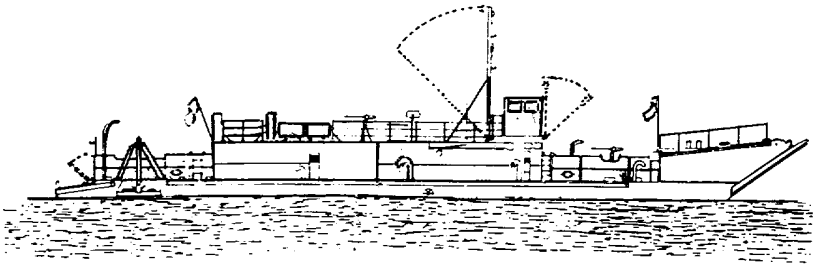
TECHNICAL MANUAL

# OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL

## LANDING CRAFT UTILITY
## LCU 1667 - 1670
## (1905-00-168-5764)



**EQUIPMENT DESCRIPTION**

**TECHNICAL PRINCIPLES DESCRIPTION**

**DESCRIPTION AND USE OF OPERATORS CONTROLS AND INDICATORS**

**PREVENTIVE MAINTENANCE CHECKS AND SERVICES**

HEADQUARTERS, DEPARTMENT OF THE ARMY

8 AUGUST 1983

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**WARNING**

**DEATH**

**OR SEVERE INJURY MAY RESULT IF PERSONNEL FAIL TO OBSERVE THE GENERAL SAFETY PRECAUTIONS BELOW, AND THE SPECIFIC PRECAUTIONS CONTAINED IN THE TEXT.**

- **War safety glasses, safety shoes, and a hard hat to provide adequate protection.**
- **Death or severe injury may result if personnel fail to use a lifting device that is adequate for the item to be lifted.**
- **Ear protection must be worn when engines or machinery is in operation.**
- **Use care when using power tools.**
- **If cleaning agents are used, be sure area is adequately ventilated, and use protective gloves and goggles, or face shield and apron.**
- **Avoid excessive injection of ether into an engine during starting attempts. Follow the instructions on the container or by the manufacturer of the starting aid.**
- **Use the recommended air pressure when using compressed air to clean components. Too much air pressure can rupture or in some way damage a component and create a hazardous situation that can lead to personal injury.**
- **When working on an engine that is running, accidental contact with the hot exhaust manifold can cause severe burns.**

**WARNING (Cont)**

- **Use extreme care when near rotating fans, belts and pulleys.**
- **Avoid making contact across the terminals of the batteries and do not spill the contents of the battery.**
- **Keep clear of the Anchor Winch or Bow Ramp Winch while it is in operation.**
- **During any removal, disassembly, assembly, or installation of an electrical device, make sure all electrical power is disconnected, and tagged. (Circuit breaker in the OFF position and tagged).**
- **Improper functioning of Engine Exhaust System can cause injury or death.**
- **Personnel should know the location and operation of all equipment for emergency use.**
- **Before attempting to operate any equipment, read the instructions completely. Then, return to the appropriate section and follow the instructions.**
- **Do not enter a Winch Compartment alone.**
- **If the Halon System is activated (horn sounds), leave the compartment immediately. Check that no one is left, and then close and dog the hatch.**
- **Use extreme care when handling gasoline for the Salvage Pump.**
- **Store all flammable material in the Flammable Storage Compartment.**

**WARNING (Cont)**

- **When cutting with a torch, or when welding, always station fire watches, ready with fire extinguishers, in the vicinity on both sides of the plate that is being cut or welded.**

- **Prior to cutting or welding on the ramp, remove drain plugs on both sides of the ramp and check if ramp interior is primer coated. If primer coated, flush thoroughly with steam, carbon dioxide, or water. Do not reinstall drain plugs until the cutting and/or welding operation is completed. Failure to take this precaution may result in explosion of accumulated primer vapors.**

- **When refueling, shut down the electrical system. Observe the no smoking rule. Do not permit anyone to operate tools or equipment which may produce sparks near the refueling operation. Sparks or fire may ignite the diesel fuel and produce an explosion.**

- **Fuel oil and other petroleum products are highly volatile in extreme heat. To minimize the possibility of explosion, wipe up all spills at once, see that fuel lines and valves are not leaking and pump bilges regularly.**

- **Before attempting to remove any compressed air system lines or components, relieve air pressure from system. Failure to do so may result in injury or possible death to maintenance personnel.**

- **Before disconnecting a line in the hydraulic system, bleed the pressure from that portion of the line. Failure to do so may result in injury or possible death to maintenance personnel.**

- **When working inside the hydraulic oil supply tank, a portable-type circulating blower should be used to prevent vapor accumulation. For extended work periods inside the tank, an air line tube respirator should be worn. Station an observer outside tank in case worker is overcome by fumes.**

**WARNING (Cont)**

- **Acids can cause serious burns or blindness. Avoid contact with eyes, skin, or clothing. Do not breathe vapors. Wear rubber gloves, goggles, and a rubber apron when handling them. When diluting acids, do not add water to acid; the acid must be added to the mixture slowly and with constant mixing. In case of contact with acid, flush the affected area with plenty of water and obtain medical aid immediately.**

- **Ramp hinge pins must be replaced one at a time, allowing three remaining pins to support ramp. Removal of two or more hinge pins may result in the weight of the ramp misaligning the remaining hinges, resulting in damage to ramp and possible injury or death to maintenance personnel.**

TECHNICAL MANUAL

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**LANDING CRAFT UTILITY**
**LCU 1667 - 1670**
**NSN 1905-00-168-5764**

**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 these procedures, please let us know. Mil your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual directly to: Commander, US Army Aviation and Troop Command, ATTN: AMSAT-I-MP, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. You may also submit your recommended changes by E-mail directly to <mpmt%avma28@st-louis-emh7.army.mil>. A reply will be furnished directly to you. Instructions for sending an electronic 2028 may be found at the back of this manual immediately preceding the hard copy 2028.**



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* This manual supersede TM 55-1905-219-14-1, dated 29 August 1980.

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# CHAPTER 1 INTRODUCTION

## Section I. GENERAL INFORMATION

### 1-1. SCOPE.

This manual covers Landing Craft Utility, LCU 1667 - 1670 manufactured by General Ship and Engine Works, East Boston, Massachusetts. See Figure FO-1 for an overall view of the landing craft.

This manual contains operating and maintenance instructions for the crew. Also included is Direct Support Maintenance Instructions.

This manual consists of ten volumes containing five chapters. Refer to the Table of Contents in this volume for an overall outline of the various volumes and their contents. Each section within a chapter will have a table of contents indicating the page on which a particular paragraph begins.

### 1-2 MAINTENANCE FORMS, RECORDS AND REPORTS.

Department of the Army (DA) forms and procedures used for equipment maintenance will be those prescribed by DA Pam 38-750, The Army Maintenance Management System (TAMMS).

### 1-3 DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE.

Procedures for destroying Army materiel to prevent enemy use are listed in TM 750-244-3.

### 1-4 REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR).

If your Landing Craft needs improvement, l us know. Send us an EIR. You, the user, are the only one who can tell us what you do not like about your equipment. Let us know why you do not like the design. Tell us why a procedure is had to perform. Put it on an SF 368 (Quality Deficiency Report). Mail it to us at: Commander, US Army Aviation and Troop Command, ATTN: AMSAT-D-WTT, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798.

### 1-5 NOMENCLATURE CROSS REFERENCE.

For nomenclature used in Army watercraft, refer to the following:

TM 55-501 Marine Crewman's Handbook
TM 55-509 Marine Engineman's Handbook

1-6. **LIST OF ABBREVIATIONS.**

ABV.BL.....Above base line (lowest part of keel)

CG.....Cleaning Gear

Condtn.....Condition

Conn.....Connector

Compt.....Compartment

Distr.....Distribution

D.O.....Diesel Oil

Eng.....Engine

Exh.....Exhaust

Fdn.....Foundation

FE.....Fire Extinguisher

FOTBPMH.....Flush Oil Tight Bolted Plate Man Hole

FP.....Freeing Port (scupper)

F.P.M.....Feet Per Minute

Fwd.....Forward

FWTBPMH.....Flush Water Tight Bolted Plate Man Hole

FWTQA.....Flush Water Tight Quick Acting

FWTQAES.....Flush Water Tight Hatch Quick Acting Emergency Scuttle

Gen.....Generator

Gov.....Governor

G.P.....Gallons Per Minute

Htr.....Heater

Hyd.....Hydraulic

IC.....Interior Communications

IFF.....Identification Friend or Foe

Inbd.....Inboard

LIST OF ABBREVIATIONS (Continued)

Ind. .....Indicator

Lkr .....Locker

Lt .....Light

Mag.....Magazine

MG.....Machine Gun

OBA.....Oxygen Breathing Apparatus

Ord .....Ordnance

Outbd.....Outboard

Plths.....Pilothouse

P/S.....Port/Starboard

P.S.I.....Pounds Square Inch

Pt.....Parts

QAWTD .....Quick Acting Water Tight Door

RAWTH .....Raised Water Tight Hatch

Rcpt .....Receptacle

Refr.....Reefer (freezer)

Rm.....Room

RMHS .....Remote Magnetic Heading System

R.P.M.....Revolutions Per Minute

R.S. Lkr (219).....Ready Service (Ammunition)

RWTH W/QAES .....Raised Water Tight Hatch With Quick Acting Emergency Scuttle

RWTMH.....Raised Water Tight Man Hole Scuttle

Shr.....Shower

Sld .....Sliding (door)

S.P.....Sound Powered

Sr.....Stateroom

LIST OF ABBREVIATIONS (Continued)

St.....Stores

Stbd.....Starboard

SW.....Salt Water

Sys.....System

Vent.....Ventilation

VL.....Vertical Ladder - U up - D down

WC.....Water Closet

Wr.....Wardroom

Wrb.....Wardrobe

WTD.....Water Tight Door

Xmfr.....Transformer

1-7. **HAND RECEIPT.**

Hand receipts for Components of End Item (COEI), Basic Issue Items (BII), and Additional Authorization List (AAL) items are published in a Hand Receipt manual, TM 55-1905-220-14-HR. This manual is published to aid in property accountability and is available through: Commander, US Army Adjutant General Publication Center, 2800 Eastern Boulevard, Baltimore, MD 21220.

## Section II. EQUIPMENT DESCRIPTION

INDEX PARAGRAPH

1-8. **EQUIPMENT PURPOSE, CAPABILITIES, AND FEATURES.**

The landing craft is twin screw, diesel-engine driven vessel of welded steel construction. For long voyages (trans-ocean) it will normally be carried on the deck of a ship in one piece. The craft is designed to carry cargo from ship to shore, shore to shore, and ship to pontoon causeway. The landing craft may be linked, bow to stern with another craft, creating its own causeway. The landing craft, upon reaching its destination, can load or unload cargo over a hinged bow ramp directly from/onto a beach or pontoon causeway. Cargo may consist of either three (3) M-103A tanks, six (6) M-42 tanks, three (3) M-48 tanks, or motor vehicles or artillery equipment and their operating/maintenance personnel. After a beach and miscellaneous cargo landing, the craft is designed to retract from the beach under its own power, assisted by the use of the stern anchor.

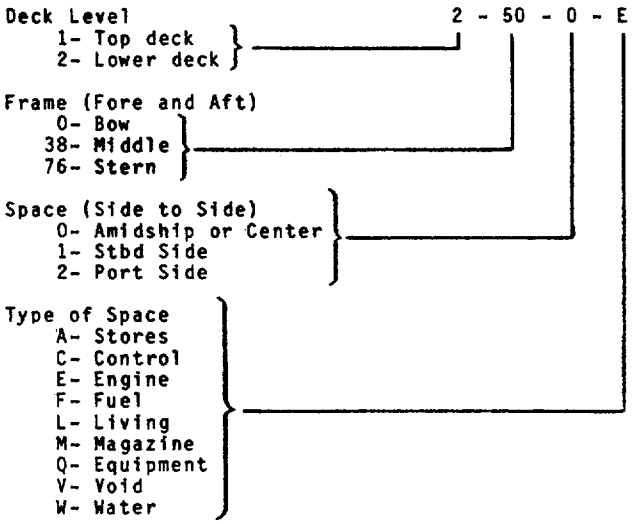
1-9. **LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.**

Refer to paragraph 1-10 for an overall orientation of the landing craft. This overall familiarization is further subdivided into the specific views contained in the subsequent section.

1-10. **GENERAL FAMILIARIZATION.**

a. Refer to Figure FO-2 for an overall starboard (Stbd) view of the landing craft. This view shows the frame identification from the bow to the stern. The frames are located every 21 inches (53.34 cm) and the numbering begins at the bow.

b. Refer to Figure FO-3 for an inboard profile view of the Stbd side of the landing craft. This view shows the various compartments which are identified as follows:




The House and Vehicle Deck view is shown in Figure FO-4. Note the frame location numbers beginning at the bow and ending at the stern. The below deck view of the landing craft is shown in Figure FO-5.

1-11. **EXTERIOR ORIENTATION.**

The following paragraphs locate and describe the major exterior components.

1-12. **MOORING, TOWING, CAUSEWAY FITTINGS, AND LASHING GEAR.**

The mooring, towing, causeway fittings, and lashing gear are shown in Figure FO-6.

1-13. **EMERGENCY/LIFE SAVING EQUIPMENT.**

The Emergency and Life Saving Equipment is shown in Figure FO-7.

1-14. **MACHINE GUN, READY SERVICE LOCKERS, AND GRENADE LOCKERS.**

The Machine Guns and Ready Service Lockers for machine gun ammunition and grenade lockers are shown in Figure FO-8.

1-15. **RUNNING LIGHTS, PELORIS, MASTS, FLAGS AND ENSIGN.**

Figure FO-9 shows the components used to navigate the vessel. Also included are the various masts and flag and ensign staffs. Refer to Figure FO-10 for the components on the Mast.

1-16. **FIRST AID EQUIPMENT.**

First Aid Equipment is located both inside and outside. Refer to Figure FO-11 for orientation.

1-17. **ANCHOR "A" FRAME AND CONTROL STATION.**

The "A" Frame and the Control Station for the Anchor are located on the Cargo Deck near the Stern. Refer to Figure 1-4 for the major components for the "A" Frame and to Figure 1-5 for the Anchor Winch Control Station.

1-18. **EMERGENCY STEERING COMPONENTS.**

The components required to steer the vessel in an emergency situation are shown in Figure 1-6.

1-19. **BOW RAMP.**

The major components of the Bow Ramp are shown in Figure 1-7.

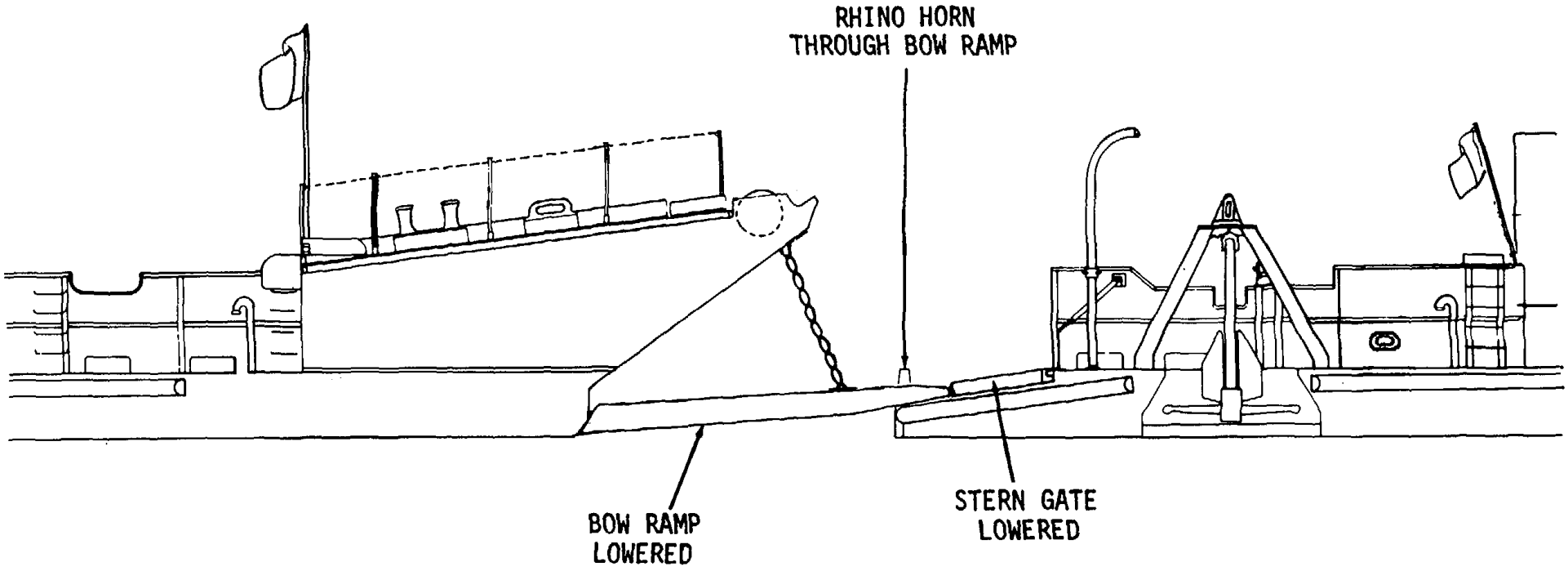
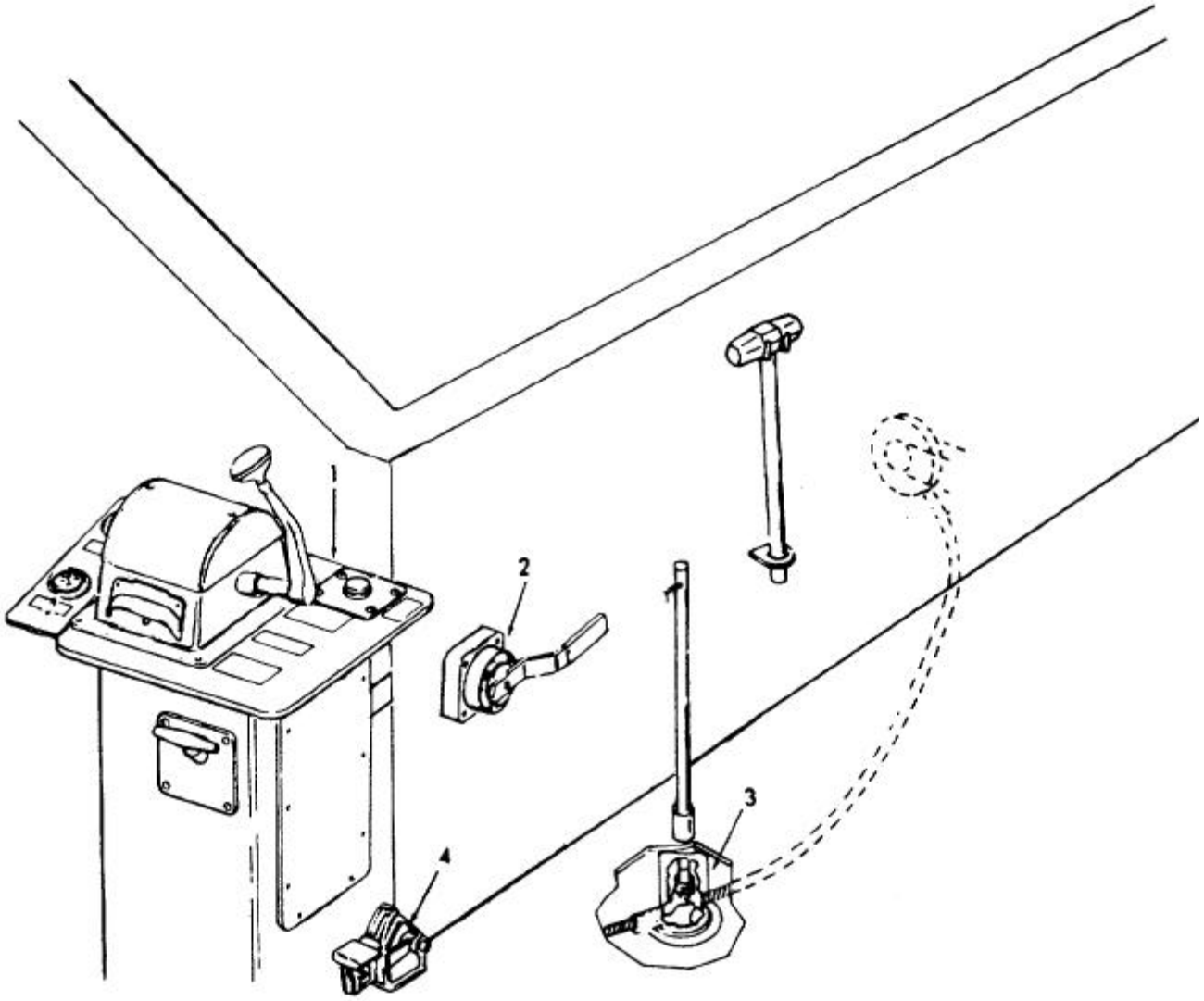
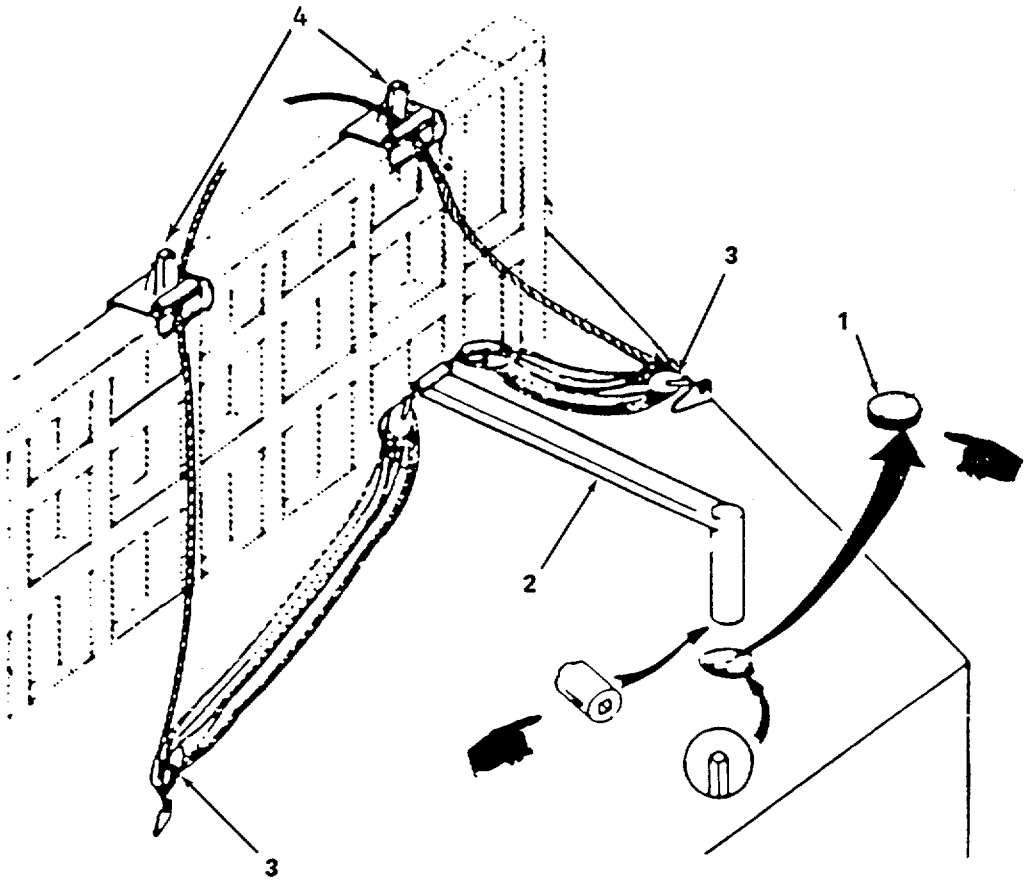



*Figure 1-1. Causeway Between Two LCU's.*




1. CONTROL STATION - Operating controls for raising and lowering the anchor.
2. DIRECTIONAL CONTROL - Controls the angle of pivot of the "A" Frame.
3. WIRE ROPE CUTTER - Cuts the anchor cable in case of emergency.

*Figure 1-5. Anchor Winch Control Station - Cargo Deck.*




4951-209

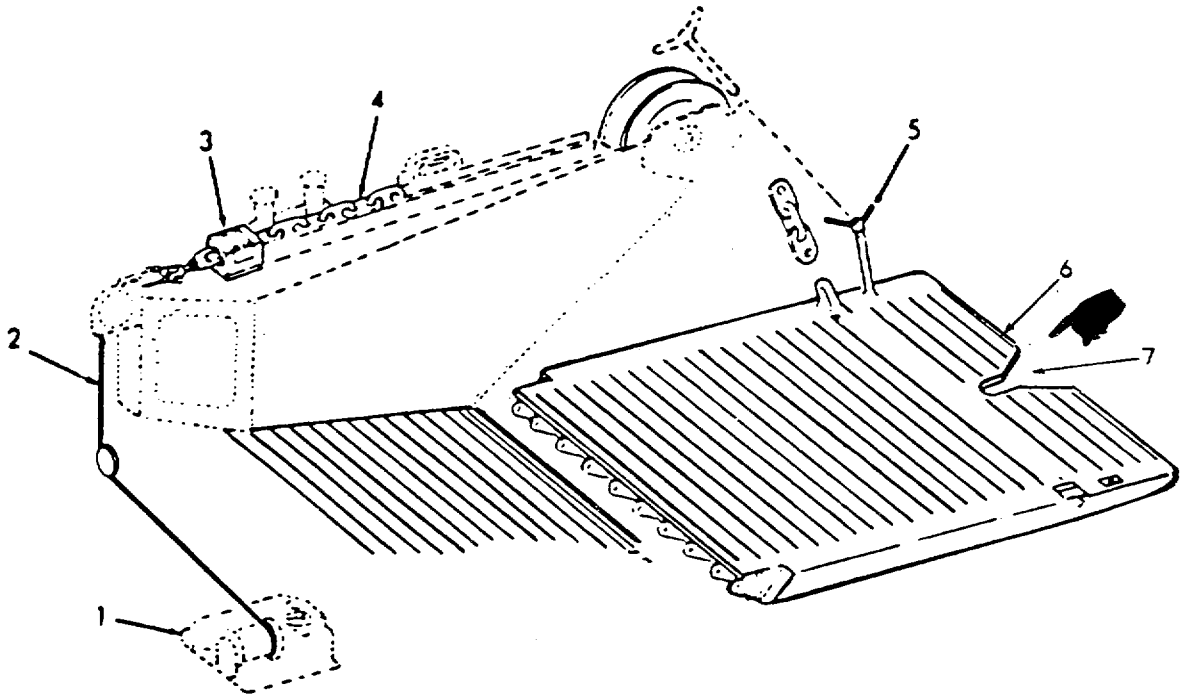
1- DECK PLATES - Removable access plate for access to top of rudder posts.

2- STEERING TILLER - Emergency steering tiller.

3- BLOCK AND TACKLE - Mechanical device to pull tiller.

4- BLOCK DAVIT - Guides rope from steering tiller to cargo deck.

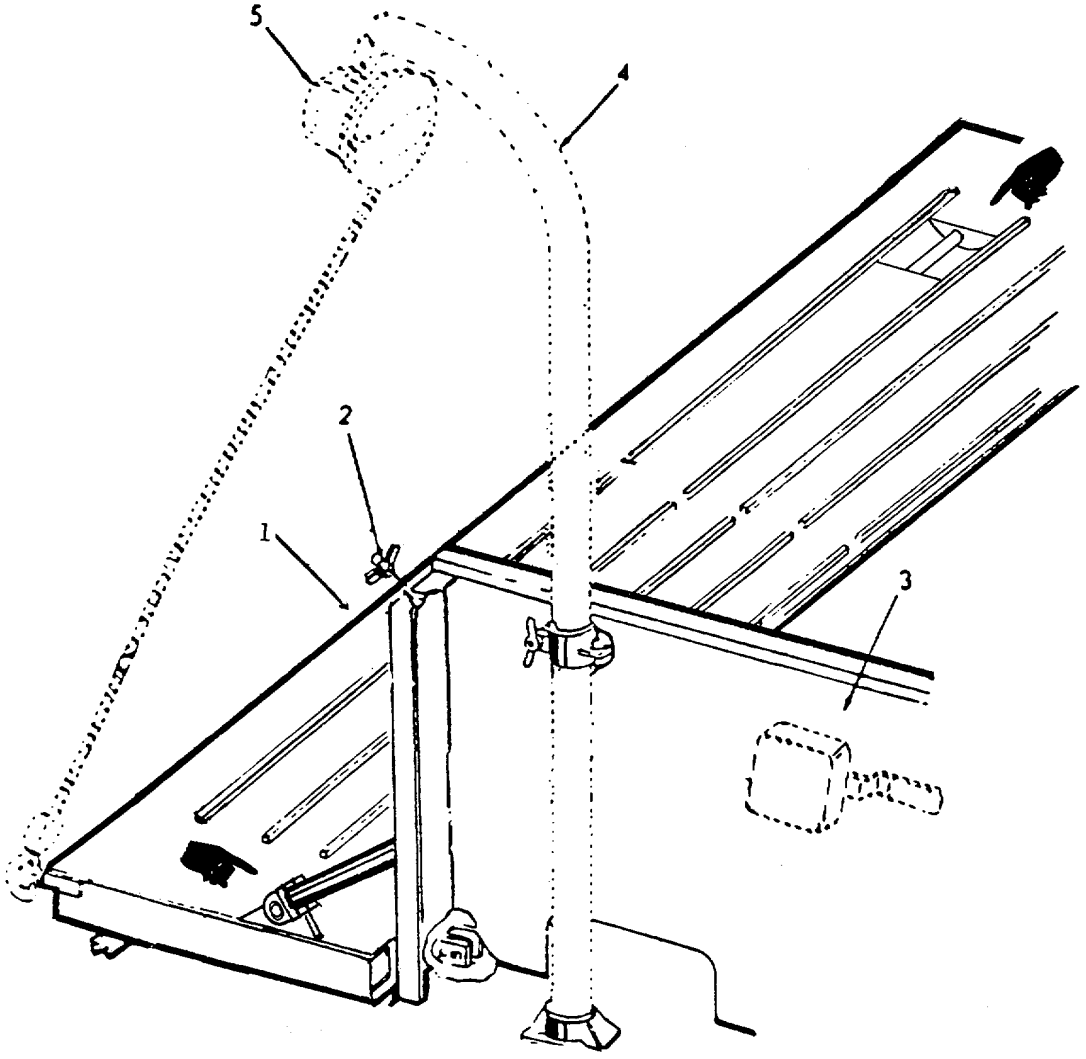
*Figure 1-6. Emergency Steering Components.*




4951-105

1. BOW RAMP WINCH - Electric winch to raise and lower bow ramp.
2. WIRE ROPES - Attaches chain to drum of Bow Ramp Winch.
3. CHAIN STOP - Stops and locks chain in any position.
4. CHAIN - Attaches wire rope to Bow Ramp.
5. TEE-BOLT - Keeps the Bow Ramp in the closed position.
6. RAMP - Raises to make a water tight hull and lowers to permit loading and unloading of cargo and personnel.
7. RHINO HORN SOCKET - Guides rhino horn into lowered bow ramp and secures in place.

*Figure 1-7. Bow Ramp.*




4951-094

1. STERN GATE - Access gate to vessel from the stern (used when two vessels are connected).

2. STERN GATE DOG - Wing handle used to secure stern gate in closed position.

3. DIRECTIONAL CONTROL - Used to raise or lower the stern gate hydraulically.

4. DAVIT - Used on the portside in conjunction with (5) and (6) to raise or lower the stern gate manually.

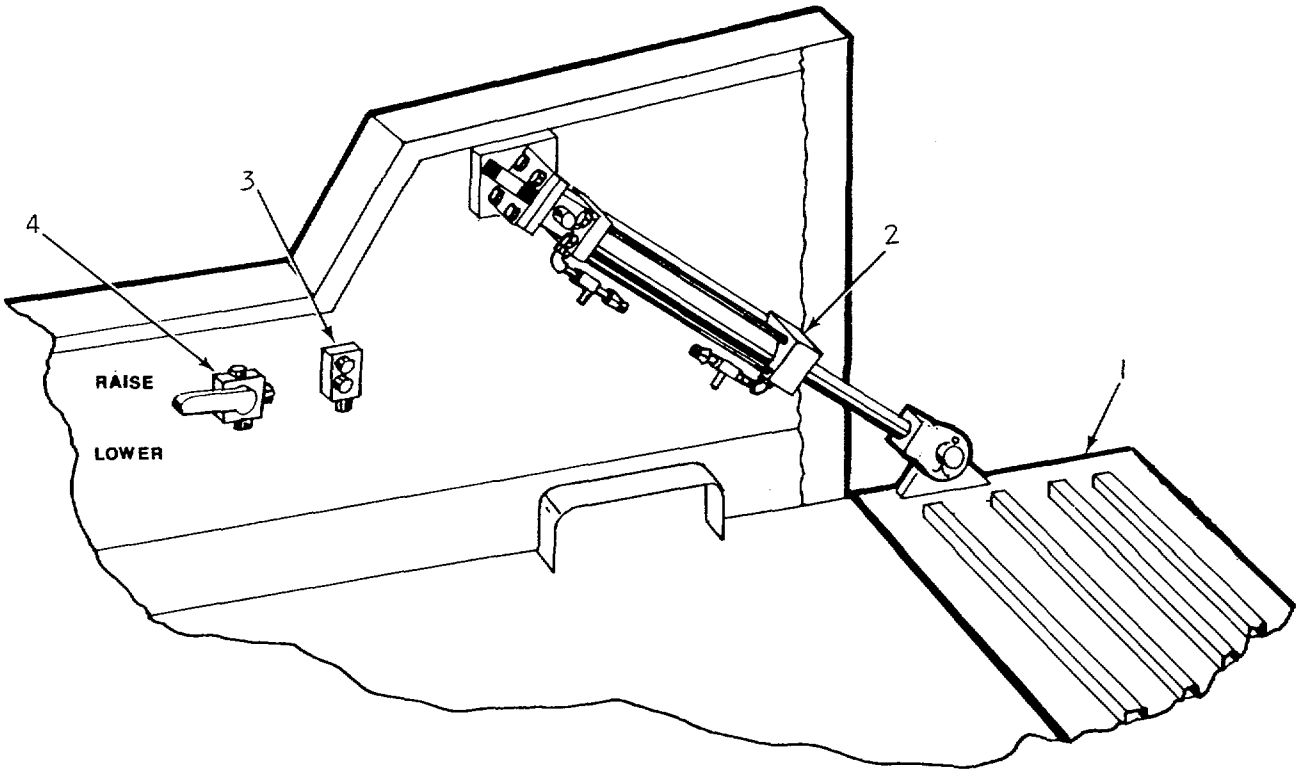
5. CHAIN HOIST - Used to manually raise or lower stern gate.

6. EMERGENCY LIFT BAR - Connection point for chain hoist (5) to raise or lower stern gate in emergency.

**NOTE**

**Davits are stowed on Port bulkhead at Frame 58.**

*Figure 1-8. Outboard View, Starboard Side; Components of the Stern Gate.*




1. STERN GATE - Access gate to vessel from stern (used when two vessels are connected).

2. HYDRAULIC RAM - Used to raise and lower stern gate.

3. ELECTRIC MOTOR START - STOP button. Activates stern gate valve (4).

4. STERN GATE CONTROL VALVE - Used to raise or lower the stern gate hydraulically.

*Figure 1-8.1. Inboard View, Starboard Side. Components of the Stern Gate.*

1-20. **STERN GATE.**

Refer to Figures 1-8 and 1-8.1 for the major components of the stern gate. The component items 4 and 5 of Figure 1-8 are for emergency/manual operation of the stern gate.

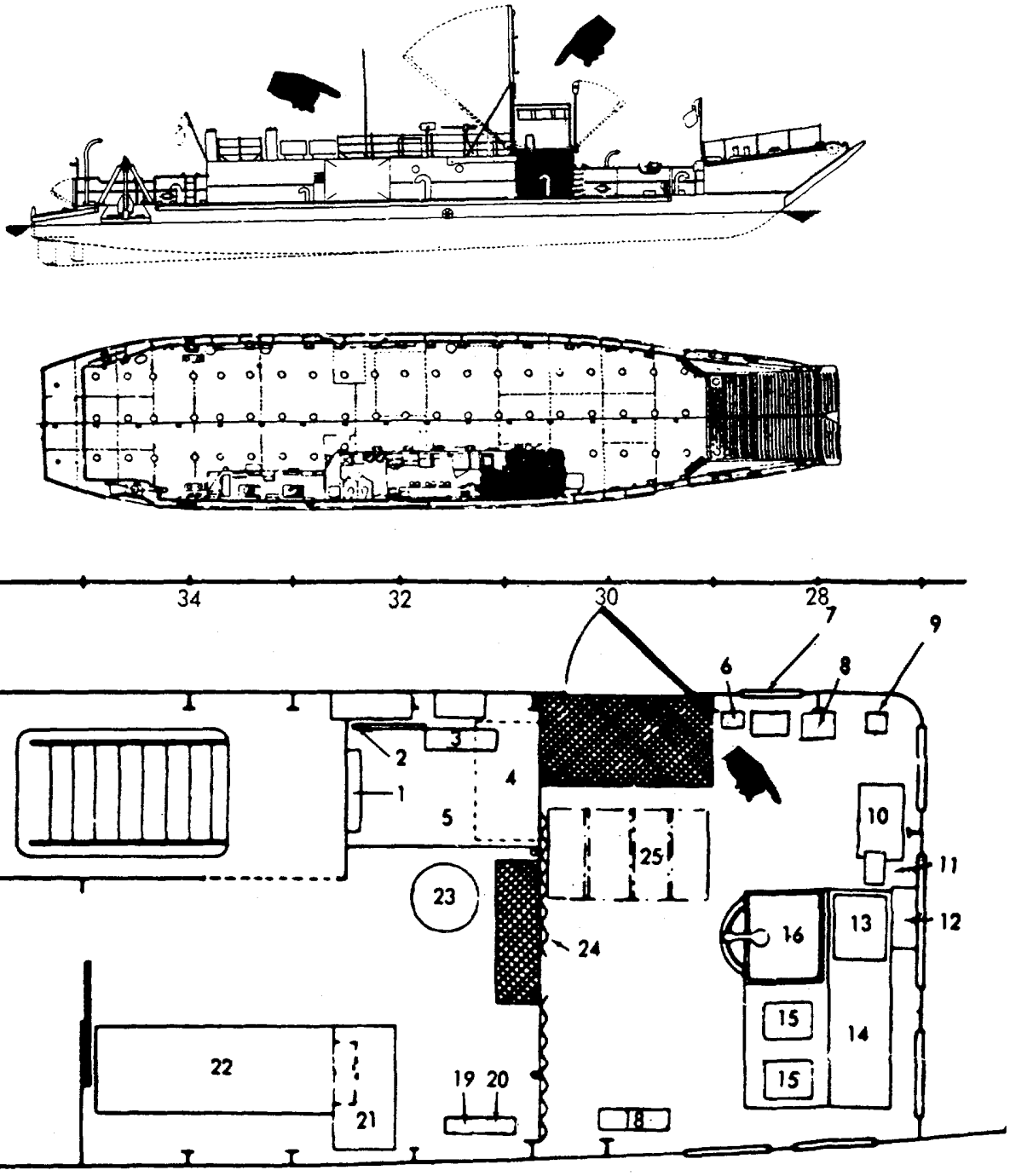
1-21. **MISCELLANEOUS COMPONENTS ON CARGO DECK.**

The miscellaneous major components located on the cargo deck are shown in Figure FO-12. Figure FO-13 shows the relationship of vents, fills, sounding tubes, and deck access to reach rods for the various tanks (sea water, fresh water, diesel oil) and the magazine.

1-22. **INTERIOR ARRANGEMENTS.**

The following paragraphs locate and describe the major interior components.

1-23. **PILOTHOUSE.**

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(Figure 1-9 Sheet 5 of 6)
(Figure 1-9 Sheet 6 of 6)

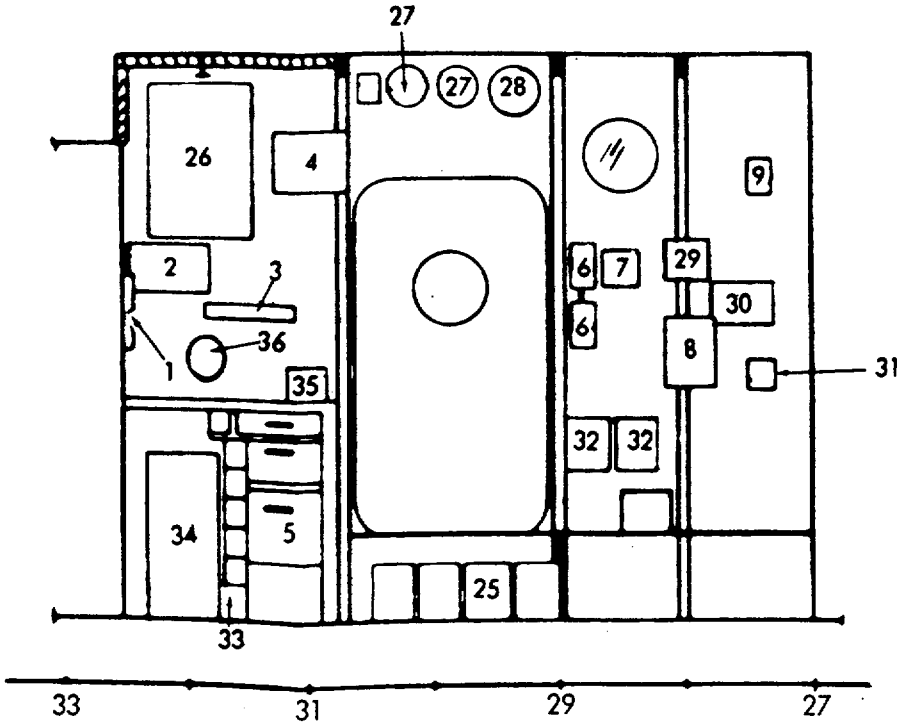
*Figure 1-9. Pilothouse (Sheet 1 of 6).*

1-23. **PILOTHOUSE (CONT)**

1. CLINOMETER - An indicator showing the level of the vessel (port to starboard list).
2. CLINOMETER - An indicator showing the level of the vessel (forward to aft pitch).
3. DESK LIGHT AND FILTER - Lights up the chart table.
4. BOOK RACK - Storage for the navigator's books.
5. CHART TABLE - Where the navigator plots the course on charts.
6. BOW RAMP CONTROLS - Controls the raising and lowering of the bow ramp.
7. AFT ENGINE ROOM VENT SHUTDOWN - A break-glass device to stop the ventilator fan in the aft engine room (2-56-0-E).
8. DARKEN SHIP LIGHT SWITCH -Turns off all external lights during a darken ship condition.
9. THERMOSTAT - Controls the heating of the Pilothouse.
10. RADAR TRANSMITTER/RECEIVER - Transmits and receives the radar signal prior to presentation on the PPI.
11. WINDOW WIPER CONTROL - Controls the windshield wiper and its internal heater.
12. WINDOW WIPER - Keeps the front window clear of rain and spray.
13. GYRO COMPASS - A non-magnetic compass showing the true heading of the vessel. Used to determine the direction the vessel is to be steered.
14. STEERING CONTROL CONSOLE - The control from which the vessel is steered. The console also contains the propulsion engine controls.
15. ENGINE CONTROLS - Contains the throttle and forward, neutral, and reverse shifts for the propulsion engine.
16. STEERING CONTROL PANEL - A panel containing the steering lever, controls for the steering pumps, and other steering and maneuvering controls.
17. (DELETED)
18. NAVIGATIONAL LIGHT CONTROL PANEL - Switches on/off the lights for navigation, breakdown, towing and manoverboard.
19. DISTRIBUTION BOX FEEDER (L-103) - Fuse box for the battery charger, navigation panel and interior communications.
20. DISTRIBUTION PANEL (2L-103) - Switch panel and fuses for the power to the alarm panel, ships' entertainment system, and miscellaneous navigation equipment.
21. RECTIFIER BATTERY CHARGER - Provides 24 volts DC for charging the battery.
22. TRANSFORMER (AN/URC-80) - Power transformer for AN/URC-80.
23. STOOL - Device for helmsman to sit on.
24. CURTAIN - Separates the front of the Pilothouse from the rear. Used at night or in darken ship conditions.
25. BATTERIES - Used to power the DC Distribution Panel (P-24).

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

1-23. **PILOTHOUSE (CONT)**

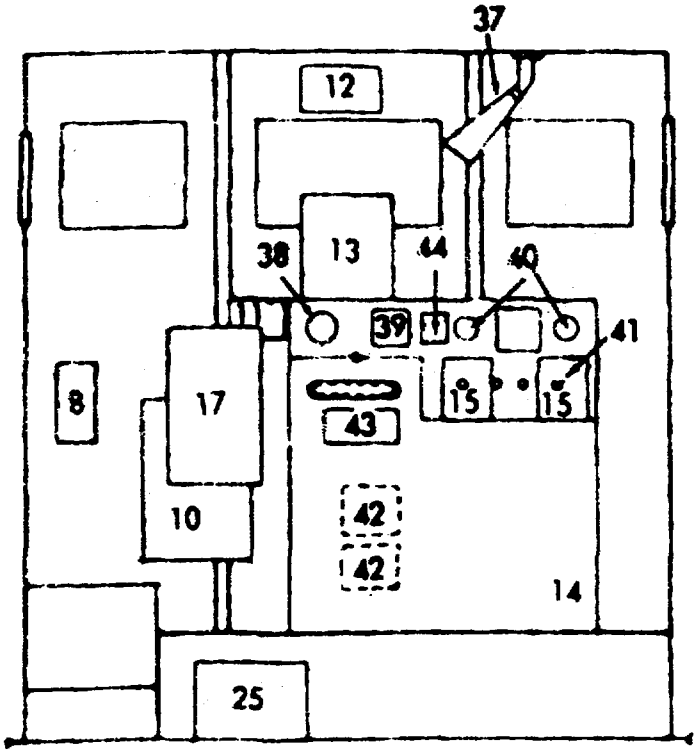



# Port Elev.

26. ALARM PANEL - An audible and visual of propulsion engine (s) low oil pressure or overheating, generator engine(s) low oil pressure or overheating, magazine high heat and sprinkler, sewage high tank level, and Gyro power failure.
27. LOUDSPEAKER - Used to hear voice communications on the AN/VRC-46.
28. SHIPS' CLOCK - Tells the time in the 24 hour method.
29. FORWARD ENGINE ROOM VENT SHUTDOWN - A break-glass device to stop the ventilator fan in the forward engine room (2-50-0-E).
30. HALON SYSTEM CONTROL PANEL - Controls the internal fire alarm and extinguishing system on the vessel.
31. BATTERY EXHAUST SWITCH - Ventilates the battery storage area. Used when the batteries are being recharged.
32. HIGH INTENSITY HAND LIGHT - A portable light.
33. CHART RACK - Storage for the navigator's charts.
34. FLAG BAG STOWAGE - Storage for the signal flags.
35. TELEGRAPH KEY - A signaling device that makes the mast blinker lights operate.
36. MICROPHONE (AN/VRC-47) - Microphone for voice communication on the AN/VRC-47.

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

1-23. **PILOTHOUSE (CONT).**
**LEGEND FIGURE 1-9 (CONT).**




# Fwd. Elev.

37. VOICE TUBE AND MOUTHPIECE – Used for voice communications between the Pilot House and the Conning Tower (located above the Pilot House).

38. RUDDER ANGLE INDICATOR – An indicator that shows the position of the steering rudders.

39. HEADING SELECTOR – A device in which a pre–determined course can be set so that the vessel will automatically steer (Autopilot).

40. ENGINE SPEED INDICATOR – Shows the revolutions per minute (RPM) that the engine is turning.

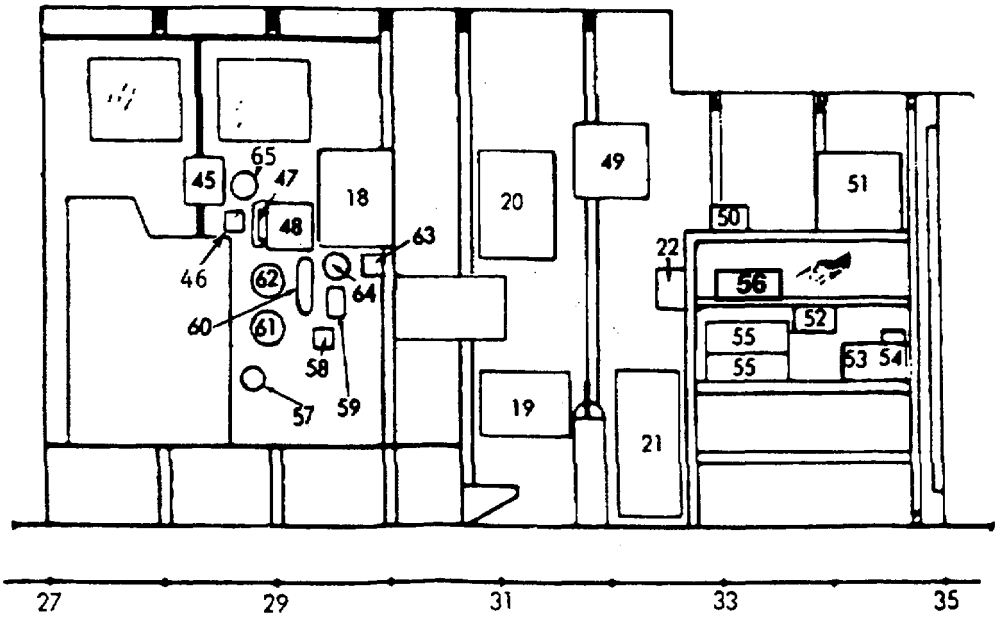
41. ENGINE START/STOP CONTROLS – Pushbuttons used to start and stop the propulsion engines in a particular area.

42. CONTROL AMPLIFIER – Electronic circuits for the steering control panel.

43. COMPASS CONTROL UNIT – The electronic circuits to control the gyro compass.

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

1-23. **PILOTHOUSE (CONT)**
**LEGEND FIGURE 1-9 (CONT).**




| | | |
|---|---|---|
| 44. | RHMS COMPASS – | A compass rose that shows the magnetic heading of the vessel. |
| 45. | REMOTE CONTROL (AN/URC–80) – | Permits remote control of a voice communications radio. |
| 46. | HALON HORN – | An audible device indicating the Halon (Fire Fighting) System has been activated. |
| 47. | HAND SETS – | Used for remote communication of the AN/URC–80 and AN/URC–46. |
| 48. | REMOTE CONTROL TRANSMITTER/ RECEIVER (AN/URC–46) – | Permits remote control of a voice communications radio. |
| 49. | DC DISTRIBUTION BOX (CP24–1) – | Distributes 24 VDC for the radio, navigation panel, and gyro compass. |
| 50. | LOUDSPEAKER – | Used to hear the voice communication on both the AN/URC–46, and the AN/URC–80. |
| 51. | RADIO RECEIVER (ENTERTAINMENT SYSTEM) – | A radio receiver for entertainment and time signals. |

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

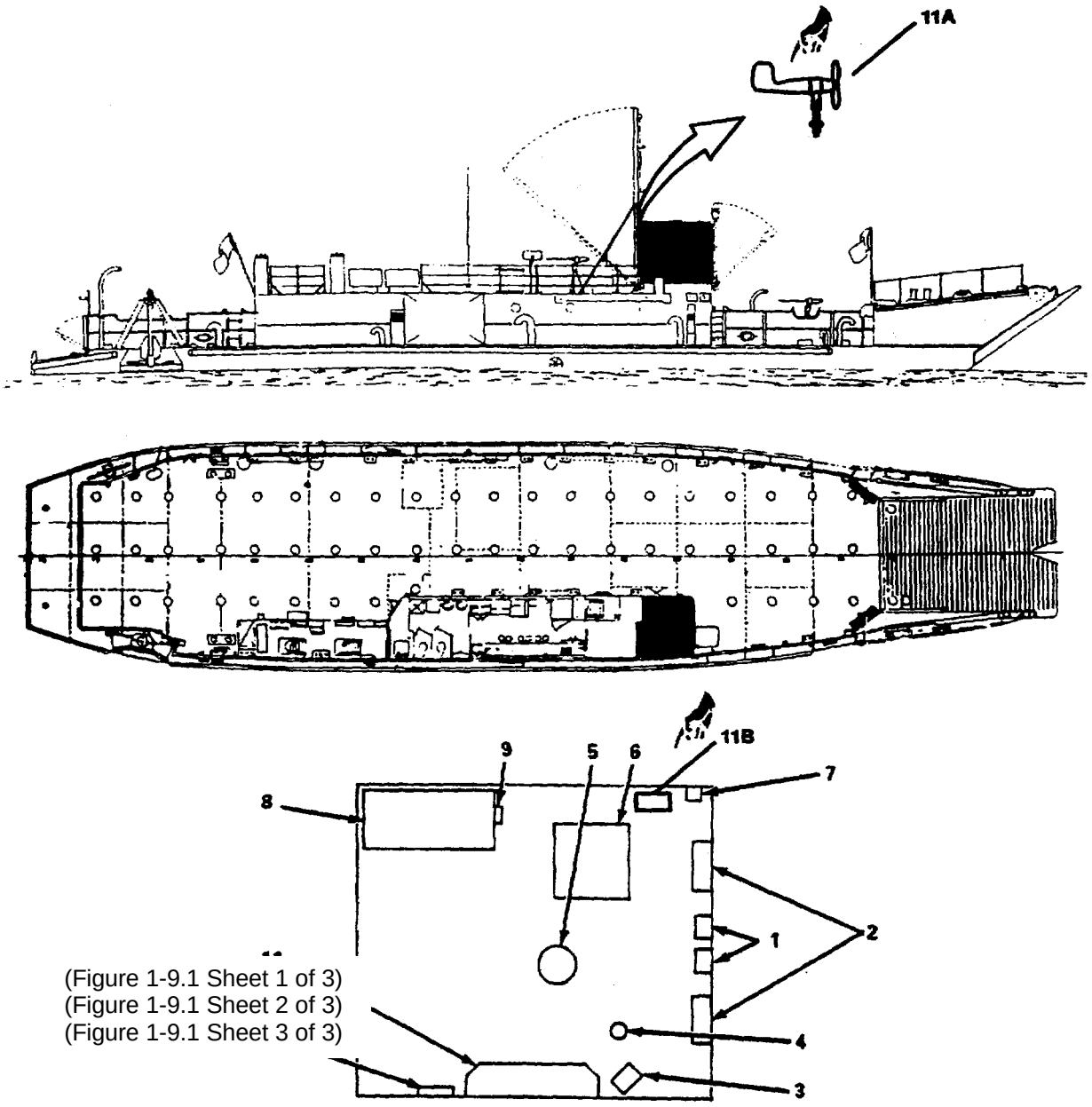
1-23. **PILOTHOUSE (CONT).**
**LEGEND FIGURE 1-9 (CONT).**

| | |
|---|---|
| 52. LOUDSPEAKER - | Used to hear the ship's entertainment system and time signals. |
| 53. TRANSMITTER/RECEIVER IDENTIFICATION FRIEND OR FOE - | Transmit a signal to an object which must respond with a friendly identification. If not, the object is considered a foe (enemy). |
| 54. CONTROL TRANSPONDER, IFF - | Part the IFF System. |
| 55. TRANSMITTER/RECEIVER (AN/URC-46) - | A transmitter/receiver used for voice communications. |
| 56. WEATHERFAX - | MARINEFAX TR-IV |
| 57. CONNECTION BOX - | Internal connections of the sound powered phone system. |
| 58. SOUND POWERED PHONE JACK - | A place to plug in the sound powered phone. Used for internal communications. |
| 59. PUSH BUTTON "E" CALL - | Switches that alert the Switchboard Room and Forward and Aft Engine Rooms to a call on the sound powered phone. |
| 60. TELEPHONE - | Sound powered phone. |
| 61. CEASE FIRE SWITCH - | Alerts the machine gun stations to cease firing. |
| 62. NAVIGATION HORN SWITCH - | When activated, operates the ships navigation horn. Used for signing and fog situations. |
| 63. WAKE LIGHT SWITCH - | Illuminates the wake of the vessel. Used when one vessel is following another during a darken ship condition. |
| 64. CALL BUZZER CKT "E" - | Circuits that alert the Switchboard Room and Forward and Aft Engine Rooms to a call on the sound powered phone. |
| 65. GENERAL ALARM CONTROL - | Activates the general alarm bells and lights for fires and emergencies. |

*Figure 1-9. Pilot House (Sheet 6 of 6)*

1-23.1 **CONNING TOWER**

The major components of the conning tower are shown in figure 1-9.1.




(Figure 1-9.1 Sheet 1 of 3)
(Figure 1-9.1 Sheet 2 of 3)
(Figure 1-9.1 Sheet 3 of 3)

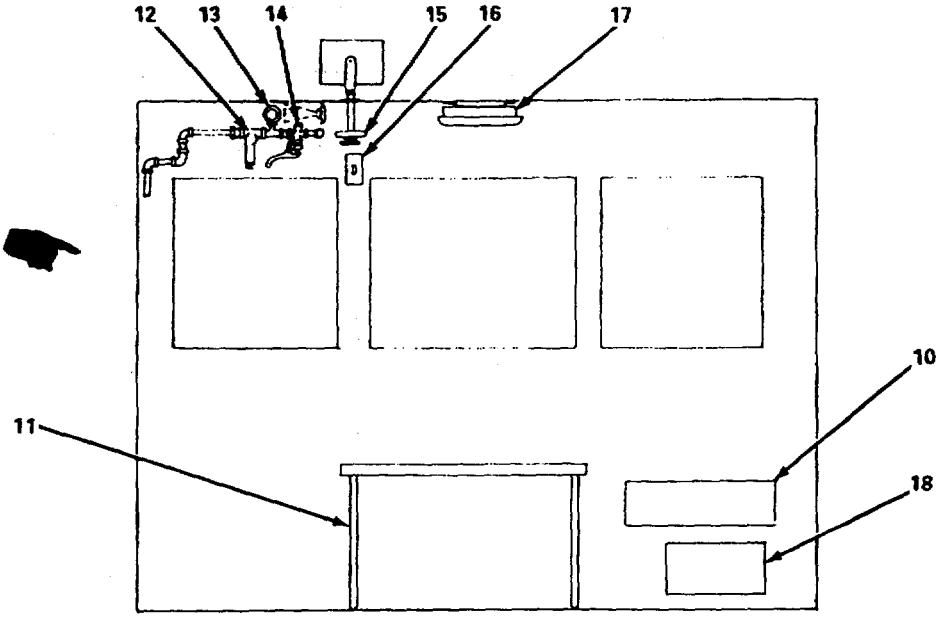
*Figure 1-9.1. Conning Tower (Sheet 1 of 3).*

1-23.1 **CONNING TOWER**
**LEGEND FIGURE 1-9.1.**

| | | |
|---|---|---|
| 1. | WINDOW WIPER CONTROLLERS - | Controls the windshield wipers. |
| 2. | WINDOW WIPERS - | Keeps the front windows dear of rain and spray. |
| 3. | I/C TRANSMITTER/RECEIVER (AN/URC-80) | A transmitter/receiver for voice communications. |
| 4 | VOICE TUBE AND MOUTHPIECE - | Used for voice communications between the pilot house and Conning Tower. |
| 5. | PELORUS - | A navigational instrument used to determine relative bearings to distant objects. |
| 6. | RADAR DISPLAY UNIT - | Plan Position Indicator (PPI). |
| 7. | THERMOSTAT - | Used to set the ambient temperature within the range of 40 and 8 degrees F, and to control the heater to supply the heat required to maintain that temperature. |
| 8. | CHART TABLE - | Used by the navigator to plot the course on charts. |
| 9. | ELECTRICAL OUTLET BOX - | Contains three 125 VAC, 15 A, grounded receptacles with covers. |
| 10. | HEATER - | Supplies heat toe Conning Tower. |
| 11. | REFERENCE TABLE - | A utility work table. |
| 11A. | WIND TRANSMITTER - | Senses wind speed and wind direction. |
| 11B. | WIND INDICATOR - | Indicates wind speed and wind direction. |

*Figure 1-9.1. Conning Tower (Sheet 2 of 3).*

1-23.1. **CONNING TOWER (CONT).**
**LEGEND FIGURE 1-9.1 (CONT).**



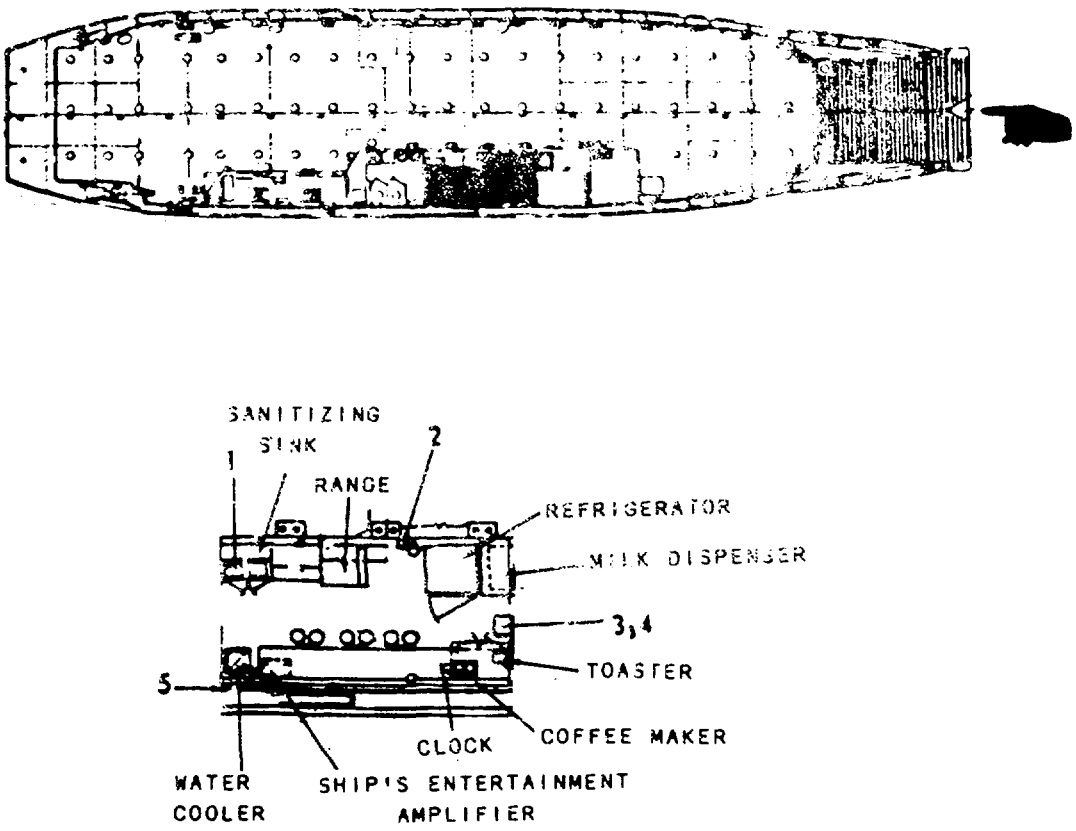

Stbd. Elev.

12. AIR STRAINER/WATER SEPARATOR – Filters and removes moisture from supply air to air horn.
13. AIR PRESSURE GAGE – Indicates pressure of air supply to air horn.
14. AIR HORN OPERATING VALVE – Manually operated valve for air horn.
15. SEARCHLIGHT REMOTE CONTROL – Allows manual control of searchlight in traverse and elevation.
16. SEARCHLIGHT SWITCH – On–Off toggle switch for searchlight.
17. LIGHT FIXTURE – Ceiling mounted fluorescent fixture for general nighttime illumination, switchable to white or red light.
18. HVAC DUCT – Covered duct to allow ventilation from ship's HVAC system.

*Figure 1-9.1. Conning Tower (Sheet 3 of 3).*

1-24. **GALLEY.**

The interior arrangement of the major components in the Galley are shown in Figure 1-10.




1. SINK HEATER - Controls for heater in sanitary sink.
2. RANGE DISCONNECT - Disconnect switch for the range.
3. GALLEY - Emergency stop for exhaust fan in Galley.
4. AIR CONDITIONING ROOM - Break-glass - Emergency stop for exhaust fan in air conditioning room.
5. DISTRIBUTION PANEL L108 - Power distribution to the various components in the Galley.

*Figure 1-10. Galley.*

1-25. **WASH ROOM, WATER CLOSET, AND SHOWER.**

The major components of the Washroom, Water Closet and Shower compartment (1-44-1-L) are shown in Figure 1-11.

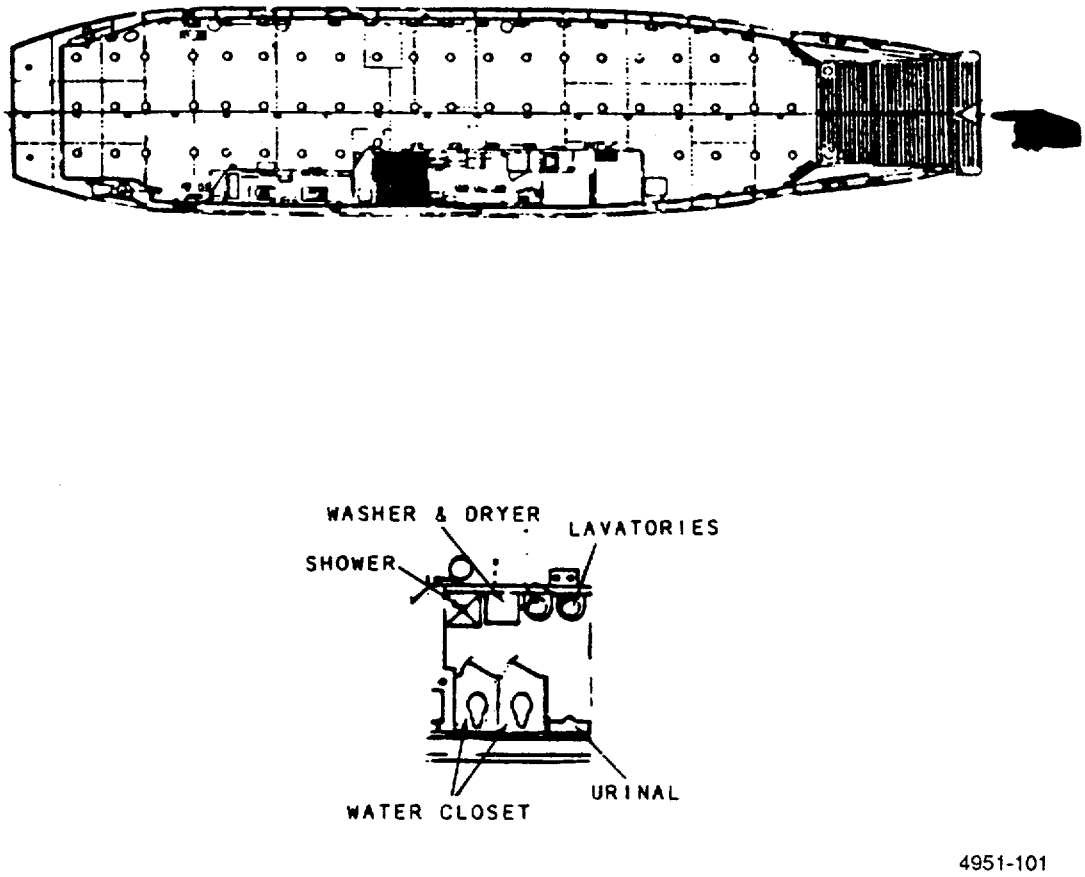
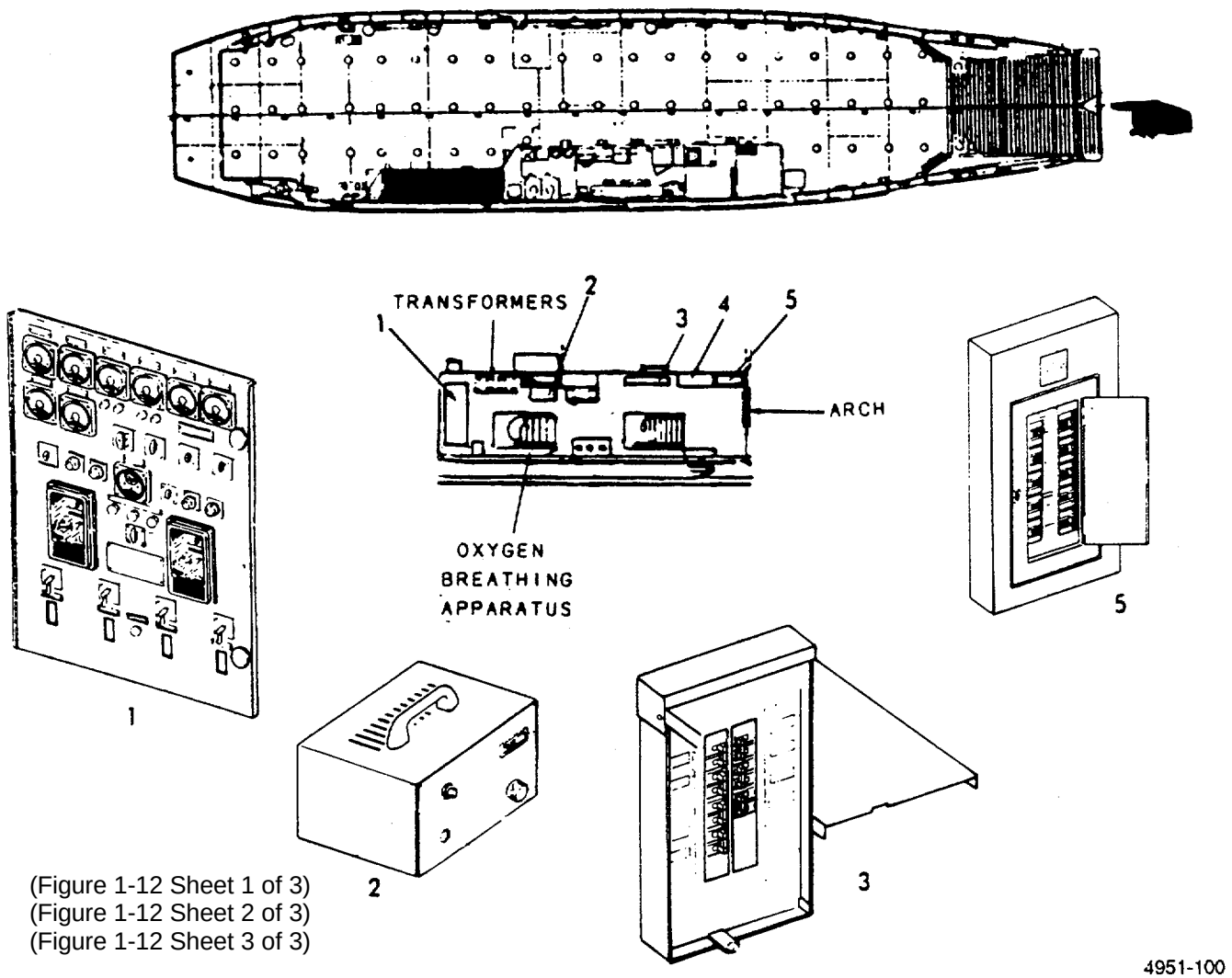



*Figure 1-11. Washroom, Water Closet and Shower.*

1-26. **ENGINE ROOM ACCESS.**

The major components of the Engine Room Access Compartment (1-50-1-Q) are shown in Figure 1-12.




(Figure 1-12 Sheet 1 of 3)
(Figure 1-12 Sheet 2 of 3)
(Figure 1-12 Sheet 3 of 3)

1. SHIPS SERVICE MAIN SWITCH BOARD - The switchboard controls, monitors, protects, and parallels the ships' two generators when underway. When in port it monitors and protects against incorrect shore power.

2. BATTERY CHARGER - BATTLE LANTERN - Used for recharging the batteries in battle lanterns.

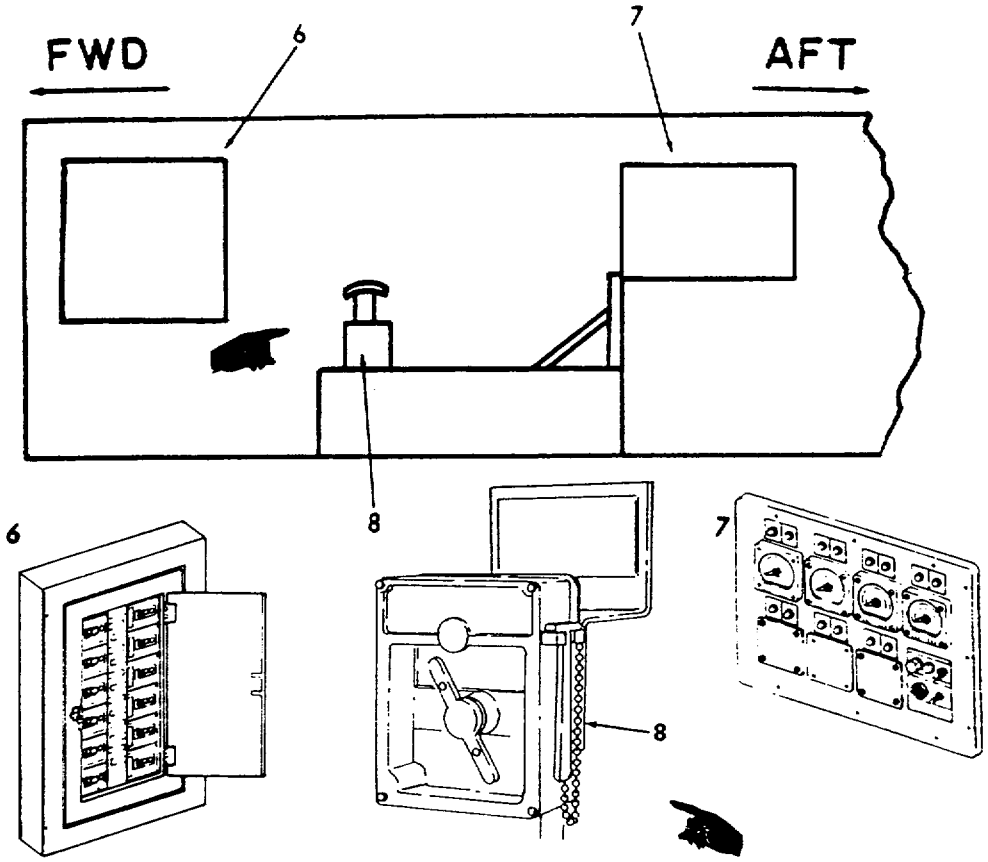
3. LIGHTING DISTRIBUTION PANEL L-110 -

4. VENT 149 PANEL -

5. LIGHTING DISTRIBUTION PANEL L-100 -

*Figure 1-12. Engine Room Access Compartment (Sheet 1 of 3).*

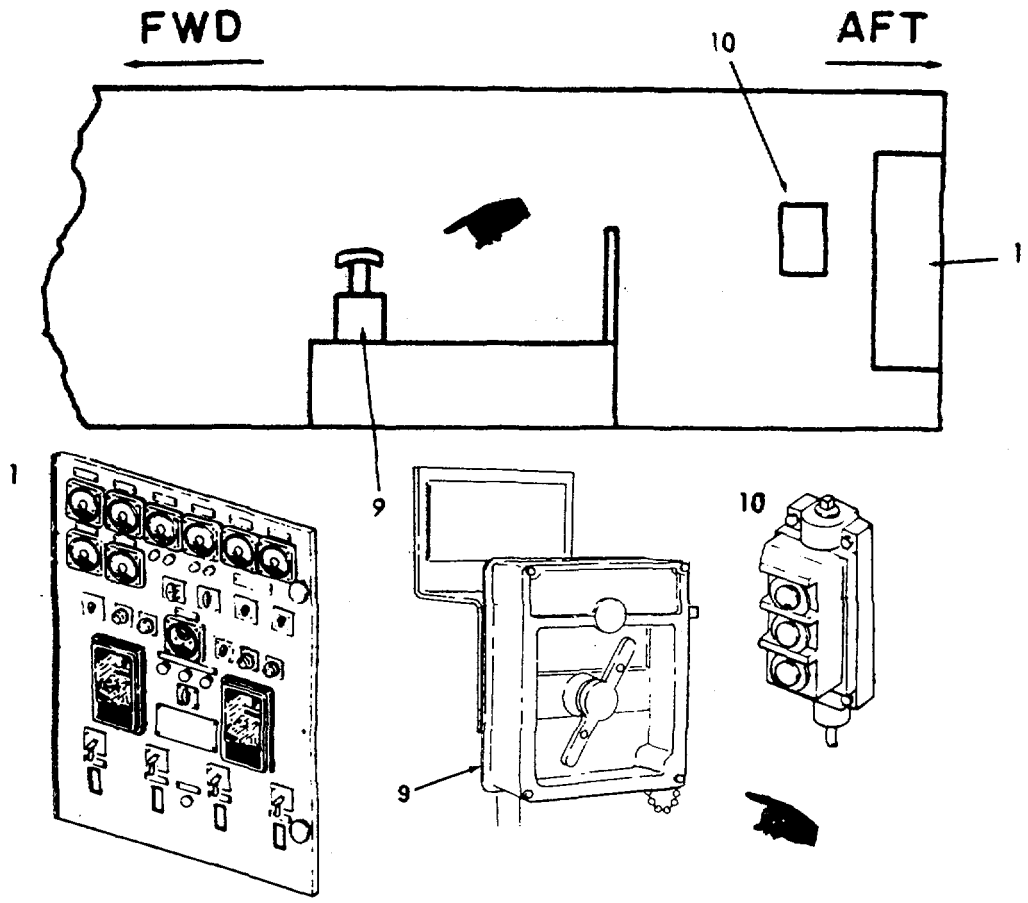
1-26. **ENGINE ROOM ACCESS (CONT).**




6. Power Distribution Panel - P400.
7. Tank Level Indicators - Indicates level of contents in Diesel Tank (Port, Diesel Tank Stbd - Fresh Water.
8. Halon Emergency Release - Fwd Engine Room.

*Figure 1-12. Engine Room Access Compartment (Sheet 2 of 3).*

1-26. **ENGINE ROOM ACCESS (CONT).**

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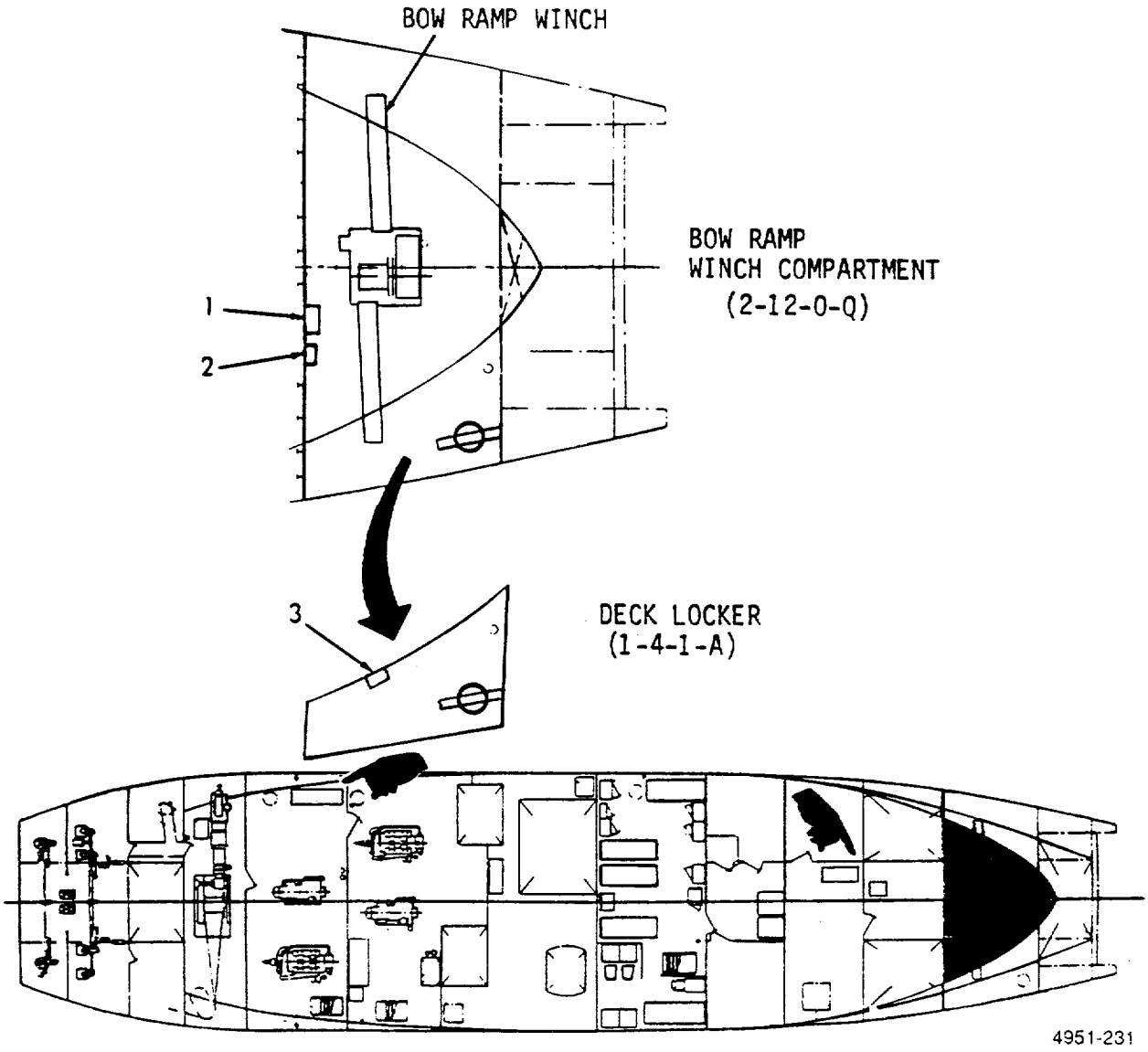
1. SHIPS SERVICE MAIN SWITCH BOARD.
9. HALON EMERGENCY RELEASE - Aft Engine Room.
10. FIRE PUMP - Remote Start/Stop.

*Figure 1-12. Engine Room Access Compartment (Sheet 3 of 3).*

1-27. **BOW RAMP WINCH COMPARTMENT AND DECK LOCKER.**

The Bow Ramp Winch Compartment (2-12-0-Q) and the Deck Locker (1-4-1-A) contain the main components for the Bow Ramp. The Deck Locker is located on the vehicle deck and provides access to the winch compartment. Refer to Figure 1-13.




1. CONTROLLER - Motor controller with start, stop, and reset switches.

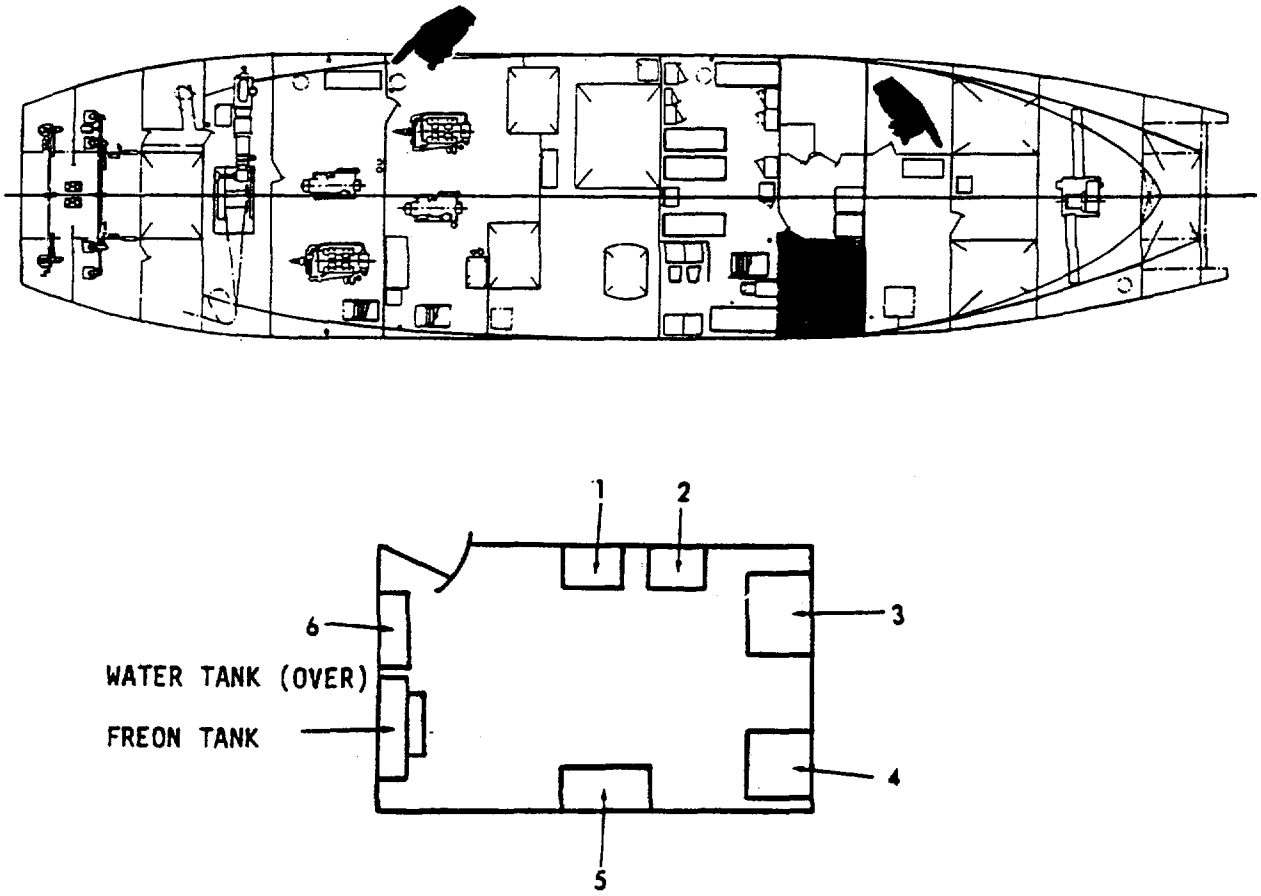
2. DISCONNECT SWITCH - Disconnects the power from the controller.

3. LOCAL PUSHBUTTON SWITCHES - Switches located in deck locker for local operation of ramp.

*Figure 1-13. Locate Bow Ramp.*

1-28. **AIR CONDITIONING MACHINERY ROOM.**

The major components of the Air Conditioning Machinery Room are shown in Figure 1-14.




1- MAIN AIR CIRCULATING VENT CONTROLLER - Controller for the air circulating vent for the pilot house, galley, and crew and transient berthing compartments.

2- SEA WATER PUMP CONT - Controller for the sea water cooling pump for the air conditioner.

3- COMPRESSOR - Air conditioner compressor and motor.

4- COMPRESSOR CONTROLLER - Controller for the air conditioner compressor and motor.

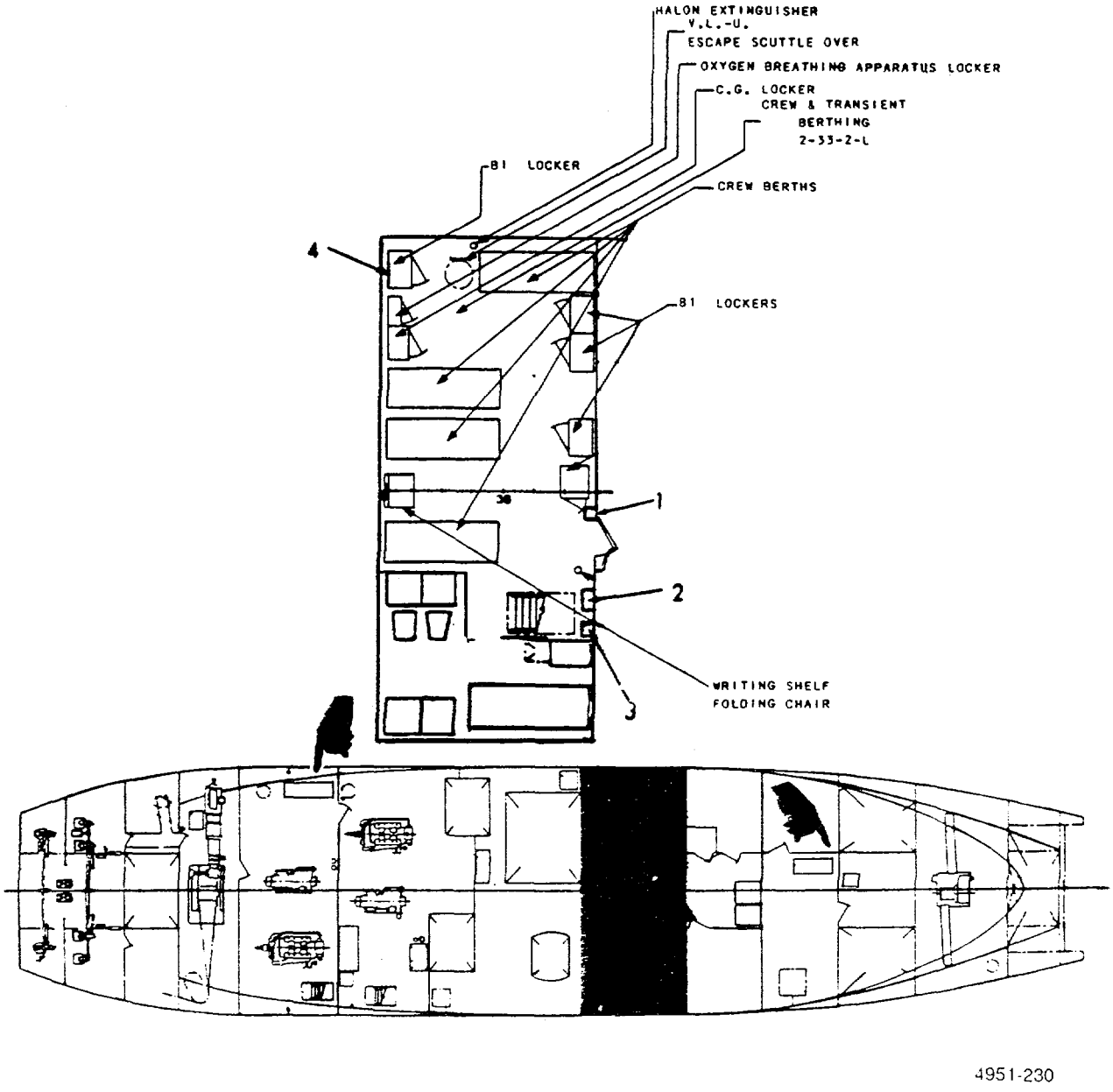
5- SEA WATER PUMP - Sea water cooling pump and motor for the air conditioner.

6- GAGES - Pressure gages for the air conditioning system.

*Figure 1-14. Air Conditioning Room.*

1-29. **CREW AND TRANSIENT BERTHING.**

The major components in the Crew and Transient Berthing Compartment (2-33-2-L) are shown in Figure 1-15.

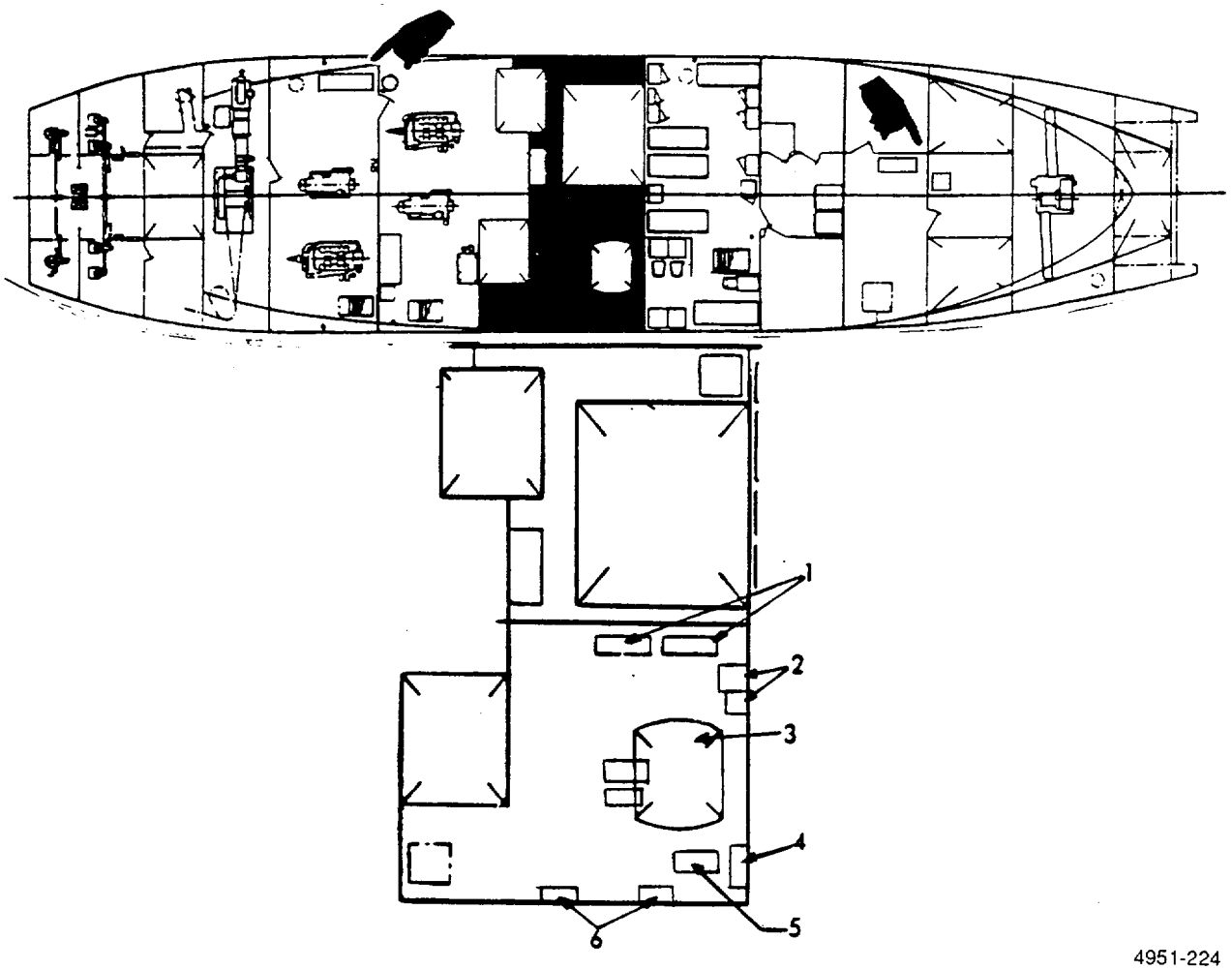



1. POWER DISTRIBUTION PANEL P-406.
2. LIGHTING DISTRIBUTION PANEL L-104.
3. SYS 545 PANEL.
4. LIGHTING DISTRIBUTION PANEL L-105.

*Figure 1-15. Crew and Transient Berthing.*

1-30. **TANK AND AUXILIARY MACHINERY COMPARTMENT.**

The major components of the Tank and Auxiliary Machinery Compartment (2-40-0-Q) are shown in Figure 1-16. The Sewage Treatment Plant is also located in this compartment, and is shown in Figure 1-17.




1- SEWAGE DISCHARGE PUMPS - Pumps for overboard discharge of sewage.

2- SEWAGE PUMP CONTROLLER - Controllers for the sewage pumps 1 and 2.

3- SEWAGE TREATMENT PLANT - Collection tank, pumps and motors for collection and disposal of sewage.

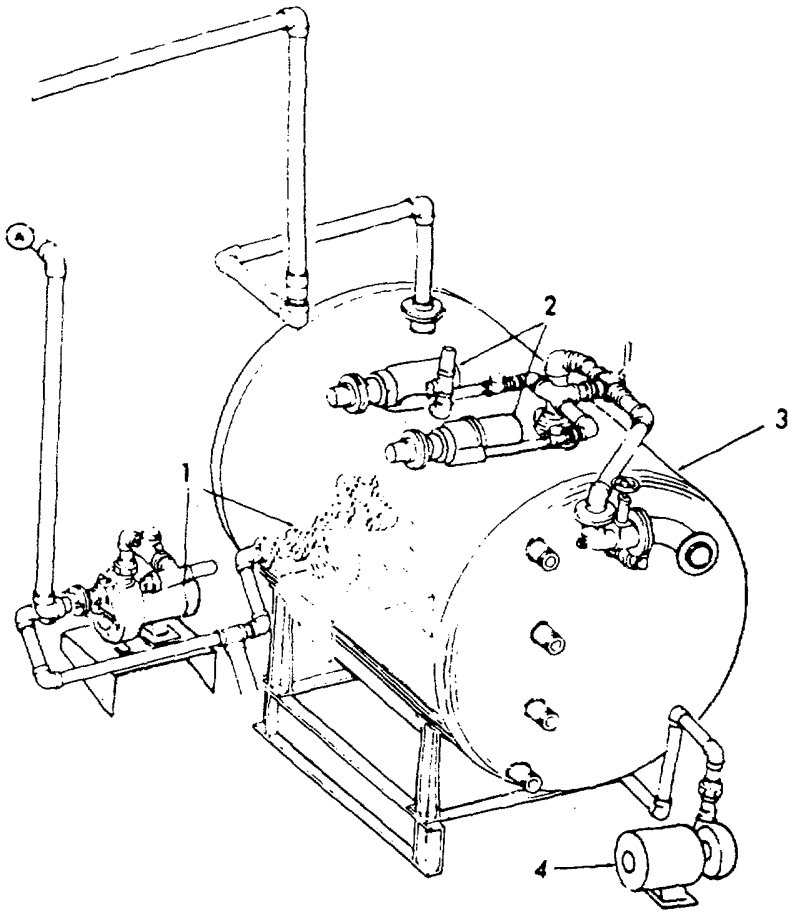
4- SEWAGE AIR PUMP CONTROLLER - Controller for the sewage air pump.

5- SEWAGE AIR PUMP - Blows air into sewage treatment tank.

6- MACERATOR PUMP CONTROLS - Controller, timers and switches for macerator pumps #1 and #2.

*Figure 1-16. Tank and Auxiliary Machinery Compartment.*

1-30. **TANK AND AUXILIARY MACHINERY COMPARTMENT (CONT).**




1- SEWAGE PUMPS #1 and #2. - Pumps the contents of the collection tank to shore disposal tanks.

2- MACERATOR PUMPS #1 and #2. - Electrically operated by flushing the urinal or water closets. Pumps break-up the sewage prior to storage in collection tank.

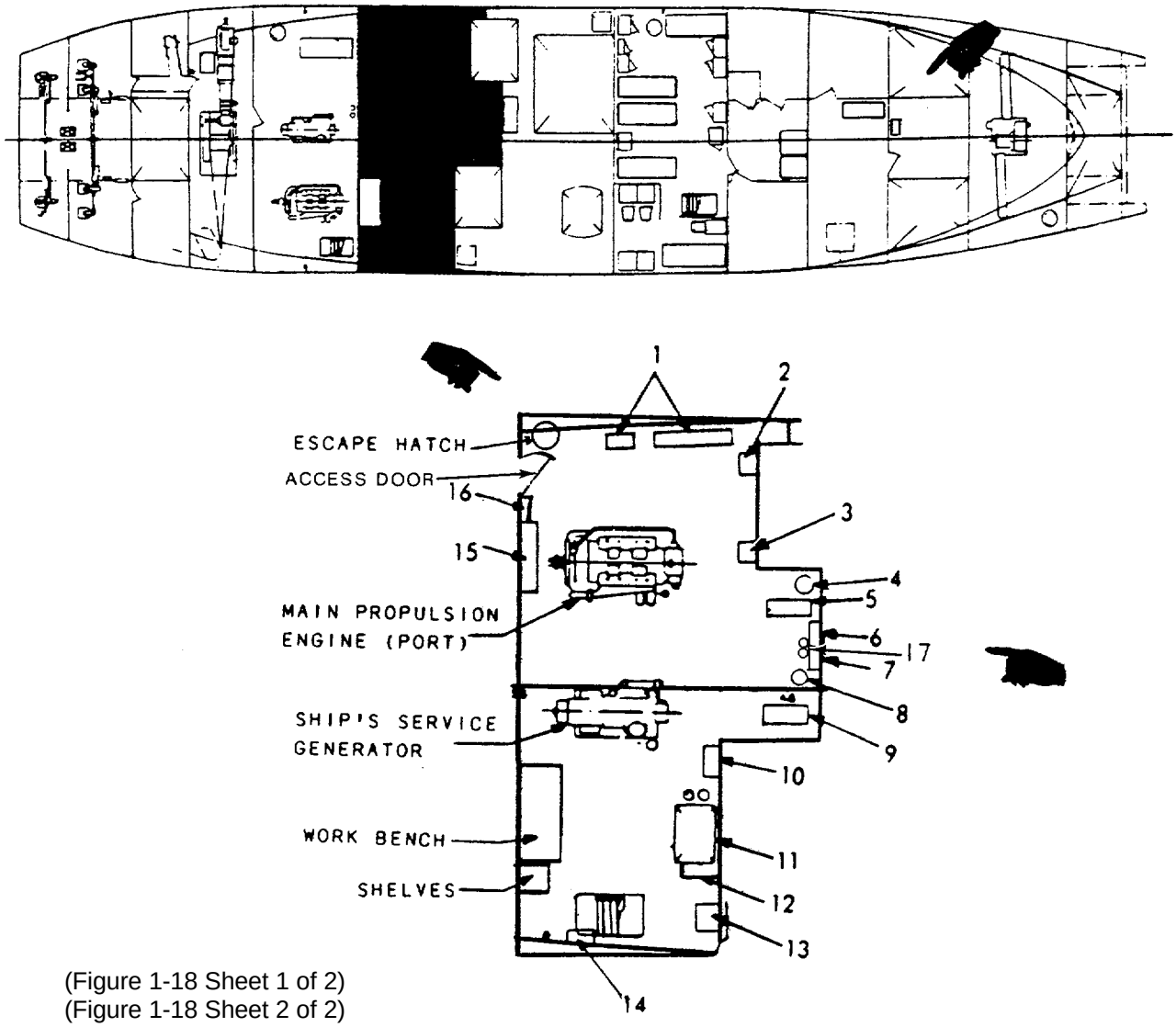
3- COLLECTION TANK - Holding tank for sewage.

4- SEWAGE AIR PUMP - Provides air to collection tank to stir up sewage.

*Figure 1-17. Sewage Treatment Plant.*

1-31. **FORWARD ENGINE ROOM.**

The major components of the Forward Engine Room (2-50-0-E) are shown in Figure 1-18. The Fresh Water System is shown in Figure 1-19. The Oil-Water Separator is shown in Figure 1-20.




(Figure 1-18 Sheet 1 of 2)
(Figure 1-18 Sheet 2 of 2)

*Figure 1-18. Forward Engine Room (Sheet 1 of 2).*

1-31. **FORWARD ENGINE ROOM (CONT).**

Legend Figure 1-18**.**

1- OIL/WATER SEPARATOR - Separates the oil from the water in the bilge.

2- FWD ENG RM VENT - Controller for the vent in the forward engine room.

3- LIGHTING DISTRIBUTION PANEL L-107 - Power lights in the machinery room, auxiliary machinery room (2-40-0-Q), switchboard area of the engine access room (1-50-1-Q), forward engine room, and tank level indicators, and main engine starting controls.

4- FRESH WATER TANK - Pressure tank for fresh water system.

5- FRESH WATER PUMP - Pressure pump for fresh water system.

6- FRESH WATER CONTROLLER - Controller for fresh water pump.

7- SEA WATER SERVICE PUMP CONTROLLER - Controller for the sea water cooling pump for diesel oil.

8- HOT WATER HEATER - Hot water heater.

9- SEA WATER SERVICE PUMP - Pressure pump for the sea water cooling tank.

10- DISTRIBUTION PANEL L-106 - Power distribution to exhaust and ventilator fans located in the hold compartments.

11- LUBE OIL TANK - Tank containing oil for lubricating the diesel engines.

12- LUBE OIL TRANSFER PUMP - Manual pump used to transfer oil to lube oil pumps on the main propulsion engines.

13- POWER DISTRIBUTION PANELS P408 and P408A - Power distribution to pumps, exhaust fans, ventilators, and the hot water heater in the forward and aft engine rooms.

14- HEATER PANEL Sys-544 - Fuses for power to the heaters in the forward and aft engine rooms.

15- LUBE OIL PUMP - Lube oil pump for the port propulsion engine.

16- LUBE OIL PUMP CONTROLLER - Controller for port Lube oil pump.

17- FUEL FILTER/WATER SEPARATOR - Separates water from fuel.

*Figure 1-18. Forward Engine Room (Sheet 2 of 2).*

1-31. **FORWARD ENGINE ROOM (CONT).**

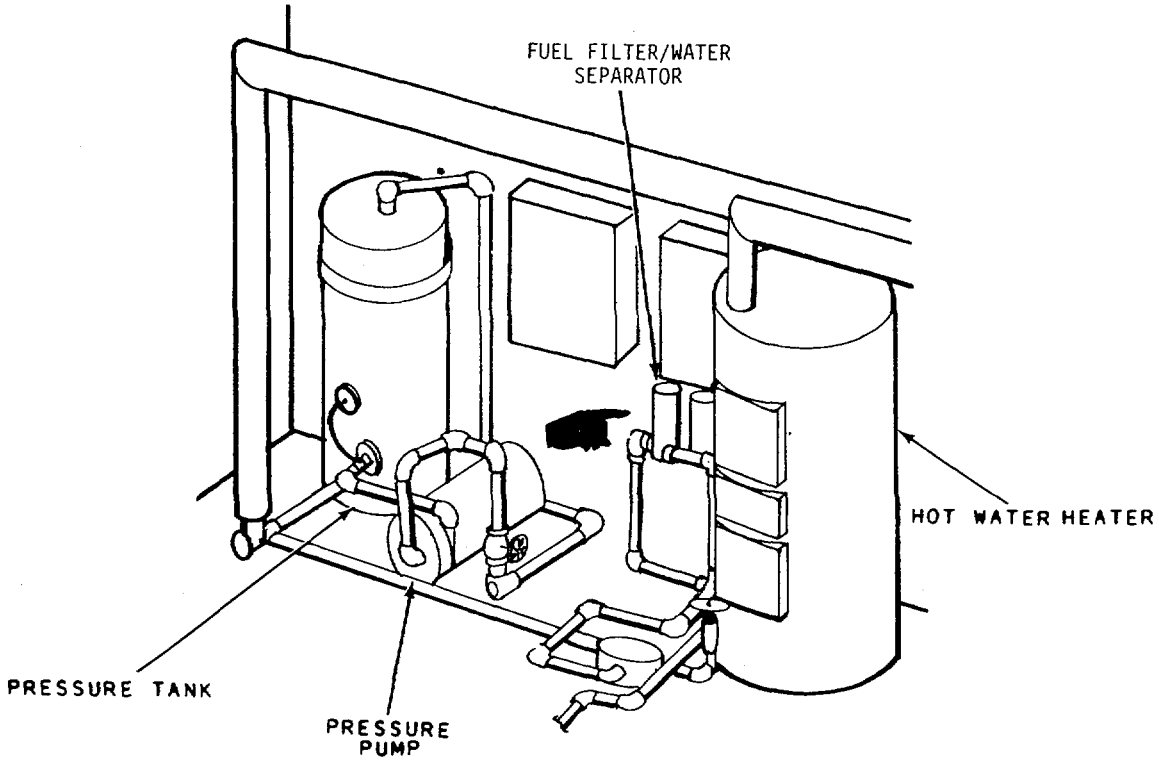



*Figure 1-19. Fresh Water System.*

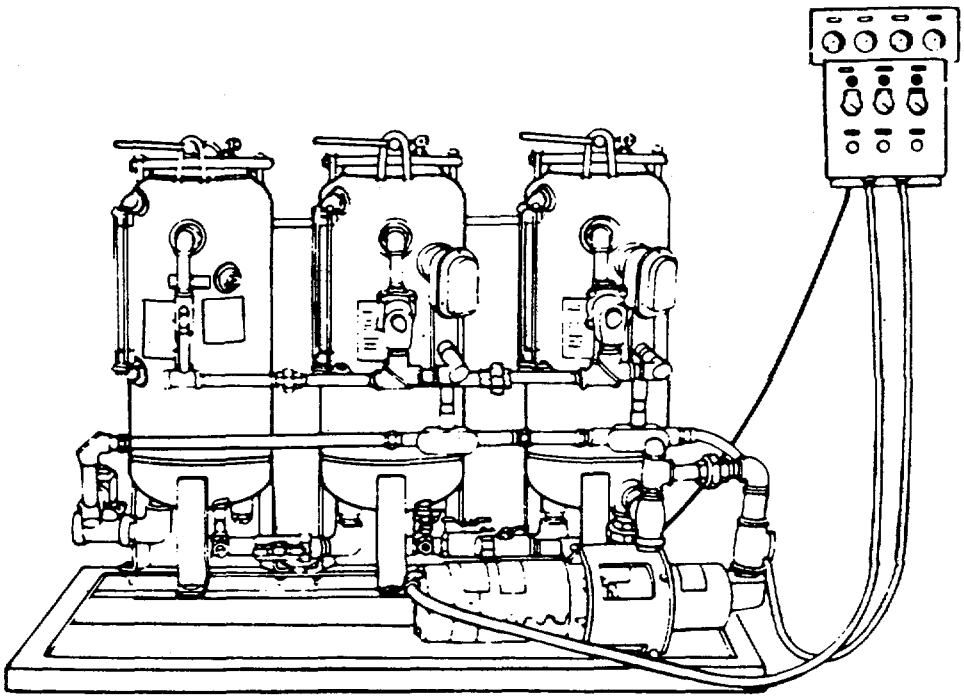
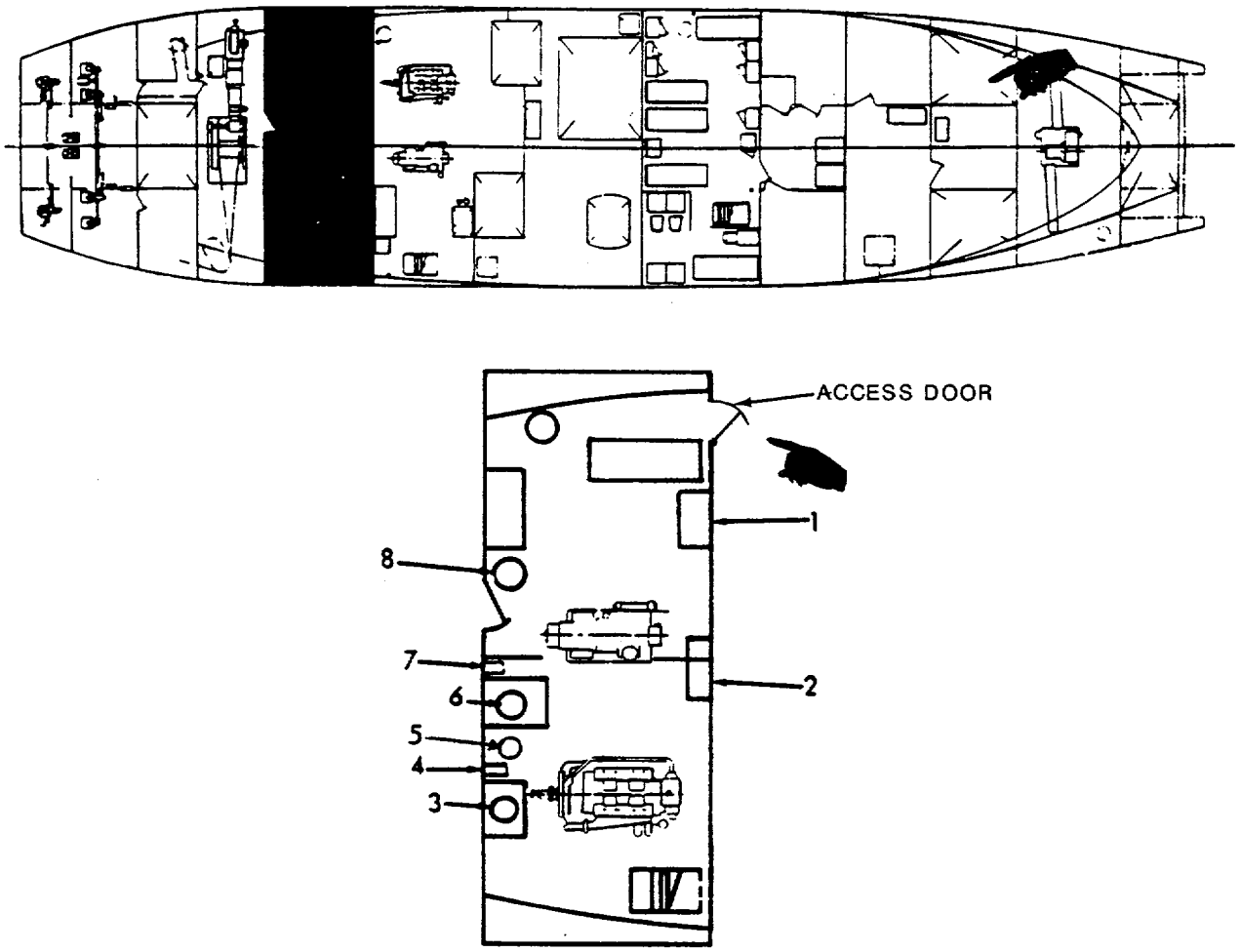


*Figure 1-20. Oil/Water Separator System.*

1-32. **AFT ENGINE ROOM.**

The major components of the Aft Engine Room (2-56-0-E) are shown in Figure 1-21.




(Figure 1-21 Sheet 1 of 2)
(Figure 1-21 Sheet 2 of 2)

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*Figure 1-21. Aft Engine Room (Sheet 1 of 2).*

1-32. **AFT ENGINE ROOM (CONT).**

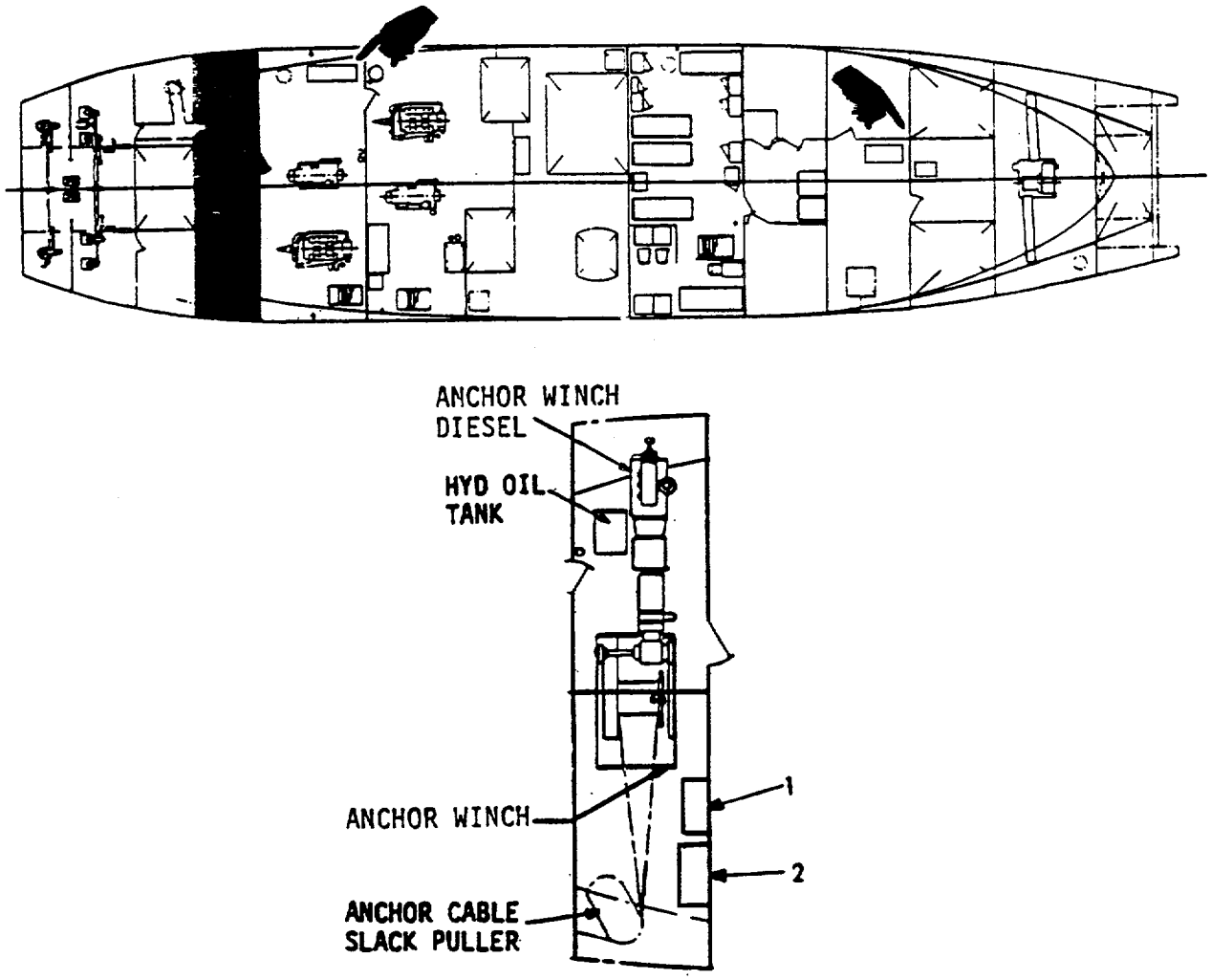
Legend Figure 1-21.

1. EXHAUST VENT (2-57-2) - Disconnect switch for exhaust ventilator in Aft Engine Room.
2. LIGHTING DISTRIBUTION PANEL L-101 - Power to lights in the Aft Engine Room, Anchor Winch Room (2-62-0-Q), Steering Gear Room (2-70-0-Q), and controls for the Anchor Winch.
3. LUBE OIL PUMP - Lube oil pump for the Starboard Main Propulsion Engine.
4. LUBE OIL PUMP CONTROLLER - Controller for the Stbd Lube Oil :Pump.
5. SHAFT SEAL TANK - Water tank for lubrication of seals on Main Propulsion Engine drive shafts.
6. FIRE PUMP - Pumps sea water for fighting fires.
7. FIRE PUMP CONTROLLER - Controller for the Fire Pump.
8. TANK LEVEL INDICATORS - Indicates level of sea water in the Sea Water Ballast Tanks (4).

*Figure 1-21. Aft Engine Room (Sheet 2 of 2).*

1-33. **ANCHOR WINCH COMPARTMENT.**

The major components of the Anchor Winch Compartment (2-62-0-Q) are shown in Figure 1-22.



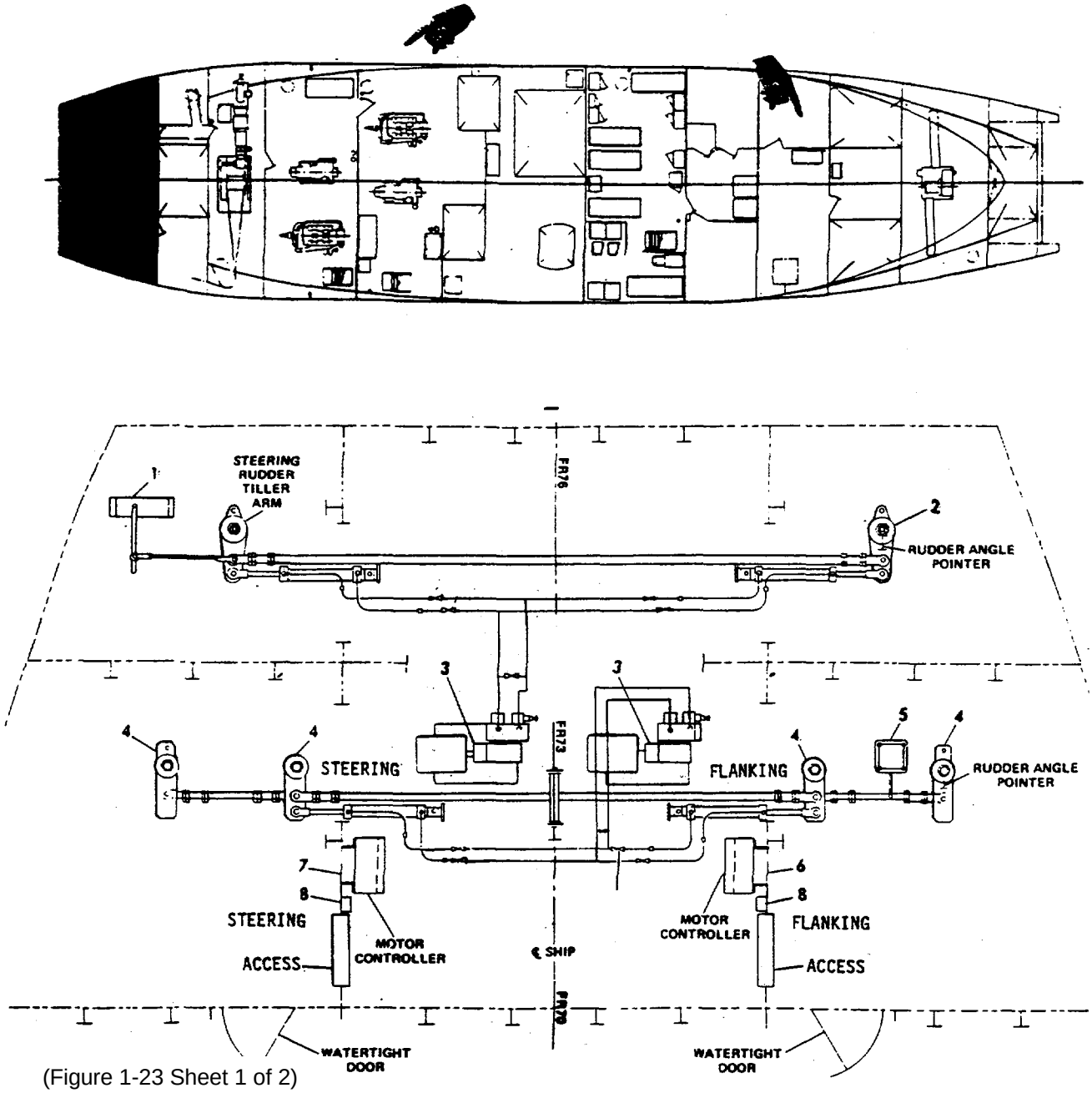

1. CENTRAL HYDRAULIC SYSTEM - Disconnect switch and controller for the Central Hydraulic System.

2. CENTRAL HYDRAULIC SYSTEM PUMP - Supplies hydraulic pressure to operate the Mast, Stern Gate, and Anchor "A" Frame.

*Figure 1-22. Anchor Winch Compartment.*

1-34. **STEERING GEAR COMPARTMENT.**

The major components of the Steering Gear Compartment (2-70-0-Q) are shown in Figure 1-23.




(Figure 1-23 Sheet 1 of 2)
(Figure 1-23 Sheet 2 of 2)

*Figure 1-23. Steering Gear Compartment (Sheet 1 of 2).*

1-34. **STEERING GEAR COMPARTMENT (CONT).**

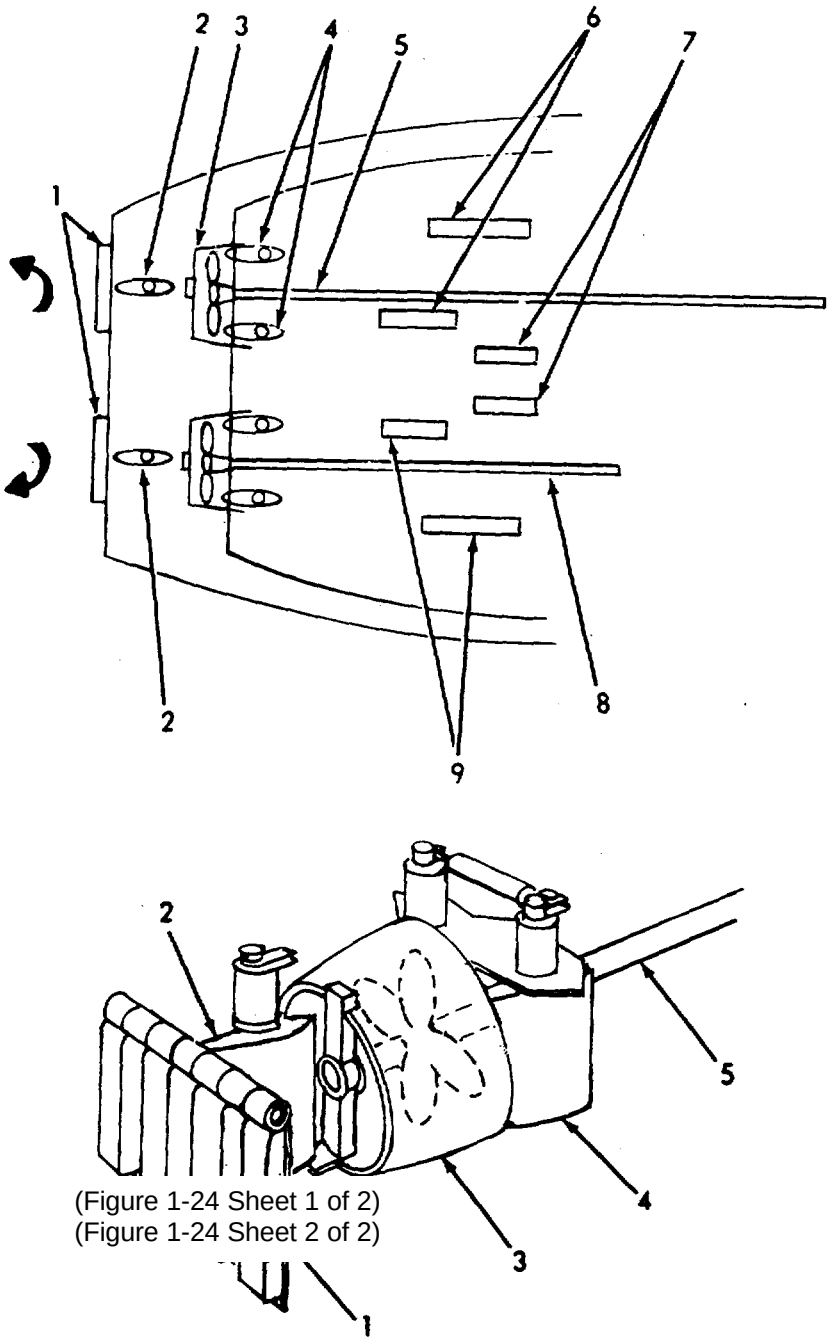
Legend Figure 1-23.

1. RUDDER REPEAT-BACK TRANSMITTER - Transmits the position of the rudder to the Steering Console in the Pilot House.
2. STEERING RUDDER TILLER ARM - Tiller arm that controls the Steering Rudders.
3. HYDRAULIC PUMP UNITS (Steering-Flanking) - Hydraulic Pump that supplies power to the Rudder Tiller Arms.
4. OUTBOARD/INBOARD FLANKING RUDDER TILLER ARM - Tiller arm that controls the Flanking Rudders.
5. LIMIT SWITCH - Sensing device for the limits of full Starboard or Port of the Flanking Rudders.
6. MOTOR CONTROLLER (STEERING) - Controls the Steering Hydraulic Pump unit motor.
7. MOTOR CONTROLLER (FLANKING) - Controls the Flanking Hydraulic Pump unit motor.
8. DISCONNECT SWITCH - Disconnects the power to the motor controller (Flanking or Steering).

*Figure 1-23. Steering Gear Compartment (Sheet 2 of 2).*

1-35. **PROPELLERS, RUDDERS, AND KEEL COOLERS.**

The Propellers, Rudders, and Keel Coolers are located under the vessel. Therefore they are not visible except when the vessel is out of water. Refer to Figure 1-24.




(Figure 1-24 Sheet 1 of 2)
(Figure 1-24 Sheet 2 of 2)

*Figure 1-24. Propellers, Rudders and Keel Coolers (Sheet 1 of 2).*

1-35. **PROPELLERS, RUDDERS, AND KEEL COOLERS (Cont)**

Legend Figure 1-24.

1. FENCE - Fence located on transom of vessel. Swings open when moving forward; closed when in reverse. Used to prevent air cavitation (air pocket containing no water).

2. STEERING RUDDER - Port and Starboard Rudders for steering the vessel in normal operation.

3. KORT NOZZLE - Air foil type of device used to obtain better efficiency from the Propeller.

4. FLANKING RUDDERS - Pair of rudders used when maneuvering vessel.

5. PROPELLER AND SHAFT - Port Engine Propeller rotates counter-clockwise.

6. KEEL COOLERS - Cooling device located under vessel. Used to cool Anchor Winch Engine and Port Propulsion Engine.

7. KEEL COOLERS - Cooling device located under vessel. Used to cool Generators.

8. PROPELLER AND SHAFT - Starboard Engine Propeller. Rotates clockwise.

9. KEEL COOLERS - Cooling device located under vessel. Used to cool Starboard Propulsion Engine.

*Figure 1-24. Propellers, Rudders and Keel Coolers (Sheet 2 of 2).*

1-36 **FIRE FIGHTING.**

The Fire Fighting components on the vessel are of four types:

- Halon system (fixed)
- Portable Extinguishers (Halon and Dry Chemical)
- Firemain System
- Portable Fire Pump

Refer to Figures FO-14.1 and FO-14.2 for the location of these components.

PORTABLE FIRE EXTINGUISHERS.

There are two types of Portable Fire Extinguishers. The type of fire extinguisher can be determined by the colors of the cylinders.

1. Dry chemical (Figure 1-25) is a solid red cylinder.
2. Halon (Figure 1-26) is a red body cylinder with a white band.

Portable Fire Extinguishers can be found in the following areas:

| COMPARTMENT | EXTINGUISHERS |
|---|---|
| Pilot House | 1 portable Halon |
| Galley and Mess | 1 portable Halon and<br>1 portable dry chemical |
| Flammable Liquid Storeroom | 1 portable Halon and<br>1 portable dry chemical |
| Bow Ramp Winch | I portable Halon |
| Forward Engine Room | 2 portable Halon and<br>1 dry chemical |
| Aft Engine Room | 2 portable Halon and<br>1 dry chemical |
| Crew and Transient Berthing | 2 portable Halon |
| Anchor Winch Compartment | 1 portable Halon |
| Steering Gear Compartment | 1 portable Halon |

FIRE MAIN SYSTEM

The Fire Main System of fire fighting is shown in Figure FO-15. This system also contains the Magazine Sprinkler.

PORTABLE FIRE PUMP

There is a portable fire/salvage pump stowed in the Flammable Liquid Storage Compartment. When fighting fires this pump can either pump sea water or foam. The foam is stored at Frame 56 Vehicle Deck Starboard and in the Engine Access Room (1-50-1-Q) under the Switchboard. The Portable Fire Pump is also used to fill and empty the Forward Sea Water Ballast Tank (2-8-0-W).

HALON SYSTEM

The Halon System (Figure FO-16) is an automatic fire detection and extinguishing system. There are three systems located in the Forward Engine Room (2-50-0-E), Aft Engine Room (2-56-0-E) and the Flammable Liquid Storage Compartment (1-4-2-A).

1-37. **DIFFERENCES BETWEEN MODELS.**

This manual is written to engineering information and documents. Slight differences between the vessels can occur because of component availability and modifications that might be made by the crew of the vessel.

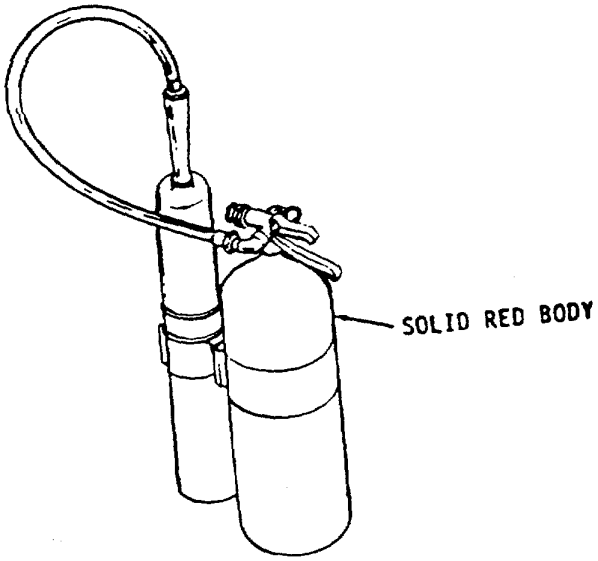



*Figure 1-25. Dry Chemical Fire Extinguisher.*

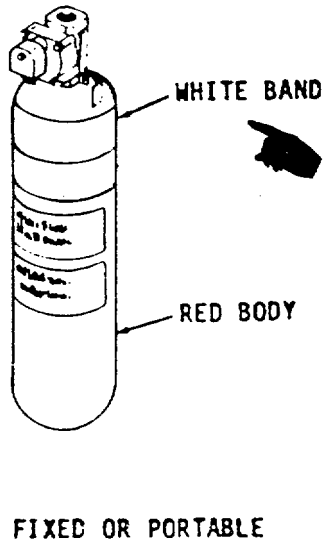



*Figure 1-26. Halon Fire Extinguisher.*

1-38. **Equipment Data.**

PRINCIPAL CHARACTERISTICS

| | |
|---|---|
| Length, overall | 134 ft. 9 in. (41.072 M) |
| Length, between perpendiculars | 134 ft. 0 in. (40.84 M) |
| Beam (extreme) | 29 ft. 0 in. (8.839 M) |
| Draft, landing displacement forward perpendicular (max) with 3 M-48 tanks | 3 ft. 6 in. (1.067 M) |
| Draft, landing displacement aft perpendicular (maximum) with 3 M-48 tanks | 6 ft. 10 in. (2.083 M) |
| Depth, to vehicle deck amidship | 8 ft. 0 in. (2.438 M) |
| Depth, to top of bulwark | 12 ft. 6 in. (3.840 M) |
| Displacement, light | 198.36 long tons (201.534 M ton) |
| Displacement, full load | 383.25 long tons (389.382 M ton) |
| Displacement, landing with 3 M-103A tanks | 362.00 tons (367.792 M ton) |
| Height of highest projection above the load water line | 17 ft. 9 in. (5.410 M) |
| Diesel oil capacity (95%) | 9.98 tons (10.140 M ton) |
| Fresh water capacity (95%) | 14.92 tons (15.159 M ton) |
| Full power speed ahead | 11 knots |
| Full power shaft | 1000 shp |
| Endurance | 1200 miles at 8 knots (1930.8 km) |

PERSONNEL ACCOMMODATIONS

| | |
|---|---|
| Officers | 2 |
| Crew | 10 |
| Transient Berthing | 2 |

GENERATOR SET

Generator

| | |
|---|---|
| Manufacturer | Delco Div., GMC |
| Model | E6256M2 |
| Capacity | 40 kW |
| Voltage | 450 volt, 3-phase, 60 Hz at 1800 rpm |
| Power Factor | 0.8 lagging |
| Excitation | Separate rotating field |

Diesel Engine

| | |
|---|---|
| Manufacturer | Detroit Diesel Div. GMC |
| Model | 1033-7005 |
| No. of Cylinders | 3 |
| Bore | 4-1/4 in. (108 mm) |
| Stroke | 5 in. (12.7 cm) |
| Starting | Hydraulic |
| Governor | Hydraulic |
| Lube Oil system | 15 qts. (14.19 1) |
| Water system | 20 qts. (18.92 1) |
| Fuel Consumption at 1800 RPM | 0.1 gpm (0.4 lpm) |

ANCHOR WINCH

| | |
|---|---|
| Winch | |
| Manufacturer | Skagit |
| Single Drum | |
| Variable Speed Unit | |
| Torque Converter Driving System | |
| Maximum load | 35,000 Pounds (15890 kg.) |
| Speed | Not less than 9 fpm (2.75 mpm) |
| Light line speed | At least 300 fpm (91.5 mpm) |
| Drum Capacity | 150 fathoms of 1-1/4 inch (3.28 cm) wire rope |
| Engine | |
| Manufacturer | Detroit Diesel Div. of General Motors |
| Model | 1043-7000 |
| Shaft Horse Power | |
| Revolutions (RPM) | |
| Reduction Ratio | |
| Rotation | Right |
| Number of Cylinders | 4 |
| Bore | 4.25 inch (108 mm) |
| Cycle | 2 |
| Stroke | 5 inch (128 mm) |
| Starting | Hydraulic |
| Compression Ratio | 18.7 to 1 |
| Hydraulic System | |
| Hydraulic Tank | |
| Engine Driven Pump | |
| Gages | |
| Valves | |
| Lines and Fittings | |
| Hydraulic Pump | |
| Manufacturer | |
| Model | |
| Type | Gear |
| Operating Pressure | Up to 1500 (1054.5 sq cm) |
| Discharge | Up to 50 (189.25 lpm) |
| Engine | Winch Diesel |
| Location | Frame 64 in the Anchor Winch Compartment |

BOW RAMP

| | |
|---|---|
| Winch | |
| Manufacturer | New England Trawler Equipment Co. |
| Model | X-1454 |
| Horsepower | 15 |
| Revolutions (RPM) | 1800 |
| Single Drum | |
| Two 7/8 Dia. Wire Ropes | |
| Capacity | 30 ft. (9.15 m) both sides |
| Type | Electric |
| Hoisting Speed | 33 ft./min. (10.07 m/min.) |
| Location | Frame 15 below deck |
| Reducer | |
| Manufacturer | Horsburgh-Scott Co. |
| Model | 90T BM 1640 |
| Size | 90T Triple Reduction Helical Speed Reducer |
| Ratio | 163-72 |
| Serial No. | L-9828 |
| Electric Motor | |
| Manufacturer | Sterling Power Systems, Inc. |
| Horsepower | 15 |
| Revolutions | 1800 |
| Volt | 440 |
| Phase | 3 |
| Hertz | 60 |
| Electric Brake | |
| Manufacturer | Dings Co. |
| Direct Brake Model | R-73050-4 |
| Torque | 45 lb. ft. (66.98 kg m) |
| Volt | 440 |
| Phase | 3 |
| Hertz | 60 |
| Drum | |
| Manufacturer | Murdock Machine and Engineering Co. of Texas. Sub. of Lockheed Corp |
| Part No. | 301918-100 |
| Type | Elastomeric Compensating |

PROPULSION

| | |
|---|---|
| Engines | |
| Manufacturer | Detroit Diesel Div. of General Motors |
| Model | 7122-7000 |
| Shaft Horsepower | 425 |
| Revolutions (RPM) | 511 |
| Reduction Ratio | 4-1/2 to 1 |
| Rotation | Right |
| Number of Cylinders | 12 |
| Bore | 4.25 in. (108 mm) |

| | |
|---|---|
| Stroke | 5 in (127 mm) |
| Starting | Hydraulic |
| Governor | |
| Capacities | |
| Lube Oil | |
| Water System | |
| Fuel Consumption | |

Engine Controls
- Two Double-Lever Combination Clutch and Throttle Controls
- Two Engine Start Pushbuttons
- Two Engine Stop Pushbuttons
- Two Engine Speed (RPM) Indicators

Propellers

| | |
|---|---|
| Number of Blades | 4 |
| Diameter | 48 inches (121.9 cm) |
| Pitch Diameter | 42 inches (106.7 cm) |
| Pitch Ratio | 0.875 |
| Weight | 395 lbs (179.3 kg) |
| Horsepower Rating Each | 500 |
| Rotation Port Propeller Viewed From Stern | Counterclockwise |
| Rotation Starboard Propeller Viewed From Stern | Clockwise |
| Propeller Shaft Speed At Rated Horsepower | 550 RPM |

FIRE PUMP

Pump

| | |
|---|---|
| Manufacturer | Worthington Pump International |
| Model | D-1021 |
| Type | Centrifugal |
| Capacity | 250 gpm (946.25 lpm) |
| Location | Aft Engine Room Frame 62 |

Motor

| | |
|---|---|
| Manufacturer | Reliance Electric Co. |
| Model | 705464 |
| Phase | 3 |
| Type | Electric |
| Revolutions (RPM) | 3600 |
| Horsepower | 30 |
| Hertz | 60 |
| Volt | 440 |

Eductor

| | |
|---|---|
| Manufacturer | Derbyshire Machine And Tool Co. |
| Model | 358 |
| Capacity | 150 gpm (567.75 lpm) |

| | |
|---|---|
| Discharge Pressure | 12 psi (843.7 gm sq cm) |
| Type Drive | Water From Fire Pump |
| Location | Aft Engine Room, Frame 56 |

FIRE AND SALVAGE PORTABLE PUMP

Pump

| | |
|---|---|
| Manufacturer | Outboard Marine Corp. |
| Model | P-250 |
| Capacity | 250 gpm (946.25 lpm) |
| Discharge Pressure | 100 psi (7030.7 gm sq cm) |
| Horsepower | 25 at 4500 rpm<br>30 at 3600 rpm |
| Piston Displacement | 35.7 cu. in. (5851.23 $cm^3$) |
| Stroke | 2-3/4 in. (6.99 cm) |
| Bore | 2-7/8 in. (7.30 cm) |
| Fuel Tank-Capacity | 6 U.S. Gallons (22.71 l) |
| Total Weight (Less Tank) | 147 Pounds (66.74 kg) |
| Fuel Tank-Weight | 14 Pounds (6.36 kg) |
| Exhaust Hose (20 Ft)-Weight | 40 Pounds (18.16 kg) |
| Type | Gasoline-driven centrifugal |
| Location | Stowed in the Flammable Liquid Stowage Compartment |
| Suction Hose (3 Lengths) 10 Ft. (3.05 m) Each)-Weight | 43 Pounds (19.52 kg) Per Length |
| Foot Valve - Weight | 17 Pounds (7.72 kg) |
| 3-Way Gate Valve-Weight | 31.5 Pounds (14.3 kg) |
| Width | 20 Inches (50.8 cm) |
| Length | 24 Inches (60.96 cm) |
| Height | 21-5/8 Inches (54.93 cm) |

Engine

| | |
|---|---|
| Manufacturer | |
| Model | |
| Cylinder | 2 |
| Cycle | 2 |
| Horsepower | 25 |

FRESH WATER PUMP

Pump

| | |
|---|---|
| Manufacturer | Worthington Pump International, Inc. |
| Model | I-TM 0 |
| Capacity | 6 gpm (22.7 lpm) at 45 PSI (3163.8 gm sq cm) |
| Cut In Pressure | 30 psi (2109.2 gm sq cm) |
| Cut Out Pressure | 45 psi (3163.8 gm sq cm) |

| | |
|---|---|
| Motor | |
| Manufacturer | Reliance Electric Co. |
| Model | 705467 |
| Type | Electric |
| Horsepower | 3/4 |
| Revolutions (RPM) | 1800 |
| Phase | 3 |
| Voltage | 440 |
| Hertz | 60 |

SEWAGE PUMPS (2)

| | |
|---|---|
| Pump | |
| Manufacturer | The Gorman-Rupp Co. |
| Model | 11-1/2 A2-E1-1/2 |
| Type | Self Priming |
| Motor | |
| Manufacturer | Marathon Electric |
| Model | U56C34F184B |
| Horsepower | 1-1/2 |
| Revolutions (RPM) | 3450 |
| Volts | 115/230 |
| Phase | 1 |
| Hertz | 60 |

AIR CONDITIONING WATER CIRCULATION PUMP

| | |
|---|---|
| Pump | |
| Manufacturer | Lancaster |
| Model | 909 |
| Type | Centrifugal |
| Capacity | 48 gpm (181.7 lpm) at a total head of 139 ft. (42.4 m) |
| Location | Frame 32 in A/C Machinery Room |
| Motor | |
| Manufacturer | General Electric Co. |
| Model | 5K182JX5211 |
| Revolutions (RPM) | 3500 |
| Horsepower | 5 |
| Hertz | 60 |
| Phase | 3 |

BILGE PUMP

| | |
|---|---|
| Pump | |
| Manufacturer | Worthington Standard Pump Corp. |
| Model | 2CNFEK-84 |
| Type | Centrifugal |

LUBE OIL PUMP

| | |
|---|---|
| Pump | |
| Manufacturer | Worthington Standard Pump Corp. |
| Model | 2GANM |
| Type | Rotary Oil |

| | |
|---|---|
| Motor | |
| Manufacturer | Reliance Electric Co. |
| Model | 705431 |
| Horsepower | 1-1/2 |
| Phase | 3 |
| Hertz | 60 |
| Vac | 440 |
| Revolutions (RPM) | 1800 |

DIESEL OIL COOLING PUMP

| | |
|---|---|
| Pump | |
| Manufacturer | Worthington Standard Pump Corp. |
| Model | 1-DNH-52 |
| Motor | |
| Manufacturer | Reliance Electric Co. |
| Model | U56C34F184B |
| Horsepower | 1-1/2 |
| Revolutions (RPM) | 3450 |
| Volts | 115/230 |
| Phase | 1 |
| Hertz | 60 |
| Model | 705417-A |
| Horsepower | 3 |
| Voltage | 440 |
| Hertz | 60 |
| Phase | 3 |
| Revolutions (RPM) | 3450 |

MACERATOR/TRANSFER PUMP

| | |
|---|---|
| Manufacturer | General American Research Div. of General American Transportation Corp. |
| Model | 2-28-15328 |

SEWAGE AIR PUMP

| | |
|---|---|
| Pump | |
| Manufacturer | ITT Pneumotive A Unit of ITT Pumps and Compressors Div. |
| Model | 4V0400FCI |
| Motor | |
| Manufacturer | |
| Model | |
| Horsepower | 3 |
| Voltage | 230/460 |
| Phase | 3 |
| Type | Electric |
| Revolutions | 1730 RPM |

LUBE OIL TRANSFER PUMP

| | |
|---|---|
| Pump | |
| Manufacturer | Dover Corp. Blackmer Pump Div. |
| Model | PA414 |
| Type | Hand Driven |

CENTRALIZED HYDRAULIC PUMP

| | |
|---|---|
| Pump | |
| Manufacturer | Sperry Vickers Div.<br>Sperry Rand Corp. |
| Model | V102P2P1B20(L) |
| Location | Mounted on the central hydraulic power unit at Frame 62-1/2 |
| Motor | |
| Manufacturer | Lincoln Electric Co. |
| Model | T2523 |
| Volt | 230/460 |
| Horsepower | 5 |
| Hertz | 60 |
| Phase | 3 |
| Type | Electric |
| Revolutions (RPM) | 1745 |

LUBRICATION OIL SYSTEM

Lube Oil Storage Tank
Manually-Operated Transfer Pump
Distribution Lines
Service Valves and Hoses

STEERING SYSTEM HYDRAULIC PUMPS

| | |
|---|---|
| Pump | |
| Manufacturer | Sperry Vickers Div. |
| Model | 182204-2 |
| Type | Rotary |
| Capacity | 6 GPM (22.7 lpm) |
| Location | Frame 74 in the Steering Compartment |
| Motor | |
| Manufacturer | Sperry Vickers Div. |
| Model | 1804192 |
| Volt | 440 |
| Horsepower | 2 |
| Hertz | 60 |
| Phase | 3 |
| Type | Electric |
| Revolutions (RPM) | 1155 |

OIL/WATER SEPARATOR SYSTEM

| | |
|---|---|
| Operating Pressure | 45 psig (3163.8 gm sq cm) |
| Capacity | 25 Gallons (94.6 1) |

| | |
|---|---|
| Pump | |
| Manufacturer | |
| Model | |
| Capacity | 5 gpm (18.9 lpm) |
| Discharge Pressure | 70 psig (4921.5 gm sq cm) |
| Suction Lift | 25 Feet (7.625 m) |
| Location | Frame 57-1/2 in the Aft Engine Room |

| | |
|---|---|
| Motor | |
| Manufacturer | |
| Model | |
| Horsepower | 1/2 |
| Vac | 115 |
| Hertz | 60 |
| Phase | Single |
| Type | Electric |

24 VDC RECTIFIER

| | |
|---|---|
| Manufacturer | Lamarche Mfg. Company |
| Model | A40-F-60-24V |
| Type | Regulated solid state |
| Input voltage | 120 vac, 1 phase |
| Output Voltage | 28.5 VDC |
| Location | Pilot House, Frame 35 Starboard |

STORAGE BATTERIES

| | |
|---|---|
| Number | 4 |
| Voltage | 6VDC (each) |
| Navy Type | 6V-5BM-100AH |
| Location | Pilot House, Frame 28 |

PILLOW BLOCK BEARING

| | |
|---|---|
| Manufacturer | Rigler Engineering Co. |
| Size | 3-15/16 Inch (10.0 cm) |
| Location | Port line shaft, Frame 59 Port |

VENTILATION FANS

1/5 Horsepower

| | |
|---|---|
| Manufacturer | Reliance Electric Co. |
| Model | 705473 |
| Speed | 3600 |
| Voltage | 115 |
| Hertz | 60 |
| Location | Ramp Machinery Compartment, Anchor Winch Compartment |

1/3 Horsepower

| | |
|---|---|
| Manufacturer | Reliance Electric Co. |
| Model | 705475 |
| Speed | 3600 |
| Voltage | 115 |
| Hertz | 60 |
| Location | Special Clothing Stores |

3/4 Horsepower

| | |
|---|---|
| Manufacturer | Reliance Electric Co. |
| Model | 705474 |
| Speed | 3600 |
| Voltage | 440 |
| Hertz | 60 |
| Location | Fwd Engine Room, Aft Engine Room, Pilot House, Radio Room, Galley, Crew Berth, and Stateroom |

1 1/4 Horsepower

| | |
|---|---|
| Manufacturer | Reliance Electric Co. |
| Model | 705472 |
| Speed | 3600 |
| Voltage | 440 |
| Hertz | 60 |
| Location | Galley/Mess, Water Closet, Aux. Machinery Room, Engine Access Room |

AIR CONDITIONING

Compressor

| | |
|---|---|
| Manufacturer | Carrier-Transicold |
| Model | 5F30 |
| Cylinders | 3 |
| Bore | 2-1/2 inch (6.35 cm) |
| Stroke | 2 inch (5.08 cm) |
| Speed | 1750 RPM |
| Capacity | 7.8 tons at 40°F (4.4°C) suction temp and 105°F (40.6°C) condensing temp |

Compressor Motor

| | |
|---|---|
| Manufacturer | Reliance Electric Co. |
| Model | 701331-57 |
| Horsepower | 10 |
| Vac | 440 |
| Hertz | 60 |
| Revolutions (RPM) | 1800 |
| Phase | 3 |

Condenser

| | |
|---|---|
| Manufacturer | Carrier-Transicold |
| Model | 90C01-2904 |
| Shell Diameter | 8-5/8 OD (21.9 cm) |
| Overall Length | 41-1/8 inch (104.5 cm) |
| Effective Cooling Surface | 72 sq ft (6.7 sq m) |
| No. of Tubes | 40 |
| No. of Passes | 2 |
| Tube Size | 3/4 (.75 cm) OD x .049 (0.12 cm) w x 3 feet lg (0.92 m) |
| Sea Water Quantity (Design) | 41 gpm (155.2 lpm) |

| | |
|---|---|
| **Receiver** | |
| Manufacturer | Standard Refrigeration |
| Model no. | C105HR33G |
| Type Mounting | Horizontal |
| Refrigerant Capacity | 110 lb (49.9 kg) |
| Shell Diameter | 10-3/4 OD (27.3 cm) |
| Overall Length | 33-1/2 (85.09 cm) |
| **Temperature Control Switch** | |
| Manufacturer | Detroit Switch |
| Model | 2504150RN |
| Range | 25°F to 90°F (-3.89°C to 32.22°C) |
| Differential | 2° to 5° |
| Recommended Settings: | |
| Close | 80°F (26.67°C) |
| Open | 78°F (25.56°C) |
| **High Pressure Control Switch** | |
| Manufacturer | Detroit Switch |
| Part No. | 223876CB7 |
| Range | 60 to 350 psig (4218.4 to 24607.5 gm sq cm) |
| Differential | 24 to 90 psi (1687.4 to 6327.6 gm sq cm) |
| Recommended Settings: | |
| Close | 125 psig (8788.4 gm sq cm) |
| Open | 175 psig (12303.7 gm sq cm) |
| **Low Pressure Control Switch** | |
| Manufacturer | Detroit Switch |
| Part No. | 223875CB3 |
| Range | 20 inch vac to 80 psig (5624.6 gm sq cm) |
| Differential | 9 to 15 psi (632.8 to 1054.6 gm sq cm) |
| Recommended Settings: | |
| Close | 37 psig (2601.4 gm sq cm) |
| Open | 28 psig (1968.6 gm sq cm) |
| **Oil Pressure Differential Switch** | |
| Manufacturer | Penn Controls |
| Carrier Part No. | HK06UL012 (5 F20-212) |
| Open Setting | 16 to 19 psi (1124.9 to 1335.8 gm sq cm) |
| Close Setting | 11 to 15 psi (773.4 to 1054.6 gm sq cm) |
| Type Reset | Manual Pushbutton |

| | |
|---|---|
| Shell Diameter | 10-3/4 OD (27.3 cm) |
| Overall Length | 33-1/2 (85.09 cm) |
| **Temperature Control Switch** | |
| Manufacturer | Detroit Switch |
| Model | 2504150RN |
| Range | 25°F to 90°F (-3.89°C to 32.22°C) |
| Differential | 2° to 5° |
| Recommended Settings: | |
| Close | 80°F (26.67°C) |
| Open | 78°F (25.56°C) |
| **High Pressure Control Switch** | |
| Manufacturer | Detroit Switch |
| Part No. | 223876CB7 |
| Range | 60 to 350 psig (4218.4 to 24607.5 gm sq cm) |
| Differential | 24 to 90 psi (1687.4 to 6327.6 gm sq cm) |
| Recommended Settings: | |
| Close | 125 psig (8788.4 gm sq cm) |
| Open | 175 psig (12303.7 gm sq cm) |
| **Low Pressure Control Switch** | |
| Manufacturer | Detroit Switch |
| Part No. | 223875CB3 |
| Range | 20 inch vac to 80 psig (5624.6 gm sq cm) |
| Differential | 9 to 15 psi (632.8 to 1054.6 gm sq cm) |
| Recommended Settings: | |
| Close | 37 psig (2601.4 gm sq cm) |
| Open | 28 psig (1968.6 gm sq cm) |
| **Oil Pressure Differential Switch** | |
| Manufacturer | Penn Controls |
| Carrier Part No. | HK06UL012 (5 F20-212) |
| Open Setting | 16 to 19 psi (1124.9 to 1335.8 gm sq cm) |
| Close Setting | 11 to 15 psi (773.4 to 1054.6 gm sq cm) |
| Type Reset | Manual Pushbutton |
| **Water Pressure Failure Switch** | |
| Manufacturer | Detroit Switch |
| Model | 223875CB3 |
| Range | 20 inch vac to 80 psig (5624.6 gm sq cm) |
| Differential | 9 to 15 psi (632.8 to 1054.6 gm sq cm) |
| Recommended Settings: | |
| Close | 15 psi (1054.6 gm sq cm) |
| Open | 5 psi (351.5 gm sq cm) |

| | |
|---|---|
| Heat Interchange | |
| Manufacturer | Dunham Bush (Heat X Inc) |
| Model | 7-1/2 SX |
| Overall Length | 22-3/4 inch (57.8 cm) |
| Shell Diameter | 3-1/2 inch OD (8.9 cm) |
| Connections | 7/8 inch (2.2 cm) OD liquid,<br>1-5/8 inch (4.1 cm) suction |
| Cooling Coil | |
| Manufacturer | McIntyre |
| Model | 56DF |
| Capacity | 7.5 tons |
| Air Quantity | 1260 cfm |
| Face Velocity | 252 fpm (76.9 mpm) |
| Entering Air Temp | 85.2F DB (29.6°C)<br>74.0°F WB (23.3°C) |
| Leaving Air Temp | *WB<br>*DB |

*Leaving Air Temperature to be established by the shipyard.

HEATERS

| | |
|---|---|
| Manufacturer | Wiegand El Div. of Emerson Electric |
| Duct Type | 1.3 kw |
| Model | DHMS-2F-008-W04H |
| Voltage | 120 |
| Phase | 1 |
| Element | One |
| Location | Wardroom Stateroom |
| Duct Type | 2.2 kw |
| Model | DHMS-2F-012-W06H |
| Voltage | 480 |
| Phase | 1 |
| Elements | Two |
| Location | Pilot House |
| Duct Type | 2.5 kw |
| Model | DHMS-2F-018-W06H |
| Vac | 480 |
| Phase | 1 |
| Element | One |
| Location | Radio Room |
| Duct Type | 3.3 kw |
| Model | DHMS-2F-012-W06H |
| Vac | 480 |
| Phase | 1 |
| Elements | Two |
| Location | Crew Berthing |
| Duct Type | 3.8 kw |
| Model | DHMS-2F-012-W08H |
| Vac | 480 |
| Phase | 3 |
| Elements | Three |
| Location | Galley/Mess |

| | |
|---|---|
| Duct Type | 3.3 kw |
| Model | DHMS-2F-012-W06H |
| Vac | 480 |
| Phase | 1 |
| Elements | Two |
| Location | Crew Berthing |
| Duct Type | 3.8 kw |
| Model | DHMS-2F-012-W08H |
| Vac | 480 |
| Phase | 3 |
| Elements | Three |
| Location | Galley/Mess |
| Duct Type | 7.5 kw |
| Model | DHMS-2F-24-W08H |
| Vac | 480 |
| Phase | 3 |
| Elements | Three |
| Location | Preheater for A/C System |
| Blower Type | 5 kw |
| Model | UB-502-TR |
| Voltage | 440 |
| Hertz | 60 |
| Phase | 3 |
| Location | Fwd Engine Room, Aft Engine Room |
| Turret Type | 1 kw |
| Model | 1H1801 |
| Voltage | 120 |
| Hertz | 60 |
| Phase | 1 |
| Location | Washroom, Water Closets and Shower, A/C Machinery Room |

PRESSURE SYSTEM

| | |
|---|---|
| Designed Pressure of System | 45 psi (3163.8 gm sq cm) |
| Relief Valve Setting-This System | 50 psi (3515.4 gm sq cm) |
| Relief Valve Setting on Hot Water Tank | 55 psi (3866.9 gm sq cm) |
| Pressure Tank with a Sight Gage | |
| Electric-Driven Pump Unit | |
| Pressure Switch | |
| Automatic Air Volume Control | |
| Hand Air Charging Pump | |
| 50 Gallon Electric Water Heater | |

HOT WATER HEATER

| | |
|---|---|
| Manufacturer | Electric Heater Co. |
| Model | 68-1011 |
| Capacity | 50 Gallons (189.25 1) |
| Control | Two Thermostats |
| Heating Elements | Two 4500 Watt |
| Specifications | MIL-H-965D |

Navigation Horn

| | |
|---|---|
| Air Compressor Unit | |
| Manufacturer | Kahlenberg Bros. Co. |
| Model | KBC-1/3E, Figure TUE-50 |
| Working Pressure (Tank) | 200 PSI |
| Motor | |
| HP | 1/2 |
| Voltage | 110 VAC |
| Speed | 1725 RPM |
| Air Horn | |
| Manufacturer | Kahlenberg Bros. Co. |
| Model | S-2, Figure 112 |
| Manual Valve | |
| Manufacturer | Kahlenberg Bros. Co. |
| Model | Figure V-12A |
| Air Strainer | |
| Manufacturer | Kahlenberg Bros. Co. |
| Model | Figure 100 |
| Fuel Filter/Water Separator | |
| Manufacturer | RACOR Industries |
| Model | 79/1000FG |
| Rated Flow | 9.48 GPM |

## Section III. TECHNICAL PRINCIPLES OF OPERATION

1-39. **GENERAL.**

This section contains the technical principles of operation of the many systems contained in the landing craft. These systems can consist of many components that function as part of an overall system. The following is an index to the systems.



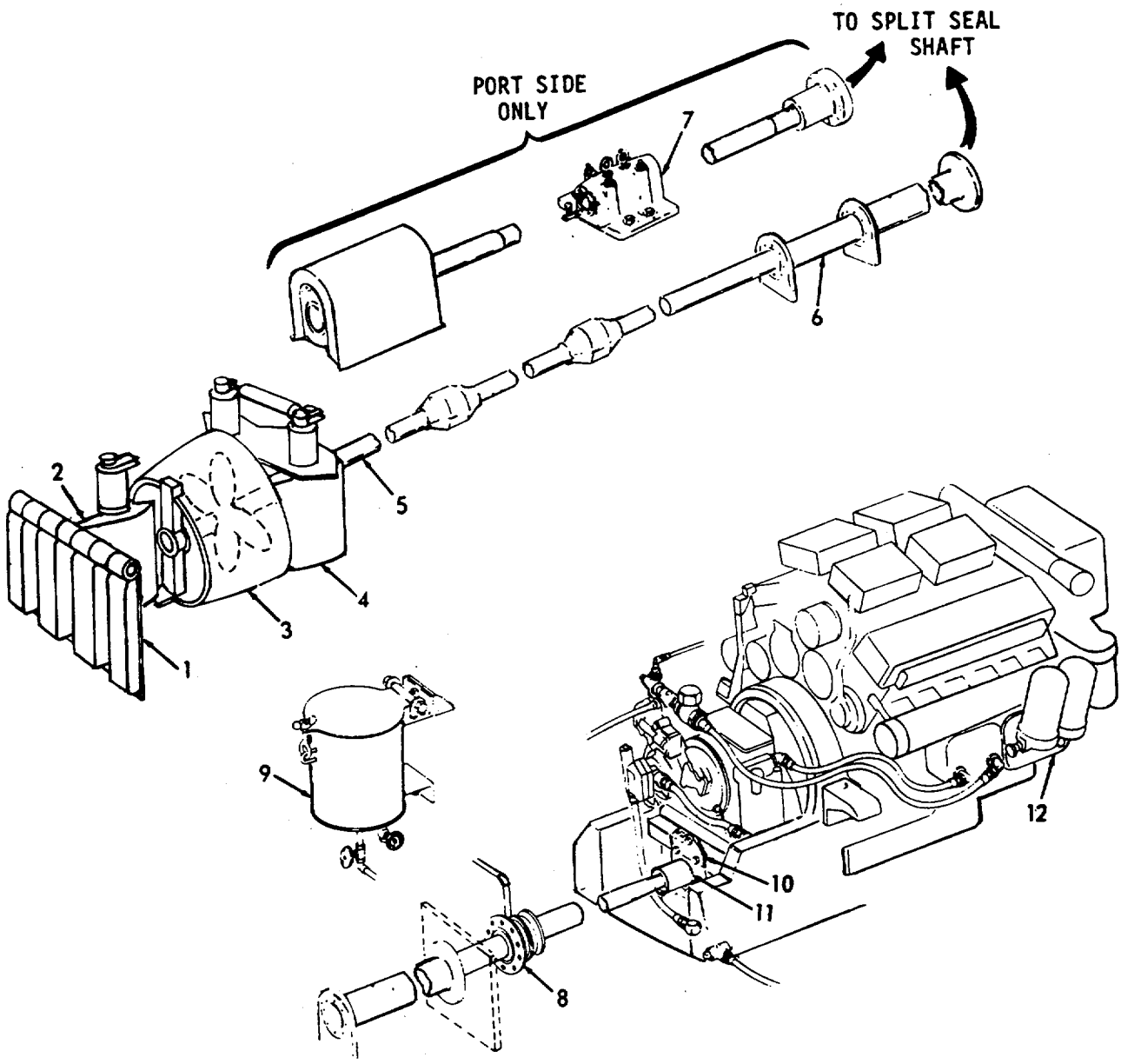
1-40. **PROPULSION.**

The Propulsion System (Figure 1-27) consists of the following:



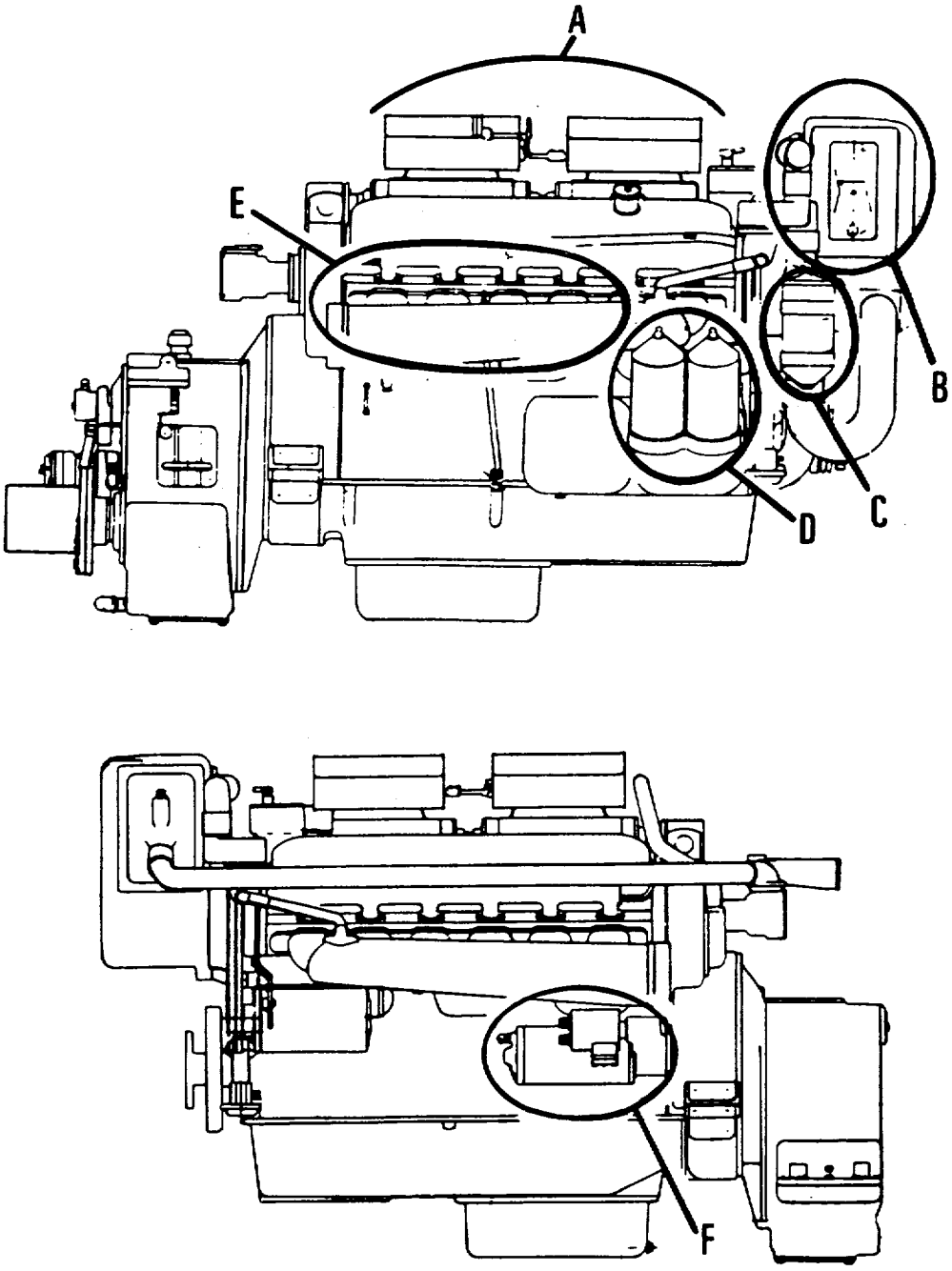
1-41. **PROPULSION ENGINE.**

a. The Main Propulsion Engine (Figure 1-28) is a 12 cylinder, V-71 Detroit Diesel. The engine is equipped with an oil coller, lubricating oil filter, fuel oil strainer, fuel oil filter, air silencers, governor, heat exchanger, raw water pump, and a hydrostarter.




1. FENCE.
2. STEERING RUDDER
3. KORT NOZZLE
4. FLANKING RUDDER
5. PROPELLER SHAFT
6. STERN TUBE
7. BEARING PILLOW BLOCK
8. SPLIT SHAFT SEAL
9. SHAFT SEAL LUBE WATER TANK
10. SHAFT LOCK (shown in unlocked position)
11. MARINE GEAR
12. PROPULSION ENGINE

*Figure 1-27. Propulsion System.*




A. Air System
B. Cooling System
C. Fuel System
D. Lubrication System
E. Exhaust System
F. Starting System

*Figure 1-28. Main Propulsion Engine System*

b. The Fuel System is shown in Figure 1-29. Fuel is drawn from the supply tank and through a strainer by a gear-type fuel pump. Then it is forced through the filter and the fuel inlet manifolds in the cylinder heads to the injectors. Excess fuel is returned to the supply tank by way of the return fuel manifolds and connecting lines. Since fuel is constantly circulating through the injectors, it serves to cool the injectors and carry off any air in the fuel system.

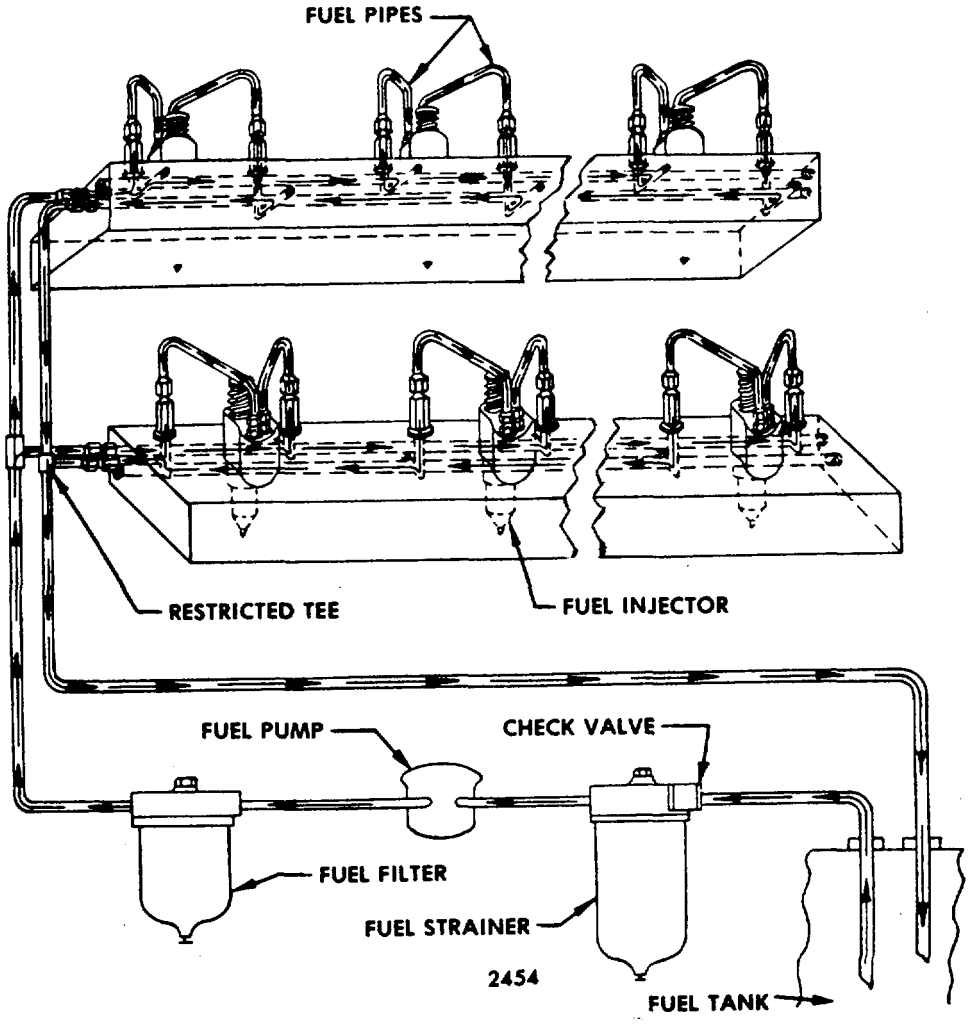



*Figure 1-29. Fuel System.*

c. The Air System is shown 3n Figure 1-30. Air for scavenging and combustion is supplied by blowers which pump air into the engine cylinders by way of the air box and cylinder liner ports. All air entering the blowers pass through an air silencer firts.

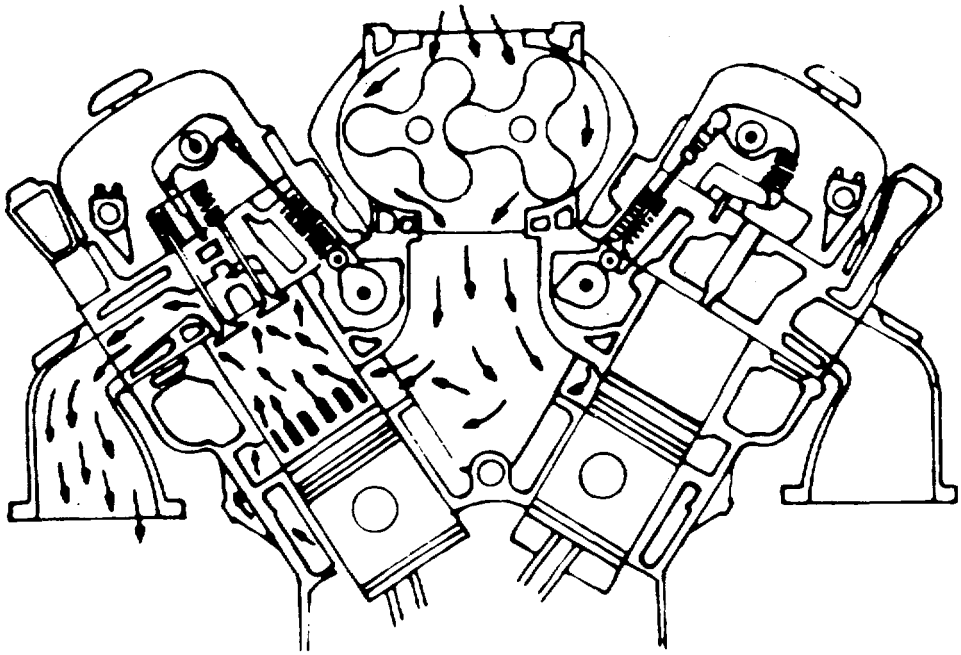


*Figure 1-30. Air Intake System Through Blower and Engine.*

d. The Oil System is shown in Figure 1-31. Full pressure lubrication is supplied to all main connecting rod and camshaft bearings, and to other moving parts of the engine. A gear-type pump draws oil from the oil pan through an intake screen and-delivers it to the oil filters and them to the oil coolers. From the oil coolers, the oil flows through passages that connect with the oil galleries in the cylinder block and cylinder heads for distribution to the bearings, rocker arm-mechanism and other functional parts.

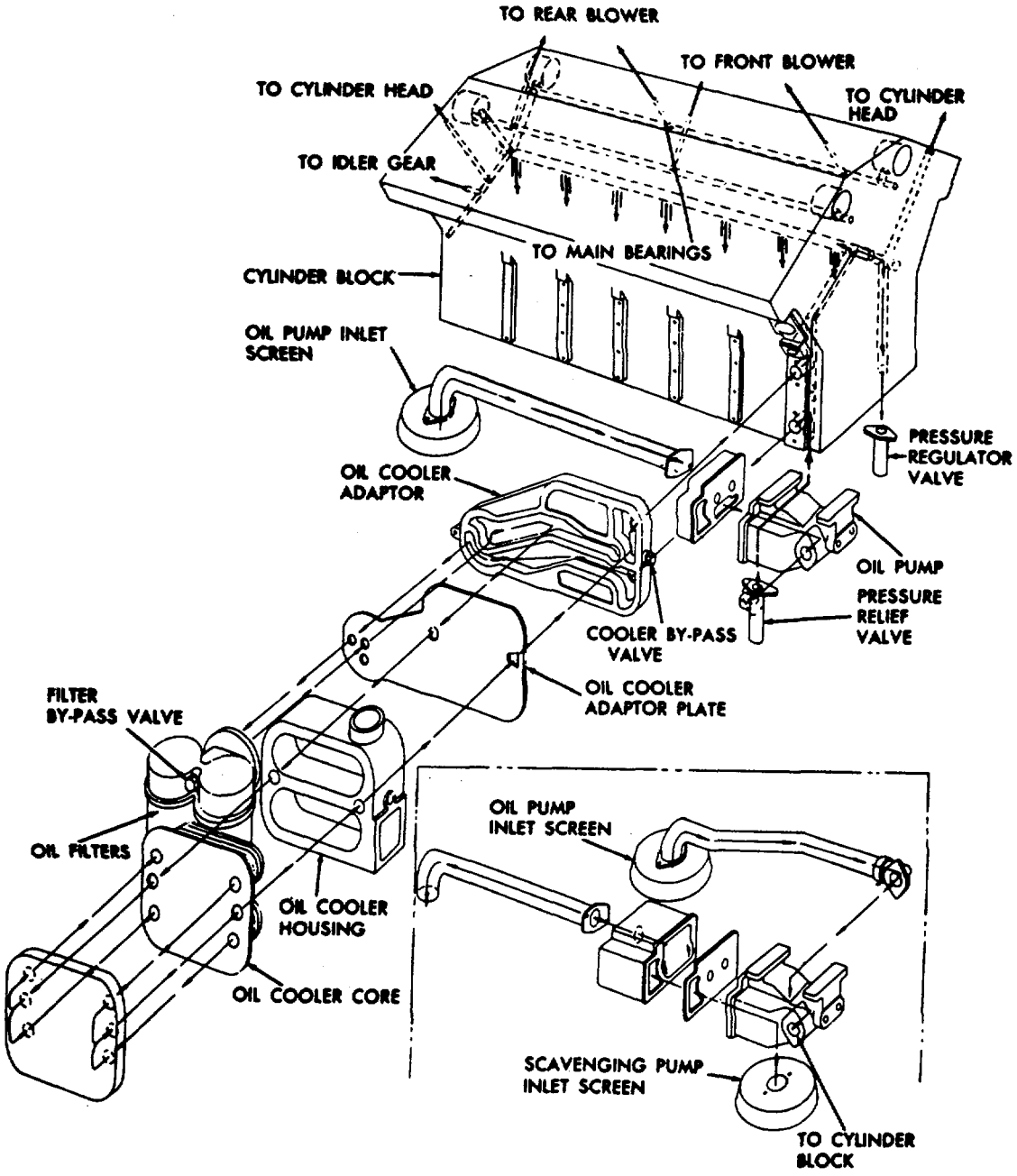



*Figure 1-31. Typical 12V71 Lubricating System*

e. The Coolant System is shown in Figure FO-17. Coolant is circulated through the engine by a centrifugal type water pump. Heat is removed from the coolant which circulates in a closed system by a heat exchanger. Control of the engine temperature is accomplished by thermostats. The thermostats regulate the flow of the coolant within the cooling system.

f. Engine starting is provided by an Hydraulic Starting System. Engine speed is controlled by a mechanical, variable speed Governor.

g. The Exhaust Manifold is shown in Figure 1-32. The water-cooled Exhaust Manifold is one piece and is cast with an integral water jacket surrounding the exhaust chamber. The diameter of the exhaust chamber increases uniformly from one end to the other where it ends in a flange to which an elbow and flexible exhaust connection is attached. A portion of the engine coolant is by-passed from the rear of the cylinder block into the rear end of the jacket surrounding the exhaust manifold. Then it is discharged from the forward end through a tube into the thermostat housing. A draincock is installed in the bottom of the manifold for draining the water jacket. A plug is provided in the bottom of the exhaust manifold elbow for draining moisture condensed from the exhaust gases.

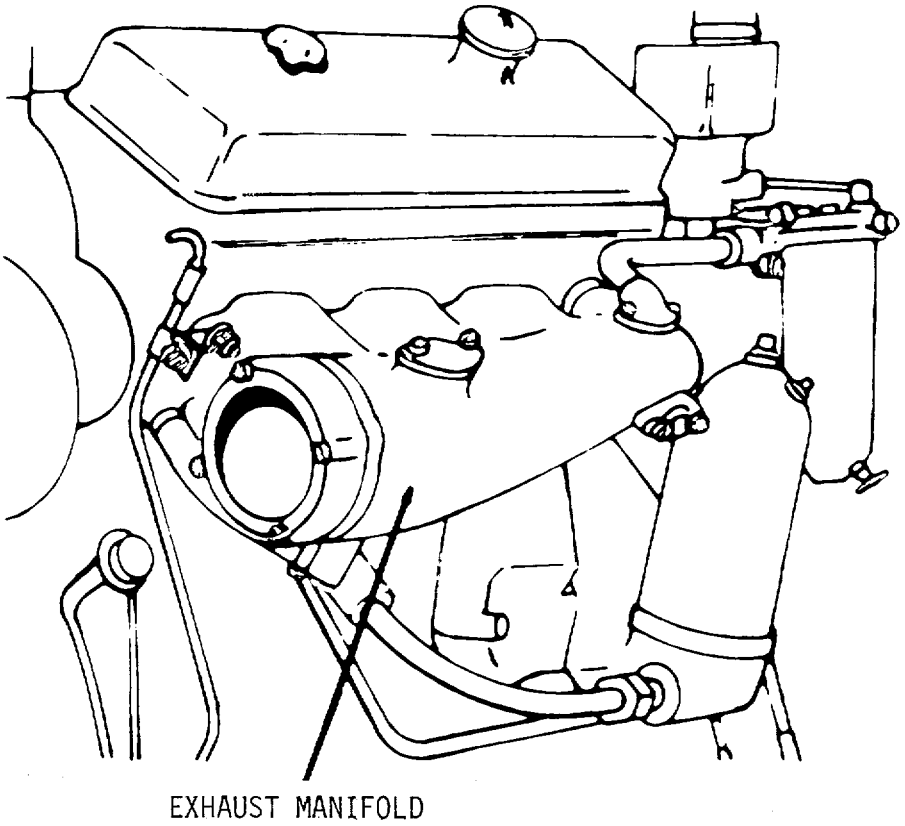



*Figure 1-32. Water-Cooled Exhaust Manifold Mounting.*

1-42. **MARINE GEAR.**

a. The Model MG-514 Marine Gear is a marine forward and reverse reduction gear in a 4.5:1 ratio. The marine gear may be operated continuously in either the forward or reverse position.

b. Identical gear ratios in forward and reverse permit the marine gear to be converted from a right rotation to a left rotation by changing the oil pump. On one engine the forward gear is run in reverse, obtaining opposite rotation of the propeller.

c. The Marine Gear is completely hydraulic in all phases. All bearings are oil lubricated, both clutches are engaged by high pressure oil, and both clutches are cooled and lubricated by low pressure oil. A mechanical lock-up, or come-home feature is provided for clutch engagement in case emergency operations are necessary.

d. The forward clutch shaft and the reverse driving gear always rotate in engine direction. Refer to Figure 1-33. The reverse clutch shaft and the reverse driven gear always rotate in anti-engine direction. When the forward clutch is engaged, the counter shaft gear will rotate in an anti-engine direction due to the gear meshing with the forward pinion. When the reverse clutch is engaged, the counter shaft gear will rotate in the engine direction due to the gear meshing with the reverse pinion.

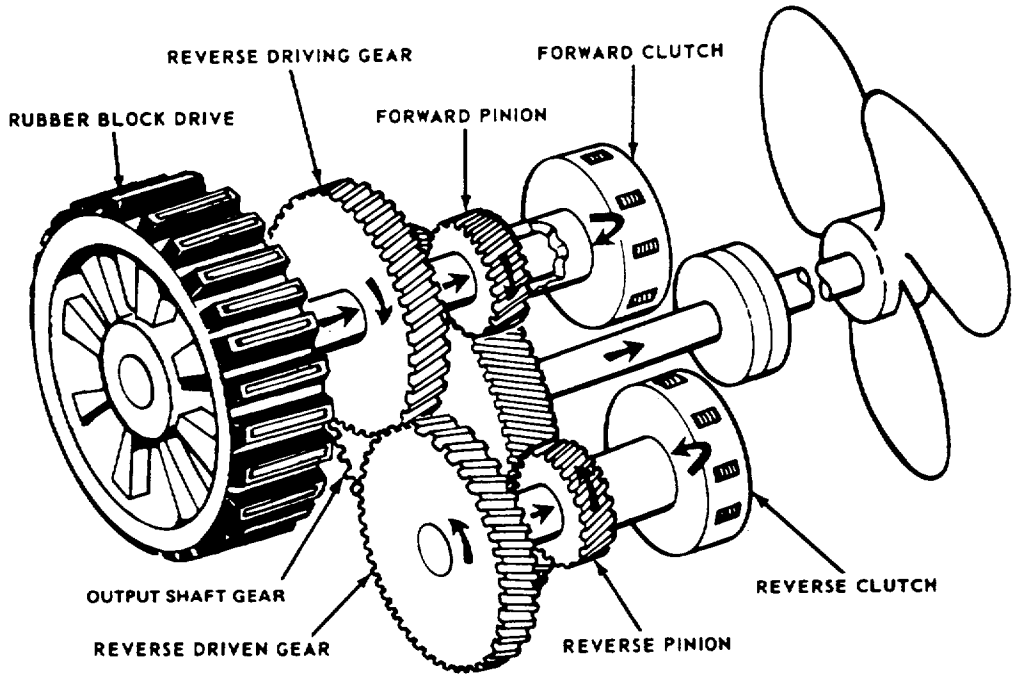



*Figure 1-33. Marine Gear Power Flow*

e. When in neutral, (Figure 1-34) all parts that rotate in the Marine Gear turn at engine speed. The driving ring that is bolted to the engine flywheel is the connecting member between the engine and the marine gear. The rubber blocks installed on the drive spider are meshed in the driving ring. The drive spider is spline-connected to the forward clutch shaft. The gear teeth of the steel clutch plates are meshed with the external gear teeth of the forward clutch shaft. Therefore, the steel clutch plates of the forward clutch rotate in engine direction at engine speed. The reverse driving gear is keyed on the taper of the forward clutch shaft. The driving gear meshes with the reverse driven gear which is keyed to the taper of the reverse clutch shaft. The ratio between the two gears is 1:1. Anti-engine rotation at engine speed of the reverse clutch shaft is obtained by the meshing of these two gears. The gear teeth of the steel clutch plates are meshed with the external gear teeth of the reverse clutch shaft. Therefore, the steel clutch plates of the reverse clutch rotate in anti-engine (or reverse) direction and at engine speed. The oil pump assembly which is connected to the reverse clutch shaft also rotates in anti-engine direction and at engine speed. Since both forward and reverse clutches are disengaged, there is no further power flow within the gear.

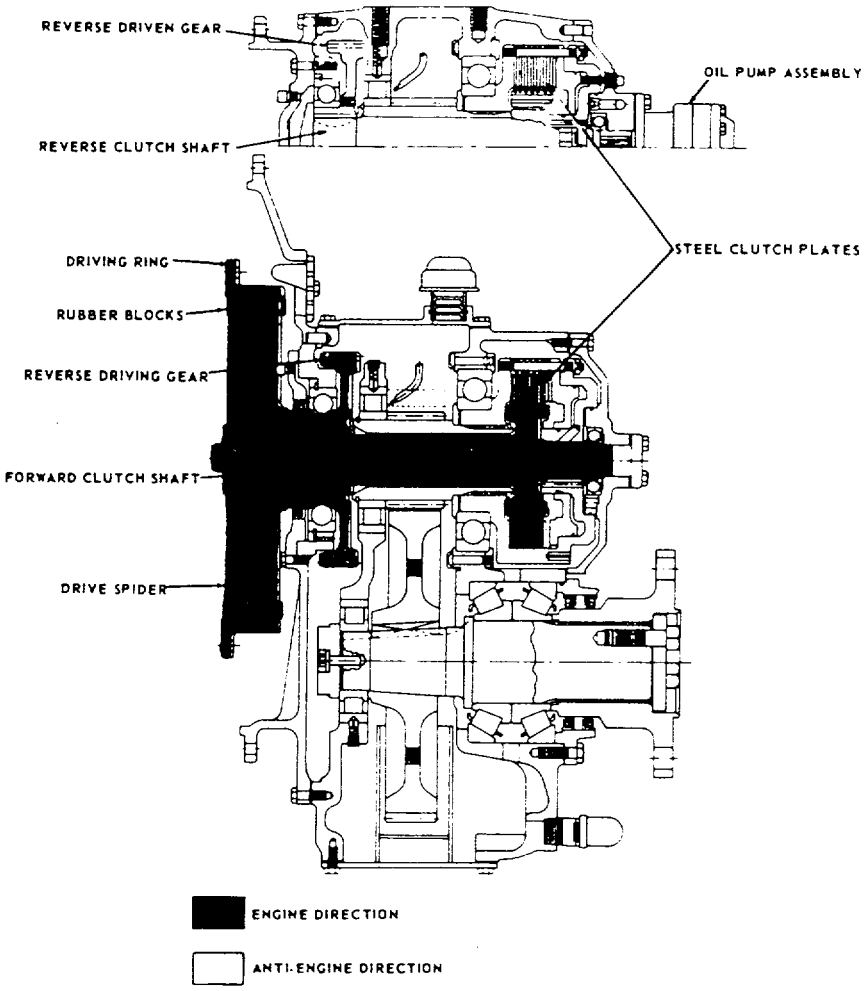



*Figure 1-34. Marine Gear Power Flow - Neutral*

f. When in forward, (Figure 1-35) all parts that rotated in neutral at engine speed are still turning. However, when the forward clutch is engaged the steel clutch plates make positive contact with the sintered-metal clutch plates. The external lugs of the sintered metal clutch plates drive the clutch spider which is spline-connected to the forward pinion. Therefore, the forward pinion rotates in engine direction at engine speed when the forward clutch is engaged. The forward pinion is meshed with the counter shaft gear which is keyed to the counter shaft. The propeller flange is spline-connected to the counter shaft and, therefore, the flange rotates in anti-engine direction when in the forward position. The counter shaft and propeller flange rotate at a reduced speed due to the ratio between the counter-shaft gear and the forward pinion.

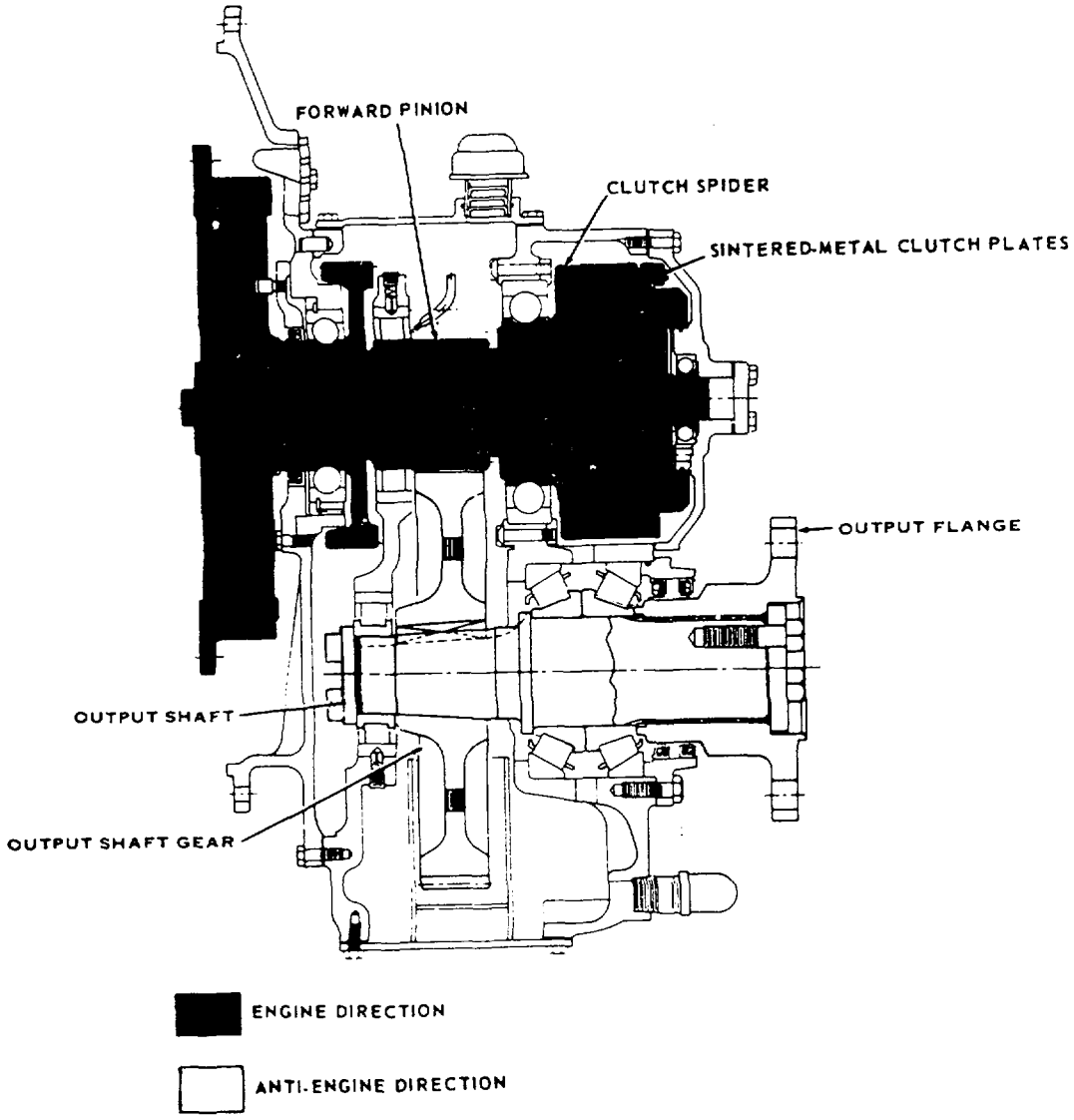



*Figure 1-35. Marine Gear Power Flow-Forward*

g. When in forward, (Figure 1-36) all parts that rotated in neutral at engine speed are still turning. However, when the forward clutch is engaged the steel clutch plates make positive contact with the sintered-metal clutch plates. The external lugs of the sintered metal clutch plates drive the clutch spider which is spline-connected to the forward pinion. Therefore, the forward pinion rotates in engine direction at engine speed when the forward clutch is engaged. The forward pinion is meshed with the counter shaft gear which is keyed to the counter shaft. The propeller flange is spline-connected to the counter shaft and, therefore, the flange rotates in anti-engine direction when in the forward position. The counter shaft and propeller flange rotate at a reduced speed due to the ratio between the counter-shaft gear and the forward pinion.

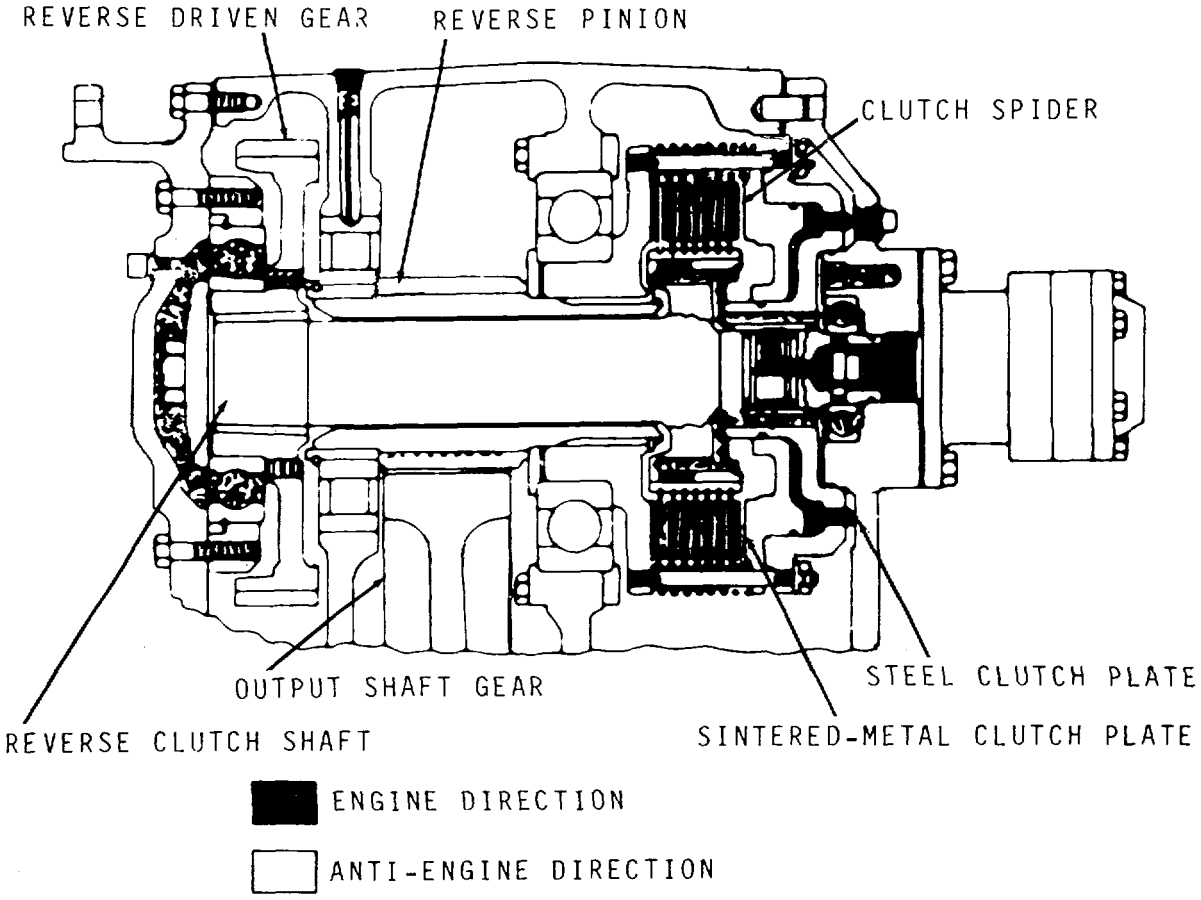



*Figure 1-36. Marine Gear Power Flow - Reverse.*

## 1-43. PROPELLER SHAFTS AND MISCELLANEOUS COMPONENTS.

a. All Propulsion shafting is forged steel. The shafts are: Stub shaft (Port/Starboard), Outboard shaft (Port/Starboard); Line shaft (Port only). Those sections of shafting, which are exposed to sea water are protectively coated by the Cordo Bond Strong Back Method, consisting of liquid resins combined with glass tape. Fairwater voids are filled with tallow.

b. Taper-bored couplings are provided between the port stern tube shaft and line shaft. They are also provided at the drive end of the port line shaft and starboard stem tube shaft.

c. A Bulkhead stuffing box for the port line shaft is located at Frame 56, Port. The stuffing boxes are cast steel with cast steel glands, and bronze studs, and are packed with lubricated flax packing and provided with grease cup lubrication. The stuffing box is easily reached from both sides of the bulkhead. The stuffing box glands should be checked daily when the ship is in operation, and tightened as required. When the gland can no longer be tightened, remove gland packing and repack.

d. The Stern tube shafts are located at Frame 62-1/2, Port and Starboard. They come provided with Split Syntron water-lubricated seals. The gasketed seal flange is bolted to the stern tube flange. A spare seal ring is housed in the forward section of the seal. An inflatable ring is included to allow replacement of the sealing elements with the vessel water borne. The ring, normally unpressurized, is inflated to form a watertight seal around the static shaft.

e. A 2-1/2 gallon (9.46) fresh water storage tank for each seal is attached to the Aft Engine Room Bulkhead above the seal. Each tank is fitted with a globe valve and connecting line to the respective seal. Tanks are provided with hinged covers for pour filling.

f. A portable shaft locking device is provided for each of the Propulsion shafts, so that either shaft may be secured when the vessel is under way on one propulsion unit, or while being towed at a speed of 11 knots. The locking plate is stowed in an inverted position on the Propulsion unit foundation below the shaft coupling.

g. If the propeller shafts are allowed to turn while being towed, or when operating on one propulsion unit, the reduction gear standby lubricating oil pumps must be put into operation.

h. The propellers are mounted to the respective stub shaft flanges and rotate within the kort nozzles. Propeller hubs are fitted with fairwater cones and steel plate rings. Rope guards are provided on the aft end. The units are right and left hand arranged to rotate outboard looking from the top.

1-44. **KORT NOZZLES, RUDDERS, AND FENCES.**

a. The Kort nozzles are the basic unit of the propeller airfoil sections. Nozzles are fitted to the hull and the propeller stub shaft and bearing strut are to be concentric with the propeller within 0.030 inch (0.076 cm). Propeller tip clearance is 1/8 to 3/8 inch (0.318 to 0.953 cm).

b. A fence is fitted to each Kort nozzle and extends aft to the transom where flaps are laterally hinged to swing aft when going ahead and close when going astern to prevent air cavitation.

c. The steering and flanking rudders are described as part of the steering system. Refer to paragraph 1-58.

1-45. **SHIP'S SERVICE GENERATING SYSTEM.**

The Ship's Service Generating System (Figure 1-37) consists of the following:

| DESCRIPTION | PARAGRAPH NUMBER |
|---|---|
| Generator Engine | 1-46 |
| Generator | 1-47 |
| Switchboard | 1-48 |
| Power Distribution | 1-49 |
| Lighting Distribution | 1-50 |

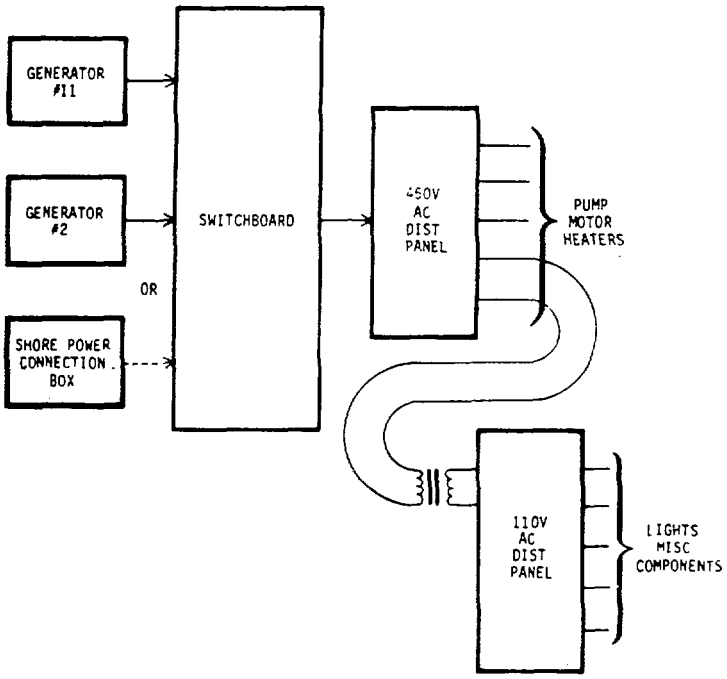
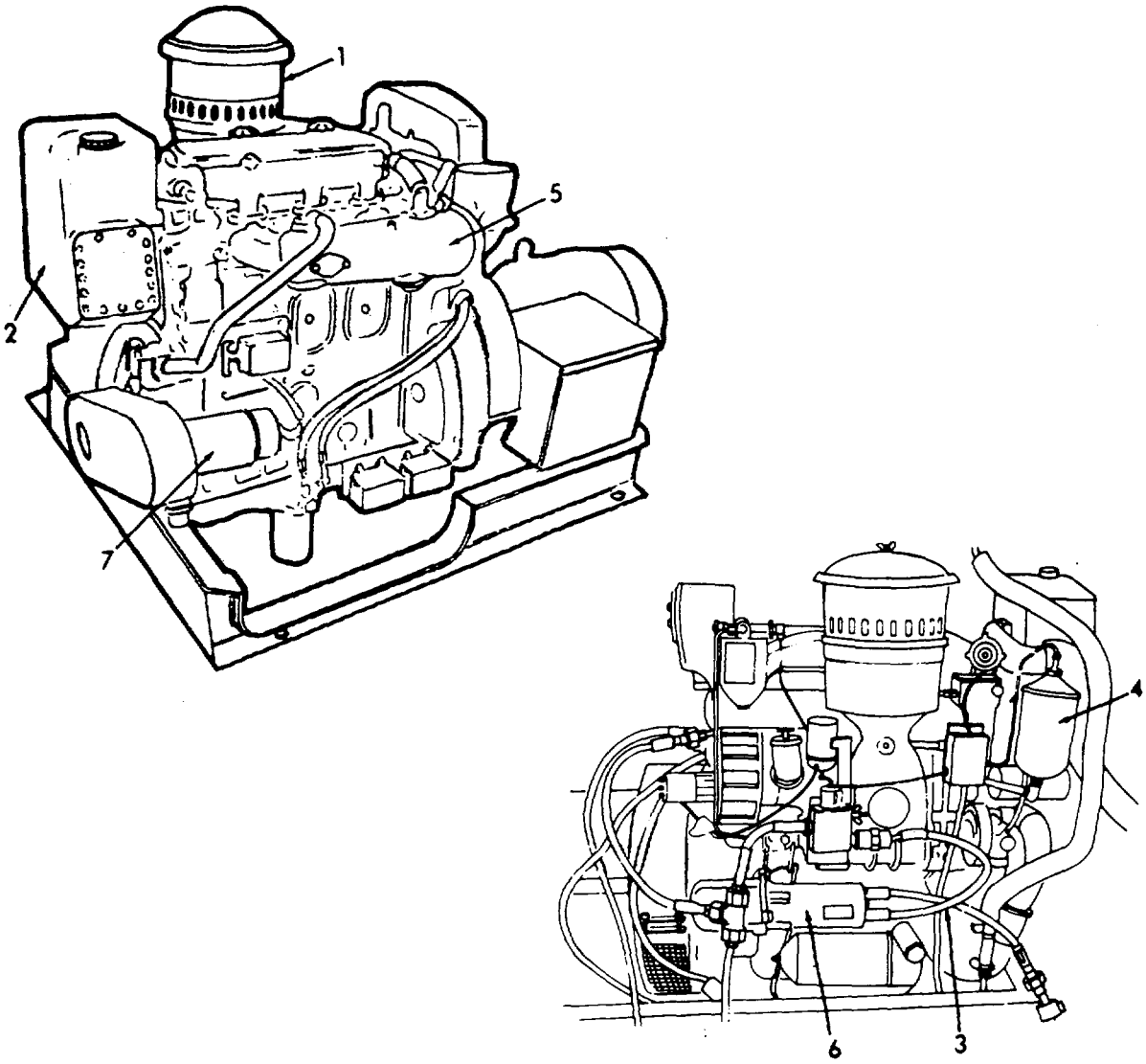



*Figure 1-37. Ship's Service Generating System*

1-46. **GENERATOR ENGINE.**

a. The Generator Engine (Figure 1-38) is a 3 cylinder, 3-71 Detroit Diesel. The engine is equipped with an oil cooler, lubricating oil filter, fuel oil strainer, fuel oil filter, air cleaner, governor, heat exchanger, raw water pump, and starting motor.




1. AIR SYSTEM
2. COOLING SYSTEM
3. FUEL SYSTEM
4. LUBRICATION SYSTEM
5. EXHAUST SYSTEM
6. STARTING SYSTEM
7. DC GENERATING SYSTEM (24 volt)

*Figure 1-38. Generator Engine*

b. The Fuel System is shown in Figure 1-39. Fuel is drawn from the supply tank through the fuel strainer by a gear-type fuel pump. It is then forced through a filter and into the fuel inlet manifold in the cylinder head and to the injectors. Excess fuel is returned to the supply tank through the fuel outlet manifold and connecting lines. Since the fuel is constantly circulating through the injectors, it serves to cool the injectors and also carries off any air in the fuel system.

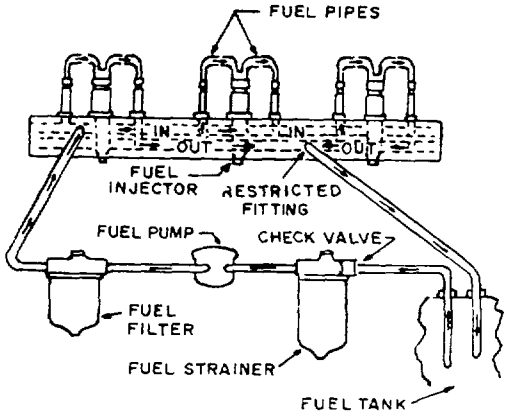



*Figure 1-39. Fuel System*

c. The Air System is shown in Figure 1-40. Air for scavenging and combustion is supplied by a blower which pumps air into the engine cylinders by way of the air box and cylinder liner ports. All air entering the blower passes through an air cleaner first.

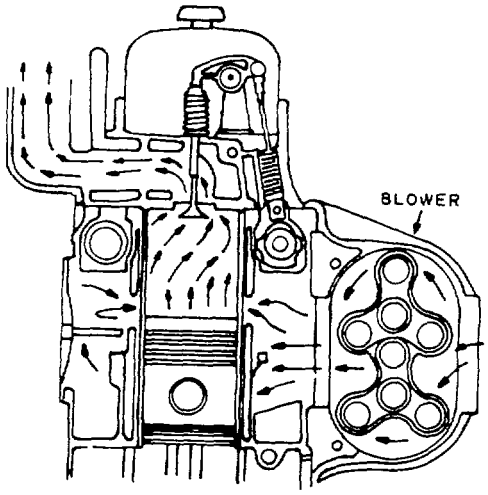



*Figure 1-40. Air System*

d. The Oil System is shown in Figure 1-41. Full pressure lubrication is supplied to all main, connecting rod and Camshaft bearings, and to other moving parts within the engine. A gear-type pump draws oil from the oil pan through an intake screen through the oil filter and then to the oil cooler. From the oil cooler, the oil enters an oil gallery in the cylinder block where the supply divides. A portion enters the by-pass filter if needed and then drains back into the oil pan part going to the cam, balance shaft end bearings and cylinder head. The remainder goes to the main bearings and connecting rod bearings by way of the drilled crankshaft.

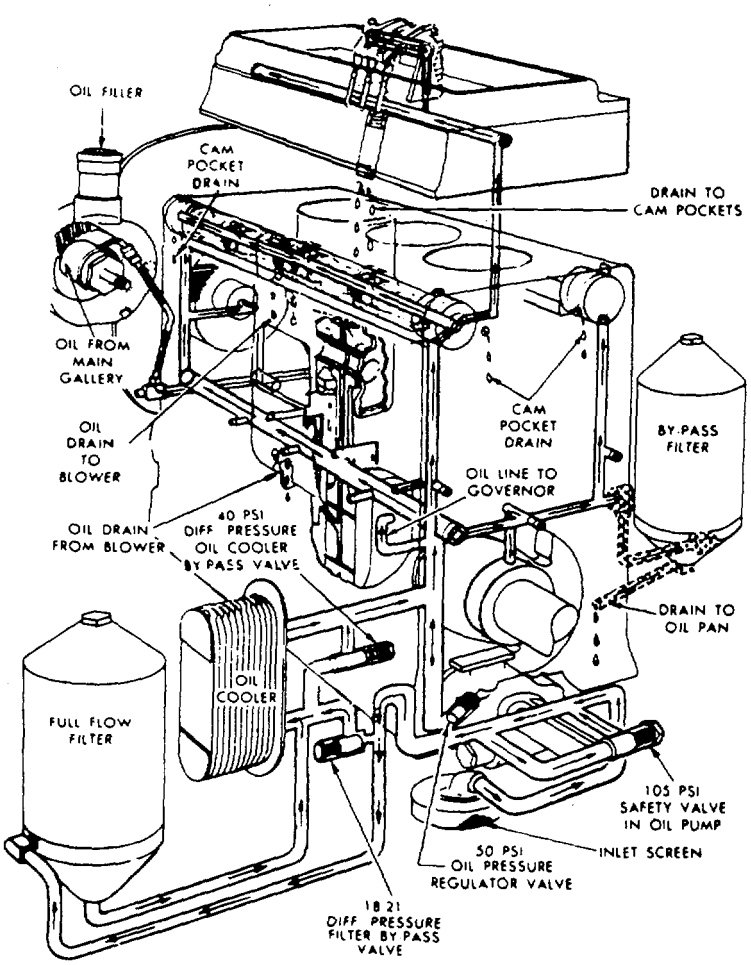



*Figure 1-41. Oil System.*

e. The Coolant System is shown in Figure 1-42. Coolant is circulated through the engine by a centrifugal-type water pump. Heat is removed from the coolant, which circulates in a closed system, by the heat exchanger. Control of the engine temperature is accomplished by a thermostat which regulates the flow of the coolant within the Cooling System.

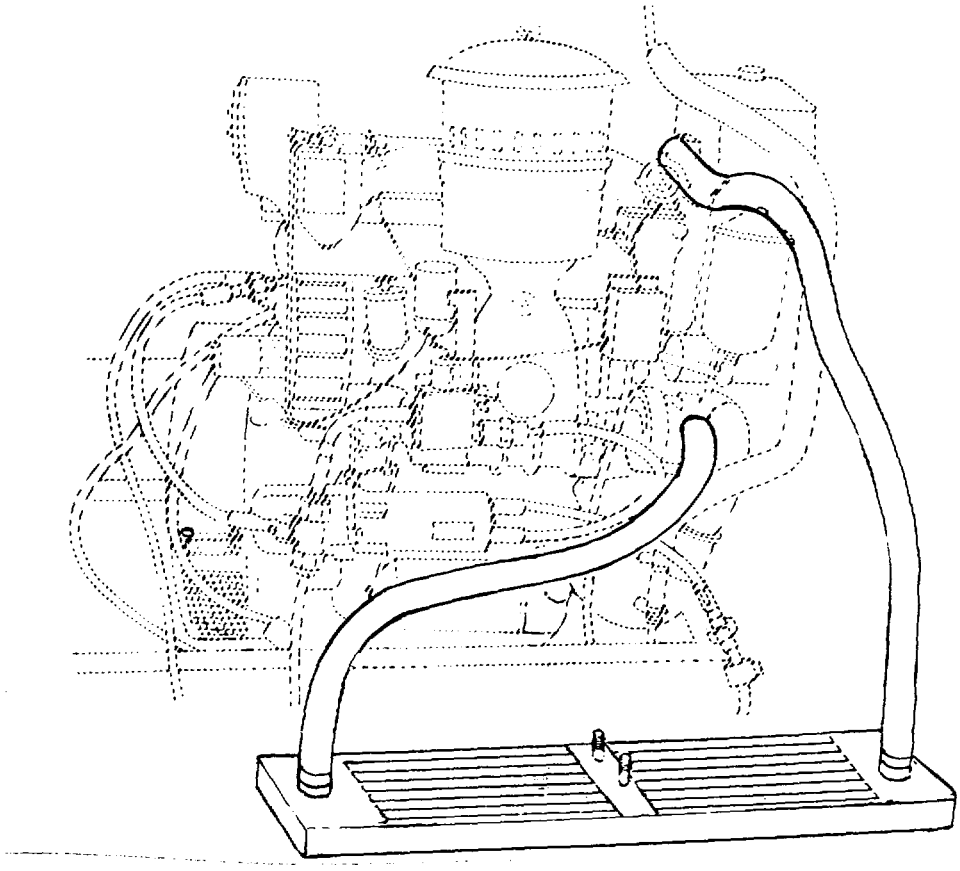


*Figure 1-42. Coolant System.*

f. Engine starting is provided by an Hydraulic Starting System. Engine speed is controlled by an electrically controlled hydraulic governor. The electric controls originate from the main switchboard.

g. The Exhaust Manifold is shown in Figure 1-43. The water-cooled Exhaust Manifold is one piece and is cast with an integral water jacket surrounding the exhaust chamber. The diameter of the exhaust chamber increases uniformly from one end to the other where it ends in a flange to which an elbow and flexible exhaust connection is attached. A portion of the engine coolant is by-passed from the water manifold into the rear end of the jacket surrounding the exhaust manifold. Then it is discharged from the forward end through a tube into the lower section of the expansion tank. A draincock, with an attached hose, is installed in the bottom of the manifold for draining the water jacket. A plug is provided in the bottom of the exhaust outlet elbow for draining moisture condensed from the exhaust gases.

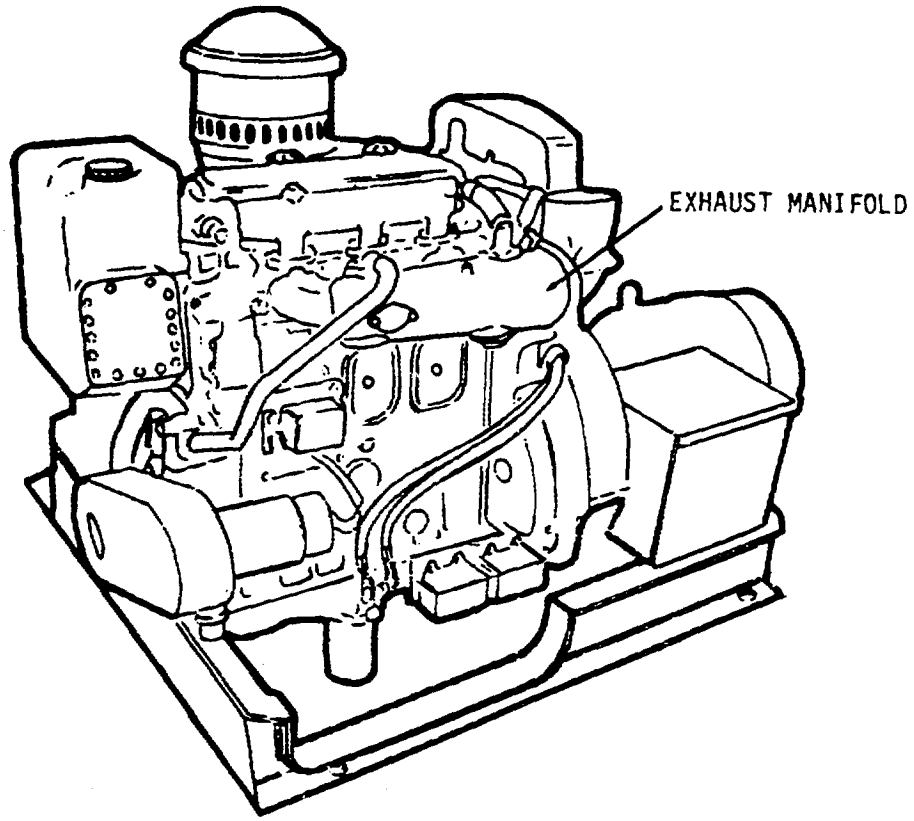



*Figure 1-43. Exhaust Manifold*

1-47. **GENERATOR.**

a. The Generator (Figure 1-44) is an alternating current (AC) brush- less type. The Generator produces 450/VAC, -3 phase, 60 hertz, 40 kilowatts at 1800 revolutions per minute (RPM).

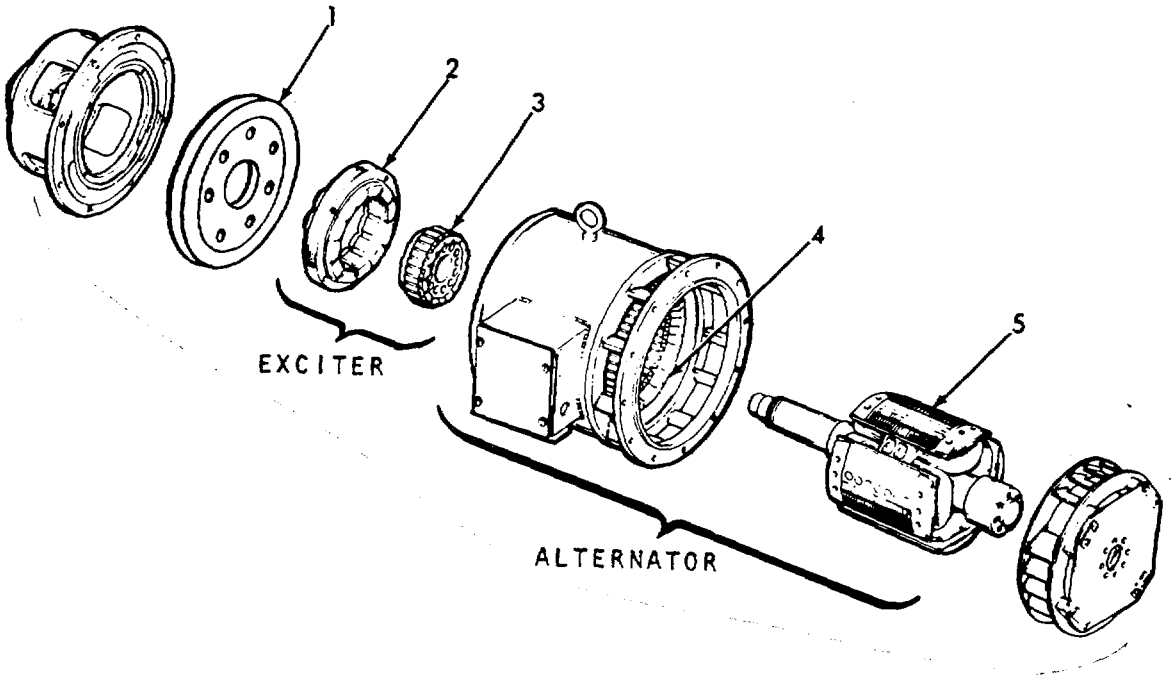
b. The Generator consists of two major components: the Alternator and a direct-connected exciter.

c. The Alternator is made up of a rotating coil assembly, or rotor, and a fixed stator-coil assembly, or stator. The rotor consists of four coil and pole piece assemblies bolted to a shaft. These coils are connected in series with leads brought out to the rotating rectifier assembly. The stator consists of coil groups placed in slots in a laminated steel cove. The stator and coils are mounted in the frame. The rotating rotor is energized by an exciter armature. The output of the exciter armature is converted to direct current (DC) by the rotating rectifier assembly.

d. The Rotating Rectifier Assembly and the Exciter Armature are mounted on the shaft. The exciter armature rotates inside the exciter field assembly. The exciter field assembly consists of twelve coils connected in series and is attached to the frame. The exciter armature is of the twelve pole type. It is connected in a three-phase, three wire, wye coil group. These groups are mounted on the shaft. The output of the armature is rectified by the rotating rectifier assembly.

e. The Rotating Rectifier Assembly is a bridge rectifier with surge protection and control components.

1-47. **Generator (Continued)**




1. ROTATING RECTIFIER ASSEMBLY
2. EXCITER FIELD ASSEMBLY
3. EXCITER ARMATURE ASSEMBLY
4. STATOR COIL ASSEMBLY
5. ROTATING COIL ASSEMBLY

*Figure 1-44. Generator Components.*

1-48. **SWITCHBOARD.**

a. The Ship's Service Generating System consists of two, three cylinder diesel-engine-driven 450 Volt, 3-phase, 40 kw alternating current generators. The No. 1 Generator set is located in the Forward Engine Room, Starboard. The No. 2 Generator set is in the Aft Engine Room. Both Generator sets are controlled from one main switchboard located in the Engine Access Room (1-50-1-Q).

b. The Main Switchboard is able to control, protect, and permit paralleling of the two generator sets. Lights to protect against circuit breaker overload and ground detection are provided on the switchboard. If needed, power can be connected to the vessel from the shore. The Shore Power Connection Box is located at Frame 61 Aft of the Deckhouse. The Shore Power Box is connected to the Main Switchboard.

c. The Switchboard is a dead-front, drip-proof bulkhead mounted type. A rear-drain type of drip shield is welded to the enclosure top to prevent overhead dripping from interfering with the operation of the Switchboard. All components are accessible from the front after opening the front door. Cables enter the Switchboard from the bottom by way of a gasketed cable entrance plate. They are terminated inside the Switchboard on stud type terminal boards or directly to pressure terminals on circuit breakers.

d. Generator No. 1 current is shown on one ammeter. Generator No. 2 or Shore Power current can be selected on the second ammeter. Voltage readings for both Generators, bus and shore power, are available by use of two voltmeters and a selector switch. Selection of individual or total wattages are available by use of two wattmeters and a switch. Generator frequency is indicated on a single meter. A phase sequence indicator is located near the center of the Switchboard. This indicator has three neon lamps which indicate when all three phases are energized and will show proper sequencing. When the pointer of the indicator is in the green region, it is sequencing correctly and when in the red region sequencing incorrectly. A synchroscope is provided for the paralleling of the generators.

1-49. **POWER DISTRIBUTION SYSTEM.**

a. Electric power is distributed all over the vessel by a Distribution System. The Distribution System starts at the generator main switchboard in the Engine Access Room (1-50-1-Q). A paralleling bus is supplied directly from the generators by way of the generator circuit breakers.

b. Power at 450 volts is directly connected to a single 450-volt distribution panel (P-400). The distribution panel is located in the topside deckhouse. All 450-volt power circuits start from this distribution panel (Figure 1-45). One circuit of this panel, with the help of transformers, furnishes the 120-volt distribution panel (L-100). All of the 120-volt, 3-phase mains come from this distribution panel. The transformer bank and 120-volt panel are located in the Engine Access Room, at Frames 53 and 61.

c. Power at 120-volts is supplied to single phase fuse or circuit breaker type distribution panels. These panels supply the ship with 120-volt single phase power, lighting, interior communication and electronic loads.

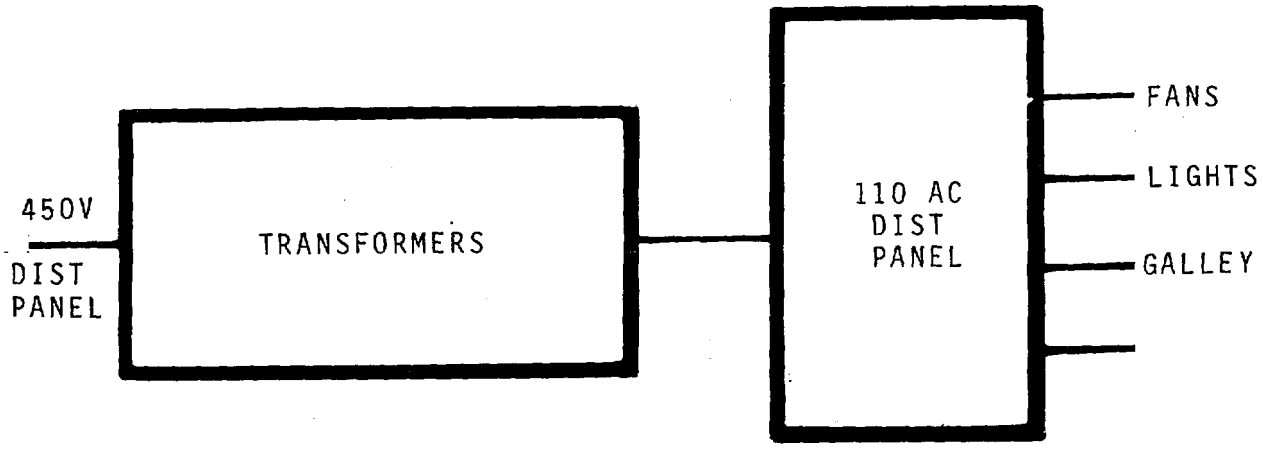



*Figure 1-45. Power Distribution System*

d. Several of the ship's circuits use Direct Current power (See Figure 1-46). The Direct Current power comes from a regulated DC power supply rectifier. The rectifier gets its power from the 120 volt distribution panel. There are two rectifier output circuits. One is for charging of the 24-volt standby batteries. A second circuit supplies a fused distribution panel (P-24). The standby batteries may be used to supply the fused distribution panel when ship service power is dead.

e. When Shore Power is available, connection to the ship is made at the Shore Power Connection Box located outside and aft of the Deckhouse. The Shore Power Connection Box is connected to the Main Switchboard. It is then connected to the 450-volt distribution panel and distributed through the normal network system.

f. Ground detector lights are located in the generator main switchboard in the Engine Access Room for the 450-volt Distribution System, and in the 120-volt distribution panel for the 120-volt system. Detection of a ground in the system calls for qualified personnel for correction.

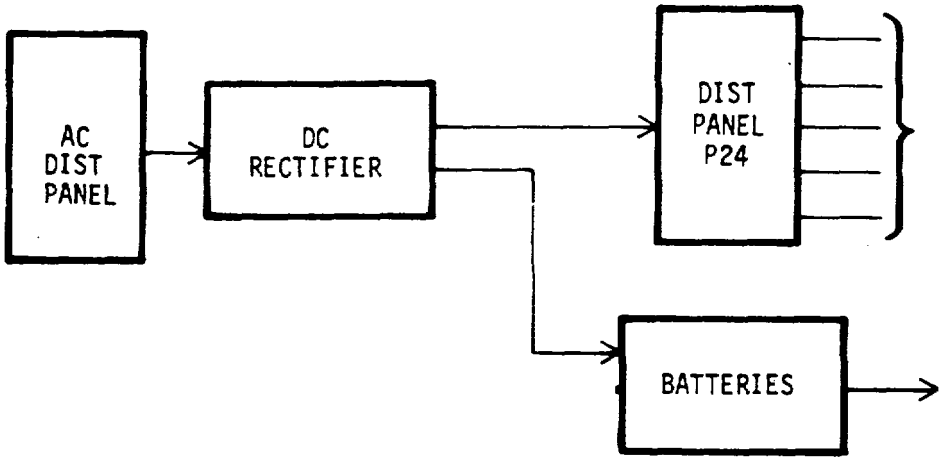



*Figure 1- 46. Direct Current Power*

1-50. **LIGHTING SYSTEMS.**

a. Most lighting equipment aboard ship consists of standard Navy lighting fixtures and fittings. In some places, commercial marine fixtures have been used.

b. All the interior, above-deck compartment lighting and crew quarters' lighting aboard the vessel is darkened ship controlled. The lighting circuit breakers in the distribution panels are marked "DARK SHIP" to allow these circuits to be opened. Also, two door switches are provided to turn off deckhouse lighting (except Pilothouse) if the deckhouse hatch or galley-to-pilothouse doors are opened.

c. Relay type hand lanterns and portable hand lanterns without relays are set up below deck to provide light in compartments if other lights fail. Lanterns are placed to light up access hatch spaces and important work areas. Five portable (Red) hand lanterns can be found above deck in the deckhouse space for use in an emergency.

d. A 12-inch signaling searchlight is mounted on a single post stand on top of the deckhouse. The searchlight housing is yoke-mounted to allow full rotation. It also allows elevations from 45 degrees below to 105 degrees above the horizontal. The lamp rating is 1000 watts.

e. Three 300-watt Floodlights are mounted along the inboard side of the deckhouse topside. Each floodlight can be turned and/or tilted to light up the vehicle deck area. The light switches are found close to the lights.

f. Local lighting is controlled from local switches. Navigation lights are all controlled and supplied from the navigational light panel in the Pilothouse. The Navigational Light Panel is supplied 120-volts AC from the L-106 Distribution Panel.

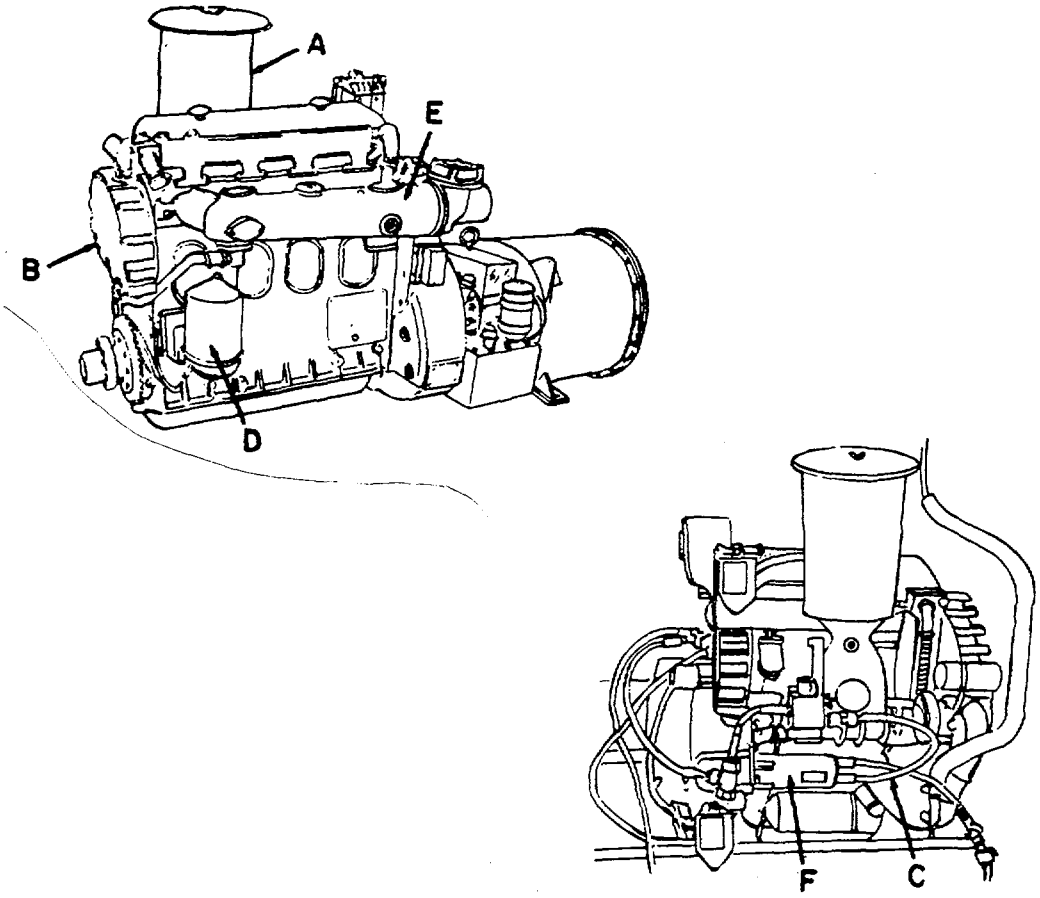
1-51. **ANCHOR WINCH SYSTEM.**

The Anchor Winch System (Figure FO-18) consists of the following:

| DESCRIPTION | PARAGRAPH NUMBER |
|---|---|
| Anchor Winch Engine | 1-52 |
| Torque Converter | 1-53 |
| Hydraulic System | 1-54 |
| Anchor Winch | 1-55 |
| "A" Frame | 1-56 |

1-52. **ANCHOR WINCH ENGINE.**

a. The Anchor Winch Engine (Figure 1-47) is a 4 cylinder, 4-71 Detroit Diesel. The engine is equipped-with an oil cooler, lubricating oil filter, fuel oil strainer, fuel oil filter, air cleaner, governor, heat exchanger, raw water pump and starting motor.




A. AIR SYSTEM
B. COOLING SYSTEM
C. FUEL SYSTEM
D. LUBRICATION SYSTEM
E. EXHAUST SYSTEM
F. STARTING SYSTEM

*Figure 1-47. Anchor Winch Engine System.*

b. The Fuel System is shown in Figure 1-48. Fuel is drawn from the supply tank through the fuel strainer by a gear-type fuel pump. Then it is forced through a filter and into the fuel inlet manifold in the cylinder head and to the injectors. Excess fuel is returned to the supply tank through the fuel outlet manifold and connecting lines. Since the fuel is constantly circulating through the injectors, it serves to cool the injectors and also carries off any air in the fuel system.

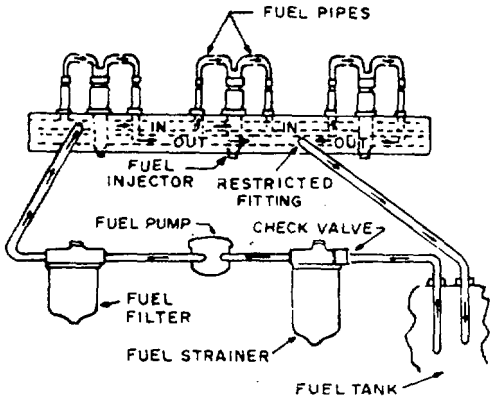



*Figure 1-48. Fuel System*

c. The Air System is shown in Figure 1-49. Air for scavenging and combustion is supplied by a blower which pumps air into the engine cylinders by way of the air box and cylinder liner ports. All air entering the blower passes through an air cleaner first.

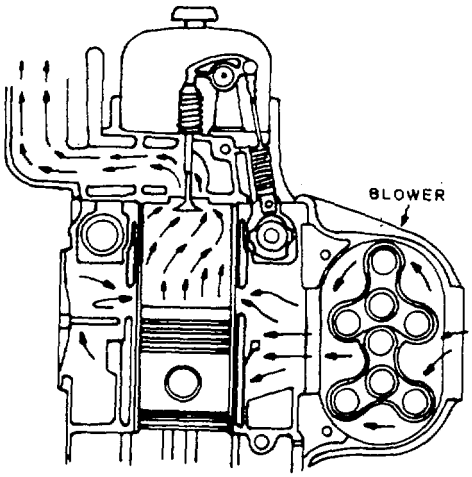



*Figure 1-49. Air Flow Through Blower And Engine*

d. The Oil System is shown in Figure 1-50. Full pressure lubrication is supplied to all main, connecting rod and camshaft bearings, and to other moving parts within the engine. A gear-type pump draws oil from the oil pan through an intake screen, through the oil filter and then to the oil cooler. From the oil cooler, the oil enters an oil gallery in the cylinder block where the supply divides. A portion enters the by-pass filter if needed and then drains back into the oil pan. Part goes to the cam, balance shaft end bearings and cylinder head, with the remainder going to the main bearings and connecting rod bearings by way of the drilled crankshaft.

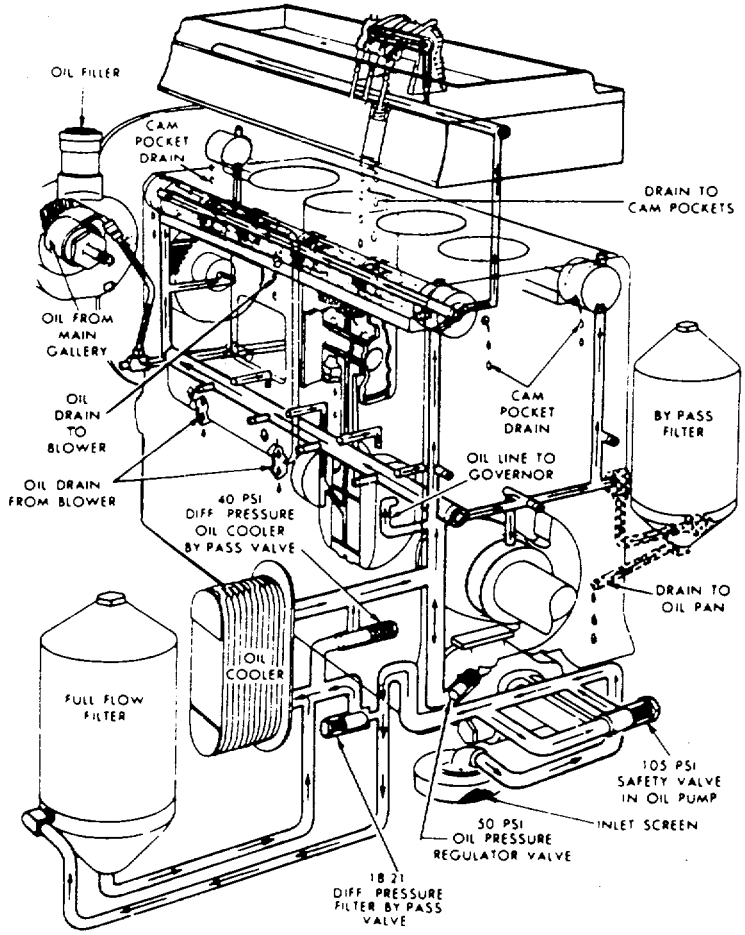



*Figure 1-50. Lubrication System*

e. The Coolant System is shown in Figure 1-51. Coolant is circulated through the engine by a centrifugal-type water pump. Heat is removed in a closed system by the heat exchanger. Control of the engine temperature is accomplished by a thermostat which regulates the flow of the coolant within the cooling system.

f. Engine starting is provided by an Hydraulic Starting System. Engine speed is controlled by a mechanical variable speed governor.

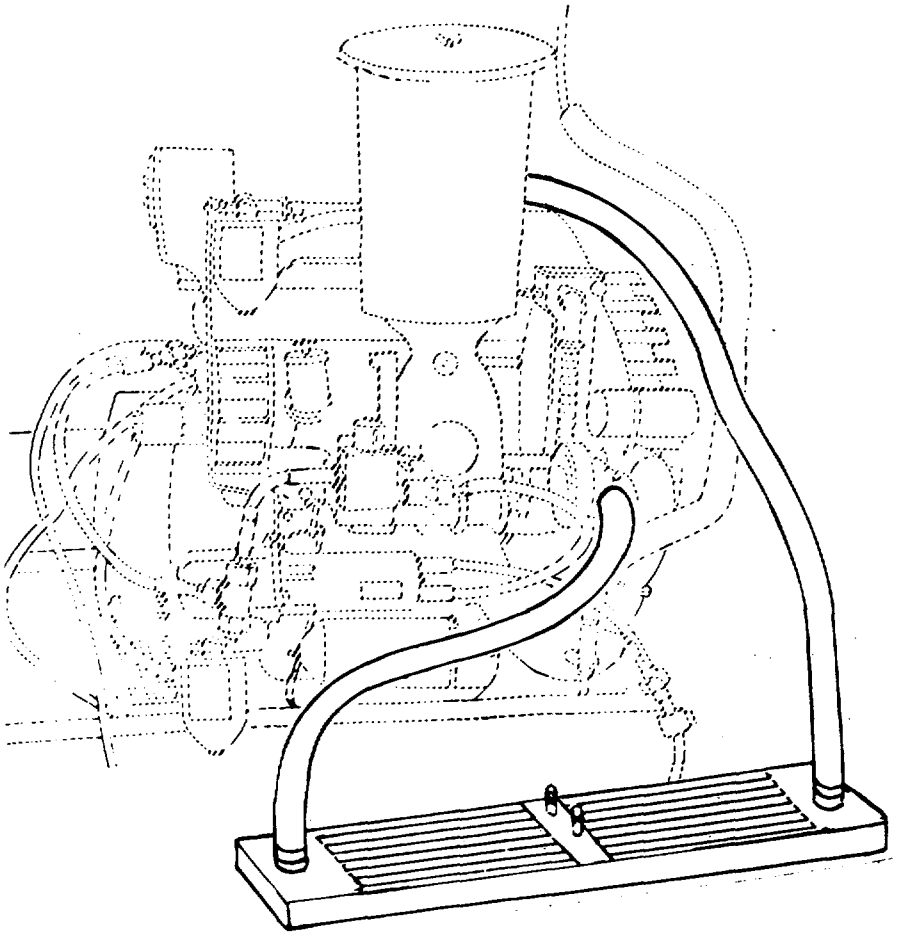


*Figure 1-51. Coolant System*

g. The Exhaust Manifold is shown in Figure 1-52. The water-cooled exhaust manifold is one piece and is cast with an integral water jacket surrounding the exhaust chamber. The diameter of the exhaust chamber increases uniformly from one end to the other where it ends in a flange to which an elbow and flexible exhaust connection is attached. A portion of the engine coolant is by-passed from the water manifold into the rear end of the jacket surrounding the exhaust manifold. It is discharged from the forward end through a tube into the lower section of the expansion tank. A draincock, with an attached hose is installed in the bottom of the manifold for draining the water jacket. A plug is provided in the bottom of the exhaust outlet elbow for draining moisture condensed from the exhaust gases.

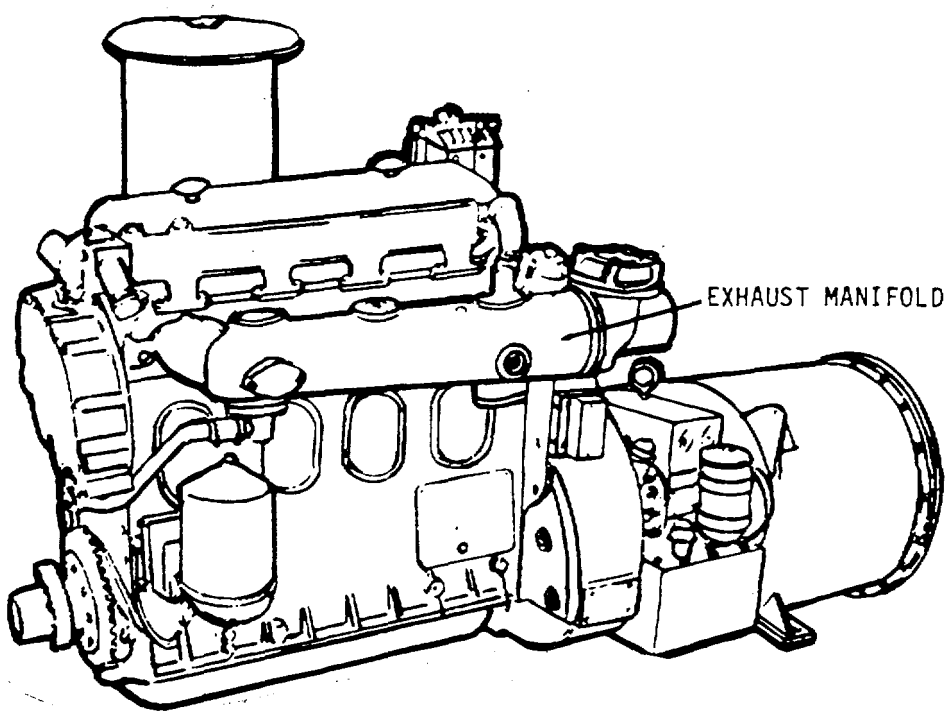



*Figure 1- 52. Water-Cooled Exhaust Manifold Mounting*

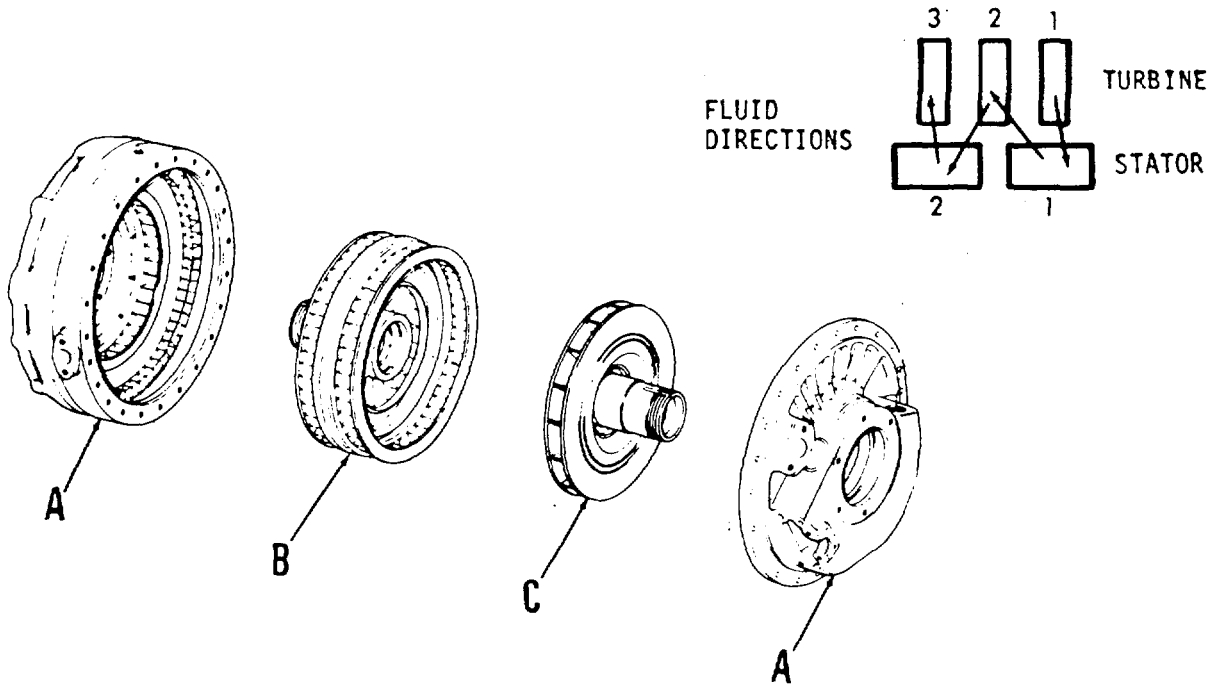
1-53. **TORQUE CONVERTER.**

a. The Torque Converter (Figure 1-53) is a device which multiplies the torque or twisting force of the diesel engine. This increased torque is used to drive the anchor winch.

b. A Torque Converter consists of three basic parts. The impeller or pump is driven by the engine. The impeller is a ring of metal blades which turn in oil. The turbine is made up of three rings of blades and is connected to the anchor winch shaft. The stator or housing contains two sets of stationary blades.

c. When the impeller turns in oil the first ring in the turbine moves. The fluid is then directed to the first set of blades in the stator. The stator directs the fluid to the second ring in the turbine. The fluid is then directed through two sets of blades of the stator and turbine rings.

d. Normally, the action of the impeller-causes the turbine to move freely. The fluid passes through the converter easily and quickly, striking each stator blade at a slight angle. But, when a load is present, the turbine slows down. The fluid strikes the blades at a greater angle. The torque relayed through the turbine will increase to five times the input torque. This increased torque moves the anchor winch cable drum.



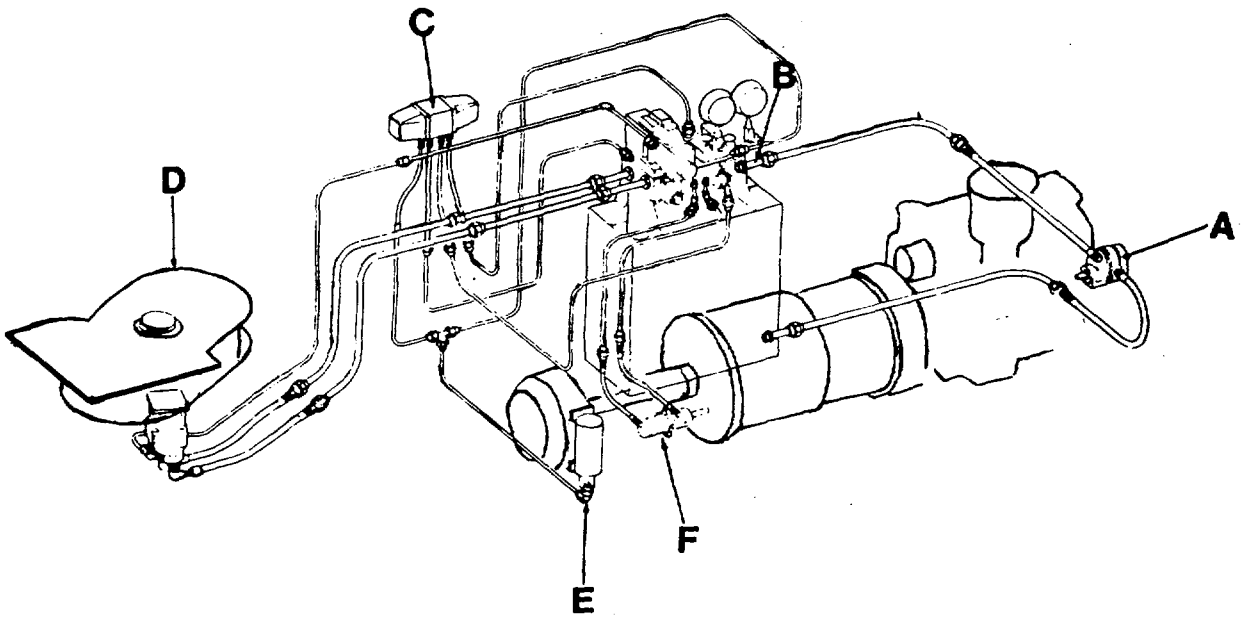

A. STATOR
B. TURBINE
C. IMPELLER

*Figure 1- 53. Torque Converter*

1-54. **HYDRAULIC SYSTEM.**

a. The Hydraulic System (Figure 1-54) supplies the hydraulic power to operate the Anchor Winch.

b. An oil pump is driven by the diesel engine. The output of the pump goes to an hydraulic tank which contains control valves and pressure gages. The valves on the tank operate automatically. The valves control the following: the clutch between the torque converter and the winch, the drive brake on the winch, and the slackpuller.




A- Oil Pump
B- Hydraulic Tank
C- Directional Control Valve
D- Slack Puller
E- Drive Brake
F- Clutch

*Figure 1-54. Hydraulic System.*

1-55. **ANCHOR WINCH.**

The Stern Anchor Winch (Figure 1-5) is a single drum, variable speed unit, powered by a diesel engine through a torque converter driving system. The Winch is controlled with a foot operated lever override which sets the release spring set brake on the winch driveshaft. The payout device is a variable speed device capable of paying out the Stern Anchor wire rope. It is also capable of providing a payout tension load. A levelwinder, which can be disengaged if desired, is built into the winch. It is synchronized with the drum rotation. An hydraulically operated slackpuller is mounted on the hull structure to aid in unspooling the drum.

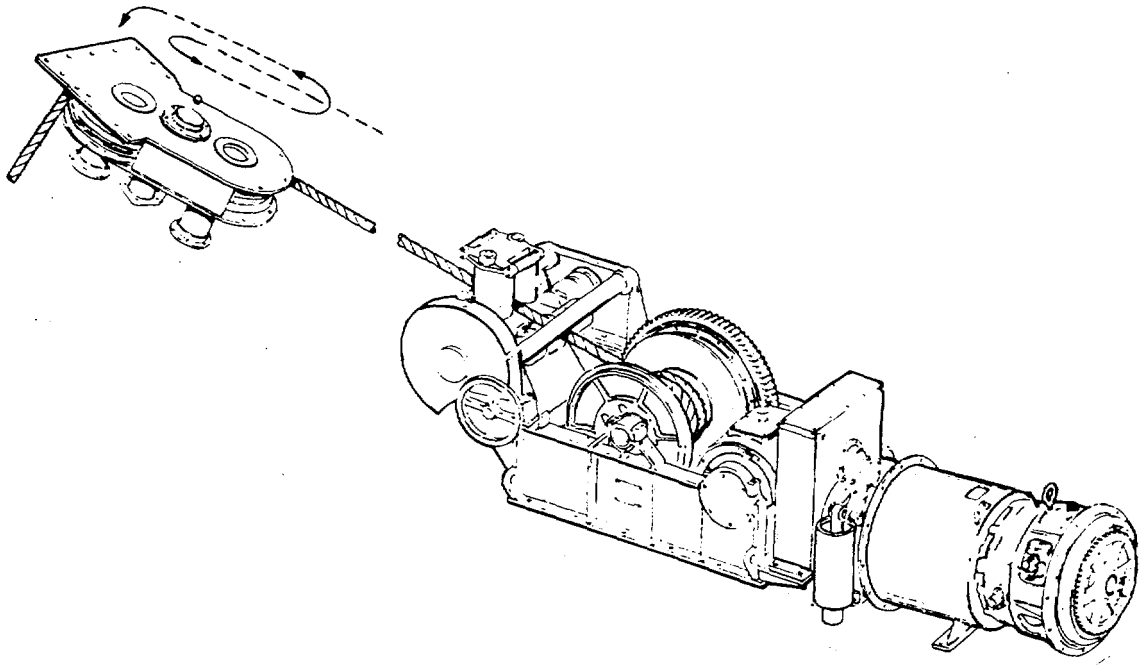
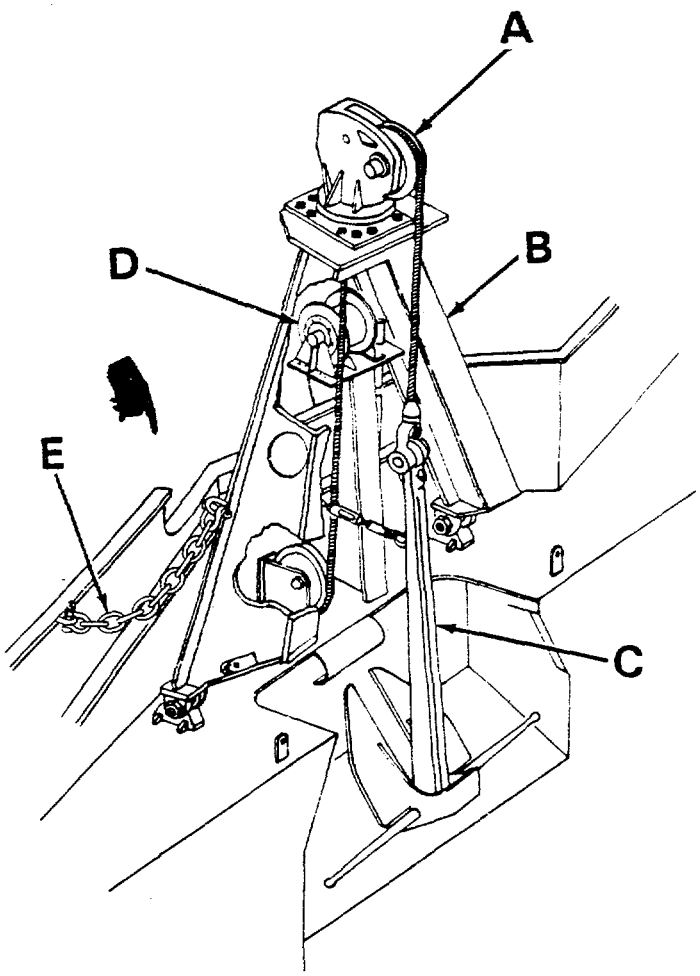


*Figure 1- 55. Anchor Winch And Slackpuller*

1-56. **"A" FRAME.**

The Anchor "A" Frame (Figure 1-56) is a pivoted "A" shaped Frame located on the Starboard side Aft. In the stowed position the "A" Frame is locked with a pin. The anchor is secured to the hull with two quick-release Pelican hooks. The anchor hangs from the "A" Frame fairlead with a cable. The cable runs over the fairlead sheath to a sheath on the deck. The cable then goes below deck to the Slackpuller and Anchor Winch.

When the anchor is to be either dropped or retrieved the central Hydraulic System is turned on. This provides power to the Hydraulic Winch. This winch will pivot the "A" Frame to an outboard position. The anchor can now be either dropped or retrieved. A safety chain is secured between the "A" frame and the starboard bulwark.

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(Figure 1-56 Sheet 1 of 3)
(Figure 1-56 Sheet 2 of 3)
(Figure 1-56 Sheet 3 of 3)

" FRAME WINCH

E. SAFETY CHAIN

*Figure 1-56. Anchor "A" Frame (Stowed Position) (Sheet 1 of 3).*

1-56. **"A" FRAME (Continued)**

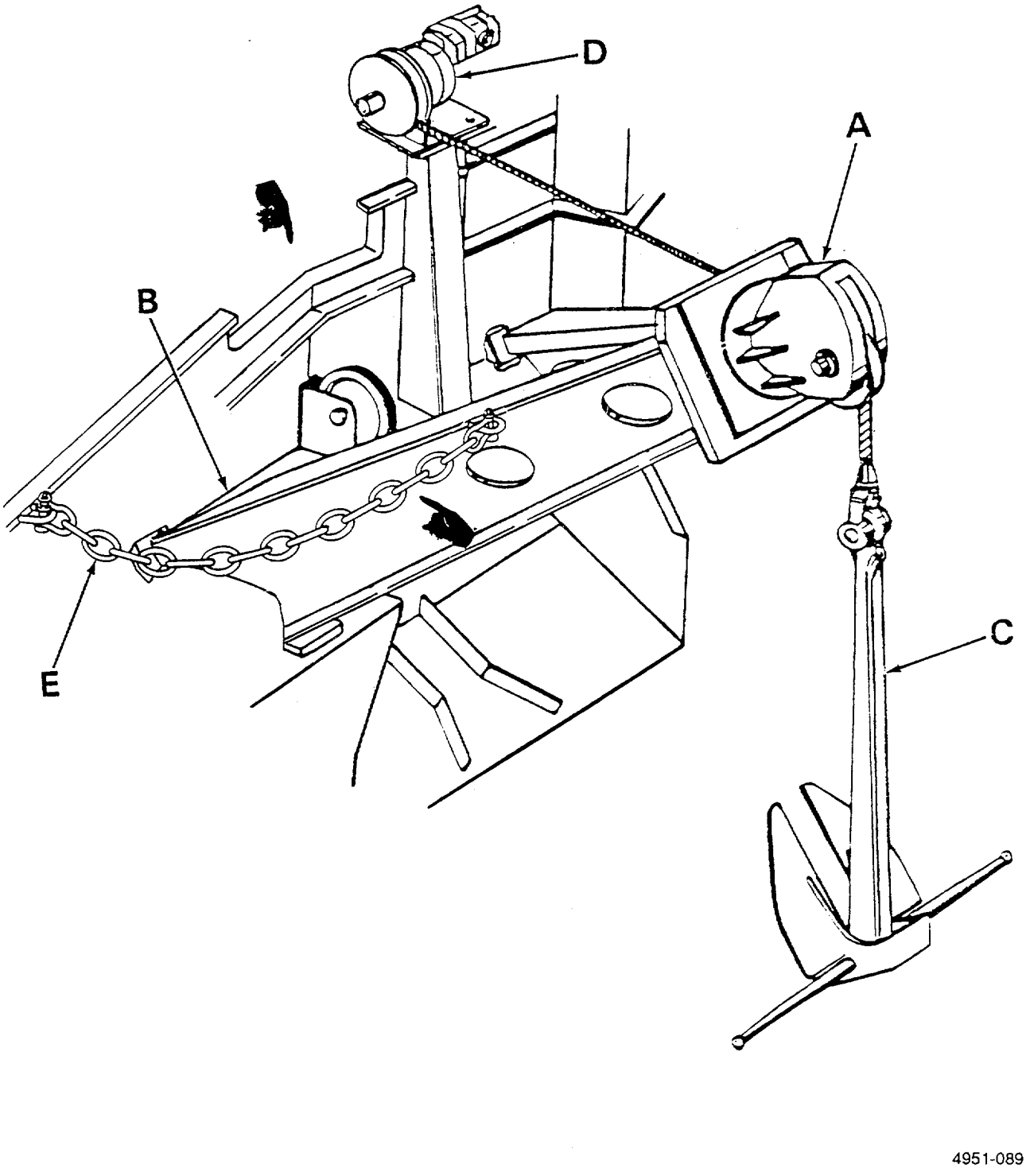


*Figure 1-56. Anchor "A" Frame ("Drop/Retrieve" Position) (Sheet 2 of 3).*

1-56. **"A" FRAME (Continued)**

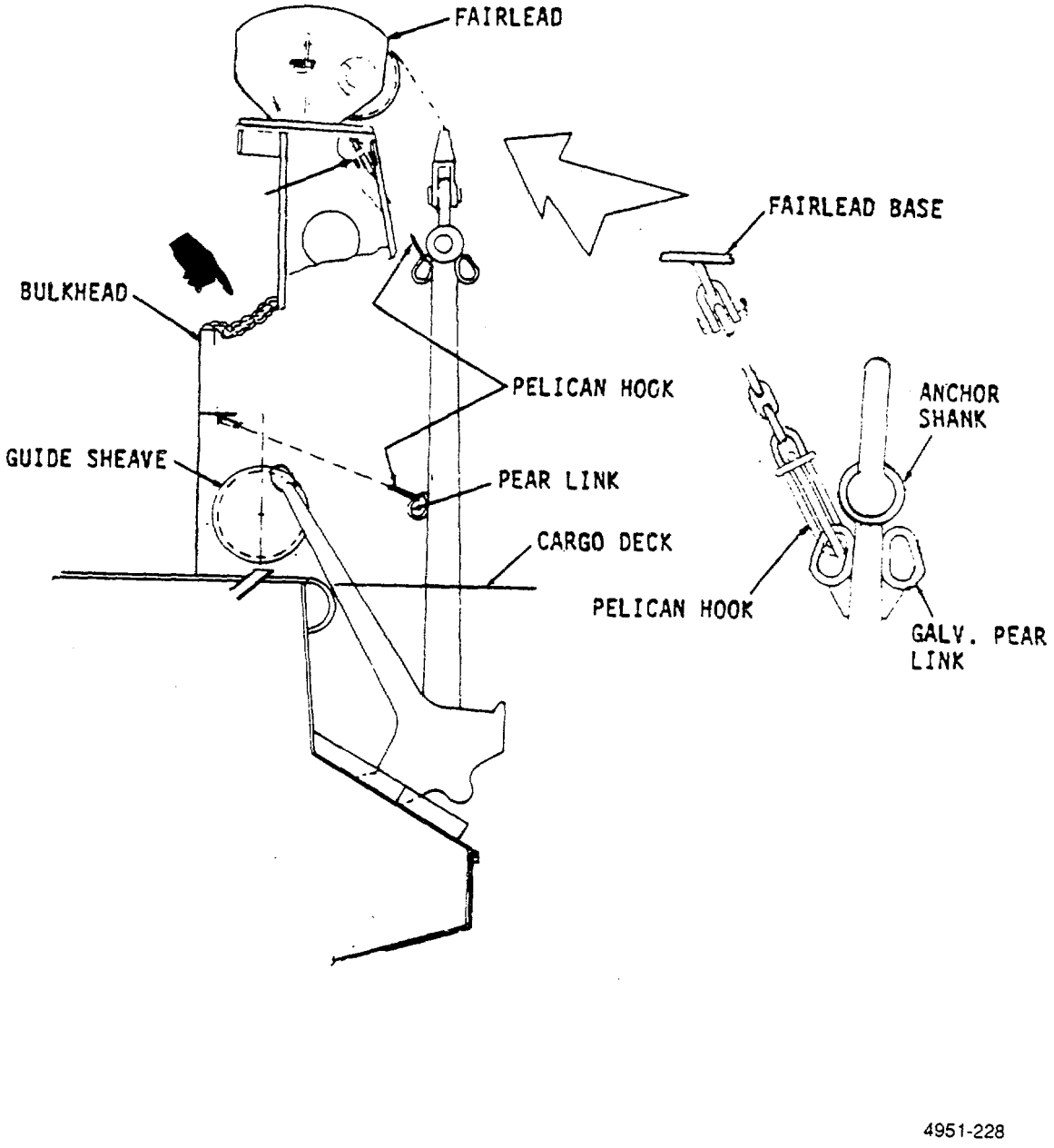


*Figure 1-56. Anchor "A" Frame (Assembly) (Sheet 3 of 3).*

1-57. **BOW RAMP WINCH.**

a. The Bow Ramp Winch (Figure 1-57) consists of a single drum with dual grooves wound opposite hand for two 7/8 inch diameter wire rope lines, mounted on the slow speed shaft of a helical gear reducer, with an outboard anti-friction bearing. The outer flange of the drum has ratchet teeth which engage with a pawl pivoted in the Frame. The pawl is engaged and disengaged by a hand lever which can be locked "IN" or "OUT". The inner drum flange is equipped with a manually-operated hand brake. The Winch is driven by a motor connected to the reducer high speed shaft by a torque limiting clutch coupling set for approximately 200% of the normal load. The motor has a spring-actuated solenoid-released, disc brake, integrally mounted.

b. The Winch is controlled by a magnetic reversing starter, with a pushbutton operating station at Starboard on the forecastle deck. There is a remote station in the Pilot House and a master station in the winch area. A slack cable limit switch is provided to de-energize the motor in case the cable goes slack because of overtravel or in the event of a "hang-up". A hand crank safety switch is also provided to prevent electrical operation when the hand crank is engaged.

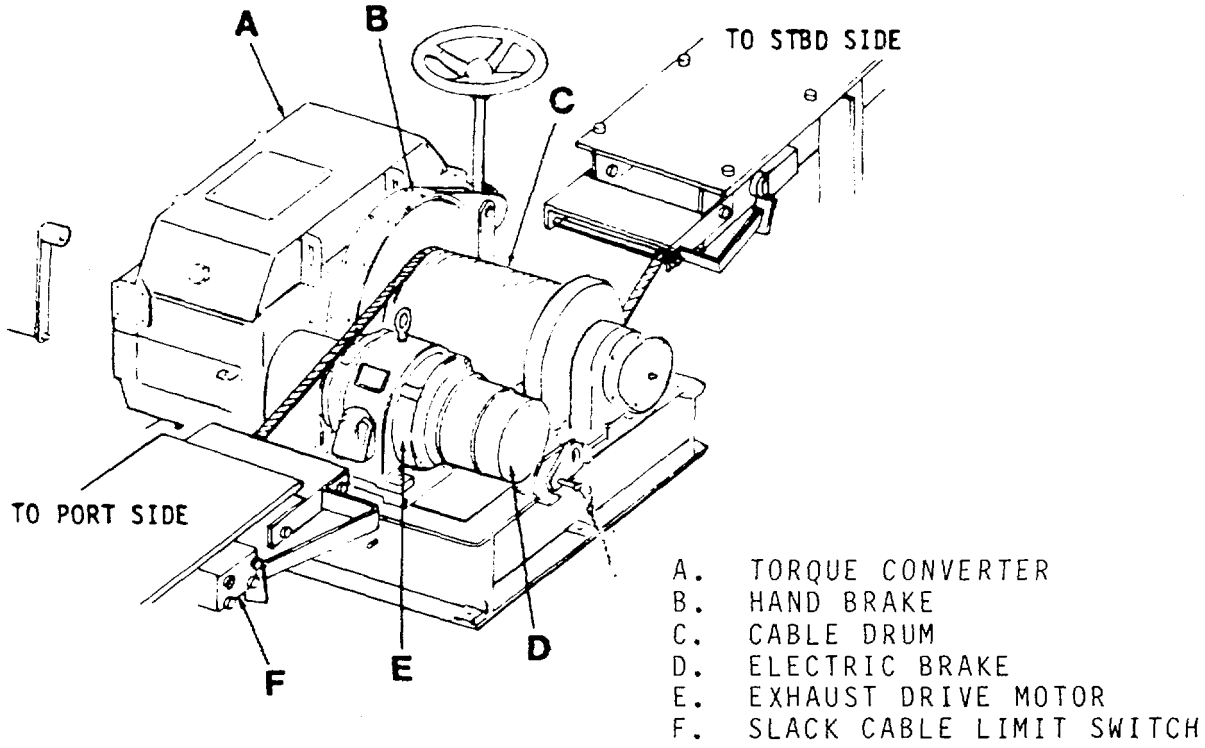


*Figure 1-57. Bow Ramp Winch*

1-58. **SHIP'S STEERING SYSTEM.**

The Ship's Steering System (Figure 1-58) consists of the following:

| DESCRIPTION | PARAGRAPH NUMBER |
|---|---|
| Cub Hydraulic Pump Unit | 1-59 |
| Heading Selector | 1-60 |
| Motor Controller | 1-61 |
| Flanking Rudder Limit Switch Assembly | 1-62 |
| Steering Rudder Repeatback Unit | 1-63 |
| Rudder Angle Indicator and Transmitter | 1-64 |

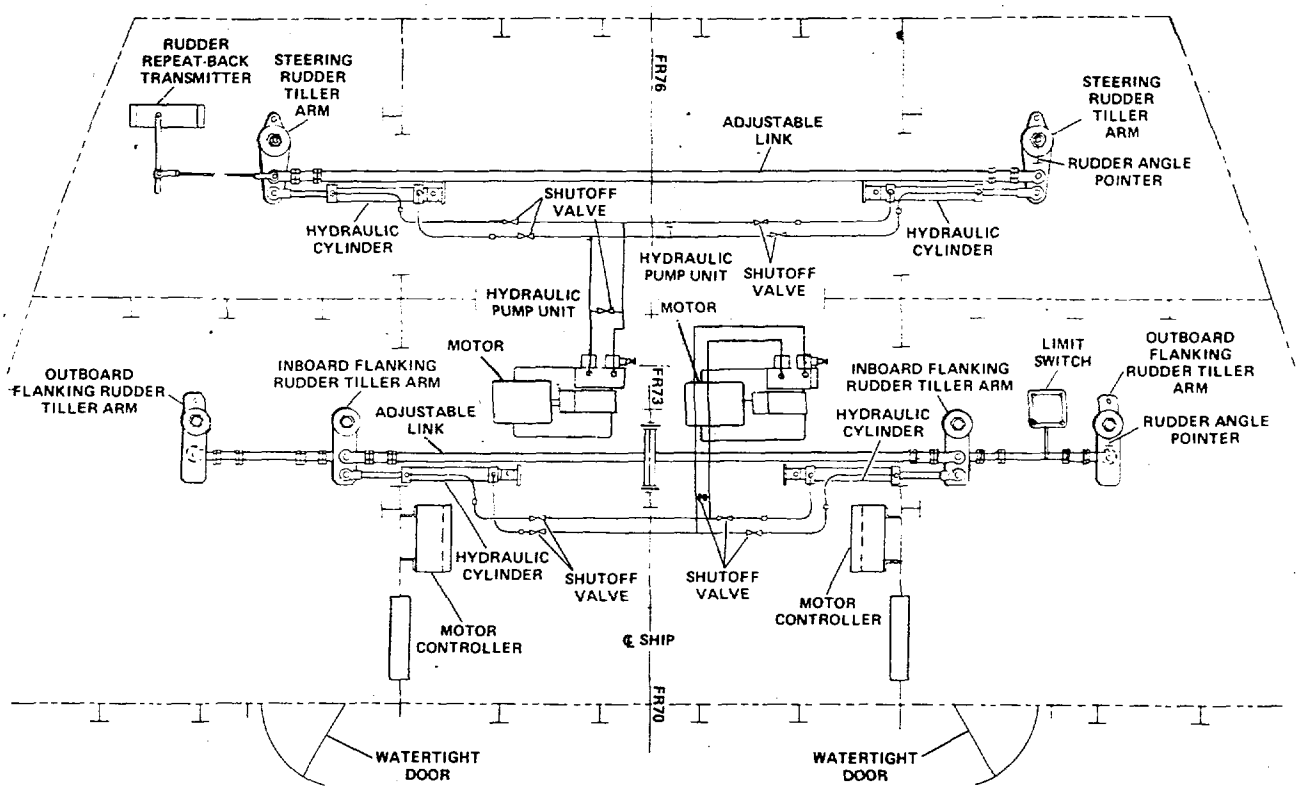


*Figure 1-58. Ship's Steering System*

1-59. **CUB HYDRAULIC PUMP UNIT.**

a. The Cub Hydraulic Pump unit (Figure 1-59) is a power source for hydraulic steering systems. The pump unit is mounted on a 10-gallon (37.9 1) tank. An hydraulic fluid level gauge is located on the side of the sump tank. A 100-mesh strainer, located in the sump, filters the fluid. An electric motor drives the pump unit.

b. The Vane Pump is a rotary, single-stage sliding vane unit consisting of a housing and rotor assembly. The rotor has a series of slots into which are fitted vanes. As the rotor turns, the vanes are thrown outward by centrifugal force to bear against the surface of an oval shaped cam. As the vanes move across the inlet chamber, the radius of the oval cam increases to create an increasing space between the rotor and the cam. Atmospheric pressure acting upon the inlet fluid forces it into this space. Fluid is trapped between vanes as they move past the inlet chamber. At this point, the radius of the contour decreases and the fluid is forced into the outlet chamber.

c. The Directional Valve is a solenoid operated valve which controls flow to operate the rudder. This valve is electrically controlled from the external electronic control amplifier. The solenoids of the valve are de-energized if the rudder limit switches are activated. Brake valves lock the cylinders in any position when no changes are being ordered. The cylinder relief valves are connected across the lines that link the pump unit to the rudder positioning cylinders. These valves limit pressure build-up as a result of an object striking the rudder by allowing the rudder to move even though the brake valves are closed. This prevents damaging the steering gear.

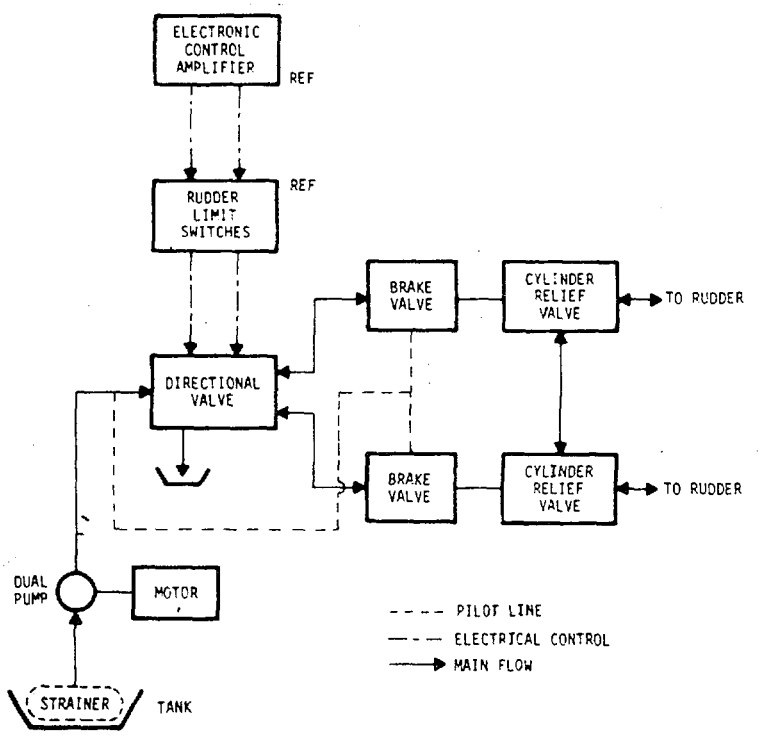


*Figure 1-59. Cub Hydraulic Pump Unit*

1-60. **HEADING SELECTOR.**

a. The Heading Selector is used as an interface between a gyrocompass and steering control equipment to select the desired heading of the vessel. The gyrocompass transmits actual heading data to the Heading Selector for comparing the actual heading data with the ordered heading data. If the actual heading and the ordered heading are the same, there is no signal output from the Heading Selector. If the actual heading and the ordered heading differ, the Heading Selector will produce a signal that will cause the rudder positioning equipment to change the vessel's actual heading to its ordered heading. Three-wire synchro data from the gyrocompass provides the heading information.

b. The Heading Selector consists of a circuit card 1882518 and associated controls and wiring mounted in an enclosure. The unit is fitted with an adjustable mounting bracket that allows positioning for operating convenience.

1-61. **MOTOR CONTROLLER.**

The Motor Controller is an AC, across-the-line non-reversing unit that controls the three-phase electric motor used with the Hydraulic Pump oh marine steering systems. The drip-proof case of the controller contains a LOCAL-OFF-REMOTE switch and a RESET control on the front panel and houses line contactor, power transformer, control relay and fuses. The controller also contains terminals to which remote accessory indicator lamps can be connected to show when the motor is under overload conditions. The overload lamp will remain lighted after a brief overload has passed until the remote RESET control is pushed. If the lamp remains lighted after the RESET control is pushed, the overload condition still exists.

1-62. **FLANKING RUDDER LIMIT SWITCH ASSEMBLY.**

The Flanking Rudder Limit Switch moves the Flanking Rudders to hard left or hard right.

1-63. **STEERING RUDDER REPEATBACK UNIT.**

a. The Rudder Repeatback (Figure 1-60l consists of a follow-up potentiometer and limit switches enclosed in a water proof housing. The potentiometer is positioned by a direct mechanical connection to the rudder quadrant and furnishes a rudder follow-up signal to the steering amplifier in the Steering Control Unit. The unit also limits the rudder order in hand-electric operation. When used with the gyropilot, a second set of limit switches provides rudder limits to prevent excessive rudder angles during course changes.

b. The Rudder Repeatback Potentiometer forms one-half of a balanced Wheatstone bridge, the other half of the bridge being in the rudder order portion of the steering equipment.

c. When the control potentiometer in the rudder order equipment is moved, an order signal is generated which causes the rudder positioning equipment to move the rudder. The rudder then rotates the Rudder Repeatback potentiometer which cancels the order signal. When the rudder reaches the ordered position, the signals from the control potentiometer and the Rudder Repeatback potentiometer are equal and opposite. The rudder will stay in the ordered position until the control potentiometer is moved again.

d. In hand-electric operation, a pair of cam-operated limit switches open the control circuit to the rudder positioning equipment a few degrees before the rudder reaches its mechanical limits.

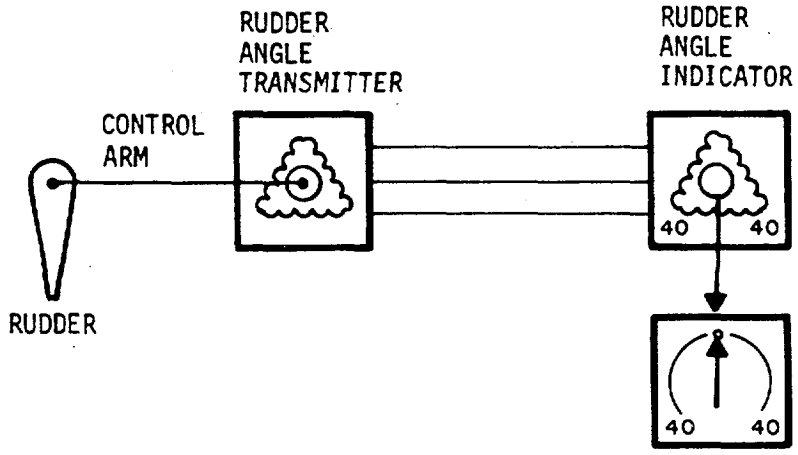


*Figure 1-60. Steering Rudder Repeatback Unit*

1-64. **RUDDER ANGLE INDICATOR AND TRANSMITTER.**

a. The Rudder Angle Indicator equipment provides the helmsman with a constant visual indication of rudder position and of the rate of rudder movement. It consists of a waterproof case containing a synchro receiver, a pointer driven by the synchro rotor, a dial, three 115-volt dial lamps, a rheostat, and a terminal block.

b. The dial is graduated in one degree increments from 40 degrees right to 40 degrees left rudder. During daytime operation, the dial indications are white against a black background. When illuminated, the dial indications are red against a black background. The rheostat allows the operator to vary the intensity of illumination over a wide range.

c. The Rudder Angle Transmitter consists of a waterproof case which contains a terminal block and a synchro transmitter operated through a pair of gears by an arm connected to the rudder stock.

d. Each synchro contains a Y connected stator and a single winding rotor. The rotor windings of the two synchros are connected to 115 volt 60 cps supply. By transformer action across the rotor gap, the rotor excitation voltage induces a voltage in each leg of the Y connected stator winding. The voltages are different for each leg and vary with the angular orientation of the rotor. Starting at a point where the rotor field is parallel to any one of the legs of the stator, and turning the rotor one complete turn will cause the induced voltage in the stator leg to start at zero, rise to a maximum of 90 volts when the rotor field is perpendicular to the stator winding, decrease to zero, decrease to -90 volts (out of phase) and then return to zero at the end of the revolution. Each successive leg of the Y connected stator will pass through zero at a shaft position 120 degrees away from the preceding leg.

e. A transmitter and receiver synchro pair are operated by connecting the stator leads (51 to S2, to S2, S3 to S3) together and applying 115 volt excitations to both rotors (R1, R2). If the rotors are at different shaft angles, the voltages induced in the rotor windings will be different. This difference in voltage will allow a circulating current to flow in each leg of the stator winding. The currents in turn, set up a force which turns the rotor.

f. At the point where both rotors are aligned, the stator voltages will be equal and opposite in all three legs of the stator winding. The force turning the rotor will be zero and the synchros will remain at the position until the rotor is turned.

g. This system sets up torques on both transmitter and receiver equally and in opposite rotations. However, since the transmitter is restrained while the receiver is free to turn, the receiver will follow the Transmitter. Thus, the pointer follows exactly the movement of the rudder and gives a constant indication of rudder position.

1-65. **SHIP'S PIPING SYSTEM.**

The Ship's Piping System consists of the following:

| DESCRIPTION | PARAGRAPH NUMBER |
|---|---|
| Engine Cooling Water System | 1-66 |
| Exhaust Piping System | 1-67 |
| Fuel System | 1-68 |
| Engine Lube Oil System | 1-69 |
| Fresh Water System | 1-70 |
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1-66. **ENGINE COOLING WATER SYSTEM.**

a. A complete fresh water circulating system is installed to cool the Propulsion Diesel Engines, Anchor Winch Diesel Engine, and the Generator Diesel Engines.

b. Two keel coolers are supplied for each of the main propulsion diesel engines (see Figure 1-61). All keel coolers are recessed into the hull area. The Port Propulsion Engine keel coolers also serves the Anchor Winch Diesel Engine. Each keel cooler is insulated from the hull with neoprene insulation. Integral expansion tanks are provided with all engines. Separate backup expansion tanks are also supplied for all diesel engines. Filling of the cooling systems is made through the fill caps in the tanks. Fresh water can be supplied by hose from makeup connections in the forward and aft engine rooms. Vents are provided on all backup expansion tanks.

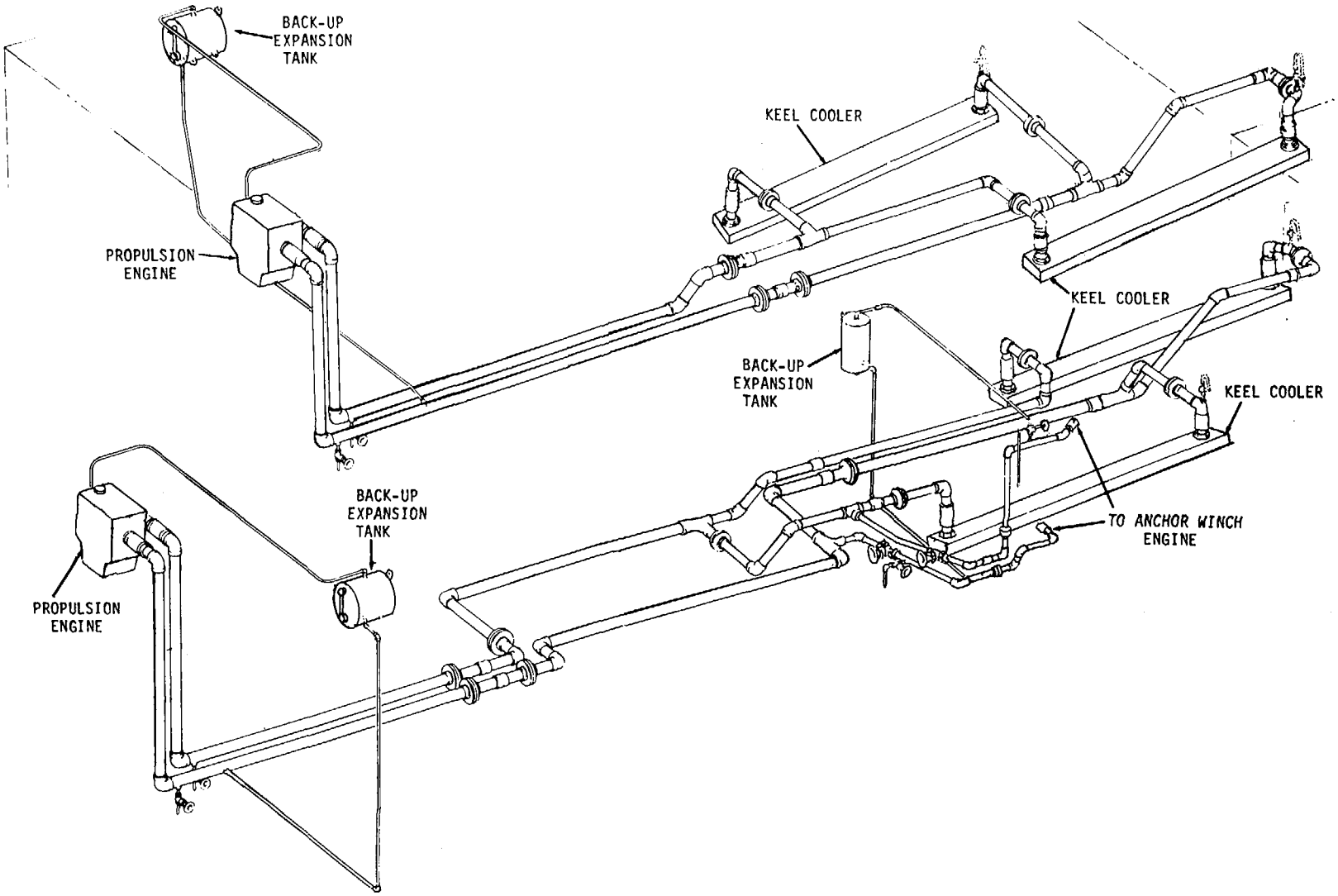



*Figure 1-61. Engine Cooling Water System (Keel Coolers)*

a. One keel cooler is provided for each of the diesel generators (see Figure FO-19). Both keel coolers are recessed into the hull. Each keel cooler is insulated from the hull with neoprene insulation. Integral expansion tanks are provided with engines. Filling of the cooling systems is made through the fill caps in the tanks. Fresh water can be supplied by hose from makeup connections in the Forward and Aft engine rooms. Vents are provided on all backup expansion tanks.

b. Valves on the cooling and return lines of each generator diesel engine allow use of the keel cooler or cooling coils in the ballast tanks to cool the circulating water for the diesel engine.

c. The coils in the ballast tank provide cooling for the generator engines. The ballast water temperature is 120°F (48.8°C). Isolation gate valves are installed in the cooling coil lines. These valves are open at all times except during repair periods.

1-67. **EXHAUST PIPING SYSTEMS.**

a. The Exhaust Piping Systems are shown in Figure 1-62 for the Forward Engine Room and Figure 1-65 for the Aft Engine Room.

b. In the Forward Engine Room the exhaust from both manifolds of the Main Propulsion Engine feeds a muffler. The output of the muffler is ducted to the aft exhaust on the forward exhaust stack on the Starboard side. The exhaust from the Generator Engine feeds a small muffler. The output of the muffler is ducted to the forward exhaust stack on Starboard side.

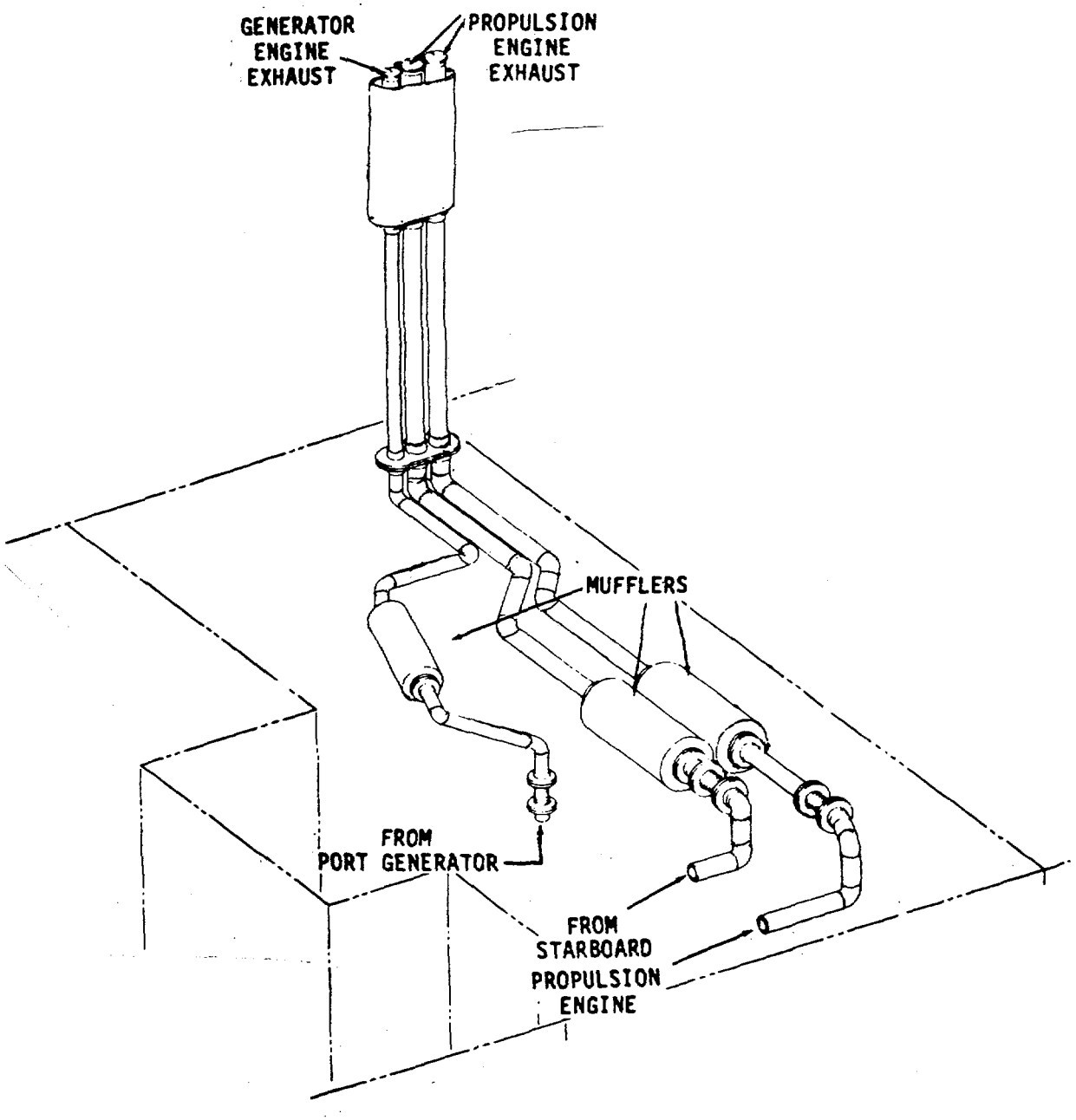



*Figure 1- 62. Diesel Engine Exhaust Piping/Forward Engine Room*

a. The Exhaust Piping System for the Aft Engine Room is shown in Figure 1-63 (Frame 56) and is similar to that in the Forward Engine Room, with the following exception: The exhaust stack is the Aft stack on the starboard side.

b. The exhaust from the Anchor Winch Engine feeds a muffler. The output of the muffler goes to a vent on the port side above the anchor winch compartment.

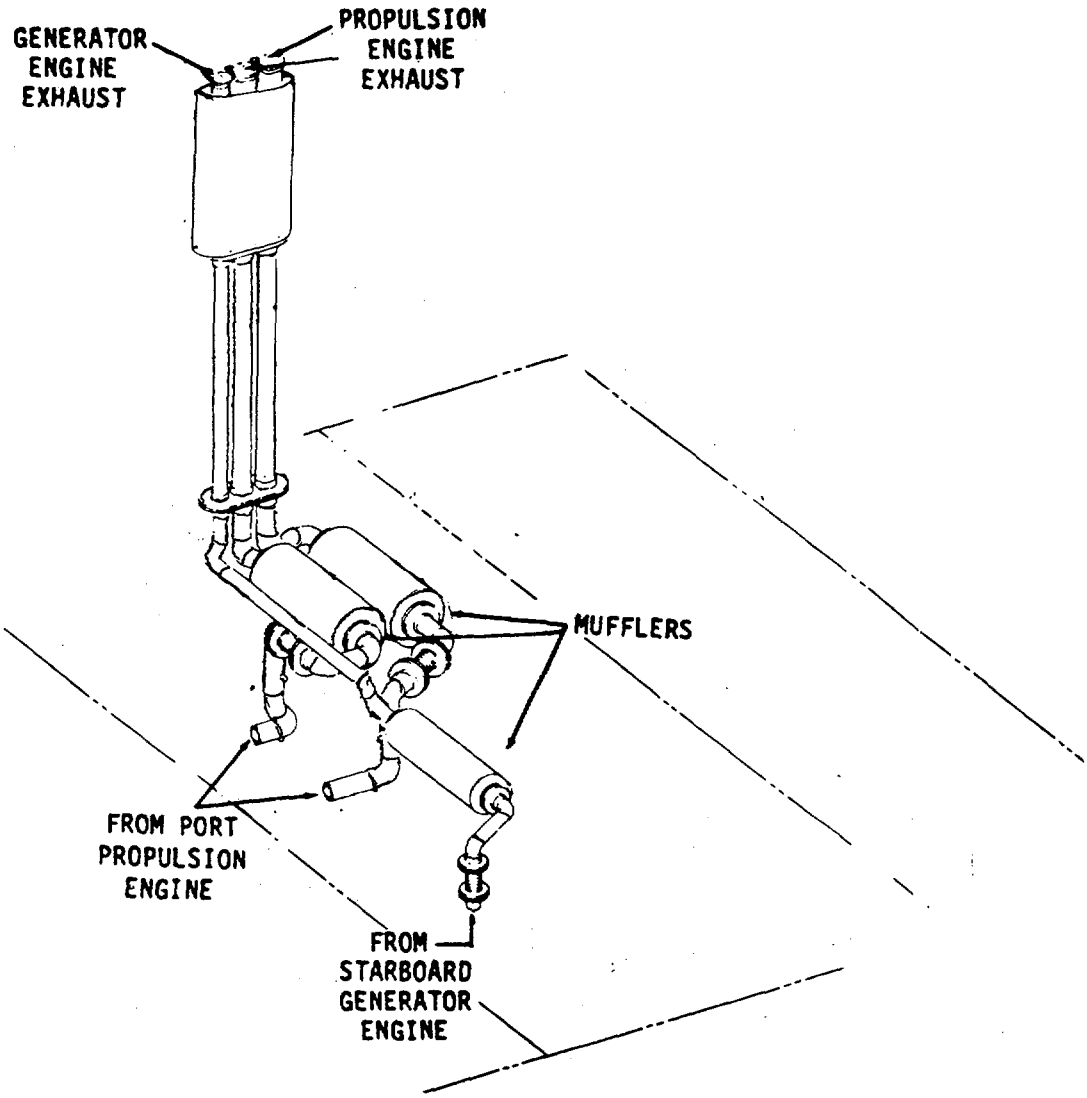



*Figure 1-63. Diesel Engine Exhaust Piping/Aft Engine Room*

1-68. **FUEL SYSTEM.**

a. The Fuel System (Figure FO-20) supplies diesel fuel oil from the two storage tanks to the Main Propulsion Engines, Anchor Winch Engine and Diesel Generator Engines. A Fuel Oil-Water Separator located between the fuel tanks will remove water from the diesel oil before it enters the supply line. The supply line is fitted with a valve, strainer and filter on each engine. Fuel return lines are fitted with check valves and lead from each engine to the storage tanks.

b. Valves are installed in the supply and return headers to return fuel to the tank. Suction is taken from the tank. These valves and the common control are located below the Forward Engine Room floor plate level, port, 6 inches (15.24 cm) off the ship's centerline.

c. Before fuel reaches the valve in the return header, it may be fed through a heat exchanger to cool the fuel (Figure FO-20). It may also be passed around the heat exchanger depending on the setting of three (3) valves. One valve is located in the bypass. The other two are located near the heat exchanger fuel input and discharge points, which are located port of centerline, under the floor plate. Cooling water is pumped by the diesel oil cooler sea water pump, from the fire sea chest through the heat exchanger. Then it is discharged on the port side. The pump is located about 2 feet (0.61 m) starboard of the centerline.

d. Shutoff valves are fitted at each tank suction. They are fitted with reach rods carried to deck boxes in the Engine Access Room, Starboard, 10 feet (3.05 m) of centerline. The wrench operating these valves is stowed against the Deckhouse bulkhead. These valves can also be operated from the Forward Engine Room.

e. Fills on each tank are carried to the main deck outboard of the port bulwark. The two (2) valves are attached to a common filling hose coupling of 2-1/2 inch size. Fill pipes are carried down to one foot (0.31 m) above the tank bottom.

f. Each fuel tank is provided with a vent. It is carried up to an inverted, screened vent check valve located outboard of the bulwarks. The port tank is vented port, and the starboard tank is vented starboard. Tank level indicating gauges for the fuel tanks are located in the Engine Access Room. Each fuel tank is also fitted with a sound pipe opening onto the main deck inboard of the bulwarks. The opening for the port tank is port and the opening for the starboard tank is starboard. Sounding tapes are stowed in the Aft Engine Room tool locker.

g. Each fuel tank is also provided with an 18 inch diameter drain-well and drain valve. Drain valves are located below engine room deck level at starboard, and port on the tanks. Drain valves are provided with a padlock and chains to secure in closed position.

h. An isolation valve is provided in the Forward Engine Room, port to shut off the fuel suction line to the Aft Engine Room and the anchor winch diesel engines.

1-69. **ENGINE LUBE OIL SYSTEM.**

The Lubrication Oil System (Figure. FO-21) consists of a lube oil storage tank, manually-operated transfer pump, distribution lines and service valves and hoses. Valves and hoses are provided in the distribution lines in both engine rooms and the anchor winch compartment. They service the main diesel engines, diesel generator set and anchor winch diesel engine. The tank is fitted with a fill, vent, drain and level gauge and is located in the forward engine room starboard. The tank fill pipe is located inboard of the deckhouse on the main deck.

1-70. **STAND-BY LUBE OIL PUMPS.**

Stand-by Lube Oil Pumps and related piping (Figure 1-64) are provided to lubricate the reduction gear bearings when trailing shaft. The Stand-by Lube Oil Pump for the starboard propulsion unit is located in the aft engine room starboard. The Stand-by Lube Oil Pump for the port propulsion unit is located in the forward engine room port.

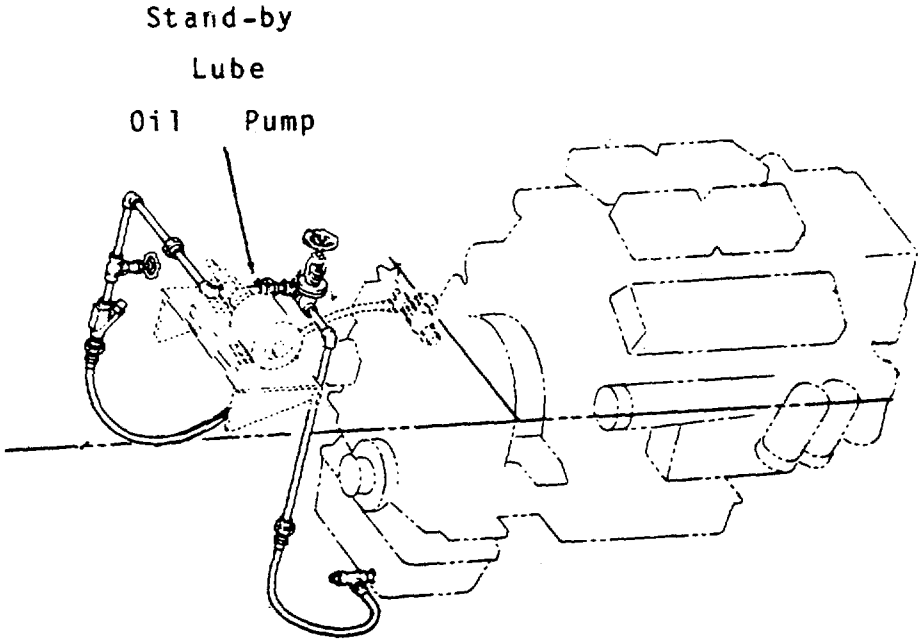



*Figure 1- 64. Stand-by Lube Oil Pump*

1-71. **FRESH WATER SYSTEM PIPING.**

a. The Fresh Water System (Figure FO-22) consists of a fresh water storage tank, pressure system, and an electric water heater. A 3/4 inch hose valve for fresh water service is located on the inboard side of the deckhouse at Frame 46.

b. The Fresh Water tank is located below decks on the centerline between Frames 40 and 44. Water from the tank is piped by the pressure system to the shower, lavatory, sink, clothes washer, drinking fountain, water heater and to the fresh water hose connections in the engine room. The tank is filled through a fill pipe and hose connection provided above the vehicle deck on the outboard port side at Frame 44-1/2. Fill hose stowage is located at Frame 40 inboard port bulwark. A tank vent is provided in the vehicle deck inside the deckhouse at Frame 41-1/2. The fresh water tank has a capacity of 4166.6 gallons (15766.4 1).

c. The Tank Suction Valve is provided in the bottom of the tank. It is located just forward of Frame 44, 2 feet (0.61 m) to port of centerline. A Y-strainer is also installed in this line. The height of water in the tank can be determined by reading the tank level indicating gauge in the engine access room; It can also be determined by opening the petcocks that are located at various heights on the aft side of the tank. A 1-inch suction pipe has been extended from the suction valve on the bottom of the tank, aft and outboard to port under the floor plates to the pressure system.

d. The Pressure System consists of an electric-driven pump unit, a pressure tank with sight gauge, a pressure switch for automatic control of the system, automatic air volume controls, hand air charging pump, and a Naval 50 gallon electric water heater. The pressure system is located below decks at Frame 49. Drains and relief valves are provided on the pressure system and hot water tank. A temperature gauge is also provided for the hot water tank. The pressure system has a designed pressure of 45 psi (3163.8 gm sq cm). The relief valve setting on the pressure tank is 50 psi (3515.4 gm sq cm). The relief valve on the hot water tank is set for 55 psi (3866.9 gm sq cm).

1-72. **DECK AND SANITARY DRAIN PIPING.**

The Drainage System (Figure 1-65) serves deck drains, galley sink, lavatories, shower, and clothes washer. Water drains toward the overboard discharge at Frame 45, Starboard. All drains work by gravity. Gagged scuppers are fitted at the overboard discharge. There are traps in the drains for the lavatories, galley sink and washer. Drains for the lavatories, washer and galley sink are vented, ending at Frame 48 inboard of the Deckhouse.

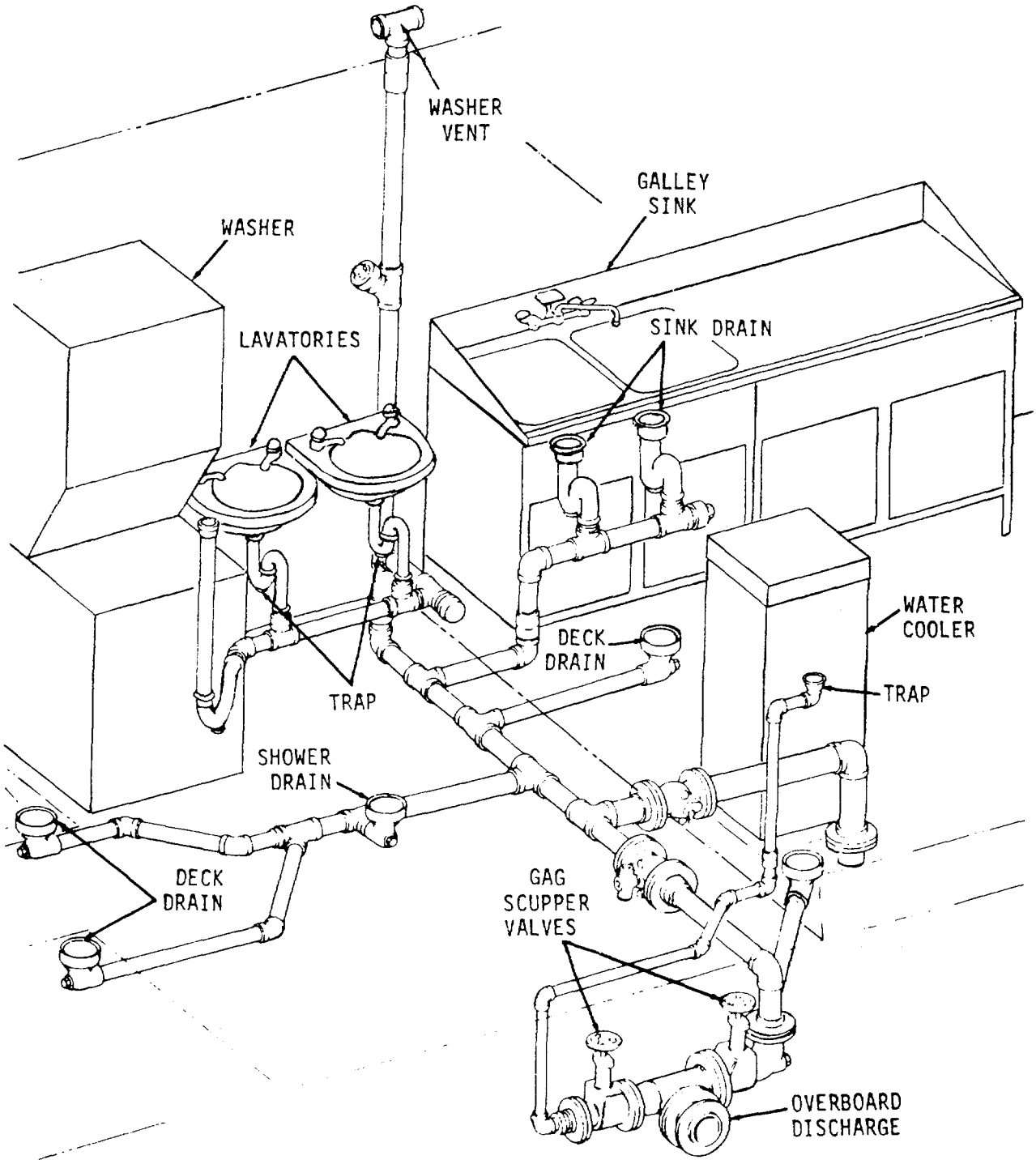



*Figure 1-65. Deck And Sanitary Drain Piping*

1-73. **SEWAGE SYSTEM PIPING.**

a. The Sewage System Piping (Figure FO-23) consists of one urinal, two water closets, one holding tank, one deck connection with valve for sewage discharge hose, two 4-inch overboard discharges with scuppers, two macerators, one three-way port valve, two sewage pumps, one air pump, and piping and fittings.

b. The holding tank is located at Frame 42, Starboard. The tank has connectors for sewage-in, sewage discharge and vents. It is also equipped with a switch, located at the 90% full mark which sets off an audible alarm in the Pilothouse when tripped.

c. The holding tank is vented at Frame 43-1/2, Starboard with a single 2-inch line to the outside air. The Sewage Drainage System is also vented by a 2-inch line to weather located at Frame 44, Starboard.

d. A three-way port valve is installed in the system just after the two macerators. The valve allows waste to be routed to the holding tank, or directly overboard when full.

e. A 2-inch deck discharge connection is provided at Frame 42, Port. This connection is fitted with a 2-inch cam lock for securing a sewage discharge hose. A 2-inch ball valve is also provided.

f. Two sewage pumps are set in parallel for discharging sewage. They are located approximately 2-feet 8-inches (0.81 m) Starboard of ship centerline, at Frames 41 and 43. Each of these pumps, along with local controls, is provided with two remote switches.

g. The System is also equipped with a sewage tank air pump. It is located at Frame 41, starboard. It is controlled by a local switch which is left in the "AUTO" position while the craft is in operation. The system will work automatically only when needed.

h. The Shipboard Collection Disposal System consists of four main assemblies; water closets, urinal, discharge valve and collection tank, and piping which uses vacuum or differential pressure to move the flushed 'black-water' to the collection tank. A control panel located on the collection tank assembly provides for semi-automatic operation of the collection system.

i. Vacuum pumps empty the collection tank and influent lines to the water closets and urinal discharge valve. When the water closet valve is started and opened, the sewage is pushed through the influent line or piping to the collection tank. Liquid level sensors control the level indicator lights. Hand operated valves are located throughout the system to direct flow for various methods of operation. They also are used to isolate components requiring servicing or maintenance. In an emergency, the tank can be emptied by air pressure applied at the tank top.

1-74. **FIRE SYSTEM PIPING.**

a. The Fire Pump (Figure FO-24) supplies sea water to the fire stations, magazine sprinkler system, and the washdown countermeasure system. It is also used to fill and empty the ballast tanks. During an emergency the Fire Pump will supply motive water to the bilge eductor to drain the bilge if the bilge pump is not working. Discharge lines are sized for a minimum pressure of 85 psi (5976.1 gm sq cm) at the highest fire plug strainer at a flow rate of 95 gpm (359.6 lpm).

b. The Fire Pump is supplied by the sea chest valve at Starboard side or by the cross connection with the ballast system. The pump takes suction through a single basket strainer. The Fire Pump discharges into the firemain, the overboard discharge, the pump bleedline overboard, the eductor actuating supply, or the ballast filling line. Valves for all these services are located near the vessel's centerline at the aft bulkhead of the Aft Engine Room. The Fire Pump bleed line overboard must be open before starting pump. A check valve is installed in the fire pump discharge line to prevent back flow. Shutoff valves are also provided for the fire stations.

1-75. **BILGE SYSTEM PIPING.**

The Bilge System Piping (Figure FO-25) consists of the bilge pump box strainers, valves and piping serving the main machinery spaces. The Bilge Pump is driven by a belt drive on the port propulsion engine. All water removed from the bilge is fed into the Oil/Water Separator System. Hose valves are installed in each engine room at Frames 50 and 56. They are used with suction hoses to remove pockets of water from the bilges. In an emergency when the port propulsion engine must be shut down, the bilge can be drained using the bilge eductor. The eductor requires motive water at 90 psig (6327.6 gm sq cm) from the Fire Pump to operate.

1-76. **BALLAST SYSTEM PIPING.**

The Ballast System (Figure FO-26) consists of piping and valves serving the aft ballast tank, the forward port and starboard ballast tanks, and the peak ballast tank. When the ballast tanks are being filled, the same piping system is used with sea water flowing in the opposite direction. Tank level indicators for the ballast tanks are located on the aft bulkhead, in the aft engine room, beside the fire pump controller. The forward port and starboard ballast tanks and peak ballast tank valves can be operated remotely by the handwheels located in the crew berthing at Frame 33. Additionally, the peak ballast tank can be filled with a hose from the deck plug at Frame 11-i. The portable fire pump may be used to drain the peak ballast tank.

1-77. **FLUSHING SYSTEM PIPING.**

The Flushing System Piping (Figure 1-66) serves the two water closets and the urinal in the Deckhouse. The System consists of an electric motor-driven pump and a pressure storage tank located at Frame 49 in the Forward Engine Room. The tank is fitted with a relief valve, air charging connections, a pressure switch for motor control, a pressure gauge and a 1/2-inch drain. There is a shutoff valve installed in the line to the water closets.

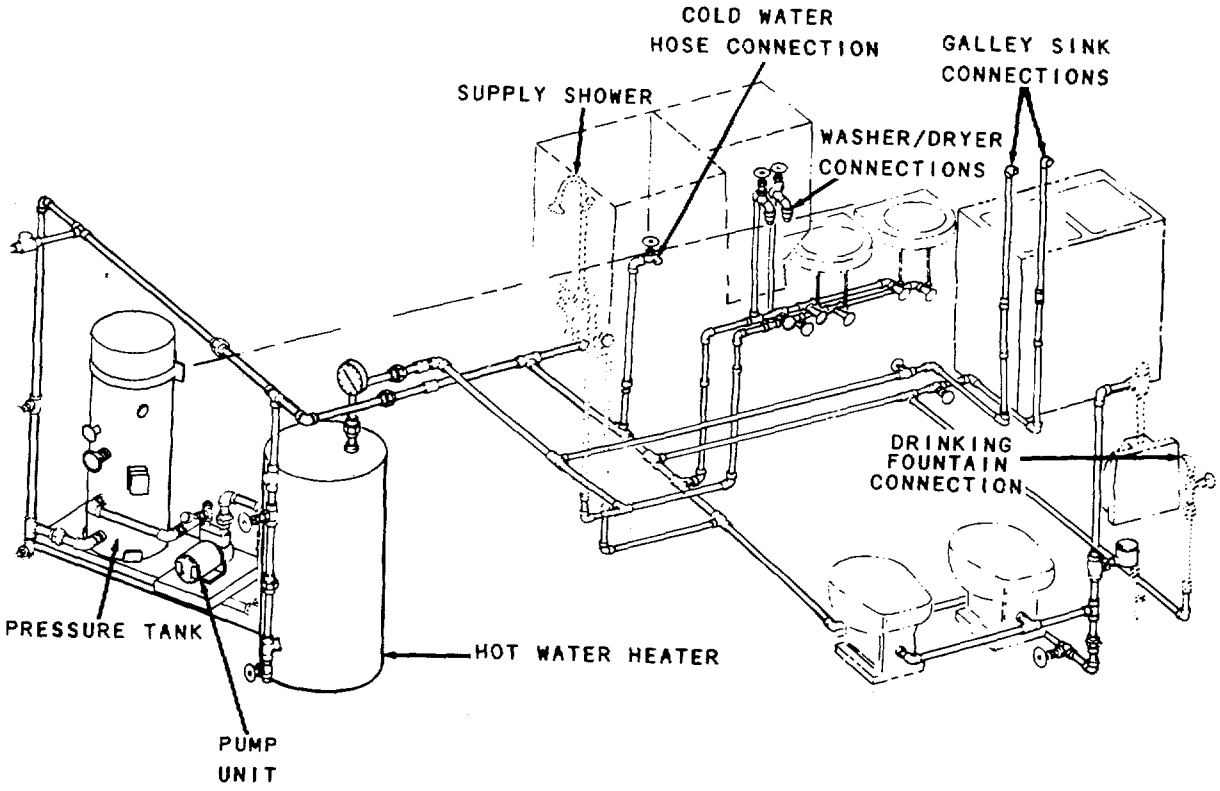



*Figure 1-66. Flushing System Piping*

1-78. **OIL/WATER SEPARATION SYSTEM PIPING.**

The Oil/Water Separation System Piping (Figure 1-67) is designed to separate and remove non-soluble oil, solids, and air from an oily water solution. Oily water is directed through filters. The filters provide a surface where very small droplets of non-soluble oil in the water attach and combine with other oil droplets. When the droplets grow large enough, they are forced off the outside of the filter and are separated from the water. Refer to Oil/Water Separator TM 55-2090-201-14 & P.

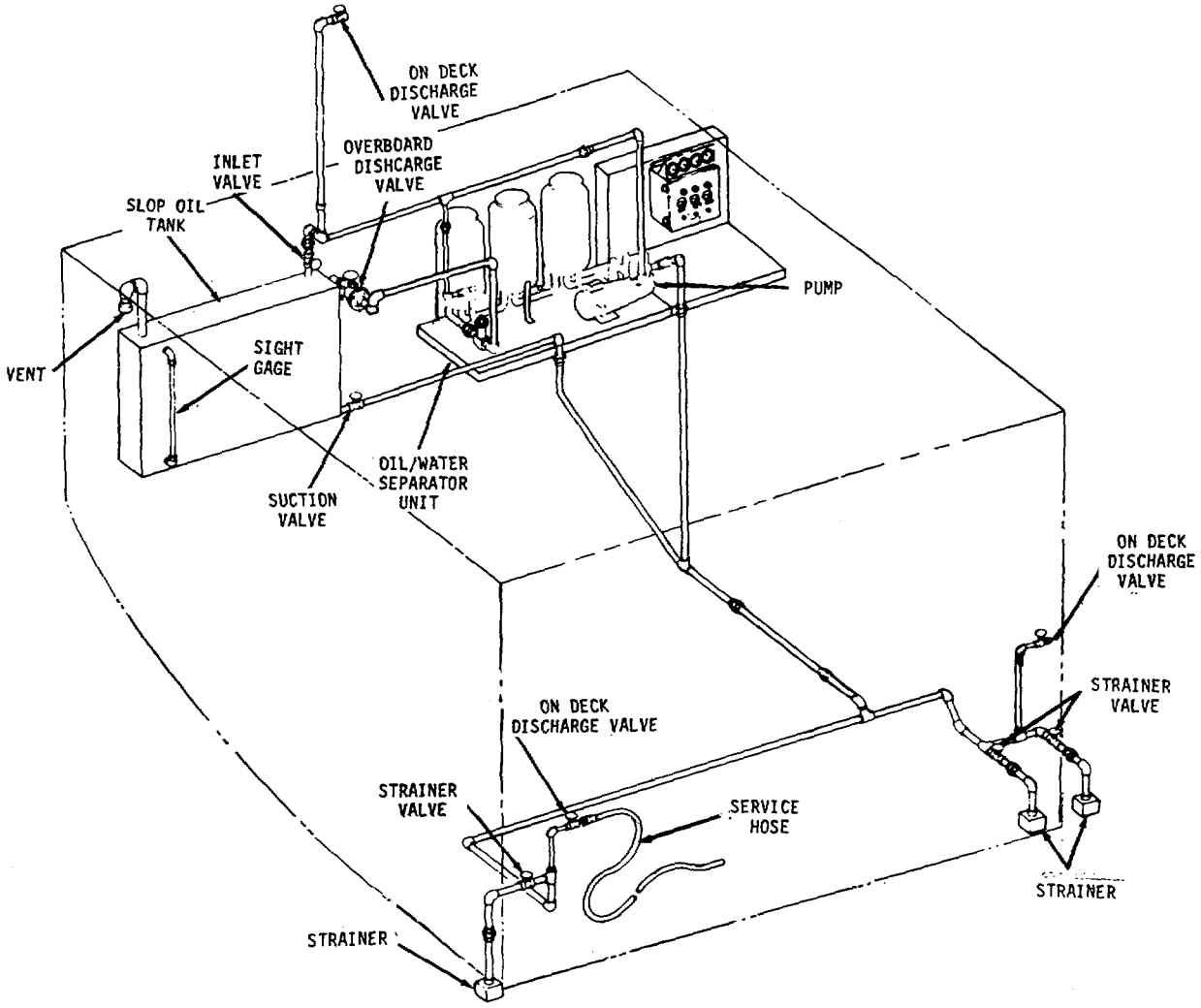



*Figure 1-67. Oil/Water Separation System Piping*

1-79. **HEATING, VENTILATION AND AIR CONDITIONING SYSTEMS (HVAC).**

a. The Air Conditioning System (Figure FO-27) consists of-a single air conditioning plant and suitable duct work serving the Crew's Berthing, Stateroom, Pilot House and Galley Mess.

b. The Air Conditioning Plant consists of a condensing unit assembly, a heat exchanger, an air conditioning cooling coil and a gauge board. It is located below deck at Frame 30 Starboard.

c. The Condensing Unit Assembly consists of a compressor unit, condenser unit, receiver and associated valves and controls. This unit is designed for automatic operation to supply refrigerant to the cooling coil. The condenser has an operating capacity of 7.8 tons and requires a refrigerant charge of approximately 70 pounds (31.8 kg).

d. The Compressor is a reciprocating type, positive displacement pump. The compressor removes refrigerant gas from the evaporator and delivers it to the condenser under pressure. The pressure allows refrigerant heat to be absorbed by sea water at ordinary temperatures.

e. The Condenser is a shell and sea water tube heat exchanger. It condenses the compressed refrigerant gas and lowers the temperature by removing heat.

f. The Receiver receives liquid refrigerant that drains from the condenser. It serves as a liquid refrigerant reservoir when there are load changes in the system, and as a storage space when pumping down the system. It also serves as a liquid seal against the entrance of refrigerant gas into the liquid line.

g. Receivers are provided with two bull's-eye sight glasses or with a magnetic, gauge type, liquid level indicator for the observation of liquid level in the receiver. To keep a liquid seal, there should always be a minimum liquid level in the receiver when the system is in operation. During shutdown, the refrigerant charge is pumped into the receiver so that only gas stays in the rest of the system.

h. The Evaporator is the part of the system where the refrigerant is vaporized to produce refrigeration. The compressor keeps a reduced refrigerant pressure within the coils. At this reduced pressure the liquid refrigerant evaporates or boils at a temperature low enough to absorb heat from the air, fresh water or brine in contact with the outside of the coils.

i. The Heat Interchanger is a shell and tube heat exchanger connected in the main suction and liquid lines near the compressor. Inside the Interchanger, the cold suction gas is used to cool the warm liquid refrigerant. This causes greater capacity and efficiency in the system. A liquid line bypass valve is usually provided to isolate the interchanger in case a liquid leak develops in the suction line or the compressor discharge gas temperature rises above 240°F (115.6°C).

1-79. **HEATING, VENTILATING AND AIR CONDITIONING SYSTEM (HVAC) (Cont)**

j. The Dryer is installed in the main liquid line or in a bypass. It is a cylinder containing renewable cartridges filled with activated alumina or silica gel. The dryer is used to keep the system free of moisture.

k. The Dryer continues working at all times after it has been installed in the main liquid line when installed in a bypass, it is used when charging refrigerant or for freeing the system of moisture. If the system is properly purged and dehydrated when first installed, and operated carefully, the dryer will only be used when drying.

l. Some Dryers come with a "dry-eye" or moisture indicator. It consists of a paper disc visible through a sight glass. The paper disc changes in color from blue to pink. A blue color indicates there is an acceptable level of moisture in the refrigerant. A pink color indicates too much moisture and the cartridges should be replaced with dryer ones.

m. Fresh air is taken in through air intakes at Frame 33 at the deckhouse and passes over the cooling coils. A circulation fan moves the cooled air to the Pilot House, Galley Mess, Crew's Berthing and Stateroom. Condensation from the cooling coil drains to the bilge.

n. The Sea Water Cooling Pump circulates water through the condenser and out the overboard discharge.

o. The control for the Air Conditioning System is located in the air conditioning room on the Forward side of Bulkhead 33, above the air conditioning condenser.

1-80. **CENTRALIZED HYDRAULIC SYSTEM.**

a. A Centralized Hydraulic System (Figure FO-28) consists of a pump, controls, hydraulic cylinders, and an hydraulic motor. These components raise and lower the following:

- Main Mast
- Stern Gate
- Anchor "A" Frame

Refer to Figure 1-68 for a block diagram.

b. The hydraulic pump unit is a centralized power source for the main mast, anchor "A" Frame winch, and stern gate. The pump unit is a 3-phase, 3-horsepower electric motor and pump.

(1) The main mast directional control valve is a manually operated valve which controls the hydraulic fluid flow to the main mast cylinder by depressing the valve lever.

(2) The main mast cylinder is an hydraulic cylinder used to raise and lower the main mast by depressing the valve lever.

(3) The Anchor "A" Frame directional control valve is a manually operated valve which controls the hydraulic fluid flow to the "A" Frame winch by depressing the lever.

(4) The "A" Frame hydraulic winch and winch drum are used to swing out the anchor "A" Frame for raising and lowering the anchor. The winch drum holds the anchor cable.

(5) The Stern Gate directional control valve is a manually operated valve which controls the hydraulic fluid flow to the two Stern Gate cylinders by depressing the lever. There is one control valve located on the Starboard bulwark.

(6) The Inline Flow control valves are hydraulic lines coming from the control valve lines directly to the Stern Gate cylinders.

(7) The Stern Gate cylinders are hydraulic cylinders used to raise and lower the Stern Gate.

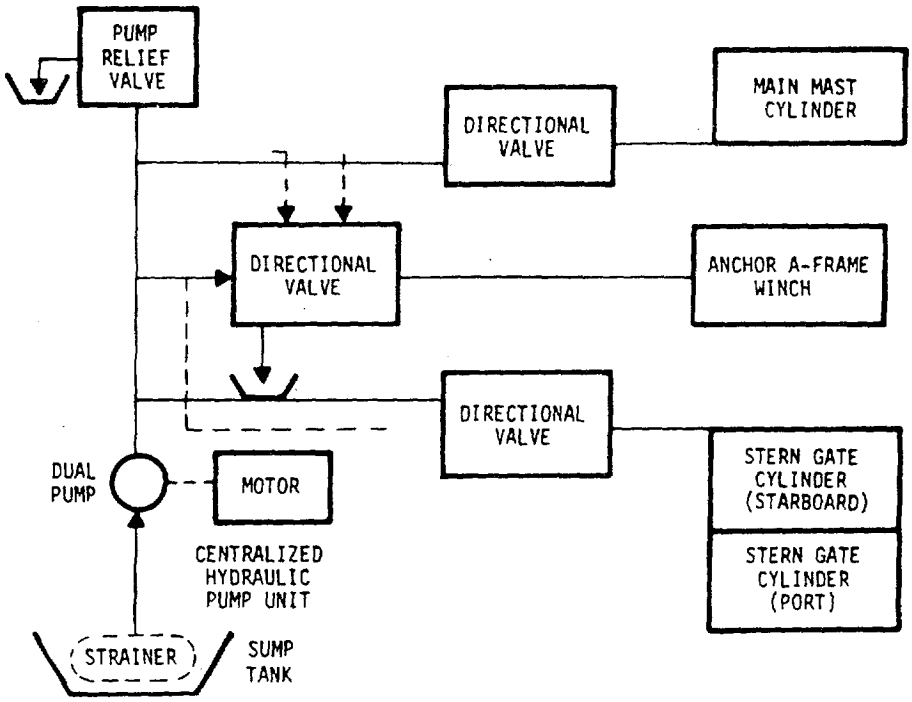



*Figure 1-68. Centralized Hydraulic System (Block Diagram)*

1-81. **HALON SYSTEM**

a. The fixed Halon Fire Extinguishing System (figure FO-16, Halon System) is located in the forward and aft engine rooms and the flammable liquid storeroom. Modes of operation are automatic, manual, and remote manual.

(1) When there is a fire in either of the engine rooms, the amber lights flash and the horns sound to warn occupants to clear the room immediately. An amber light will appear on the fire alarm panel in the pilothouse showing location of fire, and if the audible alarm is set in the ON position, the pilothouse warning horn will sound. The Halon Extinguisher will activate and put out the fire. These events will take place in the engine rooms whether the system operates in the automatic, manual, or remote manual mode.

(2) If a fire occurs in the flammable liquids storeroom, the Halon Extinguisher will activate whether in the automatic, manual, or remote manual mode. There is no electrical tie-in with the fire alarm panel in the pilothouse or the engine rooms.

b. The following illustration depicts the Halon System in the automatic mode as it would operate if detecting a fire in either of the engine rooms:

(1) Heat sensor (1) senses fire.

(2) Heated air expands and rushes down tube to control head (2).

(3) Air trips lever in control head (2) that activates the cylinder valve (3).

1-81. **HALON SYSTEM (Cont'd).**

(4) Activated valve (3) causes Halon in cylinder (4) to discharge.

(5) Discharged Halon travels through cylinder valve into pipe (5) and to pressure accumulator (6). (Pressure accumulator serves as a delay device, allowing personnel 30 seconds to escape from room.)

(6) The Halon also enters pipe to pressure switch box (8), forcing contacts to close, thereby activating the amber light (9), horn (10), and shuts off the fan (11). Discharge indicator (13) registers Halon discharge, and the pressure gauge (14) registers the pressure of Halon in the cylinder (4).

(7) After fill-up in accumulator, Halon travels to nozzle (7) and empties.

(8) Manually close air intake louver covers to engine rooms, located on port side of main deck house.

c. The fire alarm panel in pilothouse operates as follows (Figure 2-15, Fire Alarm Panel).

(1) If a fire occurs in the aft engine room, amber light (1) will light.

(2) If a fire occurs in the forward engine room, amber light (2) will light.

(3) If audible alarm switch (3) is in the ON position, pilothouse horn will sound.

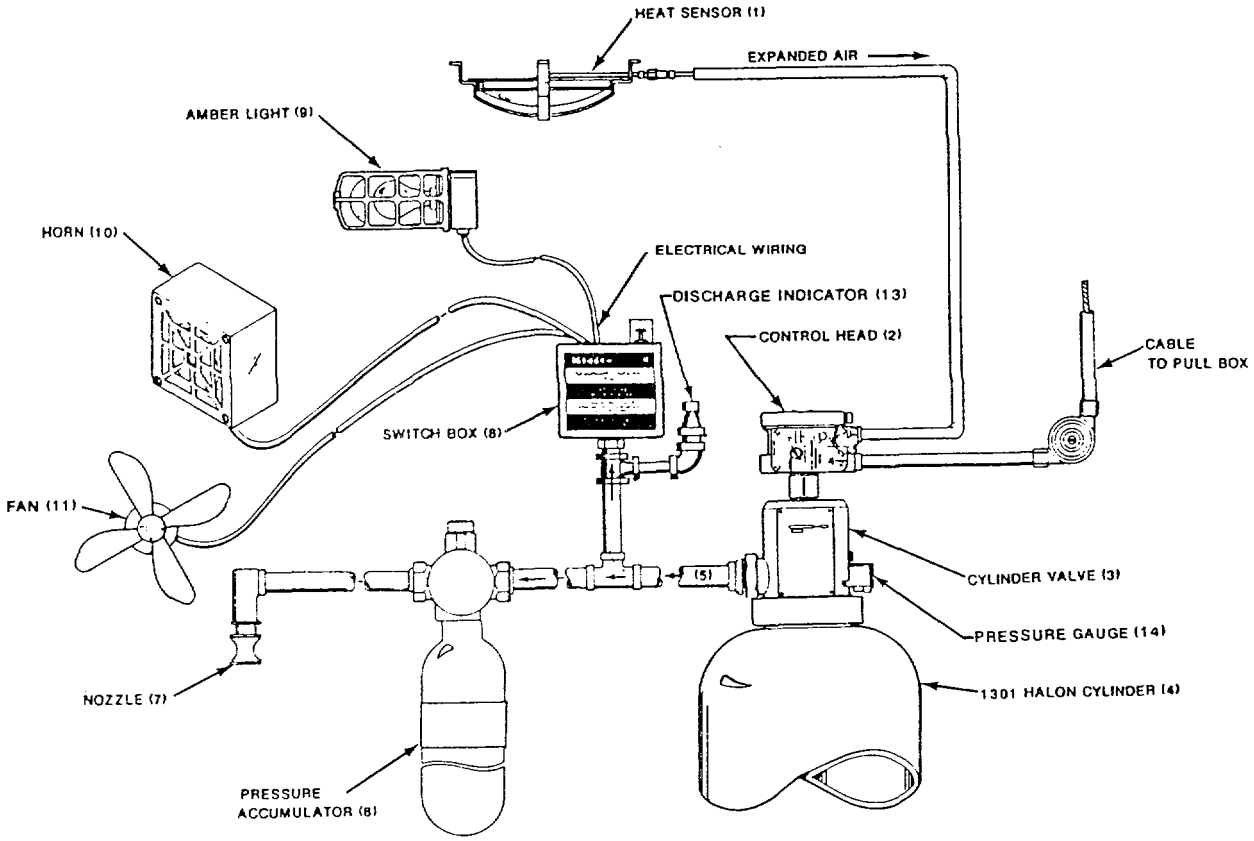



*Figure 1-68.1. Fixed Halon Fire Extinguishing System*

1-82. **TANK LEVEL INDICATING SYSTEM.**

a. The Tank Level Indicating System provides a way of determining the level of fluids stored in shipboard fluid tanks. The fluid level is indicated on meters contained in system components found throughout the ship. Electrical signals representing the fluid level that has been determined can also be examined to determine whether the fluid level falls. within already set values in the associated tanks. If the fluid level falls below or rises above these values, audible and visual signal alarm indications can be found at system components or at other shipboard locations.

b. Tank Level Indicating System Components can be divided into four general categories: Fluid level detection devices, receiver devices, remote alarm and fluid level indicating devices, and installation accessories.

c. Fluid Level Detection Devices are installed in the fluid tanks of the ship. They serve as transducers that convert the fluid level in the tank to an electrical signal. Cable assemblies associated with the fluid level detection devices connect transmitters to the ships' wiring and then to the receivers.

d. The Transmitter is a cylindrical float assembly located on a stainless steel tube that is free to move up and down within limits established by pairs of brackets.

e. The receiver modules are mounted in the Engine Access Room and Aft engine Room. The Engine Access Room receivers show the levels in the two fuel tanks and the fresh water tank. The Aft Engine Room receivers show the levels in the sea water ballast tanks. The receiver module has the operating controls meter and alarm indicators. The alarm indicators are for high level and low level. The receiver modules are mounted in a panel that contains the circuits common to all receiver modules. The panel also contains an audible alarm.

1-83. **INTERIOR COMMUNICATION EQUIPMENT.**

a. All Interior Communication circuits requiring 115 volt AC power are fed from IC Panel L-107, located on the Starboard bulkhead of the Pilot House. The 24 volt DC circuits are fed from Panel P-24.

b. Operational procedures of the various Interior Communications Systems include little more than powering the circuits. The ship's Interior Communication Systems include the following circuits:

CIRCUIT 1JV - Sound powered telephone system, string type maneuvering and docking circuit.

CIRCUIT E - E call bell circuit for sound powered telephone stations.

CIRCUIT ECW3 - Low lube oil pressure and high water temperature alarm for Port (Forward) Main Propulsion unit.

CIRCUIT ECW6 - Low lube oil pressure and high water temperature alarm for Starboard (Aft) Main Propulsion unit.

CIRCUIT ECW5 - Low lube oil pressure and high water temperature alarm for Port (Aft) generator diesel engine.

CIRCUIT ECW4 - Low lube oil pressure and high water temperature alarm for Starboard (Forward) generator diesel engine.

CIRCUIT F - High temperature magazine alarm.

CIRCUIT FH - Magazine sprinkling alarm.

CIRCUIT FR - Fixed Halon fire detection and extinguishing system.

CIRCUIT NH - Navigation Horn Operating System.

CIRCUIT KM - Propulsion Engine Revolution Indicator System.

CIRCUIT LC - Gyro Compass System.

CIRCUIT 1N - Rudder Angle Indicator System.

CIRCUIT 5T - Sewage tank high level alarm.

CIRCUIT 5U - Cease Fire Signaling System.

CIRCUIT TL - Tank Level Indicating System.

CIRCUIT RMHS - Remote Magnetic Heading System.

CIRCUIT SE - Ships' Entertainment System.

1-83. **INTERIOR COMMUNICATION EQUIPMENT (Cont).**

a. Ten sound-powered telephone headsets are provided. Nine sound-powered telephone handsets are provided. Headsets and handsets comply with Military Specification MIL-T-15514. Jackboxes are type G15A. Sound powered telephone handset holders Type Z-33B are provided for the headset in the Pilot House. Headset lockers are provided for all other headsets.

b. Each machine gun station is provided with a Type 1C/H8S4 horn for cease fire signaling. The horns are powered by the cease fire switch located in the Pilot House on the Starboard bulkhead. The power supply is 120 volt AC single phase from the IC distribution panel L-107.

c. The Type IC/S alarm system monitors a number of shipboard functions. In case of a malfunction it sounds an audible alarm. The major components of the alarm system are an alarm panel, the sensing devices, and wiring and junction boxes. The alarm panel is located in the Pilot House next to the chart table. The sensing devices are installed at a location where they can monitor a specific function. Power is supplied to the alarm panel from distribution Panel L-107. The sensing devices are connected to a junction box in the Forward Engine Room. These circuits and the other sensing devices are connected to the alarm panel through a junction box in the Ordnance Stores. The circuit breaker for the gyrocompass circuit is connected to the alarm panel.

d. The Type AN/PIC-2 Public Address Set is a portable battery-powered megaphone with external power cable and case. The unit uses its own dry cells. It may also use an external 12-volt battery using the external power cable. The megaphone is powered by pressing the trigger switch on the pistol grip handle.

1-84. **NAVIGATION SYSTEMS.**

a. The Mark 27 Gym Compass at the helm contains a gyroscope. It is controlled to seek true North using properties of the gyroscope along with rotation of the Earth and the effect of gravity. The Mark 27 is different from other gyro compasses because the gimbal system used reduces the complexity of the equipment.

b. The Type B, Mark 2, Mod. 2 ship's Course Indicator is mounted on a pelorus stand and gimbal round. It is located at the conning station atop the Deckhouse.

c. The Remote Magnetic Heading System consists of an induction compass transmitter, a heading indicator and connecting wiring. The Transmitter is mounted on the top of the mast and detects the relative bearing of the Earth's magnetic field. This signal is fed to the heading indicator for a visual display. The indicator is mounted on the helm console in the Pilot House. Power for the system is taken form the 24 volt DC Panel P-24.

1-85. **COMMUNICATION SYSTEMS.**

a. The vessel uses communications systems located in the Pilot House. They are Transceiver AN/URC-46, Radio Set AN/URC-80, Receive R-442, Marine VHF Transceiver DSC 500, and hand-held Portable Radios EPH/EPI.

b. The ship contains Identification Friend or Foe (IFF) equipment. The equipment consists of control C-6280/ APX-72, Receiver/Transmitter RT-859/APX-72, Mounting Assembly DL-SC-B691474, and Antenna AS-177A/UPX. Preparation is made for future installation of voice security kit, 1 A/T SEC. Power input is from the distribution panel in the Pilot House. IFF equipment is installed in the Pilot House's electronics rack, except for the AS-177/UPX antenna which is located on the Main Mast.

c. The Ship's Radar System is an AN/SPS-69 (7H422) Model R41X. It consists of Antenna, Indicator, and Sweep Amplifier. The antenna is mounted on a radar mast at the forward end o the Deckhouse. The antenna is cabled into the Pilot House where the other pieces are located. The radar power supply is 24 volts DC obtained from the 24 vol DC distribution panel.

1-86. **HYDRAULIC STARTING SYSTEM.**

The Ships Hydraulic Starting System consists of the following:

| DESCRIPTION | PARAGRAPH NUMBER |
|---|---|
| Anchor Winch Compartment | 1-87 |
| Diesel Generator and Propulsion Engine | 1-88 |

1-87. **HYDRAULIC STARING SYSTEM - ANCHOR WINCH COMPARTMENT.**

The Anchor Winch Compartment (Figure 1-69) contains a hydraulic starting system for the Anchor Winch Engine. The hydraulic starting system is used for cranking internal combustion engines. The system is automatically recharged after each engine start. It can also be manually recharged in an emergency. The ability to start does not decrease after sitting for a long time. Hot or cold climates do not have any harmful effects upon the hydraulic starting system.

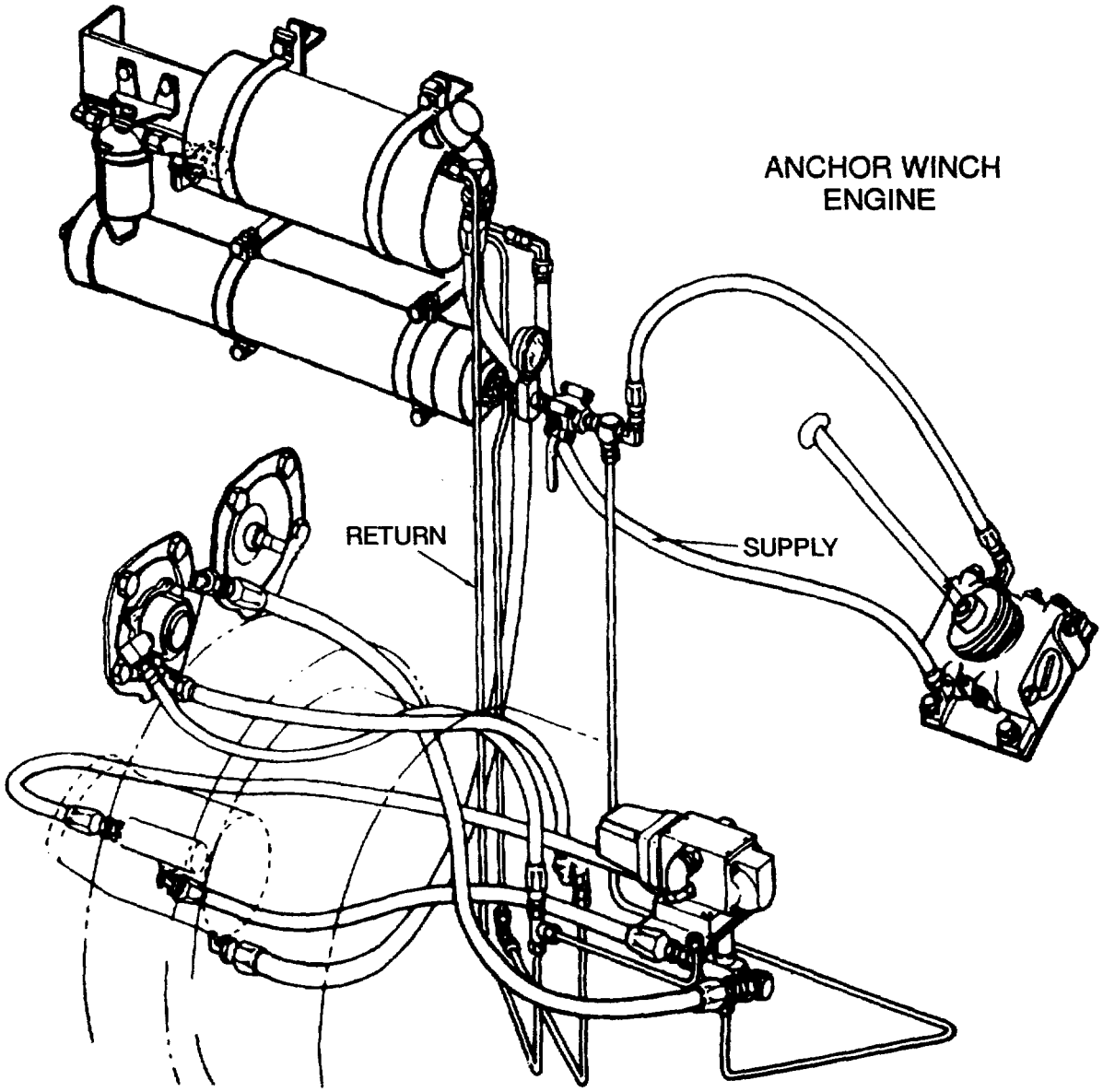



*Figure 1-69. Hydraulic Starting System - Anchor Winch Compartment*

1-87. **HYDRAULIC STARTING SYSTEM - ANCHOR WINCH COMPARTMENT (Cont)**

a. The Hydraulic Starting System (Figure 1-70) consists of a reservoir, an engine-driven charging pump mounted on the anchor winch engine, and a hand pump with pressure gauge. It also consists of two piston-type accumulators with pressure gauges, a starting motor, high and low pressure filters, and connecting hoses and fittings.

b. Hydraulic fluid flows by gravity or slight vacuum from the reservoir to engine-driven pump inlets or the hand pump inlet. The hand pump supplies the initial charge or recharges the system. The fluid is discharged from the pump outlet at a high pressure and flows into the accumulator. There it is stored at 3250 psi (228497.8 gm sq cm) under the pressure of compressed nitrogen gas. When the starter is engaged and the control valve is opened, the expanding nitrogen gas forces the fluid out of the accumulator at a high pressure. It then flows into the starting motor which quickly speeds up the engine to a high cranking speed. The fluid returns from the starter to the reservoir.

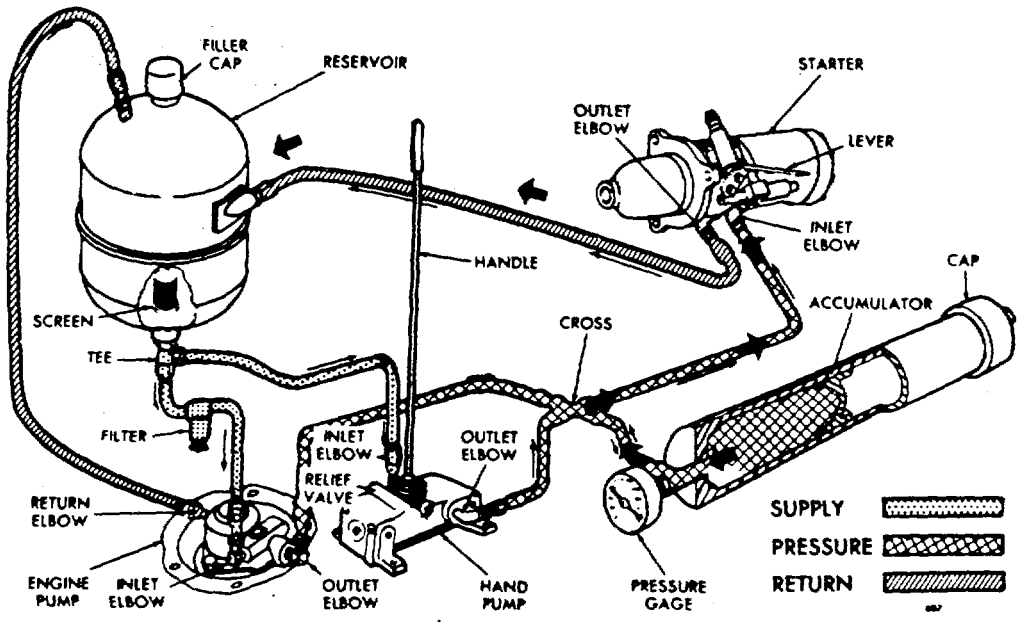



*Figure 1-70. Hydraulic Starting System,*

1-87. **HYDRAULIC STARTING SYSTEM - ANCHOR WINCH COMPARTMENT (Cont)**

a. The charging pump runs all during engine operation, recharging the accumulator with fluid. A pressure operated unloading valve in the pump opens and returns the pump discharge to the reservoir when the proper amount of fluid has been returned to the accumulator.

b. The reservoir is a steel tank with a fine mesh screen at the outlet. The filler cap contains a filter to stop dust and dirt from entering the reservoir.

c. The engine-driven charging pump is a single piston, positive displacement type. It should run at approximately engine speed. The pump contains ball check valves and an unloading valve operated by the accumulator pressure. The operation is completely automatic and operates in either direction of rotation.

d. The hand pump is a single piston, double-acting, positive displacement type. Flow through the pump is controlled by ball check valves. A manually operated relief valve is provided so the accumulator pressure may be relieved when any servicing is required.

e. The piston-type accumulator is precharged with nitrogen through a small valve. A seal ring between the piston and the shell prevents the loss of gas into the hydraulic system. The accumulator is supplied with the proper precharge.

f. The starter mounts on the flywheel housing. It has a pinion gear with an overrunning clutch for engaging the flywheel ring gear. Movement of the starter control lever engages the pinion and opens the control valve. The motor is a multi-piston, swash plate type.

## 1-88. HYDRAULIC STARTING SYSTEM-DIESEL GENERATOR AND PROPULSION ENGINE.

a. Each of the Forward and Aft Engine Rooms (Figures FO-29 and FO-30) contains one Hydraulic Starting System for the Main Propulsion Engine and Diesel Generator located in that room. The Hydraulic Starting System is used for cranking internal combustion engines. The system is automatically recharged after each engine start. It can also be manually recharged in an emergency. The ability to start does not decrease after sitting a long time. Hot or cold climates do not have any harmful effects upon the hydraulic starting system.

b. The Hydraulic Starting System (Figure 1-70) consists of a reservoir, an engine-driven charging pump mounted on the Propulsion Engine and Diesel Generator and a hand pump with pressure gauge. It also consists of two piston-type accumulators with pressure gauges, a starting motor, high and low pressure filters, and connecting hoses and fittings.

c. Hydraulic fluid flows by gravity or slight vacuum from the reservoir to engine-driven pump inlet or the hand pump inlet. The hand pump is to supply the initial charge or to recharge the system. The fluid is discharged from the pump outlet at a high pressure and flows into the accumulator. There it is stored at 3250 psi (228497.8 gm sq cm) under the pressure of compressed nitrogen gas. When the starter is engaged and the control valve is opened, the expanding nitrogen gas forces the fluid out of the accumulator at a high pressure. It then flows into the starting motor which quickly speeds up the engine to a high cranking speed. The fluid returns from the starter to the reservoir.

d. The charging pump runs all during engine operation, recharging the accumulator with fluid. A pressure operated unloading valve in the pump opens and returns the pump discharge to the reservoir when the proper amount of fluid has been returned to the accumulator.

e. The reservoir is a steel tank with a fine mesh screen at the outlet. The filler cap contains a filter to stop dust and dirt from entering the reservoir.

f. The engine-driven charging pump is a single piston, positive displacement type. It should run at approximately engine speed. The pump contains ball check valves and an unloading valve operated by the accumulator pressure. The operation is completely automatic and operates in either direction of rotation.

g. The hand pump is a single piston, double-acting, positive displacement type. Flow through the pump is controlled by ball check valves. A manually operated relief valve is provided so the accumulator pressure may be relieved when any servicing is required.

1-88. **HYDRAULIC STARTING SYSTEM-DIESEL GENERATOR AND PROPULSION ENGINE (Cont).**

h. The piston-type accumulator is precharged with nitrogen through a small valve. A seal ring between the piston and the shell prevents the loss of gas into the hydraulic system. The accumulator is supplied with the proper precharge.

i. The starter mounts on the flywheel housing. It has a pinion gear with an overrunning clutch for engaging the flywheel ring gear. Movement of the starter control lever engages the pinion and opens the control valve. The motor is a multi-piston, swash plate type.

# CHAPTER 2

# OPERATING INSTRUCTIONS

## SECTION I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

2-1. **GENERAL.**

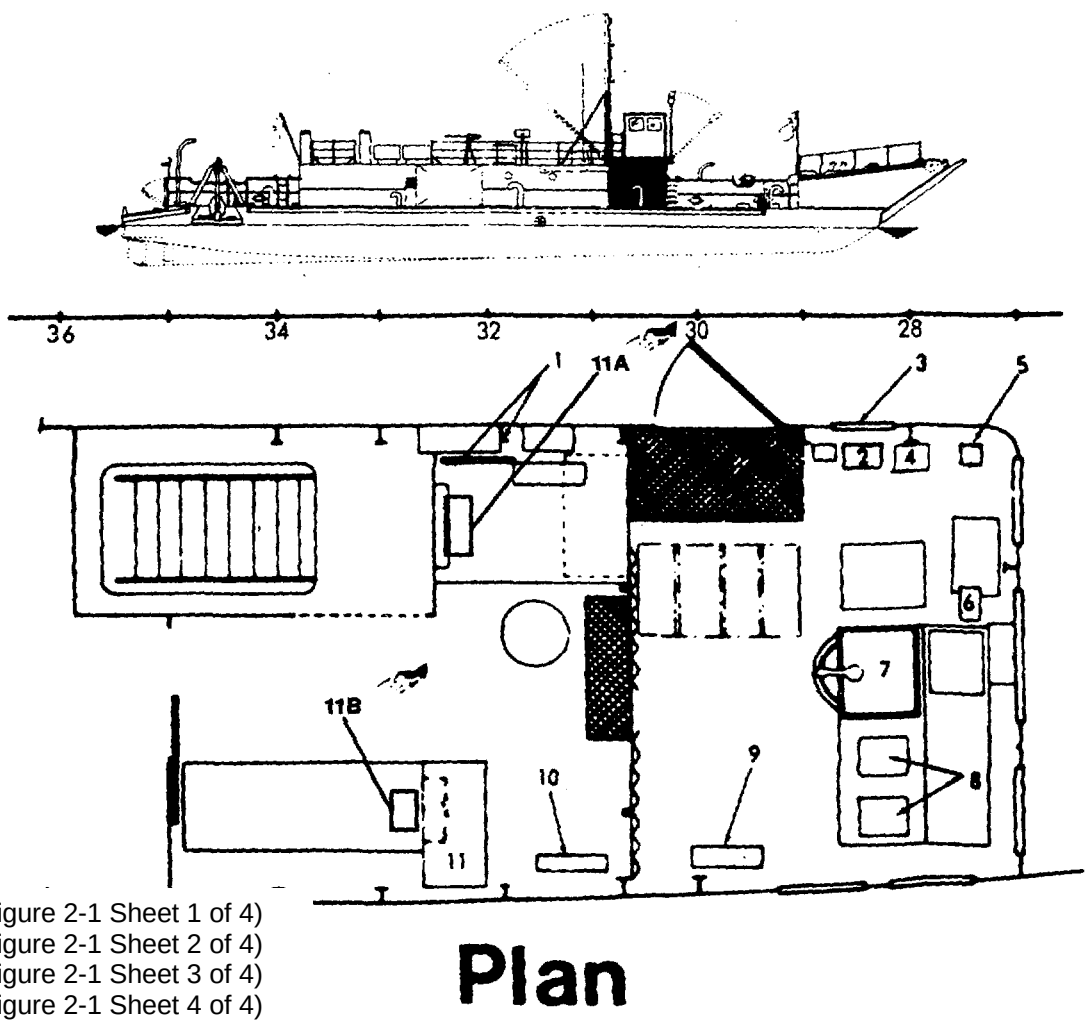
The Section contains the Operator's Controls and Indicators arranged by location. The flowing is an index of compartments and areas in which the controls and indicators are located. Before you operate any device be sure you know the location and operation of all controls.



2-2. **PILOT HOUSE**

Refer to Figure 2-1 for the arrangement of the operational component. Figure 2-1 contains an Index to the various Operators Controls and Indicators.

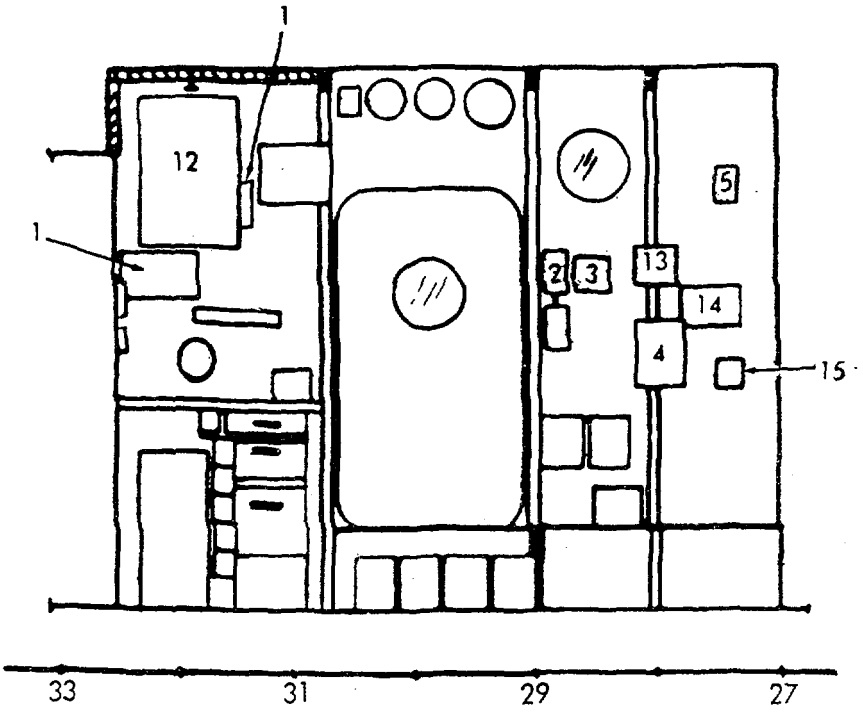
Refer to Appendix A in TM 55-1905-219-14-12 or technical manuals for the navigation and communication devices.




(Figure 2-1 Sheet 1 of 4)
(Figure 2-1 Sheet 2 of 4)
(Figure 2-1 Sheet 3 of 4)
(Figure 2-1 Sheet 4 of 4)

| Item Number | Description | See Figure |
|---|---|---|
| 1. | Clinometer | 2-2 |
| 2. | Bow Ramp Controls | 2-3 |
| 3. | Aft Engine Room Vent - Shutdown | 2-4 |
| 4. | Darken Ship Light Switch | 2-5 |
| 5. | Thermostat | 2-6 |
| 6. | Window Wiper Control | 2-7 |
| 7. | Steering Control Panel | 2-8 |
| 8. | Engine Controls | 2-9 |
| 9. | Navigation Light Control Panel | 2-10 |
| 10. | Distribution Panel (L-103 and 2L-103) | 2-11 |
| 11. | Rectifier Battery Charger | 2-12 |
| 11A. | Hand Held Transceivers/Holder/Charger | |
| 11B. | VHF Transceiver Power Supply | |

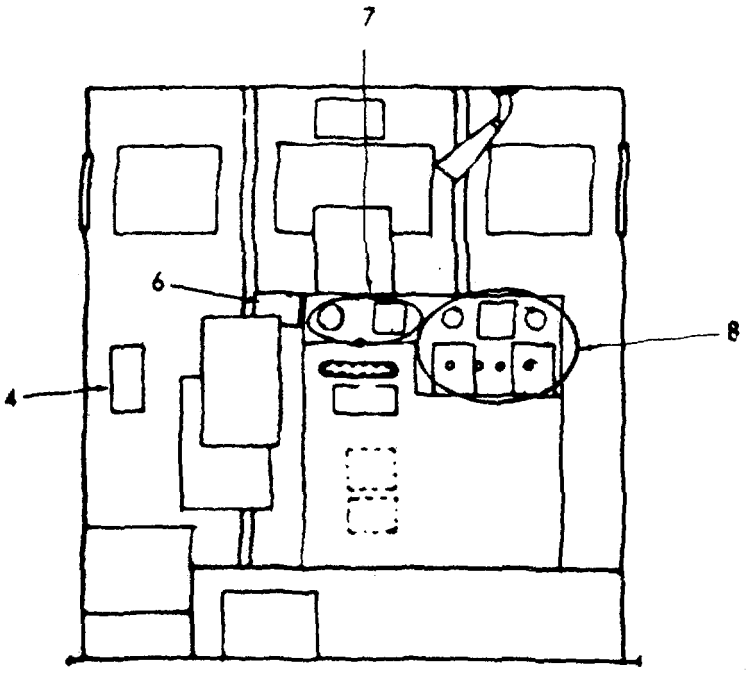
*Figure 2-1. Pilot House Arrangement (Sheet 1 of 4).*




**Port Elev.**

| Item Number | Description | See Figure |
|---|---|---|
| 1. | Clinometer | 2-2 |
| 2. | Bow Ramp Controls | 2-3 |
| 3. | Aft Engine Room Vent - Shutdown | 2-4 |
| 4. | Darken Ship Light Switch | 2-5 |
| 5. | Thermostat | 2-6 |
| 12. | Alarm Panel | 2-13 |
| 13. | Fwd Engine Room Vent - Shutdown | 2-14 |
| 14. | Fire Alarm Panel | 2-15 |
| 15. | Battery Exhaust Switch | 2-16 |

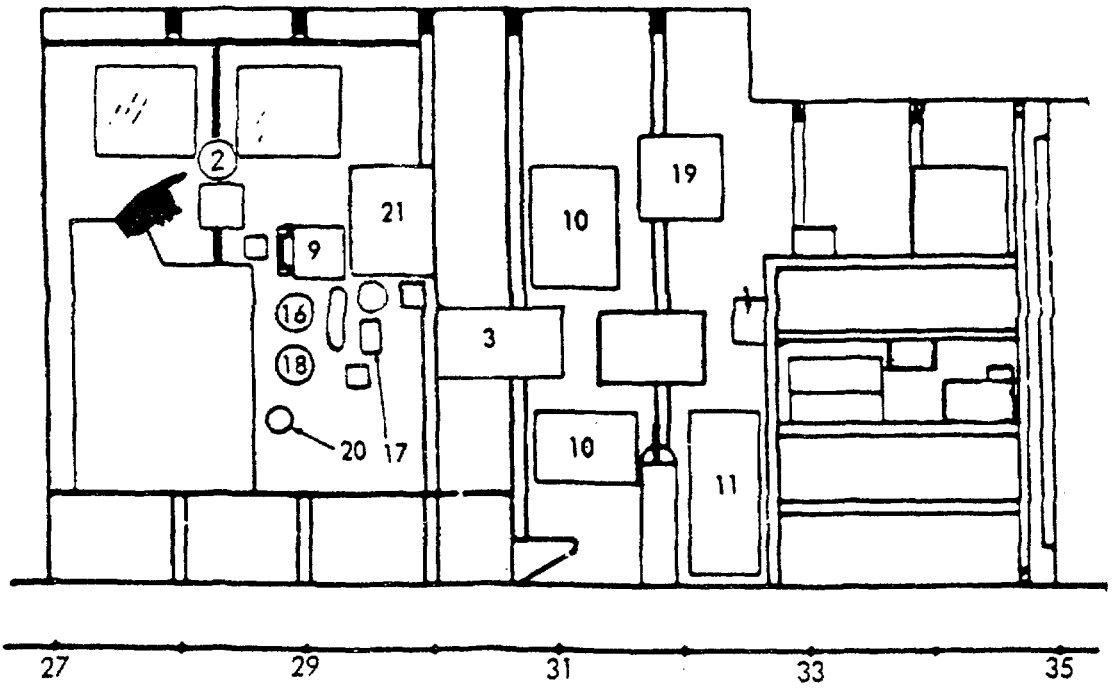
*Figure 2-1. Pilot House Arrangement (Sheet 2 of 4).*




**Fwd. Elev.**

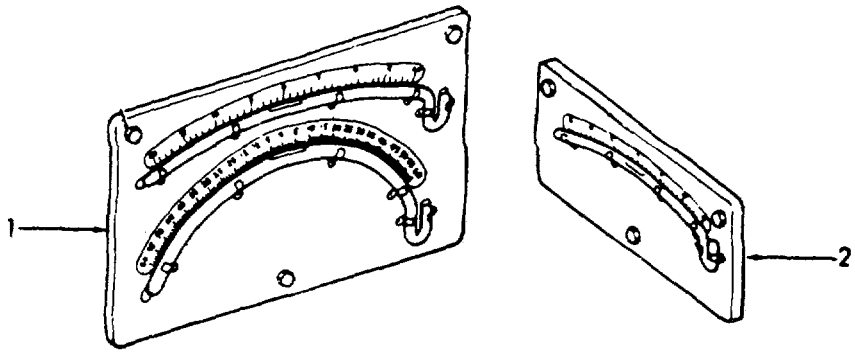
| Item Number | Description | See Figure |
|---|---|---|
| 4. | Darken Ship Light Switch | 2-5 |
| 6. | Window Wiper Control | 2-7 |
| 7. | Steering Control Panel | 2-8 |
| 8. | Engine Controls | 2-9 |

*Figure 2-1. Pilot House Arrangement (Sheet 3 of 4).*



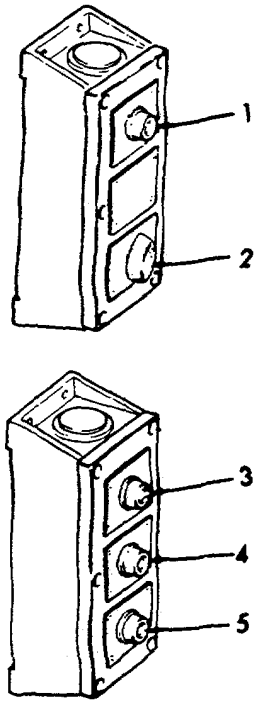

| Item Number | Description | See Figure |
|---|---|---|
| 2. | General Alarm | 2-17.2 |
| 3. | Aft Engine Room Vent - Shutdown | 2-4 |
| 9. | Navigational Light Control Panel | 2-10 |
| 10. | Distribution Panel (L-103 and 2L-103) | 2-11 |
| 11. | Rectifier Battery Charger | 2-12 |
| 16. | Navigational Horn Switch | 2-17.1 |
| 17. | Pushbutton E Call | 2-18 |
| 18. | Wake Light Switch | 2-19 |
| 19. | DC Distribution Box (CP24-1) | 2-20 |
| 20. | Cease Fire Switch | 2-21 |
| 21. | Intercommunication Switch | 2-22 |

*Figure 2-1. Pilothouse Arrangement (Sheet 4 of 4).*




1. Indicates list Port or Starboard.
2. Indicates pitch Bow to Stern.

*Figure 2-2. Clinometers.*




1. EMERGENCY RUN (RED) - Press to operate the Bow Ramp in an emergency overload condition. Press this switch at the same time you press either the RAISE or LOWER button.
2. CONTROL EMERGENCY CUT-OFF - Rotary switch permits local operation only. (Ramp handling machinery compartment *2-12-0-Q*).
3. RAISE (BLACK) - Press to raise the Bow Ramp.
4. LOWER (BLACK) - Press to lower the Bow Ramp.
5. STOP (BLACK) - Press to stop raising or lowering of the Bow Ramp.

*Figure 2-3. Bow Ramp Remote Control Pilot House.*

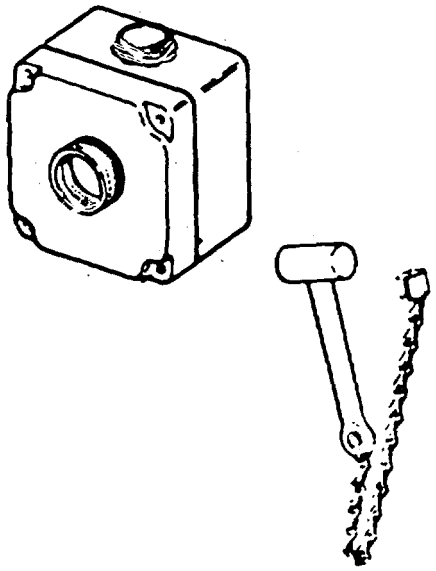
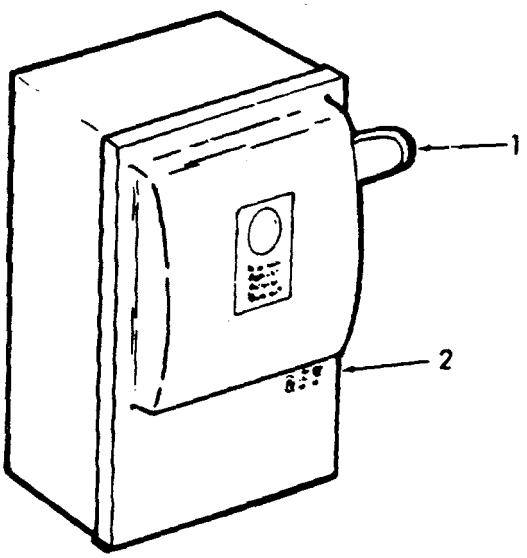
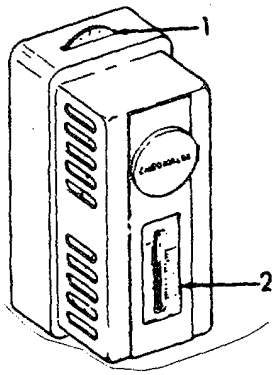


*Figure 2-4. Aft Engine Room Vent Shutdown (Break Glass).*



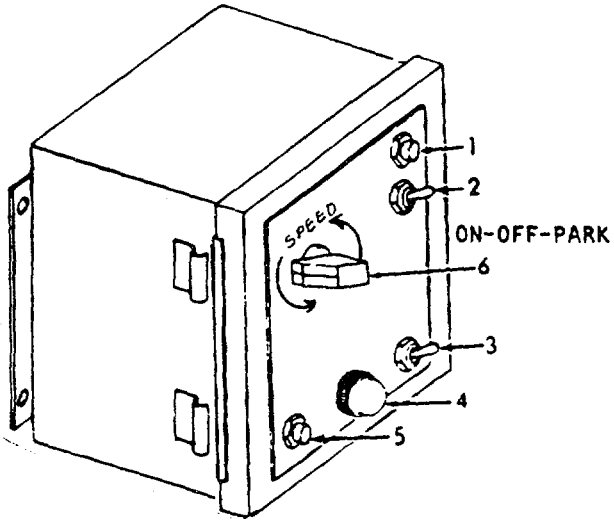

1. ON - When ON, ship is darkened for night operations.
2. OFF - When OFF, all outside lights can be operated.

*Figure 2-5. Darken Ship Light Switch.*



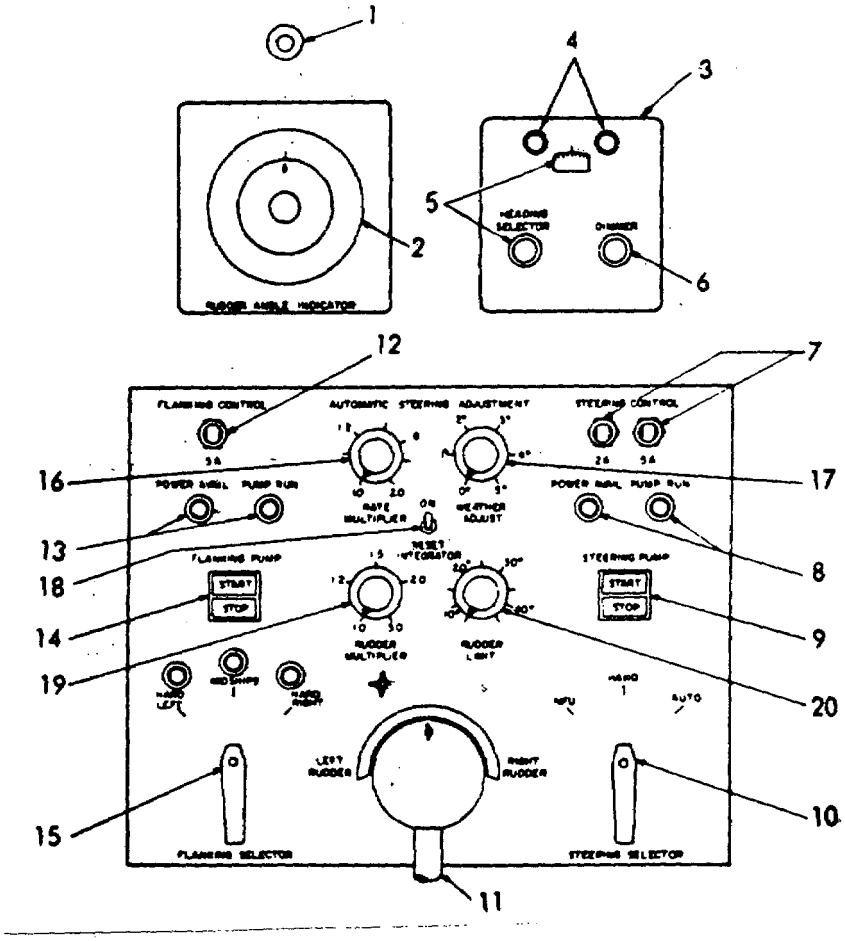

1. Temperature Setting - Rotate to set desired temperature of heating.
2. Temperature Gage - Shows actual temperature in room or compartment.

*Figure 2-6. Thermostat.*




1. MOTOR CIRCUIT BREAKER - Motor overload protection.
2. WIPER SWITCH - Three position switch to turn on/off/and park (return to right side), the wiper blade.
3. HEATER SWITCH - ON-OFF - Turns on/off the heater located in the wiper arm.
4. HEAT INDICATOR LAMP - Indicates the heater is functioning.
5. SYSTEM PROTECTION CIRCUIT BREAKER - Protects the wiper against overload conditions.
6. SPEED - Adjusts the speed of the wiper from low to high.

*Figure 2-7. Window Wiper Control.*



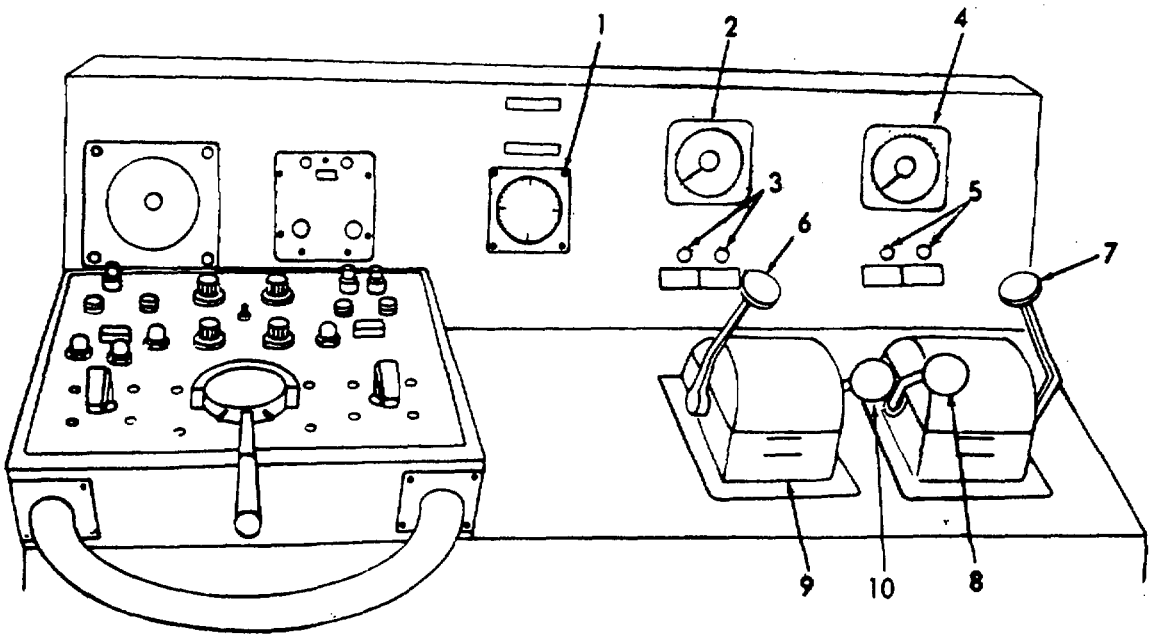

1. DIMMER - Light adjustment for Rudder Angle Indicator.
2. RUDDER ANGLE INDICATOR - Position of rudder in relationship to the center of the vessel.
3. HEADING SELECTOR UNIT - Device for automatic steering of a preset course.
4. DIAL LAMPS - Used to illuminate heading selector.
5. HEADING SELECTOR KNOB - Rotate knob to change course direction shown in window.
6. DIMMER - Light adjustment.
7. STEERING CONTROL FUSES - Fuses 2 and 5 amp. Circuit protection for steering control circuits.
8. (Figure 2-8 Sheet 1 of 2) (Figure 2-8 Sheet 2 of 2) RUN - Lights indicating steering pump running or available to run.
9. STEERING PUMP START/STOP - Pushbuttons to turn the steering pump on/off.

*Figure 2-8. Steering Control Panel (Sheet 1 of 2)*

Legend Figure 2-8 (Cont)

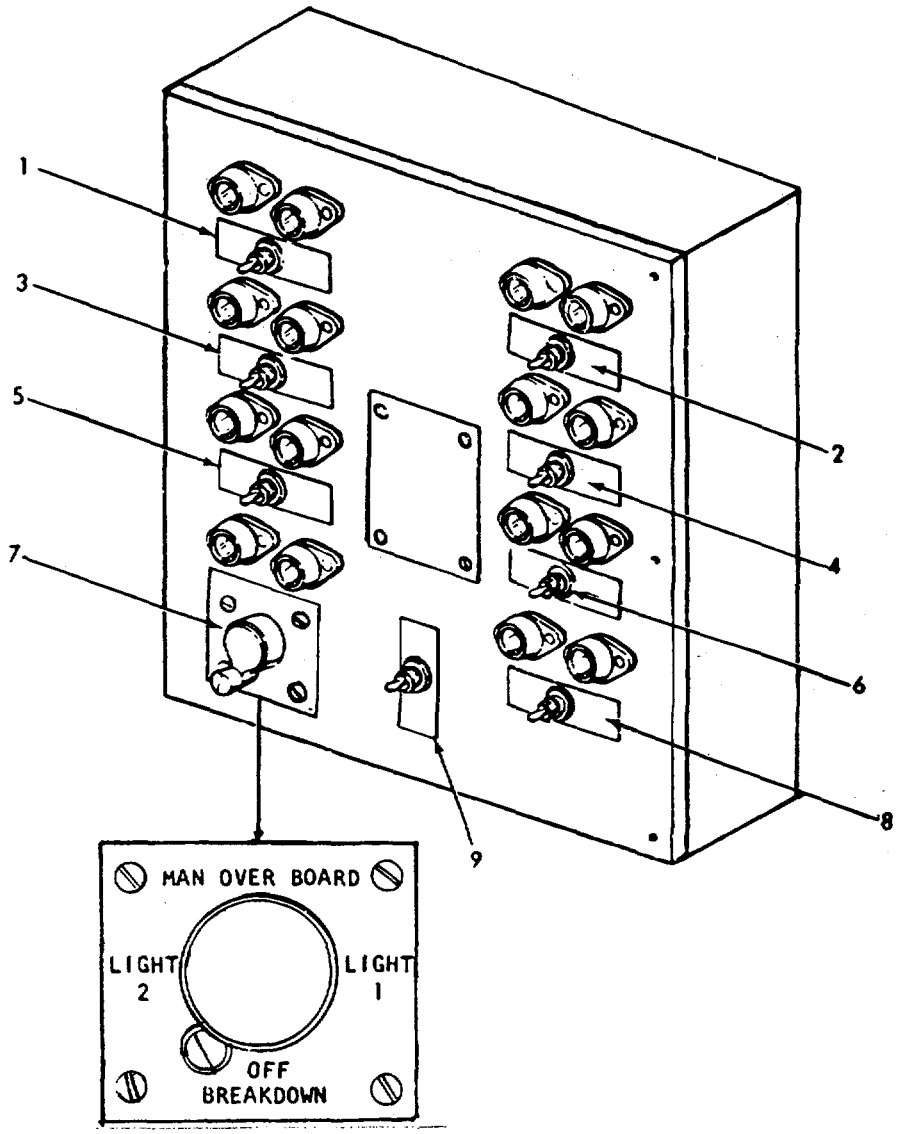
10. STEERING SELECTOR NFU-HAND-AUTO - Rotary switch to select:
    HAND - Steering lever is used to change rudder angle.
    AUTO - Steering automatic to course set on Heading Selector.
    NFU - (Non-followup) - Steering lever is used to change and hold rudder angle. (Example: When steering is in a circle, etc).
11. STEERING LEVER - Steers vessel in HAND or NFU settings of Steering Selector Switch: Clockwise for Right Rudder- counter-clockwise for Left Rudder.
12. FLANKING CONTROL FUSE - Fuse 5 amp. - Circuit protection for flanking control circuits.
13. POWER AVAIL - PUMP RUN - Lights indicating flanking pump running or available to run.
14. FLANKING PUMP START/STOP - Pushbuttons to turn the Flanking pump on/off.
15. FLANKING SELECTOR - LEFT HAND - MIDSHIPS - RIGHT HAND - Selector switch and lights indicating position of flanking rudders. (Used only during maneuvering).
16. AUTOMATIC STEERING ADJUSTMENT RATE MULTIPLIER - Controls sensitivity to changes in pre-set steering. Clockwise maximum sensitivity. Counter-clockwise minimum sensitivity (50% of maximum).
17. WEATHER ADJUST - Controls the amount of heading error permitted before rudder responds to changes.
    Calm seas - Set to 0°
    Rough seas - Set to number of degrees (5° maximum yaw motion from basic heading.
18. INTEGRATOR SWITCH - ON/RESET - In the ON position a continuous average heading error signal is computed.
19. RUDDER MULTIPLIER - Provides operator control of the rudder ratio. High settings cause the ship to respond quickly to course error by ordering larger rudder angles.
20. RUDDER LIMIT - Sets limit of rudder movement right or left, 5 to 45 degrees.

*Figure 2-8. Steering Control Panel (Sheet 2 of 2).*




1. REMOTE MAGNETIC HEADING COMPASS - Compass indicator and dimmer switch.
2. START/STOP - Switches to start/stop the Port Propulsion Engine.
3. TACHOMETER - Port Propulsion Wngine revolution per minute (RPM) indicator.
4. DIMMER KNOB - Adjusts the lights in the Tachometers.
5. START/STOP - Switches to start/stop the Starboard Propulsion Engine.
6. TACHOMETER - Starboard Propulsion Engine revolution per minute (RPM) indicator.
7. SHIFT CONTROL FORWARD - NEUTRAL - REVERSE - Port Propulsion Engine shift.
8. SHIFT CONTROL - FORWARD - NEUTRAL - REVERSE - Starboard Propulsion Engine shift.
9. THROTTLE - Adjusts speed of Starboard Propulsion Engine.
10. THROTTLE - Adjusts speed of Port Propulsion Engine.

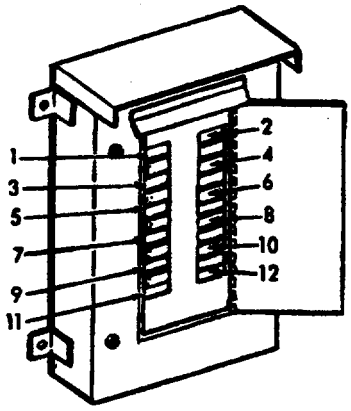
*Figure 2-9. Engine Controls.*




These switches turn on/off the following lights used for navigation:

1. MASTHEAD - (Fuses 3 amps)
2. STERN - (Fuses 3 amps)
3. ANCHOR - (Fuses 3 amps)
4. PORT/STBD RUNNING - (Fuses 3 amps)
5. BLINKER - (Fuses 5 amps)
6. TOWING - (Fuses 15 amps)
7. MAN OVERBOARD/BREAKDOWN LIGHT 1 OR LIGHT 2 - Rotary selector switch to select either set of lights. (Fuses 5 amps)
8. TASK - (Fuses 3 amps)
9. POWER ON/OFF - (Not Used)

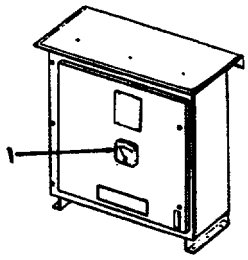
*Figure 2-10. Navigational Light Control Panel.*




The switches on this panel lturn ON/OFF the following circuits:

1. ALARM SWBD – (Fuses 5 amps)
2. ENG CALL SYSTEM – (Fuses 3 amps)
3. NAVIGATION HORN – (Fuses 3 amps)
4. RUDDER ANGLE INDICATOR – (Fuses 3 amps)
5. CEASE FIRE HORN – (Fuses 5 amps)
6. WEATHERFAX – MARINEFAX
7. PORTABLE RADIO RECEPTACLE
8. BLANK
9. BLANK
10. BLANK
11. 390 URR RECEIVER – Entertainment System (Fuses 10 Amps)
12. BLANK

*Figure 2-11. Intercommunication Fuse Panel 2L-103.*




1. METER – Indicates rate of charge of battery.

*Figure 2-12. Battery Charger.*

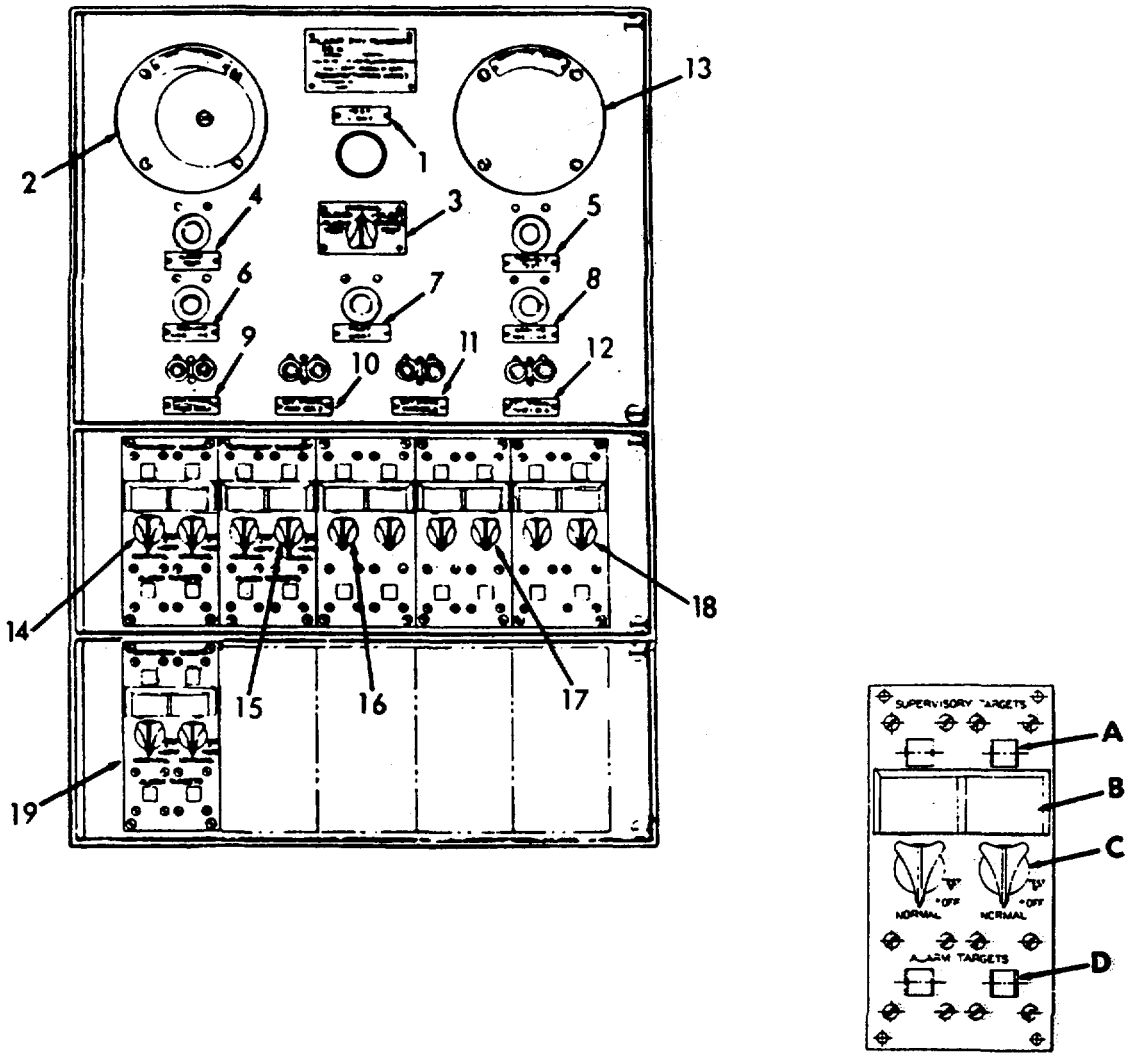



*Figure 2-13. Alarm Panel.*

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Legend Figure 2-13.

1. TEST LIGHT - Flashes in the Silent Alarm test or Silent Trouble test modes.
2. ALARM BELL - Audible alarm indicating a problem in a protected device. Check for red target in alarm unit.
3. SILENT ALARM TEST - NORMAL - SILENT TROUBLE TEST - Three position switch to select a test mode.
4. ALARM TEST - Indicator lights in the Silent Alarm test mode. Alarm bell silent.
5. TROUBLE TEST - Indicator lights in the Silent Trouble test mode. Trouble buzzer silent.
6. GROUND NEG LINE - Lamp glows when the negative side of the internal power supply is grounded.
7. PILOT LAMP - When lit, the alarm panel is in operation.
8. GROUND POS LINE - Lamp glows when the positive side of the internal power supply is grounded.
9. 
10. EXT. SIGNAL FUSE CIR 1, 2, 3, 4 - Not used.
11. 
12. 
13. TROUBLE BUZZER ALARM - Audible alarm indicating a problem when performing tests.

The following components are similar on all of the alarm units:

A. SUPERVISORY TARGETS - Gray - Normal condition.
Yellow - Circuit trouble condition.
B. IDENTIFICATION PLATES - See items 14 thru 19 below.
C. TEST-OFF-NORMAL - Switch for test or normal operation.
D. ALARM TARGETS - Gray - Normal condition.
Red - Alarm for problem in the specified area. Alarm bell rings.

14. HIGH WATER TEMP - STBD GEN FWD (Starboard Generator Forward Engine Room).
LOW OIL PRESSURE - STBD GEN FWD (Starboard Generator Forward Engine Room).
15. LOW OIL PRESSURE - PORT GEN AFT (Port Generator Aft Engine Room).
HIGH WATER TEMP - PORT GEN AFT (Port Generator Aft Engine Room).
16. SPRINKLER - MAGAZINE - HIGH TEMP IN MAGAZINE.
17. HIGH WATER TEMP AFT ENG - (Propulsion Engine (Port) Aft Engine Room).
HIGH WATER TEMP FWD ENG - (Propulsion Engine (Starboard) Forward Engine Room).
18. LOW OIL PRESS - AFT ENG - (Propulsion Engine (Port) Aft Engine Room).
19. SEWAGE TANK HIGH LEVEL GYRO COMPASS (Power Failure).

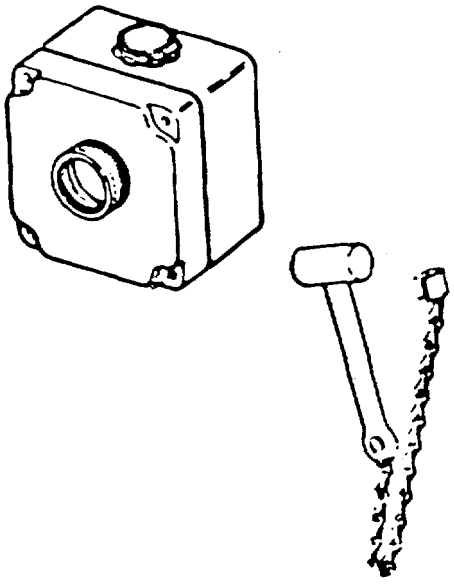


*Figure 2-14. Forward Engine Room Vent Shutdown (Break-Glass)*

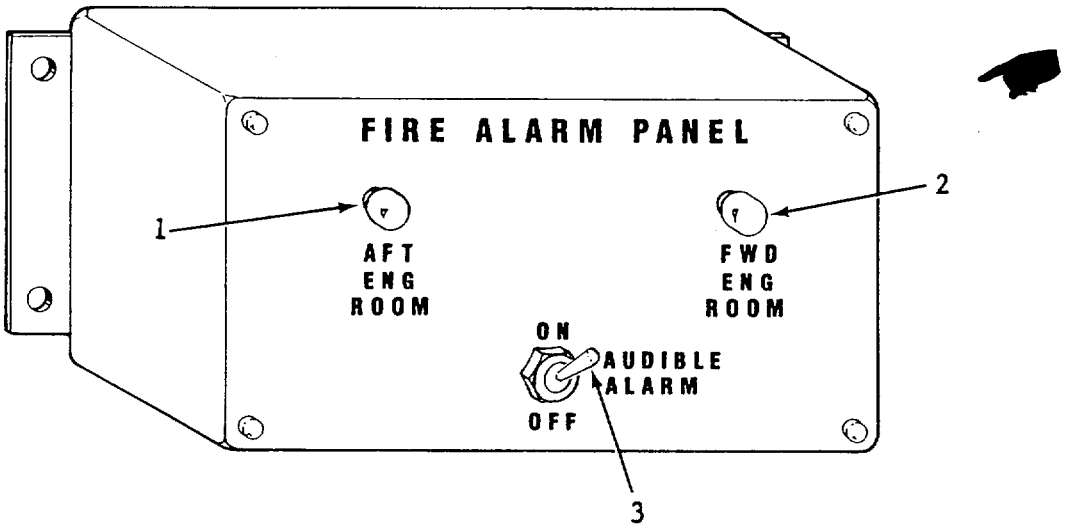


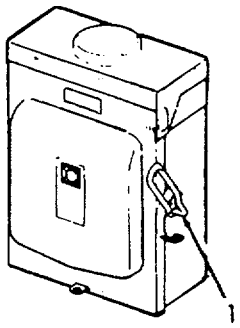

*Figure 2-15. Fire Alarm Panel*

Legend Figure 2-15.

(1) FIRE ALARM LIGHT - AFT ENGINE ROOM - Amber indicator light - Fire in aft engine room.

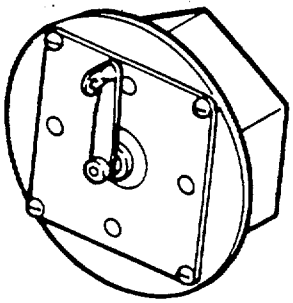
(2) FIRE ALARM LIGHT - FWD ENGINE ROOM - Amber indication light - Fire in fwd engine room.

(3) AUDIBLE ALARM - ON/OFF SWITCH - Turns on/off the horn in the pilothouse.



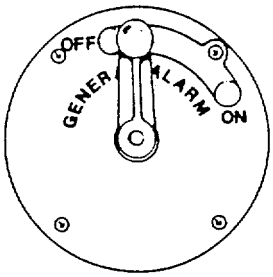

1. LEVER - Move lever to turn on/off the battery exhaust fan located in the Battery compartment.

*Figure 2-16. Battery Compartment Exhaust Fan Switch*



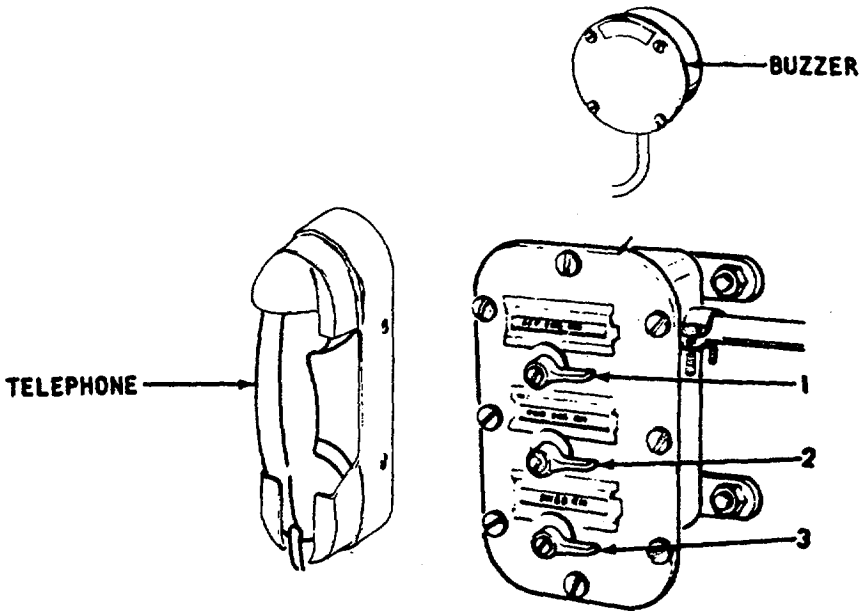
SWITCH - Operates navigational horn (electric) (Fog and Signaling).

*Figure 2-17.1. Navigational (Electric) Horn Switch Pilothouse.*




GENERAL ALARM ACTUATING Switch - Operate the general alarm system.

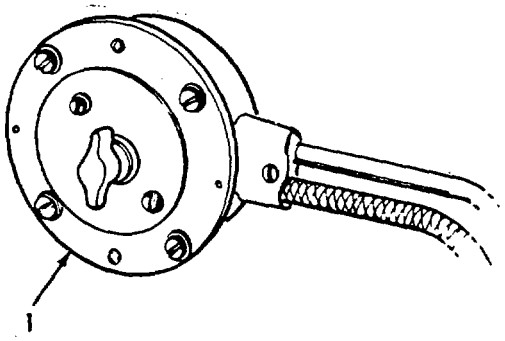
*Figure 2-17.2.*




The following switches, when pressed, signal the indicated compartment to communicate on the sound powered phone.

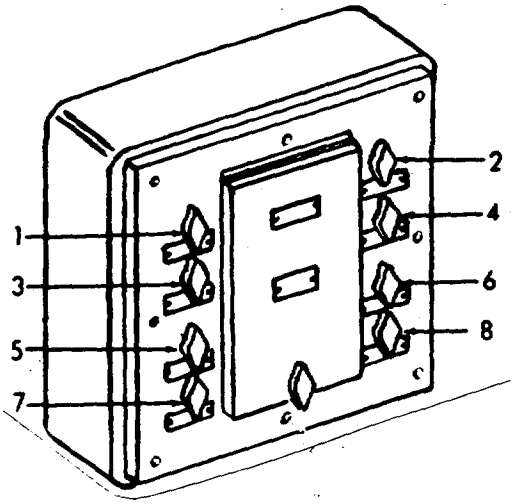
1. SWBD ROOM (Switchboard in Engine Room Access)
2. FWD ENGINE ROOM
3. AFT ENGINE ROOM

*Figure 2-18. Pushbutton E Call.*



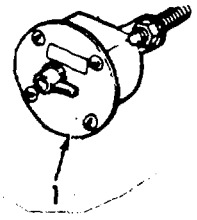

1. WAKE LIGHT SWITCH - Turns Wake Light ON/OFF.

*Figure 2-19. Wake Light Switch.*



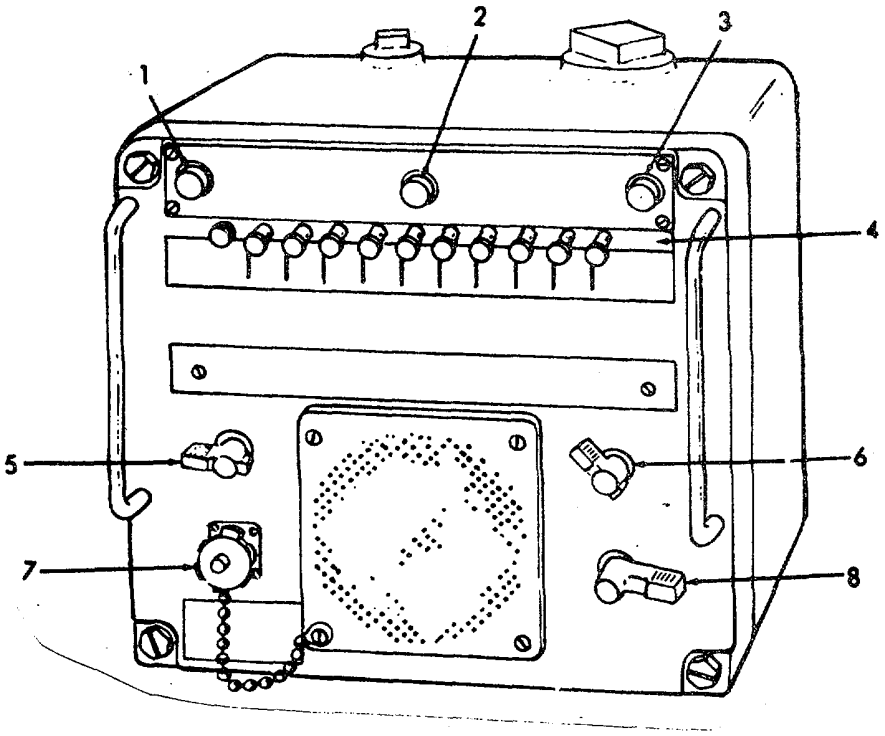

1. RADAR - Turns on/off the Radar System. (Fuses 15 amps).
2. GYRO COMPASS SYSTEM - Turns on/off the Gyro Compass System. (Fuses 5 amps).
3. AN/VRD 46 RADIO - Turns on/off a voice communication radio. (Fuses 15 amps).
4. AN/APX - 72 SYSTEM - Turns on/off the IFF System. (Fuses 5 amps).
5. REMOTE MAGNETIC HEADING SYSTEM (RMHS) - Turns on/off the Remote Magnetic Heading System. (Fuses 5 amps).
6. BLANK
7. HALON - Turns on/off the Halon (Fire) control system (Unfused).
8. MAIN ENGINE SHUTDOWN - Turns on/off the engine operating controls. (Fuses 20 amps).

*Figure 2-20. DC Distribution Box (CP24-1)*




1. CEASE FIRE SWITCH - Turns on Cease Fire horns at gun stations.

*Figure 2-21. Cease Fire Switch.*




1. ON INDICATOR LAMP - Indicates power on.
2. CALL INDICATOR LAMP - Indicates a call is coming in.
3. BUSY INDICATOR LAMP - Indicates called station is busy.
4. PRESS TO RELEASE SWITCHES - Press switch to talk to a given station. Press switch again to release called station.
5. VOLUME - Lowers or raises volume.
6. DIMMER - Adjusts brightness of Indicator lamps.
7. MIC ON - Remove cover to use a remote microphone.
8. HAND FREE - NORMAL - PRESS TO TALK - Press lever down to talk. Release to normal when done. Raise lever for continuous talk when required.

*Figure 2-22. Intercommunication System.*

## 2-3. GALLEY AND MESS.

The Operator Controls and Indicators for the Galley and Mess (1-35-I-L) are shown in Figure 2-23. Figure 2-23 also contains an Index to the various Controls and Indicators on the various components.

| Item Number | Description | See Figure |
|---|---|---|
| 1. | Air Conditioning Room - Shutdown | 2-24 |
| 2. | Galley Fan - Shutdown | 2-25 |
| 3. | Toaster | 2-26 |
| 4. | Entertainment Amplifier | 2-27 |
| 5. | Distribution Panel (L-108) | 2-28 |
| 6. | Sanitizing Sink Heater | 2-29 |
| 7. | Range | 2-30 |
| 8. | Disconnect Switch - Range | 2-31 |
| 9. | Milk Dispenser | 2-32 |

Legend Figure 2-23.

1. Air Conditioning Room - Shutdown
2. Galley Fan - Shutdown
3. Toaster
4. Entertainment Amplifier
5. Distribution Panel (L-108)
6. Sanitizing Sink Heater
7. Range
8. Disconnect Switch for the Range
9. Milk Dispenser

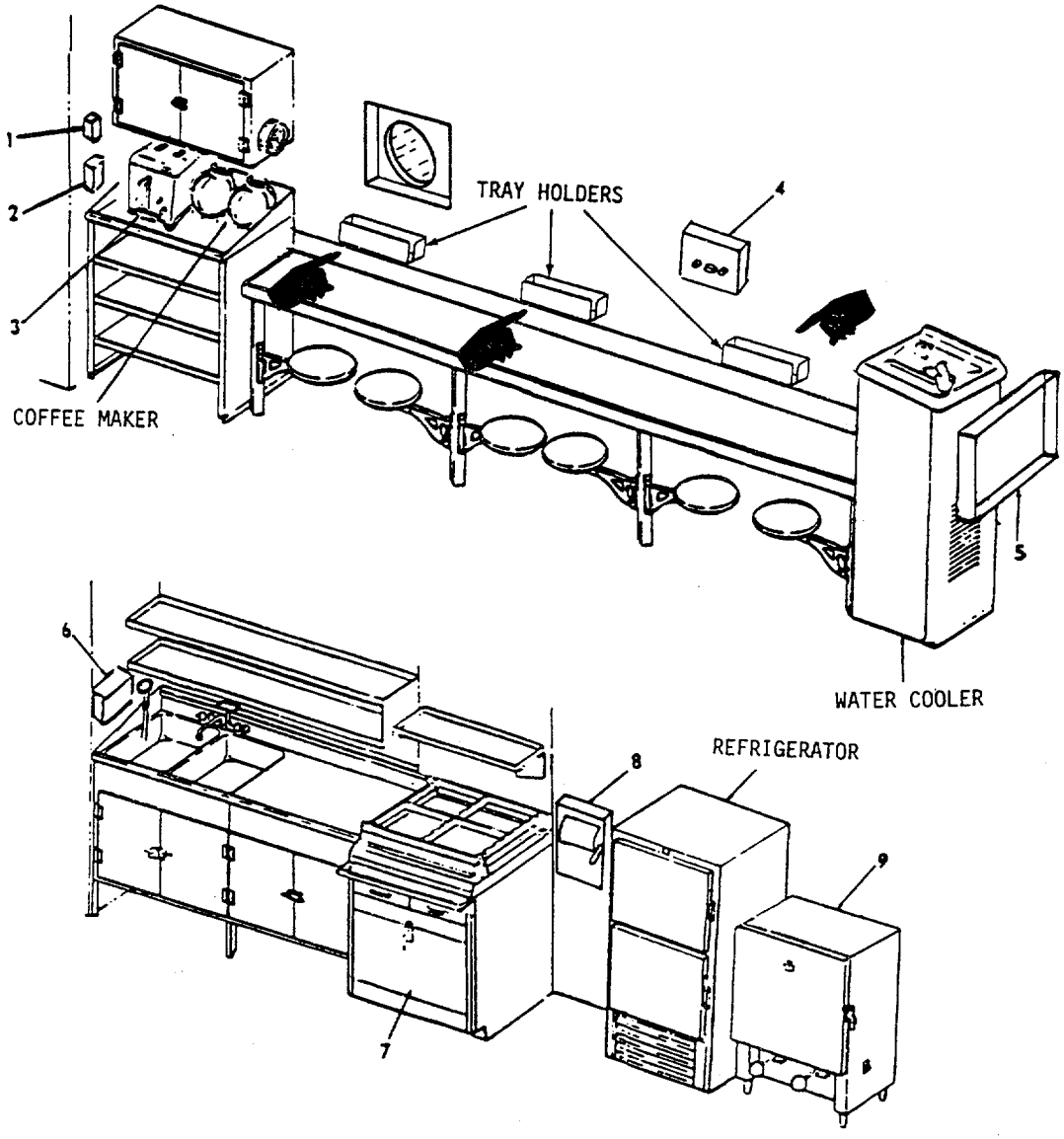



*Figure 2-23. Galley And Mess Arrangement.*

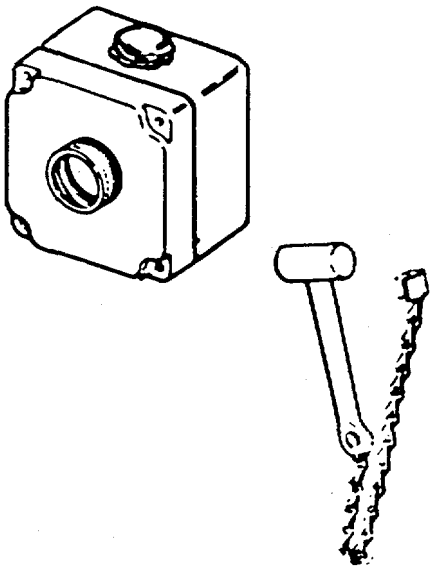


*Figure 2-24. Air Conditioning Room Emergency Stop (Break-Glass).*

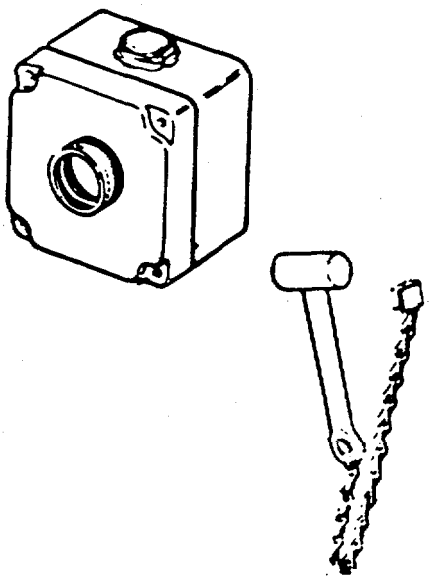
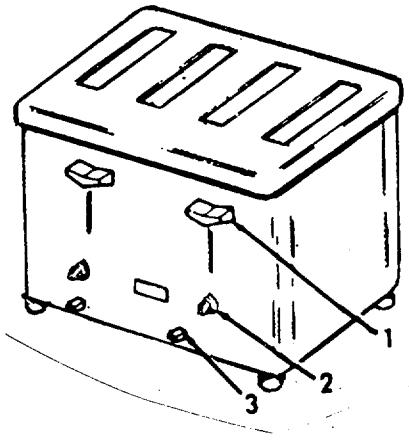
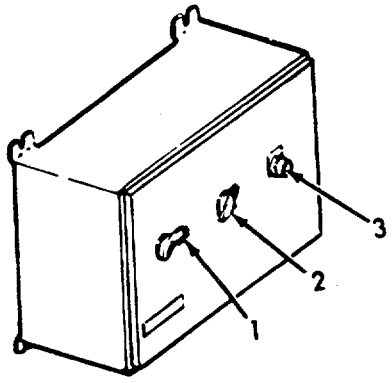


*Figure 2-25. Galley Emergency Stop (Break-Glass).*



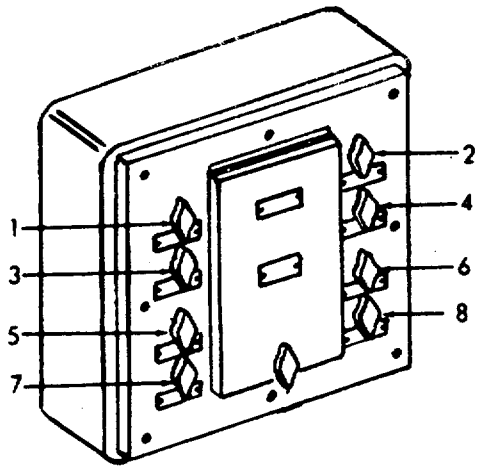

1. LEVER - Press down Lever to start toaster.
2. TEMPERATURE CONTROL - Adjust for amount of toasting (light or dark).
3. EJECT LEVER - Press to shut off toaster.

*Figure 2-26. Toaster.*



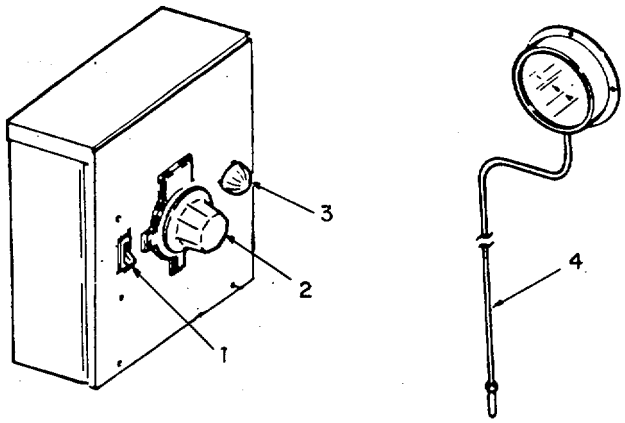

1. ON/OFF SWITCH - Turns power on/off.
2. VOLUME - Volume control.
3. LAMP - POWER ON indicator.

*Figure 2-27. Entertainment Amplifier.*



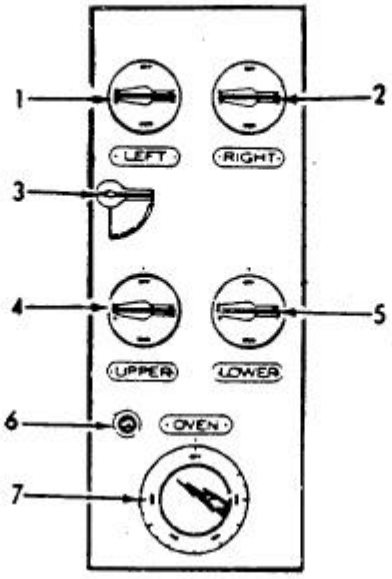

1. HEATER 1-46-1 - Turns on/off heater in washroom. (Fuses 10 amps).
2. ELEC TOILET - Turns on/off toilet flush. (Fuses 10 amps).
3. WATER HEATER - Turns on/off Heater in Galley sink. (Fuses 20 amps).
4. REFRIGERATOR - Turns on/off regrigerator in Galley. (Fuses 15 amps).
5. HEATER 1-44-1 - Turns on/off heater in washroom. (Fuses 10 amps).
6. DRINKING FOUNTAIN - Turns on/off drinking fountain. (Fuses 15 amps).
7. MILK DISPENSER - Turns on/off milk dispenser. (Fuses 20 amps).
8. CIRCUIT SHIPS' ENTERTAINMENT - Turns on/off the entertainment amplifier in the Galley. (Fuses 10 amps).

*Figure 2-28. Distribution Panel (L-108).*



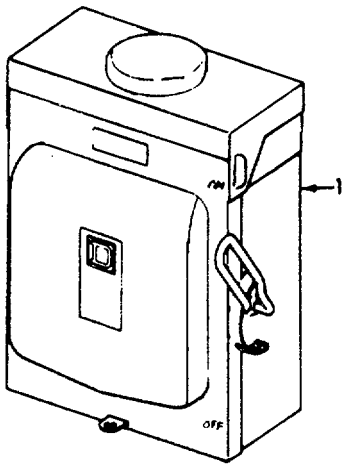

1. POWER - Turns on/off the heater.
2. TEMPERATURE - Adjustment for heater temperature.
3. POWER ON INDICATOR LAMP -
4. THERMOMETER - Located in sink for measurement of heated water.

*Figure 2-29. Sanitizing Sink Heater.*



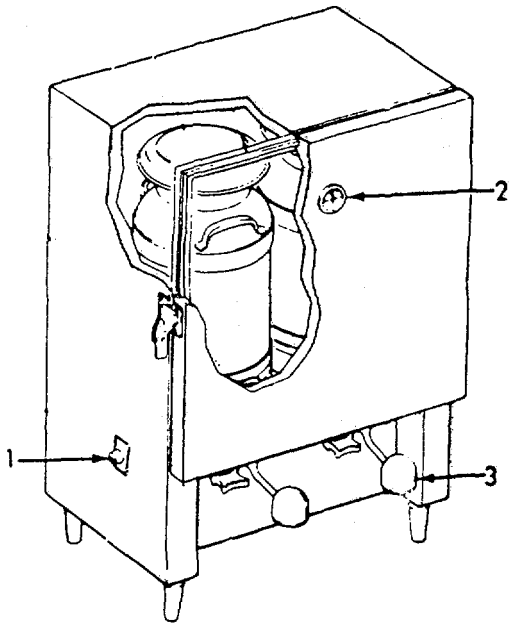

1. LEFT - HIGH-MEDIUM-LOW-OFF - Turns on/off and adjusts heat on left side.
2. RIGHT - HIGH-MEDIUM-LOW-OFF - Turns on/off and adjusts heat on right side.
3. DAMPER - Oven air damper
4. UPPER-HIGH-MEDIUM-LOW-OFF - Turns on/off and adjusts heat in top of oven.
5. LOWER-HIGH-MEDIUM-LOW-OFF - Turns on/off and adjusts heat in bottom of oven.
6. INDICATOR LIGHT (RED) - Thermostat pilot light.
7. THERMOSTAT - Maintains heat of oven automatically.

*Figure 2-30. Range.*




1. ON - The range is able to be operated.
   OFF - Stops power which runs the range.

*Figure 2-31. Range Disconnect Switch.*




1. TEMPERATURE CONTROL - Adjusts temperature of milk dispenser.
2. THERMOMETER - Indicates internal temperature.
3. DISPENSING LEVER - Lift lever to obtain milk.

*Figure 2-32. Milk Dispenser.*

## 2-4. WASH ROOM, WATER CLOSET AND SHOWER.

The Operator Controls and Indicators for the Wash Room, Water Closet, and Shower (1-44-1-L) are shown in Figure 2-33.

| Item Number | Description | See Figure |
|---|---|---|
| 1. | Water Closet Controls | 2-34 |
| 2. | Washer/Dryer Controls | 2-35 |

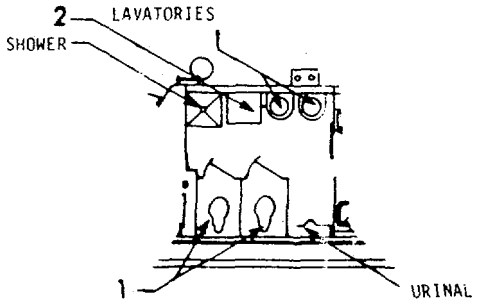
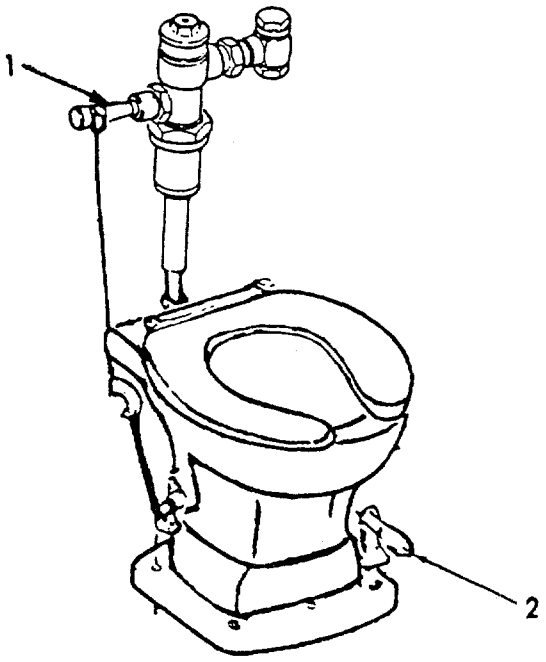
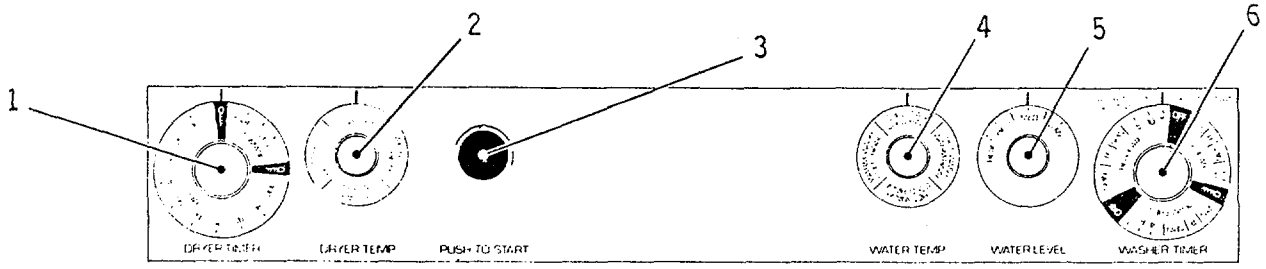



*Figure 2-33. Washroom, Water Closet, And Shower Controls And Indicators.*




1. FLUSH VALVE - Adds water to water closet.
2. FOOT PEDAL - Adds water and turns on the flush pump.

*Figure 2-34. Water Closet Controls.*




1. DRYER TIMER - Times the drying cycle.
2. DRYER TEMPERATURE SELECTOR - Selects temperature for fabric being dried.
3. PUSH TO START BUTTON - Starts and stops the dryer.
4. WATER TEMPERATURE SELECTOR - Controls wash and rinse temperature of water in washer.
5. WATER LEVEL SELECTOR - Selects water level for various sizes of loads.
6. WASHER TIMER - Times the wash cycle.

*Figure 2-35. Washer/Dryer Controls,*

## 2-5. ENGINE ROOM ACCESS.

The Operator Controls and Indicators for the Engine Room Access Compartment (1-50-1-Q) are shown in Figure 2-36. Figure 2-36 contains an Index to the controls and indicators on the various components.

| Item Number | Description | See Figure |
|---|---|---|
| 1. | Power Distribution Panel (P-400) | 2-37 |
| 2. | Halon Emergency Release - Fwd Engine Room | 2-38 |
| 3. | Tank Level Indicators | 2-39 |
| 4. | Halon Emergency Release - Aft Engine Room | 2-40 |
| 5. | Fire Pump Motor Remote Controls | 2-41 |
| 6. | Ships' Service Main Switchboard | 2-42 |
| 7. | Battery Charger - Battle Lantern | 2-43 |
| 8. | Lighting Distribution Panel (L-110) | 2-44 |
| 9. | Lighting Distribution Panel (L-100) | 2-45 |

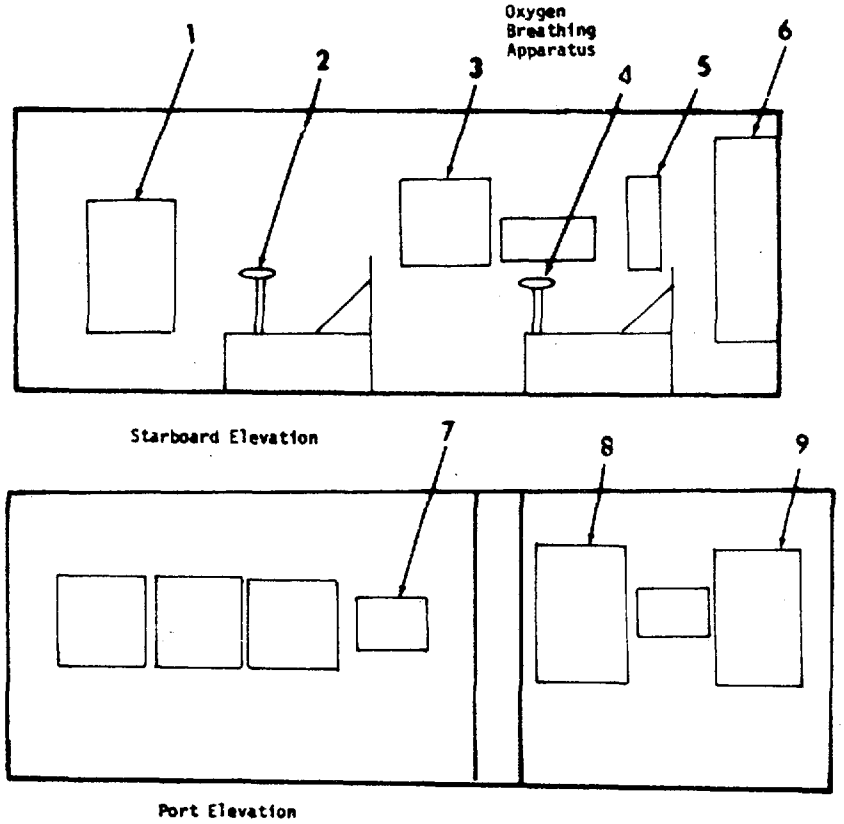
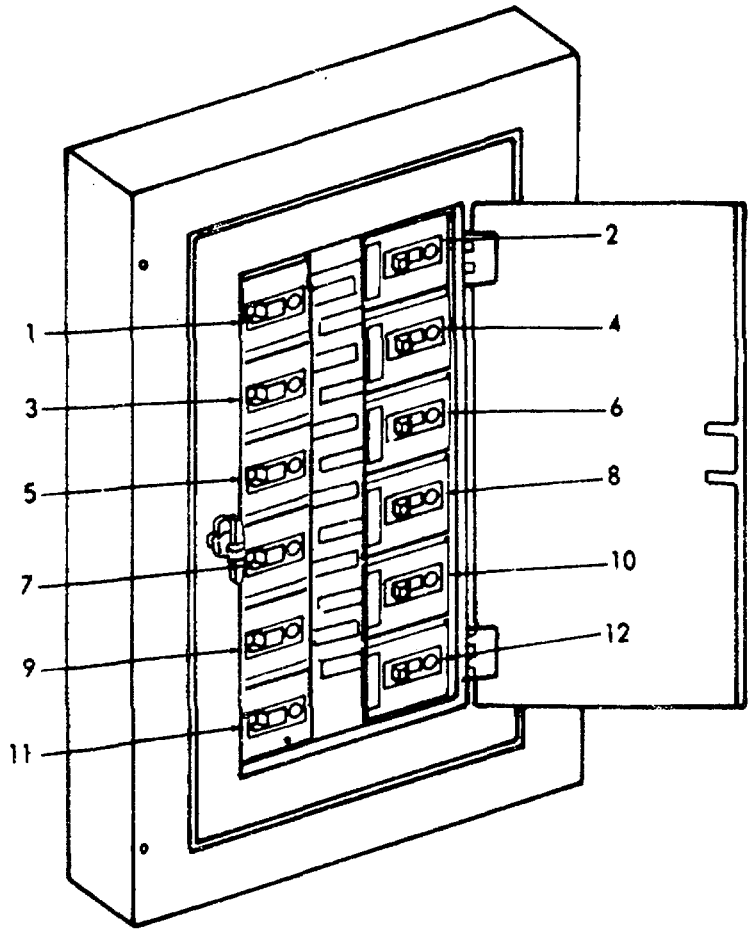
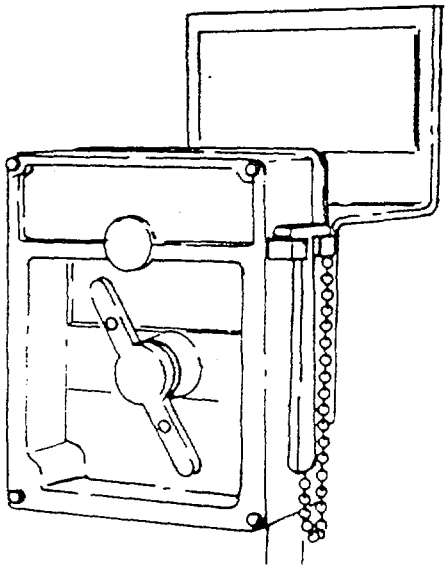



*Figure 2-36. Engine Room Access.*




1. HEATER DIST - Power to Distribution Panel L-100 located in the Engine Access Room.
2. LIGHTING XFMR - Power to Lighting Transformers located in the Engine Access Room. Circuit breaker 50 amps.
3. SPARE - Circuit breaker 100 amps.
4. FIRE PUMP - Power to Fire Pump. Circuit breaker 50 amps.
5. STEERING PUMP - Power to Hydraulic Steering controls. Circuit breaker 70 amps.
6. DIST PANEL CREWS QTRS - Power to Distribution Panel P-406 located in the crews quarters. Circuit breaker 50 amps.
7. RANGE - Power to Range in Galley. Circuit breaker 20 amps.
8. FWD AND AFT ENGINE RM, ANCHOR WINCH, SEWAGE - Distribution Panel P-408.
9. HEATING DIST BOX - P-409 - Power to Distribution Panel P-409 located in the Crew and Transient Berthing Compartment.
10. BOW RAMP - Power to Bow Ramp controls. Circuit breaker 30 amps.
11. SPARE - Circuit breaker 40 amps.
12. SEWAGE PUMP - Power to Sewage Pump. Circuit breaker 10 amps.

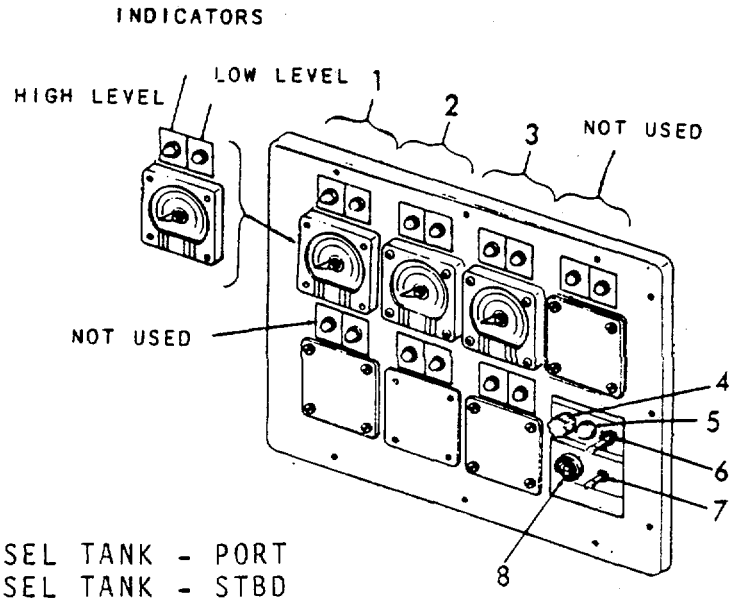
*Figure 2-37. Power Distribution Panel (P-400).*



4951-206

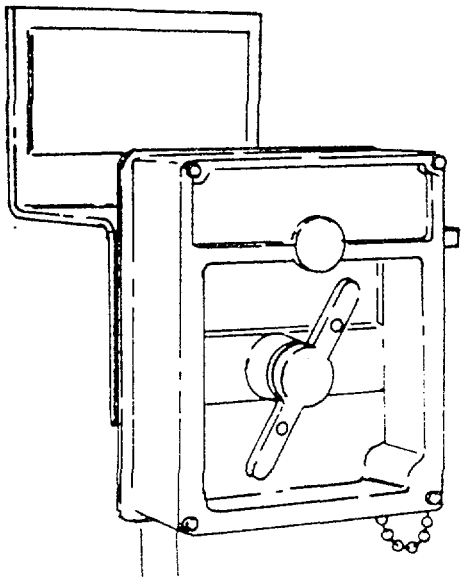
1. Pull to release Halon in Forward Engine Room in an emergency.

*Figure 2-38. Halon Emergency Release-Forward Engine Room.*




1. DIESEL TANK - PORT
2. DIESEL TANK - STBD
3. FRESH WATER
4. FUSE 2 AMP - Circuit protection.
5. POWER - POWER ON Indicator lamp.
6. ON/OFF - Power on/off switch.
7. ALARM SILENCE SW - Turns on/off the audible alarm.
8. ALARM - Audible alarm horn.

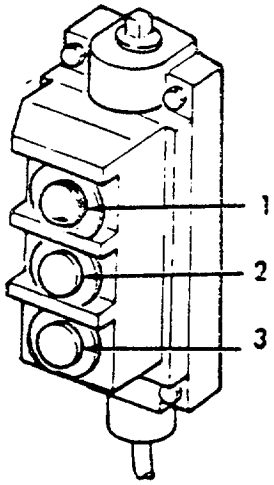
*Figure 2-39. Tank Level Indicators.*



4951-205

1. Pull to release Halon in Aft Engine Room in an emergency.

*Figure 2-40. Halon Emergency Release - AFT Engine Room.*




1. LIGHT - Shows that pump is in operation.
2. START - Turns Fire Pump on.
3. STOP - Turns Fire Pump off.

*Figure 2-41. Fire Pump Motor Remote Control.*

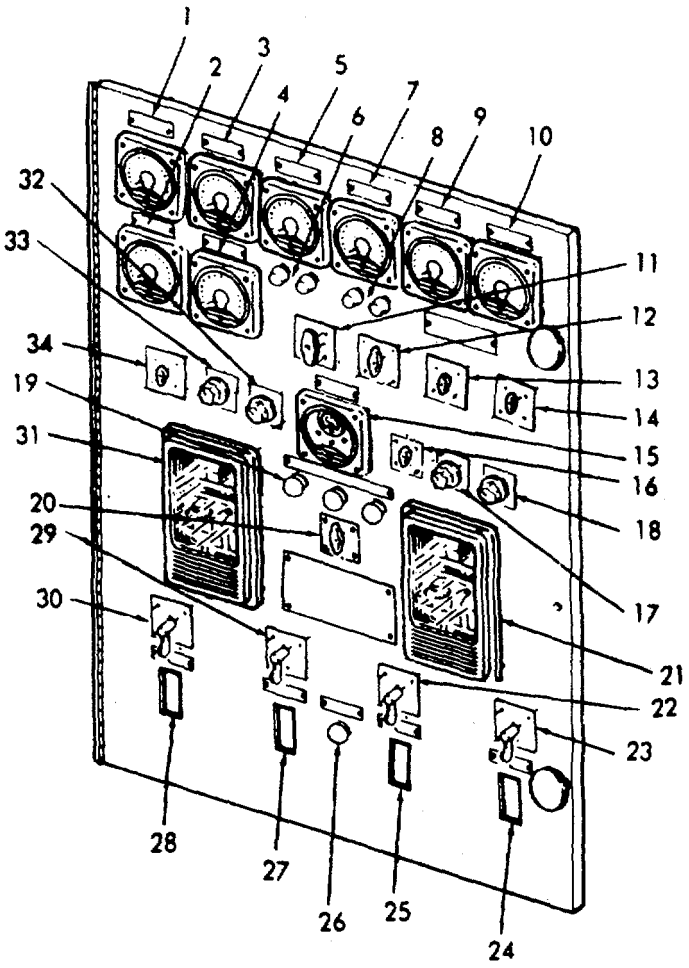
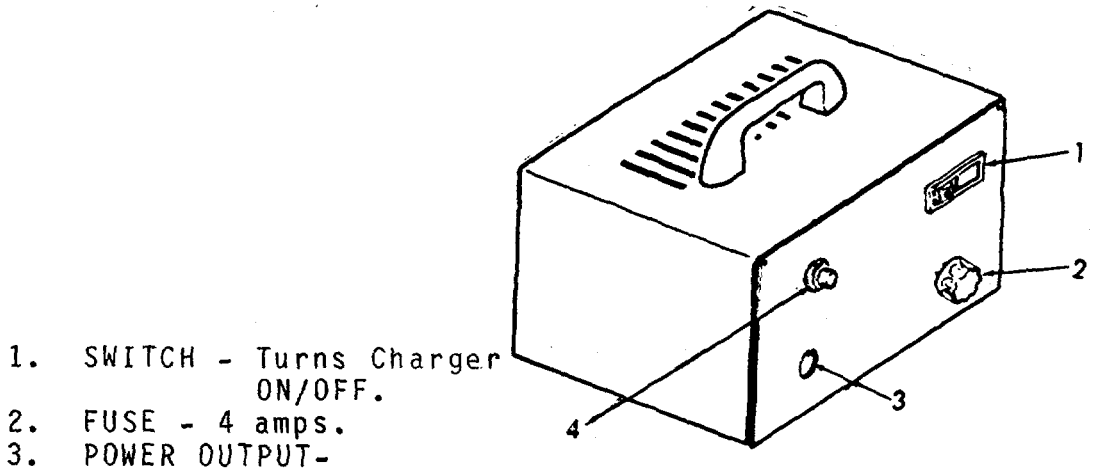



*Figure 2-42. Ship's Service Main Switchboard.*

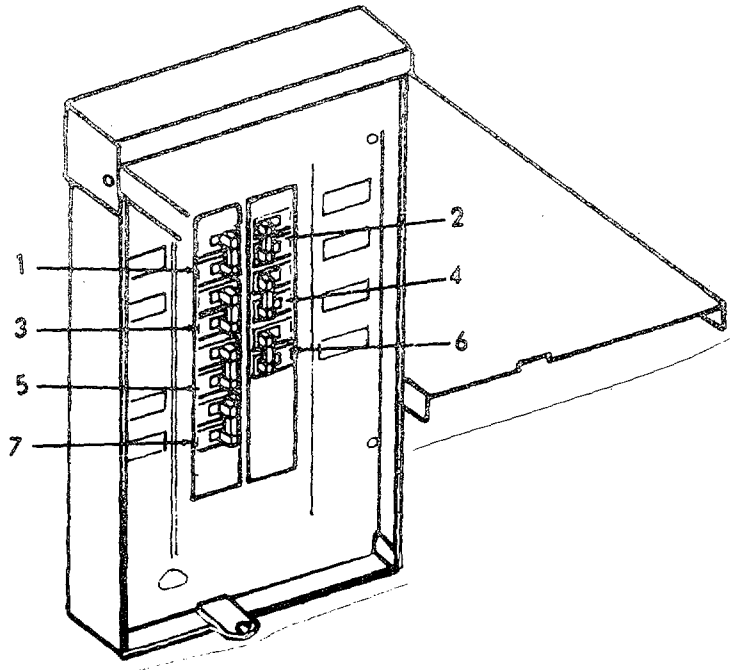
Legend Figure 2-42.

1. GENERATOR #1 VOLTMETER.
2. GENERATOR #1 AMMETER.
3. GENERATOR #2 / SHORE POWER VOLTMETER.
4. GENERATOR #2 / SHORE POWER AMMETER.
5. GENERATOR #1 WATTMETER.
6. FUSES - WATTMETER.
7. GENERATOR #2 WATTMETER.
8. FUSES - WATTMETER.
9. SYNCROSCOPE.
10. FREQUENCY METER.
11. GENERATOR #2 / SHORE POWER AMMETER SWITCH.
12. GENERATOR #2 / SHORE POWER VOLTMETER SWITCH.
13. SYNCROSCOPE SWITCH.
14. FREQUENCY SWITCH.
15. SHORE POWER PHASE SEQUENCE INDICATOR.
16. SWITCH GENERATOR #2 UNIT PARALLEL SWITCH.
17. GENERATOR #2 VOLTAGE ADJUST RHEOSTAT
18. GENERATOR #2 DROOP RHEOSTAT.
19. GROUND BUS INDICATORS.
20. GROUND TEST SWITCH.
21. GENERATOR #2 REVERSE POWER RELAY.
22. GENERATOR #2 AUTOMATIC/MANUAL SWITCH.
23. GENERATOR #2 GOVERNOR SWITCH.
24. CIRCUIT BREAKER 150 AMP - Main power to Ship's Distribution Panels.
25. CIRCUIT BREAKER 100 AMP - Shore Connection.
26. SHORE POWER INDICATOR LIGHT.
27. CIRCUIT BREAKER 70 AMP - Generator #1.
28. CIRCUIT BREAKER 70 AMP - Generator #2.
29. GENERATOR #1 GOVERNOR SWITCH.
30. GENERATOR #1 AUTOMATIC/MANUAL SWITCH.
31. GENERATOR #1 REVERSE POWER RELAY.
32. GENERATOR #1 DROOP RHEOSTAT.
33. GENERATOR #1 VOLTAGE ADJUST RHEOSTAT.
34. GENERATOR #1 UNIT PARALLEL SWITCH.




1. SWITCH - Turns Charger ON/OFF.
2. FUSE - 4 amps.
3. POWER OUTPUT- Attach cable to battery,
4. SWITCH.

*Figure 2-43. Battery Charger - Battle Lantern.*




ALL CIRCUIT BREAKERS ARE 15 AMPS.

1. SEARCH LIGHT - Power to Searchlight.
2. DECK FLOODS - Power to Deck Floodlights.
3. UPPER DECK RECPT - Power to receptacles located on Upper Deck.
4. HOLD RECPT - Power to receptacles located under Cargo Deck.
5. COFFEE URN - Power to the Coffeemaker.
6. TOASTER - Power to the Toaster.
7. WAKE/TOWING LIGHTS - Power to the Wake/Towing lights.

*Figure 2-44. Lighting Distribution Panel (L-110).*

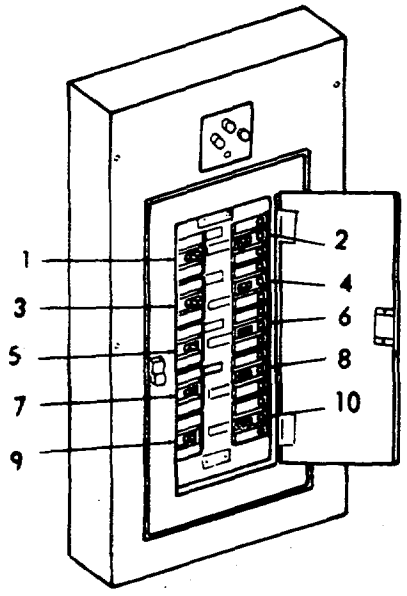


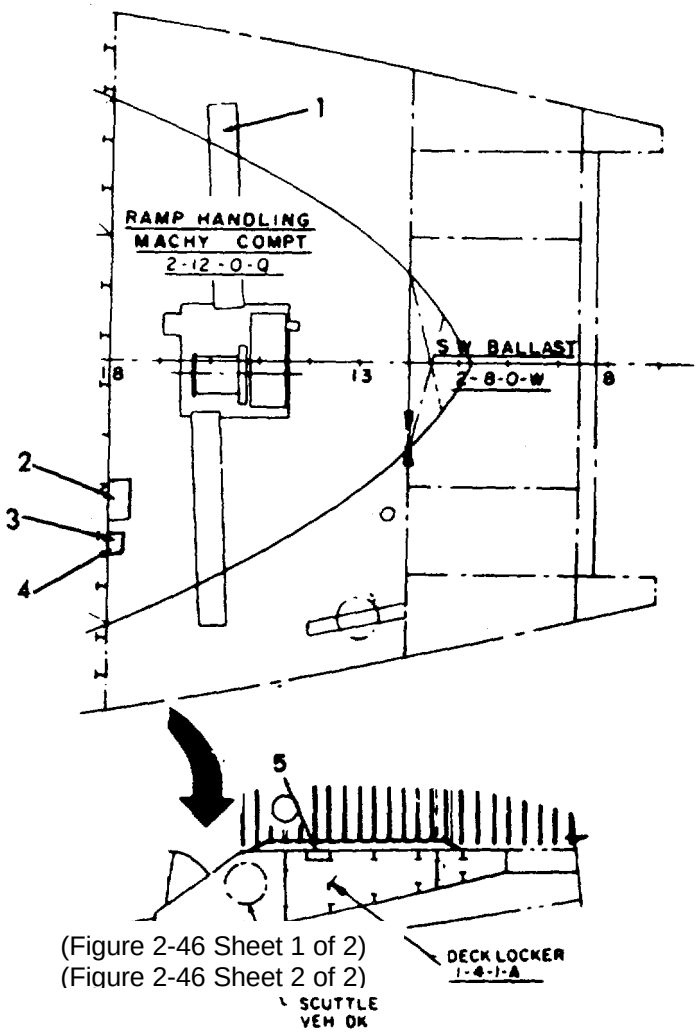

*Figure 2-45. Lighting Distribution Panel (L-100).*

Legend Figure 2-45.

1. PILOT HOUSE DIST PNL - Distribution to Panel L-105. (Circuit breaker 15 amps).
2. AFT ENG RM PNL - L-101 - Distribution to Panel L-101 located in the Aft Engine Room. (Circuit breaker 30 amps).
3. CREW & TRANSIENT BERTH PNL - L-104 - Distribution to Panel L-104 located in Crew and Transient Berthing Compartment. (Circuit breaker 30 amps).
4. FWD DIST BOX L-105 - To darken switch in Pilot House. Then, to lighting distribution Panel L-105, located in Crew and Transient Berthing. (Circuit breaker 30 amps).
5. SPARE - (Circuit breaker 15 amps).
6. VENT DIST BOX - Distribution to vent panel L-106. (Circuit breaker 20 amps).
7. FWD ENG RM PNL L-107 - Distribution to Panel L-107 located in Forward Engine Room. (Circuit breaker 25 amps).
8. GALLEY & MESS - L-108 - Distribution to Panel L-108 located in Galley and Mess. (Circuit breaker 30 amps).
9. SPARE - (Circuit breaker 15 amps).
10. RECPT PNL - Distribution to Panel L-110. (Circuit breaker 30 amps).

## 2-6. RAMP HANDLING MACHINERY COMPARTMENT AND BOW RAMP.

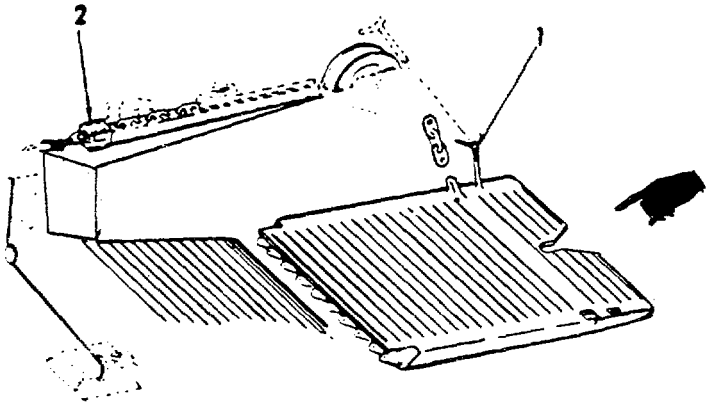
The Operator Controls and Indicators for the Bow Ramp in the Ramp Handling Machinery Compartment (2-12-0-Q) are shown in Figure 2-46. Figure 2-46 also contains an Index to the Controls and Indicators on the various components.




(Figure 2-46 Sheet 1 of 2)
(Figure 2-46 Sheet 2 of 2)

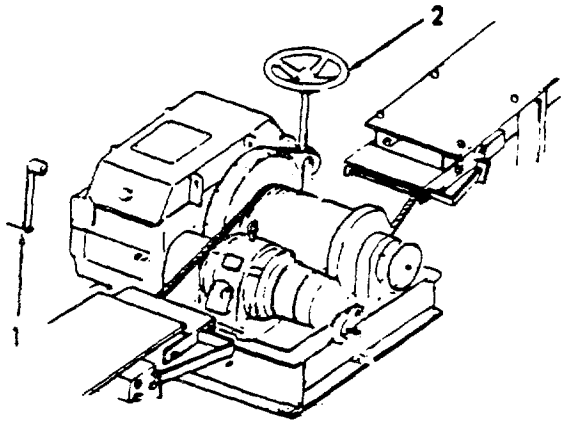
*Figure 2-46. Bow Ramp Machinery. (Sheet 1 of 2)*

| Item Number | Description | See Figure |
|---|---|---|
| 1. | Bow Ramp Winch | 2-47 |
| 2. | Bow Ramp Controller | 2-48 |
| 3. | Bow Ramp Disconnect Switch | 2-49 |
| 4. | Bow Ramp Local Control | 2-50 |
| 5. | Bow Ramp Remote Control | 2-51 |



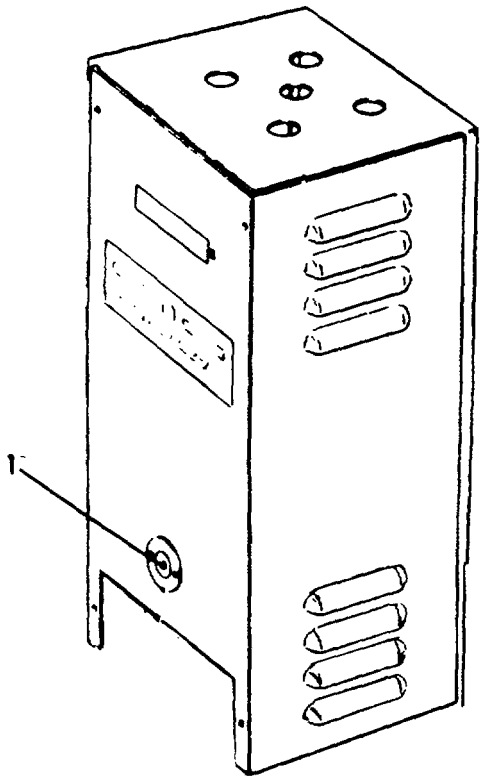

1. CHAIN STOP BLOCK - Stops and locks chain in any position.
2. T-Bolt - Keeps the Bow Ramp in the closed position.

*Figure 2-46. Bow Ramp Machinery. (Sheet 2 of 2)*




1. HAND CRANK - Used to raise or lower Ramp manually.
2. BRAKE - Used to slow down or stop the lowering of the Ramp.

*Figure 2-47. Bow Ramp Winch.*




1. RESET - Press to reset button.

*Figure 2-48. Bow Ramp Controller.*

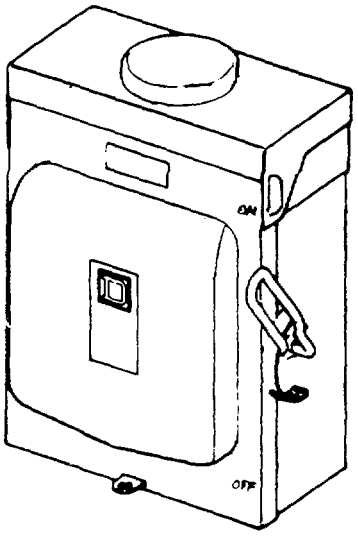
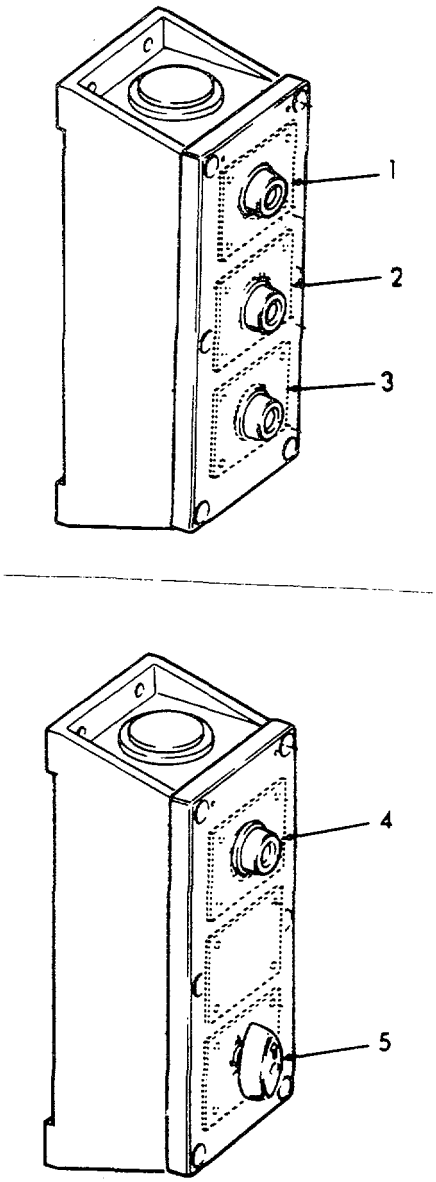
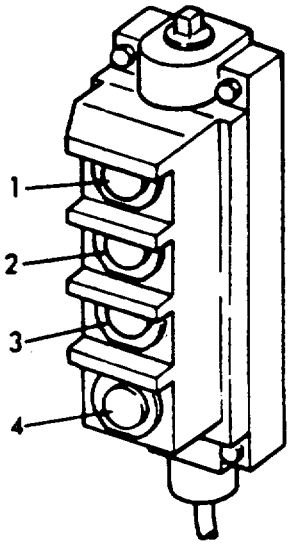



*Figure 2-49. Bow Ramp Disconnect Switch.*




1. RAISE - Press to raise Bow Ramp.
2. LOWER - Press to lower Bow Ramp.
3. EMG RUN - In an emergency, press at the same time, the Emg Run button, and either the RAISE or LOWER button.
4. STOP - Press to stop the raising or lowering of Ramp.
5. LOCAL/REMOTE - Rotate to select local or remote operation.

*Figure 2-50. Bow Ramp Local Control.*



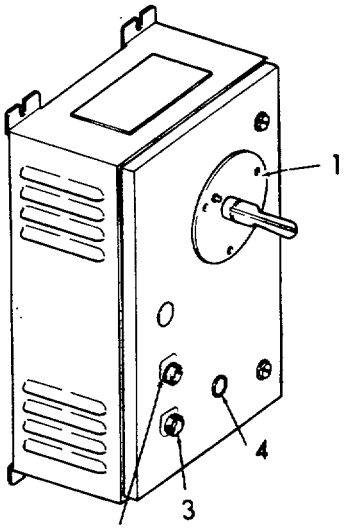

1. EMG RUN - In an emergency, press at the same time, the Emg Run button, and either the RAISE or LOWER button.
2. RAISE - Press to raise the Bow Ramp.
3. LOWER - Press to lower the Bow Ramp.
4. STOP - Press to stop the raising or lowering of the Ramp.

*Figure 2-51. Bow Ramp Remote Control In Deck Locker.*

## 2-7. AIR CONDITIONING MACHINERY ROOM.

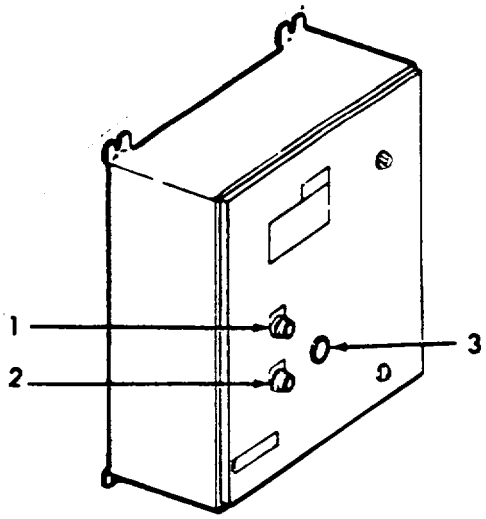
The Operator Controls and Indicators for the Air Conditioning Machinery Room (2-28-1-H) are shown in Figure 2-52. Figure 2-52 contains an Index to the components in the room. Figure 2-52 also shows various components that are used during turn on and off operations. These components are contained in the operation section of this manual.

| ITEM NUMBER | DESCRIPTION | FIGURE NUMBER |
|---|---|---|
| 1. | Main Air Circulating Vent Motor Controller | 2-53 |
| 2. | Sea Water Pump Motor Controller | 2-54 |
| 3. | Compressor Motor Controller | 2-55 |



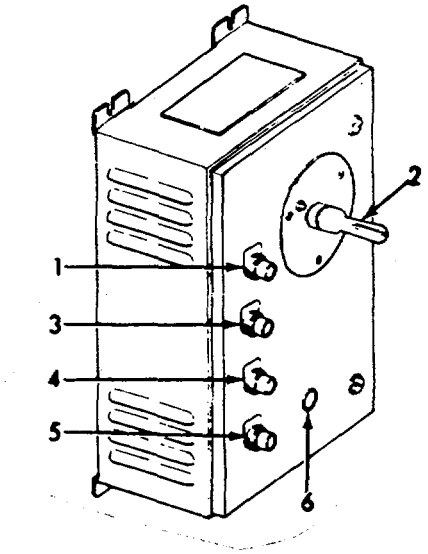

1. DISCONNECT - Stops power running from air circulating vent fans.
2. START - Starts air circulating vent fans.
3. STOP - Stops air circulating vent fans.
4. RESET - Resets the air circulating vent fans.

*Figure 2-52. Main Air Circulating Vent Controller Air Conditioning Machinery Room. (Galley - Pilothouse - Crews' Berthing)*




1. START - Press to start the sea water pump motor.
2. STOP - Press to stop the sea water pump motor.
3. RESET - Press to reset the controller motor.

*Figure 2- 53. Sea Water Pump Controller.*




1. LP BY-PASS - Low Pressure By-pass (momentary switch).
2. DISCONNECT - Stops the power that enables A/C Compressor Motor to be operated.
3. START - Starts the A/C Compressor Motor.
4. STOP - Stops the A/C Compressor Motor.
5. RESET - A/C Compressor Motor Contactor Reset. Push at same time.
6. RESET - A/C Compressor Motor Contactor Reset. Push at same time.

*Figure 2-54. Compressor Motor Controller.*

## 2-8. CREW AND TRANSIENT BERTHING.

The Operator Controls and Indicators for the Crew And Transient Berthing Compartment (2-33-2-L) are shown in Figure 2-55. Figure 2-55 also contains an Index to the components in the room.

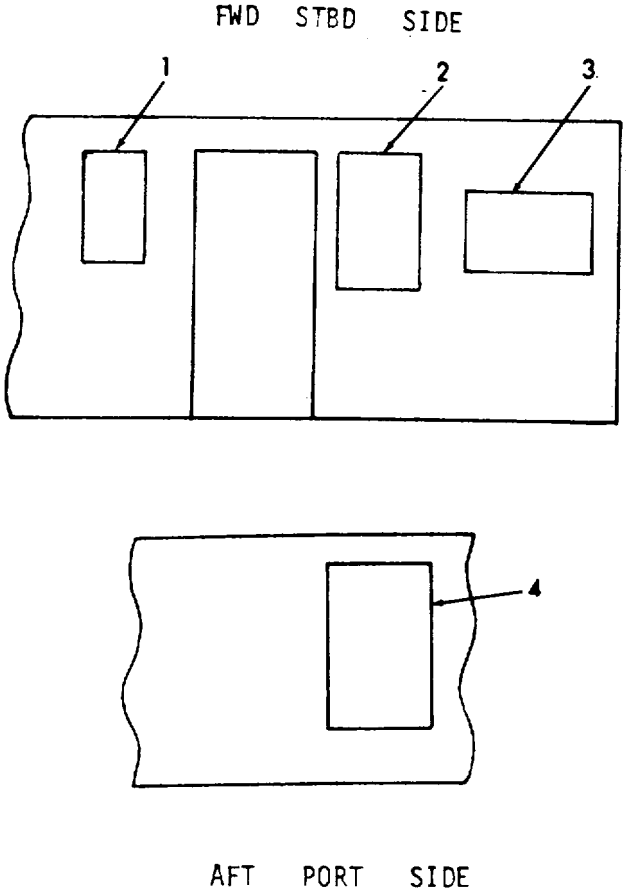
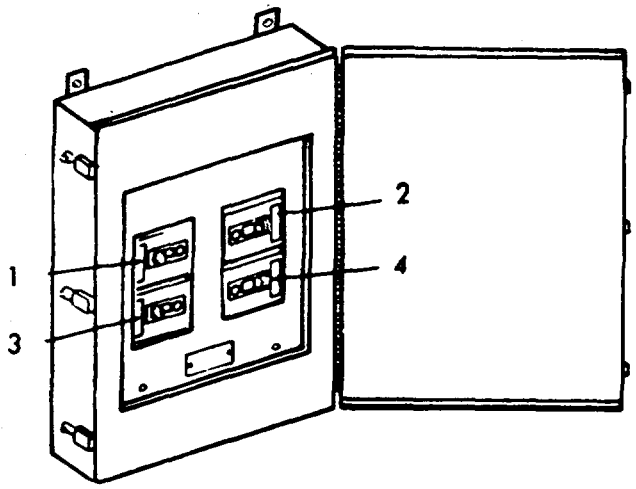


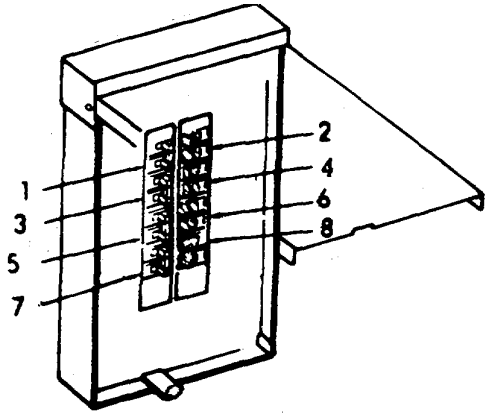

*Figure 2-55. Crew And Transient Berthing.*

| ITEM NUMBER | DESCRIPTION | FIGURE NUMBER |
|---|---|---|
| 1. | Power Distribution Panel (P-406) | 2-56 |
| 2. | Lighting Distribution Panel (L-104) | |
| 3. | Heater Panel (P-409) | 2-58 |
| 4. | Lighting Distribution Panel (L-105) | 2-59 |



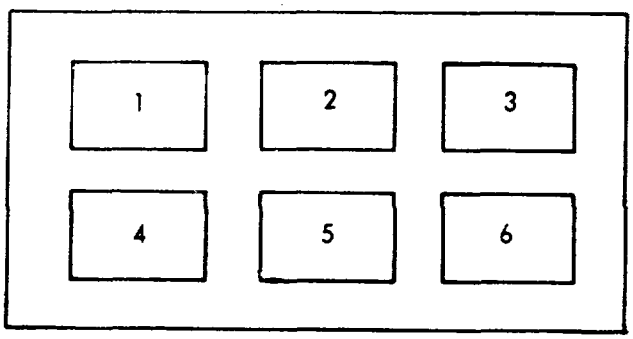

1. VENT - Power to the vent in the Air Conditioning Machinery Room (2-28-1-H). (Circuit breaker 15 amps).
2. A/C COND SALT WATER PUMP - Power to the Salt Water Pump located in the Air Conditioning Machinery Room. (Circuit breaker 15 amps).
3. A/C UNIT - Power to the Air Conditioning unit located in the Air conditioning Machinery Room. (Circuit breaker 15 amps).

*Figure 2- 56. Power Distribution Panel (P-406).*



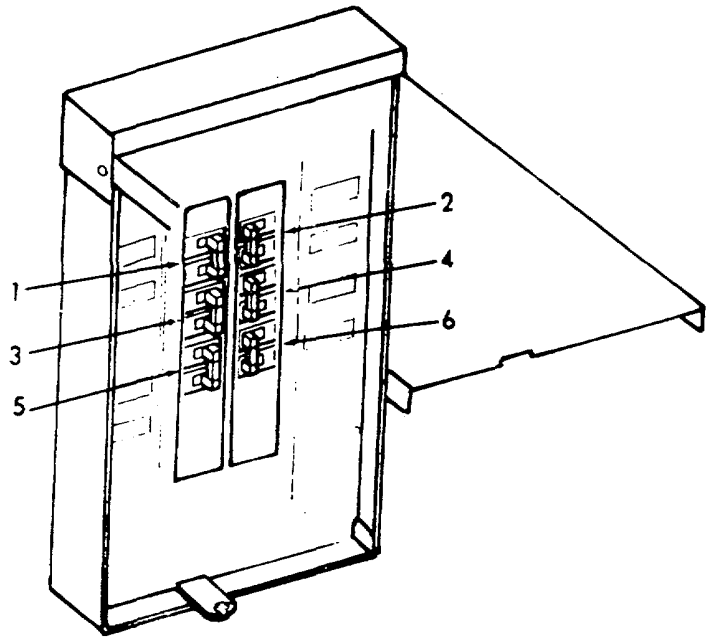

1. STORES LIGHTS - Power to the lights in the dry provision Store Room (2-23-2-A).
2. REFRIG #2 - Power to Refrigerator #2.
3. FWD COMP & MAIN DECK LIGHTS - Power to lights in the Forward Compartments (1-4-2-A and 1-4-1-A) and the lights on the Main Deck.
4. BOSUN AND RAMP COMP LIGHTS - Power to the lights in the Bosun Stores (2-23-0-Q), Special Clothing (2-18-0-4-) and the Ramp Handling Machinery Compartment.
5. PILOT HOUSE LIGHTS - Power to the lights in the Pilot House.
6. WINDSHIELD WIPER AND CONSOLE LIGHTS - Power to the windshield Wiper and Steering Console lights.
7. REFRIG #1 - Power to Refrigerator #1.
8. SPARE

*Figure 2-57. Lighting Distribution Panel (L-104).*




1. SEWAGE AIR BLOWER - Power to Sewage Air Blower located in Tank and Auxiliary Machinery Compartment.
2. CREWS' BERTH HEATER - Power to the heater.
3. A/C ROOM HEATER - Power to the Heater.
4. REFRIG RM HEATER - Power to the heater.
5. PILOT HOUSE HEATER - Power to the heater.
6. GALLEY HEATER - Power to the heater.

*Figure 2-58. Heater Panel P-409.*




1. WASH RM LIGHTS - Power to lights in Wash Room (1-46-1-L).
2. GALLEY AND MESS LIGHTS - Power to lights in Galley/Mess (1-35-1-L).
3. GALLEY RM LIGHTS - Power to the lights in the Galley.
4. CREWS' BERTH LIGHTS - Power to lights in Crew/Transient Berthing Compartment (2-33-2-L).
5. CREWS' BERTH LIGHTS - Power to lights in Crew/Transient Berthing Compartment (2-33-2-L).
6. BUNK LIGHTS - Power to lights in Crew/Transient Berthing Compartment (2-33-2-L).

*Figure 2-59. Lighting Distribution Panel (L-105).*

## 2-9. TANK AND AUXILIARY MACHINERY COMPARTMENT.

The Operator Controls And Indicators for the Sewage Treatment Plant which is located in the Tank And Auxiliary Machinery Compartment (2-40-0-Q), are shown in Figure 2-60. Figure 2-60 also contains an Index to the components in the compartment.

Legend Figure 2-60:

| ITEM NUMBER | DESCRIPTION | FIGURE NUMBER |
|---|---|---|
| 1. | Sewage Pump #1 Controller | 2-61 |
| 2. | Sewage Pump #2 Controller | 2-61 |
| 3. | Sewage Air Pump Controller | 2-62 |
| 4. | Macerator #1 Controller | 2-63 |
| 5. | Macerator #2 Controller | 2-63 |
| 6. | Macerator #1 Disconnect Switch | 2-64 |
| 7. | Macerator #2 Disconnect Switch | 2-64 |
| 8. | Macerator Pump Selector Switch | 2-65 |

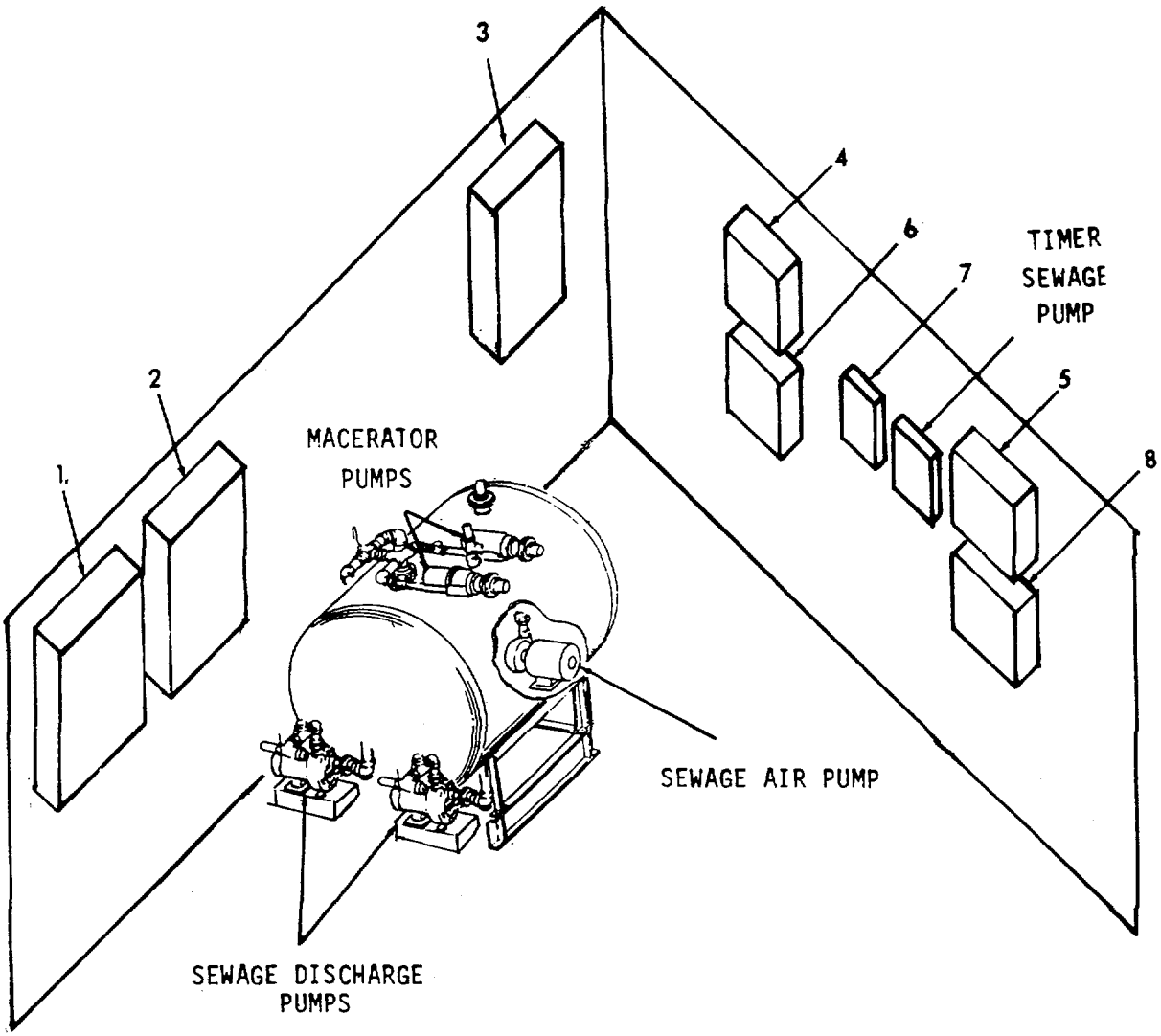
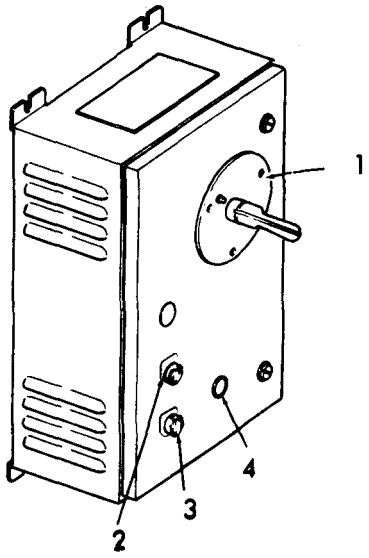
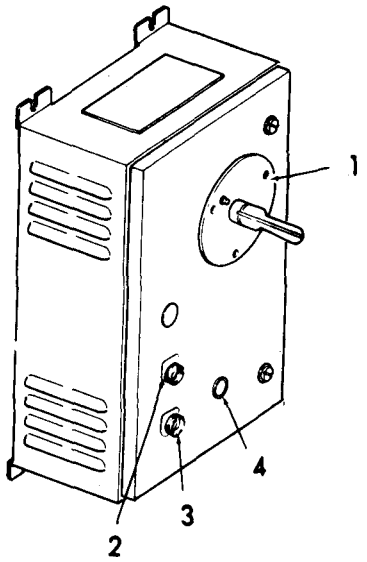



*Figure 2- 60. Sewage Treatment Plant.*



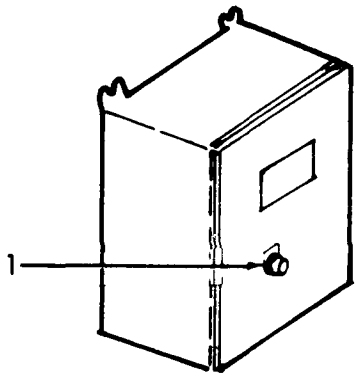

1. DISCONNECT - Disconnects power that runs from the sewage pump controller.
2. START - Starts the Sewage Pump.
3. STOP - Stops the Sewage Pump.
4. RESET - Resets the Controller.

*Figure 2- 61. Sewage Pumps #1 and #2 Controller.*



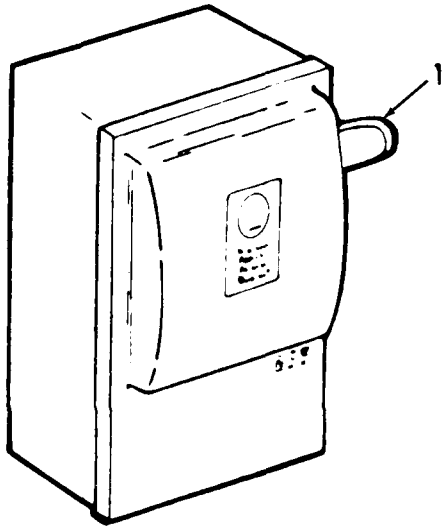

1. DISCONNECT - Disconnects power that runs from the Sewage Air Pump Controller.
2. START - Starts the Sewage Air Pump.
3. STOP - Stops the Sewage Air Pump.
4. RESET - Resets the Controller.

*Figure 2-62. Sewage Air Pump Controller.*



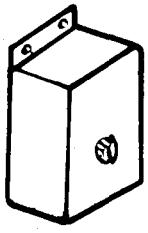

1. STOP AND START - Used to start and stop Controller.

*Figure 2-63. Macerator #1 and #2 Controllers.*




1. DISCONNECT SWITCH - Disconnects power running from the Controller.

*Figure 2-64. Macerator #1 and #2 Disconnect Switch.*



1. SELECTOR SWITCH - Selects between pump number 1 and number 2.

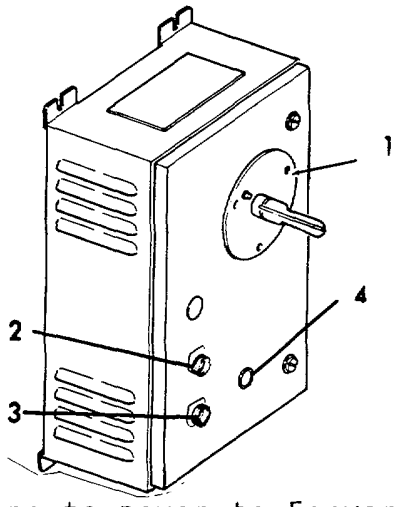
*Figure 2-65. Macerator Pump Selector Switch.*

2-10. **FORWARD ENGINE ROOM.**

a. The Controls located in the Forward Engine Room (2-50-0-E) are shown in Figure FO-33. The list below contains an index to the components in the room.

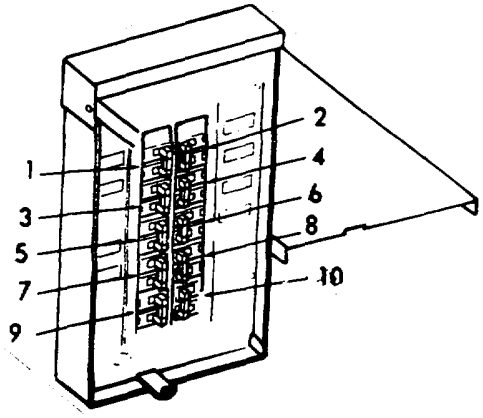
| ITEM NUMBER | DESCRIPTION | FIGURE NUMBER |
|---|---|---|
| 1. | Forward Engine Room Vent Controller | 2-66 |
| 2. | Lighting Distribution Panel (L-107) | 2-67 |
| 3. | Fresh Water Controller | 2-68 |
| 4. | Sea Water Service Pump Controller | 2-69 |
| 5. | Power Distribution Panel (L-106) | 2-70 |
| 6. | Power Distribution Panel (P-408) | 2-71 |
| 7. | Power Distribution Panel (P-408A) | 2-72 |
| 8. | Lube Oil Pump Controller | 2-73 |

b. The instrument panel for the Main Propulsion Engine is shown in Figure 2-74. Figure 2-75 shows the instrument panel for the Generator Engine.



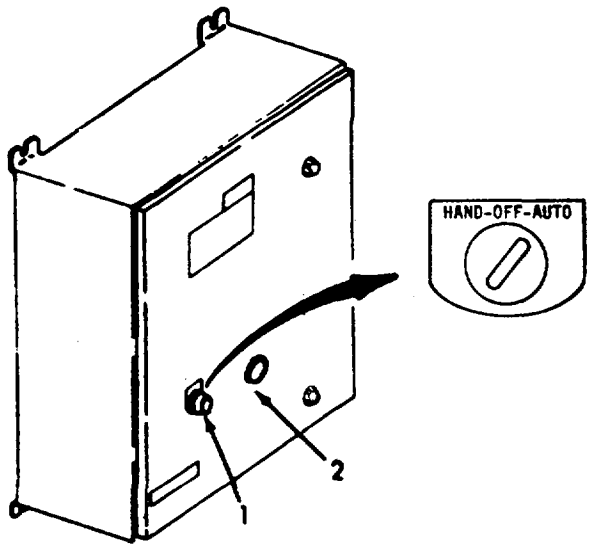

1. DISCONNECT - Disconnects power to Forward Engine Room vent.
2. START - Starts Forward Engine Room's vent.
3. STOP - Stops Forward Engine Room's vent.
4. RESET - Resets Forward Engine Room vent controller.

*Figure 2-66. Forward Engine Room Vent Controller.*



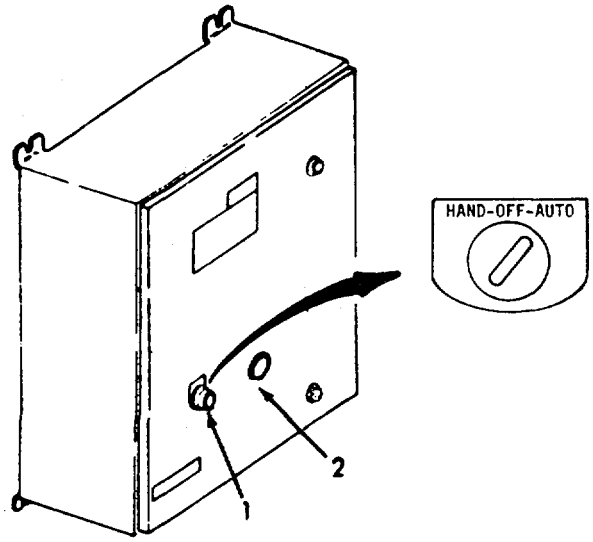

1. MACH ROOM LIGHTS - Power to lights in Tank and Auxiliary Machinery Compartment (2-40-0-Q).
2. FWD ENGINE RM LIGHTS - Power to lights in Forward Engine Room (2-50-0-E).
3. AUX MACH RM LIGHTS - Power to lights in Tank and Auxiliary Machinery Compartment (2-40-0-Q).
4. FWD ENG RM LIGHTS - Power to lights in Forward Engine Room (2-50-0-E).
5. SWITCH BD RM LIGHTS - Power to lights in Switchboard Room area of Engine Room Access Compartment (1-50-1-Q).
6. SWITCH BD RM LIGHTS - Power to lights in Switchboard Room area of Engine Room Access Compartment (1-50-1-Q).
7. TANK LEVEL IND - Power to the Tank Level Indicators in Aft Engine Room (2-56-0-E) and Engine Access Room (1-50-1-Q).
8. MAIN ENG START SYS - Power to the starting system for the Main Propulsion Engines.
9. OIL/WATER SEPARATOR - 20 AMP GANGED.

*Figure 2-67. Lighting Distribution Panel (L-107). (Forward Engine Room Frame 49 Port)*



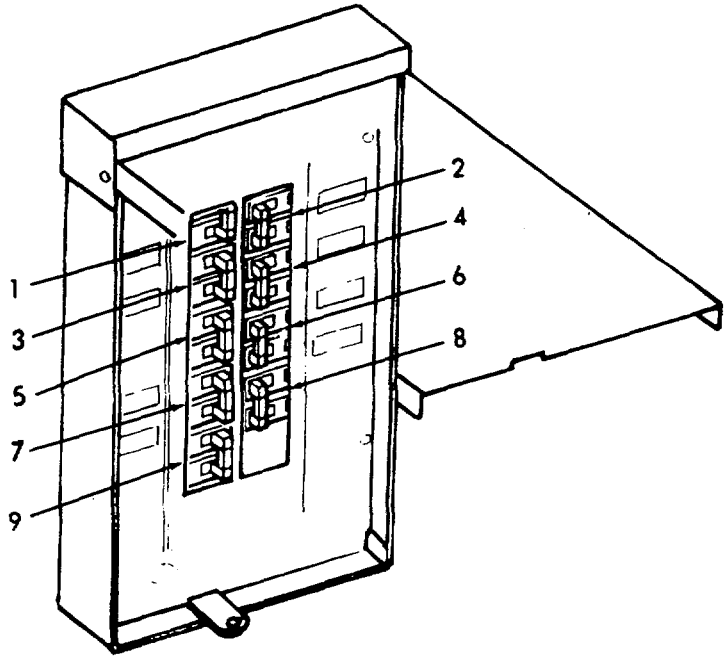

1. HAND-OFF-AUTO - Selector switch for momentary local operation, system off, or automatic operation.
2. RESET - Press to reset controller.

*Figure 2-68. Fresh Water Pump Controller.*




1. HAND-OFF-AUTO - Selector switch for momentary local operation, system off, or automatic controller.
2. RESET - Press to reset controller.

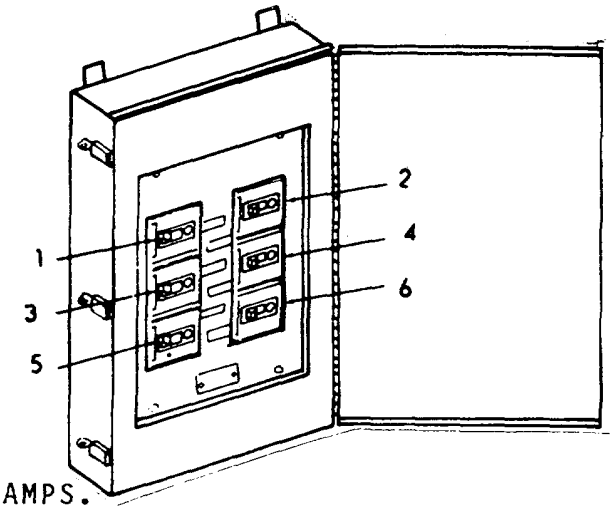
*Figure 2-69. Sea Water Pump Controller.*




ALL CIRCUIT BREAKERS ARE 15 AMPS.

1. ANCHOR WINCH RM EXH - Power to Exhaust Fan in Ancnor Winch Room (2-62-0-Q)
2. A/C ROOM VENT FAN - Power to Ventilation Fan in Air Conditioning Machinery Room (2-28-1-H).
3. RAMP COMPARTMENT EXH - Power to Exhaust Fan in the Ramp Handling Machinery Compartment (2-12-0-Q).
4. MAGAZINE VENT FAN - Power to Exhaust Fan in Magazine (2-28-2-M).
5. SEWAGE COMP HEATER - Power to Heater in Sewage Treatment area of Tank and Auxiliary Machinery Compartment (2-40-0-Q).
6. VENT HEATER CHIEFS QTRS - Power to Ventilator and Heater in Ward/ Room/Stateroom Compartment (2-33-2-L).
7. VENT HEATER/FAN INTERLOCK - Power.
8. A/C ROOM HEATER - Power to Heater in Air Conditioning Machinery Room (2-28-1-H).
9. BATTERY VENT - Power to Ventilator Fan for batteries in the Pilot House (1-27-1-C).

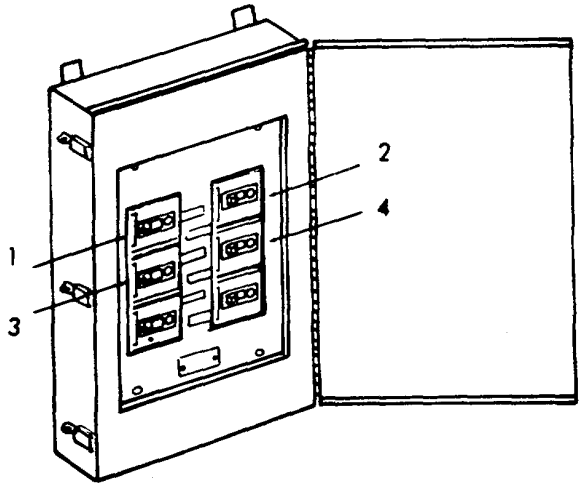
*Figure 2-70. Power Distribution Panel (L-106) (Forward Engine Room Frame 50 Stbd).*




ALL CIRCUIT BREAKERS ARE 15 AMPS.

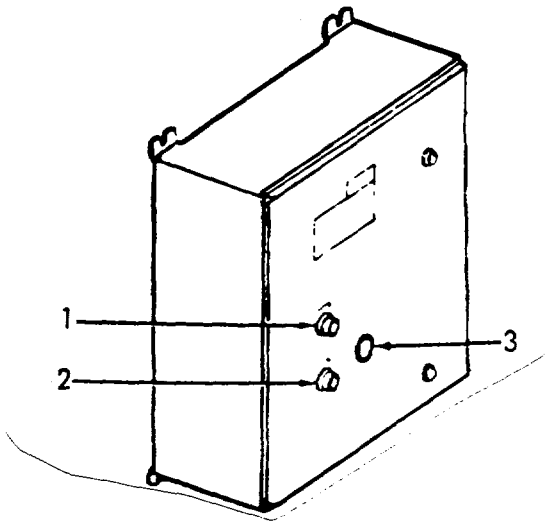
1. HOT WATER HEATER - Power to Hot Water Heater/Forward Engine Room.
2. DIESEL OIL COOLING PUMP - Power to Diesel Oil Cooling Pump in Forward Engine Room.
3. FWD ENG RM EXH - Power to Exhaust Fan in Forward Engine Room.
4. AFT ENG RM EXH - Power to Exhaust Fan in Aft Engine Room.
5. 5K VA XFMR - Power to Step-down Transformer for Sewage Discharge Pump in Tank and Auxiliary Machinery Compartment (2-40-0-Q).
6. VENT 1-49-1 - Power to Ventilating Fan in Engine Access Room (1-50-1-Q).

*Figure 2- 71. Power Distribution Panel (P-408).*



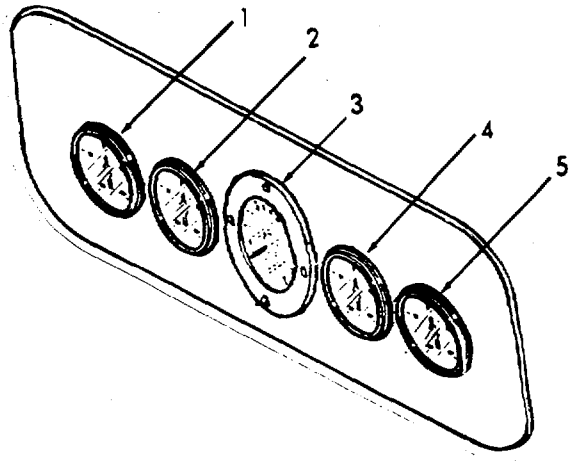

1. FRESH WATER PUMP - Power to the fresh water pump in the Forward Engine Room. (Circuit breaker 15 amps).
2. FWD RED GEAR L/O PUMP - Power to the lube oil pump for the Port Propulsion Engine. (Circuit breaker 15 amps).
3. CENTRAL HYDRAULIC SYSTEM - (Circuit breaker 20 amps).
4. AFT RED GEAR L/O PUMP - Power to the lube oil pump for the Starboard Propulsion Engine located in the Aft Engine Room. (Circuit breaker 25 amps.

*Figure 2-72. Forward Engine Room (P-408A).*



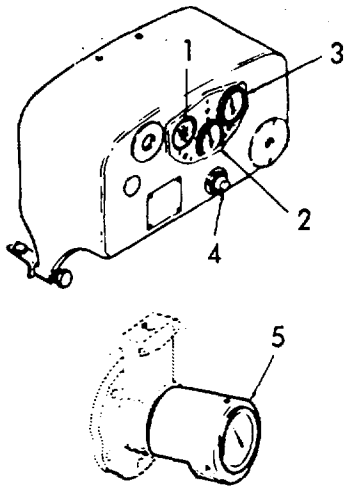

1. START - Starts Lube Oil Pump Motor.
2. STOP - Stops Lube Oil Pump Motor.
3. RESET - Resets Lube Oil Pump Motor Controller.

*Figure 2-73. Controller-Lube Oil Pump Motor.*




1. ENGINE OIL PRESSURE - Measures the oil pressure of the Main Engine.
2. MARINE GEAR OIL PRESSURE - Measures the oil pressure of the Marine Gear.
3. TACHOMETER - Records the speed of the engine.
4. WATER TEMPERATURE - Records the temperature of the water in the engine.
5. AMMETER (0-60A) - Measures the electric current in the engine.

*Figure 2-74. Instrument Panel - Main Propulsion Engine (Forward Engine Room).*




1. WATER TEMPERATURE - Records the temperature of the water in the Generator Engine.
2. AMMETER BATTERY CHARGE - Indicates the rate of charge to the Battery.
3. OIL PRESSURE - Measure oil pressure in the Generator Engine.
4. STARTING SWITCH - Starts the Generator Engine.
5. TACHOMETER - Measures the speed of the Generator Engine.

*Figure 2-75. Instrument Panel - Generator Engine.*

2-11. **AFT ENGINE ROOM.**

a. The Controls and Indicators located in the Aft Engine Room (2-56-0-E) are shown in Figure 2- 76. Figure 2-76 -also contains an Index to the components in the room.

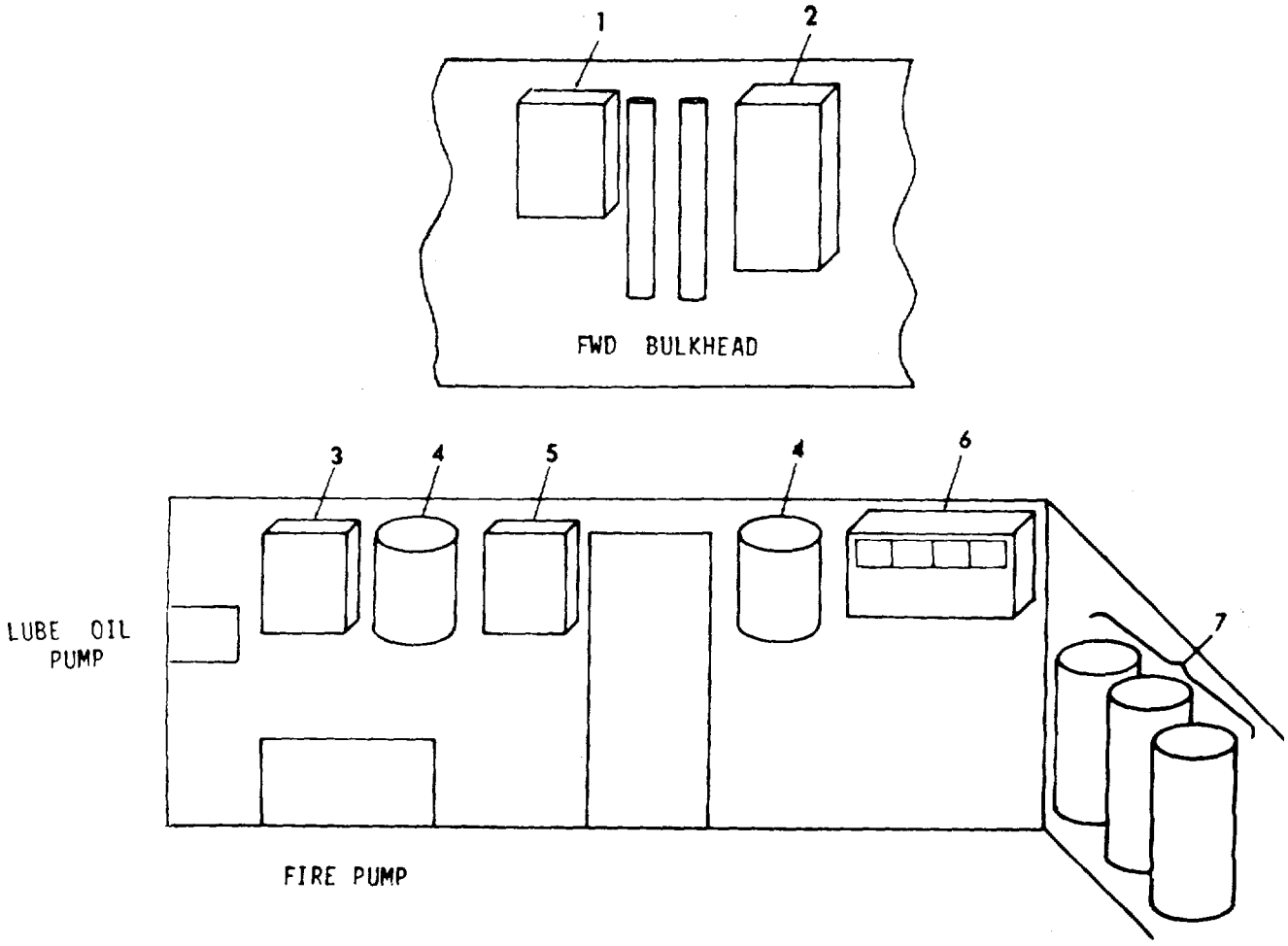
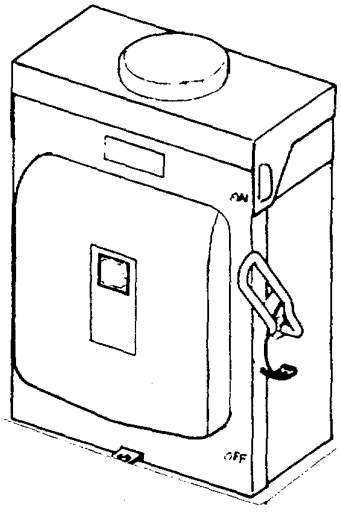



*Figure 2-76. Aft Engine Room.*

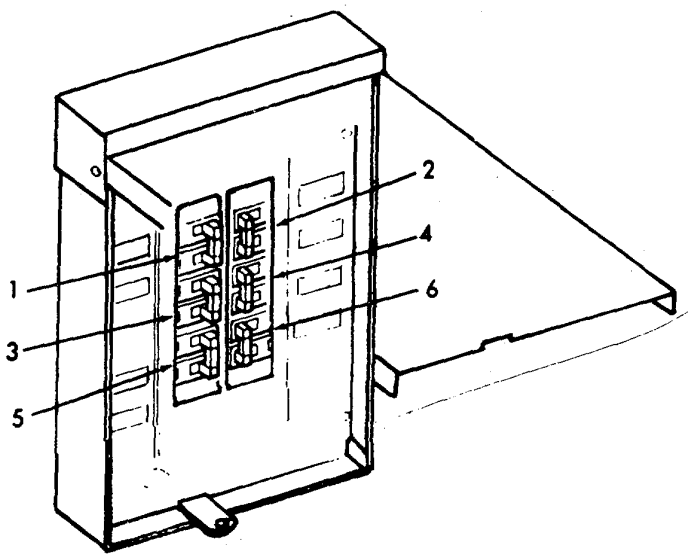
| ITEM NUMBER | DESCRIPTION | FIGURE NUMBER |
|---|---|---|
| 1. | Exhaust Vent Disconnect Switch | 2-77 |
| 2. | Lighting Distribution Panel (L-101) | 2-78 |
| 3. | Lube Oil Pump Controller | 2-79 |
| 4. | Shaft Seal Tank | 2-80 |
| 5. | Fire Pump Controller | 2-81 |
| 6. | Tank Level Indicators | 2-82 |
| 7. | Oil/Water Separator | 2-83 |

b. The instrument panel for the Propulsion Engine is shown in Figure 2-84. Figure 2-85 shows the instrument panel for the Generator Engine.




1. DISCONNECT SWITCH - When switch is turned off, exhaust fan will not operate. When switch is on, exhaust fan can be operated.

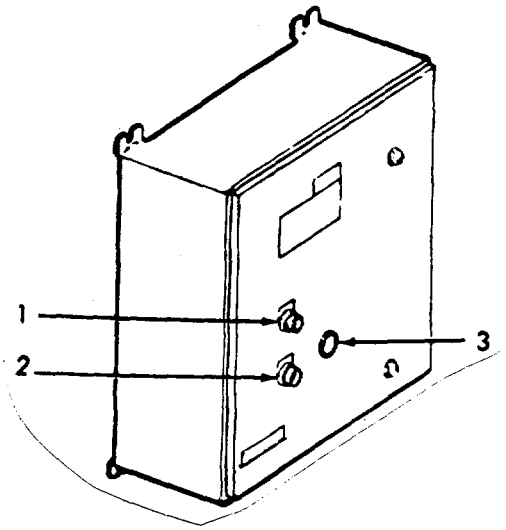
*Figure 2-77. Exhaust Fan Disconnect Switch (2-57-2).*




ALL CIRCUIT BREAKERS ARE 15 AMPS.

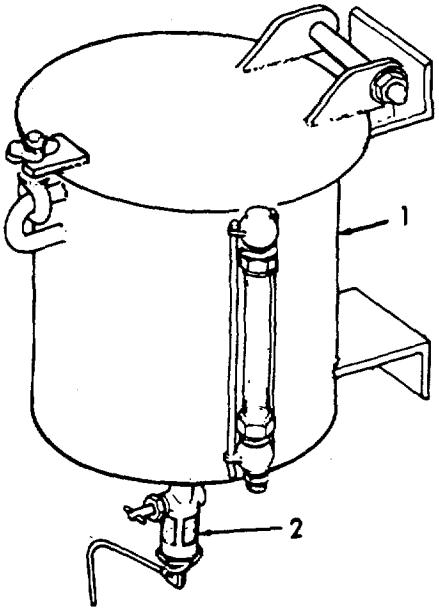
1. ANCHOR WINCH ROOM LIGHTS - Power to the lights in the Anchor Winch Room (2-62-0-Q).
2. AFT ENGINE ROOM LIGHTS - Power to the lights in the Aft Engine Room.
3. ANCHOR WINCH ALARM - Power to the Anchor Winch Alarm located on the vehicle deck near the anchor.
4. STEERING GEAR RM LIGHTS - Power to the lights in the Steering Gear Room (2-70-0-Q).
5. SPARE
6. ANCHOR START/HYDRAULIC CONTROL - Power to the Anchor Winch Engine.

*Figure 2-78. Lighting Distribution Panel (L-101).*



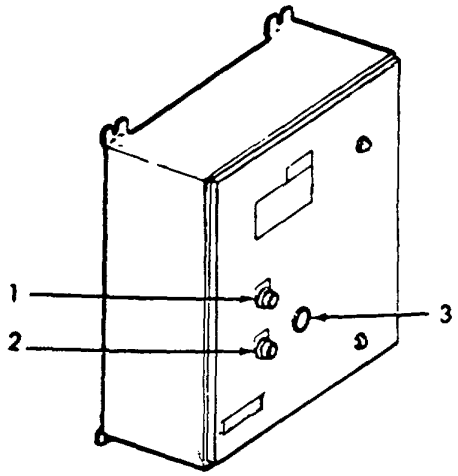

1. START - Starts the Lube Oil Pump Motor.
2. STOP - Stops the Lube Oil Pump Motor.
3. RESET - Resets the Lube Oil Pump Motor Controller.

*Figure 2-79. Lube Oil Pump Motor Controller.*



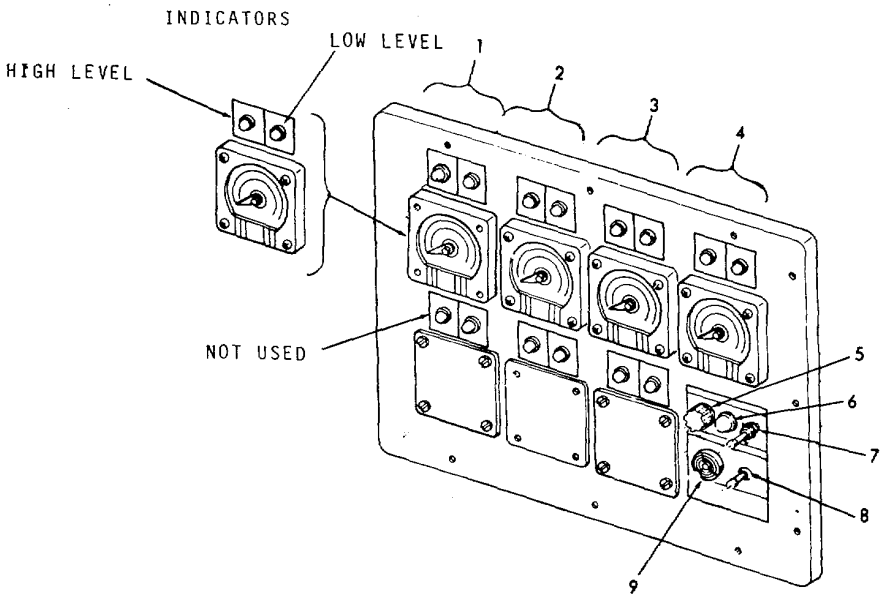

1. SIGHT GLASS - Indicates level of contents.
2. VALVE - Adjustment for drip of water and drip sight glass.

*Figure 2-80. Shaft Seal Tank.*



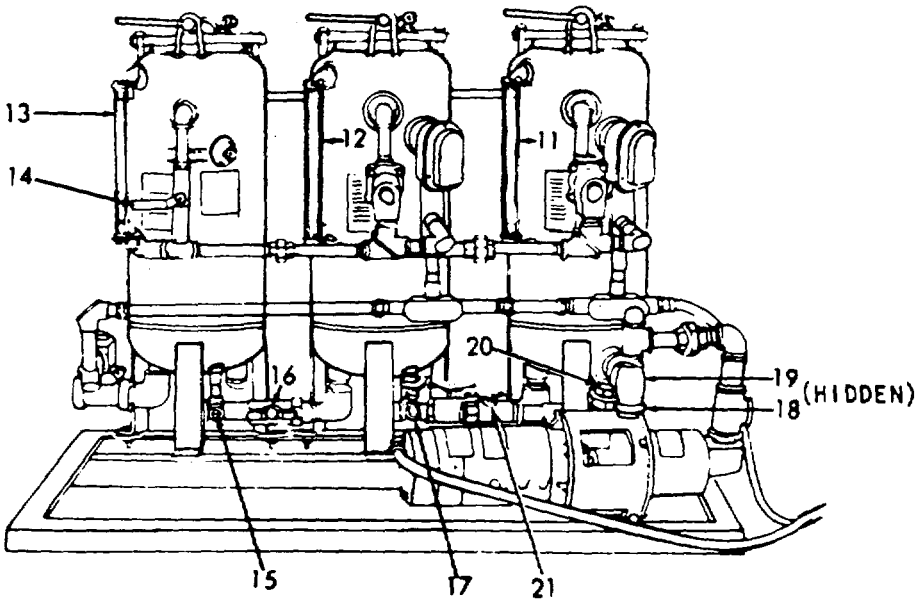

1. START - Starts the Fire Pump Motor.
2. STOP - Stops the Fire Pump Motor.
3. RESET - Resets the Fire Pump Motor Controller.

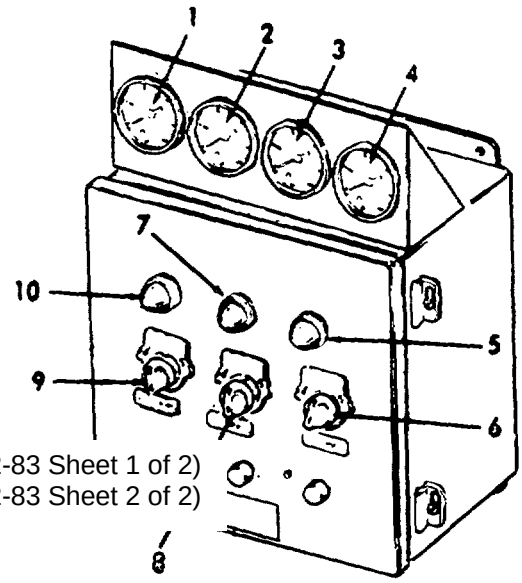
*Figure 2-81. Fire Pump Motor Controller.*




1. S.W. BALLAST (2-66-0-W) - Contents of Sea Water Ballast Tank in the Stern.
2. S.W. BALLAST (2-18-2-W) - Contents of Sea Water Ballast Tank Port side.
3. S.W. BALLAST (2-18-1-W) - Contents of Sea Water Ballast Tank Stbd side.
4. S.W. BALLAST (2-8-0-W) - Contents of Sea Water Ballast Tank in the Bow.
5. FUSE 2 AMP - Circuit protection.
6. INDICATOR - Power on indicator.
7. ON-OFF - Power on/off switch.
8. ALARM SILENCE SW - Turns on/off the Audible Alarm.
9. ALARM - Audible Alarm horn.

*Figure 2-82. Tank Level Indicator - Aft Engine Room.*



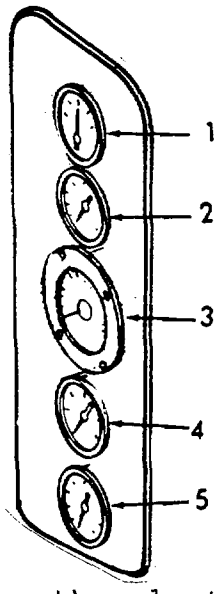




(Figure 2-83 Sheet 1 of 2)
(Figure 2-83 Sheet 2 of 2)

*Figure 2-83. Oil/Water Separator (Sheet 1 of 2).*

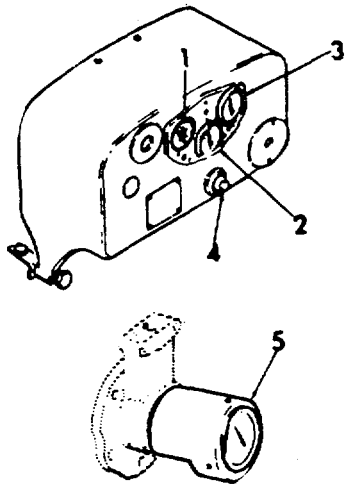
1. INLET PRESSURE GAGE - Needle points to actual fluid pressure at inlet to Prefilter Primary Separator.
2. 2ND STAGE PRESSURE GAGE - Needle points to actual fluid pressure at 2nd stage Prefilter Separator inlet.
3. 3RD STAGE PRESSURE GAGE - Needle points to actual fluid pressure at 3rd stage Separator inlet.
4. 3RD STAGE PRESSURE GAGE - Needle points to actual fluid pressure at 3rd stage Separator outlet.
5. SUPPLY PUMP INDICATOR LIGHT - Lights up when Pump Switch is turned on.
6. SUPPLY PUMP SELECTOR SWITCH - Switch for turning electrical power ON/OFF for Supply Pump.
7. MONITOR INDICATOR LIGHT - Lights up when Monitor Switch is turned on.
8. MONITOR SELECTOR SWITCH - Switch for turning electric ON/OFF for Monitor Light.
9. AUTO CONTROL SELECTOR SWITCH - switch for turning electric ON/OFF to operate the relays and solenoid valves.
10. AUTO CONTROLS INDICATOR LIGHT - Lights up when control circuit is turned on.
11. SIGHT GLASS FOR PREFILTER SEPARATOR - Shows amount of oil in Separator.
12. SIGHT GLASS FOR SECOND STAGE SEPARATOR - Shows amount of oil in Separator.
13. SIGHT GLASS FOR THIRD STAGE SEPARATOR - Shows amount of oil in Separator.
14. OIL DISCHARGE VALVE - Manually operated valve for releasing oil from 3rd stage Separator.
15. SAMPLE/DRAIN VALVE - Manually operated valve to drain or sample water in 3rd stage Separator.
16. INTERVESSEL/SHUTOFF VALVE - Manually operated valve to stop flow of fluid between 2nd and 3rd stage Separators.
17. SAMPLE/DRAIN VALVE - Manually operated valve to drain or sample water in 2nd stage Separator.
18. MANUAL SHUTOFF VALVE - Manually operated valve for discharging engine crankcase oil pumped by supply pump and bypassing the separator.
19. MANUAL SHUTOFF VALVE - Manually operated valve to prevent fluid flow to prefilter Separator.
20. SAMPLE/DRAIN VALVE - Manually operated valve to drain or sample water in prefilter Separator.
21. INTERVESSEL SHUTOFF VALVE - Manually operated valve to prevent fluid flow between prefilter Separator and second stage Separator.

*Figure 2-83. Oil/Water Separator (Sheet 2 of 2).*




1. AMMETER (0-60A) - Measures the electric current in the engine.
2. WATER TEMPERATURE - Records the temperature of the water in the engine.
3. TACHOMETER - Records the speed of the engine.
4. OIL PRESSURE - Measures the oil pressure of the Main Engine.
5. OIL PRESSURE - Measures the oil pressure of the Marine Gear.

*Figure 2-84. Instrument Panel - Main Propulsion Engine (Aft Engine Room).*

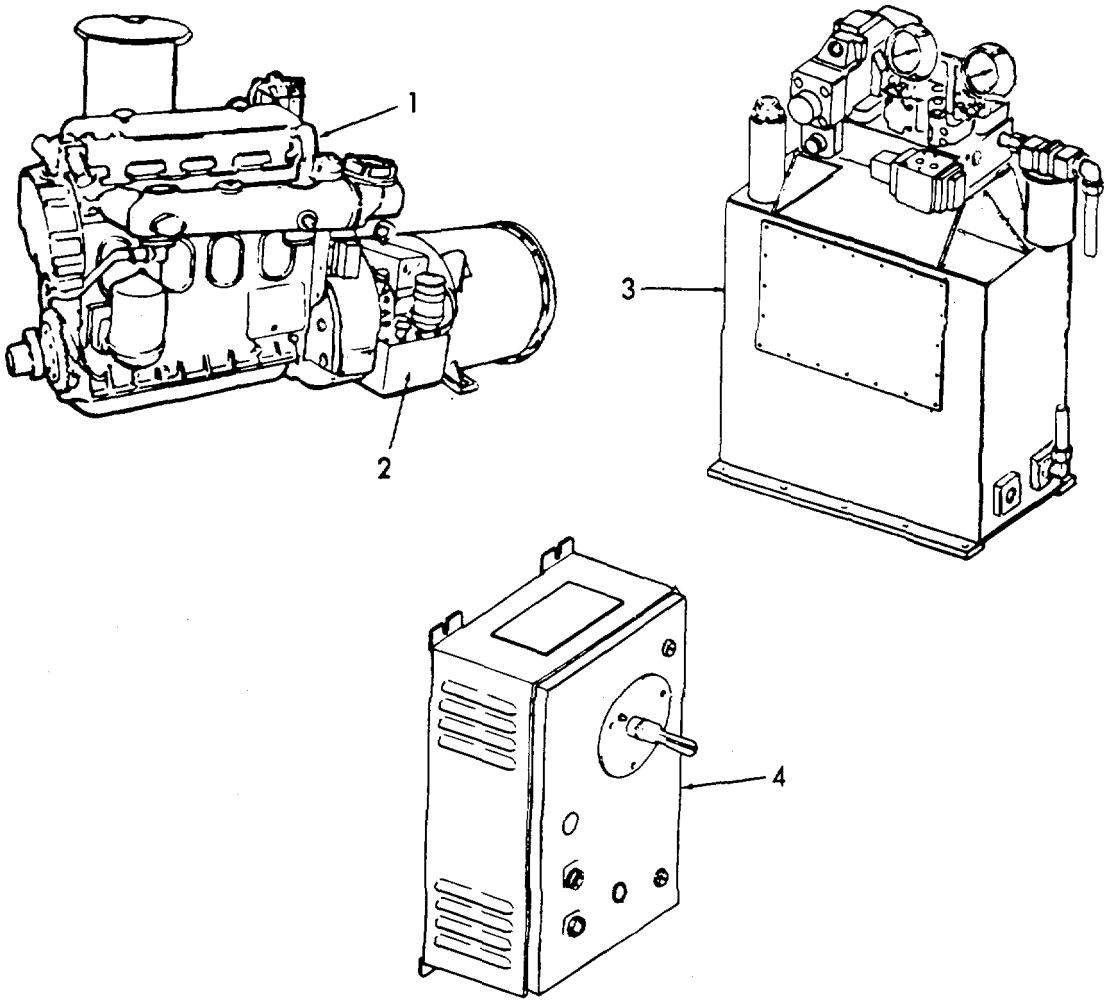



1. WATER TEMPERATURE - Records the temperature of the water in the Generator Engine.
2. AMMETER BATTERY CHARGE - Indicates the rate of charge to the Battery.
3. OIL PRESSURE - Measures the oil pressure in the Generator Engine.
4. STARTING SWITCH - Starts the Generator Engine.
5. TACHOMETER - Records the speed of the Generator Engine.

*Figure 2-85. Instrument Panel - Generator Engine.*

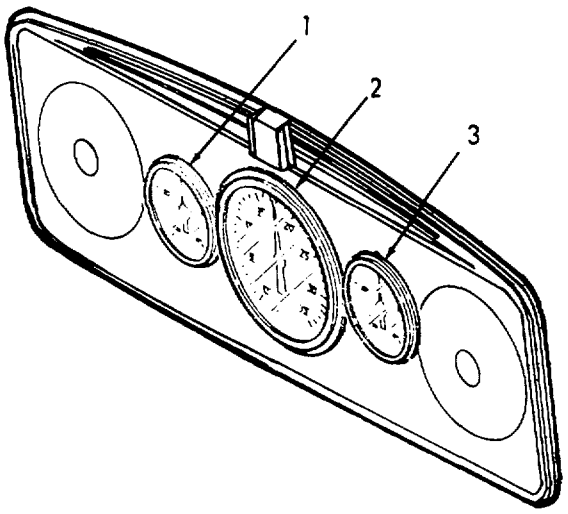
2-12. **ANCHOR WINCH ROOM.**

The Operator Controls and Indicators for the Anchor Winch Room (2-62-0-Q) are shown in Figure 2-86. Figure 2-86 also contains an index to the components in the room



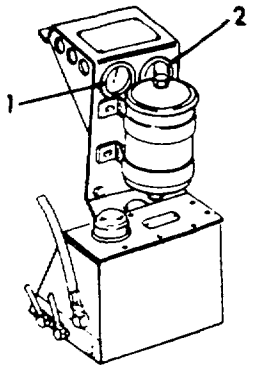

| ITEM NUMBER | DESCRIPTION | FIGURE NUMBER |
|---|---|---|
| 1. | Engine Controls | 2-87 |
| 2. | Torque Converter | 2-88 |
| 3. | Hydraulic Tank | 2-89 |
| 4. | Centralized Hydraulic System Controller | 2-90 |

*Figure 2-86. Anchor Winch Engine Room.*




1. OIL PRESSURE GAGE - Indicates the oil pressure in the Anchor Winch Engine.
2. TACHOMETER - Indicates the speed of the Anchor Winch Engine.
3. WATER TEMPERATURE GAGE - Indicates the temperature of the water in the Anchor Winch Engine.

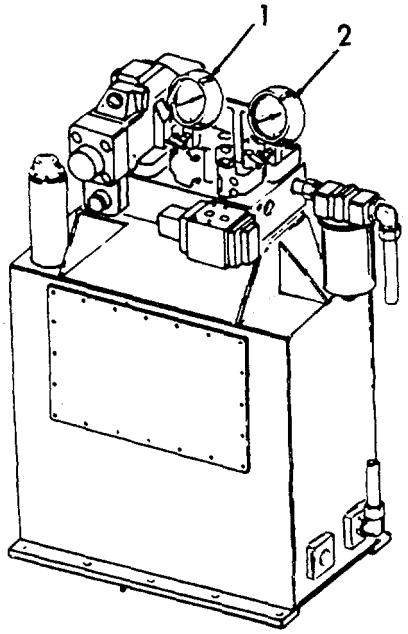
*Figure 2- 87. Anchor Winch Engine Controls And Indicators.*




1. OIL PRESSURE GAGE - Indicates the oil pressure in the Torque Converter.

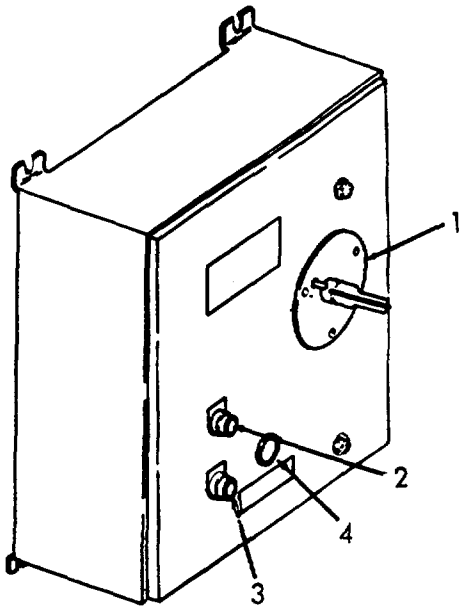
2. OIL TEMPERATURE GAGE - Indicates the temperature of the oil in the Torque Converter.

*Figure 2-88. Torque Converter Indicators*




1. OIL PRESSURE GAGE - (2000 PSI)
2. OIL PRESSURE GAGE - (1000 PSI)

*Figure 2-89. Hydraulic Tank in Anchor Winch Room.*

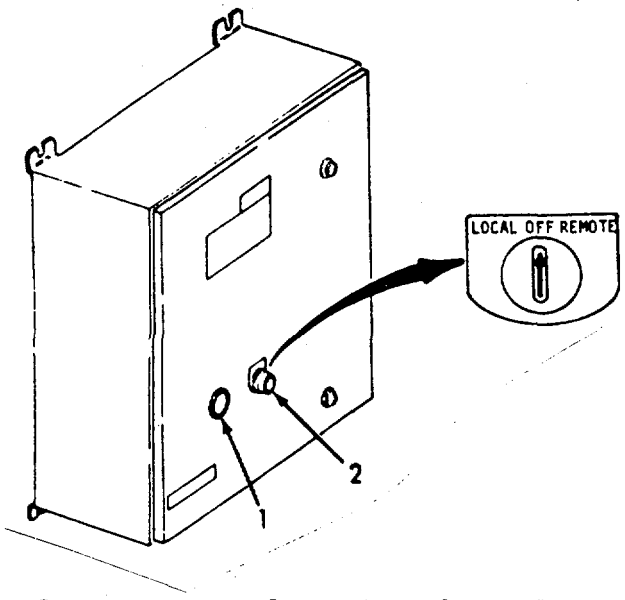



1. DISCONNECT SWITCH - Disconnects power to the Hydraulic Pump.
2. START - Start the Hydraulic Pump.
3. STOP - Stops the Hydraulic Pump.
4. RESET - Resets the Hydraulic Pump Controller.

*Figure 2-90. Centralized Hydraulic System (Winch Engine Room).*

2-13. **STEERING GEAR EQUIPMENT.**

The Operator Controls and Indicators in the Steering Gear Compartment (2-70-0-Q) are shown in Figure 2-91.

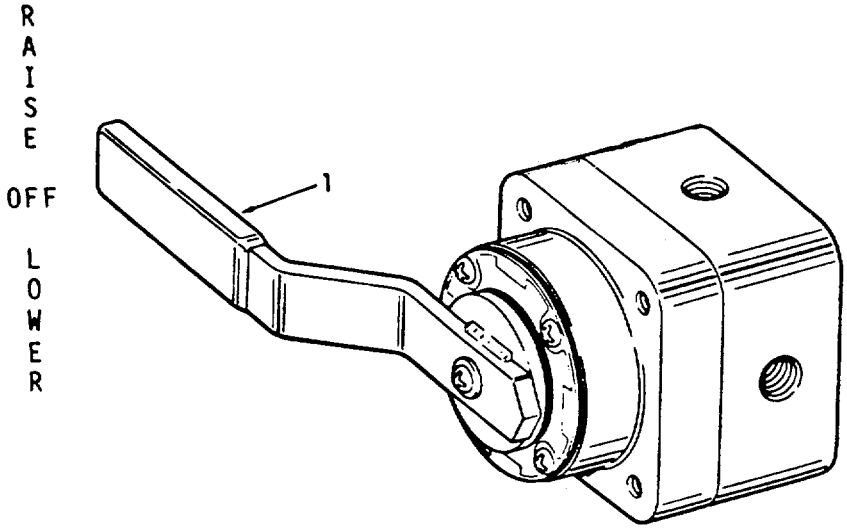



1. LOCAL/REMOTE - Rotate to select Local or Remote operation of Hydraulic Pump Motor. Turn to OFF to stop Hydraulic Pump Motor.

*Figure 2- 91. Hydraulic Pump Motor Controller.*

2-14. **MAST CONTROL.**

The Operator Control for the Mast is shown in Figure 2-92. The Control is located at Frame 38 - Stbd Side Vehicle Deck.

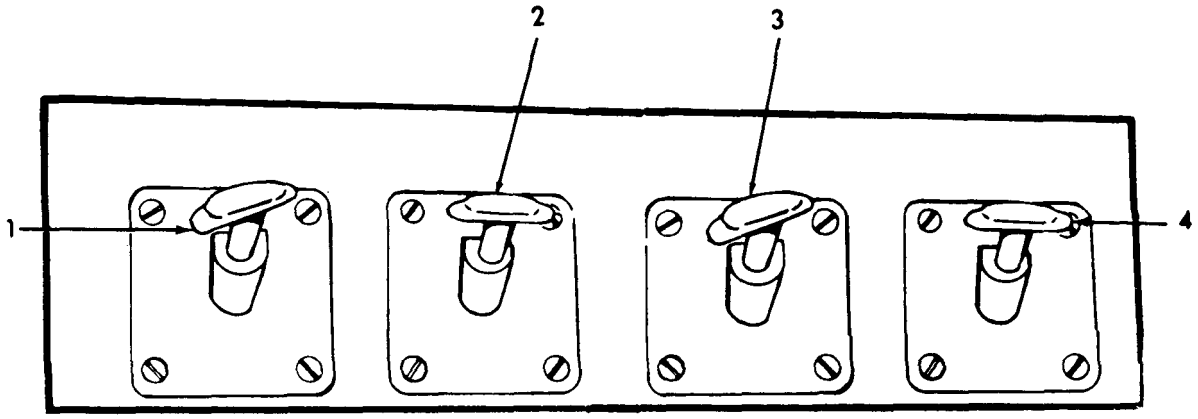



1. OPERATOR CONTROL - Raise the control to raise the Mast. Lower the control to lower the Mast.

*Figure 2-92. Mast Directional Control Valve.*

2-15. **EMERGENCY SHUTDOWN.**

The Operator Controls for Emergency Shutdown of the Diesel Engine Generators and Main Propulsion Engines are shown in Figure 2-93. These controls are located at Frame 54-1/2 Stbd Side Vehicle Deck.

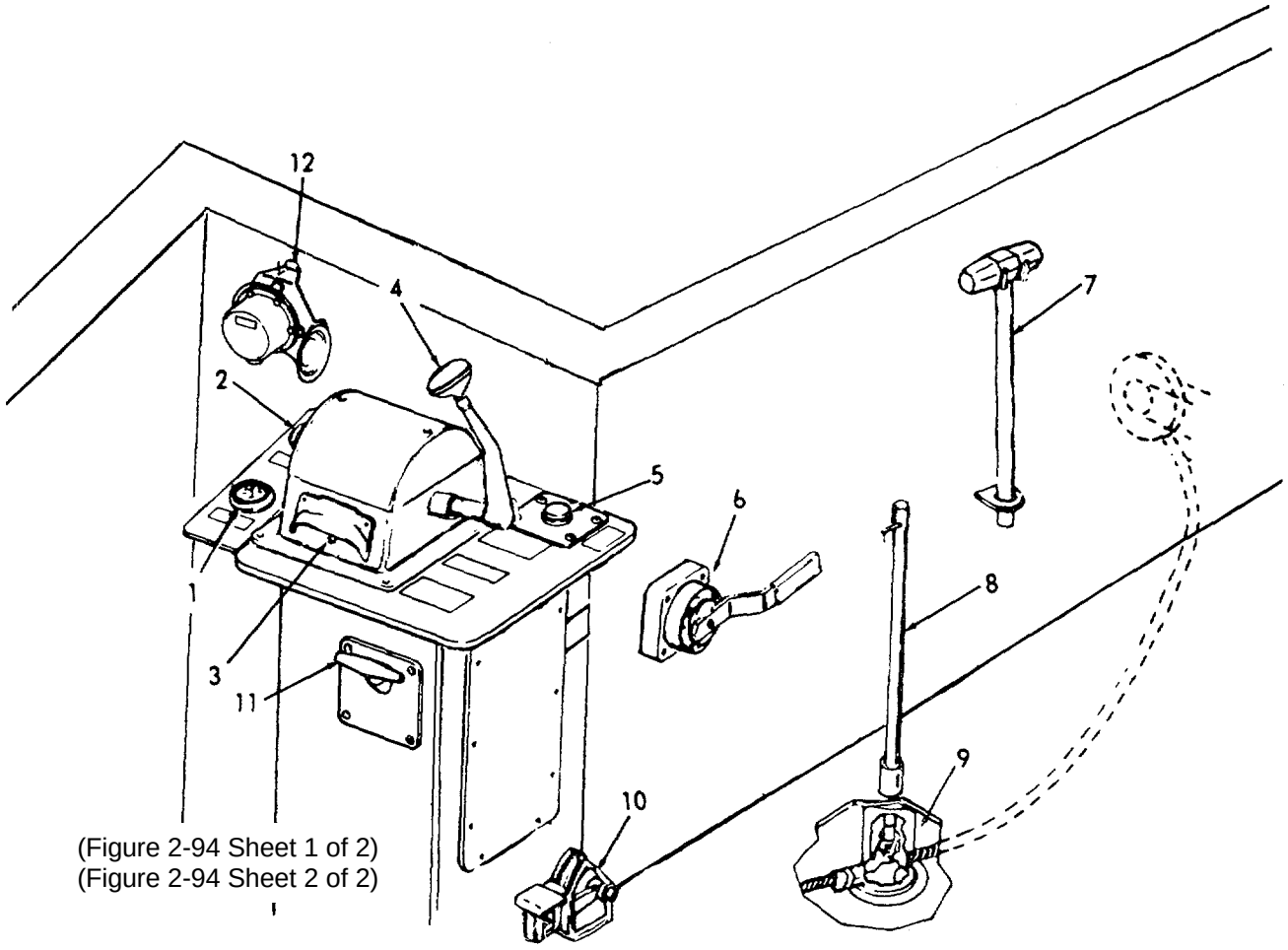



1. AFT MAIN ENGINE
2. AFT GENERATOR
3. FORWARD GENERATOR
4. FORWARD MAIN ENGINE

*Figure 2- 93. Emergency Shutdown - Vehicle Deck.*

2-16. **ANCHOR WINCH CONTROL.**

The Operator Controls and Indicators for the Anchor Winch are shown in Figure 2-94. The Operator Controls for the Anchor "A" Frame are shown in Figure 2-95.

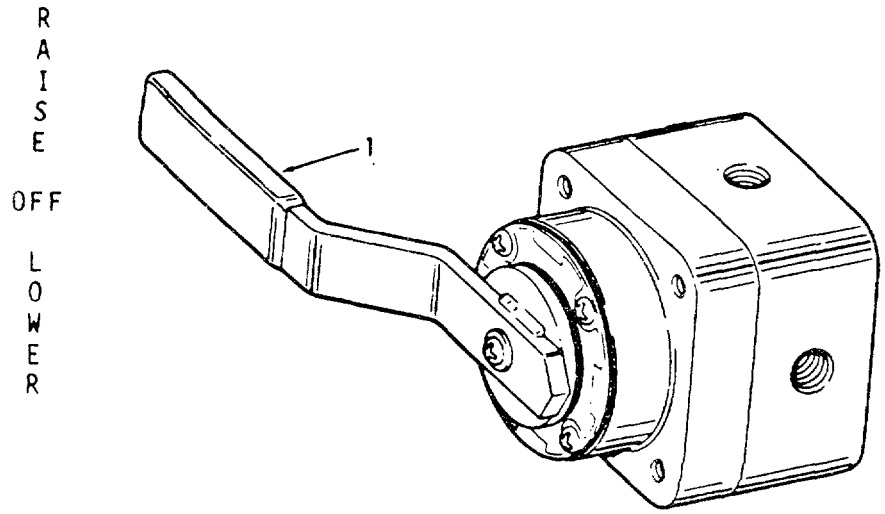



(Figure 2-94 Sheet 1 of 2)
(Figure 2-94 Sheet 2 of 2)

*Figure 2-94. Anchor Winch Controls (Sheet 1 of 2).*

1. WATER TEMPERATURE - Indicates Anchor Winch Engine cooling water temperature.
2. OIL PRESSURE - Indicates Anchor Winch Engine internal oil pressure.
3. MAINLINE SW - Controls operation of Hydraulic Pump that operates the Hydraulic Winch.
4. THROTTLE - Adjusts the speed of the Anchor Winch Engine.
5. ENGINE START - Press to start the Anchor Winch Engine.
6. HYDRAULIC CONTROL - Direction control valve used to pivot Anchor Hoist "A" Frame. Refer to Figure 2- 91.
7. SLEDGE HAMMER - Used to hit sheer rod when wire rope is to be cut.
8. SHEER ROD - Screw in sheer rod for wire rope cutter.
9. WIRE ROPE CUTTER - Used to cut Anchor Wire rope in an emergency.
10. BRAKE CONTROL - Foot operated brake for the Anchor Winch.
11. ENGINE STOP - Pull lever to stop Anchor Winch Engine.
12. WINDLASS ANCHOR HORN - Sounds when Anchor is lowered.

*Figure 2-94. Anchor Winch Controls (Sheet 2 of 2).*

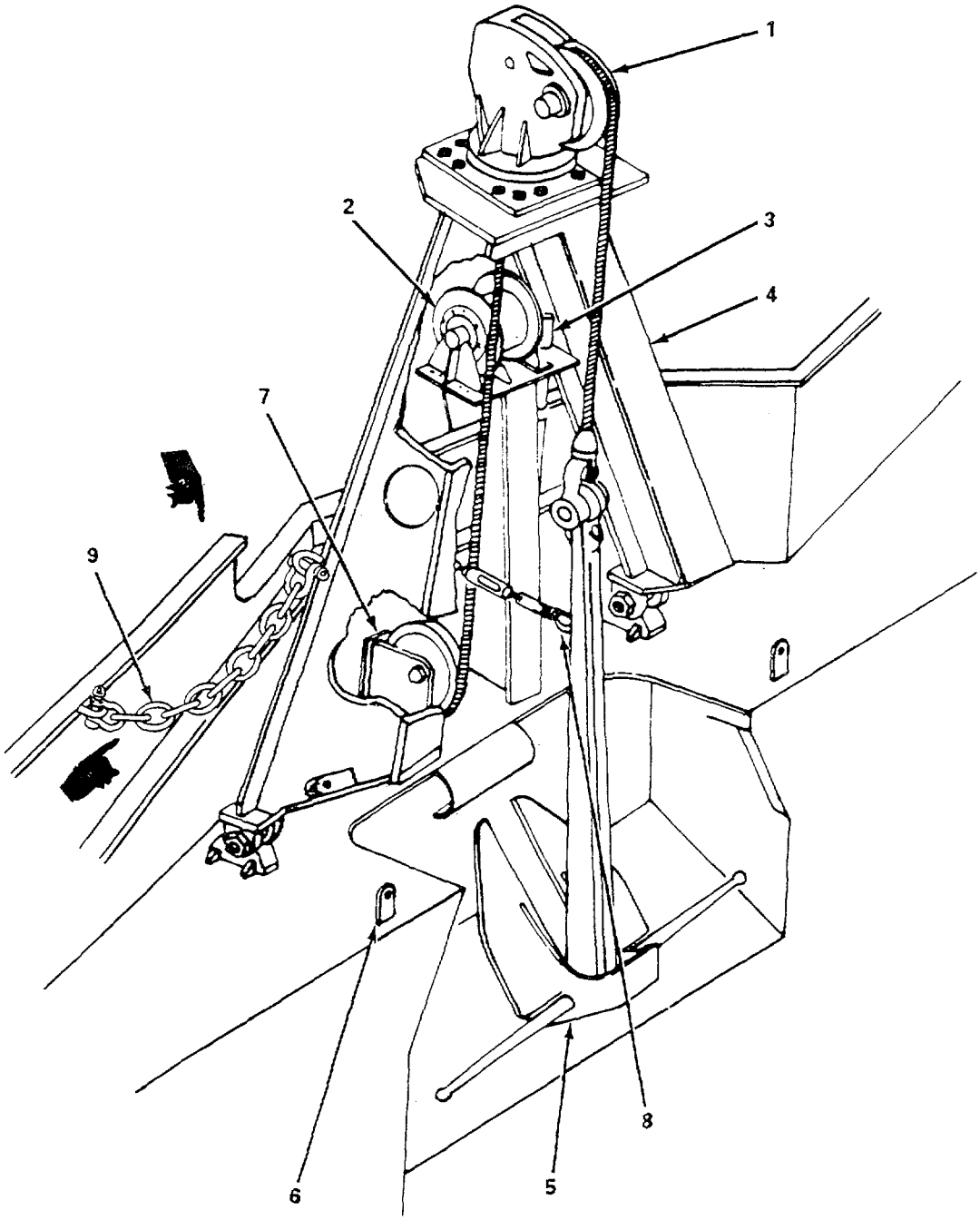



1. OPERATOR CONTROL - Lower to move "A" Frame out.
Raise to bring "A" Frame in.

**NOTE**

**"A" Frame must be lowered to raise or lower the Anchor.**

*Figure 2-95. Anchor Winch "A" Frame Directional Control Valve.*




(Figure 2-96 Sheet 1 of 2)
(Figure 2-96 Sheet 2 of 2)

4951-090

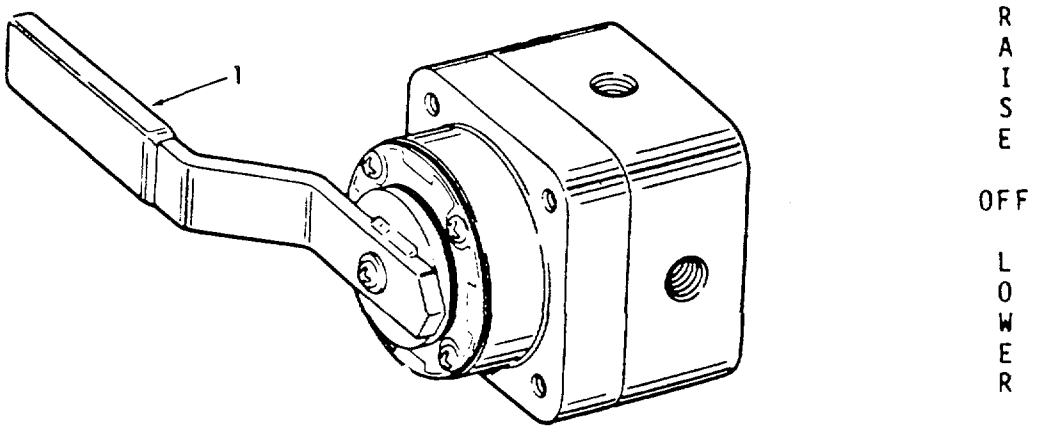
*Figure 2-96. Anchor "A" Frame (Sheet 1 of 2).*

1. FAIRLEADER - Upper cable sheave for anchor cable.
2. HYDRAULIC WINCH - Controls the angle of pivot of the anchor "A" frame.
3. "A" FRAME TOGGLE PIN - Locks "A" frame in the inboard (secured) position.
4. "A" FRAME - When lowered, swings the anchor clear of the side of the vessel.
5. ANCHOR
6. "A" FRAME TOGGLE PIN - Locks "A" frame in the outboard position.
7. SHEAVE - Guides cable from inside vessel to top of "A" frame.
8. PELICAN HOOK - Quick releases for securing anchor to vessel.
9. SAFETY CHAIN - For leverage and stability while releasing or replacing pins and pelican hook.

*Figure 2-96. Anchor "A" Frame (Sheet 2 of 2)*

2-17. **STERN GATE CONTROLS.**

The Operator Controls for the Stern Gate are shown in Figure 2-97.




1. OPERATOR CONTROL - Raise control to raise the Stern Gate.
   Lower control to lower the Stern Gate.

*Figure 2-97. Stern Gate Control.*

## SECTION II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

2-18. **GENERAL.** Preventive Maintenance Checks and Services (PMCS) means systematic caring, inspecting, and servicing of equipment to keep it in good condition and to prevent breakdowns. As the LCU's operator, your mission is to:

a. Be sure to perform your PMCS each time you operate the LCU. Always do your PMCS in the same order, so it gets to be a habit. Once you've had some practice, you quickly spot anything wrong.

b. Do your BEFORE PMCS just before you operate the LCU. Pay attention to WARNINGs, CAUTIONs, and NOTEs.

c. Do your DURING PMCS while you operate the LCU. During operation means to monitor the LCU and its related components while it is actually being operated. Pay attention to WARNINGs, CAUTIONs, and NOTEs.

d. Do your AFTER PMCS right after operating the LCU. Pay attention to WARNINGs, CAUTIONs, and NOTEs.

e. Do your WEEKLY PMCS once a week.

f. Do your MONTHLY PMCS once a moth.

g. Use DA Form 2404 (Equipment Inspection and Maintenance Worksheet record any faults that you discover before, during, or after operation, unless you can fix them. You DO NOT need t record faults that you fix.

h. Be prepared to assist unit maintenance when they lubricate the LCU. Perform any other services when required by unit maintenance.

2-19. **PMCS PROCEDURES.**

a. Your Preventive Maintenance Checks and Services, Table 2-1, lists inspections and care required to keep your LCU in good operating condition. It is set up so you can make your BEFORE OPERATION checks as you walk around the LCU.

b. The "INTERVAL" column of Table 2-1 tells you when to do a certain check or service.

c. The "PROCEDURE" column of Table 2-1 tells you how to do required checks and services. Carefully follow these instructions. If you do not have tools, or if the procedure tells you to, notify your supervisor.

d. The "NOT MISSION CAPABLE IF:" column in Table 2-1 tells you when your LCU is non mission capable and why the LCU cannot be used.

e. If the LCU does not perform as required, refer to Chapter 3, Section II, Troubleshooting.

f. If anything looks wrong and you can't fix it, write it on your DA Form 2404. IMMEDIATELY, report it to your supervisor.

g. When you do your PMCS, you will always need a rag or two. Following are checks that are common to the entire LCU:

(1) Keep It Clean. Dirt, grease, oil, and debris only get in the way and may cover up a serious problem. Clean as you work and as needed. Use dry cleaning solvent (SD-2) on all metal surfaces. Use soap and water when you clean rubber or plastic material. Upholstery can be cleaned with soap and water and a clean, damp cloth.

(2) Rust and Corrosion. Check LCU structure for rust and corrosion. If any bare metal or corrosion exists, clean, and apply a thin coat of oil. Report it to your supervisor.

(3) Bolts, Nuts, and Screws. Check them all for obvious looseness, missing, bent, or broken condition. You can't try them all with a tool, but look for chipped paint, bare metal, or rust around bolt heads. If you find a bolt, nut or screw you think is loose, tighten it or report it to your supervisor.

(4) Welds. Look for loose or chipped paint, rust, or gaps where parts are welded together. If you find a bad weld, report it to your supervisor

(5) Electric Wires and Connectors. Look for cracked, frayed, or broken insulation, bare wires, and loose or broken connectors. Tighten loose connectors. Report any damaged wires to your supervisor.

(6) Hoses and Fluid Lines. Look for wear, damage, and leaks, and make sure damps and fittings are tight. Wet spots show leaks, but a stain around a fitting or connector can also mean a leak. If a leak comes from a loose fitting or connector, tighten it. If something is broken or worn out, report it to your supervisor.

h. When you check for "operating condition" you look a the component to see f its serviceable.

2-20. **CLEANING AGENTS.**

**WARNING**

- **DO NOT use diesel fuel, gasoline, or benzene (benzol) for cleaning.**
- **DO NOT SMOKE when using cleaning solvent. NEVER USE IT NEAR AN OPEN FLAME. Be sure there is a fire extinguisher nearby and use cleaning solvent only in well-ventilated places. Flash point of solvent is 138° F (60° C).**
- **USE CAUTION when using cleaning solvents. Cleaning solvents evaporate quickly and can irritate exposed skin if solvent contact skin. In cold weather, contact of exposed skin with cleaning solvent can cause frostbite.**

**CAUTION**

**When cleaning engine areas, engine must be COLD (same temperature as outside air). DO NOT point water or steam directly a any electrical connection. DO NOT point water stream directly at radiator fins. DO NOT use high pressure water supply system. Damage to engine, electric system, and other components may result**

**NOTE**

**Only use those authorized cleaning solvents or agents listed in Appendix D.**

a. Cleaning Engine Areas.

(1) When using water to dean the engine compartment, always cover alternators and air cleaner inlet using waterproof material. Use water pressure and volume similar to a standard low pressure water supply system (45-70 psi, 6.5-10.2 kPs).

(2) After cleaning, allow engine to air dry. Do not use compressed air to dry engine. Do not run engine to decease drying time.

(3) Remove all component coves before starting engine.

**CAUTION**

**Keep cleaning solvents, gasoline, and lubricants away from rubber or soft plastic parts. They will deteriorate material.**

b. Cleaning Rust or Grease. When leaning grease buildup or rusty places, use a cleaning solvent. Then apply a thin coat of light oil to affected area.

2-21. **LEAKAGE DEFINITIONS FOR OPERATOR PMCS.** It is necessary for you to know how fluid leakage affects the status of the LCU. Following are types/classes of leakage an operator needs to know to be able to determine the status of the LCU. Learn these leakage definitions and remember - when in doubt, notify your supervisor.

**CAUTION**

- **Equipment operation is allowable with minor leakages (Class I or II). Of course, consideration must be given to fluid capacity in the item/system being checked/inspected. When in doubt, notify your supervisor.**
- **When operating with Class I or II leaks, continue to check fluid levels as required in your PMCS.**
- **Class III leak should be reported immediately to your supervisor**

a. CLASS I - Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.

b. CLASS II - Leakage of fluid great enough to form drop but not enough to cause drops to drip from item being checked/inspected.

c. CLASS III - Leakage of fluid great enough to form drops that fall from item being checked/inspected.

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)*

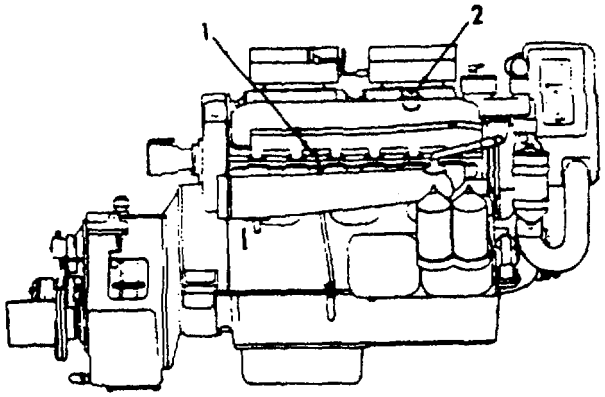
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 1 | BEFORE | Engine Room | ENGINE OIL. Check the oil level before starting the engine by removing dipstick (1). Add oil, if necessary by removing oil fill cap (2). Bring oil to the proper level on the dipstick.<br><br>**NOTE**<br><br>**Dipstick may be located on opposite side engine.**<br><br>**NOTE**<br><br>**FULL - Engine has 34 quarts (32.2 liters)**<br><br>**LOW - Engine has 26 quarts (24.6 liters)**<br><br>  | Low oil level. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

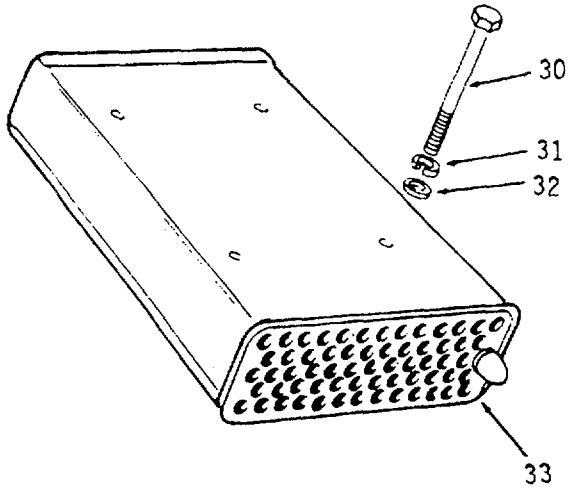
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 2 | BEFORE | Engine Room | SILENCER ASSEMBLY. Remove screw (30), lock washes (31) and washers (32) in order to remove silencer assembly (3) from air inlet housing. Inspect the silencer and if necessary, clean in fuel oil. Dry with compressed air. Reassemble in reverse order.<br><br>**WARNING**<br><br>**Use eye protection when using compressed air.**<br><br>  <br> | Air intake is blocked or obstructed. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

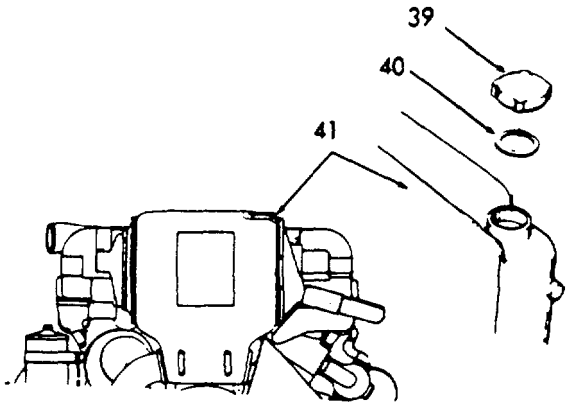
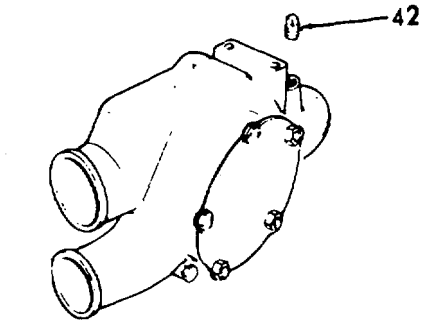
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 3 | BEFORE | Engine Room | FRONT SIDE<br><br>EXPANSION TANK. Remove cap (39) and gasket (40). Check the coolant level. It should be near the top of the expansion tank (41).<br><br>**NOTE**<br><br>**Use Antifreeze, Ethylene Glycol, Type ML-A-46153.**<br><br>  | Expansion tank leaks or cap fails to maintain pressure. |
| 4 | BEFORE | Engine Room | RAW WATER PUMP. Check the prime on the Raw Water Pump; the Engine should not be operate with a dry pump. Remove the pipe plug (42) to let trapped air escape.<br><br>  | Pump not primed. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 5 | BEFORE | Engine Room | Check dive belts (90) for wear and proper tension. | Belts cracked or torn. |

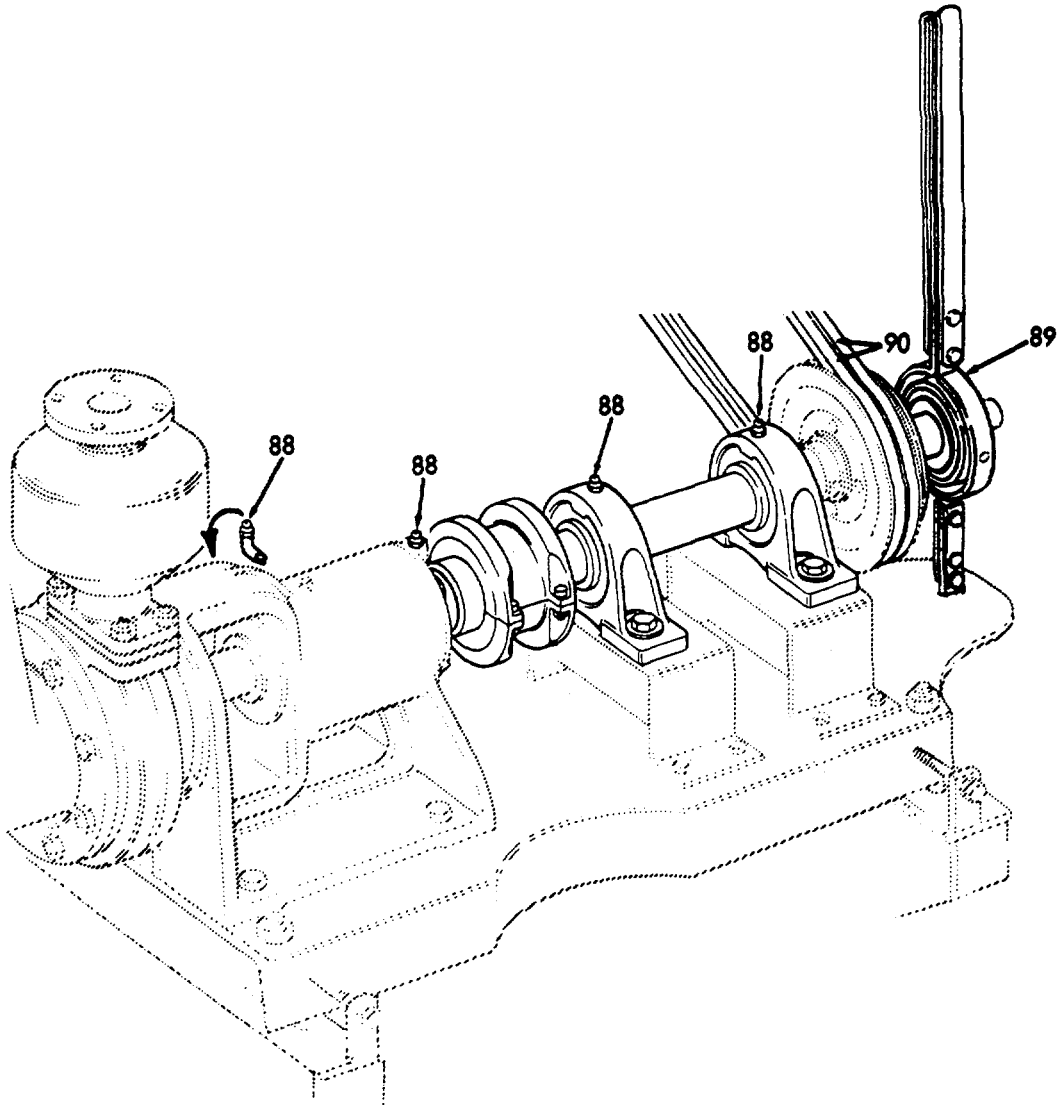
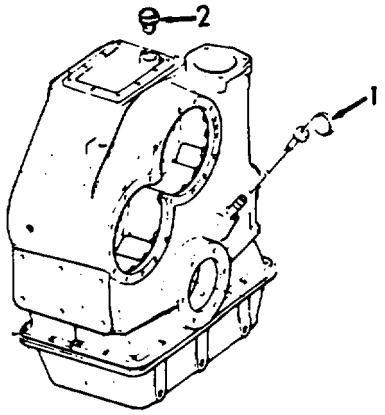


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 6 | BEFORE | Engine Room | MARINE DRIVE GEAR OIL LEVEL. With the engine running at idle speed, check the oil level on dipstick (1). Remove oil breather assembly (2) and add oil as required to bring it to the proper level on the dipstick (1).   | Low oil level. |
| 7 | BEFORE | Engine Room | BULKHEAD STUFFING BOX - PORT SIDE. Check grease in grease cup (2). Add grease (MIL-G-24139A (SH)) as required. | No grease. |

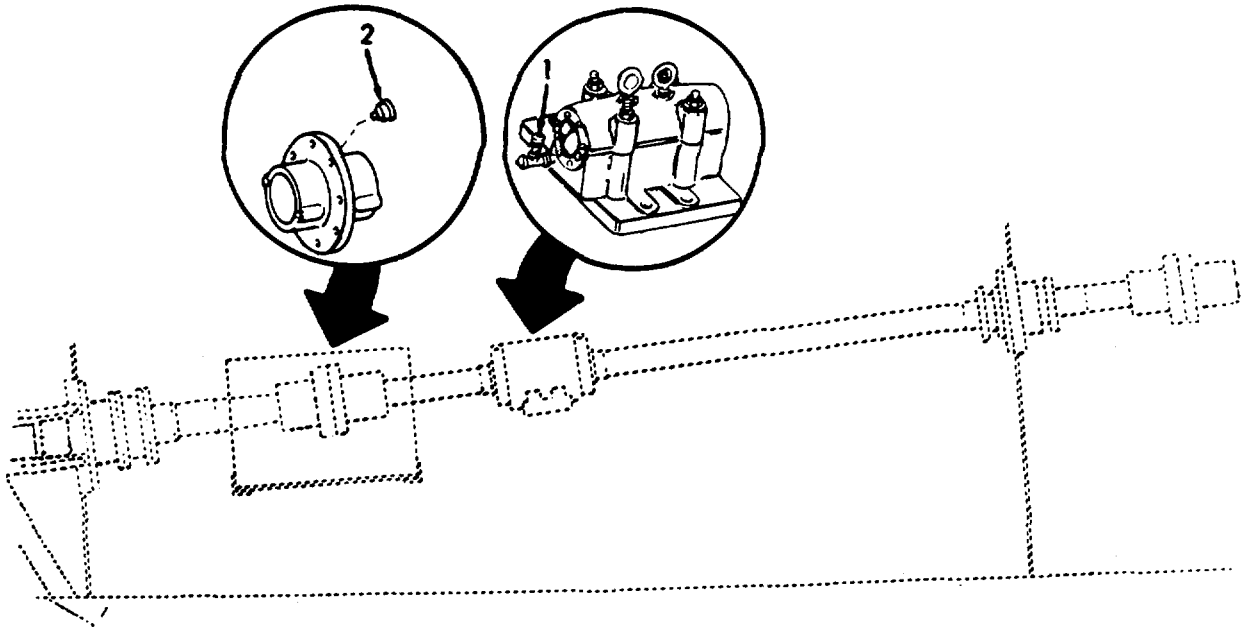


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 8 | BEFORE | Engine Room | PROPELLER SHAFT BEARINGS. Check level of water in tank (3). Add water as required. | Low water level. |

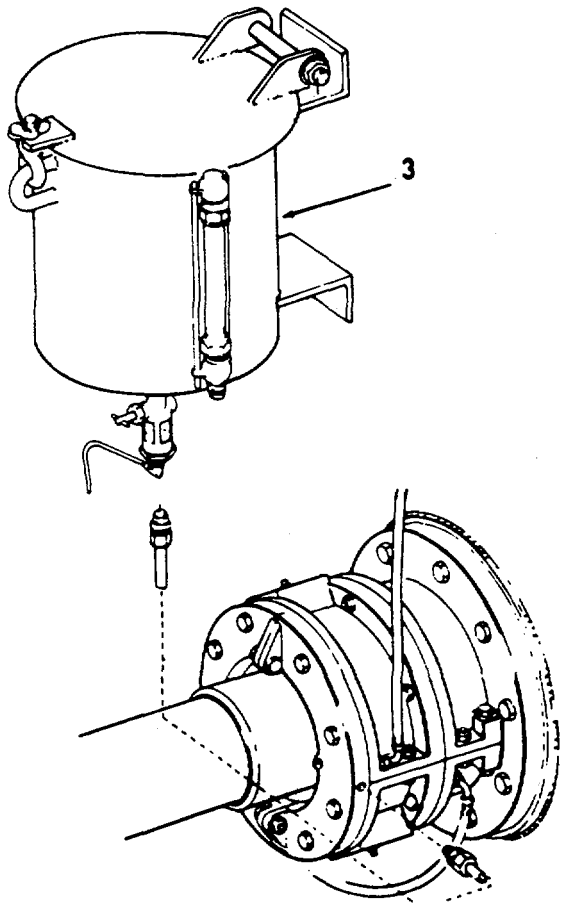


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

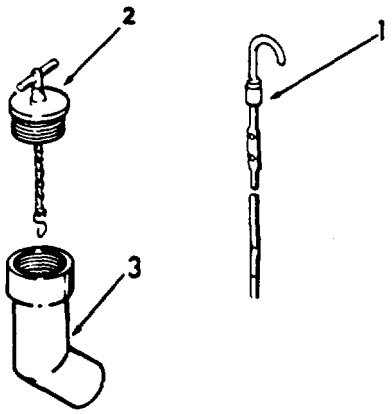
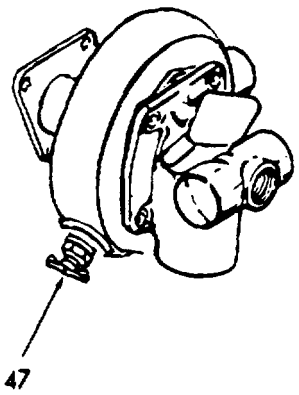
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 9 | BEFORE | Engine Room (Generator) | ENGINE OIL. Check the oil level on dipstick (1) before starting the engine. If necessary, add oil by removing oil filler cap (2) from oil filler tube (3) to bring it to the proper level on the dipstick.   | Low oil level. |
| 10 | BEFORE | Engine Room (Generator) | FRESH WATER PUMP. Check the prime on the fresh water pump. The engine should not be operated with a dry pump. Prime the pump, if necessary, by opening the draincock (47) to bleed out trapped air. Close the draincock (47) and add anti-freeze if required.   | Pump not primed. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

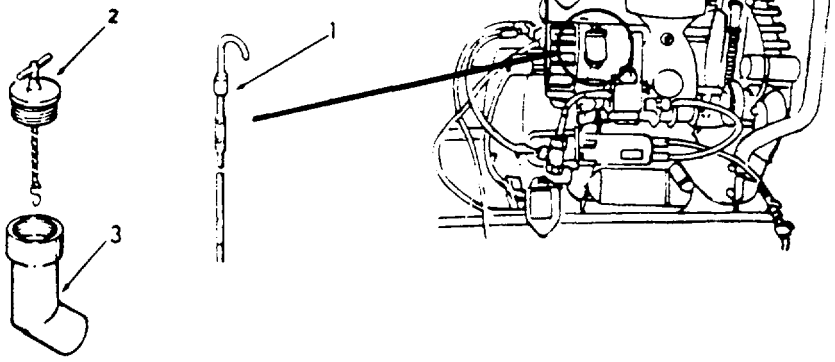
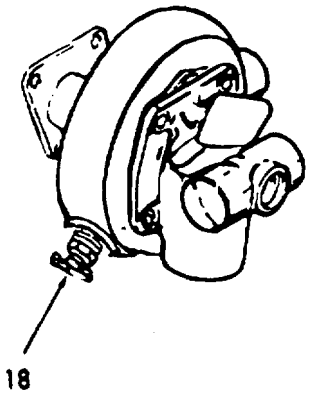
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 11 | BEFORE | Anchor Winch Compartment | ENGINE OIL. Check the oil level on dipstick (1) before starting the engine. If necessary, add oil by removing oil breather cap (2) from oil filler tube (3) to bring it to the proper level on the dipstick. | Low oil level. |
| | | |   | |
| 12 | BEFORE | Anchor Winch Compartment | FRESH WATER PUMP. Check the prime on the fresh water pump; the engine should not be operated with a dry pump. Prime the pump, if necessary, by opening the draincock (18).<br><br>Close the draincock (18) and add anti-freeze to expansion tank on Port Main Propulsion Engine (see Item No. 3). | Pump not primed. |
| | | |  | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

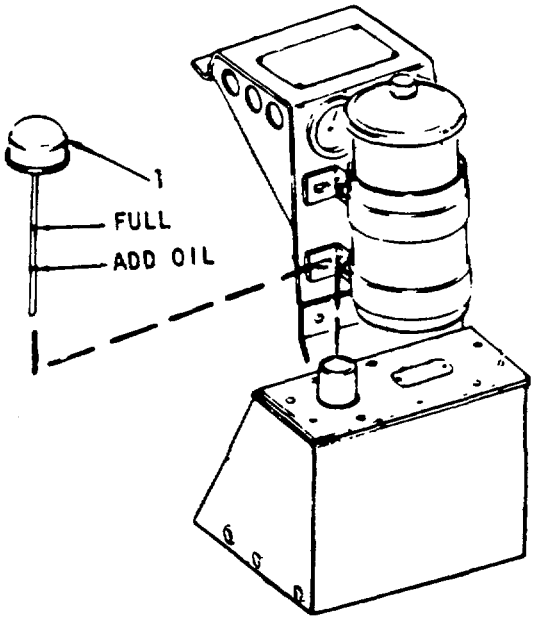
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 13 | BEFORE | Anchor Winch Compartment | OIL LEVEL. Remove fluid gage (1) and check oil level. Add oil as required.<br><br>**CAUTION**<br><br>**Make sure Anchor Winch Engine is not running.**<br><br>  <br> | Low oil level. |
| 14 | BEFORE | Anchor Winch Compartment | LEVEL WIND ASSEMBLY AND GUARD:<br><br>WORM SHAFT. Lubricate fittings (14) with grease (MIL-G-24139A (SH)).<br><br>CARRIAGE GUIDE. Lubricate fittings (16 with grease (MIL-G-24139A (SH)).<br><br>VERTICAL ROLLERS. Lubricate fittings (17) with grease (MIL-G-24139A (SH)). | Any of these gears, shafts, etc., bind or fails to function.<br><br>Any of these gears, shafts, etc., bind or fails to function.<br><br>Any of these gears, shafts, etc, bind or fails to function. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 14 Continued | | | FAIRLEAD PINION SHAFT. Lubricate fitting (19) with grease (MIL-G-24139A (SH)). | Any of these gears, shafts, etc., bind or fails to function. |
| | | | FAIRLEAD DRIVE CHAIN. Oil chain (20) with oil (MIL-L-9000H (SH)). | Any of these gears, shafts, etc., bind or fails to function. |

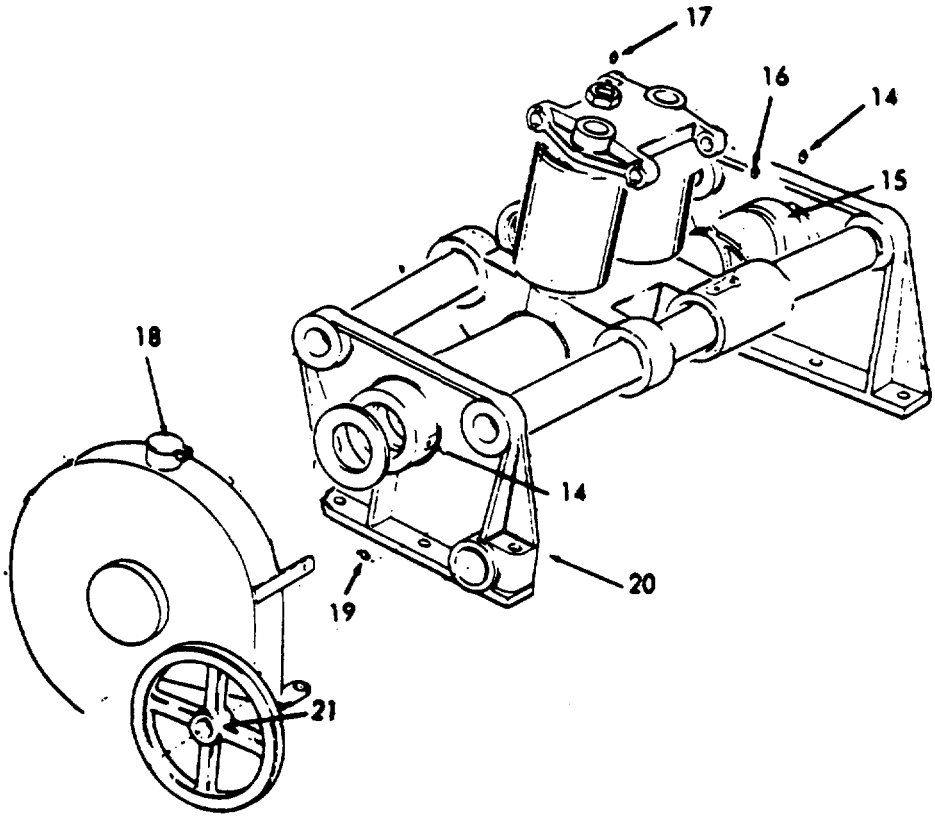


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

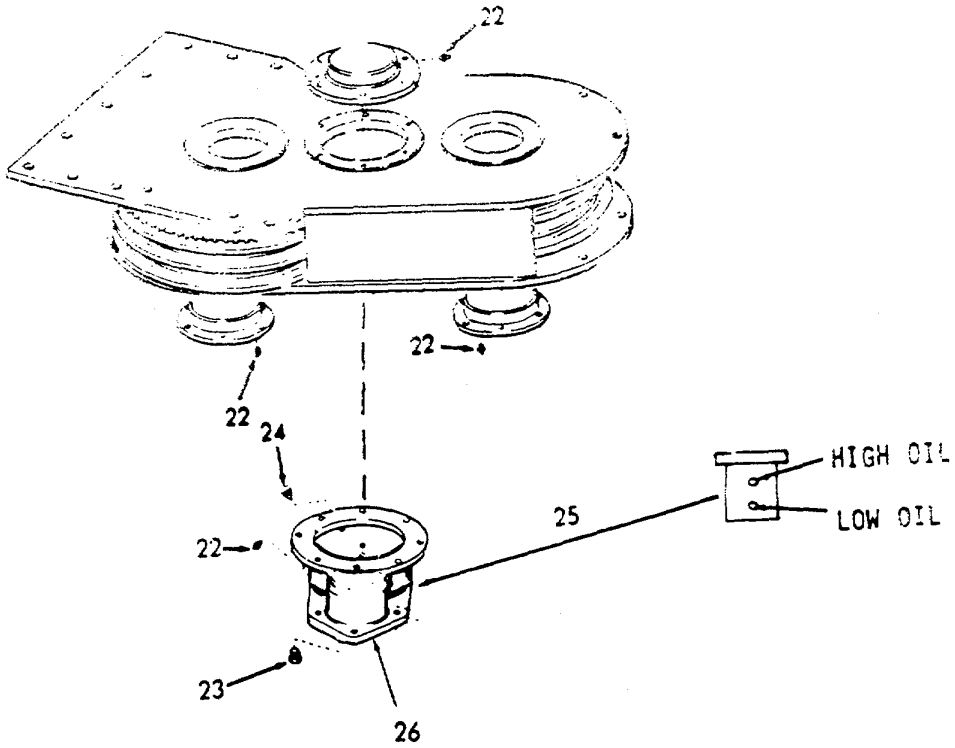
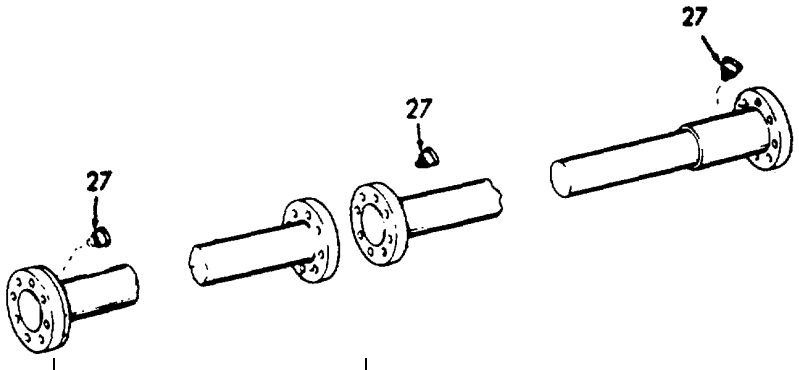
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 15 | BEFORE | Anchor Winch Compartment | SLACK PULLER. Lubricate fittings (22) with grease (MIL-G-24139A (SH)). | Any of these gears, shafts, etc., bind or fails to function. |
| | | |  | |
| 16 | BEFORE | Anchor Winch Compartment | FLANGE FITTINGS. Add oil to oil can fittings on flanges (27). Use oil (MIL-L-9000H (SH)). | Any of these gears, shafts, etc., bind or fails to function. |
| | | |  | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

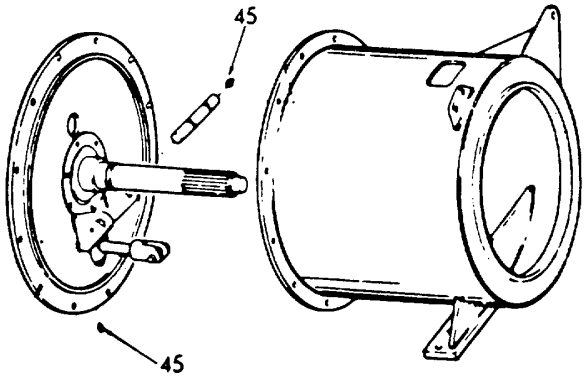
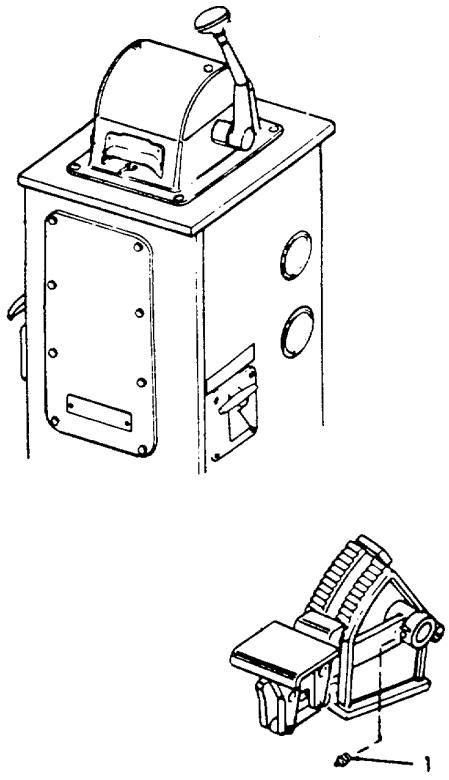
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 17 | BEFORE | Anchor Winch Compartment | DISCONNECT CLUTCH. Lubricate fittings (45) with grease (MIL-G-24139A (SH)). | Clutch binds or fails to function. |
| | | |  | |
| 18 | BEFORE | Vehicle Deck AFT/STBD | ANCHOR WINCH BRAKE CONTROL. Lubricate fittings (1) with grease (MIL-G-18458B (SH)). | Brake binds, is cracked, or fails to function. |
| | | |  | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

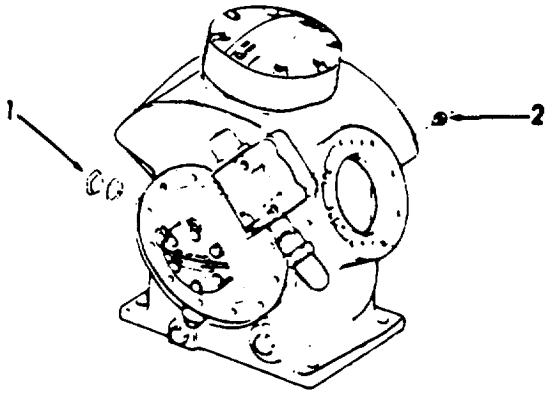
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 19 | BEFORE | Air Conditioning | COMPRESSOR UNIT ASSEMBLY<br><br>CHECK OIL LEVEL. While system is in operation, check oil level in crankcase by checking sight glass (1). Add oil (VV-L-825), whenever the oil level drops below norm, (half-way up on sight glass), by removing pipe plug (2). Replace the pipe plug. Allow sufficient time for the system to balance after adding oil. Check oil level again. If the oil level in the crankcase still falls below normal, refer to maintenance.<br><br>  <br><br><br>**NOTE**<br><br>**After the compressor has been stopped for several minutes, the oil level in the compressor crankcase should be about half-way up on the sight glass. During operation, the oil level will be slightly lower but will appear higher when oil is foaming.**<br><br>**NOTE**<br><br>**The compressor holds 5 1/2 pts. of oil.** | Low oil level. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 20 | BEFORE | Air Conditioning | SIGHT FLOW INDICATOR. Check indicator (4) for the following:<br><br>Indicator — Condition<br><br>Solid Column — Normal lack of refrigerant.<br>Liquid Bubbles — See Maintenance. | Low oil level. |

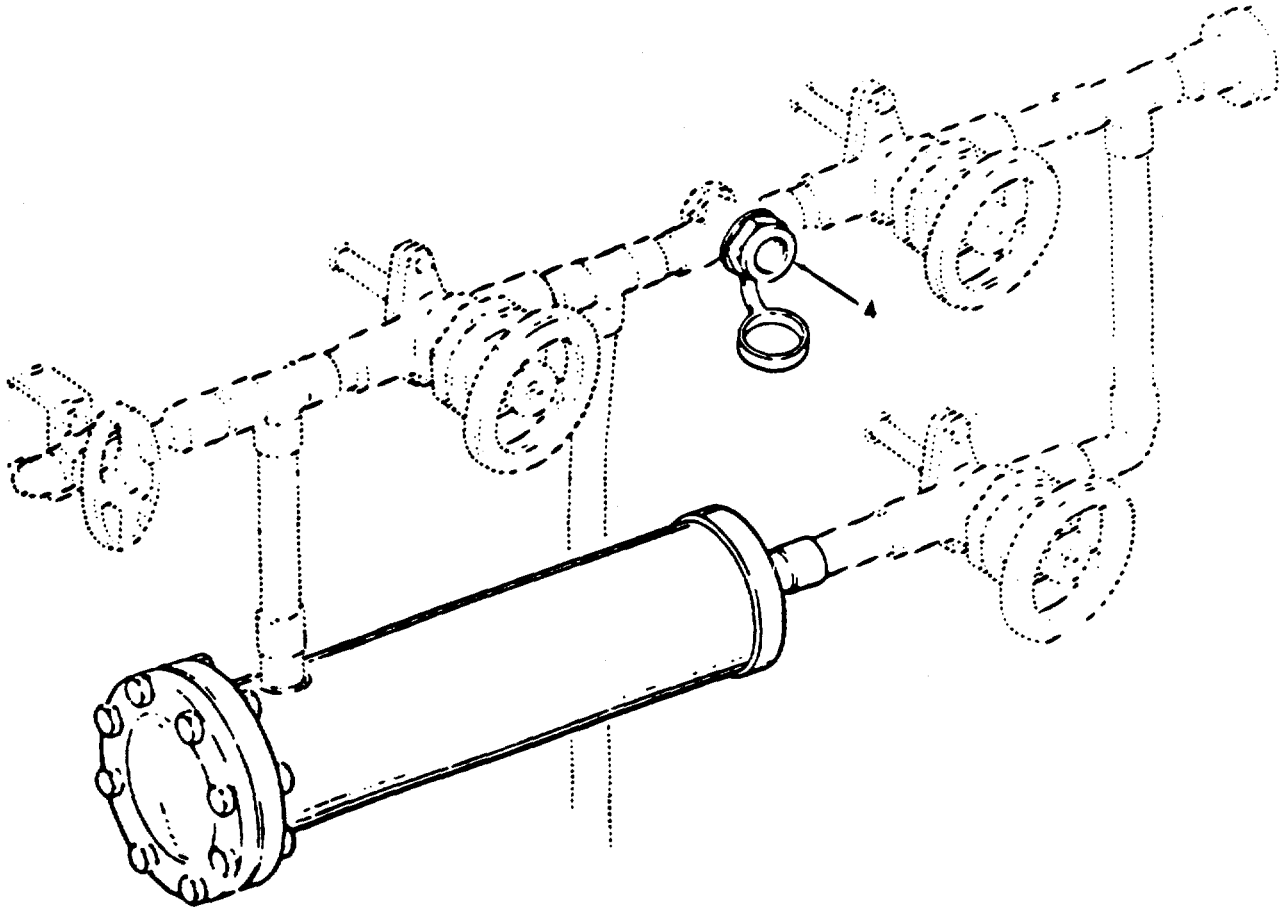


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 21 | BEFORE | Portable Equipment | AIR COMPRESSOR<br><br>OIL LEVEL. Remove plug (1). Add oil (MIL-L-9000H (SH)) as needed.<br><br>**WARNING**<br><br>**Use eye protection when using compressed air.**<br><br>DRAIN MOISTURE. Open draincock (2). | Low oil level. |

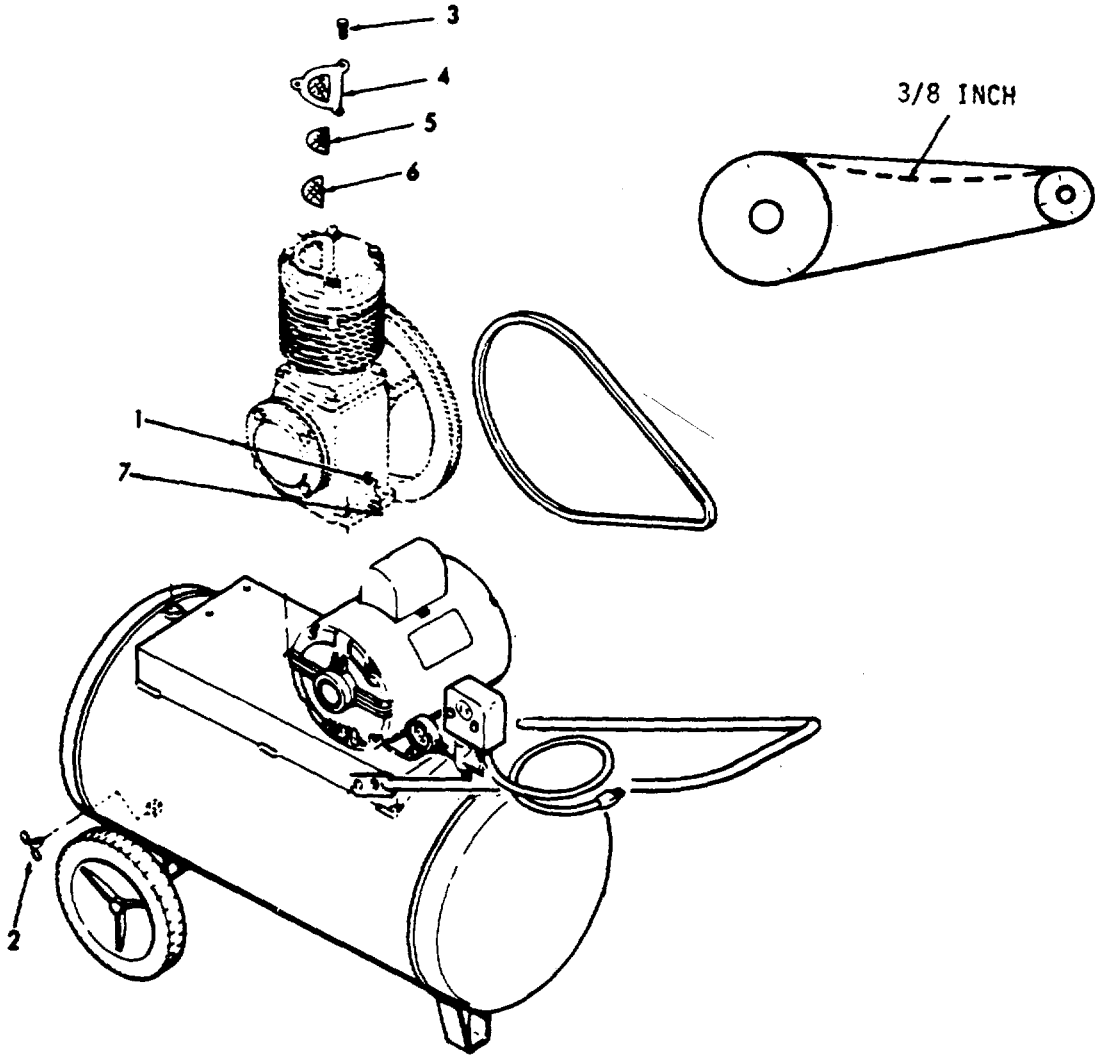


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 22 | DURING | Engine Room | HOSES. Inspect all of the hoses visually and by touch for signs of deterioration, leaking and/or cracking.<br><br>Variable Speed Governor Hose (69)<br>Hose (70)<br>Hose (71)<br>Expansion Tank Outlet Hose (72) | Leaking, cracked, or deteriorated. |
| | | | | |
| | | | Fuel Pump Inlet Hose (73)<br>Fuel Pump to Filter Hose (74)<br>Fuel Filter to Cylinder Head Hose (75) right bank<br>Fuel Filter to Cylinder Head Hose (78) left bank<br>Crossover Hose (76)<br>Fuel Drain Hose (77) | |

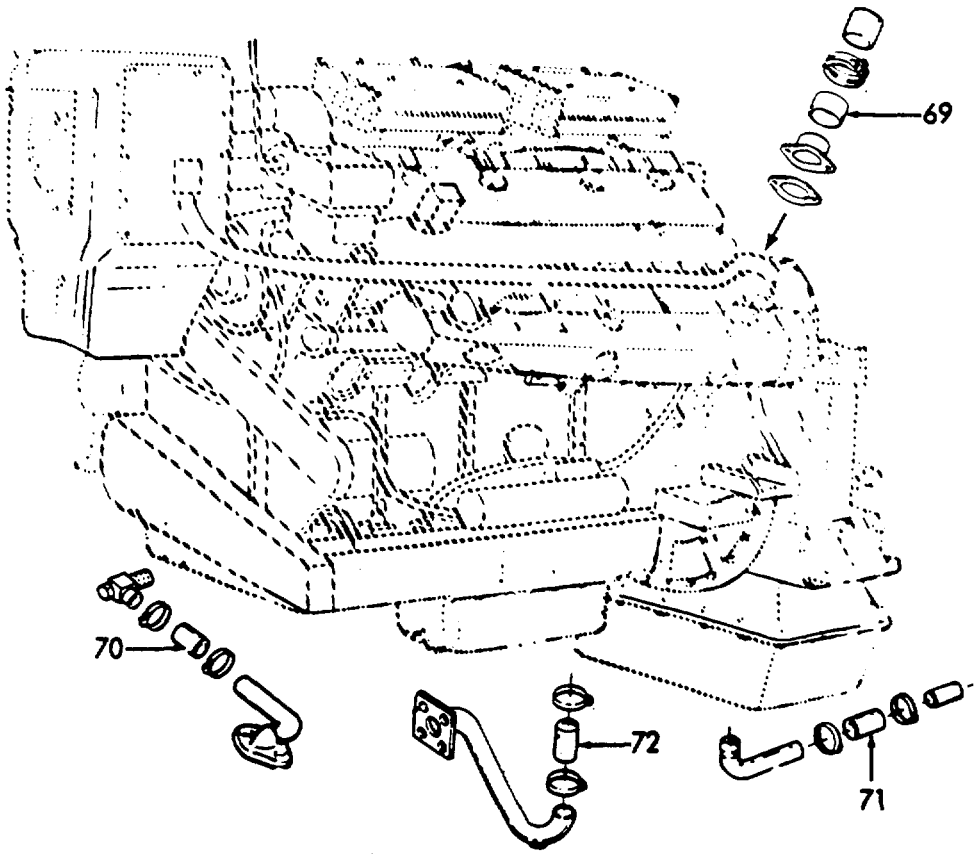
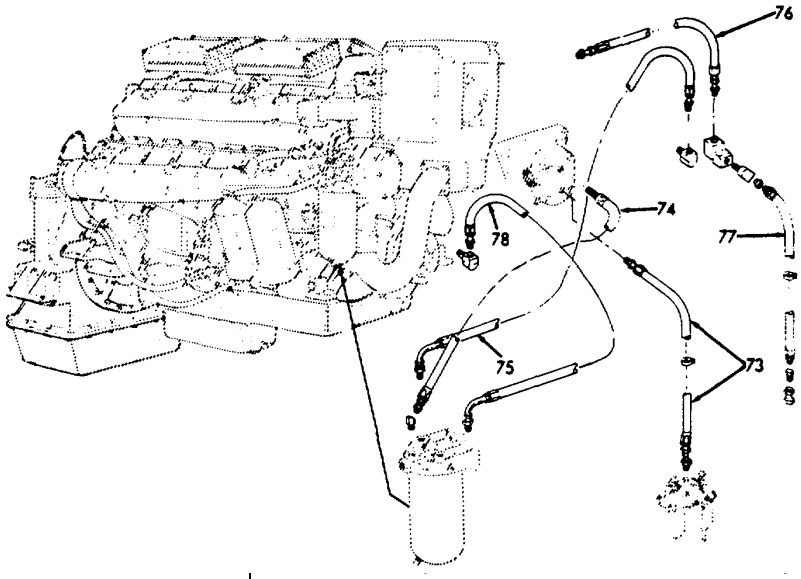


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 22 Continued | | | | |




Oil Cooler Water Inlet Hose (79)
Oil Cooler Water Outlet Hose (80)
Hose (84)
Hose (85)
Water By-pass Tube Hose (86)
Oil Pump Outlet Hose (87)
Hose (81)
Expansion Tank Outlet Hose (3)
Hose (82)

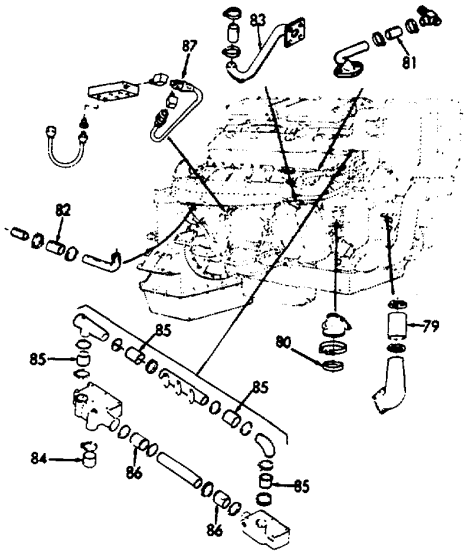


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

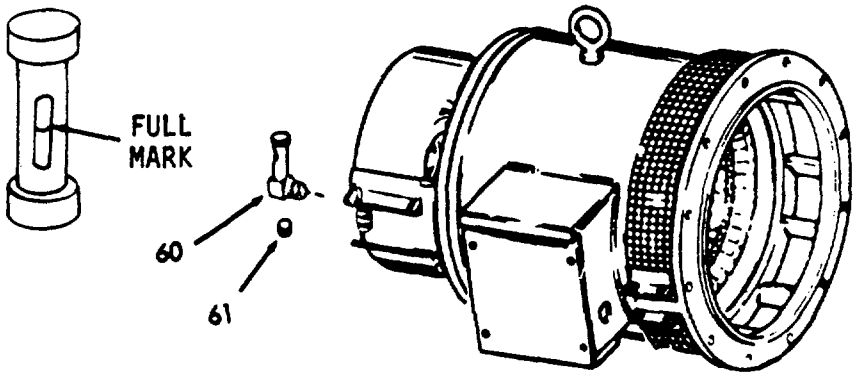
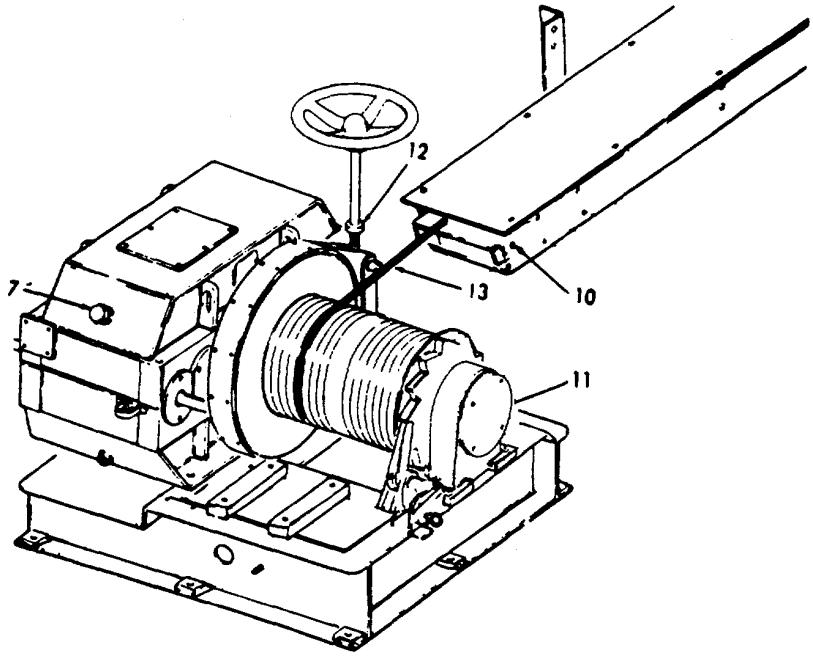
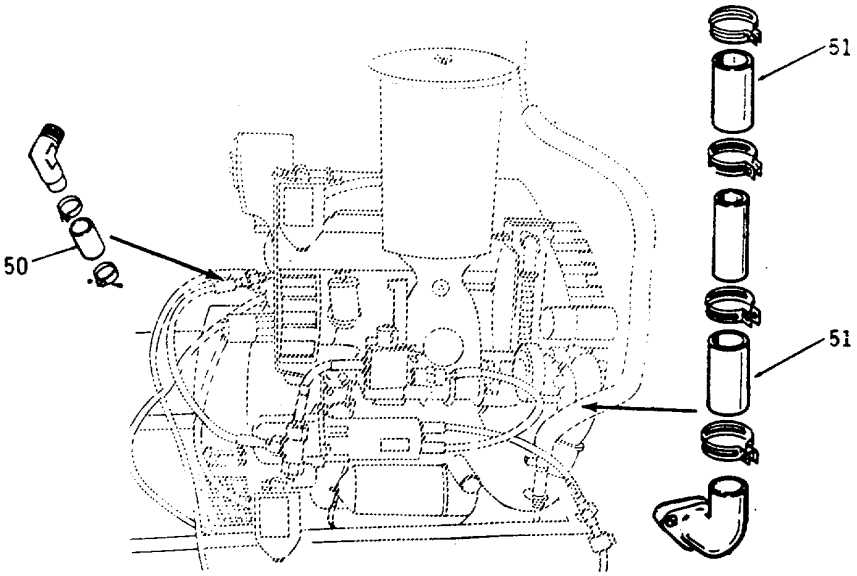
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 23 | DURING | Engine Room | CHECK. Fuel lines, fuel filters and strainers for leak and/or cracks. | Leaking or cracked. |
| 24 | DURING | Engine Room | Check expansion tank and cap for leaks or cracks. | Leaking or cracked. |
| 25 | DURING | Engine Room | POWER GENERATOR. Check the oil level in the sight gage (60). (MIL-L-9000H (SH)). | Low oil level. |
| | | |  | |
| 26 | DURING | Ramp Handling Machinery Compartment | Check bow ramp cable for fraying and ensure cables are greased. | Frayed or broken. |
| | | |  | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 27 | DURING | Ramp Handling Machinery Compartment | HOSES. Inspect (visually and by touch) all of the hoses for signs of deterioration. Replace the hoses if necessary.<br><br>Fresh Water Pump Hose (50)<br>Oil Cooler Water Hose (51)<br>Thermostat Hose (52)<br>Water By-Pass Hose (53)<br>Water By-Pass Hose (54) | Leaks or cracks. |



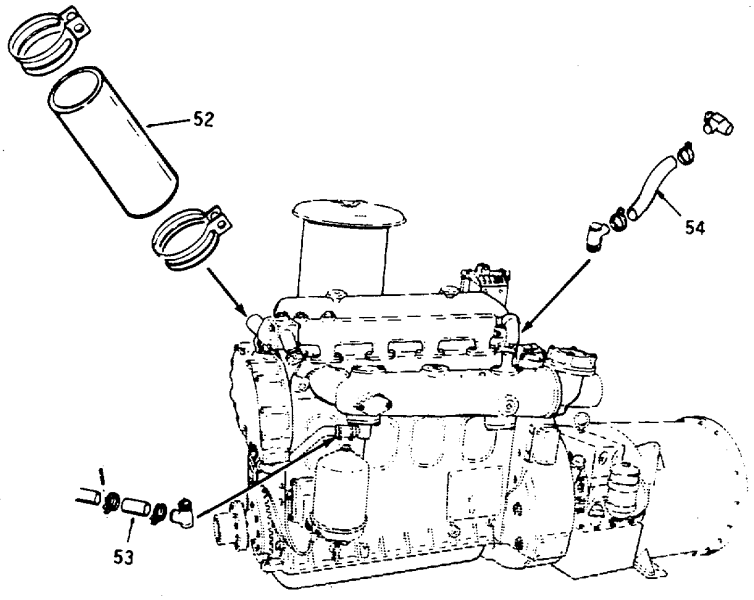



*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

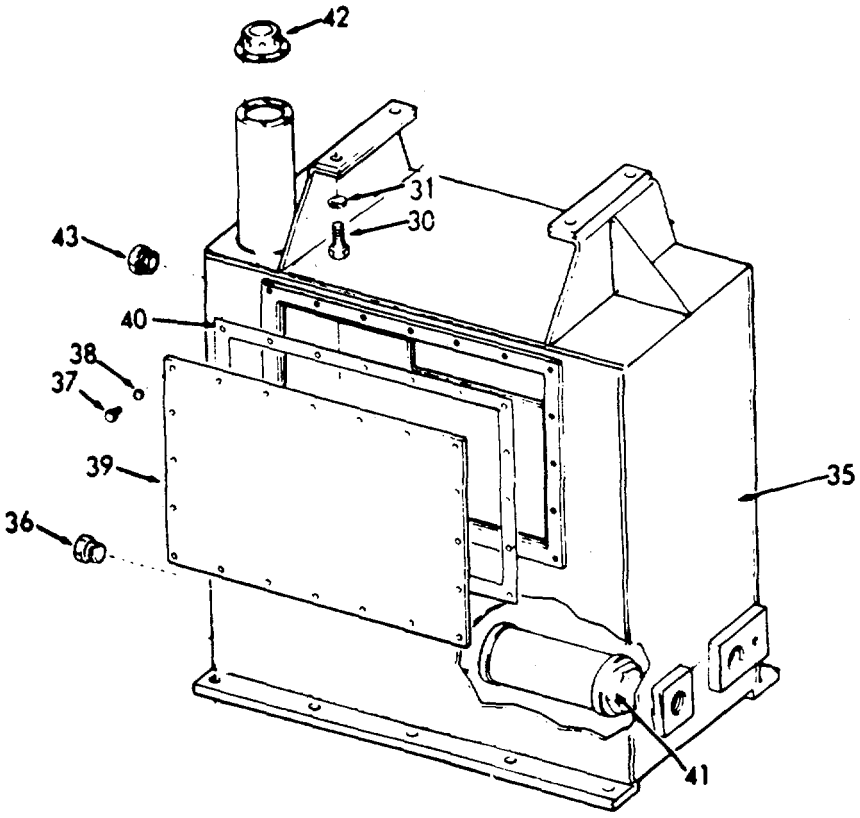
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 28 | DURING | Anchor Winch Compartment | HYDRAULIC TANK. Visually check the level of fluid on the upper sight glass (43). Add oil if required. (ML-H-46170, Type I) | Leaking (or) low oil level. |
| | |  | | |
| 29 | DURING | General | Visually check boat for unsafe conditions and hazards. Be alert to unusual sounds. | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

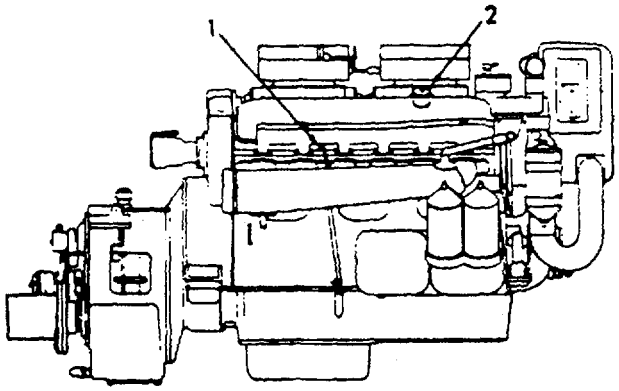
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 30 | AFTER | Engine Room | ENGINE OIL. Check the oil level, after engine has cooled, by removing dipstick (1). Add oil, if necessary by removing oil fill cap (2). Bring oil to the proper level on the dipstick.<br><br>**NOTE**<br><br>**Dipstick may be located on opposite side o engine.**<br><br>**NOTE**<br><br>**FULL - Engine has 34 quarts (32.2 liters)**<br><br>**LOW - Engine has 26 quarts (24.6 liters)**<br><br>  <br> | Low oil level. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

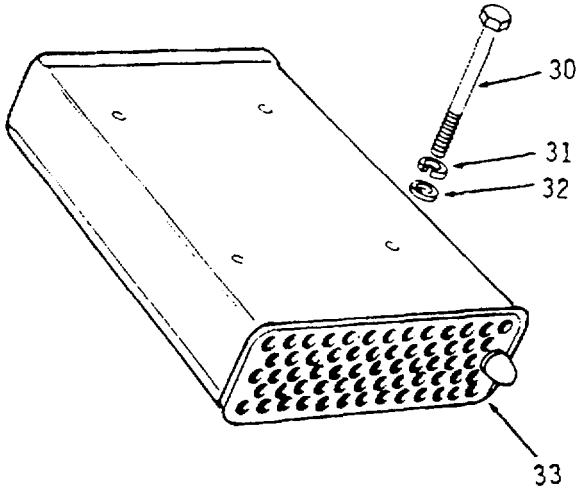
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 31 | AFTER | Engine Room | SILENCER ASSEMBLY. Remove screws (30), lock washers (31) and washers (32) in order to remove silencer assembly (33) from air inlet housing. Inspect the silencer and if necessary, clean in fuel oil. Dry with compressed air. Reassemble in reverse order.<br><br>**WARNING**<br><br>**Use eye protection when using compressed air.**<br><br>  <br> | Fails to function. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

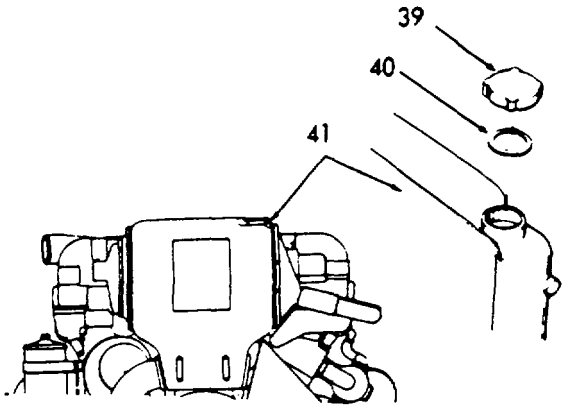
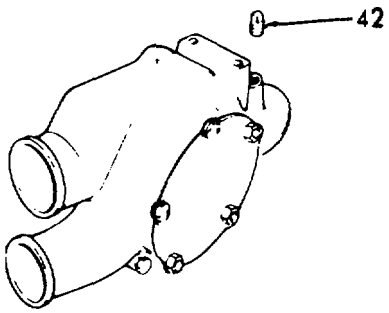
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 32 | AFTER | Engine Room | FRONT SIDE<br><br>EXPANSION TANK. Remove cap (39) and gasket (40). Check the coolant level. It should be near the top of the expansion tank (41).<br><br>**NOTE**<br><br>**Use Antifreeze, Ethylene Glycol, Type MIL-A-46153.**<br><br>  <br> | Expansion tank leaks or cap fails to maintain pressure. |
| 33 | AFTER | Engine Room | RAW WATER PUMP. Check the prime on the Raw Water Pump; the Engine should not be operated with a dry pump. Remove the pipe plug (42) to let trapped air escape.<br><br>  <br> | Pump not primed. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

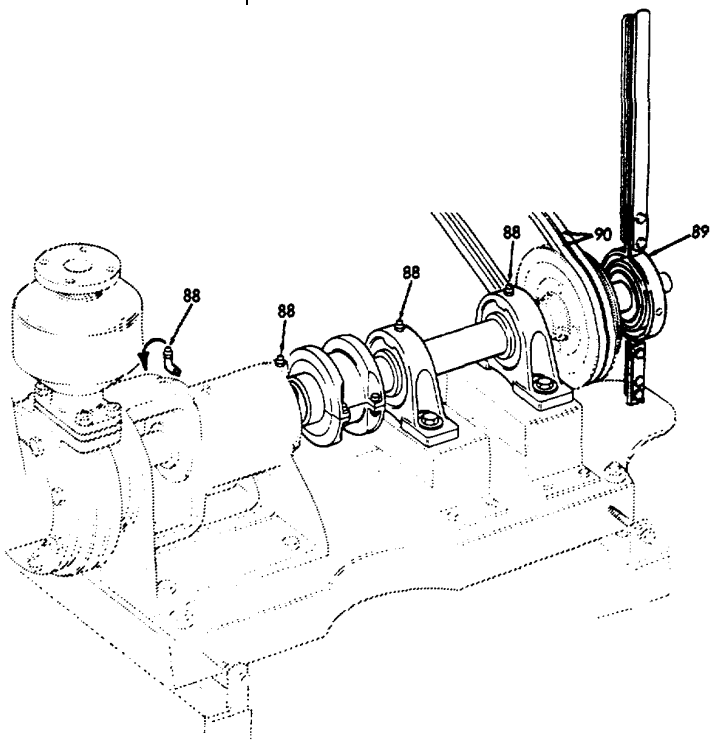
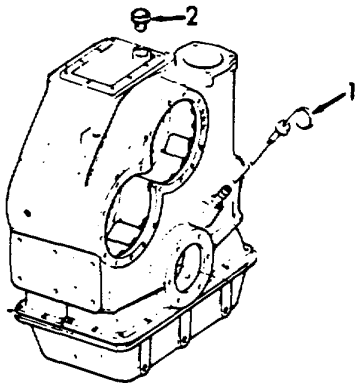
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 34 | AFTER | Engine Room | Check drive belts (90) for wear and proper tension. | Belts cracked or torn. |
| | | |  | |
| 35 | AFTER | Engine Room | MARINE DRIVE GEAR OIL LEVEL. With the engine running at idle speed, check the oil level on dipstick (1). Remove oil breather assembly (2) and add oil as required to bring it to the proper level on the dipstick (1). | Low oil level. |
| | | |  | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

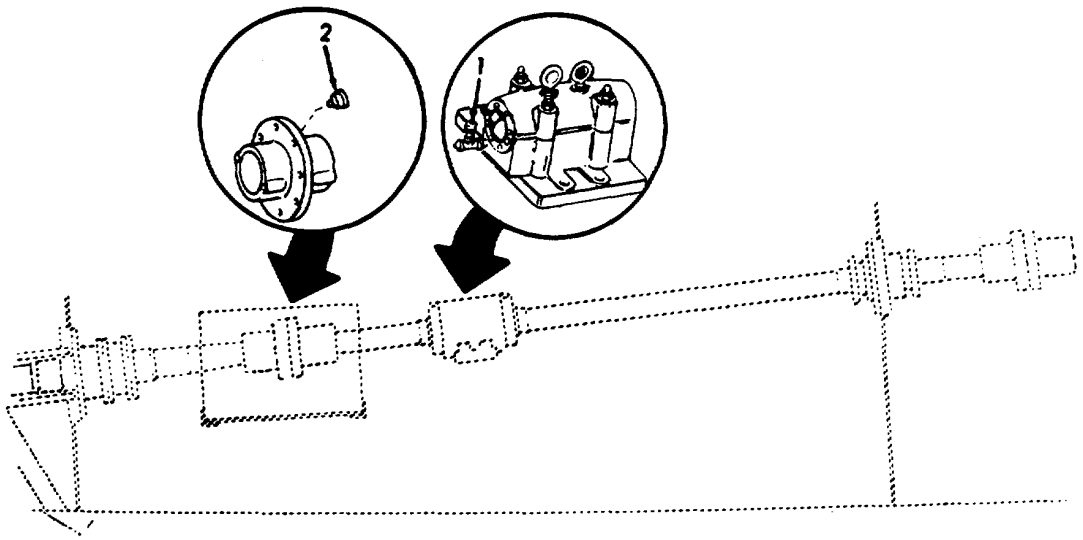
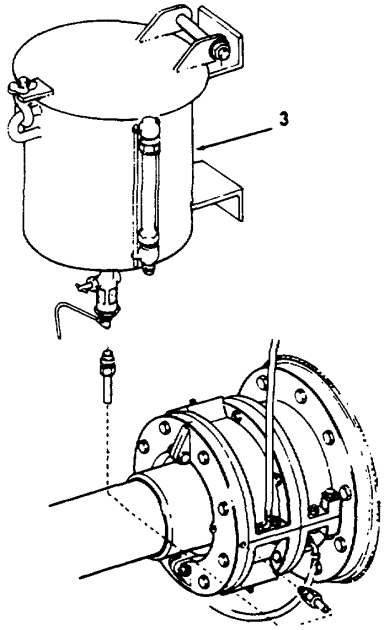
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 36 | AFTER | Engine Room | BULKHEAD STUFFING BOX - PORT SIDE. Check grease in grease cup (2). Add grease (MIL-G-24139A (SH)) as required. | No grease. |
| | | |  | |
| 37 | AFTER | Engine Room | PROPELLER SHAFT BEARINGS. Check level of water in tank (3). Add water as required. | Low water level. |
| | | |  | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

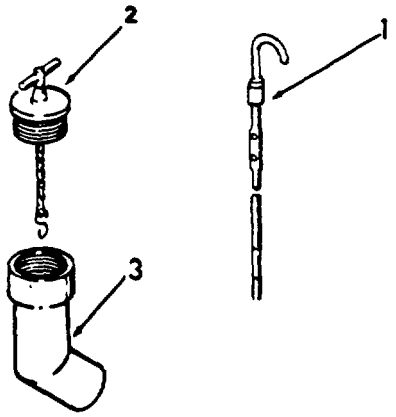
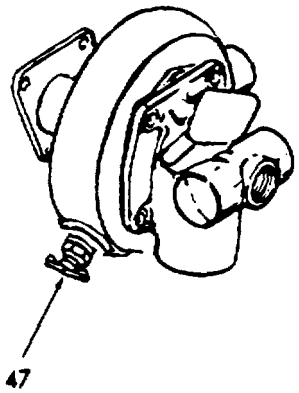
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 38 | AFTER | Engine Room (Generator) | ENGINE OIL. Check the oil level on dipstick (1) before starting the engine. If necessary, add oil by removing oil filler cap (2) from oil filler tube (3) to bring it to the proper level on the dipstick.   | Low oil level. |
| 39 | AFTER | Engine Room (Generator) | FRESH WATER PUMP. Check the prime on the fresh water pump. The engine should not be operated with a dry pump. Prime the pump, if necessary, by opening the draincock (47) to bleed out trapped air. Close the draincock (47) and add anti-freeze required.   | Pump not primed. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

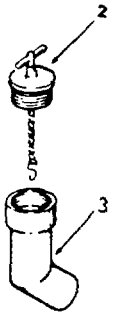
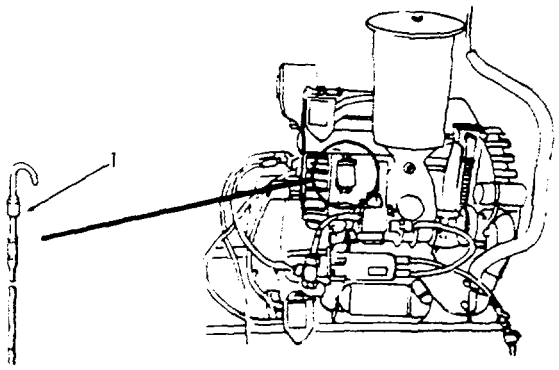
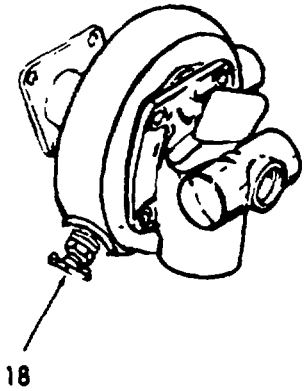
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 40 | AFTER | Anchor Winch Compartment | ENGINE OIL. Check the oil level on dipstick (1) before starting the engine. If necessary, add oil by removing oil breather cap (2) from oil filler tube (3) to bring it to the proper level on the dipstick. Use MIL-L-9000H (SH). | Low oil level. |
| | | |   | |
| 41 | AFTER | Anchor Winch Compartment | FRESH WATER PUMP. Check the prime on the fresh water pump; the engine should not be operated with a dry pump. Prime the pump, if necessary, by opening the draincock (18).<br><br>Close the draincock (18) and add anti-freeze to expansion tank on Port Main Propulsion Engine (see Item No. 3). | Pump not primed. |
| | | |  | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

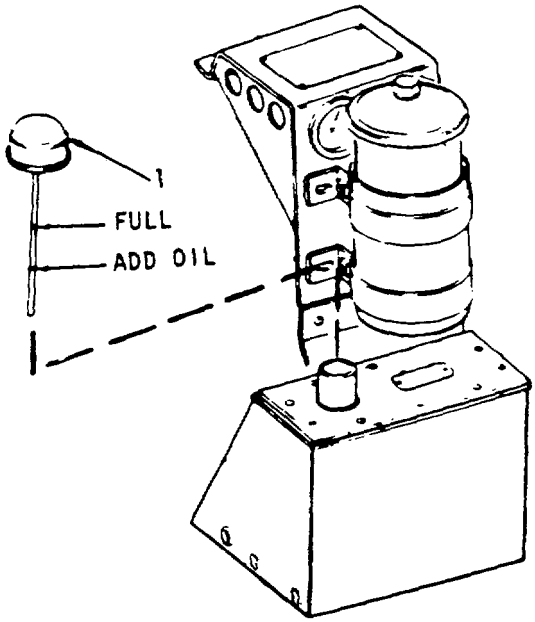
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 42 | AFTER | Anchor Winch Compartment | OIL LEVEL. Remove fluid gage (1) and check oil level. Add oil as required. (MIL-L-9000H (SH)).<br><br>**CAUTION**<br><br>**Make sure Anchor Winch Engine is not running.**<br><br>  <br> | Low oil level. |
| 43 | AFTER | Anchor Winch Compartment | LEVEL WIND ASSEMBLY AND GUARD:<br><br>WORM SHAFT. Lubricate fittings (14) with grease (MIL-G-24139A (SH)).<br><br>CARRIAGE GUIDE. Lubricate fittings (16) with grease (MIL-G-24139A (SH)).<br><br>VERTICAL ROLLERS. Lubricate fittings (17) with grease (MIL-G-24139A (SH)). | <br><br>Any of these gears, shafts, etc., bind or fails to function.<br><br>Any of these gears, shafts, etc., bind or fails to function.<br><br>Any of these gears, shafts, etc., bind or fails to function. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 43 Continued | | | FAIRLEAD PINION SHAFT. Lubricate fitting (19) with grease (MIL-G-24139A (SH)).<br><br>FAIRLEAD DRIVE CHAIN. Oil chain (20) with oil (MIL-L-9000H (SH)). | Any of these gears, shafts, etc., bind or fails to function.<br><br>Any of these gears, shafts, etc., bind or fails to function. |

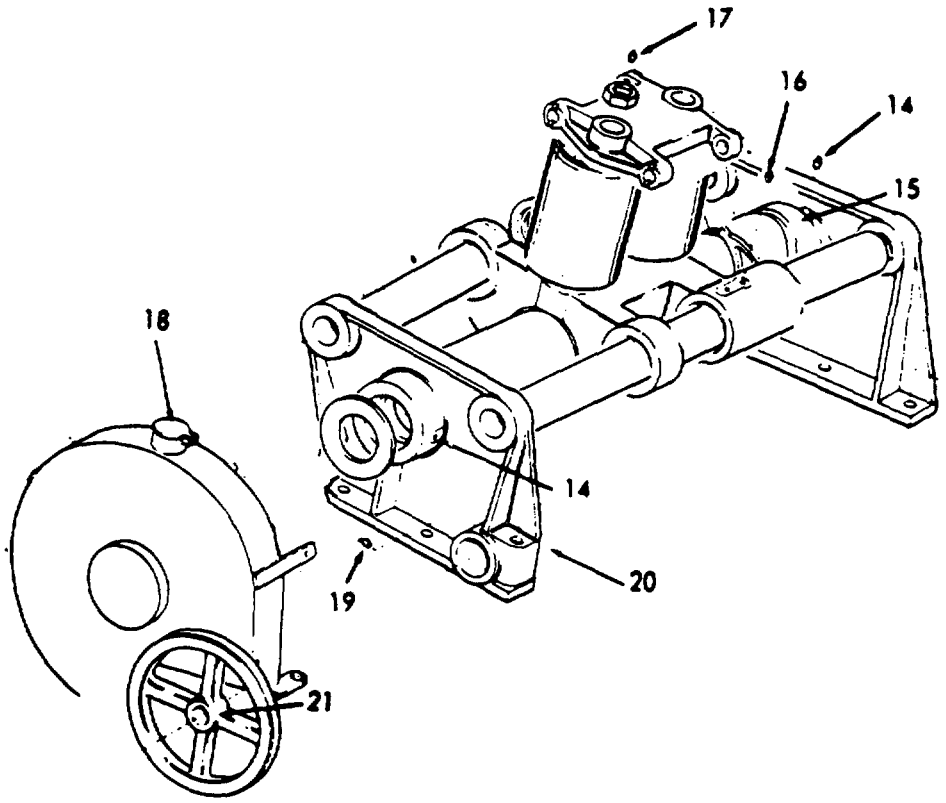


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

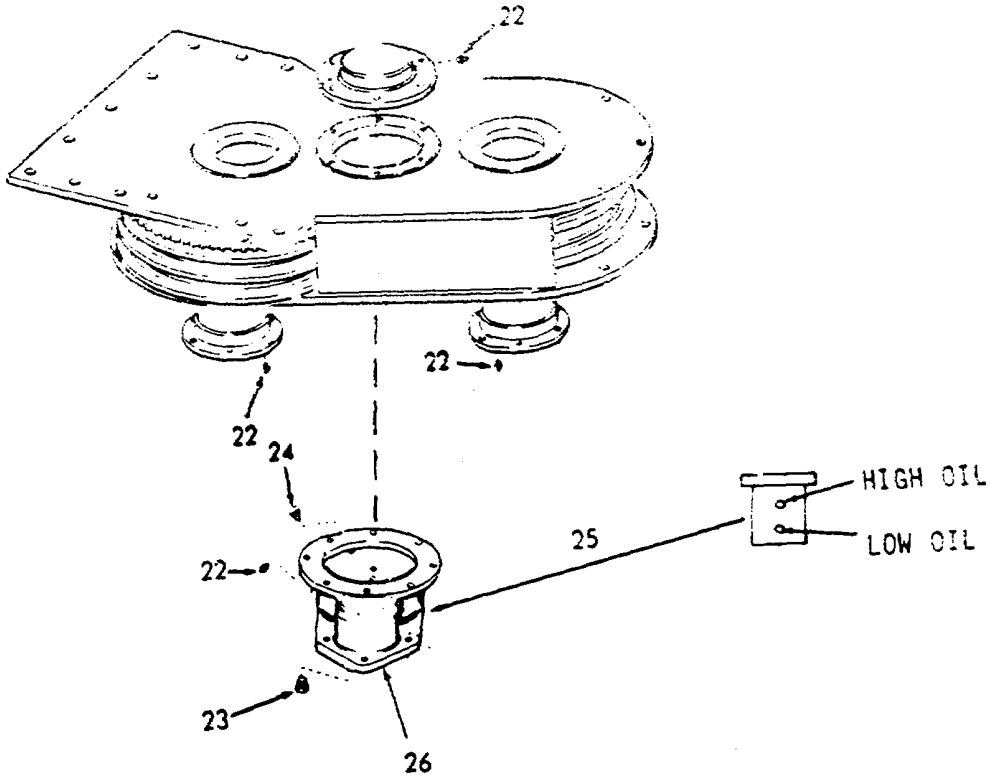
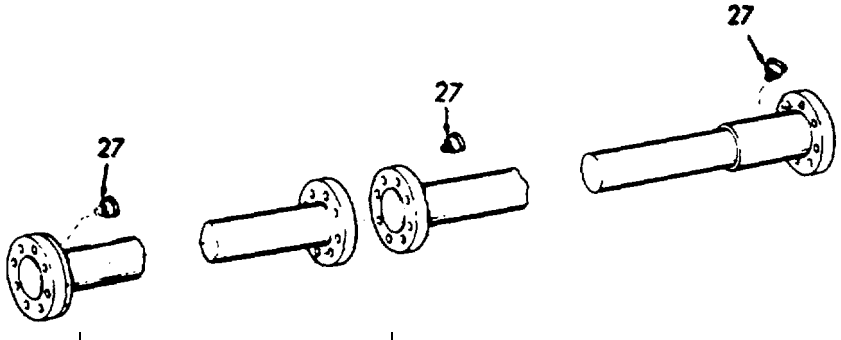
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 44 | AFTER | Anchor Winch Compartment | SLACK PULLER. Lubricate fittings (22) with grease (MIL-G-24139A (SH)). | Any of these gears, shafts, etc., bind or fails to function. |
| | | |  | |
| 45 | AFTER | Anchor Winch Compartment | FLANGE FITTINGS. Add oil to oil can fittings on flanges (27). Use oil (MIL-L-9000H (SH)). | Any of these gears, shafts, etc., bind or fails to function. |
| | | |  | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

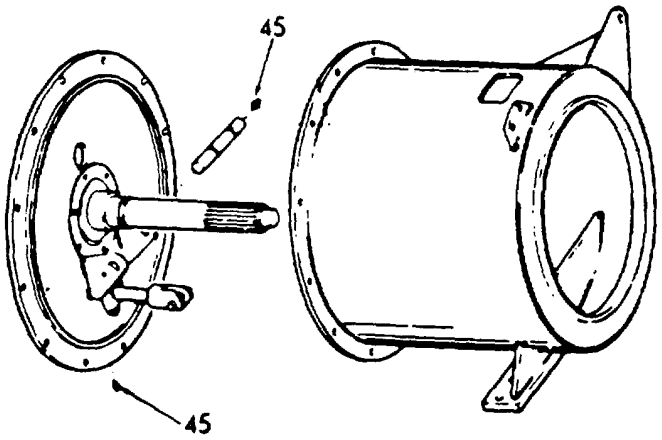
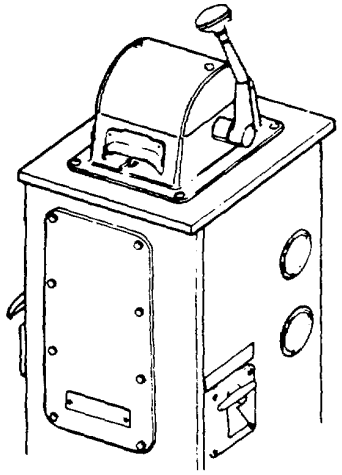
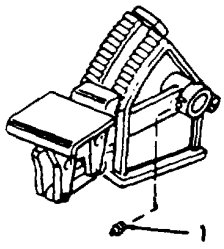
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 46 | AFTER | Anchor Winch Compartment | DISCONNECT CLUTCH. Lubricate fittings (45) with grease (MIL-G-24139A (SH)). | Clutch binds or fails to function. |
| | | |  | |
| 47 | AFTER | Vehicle Deck AFT/STBD | ANCHOR WINCH BRAKE CONTROL. Lubricate fittings (1) with grease (MIL-G-184588 (SH)). | Brake binds, is cracked, or fails to function. |
| | | |  | |
| | | |  | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

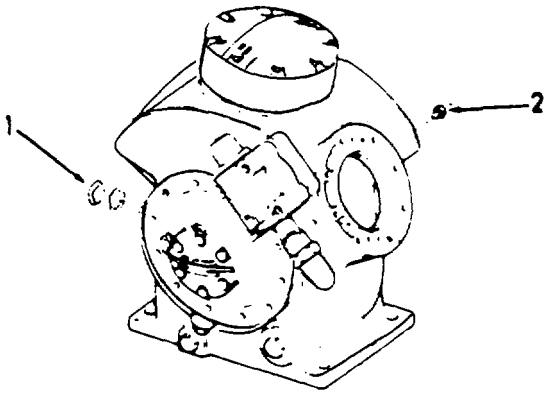
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 48 | AFTER | Air Conditioning | COMPRESSOR UNIT ASSEMBLY<br><br>CHECK OIL LEVEL. While system is in operation, check oil level in crankcase by checking sight glass (1). Add oil (VV-L-825), whenever the oil level drops below normal, (half-way up on sight glass), by removing pipe plug (2). Replace the pipe plug. Allow sufficient time for the system to balance after adding oil. Check oil level again. If the oil level in the crankcase still falls below normal, refer to maintenance.<br><br>  <br><br><br>**NOTE**<br><br>**After the compressor has been stopped for several minutes, the oil level in the compressor crankcase should be about half-way up on the sight glass. During operation, the oil level will be slightly lower but will appear higher when oil is foaming.**<br><br>**NOTE**<br><br>**The compressor holds 5 1/2 pts. of oil.** | Low oil level. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 49 | AFTER | Air Conditioning | SIGHT FLOW INDICATOR. Check indicator (4) for the following:<br><br>Indicator — Condition<br><br>Solid Column — Norma lack of refrigerant.<br>Liquid Bubbles — See Maintenance. | Low oil level. |

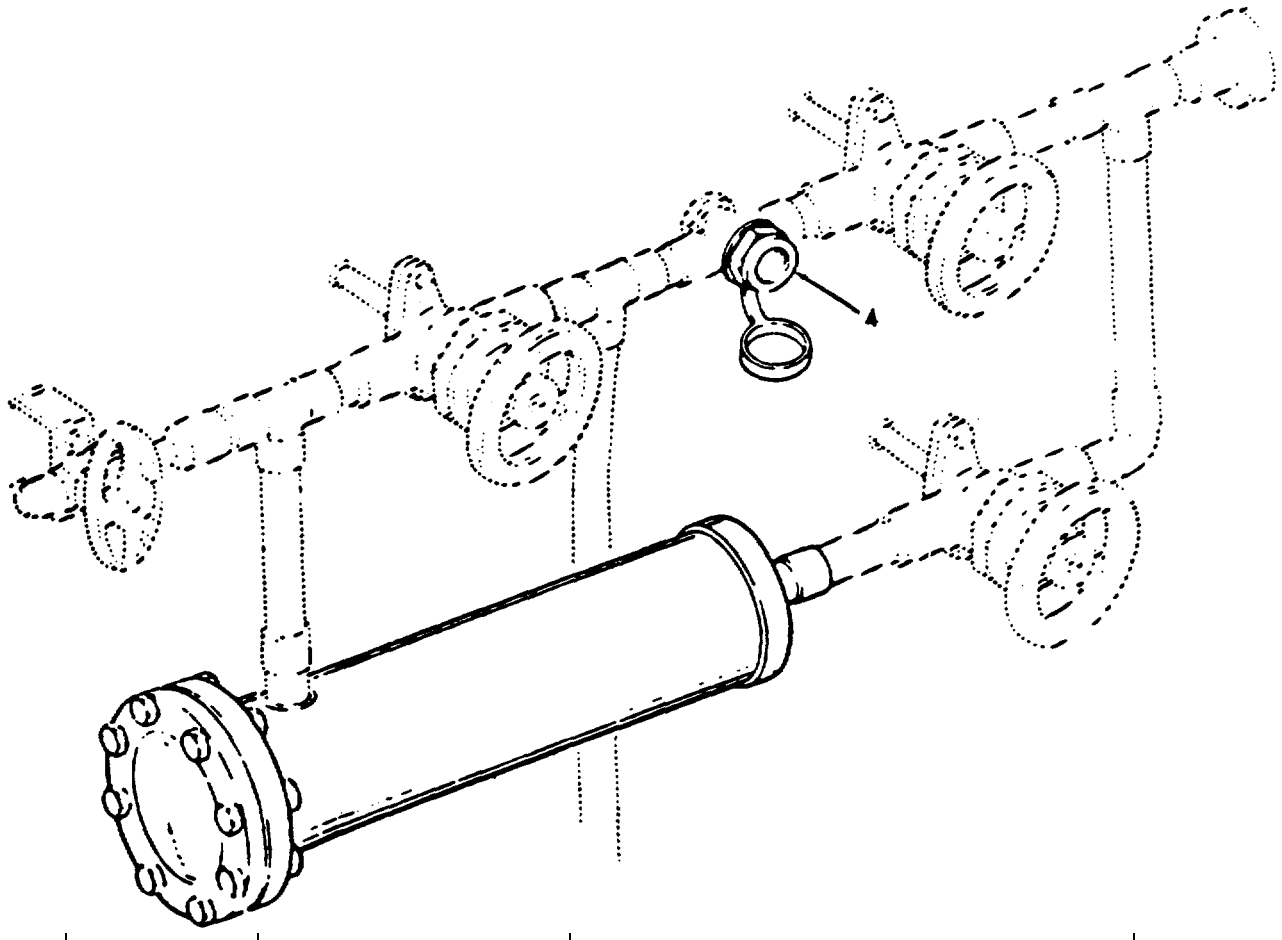


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 50 | AFTER | Portable Equipment | AIR COMPRESSOR<br><br>OIL LEVEL. Remove plug (1). Add oil (MIL-L-9000H (SH)) as needed.<br><br>**WARNING**<br><br>**Use eye protection when using compressed air.**<br><br>DRAIN MOISTURE. Open draincock (2). | Low oil level. |

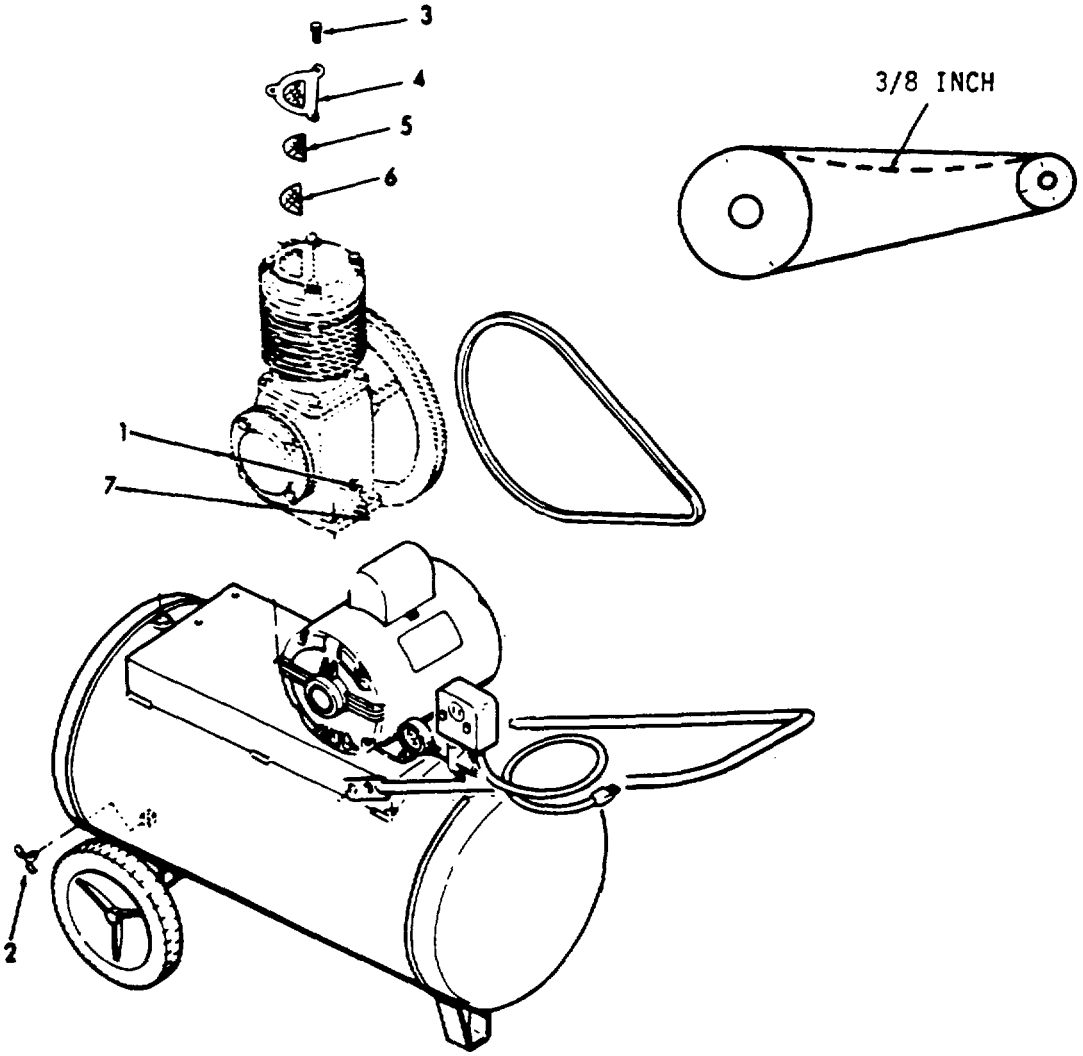


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 51 | HOURLY | Engine Room | MAIN ENGINE.<br><br>ENGINE OIL CHANGE. Pump oil into suitable container through tube (25).<br><br>**NOTE**<br><br>**Use rotary hand dispensing pump NSN 4930-00-263-9886.**<br><br>**NOTE**<br><br>**Do not drain oil into bilges. Use oil separation system to collect drained oil.**<br><br>**FULL - Engine has 34 quarts (32.2 liters).**<br><br>**LOW - Engine has 26 quarts (24.6 liters)** | *Hourly usage exceeds 250 and/or when oil sample analysis indicates need for action. |

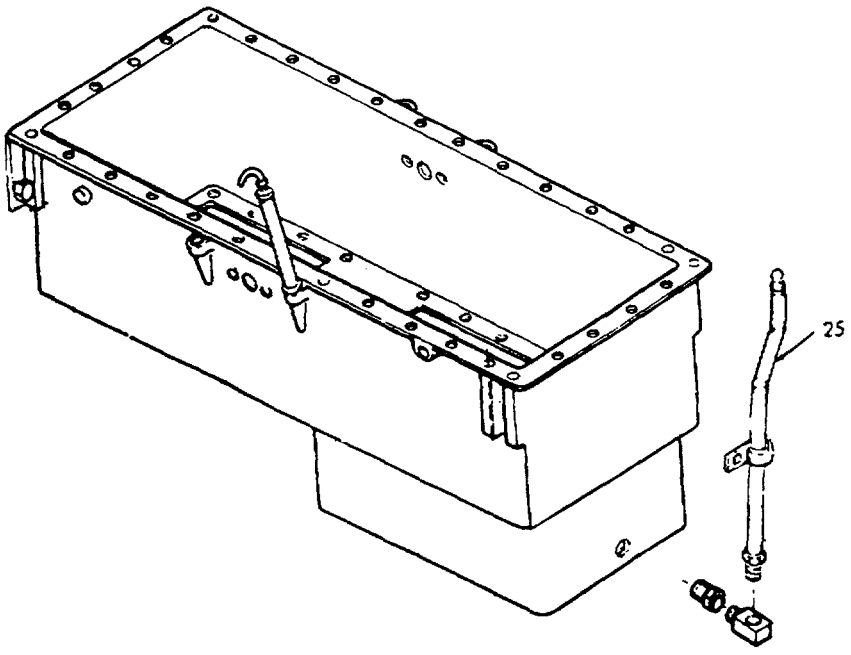


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 51 Continued | | | **NOTE*** **It is recommended that new engines be started with 100-hour oil change periods. Establishment of the most practical oil change period should be based on results of oil sample analysis.** | |
| 52 | HOURLY | Engine Room | GENERATOR ENGINE. ENGINE OIL CHANGE. Pump engine oil into a suitable container through dipstick hole (10). **NOTE*** **It is recommended that new engines be started with 100-hour oil change periods. Establishment of the most practical oil change period should be based on results of oil sample analysis.** **NOTE** **Do not drain oil into bilges. Use the oil/water separation system to collect drained oil.** **NOTE** **Use rotary hand dispensing pump NSN 4930-00-263-9880.** | *Hourly usage exceeds 250 and/or when oil sample analysis indicates need for action. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

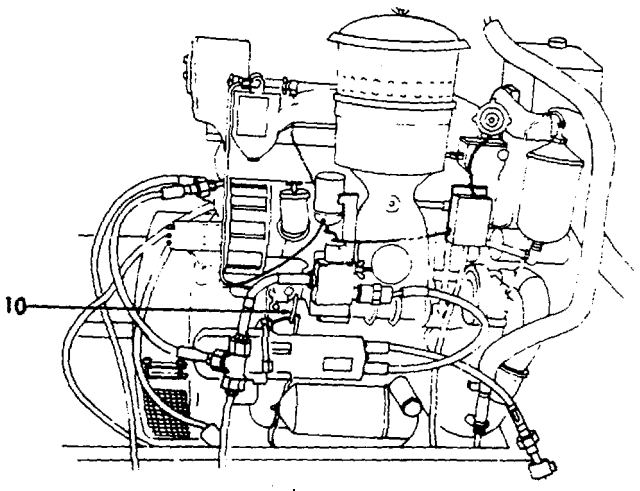
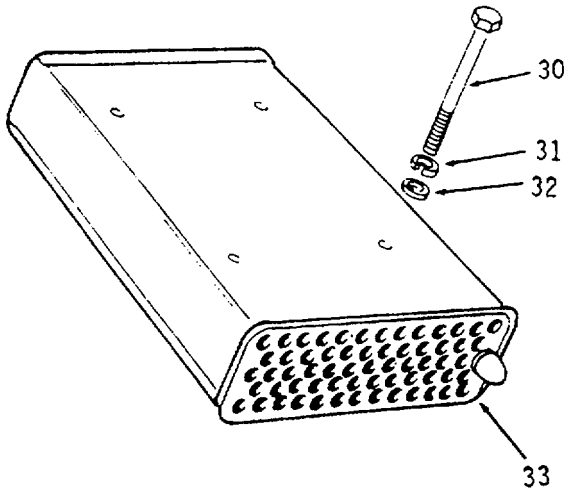
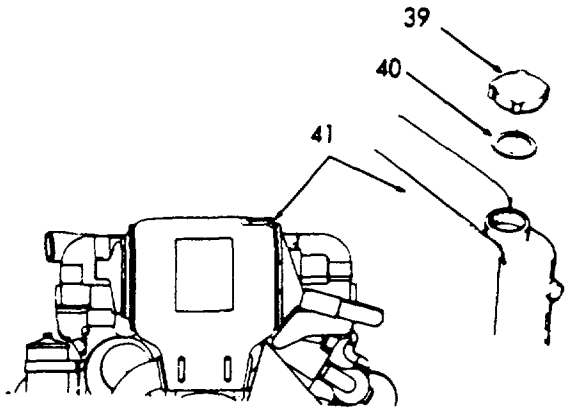
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 52 Continued | | |  | |
| 53 | DAILY | Engine Room | SILENCER ASSEMBLY. Remove screws (30), lock washers (31) and washers (32) in order to remove silencer assembly (33) from air inlet housing. Inspect the silencer and if necessary, clean in fuel oil. Dry with compressed air. Reassemble in reverse order.<br><br>**WARNING**<br><br>**Use eye protection when using compressed air.**<br><br>  | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 54 | DAILY | Engine Room | EXPANSION TANK. Remove cap (39) and gasket (40). Check the coolant level. It should be near the top of the expansion tank (41).<br><br>**NOTE**<br><br>**Use Antifreeze, Ethylene Glycol, Type MIL-A-46153.** | Expansion tank leaks or cap fails to maintain pressure. |
| 55 | DAILY | Engine Room | Check drive belts (90) for wear and proper tension. | Belts cracked or torn. |



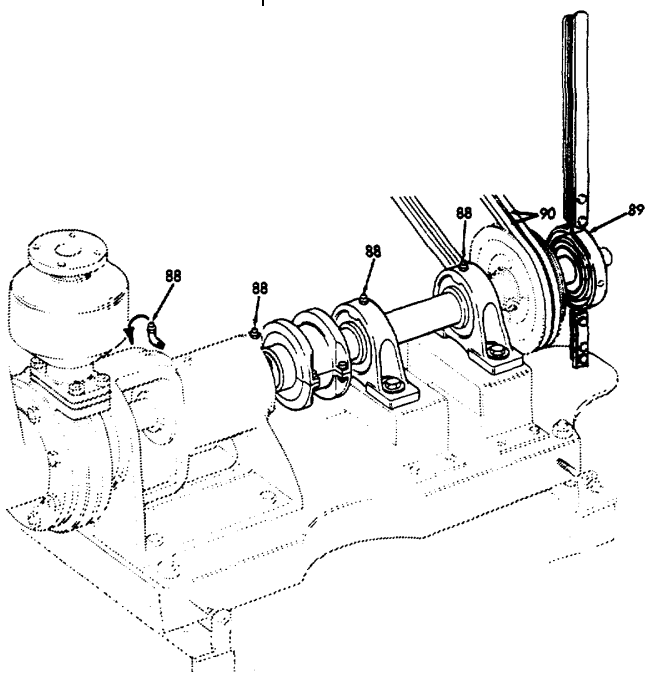
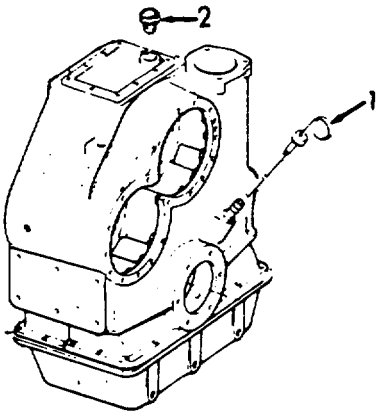



*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 56 | DAILY | Engine Room | MARINE DRIVE GEAR OIL LEVEL. With the engine running at idle speed, check the oil level on dipstick (1). Remove oil breather assembly (2) and add oil as required to bring it to the proper level on the dipstick (1).   | Low oil level. |
| 57 | DAILY | Engine Room | BULKHEAD STUFFING BOX - PORT SIDE. Check grease in grease cup (2). Add grease (MIL-G-24139A (SH)) as required. | No grease. |

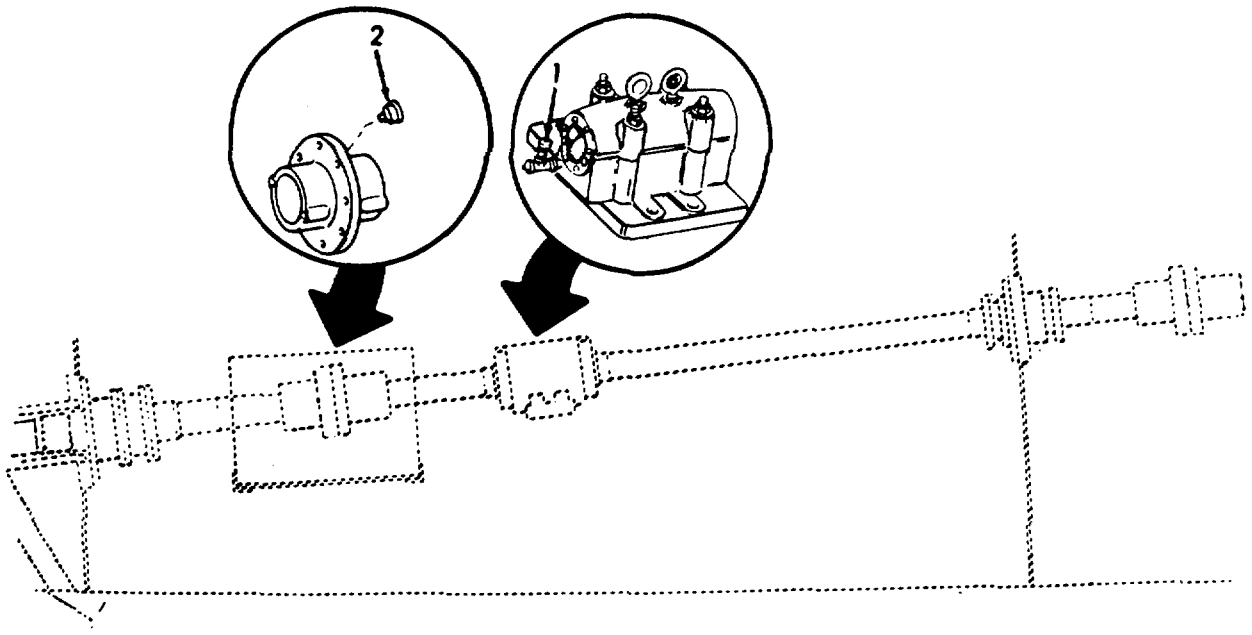


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 58 | DAILY | Engine Room | PROPELLER SHAFT BEARINGS. Check level of water in tank (3). Add water as required. | Low water level. |
| 59 | DAILY | Anchor Winch Compartment | TORQUE CONVERTER<br><br>OIL LEVEL. Remove fluid gage (1) and check oil level. Add oil as required. (MIL-L-9000H (SH)). See item 59, same figure. | Low oil level. |

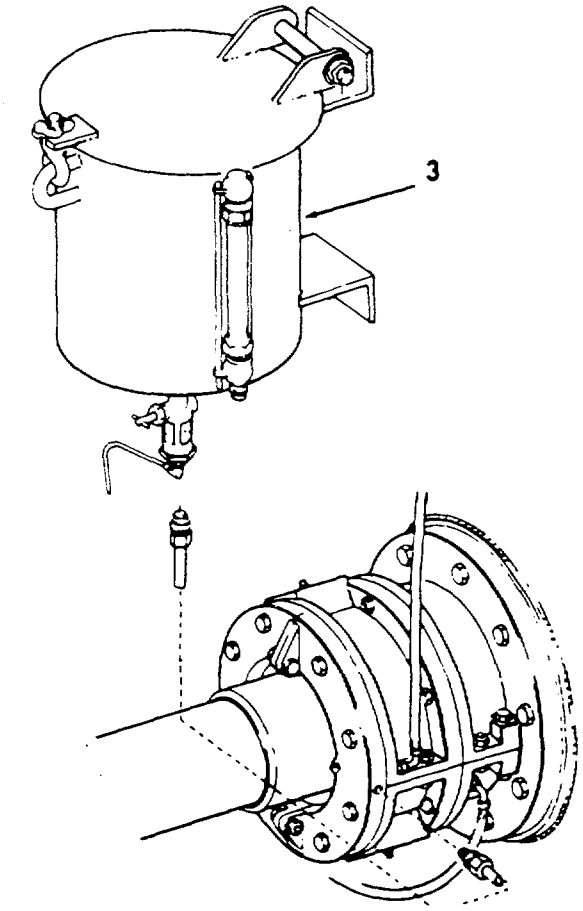


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 60 | DAILY | Anchor Winch Compartment | LEVEL WIND ASSEMBLY AND GUARD. | Bind or fail to function. |
| | | | WORM SHAFT. Lubricate fittings (14) with grease (MIL-G-24139A (SH)). | Bind or fail to function. |
| | | | Lubricate worm shaft (15) with grease (MIL-G-24139A (SH)). | Bind or fail to function. |
| | | | CARRIAGE GUIDE. Lubricate fittings (16) with grease (MIL-G-24139A (SH)). | Bind or fail to function. |
| | | | VERTICAL ROLLERS. Lubricate fittings (17) with grease (MIL-G-24139A (SH)). | Bind or fail to function. |
| | | | FAIRLEAD PINION SHAFT. Lubricate fitting (19) with grease (MIL-G-24139A (SH)). | Bind or fail to function. |
| | | | FAIRLEAD DRIVE CHAIN. Oil chain (20) with oil (MIL-L-9000H (SH)). | Bind or fail to function. |

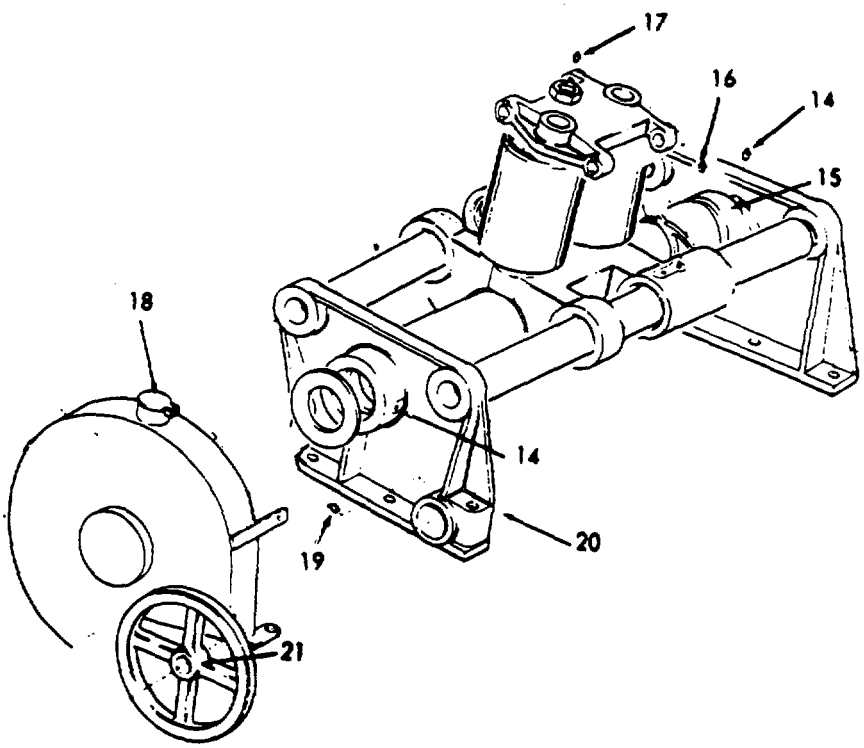


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

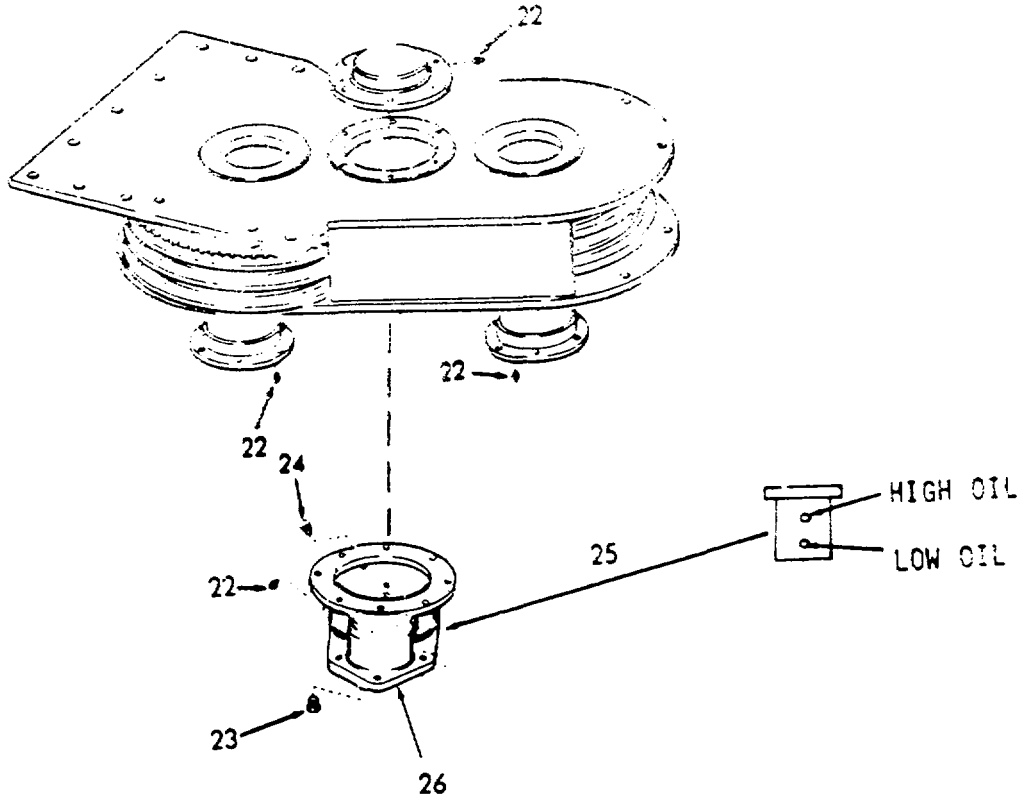
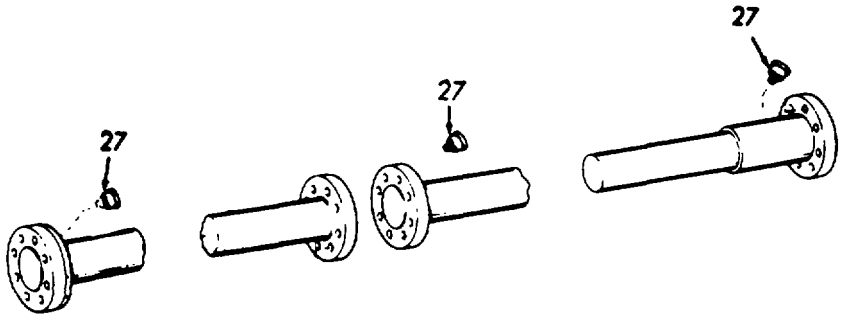
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 61 | DAILY | Anchor Winch Compartment | SLACK PULLER. Lubricate fittings (22) with grease MIL-G-24139A (SH)). | Bind or fail to function. |
| | | |  | |
| 62 | DAILY | Anchor Winch Compartment | FLANGE FITTINGS. Add oil to oil can fittings on flanges (27). Use oil (MIL-L-9000H (SH)). | Binds or fails to function. |
| | | |  | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

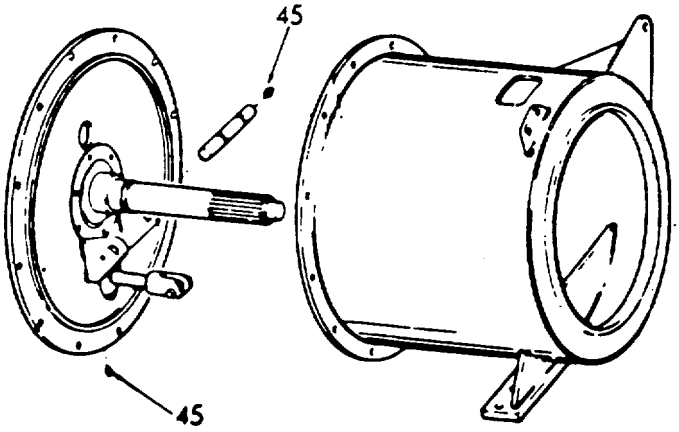
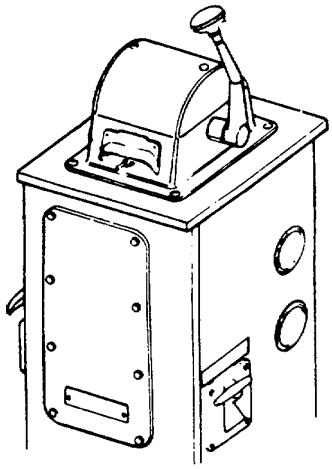
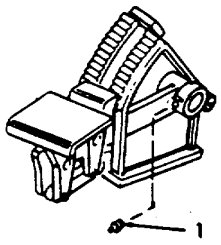
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 63 | DAILY | Anchor Winch Compartment | DISCONNECT CLUTCH. Lubricate fittings (45) with grease (MIL-G-24139A (SH)). | Clutch binds or fails to function. |
| | |  | | |
| 64 | DAILY | Vehicle Deck AFT/STBD | ANCHOR WINCH BRAKE CONTROL. Lubricate fittings (1) with grease (MIL-G-18458B (SH)). | Brake binds, is cracked, or fails to function. |
| | |  | | |
| | |  | | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

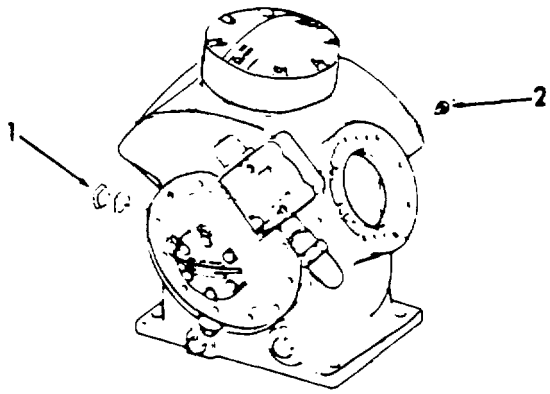
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 65 | DAILY | Air Conditioning Room | COMPRESSOR UNIT ASSEMBLY<br><br>CHECK OIL LEVEL. While system is in operation, check oil level in crankcase by checking sight glass (1). Add oil (W-L-825), whenever the oil level drops below normal, (half-way up on sight glass), by removing pipe plug (2). Replace the pipe plug. Allow sufficient time for the system to balance after adding oil. Check oil level again. If the oil level in the crankcase still falls below normal, refer to maintenance.<br><br>  <br><br>**NOTE**<br><br>**After the compressor has been stopped for several minutes, the oil level in the compressor crankcase should be about half-way up on the sight glass. During operation, the oil level will be slightly lower but will appear higher when oil is foaming.** | Oil level is low. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 66 | DAILY | Air Conditioning Room | SIGHT FLOW INDICATOR. Check indicator (4) for the following:<br><br>Indicator — Condition<br><br>Solid Column — Normal lack of refrigerant.<br>Liquid Bubbles — See Maintenance. | Low oil level. |

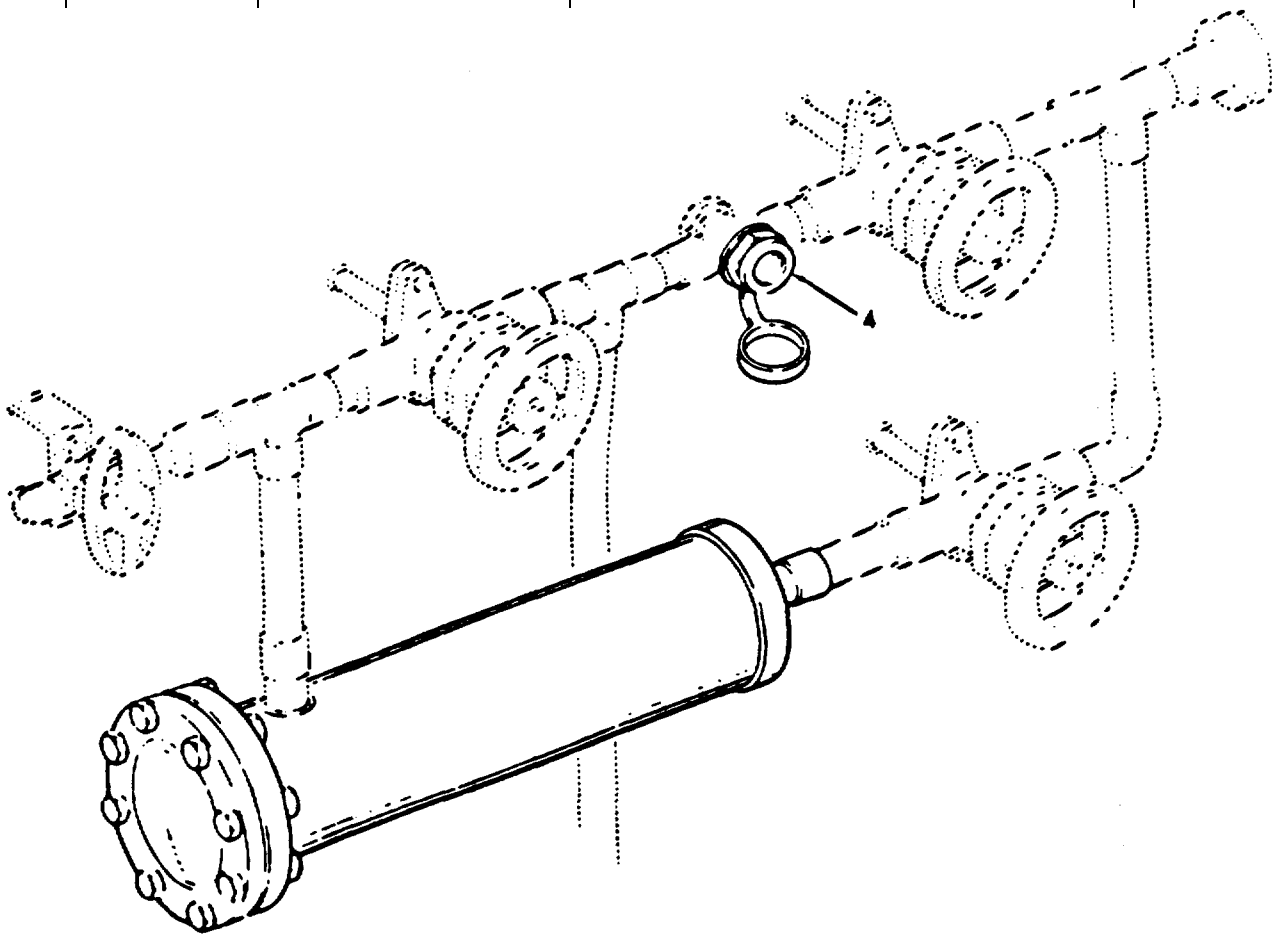


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 67 | DAILY | Portable | AIR COMPRESSOR<br><br>OIL LEVEL. Remove plug (1). Add oil (MIL-L-9000H (SH)) as needed. | Low oil level. |

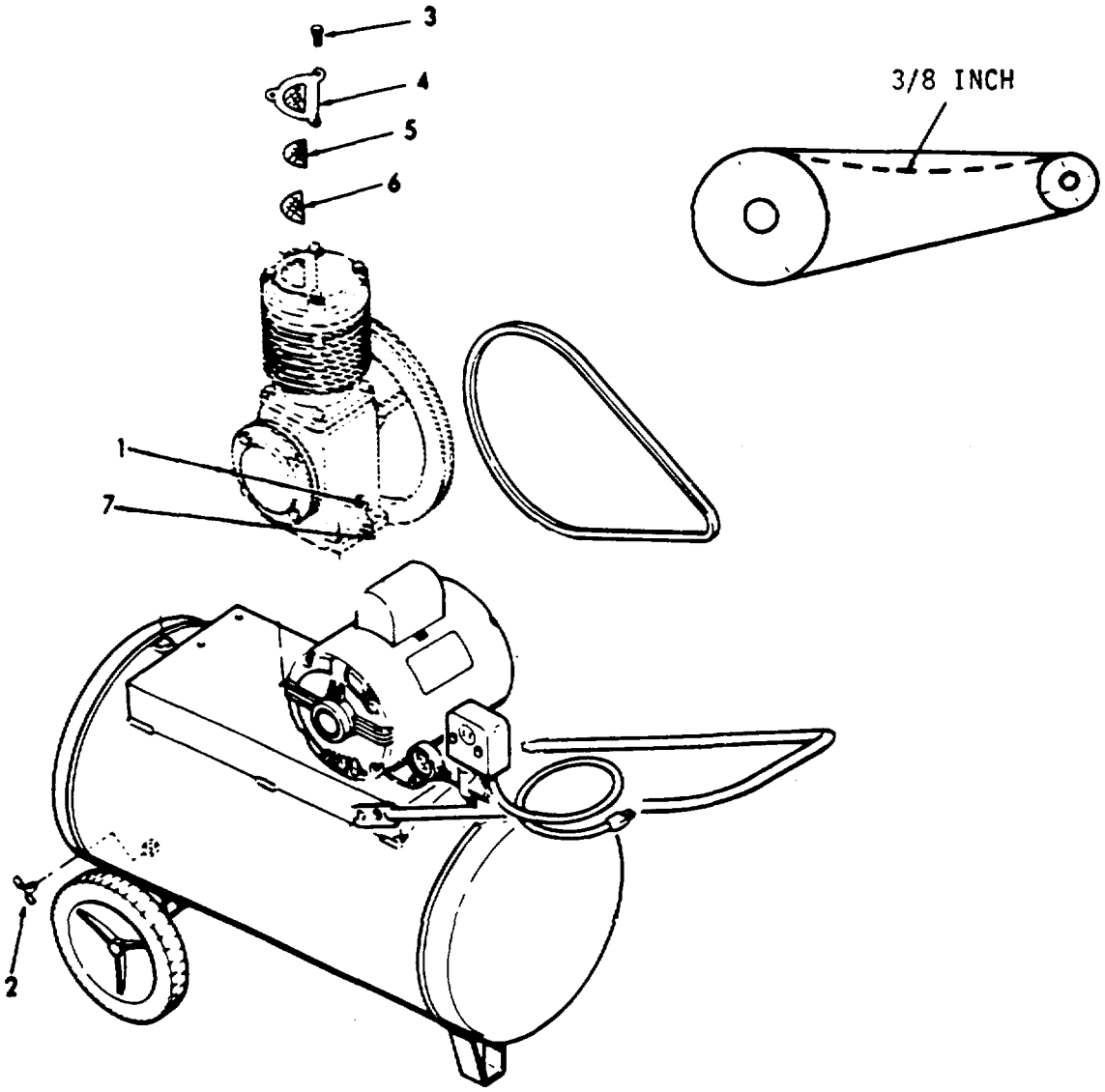


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

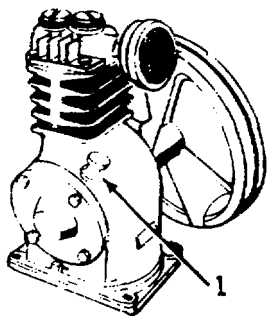
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 68 | DAILY | Equipment General | AIR HORN AIR COMPRESSOR<br><br>**WARNING**<br><br>**Disconnect power to compressor motor before performing any maintenance on compressor.**<br><br>OIL LEVEL. Remove bayonet stick oil gauge (1). Add oil (ML-L-9000H (SH)) as needed. The oil level must be maintained between the two marks on the gage.<br><br>**CAUTION**<br><br>**NEVER allow oil level to fall below lower mark on stick oil gage.**<br><br>**WARNING**<br><br>**Use eye protection when using compressed air.**<br><br>  <br> | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

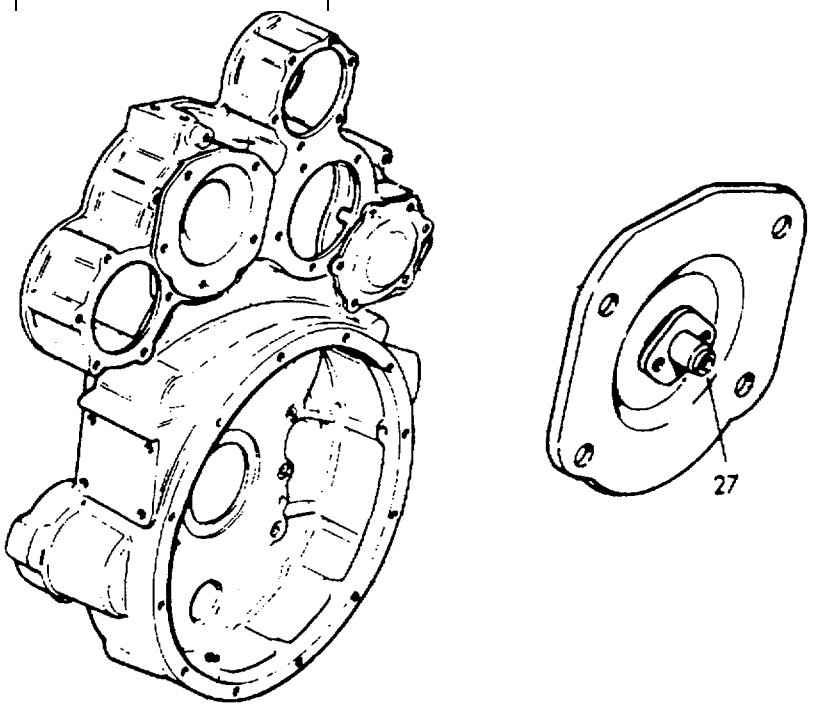
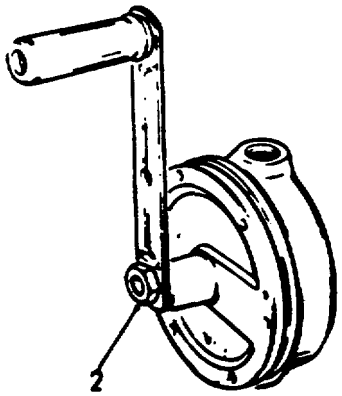
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 69 | WEEKLY | Engine Room | TACHOMETER DRIVE. Lubricate the tachometer drive (27) with grease (MIL-G-24139A (SH)). | Fails to function. |
| | | |   | |
| 70 | WEEKLY | Engine Room FR 51 | LUBE OIL TRANSFER PUMP. Operate pump for internal lubrication.   Add oil to shaft (2). Use oil (MIL-L-9000H (SH). | Fails to function. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 71 | WEEKLY | Bow/Main Deck | BOW RAMP and FAIRLEAD. Lubricate four filings (1 and 2) with grease, (MIL-G-24139A (SH)).<br><br>Lubricate ramp hinges (3) (10 places) with grease (MIL-G-24139A (SH)).<br><br>Lubricate dog bolt threads (4) with grease (MIL-G-24139A (SH)).<br><br>Lubricate cable (5) with grease (MIL-G-18458B (SH)). | <br><br>Broken.<br><br><br><br>Frayed or broken. |

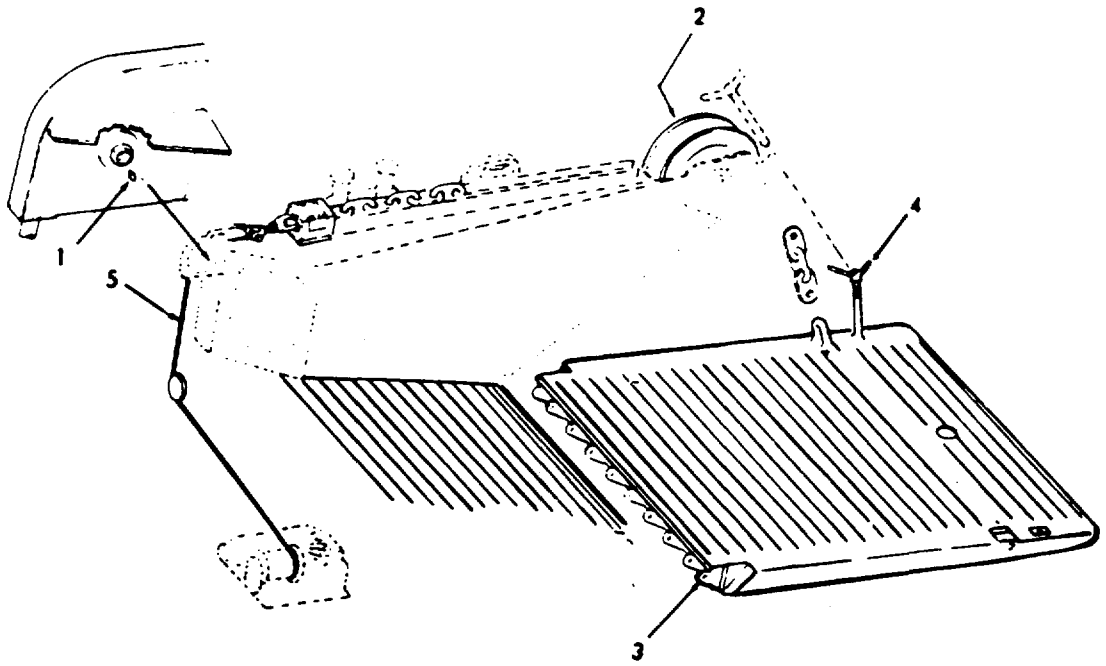


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 72 | WEEKLY | Bow Ramp Winch | Lubricate lower Fairlead Sheath (10) with grease (MIL-G-24139A (SH)). | Broken. |
| 73 | WEEKLY | Bow Ramp Winch | Lubricate cables (3) with grease (MIL-G-24139A (SH)). | Frayed or broken. |

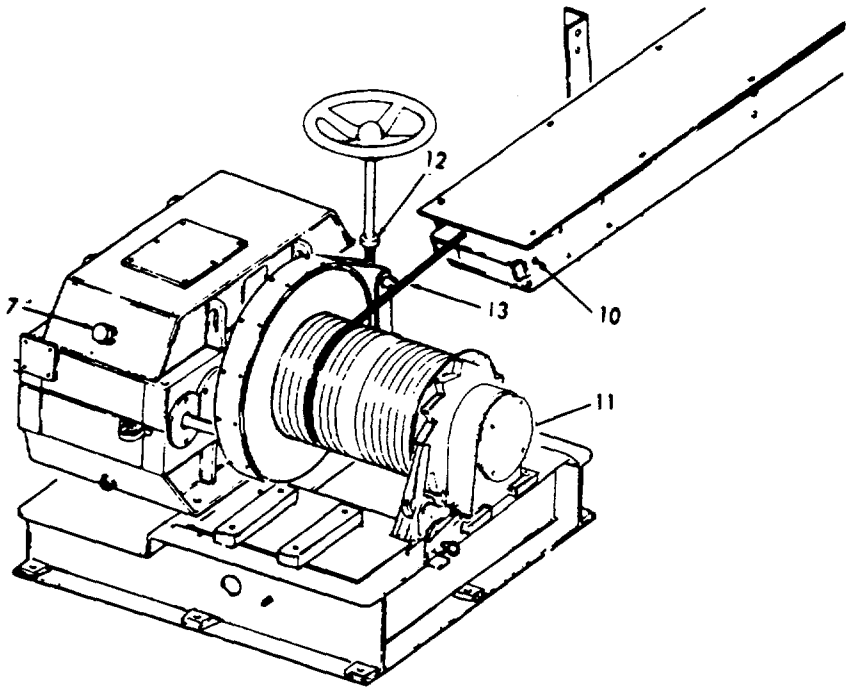


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

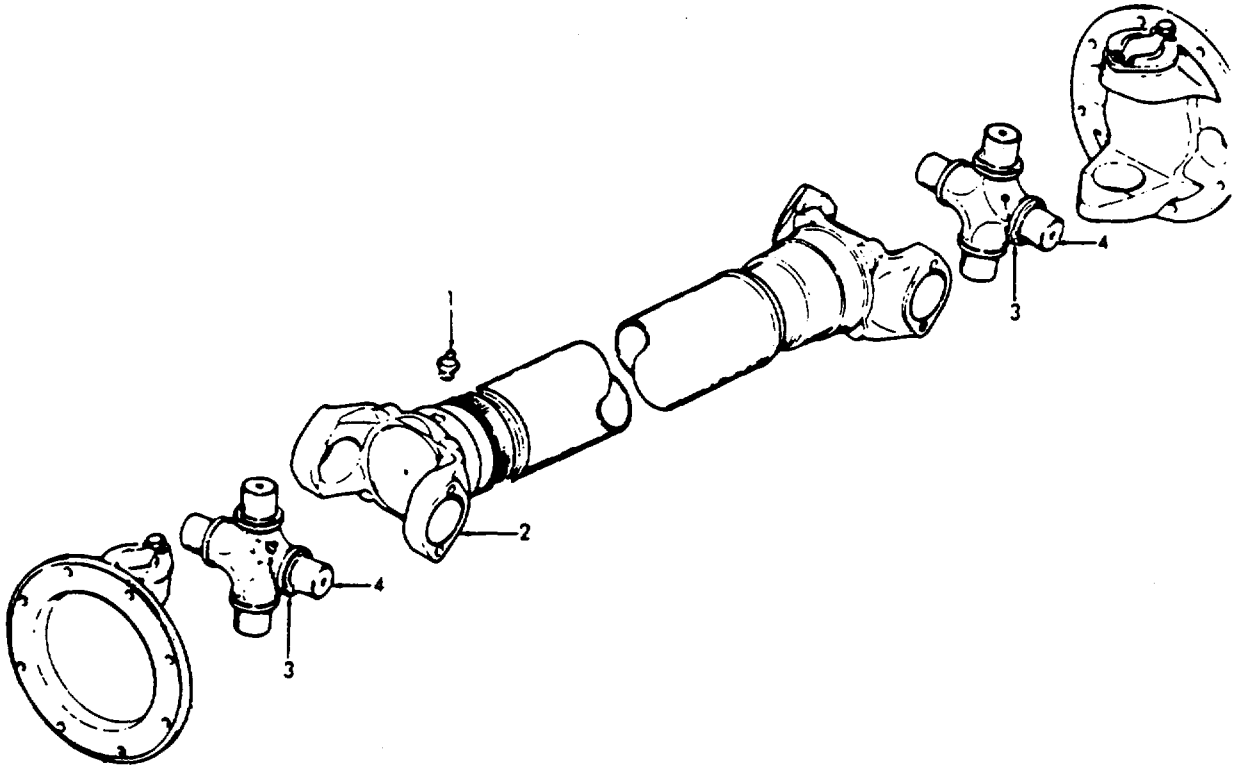
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 74 | WEEKLY | Anchor Winch Compartment | UNIVERSAL JOINT ASSEMBLY<br><br>Lubricate fitting (1) on yoke assembly (2) with grease (MIL-G-24139A (SH)).<br><br>Lubricate fittings (3) on cross (4) with grease (MIL-G-24139A (SH)). | Broken. |
| | | |  | |
| 75 | WEEKLY | Anchor Winch Compartment | LEVEL WIND ASSEMBLY AND GUARD.<br><br>Lubricate worm shaft (15) with grease (MIL-G-24139A (SH)). | Any of these gears, shafts, etc., bind or fail to function.<br><br>Any of these gears, shafts, etc., bind or fail to function. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 76 | WEEKLY | Anchor Winch Compartment | FAIRLEAD GEAR. Lift cover (18) and pour oil on gear while winch is running. (MIL-L-9000H (SH)).<br>**WARNING**<br>**Stay clear of operating gears and cables.** | Any of these gears, shafts, etc., bind or fail to function. |
| 77 | WEEKLY | Anchor Winch Compartment | HANDLE. Lubricate handle (21) with grease (MIL-G-24139A (SH)). | Any of these gears, shafts, etc., bind or fail to function. |

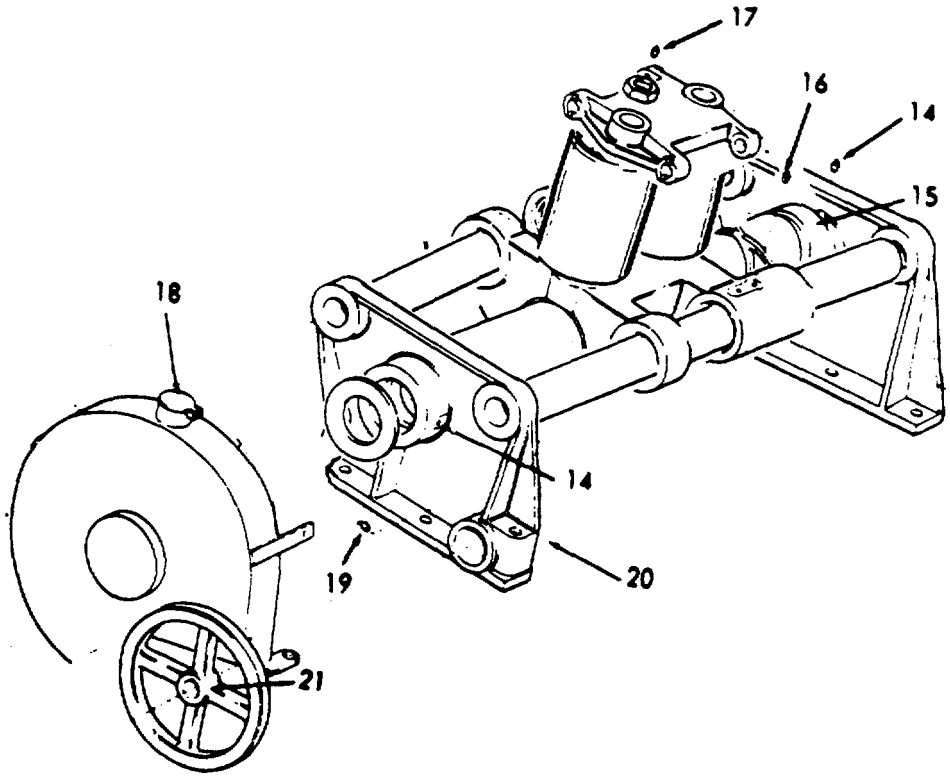


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

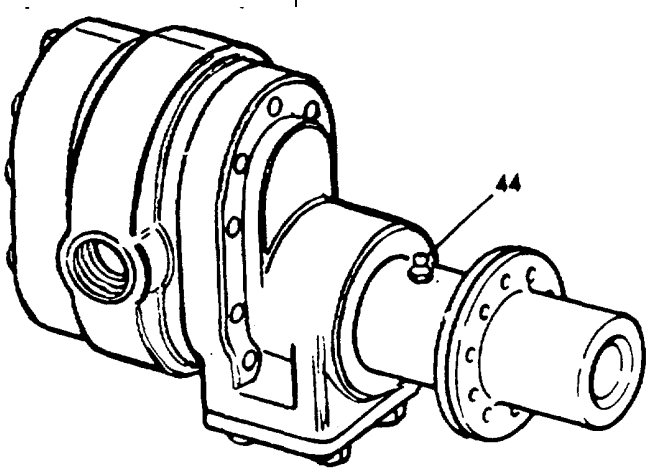
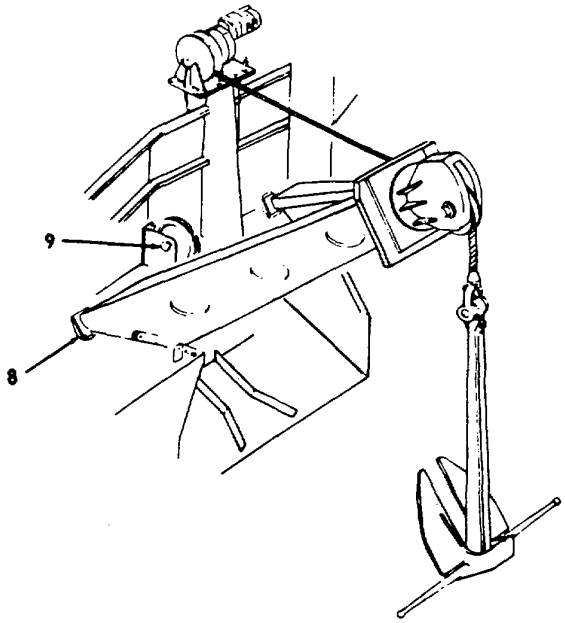
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| | | | | |
| 78 | WEEKLY | Anchor Winch Compartment | HYDRAULIC PUMP DRIVE COUPLINGS. Lubricate fitting (44) with grease (MIL-G-24139A (SH)). | Binds or fails to function. |
| | |  | | |
| 79 | WEEKLY | Vehicle Deck AFT/STBD | "A" FRAME HINGE PIN. Lubricate pin (8) with grease (MIL-G-18458B (SH)). | Worn to excess or binding. |
| 80 | WEEKLY | Vehicle Deck AFT/STBD | "A" FRAME GUIDE SHEATH. Lubricate guide sheath (9) with grease (MIL-G-18458B (SH)). | Guide sheath is worn or binds. |
| | |  | | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

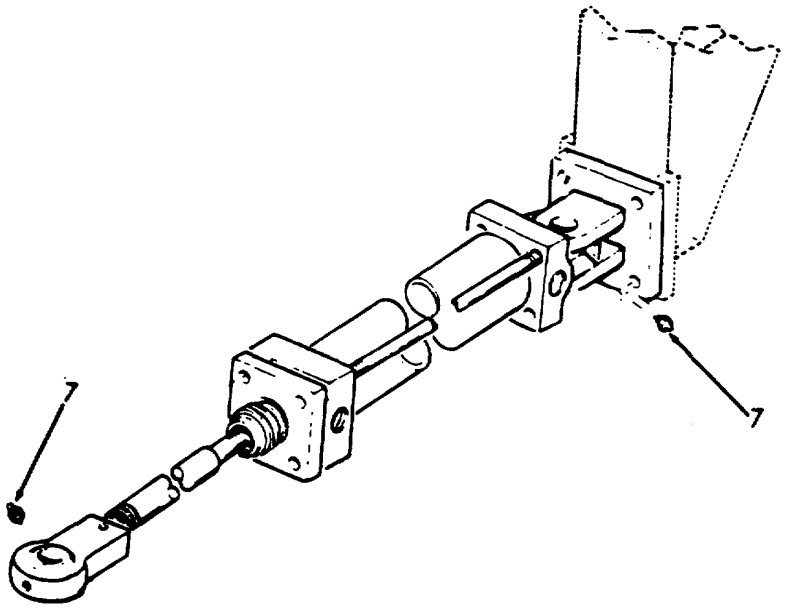
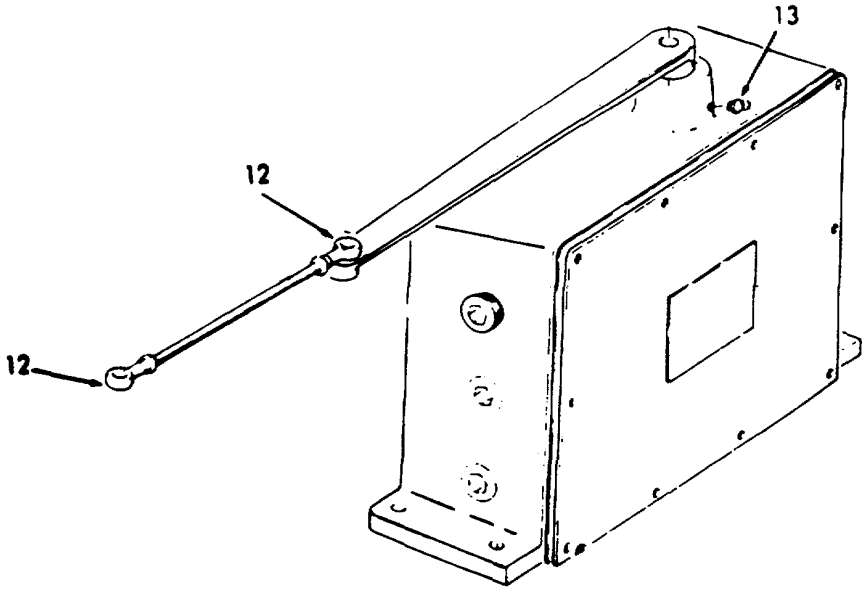
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 81 | WEEKLY | AFT/FR 70-72 | STEERING HYDRAULIC CYLINDER. Lubricate fittings on four cylinders at fittings (7). Use grease (MIL-G-24139A (SH)). | Worn or leaking. |
| | | |  | |
| 82 | WEEKLY | AFT/FR 72-75 | RUDDER REPEATBACK TRANSMITTER. Lubricate ball joints (12) with a few drops of oil (MIL-L-9000H (SH)). | Binding or fails to function. |
| | | |  | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

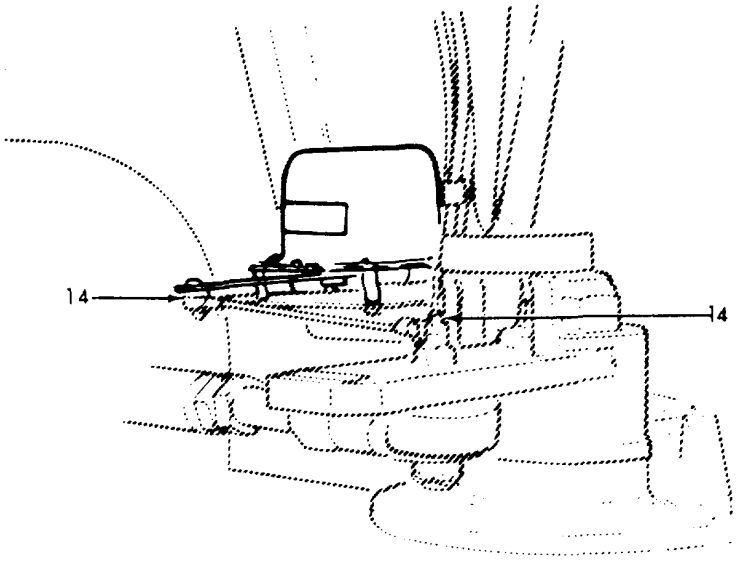
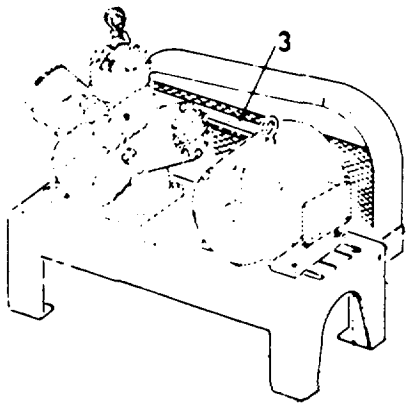
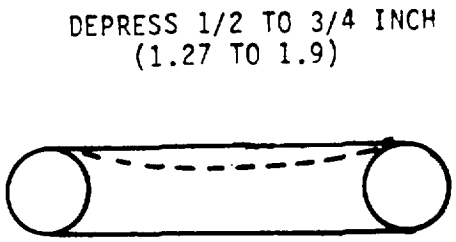
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 83 | WEEKLY | AFT | RUDDER LIMIT SWITCH. Lubricate ball joints (14) with a few drops of oil (MIL-L-9000H (SH)). | Fails to function. |
| | | |  | |
| 84 | WEEKLY | Equipment and Repair | COMPRESSOR UNIT ASSEMBLY.<br>**NOTE**<br>**The compressor holds 5 1/2 pts. of oil.** | |
| | | | DRIVE BELTS. Check drive belts (3) r wear. Replace if necessary. Check drive belts (3) for proper tension. | Cracked or worn. |
| | | |  | |
| | | |  | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 85 | WEEKLY | Air Conditioning Room | LEAK TESTS GENERAL. Test all joints, valves, and components for leaks using an electronic leak detector.<br><br>**NOTE**<br><br>**Ventilate the compartment prior to leak testing. Test sensitivity is lowered if large quantities of refrigerant are present in the air.**<br><br>**NOTE**<br><br>**If the system is losing refrigerant and a piping leak cannot be detected, test the condenser.**<br><br>LEAK TEST CONDENSER. Shut down the air conditioning system for about 12 hours. Slowly open the vents (5), one at a time. Insert probe of leak detector, and check for leaks. | Leaking.<br><br>Leaks detected. |

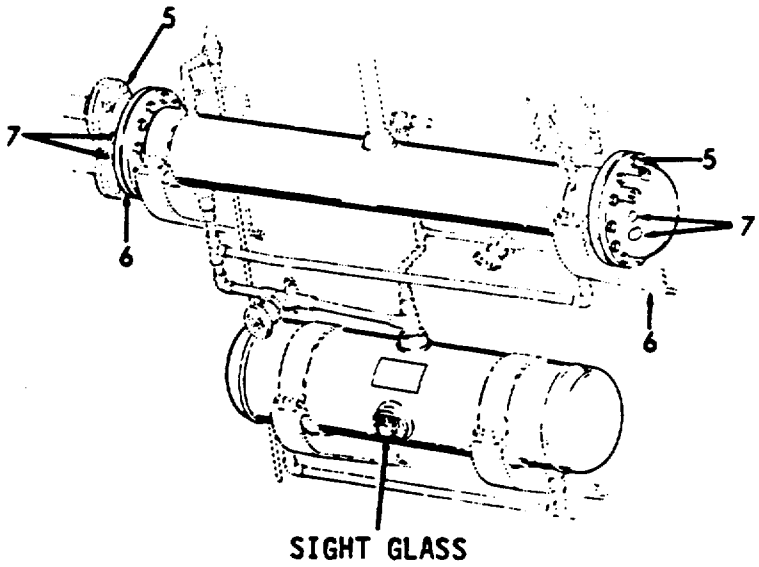


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| | | | | |
| 86 | WEEKLY | Portable | AIR COMPRESSOR<br><br>**WARNING**<br><br>**Use eye protection when using compressed air.**<br><br>DRAIN MOISTURE. Open draincock (2).<br><br>AIR INTAKE FILTER. Remove screw (3), and filer retainer (4). Remove filter compressor (5) and filter silencer (6). Clean in an approved solvent and air dry. Lubricate with oil (MIL-L-9000H (SH)).<br><br>DRIVE BELT. Check for wear. Check tension. A 3/8 inch play is allowed. Tighten if required. | Filter plugged.<br><br>Cracked, worn or improper tension. |

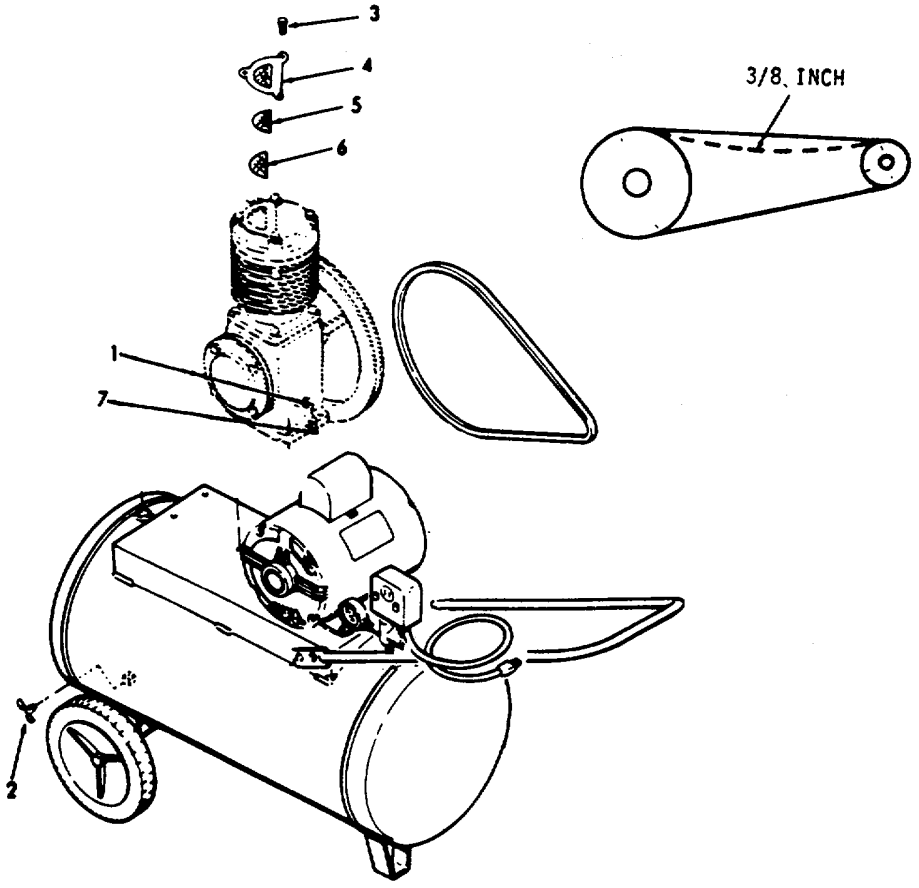


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

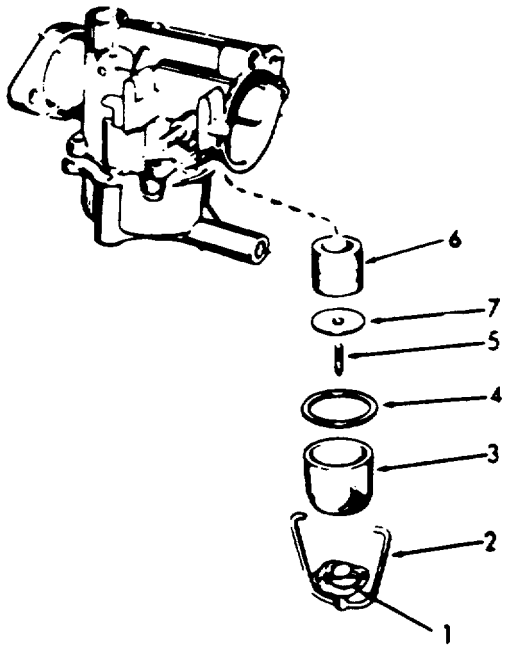
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| | | | | |
| 87 | WEEKLY | Portable | FIRE PUMP<br><br>FUEL BOWL. Loosen fingernut (1). Swing bracket (2) out of way. Remove bowl (3).<br><br>**WARNING**<br><br>**Do not smoke or have an open flame when handling gasoline.**<br><br>Remove filer nut (4) from stud (5). Remove filter (6). Clean filer (6) and bowl (3) in gasoline. Replace gasket (7) if damaged. Reassemble filter (6), nut (4) and stud (5). Reassemble bowl (3) and bracket (2). Tighten fingernut (1).<br><br>  <br> | Plugged, leaking or cracked. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 88 | WEEKLY | Main Deck | "A" FRAME HINGE PIN. Lubricate pin (8) with grease (MIL-G-18458B (SH)).<br><br>"A FRAME GUIDE SHEATH. Lubricate guide sheath (9) with grease (MIL-G-18458B (SH)). | Fails to function.<br><br>Fails to function. |

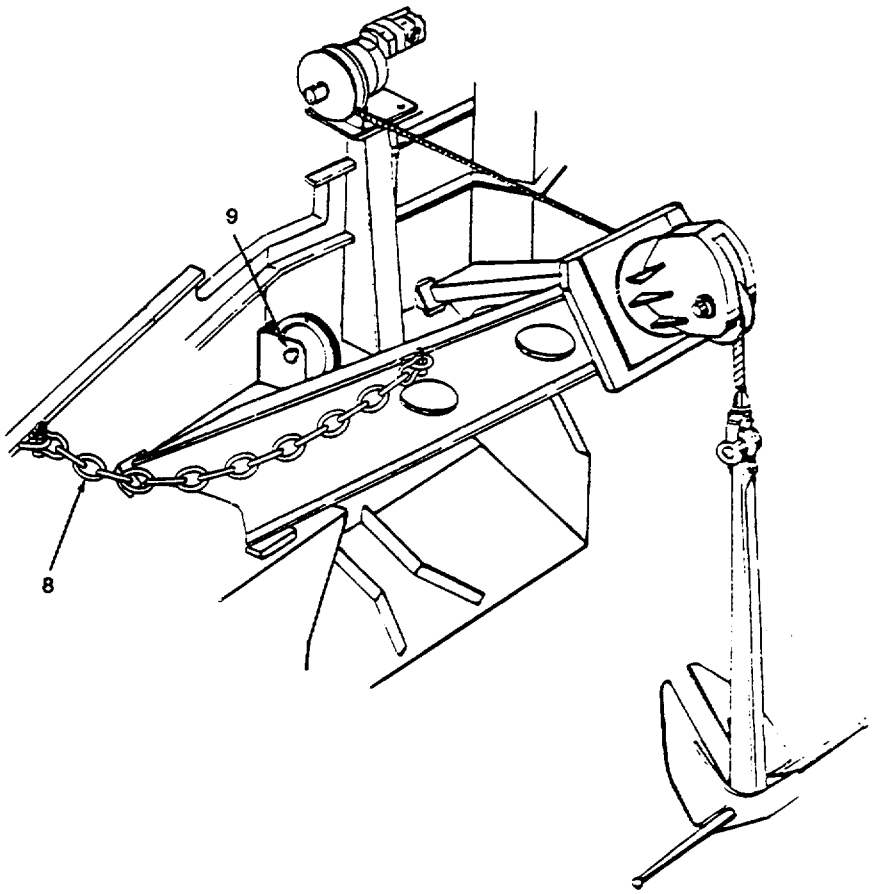


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 89 | WEEKLY | Equipment General | AIR HORN COMPRESSOR<br><br>DRIVE BELT. Check for wear and cracks. Check tension. A 3/8 inch play is allowed. Tighten if required. Tension on V-bet is adjusted by loosening the four bolts which hold the motor to the base. Slotted bolt holes are provided for this purpose.<br><br>**CAUTION**<br><br>**Avoid overtightening the belt. While the belt should not be loose enough to cause slipping, it should not be tight or overstrained. This puts an extra load on the motor and compressor bearings. Keep oil and water off the belt and do not use belt dressing on it.**<br><br>**CAUTION**<br><br>**When moving the motor to adjust the belt always check the alignment of the pulleys so the belt runs true. Misalignment of the pulleys causes rapid belt wear.** | Worn, cracked or broken. |
| 90 | BI-WEEKLY | Engine Room | DUAL OIL FILTER. Install new element and gasket when engine oil is changed. Remove drain plug (15) and drain contents into a suitable container. Remove screw (16) and washer (17). Remove shell (18), spring (19), spacer ring (20), spring (21), and spring (22). Also remove filer (23) and gasket (24).<br><br>**NOTE**<br><br>**Prior to installing gasket, place a light coating of oil on gasket.** | Filter obstructed. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 90 Continued | | | Install new filter (23) and gasket (24). Replace spring (22) and spring retainer (21), spacer ring (20), spring (19) and shell (18). Replace washer (17), screw (16) and plug (15). | |

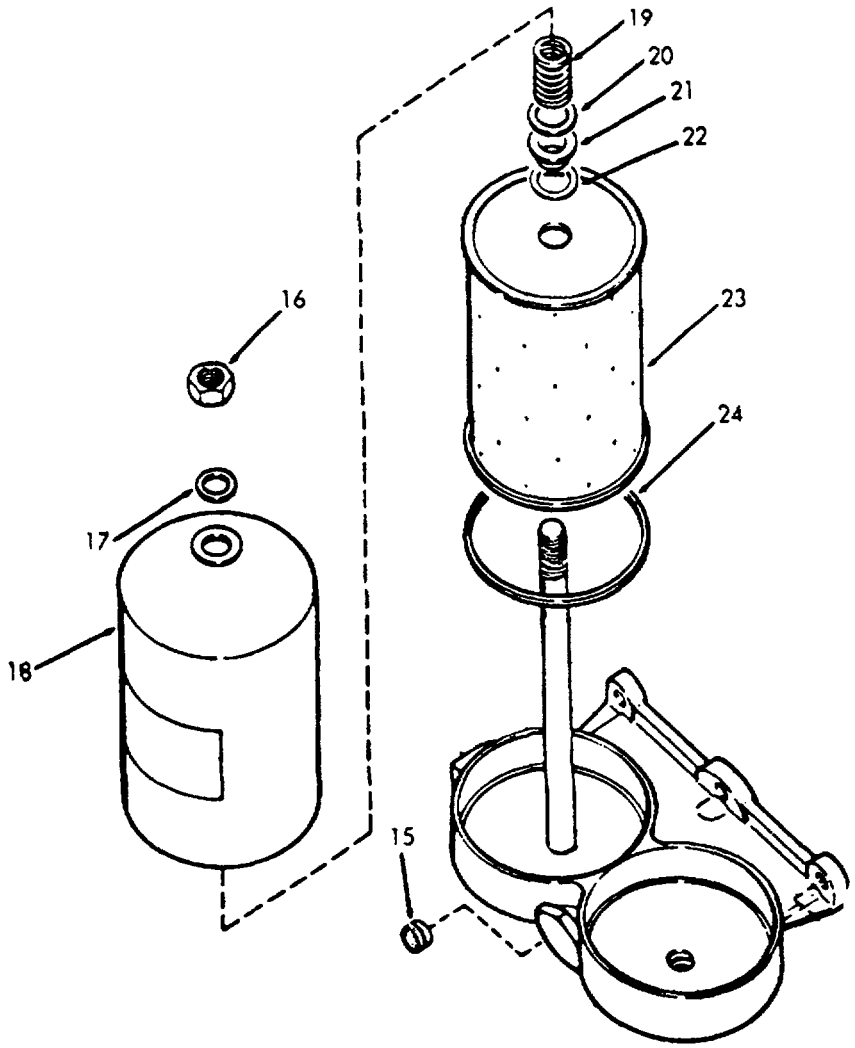


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

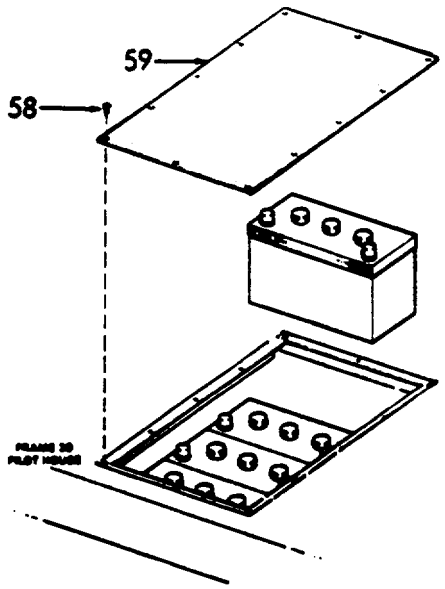
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 91 | BI-WEEKLY | Engine Room | BATTERY. Check the specific gravity of the electrolytes in the batteries.<br><br>In the Pilothouse, remove 12 screws (58) and cover plate (59).<br><br>Replace cover (59) after completion of servicing.<br><br>**WARNING**<br><br>**Battery acids are dangerous. Do not get acids on skin or in eyes. Get medical help immediately if you do.**<br><br>  <br><br>Inspect batteries, cables and battery terminals. Remove battery clamps from terminals and clean, using battery cleaning brush.<br><br>Replace battery cables after servicing. | Battery electrolyte low; or specific gravity reading lower than 1.220.<br><br>Battery electrolyte low; or specific gravity reading lower than 1.220. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

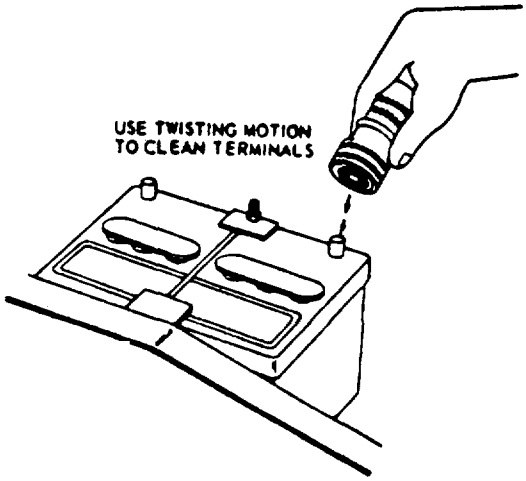
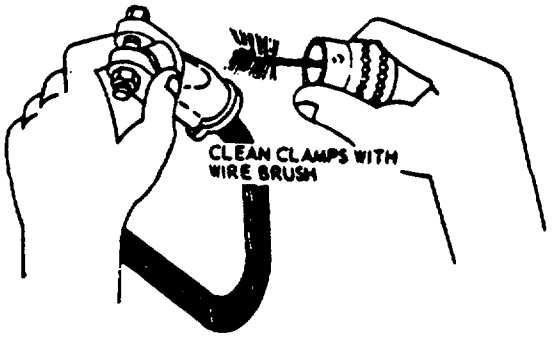
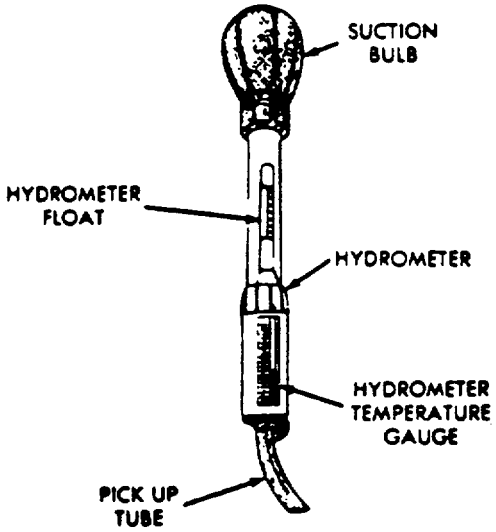
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 91 Continued | | |   **NOTE** **Apply a light coating of grease to terminals after cleaning.** To check electrolyte in batteries, remove battery caps. Liquid level should be at bottom of each vent hole. Add mineral free water as required. | Battery electrolyte low; or specific gravity reading lower than 1.220. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 91 Continued | | | Check specific gravy of batteries using a hydrometer. Place the pick-up tube in a battery cell. Squeeze the suction bulb to obtain reading. If the specific gravity is less than 1.220, the battery requires charging. All cells of a battery should be within .025. Replace battery caps after servicing.<br><br>**WARNING**<br><br>**Battery acids are dangerous. Do not get acids on skin or in eyes. Get medical help immediately if you do.** | |
| | | | If recharging does not bring the specific gravity to 1.220, a new replacement battery is required.<br><br>The battery can be washed with a baking powder solution, and rinse with water. | Battery electrolyte low; or specific gravity reading lower than 1.220. |



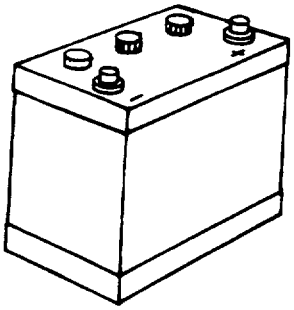
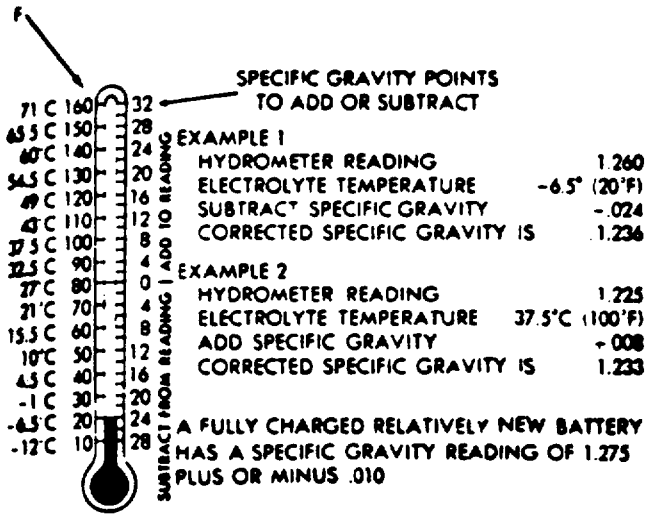



*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 91 Continued | | | **CAUTION**<br><br>**Do not get baking soda solution in battery cells, as it will damage battery.**<br><br>**NOTE**<br><br>**Wash battery in a suitable area.** | |




**Hydrometer Correction Chart**

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 92 | BI-WEEKLY | Main Deck/AFT | STERN GATE. Lubricate hinges (1) with grease (MIL-G-24139A (SH)).<br><br>STERN GATE DAVITS. Lubricate davits (2) with grease (MIL-G-24139A (SH)). | Broken.<br><br>Broken. |

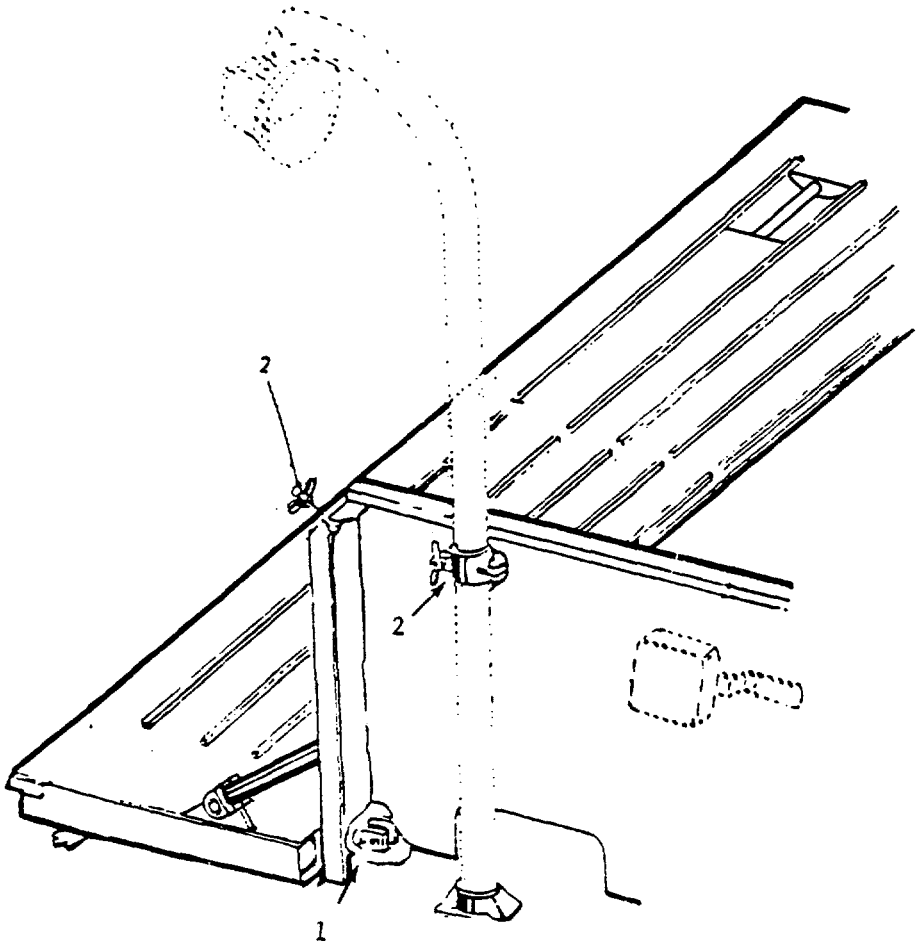


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

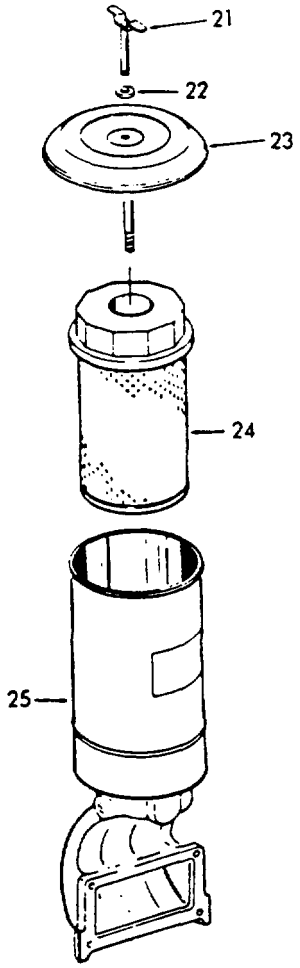
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 93 | BI-WEEKLY | Anchor Winch Compartment | AIR CLEANER. Loosen wingnut (21). Remove washer (22) and cover (23). Remove air cleaner element (24) from air cleaner body (25). Inspect for thin spots, pin holes, or ruptures. Replace if damaged. Clean air cleaner element (24) with compressed air. | Cleaner obstructed. |
| | | | **WARNING**<br>**Use eye protection when using compressed air.** | |
| | | | Insert air cleaner element (24) in body (25). Replace cover (23), washer (22) and tighten wing nut (21). | Cleaner obstructed. |
| | | |  | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 94 | BI-WEEKLY | Anchor Winch Compartment | OIL FILTER BYPASS. A new element and gasket should be installed each time the engine oil is changed. (See Item 172). Remove pipe plug (26) and drain contents into a suitable container.<br><br>**NOTE**<br><br>**Do not drain oil into bilges. Use oil separation/recovery system to collect drained oil.**<br><br>Remove oil filter stud and shell (27). Remove filter (28) and gasket (29). Install a new filter (28) and gasket (29).<br><br>Replace shell and tighten stud (27).<br><br>Replace pipe plug (26).<br><br>Add engine oil (MIL-L-9000H (SH)) to oil fill as required.<br><br>**NOTE**<br><br>**Wipe excess oil from filter shell and recover.** | Filter bypass obstructed.<br><br>Filter bypass obstructed. |

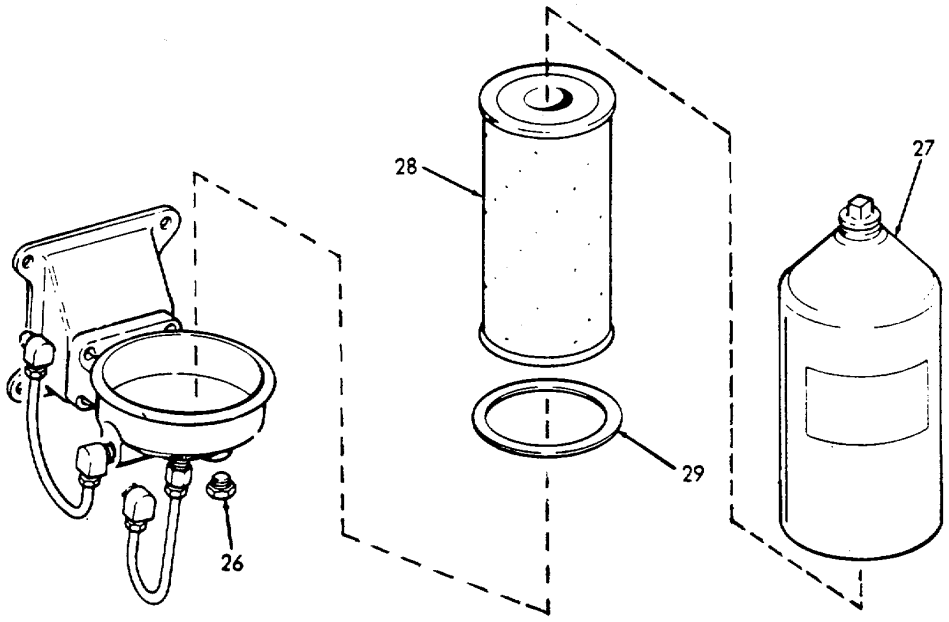


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 95 | BI-WEEKLY | Vehicle Deck AFT/STBD | ENGINE CLUTCH AND THROTTLE<br><br>CONTROLS. Remove cover screws (2) from control cover (3). Place 2 to 4 drops of oil in the cover screw holes (4). Use oil (MIL-L-9000H (SH)).<br><br>Oil the throttle joint (5) with 2 to 4 drops of oil (MIL-L-9000H (SH)).<br><br>Clutch quadrant cam (6) requires application of grease (MIL-G-24139A (SH)).<br><br>Reinstall cover (3) and replace screws (2). | Clutch and/or throttle bind or fail to function.<br><br>Clutch and/or throttle bind or fail to function. |

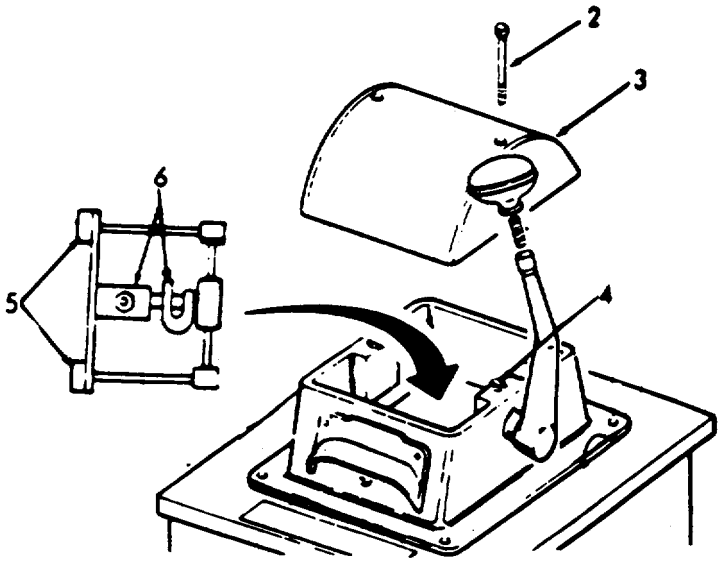


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

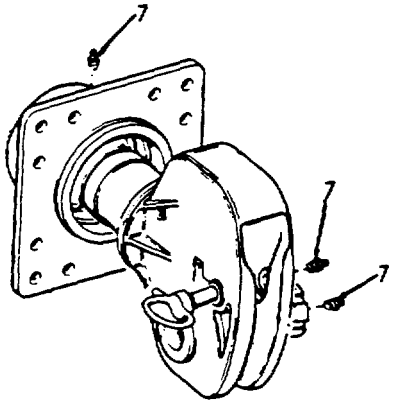
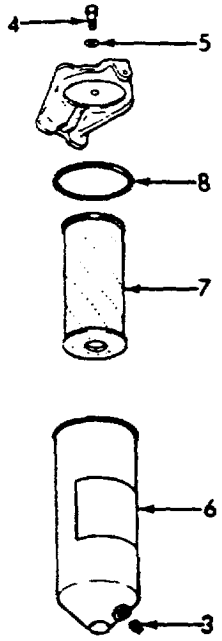
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 96 | BI-WEEKLY | Vehicle Deck AFT/STBD | ANCHOR A-FRAME FAIRLEADER. Lubricate grease fittings (7) with grease (MIL-G-18458B (SH)).   | Fails to function. |
| 97 | MONTHLY | Engine Room | FUEL FILTER. Replace monthly or when plugging is indicated. Remove plug (3) and drain contents into a suitable container. Remove screw (4) and washer (5). Remove shell (6), filter (7) and gasket (8). Install new filter (7) and gasket (8). Replace shell (6), washer (5), screw (4) and plug (3).   | Filter obstructed. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 98 | MONTHLY | Engine Room | FUEL STRAINER. Install new elements monthly or when plugging is indicated. Remove vent plug (9). Remove screw (10) and washer (11) and drain contents into a suitable containers. Remove shell (12), strainer (3), and gasket (14). Install new strainer (13) and gasket (14). Replace shell (12), washer (11), screw (10) and plug (9).<br><br>**NOTE**<br><br>**Valve (15) can be rotated to select either the right or left strainer.**<br><br>**NOTE**<br><br>**Apply a light coating of engine fuel oil on gasket (14) prior to assembly.** | Strainer obstructed. |

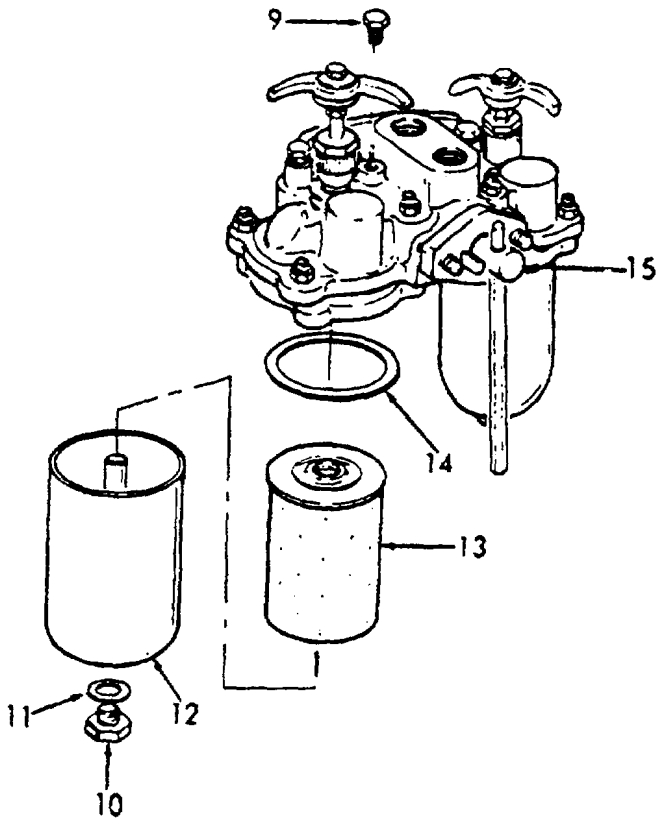


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

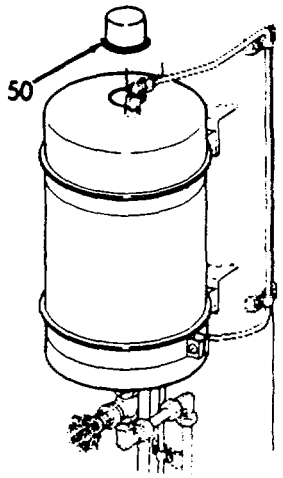
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 99 | MONTHLY | Engine Room | HYDROSTARTER RESERVOIR. Remove breather cap (50) and clean with compressed air. Check fluid level in sight gage and fill as required.<br><br>**NOTE**<br><br>**Use Mineral Oil, MIL-L-17672, Type 2135TH.**<br><br>**WARNING**<br><br>**Use eye protection when using compressed air.**<br><br>  | Low fluid level. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

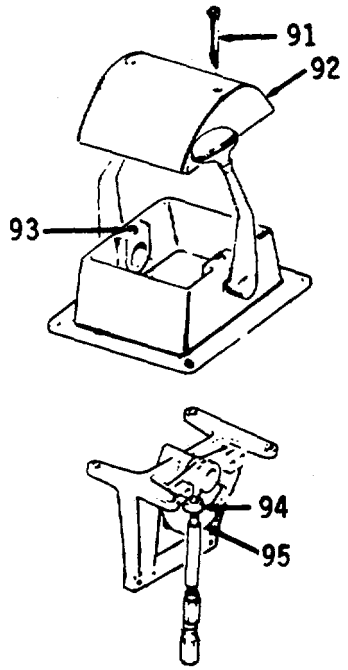
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 100 | MONTHLY | Engine Room | POSITROL STATION. Remove cover screws (91) from central station cover (92). Place a few drops of oil (MIL-L-9000H (SH)) in the cover screw holes (93) to lubricate handle bearings.<br><br>Lubricate three cable swivel joints (94) with 2 to 4 drops of oil, (MIL-L-9000H (SH)).<br><br>Lubricate clutch cam (95) with grease (MIL-G-24139A (SH)).<br><br>  | Handle or clutch cam bind or fail to function. |
| 101 | MONTHLY | Engine Room | PILLOW BLOCK - PORT SIDE. In the Aft Engine Room. Remove plug (1). Check oil level with finger. Oil level s correct finger touches oil. Add oil (ML-L-9000H (SH)) as required. See Item 7, same figure. | Low oil level. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 102 | MONTHLY | Engine Room | OIL FILTER. Drain oil from filter by removing drain plug (11). Drain into a suitable container.<br><br>**NOTE**<br><br>**Do not drain oil into bilges. Use oil separator and recovery system to collect drained oil.** | Filter obstructed. |
| | | | Turn screw (12) that attaches filter shell (13) to engine. Remove gasket (14) and filter (15). | Filter obstructed. |
| | | | Install new filter (15) and gasket (14) to filter shell (13). Attach filter shell (13) to engine and tighten screw (12).<br><br>Reinstall plug (1) and dipstick. | Filter obstructed. |
| | | | **NOTE**<br><br>**Engine holds 15 quarts (14.2 l) of oil. Operate engine for 5 minutes. Check for leaks. Add oil as required to bring level to full on dipstick** | |

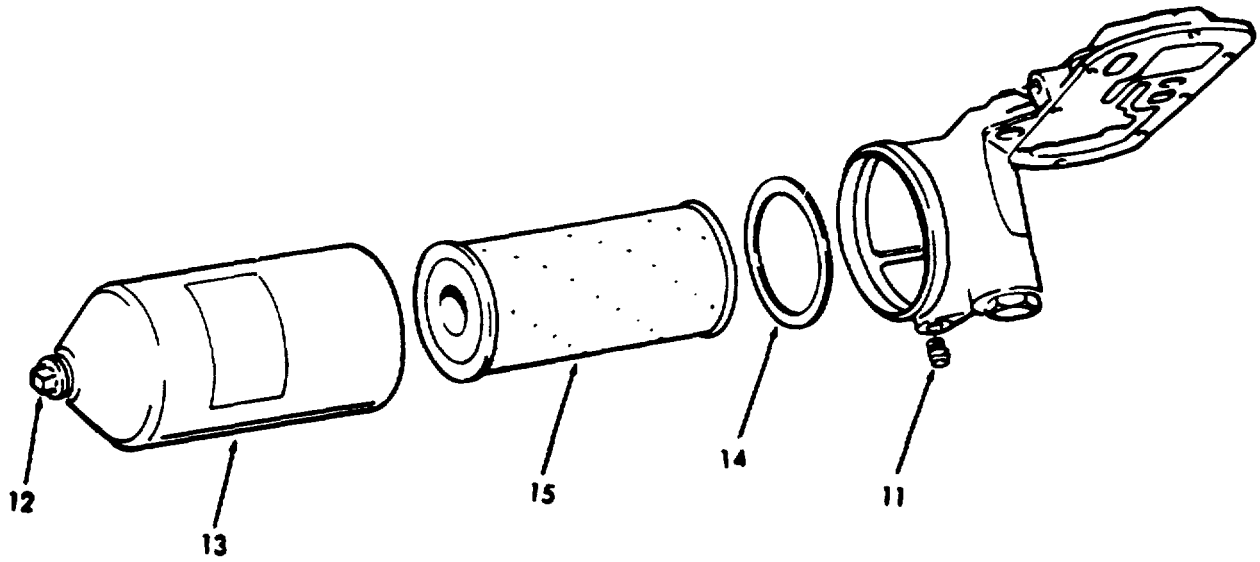
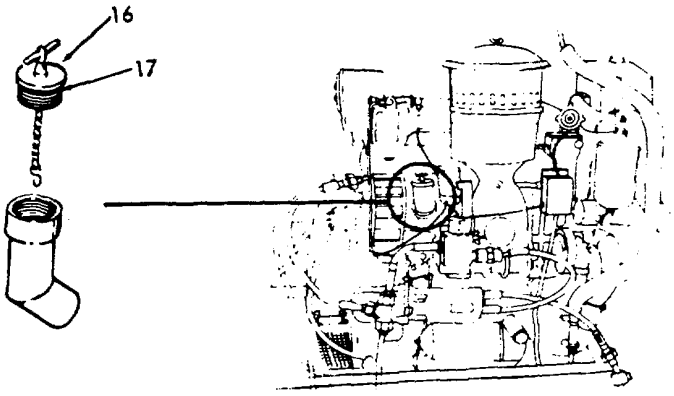


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 103 | MONTHLY | Engine Room | OIL BREATHER CAP. Remove oil breather cap (16). Clean with engine oil (MIL-L-9000H (SH)). Replace gasket (17) i necessary. Reinstall oil breather cap (16). | Air flow obstructed. |
| 104 | MONTHLY | Engine Room | FUEL FILTER. Drain fuel from filter by opening draincock (18). Remove spin-off shell (19), gasket (20) and filter (21). Install a new filter (21) and gasket (20). Replace spin-off shell (19) and close draincock (18). | Filter obstructed. |



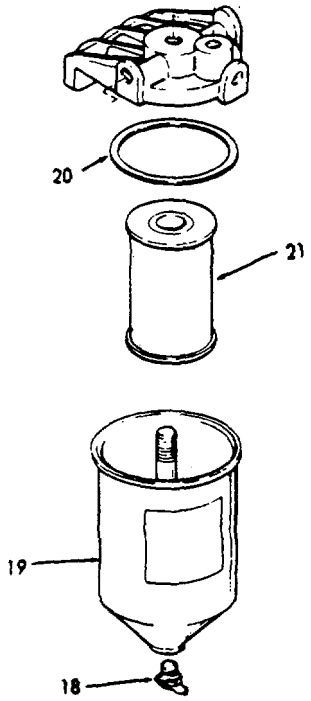



*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

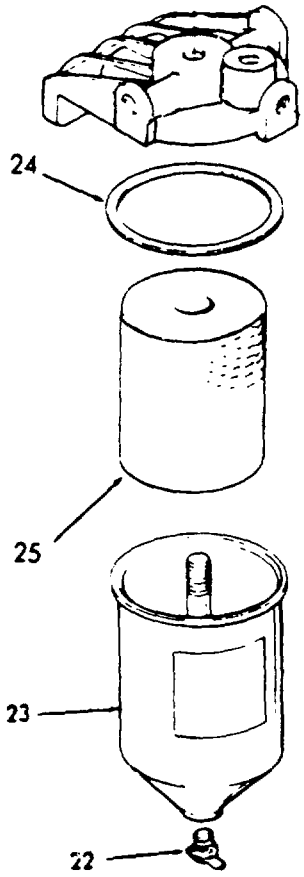
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 105 | MONTHLY | Engine Room | FUEL STRAINER. Drain fuel from filter by opening draincock (22). Remove spin-off shell (23), gasket (24) and strainer (25). Install a new strainer (25) and gasket (24). Replace spin-off shell (23) and close draincock (22).   | Strainer obstructed. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

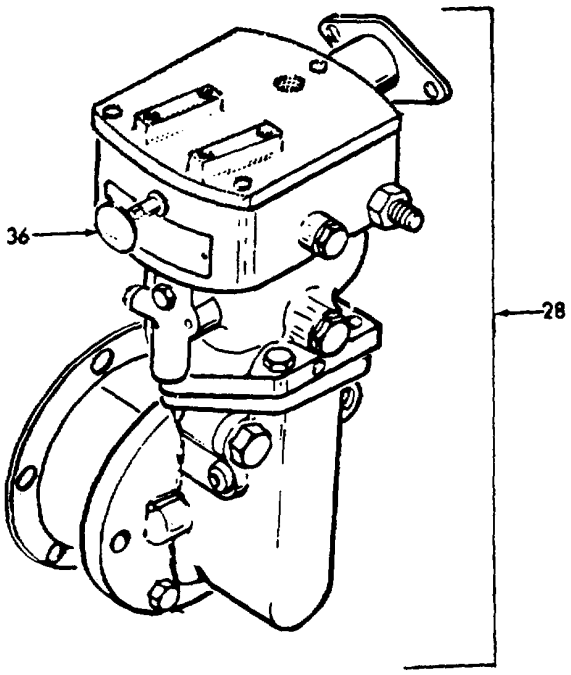
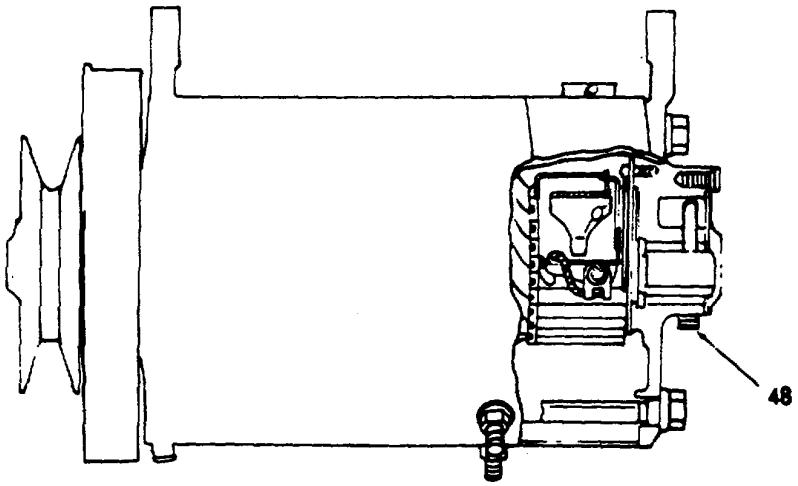
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| | | | | |
| 106 | MONTHLY | Engine Room | FUEL ROD KNOB. Lubricate the fuel rod knob (36) located on the Hydraulic Governor Assembly (28). | Broken. |
| | | |  | |
| 107 | MONTHLY | Engine Room | GENERATOR. Lubricate the generator bearings with 5 or 6 drops of engine oil (MIL-L-9000H (SH) at the hinge cap oiler (48). | Binding (or) bearings noisy. |
| | | |  | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

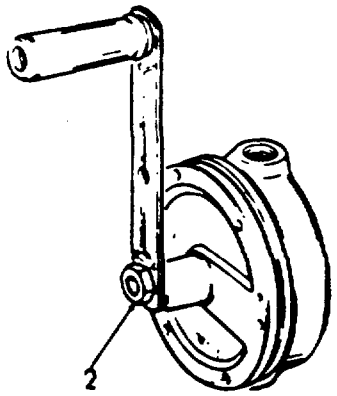
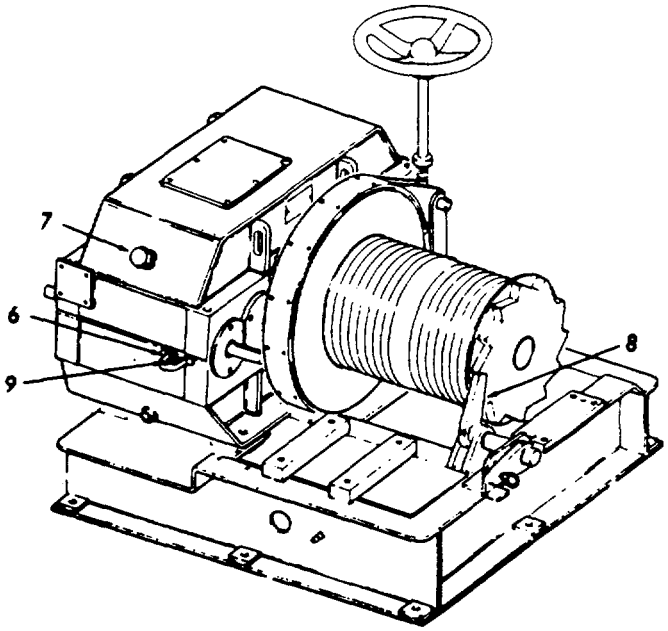
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 108 | MONTHLY | Engine Room (FR 51) | LUBE OIL TRANSFER PUMP.<br><br>Add oil to shaft (2). Use oil (MIL-L-9000H (SH)).<br><br>  <br> | Fails to function. |
| 109 | MONTHLY | Ramp Handling Machinery Compartment | BOW RAMP WINCH. Check reducer oil level. Remove dipstick (6) and check oil level. Remove vent plug (7) to add gear oil (MIL-L-2105D, GO 80/90) as needed.<br><br>Lubricate pawl (8) with oil (MIL-L-9000H (SH)) as needed.<br><br>  <br> | Low oil level. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

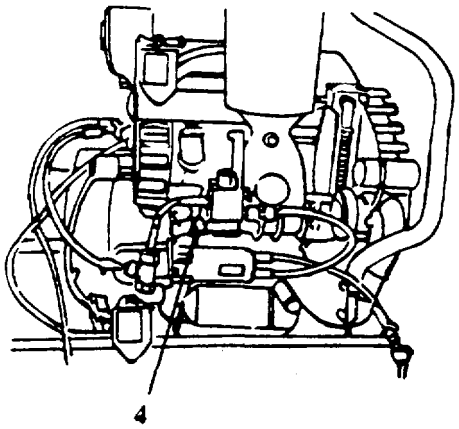
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 110 | MONTHLY | Anchor Winch Compartment | CHANGE ENGINE OIL. Pump oil into a suitable container through dipstick hole (4).<br><br>**NOTE**<br><br>**Do not drain oil into bilges. Use oil separation/recovery system to collect used oil.**<br><br>  <br> | Low oil level. |
| 111 | MONTHLY | Anchor Winch Compartment | OIL FILTER. Remove pipe plug (5) and drain oil into a suitable container.<br><br>**NOTE**<br><br>**Do not drain oil into bilges. Use oil separation system to collect used oil.**<br><br>Loosen oil filter stud (6) and oil filter shell (7). Remove gasket (8) and filter (9). Install a new filter (9) and gasket (8) into oil filer shell (7). Tighten stud (6). Replace drain plug (5).<br><br>**NOTE**<br><br>**Also, do oil filter by-pass. It is located on the left side. Refer to Item 94.** | Filter obstructed.<br><br>Filter obstructed. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

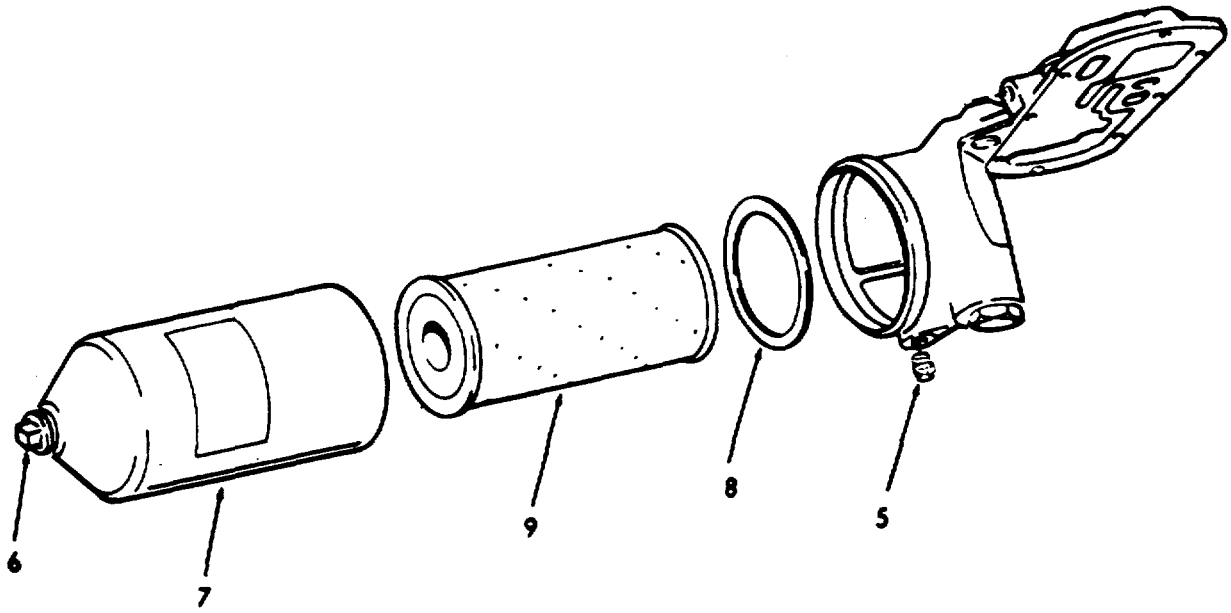
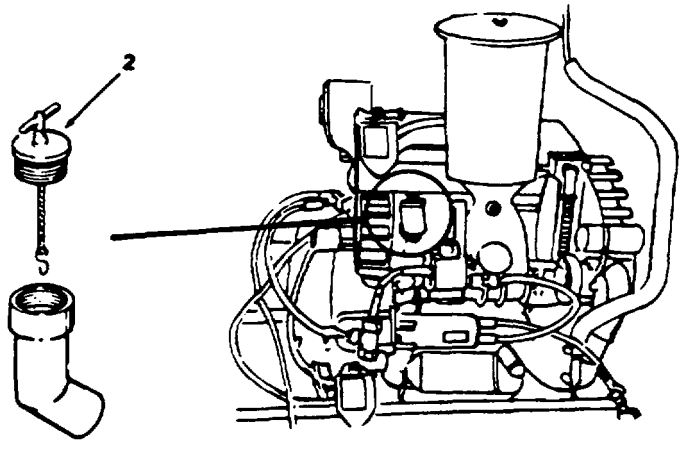
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 111 Continued | | | **NOTE**<br><br>**Filter shell and cover should be wiped free of excess oil.** | |
| | | |  | |
| 112 | MONTHLY | Anchor Winch Compartment | OIL BREATHER CAP. Remove oil breather cap (2). Clean with oil (MIL-L-9000H (SH)). | Cap obstructed. |
| | | |  | |
| | | | Replace dipstick in dipstick hole. Fill engine with oil. Engine holds 15 quarts (14.2 liters) of oil. | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

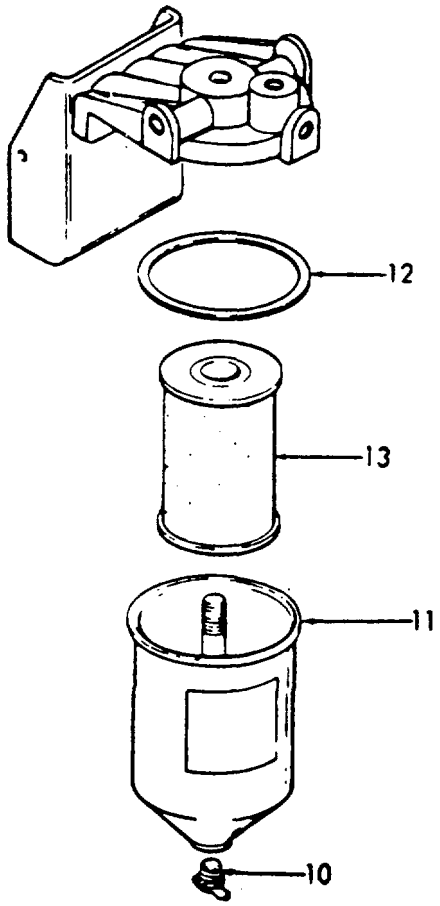
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 113 | MONTHLY | Anchor Winch Compartment | FUEL FILTER. Drain fuel from filter by opening drain cock (10). Drain into a suitable container. Remove spin-off shell (11), gasket (12) and strainer (13). Install a new strainer (13) and gasket (12). Replace spin-off shell (11) and close draincock (10).   | Filter obstructed. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

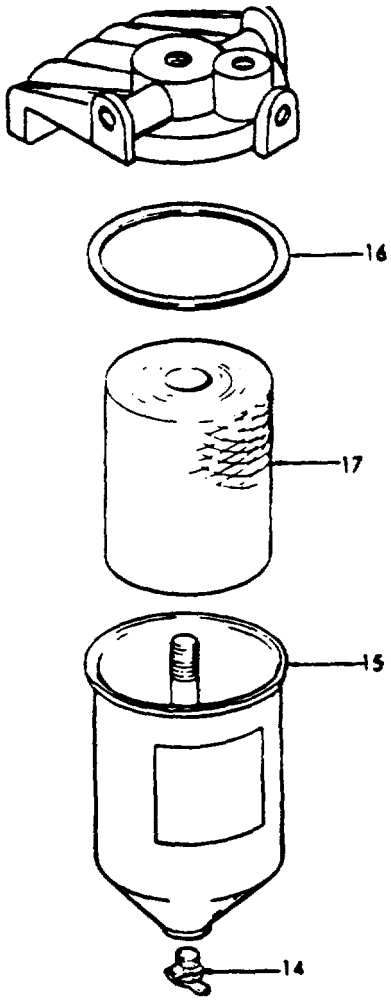
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 114 | MONTHLY | Anchor Winch Compartment | FUEL STRAINER. Drain fuel from strainer by opening draincock (14). Remove spin-off shell (15), gasket (16) and filter (17). Install a new filter (17) and gasket (16). Replace spin-off shell (15) and close draincock (14).   | Strainer obstructed. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

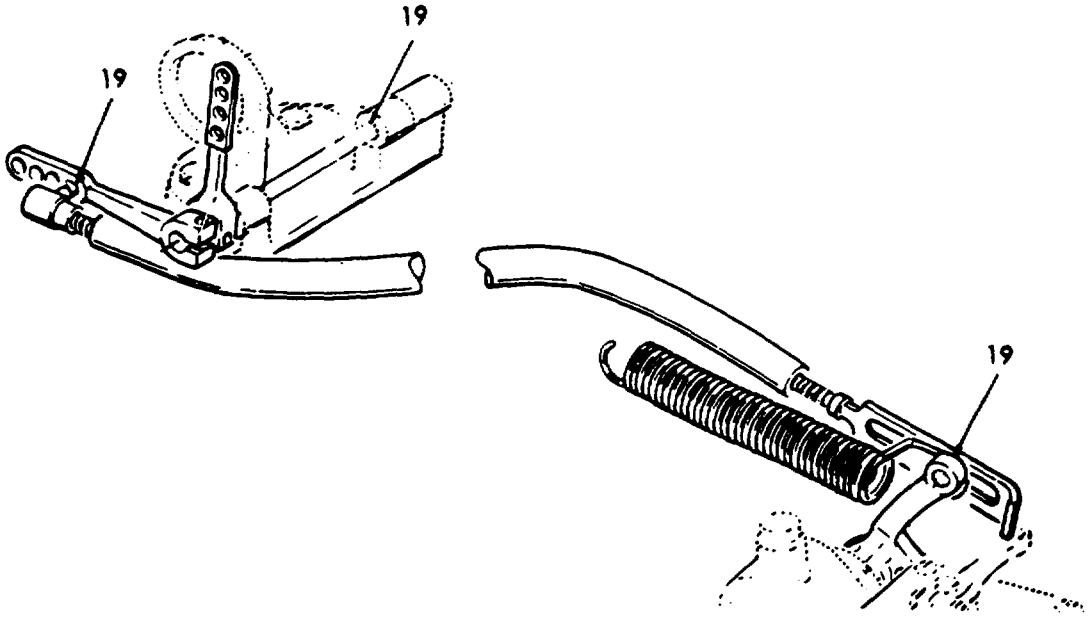
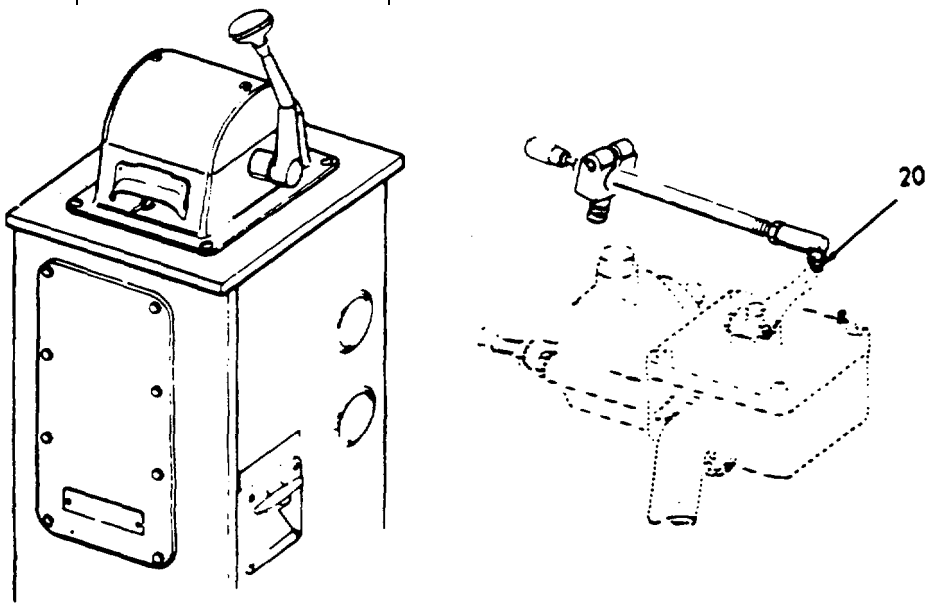
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 115 | MONTHLY | Anchor Winch Compartment | ENGINE THROTTLE CONTROL. Lubricate linkages, clevis, pins and exposed threads (19) with oil (MIL-L-9000H (SH)). | Throttle control binds or fails to function. |
| | |  | | |
| 116 | MONTHLY | Main Deck AFT/STBD | ENGINE STOP CONTROL. Lubricate linkage, clevis, pins and exposed threads (20) with oil (MIL-L-9000H (SH)). | Stop control binds or fails to function. |
| | |  | | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 117 | MONTHLY | Anchor Winch Compartment | HYDROSTARTER RESERVOIR. Remove breather cap (30), and clean with compressed air. Check fluid level in sight gage, and fill as required.<br><br>**NOTE**<br><br>**Use mineral oil (MIL-H-461 70, FRH, Type I).**<br><br>**WARNING**<br><br>**Use eye protection when using compressed air.** | Low fluid level. |

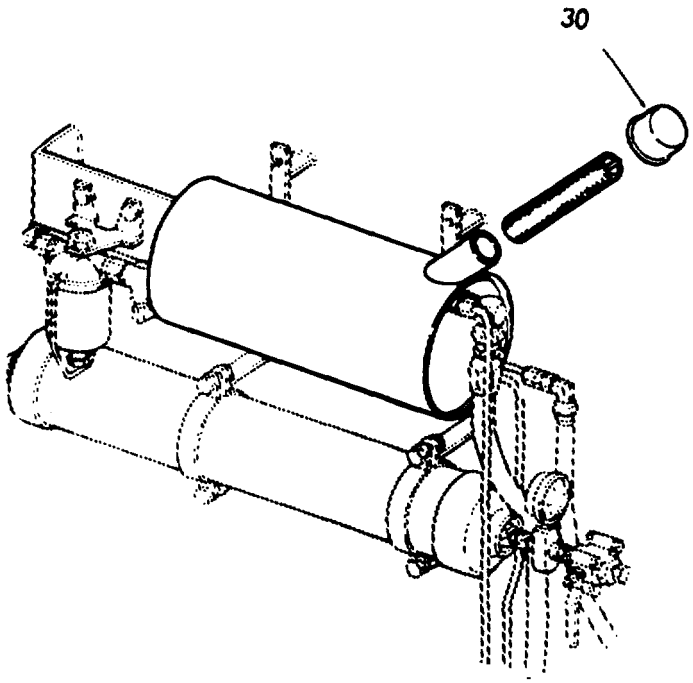


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 118 | MONTHLY | Anchor Winch Compartment | SLACK PULLER.<br><br>GEAR DRIVE BREATHER. Remove pipe plug (2 and breather cap (24). Drain oil into a suitable container. Replace pipe plug (23).<br><br>Clean breather in fuel oil and dry with compressed air.<br><br>Remove high oil plug (25). If oil is present replace plug. If oil is not present, remove low oil plug. If oil is not present, replace plug.<br><br>Fill gear dive (26) with oil (MIL-L-21050, GO 80/90) until it comes out of the high oil plug hole. Replace plug.<br><br>Replace breather (24). | Low oil level.<br><br>Low oil level.<br><br>Low oil level. |

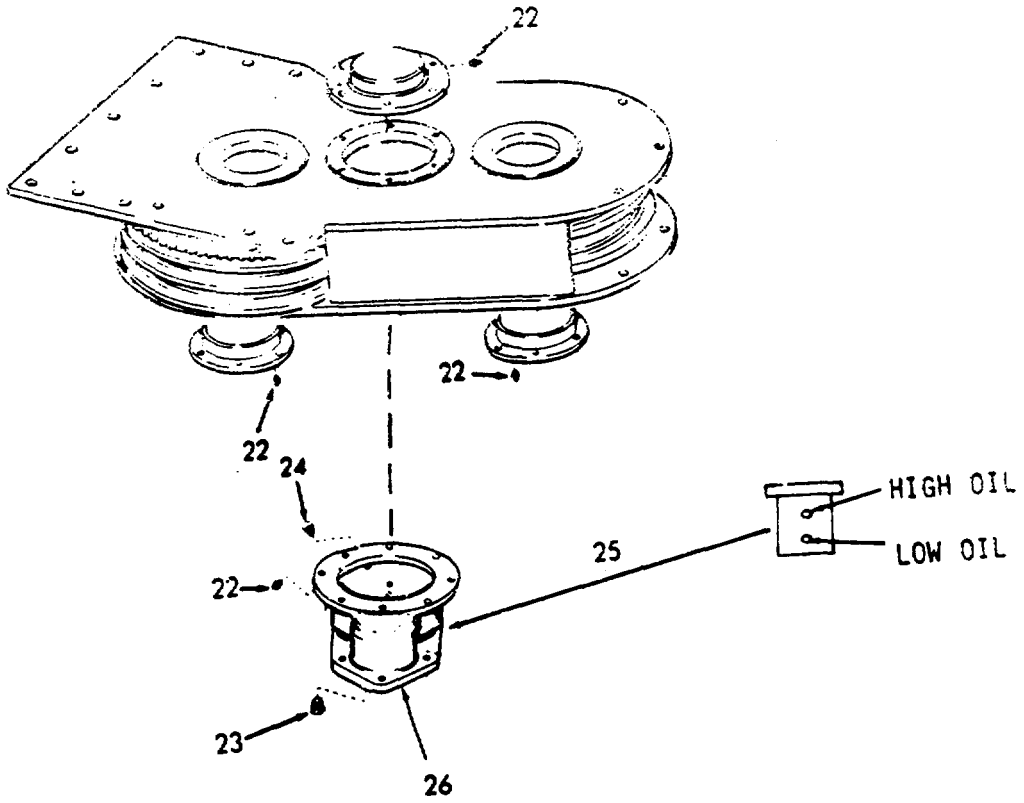


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

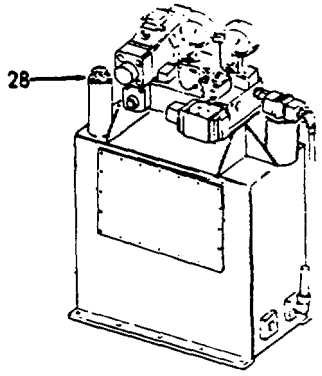
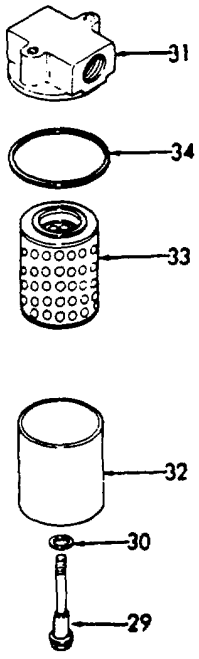
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 119 | MONTHLY | Anchor Winch Compartment | HYDRAULIC TANK<br><br>BREATHER. Remove breather cap (2). Clean in fuel oil and dry with compressed air. Replace.<br><br>  <br><br>HYDRAULIC FILTER. Remove bolt (29) and washer (30) from filter body (31). Remove filter shell (32) and filter element (33). Remove and discard gasket (4). Install a new filter element (33) and gasket (34). Reinstall filter shell (32), filter body (31) using washer (30) and bolt (29).<br><br>  | Obstructed.<br><br>Filter obstructed. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

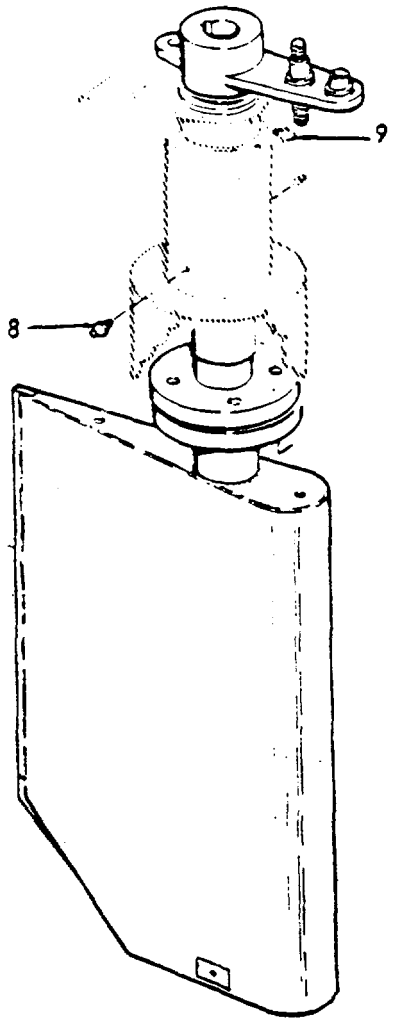
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 120 | MONTHLY | Engine Room | HYDRAULIC CUB PUMP UNIT<br><br>CHECK FLUID LEVEL. Check for proper fluid level in the hydraulic reservoir (1) by using sight gage (2). If the sight gage does not register the proper level of fluid, then remove filler breather cap (3) and add hydraulic fluid (MIL-H-46170, FRH, Type 1). Replace filler breather cap (3). | Low oil level. |
| 121 | MONTHLY | AFT/FR 72-75 | MAIN RUDDER STOCK ARRANGEMENT. Lubricate fittings (8) and (9) with grease (MIL-G-241 39A (SH)).<br><br>  <br> | Binding. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

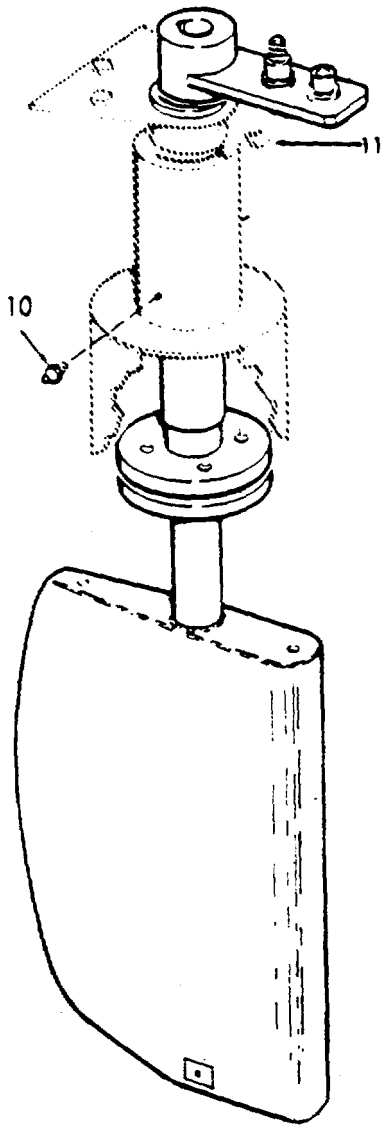
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 121 Continued | | | FLANKING RUDDER STOCK ARRANGEMENT. Lubricate fittings (10) and (11) with grease (MIL-G-24139A (SH)).   | Binding. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

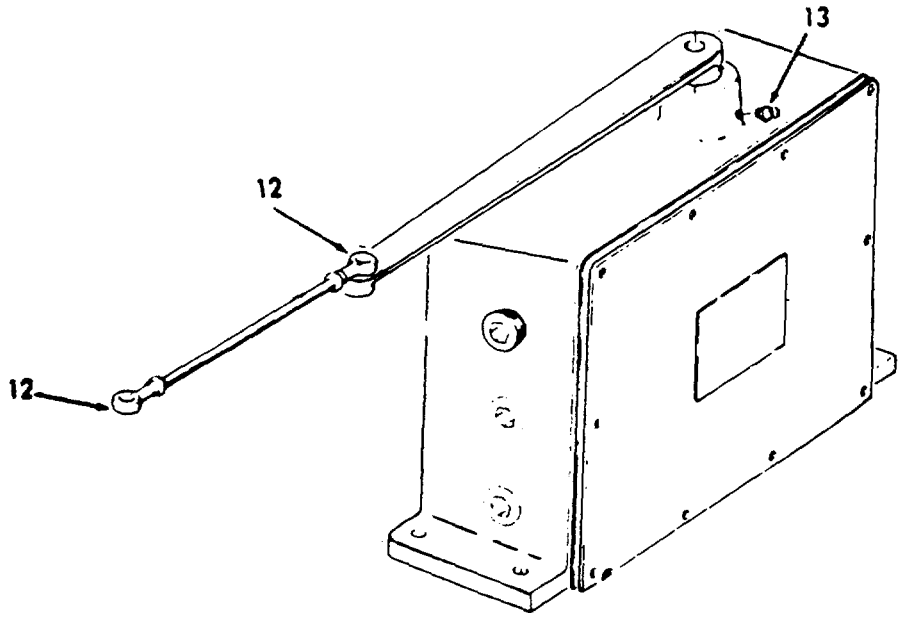
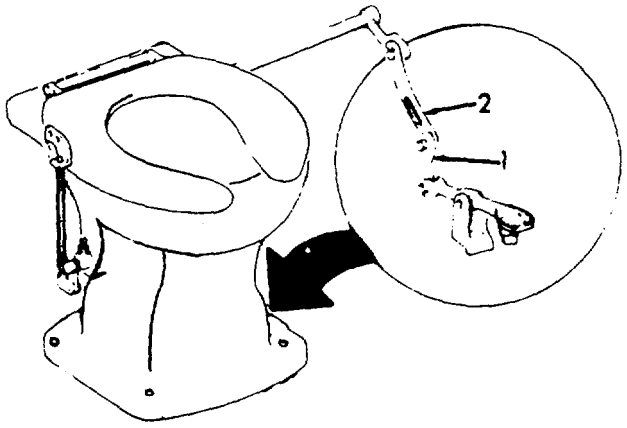
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 122 | MONTHLY | AFT/FR 72-75 | STEERING LINKAGE. Lubricate ball joints (2) or steering linkage(12) with a few drops of oil (MIL-L-9000H (SH)). | Binding or fails to function. |
| | |  | | |
| 123 | MONTHLY | Wash Room/Water Closet | COMMODE. Lubricate link (1) and hopper link (2) with a suitable water-insoluble grease such as “Lubriplate”. | Linkage binds or fails to function. |
| | |  | | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 124 | MONTHLY | Equipment and Repair (2-40-O-A) | SEWAGE AIR PUMP.<br><br>OIL SEPARATOR LEVEL. Check oil level in oil gage (6). To add oil, remove pipe plug (7). Use oil (MIL-L-9000H (SH)) (nondetergent).<br><br>PUMP OIL LEVELS. Check oil levels in sight valves (8). If oil is not visible, check oil level on o gage (6). Add oil (MIL-L-9000H (SH)) (nondetergent). Purge system by loosening fittings (9). | |
| 125 | MONTHLY | Air Conditioning Room | CONDENSER<br><br>DRAINING. Drain water by opening valves (6).<br><br>ZINC PROTECTORS. Remove protectors (7), check for corrosion. Clean with wire brush. Replace when badly worn. | Corroded or worn. |

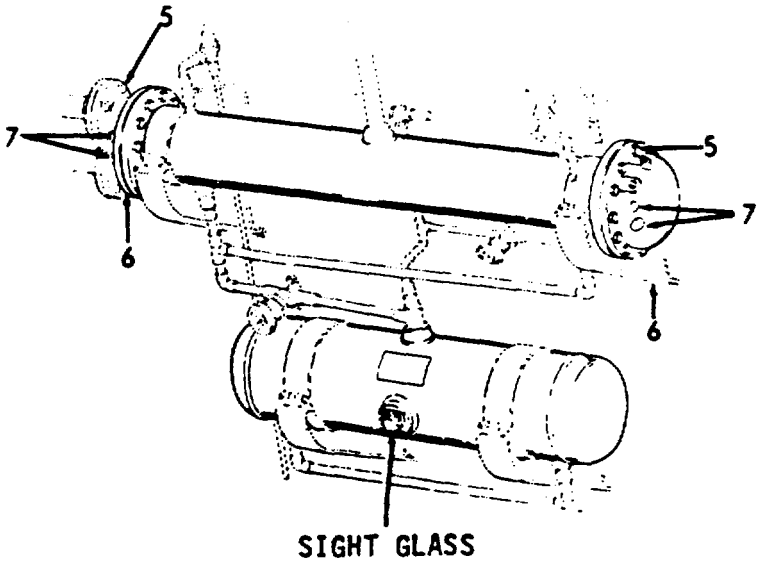


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 126 | MONTHLY | Air Conditioning Room | AIR CONDITIONING COOLING PIPING STRAINER. Shut valve (8). Loosen strainer cap. Then remove bolts (10), holddown (9) and strainer cap (11). Remove strainer basket (12). Clean strainer basket (12) and shell (13). Replace strainer basket (12), strainer cap (11) and bolts (10). Tighten strainer holddown (9). Open valve (8). | Strainer plugged. |
| | | | SCREEN. Close valve (8). Remove cap (14) and attach hose. Close valve (15). Open valve (16). Turn on water. The screen will be reversed flushed.<br><br>Turn off water. Close valve (16). Open valve (15) and (8). Remove hose and dose cap (14). | Strainer plugged. |

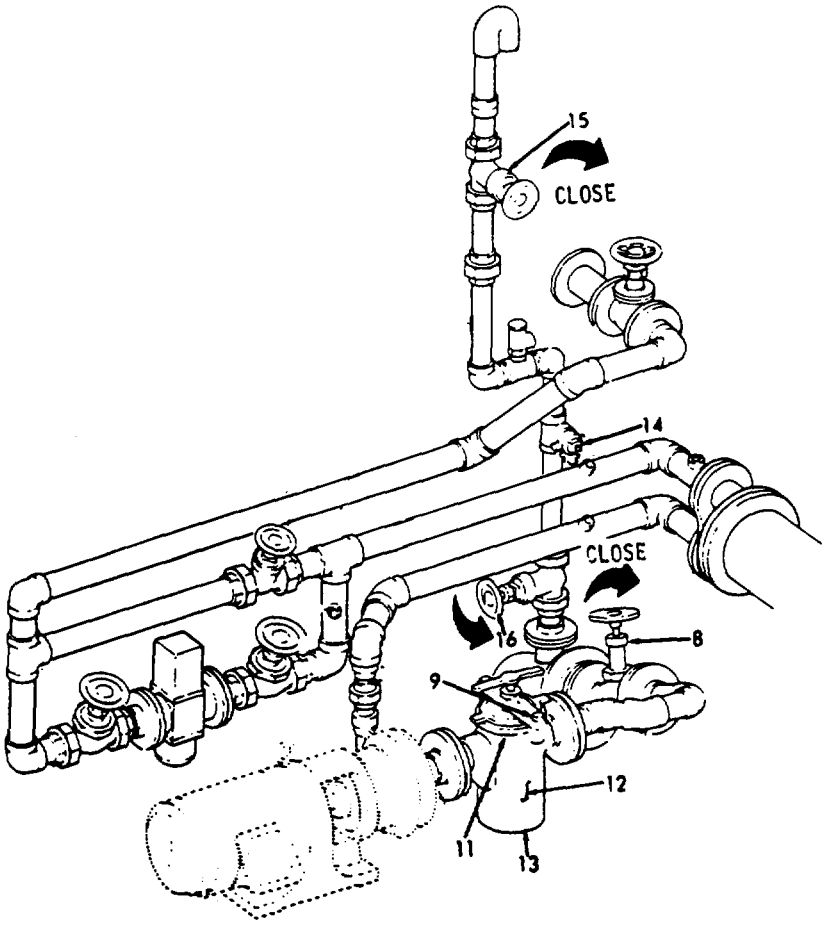
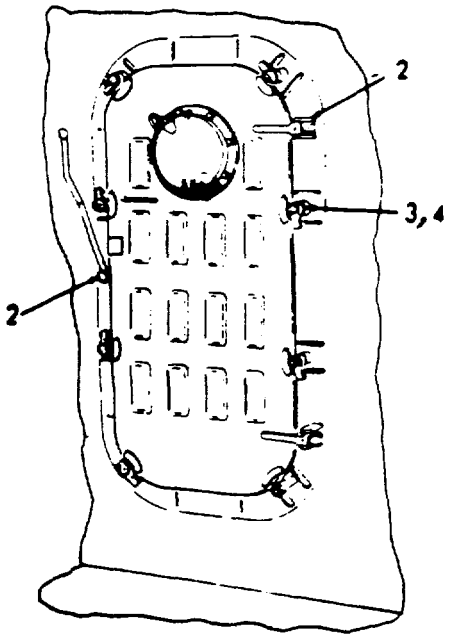


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 127 | MONTHLY | At SER Sites FR 12, FR 48, FR 56 | HALON SYSTEM - General. Check that all components are securely mounted and installed at proper sites. Also check that all wiring and electrical connections are secure. Inspect for any physical damage of the parts. Inspect all plumbing connections in the system.<br><br>Perform the functional test of the Detection System. (Refer to paragraph 2-123). | Functional test fails. |
| 128 | MONTHLY | General | DOORS, HATCHES, SCUTTLES, AND MANHOLES.<br><br>**NOTE**<br><br>**Use grease (MIL-G-18458B (SH)).**<br><br>Doors - Lubricate hinges (2), link (3), and dogs (4).<br><br>Hatches - Lubricate hinges (5), link (6), and dogs (7). | They fail to seal. |



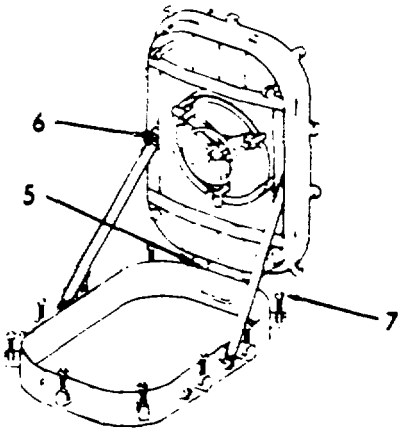
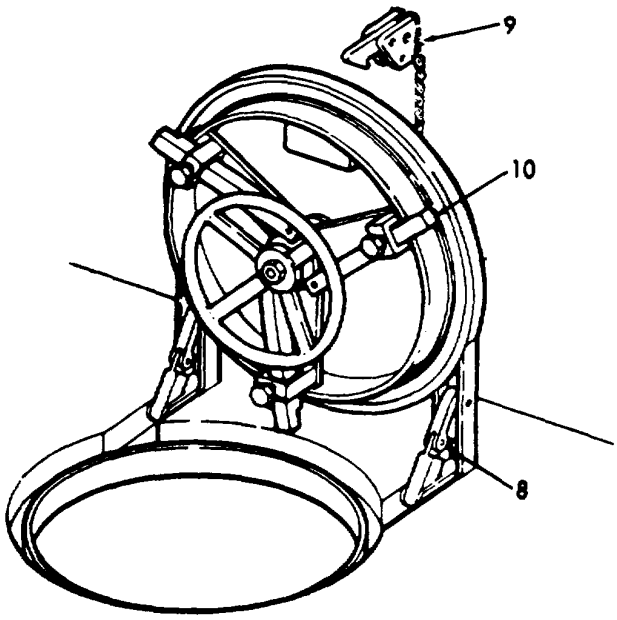



*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 128 Continued | | | Scuttles - Lubricate hinges (8), links (99, and dogs (10).<br><br>Manholes - Lubricate hinges (11) and dogs (12).<br><br>**NOTE**<br><br>**Clean point from water tight seals. Lubricate with oil (MIL-L-9000H (SH)).** | |



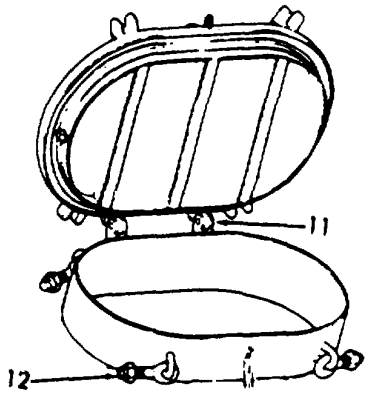



*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 129 | MONTHLY | Pilot House | MAIN MAST. Lubricate fittings (1) three places with grease (MIL-G-18458 (SH)). | Worn or cracked. |

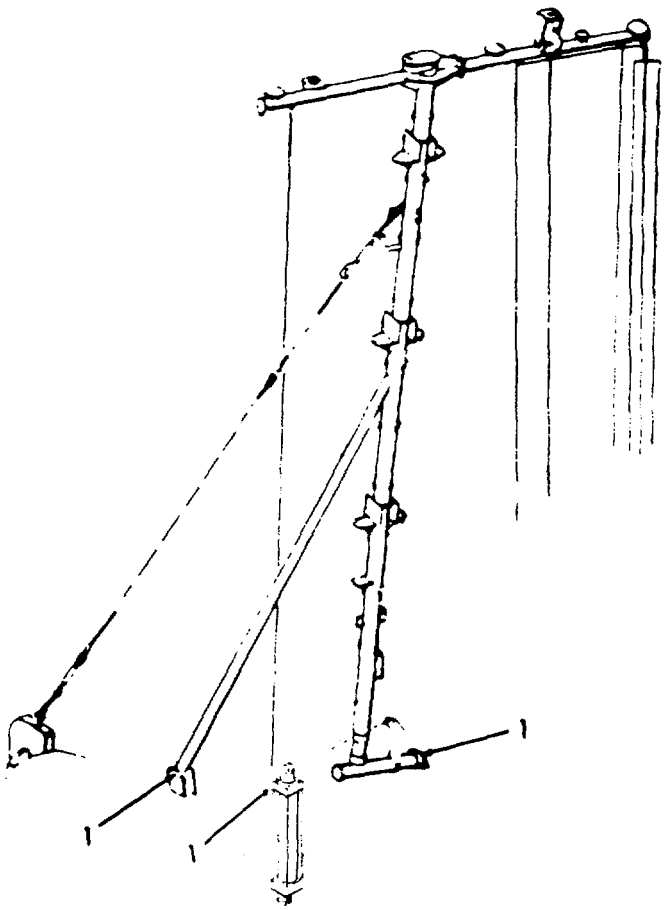


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

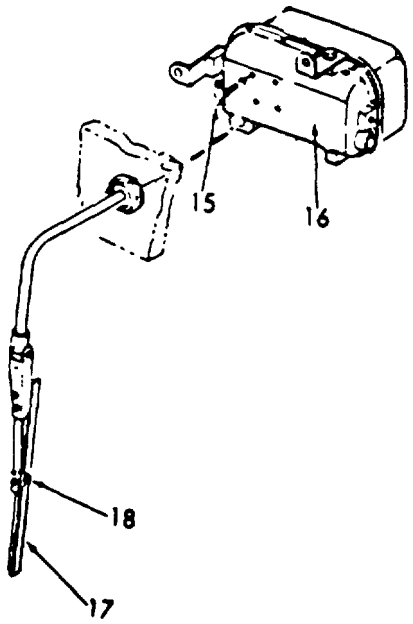
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 130 | MONTHLY | Pilot House | WINDSHIELD WIPER. Fill oil cup (15) with oil (MIL-L-9000H (SH)).<br><br>Remove cover (16) and lubricate internal linkage with oil (MIL-L-9000H (SH)).<br><br>Inspect wiper blade (17) and replace when damaged. Remove screw (18) to disassemble.<br><br>  | Low oil level.<br><br>Worn, cracked, or torn. |
| 131 | MONTHLY | Above Galley and Mess | SEARCHLIGHT<br><br>LUBRICATION. Lubricate trunnion bolts (24) with oil (MIL-L-9000H (SH)). Grease fitting (25) located at socket (26) with grease (MIL-G-16456B (SH)).<br><br>Remove clamps (27) from center blade rod. Then remove bearing housing covers (28). Apply a few drops of oil (MIL-L-9000H (SH)), into the hole in the hub of bearing housing assemblies (29). | Lamp fails to function. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 131 Continued | | | Loosen sews (30) and rotate the flange assembly (31) counterclockwise approximately 1/4 inch. Then remove the entire assembly and lubricate shutter bearings (32) with oil (MIL-L-9000H (SH)).<br><br>Replace flange assembly (31) and tighten screws (3). Replace bearing housing covers (28) and clamps (27). | Lamp fails to function. |
| 132 | MONTHLY | Equipment General | CLEANING. Clean lenses (32), lamp (33) and reflector (34) with an approved lens cleaner. | Lenses are cracked or broken. |

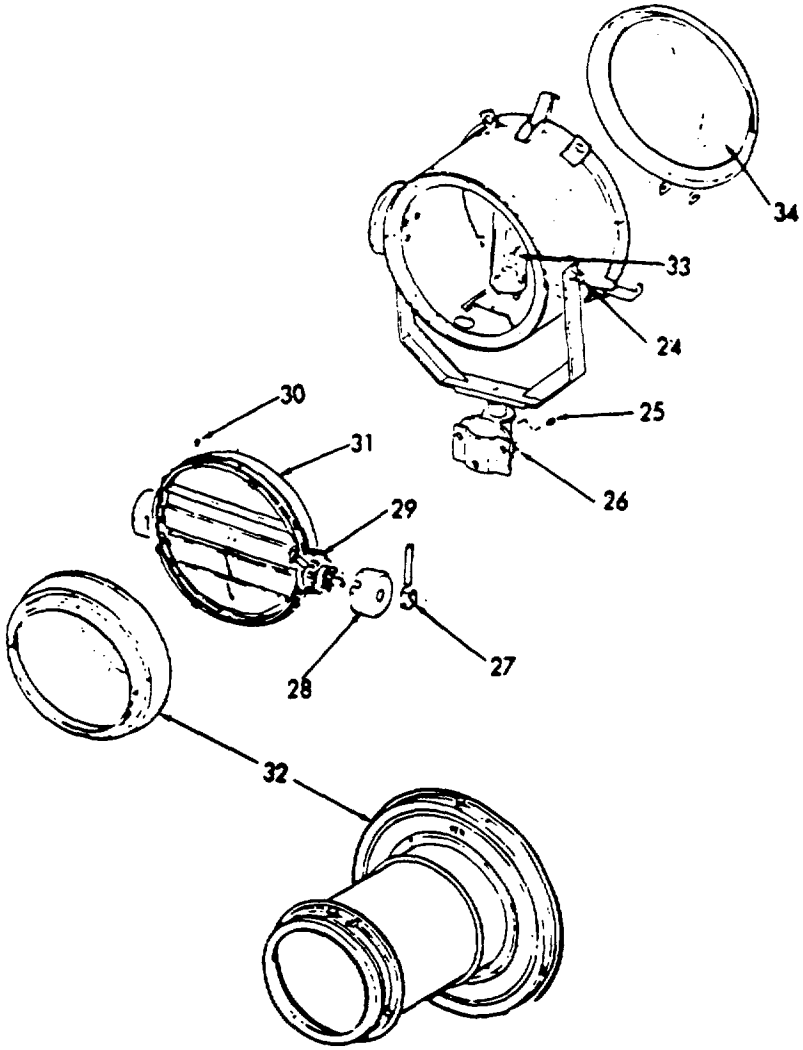


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 133 | MONTHLY | Equipment General | HYDRAULIC CUB PUMP UNIT<br><br>CHECK FLUID LEVEL. Check for proper fluid level in the hydraulic reservoir (1) by using sight gage (2). If the sight gage does not register the proper level of fluid, then remove filler breather cap (3) and add hydraulic fluid (MIL-H-46170, FRH, Type 1). Replace filler breather cap (3). | Fluid level low. |

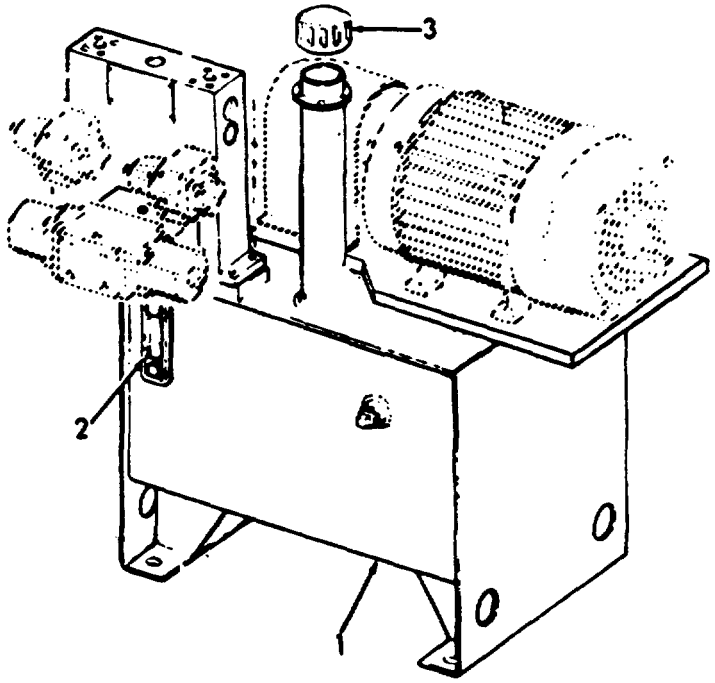


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

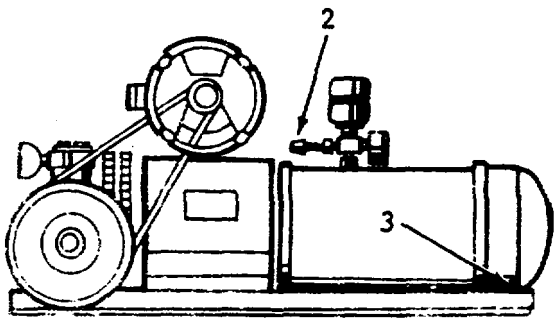
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 134 | MONTHLY | Equipment General | AIR HORN AIR COMPRESSOR<br><br>**WARNING**<br><br>**Disconnect power to compressor motor before performing any maintenance on compressor.**<br><br>**CAUTION**<br><br>**NEVER allow oil level to fall below lower mark on stick oil gage.**<br><br>**WARNING**<br><br>**Use eye protection when using compressed air.**<br><br>DRAIN MOISTURE. Release tank air pressure (2) and remove drain plug (3) located at boom of tank at end farthest compressor.<br><br>**NOTE**<br><br>**Tank should be drained once each month or more frequently if service conditions cause greater amount of water to accumulate.**<br><br>  <br> | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 135 | MONTHLY | Equipment General | AIR HORN COMPRESSOR<br><br>AIR INTAKE FILTER. Remove retaining ring (4), remove screen filter (5), felt filter (6) and second screen filter (7). Clean in an approve solvent and air dry.<br><br>Reassemble filters and retaining ring in reverse order. | Fails to retain pressure. |

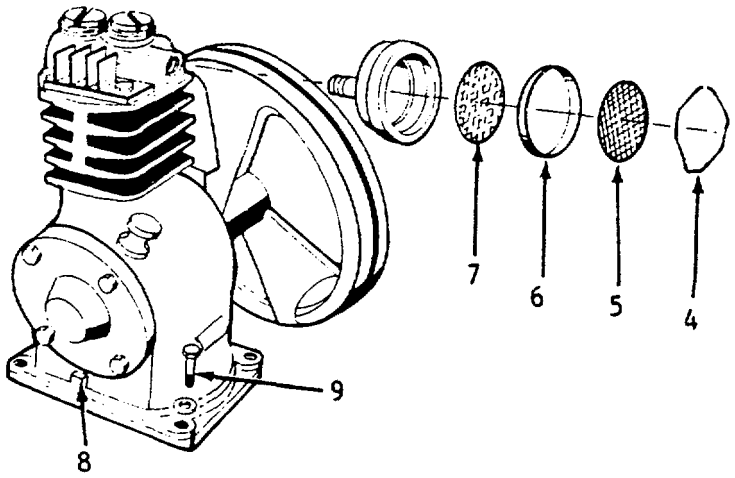


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

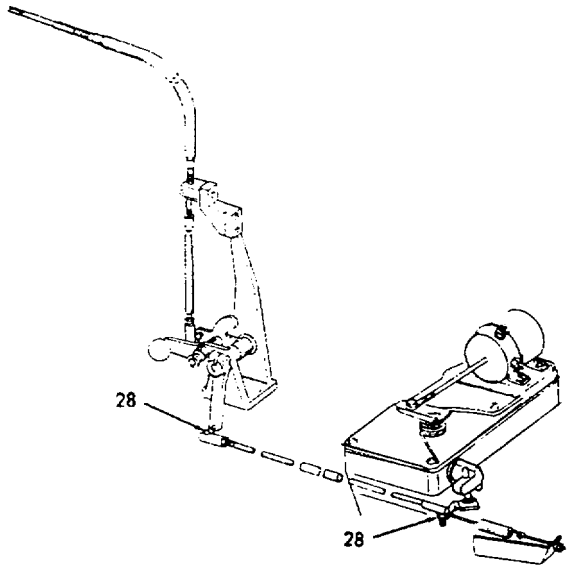
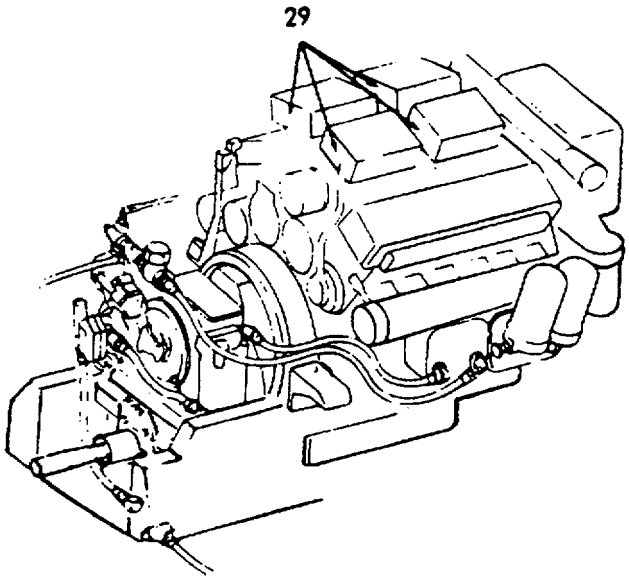
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 136 | QUARTERLY | Engine Room | THROTTLE CONTROL. Lubricate the throttle control at 2 locations (28) with 2 to 4 drops of oil (MIL-L-9000H (SH)). | Throttle controls stick or bind. |
| | |  | | |
| 137 | QUARTERLY | Engine Room | EMERGENCY STOP CONTROL. Lubricate the stop control at 12 locations (29) with 2 to 4 drops of oil (MIL-L-9000H (SH)). | Emergency stop fails to function or binds. |
| | |  | | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 138 | QUARTERLY | Engine Room | MARINE DRIVE GEAR CONTROL UNIT. Place a few drops of oil (MIL-L-9000H (SH)) on either side of levers (13). Pull manual disconnect pin (14) as far as it will go and place a drop or two of oil on the exposed section. | Control unit binds or fails to function. |

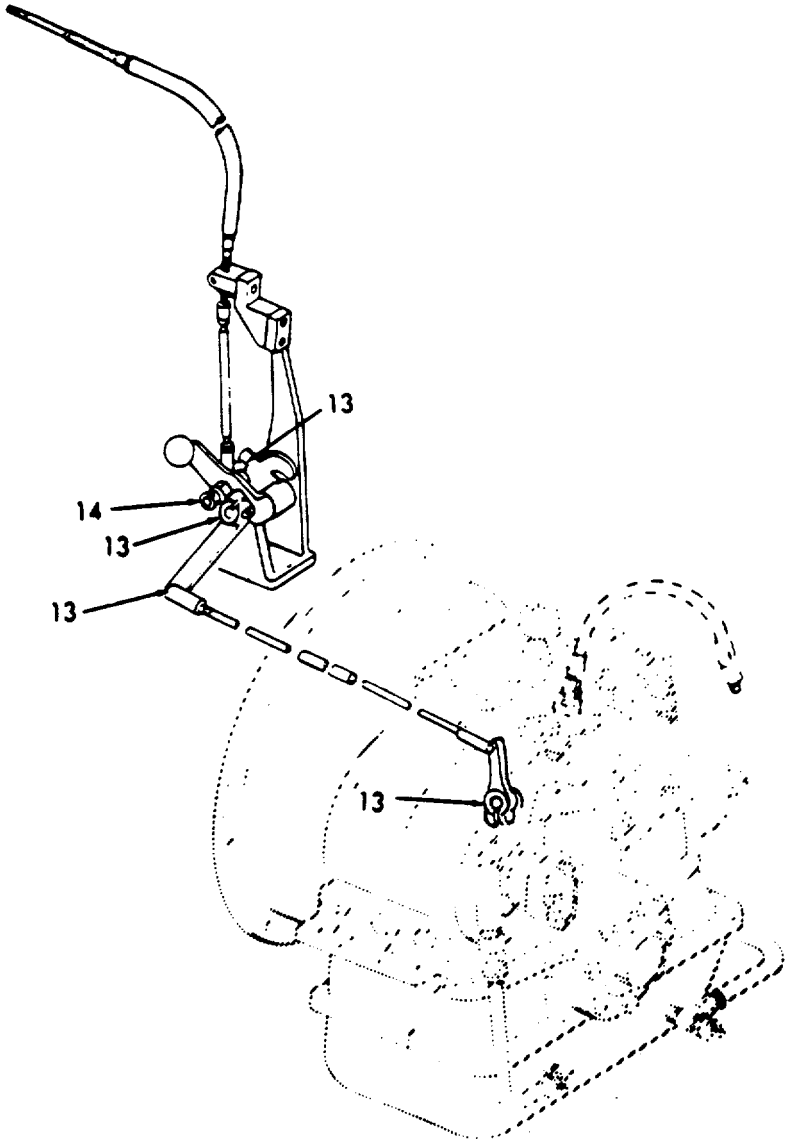


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

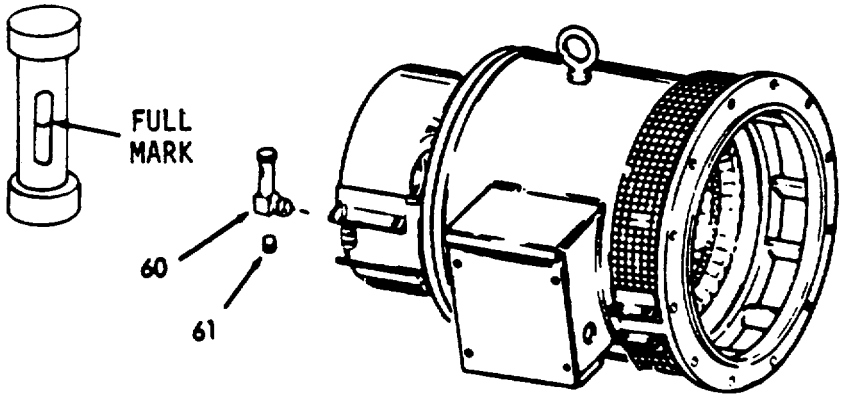
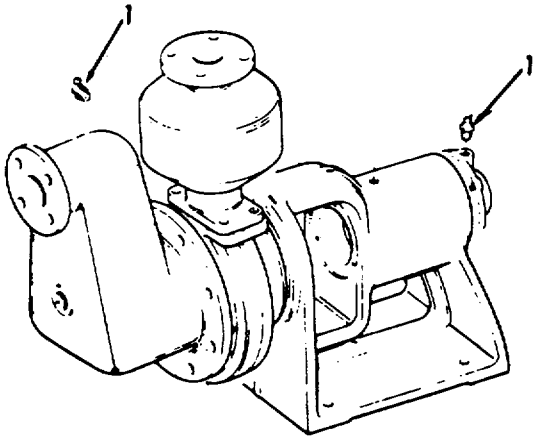
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 139 | QUARTERLY | Engine Room | POWER GENERATOR. Check the oil level in the sight gage (60). Add oil, (MIL-L-9000H (SH)) if necessary, to maintain the oil level to the line on the sight gage. Do not overfill. After adding oil, run engine for several minutes. Then shutdown engine and recheck oil level.<br><br>Change the oil by removing oil plug (61) from the sight gage. Use oil (MIL-L-9000H (SH)). | Low oil level. |
| | | |  | |
| 140 | QUARTERLY | Engine Room | BILGE PUMP (Electric). Lubricate fittings (1) with grease (MIL-G-24139A (SH)), with pump running. | Bilge pump fails to function. |
| | | |  | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

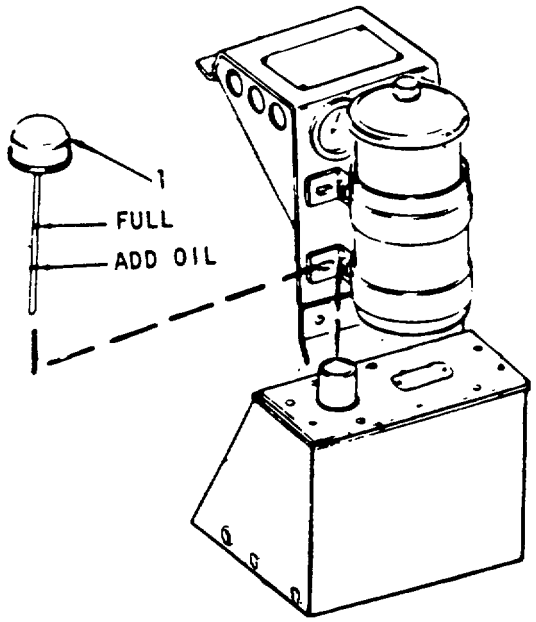
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 141 | QUARTERLY | Anchor Winch Compartment | CHANGE OIL.<br><br>**CAUTION**<br><br>**Make sure Anchor Winch Engine is not running.**<br><br>  <br><br><br>**CAUTION**<br><br>**The winch engine must be shut off. The torque converter could be damaged.**<br><br>Pump oil from the reserve tank (2) into a suitable container through fluid gage hole (3).<br><br>**NOTE**<br><br>**Do not drain oil into bilges. Use the oil separation system to collect the drained oil.** | Binds or fails to function. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

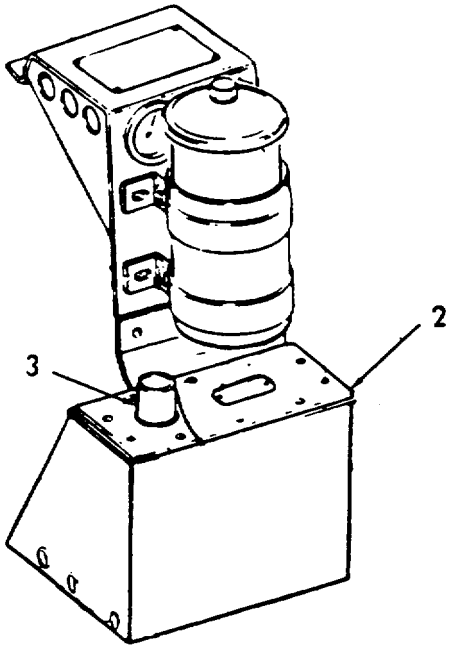
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 141 Continued | | |  | |
| | | | Drain turbine converter housing assembly (4), by removing pipe plug (5).<br><br>**NOTE**<br><br>**The contents of the heat exchanger (6) is approximately 7 gallons (26.5 l).**<br><br>Remove cover (7) from the filter assembly (8). Remove filter (9). Install a new filter (9) and replace the cover (8). | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 141 Continued | | | Remove elbow (1 0) from reserve tank (3). Remove nuts (11), washers (12). Remove cover plate (13) and gasket (14). Clean the screen element (15). Replace elbow (10).<br><br>Remove orifice head (16), gasket (17), and filter (18). Clean the filter and the hole in the orifice filter body (19). Replace filter (18), gasket (17) and orifice head (16).<br><br>Replace gasket (14), cover plate (13), washers (12) and nuts (11).<br><br>Replace pipe plugs (2 and 5). Open vent valve (19). Open bleed valve (20). Remove fill cap (21). Add approximately 7 gallons (26.5 l) of oil (MIL-L-9000H (SH)). Stop when oil flows from vent (19). Close vent (19). Continue filling until oil level reaches filler opening. Close bleed valve (20). Replace and tighten fill cap (21).<br><br>Remove cap (22). Fill with approximately 3 quarts (2.84 liters) of oil (MIL-L-9000H (SH)).<br><br>**NOTE**<br><br>**Fill to one inch (2.54 cm) below full mark on dipstick.**<br><br>Replace cap (22), and start engine and operate at 1/2 throttle. Check for leaks. Check pressure gage (23). Normal operation pressure is 45 to $65_2$ PSI (31.64 to 45.70 $kg/cm^2$).<br><br>Check temperature gage (24). Normal operating temperature is less than 200°F (93.3°C).<br><br>The oil pressure and temperature are measured with the converter properly filled and vented. | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 141 Continued | | | **NOTE**<br><br>**The pressure gage (23) respond instantly to oil pressure. Sluggishness indicates air in system. Open bleed valve (20).** | |

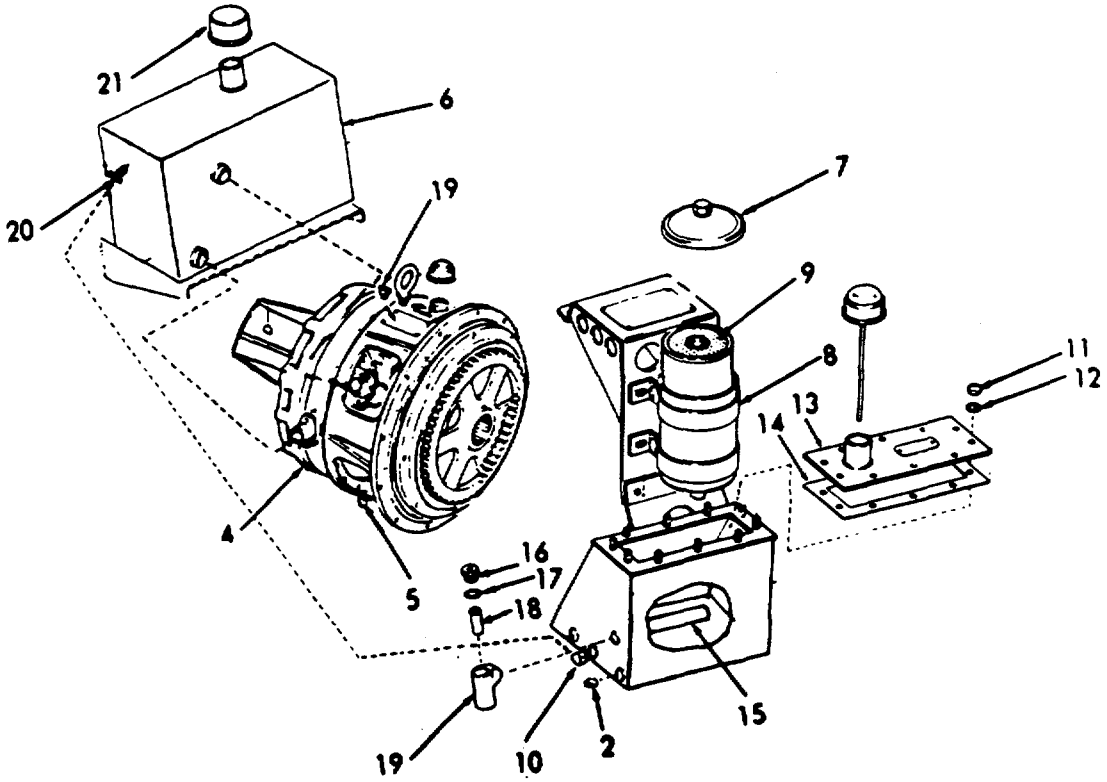


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

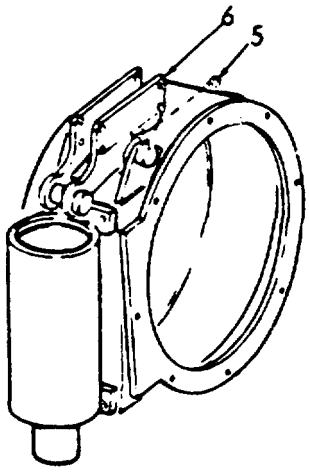
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 142 | QUARTERLY | Anchor Winch Compartment | DRIVE BRAKE<br><br>Lubricate fitting (5) located on drive brake double toggle (6) with grease (MIL-G-24139A (SH)).<br><br>  <br> | Binds or fails to function. |
| 143 | QUARTERLY | Anchor Winch Compartment | GEAR DRIVE<br><br>GEAR HOUSING. Remove breather cap (7). Drain gear housing (8) by removing pipe plug (9). Drain into a suitable container.<br><br>**NOTE**<br><br>**Do not drain oil into bilges. Use oil separation/recovery system to collect drained oil.**<br><br>Replace pipe plug (9). Refill gear housing with approximately 10 gallons (7.85 l) of oil (MIL-L-2105D, GO 80/90) through the pipe nipple for breather cap (7). Replace breather cap (7). | Low oil level. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

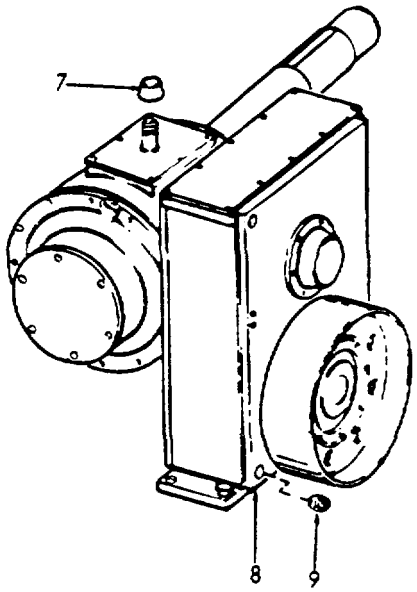
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 143 Continued | | |  | |
| 144 | QUARTERLY | Anchor Winch Compartment | INTERMEDIATE SHAFT AND DRUM GEAR. | |
| | | | INTERMEDIATE SHAFT BEARING. Lubricate fitting (10) located on pedestal cap (11). Use grease (MIL-G-24139A (SH)). | Low oil level. |
| | | | DRUM GEAR. Lift access door (12) and pour a pint of oil on gear while winch is running.<br><br>**WARNING**<br><br>**Stay clear of operating gages and cables.**<br><br>Use oil (MIL-G-18458B (SH)). | Low oil level. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

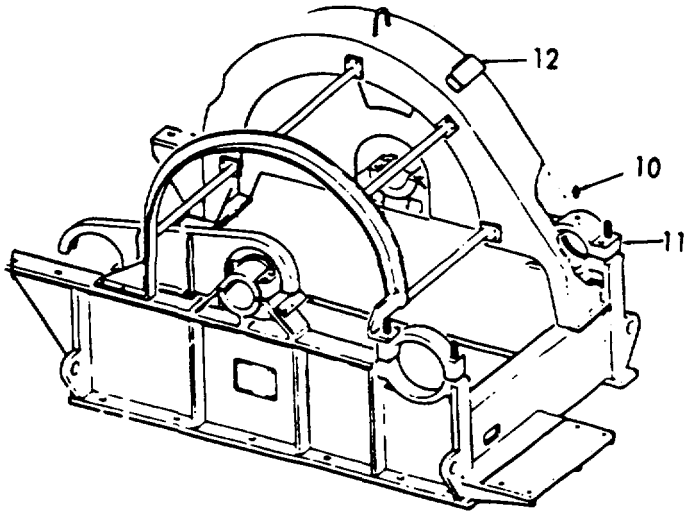
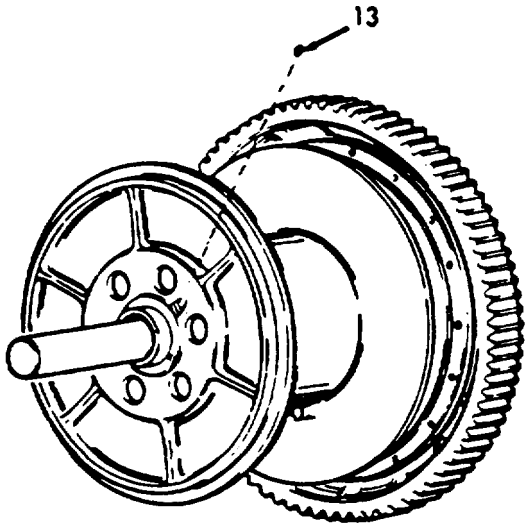
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 144 Continued | | | | |
| | | |  | |
| 145 | QUARTERLY | Anchor Winch Compartment | DRUM ASSEMBLY. Lubricate fittings (13). Use grease (MIL-G-24139A (SH)).<br>**WARNING**<br>**Stay clear of operating gears and cables.** | Gears slip and/or teeth damaged. |
| | | |  | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 146 | QUARTERLY | Equipment and Repair (2-40-O-A) | SEWAGE AIR PUMP<br><br>INLET DUST FILTER. Remove jar (1) bag holder (2), and filter bag (3). Discard bag (3). Clean jar, bay holder nipple (4). Replace gasket (5) if damaged. Replace bag (3) and reassemble. | Filter obstructed. |
| 147 | QUARTERLY | Equipment and Repair (2-40-O-A) | CHANGING OIL<br><br>Open draincock (10) and drain into a suitable container. | |

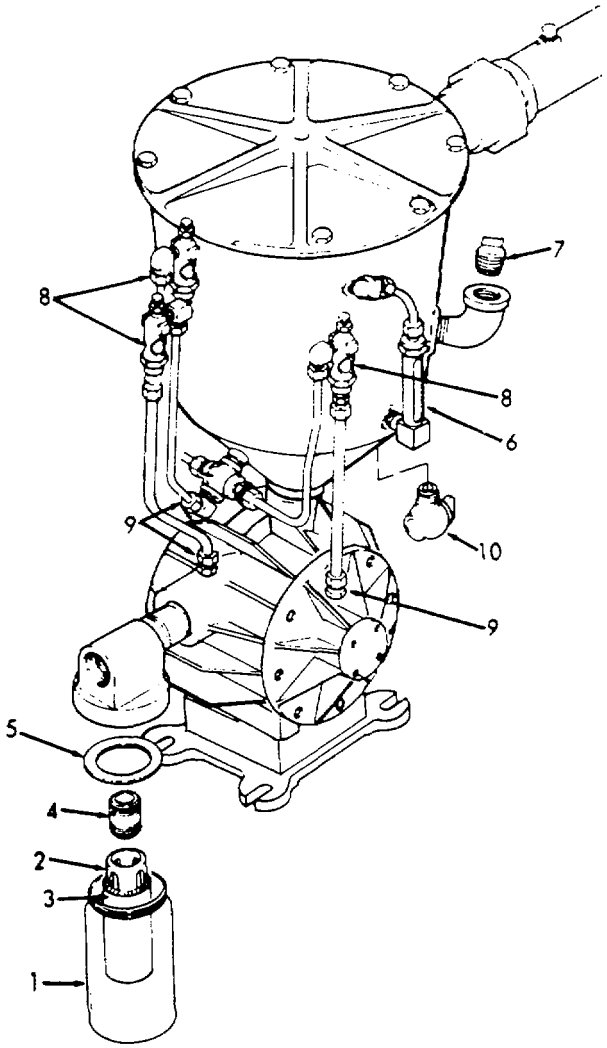
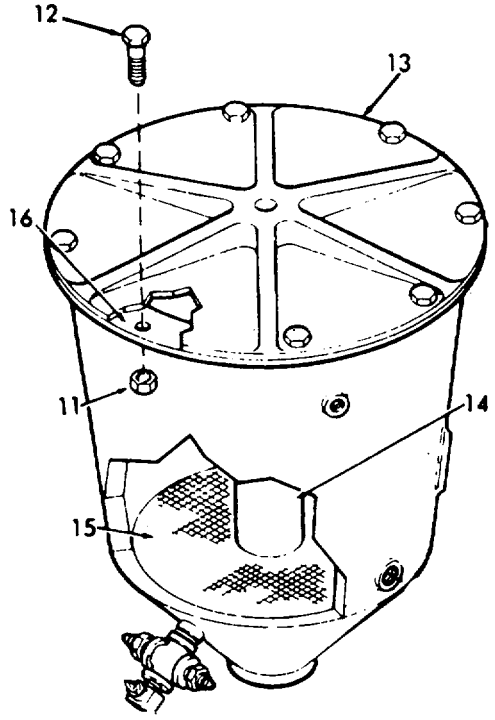


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 147 Continued | | | **NOTE**<br><br>**Do not drain oil into bilges. Use oil separation and recovery system to collect drained oil.**<br><br>Remove nuts (11), bolt (12) and cover (13). Remove oil tube (14) and screen (15). Replace screen (15). Reassembly oil tube (14). Replace gasket (16) if damaged. Reassemble cover (13) using bolts (12) and nuts (11). Close draincock (10).<br><br>Remove pipe plug (7) and fill with oil (MIL-L-9000H (SH)), (non-detergent) to full level on oil gage (6). Replace pipe plug (7). Operate system - check oil levels on sight valves (8) and oil gage (6). Add oil if necessary. | Filter obstructed. |



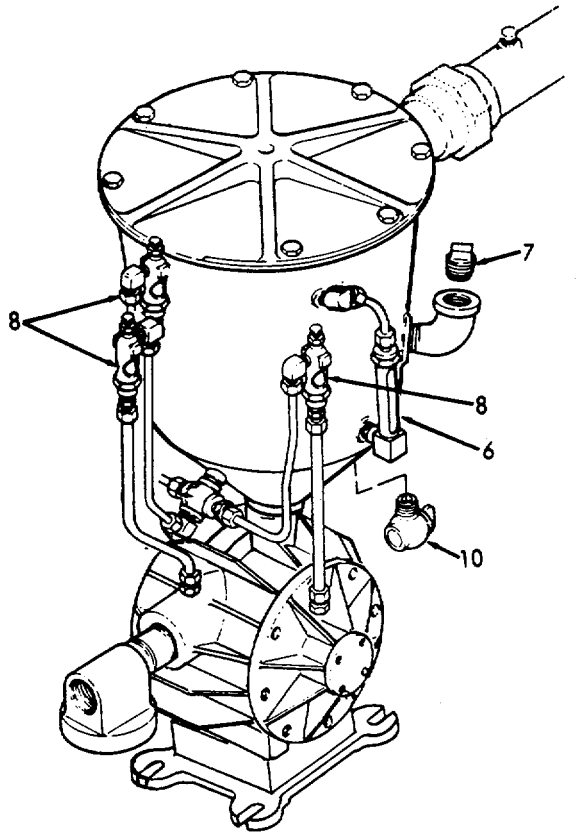



*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 148 | QUARTERLY | Equipment and Repair | SEWAGE PUMP<br><br>Check the spring-loaded grease cup (1). The grease cup (1) must be refilled when plunger (2) bottoms on grease cup (1).<br><br>To fill grease cup (1), turn cross arm (3) clockwise to raise the plunger (2) and compress the spring. Using grease (MIL-G-24139A (SH)), at fitting (4), fill the cup until grease comes out of the relief hole (5). Turn cross arm (3) counter-clockwise until is at the top of the plunger | Plunger bottoms onto grease cup. |

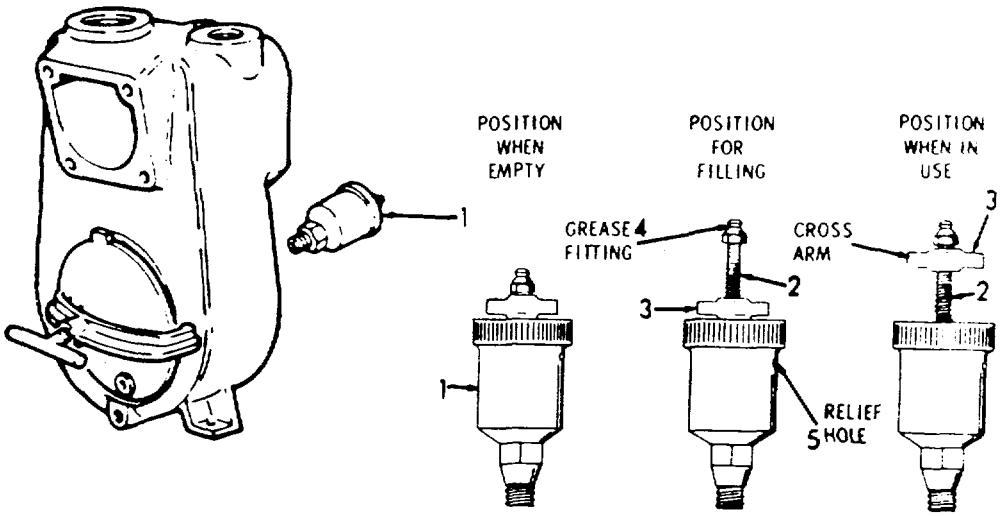


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 149 | QUARTERLY | Portable | OIL CHANGE. Remove plug (7) and drain oil into a suitable container. Replace plug (7). Remove plug (1) and add oil (MIL-L-9000H (SH)). | |

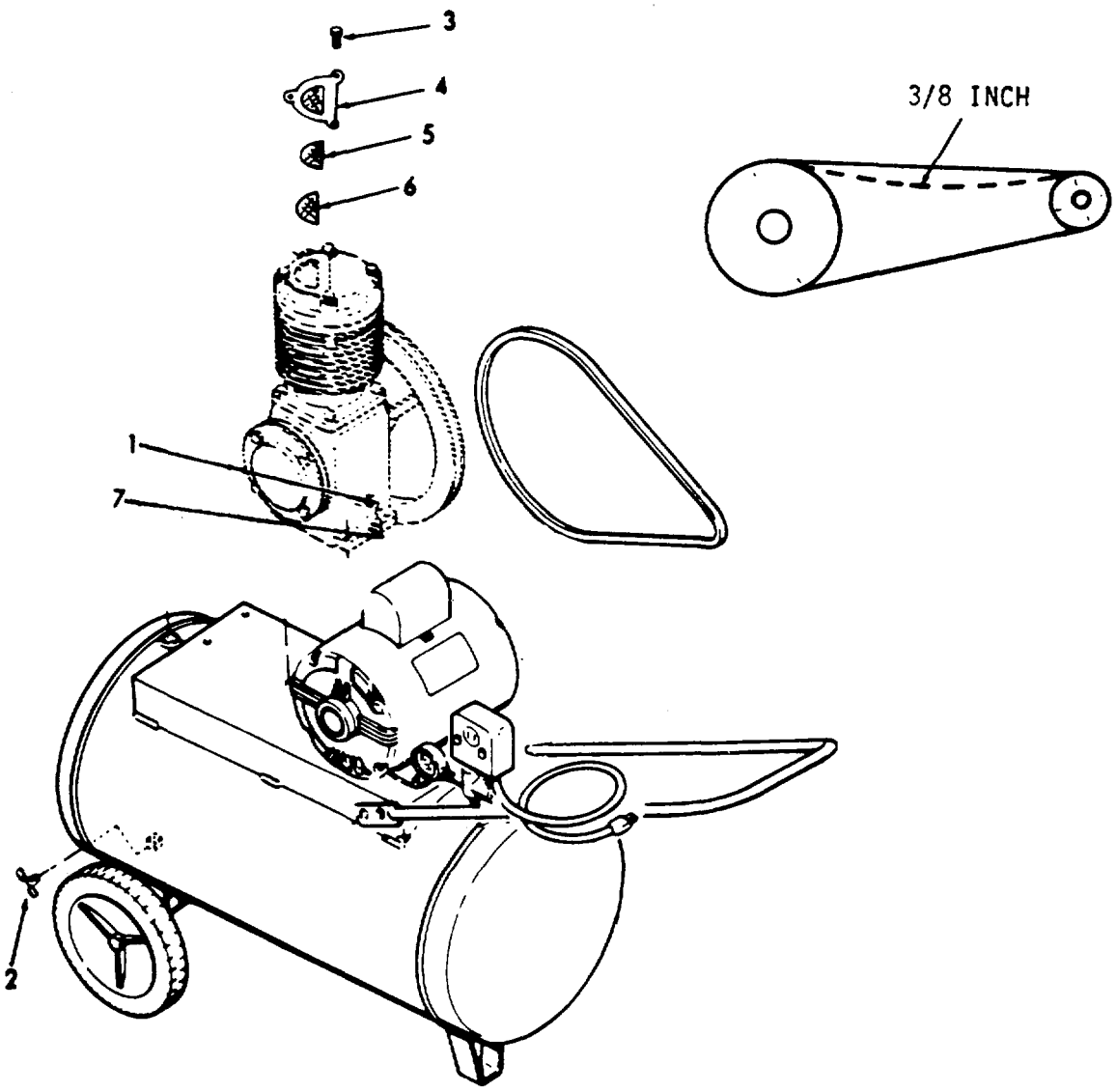


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 150 | SEMI-ANNUAL | Engine Room | AIR INTAKE ASSEMBLY. Remove screws (30), lockwashers (31) and washers (32), and remove silencer assembly (33) from air inlet housing (34). Remove screws (35, 36) and lockwashers (37). Lift air inlet housing (34) to remove screen (38) from blower (39). | Air intake is blocked or obstructed. |
| | | | Inspect bower screen (38) and, if necessary, clean in fuel oil. Dry with compressed air.<br><br>**WARNING**<br><br>**Wear eye protection when using compressed air.** | Air intake is blocked or obstructed. |

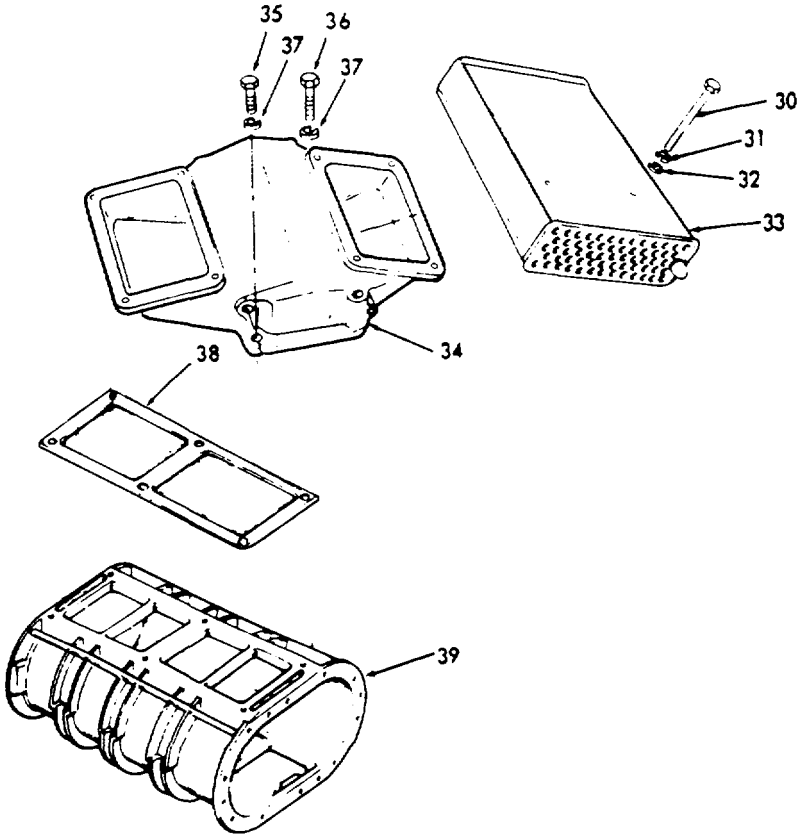


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

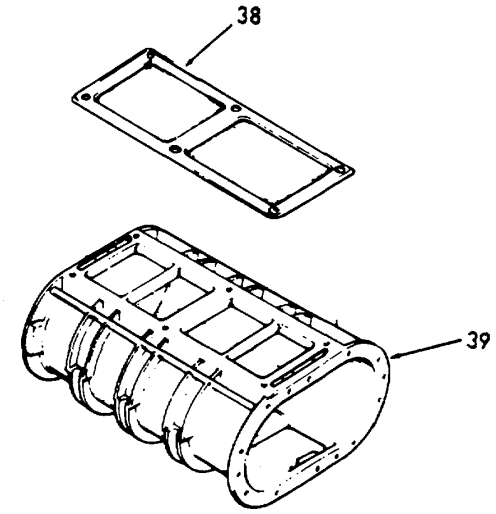
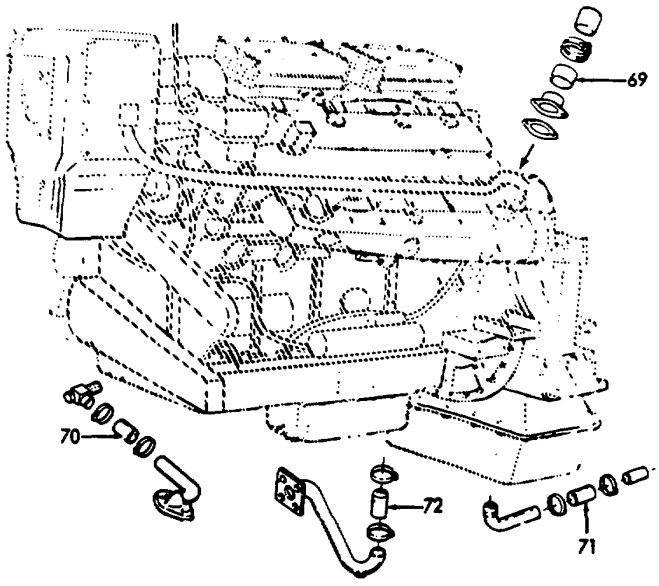
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 150 Continued | | | | |
| | | |  | |
| 151 | SEMI-ANNUAL | Engine Room | HOSES. Inspect all of the hoses visually and by touch for signs of deterioration. Replace the hoses if necessary.<br><br>Variable Speed Governor Hose (69)<br>Hose (70)<br>Hose (71)<br>Expansion Tank Outlet Hose (72) | Hoses have cracks or leaks. |
| | | |  | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 151 Continued | | | Fuel Pump Inlet Hose (73)<br>Fuel Pump to Filter Hose (74)<br>Fuel Filter to Cylinder Head Hose (75) right bank<br>Fuel Filter to Cylinder Head Hose (78) left bank<br>Crossover Hose (76)<br>Fuel Drain Hose (77) | Hoses have cracks or leaks. |
| | | | Oil Cooler Water Inlet Hose (79)<br>Oil Cooler Water Outlet Hose (80)<br>Hose (84)<br>Hose (85)<br>Water By-pass Tube Hose (86)<br>Oil Pump Outlet Hose (87)<br>Hose (81)<br>Expansion Tank Outlet Hose (83)<br>Hose (82) | Hoses have cracks or leaks. |

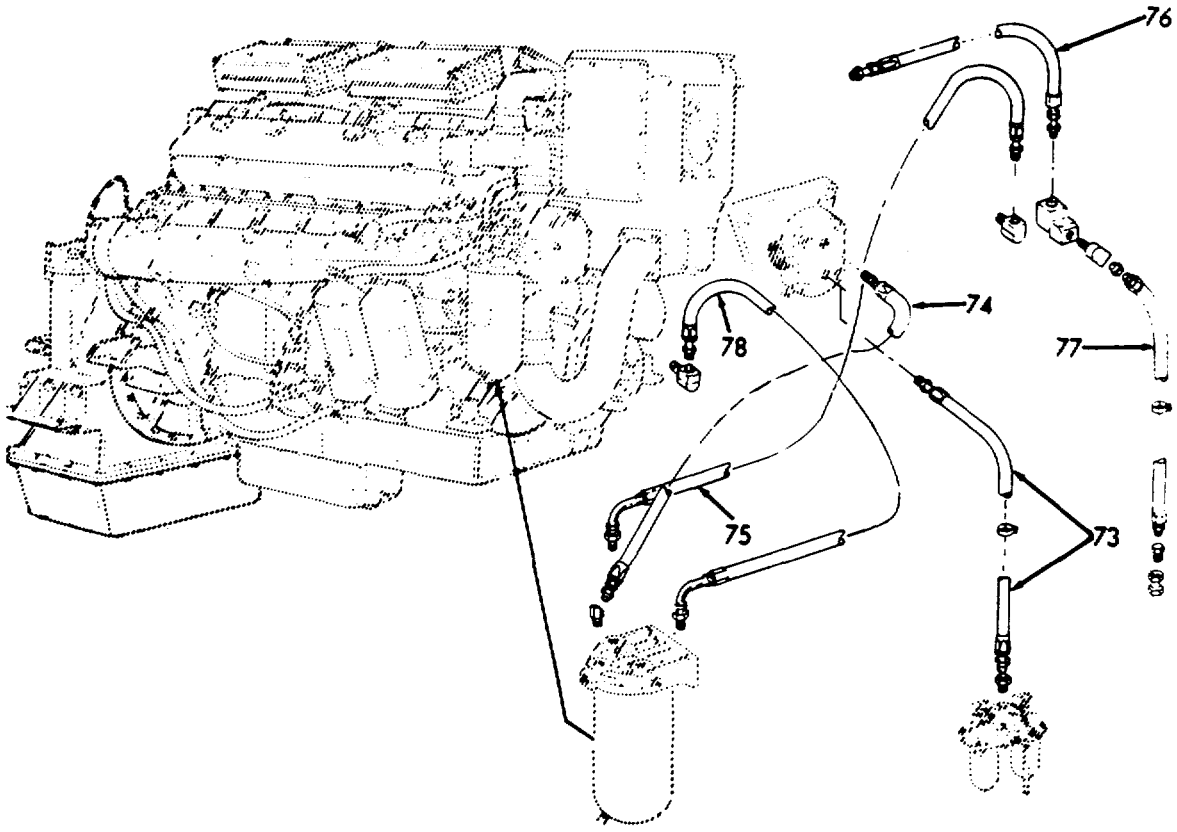


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

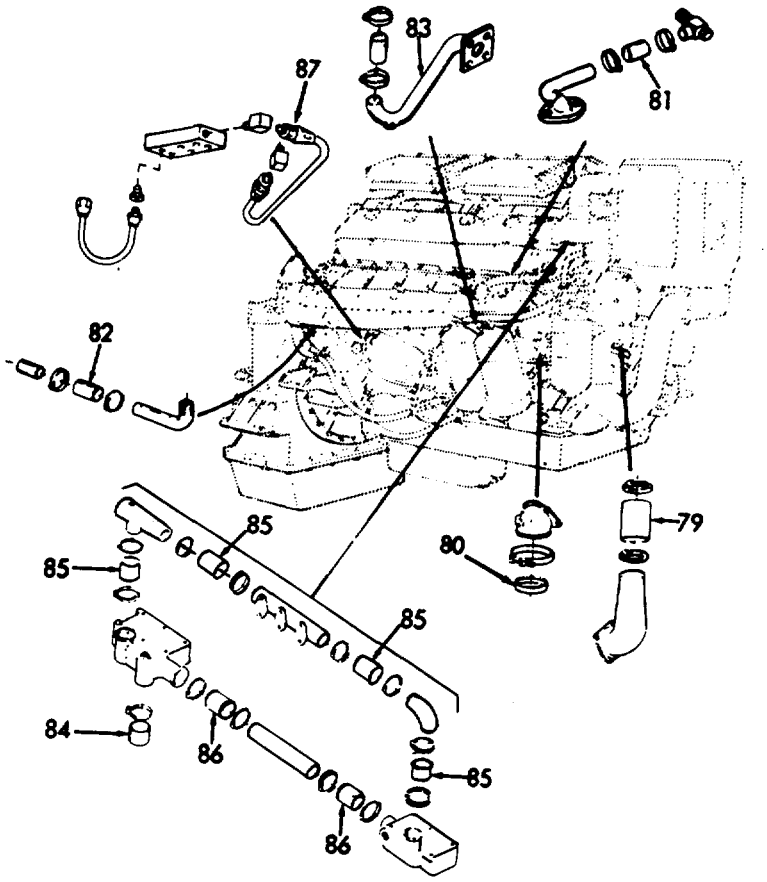
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 151 Continued | | | | |
| | |  | | |
| 152 | SEMI-ANNUAL | Engine Room | ENGINE TUNE-UP. There is no scheduled interval for performing an engine tune-up. As long as the engine performance is satisfactory, no tune-up should be needed. | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 153 | SEMI-ANNUAL | Engine Room | BILGE PUMP DRIVE. Lubricate four fittings (88) with grease (MIL-G-24139A (SH)). Lubricate shifter yoke (9) with grease (MIL-G-24139A (SH)) so that it moves freely.<br><br>Check drive belts (90) for wear and proper tension. | Shifter yoke binds.<br><br>Belts cracked or torn. |

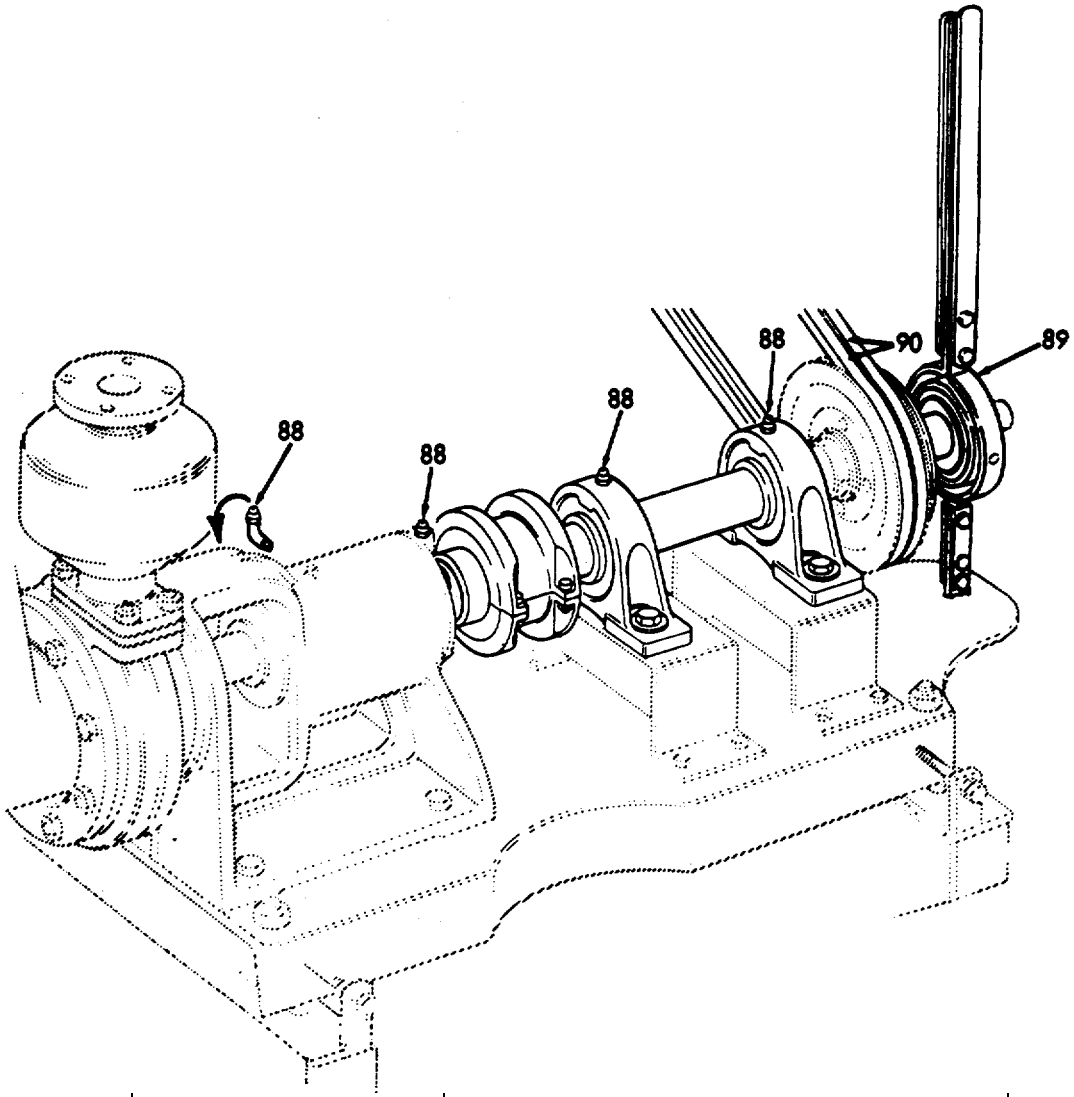


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

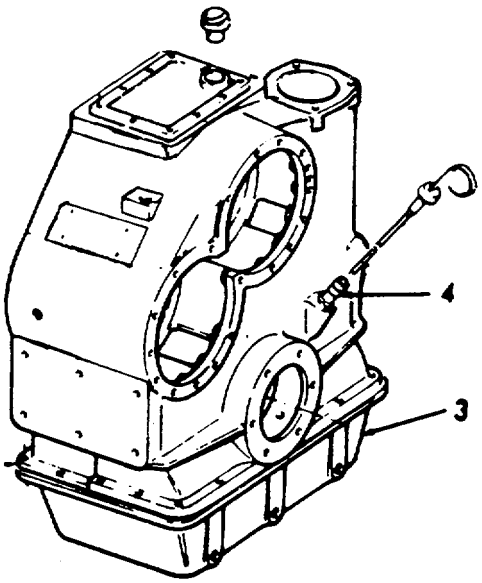
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 154 | SEMI-ANNUAL | Engine Room | CHANGE MARINE DRIVE GEAR OIL Drain the oil from bottom cover (3) by removing pipe plug (4).<br><br>**NOTE**<br><br>**Do not drain oil into bilges. Use the oil/water separation system to collect drained oil.**<br><br>  <br><br>Remove screws (5), cover plate (6) and gasket (7). Remove filter (8). Install a new filter (8) and a new gasket (7). Replace cover plate (6) and screws (5).<br><br>Remove pipe plug (9) and oil strainer (10) and clean using clean diesel fuel. Replace strainer (10) and pipe plug (9).<br><br>Remove oil breather cap (11) and remove gasket (12). Flush cap (11) in clean diesel fuel. Install new gasket (12) on cap (11).<br><br>Fill Marine Gear with oil. | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

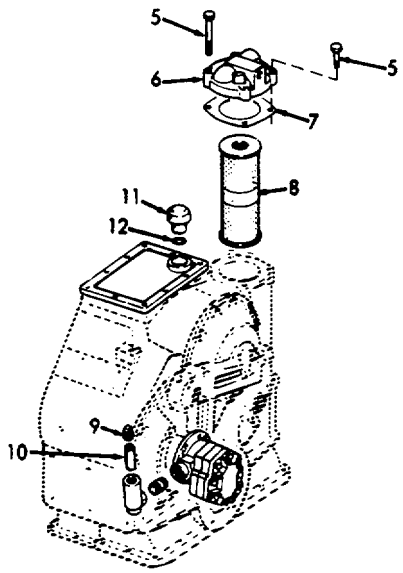
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 154 Continued | | |  <br>**NOTE**<br>**Marine gear holds 24 quarts (22.7 l) of oil. Operate engine for 5 minutes. Check for leaks. Add oil as required to bring level up to FULL on dipstick.** | |
| 155 | SEMI-ANNUAL | Engine Room | AIR CLEANER. Remove wing nut (6), bolt retainer sea (27) and bolt gasket seal (28). Remove the top cover (29) and filter screen (30) from casing (31). Squeeze ends of snap ring (32) together in order to remove air cleaner baffle (33) and air cleaner cup (34). | Cleaner blocked or obstructed. |
| | | | Remove the dirty oil and sludge from the air cleaner cup (34) and its' center tube. Wash the cup and other elements in clean fuel oil and refill the cup to the full level mark with engine oil (MIL-L-9000H (SH)). | Cleaner blocked or obstructed. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

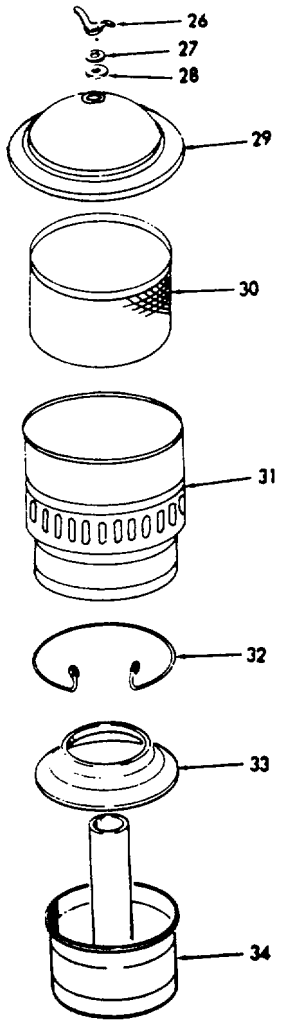
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 155 Continued | | | Clean filter screen with compressed air.<br><br>**WARNING**<br><br>**Use eye protection when using compressed air.**<br><br>Place air cleaner baffle (33) on air cleaner cup (34). Install snap ring (32). Place assembly in casing (31), insert air filter screen (30). Install wing nut (26), retaining seal (27), bolt gasket seal (28) and top cover (29) on casing (31).<br><br>  | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

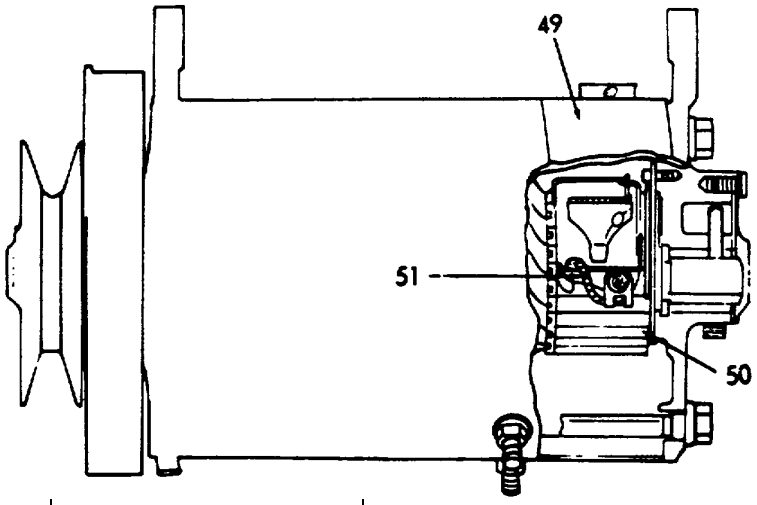
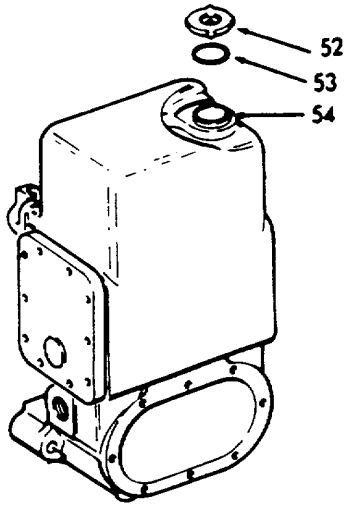
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 156 | SEMI-ANNUAL | Engine Room | GENERATOR<br>  <br>Remove cover band (49). Inspect the commutator (50) and brushes (51). | Bearings are binding or noisy. Output isn't correct. |
| 157 | SEMI-ANNUAL | Engine Room | EXPANSION TANK. Remove cap (52) and gasket (53) from the expansion tank (54) and check the coolant level. It should be near the top of the expansion tank. Add anti-freeze (MIL-A-46153) as required. Re-install in reverse sequence before operating engine.<br>  | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

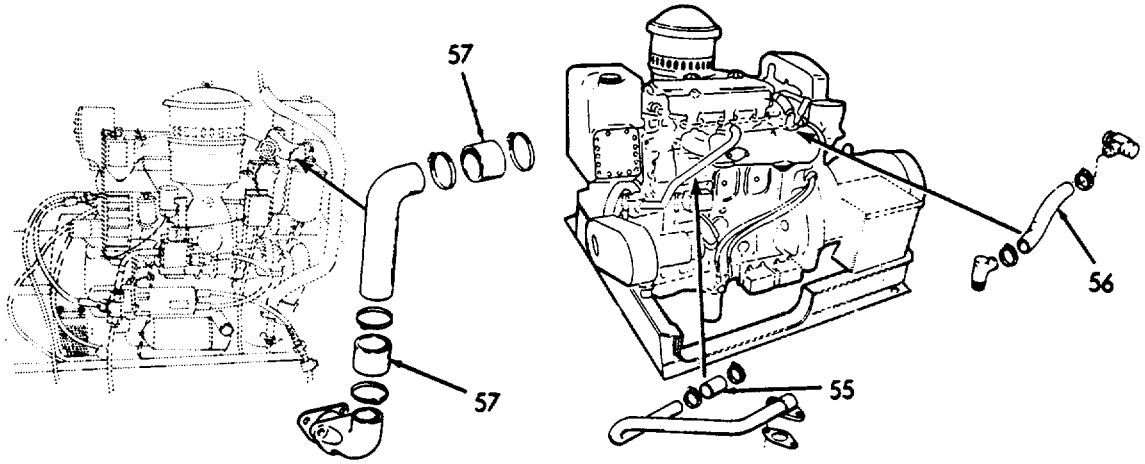
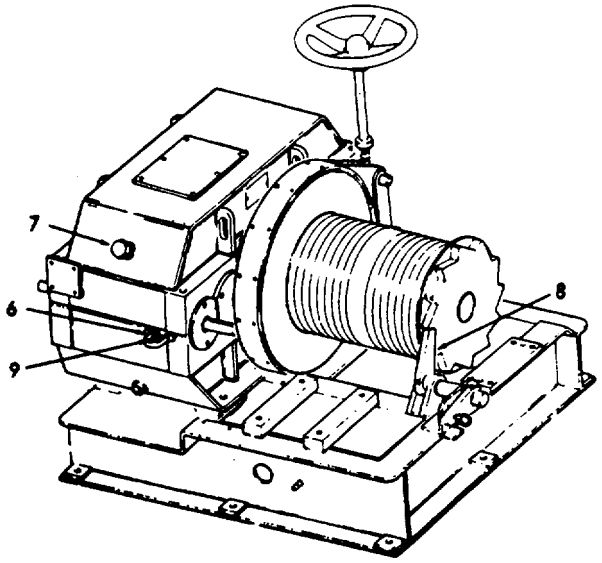
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 158 | SEMI-ANNUAL | Engine Room | HOSES. Inspect (visually and touch) all of the hoses for signs of deterioration. Replace the hoses if necessary.<br><br>Water By-Pass Hose (55)<br>Water By-Pass Exhaust Manifold Hose (56)<br>Oil Cooler to Expansion Tank Hose (57) | Cracked or torn and/or leaking. |
| | | |  | |
| 159 | SEMI-ANNUAL | Anchor Winch Compartment | Change reducer oil by pumping oil into a suitable container through dipstick hole (9). | |
| | | |  | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 159 Continued | | | Remove vent pug (7) to add gear oil (MIL-L-210D, GO 80/90). Capacity one gallon (3.78 liters). | |
| 160 | SEMI-ANNUAL | Anchor Winch Compartment | HOSES. Inspect (visually and by touch) of the hoses for signs of deterioration. Replace the hoses if necessary.<br><br>Fresh Water Pump Hose (50)<br>Oil Cooler Water Hoses (51)<br>Thermostat Hose (52)<br>Water By-Pass Hose (53)<br>Water By-Pass Hose (54) | Cracked and/or leaking. |

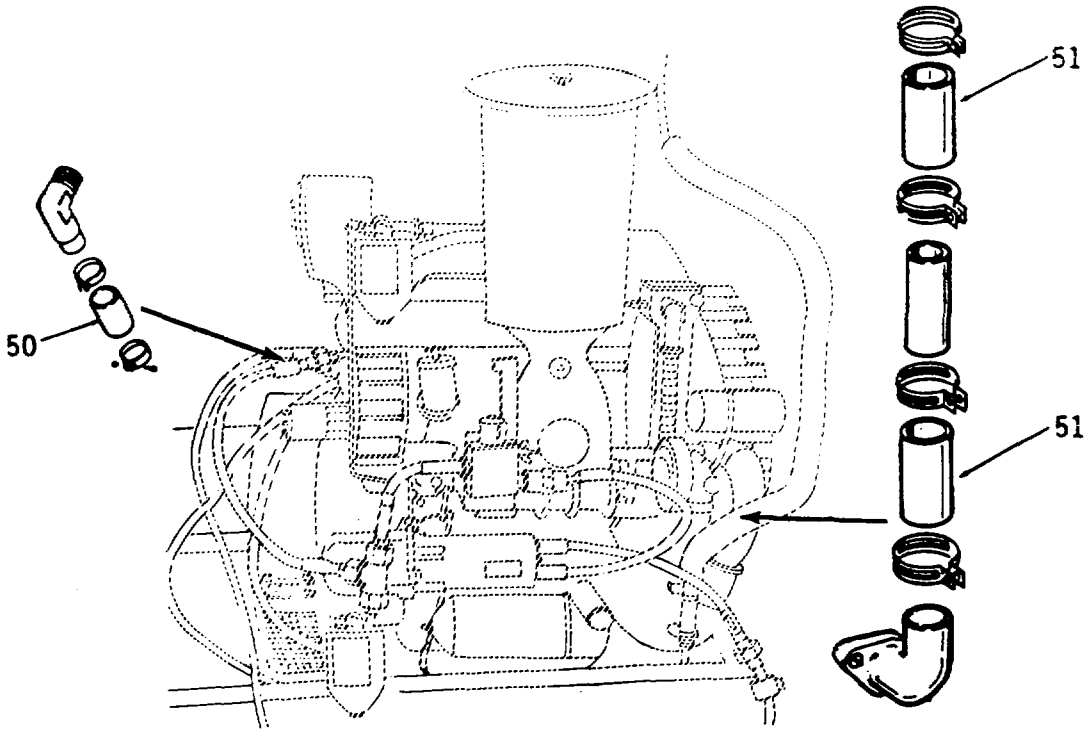
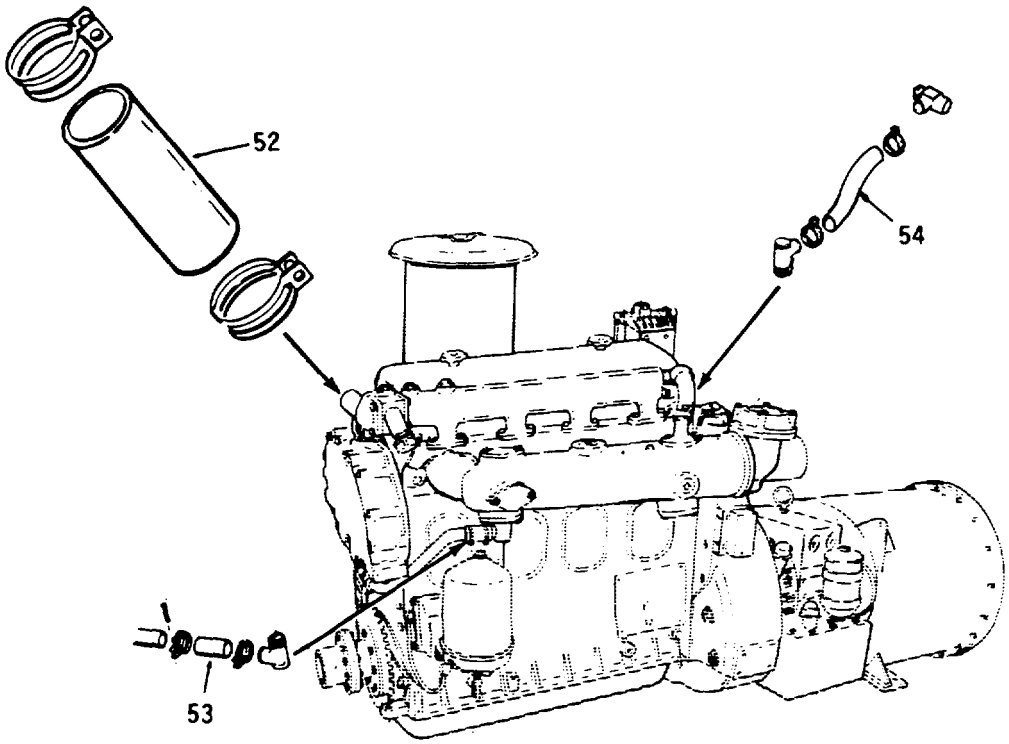


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 160 Continued | | | | |




| | | | | |
|---|---|---|---|---|
| 161 | SEMI-ANNUAL | AFT/FR 72-75 | STEERING LINKAGE. Lubricate ball joints (12) or steering linkage with a few drops of oil (ML-L-9000H (SH)). | |

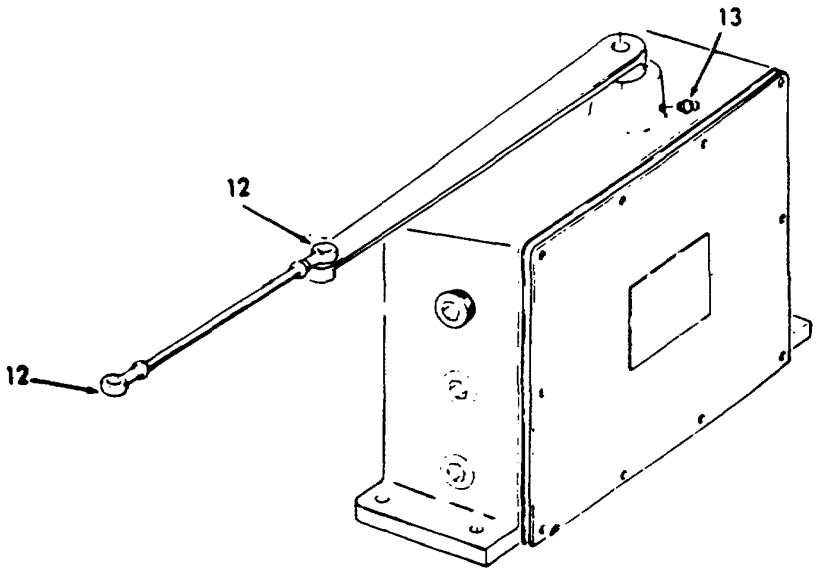


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

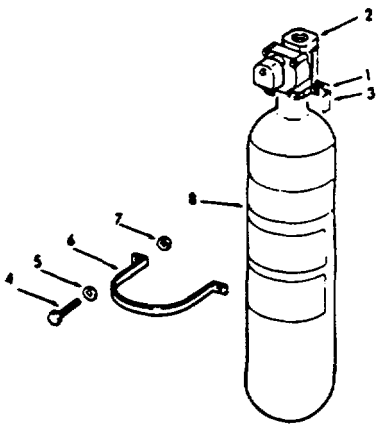
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 162 | SEMI-ANNUAL | At SEP Sites FR 12, FR 48, FR 56 | HALON SYSTEM<br><br>CYLINDER ASSEMBLY (Small Cylinder)<br><br>**WARNING**<br><br>**Before performing maintenance, be sure system is off and that safety pin (1) is inserted in solenoid valve (2). The system is oxygen robbing. The instruction tag (3) should be read before any maintenance is performed on the cylinder assembly.**<br><br>Insert safety pin (1). Remove screws (4), washers (5), bracket (6) and nuts (7) from cylinder (8).<br><br>**CAUTION**<br><br>**Do not remove cylinder (8) from solenoid valve (2).**<br><br>Weigh the cylinder, valve and nozzle assembly. When filled, the cylinder assembly should weigh 12.5 lbs. (5.68 kg). Replace if below weight.<br><br>Then replace nuts (7), bracket (6), washers (5) and screws (4). Remove the safety pin (1). Turn the system on.<br><br>  <br> | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 162 Continued | | | LARGE CYLINDER<br><br>**WARNING**<br><br>**Before performing maintenance, make sure that the system is turned off and that locking pin (9) is inserted in pneumatic control head (10). The instruction should be read before any maintenance is performed on the cylinder assembly.**<br><br>Insert locking pin (9). Disconnect pneumatic control head (10) and tube assembly (11). Then remove screws (12), washers (13), bracket (14) and nuts (15) from cylinder (16).<br><br>Weigh the cylinder and valve assembly. Filled, the assembly should weigh 213 lbs. (97 kg). Replace if below weight.<br><br>Replace cylinder (16), nuts (15), bracket (14), washers (13), and screws (12). Reconnect tube assembly (11) and pneumatic control head (10). Remove locking pin (9). Turn the system on. | |

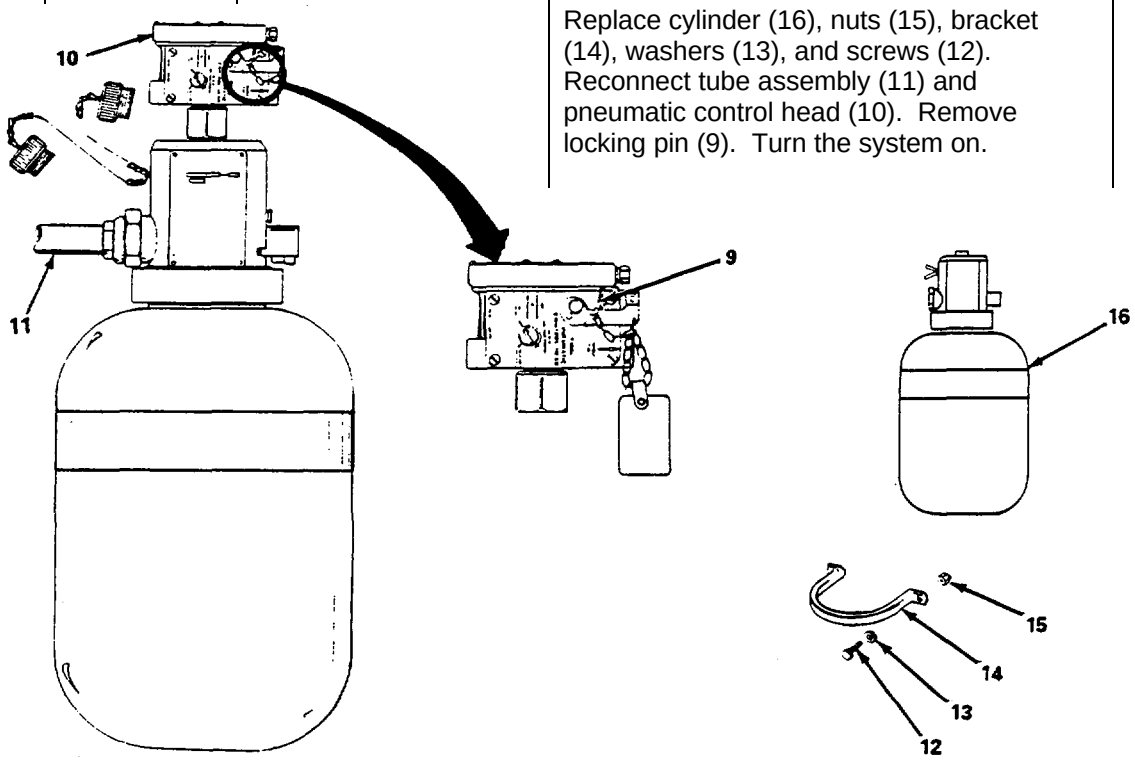


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 163 | SEMI-ANNUAL | At SEP. Sites FR 12, FR 48, FR 56 | $CO_2$ DEVICES<br><br>Remove and weigh each cylinder. The weight should be that shown on the cylinders. | Weight below cylinder. requirements. |
| 164 | SEMI-ANNUAL | Equipment General | AIRPORTS AND BATTLE COVERS. Lubricate hinges (13) and dogs (14) with grease (MIL-G-18458B (SH)). | Ports are cracked and/or covers are missing. |

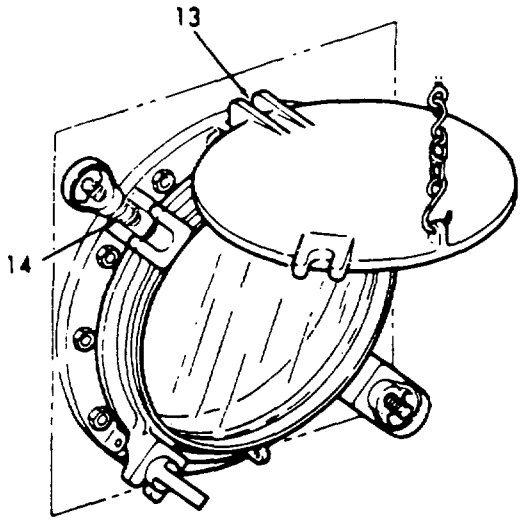


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 165 | SEMI-ANNUAL | Equipment General | REACH RODS TYPICAL. Lubricate stuffing boxes (19), gears (20), hinge joints (21), hangers (22) and fork valves (23). Use grease (MIL-G-1 8458B (SH)). | Bent, jammed and/or non-functioning. |

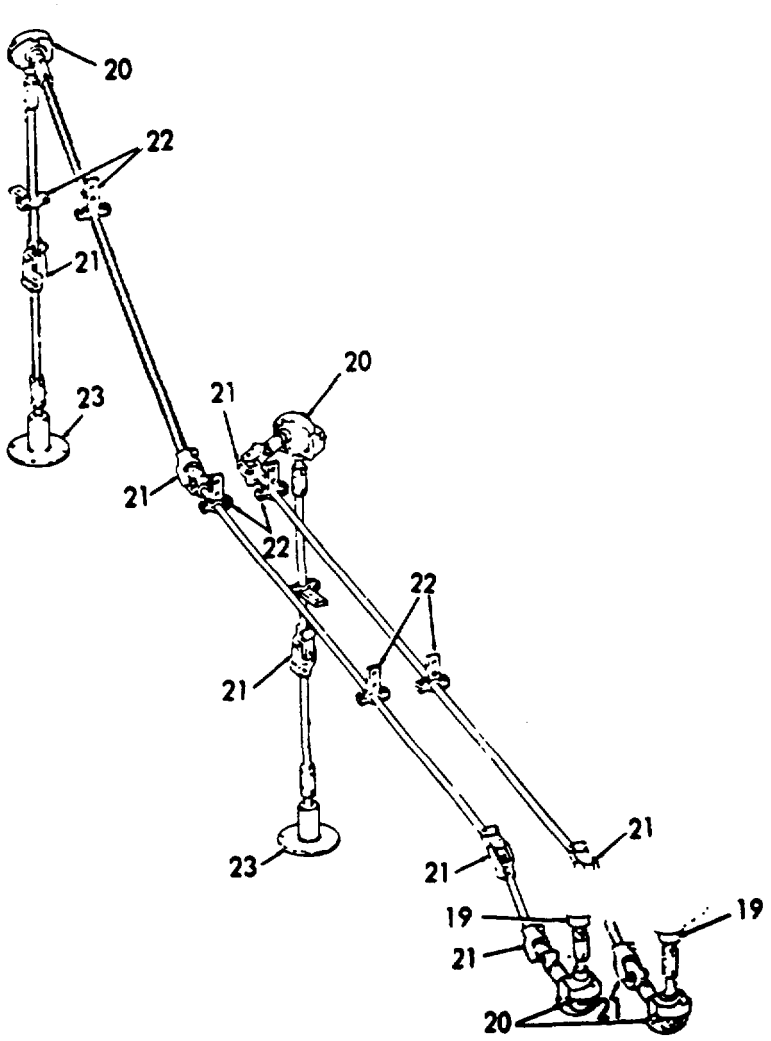


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 166 | SEMI-ANNUAL | Equipment General | AIR HORN COMPRESSOR<br><br>OIL CHANGE. Oil in the crankcase should be changed after every 5000 hours of operation. The crankcase should be thoroughly cleaned at time of every oil change. A threaded pipe plug (8) is provided in the crankcase oil sump for draining. Remove oil drain plug and drain oil into a suitable container. Replace oil drain plug and add 1/4 pint of oil (MIL-L-9000H (SH)). | Fails to hold pressure. |

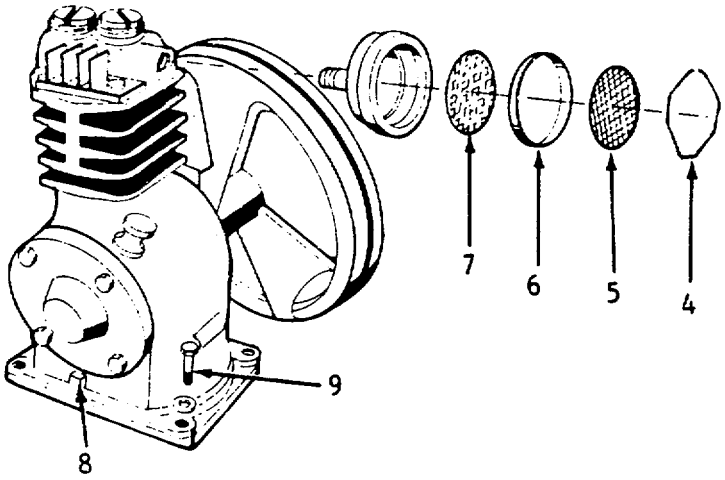


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

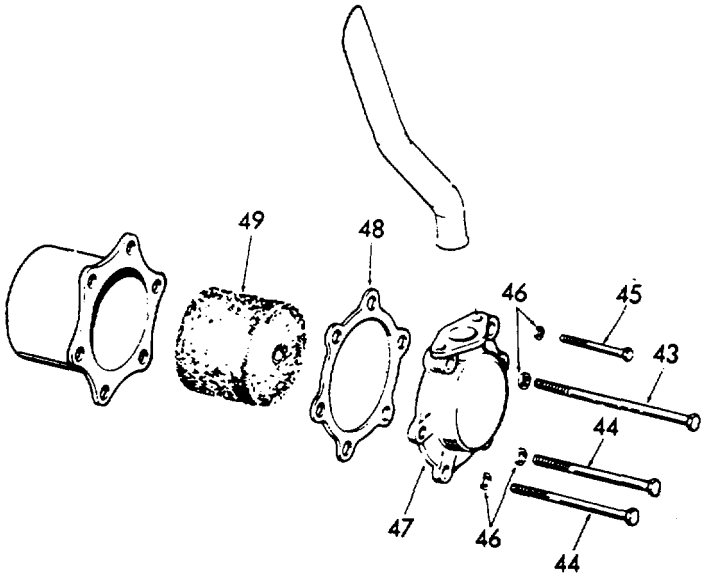
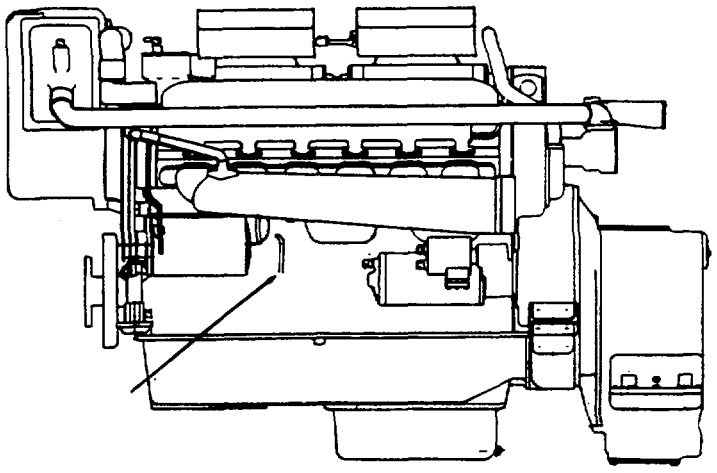
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 167 | ANNUAL | Engine Room | VENTILATION. Remove screws (43, 44, 45) and washers (46). Remove cover breather (47), gasket breather (48), and filter (49). Clean the cover breather (47) in clean fuel oil. Install new filter (49) and gasket (48). Replace cover breather (47), washers (46) and screws (43, 44, 45). | Breather obstructed. |
| | | |  | |
| 168 | ANNUAL | Engine Room | AIR BOX DRAINS. With the engine running, check for flow of air from the air box drain tubes. If the tubes are clogged, remove, clean and re-install the tubes. | Breather obstructed. |
| | | |  | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

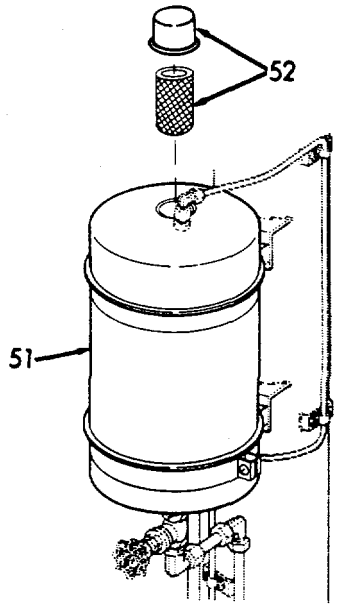
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 169 | ANNUAL | Engine Room | HYDROSTARTER RESERVOIR. Drain reservoir (51) and remove breather cap and screen (52). Flush out the reservoir and clean the screen and breather cap. Clean with compressed air. Re-install the screen.<br><br>**NOTE**<br><br>**Use mineral oil, MIL-L-17672, type 2135 TM.**<br><br>**WARNING**<br><br>**Use eye protection when using compressed air.**<br><br>  <br> | Breather obstructed. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

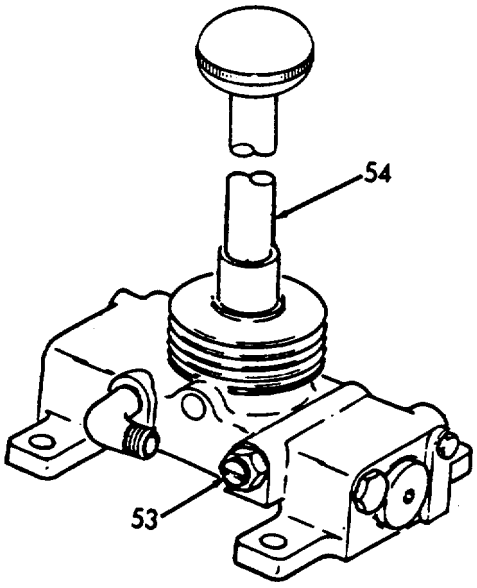
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 170 | ANNUAL | Engine Room | HYDROSTARTER FILTER.<br><br>**CAUTION**<br><br>**Do not attempt to change filter element until the pressure in the system is released.**<br><br>Release pressure by loosening relief valve (53) on the hand pump (54). Loosen bail nut (55) and swing bail (56 aside. Remove cup (57), filter (58) and gasket (59). Discard filter and gasket. Clean cup (57) with compressed air.<br><br>Reinstall in reverse order.<br><br>**WARNING**<br><br>**Use eye protection when using compressed air.**<br><br>  <br> | Filter obstructed. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

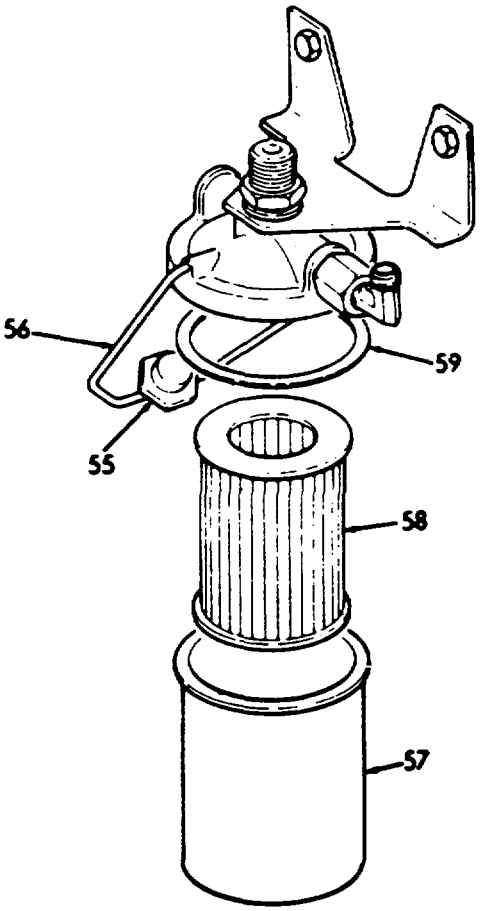
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 170 Continued | | | Install new filter (58) and gasket (59) in cup (57). Place bail (56) in position and tighten bail nut (55). Close relief valve (53) on the hand pump (54).   | |
| 171 | ANNUAL | Engine Room | HYDROSTARTER. Remove the hydrostarter from the engine for lubrication. Before removing the hydrostarter release the pressure in the system by means of the relief valve (60) on the hand pump 61).<br><br>Then remove three bolts (62) and washers (63) that attach the starting motor (64) to the flywheel housing. Remove the starting motor without disconnecting the hydraulic hoses. | Filter obstructed. |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 171 Continued | | | Apply a grease (MIL-G-24139A (SH) on drive clutch pinion (65) so that it will ride freely while compressing spring. Also apply grease to the fingers of clutch fork (66) and spool of clutch yoke (67).<br><br>Remove pipe plug (68) from starting motor drive housing (64) and saturate shaft oil wick (69) with engine oil. Reinstall the plug (68).<br><br>After lubricating, install starting motor on the flywheel housing and recharge the accumulator with the hand pump. | |

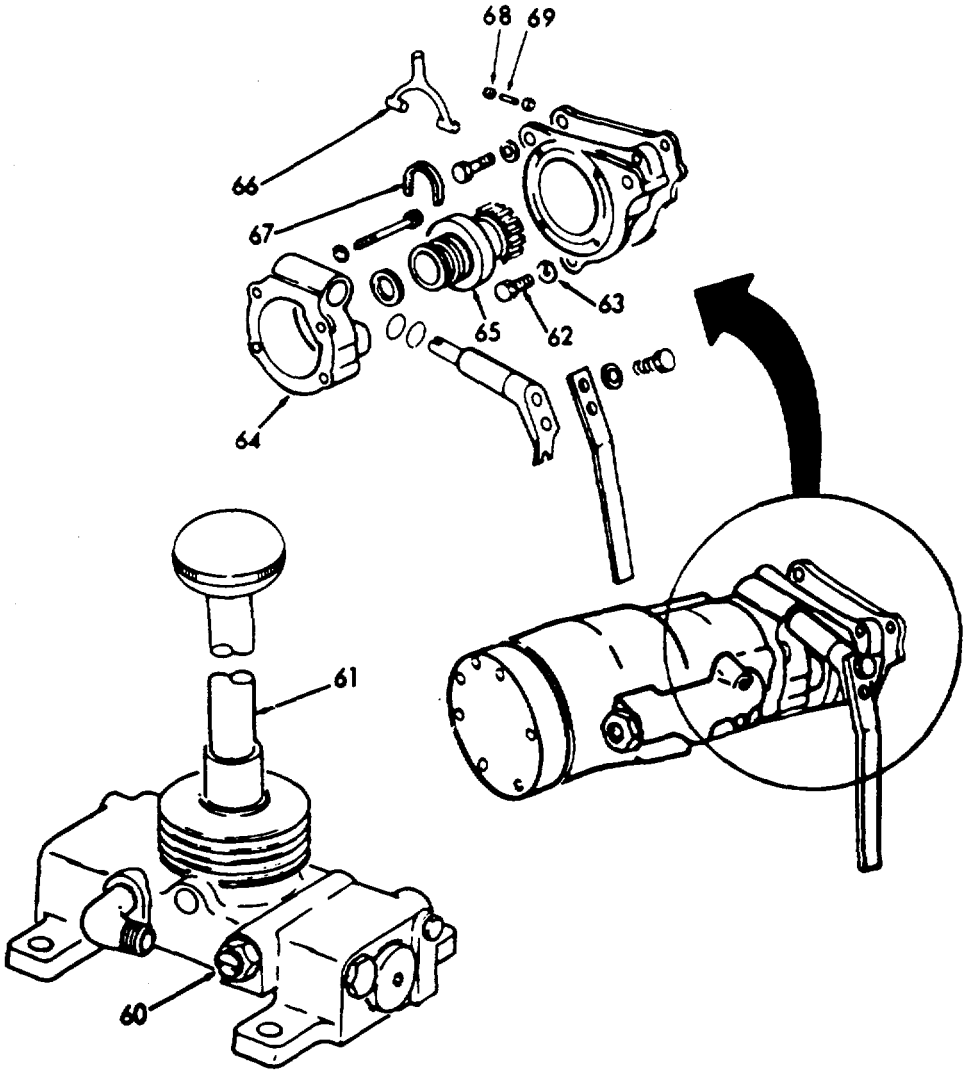


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

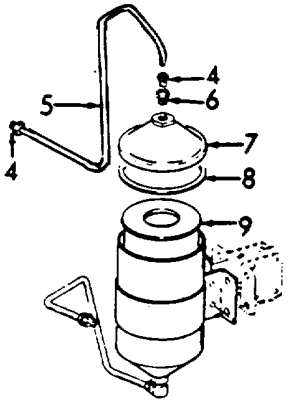
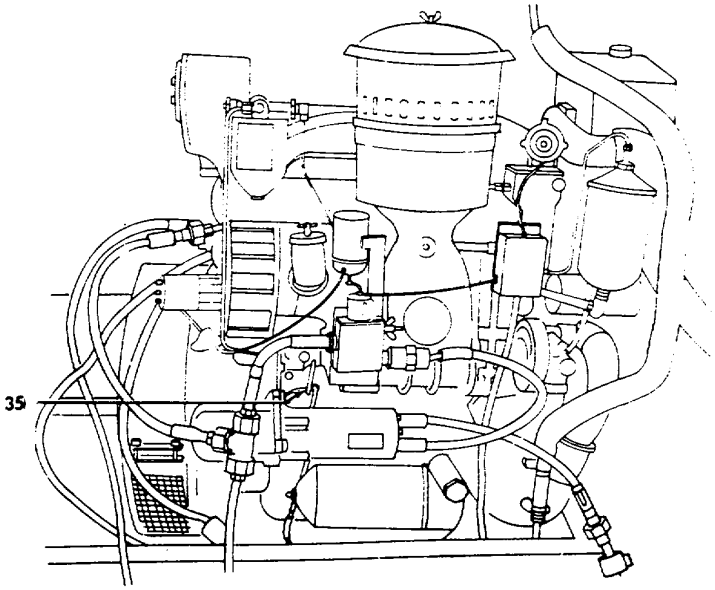
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 172 | ANNUAL | Engine Room | GOVERNOR OIL FILTER. Remove straight adapter (4), overflow reservoir tube (5), and pipe reducer (6). Remove cover (7), gasket (8) and filter (9). Install new filter (9) and gasket (8). Replace cover (7), pipe reducer (6), overflow reservoir tube (5) and straight adapters (4).   | Filter obstructed. |
| 173 | ANNUAL | Engine Room | AIR BOX DRAINS. With the engine running, check for flow of air from the air box drain tubes (35). If the tubes are clogged, remove along with inverted elbow. Clean and re-install the air box drain tubes (35) and inverted elbow.   | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

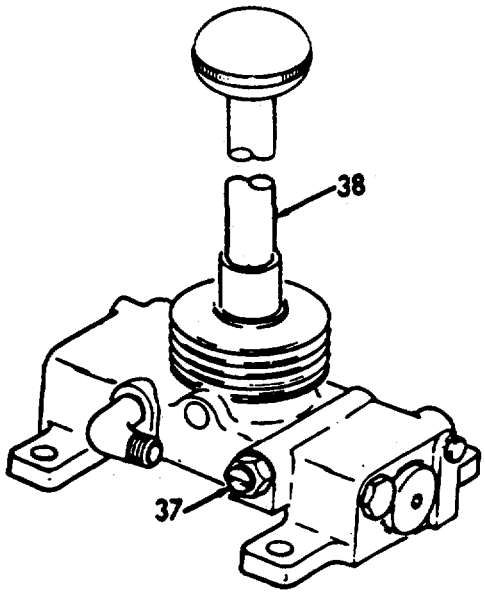
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 174 | ANNUAL | Engine Room | HYDROSTARTER SYSTEM. Refer to Table 2-1 for maintenance on the Hydraulic Reservoir.<br><br>Remove the Hydrostarter from the Generator for lubrication. Before removing the Hydrostarter release the pressure in the system by means of the relief valve (37) on the hand pump (38). Then remove three bolts (39) and washers (40) that attach starting motor (41) to the flywheel housing. Remove the starting motor without disconnecting the hydraulic hoses.<br><br>  <br><br>Apply grease (MIL-G-24139A (SH)) on drive clutch pinion (42) to make sure clutch will slide freely while compressing spring Also apply grease to the fingers of clutch fork (4) and on the spool of clutch yoke (44). | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

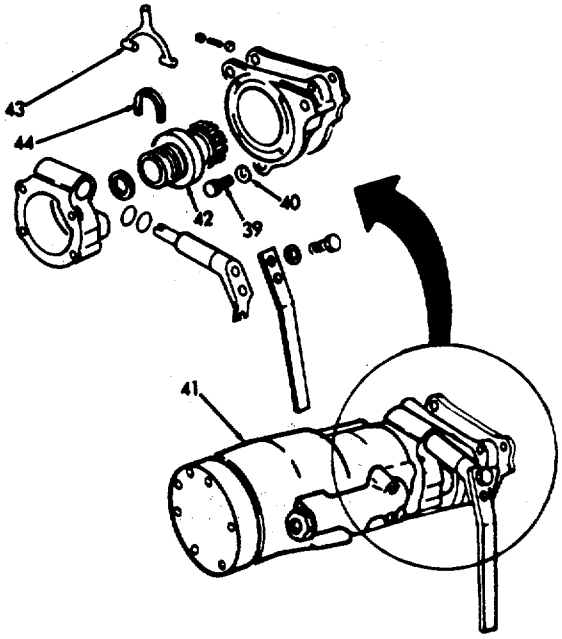
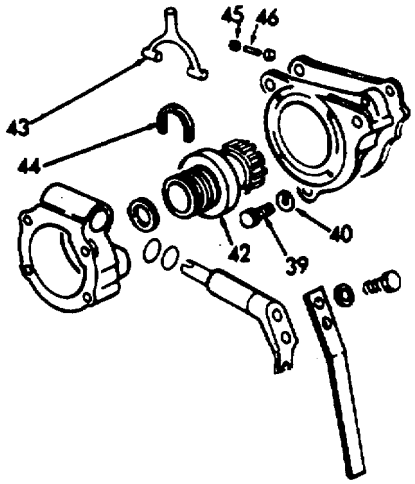
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 174 Continued | |  | | |
| | | | Remove pipe pug (45) from starting motor drive housing and saturate shaft oil wick (46) with engine oil. (MIL-L-9000H (SH)). Reinstall the plug (45).<br><br>After lubricating, install starting motor on the flywheel housing and recharge the accumulator with the hand pump.<br><br>Make sure relief valve is secure.<br><br>  | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 175 | ANNUAL | Engine Room | GENERATOR.<br><br>Clean the commutator (50) if necessary, with No. 00 sandpaper or a brush seating stone. After cleaning, reseat the brushes and blow out the dust with compressed air. Replace the cover band (49).<br><br>**WARNING**<br><br>**Use eye protection when using compressed air.** | Fails to function. |

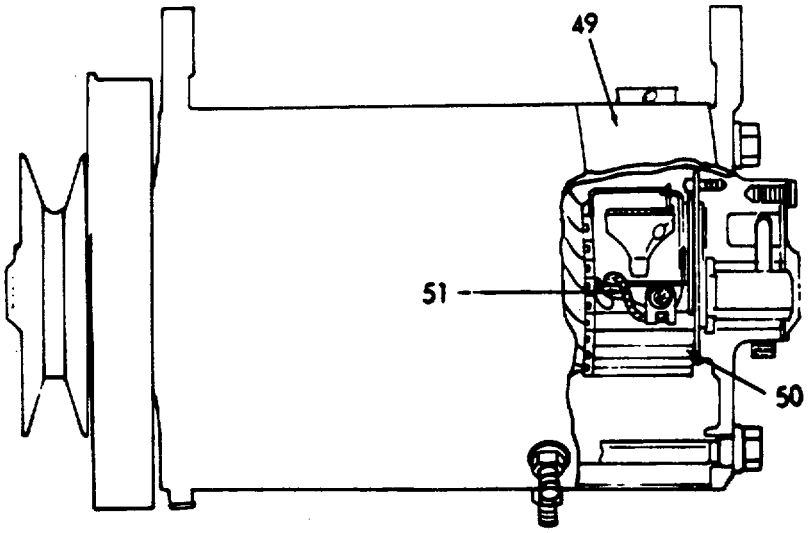


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 176 | ANNUAL | Engine Room | MOTORS-LARGE. These instructions apply to the following motors only:<br><br>Fire Pump<br>Salt Water Circulating Pump<br>Reduction Gear Lube Oil Pump<br>Air Compressor<br><br>Remove plugs. Lubricate bearings at holes with grease (MIL-G-24139A (SH)).<br><br>Force grease thru filling holes until grease appears at drain hole or along shaft. Operate motor for at least 2 hours. Replace plug. | Fail to function. |
| 177 | ANNUAL | Ramp Handling Equipment | Lubricate grease fitting (11) and brake nut (12) with grease (MIL-G-24139A (SH)). | |

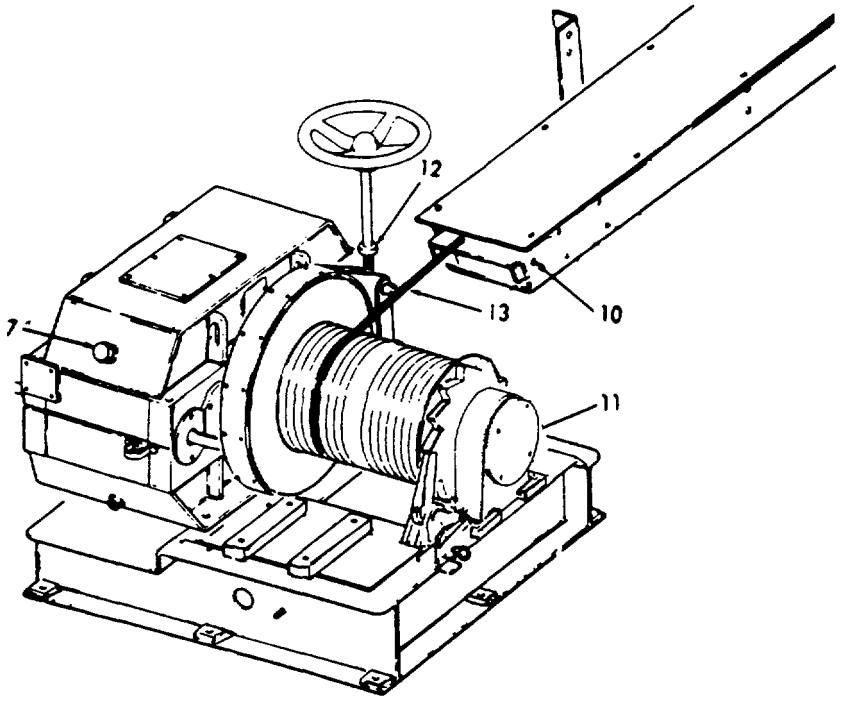


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

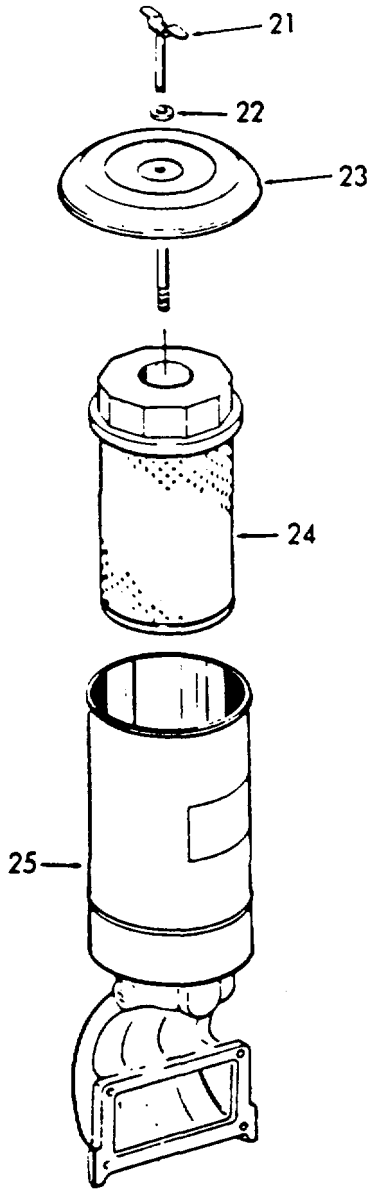
| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 178 | ANNUAL | Anchor Winch Compartment | AIR CLEANER. Replace air filter element (24).   | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 179 | ANNUAL | Anchor Winch Compartment | HYDROSTARTER RESERVOIR. Drain reservoir and remove breather cap and screen (30). Flush out reservoir and clean screen and breather cap. Clean with compressed air. Reinstall the screen.<br><br>**WARNING**<br><br>**Use eye protection when using compressed air.** | |

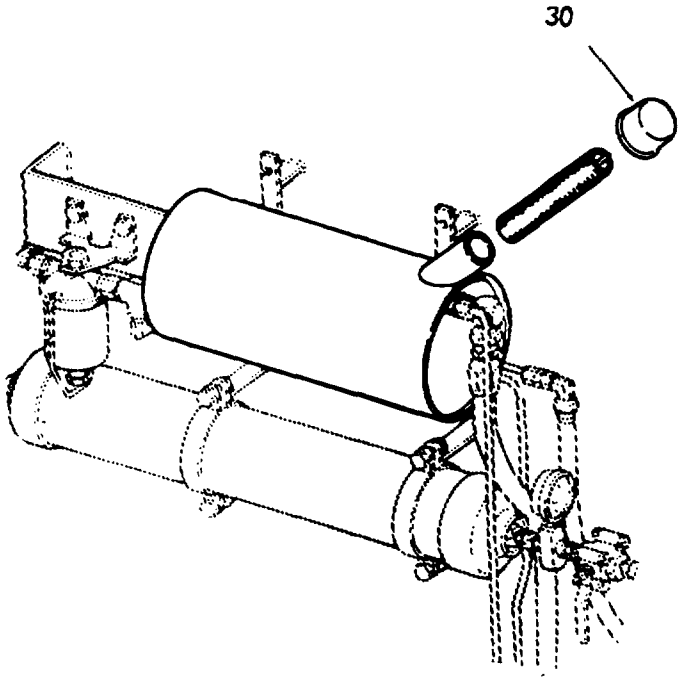
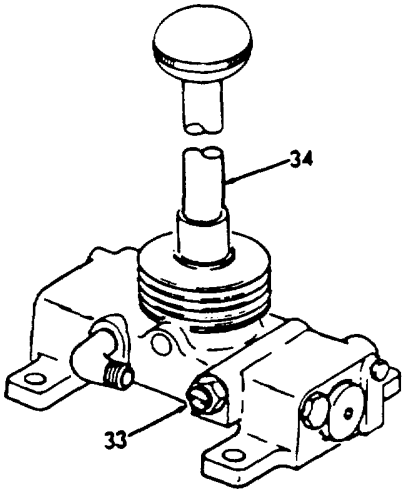


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 180 | ANNUAL | Anchor Winch Compartment | HYDROSTARTER FILTER.<br><br>**CAUTION**<br><br>**Do not attempt to change filter element until system pressure is released.**<br><br>Release pressure by loosening relief valve (33) on the hand pump (34). Loosen bail nut (35) and swing bail (36) aside. Remove cup (37), filter (38) and gasket (39). Discard filer and gasket. Clean cup (37) with compressed air.<br><br>Reinstall in reverse order.<br><br>Install new filter (38) and gasket (39) in cup (37). Place bail (36) in position and tighten bail nut (35). Close relief valve (33) on the hand pump (34). | |



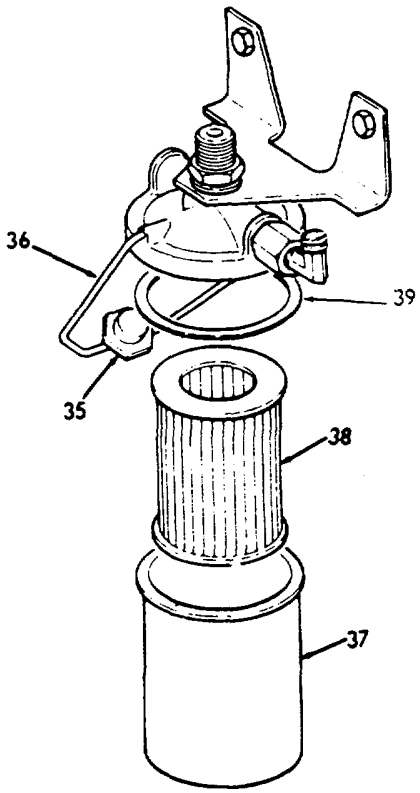
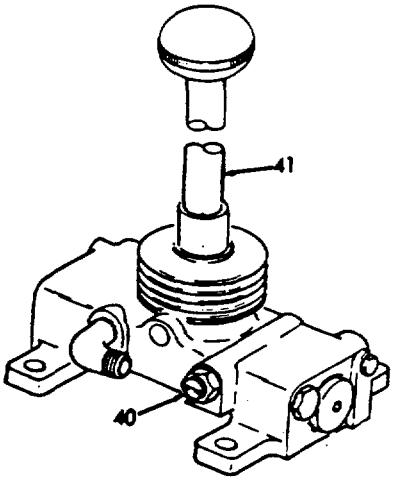



*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 181 | ANNUAL | Anchor Winch Compartment | HYDROSTARTER. Remove the hydrostarter from the engine for lubrication. Before removing the hydrostarter, release the pressure in the system by means of the relief valve (40) on the hand pump (41).<br><br>Then remove three bolts (42) and washers (43) that attach starting motor (44) to the flywheel housing. Remove the starting motor without disconnecting the hydraulic hoses.<br><br>Apply a grease (MIL-L-24139A (SH)) on drive clutch pinion (45) so that it will slice freely while compressing spring. Also apply grease to the fingers of clutch fork (46) and spool of clutch yoke (47).<br><br>Remove pipe plug (48) from starting motor drive housing (44) and saturate shaft oil wick (49) with engine oil. Re-install the plug (48).<br><br>After lubricating, install starting motor on the flywheel housing and recharge the accumulator with the hand pump. | |



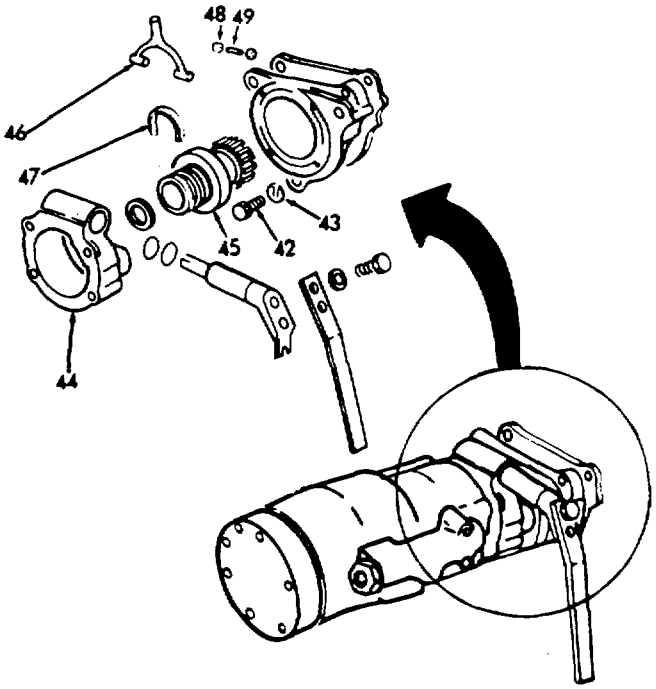



*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 182 | ANNUAL | Anchor Winch Compartment | HYDRAULIC TANK DRAIN. Drain the Hydraulic Tank (35) by removing drain plug (36). Drain the oil into a suitable container<br><br>**NOTE**<br><br>**Do not drain oil into bilges. Use oil separation/recovery system to collect the drained oil.**<br><br>Remove screws (37), washers (38), cover (39) and gasket (40).<br><br>Unscrew strainer (41). Clean with el oil and d with compressed air.<br><br>**WARNING**<br><br>**Use eye protection when using compressed air.**<br><br>Clean inside of hydraulic tank with clean cloths.<br><br>Replace strainer (41). Using a new gasket (40), replace cover (39), washers (38) and screws (37).<br><br>Replace drain plug (36). Remove breather filler cap (42) and fill the tank with oil (MIL-H-46170, FRH, Type 1). The system uses 55 gallons (208.18 liters) of oil.<br><br>Measure the level of fluid on the upper sight glass (43). Add oil if required. | |

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 182 Continued | | | | |

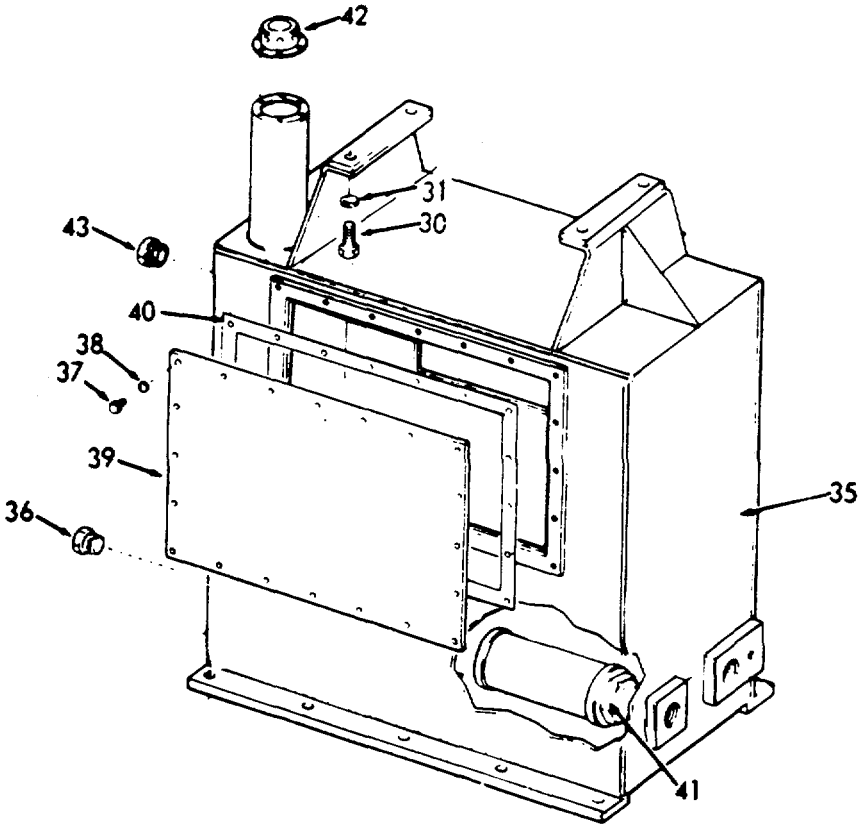
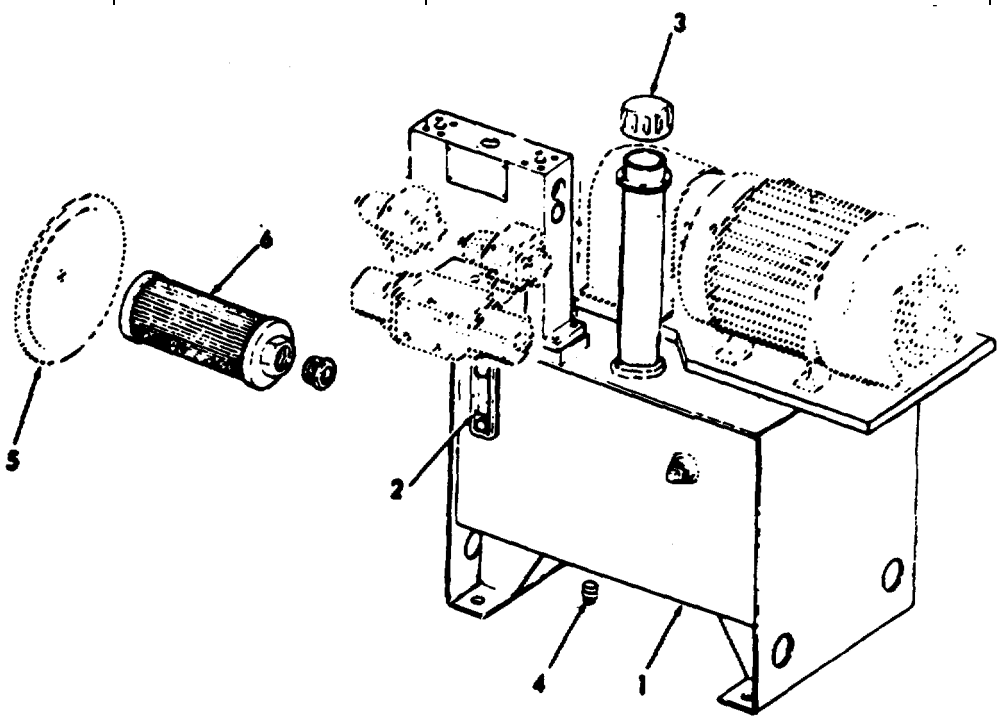


*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 183 | *ANNUAL | Engine Room | CHANGE THE HYDRAULIC FLUID.<br><br>This should be done by first operating the hydraulic system until the hydraulic fluid is warm. Then stop the pump unit and remove drain pug (4) located beneath the hydraulic reservoir (1). Drain the hydraulic fluid into a suitable container.<br><br>**NOTE**<br><br>**Do not drain oil into bilges. Use the oil separation and recovery system to collect drained oil.**<br><br>Remove the access plate (5) and clean sump with a clean cloth. Remove hydraulic strainer (6) and clean with diesel oil. Reinstall hydraulic strainer (6) and access plate (5). | |




* Change hydraulic flue after the first month of operation and once a year for hard continuous service or every two years with light service.

*Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued*

| Item No. | Interval | Location Item to Check/ Service | Procedure | Not Mission Capable : |
|---|---|---|---|---|
| 183 Continued | | | **NOTE**<br><br>**Be sure strainer is free of diesel oil before replacing.**<br><br>Remove filler breather cap (3) and refill hydraulic reservoir (1) with hydraulic fluid.<br><br>**NOTE**<br><br>**Hydraulic fluid used in the pump unit is MIL-H-46170, FRH, Type 1.**<br><br>Replace filler breather cap (3). Operate the system and maintain the reservoir oil level.<br><br>**CAUTION**<br><br>**Add hydraulic fluid to the reservoir to maintain the proper level as the system fills. The reservoir holds 10 gallons (37.85 liters). The system holds 30 gallons (113.55 liters).**<br><br>Continue to operate system to purge air from the lines for smooth and quiet operation. | |

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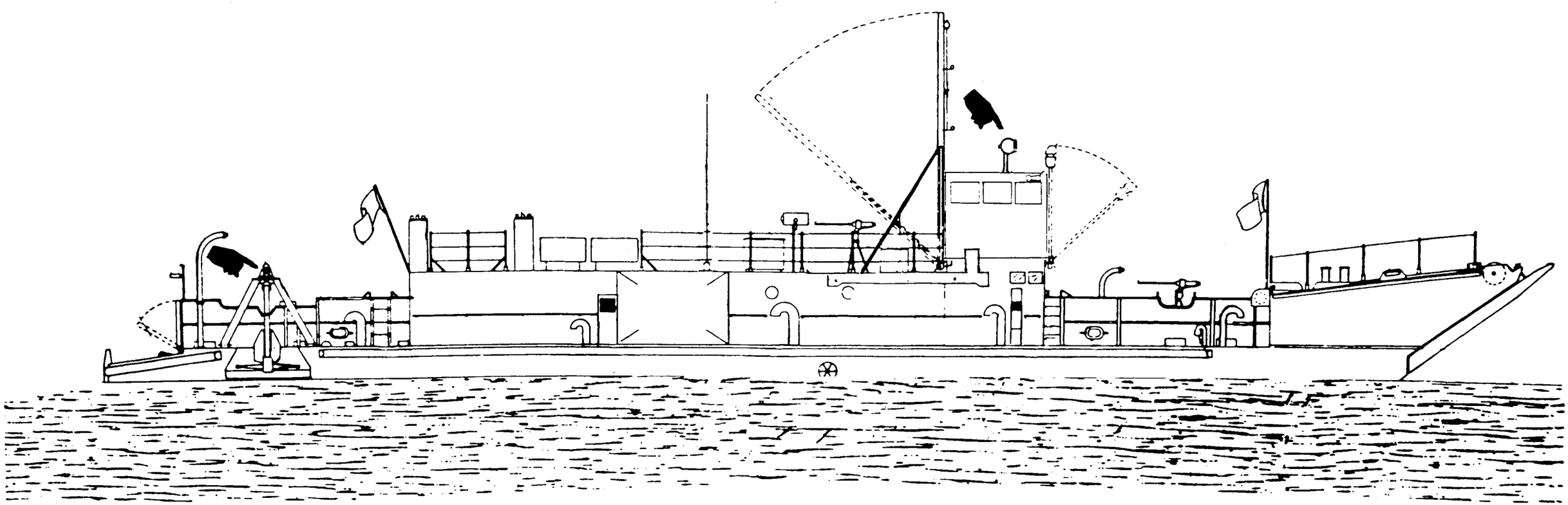
**By Order of the Secretary of the Army:**

**JOHN A. WICKHAM, JR.**
***General, United States Army***
***Chief of Staff***

**Official:**

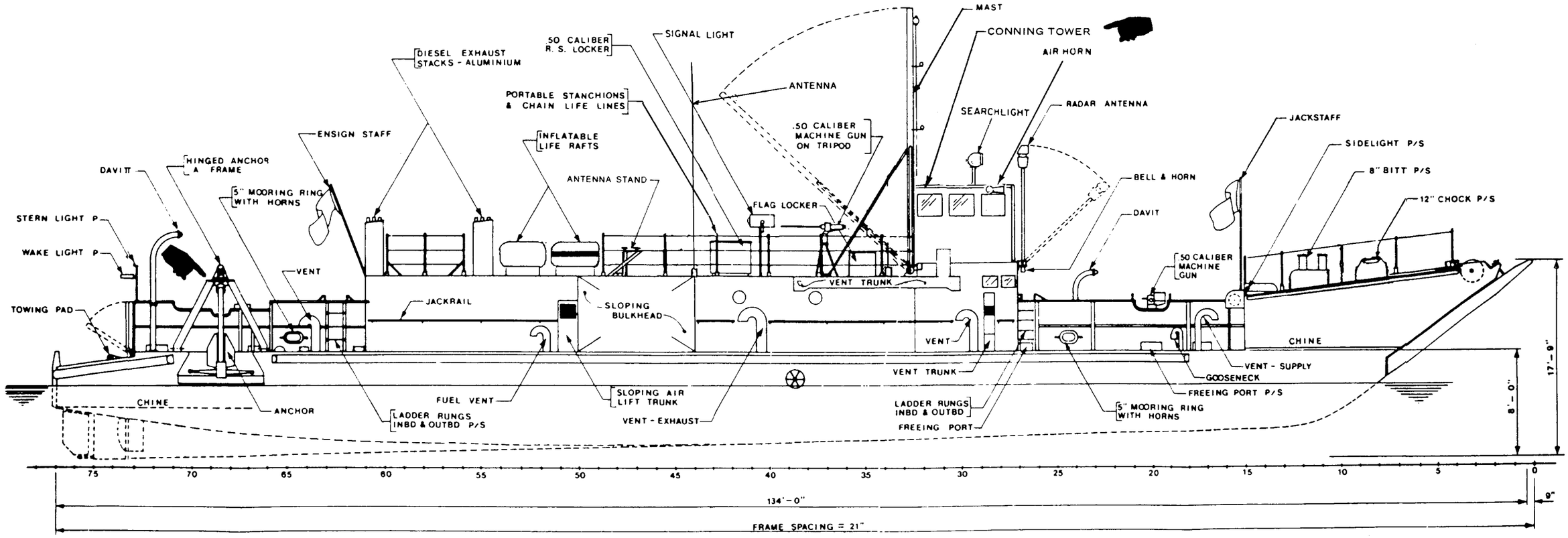
**ROBERT M. JOYCE**
***Major General, United States Army***
***The Adjutant General***

DISTRIBUTION:
To be distributed in accordance with DA Form 12-25D, Operator Maintenance requirements for Marine Equipment, All.



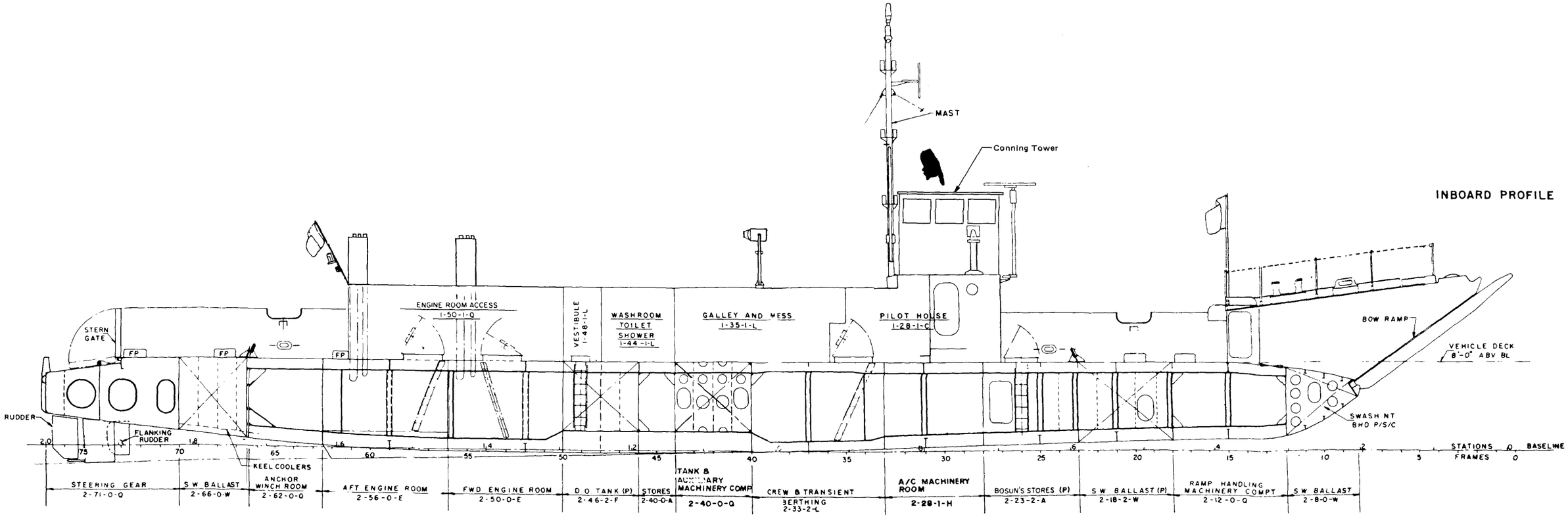
4954-016

*FO-1. Overall View.*

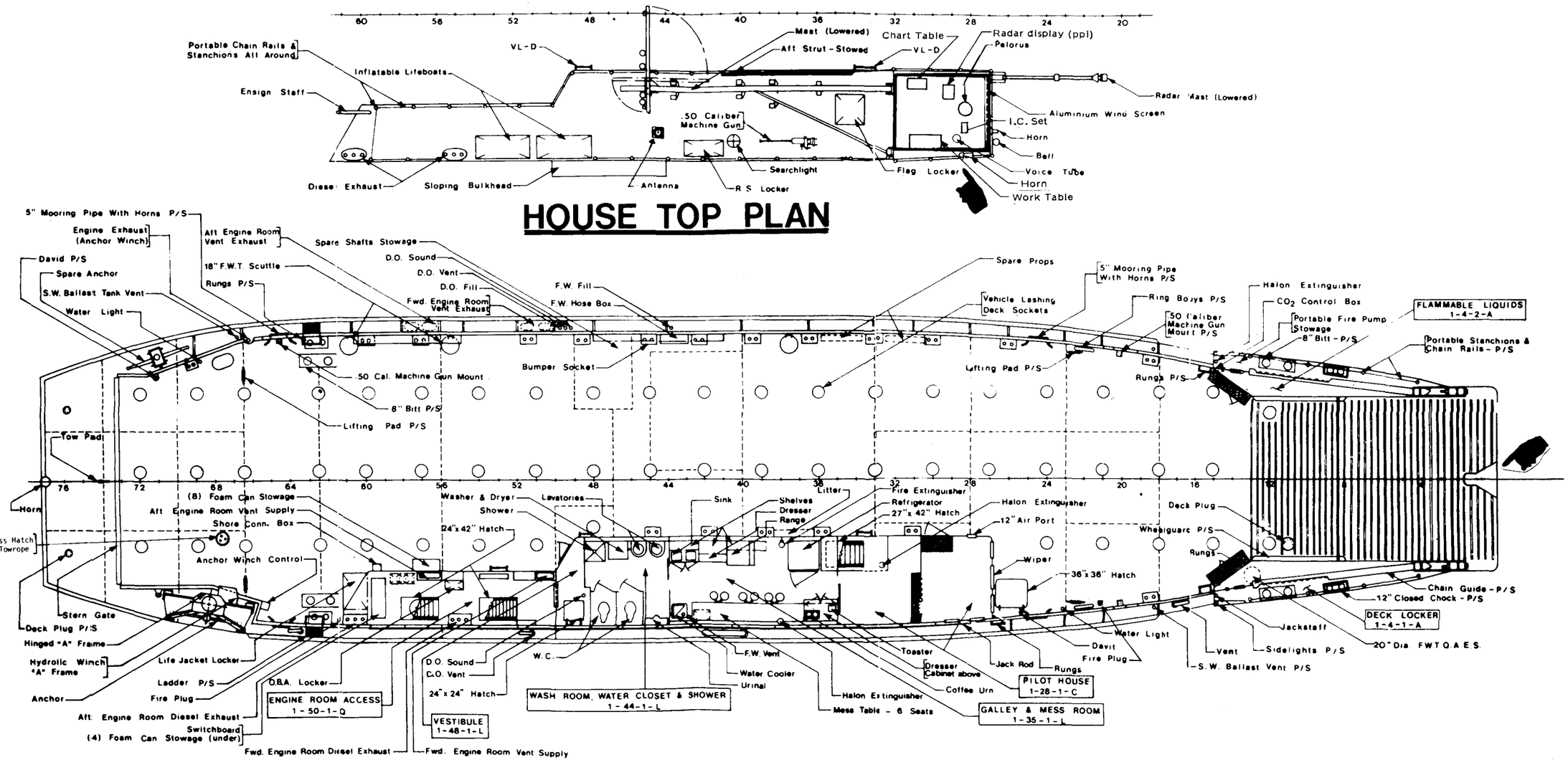



4954-015

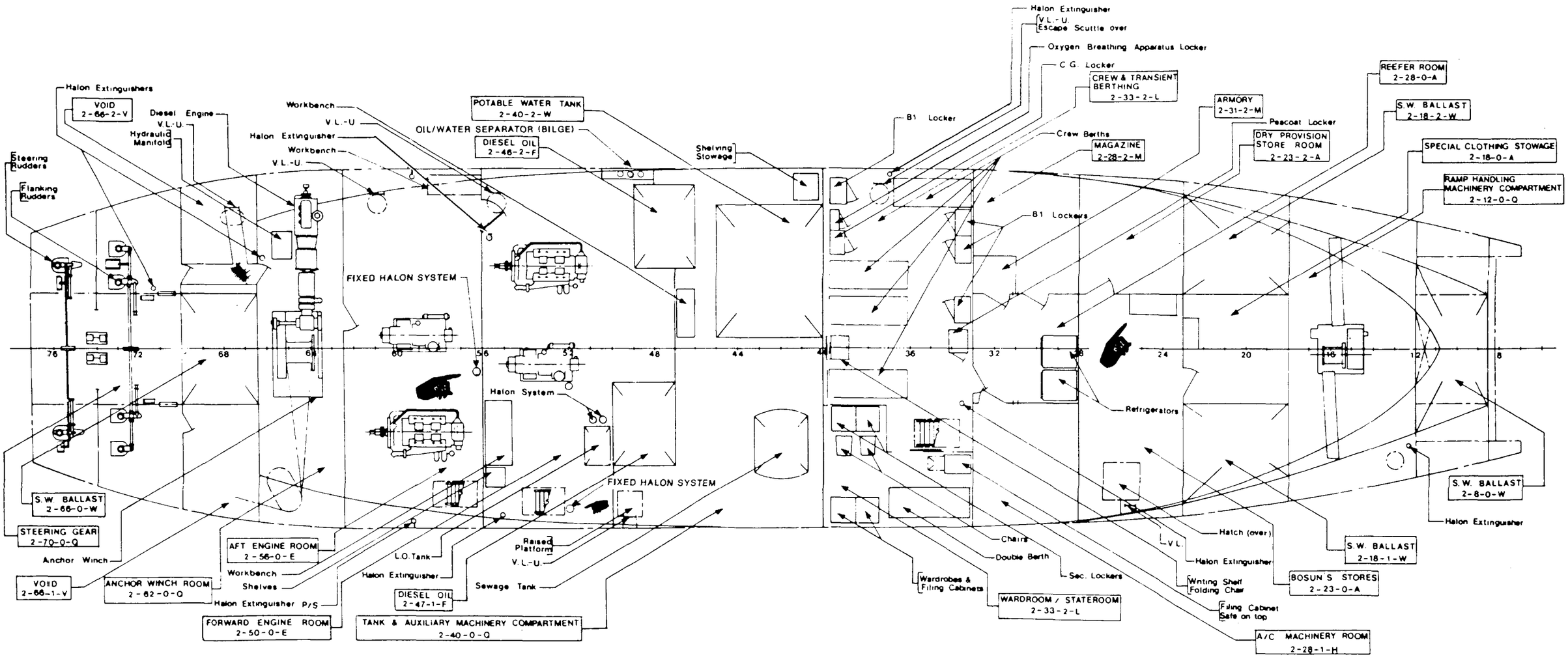
*FO-2. Starboard View.*



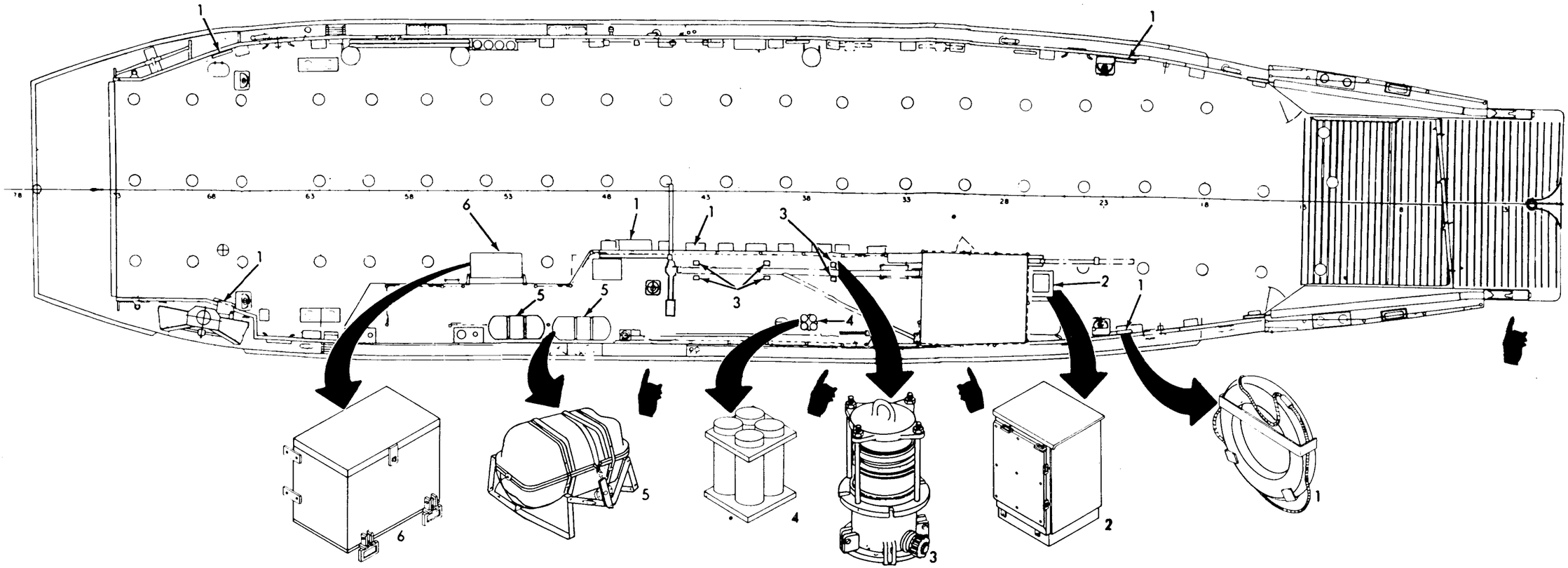

*FO-3. Inboard Profile View of Stbd Side.*




*FO-4. House and Vehicle Deck.*




*FO-5. Below Deck of Landing Craft.*




4954-017

1 - LIFE RING - Throwable life ring used to rescue a man overboard.

2 - PYROTECHNIC LOCKER - Locker containing signal flares and rockets, and fluorescent sea markers that are used in an emergency.

3 - MAN OVERBOARD LIGHTS - Lights located on the mast that are lit when a man is overboard. (Mast shown folded down.)

4 - AIRCRAFT FLOAT LIGHTS - Floating high intensity lights to be used when abandoning ship.

5 - LIFE BOATS - Inflatable 15 man lifeboats, to be used when abandoning ship.

6 - LIFE JACKET LOCKER - Locker containing 15 adult lifejackets.

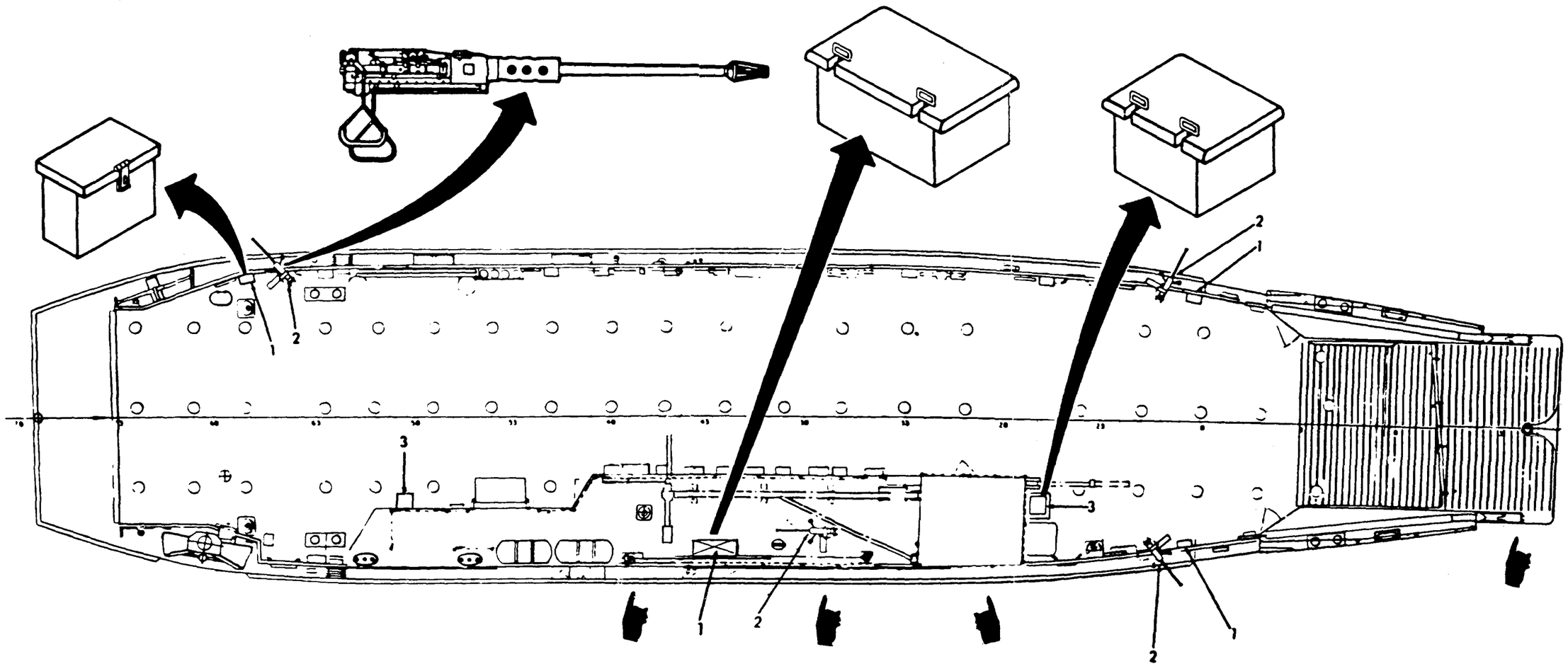
*FO-7. Emergency/Life Saving Equipment.*

1 - READY SERVICE LOCKER - Locker containing ammunition for machine gun.

2 - MACHINE GUN - Mount for .50 cal machine gun.

3 - GRENADE FUSE LOCKER

4 - GRENADE LOCKER




*FO-8. Machine Gun, Ready Service Lockers, and Grenade Lockers.*

1 - ENSIGN STAFF - Place to fly the national ensign.

2 - STERN LIGHT - White navigational light.

3 - WAKE LIGHT - White light showing in the wake - used when being followed by another vessel at night.

4 - RUNNING LIGHT (PORT) - RED navigational light.

5 - RUNNING LIGHT (STBD) - GREEN navigational light.

6 - JACK STAFF - Place to fly the Union Jack.

7 - RADAR MAST - Hinged mast for radar antenna.

8 - NAVIGATION HORN (ELECTRIC) - Signaling horn.

9 - BELL - Ship's bell.

10 - VOICE TUBE - Communication between upper deck and pilot house.

11 - SPOTLIGHT - Light for maneuvering at night.

12 - PELORIS - Bearing device attached to a gyro compass repeater.

13 - FLAG BAG - Container for alphabetic/numeric signal flags.

14 - ANTENNA (AM-HF) - Antenna for AM-HF (amplitude modulation - high frequency) communication.

15 - SEARCHLIGHT - High intensity light for communication and illumination of surrounding areas.

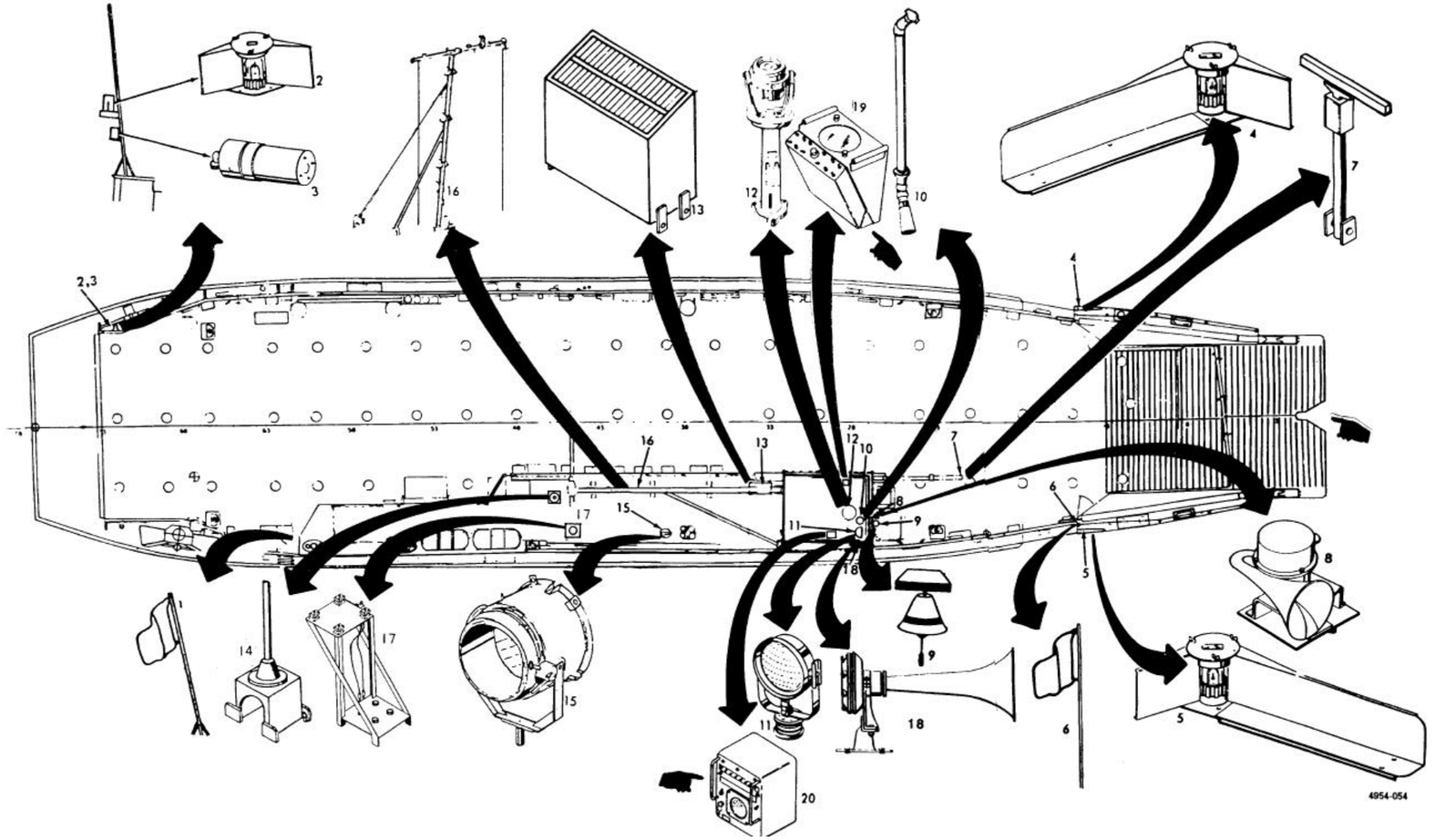
16 - MAIN MAST - Hinged mast for navigational and emergency lights, signal flags, and antennas.

17- ANTENNA - (FM-VHF) - Antenna for FM-VHF (frequency modulation - very high frequency) communication.

18 - NAVIGATION HORN (AIR) - Signaling horn.

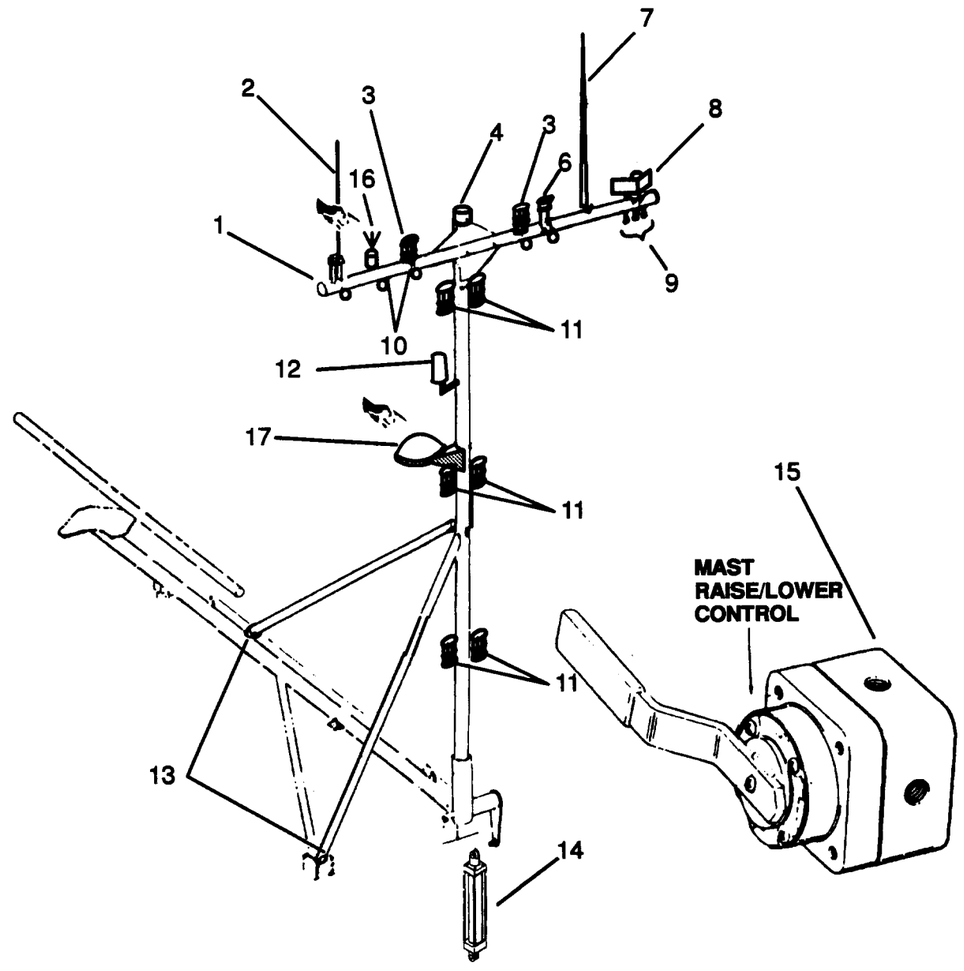
19 - RADAR STATION - Radar screen and controls used during ship's navigation.

20 - INTERCOMMUNICATIONS STATION - Control panel used to operate ship's on-board communication system.

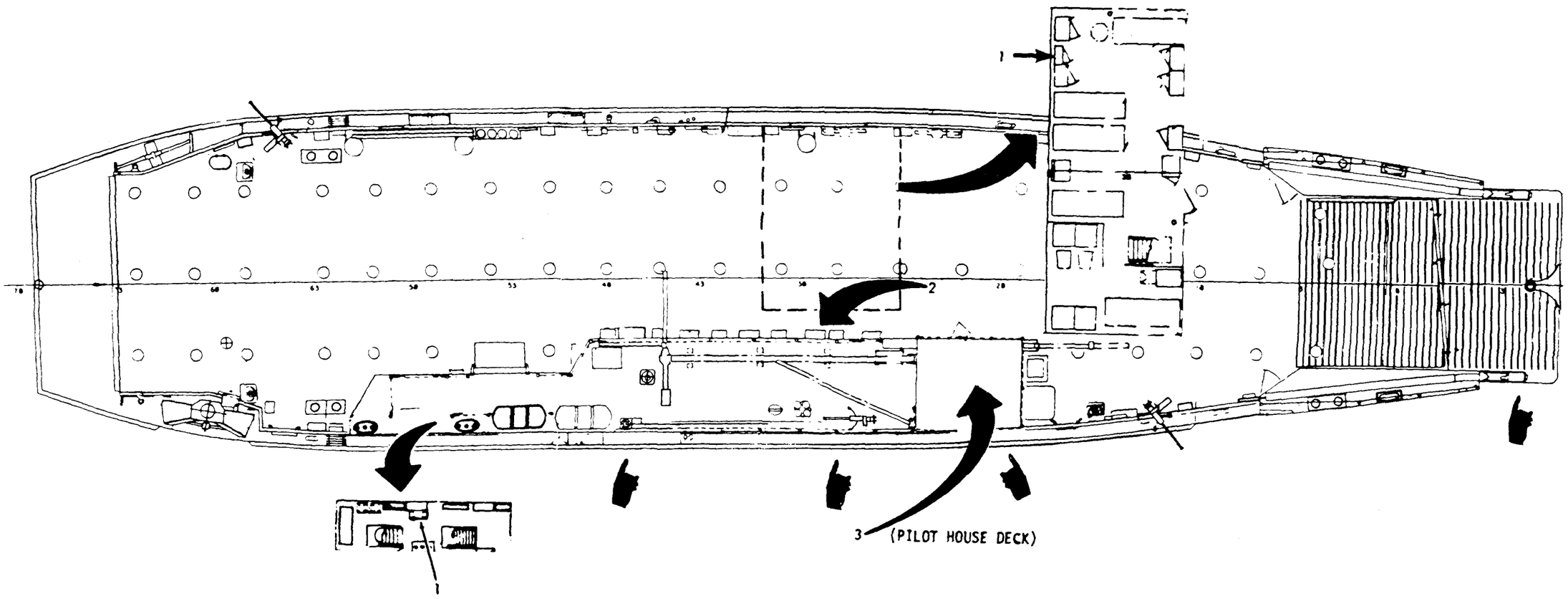



*FO-9. Running Lights, Peloris, Masts and Ensigns.*

1. Yardarm
2. Communication Antenna (AS/1729/VRC)
3. Aircraft Obstruction Marker/Blinder Light (Red)
4. Remote Magnetic Heading System (RHMS Transmitter)
5. Yardarm Pivot and Bolts
6. Anchor Lights (White)
7. Communication Antenna (AS/3095/URC)
8. Masthead Light (White)
9. Light Hoist Line, Guide Lines, Task/Towing Lights (White)
10. Halyards, Padeyes and Block (Rigging)
11. Man Overboard and Breakdown Lights (Red)
12. Identification Friend or Foe (IFF) Antenna (AS177-B/UPX)
13. Mast Brace and Support
14. Hydraulic Lifting Cylinder
15. Directional Control Valve
16. Marinefax Antenna
17. Omnidirectional Antenna




*FO-10. Components of the Mast.*

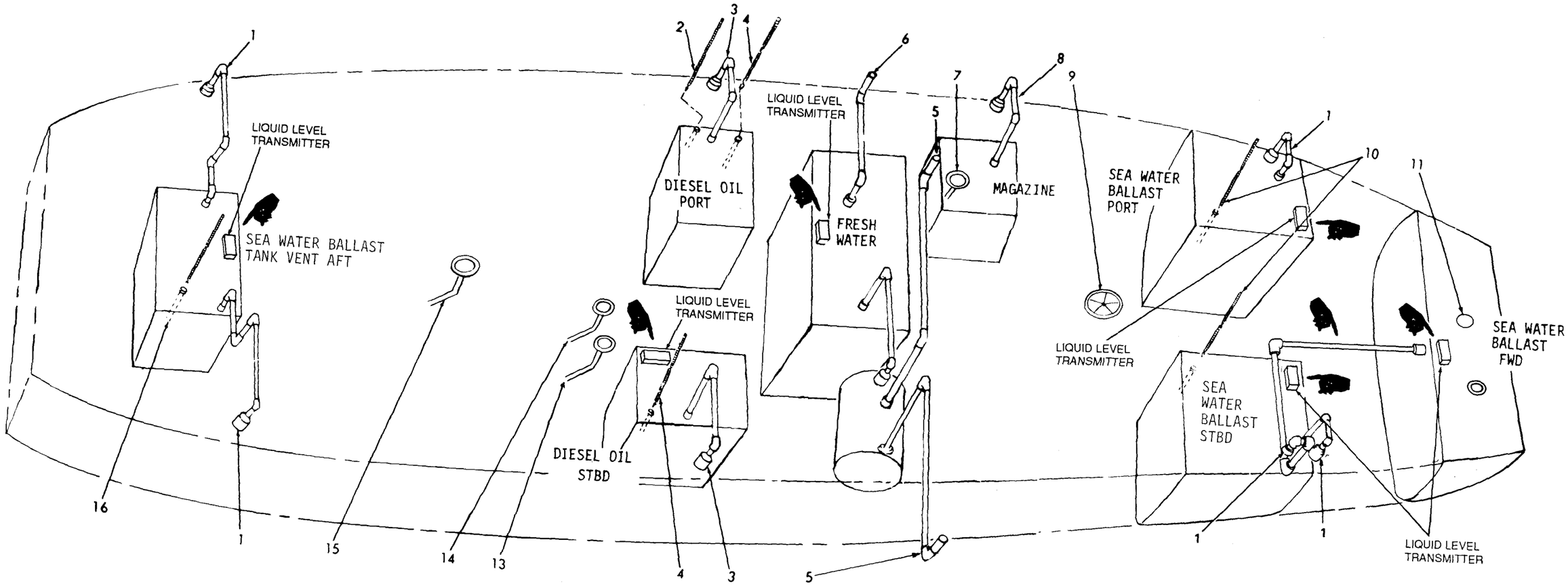



1 - OXYGEN BREATHING APPARATUS (OBA) - Emergency oxygen masks.

2 - STOKES LITTER - Rigid litter for transporting injured personnel.

3 - FIRST AID STATION - First aid equipment located in Pilot House under deck.

*FO-11. First Air Equipment.*

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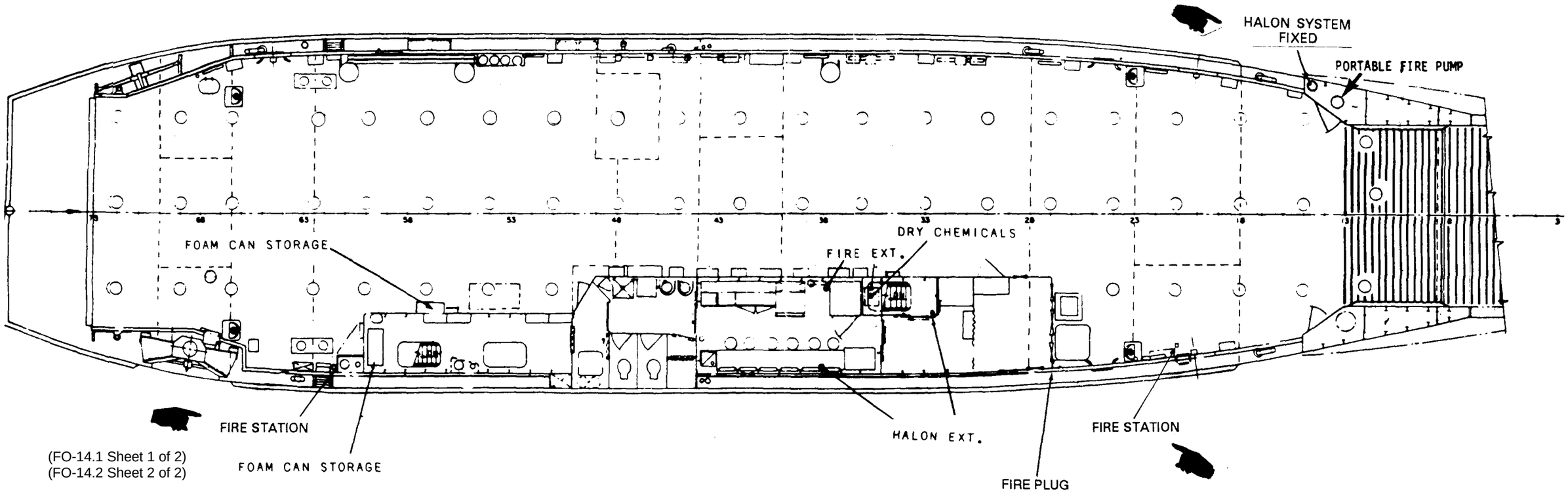
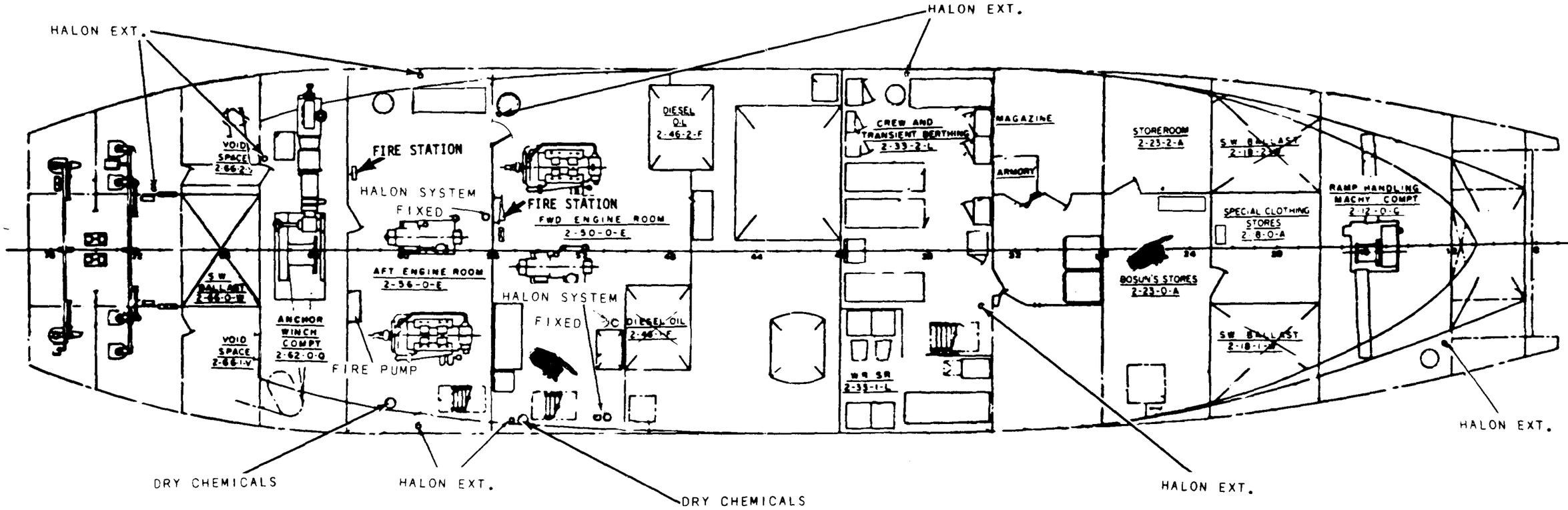
1. SEA WATER BALLAST TANK VENT
2. DIESEL OIL FILL, PORT
3. DIESEL TANK VENT
4. DIESEL OIL SOUNDING TUBE
5. SEWAGE DISCHARGE
6. FRESH WATER FILL
7. MAGAZINE SPRINKLER VALVE DECK ACCESS
8. MAGAZINE VENT
9. FWD SEA WATER BALLAST SUCTION - Read rod shut off handwheels located at frame 33 in crews' berthing and frame 30 in reefer room for all forward ballast tanks.
10. SEA WATER BALLAST TANK SOUNDING TUBES PORT/STBD
11. FOREPEAK SEA WATER BALLAST TANK DECK ACCESS - Deck plug may be removed to fill tank using a fire hose. To empty tank, the portable fire pump may be used.
12. FRESH WATER VENT
13. STBD DIESEL OIL VALVE DECK ACCESS REACH RODS.
14. PORT DIESEL OIL VALVE ACCESS REACH ROADS.
15. BILGE SUCTION ISOLATION - Reach rod shut off handwheel.
16. AFTER/PEAK SEA WATER BALLAST TANK SOUNDING TUBE
17. DELETED

*FO-13. Fills, Vents, Sounding Tubes and Deck Access to Reach Rods.*




(FO-14.1 Sheet 1 of 2)
(FO-14.2 Sheet 2 of 2)

*FO-14.1. Fire Fighting Components (Sheet 1 of 2).*




4954-049

*FO-14.2. Fire Fighting Components (Sheet 2 of 2).*

1. Fire Pump is located in the Aft Engine Room (2-56-0-E). The Fire Pump supplies sea water to four (4) fire stations and the Magazine Sprinkler system during a fire emergency.

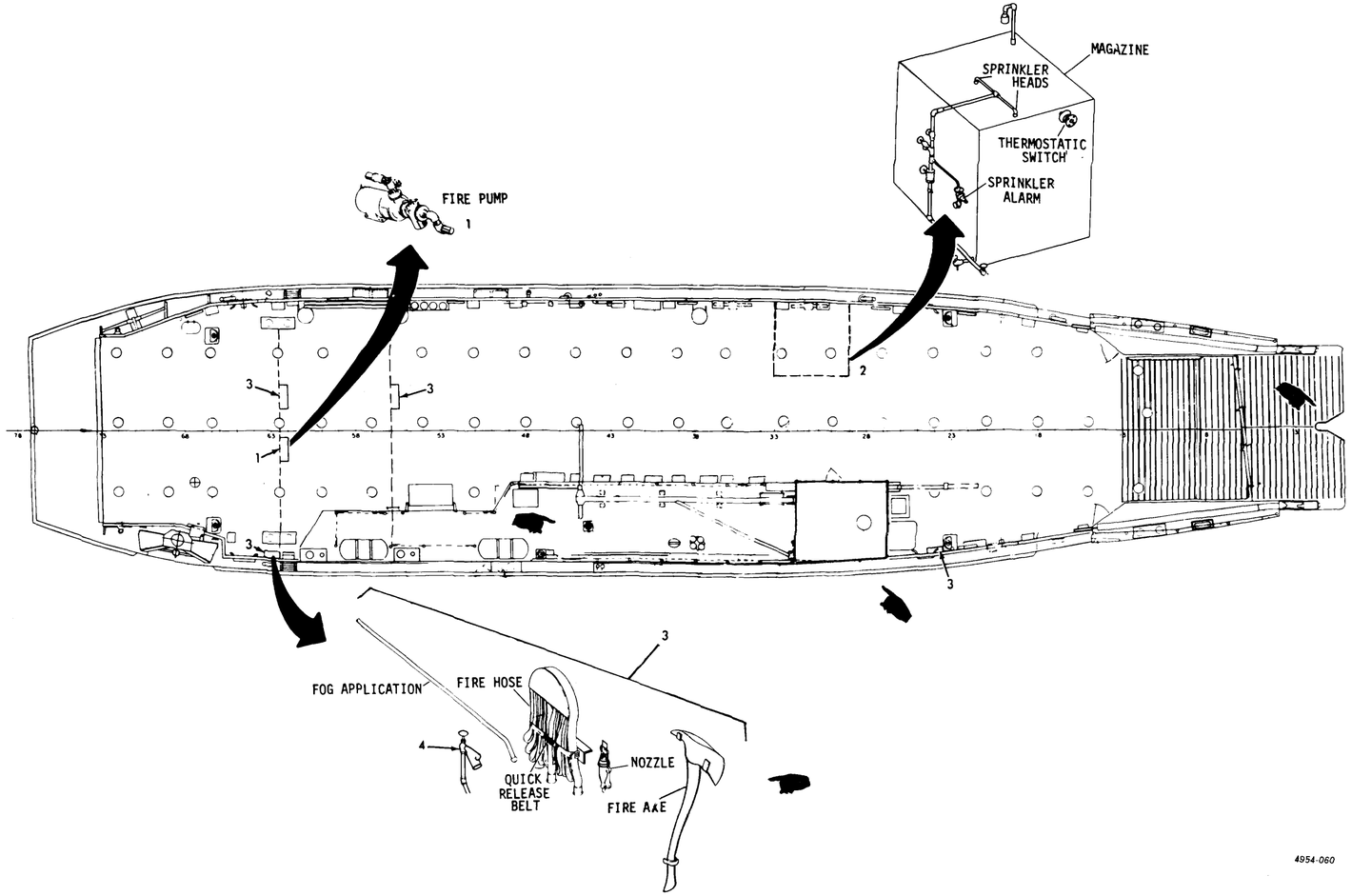
2. MAGAZINE - The Magazine (2-28-2-M) contains sprinklers and controls that activate alarms in the Pilot House. These alarms are: Magazine High Temperature and Sprinkler On.

3. FIRE STATIONS are located in the following areas:

   a. Vehicle Deck, Aft - Frame 62, Aft end of Deck House.
   b. Vehicle Deck, Frame - FRAME 62. Forward of Pilot House.
   c. Forward Engine Room - Frame 56, Port side.
   d. Aft Engine Room - Frame 62, Port.

   Each fire station contains 50 feet of hose, fog applicator, nozzle and in-line strainer.

4. INLINE STRAINERS (Wye) are located near the firemain shut off valves. The strainers are used to filter water to prevent clogging in fire nozzle.




*FO-15. Fire Main System.*

HALON SYSTEM

1 - HORN - Horn sounds when a detector senses fire and the Halon System is activated. The horn is located in the Engine Rooms.

2 - PRESSURE SWITCH - Located near the Halon cylinders in the engine rooms; activates horns and lights, and shuts off the exhaust fans.

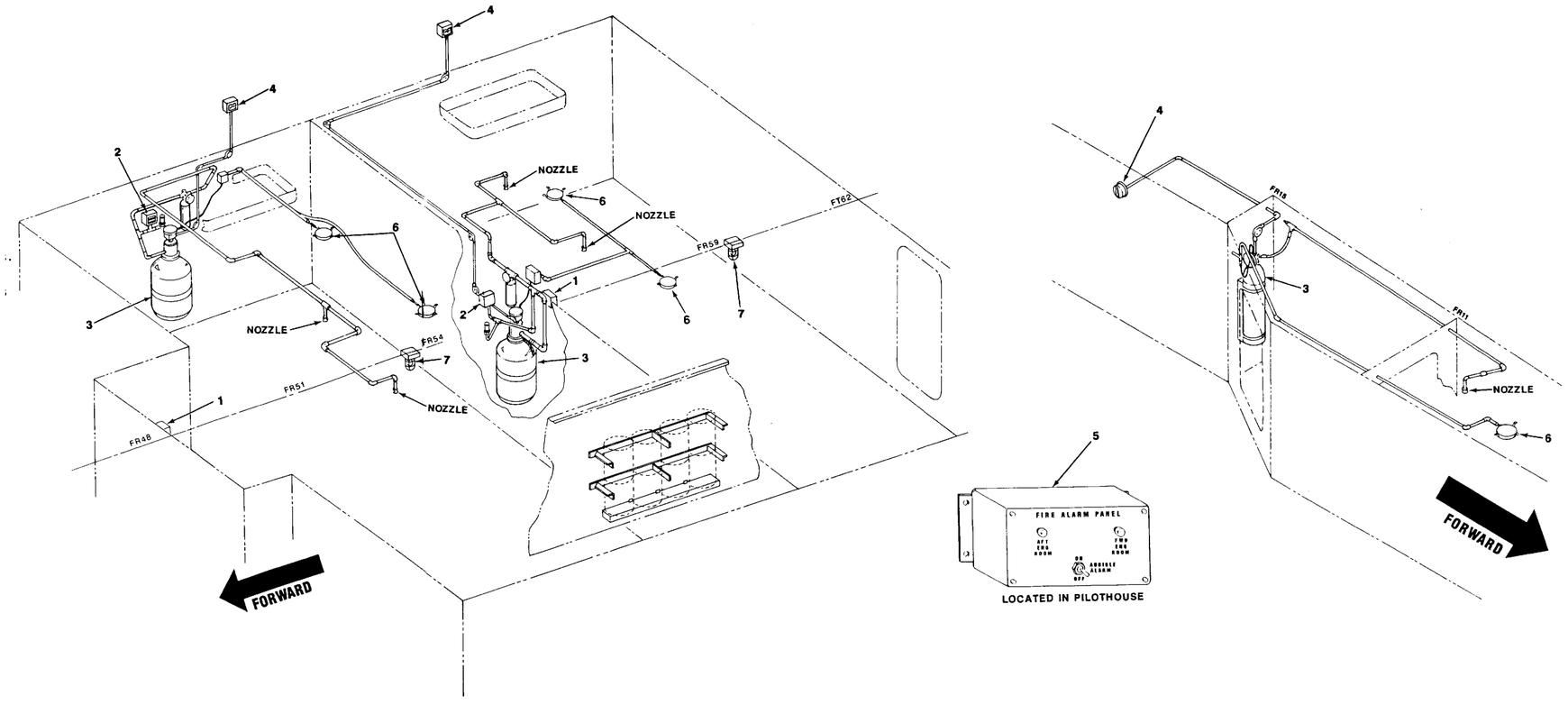
3 - HALON FIXED CYLINDERS - Located in the Aft Engine Room, Forward Engine Room and Flammable Storage Area. Pressurized cylinder is solid red with white bands.

4 - PULL CABLE HANDLE - Manual release of the Halon System located on the outside of the Engine Room Access hatches and on bulwark next to Flammable Liquids Storage Room.

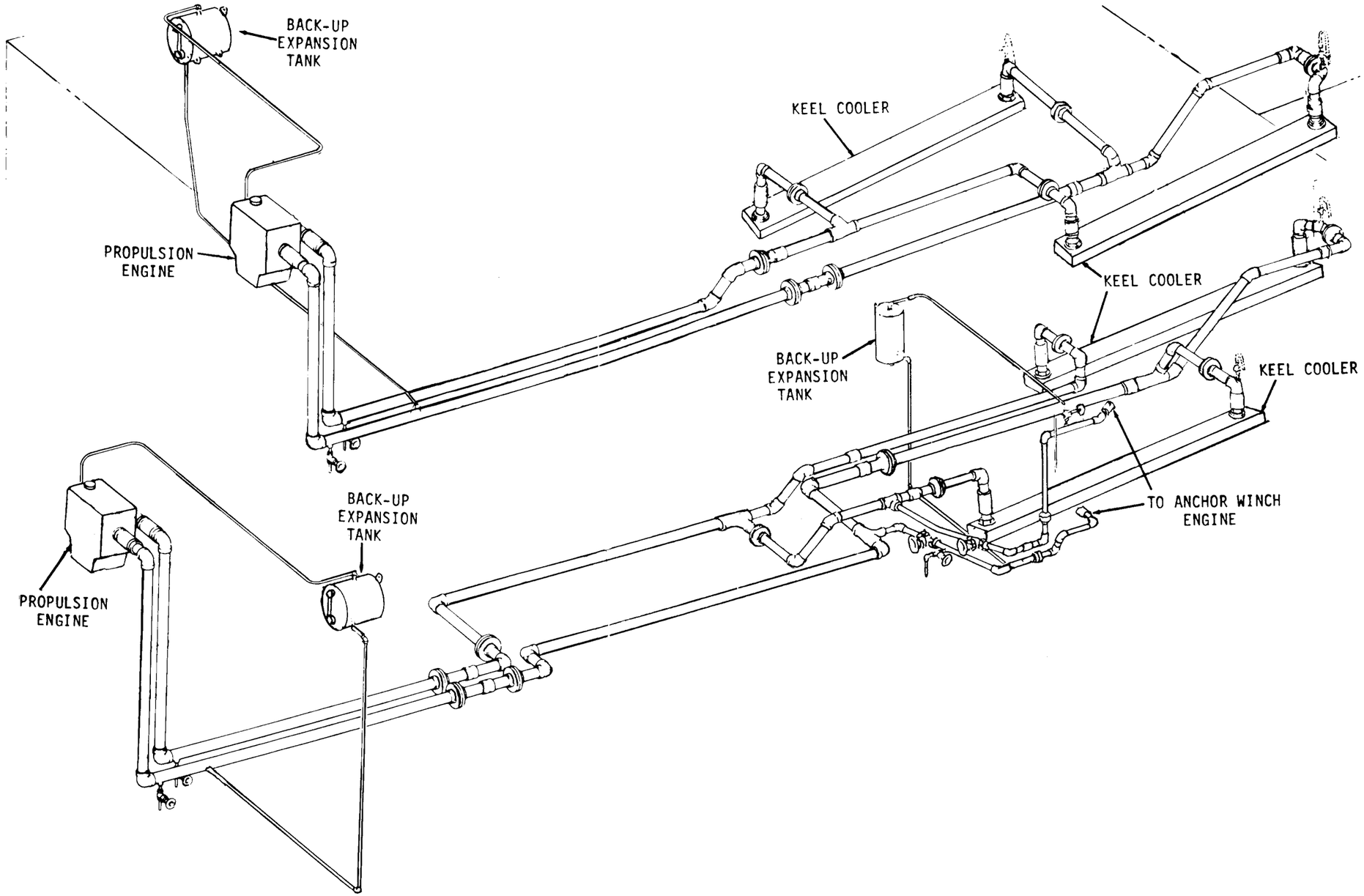
5 - FIRE ALARM PANEL - Contains two location indicators and is located in the Pilothouse.

6 - HEAT DETECTOR - Senses heat build-up in Engine Rooms and Flammable Liquids Storeroom.

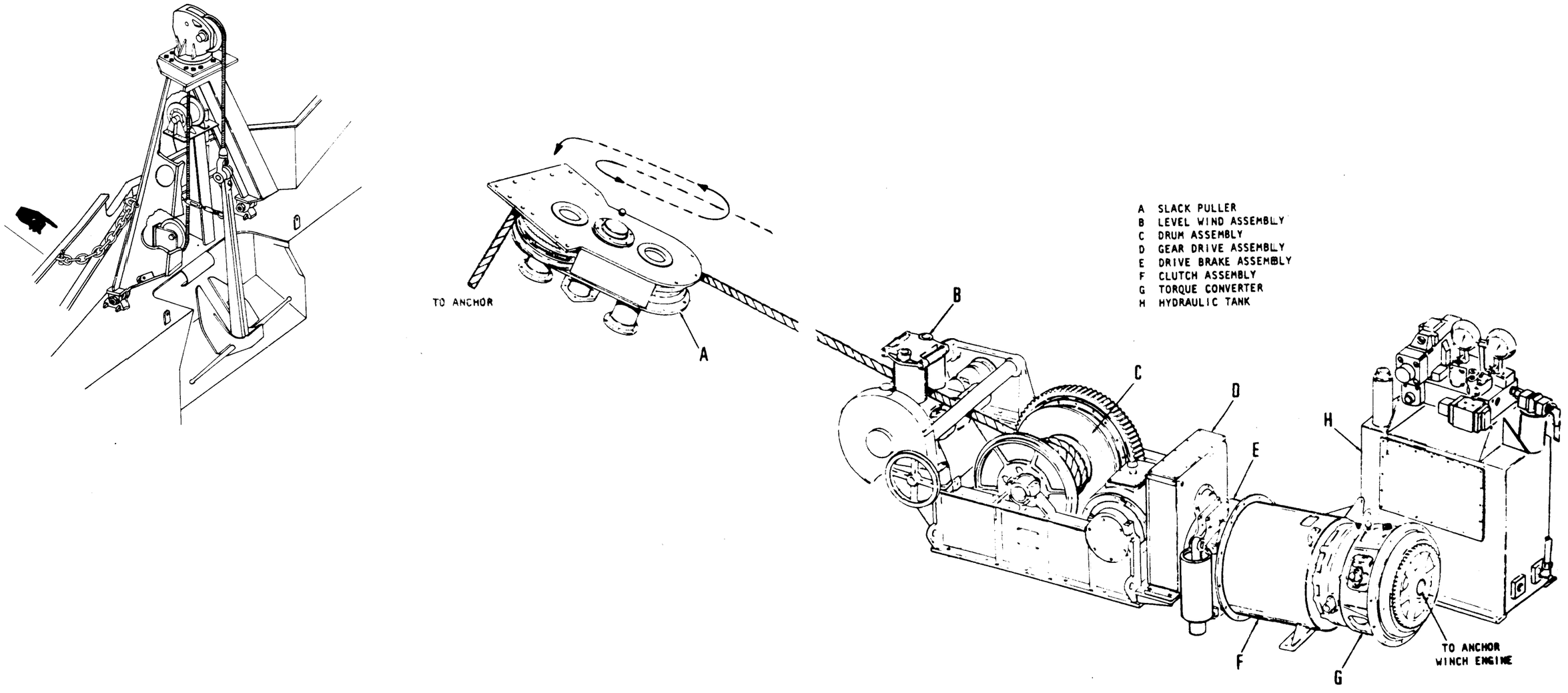
7 - FLASHING UNIT - An amber light that commences to flash when a fire is detected in the engine rooms.



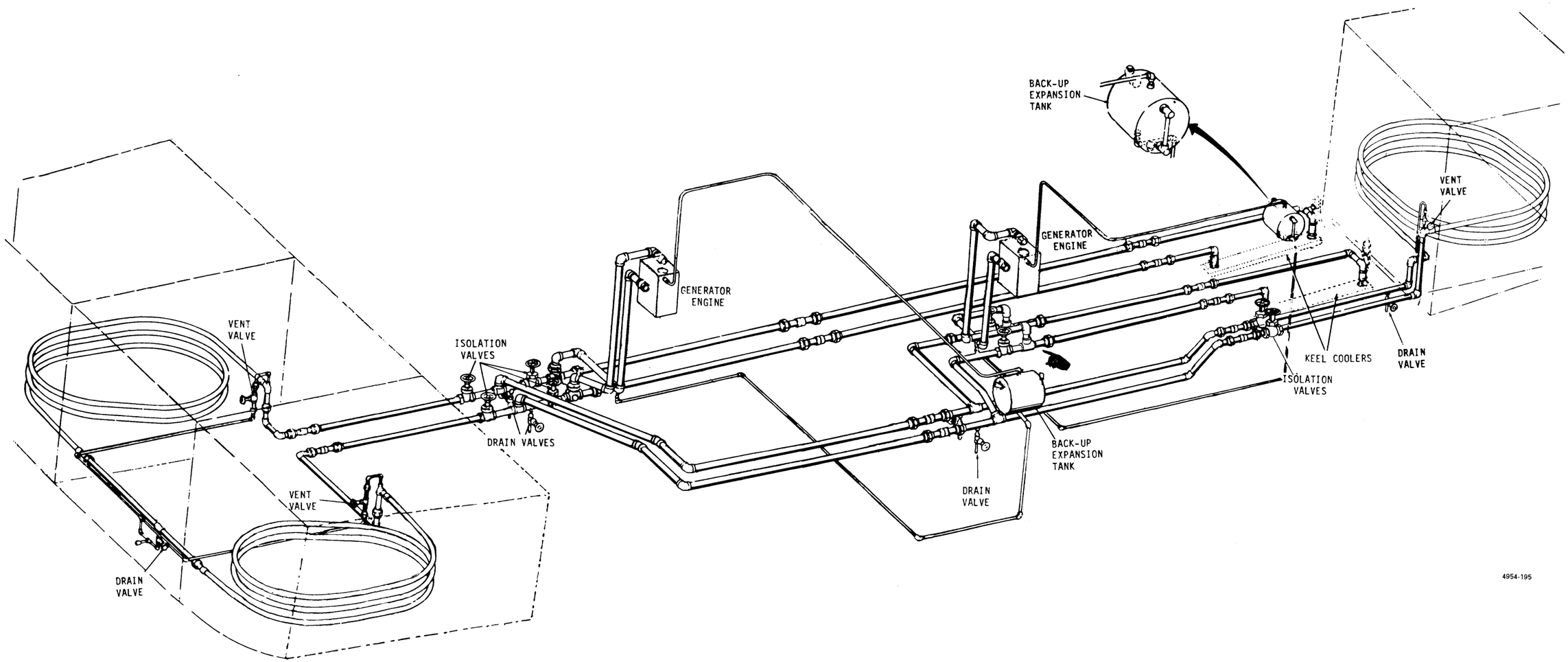

*FO-16. Halon System.*



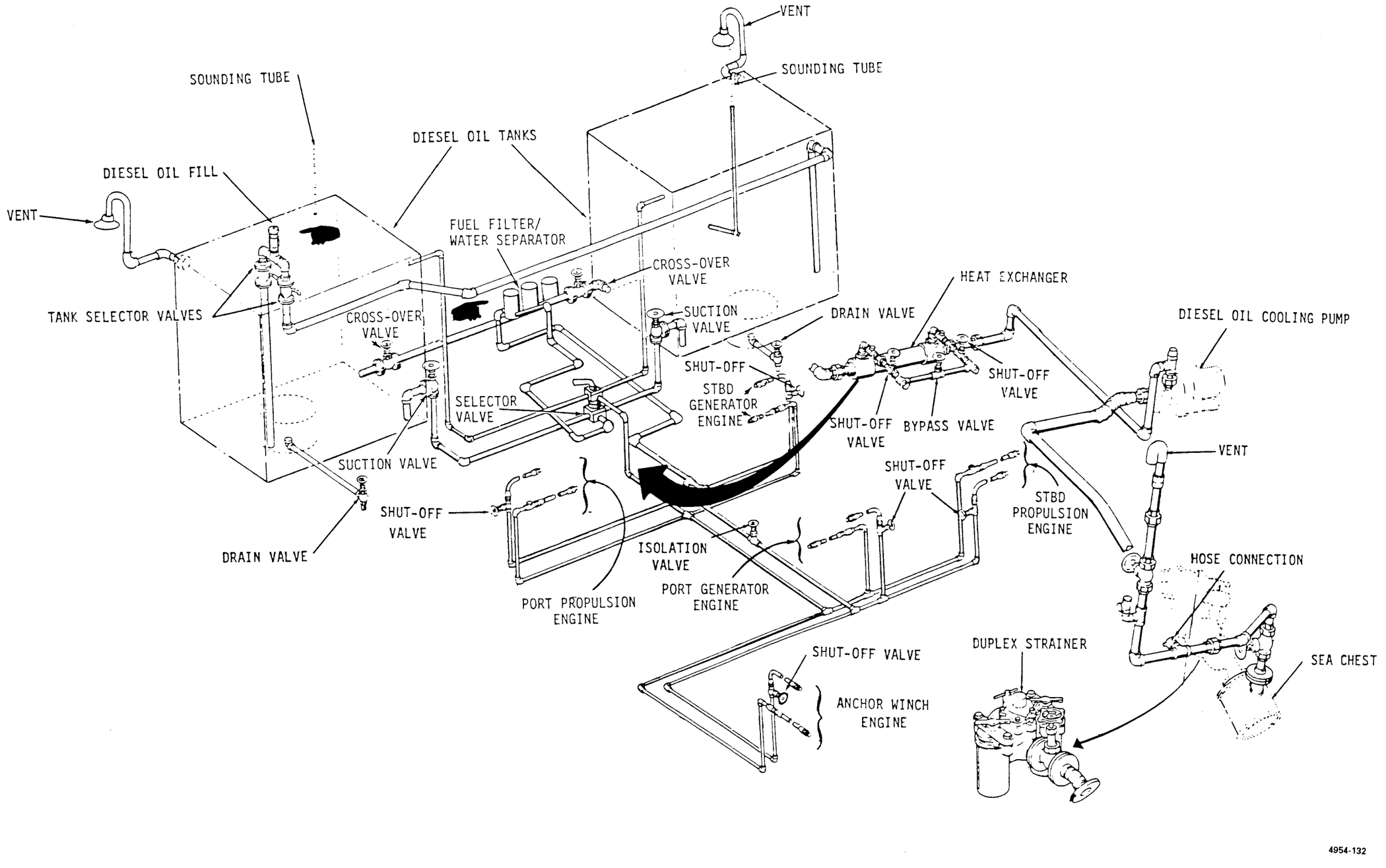

*FO-17. Coolant System.*



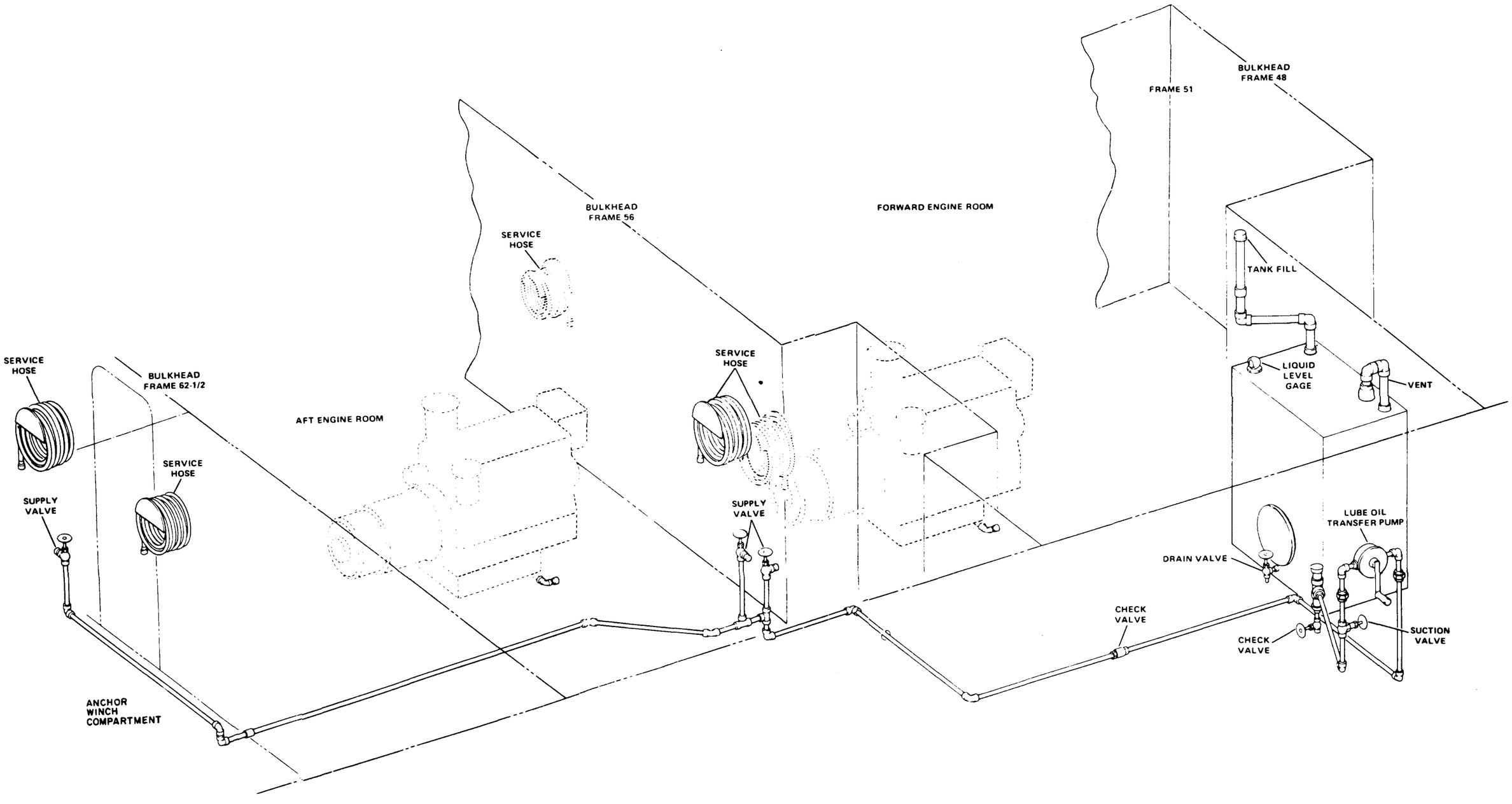

*FO-18. Anchor Winch System.*



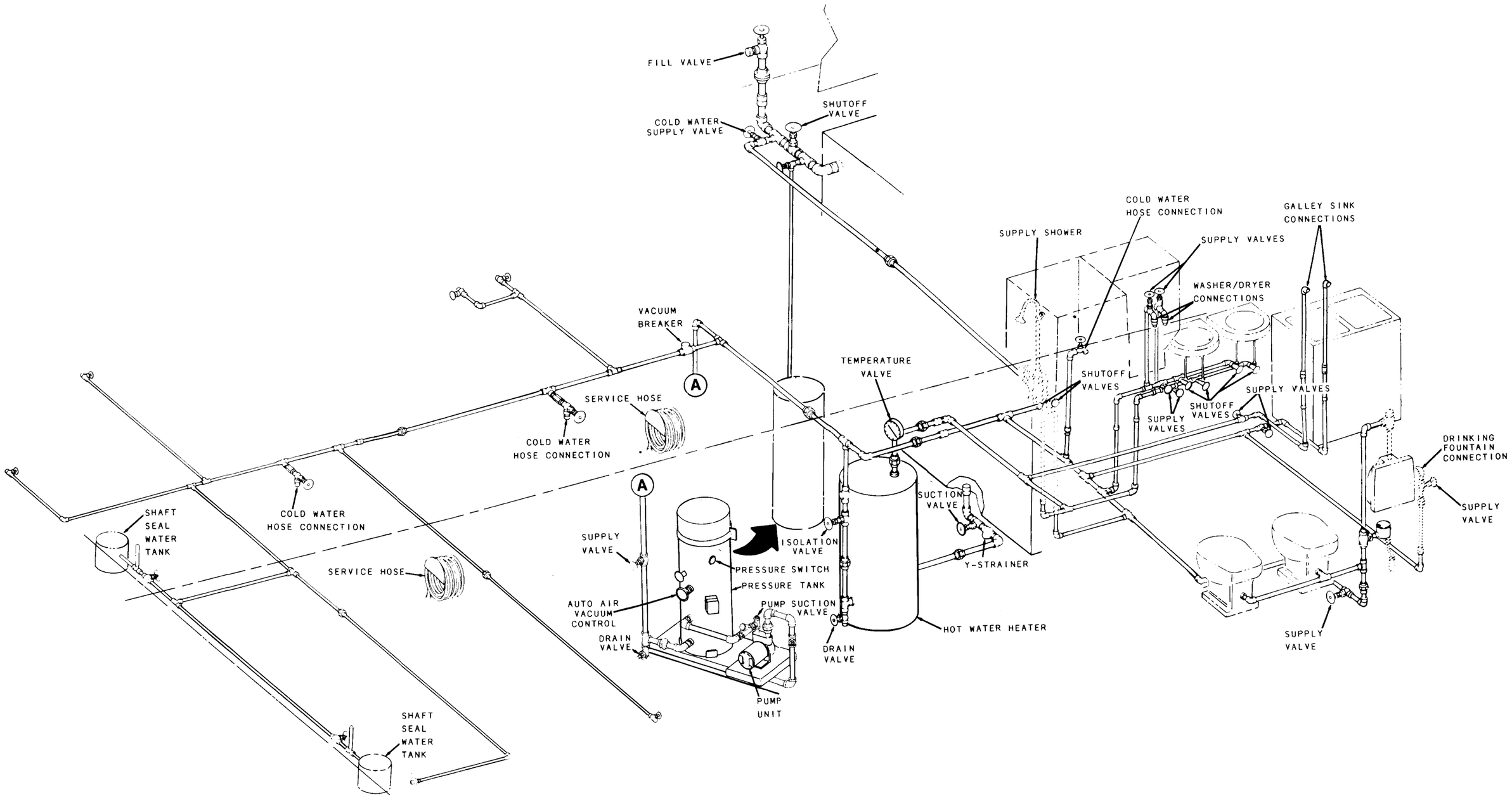

*FO-19. Diesel Generator - Keel Cooler.*



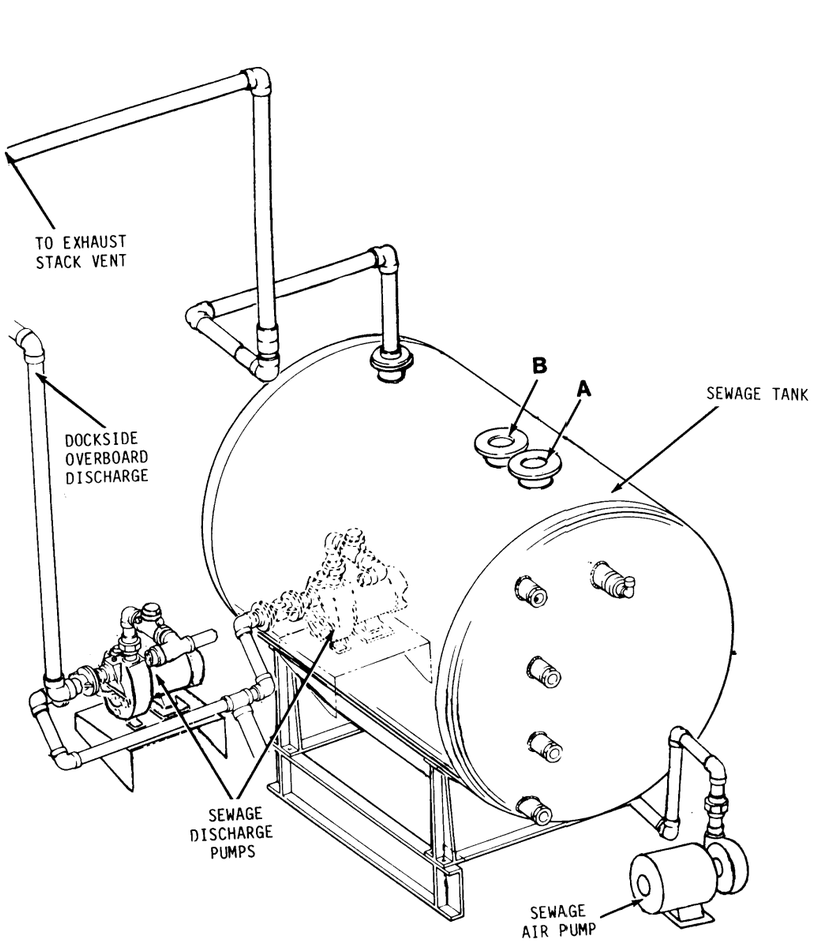

*FO-20. Fuel System Piping.*

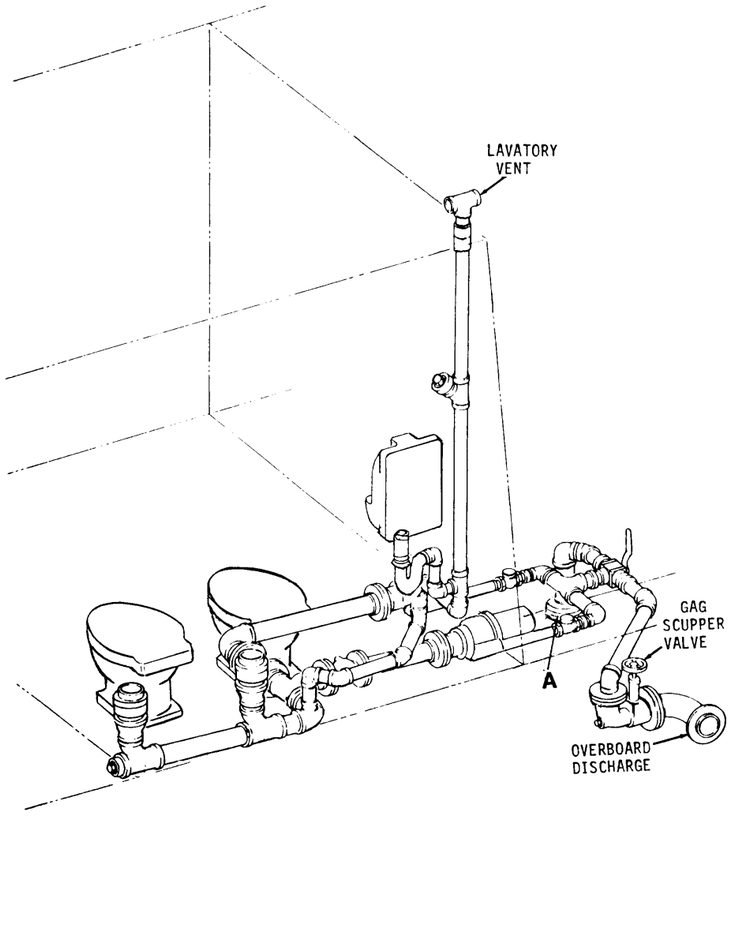


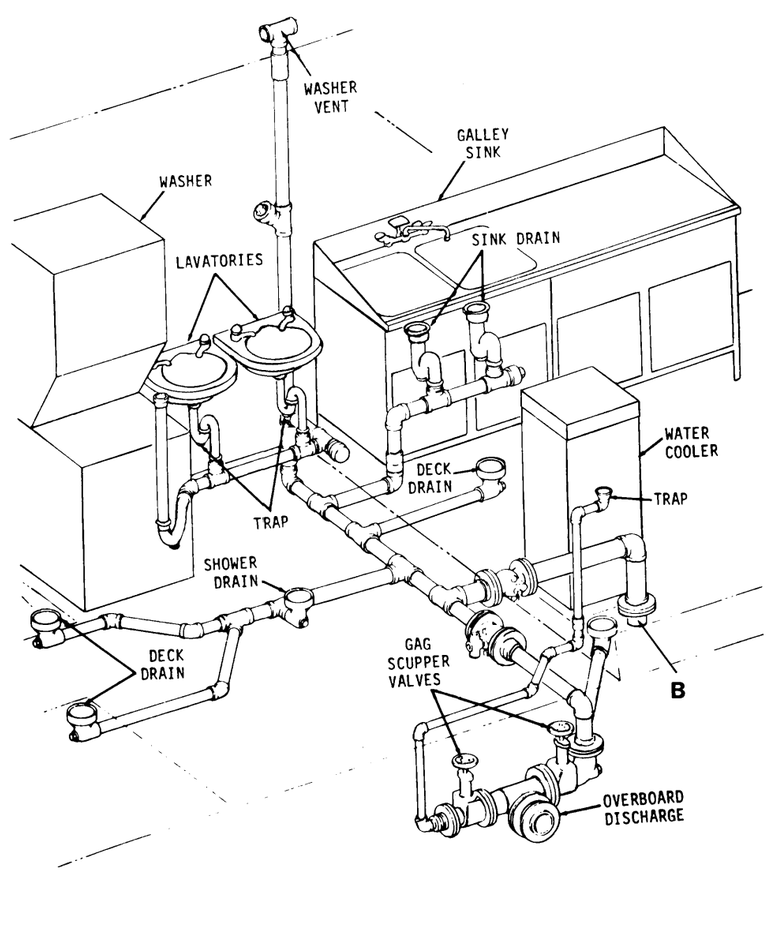

*FO-21. Lube Oil Transfer System.*



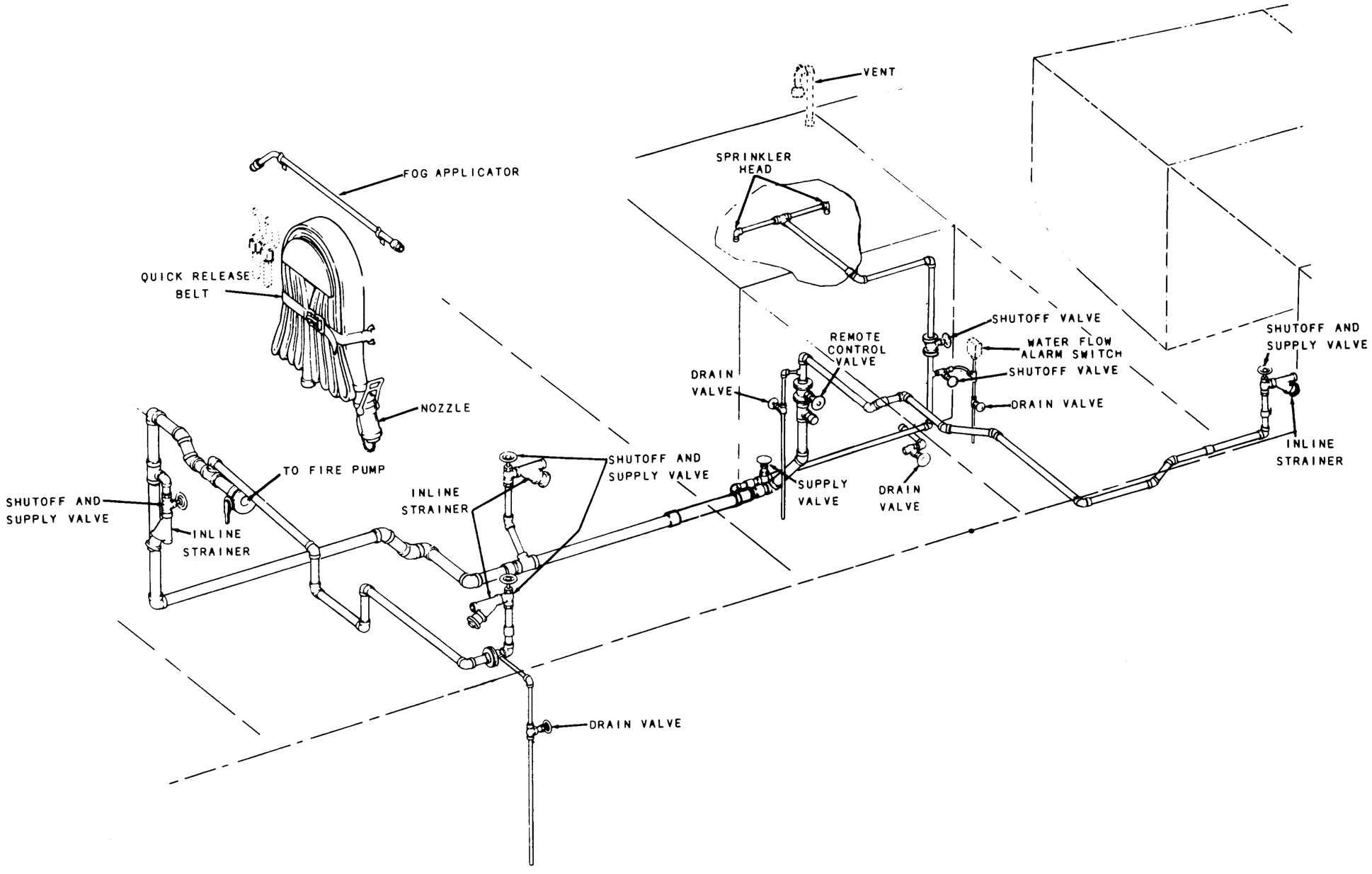

*FO-22. Fresh Water System Piping.*



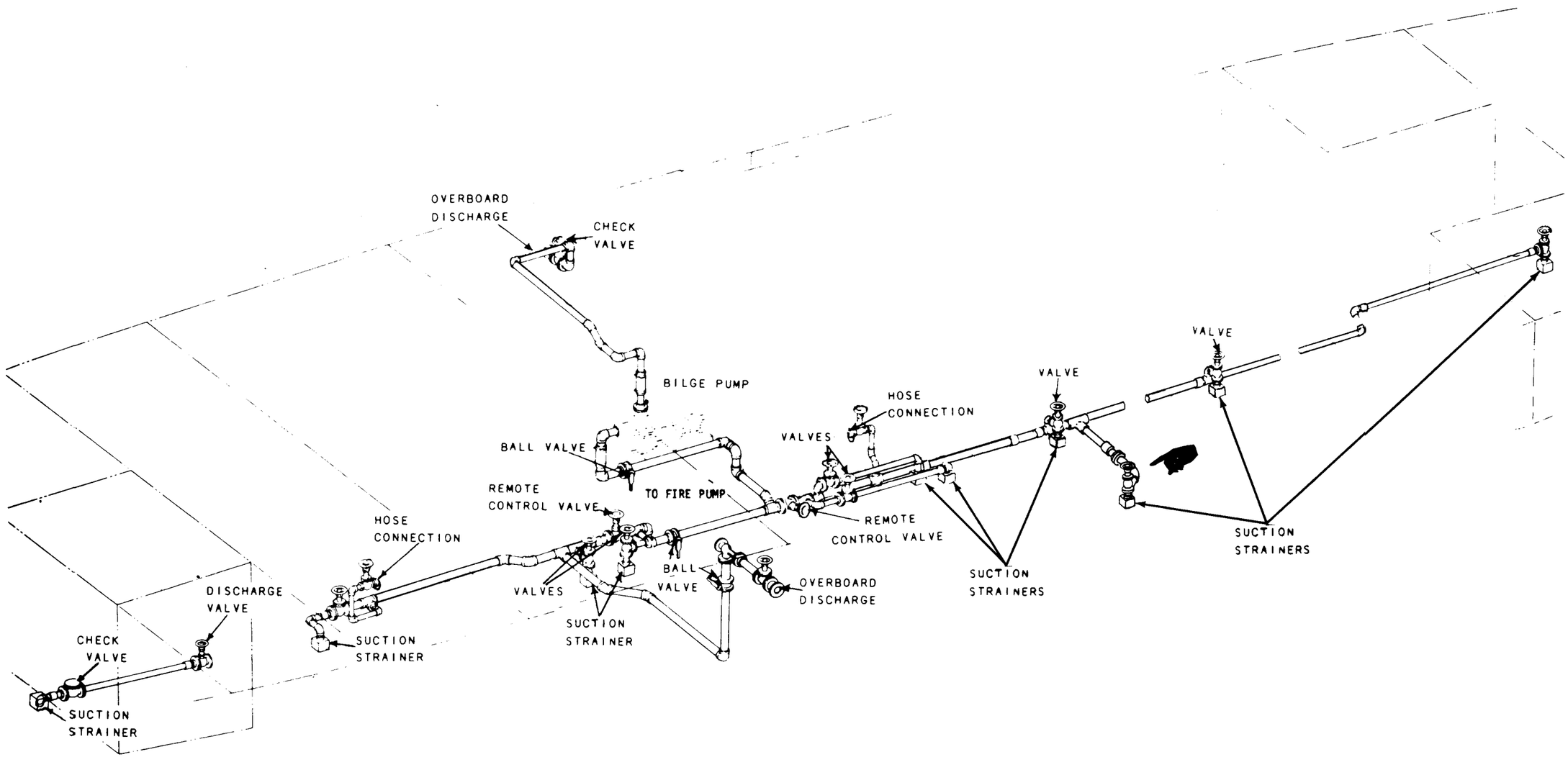




*FO-23. Sewage System Piping.*




*FO-24. Fire System Piping.*

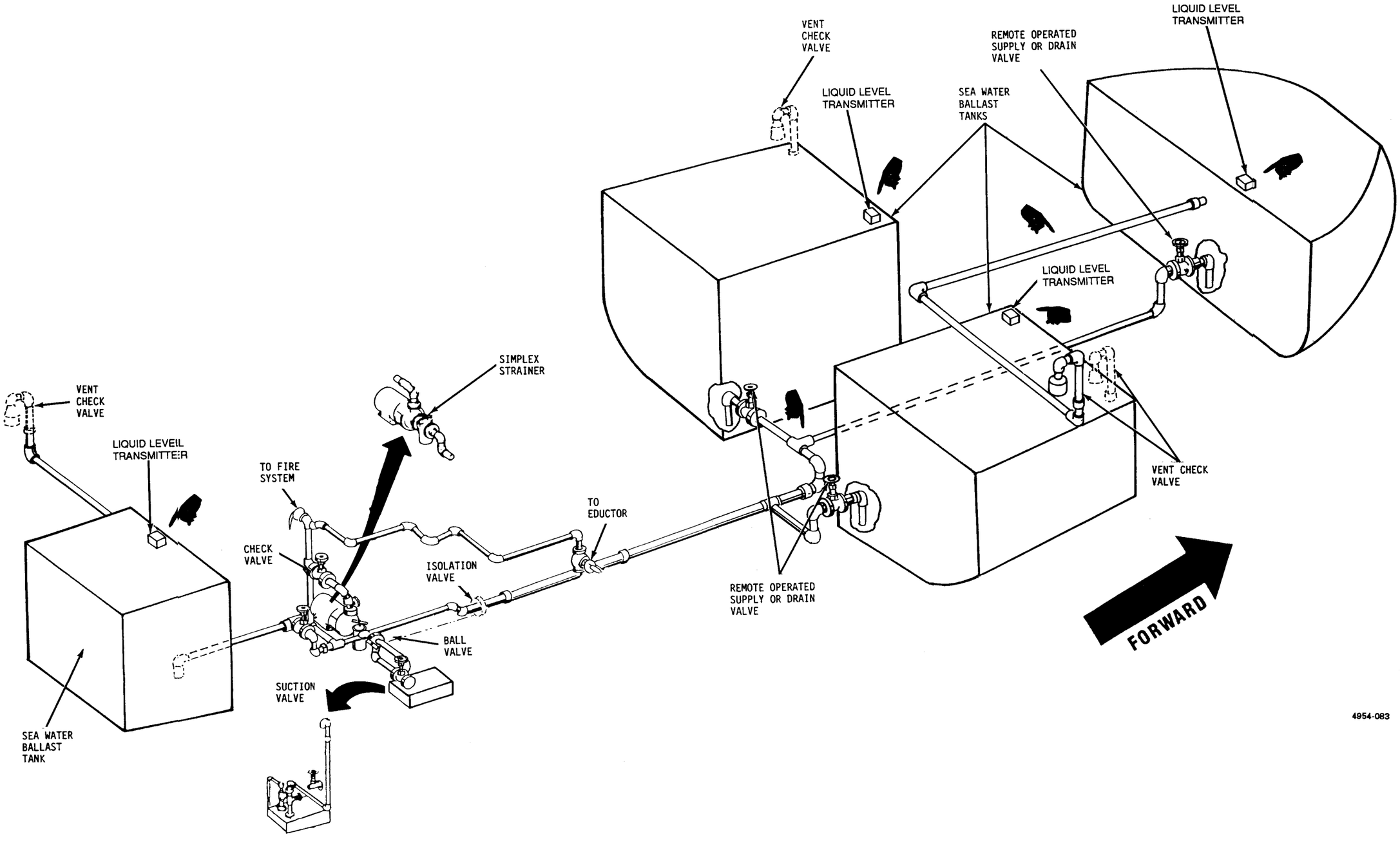



**WARNING**

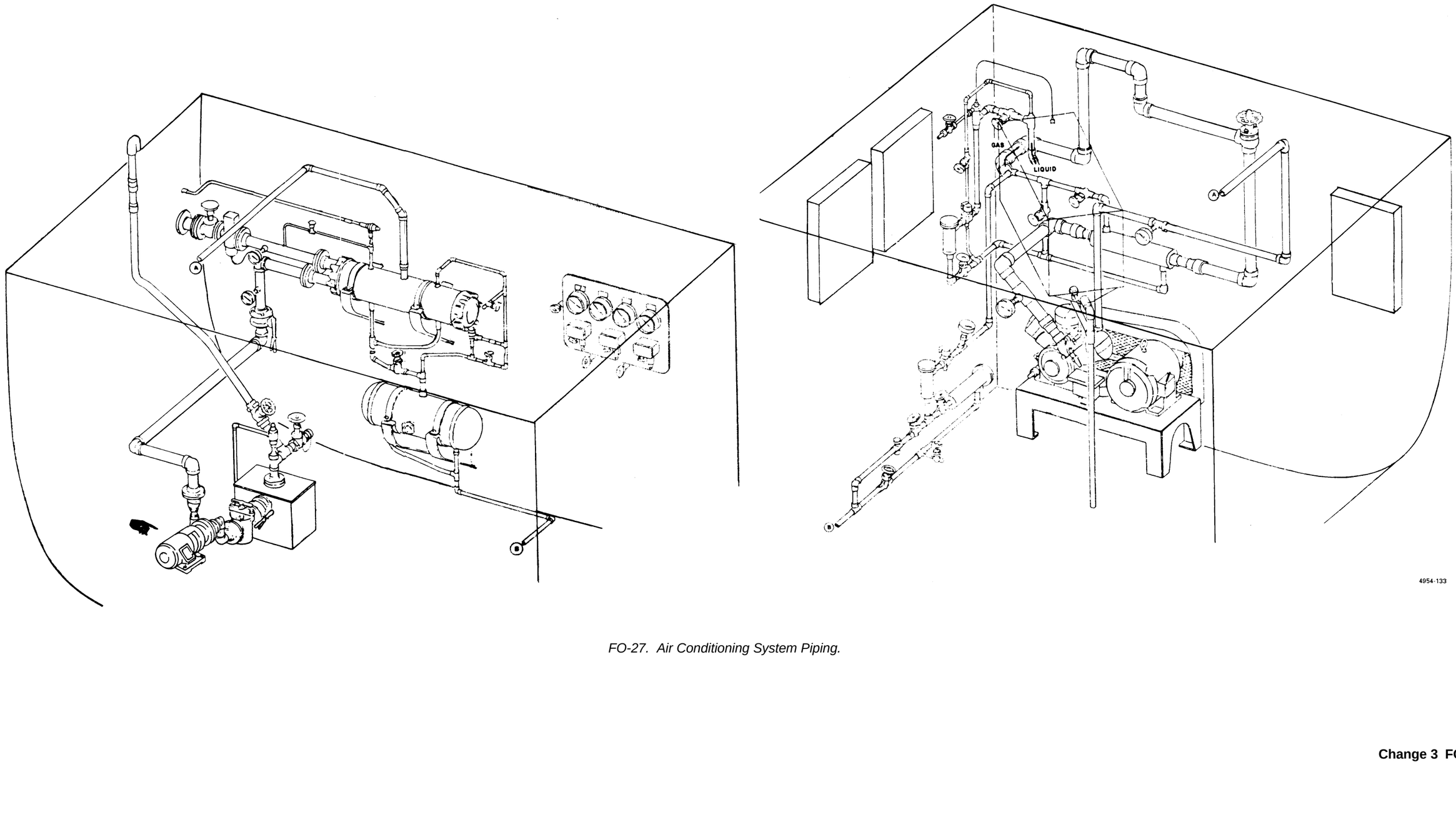
**DO NOT OPERATE BILGE SYSTEM IN RESTRICTED WATERS**

4954-072

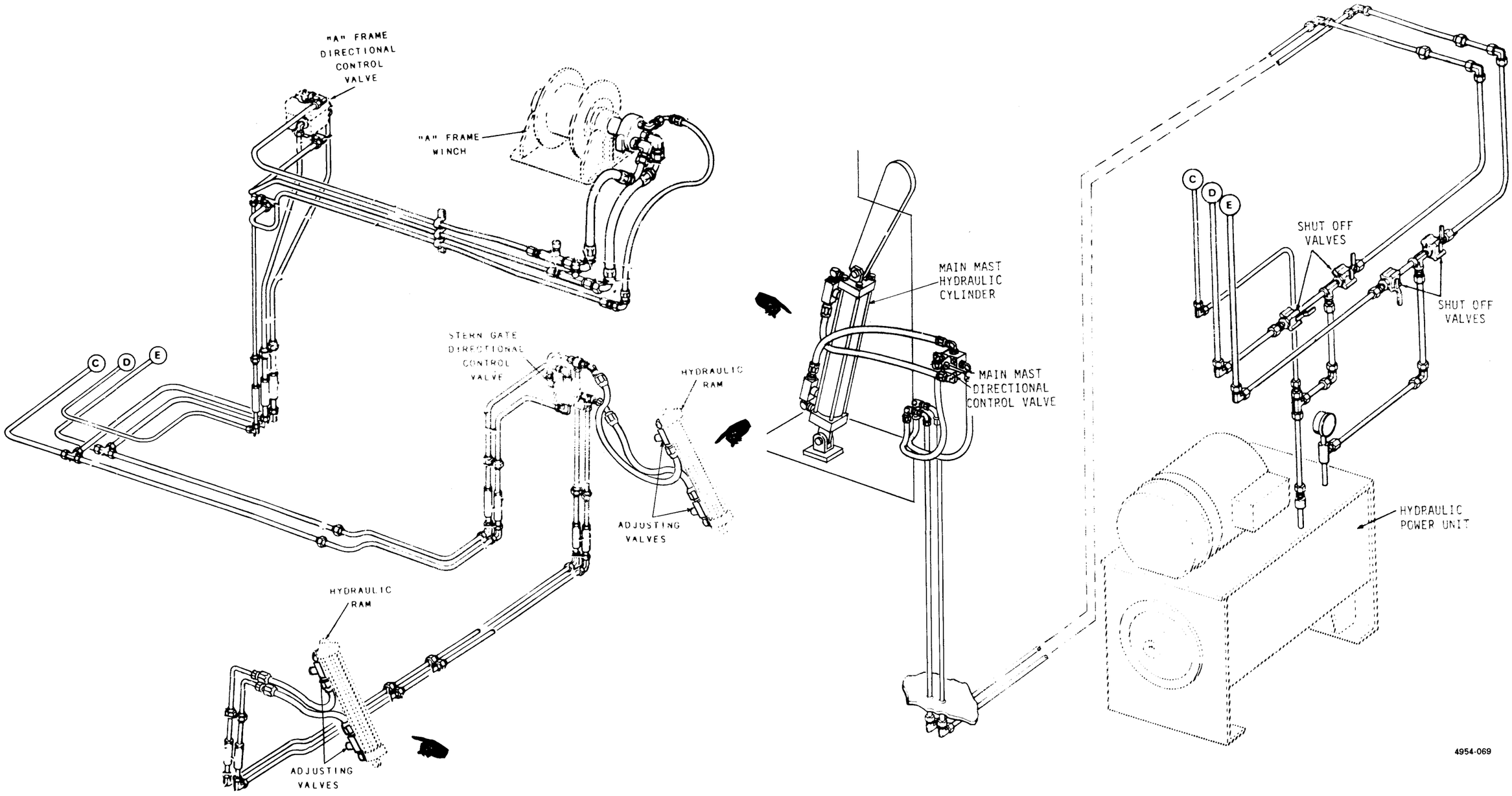
*FO-25. Bilge System Piping.*



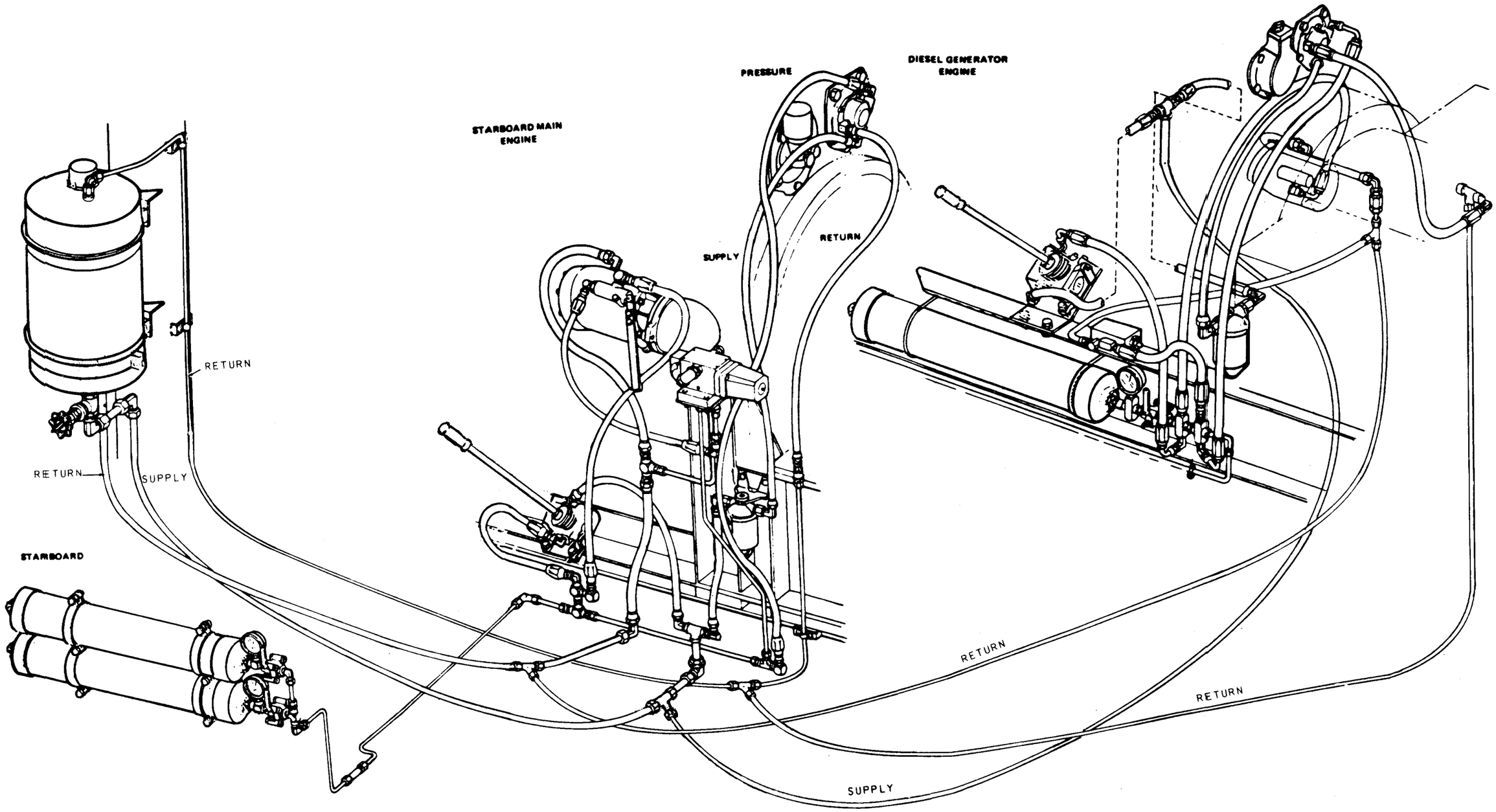

*FO-26. Ballast System Piping.*



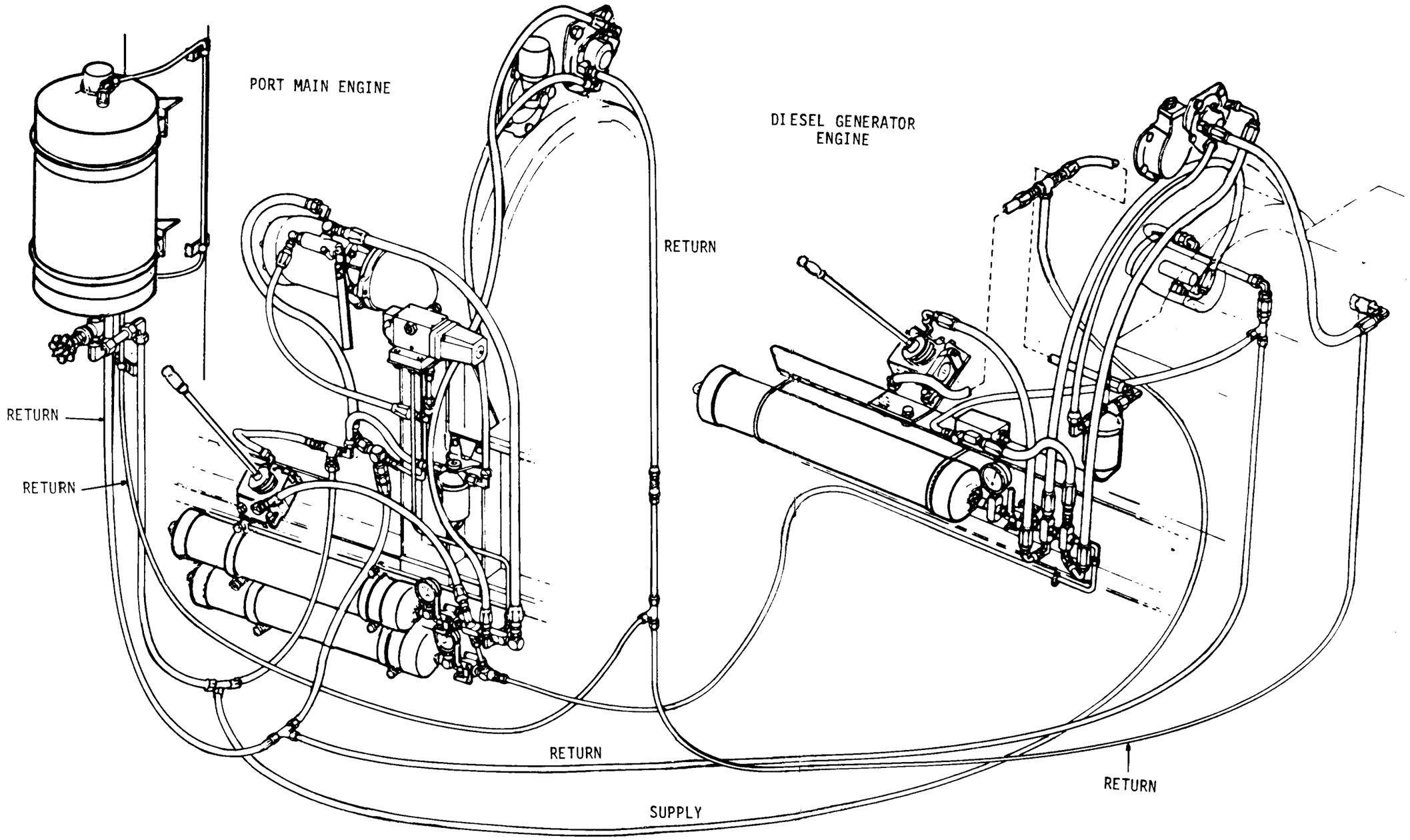

*FO-27. Air Conditioning System Piping.*



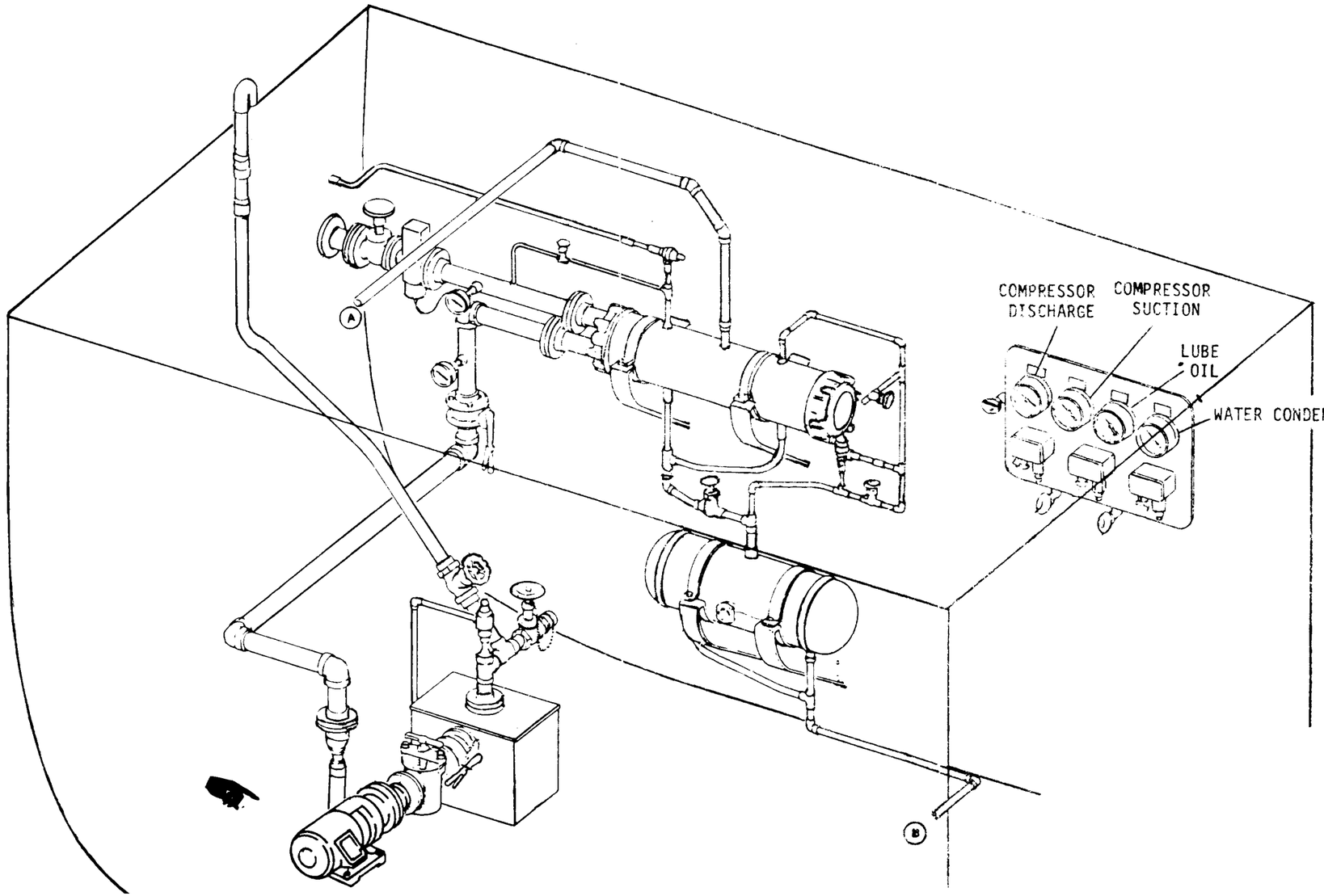

*FO-28. Centralized Hydraulic System.*




*FO-29. Hydraulic Starting System - Forward Engine Room.*

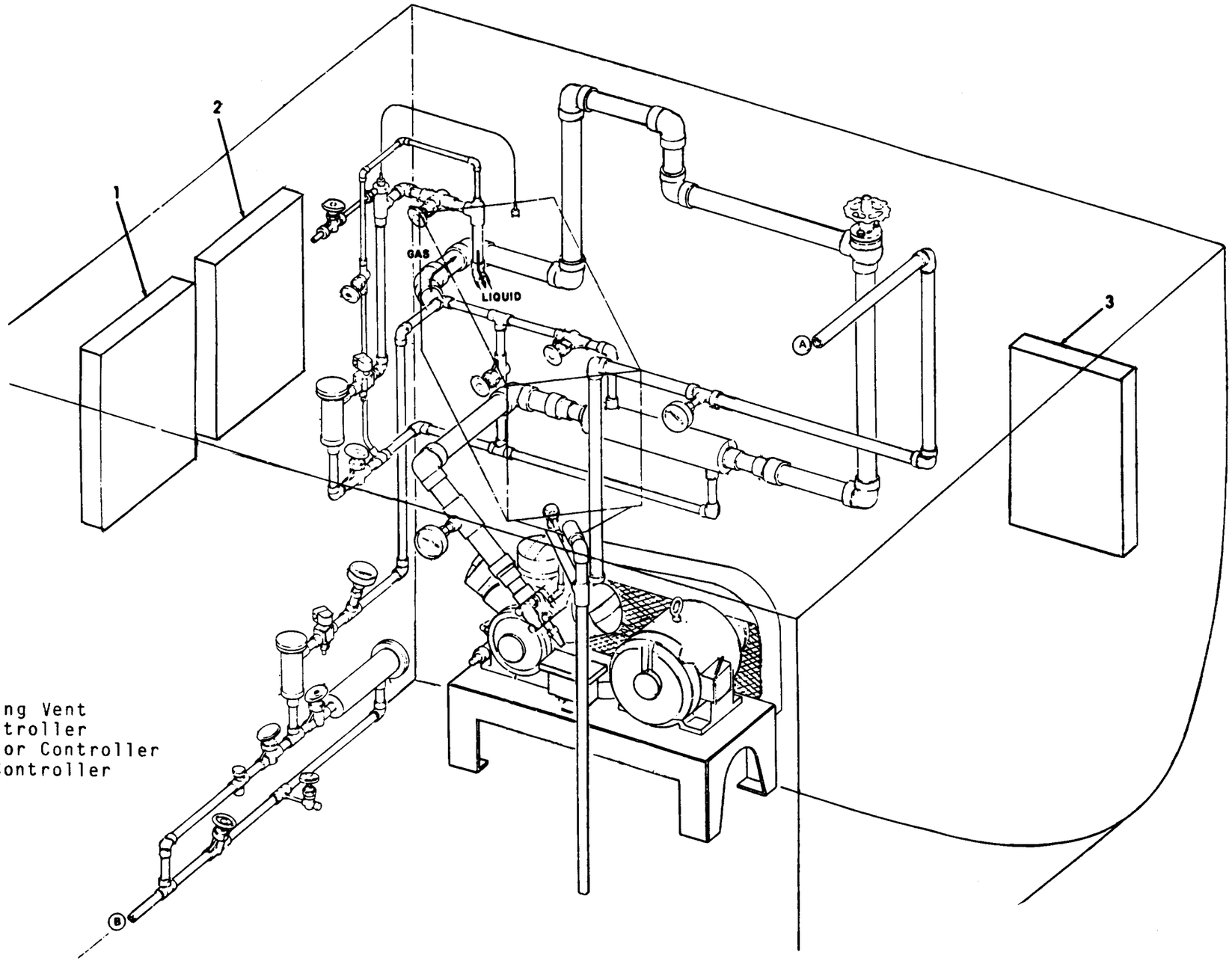



*FO-30. Hydraulic Starting System - Aft Engine Room.*



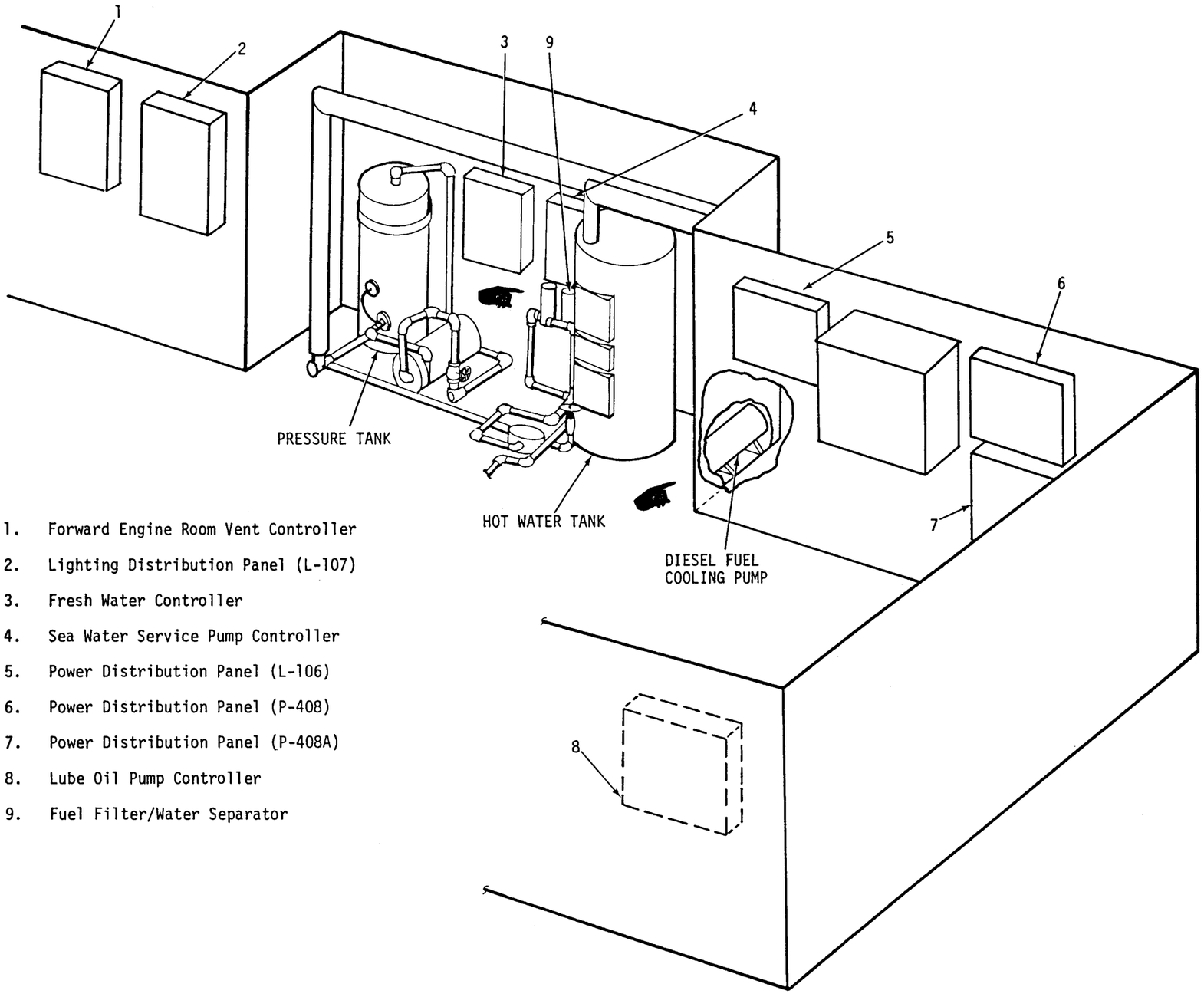

(FO-31.1 Sheet 1 of 2)
(FO-31.2 Sheet 2 of 2)

*FO-31.1. Air Conditioning Machinery Room (Sheet 1 of 2).*




1. Main Air Circulating Vent Motor Controller
2. Sea Water Pump Motor Controller
3. Compressor Motor Controller

*FO-31.2. Air Conditioning Machinery Room (Sheet 2 of 2)*




1. Forward Engine Room Vent Controller
2. Lighting Distribution Panel (L-107)
3. Fresh Water Controller
4. Sea Water Service Pump Controller
5. Power Distribution Panel (L-106)
6. Power Distribution Panel (P-408)
7. Power Distribution Panel (P-408A)
8. Lube Oil Pump Controller
9. Fuel Filter/Water Separator

*FO-32. Forward Engine Room.*

***These are the instructions for sending an electronic 2028***

The following format must be used if submitting an electronic 2028. The subject line must be exactly the same and a 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 <whomeveravma27.armymil>
To: mpmt/avma28@st-louis-emh7.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-98
8. ***Pub no:*** 55-2840-229-23
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:* 2
19. *Paragraph:* 3
20. *Line:* 4
21. *NSN:* 5
22. *Reference:* 6
23. *Figure:* 7
24. *Table:* 8
25. *Item:* 9
26. *Total* 123
27. ***Text:***

This is the text for the problem below line 27.

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

THEN . JOT DOWN THE DOPE ABOUT IT ON THIS FORM, CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

## SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)
PFC John DOE
CO A 3rd Engineer Bn
Ft. Leonardwood, MO 63108

DATE SENT: 22 August 1992

| PUBLICATION NUMBER | PUBLICATION DATE | PUBLICATION TITLE |
|---|---|---|
| TM 1-1520-250-10 | 15 June 1992 | Operator's manual MH60K Helicopter |

BE EXACT PIN-POINT WHERE IT IS

| PAGE NO | PARA-GRAPH | FIGURE NO | TABLE NO |
|---|---|---|---|
| 6 | 2-1 a | | |
| B1 | | 4-3 | |

IN THIS SPACE, TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

In line 6 of paragraph 2-1a the manual states the engine has 6 cylinders. The engine on my set only has 4 cylinders. Change the manual to show 4 cylinders.

Callout 16 on figure 4-3 is pointed at a bolt. In key to figure 4-3, item 16 is called a shim. Please correct one or the other

EXAMPLE

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER: JOHN DOE, PFC (268) 317-7111

SIGN HERE: JOHN DOE John Doe

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

DRSTS-M verprint2, 1 Nov 80

P.S.- - IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION, MAKE A CARBON COPY OF THIS AND GIVE TO YOUR HEADQUARTERS.

REVERSE OF DA FORM 2028-2 Reverse of DRSTS-M Overprint 2, 1 Nov 80

TEAR ALONG PERFORATED LINE

FILL IN YOUR UNITS ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS

COMMANDER
U.S. ARMY AVIATION AND TROOP COMMAND
ATTN: AMSAT-I-MP
4300 GOODFELLOW BOULEVARD
ST. LOUIS, MO 63120-1798

**RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS**

# SOMETHING WRONG WITH THIS PUBLICATION?

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**FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)**

**DATE SENT**

| PUBLICATION NUMBER | PUBLICATION DATE | PUBLICATION TITLE |
|---|---|---|
| TM 55-1905-219-14-1 | 8 August 1983 | Landing Craft Utility LCU 1667-1670 |

**BE EXACT PIN-POINT WHERE IT IS**

| PAGE NO | PARA-GRAPH | FIGURE NO | TABLE NO |
|---|---|---|---|
| | | | |

**IN THIS SPACE, TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:**

**PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER**

**SIGN HERE**

**DA FORM 1 JUL 79 2028-2**

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