Start*.

(1) Open fuel valve FO-32, FO SPLY TO EDG and FO-12.

(2) Emergency switchboard (Figure 2-401). Set ENG. CONTROL SW (3) to AUTO position.

(3) Emergency diesel generator control panel (Figure 2-401).

(a) Turn START/STOP pushbutton (2) clockwise to release pushbutton to OUT position.

(b) Set RESET control switch (1) to AUTO START position.

b. *Alignment for Emergency Diesel Generator Manual Start*.

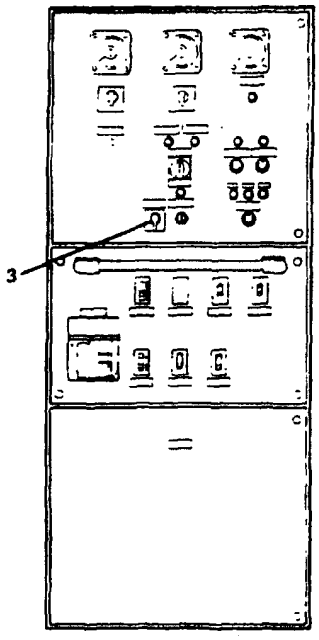
(1) Line up fuel system to allow engine to take suction from and return to EDG Day Tank by opening valve FO-32.

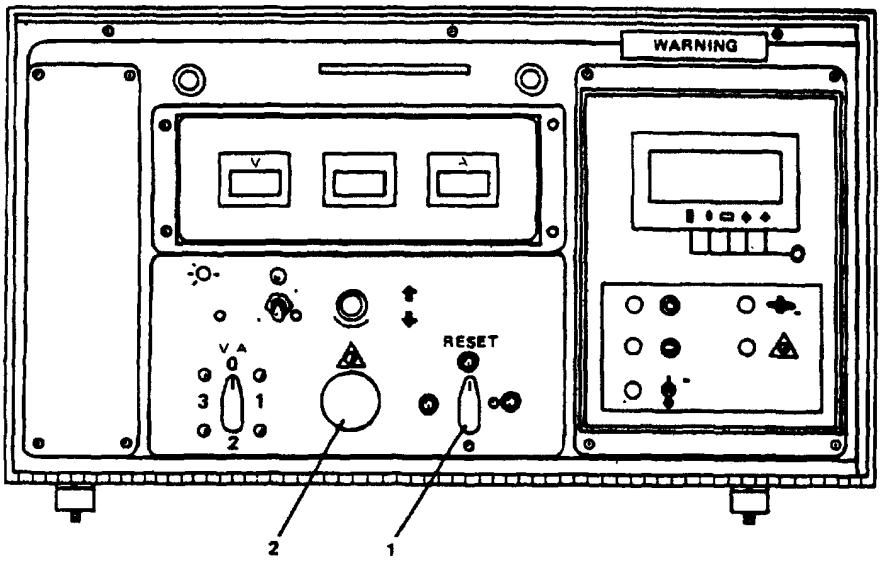
(2) Prime fuel oil system on engine. If necessary, use engine mounted hand pump.

NOTE

Either battery bank No. 1 or No. 2 may be used to start EDG. Both battery banks are continuously charged.

(3) Set emergency switchboard engine control switch (7, Figure 2-403) to HAND.





EMERGENCY SWITCHBOARD

EMERGENCY DIESEL GENERATOR CONTROL PANEL

1. RESET CONTROL SWITCH
2. RED START/STOP PUSHBUTTON
3. ENG. CONTROL SW SWITCH

Figure 2-401. Emergency Diesel Generator Control Panel.

(4) Release EMERGENCY STOP button (2, Figure 2-401) and turn engine panel switch (1) to RESET.

(5) Start engine by turning panel switch (1) to ENGINE START.

c. *Emergency Equipment Available*. When the emergency generator is supplying power to emergency switchboard, power may be supplied to the following equipment from the emergency switchboard:

(1) Bilge pump no. 1.

(2) Fire pump no. 1.

(3) 3-10KVA XFMRS to emergency load center distribution panel.

(4) Fuel oil transfer pump no. 1.

(5) Steering gear no. 1.

d. *Operate Main Switchboard on Emergency Power*.

CAUTION

Emergency power is only 65 kw compared to 275 kw normal power. Extreme care must be taken to prevent overloading emergency generator. Overloading emergency generator will seriously damage generator.

(1) *Prepare main switchboard (Figure 2-402)*. Set all circuit breakers to OFF position.

(2) *Feedback power to emergency switchboard (Figure 2-403)*. Insert key into BUS TIE BKR FEEDBACK SW (6) and set switch to FEEDBACK position. BUS TIE BKR SET FOR FEEDBACK indicator (8) will light.

e. *Secure Power Feedback*. *When* ship service diesel generator(s) are operating, proceed as follows:

(1) *Emergency switchboard (Figure 2-403)*. Insert key into BUS TIE BKR FEEDBACK SW (6) and set switch to NORMAL position. BUS TIE BKR SET FOR FEEDBACK indicator (8) will go out.

(2) *Main switchboard (Figure 2-402)*. Bring selected SSDG on line (see paragraphs 2-6 or 2-11).

(3) *Emergency switchboard (Figure 2-403)*.

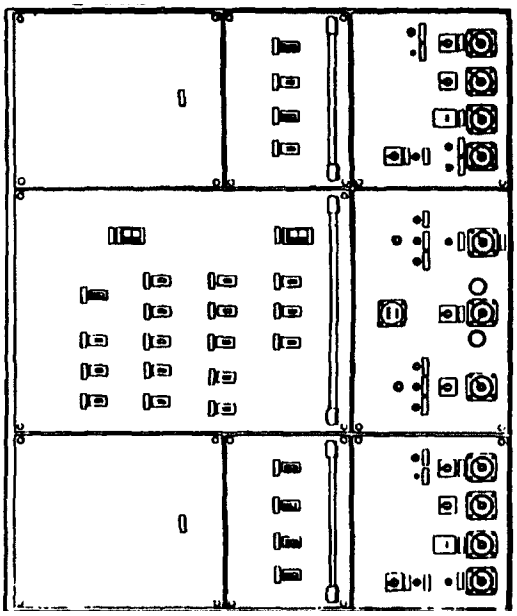


Figure 2-402. Main Switchboard.

(a) Set EMG GENERATOR CIRCUIT BREAKER (9) to OPEN position. EMG GENERATOR CIRCUIT BREAKER OPEN indicator (10) will light and EMG GENERATOR CIRCUIT BREAKER CLOSE indicator (2) will go out.

(b) Set ENG. CONTROL SW. switch (7) to MAN position.

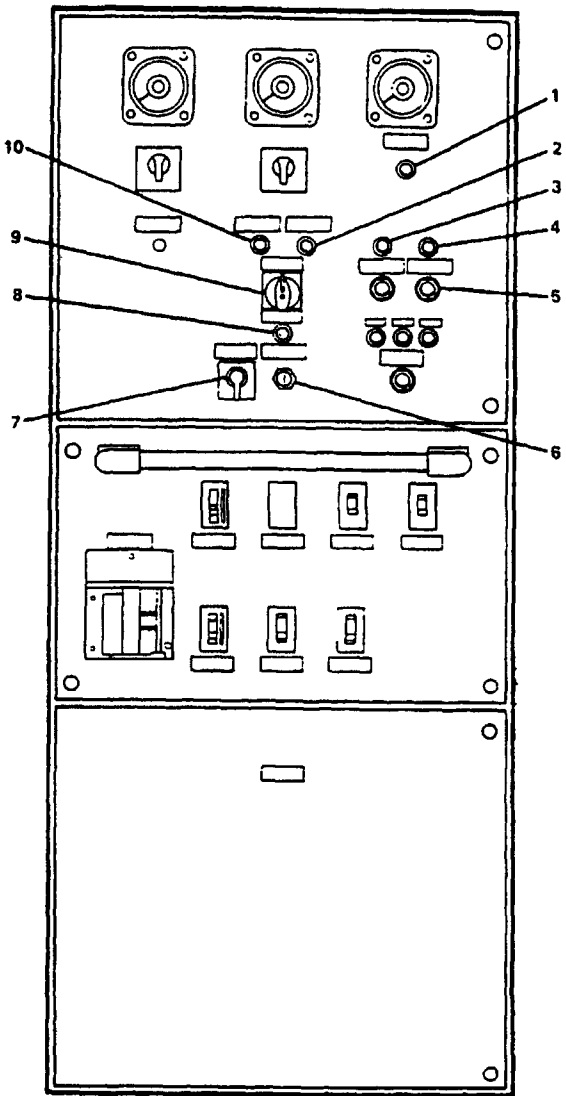
CAUTION

Allow generator set to operate at no load for 5 minutes to cool down. Damage to the engine will result if not allowed to properly cool down.

(c) Press MAIN SWBD BUS TIE CIRCUIT BREAKER CLOSED pushbutton (5). Indicator (4) will light. Indicator (3) will go out.

(d) Set ENG. CONTROL SW. (7) to OFF position. EMG GENERATOR POWER AVAILABLE indicator (1) will go out.

(e) After engine stops, set ENG. CONTROL SW. (7) to AUTO position.



1. **EMG GENERATOR POWER AVAILABLE**
2. **EMG GENERATOR CIRCUIT BREAKER CLOSE**
3. **MAIN SWBD BUS TIE CKT BKR OPEN INDICATOR**
4. **MAIN SWBD BUS TIE CKT BKR CLOSED INDICATOR**
5. **MAIN SWBD BUS TIE CKT BKR SWITCH**
6. **BUS TIE BKR FEEDBACK SW**
7. **ENG. CONTROL SW.**
8. **BUS TIE BKR SET FOR FEEDBACK INDICATOR**
9. **EMG GENERATOR CIRCUIT BREAKER**
10. **EMG GENERATOR CIRCUIT BREAKER OPEN INDICATOR**

Figure 2-403. Emergency Switchboard.

2-49. Gyrocompass System.

a. Align Electrical System.

(1) Pilothouse emergency distribution panel (Figure 2-404). Set the following circuit breakers to ON position:

(a) MK37 GYRO XMTR (1).

(b) MK27 GYRO COMPASS (2).

(2) Mk 37 Mod E transmission unit (Figure 2-405). Set OFF POWER switch (1) to UP position.

b. Heavy Sea Starting.

(1) Position RPTR switch (3, Figure 2-406) to OFF (down) and SELECTOR switch (6) to SLEW.

NOTE

The compass will slew rapidly if the gyro is caged.

(2) Note that the CAGED indicator (2) is lighted. If not, depress the CAGED BUTTON (9), located on top of binnacle, to cage gyro and wait 5 minutes for ballistic fluid to stabilize.

(3) Use the TILT AZIMUTH switch (7) to rotate the compass card to the approximate course of the ship. In the (+) position, the card rotates counterclockwise; in the (-) position, the card rotates clockwise.

NOTE

The compass card will move away from heading rapidly if a longer period than that indicated in the following steps is allowed between starting and uncaging. If possible, uncage when the ship is at the center of pitch or roll, so that the gyro will be released near a level position.

(4) Position the SELECTOR switch (6) to START. Wait 30 to 35 seconds, then depress CAGED BUTTON (9), located on top of the binnacle, and note that the CAGED indicator (2) extinguishes.

(5) Observe if the pointer on the LEVEL METER (4) swings equally about the zero point. If it does, proceed to the next step. If it does not, operate the TILT AZIMUTH switch (7) in the direction of the required tilt correction until equal travel about the zero point is obtained.

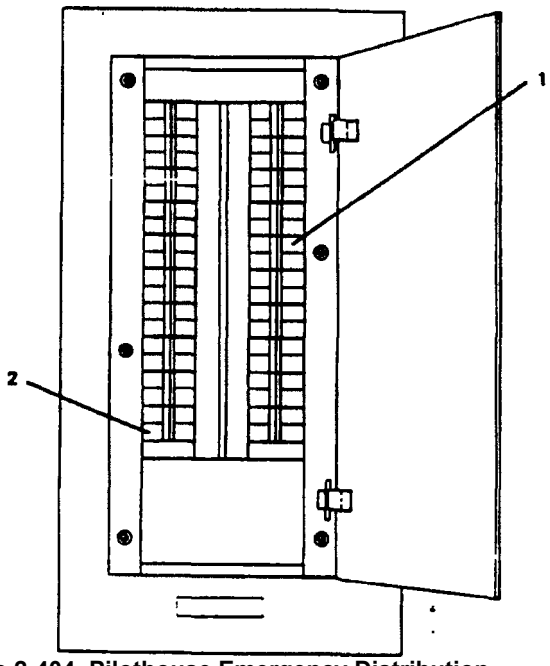
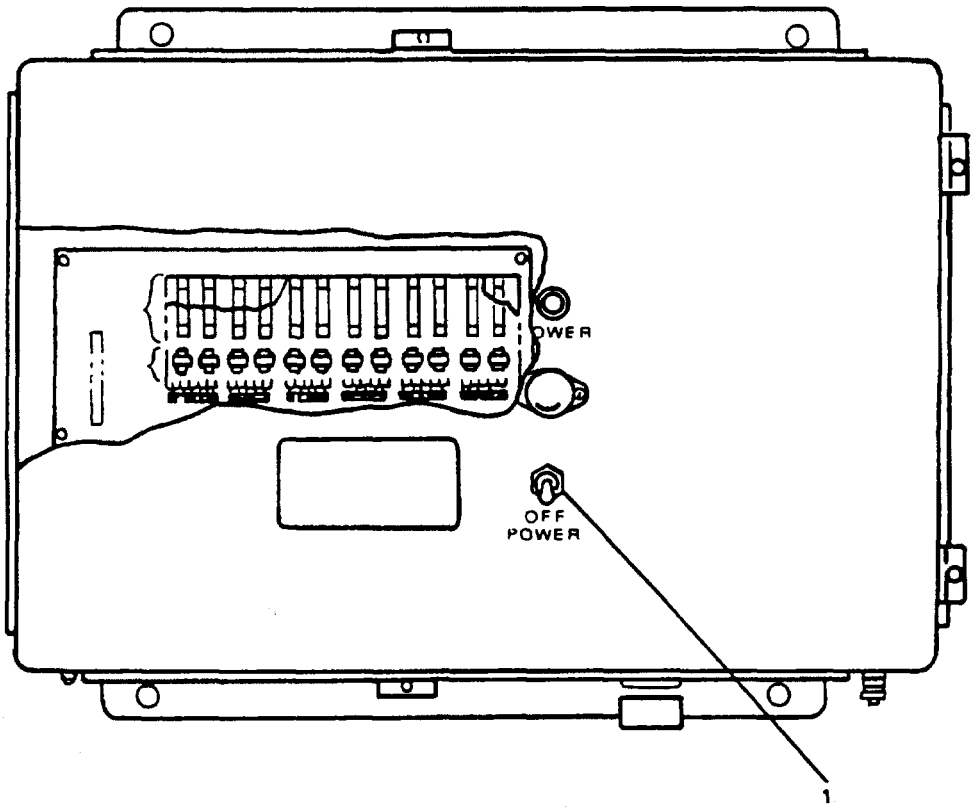


Figure 2-404. Pilothouse Emergency Distribution Panel.

(6) Observe the compass card through viewing window (10) for about 1 minute to determine the direction of card movement with respect to the required course.

(a) If the card is moving toward the heading, allow it to continue until it is within 2 degrees of the desired heading; then operate the TILT AZIMUTH switch (7) to level the gyro and make the average position of the LEVEL METER (4) pointer zero.

(b) If the card is moving away from heading, reverse polarity of the average point position by operating the TILT AZIMUTH switch (7). Wait until the direction of card heading stabilizes; then operate the TILT AZIMUTH switch (7) to level the gyro and make the average position of the LEVEL METER (4) pointer zero.



1. OFF POWER

Figure 2-405. Mk 37 Mod E Transmission Unit.

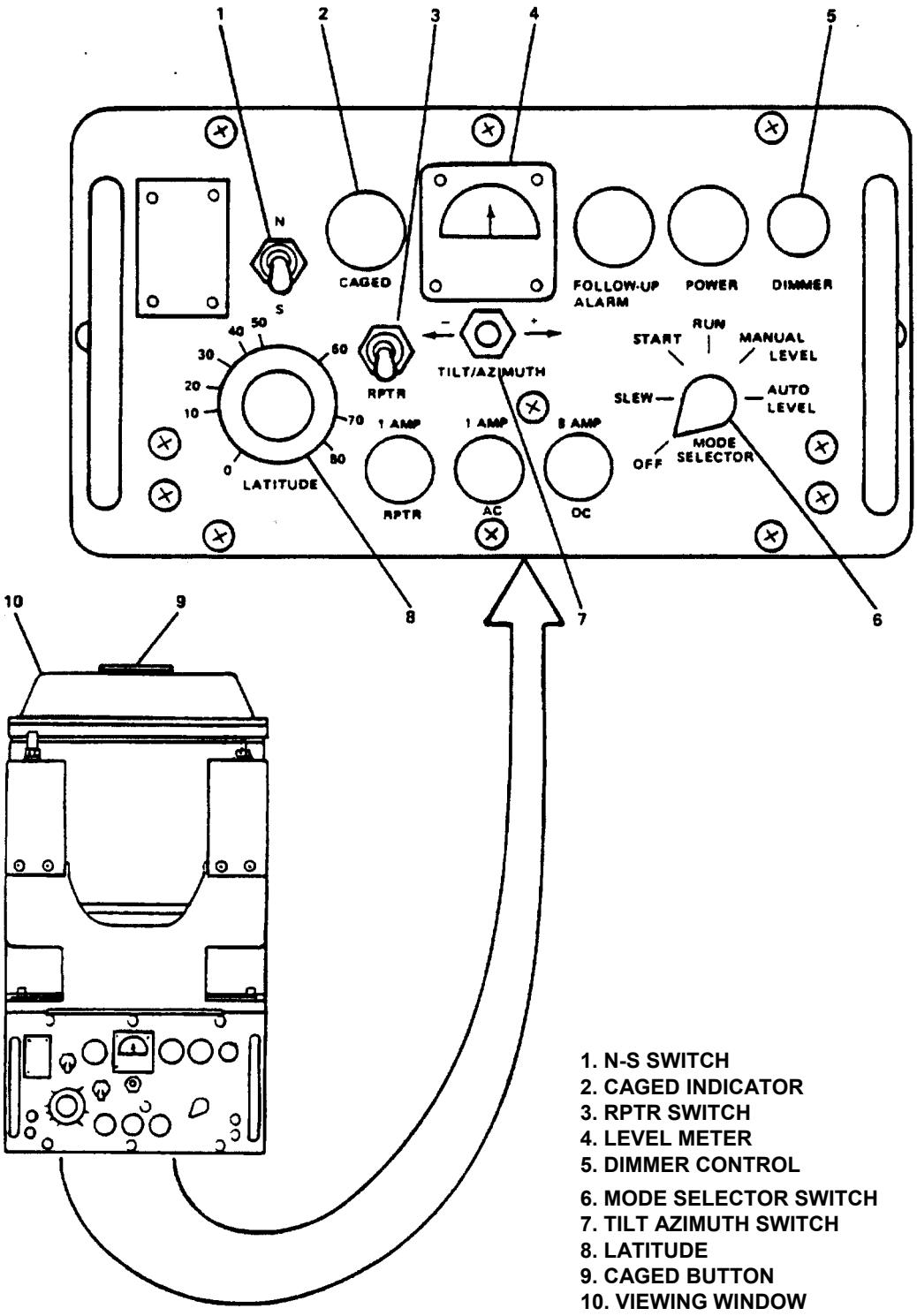


Figure 2-406. Gyrocompass Mk 27 Mod 1 Electronic Control Panel.

(7) Position SELECTOR switch (6) to RUN.

(8) Position N-S switch (1) to N (north) or S (south) as required.

(9) Position LATITUDE control (8) to ship's latitude.

NOTE

If step repeaters are used, they must be synchronized to the compass card before positioning RPTR switch to ON.

(10) Wait 10 minutes after uncaging and position RPTR switch (3) to ON if repeaters are used.

(11) Adjust DIMMER control (5), as required.

c. Emergency Restarting.

NOTE

The following procedure is to be used if the gyro has dumped, or the compass must be started with the gyro running. This condition is indicated by full-scale deflection of the level meter and a rapid slewing of the compass card.

(1) Position SELECTOR switch (6, Figure 2-406) to AUTO LEVEL. Compass will stop slewing and settle at a random heading.

(2) Position SELECTOR switch (6) to MANUAL LEVEL.

(3) Depress CAGED BUTTON (9), located on top of binnacle, and note that CAGED indicator (2) lights.

(4) Position TILT AZIMUTH switch (7) in the same direction required to return compass card to the proper heading. Release the switch after the compass card begins to rotate slowly toward the desired heading.

(5) Allow compass card to rotate 2 to 3 degrees past the required heading, then depress CAGED BUTTON (9) on top of the binnacle. CAGED indicator (2) will extinguish.

(6) Position the SELECTOR switch (6) to AUTO LEVEL and note that the gyro comes to an approximate level, as indicated by the LEVEL METER (4).

(7) Position SELECTOR switch (6) to MANUAL LEVEL; then operate TILT AZIMUTH switch (7) to obtain a zero indication on the LEVEL METER (4).

(8) Position SELECTOR switch (6) to RUN.

2-50. Steering System Failure.

Emergency steering may be accomplished by either hand-hydraulic steering or manual power hydraulic steering depending on the type of failure. Manual power hydraulic steering mode is used when a malfunction has resulted in loss of control in pilothouse, but power is available at the steering hydraulic power pack (AMS 2). When power has been lost at the steering hydraulic power pack, hand-hydraulic steering is used.

a. *Hand-Hydraulic Steering*.

(1) *Open emergency handpump isolation valves (Figure 2-408)*. Open the following valves:

(a) SH-7, HAND PMP C.O.V. (1).

(b) SH-8, HAND PMP C.O.V. (2).

(2) Steer vessel. Turn handwheel (Figure 2-408) to adjust course as desired.

NOTE

Vessel heading is indicated on bulkhead mounted rudder angle indicator. Use sound powered telephones to communicate with pilothouse for course changes.

b. *Manual Power-Hydraulic Steering*.

NOTE

No change to valve alignment is necessary from normal steering.

(1) *Align electrical system*. On steering gear motor controller (Figure 2-407), set switch (1) to position 3.

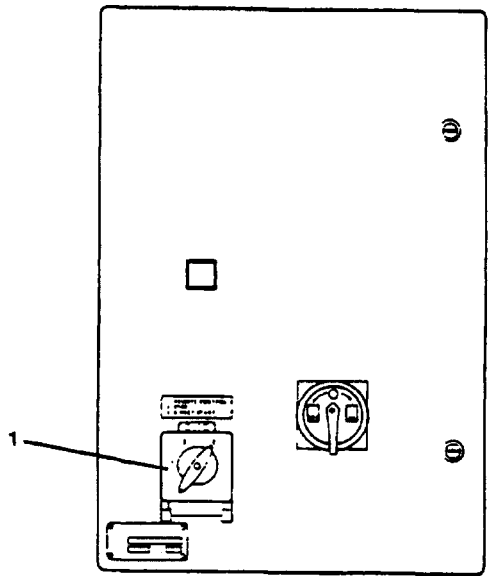
(2) *Steer vessel*.

NOTE

There are two power packs, one for each rudder. Each power pack is controlled by two valves.

(a) Adjust course to port by pressing down on control valve handle (1, Figure 2-409) on each power pack.

(b) Adjust course to starboard by pressing down on control valve handle (2) on each power pack.



1. CHANGE-OVER SWITCH

Figure 2-407. Steering Gear Motor Controller.

NOTE

Vessel heading is indicated on bulkhead mounted rudder angle indicator. Use sound powered telephones to communicate with pilothouse for course changes.

c. *Secure Hand-Hydraulic Steering*. Once malfunction has been repaired, proceed as follows:

(1) *Close emergency handpump isolation valves (Figure 2-408)*. Close the following valves:

(a) SH-7, HAND PMP C.O.V. (2).

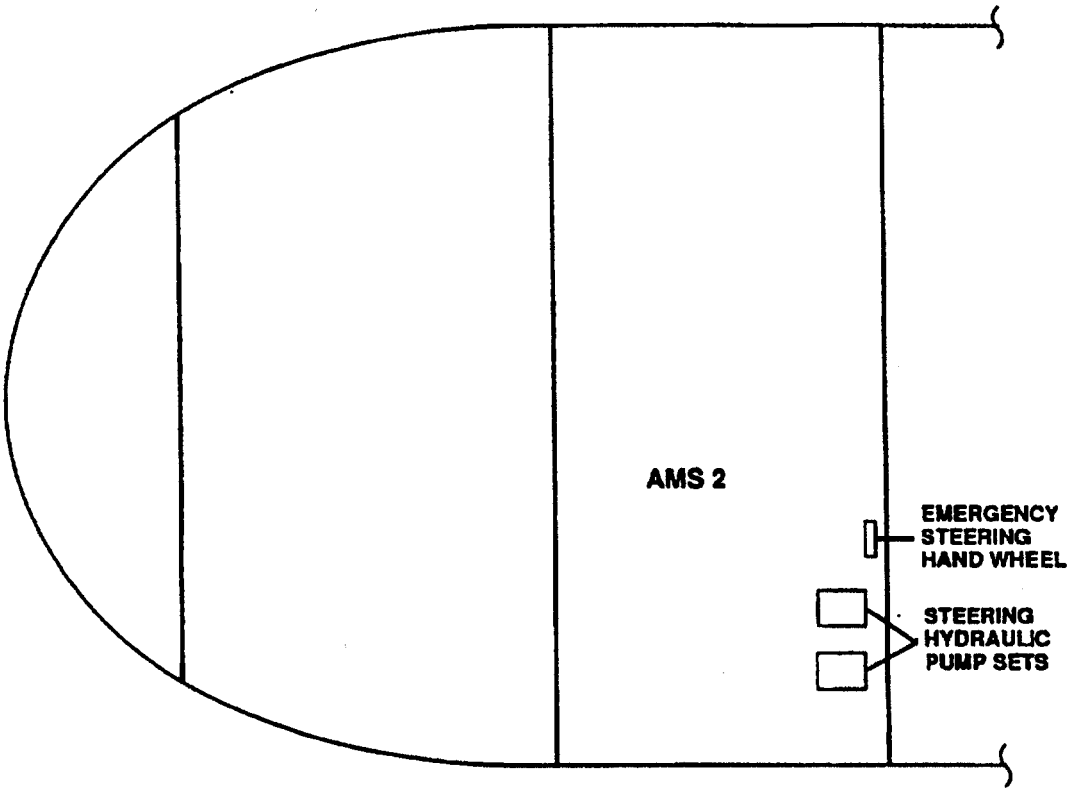
(b) SH-8, HAND PMP C.O.V. (1).

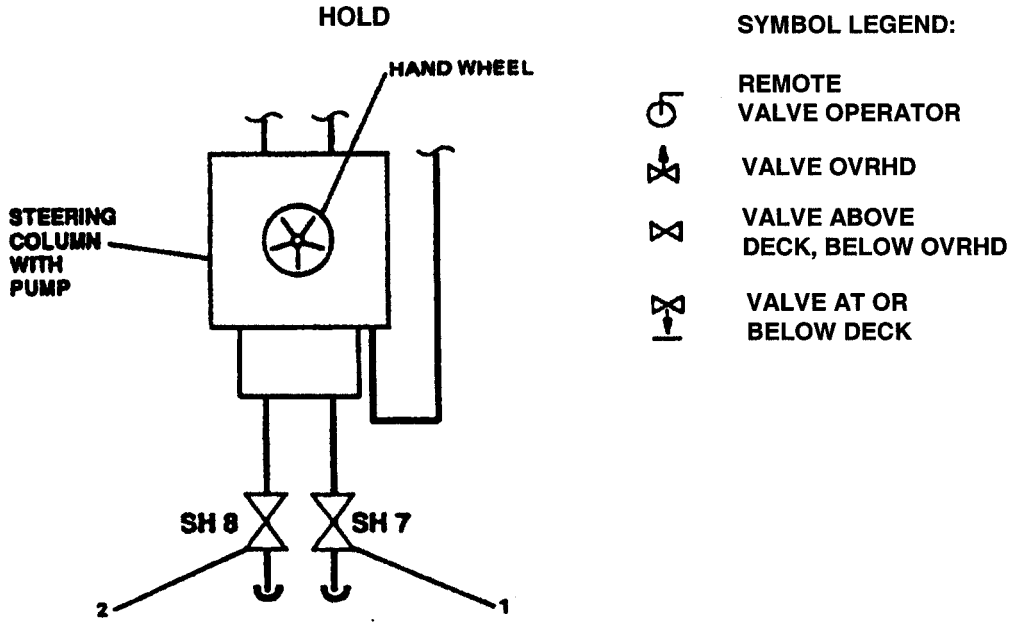
(2) *Return to normal steering*. Set switch (1, Figure 2-407) to position 1. Steer vessel as described in paragraph 2-13.

d. *Secure Manual Power-Hydraulic Steering*. Once malfunction has been repaired, proceed as follows:

(1) *Align electrical system*. On steering gear motor controller (Figure 2-407), set switch (1) to position 1.

(2) *Return to normal steering*. Steer vessel as described in paragraph 2-13.

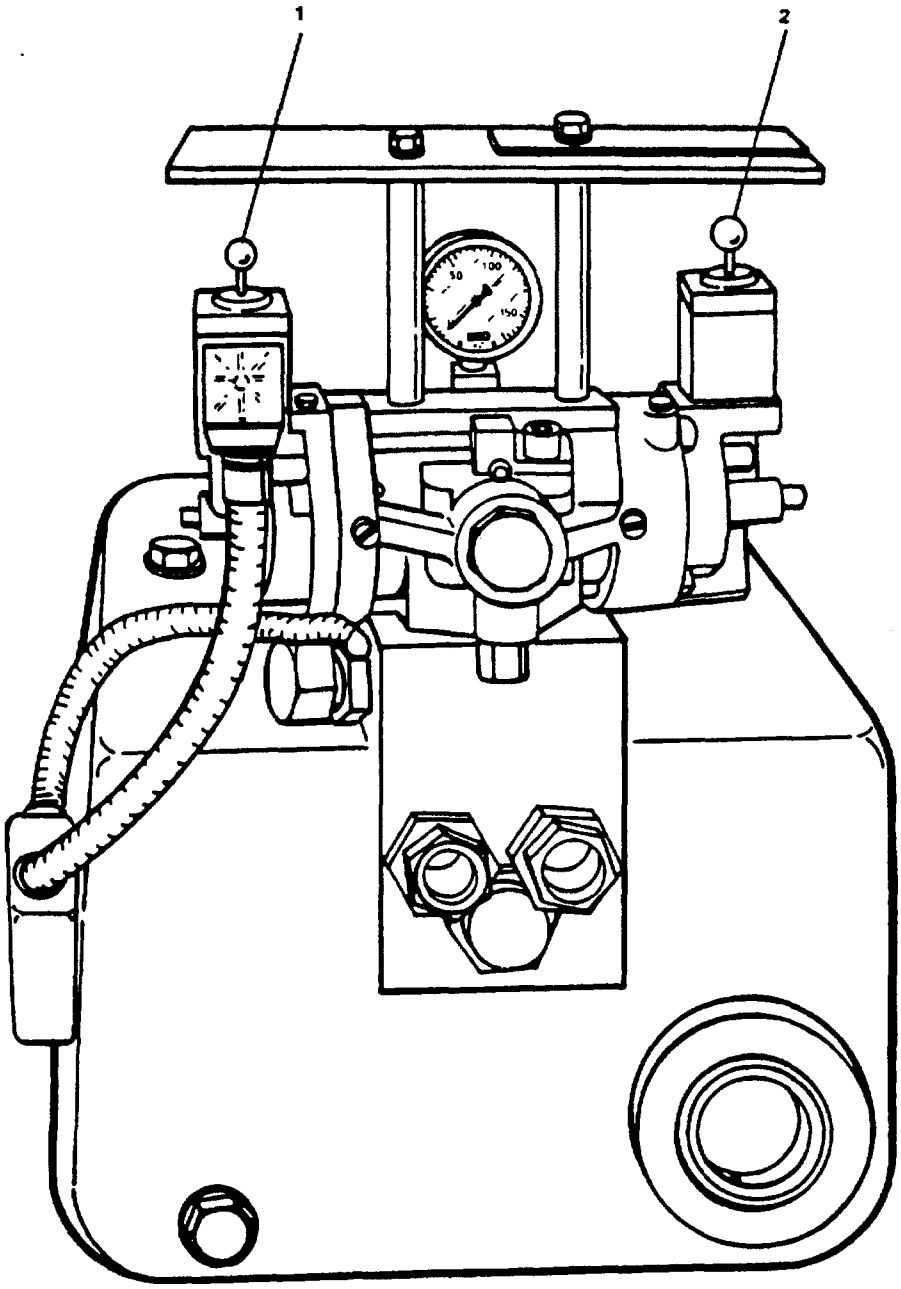




1. SH4, HAND PMP C.O.V.
2. SH7, HAND PMP C.O.V.

EMERGENCY STEERING HYDRAULIC PUMP (AMS 2)

Figure 2-408. Steering Hydraulics Valve Location



1. PORT CONTROL VALVE HANDLE
2. STARBOARD CONTROL VALVE HANDLE

Figure 2-409. Steering Gear Power Pack.

2-51. HALON 1301 Fire Suppression System. The HALON 1301 fire suppression system protects in the main engine room, auxiliary machinery space 1 (AMS 1), and the paint locker. The system is located in auxiliary machinery space 2 (AMS 2) and the paint locker.

NOTE

Not applicable to Hull No. LT801, LT804 and LT805. Reference Para. 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment detail and installation drawings.

a. Main Engine Room and AMS 1 Operation.

WARNING

- **All personnel must leave the engine room immediately upon activation of the HALON 1301 fire suppression system alarm. System discharges 60 seconds after activation. Evacuating personnel must secure the sliding watertight doors and shut the two EOS ventilation fire dampers as they evacuate the area.**
- **A waiting period of at least 30 minutes is required to ensure that the area has cooled and that the fire will not reignite upon entry of personnel. When a hatch or door is opened, or the ventilation system is started, oxygen enters the area and dilutes the HALON.**
- **Do not reenter the space where HALON has been used to extinguish a fire unless wearing an emergency breathing apparatus. Wear the breathing apparatus until the atmosphere is certified safe. Anyone suffering from the toxic effects of HALON 1301 vapor should immediately move, or be moved, to fresh air.**

(1) Remote activation. To remotely activate the HALON 1301 fire suppression system perform the following:

(a) Break glass on VALVE RELEASE surface fire pull box (Figure 2-410) with hammer (1).

(b) Pull handle (2) hard. Release handle.

(c) Break glass on CYLINDER RELEASE surface fire pull box with hammer (1).

(d) Pull handle (2) hard. Release handle.

(2) Local activation. To locally activate the HALON 1301 fire suppression system perform the following:

(a) Open CO2 cylinder control valve by removing locking pin(s) (1, Figure 2-411) and operating lever (2) of control head mounted on control valve.

(b) Discharge cylinders by removing locking pins (1) and operating levers (2) of control heads mounted on the control cylinders.

(c) To bypass discharge delay, remove locking pin (3) and operate lever (4) of control head mounted on discharge delay.

(3) Isolate Ventilation System.

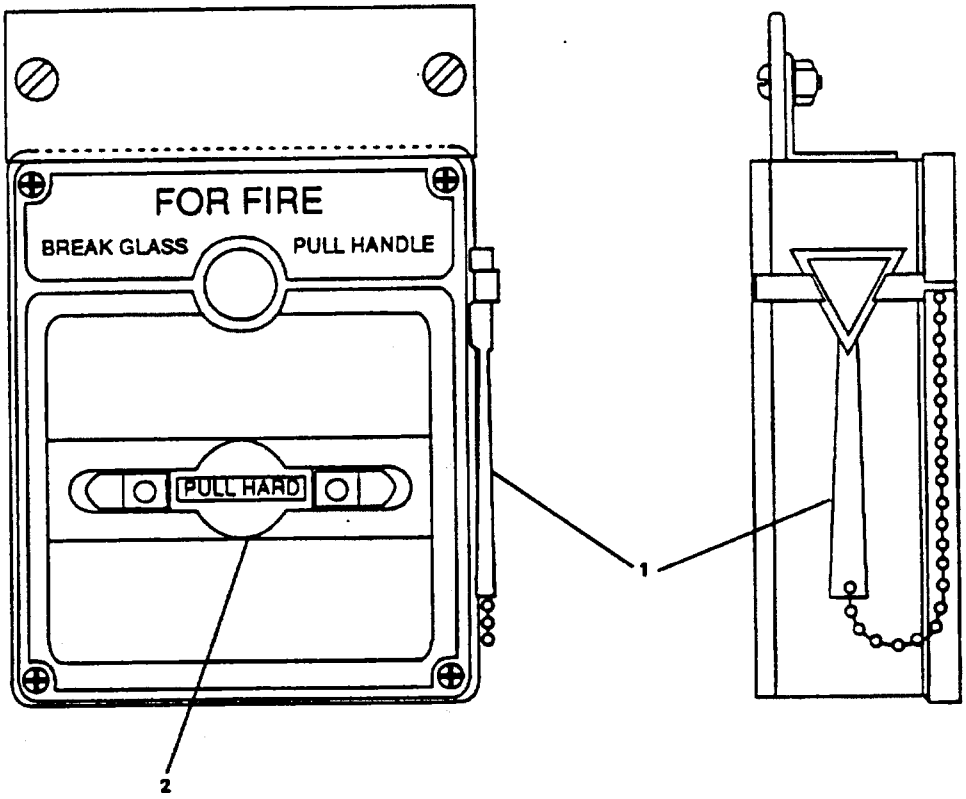
(a) Close fire dampers (PORT and STBD) in 01 Level Plenium.

(b) Close AMS 1 supply and exhaust watertight covers located on 01 Level (PORT and STBD).

(c) Place canvas covers on 02 Level vent plenium exhaust louvers.

WARNING

- **A waiting period of at least 30 minutes is required to ensure that the area has cooled and that the fire will not reignite upon entry of personnel. When hatch or door is opened, or the ventilation system is started, oxygen enters the area and dilutes the HALON.**
- **Do not reenter the space where HALON has been used to extinguish a fire unless wearing an emergency breathing apparatus. Wear the breathing apparatus until the atmosphere is certified safe. Anyone suffering from the toxic effects of HALON 1301 vapor should immediately move, or be moved, to fresh air.**



1. HAMMER
2. HANDLE

Figure 2-410. Surface Fire Pull Boxes.

NOTE

- Alarm siren will sound in main engine room. Unless bypassed locally, discharge of HALON will be delayed for 60 seconds to allow evacuation of main engine room personnel. Discharge of HALON is completed in 10 seconds.

- During the 60-second warning time, a PRESSURE OPERATED SWITCH (Figure 2-412) automatically shuts down the fuel oil transfer pumps and the ventilation system in the main engine room. Before this equipment can be restarted, the PRESSURE OPERATED SWITCH located near the CO2 bottles on the forward bulkhead of AMS 2 must be reset.

- The resetting of the PRESSURE OPERATED SWITCH does not reset the HALON 1301 fire suppression system. The HALON and CO2 cylinders must be recharged or replaced and the pull boxes reset by depot maintenance when the LT is docked.

(4) Reset plunger. After the fire has been extinguished, and at least 30 minutes have passed, and equipment is to be restarted, reset the pressure operated switch (Figure 2-412) located near the CO2 bottles on the forward bulkhead of AMS 2 by pushing reset plunger (1) down to the SET position.

b. Paint Locker HALON Operation.

NOTE

Not applicable to Hull No. LT801, LT804 and LT805. Reference Para. 2-65 for FM-200 operation procedures. Reference TM 55-1925-227-24&P for FM-200 equipment details and installation drawings.

WARNING

- **All personnel must leave the room immediately upon activation of the HALON 1301 fire suppression system alarm. System discharges 25 seconds after activation. Evacuating personnel must secure the door and shut the ventilation fire dampers in the boatswain's storeroom as they evacuate the area.**

- **A waiting period of at least 30 minutes is required to ensure that the area has cooled and that the fire will not reignite upon entry of personnel. When a hatch or door is opened, or the ventilation system is started, oxygen enters the area and dilutes the HALON.**

- **Do not reenter the space where HALON has been used to extinguish a fire unless wearing an emergency breathing apparatus. Wear the breathing apparatus until the atmosphere is certified safe. Anyone suffering from the toxic effects of HALON 1301 vapor should immediately move, or be moved, to fresh air.**

NOTE

- Alarm siren will sound. Unless bypassed locally, discharge of HALON will be delayed for 25 seconds to allow evacuation of personnel. Discharge of HALON is completed in 10 seconds.

- During the 25-second warning time, a PRESSURE OPERATED SWITCH automatically shuts down the boatswain's storeroom supply fan and the paint locker exhaust fan. Before this equipment can be restarted, the pressure operated switch located outside the paint locker above and aft of the 25-second discharge delay must be reset.

- The resetting of the PRESSURE OPERATED SWITCH does not reset the HALON 1301 fire suppression system. The HALON cylinder must be recharged or replaced and the pull box reset by depot maintenance when the LT is docked.

(1) Remote activation. To remotely activate the HALON 1301 fire suppression system perform the following:

(a) Break glass on VALVE RELEASE surface fire pull box with hammer (1, Figure 2-410).

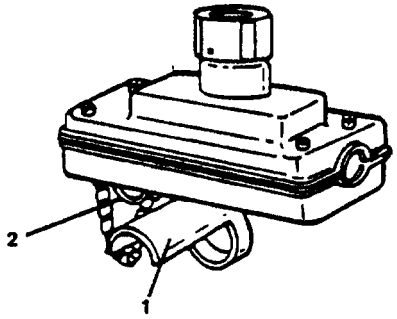
(b) Pull HALON RELEASE handle (2) hard. Release handle.

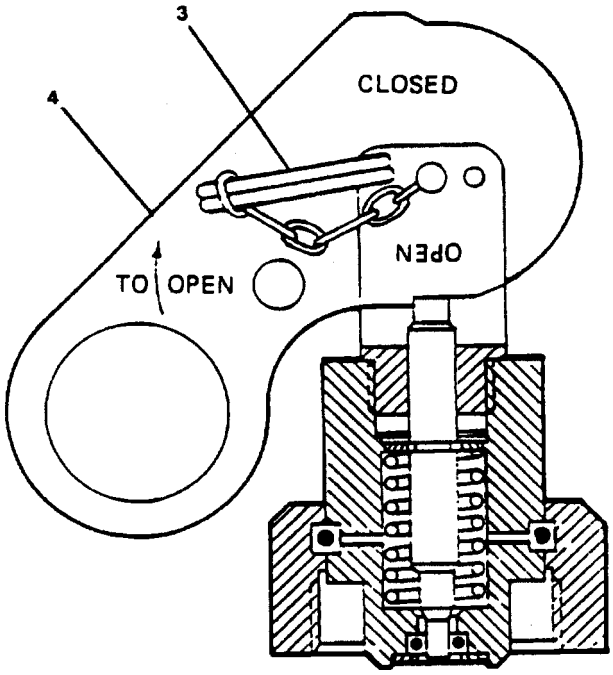
(2) Local activation. To locally activate the HALON 1301 fire suppression system perform the following:

(a) Discharge cylinder by removing locking pin (1, Figure 2-411) and operating lever (2) of control head mounted on the control cylinder.

(b) To bypass discharge delay, remove locking pin (3) and operate lever (4) of control head mounted on discharge delay.

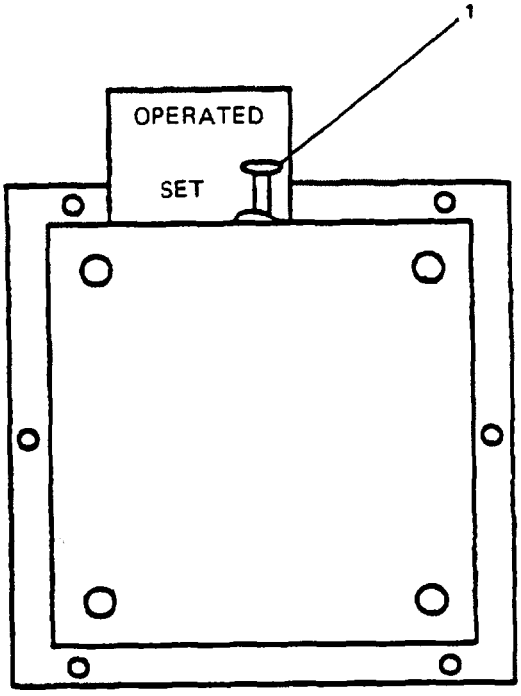
(3) Reset plunger. After the fire has been extinguished, and at least 30 minutes have passed, and equipment is to be restarted, reset the pressure operated switch (Figure 2-412) located near the HALON bottles on the exterior bulkhead of the paint locker by pushing reset plunger (1) down to the SET position.





1. LOCKING PIN
2. LEVER
3. LOCKING PIN
4. LEVER

Figure 2-411. Lever Operated Control Valve.



FRONT VIEW
COVER REMOVED

1. RESET PLUNGER

Figure 2-412. Pressure Operated Switch.

2-52. Fire Damper Operation. Dampers are used to balance the amount of air provided to the various compartments supplied. In the event of a fire, fire dampers are used to prevent "fanning" the fire. The following procedure provides instructions for closing and opening dampers.

a. Close Damper.

(1) Remove locking pin (3, Figure 2-413).

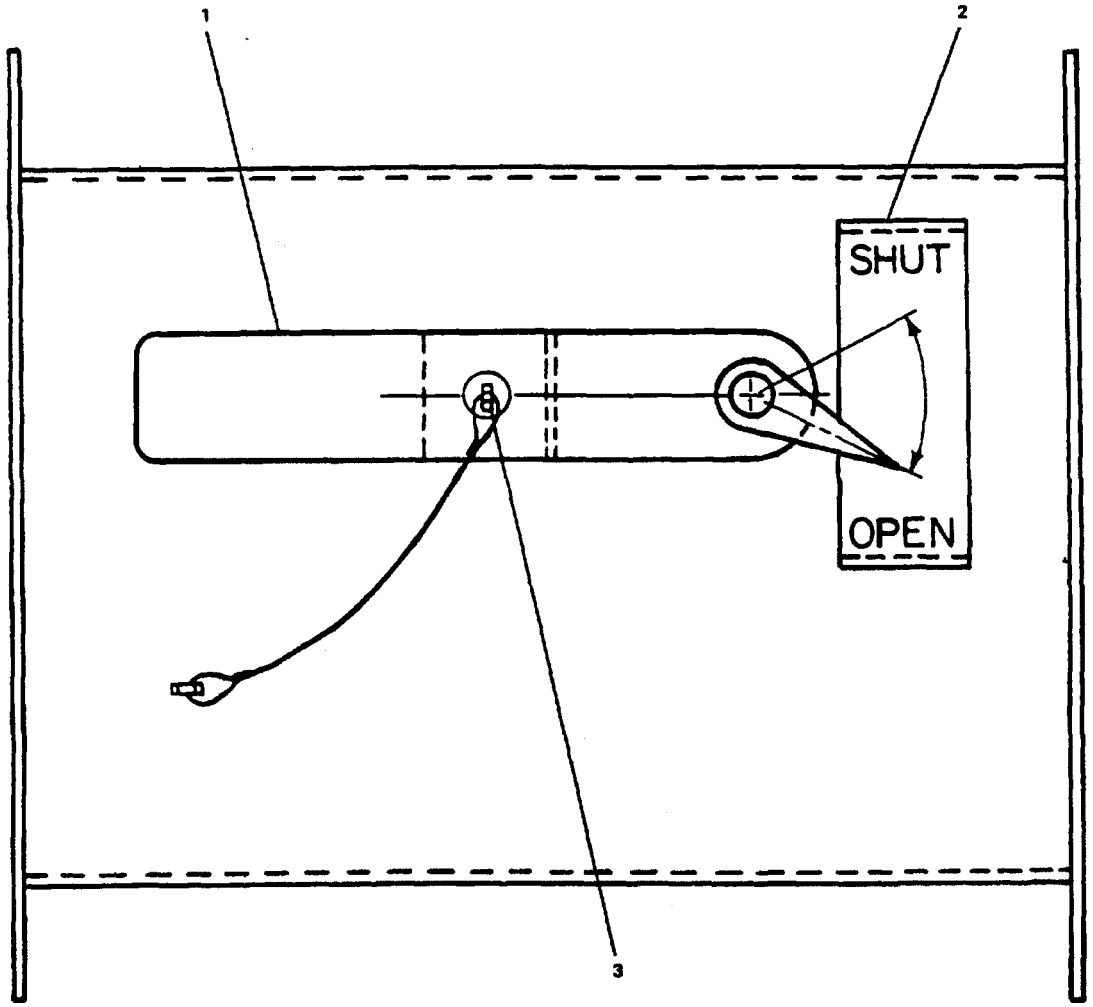
(2) Move damper lever (1) in SHUT direction indicated on lever guide (2).

b. Open Damper.

(1) Remove locking pin (3).

(2) Move damper lever (1) in OPEN direction indicated on lever guide (2).

(3) Reinstall locking pin (3).



1. DAMPER LEVER **2. LEVER GUIDE** **3. LOCKING PIN**

Figure 2-413. Damper Operation.

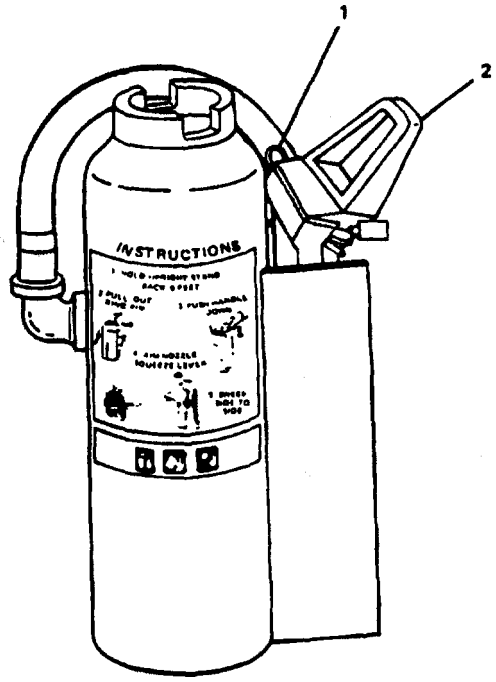
2-53. Portable Fire Extinguisher Operation.

a. Hold extinguisher upright.

b. Pull pin (1, Figure 2-414). Push lever (2) down.

c. Stand 8 feet back from fire. Aim at base of fire.

d. Squeeze lever. Sweep side to side.



1. PIN
2. LEVER

Figure 2-414. Portable Fire Extinguisher.

2-54. Emergency Bilge Pumping Using Fire and General Service Pumps.

a. Close the Following Valves (Figure 2-415).

(1) FM-16, FIRE/PMP NO. 1 DISCH TO FM (5).

(2) FM-17, FIRE/G.S. PMP NO. 1 DISCH TO G. S. (6).

b. Open the Following Valves (Figure 2-415):

(1) FM-4, EMER. BILGE SUCT. (2).

(2) FM-6, FIRE/G.S. PMP NO. 1 SUCT. (4).

(3) FM-8, EMG. BILGE OVBD (3).

(4) FM-31, OVBD DISCH (1).

c. Align Electrical System.

(1) Emergency switchboard (Figure 2-416). Set FIRE PUMP NO. 1 circuit breaker (1) to ON position.

(2) Fire pump no. 1 motor controller (Figure 2-417).

(a) Set LOCAL-REMOTE switch (6) to LOCAL position.

(b) Set ON-OFF switch (1) to ON position.

(c) POWER AVAILABLE indicator (2) should light.

d. Start Pump. Press START pushbutton (4).

(1) MOTOR RUN indicator (3) will light.

CAUTION

Observe tank level indicator of desired tank. When tank reaches desired level, proceed. Never operate pumps without fluid. Damage to pumps could result.

e. Stop Pump. Press STOP pushbutton (5).

(1) MOTOR RUN indicator (3) will go out.

f. Secure Electrical System.

(1) Fire pump no. 1 motor controller. Set ON-OFF switch (1) to OFF position.

(2) POWER AVAILABLE indicator (2) will go out.

(3) Emergency switchboard (Figure 2-416). Set FIRE PUMP NO. 1 circuit breaker (1) to OFF position.

g. Secure Piping System. Close the following valves (Figure 2-415):

(1) FM-4, EMER BILGE SUCT. (2).

(2) FM-6, FIRE/G.S. PMP NO. 1 SUCT. (4).

(3) FM-8, EMG. BILGE OVBD (3).

(4) FM-31, OVBD DISCH (1).

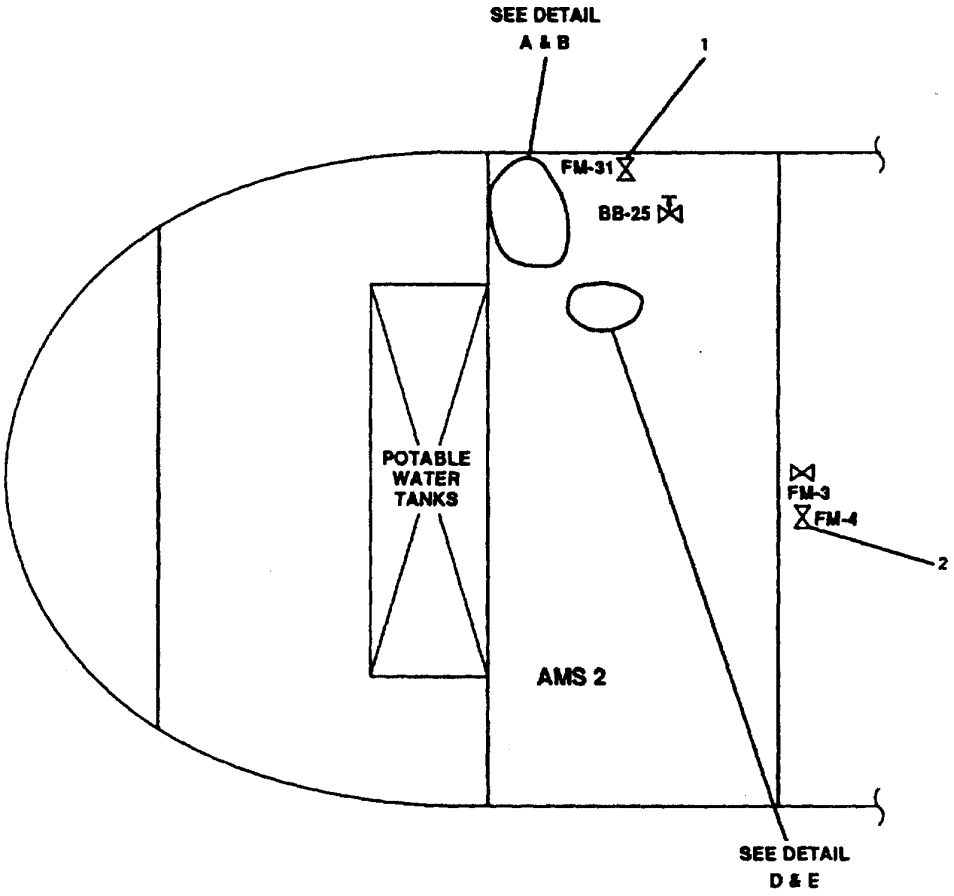


Figure 2-415. Emergency Bilge Pumping Using Fire Pumps Valve Locations (Sheet 1 of 4).

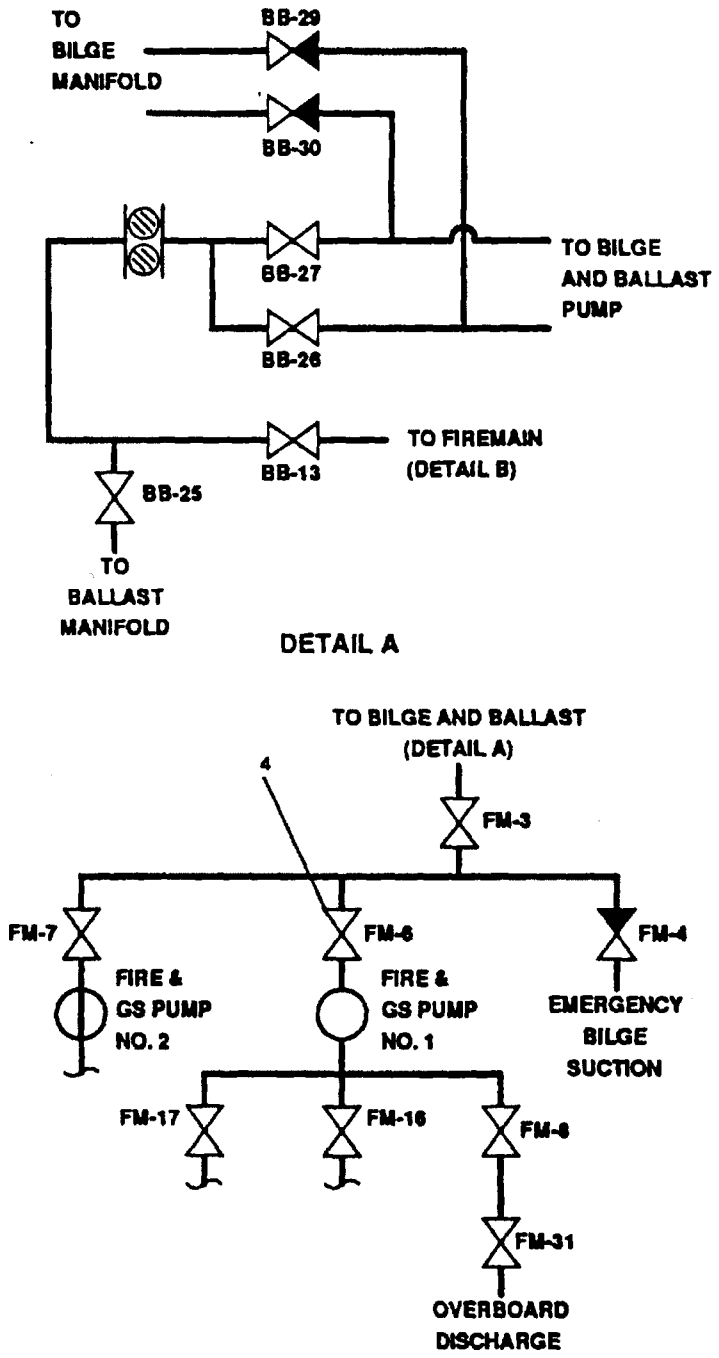
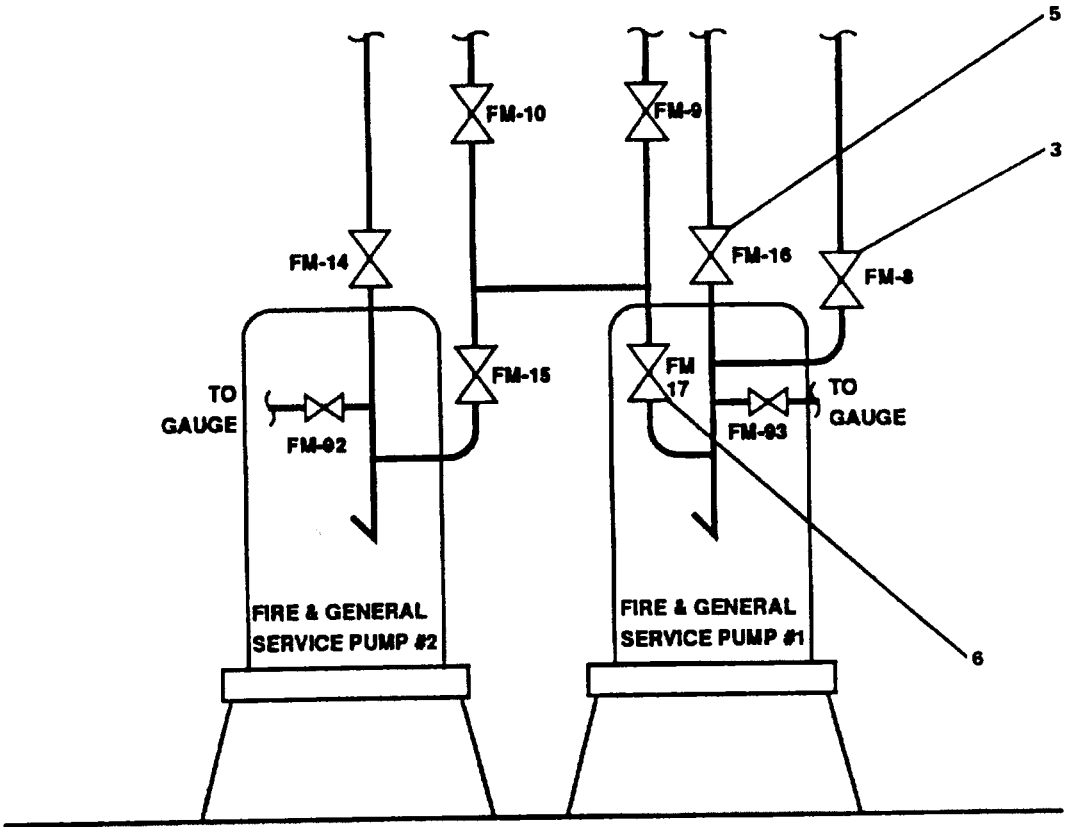


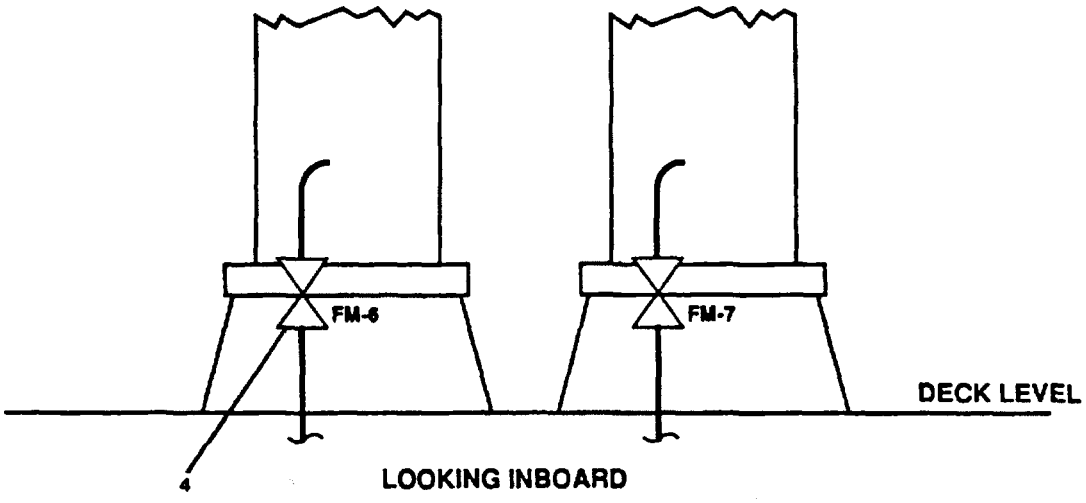
Figure 2-415. Emergency Bilge Pumping Using Fire Pumps Valve Locations (Sheet 2 of 4).



LOOKING OUTBOARD

DETAIL C

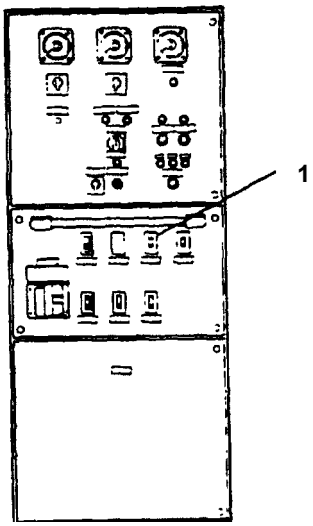
Figure 2-415. Emergency Bilge Pumping Using Fire Pumps Valve Locations (Sheet 3 of 4).



DETAIL D

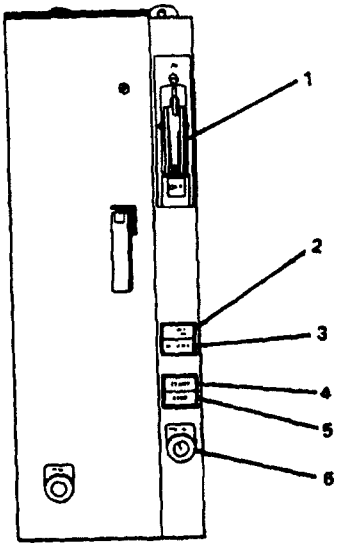
1. FM-31, OVBD DISCH
2. FM-4, EMER BILGE SUCT.
3. FM-8, EMG. BILGE OVBD
4. FM-6, FIRE/G.S. PMP NO. 1 SUCT.
5. FM-16, FIRE/PMP NO. 1 DISCH TO FM
6. FM-17, FIRE/G.S. PMP NO. 1 DISCH TO G.S.

Figure 2-415. Emergency Bilge Pumping Using Fire Pumps Valve Locations (Sheet 4 of 4).



1. FIRE PUMP NO. 1

Figure 2-416. Emergency Switchboard.



1. ON-OFF SWITCH
2. POWER AVAILABLE INDICATOR
3. MOTOR RUN INDICATOR
4. START PUSHBUTTON
5. STOP PUSHBUTTON
6. LOCAL-REMOTE SWITCH

Figure 2-417. Fire Pump No. 1 Motor Controller.

2-55. Main Engine Cold Weather Starting.

a. Starboard Propulsion Plant.

(1) Align electrical system.

(a) Engine room emergency distribution panel No. 1 (Figure 2-418). Set the following circuit breakers to ON position:

1 REMOTE PROPULSION INDICATING PANEL SYS (1).

2 MONITORING SYS CRT (2).

3 ENGINE ORDER TELEGRAPH SYS (3).

(b) Engine room power panel no. 1 (Figure 2-419). Set the following circuit breakers to the ON position.

1 #1 RED GR CLG PUMP (1).

2 #1 M.E.L.O. PRIME PUMP (6).

3 #1 M.E. CONTROL PANEL (2).

(2) Align fuel oil service system (Figure 2-420).

(a) Open FO-20, F.O. SPLY TO M.E. NO. 1 (11).

(b) Open FO-15, F.O. SERV. SUCT. STBD (16).

(c) Open FO-35, F.O. RTN. TO DAY TK STBD (17).

(d) Open FO-14, F.O. SERV. CRSVR (15).

(e) Open FO-34, F.O. RTN. CRSVR (19).

(3) Align fresh water cooling system (Figure 2-420).

(a) Open FWC-3, F.W. FR. M.E. NO. 1 TO KEEL CLR. (20).

(b) Open FWC-1, F.W. FR. KEEL CLR. TO M.E. NO. 1 (18).

(c) Open FWC-15, F.W. FR. KEEL CLR. TO RED. GEAR NO. 1 (12).

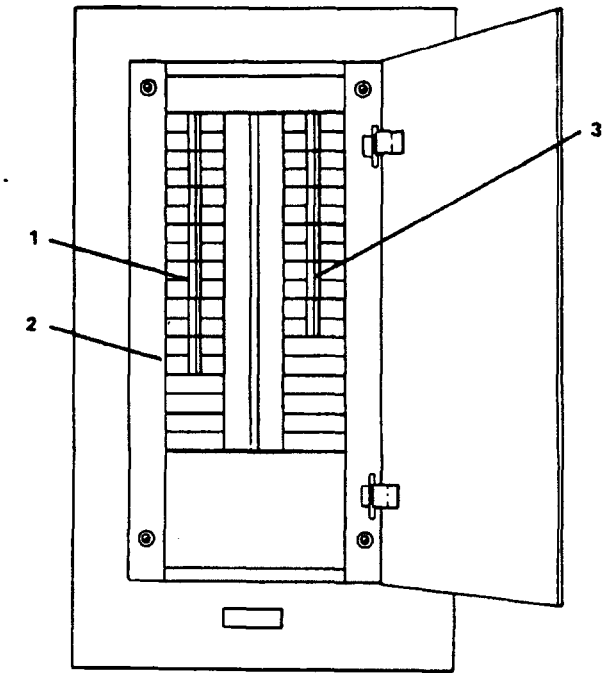


Figure 2-418. Engine Room Emergency Distribution Panel No. 1.

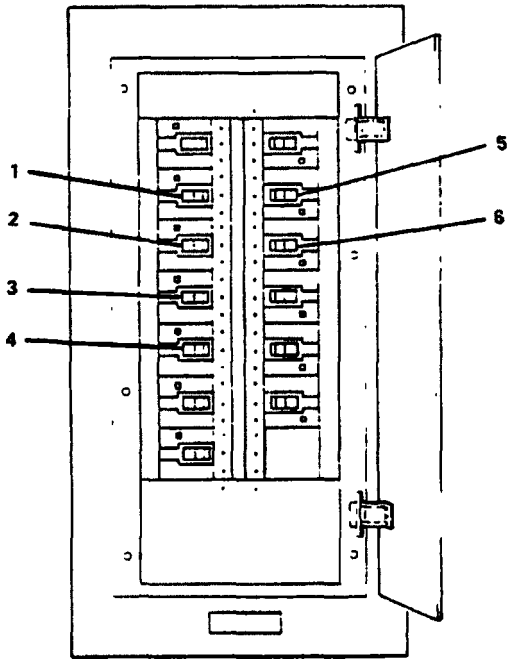


Figure 2-419. Engine Room Power Panel No. 1.

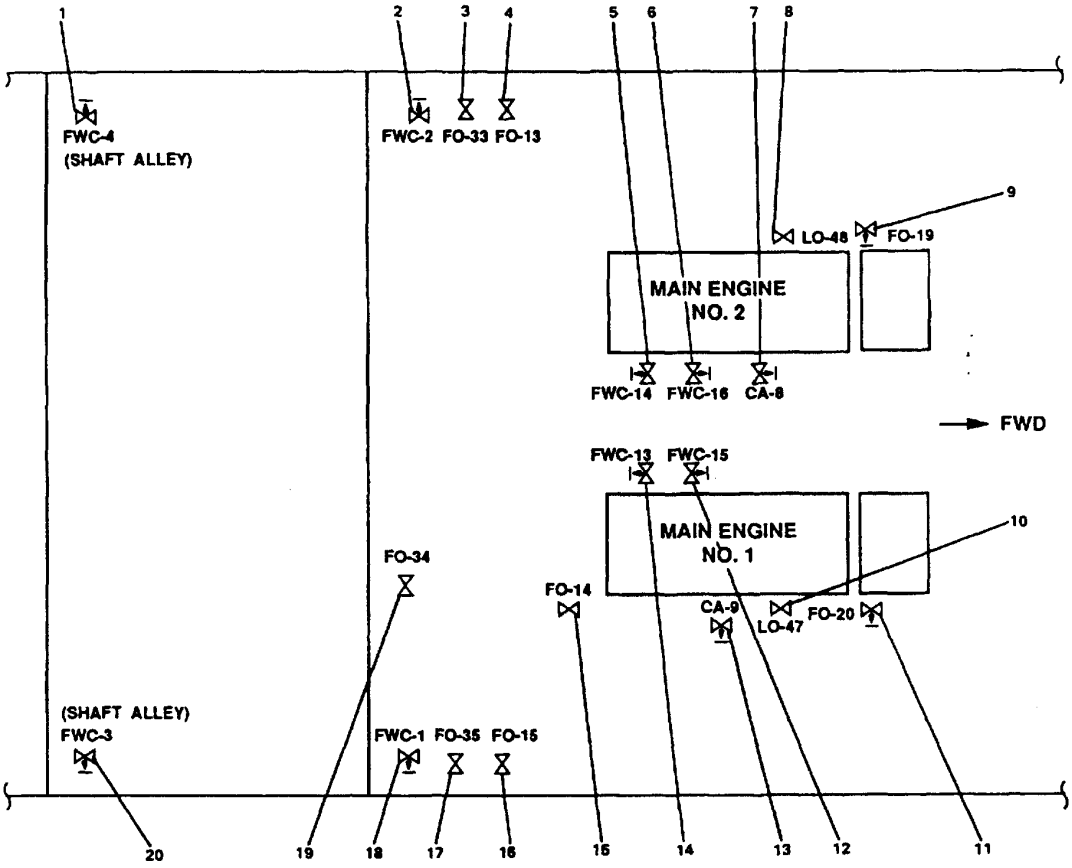
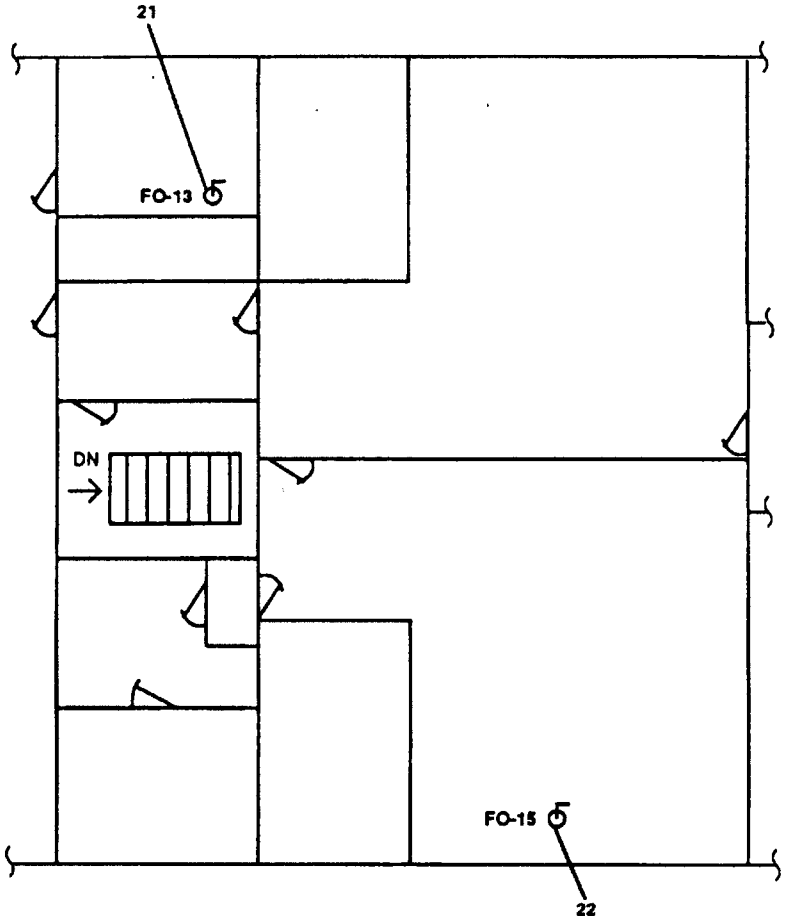


Figure 2-420. Main Propulsion System Valve Locations (Sheet 1 of 2).



1. FWC-4, F.W. FR. M.E. NO. 2 TO KEEL CLR.
2. FWC-2, F.W. FR. KEEL CLR. TO M.E. NO. 2
3. FO-33, F.O. RTN. TO DAY TK. PORT
4. FO-13, F.O. SERV. SUCT. PORT
5. FWC-14, F.W. FR. RED. GEAR NO. 2 TO KEEL CLR
6. FWC-16, F.W. FR. KEEL CLR. TO RED. GEAR NO. 2
7. CA-8, STG AIR TO ME
8. LO-48, C.O.V. PRELUBE PMP. DISCH.
9. FO-19, F.O. SPLY TO M.E. NO. 2
10. LO-47, C.O.V. PRELUBE PMP. DISCH.
11. FO-20, F.O. SPLY TO M.E. NO. 1
12. FWC-15, F.W. FR. KEEL CLR. TO RED. GEAR NO. 1
13. CA-9, STG AIR TO ME
14. FWC-13, F.W. FR. RED. GEAR NO. 1 TO KEEL CLR.
15. FO-14, F.O. SERV. CRSVR
16. FO-15, F.O. SERV. SUCT. STBD
17. FO-35, F.O. RTN. TO DAY TK STBD
18. FWC-1, F.W. FR. KEEL CLR. TO M.E. NO. 1
19. FO-34, F.O. RTN. CRSVR
20. FWC-3, F.W. FR. M.E. NO. 1 TO KEEL CLR
21. REMOTE VALVE OPERATOR FOR FO-13
22. REMOTE VALVE OPERATOR FOR FO-15

REMOTE VALVE OPERATOR

VALVE OVRHD

VALVE ABOVE DECK, BELOW OVRHD

VALVE AT OR BELOW DECK

Figure 2-420. Main Propulsion System Valve Locations (Sheet 2 of 2).

(d) Open FWC-13, F.W. FR. RED. GEAR NO. 1 TO KEEL CLR. (14).

(4) Fresh water no. 1 reduction gear cooling pump motor controller (Figure 2-421).

(a) Set ON-OFF switch (1) to ON position.

(b) POWER AVAILABLE indicator (2) will light.

(c) Press START pushbutton (4).

(d) MOTOR RUN indicator (3) will light.

(5) Pressure and coolant checks. Check RED GR #1 FW COOLING PMP DISCH PRESS discharge pressure gauge (approx. 20 psi) and coolant level in forward expansion tank sight glass.

NOTE

Air compressors are running and air pressure is 250 psi in air receivers.

(6) Align compressed air piping system (Figure 2-420). Open CA-9, STG AIR TO ME (13) and in-line ball valve.

(7) Start starboard main engine.

CAUTION

Prelubrication of a new or overhauled engine or an engine which has been inoperative for more than 48 hours is necessary to prevent engine damage. Prelubrication protects otherwise unlubricated engine parts while the lube oil pump is filling the passages with oil.

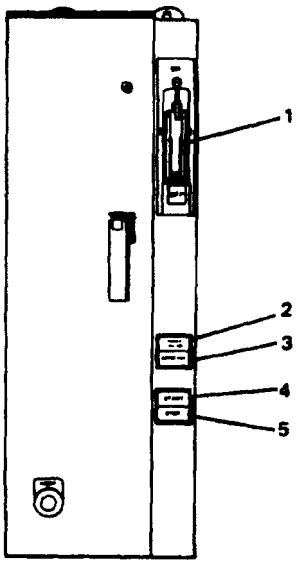
(a) Prelubrication.

1 Open LO-47, C.O.V. PRELUBE PMP. DISCH. (10, Figure 2-420).

2 On lube oil priming pump no. 1 motor controller (Figure 2-422), POWER AVAILABLE indicator (4) is lit.

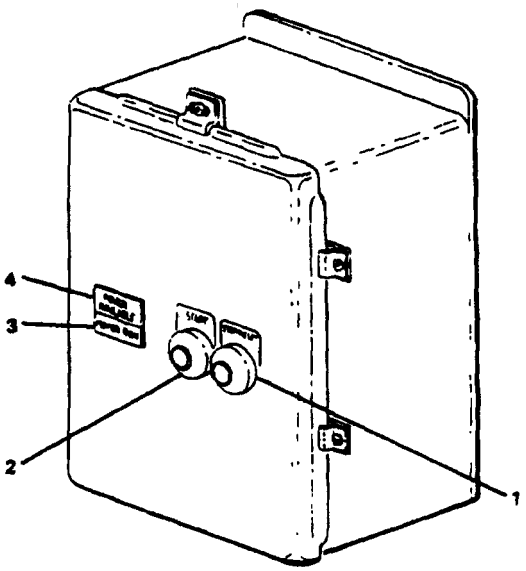
3 Press START pushbutton (2).

4 MOTOR RUN indicator (3) will light.



1. ON-OFF SWITCH
2. POWER AVAILABLE INDICATOR
3. MOTOR RUN INDICATOR
4. START PUSHBUTTON
5. STOP PUSHBUTTON

Figure 2-421. Fresh Water Reduction Gear Cooling Pump Motor Controller.



1. STOP-RESET PUSHBUTTON
2. START PUSHBUTTON
3. MOTOR RUN INDICATOR
4. POWER AVAILABLE INDICATOR

Figure 2-422. Lube Oil Priming Pump Motor Controller.

CAUTION

DO NOT operate lube oily priming pump for more than 3 minutes.

5 Open forward rocker covers on both sides of engine. Allow engine to prelube until a small amount of oil is observed flowing from the forward cam bearing. Close rocker covers.

6 On lube oil priming pump no. 1 motor controller, press STOP RESET pushbutton (1).

7 MOTOR RUN indicator (3) will go out.

8 Close LO-47, C.O.V. PRELUBE PMP. DISCH. (10, Figure 2-420).

(b) Engine control cabinet (Figure 2-423).

1 Press CONTROL POWER ON pushbutton (5). CONTROL POWER indicator (5) will light and ON indicator (6) (ALARM TEST ALARM OFF) will light.

(c) Prepare engine for starting.

1 On engine control cabinet, check START AIR pressure gauge (3) (approx. 200 psi).

2 Check EOS control air pressure gauge (125 psi).

3 Check engine coolant level at expansion tank sight glass.

NOTE

Ensure shaft brake pressure gauge on AFT end of reduction gear indicates 1200 to 1500 psi.

(d) Blow down engine.

1 Open test valves (Figure 2-425) on both sides of engine 1/2 inch.

2 Close CA-9, STG AIR TO ME (13, Figure 2-420).

NOTE

The following steps require two soldiers.

3 Push and hold T-handle (1, Figure 2-426) in to engage starter drive pinions.

4 Remove barring hole end plugs (1, Figure 2-427) from barring hole.

5 Insert 5/16-inch Allen wrench in end plug opening barring hole (1).

6 Turn one revolution.

WARNING

Use eye protection when checking test valves.

7 Check test valves and air box blow down valve for oil and/or water. Close test valves (Figure 2-425).

8 Remove barring tool and release T-handle (1, Figure 2-426).

9 Install end plugs in barring holes.

10 Ensure overspeed trip lever (Figure 2-424) is in RUNNING (latched) position.

11 Open CA-9, STG AIR TO ME (13, Figure 2-420).

NOTE

Once idle RPM has been set, it is not necessary to adjust manual speed control knob each time engine is started.

12 Ensure governor manual speed adjusting knob (1, Figure 2-428) is set to MIN position.

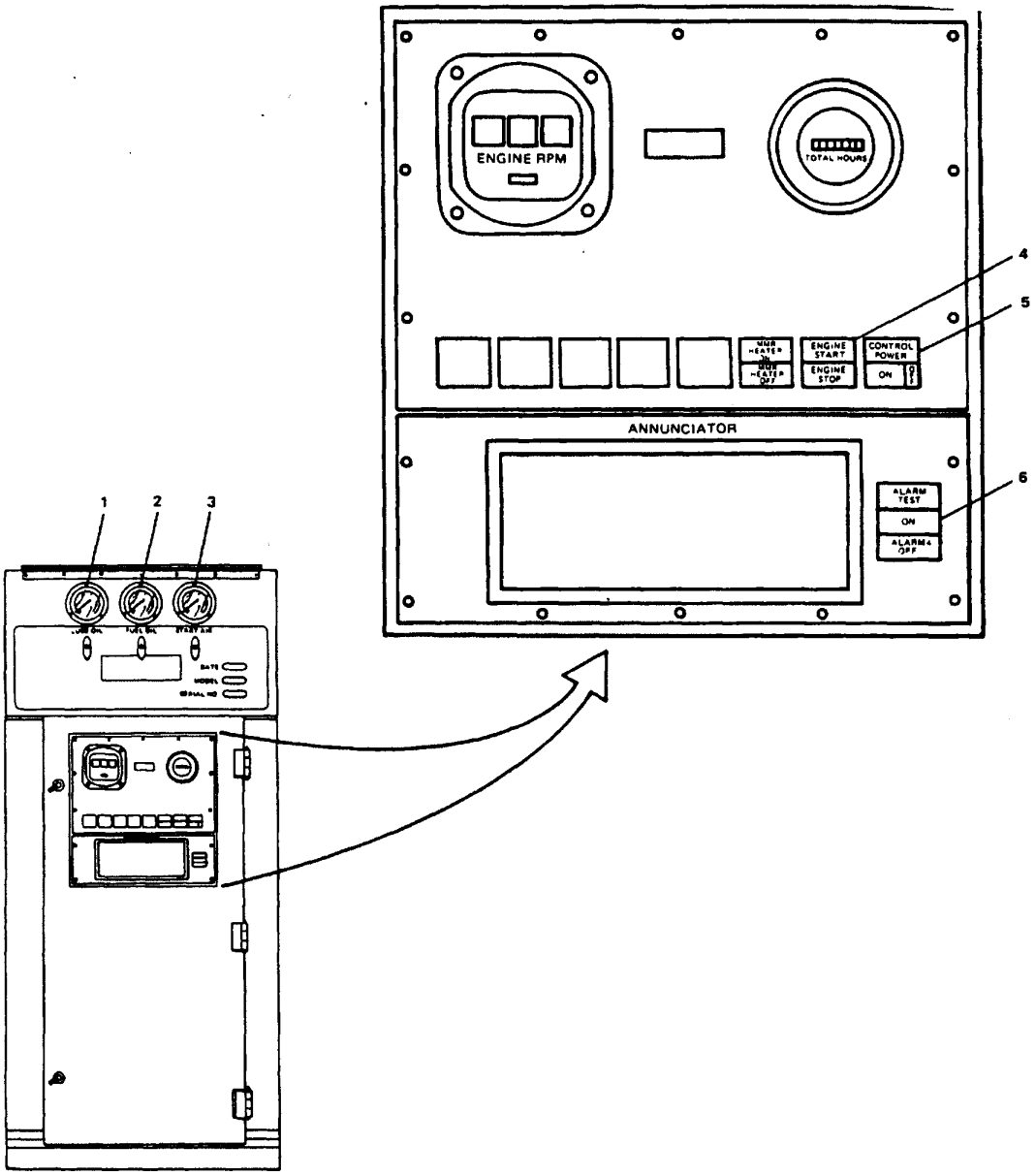
13 Operate hand crank fuel priming pump until pressure is indicated on the engine control cabinet FUEL OIL pressure gauge (2, Figure 2-423).

NOTE

Check L.O. level and gear box oil level.

14 On EOS console, place STBD MN ENG THROTTLE CLUTCH control (3, Figure 2-429) in NEUTRAL position (straight up).

15 Place COMMAND TRANSFER valve (1) in E.O.S. position.



1. LUBE OIL PRESSURE GAUGE
2. FUEL OIL PRESSURE GAUGE
3. START AIR PRESSURE GAUGE
4. ENGINE START PUSHBUTTON
5. CONTROL POWER PUSHBUTTON
6. POWER ON INDICATOR (ALARM)

Figure 2-423. Engine Control Cabinet.

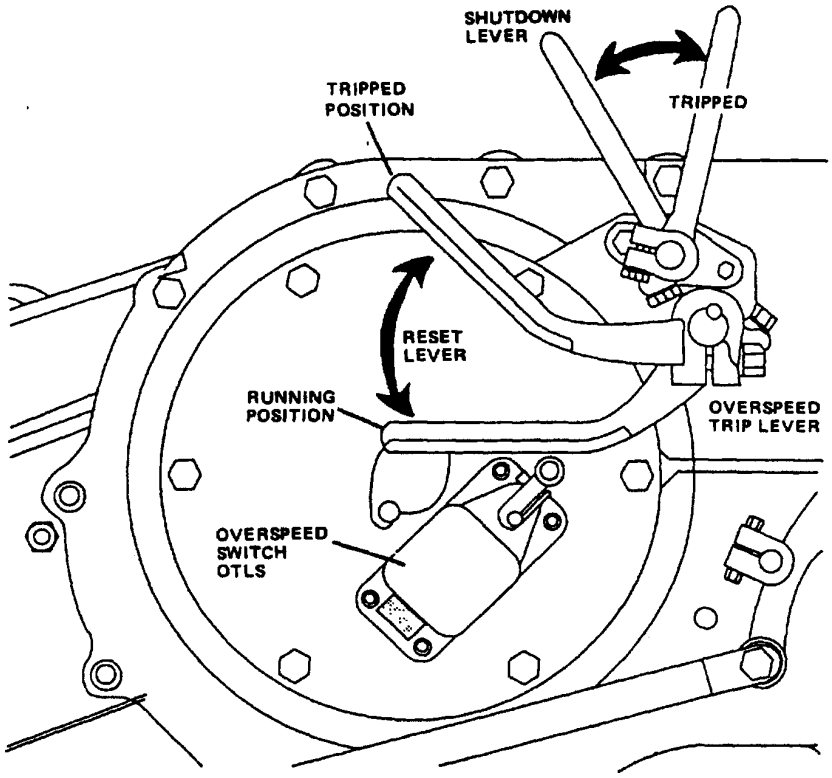


Figure 2-424. Overspeed Trip Lever.

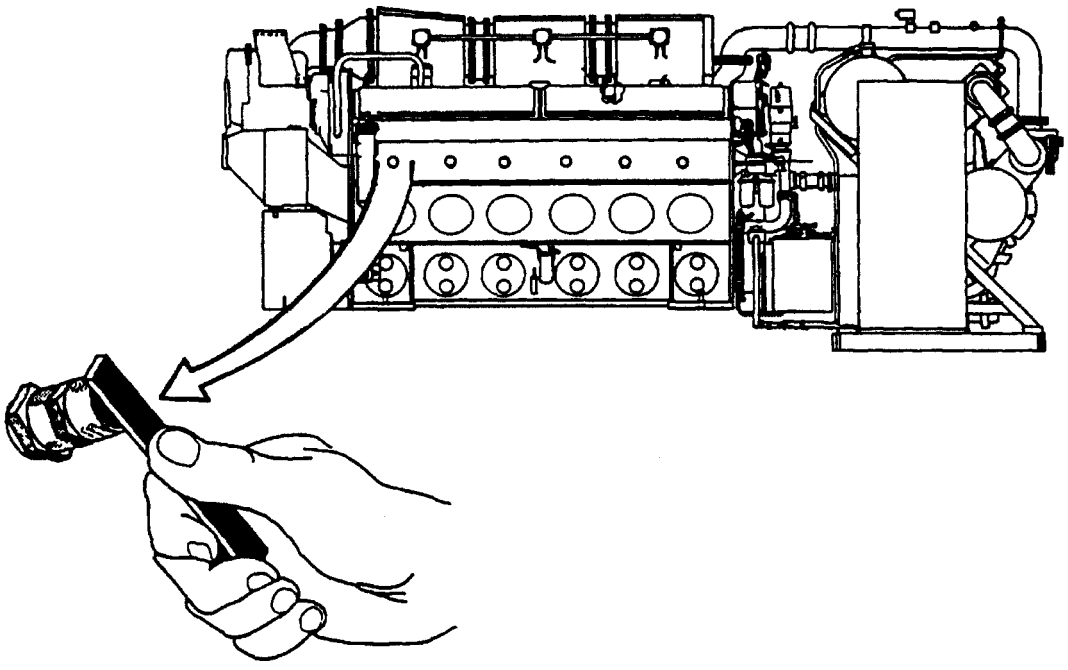


Figure 2-425. Test Valve

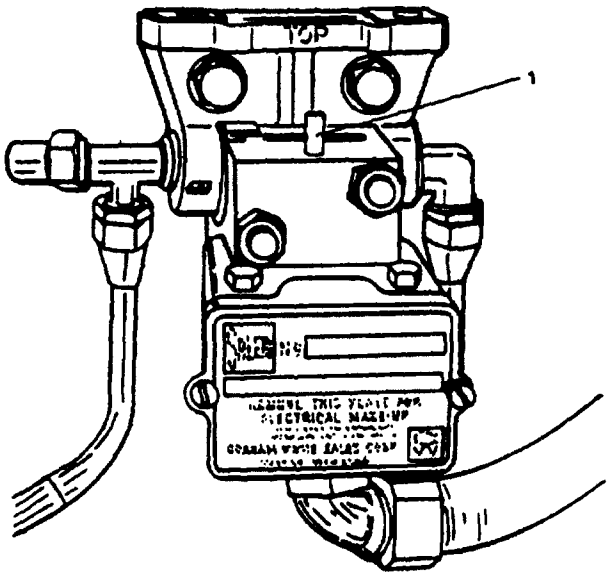
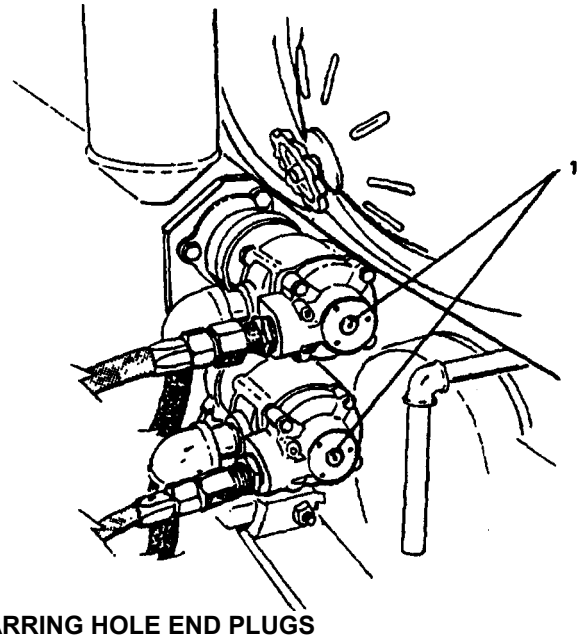
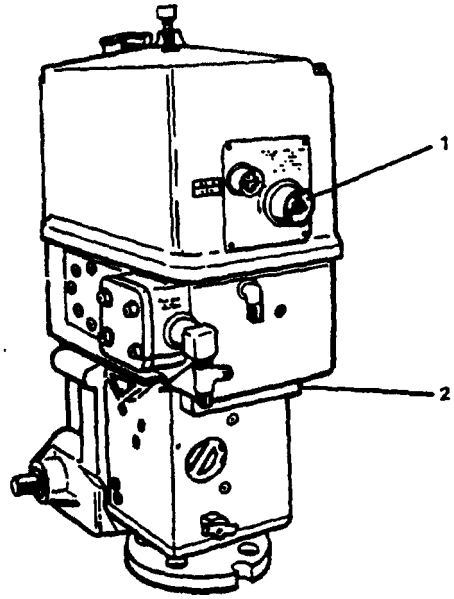


Figure 2-426. Air Start Solenoid Valve.



1. BARRING HOLE END PLUGS

Figure 2-427. Barring Hole.



1. MANUAL SPEED ADJUSTING KNOB
2. OIL LEVEL SIGHT GAUGE (NOT SHOWN)

Figure 2-428. Governor.

16 On engine control cabinet (Figure 2-423), momentarily press ENGINE START pushbutton (4) and release. This starts the turbocharger lube oil pump. Allow pump to run for a minimum of 30 seconds before proceeding.

NOTE

Perform steps 17 through 19 only after rebuild or prolonged layup.

17 Remove rear oil pan handhold cover and confirm that oil is flowing from the gear train.

NOTE

A normal engine start should include the 60 second operation of the turbo lube pump (soak back pump) prior to starting the engine. However, in an emergency situation, engine may be started without the delay.

18 Check for fluid discharge at cylinder test valves.

CAUTION

If there is any sign of water or oil being ejected at the cylinder test valves, or any indication of obstruction while rotating the engine, refer to unit maintenance. Do NOT attempt to start the engine until the problem has been corrected. Serious damage to the engine could result.

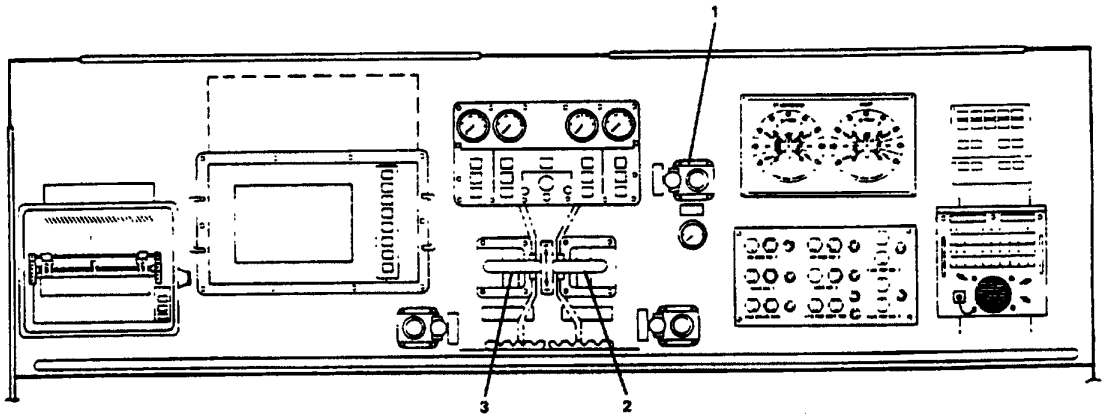
19 Replace and secure all handhold covers and engine top deck covers.

(e) Start starboard main engine.

NOTE

Starboard main engine can be started by pressing MN ENG NO. 1 green pushbutton on EOS console.

1 On engine control cabinet (Figure 2-423) press and hold ENGINE START pushbutton (4) until engine starts.



1. COMMAND TRANSFER
2. PORT MN ENG THROTTLE CLUTCH
3. STBD MN ENG THROTTLE CLUTCH

Figure 2-429. Enclosed Operating Station Console.

NOTE

Engine should start within 10 seconds.

2 Release ENGINE START pushbutton (4).

3 On engine control cabinet, check lubricating oil pressure gauge (1). If pressure is not indicated on gauge within 30 seconds, stop engine and determine cause.

4 Check gearbox bearing oil pressure (32 psi) as soon as engine starts; also check gauges and flow switch indicators.

5 Check water level in expansion tank.

6 Check governor oil for proper level on sight gauge (2, Figure 2-428).

7 Check engine oil level on dipstick.

CAUTION

Do not increase engine speed above idle until fresh water temperature gauge above governor indicates 49 C (120°F).

CAUTION

Engine operation at less than 50% load increases turbocharger gear train wear and adds to maintenance requirements.

8 Check engine operating conditions on machinery monitoring system.

b. Port Propulsion Plant.

(1) Align electrical system engine room power panel no. 1 (Figure 2-419). Set the following circuit breakers to the ON position:

(a) #2 RED GR CLG PUMP (5).

(b) #2 M.E. L.O. PRIME PUMP (3).

(c) #2 M.E. CONTROL PANEL (4).

(2) Align fuel oil service system (Figure 2-420).

(a) Open FO-19, F.O. SPLY TO M.E. NO. 2 (9).

(b) Open FO-13, F.O. SERV. SUCT. PORT (4).

(c) Open FO-33, F.O. RTN. TO DAY TK. PORT (3).

(d) Open FO-14, F.O. SERV. CRSVR (15).

(e) Open FO-34, F.O. RTN. CRSVR (19).

(3) Align fresh water cooling system (Figure 2-420).

(a) Open FWC-4, F.W. FR. M.E. NO. 2 TO KEEL CLR. (1).

(b) Open FWC-2, F.W. FR. KEEL CLR. TO M.E. NO. 2 (2).

(c) Open FWC-16, F.W. FR. KEEL CLR. TO RED. GEAR NO. 2 (6).

(d) Open FWC-14, F.W. FR. RED. GEAR NO. 2 TO KEEL CLR. (5).

(4) Fresh water no. 2 reduction gear cooling pump motor controller (Figure 2-421).

(a) Set ON-OFF switch (1) to ON position.

(b) POWER AVAILABLE indicator (2) will light.

(c) Press START pushbutton (4).

(d) MOTOR RUN indicator (3) will light.

(5) Pressure and coolant checks. Check RED GR #2 FW COOLING PMP DISCH PRESS discharge pressure gauge (approx. 20 psi) and coolant level in AFT STBD expansion tank sight glass.

(6) Align compressed air piping system (Figure 2-420). Open. CA-8, STG AIR TO ME (7) and in-line ball valve.

(7) Start port main engine.

CAUTION

Prelubrication of a new or overhauled engine or an engine which has been inoperative for more than 48 hours is necessary to prevent engine damage. Prelubrication protects otherwise unlubricated engine parts while the lube oil pump is filling the passages with oil.

(a) Prelubrication.

1 Open LO-48, C.O.V. PRELUBE PMP. DISCH. (8, Figure 2-420).

2 On lube oil priming pump no. 2 motor controller (Figure 2-422), POWER AVAILABLE indicator (4) will light.

3 Press START pushbutton (2).

4 MOTOR RUN indicator (3) will light.

CAUTION

DO NOT operate lube oil priming pump for more than 5 minutes.

5 Open forward rocker covers on both sides of engine. Allow engine to prelube until a small amount of oil is observed flowing from the forward cam bearing. Close rocker covers.

6 On lube oil priming pump no. 2 motor controller press STOP RESET pushbutton (1).

7 MOTOR RUN indicator (3) will go out.

8 Close LO-48, C.O.V. PRELUBE PMP. DISCH. (8, Figure 2-420).

(b) Engine control cabinet (Figure 2-423).

1 Press CONTROL POWER ON pushbutton (5). CONTROL POWER indicator (5) will light and ON indicator (6) (ALARM TEST ALARM OFF) will light.

(c) Prepare engine for starting.

1 On engine control panel, check START AIR PRESSURE gauge (3) (approx. 200 psi).

2 Check EOS control air pressure gauge (approx. 125 to 140 psi).

3 Check engine coolant level at expansion tank sight gauge.

NOTE

Ensure shaft brake pressure gauge on AFT end of reduction gear indicates 1200 to 1500 psi.

(d) Blow down engine.

1 Open test valves on back sides of engine 1/2 inch (Figure 2-425).

2 Close CA-8, STG AIR TO M.E. (7, Figure 2-420).

NOTE

The following steps require two soldiers.

3 Push and hold T-handle (1, Figure 2-426) in to engage starter drive pinions.

4 Remove barring hole end plugs (1, Figure 2-427) from barring holes.

5 Insert 5/16-inch Allen wrench in end plug opening barring hole (1).

6 Turn one revolution.

WARNING

DO NOT test valves without wearing eye protection.

7 Check test valves for oil and/or water. Close test valves (Figure 2-425).

8 Remove barring tool and release T-handle (1, Figure 2-426).

9 Install end plugs into barring holes.

10 Ensure overspeed trip lever (Figure 2-424) is in RUNNING (latched) position.

11 Open CA-8, STG AIR TO M.E. (7, Figure 2-420).

NOTE

Once idle RPM has been set, it is not necessary to adjust manual speed control knob each time engine is started.

12 Ensure governor manual speed adjusting knob (1, Figure 2-428) is not set to MIN position.

13 Operate hand crank fuel priming pump on FORWARD PORT side of engine until pressure is indicated on the engine control cabinet FUEL OIL PRESSURE gauge (2, Figure 2-423).

NOTE

Check L.O. level and gear box oil level.

14 On EOS console, place PORT MN ENG THROTTLE CLUTCH controls (2, Figure 2-429) in NEUTRAL position (straight up).

15 Place COMMAND TRANSFER valve (1) in E.O.S. position.

16 On engine control cabinet (Figure 2-423), momentarily press ENGINE START pushbutton (4) and release. This starts the turbocharger lube oil pump. Allow pump to run for a minimum of 30 seconds before proceeding.

NOTE

Perform steps 17 through 19 only after rebuild or prolonged layup.

17 Remove rear oil pan handhold cover and confirm that oil is flowing from the gear train.

NOTE

A normal engine start should include the 60 second operation of the turbo lube pump (soak back pump) prior to starting the engine. However, in an emergency situation, engine may be started without the delay.

18 Check for fluid discharge at cylinder test valves.

CAUTION

If there is any sign of water or oil being ejected at the cylinder test valves, or any indication of obstruction while rotating the engine, refer to unit maintenance.

Do NOT attempt to start the engine until the problem has been corrected. Serious damage to the engine could result.

19 Replace and secure all handhold covers and engine top deck covers.

(e) Start port main engine.

NOTE

Port main engine can be started by pressing MN ENG NO. 2 green pushbutton on EOS console.

1 On engine control cabinet (Figure 2-423) press and hold ENGINE START pushbutton (4) until engine starts.

NOTE

Engine should start within 10 seconds.

2 Release ENGINE START pushbutton (4).

3 On engine control cabinet, check lubricating oil pressure (1). If pressure is not indicated on the gauge within 30 seconds, stop the engine and determine cause.

4 Check gearbox bearing oil pressure (32 psi) as soon as engine starts; also check gauges and flow switch indicators.

5 Check water level in expansion tank.

6 Check governor oil (2, Figure 2-428) for proper level on sight gauge.

7 Check engine oil level on dipstick.

CAUTIONS

Do not increase engine speed beyond idle until fresh water temperature gauge above governor indicates 49°C (120 F).

Engine operation at less than 50% load increases turbocharger gear train wear and adds to maintenance requirements.

8 Check engine operating conditions on machinery monitoring system.

2-56. Main Engine Emergency Stopping.

a. Starboard Propulsion Plant.

(1) Stop-Engine. In an emergency, the engine may be stopped by moving the overspeed trip lever, (Figure 2-424) to the TRIPPED position; or pressing the MN ENG NO. 1 red pushbutton on the EOS console.

NOTE

Turbocharger lube oil pump will automatically run for a short time after engine stops.

(2) Secure compressed air piping system (Figure 2-420). Close CA-9, STG AIR TO M.E. (13) and in-line ball valve.

(3) Secure fresh water cooling system (Figure 2-420).

(a) Close FWC-13, F.W. FR. RED. GEAR NO. 1 TO KEEL CLR. (14).

(b) Close FWC-15, F.W. FR. KEEL CLR. TO RED. GEAR NO. 1 (12).

(c) Close FWC-3, F.W. FR. M.E. NO. 1 TO KEEL CLR. (20).

(4) Secure fuel oil service system (Figure 2-420).

(a) Close FO-15, F.O. SERV. SUCT. STBD (16).

(b) Close FO-35, F.O. RTN. TO DAY TK STBD (17).

(c) Close FO-20, F.O. SPLY TO M.E. NO. 1 (11).

(d) FO-14, F.O. SERV. CRSVR (15).

(e) FO-34, F.O. RTN. CRSVR (19).

(5) Secure reduction gear cooling pump motor controller (Figure 2-421).

(a) Press STOP pushbutton (5). Motor RUN indicator (2) will go out.

(b) Turn ON-OFF switch (1) to the OFF position.

(6) Secure electrical system.

(a) Engine room emergency distribution panel no. 1 (Figure 2-418). Set the following circuit breakers to the OFF position.

1 ENGINE ORDER TELEGRAPH SYS (3).

2 MONITORING SYS CRT (2).

3 REMOTE PROPULSION INDICATING PANEL SYS (1).

(b) Engine room power panel no. 1 (Figure 2-419). Set the following circuit breakers to the OFF position.

1 #1 M.E. CONTROL PANEL (2).

2 #1 M.E. L.O. PRIME PUMP (6).

3 #1 REDGRCLG PUMP (1).

b. Port Propulsion Plant.

(1) Stop engine. In an emergency, the engine may be stopped by moving the overspeed trip lever (Figure 2-424) to the tripped position; or by pressing MN ENG NO. 2 pushbutton on EOS console.

NOTE

Turbocharger lube oil pump will automatically run for a short time after engine stops.

(2) Secure compressed air piping system (Figure 2-420). Close CA-8, STG AIR TO M.E. (7) and in-line ball valve.

(3) Secure fresh water cooling system (Figure 2-420).

(a) Close FWC-14, F.W. FR. RED. GEAR NO. 2 TO KEEL CLR. (5).

(b) Close FWC-16, F.W. FR. KEEL CLR. TO RED. GEAR NO. 2 (6).

(c) Close FWC-2, F.W. FR. KEEL CLR. TO M.E. NO. 2 (2).

(d) Close FWC-4, F.W. FR. M.E. NO. 2 TO KEEL CLR. (1).

(4) Secure fuel oil service system (Figure 2-420).

(a) Close FO-13, F.O. SERV. SUCT. PORT (4).

(b) Close FO-33, F.O. RTN. TO DAY TK. PORT (3).

(c) Close FO-19, F.O. SPLY TO M. E. NO. 2 (9).

(d) FO-14, F.O. SERV. CRSVR (15).

(e) FO-34, F.O. RTN. CRSVR (19).

(5) Secure reduction gear cooling pump motor controller (Figure 2-421).

(a) Press STOP pushbutton (5). Motor RUN indicator (2) will go out.

(b) Turn ON-OFF switch (1) to the OFF position.

(6) Secure electrical system.

(a) Engine room emergency distribution panel no. 1 (Figure 2-418). Set the following circuit breakers to the OFF position.

1 ENGINE ORDER TELEGRAPH SYS (3).

2 MONITORING SYS CRT (2).

3 REMOTE PROPULSION INDICATING PANEL SYS (1).

(b) Engine room power panel no. 1 (Figure 2-419). Set the following circuit breakers to the OFF position:

1 #2 M.E. CONTROL PANEL (4).

2 #2 M.E.L.O. PRIME PUMP (3).

3 #2 RED GR CLG PUMP (5).

2-57. Rigging the LT to be Towed.

Refer to US NAVY Towing Manual SL740-AA-MAN-010 to rig the LT to be towed. Receive specific towing instructions from the towing vessel master.

2-58. Fire Fighting System Operation Using Pump Drive Engine.

a. Firemain.

(1) Align piping system Figure 2-430).

(a) Open the following valves:

1 FM-1, SEA SUCT. F.F. PMP. (4).

2 AE-28, SEACHEST VENT (15).

3 FM-13, F. F. TO F. M. CRSVR (6).

4 FO-31, F.O. SPLY TO PMP. DR. ENG. (11).

5 FO-13, F.O. SERV. SUCT., PORT (2).

6 FO-33, F.O. RTN. TO DAY TK. PORT (3).

7 ASW-17, SEA SUCTION S.W. COOLING (16).

8 ASW-19, S.W. TO PUMP DRIVE ENG. (7).

9 ASW-20, S.W. FR. PUMP DRIVE ENG. TO OVBD. DISCH. (8).

10 ASW-22, OVBD. DISCH., S.W. COOLING (10).

11 FF PMP. SUCT. STR. DIFF. PRESS. GAUGE CUTOUT valves (14) and FIREMAIN PRESS. GAUGE.

12 SW STRNR. DIFF. PRESS. GAUGE CUTOUT valves (5).

13 GS-75, TOW WN HYD OIL CLR SPLY (13).

14 GS-77, HYD OIL CLR DISCH (12).

(b) Close the following valves.

1 FM-14, FIRE/G.S. PMP. NO. 2 DISCH. TO FM. (17).

2 FM-16, FIRE PMP. NO. 1 DISCH TO FM. (18).

3 FM-6, FIRE/G.S. PMP. NO. 1 SUCT. (19).

4 FM-7, FIRE/G.S. PMP. NO. 2 SUCT. (20).

5 WDCM-11, WDCM SPLY (1).

6 FM-60, FM-61, and FM-62, COV AFFF MON (Figure 2-431).

(2) Start pump.

(a) Align electrical system.

1 On machinery DC control distribution panel, set PMP DR ENG circuit breaker (1, Figure 2-432) to ON position.

(b) Start pump drive engine.

1 Place power take-off control lever (1, Figure 2-433) in disengaged (aft) position.

2 Move the governor control lever (6, Figure 2-434) to half engine speed position (approximately straight up).

3 Check PMP DR ENG STG AIR PRESS gauge. The air start must be 100 psi to operate properly.

4 Open CA-8, STG AIR TO PMP DR. ENG. (9, Figure 2-430).

CAUTION

Do not crank engine for more than 30 seconds. Allow 2 minutes for starter motor to cool before cranking again. Engine damage could occur.

5 Turn START/STOP pushbutton (4, Figure 2-434) clockwise to release pushbutton to OUT position.

6 Push OFF-RUN-START toggle switch (5) up to START position to crank engine. As soon as engine starts, release toggle switch (switch is spring-loaded and will return to run position).

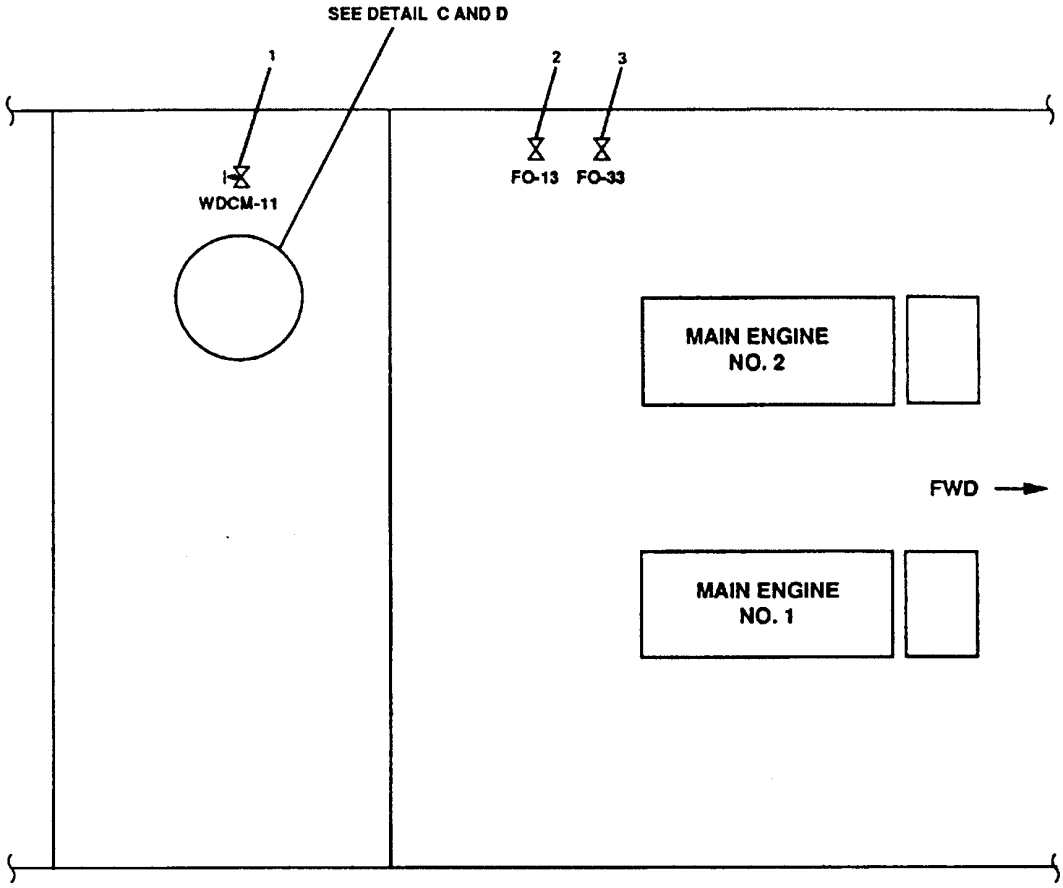
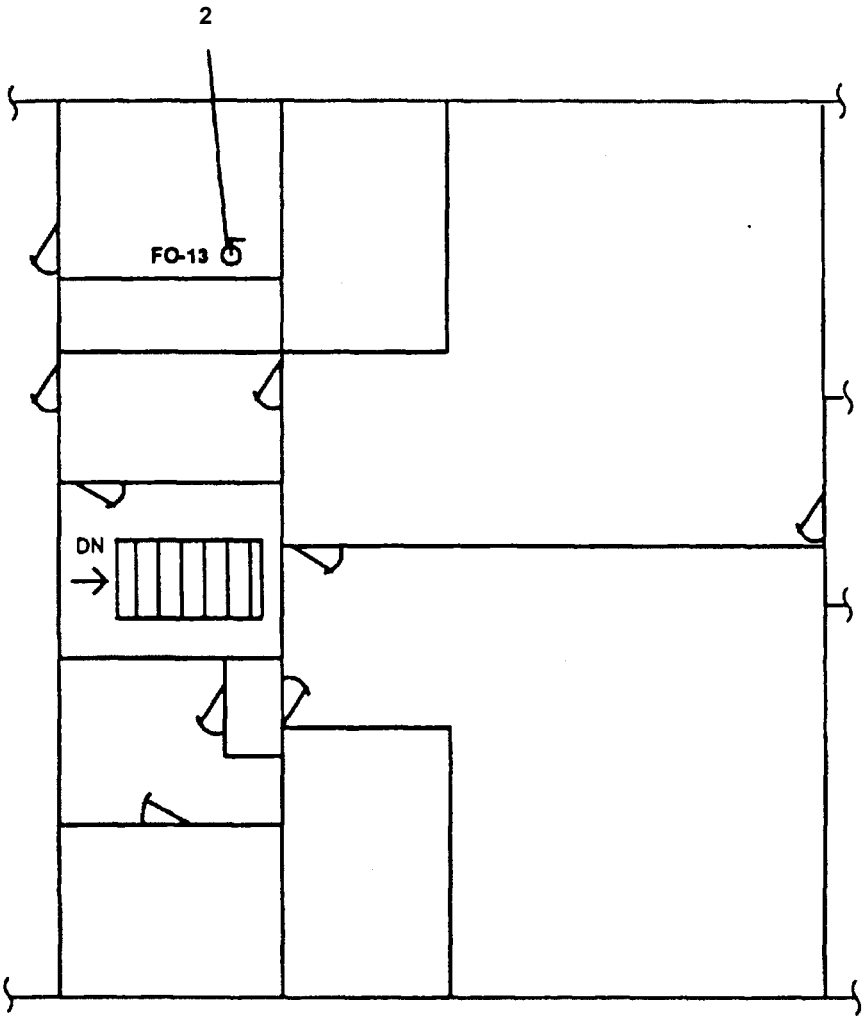


Figure 2-430. Fire Fighting System Valve Locations (Sheet 1 of 6).



MAIN DECK

Figure 2-430. Fire Fighting System Valve Locations (Sheet 2 of 6).

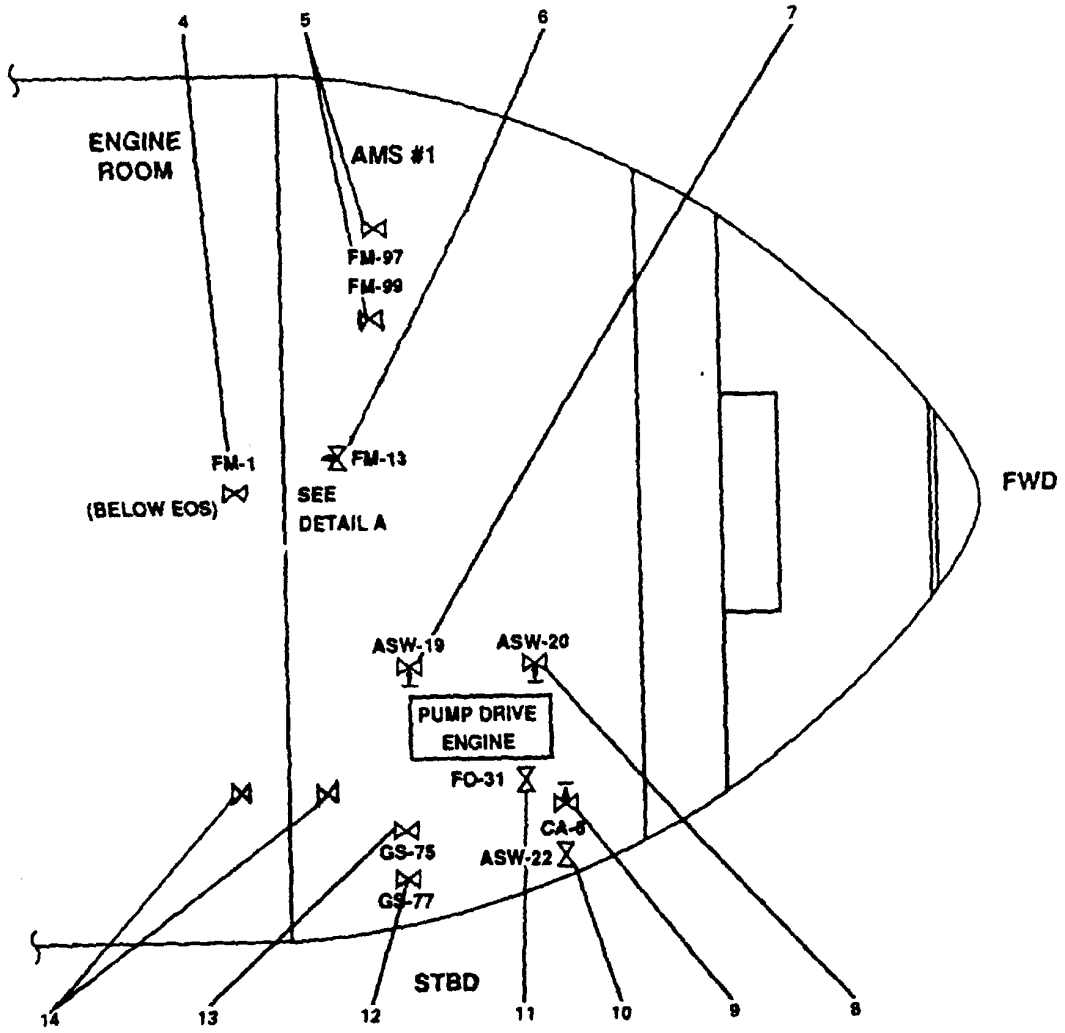
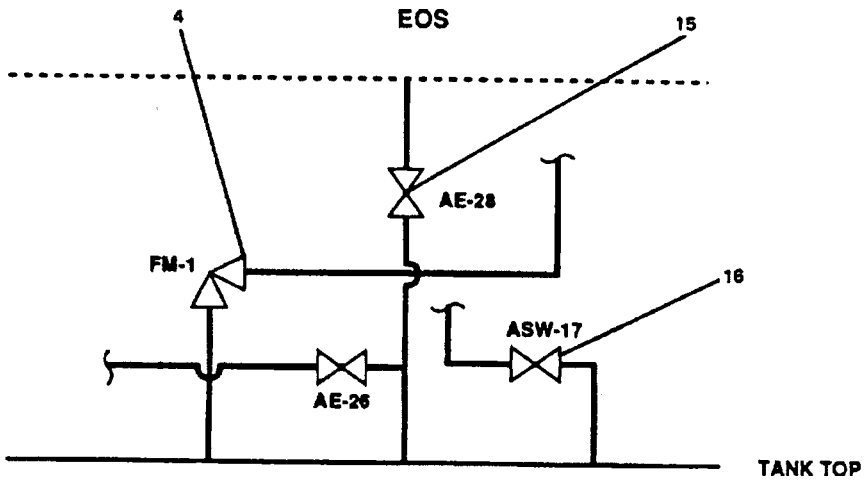
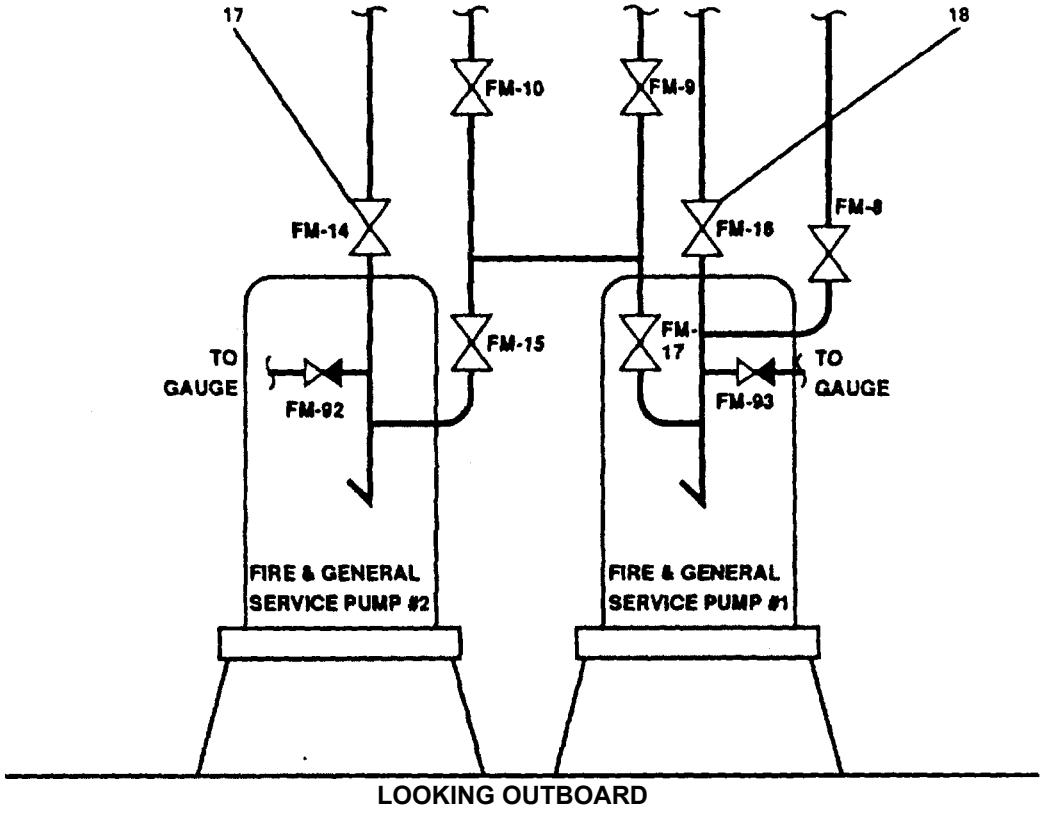


Figure 2-430. Fire Fighting System Valve Locations (Sheet 3 of 6).



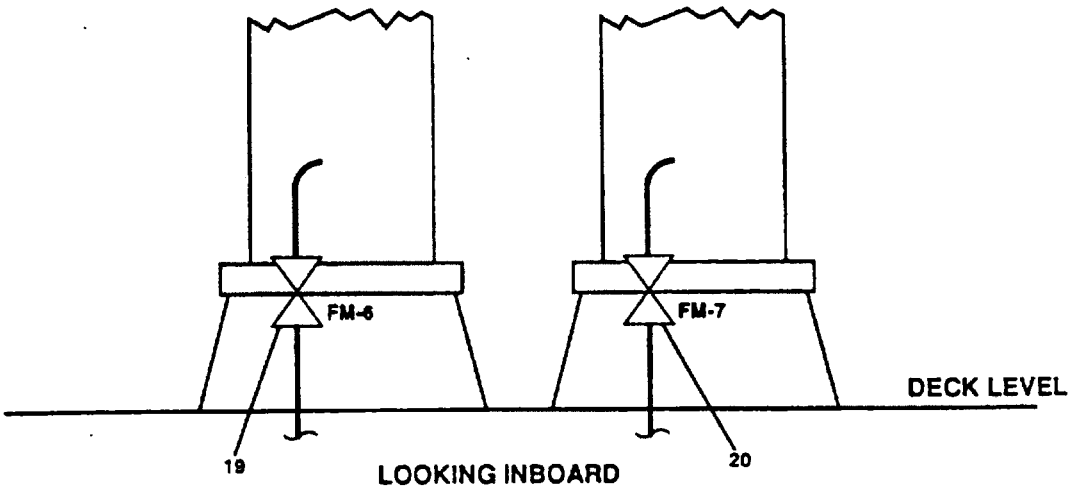
DETAIL A

Figure 2-430. Fire Fighting System Valve Locations (Sheet 4 of 6).



DETAIL B

Figure 2-430. Fire Fighting System Valve Locations (Sheet 5 of 6).



DETAIL C

SYMBOL LEGEND:

REMOTE VALVE OPERATOR

VALVE OVRHD

VALVE ABOVE DECK, BELOW OVRHD

VALVE AT OR BELOW DECK

1. WDCM-11, WDCM SPLY
2. FO-13, F.O. SERV. SUCT. PORT
3. FO-33, F.O. RTN. TO DAY TK. PORT
4. FM-1, SEA SUCT., F.F. PMP.
5. FM-97 & FM-99, PRESSURE GAUGE CUTOUT
6. FM-13, F.F. TO F.M. CRSVR
7. ASW-19, S.W. TO PUMP DRIVE ENG.
8. ASW-20, S.W. FR. PUMP DRIVE ENG. TO OVBD. DISCH.
9. CA-8, STG AIR TO PMP DR. ENG.
10. ASW-22, OVBD. DISCH., S.W. COOLING
11. FO-31, F.O. SPLY TO PMP. DR. ENG
12. GS-77, HYD OIL CLR DISCH
13. GS-75, TOW WN HYD OIL CLR SPLY
14. PRESSURE GAUGE CUTOUTS
15. AE-28, SEACHEST VENT
16. ASW-17, SEA SUCTION S.W. COOLING
17. FM-14, FIRE/G.S. PMP. NO. 2 DISCH. TO FM.
18. FM-16, FIRE PMP. NO. 1 DISCH. TO FM.
19. FM-6, FIRE/G.S. PMP. NO.1 SUCT.
20. FM-7, FIRE/G.S. PMP. NO. 2 SUCT.

Figure 2-430. Fire Fighting System Valve Locations (Sheet 6 of 6).

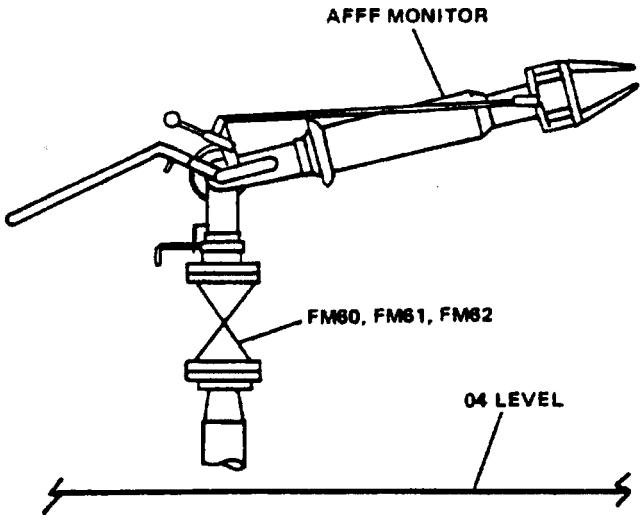


Figure 2-431. AFFF Monitor Cutout Valve.

CAUTION

Oil pressure should rise within 15 seconds after engine starts. If oil pressure does not rise, stop the engine immediately push toggle switch down to STOP to prevent damage and refer problem to unit maintenance.

7 Allow engine to idle 3 to 5 minutes, or until oil pressure gauge (1) reads between 35 and 70 psi.

8 Operate engine at low load until all systems reach operating temperatures. Check all gauges (1, 2, and 3) during the warm-up period.

(c) *Operate fire fighting pump.*

1 Ensure pump is primed.

2 Place power take-off control lever (1, Figure 2-433) in engaged (forward) position.

3 Move the governor control lever (6, Figure 2-434) to high idle (full load) position.

4 Check the engine gauges (1 and 3) for readings in green range.

5 Observe FIREMAIN PRESS gauge to ensure fire fighting pump is delivering liquid.

(d) Operate firemain in accordance with procedures in paragraph 2-8.

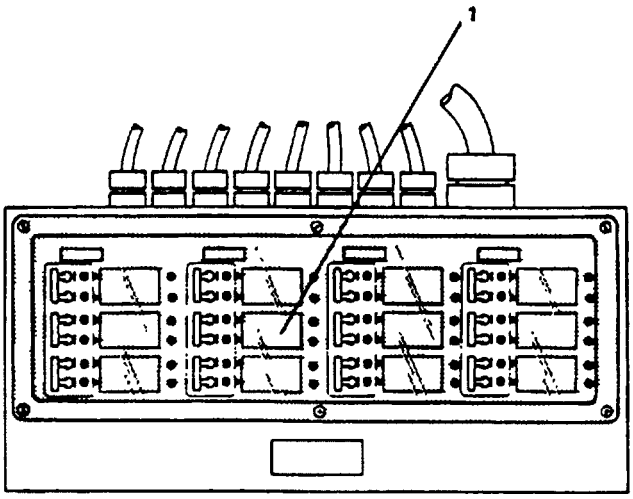
(3) *Fire fighting pump shutdown.*

(a) Move governor control lever (6) to half engine speed (slow idle).

(b) Place power take-off control lever (1, Figure 2-433) in disengaged (aft) position.

CAUTION

Stopping engine without cooldown period may cause accelerated wear of engine components. Follow the stopping procedure below to avoid damage to the engine.



1. PMP DR ENG CIRCUIT BREAKER

Figure 2-432. Machinery DC Control Distribution Panel.

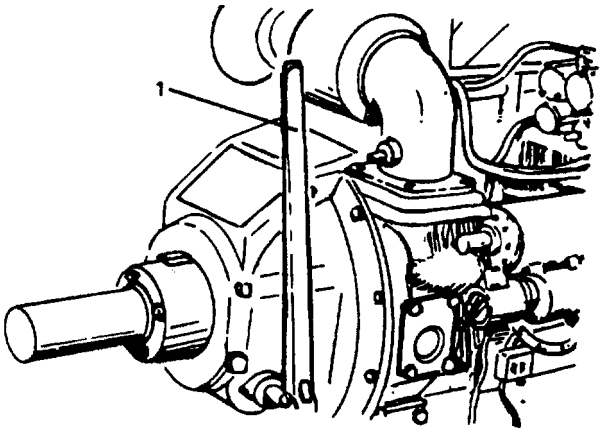
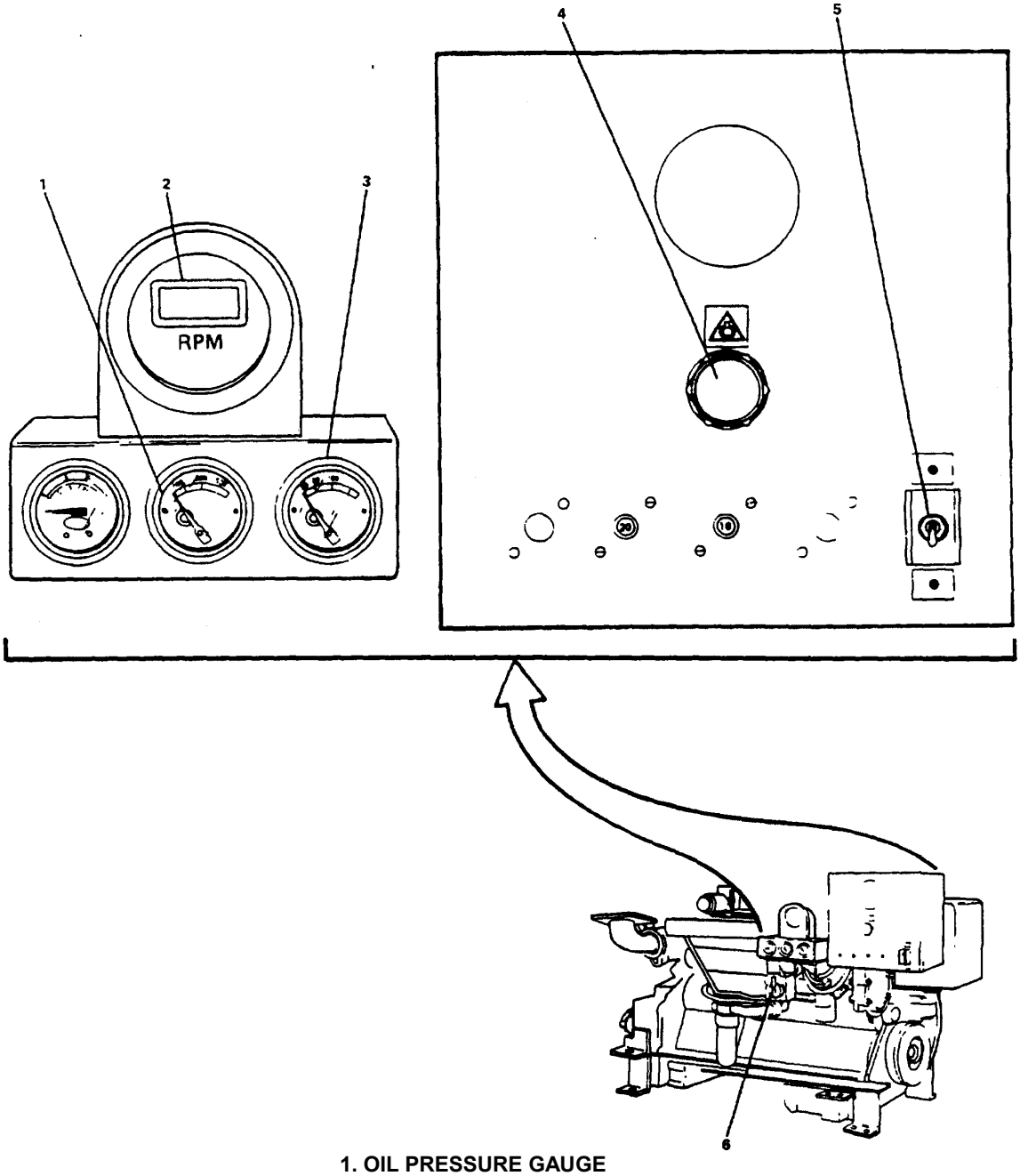


Figure 2-433. Pump Drive Engine Power Take-off.



1. OIL PRESSURE GAUGE
2. RPM
3. WATER TEMPERATURE GAUGE
4. START/STOP PUSHBUTTON
5. START-RUN-OFF SWITCH
6. GOVERNOR CONTROL LEVER

Figure 2-434. Pump Drive Engine Controls.

(c) Allow engine to idle with no load for 5 minutes.

(d) Move governor control lever (6, Figure 2-435) to OFF position.

(e) Push START-RUN-OFF toggle switch 5) down to OFF position.

(f) Push in START/STOP pushbutton (4).

(4) Secure piping system. Close the following valves (Figure 2-431):

(a) FM-1, SEA SUCT., F. F. PMP. (4).

(b) AE-28, SEA CHEST VENT (15).

(c) FM-13, F. F. TO F. M. CRSVR (6).

(d) FO-31, F. O. SPLY. TO PMP. DR. ENG. (11).

(e) FO-13, F. O. SERV. SUCT., PORT (3).

(f) FO-33, F. O. RTN. TO DAY TK. PORT (2).

(g) ASW-17, SEA SUCTION S. W. COOLING (16).

(h) ASW-19, S. W. TO PUMP DRIVE ENG. (7)

(i) ASW-20, S. W. FR. PUMP DRIVE ENG. TO OVBD. DISCH. (8).

(j) ASW-22, OVBD. DISCH. , S. W. COOLING (10).

(k) CA-6, STG AIR TO PMP DR. ENG. (9).

(l) FF PMP. SUCT. STIR. DIFF. PRESS. GAUGE CUTOUT valves (14) and FIREMAN PRESS. GAUGE (14).

(m) SW STRNR. DIFF. PRESS. GAUGE CUTOUT valves (5).

(n) GS-75, TOW WN HYD OIL CLR SPLY(13).

(o) GS-77, HYD OIL CLR DISCH (12).

b. Washdown Counter-Measure System.

(1) Align piping system.

(a) Open the following valves (Figure 2-431).

1 FM-1, SEA SUCT. F. F. PMP. (4).

2 AE-28, SEA CHEST VENT (15).

3 FM-13, F.F. TO F. M. CRSVR (6).

4 WDCM-11, WDCM SPLY (1).

5 FO-31, F.O. SPLY TO PMP. DR. ENG. (11).

6 FO-13, F.O. SERV. SUCT., PORT

7 FO-33, F.O. RTN. TO DAY TK.

8 ASW-19, S. W. TO PUMP DRIVE ENG. (7).

9 ASW-20, S. W. FR. PUMP DRIVE ENG. TO OVBD. DISCH. (8).

10 ASW-22, OVBD. DISCH. , S. W. COOLING (10).

11 ASW-17, SEA SUCTIONS. W. COOLING (16).

12 FM-94, FM-95 and FM-96, PRESSURE GAUGE CUTOUT valves (14).

13 FM-97 and FM-99, PRESSURE GAUGE CUTOUT valves (5).

14 GS-75, TOW WN HYD OIL CLR SPLY (13).

15 GS-77, HYD OIL CLR DISCH (12).

(b) Close the following valves:

1 FM-14, FIRE/G. S. PMP. NO. 2 DISCH. TO FM. (17).

2 FM-16, FIRE PMP. NO. 1 DISCH. TO FM. (18).

3 FM-6, FIRE/G. S. PMP. NO. 1SUCT. (1 9).

4 FM-7, FIRE/G. S. PMP. NO. 2 SUCT. (20).

(2) Start pump.

(a) Align electrical system. On machinery DC control distribution panel, set PMP DR ENG circuit breaker (1, Figure 2-433) to ON position.

(b) Start pump drive engine.

1 Place power take-off control lever (1, Figure 2-434) in disengaged (aft) position.

2 Move the governor control lever (6, Figure 2-435) to half engine speed position (approximately straight up).

3 Check PMP DR ENG STG AIR PRESS gauge. The air start must be 100 to 120 psi to operate properly.

4 Open CA-6, STG AIR TO PMP DR. ENG. (9, Figure 2-431).

CAUTION

Do not crank engine for more than 30 seconds. Allow 2 minutes for starter motor to cool before cranking again. Engine damage could occur.

5 Turn START/STOP pushbutton (4, Figure 2-435) clockwise to release pushbutton to OUT position.

6 Push OFF-RUN-START toggle switch (5) up to start position to crank engine. As soon as engine starts, release toggle switch (switch is spring-loaded and will return to run position).

CAUTION

Oil pressure should rise within 15 seconds after engine starts. If oil pressure codes not rise, stop the engine immediately push toggle switch down to STOP to prevent damage and refer problem to unit maintenance.

7 Allow engine to idle 3 to 5 minutes, or until oil pressure gauge (1) is between 35 to 70 psi.

8 Operate engine at low load until all systems reach operating temperatures. Check gauges (1, 2, and 3) during the warm-up period.

(c) Operate fire fighting pump.

1 Ensure pump is primed.

2 Place power take-off control lever (1, Figure 2-434) In engaged (forward) position.

3 Move the governor control lever (6, Figure 2-435) to high idle (full load) position.

4 Check the engine gauges (1 and 3) for readings in Green range.

5 Observe FIREMAIN PRESS gauge to ensure fire fighting pump is delivering liquid.

(d) Operate firemain in accordance with procedures in paragraph 2-8.

(3) Fire fighting pump shutdown.

(a) Move governor control lever (6) to half engine speed (slow idle).

(b) Place power take-off control lever (1, Figure 2-434) in disengaged (aft) position.

CAUTION

Stopping engine without cooldown period may cause accelerated wear of engine components. Follow the stopping procedure below to avoid damage to the engine.

(c) Allow engine to idle with no load for 5 minutes.

(d) Move governor control lever on engine control panel (6, Figure 2-435) to OFF position.

(e) Push START-RUN-OFF toggle switch (5) down to OFF position.

(f) Push in START/STOP pushbutton (4).

(g) On machinery DC control distribution panel, set PMP DR ENG circuit breaker (1, Figure 2-433) to OFF position.

(4) Secure piping system. Close the following valves (Figure 2-431):

(a) FM-1, SEA SUCT., F.F. PMP. (4).

(b) AE-28, SEA CHEST VENT (15).

(c) FM-13, F.F. TO F.M. CRSVR (6).

(d) WDCM-11, WDCM SPLY (1).

(e) FO-31, F.O. SPLY. TO PMP. DR.

(f) FO-13, F.O. SERV. SUCT., PORT (3).

(g) FO-33, F.O. RTN. TO DAY TK. PORT (2)

(h) ASW-19, S.W. TO PUMP DRIVE

(i) ASW-20, S.W. FR. PUMP DRIVE ENG. TO OVBD. DISCH. (8).

(j) ASW-17, SEA SUCTION S.W. COOLING (16).

(k) CA-6, STG. AIR TO PMP DR. ENG. (9).

(l) FF PMP. SUCT. STR. DIFF. PRESS. GAUGE CUTOUT valves (14) and FIREMAN PRESS. GAUGE. CUTOUT valves (5).

(m) SW STRNR. DIFF. PRESS. GAUGE

(n) GS-75, TOW WN HYD OIL CLR SPLY (13).

(o) GS-77, HYD OIL CLR DISCH (12).

2-59. Launch and Retrieve Workboat in Heavy Weather. Operations to launch and retrieve workboat in heavy weather follow the same procedures as provided in paragraph 2-28 except that vessel must be steered so that port side of vessel is leeward before launching or retrieving workboat.

WARNING

All personnel working outdoors in heavy weather must wear life jackets to prevent drowning in the event of falling overboard.

2-60. Heavy Weather Preparations.

WARNING

Unexpected roll or pitch of vessel can cause personnel to fall against five electrical circuits, rotating machinery or hot surfaces. Exercise extreme caution.

a. Secure Weather Decks.

(1) Tie down workboat and crane.

(2) Secure all lines, hoses and loose equipment.

(3) Cover and secure all vents, electrical outlets, and call boxes.

(4) Secure and dog all doors and hatches.

(5) Rig storm lines if any work is to be performed on weather deck during heavy weather.

b. Secure Pilothouse.

(1) Secure all microphones or headsets in their holders.

(2) Secure pencils, rulers, compasses, binoculars and azimuth circle on chart table.

(3) Secure coffee pot and tie down all chairs to desk or table legs.

c. Secure Living Spaces and Mess Deck.

(1) Secure all pots, cups, dishes and silverware in dining area.

(2) Strap chairs to deck.

(3) Secure loose personal gear in berthing spaces.

d. Secure Galley.

(1) Stop all food preparation that presents a hazard. Do not use hot oil in fryer, and steam, boiling water or hot liquids on stove. Secure power to all food preparation equipment. Do not turn off cold storage equipment.

(2) Secure all pots, pans, cooking utensils, and coffee maker.

(3) Secure any remaining loose items in galley.

e. Secure Engine and Machinery Spaces.

(1) Secure all loose items, equipment and tools.

(2) Stop all non-essential maintenance. If maintenance work is absolutely essential, personnel must work in pairs.

2-61. Tow Winch Unusual Operation.

NOTE

Tow emergency procedures apply to the tow winch. THESE PROCEDURES ARE TO BE USED IN EMERGENCIES ONLY.

a. Towing on the Dog.

(1) Rig tow. Prepare the tow winch for operation and rig the tow, including establishing desired scope in accordance with paragraph 2-32 and 2-46.

WARNING

Never engage dog while drum is rotating in payout direction. Doing so will damage the dog. Personal injury could result.

(2) Set dog (Figure 2-435).

(a) Remove keeper pin (a).

(b) Engage dog (4) in ratchet teeth.

(c) Loosen clutch-brake handwheel (1) slowly until drum turns slightly and all load is transferred to dog.

(d) Retighten clutch-brake handwheel (1).

(e) Install keeper pin (5).

NOTE

• Operator must observe tow at all times while towing on the dog.

• All emergency release features of machine are disabled when dog is engaged. In order to pay out or pull in, the tow winch must first be put into HEAVE mode and dog disengaged.

(3) Secure tow winch. Secure tow winch and hydraulic system in accordance with paragraph 2-32.

b. Emergency Release of Towline.

WARNING

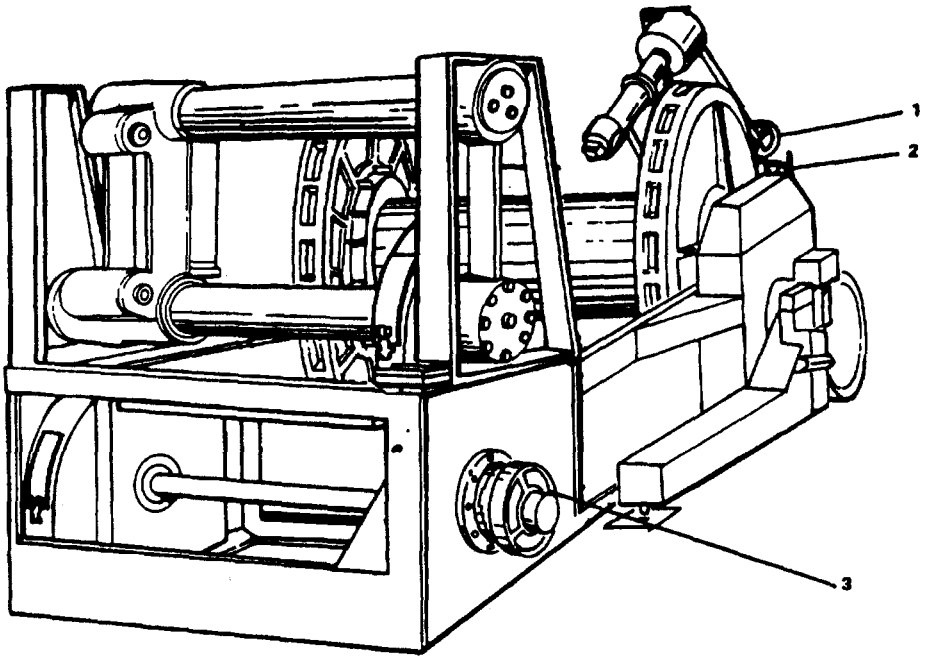
Should the LT "get in irons" or find the tow must be released, the clutch-brake can be released and towline allowed to pull off the drum. The bitter end is designed to pull loose at approximately 15, 000 lbs pull. Make sure all personnel are cleared from the main deck to avoid line whip as it pulls off. Serious personal injury or death could result.

(1) Clear all personnel from main deck.

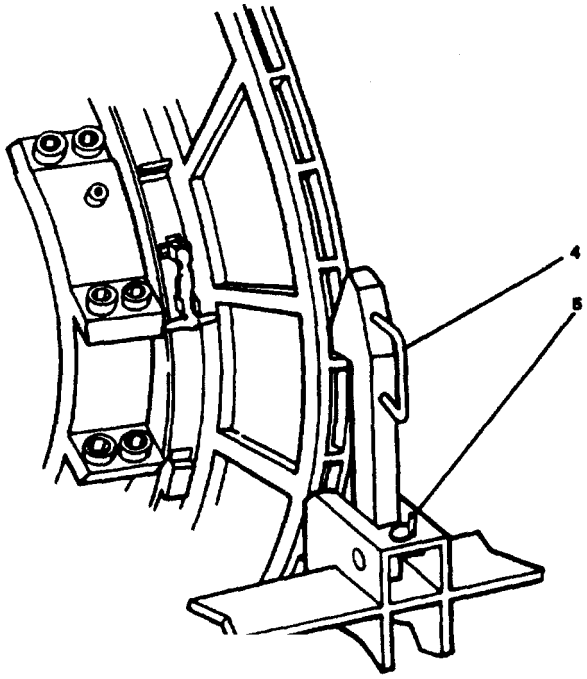
(2) Ensure dog (4, Figure 2-435) is NOT set.

(3) One crew member releases clutch-brake handwheel (1).

(4) Allow line to pull off drum.



PORT WINCH



1. CLUTCH BRAKE
2. AUXILIARY BRAKE
3. SPOOLING DEVICE HAND WHEEL
4. DOG
5. KEEPER PIN

PORT WINCH
FORWARD LOOKING AFT

Figure 2-435. Double Drum Tow Winch.

2-62. Tow Winch Operation Powered by Central Hydraulics.

NOTE

LT-801 is not piped to perform this function.

a. Start Central Hydraulics.

(1) Align piping system (Figure 2-436).

(a) Close the following valves:

1 TH-14 (1).

2 CH-26, DRN. CUTOUT TOW WN. HYDR. (4).

3 CH-27, RTN. CUTOUT TOW WN. HYDR. (7).

(b) Open the following valves:

1 TH-2, PRESS. /RTN. CRSVR. TO CENT. HYD. (2).

2 TH-1, C. O. V. PMP DISCH. TO TOW WN. HYD. (3).

3 TH-4, RTN CRSVR. TO CENT HYD. (6).

4 TH-3, PRESSJRTN. CRSVR. TO CENT. HYD. (5).

(2) Align electrical system.

(a) Main switchboard (Figure 2-437). Set CENT HYD SYS PWR UNIT NO. 1 & 2 circuit breaker (1) to ON position.

1 READY indicators (on power pack control panel) will light.

(b) Engine room emergency distribution panel no. 1 (Figure 2-438). Set TOWING MACHINE CONTROL POWER circuit breaker (1) to ON position.

(c) Central hydraulic system power pack control panel (Figure 2-439). Set ON-OFF switch (3) to ON position.

(3) Start power pack.

CAUTION

Normally only one pump is used to operate the power pack. Both pumps may be operated at the same time; however, the reservoir temperature must be checked frequently. If HI OIL TEMP indicator illuminates, shut system down immediately and allow to cool before operating. Operating the pumps with hot oil (above 180°F (82°C)) could damage equipment.

(a) Select pump(s). Select pump(s) desired.

1 Set MODE SELECT switch (1) to ON position.

2 Set PUMP SELECT switch (2) to P1, P2, or P1 & P2 position.

NOTE

Check deck machinery and the winch to ensure all controls are disengaged.

(b) Start pump(s).

CAUTION

If LOW OIL LEVEL indicator or HI OIL TEMP indicator illuminates at any time, stop pumps. Continued operation could result in damage to equipment.

1 Press START pushbutton (7).

2 RUNNING indicators (8 and/or 9) will light, depending on pump selected.

b. Operate Tow Winch (Figure 2-440).

CAUTION

Never use a lever or wrench to tighten clutch-brake. Overightening clutch brake will damage mechanism.

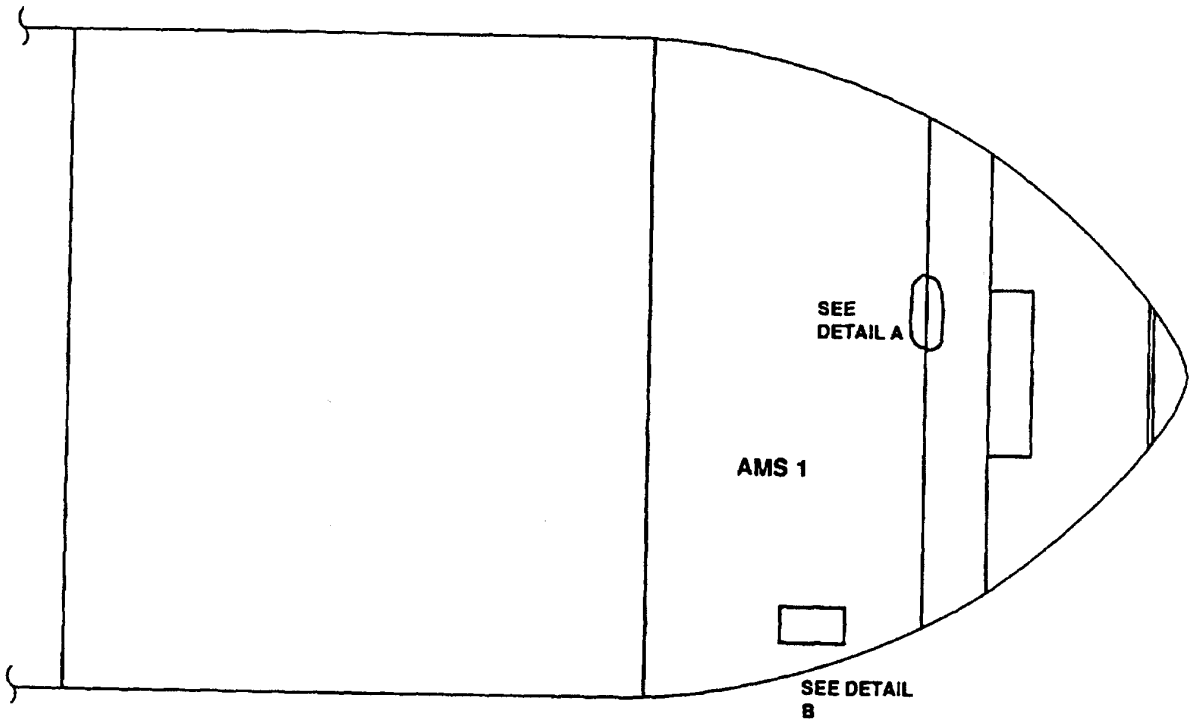


Figure 2-436. System Valve Locations (Sheet 1 of 3).

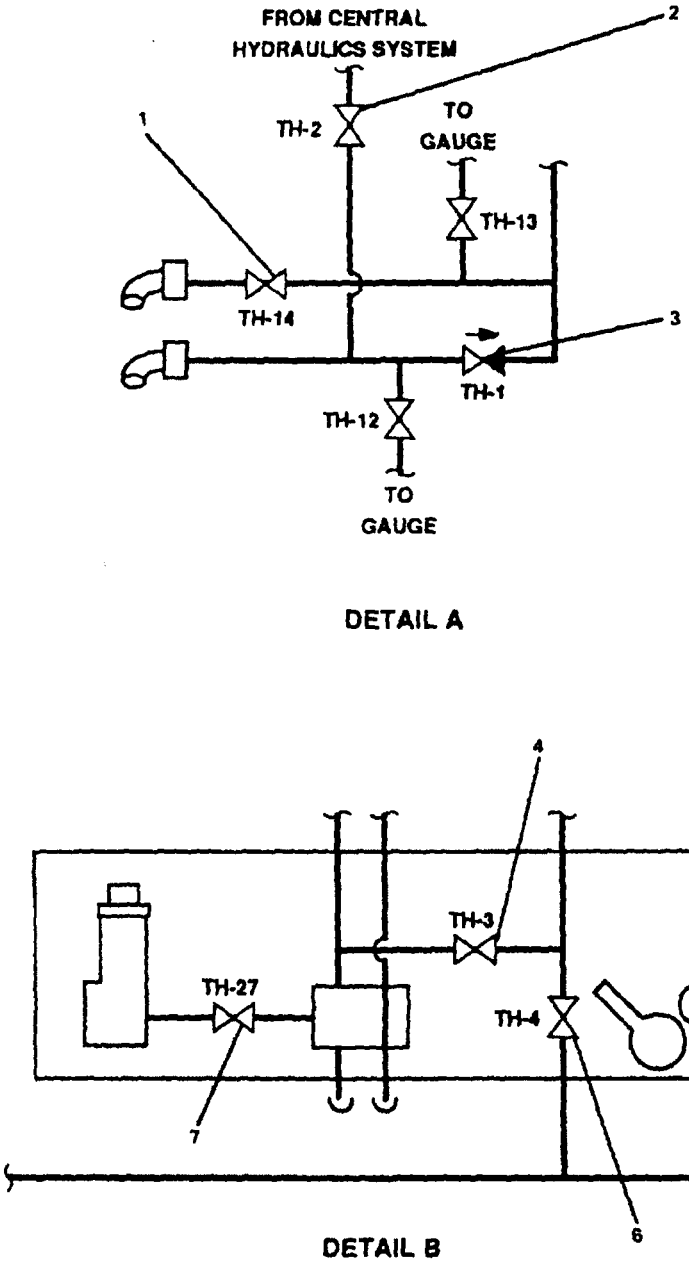
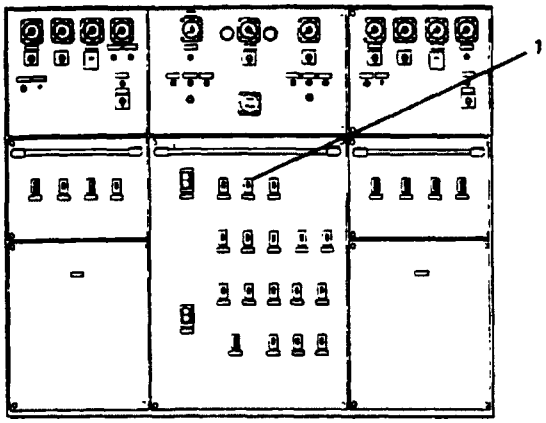


Figure 2-436. System Valve Locations (Sheet 2 of 3).

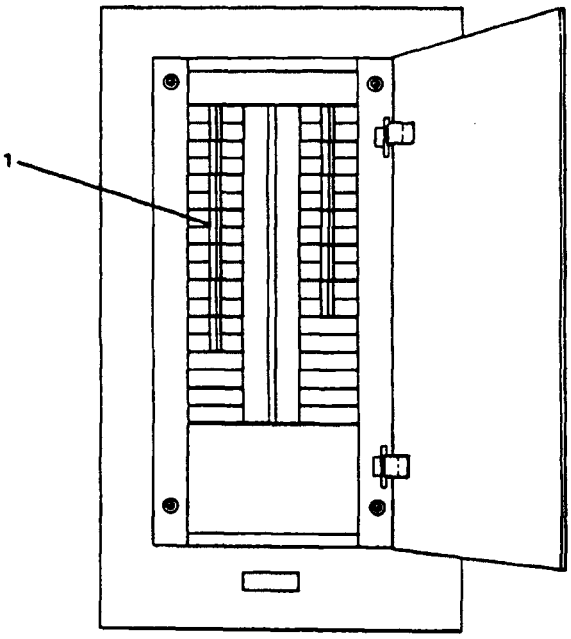
1. TH-14
2. TH-2, PRESS./RTN. CRSVR. TO CENT. HYDR.
3. TH-1, C.O.V. PMP. DISCH. TO TOW WN. HYDR.
4. CH-26, DRN. CUTOUT TOW WN. HYDR.
5. TH-3, PRESS./RTN. CRSVR. TO CENT. HYDR.
6. TH-4, RTN. CRSVR. TO CENT. HYDR.
7. CH-23, RTN. CUTOUT TOW WN. HYDR.

Figure 2-436. System Valve Locations (Sheet 3 of 3).



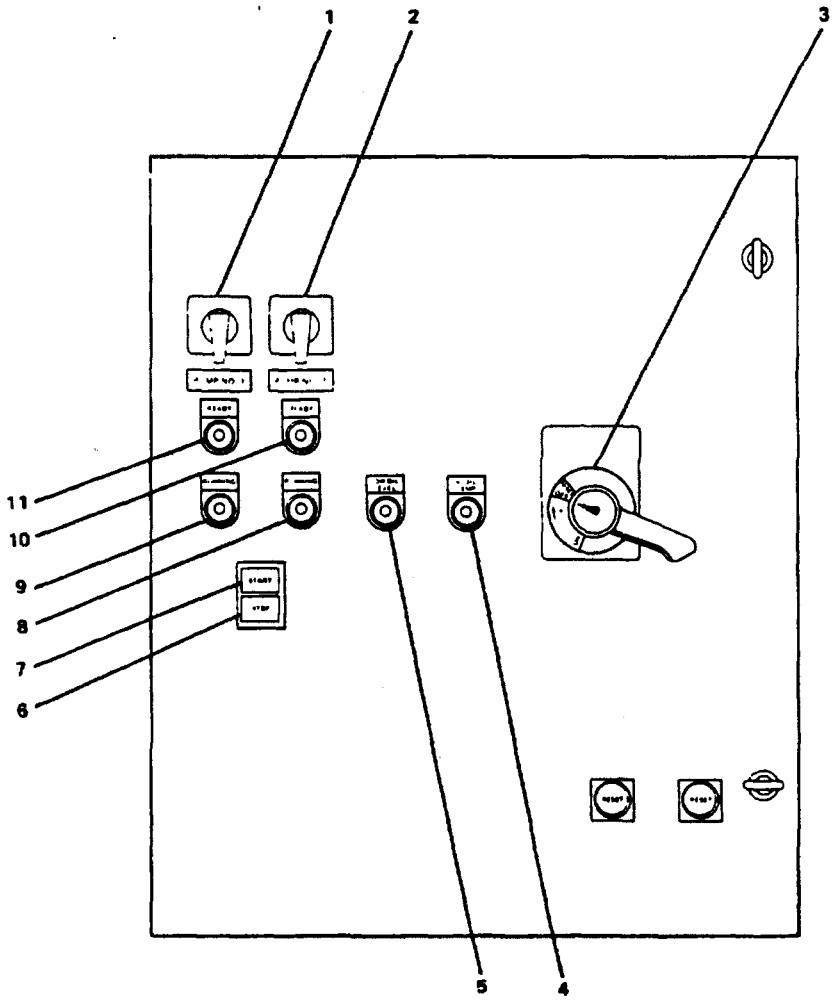
1. CENT HYD SYS PWR UNIT NO. 1 & 2

Figure 2-437. Main Switchboard.



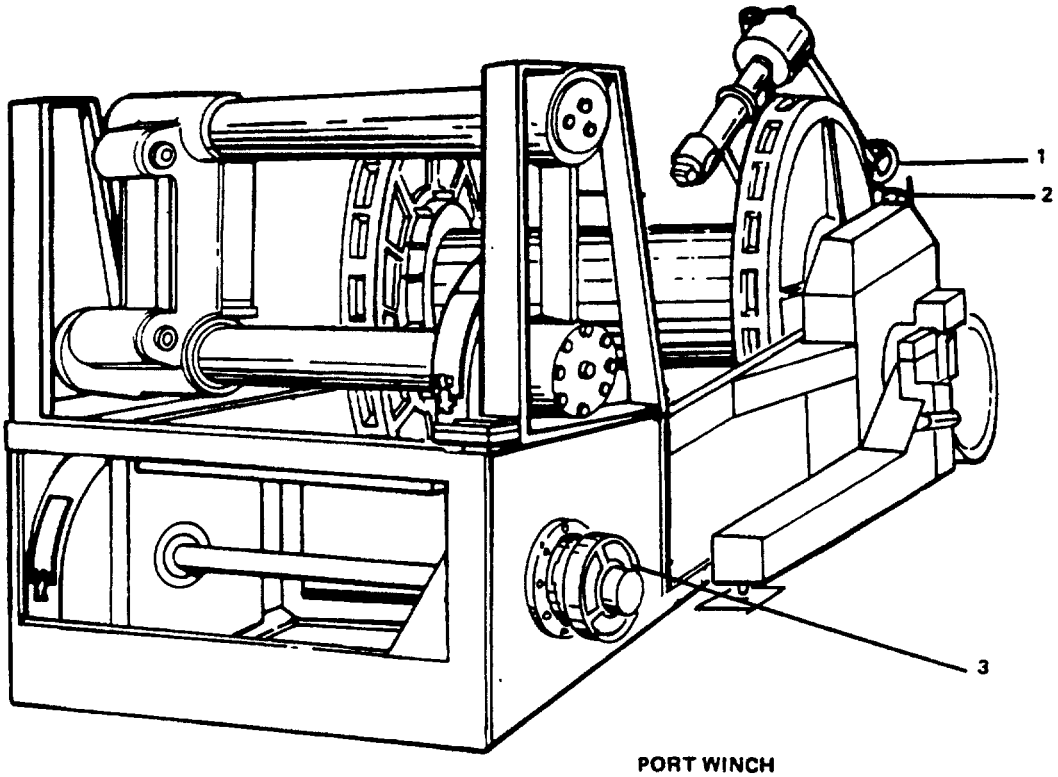
1. TOWING MACHINE CONTROL POWER

Figure 2-438. Engine Room Emergency Distribution Panel No. 1.

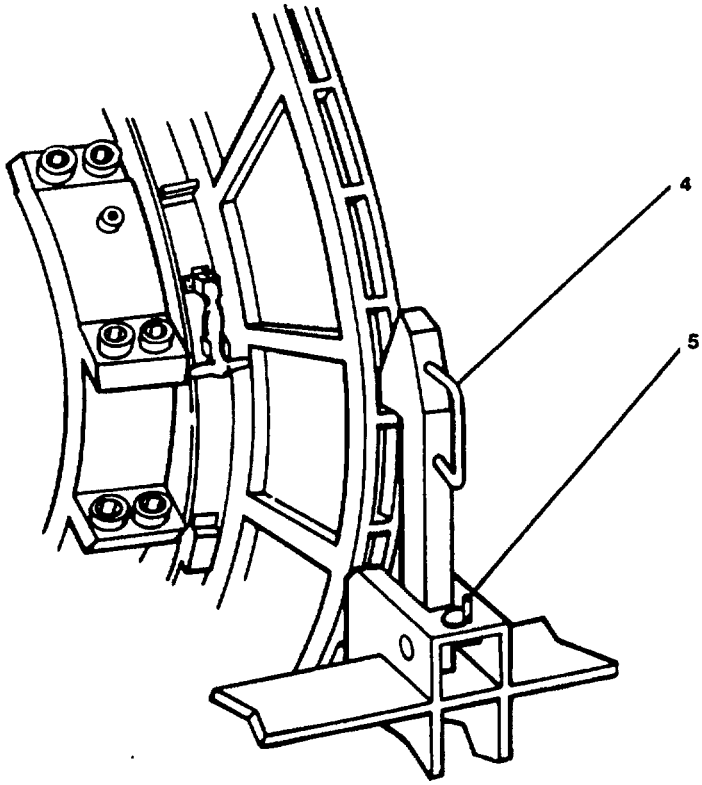


1. MODE SELECT SWITCH
2. PUMP SELECT SWITCH
3. ON-OFF SWITCH
4. HI-OIL TEMP INDICATOR
5. LOW OIL LEVEL INDICATOR
6. STOP PUSHBUTTON
7. START PUSHBUTTON
8. RUNNING INDICATOR
9. RUNNING INDICATOR
10. READY INDICATOR
11. READY INDICATOR

Figure 2-439. Central Hydraulic System Power Pack Control Panel.



PORT WINCH
AFT LOOKING FORWARD



PORT WINCH
FORWARD LOOKING AFT

1. CLUTCH BRAKE
2. AUXILIARY BRAKE
3. SPOOLING DEVICE HANDWHEEL
4. DOG
5. KEEPER PIN

Figure 2-440. Double Drum Tow Winch.

NOTE

A force of about 25 pounds on the handwheel is usually sufficient to provide enough friction in clutch-brake to drive machine under normal loads.

(2) Set up auxiliary brake. Loosen auxiliary brake handwheel (2) to allow free rotation of drums.

(3) Check dog position. Pull dog (4) away from drum and insert keeper pin (5).

WARNING

Never engage dog while drum is rotating in PAYOUT direction. Doing so will usually break dog mounting hardware, bend the dog and/or shear the dog mounting pin. Failure could also cause serious personal injury.

(4) Set up spooling device.

WARNING

Do not disengage clutch if there is heavy quartering load on towline as the towline may drive the handwheel at rapid speed until spooling rollers align themselves with wire rope. Always make sure there is light line pull or small misalignment before disengaging clutch. Rapidly turning handwheel could cause personal injury.

(a) Observe spooling device alignment. Observe spooling device alignment to make sure wire rope is passing through rollers more or less perpendicular to drum and in line with previous wrap.

NOTE

For tight spooling, the rollers should have a slight lead on the previous wrap. This is more important during respooling than paying out.

(b) Re-align spooling device. If there is severe misalignment (more than 3"):

1 De-clutch spooling device by loosening butterfly.

2 Re-align by turning handwheel (3) in desired direction.

3 Re-engage clutch by tightening butterfly.

(5) Operate tow winch. Operate tow winch in desired mode in accordance with appropriate sub-paragraph of paragraph 2-32.

c. Secure Tow Winch.

(1) Stop operation. Place control lever in NEUTRAL position.

(2) Set dog. Set dog (4) in aft (engaged) position and insert keeper pin (5).

(3) Set auxiliary brake. Set auxiliary brake by turning handwheel (2) in clockwise direction until handtight.

d. Shut Down Central Hydraulic System (Figure 2-439).

(1) Stop pump(s).

(a) Press STOP pushbutton (6).

(b) RUNNING indicators (8 and 9) should extinguish.

(c) Set MODE SELECT switch (1) to REMOTE position.

(2) Secure electrical system.

(a) Central hydraulic system power pack control panel. Set ON-OFF switch (3) to OFF position.

(b) Engine room emergency distribution panel no. 1 (Figure 2-438). Set TOWING MACHINE CONTROL POWER circuit breaker (1) to OFF position.

(c) Main switchboard (Figure 2-437). Set CENT HYD SYS PWR UNIT NO. 1 & 2 circuit breaker (1) to OFF position.

1 READY indicators (10 and 11, Figure 2-439) will go out.

(3) Secure piping system (Figure 2-438). Close the following valves:

(a) TH-3, PRESS. /RTN. CRSVR. TO CENT. HYD. (5).

(b) TH-4, RTN CRSVR. TO CENT. HYD. (6).

(c) TH-1, C.O.V. PMP DISCH. TO TOW WN. HYD. (3).

(d) TH-2, PRESS. /RTN. CRSVR. CENT. HYD. (2).

2-63. Ship Stores Refrigeration Split-Plant Operation.

NOTE

The following procedures provide for shifting to standby condenser and for pulldown (both condensers on line) operation.

a. Shift to Standby Condensing Unit.

(1) Align electrical system.

(a) Main power *disconnect switch (Figure 2-441).* Ensure main power disconnect switch (1) is in ON position on standby refrigeration condensing unit.

(2) Auxiliary machinery space 2 power panel no. 5 *(Figure 2-442).* Ensure following circuit breakers are in ON position:

(a) #1 STORES REFRIGERATION CONDENSING UNIT (2).

(b) #2 STORES REFRIGERATION CONDENSING UNIT (4).

b. Start Standby Refrigeration Plant No. 1 .

CAUTION

Align condenser cooling water piping system before starting refrigeration plant. Damage to plant can occur.

(1) Align condenser cooling water piping system (Figure 2-443).

(a) Open GS-38, AC/COND NO. 1 or GS39, NO. 2 SPLY (4).

(b) Open GS-67 or GS-68, WTR RGLTR COV (3).

(c) Open GS-48, or GS-49, WTR REGLTR COV (5).

(d) Close GS-82 of GS-71, BYP WTR RGLTR (1).

NOTE

Before starting compressor, crankcase heater must be energized for 24 hours. Energizing heater for this period of time should drive all refrigerant from oil.

CAUTION

When starting compressor, avoid rapid pumpdown to ensure oil is not carried off with refrigerant. If oil is pulled from sump, ensure oil pressure is a minimum of 16 psig above suction pressure. If pressure drops below this, stop the compressor and add oil temporarily. The added oil must later be removed when oil in sight glass is too high. If this situation occurs, refer to unit maintenance. Low oil pressure and oil level could damage compressor.

(2) Align condenser unit piping (Figure 2-441).

NOTE

Use refrigeration ratchet wrench to open/ close the following valves (2, 5, and 6).

(a) Open COMPRESSOR DISCHARGE valve (5).

(b) Close COMPRESSOR SUCTION valve (6).

(c) Open CONDENSER OUTLET valve (11).

(d) Open DEHYDRATOR OUTLET valve (7).

(e) Close DEHYDRATOR BY-PASS valve (10).

(f) Open DEHYDRATOR INLET valve (9).

(g) Open RELIEF VALVE BY-PASS valve (4).

(h) Close PURGE valve (2).

(i) Close CHARGE AND DRAIN valve (8).

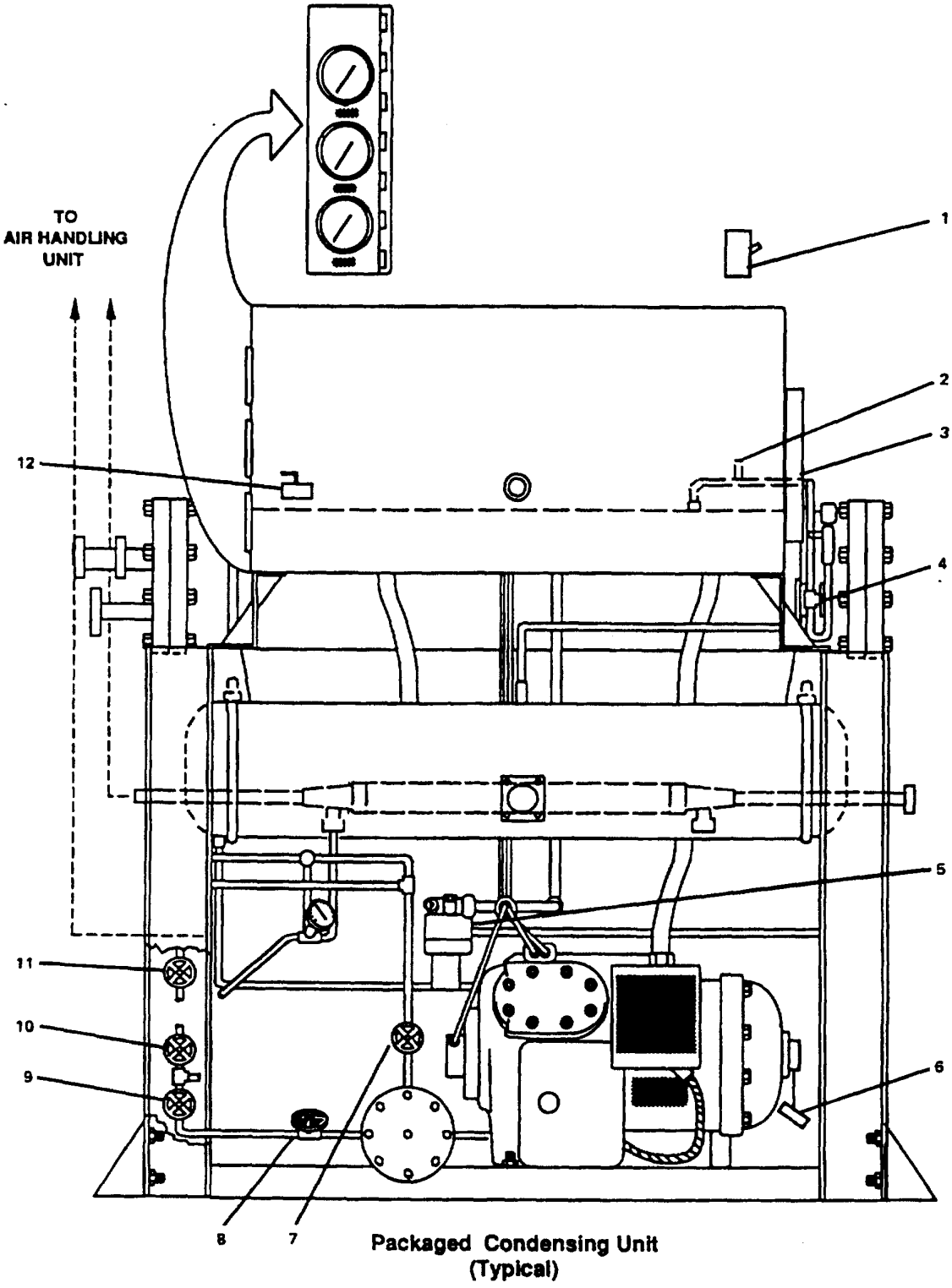


Figure 2-441. Refrigeration Condenser Unit (Sheet 1 of 2).

1. POWER SWITCH
2. PURGE
3. MAIN POWER DISCONNECT
4. RELIEF VALVE BY-PASS
5. COMPRESSOR DISCHARGE
6. COMPRESSOR SUCTION
7. DEHYDRATOR OUTLET
8. CHARGE AND DRAIN
9. DEHYDRATOR INLET
10. DEHYDRATOR BY-PASS
11. CONDENSER OUTLET
12. WATER REGULATOR VALVE ACTUATING LINE VALVE

Figure 2-441. Refrigeration Condenser Unit (Sheet 2 of 2).

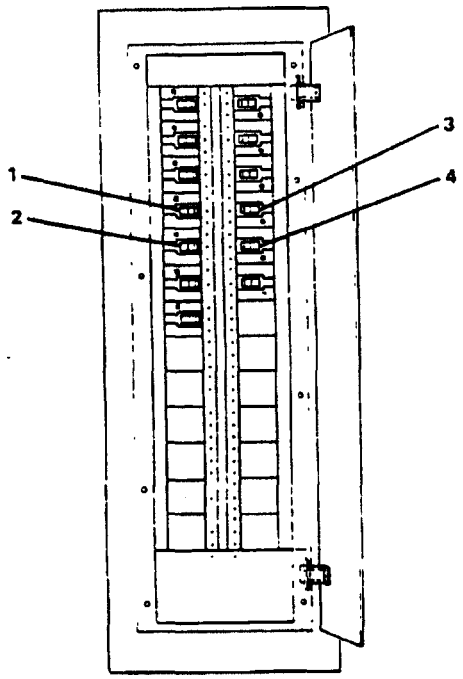
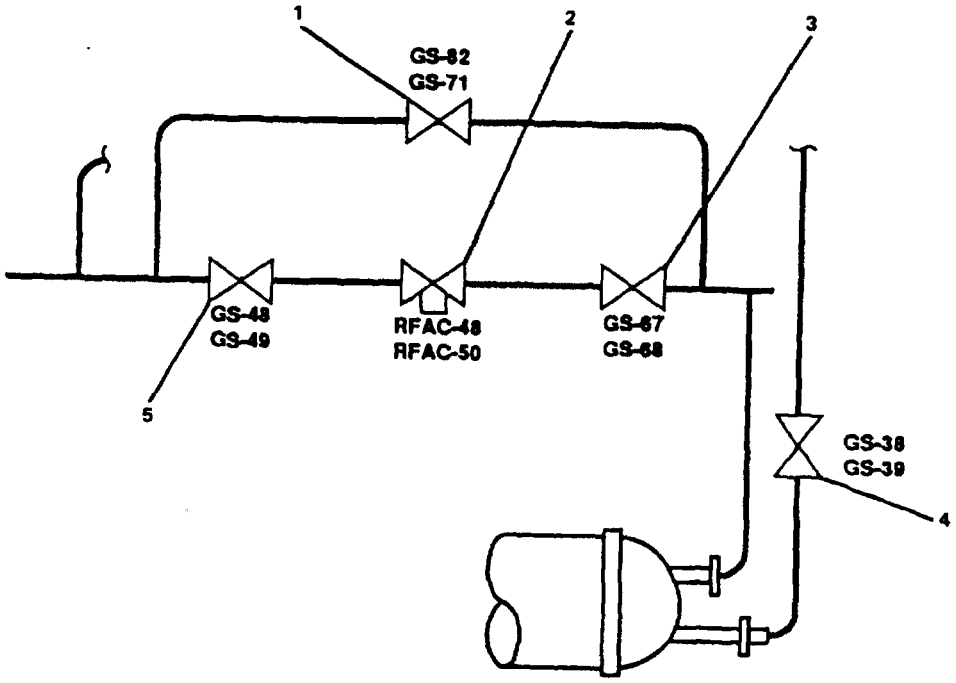


Figure 2-442. Auxiliary Machinery Space No. 2 Power Panel No.



SYMBOL LEGEND:

REMOTE VALVE OPERATOR

VALVE OVRHD

VALVE ABOVE DECK, BELOW OVRHD

VALVE AT OR BELOW DECK

1- GS-82, BYP WTR RGLRT
GS-71, BYP WTR RGLTR
2. RFAC-48, WTR RGLTR
RFAC-50, WTR RGLTR
3. GS-67, WTR RGLTR COV
GS-68, WTR RGLTR COV
4. GS-38, A/C COND NO. 1 SPLY
GS-39, A/C COND NO. 2 SPLY
5. GS-48, WTR RGLTR COV
GS-49, WTR RGLTR COV

Figure 2-443. Condenser Cooling Water Valve Locations.

Q) Open WATER REGULATOR VALVE ACTUATING LINE valve (12).

(3) Align refrigerant piping system (Figure 2-444).

(a) Close RFSS-13, LIQUID LINE CRSVR CO (17).

(b) Open RFSS-8 (4) or RFSS-9, EQL LINE (7).

(c) Open RFSS-11 (1)or RFSS-12, TXV/ STNR/LLSV COV (15).

(d) Open RFSS-14 (3) OR RFSS-15, TXV/ STNR/LLSV COV (6).

(e) Close RFSS-16 and RFSS-18, EVAP PRESS RGLTR COV (9 and 12).

(f) Open RFSS-17, BYPASS-EVAP PRESS RGLTR (10).

(g) Close RFSS-20, SUCT LINE CRSVR COV (13).

CAUTION

• If condenser water cooling system has been drained, have unit maintenance purge air from system. Air in cooling system will reduce cooling efficiency and could result in damage to compressor.

• To prevent oil return problems and possible damage to compressor, do not operate both condensing units at the same time with RFSS13, LIQUID LINE CRSVR CO and RFSS-20, SUCT LINE CRSVR COV valves open.

(4) Start compressor (Figure 2-441).

(a) Open COMPRESSOR SUCTION valve (6) approximately one full turn.

(b) Immediately, slowly continue to open COMPRESSION SUCTION valve (6) as suction pressure is reduced.

CAUTION

Open COMPRESSION SUCTION valve slowly to prevent rapid pumping down of suction pressure side which could cause oil foaming and result in pumping of oil from compressor crankcase. Damage to compressor could result from lack of lubrication.

(c) Observe compressor operation for 5 minutes.

(d) If there is no evidence of liquid refrigerant return to compressor, open COMPRESSOR SUCTION valve (6) wide.

(e) When there is evidence of liquid refrigerant return to compressor, adjust COMPRESSOR SUCTION valve until proper suction pressure (2. 3 to 2. 4 psig) is indicated on suction gauge.

NOTE

Liquid refrigerant return to compressor will be indicated by a sudden drop in suction temperature and rapid fluctuation in suction pressure.

CAUTION

If the suction temperature and oil pressure do not stabilize or if compressor develops a knock, stop compressor by placing power disconnect switch in OFF position and notify unit maintenance. Continued operation could damage compressor.

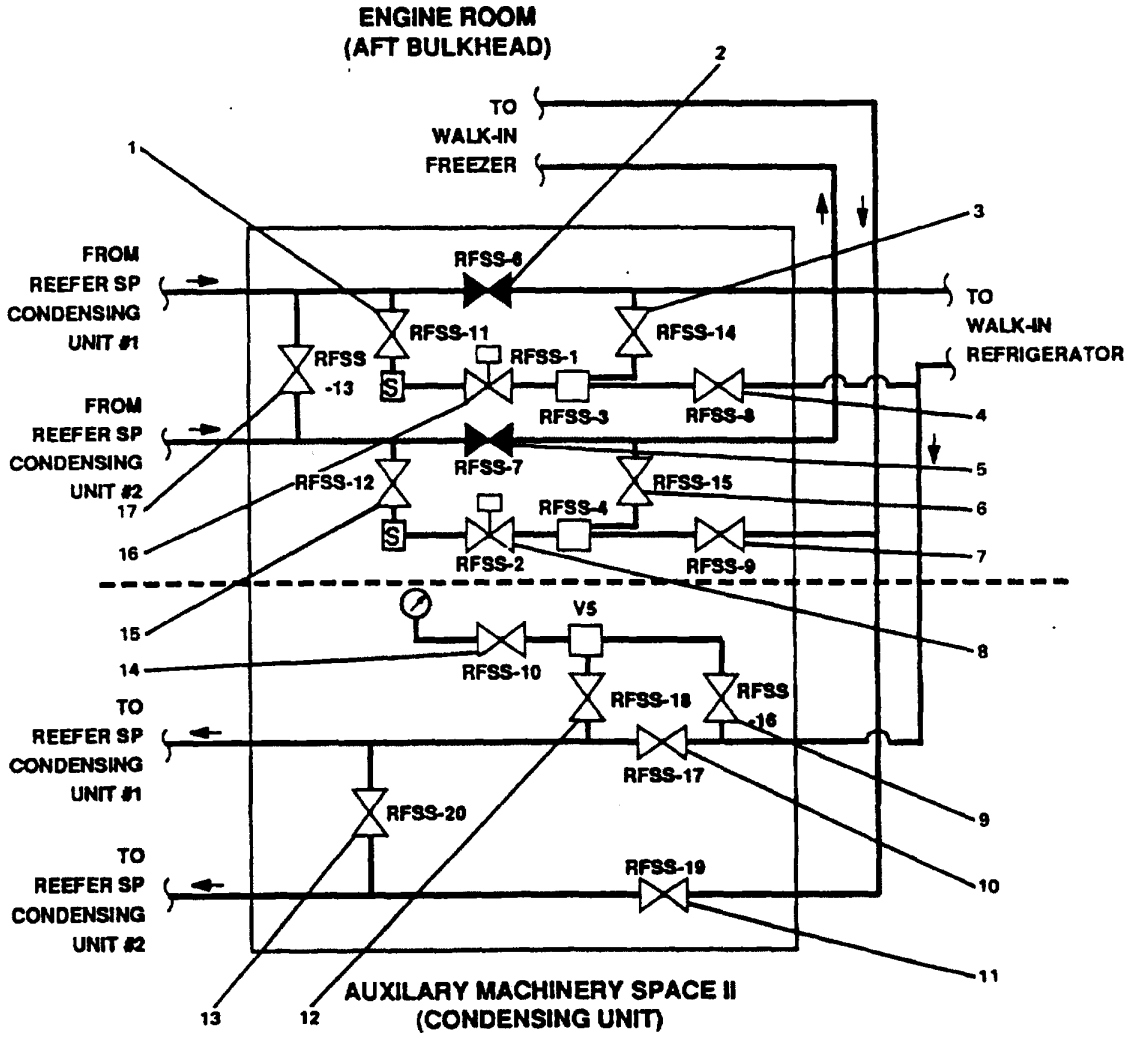
(f) After gauges have stabilized to normal operating readings, secure other condenser.

(5) Shut down other condenser.

(a) Close DEHYDRATOR INLET valve (9) at condensing unit being secured.

NOTE

Allow compressor to operate until it is shut down automatically by the suction pressure switch.



1. RFSS-11, TXV/STNR/LLSV COV
2. RFSS-6, HAND EXP V
3. RFSS-14, TXV/STNR/LLSV COV
4. RFSS-8, EQL LINE
5. RFSS 7, HAND EXP V
6. RFSS-15, TXV/STNR/LLSV COV
7. RFSS-8, EQL LINE
8. RFSS-2, LLSV-FRZ BOX
9. RFSS-16, EVAP PRESS RGLTR COV
10. RFSS-17, BYPASS - EVAP PRESS RGLTR
11. RFSS-19, COV - FRZ BOX COIL SUCT.
12. RFSS-18, EVAP PRESS RGLTR COV
13. RFSS-20, SUCT LINE CRSVR COV
14. RFSS-10, EVAP RGLTR PRESSURE GAUGE COV
15. RFSS-12, TXV/STNR/LLSV COV
16. RFSS-1, LLSV - CHILL BOX
17. RFSS-13, LIQUID LINE CRSVR CO

Figure 2-444. Refrigerant Piping Valve Locations.

WARNING

Tag power switch and service valves. Serious compressor damage (and possible injury to personnel) will result if discharge service valve is not opened before compressor is started.

(b) Close COMPRESSOR SUCTION valve (6) of condensing unit being secured.

(c) Close COMPRESSOR DISCHARGE valve (5) of condensing unit being secured.

(6) Align refrigerant piping system (Figure 2-444).

(a) Open RFSS-13, LIQUID LINE CRSVR CO (17).

(b) Open RFSS-20, SUCT LINE CRSVR COV (13).

(c) Open RFSS-16, EVAP PRESS RGLTR COV (9).

(d) Open RFSS-18, EVAP PRESS RGLTR COV (12).

(e) Close RFSS-17, BYPASS EVAP PRESS RGLTR (10).

c. Pulldown Mode Operation.

(1) Align electrical system.

(a) Main power disconnect switch (Figure 2-441). Ensure main power disconnect (1) is in ON position on standby refrigeration condensing unit.

(2) Auxiliary machinery space no. 2 power panel no. 5 (Figure 2-442). Ensure following circuit breakers are in ON position:

(a) #1 STORES REFRIGERATION CONDENSING UNIT (2).

(b) #2 STORES REFRIGERATION CONDENSING UNIT (4).

d. Start Standby Refrigeration Plant No. 1.

CAUTION

Align condenser cooling water piping system before starting refrigeration plant. Damage to plant can occur.

(1) Align condenser cooling water Dijaingi system (Figure 2-443).

(a) Open GS-38, A/C COND NO. 1 SPLY or GS-39, NO. 2 SPLY (4).

(b) Open GS-67 or GS-68, WTR REGLTR COV (3).

(c) Open GS-48 or GS-49, WTR RGLTR COV (5).

(d) Close GS-82 or GS-71, BYP WTR RGLTR (1).

NOTE

Before starting compressor, crankcase heater must be energized for 24 hours. Energizing heater for this period of time should drive all refrigerant from oil.

CAUTION

When starting compressor, avoid rapid pumpdown to ensure oil is not carried off with refrigerant. If oil is pulled from sump, ensure oil pressure is a minimum of 16 psig above suction pressure. If pressure drops below this, stop the compressor and add oil temporarily. The added oil must later be removed when oil in sight glass is too high. If this situation occurs, refer to unit maintenance. Low oil pressure and oil level could damage compressor.

(2) Align condenser unit piping (Figure 2-441).

(a) Open COMPRESSOR DISCHARGE valve (5).

(b) Close COMPRESSOR SUCTION valve (6).

(c) Open CONDENSER OUTLET valve (11).

(d) Open DEHYDRATOR OUTLET valve (7).

(e) Close DEHYDRATOR BY-PASS valve (10).

(f) Open DEHYDRATOR INLET valve (9).

(g) Open RELIEF VALVE BY-PASS valve (4).

(h) Close PURGE valve (2).

(i) Close CHARGE AND DRAIN valve (8).

Q) Open WATER REGULATOR VALVE ACTUATING LINE valve (12).

(3) Align refrigerant piping system (Figure 2-444).

(a) Close RFSS-13, LIQUID LINE CRSVR CO (17).

(b) Open RFSS-8 (4) or RFSS-9, EQL LINE (7).

(c) Open RFSS-11 (1) and RFSS-12, TXV/STNR/LLSV COV (15).

(d) Open RFSS-14 (3) and RFSS-15, TXV/STNR/LLSV COV (6).

(e) Close RFSS-16 and RFSS-18, EVAP PRESS RGLTR COV (9 and 12).

(f) Open RFSS-17, BYPASS-EVAP PRESS RGLTR (10).

(g) Close RFSS-20, SUCT LINE CRSVR COV (13).

CAUTION

• If condenser water cooling system has been drained, have unit maintenance purge air from system. Air in cooling system will reduce cooling efficiency and could result in damage to compressor.

CAUTION

• To prevent oil return problems and possible damage to compressor, do notoeprate both condensing units at the same time with RFSS-13, LIQUID LINE CRSVR CO and RFSS-20, SUCT LINE CRSVR COV valves open.

(4) Start compressor (Figure 2-441).

(a) Place power switch (1) to ON position.

(b) Open COMPRESSOR SUCTION valve (6) approximately one full turn.

(c) Immediately, slowly continue to open COMPRESSION SUCTION valve (6) as suction pressure is reduced.

CAUTION

Open COMPRESSION SUCTION valve slowly to prevent rapid pumping down of suction pressure side which could cause oil foaming and result in pumping of oil from compressor crankcase. Damage to compressor could result from lack of lubrication.

CAUTION

• Condenser water temperature should read in NORMAL operating range.

• The following gauges should also be in the NORMAL operating range:

Liquid line temperature gauge Suction pressure gauge Suction temperature gauge Discharge pressure gauge Oil pressure gauge

NOTE

Oil pressure MUST be 20 psi ABOVE suction pressure.

NOTE

Liquid refrigerant return to compressor will be indicated by a sudden drop in suction temperature and rapid fluctuation in suction pressure.

CAUTION

If the suction temperature and oil pressure do not stabilize or if compressor develops a knock, stop compressor by placing power switch in OFF position and notify unit maintenance. Continued operation could damage compressor.

(d) Observe compressor operation for 5 minutes.

(e) If there is no evidence of liquid refrigerant return to compressor, open COMPRESSOR SUCTION valve (6) wide.

(f) When there is evidence of liquid refrigerant return to compressor, adjust COMPRESSOR SUCTION valve (6) until proper suction pressure (2. 3 to 2.4 psig) is indicated on suction gauge.

2-64. Air Conditioning Split-Plant Operation.

a. Normal to Split-Plant Operation.

NOTE

The air conditioning system normally has both air conditioning plants in operation. This procedure aligns the system for use with one air conditioning unit operating.

(1) Shut down one condensing unit (Figure 2-445).

(a) Close DEHYDRATOR INLET valve (9) on condenser being shut down.

(b) Allow compressor to operate until it is shut down automatically by the suction pressure switch.

(2) Align air conditioning piping (Figure 2-446).

(a) Open RFAC-39, LIQUID LINE CRSVR NO (1).

(b) Open RFAC-41, SUCT LINE CRSVR CO (2).

(3) Secure general service piping. Close the following valves for the condensing unit being shut down:

(a) Air conditioning condensing unit No. 1:

1 GS-33, A/C COND NO. 1 SPLY (4).

2 GS-70, WTR FGLTR COV (3).

3 GS-37, WTR RGLTR COV (5).

(b) Air conditioning condensing unit no. 2:

1 GS-34, A/C COND NO. 2 SPLY (4).

2 GS-69, WTR RGLTR COV (3).

3 GS-36, WTR RGLTR COV (5).

b. Split-Plant to Normal Operation.

(1) Align general service piping (Figure 2-447). Open the following valves for the condensing unit being started:

(a) Air conditioning condensing unit no. 1:

1 GS-33, A/C COND NO. 1 SPLY (4).
2 GS-70, WTR RGLTR COV (3).
3 GS-37, WTR RGLRT COV (5).

(b) Air conditioning condensing unit no. 2:

1 GS-34, AC COND NO. 2 SPLY (4).
2 GS-69, WTR RGLRT COV (3).
3 GS-36, WTR RGLTR COV (5).

(2) Align condenser unit piping (Figure 2-445).

NOTE

Use refrigeration ratchet wrench to open/ close the following valves (2, 3, 4, and 6).

(a) Open COMPRESSOR DISCHARGE valve (5).

(b) Close COMPRESSOR SUCTION valve (6).

(c) Open CONDENSER OUTLET valve (11).

(d) Open DEHYDRATOR OUTLET valve (7).

(e) Close DEHYDRATOR BY-PASS valve (10).

(f) Open DEHYDRATOR INLET valve (9).

(g) Open RELIEF VALVE BY-PASS valve (4).

(h) Close PURGE valve (2).

(i) Close CHARGE AND DRAIN valve (8).

(j) Open WATER REGULATOR VALVE ACTUATING LINE valve (12).

(3) Align air conditioning piping (Figure 2-446).

(a) Close RFAC-39, LIQUID LINE CRSVR CO (1).

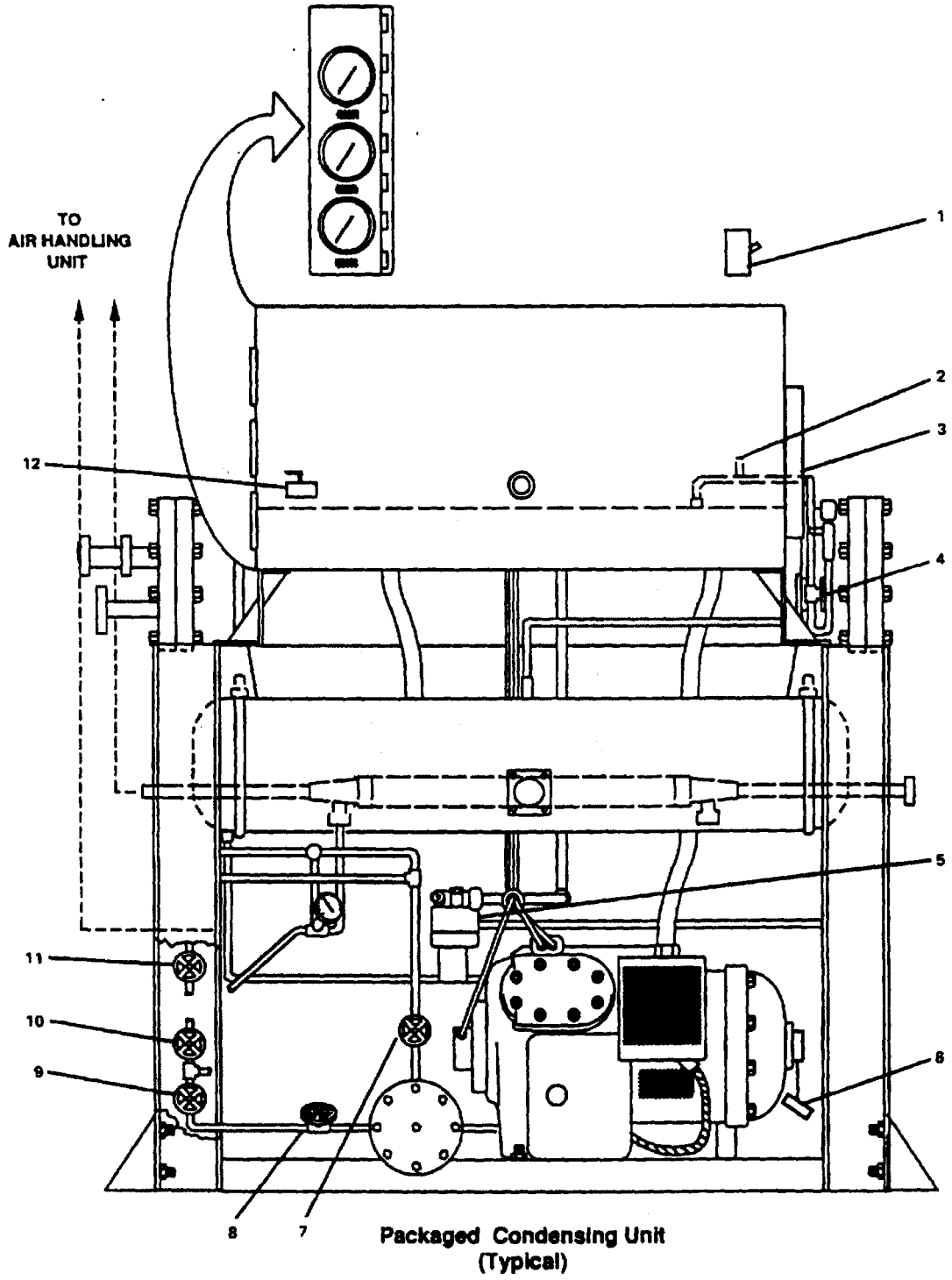
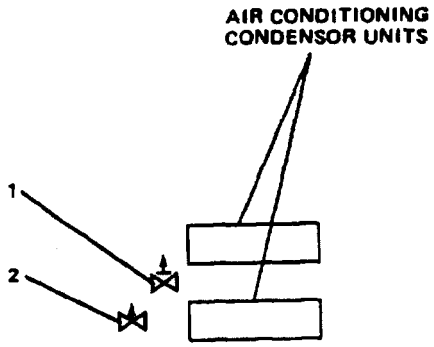


Figure 2-445. Air Conditioning Condenser Unit (Sheet 1 of 2).

1. POWER SWITCH
2. PURGE
3. MAIN POWER DISCONNECT
4. RELIEF VALVE BY-PASS
5. COMPRESSOR DISCHARGE
6. COMPRESSOR SUCTION
7. DEHYDRATOR OUTLET
8. CHARGE AND DRAIN
9. DEHYDRATOR INLET
10. DEHYDRATOR BY-PASS
11. CONDENSER OUTLET
12. WATER REGULATOR VALVE ACTUATING LINE VALVE

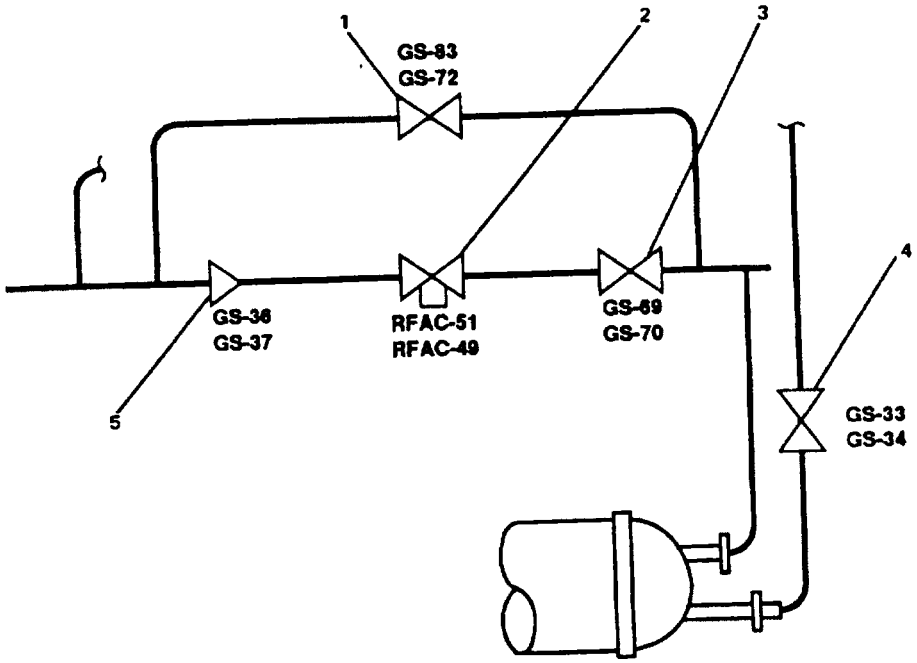
Figure 2-445. Air Conditioning Condenser Unit (Sheet 2 of 2).



(AMS 2)

1. RFAC-39, LIQUID LINE CRSVR CO
2. RFAC-41, SUCT LINE CRSVR CO

Figure 2-446. Air Conditioning Piping Valve Locations.



SYMBOL LEGEND:

REMOTE VALVE OPERATOR

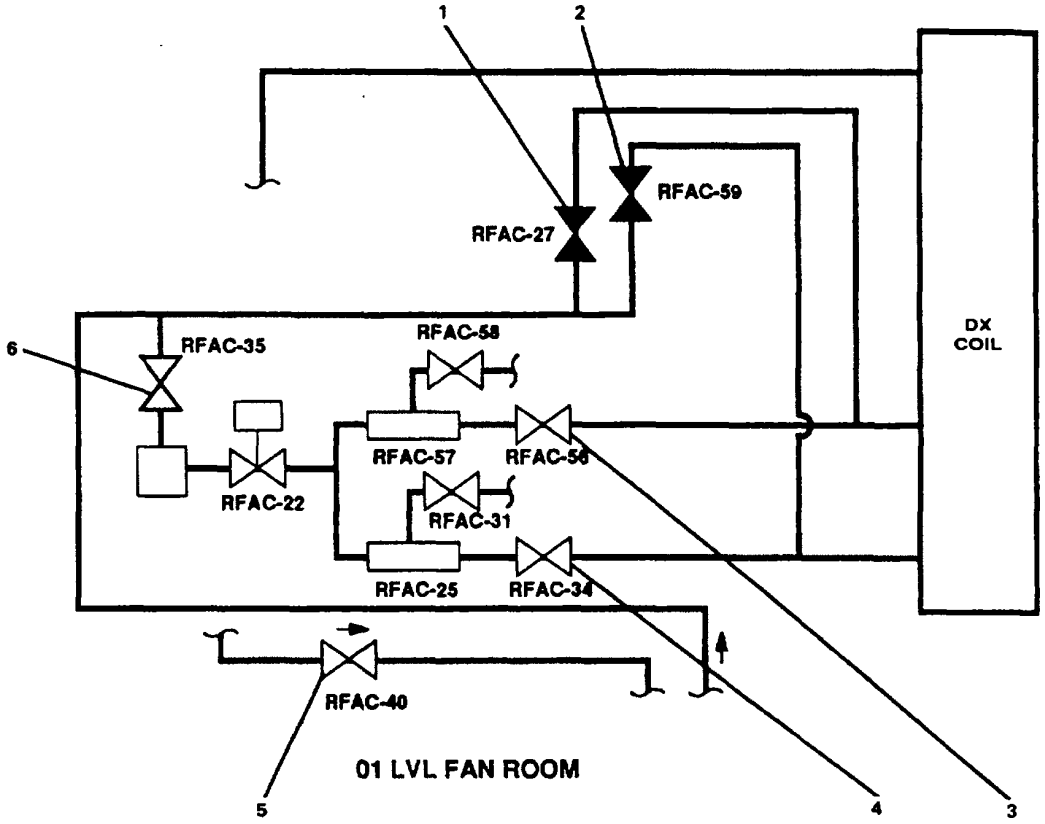
VALVE OVRHD

VALVE ABOVE DECK, BELOW OVRHD

VALVE AT OR BELOW DECK

1. GS-83, BYP WTR RGLTT
   GS-72, BYP WTR RGLTR
2. RFAC-49, WTR RGLTR
   RFAC051 WTR RGLTR
3. GS-69, WTR RGLTR COV
   GS-70, WTR RGLTR COV
4. GS-33, A/C COND NO. 1 SPLY
   GS-34, A/C COND NO. 2 SPLY
5. GS-36, WTR RGLTR COV
   GS-37, WTR RGLTR COV

Figure 2-447. Condenser Cooling Water Valve Locations.



SYMBOL LEGEND:

REMOTE VALVE OPERATOR

VALVE OVRHD

VALVE ABOVE DECK, BELOW OVRHD

VALVE AT OR BELOW DECK

1. RFAC-27, HAND EXP
2. RFAC-59, HAND EXP
3. RFAC-58, EOL LINE
4. RFAC-34, TXV COV, RO1-32-2
5. RFAC-40, COIL SUCT. COV, RO1-32-2
6. RFAC-35, TXV COV, RO1-32-2

Figure 2-448. Air Conditioning Refrigerant Piping Valve Locations.

(b) Close RFAC41, SUCT LINE CRVSR CO (2).

(c) Open RFAC-34 and RFAC-35, TXV COV (4 and 6, Figure 2-448).

(d) Open RFAC-59, HAND EXP (2).

(e) Open RFAC-56, EQL LINE (3).

(f) Open RFAC-27, HAND EXP (1).

(h) Open RFAC-40, COIL SUCT COV (5).

CAUTION

• If condenser water cooling system has been drained, have unit maintenance purge air from system. Air in cooling system will reduce cooling efficiency and could result in damage to compressor.

• Before starting compressor crankcase heater must be energized for 24 hours. Energizing heater for 24 hours should drive all refrigerant from oil.

• To prevent oil return problems and possible damage to compressor, do not operate both condensing units at the same time with RFAC-39 LIQUID LINE CRSVR CO (1, Figure 2-446) and RFAC41, SUCT LINE CRSVR COV (2) valves open.

(4) Start compressor (Figure 2-445).

(a) Set power switch (1) to ON position.

(b) Open COMPRESSOR SUCTION valve (6) approximately one full turn.

(c) Immediately, slowly continue to open COMPRESSION SUCTION valve (6) as suction pressure is reduced.

CAUTION

Open COMPRESSION SUCTION valve slowly to prevent rapid pumping down of suction pressure side which could cause oil foaming and result in pumping of oil from compressor crankcase.

2-65. FM-200 SYSTEM ACTUATION

In the event the FM-200 Fixed Fire Fighting System is to be actuated, the following steps must be accomplished prior to actuation of the system:

a. Actuation Procedures, Engine Room, and AMS I FM-200 System. All fire scenarios and situations leading to the decision when to actuate the FM-200 total flooding fire extinguishing system are not intended to be discussed here. Refer to the US Army Fire Fighting Doctrine for guidance. However, the following steps must be completed to effectively deploy the FM-200 system as designed.

(1) Evacuate All Personnel from Space. The Watch Officer or on scene commander must ensure all personnel have evacuated the space and are accounted for.

WARNING

In the event the FM-200 System electric horns/strobes or the warning lights (amber strobes) are activated, always leave the protected space immediately, FM-200 is being released within 60 seconds.

(2) Activate the Water Washdown System (WWS). In order to operate the WWS, the fire main system must be charged. Place the Fire and General Service Pump No. 1 located in the AMS II, port side, on line to the maximum operating pressure.

NOTE

Enter and evacuate the AMS II using the AMS II Emergency Escape Scuttle only.

The fire main overboard by-pass valve must be normally closed due to the probability that there will be no access to this valve in the event of a fire emergency in the main engine room protected space.

Close the following General Service valves located in the AMS II at the discharge of the Fire and General Service Pump No. 1 and General Service Pump No. 2.

Valve Designation	Valve Labeling
FM-17	Fire/GS Pmp No. 1 Dischg to GS
FM-15	Fire/GS Pmp No. 2 Dischg to GS

WARNING

To provide adequate volume of seawater for the WWS, valves FM-17 and FM-15 must be closed prior to activation of the WWS. The Engine Room and AMS I WWS requires a minimum of 145 GPM at 104 PSI to operate as intended. Fire and General Service Pump No. 1 must be operating at a minimum pressure of 104 PSI.

Activate the WWS by unlocking and opening valve WWS-1. Engine Room WWS Control Valve, located in the Engine Room WWS Control Station, Engine Room Vestibule, Main Deck Level, Frame 25. Refer to para. 2-66 for detailed WWS operating instructions and TM 55-1925-227-24&P for WWS maintenance instructions and installation drawings.

CAUTION

Padlocking of this ball valve should only occur during system maintenance. The WWS should always be ready to immediately deploy by disengaging the locking mechanism on the ball valve handle.

The Water Washdown System (WWS), installed to augment the engine room and AMS I FM-200 System, shall be activated prior to actuation of the FM-200 Fixed Fire Extinguishing System.

(3) Secure Ventilation. Secure powered ventilation systems and diesel engines. The powered ventilation systems can be secured from the Heating, Ventilation, and Air Conditioning (HVAC) Emergency Stop Station located in the Engine Room Vestibule Main Deck Level, Frame 23. The diesel engines can be secured from the Engineer's Operating Station (EOS). These procedures should only be done during the evacuation process, if the situation allows. The powered ventilation systems and diesel engines (excluding main engines) can be secured at the FM-200 storage cylinders located in the Auxiliary Machinery Space II (AMS II) by manually lifting the plungers located on the tops of the FM-200 pressure switches. In any case, the powered ventilation systems and diesel engines (excluding main engines) will secure automatically during FM-200 system activation.

Ensure the following Powered Ventilation Systems are secured:

Port Engine Room Supply Fan
Port Engine Room Exhaust Fan

Starboard Engine Room Supply Fan
Starboard Engine Room Exhaust Fan
AMS I Supply Fan.

Ensure the following Internal Combustion Engines are secured:

Main Propulsion Engine No. 1
Ships Service Diesel Generator No. 1
Bow Thruster Diesel Engine
Main Propulsion Engine No. 2
Ships Service Diesel Generator No. 2
Emergency Fire Pump Diesel Engine.

Secure the following openings to the protected space:

NOTE

The responsibilities to perform these space preparations listed below have been identified on the vessel Station Bill for fire and damage control conditions and crew members should routinely train for these responsibilities.

OPENING	LOCATION
Port Engine Room Supply Fan Intake Damper	Inside of Port Stack Casing. Aft Side. 0-1 Level
Stbd Engine Room Supply Fan Intake Damper	Inside of Stbd Stack Casing. Aft Side. 0-1 Level
Port Engine Room Exhaust Fan Outlet Cover	Port Stack Casing. Forward Side. 0-2 Level
Stbd Engine Room Exhaust Fan Outlet Cover	Stbd Stack Casing. Forward Side. 0-2 Level
AMS I Supply Fan Intake Hinged Cover	0-1 Level. Stbd Side. Frame 47
AMS I Exhaust Hinged Cover	0-1 Level. Port Side. Frame 47
Engine Room/AMS II Sliding Watertight Door	Use Remote Closure located on Main Deck Level, Frame 26
Engine Room Entrance Door	Engine Room Vestibule. Main Deck Level, Frame 22
Engineer's Operating Station (EOS) Escape Hatch	Main Deck Passageway, Frame 41
AMS I Escape Scuttle	Damage Control Locker, Frame 51

(4) Break Glass on FM-200 Pull Station. Initiate actuating the FM-200 Fixed Fire Fighting System for the Aft Engine Room by breaking the glass for access to the pull handle.

Pull Stations are found in the following areas:

(a) Engine Room Interior
Remote FM-200 Pull Station located in the Engine Room Vestibule, Main Deck, Level, Frame 23

(b) Engine RoomExterior
Remote FM-200 Pull Station located on the Main Deck Level, inboard of the Engine Room Vestibule Entrance Door, Frame 21. This exterior watertight pull station requires first opening the watertight cover to expose the glass.

(5) Pull Lever on FM-200 Pull Station. Actuate the FM-200 system by pulling the handle. The lever was designed to require less than 40 pounds force and 14 inches to operate. Allow no one to enter the protected space until authorized to do so.

NOTE

Upon actuation of the FM-200 Fire Extinguishing System, a 60 second delay in agent discharge will be experienced. During this delay, FM-200 System Electric Horns/Strobes will sound. FM-200 system warning bell will sound, and the FM-200 discharge warning lights (amber strobe) will be illuminated.

Actuation of the engine room and AMS I FM-200 system will simultaneously actuate the Engine Room and AMS I Bilge FM-200 System. FM-200 discharge to the protected space will occur concurrently.

WARNING

In the event the FM-200 System electric horns/strobes or the warning lights (amber strobe) are activated, always leave the protected space immediately, FM-200 is being released.

(6) As a fail safe mode, actuation of the FM-200 Fixed Fire Extinguishing System will result in the automatic shutdown of the following machinery, equipment, and powered ventilation system motors affecting the protected space:

Machinery:

Ships Service Diesel Generator No. 1
Ships Service Diesel Generator No. 2
Bowthruster Diesel Engine
Emergency Fire Pump Diesel Engine

Ventilation Systems:

Port Engine Room Supply Fan
Stbd Engine Room Supply Fan
Port Engine Room Exhaust Fan
Stbd Engine Room Exhaust Fan
AMS I Supply Fan.

NOTE

The main propulsion engines will not shutdown automatically as they draw intake air from outside the protected space.

Upon automatic shutdown of ship's service generators, the emergency diesel generator set will automatically start and place itself on line within 45 seconds.

WARNING

The FM-200 System has been outfitted with a time delay override located on top of the time delay.

When the time delay override lever is pulled, the 60 second time delay is negated and FM-200 will immediately discharge into the protected areas.

This procedure shall only be performed under extreme circumstances and with the authority of the watch officer or scene commander.

Actuation of the FM-200 System in the emergency discharge mode will result in by-passing the 60 second time delay. FM-200 system electric horns/strobes, FM-200 discharge warning lights (amber strobe) , and FM-200 warning bell will not function. FM-200 will be discharged immediately.

(7) If the FM-200 System fails to operate, proceed to the FM-200 cylinder location, AMS II, Frame 22, and follow Emergency Discharge Instructions posted at the cylinder location. Enter and evacuate the AMS II using the AMS II Emergency Escape Scuttle only.

WARNING

To reduce temperatures within the protected space and manage the risk of HF exposure to humans, the WWS is designed and intended to be operated for a minimum of 15 minutes. This procedure should be followed to the full extent.

(8) Operate the WWS for a minimum of fifteen (15) minutes. During the WWS operating period, approximately ever three (3) minutes, open valve WWS-2, Engine Room WWS Strainer Blow Off for approximately ten (10) seconds. This will allow any foreign matter to be flushed from the strainer basket.

NOTE

The Engine Room and AMS I FM-200 System is augmented with an installed WWS. If necessary, the FM-200 System could be used as a stand alone system.

b. Actuation Procedures, Paint Locker FM-200 System.

(1) Evacuate all personnel from space. The Watch Officer or on scene commander must ensure all personnel have evacuated the space and are accounted for.

WARNING

In the event the FM-200 System siren is activated, always leave the protected space immediately. FM-200 is being released

(2) Secure Ventilation. Secure powered ventilation systems. The powered ventilation systems can be secured from the controllers in the Boatswain's Store Room (Frames 54 and 57). This procedure should only be done during the evacuation process, if the situation allows. The powered ventilation systems can be secured at the FM-200 storage cylinder located in the Boatswain's Store Room by manually lifting the plunger located on the top of the FM-200 pressure switch. In any case, the powered ventilation systems will secure automatically during FM-200 actuation.

Ensure the following Powered Ventilation Systems are secured:

Boatswain's Store Room Supply Fan
Paint Locker Exhaust Fan

Secure the following openings to the protected space:

OPENING	LOCATION
Powered Supply Air Duct Damper	Main Deck Level, Frame 60, Above Paint Locker Door
Powered Exhaust Air Duct Damper	Main Deck Level, Frame 60, Above Paint Locker Door
Natural Supply Air Duct Damper	Main Deck Level, Frame 60, Above Paint Locker Door
Paint Locker Door	Main Deck Level, Frame 60, Entrance to Paint Locker

NOTE

The responsibilities to perform these space preparations listed above have been identified on the vessel Station Bill for fire and damage control conditions and crew members should routinely train for these responsibilities.

(3) Break Glass on FM-200 Pull Station. Initiate actuating the FM-200 Fixed Fire Fighting System for the Paint Locker by breaking the glass for access to the pull handle.

Pull Stations are found in the Paint Locker Interior FM-200 Pull Station located on the exterior of the Paint Locker inboard bulkhead, Main Deck Level, Frame 62.

WARNING

The Paint Locker FM-200 System is not fitted with a time delay. Upon actuation of the FM-200 system, FM-200 will be discharged immediately.

(4) Pull Lever on FM-200 Pull Station. Actuate the FM-200 System by pulling the handle. The lever was designed to require less than 40 pounds force and 14 inches to operate. Allow no one to enter the protected space until authorized to do so.

NOTE

Upon actuation of the FM-200 Fire Extinguishing System, FM-200 System Siren will sound, and the FM-200 System Warning Bell will sound.

WARNING

In the event the FM-200 System Siren or the warning bell are activated, always leave the protected space immediately. FM-200 is being released.

As a fail safe mode, actuation of the FM-200 Fixed Fire Extinguishing System will result in the automatic shutdown of the following machinery, equipment, and powered ventilation system motors affecting the protected space.

Ventilation Systems:
Boatswain's Store Room Supply Fan,
Paint Locker Exhaust Fan.

If the FM-200 system fails to operate, proceed to the FM-200 Cylinder located on the exterior of the Paint Locker inboard bulkhead, Main Deck Level, Frame 62, and follow Local Manual Release Instructions posted at the cylinder location.

c. Post Fire Re-Entry

(1) System Safety

NOTE

Nature and Characteristics of FM-200.

- **Suppresses fire by a combination of chemical and physical mechanisms without affecting available oxygen.**
- **Designed for use on Class A (cellulose material), Class B (flammable liquids and gases), and Class C (electrical) fires.**
- **Hydrofluorocarbon (HFC) family (HFC-227ea).**
- **Trade Name: FM-200**
- **Zero Ozone Depleting Potential (ODP).**
- **Fast Action: Discharge within10 seconds**
- **Clean: Discharges as a gas leaves no residue to damage sensitive equipment.**
- **People safe in case of unintentional discharge in the protected space.**
  Propelled by nitrogen.
- **Predischarge controlled by $C0_2$ (Engine Room and AMS l FM-200 System only)**

WARNING

FM-200 has acceptable toxicity for use in occupied spaces when used as specified in the U.S. Environmental Protection Agency (EPA) Significant New Alternatives Policy (SNAP) program rules. Although FM-200 is considered non-toxic to humans in concentrations necessary to extinguish most fires, certain safety considerations should be observed when applying and handling the agent. The discharge of FM-200 may create a hazard to personnel from the undecomposed agent itself and from the decomposition products which result when the agent is exposed to fire or other hot surfaces at temperatures above 1300°F. Exposure to the FM-200 agent is generally of less concern than is exposure to the decomposition products. Unnecessary exposure to the agent or decomposition products should be avoided.

WARNING

HYDROGEN FLOURIDE (HF) GAS. FM-200, when exposed to fire or other hot surfaces at temperatures above 1300°F, will produce HF Gas. Over exposure to HF Gas, in concentrations greater than three (3) parts per mission (ppm), will have the following effects on humans:

- Corrosive and irritating to the eyes.
- Corrosive and irritating to skin and all living tissue.
- When ingested, corrosive and irritating to the gastrointestinal system.
- When inhaled, corrosive and irritating to upper and lower respiratory tract; may result in chemical pneumonitis and pulmonary edema which could be fatal.

WARNING

OXYGEN BREATHING APPARATUS (OBA) AND FIRE FIGHTING EQUIPMENT. HF gas damages aluminum, Kevlar, and metal components. OBA and Fire Fighting Equipment, when exposed to HFgas, shall be taken out of service until affected components are replaced.

(2) Combating HF Gas. In order to combat HF Gas, below Main Deck Machinery Spaces (Engine Room and AMS I) have been fitted with a Water Washdown System (WWS). The purpose of the WWS is to:

- Quickly reduce temperature in the protected space.
- Minimize production of HF Gas generated as a result of FM-200 agent decomposition from contact with hot surfaces and flame at temperatures above 1300°F.
- Aid in scrubbing of any HF Gas generated.
- Expedite ventilation of the protective space.

(3) Material Safety Data Sheet (MSDS). The MSDA for HF Gas and other chemicals used in the installed FM-200 systems are identified below. Ref: TM 55-1925-227-24&P, Fire Fighting System for Large Tug (LT) for additional information.

MSDS	LOCATION
Hydrogen Fluoride (HF) Gas	TM 55-1925-227-24&P Appendix C
FM-200	TM 55-1925-227-24&P Appendix C
Nitrogen	TM 55-1925-227-24&P Appendix C
Carbon Dioxide Gas (CO2)	TM 55-1925-227-24&P Appendix C

d. Re-Entry Testing Requirements

(1) TESTING PRIOR TO RE-ENTERING ENGINE ROOM AND AMS I. Prior to re-entry into the Engine Room and AMS I, after discharge of the FM-200 fixed fire extinguishing system, the protected space shall be tested for levels of HF gas. An HF Gas Sampling Port has been installed to facilitate testing. The HF Gas Sampling Port for the Engine Room and AMS I is located in the Water Washdown Control Station, Engine Room Vestibule, Main Deck, Frame 25. Testing for levels of HF gas shall be accomplished using the Sampling Pump which has been issued at the time of FM-200 system installations. Ref: TM 55-1925-227-24&P, Fire Fighting System for Large Tug (LT) for Kwik-Draw Sampling Pump Operation and Maintenance Instructions and attached Brochure 08-00-02, Detector Tubes and Kwik-Draw Pumps.

NOTE

A minimum of three (3) samples at two (2) minute intervals shall be taken.

(2) TESTING PRIOR TO RE-ENTERING PAINT LOCKER. Prior to re-entry into the Paint Locker, after discharge of the FM-200 fixed fire extinguishing system, the protected space shall be tested for levels of HF gas. An HF Gas Sampling Port has been

installed to facilitate testing. The HF Gas Sampling Port for the Paint Locker is located on the Paint Locker Inboard Bulkhead, Boatswain's Store Room, Frame 58. Testing for levels of HF gas shall be accomplished using the Sampling Pump which has been issued at the time of FM-

200 system installation. Ref: TM 55-1925-227-24&P, Fire Fighting Systems for Large Tugs (LT) for Kwik-Draw Sampling Pump Operation and Maintenance Instructions and attached brochure 08-00-02, Detector Tubes and Kwik-Draw Pumps

NOTE

A minimum of three (3) samples at two (2) minute intervals shall be taken.

WARNING

Dependent upon the temperature of the fire within the protected space prior to extinguishment, the protected space may contain a level of HF gas which is dangerous to humans. Re-entry testing to verify the level of HF gas is safe for re-entry must be performed and followed to the full extent of the re-entry test.procedures for HF gas contained in manufacturer's Operation And Maintenance instructions. The protected space shall not be entered unprotected when the level of HF gas has a threshold limit value (TLV) of three (3) parts per million (PPM) or greater.

If HF gas reading is above 3 PPM, continue to operate the water washdown system and follow testing procedures until level is safe for re-entry. For those spaces without an installed water washdown system, the natural decay (drop out) rate for HF gas is approximately 15 minutes after the fire is extinguished.

e. Re-Entry.

(1) ENGINE ROOM AND AMS I RE-ENTRY PROCEDURES. Upon issuance of re-entry authorization by the person in charge at the scene and authorization to ventilate space, the following actions shall be taken:

- Open Port and Starboard Engine Room Supply Air dampers.
- Remove all ventilation covers.
- Reset Pressure Switches.
- Start all available powered ventilation within the protected space.
- Washdown complete interior and all equipment, within the protected space, with fresh water.

(2) PAINT LOCKER RE-ENTRY PROCEDURES. Upon issuance of re-entry authorization by the person in charge at the scene and authorization to ventilate, the following actions shall be taken:

- Open the three (3) ventilation dampers above Paint Locker door.
- Reset Pressure Switch
- Start all available powered ventilation within the protected space.
- Washdown complete interior and all equipment, within the protected space, with fresh water.

f. Bilge Water.

(1) CLASSIFICATION. Bilge water which has been exposed to FM-200 fire extinguishing agent in extinguishing a fire, shall be classified and treated as hazardous waste.

(2) DISPOSAL OF HAZARDOUS WASTE. Hazardous waste shall be disposed of in accordance with local, state, and federal requirements and regulations for hazardous waste.

g. Preposition or Storage of Vessel.

PLACING VESSEL IN PREPOSITION FOR STORAGE. There are no maintenance actions required on the FM-200 Systems prior to placing the vessel in preposition or storage. The FM-200 cylinders may require storage in an environmentally controlled external storage place. The FM-200 cylinders are required to be in an environment protected from weather where the ambient temperature does not exceed 130°F, nor fall below 32°F, at all times.

h. Removing Vessel from Preposition or Storage.

(1) Engine Room and AMS I FM-200 System. Perform Item No. 238 (crew level inspection) as identified in Preventative Maintenance Checks and Services (PMCS) for Engine Room and AMS I FM-200 System.

(2) Paint Locker FM-200 System. Perform Item No. 239 (Crew level inspections) in Preventative Maintenance Checks and Services (PMCS) for Paint locker FM-200 System.

2-66. WATER WASHDOWN SYSTEM (WWS) ACTIVATION

a. Activation Procedures.

(1) Evacuate all personnel from the protected space.

(2) Place Fire and General Service Pump No. 1 online at maximum operating pressure.

(3) Close the following General Service Valves located at the discharge of Fire and General Service Pump No. 1 and Fire and General Service Pump No. 2

Valve Designation Number	Valve Labeling
FM-17	Fire/GS Pmp No. 1 Dischg to GS
FM-15	Fire/GS Pmp No. 1 Dischg to GS

WARNING

To provide adequate volume of sea water for the WWS, valves FM-17 and FM-15 must be closed prior to activation of the WWS. The Engine Room and AMS I WWS requires a minimum of 145 gpm at 104 psi to operate as intended. Fire and general service pump No. 1 must be operating at a minimum pressure of 104 psi.

(4) Activate the WWS by unlocking and opening valve WWS-1, Engine Room WWS Control Valve. Valve WWS-1 is located in the Engine Room WWS Control Station located in the Engine Room Vestibule, main deck, at Frame 25.

CAUTION

Pad locking of this ball valve should only occur during system maintenance. The WWS should always be ready to immediately deploy by disengaging the locking mechanism on the ball valve handle.

(5) Actuate the FM-200 Fixed Fire Extinguishing System in accordance with the instructions contained in paragraph 2-65 for the FM-200 Flooding Fire Extinguishing System installed on U.S. Army Large Tug, Design 128 (LT-801) and the FM-200 Actuation Placards located at the FM-200 actuation stations.

NOTE

Upon actuation of the FM-200 Fire Extinguishing System, a 60 second delay in agent discharge will be experienced. During this delay, FM-200 System Electric Horns/Strobes will sound, FM-200 System Alarm Bell will sound, and the FM-200 System Discharge Warning Lights will be illuminated.

Actuation of the Fixed FM-200 Fire Extinguishing System will result in automatic shut down of the following equipment and ventilation systems:

Ships Service Diesel Generator No. 1
Ships Service Diesel Generator No. 2
Bowthruster Diesel Engine
Emergency Fire Pump Diesel Engine
Engine Room Supply Fan No. 1
Engine Room Supply Fan No. 2
Engine Room Exhaust Fan No. 1
Engine Room Exhaust Fan No. 2
AMS I Supply Fan

NOTE

The main propulsion engines will not shutdown automatically as they draw intake air from outside the protected space. Upon automatic shutdown of ship's service generators, the emergency diesel generator set will automatically start and place itself on line within 45 seconds.

WARNING

The WWS is not designed nor intended to be a stand alone fire extinguishing system. It is designed to be used in conjunction with the installed FM-200 fixed Fire Extinguishing System.

(6) Operate the WWS for a minimum of fifteen (15) minutes. During the WWS operating period, approximately ever three (3) minutes, open valve WWS-2, Engine Room WWS Strainer Blow Off, for approximately ten (10) seconds. This will allow any foreign matter to be flushed from the in-line strainer basket.

WARNING

To reduce temperatures within the protected space and manage the risk of HF exposure to humans, the WWS is designed and intended to be operated for a minimum of 15 minutes. This procedure should be followed to the full extent.

b. Post Fire Re-Entry, Reference Para 2-65c.

c.Testing Requirement for Re-entry. Reference Para 2-65d.

d. Re-Entry, Reference Para 2-65e.

e. Bilge Water, Reference Para 2-65f.

By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official:

PATRICIA P. HICKERSON
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-25E, (qty rqr block no. 5667).

These are the instructions for sending an electronic 2028

The following format must be used if submitting an electronic 2028. The subject line must be exactly the same and all fields must be included; however only the following fields are mandatory:
1, 3, 4, 5, 6, 7, 8, 9, 10, 13, 15, 16, 17, and 27.

From: "Whomever" <whomever@avma27.army.mil>
To: TACOM-TECH-PUBS@ria.army.mil
Subject: DA Form 2028

1. From: Joe Smith
2. Unit: home
3. Address: 4300 Park
4. City: Hometown
5. St: MO
6. Zip: 77777
7. Date Sent: 19-OCT-93
8. Pub no: 55-2840-249-23
9. Pub Title: TM
10. Publication Date: 04-JUL-85
11. Change Number: 7
12. Submitter Rank: MSG
13. Submitter FName: Joe
14. Submitter MName: T
15. Submitter LName: Smith
16. Submitter Phone: 123-123-1234
17. Problem: 1
18. Page: 1
19. Paragraph: 3
20. Line: 4
21. NSN: 5
22. Reference: 6
23. Figure: 7
24. Table: 8
25. Item: 9
26. Total: 123
27. Text:

This is the text for the problem below line 27.

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 25-30; the proponent agency is OAASA	Use Part II *(reverse)* for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
TO: *(Forward to proponent of publication or form) (Include ZIP Code)*	**FROM:** *(Activity and location) (Include ZIP Code)*	

PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE
TM 55-1925-207-10-1	16 August 1991	Large Tug

ITEM	PAGE	PARA-GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON

** Reference to line numbers within the paragraph or subparagraph.*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE

TO: *(Forward direct to addressee listed in publication)*	**FROM:** *(Activity and location) (Include ZIP Code)*	DATE

PART II - REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION NUMBER	DATE	TITLE

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III - REMARKS *(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE

The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 decameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigrams = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decameter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 feet

Approximate Conversion Factors

To change	*to*	*multiply by*	*To change*	*to*	*multiply by*
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	Meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29.573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.356	metric tons	short tons	1.102
pound-inches	newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

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