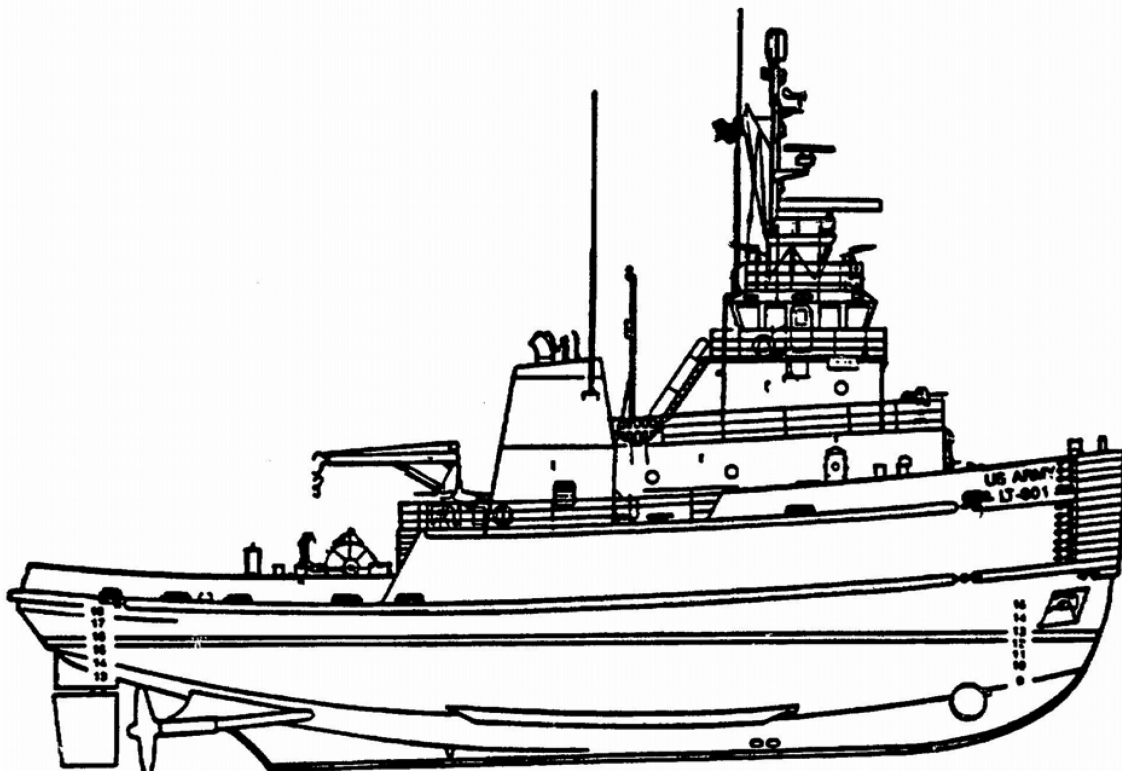


TECHNICAL MANUAL
UNIT, INTERMEDIATE DIRECT SUPPORT
AND INTERMEDIATE GENERAL SUPPORT
MAINTENANCE MANUAL
INCLUDING REPAIR PARTS
AND SPECIAL TOOLS LIST

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



This technical manual is an authentication of the manufacturer's commercial literature and does not conform with the format and the content requirements normally associated with Army technical manuals. This technical manual does, however, contain all essential information required to operate and maintain the equipment.

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AND INTERMEDIATE GENERAL SUPPORT
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1-62 – 1-65.....	0
1-66	1
1-67 – 1-72.....	0
2-1	2
2-2 – 2-8.....	0
2-9	1
2-10 – 2-11	0
2-12	1
2-13 – 2-24	0
2-25 – 2-26	2
2-27 – 2-301.....	1
2-302 – 2-318	0
2-319	1
2-320 – 2-370	0
DA-2028.....	2

WARNING

MODIFICATION HAZARD

Unauthorized modifications, alterations or installations of or 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.

Never use a vacuum cleaner to clean electrical power systems. DO NOT vacuum a live circuit. Failure to observe this WARNING could result in serious injury to personnel, even death.

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 their 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.

For Artificial Respiration, refer to FM 21-11.

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

TECHNICAL MANUAL
NO. 55-1925-207-24&P-1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON D.C. 16 August 1991

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SUPPLEMENTARY INTRODUCTORY MATERIAL

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

1-2. Reporting Errors and Recommending Improvements. You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms) located in the back of this manual directly to: Technical Publication Information Office, TACOM-RI, 1 Rock Island Arsenal, IL 61299-7630. A reply will be furnished directly to you.

1-3. Preparation for Storage and Shipment. Refer to Maintenance Section of the Operation and Maintenance Manual for Fire Detection System (Pyrotronics System 3).

1-4. Destruction of Army Materiel to Prevent Enemy Use. Refer to TM 750-244-3 for instructions covering the destruction of Army Materiel to Prevent enemy use.

CHAPTER 1

INTRODUCTION

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SECTION I. GENERAL INFORMATION

1-1. Scope. This manual covers maintenance procedures for selected subsystems aboard the Large Tug (LT) that are not otherwise covered by commercial manuals.

- a. Type of Manual. Unit, intermediate direct support, and intermediate general support maintenance manual.
- b. Model Number and Equipment Name. Refer to the individual subsystems contained in this Technical Manual (TM).
- c. Purpose of Equipment. Refer to the individual subsystems contained in this TM and in the Operator's Manual, TM 55-1925-207-10.

1-2. Maintenance Forms, Records, and Reports. Department of the Army forms and procedures used for equipment maintenance are prescribed by DA Pam 738750, The Army Maintenance Management Systems (TAMMS).

1-3. Destruction of Army Materiel. Refer to TM 750-244-3 for instructions covering the destruction of Army material to prevent enemy use.

1-4. Reporting Equipment Improvement Recommendations. If your equipment 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 your equipment. Let us know why you don't like the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to Commander, U. S. Army Troop Support Command; ATTN: AMSTR-MOF; 4300 Goodfellow Blvd. ; St. Louis, Missouri 63120-1798. We'll send you a reply.

1-5. Preparation for Storage or Shipment. Administrative storage of equipment issued to and used by Army activities will have preventive maintenance performed in accordance with the Preventive Maintenance Checks and Services (PMCS) charts before storing. When removing the equipment from administrative storage, the PMCS should be performed to assure operational readiness. Preparation of equipment for shipment or short term storage is covered in Section VI.

SECTION II. EQUIPMENT DATA

1-6. Characteristics, Capabilities, and Features. A broad view of the Basic LT components is covered in the Operator's Manual, TM 55-1925-207-10. Figure 1-1 illustrates the LT.

1-7. Location and Description of Major Components. Refer to Section II. Equipment Description of Operator's Manual, TM 55-1925-207-10.

1-8. Equipment Data. Refer to the equipment data given in the Operator's Manual, TM 55-1925-207-10.

1-9. Safety, Care, and Handling. Safety precautions must be observed at all times while performing maintenance. General WARNINGS and first-aid data appear in the front of this manual. Review all safety information before starting any task. Carefully read through an entire procedure before performing any maintenance function. Ensure the task can be done safely. All WARNINGS, CAUTIONS, and NOTES are of great importance to your safety and the safety of the equipment.

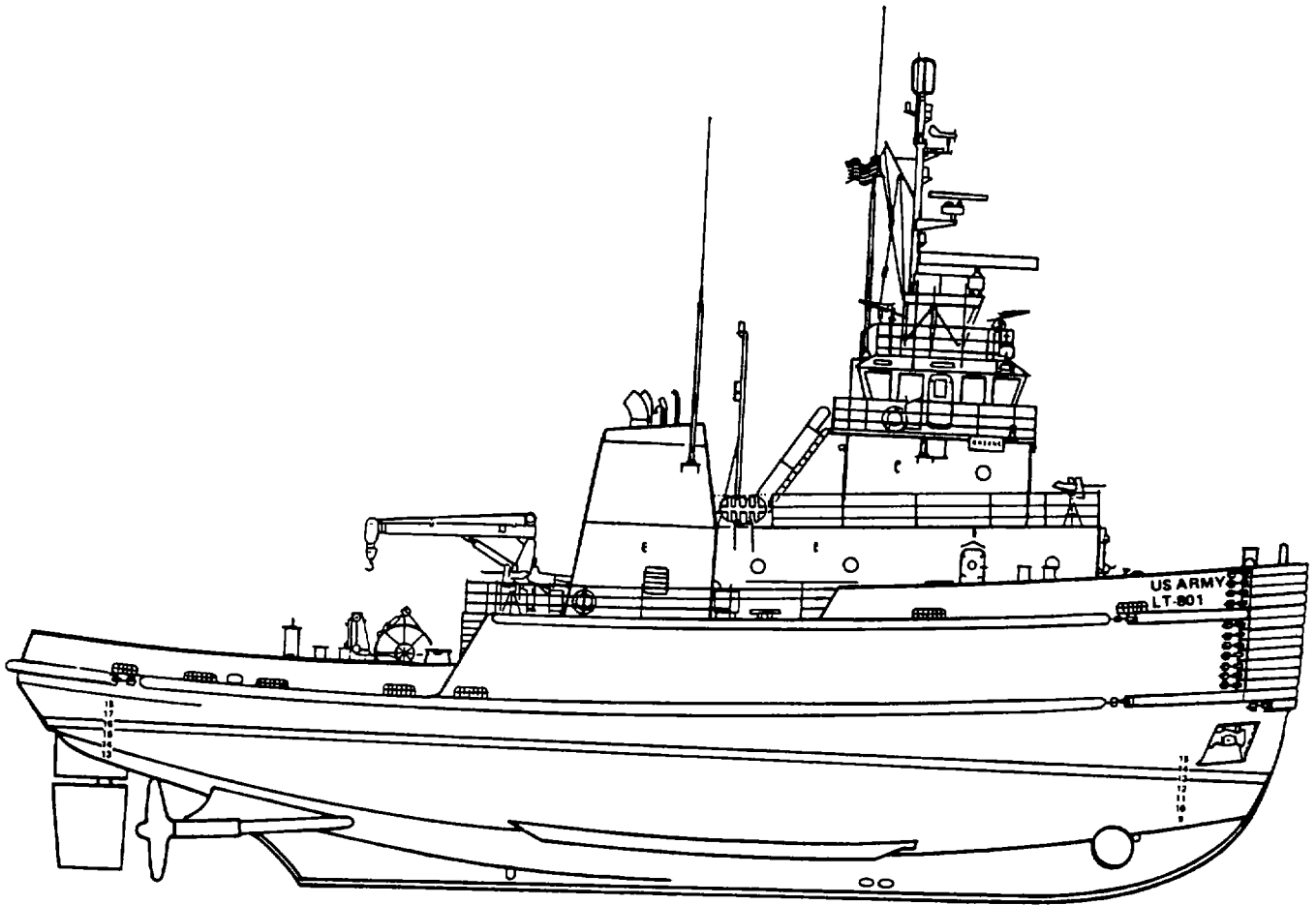


Figure 1-1. Large Tug.

SECTION III. PRINCIPLES OF OPERATION

1-10. General. The following paragraphs provide principles of operation of the LT systems and subsystems contained in this manual.

1-11. Tank Level Indicator (TLI). The TLI system is used to provide an indication of the level of fluids in the ship tanks (Figure 1-2). Levels are continuously monitored. In addition to 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 percent) or rising too high (95 percent). The detection of an alarm condition is indicated by the sounding of an alarm.

1-12. Workshop. Workshop equipment provides for general machining threading, grinding, drilling, and welding functions. The shop contains an arc welder, drill press, lathe, vise, bench grinder, and associated equipment.

1-13. 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.

1-14. Doors, Hatches, Scuttles, Manholes, and Windows.

a. Doors, Hatches, Scuttles, and Manholes. Doors, hatches, and scuttles provide access to spaces of either privacy, or watertight/firetight integrity. Interior doors primarily provide access between above main deck interior spaces where security or watertight integrity is not a concern. Watertight doors provide access to interior spaces from weather decks 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 1-3). 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 hand pumps at a remote location or from hand pumps on 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 hand pumps are located in the main deck vestibule and main deck passageway. These pumps can only close the door. An expansion tank, remote position indicator and two valves are mounted on the bulkhead near each remote hand pump. The tank provides hydraulic fluid necessary for the system. The remote position indicator shows the position of the door (open and close). The valves are locked open to provide hydraulic fluid to the cylinder.

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 headlight 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.

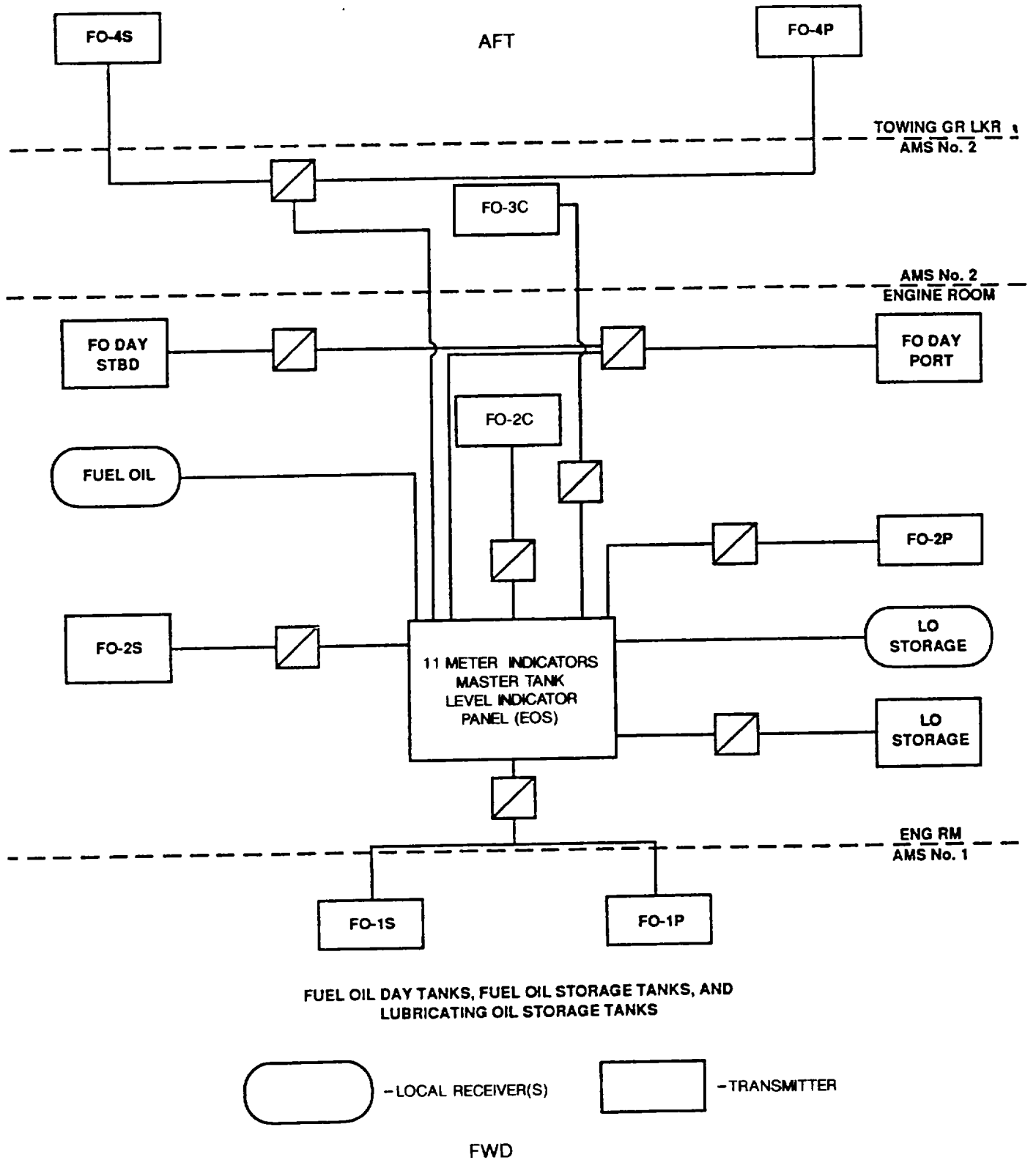


Figure 1-2. Tank Level Indicator System (Sheet 1 of 2).

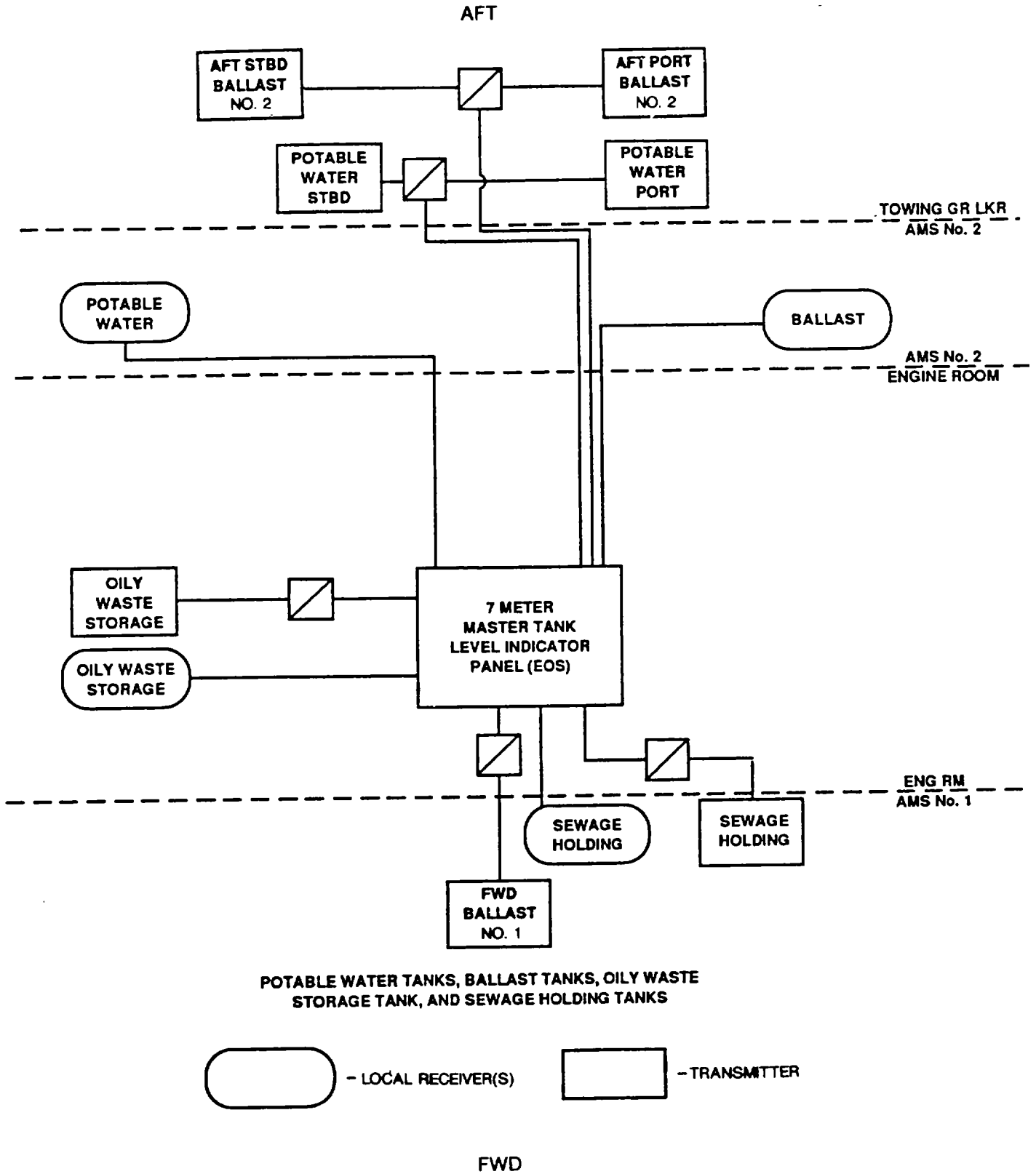


Figure 1-2. Tank Level Indicator System (Sheet 2 of 2).

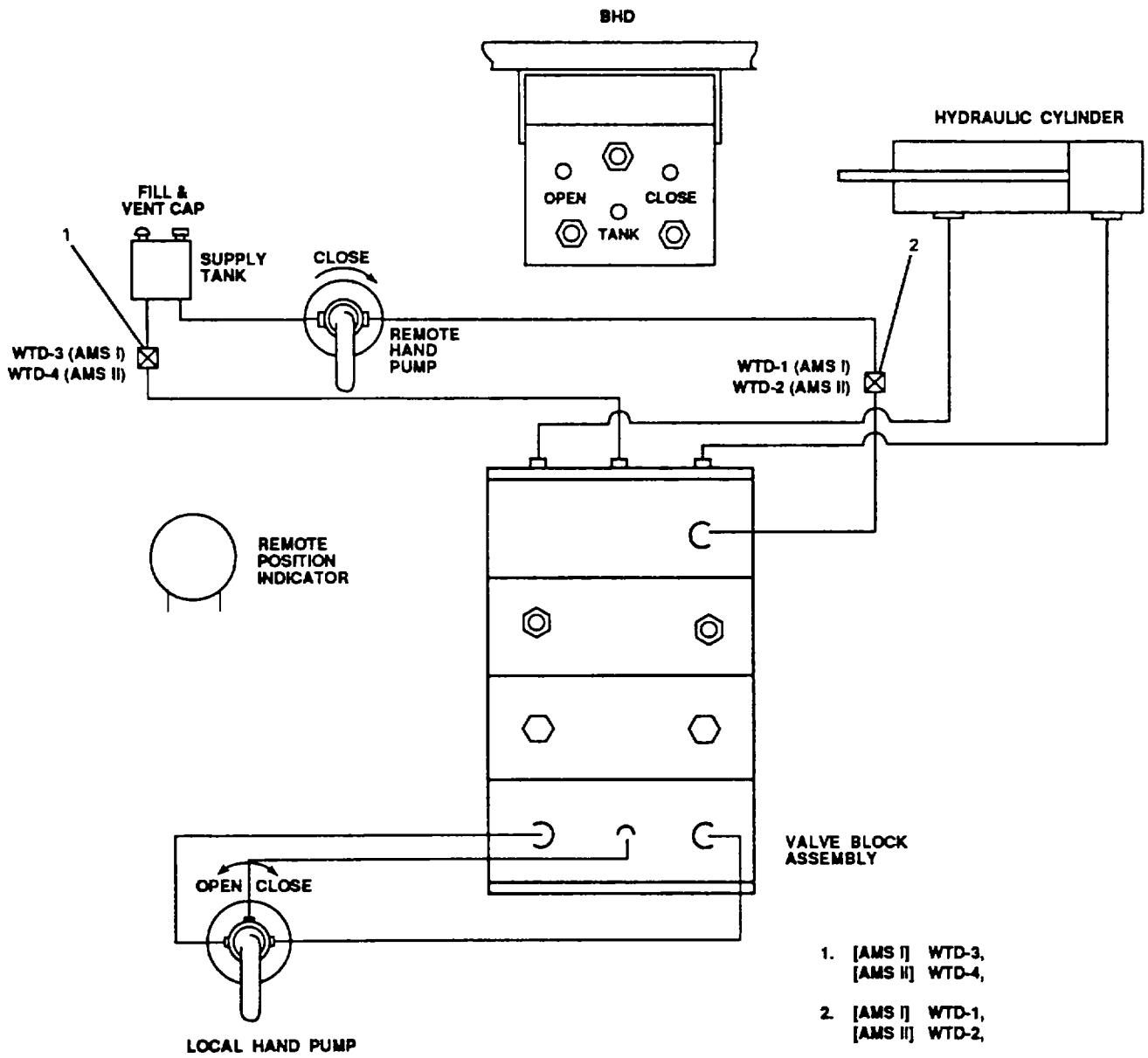


Figure 1-3. Hydraulic Sliding Door.

1-15. Electric Power System. The electric power system consists of the power generation system, power distribution system, and storage batteries.

a. Power Generation System. The power generation system (Figure 1-4) provides the LT with service (450 Vac, 3-phase, 60 Hz, 275 kW) and emergency (450 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 (450 Vac), 400A 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 generators. 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 power necessary 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 and the other in reserve. For parallel operation, controls necessary to parallel the generators are provided on the main switchboard in the enclosed operating station (EOS). (Vessel is labeled).

(b). Ship service diesel generator engine. A turbocharged V-8 diesel engine provides power to the generator. The port SSDG engine (No. 2) is air started, the starboard (No. 1) is electrically started. Engine control and monitoring is provided from the EOS 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 (SSDG #6) and service hour meter.

2. Fuel System. The fuel oil service system (Figure 1-5) 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 from the day tank is drawn in by the fuel pump through the filter/coalescer, and delivered to the engine mounted filters. Fuel passes through the filter elements to the fuel manifold in the injector pump housing. Fuel in 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. 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 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 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.

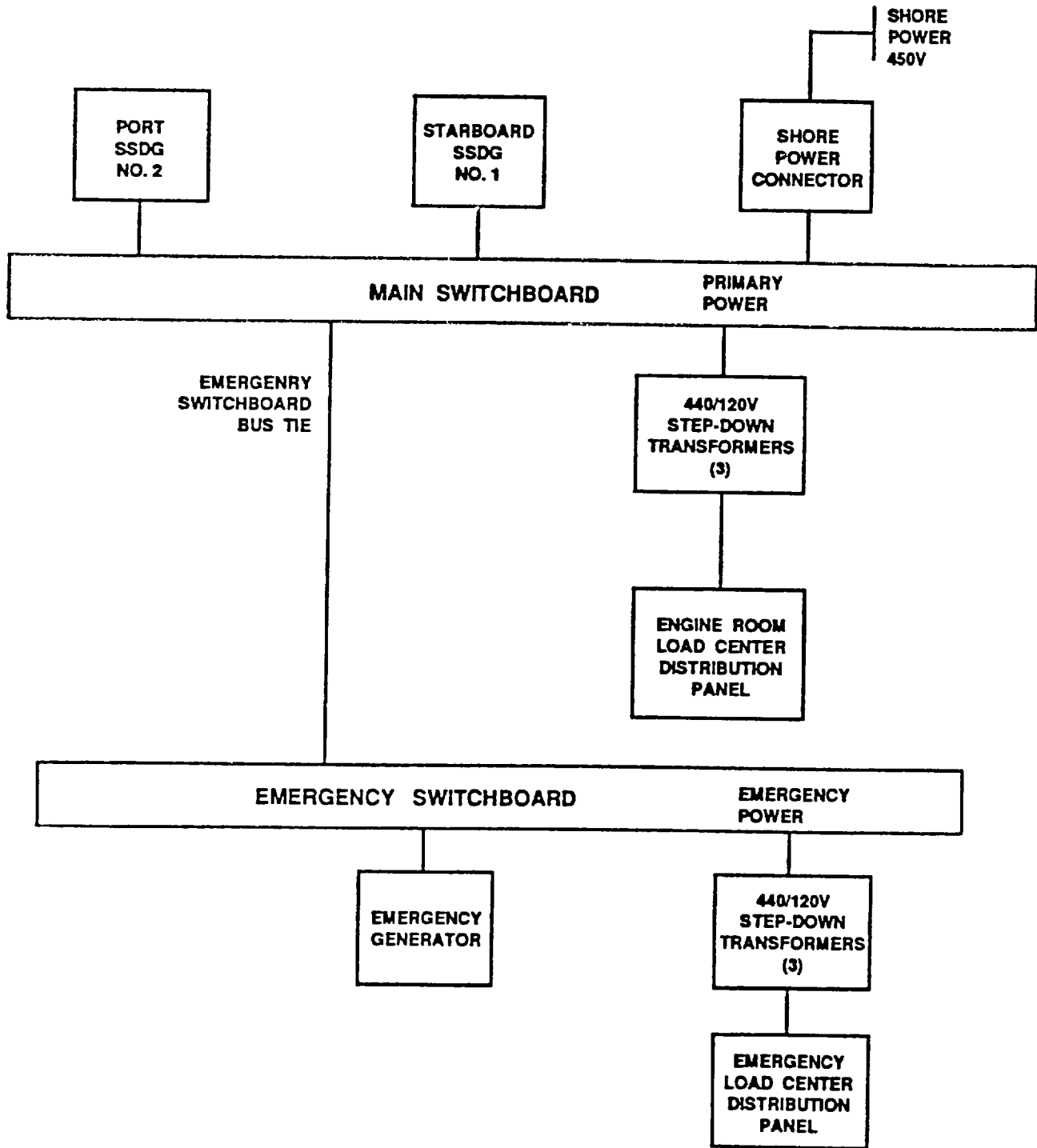


Figure 1-4. Power Generation System.

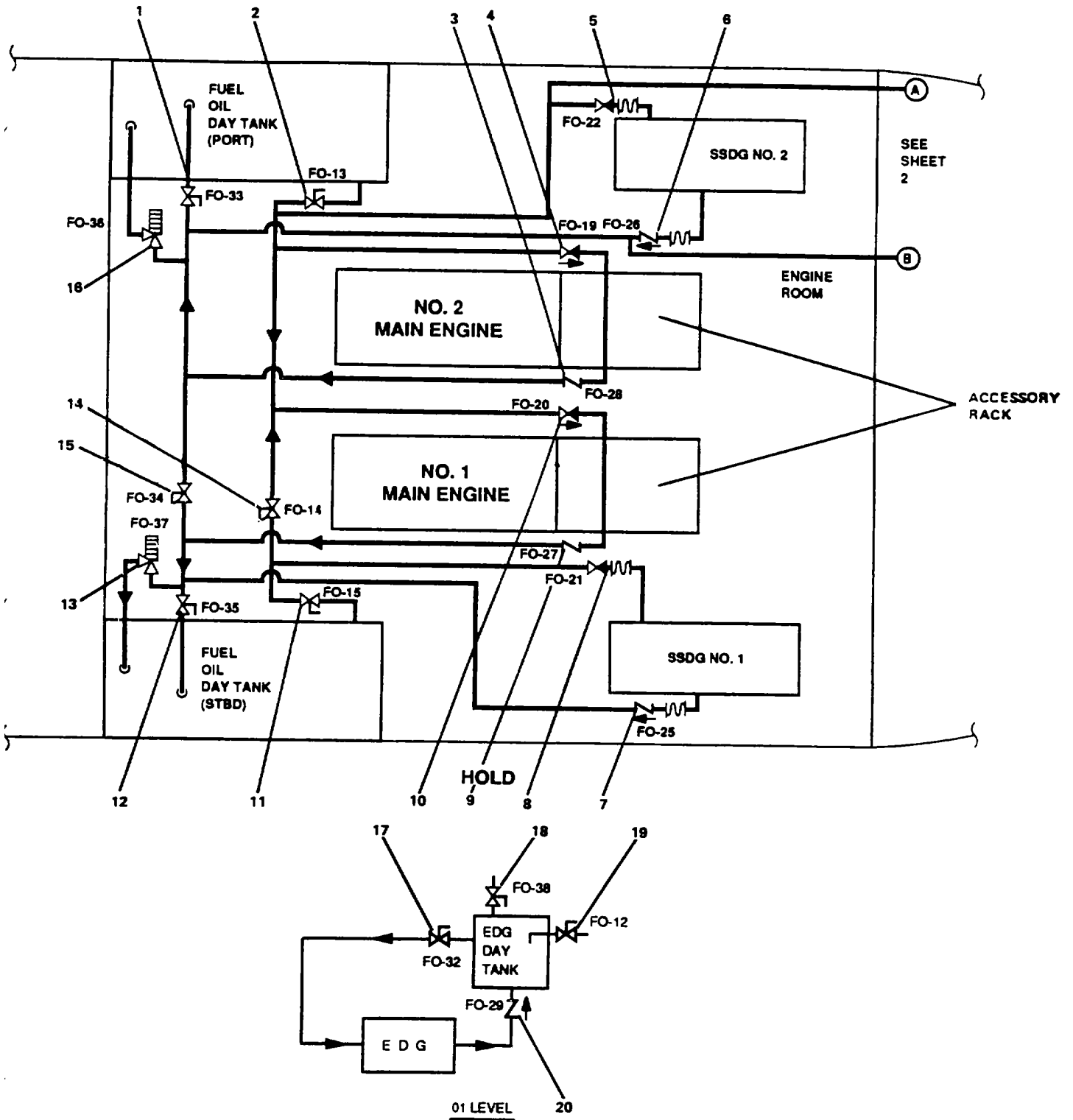
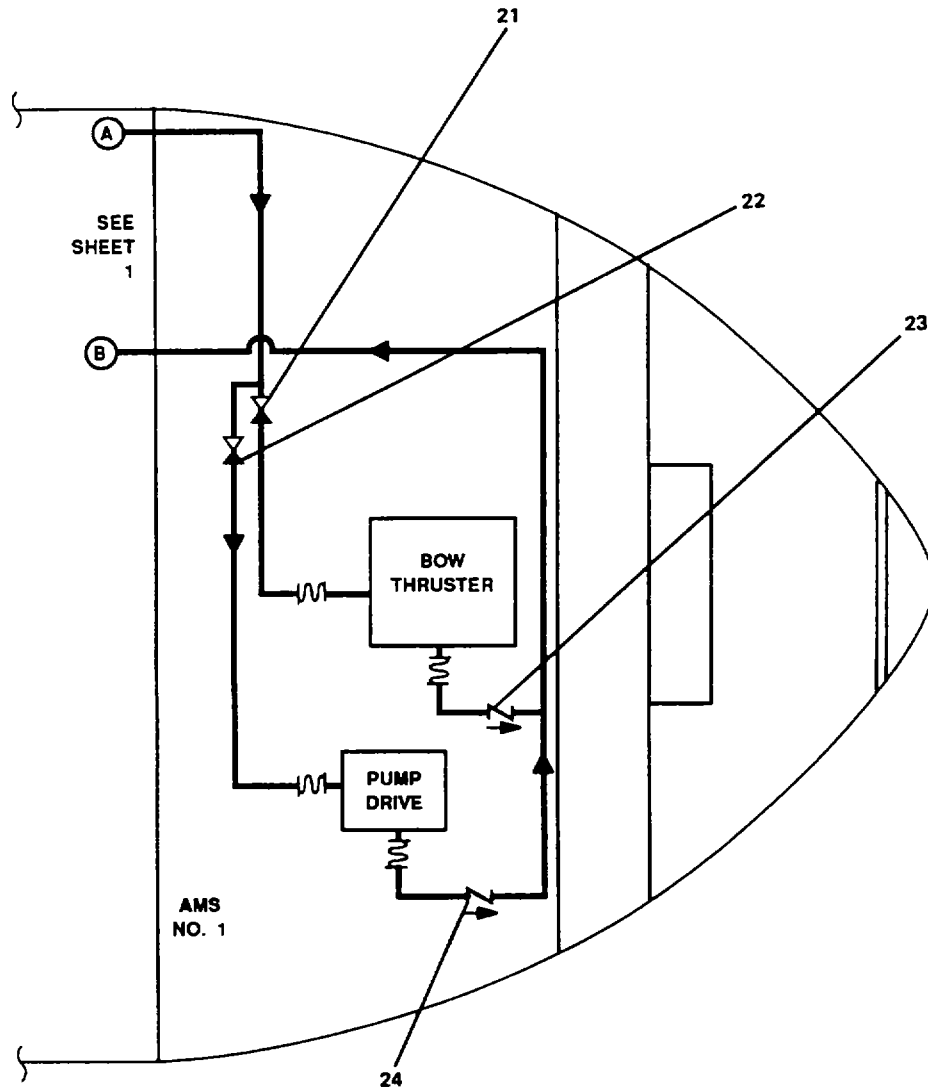


Figure 1-5. Fuel Oil Service System (Sheet 1 of 2).



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

Figure 1-5. Fuel Oil Service System (Sheet 2 of 2).

4. Engine exhaust system. (Figure 1-6). 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 wheel. 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.

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 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 relay valve and lets the main air supply go 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 the 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 air starting 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 starter motor too fast. When the start switch is released, the starter moves away from the ring gear.

7. Lubricating oil system. The engine lubricating oil is supplied by a gear-type pump. The oil is both cooled and filtered. 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. 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 clogged.

8. Cooling system. The engine cooling system (Figure 1-7) consists of gear driven centrifugal water pump, an oil cooler, and expansion tank, and a keel cooler. Engine water is also circulated through each aftercooler located in the turbocharger air discharger 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 disipates heat from the engine cooling water to the sea. Jacket water heaters are provided for cold-weather starting.

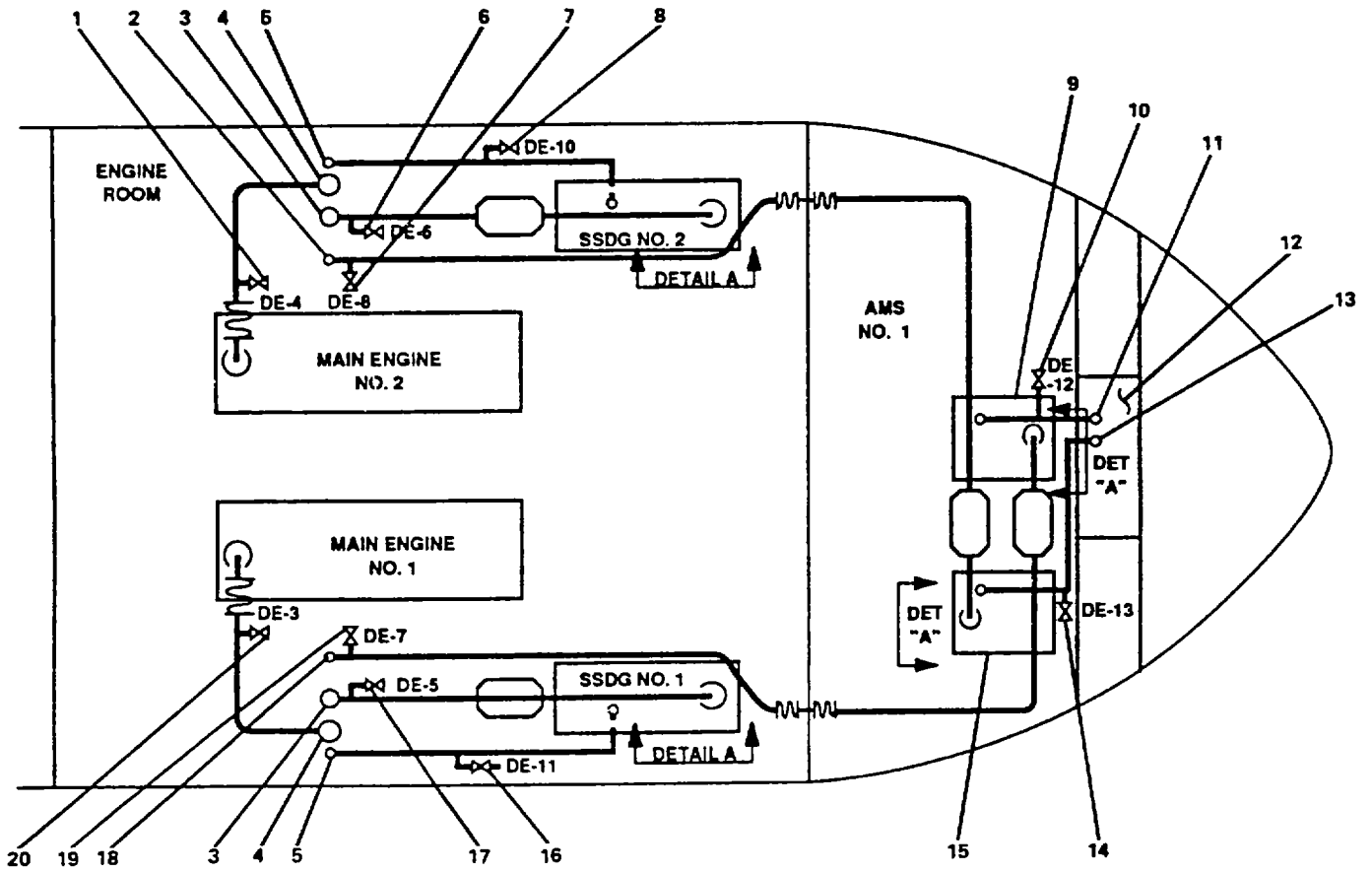
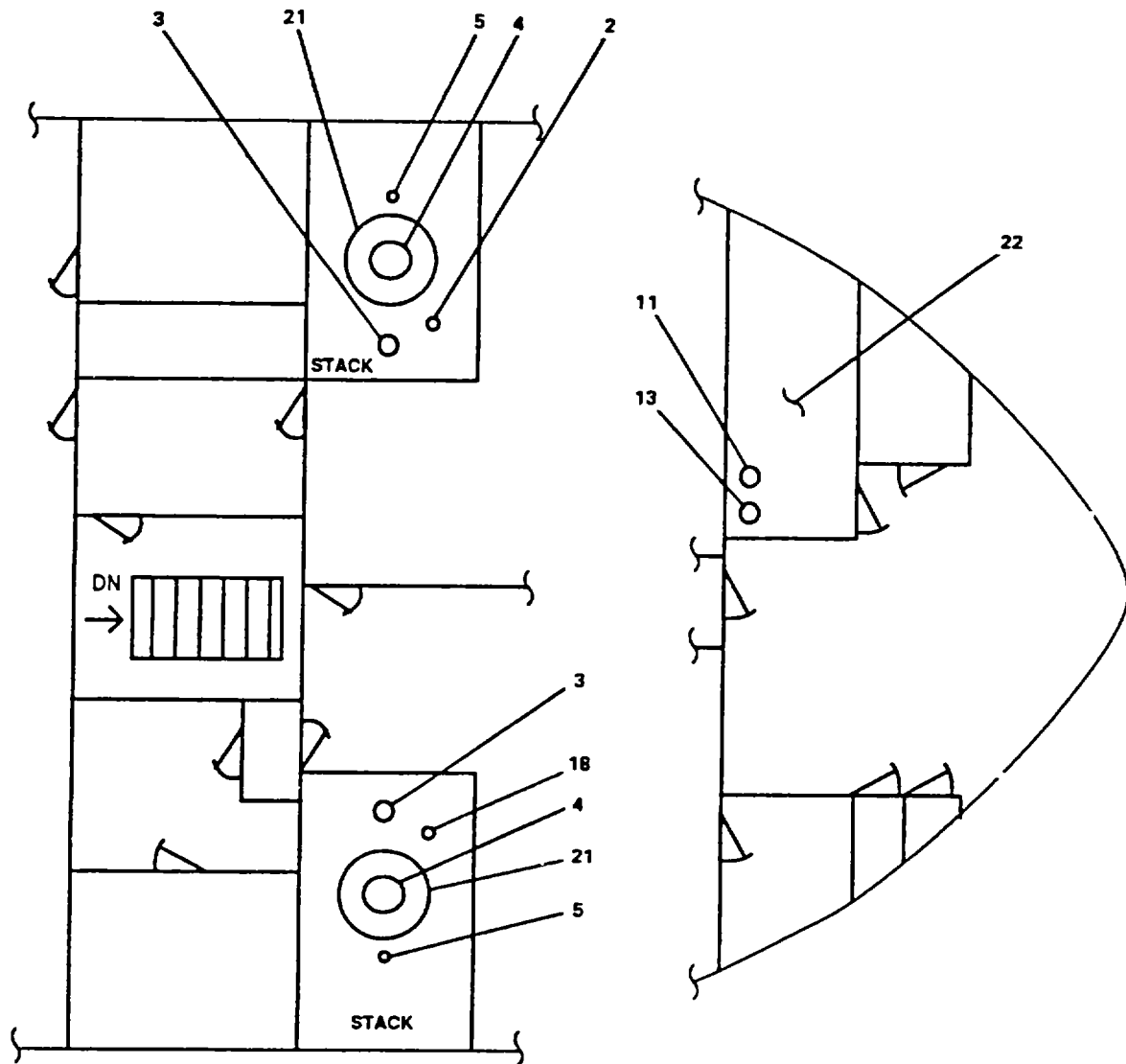


Figure 1-6. Engine Exhaust and Crankcase Vent System (Sheet 1 of 5).



MAIN DECK

Figure 1-6. Engine Exhaust and Crankcase Vent System (Sheet 2 of 5).

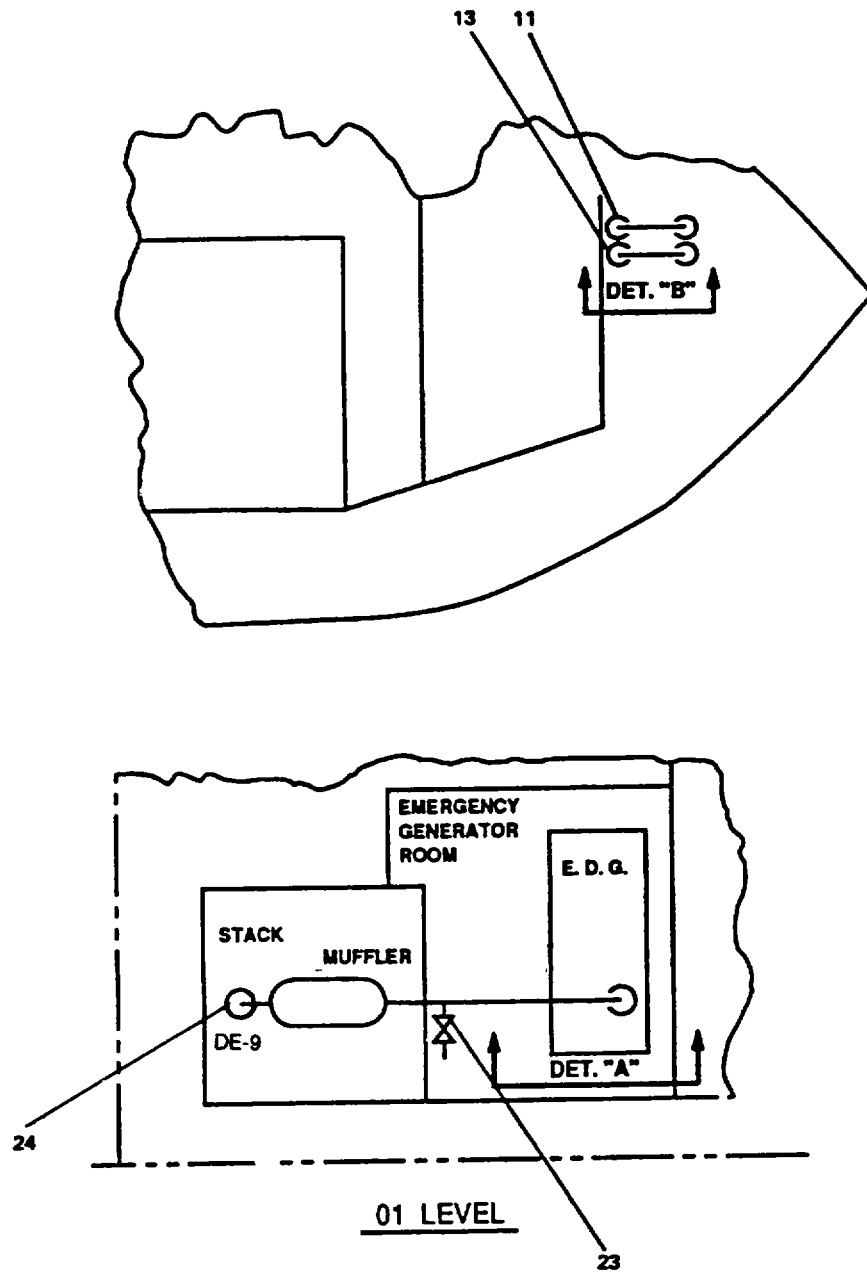
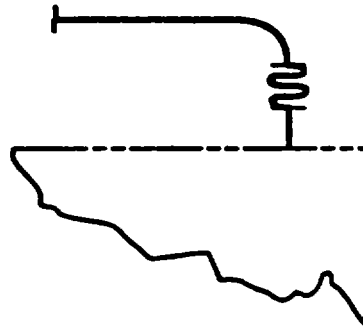
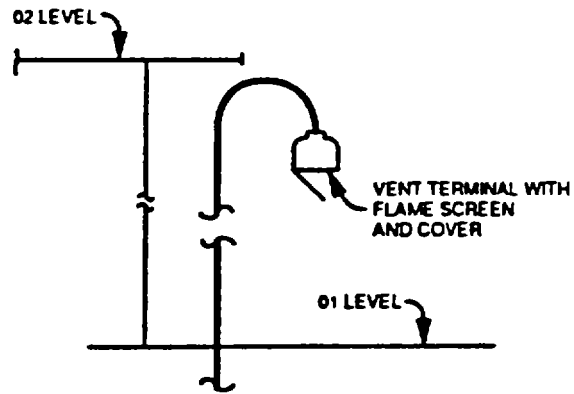


Figure 1-6. Engine Exhaust and Crankcase Vent System (Sheet 3 of 5).



DETAIL "A"
EXPANSION JOINT CONNECTION



DETAIL "B"
BOW THRUSTER PUMP DRIVE
CRANK CASE VENT TERMINAL

Figure 1-6. Engine Exhaust and Crankcase Vent System (Sheet 4 of 5).

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. NO. 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 COMPARTMENT
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. DE-9, DR. ED.G. EXH.
24. EDG ENGINE EXHAUST UP

Figure 1-6. Engine Exhaust and Crankcase Vent System (Sheet 5 of 5).

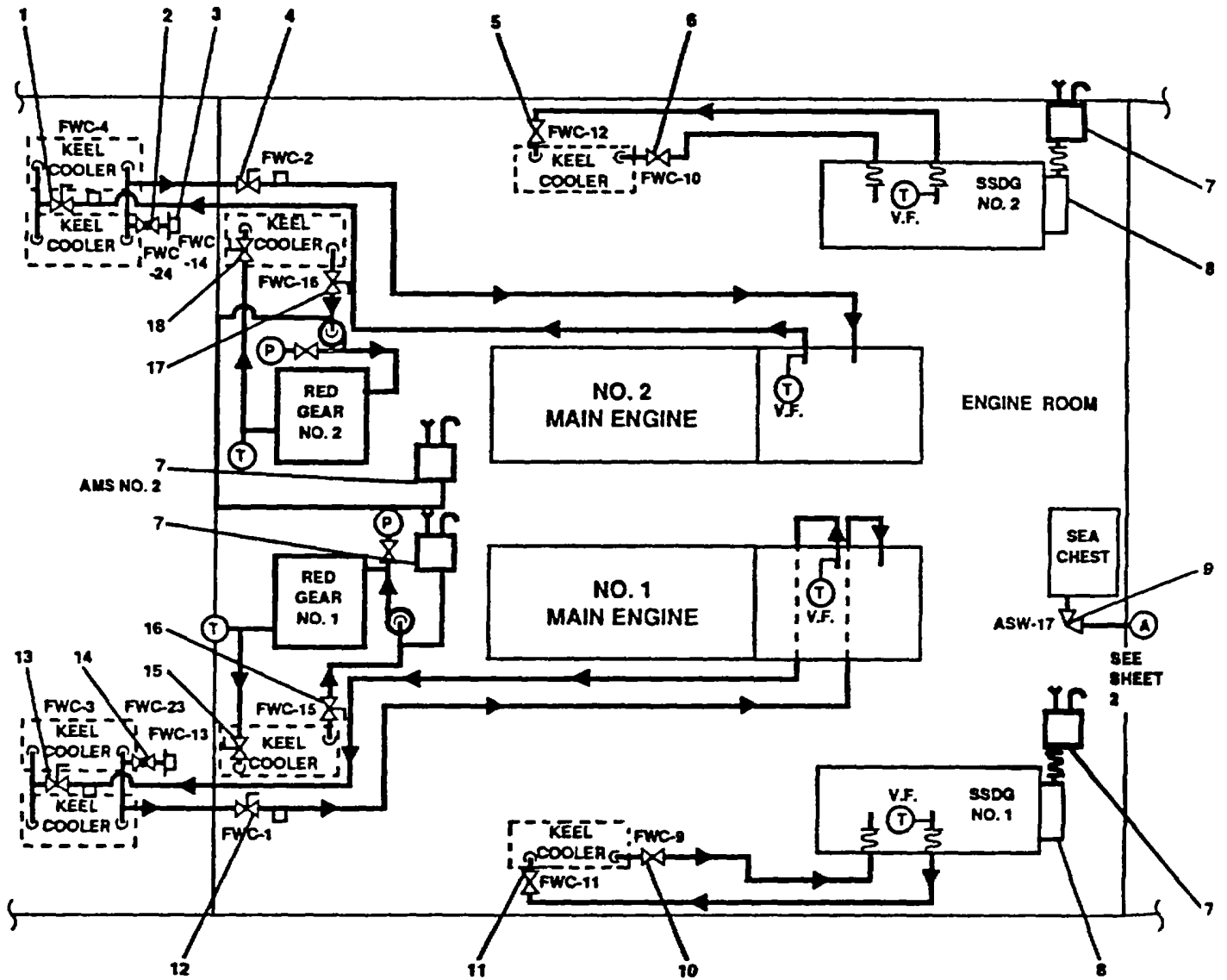


Figure 1-7. Main and Auxiliary Engine Fresh Water Cooling System (Sheet 1 of 3).

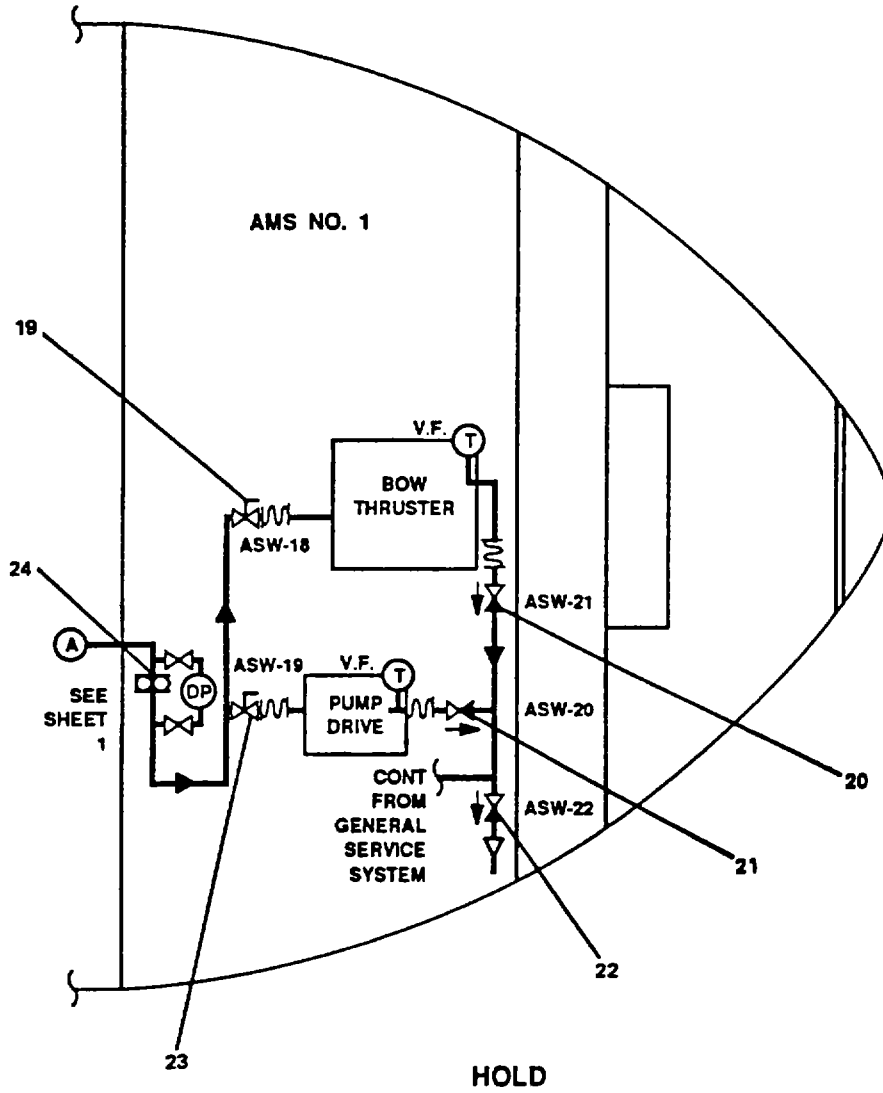


Figure 1-7. Main and Auxiliary Engine Fresh Water Cooling System (Sheet 2 of 3).

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 CONN.
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. KEEL 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

Figure 1-7. Main and Auxiliary Engine Fresh Water Cooling System (Sheet 3 of 3).

(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 subbase.

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

(b). Emergency generator engine. An in line 4 cylinder diesel engine provides power to the emergency generator. The engine is electrically started, has its own lubricating oil, 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, starts the engine, and closes the emergency generator breaker.

1. Engine instrument and control panel. The engine control panel contains the controls and indicators necessary for operation of the engine. An AC meter module and an Engine Control Module (ECM) provide essential readouts.

2. Fuel System. The fuel oil service system (Figure 1-5) 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 a 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 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.

4. Engine exhaust system (Figure 1-6). 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.

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 to 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. The oil is both cooled and filtered. 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 bearings and piston surfaces. The oil then flows back to the pan.

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 to the water pump inlet. The water pump pushes the coolant through the system.

(3). Shore Power Connector. A 450 Vac, 400A shore power connector is located on the main deck, aft exterior bulkhead. The shore power connector provides the capacity of connecting the ship electrical system to a shore power source.

b. Power Distribution. The power distribution system consists of the ship service (main) switchboard, 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 and emergency switchboards to selected equipment and panels.

(1). Main switchboard. The main switchboard (Figure 1-8), 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 step-down transformers located in the engine room. The emergency switchboard bus tie circuit breaker provides 450 Vac to the emergency switchboard. Power monitoring is provided by ammeters, voltmeters, frequency meters, kilowatt meters, a synchronization meter, and a phase rotation 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.

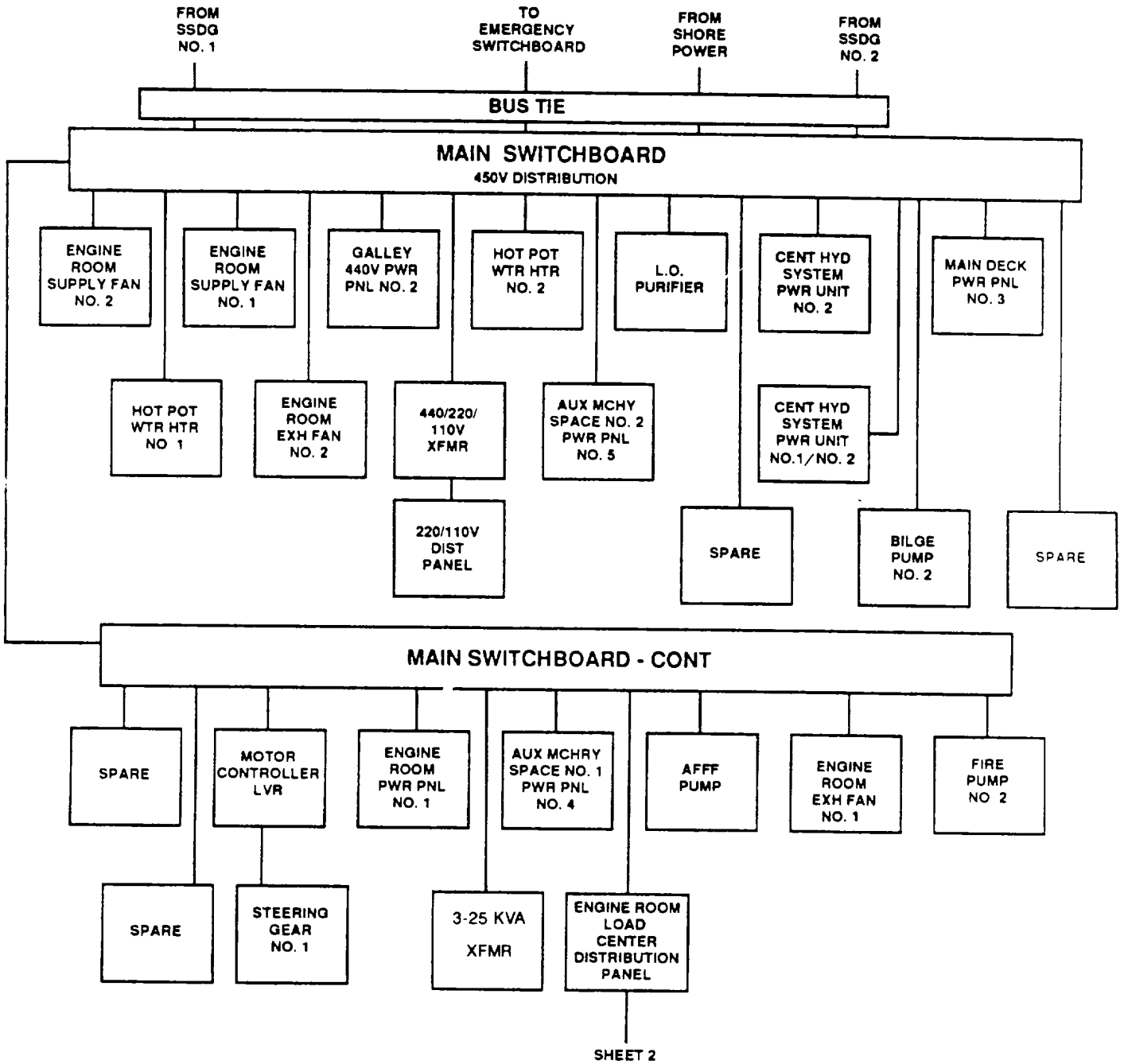


Figure 1- 8. Main Switchboard (Sheet 1 of 2).

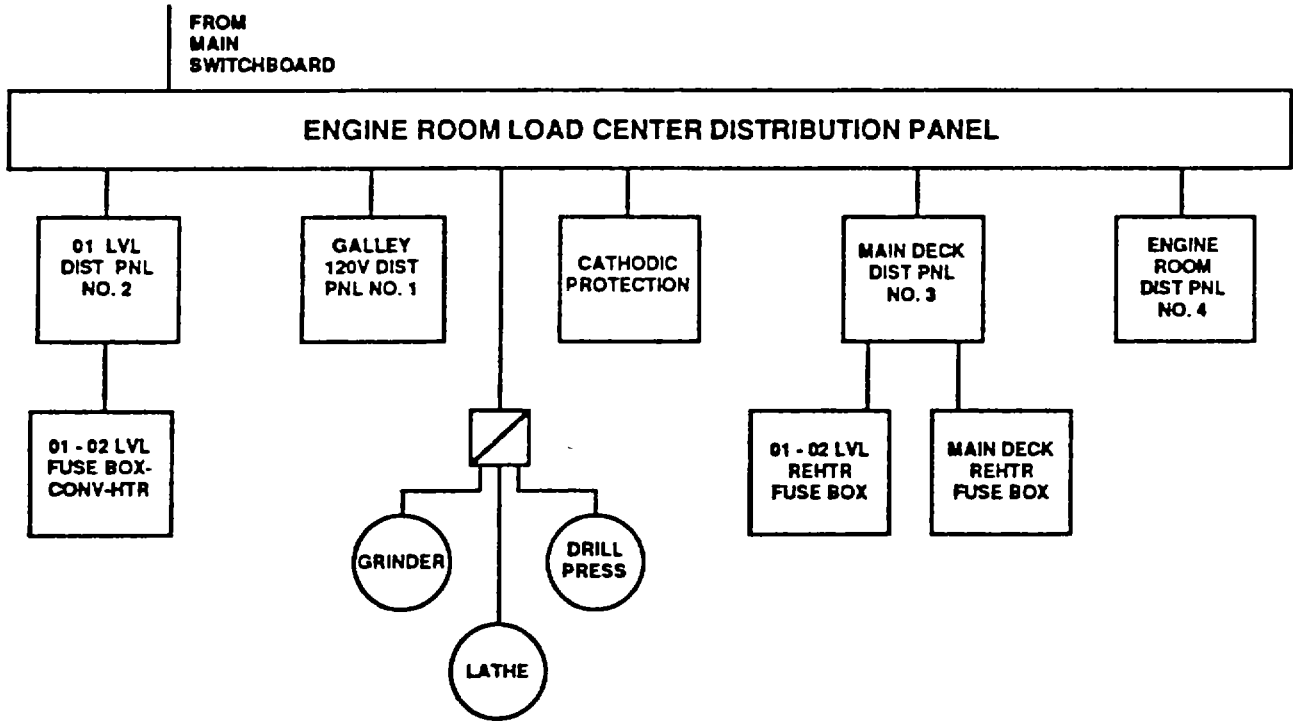


Figure 1-8. Main Switchboard (Sheet 2 of 2).

(2). Emergency Switchboard. The emergency switchboard (Figure 1-9), located in the emergency generator room, normally receives 450 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 (450 Vac) to the main switchboard. The emergency generator circuit breaker is prevented from being closed by an interlock system when primary power is being provided through the bus tie. Power distribution (450 Vac) is accomplished through circuit breakers on the switchboard. A step-down transformer provides 120 Vac to the Emergency Load Center Distribution Panel.

c. Battery Power Distribution (Figure 1-10). 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 dc panel, which supplies selected Communication, Electronic, and Navigation (CEN) equipment. The fifth set of batteries provides power for the machinery plant monitoring system, and engine control. Battery chargers for each battery bank are provided. The chargers supplied from the emergency load center distribution panel (120 Vac) (general alarm system and emergency generator), engine room emergency distribution panel No. 1 (SSDG No. 1 and machinery plant monitoring system), and radio room electronics distribution panel (CEN equipment).

d. Illumination and Navigation Lights. Navigation lights include blinker lights, XENON searchlights, floodlights, masthead lights, running lights, towing lights, stern lights, and not under command lights.

(1). 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.

(2). 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 bulkhead of pilothouse.

(3). 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.

(4). Floodlights. Six high intensity floodlights are mounted on the weather deck structure (four on the 01 Level, two on the main deck) to provide illumination of the deck area.

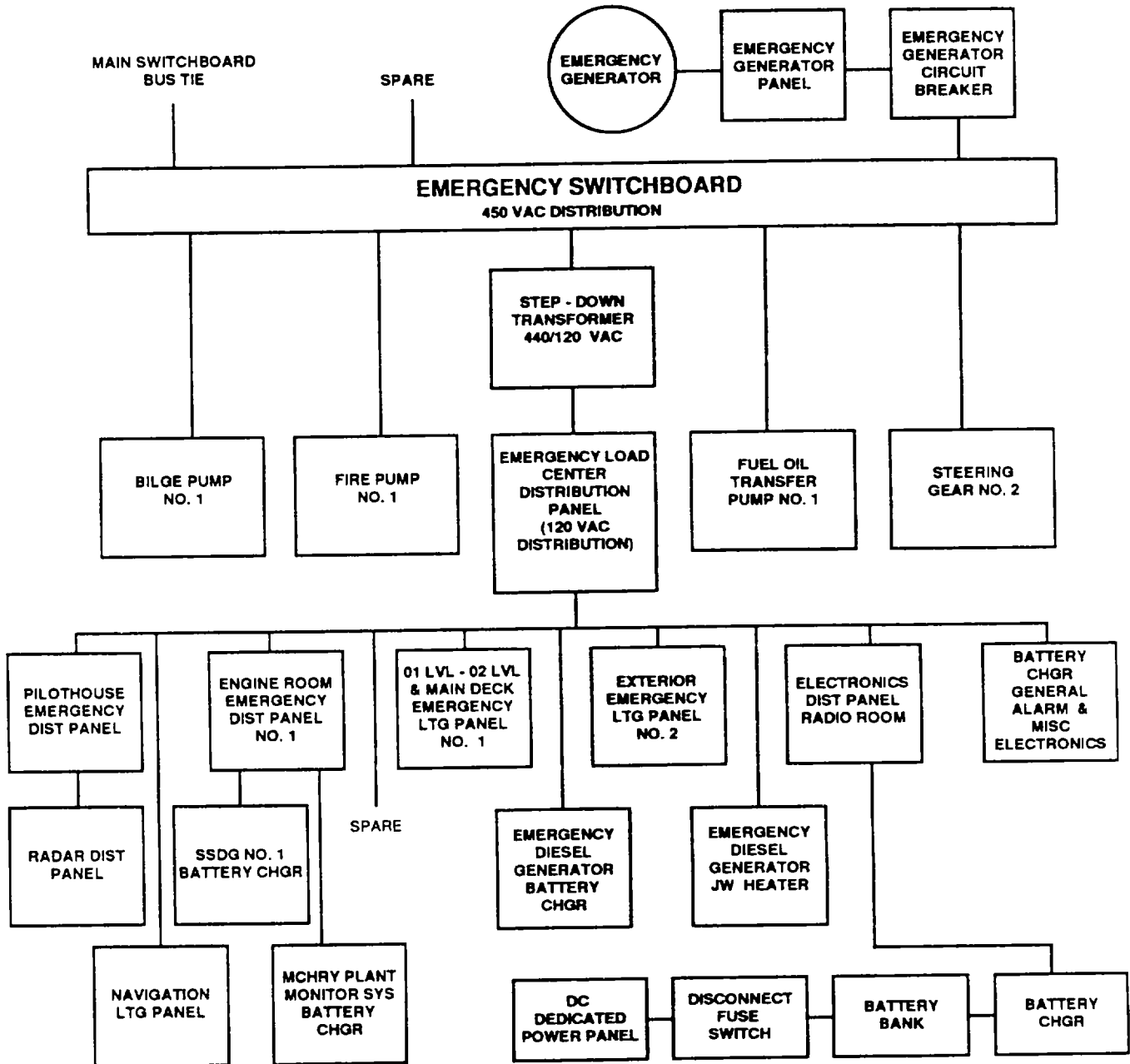


Figure 1-9. Emergency Switchboard.

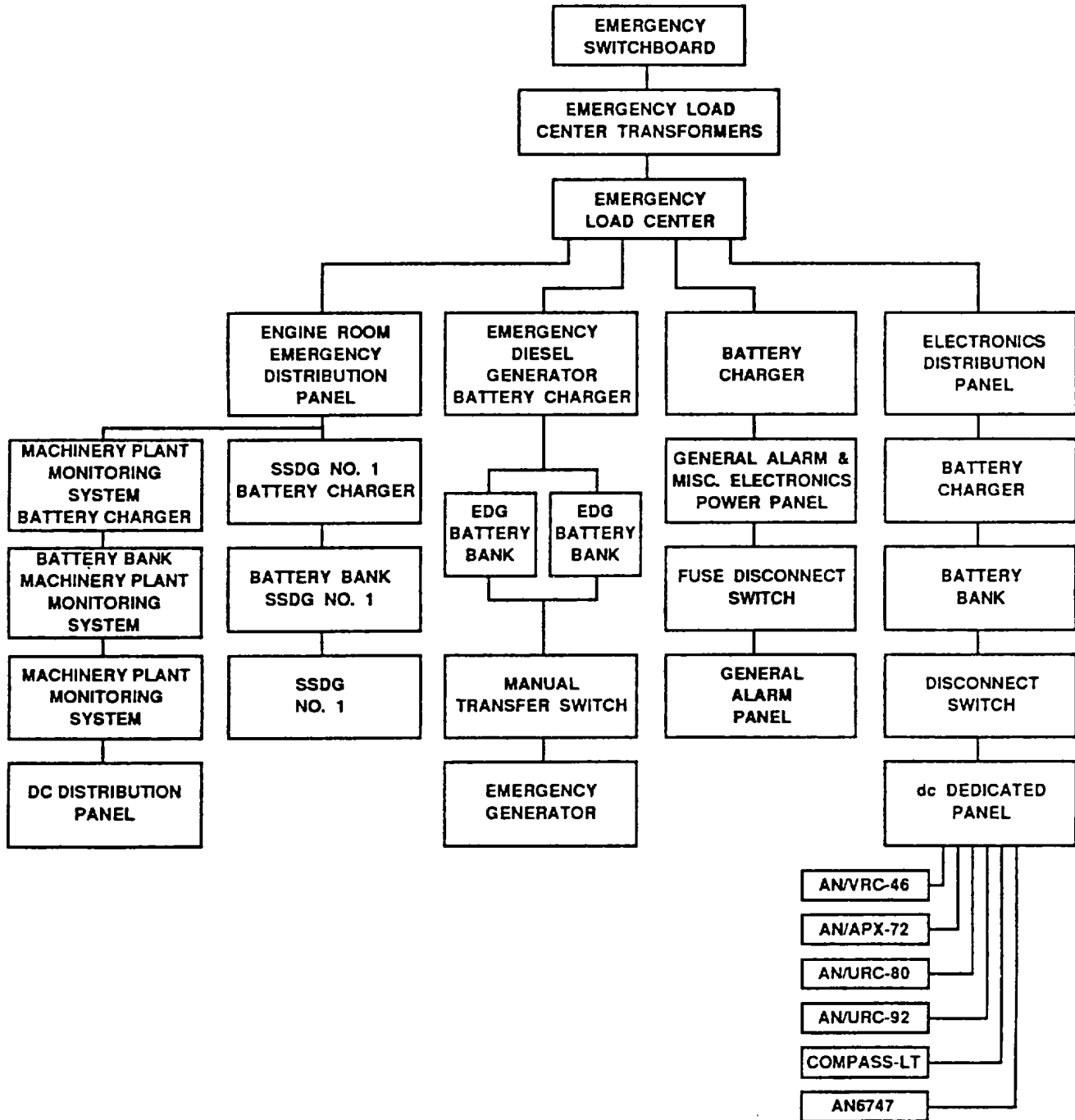


Figure 1-10. Battery Power Distribution.

1-16. Piping System. The piping systems for the LT includes bilge/ballast, fuel oil fill and transfer, lubricating oil transfer and purificating, compressed air, potable water, sewage collection, holding, transfer, and firemain and general service firefighting system.

1-17. Bilge/Ballast System. The bilge/ballast system is composed of bilge system and the ballast system.

a. *Bilge System.* The bilge system (Figure 1-11) transfers accumulated water from the engine room, shaft alleys (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.

(1) *Aft steering gear compartment and towing gear bilge system.* General service system piping supplies pressurized seawater to eductors to remove accumulated water in these spaces. Output from eductors is discharged overboard.

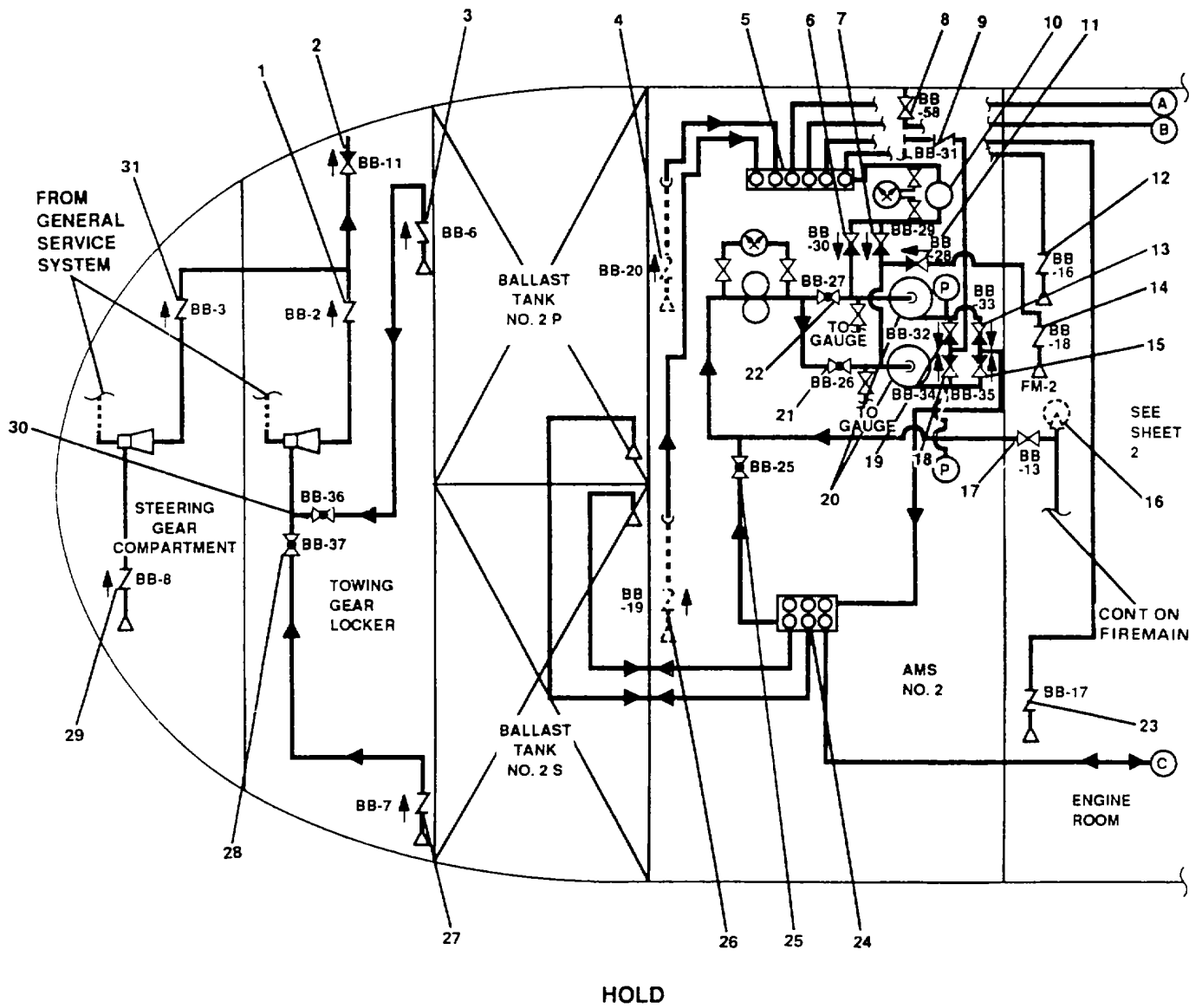


Figure 1-11. Bilge and Ballast System (Sheet 1 of 3).

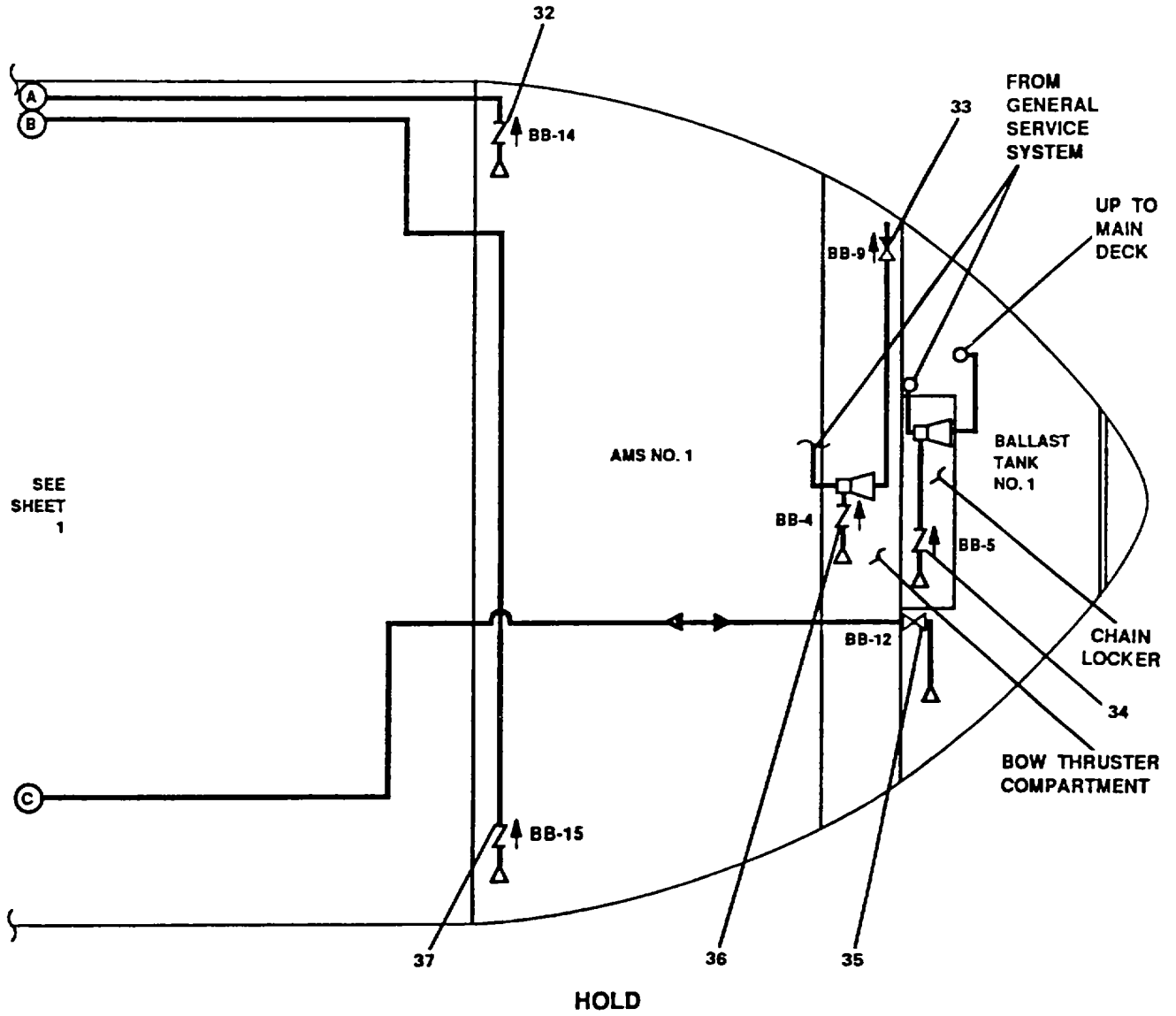
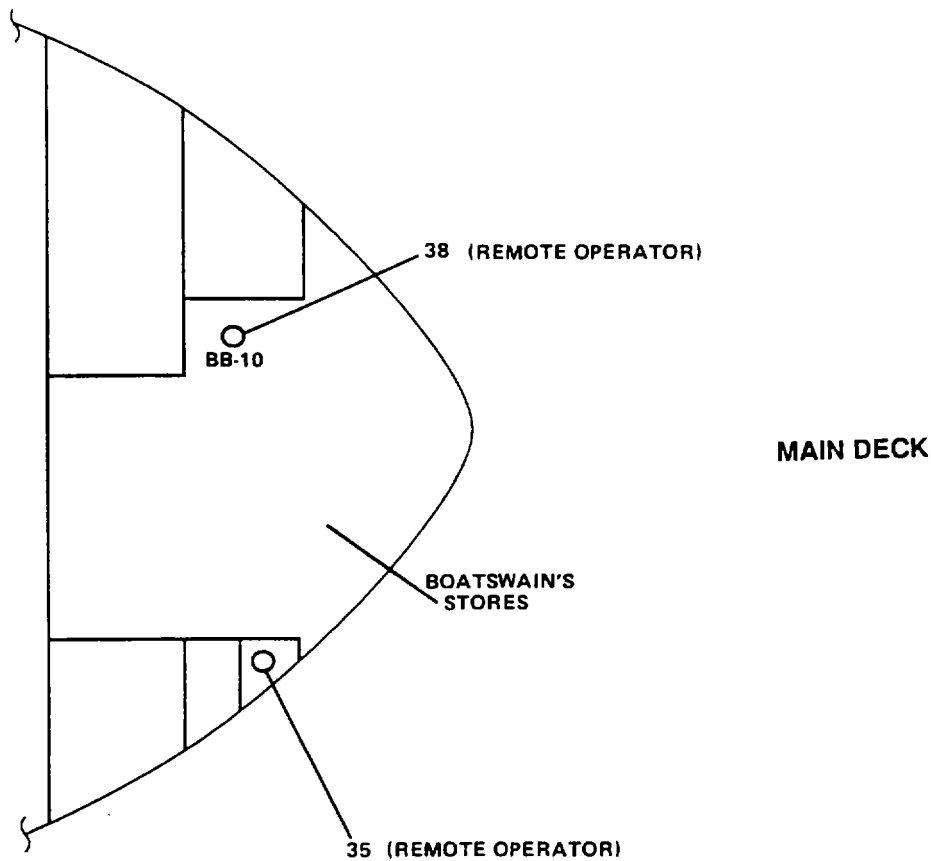


Figure 1-11. Bilge and Ballast System (Sheet 2 of 3).



- | | |
|--|---|
| <ol style="list-style-type: none"> 1. BB-2 2. BB-11, OVBD. DISCH. BILGE EDUC. 3. BB-6 4. BB-20 5. BILGE MANIFOLD 6. BB-30, B/B 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, B/B 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. FIRE/G.S. AND BLST. PMPS. 17. BB-13, S.W. TO BLST. PMPS. 18. BB-34, B/B PMP. NO. 1 OVBD. DISCH. 19. BB-32, B/B PUIP. NO. 2 OVBD. DISCH. | <ol style="list-style-type: none"> 20. BILGE & BALLAST PUMPS 21. BB-26, B/B PMP. NO. 1 BLST. SUCT. 22. BB-27, B/B 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 30. BB-36, BILGE EDUCT. SUCT. C.O.V. 31. BB-3 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, OVRD. DISCH. BILGE EDUC. |
|--|---|

Figure 1-11. Bilge and Ballast System (Sheet 3 of 3).

(2) Bow thruster compartment and chain locker bilge system. General service system piping supplies pressurized seawater to eductors to remove accumulated water in these spaces. Output from eductors is discharged overboard.

(3) Emergency room shaft alley (port and starboard and AMS-1 bilge system). The engine room shaft alley and AMS-1 bilge system removes accumulated water for these spaces. This system is comprised of two bilge and ballast pumps, bilge manifold, and bilge piping.

(a) Bilge and ballast pumps. Bilge and ballast pumps are horizontal centrifugal pumps, each with 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 pumps can be directed either overboard or to the ballast manifold.

(b) Bilge manifold. A simplex manifold providing 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, and shaft alleys (port and starboard). Each piping branch is equipped with a check valve at its end.

(4) Oily bilge system. The oily bilge system (Figure 1-12) provides a means to remove accumulated oily water from the bilges in the engine room, and 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 storage tank, oily waste drain 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 pumps. 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 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 stowage tank.

(d) Oily waste stowage tank. The oily waste stowage tank provides a holding tank which supplies oily water to be processed by the oily water 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-stage coalescer with self-contained pumps and motors. Power is supplied from 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 stowage tank. 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 water stowage tank.

PORT DESIGNATIONS	
A	BILGE INLET
B	OILY DISCHARGE
C	BACKFLUSH INLET
D	EFFLUENT DISCHARGE OVBD
E	BACKFLUSH RECIRC TO BILGE
F	DRAIN TO BILGE
G	AIR RELIEF TO BILGE
K	EFFLUENT RECIRCULATE

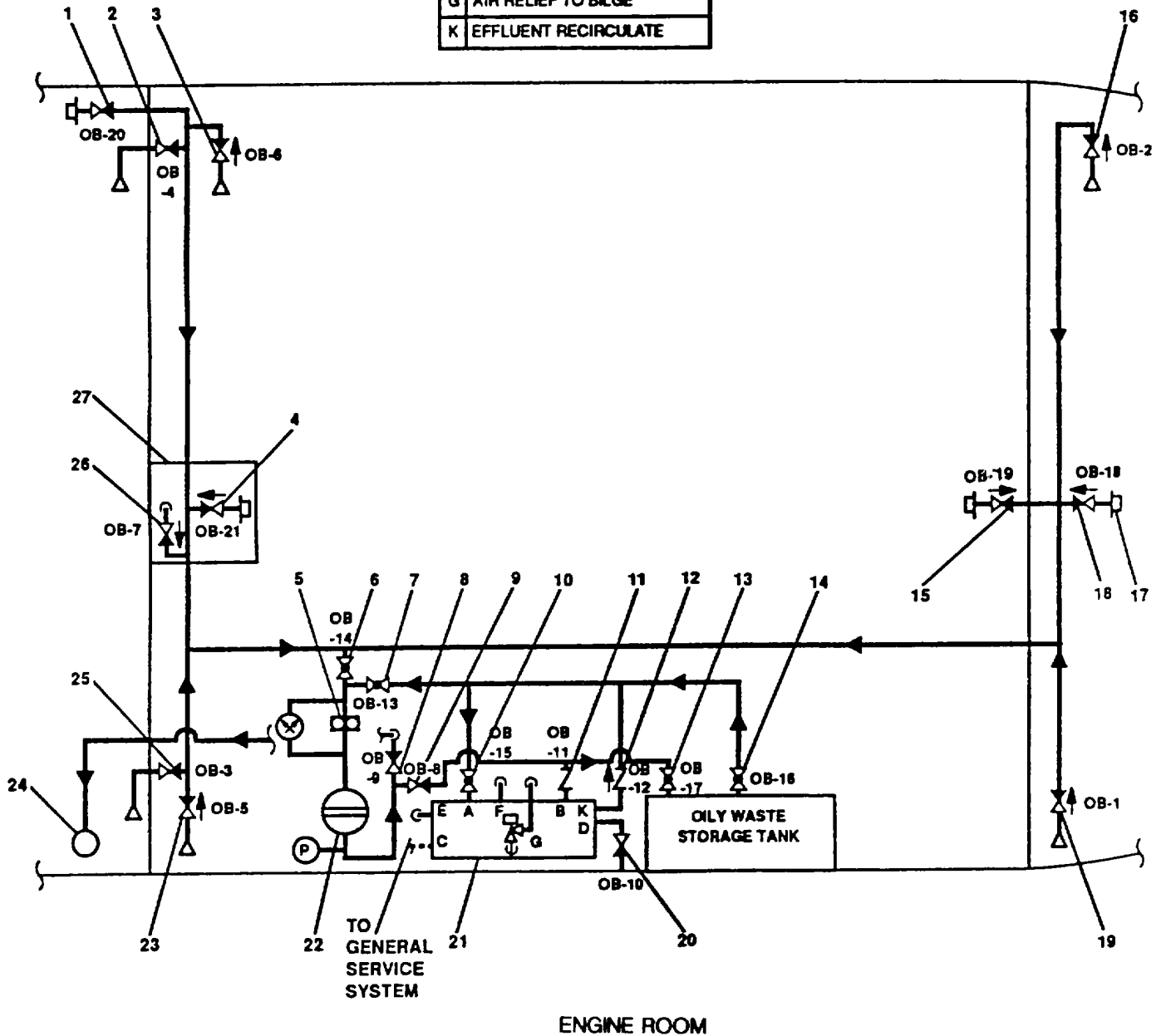
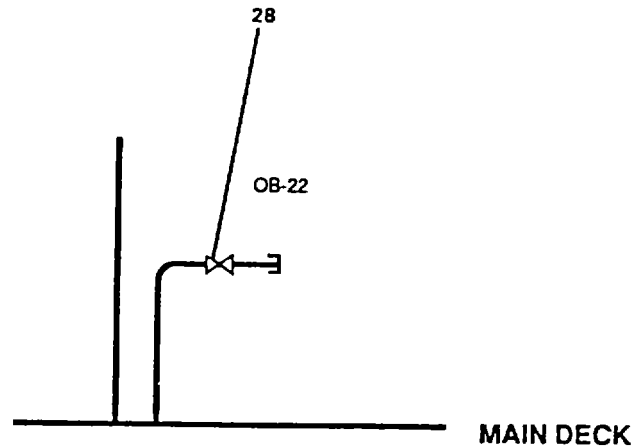


Figure 1-12. Oily Bilge System. (Sheet 1 of 2).



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 PMP SUCT.
7. OB-13, OILY WST. STOR. TK. TO OILY BILGE PMP. SUCT.
8. OB-9, OILY BILGE PMP. DISCH. TO SHORE
9. OB-, 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 1-12. Oily Bilge System. (Sheet 2 of 2).

(5) Emergency bilge suction. An emergency bilge suction with strainer, located in the engine room, is included in the firemain and general service system. 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 in an emergency.

b. Ballast System. The ballast system (Figure 1-11) 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. Horizontal centrifugal pumps, each with rated output of 100 gpm at 50 psi, 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.

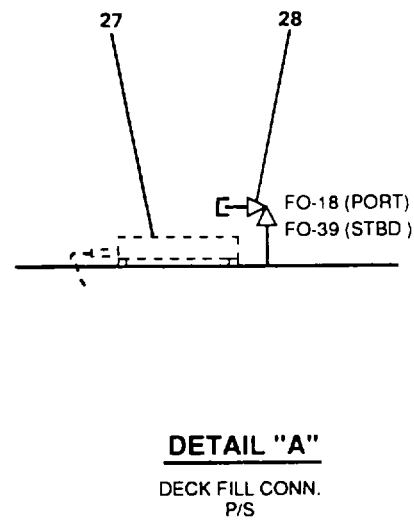
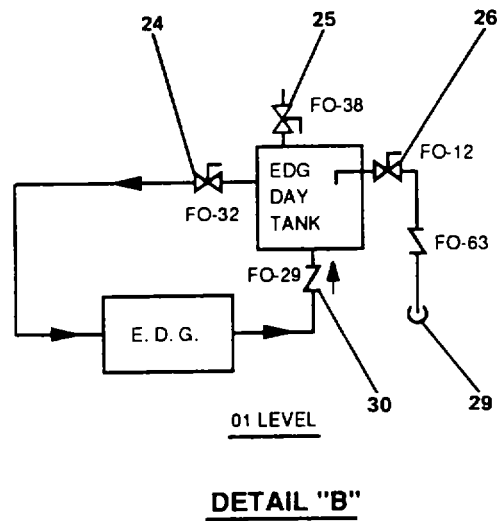
(2) Ballast manifold. A duplex manifold providing selection and control of piping alignment. The manifold is connected through a strainer to the suction side of the bilge/ballast pumps.

(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 terminates in a ballast tank.

1-18. 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.

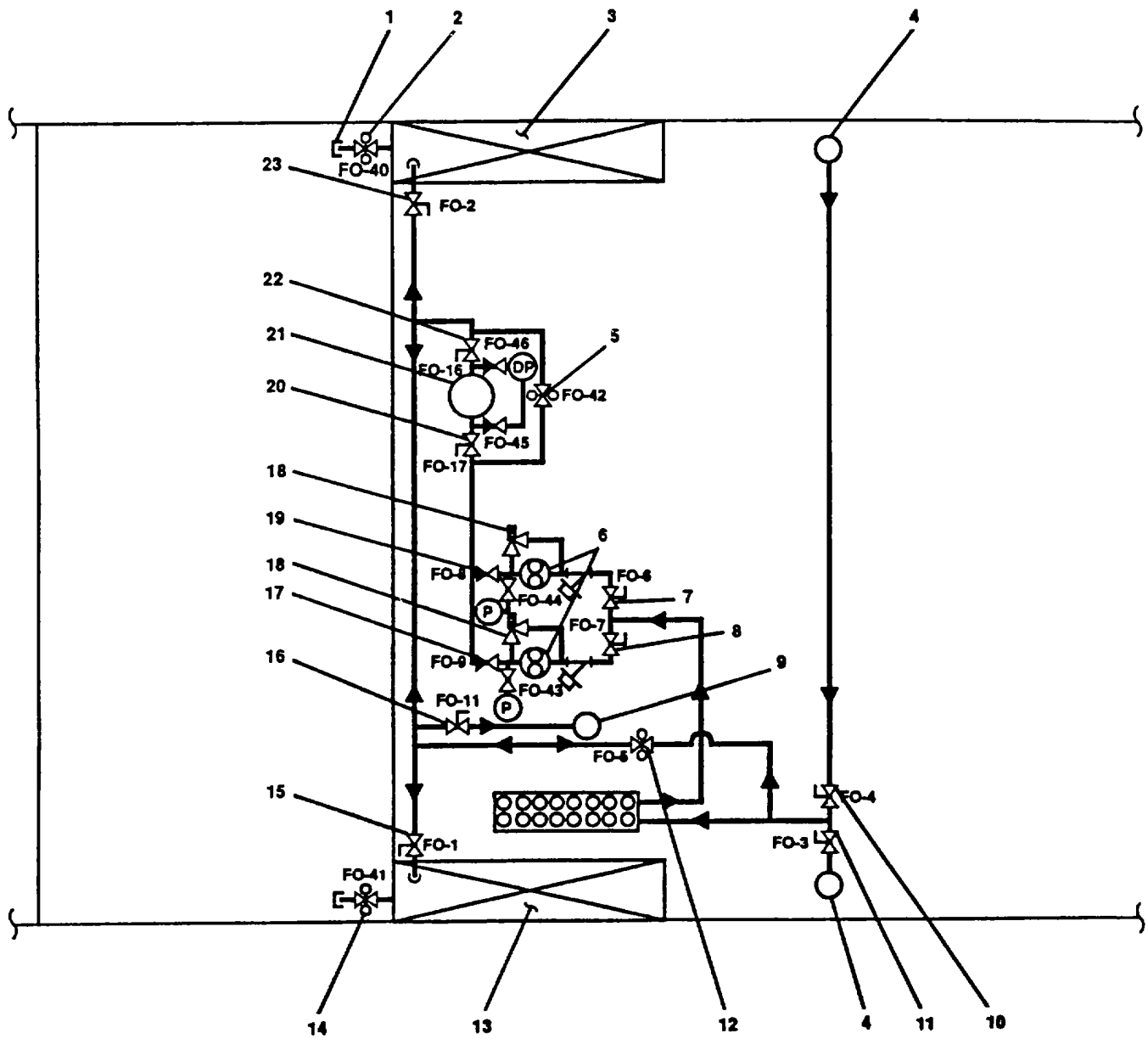
The system also replenishes fuel oil (port and starboard) day tanks and emergency diesel generator day tank by transferring fuel oil from storage tanks. System control is maintained through a combination of valves as shown in Figure 1-13. Fuel oil can be transferred from any storage tank to any day tank. 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 spaces. 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 an local START/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.

1-19. 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, SSDG's, and auxiliary engines. The system also transfers lubricating oil from the lube oil storage tank to the main engine, SSDG pumps, bow thruster engine sump, and pump drive engine sump. System alignment is maintained by a combination of valves as shown in Figure 1-14. A fast lube oil drain system allows dirty oil and sludge to be discharged from the engine sumps to the 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 handpump. 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 provided directly from the main switchboard. Each 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.



- | | |
|--|--|
| <ol style="list-style-type: none"> 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. FILL CONN. 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. | <ol style="list-style-type: none"> 17. FO-9, C.O.V. - F.O. XFER PMP NO. 2 DISCHARGE 18. PUMP INTERNAL RELIEF VALVE 19. FO-8, C.O.V. - F.O. XFER PMP NO. 1 DISCHARGE 20. FO-17, F.O. FLTR/CLSR INLET 21. FILTER/COALESCER 22. FO16, F.O. FLTR/CLSR OUTLET 23. FO2, F.O. DAY TK FILL 24. FO-32, F.O. SPLY TO E.D.G. 25. FO-38 26. FO-12, E.D.G. DAY TK FILL 27. SPILL CONTAINER 28. FO-18, DK. FILL CONN. PORT
FO-39, DK. FILL CONN. STBD 29. FROM BELOW 30. FO-29 |
|--|--|

Figure 1-13. Fuel Oil Fill and Transfer System (Sheet 1 of 3).



ENGINE ROOM

Figure 1-13. Fuel Oil Fill and Transfer System (Sheet 2 of 3).

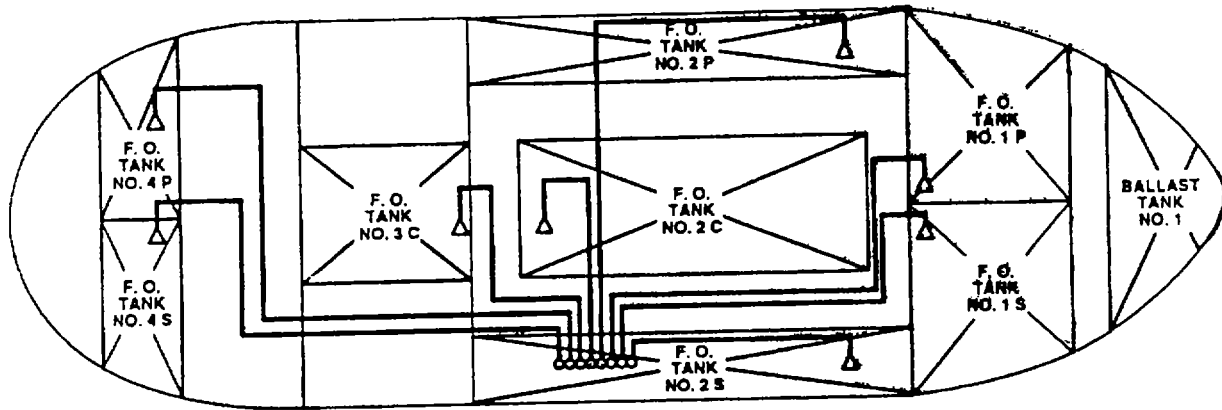


Figure 1-13. Fuel Oil Fill and Transfer System (Sheet 3 of 3).

Change 1 1-37

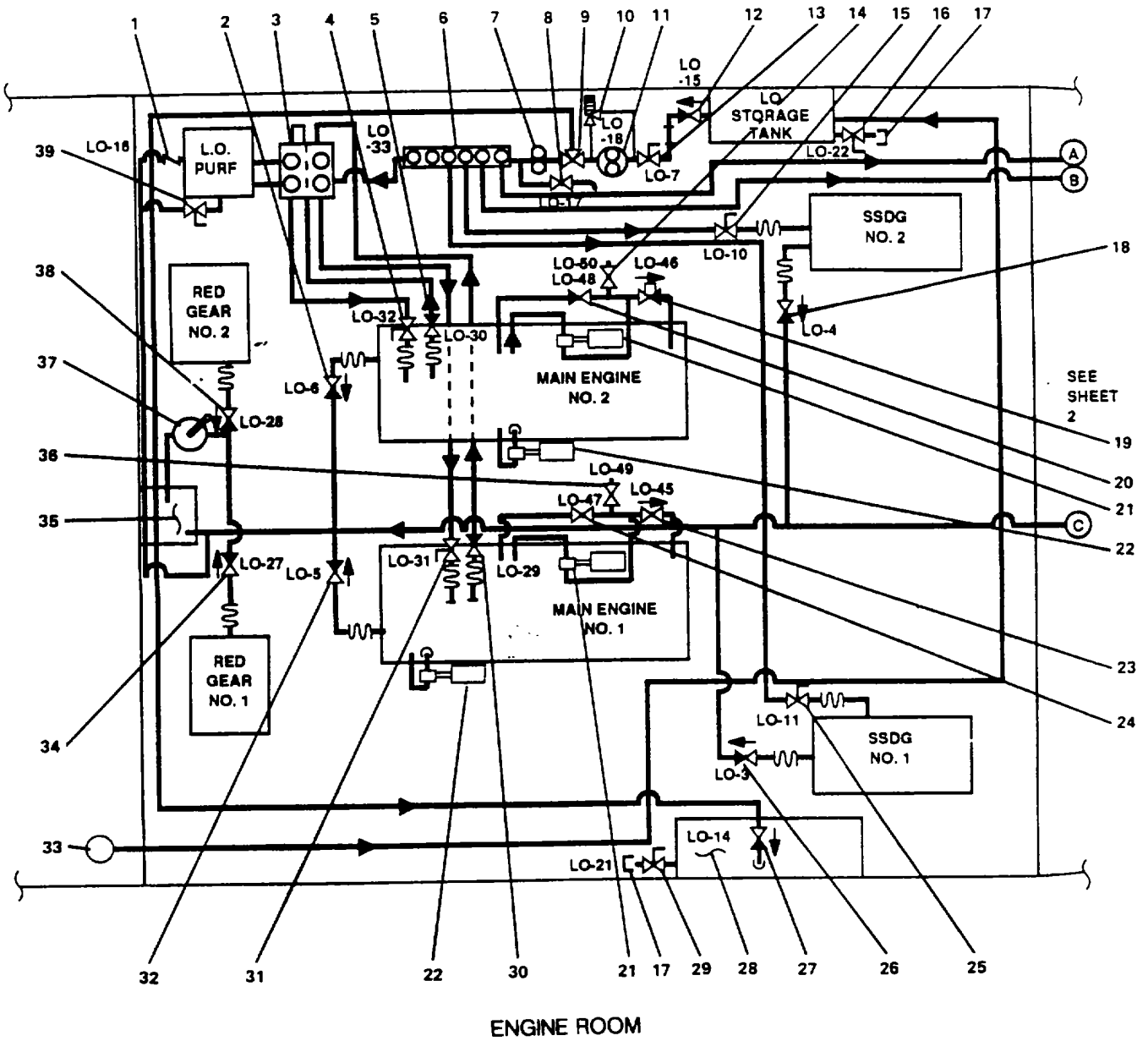


Figure 1-14. Lube Oil Transfer and Storage System (Sheet 1 of 3).

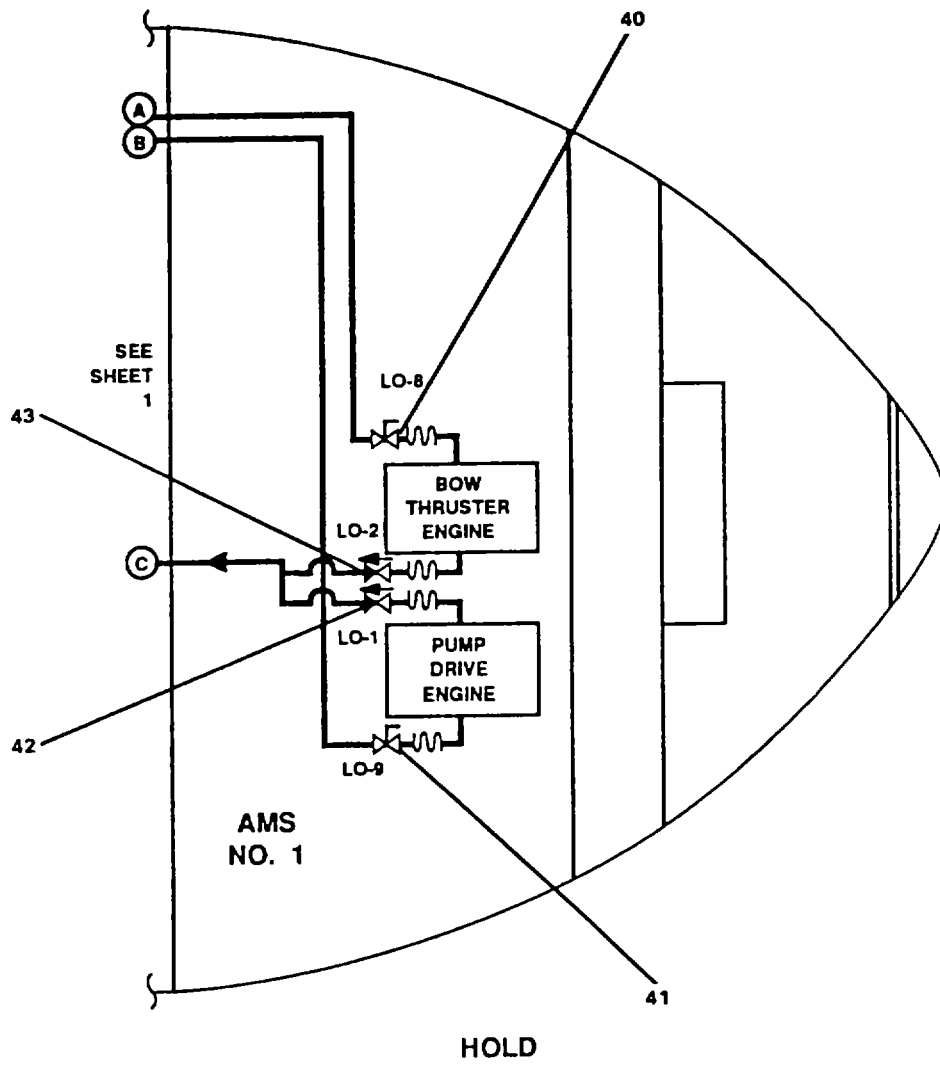


Figure 1-14. Lube Oil Transfer and Storage System (Sheet 2 of 3).

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. TANK
19. LO-46, RELIEF - SET AT 30 PSI
20. LO-48, C.O.V. PRELUBE PMP. DISCH
21. PRELUBE PUMP
22. SOAKBACK PUMP
23. LO-45, RELIEF - SET AT 30 PSI
24. LO-47, C.O.V. PRELUBE PMP. DISCH.
25. LO-11, LUBO TO S.S.D.G. NO. 1
26. LO-3, LUBO DR. TO OILY DR. TANK
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 OILY DR. TK.
43. LO-2, LUBO DR. TO OILY DR. TK.

Figure 1-14. Lube Oil Transfer and Storage System (Sheet 3 of 3).

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 engine 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 SSDG's, main engines lube oil transfer manifold, bow thruster engine, and pump drive engine.

d. Lube Oil Transfer Pump. A rotary vane type pump with rated output of 15 GPM at 25 psi. The lube oil transfer 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.

1-20. Compressed Air Piping System.

The compressed air piping system consists of three subsystems: starting air subsystem, service air subsystem, and control air subsystem. System control is maintained through a combination of valves as shown in Figure 1-15.

a. Starting Air Subsystem. The starting air subsystem consists of two compressors that deliver compressed air through moisture separators to two 400 gallon starting air receivers at 250 psi pressure. Air from the starting air 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 machinery space No. 1 power panel No. 4.

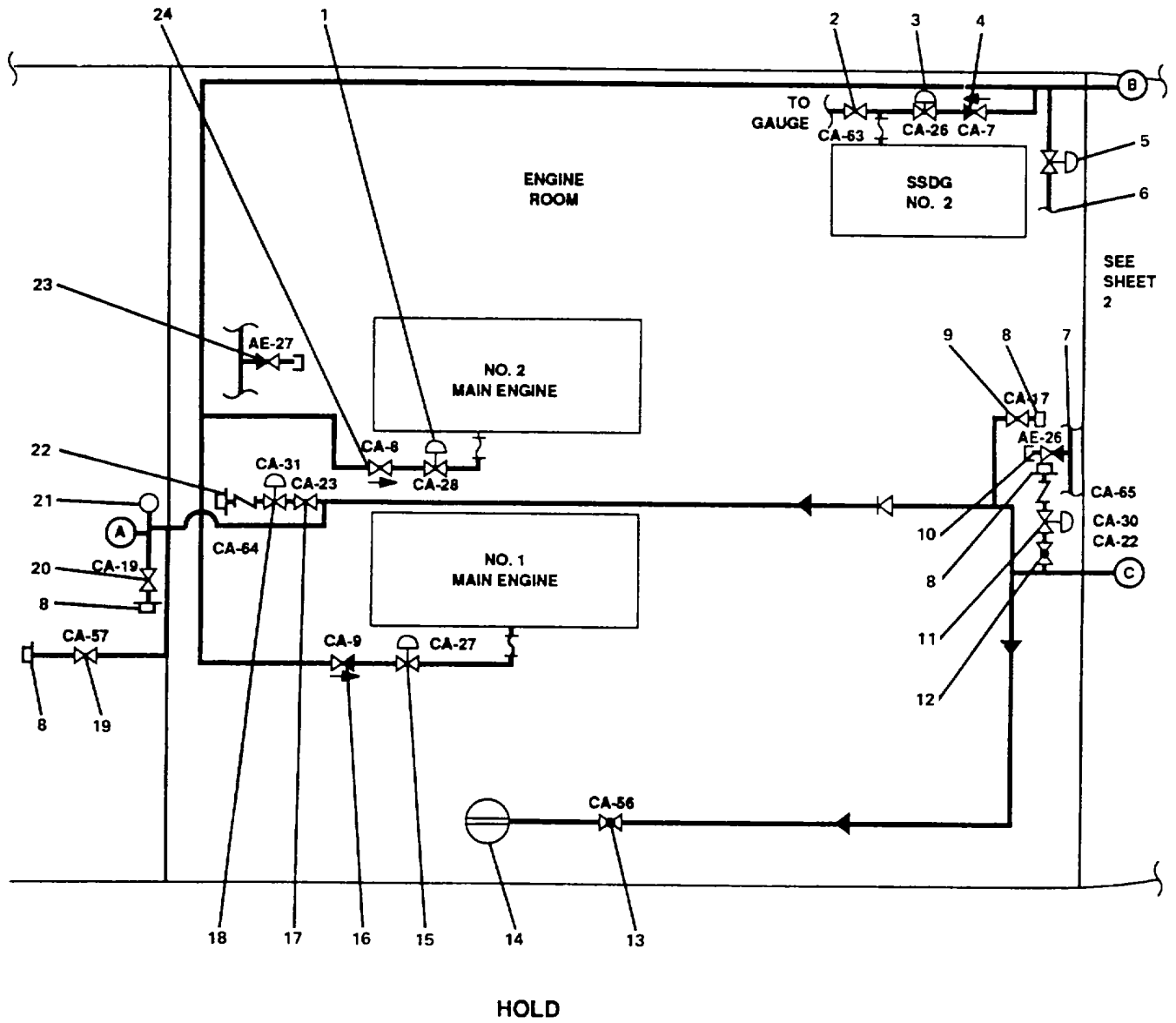


Figure 1-15. Compressed Air System (Sheet 1 of 8).

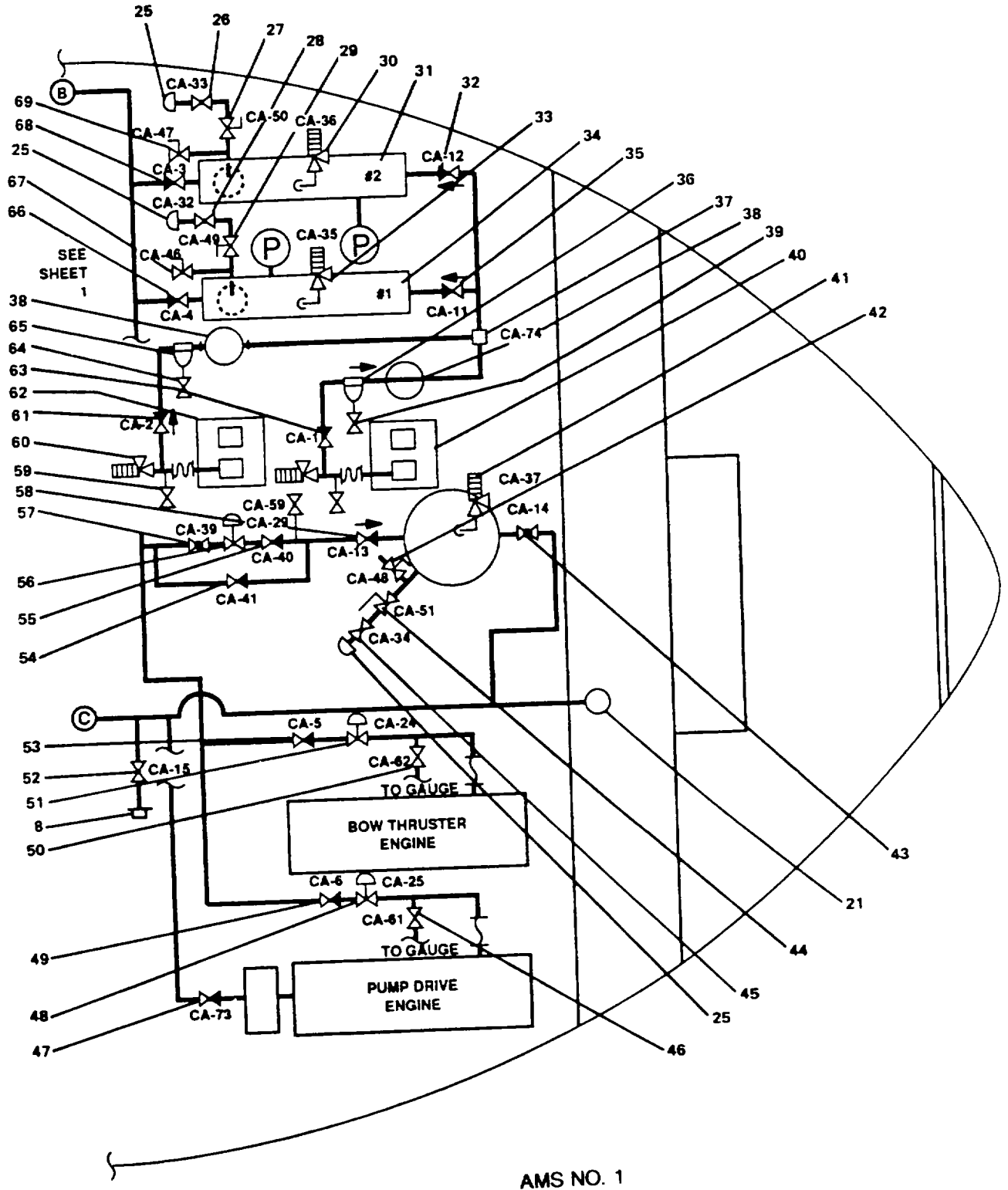


Figure 1-15. Compressed Air System (Sheet 2 of 8).

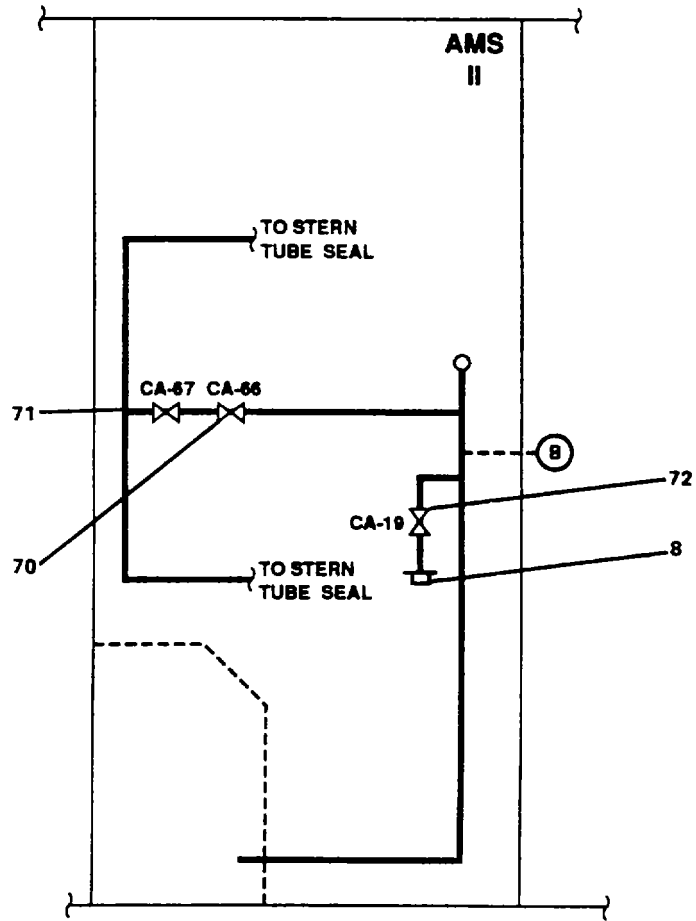


Figure 1-15. Compressed Air System (Sheet 3 of 8).

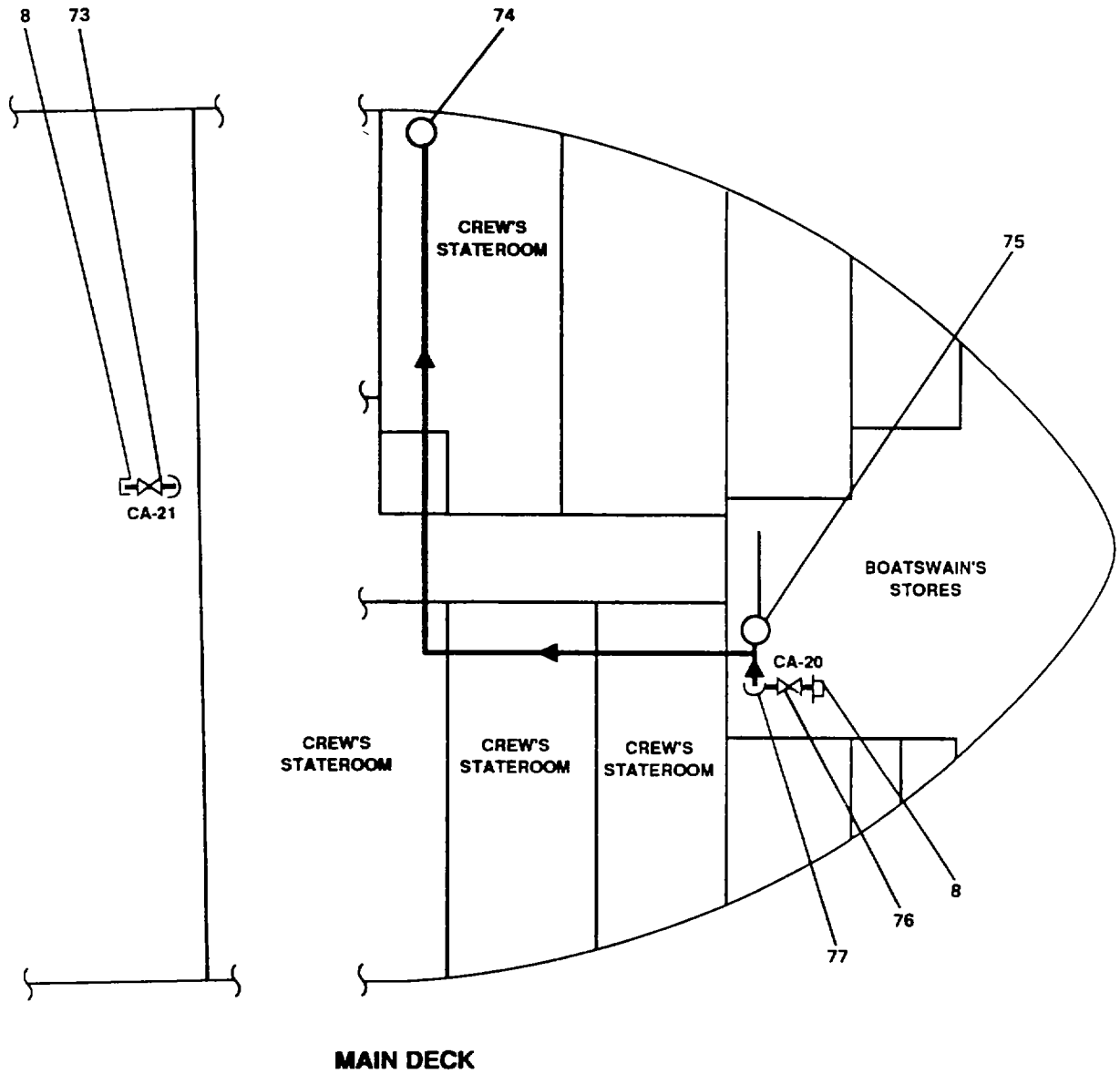


Figure 1-15. Compressed Air System (Sheet 4 of 8).

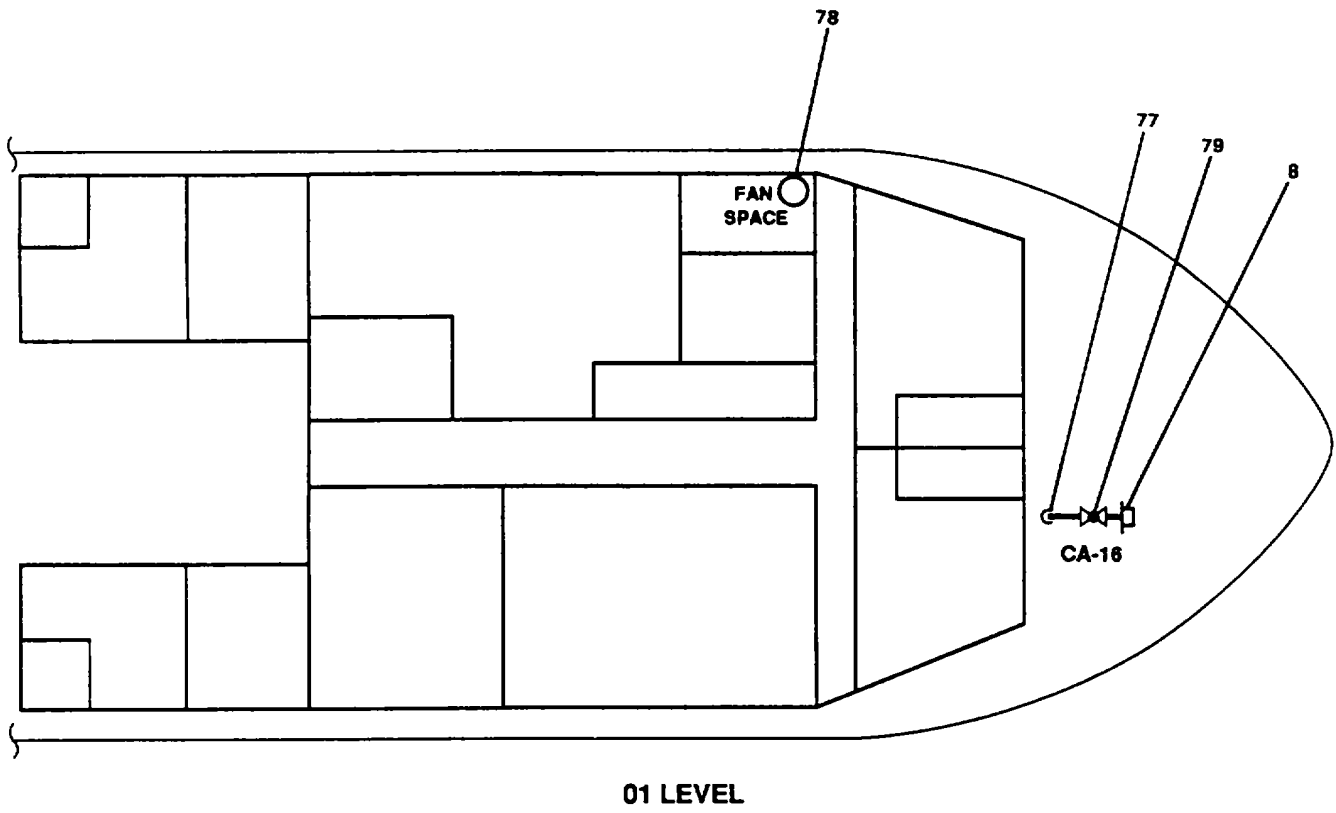


Figure 1-15. Compressed Air System (Sheet 5 of 8).

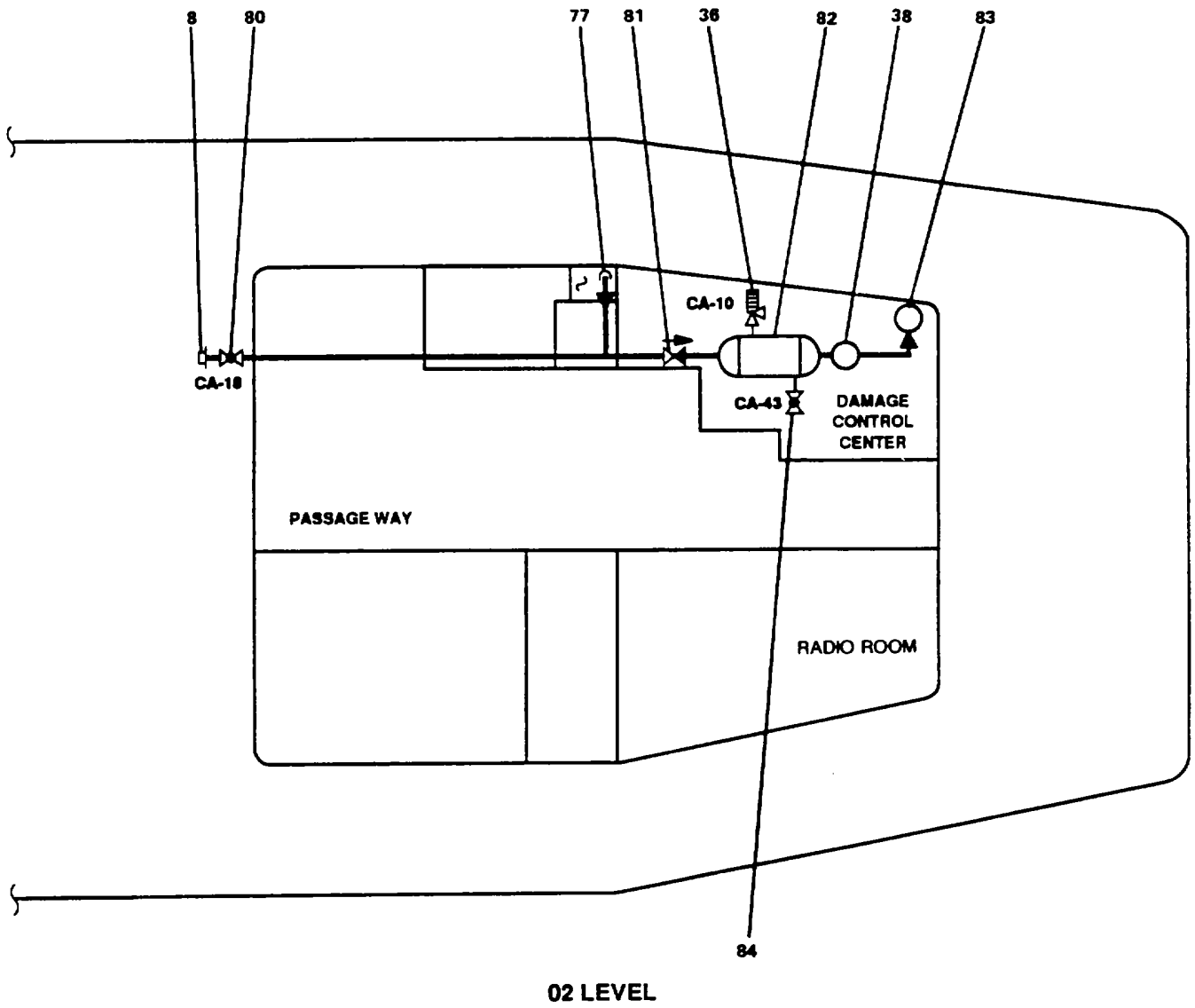


Figure 1-15. Compressed Air System (Sheet 6 of 8).

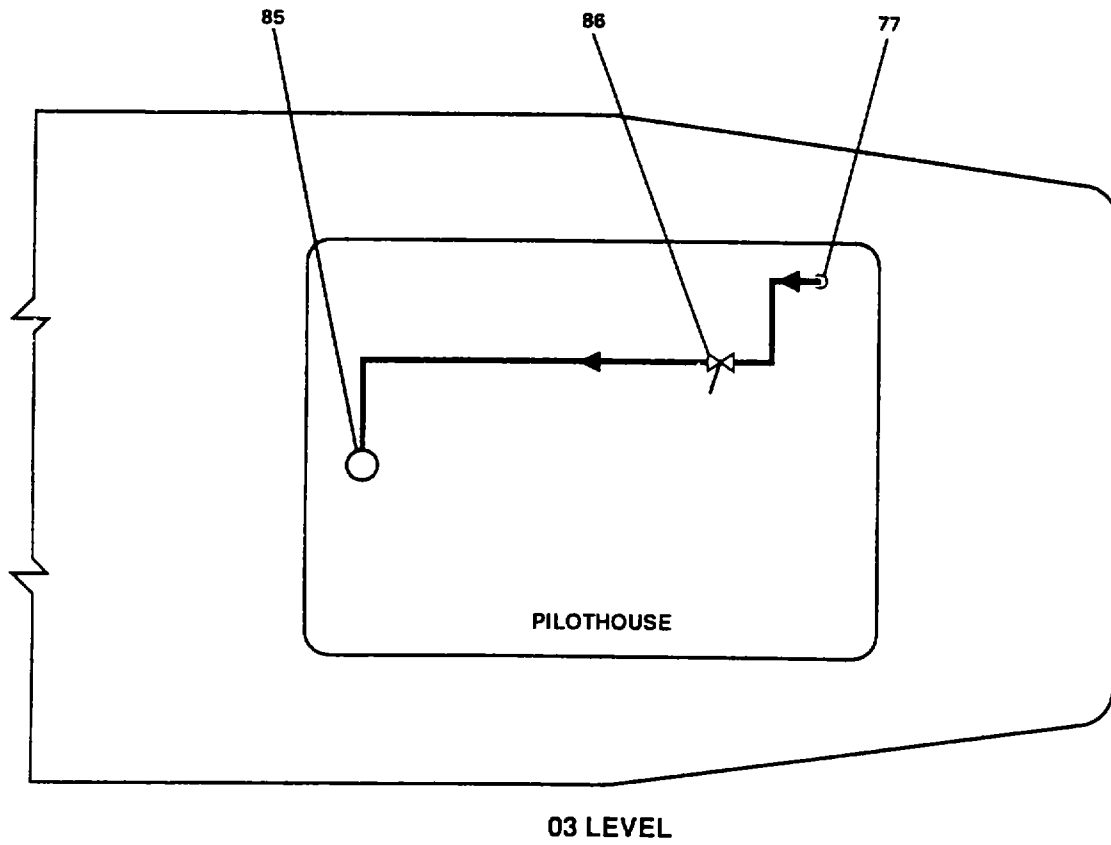


Figure 1-15. Compressed Air System (Sheet 7 of 8).

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. TO SEACHEST
8. AIR TOOL CONNECTION
9. CA-17, AIR TOOL CONN.
10. AE-26, SEACHEST BLWDN
11. CA-30, PRV-SET AT 25 PSI
12. CA-22, SEACHEST BLWT
13. CA-56, COV - OILY BILGE PMP SUCT
14. OILY BILGE PUMP
15. CA-27, PRV - SET AT 200 PSI
16. CA-9, STG AIR TO ME
17. CA-23, SEACHEST BLWT
18. CA-31, PRV - SET AT 25 PSI
19. CA-57, AIR TOOL CONN.
20. CA-19, AIR TOOL CONN.
21. UP TO MAIN DECK
22. SEACHEST BLOW-OUT CONNECTION
23. AE-27, SEACHEST BLWDN
24. CA-8, STG AIR TO ME
25. AUTOMATIC DRAIN
26. CA-33, AUTO DR - STG AIR TK
27. CA-SO, AUTO DR
28. CA-32, AUTO DR - STG AIR TK
29. CA-49, AUTO DR
30. CA-36, RLF - SET AT 275 PSI
31. STARTING AIR RECEIVER NO. 2
32. CA-12, STG AIR TK INL
33. CA-35, RLF - SET AT 275 PSI
34. STARTING AIR RECEIVER NO. 1
35. CA-11, STG AIR TK INL
36. CA-45, RELIEF VALVE
37. DRAIN
38. MOISTURE SEPARATOR
39. DRAIN
40. AIR COMPRESSOR #1
41. CA-37, RLF-SET AT 137.5 PSI
42. CA-48, SVCE AIR TK DR
43. CA-14, SVCE AIR TK OUT
44. CA-51, AUTO DR
45. CA-34, AUTO DR - SVCE AIR TK
46. CA-61
47. CA-73
48. CA-25, PRV-SET AT 125 PSI
49. CA-6, STG AIR TO PMP DR ENG.
50. CA-62
51. CA-24, PRV- SET AT 125 PSI
52. CA-15, AIR TOOL CONN.
53. CA-S, STG AIR TO BOW THRUSTER ENG.
54. CA-41, BYP RDC STA
55. CA-40, SVCE AIR TK INL
56. CA-29, PRV- SET AT 125 PSI
57. CA-39, SVCE AIR TK INL
58. CA-13, SVCE AIR TK INL
59. DRAIN
60. CA-44, RELIEF VALVE
61. CA-2, COV- COMPR DISCH
62. AIR COMPRESSOR #2
63. CA-1, COV - COMPR DISCH.
64. DRAIN
65. REFIEF VALVE
66. CA4, STG AIR TK OUT
67. CA-46, STG AIR TK DR
68. CA-3, STG AIR TK OUT
69. CA-47, STG AIR TK DR
70. CA-66, SVCE AIR TO STERN TUBE
71. CA-67, SVCE AIR TO STERN TUBE
72. CA-19, AIR TOOL CONN.
73. CA-21, WEA TOOL CONN.
74. UP TO 01 LEVEL
75. UP TO 01 LEVEL
76. CA-20, AIR TOOL CONN.
77. FROM BELOW
78. UP TO 02 LEVEL
79. CA-16, AIR TOOL CONN.
80. CA-18, AIR TOOL CONN.
81. CA-1 0, WSTL AIR RCVR
82. WHISTLE AIR RECEIVER
83. UP TO 03 LEVEL
84. CA-43, WSTL AIR RCVR DR
85. UP TO WHISTLE
86. CA-42, SVCE AIR TO WSTL

Figure 1-15. Compressed Air System (Sheet 8 of 8).

b. Ship Service Air Subsystem. Compressed air for the service air subsystem is supplied from the starting air 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 starting air 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 the starting air subsystem through an automatic air dryer.

1-21. 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 1-16. The system consists of two reverse osmosis watermakers, a proportioning bromine feeder, two potable water pumps, a hydropneumatic tank with pressure switch, 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 water 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 fresh water cooling piping systems.

a. Potable Water Pumps No. 1 and No. 2. Two horizontal centrifugal potable water pumps draw water from the port or starboard potable water tanks and route the water under pressure to the hydropneumatic tank, which maintains water pressure throughout the system. Each pump is rated for 15 gpm at 60 psi. Each pump is driven by a 3 hp electric motor 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 and the other (standby) is on reserve.

b. Pressure Switches. The potable water pump pressure switch automatically turns on the pump in use when pressure drops to 40 psi in the hydropneumatic tank. Each pump pressure switch deenergizes the pump in use when pressure reaches 60 psi.

c. Proportioning Bromine Feeder. The proportioning bromine feeder is used to treat distilled water by adding a predetermined quantity of bromine for the purpose of disinfecting (to ensure the water supplied to the potable water tanks is bacteriologically safe for human consumption) as the water is being transferred from the reverse osmosis water makers 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 noncontaminated the low feed rate is used. If the seawater is considered contaminated the high feed rate is used. The feed rate is manually selected. The bromine feeder also injects bromine as water recirculates to and from the potable water tanks.

d. Hydropneumatic Tank. The hydropneumatic tank maintains water supply pressure for the system. Pressurized water is supplied from the tank to various points throughout the ship and to the potable water heaters. Initial charging of the hydropneumatic tank is accomplished by connecting a hose to the compressed air system. Once charged, the pressure switch (para. b above) controls pump operation to maintain pressure.

e. Potable Water Heaters. Two potable water heaters maintain the potable water setpoint temperature. Power for the hot water heater is supplied and controlled from the main switchboard.

f. Hot Potable Water Recirculating Pump. A horizontal centrifugal recirculating pump is provided. This 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.

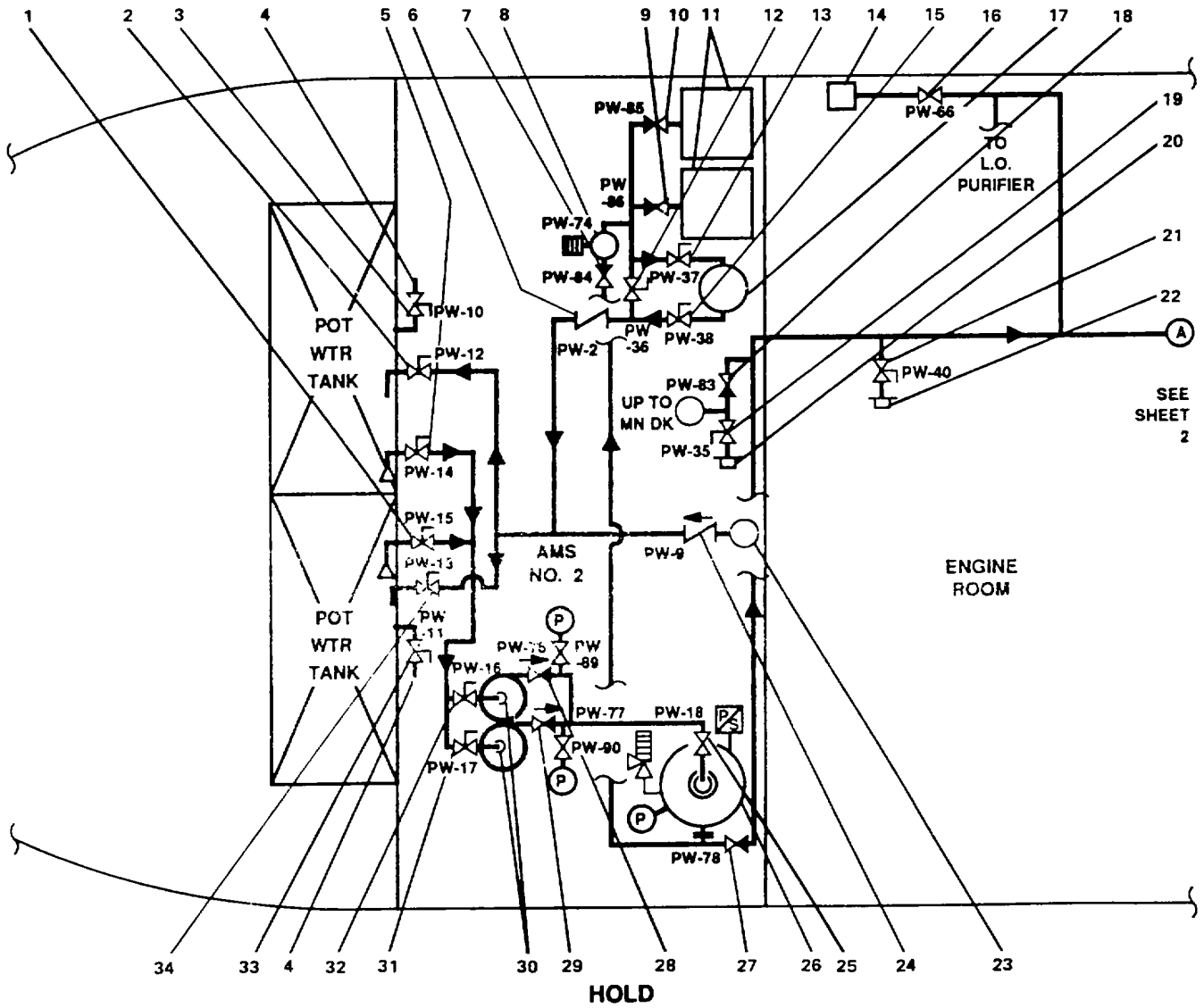


Figure 1-16. Potable Water System (Sheet 1 of 9).

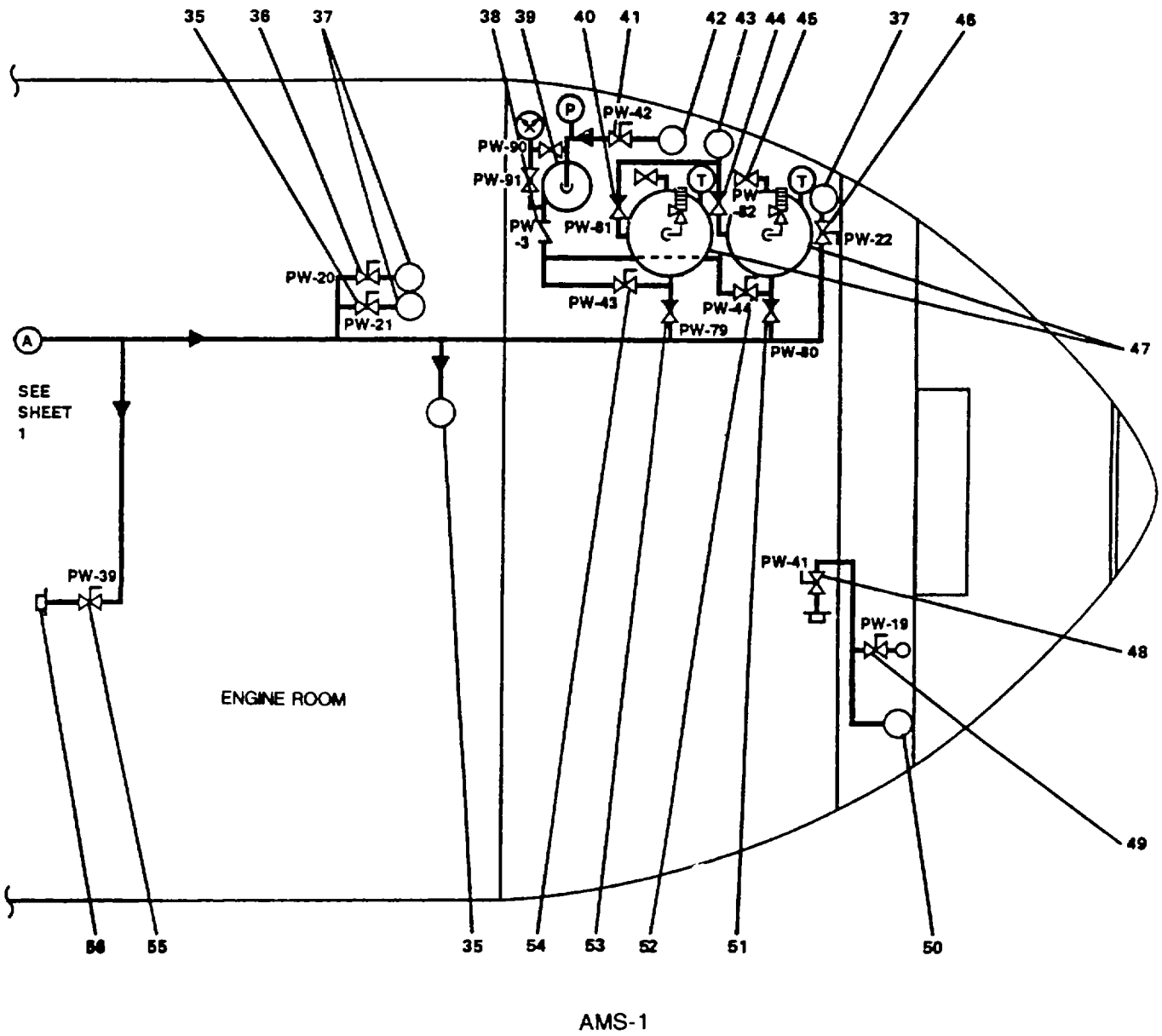


Figure 1-16. Potable Water System (Sheet 2 of 9).

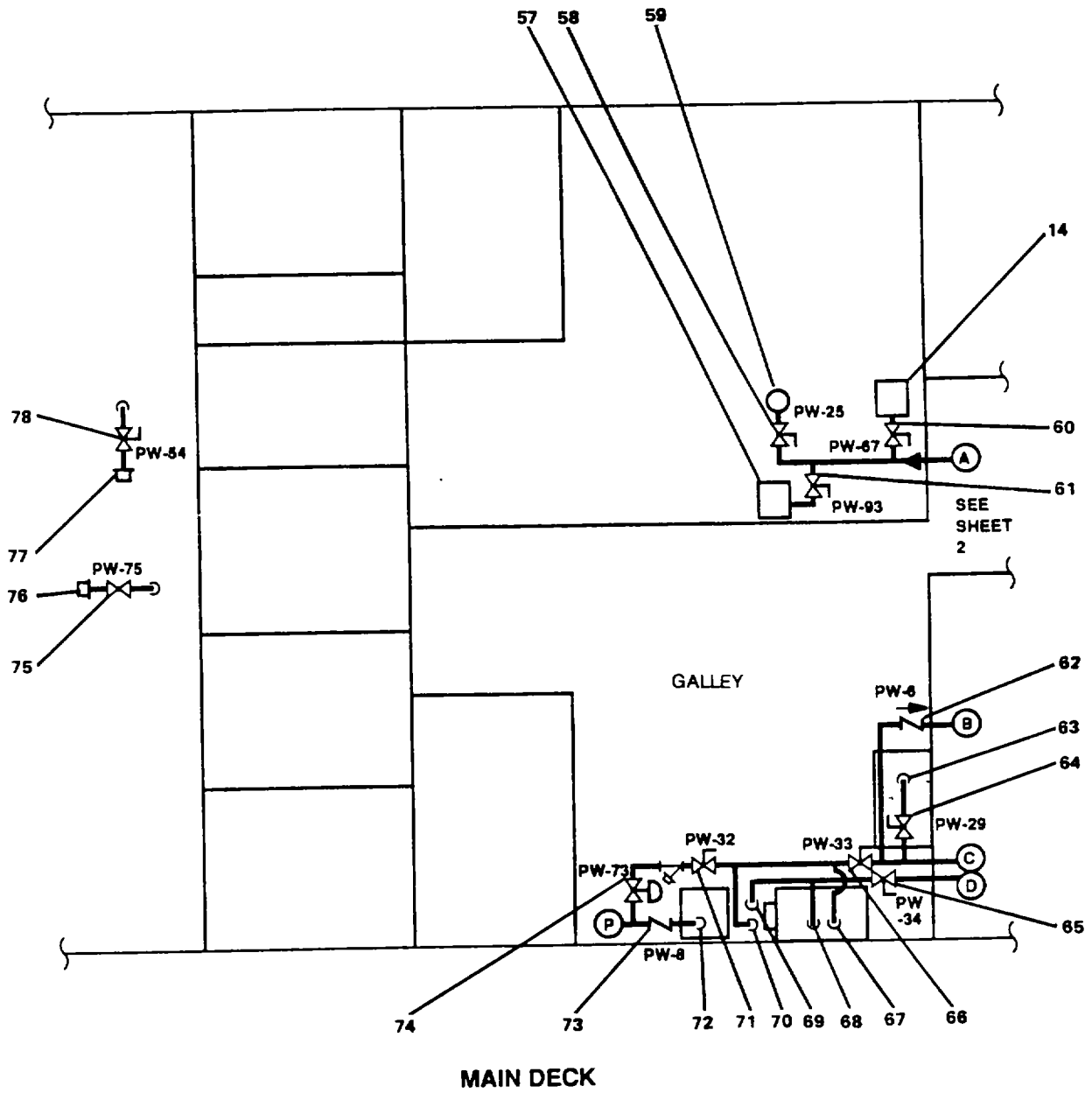


Figure 1-16. Potable Water System (Sheet 3 of 9).

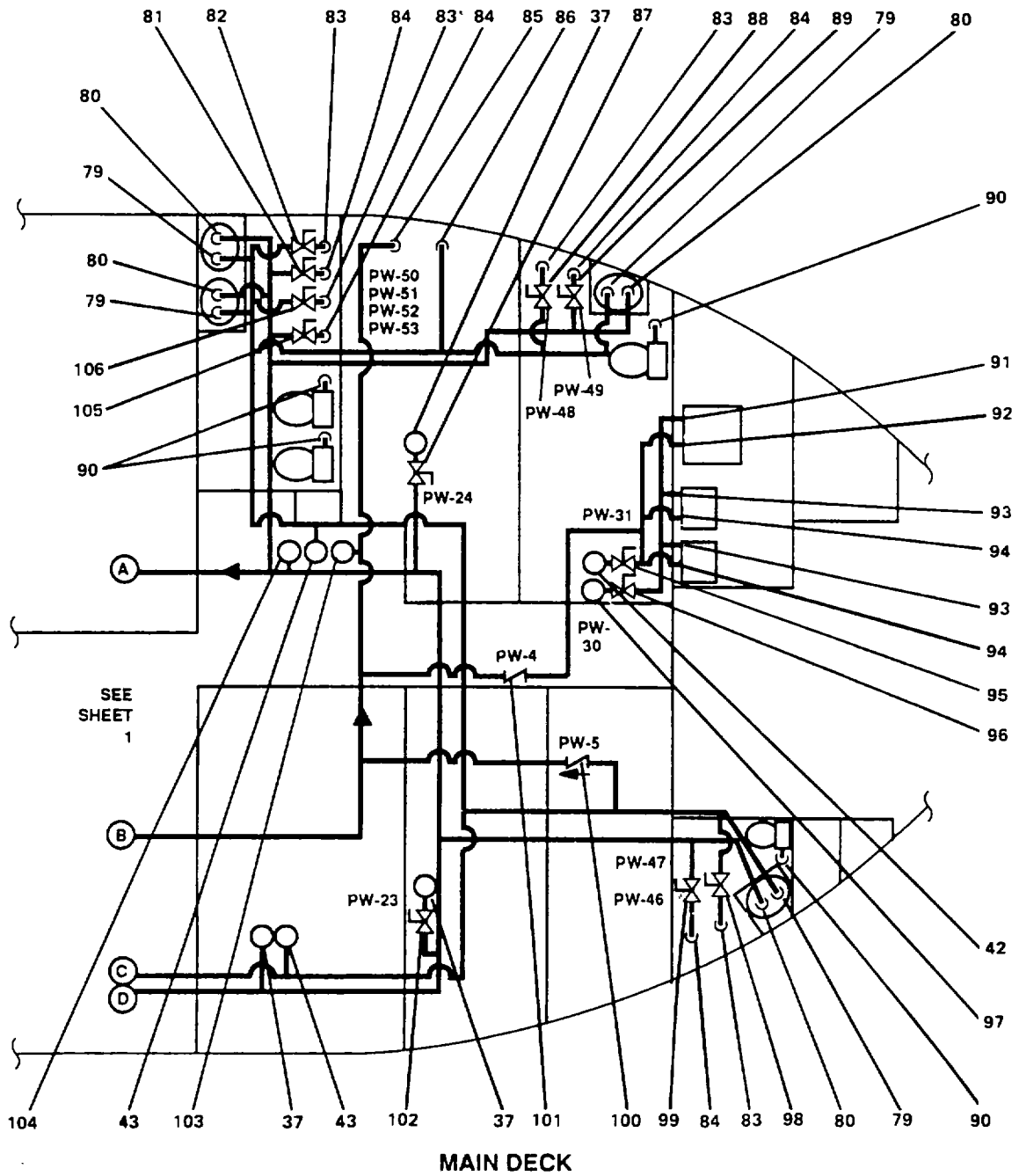


Figure 1-16. Potable Water System (Sheet 4 of 9).

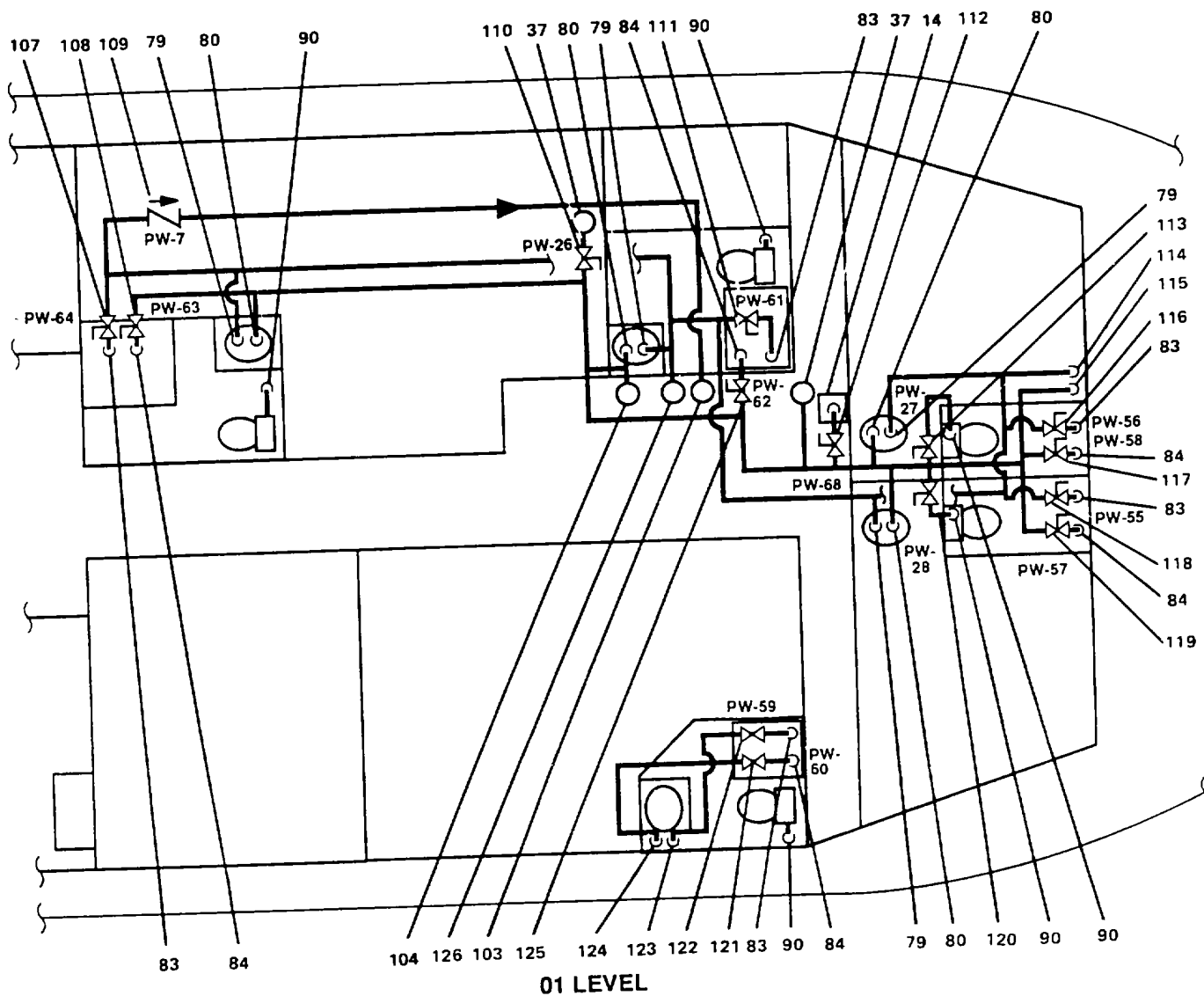


Figure 1-16. Potable Water System (Sheet 5 of 9).

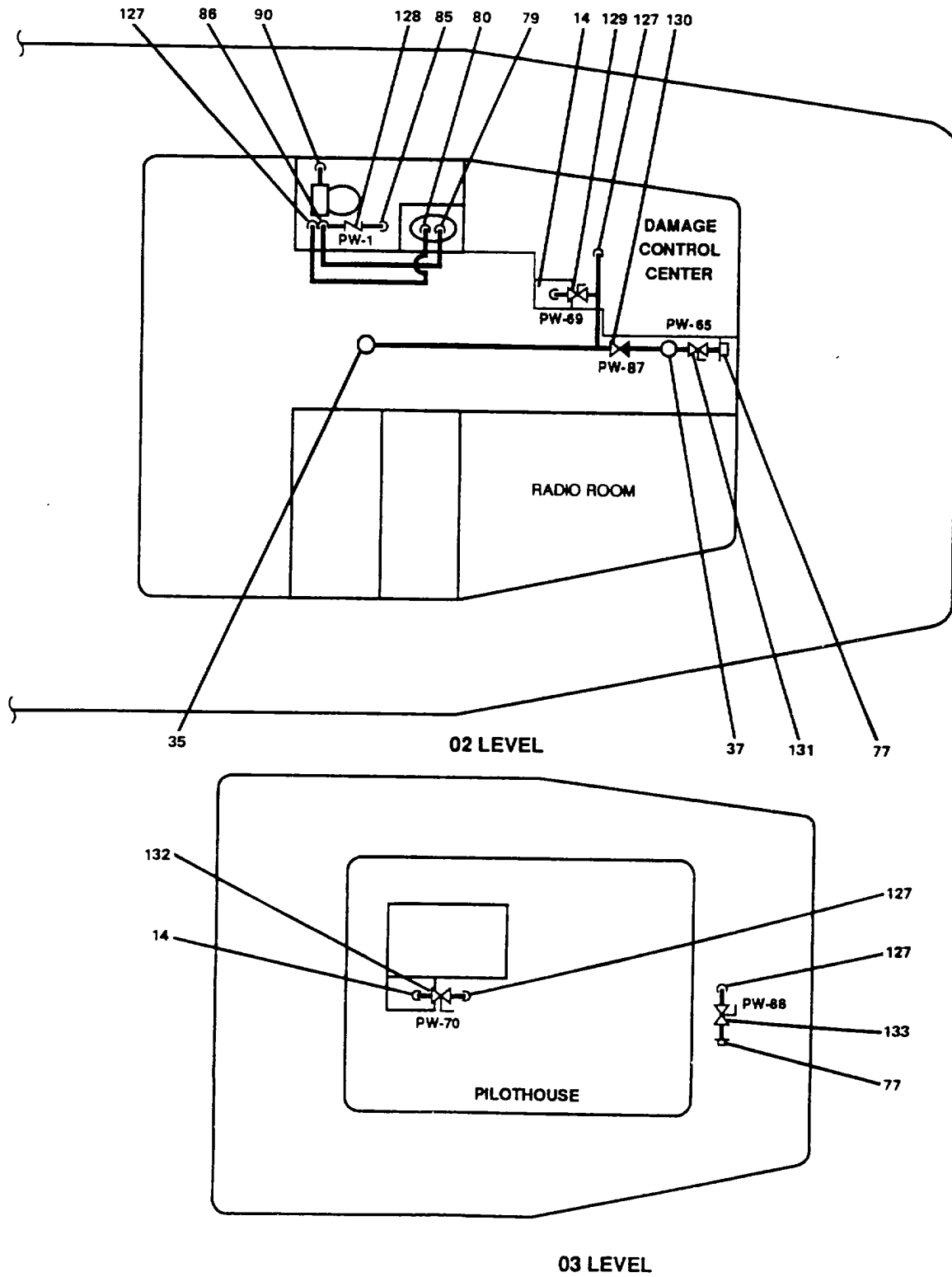


Figure 1--16. Potable Water System (Sheet 6 of 9).

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-83, POT. WTR. TO MN. DK. WSH. DN.
19. PW-35, M.E. KEEL CLR WTR FILL CONN.
20. MAIN ENGINE COOLING WATER FILL CONNECTION
21. PW-40, ENG. FILL CONN. PORT
22. HOSE CONNECTION FOR PORT ENGINE & SSDG FILL
23. DECK FILL FROM MAIN DECK
24. PW-9
25. PW-18, HYDRO. PNEU TK INLET
26. HYDRO PNEUMATIC TANK
27. PW-78, C.O.V. - HYDR. PNEU TK. OUTLET
28. PW-76, C.O.V. - POT. WTR. PMP. NO. 1 DISCH.
29. PW-77, C.O.V. - POT. WTR. PMP. NO. 2
30. POTABLE WATER PUMPS
31. PW-17, C.O.V. - POT. WTR. PMP. NO. 2 SUCT
32. PW-16, C.O.V. -POT. WTR. PMP. NO. 1 SUCT
33. PW-11, POT. WTR. TK. STBD. DR
34. PW-13, POT. WTR. TK. STBD. FILL
35. PW-21, C.W. TO W.C.
36. PW-20, C.W. TO W.C.
37. COLD UP
38. PW-3
39. HOT WATER RECIRCULATING PUMP
40. PW-81, H.W. HTR. OUT
41. PW-42, H.W. RECIR. PMP. SUCT.
42. HOT DOWN FROM ABOVE
43. HOT WATER UP
44. PW-82, H.W. HTR. OUT
45. DRAIN CONNECTION
46. PW-22, C.W. TO W.C.
47. HOT WATER HEATERS
48. PW41, BOW THRUSTER PUMP DRIVE FILL CONN.
49. PW-19, C.W. TO W.C.
50. COLD FROM ABOVE

Figure 1-16. Potable Water System (Sheet 7 of 9).

51. PW-80, POT. WTR. TO H.W. HTR.
52. PW-44, RECIRC TO H.W. HEATER
53. PW-79, POT. WTR. TO H.W. HTR.
54. PW-43, RECIRC TO H.W. HEATER
55. PW-39, ENG. FILL CONN. STBD
56. MAIN ENGINE NO 1 AND SSDG NO.1 HOSE FILL CONNECTION
57. ICEMAKER
58. PW-25, C.W. TO W.C.
59. UP TO 01 LEVEL
60. PW-67
61. PW-93, C.W. TO W.C.
62. PW-6
63. TO VENTILATOR HOOD
64. PW-29
65. PW-33
66. PW-34
67. HOT TO SINK
68. COLD TO SINK
69. COLD TO PRE-RINSE SPRAY
70. HOT TO PRE-RINSE SPRAY
71. PW-32
72. HOT TO DISHWASHER
73. PW-8
74. PW-73, PRESS. RDC. VLV. SET AT 20 P.S.I.
75. PW-75, POT. WTR. DK. FILL
76. DECK FILL CONNECTION
77. HOSE CONNECTION
78. PW-54, DK. WASH DN.
79. HOT TO LAVATORY
80. COLD TO LAVATORY
81. PW-51
82. PW-50
83. HOT TO SHOWER
84. COLD TO SHOWER
85. RECIRCULATION DOWN
86. HOT FROM BELOW
87. PW-24, C.W. TO W.C.
88. PW-48
89. PW-49
90. FROM BELOW TO WATER CLOSET
91. COLD TO WASHER
92. HOT TO WASHER
93. COLD TO LAUNDRY TUB
94. HOT TO LAUNDRY TUB
95. PW-31
96. PW-30
97. COLD FROM ABOVE
98. PW-47
99. PW-46
100. PW-5

Figure 1-16. Potable Water System (Sheet 8 of 9).

- 101. PW4
- 102. PW-23, C.W. TO W.C .
- 103. RECIRCULATION FROM ABOVE
- 104. COLD WATER FROM BELOW AND UP
- 105. PW-53
- 106. PW-52
- 107. PW-64
- 108. PW-63
- 109. PW-7
- 110. PW-26, C.W. TO W.C.
- 111. PW-61
- 112. PW-68
- 113. PW-27
- 114. HOTDOWN
- 115. COLD DOWN
- 116. PW-56
- 117. PW-58
- 118. PW-55
- 119. PW-57
- 120. PW-28
- 121. PW-60
- 122. PW-59
- 123. HOT FROM BELOW TO SANITARY SPACE
- 124. COLD FROM BELOW TO SANITARY SPACE
- 125. PW-62
- 126. HOT FROM BELOW AND UP
- 127. COLD FROM BELOW
- 128. PW-1
- 129. PW-69
- 130. PW-87, C.W. TO HOSE CONN.
- 131. PW-65, C.O.V. - HOSE CONN.
- 132. PW-70
- 133. PW-88, DK. WSH. DN.

Figure 1-16. Potable Water System (Sheet 9 of 9).

1-22. 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 1-17.

a. Sewage Discharge Pumps. Two horizontal centrifugal non-clog pumps are provided and rated for 30 gpm at 40 psi. 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 (Figure 1-18) utilizes two tanks, a media tank and a contact tank. Raw sewage enters the media tank through the sewage inlet where natural bacteria (the media) treatment takes place. The water level in the media tank is constant. As sewage enters, an equal volume of clear effluent is discharged through the spillover, passes through the trap and the tablet chlorinator into the wet well. The wet well 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 starts the MSD discharge pump which pumps the treated water overboard. When the float switch reaches the pump-off preset level, the MSD discharge pump is stopped. Incorporated in the media tank is an air lift and air scour. The air lift circulates and aerates the contents to improve treatment. The air scour is a built-in cleaning system to prevent deposits from collecting on the bottom of the tank. Both the air lift and air scour use air from the blower. Power for the MSD is supplied from the main switchboard through auxiliary machinery space No 1 power panel No. 4.

1-23. Interior Communications Systems. The LT has five 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
 - freezer alarm
 - radio room door, fan room door and arms stowage room alarm

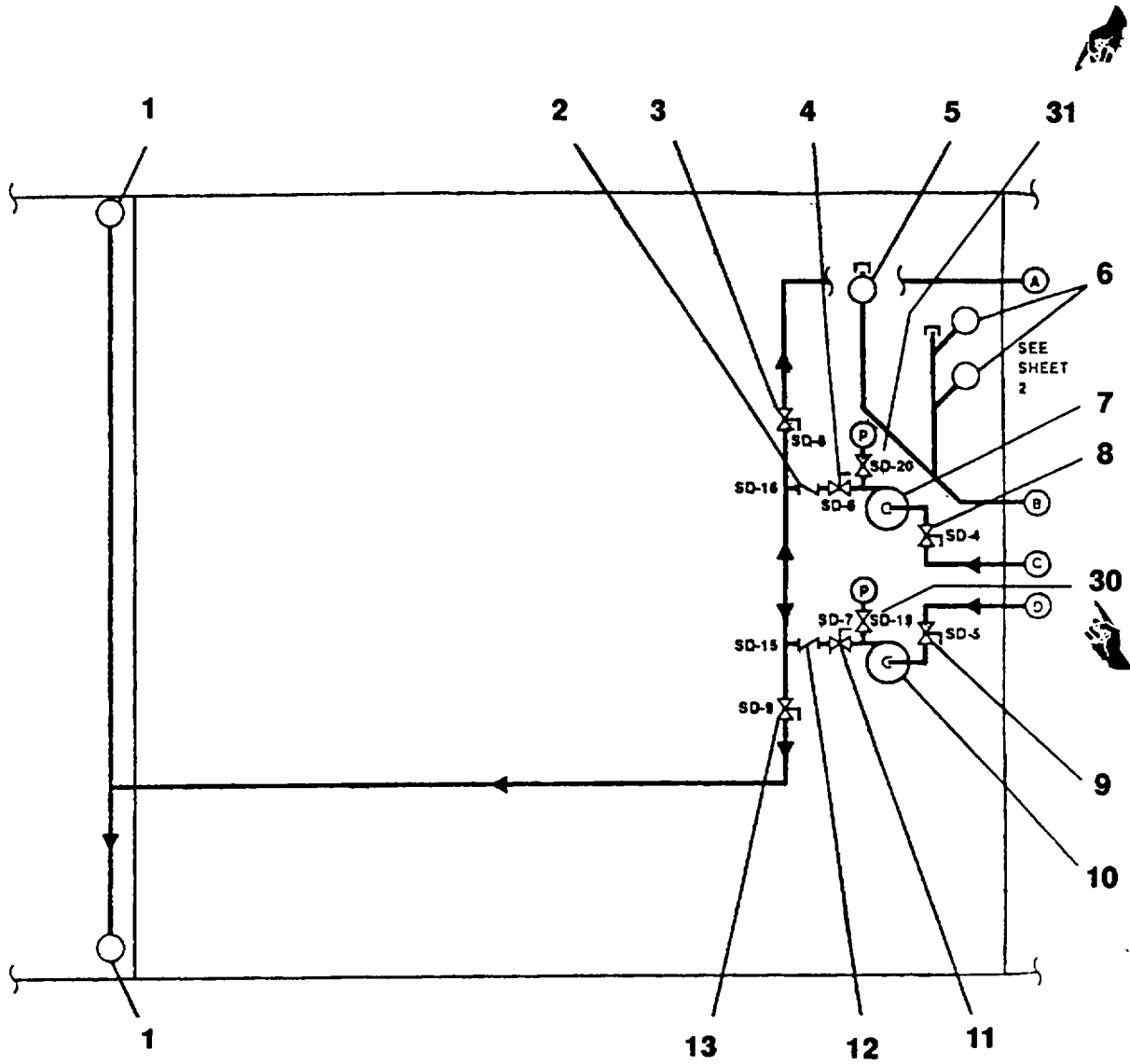
a. Sound Powered Telephone System. The sound powered telephone system provides voice communications throughout the ship by means of fixed phone stations and portable units. Since the system is powered by voice only, it is functional even with the loss of all ship power. There are two circuits within 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 at Figure 1-19.

b. Interconnection (Intercom) System. The Intercom system is a 20 station system powered by 100 Vac 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.

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 are used to 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 at Figure 1-20.

d. Engine Order Telegraph. The engine order telegraph (EOT) system is a 24 Vdc system used to transmit commands 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 at Figure 1-21.

e. Radio Room Door. Fan Room Door. Freezer Alarm System and Arms Stowage Alarm Systems These alarms alert the pilothouse to entry to the radio room or fan room, high temperature in the arms control room, or activation of the arms control room sprinkler system. Two independent systems (Figure 1-22) are discussed below.



ENGINE ROOM

Figure 1-17. Sewage Drain System (Sheet 1 of 6).

Change 1 1-61

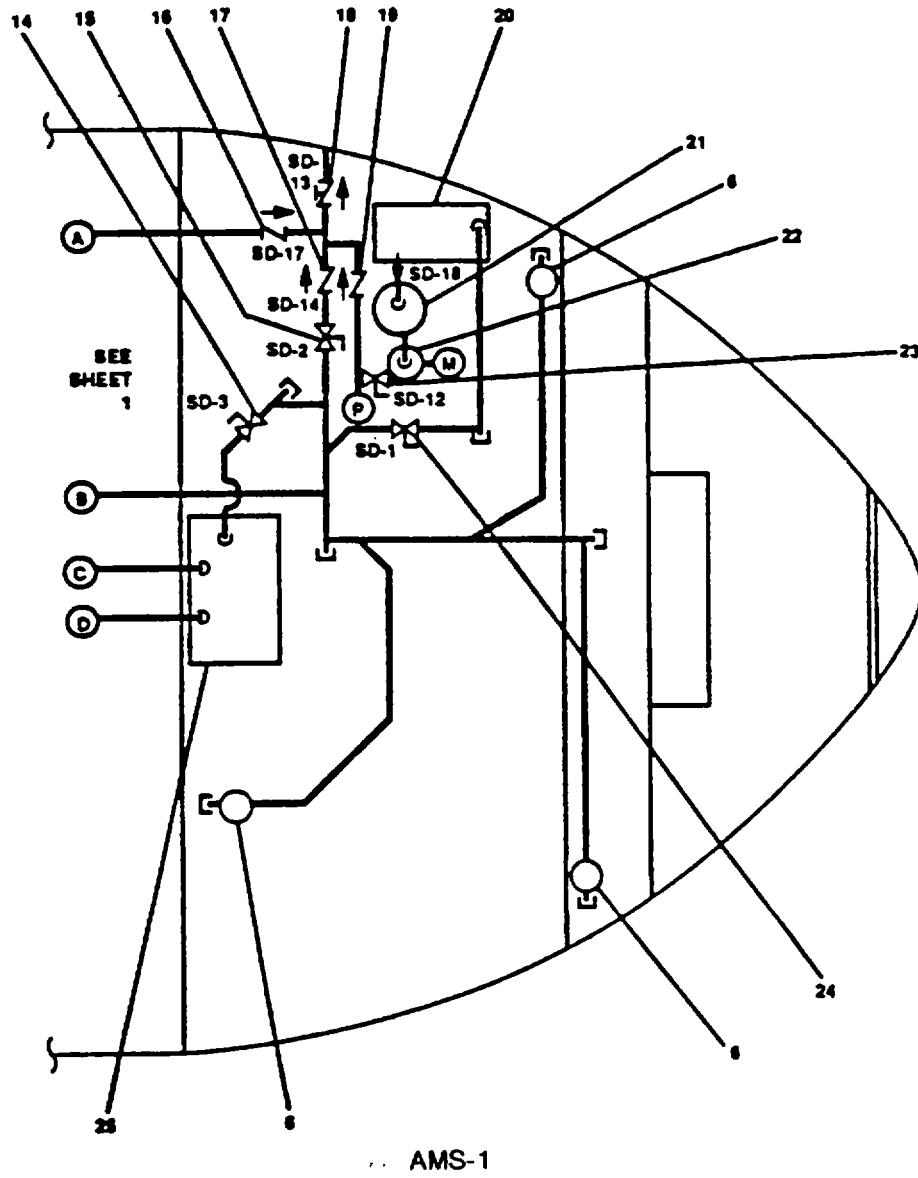


Figure 1-17. Sewage Drain System (Sheet 2 of 6).

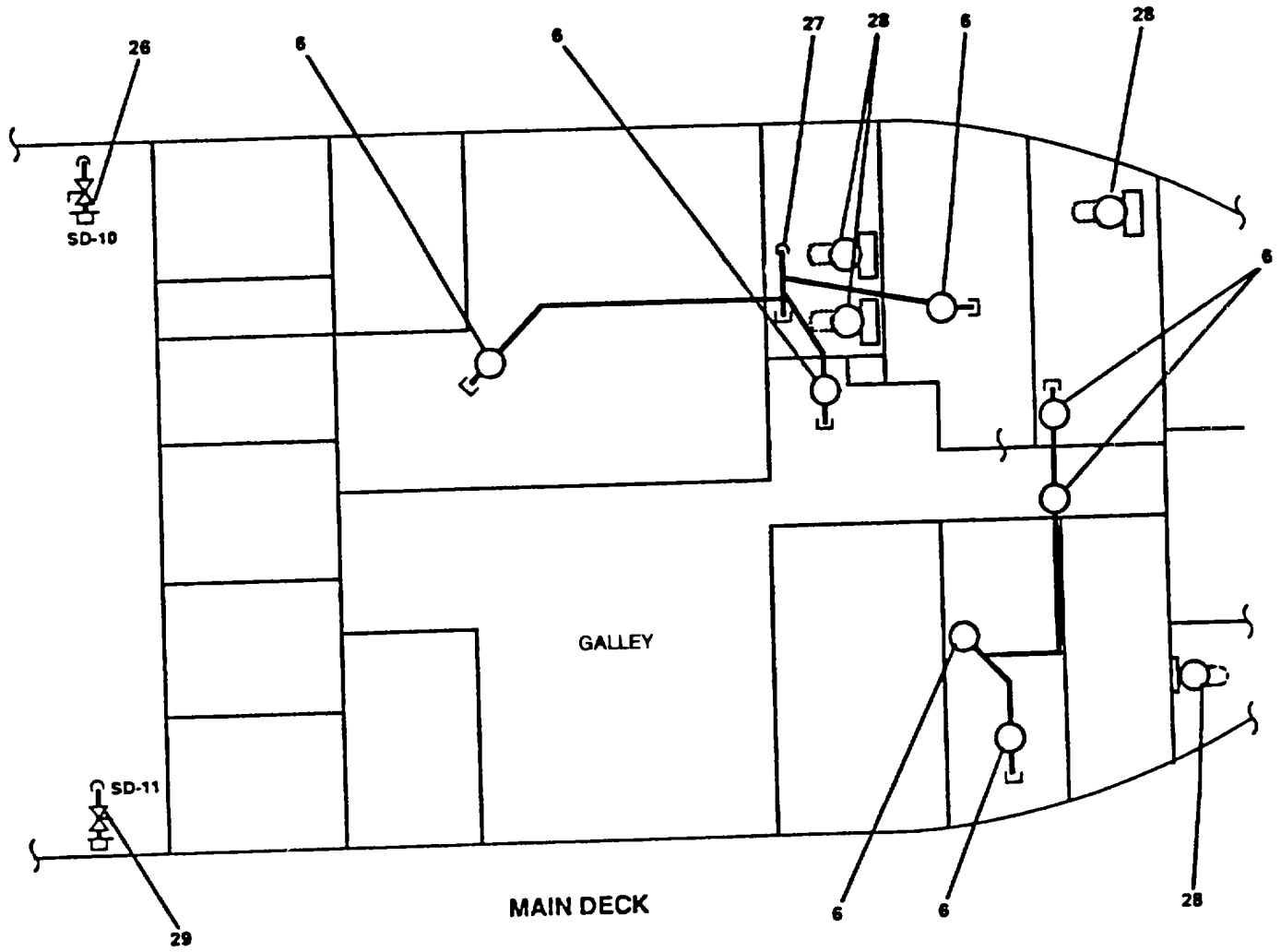


Figure 1-17. Sewage Drain System (Sheet 3 of 6).

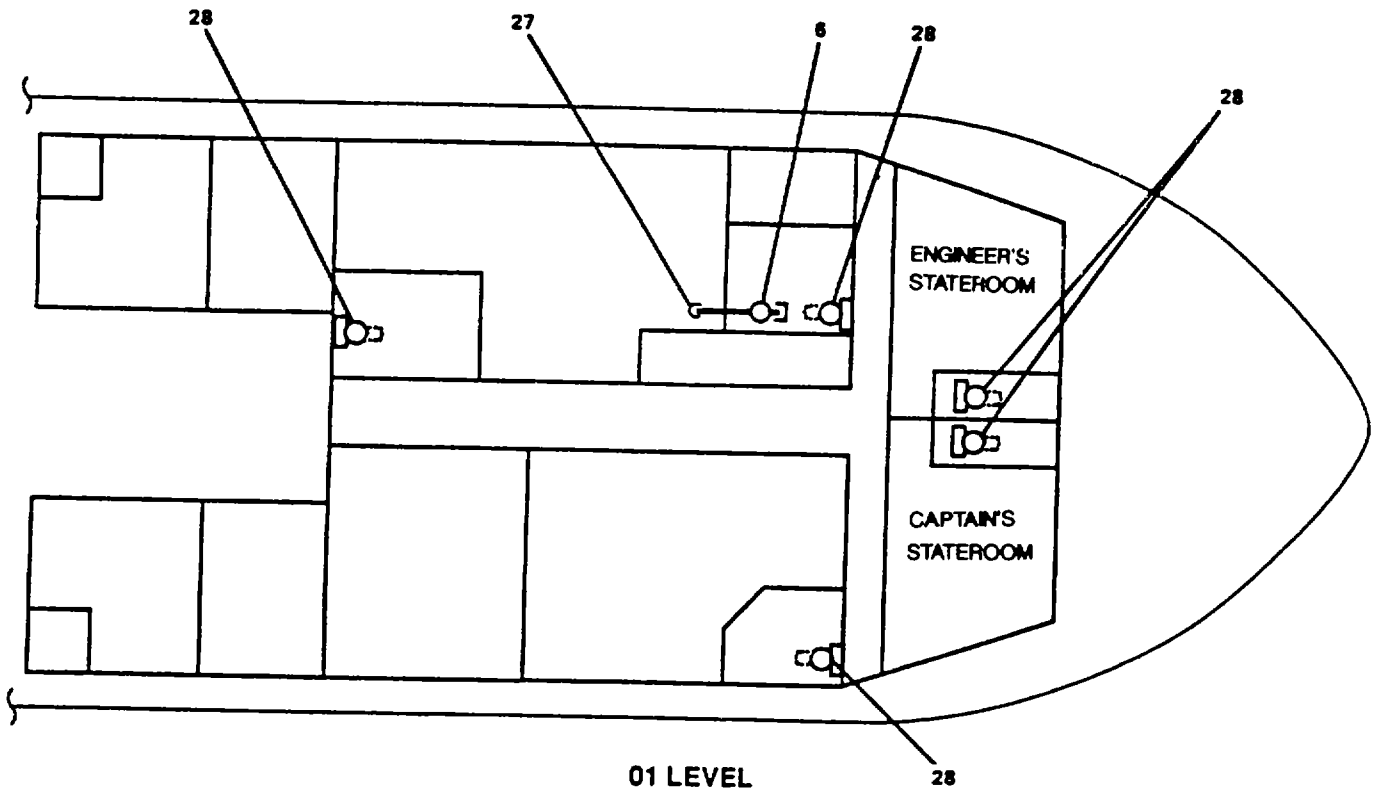


Figure 1-17. Sewage Drain System (Sheet 4 of 6).

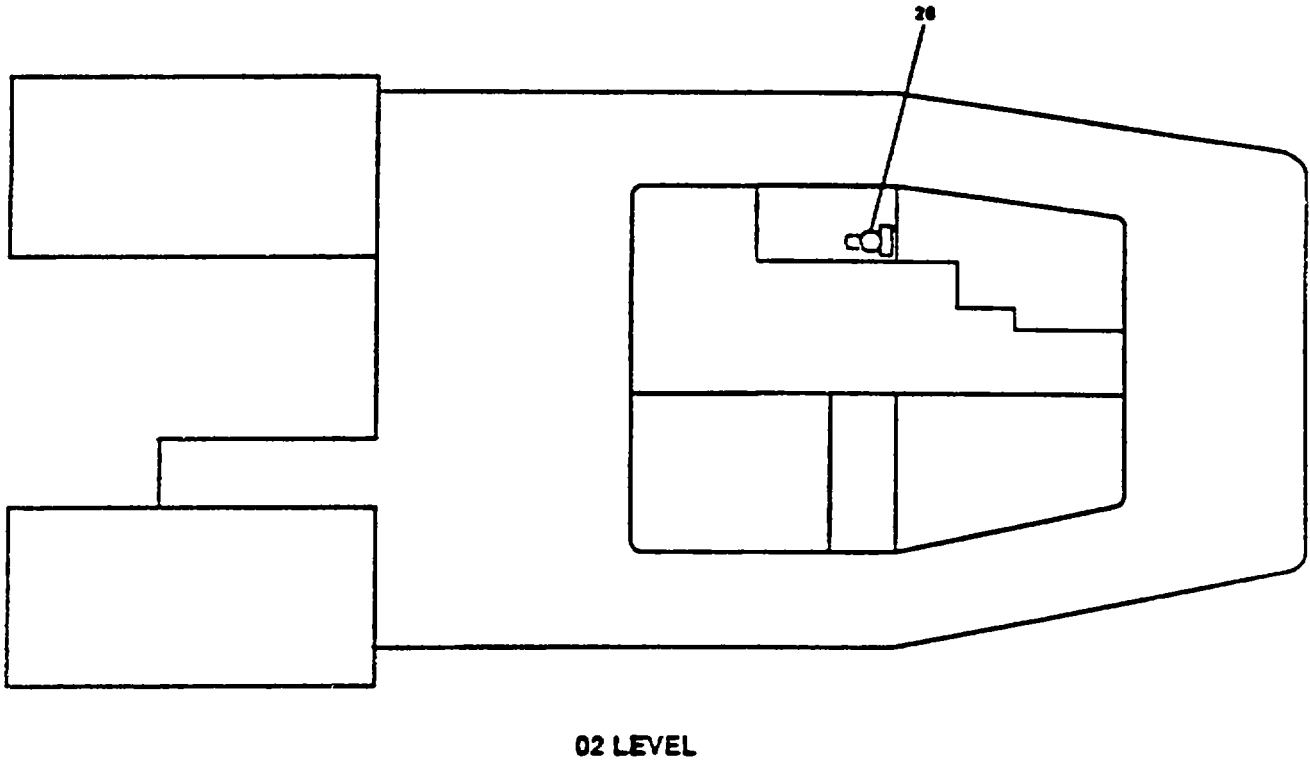
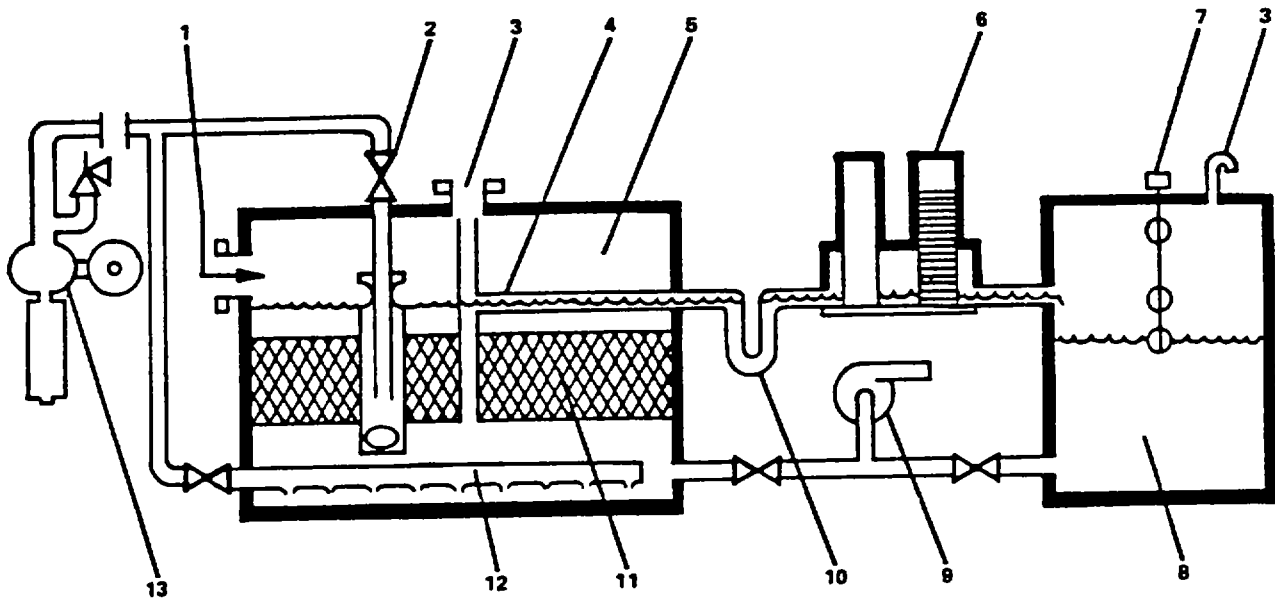


Figure 1-17. Sewage Drain System (Sheet 5 of 6).

1. UP TO SHORE CONNECTION
2. SD-16
3. SD-8, SEW. OVBD. DISCH
4. SD-6, C.O.V. - SEW. DISCH. PMP. NO. 2 DISCH
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-5, C.O.V. - SEW. DISCH. PMP. NO. 1 SUCT.
10. SEWAGE DISCHARGE PUMP NO. 1
11. SD-7, C.O.V. - SEW. DISCH. PMP. NO. 1 DISCH
12. SD-15
13. SD-9, SEW, TO SH. CONN.
14. SD-3, SEW. DR. TO HOLD. TK.
15. SD-2, SEW. OVBD. DISCH
16. SD-17
17. SD-14
18. SD-13, SEW. OVBD. DISCH.
19. SD-18
20. MSD MEDIA TANK
21. MSD CONTACT TANK
22. MSD SEWAGE DISCHARGE PUMP
23. SD-12, MSD OVBD. DISCH. PUMP DISCH.
24. SD-1, SEW. INLET TO MSD
25. SEWAGE CHT TANK
26. SD-10, SEW. SHORE CONN. PORT
27. DRAIN DOWN
28. WATER CLOSET DRAIN DOWN
29. SD-11, SEW. SHORE. CONN. STBD
30. SD-19
31. SD-20

FLOW DIAGRAM



- | | | | |
|----|--------------------|-----|--------------------|
| 1. | SEWAGE INLET | 8. | WET WELL |
| 2. | AIRLIFT | 9. | MSD DISCHARGE PUMP |
| 3. | VENT | 10. | TRAP |
| 4. | SPILLOVER | 11. | MEDIA |
| 5. | MEDIA TANK | 12. | AIR SCOUR |
| 6. | TABLET CHLORINATOR | 13. | BLOWER |
| 7. | FLOAT SWITCH | | |

Figure 1-18. Marine Sanitation Device Operation.

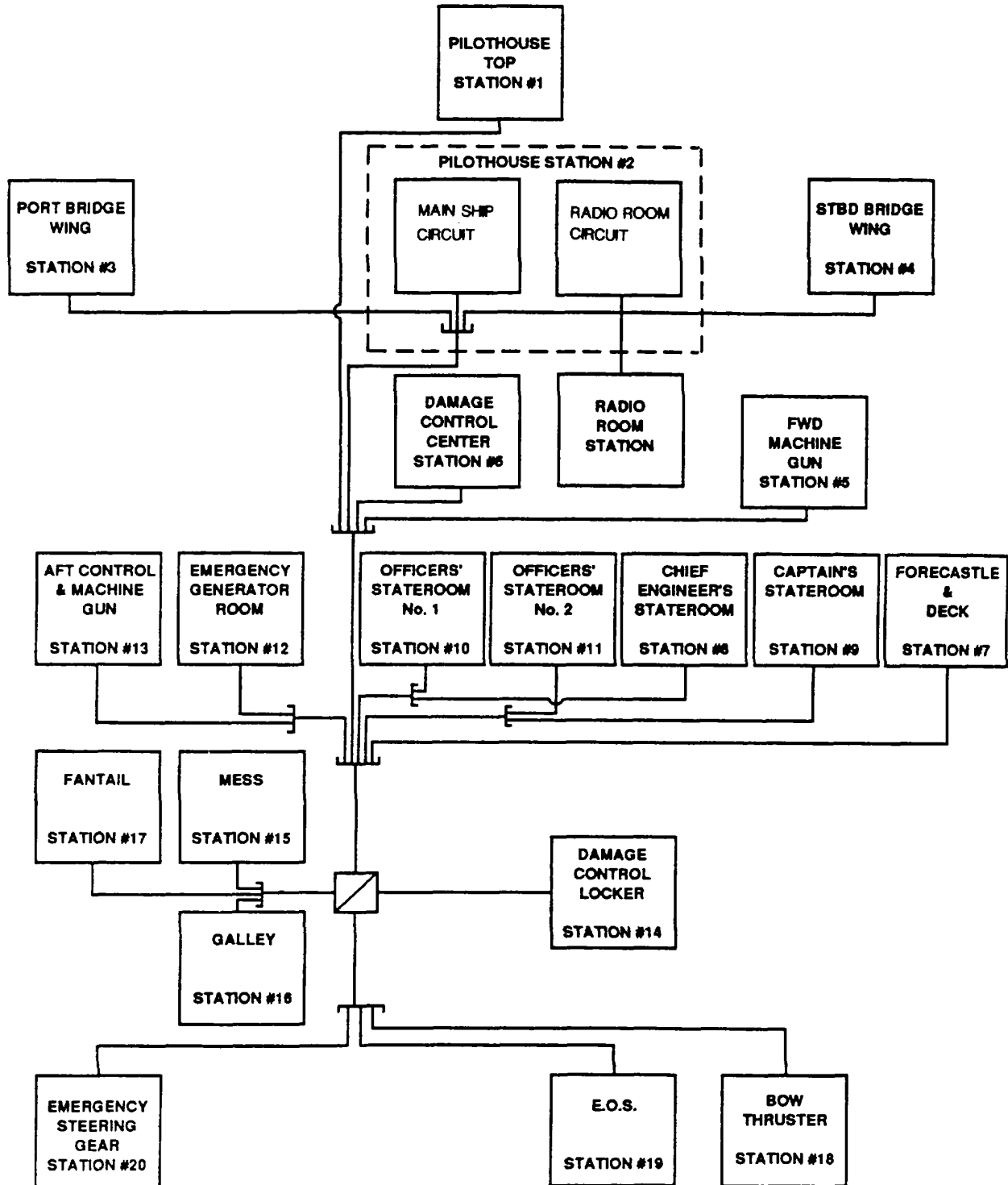


Figure 1-19. Sound Powered Telephone System.

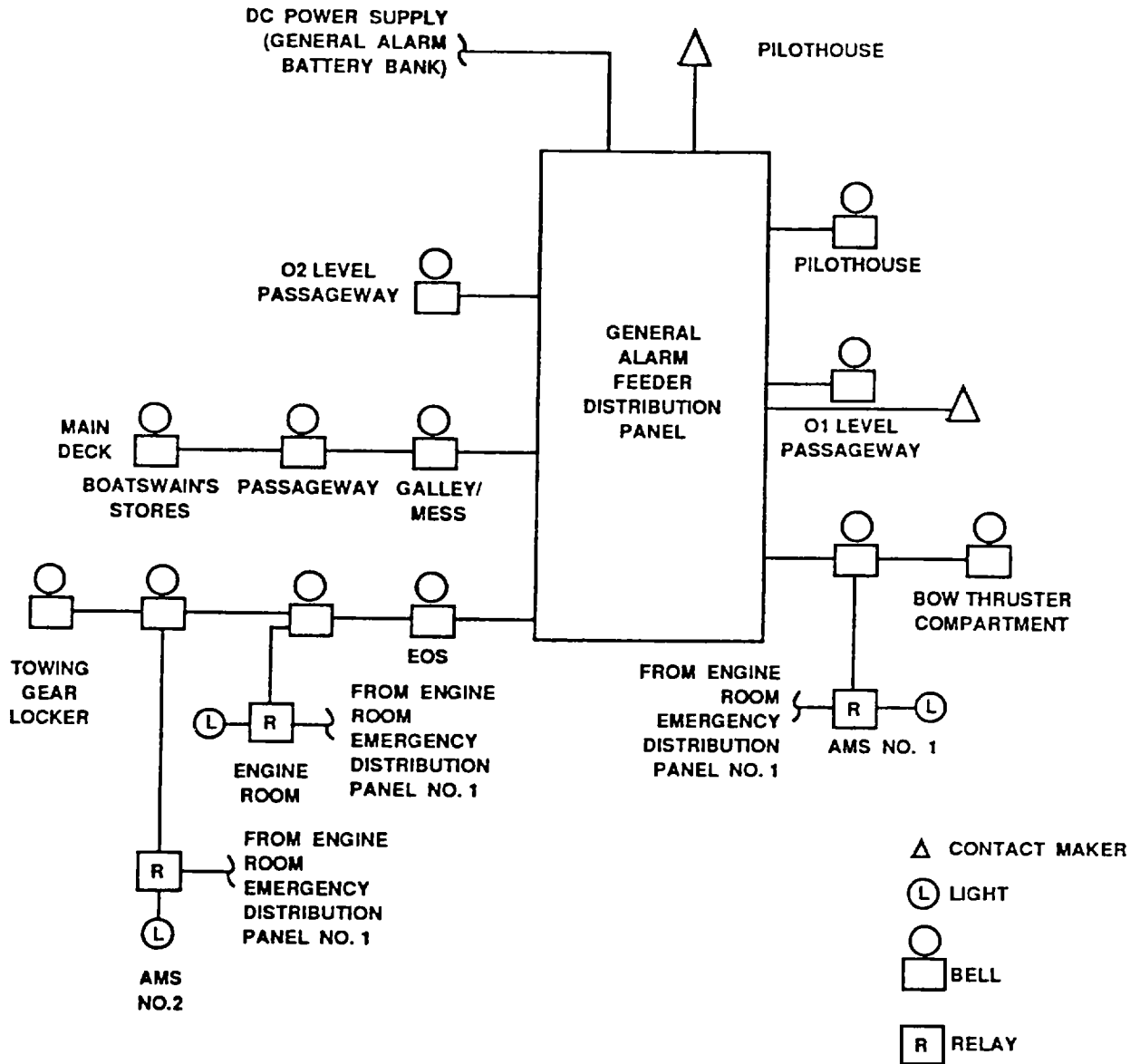


Figure 1-20. General Alarm System.

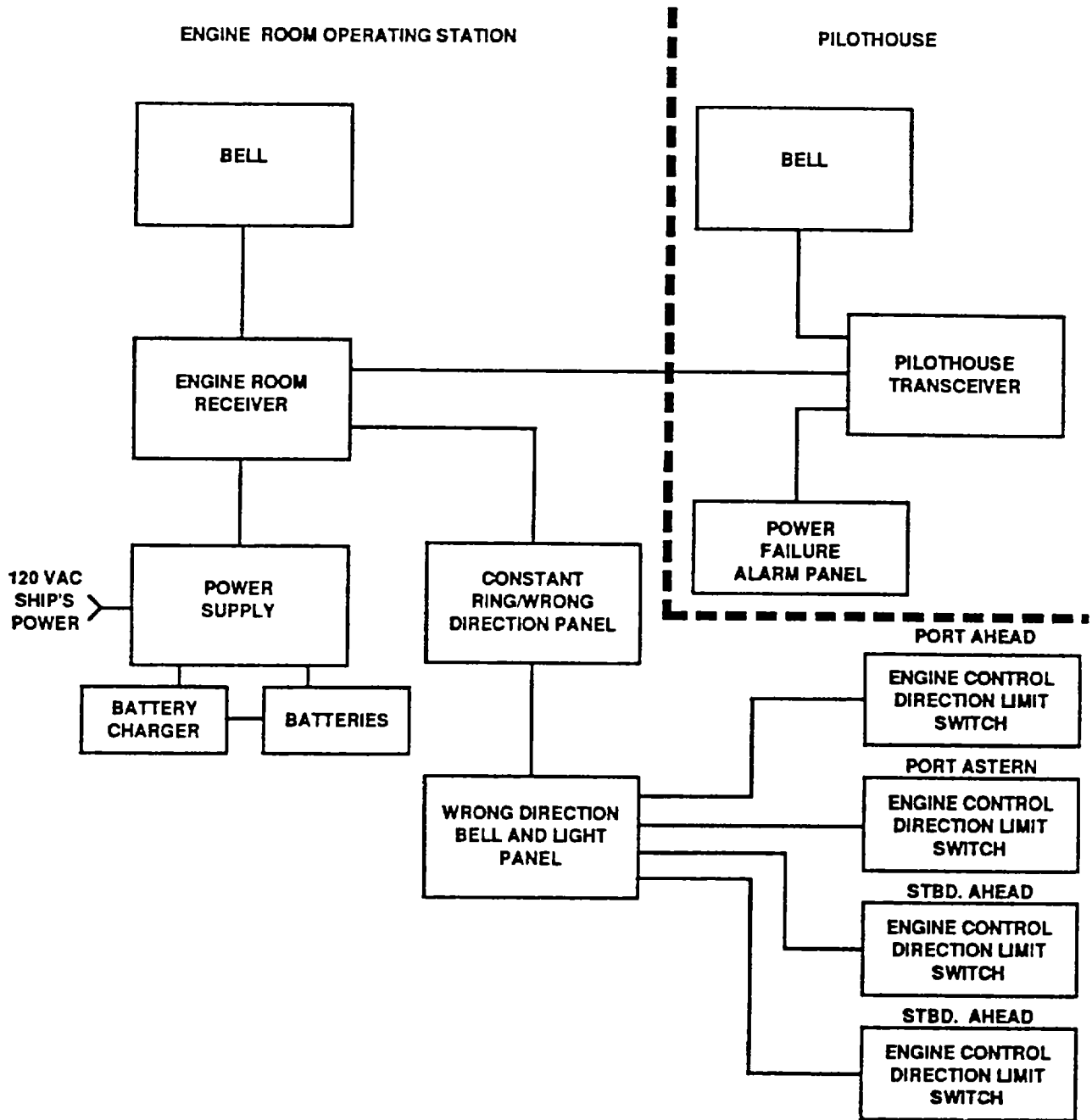


Figure 1-21. EOT System.

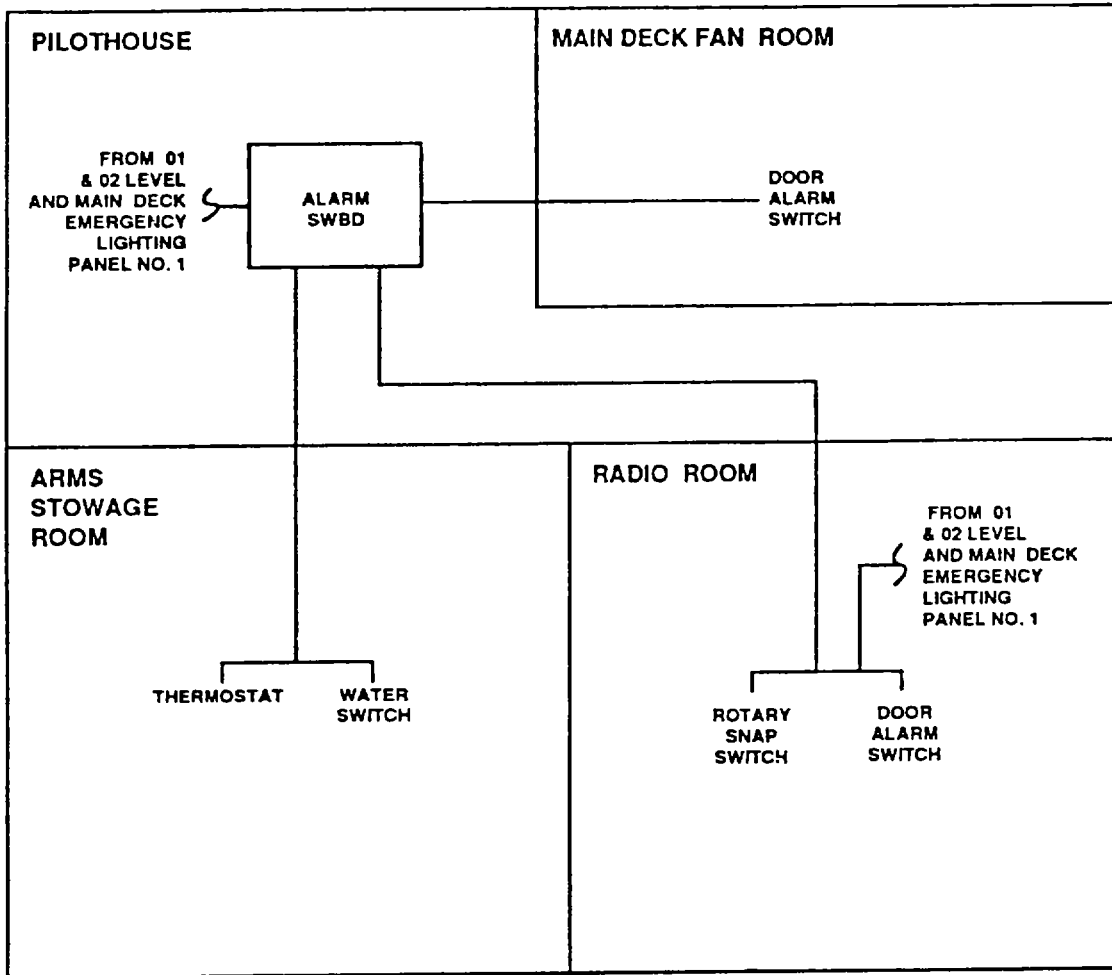


Figure 1-22. Radio Room Door. Fan Room Door and Arms Stowage Alarm.

(1) Radio Room and Fan Room Door Alarm System. This alarm system uses 110 Vac. supplied from 01, 02, and main deck emergency lighting panel No. 1. When the door to the radio room or main deck fan room is open, an alarm buzzer and light in the pilothouse are activated. A 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 uses 110 Vac.. supplied from the 01 & 02 level and main deck emergency lighting 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 alarms. The sprinkler sensor is a water flow switch 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 in the alarm switchboard.

(3) Freezer Alarm System. The freeze alarm system consists of three pilot light switches and a buzzer. The system power is supplied from emergency distribution panel No. 1. The switches are located in the thaw room, vegetable storm room, and freezer room. When operated, the switches energize the buzzer in the galley to alert personnel that someone is trapped in the room.

1-24. 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.

1-25. Portable Pumps. Portable pumps consists of one gasoline engine driven portable fire fighting pump and two electric pumps. All three pumps are normally stowed in the forward damage control locker.

1-26. Electric Motors. Electric motors drive the pumps for the various systems throughout the LT. The motors are normally started and stopped at the associated motor controller. Electric motors drive pumps associated with the following system:

- Fuel Oil Transfer
- Lube Oil Transfer
- Sewage Discharge
- Bilge and Ballast
- Fire and General Service
- Potable Water
- Reduction Gear Cooling
- Hot Potable Water Recirculation
- Pre-lubrication Oil
- Air Compressor
- Reverse Osmosis Water Maker

CHAPTER 2

UNIT MAINTENANCE INSTRUCTIONS

	<u>Page</u>
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SECTION I. REPAIR PARTS, SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT

2-1. Common Tools and Equipment. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your organization.

2-2. Special Tools, TMDE, and Support Equipment. Special tools; test, measurement, and diagnostic equipment; and support equipment requirements are listed and illustrated in the Repair Parts and Special Tools List (RPSTL), Appendix C. These items are also listed in the Maintenance Allocation Chart (MAC), Appendix B of this manual.

2-3. Repair Parts. Repair parts are listed and illustrated in the Repair Parts and Special Tools List (RPSTL), Appendix C.

SECTION II. SERVICE UPON RECEIPT

2-4. Checking Unpacked Equipment.

- a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage in accordance with the instructions of DA Pam 738-750.
- b. Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions of DA Pam 738-750.
- c. Check to see whether the equipment has been modified.

2-5. Deprocessing Unpacked Equipment.

- a. Remove protective caps, inserts, wrapping, and tape when inspection/inventory is completed. Inspect piping openings for damage. Wipe off dirt, grease, or protective films at time of installation.
- b. Remove chocks from resilient mounted components.

2-6. Preoperative Checks. Before actual receipt of the Large Tug (LT) by the Government, the vessel has undergone dockside trials as well as acceptance trials. All systems have been checked out during these trials. However, it is recommended that the following preoperative checks be made on the equipment before the vessel is put into normal operation.

- a. Halon/Firefighting Equipment. Check all equipment for obvious damage. Visually inspect all halon systems and firefighting equipment for breakage, loose connections, proper stowage and ready availability for use.

NOTE

Not applicable to Hull No. LT801, LT804 and LT805. Reference Para. 2-65 from TM 55-1925-207-10 for FM-200 operation procedures.

- b. Furniture and Furnishings. Visually inspect all tables, chairs, beds, desks, wardrobes, safes,

lockers and other furnishings for obvious breakage and proper operation.

c. Entertainment System. Check television, video cassette recorder, video amplifier and UHF/VHF antenna for obvious breakage or damage. Operate equipment in accordance with Operator's Manual, TM 55-1925-207-10.

d. Interior Communications System. Check all equipment for obvious damage, breakage and missing components. Operate all equipment in accordance with Operator's Manual, TM 55-1925-207-10.

e. Purifiers/Separators. Check lube oil purifier, diesel fuel oil filter/separator and oil/water separator for leaks, damage, or missing components. Operate each system in accordance with Operator's Manual, TM 55-1925-207-10.

f. Tank Level Indicator (TLI). As completely as practical, visually inspect all equipment and indicators for obvious damage and breakage. Operate TLIs in accordance with Operator's Manual, TM 55-1925-207-10. Inspect all tanks for leaks, cracks or other obvious damage. Inspect voids for gear adrift and proper closures.

g. Navigation System. Check that the searchlight, ship whistle, bell, and gong are in working order. Check navigation lights for breakage and obvious damage. Operate all equipment in accordance with Operator's Manual, TM 55-1925-207-10.

h. Machine Shop Equipment. Check all equipment for obvious damage or breakage. Operate all equipment in accordance with Operator's Manual, TM 55-1925-207-10.

i. Commissary/Laundry Equipment. Check all equipment for obvious damage or breakage. Operate all equipment in accordance with Operator's Manual, TM 55-1925-207-10.

j. Pumps/Motors. Check the following pumps and their associated motors for obvious damage, breakage, leaks and loose connections:

- Potable water pumps
- Sewage and bilge/ballast pumps
- R.O. pumps
- Fuel oil transfer pumps
- Lubricating oil transfer pumps
- Dirty lube oil pump
- Hot water recirculating pumps

Pre-lubricating pumps
Reduction gear cooling water pumps
Portable pumps
Operate pumps in accordance with Operator's Manual, TM 55-1925-207-10.

k. Controls Subsystems. Check for obvious damage or breakage. Ensure proper operation in accordance with Operator's Manual, TM 55-1925-207-10.

l. Electrical System. Visually inspect all wiring runs and connection boxes for obvious damage, broken wires, stripped insulation or loose connections.

m. Doors/Hatches/Scuttles/Windows. Check dogs, hinges, and locking devices for proper operation. Check gaskets for cracks and tears. Check condition of glass.

n. Lashing Gear/Towing/Mooring Equipment. Visually check for obvious damage or breakage. Operate towing gear in accordance with Operator's Manual TM 55-1925-207-10.

o. Workboat/Liferafts/Crane. Visually check for secure mountings and any obvious damage or breakage. Ensure crane and workboat operate in accordance with Operator's Manual TM 55-1925-207-10.

p. Control Centers/Switchboards. Visually check for obvious damage, breakage and loose connections.

q. Propellers/Shafts. As far as practical, visually check for obvious damage, breakage or misalignment. During initial operation be alert for excessive vibration or leaks along the shaft and its connections.

r. Valves/Strainers. Visually inspect all valves and strainers for secure connections. Check for leaks under pressure. Ensure proper operation in accordance with Operator's Manual, TM 55-1925-207-10.

s. Piping System. Visually check all piping systems for leaks, damaged, broken or missing components. Operate each system in accordance with Operator's Manual, TM 55-1925-207-10.

t. Hull/Ladders/Rails. Visually check for obvious damage, broken or missing components. Check

security of life lines and rails. Check proper storage of portable ladders and gangways.

2-7. Initial Setup Procedure. Includes operational checks and inspections that are not performed for a routine startup. Direct support maintenance personnel will perform initial setup in accordance with Operator's Manual, TM 55-1925-207-10.

2-8. Normal Startup. Refer to the Operator's Manual, TM 55-1925-207-10.

2-9. Shutdown Procedures (Usual or Unusual). Refer to the Operator's Manual, TM 55-1925-207-10.

SECTION III. UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

2-10. Explanation of PMCS Table. PMCS is designed to keep the equipment in good working condition. This is accomplished by performing certain tests, inspections, and services. Table 2-1 lists items to be serviced and the procedures needed to accomplish the PMCS. The items are listed in the order established by the Maintenance Allocation Chart (MAC) in Appendix B of this manual. The "Interval" column indicates the frequency to perform a check or service. PMCS procedures for each MAC group (2601 through 2609) are arranged according to Frequency with procedures having the highest frequency listed first. If needed, PMCS may be performed more frequently than the indicated interval. The "Procedures" column tells how to perform the required checks and services. If the equipment does not perform as required see Table 2-2, Unit Maintenance Troubleshooting. Report any malfunctions or failures on DA Form 2404. In the "Item Number" column on DA Form 2404. record the appropriate Item number from the PMCS table.

Table 2-1. Preventive Maintenance Checks and Services

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
1			●				<p>Tank Level Indicator Exterior Components (Inspect)</p>	<p><u>TANK LEVEL INDICATOR (TLI) SYSTEM</u></p> <p>Inspect the exteriors of the TLI System components by performing the following procedures:</p> <ol style="list-style-type: none"> Examine the face of fluid level meters on receiver panels and receiver modules for cracks, breaks, fogging, and objectionable scratches. Replace the meter face if effective operation is impaired by any of these defects. Examine boxes of receiver modules and receiver panels for dents, cracks, scratches, or other physical damage. Hammer out dents, seal cracks, use touch-up paint and make any other necessary repairs, if any of these defects are found. Check lamps on receiver panels for broken or missing lenses. Replace broken or missing lenses. Check fuses on receiver panels to ensure that proper rated fuses are installed and are not blown. Replace any improperly rated or blown fuses. Check front panel switches on receiver panels to ensure they are operating without binding. Replace any defective switches. Check that cable and wire connections to all electrical components are secured. Tighten any loose electrical connectors or terminal board posts. Check for loose or missing attaching hardware on mounting racks and on receiver modules and receiver panels. Tighten or replace any missing hardware.
2			●				<p>Tank Level Indicator Exterior Components (Service)</p>	<p>To clean components of the TLI system that are located outside fluid tanks proceed as follows:</p> <p style="text-align: center;">WARNING</p> <p>Use solvent in a well ventilated area. Avoid breathing the solvent fumes. Keep the solvent away from flames.</p> <ol style="list-style-type: none"> Wipe the exterior of metal parts with a clean lint-free cloth moistened with dry cleaning solvent, Federal Specification P-S-661. Remove any solvent film remaining from the performance of step a. by using clean, lint-free cloth moistened with Ethyl-Alcohol, Federal Specification O-E-760

Table 2-1. Preventive Maintenance Checks and Services

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
2 Cont.			●				<p>Tank Level Indicator Exterior Components (Service) - Cont.</p>	<p><u>TANK LEVEL INDICATOR (TLI) SYSTEM - CONT.</u></p> <p>WARNING</p> <p>Observe caution during the performance of the following procedures. 115-volt, 60 Hz power is connected to components of the TLI system even though power is turned off at the component.</p> <p>c. Remove any grease, oil or other deposits on exteriors, using soft-bristled, non-metallic brush moistened with Ethyl Alcohol, Federal Specification O-E-760.</p> <p>d. Remove corrosion from working surfaces using scraper, wire brushes, or other convenient means. Remove corrosion from fitted surfaces using fine stone or non-metallic abrasive. cloth. After removing corrosion, apply grade 2 compound, rust preventive, thin film (polar type) as covered by the latest revision of MIL-C-16173.</p>
3			●				<p>Tank Level Indicator Performance Tests</p>	<p>If any of the indicated results cannot be obtained, refer to the troubleshooting procedures in Section IV of this manual.</p> <p>a. Place ON-OFF switch on receiver panels to ON position. Verify POWER lamp lights.</p> <p>b. Place ON-OFF switch on each receiver panel, in turn, to the OFF position long enough to observe all fluid level meters on the receiver panel with power off. All fluid level meters on the receiver panels deflect to zero.</p> <p>c. Return the ON-OFF switch on each receiver panel to ON.</p> <p>d. Open the front cover of each receiver panel, in turn.</p> <p>e. Press the Calibrate push-button switch on each control module on the receiver panel, in turn. While the switch is held depressed, the associated fluid level meter deflects to the full-scale (maximum tank level indication) position. If the control module containing the Calibrate push-button being pressed contains a high-alarm circuit, the alarm horn sounds and the associated HIGH ALARM lamp lights as long as the switch is held depressed.</p> <p>f. Release the Calibrate push-button switch.</p> <p>g. Disconnect the ship wiring leads connected to terminals 1, 2, 3 of each receiver panel terminal board that is associated with a control module having an alarm circuit, in turn.</p>

Table 2-1. Preventive Maintenance Checks and Services

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
3 Cont.							Tank Level Indicator Performance Tests - Cont.	<p><u>TANK LEVEL INDICATOR (TLI) SYSTEM - CONT.</u></p> <ul style="list-style-type: none"> h. Disconnect the float simulator cable from the float simulator bracket. i. Connect the float simulator cable to the terminal board associated with each control module having an alarm circuit, in turn, as follows: connect float simulator cable red lead to terminal 1, black lead to terminal 2, and green lead to terminal 3. j. Observe fluid level meter deflection on all secondary receiver modules. Deflection shall be the same as the associated receiver panel fluid level meter. k. Adjust the FLOAT SIMULATOR control to bring deflection on the fluid level meter connected to the control module being checked below the low-level alarm setting marked on the face of the fluid level meter. The LOW ALARM lamp lights steadily and the ALARM horn at the receiver panel sounds. l. Press the ALARM SILENCE switch on the receiver panel. The ALARM horn shall be silenced. m. Adjust the FLOAT SIMULATOR control to bring deflection on the fluid level meter above the low-level alarm setting, but still below the high-level alarm setting, if there is a high-level alarm setting. The LOW ALARM lamp(s) go out. n. Adjust the FLOAT SIMULATOR control to bring deflection on the fluid level meter above the high-level alarm setting. The ALARM horn sounds and the HIGH ALARM lamp lights. o. Press the ALARM SILENCE switch on the receiver panel. The ALARM horn shall be silenced. p. Adjust the FLOAT SIMULATOR control to bring deflection on the fluid level meter within the normal (no-alarm) range. The HIGH ALARM lamp goes out. q. Disconnect the float simulator cable from the control module terminal board and reconnect ship wiring. r. Close the receiver panel front cover.

Table 2-1. Preventive Maintenance Checks and Services - Cont.

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
4					●		Tank Level Indicator Interior Components (Clean)	<p><u>TANK LEVEL INDICATOR (TLI) SYSTEM-CONT.</u></p> <p>WARNING</p> <p>Observe caution during the performance of the following procedures. 115- volt, 60 Hz power is connected to components of the TLI system even though power is turned off at the component.</p> <p>Open front cover of receiver panels. Clean interiors of components by dusting resistors, capacitors, etc. with clean, dry compressed air and soft-bristled non-metallic brush.</p> <p>Remove any grease, oil or other deposits on interior, using soft-bristled, non-metallic brush moistened with Ethyl Alcohol, Federal Specification O-E-760.</p>
5					●		Tank Level Interior Components (Inspect)	<p>Inspect the interiors of the TLI system components by Indicator performing the following procedures:</p> <p>a. Open the front cover of receiver panels and remove receiver modules from their mounting racks to perform the inspection procedures in steps b. through h.</p> <p>WARNING</p> <p>Observe caution during the performance of the following procedures. 115- volt, 60 Hz power is connected to components of the TLI system even though power is turned off at the component.</p> <p>b. Examine wire connection to and In ail components for evidence of aging, burning, worn insulation, corrosion, or other signs of wear or damage. Replace or repair wires, insulation, or both, if defective.</p> <p>c. Check terminal boards in receiver panels to ensure that all terminal board screws are tightened and connections properly made. Tighten loose screws and correct improperly made connections.</p> <p>d. Examine attaching hardware for stripped screw threads, worn slots, and loss. Replace defective or missing hardware.</p> <p>e. Examine printed circuit boards for cracks, blisters, chars, broken or cracked eyelets or standoffs, and for cracked bands. Repair or replace any defective parts.</p>

Table 2-1. Preventive Maintenance Checks and Services

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
5. Cont						●	Tank Level Indicator Interior Components (Inspect)-Cont.	<p align="center"><u>TANK LEVEL INDICATOR (TLI) SYSTEM - CONT.</u></p> <p>f. Check all capacitors for cracked, blistered, or dented bodies, broken or loose seals, and leaks or signs of leakage. Replace any capacitor exhibiting any of these defects.</p> <p>g. Check transformers for charred leads, bulging cases, or signs of leakage. Replace any transformer exhibiting any of these defects.</p> <p>h. Check resistors and potentiometers for signs of burning or cracking. Replace any resistor or potentiometer exhibiting either of these defects.</p>
6							Tank Level Indicator Overhaul Cycle Performance Test	<p>When a fluid tank has been emptied and can be filled or emptied for test purposes, perform the monthly performance test in Item No. 3 and the following steps for each fluid tank as follows:</p> <p>a. Place the ON-OFF switch on receiver panel in the ON position. If a low-level alarm circuit is associated with the fluid tank being tested, applicable alarm indications shall be produced (LOW ALARM lamps light and alarm horns and alarm bells sound).</p> <p>b. Fill the tank with fluid at a measured rate. The fluid level meter on the receiver module(s) and the receiver panel associated with the tank shall deflect to the gallonage increment that corresponds to the amount of fluid being added. When the fluid level meter deflection rises above the low-level alarm point on the fluid level meter, the low-level alarm indications shall be removed (LOW ALARM lamps go out and alarm horns and bells silenced). When the fluid level meter deflection rises above the high-level alarm point on the fluid level meter, associated high level alarm indications shall be observed (HIGH ALARM lamps light and alarm horns and bells sound).</p> <p>c. After the tank is filled, begin emptying the tank at a measured rate. The associated fluid level meters shall deflect in accordance with the amount of fluid that is being removed. Where applicable, high-level alarm indications shall be removed when the fluid level drops below the high-level alarm point and low-level alarm conditions shall be observable when the fluid level drops below the low-level alarm point.</p>

Table 2-1. Preventive Maintenance Checks and Services

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
7	●						Workshop	<p align="center"><u>WORKSHOP EQUIPMENT</u></p> <p>a. Visually inspect the workshop for loose parts, tools, or heavy objects that may fall or slide in heavy seas. Secure loose objects.</p> <p>b. Ensure decking is secure, lights are operational, shop is dean and free of salt deposits, no flammable liquids are stowed in shop, and shop is free of trash and other solid flammables.</p> <p>c. Inspect workshop equipment for obvious damage. Remove metal chips using soft hand brush after each use. Dress grinding wheel as required (para 2-20). Fill oil dimples, lubricate tailstock and if necessary add oil in accordance with LO 55-1925-207-12. Clean out welder as follows:</p> <p align="center">WARNING</p> <p>Use eye protection when performing this operation.</p> <p align="center">NOTE</p> <p>Vacuuming may also be used for cleaning operation of arc welding machine.</p> <p>a. On AUX MACH SPACE NO. 2 POWER PANEL NO. 5 set WELDING MACHINE circuit breaker to OFF position and tag "Out of Service - Do Not Operate".</p> <p>b. Remove cover retaining screws.</p> <p>c. Remove cover.</p> <p>d. Clean inside of welder with compressed air.</p> <p>e. Install cover.</p> <p>f. Place circuit breaker to ON position. Remove tag.</p> <p>Clean filter when necessary as follows: (Refer to Wet/Dry Vacuum cleaner Filter Removal Diagram)</p> <p>a. Remove cover (1) by pulling out on flexible locking handles (2).</p> <p>b. Lift cover and invert to gain access to filter.</p> <p>c. Remove nut (3), filter plate (4) and filter (5).</p> <p>d. Clean filter in clean, slow running water.</p> <p>e. Install filter.</p> <p>f. Operate vacuum cleaner, without hoses, for 10 minutes to dry filter.</p>
8	●						Drill Press	
9	●						Bench Grinder	
10	●						Lathe	
11		●					Arc Welding Machine	
12	●						Wet/Dry Vacuum Cleaner	

Table 2-1. Preventive Maintenance Checks and Services

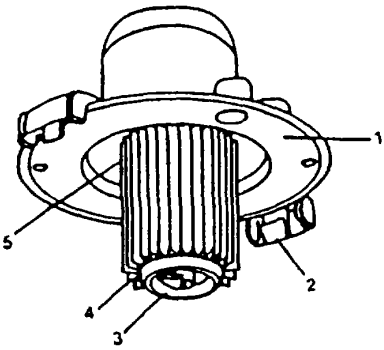
Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
12 Cont.	●						Wet/Dry Vacuum Cleaner - Cont.	<p align="center"><u>WORKSHOP EQUIPMENT - CONT.</u></p>  <p align="center"><u>Wet/Dry Vacuum Cleaner Filter Removal.</u></p>
13		●					Drill Press	Lubricate in accordance with LO 55-1925-207-12.
14		●					Lathe	Lubricate grease fittings on shaft, change gears and half nut and worm gear in accordance with LO 55-1925-207-12.
15			●				Drill Press	Lubricate slide bars in accordance with LO 55-1925-207-12.
16			●				Vise and Bench Grinder	<p>Visually inspect the vise and bench grinder.</p> <ol style="list-style-type: none"> Rotate the vise clamp wheels and check for ease of motion. Look for loose connections on the grinder, excess buildup of metal residue and chips on the grinding wheels. <p align="center">WARNING</p> <p>Ensure AUX MACH SPACE NO. 2 POWER PANEL NO. 5 WELDING MACHINE circuit breaker is OFF or serious injury could result. Power switch on welder does not remove all power from inside of machine.</p>
17			●				Arc Welding Machine	Visually inspect for frayed or broken wires, cuts and damaged insulation.
18				●			Arc Welding Machine Leads/Grounds	<ol style="list-style-type: none"> Visually inspect all cables and connections for damaged insulation, cuts, broken wires, and fraying. Clean and tighten connections.

Table 2-1. Preventive Maintenance Checks and Services

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
19				●			Arc Welding Machine - Spark Gap Adjustment	<p align="center"><u>WORKSHOP EQUIPMENT - CONT.</u> WARNING</p> <p>Death or serious injury can result from contact with live electrical circuits. Ensure all electrical power is OFF and tagged "Out of Service - Do Not Operate."</p> <ol style="list-style-type: none"> On AUX MACH SPACE NO. 2 POWER PANEL NO. 5 set WELDING MACHINE circuit breaker to OFF and tag "Out of Service - Do Not Operate." Press spring-loaded door latch and open front access door by lifting up. Use feeler gauge to check spark gap of 0.008 inch (0.0203 mm). Adjust as necessary (para. 2-23). Repeat for other spark gap contact points. Close access panel. Remove tag and set circuit breaker to ON position.
20					●		Drill Press	Lubricate drill in accordance with LO 55-1925-207-12.
21					●		Arc Welding Machine	Inspect all precautionary labels for legibility.
22		●					Washer, Automatic	<p align="center">LAUNDRY EQUIPMENT</p> <p>Clean exterior of cabinet with warm soapy water. Dry thoroughly.</p> <ol style="list-style-type: none"> Inspect hoses for splits or cracks. Inspect drive belt for excessive wear. Inspect electrical connections to ensure there is good contact and wires are not frayed. Run a cycle check, using the following procedures: <ol style="list-style-type: none"> Start washer in the WASH FILL cycle, noting timer dial alignment and checking fill hoses for leaks. Check mixing valve coils and temperature selector switch by selecting various temperatures during the fill cycle. Allow machine to fill in each water level selection. This is to check and see if the pressure switch is working properly. Allow machine to advance into AGITATION and check for recirculating flow, leaks, filter action, rattles and squeaks.

Table 2-1. Preventive Maintenance Checks and Services

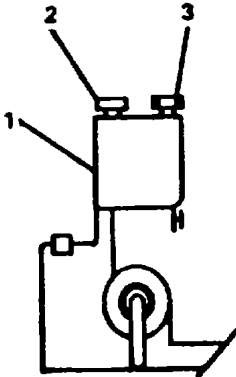
Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
22 Cont.							Washer, Automatic - Cont.	<p align="center">LAUNDRY EQUIPMENT - CONT.</p> <p>e. Turn the timer OFF, the manually advance timer into pump-out. Turn timer ON and check for complete pump out, kinked and/or leaking drain hose.</p> <p>f. In the SPIN cycle, turn the timer ON. Open the lid quickly, to see if the basket quits spinning. This checks to see if the lid switch is working properly. Clean lint filter.</p> <p>Clean exterior of cabinet with warm soapy water. Dry thoroughly. Inspect belt for wear.</p> <p>a. Inspect electrical connections to ensure there is good contact and wires are not frayed.</p> <p>b. Use multimeter to test resistance of electrical components.</p> <p align="center">DOORS, HATCHES, SCUTTLES, MANHOLES, WINDOWS GROUP</p> <p>a. Remove dipstick (2) and check oil level in expansion tank (1).</p> <p align="center">NOTE</p> <p>Use a petroleum base hydraulic fluid.</p> <p>b. If oil is required, remove filler/vent cap (3) and fill.</p> <div style="text-align: center;">  </div> <p align="center">MAIN DECK</p> <p>a. Clean glass, using glass cleaner and soft cloths.</p> <p>b. Visually inspect glass for chips or cracks.</p>
23	●	●					Dryer, Automatic	
24	●						Hydraulic Watertight Door Expansion	
25	●						Windows	

Table 2-1. Preventive Maintenance Checks and Services - Cont.

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
26	•						Rotary Window	<p><u>DOORS.HATCHES.SCUTTLES.MANHOLES, WINDOWS GROUP - CONT.</u></p> <p>a. Operational Check.</p> <p>(1) Energize rotary window motor and heater.</p> <p>(2) Check for proper operation of units.</p> <p>(3) Check for plugged drain holes.</p> <p>NOTE If drain holes are plugged up, any leakage will remain inside the chamber and cause poor visibility, such as fogging.</p> <p>(4) If drain holes are plugged, refer to PMCS, Item 29, step a.(1) through (3)</p> <p>(5) With window and heater operating, visually check to make sure that the drain holes in the bottom of the air chamber between the two glass panels are free from obstructions.</p> <p>NOTE The glass should be clean inside and outside to maintain maximum visibility.</p> <p>(6) Visually check glass panels for cleanliness; if dirty see PMCS Item 29 for corrective action.</p>
27			•				Hydraulic Watertight Door	<p>a. Lubricate sealing surfaces around perimeter of door every 2 weeks in accordance with LO 55-1925-207-12.</p> <p>b. Lubricate roller pins Alemite Standard fitting every 2 weeks in accordance with LO 55-1925-207-12.</p>
28				•			Quick Action Doors	<p>a. Inspect moving parts for wear or damage.</p> <p>b. Lubricate guides, operating mechanism, dogs and hinges.</p>
29				•		•	Rotary Window	<p>a. Clean glass panels and unplug drain holes.</p> <p>(1) Remove the spinning assembly (para. 3-23).</p> <p>(2) Using a small piece of wire, poke out any obstructions in the drain holes.</p> <p>(3) Be sure all the holes are completely cleaned out.</p> <p>(4) Clean glass panels with glass cleaner.</p> <p>(5) Use a clean soft cloth or paper towel so as not to scratch the glass.</p>

Table 2-1. Preventive Maintenance Checks and Services - Cont.

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
29				•			Rotary Window -Cont.	<p>DOORS, HATCHES, SCUTTLES, MANHOLES, WINDOWS GROUP - CONT.</p> <p><u>WARNING</u></p> <p>When assembling the unit DO NOT bump the spinning assembly. This unit is dynamically balanced during manufacturing to assure proper operation and MAY SHATTER AND CAUSE INJURY if used in a damaged condition.</p> <p>(6) Assemble and install the spinning assembly.</p> <p>NOTE</p> <p>Accomplish semiannually or more frequently if necessitated by adverse conditions.</p> <p>a. Inspect, clean, lubricate, and test watertight doors.</p> <p>(1) Inspect doors as indicated below; omit steps not applicable.</p> <p>(a) Loose, missing and damaged parts, or parts having excessive wear or corrosion.</p> <p>(b) Paint, rust, and other foreign matter on gaskets, knife-edges, wedge pads, and working</p> <p>(c) Binding and difficult operation instead of smooth and positive action.</p> <p>(d) Distortion and deterioration of metal surfaces.</p> <p>(e) Hinge pin wear; ensure pins are properly secured.</p> <p>(2) Clean door assembly knife-edge and gasket as indicated below:</p> <p>(a) Clean steel knife-edge, if applicable, with aluminum oxide abrasive cloth, grit number 320, only if paint or rust is present. Use clean rag to remove any abrasive grit remaining on knife-edge.</p> <p><u>CAUTION</u></p> <p>Do not use abrasive cloth to clean aluminum knife-edges under any circumstances.</p>
30					•		Watertight Doors	

Table 2-1. Preventive Maintenance Checks and Services - Cont.

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
30 Cont.					•		Watertight Doors - Cont.	<p align="center"><u>DOORS, HATCHES, SCUTTLES, MANHOLES, WINDOWS GROUP - CONT.</u></p> <p>(b) Clean any aluminum knife-edges with paint remover if paint and similar substances are present. Use clean rag to dry knife-edge after cleaning.</p> <p align="center"><u>CAUTION</u></p> <p>Under no circumstances should a wire brush or metal scraper be used to clean the rubber gasket.</p> <p>(c) Clean all paint and rust from rubber gasket by scraping with hardwood block or rubber eraser. If gasket condition is unsatisfactory, accomplish steps (3) through (6) below.</p> <p align="center"><u>NOTE</u></p> <p>After inspection and cleaning procedures indicated above have been completed, the following restoration measures should be accomplished to the degree inspection indicates necessary.</p> <p align="center"><u>WARNING</u></p> <p>Wear safety goggles when using wire brush.</p> <p>(3) Remove old gasket and clean gasket coating with wire brush until bare metal is exposed.</p> <p>(4) Apply one coat of formula 150 primer and two topcoats of formula 151 or equivalent paint. Take care not to paint knife-edges.</p> <p>(5) Install new gasket (if removed in step (3)).</p> <p>(a) Measure and cut new gasket.</p> <p align="center"><u>NOTE</u></p> <p>Because gasket will shrink with age, it should be Cut several inches over size (approximately 1 inch extra for every 3 feet of channel).</p> <p>(b) Install gasket in channel and let set for shrinkage.</p> <p>(c) Remove gasket and trim excess material.</p> <p align="center"><u>NOTE</u></p> <p>Allow 1 inch extra for compressing gasket in channel.</p>

Table 2-1. Preventive Maintenance Checks and Services - Cont.

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
30. Cont					•		Watertight Doors - Cont.	<p><u>DOORS. HATCHES. SCUTTLES. MANHOLES, WINDOWS GROUP - CONT.</u></p> <p>NOTE A 45° joint should be used at corners in closures with square corners. Elsewhere, square butt joints are preferable. Joints should not be located in radius portions of closures. The number of gasket joints should be kept to a minimum (no more than 4). Very short strips (less than 2 feet) should not be used.</p> <p>(d) Apply sealing compound to back of gasket and install gasket in channel.</p> <p>(e) Clean old grease and foreign matter from threaded and exposed working parts with cleaning solvent.</p> <p>(6) Lubrication procedures.</p> <p><u>CAUTION</u> Ensure oil or petroleum grease does not contact gaskets.</p> <p>(a) Screw packing plunger several turns to force existing lubricating stick packing out and around spindle. If stickpacking has been completely used up, the packing plunger will not screw in any further and stick packing must be replenished as follows:</p> <ol style="list-style-type: none"> 1 Remove packing plunger from spindle. 2 Insert stick packing in shaft opening. 3 Push stick packing deep into shaft opening using a 1/4-inch diameter rod. 4 Reinsert packing plunger in packing shaft opening. 5 Tighten plunger with a screwdriver until excess packing appears around spindle. <p>NOTE If dog or hand lever shafts tend to freeze, disassemble, clean, and lubricate with a light coat of grease, replace the string packing between the coils of the compression spring on the dog spindle, reassemble and adjust. See Watertight Door Dog Diagram.</p>

Table 2-1. Preventive Maintenance Checks and Services - Cont.

D - Daily W - Weekly M - Monthly Q - Quarterly S - Semi-Annually A - Annually

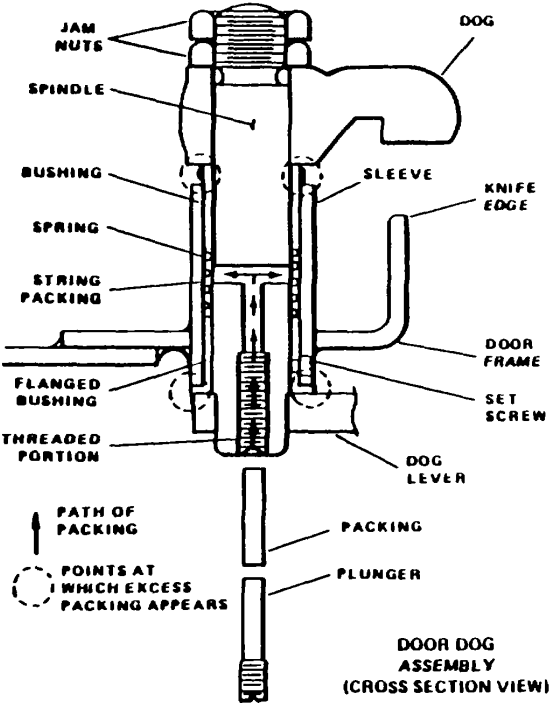
Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
30	*						Watertight Doors -Cont.	<p><u>DOORS.HATCHES,SCUTTLES.MANHOLES, WINDOWS GROUP - CONT.</u></p> <p>(b) Apply a light coat of grease to threaded dogs and shaft. Turn dog nuts through entire threaded length to ensure smooth operation.</p> <p>(c) Lubricate remaining working parts and surfaces with grease, stick packing, or with a few drops of oil, as applicable.</p>  <p style="text-align: center;">Watertight Door Dog Diagram.</p>

Table 2-1. Preventive Maintenance Checks and Services - Cont.

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
30 . Cont.					•		Watertight Doors - Cont.	<p align="center"><u>DOORS.HATCHFS.SCUTTLES.MANHOLES, WINDOWS GROUP - CONT.</u></p> <p>(d) Remove excess lubricant.</p> <p>(7) Test procedure.</p> <p>(a) Use chalk test procedure for standard closures with slab-gasket/knife-edge/bevel-edge seal.</p> <p><u>1</u> Rub chalk on door knife edge.</p> <p><u>2</u> Close and dog closure tightly. The gasket should seat tightly on mating surface around entire closure.</p> <p><u>3</u> Open closure and inspect imprint of chalk on gasket. If chalk line is not continuous, closure is not watertight and requires adjustment or repair.</p> <p align="center"><u>CAUTION</u></p> <p>Compression of the gasket should not exceed 1/8-inch. Excess compression will damage the gasket.</p> <p><u>4</u> Increase compression on the gasket in area of no contact by adjusting nearest dog or hinge, by tightening dog spindle adjustment nuts, or hinge pin positioning set screw on an airtight door. In order to obtain satisfactory seating on airtight-doors, since they are fitted with "bound" hinges, it may be necessary to back off on tightness of hinge edge when dog edge of door is adjusted tighter.</p> <p><u>5</u> Repeat steps (7) (a) 1 through (7) (a) 4 and make the proper adjustments until chalk imprint is continuous.</p> <p><u>6</u> Apply a light coat of silicone compound to gasket.</p> <p>(b) Operate closure through full cycle of operation several times to ensure smooth and positive dogging action</p>

Table 2-1. Preventive Maintenance Checks and Services - Cont.

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
31					•		<p><u>DOORS, HATCHES, SCUTTLES, MANHOLES, WINDOWS GROUP - CONT.</u></p> <p>a. Check for the following problems during inspection of emergency escape scuttles:</p> <ol style="list-style-type: none"> (1) Jammed in closed position. (2) Will only partially open. (3) Material stacked on top of scuttle preventing opening of scuttle. (4) Hinge pins severely corroded and hard to operate. (5) Locking arm adrift or inoperative. (6) Scuttle will not lock in an open position. (7) Recessed area of scuttle is full of dirt, debris, water and miscellaneous material that blocks operation of hinge pins. (8) Access to scuttle blocked. (9) T-wrench missing. <p>b. Inspect, clean, lubricate, and test watertight hatches and scuttles.</p> <ol style="list-style-type: none"> (1) Inspect hatches and scuttles for: <ol style="list-style-type: none"> (a) Loose, missing, and damaged parts. (b) Paint, rust, and other foreign matter on gaskets, knife-edges, and working parts. (c) Binding and difficult operation. (d) Distortion and deterioration of metal surfaces. (e) Hinge pin wear; ensure pins are properly secured. (f) Gasket cracks, deterioration, hardness, permanent set over 1/8-inch deep, and gaps due to shrinkage where gasket ends meet. (g) Unobstructed access to escape scuttles. 	

Table 2-1. Preventive Maintenance Checks and Services - Cont.

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
31 Cont.					•		Watertight Hatches and Scuttles - Cont.	<p align="center"><u>DOORS. HATCHES. SCUTTLES. MANHOLES. WINDOWS GROUP - CONT.</u></p> <p>(2) Clean steel knife-edges with abrasive cloth only if paint or rust are present. Use clean rags to remove any abrasive grit remaining on knife-edges.</p> <p align="center"><u>CAUTION</u></p> <p>Do not use abrasive cloth to clean aluminum knife-edges under any circumstances.</p> <p>(3) Clean any aluminum knife-edges with paint remover if paint or similar substance is present. Use clean rag to dry knife edges after cleaning.</p> <p>(4) Clean gaskets by scraping with hardwood block, or rubber eraser.</p> <p>(5) Clean debris from flush hatch and scuttle recesses, if applicable.</p> <p>(6) Clean old grease and foreign matter from threaded and exposed working parts.</p> <p>(7) Remove gasket if any condition in step b.(1) (f) exists, or if the closure panel required painting.</p> <p align="center"><u>WARNING</u></p> <p>Wear safety goggles when using wire brush. (8) Using wire brush, clean corroded areas until bare metal is exposed.</p> <p>(9) Apply one coat of formula 150 primer and two topcoats of formula 151 or equivalent paint. Take care not to paint knife-edges or gaskets.</p> <p>(10) Install new gasket (if removed in step b.(7)).</p> <p>(a) Measure and cut new gasket.</p> <p align="center"><u>NOTE</u></p> <p>Because gasket will shrink with age, It should be cut several inches over size (approximately 1 Inch extra for every 3 feet of channel)</p> <p>(b) Install gasket In channel and let set for approximately 24 hours to allow for shrinkage.</p> <p>(c) Remove gasket and trim excess material</p> <p align="center"><u>NOTE</u></p> <p>Allow 1 inch extra for compressing gasket In channel</p>

Table 2-1. Preventive Maintenance Checks and Services - Cont.

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
31 Cont.					•		Watertight Hatches and Scuttles - Cont.	<p align="center"><u>DOORS,HATCHES,SCUTTLES,MANHOLES, WINDOWS GROUP - CONT.</u></p> <p align="center">NOTE</p> <p>A 450 joint should be used at corners in closures with square corners. Elsewhere, square butt joints are preferable. Joints should not be located in radius portions of closures. The number of gasket joints should be kept to a minimum (no more than 4). Very short strips (less than 3 feet) should not be used.</p> <p>(d) Apply sealing compound to back of gasket and install gasket in channel.</p> <p align="center">CAUTION</p> <p>Ensure oil or grease does not contact gaskets.</p> <p>(11) Apply wire rope grease MIL-C-18458/MIL-G 23549 to hinges, guides brace link, dogs, and operating mechanism.</p> <p align="center">NOTE</p> <p>Operating handle or dog-spindles that penetrate through watertight closure frames or panels should not have grease fittings, in lieu of stick- packing plungers, for accomplishing packing of the spindle. A through spindle packed with general purpose grease is not watertight; therefore, grease fittings must be used only on non-penetrating spindles.</p> <p>(12) Lubricate dog or handwheel shafts:</p> <p>(a) Screw packing plunger several turns to force existing lubricating stick packing out and around spindle. If stick packing has been completely used up, the packing plunger will not screw in any further and stick packing must be replenished as follows:</p> <ol style="list-style-type: none"> 1 Remove packing plunger from spindle. 2 Insert stick packing in shaft opening. 3 Push stick packing deep into shaft opening using a 1/4-inch diameter rod.

Table 2-1. Preventive Maintenance Checks and Services - Cont.

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
31 Cont.					•		<p>Watertight Hatches and Scuttles - Cont.</p> <p><u>DOORS.HATCHES.SCUTTLES.MANHOLES, WINDOWS GROUP - CONT.</u></p> <p>4 Reinsert packing plunger in packing shaft opening.</p> <p>5 Tighten plunger with a screwdriver until excess packing appears around spindle.</p> <p>(b) If dogging mechanism does not penetrate the watertight boundary and is equipped with grease fittings, inject grease MIL-G-23549, until grease appears around spindle.</p> <p>NOTE</p> <p>If dog, handwheel, or handlever shafts tend to freeze, disassemble, clean and lubricate with a light coat of grease, MIL-G-23549, reassemble and adjust.</p> <p>(13) Apply a light coat of grease to threaded dogs and shafts. Turn dog nuts through entire threaded length to ensure smooth operation.</p> <p>(14) Lubricate remaining working parts and surfaces through grease fittings, with stick packing, or with a few drops of oil, as applicable.</p> <p>(15) Remove excess lubricant.</p> <p>(16) Test procedure.</p> <p>(a) Rub chalk on knife-edge.</p> <p>(b) Close and dog closure tightly. The gasket should seal tightly on knife-edge around entire periphery.</p> <p>CAUTION</p> <p>Compression of the gasket should not exceed 1/8-inch. Excess compression will damage the gasket.</p> <p>(c) Open closure and observe imprint of chalk on gasket. If chalk line is not continuous, adjustment or repair.</p> <p>(17) Apply a light coat of silicone compound, MIL-S-8660, to gasket.</p> <p>(18) Operate closure through full cycle of operation several times to ensure smooth and positive dogging action.</p> <p>(19) Inspect safety devices for the following as applicable:</p> <p>(a) Cracked or broken welds.</p>	

Table 2-1. Preventive Maintenance Checks and Services - Cont.

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
31 Cont.					•		Watertight Hatches and Scuttles - Cont.	<p align="center"><u>DOORS.HATCHES.SCUTTLES.MANHOLES, WINDOWS GROUP - CONT.</u></p> <p>(b) Missing or damaged safety arms.</p> <p>(c) Proper operation and condition of safety latches.</p> <p>(d) Proper installation of toggle pin/bolts and chains.</p> <p>(e) Proper installation and condition of safety stanchions and lifelines/rails.</p> <p>Check Motor Brushes.</p> <p align="center"><u>WARNING</u></p> <p>The clear-view screen is an electrically operated device. On EXTERIOR EMER LIGHTING PANEL NO. 2 set ROTARY CLEAR VIEW SCREEN and HEATER circuit breaker to OFF position and tag "Out of Service - Do Not Operate" before servicing either the control box or the screen unit.</p> <p>Caution should be exercised if this unit has been in continuous operation for an extended period of time. High present and burns could result.</p> <p>(1) Disconnect electrical connector from top of junction box.</p> <p>(2) Remove back cover and slotted head screws. Pull cover off motor.</p> <p>(3) Unscrew brush caps located on opposite sides of motor and pull brushes out of their holders.</p> <p>(4) Replace brushes when the carbon is less than 1/4-inch long.</p> <p>(5) Wipe off all dust and residue from brushes and brush holders before reassembly.</p> <p>(6) Insert brushes into holders.</p> <p>(7) Screw in brush caps.</p> <p>(8) Install cover on motor and secure with screws.</p> <p>(9) Connect electrical connector on the top of the junction box.</p> <p>(10) Turn circuit breaker to ON position. Remove tag.</p> <p>(11) Energize motor and check for proper operation.</p>
32					•		Rotary Window	

Table 2-1. Preventive Maintenance Checks and Services - Cont.

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
33	•						Main Switchboard	<p align="center"><u>ELECTRICAL POWER SYSTEM</u></p> <p>a. Visually inspect exterior of switchboard for damaged or missing circuit breakers, meters, controls or indicators.</p> <p>b. Press GND DETECT PUSH TO TEST buttons. Ensure lamps light.</p> <p>a. Visually inspect exterior of switchboard for damaged or missing circuit breakers, meters, controls or indicators.</p> <p>b. Press GND DETECT PUSH TO TEST buttons. Ensure lamps light.</p> <p>Inspect for broken and/or missing lens, bulbs and gaskets on light fixtures. Turn lights on and off to test lights for proper operation.</p> <p>Check for dents and corrosion on drum assembly and starter, cracked cover glass, burned out filament and damaged gaskets.</p> <p align="center"><u>WARNING</u></p> <p>Lock power supply in OFF position. Eye protection must be worn.</p> <p>Clean with a soft cloth. Do not use coarse scratchy material. Clean with silver polish if required.</p> <p>a. Turn the searchlight on and feel for air flow at exhaust opening to ensure the fan in the power supply is operating properly.</p> <p>b. Read elapsed time meter to determine if lamp should be replaced (1500 hours).</p> <p>c. Clean with damp, soft cloth.</p> <p>d. Remove dust accumulation from rectifier with a long fine brush or air blast.</p>
34	•						Emergency Switchboard	
35		•					Port Running Light, Star-board Running Light, Mast Head Lights, Stern Lights, Anchor Lights, Not-Under-Command Lights, Yardarm Blinker Lights	
36		•					XENON Searchlight	
37		•					XENON Searchlight, Reflector	
38		•					XENON Searchlight, Power Supply	

Table 2-1. Preventive Maintenance Checks and Services - Cont.

Item No.	D - Daily		W - Weekly			M - Monthly	Q - Quarterly	S - Semi-Annually	A - Annually	Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A					
39	•									XENON Searchlight Control Station	<p>ELECTRICAL POWER SYSTEM - CONT. Inspect for cleanliness, breakage and toggle switch movement. Have another soldier observe searchlight. Operate joystick to ensure searchlight moves in desired direction. Change SPEED control and operate joystick to ensure speed control and focus operate properly.</p> <p>Inspect for cleanliness, breakage and toggle switch movement. Ensure that navigation lights operate properly when switches are in the primary and secondary positions.</p> <p>Flood Lights Check for proper operation of switches and bulbs. Check for loose connections, cracked or missing lenses and secure mounting.</p> <p>Check for proper operation of switches and bulbs. Check for loose connections, cracked or missing lenses and secure mounting.</p> <p style="text-align: center;"><u>WARNING</u></p> <p>Arcing can cause a battery explosion resulting in personal injury.</p> <p>Observe NO SMOKING regulation. Wear safety glasses, rubber gloves, and rubber apron to prevent injury from sulfuric acid.</p> <p>a. Observe the following before performing test(s) on a fully charged battery:</p> <ol style="list-style-type: none"> (1) Do not connect the Load Test Cables to the battery with the Load Adjustment knob turned on. (2) Turn the Load Adjustment knob counterclockwise to the OFF position before the Load Test Cables are connected to the battery. (3) Never disconnect, shake, or twist the Load Test Cables during the load test; this also may cause arcing. (4) Stand clear while testing the battery. (5) Do not apply a load to a voltage source (battery) of more than 12 volts or tester may overheat. (6) To prevent damage to the Battery Load Tester, load may only be applied to a battery for 15 seconds; then wait 5 minutes to check the temperature before another test is made.
40	•									Navigation Panel Lights and Switches	
41	•										
42	•									Fluorescent and Incandescent Lights	
43	•									Battery Storage Group	
										Battery Testing	

Table 2-1. Preventive Maintenance Checks and Services – Cont.

Item No.	D – Daily		W- Weekly		M- Monthly	Q – Quarterly	S – Semi-Annually	A – Annually	Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A				
43		•							Battery Testing – Cont.	<p>ELECTRICAL POWER SYSTEM - CONT.</p> <p>(7) During operation, if the thermometer exceeds 130°C (266°F), turn the unit off and disconnect the leads to allow the unit to cool. Do not proceed with the test until the thermometer is below 130°C (266°F) or the Battery Load Tester may be damaged.</p> <p>(8) Load Adjustment knob may become hot after extended use.</p> <p>(9) The Battery Load Tester can be operated with the front panel in either the vertical or horizontal position.</p> <p>(10) Use this tester on only one battery at a time.</p> <p>b. Test fully charged battery as follows:</p> <p>(1) On battery load tester (1) turn load control knob (4) counterclockwise to OFF position.</p> <p>(2) Connect digital multimeter (5) test leads to battery terminals (red to positive and black to negative). Set the range switch to the 20VDC position.</p>

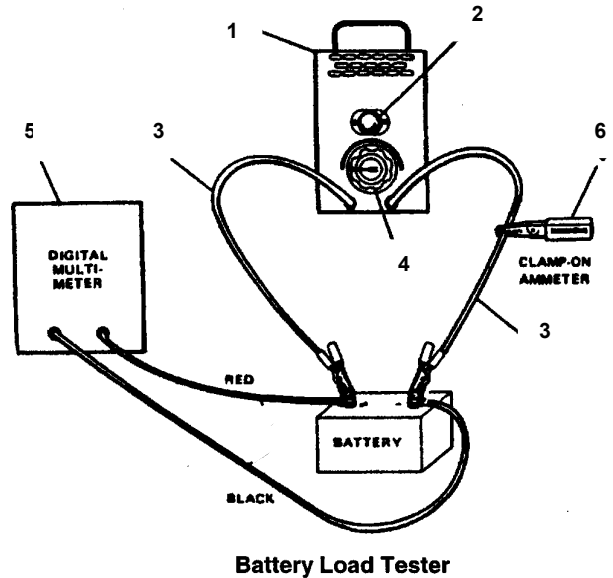


Table 2-1. Preventive Maintenance Checks and Services - Cont.

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure								
	D	W	M	Q	S	A										
43 Cont.		•					Battery Testing - Cont. (3) On AC/DC Clamp-on Ammeter (6) slide AC-DC Mode switch on handle to DC. Depress the power trigger switch and lock it on. Adjust the DC zero. (4) Connect the load tester leads (3) to battery. Open Ammeter (6) jaws and clamp Ammeter on negative cable so the Ammeter arrow points toward negative battery terminal. Position Ammeter so digital readout can be seen while performing test. <p style="text-align: center;">NOTE</p> To determine the 15-second test load amps for a battery, divide the cold cranking ampere rating of the battery <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>TYPE</th> <th>COLD CRANKING AMPS</th> <th>15-SECOND TEST LOAD AMPS</th> </tr> </thead> <tbody> <tr> <td>HR-8D</td> <td>920</td> <td>460</td> </tr> <tr> <td>T-12-120</td> <td>610</td> <td>305</td> </tr> </tbody> </table> (5) Turn load control knob (4) clockwise until Ammeter reads the 15-second test load amps for battery under test. Maintain amps for 15 seconds. Read battery voltage on multimeter (5) and record voltage. (6) Use thermometer (2) to monitor temperature of battery during test. (7) Turn load control knob (4) counterclockwise to OFF position. Disconnect leads. (8) Replace battery if battery voltage reading obtained in step (5) is less than 9 volts. a. Measure Portable Storage Battery Electrolyte Specific Gravity. <p style="text-align: center;">WARNING</p> Observe NO SMOKING regulations. Wear safety glasses, rubber gloves, and rubber apron to prevent injury from sulfuric acid. <p style="text-align: center;">NOTE</p> Batteries having float indicators do not require step a.(1) through (9); however state of charge must be noted.	TYPE	COLD CRANKING AMPS	15-SECOND TEST LOAD AMPS	HR-8D	920	460	T-12-120	610	305
TYPE	COLD CRANKING AMPS	15-SECOND TEST LOAD AMPS														
HR-8D	920	460														
T-12-120	610	305														
44		•					Battery Testing - Specific Gravity a. Measure Portable Storage Battery Electrolyte Specific Gravity. <p style="text-align: center;">WARNING</p> Observe NO SMOKING regulations. Wear safety glasses, rubber gloves, and rubber apron to prevent injury from sulfuric acid. <p style="text-align: center;">NOTE</p> Batteries having float indicators do not require step a.(1) through (9); however state of charge must be noted.									

Table 2-1. Preventive Maintenance Checks and Services - Cont.

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
44 Cont.		•					Battery Testing - Specific Gravity - Cont	<p align="center"><u>ELECTRICAL POWER SYSTEM - CONT.</u></p> <ol style="list-style-type: none"> (1) Remove battery vent and fill plugs. (2) Insert thermometer into one cell; ensure the thermostat bulb is completely immersed in electrolyte. (3) Draw electrolyte into hydrometer until float is floating freely and electrolyte in barrel is free of air bubbles. (4) Raise hydrometer to eye level and observe scale reading at bottom of curved surface of liquid. (5) Void hydrometer into cell from which electrolyte was drawn. (6) Observe temperature indicated on cell thermometer; correct specific gravity to not less than 1.180 at a temperature of 80°F. (7) Remove thermometer from cell. <p align="center">NOTE</p> <p align="center">This cell should not be selected for next temperature and specific gravity reading.</p> <ol style="list-style-type: none"> (8) Inspect electrolyte level in each cell; fluid should be just below bottom of filling tube or approximately 3/8-inch above top of separators. (9) Reinstall vent and fill plugs. (10) Repeat steps (1) through (9) for remaining batteries. (11) Return equipment to readiness condition. <ol style="list-style-type: none"> a. Perform Functional Test of Engine Starting Batteries. <ol style="list-style-type: none"> (1) Verify that engine can be started in accordance with operating instructions (refer to TM 55-1925-207-10). (2) Start engine. (3) Ensure batteries are capable of cranking and starting engine. (4) Stop engine. (5) If batteries are not functional: <ol style="list-style-type: none"> (a) Apply normal charge. (b) Repeat steps a.(1) through (4).
45		•					Battery Testing - Engine Starting	

Table 2-1. Preventive Maintenance Checks and Services - Cont.

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
45 Cont.		•					Battery Testing - Engine Starting-Cont. Switchboards and Load Centers	<p style="text-align: center;"><u>ELECTRICAL POWER SYSTEM - CONT.</u></p> (c) Replace batteries which are not functional. <p style="text-align: center;">NOTE</p> Perform this requirement monthly or when ground indicators indicate low resistance. <p>a. Preliminary:</p> (1) Ensure switchboard and associated system are not in operation. (2) Deenergize power sources and tag, "Out of Service - Do Not Operate". (3) Position all circuit breakers on panel to OFF. (4) Open and/or remove access covers, as required. Lock doors in full open position. <p style="text-align: center;"><u>WARNING</u></p> Voltage dangerous to life exists when the equipment is open and energized. Do not work alone. <p style="text-align: center;"><u>WARNING</u></p> Never use a vacuum cleaner to dean the electrical power system. DO NOT vacuum a live circuit. Failure to observe this WARNING could result in serious injury to personnel, even death. <p>b. Clean and inspect panels and associated equipment.</p> <p style="text-align: center;">NOTE</p> Perform the following for each panel: (1) Clean accessible areas, utilizing dusting brush; use 1-inch paintbrush to dean hard-to-reach areas. (2) Wipe accessible painted areas with a cloth; remove oil/grease stains with solvent. (3) Inspect interior and exterior, as appropriate, for the following: (a) Loose mechanical and electrical connections. (b) Missing hardware. (c) Kinks, sharp bends, or stresses in wiring.
46			•					

Table 2-1. Preventive Maintenance Checks and Services - Cont.

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
46 Cont.			•				Switchboards and Load Centers - Cont.	<p style="text-align: center;"><u>ELECTRICAL POWFR SYSTEM - CONT.</u></p> <p>(d) Broken or wrinkled cable sheath.</p> <p>(e) Cracked or frayed insulation.</p> <p>(f) Foreign matter.</p> <p>(g) Damaged or missing circuit breakers.</p> <p>(h) Missing, damaged, or loose switch label plates.</p> <p>(4) Remove, repair, or replace as necessary.</p> <p>(5) Where applicable, apply a light coat of grease to door hinges.</p> <p>(6) Close or reinstall access covers.</p> <p>(7) Remove safety tags.</p> <p>(8) Return equipment to readiness condition.</p> <p>a. Deenergize/disconnect battery chargers, where applicable, and tag "Out of Service - Do Not Operate."</p> <p style="text-align: center;"><u>WARNING</u></p> <p>Observe NO SMOKING regulations. Wear safety glasses, rubber gloves, and rubber apron to prevent injury from sulfuric acid.</p> <p>b. Clean and inspect battery.</p> <p>(1) Clean battery with a lint-free towel dampened in baking soda and distilled water solution.</p> <p>(2) Rinse battery with distilled water.</p> <p>(3) Dry battery with a lint-free towel.</p> <p>(4) Inspect case for cracks and evidence of leakage.</p> <p>(5) Inspect terminal posts, cable connectors, and cell connectors for loose and broken connections.</p> <p>(6) Apply thin film of grease to terminal posts, cable connectors, and cell connectors.</p> <p>(7) Repeat steps b.(1) through (6) for remaining batteries.</p> <p>(8) For installations having ventilation ducting, ensure air passages are free of obstruction.</p> <p>a. Deenergize circuit and tag "Out of Service - Do Not Operate."</p> <p>b. Disconnect battery charging cable from batteries.</p>
47		•					Battery Storage Group	
48				•			Battery Charger	

Table 2-1. Preventive Maintenance Checks and Services - Cont.

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
48 Cont.				•			Battery Charger - Cont.	<p><u>ELECTRICAL POWER SYSTEM - CONT.</u></p> <p>c. Clean and inspect Battery Charger.</p> <p>(1) Open or remove access cover.</p> <p>(2) Use voltage tester to ensure electrical circuits are deenergized.</p> <p style="text-align: center;"><u>WARNING</u></p> <p style="text-align: center;">High-voltage, high-capacitance components may contain voltages dangerous to life.</p> <p>(3) Discharge high-voltage, high-capacitance components to electrical ground.</p> <p>(4) Use dusting brush to dean hard-to-reach areas. </p> <p>(5) Inspect components for cracked or broken parts, discoloration, or evidence of overheating.</p> <p>(6) Inspect electrical and mechanical connections for tightness; use lockwashers or jamnuts to keep connections tight.</p> <p>(7) Inspect wiring for evidence of overheating, chafing, and frayed or chipped insulation.</p> <p style="text-align: center;"><u>NOTE</u></p> <p style="text-align: center;">The brown discoloration found on silver and silver-plated contacts is harmless. Silver or silver-faced contacts should not be dressed unless sharp projections extend beyond contact surface.</p> <p>(a) Inspect battery charging cable for fraying and corrosion.</p> <p>(b) Inspect battery port connectors for deterioration.</p> <p>(c) Inspect cable plugs for corrosion, pitting, and burrs.</p> <p>d. Measure Insulation Resistance.</p> <p style="text-align: center;"><u>CAUTION</u></p> <p style="text-align: center;">Do not use a megger to measure the insulation resistance of electronic control devices. Failure to observe this precaution may result in damage to rectifier units and other control elements.</p>

Table 2-1. Preventive Maintenance Checks and Services - Cont.

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
48 Cont.				•			Battery Charger - Cont.	<p><u>ELECTRICAL POWER SYSTEM - CONT.</u></p> <p>(1) Use multimeter to measure insulation resistance of charger input and output leads; minimum acceptable resistance is 1.0 megohm.</p> <p>(2) Close or reinstall access covers.</p> <p>(3) Remove tags and return equipment to readiness condition.</p>
49					•		XENON Searchlight	Lubricate searchlight IAW LO 55-1925-207-12.
50					•		Distribution Panels	<p>a. Clean and inspect distribution panels.</p> <p>(1) Deenergize power supplies to distribution panel and tag "Out of Service - Do Not Operate".</p> <p>(2) Open or remove access covers.</p> <p>(3) Test with voltage tester to ensure electrical circuits are deenergized.</p> <p>(4) Use dusting brush to loosen dirt.</p> <p>(5) Inspect electrical and mechanical fasteners; tighten loose connections. Use lockwashers or jamnuts where necessary to keep connections tight.</p> <p>NOTE</p> <p>Step (6) applies to units having spray-tight or drip-type shielding, with gasket material beneath the shield mounting bolts, to prevent the entry of liquid spray contamination within the unit.</p> <p>(6) Inspect the rubber/neoprene gasket material for damage, dry rot, or inadequate compression; replace if necessary.</p> <p>(7) Inspect fuse dips to ensure fuse retainers are in place.</p> <p>(8) Ensure overload devices are of the proper rating.</p> <p>(9) Inspect cable and component insulation for discoloration or deterioration.</p> <p>(10) Operate switches/circuit breakers to detect irregular or faulty operations.</p> <p>(11) Close or reinstall access covers.</p> <p>(12) Remove safety tags and energize power supplies.</p>

Table 2-1. Preventive Maintenance Checks and Services - Cont.

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure																																				
	D	W	M	Q	S	A																																						
61 Cont.							• Valves - Cont.	<p align="center">PIPING SYSTEMS - CONT.</p> <p>b. Check torque on bolted bonnet valves and gland bolts.</p> <table border="1"> <thead> <tr> <th>Valve Size</th> <th>Bolt Size</th> <th>Torque in ft-lb</th> </tr> </thead> <tbody> <tr> <td>1/4"- 3/8"-1/2"</td> <td>5/16-18</td> <td>18 - 20*</td> </tr> <tr> <td>3/4"</td> <td>3/8 -16</td> <td>26 - 30*</td> </tr> <tr> <td>1"</td> <td>1/2 -13</td> <td>65 - 75</td> </tr> <tr> <td>1-1/4" -1-1/2"</td> <td>9/16 -12</td> <td>100 -115</td> </tr> <tr> <td>2"</td> <td>5/8 -11</td> <td>140 - 50</td> </tr> </tbody> </table> <p>Full Port - Gate Valves</p> <table border="1"> <thead> <tr> <th>Valve Size</th> <th>Bolt Size</th> <th>Torque in ft-lb</th> </tr> </thead> <tbody> <tr> <td>1/4"- 3/8"</td> <td>5/16 -18</td> <td>18 - 20*</td> </tr> <tr> <td>1/2"</td> <td>3/8-16</td> <td>26 - 30 *</td> </tr> <tr> <td>3/4"</td> <td>1/2-13</td> <td>65 - 75</td> </tr> <tr> <td>1/4"</td> <td>9/16 -12</td> <td>100 - 115</td> </tr> <tr> <td>1-1/2"</td> <td>5/8-11</td> <td>140 - 150</td> </tr> </tbody> </table> <p>* May be increased 10 ft-lb if necessary.</p>	Valve Size	Bolt Size	Torque in ft-lb	1/4"- 3/8"-1/2"	5/16-18	18 - 20*	3/4"	3/8 -16	26 - 30*	1"	1/2 -13	65 - 75	1-1/4" -1-1/2"	9/16 -12	100 -115	2"	5/8 -11	140 - 50	Valve Size	Bolt Size	Torque in ft-lb	1/4"- 3/8"	5/16 -18	18 - 20*	1/2"	3/8-16	26 - 30 *	3/4"	1/2-13	65 - 75	1/4"	9/16 -12	100 - 115	1-1/2"	5/8-11	140 - 150
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1/4"	9/16 -12	100 - 115																																										
1-1/2"	5/8-11	140 - 150																																										
62							• Hot Water Heater	Clean lime scale for elements using UN.LIME® delimer.																																				
63	•						Head Set- Chest Set	<p align="center">INTERIOR COMMUNICATIONS SYSTEM</p> <p>a. Visually inspect head set connections to the chest set for frayed wiring on loose connections. Inspect ear cups for tears and cleanliness. Inspect neck straps for fraying or missing fasteners.</p> <p>b. Press pushbutton on mouthpiece and release. Observe pushbutton goes in and out.Visually inspect wire from chest set to jack plug for loose connections, cracks on damaged insulation.Check the two-way voice capability of the head set.Select another station on the system and conduct a two-way conversation. Transmission and receptions should be clear, undistorted and easily understood.</p>																																				
64	•						Sound Powered	<p>a. Visually inspect wiring for loose connections. Tighten Telephones as necessary.Visually inspect exterior for damage or dirt buildup.Clean using a soft, clean cloth.</p> <p>b. Inspect mounting hardware for tightness. Tighten as necessary.</p>																																				
65		•					Sound Powered Telephone	<p>c. Check mechanical operation of each rotary switch. Check the two-way voice capability of the unit. Select other stations and conduct a two-way conversation.</p> <p>a. Transmissions and receptions should be clear, undistorted and easily understood.</p> <p>b. Check the audible and light indicators, where applicable.</p> <p>c. Use multimeter to conduct continuity checks as required.</p>																																				

Table 2-1. Preventive Maintenance Checks and Services - Cont.

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
66			•				Intercommuni-cations Station	<p align="center">INTERIOR COMMUNICATIONS SYSTEMS-CONT.</p> <p>a. Clean the exterior of the equipment with a vacuum cleaner, soft hand brush, or cloth.</p> <p>b. Remove the unit (para.2-147)and visually inspect all wiring.</p> <p>c. Watch for loose connections.Do not unnecessarily move wiring or parts.Resolder or tighten as required.</p> <p>d. Inspect and tighten loose hardware.</p> <p>e. Check the mechanical operation of each rotary switch.</p> <p>f. Check each pushbutton switch for smooth mechanical operation. Clean dirt off shafts and lightly lubricate with lubricant conforming to MIL-S-8660.</p> <p>g. Perform operational test (para. 2-146).</p> <p>h. Use multimeter to conduct continuity checks as required.</p>
67			•				Intercommuni-cations Station Test Fixture	<p>i. Install unit (para. 2-147).</p> <p>a. Clean the exterior of the equipment with a vacuum cleaner, soft hand brush, or cloth.</p> <p>b. Check the mechanical operation of each switch and pushbutton switch for smooth mechanical operation. Clean dirt off shafts and lightly lubricate pushbutton switches with lubricant conforming to MIL-S-8660.</p> <p>c. Perform operational test (para. 2-146).</p> <p>d. Use multimeter to conduct continuity checks as required.</p>
68			•				Arms Storage and Radio Room Alarm System	<p>a. Inspect alarm switchboard for obvious damage. Press ALARM TEST button.Verify alarm indications.</p> <p>b. Open radio room and fan room doors to generate alarms. Ensure light and buzzer operate at alarm switchboard.</p> <p>c. Set radio room rotary switch to OFF position. Verify alarm is silenced.</p> <p>d. Use multimeter to conduct continuity checks as required.</p>
69			•				Engine Order Telegraph	<p>a. Conduct test between pilothouse and EOS to ensure communication.Move selector through each position ensuring corresponding indicator lights and bells. Verify operation of wrong direction alarm system.</p> <p>b. Use multimeter to conduct continuity checks as required.</p>

Table 2-1. Preventive Maintenance Checks and Services - Cont.

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure																			
	D	W	M	Q	S	A																					
70			•				<p>General Alarm System</p> <p>INTERIOR COMMUNICATIONS SYSTEMS - CONT.</p> <p>a. Inspect general alarm operators, bells and rotating beacons for obvious damage.</p> <p>b. Operate general alarm switches in pilothouse and 02 level passageway. Verify operation of all bells and rotating beacons.</p> <p>c. Use multimeter to conduct continuity checks as required.</p>																				
71*							<p>Fire Fighting Pump, PE-250 Fresh Water Flush*</p> <p>* After each use with contaminated or salt water, wash down and flush out the pump with clean, non-contaminated, fresh water.</p>																				
72		•					<p>Wires and Cables</p> <p>a. Visually inspect all wires and cables for damaged insulation, cuts, broken leads, and fraying.</p> <p>b. Check for loose connections.</p>																				
73			•				<p>Fire Fighting Pump, PE-250, Battery</p> <p>WARNING</p> <p>Observe NO SMOKING regulations. Wear safety glasses, rubber gloves, and rubber apron to prevent injury from sulfuric acid.</p> <p>a. Check and inspect battery.</p> <p>NOTE</p> <p>Check battery monthly or after each use.</p> <p>(1) Remove vent caps and check individual cell</p> <p>(2) Place hydrometer in each cell and take reading and recharge if required. The following table provides ranges of specific gravity for a cell of 80°F (26.7°C).</p> <p>Cold and Temperate Climates</p> <table border="0"> <tr> <td>1.265 S.P. Gr.</td> <td>100 percent charged</td> </tr> <tr> <td>1.225 S.P. Gr.</td> <td>75 percent charged</td> </tr> <tr> <td>1.190 S.P. Gr.</td> <td>50 percent charged</td> </tr> <tr> <td>1.155 S.P. Gr.</td> <td>25 percent charged</td> </tr> <tr> <td>1.120 S.P. Gr.</td> <td>Discharged</td> </tr> </table> <p>Tropical Climates</p> <table border="0"> <tr> <td>1.225 S.P. Gr.</td> <td>100 percent charged</td> </tr> <tr> <td>1.185 S.P. Gr.</td> <td>75 percent charged</td> </tr> <tr> <td>1.150 S.P. Gr.</td> <td>50 percent charged</td> </tr> <tr> <td>1.115 S.P. Gr.</td> <td>25 percent charged</td> </tr> <tr> <td>1.080 S.P. Gr.</td> <td>Discharged</td> </tr> </table>	1.265 S.P. Gr.	100 percent charged	1.225 S.P. Gr.	75 percent charged	1.190 S.P. Gr.	50 percent charged	1.155 S.P. Gr.	25 percent charged	1.120 S.P. Gr.	Discharged	1.225 S.P. Gr.	100 percent charged	1.185 S.P. Gr.	75 percent charged	1.150 S.P. Gr.	50 percent charged	1.115 S.P. Gr.	25 percent charged	1.080 S.P. Gr.	Discharged
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Table 2-1. Preventive Maintenance Checks and Services - Cont.

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
73 Cont.			•				Fire Fighting Pump, PE-250, Battery-Cont.	<p align="center"><u>PORTABLE PUMPS - CONT.</u></p> <p>(3)Check battery terminals and cables for cleanliness. If corrosion is indicated, proceed as follows: (a)Remove battery cables from terminals. (b)Using a wire brush, clean cable terminals (c)Coat battery terminals with grease.</p> <p align="center"><u>CAUTION</u></p> <p>Connect positive battery cable to positive (+) terminal on battery and negative battery cable to negative (-)terminal on battery.</p> <p>(d)Connect battery cables.</p>
74			•				Fire Fighting Pump, PE-250, Fan Belt Tension	<p align="center">NOTE</p> <p>Check monthly or after each use.</p> <p>a. Check fan belt for wear and proper tension. b. Adjust fan belt (para. 2-154).</p>
75			•				Priming Pump Oil Level Check	<p align="center">NOTE</p> <p>Check monthly or after each use.</p> <p>a. Remove dip stick and check oil level. b. If oil is required, remove filler cap and add oil per MIL-L-46152.</p>
76						•	Carburetor	Adjust carburetor (para.2-154). Adjustment
77						•	Ignition Timing	NOTE
78						•	Fire Fighting Pump, PE-250, Spark Plugs	<p>Set timing annually or whenever starting becomes difficult. Set Ignition timing (para.2-154).</p> <p align="center">NOTE</p> <p>Replace spark plugs annually or whenever starting becomes difficult.</p> <p>a. Inspect spark plugs. (1) Remove spark plug cables from spark plugs. (2) Unscrew and remove spark plugs.</p>

Table 2-1. Preventive Maintenance Checks and Services - Cont.

Item No.	Interval						Item To Be Inspected/ Serviced	Procedure
	D	W	M	Q	S	A		
78 Cont.							<ul style="list-style-type: none"> Fire Fighting Pump, PE-250, Spark Plugs - Cont. 	<p align="center"><u>PORTABLE PUMPS - CONT.</u></p> <p align="center">NOTE</p> <p>Spark plugs whose electrodes are tan in color need not be replaced.</p> <p>(3) Spark plugs should be replaced if the electrodes are black or white or if porcelain is cracked.</p> <p>Visually inspect for leakage.</p> <p>Visually inspect all parts for wear and damage.</p> <p>Visually inspect impeller, rotary seal, and screen for wear and damage.</p> <p align="center"><u>ELECTRIC MOTORS</u></p> <p>a. Inspect/clean motor casing.</p> <p>b. Check for damage and corrosion.</p> <p>c. Inspect motor for chipped paint or excessive metal wear.</p> <p>d. Check for loose or broken pump/motor coupling.</p> <p>a. Inspect for security, cracks, and deterioration of electrical wiring.</p> <p>b. Inspect motor electrical wiring and connections.</p> <p>c. Check for evidence of burning or overheating of wire insulation.</p> <p>d. Check security of cable harnesses between power.</p>
79							<ul style="list-style-type: none"> Water Seal 	
80			•				<ul style="list-style-type: none"> Centrifugal Pump 	
81			•				<ul style="list-style-type: none"> Centrifugal Pump, Electric Submersible 	
82				•			<ul style="list-style-type: none"> Electric Motors 	
83							<ul style="list-style-type: none"> Electric Motors 	

SECTION IV. UNIT TROUBLESHOOTING

2-11. Symptom Index. Both a symptom index and troubleshooting table are provided. The symptom index will help

you locate you locate information you need for troubleshooting

SYMPTOM INDEX

Troubleshooting Procedure (Table 2-2)

BATTERY

- Will not charge Item 36
- Will not hold charge Item 37

BATTERY CHARGER

- No output Item 35

DOOR, HAND HYDRAULIC (WATERTIGHT)

- Door will not open under full power Item 26
- Door moves very slowly and with jerky motion Item 27
- Long length of time to reverse direction Item 28

DRYER, AUTOMATIC

- Motor does not run Item 22
- Heater element does not heat Item 23
- Heater element shuts of prematurely Item 24
- Heater element cycles on/off Item 25

ELECTRICAL RECEPTACLE

- No power output Item 32

ELECTRIC MOTOR

- Pump motor not running Item 66
- Noisy motor operation Item 67

HOT WATER HEATER

- No hot water Item 46
- Water temperature below setting at all times Item 47
- Relief valve discharges continuously Item 48

HYDROPNEUMATIC TANK LOW PRESSURE Item 43

LOAD CENTERS/POWER DISTRIBUTION PANELS

- No power Item 30
- Fluorescent, incandescent or floodlight does not work Item 31

MOTOR CONTROLLERS

- No power Item 29

SYMPTOM INDEX (cont)

Troubleshooting
Procedure
(Table 2-2)

NAVIGATION LIGHTS

- Light does not work - no power Item 33
- Light does not work - power on Item 34

PORTABLE PUMPS

- Lack of fuel Item 53
- Weak or no ignition spark Item 54
- Engine flooded Item 55
- Poor compression Item 56
- Lacks power Item 57
- Runs rough Item 58
- Poor or no acceleration Item 59
- Pings under heavy load or full throttle Item 60
- Engine stops Item 61
- Pump primes slowly or not at all Item 62
- Magnetic clutch slipping Item 63
- Pump will not pump water or is not pumping enough Item 64
- Constant vibration Item 65

PROPORTIONING BROMIDE FEEDER

- Inadequate or no Bromide residual in fresh filled potable water tank Item 44
- Inadequate or no Bromide being fed by dual feed Bromide feeder Item 45

SOUND POWERED TELEPHONES

- Will not receive or transmit Item 49
- Low or erratic transmission or reception Item 50
- Will not transmit ring to other telephones Item 51
- Will not receive ring Item 52

TANK LEVEL INDICATOR

- Receiver meters not operating Item 1

VALVES AND STRAINERS

- Valve gasket leaking Item 38
- No flow or limited flow through strainer Item 39
- Strainer leaking Item 40
- Sticking valve stem(s) Item 41
- Valve leaking Item 42

SYMPTOM INDEX (cont)

Troubleshooting
Procedure
(Table 2-2)

WASHER, AUTOMATIC

Excessive vibration	Item 16
No agitation	Item 17
No cold water	Item 18
No hot water	Item 19
Timer does not advance	Item 20
Water does not empty	Item 21

WORKSHOP EQUIPMENT

Drill Press

Noisy operation	Item 2
Drill bit burns or smokes	Item 3
Excessive drill runout or wobble	Item 4
Drill binds in workpiece	Item 5
Workpiece torn loose from hand	Item 6

Bench Grinder

Bench grinder does not grind evenly	Item 7
Bench grinder does not operate	Item 8

Arc Welding machine

No weld output; unit completely inoperative; pilot light PL1 off	Item 9
No weld output; unit completely inoperative; fan motor FM running; pilot light PL1 on	Item 10
Low output with no control	Item 11
Erratic weld output	Item 12
Low frequency; difficulty in establishing an arc	Item 13
No high frequency	Item 14
No power output at 115 VAC receptacle; weld output available	Item 15

2-12. Troubleshooting. Table 2-2 lists the common fault conditions that may be found during operation and maintenance of equipment. Look for causes and do corrective actions in order listed. This manual cannot list every symptom that may

show up, and it cannot list all possible causes and corrective actions. If a symptom is not listed, or if it continues after performing corrective action(s), notify your supervisor.

Table 2-2. Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
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TANK LEVEL INDICATORS

1. Receiver meters not operating.

STEP 1. Check for defective printed circuit cards.

Replace defective card(s) (para. 2-16, 2-17, and 2-18).

WORKSHOP EQUIPMENT

DRILL PRESS

2. Noisy operation.

STEP 1. Check belt tension.
Adjust tension.

STEP 2. Check for dry spindle.
Lubricate spindle in accordance with LO 55-1905-207-12.

STEP 3. Check for loose spindle or motor pulley(s).
Tighten setscrews in pulley(s).

3. Drill bit burns or smokes.

STEP 1. Check speed.
Change speed, if applicable.

STEP 2. Check for chips not coming out of hole.
Retract bit frequently to clear chips.

STEP 3. Check for dull bit.
Sharpen or replace bit.

STEP 4. Check bit for dryness.
Lubricate bit.

Table 2-2. Troubleshooting. (cont)

MALFUNCTION**TEST OR INSPECTION****CORRECTIVE ACTION**

STEP 5. Check rotation of bit (running backwards).
Ensure motor rotation is correct.

4. Excessive drill runout or wobble.

STEP 1. Check for bent bit.
Replace with straight bit.

STEP 2. Check for worn spindle bearings.
Replace bearings.

STEP 3. Check that bit is properly installed in chuck.
Install bit correctly.

STEP 4. Check that chuck is properly installed.
Install chuck correctly.

5. Drill binds in workpiece.

STEP 1. Check workpiece for pinching bit or excessive feed pressure.
Support or clamp workpiece.

STEP 2. Check belt tension.
Adjust tension.

6. Workpiece torn loose from hand.

STEP 1. Check workpiece is supported or clamped properly.
Support or clamp workpiece.

BENCH GRINDER

7. Bench grinder does not grind evenly.

STEP 1. Check for loose, out-of-round, or grooved grinding wheel(s).
a. Tighten grinding wheel mounting nut.
b. Dress grinding wheel (para. 2-20).

Table 2-2. Troubleshooting. (cont)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

8. Bench grinder does not operate.

STEP 1. Check circuit breaker.

Reset circuit breaker.

ARC WELDING MACHINE

9. No weld output; unit completely inoperative; pilot light PL1 off.

STEP 1. Check for line switch and/or circuit breaker in OFF position.

Place applicable switch/breaker to ON position.

STEP 2. Check for circuit breaker CB1.

Reset CB1.

10. No weld output; unit completely inoperative; fan motor FM running; pilot light on.

STEP 1. Check position of OUTPUT/CONTACTOR switch.

Place switch to On position.

STEP 2. Check position of RANGE switch.

Place switch to desired position.

STEP 3. Check for thermal shutdown.

Allow a cooling period of 15 minutes.

11. Low output with no control.

STEP 1. Check position of AMPERAGE ADJUSTMENT switch.

Place switch to PANEL position.

12. Erratic weld output.

STEP 1. Check electrode.

Replace electrode.

13. Low frequency; difficulty in establishing an arc.

STEP 1. Check spark gap.

Adjust spark gap (para. 2-23).

Table 2-2. Troubleshooting. (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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STEP 2. Check for low setting on HIGH FREQUENCY INTENSITY control behind BTM panel.

Increase setting.

14. No high frequency.

STEP 1. Check HIGH FREQUENCY Switch in OFF positions.

Position switch to desired position.

15. No power output at 115 Vac receptacle; weld output available.

STEP 1. Check position of AMPERAGE ADJUSTMENT switch.

Place switch to PANEL position.

STEP 2. Check for open circuit breaker 15.

Reset circuit breaker.

LAUNDRY EQUIPMENT

WASHER. AUTOMATIC

16. Excessive vibration.

STEP 1. Check for unbalanced load in tub.

Redistribute load.

17. No agitation.

STEP 1. Check for loose or broken wires.

Tighten or replace wires.

18. No cold water.

STEP 1. Check cold water supply valve.

Open valve.

19. No hot water.

STEP 1. Check hot water supply valve.

Open valve.

STEP 2. Clogged pressure hose.

Clean hose.

Table 2-2. Troubleshooting. (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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STEP 3. Check for loose or broken wires.

Tighten or replace wires.

20. Timer does not advance.

STEP 1. Timer is designed to pause during filling.

Allow for completion of fill cycle.

STEP 2. Check water level.

Timer pauses until water level is correct.

21. Water does not empty.

STEP 1. Check for crimped drain hose.

Straighten hose.

STEP 2. Check for obstruction in outer tube outlet hose.

Clean hose.

DRYER. AUTOMATIC

22. Motor does not run.

STEP 1. Check for tripped circuit breaker.

Reset circuit breaker in Main Deck Distribution Panel # 3.

STEP 2. Check lint filter.

Remove lint.

23. Heater element does not heat.

STEP 1. Check for tripped circuit breaker.

Reset circuit breaker.

STEP 2. Check for defective heater element.

Replace heater element.

Table 2-2. Troubleshooting. (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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24. Heater element shuts off prematurely.

STEP 1. Check exhaust system for proper installation.

Correct as required.

25. Heater element cycle on/off.

STEP 1. Check lint filter.

Clean lint filter.

STEP 2. Check for lint in internal dryer ductwork.

Clean ductwork.

STEP 3. Check for lint in external exhaust system.

Clean exhaust system.

DOORS. HATCHES. SCUTTLES. MANHOLES. AND WINDOWS

DOOR. HAND HYDRAULIC (WATERTIGHT)

26. Door will not open under full power.

STEP 1. Check for door closing too far into tapered seat.

Set stop bolts so brass overlaps steel seat by 3/4-inch minimum to 1-inch maximum.

27. Door moves very slowly and with jerky motion.

STEP 1. Check relief valve setting.

Set relief valve between 500 and 1000 psi.

Adjust screw will extend to 1 1/4-inch above valve block.

STEP 2. Check proper seating of quad check balls.

Reseat stainless steel balls using hammer and brass rod.

STEP 3. Check for oil leaking into tank or shuttle unit bleed valve open too far.

Close needle valves until they bottom completely, then back off 1/8 to 1/4 turn.

Table 2-2. Troubleshooting. (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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STEP 4. Check for air in hydraulic system.

- a. Check level of oil in expansion tank.
- b. Fill tank to required level, if applicable.
- c. Bleed off air at all high points.

28. Long length of time to reverse direction.

STEP 1. Check for air in system.

See Item 27, Step 4, a, b, and c.

ELECTRICAL POWER SYSTEM

MOTOR CONTROLLERS

29. No power.

STEP 1. Check for open fuses.

Replace fuses.

(Refer to Index for procedure(s) for particular motor controller fuse(s)).

STEP 2. Check for open circuit breaker.

Reset circuit breaker.

STEP 3. Check for loose or broken electrical power cables.

Tighten or repair/replace broken electrical power cables.

LOAD CENTERS/POWER DISTRIBUTION PANELS

30. No power.

STEP 1. Check for open circuit breaker.

Reset circuit breaker.

STEP 2. Check for loose or broken electrical power cable.

Tighten or repair/replace electrical power cables.

Table 2-2. Troubleshooting. (cont)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

STEP 3. Using a multimeter, check for broken electrical power cable between main switchboard and power distribution panel.

Repair/replace electrical power cable.

31. Fluorescent, incandescent or floodlight does not work.

STEP 1. Check fluorescent tube or light bulb.

Replace burnt out tube or bulb.

STEP 2. Check circuit breaker at power distribution panel.

Reset circuit breaker.

STEP 3. Using a multimeter, check electrical power cables between power distribution panel and fixture.

Repair/replace electrical power cable.

STEP 4. Using a multimeter, check electrical power cables between main switchboard and power distribution panel.

Repair/replace electrical power cable.

ELECTRICAL RECEPTACLE

32. No power output.

STEP 1. Using a multimeter, check electrical power cable between power distribution panel and receptacle.

Repair/replace electrical power cable, if applicable.

NAVIGATION LIGHTS

33. Light does not work, no power.

STEP 1. Check for blown fuse (if applicable) in light panel.

Replace fuse.

STEP 2. Use a multimeter and check for defective switch (if applicable) in light panel.

Replace switch.

STEP 3. Check electrical power to light panel.

Table 2-2. Troubleshooting. (cont)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

34. Light does not work, power on.

STEP 1. Check for defective bulb.

Replace bulb (para. 2-71 or 2-72).

BATTERY CHARGER

35. No output.

STEP 1. Check for blown fuse.

Replace fuse (para. 2-108).

STEP 2. Check for loose or damaged electrical cables.

Tighten or repair/replace.

BATTERY

36. Battery will not charge.

STEP 1. Check terminals.

Clean terminals.

STEP 2. Check electrolyte.

Add electrolyte as required.

STEP 3. Check for defective cells.

Use a multimeter and check cell voltage. Voltage reading should be 9 to 12 volts.

Replace battery (para. 2-114).

37. Battery will not hold charge.

STEP 1. Check electrolyte.

Use a hydrometer to check specific gravity of electrolyte.

Specific gravity should not be less than 1.180.

STEP 2. Check for dead cell.

Use a multimeter and check each cell. Voltage reading should be 9 to 12 volts.

Replace battery (para. 2-114).

Table 2-2. Troubleshooting. (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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PIPING SYSTEMS

VALVES and STRAINERS

38. Valve gasket leaking.

STEP 1. Check for security of fittings.

Replace gasket or valve.

(Refer to Index for procedure(s) for particular valve.)

39. No flow or limited flow through strainer.

STEP 1. Check for clogged strainer.

a. Clean strainer.

b. Replace strainer element or basket.

c. Replace strainer.

(Refer to Index for procedure(s) for particular strainer.)

40. Strainer leaking.

STEP 1. Check for clogged strainer.

a. Clean strainer.

b. Replace strainer element or basket.

(Refer to Index for procedure(s) for particular strainer.)

STEP 2. Check for worn gasket or preformed packing.

a. Replace gasket or packing.

b. Replace strainer.

(Refer to Index for procedure(s) for particular strainer.)

41. Sticking valve stem(s).

STEP 1. Check for sticking valves.

NOTE

The main cause of a sticking valve stem is overtight packing.

Table 2-2. Troubleshooting. (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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- a. To loosen the stem, slack up the gland.
 - b. Check that the gland is not binding the stem.
 - c. If this is the case, correct the position of the gland by adjusting the gland nuts.
 - d. Paint or other foreign matter on the valve stem can cause sticking.
 - e. Remove paint or foreign matter by cleaning.
 - f. If the valve is jammed open or shut, release the jam by using the handwheel.
 - g. If the valve stem is bent or the threads are burred/stripped, repair/replace valve.
- (Refer to Index for procedure(s) for particular valve.)

42. Valve leaking.

STEP 1. Check for leakage through stuffing-box packing.

- a. Tighten the gland.
- b. If the gland has entered the stuffing-box to an extent that there is no remaining adjustment, repack packing gland.

(Refer to Index for procedures for particular valve.)

STEP 2. Check for leakage across valve seats.

NOTE

Leakage across the valve seats may be due to foreign matter lodged in the seats.

Replace/repair valve. (Refer to Index for procedures for particular valve.)

43. Hydropneumatic tank low pressure.

STEP 1. Check for defective hydropneumatic pressure tank.

Inspect for leaks, excessive corrosion, security, and general condition of tank.

STEP 2. Check valve jammed by foreign matter.

- a. Remove valve.
- b. Inspect and clean as necessary.

Table 2-2. Troubleshooting. (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
STEP 3. Check for malfunctioning pressure gauge.		Replace faulty gauge.
STEP 4. Check for defective pressure switch.		Replace pressure switch (para. 2-140).
<u>PROPORTIONING BROMIDE FEEDER</u>		
44. Inadequate or no Bromide residual in freshly filled potable water tank.		
STEP 1. Check testing is being conducted properly.		Retest using proper testing procedures.
STEP 2. Check DPD tablets are within manufacturer's date.		Discard outdated DPD tablets and retest with fresh DPD tablets.
STEP 3. Check potable water for contamination.		Cleanse system and raise Bromide residual with recirculating Bromide feeder.
45. Inadequate or no Bromide being fed by dual feed Bromide feeder.		
STEP 1. Refer to Item 44, step 1.		
STEP 2. Refer to Item 44, step 2.		
STEP 3. Check for dual feed valve in proper position.		Turn handle to proper position.
STEP 4. Check for defective wiring and loose connections.		Repair or replace wiring and tighten connections.
STEP 5. Cartridge is exhausted (time totalizer denotes 0 hours) or overaged.		Replace cartridge (para. 2-141).
STEP 6. Air pocket in feed assembly.		Bleed air.

Table 2-2. Troubleshooting. (cont)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

STEP 7. Reduced flow in line between bypass header assembly and feeder assembly.

Free line(s) of obstruction(s).

HOT WATER HEATER

46. No hot water.

STEP 1. Check thermostat adjustment.

Adjust thermostat (para. 2-142).

47. Water temperature below setting at all times.

STEP 1. Check thermostat adjustment.

Adjust thermostat (para. 2-142).

48. Relief valve discharges continuously.

STEP 1. Check water pressure (over 125 psi).

Adjust water pressure.

INTERIOR COMMUNICATIONS SYSTEMS

SOUND POWERED TELEPHONES

49. Will not receive or transmit.

STEP 1. Check for defective handset.

Replace handset.

50. Low or erratic transmission or reception.

STEP 1. Check for defective handset.

Replace handset.

51. Will not transmit ring to other telephones.

STEP 1. Check for loose or broken wiring or connections.

Tighten or replace loose or broken wiring or connections.

Table 2-2. Troubleshooting. (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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52. Will not receive ring.

STEP 1. Check for loose or broken wiring.

Tighten or replace loose or broken wiring.

PORTABLE PUMPS

FIRE FIGHTING PUMP (PE-250)

53. Lack of fuel.

STEP 1. Check for empty fuel tank.

Fill fuel tank.

STEP 2. Check for pinched or disconnected fuel line.

Repair or replace fuel line.

STEP 3. Check for clogged fuel line connector.

Remove connection and clean.

54. Weak or no ignition spark.

STEP 1. Ignition not turned on.

Turn on ignition.

STEP 2. Check for wet or fouled spark plug(s).

Dry and/or clean spark plug(s).

STEP 3. Check for broken spark plug electrode(s).

Replace spark plug(s) (para. 2-156).

STEP 4. Check for loose or broken spark plug wires.

Tighten or replace spark plug wires.

55. Engine flooded.

STEP 1. Check setting of metering diaphragm lever.

Adjust lever to proper setting.

Table 2-2. Troubleshooting. (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
STEP 2. Check for faulty fuel delivery system to carburetor.		Fill fuel tank, replace or repair lines, clean connector.
56. Poor compression.	STEP 1. Check for loose spark plugs.	Tighten spark plugs.
57. Lacks power.	STEP 1. Check for proper fuel mixture.	Empty fuel tank into proper container and fill tank with proper fuel mixture.
STEP 2. Check for improperly adjusted carburetor.		Adjust carburetor (para. 2-154).
58. Runs rough.	STEP 1. Check for fouled or wrong type of spark plugs.	Replace spark plugs (para. 2-156).
59. Poor or no acceleration.	STEP 1. Check for closed choke.	Open choke.
STEP 2. Check for improperly adjusted carburetor.		Adjust carburetor (para. 2-154).
60. Pings under heavy load or full throttle.	STEP 1. Check ignition timing.	Reset ignition timing (para. 2-154).
STEP 2. Check for wrong type of spark plug(s).		Replace spark plug(s) (para. 2-156).

Table 2-2. Troubleshooting. (cont)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

61. Engine stops.

STEP 1. Check for empty fuel tank.

Fill fuel tank.

STEP 2. Check for blocked exhaust port and/or muffler.

Remove blockage.

62. Pump primes slowly or not at all.

STEP 1. Check for defective check valve.

Replace check valve (para. 2-156).

63. Magnetic clutch slipping.

STEP 1. Check fan belt tension.

Adjust fan belt tension (para. 2-154).

64. Pump will not pump water or is not pumping enough.

STEP 1. Check for clogged discharge valve.

Remove and clean discharge valve (para. 2-156).

CENTRIFUGAL PUMP

65. Constant vibration.

STEP 1. Check for air leak.

Tighten all connectors on suction lines.

ELECTRIC MOTORS

66. Pump motor not running.

STEP 1. Check for open motor circuit breaker (or switch).

Reset circuit breaker (or switch).

STEP 2. Check for defective motor.

Replace motor.

(Refer to Index for procedure(s) for particular motor.)

Table 2-2. Troubleshooting. (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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67. Noisy motor operation.

STEP 1. Check for worn or dry motor bearings.

a. Grease bearings (LO 55-1925-207-12).

b. Replace motor.

(Refer to Index for procedure(s) for particular motor.)

STEP 2. Check for worn or loose pump/motor coupling.

Tighten or replace pump/motor coupling.

(Refer to Index for procedure(s) for particular motor.)

STEP 3. Check for loose or broken mounting bolts.

Tighten or replace mounting bolts.

(Refer to Index for procedure(s) for particular motor.)

SECTION V. UNIT MAINTENANCE PROCEDURES

2-13. Detailed Procedures. Information to perform unit maintenance tasks, in accordance with the Maintenance Allocation Chart (MAC), is provided. The

procedures for each separate MAC begin with a boxed heading showing.

MAINTENANCE OF...

MAINTENANCE OF TANK LEVEL INDICATORS

2-14. Adjust Receiver Devices.

This task covers: a. Adjustment/Calibration

INITIAL SETUP

Tools

Materials/Parts

Warning tags, Item 1, Appendix D

Equipment Condition

On ENG RM EMER DIST PANEL NO. 1 set TLI SYSTEM circuit breaker to OFF and tag "Out of Service - Do Not Operate." Service, inspection, and test in accordance with PMCS, Table 2-1.

WARNING

When performing adjustment and alignment procedures in fluid tanks that contain or have contained inflammable or explosive liquids, ground the tank and observe all precautions for a hazardous area.

ADJUSTMENT

NOTE

For this procedure, adjustment/calibration is considered one and the same.

1. Receiver Panel Zero Adjustment.

WARNING

Hold door while loosening screws. Door may swing open causing personal injury.

a. Loosen captive screws securing front cover of receiver panel and swing the cover open.

b. Remove the control module (with the same numerical designation as the meter being calibrated) from the card rack.

c. Using a screwdriver, adjust the ZERO adjustment screw at the rear of the meter to its mid-position (if meter has no O-mark) or to the setting that causes deflection to the O-mark (if meter has one).

NOTE

Always read meter from the same viewing point to avoid errors.

Figure 2-1 shows the location of the ZERO adjustment screw on an edgeview meter installed in a receiver module. Receiver panel edgeview meters have no receiver housing as indicated on the illustration, but do have the ZERO adjustment screw in the same location. If there is no O-mark, remove the four mounting screws securing the face frame and glass to the meter (Figure 2-2) and make a pencil mark at the location of the meter needle.

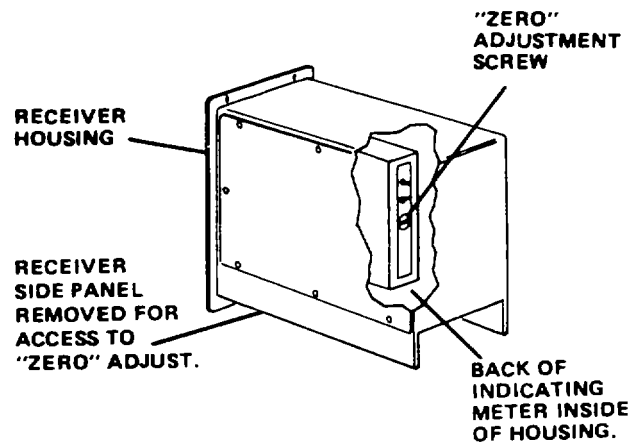


Figure 2-1. Receiver Panel Zero Adjustment

d. Return the control module printed circuit board to the card rack, but do not replace the face frame and glass until completion of meter adjustment procedures.

2. Receiver Module Zero Adjustment.

- a. Disconnect cables to the receiver module.
- b. Remove receiver module from its mounting rack.
- c. Remove eight screws securing the right side cover of the receiver module to the module.
- d. Position receiver module in the attitude it will have during normal operation.
- e. Using a screwdriver, adjust the ZERO adjustment screw at the rear of the meter (Figure 2-1) to its mid-position (if meter has no mark) or to the setting that causes deflection to the O-mark (if meter has one). If there is no O-mark, remove the four frame mounting screws and lockwashers securing the face frame and glass to the meter (Figure 2-2) and make a pencil mark at the location of the meter needle.
- f. Reconnect the cables to the receiver module, but do not replace the face frame and glass, the right side cover, or return the receiver module to the mounting rack until the completion of meter adjustment procedures.

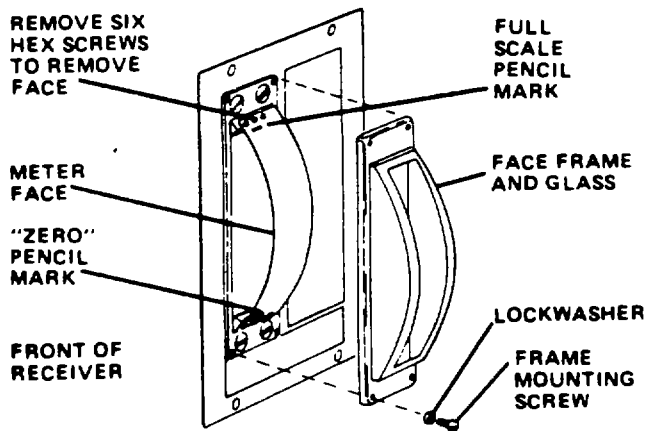


Figure 2-2. Receiver Panel Face Detail.

3. Receiver Panel Full-Scale Deflection Adjustment.

- a. Place the ON-OFF switch on the front panel in the ON position (Figure 2-3).
- b. Press the Calibrate switch on the control module with the same numerical designation as the meter being calibrated (Figure 2-4). Tank Level Indicators turn system circuit breaker to ON position and remove tag.
- c. Using a screwdriver, adjust Calibrate potentiometer (RP1) on the control module (Figure 2-4) with the same numerical designation as the meter being calibrated to the setting that causes deflection to the full-scale fluid indication mark.

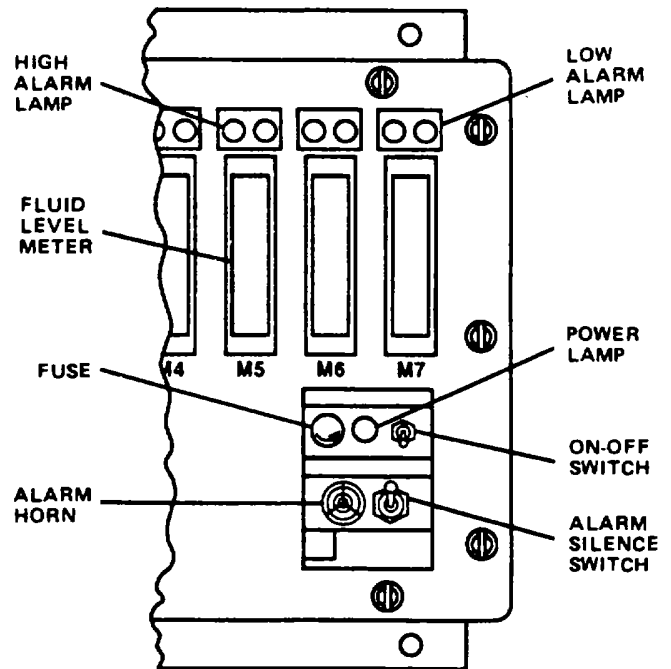


Figure 2-3. Receiver Panel. Full-Scale Adjustment.

d. Receiver panel alarm adjustment. To perform the alarm adjustments for F.O. Day Tank receiver circuits, proceed as follows:

- (1) Place ON-OFF switch on receiver panel to OFF position (Figure 2-3).

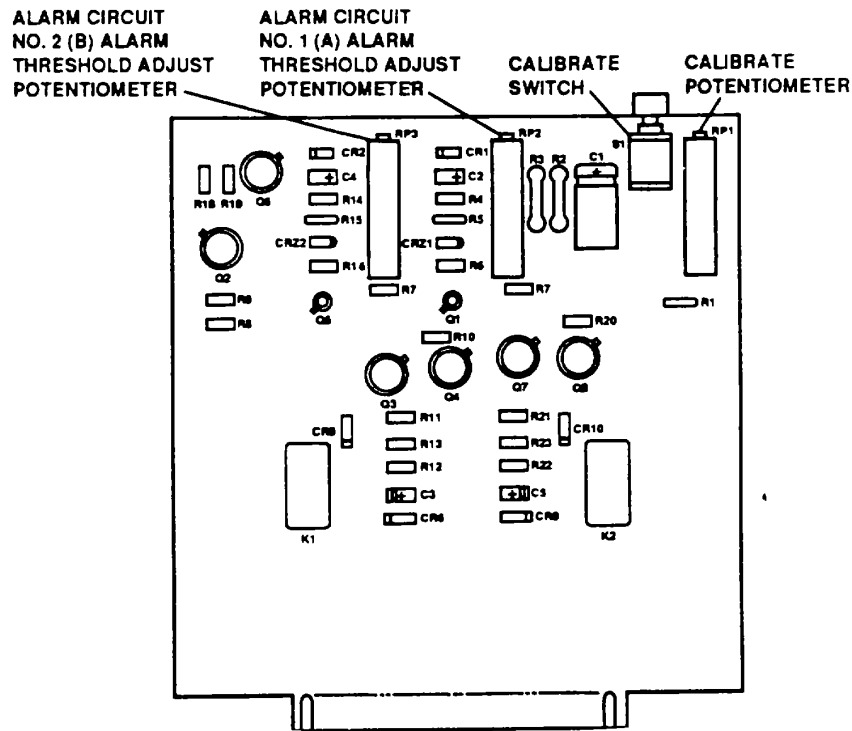


Figure 2-4. Control Module Card.

(2) Disconnect the red, black, and white cable leads connecting to terminals 1, 2, and 3 on the terminal board (TB10 or TB11) associated with the receiving circuits being adjusted.

(3) Disconnect the float simulator cable from the float simulator mounting bracket (Figure 2-5).

(4) Connect the red lead of the float simulator cable to terminal 1 of the terminal board associated with the receiver circuits being adjusted.

(5) Connect the black lead of the float simulator cable to terminal 2 of the terminal board associated with the receiver circuits being adjusted.

(6) Connect the green lead of the float simulator cable to terminal 3 of the terminal board associated with the receiver circuits being adjusted.

(7) Place ON-OFF switch on panel receiver to ON position (Figure 2-3).

(8) Adjust the FLOAT-SIMULATOR control (Figure 2-5) to bring meter deflection to the desired low-level alarm setting marked on the meter face.

NOTE

If a low-level alarm occurs in a tank in which a level link is used, adjust the FLOAT SIMULATOR control to bring deflection to a point slightly (3/16 to 1/4 inch) below the alarm setting marked on the meter.

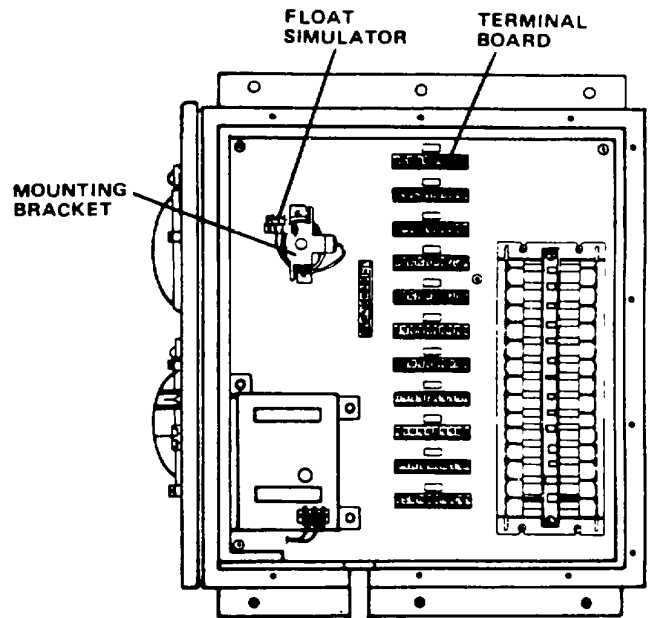


Figure 2-5. Receiver Panel Float Simulator.

(9) Adjust Alarm Circuit Threshold Adjust Potentiometer (Figure 2-4) on the low-level alarm control module printed circuit board associated with the meter that has deflected until the LOW ALARM lamp for that meter just lights (Figure 2-3).

(10) Adjust the FLOAT SIMULATOR control (Figure 2-5) to bring meter deflection to the desired high-level alarm setting marked on the meter-face.

NOTE

If a high-level alarm occurs in a tank in which a level link is used, adjust the FLOAT SIMULATOR control to bring meter deflection to a point slightly (3/16 to 1/4 inch) below the alarm setting marked on the meter.

(11) Adjust Alarm Circuit Threshold Adjust Potentiometer (Figure 2-4) on the high-level alarm

control module printed circuit board associated with the meter that has deflected until the HIGH ALARM lamp just lights (Figure 2-3).

(12) Place the ON-OFF switch (Figure 2-3) to OFF position.

(13) Disconnect the float simulator cable leads from the terminal board for the receiver circuits being adjusted and connect them to the float simulator mounting bracket.

(14) Connect the transmitter cable to the terminal board associated with the receiver circuits that have been adjusted, connecting the red lead to terminal 1, the black lead to terminal 2, and the white lead to terminal 3.

(15) Close the front cover of the receiver panel and secure it with the captive screws.

2-15. Calibrate Receiver Devices.

This task covers:

a. Calibration

INITIAL SETUP

Tools

Equipment Condition

Tank must be empty before performing this procedure.

CALIBRATION

1. Fluid Level Calibration.

Following the performance of zero and full-scale deflection adjustments, the marking for intermediate tank fluid levels is accomplished (refer to para. 2-14).

2. Dry Tank Calibration.

a. Position one person at tank for which meter is being calibrated and a second person at meter.

b. Provide the two people performing the calibration procedure with sound powered telephones.

c. Determine the gallonage increments for which indications are to be provided on the meter.

d. Using the sounding table or tank capacity curve for the tank on which the calibration is being performed, compare the height in feet and inches at which the gallonage increments determined in STEP c. are found. (A sample of a portion of a sounding table or tank capacity curve is shown in Table 2-3). Use the record prepared during installation for the mounting of level links when calibrating the portions of meter indications that are derived from level links.

e. Place the receiver panel ON-OFF switch (Figure 2-3) in the ON position.

f. Suspend a sounding tape vertically alongside the transmitter in the tank.

g. Align the sounding tape so that the dimension determined from the sounding table or tank cap capacity curve for the gallonage for a full tank (100 percent of capacity) is at the top of the tank.

h. As determined by whether a transmitter or level link is at the bottom of the tank, read the dimension on the sounding tape, as follows:

(1) At the center of the float on the lowest transmitter, or

(2) At the center of the float on the bottom station assembly when that float has been moved to the point at which the level link is actuated.

i. Using the sounding table or tank capacity curve, compare the gallonage equivalent to the dimension read in STEP h.

j. Mark the gallonage compared in STEP i. as the lowest level indicated by the meter alongside the O-mark in the zero adjustment procedure (refer to para. 2-14).

k. Manually raise the float of the lowest transmitter until the float center is at the dimensional equivalent on the sounding tape of the next higher desired gallonage increment compared in STEP d. or manually raise the float of the next highest level link station assembly until it actuates the station assembly, whichever is applicable.

l. Mark the meter face with a pencil at the point of meter deflection and label it with the applicable gallonage increment or record the current value, whichever is applicable.

**Table 2-3. Sample Listing of Tank Soundings
(with Gallonage Equivalents for Meter Marking)**

Distance from Tank Bottom	Gallons (to nearest thousand)
2' 10"	1, 000
4' 11"	2, 000
7' 0"	3, 000
9' 1"	4, 000
11' 2"	5, 000
13' 4"	6, 000
15' 5"	7, 000
17' 7"	8, 000
19' 8"	9, 000
21' 9"	10, 000
23' 11"	11,000
26' 0"	12,000
28' 1"	13,000
30' 3"	14,000
31' 1"	14,400

m. Repeat procedures outlined in STEPS k. and l. for each successive gallonage increment to be calibrated. In tanks with multiple-transmitter installations, when the float of the lower of two transmitters if brought to the same height as the float of the higher transmitter, move the floats for both transmitters until the lower transmitter float reaches its top limit. Slowly lower the lower transmitter float to its rest position, being careful that it does not fall. Continue raising the higher transmitter float until it is at the desired height, making certain that the higher transmitter float is never lower than the lower transmitter float. In tanks with level links, repeat procedures outlined in STEPS k. and l. by manually raising the float of next higher station assemblies to actuate each in turn.

NOTE

At gallonage increments corresponding to low and high-level alarm points interpolated from the sounding table, mark or record the points of deflection on the meter face in pencil.

n. Upon completion of the making of the pencil markings for the full range of tank indications, mark over

the pencil marks in ink or with some other permanent marker.

o. Reassemble the face frame and glass to the meter and secure them with the frame mounting screws and lockwashers.

3. Liquid-in Tank Calibration.

a. Place the ON-OFF switch (Figure 2-3) to the ON position.

b. Fill the tank with known increments of water, marking the meter face in pencil at the deflection point that is realized for appropriate fluid level indications or recording the current value, whichever is applicable.

c. Upon completion of the calibration in pencil for the full range of tank indications, mark over the pencil marks in ink or with some other permanent marker.

d. Reassemble the face frame and glass to the meter and secure with the frame mounting screws and lockwashers.

4. *Interface Calibration.*

To calibrate a compensated tank, perform the procedure in STEP 2 or 3. However, determine the gallonage increment at each marking by subtracting the value that would otherwise be marked from the value for the full capacity of the tank. Mark the difference value on the meter face or record the current value, whichever is applicable. For example, if the capacity curve dimension (STEP 2.) or known fluid quantity in the tank (STEP 3.) corresponds to 7,000 gallons in a tank with a 14,400 gallon total capacity, mark the meter face or record the current value at that point as 7,400 gallons (14,400 minus 7,000). In this fashion, when the tank is full of water, the meter will be calibrated as being empty of fuel and conversely when the tank is emptied of water, the meter will be calibrated as being filled to capacity with fuel.

2-16. Replace Control Module.

This task covers:

a. Removal

b. Replacement

INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On ENG RM EMER DIST PANEL NO. 1
set TLI circuit breaker to the OFF position
and tag "Out of Service Do Not Operate."

Materials/Parts

Control modules (15) P/N 38100
Warning tags, Item 1, Appendix D

REMOVAL

- a. Turn power switch (3, Figure 2-6) to the OFF position.
- b. Loosen captive screws (1).

WARNING

Hold door while loosening screws. Door may swing open causing personal injury .

- c. Swing open front panel (2).
- d. Loosen two captive screws (1, Figure 2-7).
- e. Remove retaining bar assembly (2).
- f. Grasp control module (3) (labeled CM1 through CM11, whichever is appropriate) between thumb and forefinger. Pull straight out until separated from card rack (4).

REPLACEMENT

- a. Place control module (3, Figure 2-7) in appropriate slot of card rack (4) and push inward until firmly seated.
- b. Secure retaining bar assembly (2) with captive screws (1).
- c. Close front panel (2, Figure 2-6).
- d. Secure front panel with captive screws (1).
- e. Turn power switch (3) to the ON position.
- f. Set circuit breaker to ON position and remove warning tag.

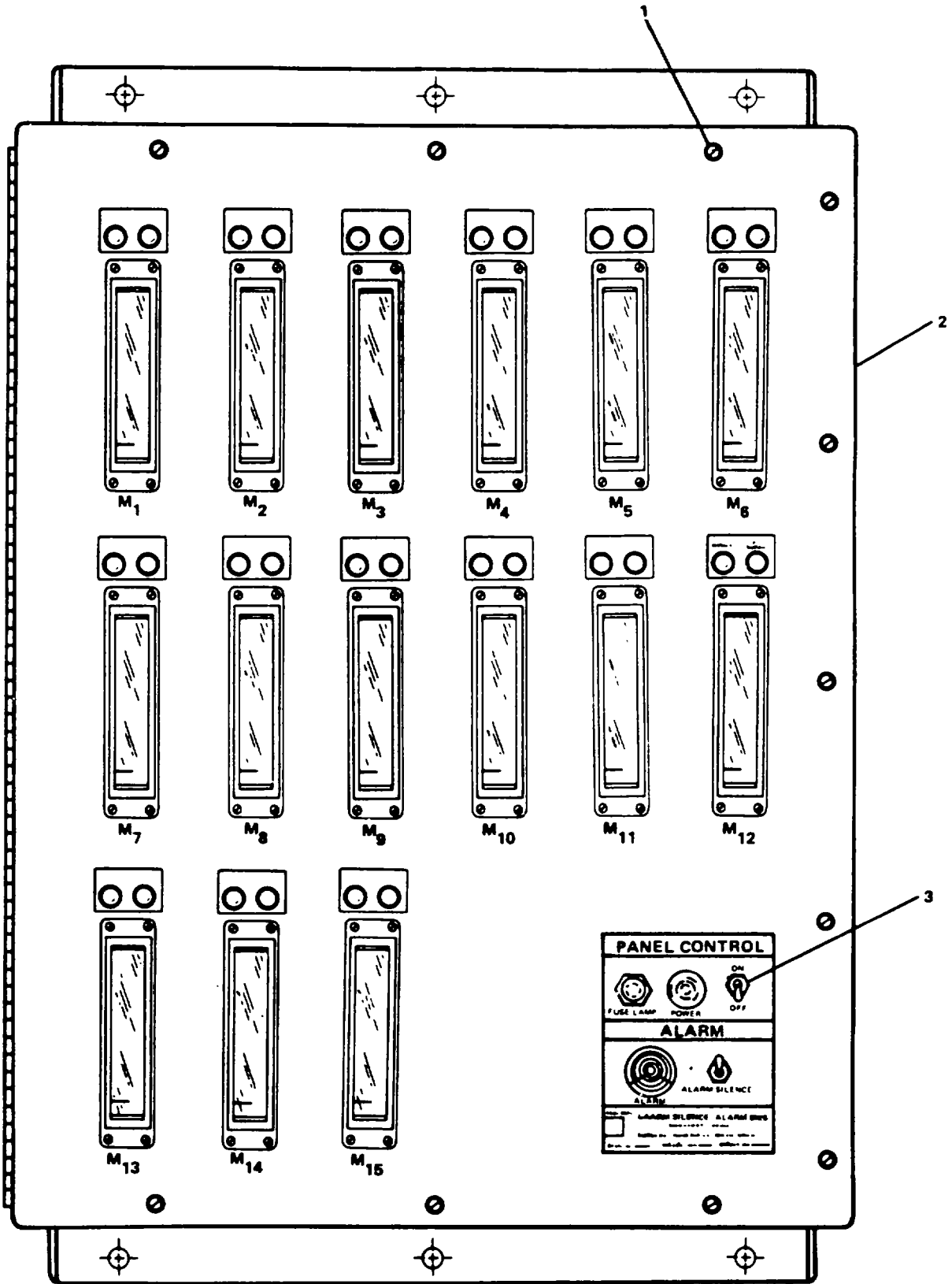


Figure 2-6. Receiver Panel. Front View.

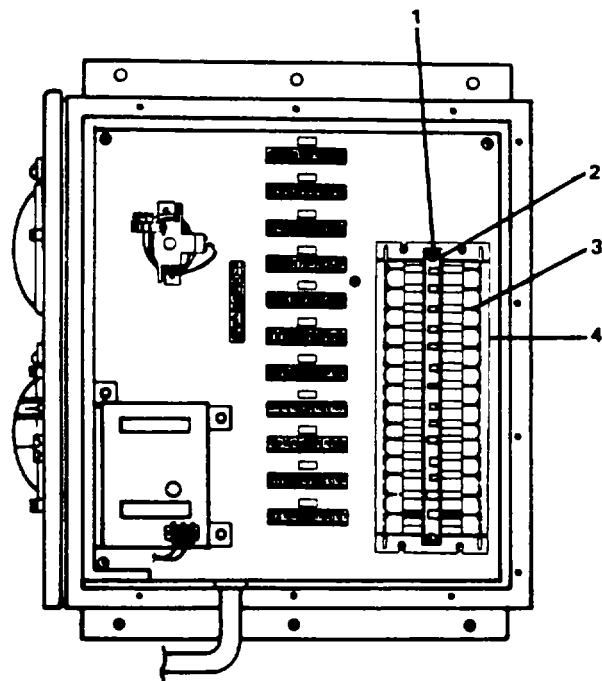


Figure 2-7. Receiver Panel. Open.

2-17. Replace Flasher and Full-Wave Rectifier Module.

This task covers:

- a. Removal b. Replacement
-

INITIAL SETUP
Tools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On ENG RM EMER DIST PANEL NO. 1
set TLI circuit breaker to OFF position
and tag "Out of Service Do Not Operate."

Materials/Parts

Flasher/full wave rectifier
module (2) P/N 38105
Warning tags, Item 1, Appendix D

REMOVAL

- a. Turn power switch (3, Figure 2-6) to the OFF position.
- b. Loosen captive screws (1).

WARNING

Hold door while loosening screws. Door may swing open causing personal injury .

- c. Swing open front panel (2).
- d. Loosen two captive screws (1, Figure 2-8).
- e. Remove retaining bar assembly (2).
- f. Grasp flasher/full wave rectifier module (3) (labeled FL1) between thumb and forefinger. Pull straight out until separated from card rack (4).

REPLACEMENT

- a. Place flasher/full wave rectifier module (3, Figure 2- 8) in appropriate slot of card rack (4) and push inward until firmly seated.
- b. Secure retaining bar assembly (2) with captive screws (1).
- c. Close front panel (2, Figure 2-6).
- d. Secure front panel with eleven captive screws (1).
- e. Turn power switch (3) to the ON position.
- f. Set circuit breaker to ON position and remove warning tag.

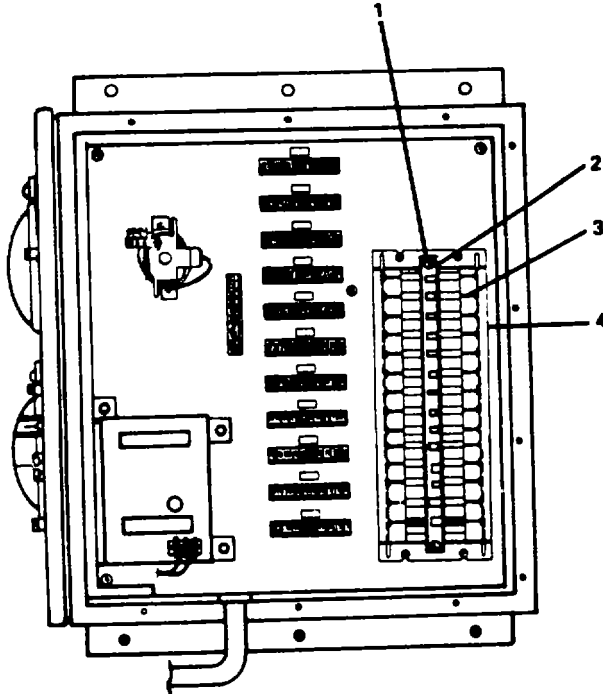


Figure 2-8. Receiver Panel. Flasher and Full-Wave Rectifier Module.

2-18. Replace Power Supply & Master Alarm Module.

This task covers:

- a. Removal b. Replacement
-

INITIAL SETUP
Tools

Tool kit, general mechanic's,
5180-00-629-9783

Equipment Condition

On ENG RM EMER DIST PANEL NO. 1
set TLI SYSTEM circuit breaker to
OFF position and tag "Out of
Service - Do Not Operate."

Materials/Parts

Power supply/general alarm
module (2) P/N 38005
Warning tag, Item 1, Appendix D

REMOVAL

- a. Turn power switch (3, Figure 2-6) to the OFF position.
- b. Loosen captive screws (1).

WARNING

Hold door while loosening screws. Door may swing open causing personal injury.

- c. Swing open front panel (2).
- d. Loosen two captive screws (1, Figure 2-9).
- e. Remove retaining bar assembly (2).
- f. Grasp power supply/master alarm module (3) (labeled PS-1) between thumb and forefinger. Pull straight out until separated from card rack (4).

REPLACEMENT

- a. Place power supply/master alarm module (3, Figure 2-9) in appropriate slot of card rack (4) and push inward until firmly seated.
- b. Secure retaining bar assembly (2) with captive screws (1).
- c. Close front panel (2, Figure 2-6).
- d. Secure front panel with eleven captive screws (1).
- e. Turn power switch (3) to the ON position.
- f. Set circuit breaker to ON position and remove warning tag

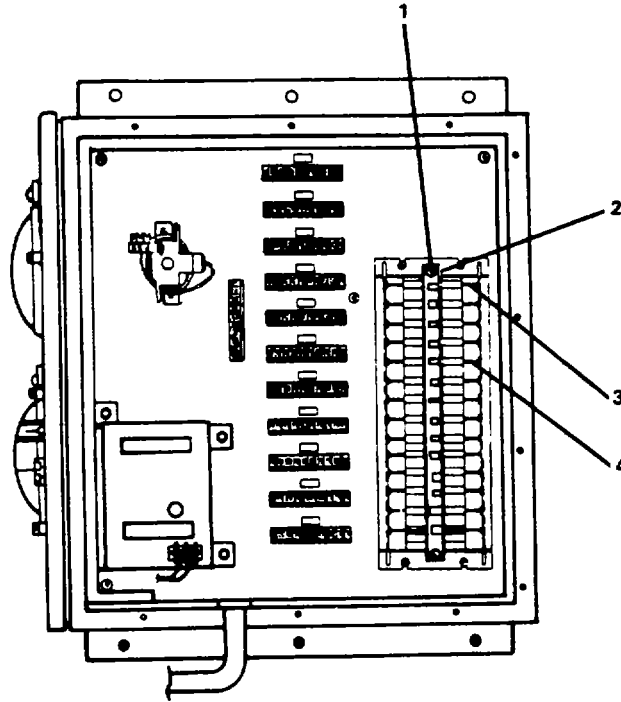


Figure 2-9. Receiver Panel, Power Supply and Master Alarm Module.

MAINTENANCE OF WORKSHOP EQUIPMENT
--

2-19. Adjust Drill Press.

This task covers:

- a. Adjustment

INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895

Materials/Parts

Warning tags, Item 1, Appendix D

Equipment Condition

On Engine Room load CTR Distribution Panel,
set workshop equipment circuit breaker to OFF
and tagged "Out of Service-Do Not Operate."

General Safety Instructions**WARNING**

Wear safety glasses.

Do not wear gloves, necktie, or loose clothing.

Clamp workpiece or brace against column to prevent rotation.

Use recommended speed for drill accessory and workpiece material.

ADJUSTMENT

nut (6) and small locator pin easily slips out. Tilt
TABLE (Drill Press)

a. To adjust table (1, Figure 2-10) up or down,
loosen column lock handle (2) and turn crank
handle (3) until table (1) is at desired height.
Tighten column lock handle (2).

b. To swing table (1) 360 degrees, loosen column
lock handle (2) and swing table (1) to appropriate
position. Tighten column lock handle (2).

c. To rotate table (1), loosen table lock handle (4)
and rotate table (1) to desired position. Tighten
table lock handle (4).

d. To tilt table (1), loosen pivot bolt (5) and tighten
table (1) to desired angle up to 45 degrees. Tighten
pivot bolt (5).

e. To stop drill at desired depth, loosen scale set
handle (7) located on feed shaft assembly (8),
rotate spindle depth to desired depth and tighten
handle (7).

f. To hold a stationary depth loosen scale set
handle (7) and turn feed shaft (8) to lowest point,
rotate spindle depth to desired depth and tighten
handle (7).

g. Turn circuit breaker to ON position and remove
log.

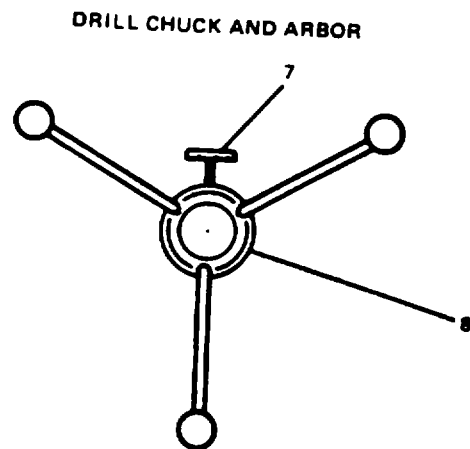
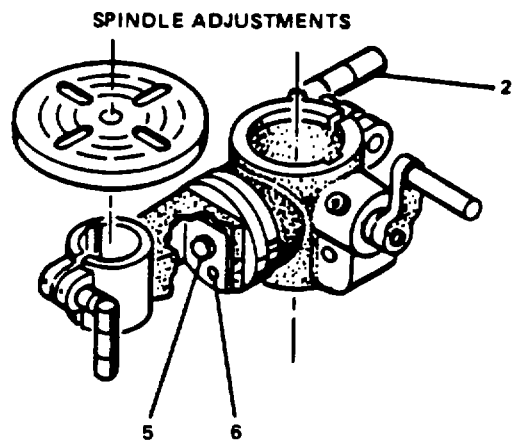
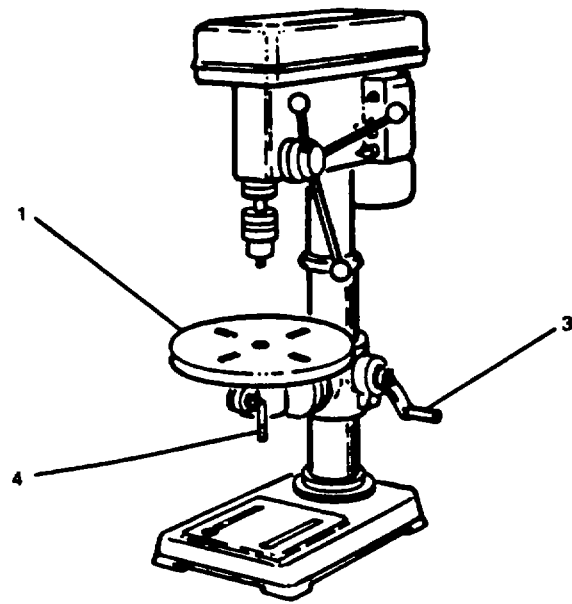


Figure 2-10. Adjust Drill Press.

2-20. Service Bench Grinder.

This task covers:

- a. **Service**
-

INITIAL SETUP

Tools

Cutter, abrasive wheel
5120-00-278-6641

Equipment Condition

General Safety Instructions

Material/Parts

WARNING

Exercise extreme caution when working around rotating machinery.

Never operate grinder with cracked, badly chipped or loose grinding wheel.

Always use guards and safety glasses. Use face or dust mask if grinding operation is dusty.

Wear proper apparel. Loose clothing, gloves, neckties, rings, bracelets or other jewelry may get caught in moving parts. Wear protective hair covering to contain long hair.

SERVICE

handle and brace dresser on tool rest (2) with Dress Grinding Wheel. touching grinding wheel (1).

c. Hold grinding wheel dresser (3, Figure 2-12) by cutting wheels of dresser aligned with but not

d. Slowly move wheel dresser toward cutting surface of grinding wheel until contact is made.

e. Hold dresser in position until high spots on grinding wheel are reduced and only slight grinding noise can be detected.

f. Move dresser inward slightly for another cut.

g. Hold dresser in position until only a slight grinding noise is detected.

h. Repeat STEPS e. and f. until cutting surface of dresser into grinding wheel is clean and flat.

i. Set rocker switch (2, Figure 2-11) to OFF position.

WARNING

Use tool rest, safety glasses and ear protectors.

Use face or dust mask during wheel dressing operation.

Wear proper apparel. Loose clothing, gloves, neckties, rings, bracelets or other jewelry may get caught in moving parts. Wear protective hair covering to contain long hair.

CAUTION

When dressing grinding wheel never force wheel dresser into grinding wheel.

a. Ensure eye shield (1, Figure 2-11) is properly attached.

b. Set rocker switch (2) to ON position.

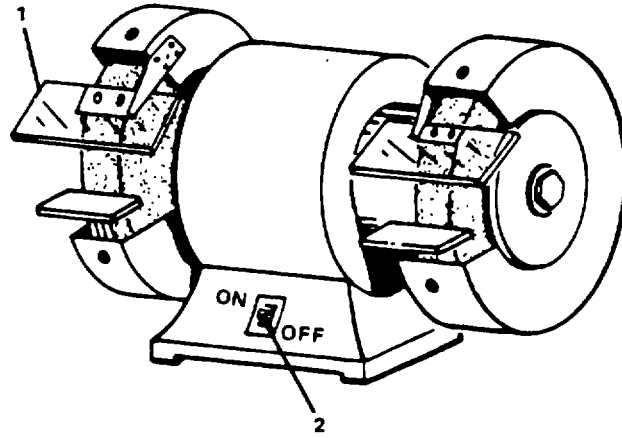


Figure 2-11. Bench Grinder Operation.

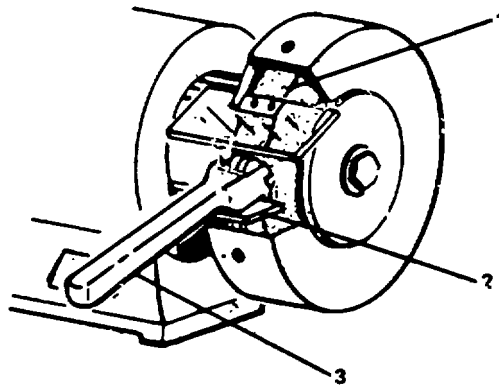


Figure 2-12. Service Bench Grinder.

2-21. Replace/Repair Bench Grinder.

This task covers: a. Removal, b. Disassembly, c. Repair, d. Assembly, e. Replacement

INITIAL SETUP

Tools

Tool kit, general mechanic's,
Turn circuit breaker off and tag on engine room
5180-00-629-9783
wired direct.

Material/Parts

Abrasive Disk
P/N A-A-I 016

Bench grinder
P/N 1 84-VPA-Y

Warning tags, Item 1,
Appendix D

Equipment Condition

load dist. panel, "Out of service - grinder is

General Safety Instructions

WARNING

High voltages exist. Do not attempt the following procedure until electrical power is disconnected.

REMOVAL

a. Open workbench drawer and locate head of mounting nut (10, Figure 2-13) on underside of work bench.

b. Hold nut with wrench and remove bolts (7) and flatwashers (8).

c. Remove nuts (10) and lockwashers (9).
Remove bench grinder (1).

DISASSEMBLY

a. Remove three self tapping screws (2) and guard cover (3).

b. Remove hex nut (4), wheel flange (5) and remove abrasive disk (6).

c. Repeat steps a.
grinder.
nuts (10) and lockwashers (9).

REPAIR

Repair at this level of maintenance is by replacement of abrasive disks (6).

ASSEMBLY

a. Install abrasive disk (6), wheel flange (5) and secure with hex nut (4).

b. Position guard cover (3) over grinding wheel and secure with three self tapping screws (2).

c. Repeat steps a. and b. for opposite side of grinder.

REPLACEMENT

Replace Bench Grinder.

a. Position bench grinder (1) over bolt holes on work bench.

b. Replace bolts (7) and flatwashers (8).

and b. for opposite side of
c. Secure bench grinder to work bench with

d. Turn circuit breaker to ON position.

e. Check bench grinder for proper operation.

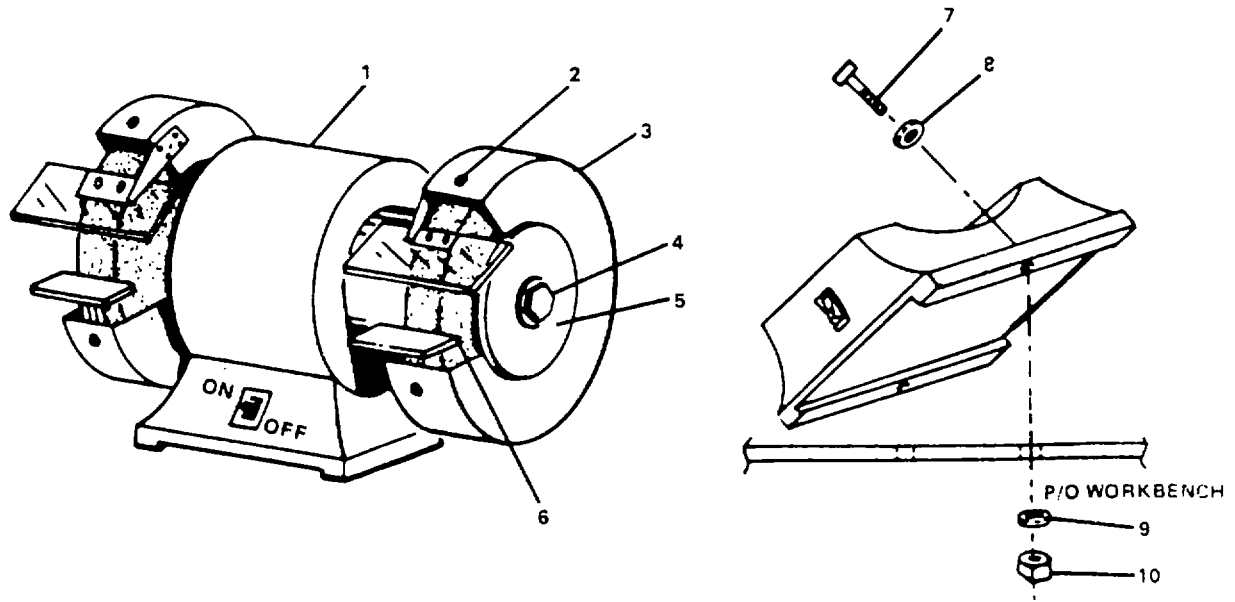


Figure 2-13. Replace/Repair Bench Grinder.

2-22. Adjust Lathe.

This task covers: a. Adjustment

INITIAL SETUP

Tools

Tool kit, machinists
5280-00-511-1950

Materials/Parts

Equipment Condition

Lathe operating.

General Safety Instructions

WARNING

Exercise extreme caution when working around rotating machinery. Never operate grinder with cracked, badly chipped or loose grinding wheel. Always use guards and safety glasses. Use face or dust mask if grinding operation is dusty. Wear proper apparel. Loose clothing, gloves, neckties, rings, bracelets or other jewelry may get caught in moving parts. Wear protective hair covering to contain long hair.

ADJUSTMENT

backlash is compensated.

Adjust main spindle bearings.

NOTE

Adjust only if play is evident when the spindle is running.

Adjust cross and top slide dovetail sideways.

a. Loosen set screw (1, Figure 2-14).

b. Tighten slotted clamping nut (2) clockwise.

c. Tighten set screw (1).

Adjust top slide.

without play.

NOTE

Adjust only if top slide does not move when the handwheel is turned a certain angle.

a. Dismount the top slide (3).

b. Adjust set screw (4) on bottom of topside until

CAUTION

Excessive adjustment causes unnecessary wear of the cross slide nut.

a. Remove three Allen screws and remove left side panel of lathe.

b. Loosen hexagon nuts (5).

c. Adjust set screws (6) until slide runs smoothly

d. Hold set screw (6) in position with screwdriver and tighten hexagon nuts (5).

e. Install side panel. Secure with three Allen screws.

Adjust play between half-nuts and leadscrew.

- a. Unscrew socket head screw (8) 2 or 3 turns.
- b. Use half-nut lever (7) to engage half-nut completely with leadscrew
- c. Tighten socket head screw (8) until the other part of the half nut is touched but not moved.
- d. Tighten socket head screw (8) an additional one-half turn.

Adjust half-nut guidance.

NOTE

Adjust when the half-nut lever (7) turns downward by itself during thread cutting.

- a. Loosen hexagon head screws (9).

- b. Adjust set screw (10) until half nut lever (7) operates smoothly.

- c. Tighten hexagon head screws (9).

Adjust axial play of leadscrew.

NOTE

Adjust when the leadscrew can be moved axially by hand.

- a. Engage half-nut with the half-nut lever (7).
- b. Adjust securing nut (11) until the axial play is less than 0.002 inches (0.05 mm).

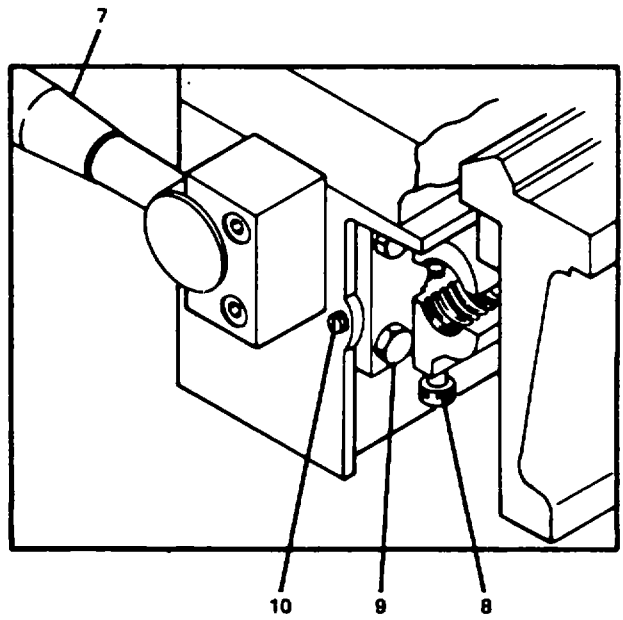
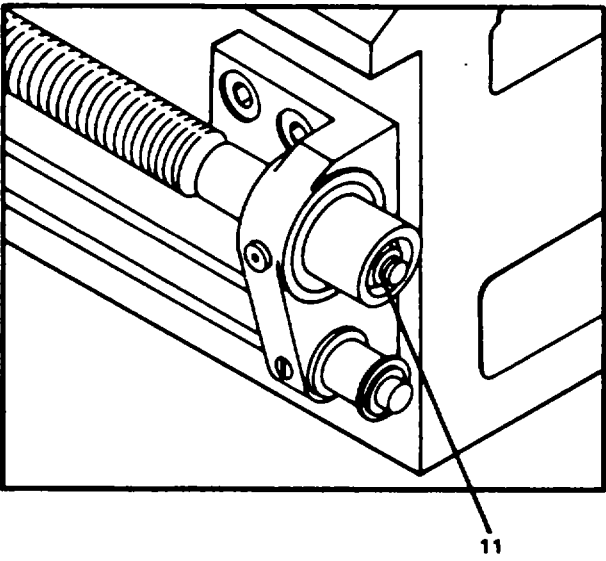
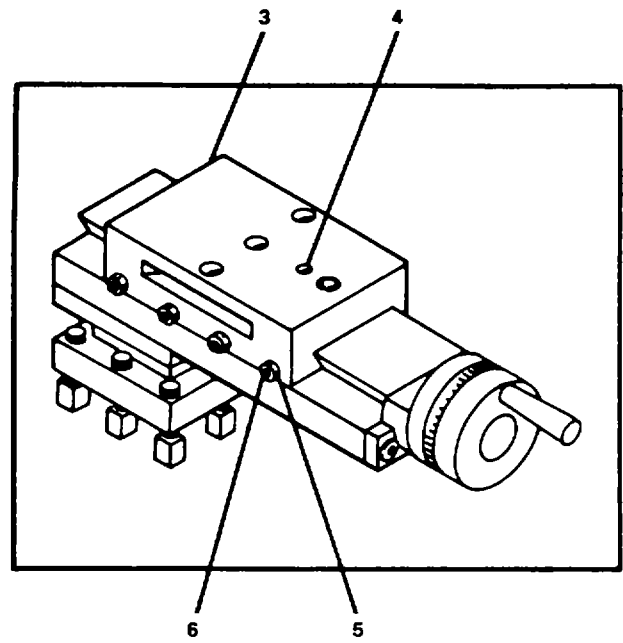
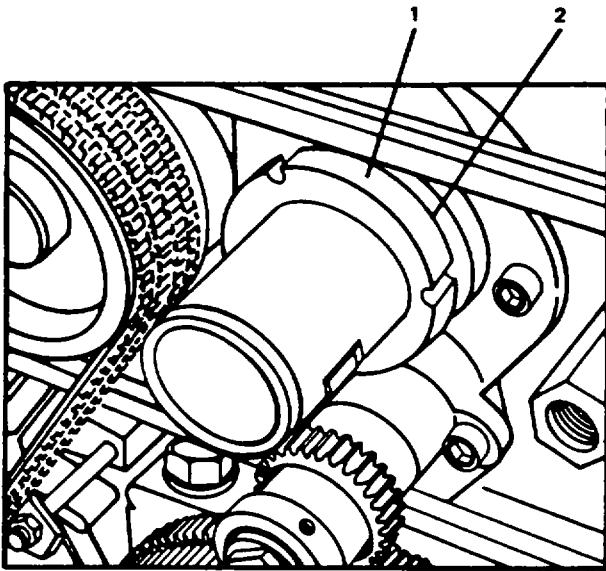


Figure 2-14. Lathe Adjustment.

2-23. Adjust Arc Welding Machine.

This task covers:

- a. Adjustment**
-

INITIAL SETUPToolsTool kit, general mechanic's,
5180-00-629-9783Equipment ConditionOn AUX MACH SPACE NO. 2 POWER PANEL
No. 5 set WELDING MACHINE circuit
breaker to OFF position and tag
"Out of Service - Do Not Operate".Materials/PartsWarning tags, Item 1, Appendix D

WARNING

drag is felt as gauge is moved between the points.

Death or serious injury can result from contact with live electrical circuits. Ensure all electrical secure contact point assembly. power is OFF and tagged "Out of Service - Do Not Operate".

a. Press spring-loaded door latch (1, Figure 2-5) and open front access door (2) by lifting up.

b. Loosen pan head screw (4) that secures each single spark gap assembly.

c. Insert 0.008 inch (0.0203 mm) feeler gauge. between spark gap contact points (3).

d. Move loosened contact point (5) until slight

e. Tighten the loosened pan head screw (4) to

f. Remove feeler gauge.

g. Repeat step c. through f. for other spark gap contact points.

h. Close access panel (2).

i. Remove tag and set circuit breaker to ON position.

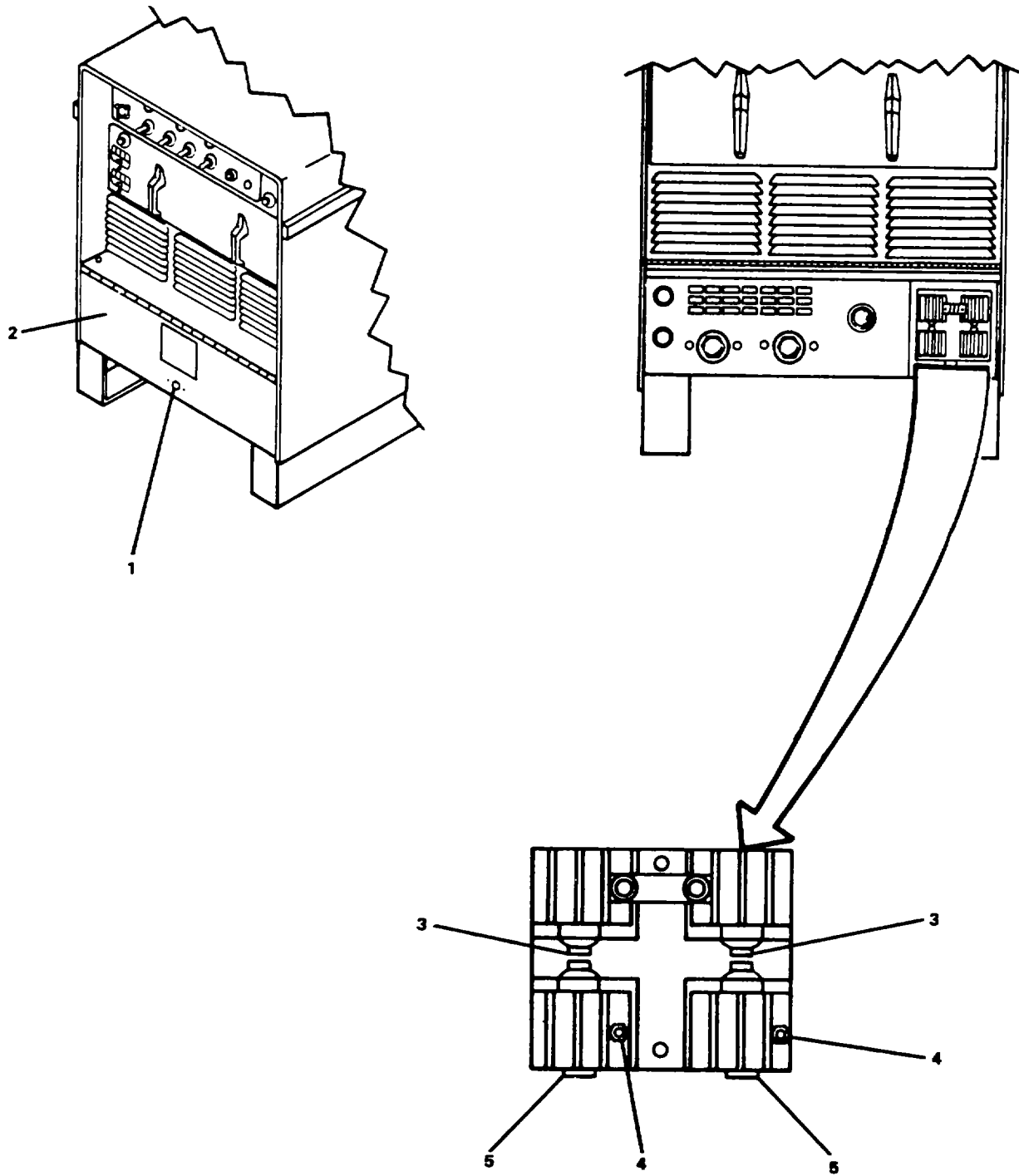


Figure 2-15. Arc Welding Machine Spark Gap Adjustment.

MAINTENANCE OF LAUNDRY EQUIPMENT

2-24. Replace Washer (Automatic) and Dryer (Automatic).

This task covers:

- a. Removal b. Replacement

INITIAL SETUP

Tools

Tool kit, general mechanic's,
5180-00-629-9783

Equipment Condition

Materials/Parts

Washer, automatic P/N 110.81860100
Dryer, automatic P/N 110.86860100
Dolly

REMOVAL

1. *Remove Washer*

- a. Disconnect power cord (4, Figure 2-16) and grounding wire (10) from back of washer (5).
- b. Turn off hot and cold water at water outlets (1, 2).
- c. Remove bolts (11) and securing bar (3) from top of washer (5).

WARNING

To prevent personal injury, at least two soldiers should handle washer.

- d. Lift and move washer away from bulkhead.
 - e. Squeeze the ears of clamp (8) and remove drain hose (9) from connector (7).
 - f. Remove hot and cold water hoses (6) from back of washer (5).
 - g. Remove washer.
2. *Remove Dryer.*
- a. Remove bolts (1, Figure 2-17) and securing bar (2) from top of dryer (3).
 - b. Disconnect power cord (4) from dryer.

WARNING

To prevent personal injury at least two soldiers should handle dryer.

- c. Lift and move dryer (3) away from bulkhead for access to back of dryer.
- d. Remove exhaust clamp (6).
- e. Remove exhaust duct (6) from dryer (3).
- f. Remove dryer.

REPLACEMENT

1. *Replace Dryer*

WARNING

Do not use nonmetallic flexible duct. It is a potential fire hazard.

- a. Install exhaust duct (6, Figure 2-17) in dryer (3). Secure duct with exhaust clamp (5).
- b. Position dryer against bulkhead.
- c. Connect power cord (4) into dryer (3).
- d. Install securing bar (2) and bolts (1).
- e. Turn-on dryer and check for proper operation.

2. Replace Washer

a. Squeeze the ears of clamp (8, Figure 2-16) and connect drain hose (9) to connector (7) on back of washer (5).

b. Connect hot and cold water hoses (6) to back of washer (5).

c. Connect grounding wire (10) to ground lug on back of washer.

d. Connect power cord (4) into washer.

e. Position washer against bulkhead.

f. Install securing bar (3) and bolts (11).

g. Turn-on hot and cold water at water outlets (1, 2).

h. Check washer for proper operation.

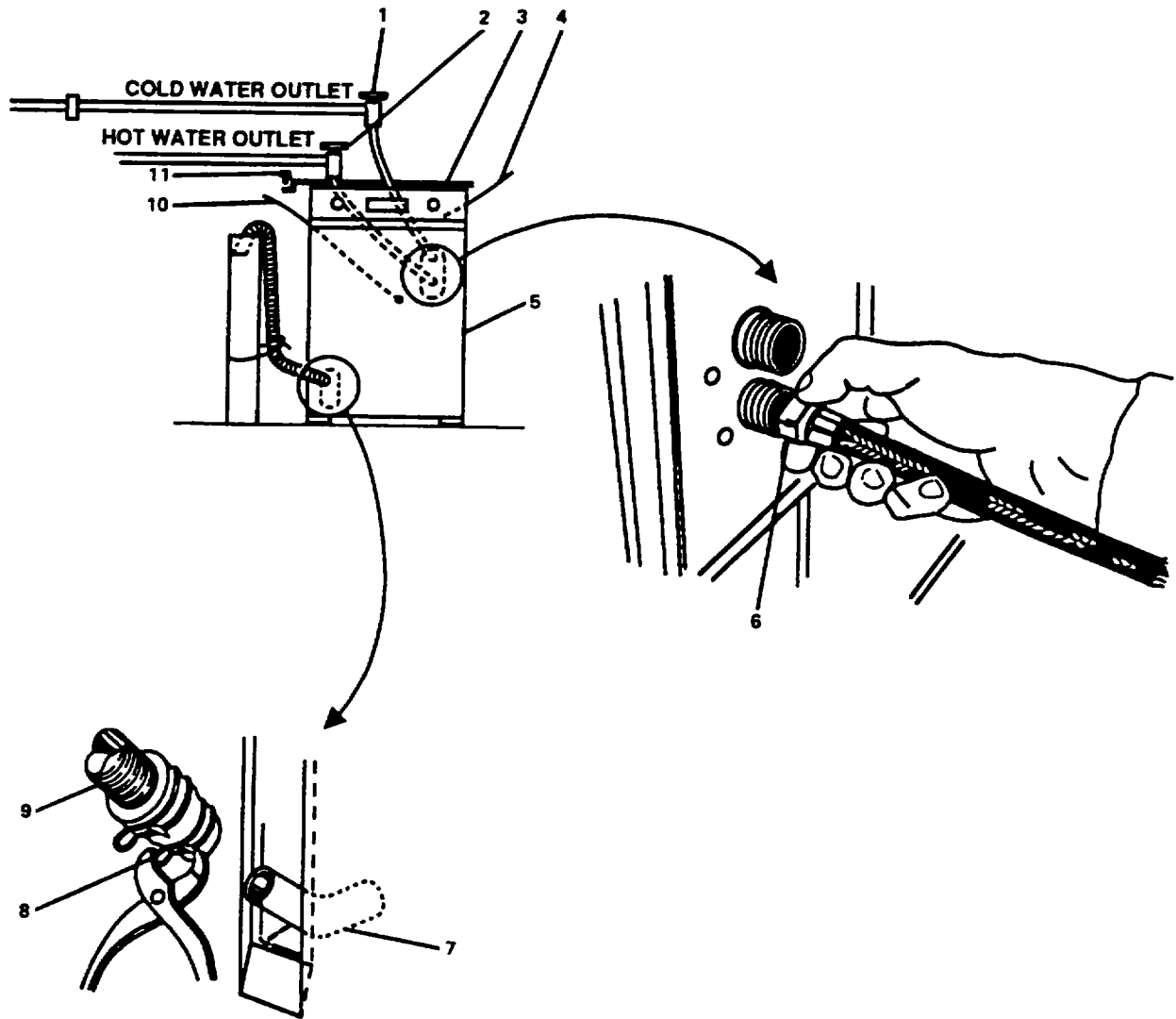


Figure 2-16. Replace Washer Machine,

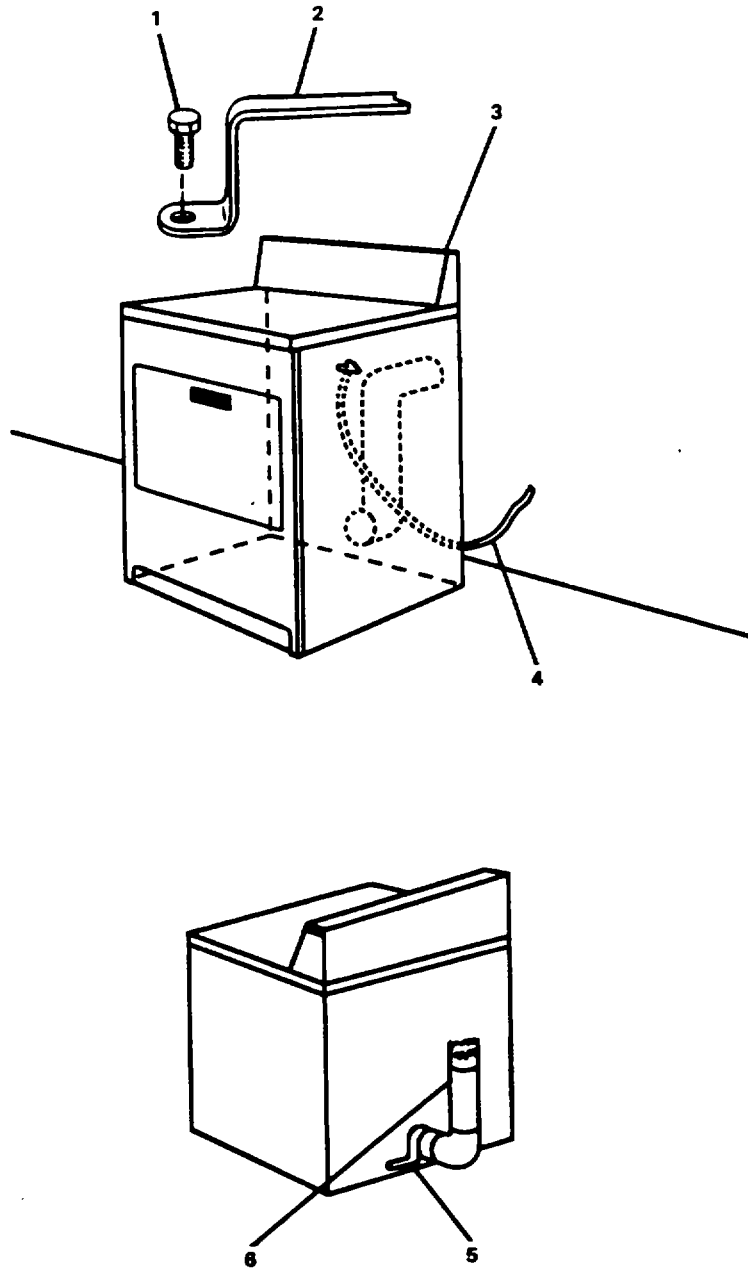


Figure 2-17. Replace Dryer.

MAINTENANCE OF DOORS, HATCHES, SCUTTLES, MANHOLES AND WINDOWS

2-25. Service/Adjust Hydraulic Watertight Doors.

This task covers:

a. Service b. Adjustment

INITIAL SETUP

Tools

Tool kit, general mechanic's,
5180-00-629-9783

Materials/Parts

Hydraulic fluid, Item 3,
Appendix D
Wiping rags, Item 2, Appendix D
Warning tags, Item 1,
Appendix D

Equipment Condition

Door(s) 'OPEN' and hand pumps
tagged "Out of Service - Do Not Operate."

General Safety Instructions

Do not operate door(s) with the two
shutoff valves closed. This will
cause back pressure on the local
hand pumps and cause the shaft
seals to blow.

SERVICE

hand pump by turning clockwise until snug.

CAUTION

*Ensure valves (1, Figure 2-18) and (4) are open
before operating pump.
emitted.*

Bleed Air Out of System.

a. Remove socket head pipe plug from drain line
(7) in quad check valve (5), until oil flows. Replace
plug.

b. Open vent (10) on mounting end of cylinder
(11).

closing direction (clockwise) until all air is emitted.

c. Rotate crank (3) on remote hand pump (2) in

closing direction (clockwise) until oil flows freely
from vent (10).

d. Close vent and continue to rotate crank until
door closes.

e. Loosen the small bleeder line (7) about 3/4 turn
(counterclockwise) until all air is emitted.

f. Rotate crank (8) in a counterclockwise direction
until oil flows from the bleeder line.

g. Tighten bleeder line connection at the local

h. Open vent (12) at the rod end of the cylinder.

i. Rotate crank (8) on local hand pump (9) in
opening direction (counterclockwise) until all air is

j. Close vent (12) and continue to rotate crank(s)
until door is opened.

k. Open vent (10) on mounting end of cylinder.

l. Rotate crank (8) on local hand pump (9) in

m. Close vent (10) and continue to rotate crank
until door is closed.

n. Open a tubing connector in valve (6) to allow
air to escape.

o. Operate crank (8) in opening direction until all
air is emitted.

p. Tighten connection in valve (6) and operate
crank (8) until door is open.

ADJUSTMENT

a. The clearance between door and frame at all points along the sealing surface should be less than 0.003 inch, but not close enough to cause the door to stick in the closed position when full power is applied for opening.

b. Check clearance with a 0.003 inch feeler gauge. It should not pass through at any point along the sealing surface.

c. If the door sticks or if the clearance is exceeded, adjust the clearance by turning set bolts (1, Figure 2-19) in or out to obtain required clearance.

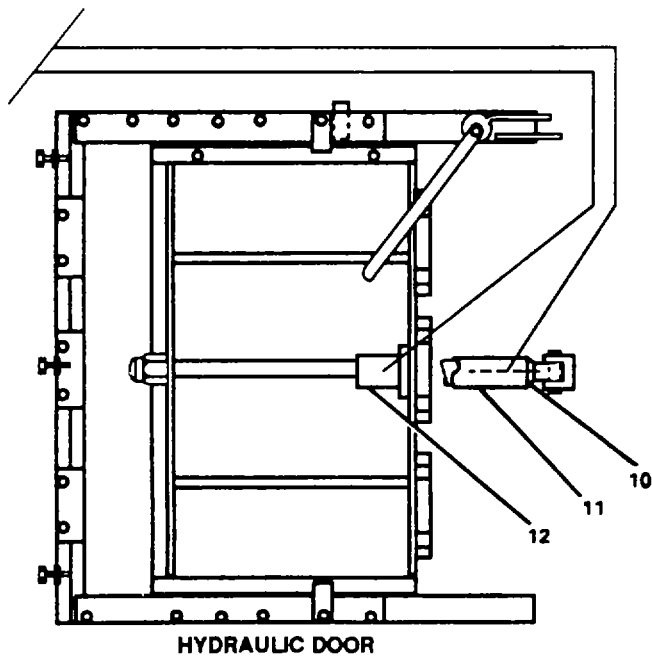
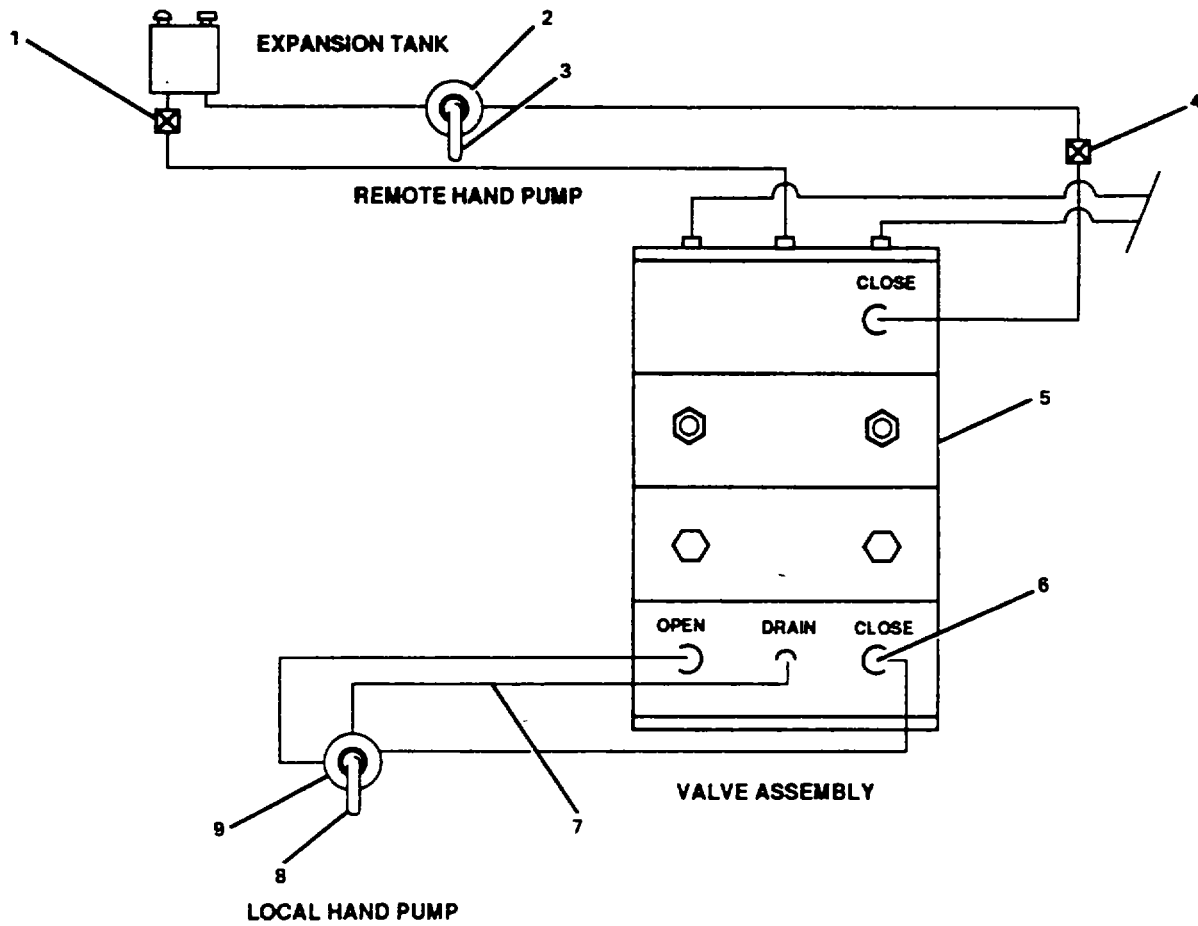


Figure 2-18. Service Hydraulic Watertight Door.

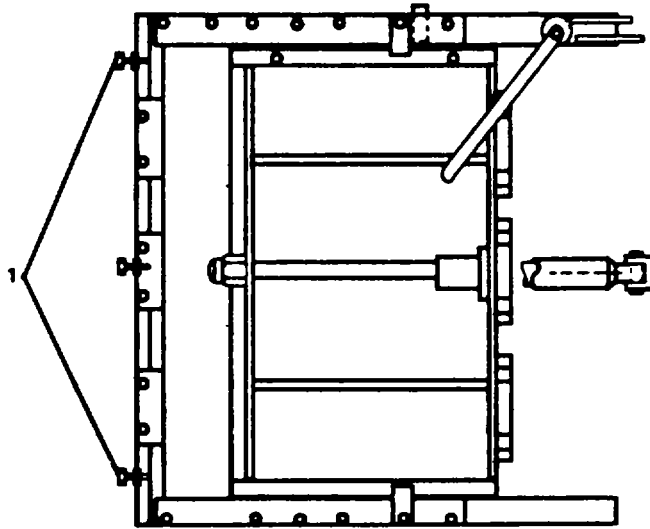


Figure 2-19. Adjust Hydraulic Watertight Door.

2-26. Repair Control Valve Assembly.

This task covers: a. Removal b. Disassembly c. Repair d. Assembly e. Replacement

INITIAL SETUP

Tools

Tool kit, general mechanic's,
5180-00-629-9783

Equipment Condition

Hydraulic doors secured and hand pumps tagged "Out of Service - Do Not Operate."

Materials/Parts

Preformed packing (14) P/N 114-78-00-00
Preformed packing (12) P/N 2-115
Preformed packing (2) P/N 2-008
Aluminum gaskets (4)
 P/N 600-001-3-8
Aluminum washers (4)
 P/N 460-215-20
Wiping rags, Item 2, Appendix D
Warning tags, Item 1, Appendix D

General Safety Instructions

Do not operate the hydraulic door with two shutoff valves closed. This will create back pressure in the hand pumps and cause the shaft seals to blow.

This procedure is intended for repairing oil leaks only.

REMOVAL

assembly together.

Remove Valve Assembly.

- a. Shut remote valves (1 and 2, Figure 2-20).

WARNING

Wear eye protection while bleeding hydraulic system. Severe injury to eyes could result.

- b. Loosen drain connection (9) to relieve pressure from system.

WARNING

Wipe up hydraulic fluid immediately to prevent unsafe working conditions.

- c. Tag and disconnect hydraulic lines (3, 4, 5, 6, 7, 8, and 9).
- d. Remove four mounting bolts (11) securing valve assembly (10) to bulkhead
- e. Remove valve assembly (10).

DISASSEMBLY

1. *Disassemble Valve Assembly.*

- a. Remove three bolts (13) holding the valve
- b. Remove top and bottom end plates (12).
- c. Separate the control valves.

2. *Disassemble Single Check Valve.*

- a. Remove Preformed packing (1, 2, and 3, Figure 2-21).
- b. Remove plug (4), spring (5) and ball (6) from body (8).
- c. Remove Preformed packing (7).

3. *Disassemble Dual Relief Valve.*

- a. Remove Preformed packing (1, 2, and 3, Figure 2-22).
- b. Remove cap nut (4) and aluminum gasket (5).
- c. Remove jam nut (6) and aluminum gasket (7).
- d. Remove plug (8), spring (9) and ball (10) from body (12).
- e. Remove Preformed packing (11).

4. Disassemble Quad Check Valve.

- a. Remove Preformed packing (1, 2, and 3, Figure 2-23).
- b. Remove plug (4), spring (5) and ball (6) from body (8).
- c. Remove preformed packing (7).

5. Disassemble Shuttle Valve.

- a. Remove preformed packing (1, 2, and 3, Figure 2-24).
- b. Remove cap nut (4) and aluminum washers (5).
- c. Remove jam nut (6) and aluminum washers (5).
- d. Remove preformed packing (8) from needle valve.
- e. Remove plug (9) from body (15) and remove preformed packing (10).
- f. Remove plug (11), spring (12), and ball (13) from body.
- g. Remove preformed packing (14).

REPAIR

Repair at this level of maintenance is by replacement of preformed packing (14, Figure 2-24), preformed packing (1,2,3,8,10), aluminum gaskets (5,7), preformed packing (1,2,3,7, Figure 2-23), preformed packing (11, Figure 2-22), aluminum gaskets (5,7), preformed packing (1,2,3), and preformed packing (7, Figure 2-21), preformed packing (1, 2, 3).

ASSEMBLY

1. Assemble Shuttle Valve.

- a. Seat ball (13, Figure 2-24) and spring (12) into body (15).
- b. Install preformed packing (14). Replace plug (11).
- c. Install preformed packing (10) and replace plug (9).
- d. Install preformed packing (8).
- e. Install aluminum washers (7) and replace jam nut (6).
- f. Install aluminum washers (5) and replace cap nut (4).

- g. Install Preformed packing (1, 2, and 3).

2. Assemble Quad Check Valve.

- a. Seat ball (6, Figure 2-23) and spring (5) into body (8).
- b. Install Preformed packing (7). Replace plug (4).
- c. Install Preformed packing (1, 2, and 3).

3. Assemble Dual Relief Valve.

- a. Seat ball (10, Figure 2-22) and spring (9) into body (12).
- b. Install Preformed packing (11). Replace plug (8).
- c. Install aluminum gasket (7) and replace jam nut (6).
- d. Install aluminum gasket (5) and replace cap nut (4).
- e. Install Preformed packing (1,2, and 3).

4. Assemble Single Check Valve.

- a. Seat ball (6, Figure 2-21) and spring (5) into body (8).
- b. Install Preformed packing (7). Replace plug (4).
- c. Install Preformed packing (1, 2, and 3).

5. Assemble Valve Assembly.

- a. Fit the control valves together, being careful not to displace the Preformed packing previously installed.
- b. Replace top and bottom end plates (12, Figure 2-20) and secure with three bolts (13).

REPLACEMENT

Replace Valve Assembly.

- a. Position valve assembly (10, Figure 2-20) and secure with four mounting bolts (11).
- b. Connect hydraulic lines (3, 4, 5, 6, 7, 8, and 9) and remove tags.
- c. Tighten drain connection (9).
- d. Open remote valves (1, 2).
- e. Remove warning tags from pumps.
- f. Service system (refer to paragraph 2-25).

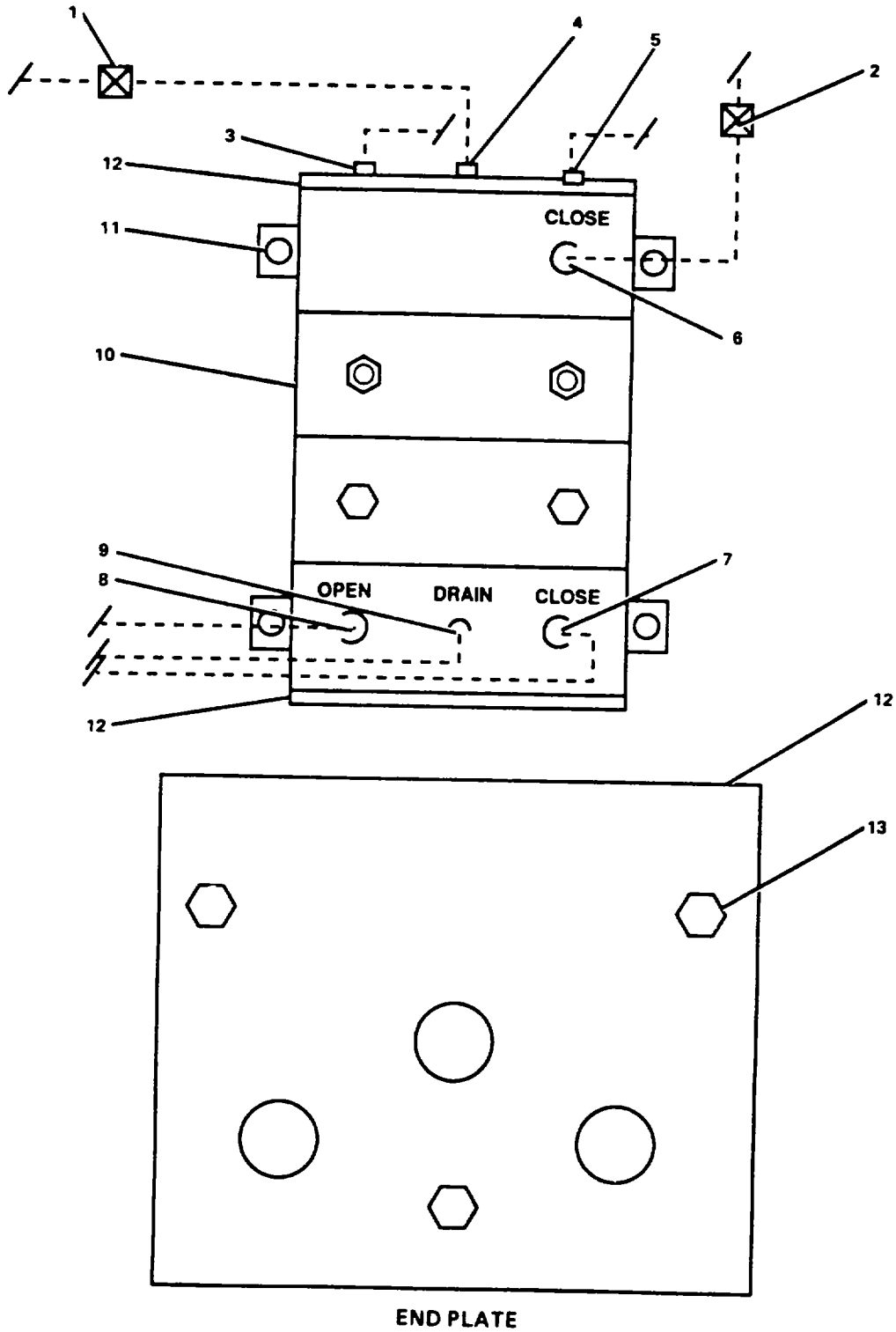


Figure 2-20. Remove Control Valve Assembly.

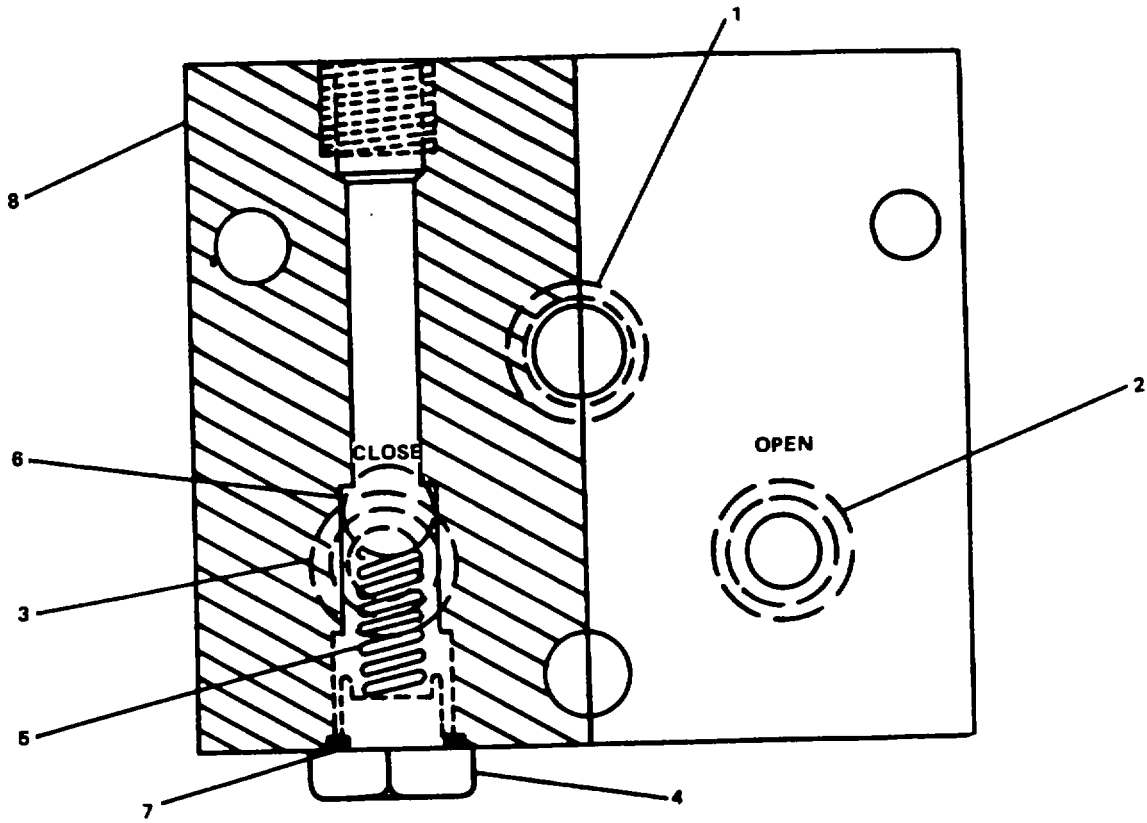


Figure 2-21. Single Check Valve.

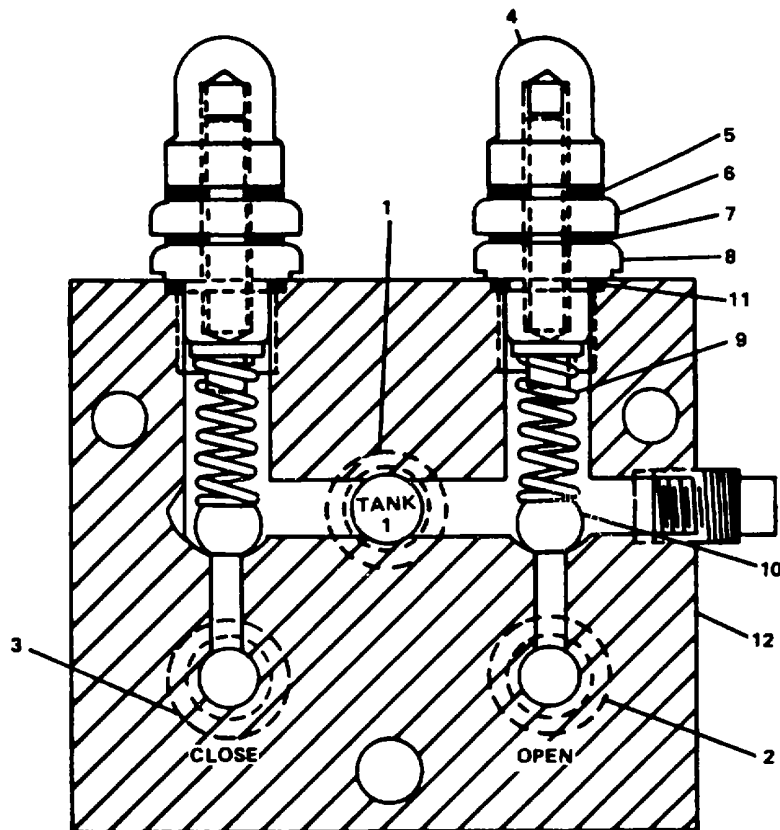


Figure 2-22. Dual Relief Valve.

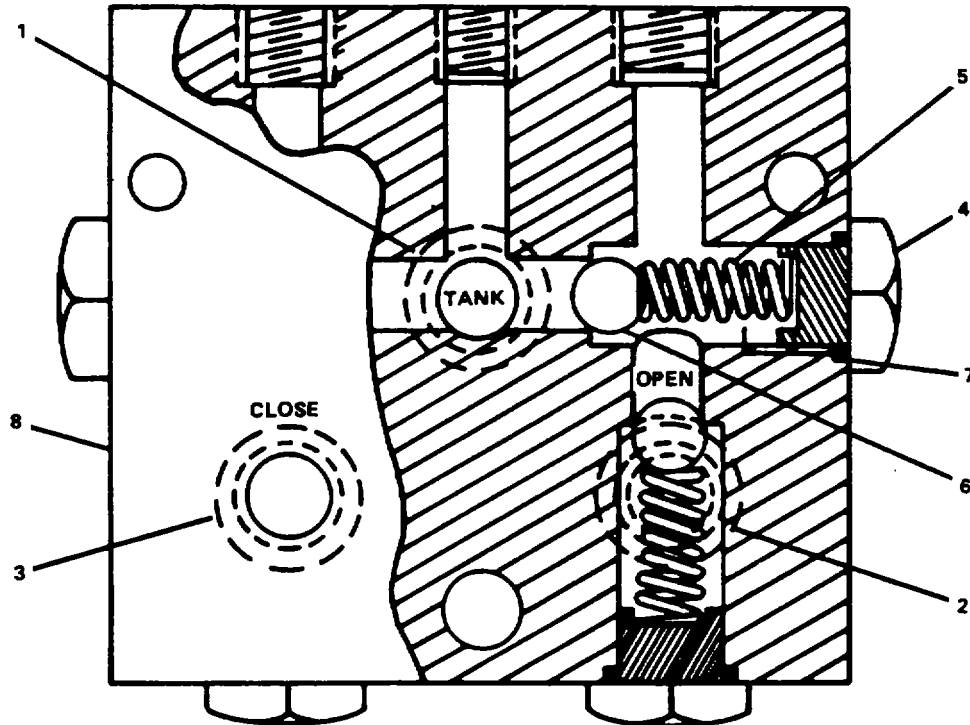


Figure 2-23. Quad Check Valve.

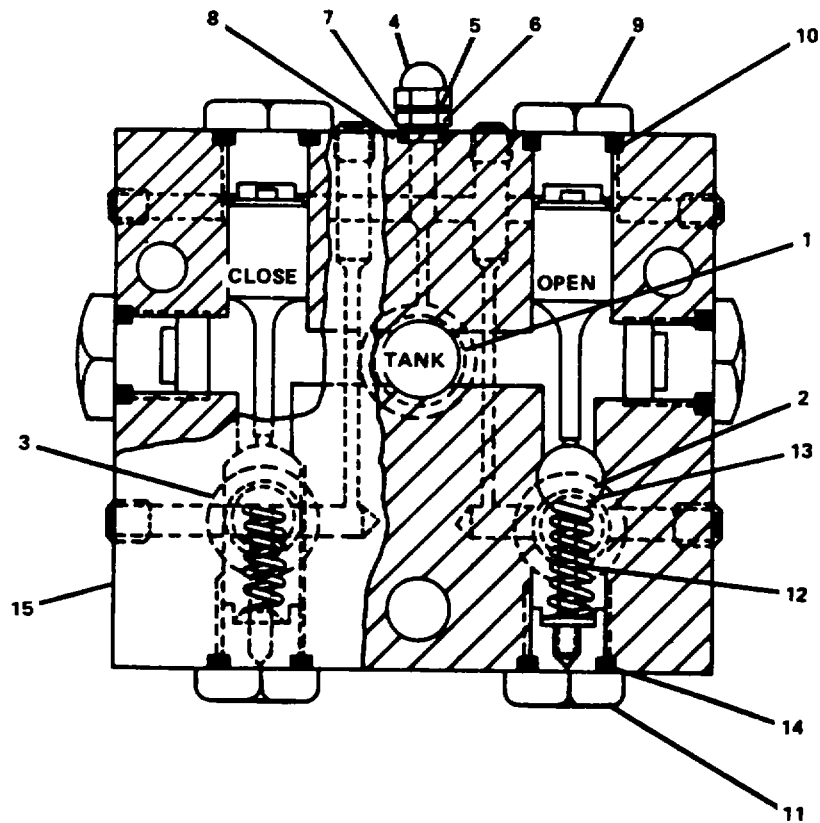


Figure 2-24. Shuttle Valve.

2-27. Repair Remote Hand Pump.

This task covers:

- a. Removal b. Disassembly c. Repair d. Assembly e. Replacement
-

INITIAL SETUP

Tools

Tool kit, general mechanic's,
5180-00-629-9783

Materials/Parts

Remote Hand Pump P/N H-3
Gasket P/N 2022031-2
Preformed packing P/N 2-28
Shaft seal P/N 60250
Wiping rags, Item 2,
Appendix D
Warning tags, Item 1,
Appendix D

Equipment Condition

Hydraulic doors secured and hand
pumps tagged "Out of Service -
Do Not Operate."

General Safety Instructions

Do not operate the hydraulic
door with two shutoff valves
closed. This will create
back pressure in the hand
pumps and cause the shaft
seals to blow.

This procedure is intended for
repairing oil leaks only.

REMOVAL

1. Remove Hydraulic Lines.

a. Place pail under hydraulic tank.

b. Shut remote valves (1 and 4, Figure 2-25).

2.

WARNING

(6)

*Wear eye protection when removing and draining
hydraulic lines.*

c. Loosen one of the hydraulic lines (2) at pump
(3) to release pressure from system.

WARNING

*Wipe up hydraulic fluid immediately to prevent
unsafe working conditions and personal injury.*

d. Disconnect hydraulic lines at pump.

Remove Remote Hand Pump(s).

a. Remove two taper pin (5) securing hand crank
to pump shaft and remove hand crank.

b. Remove six mounting bolts (8) and remove
pump (3).

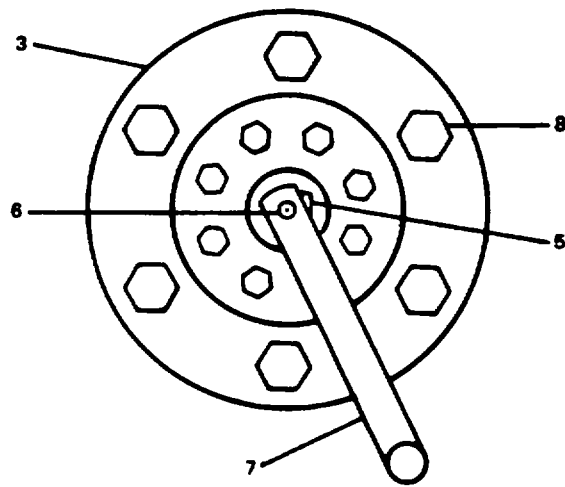
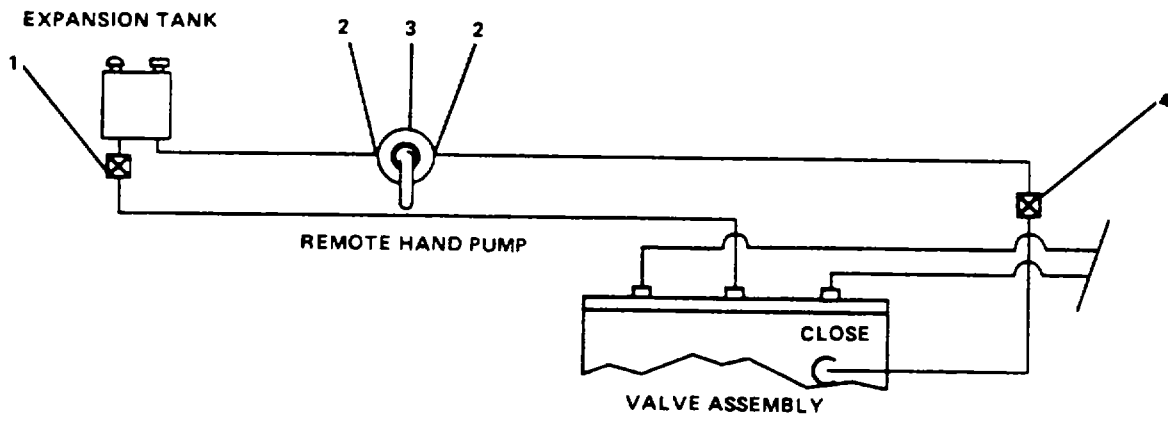


Figure 2-25. Remove Remote Hand Pump.

DISASSEMBLY

1. Disassemble Pump Housing.
 - a. Remove hex head screws (1, Figure 2-26) holding end cap (2) to pump.
 - b. Remove and discard end cap gasket (3).
 - c. Remove collar retaining pin (4) and remove collar (5).
 - d. Remove hex head screws (6) holding pump head to body and separate.

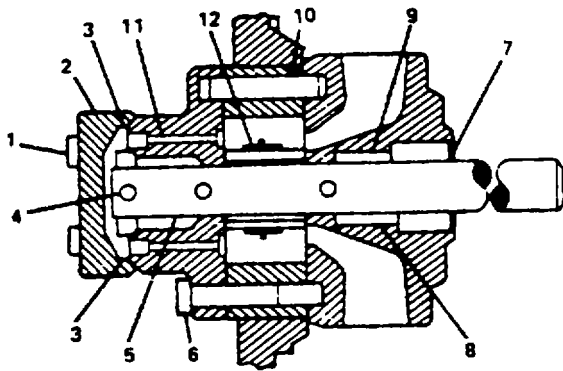


Figure 2-26. Disassemble Remote Hand Pump.

2. Remove Seals, Bearings, preformed packing, and Rotor.
 - a. Remove seal (7) from shaft end of pump.
 - b. Use pliers to remove snap ring (8) and remove front shaft bearing (9).
 - c. Remove preformed packing (10), rear bearing (11) and rotor (12).

REPAIR

Repair at this level of maintenance is by replacement of gasket (3), seal (7), and preformed packing (10).

ASSEMBLY

1. Install Seals, Bearings, preformed packing, and Rotor.
 - a. Install preformed packing (10, Figure 2-26), rear bearing (11) and rotor (12).
 - b. Install front shaft bearing (9) and snap ring (8).
 - c. Install shaft seal (7).
2. Assemble Pump Housing.
 - a. Assemble pump head to body and secure with hex head screws (6).
 - b. Install collar (5) and secure with collar retaining pin (4).
 - c. Install new gasket (3), end cap (2) and secure with four hex head screws (1).

REPLACEMENT

1. Replace Remote Hand Pump.
 - a. Install pump (3, Figure 2-25) and secure with six mounting bolts (8).
 - b. Install hand crank (7) on pump shaft (6) and secure with taper pin (5).
2. Replace Hydraulic Lines.
 - a. Connect hydraulic lines (2) at pump(s) (3).
 - b. Fill hydraulic tank
 - c. Open valves (1, 4).
 - d. Remove warning tags from pumps.
 - e. Service system (refer to para. 2-25) and expansion tank (refer to PMCS, Table 2-1). Wipe up all fluid spills.

2-28. Repair Local Hand Pump.

This task covers:

a. Removal, b.Disassembly, c. Repair, d.Assembly, e.Replacement

INITIAL SETUP

Tools

Tool kit, general mechanic's,
5180-00-629-9783

Materials/Parts

Local Hand Pump PIN H-5
Gasket P/N 20-22031-2
Preformed Packing P/N 2-428
Shaft seal P/N 60250
Wiping rags, Item 2, Appendix D
Warning tags, Item 1, Appendix D

Equipment Condition

Hydraulic doors secured and pumps tagged,
“Out of Service - Do Not Operate”.

General Safety Instructions

Do not operate the door with two shutoff valves
dosed. This will create back pressure in the
hand pumps and cause the shaft seals to blow.

This procedure is intended for repairing oil leaks
only.

REMOVAL

WARNING

*Wear eye protection when removing and
draining hydraulic lines.*

NOTE

c.

*Local hand pumps are located on each side of
the hydraulic door.*

1. Remove Hydraulic Lines.

- a. Shut remote valves (1 and 2, Figure 2-27).
- b. Loosen one of the hydraulic lines (3) at
pump (4) to release pressure from system.

WARNING

*Wipe up hydraulic fluid immediately to prevent
unsafe working conditions and personal injury.*

Disconnect hydraulic lines from pump.

2 Remove Local Hand Pump.

- a. Remove taper pin (5) securing crank (6) to
pump shaft and remove crank
- b. Repeat step a. for other hand crank
- c. Remove six mounting bolts (7) and remove
pump (4).

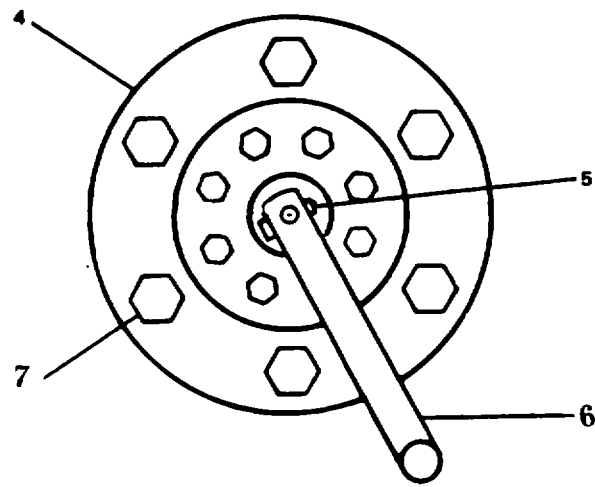
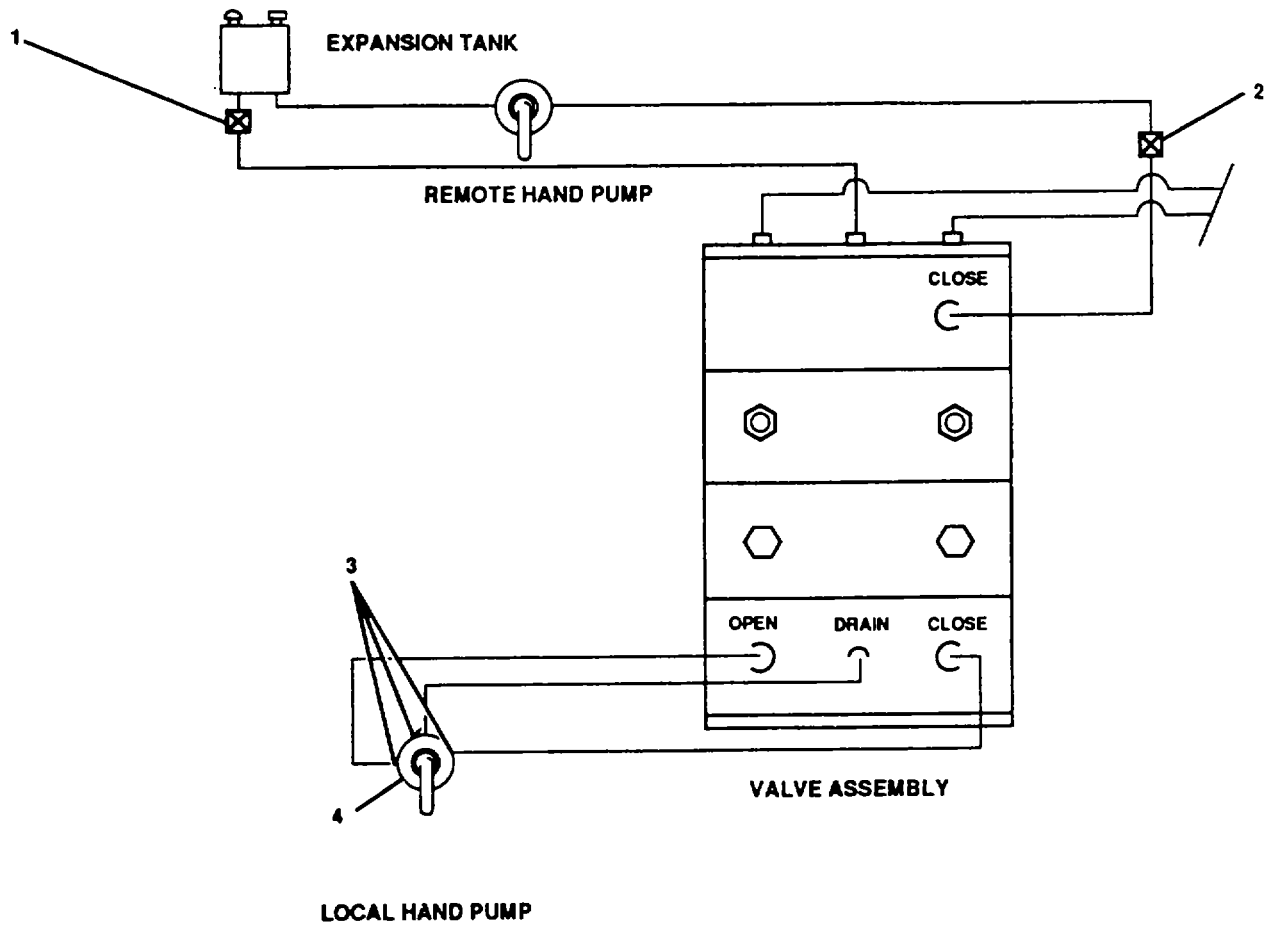


Figure 2-27. Remove Local Hand Pump.

DISASSEMBLY

1. *Disassemble Pump.*

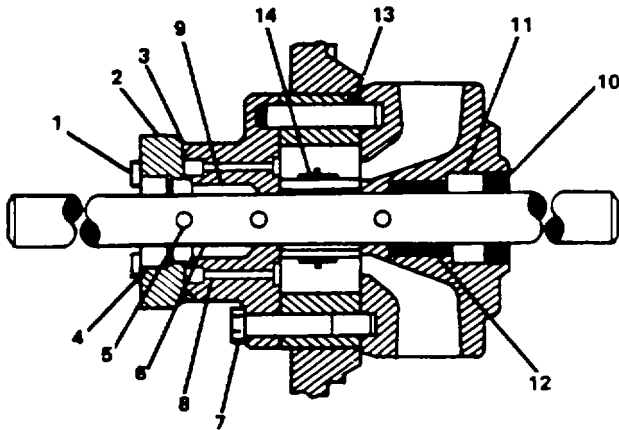


Figure 2-28. Disassemble Local Hand Pump.

a. Remove four hex head screws (1, Figure 2-28) holding end cap (2) to pump.

b. Remove and discard gasket (3) from end cap.

c. Remove rear shaft seal (4), collar retaining pin (5) and remove collar (6).

d. Remove hex head screws (7) holding pump head to body and separate the two.

2. Remove Seals, Bearings, Preformed packing and Rotor.

a. Use pliers to remove snap ring (8) and remove rear bearing (9).

b. Remove front shaft seal (10).

c. Use pliers to remove snap ring (11) and remove front bearing (12).

d. Remove preformed packing (13) and rotor (14).

REPAIR

Repair at this level of maintenance is by replacement of gasket (3), seals (4, 10), and preformed packing (13).

ASSEMBLY

1. Install Seals, Bearings, Preformed packing and Rotor.

a. Install rotor (14, Figure 2-28) and preformed packing (13).

b. Install front bearing (12) and replace snap ring (11).

c. Install front shaft seal (10).

d. Install rear bearing (9) and replace snap ring (8).

2. Assemble Pump.

a. Assemble pump head to pump body and secure with hex head screws (7).

b. Install collar (6), collar retaining pin (5) and rear shaft seal (4).

c. Install new gasket (3), end cap (2) and secure with four hex head screws (1).

REPLACEMENT

1. Replace Local Hand Pump.

a. Install pump (4, Figure 2-27) and secure with six mounting bolts (7).

b. Install hand crank (6) on pump shaft and secure with taper pin (5).

c. Repeat step b for second hand crank.

2. Replace Hydraulic Lines.

a. Connect hydraulic lines (3) at pump (4).

b. Open remote valves (1, 2).

c. Remove warning tags from pumps.

d. Service system (refer to para. 2-25) and expansion tank (refer to PMCS, Table 2-1). Wipe up all fluid spills.

2-29. Replace/Repair Watertight Door, Six Dogs.

This task covers:	a. Removal,	b. Disassembly,	c. Repair,
d.	Assembly	e. Replacement	

INITIAL SETUP

Tools

Tool kit, general mechanics,
5180-00-629-9783

Equipment Condition

NOTE

Replace/repair procedures for the fixed light watertight doors are the same as the following procedures.

Materials/Parts

Gasket PIN 102-7
Preformed packing P/N 102-13
Bushing (oilite bronze) P/N 102-6
Marking chalk, Item 4, Appendix D

REMOVAL

WARNING

Doors weigh approximately 100 pounds. To prevent personal injury, at least two soldiers should handle door.

NOTE

Removal/Replacement procedures for both left and right hand doors are the same.

a. Remove (if installed) grounding straps (6, Figure 2-29) from hinge blades (2) and from bulkhead.

NOTE

When loosening dogs in watertight doors, those dogs nearest the hinge should be loosened first. This prevents the door from springing and makes it easier to operate the remaining dogs.

b. Open door (1).

c. Remove cotter pins (5) from cylindrical pins (3).

d. Remove cylindrical pins from hinge blades (2). replacement of gasket (12, Figure 2-30), pre-

e. Remove flat washers (4) then remove door (1).

DISASSEMBLY

NOTE

Disassembly/Assembly procedures for both left and right hand doors are the same.

a. Remove hex nuts (6, Figure 2-30) and handles (7) from door (1)

b. Remove bronze bushing (5) and preformed packing (4) from door.

c. Remove dog door closer (11) from door.

d. Remove shim (10) and pipe sleeve (9) from door.

e. Remove gasket (12) from door.

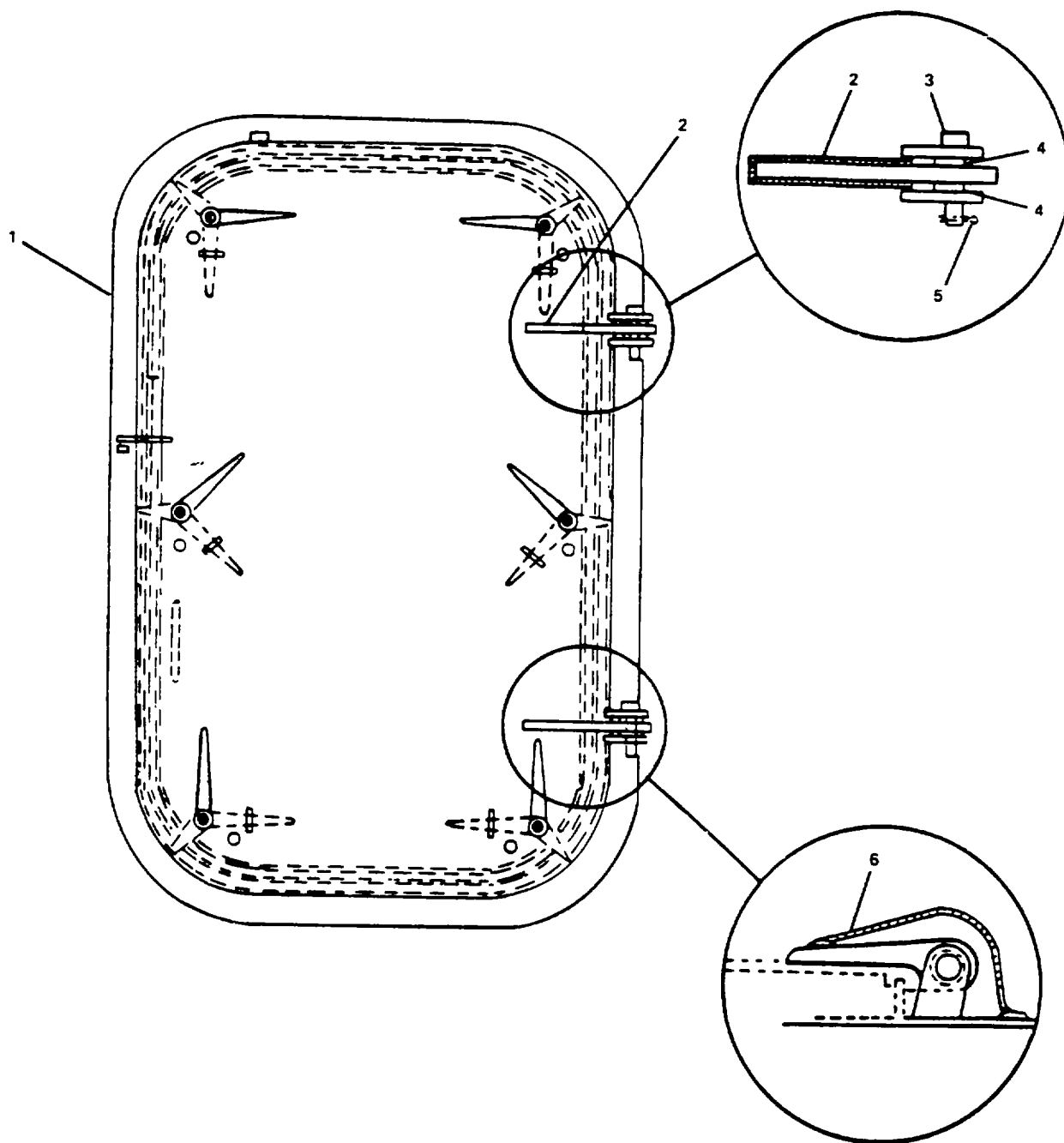
f. Clean gasket channel thoroughly.

NOTE

After removing the old gasket, the entire gasket channel should be thoroughly cleaned.

REMOVAL

Repair at this level of maintenance is by replacement of gasket (12, Figure 2-30), preformed packing (4) and oilite bronze bushings (8).



TYPICAL WATERTIGHT
DOOR GROUNDING STRAP

Figure 2-29. Replace Watertight Door. Six Dogs.

ASSEMBLY

- a. Measure the required length around the door for the gasket.
- b. Add one additional inch and cut gasket.

NOTE

If the gasket is shorter it will eventually shrink, leaving a gap at the joint and destroying the watertight integrity of the door.

- c. Install gasket (12) and gasket retainer (8) on door.
- d. Install dog closer (11) on door.
- e. Install preformed packing (4) and bronze bushings (5) on door.
- f. Install handles (7) on door.
- g. Secure handles using hex nuts

REPLACEMENT

- a. Place door (1, Figure 2-29) in position on frame.
- b. Install flat washers (4) and align holes.

NOTE

Make sure that one washer is placed on each side of hinge blade.

- c. Insert cylindrical pins (3) in hinge blades (2).
- d. Secure cylindrical pins using cotter pins (5).

NOTE

Upon initial installation of a door, new gasket, or new dog the door should be "chalk tested."

e. Perform chalk test as follows:

- (1) Clean the knife edge of the closure frame.
- (2) Apply a chalk line completely around the knife edge of door frame.

NOTE

When setting up dogs on watertight doors. A dog on the opposite side from the hinges should be set up first with sufficient pressure to hold the door. Two dogs should then be set up snugly on the hinge side. Then all the dogs should be set up evenly to ensure a good bearing all around.

- (3) Dog the door.
- (4) If the door is watertight, the gasket will show an unbroken chalk line.
- (5) If the line is broken, adjust the dogs and retest.

CAUTION

Dogs should not be adjusted to give more than 1/8" compression. Excessive pressure is harmful to the gasket.

- f. Operate door and check for smooth and positive dogging action.
- g. Install (if removed in STEP a. of removal procedure) grounding straps (6, Figure 2-29) to hinge blades (2) and to bulkhead.

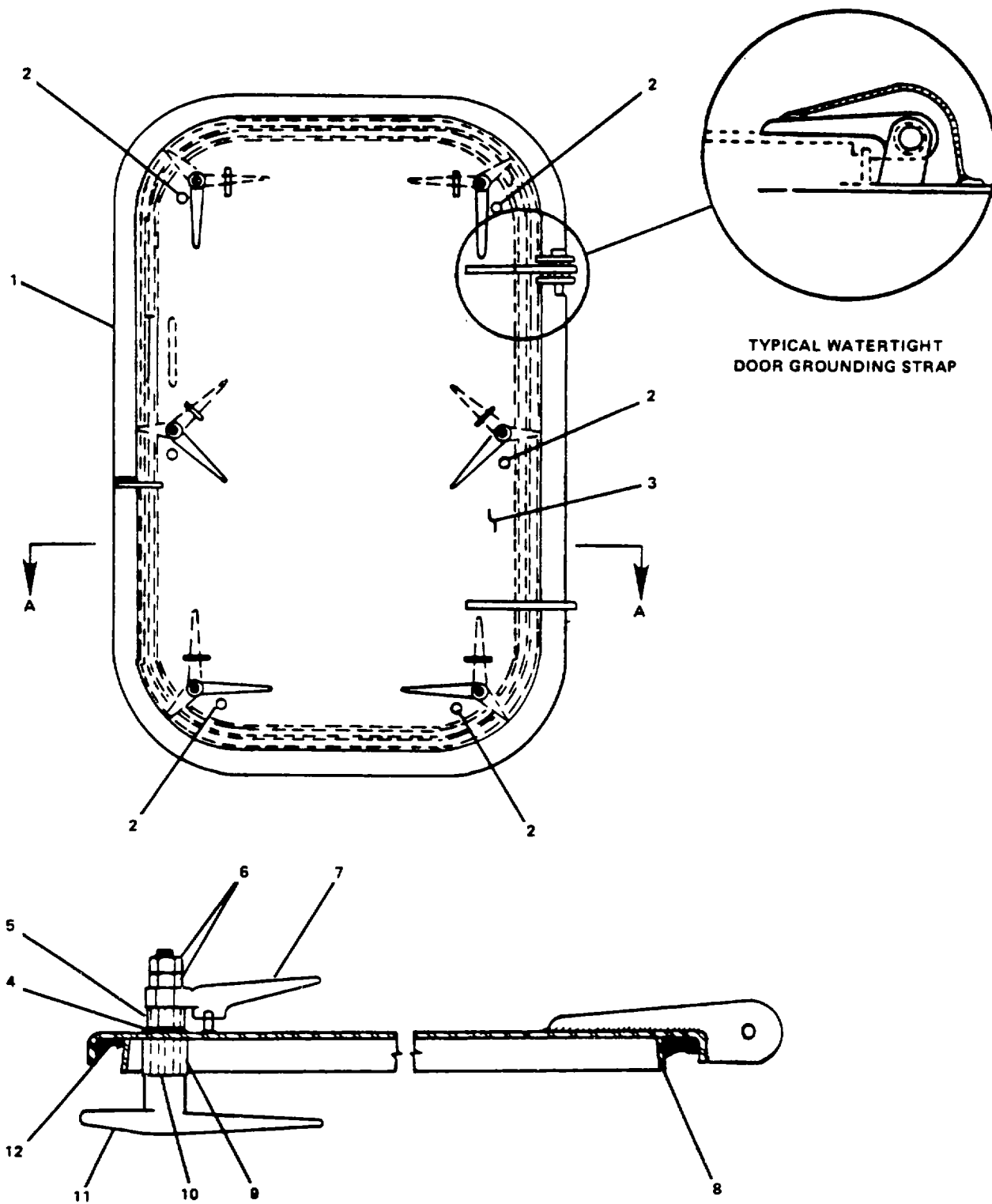


Figure 2-30. Repair Watertight Door. Six Dogs.

2-30. Replace/Repair Watertight Door, Four Dogs.

This task covers:	a. Removal,	b. Disassembly,	c. Repair,
d.	Assembly	e. Replacement	

INITIAL SETUPTools

Tool kit, general mechanics,
5180-00-629-9783

Equipment ConditionMaterials/Parts

Gasket PIN 102-7
Preformed packing P/N 102-13
Bushing (oilite bronze) P/N 102-6
Marking chalk, Item 4, Appendix D

REMOVAL**WARNING**

Doors weigh approximately 100 pounds. To prevent personal injury, at least two soldiers should handle door.

NOTE

Removal/Replacement procedures for both left and right hand doors are the same.

a. Remove (if installed) grounding straps (6, Figure 2-31) from hinge blades (2) and from bulkhead.

NOTE

When loosening dogs in watertight doors, those dogs nearest the hinges should be loosened first. This prevents the door from springing and makes it easier to operate the remaining dogs.

b. Open door (1).

c. Remove cotter pins (5) from cylindrical pins (3).

d. Remove cylindrical pins from hinge blades (2).

e. Remove flat washers (4) then remove door (1).

DISASSEMBLY**NOTE**

Disassembly/Assembly procedures for both left and right hand doors are the same.

a. Remove hex nuts (6, Figure 2-32) and handles (7) from door (1).

b. Remove bronze bushing (5) and preformed packing (4) from door.
c. Remove dog door closer (9) from door.
d. Remove gasket (11) from door.
e. Clean gasket channel thoroughly.

NOTE

After removing the old gasket, the entire gasket channel should be thoroughly cleaned.

REPAIR

Repair at this level of maintenance is by replacement of gasket (11, Figure 2-32), preformed packing (4), and oilite bronze bushings

a. Measure the required length around the door for the gasket.

b. Add one additional inch for each 36 inches of channel and cut gasket.

NOTE

If the gasket is shorter it will eventually shrink, leaving a gap at the joint and watertight integrity of the door.

c. Install gasket (11) on door.

d. Install dog door closer (9) on door.

e. Install preformed packing (4) and bronze bushings (5) on door.

f. Install handles (7) on door.

g. Secure handles using hex nuts (6).

REPLACEMENT

- a. Place door (1, Figure 2-31) in position on frame.
- b. Install flat washers (4) and align holes.

NOTE

Ensure that one washer is placed on each side of hinge blade.

- c. Insert cylindrical pins (3) in hinge blades (2).
- d. Secure cylindrical pins using cotter pins (5).
 - (1) Clean the knife edge of the closure frame.
 - (2) Apply a chalk line completely around the knife edge of door frame.

NOTE

When setting up dogs on watertight doors. A dog on the opposite side from the hinges should be set up first with sufficient pressure to hold the door. Two dogs should then be set up snugly on the hinge side. Then the dogs should be set up evenly to ensure a good bearing all around.

- (3) Dog the door.

(4) If the door is watertight, the gasket will show an unbroken chalk line.

- 5) If the line is broken, adjust the dogs and retest.

CAUTION

Dogs should not be adjusted to give more than 1/8" compression. Excessive pressure is harmful to the gasket.

f. Operate door and check for smooth and positive dogging action.

g. Install (if removed in STEP a. of removal procedure) grounding straps (6, Figure 2-31) to hinge blades (2) and to bulkhead.

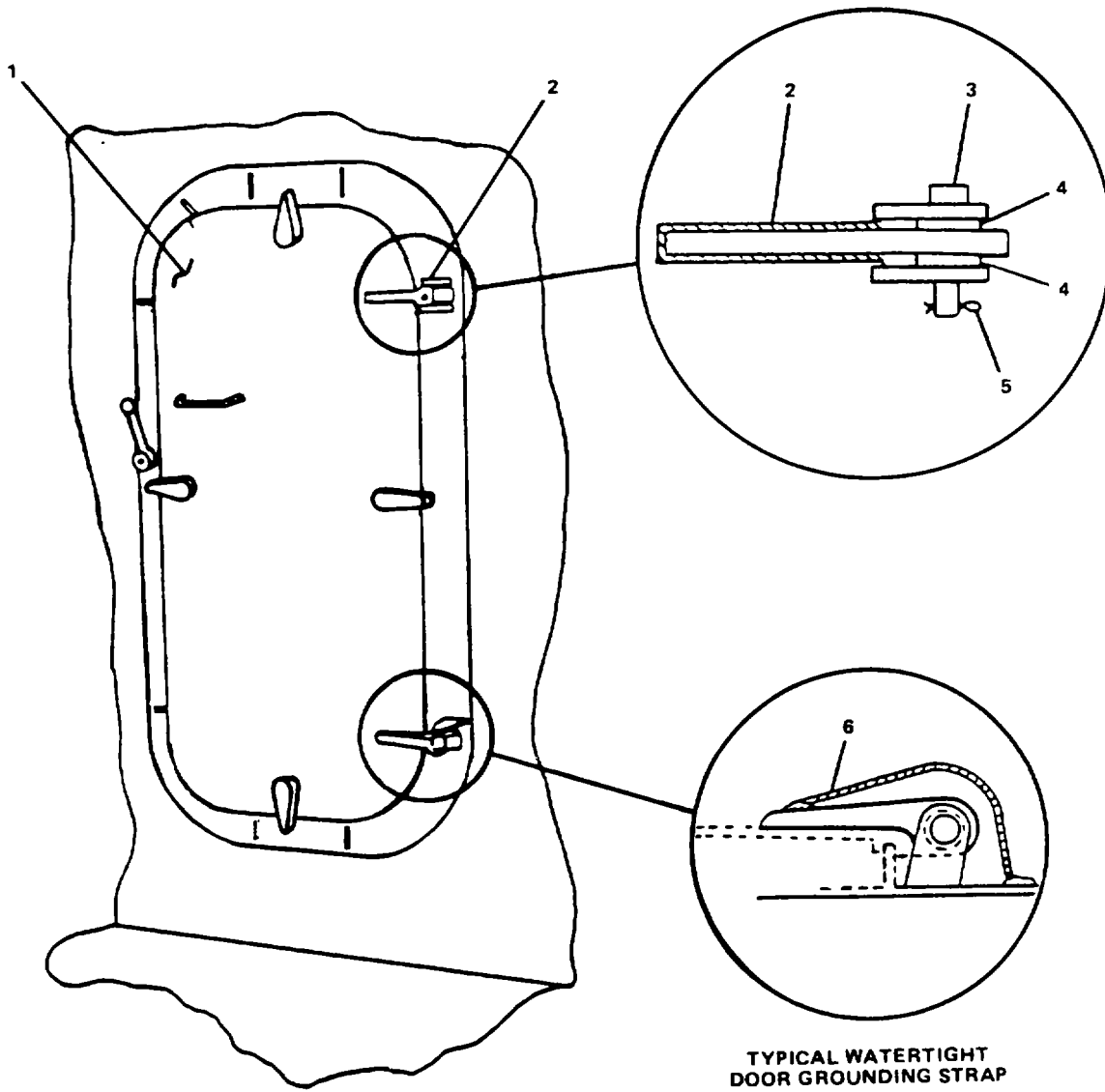


Figure 2-31. Replace Waternight Door.. Four Dogs.

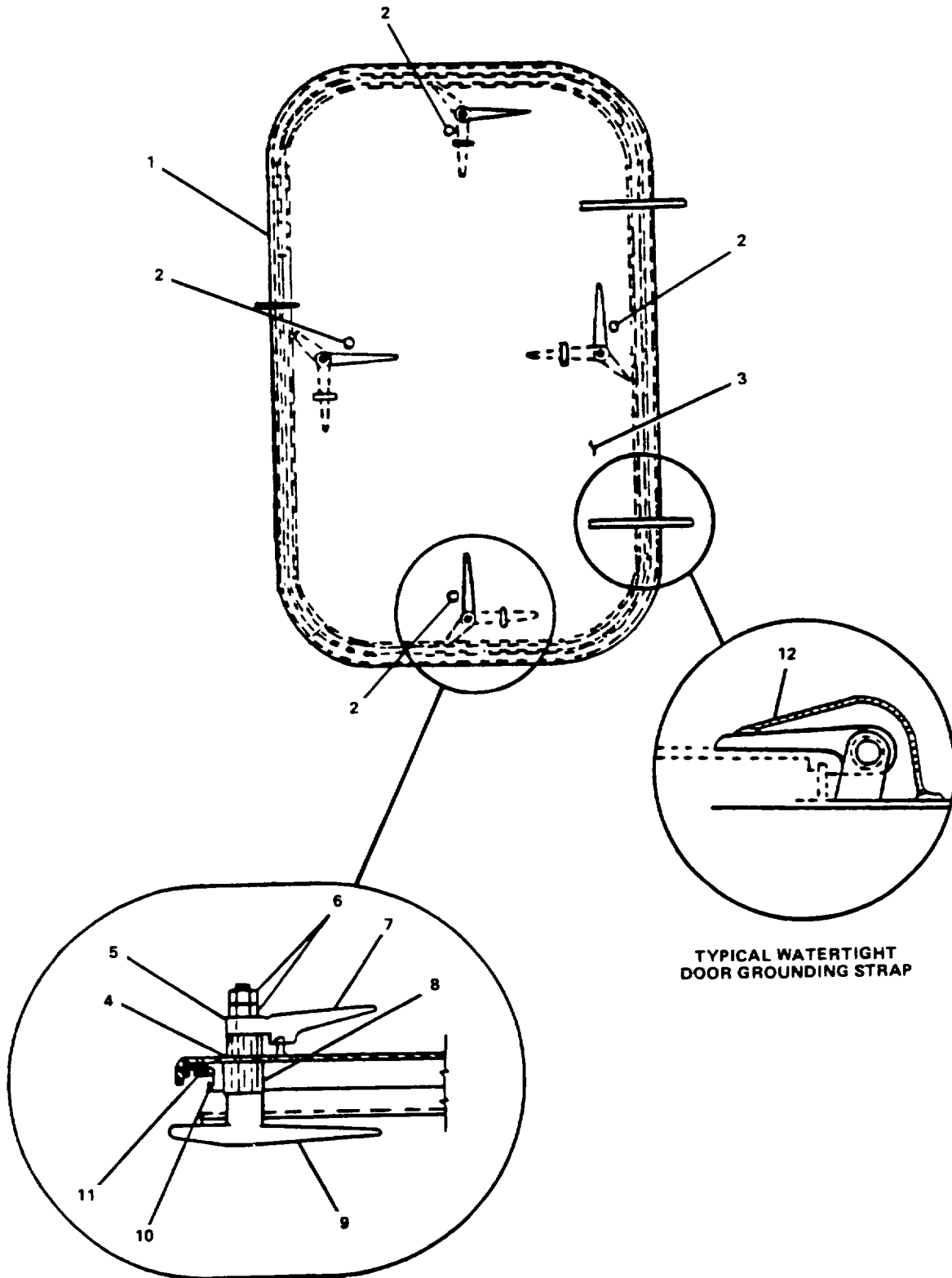


Figure 2-32. Repair Waternight Door, Four Dogs.

2-31. Replace/Repair Watertight Door, Quick Action, Left Hand.

This task covers:	a. Removal, Assembly	b. Disassembly, Replacement	c. Repair,
d.		e.	

INITIAL SETUP

Tools

Tool kit, general mechanic's,
51 8-00-629-9783

Equipment Condition

Materials/Parts

Bushing P/N 104-21
Preformed packing P/N 104-13
Helical compression spring P/N 104-27
Gasket P/N 104-7
Bushing (brass) P/N 104-28
Marking chalk, Item 4, Appendix D

REMOVAL

WARNING

Doors weigh approximately 100 pounds. To prevent personal injury, at least two soldiers should handle door.

NOTE

Removal/Replacement procedures for both left and right hand doors are the same.

- a. Remove (if installed) grounding straps (6, Figure 2-31) from hinge blades (2) and from bulkhead.
- b. Open door (1).
- c. Remove cotter pins (5) from cylindrical pins (3).
- d. Remove cylindrical pins (3) from hinge blades (2).
- e. Remove flat washers (4) then remove door (1).

DISASSEMBLY

- a. Remove hex nuts (7). 9, Figure 2-34) from handwheel (7).

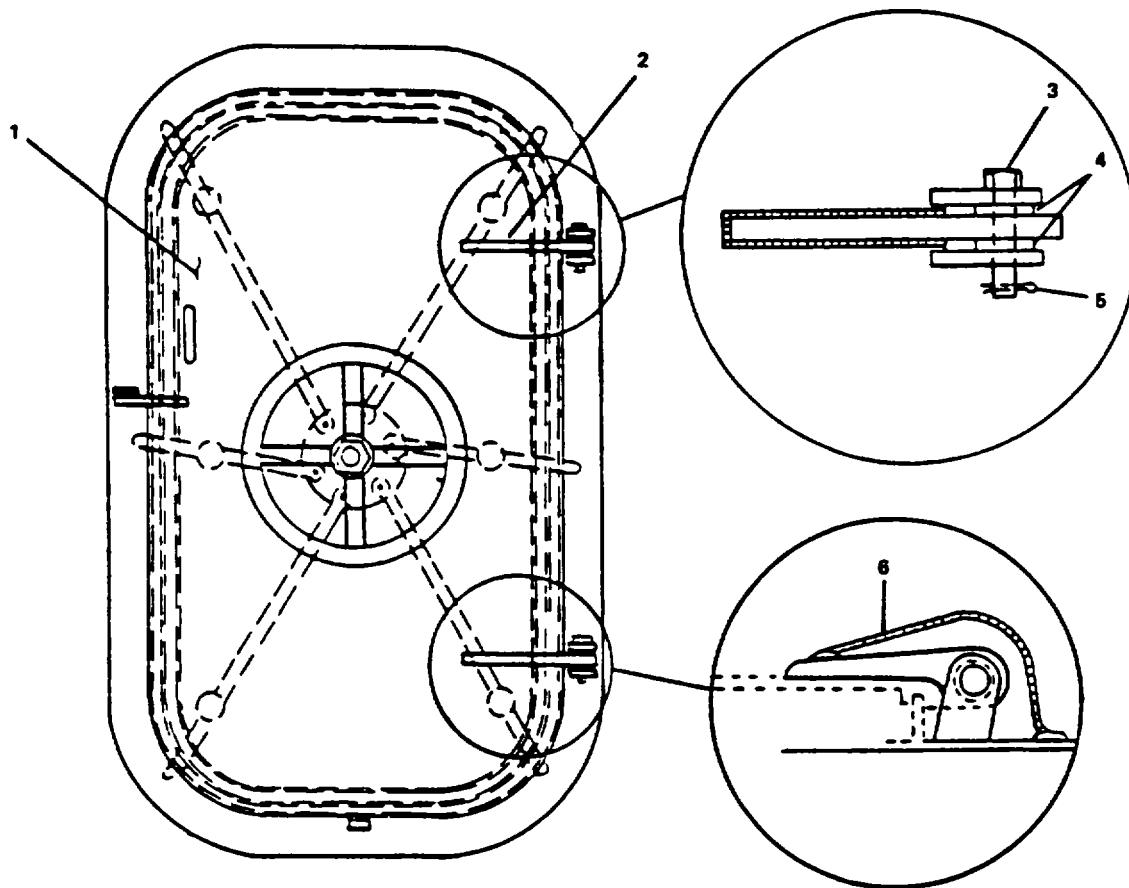
- b. Remove cover (16) and strap cover (20) from door.
- c. Remove cotter pins (15) and cylindrical pins (11) from dog arms (2).
- d. Loosen setscrews (14) and remove dog arms with guides (21) and bushings (4).
- e. Remove handwheel (7) and shaft (17) from door.
- f. Remove helical compression springs (6) from door (1).
- g. Remove shim (18), brass bushings (10), and preformed packing (8) from handwheel shaft.
- h. Clean gasket channel thoroughly.

NOTE

After removing the old gasket, the entire gasket channel should be thoroughly cleaned.

REPAIR

Repair at this level of maintenance is by replacement of preformed packing (8, Figure 2-34), gasket (5), brass bushings (10) helical compression springs (6), and bushings (4).



**TYPICAL WATERTIGHT
DOOR GROUNDING STRAP**

Figure 2-33. Replace Watertight Door. Quick Action. Left Hand.

ASSEMBLY

- a. Measure the required length around the door for gasket.
- b. Add one additional inch for each 36 inches of channel and cut gasket.

NOTE

If the gasket is shorter it will eventually shrink, leaving a gap at the joint and destroying the watertight integrity of the door.

- c. Install gasket (5) in figure 2-34 gasket retainer (13) on door.
- d. Install preformed packing (8), brass bushings (10), and shim (18) on handwheel shaft.
- e. Place helical compression springs (6), then bushings (4) on door.
- f. Install dog arms (2) with guides (21) and secure using setscrews (14).
- g. Install handwheel (7) and shaft (17) on door.
- h. Install cylindrical pins in dog arms and secure using cotter pins (15).
- i. Install handwheel (7) and secure with hex nuts (9).
- j. Install strap cover (20) and cover (16) on door.

REPLACEMENT

- a. Place door (1, Figure 2-33) in position on frame.

- b. Install flat washers (4) and align holes.

NOTE

Ensure that one washer is placed on each side of hinge blade.

- c. Insert cylindrical pins (3) in hinge blades (2).
- d. Secure cylindrical pins using cotter pins (5).

NOTE

Upon initial installation of a door, new gasket, or new dog the door should be "chalk tested."

- e. Perform chalk test as follows:

- (1) Clean the knife edge of the closure frame.
- (2) Apply a chalk line completely around the knife edge of door frame.
- (3) Dog the door.
- (4) If the door is watertight, the gasket will show an unbroken chalk line.
- (5) If the line is broken, adjust the dogs and retest.

CAUTION

Dogs should not be adjusted to give more than 1/8" compression. Excessive pressure is harmful to the gasket.

- f. Operate door and check for smooth and positive dogging action.
- g. Install (if removed in STEP a. of removal procedure) grounding straps (6, Figure 2-33) hinge blades (2) and to bulkhead.

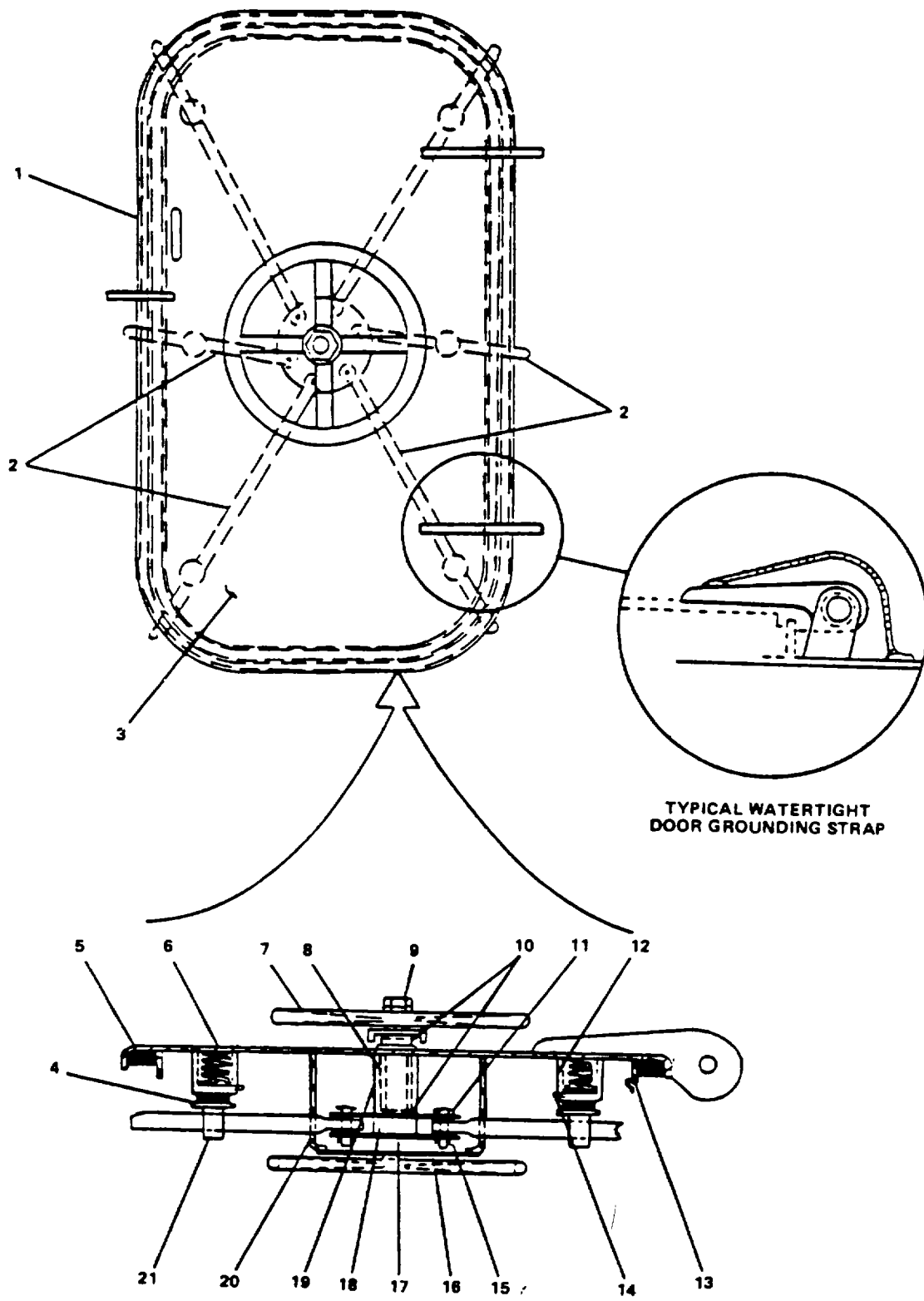


Figure 2-34. Repair Watertight Door. Quick Action. Left Hand.

2-32. Replace/Repair Watertight Hatch, Flush (Four Dogs).

This task covers:	a. Removal,	b. Disassembly,	c. Repair,
d.	Assembly	e. Replacement	

INITIAL SETUP

Tools

Tool kit, general mechanic's,
5180-00-629-9783

Equipment Condition

Materials/Parts

Bushing P/N 211-13
Preformed packing P/N 211-16
Gasket P/N 211-7
Marking chalk, Item 4, Appendix D

REMOVAL

WARNING

Hatch is heavy. To prevent personal injury, at least two soldiers should handle hatch.

- a. Open hatch (1, Figure 2-35).
- b. Remove hinge pin (2), threaded coupling (3), threaded plug (4), and washers (5).
- c. Remove hatch from closure.

DISASSEMBLY

- a. Remove nut (6), shim (7) and dog handle (8).
- b. Remove sleeve (9), preformed packing (10) and bushings (11).
- d. Place bushings (11) in position, then install
- c. Remove gasket retainer (12) and gasket (13).

NOTE

After removing the old gasket, the entire gasket channel should be thoroughly cleaned.

REPAIR

Repair at this level of maintenance is by replacement of preformed packing (10), bushings(11), and gasket (13).

ASSEMBLY

- a. Measure the required length around the hatch for gasket replacement.
- b. Add one additional inch and cut gasket.

NOTE

If the gasket is shorter it will eventually shrink, leaving a gap at the joint and destroying the watertight integrity of the hatch.

- c. Install gasket (13).
- d. Place bushing (1) in position, then install preformed packing (10) and sleeve (9).
- e. Install dog handle (8), shim (8) and secure with nut (6).

REPLACEMENT

- a. Place hatch (1) in position on frame.
- b. Install flat washers (5) and align holes.

NOTE

Ensure one washer is placed on each side of hinge blade.

- c. Insert threaded plug (4) and secure with threaded coupling (3).
- d. Install hinge pins (2).

NOTE

Upon initial installation of a hatch, new gasket, or new dog the hatch should be "chalk tested".

- e. Perform chalk test as follows:

- (1) Clean the knife edge of the closure frame.
- (2) Apply a chalk line completely around the knife edge of the hatch frame.
- (3) Dog the hatch.
- (4) If the hatch is watertight, the gasket will show an unbroken chalk line.
- (5) If the line is broken, adjust the dogs and retest.

CAUTION

Dogs should not be adjusted to give more than 1/8" compression. Excessive pressure is harmful to the gasket.

- f. Operate hatch and check for smooth and positive dogging action.

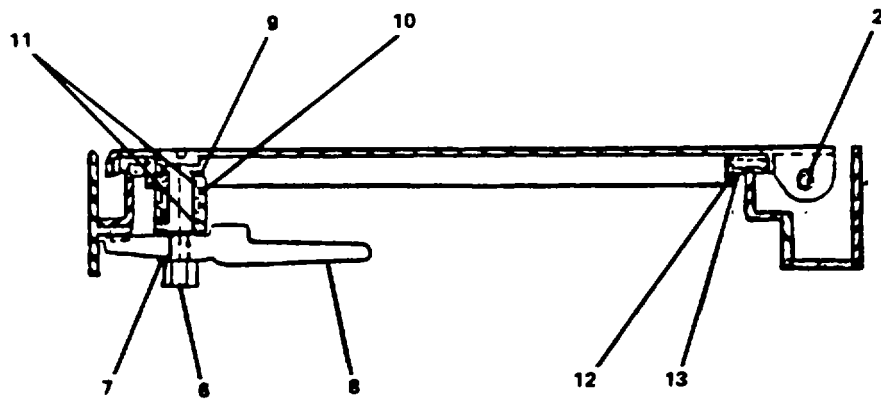
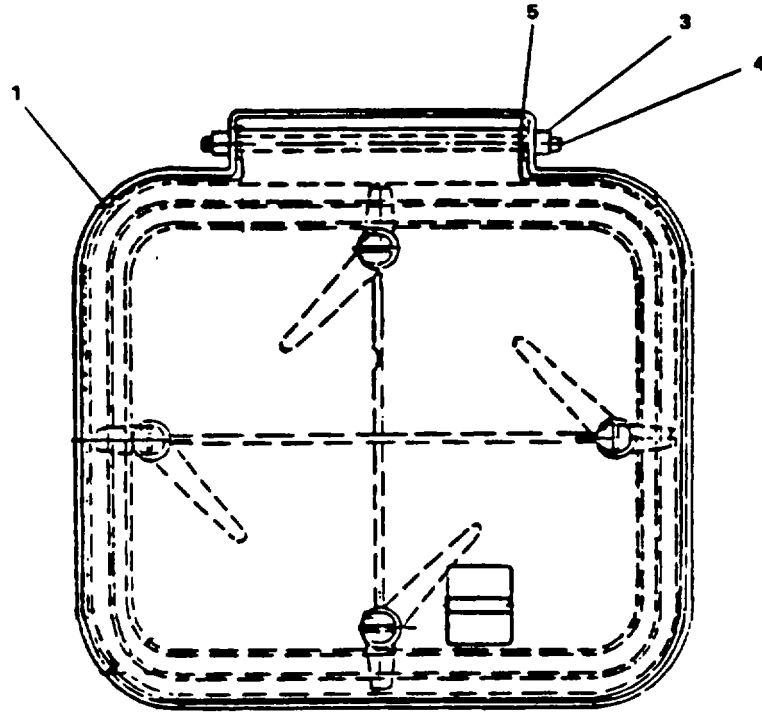


Figure 2-35. Replace/Repair Watertight Hatch. Flush (Four Dogs).

2-33. Replace/Repair Watertight Hatch.

This task covers:	a. Removal,	b. Disassembly,	c. Repair,
d.	Assembly	e. Replacement	

INITIAL SETUPTools

Tool kit, general mechanic's,
5180-0629-9783

Equipment ConditionMaterials/Parts

Bushing P/N 201-18
Preformed graphite packing P/N 201-19
Gasket P/N 201-
Marking chalk, Item 4, Appendix D

REMOVAL**WARNING**

Hatch is heavy. To prevent personal injury, at least two soldiers should handle hatch.

- Open hatch (1, Figure 2-36).
- Remove cotter pin (2), pin (3), and washers (4) from hinge blade (5).
- Remove hatch from closure.

DISASSEMBLY

- Remove jam nut (6) and handles (7, 8).
- Remove sleeve (9), bushings (10), and preformed packing (11)
- Remove gasket retainer (12) and gasket (13).

NOTE

After removing the old gasket, the entire gasket channel should be thoroughly cleaned.

REPAIR

Repair at this level of maintenance is by replacement of bushings (10), preformed packing (11), and gasket (13).

ASSEMBLY

- Measure the required length around the hatch for gasket replacement.

- Add one additional inch and cut gasket.

NOTE

If the gasket is shorter it will eventually shrink, leaving a gap at the joint and destroying the watertight integrity of the hatch.

- Install gasket (13) and gasket retainer (12).
- Place bushings (10) in position, then install preformed packing (11) and sleeve (9).
- Install dogs (7, 8) and secure with jam nut (6).

REPLACEMENT

- Place hatch (1) in position on frame.
- Install washers (4) and align holes.

NOTE

Ensure one washer is placed on each side of hinge blade.

- Insert pin (3) through washers and hinge blade(5).
- Replace cotter pin (2).

NOTE

Upon initial installation of a hatch, new gasket, or new dog the hatch should be chalk tested.

e. Perform chalk test as follows:

- (1) Clean the knife edge of the closure frame.
- (2) Apply a chalk line completely around the knife edge of the hatch frame.
- (3) Dog the hatch.
- (4) If the hatch is watertight, the gasket will show an unbroken chalk line.
- (5) If the line is broken, adjust the dogs and retest.

CAUTION

Dogs should not be adjusted to give more than 1/8" compression. Excessive pressure is harmful to the gasket.

- f. Operate hatch and check for smooth and positive dogging action.

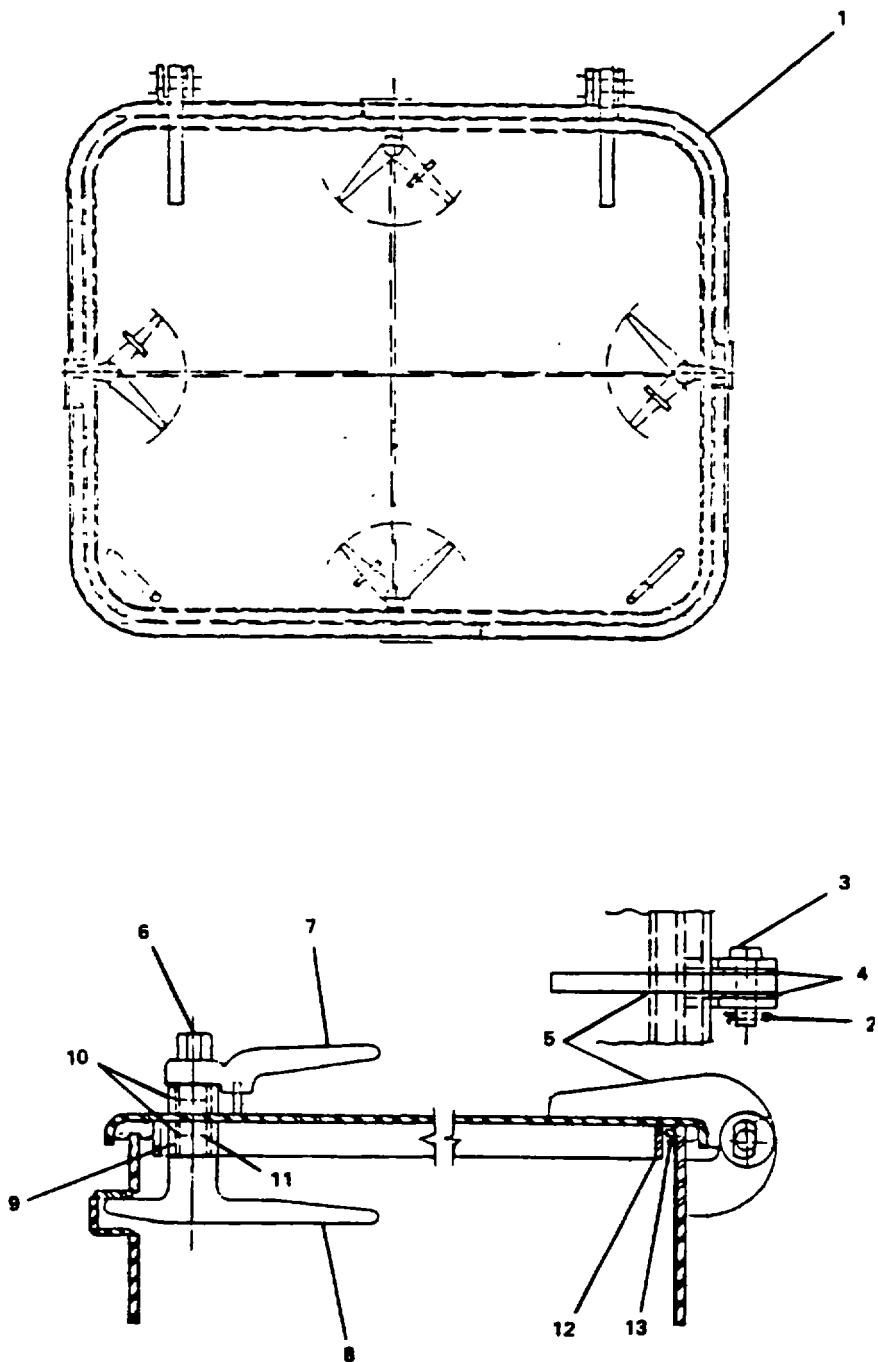


Figure 2-36. Replace/Repair Watertight Hatch.

2-34. Replace/Repair Watertight Hatch, Quick Action.

This task covers:	a. Removal,	b. Disassembly,	c. Repair,
d.	Assembly	e. Replacement	

INITIAL SETUPTools

Tool kit, general mechanic's,
5180-00-629-9783

Equipment ConditionMaterials/Parts

Bushing (Delrin) PIN 202-16, PIN 205-8
Preformed packing P/N 202-13, P/N 205-16
Bushing (oilite bronze) P/N 202-21
Helical Compression Spring PIN 202-17,
P/N 205-26
Gasket P/N 202-7, P/N 205-7
Marking chalk, Item 4, Appendix D

REMOVAL**WARNING**

Hatch is heavy. To prevent personal injury at least two soldiers should handle hatch.

- b. Remove cotter pins (4) and pin (3) from hinge blade (2).
- c. Remove hatch (1) from closure.

DISASSEMBLY

- a. Remove hex nuts (6, Figure 2-38) from handwheel (7).
- b. Remove handwheel shaft (12) from hatch.
- c. Remove delrin bushings (8) and preformed packing (4) from handwheel shaft (12).
- d. Remove cover (11).

- e. Remove cotter pins (9) from cylindrical pins (10).
- f. Remove cylindrical pins (10) from dog arms (17).
- g. Loosen setscrews (15) and remove dog arms (17) with guides (16) and bronze bushing (18).
- h. Remove helical compression spring (2) from coupling (19), then remove coupling.
- i. Remove shim (13) and pipe sleeve (5) from hatch.
- j. Remove cover strap (14).
- k. Remove gasket (21) from hatch.
- l. Clean gasket channel thoroughly.
- m. Clean coaming (20) and cover (3).

REPAIR

Repair at this level of maintenance is by replacement of delrin bushings (8, Figure 2-38), helical compression springs (2), preformed packing (4), bronze bushings (18), and gasket (21).

ASSEMBLY

- a. Install cover (3. Figure 2-38).
- b. Measure the required length around the hatch for gasket (21).
- c. Add one additional inch and cut gasket.

NOTE

If the gasket is shorter it will eventually shrink, leaving a gap at the joint and destroying the watertight integrity of the hatch.
- d. Install gasket (21) and gasket retainer (1) on hatch.
- e. Install cover strap (14).
- f. Install pipe sleeve (5) and shim (13) on hatch.
- g. Install coupling (19) and helical compression spring (2) on hatch.
- h. Place bronze bushings (18) in position, then install dog arms (17) with guides (16) on hatch.
- i. Tighten setscrews (15).
- j. Install cylindrical pins (10) in dog arms (17).
- k. Secure cylindrical pins (10) using cotter pins (9).
- l. Install cover (11) on hatch.
- m. Place preformed packing (4) and delrin bushings (8) on handwheel shaft (12).

- n. Install handwheel shaft (12) on hatch.
- o. Install handwheel (7) and secure using hex nuts (6).

REPLACEMENT

- a. Place hatch (1, Figure 2-37) in position on frame.
- b. Install pin (3) in hinge blade (2).
- c. Secure pin (3) using cotter pins (4).

NOTE

Upon initial installation of a hatch, new gasket, or new dog the hatch should be "chalk tested."

- d. Perform chalk test as follows:
 - (1) Clean the knife edge of the closure frame.
 - (2) Apply a chalk line completely around the knife edge of hatch frame.
 - (3) Dog the hatch.
 - (4) If the hatch is watertight, the gasket will show an unbroken chalk line.
 - (5) If the line is broken, adjust the dogs and retest.

CAUTION

Dogs should not be adjusted to give more than 1/8" compression. Excessive pressure is harmful to the gasket.

- f. Operate hatch and check for smooth and positive dogging action.

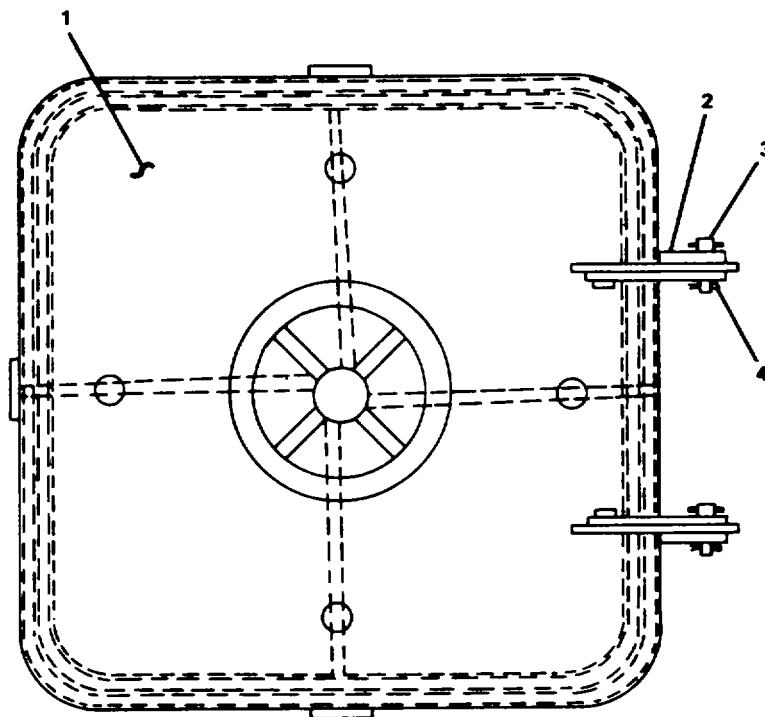


Figure 2-37. Replace Watertight Hatch. Quick Action.

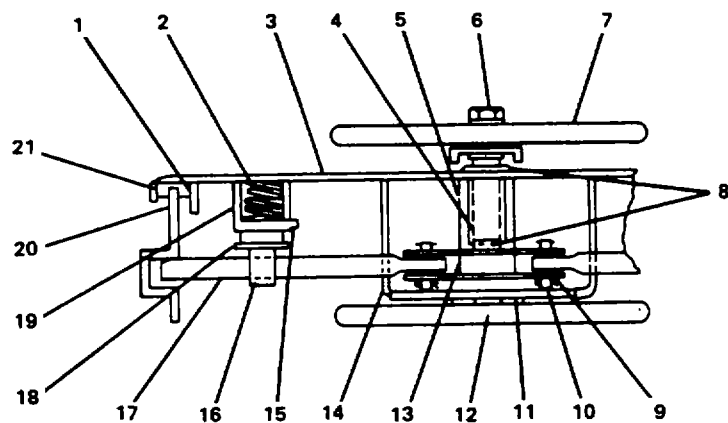


Figure 2-38. Repair Watertight Hatch. Quick Section.

2-35. Replace/Repair Watertight Scuttle, Quick Action (Flush).

This task covers:	a. Removal,	b. Disassembly,	c. Repair,
d.	Assembly	e. Replacement	

INITIAL SETUP

Tools

Tool kit, general mechanic's,
5180-00-629-9783

Equipment Condition

Materials/Parts

Gasket P/N 401 - 9
Bushing (oilite bronze) P/N 401-17
Preformed packing P/N 401 - 18
Bushing (steel) P/N 401- 26
Helical compression spring P/N 401 - 25
Marking chalk, Item 4, Appendix D

REMOVAL

WARNING

Scuttle is heavy. To prevent personal injury, at least two soldiers should handle scuttle.

- a. Open scuttle (1, Figure 2-39).
- b. Remove couplings (2), washers (3), and threaded plug (4) from hinge pad.
- c. Remove cylindrical hinge pin (5) from hinge pad.
- d. Remove scuttle (1) from closure.

- b. Remove cotter pins (14) from cylindrical pins (5), then remove cylindrical pins.
- c. Loosen setscrews (18) and remove dog arms (21) and guides (19) from scuttle.
- d. Remove hex steel bushings (20) and springs(4) from scuttle.
- e. Remove spider (17) and shim (9) from scuttle.
- f. Remove delrin bushings (6) and preformed packing (8).
- g. Remove dog stud (7) from scuttle.
- h. Remove gasket (12) from scuttle.
- i. Clean gasket channel thoroughly.

NOTE

After removing the old gasket, the entire gasket channel should be thoroughly cleaned.

DISASSEMBLY

- a. Remove hex nuts (16, Figure 2-40) and handwheel (15) from scuttle (1).

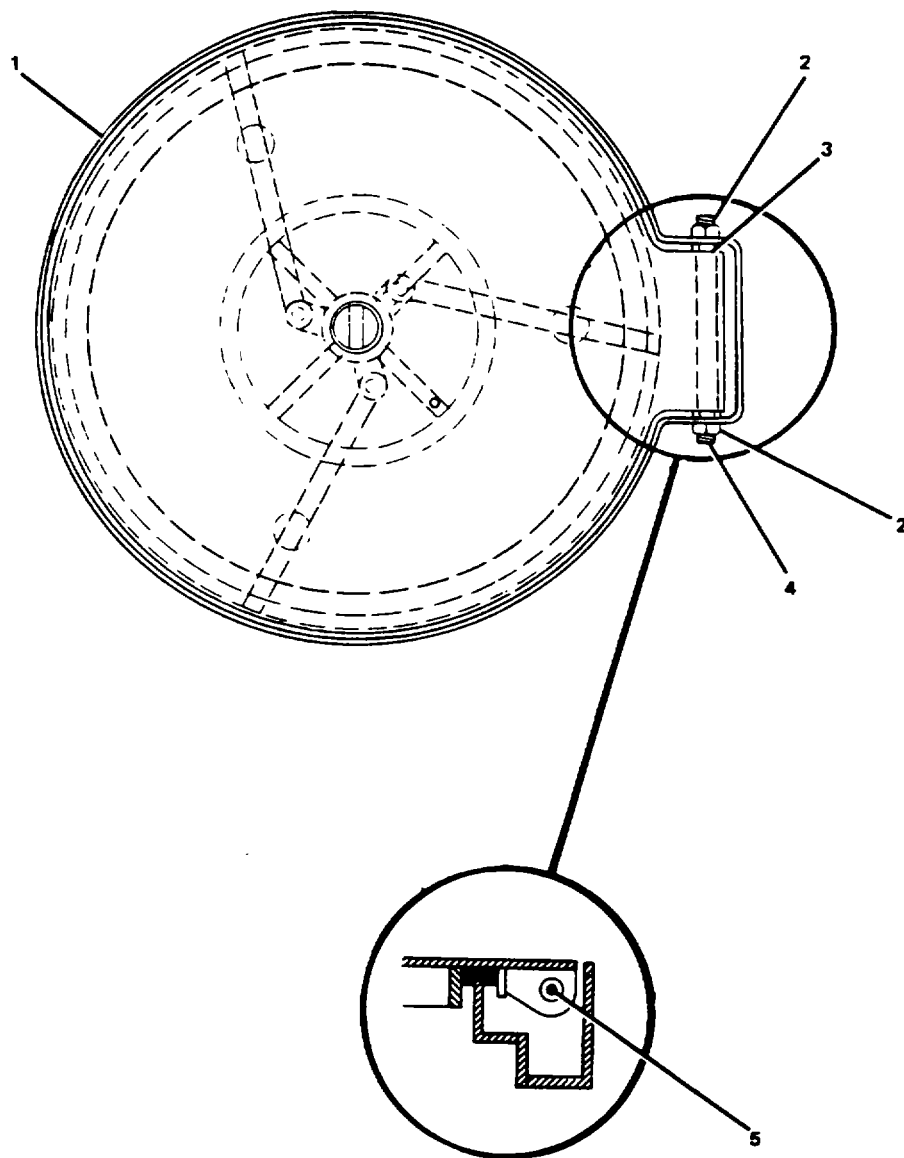


Figure 2-39. Replace Watertight Scuttle. Quick Action (Flush).

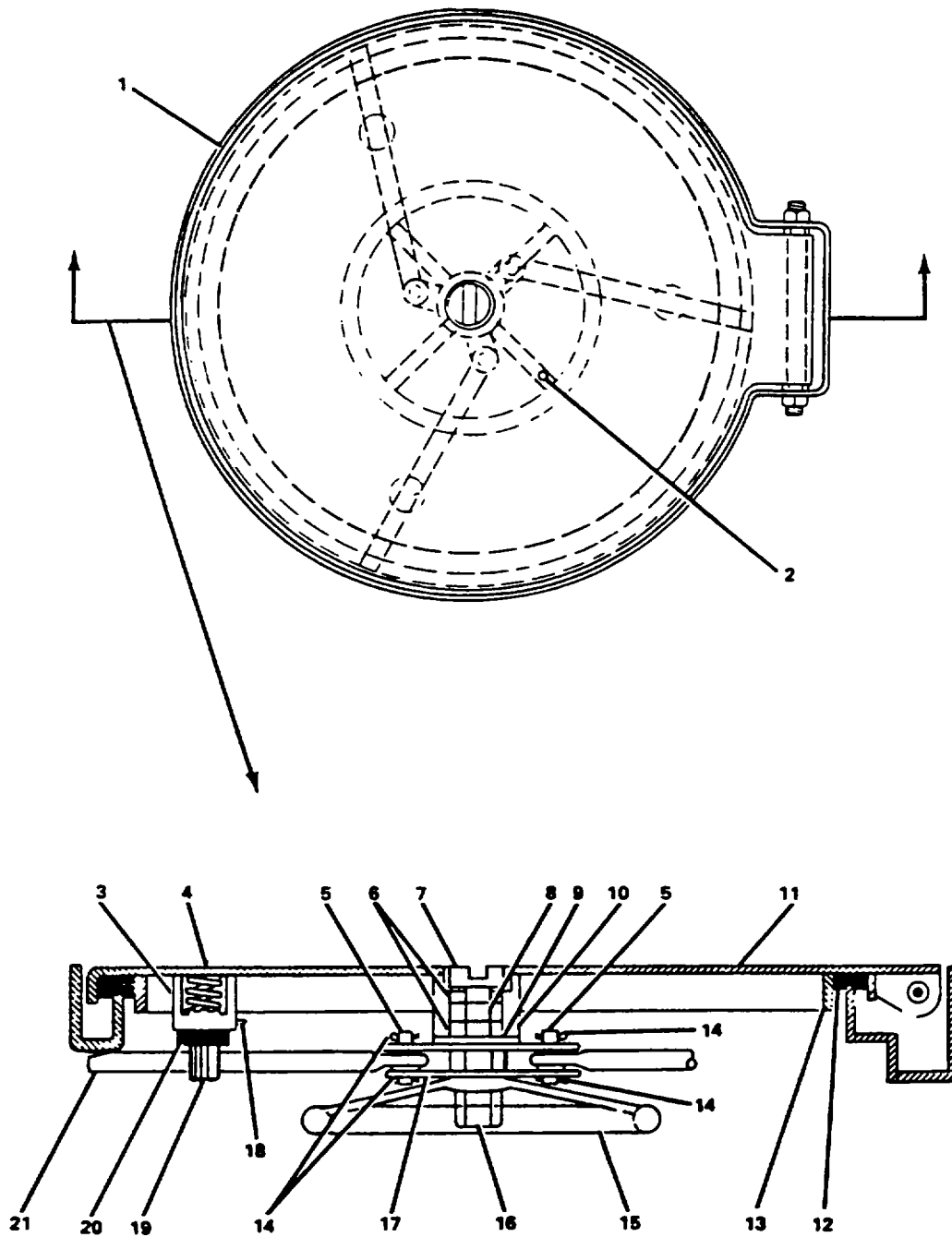


Figure 2-40. Repair Watertight Scuttle. Quick Action (Flush).

REPAIR

Repair at this level of maintenance is by replacement of gasket (12, Figure 2-40), delrin bushings (6), preformed packing (8), hex steel bushings (20), and helical compression springs (4).

ASSEMBLY

- a. Measure the required length around the scuttle for gasket.
- b. Add an additional inch and cut gasket.

NOTE

If the gasket is shorter it will eventually shrink, leaving a gap at the joint and destroying the watertight integrity of the scuttle.

- c. Install dog stud (7).
- d. Install gasket (12) and gasket retainer (13) on scuttle.
- e. Install preformed packing (8) and delrin bushings (6) on scuttle.
- f. Install shim (9) and spider (17).
- g. Place springs (4) and hex steel bushings (20) in position.
- h. Install guides (19) with dog arms (21) and tighten setscrews (18).
- i. Install cylindrical pins (5) in dog arms.
- j. Secure cylindrical pins using cotter pins (14).
- k. Install handwheel (15) and secure using hex nuts (16).

REPLACEMENT

- a. Place scuttle (1, Figure 2-39) in position on closure.
- b. Insert cylindrical hinge pin (5) in hinge pad.

NOTE

Upon initial installation of a scuttle, new gasket, or new dog the hatch should be "chalk tested."

- c. Install threaded plug (4) washers (3), and couplings (2) on hinge pad.

NOTE

Ensure that one washer is placed on each side of hinge blade.

- d. Perform chalk test as follows:

- (1) Clean the knife edge of the closure frame.
- (2) Apply a chalk line completely around the knife edge of scuttle
- (3) Dog the scuttle.
- (4) If the scuttle is watertight, the gasket will show an unbroken chalk line.
- (5) If the line is broken, adjust the dogs and retest.

CAUTION

Dogs should not be adjusted to give more than 1/8" compression. Excessive pressure is harmful to the gasket

- e. Operate scuttle and check for smooth and positive dogging action.

2-36. Replace/Repair Manhole (Bolted Plate, Raised).

This task covers:	a. Removal,	b. Disassembly,	c. Repair,
d.	Assembly	e. Replacement	

INITIAL SETUPTools

Tool kit, general mechanic's,
5180-629-9783

Equipment ConditionMaterials/Parts

Gasket P/N MIL--G-1149

REMOVAL

- a. Remove nuts (3, Figure 2-41) and washers (2) from stud (4).
- b. Remove manhole cover (1) from closure.
- c. Remove gasket (5) from manhole cover.

REPAIR

Repair at this level of maintenance is by replacement of gasket (5).

REPLACEMENT

- a. Install gasket (5) on manhole cover (1).
- b. Place manhole cover (1) from on closure.
- c. Secure cover using washers (2) and nuts (3).

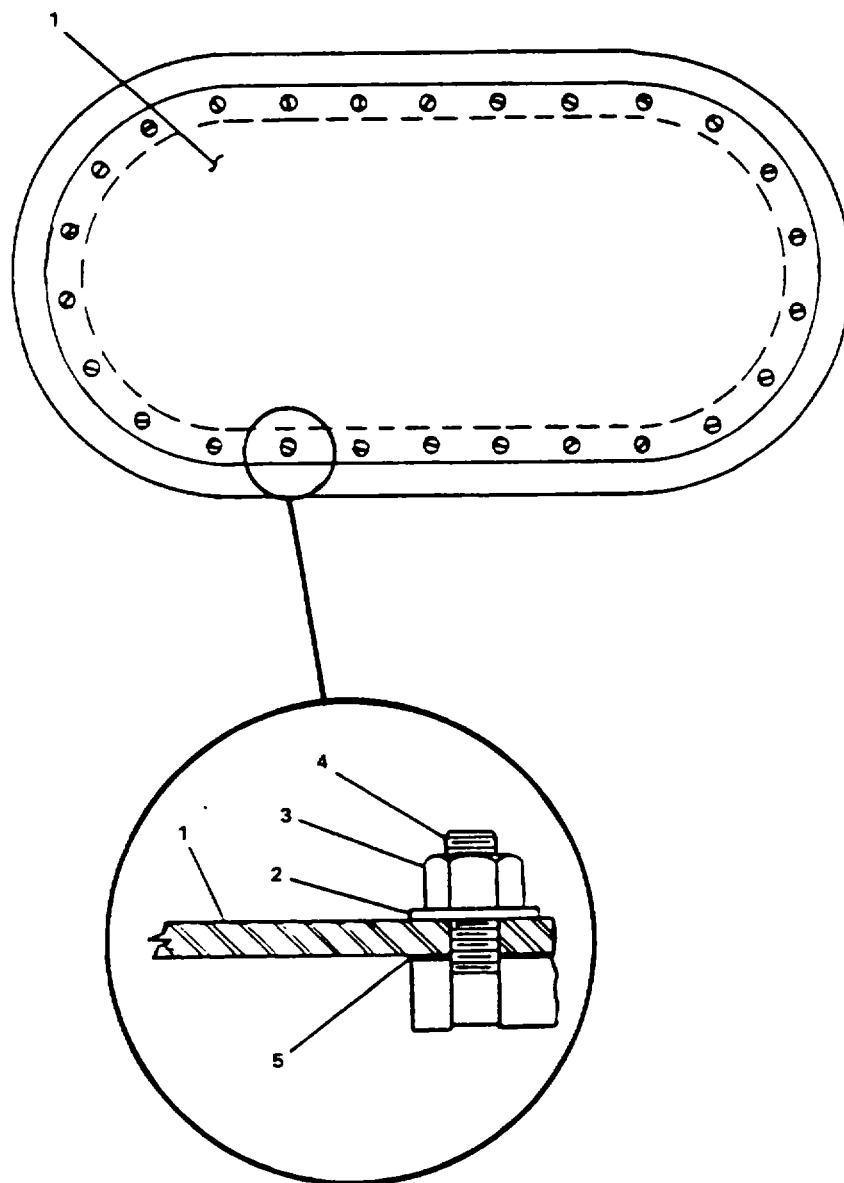


Figure 2-41. Manhole (Bolted Plate. Raised).

2-37. Replace/Repair Manhole (Bolted Plate, Flush).

This task covers:	a. Removal,	b. Disassembly,	c. Repair,
d.	Assembly	e. Replacement	

INITIAL SETUPTools

Tool kit, general mechanic's,
518-00 629 -9783

Equipment ConditionMaterials/Parts

Gasket P/N MIL-G-1 149

REMOVAL

- a. Remove screws (2, Figure 2-42) from manhole cover (1).
- b. Remove manhole cover (1) from closure.
- c. Remove gasket (3) from manhole cover.

REPAIR

Repair at this level of maintenance is by replacement of gasket (3).

REPLACEMENT

- a. Install gasket (3) on manhole cover (1).
- b. Place manhole cover (1) on closure.
- c. Install screws (2) on manhole cover.

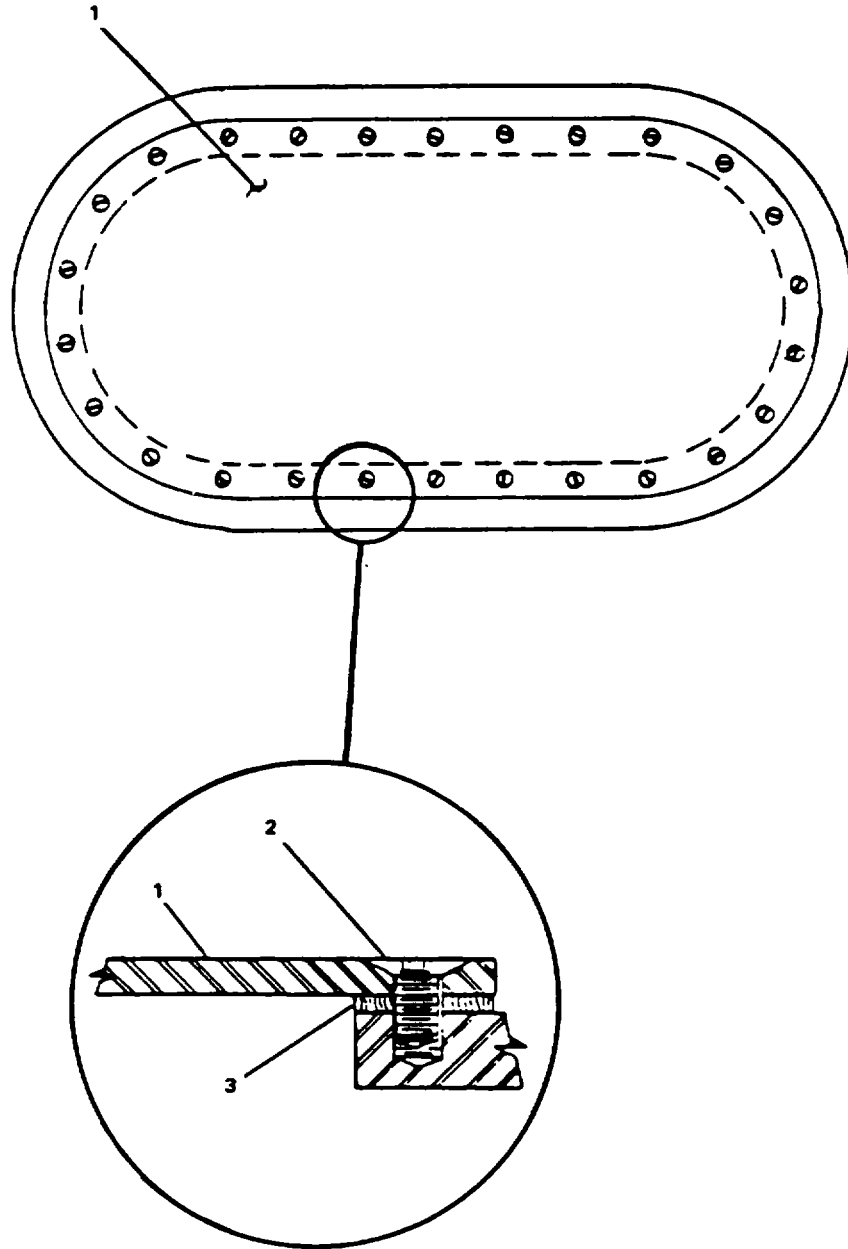


Figure 2-42. Manhole (Bolted Plate. Flush).

MAINTENANCE OF ELECTRICAL POWER SYSTEM

2-38. Repair Main Switchboard Top Left Panel.

This task covers:

a.	Disassembly	b.	Repair	c.	Assembly
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INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

Power to Main Switchboard OFF,
locked out, and tagged "Out of
Service-Do Not Operate."

Materials/Parts

to OFF position.

Set switchboard circuit breakers

Incandescent lamp (3) P/N 310901-01-102
Select switch (2) P/N S7021200,
P/N S7021205
Toggle switch P/N S702-1385
Circuit Breaker Switch P/N S7021385
Warning tags, Item 1, Appendix D

DISASSEMBLY

a. Remove indicator lens covers (2, 4, Figure 2-43) by holding between thumb and forefinger and turning slightly and pulling straight out.

b. Remove incandescent lamp from each socket by turning counterclockwise.

c. Remove associated hardware from governor toggle switch (3).

d. Remove knob and associated hardware from circuit breaker switch (5).

e. Remove knob and associated hardware from select switches (6,7).

f. Loosen door panel screws (1) by turning counterclockwise.

g. Swing door panel (8) left to open.

h. Tag and disconnect electrical wiring to select switches (1, 2, Figure 2-44), governor toggle switch (4), and circuit breaker switch (3).

i. Remove associated hardware from select switches (1, 2), toggle switch (4), and circuit breaker switch (5). Remove components from switchboard panel.

REPAIR

Repair at this level of maintenance is by replacement of lamps (2, 4, Figure 2-43), governor toggle switch (3), circuit breaker switch (5), and select switches (6, 7).

ASSEMBLY

a. Install select switches (6, 7, Figure 2-43), circuit breaker switch (5), and toggle switch (3) through rear of panel door.

b. Install associated hardware on select switches (1, 2, Figure 2-44), circuit breaker switch (3), and toggle switch (4).

c. Connect electrical wiring to components in step b. and remove tags.

d. Close door panel (9, Figure 2-43). Turn door panel screws (1) clockwise until tight.

e. Install incandescent lamps into each socket by turning clockwise until tight.

f. Install indicator lens covers (2, 4) by pushing straight into indicator opening.

g. Install associated hardware to toggle switch (3), associated hardware and knob to circuit breaker switch (5), and associated hardware and knob to select switches (6, 7).

h. Turn main switchboard power ON. Remove tag.

i. Check operation of indicators, switches, and circuit breaker switch. Refer to TM 55-1925207-10.

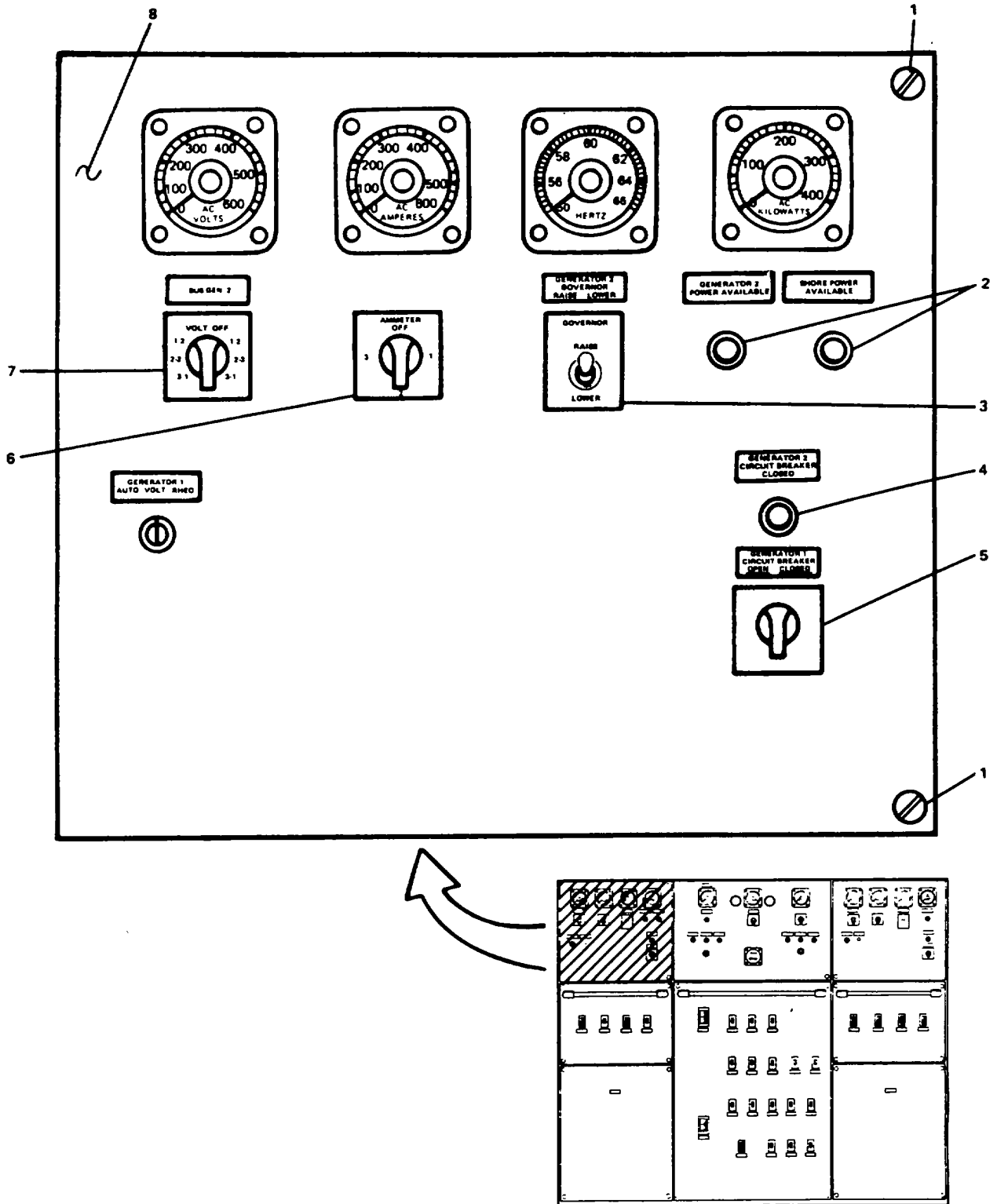


Figure 2-43. Main Switchboard Top Left Panel.

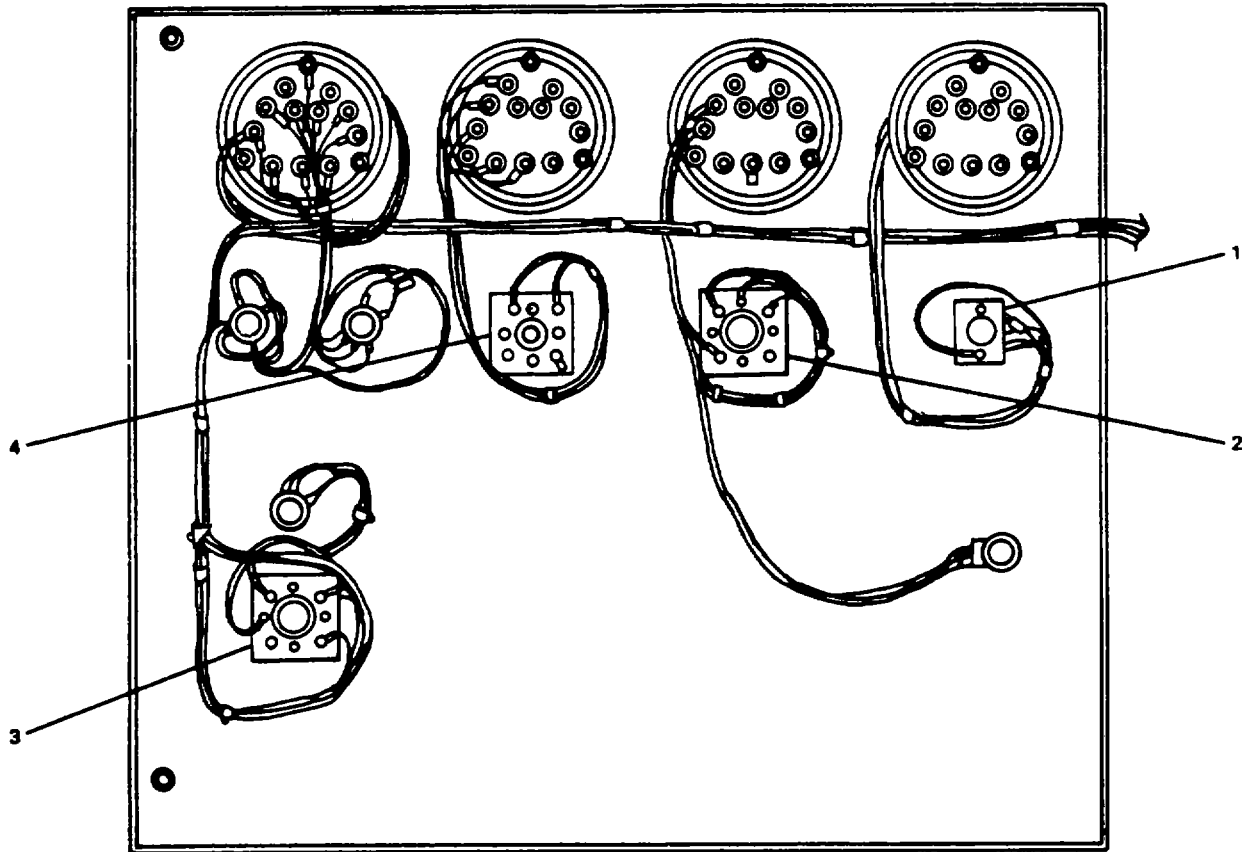


Figure 2-44. Main Switchboard Top Left Aft Panel (Rear).

2-39. Repair Main Switchboard Middle Left Panel.

This task covers:

- a. Removal b. Repair c. Replacement

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

Power to Main Switchboard OFF,
locked out, and tagged "Out of Service - bo
Not Operate." Set switchboard circuit
breakers to OFF position.

Materials/Parts

Circuit breaker
P/N 37006-125 (CF-250N) (2)
P/N 38013-40 (CE104N)
P/N 38013-030 (CE104N)
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate."

d.Remove circuit breakers (4) by pulling straight out from their respective mounting.

REPAIR

Repair at this level of maintenance is by replacement of circuit breakers (4).

REPLACEMENT

a.Install circuit breakers (4) by pushing straight into their respective mounting.

b.Tighten six associated screws on each circuit breaker (4).

c.Install door panel (2) using handrail (3).

d.Turn door panel screws (1) clockwise until tight.

e.Turn power to Main Switchboard ON.

f.Set circuit breakers (4) to ON position.

REMOVAL

a.Turn four door panel screws (1, Figure 2-45) counterclockwise to loosen.

b.Remove door panel (2) using handrail (3). Store door panel (2) in a safe out-of-way place.

NOTE

Circuit breaker may have internally mounted and factory installed accessories.

c.Loosen six (3 top and 3 bottom) associated screws from each circuit breaker (4).

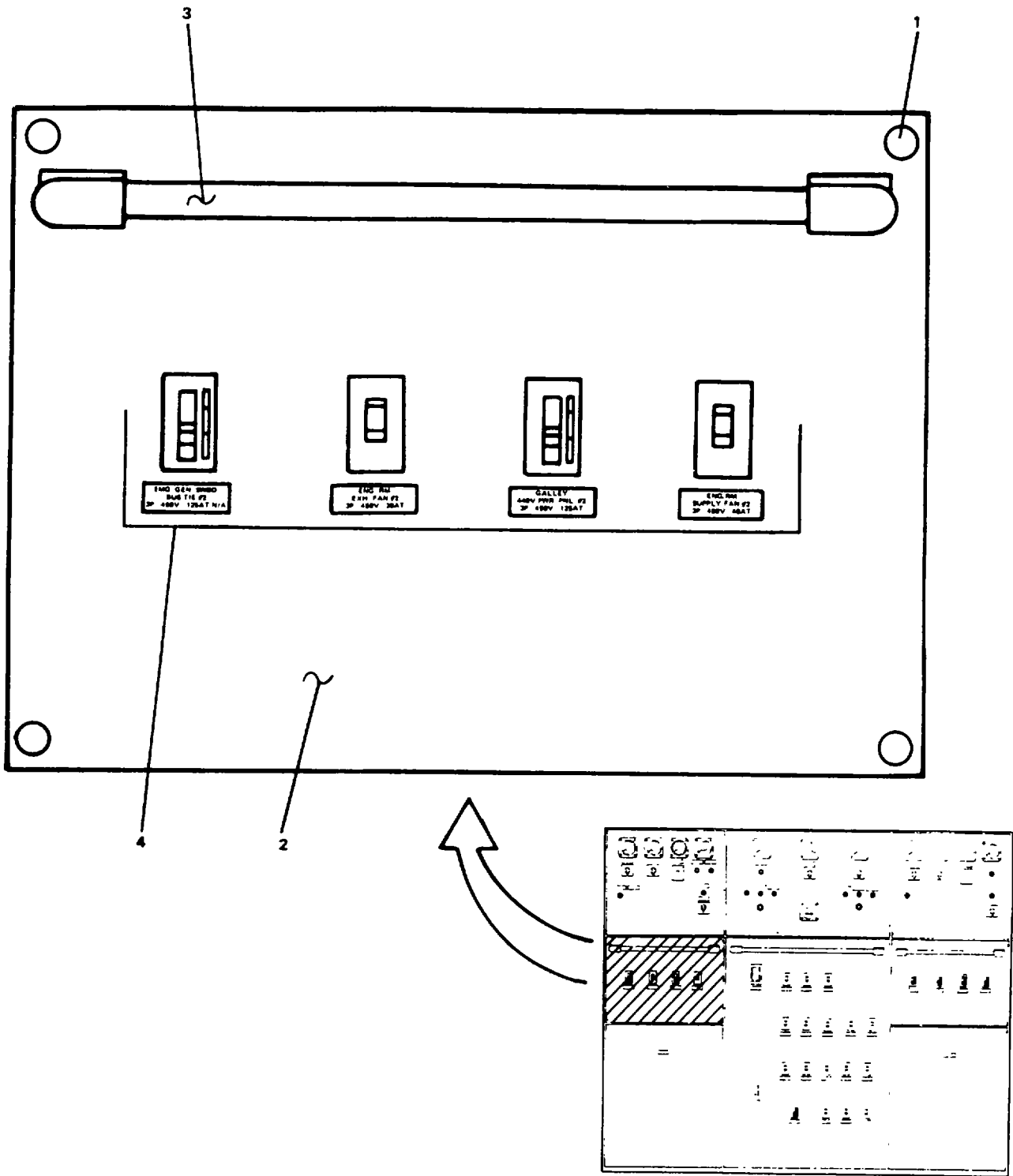


Figure 2-45. Main Switchboard Middle Left Panel.

2-40. Repair Main Switchboard Top Center Panel.

This task covers:

a.	Disassembly	b.	Repair	c.	Assembly
----	-------------	----	--------	----	----------

INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

Power to Main Switchboard OFF,
locked out, and tagged "Out of
Service - Do Not Operate."

Materials/Parts

Select switches (2) P/N S7021449,
P/N S7021204
Pushbuttons (2) P/N 3SB03-PFB01
Lamps (7) P/N 31-901-01-102
Sync light (2) P/N S14
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate."

DISASSEMBLY

a. For disassembly of switches (3, 6, Figure 2-46) and indicator lamps (4, 7) refer to paragraph 2-38 and Figures 2-43 and 2-44.

b. Remove sync light (1) from socket by turning counterclockwise.

c. Remove associated hardware from pushbutton (5).

d. Loosen door panel screws (2) by turning counterclockwise.

e. Swing door panel (8) left to open.

f. Tag and disconnect electrical wiring to pushbutton (1, Figure 2-47).

g. Remove pushbutton.

REPAIR

Repair at this level of maintenance is by replacement of indicator lamps (4, 7, Figure 2-46), switches (3, 6), pushbuttons (5), and sync light (1).

ASSEMBLY

a. For assembly of switches (3, 6, Figure 2-46) and indicator lamps (4, 7) refer to paragraph 2-38 and Figures 2-43 and 2-44.

b. Install pushbutton (1, Figure 2-47) through rear of door panel.

c. Connect electrical wiring to pushbutton (1). Remove tag.

d. Install associated hardware on pushbutton (5, Figure 2-46).

e. Install lamp (1) into socket by turning clockwise until tight.

f. Close panel door (8).

g. Turn door panel screws (2) clockwise until tight.

h. Turn main switchboard power ON. Remove tag.

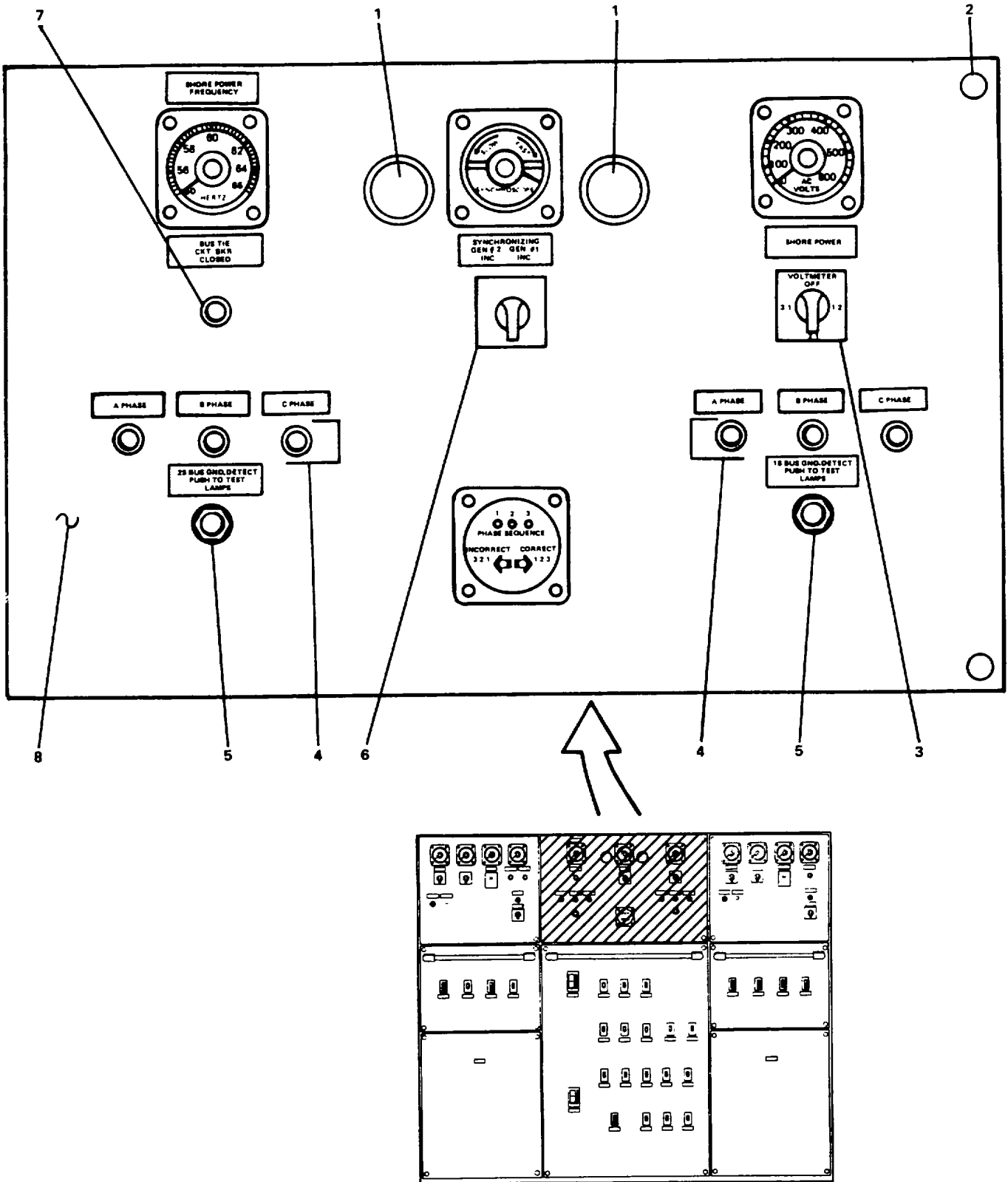


Figure 2-46. Main Switchboard Top Center Panel.

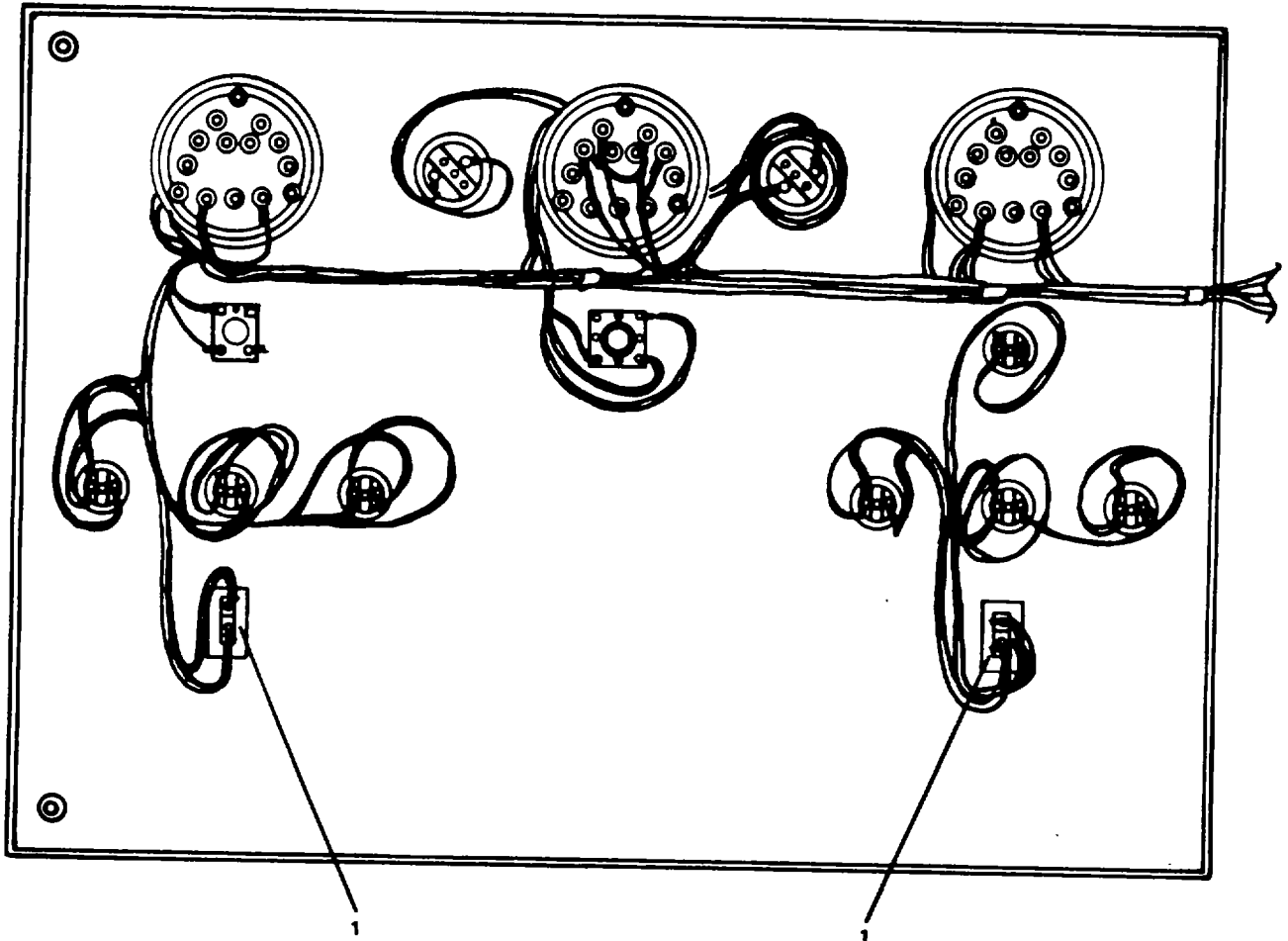


Figure 2-47. Main Switchboard, Top Center Panel (Rear).
2-143

2-41. Repair Main Switchboard Bottom Center Panel.

This task covers:

- | | | |
|------------|-----------|----------------|
| a. Removal | b. Repair | c. Replacement |
|------------|-----------|----------------|

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

Power to Main Switchboard OFF,
locked out, and tagged "Out of
Service - Do Not Operate."

Materials/Parts

Set all circuit breakers to OFF position.

Circuit breaker (17)
Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate."

REPLACEMENT

NOTE

Procedures for REPLACEMENT of circuit breakers are basically the same as those described in paragraph 2-39 and illustrated in Figure 2-45. For configuration variance of circuit breakers (1) refer to Figure 2-48.

REMOVAL

NOTE

Procedures for REMOVAL of circuit breakers are basically the same as those described in paragraph 2-39 and illustrated in Figure 2-45. For configuration variance of circuit breakers (1) refer to Figure 2-48.

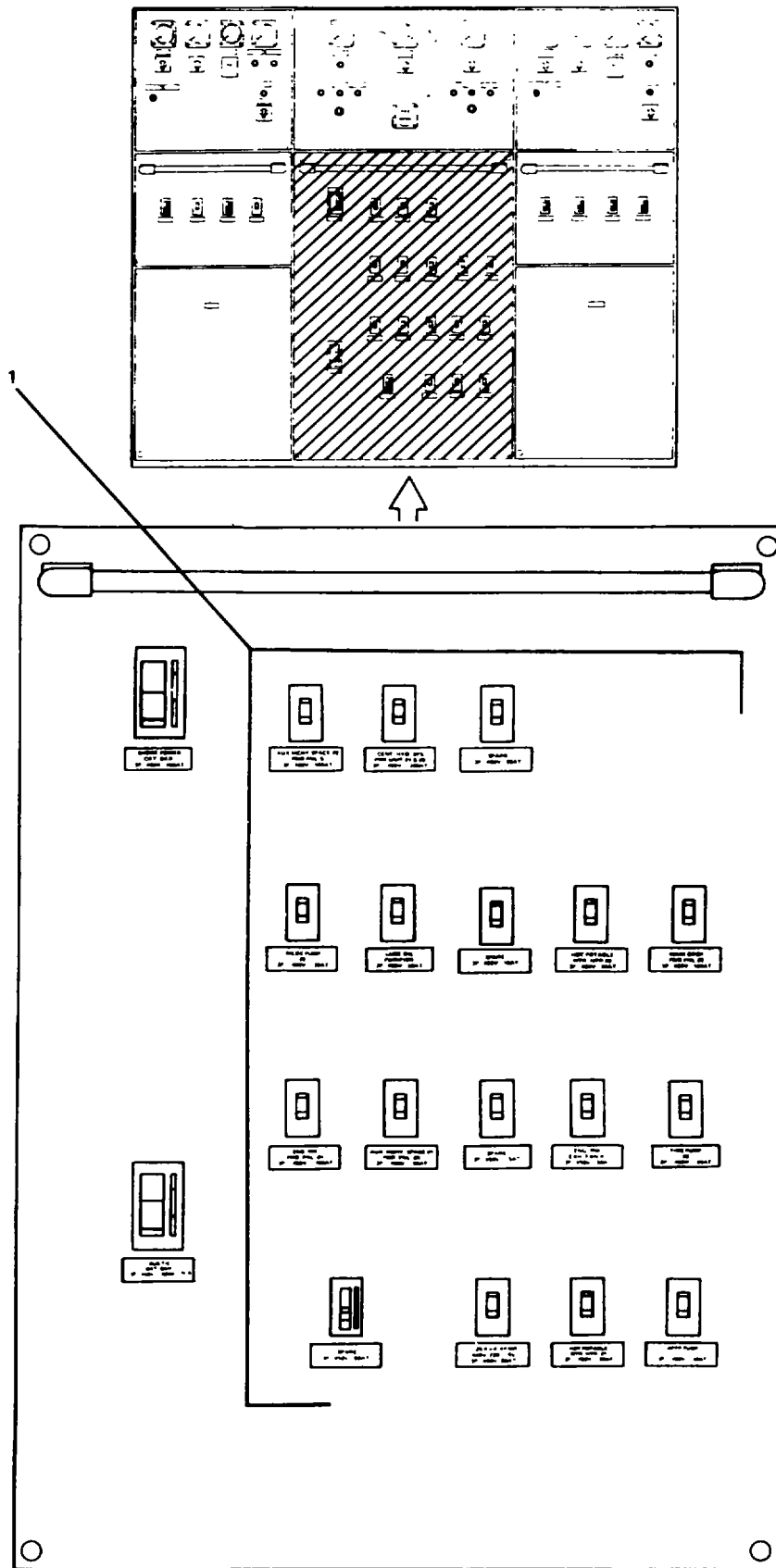


Figure 2-48. Main Switchboard Bottom Center Panel.
2-145

2-42. Repair Main Switchboard Top Right Panel.

This task covers:

a.	Disassembly	b.	Repair	c.	Assembly
----	-------------	----	--------	----	----------

INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895

Set switchboard circuit breakers to

Materials/Parts

Incandescent lamp (3) P/N 31-0901-01-102
Select switch (2) P/N S7021200
P/N S7021205
Toggle switch P/N S702-1385
Circuit breaker switch P/N S7021385
Warning tags, Item 1, Appendix D

Equipment Condition

On Main Switchboard power OFF,
locked out, and tagged "Out of
Service - Do Not Operate."

OFF position.

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate."

DISASSEMBLY

Refer to paragraph 2-38.

REMOVAL

Refer to paragraph 2-38.

ASSEMBLY

Refer to paragraph 2-38.

2-43. Repair Main Switchboard Middle Right Panel.

This task covers:

a. Removal	b. Repair	c. Replacement
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INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On Main Switchboard power OFF,
locked out, and tagged "Out of
Service - Do Not Operate."

Materials/Parts

Set all circuit breakers to OFF position.

Circuit breaker

P/N 37006-125 (CF250N) (2)
P/N 38013-040 (CE104N)
P/N 41761 C125HMA40A
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service -Do Not Operate."

DISASSEMBLY

Refer to paragraph 2-39.

REMOVAL

Refer to replacement parts list.

ASSEMBLY

Refer to paragraph 2-39.

2-44. Repair Main Switchboard Fuses, Relays, and Transformers.

This task covers:

a. Disassembly b. Repair c. Assembly

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

Power to Main Switchboard OFF,
locked out, and tagged "Out of
Service - Do Not Operate."

Materials/Parts

Fuse (5)
P/N BBS-3

Top right, top center, and top left
switchboard door panels open.

Relay

P/N 256 PLDU (2)
P/N 256 PATU (2)
P/N 252 PVAU (2)
P/N KRPA-14AG-120
P/N KRPA-1 1AG-120

Transformer

P/N 9T58B46 (6)
P/N 9T58B42 (8)
P/N 9T58B50 (2)

Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate."

DISASSEMBLY

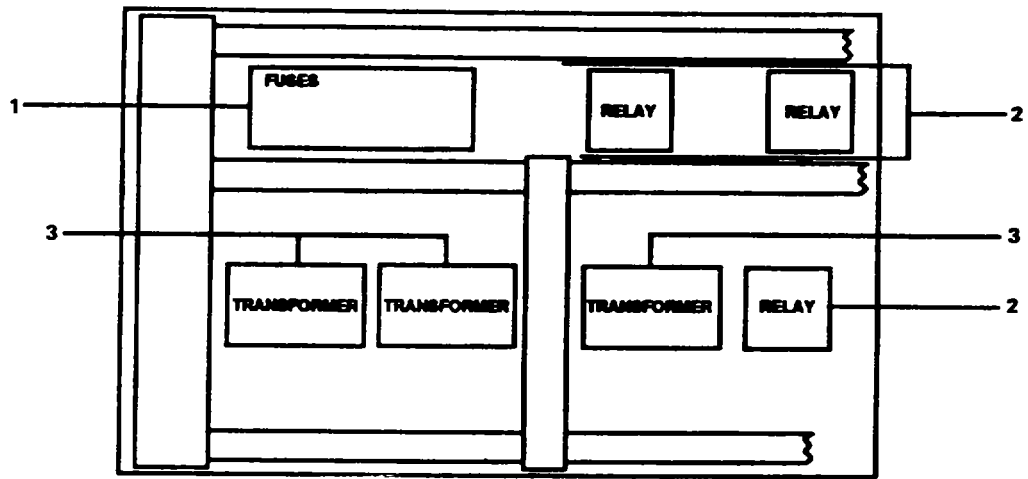
- a. Remove fuses (1, Figure 2-49) from fuse holders.
- b. Tag and remove wires from relays (2). Unplug relays (2) from relay sockets.
- c. Tag and disconnect electrical wiring to transformers (3).
- d. Remove associated hardware from transformers (3). Remove transformers.

REPAIR

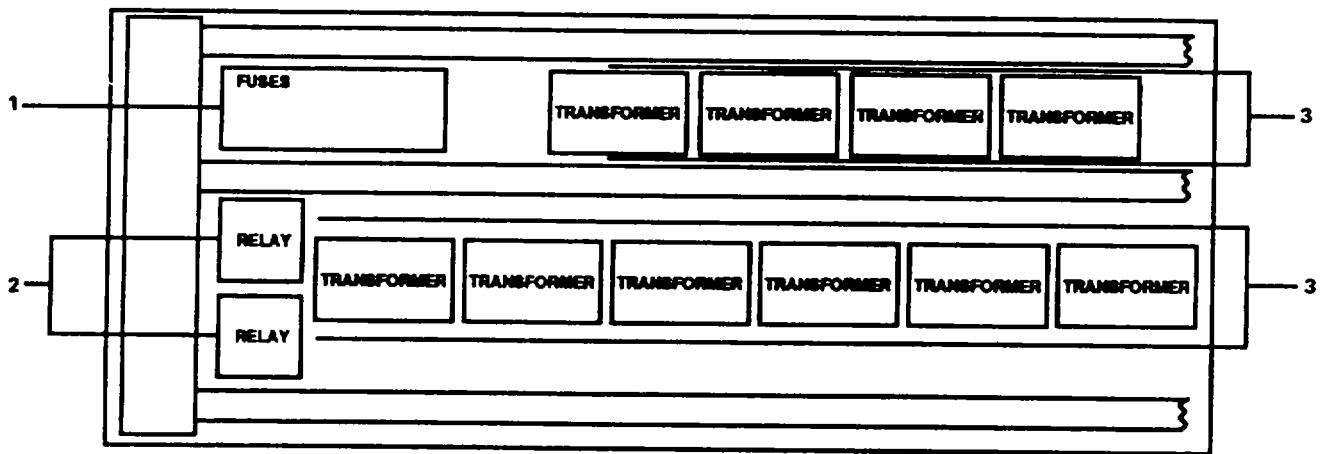
Repair at this level of maintenance is by replacement of fuses (1), relays (2), and transformers (3).

ASSEMBLY

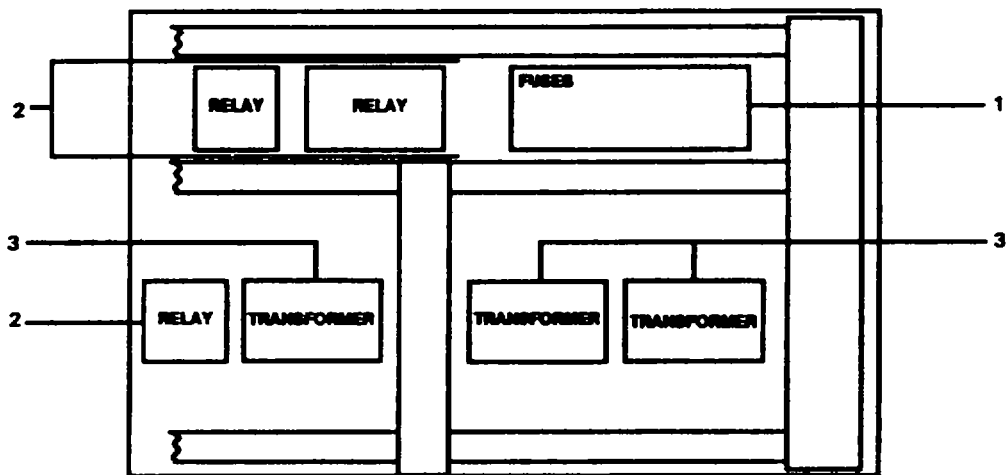
- a. Install transformers (3) with associated hardware.
- b. Connect electrical wiring to transformers (3). Remove tags.
- c. Plug relays (2) into relay sockets. Remove tags.
- d. Install fuses (1) into fuse holders.
- e. Close and secure switchboard door panels.
- f. Turn Main Switchboard power to ON. Remove tags.



GENERATOR #2 SECTION BACKPAN LAYOUT



SYNCHRONIZING SECTION BACKPAN LAYOUT



GENERATOR #1 BACKPAN LAYOUT

Figure 2-49. Main Switchboard Backpan Layout.
2-149

2-45. Repair Emergency Switchboard Top Panel.

This task covers:

a. Disassembly b. Repair c. Assembly

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

Power to Emergency Switchboard OFF,
locked out, and tagged "Out of
Service - Do Not Operate."

Materials/Parts

Set switchboard switches to OFF position.

Switch, voltmeter P/N S7021449
Switch, ammeter P/N S7021205
Switch, circuit breaker control
P/N S7021385
Switch, Engine Mode
P/N S7021204
Switch, Main SWBD Feedback P/N CR104PSK21A92L
Pushbutton (3) P/N CR104PBG91U1
Incandescent lamp (9)
P/N 31-0901-1-102
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate."

REPAIR

Refer to replacement parts list.

ASSEMBLY

NOTE

DISASSEMBLY

NOTE

Procedures for DISASSEMBLY of indicator lamps and switches are basically the same as described in paragraph 2-38 and illustrated in Figures 2-43 and 2-44; for pushbuttons refer to paragraph 2-40 and Figures 2-46 and 2-47. For switchboard panel configuration variance refer to Figure 2-50.

Procedures for Assembly of indicator lamps and switches are basically the same as described in paragraph 2-38 and illustrated in Figures 2-43 and 2-44; for pushbuttons refer to paragraph 2-40 and Figures 2-46 and 2-47. For switchboard panel configuration variance refer to Figure 2-50.

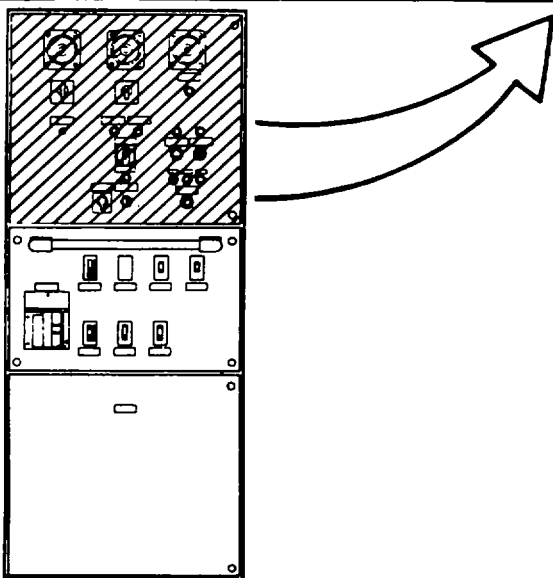
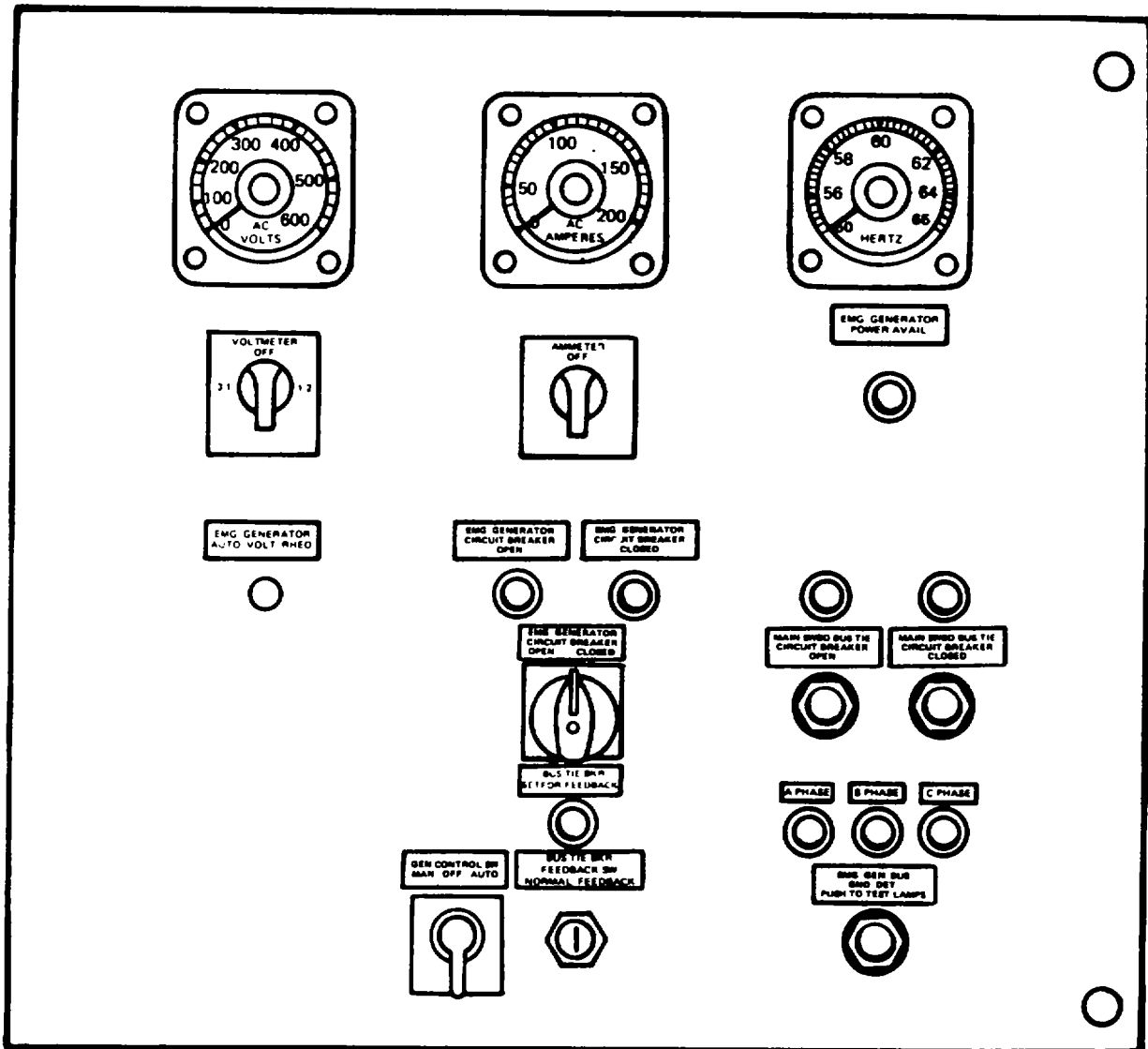


Figure 2-50. Emergency Switchboard Top Panel.

2-46. Repair Emergency Switchboard Middle Panel.

This task covers:

a. Removal	b. Repair	c. Replacement
------------	-----------	----------------

INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

Power to Emergency Switchboard OFF,
locked out, and tagged "Out of
Service - Do Not Operate."

Materials/Parts

Set switchboard switches to OFF position.

Circuit breaker

P/N 37006-125 (CF250N)
P/N 38013-060 (CE104N)
P/N 38013-050 (CE104N)
P/N 38013-030 (CE104N) (2)
P/N 38013-015 (CE104N)
P/N 41761-C125H

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate."

REMOVAL

Refer to paragraph 2-39. For configuration variance, see Figure 2-51.

REPAIR

Repair is by replacement of circuit breaker. Refer to replacement parts list.

REPLACEMENT

Refer to paragraph 2-39. For configuration variance, see Figure 2-51.

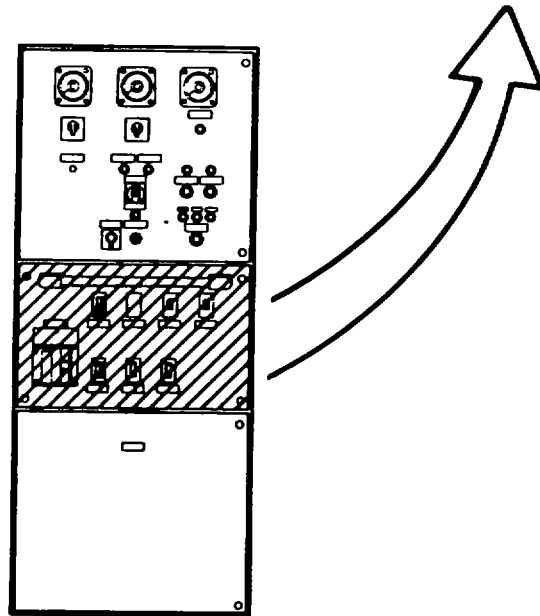
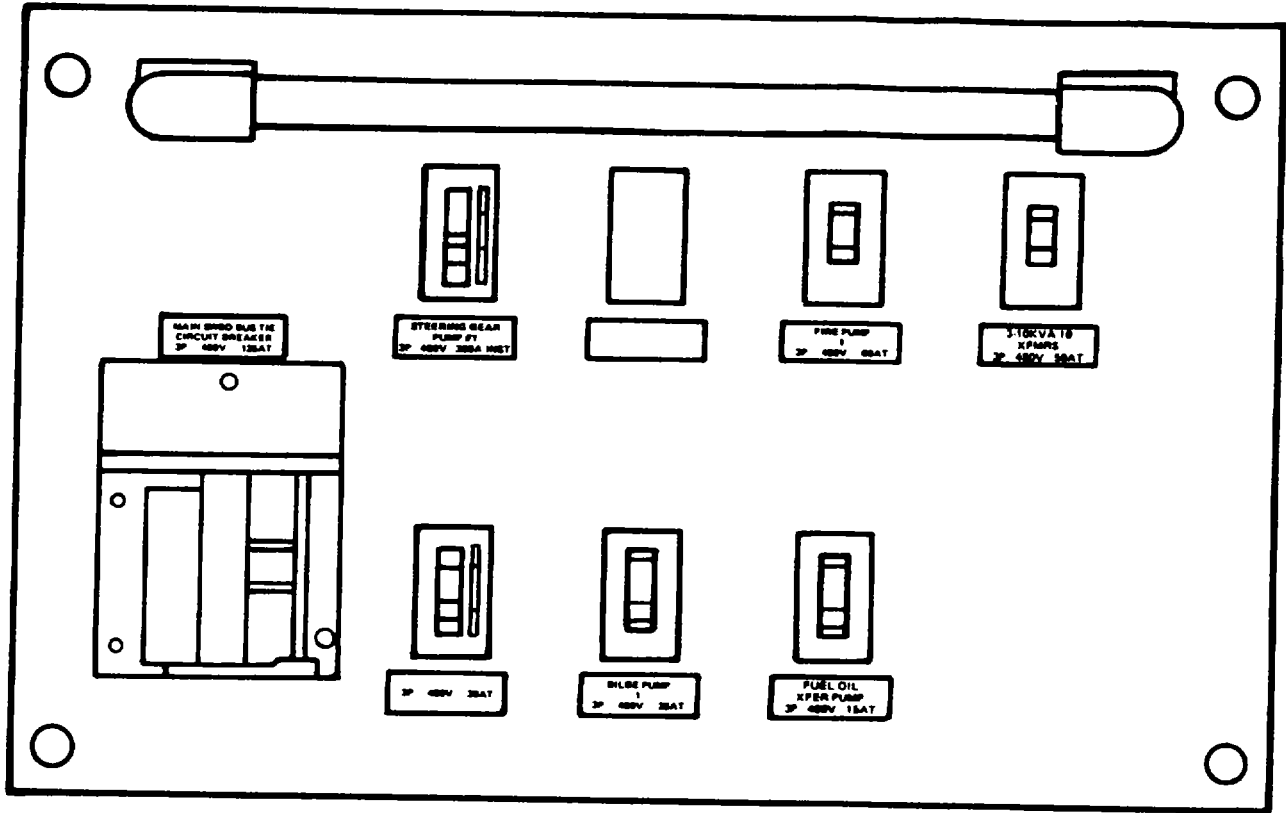


Figure 2-51. Emergency Switchboard Middle Panel.
2-153

2-47. Repair Emergency Switchboard Fuses, Relays, and Transformers

This task covers:

a. Disassembly b. Repair c. Assembly

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

Power to Emergency Switchboard OFF,
locked out, and tagged "Out of
Service - Do Not Operate."

Materials/Parts

Switchboard door panel open.

Fuse (8) P/N BBS3
Fuse (2) P/N BBS-10
Relay
P/N 7022AD
P/N KRPA-11 AG-120
P/N SSC12A8A (2)
P/N KRPA-14AG-120

Transformer
P/N 9T55Y51
P/N 9T58B42 (3)
P/N 9T58B47

Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate."

DISASSEMBLY

Refer to paragraph 2-44. Configuration variance refer to Figure 2-52.

REPAIR

Refer to replacement parts list.

ASSEMBLY

Refer to paragraph 2-44. Configuration variance see Figure 2-52.

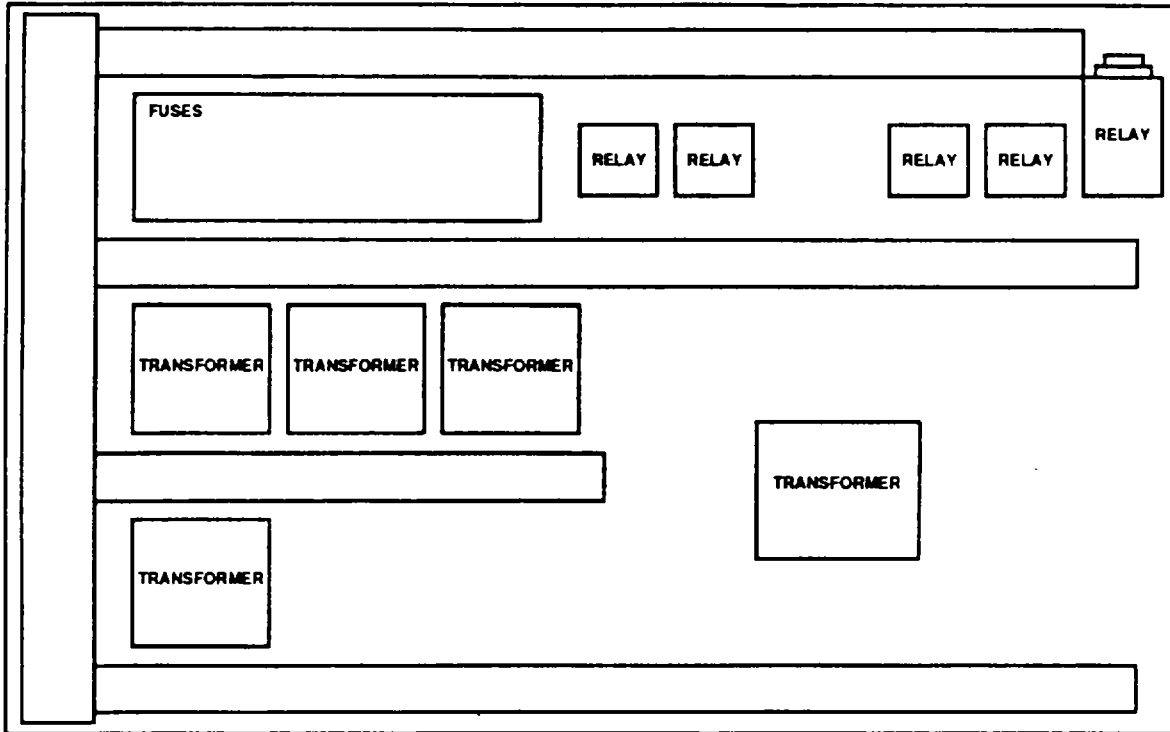


Figure 2-52. Emergency Switchboard Backpan Layout
2-155

2-48. Repair Engine Room Load Center Ground Detection Lamps.

This task covers:

a. Disassembly b. Repair c. Assembly

INITIAL SETUP

Tools

Equipment Condition

Tool kit, electrician's
5180-00-392-2895

Energized

Materials/Parts

Lamps (3) P/N 04-677-21020-3

NOTE

Exercise care when replacing lamps. Power applied to panel.

REPAIR

Repair at this level of maintenance is by replacement of lamps (1).

DISASSEMBLY

a. Remove indicator lens cap (1, Figure 2-53) by grasping between thumb and forefinger and turning slightly while pulling straight out.

REPLACEMENT

a. Install lamp in socket by turning clockwise until tight.

b. Unscrew lamp from socket by turning counterclockwise.

b. Install lens cap (1) by pushing straight into indicator opening.

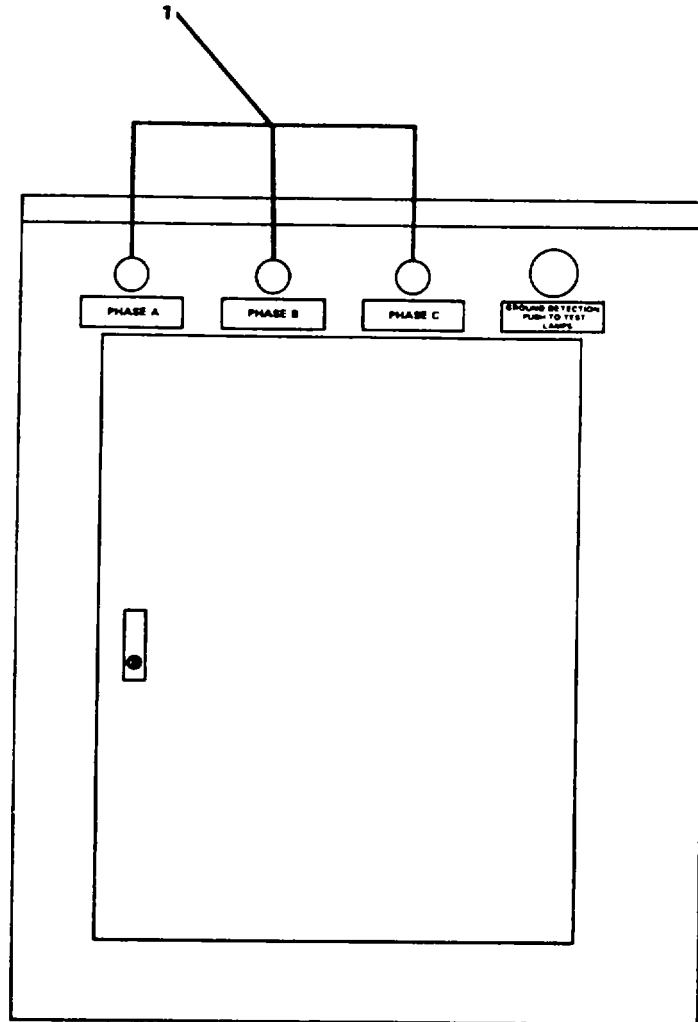


Figure 2-53. Load Center Typical.
2-157

2-49. Repair Emergency Load Center Ground Detection Lamps.

This task covers:

a. Disassembly b. Repair c. Assembly

INITIAL SETUP

Tools

Equipment Condition

Tool kit, electrician's
5180-392-2895

Energized

Materials/Parts

Ground detection
lamps (3) P/N 04-6677-21020-3

NOTE

Exercise care when replacing lamps. Power applied to panel.

DISASSEMBLY

Refer to paragraph 2-48.

REPAIR

Refer to replacement parts list.

ASSEMBLY

Refer to paragraph 2-48.

2-50. Replace Engine Room Load Center.

This task covers:

- a. Removal b. Replacement

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895
position and tag 'Out of Service
Do Not Operate.'

Materials/Parts

Warning tags, Item 1, Appendix D

Equipment Condition

On Main Switchboard set 3-25 KVA 1 0
XFMRs circuit breaker to OFF

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate."

e.Tag and disconnect electrical wiring to circuit breakers (7) and bus bars (8).

f.Remove four hex nuts (9).

g.Remove component mounting panel (10).

REPLACEMENT

a.Install component mounting panel (10) with hex nuts (9). Tighten nuts.

b.Connect electrical wiring to bus bars (8) and circuit breakers (9). Remove tags.

c.Install inner-face panel (6) with screws (5). Tighten screws.

d.Install face panel (4) and door (2) with screws (3).

e.On Main Switchboard set 3-25 KVA 1 0 XFMRs circuit breaker to ON position. Remove tag.

f.On Load Center set all circuit breakers to ON position. Close door (2).

REMOVAL

a.Press key latch (1, Figure 2-54) and open door (2).

b.Set all circuit breakers to OFF position.

NOTE

Exercise care when removing face panel and door to prevent damage of ground detection cable.

c.Loosen six screws (3) and remove face panel (4) and door (2).

d.Remove four screws (5) from inner-face panel (6). Remove panel.

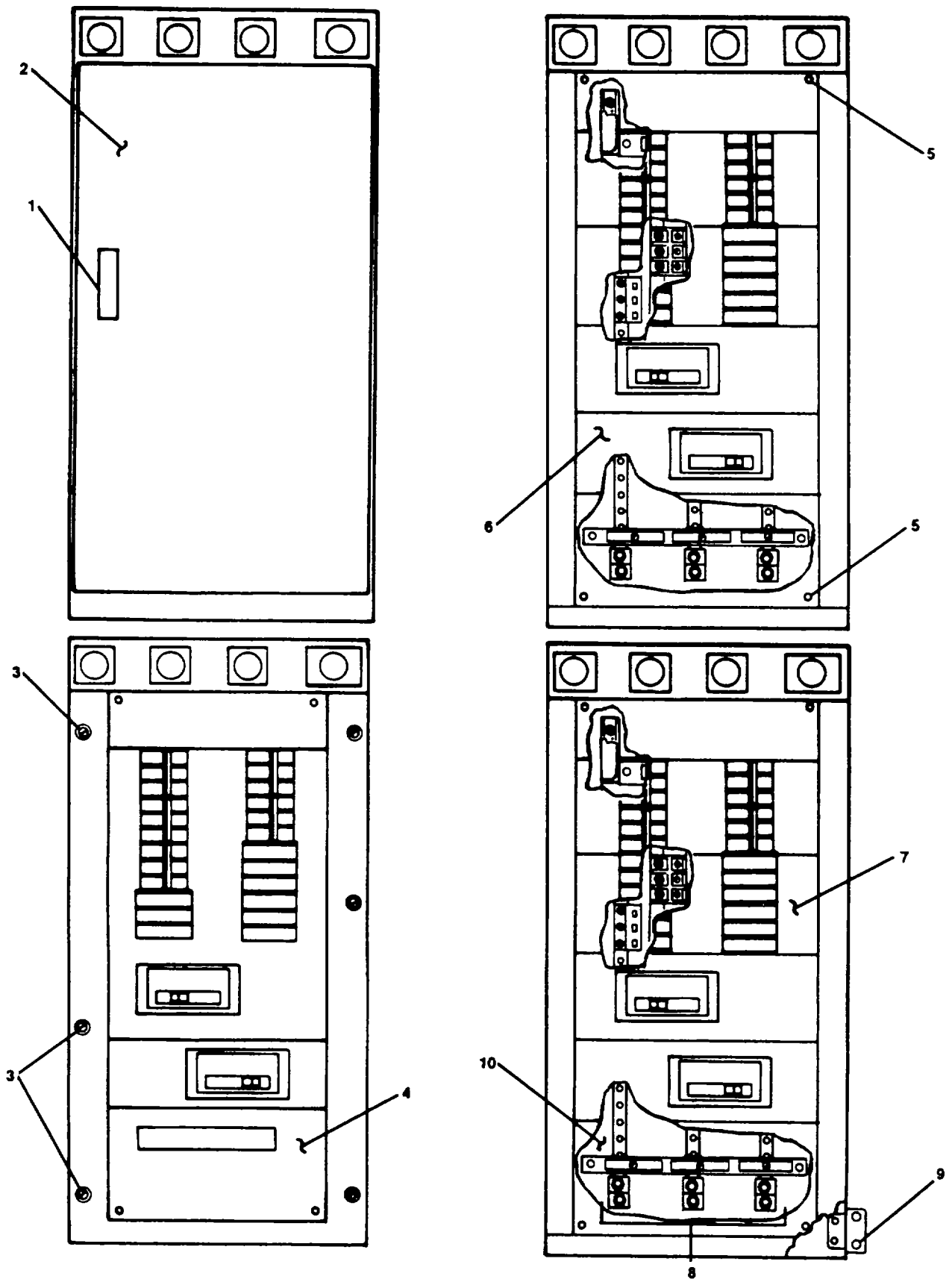


Figure 2-54. Replace Load Center.
2-160

2-51. Repair Engine Room Load Center.

This task covers:

- | | | |
|------------|-----------|----------------|
| a. Removal | b. Repair | c. Replacement |
|------------|-----------|----------------|

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On Main Switchboard set 3-25 KVA 1 0
XFMRs circuit breaker to OFF
position and tag 'Out of Service
Do Not Operate.'

Materials/Parts

Circuit breakers
Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Cartridge fuses (3) P/N BBS-3
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate."

d.Remove three fuses (7) using fuse puller.

NOTE

Circuit breakers may be single, double, or triple ganged. Remove appropriate number of screws when replacing circuit breaker(s).

REMOVAL

a.Press key latch (1, Figure 2-55) and open door (2).

NOTE

Exercise care when removing face panel and door to prevent damage of ground detection cable.

b.Loosen six screws (3) and remove face panel (4).

NOTE

Exercise care when removing face panel and door to prevent damage of ground detection cable.

c.Remove four screws (5) from inner-panel (6).
Remove panel.

e.Remove associated screws from circuit breaker (8).

f.Remove circuit breaker (8) by holding end nearest center of panel and pull (in an arc motion) out until breaker (8) is clear.

g.Remove screws (10) from circuit breaker (9).
Remove breakers.

REPAIR

Repair at this level of maintenance is by replacement of fuses (7) and circuit breakers (8, 9).

REPLACEMENT

- a. Install fuses (7) by using fuse holder.
- b. Install circuit breaker (8) by positioning breaker (8) holding bar under D-lip (if applicable) and pushing towards center of panel.
- c. Install associated screws. Tighten screws.
- d. Install circuit breaker (9) with screws (10). Tighten screws.
- e. Install inner-face panel (6) with screws (5). Tighten screws.
- f. Install face panel (4) and door (2) with screws (3). Tighten screws.
- g. On Main Switchboard set 3-25 KVA 10 XFMRs circuit breaker to ON position. Remove tag.
- h. On Load Center set all circuit breakers to ON position. Close door (2).

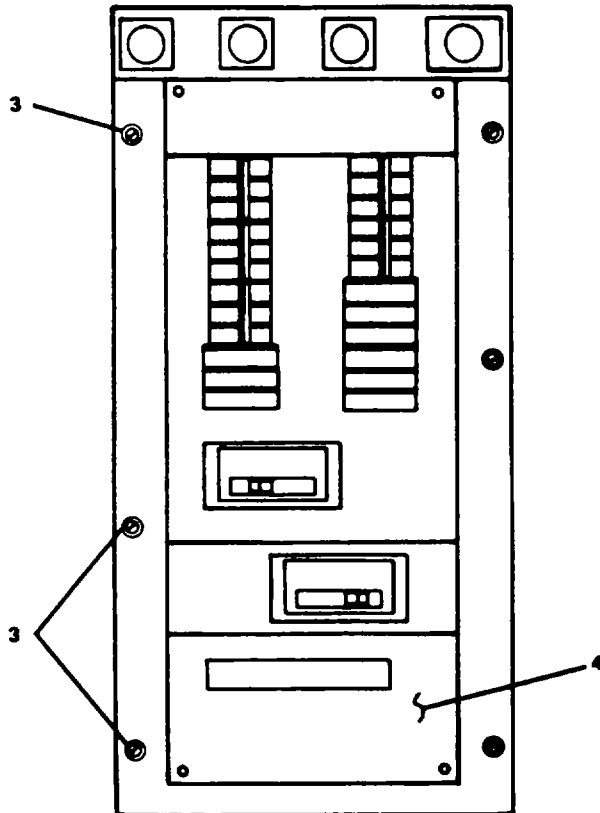
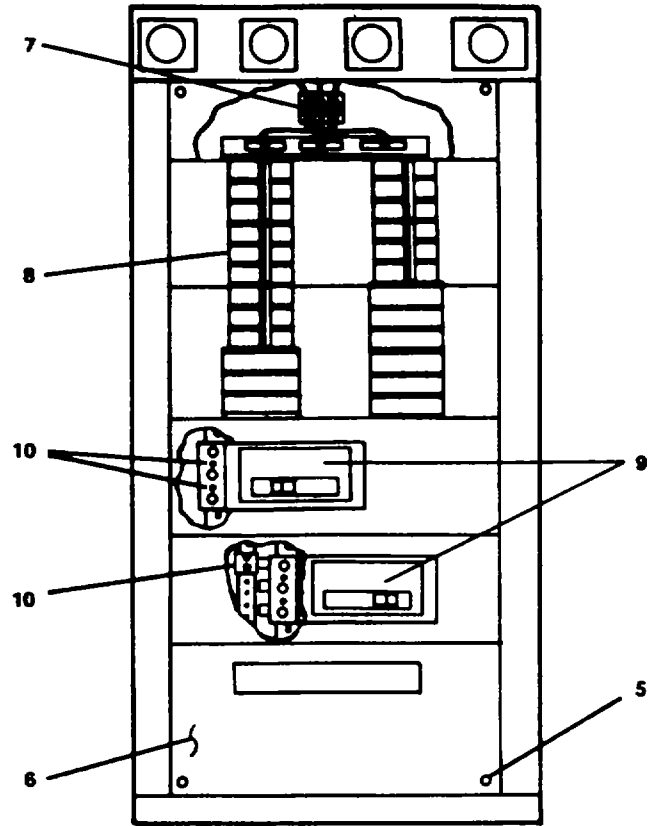
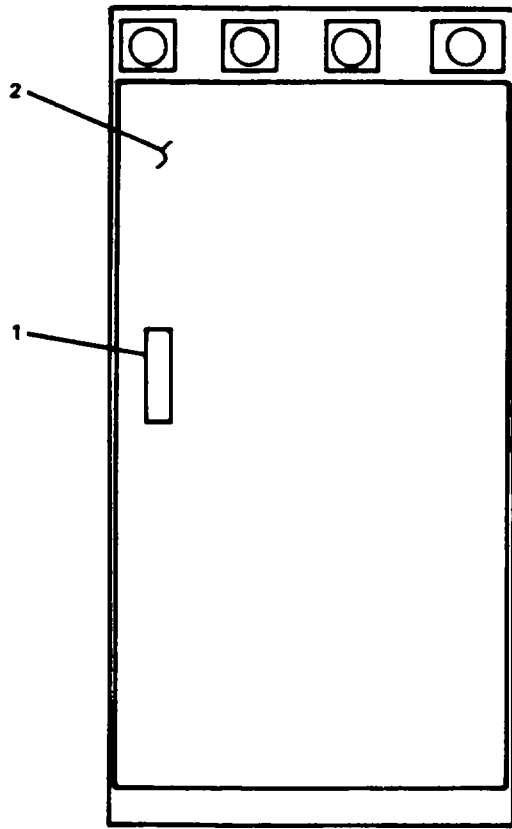


Figure 2-55. Repair Load Center.
2-163

2-52. Replace/Repair Emergency Load Center.

This task covers:

a. Removal	b. Repair	c. Replacement
------------	-----------	----------------

INITIAL SETUPTools

Tool kit, electrician's
KVA 1 Ø
5180-00-392-2895
position and tag "Out of Service
Do Not Operate."

Equipment Condition

On Main Switchboard set 3-10
XFMRS circuit breaker to OFF

Materials/Parts

Circuit breakers (10)
Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate."

REMOVAL

Refer to paragraph 2-50.

REPAIR

Refer to replacement parts lists and paragraph 2-51.

REPLACEMENT

Refer to paragraph 2-50.

2-53. Replace Engine Room Power Panel No. 1

This task covers:

- | | | | |
|----|---------|----|-------------|
| a. | Removal | b. | Replacement |
|----|---------|----|-------------|
-

INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On Main Switchboard set ENG.
RM. PWR. PANEL #1 circuit breaker
to OFF position and tag "Out of
Service Do Not Operate."

Materials/Parts

Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate. "

e. Remove four hex bolts (9).

f. Remove component panel (10).

REPLACEMENT

a. Install component panel (10) with hex bolts (9). Tighten bolts.

b. Connect electrical wiring to circuit breakers (7) and bus bars (8). Remove tags.

c. Install inner-face panel (6) with screws (5). Tighten screws.

d. Install face panel (4) and door (2) with screws (3). Tighten screws.

e. Set circuit breaker to ON position. Remove tag.

f. On Panel, set circuit breakers to ON position and close door (2).

REMOVAL

a. Press key latch (1, Figure 2-56) and open door (2).

b. Loosen six screws (3) and remove face panel (4) and door (2).

c. Remove four screws (5) from inner-face panel (6). Remove panel.

d. Tag and disconnect electrical wiring to circuit breakers (7) and bus bars (8).

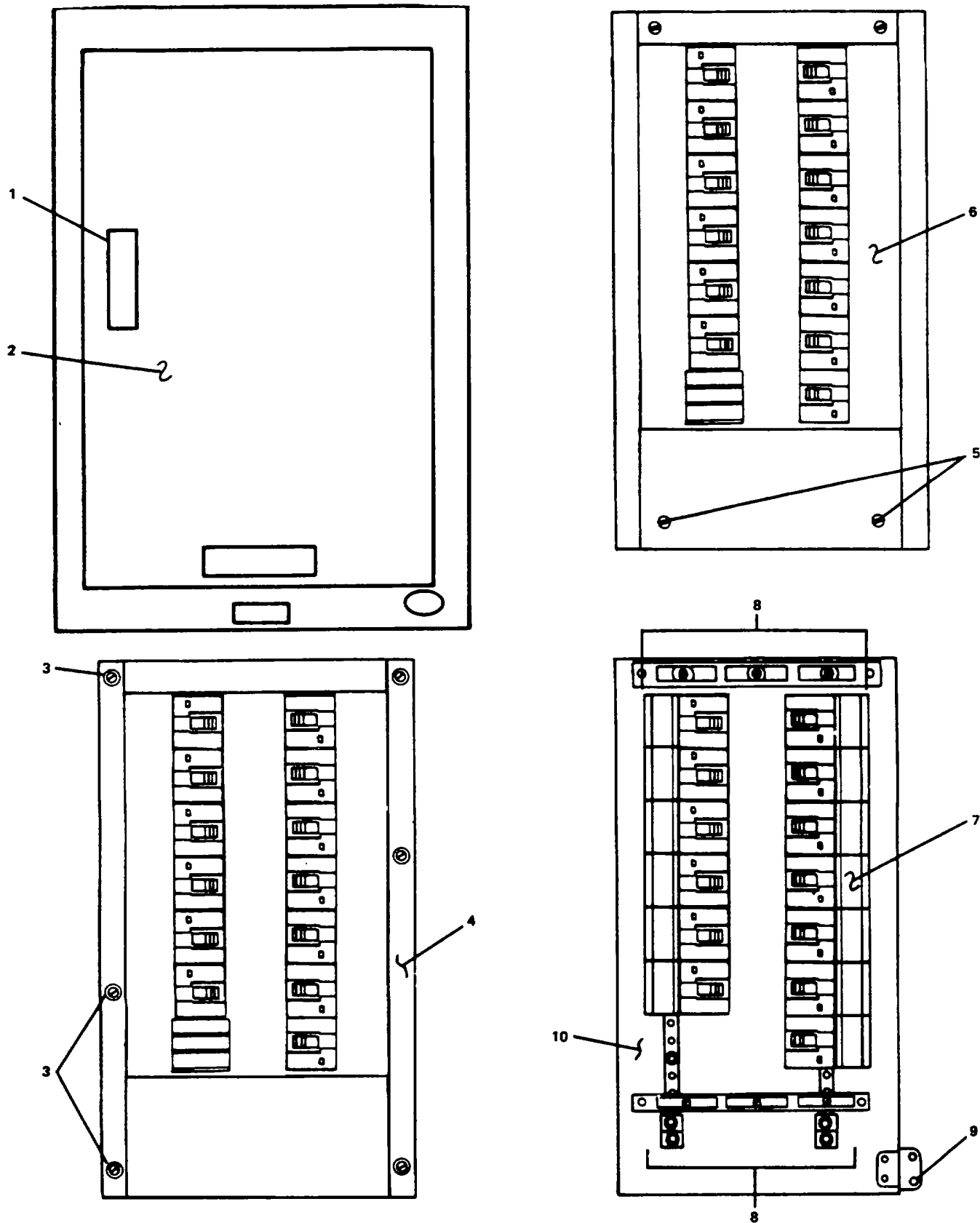


Figure 2-56. Replace Power Distribution Panel (Typical).

2-54. Repair Engine Room Power Panel No. 1.

This task covers:

a.	Disassembly	b.	Repair	c.	Assembly
----	-------------	----	--------	----	----------

INITIAL SETUPTools

Tool kit, electrician's
5180- 00-392-2895

Equipment Condition

On Main Switchboard set ENG.
RM. PWR. PANEL #1 circuit breaker
to OFF position and tag "Out of
Service - Do Not Operate."

Materials/Parts

Circuit breakers (13)
Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag 'Out of Service Do Not Operate. "

DISASSEMBLY

- a. Press key latch (1, Figure 2-57) and open door (2).
- b. Loosen six screws (3) and remove face panel (4) and door (2).
- c. Remove four screws (5) from inner-face panel (6). Remove panel.
- d. Tag and disconnect electrical wiring (if applicable) to circuit breakers (7).
- e. Loosen screws (8).
- f. Remove circuit breaker (7).

REPAIR

Repair at this level of maintenance is by replacement of circuit breakers (7).

ASSEMBLY

- a. Install circuit breaker (7).
- b. Install screws (8) in circuit breaker (7). Tighten screws.
- c. Connect electrical wiring (if applicable) to circuit breaker (7) and remove tag.
- d. Install inner-face panel (6) with screws (5). Tighten screws.
- e. Install face panel (4) and door (2) with screws (3). Tighten screws.
- f. Set circuit breaker to ON position. Remove tag.
- g. On Power Panel, set circuit breakers to ON position and close door (2).

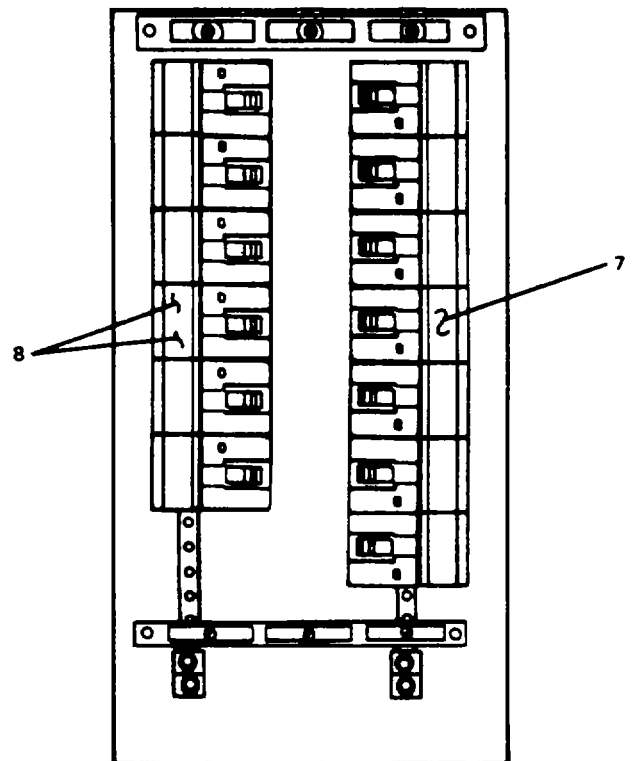
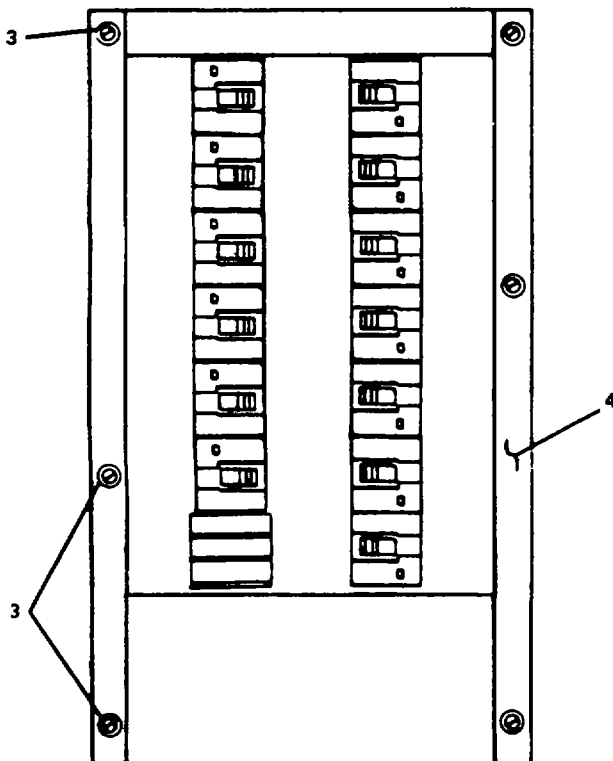
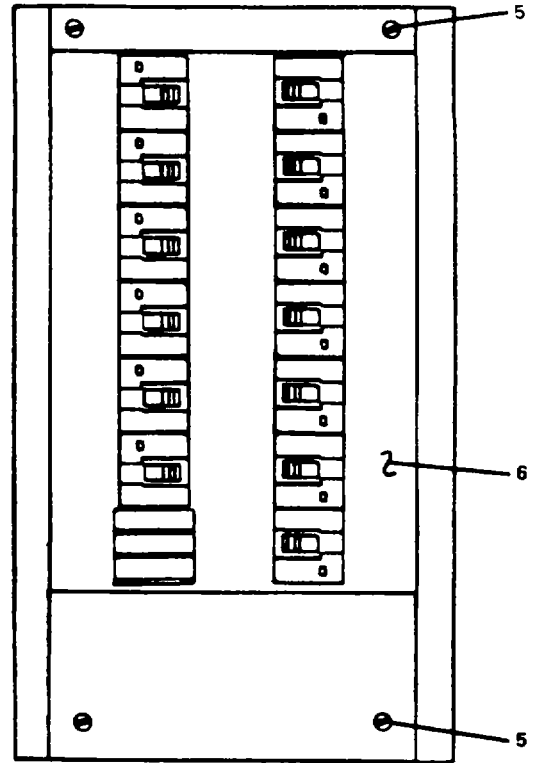
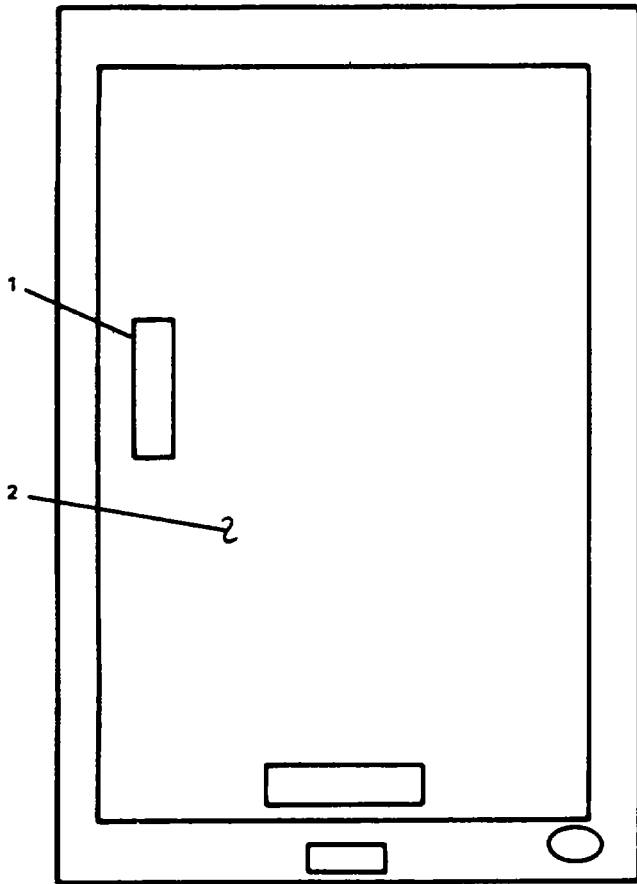


Figure 2-57. Repair Power Distribution Panel (Typical).
2-168

2-55. Replace/Repair Galley 460V Power Panel #2

This task covers:

a. Removal b. Repair c. Replacement

INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On Main Switchboard set GALLEY
440V PWR. PNL. #2 circuit breaker
to OFF position and tag "Out of
Service - Do Not Operate."

Materials/Parts

Circuit breakers (11)
Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate. "

REMOVAL

Refer to paragraph 2-53.

REPAIR

Refer to replacement parts list and paragraph 2-54.

REPLACEMENT

Refer to paragraph 2-53.

2-56. Replace/Repair Main Deck Distribution Panel No. 3.

This task covers:

a. Removal b. Repair c. Replacement

INITIAL SETUP**Tools**

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On ENG RM LOAD CTR DIST PANEL
set MN DK DIST PNL circuit breaker
to OFF position and tag "Out of
Service - Do Not Operate."

Materials/Parts

Circuit breakers (12)
Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate. "

REMOVAL

Refer to paragraph 2-53.

REPAIR

Refer to replacement parts list and paragraph 2-54.

REPLACEMENT

Refer to paragraph 2-53.

2-57. Replace/Repair Aux. Machinery Space No. 1 Power Panel No. 4.

This task covers:

- a. Removal b. Repair c. Replacement
-

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On Main Switchboard, set AUX MCHY.
SPACE #1 PWR. PNL. #4 circuit breaker
to OFF position and tag "Out of
Service - Do Not Operate."

Materials/Parts

Circuit breakers (10)
Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate. "

Refer to paragraph 2-53.

REMOVAL

Refer to paragraph 2-53.

REPAIR

Refer to replacement parts list and paragraph 2-54.

REPLACEMENT

2-58. Replace/Repair Aux. Machinery Space No. 2 Power Panel No. 5.

This task covers:

a. Removal b. Repair c. Replacement

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On Main Switchboard, set AUX MCHY.
SPACE #2 PWR. PNL. #5 circuit breaker
to OFF position and tag "Out of
Service - Do Not Operate."

Materials/Parts

Circuit breakers (13)
Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate. "

REMOVAL

Refer to paragraph 2-53.

REPAIR

Refer to replacement parts list and paragraph 2-54.

REPLACEMENT

Refer to paragraph 2-53.

2-59. Replace Pilothouse Emergency Distribution Panel

This task covers:

- a. **Removal** b. **Replacement**
-

INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On EMER LOAD CTR DISTRIBUTION PANEL
set PILOTHOUSE EMER DIST PNL
circuit breaker to OFF position
and tag Out of Service - Do Not Operate."

Materials/Parts

Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate. "

REMOVAL

- a. Press key latch (1, Figure 2-58) and open door (2).
- b. Loosen four screws (3) and remove face panel (4) and door (2).
- c. Remove four screws (5) from inner-face panel (6). Remove panel.
- d. Tag and disconnect electrical wiring to circuit breakers (7) and bus bars (8).

- e. Remove four wing nuts (9). Remove component panel (10).

REPLACEMENT

- a. Install component panel (10) with wing nuts (9). Tighten nuts.
- b. Connect electrical wiring to bus bars (8) and circuit breakers (7). Remove tags.
- c. Install inner-face panel (6) with screws (5). Tighten screws.
- d. Install face panel (4) and door (2) with screws (3). Tighten screws.
- e. Set circuit breaker to ON position. Remove tag.
- f. On Panel set circuit breakers to ON position and close door (2).

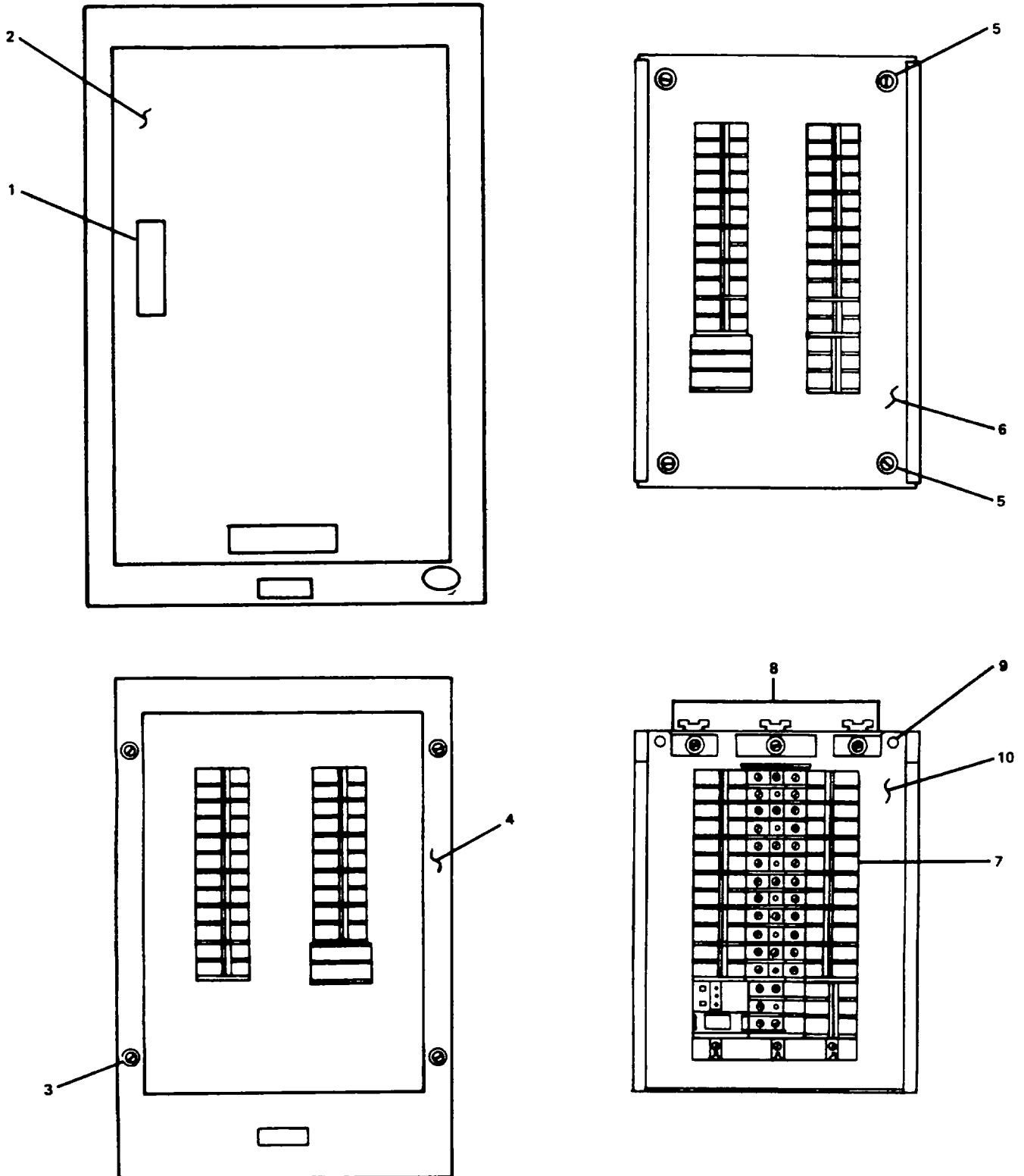


Figure 2-58. Replace Distribution Panel (Typical).

2-60. Repair Pilothouse Emergency Distribution Panel.

This task covers:

a.	Disassembly	b.	Repair	c.	Assembly
----	-------------	----	--------	----	----------

INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On EMER LOAD CTR DISTRIBUTION PANEL
set PILOTHOUSE EMER DIST PNL
circuit breaker to OFF position
and tag "Out of Service - Do Not Operate."

Materials/Parts

Circuit breakers (20)
Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate. "

f. Remove circuit breaker (7) by holding end nearest center of panel and pull (in arc motion) out until breaker (7) clears D-lip (9).

REPAIR

Repair at this level of maintenance is by replacement of circuit breakers (7).

DISASSEMBLY

- a. Press key latch (1, Figure 2-59) and open door (2).
- b. Loosen four screws (3) and remove face panel (4) and door (2).
- c. Remove four screws (5) from inner-face panel (6). Remove panel.
- d. Tag and disconnect electrical wiring to circuit breakers (7).

NOTE

Circuit breakers may be single, double, or triple ganged. Remove appropriate number of screw(s) when replacing circuit breaker(s).

- e. Remove screws (8).

ASSEMBLY

- a. Install circuit breaker (7) by positioning breaker holding bar under D-lip (9) and pushing towards center of panel.
- b. Install screws (8).
- c. Connect electrical wiring to circuit breakers (7). Remove tag.
- d. Install inner-face panel (6) with screws (5). Tighten screws.
- e. Install face panel (4) and door (2) with screws (3). Tighten screws.
- f. Set circuit breaker to ON position.
- g. On Panel set circuit breakers to ON position and close door (2).

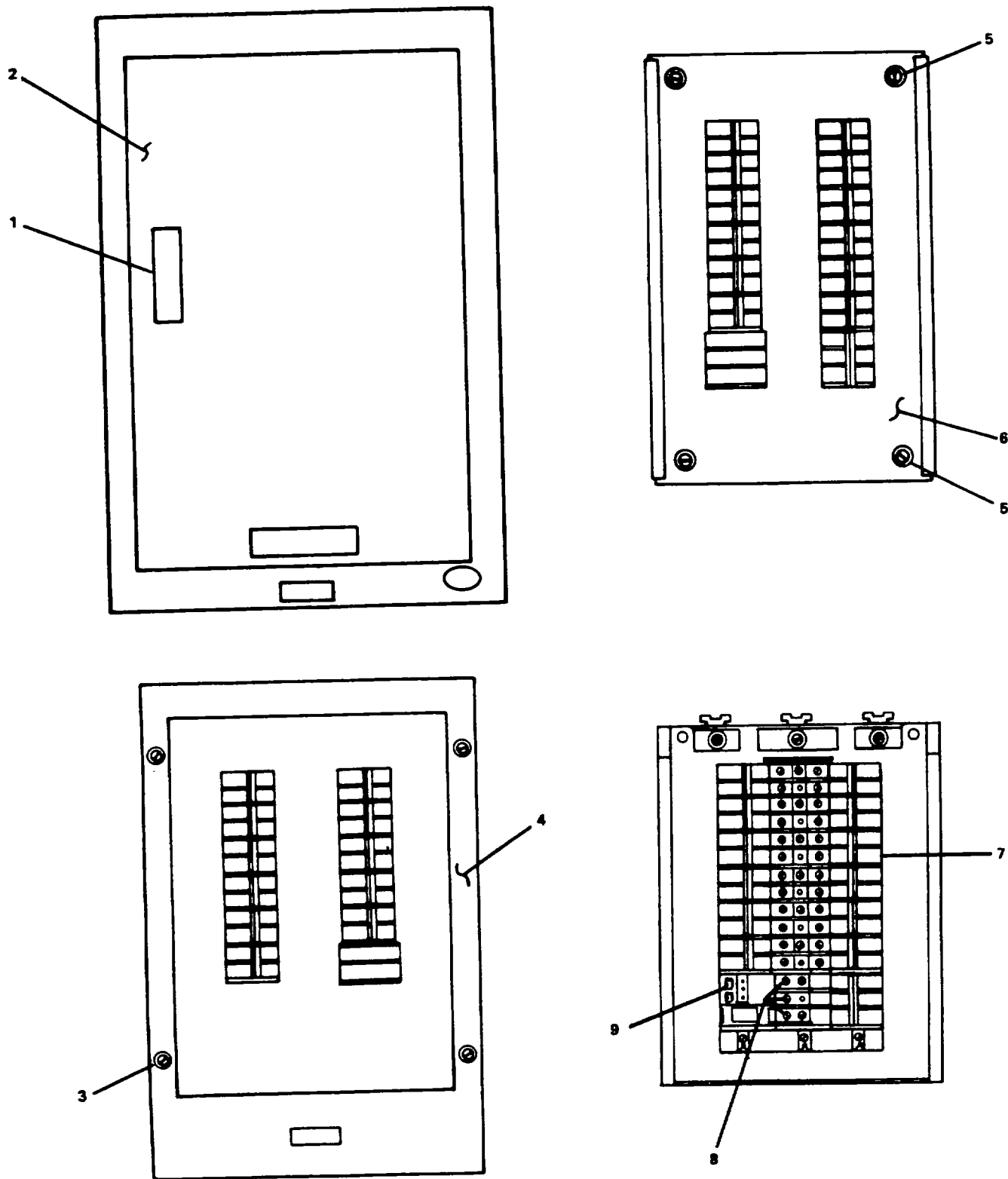


Figure 2-59. Repair Distribution Panel (Typical).

2-61. Replace/Repair Engine Room Emergency Distribution Panel #1

This task covers:

a. Removal b. Repair c. Replacement

INITIAL SETUP

Tools

Tool kit, electrician's
5180--392-2895

Equipment Condition

On EMER LOAD CTR DISTRIBUTION PANEL
set EMER. DIST. PNL #1
circuit breaker to OFF position
and tag 'Out of Service - Do Not Operate.'

Materials/Parts

Circuit breakers (13)
Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate. "

REMOVAL

Refer to paragraph 2-59.

REPAIR

Refer to replacement parts list and paragraph 2-60.

REPLACEMENT

Refer to paragraph 2-59.

2-62. Replace/Repair 01 and 02 Level and Main Deck Power Emergency Lighting Panel No. 1.

This task covers:

a. Removal b. Repair c. Replacement

INITIAL SETUP

Tools

Tool kit, electrician's
5180--392-2895

Equipment Condition

On EMER LOAD CTR DISTRIBUTION PANEL
set EMER. LTG. PNL #1
circuit breaker to OFF position
and tag 'Out of Service - Do Not Operate.'

Materials/Parts

Circuit breakers (13)
Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate. "

REMOVAL

Refer to paragraph 2-59.

REPAIR

Refer to replacement parts list and paragraph 2-60.

REPLACEMENT

Refer to paragraph 2-59.

2-63. Replace/Repair Exterior Emergency Lighting Panel No. 2

This task covers:

a. Removal b. Repair c. Replacement

INITIAL SETUPToolsTool kit, electrician's
5180--392-2895Equipment ConditionOn EMER LOAD CTR DISTRIBUTION PANEL
set EMER. EXTERIOR EMER LTG. PNL #2
circuit breaker to OFF position
and tag 'Out of Service - Do Not Operate.'Materials/PartsCircuit breakers (13)
Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate. "

REMOVAL

Refer to paragraph 2-59.

REPAIR

Refer to replacement parts list and paragraph 2-60.

REPLACEMENT

Refer to paragraph 2-59.

2-64. Replace/Repair Radio Room Electronic Distribution Panel

This task covers:

a. Removal b. Repair c. Replacement

INITIAL SETUPToolsTool kit, electrician's
5180--392-2895Equipment ConditionOn EMER LOAD CTR DISTRIBUTION PANEL
set RADIO RM ELEX PNL
circuit breaker to OFF position
and tag 'Out of Service - Do Not Operate.'Materials/PartsCircuit breakers (13)
Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate. "

REMOVAL

Refer to paragraph 2-59.

REPAIR

Refer to replacement parts list and paragraph 2-60.

REPLACEMENT

Refer to paragraph 2-59.

2-65. Replace/Repair Galley 120V Distribution Panel No. 1.

This task covers:

a. Removal b. Repair c. Replacement

INITIAL SETUPTools

Tool kit, electrician's
5180--392-2895

Equipment Condition

On ENG RM LOAD CTR DIST PANEL
set GALLERY. DIST. PNL NO. 1
circuit breaker to OFF position
and tag 'Out of Service - Do Not Operate.'

Materials/Parts

Circuit breakers (13)
Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate. "

REMOVAL

Refer to paragraph 2-59.

REPAIR

Refer to replacement parts list and paragraph 2-60.

REPLACEMENT

Refer to paragraph 2-59.

2-66. Replace/Repair 01 Level Distribution Panel No. 2.

This task covers:

a. Removal b. Repair c. Replacement

INITIAL SETUP

This task covers: a. Removal, b., c. Replacement

ToolsTool kit, electrician's
5180--392-2895Equipment ConditionOn ENG RM LOAD CTR DIST PANEL
set GALLERY. DIST. PNL NO. 2
circuit breaker to OFF position
and tag 'Out of Service - Do Not Operate.'Materials/PartsCircuit breakers (13)
Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate. "

REMOVAL

Refer to paragraph 2-59.

REPAIR

Refer to replacement parts list and paragraph 2-60.

REPLACEMENT

Refer to paragraph 2-59.

2-67. Replace/Repair Main Deck Power Panel No. 3

This task covers:

a. Removal	b. Repair	c. Replacement
------------	-----------	----------------

INITIAL SETUPTools

Tool kit, electrician's
5180--392-2895

Equipment Condition

On ENG RM LOAD CTR DIST PANEL
set MN DK. DIST PANEL
circuit breaker to OFF position
and tag 'Out of Service - Do Not Operate.'

Materials/Parts

Circuit breakers (13)
Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate. "

REMOVAL

Refer to paragraph 2-59.

REPAIR

Refer to replacement parts list and paragraph 2-60.

REPLACEMENT

Refer to paragraph 2-59.

2-68. Replace/Repair Engine Room Distribution Panel No. 4

This task covers:

- | | | |
|------------|-----------|----------------|
| a. Removal | b. Repair | c. Replacement |
|------------|-----------|----------------|
-

INITIAL SETUP

Tools

Tool kit, electrician's
5180--392-2895

Equipment Condition

On ENG RM LOAD CTR DIST PANEL
set ENG ROOM . DIST PNL NO 4
circuit breaker to OFF position
and tag 'Out of Service - Do Not Operate.'

Materials/Parts

Circuit breakers (13)
Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate. "

REMOVAL

Refer to paragraph 2-59.

REPAIR

Refer to replacement parts list and paragraph 2-60.

REPLACEMENT

Refer to paragraph 2-59.

2-69. Replace/Repair 220/110V Distribution Panel

This task covers:

a. Removal b. Repair c. Replacement

INITIAL SETUPTools

Tool kit, electrician's
5180--392-2895

Equipment Condition

On Main Switchboard set
1-25 KVA XFMR 440V/220-110V
circuit breaker to OFF position
and tag 'Out of Service - Do Not Operate.'

Materials/Parts

Circuit breakers (13)
Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate. "

REMOVAL

Refer to paragraph 2-59.

REPAIR

Refer to replacement parts list and paragraph 2-48 (lamps) 2-60. (Circuit breakers)

REPLACEMENT

Refer to paragraph 2-59.

2-70. Replace Navigation Lights (Single Lens).

This task covers:

- a. Removal b. Replacement
-

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On Navigation Lighting Panel set
toggle switches to OFF position
and tag "Out of Service - Do Not Operate."

Materials/Parts

Towing light (masthead) (2)
P/N 33071-009
Towing/pushing light
P/N 3072499
Anchor light P/N 33070009
Not under command light
P/N 33071-009
Not under command/restricted
light (4) P/N 33070-109
Warning tags, Item 1,
Appendix D

NOTE

Single lens navigation lights are structurally identical. They differ in the color of the lens. This procedure is applicable to the four single lens navigation lights.

- c. Remove four bolts (5) and nuts (4). Remove light.

REPLACEMENT

- a. Position light (3) and replace four nuts (4) and bolts (5).

b. Replace electrical connection (2) by outlet.

c. Set toggle switches to ON position. Remove tags.

REMOVAL

- a. Unscrew electrical connection (2) to light and remove.

b. Remove locknuts (4).

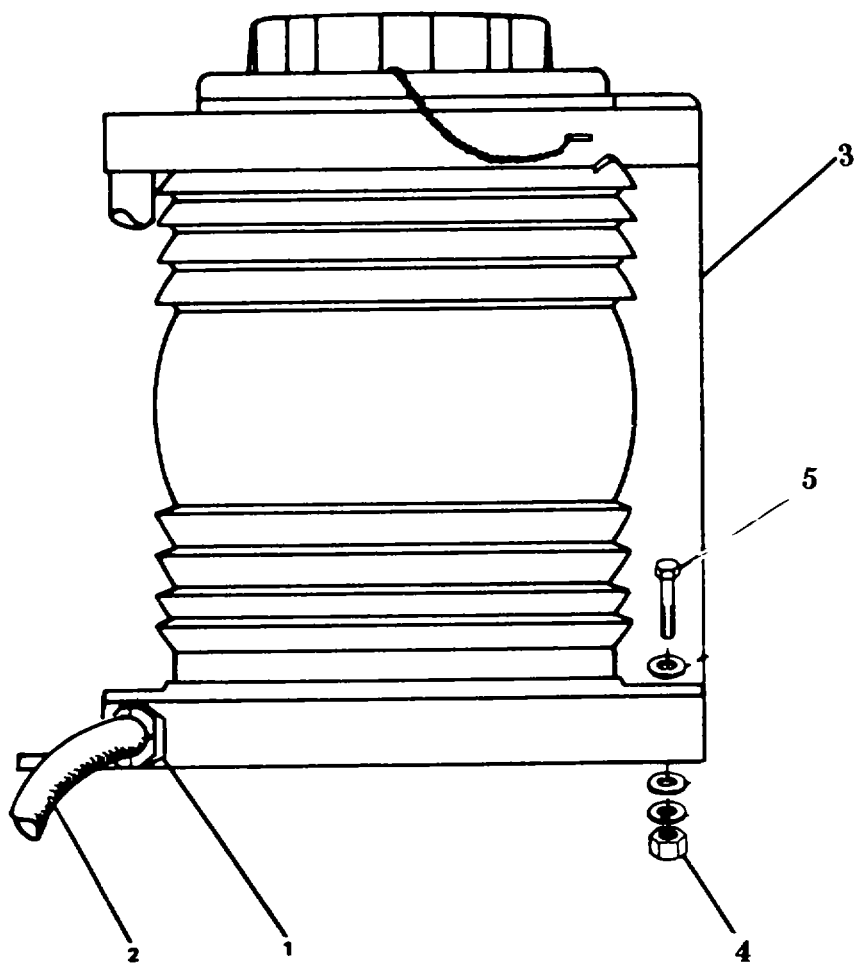


Figure 2-60. Remove Navigation Lights (Single Lens).

2-71. Repair Navigation Lights (Single Lens).

This task covers:

- a. Disassembly b. Repair c. Assembly

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895

Materials/Parts

Gasket (9) P/N 95800146
Tungsten bulb (9) P/N 90400290
White lens (4) P/N 83070017
Red lens (4) P/N 83070019
Yellow lens P/N 83072006
Warning tags, Item 1, Appendix D

Equipment Condition

On Navigation Lighting Panel set
toggle switches to OFF position
and tag "Out of Service - Do Not Operate."

Navigation light(s) single lens
removed, paragraph 2-70.

NOTE

Single lens navigation lights are structurally identical. They differ in the color of the lens. This procedure is applicable to the four single lens navigation lights. Use correct replacement color when replacing lens.

d. Replace navigation light(s), paragraph 2-70.

e Remove tag and turn on electrical power at Navigation Lighting Panel.

DISASSEMBLY

- a. Loosen setscrew (1, Figure 2-61) and remove lid (2) and gasket (3).
- b. Unscrew and remove clamp (4).
- c. Remove lens (5).
- d. Unscrew and remove bulb (6) from socket (7).

REPAIR

Repair at this level maintenance is by replacement of gasket (3), lens (5), and bulb (6).

ASSEMBLY

- a. Install bulb (6) into socket (7).
- b. Position lens (5) on light base and secure with clamp (4).
- c. Install gasket (3), lid (2), and secure with setscrew (1).

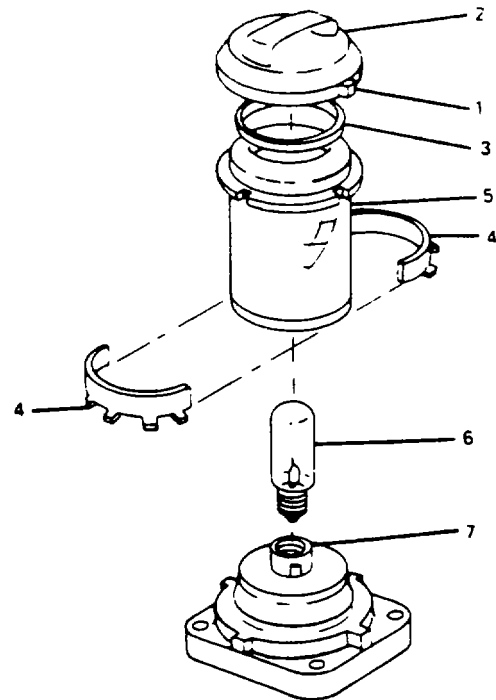


Figure 2-61. Repair Navigation Light (Single Lens).

2-72. Replace Navigation Lights (Double Lens).

This task covers:

- | | | | |
|----|---------|----|-------------|
| a. | Removal | b. | Replacement |
|----|---------|----|-------------|
-

INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On Navigation Lighting Panel set
toggle switches to OFF position
and tag 'Out of Service - Do Not Operate.'

Materials/Parts

Masthead light P/N 3076009
Running light (STBD) P/N 33079-109
Running light (Port) P/N 33078-209
Stern light P/N 33077-009
Warning tags, Item 1, Appendix D

NOTE

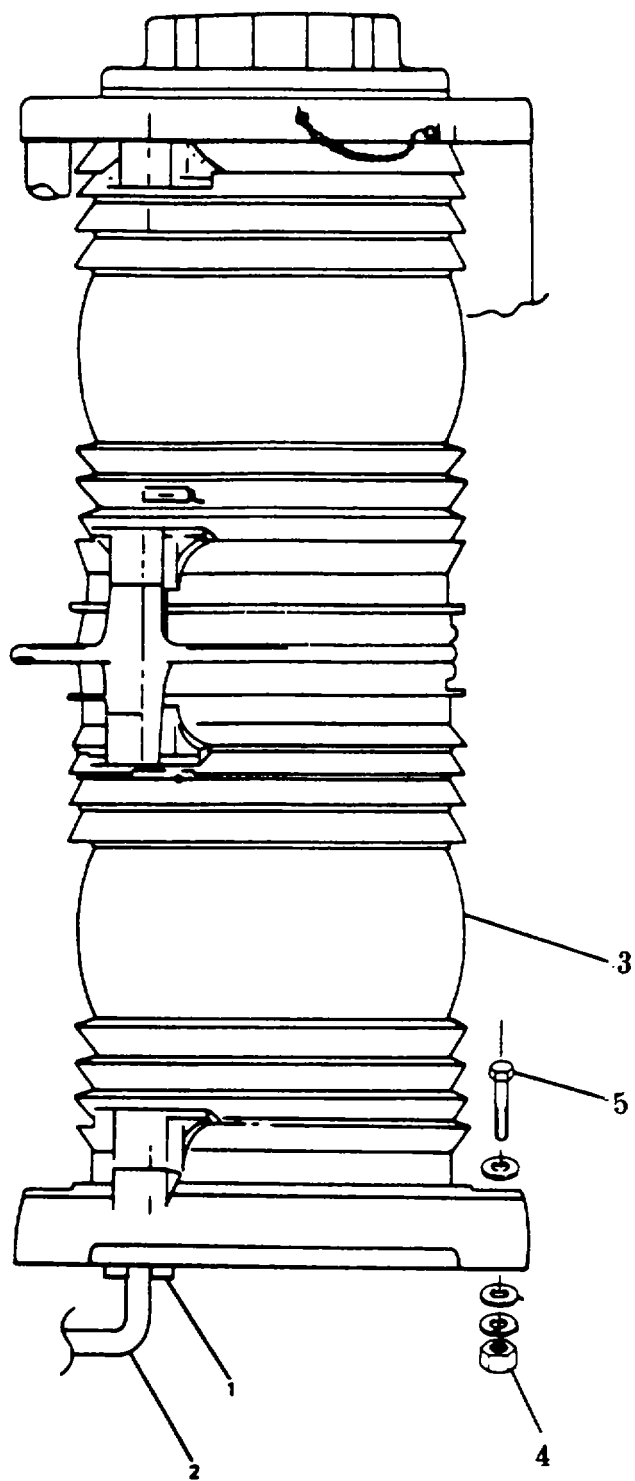
Double lens navigation light are structurally identical. They differ in the color of the lens. This procedure is applicable to the four double lens navigation lights.

- c. Remove four bolts (5). Remove light (3).

REPLACEMENT**REMOVAL**

- a. Unscrew electrical connection (2) to light and remove.
- b. Remove locknuts (4).

- a. Position light (3).
- b. Replace four nuts (4) and bolt (5).
- c. Replace electrical connection (2) to outlet.
- d. Set toggle switches to ON position. Remove tag.



-1-1Figure 2-62. Remove Navigation Lights (Double Lens).

2-73. Repair Navigation Lights (Double Lens).

This task covers:

a. Disassembly	b. Repair	c. Assembly
-----------------------	------------------	--------------------

INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895

Materials/Parts

Gasket (9) P/N 95800146
Tungsten bulb (2) P/N 90400290
White lens P/N
P/N 83075013
Red lens P/N
P/N 83075015
Green lens P/N 83070018
P/N 83075014
Warning tags, Item 1, Appendix D

Equipment Condition

On Navigation Lighting Panel set
toggle switches to OFF position
and tag 'Out of Service - Do Not Operate.'

Navigation light(s), double lens
removed, paragraph 2-72.

NOTE

Double lens navigation lights are structurally identical. They differ in the color of the lens. This procedure is applicable to the four double lens navigation lights. Use correct replacement colors when replacing lens.

DISASSEMBLY

- a. Loosen setscrew (1, Figure 2-63) and remove lid (2) and gasket (3).
- b. Unscrew and remove upper clamp (4).
- c. Remove upper lens (5) and screen (6).
- d. Loosen and remove upper bulb (7) from upper socket (8).
- e. Unscrew and remove lower clamp (9).
- f. Remove lower lens (10).
- g. Loosen and remove lower bulb (11) from lower socket (12).

REPAIR

Repair at this level of maintenance is by replacement of gaskets (3), lens (5, 10), and bulbs (7, 11).

ASSEMBLY

- a. Install bulb (11) into lower socket (12).
- b. Position lower lens (10) over base.
- c. Install lower clamp (9) and secure mounting screw.
- d. Install upper bulb (7) into upper socket (8).
- e. Position upper lens (5) and screen (6) on light and install clamp (4).
- f. Install gasket (3) and lid (2) and secure with setscrew (1).
- g. Replace navigation light(s), paragraph 2-72.

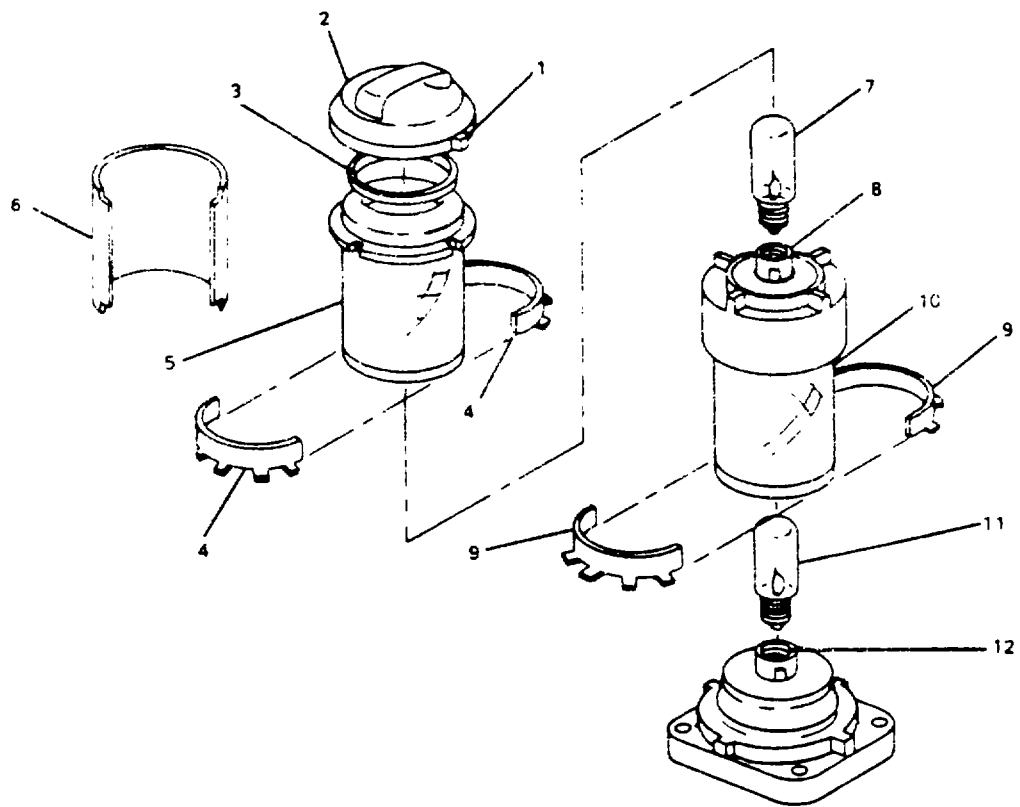


Figure 2-63. Repair Navigation Light (Double Lens).

2-74. Replace/Repair Yardarm Blinker Light and Key.**This task covers:**

- a. Removal, b. Disassembly, c. Repair, d. Assembly, e. Replacement**

INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On Navigation Lighting Panel set
BLINKER toggle switch to OFF
position and tag "Out of Service -
Do Not Operate."

Materials/Parts

Blinker light P/N 1159ACLRD2
Gaskets P/N GKT1008, P/N GKT1048
Lens P/N INX2058C
Incandescent lamp P/N INX3528
Key P/N 810
Warning tags, Item 1, Appendix D

REMOVAL

- a. Remove light.
- (1) Remove hex bolts (1, Figure 2-64).
 - (2) Lift up blinker light (2) and tag and disconnect wiring.
 - (3) Remove gasket (3) and discard.
- b. Remove Blinker key.
- (1) On port side of pilothouse, remove hex bolts (4) from Blinker key (5).
 - (2) Tag and disconnect electrical leads.
 - (3) Remove blinker key (5).

DISASSEMBLY

- a. Remove screws (6) and guard cover (7).
- b. Unscrew lens (8) and remove.
- c. Turn incandescent lamp (9) counterclockwise to remove from lamp socket.
- d. Remove ring cover (10) and gasket (11). Discard gasket.

REPAIR

Repair at this level of maintenance is by replacement of gaskets (3, 11), incandescent lamp (9), lens (8) and key (5).

ASSEMBLY

- a. Install top gasket (11) and ring cover (10).
- b. Install incandescent lamp (9) in lamp socket by turning clockwise until finger tight.
- c. Install lens (8).
- d. Install guard cover (7) and attach screws (6).

REPLACEMENT

- a. Position blinker key (5). Connect electrical leads and remove tags.
- b. Secure key (5) with hex bolts (4).
- c. Install gasket (3).
- d. Install blinker (2) with hex bolts (1).
- e. Set Blinker toggle switch to ON position. Remove tag.

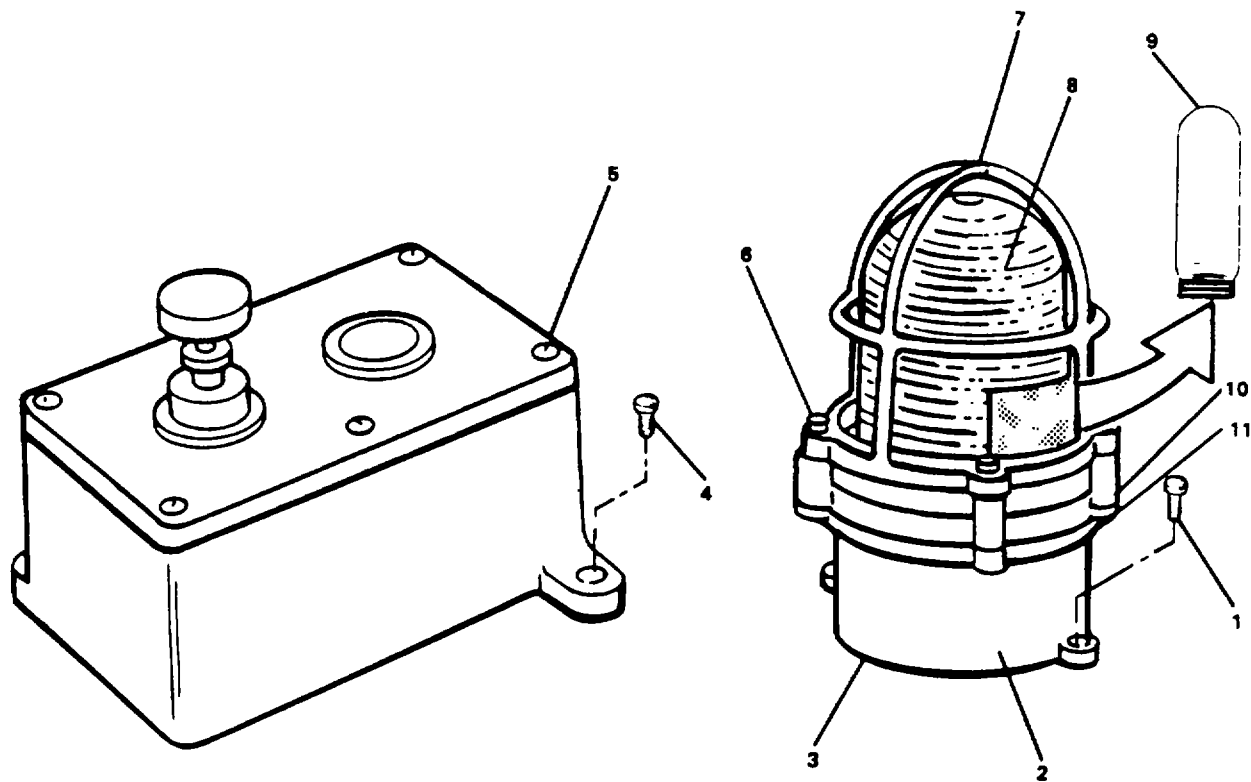


Figure 2-64. Repair Blinker and Key.

2-75. Repair Navigation Lighting Panel Fuses.

This task covers:

a. Removal

b. Repair,

c. Replacement

INITIAL SETUP

Tools

Equipment Condition

Materials/Parts

Cartridge fuse (28)

P/N 270-1273

Cartridge fuse (2)

P/N 270-1254

REMOVAL

a. Remove fuseholder receptacle (1, Figure 2-65) by pushing in and turning counterclockwise to release fuseholder receptacle from panel (2).

b. Remove cartridge fuse from fuseholder receptacle (1).

REPAIR

Repair at this level of maintenance is by replacement of cartridge fuse.

REPLACEMENT

a. Install cartridge fuse in fuseholder receptacle (1).

b. Install fuseholder receptacle (1) into panel (2) by pushing in and turning clockwise until fuseholder (1) is secured.

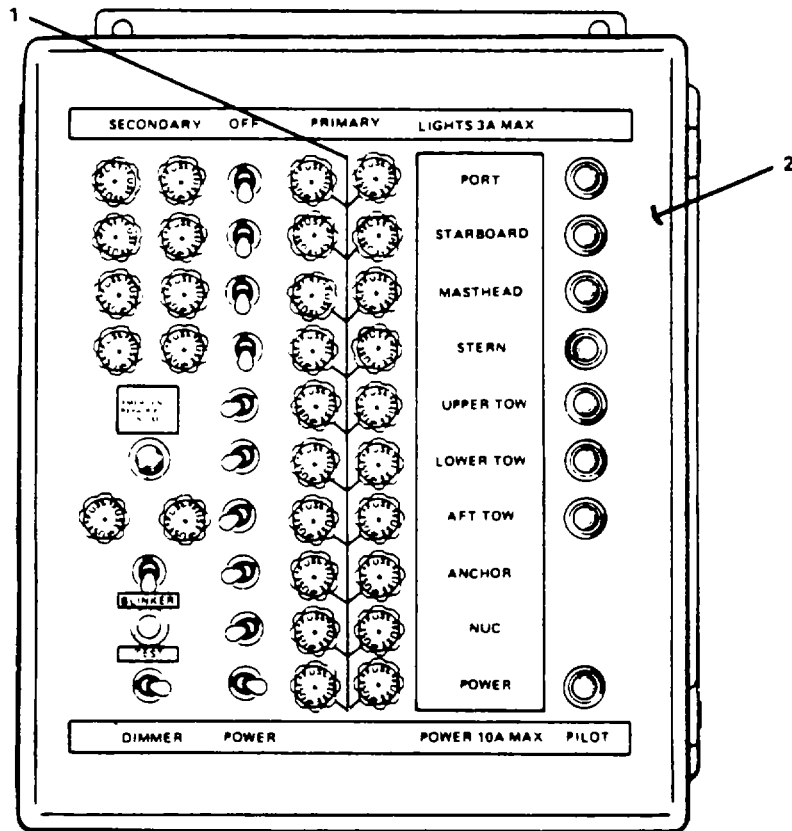


Figure 2-65. Repair Navigation Lighting Panel Fuses.

2-76. Replace/Repair Navigation Lighting Panel.

This task covers:

a. Removal

b. Repair,

c. Replacement

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On EMER LOAD CTR DISTRIBUTION PANEL
set NAVIGATION PNL circuit
breaker to OFF position and tag
"Out of Service - Do Not Operate."

Materials/Parts

Navigation lighting panel P/N
NLSM 4D3S3SW12OAUG
Indicator light (10) P/N FL67C7G
Toggle switch (12) P/N 0121-0018,
P/N 170, P/N 0090-002, PIN 0091-0003
Warning tags, Item 1, Appendix D

REMOVAL

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate."

- a. Loosen screws (1, Figure 2-66) until clamp (2) clears lip of door (3). Open door.
- b. Tag and disconnect electrical power cables.
- c. Tag and disconnect electrical wiring (4) from 9 indicator lights (5).
- d. Unscrew locking rings (6) from indicator lights (5), remove Indicator lenses (7), and remove lights (5) through back of Indicator panel door (3).
- e. Tag and disconnect electrical wiring (8) from toggle switches (9).
- f. Unscrew lockrings (10) from toggle switches (9) and remove through back of indicator panel door (3).
- g. Remove associated electrical power cable hardware. Remove power cables.

- h. Remove mounting bolts (12) holding navigation lighting panel (11). Remove panel.

REPAIR

Repair at this level of maintenance is by replacement of Indicator lights (5) and toggle switches (9).

REPLACEMENT

- a. Install navigation lighting panel (11) with mounting bolts (12). Tighten bolts.
- b. Install electrical power cables with associated hardware.
- c. Install toggle switches (9) through back of Indicator panel door (3) and secure by screwing lockrings (10) on toggle switches (9) until tight.
- d. Connect electrical wiring (8) to toggle switches (9). Remove tags.
- e. Install Indicator lights (5) through back of panel door (3), install lenses (7), and secure by screwing lockrings (6) on indicator lights (5) until tight. Remove tags.
- f. Connect electrical power cables. Remove tags.

- g. Close panel door (3).
- h. Rotate clamps (2) until positioned over lip of door (3). Tighten screws (1).
- i. Set circuit breaker to ON position. Remove tag.
- j. Operate navigation lighting panel in accordance with TM 55-1925-207-10.

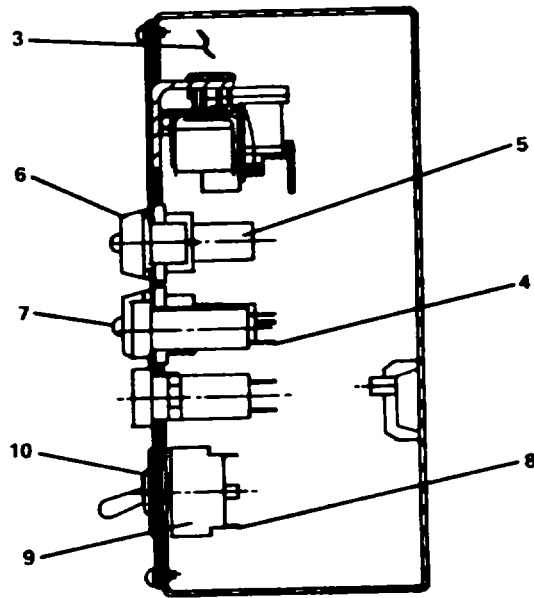
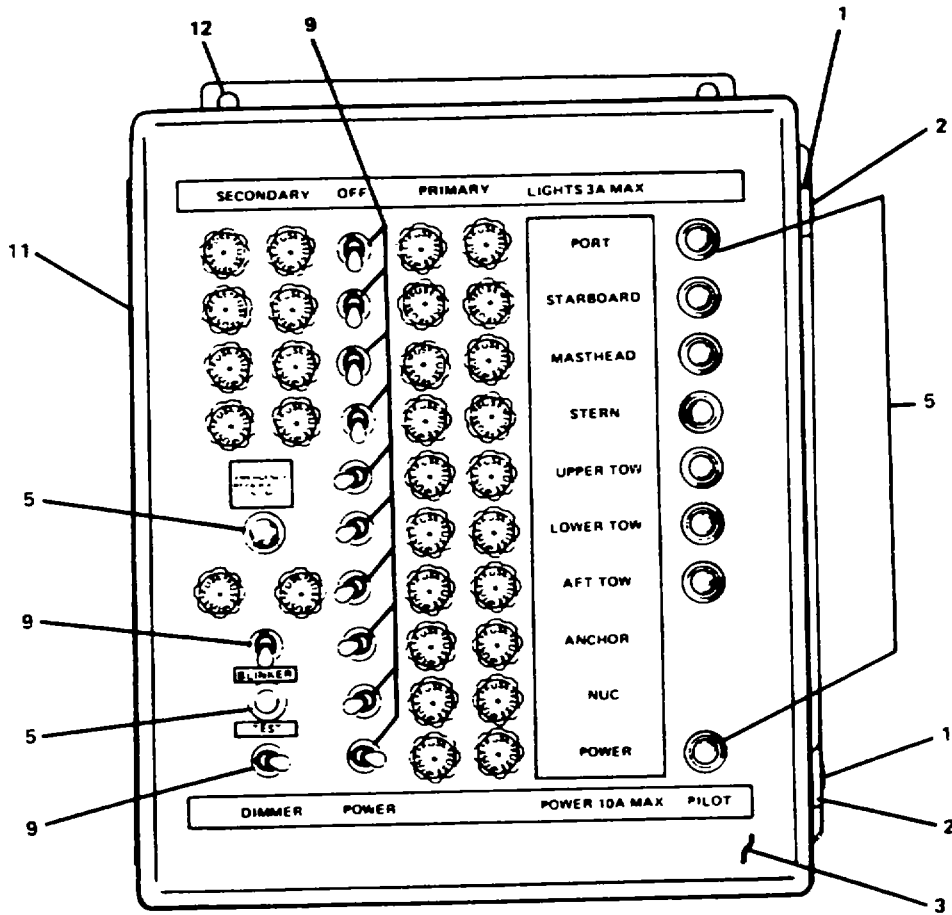


Figure 2-66. Replace/Repair Navigation Lighting Panel.

2-77. Repair Floodlight.

This task covers:

a. Disassembly**b. Repair,****c. Assembly****INITIAL SETUP****Tools**

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On EXTERIOR EMER LIGHTING PNL NO. 2
set associated floodlight circuit
breaker to OFF position and tag
"Out of Service - Do Not Operate."

Materials/Parts

Lamp P/N 04-6677-23349-4
Warning tag, Item 1, Appendix D

DISASSEMBLY

- a. Remove wing nuts (1, Figure 2-67).
- b. Remove lens frame (2).
- c. Remove lamp (3).

REPAIR

Repair at this level of maintenance is by replacement of lamp (3).

ASSEMBLY

- a. Install lamp (3).
- b. Install lens frame (2).
- c. Install wing nuts (1).
- d. Set associated floodlight circuit breaker to ON position and remove tag.
- e. Operate floodlight. Refer to TM 55-1925-207-10.

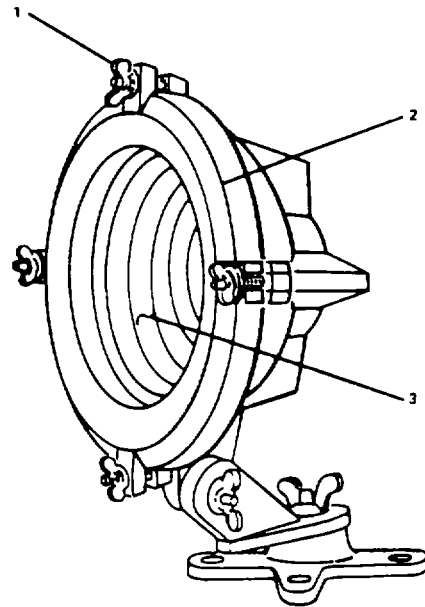


Figure 2-67. Repair Floodlight.

2-78. Replace Floodlight.

This task covers:

a. Removal,

b. Replacement

INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On EXTERIOR EMER LIGHTING PNL NO. 2
set associated floodlight circuit
breaker to OFF position and tag
"Out of Service - Do Not Operate."

Materials/Parts

Floodlight P/N 740SM
Warning tag, Item 1, Appendix D

REMOVAL

- a. Tag and disconnect electrical wiring (1, Figure 2-68) at power source.
- b. Remove wing nut (2). Remove floodlight (3) from mounting fixture.

REPLACEMENT

- a. Position floodlight (3) on mounting fixture.
- b. Secure floodlight (3) to mounting fixture with wingnut (2).
- c. Connect electrical wiring to power source.
Remove tags.
- d. Set associated floodlight circuit breaker to ON position and remove tag.
- e. Operate floodlight TM 55-1925-207-10.

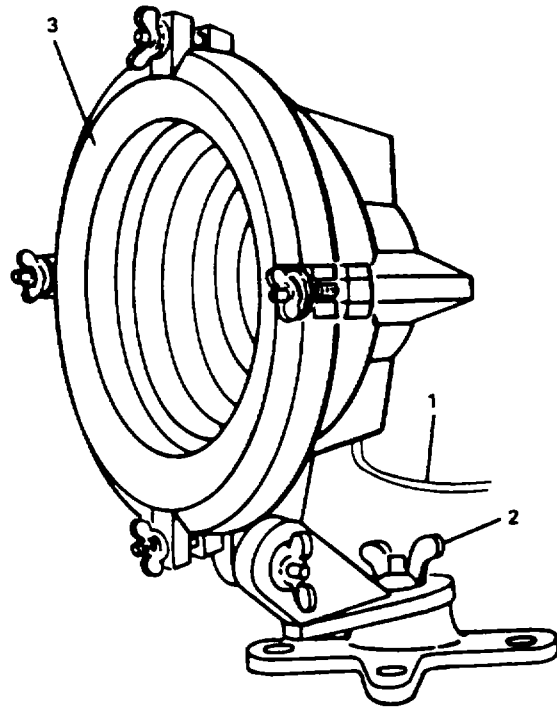


Figure 2-68. Replace Floodlight.

2-79. Repair Metal Halide Floodlight.

This task covers:

- a. Disassembly, b. Repair, c. Assembly**
-

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On EXTERIOR EMER LIGHTING PNL NO. 2
set associated floodlight circuit
breaker to OFF position and tag
Out of Service - Do Not Operate."

Materials/Parts

Gasket P/N GKT6052
Lens P/N INX2126
Lamp P/N INX3551
Warning tag, Item 1, Appendix D

DISASSEMBLY

- a. Remove nuts (4, Figure 2-69).
- b. Remove access plate (3) and gasket (2).
- c. Remove lamp (1).
- d. Remove nuts (5).
- e. Remove lens frame (8), lens (7), and gasket (6).

REPAIR

Repair at this level of maintenance is by replacement of lamp (1), lens (7), and gasket (6).

ASSEMBLY

- a. Install gasket (6), lens (7), and lens frame (8).
- b. Install nuts (5).
- c. Install lamp (1).
- d. Install gasket (2) and access plate (3).
- e. Install nuts (4).
- f. Set associated floodlight circuit breaker to ON position and remove tag.
- g. Operate floodlight. Refer to TM 55-1925-207-10.

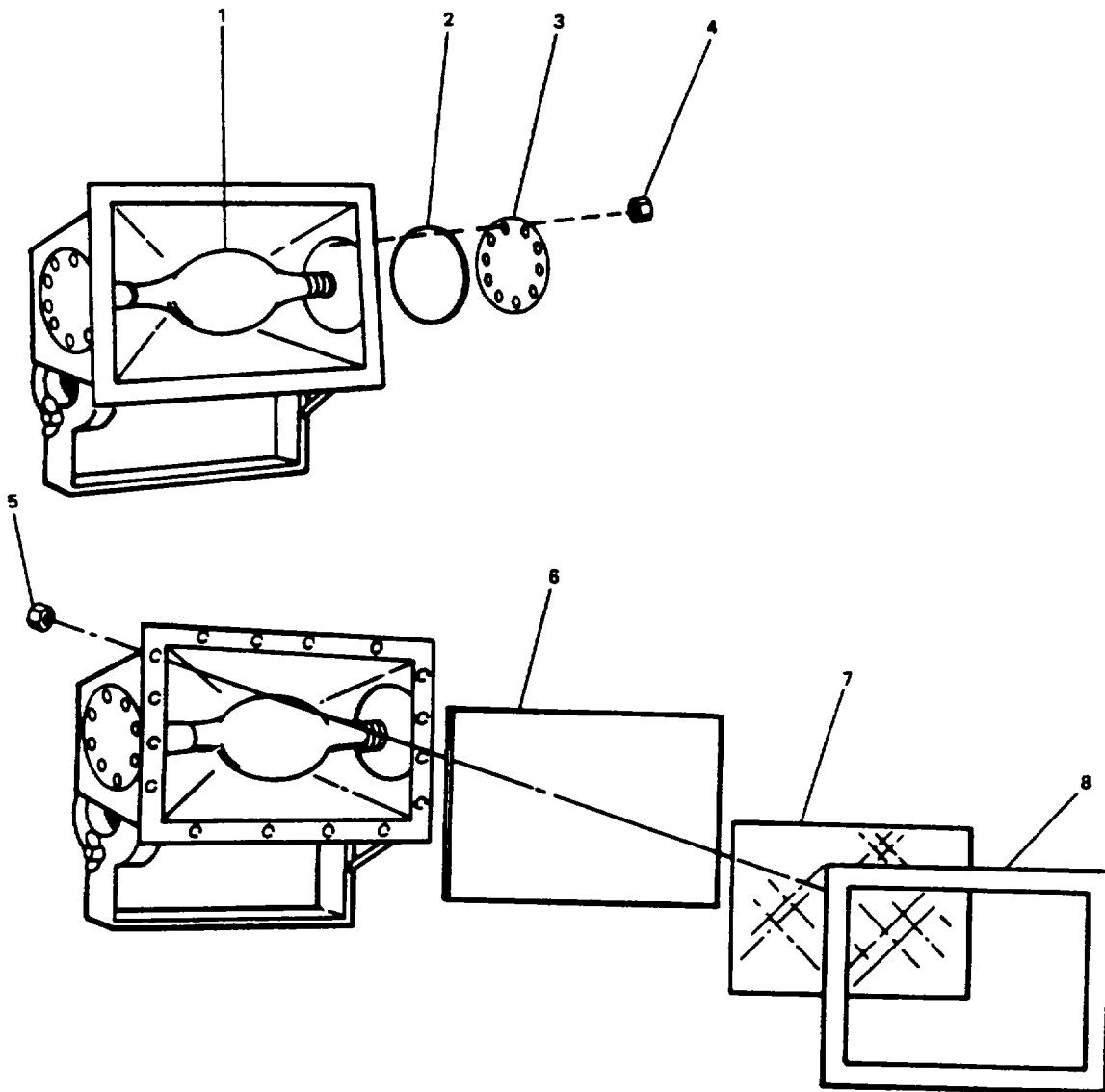


Figure 2-69. Repair Metal Halide Floodlight.

2-80. Replace Metal Halide Floodlight.

This task covers:

- a. Removal, b. Replacement
-

INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On EXTERIOR EMER LIGHTING PNL NO. 2
set associated floodlight circuit
breaker to OFF position and tag
"Out of Service - Do Not Operate."

Materials/Parts

Floodlight P/N HIDHA171B
Warning tag, Item 1, Appendix D

REMOVAL

- a. Tag and disconnect electrical wiring at power source.
- b. Remove mounting bolts and nuts (2). Remove floodlight (1) from mounting fixture.

REPLACEMENT

- a. Position floodlight (1) on mounting fixture.
- b. Secure floodlight (1) to mounting fixture with bolts and nuts (2).
- c. Connect electrical wiring to power source. Remove tags.
- d. Set associated floodlight circuit breaker to ON position and remove tag.
- e. Operate floodlight. Refer to TM 55-1925-207-10.

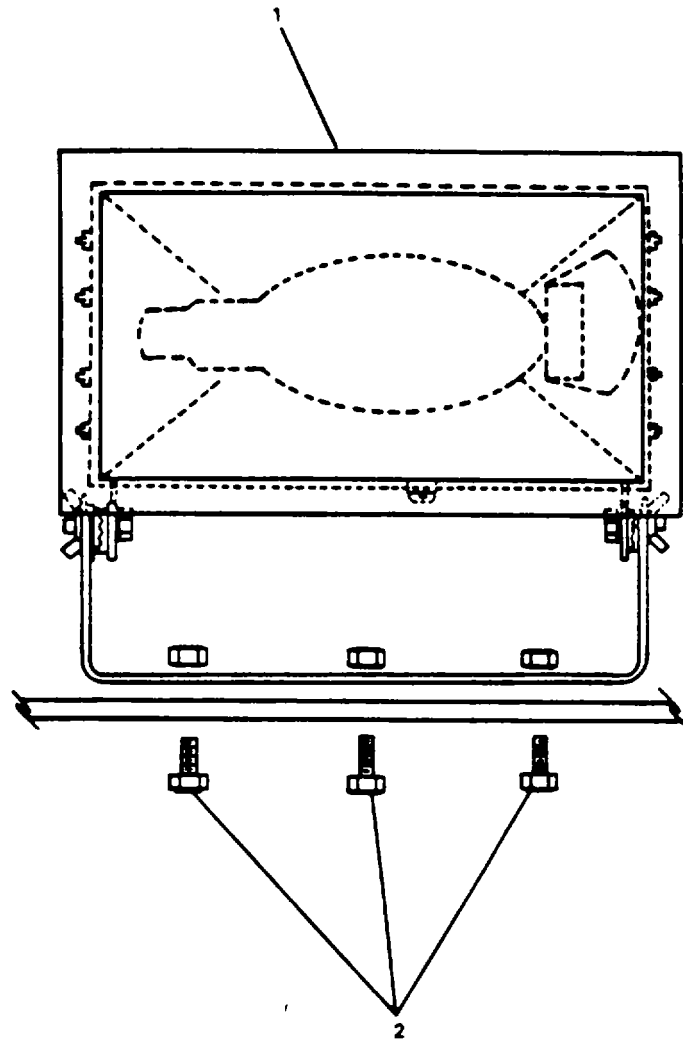


Figure 2-70. Replace Metal Halide Floodlight,

2-81. Repair Junction Box Lighting Fixture (Typical).

This task covers:

- a. Disassembly, b. Repair, c. Assembly
-

INITIAL SETUP
Tools

Tool kit, electrician's
5180-00-392-2895
Tool kit, general mechanic's
5180-00-629-9783

Equipment Condition

On associated lighting panel set circuit breaker(s) to OFF position and tag "Out of Service - Do Not Operate."

Materials/Parts

Globe P/N GG 10C
Lamp P/N 046677-20150-9
Warning tag, Item 1, Appendix D

DISASSEMBLY

- a. Remove guard (1, Figure 2-71) from fixture by turning counterclockwise.
- b. Remove globe (2) from fixture by turning counterclockwise.
- c. Remove lamp (3) from lamp socket.

REPAIR

Repair at this level of maintenance is by replacement of globe (2) and lamp (3).

ASSEMBLY

- a. Install lamp (3) in lamp socket.
- b. Position globe (2) in fixture and turn clockwise until hand tight.
- c. Position guard (1) in fixture and turn clockwise until hand tight.
- d. Set associated circuit breaker(s) to ON position. Remove tags.

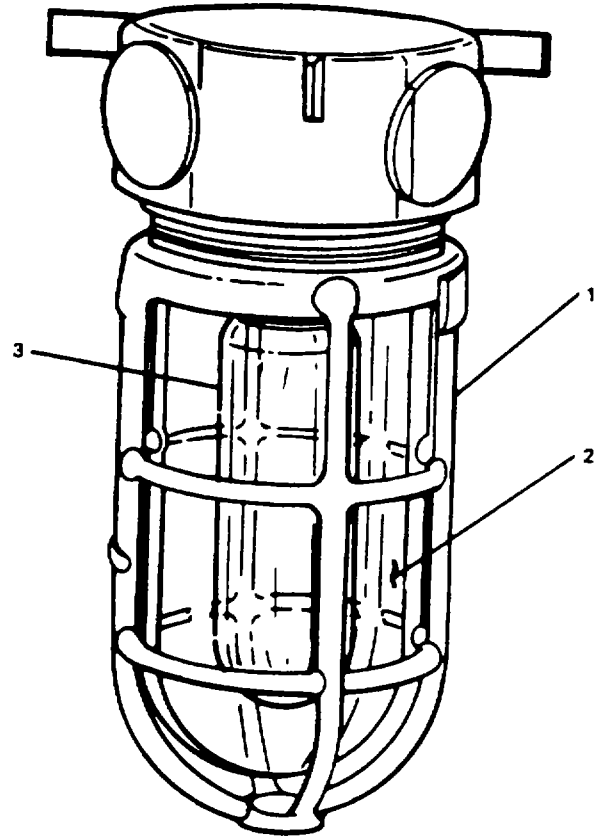


Figure 2-71. Junction Box Lighting (Typical).

2-82. Repair Bracket Lighting Fixture (Typical).

This task covers:

- a. Disassembly, b. Repair, c. Assembly
-

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895
Tool kit, general mechanic's
5180-00-629-9783

Equipment Condition

On associated lighting panel set circuit
breaker(s) to OFF position and tag
"Out of Service - Do Not Operate."

Materials/Parts

Globe P/N GG100C
Lamp P/N 046677-20150-9
Warning tag, Item 1, Appendix D

DISASSEMBLY

Refer to paragraph 2-81.

REPAIR

Refer to paragraph 2-81.

ASSEMBLY

Refer to paragraph 2-81.

2-83. Repair Florescent Fixture, Recessed.

This task covers:

- | | | |
|-----------------|------------|-------------|
| a. Disassembly, | b. Repair, | c. Assembly |
|-----------------|------------|-------------|
-

INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895
Tool kit, general mechanic's
5180-00-629-9783

Equipment Condition

On associated lighting panel set circuit
breaker(s) to OFF position and tag
"Out of Service - Do Not Operate."

Materials/Parts

Lamps (3) P/N 04-6677-37350-6
Diffuser P/N LF02L
Warning tags, Item 1, Appendix D

DISASSEMBLY

- a. Remove captive-knurled screws (1, Figure 2-72).
- b. Remove diffuser (2).
- c. Remove fluorescent lamps (3).

REPAIR

Repair at this level of maintenance is by replacement of diffuser (2) and fluorescent lamps (3).

ASSEMBLY

- a. Install fluorescent lamps (3).
- b. Install diffuser (2).
- c. Install captive-knurled screws (1).
- d. Turn associated circuit breaker(s) to ON position. Remove tags.

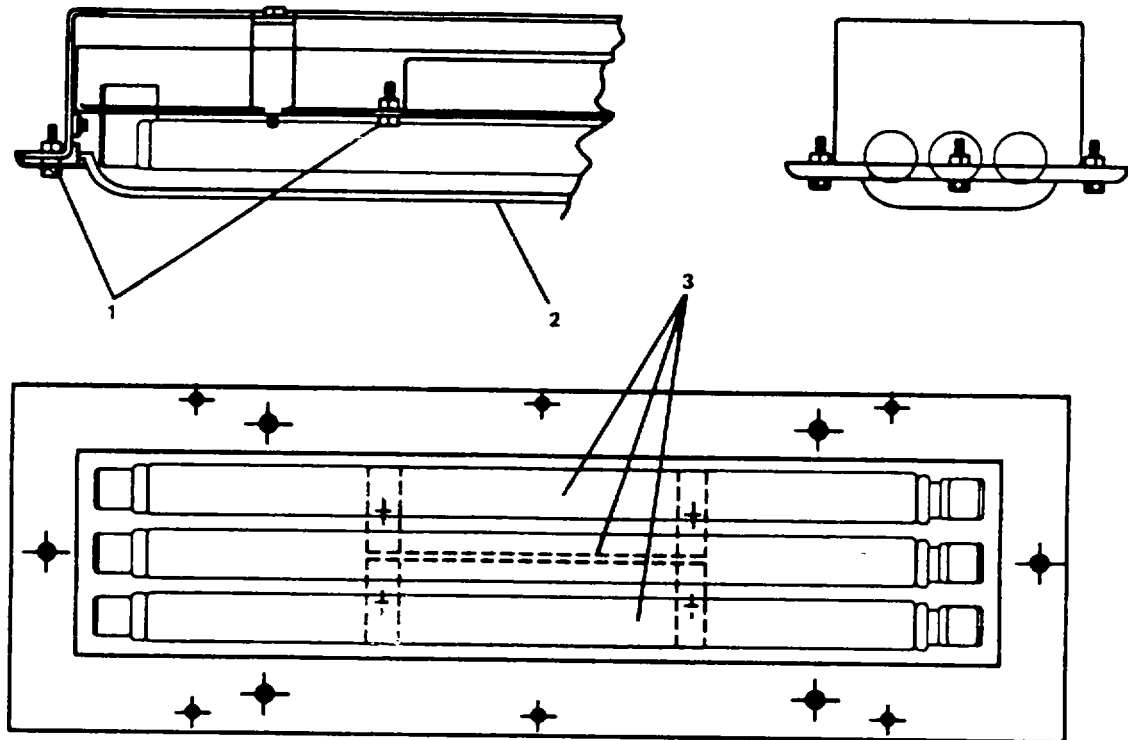


Figure 2-72. Repair Fluorescent Fixture. Recessed

2-84. Repair Florescent Light, Surface Mount.

This task covers:

- a. Disassembly, b. Repair, c. Assembly
-

INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895
Tool kit, general mechanic's
5180-00-629-9783

Equipment Condition

On associated lighting panel set circuit
breaker(s) to OFF position and tag
"Out of Service - Do Not Operate."

Materials/Parts

Lamps P/N 04-6677-25949-9
P/N 04-6677-37350-6
Diffuser P/N FX2092
Warning tags, Item 1, Appendix D

DISASSEMBLY

- a. Remove screws (1, Figure 2-73).
- b. Remove diffuser (2).
- c. Remove fluorescent lamps (3).

REPAIR

Repair at this level of maintenance is by replacement of diffuser (2) and fluorescent lamps (3).

ASSEMBLY

- a. Install fluorescent lamps (3).
- b. Install diffuser (2) with screws (1).
- c. Set associated circuit breaker(s) to ON position. Remove tags.

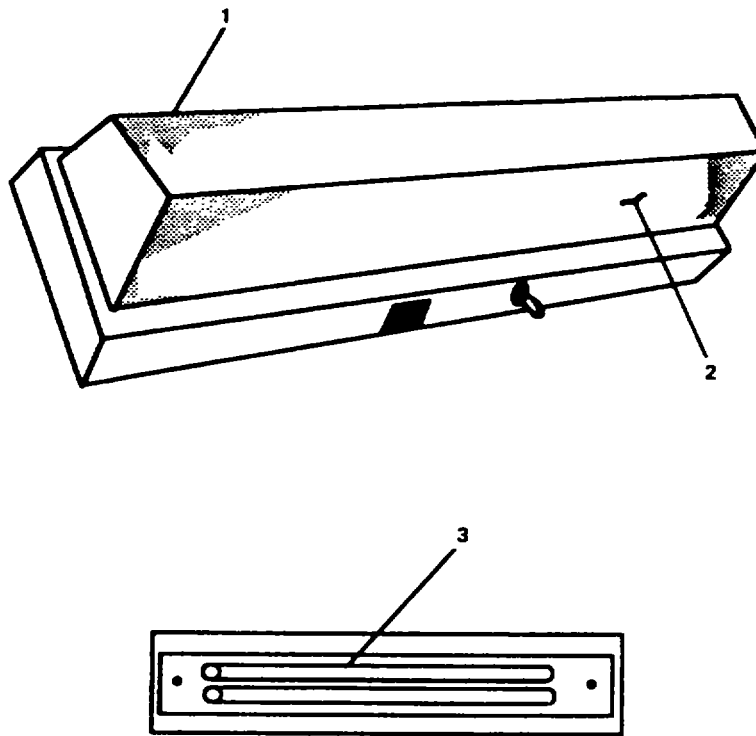


Figure 2-73. Repair Fluorescent Light. Surface Mount.

2-85. Repair Watertight Incandescent Explosion Proof Lighting Fixture (Typical).

This task covers:

- a. Disassembly, b. Repair, c. Assembly
-

INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895
Tool kit, general mechanic's
5180-00-629-9783

Equipment Condition

On associated lighting panel set circuit
breaker(s) to OFF position and tag
"Out of Service - Do Not Operate."

Materials/Parts

Globe P/N INX9005A
Lamp P/N 04-6677-20150-9
Warning tags, Item 1, Appendix D

DISASSEMBLY

- a. Remove screws (1, Figure 2-74) and remove guard (2).
- b. Turn globe (3) counterclockwise and remove.
- c. Remove lamp (4) from lamp socket.

REPAIR

Repair at this level of maintenance is by replacement of globe (3) and lamp (4).

ASSEMBLY

- a. Install lamp (4) into lamp socket.
- b. Install globe (3) by turning clockwise until hand tight.
- c. Install guard (2) with attaching screws (1).
- d. Set circuit breaker(s) to ON position. Remove tags.

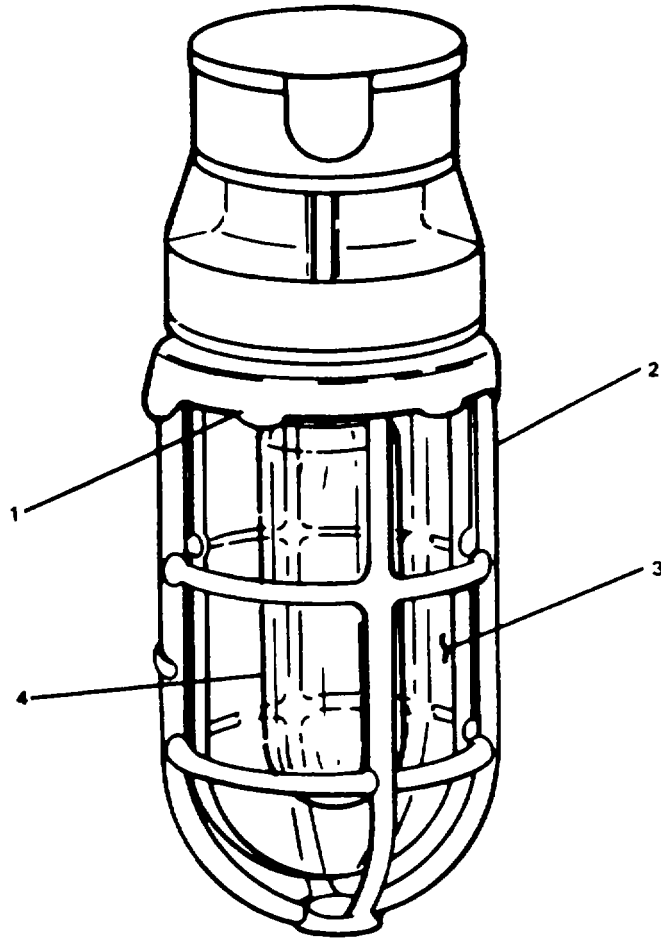


Figure 2- 74. Repair Explosion Proof Lighting Fixture.

2-86. Replace/Repair Motor Controller, Reduction Gear Cooling Pump No. 1 and 2.

This task covers:

a. Removal,

b. Repair,

c. Replacement.

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895

Materials/Parts

Do Not Operate."

Motor Controller P/N A30BDAOG60

Cartridge fuse (2) P/N KLDR 6/10

Slo-blo fuse P/N MSL 6/10

Transformer P/N C340AG

Starter-motor P/N A10BNOA

Lamp (2) P/N 120PSB

Warning tags, Item 1, Appendix D

Equipment Condition

On ENGINE ROOM POWER PANEL NO. 1 set
#1 RED GR CLG PUMP and/or #2 RED GR
CLG PUMP circuit breaker to OFF
position and tag "Out of Service -

REMOVAL

- a. Remove lens cover (5, Figure 2-75)
- b. Remove lamps from indicators

NOTE

Switch handle must be "OFF" to open door.

- c. Pull down switch handle (2).
- d. Loosen controller door screw (1) and turn handle (3) to open door (4).
- e. Remove two cartridge fuses (8) and one slo-blo fuse (9) by holding fuse between thumb and forefinger and pulling straight out.
- f. Tag and disconnect electrical wiring to starter-motor (12) and transformer (10).
- g. Remove three screws (11) holding starter-motor (12) to controller back plate (6). Remove starter-motor.
- h. Remove four screws (7) holding transformer (10) to controller back plate (6). Remove transformer.
- i. Remove mounting hardware (13). Remove motor controller (14)

REPAIR

Repair at this level of maintenance is by replacement of fuses (8 and 9), lamps (5), starter-motor (12), and transformer (10).

REPLACEMENT

- a. Position motor controller (14). Secure with mounting hardware (13).
- b. Position transformer (10) on controller back plate (6) and install screws (7). Tighten screws.
- c. Position starter-motor (12) on controller back plate (6) and install screws (11). Tighten screws.
- d. Connect electrical wiring to transformer (10) and starter-motor (12). Remove tags
- e. Install cartridge fuses (8) and slo-blo fuse (9) using fuse puller.
- f. Install lamps and lens covers (5).
- g. Close and secure controller door (4) by turning handle (3).
- h. Place switch handle (2) in up position.
- i. Set circuit breaker to ON position. Remove tag.
- j. Check motor controller operation. refer to TM 55-1925-207-10.

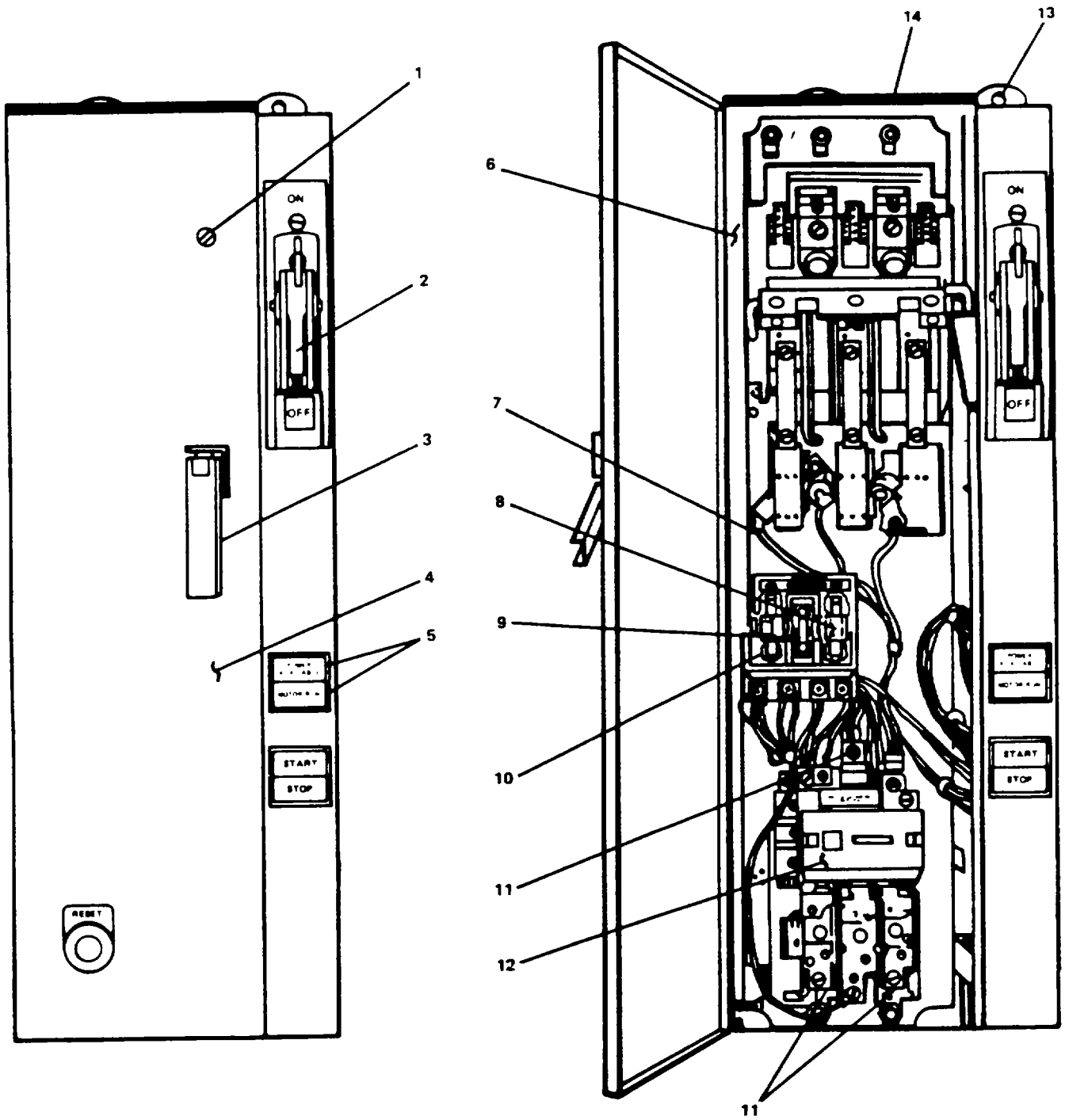


Figure 2-75. Motor Controller (Typical).

2-87. Replace/Repair Motor Controller, Sewage Discharge Pump No. 1 and 2.

This task covers:

- a. Removal, b. Repair, c. Replacement.
-

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On ENGINE ROOM POWER PANEL NO. 1 set
#1 SEWAGE DISCH PUMP and/or
#2 SEWAGE DISCH PUMP circuit breaker to
OFF position and tag "Out of Service -
Do Not Operate."

Materials/Parts

Motor Controller P/N A30BDAOG60
Cartridge fuse (2) P/N KLDR 6/10
Slo-blo fuse P/N MSL 6/10
Transformer P/N C340AG
Starter-motor P/N A10BNOA
Lamp (2) P/N 120PSB
Warning tags, Item 1, Appendix D

REMOVAL

Refer to paragraph 2-86.

REPAIR

Refer to paragraph 2-86.

REPLACEMENT

Refer to paragraph 2-86.

2-88. Replace/Repair Motor Controller, Lube Oil Transfer Pump.

This task covers:

a. Removal,

b. Repair,

c. Replacement.

INITIAL SETUP**Tools**

Tool kit, electrician's
5180-00-392-2895

Materials/Parts

Motor Controller P/N A30BDAOG60
Cartridge fuse (2) P/N KLDR 6/10
Slo-blo fuse P/N MSL 6/10
Transformer P/N C340AG
Starter-motor P/N A10BNOA
Lamp (2) P/N 120PSB
Warning tags, Item 1, Appendix D

Equipment Condition

On ENGINE ROOM POWER PANEL NO. 1 set
set L.O. XFER PUMP circuit breaker to OFF
position and tag "Out of Service -
Do Not Operate."

REMOVAL

Refer to paragraph 2-86.

REPAIR

Refer to paragraph 2-86.

REPLACEMENT

Refer to paragraph 2-86.

2-89. Replace/Repair Motor Controller, AFFF Pump.

This task covers:

a. Removal,

b. Repair,

c. Replacement.

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On Main Switchboard set AFFF PUMP
circuit breaker to OFF position
and tag "Out of Service - Do Not Operate."

Materials/Parts

Motor Controller P/N A30BDAOG60
Cartridge fuse (2) P/N KLDR 6/10
Slo-blo fuse P/N MSL 6/10
Transformer P/N C340AG
Starter-motor P/N A1 ODNOAB
Lamp (2) P/N 120PSB
Warning tags, Item 1, Appendix D

REMOVAL

Refer to paragraph 2-86.

REPAIR

Refer to paragraph 2-86.

REPLACEMENT

Refer to paragraph 2-86.

2-90. Replace/Repair Motor Controller, Potable Water Pump No. 1 and No. 2.

This task covers:

a. Removal,

b. Repair,

c. Replacement.

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On AUX MACH SPACE NO. 2 POWER PANEL
NO. 5 set #1 POT WTR PUMP and/or #2
POT WTR PUMP circuit breakers to OFF
position and tag "Out of Service -
Do Not Operate."

Materials/Parts

Motor Controller P/N A30BDAOG60
Cartridge fuse (2) P/N KLDR 6/10
Slo-blo fuse P/N MSL 6/10
Transformer P/N C340AG
Starter-motor P/N A10BNOA
Lamp (2) P/N 120PSB
Warning tags, Item 1, Appendix D

REMOVAL

Refer to paragraph 2-86.

REPAIR

Refer to paragraph 2-86.

REPLACEMENT

Refer to paragraph 2-86.

2-91. Replace/Repair Motor Controller, Galley Supply and Exhaust Fans.

This task covers:

a. Removal,

b. Repair,

c. Replacement.

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On GALLEY 460V POWER PNL NO. 2
set GALLEY SUPPLY FAN and/or GALLEY
EXHAUST FAN circuit breakers to OFF
position and tag "Out of Service -
Do Not Operate."

Materials/Parts

Motor Controller P/N A30BDAOG60
Cartridge fuse (2) P/N KLDR 6/10
Slo-blo fuse P/N MSL 6/10
Transformer P/N C340AG
Starter-motor P/N A10BNOA
Lamp (2) P/N 120PSB
Warning tags, Item 1, Appendix D

REMOVAL

Refer to paragraph 2-86.

REPAIR

Refer to paragraph 2-6.

REPLACEMENT

Refer to paragraph 2-86.

2-92. Replace/Repair Motor Controller, Sanitary Space Exhaust Fan.

This task covers:

a. Removal,

b. Repair,

c. Replacement.

INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On MAIN DECK POWER PANEL NO. 3 set
SANITARY SPACE EXHAUST FAN circuit
breaker to OFF position and tag "Out
of Service - Do Not Operate."

Materials/Parts

Motor Controller P/N A30BDAOG60
Cartridge fuse (2) P/N KLDR 6/10
Slo-blo fuse P/N MSL 6/10
Transformer P/N C340AG
Starter-motor P/N A10OBNOA
Lamp (2) P/N 120PSB
Warning tags, Item 1, Appendix D

REMOVAL

Refer to paragraph 2-86.

REPAIR

Refer to paragraph 2-86.

REPLACEMENT

Refer to paragraph 2-86.

2-93 Replace/Repair Motor Controller, Crew Mess Fan Coil Unit.

This task covers:

a. Removal,

b. Repair,

c. Replacement.

INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On MAIN DECK POWER PANEL NO. 3 set
CREWS MESS FAN COIL UNIT circuit
breaker to OFF position and tag "Out
of Service - Do Not Operate."

Materials/Parts

Motor Controller P/N A30BDAOG60
Cartridge fuse (2) P/N KLPR 6/10
Slo-blo fuse P/N MSL 6/10
Transformer P/N C340AG
Starter-motor P/N A1 OBNOA
Lamp (2) P/N 120PSB
Warning tags, Item 1, Appendix D

REMOVAL

Refer to paragraph 2-86.

REPAIR

Refer to paragraph 2-86.

REPLACEMENT

Refer to paragraph 2-86.

2-94. Replace/Repair Motor Controller, Fan Coil Unit, 01, 02, and 03 Levels.

This task covers:

a. Removal

b. Repair

c. Replacement.

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On MAIN DECK POWER PANEL NO. 3 set
01, 02 & 03 LEVEL FAN COIL UNIT circuit
breaker to OFF position and tag "Out
of Service - Do Not Operate."

Materials/Parts

Motor Controller P/N A30BDAOG60
Cartridge fuse (2) P/N KLDR 6/10
Starter-blower fuse P/N MSL 6/10
Transformer P/N C340AG
Starter-motor P/N A100BNOA
Lamp (2) P/N 120PSB
Warning tags, Item 1, Appendix D

REMOVAL

Refer to paragraph 2-86.

REPAIR

Refer to paragraph 2-86.

REPLACEMENT

Refer to paragraph 2-86.

2-95. Replace/Repair Motor Controller, Air Compressor No.1 and No. 2.

This task covers:

a. Removal

b. Repair

c. Replacement.

INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On AUX MACH SPACE NO. 1 POWER PANEL
NO. 4 set #1 AIR COMP. and/or #2 AIR
COMP. circuit breaker to OFF position and
tag "Out of Service - Do Not Operate."

Materials/Parts

Motor Controller P/N A30BDAOG60
Cartridge fuse (2) P/N KLDR 6/10
Slo-blo fuse P/N MSL 6/10
Transformer P/N C340AG
Starter-motor P/N A1 OBNOA
Lamp (2) P/N 120PSB
Warning tags, Item 1, Appendix D

REMOVAL

Refer to paragraph 2-86.

REPAIR

Refer to paragraph 2-86.

REPLACEMENT

Refer to paragraph 2-86.

2-96. Replace/Repair Motor Controller, Fuel Oil Transfer Pump No. 1 and No.2.

This task covers:

a. Removal

b. Repair

c. Replacement.

INITIAL SETUP**Tools**

Tool kit, electrician's
5180-00-392-2895

Materials/Parts

Motor Controller P/N A30BDAOG60
Cartridge fuse (2) P/N KLDR 6/10
Slo-blo fuse P/N MSL 6/10
Transformer P/N C340AG
Starter-motor P/N AI OBNOA
Lamp (2) P/N 120PSB
Warning tags, Item 1, Appendix D

Equipment Condition

On Emergency Switchboard set FUEL OIL
XFER PUMP circuit breaker to OFF
position and tag "Out of Service - Do
Not Operate."

On ENGINE ROOM POWER PANEL NO. 1 set
XFER PUMP circuit breaker to OFF
position and tag "Out of Service -
Do Not Operate."

REMOVAL

Refer to paragraph 2-86.

REPAIR

Refer to paragraph 2-86.

REPLACEMENT

Refer to paragraph 2-86.

2-97. Replace/Repair Motor Controller, Bilge and Ballast Pump No. 1 and No 2.

This task covers:

a. Removal**b. Repair****c. Replacement.****INITIAL SETUP****Tools**

Tool kit, electrician's
5180-00-392-2895

Materials/Parts

Motor Controller P/N A30BDAOG60
Cartridge fuse (2) P/N KLDR 6/10
Slo-blo fuse P/N MSL 6/10
Transformer P/N C340AG
Starter-motor P/N A100BNOA
Lamp (2) P/N 120PSB
Warning tags, Item 1, Appendix D

Equipment Condition

On Emergency Switchboard set BILGE PUMP
#1 circuit breaker to OFF position and
tag "Out of Service - Do Not Operate."

On Main Switchboard set BILGE PUMP #2
circuit breaker to OFF position and
tag "Out of Service - Do Not Operate."

REMOVAL

- a. Remove lens cover (5, Figure 2-76).
- b. Remove lamps from indicators.
NOTE
Switch handle must be "OFF" to open door.
- c. Pull down switch handle (2).
- d. Loosen controller door screw (1) and turn handle (3) to open door (4).
- e. Remove two cartridge fuses (8) and one slo-blo fuse (9) using fuse puller.
- f. Tag and disconnect electrical wiring to starter-motor (12) and transformer (10).
- g. Remove three screws (11) holding starter-motor (12) to controller back plate (6). Remove starter-motor.
- h. Remove four screws (7) holding transformer (10) to controller back plate (6). Remove transformer.
- i. Remove mounting hardware (13). Remove motor controller (14).

REPAIR

Repair at this level of maintenance is by replacement of fuses (8 and 9), lamps (5) starter-motor (12), and transformer (10).

REPLACEMENT

- a. Position motor controller (14). Secure with mounting hardware (13).
- b. Position transformer (10) on controller back plate (6) and install screws (7). Tighten screws.
- c. Position starter-motor (12) on controller back plate (6) and install screws (11). Tighten screws.
- d. Connect electrical wiring to transformer (10) and starter-motor (12). Remove tags.
- e. Install cartridge fuses (8) and slo-blo fuse (9) using fuse puller.
- f. Install lamps and lens covers (5).
- g. Close and secure controller door (4) by turning handle (3).
- h. Place switch handle (2) in up position.
- i. Set circuit breaker to ON position. Remove tag.
- j. Check motor controller operation. Refer to TM 55-1925-207-10.

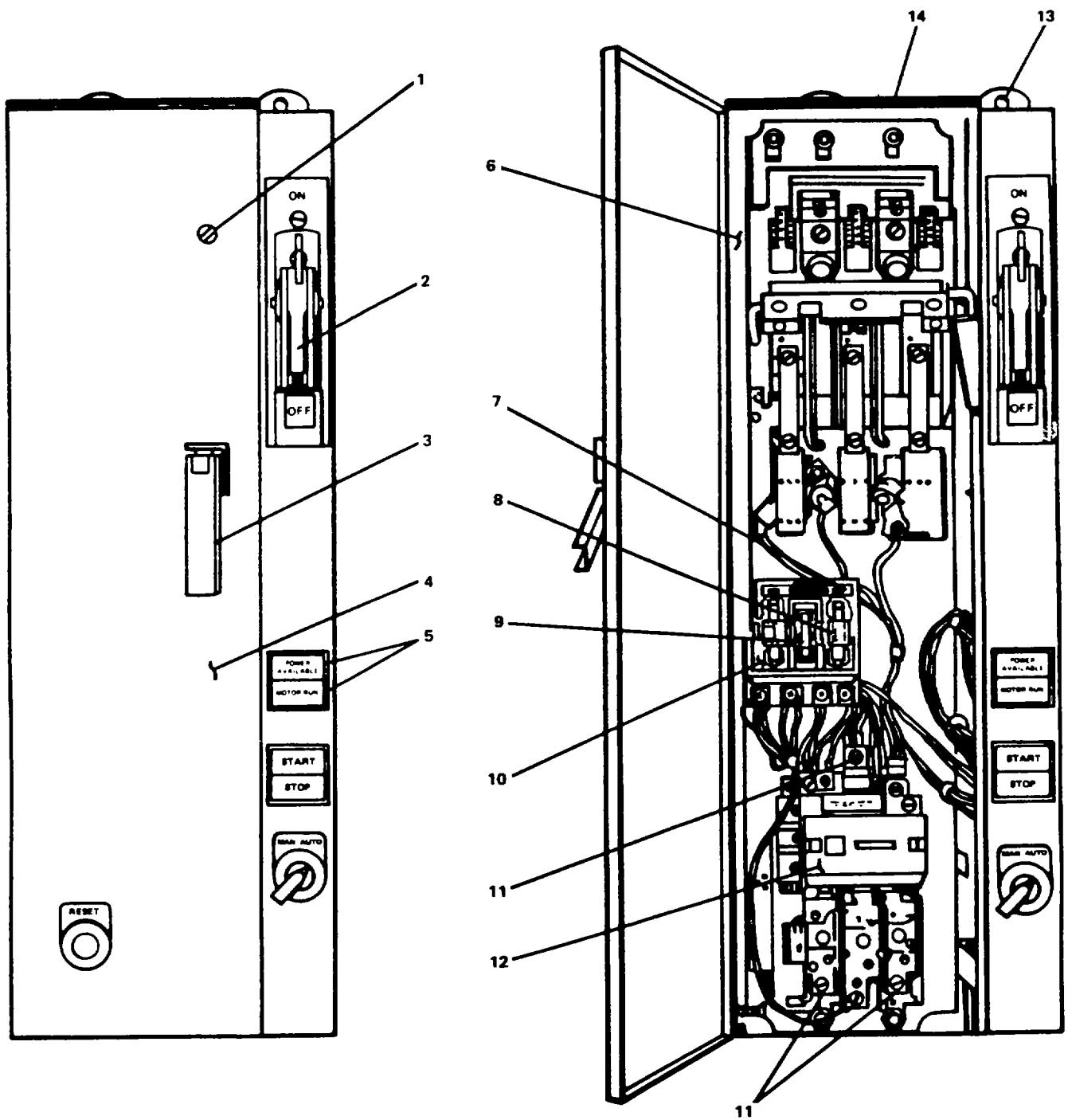


Figure 2-76. Motor Controller (Bilge and Ballast Pump).

2-98. Replace/Repair Motor Controller, AMS-1 and AMS-2 Supply Fan.

This task covers:

a. Removal

b. Repair

c. Replacement.

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895

Materials/Parts

Motor Controller P/N A7108Q7
Cartridge fuse (3)
 P/N FNQ-1
 P/N FNQ-R-5
Transformer P/N V100BTZ13RB
Starter-motor (2) P/N A700BN021 8A
Lamp (3) P/N 120PSB
Warning tags, Item 1, Appendix D

Equipment Condition

On AUX MACH SPACE NO. 1 POWER PANEL
NO. 4 set AMS-1 SUPPLY FAN circuit
breaker to OFF position and tag
"Out of Service - Do Not Operate."

On MAIN DECK POWER PANEL NO. 3 set
AMS-2 SUPPLY FAN circuit breaker
to OFF position and tag "Out of
Service - Do Not Operate."

REMOVAL

a. Remove lens covers and lamps (5, Figure 2-77) from indicators.

NOTE

Switch handle must be "OFF" to open door.

- b. Pull down switch handle (2).
- c. Loosen controller door screw (1) and turn handle (3) to open door (4).
- d. Remove three cartridge fuses (6) using fuse puller.
- e. Tag and disconnect electrical wiring to starter-motor (9) and transformer (10).
- f. Remove three screws (8) each holding starter-motors (9) to controller back plate (7). Remove starter-motors.
- g. Remove four screws (11) holding transformer (10) to back plate (7). Remove transformer.
- h. Remove mounting hardware (13). Remove motor controller (12).

REPAIR

Repair at this level of maintenance is by replacement of fuses (6), lamps (5), starter-motors (9), and transformer (10).

REPLACEMENT

- a. Position motor controller (12). Secure with mounting hardware (13).
- b. Position transformer (10) on controller back plate (7) and install screws (11). Tighten screws.
- c. Position each starter-motor (9) on back plate (7) and install screws (8). Tighten screws.
- d. Connect electrical wiring to transformer (10) and starter-motors (9). Remove tags.
- e. Install cartridge fuses (6) by using fuse puller.
- f. Close controller door (4) and turn handle (3).
- g. Install lamps and lens covers (5).
- h. Place switch handle (2) in ON position.
- i. Set circuit breaker to ON position. Remove tag.
- j. Check motor controller operation. Refer to TM55-1925-207-10.

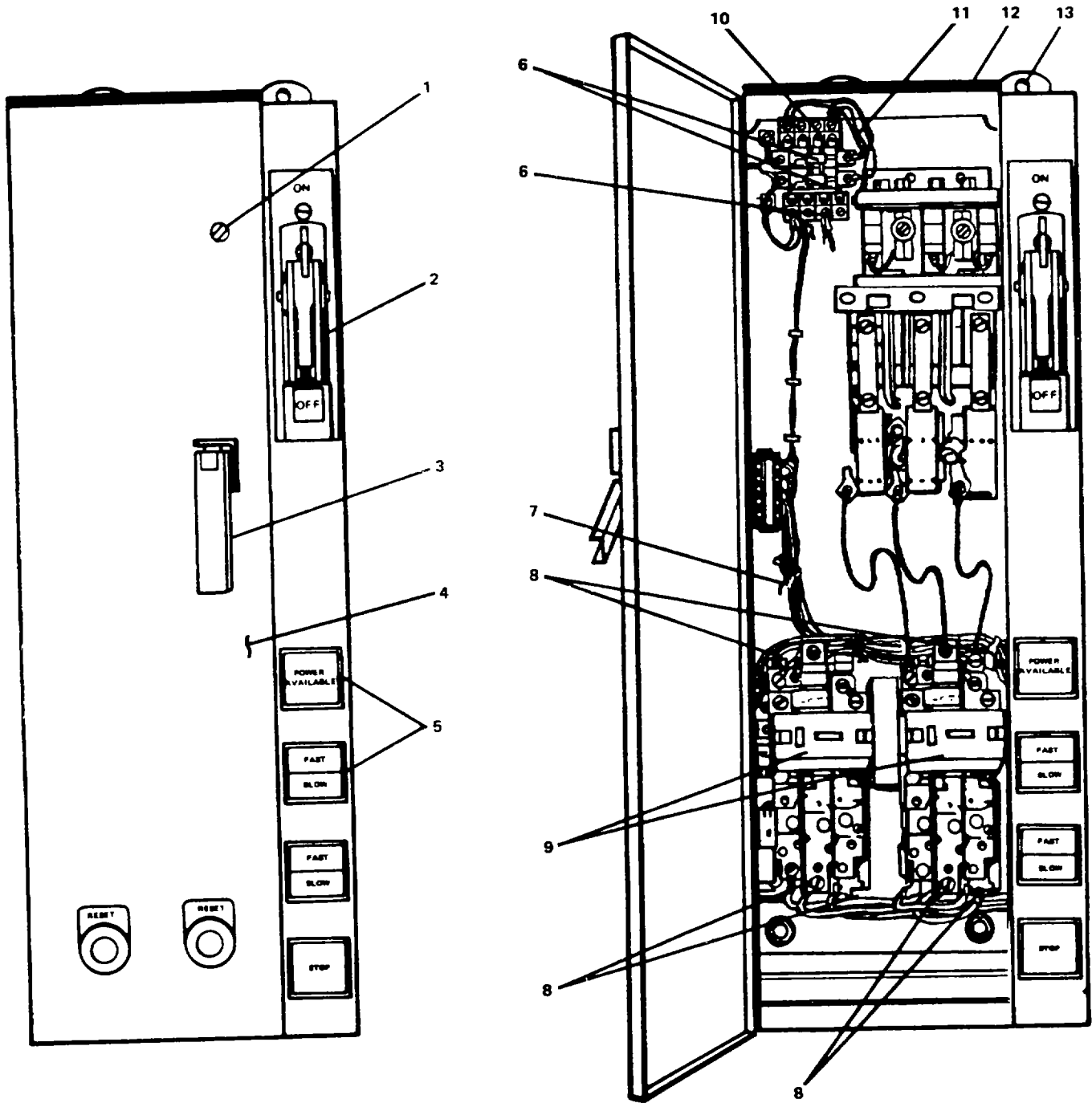


Figure 2-77. Motor Controller (A 710BQ 7/A 710CQ7).

2-99. Replace/Repair Motor Controller, Engine Room Exhaust Fan No. 11 and No. 2.

This task covers: a. Removal b. Repair c. Replacement.

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On Main Switchboard set ENG RM EXH FAN
#1 and EXH FAN #2 circuit breakers to
OFF position and tag "Out of Service
- Do Not Operate."

Materials/Parts

Motor Controller P/N A710CQ7
Cartridge fuses (3)
 P/N FNQ-1
 P/N FNQ-R-5
Transformer P/N V100BTZ13RB
Starter-motor (2) P/N A100CN0218A
Lamp (3) P/N 120PSB
Warning tags, Item 1, Appendix D

REMOVAL

Refer to paragraph 2-98.

REPAIR

Refer to paragraph 2-98.

REPLACEMENT

Refer to paragraph 2-98.

2-100. Replace/Repair Motor Controller, Bosun Store Room Supply Fan.

This task covers:

a. Removal

b. Repair

c. Replacement.

INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On MAIN DECK POWER PANEL NO. 3 set
BOSUN STORE ROOM SUPPLY FAN circuit
breaker to OFF position and tag
"Out of Service - Do Not Operate."

Materials/Parts

Motor Controller P/N A710BQ7
Cartridge fuses (3)
P/N FNQ-1
P/N FNQ-R-5
Transformer P/N V100BTZ13RB
Starter-motor (2) P/N A100CN0218A
Lamp (3) P/N 120PSB
Warning tags, Item 1, Appendix D

REMOVAL

Refer to paragraph 2-99.

REPAIR

Refer to paragraph 2-99.

REPLACEMENT

Refer to paragraph 2-99.

2-101. Replace/Repair Motor Controller, Paint Locker Exhaust Fan.

This task covers:

a. Removal

b. Repair

c. Replacement.

INITIAL SETUP**Tools**

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On MN DK DIST PNL #3 set PAINT
LOCKER EXHAUST FAN circuit breaker
to OFF position and tag "Out of Service
-Do Not Operate."

Materials/Parts

Motor Controller P/N A710BQ7
Cartridge fuses (3)
 P/N FNQ-1
 P/N FNQ-R-5
Transformer P/N V100BTZ13RB
Starter-motor (2) P/N A1 OOCN021 8A
Lamp (3) P/N 120PSB
Warning tags, Item 1, Appendix D

REMOVAL

Refer to paragraph 2-98.

REPAIR

Refer to paragraph 2-98.

REPLACEMENT

Refer to paragraph 2-98.

2-102. Replace/Repair Motor Controller, Engine Room Supply Fan No. 1 and 2.

This task covers

a. Removal

b. Repair

c. Replacement.

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On Main Switchboard set ENG RM SUPPLY
FAN #1 and ENG RM SUPPLY FAN #2
circuit breakers to OFF position
and tag "Out of Service - Do Not Operate."

Materials/Parts

Motor Controller P/N A710DQ7
Cartridge fuses (3)
P/N FNQ-1
P/N FNQ-R-5
Transformer P/N V100BTZ13RB
Starter-motor (2) P/N A1 00CN021 8A
Lamp (3) P/N 120PSB
Warning tags, Item 1, Appendix D

REMOVAL

a. Remove lens covers and lamps (5, Figure 2-78) from indicators.

NOTE

Switch handle must be "OFF" to open door.

- b. Pull down switch handle (2).
- c. Loosen controller door screw (1) and turn handle (3) to open door (4).
- d. Remove three cartridge fuses (6) using fuse puller.
- e. Tag and disconnect electrical wiring to starter-motors (9) and transformer (10).
- f. Remove three screws (8) each holding starter-motors (9) to controller back plate (7). Remove starter-motors.
- g. Remove four screws (11) holding transformer (12) to back plate (7). Remove transformer.
- h. Remove mounting hardware (13). Remove motor controller (12).

REPAIR

Repair at this level of maintenance is by replacement of fuses (6), lamps (5), starter-motors (9), and transformer (10).

REPLACEMENT

- a. Position motor controller (12). Secure with mounting hardware (13).
- b. Position transformer (10) on controller back plate (7) and install screws (11). Tighten screws.
- c. Position each starter-motor (9) on back plate (7) and install screws (8). Tighten screws.
- d. Connect electrical wiring to transformer (10) and starter-motors (9). Remove tags.
- e. Install cartridge fuses (6) using fuse puller.
- f. Close controller door (4) and turn handle (3)
- g. Install lamps and lens covers (5).
- h. Place switch handle (2) in ON position.
- i. Set circuit breaker to ON position. Remove tag.
- j. Check motor controller operation. Refer to TM 55-1925-207-10.

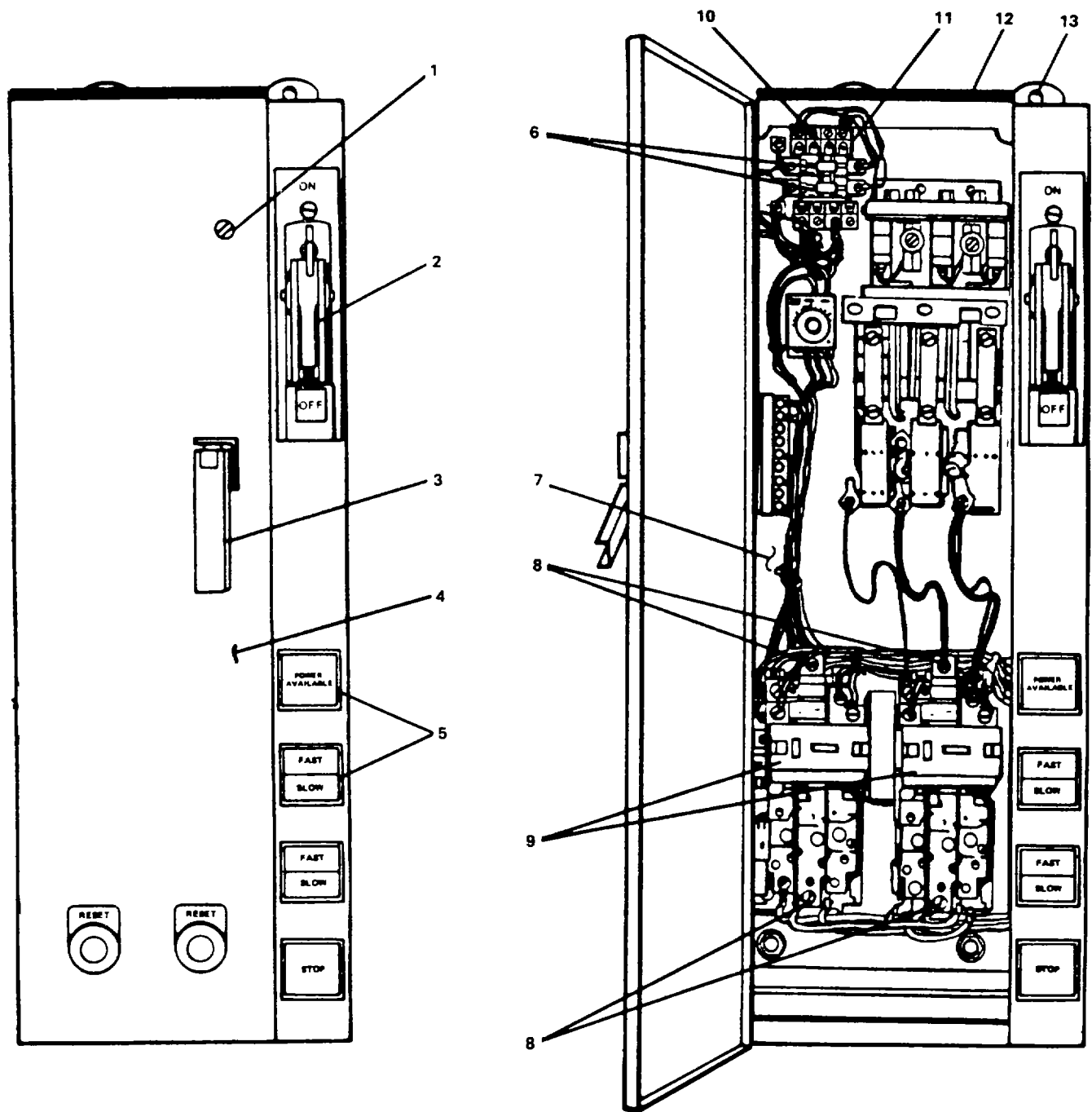


Figure 2-78. Motor Controller (Engine Room Supply Fan).

2-103. Replace/Repair Motor Controller, Fire and General Service Pump #1.**This task covers:****a. Removal****b. Repair****c. Replacement.****INITIAL SETUP**Tools

Tool kit, electrician's
5180-00-392-2895

Materials/Parts

Motor Controller P/N A41 OED021 C60B
Cartridge Fuse (3)
PIN FNQ-1.5
P/N FNQ-R-1/2
Transformer P/N V1 50BTZ1 3RB
Time-delay Relay P/N 10-5167
Relay (3) P/N 22935724
Thermal Relay P/N C300EN3
Auto-transformer P/N 42-1679-5
Lamp (2) P/N 120PSB
Starter-Motor (3) P/N C1 OEN2
Warning Tags, Item 1, Appendix D

Equipment Condition

On Emergency Switchboard set
FIRE PUMP #1 circuit breaker to OFF
position and tag, Out of Service -
Do Not Operate'.

REMOVAL

- a. Remove lens covers and lamps (5, Figure 2-79) from indicators.

NOTE

Switch handle must be "OFF" to open door.

- b. Pull down switch handle (1).
c. Loosen controller door screw (2) and turn handle (3) to open door (4).
d. Remove cartridge fuses (16) using fuse puller.
e. Tag and disconnect electrical wiring to transformer (15), relays (8 and 11), auto-transformer (13) and starter motors (9).
f. Remove four screws (17) holding transformer (15) to controller back plate (7). Remove transformer.
g. Remove four screws (6) holding relay (8) to back plate (7). Remove relay.
h. Remove three screws (12) holding relays (11) to back plate (7). Remove relays
i. Remove screws (10) holding starter-motor (9) to back plate (7). Remove starter-motor.
j. Remove four hex nuts (14) holding auto-transformer (13) to back plate (7). Remove auto-transformer.
k. Remove mounting hardware (19). Remove motor controller (18).

REPAIR

Repair at this level of maintenance is by replacement of fuses (16), lamps (5), transformer (15), relays (8 and 11), auto-transformer (13) and starter-motors (9).

REPLACEMENT

- a. Position motor controller (18). Secure with mounting hardware (19)
- b. Position auto-transformer (13) on controller back plate (7) and install hex nuts (14). Tighten nuts.
- c. Position starter-motors (9) on back plate (7) and install screws (10). Tighten screws.
- d. Position relay (11) on back plate (7) and install screws (12). Tighten screws.
- e. Position relay (8) on back plate (7) and install screws (6). Tighten screws.
- f. Position transformer (15) on back plate (7) and install screws (17). Tighten screws.
- g. Connect electrical wiring to transformer (15), relays (8 and 11), auto-transformer (13) and starter motors (9). Remove tags.
- h. Install fuses (5) using fuse puller.
- i. Close controller door (4) and turn handle (3).
- j. Install lamps and lens covers (5).
- k. Place switch handle (2) in ON position.
- l. On Emergency Switchboard set FIRE PUMP NO. 1 circuit breaker to ON position. Remove tag.
- m. Check motor controller operation. Refer to TM 55-1925-207-10.

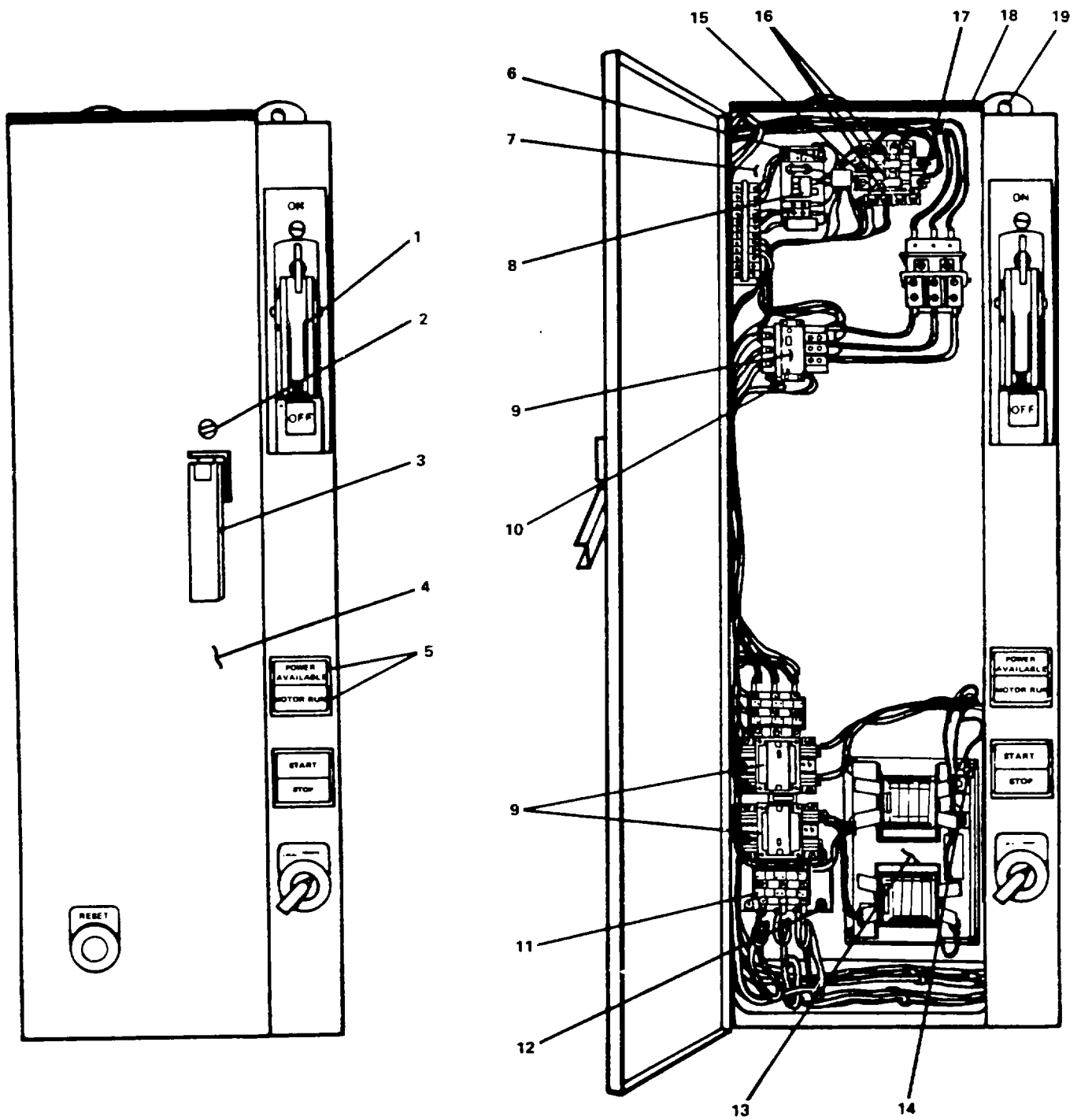


Figure 2-79. Motor Controller (Fire and General Service Pump # 1).

2-104. Replace/Repair Motor Controller, Fire and General Service Pump #2.

This task covers:

a. Removal

b. Repair

c. Replacement.

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895

Materials/Parts

Motor Controller P/N A71ODQ7
Cartridge fuses (3)
 P/N MSL 1.2
 P/N KLDR 2.5
Transformer P/N C340CG
Starter-motor P/N A10OENOA
Lamp (2) P/N 120PSB
Warning tags, Item 1, Appendix D

Equipment Condition

On Main Switchboard set FIRE PUMP
#2 circuit breaker to OFF position and
tag "Out of Service - Do Not Operate."

REMOVAL

- a. Remove lens covers (5, Figure 2-80).
- b. Remove lamps from indicators.

NOTE

Switch handle must be "OFF" to open door

- c. Pull down switch handle (1).
- d. Loosen controller door screw (1) and turn handle (3) to open door (4).
- e. Remove fuses (10) using fuse puller.
- f. Tag and disconnect electrical wiring to starter motors (7) and transformer (9).
- g. Remove three screws (6) holding starter-motor (7) to controller back plate (10). Remove starter-motor.
- h. Remove four screws (8) holding transformer (9) to controller back plate (10). Remove transformer.
- i. Remove mounting hardware (12). Remove motor controller (11).

REPAIR

Repair at this level of maintenance is by replacement of fuses (10), lamps (5), starter-motor (7), and transformer (9).

REPLACEMENT

- a. Position motor controller (11). Secure with mounting hardware (12).
- b. Position transformer (9) on controller back plate (10) and install screws (8). Tighten nuts.
- c. Position starter-motors (7) on controllers back plate (10) and install screws (16). Tighten screws.
- d. Connect electrical wiring to transformer (9) and starter-motor. Remove tags.
- e. Install cartridge fuses (8) using fuse puller.
- f. Install lamps and lens covers (5).
- g. Close controller door (4) and turn handle (3).
- h. Place switch handle (2) in up position.
- i. Set circuit breaker to ON position. Remove tag.
- j. Check motor controller operation. Refer to TM 55-1925-207.10.

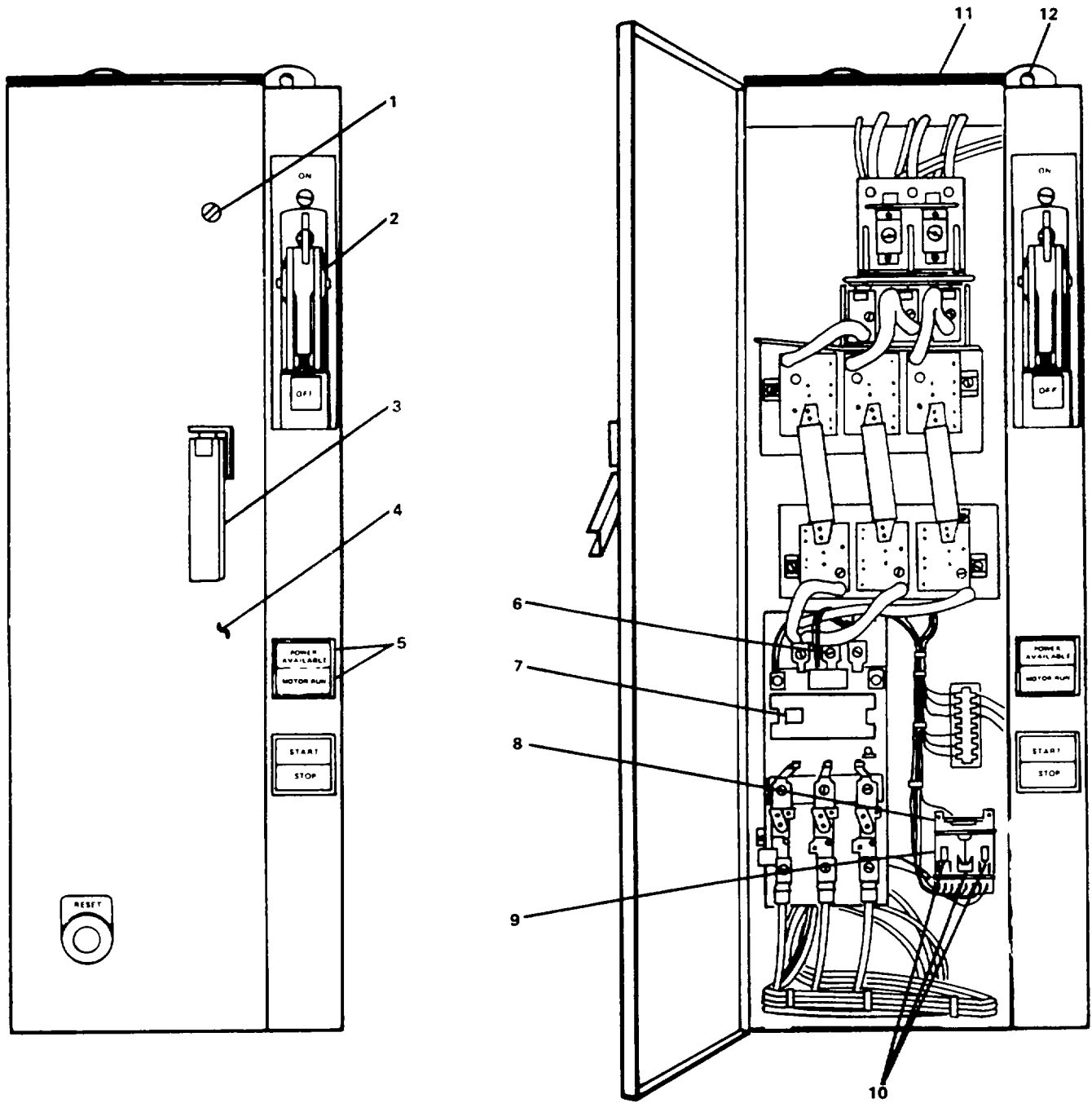


Figure 2-80. Motor Controller (Fire and General Service Pump #2).

2-105. Replace/Repair Motor Controller, Hot Potable Water Recirculation Pump.

This task covers:

a. Removal

b. Repair

c. Replacement.

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On AUX MACH SPACE NO. 1 POWER PANEL
NO. 4 set HOT POT WTR REC PUMP circuit
breaker to OFF position and tag "Out
of Service - Do Not Operate."

Materials/Parts

Starter P/N 9115H167
Lamp (2) P/N 120PSB
Warning tags, Item 1, Appendix D

REMOVAL

- a. Remove lens covers and lamps (7, Figure 2-81) from indicators.
- b. Loosen screws (1) until clamp (2) clears lip of door (3). Rotate clamp (2) clear of door lip. Open door (3).
- c. Tag and disconnect electrical wiring to starter (4).
- d. Remove three screws (5) holding starter (4) to controller back plate (6). Remove starter.

REPAIR

Repair at this level of maintenance is by replacement of starter (4) and lamps (7).

REPLACEMENT

- a. Position starter (4) on back plate (6). Tighten screws.
- b. Connect electrical wiring to starter (4). Remove tags.
- c. Close controller door (3).
- d. Rotate clamp (2) until over lip of door (3). Tighten screws (1) .
- e. Install lamps and lens covers (7) in indicators.
- f. Set circuit breaker to ON position. Remove tag.
- g. Check motor controller operation. Refer to TM 55-1925-207-10.

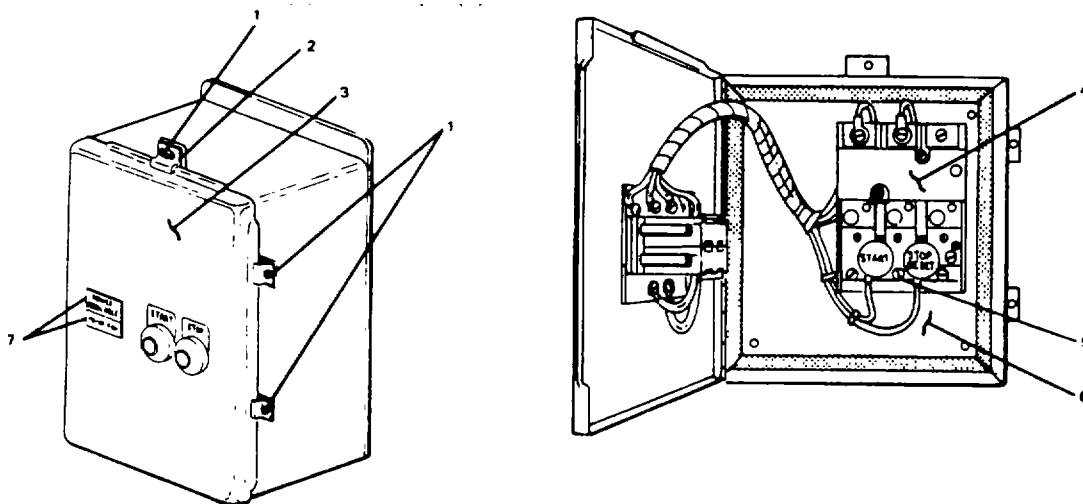


Figure 2-81. Motor Controller (9115H167).

2-106. Replace/Repair Motor Controller, Lube Oil Priming Pump No.1 and No.2.

This task covers:

a. Removal

b. Repair

c. Replacement.

INITIAL SETUPTools

Tool kit, electrician's
5180-00392-2895

Equipment Condition

On ENG ROOM POWER PANEL NO. 1 set
#1 M.E.L.O. Prime Pump and #2 M.E.L.O.
PRIME PUMP circuit breaker to OFF position
and tag "Out of Service - Do Not Operate."

Materials/Parts

Starter P/N D82-2084-6
Lamp (2) P/N 120PSB
Warning tags, Item 1, Appendix D

REMOVAL

Refer to Paragraph 2-105.

REPAIR

Refer to Paragraph 2-105

REPLACEMENT

Refer to Paragraph 2-105

2-107. Replace/Repair Motor Controller, Weld Hood Exhaust Fan.

This task covers:

a. Removal

b. Repair

c. Replacement.

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00392-2895

Equipment Condition

On ENG RM DIST PNL NO. 4 set
WORKSHOP EXHAUST FAN circuit
breaker to OFF position and tag
"Out of Service - Do Not Operate."

Materials/Parts

Starter P/N D82-2084-6
Lamp (2) P/N 120PSB
Warning tags, Item 1, Appendix D

REMOVAL

- a. Remove lens cover and lamps (6, Figure 2-82) from indicator.
- b. Loosen screws (1) until clamp (2) clears lip of door (3). Rotate clamp (2) clear of door lip. Open door (3).
- c. Tag and disconnect electrical wiring to starter (5).
- d. Remove screws (5) holding starter (5) to door (3). Remove starter.

REPAIR

Repair at this level of maintenance is by replacement of starter (5) and lamps (6).

REPLACEMENT

- a. Position starter (5) on door (3) and install screws (4). Tighten screws.
- b. Connect electrical wiring to starter (5). Remove tag.
- c. Close door (3).
- d. Rotate clamp (2) until over lip of door (3). Tighten screws (1) .
- e. Install lamps and lens covers (6) in indicators.
- f. Set circuit breaker to ON position. Remove tag.
- g. Check motor controller operation. Refer to TM 55-1925-207-10.

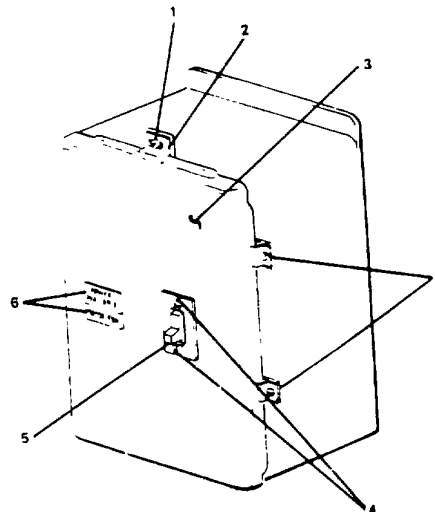


Figure 2-82. Motor Controller (Weld Hood Exhaust Fan).

2-108. Repair Battery Charger (Emergency Diesel Generator Set).

This task covers:

a. Disassembly**b. Repair****c. Assembly.****INITIAL SETUP**Tools

Tool kit, electrician's
5180-00-392-2895

Materials/Parts

DC Ammeter (0-50)
P/N PIDA-E5SA1S
Cartridge Fuse (4)
P/N F15B250V30A, P/N P8-C2-B50
Circuit Breaker P/N P4-WQC-35A2
Warning tags, Item 1, Appendix D

Equipment Condition

On EMER LOAD CTR DISTRIBUTION PANEL
set BATTERY CHARGER EMER DIESEL
GEN circuit breaker to OFF position and tag
"Out of Service - Do Not Operate."

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate."

DISASSEMBLY

a. Remove cartridge fuses.

(1) Loosen door screw (1, Figure 2-83) and open door (2).

(2) Pull fuses (3, 4) using fuse puller.

b. Remove ammeter.

(1) Tag and disconnect electrical leads from ammeter (5).

(2) Remove mounting hardware from ammeter (5).

(3) Remove ammeter (5) from door (2).

c. Remove circuit breaker.

(1) Tag and disconnect electrical leads from circuit breaker (6).

(2) Remove mounting hardware from circuit breakers (6).

(3) Remove circuit breakers (6) from door (2).

REPAIR

Repair at this level of maintenance is by replacement of cartridge fuses (3, 4) circuit breaker (6) and ammeter (5).

ASSEMBLY

a. Replace ammeter.

(1) Position ammeter (5) in door (2).

(2) Attach mounting hardware, connect electrical leads, and remove tags.

b. Replace cartridge fuses.

(1) Install cartridge fuses (3,4) using fuse puller.

(2) Close door (2).

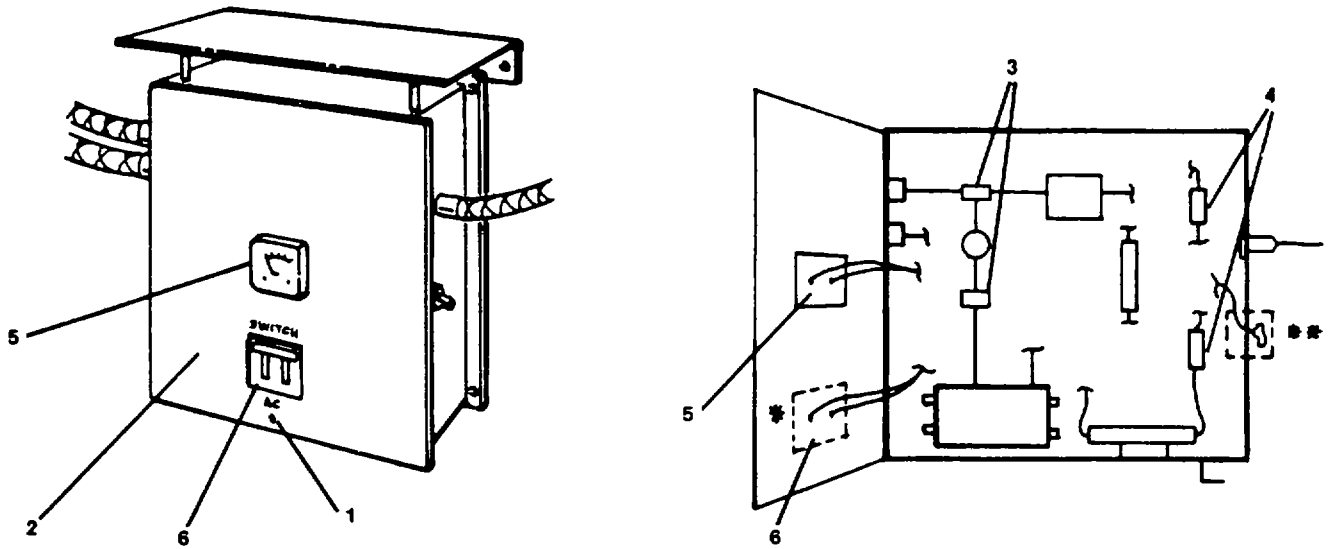
(3) Tighten door screw (1).

c. Replace circuit breaker.

(1) Replace circuit breaker (6) in door (2).

(2) Attach mounting hardware, connect electrical leads, and remove tags.

d. Set circuit breaker to ON position. Remove tag.



NOTE
CONFIGURATION VARIANCE: UNIT WILL BE
EQUIPPED WITH EITHER A CIRCUIT
BREAKER* OR TOGGLE SWITCH.**

Figure 2-83. Repair Battery. Charger (Typical).

2-109. Repair Battery Charger (General Alarm and Miscellaneous Electronics).

This task covers:

a. Disassembly

b. Repair

c. Assembly.

INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On EMER LOAD CTR DISTRIBUTION PANEL
set BATTERY CHARGER GENERAL ALARM
circuit breaker to OFF position and tag
"Out of Service - Do Not Operate."

Materials/Parts

DC Ammeter (0-50)
P/N P1 DA-E50-A1 S
Cartridge Fuse (4)
P/N F1 5B250V30A, P/N P8-C2-B50
Circuit Breaker P/N P4-WQC-35A2
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate."

DISASSEMBLY

Refer to paragraph 2-108.

REPAIR

Refer to paragraph 2-108.

ASSEMBLY

Refer to paragraph 2-108.

2-110. Repair Battery Charger (SSDG NO.1).

This task covers:

a. Disassembly

b. Repair

c. Assembly.

INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On EMER LOAD CTR DISTRIBUTION PANEL No. 1
set BATTERY CHARGER SSDG
circuit breaker to OFF position and tag
"Out of Service - Do Not Operate."

Materials/Parts

DC Ammeter (0-50)
P/N P1 DA-E50-A1 S
Cartridge Fuse (4)
P/N F1 5B250V30A, P/N P8-C2-B50
Circuit Breaker P/N P4-WQC-35A2
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate."

DISASSEMBLY

Refer to paragraph 2-108.

REPAIR

Refer to paragraph 2-108.

ASSEMBLY

Refer to paragraph 2-108.

2-111. Repair Battery Charger (MACHINERY DC CONTROL).

This task covers:

a. Disassembly

b. Repair

c. Assembly.

INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On EMER LOAD CTR DISTRIBUTION PANEL
set BATTERY CHARGER MACH DC
CONTROL circuit breaker to OFF position and tag
"Out of Service - Do Not Operate."

Materials/Parts

DC Ammeter (0-50)
P/N P1 DA-E50-A1 S
Cartridge Fuse (4)
P/N F1 5B250V30A, P/N P8-C2-B50
Circuit Breaker P/N P4-WQC-35A2
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate."

DISASSEMBLY

Refer to paragraph 2-108.

REPAIR

Refer to paragraph 2-108.

ASSEMBLY

Refer to paragraph 2-108.

2-111. Repair Battery Charger (Radio Room).

This task covers:

a. Disassembly

b. Repair

c. Assembly.

INITIAL SETUP**Tools**

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On RADIO ROOM ELEX DIST PANEL
set BATTERY CHARGER RADIO RM DC
PANEL circuit breaker to OFF position and
tag "Out of Service - Do Not Operate."

Materials/Parts

DC Ammeter (0-30)
P/N P1DA-E30-A1S
Cartridge Fuse (4)
P/N P8-C1-B18, P/N F16A250V35A
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate."

DISASSEMBLY

Refer to paragraph 2-108.

REPAIR

Refer to paragraph 2-108.

ASSEMBLY

Refer to paragraph 2-108.

2-113. Replace Battery Bank Assembly (Typical).

This task covers:

a. Replacement.

Tools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

Materials/Parts

Warning tags, Item 1, Appendix D

REPLACEMENT

Replacement of battery bank assembly is by replacement of components in group. Refer to paragraph 2-114.

2-114. Repair Battery Bank Assembly (Typical).

This task covers:

a. Disassembly**b. Repair****c. Assembly.****INITIAL SETUP**Tools

Tool kit, electrician's
5180-00-392-2895

Materials/Parts

Battery PIN HR-8D or PIN T12-120
Warning Tags, Item 1, Appendix D

Equipment Condition

On EMER LOAD CTR DISTRIBUTION PANEL
or ENG RM EMER DIST PANEL NO. 1 set
associated BTTY CHGR circuit breaker to
OFF position and tag, "Out of Service-
Do Not Operate."

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag, "Out of Service Do Not Operate." Use eye protection when disconnecting valves or piping.

DISASSEMBLY

- a. Remove hex nut and flat washer (1, Figure 2-84) from J-bolt (2).
- b. Remove battery box cover (3).
- c. Remove wood spacer bar (4).
- d. Loosen cable hold down bolts and tag and remove positive and negative cables (6) from battery (7).
- e. Remove wood wedges (5).
- f. Remove battery (7) from battery box (8).

REPAIR

Repair at this level of maintenance is by replacement of battery.

ASSEMBLY**CAUTION**

Ensure there are no foreign objects, such as loose nuts, on the bottom of the battery box. The battery could be damaged if placed on foreign objects.

- a. Place battery (7) in battery box (8). Ensure battery is level and that battery positive post is nearest to positive cable.
- b. Install wood wedges (5).
- c. Attach positive and negative cables (6) to battery (7). Remove tags.

CAUTION

Do not over tighten hold down bolts. Overtightening can distort or crack the battery.

- d. Tighten hold down bolts on cables (6).
- e. Install wood spacer bar (4).
- f. Replace battery box cover (3).
- g. Install flat washer and hex nut (1) on J-bolt (2). Tighten nut.
- h. Set associated BATTERY CHGR circuit breaker to ON position. Remove tag.

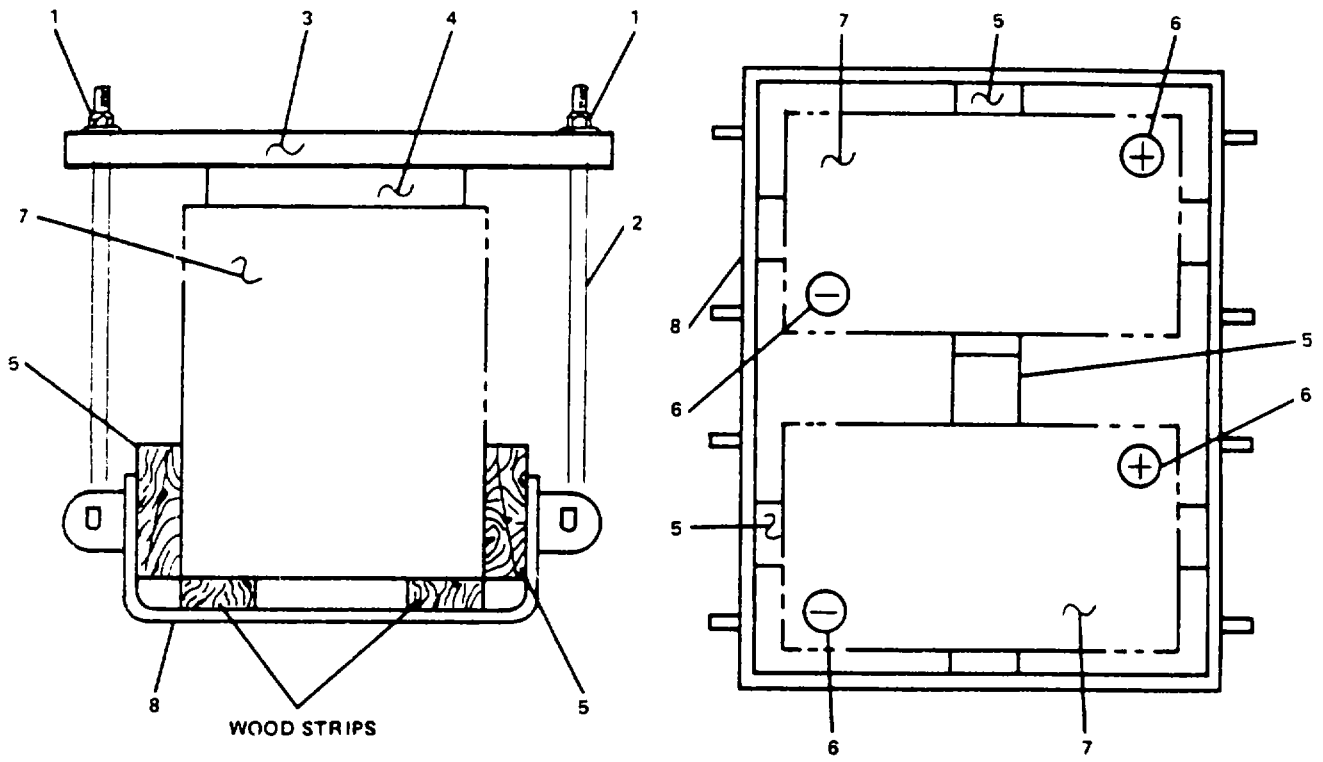


Figure 2-84. Battery Replacement.

MAINTENANCE OF PIPING SYSTEMS

2-115. Replace Two - Way Ball Valve SP Type.

This task covers:

a. Removal**b. Replacement.****INITIAL SETUP**Tools

Tool kit, general mechanic's, 5180-00-629-9783
Torque wrench 0-250 ft.-lb, 5120-00-640-6365

Equipment Condition

Valve isolated from system and system tagged
"Out of Service - Do Not Operate."
Reference: TM 55-1 925-207-10.

Materials/Parts

Refer to Repair Parts and Special Tools List
(RPSTL), Appendix C
Utility pail, Item 5, Appendix D
Wiping rags, Item 2, Appendix D
Warning tags, Item 1, Appendix D

REMOVAL**WARNING**

Use extreme care when disconnecting valves or piping. Escaping system pressure or fluid could cause injury.

Use eye protection when disconnecting valves or piping.

- a. Place utility pail under valve (1, Figure 2-85).
- b. Remove nuts (2) from bolts (3).
- c. Remove valve body (1).

REPLACEMENT

- a. Install valve body (1) with bolt holes aligned.
- b. Install bolts (3) and nuts (2).

NOTE

Refer to Figure 2-85 for torquing sequences.

- c. Torque nuts to 75 ft.-lb.
- d. Open valve.
- e. Operate system in accordance with TM 55-1925-207-10.
- f. Check for leaks and tighten connections as necessary. Remove tag(s).
- g. Remove pail and properly discard contents.

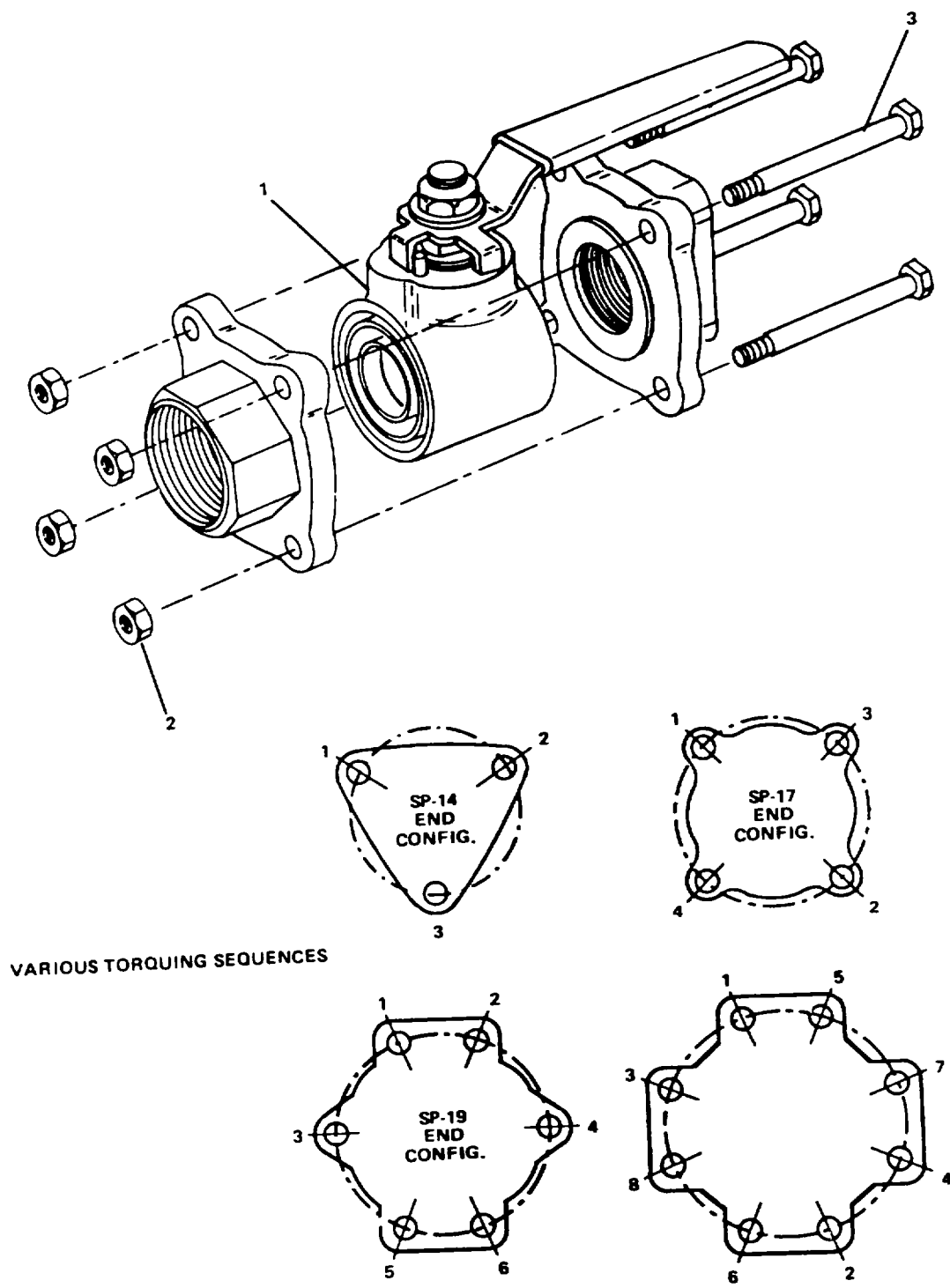


Figure 2-85. Replace Two-Way Ball Valve (Typical).

2-116. Replace Two-Way Ball Valve SS Type.

This task covers:**a. Removal,****b. Replacement.**

INITIAL SETUPTools

Tool kit, general mechanic's
5180-00-629-9783
Torque wrench 0-250 ft.-lb.
5120-00-640-6365

Equipment Condition

Valve isolated from system and
system tagged "Out of Service
- Do Not Operate."

Materials/Parts

Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Utility pail, Item 5, Appendix D
Wiping rags, Item 2, Appendix D
Warning tags, Item 1, Appendix D

Reference TM 55-1925-207-10.

REMOVAL**WARNING**

**Use extreme care when disconnecting
valves or piping. Escaping system
pressure or fluid could cause injury.**

WARNING

**Use eye protection when
disconnection valves or piping.**

Refer to paragraph 2-115.

REPLACEMENT

Refer to paragraph 2-115.

2-117. Replace Two-Way Ball Valve Type 83-200.

This task covers:

- a. Removal, b. Replacement.
-

INITIAL SETUPTools

Tool kit, general mechanic's
5180-00-629-9783

Equipment Condition

Valve isolated from system and
system tagged "Out of Service
- Do Not Operate."

Materials/Parts

Ball Valve 1/2 In. P/N 83-203-01
Ball Valve 3/4 In. P/N 83-204-01
Ball Valve 1 In. P/N 83-205-01
Ball Valve 1 1/2 In. P/N 83-207-01
Utility pail, Item 5, Appendix D
Wiping rags, Item 2, Appendix D
Warning tags, Item 1, Appendix D

Reference TM 55-1925-207-10.

REMOVAL**WARNING**

Use extreme care when disconnecting
valves of piping. Escaping system
pressure or fluid could cause injury.

WARNING

Use eye protection when
disconnecting valves or piping.

Refer to paragraph 2-115.

REPLACEMENT

Refer to paragraph 2-115.

2-118. Replace Two-Way Ball Valve Type 88-100 (Flanged).

This task covers:

- a. . Removal, b. Replacement.**
-

INITIAL SETUPTools

Tool kit, general mechanic's
5180-00-629-9783
Torque wrench, 0 - 250 ft. lbs.
NSN 5120-00-640-6365

Materials/Parts

Ball Valve P/N 88-108-01,
P/N 88-10E-01, P/N 88-103-01
Utility pail, Item 5, Appendix D
Wiping rags, Item 2, Appendix D
Warning Tags, Item 1, Appendix D

Equipment Condition

Valve isolated from system and system tagged
"Out of Service - Do Not Operate".

Reference: TM 55-1925-207-10.

REMOVAL**WARNING**

Use extreme care when disconnecting valves or piping. Escaping system pressure or fluid could cause injury.

Use eye protection when disconnecting valves or piping.

- a. Place utility pail under valve (1, Figure 2-86).
- b. Remove nuts (2) from bolts (3).
- c. Remove valve.

REPLACEMENT

- a. Install valve (1) with bolt holes aligned.
- b. Install bolts (3) and nuts (2).
- c. Torque nuts to 75 ft.-lb.
- d. Open valve.
- e. Operate system in accordance with TM-55-1925-207-10.
- f. Check for leaks and tighten connections as necessary. Remove tags.
- g. Remove pail and properly discard contents.

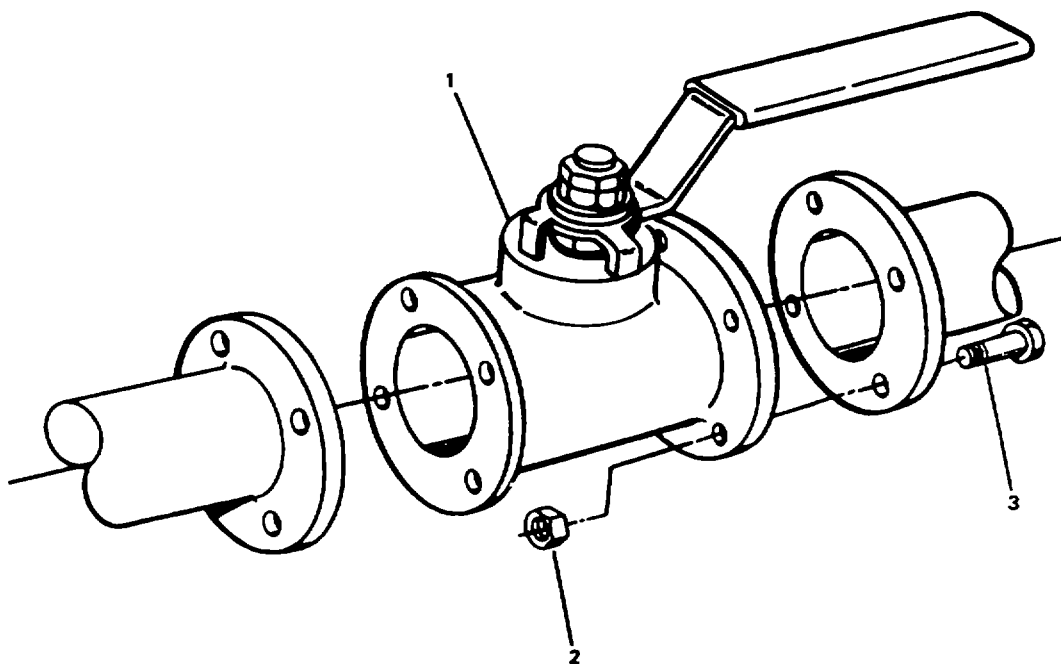


Figure 2-86. Replace Two-Way Ball Valve (Flange).

2-119. Replace Two-Way Ball Valve Type 73-100 Threaded.

This task covers:**a. Removal,****b. Replacement.**

INITIAL SETUPTools

Tool kit, general mechanic's
5180-00-629-9783
Pipe Wrench

Equipment Condition

Valve isolated from system and
system tagged "Out of Service
- Do Not Operate."

Materials/Parts

Reference TM 55-1925-207-10.

Anti-Seize Compound, Item 6, Appendix D
Ball valve P/N D-1754
Utility pail, Item 5, Appendix D
Wiping rags, Item 2, Appendix D
Warning tags, Item 1, Appendix D

REMOVAL**WARNING**

Use extreme care when disconnecting valves or piping. Escaping system pressure or fluid could cause injury.

WARNING

Use eye protection when disconnecting valves or piping.

Refer to paragraph 2-121.

REPLACEMENT

Refer to paragraph 2-121.

2-120. Replace Three-Way Ball Valve Type MP (Flanged).

This task covers:

- a. Removal,** **b. Replacement.**
-

INITIAL SETUP

Tools

Tool kit, general mechanic's
5180-00-629-9783
Torque wrench, 0-250 ft.-lb.,
5120-00-640-6365
Materials/Parts
Three-way ball valve (flanged)
P/N 1IN.MPE14-F152POCO
Utility pail, Item 5, Appendix D
Wiping rags, Item 2, Appendix D
Warning tags, Item 1, Appendix D

Equipment Condition

Valve isolated from system
and system tagged "Out of
Service - Do Not Operate."

Reference TM 55-1925-207-10.

REMOVAL

WARNING

Use extreme care when disconnecting valves or piping. Escaping system pressure or fluid could cause injury.

WARNING

Use eye protection when disconnecting valves or piping.

NOTE

Two soliders will be required to remove/replace ball valve.

- a. Place utility pail under ball valve (4, Figure 2-87).
- b. Remove bolts (1) and nuts (2) from flanges (3).

- c. Remove ball valve.

REPLACEMENT

- a. Install ball valve (4) and secure to piping with bolts (1) and nuts (2).

NOTE

Refer to Figure 2-85 for torquing sequences.

- b. Torque nuts to 75 ft.-lb.
- c. Open valve and operate system in accordance with TM 55-1925- 207-10.
- d. Check for leaks and tighten nuts as necessary. Remove tag(s).
- e. Remove pail and properly discard contents.

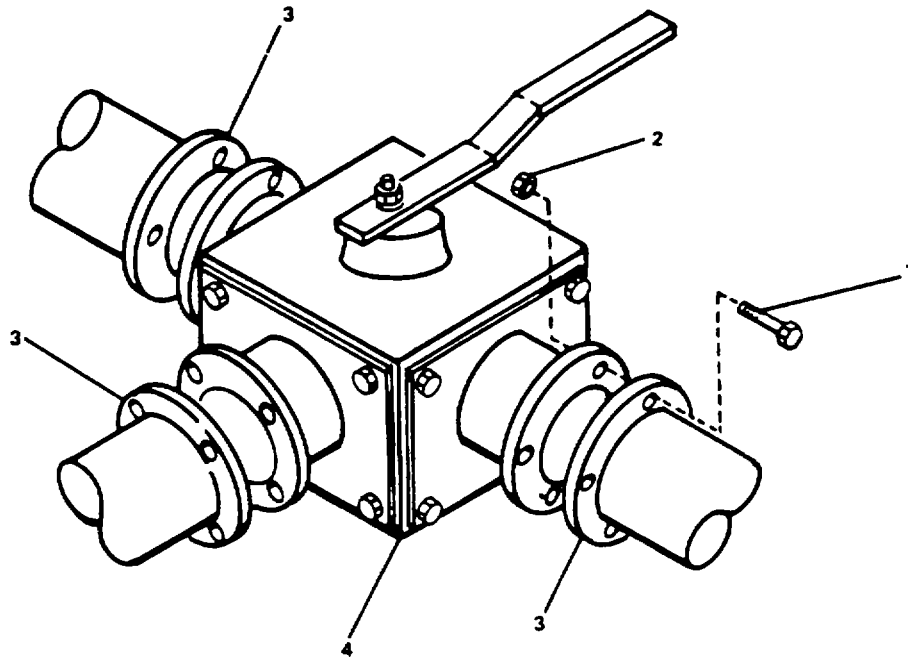


Figure 2-87. Replace Three-Way Ball Valve (Flanged).

2-121. Replace/Repair Threaded Valve (Typical).

This task covers:

a. Removal,

b. Repair,

c. Replacement.

INITIAL SETUP

Tools

Tool kit, general mechanic's
5180-00-629-9783

Pipe Wrench

Materials/Parts

Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Anti-seize compound, Item 6, Appendix D
Warning tags, Item 1, Appendix D
Utility pail, Item 5, Appendix D
Wiping rags, Item 2, Appendix D

Equipment Condition

Valve(s) isolated from system
and system tagged "Out of
Service - Do Not Operate."
Reference TM 55-1925-207-10.

REMOVAL

WARNING

Use extreme care when disconnecting valves or piping. Escaping system pressure or fluid could cause injury.

WARNING

Use eye protection when disconnecting valves or piping.

NOTE

All threaded type valves are replaced or repaired in similar manner. This procedure covers typical replacement and/or repair.

a. Trace inlet piping (2, Figure 2-88) to shutoff valve (1) and close shutoff valve.

b. Trace outlet piping (3) to shutoff valve (4) and close shutoff valve.

WARNING

Clean up spills immediately. Spills create an unsafe working area.

c. Position utility pail to catch spillage.

d. Separate inlet piping by holding tail piece (5) of union (6) and turning union collar (7) counterclockwise.

e. Separate outlet piping by holding tail piece (8) of union (9) and turning union collar (10) counterclockwise.

f. Remove threaded valve (11) with piping (12, 13) attached.

NOTE

Threaded gate valve shown, typical breakdown for all threaded type valves.

g. Hold valve (11) stationary and turn attached piping (12, 13) counterclockwise to remove.

h. Remove piping from valve.

REPAIR

Repair at this level of maintenance is by replacement of threaded valve(s).

REPLACEMENT

NOTE

Coat threads of piping and fittings with antiseize compound prior to replacement.

a. Thread piping (12, 13) into each part of valve (11) in clockwise direction until tight.

b. Position valve with attached piping into piping system.

c. Adjust piping as needed to align tail piece (5, 8) of union (6, 9) with union collar (7, 10).

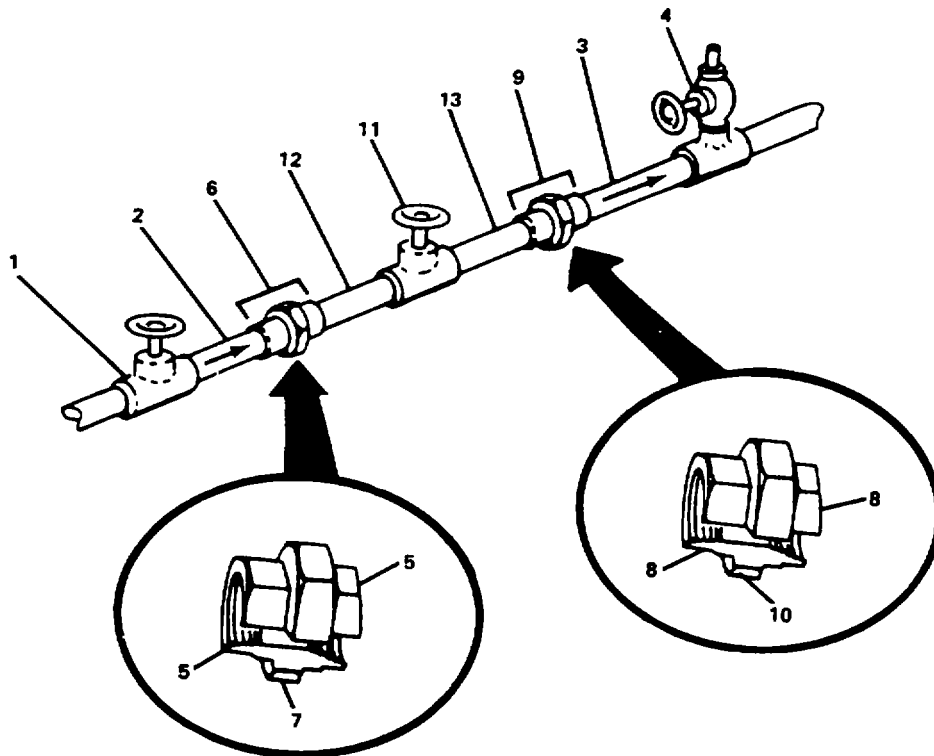
d. Connect inlet piping (2) and outlet piping (3) by holding tail piece of each union stationary and threading union collars in clockwise direction until tight.

e. Open shutoff valves (1, 4).

f. Operate system in accordance with TM 55-1925-207-10.

g. Check for leaks in system and tighten connections as necessary. Remove tag(s).

h. Remove pail and properly discard contents.



**NOTE: THREADED GATE VALVE SHOWN,
TYPICAL BREAKDOWN FOR ALL
THREADED TYPE VALVES.**

Figure 2-88. Threaded Valve (Typical).

2-122. Replace Swing Check Valve, Flanged.

This task covers:

- a. Removal, b. Replacement.

INITIAL SETUP

Tools

Tool kit, general mechanic's
5180-00-629-9783
Torque wrench, 0-250 ft.-lb.,
5120-00-640-6365

Equipment Condition

Valve isolated from system
and system tagged "Out of
Service - Do Not Operate."

Materials/Parts

Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Warning tags, Item 1, Appendix D
Utility pail, Item 5, Appendix D

Reference TM 55-1925-207-10.

NOTE

This procedure is typical for all sizes
of swing check valves.

WARNING

**Use eye protection when
disconnecting valves or piping.**

REMOVAL

- a. Place a utility pail under check valve (1, Figure 2-89).
- b. Remove nuts (2) and bolts (3) from flanges (4).

NOTE

**Two soldiers will be required to
remove/replace swing check valve.**

- c. Remove swing check valve.

REPLACEMENT

NOTE

**Two soldiers will be required to
remove/replace swing check valve.**

- a. Install swing check valve (1) and attach with bolts (3).

NOTE

**Refer to Figure 2-85 for torquing
sequences.**

- b. Install nuts (2) and torque to 75 ft.-lb.
- c. Charge pipeline and check for leaks and tighten connections as necessary.
- d. Operate system in accordance with TM 55-1925-207-10.
- e. Remove utility pail and properly discard contents.

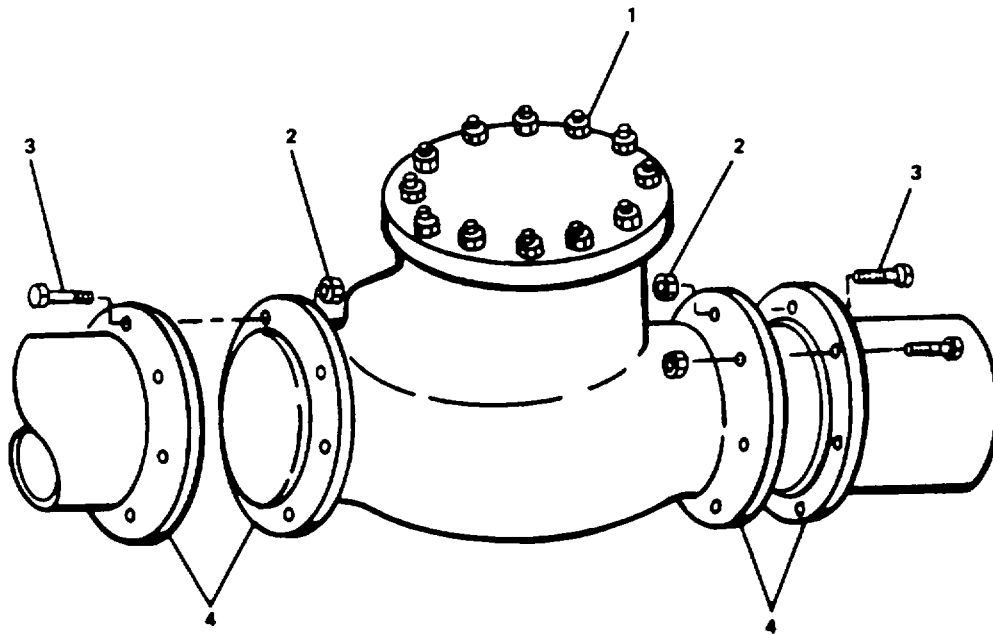


Figure 2-89. Remove Swing Check Valve. Typical.

2-123. Replace Stop Check Angle Valve (Typical).

This task covers:

- a. Removal,** **b. Replacement**
-

INITIAL SETUP

Tools

Tool kit, general mechanic's
5180-00-629-9783
Torch outfit, cutting & welding
3433-00-357-8116

Equipment Condition

Valve isolated from system
and system tagged "Out of
Service - Do Not Operate."

Materials/Parts

Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Warning tags, Item 1, Appendix D
Utility pail, Item 5, Appendix D

Reference TM 55-1925-207-10.

REMOVAL

WARNING

Use extreme care when disconnecting valves or piping. Escaping system pressure or fluid could cause injury.

- a. Position utility pail under stop check angel valve.
- b. Use welding torch to cut valve (1, Figure 2-90) at pipes (2, 3).

NOTE

Figure 2-90 shows a flanged valve. Valves may also have silver braized union fittings.

- c. Remove valve.

- d. File pipe edges smooth.

REPLACEMENT

- a. Position valve (1) at pipes (2, 3).
- b. Weld valve to pipes.
- c. Allow time for valve to cool before operating the system.
- d. Operate system in accordance with TM 55-1925-207-10.
- e. Remove pail and properly discard contents.

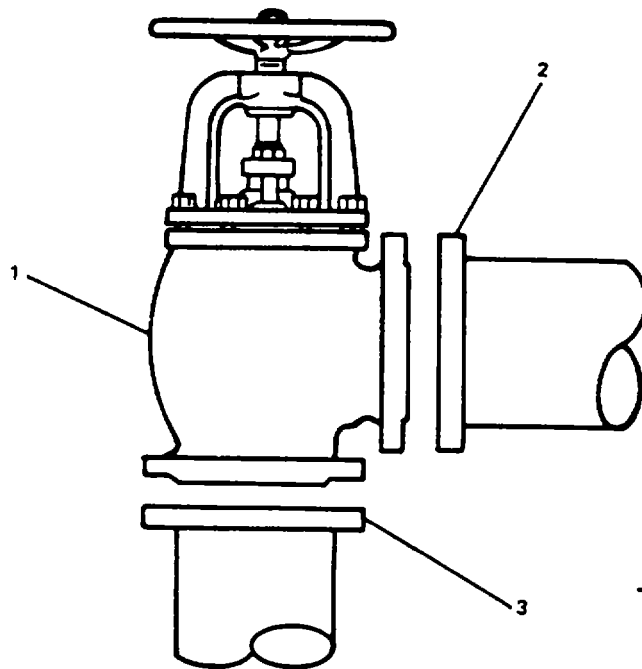


Figure 2-90. Remove Stop Check Angle Valve (Typical).

2-124. Replace Angle Globe Valve.

This task covers:

- | | |
|--------------------|-----------------------|
| a. Removal, | b. Replacement |
|--------------------|-----------------------|
-

INITIAL SETUP

Tools

Tool kit, general mechanic's
5180-00-629-9783
Torque Wrench 0-250 ft.-lb.,
5120-00-640-6365

Equipment Condition

Valve isolated from system
and system tagged "Out of
Service - Do Not Operate."

Materials/Parts

Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Wiping rags, Item 2, Appendix D
Utility pail, Item 5, Appendix D
Warning tags, Item 1, Appendix D

Reference TM 55-1925-207-10.

REMOVAL

WARNING

Use extreme care when disconnecting valves or piping. Escaping system pressure or fluid could cause injury.

WARNING

Use eye protection when disconnecting valves or piping.

- a. Place utility pail under valve (1, Figure 2-91).
- b. Remove twelve flange nuts (3) and bolts (2).
- c. Lift valve out of piping.

NOTE

Remove and replace gaskets, if applicable.

REPLACEMENT

- a. Position valve in piping with bolt holes aligned.
- b. Install flange bolts (2) with threaded portions of bolts (2) toward valve body.
- c. Install nuts (3) on flange bolts. Torque nuts to 75 ft.-lb.
- d. Open valve and operate system as in accordance with TM 55-1925-207-10.
- e. Check for leaks and tighten connections as necessary.
- f. Remove pail and properly discard contents.
- g. Remove tag.

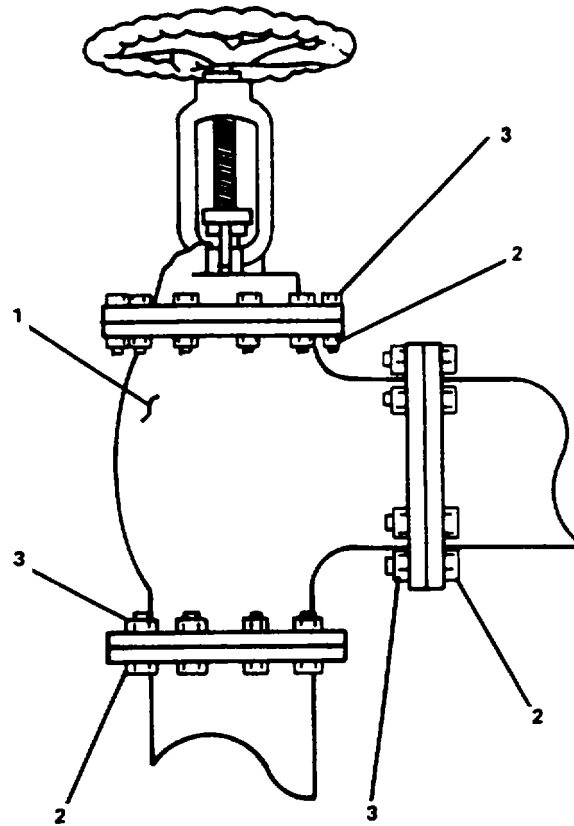


Figure 2-91. Replace Angle Globe Valve.

2-125. Replace Flange Valve (Typical).

This task covers:

a. Removal,

b. Replacement

INITIAL SETUP

Tools

Tool kit, general mechanic's
5180-00-629-9783
Torque Wrench 0-250 ft.-lb.,
5120-00-640-6365
Stuffing extractor
5120-00-223-9556

Equipment Condition

Piping system shut down.

Valve isolated from system and
system tagged "Out of Service
- Do Not Operate."

Materials/Parts

Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Warning tags, Item 1, Appendix D
Utility pail, Item 5, Appendix D
Wiping rags, Item 2, Appendix D

Reference TM 55-1925-207-10.

REMOVAL

WARNING

Use extreme care when disconnecting valves or piping. Escaping system pressure or fluid could cause injury.

WARNING

Use eye protection when disconnecting valves or piping.

NOTE

All flange type valves are replaced in basically the same manner. This procedure covers typical replacement.

- a. Trace inlet piping (1, Figure 2-92) to nearest manually operated shutoff valve.
- b. Close shutoff valve.
- c. Trace outlet piping (2) to nearest manually operated shutoff valve.
- d. Close shutoff valve.

- e. Close valve (3) by turning handwheel clockwise.

NOTE

Gate valve shown, all flanged valves typical in replacement.

WARNING

Clean up spills immediately. Spills create an unsafe work area.

- f. Position utility pail under valve to catch spillage.

NOTE

Flanges four to eight inches in diameter use eight bolts; flanges below four inches use four bolts.

- g. Remove outlet flange bolts (4) and nuts (5).
- h. Remove inlet flange bolts (6) and nuts (7).
- i. Remove valve (3) from piping system.
- j. Remove flange gaskets (8, 9) from valve.

REPLACEMENT**CAUTION**

To prevent damaging the system, make sure valves are installed so the valve disc will open with the direction of flow.

- a. Position valve (3) in piping with inlet and outlet piping aligned.
- b. Hold valve in place and insert gasket (8) (if required) between valve inlet flange and inlet piping flange.
- c. Align gasket bolt holes with flange bolt holes.
- d. Insert bolts (6) through aligned bolt holes of gasket and flanges.
- e. Thread nuts (7) onto each inlet flange bolt but do not tighten.
- f. Position gasket (9) between valve outlet flange and outlet piping flange.
- g. Align gasket bolt holes with flange bolt holes.
- h. Insert bolts (4) through aligned bolt holes of gasket and flanges.

- i. Thread nuts (5) onto each outlet flange bolt but do not tighten.

CAUTION

Do not continue to tighten bolts or nuts after metal to metal contact is made. Excessive torque may distort flanges.

NOTE

Ensure all bolts are tightened evenly and that gasket and flange faces are aligned.

- j. Tighten bolts in sequence shown in Figure 2-92.
- k. Tighten bolts until a noticeable increase in torque is felt and when metal to metal contact is made.
- l. Reopen nearest valve. Manually operate shutoff. Reopen flanged valve.
- m. Operate system in accordance with TM 55-1925-207-10.
- n. Check for leaks in system and retighten connections as necessary. Remove tag(s).
- o. Remove pail and properly discard contents.

NOTE

GATE VALVE SHOWN, ALL FLANGED VALVES TYPICAL IN REPLACEMENT.

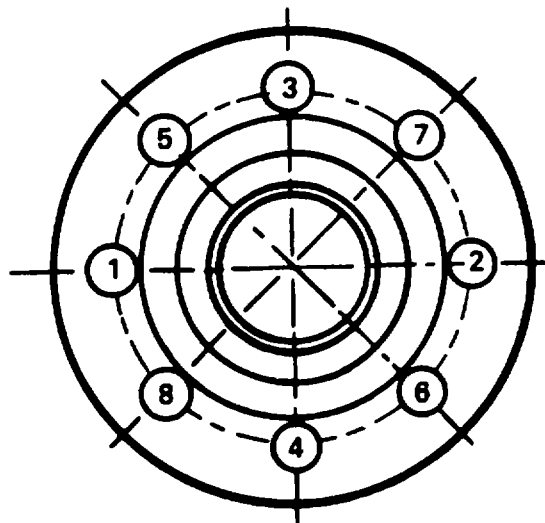
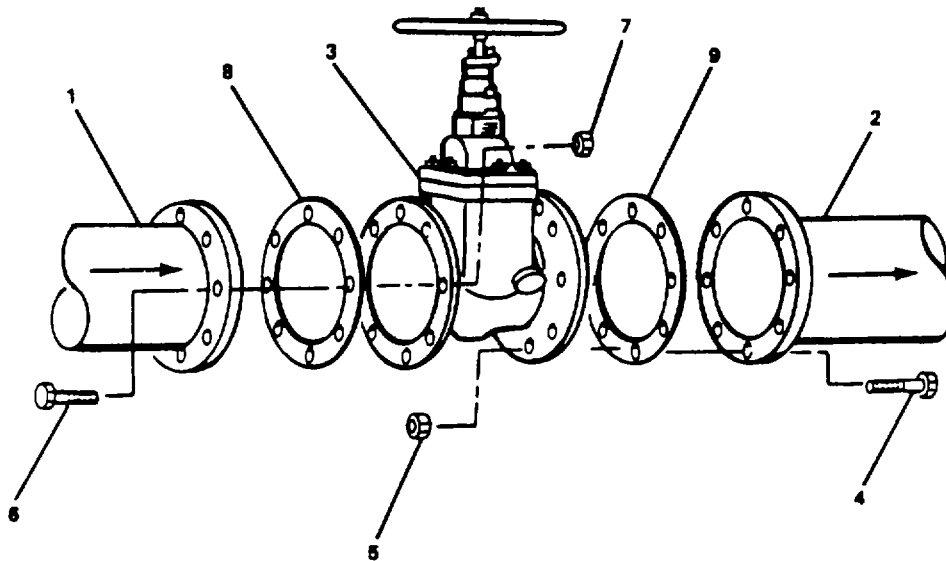


Figure 2-92. Replace Flange Valve.

2-126. Replace/Repair Gag Scupper Valve.

This task covers:

- | | | |
|-----------------------------|------------------------------------|------------|
| a. Removal,
e. Assembly, | b. Disassembly,
f. Replacement. | c. Repair, |
|-----------------------------|------------------------------------|------------|

INITIAL SETUP

Tools

Tool kit, general mechanic's
5180-00-629-9783
Torque Wrench 0-250 ft.-lb.,
5120-00-640-6365

Equipment Condition

Valve isolated from system
and system tagged "Out of
Service - Do Not Operate."

Materials/Parts

Reference TM 55-1925-207-10.

4-Inch Gag scupper valve (3)
P/N 5071-0400
Gasket P/N 507100-0400-22W7
Packing Ring P/N 507100-0200-19P2
Preformed packing P/N 507100-0200-21 X7
Warning tags, Item 1, Appendix D
Utility pail, Item 5, Appendix D

REMOVAL

- a. Place utility pail under valve.

NOTE

Valve is heavy, two soldiers are required to remove valve.

- b. Remove hex head nuts (1, Figure 2-93) and bolts (2) from each side of valve.
- c. Remove valve (3) and gaskets (4) from piping system.

DISASSEMBLY

- a. Loosen retaining nut (5).
- b. Remove handwheel assembly (6). Remove preformed packing (7), seated under retaining nut (5).
- c. Remove six hex head bolts (8) and remove cover plate (9) and gasket (10).

REPAIR

Repair at this level of maintenance is by replacement of gaskets (4), preformed packing (7) and gasket (10).

ASSEMBLY

- b. Replace cover plate (9) and secure with six hex hand bolts (8). Torque to 75 ft.-lb.
- c. Install preformed packing (7), replace handwheel assembly (6) and secure retaining nut (5).

REPLACEMENT

NOTE

Valve is heavy, two soldiers are required to replace valve.

- a. Position gasket (4) and valve (3) in piping system.
- b. Secure valve with bolts (2) and nuts (1). Torque nuts to 75 ft.-lbs.
- c. Operate system in accordance with TM 55-1925-207-10.
- d. Check for leaks in system and retighten connections as necessary. Remove tag(s).
- e. Remove pail and properly discard contents.

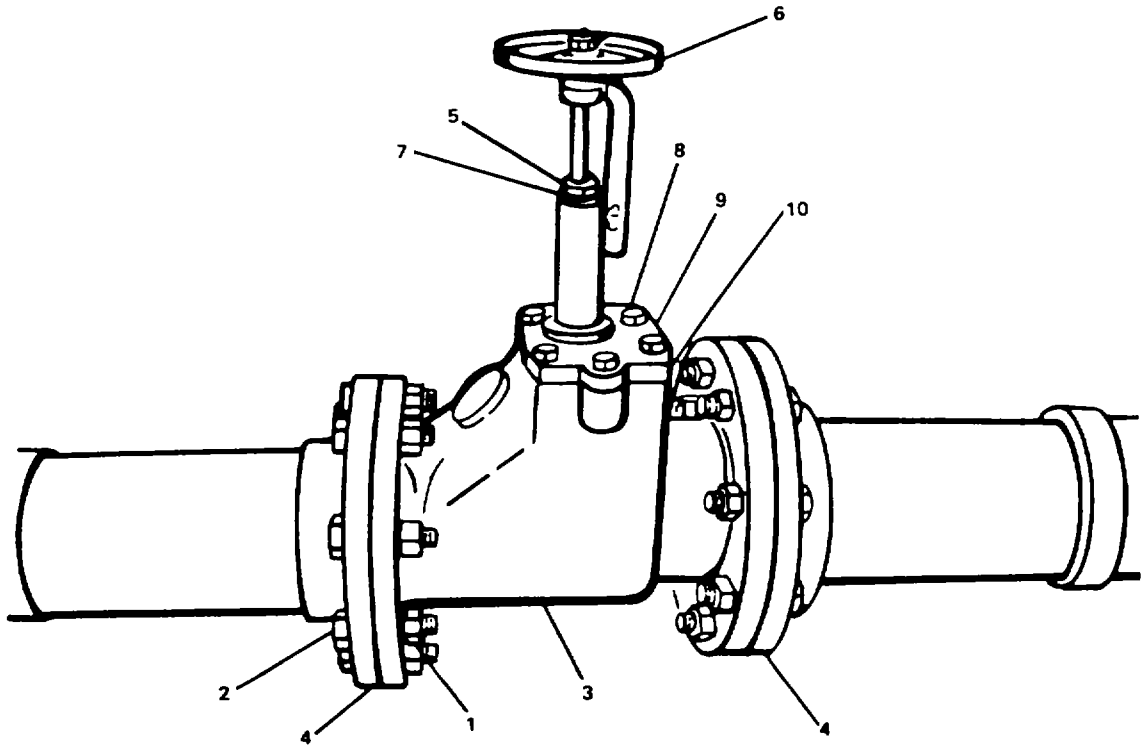


Figure 2-93. Replace/Repair Gag Scupper Valve.

2-127. Replace/Adjust Constant Flow Regulator Valve.

This task covers:

- a. Removal, b. Replacement c. Adjustment**

INITIAL SETUP

Tools

Tool kit, general mechanic's
5180-00-629-9783

Equipment Condition

Valve isolated from system and
system tagged "Out of Service
- Do Not Operate."

Materials/Parts

Reference TM 55-1925-207-10.

Flow Control Valve P/N 2FRM162X-60L,
P/N 2FRM1 0-2X-50L
Constant Flow Regulator Valve
P/N 2365-1041-1/21N
Warning tags, Item 1, Appendix D
Utility pail, Item 5, Appendix D
Wiping rags, Item 2, Appendix D

REMOVAL

WARNING

Use extreme care when disconnecting valves or piping. Escaping system pressure or fluid could cause injury.

Clean up spills immediately. Spills create an unsafe work area.

WARNING

Use eye protection when disconnecting valves or piping.

- a. Position utility pail to catch spillage.
- b. Remove Allen bolts (1, Figure 2-94 holding valve (3) to mounting foundation (2).
- c. Remove valve (3).

REPLACEMENT

NOTE

Coat threads with antiseize compound prior to replacement.

- a. Replace preformed packing if worn or damaged. Position valve (3) on mounting foundation (2).
- b. Install Allen bolts (1). Tighten bolts.
- c. Operate system in accordance with TM 55-1925-207-10.
- d. Check for leaks and tighten bolts as necessary.
- e. Remove pail and properly discard contents.
- f. Remove tags.

ADJUSTMENT

- a. Unlock manual adjustment mechanism (4).
- b. Adjust flow rate using manual adjustment mechanism.
- c. Lock manual adjustment mechanism.

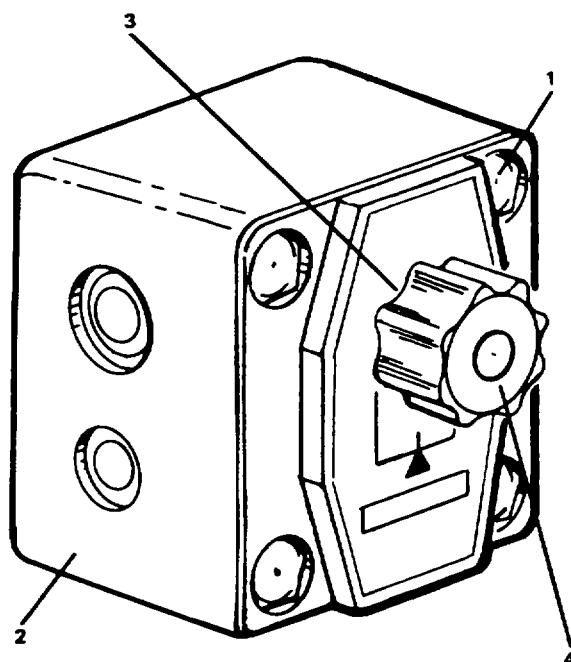


Figure 2-94. Replace Constant Flow Regulator Valve (Typical).

2-128. Replace Pneumatic Drain Valve with Solenoid.

This task covers:

a. Removal,**b. Replacement.****INITIAL SETUP**Tools

Tool kit, general mechanic's
5180-00-629-9783
Torque Wrench (0-250 ft-lb)
5120-00-640-6365

Materials/Parts

Pneumatic drain valve P/N 5702
Warning tags, Item 1, Appendix D

Equipment Condition

Valve isolated from system. On associated distribution panel set circuit breaker to OFF position and tag " Out of Service - Do Not Operate."

Reference TM 55-1955-207-10.

REMOVAL

- a. Disconnect and tag electrical wiring (1, Figure 2-95) from power source.
- b. Remove valve (2) from threaded pipe (3) by turning counterclockwise.

REPLACEMENT

- a. Position valve (2) on threaded pipe (3) and turn clockwise until completely threaded and tight.
- b. Connect electrical wiring (1) to power source and remove tags.
- c. Operate system in accordance with TM 55-1925207-10.
- d. Check for leaks and tighten connections as necessary. Remove tag(s)

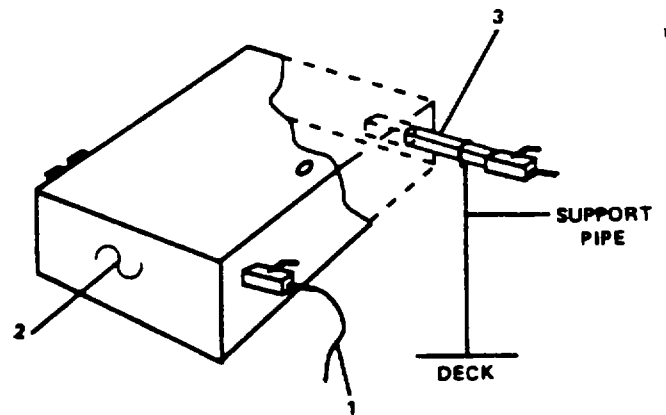


Figure 2-95. Replace Solenoid Valve.

2-129. Replace Pressure Reducing Valve, 3-inch.

This task covers:

a. Removal,

b. Replacement.

INITIAL SETUP

Tools

Tool kit, general mechanic's
5180-00-629-9783
Torque Wrench 0-250 ft-lb
5120-00-640-6365

Equipment Condition

Valve isolated from system
and system tagged "Out of
Service - Do Not Operate."

Materials/Parts

Pressure reducing valve
P/N 500-125/6
Warning tags, Item 1, Appendix D
Utility pail, Item 5, Appendix D
Wiping rags, Item 2, Appendix D

Reference TM 55-1955-207-10.

REMOVAL

WARNING

Use extreme care when disconnecting valves or piping. Escaping fluids or pressure could cause injury.

Clean up spills immediately Spills create an unsafe working area.

NOTE

Two soliders will be required to remove/replace pressure reducing valve.

- a. Position utility pail under reducing valve.
- b. Remove nuts (2, Figure 2-96) washers, and bolts (3) from flanges (4).
- c. Remove valve (1).

REPLACEMENT

NOTE

Before installing valve, clean lines to remove any loose dirt and scale.

- a. Position valve (1) and align bolt holes in flanges (4).

NOTE

Refer to Figure 2-85 for torquing sequences.

- b. Install bolts (3), washers and nuts on flange (4). Torque to 75 ft.-lb.
- c. Operate system in accordance with TM 55-1925-207-10.
- d. Check for leaks and tighten connections as necessary. Remove tag(s).
- e. Remove utility pail and properly discard contents.

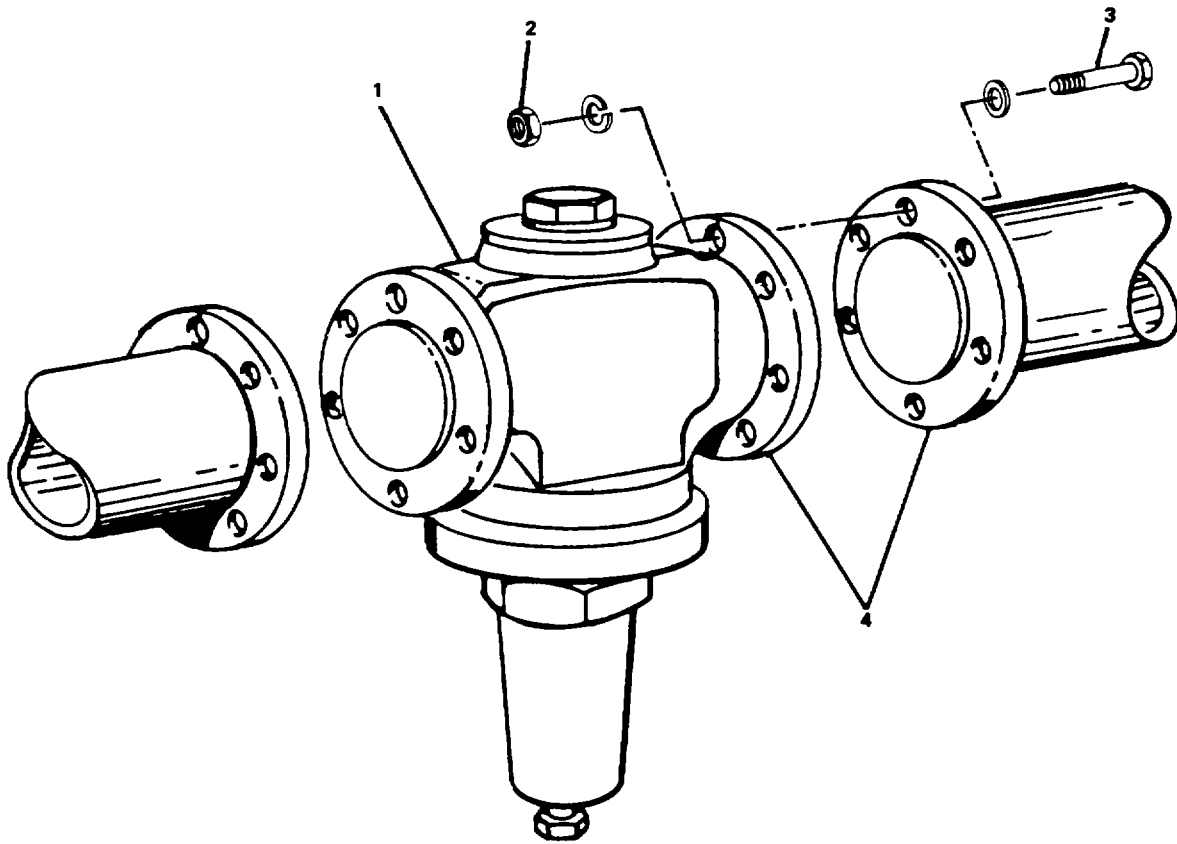


Figure 2-96. Replace Pressure Reducing Valve, 3-Inch.

2-130. Replace Pressure Reducing Valve, 1/2 to 2-inch.

This task covers:

a. Removal,**b. Replacement.****INITIAL SETUP**Tools

Tool kit, general mechanic's
5180-00-629-9783
Pipe Wrench

Materials/Parts

Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Warning tags, Item 1, Appendix D
Utility pail, Item, Appendix D

Equipment Condition

Valve(s) isolated from system
and system tagged "Out of
Service - Do Not Operate."

Reference TM 55-1925-207-10.

REMOVAL**WARNING**

Use extreme care when disconnecting valves or piping. Escaping fluids or pressure could cause injury.

Clean up spills immediately. Spills create an unsafe working area.

WARNING

Use eye protection when disconnecting valves or piping.

- a. Shut off nearest shutoff valve.
- b. Position utility pail to catch spillage.
- c. Separate valve (5, Figure 2-97) from inlet/outlet piping (1) by holding tailpiece (3) of union nut (2) and turning union collar (4) counterclockwise.
- d. Slide union collar (4) away from valve.
- e. Remove valve (3).

REPLACEMENT**NOTE**

Coat valve threads with antiseize compound prior to replacement.

- a. Position valve so it is aligned with inlet/outlet piping (1).
- b. Slide union collar (4) toward valve and thread union collar (4) clockwise until hand tight.
- c. Hold tailpiece (3) and turn union collar (4) until tight.
- d. Reopen nearest shutoff valve.
- e. Operate system in accordance with TM 55-1925-207-10.
- f. Check for leaks and tighten connections as necessary. Remove tag(s).
- g. Remove utility pail and properly discard contents.

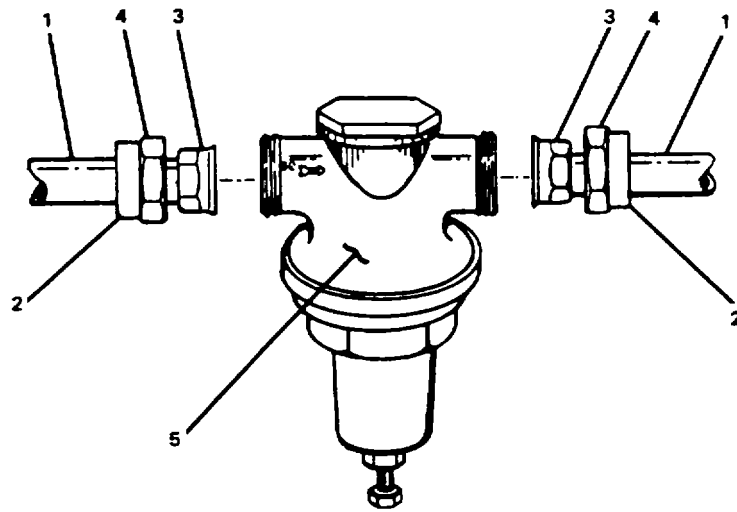


Figure 2-97. Replace Reducing Valve, 1/2 to 2-Inch.

2-131. Replace Relief Valve, 1/2-Inch.

This task covers:

- a. Removal,** **b. Replacement.**
-

INITIAL SETUP

Tools

Tool kit, general mechanic's
5180-00-629-9783

Materials/Parts

Relief Valve 1/2-inch
P/N L14

Warning tags, Item 1, Appendix D

Equipment Condition

Valve isolated from system and
system tagged "Out of Service
- Do Not Operate."
Reference TM 55-1925-207-10.

REMOVAL

WARNING

Use extreme care when disconnecting valves or piping. Escaping fluids or pressure could cause injury.

WARNING

Use eye protection when disconnecting valves or piping.

a. Remove discharge pipe by disconnecting at flange (2, figure 2-98).

b. Remove valve (1) by disconnecting at flange (3).

REPLACEMENT

a. Install valve (1) into piping.

b. Connect valve at flanges (2, 3).

c. Operate system in accordance with TM 55-1925-207-10. Remove tag(s).

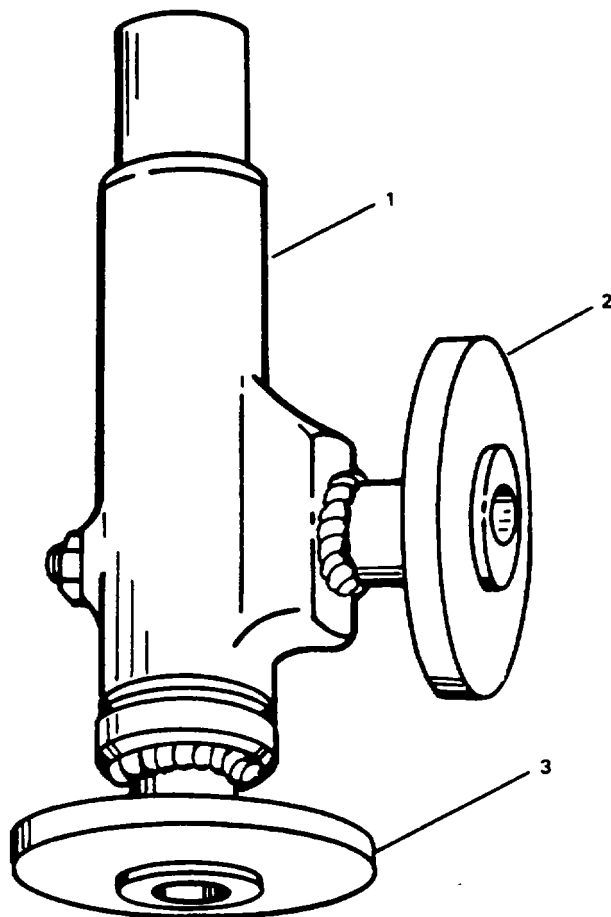


Figure 2-98. Replace Relief Valve, 1/2-Inch.

2-132. Replace Relief Valve, 1-Inch.

This task covers:

a. Removal

b. Replacement.

INITIAL SETUP

Tools

Tool kit, general mechanic's
5180-00-629-9783
Pipe Wrench

Equipment Condition

Valve isolated from system and
system tagged "Out of Service
- Do Not Operate."

Materials/Parts

Relief valve P/N 1384-1IN-1 30T0200
Warning tags, Item 1, Appendix D

Reference TM 55-1925-207-10.

REMOVAL

WARNING

Use extreme care when disconnecting valves or piping. Escaping fluids or pressure could cause injury.

- a. Position lever (1, Figure 2-99) in line with valve body (2).

WARNING

Use eye protection when disconnecting valves or piping.

- b. Separate valve (2) from inlet/ outlet piping (3) by holding tailpiece (4) of union and turning union collar (5) counterclockwise.
- c. Slide collar (5) away from valve (2). Remove valve.

REPLACEMENT

NOTE

Coat threads with antiseize compound prior to replacement

- a. Align valve (2) with inlet/outlet piping.
- b. Adjust piping as needed to align tail piece (4) of union with collar (5).
- c. Connecting piping by holding tail piece (4) of union and threading collar (5) clockwise until tight.
- d. Operate system in accordance with TM 55-1925-207-10.
- e. Check for leaks and tighten connections as necessary. Remove tag(s).

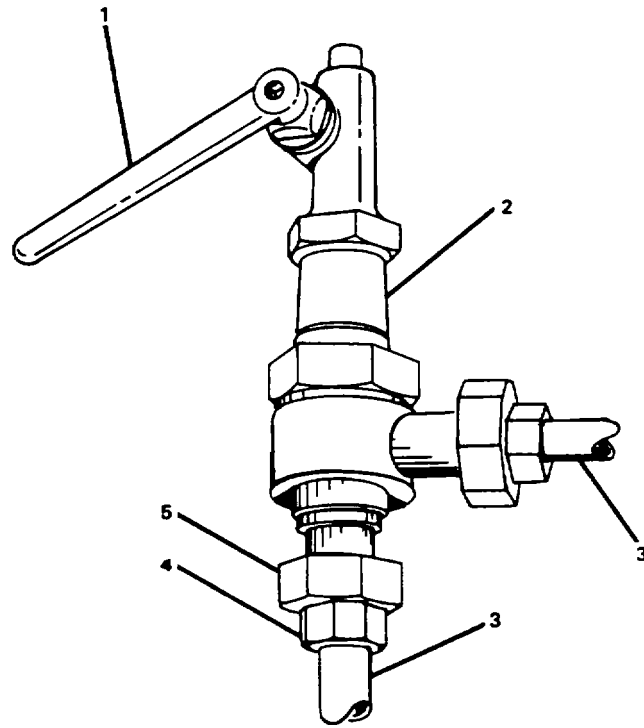


Figure 2-99. Remove Relief Valve.

2-133. Repair Y-Strainer, Flanged (Typical).

This task covers:

- a. Disassembly, b. Repair, c. Assembly.**
-

INITIAL SETUPTools

Tool kit, general mechanic's
5180-00-629-9783
Torque Wrench 0-250 ft.-lb.,
5120-0-640-6365

Equipment Condition

Strainer isolated from system
and system tagged "Out of
Service - Do Not Operate."

Materials/Parts

Reference TM 55-1925-207-10.

Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Utility pail, Item 5, Appendix D
Warning tags, Item 1, Appendix D
Wiping rags, Item 2, Appendix D

NOTE

All flanged type Y-strainers are replaced or repaired in the same manner. This procedure will cover typical replacement and/or repair.

DISASSEMBLY

- a. Place utility pail under strainer (1, Figure 2-100) and remove drain plug (2).
- b. Replace drain plug after draining strainer.
- c. Remove nuts (3) from strainer.
- d. Remove cover plate (4).
- e. Remove strainer element (5).
- f. Remove gasket (6) and discard.

REPAIR

Repair at this level of maintenance is by replacement of gasket (6) and strainer sediment element (5).

ASSEMBLY

- a. Install strainer element (5).
- b. Install gasket (6) and replace cover plate (4).
- c. Replace hex nuts (3) and torque to 75 ft.-lb.
- d. Operate system in accordance with TM 55-1925-207-10 and check for leaks. Remove tag(s).
- e. Remove utility pail and properly discard contents.

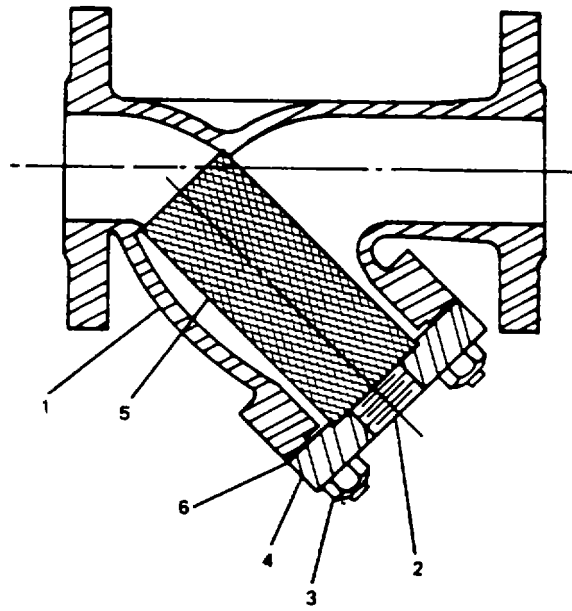


Figure 2-100. Repair Y-Strainer.

2-134. Replace Y-Strainer, Flanged, (Typical).

This task covers:

- a. Removal,** **b. Replacement.**
-

INITIAL SETUPTools

Tool kit, general mechanic's
5180-00-629-9783
Torque Wrench 0-250 ft.-lb.,
5120-00-64-6365

Equipment Condition

Strainer isolated from system
and system tagged "Out of
Service - Do Not Operate."

Materials/Parts

Reference TM 55-1925-207-10.

Y-strainer

P/N 1.5-761, P/N 2.5-851, P/N 3.0-851

Utility pail, Item 5, Appendix D

Wiping rags, Item 2, Appendix D

Warning tags, Item 1, Appendix D

REMOVAL

- a. Place a utility pail under Y-strainer (1, Figure 2-101) and remove drain plug (2).
- b. Replace drain plug after draining strainer.
- c. Remove nuts (3) and bolts (4).
- d. Remove Y-strainer.

REPLACEMENT**NOTE**

**Two soldiers will be required to
replace sediment strainer basket**

- a. Install sediment strainer (1) and attach with bolts (4).
- b. Install nuts (3) and torque to 75 ft. -lb.
- c. Charge pipeline in accordance with TM 55-1925-207-10, and check for leaks. Remove tag(s).
- d. Remove utility pail and properly discard contents.

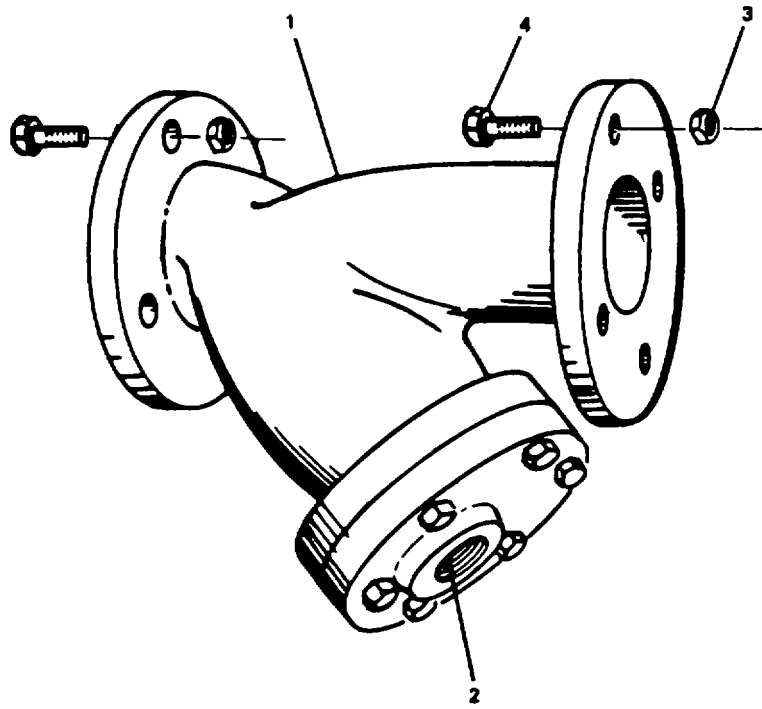


Figure 2-101. Replace Y-Strainer.

2-135. Repair Duplex Strainer (Typical).

This task covers:

a. Disassembly,**b. Repair,****c. Assembly.****INITIAL SETUP**Tools

Tool kit, general mechanic's
5180-00629-9783
Torque Wrench 0-250 ft.-lb.,
5120-00-640-6365

Equipment Condition

Piping system shut down.
Strainer isolated from
system and system tagged
"Out of Service - Do Not Operate."

Materials/Parts

Reference TM 55-1905-223-10.

Refer to Repair Parts and Special
Tools List (RPSTL), Appendix C
Utility pail, Item 5, Appendix D
Wiping rags, Item 2, Appendix D
Warning tags, Item 1, Appendix D

DISASSEMBLY

- a. Position handle (1, Figure 2-102) over opposite strainer.
- b. Place utility pail under duplex strainer (4) and remove drain plug (5).
- c. Replace pipe plug (5) after draining strainer.
- d. Loosen yoke clamp retaining bolt (3).
- e. Rotate yoke screw (6) counterclockwise until fully extended and aligned with yoke clamp (7).
- f. Swing yoke clamp (7) 90 degrees.
- g. Remove well cover plate (2) and gasket (9).
- h. Remove strainer element (8).

REPAIR

Repair at this level of maintenance is by replacement of strainer element (8) and cover gasket (9).

ASSEMBLY

- a. Install strainer element (8).
- b. Install gasket (9) and cover (2).
- c. Swing yoke clamp (7) over cover (2).
- d. Tighten yoke clamp retaining bolt (3).
- e. Rotate yoke screw (6) clockwise until tight.
- f. Charge piping system in accordance with TM 55-1925-207-10 and check for leaks. Remove tag(s).
- g. Remove pail and properly discard contents.

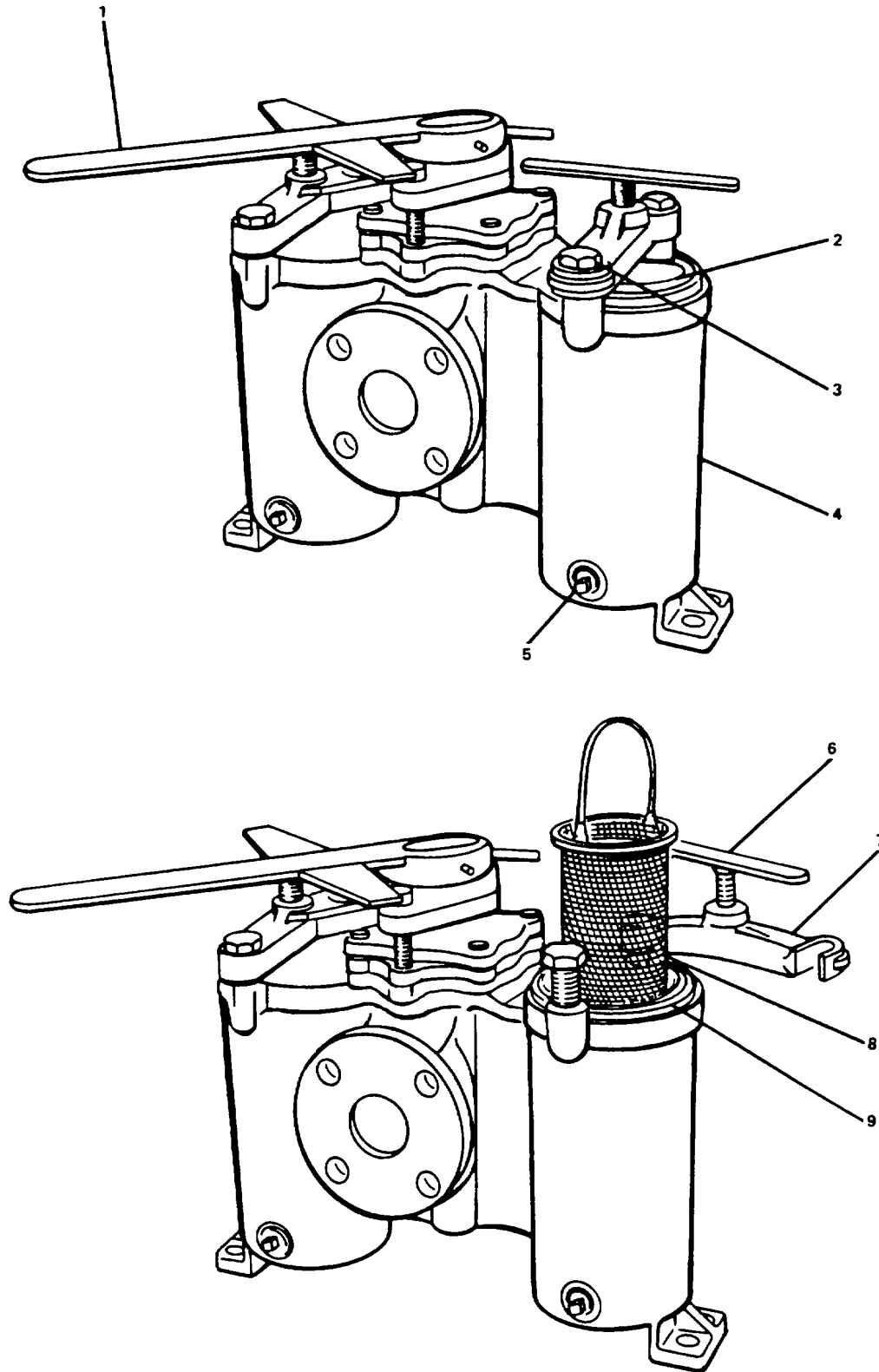


Figure 2-102. Repair Duplex Strainer.

2-136. Replace Duplex Strainer (Typical).

This task covers:

- a. Removal,** **b. Replacement.**

INITIAL SETUP**Tools**

Tool kit, general mechanic's
5180-00-629-9783
Torque Wrench 0-250 ft.-lb.,
5120-00-640-365
Lifting sling P/N 3375958
Chain hoist
3950-00-235-235

Equipment Condition

Strainer isolated from system
and system tagged "Out of
Service - Do Not Operate."

Materials/Parts

Reference TM 551925207-10.

Duplex Strainer P/N ST051010BT31AMS,
P/N ST051015BT1 I1APS,
P/N ST051030AF41APS,
P/N ST05A040BF11A
Utility pail, Item 5, Appendix D
Wiping rags, Item 2, Appendix D
Warning tags, Item 1, Appendix D

REMOVAL**NOTE**

**1 inch and 1 1/2 inch strainers are threaded. 3 inch
and 4 inch strainers are flanged.**

- a. Place utility pail under duplex strainer (1, Figure 2-103) and remove drain plugs (2).
- b. Replace drain plugs (2) after draining strainer.
- c. Remove nuts (4) and bolts (3) on flanged strainer (1) or threaded pipe (7) on threaded strainer (6).
- d. Remove mounting bolts (5).

NOTE

**The duplex sediment strainer is heavy
and will require two soldiers or a chain
hoist to remove.**

- e. Remove duplex sediment strainer (1 or 6).

REPLACEMENT**NOTE**

**The duplex sediment strainer is heavy and will
require two soldiers or chain hoist to replace.**

- a. Install duplex sediment strainer (1 or 6).
- b. Install mounting bolts (5) and torque to 75 ft. - lb.
- c. Install bolts (3), nuts (4) on flanged strainer (1). Torque to 75 it. -lb.
- d. Install threaded pipe (7) on threaded strainer (6).
- e. Charge piping system in accordance with TM 55-1925-207-10 and check for leaks. Remove tag(s).
- f. Remove pail and properly discard contents.

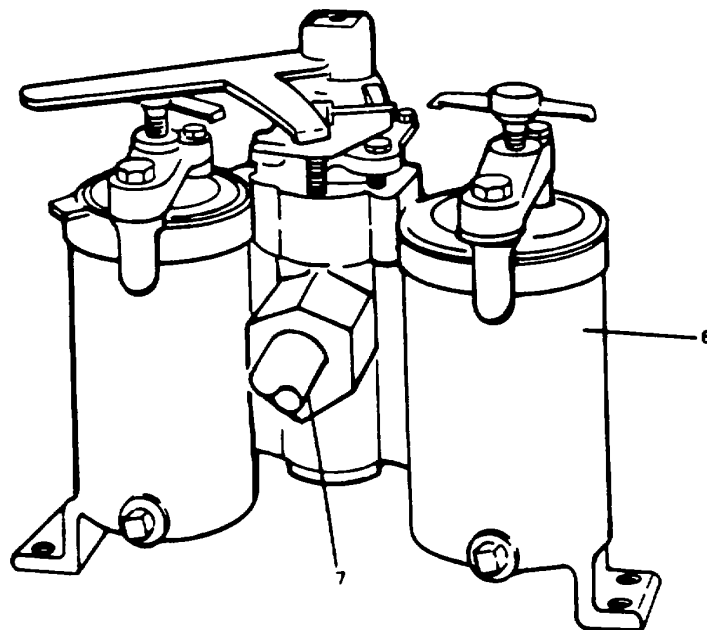
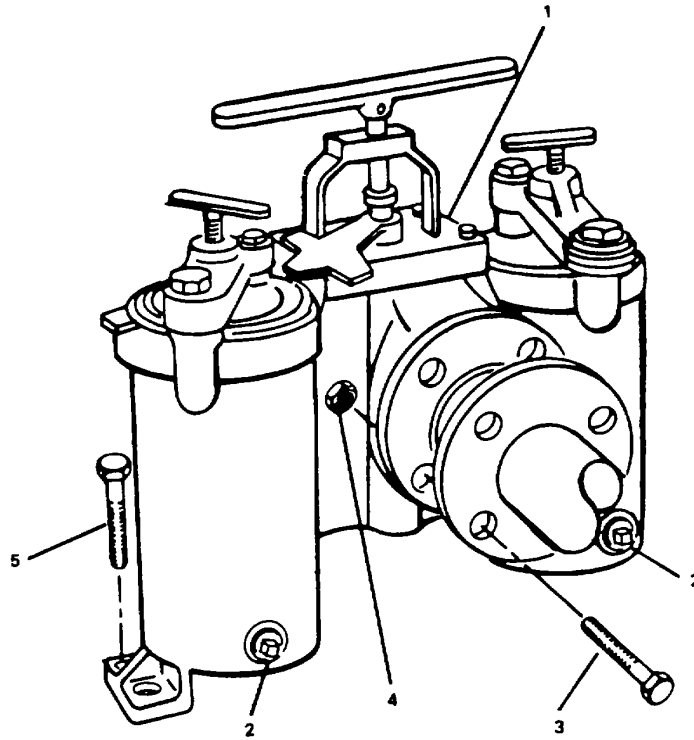


Figure 2-103. Replace Duplex Strainer.

2-137. Repair 8-nch Simplex Strainer.

This task covers:

- a. Disassembly, b. Repair, c. Assembly.

INITIAL SETUPTools

Tool kit, general mechanic's
5180-00-629-9783
Torque Wrench 0-250 ft.-lb.,
5120-00-640-365
Chain Hoist 3950-0-235-4235

Equipment Condition

Strainer isolated from system
and system tagged "Out of
Service - Do Not Operate."

Reference TM 55-1925-207-10.

Materials/Parts

Gasket P/N TG-8.0-911 B-0
Strainer Element P/N BK-8.0-911-4-1-0
Utility Pail, Item 5, Appendix D
Wiping rags, Item 2, Appendix D
Warning tags, Item 1, Appendix D

DISASSEMBLY

- a. Place utility pail under strainer (1, Figure 2-104) and remove plug (2).
- b. Replace plug (2) after draining strainer.
- c. Remove hex head capscrews (3).
- d. Remove cover (4).
- e. Remove gasket (5) and discard.
- f. Remove strainer element (6).

REMOVAL

Repair at this level of maintenance by replacement of gasket (5) and strainer element (6).

ASSEMBLY

- a. Install strainer element (6).
- b. Install gasket (5).
- c. Install cover (4).
- d. Install hex head capscrews (3) and torque to 75 ft.-lbs.
- e. Charge piping system in accordance with TM 55-1925-207-10 and check for leaks. Remove tag(s).
- f. Remove pail and properly discard contents.

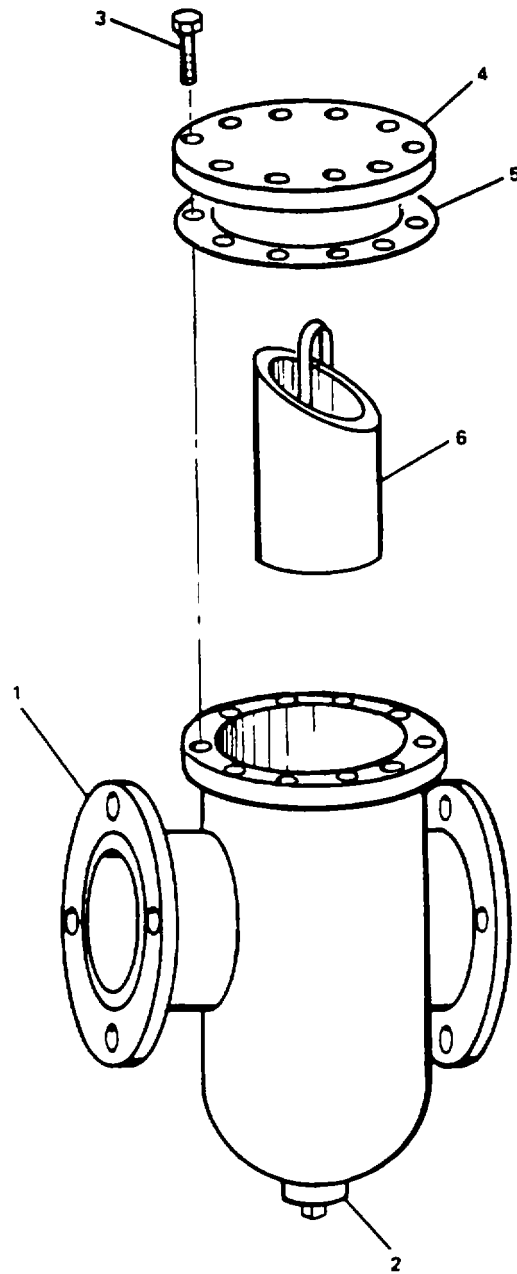


Figure 2-104. Repair 8-Inch Simplex Strainer.

2-138. Replace 8-inch Simplex Strainer.

This task covers:

- a. Removal, b. Replacement.
-

INITIAL SETUP**Tools**

Tool kit, general mechanic's
5180-00-629-9783
Torque Wrench 0-250 ft.-lb.
5120-00-640-6365
Chain Hoist 395(-00-235-4235

Equipment Condition

Strainer isolated from system
and system tagged "Out of
Service - Do Not Operate."

Reference TM 55-1925-207-10.

Materials/Parts

8-inch simplex strainer P/N
AN-8.0-1 65B-E
Utility pail, Item 5, Appendix D
Warning tags, Item 1, Appendix D

REMOVAL

- a. Place utility pail under strainer (1, Figure 2-105) and remove plug (2).
- b. Replace plug (2) after draining strainer.
- c. Remove nuts (4) and bolts (3).

NOTE

Simplex strainer is heavy and will require two soldiers or chain hoist to remove.

- d. Remove strainer.

REPLACEMENT**NOTE**

Simplex strainer is heavy and will require two soldiers to replace.

- a. Install strainer (1).
- b. Install bolts (3) and nuts (4). Torque to 75 ft. - lbs.
- c. Charge piping system in accordance with TM 551 925-207-10 and check for leaks. Remove tag(s).
- d. Remove utility pail and properly discard contents.

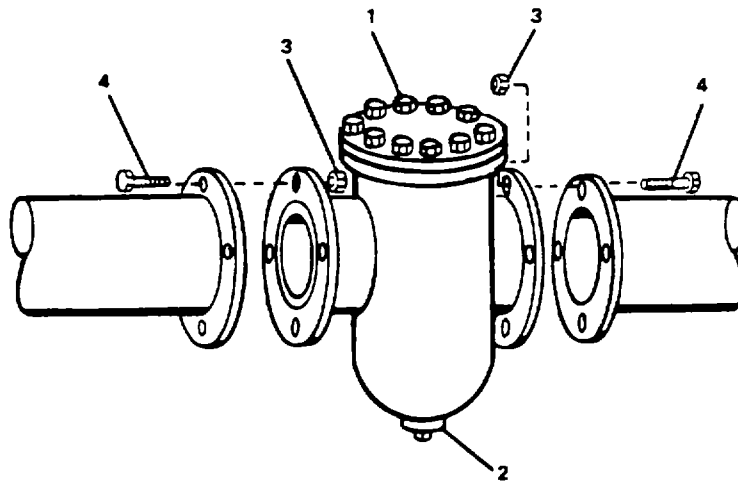


Figure 2-105. Replace 8-Inch Simplex Strainer.

2-139. Replace Hand Pump.

This task covers:**a. Removal,****b. Replacement**

INITIAL SETUPTools

Tool kit, general mechanic's
5180-00-629-9783
Pipe Wrench

Equipment Condition

Pump isolated from system.

Materials/Parts

Hand pump P/N 525
Wiping rags, Item 2, Appendix D

REMOVAL

- a. Disconnect discharge line (1, Figure 2-106) and suction line (3) at unions (2).
- b. Remove hand pump (4) .

- b. Connect discharge line (1) and suction line (3) at unions (2). Tighten unions (2).
- c. Operate hand pump and check for proper operation and leaks.
- d. Tighten connections as necessary. Remove tag(s).

REPLACEMENT

- a. Align rotary hand (4) with discharge line (1) and suction line (3).

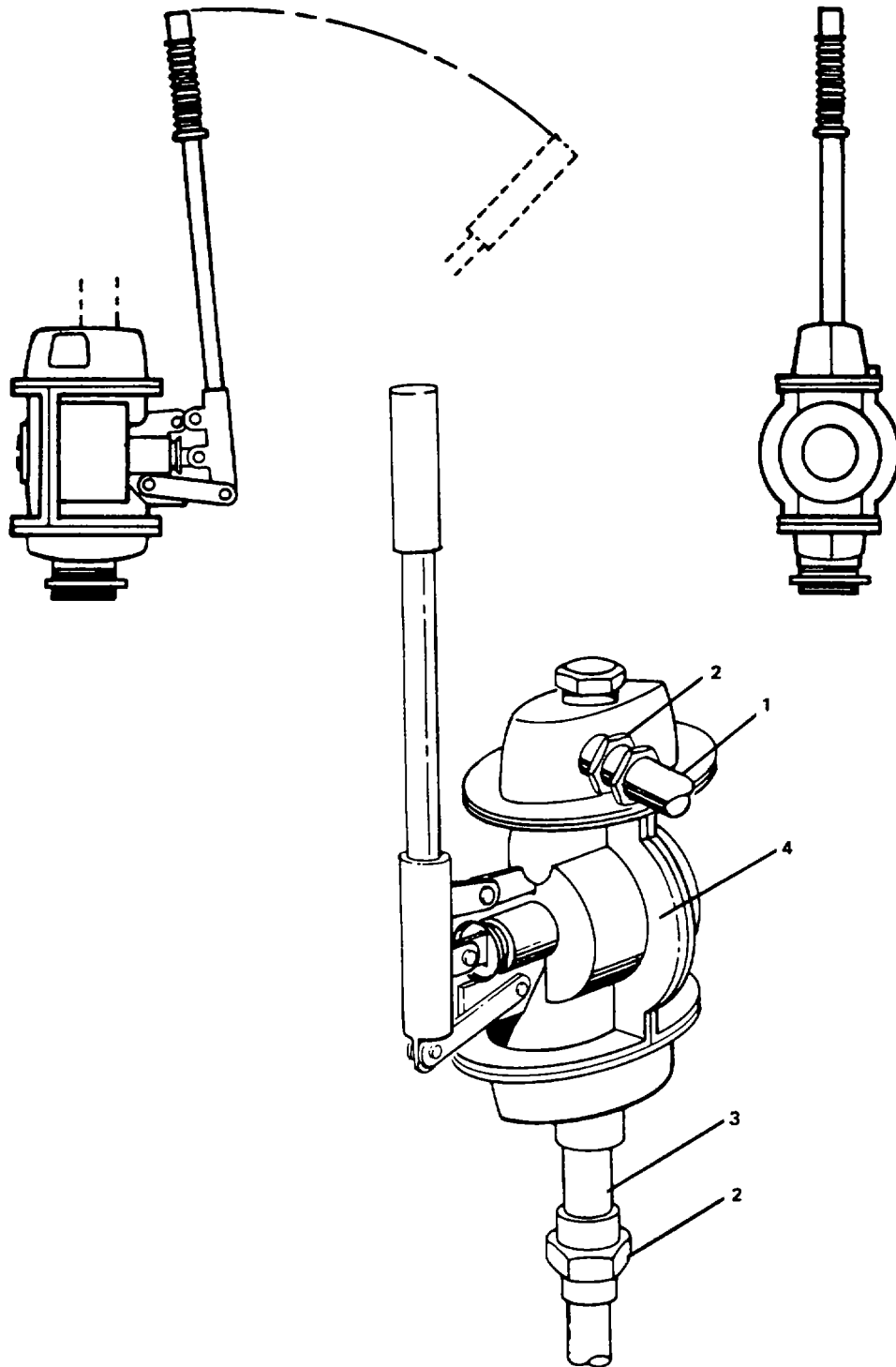


Figure 2-106. Replace Hand Pump.

2-140. Replace Pressure Switch.

This task covers:

- a. Removal, b. Replacement.

INITIAL SETUPMaterials/Parts

Pressure switch P/N 836-8423
Warning tags, Item 1, Appendix D

Equipment Condition

On associated Engine Room Distribution Panel
set circuit breaker to OFF position and tag
"Out of Service - Do Not Operate".

REMOVAL

- a. Tag and disconnect electrical wiring (1, Figure 2-107) from pressure switch (2).

NOTE

**Bleed pressure from tank before
removing pressure switch.**

- b. Remove pressure switch (2) from threaded standpipe (3) by turning counterclockwise until completely unthreaded.

REPLACEMENT

- a. Position pressure switch (2) on threaded standpipe (3), turn clockwise until completely threaded and tight.
- b. Connect electrical wiring (1) to pressure switch (2).
- c. Set circuit breaker to ON and remove tags.

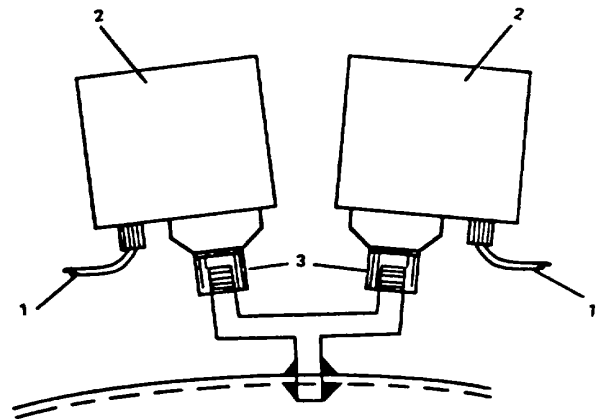


Figure 2-107. Replace Pressure Switch

2-141. Replace/Test Proportioning Bromine Feeder System.

This task covers:

a. Removal

b. Replacement.

c. Test

INITIAL SETUP

Tools

Tool kit, general mechanic's
5180-00-629-9783

Equipment Condition

On ENG RM EMER DIST PANEL NO. 1
set BOW THRUSTER and AMS 1 EMER
LTS circuit breakers to OFF position and tag
"Out of Service -Do Not Operate."

Materials/Parts

Proportioning bromine feeder assembly
P/N 9065-04
Test kit P/N 5719-00
Bypass header assembly P/N 3037-41
Feeder assembly P/N 4656-00
Gasket P/N 0344-00
Dual feed valve P/N 3035-13
Bromine feeder cartridge P/N 9540-01
Warning tags, Item 1, Appendix D
Wiping rags, Item 2, Appendix D
Utility pail, Item 5, Appendix D

REMOVAL

1. REMOVE BROMINE FEEDER CARTRIDGE.

- a. Open PW-36, BYPASS-BROMINATOR valve (1, Figure 2-108).
- b. Close PW-37, BROMINATOR INLET valve (2) and PW-38, BROMINATOR OUTLET valve (3). Tag valves "Out of Service Do Not Operate. "

NOTE

FEEDER ON indicator light (4) goes off when water to by pass header assembly is secured.

- c. Place pail under test tap valve (5). Open test tap valve (5).
- d. Depress air-bleeder button on feeder top assembly (6) to allow water to drain.
- e. Loosen T-nut (7) and remove and V-band assembly (8).

- f. Lift off feeder top assembly (6) and gasket (9).

WARNING

Drainage from cartridge is slightly corrosive. If drainage comes in contact with skin, wash skin with water. Wipe up spillage.

- g. Insert tips of fingers in holes in top of bromine cartridge, and unscrew cartridge (10).
- h. Lift cartridge out of bromine vessel. Allow water to drain from cartridge.

WARNING

If contents of cartridge are accidentally spilled, sweep up resin and discard, preferably into water.

NOTE

Do not depress time totalizer pushbutton to reset number dials unless a new cartridge is being installed.

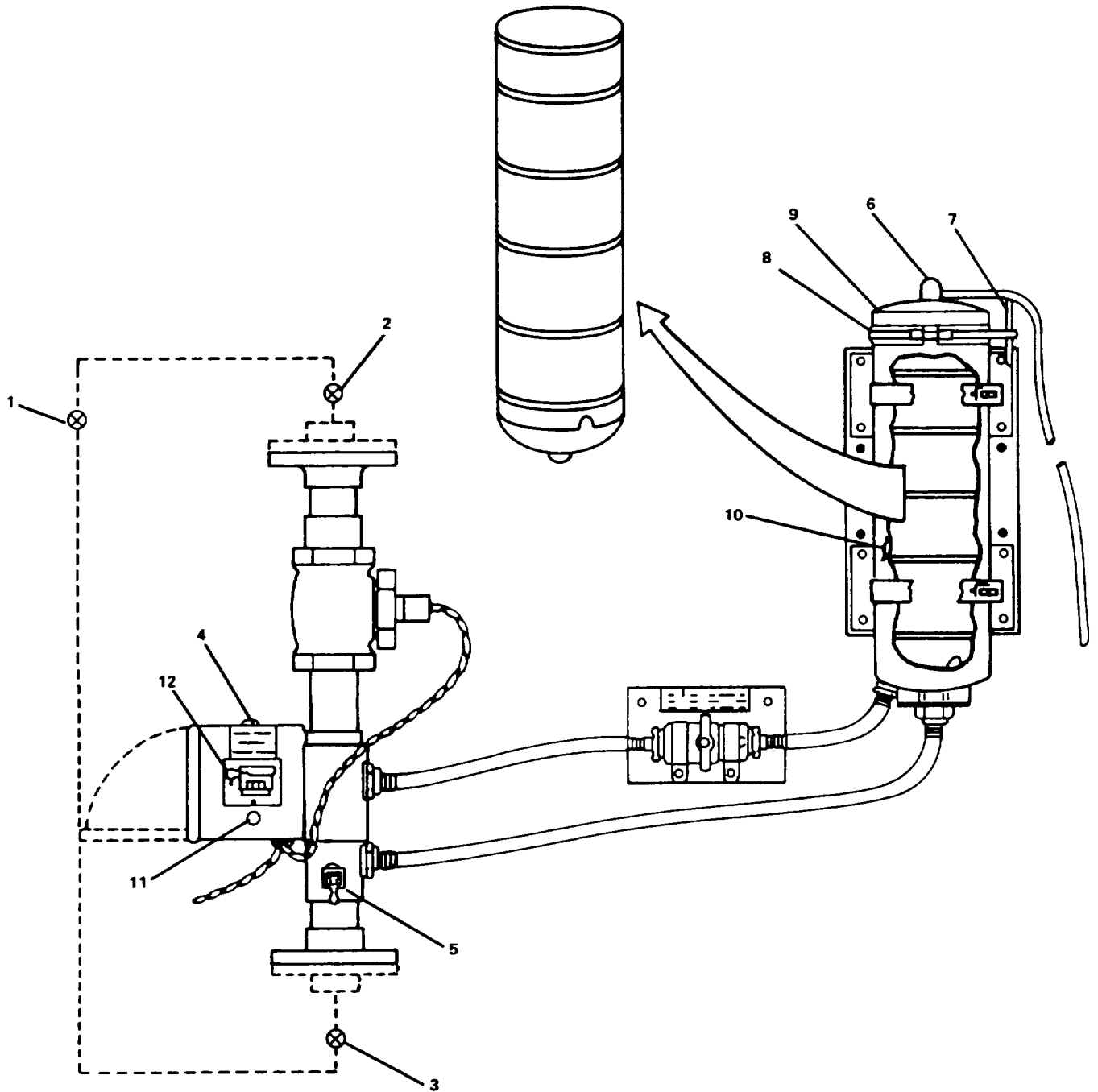


Figure 2-108. Remove Bromide Feeder Cartridge.

- i. If removed cartridge is only partially exhausted and is being removed as a result of no anticipated usage of proportioning bromine feeder for a period in excess of 14 days, store cartridge in an old shipping container. Mark the container "PARTIALLY EXHAUSTED CARTRIDGE". Record the date the proportioning bromine feeder cartridge was removed.
- j. If removed cartridge is totally, exhausted and requires immediate replacement store old cartridge in shipping container from which new cartridge was removed and dispose of in a proper manner.

WARNING

DO NOT incinerate cartridge.

2. REMOVE BYPASS HEADER ASSEMBLY.

- a. Open PW-36, BYPASS-BROMINATOR valve (1, Figure 2-109).
- b. Close PW-37, BROMINATOR INLET valve (2) and PW-38, BROMINATOR OUTLET valve (3). Tag valve "Out of Service Do Not Operate. "
- c. Place pall under test tap valve (10). Open test tap valve (10) and press air bleeder valve (5) on the feeder top assembly to allow water to drain from plumbing.

WARNING

Death, serious injury, or equipment damage can result from contact with electrical circuits. Before beginning work on this or any other electrical equipment, turn OFF power and control voltage circuit breaker(s) and tag "Out of Service Do Not Operate. "

- d. Remove screws and open electrical box cover (14) and tag and disconnect leads from terminal 1 and 2 of terminal board inside case.
- e. Loosen strain relief (13) at bottom of case and disengage input leads from case assembly.
- f. Loosen hose clamps (8) and disconnect tubing (9).
- g. Unbolt bypass header assembly inlet (5) and outlet (11) flanges from system flanges (4, 12)
- h. Remove bypass header assembly (6).

3. REMOVE DUAL FEED VALVE ASSEMBLY. STEP 2.

- a. Disconnect tubing (9, Figure 2-110) from dual feed valve (7).
- b. Remove screws (1), nuts (2), washers (3) and spacers (4).
- c. Remove clamps (5, 6) securing dual feed valve (7) to bracket (8).
- d. Remove dual feed valve from bracket.

4. REMOVE FEEDER ASSEMBLY. STEP 2.

- a. Disconnect tubing (3, Figure 2-111) from feeder assembly (4).
- b. Loosen T-nuts (2).
- c. Remove V-bands (1).
- d. Remove feeder assembly (4) from support (5).

REPLACEMENT

1. REPLACE FEEDER ASSEMBLY.

- a. Position feeder assembly (4, Figure 2-111) on support (5).
- b. Fasten V-bands (1) and secure with T-nuts (2).
- c. Connect tubing (3) to feeder assembly (4).

2. REPLACE DUAL VALVE ASSEMBLY.

- a. Position dual valve assembly (7, Figure 2-110) on bracket (8).
- b. Replace clamps (5, 6) and secure with screws (1), nuts (2), washers (3) and spacers (4).
- c. Connect tubing (9) to dual feed valve (7).

3. REPLACE BYPASS HEADER ASSEMBLY.

- a. Position bypass header assembly (6, Figure 2-109) between system flanges (4, 12).
- b. Line up inlet flange (5) with system flange (4), replace bolts but do not tighten.
- c. Line outlet flange (11) with system (12), replace bolts and tighten. Also tighten bolts on inlet flange at this time.
- d. Replace tubing (9) and secure to applicable assembly with hose clamps (8).
- e. Insert leads through strain relief (13) and secure strain relief.

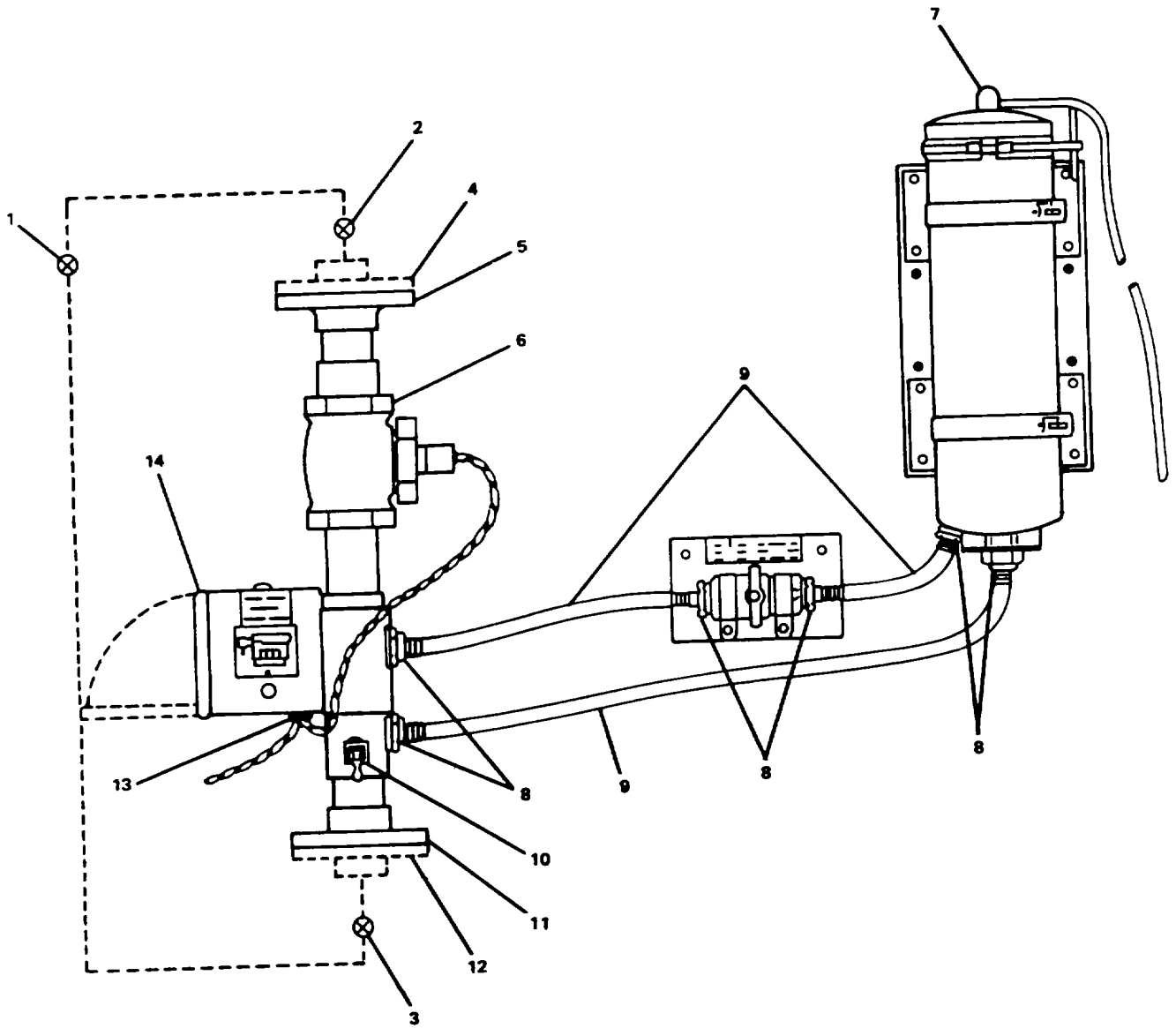


Figure 2-109. Remove Bypass Header Assembly.

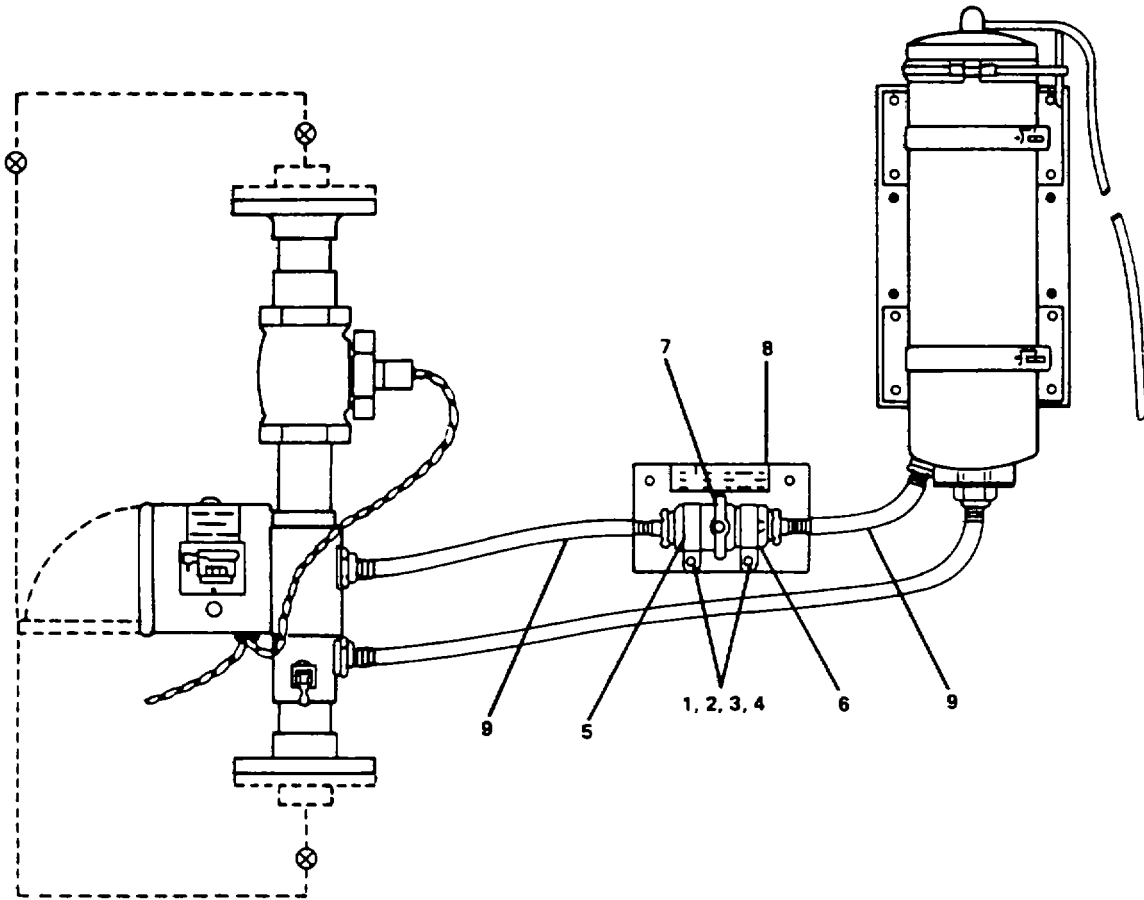


Figure 2-110. Remove Dual Feed Valve Assembly.

- f. Connect leads to terminal 1 and 2 of terminal board inside case and remove tags.
- g. Close electrical box cover (13). Secure with screws.

4. REPLACE BROMINE FEEDER CARTRIDGE.

- a. Insert cartridge (10, Figure 2-108) in bromine vessel and screw in finger tight.
- b. Install gasket (9) and feeder top assembly (6).
- c. Install V-band assembly (8) and tighten T-nut (7).
- d. Set circuit breaker to ON.
- e. Verify CARTRIDGE CHANGE indicator (11) is not lit.

CAUTION

Do not press TIME TOTALIZER pushbutton (12) to reset time dial if reinstalling a partially exhausted cartridge. If time has been inadvertently reset, remove partially exhausted cartridge and install a new cartridge.

- f. If installing a new cartridge, press TIME TOTALIZER pushbutton (11) to reset time dials.
- g. Close test tap valve (4).
- h. Close PW-36, BYPASS-BROMINAOTR (1).
- i. Open PW-37, BROMINATOR INLET valve (2) and PW-38 BROMINATOR OUTLET valve (3). Remove tags.

TEST

- a. Depress air-bleeder button on feeder top assembly (6, Figure 2-108) to bleed all air out of vessel.
- b. Operate system in accordance with TM 55-1925-207-10.
- c. Check that CARTRIDGE CHANGE indicator light (11) is OFF and cartridge change indicator meter (12) is operating.
- d. Draw a sample of water from the test tap (4).
- e. Follow instructions on bromine/chlorine test kit to verify operation of proportioning bromine feed system.

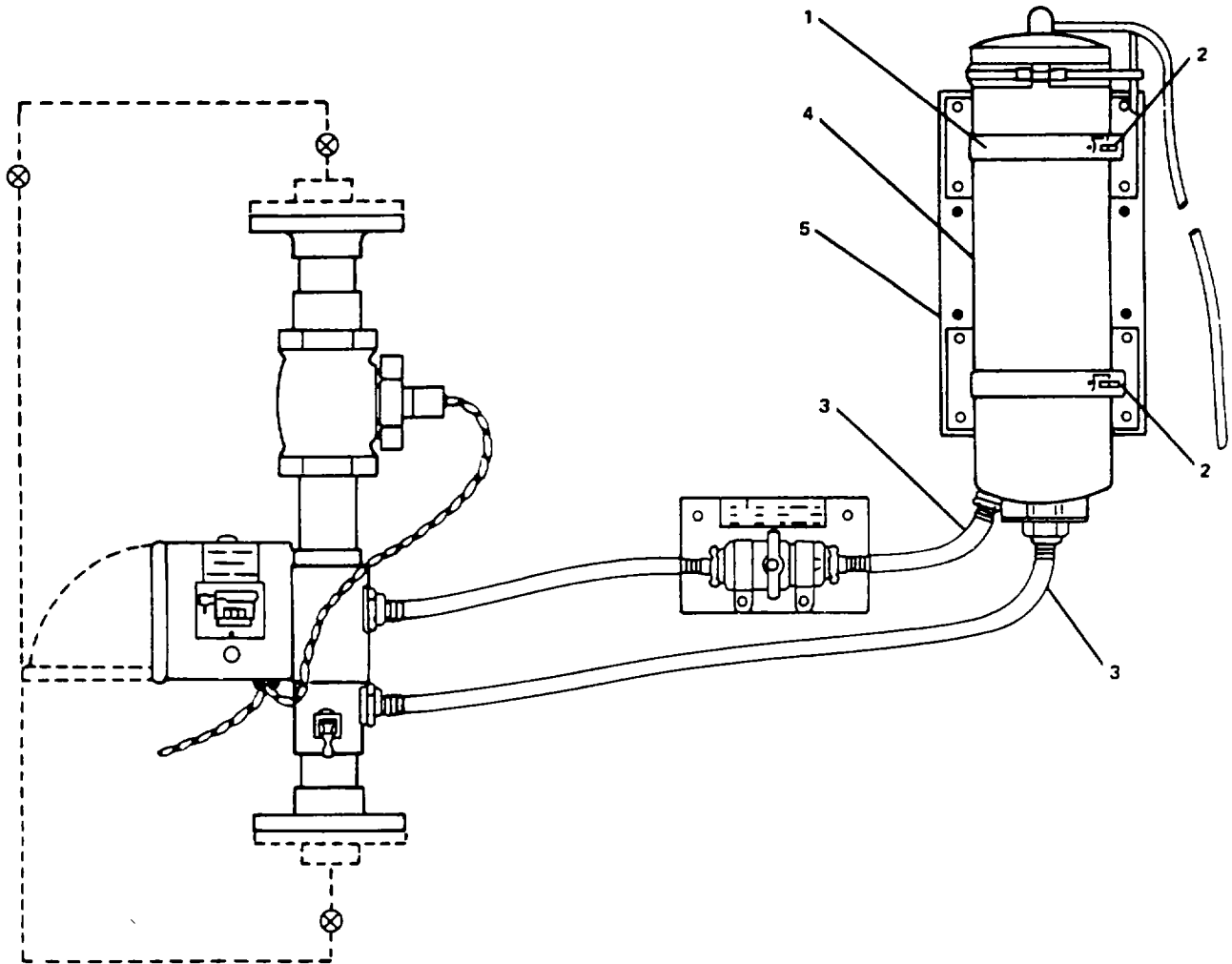


Figure 2-111. Remove Feeder Assembly.

2-142. Replace/Adjust Water Heater.

This task covers:

- a. Removal, b. Replacement, c. Adjustment
-

INITIAL SETUP

Tools

Tool kit, general mechanic's
518-00-629-9783

Equipment Condition

On Main Switchboard set HOT POTABLE
WTR HTR #1 or #2 circuit breaker
to OFF position and tag
"Out of Service- Do Not Operate."

Materials/Parts

Electric water heater (2)
P/N SE8C0--10SLT4
Teflon tape, Item 7, Appendix D
Warning tags, Item 1, Appendix D
Utility pail, Item, Appendix D

WARNING

To prevent burns to personnel from hot water heater, make sure heater has been turned off long enough to allow water and parts to cool before performing maintenance.

NOTE

Water heater is heavy, removal will require two soldiers.

- j. Remove water heater (13).

REMOVAL

- a. Close PW-81 or PW-82, H. W. HTR OUT valve (1, Figure 2-112, Sheet 1).
- b. Close PW-79 or PW-80, POT WTR TO H. W. HTR valve (2).
- c. If installed, remove insulation jacket (6) surrounding water heater.
- d. Place pail under drain faucet (3) and open faucet (3) to drain water from heater.
- e. Tag and disconnect electrical leads (7) from heater.
- f. Disconnect cold water piping at union (4).
- g. Disconnect hot water piping at union (5).
- h. Remove retaining nuts and lockwashers (8) securing water heater to bulkhead brackets (9).
- i. Under bottom of water heater remove retaining nuts (10) and lockwashers (11) securing water heater to angle brackets (12).

REPLACEMENT

NOTE

Water heater is heavy, replacement will require two soldiers.

- a. Position water heater (13) on angle brackets (12). Secure water heater to brackets with retaining nuts (10) and lockwashers (11).
- b. Secure upper portion of water heater to bulkhead brackets (9) with retaining nuts and lockwashers (8).
- c. Connect electrical leads (7) to heater. Remove tags.
- d. If removed, replace insulation jacket (6) around water heater.
- e. Close drain faucet (3). Remove pail.

NOTE

Apply teflon tape to all pipe threads prior to connection.

- f. Connect hot water piping at union (5).
- g. Connect cold water piping at union (4).
- h. Open PW-79 or PW-80, POT WTR TO H.W. HTR valve (2).
- i. Open PW-81 or PW-82, H.W. HTR OUT valve (1).
- j. Set circuit breaker to ON position. Remove tag.

- k. Check for leaks around piping connections and tighten as required.

ADJUSTMENT

- a. Open access cover (14) of water heater.
- b. Set upper and lower temperature controls (15) to desired range.
- c. Close and secure access cover (14).

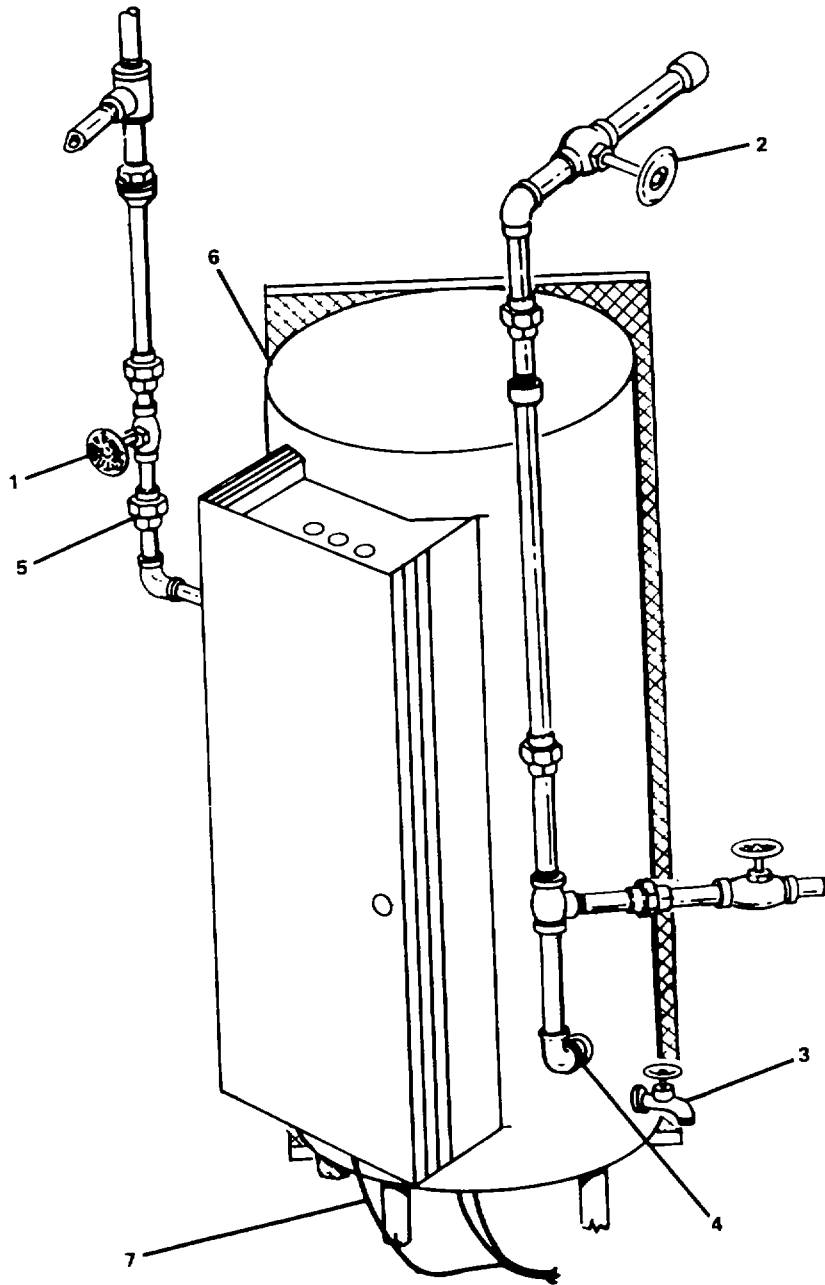


Figure 2-112. Replace Water Heater (Sheet 1 of 2).

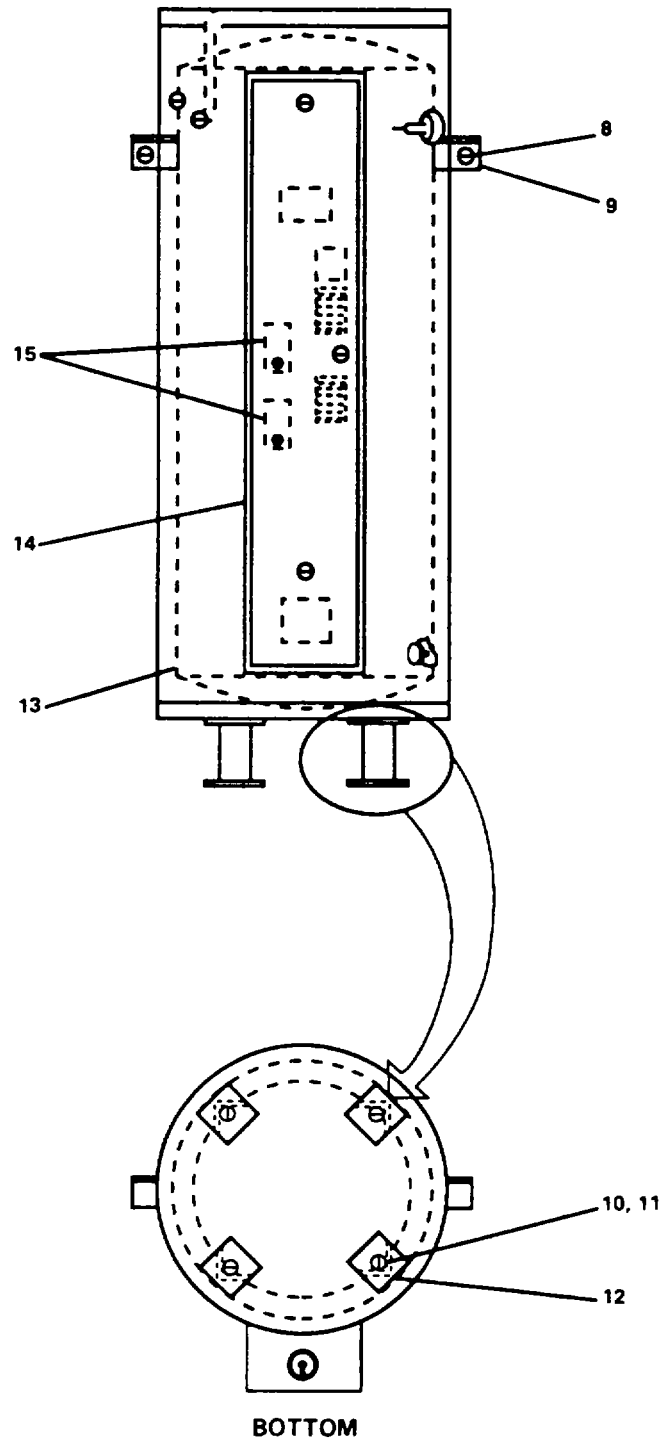


Figure 2-112. Replace Water Heater (Sheet 2 of 2).

2-143. Replace Hydraulic Tow Pin Components

This task covers:**a. Removal****b. Replacement**

INITIAL SETUPTools

Tool kit, general mechanic's
5180-00-629-9783

Equipment Condition

On ENG RM EMER DIST PANEL NO. 1
set TOWING MACHINE CONTROL
POWER circuit breaker to OFF position
and tag "Out of Service - Do Not Operate."

Materials/Parts

Direction Control Valve
P/N 4WE6JA5X
Check Valve P/N Z2S6A26X
Flow Control Valve P/N 2FRM102X16L
Hydraulic Cylinder P/N 1-1/2HHC15CC
Warning tags, Item 1, Appendix D
Utility pail, Item 5, Appendix D
Wiping rags, Item 2, Appendix D

Valves isolated from system and system tagged
"Out of Service -Do Not Operate."

Reference TM 55-1925-207-10.

REMOVAL**WARNING**

Clean up spills immediately. Spills create an unsafe working area.

a. Remove Hydraulic Cylinder.

1. Raise tow pins (18, Figure 2-113). Refer to TM 55-1925-207-10.
2. Remove cotter pin (17) and rod (11). Remove tow pin(18).
3. Tag and disconnect hydraulic connections (16).
4. Remove cotter pins (13) and rod (14) from clevis mount(1 5).
5. Remove hydraulic cylinder (12).

b. Remove Directional Control Valve and Check Valve.

1. Position utility pail to catch spillage.
2. Remove four screws (1) and terminal box cover (2).

3. Tag and disconnect electrical wires from terminal box (4).
4. Tag and disconnect hydraulic connections (6).
5. Remove mounting screws (3).
6. Remove directional control valve (7) and check valve (5).
- c. Remove Flow Control Valve.
 1. Position utility pail to catch spillage.
 2. Tag and disconnect hydraulic connections (10).
 3. Remove mounting screws (8) and remove flow control valve (9).

REPLACEMENT**a. Replace Flow Control Valve.**

1. Install flow control valve (9) and secure with mounting screws (8).
2. Attach hydraulic connections (10). Remove tags.

b. Replace Directional Control Valve and Check Valve.

1. Install check valve (5) and directional control valve (7). Secure with mounting screws (3).
2. Attach hydraulic connections (6). Remove tags.
3. Attach electrical wires in terminal box (4). Remove tags.
4. Install terminal box cover (2) and secure with four screws (1).

c. Replace Hydraulic Cylinder

1. Position hydraulic cylinder (12) on clevis mount (15) with holes aligned.
2. Insert rod (14) and secure with cotter pins (13).

3. Attach hydraulic connections (16). Remove tags.

4. Raise hydraulic cylinder.

5. Attach tow pin (18), rod (11) and cotter pin (17).

d. Test System.

1. Restore electrical power to solenoids. Remove tags.

2. Operate system in accordance with TM 55-1925-207-10.

3. Check for leaks and tighten connections as necessary.

4. Remove pail and properly discard contents.

5. Remove tags.

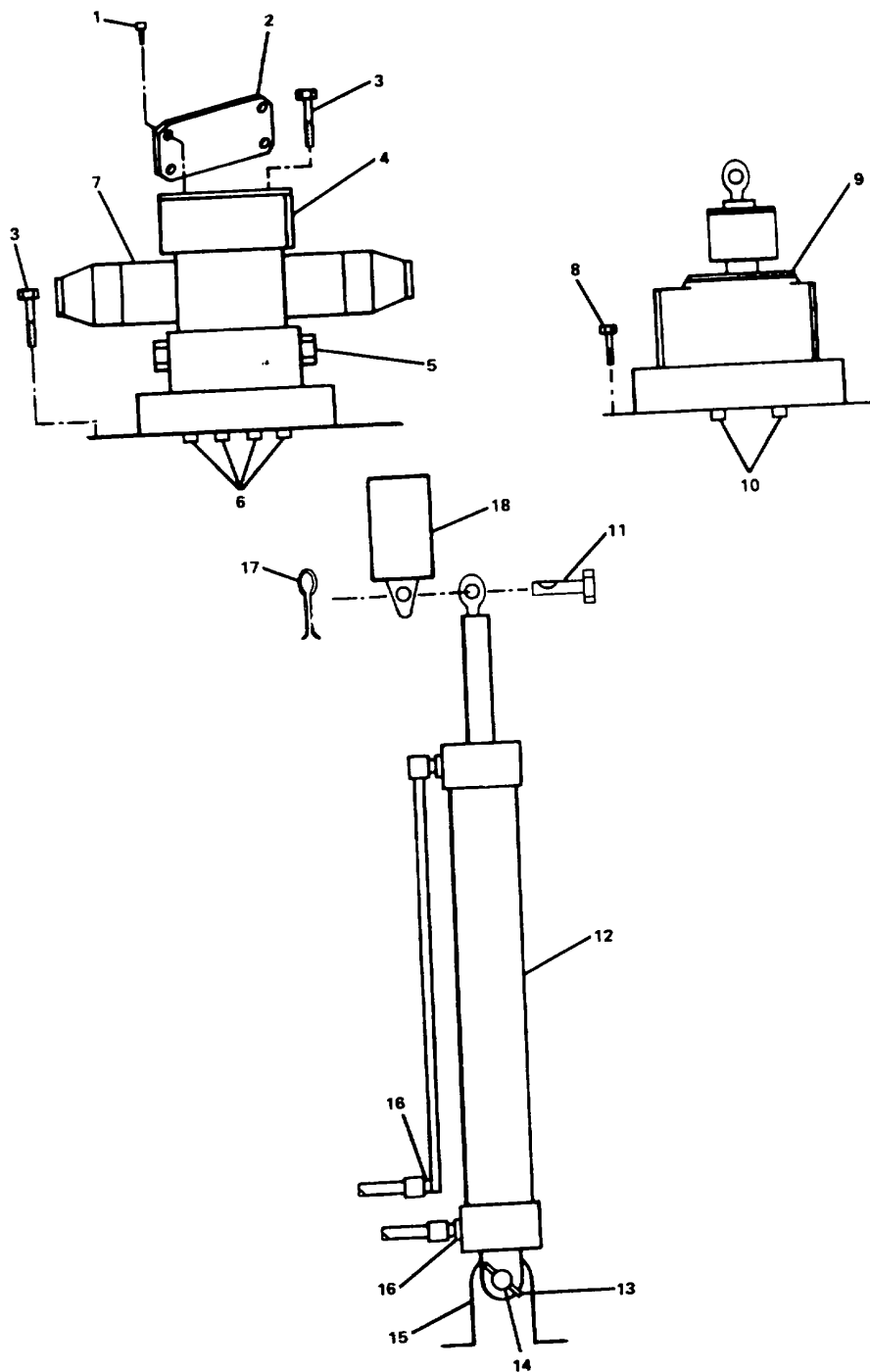


Figure 2-113. Replace Hydraulic Tow Pin Components.

MAINTENANCE OF INTERIOR COMMUNICATIONS

2-144. Replace Sound Powered Telephone.

This task covers:

a. Removal**b. Replacement****INITIAL SETUP**Tools

Tool kit, electrician's
5180-00-392-2895
Multimeter, 6625-01-265-6000

Equipment Condition

Notify the bridge that the sound
powered telephone(s) will be secured
until maintenance is complete.

Materials/Parts

Sound powered telephone sets P/Ns
MWT - 246J, SW- 23J,
SWLR- 243J, SW243J
Headset-chest set P/Ns H-200/U, A332

NOTE

The sound powered telephone system consists of similar sound powered telephones that contain identical handsets and headset-chest sets.

REMOVAL

- a. Remove headset-chest set (1, Figure 2-114) by disconnecting plug (2) from receptacle (3) on jackbox (4).
- b. Remove handset (5) by disconnecting telephone cord nut (6).
- c. Remove sound powered telephone.
 1. Remove screws (9) and front panel (10). Tag and disconnect wires.
 2. Remove hex head screws (7) securing telephone (8) to bulkhead.
 3. Remove telephone (8).

REPLACEMENT

- a. Replace sound powered telephone.
 1. Position telephone set (8) on bulkhead.
 2. Secure telephone with hex head screws (7).
 3. Remove screws (9) and front panel (10). Connect wires and remove tags.
 4. Install front panel (10). Secure with screws (9).
- b. Connect telephone cord and secure with telephone cord nut (6).
- c. Replace handset (5).
- d. Replace sound powered telephone headset - chest set (1). Connect headset - chest set to jackbox (4) by pushing plug (2) into receptacle (3).
- e. Notify the bridge that maintenance is complete on the sound powered telephone(s). Check for proper operation in accordance with TM 55-1925-207- 10.

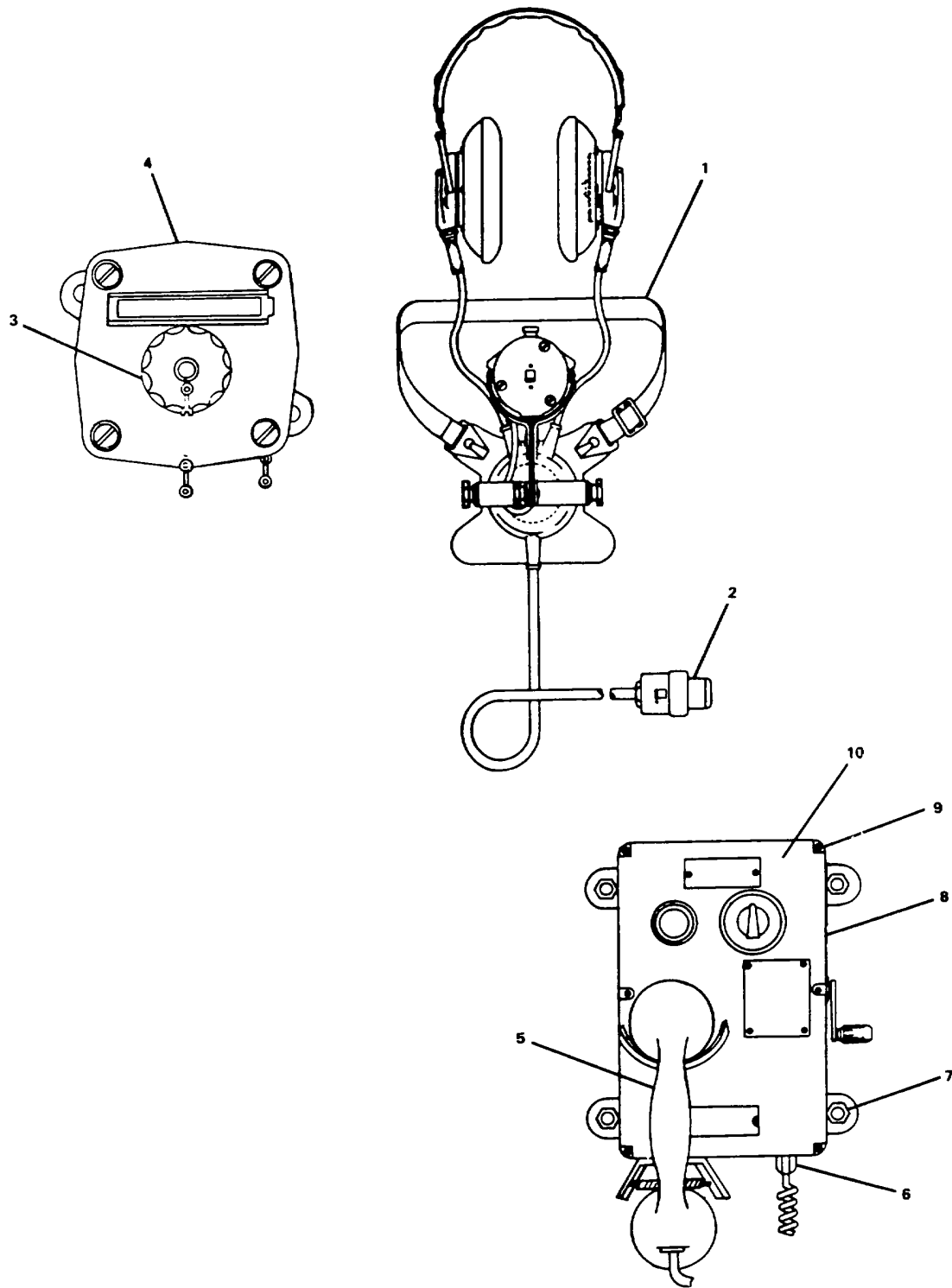


Figure 2-114. Remove Sound Powered Telephone (Typical).

2-145. Functional Test of Intercommunications System.

This task covers:

a. Test.

INITIAL SETUPTools

Multimeter, 6625-01-265-6000

Materials/PartsEquipment Condition

Intercommunications system operational.

Reference TM 55-1925-207-10.

NOTE

The following performance tests should be accomplished on a weekly basis or as directed by Maintenance Officer.

TEST

a. Check the two-way voice capabilities of each master station by selecting other stations in the system and carrying on two-way conversations. Transmissions and receptions should be clear, undistorted, and easily understood.

b. Check the indicators. The CALL lamps at the called stations should light. The REL lamp at the calling station should light. If a called station is busy, the BUSY light at the calling station should light.

c. Check the VOLUME control switch. Vary its position during a reception to verify that the intensity of the received speech can be controlled.

d. Check the handsfree capability by operating handsfree with another station in the system.

e. Check the DIMMER control switch by varying its position and observing the intensity of the panel illumination.

2-146. Test Intercommunications Station and Test Fixture.

This task covers:**a. Removal****b. Replacement**

INITIAL SETUPTools

Multimeter, 6625-01-265-6000

Materials/PartsEquipment ConditionIntercommunications station removed
(para. 2-147).Reference: TM 55-1925-207-10.

NOTE

The following performance tests should be accomplished when an intercommunications station or the test fixture is thought to be defective.

TEST**a. Test Setup.**

(1) Mate locating pins of intercommunication station (13, Figure 2-115) with test fixture holes (20). Press units together and secure with side straps (8).

(2) Press station PRESS TO RELEASE buttons (16). Verify all select buttons are out.

(3) Rotate station VOLUME (15) and DIMMER (11) knobs to maximum clockwise position.

(4) Connect microphone to station receptacle (14).

(5) Plug test fixture cord (19) into wall receptacle.

b. Polarity Test

(1) Place test fixture REVERSE/OFF/PHASE OK switch (3) to REVERSE. Verify POLARITY IND light (2) ■remains out.

(2) Place REVERSE/OFF/PHASE OK switch (3) to ■PHASE OK. Verify POLARITY IND light (2) goes out.

(3) Place REVERSE/OFF/PHASE OK switch (3) to OFF. ■Verify POLARITY IND light (2) remains out.

c. Call Lamp Test

(1) Place test fixture TALK/OFF/CALL switch (1) to CALL. Verify station CALL indicator (9) lights.

(2) Place test fixture TALK/OFF/CALL switch (1) to OFF. Verify station CALL indicator goes out.

d. Amplifier/Speaker Test.

(1) Place station HANDS FREE switch (12) in NORMAL.

(2) Place test fixture TALK/OFF/CALL switch (1) to TALK. Move microphone away from speaker. Speak into microphone. Verify voice is clearly reproduced with no microphonic howl.

e. Station Selector Audio Circuits Test.

(1) Place test fixture TALK/OFF/CALL switch (1) to TALK. Hold microphone close to speaker. Verify microphonic system howl.

(2) Place test fixture OUTPUT LOAD/STBY/TEST switch (4) to TEST. Verify howl stops/decreases.

(3) Return OUTPUT LOAD/STBY TEST switch (4) to STBY. Press station select pushbutton No. 1 (18). Verify system howls when microphone is near speaker.

(4) Place test fixture STATION SELECTOR 2/12 switch (22) in position 2. Verify howl stops/decreases.

(5) Release test fixture STATION selector switch. Depress station PRESS TO RELEASE switch (16). Verify howl returns.

(6) Repeat steps (3) through (5) for each station select pushbutton and corresponding STATION SELECT switch.

f. Station Selector Signal Circuits Test.

(1) Place test fixture TALK/OFF/CALL switch to OFF and OUTPUT LOAD/STBY/TEST switch (4) to STBY.

(2) If required, press station PRESS TO RELEASE button (16) so all select buttons are out.

(3) Place test fixture STATION SELECT switch 2/12 (22) in position 2. Press station select button No. 1 (18). Verify station BUSY (10) and REL (17) indicators light.

(4) Press station PRESS TO RELEASE button (16). Verify indicators (10 and 17) go out.

(5) Repeat above sequence for each station select button using corresponding test fixture STATION SELECT switch.

g. Remote Loadspeaker Circuit Test.

(1) Plug handset into test fixture receptacle (7). Place TALK/OFF/CALL switch (1) in TALK and OUTPUT LOAD/STBY/TEST switch (4) in OUTPUT LOAD.

(2) Place test fixture REMOTE TALK switch (6) in REMOTE TALK.

(3) Speak into handset. Verify voice is clearly reproduced on station speaker. Verify test fixture OUTPUT IND lamp (5) flickers on speech peaks.

(4) Place test fixture REMOTE TALK switch (6) in RECEIVE & HANDS FREE.

(5) Hold station HANDS FREE switch (12) in PRESS TO TALK and speak into station speaker.

(6) Verify voice is clearly reproduced on handset receiver. Verify test fixture OUTPUT IND lamp (5) flickers on speech peaks.

h. Handsfree Operation Test.

(1) Place test fixture TALK/OFF/CALL switch (1) to TALK and REMOTE TALK switch (6) to RECEIVE & HANDS FREE.

(2) Place station HANDS FREE switch (12) to HANDS FREE.

(3) Depress handset PTT switch and speak into station speaker.

(4) Verify voice is clearly reproduced on handset receiver. Verify test fixture OUTPUT IND lamp (5) flickers on speech peaks.

i. Conduct continuity checks on station or test set with multimeter as required.

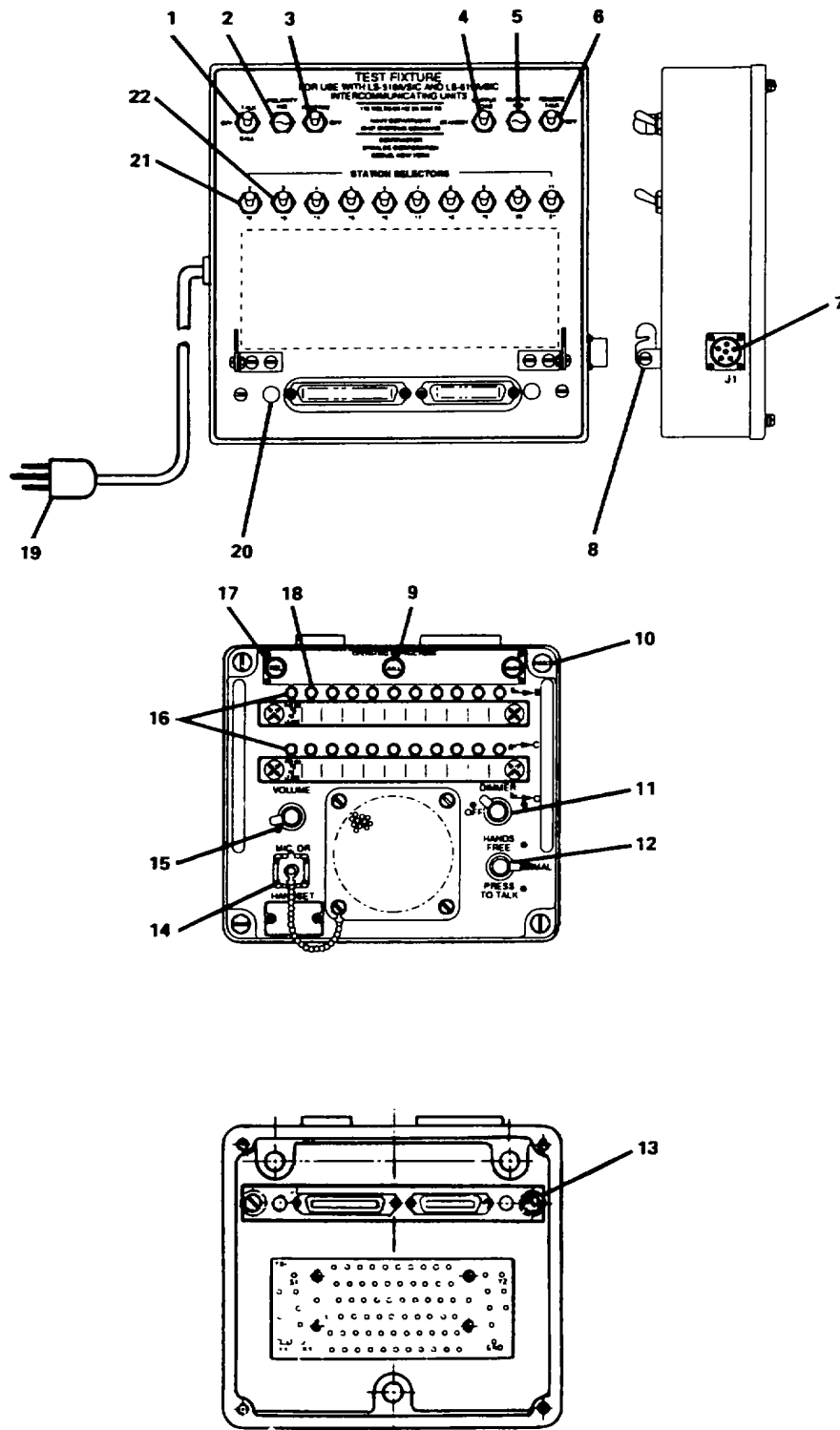


Figure 2-115. Test Intercommunications Unit.

2-147. Replace Intercommunications Station and Test Fixture.

This task covers:

- a. Removal.** **b. Replacement**
-

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895
Multimeter, 6625-01-265-6000

Equipment Condition

On PILOT HOUSE EMER DIST PANEL set
LS-519A/SIC INTERCOM circuit breaker to
OFF position and tag "Out of Service
- Do Not Operate."

Materials/Parts

Intercommunication unit (10)
P/N LS-519A/SIC
Test Fixture P/N 61690-090
Warning tags, Item 1, Appendix D

WARNING

Operation of this equipment involves the use of voltages which are dangerous to life. Proceed with caution when performing maintenance in areas where live circuits are exposed. Do not perform maintenance without the immediate presence or assistance of another person capable of rendering aid.

- a. Remove test fixture.
- (1) Unplug power cable (5, Figure 2-116) from receptacle.
(2) Remove test fixture (1).
- b. Remove intercommunications unit.
- (1) Remove four cover seal screws (2).

(2) Grasp handles (3) and pull straight out until unit (4) is removed from housing.

REPLACEMENT

- a. Replace intercommunications unit.
- (1) Position unit (4) in housing (2).
(2) Secure with four cover seal screws (2).
- b. Replace test set.
- (1) Position test fixture (1).
(2) Plug power cable (5) into receptacle.
(3) Set circuit breaker to ON position. Remove tag.
(4) Test IC System. Refer paragraph 2-145.

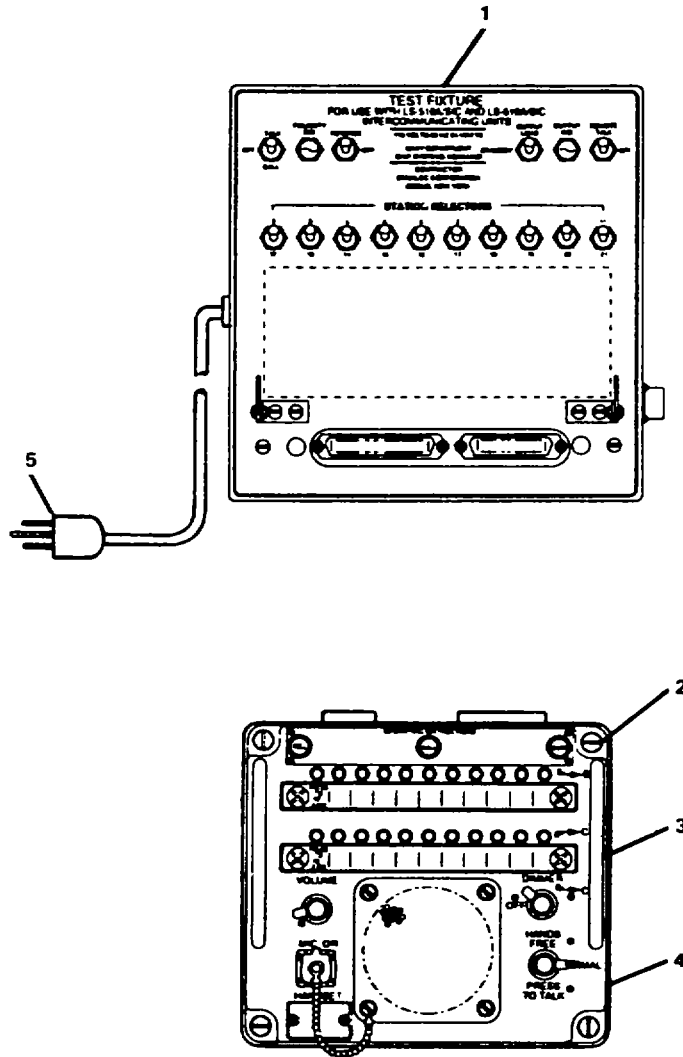


Figure 2-116. Remove Intercommunication Unit.

2-148. Repair Arms Storage and Radio Room Alarm System.

This task covers:

a. Disassembly

b. Repair

c. Assembly

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On 01,02 & MN DK EMER LTG PANEL
NO. 1 set PILOTHOUSE ALARM SWBD
circuit breaker to OFF position and tag
"Out of Service - Do Not Operate."

Materials/Parts

Door alarm switch (2)
P/N 9000S6202-74052
Rotary snap switch P/N MI 15743/3-003
Audible alarm buzzer (2)
P/N 9000S6504-73905
Indicator light P/N 578A626P3
Magazine sprinkler water switch P/N IC/W
Thermostat +750 to +2000 P/N 7L1 HH203
Warning tags, Item 1, Appendix D

General Safety Instruction

Notify bridge that shipboard alarm panel
will be secured for maintenance.

DISASSEMBLY

- a. Remove Door Alarm Switch.
 - (1) Remove three screws (4) and cover (1).
 - (2) Tag and disconnect electrical wiring.
 - (3) Remove three nuts (3). Remove door alarm switch (2).
- b. Remove Rotary Snap Switch.
 - (1) Remove four screws (5) and cover (6).
 - (2) Tag and disconnect electrical wiring.
 - (3) Remove three nuts (7). Remove rotary snap switch (8).
- c. Remove Magazine Sprinkler Water Switch.
 - (1) Close valve FM-52 in passageway.
 - (2) Remove three bolts (9). Remove back plate (12).
 - (3) Tag and disconnect electrical wiring.
 - (4) Remove four bolts (10). Remove magazine sprinkler water switch (11).

- d. Remove Thermostat.
 - (1) Remove four screws (13) and cover (14).
 - (2) Tag and disconnect electrical wiring.
 - (3) Remove two bolts (16). Remove thermostat (15).
- e. Remove Alarm Switchboard Indicator Light and Audible Alarm Buzzer.
 - (1) Loosen two screws (19) and clamp (20). Open door (18).
 - (2) Tag and disconnect electrical wires from indicator (17) and audible alarm (21).
 - (3) Remove attaching hardware. Remove indicator (17) and audible alarm buzzer (21).

REPAIR

Repair at this level of maintenance is by replacement of door alarm switch (2), rotary snap switch (8), magazine sprinkler water switch (11), thermostat (15), indicator (17) and audible alarm buzzer (21).

ASSEMBLY

a. Install Indicator Light and Audible Alarm Buzzer.

- (1) Position indicator (17) and audible alarm buzzer (21) on alarm switch door (18) secure with attaching hardware.
- (2) Connect electrical wires and remove tags.
- (3) Close door (18).
- (4) Position clamps (20) and tighten screws (19).

b. Install Thermostat.

- (1) Position thermostat (15) and secure with two bolts (16).
- (2) Connect electrical wiring and remove tags.
- (3) Install cover (14) and secure with four screws (13).

c. Install Magazine Sprinkler Water Switch.

- (1) Position magazine sprinkler water switch (13) with gasket and secure with four bolts (12).

- (2) Connect electrical wires and remove tags.

- (3) Install back plate (14) and secure with three bolts.

- (4) Open valve FM-52 and check for leaks.

d. Install Rotary Snap Switch.

- (1) Position rotary snap switch (8) and secure with three screws (7).

- (2) Connect electrical wires and remove tags.

- (3) Install cover (6) and secure with four screws (5).

e. Install Door Alarm Switch.

- (1) Position door alarm switch (2) and secure with three nuts (3).

- (2) Connect electrical wires and remove tags.

- (3) Install cover (1) and secure with three screws

- (4).

- f. Set circuit breaker to ON position and remove tags.

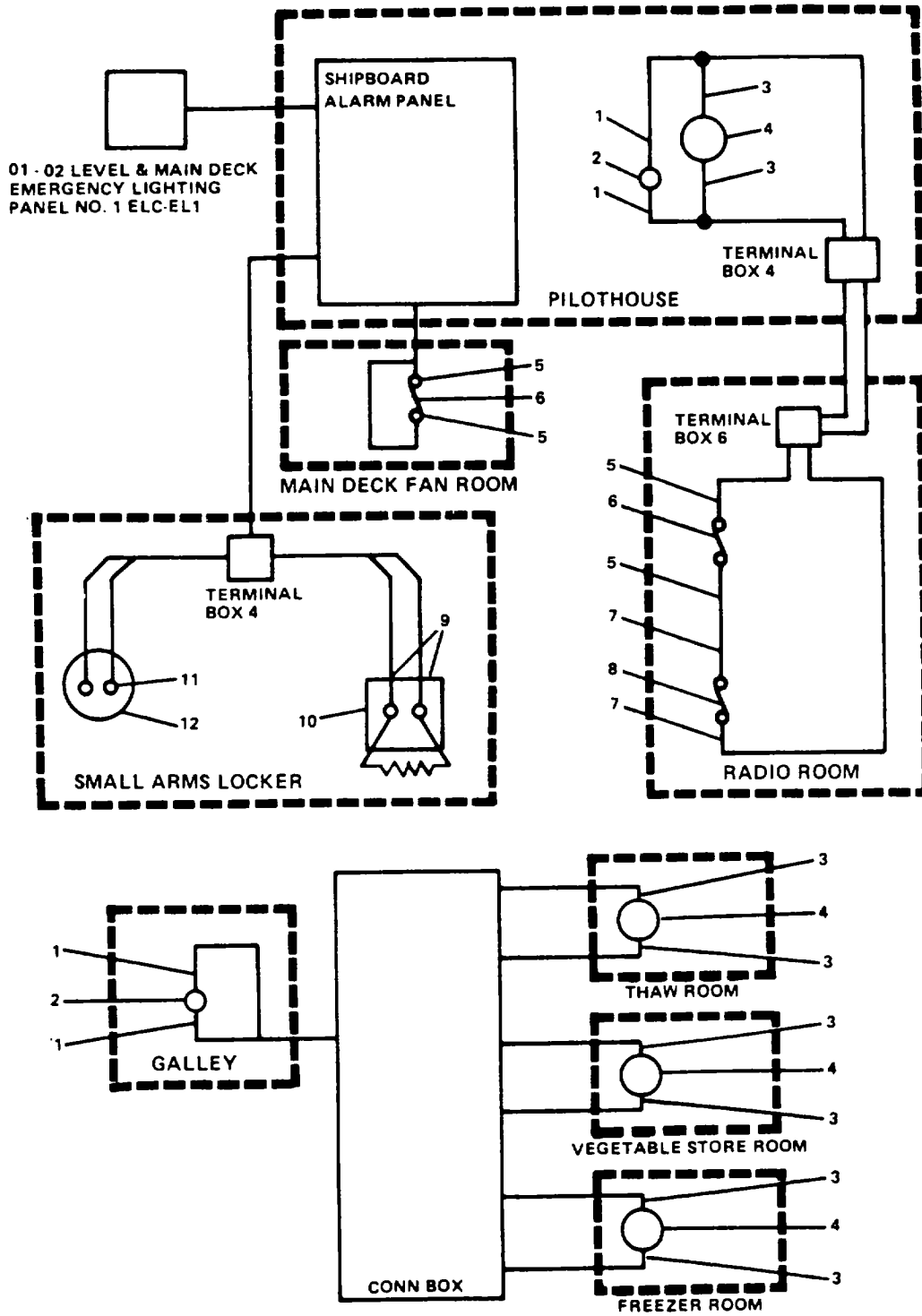
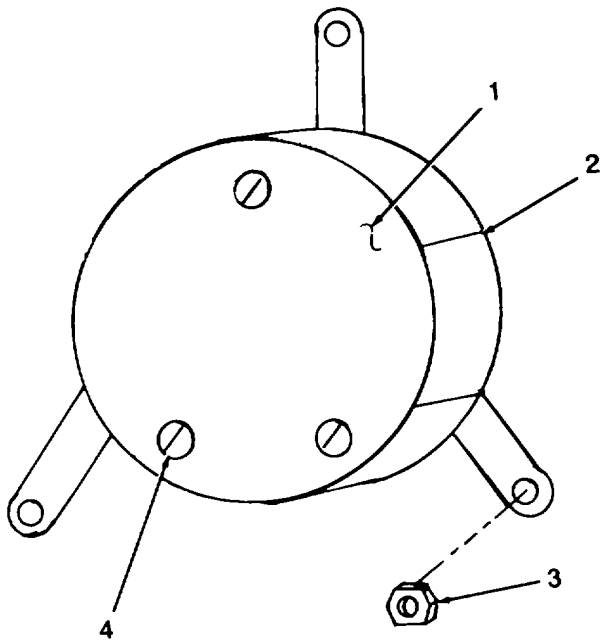
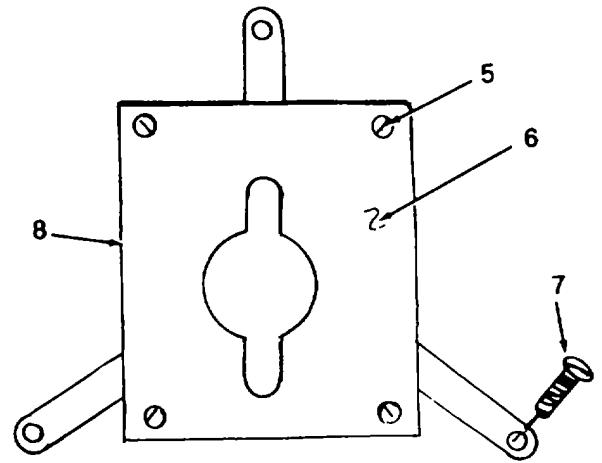


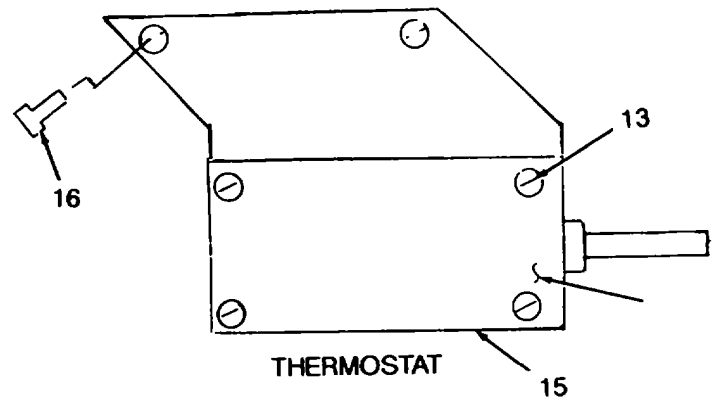
Figure 2-117. Arms Storage and Radio Room Alarm System (Sheet 1 of 2).



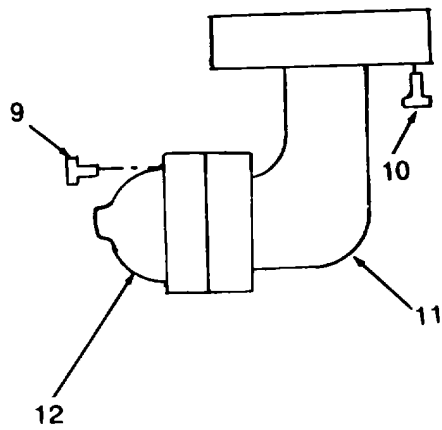
DOOR ALARM SWITCH



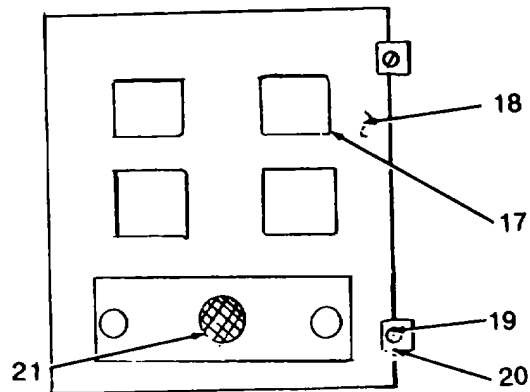
ROTARY SNAP SWITCH



THERMOSTAT



MAGAZINE SPRINKLER WATER SWITCH



ALARM SWITCHBOARD

Figure 2-117. Arms Storage and Radio Room Alarm System (Sheet 2 of 2).

2-149. Replace Engine Order Telegraph Panel

This task covers:

a. Removal

b. Replacement

INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On ENG RM EMER DIST PANEL NO. 1 set
ENGINE ORDER TELEGRAPH SYS
breaker to OFF position circuit and tag
"Out of Service - Do Not Operate."

Materials/Parts

EOT Panel P/N 301873-2, P/N 301874-2
Warning tag, Item 1, Appendix D

REMOVAL**WARNING**

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate."

- a. Remove four screws (1, Figure 2-118).
- b. Lift top panel (2) and turn over. Be careful not to damage panel.

- c. Tag and disconnect panel electrical from terminal boards (3)

- d. Remove E.O.T. panel.

REPLACEMENT

- a. Position and connect panel wiring to terminal boards (3). Remove tag(s).
- b. Install top panel (2) with black head screws (1). Tighten screws.
- c. Set circuit breaker to ON position. Remove tag.
- d. Operate E.O.T in accordance with TM 55-1925-207-10.

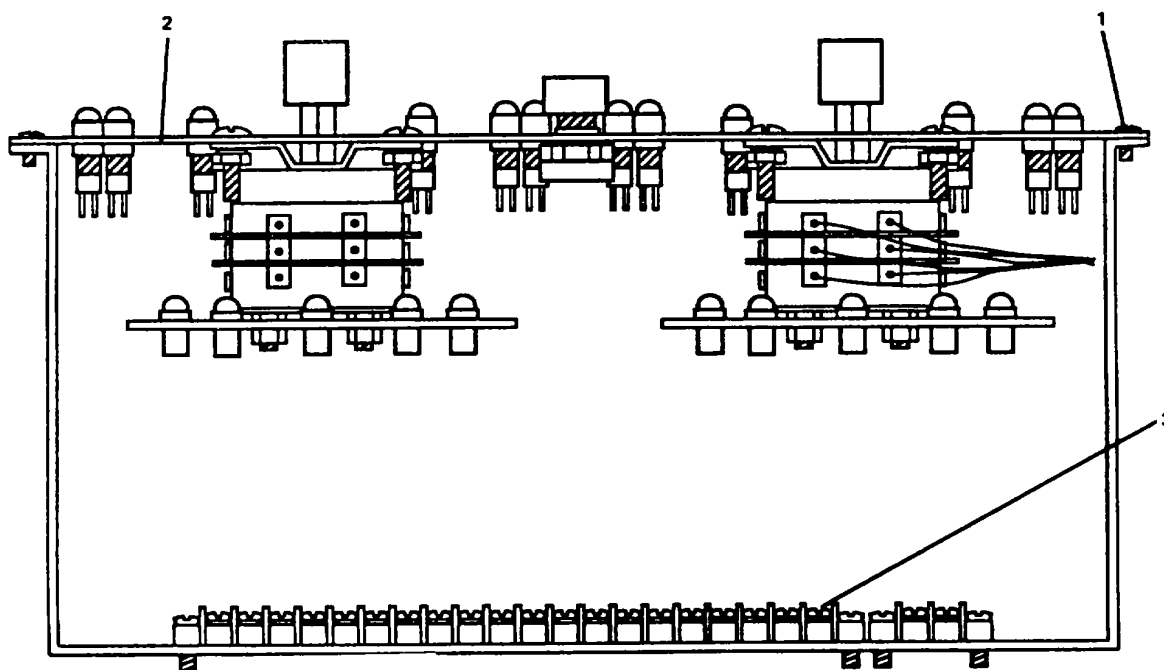
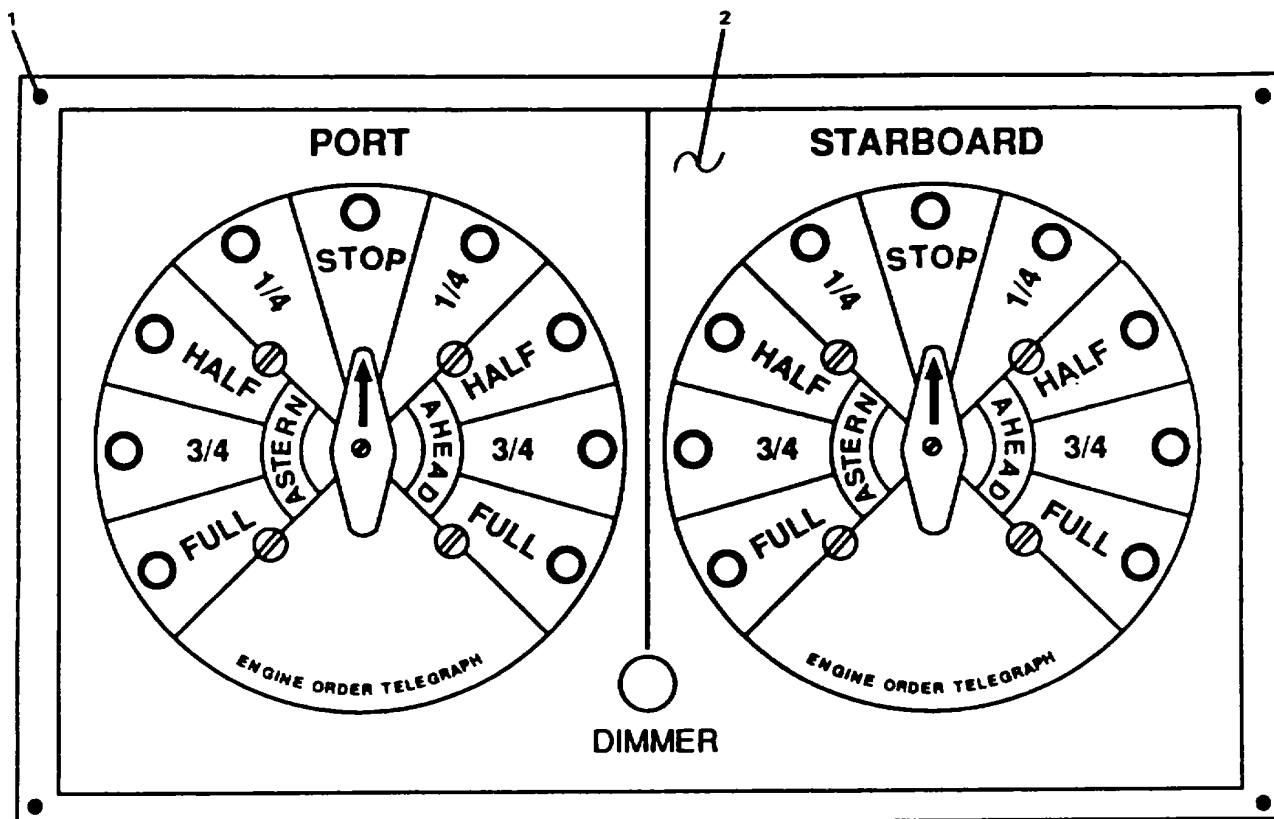


Figure 2-118. Replace E.O.T. Panel.

2-150. Replace/Repair General alarm Rotating Beacon**This task covers:**

- a. Removal b. Disassembly c. Repair d. Assembly e. Replacement**

INITIAL SETUPTools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

On ENG RM EMER DIST PANEL NO. 1
set ENG RM EMER LIGHTS PORT BOW
THRUSTER & AMS 1 EMER LTS, OR AMS 2
EMER LTS circuit breaker to OFF position
and tag "Out of Service - Do Not Operate."

Materials/Parts

Beacon, Rotating (3) P/N 870-02
Packing, preformed (3) P/N 870-205
Lamp (3) P/N 6192
Pyrex lens (9) P/N 6160
Motor assembly (3) P/N 6152
Dome, lexan red P/N 870-212
Warning tags, Item 1, Appendix D

General Safety Instructions

Notify bridge that General Alarm System
will be secured for maintenance.

REMOVAL

- a. Tag and disconnect electrical wiring (1, Figure 2-119) to rotating beacon.
- b. Remove two hex head nuts (2) and lockwashers (3). Remove rotating beacon.

DISASSEMBLY

- a. Remove locking screw (4) and clamp ring (5).
- b. Remove dome (6) by turning counterclockwise. Remove preformed packing (7) and discard.
- c. Tag and disconnect electrical wiring (8) by removing wire nuts (9).
- d. Remove roto-beam assembly (10) by removing four screws (11).
- e. Remove associated hardware and remove tie rod assembly (12) from motor assembly (13).
- f. Turn lamp (14) 1/4 turn and remove from lamp holder.
- g. Remove lens (15) from frame (16).
- h. Remove motor assembly (13).

REPAIR

Repair at this level of maintenance is by replacement of dome (6), motor assembly (13), lamp (14), lens (15), and preformed packing (7),

ASSEMBLY

- a. Replace lens (15) in frame (16).
- b. Position frame (16) over motor assembly (13).
- c. Install lamp (14) in lamp holder.
- d. Install tie rod assembly (12) and secure to motor assembly (13) with associated hardware.
- e. Install roto-beam assembly (10) with four screws (11).
- f. Connect electrical wiring (8) with wire nuts (9). Remove tags.
- g. Position dome (6) with preformed packing (7) over light base and turn clockwise to secure.
- h. Install clamp ring (5) and secure with locking screw (4).

REPLACEMENT

- a. Position rotating beacon over mounting studs.
- b. Secure beacon with two hex head nuts (2) and lockwashers (3).
- c. Connect electrical wiring (1) and remove tags.
- d. Set circuit breaker to ON position. Remove tag(s).
- e. Notify bridge maintenance is complete.
- f. Operate system in accordance with TM 55-1925-207-10.

2-331

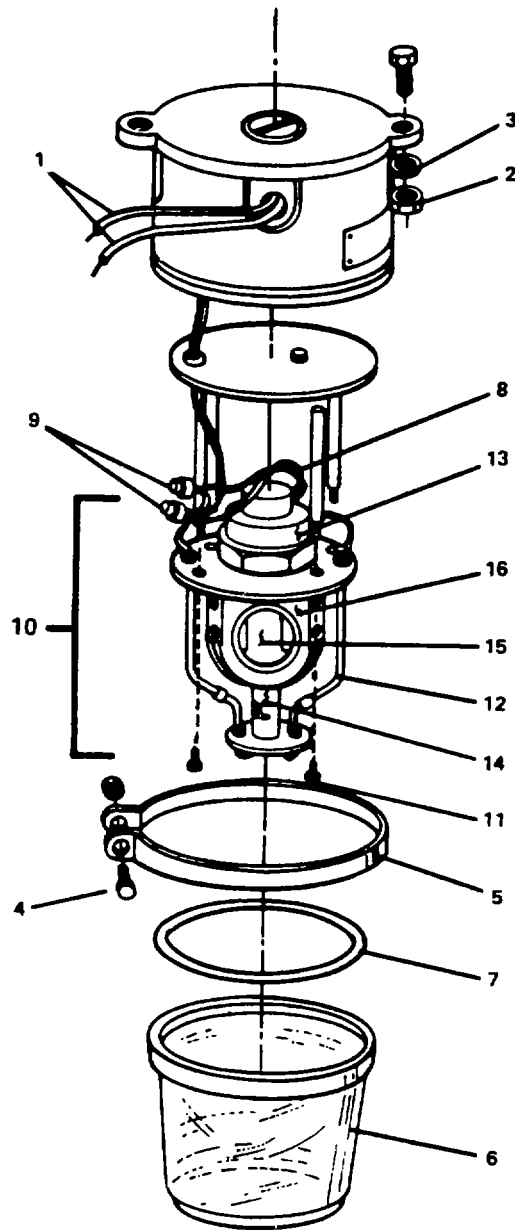


Figure 2-119. Replace/Repair Rotating Beacon.

2-151. Repair Battery Charger (General Alarm and Miscellaneous Electronics.)

This task covers:

a. Disassembly**b. Repair****c. Assembly**

INITIAL SETUP

Tools

Tool kit, electrician's,
5180-00-392-2895

Equipment Condition

On EMER LOAD CTR DISTRIBUTION
PANEL set BATTERY CHARGER GENERAL
ALARM circuit breaker to OFF position and
tag "Out of Service - Do Not Operate."**Materials/Parts**DC Ammeter (0-50) P/N P1 DA-E50-A1 S
Cartridge Fuse (4)
P/N F15B250V30A, P/N P8-C2-B50
Circuit Breaker P/N P4-WQC-35A2
Warning tags, Item 1, Appendix D

WARNING

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this, or any other electrical equipment, turn power and control circuit breakers OFF and tag "Out of Service Do Not Operate."

DISASSEMBLY

Refer to paragraph 2-109.

REPAIR

Refer to paragraph 2-109.

ASSEMBLY

Refer to paragraph 2-109.

2-152. Replace/Repair Battery Bank.

This task covers:

- a. Replacement b. Repair
-

INITIAL SETUPTools

Tool kit, electrician's,
5180-00-392-2895

Equipment Condition

On EMER LOAD CTR DISTRIBUTION
PANEL set BATTERY CHARGER
GENERAL ALARM circuit breaker to
OFF position and tag "Out of Service
- Do Not Operate."

Materials/Parts

Storage Battery, P/N T12-120
Warning Tags, Item 1, Appendix D

REPLACEMENT

Refer to paragraph 2-113.

REPAIR

Refer to paragraph 2-114.

2.153. Replace/Repair Entertainment System.

This task covers:

a. Removal.

b. Repair.

c. Replacement

INITIAL SETUP

Tools

Tool kit, electrician's
5180-00-392-2895

Equipment Condition

Color television and video cassette
recorder turned off.

Materials/Parts

Color television P/N 20RV79
Video cassette recorder P/N VC-A105U

REMOVAL

- a. Remove video cassette recorder (VCR) plug (3, Figure 2-120) from wall outlet.
- b. Remove color television (TV) plug (6) from wall outlet.
- c. Disconnect cable (10) from TV jack on rear of VCR and input jack on rear of TV.
- d. Disconnect cable (1) going to RF IN on rear of VCR.
- e. Remove retaining screw (3) from bottom of shelf.
- f. Remove VCR (2).
- g. Remove screws (8) and retaining bracket (9) from TV (7).
- h. Remove TV (7).

REPAIR

Repair at this level of maintenance is by replacement of VCR (2) and TV (7).

REMOVAL

- a. Position TV (7) and retaining bar (9). Secure with screws (8).
- b. Position VCR (2). Secure with screws (4).
- c. Connect cable (1) into rear of VCR.
- d. Connect cable (10) into input jack on TV and TV jack on rear of VCR.
- e. Plug TV plug (6) and VCR plug (3) into wall outlet.
- f. Turn TV and VCR on and check for proper operation.

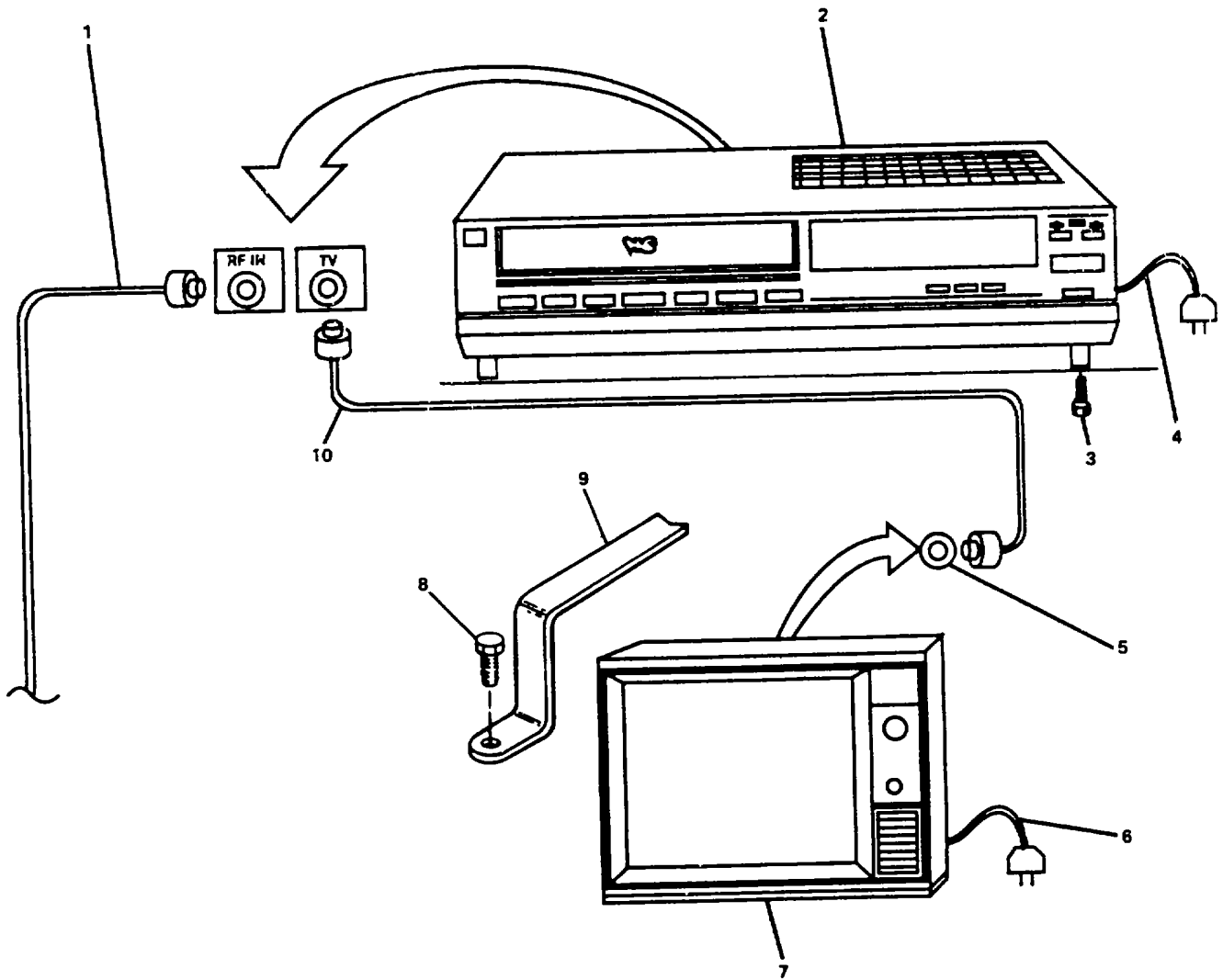


Figure 2-120. Replace Entertainment System.

MAINTENANCE OF PORTABLE PUMPS

2-154. Adjust Pump, Engine Driven Centrifugal (Fire Fighting, portable).

This task covers:

a. Adjustment.**INITIAL SETUP**Tools

Tool kit, general mechanic's
5180-00-629-9783

Equipment Condition

Pump shut down and tagged
"Out of Service - Do Not Operate."

Materials/Parts

Warning tags, Item 1, Appendix D

ADJUSTMENT1. FAN BELT TENSION ADJUSTMENT.

- a. Remove three nuts (1, Figure 2-121) and remove fan belt guard (2).
- b. Remove four screws from fan cover (4).
- c. Loosen four bolts (6) on priming pump mounting bracket (7).
- d. Loosen two bolts (9) on priming pump stabilizer bracket (10).
- e. Slide priming pump (8) out to tighten fan belt (13).
- f. When fan belt deflection is 5/32 inch, tighten four bolts (6) on priming pump mounting bracket (7) and two bolts (9) on priming pump stabilizer bracket (10).
- g. If fan belt shows sign of wear or proper tension cannot be obtained, replace fan belt (para. 2-156).
- h. Replace fan cover (4) and fan belt guard (2).

2. CARBURETOR ADJUSTMENT**CAUTION**

Fuel adjustment screws must be bottomed lightly.
Do not force.

- a. Turn idle fuel adjustment screw (1, Figure 2-122) and main fuel adjustment screw (2) clockwise until they bottom.

- b. Turn idle fuel and main fuel adjustment screws counterclockwise 1 1/4 turns.

NOTE

The carburetor is now adjusted slightly to the side. If a leaner adjustment is required, turn adjustment screws clockwise 1/8 of a turn.

3. IGNITION TIMING.

- a. Remove spark plug wires (3) from spark plugs.
- b. Remove retractable starter (5, Figure 2-121) by remounting three hex bolts.
- c. Unscrew and remove three hex head bolts (11) and remove starter pulley (12).
- d. Twist fan belt (13) out of the way.

CAUTION

When adjusting the starter assembly, take care not to damage the coil windings.

- e. Loosen the stator assembly (1, Figure 2-123) mounting screws (2) through the holes in the flywheel.

f. To correct timing, rotate the stator assembly (1) as required (clockwise to retard the timing; counterclockwise to advance the timing).

g. Tighten stator assembly (1) mounting screws (2).

h. Replace fan belt (16).

i. Replace starter pulley (12, Figure 2-121). Secure with three hex head bolts (11).

j. Replace retractable starter (5). Secure with three hex head bolts.

k. Replace spark plug wires (3).

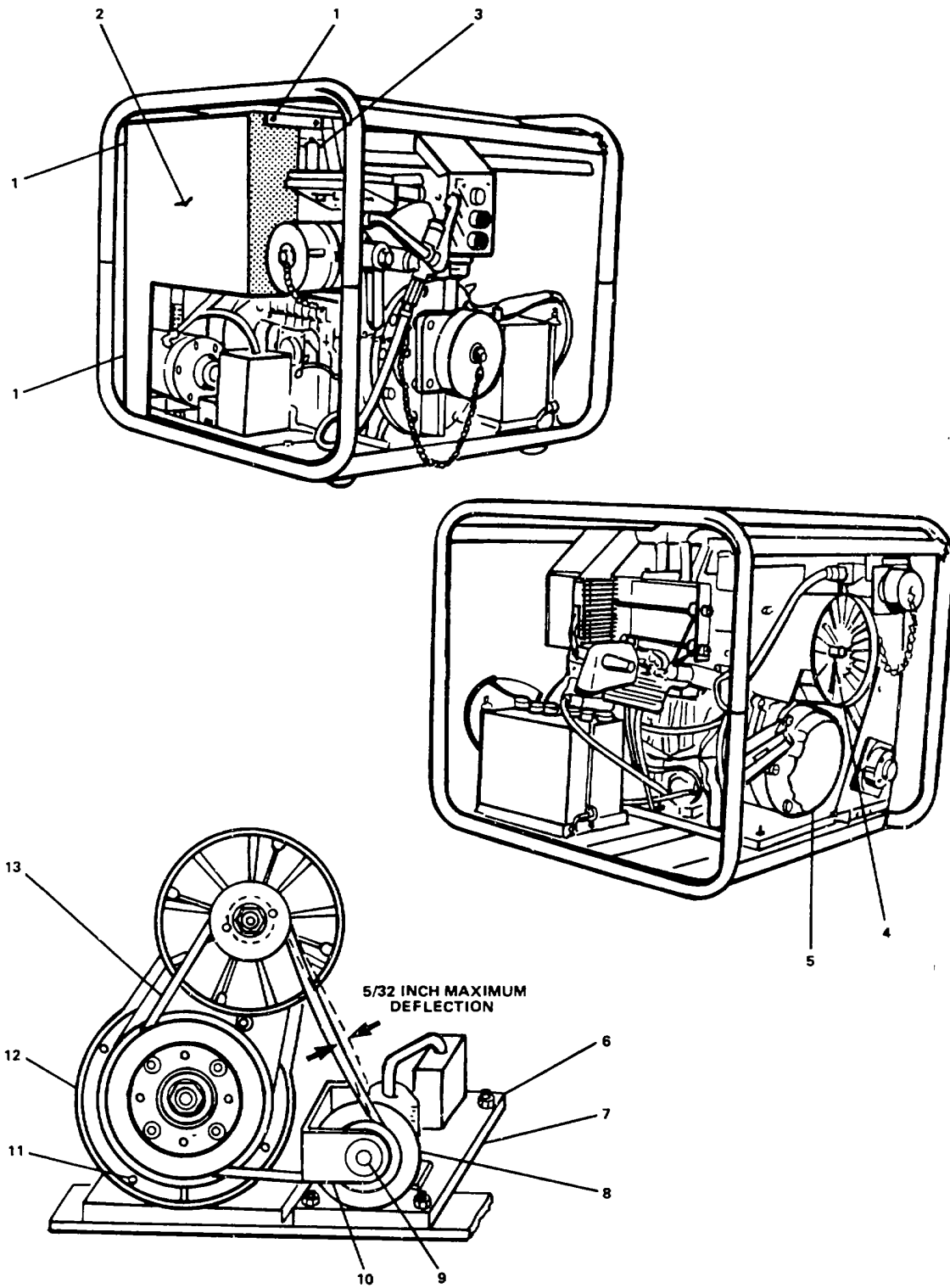


Figure 2-121. Fan Belt Tension Adjustment.

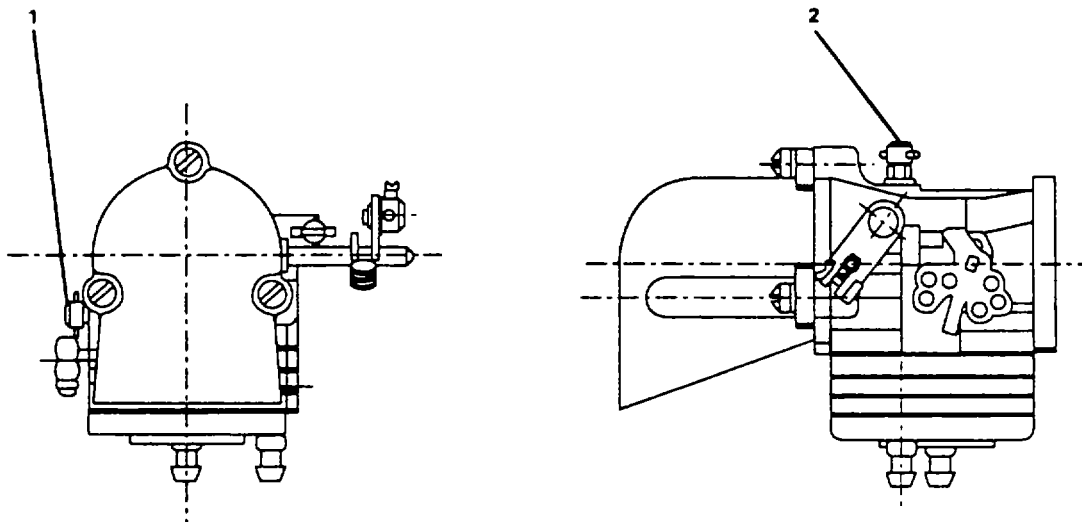


Figure 2-122. Carburetor Adjustment

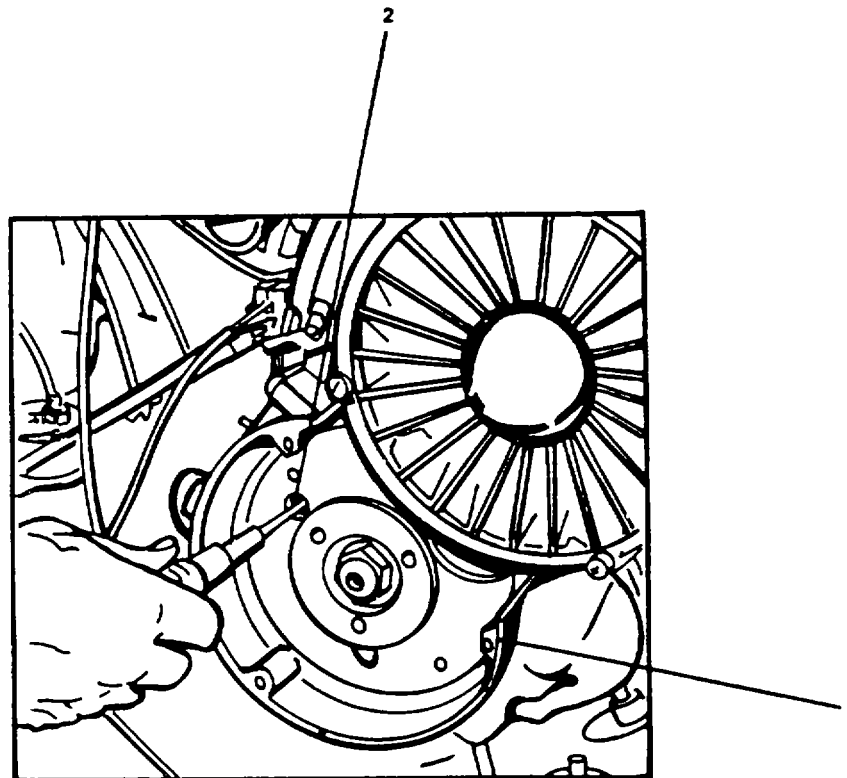


Figure 2-123. Ignition Timing.

2-155. Test Pump, Engine Driven Centrifugal (Fire Fighting), Portable.**This task covers:****a. Test.****INITIAL SETUP**Tools

Tool kit, general mechanic's
5180-00-629-9783

Equipment Condition

Pump operational.

Materials/Parts**TEST****1. PERFORMANCE TEST.**

- a. Operate pump (in accordance with TM 55-1925-207-10) at a suction lift of 16 feet.
- b. Verify that the pump pumps 250 gpm at a discharge pressure of 100 psi.
- c. Check piping, valves, and fittings for any indication of leakage.
- d. Replace any leaking component (refer to paragraph 2-156.) and retest the pump.
- e. Shut down pump in accordance with TM 55-1925-207-10.

2. HYDROSTATIC LEAKAGE TEST.

- a. Shut down pump. Refer to TM 55-1925-207-10.
- b. Remove check valve (1, Figure 2-124) in exhaust cooling line (paragraph 2-156) and reinstall it in the opposite direction.

- c. Remove check valve (2) in priming system line (paragraph 2-156) and reinstall it in the opposite direction.
- d. Connect fire pump to a water pressure source at suction inlet (3), not to exceed 150 psi
- e. With water pressure applied, open discharge valve (4) until water comes out of discharge line.
- f. Close discharge valve and allow pressure to rise in pump.
- g. Inspect pump for leakage.
- h. Shut down pump and disconnect water pressure to pump.
- i. Replace any leaking component and retest pump.
- j. Remove check valve (2) (paragraph 2-156) and reinstall it in the normal flow direction.
- k. Remove check valve (1) (paragraph 2-156) and reinstall it in the normal flow direction.
- l. Operate pump in accordance with TM 55-1925207-10.

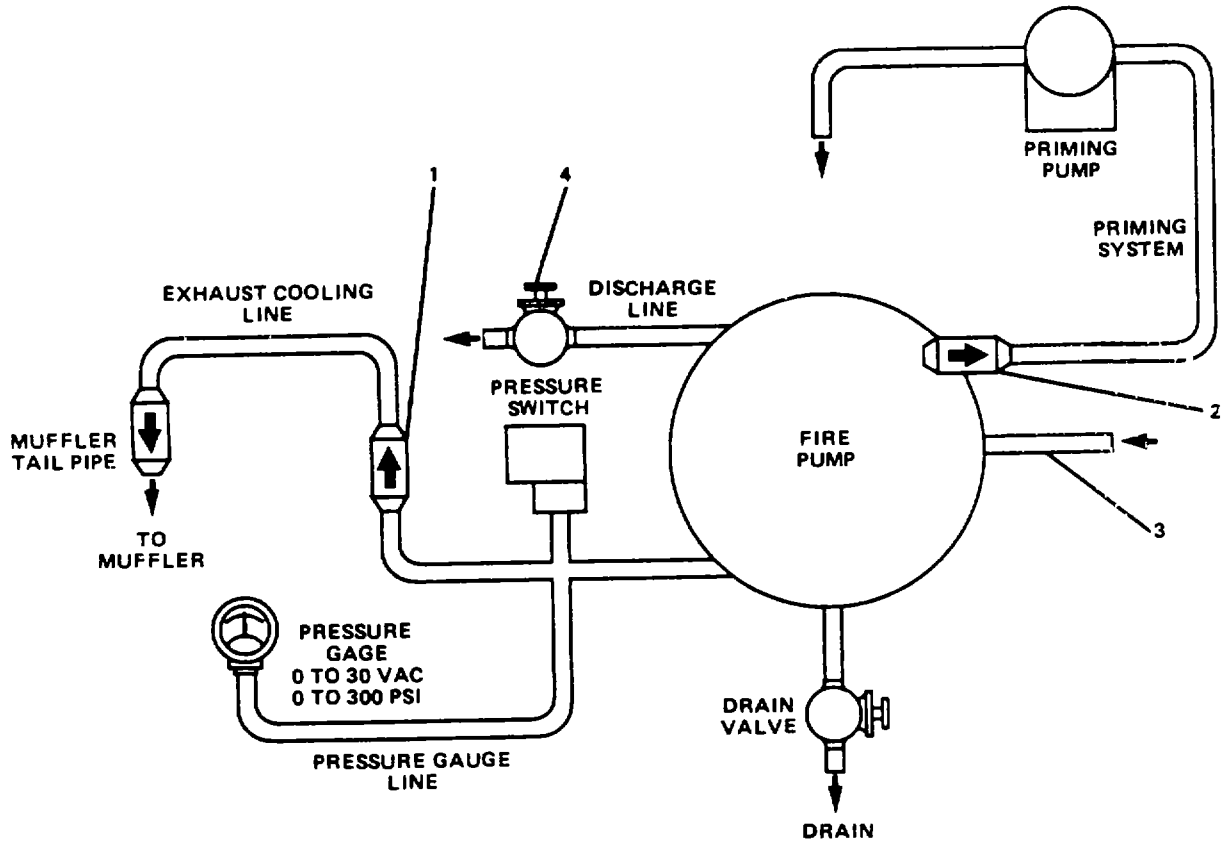


Figure 2-124. Hydrostatic Leakage Test.

2-156. Repair Pump, Engine Drive Centrifugal (Fire Fighting), Portable.

This task covers:

a. Removal**b. Repair****c. Replacement.****INITIAL SETUP**Tools

Tool kit, general mechanic's
5180-00-629-9783

Equipment Condition

Pump shutdown and tagged
"Out of Service - Do Not Operate."

Materials/Parts

Pump P/N XPE5101
V-belt P/N MS51065-33
Spark Plug P/N RN3C
Discharge valve P/N 2892-SPEC-R-F
Check valve P/N PE-1567, PE-2567, PE-3596
Antiseize compound, Item 6, Appendix D
Silicone compound, MIL-S-8660, Item 8,
Appendix D
Warning Tags, Item 1, Appendix D
General purpose cleaner, P-D-680
Type II, Item 9, Appendix D
Wiping rags, Item 2, Appendix D
Scale removing compound, PS-120,
Item 10, Appendix D

REMOVAL**1. REMOVE FAN BELT.**

- a. Remove three nuts (1, Figure 2-125) and remove fan belt guard(2).
- b. Remove four screws and fan cover (6).
- c. Loosen four bolts (9) on priming pump mounting bracket (10) .
- d. Loosen two bolts (11) on priming pump stabilizer bracket (12).
- e. Remove retractable starter (7) by removing three hex head bolts (8).
- f. Using a spanner wrench, hold fan pulley (13) and remove nut and washer (14).
- g. Unscrew and remove three hex head bolts (15) and remove starter pulley (16).
- h. Remove fan belt (17).

2. REMOVE SPARK PLUG.

- a. Remove spark plug wire (3, Figure 2-125).
- b. Unscrew and remove spark plug.

3. REMOVE DISCHARGE VALVE.

- a. Unscrew discharge cap and chain (5, Figure 2-125).
- b. Unscrew and remove four cap screws and remove discharge valve ,4)
- c. Clean discharge valve as follows:

WARNING

Observe no smoking regulation and avoid prolonged contact with, or inhalation of, cleaning solvents. Avoid use near heat or open flame and provide adequate ventilation.

WARNING**Use eye protection when disconnecting valves or piping.**

(1) Wash discharge valve carefully with general purpose cleaner. Salt or scale deposits on surfaces may be removed by using scale removing compound.

(2) Blow out and dry internal passage and hose fitting of discharge valve with filtered compressed air.

(3) Wipe external surfaces of discharge valve dry with clean wiping rag.

d. Replace discharge valve if it shows signs of wear or damage.

4. REMOVE CHECK VALVE FROM PUMP BODY.

a. Hold nut (1, Figure 2-126) with wrench, unscrew check valve (2) counterclockwise and remove.

b. Loosen nut (3) and separate exhaust cooling pipe (4) from check valve (7).

c. Unscrew nut (5) and remove check valve (7) from nipple (6).

d. Clean check valves (refer to STEP 3.c.).

5. REMOVE CHECK VALVE FROM MUFFLER EXHAUST ASSEMBLY.

a. Remove three nuts (1, Figure 2-125) and remove fan belt guard (2).

a. Hold coupling (1, Figure 2-127) with pipe wrench and unscrew check valve (2) and remove .

b. Clean check valve (refer to STEP 3. c)

REPAIR

Repair at this level of maintenance is by replacement of fan belt (17, Figure 2-125), spark plugs (3, Figure 2-125) discharge valve (4, Figure 2-125), check valves (2 and 7, Figure 2-126) and check valve (2, Figure 2-127).

REPLACEMENT**1. REPLACE CHECK VALVE IN MUFFLER EXHAUST ASSEMBLY.**

a. Apply a thin coat of silicone compound to threads of check valve (2, Figure 2-127).

b. Hold coupling (1) with pipe wrench and screw check valve (2) into coupling in a clockwise direction until tight.

c. Install fan belt guard (2, Figure 2-125) and secure with nuts (1).

2. REPLACE CHECK VALVE IN PUMP BODY.

a. Apply a thin coat of antiseize compound to threads of valves.

b. Screw check valve (7, Figure 2-126) onto nipple (6) until tight. Tighten nut (5).

c. Reconnect exhaust cooling pipe (4) to check valve (7) by tightening nut (3).

d. Screw check valve (2) into nut (1) until tight.

3. REPLACE DISCHARGE VALVE.

a. Install discharge valve (4, Figure 2-125).

b. Install capscrews.

c. Install discharge cap and chain (5).

4. REPLACE SPARK PLUG.

a. Screw in spark plug.

b. Replace spark plug wire (3, Figure 2-125).

5. REPLACE FAN BELT.

a. Install fan belt (17, Figure 2-125).

b. Install starter pulley (16) and secure with three hex head bolts (15).

c. Using a spanner wrench, hold fan pulley (13) and install nut and washer (14).

d. Install retractable starter (7). Secure with three hex head bolts (8).¹

e. Adjust fan belt tension in accordance with para. 2-154.

6. OPERATE PUMP.

a. Remove tags.

b. Test pump in accordance with paragraph 2-155.

c. Adjust pump in accordance with paragraph 2-154.

d. Operate pump in accordance with TM 55-1925-207-10.

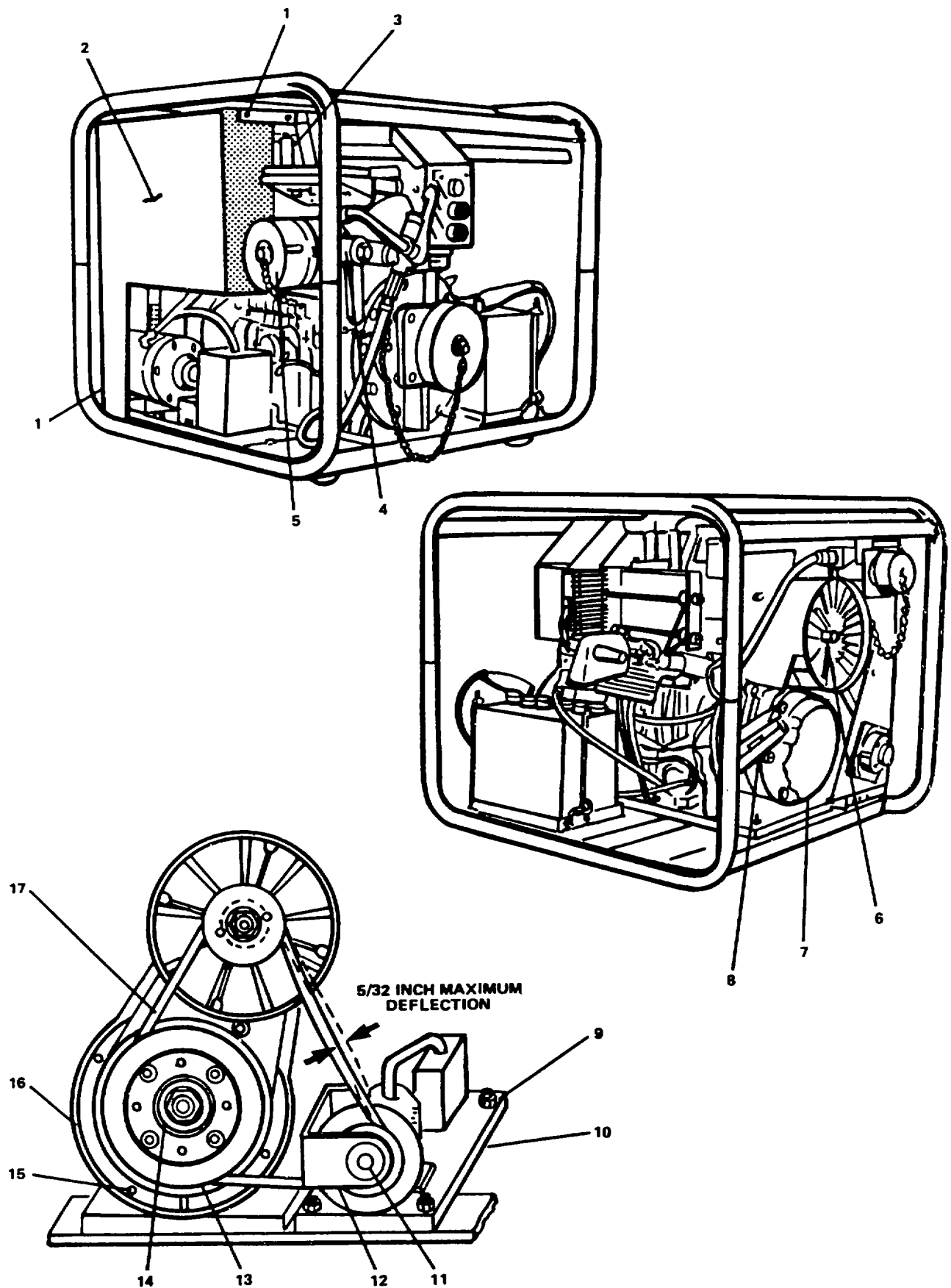


Figure 2-125. Repair Fire Fighting Pump.
2-345

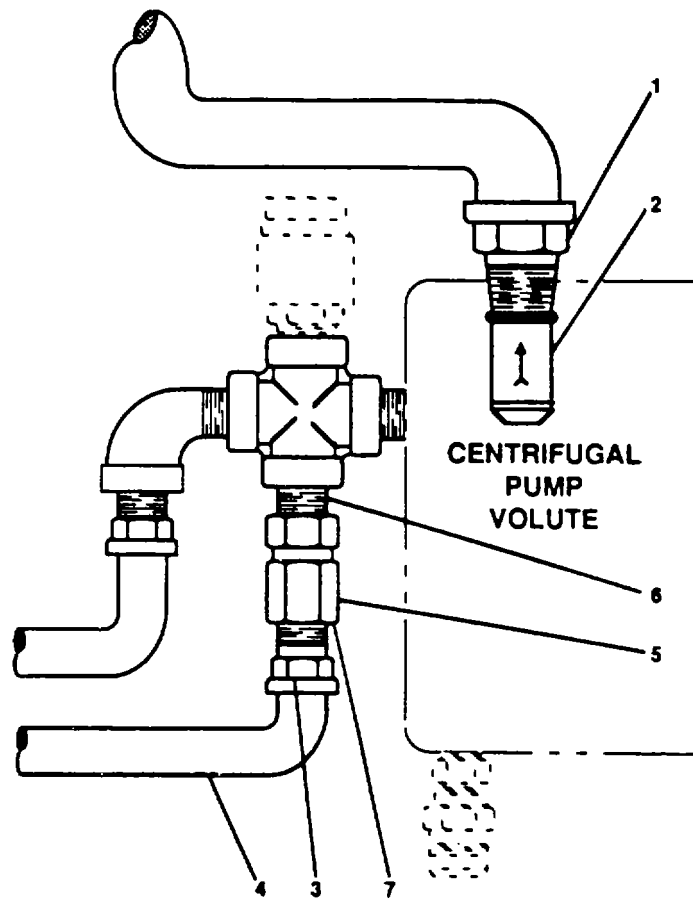


Figure 2-126. Remove Check Valve (Pump Body).

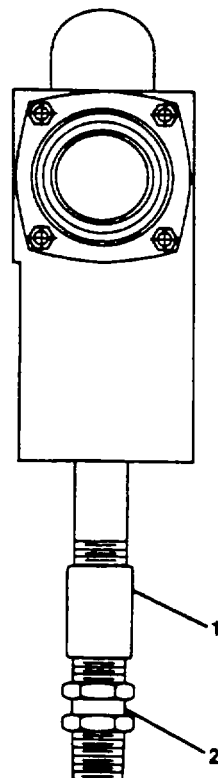


Figure 2-127. Remove Check Valve (Muffler Exhaust Assembly).
2-346

2-157. Repair Centrifugal Electrical Submersible Pump.

This task covers:

a. Disassembly

b. Repair

c. Assembly.

INITIAL SETUPTools

Tool kit, general mechanic's
5180-00-629-9783

Equipment Condition

Pump out of service.

Materials/Parts

Submersible pump P/N 4327K4
Cover P/N 2519
Base P/N 2516
Screen P/N 2702
Impeller P/N 2520
Motor P/N 2507

NOTE

Repair at this level of maintenance is normally by replacement of the centrifugal electrical submersible pump (1, Figure 2-128). The following procedure is for replacement of individual components.

DISASSEMBLY

- a. Remove attaching hardware and cover (2, Figure 2-128).
- b. Remove attaching hardware and base (4).
- c. Remove screen (6) from base (4).
- d. Remove impeller (5) from motor (3).

2-157. Repair Centrifugal Electrical Submersible Pump.

This task covers:

- a. Disassembly, b. Repair c. Assembly.

INITIAL SETUPTools

Tool kit, general mechanic's
5180-00-629-9783

Equipment Condition

Pump out of service.

Materials/Parts

Submersible pump P/N 4327K4
Cover P/N 2519
Base P/N 2516
Screen P/N 2702
Impeller P/N 2520
Motor P/N 2507

NOTE

Repair at this level of maintenance is normally by replacement of the centrifugal electrical submersible pump (1, Figure 2-128). The following procedure is for replacement of individual components.

DISASSEMBLY

- Remove attaching hardware and cover (2, Figure 2-128).
- Remove attaching hardware and base (4).
- Remove screen (6) from base (4).
- Remove impeller (5) from motor (3).

REPAIR

Repair at this level of maintenance is by replacement of cover (2), motor (3), base (4), impeller (5) and screen (6).

ASSEMBLY

- Install impeller (5) on motor (3).
- Install screen (6) in base (4).
- Install base (4) on motor (3). Secure with attaching hardware.
- Install cover (2). Secure with attaching hardware.

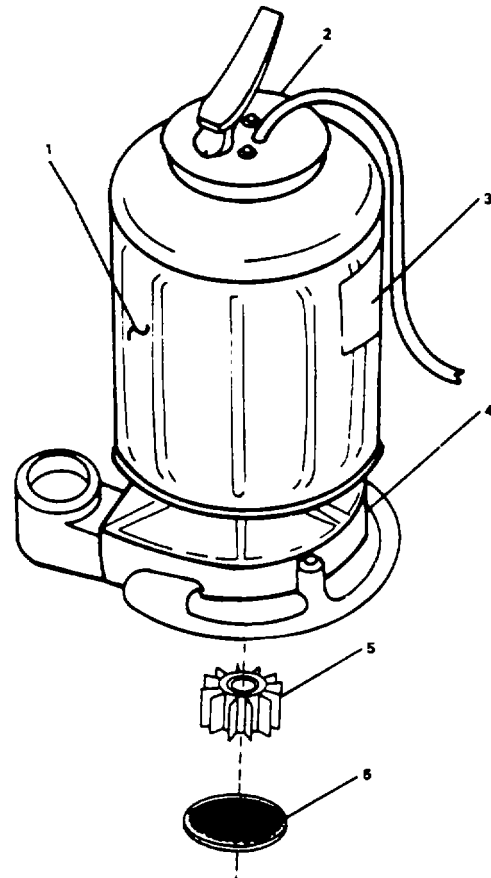


Figure 2-128. Replace Centrifugal Electric Submersible Pump.

MAINTENANCE OF ELECTRIC MOTORS

2-158. Replace Fuel Oil Transfer Pump No. 1 Motor, Electric

This task covers:

a. Removal

b. Replacement.

INITIAL SETUPToolsTool kit, general mechanic's
5180-00-629-9783Tool kit, electrician's
5180-00-392-2895

Endless sling 3940-01-183-9412

Materials/Parts

Motor, electric P/N 926743VQ

Warning tags, Item 1, Appendix D

Equipment Condition

On Fuel Oil Transfer Pump No. 1 motor controller place disconnect switch to OFF position and tag "Out of Service - Do Not Operate."

Repeat entire procedure for replacement of pump No. 2 motor, electric.

WARNING

Death or serious injury can result from contact with live electrical circuits. Before beginning work on this, or any other electrical circuit or equipment, ensure electrical power is OFF, locked out, and tagged to prevent TURN ON during maintenance.

NOTE

Electrical junction boxes may vary in size, shape, and mounting position of box on motor frame. Electrical junction box covers may vary in number and placement of screws holding cover in place.

REMOVAL

a. Remove screws (1, Figure 2-129) holding electrical junction box cover (2). Remove cover.

b. Tag and disconnect electrical wiring.

c. Remove two bolts (1, Figure 2-130) and associated hardware.

d. Remove coupling guard (2).

e. Loosen motor coupling flange setscrew (1, Figure 2-131).

- f. Slide motor coupling flange (2) towards motor (4).
- g. Remove four bolts (3) and associated hardware.

NOTE

Some motor to pump coupling flanges may contain a flexible spider insert.

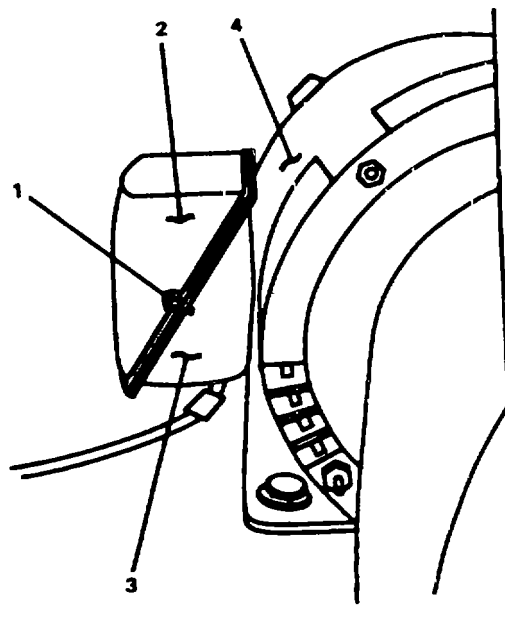


Figure 2-129. Electrical Junction Box.

NOTE

Some motors may be secured to the pump foundation with up to eight bolts and associated hardware. Some motors, because of size and weight, may be equipped with one or two pad eyes. For motors so equipped, two soldiers and/or a chain hoist will be needed to remove.

- h. Remove motor (4) from pump foundation.
- i. Slide motor coupling flange (2) off motor shaft.

REPLACEMENT

- a. Slide motor coupling flange (2, Figure 2-131) on motor shaft with flat end towards motor (4) housing.
- b. Position motor (4) on pump foundation with mounting holes aligned.
- c. Install four bolts (3) and associated hardware. Do not tighten.

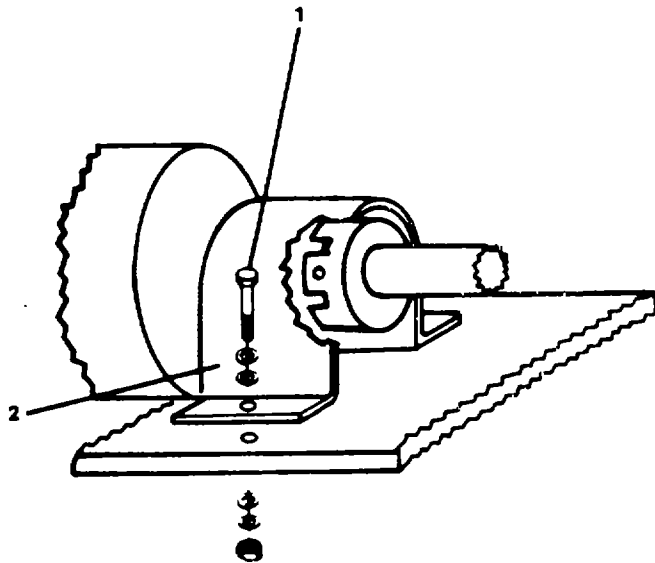


Figure 2-130. Coupling Guard.
NOTE

Some motors may require the installation of eight bolts and associated hardware.

- d. Align motor coupling flange (2) with pump coupling flange.

NOTE

When coupling motor to pump bring coupling flanges together leaving approximately 1/16-inch space between the ends of couplings. Check alignment between the two coupling flanges. Maximum angular offset shall be 1 degree and maximum parallel offset shall be 0.015 inch.

- e. Tighten motor coupling flange setscrew (1).
- f. Tighten four bolts (3).
- g. Install coupling guard (2, Figure 2-130) with two bolts (1) and associated hardware. Tighten bolts.
- h. Connect electrical wiring and remove tags.
- i. Install electrical junction box cover (2) with screws (1). Tighten screws.
- j. Set motor controller disconnect switch to ON position. Remove tag.
- k. Operate in accordance with TM 55-1925-207-10.

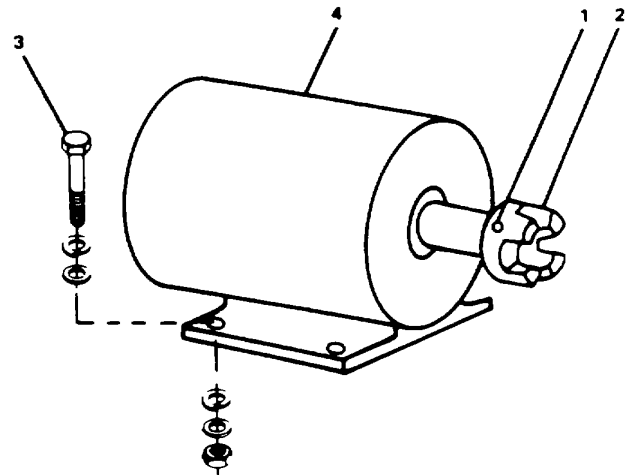


Figure 2-131. Electric Motor.

2-159. Replace Lube Oil Transfer Pump Motor, Electric

This task covers:

a. Removal

b. Replacement.

INITIAL SETUP**Tools**

Tool kit, general mechanic's
5180-00-629- 9783
Tool kit, electrician' s
5180-00-392- 2895
Endless sling 3940-01-183-9412

Equipment Condition

At Lube Oil Transfer Pump motor
controller place disconnect switch to
OFF position and tag "Out of Service -
Do Not Operate."

Materials /Parts

Motor, electric P/N 926743VQ
Warning Tags, Item 1, Appendix D

WARNING

Death or serious injury can result from contact with live electrical circuits. Before beginning work on this, or any other electrical circuit or equipment, ensure electrical power is OFF, locked out, and tagged to prevent TURN ON during maintenance.

REMOVAL

Refer to paragraph 2-158 .

REPLACEMENT

Refer to paragraph 2-158
.

2-160. Replace Sewage Discharge Centrifugal Pump No. 1 Motor, Electrical

This task covers:

a. Removal

b. Replacement.

INITIAL SETUP**Tools**

Tool kit, general mechanic's

5180-00-629-9783

Tool kit, electrician's

5180-00-392-2895

Endless sling 3940-01-183-9412

Materials/Parts

Motor, electric P/N 957163-2-NO

Warning tags, Item 1, Appendix D

Equipment Condition

On Sewage Discharge Pump No. 1 motor controller place disconnect switch to OFF position and tag "Out of Service - Do Not Operate."

Repeat entire procedure for replacement of pump No. 2 motor, electric.

WARNING

Death or serious injury can result from contact with live electrical circuits. Before beginning work on this, or any other electrical circuit or equipment, ensure electrical power is OFF, locked out, and tagged to prevent TURN ON during maintenance.

NOTE

Electrical junction boxes may vary in size, shape, and mounting position of box on motor frame. Electrical junction box covers may vary in number and placement of screws holding cover in place.

REMOVAL

- Remove screws (1, Figure 2-132) holding electrical junction box cover (2). Remove cover.
- Tag and disconnect electrical wiring.
- Remove two bolts (1, Figure 2-133) and associated hardware.
- Remove coupling guard (2).
- Loosen motor coupling flange setscrew (1, Figure 2-134).
- Slide motor coupling flange (2) and sleeve towards motor (4).
- Remove four bolts (3) and associated hardware.

NOTE

Some motors, because of size and weight, may be equipped with one or two pad eyes. For motors so equipped, two soldiers and/or a chain hoist will be needed to remove.

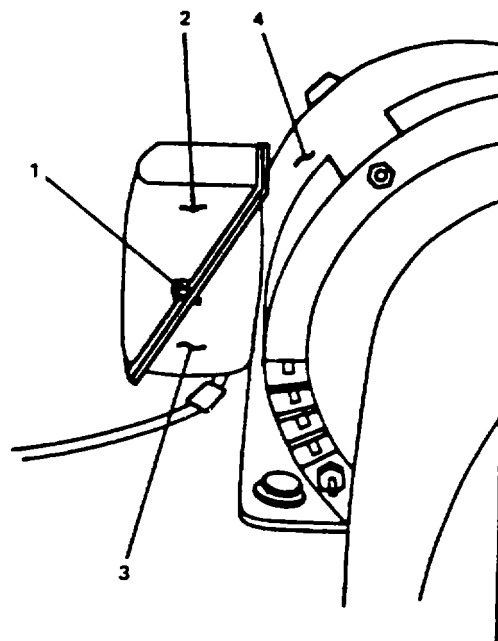


Figure 2-132. Electric Junction Box.

- h. Remove motor (4) from pump foundation.
- i. Slide motor coupling flange (2) and sleeve off motor shaft.

REPLACEMENT

- a. Slide motor coupling flange (2, Figure 2-134) and sleeve on motor shaft with flat end of flange (2) toward motor (4) housing.
- b. Position motor (4) on pump foundation with mounting holes aligned.
- c. Install four bolts (3) and associated hardware. Do not tighten.

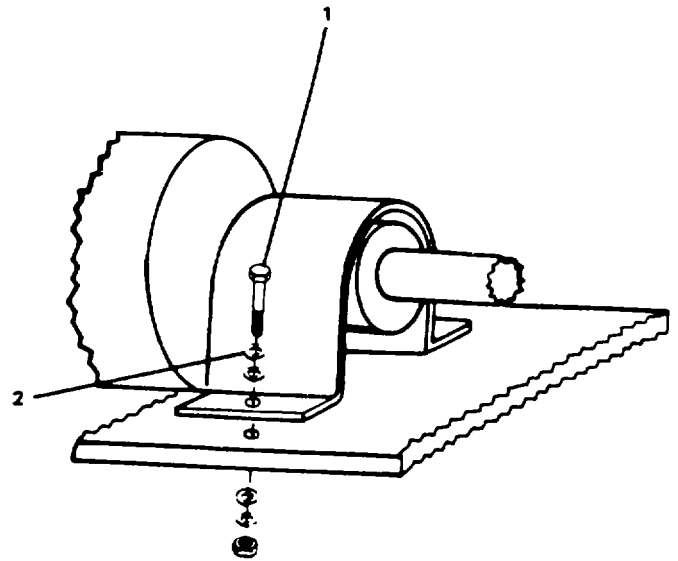


Figure 2-133. Coupling Guard.

NOTE

When coupling motor to pump position coupling on shafts to approximate axial spacing of 1.938 inches for sewage discharge pump and 2.538 inches for bilge and ballast pump. There should be an equal amount of shaft extending into each coupling flange.

- d. Align motor coupling flange (2) and sleeve with pump coupling flange until sleeve is completely sealed in each flange.
- e. Tighten motor coupling flange setscrew (1).

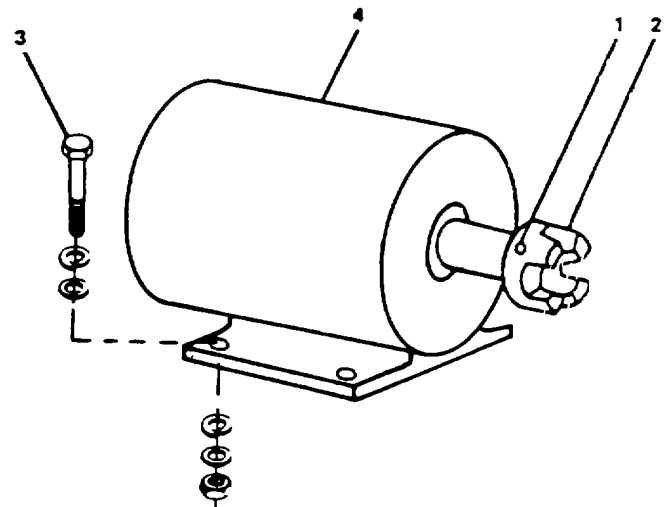


Figure 2-134. Electric Motor.

NOTE

Check for parallel and angular alignment. Maximum tolerances are 0.015 inches parallel and 0.056 inches angular for sewage discharge pump and 0.015 inches parallel and 0.070 inches angular for bilge and ballast pump.

- f. Tighten four bolts (3).
- g. Install coupling guard (2, Figure 2-133) with two bolts (1) and associated hardware. Tighten bolts.
- h. Connect electrical wiring and remove tags.
- i. Install junction box cover (2) with screws (1). Tighten screws.
- j. Set motor controller disconnect switch to ON position. Remove tag.
- k. Operate in accordance with TM 55-1925-207-10.

2-161. Replace Bilge and Ballast Pump No. 1 Motor, Electric

This task covers:

a. Removal

b. Replacement.

INITIAL SETUP**Tools**

Tool kit, general mechanic's
5180-00-629-9783
Tool kit, electrician's
5180-00-392-2895
Endless sling 3940-01-183-9412

Materials /Parts

Motor, electric P/N 922837-1-VP
Warning tags, Item 1, Appendix D

Equipment Condition

At Bilge and Ballast Pump No. 1 motor controller place disconnect switch to OFF position and tag "Out of Service - Do Not Operate."

Repeat entire procedure for replacement of pump No. 2 motor, electric.

WARNING

Death or serious injury can result from contact with live electrical circuits. Before beginning work on this, or any other electrical circuit or equipment, ensure electrical power is OFF, locked out, and tagged to prevent TURN ON during maintenance.

REMOVAL

Refer to paragraph 2-160 .

REPLACEMENT

Refer to paragraph 2-160 .

2-162. Replace Fire and General Service Pump No. 1 Motor, Electric

This task covers:

a. Removal**b. Replacement.****INITIAL SETUP**Tools

Tool kit, general mechanic's

5180-00-629-9783

Tool kit, electrician's

5180-00-392-2895

Chain hoist

Endless sling 394001-183-9412

Materials /Parts

Motor, electric P/N 605640

Warning tags, Item 1, Appendix D

Equipment Condition

On Fire and General Service Pump No.

1 motor controller place disconnect switch to OFF position and tag "Out of Service - Do Not Operate."

Repeat entire procedure for replacement of pump No. 2 motor, electric.

WARNING

Death or serious injury can result from contact with live electrical circuits. Before beginning work on this, or any other electrical circuit or equipment, ensure electrical power is OFF, locked out, and tagged to prevent TURN ON during maintenance.

NOTE

Electrical junction boxes may vary in size, shape, and mounting position of box on motor frame. Electrical junction box covers may vary in number and placement of screws holding cover in place.

REMOVAL

a. Remove screws (1, Figure 2-135) holding electrical junction box cover (2). Remove cover.

b. Tag and disconnect electrical wiring.

c. Remove four nuts (1, Figure 2-136) and associated hardware from motor (2).

d. Attach chain hoist to pad eyes (3).

e. Remove motor (2) from pump foundation.

f. Remove chain hoist.

REPLACEMENT

a. Attach chain hoist to pad eyes (3, Figure 2-136).

b. Position motor (2) on pump foundation with mounting holes aligned.

c. Install four nuts (1) and associated hardware. Tighten nuts.

d. Connect electrical wiring and remove tags.

e. Install electrical junction box cover (2) with screws (1). Tighten screws.

f. Set motor controller disconnect switch to ON position. Remove tag.

g. Operate in accordance with TM 55-1925-207-10.

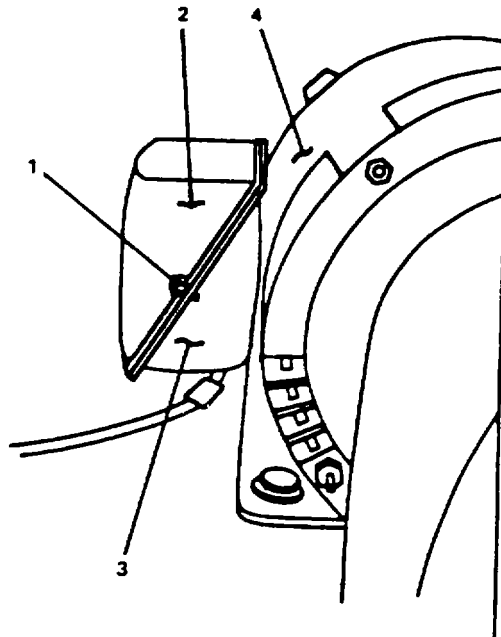


Figure 2-135. Electrical Junction Box.

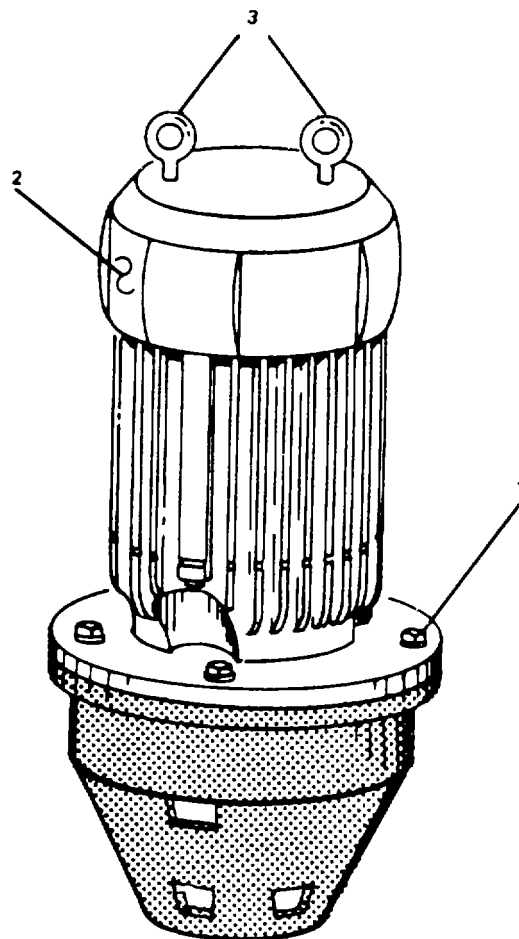


Figure 2-136. Electric Motor.

2-163. Replace Potable Water Pump No. 1 Motor, Electrical

This task covers:

a. Removal**b. Replacement.****INITIAL SETUP**Tools

Tool kit, general mechanic's
5180-00-629-9783
Tool kit, electrician's
5180-00-392-2895
Endless sling 3940-01-183-9412

Equipment Condition

At Potable Water Pump No. 1 motor controller place disconnect switch to OFF position and tag "Out of Service - Do Not Operate."

Repeat entire procedure for replacement of pump No. 2 motor, electric.

Materials/Parts

Motor, electric P/N SK182KD124
Warning tags, Item 1, Appendix D

WARNING

Death or serious injury can result from contact with live electrical circuits. Before beginning work on this, or any other electrical circuit or equipment, ensure electrical power is OFF, locked out, and tagged to prevent TURN ON during maintenance.

NOTE

Electrical junction boxes may vary in size, shape, and mounting position of box on motor frame. Electrical junction box covers may vary in number and placement of screws holding cover in place.

REMOVAL

- a. Remove screws (1, Figure 2-137) holding electrical junction box cover (2). Remove cover.
- b. Tag and disconnect electrical wiring.
- c. Loosen setscrew (1, Figure 2-138).
- d. Remove four motor retaining bolts (2) from motor (3).
- e. Remove motor (3) by pulling straight out from pump body (4).

NOTE

Remove woodruff key (if applicable) from motor spline and retain.

REPLACEMENT

- a. Install woodruff key (if applicable) in motor shaft spline.
- b. Install motor (3, Figure 2-138) by pushing it straight into pump body (4).
- c. Install four motor retaining bolts (2). Tighten bolts.
- d. Tighten setscrew (1).
- e. Connect electrical wiring and remove tags.
- f. Install electrical junction box cover (2) with screws (1). Tighten screws.
- g. Set motor controller disconnect switch to ON position. Remove tags.
- h. Operate in accordance with TM 55-1925-207-10.

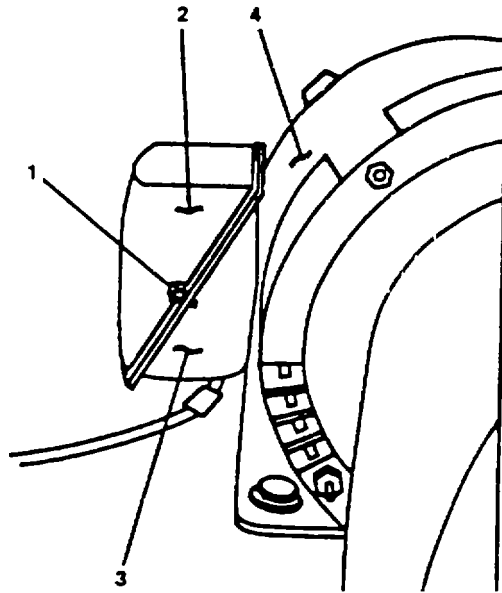


Figure 2-137. Electrical Junction Box.

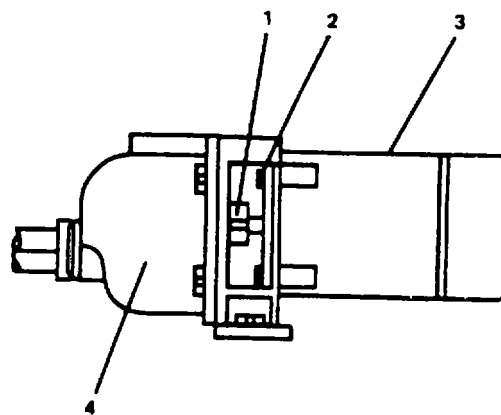


Figure 2-138. Pump Motor Assembly.

2-164. Replace Reduction Gear Cooling Pump No. 1 Motor, Electric

This task covers:

a. Removal

b. Replacement.

INITIAL SETUP**Tools**

Tool kit, general mechanic's
5180-00-629-9783
Tool kit, electrician's
5180-00-392-2895
Endless sling 3940-01-183-9412

Equipment Condition

At Reduction Gear Cooling Pump No. 1
motor controller place disconnect
switch to OFF position and tag "Out of
Service -Do Not Operate."

Repeat entire procedure for replacement
of pump No. 2 motor, electric.

Materials/Parts

Motor, electric P/N JM 3550
Warning tags, Item 1, Appendix D

WARNING

Death or serious injury can result from contact with live electrical circuits. Before beginning work on this, or any other electrical circuit or equipment, ensure electrical power is OFF, locked out, and tagged to prevent TURN ON during maintenance.

REMOVAL

Refer to paragraph 2-163.

REPLACEMENT

Refer to paragraph 2-163.

2-165. Replace Hot Potable Water Recirculation Pump No. 1 Motor, Electric

This task covers:

a. Removal

b. Replacement.

INITIAL SETUP**Tools**

Tool kit, general mechanic's
5180-00-629-9783
Tool kit, electrician' s
5180-00-392-2895
Endless sling 3940-01-183-9412

Materials /Parts

Motor, electric P/N JM 3463
Warning tags, Item 1, Appendix D

Equipment Condition

On Hot Potable Water Recirculation
Pump motor controller press STOP
switch and tag "Out of Service -
Do Not Operate.

Repeat entire procedure for replacement
of pump No. 2 motor, electric.

WARNING

Death or serious injury can result from contact with live electrical circuits. Before beginning work on this, or any other electrical circuit or equipment, ensure electrical power is OFF, locked out, and tagged to prevent TURN ON during maintenance.

REMOVAL

Refer to paragraph 2-163.

REPLACEMENT

Refer to paragraph 2-163.

2-166. Replace Pre-lubrication Oil Pump No. 1 Motor, Electric

This task covers:

a. Removal

b. Replacement.

INITIAL SETUPTools

Tool kit, general mechanic's
5180-00-629-9783
Tool kit, electrician' s
5180-00-392-2895
Endless sling 3940-01-183-9412

Materials /Parts

Motor, electric P/N JM 926743VQ
Warning tags, Item 1, Appendix D

Equipment Condition

On Pre-lubrication Oil Pump No. 1
motor controller press STOP switch and
tag "Out of Service - Do Not Operate."

Repeat entire procedure for
replacement of pump No. 2 motor, electric.

WARNING

Death or serious injury can result from contact with live electrical circuits. Before beginning work on this, or any other electrical circuit or equipment, ensure electrical power is OFF, locked out, and tagged to prevent TURN ON during maintenance.

REMOVAL

Refer to paragraph 2-158 .

REPLACEMENT

Refer to paragraph 2-158.

2-167. Replace Air Compressor No. 1 Motor, Electric

This task covers:**a. Removal****b. Replacement.****c. Adjust.**

INITIAL SETUP**Tools**

Tool kit, general mechanic's
5180-00-629-9783
Tool kit, electrician's
5180-00-392-2895
Endless Sling 3940-01-183-7412

Materials/Parts

Motor, electric P/N 6-357719-01
Warning tags, Item 1, Appendix D

Equipment Condition

On Air Compressor No. 1 motor
controller place disconnect switch to OFF
position and tag "Out of Service - Do
Not Operate."

Repeat entire procedure for replacement
of pump No. 2 motor, electric.

WARNING

Death or serious injury can result from contact with live electrical circuits. Before beginning work on this, or any other electrical circuit or equipment, ensure electrical power is OFF, locked out, and tagged to prevent TURN ON during maintenance.

REMOVAL

a. Remove belt guard (1, Figure 2-139) as follows:

(1) Remove bolts, nuts and washers (2, 6) and remove upper half of guard (4).

(2) Remove bolts and washers (3, 5) and remove bottom half of guard (4).

b. Remove screws (10) holding electrical junction cover (11). Remove cover.

c. Tag and disconnect electrical wiring.

d. Remove four motor mounting bolts (14), nuts (15), and washers (16).

e. Slide motor (17) toward compressor drive sheave (7) and remove vee belts (8).

f. Remove motor (17) from motor mounting rail (18).

g. Remove two bolts (19) and washers (20) and remove pulley (9) from motor shaft.

h. Remove the woodruff key from spline in motor shaft.

REPLACEMENT

a. Place woodruff key in motor shaft spline and slide pulley (9) on motor shaft.

b. Secure pulley (9) on motor shaft with two bolts (19) and washers (20).

c. Set motor (17) on motor mounting rail (18).

d. Install four motor mounting bolts (14), nuts (15), and washers (16). Do not completely tighten.

NOTE

Ensure compressor pulley and drive pulley are aligned.

e. Install vee belts (8).

f. Adjust vee belt tension as follows:

(1) Slide motor (17) away from compressor drive sheave (7) to increase tension.

(2) Measure span length (1, Figure 2-140) between center of pulley on air compressor and center of pulley on electric motor.

(3) Divide measurement in half to find center .

NOTE

Always apply force perpendicular to belt. (4) At center of span, measure force required to depress (deflect) belt 1/64 inch per inch of span length. For example, if the span is 2 feet (24 inches), deflect belt 24/64 or 3/8 of an inch. Measure force required to deflect belt.

(5) Compare this deflection force with range of forces given in Table 2-4.

(a) If deflection force is less than minimum, belt should be tightened .

(b) If deflection force is more than maximum, belt should be loosened .

(c) New belts should be checked frequently until their deflection stabilizes, as some new belts stretch more than others.

g. Tighten the four motor mounting bolts (14, Figure 2-139) and nuts (15) firmly.

h. Connect electrical wiring and remove tags.

i. Install electrical junction box cover (11) with screws (10). Tighten screws.

j. Install belt guard (1) as follows:

(1) Mount lower half of guard (4) with bolts and washers (3, 5). Do not tighten bolts until guard is adjusted.

(2) Install upper half of guard (4) with bolts, nuts, and washers (2, 6).

(3) Adjust the guard by sliding it up or down as required to keep it clear of belts and pulleys. Tighten bolts and washers (3, 5) firmly.

k. Set motor controller disconnect switch to ON position. Remove tag.

l. Operate in accordance with TM 55-1925-207-10.

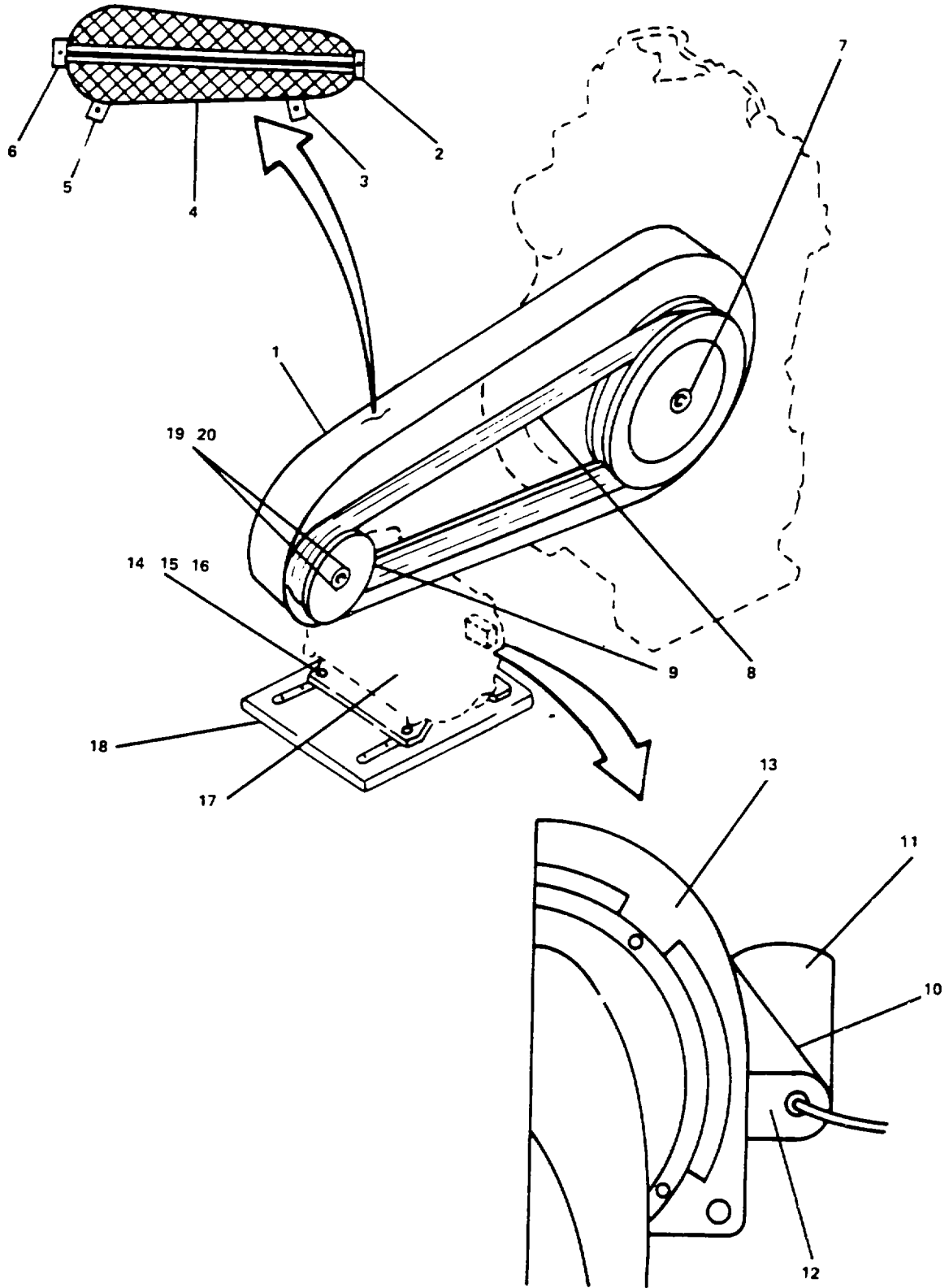


Figure 2-139. Motor Assembly.

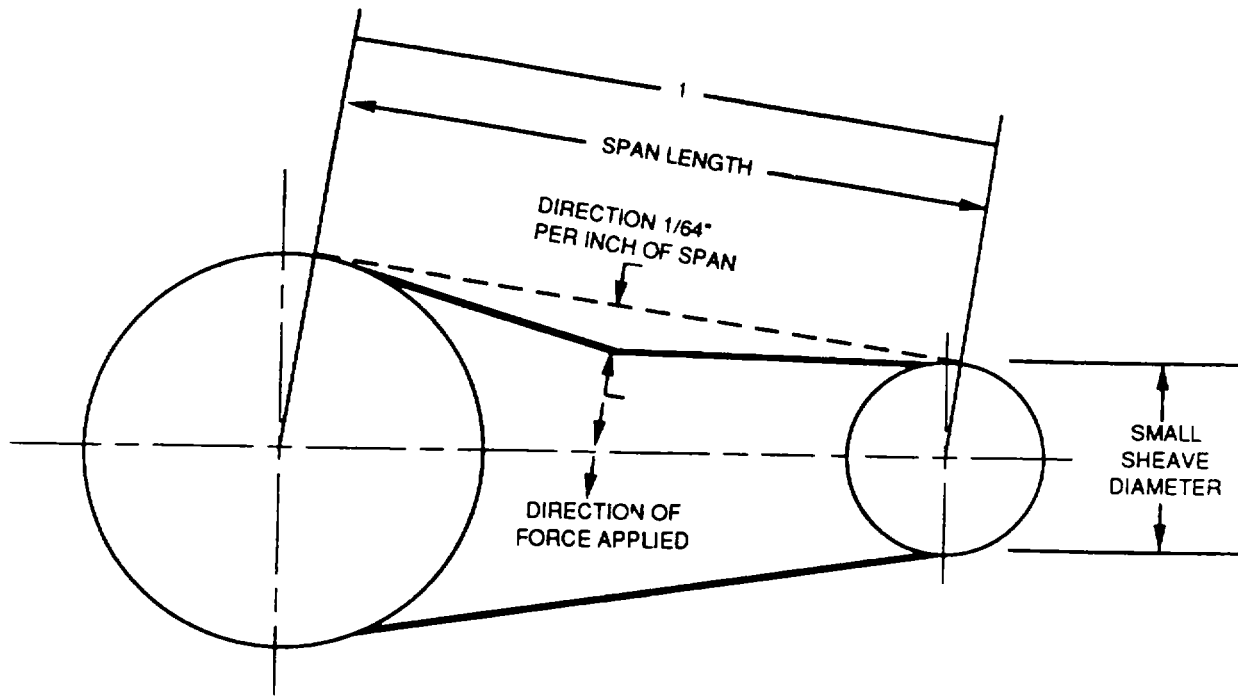


Figure 2-140. Adjust Vee Belt.

Table 2-4. Recommended Deflection Forces

Small Pulley Diameter Range	Deflection Force, Lb. Minimum	Recommended Maximum
3.0" - 3.2"	2.3	3.2
3.4" - 3.6"	2.5	3.6
3.8" - 4.2"	2.9	4.2
4.6" - 7.0"	3.5	5.1
4.6"	4.0	5.9
5.0" - 5.4"	4.5	6.7
5.6" - 6.4"	5.0	7.4
6.8" - 9.4'	5.8	8.6
7.0"	7.1	10.0
7.5" - 8.0'	7.9	11.0
8.5" - 10.0"	9.3	13.0
10.5" - 16.0'	11.0	16.0

2-168. Replace Reverse Osmosis Water Maker High Pressure Pump No. 1 Motor, Electrical**This task covers:**

- a. Removal** **b. Replacement.**

INITIAL SETUPTools

Tool kit, general mechanic's
5180-00-629-9783
Tool kit, electrician's
5180-00-392-2895
Endless sling 3940-01-183-9412

Equipment Condition

On AUX MACH SPACE NO. 2
POWER PANEL NO. 5 set #1 REVERSE
OSMOSIS UNIT circuit breaker to OFF
position and tag "Out of Service - Do Not
Operate."

Materials /Parts

Motor, electric P/N M3611T
Warning tags. Item 1, Appendix D
LOC-TITE, Item 11, Appendix D

WARNING

Death or serious injury can result from contact with live electrical circuits. Before beginning work on this, or any other electrical circuit or equipment, ensure electrical power is OFF, locked out, and tagged to prevent TURN ON during maintenance.

NOTE

High pressure pump is on the bottom of both units.

REMOVAL

- a. Remove screw (1) (Figure 2-141) holding electrical junction box cover (2). Remove cover.
- b. Tag and disconnect electrical wiring.
- c. Remove four nuts from motor tie-rods (3, Figure 2-141) at pump end of motor (7).
- d. Remove four mounting bolts (6).
- e. Remove motor end plate (2) with pump adapter plate (4) attached.

CAUTION

LOC-TITE is used on bolt threads. Loosen and tighten (do not overtighten) bolts repeatedly in 1/4-turn increments. This method will prevent shearing of bolts.

NOTE
Pump not shown.

- f. Remove motor (7).

REPLACEMENT**NOTE**

Before installing new motor (5) remove four nuts (1) and remove end plate (2). Before installing clean bolt threads and coat with LOC-TITE.

- a. Position motor end plate (5) with pump attached to motor frame (7).
- b. Install four nuts on motor tie-rods (3). Tighten nuts.
- c. Install four mounting bolts (6). Tighten bolts.
- d. Connect electrical wiring. Set circuit breaker to ON position. Remove tags.
- e. Install electrical junction box cover (2) with screws (1). Tighten screws.
- f. Operate in accordance with TM 55-1925-207-10.

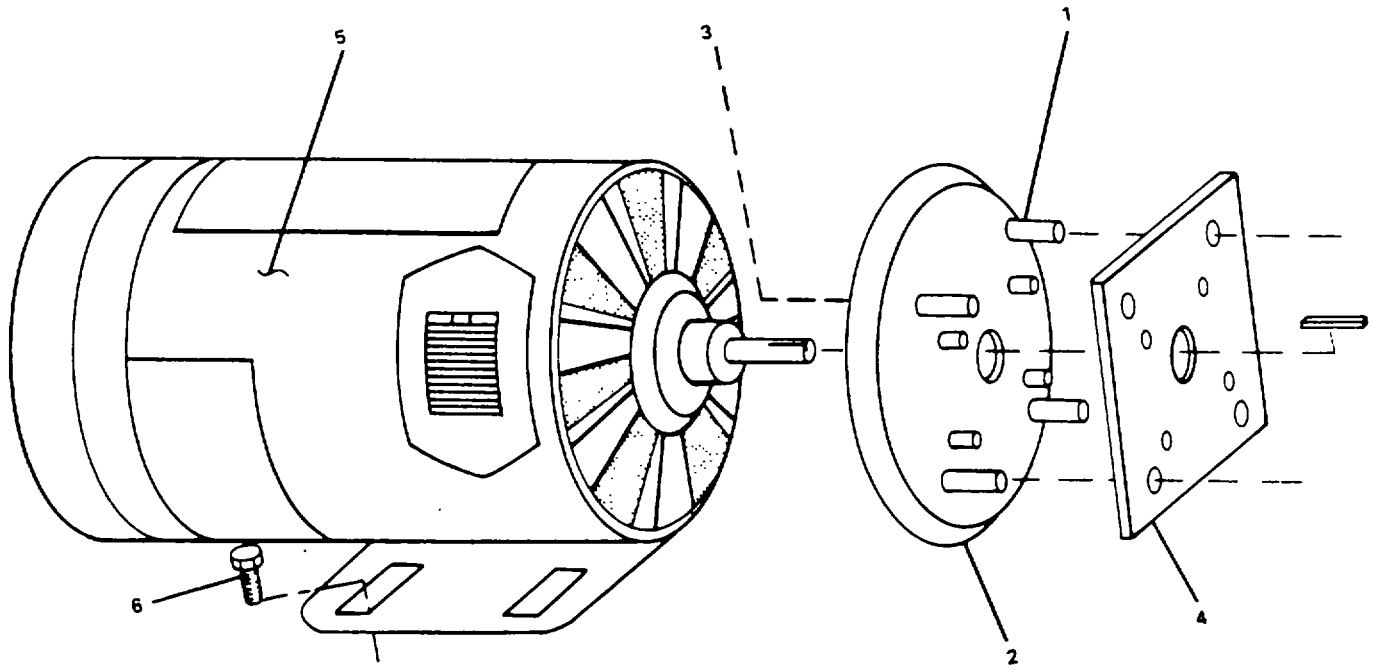


Figure 2-141. High Pressure Pump Motor.

2-169. Replace Reverse Osmosis Water Maker Low Pressure Pump No. 1 Motor, Electric

This task covers:

- a. Removal b. Replacement.

INITIAL SETUP**Tools**

Tool kit, general mechanic's
5180-00-629-9783
Tool kit, electrician's
5180-00-392-2895
Endless sling 3940-01-183-9412

Materials/Parts

Motor, electric P/N 1440
Warning tags, Item 1, Appendix D

Equipment Condition

On AUX MACH SPACE NO. 2
POWER PANEL NO. 5 set #1 REVERSE
OSMOSIS UNIT circuit breaker to OFF
position and tag "Out of Service -Do Not
Operate."

Repeat entire procedure for replacement
of pump No. 2 motor, electrical.

WARNING

Death or serious injury can result from contact with live electrical circuits. Before beginning work on this, or any other electrical circuit or equipment, ensure electrical power is OFF, locked out, and tagged to prevent TURN ON during maintenance.

NOTE

Low pressure pump is above high pressure pump on both units.

REMOVAL

- a. Remove screws (1, Figure 2-142) holding electrical junction box cover (2). Remove cover.
- b. Tag and disconnect electrical wiring.
- c. Loosen two hex setscrews (5) on motor pump coupling (4).
- d. Remove four bolts (6) holding pump (2) to motor (7).

NOTE

Support motor pump assembly before removing mounting bolts.

- e. Remove four bolts (3) securing motor base to rear of pump frame.
- f. Remove pump (2) from motor shaft by sliding away from motor (7).

- g. Remove motor (7).

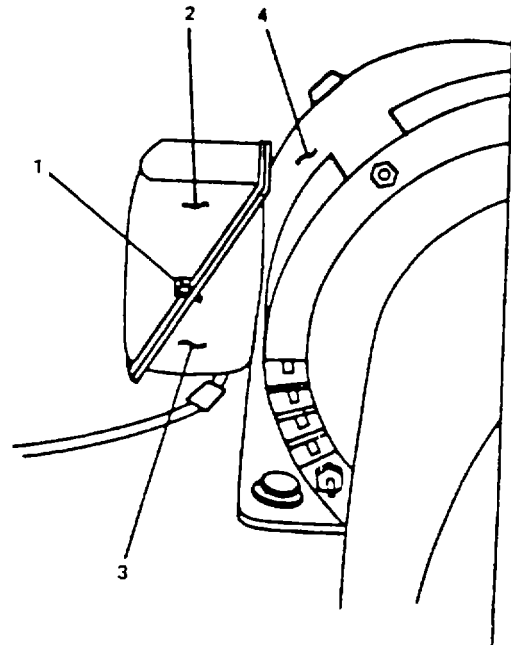


Figure 2-142. Electrical Junction Box.

REPLACEMENT

- a. Install pump (2, Figure 2-143) on motor shaft by sliding towards motor (7).
- b. Install four bolts (6) to hold pump to motor (7). Tighten bolts.
- c. Tighten two hex setscrew (5) on motor pump coupling (4).
- d. Position motor pump assembly on pump frame and align motor bolt
- e. Install four bolts (3) to secure motor base to rear of pump frame. Tighten bolts.
- f. Connect 3/4-inch flexible hose (1) to pump (2).
- g. Place electrical junction box (3, Figure 2-142) with associated electrical wiring cable over junction box opening in motor frame (4). Secure junction box (3) to motor frame (4) with associated hardware.
- h. Connect electrical wiring and remove tags.
- i. Install electrical junction box cover (2) with screws (1). Tighten screws.
- j. Set circuit breaker to ON position. Remove tag.
- k. Operate in accordance with TM 55-1925-207-10.

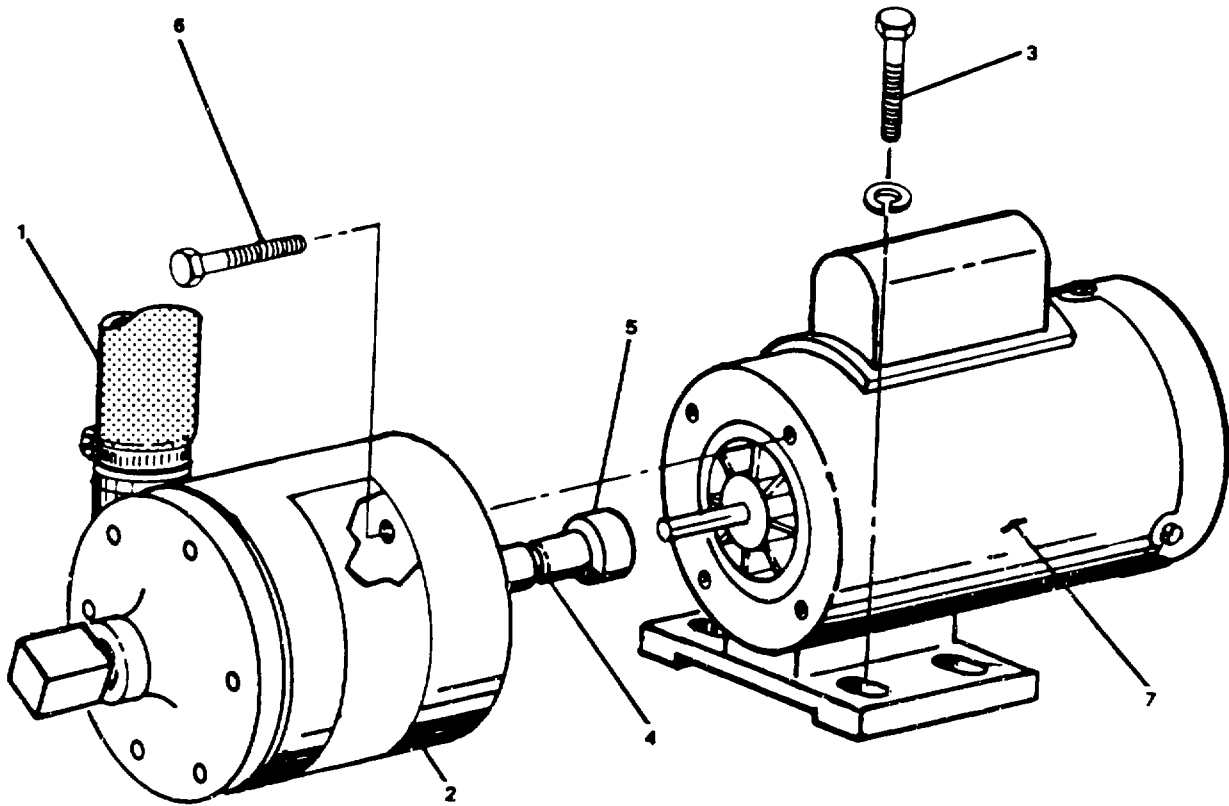


Figure 2-143. Low Pressure Pump Motor.

SECTION VI. PREPARATION FOR STORAGE OR SHIPMENT

2-170. Administrative storage of equipment issued to and used by Army activities will have preventive maintenance performed in accordance with the Preventive Maintenance Checks and Services (PMCS) charts before storing. When removing the equipment from administrative storage, the PMCS should be performed to ensure operational readiness. Removal of the motors for shipment or limited storage is covered in paragraphs 2-158 through 2-169. Use the following steps for repacking the motors for shipment or storage.

- a. Place all loose items in a plastic bag and secure the bag to the component removed.
- b. Place protective connector covers on all connectors.
- c. Securely crate the component to prevent damage during movement.
- d. Do not store with or near corrosive materials.

2-370

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. 5668).

*U.S. GOVERNMENT PRINTING OFFICE : 1993 0 - 342-421 (81055)

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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.

<p>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</p> <p>For use of this form, see AR 25-30; the proponent agency is OAASA</p>	<p>Use Part II (<i>reverse</i>) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).</p>	<p>DATE</p>
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<p>TO: (<i>Forward to proponent of publication or form</i>) (<i>Include ZIP Code</i>)</p>	<p>FROM: (<i>Activity and location</i>) (<i>Include ZIP Code</i>)</p>
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PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

<p>PUBLICATION/FORM NUMBER TM 55-1925-207-24&P-1</p>	<p>DATE 16 August 1991</p>	<p>TITLE Large Tug</p>
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ITEM	PAGE	PARA-GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON

* Reference to line numbers within the paragraph or subparagraph.

<p>TYPED NAME, GRADE OR TITLE</p>	<p>TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION</p>	<p>SIGNATURE</p>
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PART II - REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION NUMBER	DATE	TITLE
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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.)*

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PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

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ITEM	PAGE	PARA- GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON

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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

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PUBLICATION/FORM NUMBER TM 55-1925-207-24&P-1						DATE 16 August 1991	TITLE Large Tug
ITEM	PAGE	PARA-GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON	
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TO: <i>(Forward direct to addressee listed in publication)</i>	FROM: <i>(Activity and location) (Include ZIP Code)</i>	DATE
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PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inches
 1 decimeter = 10 centimeters = 3.94 inches
 1 meter = 10 decimeters = 39.37 inches
 1 dekameter = 10 meters = 32.8 feet
 1 hectometer = 10 dekameters = 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 decigram = .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. ft.
 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. decimeter = 1000 cu. centimeters = 61.02 cu. inches
 1 cu. meter = 1000 cu. decimeters = 35.31 cu. 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
pounds-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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