TECHNICAL MANUAL

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

LANDING CRAFT UTILITY
LCU 1671-1679
(1905-01-009-1056)

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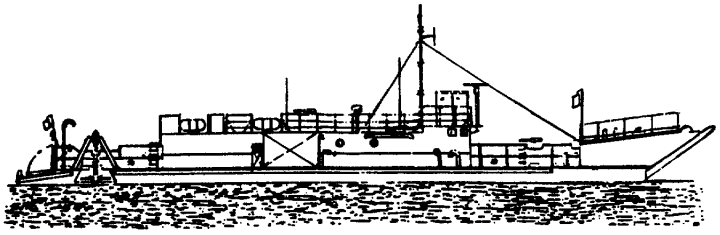

DESCRIPTION AND USE OF OPERATORS CONTROLS AND INDICATORS DESCRIPTION

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PREVENTIVE MAINTENANCE CHECKS AND SERVICES

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CHANGE

NO. 5

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C 1

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Direct Support, and General Support
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LANDING CRAFT UTILITY
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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.

- Wear 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.

- 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.

WARNING

(Cont)

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

TECHNICAL MANUAL

NO. 55-1905-220-14-1

HEADQUARTERS
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WASHINGTON, D.C., 1 June 1983

Operator's, Organizational, Direct
Support, And General Support
Maintenance Manual

LANDING CRAFT UTILITY
LCU 1671 - 1679
NSN 1905-01-009-1056

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. Mail 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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CHAPTER 1 INTRODUCTION

Section I. GENERAL INFORMATION

1-1. SCOPE.

a. This manual covers Landing Craft Utility, LCU 1671-1679 manufactured by Marinette Marine Corporation, Marinette, Wisconsin 54143. See Figure FO-1 for an overall view of the landing craft.

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

c. 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, let 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 hard 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:

a. TM 55-501 Marine Crewman's Handbook
b. 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.M ..... 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 - W 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

Equipment Purpose, Capabilities and Features 1-8

Location and Description of Major Components 1-9

General Orientation 1-10

Exterior Orientation 1-11

Mooring, Towing, Causeway Fittings and Lashing Gear 1-12

Emergency Life Saving Equipment 1-13

Machine Gun and Ready Service Lockers and Grenade Lockers 1-14

Running Lights, Peloris, Masts, Flags and Ensigns 1-15

First Aid Equipment 1-16

Anchor "A" Frame and Control Station 1-17

Emergency Steering Components 1-18

Bow Ramp 1-19

Stern Gate 1-20

Miscellaneous Components on Vehicle Deck 1-21

1-8. EQUIPMENT PURPOSE, CAPABILITIES, and FEATURES.

The Landing Craft is a 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, 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, motor vehicles or artillery equipment and their operating /maintenance personnel and miscellaneous cargo. After a beach landing, the craft is designed to retract from the beach under its own power, assisted by the use of the Stern Anchor.

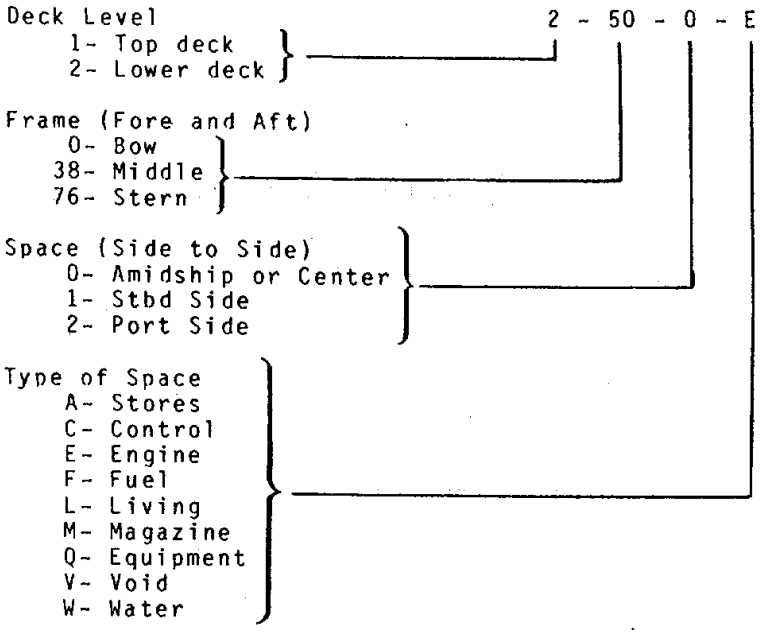
1-9. LOCATION AND DESCRIPTION of MAJOR COMPONENTS.

Refer to Paragraph 1-10 for an overall orientation of the Landing Craft. This overall familiarization is further subdivided into the specific section views contained in the subsequent paragraphs.

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.

c. 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.

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 1-4 for the Components on the Mast.

1-16. FIRST AID EQUIPMENT.

First Aid Equipment is located both inside and outside. Refer to Figure FO-10 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 1-5 for the major components of the "A" Frame and to Figure 1-6 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 1-7.

1-19. BOW RAMP.

The major components of the Bow Ramp are shown in Figure 1-8.

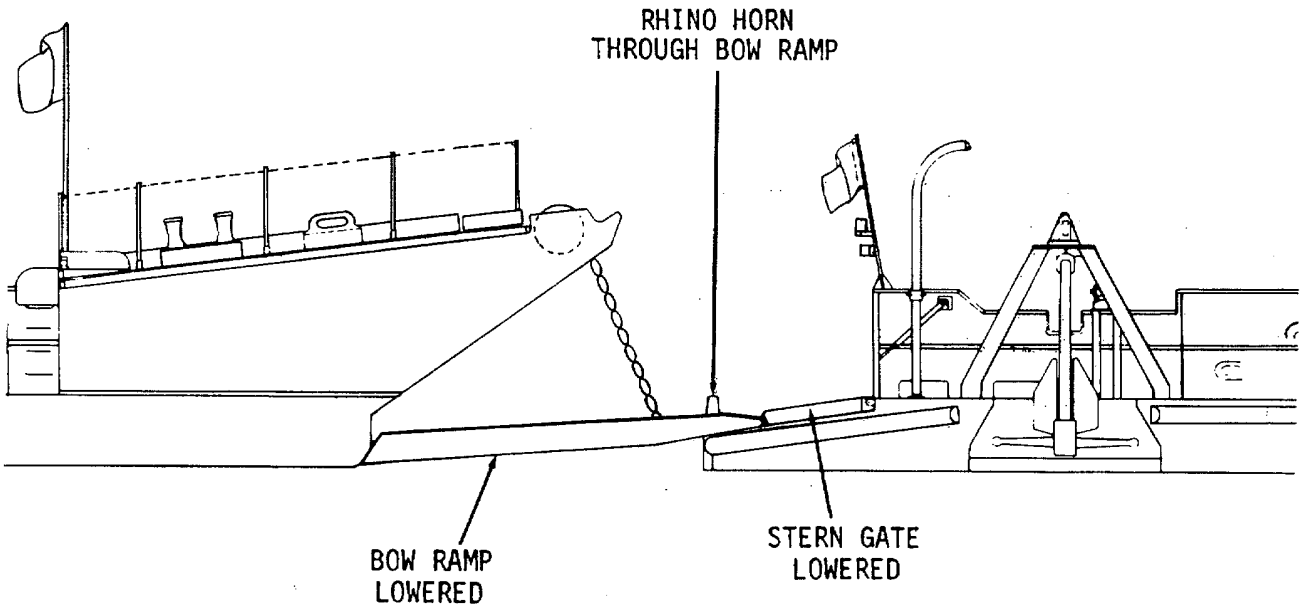


Figure 1-1. Causeway Between Two LCU's.

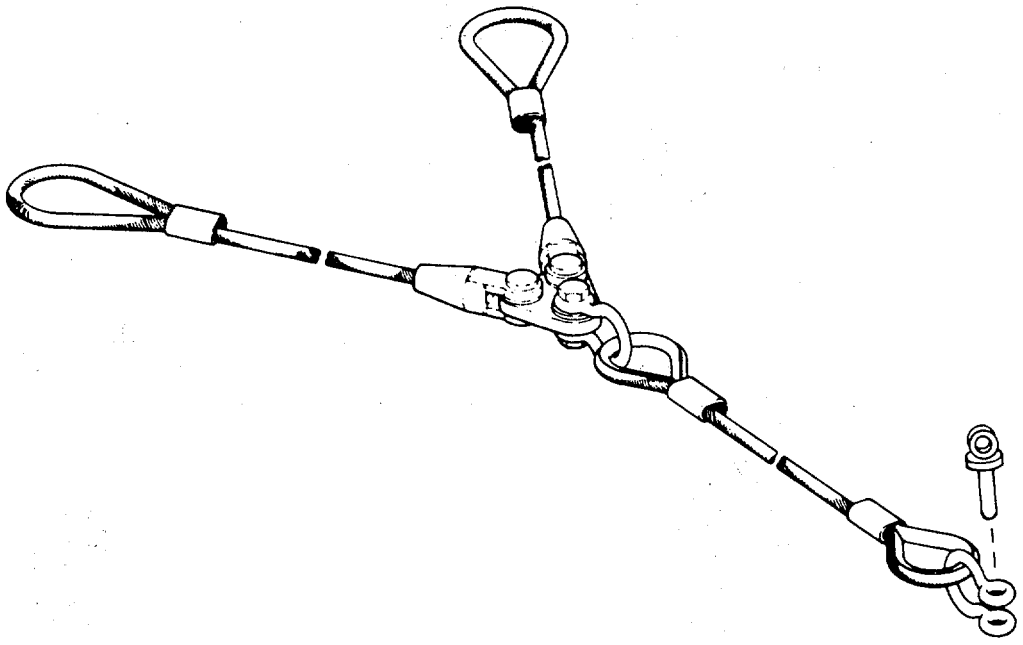


Figure 1-2. Towing Bridle.

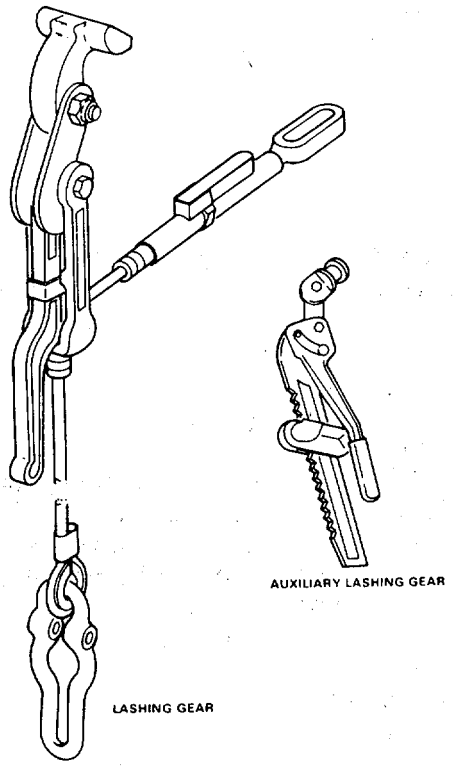
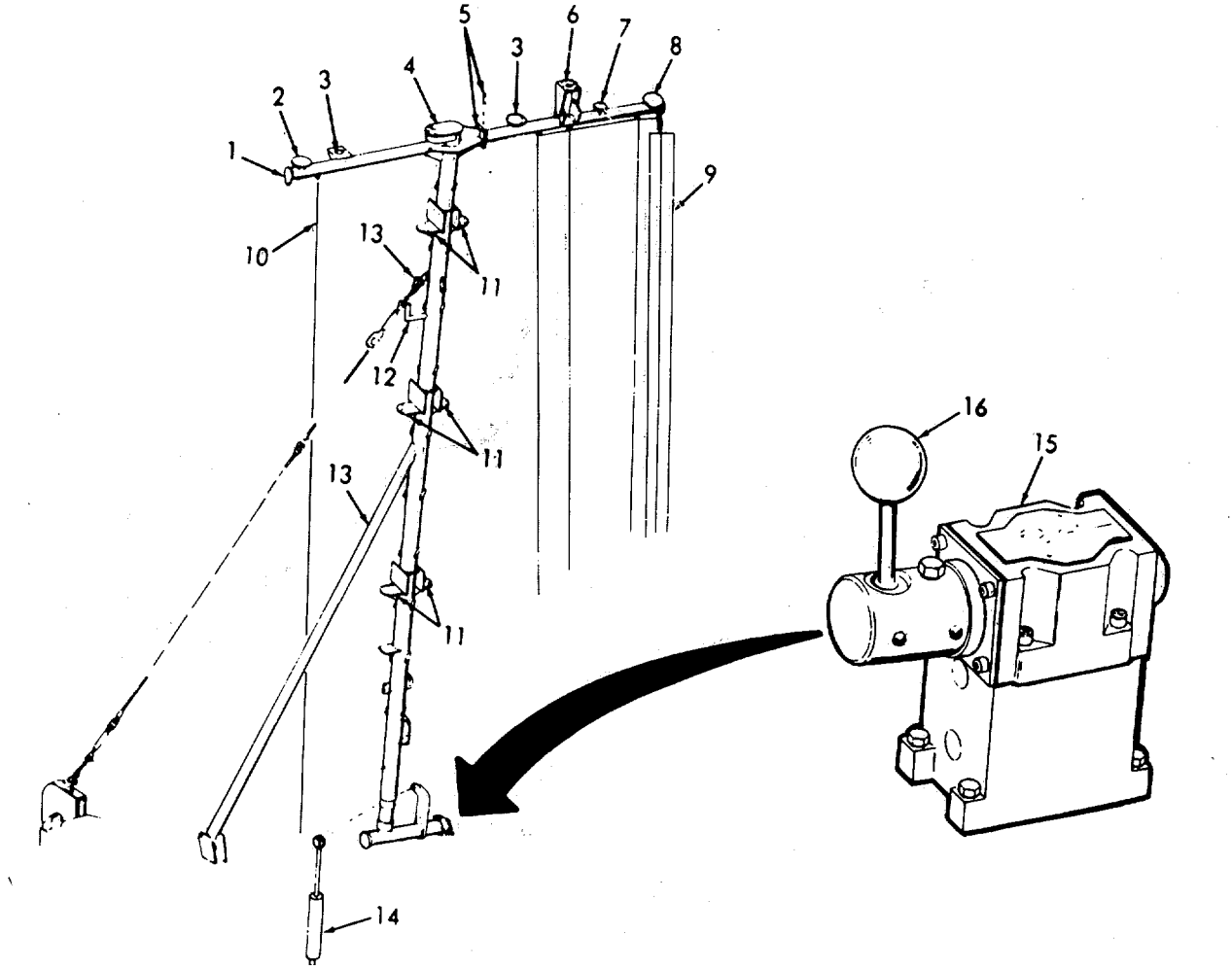
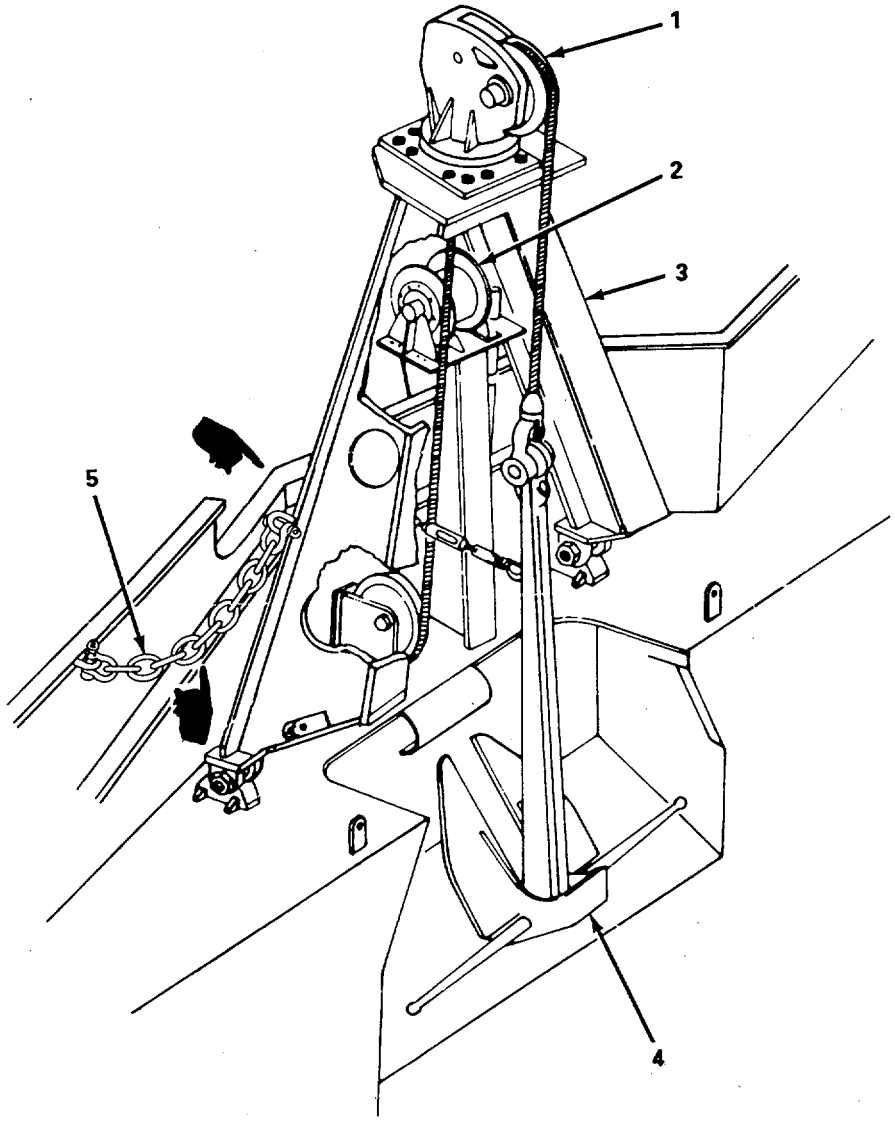


Figure 1-3. Lashing Gear.



1. Yardarm
2. Communication Antenna (AS/1729/VRC)
3. Aircraft Obstruction Marker/Blinker Light (Red)
4. Remote Magnetic Heading System (RMHS'Transmitter)
5. Yardarm Pivot and Cotter Pin
6. Anchor Light (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 Blocks (Rigging)
11. Man Overboard and Breakdown Lights (Red)
12. Identification Friend, Foe Antenna (AS1177-B/UPX) (IFF)
13. Mast Brace and Support
14. Hydraulic Lifting Cylinder
15. Directional Control Valve
16. Directional Control

Figure 1-4. Components of the Mast.



1- FAIRLEAD - Guide for anchor cable.

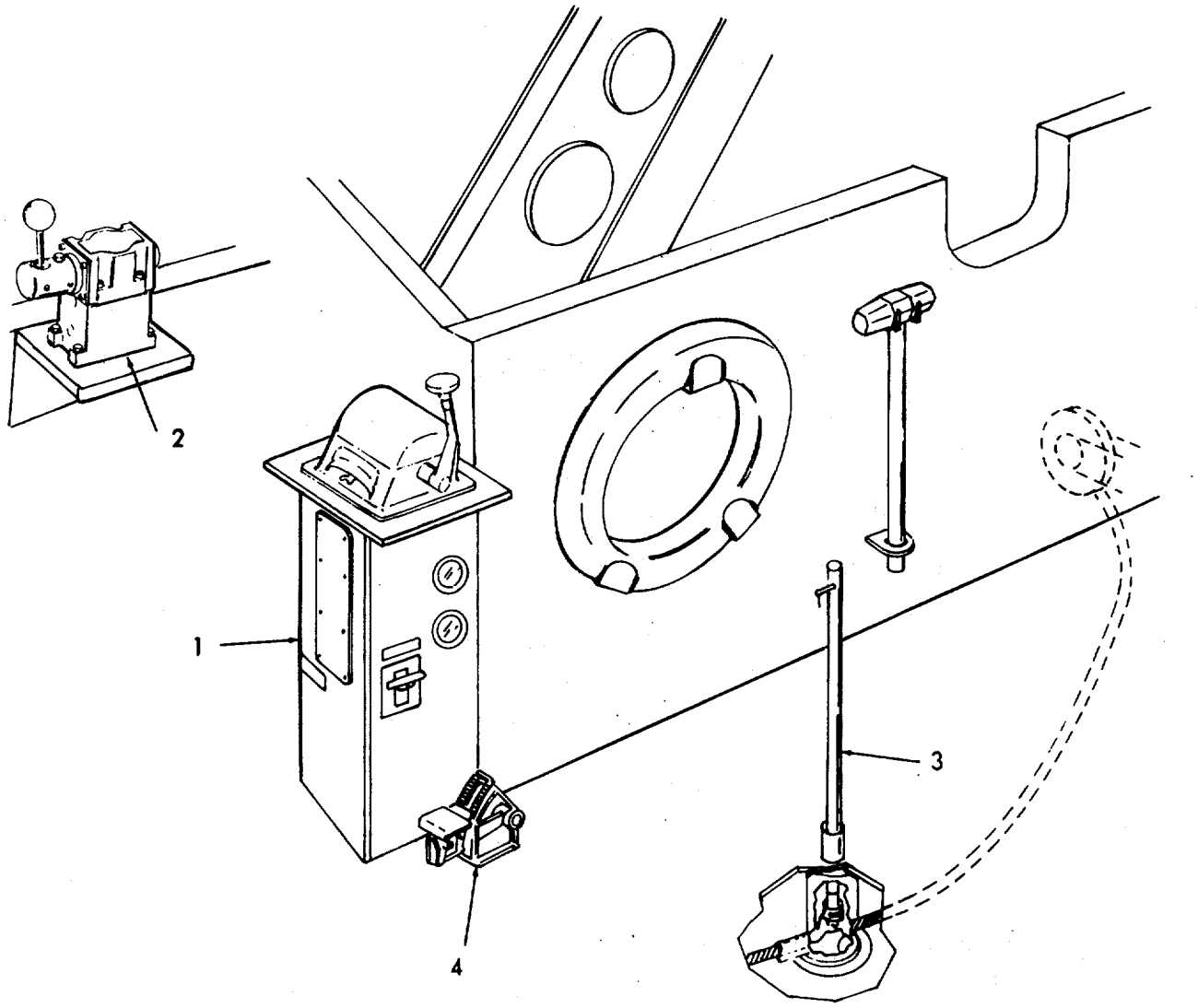
2- HYDRAULIC WINCH - Controls the angle of pivot of the anchor "A" frame.

3- "A" FRAME - Holds the anchor clear of the side of the vessel.

4- ANCHOR

5- SAFETY CHAIN - Restricts total outboard travel of "A" frame.

Figure 1-5. Anchor "A" Frame.



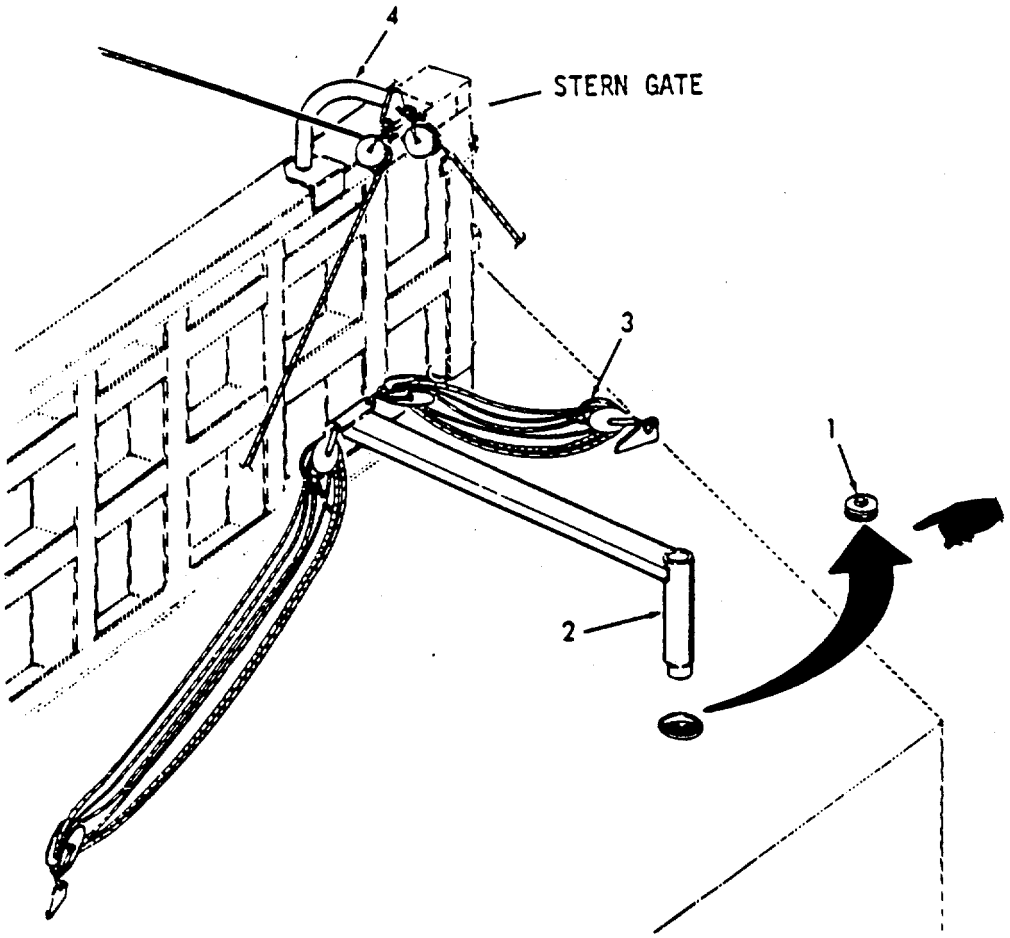
1- CONTROL STATION - Operating controls to raise and lower the anchor.

2- DIRECTIONAL CONTROL - Controls the angle of pivot of the "A" Frame.

3- WIRE ROPE CUTTER - Cuts the anchor cable in case of emergency.

4- FOOT BRAKE - Controls the anchor cable.

Figure 1-6. Anchor Winch Control Station Cargo Deck.



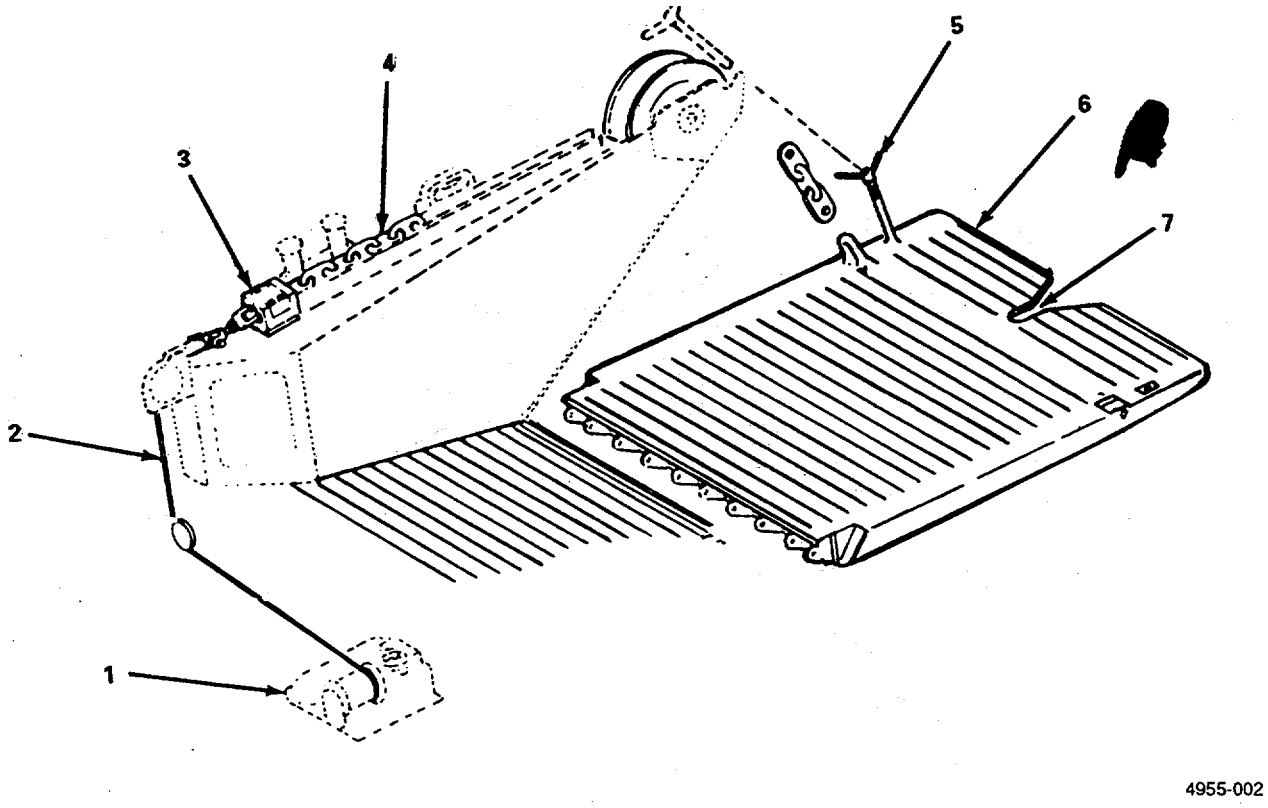
1- DECK PLATES - Removable access plate for access to top of rudder posts.

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 1-7. Emergency Steering Components.



1. BOW RAMP WINCH - Electric winch to raise and lower bow ramp.
2. WIRE ROPE - 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 into lowered bow ramp and secures in place.

Figure 1-8. BOW RAMP

1-20. STERN GATE.

Refer to Figures 1-9 and 1-9.1 for the major components of the Stern Gate. The component items 4 and 5 of Figure 1-9 are for emergency/manual operation of the Stern Gate.

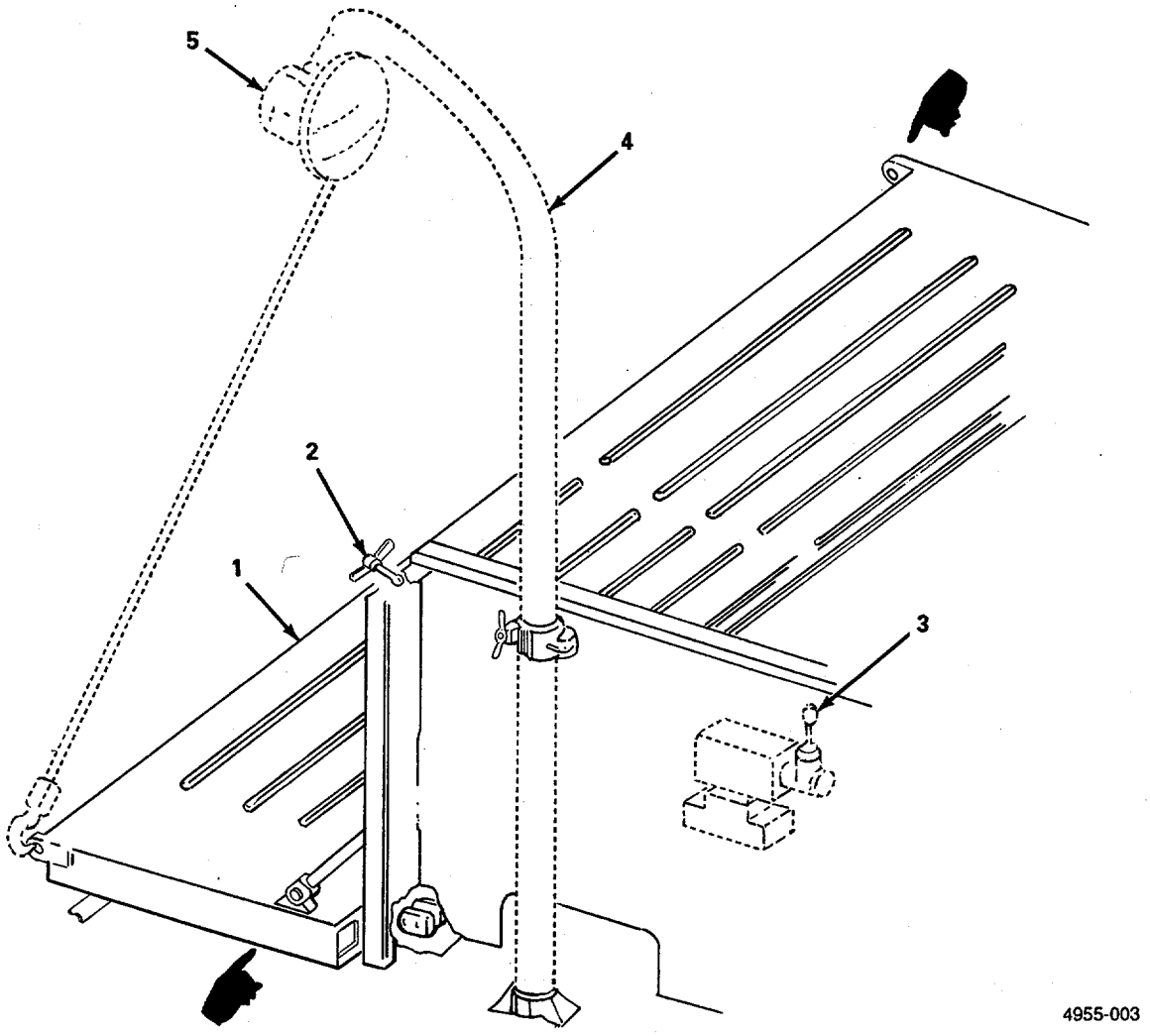
1-21. MISCELLANEOUS COMPONENTS ON CARGO DECK.

The miscellaneous major components located on the Cargo Deck are shown in Figure FO-11. Figure FO-12 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.

	Paragraph
Interior Arrangements	1-22
Pilot House	1-23
Galley	1-24
Wash Room, Water Closet and Shower	1-25
Engine Access Room	1-26
Bow Ramp Winch Compartment and Deck Locker	1-27
Air Conditioning Machinery Room	1-28
Crew Day Room	1-29
Crew and Transient Berthing	1-30
Equipment and repair parts stores	1-31
Forward Engine Room	1-32
Aft Engine Room	1-33
Anchor Winch Compartment	1-34
Steering Gear Compartment	1-35
Propellers, Rudders, and Keel Coolers	1-36
Fire Fighting Systems	1-37



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.

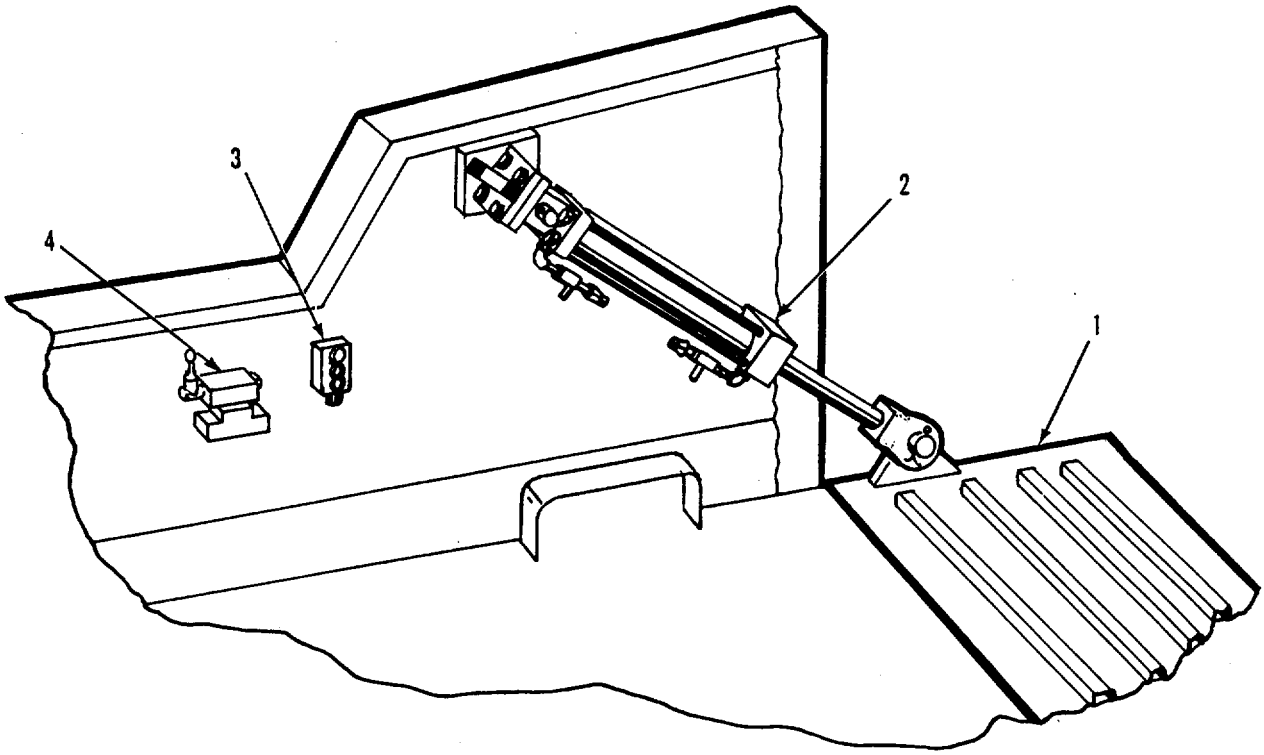
4- DAVIT - Used in conjunction with (5) to raise or lower the stern gate manually. Davit can be located on either port or stbd side.

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

NOTE

Davits are stowed on Port bulkhead
at Frame 58.

Figure 1-9. 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.

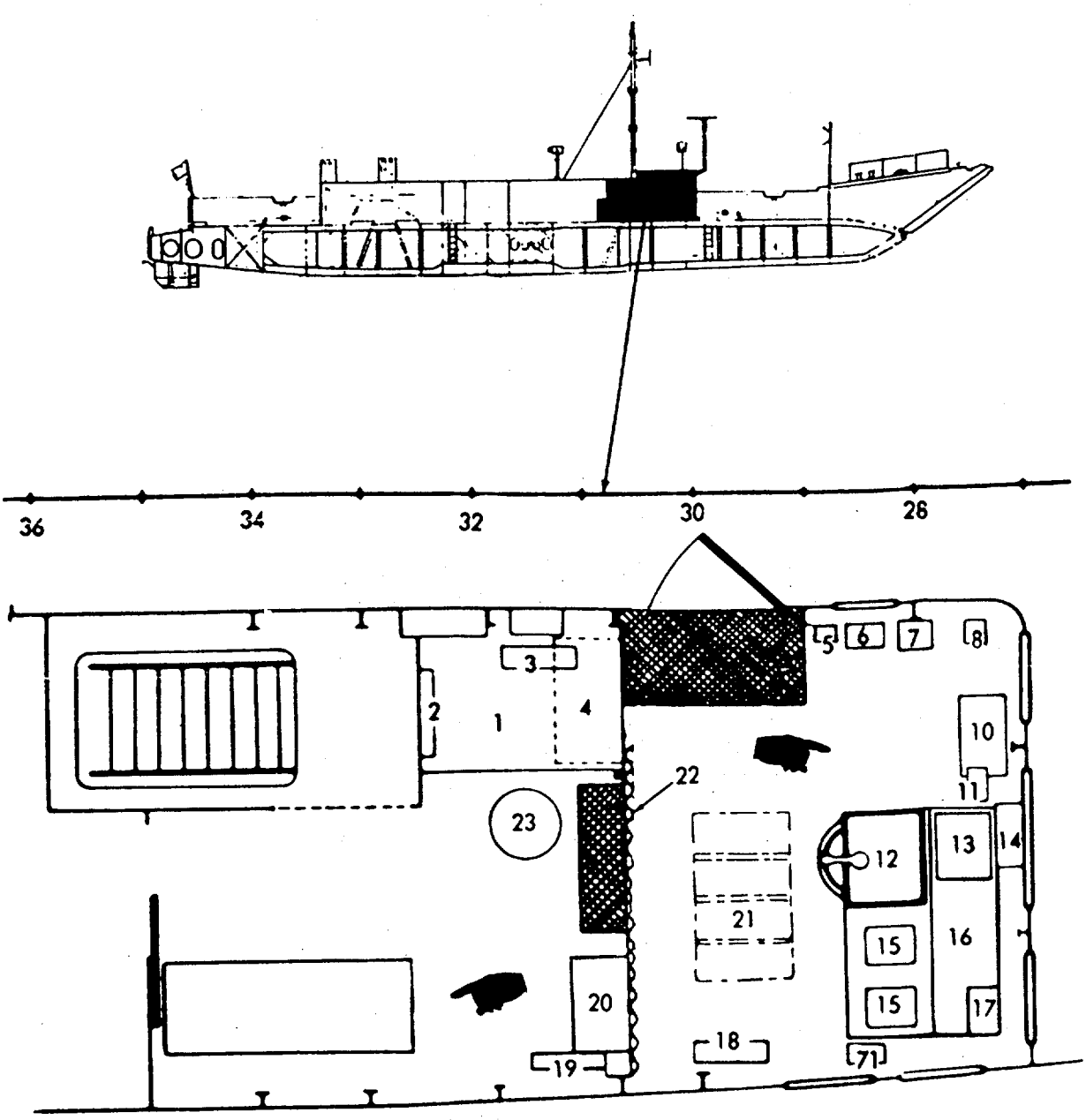
3. ELECTRIC MOTOR START - STOP button. Activates stern gate valve (4).

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

Figure 1-9.1. Inboard View, Starboard Side. Components of the Stern Gate.

1-23. PILOT HOUSE.

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



PLAN

Figure 1-10. Pilot House (Sheet 1 of 7)

Legend Figure 1-10:

1- CHART TABLE - Where the navigator plots the course on charts.

2- 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.

3- DESK LIGHT AND FILTER - Lights up the chart table.

4- BOOK RACK - Storage for the navigator's books.

5- BOW RAMP CONTROLS - Controls the raising and lowering of the bow ramp.

6- BINOCULAR CASE - Where the binoculars are stored.

7- DARKEN SHIP LIGHT SWITCH - Turns off all external lights during a darken ship condition.

8- THERMOSTAT - Controls the heating of the Pilot House.

9- (DELETED)

10- RADAR TRANSMITTER/RECEIVER - Transmits and then receives the radar signal prior to presentation on the PPI.

11- WINDOW WIPER CON TROL - Controls the windshield wiper and its internal heater.

12- STEERING CONTROL PANEL - A panel containing the steering lever, controls for the steering pumps, and other steering and maneuvering controls.

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- WINDOW WIPER - Keeps the front window clear of rain and spray.

15- ENGINE CONTROLS - Contains the throttle and forward, neutral, and reverse shift for the propulsion engine.

16- STEERING CONTROL CONSOLE - The control from which the vessel is steered. The console also contains the propulsion engine controls.

Figure 1-10. Pilot House (Sheet 2 of 7)

Legend Figure 1-10 (Continued)

17- TELEGRAPH KEY - A signaling device that makes the mast blinker lights operate.

18- NAVIGATION LIGHT CONTROL PANEL - Switches on and off the lights for navigation, breakdown, towing and man overboard.

19- DISTRIBUTION BOX (L107) - Horn, sound powered phone call system, cease fire system, ships' entertainment, rudder angle indicator system, compass lighting, and tank level indicator system.

20- BATTERY CHARGER - Provides 24 volts DC for charging the batteries.

21- BATTERIES - Used to power the DC Distribution Panel (P-24).

22- CURTAINS - Separates the front of the Pilot House from the rear. Used at night or in darken ship conditions.

23- STOOL - Device for helmsman to sit on.

24- (DELETED)

25- BAROMETER - An indicator that shows the rise and fall in barometric pressure.

26- SHIPS CLOCK - Tells the time in the 24 hour method.

27- CLINOMETER - An indicator showing the level of the vessel (port to starboard list).

28- CLINOMETER - An indicator showing the level of the vessel (forward to aft pitch).

29- HALON HORN - An audible device indicating the Halon (Fire) System has been activated..

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- HAND LANTERN- (High Intensity) - A portable light.

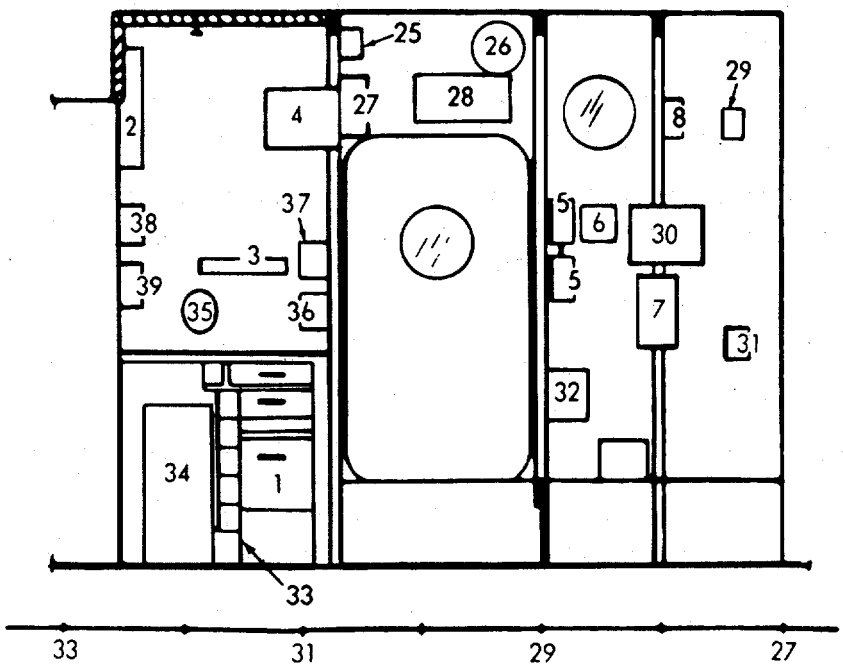
33- CHART RACK - Storage for the navigators charts.

34- FLAG-BAG STORAGE - Storage for the signal flags.

35- MICROPHONE (AN/VRC 47) - Microphone for voice communication on the AN/URC 48.

Figure 1-10. Pilot House (Sheet 3 of 7)

1-23. PILOT HOUSE (CONT).



Port Elev.

Legend Figure 1-10 (Continued)

36- RADIO ROOM LIGHT - Turns ON/OFF the radio room light (white)

37- RADIO ROOM RED LIGHT SWITCH - Turns ON/OFF the red (night) light in the radio room.

38- AIR CONDITIONER SYSTEM EMERGENCY STOP - A break-glass device to stop the air conditioner.

39- EXHAUST FAN EMERGENCY STOP - A break-glass device to stop the exhause fan in the equipment room and repair parts storage room (2-20-0-A).

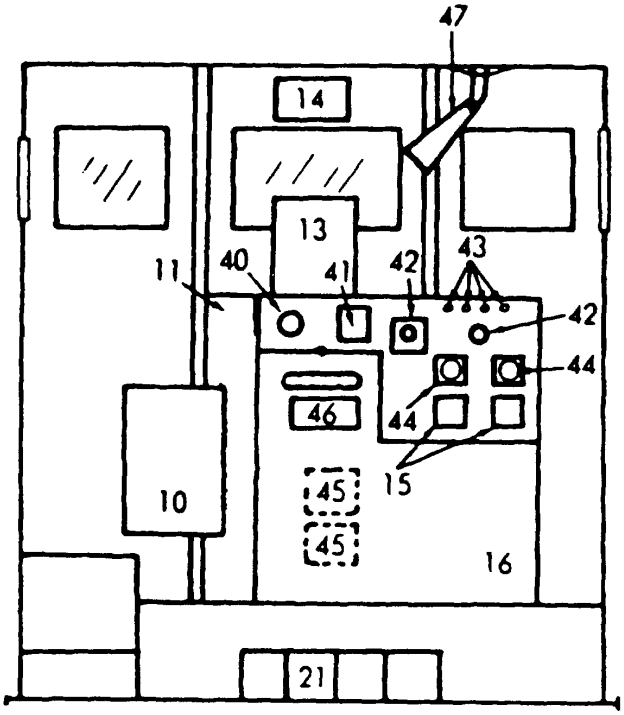
40- RUDDER ANGLE INDICATOR - An indicator that shows the position of the steering rudders.

41- HEADING SELECTOR - A device in which a pre-determined course can be set. Then the vessel will automatically steer (auto pilot).

42- REMOTE MAGNETIC HEADING INDICATOR - A compass rose that shows the magnetic heading of the vessel.

Figure 1-10. Pilot House (Sheet 4 of 7)

1-23. PILOT HOUSE (CONT).
LEGEND FIGURE 1-10 (CONT).



Fwd. Elev.

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

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

45. CONTROL AMPLIFIER - Electronic circuits for the Steering Control Panel.

46. COMPASS CONTROL UNIT - The electronic circuits to control the Gyro Compass.

47. VOICE TUBE AND MOUTHPIECE - Used for voice communications between the Pilot House and the Conning Station (area above the Pilot House).

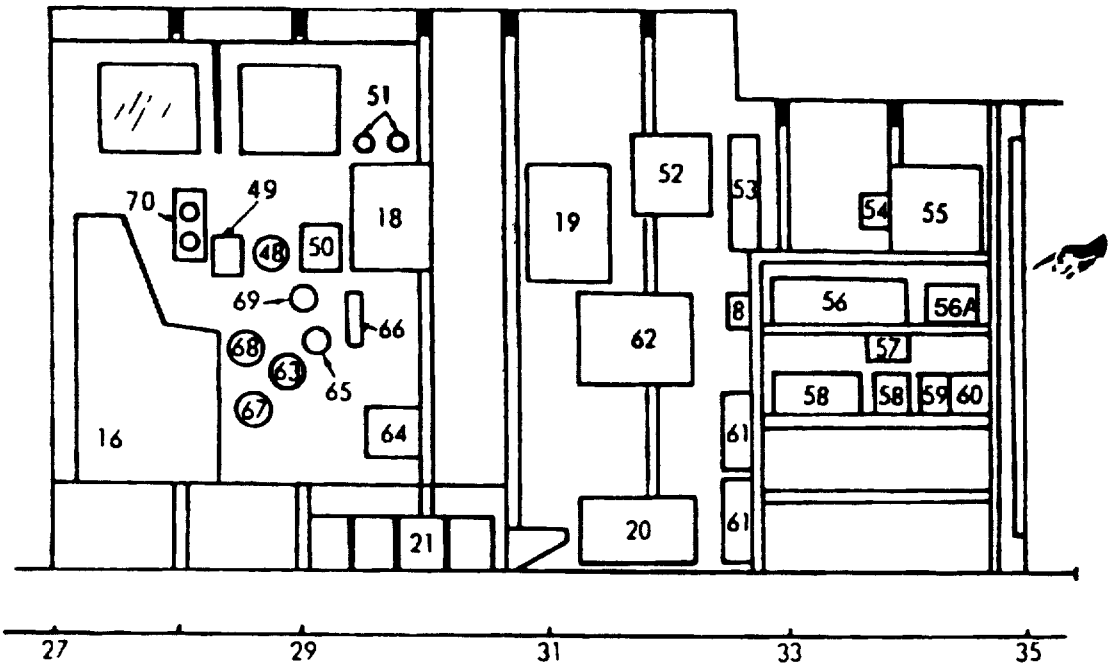
48. HAND SETS - Used for remote communication of the AN/URC-80 and AN/URC-46.

49. REMOTE CONTROL (AN/URC-80) - Permits remote control of a voice communications radio.

50. REMOTE CONTROL TRANSMITTER/ RECEIVER (AN/URC-46) Permits remote control of a voice communications radio.

Figure 1-10. Pilot House (Sheet 5 of 7)

1-23. PILOT HOUSE (CONT).
LEGEND FIGURE 1-10 (CONT).



Stbd. Elev.

51. LOUDSPEAKERS -	Used to hear the voice communication on both the /URC-46, and the AN/URC-80.
52. DC DISTRIBUTION BOX (P24) -	Distributes 24 VDC for the radios, navigation panel, and gyro compass.
53. DISTRIBUTION BOX (L106) -	Pilot House lights, window wiper, wake light, navigation lights, and the battery charger.
54. LOUDSPEAKER -	Used to hear the ship's entertainment system and time signals.
55. SHIP'S ENTERTAINMENT SYSTEM (AN/R390A/URR)	A radio receiver for entertainment and time signals.
56. TRANSMITTER/RECEIVER (AN/URC-92)	Location of the VHF radio.
56A. WEATHERFAX	MARINEFAX TR-4
57. LOUDSPEAKER -	Used to hear voice communications of the AN/URC-46.
58. TRANSMITTER/RECEIVER (AN/URC-46) -	A transmitter/receiver used for voice communications.

Figure 1-10. Pilot House (Sheet 6 of 7)

1-23. PILOT HOUSE (CONT).
LEGEND FIGURE 1-10 (CONT).

59. TRANSMITTER/RECEIVER IDENTIFICATION FRIEND OR FOE - (IFF) (AN/APX-72)	Transmits a signal to an object which must respond with a friendly identification. If not, the object is considered a foe (enemy).
60. CONTROL TRANSPONDER, IFF -	Part of the IFF System.
61. HEATER CONTROLS -	Switch panel controlling the heaters in the Pilot House.
62. TRANSMITTER/RECEIVER (AN/URC-80) -	A transmitter/receiver used for voice communications.
63. CONNECTION BOX -	Internal connections of the sound powered phone system.
64. JUNCTION BOX -	For sound powered call system.
65. WAKE LIGHT SWITCH -	Illuminates the wake of the vessel. Used when one vessel is following another during a darken ship condition.
66. CALL STATION SIGNAL SWITCH -	Switches that alert the Switchboard Room, and Forward and Aft Engine Rooms to a call on the sound powered phone.
67. CEASE FIRE SWITCH -	Alerts the machine gun stations to cease firing.
68. NAVIGATION HORN SWITCH -	When activated, operates the ship's navigation horn. Used for signaling between vessels and fog signals.
69. CONNING STATION CALL -	Signaling device to the Conning Station.
70. SOUND POWERED PHONE -	Used for internal communications.
71. INTERCOMMUNICATION SYSTEM	Used for calling between the Pilot House, Forward and Aft Engine Rooms, and the Crew's Quarters.

Figure 1-10. Pilot House (Sheet 7 of 7)

1-23.1 CONNING TOWER

The major components of the conning tower are shown in figure 1-10.1.

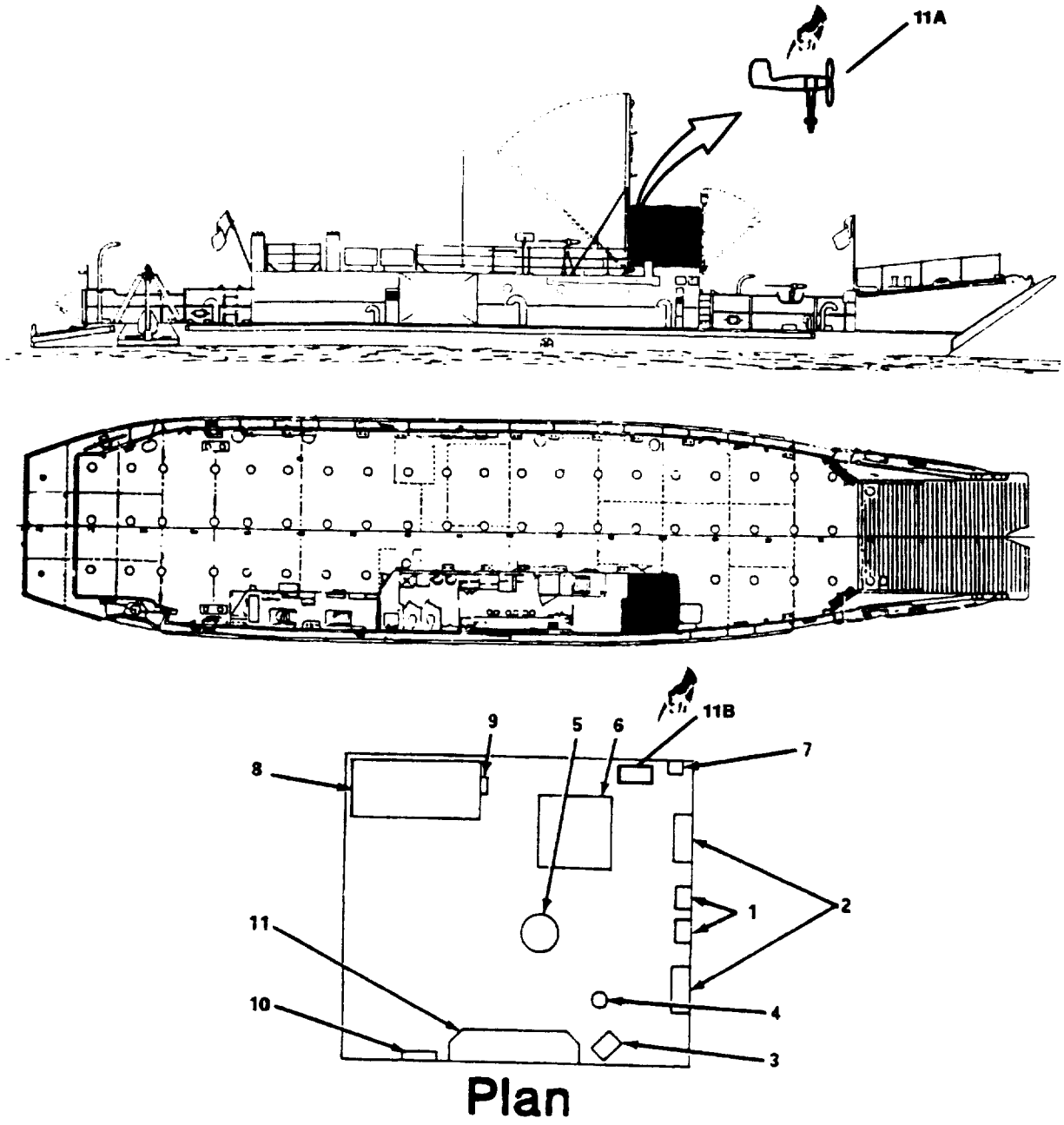


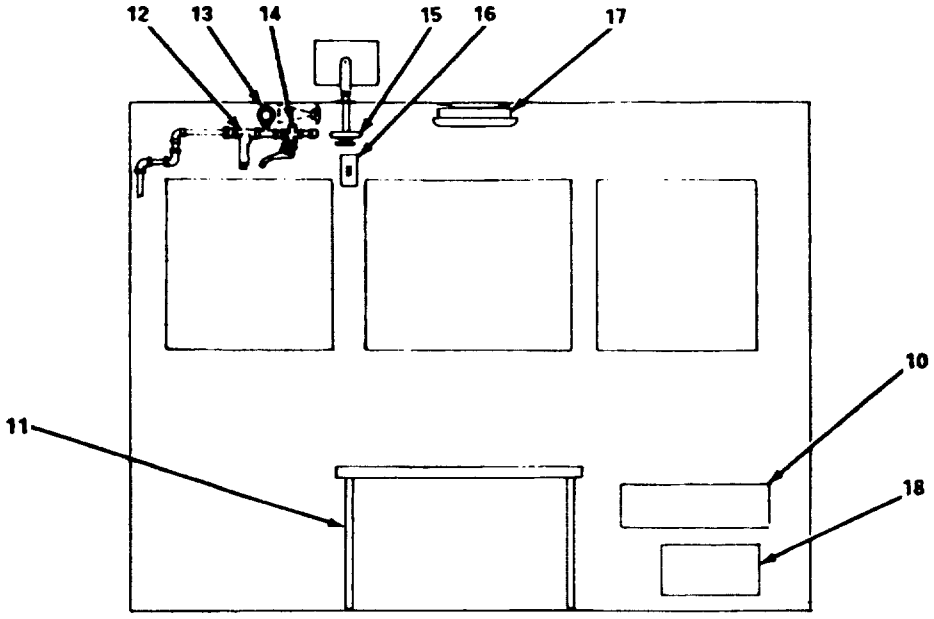
Figure 1-10.1. Conning Tower (Sheet 1 of 3).

1-23.1 CONNING TOWER
LEGEND FIGURE 1-10.1.

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 80 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 to the 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 1-10.1. Conning Tower (Sheet 2 of 3).

1-23.1. CONNING TOWER (CONT).
LEGEND FIGURE 1-10.1 (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.

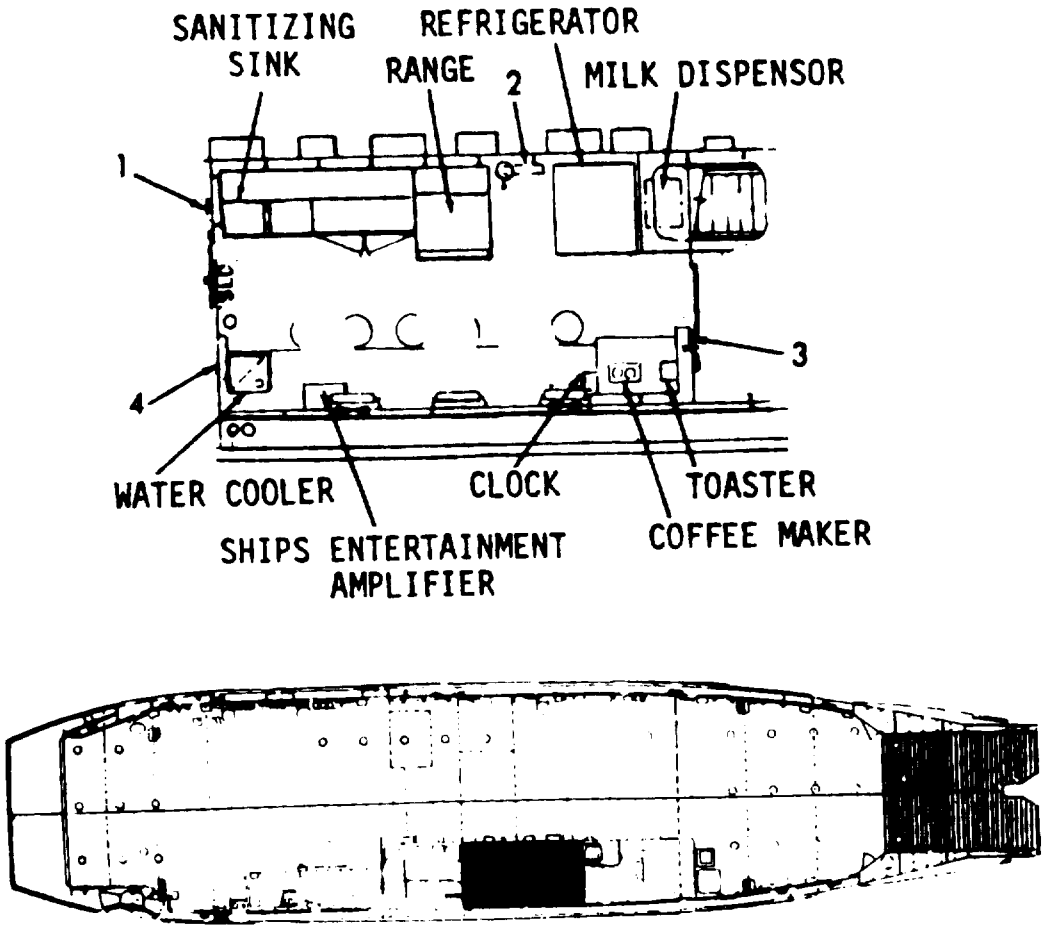
17. LIGHT FIXTURE - Ceiling mounted fluorescent fixture for general nighttime illumination, switchable to white or red light.

18. HVAC DUCT - Covered duct to allow ventilation from ship's HVAC system.

Figure 1-10.1. Conning Tower (Sheet 3 of 3).

1-24. GALLEY.

The major components of the Galley (1-35-1-L) are shown in Figure 1-11.



1. SINK HEATER - Controls for heater in sanitizing sink
2. RANGE DISCONNECT - Disconnect switch for range.
3. DECK HOUSE EXHAUST FAN - Break-glass emergency stop for exhaust fan in Deck House.
4. DISTRIBUTION PANEL L105 - Power distribution to the various components in the Galley.

Figure 1-11. Galley.

1. Yardarm
2. Communication Antenna (AS/1729/VRC)
3. Aircraft Obstruction Marker/Blinker 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 Blocks (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

Figure 1-11.1. Components of the Mast (Sheet 1 of 2).

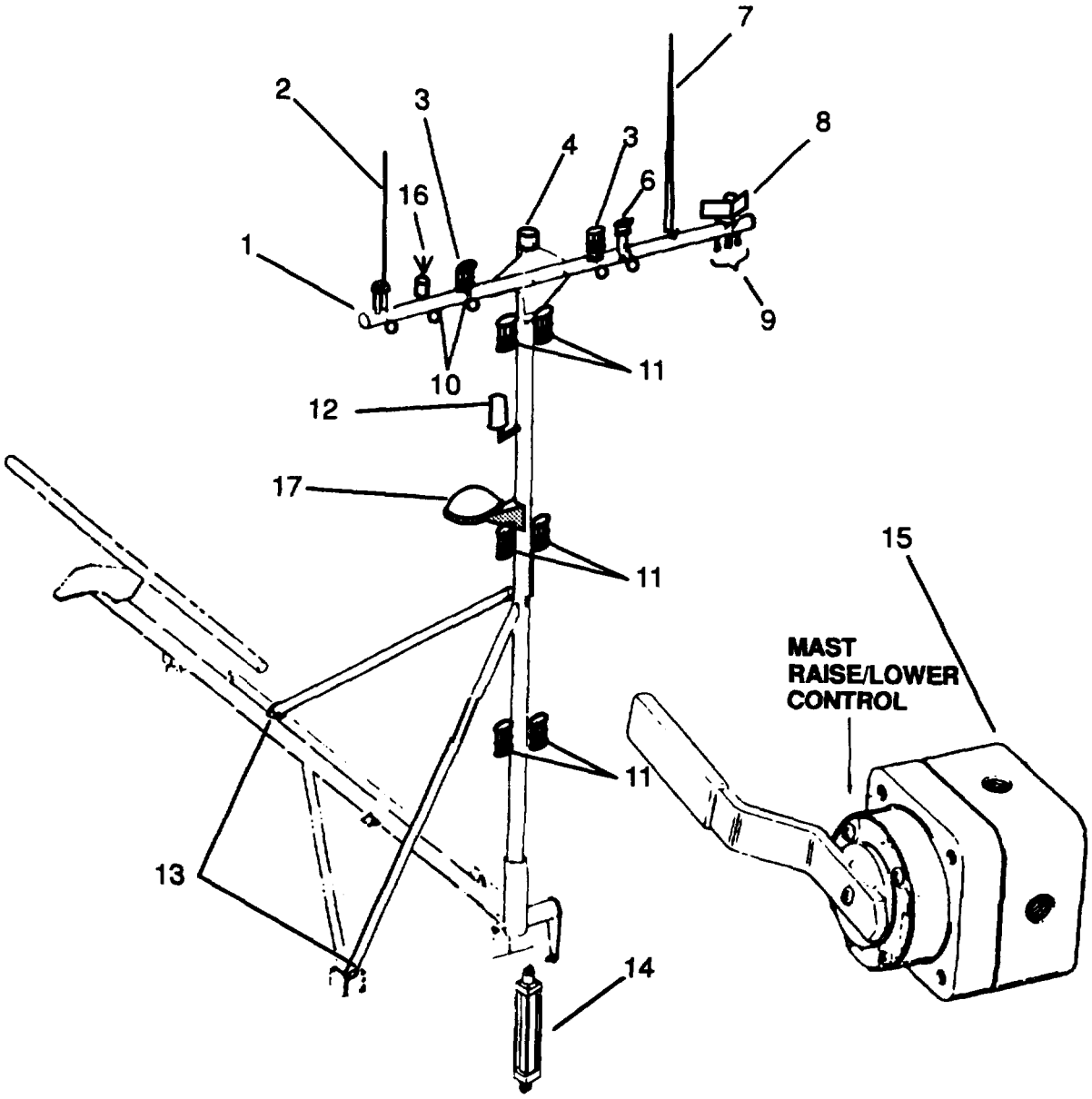


Figure 1-11.1. Components of the Mast (Sheet 2 of 2).

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

The major components of the Wash Room, Water Closet and Shower compartment (1-44-1-L) are shown in Figure 1-12.

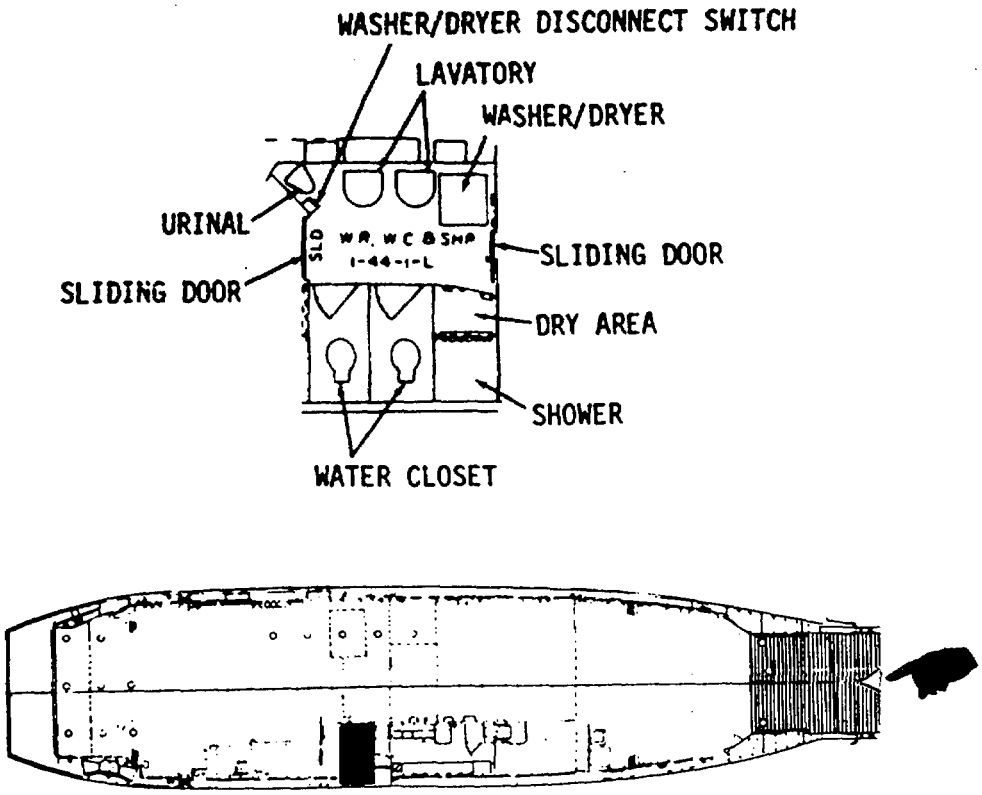
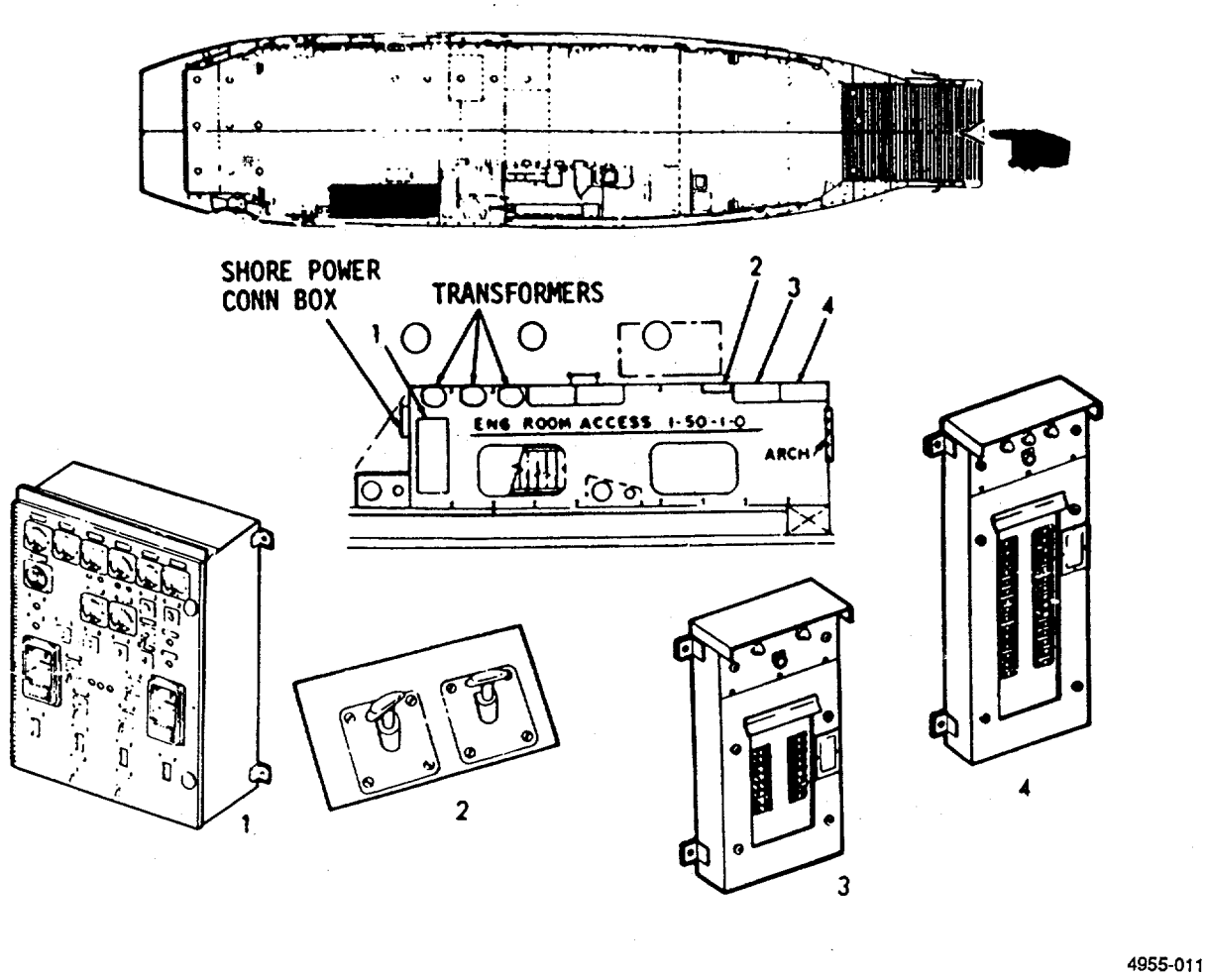


Figure 1-12. Washroom, Water Closet And Shower

1-26. ENGINE ROOM ACCESS.

The major components of the Engine Room Access Compartment (1-50-1-Q) are shown in Figure 1-13.



Legend Figure 1-13.

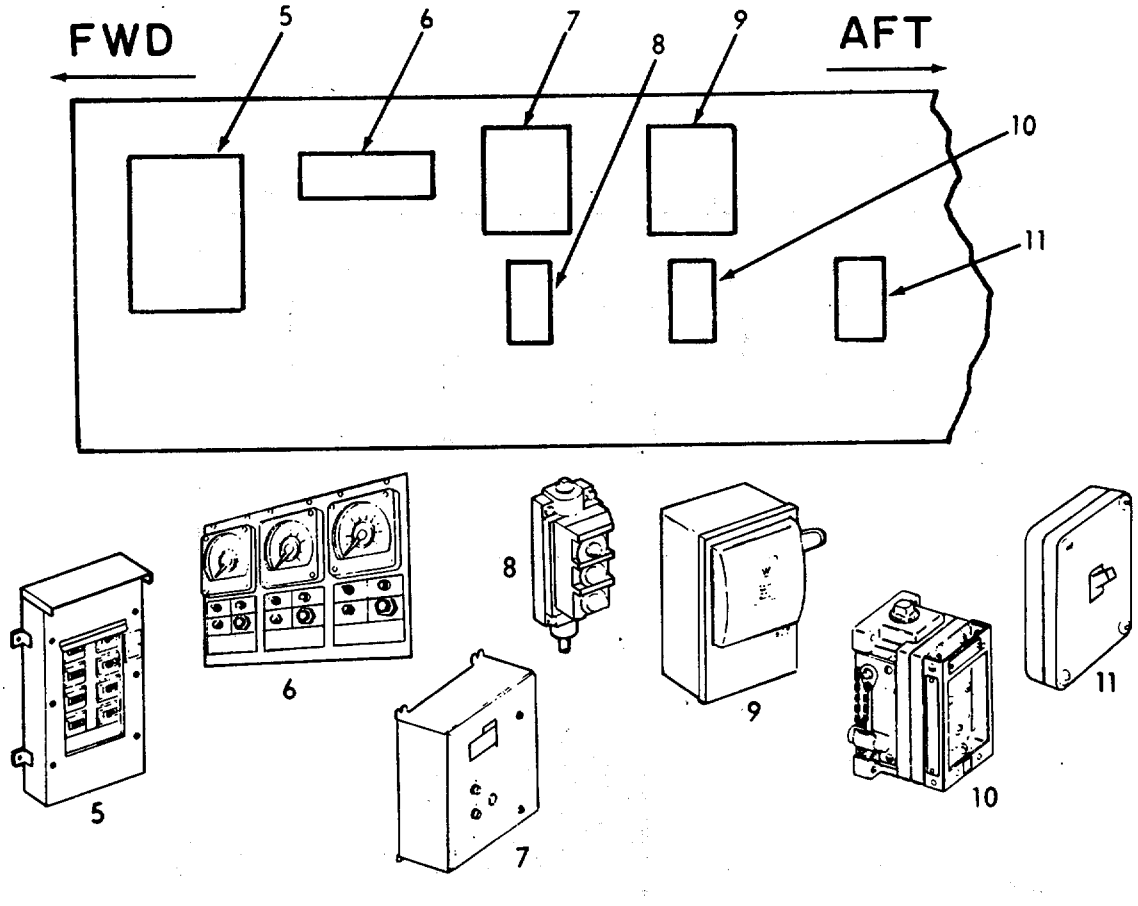
1- SHIPS SERVICE MAIN SWITCHBOARD - The switchboard monitors, protects and parallels the ships' two generators when underway. When in port, it monitors and protects against incorrect shore power.

2- PROPULSION ENGINE EMERGENCY SHUT DOWN PORT-STARBOARD - Pull levers to shut down an engine in an emergency situation.

3- LIGHTING DISTRIBUTION PANEL L102.

4- LIGHTING DISTRIBUTION PANEL L100.

Figure 1-13. Engine Room Access Compartment (Sheet 1 of 3)



Legend Figure 1-13 (Continued)

5- POWER DISTRIBUTION PANEL P-400.

6- TANK LEVEL INDICATORS - Indicates level of contents in the DIESEL TANK PORT-DIESEL TANK STBD - FRESH WATER.

7- DECK HOUSE EXHAUST FAN - Controller for the exhaust fans in the Pilot House, galley and washroom.

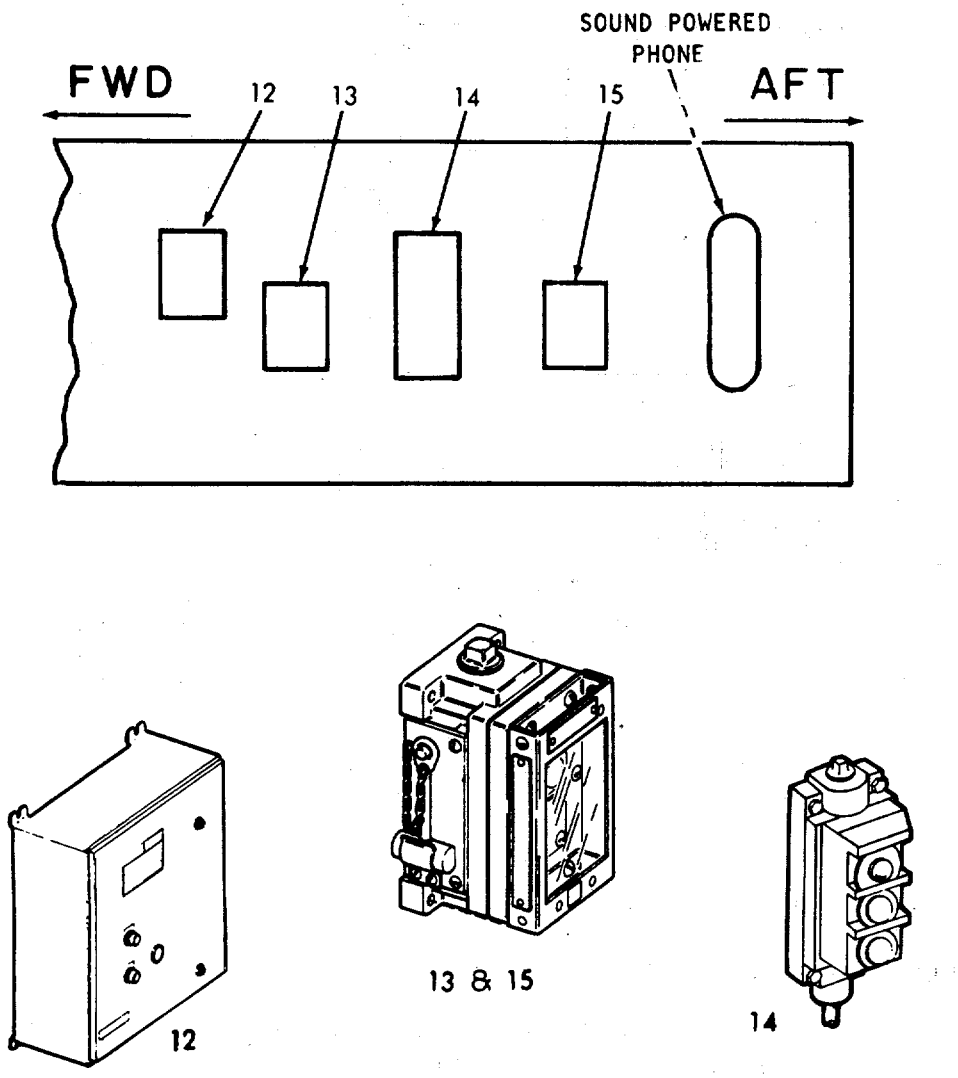
8- CENTRAL HYDRAULIC SYSTEM - Remote start/stop for the central hydraulic system.

9- DECK HOUSE EXHAUST FAN DISCONNECT SWITCH - Used to disconnect power to the controller.

10- FWD ENG RM EXH FAN - Emergency stop for the exhaust fan in the forward engine room.

11- FWD ENG RM LIGHTS --Switch to turn on/off the lights in the forward engine room.

Figure 1-13. Engine Room Access Compartment (Sheet 2 of 3)



Legend Figure 1-13 (Continued)

12- AFT ENG RM LIGHTS - Switch to turn on/off the lights in the Aft Engine Room.

13- AFT ENG RM EXH FAN - Emergency stop for the exhaust fan in the Aft Engine Room.

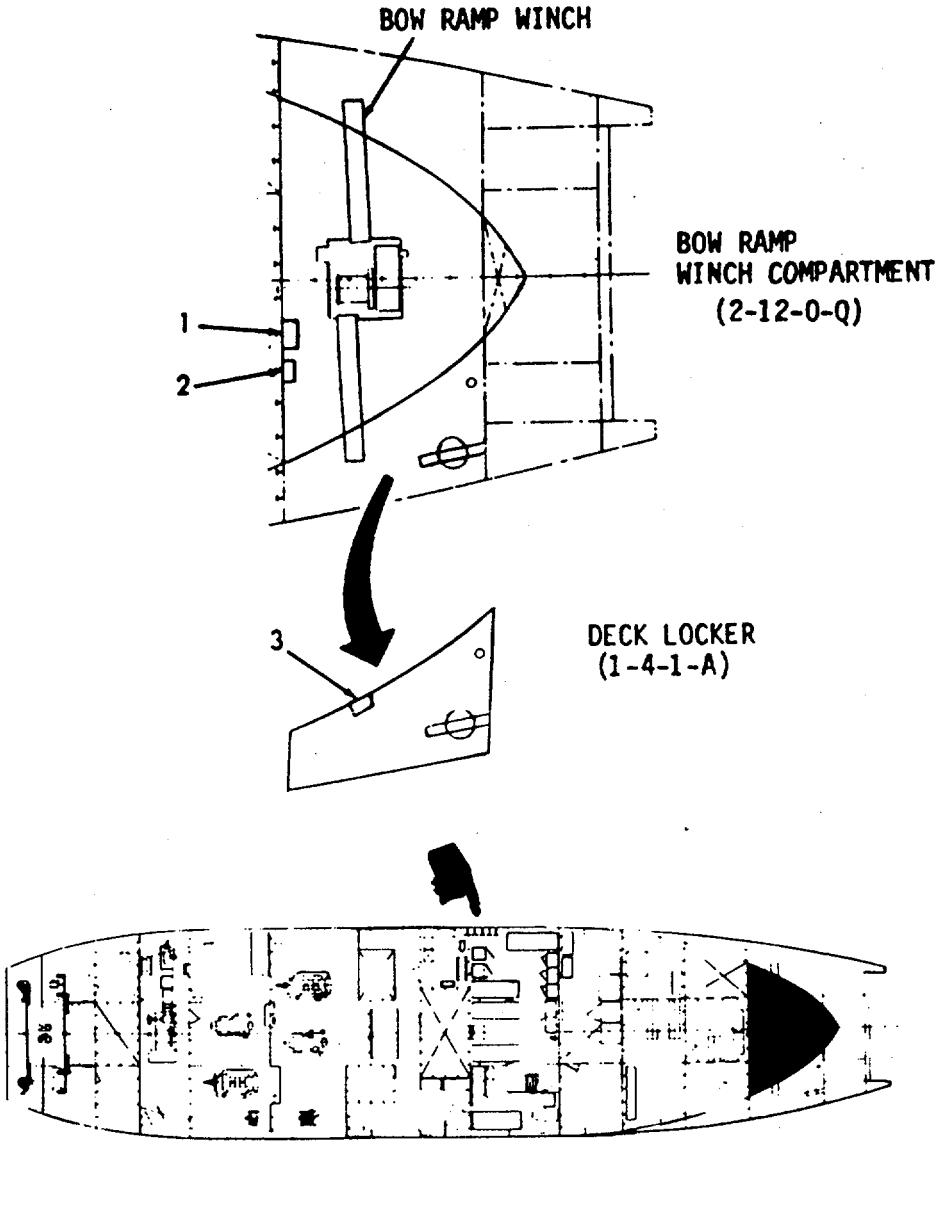
14- FIRE PUMP - Remote start/stop for the Fire Pump.

15- ANCHOR WINCH EXH FAN - Emergency stop for the exhaust fan in the Anchor Winch Compartment.

Figure 1-13. 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 Cargo Deck and provides access to the Winch Compartment. Refer to Figure 1-14.

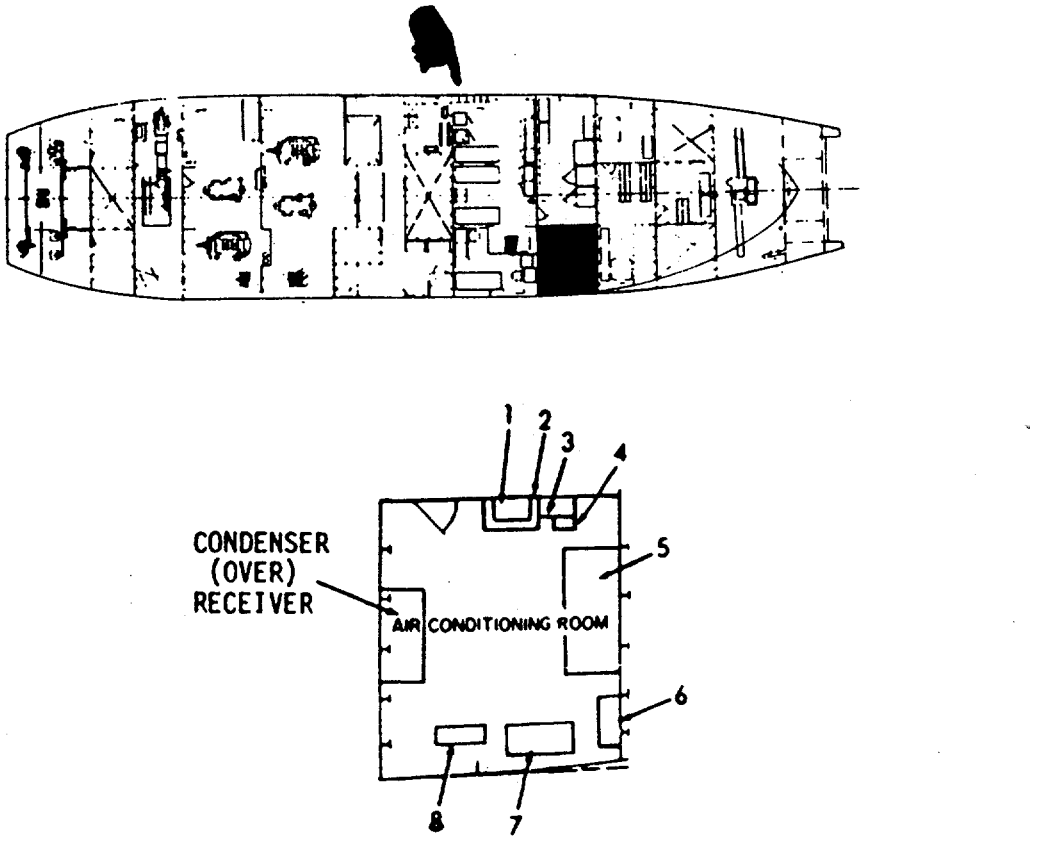


1. CONTROLLER - Motor controller with start, stop, and re-set switches.
2. DISCONNECT SWITCH - Disconnects the power from the controller.
3. LOCAL PUSHBUTTON SWITCHES - Switches located in Deck Locker for local operation of Ramp.

Figure 1-14. Bow Ramp

1-28. AIR CONDITIONING MACHINERY ROOM.

The major components of the Air Conditioning Machinery Room are shown in Figure 1-15.



1- A/C FAN - Controller for the exhaust fan in the Air Conditioning Room.

2- A/C COMPRESSOR - Controller for the compressor motor.

3- A/C SEA WATER PUMP - Controller for the sea water cooling pump for the air conditioner.

4- HEATER - Disconnect switch for the heater in the Air Conditioner Room.

5- COMPRESSOR - Compressor and motor for the air conditioner.

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

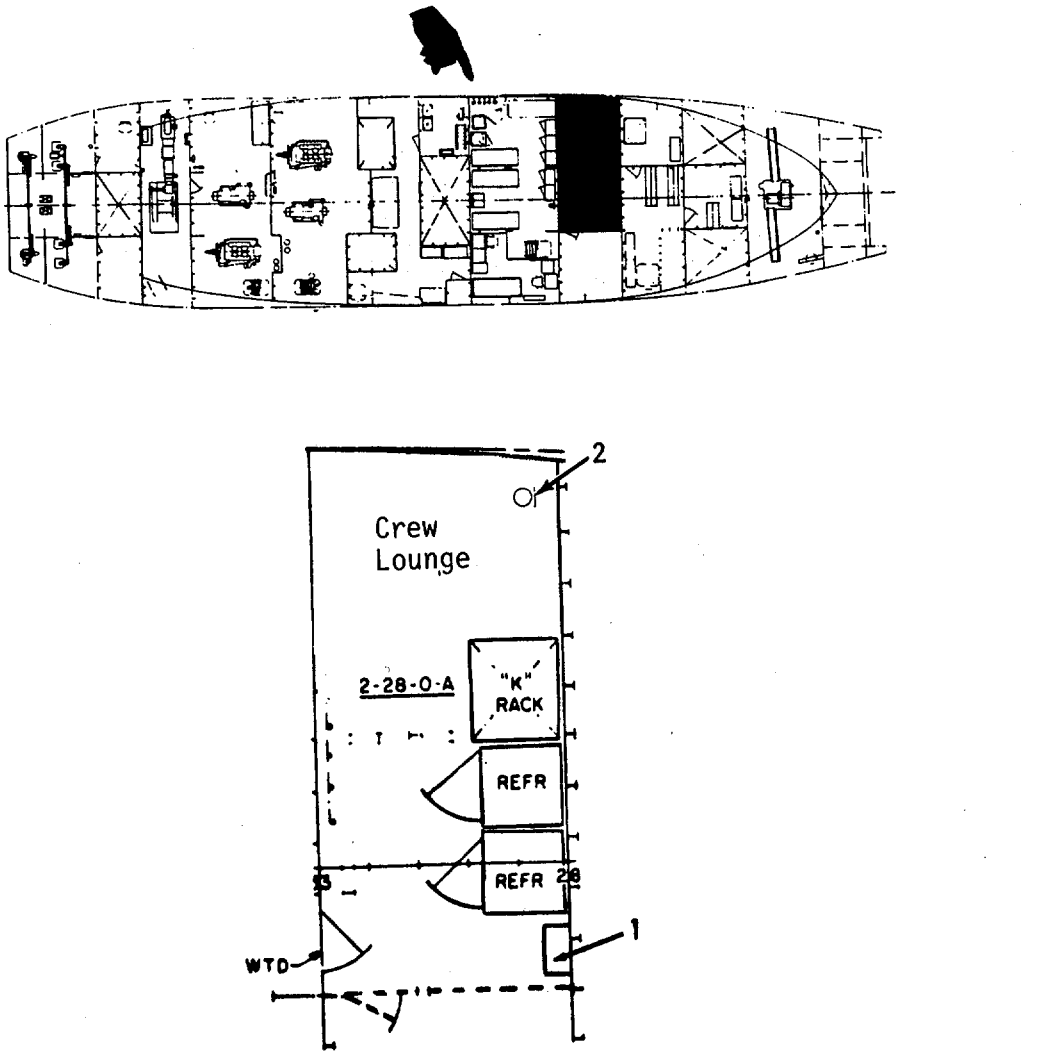
7- SEA WATER PUMP - Seawater cooling pump and motor.

8- POWER DISTRIBUTION PANEL P-409 - Distributes power to the Air Conditioning Room.

Figure 1-15. Air Conditioning Room

1-29. EQUIPMENT AND REPAIR PARTS STORES.

The Crew Lounge (2-28-0-A) contains two major components. See Figure 1-16.

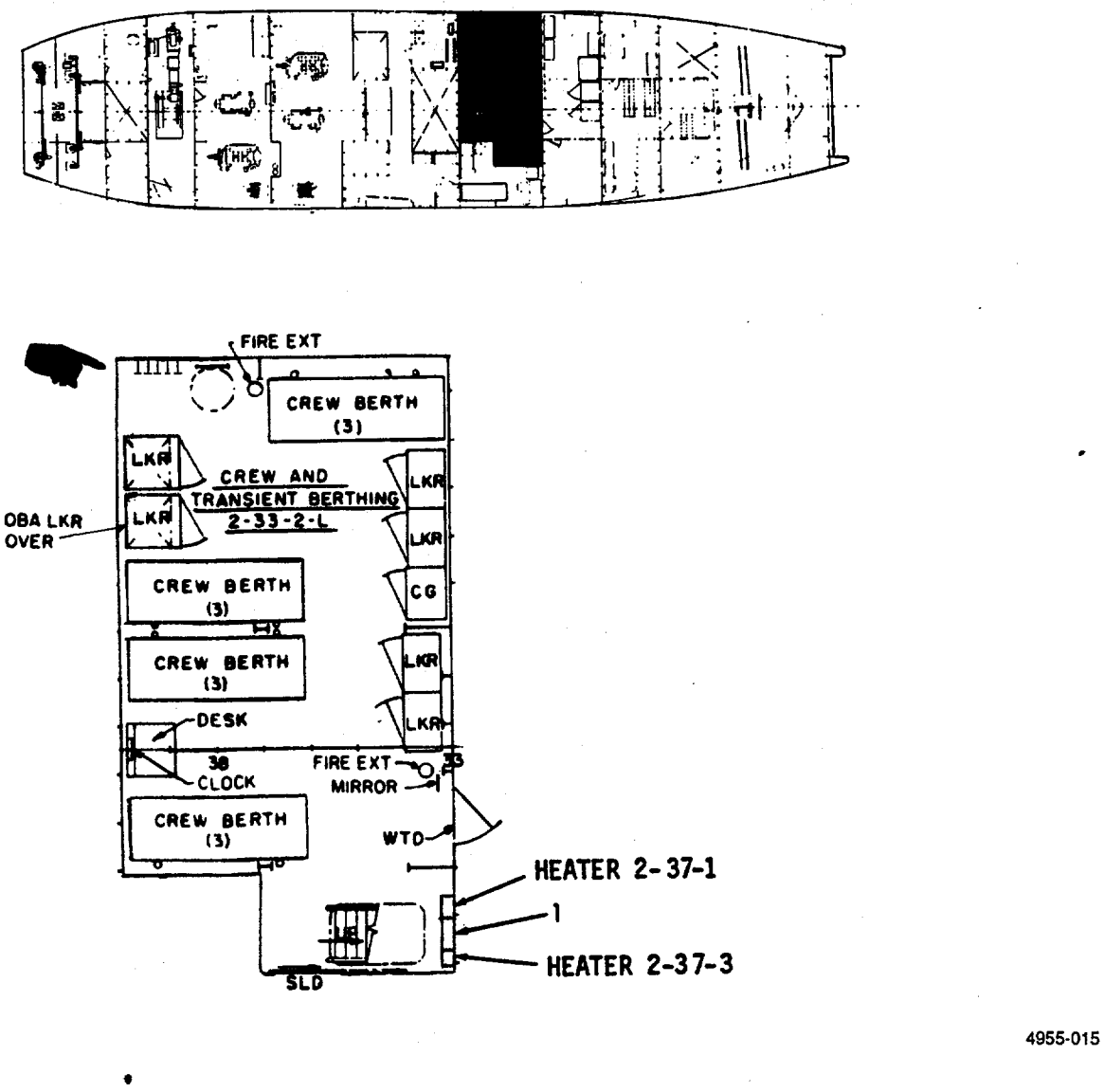


1. LIGHTING PANEL L-109 - Distribution of power to lights and fans located forward of Frame 40 in the hold.
2. EMERGENCY ESCAPE HATCH

Figure 1-16. Crew Lounge

1-30. CREW AND TRANSIENT BERTHING.

The major components in the Crew and Transient Berthing Compartment (2-33-2-L) are shown in Figure 1-17.

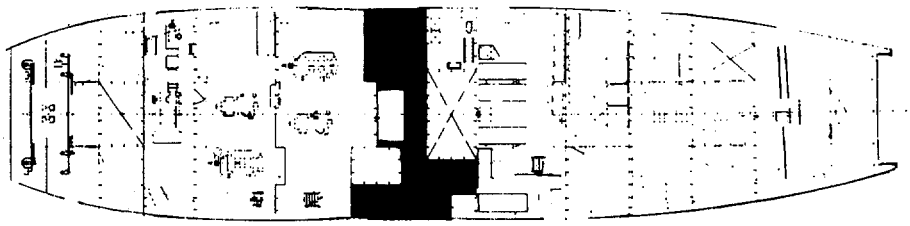


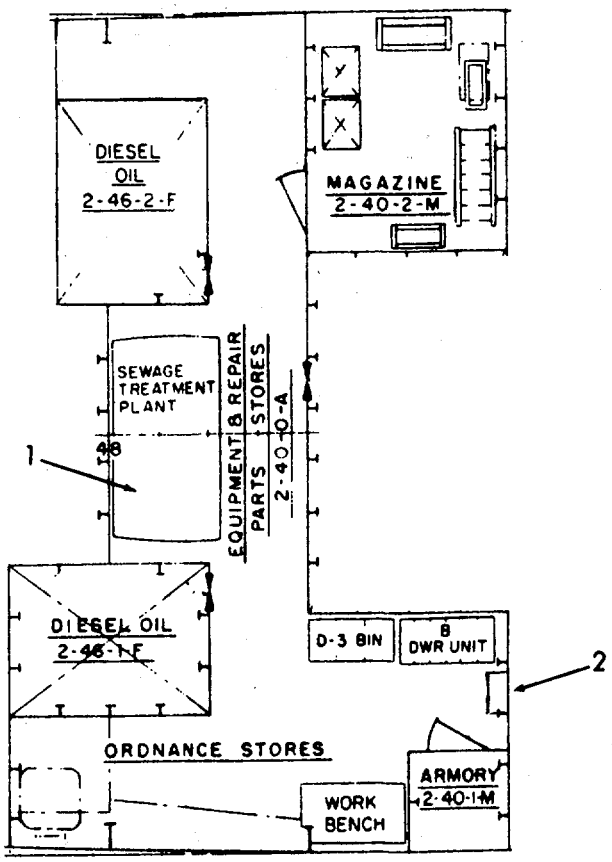
1- HEATER PANEL P-410

Figure 1-17. Crew and Transient Berthing

1-31. EQUIPMENT AND REPAIR PARTS STORES.

The major components of the Equipment and Repair Parts Stores Compartment (2-40-0-A) are shown in Figure 1-18 The Sewage Treatment Plant is also located in this compartment, and is shown in Figure 1-19.

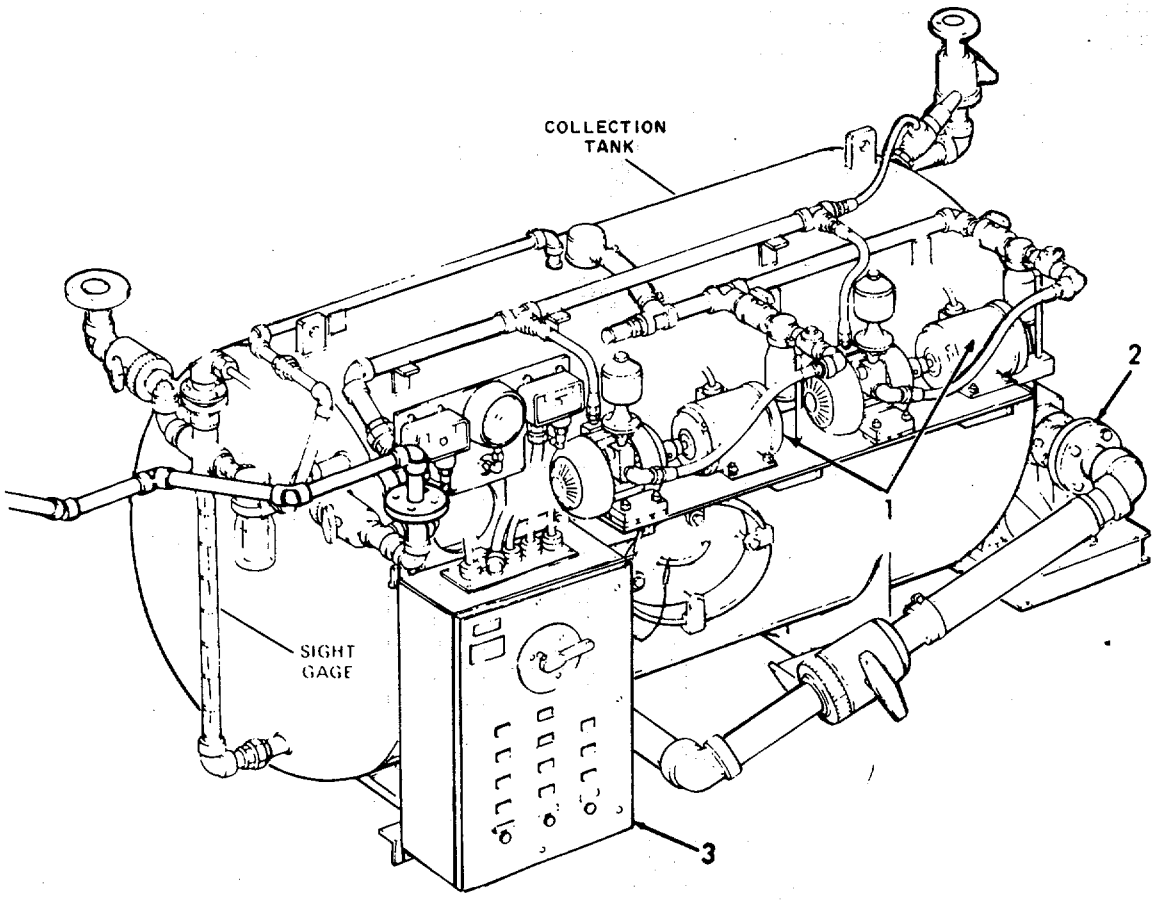




1- SEWAGE TREATMENT PLANT - Collection tank, pump and motor for the collection and disposal of sewage.

2- HEATER DISTRIBUTION PANEL L-110.

Figure 1-18. Ordnance And Equipment And Repair Parts Stores



1- VACUUM PUMP AND MOTORS - Electrically operated by flushing the urinal and water closets. Pumps pull sewage into collection tank.

2- DISCHARGE PUMP AND MOTOR - Pumps the contents of the collection tank to shore disposal tanks.

3- CONTROLLER - Controls the operation of the pump motors and alarm systems.

Figure 1-19. Sewage Treatment Plant

1-32. FORWARD ENGINE ROOM.

The major components of the Forward Engine Room (2-50-0-E) are shown in Figure 1-20. The fresh water system is shown in Figure 1 -21.

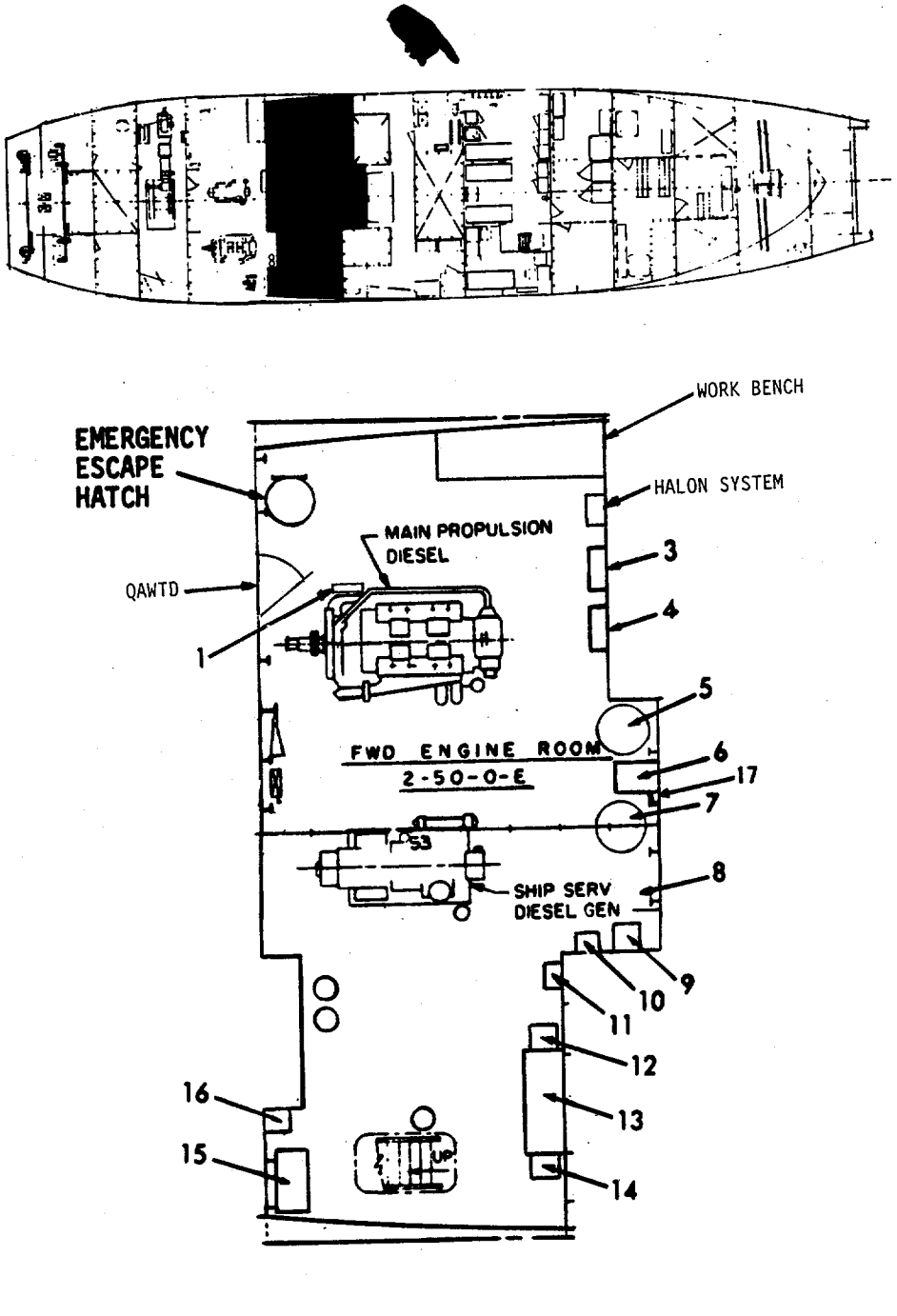
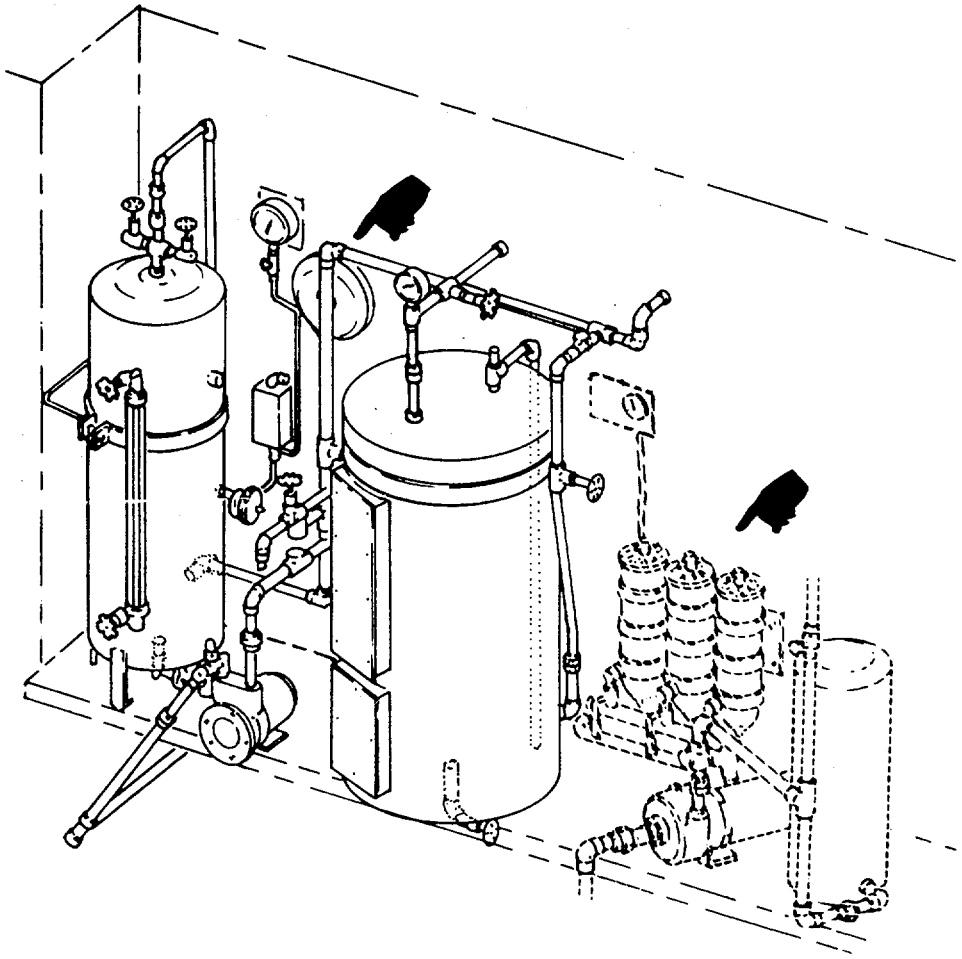


Figure 1-20. Forward Engine Room

Legend Figure 1-20.

1. PORT L/O PUMP - Controller for the Port Engine Lube Oil Pump.
2. LUBE OIL PUMP - Lube oil pump for the Port Propulsion Engine.
3. FWD ENG RM EXH FAN - Controller for Forward Engine Room Exhaust Fan.
4. FRESH WATER PUMP CONTROLLER - Controller for fresh water pump.
5. FRESH WATER TANK - Pressure tank for Fresh Water System.
6. FRESH WATER PUMP - Pressure pump for Fresh Water System.
7. HOT WATER TANK - Hot water heater.
8. SEA WATER SERVICE PUMP - Pressure pump for sea water flushing of urinal and water closets.
9. SEA WATER TANK - Pressure tank for Sea Water Flushing System.
10. FLUSHING WATER CONT - Controller for sea water service pump.
11. POWER DISTRIBUTION PANEL P-401 - Distributes power to pumps, heaters, and ventilators located in the Fwd and Aft Engine Rooms.
12. LIGHTING DISTRIBUTION PANEL L-103 - Distributes power to lights in Ordnance Stores, Fwd Engine Room, Anchor Winch, and Engine Access Compartments.
13. LUBE OIL TANK - Tank containing oil for lubrication of the diesel engines.
14. LUBE OIL TRANSFER PUMP - Manual pump used to transfer oil to lube oil pumps on main propulsion engines.
15. CENTRALIZED HYDRAULIC SYSTEM PUMP - Supplies hydraulic pressure to operate the Mast, Stern Gate, and the Anchor "A" Frame.
16. CENTRAL HYDRAULIC CONTROLLER - Controls the Central Hydraulic System Pump.
17. FUEL FILTER/WATER SEPARATOR - Separates water from diesel



4955-017

Figure 1-21. Fresh Water System

1-33. AFT ENGINE ROOM.

The major components of the Aft Engine Room (2-56-0-E) are shown in Figure 1-22. The Oil-Water Separator is shown in Figure 1 -23.

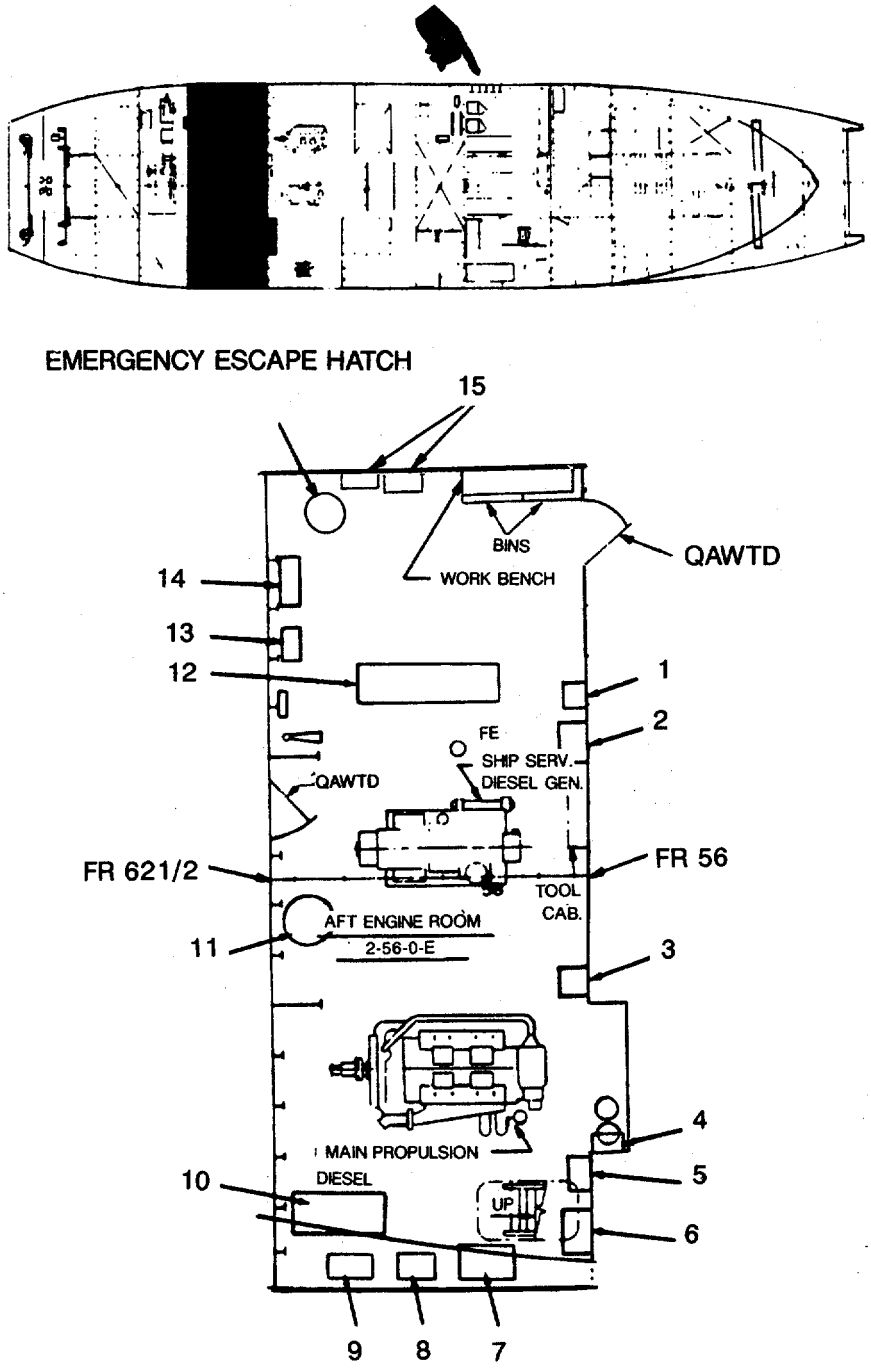


Figure 1-22. Aft Engine Room.

Legend Figure 1-22. Aft Engine Room (2-56-0-E)

1. AFT ENG RM EXH FAN - Disconnect Switch for the exhaust fan in the Aft Engine Room.
2. AFT ENG RM EXH FAN - Controller for the exhaust fan in the Aft Engine Room.
3. HEATER AFT ENG RM - Disconnect Switch for the heater in the Aft Engine Room.
4. HEATER FWD ENG RM - Disconnect Switch for the heater in the Forward Engine Room.
5. SEA WATER COOLING - Disconnect Switch located over Controller. Controls the sea water cooling pump for diesel oil cooling.
6. SEA WATER COOLING PUMP - Pump for sea water cooling of diesel oil.
7. LIGHTING DISTRIBUTION PANEL - L-101 - Supplies power to lights in the Aft Engine Room, Voids and Steering Gear Compartment, Anchor Winch Room, Oil/Water Separator, and Anchor Winch Controls.
8. AFT LUBE OIL PUMP - Disconnect Switch for the Aft lubricating oil pump.
9. AFT LUBE OIL PUMP - Controller for the Aft lubricating oil pump.
10. AFT LUBE OIL PUMP - Pump for the lubrication oil for the Starboard Main Propulsion Engine.
11. FIRE PUMP - Pumps sea water to fight fires.
12. OIL/WATER SEPARATOR - Separates the oil from the water in the bilges.
13. TANK LEVEL INDICATOR - Indicates the level of sea water in the sea water ballast tanks.
14. FIRE PUMP CONTROLLER - Controller for the Fire Pump.
15. FIRE PUMP - Disconnect Switch for the Fire Pump Controller.

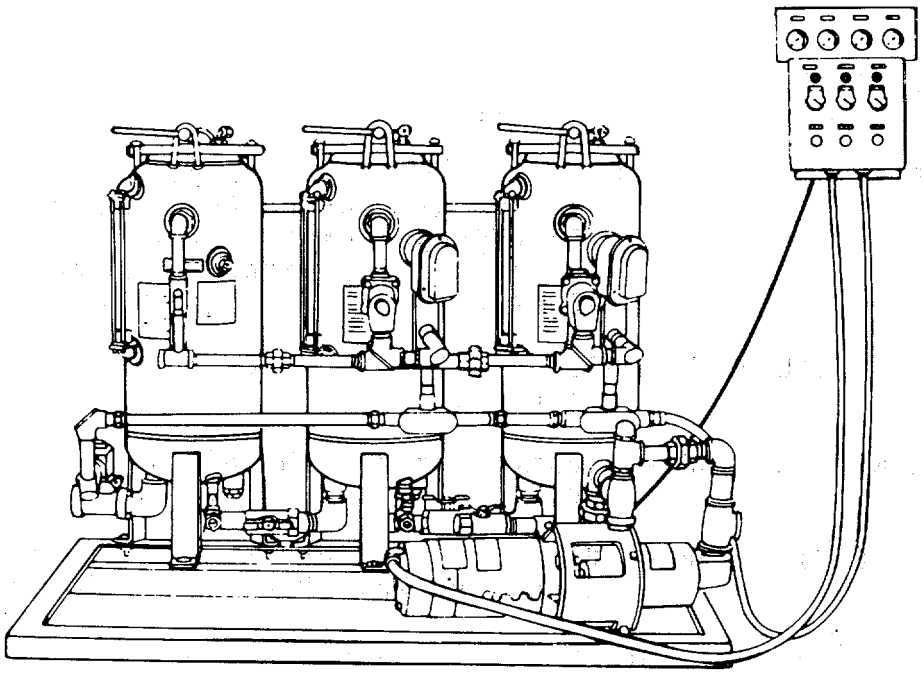


Figure 1-23. Oil/Water Separator

1-34. ANCHOR WINCH COMPARTMENT.

The major components of the Anchor Winch Compartment (2-62-O-Q) are shown in Figure 1-24.

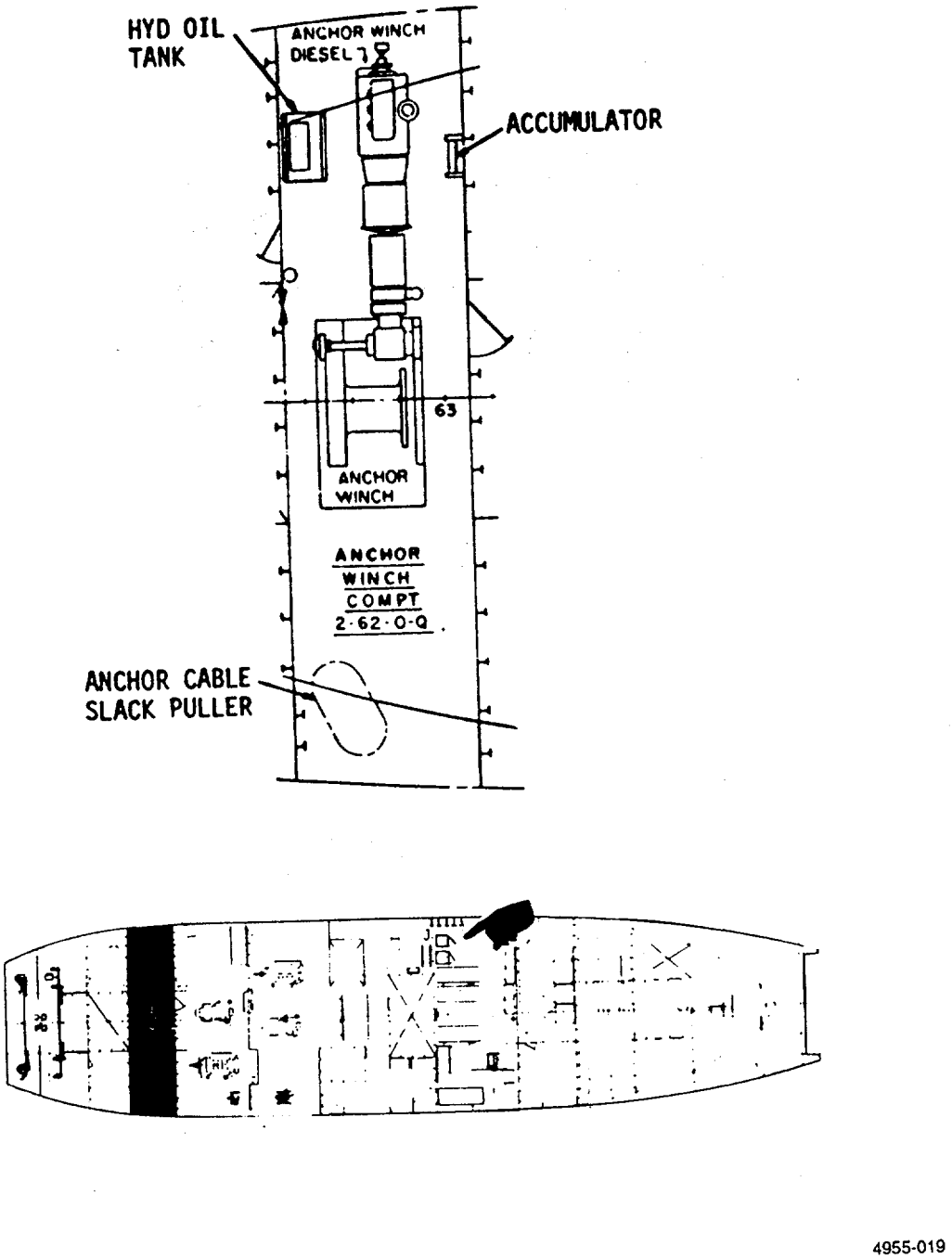


Figure 1-24. Anchor Winch Compartment

1-35. STEERING GEAR COMPARTMENT.

The major components of the Steering Gear Compartment (2-70-0-Q) are shown in Figure 1-25.

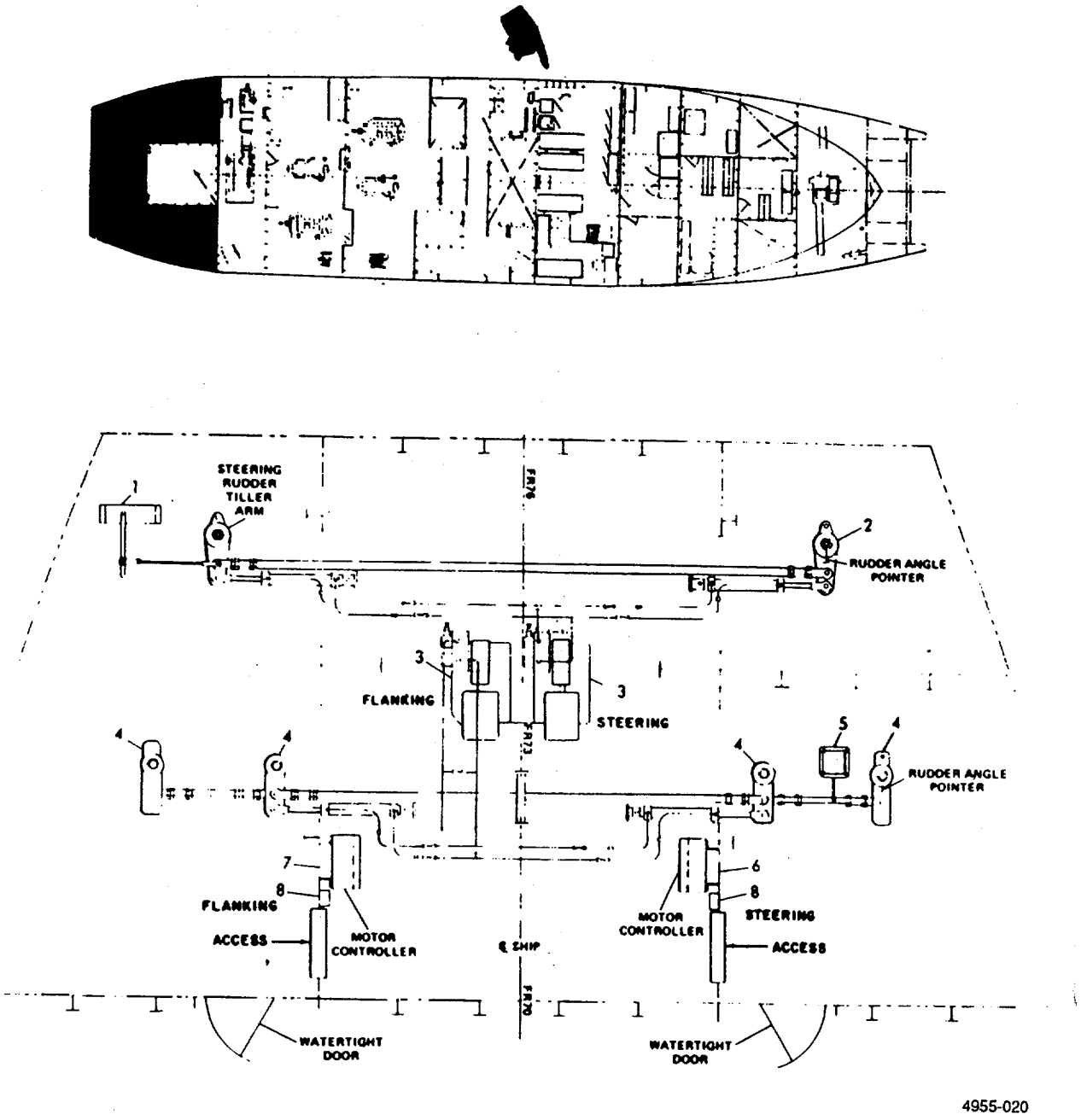


Figure 1-25. Steering Gear Compartment

Legend Figure 1-25. Steering Gear Compartment.

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).

1-36. 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 the water. Refer to Figure 1-26.

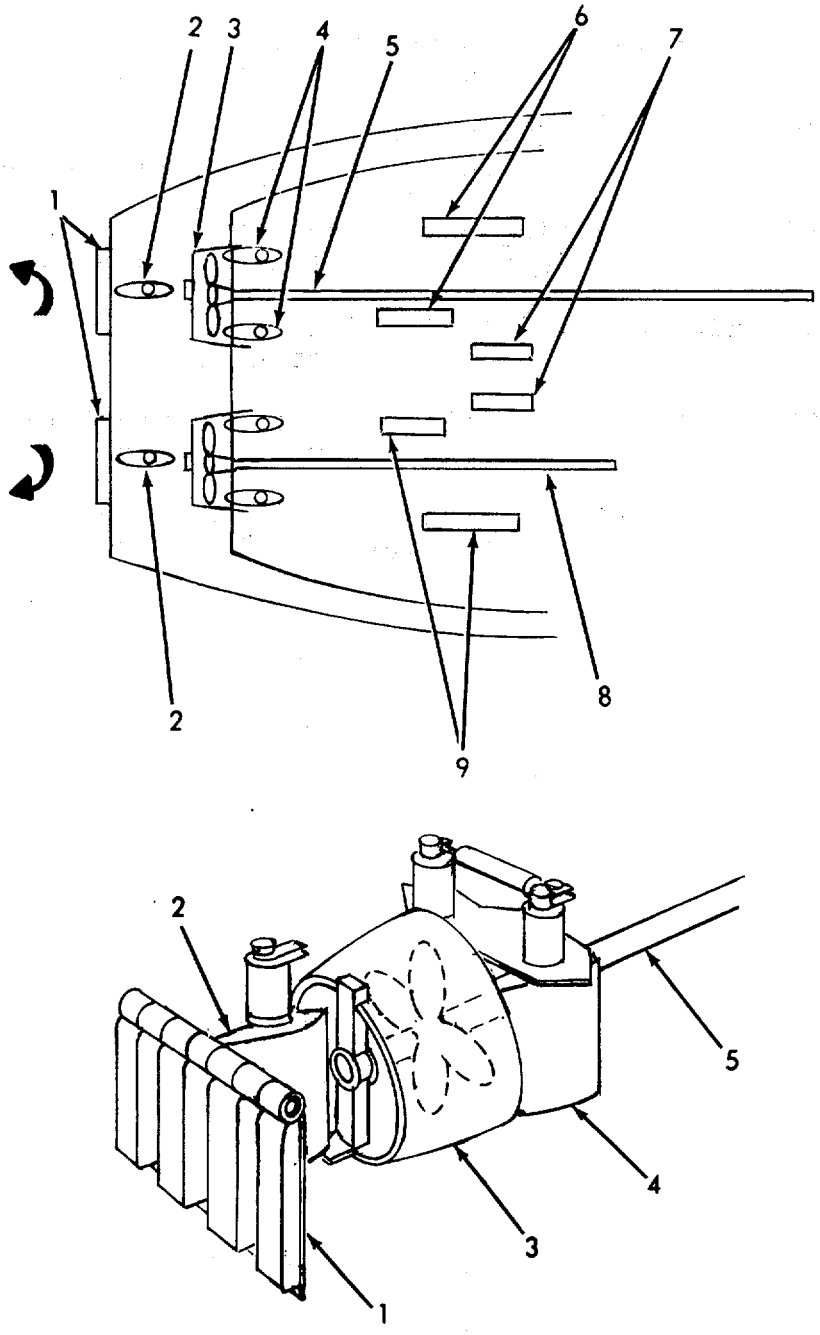


Figure 1-26. Propellers, Rudders And Keel Coolers

Legend Figure 1-26. Propellers, Rudders And Keel Coolers.

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 COOLER - Cooling device located under vessel, used to cool Starboard Propulsion Engine.

1-37. 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-13.1 and FO-13.2 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 1-27) is a solid red cylinder.
2. Halon (Figure 1-28) 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 1 portable dry chemical
Flammable Liquid Storeroom	1 portable Halon and 1 portable dry chemical
Bow Ramp Winch	1 portable Halon
Forward Engine Room	2 portable Halon and 1 dry chemical
Aft Engine Room	2 portable Halon and 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-14. 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 53 Vehicle Deck Portside and in the Engine Access Room (1-49-1-L) under the Switchboard. The Portable Fire Pump is also used to fill and empty the Forward Sea Water Ballast Tank (2-8-0-W). It is stored in the flammable liquids storeroom (1-4-2-A).

HALON SYSTEM

The Halon System (Figure FO-15) is an automatic fire detection and extinguishing system. There are three systems; one in the Forward Engine Room (2-50-0-E), one in the Aft Engine Room (2-56-0-E), and a third in the Flammable Liquid Storage Compartment (1-4-2-A).

1-38. 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.

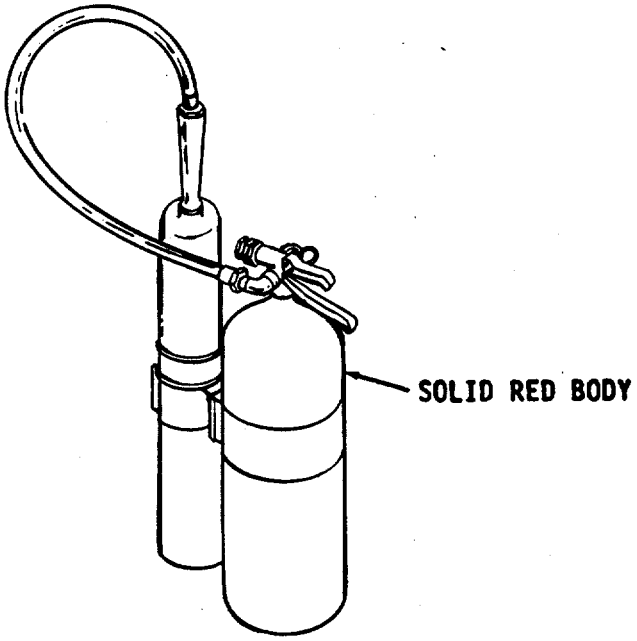
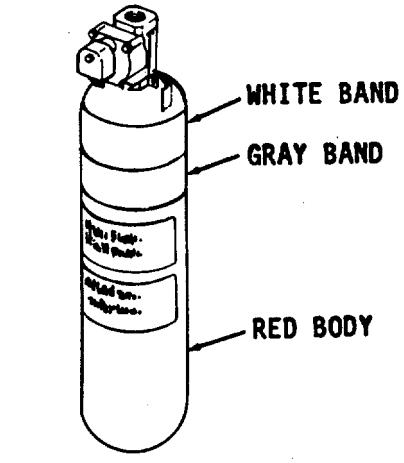


Figure 1-27. C02 Fire Extinguisher



FIXED OR PORTABLE

Figure 1-28. Fixed Halon Fire Extinguisher

1-39. EQUIPMENT DATA.

PRINCIPAL CHARACTERISTICS

Length, overall	135 ft. 1-5/16 in. (41.181 m)
Length, between perpendiculars	134 ft. 0 in. (40.843 m)
Beam (extreme)	29 ft. 9-1/8 in. (9.071 m)
Maximum Draft, landing displacement with 3 M-48 tanks (Fwd Marks)	3 ft. 11-3/4 in. (1.219 m)
Maximum Draft, landing displacement with 3 M-48 tanks (Aft Marks)	6 ft. 7-1/2 in. (2.019 m)
Limiting Draft - above keel at midship (6" Fwd FR 39)	5 ft. 5 in. (1.651 m)
Limiting Height above line of lowest point of keel (for entering LSD)	17 ft. 9 in. (5.410 m)
Vehicle deck above line of lowest point of keel (no camber-no sheer)	9 ft. 8-1/8 in. (2.950 m)
Displacement, light	204.65 long tons (207.924 m ton)
Displacement, landing (with 3 M103 tanks)	375.69 long tons (381.701 m ton)
Fuel oil capacity (95%)	3,290 gal. (12952.65 1
Fresh water capacity (95%)	3,958 gal. (14981.03 1
Shaft horsepower-continuous	850 shp.
Speed (in landing condition)	11 knots
Range	1600 nautical miles (2574.4 km)

PERSONNEL ACCOMMODATIONS

Officers	2
Enlisted Men (including crew)	10
Transient Berths	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 inches (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 1pm)

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
Rotation	Right
Number of Cylinders	4
Bore	4.25 inch (108 mm)
Cycle	2
Stroke	5 inch (127 mm)
Starting	Hydraulic
Compression Ratio	18.7 to 1
Hydraulic Pump	
Manufacturer	
Model	PD3118AEQ20-4
Type	Gear
Operating Pressure	Up to 1500 psi (1054.5 kg sq cm)
Discharge	Up to 50 gpm (189.25 1pm)
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
Volt440	
Phase	3
Hertz	60

Electric Brake

Manufacturer	Dings Co.
Direct Brake Model	R-73050-4
Torque	45 lb. ft. (66.98 kgm)
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

Engine

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 inches (108 mm)
Stroke	5 inches (127 mm)
Starting	Hydraulic
Governor	Mechanical
Capacities	
Lube Oil	34 Quarts (32.2 Liters)

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	Counter-clockwise
Rotation Starboard Propeller Viewed From Stern	Clockwise
Propeller Shaft Speed At rated Horsepower	550 RPM

FIRE PUMP

Pump	
Manufacturer	Crane-Deming
Model	3185-Size VA50
Type	Centrifugal
Capacity	250 gpm (946.25 1pm)
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

BILGE EDUCTOR

Capacity	150 gpm (567.8 1pm)
Discharge Pressure	12 psi (843.7 gm sq cm)
Drive	Motive water supplied by the Fire Pump
Location	Aft Engine Room at Frame 62

FIRE AND SALVAGE PORTABLE PUMP

Pump	
Manufacturer	Outboard Marine Corp. or Prosser Industries
Model	P-250
Part No.	592150
Capacity	250 gpm (946.25 1pm)
Discharge Pressure	100 psi (7030.7 gm sq cm)
Horsepower	25 at 4500 RPM 30 at 3600 RPM
Piston Displacement	35.7 cu. in. (5851.23 cm)
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 1)
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-drive Centrifugal
Location	Stored in the Flammable Liquid Storage 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 (54.9.3 cm)

Engine

Manufacturer	Outboard Marine Corp. or Prosser Industries
Model	P-250
Cylinder	2
Cycle	2
Horsepower	25

SEA WATER FLUSHING PUMP

Pump

Manufacturer	Paco
Model	10-12501
Type	Centrifugal
Capacity	10 gpm (37.85 1pm) at a total head of 92 ft. (28.06 m)
Location	Forward Engine Room, Frame 49

Motor

Manufacturer	Reliance Electric Co.
Model	705470
Horsepower	1-1/2
Hertz	60
Phase	3

SEA WATER COOLING PUMP-DIESEL OIL

Pump

Manufacturer	Paco
Model	10-12501
Type	Centrifugal
Capacity	20 gpm (75.7 1pm) at a total head of 46 ft. (14.03 m)
Location	Aft of Frame 56, about 8 ft. Starboard of Centerline

Motor

Manufacturer	Reliance Electric Co.
Model	705471
Horsepower	3/4
Hertz	60
Phase	3

SEA WATER COOLING PUMP-AIR CONDITIONING

Pump

Manufacturer	Lancaster
Model	909
Type	Centrifugal
Capacity	48 gpm (181.7 1pm) 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

FRESH WATER PRESSURE PUMP

Pump

Manufacturer	Paco
Model	22-25
Type	Turbine, Centrifugal
Capacity	5 gpm (18.9 1pm) at 45 psi (3163.8 gm sq cm) total head
Location	Forward Engine Room, Frame 49

Motor

Manufacturer	Reliance Electric Co.
Model	705467
Type	Electric
Horsepower	3/4
Hertz	60
Phase	3
Volt	440

SEWAGE DISCHARGE PUMP

Pump

Manufacturer	Weil-McLain Co. Inc. 80652
Model	30 MPO
Type	Self-Priming, 3 inch (7.6 cm) with flanged suction and discharge ports
Location	Frame 46-1/2 on the Sewage Treatment Plant

Motor

Manufacturer	Baldor Electric Co. 05472
Model	36J54
Revolutions (RPM)	1800
Vacuum	440
Horsepower	5
Hertz	60
Phase	3
Type	Electric

SEWAGE SYSTEM VACUUM PUMPS (2)

Pump

Manufacturer	Kenro Corp. 21423
Model	2065-V2
Type	3/4 inch (0.75 cm) Rotary Vane
Location	Frame 45-12 on the Sewage Treatment Plant

Motor

Manufacturer	Baldor Electric Co. 05472
Model	35P50
Horsepower	1
Hertz	60
Phase	3
Type	Electric

STANDBY LUBE OIL PUMP

Pump	
Manufacturer	Crane-Deming
Model	1537-1
Type	1 inch (2.54 cm) Belt Driven Rotary
Capacity	13 fpm (49.2 1pm)
Location	At Frame 60 in Aft Engine Room and at Frame 55-1/2 in the Forward Engine Room
Motor	
Manufacturer	Reliance Electric Co.
Model	705469
Vol t	440
Horsepower	1-1/2
Hertz	60
Phase	3
Type	Electric

LUBE OIL TRANSFER PUMP

Type	Rotary, Hand Driven Positive Displacement
Capacity	5 gpm (18.9 1pm) at a total head of 10 psi (703.07 gm sq cm)
Location	On the Lube Oil Storage Tank at Frame 51, Starboard

CENTRAL HYDRAULIC SYSTEM PUMP

Pump	
Manufacturer	Rexnord Inc. Hydraulic Components Div.
Model	PVQ-PSEJ-06-ERM
Type	Variable Volume Vane
Capacity	6.5 gpm (24.6 1pm)
Max. Outlet Pressure	1,000 psi (70307 gm sq cm)
Location	Mounted on the Central Hydraulic Power Unit at Frame 55
Motor	
Manufacturer	Lincoln Electric Co.
Model	182T
Volt	440
Horsepower	3
Hertz	60
Phase	3
Type	Electric
Revolutions (RPM)	1800

STEERING SYSTEM HYDRAULIC PUMPS

Pump

Manufacturer	Sperry Vickers Division
Model	182204-2
Type	Rotary
Capacity	6 gpm (22.7 1pm)
Location	Frame 74 in Steering Compartment A

Motor

Manufacturer	Sperry Vickers Div.
Model	1804192
Volt440	
Horsepower	2
Hertz	60
Phase	3
Type	Electric

BILGE PUMP

Manufacturer	Tecumseh Products Co. MP Pump Div.
Model	Flomax 24552
Capacity	150 gpm (567.8 1PM)
Discharge Pressure	15 psi (1054.6 gm sq cm)
Type	Self-Priming Centrifugal
Location	Forward Engine Room, Frame 52

OIL/WATER SEPARATOR SYSTEM

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

Pump

Manufacturer	Robbins and Myers Inc. 50164
Capacity	5 gpm (18.9 1pm)
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	Robbins and Myers Inc. 50164
Horsepower	1/2
Vac	115
Hertz	60
Phase	Single
Type	Electric

BALLAST TANK CAPACITY

Aft lank	2565 Gallons (9708.5 1)
Forward Port Tank	3290 Gallons (12074.2 1)
Forward Starboard Tank	3140 Gallons (11884.9 1)
Peak Tank	2830 Gallons (10711.6 1)

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	A/C Machinery Room, Equipment and Spare Parts Storeroom

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 Wardrobe Stateroom

1 1/4 Horsepower

Manufacturer	Reliance Electric Co.
Model	70547
Speed	3600
Voltage	440
Hertz	60
Location	Galley and Water Closets, Shower, Aux. Machinery Room, Engine Room Access

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	6 VDC (Each)
Navy Type	6V-SBM-1OOAH
Location	Pilot House, Frame 28

ON-BOARD ELECTRONICS EQUIPMENT

Radar
- Sweep Amplifier
- Indicator, PPI
- Antenna Unit
- Loudspeaker (Commercial)
- Antenna (String)

Transceiver, AN/VRC-46
- Antenna AS-1729/VRC
- Antenna Coupler MX-2799/VRC
- Microphone M-80/GR

Test Equippment
- Ohmeter 0-1000 Meg.
- Ammeter, Port AC
- Voltage, Port AC
- Voltmeter, Port DC

Receiver 442
- Antenna AB-558/GR
- Speaker LS-454

IFF System
- Antenna AS-177A/UPX
- Control C-6280/APX-72
- Rcvr/Smtr RT-859/APX-72
- Mtg DL-SC-B-691474

Radio Set AN/URC-80
- Rcvr/Xmtr RT-1061
- Control C-8981
- Junction Box JB-3319
- Remote C-9772/URC-80

Intercommunication System
- LS-518

Radio Set AN/URC-92

AIR CONDITIONING

Compressor

Manufacturer	Carrier-Transicold Company
Model	5F30
Cylinders	3
Bore	2-1/2 inches (6.35 cm)
Stroke	2 inches (5.08 cm)
Speed	1750 RPM
Capacity	7.8 tons at 40°F (4.40C) Suction Temp and 105°F (40.60C) Condensing Temp

Compressor Motor

Manufacturer	General Electric Co.
Model	5K182JX5211
Horsepower	5
VAC	208/230/460
Hertz	60
Revolutions (RPM)	3505
Phase	3

Condenser	
Manufacturer	Carrier
Model	90C01-2904
Shell Diameter	8-5/8 OD (21.9 cm)
Overall Length	41-1/8 (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 (0.75 cm) OD x .049 (0.12 cm) w x 3 inch 1g (0.92 m)
Sea Water Quantity (Design)	41 gpm (155.2 1pm)
Receiver	
Manufacturer	Standard Refrigeration
Model	C1O5HR33G
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. 220C)
Differential	2° to 50
Recommended Settings:	
Close	80°F (26.670C)
Open	78°F (25.560C)
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 (5F20-212)
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 Interchanger	
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 (2.2 cm) Liquid, 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	85.20F DB (29.6°C) 74.0°F WB (23.3°C)

*Leaving Air Temperature to be established by the shipyard.

HEATERS

Manufacturer	Wiegand Elec. Div of Emerson
Type	Electric
Duct Type	1.3 kw
Model	DHMS-2F-008-WO4H
Voltage	120
Phase	1
Element	One
Location	Wardroom Stateroom

Duct Type	2.2 kw
Model	DHMS-2F-012-WO6H
Voltage	480
Phase	1
Elements	Two
Location	Pilothouse
Duct Type	2.5 kw
Model	OHMS-2F-018-WO6H
Vac	480
Phase	1
El event	One
Location	Radio Room
Duct Type	3.3 kw
Model	DHMS-2F-012-WO6H
Vac	480
Phase	1
Elements	Two
Location	Crew Berthing
Duct Type	3.8 kw
Model	DHMS-2F-012-WO8H
Vac	480
Phase	3
Elements	Three
Location	Galley
Duct Type	7.5 kw
Model	DHMS-2F-024-WO8H
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	IH1801
Voltage	120
Hertz	60
Phase	1
Location	Washroom Water Closets and Shower, A/C Machinery Room

Navigation Horn

Air Compressor Unit

Compressor	
Manufacturer	Kahlenberg Bros. Co.
Model	
Type	Air Cooled, Single-Stage, Splash-Lubricated /reciprocating Air Compressor
Capacity	Max Pressure 250 lbs, Operating Pressure 125 to 150
Location	Bos'n Locker
Motor	
Manufacturer	AJAX
Model	XTM-12
Type	Electric
Horsepower	1/2
Hertz	60
Phase	1
Volts	115/208-230
Air Horn	
Manufacturer	Kahenberg Bros. Co.
Model	Figure V-12A
Air Strainer	
Manufacturer	Kahenberg 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

1-40. 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.

DESCRIPTION	PARAGRAPH NUMBER
Propulsion System	1-41
Ships' Service Generating System	1-46
Anchor Winch System	1-52
Bow Ramp System	1-58
Steering System	1-59
Piping Systems	1-66
Interior Communication Systems	1-84
Navigation Systems	1-85
Communication Systems	1-86
Hydraulic Starting System	1-87

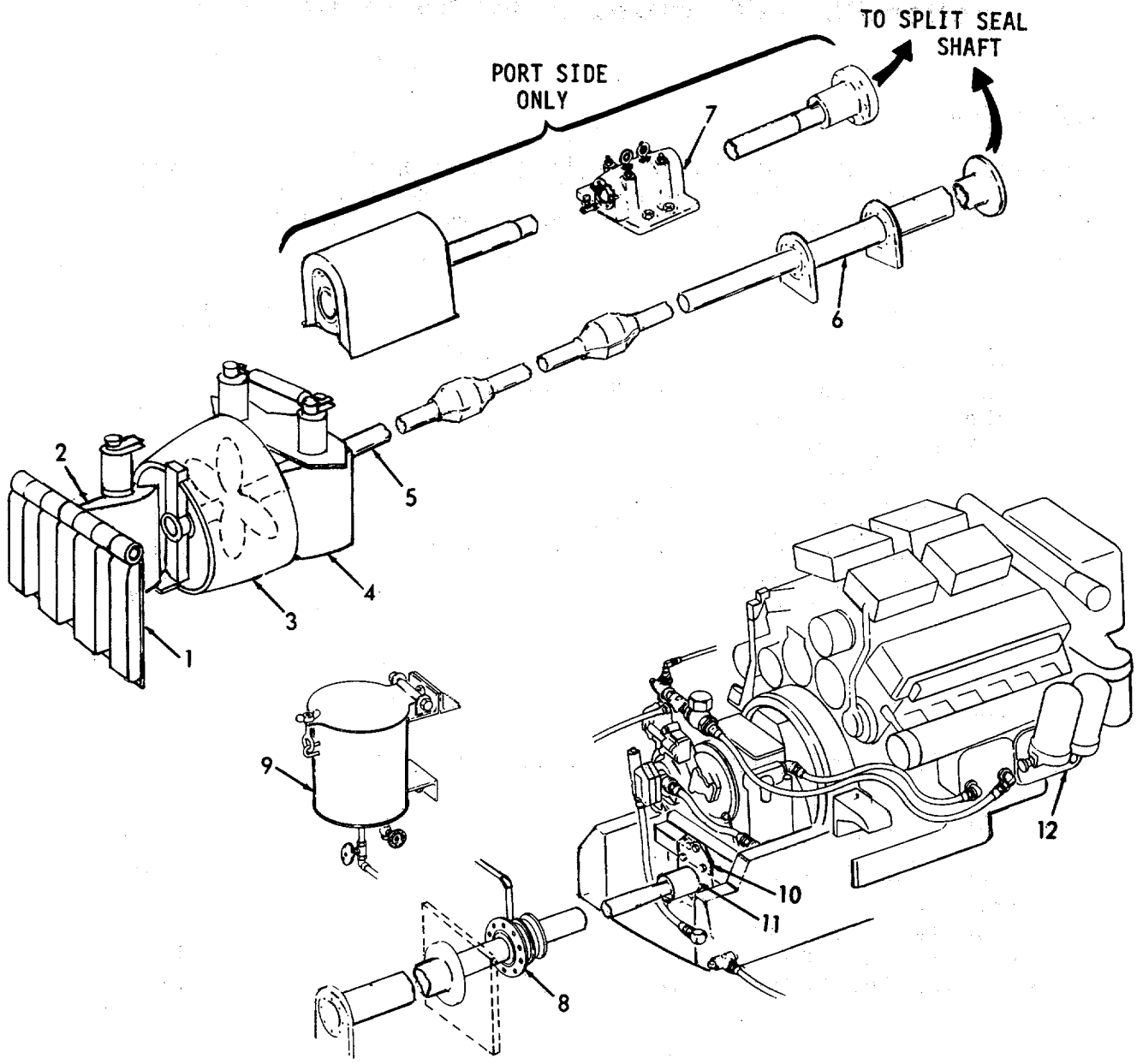
1-41. PROPULSION.

The Propulsion System (Figure 1-29) consists of the following:

DESCRIPTION	PARAGRAPH NUMBER
Propulsion Engine	1-42
Marine Gear	1-43
Propeller Shaft and Miscellaneous Components	1-44
Kort Nozzle, Rudders, and Fence	1-45

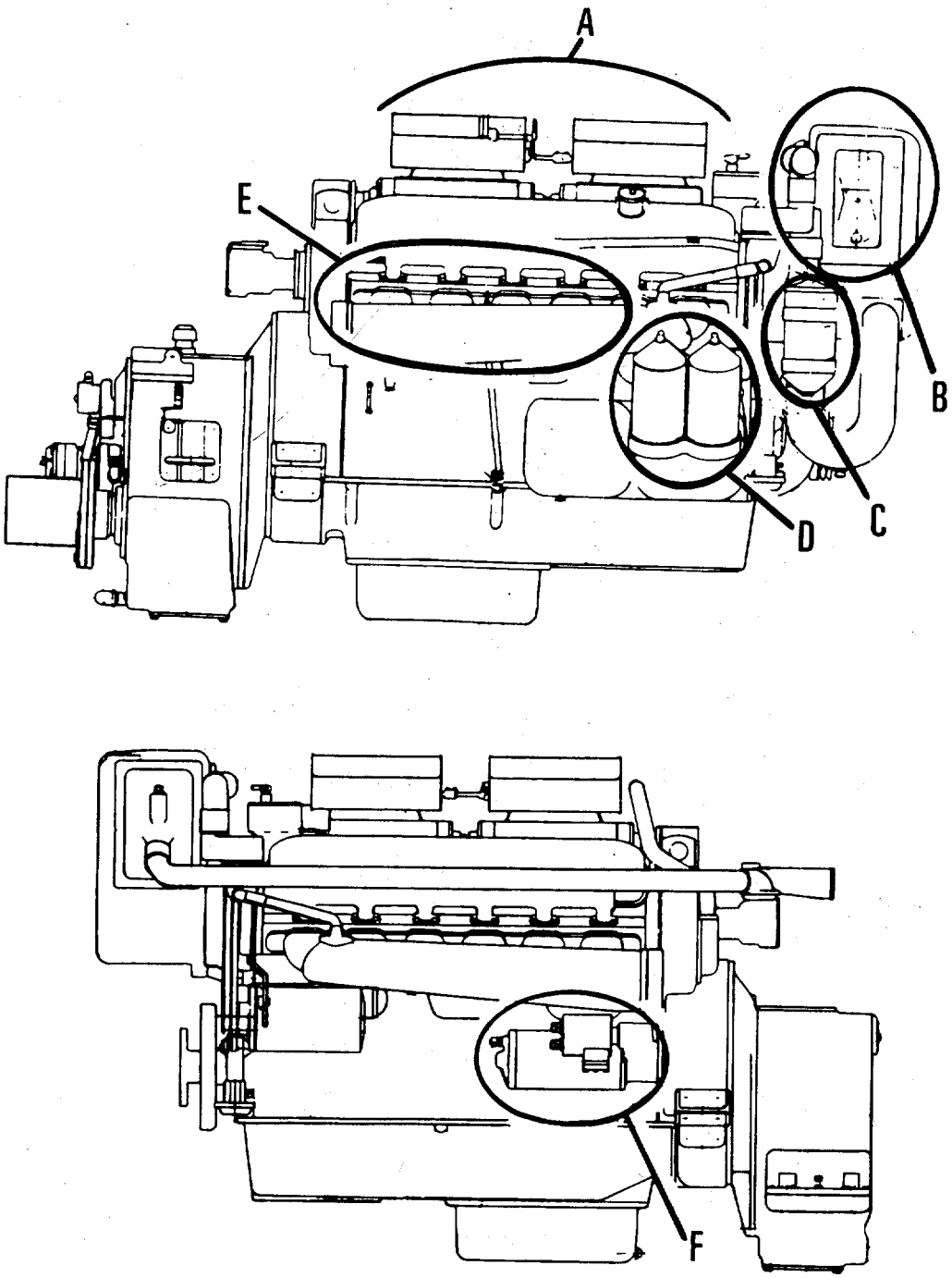
1-42. PROPULSION ENGINE.

a. The Main Propulsion Engine (Figure 1-30) is a 12 cylinder V-71 Detroit Diesel. The engine is equipped with an oil cooler, 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 1-29. Propulsion System



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

Figure 1-30. Main Propulsion Engine Systems

b. The Fuel System is shown in Figure 1-31. 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.

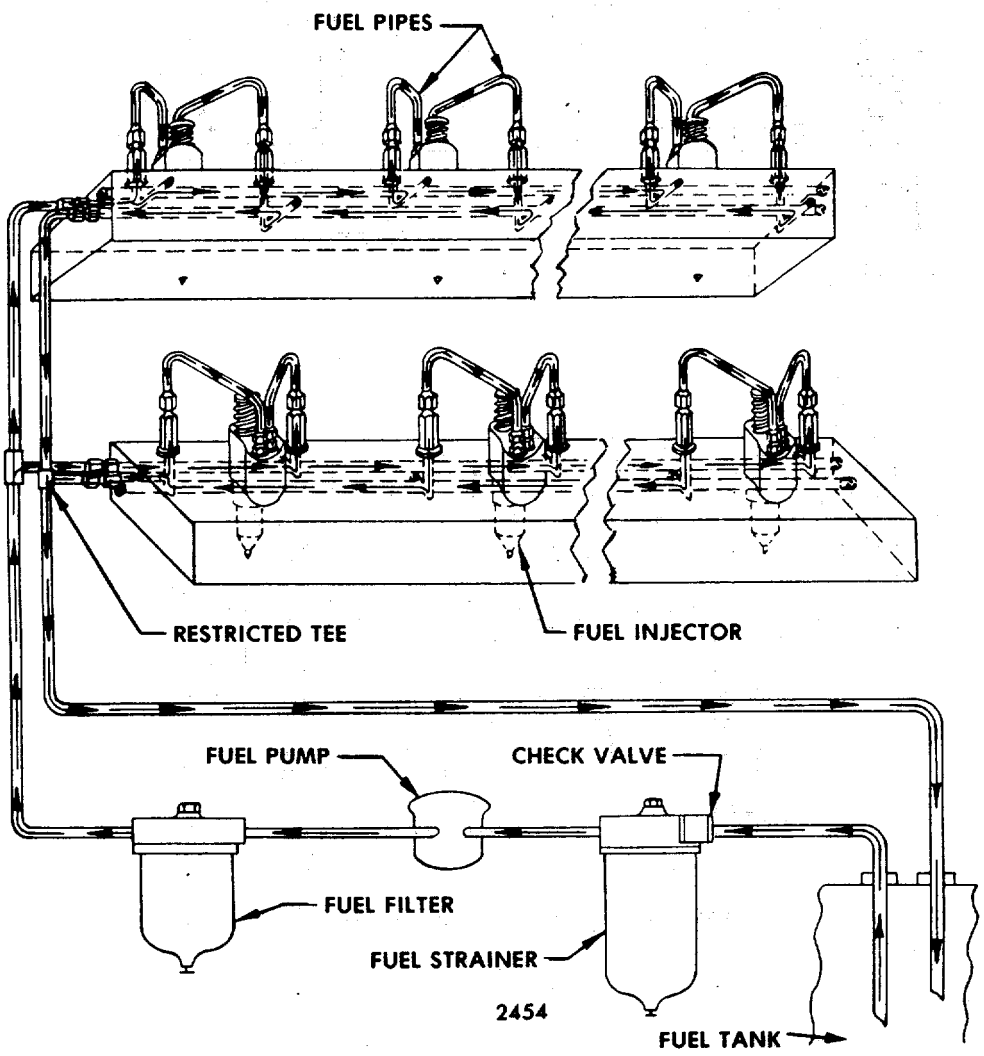


Figure 1-31. Fuel System

c. The Air System is shown in Figure 1-32. 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 first pass through an air silencer.

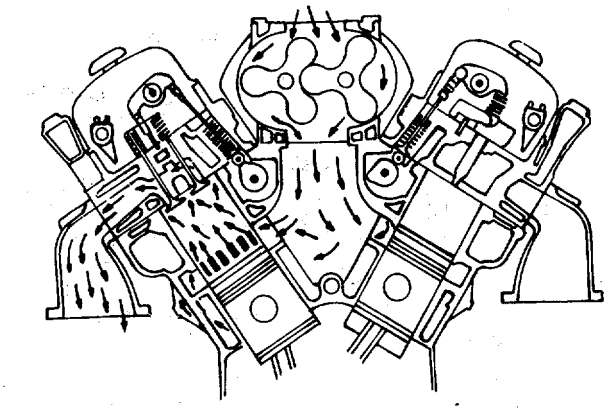


Figure 1-32. Air Intake System Through Blower and Engine

d. The Oil System is shown in Figure 1-33. 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 then 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.

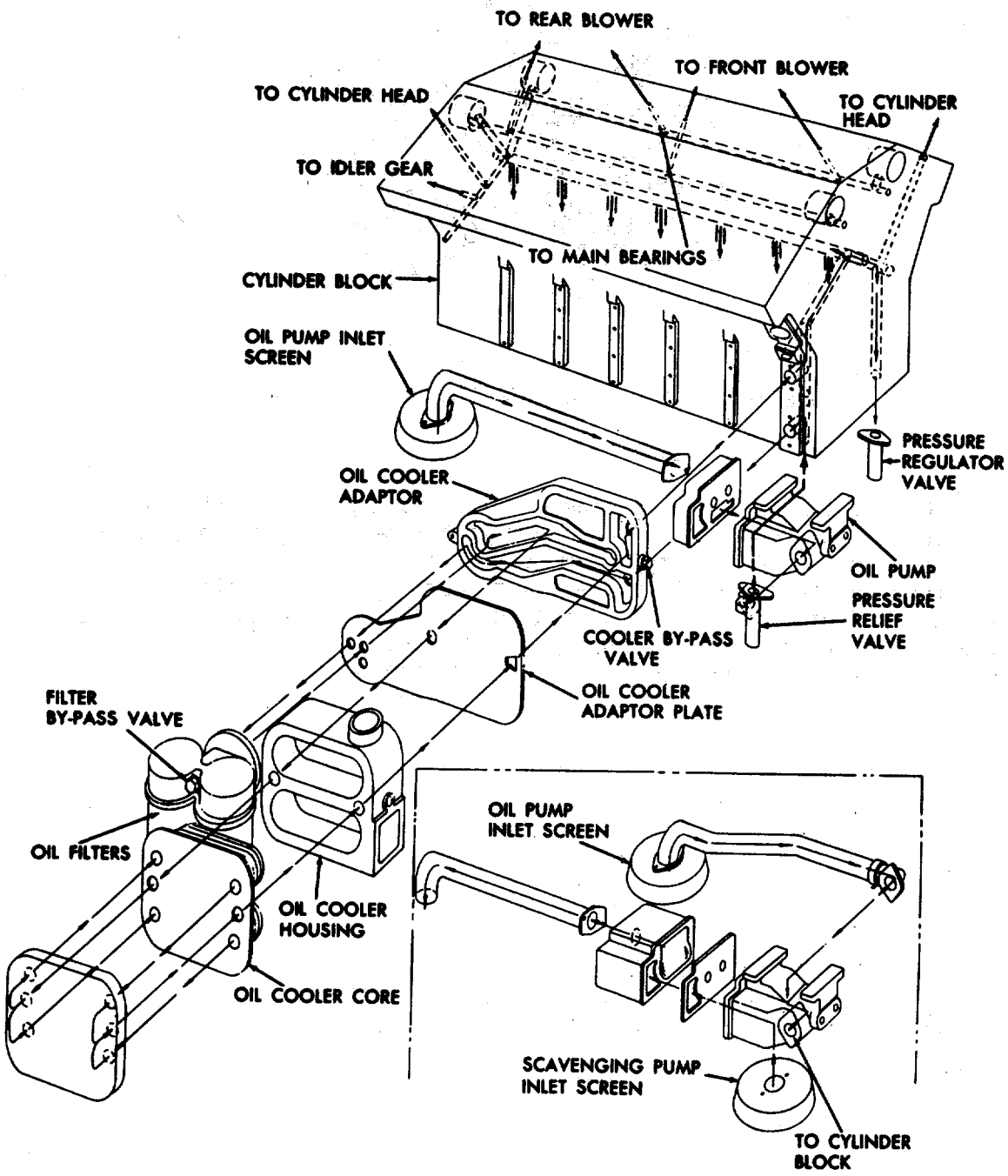


Figure 1-33. Typical 12V71 Lubricating System

e. The Coolant System is shown in Figure FO-16. 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 a hydraulic starting system. Engine speed is controlled by a mechanical variable speed governor.

g. The Exhaust Manifold is shown in Figure 1-34. 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 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.

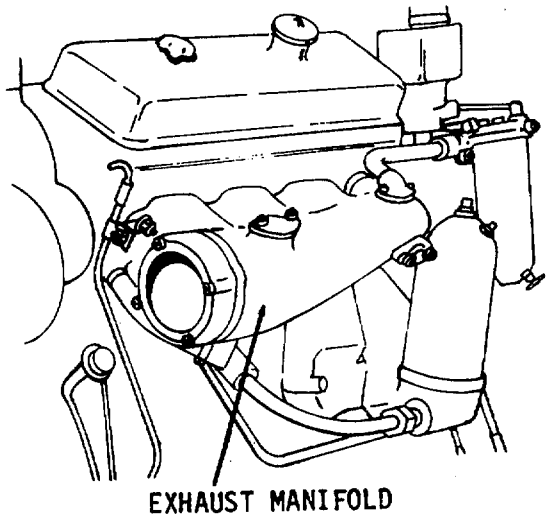


Figure 1-34. Water-Cooled Exhaust Manifold Mounting

1-43. 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 1-35. 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 an engine direction due to the gear meshing with the reverse pinion.

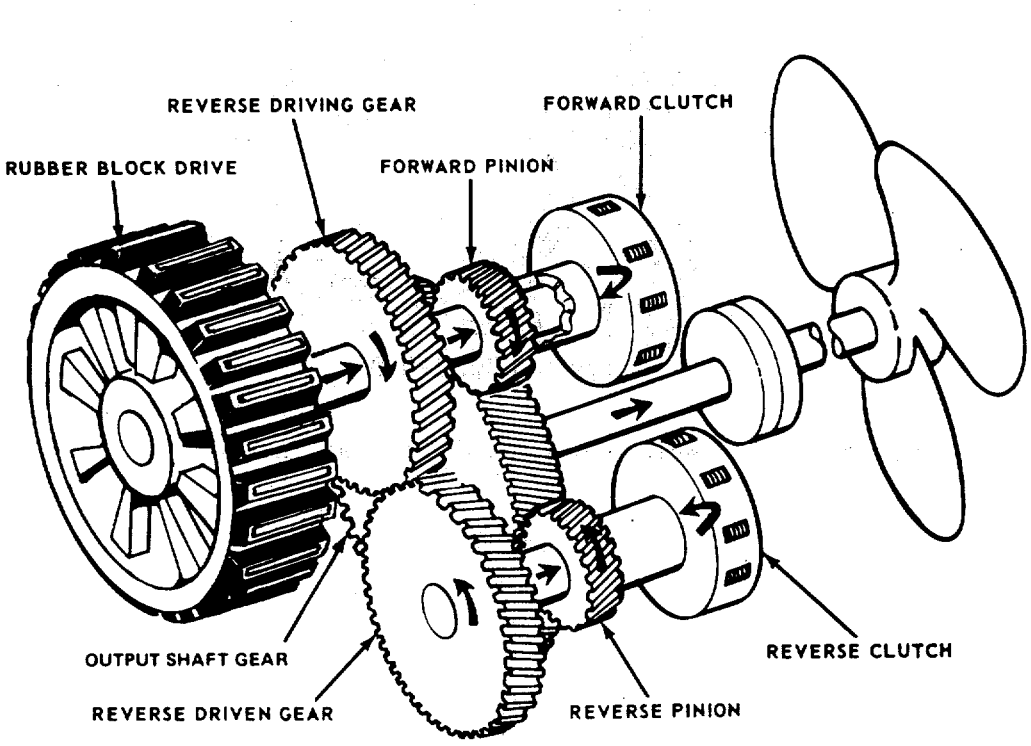


Figure 1-35. Marine Gear Power Flow

e. When in neutral, (Figure 1-36) 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.

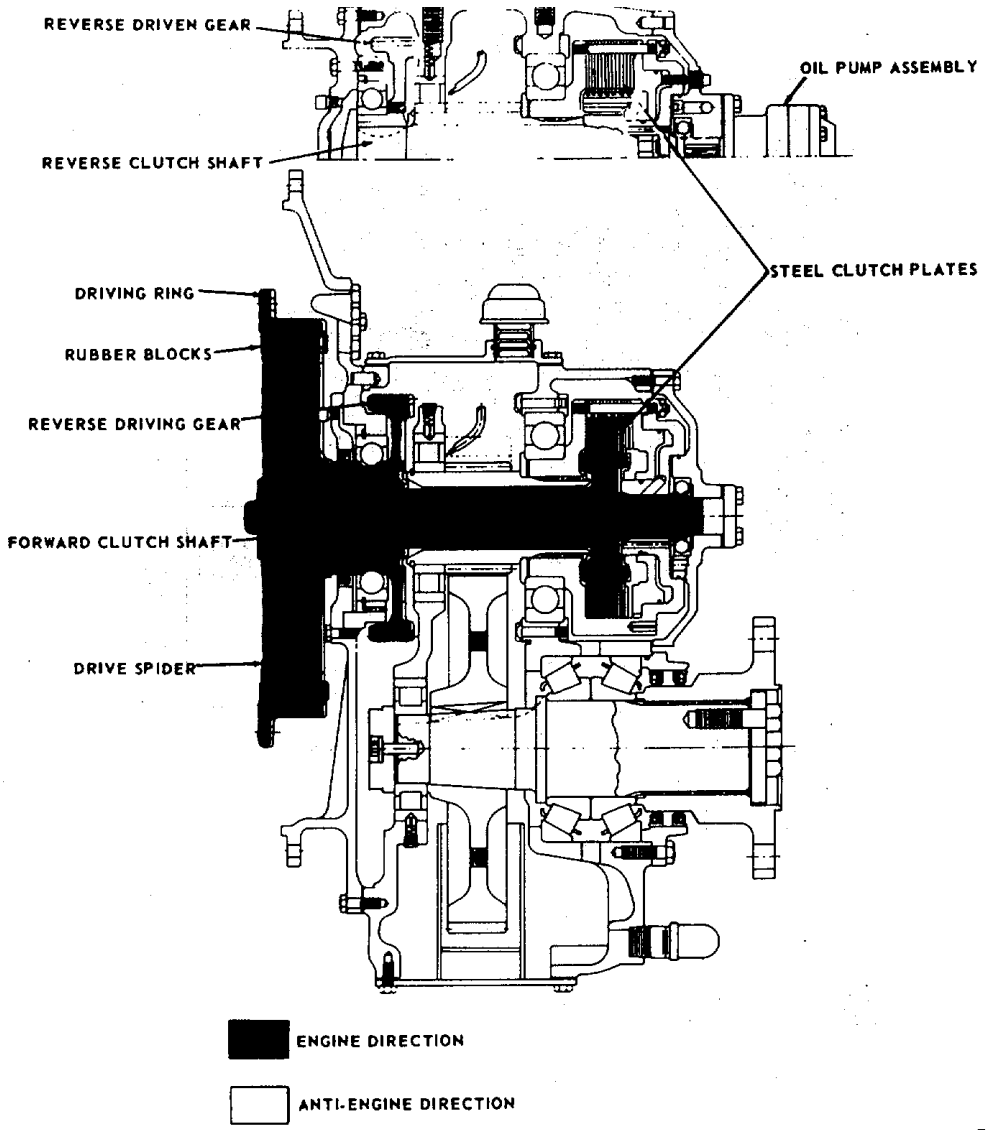


Figure 1-36. Marine Gear Power Flow-Neutral

f. When in forward, (Figure 1-37), 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 either 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.

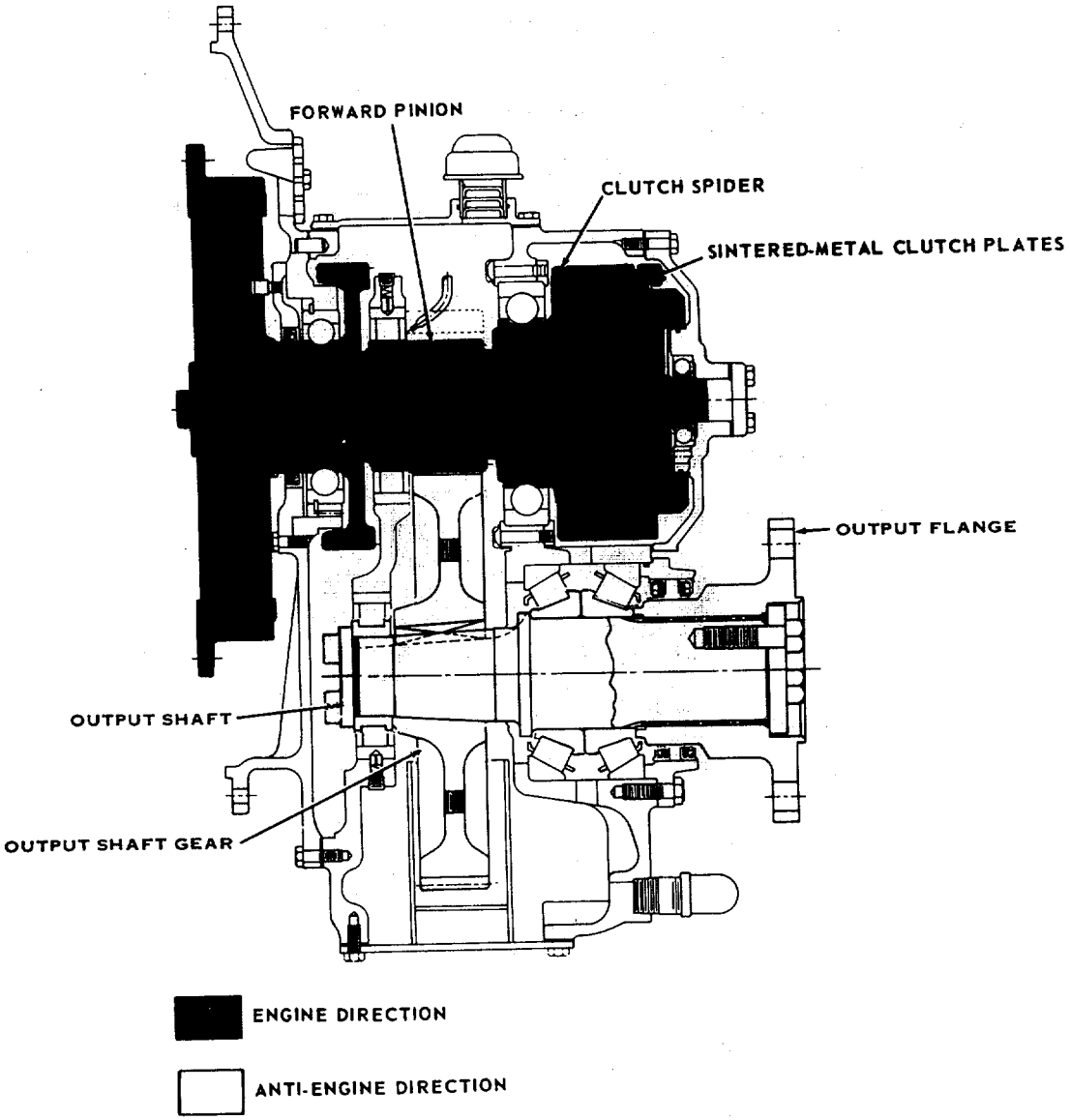


Figure 1-37. Marine Gear Power Flow-Forward

g. When in reverse, (Figure 1-38) all parts that rotated in neutral at engine speed are still turning. However, when the reverse 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 reverse pinion. Therefore, the reverse pinion rotates in anti-engine ½ direction at engine speed when the reverse clutch is engaged. The reverse 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 engine direction when in the reverse position. The counter shaft and propeller flange rotate at a reduced speed due to the ratio between the counter shaft gear and the reverse pinion.

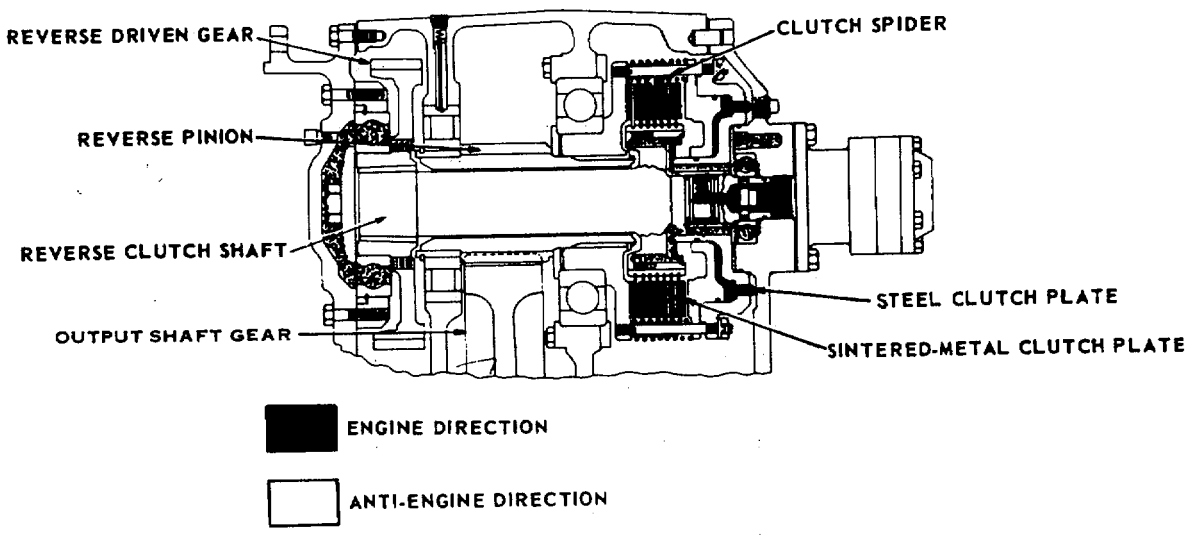


Figure 1-38. Marine Gear Power Flow-Reverse

1-44. 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, 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 waterborne. The ring,-,normally unpressurized, is inflated to form a watertight seal around the static shaft.

e. A 2-1/2 gallon (9.46 1) 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-type 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.

1-45. 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 struts 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 1-59.

1-46. SHIP'S SERVICE GENERATING SYSTEM.

The Ship's Service Generating System (Figure 1-39) consists of the following:

DESCRIPTION	PARAGRAPH NUMBER
Generator Engine	1-47
Generator	1-48
Switchboard	1-49
Power Distribution	1-50
Lighting Distribution	1-51

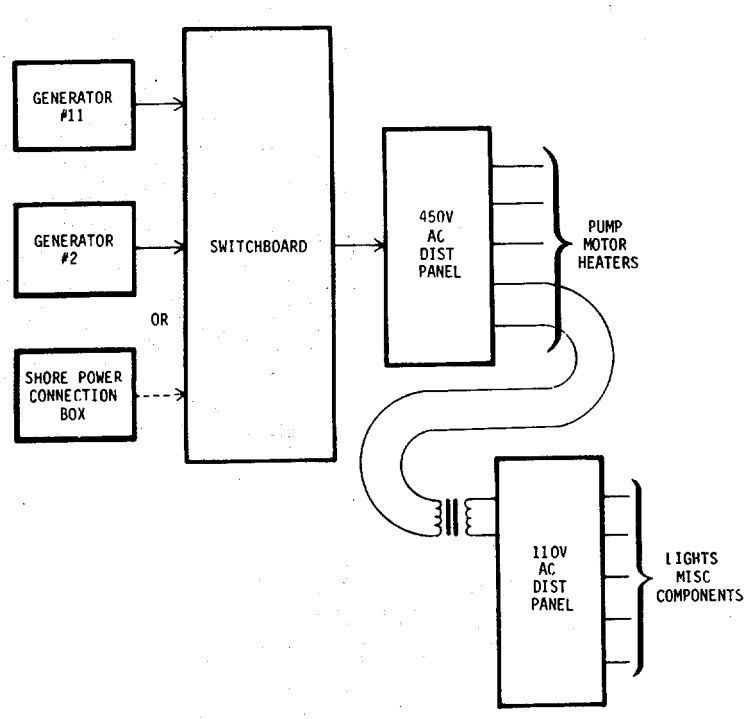
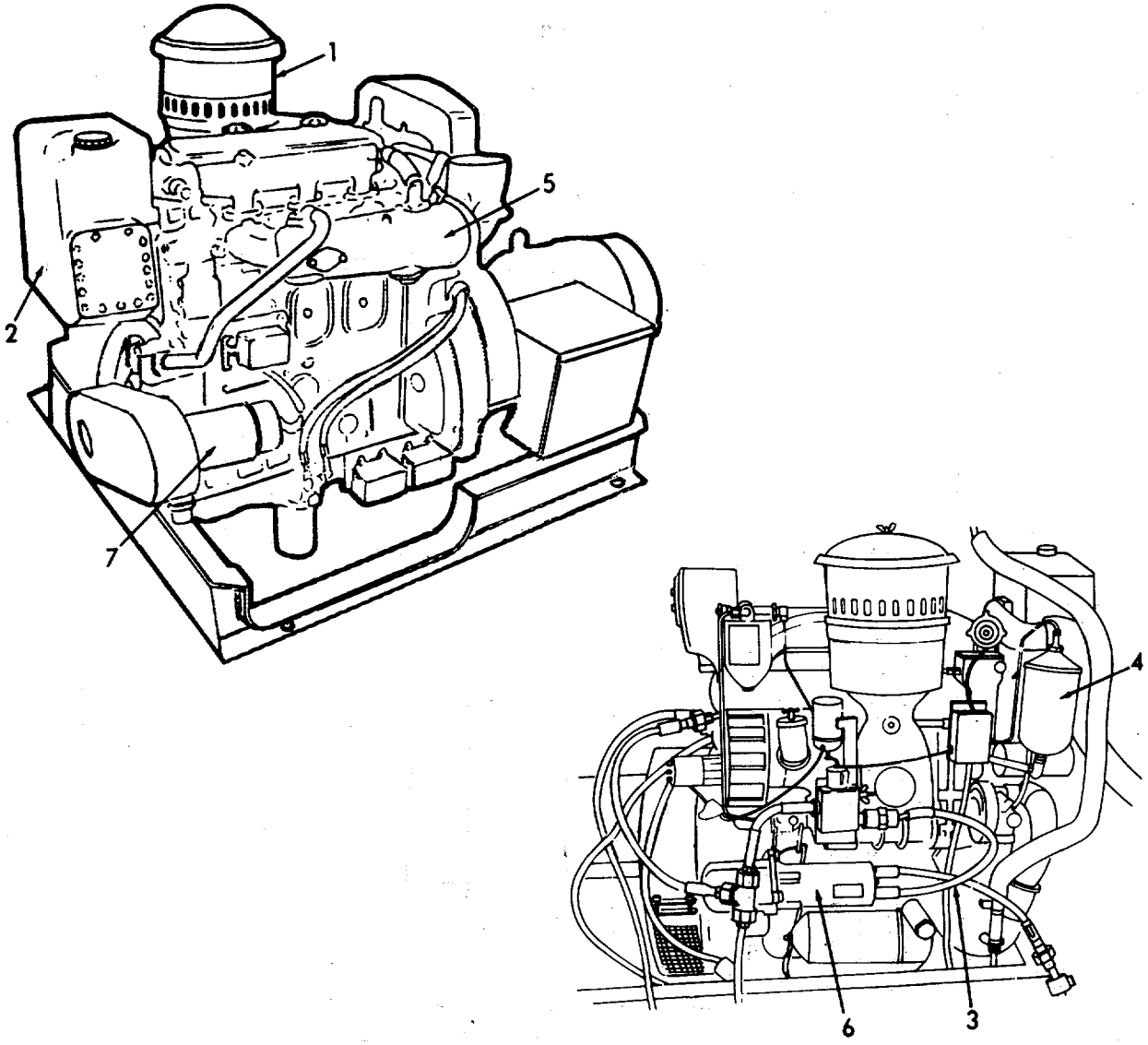


Figure 1-39. Ship's Service Generating System

1-47. GENERATOR ENGINE.

a. The Generator Engine (Figure 1-40) 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 1-40. Generator Engine

b. The Fuel System is shown in Figure -141. Fuel is drawn from the v supply tank through the fuel stainer 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 I serves to cool the injectors and also carries off any air in the fuel system.

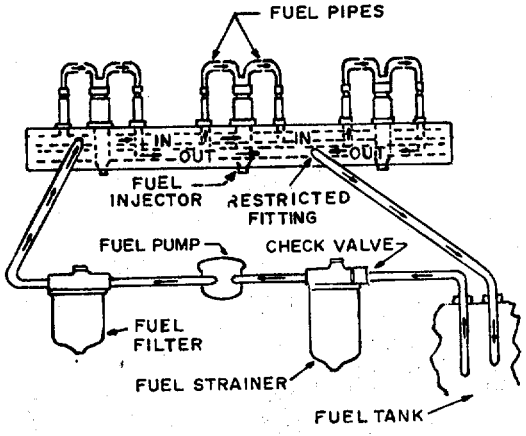


Figure 1-41. Fuel System

c. The Air System is shown in Figure 1-42. 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 first passes through an air cleaner.

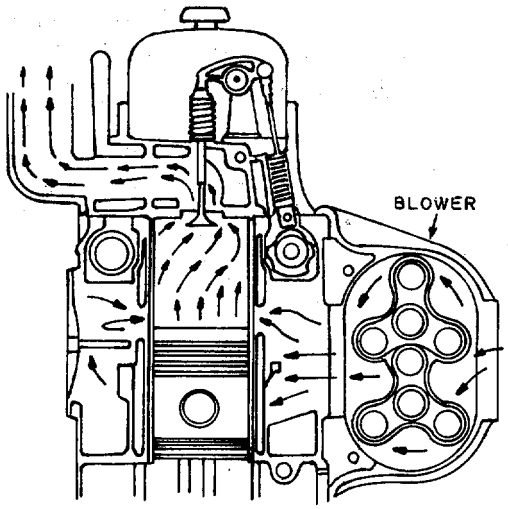


Figure 1-42. Air System

d. The Oil System is shown in Figure 1-43. 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, and then drains back into the oil pan part which goes to the cam and balance shaft end bearings and cylinder head. The remainder goes to the main bearings and connecting rod bearings by way of the drilled crankshaft.

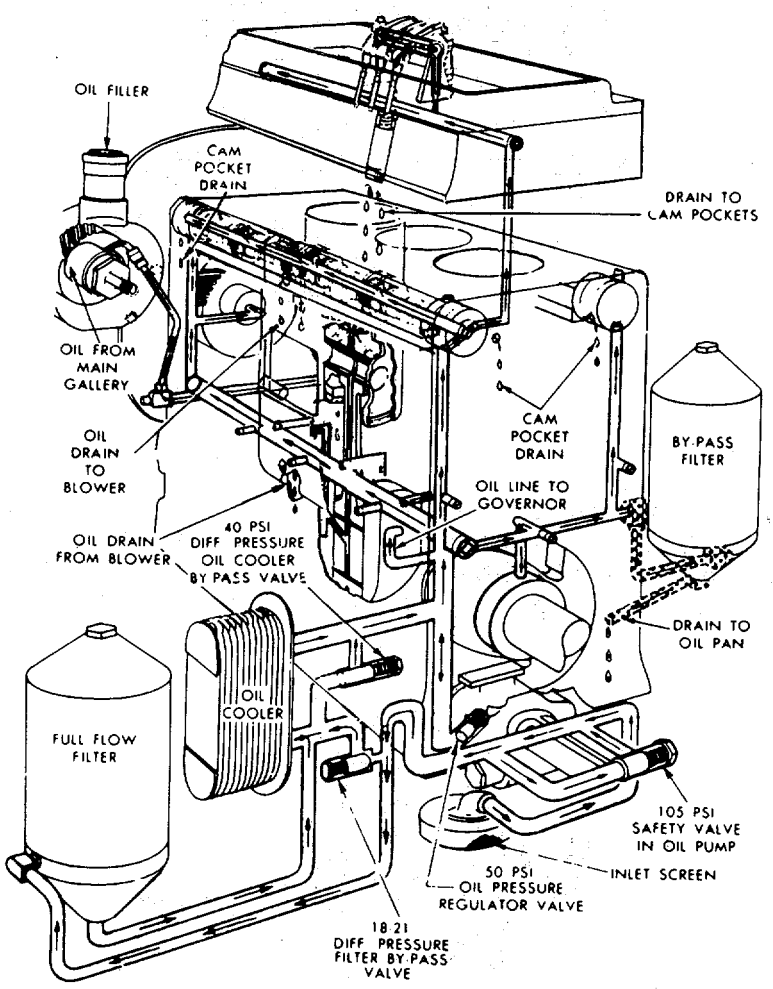


Figure 1-43. Oil System

e. The Coolant System is shown in Figure 1-44. 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.

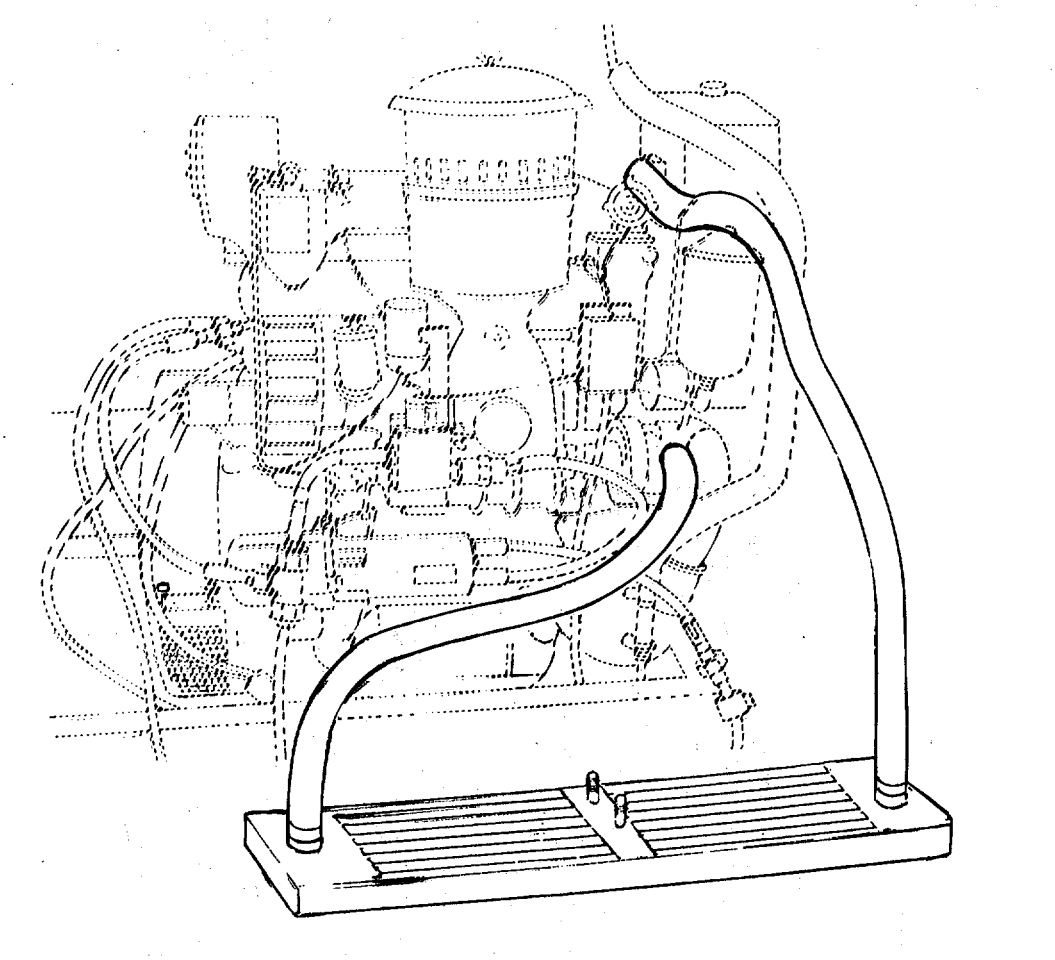


Figure 1-44-. Coolant System

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 1-45. 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.

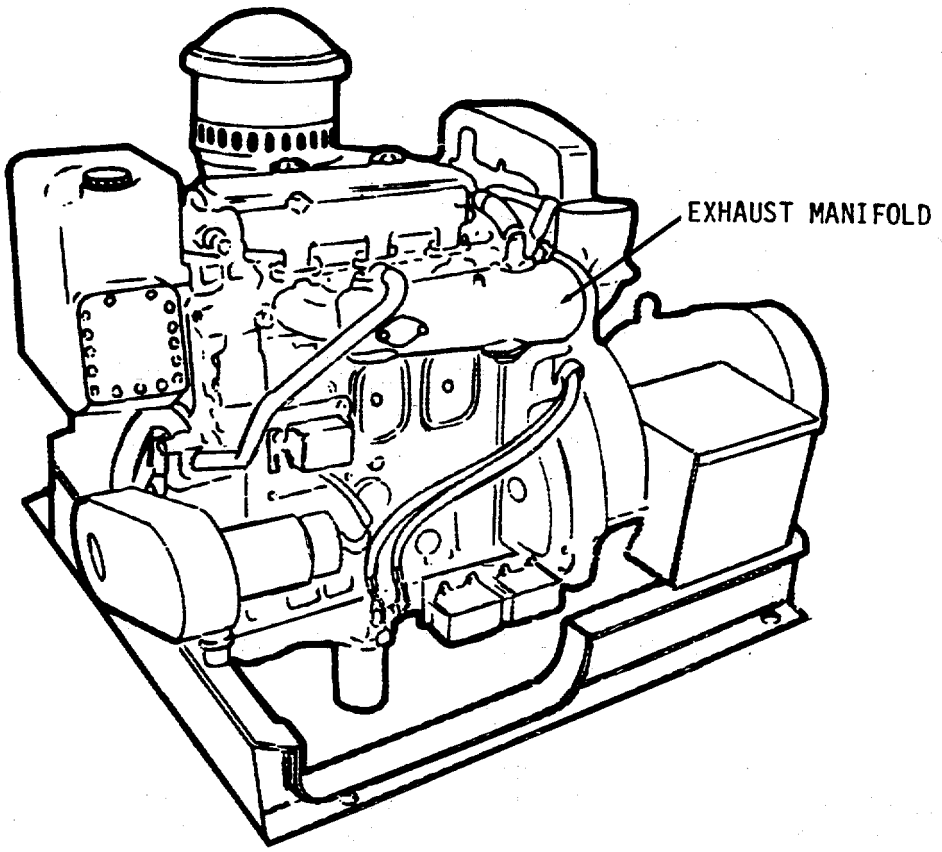


Figure 1-45. Exhaust Manifold

1-48. GENERATOR.

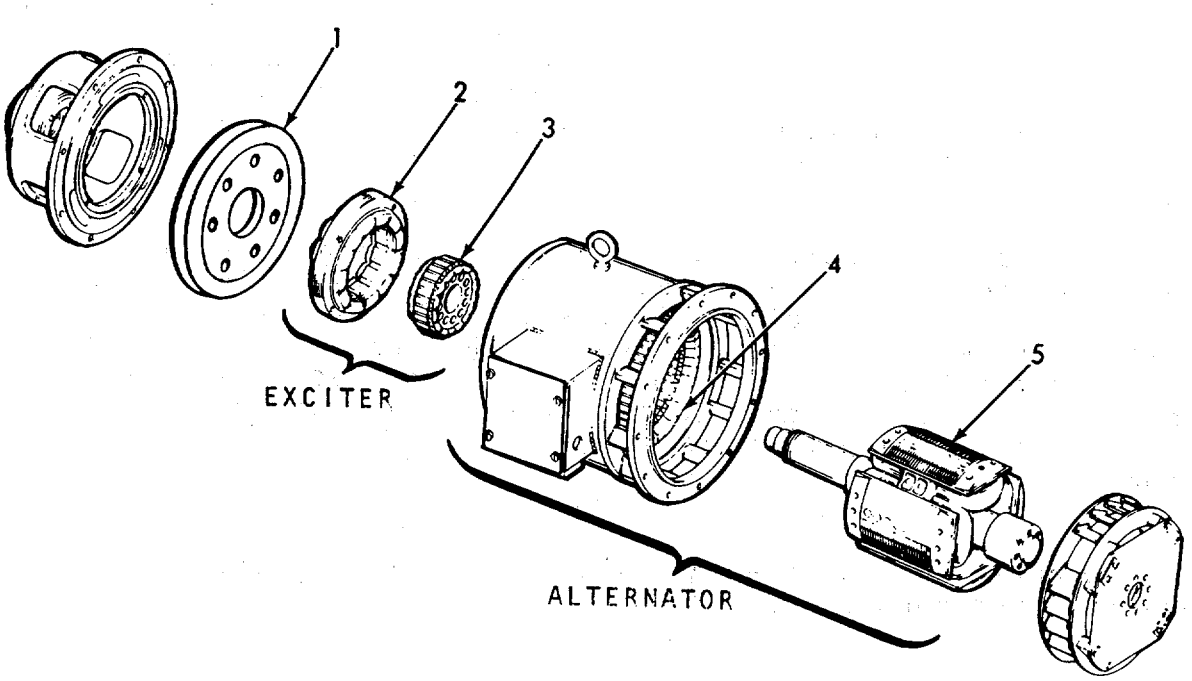
a. The Generator (Figure 1-46) is an alternating current (AC) brushless type. The Generator produces 450/VAC, 3 phase, 60 hertz, 40 kilowatts at 1800 revolutions per minute (RPM).

b. The Generator consists of two major components: an 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 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. ROTATING RECTIFIER ASSEMBLY
2. EXCITER FIELD ASSEMBLY
3. EXCITER ARMATURE ASSEMBLY
4. STATOR COIL ASSEMBLY
5. ROTATING COIL ASSEMBLY

Figure 1-46. Generator Components

1-49. SWITCHBOARD.

a. The Ship's Service Generating System consists of two, 3 cylinder diesel, engine-driven 450 Volt, 3-phase, 40 kw alternating current (AC) 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.

1-50. 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-I-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 (See Figure 1-47). 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 electronics loads.

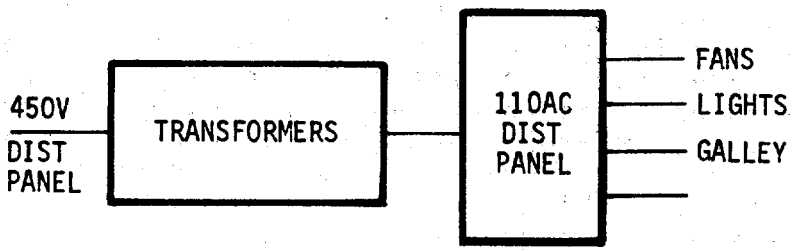


Figure 1-47. Power Distribution System

d. Several of the ship's circuits use direct current power (See Figure 1-48). 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 deck-house. 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 Aoom 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.

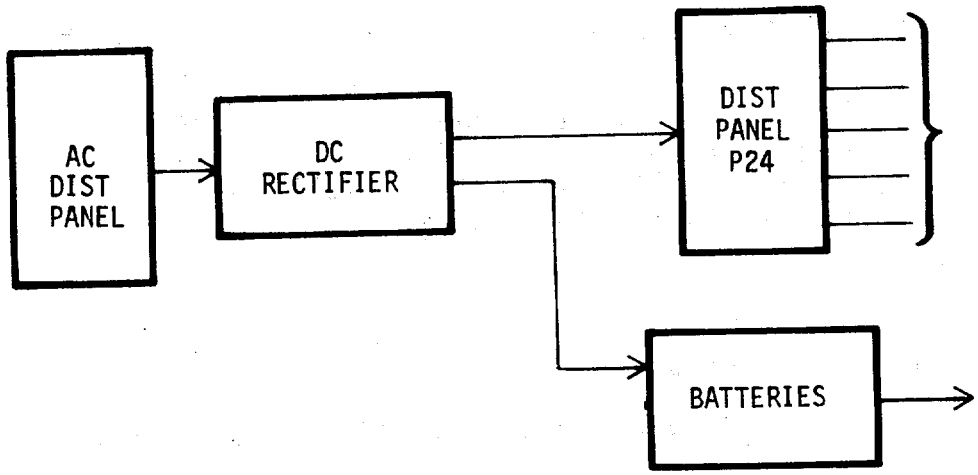


Figure 1-48. Direct Current Power

1-51. 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 relay 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 navigation light panel in the Pilothouse. The Navigation Light Panel is supplied 120- volts AC from the L-106 Distribution Panel.

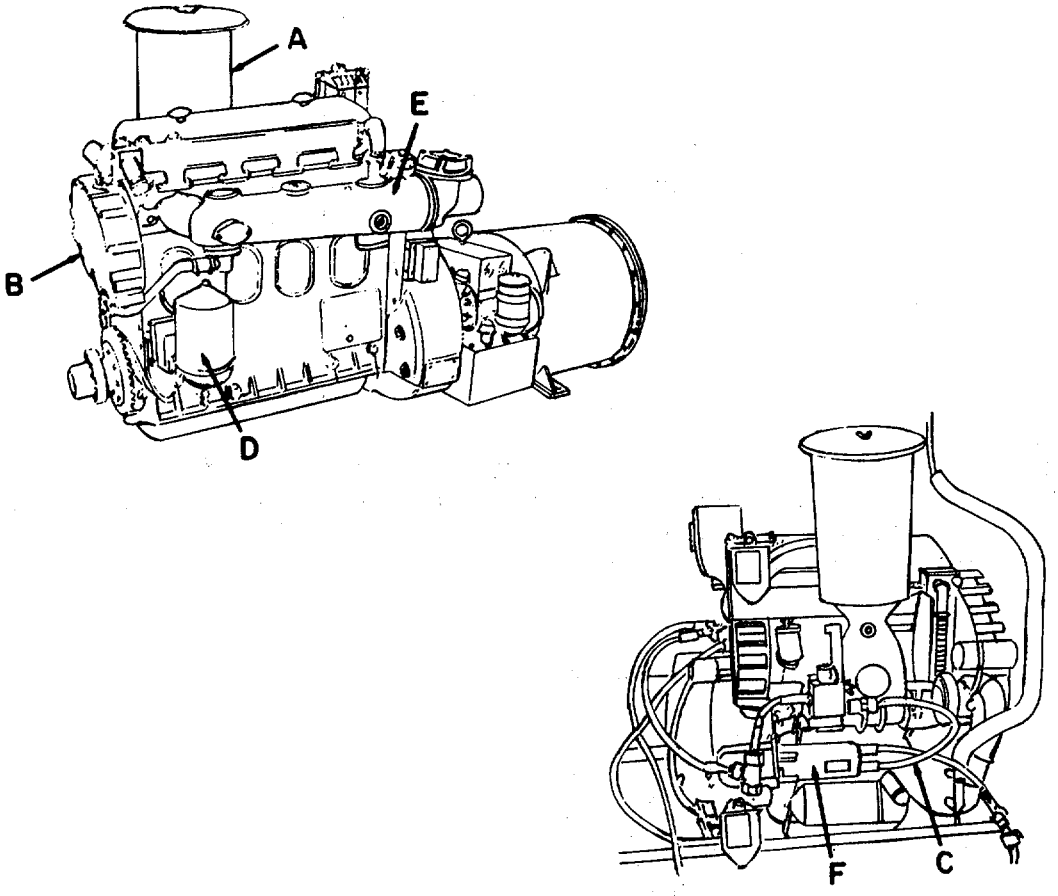
1-52. ANCHOR WINCH SYSTEM.

The Anchor Winch System (Figure FO-17) consists of the following:

DESCRIPTION	PARAGRAPH NUMBER
Anchor Winch Engine	1-53
Torque Converter	1-54
Hydraulic System	1-55
Anchor Winch	1-56
"A" Frame	1-57

1-53. ANCHOR W4INCH ENGINE.

a. The Anchor Winch Engine (Figure 1-49), is a 4 cylinder, 4-71 Detroit Diesel engine. 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 1-49. Anchor Winch Engine Systems

b. The Fuel System is shown in Figure 1-50. 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.

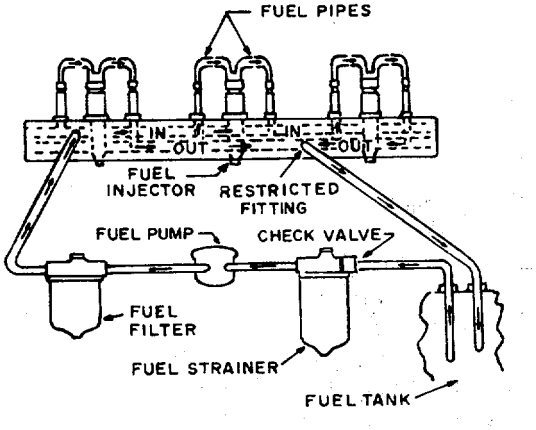


Figure 1-50. Fuel System

c. The Air System is shown in Figure 1-51. 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 first through an air cleaner.

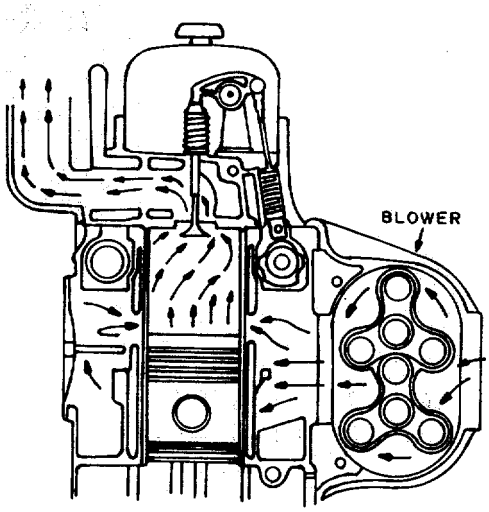


Figure 1-51. Air Flow Through Blower And Engine

d. The Oil System is shown in Figure 1-52. 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, and then drains back into the oil pan. A part goes to the cam and balance shaft end bearings and cylinder head, and the remainder goes to the main bearings and connecting rod bearings by way of the drilled crankshaft.

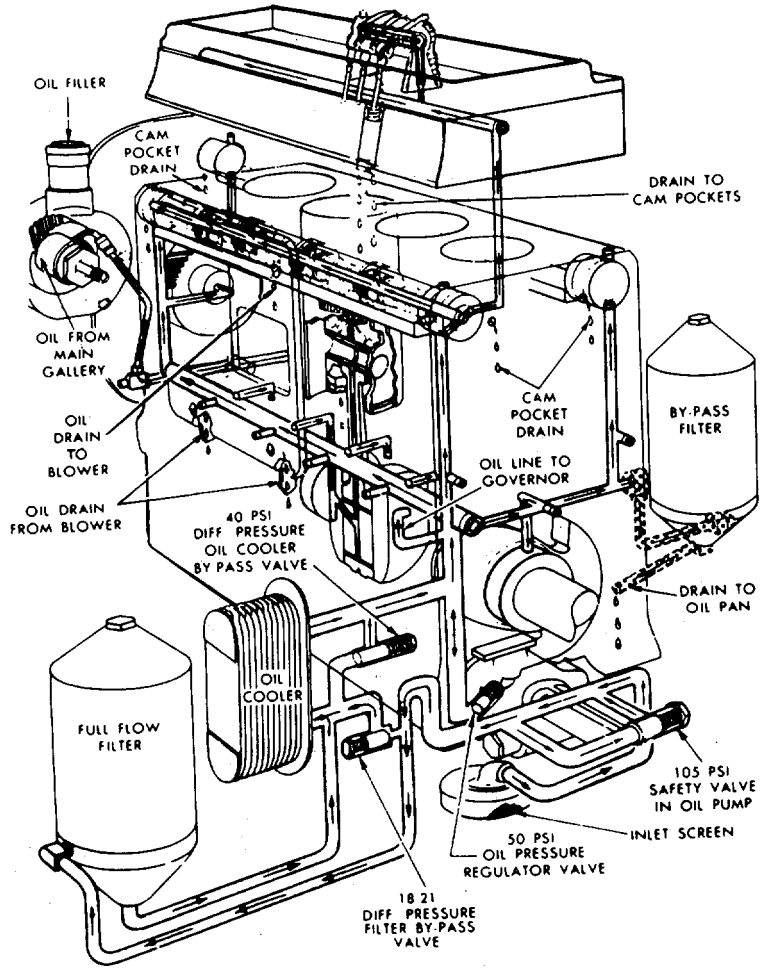


Figure 1-52. Lubrication System

e. The Coolant System is shown in Figure 1-53. 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. 1-132

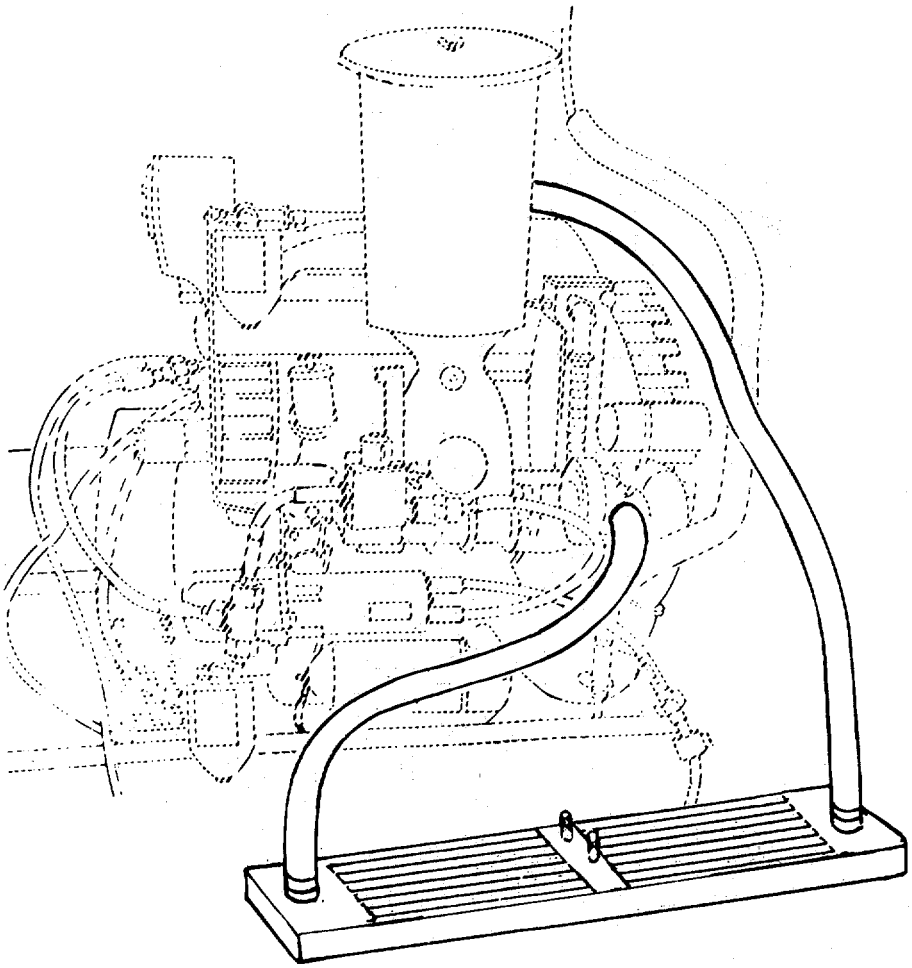


Figure 1-53. Coolant System

g. The Exhaust Manifold is shown in Figure 1-54. 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.

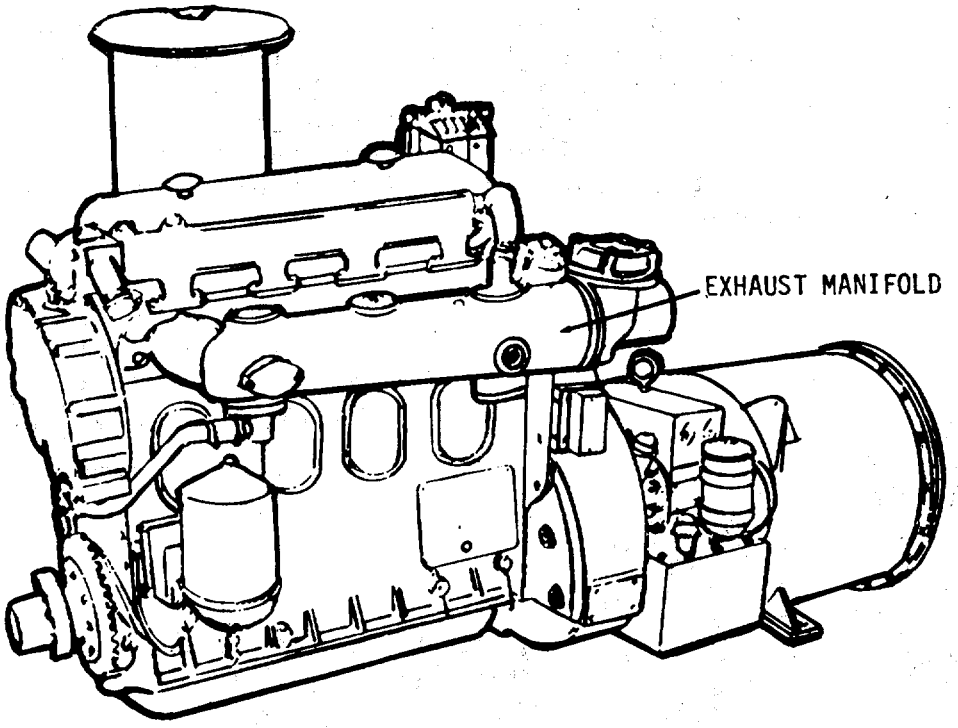


Figure 1-54. Water Cooled Exhaust Manifold Mounting

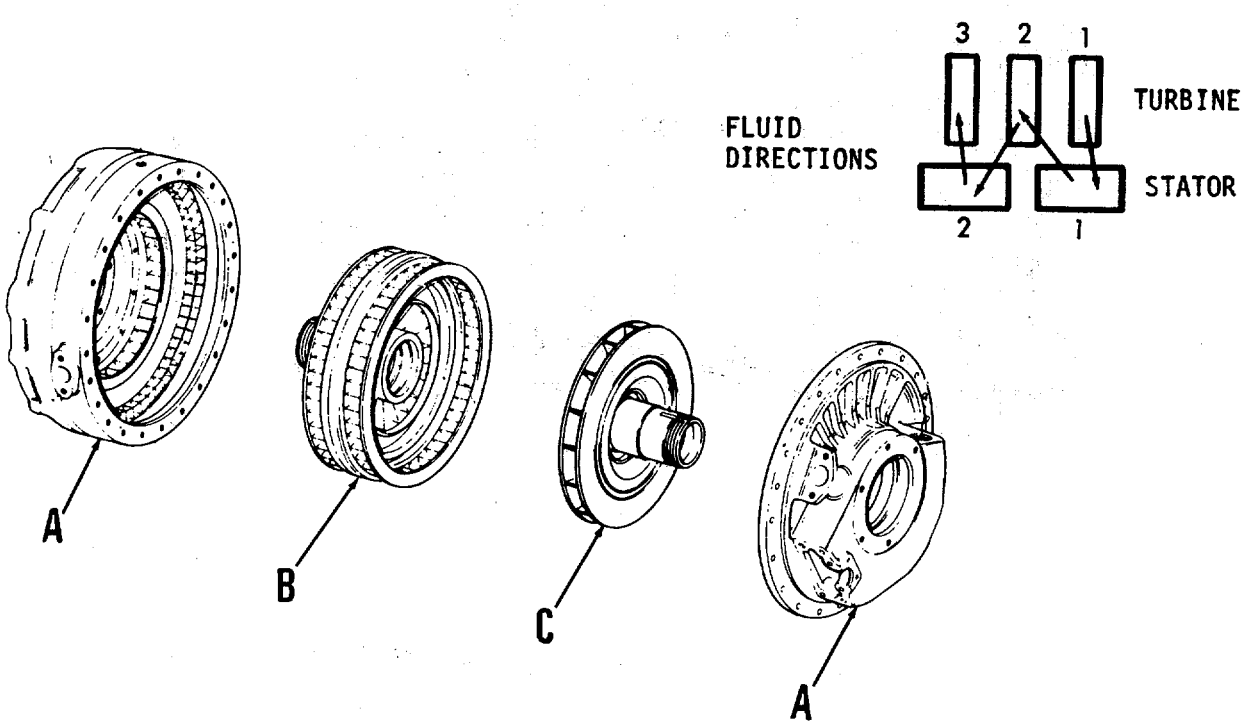
1-54. TORQUE CONVERTER.

a. The Torque Converter (Figure 1-55) 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 1-55. Torque Converter

1-55. HYDRAULIC SYSTEM.

a. The Hydraulic System (Figure 1-56.) 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 gauges. 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 slack puller.

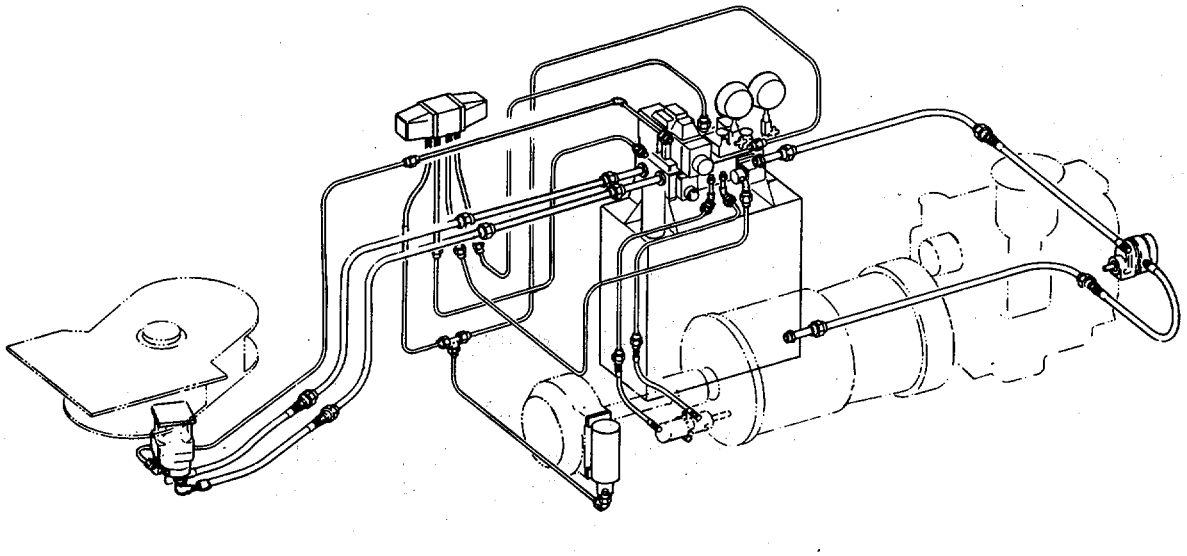


Figure 1-56. Hydraulic System

1-56. ANCHOR WINCH.

The Stern Anchor Winch (Figure 1-57) 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 drive-shaft. 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 level winder, which can be disengaged if desired, is built into the winch. It is synchronized with the drum rotation. A hydraulically operated slack puller is mounted on the hull structure to aid in unspooling the drum.

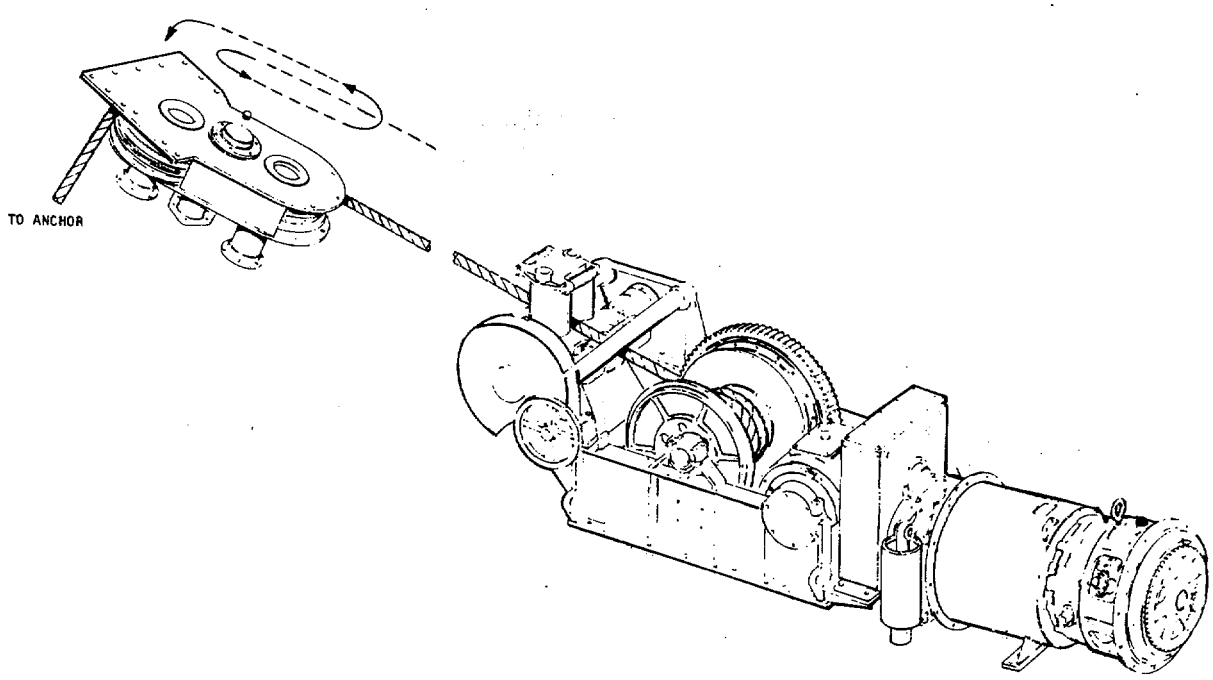
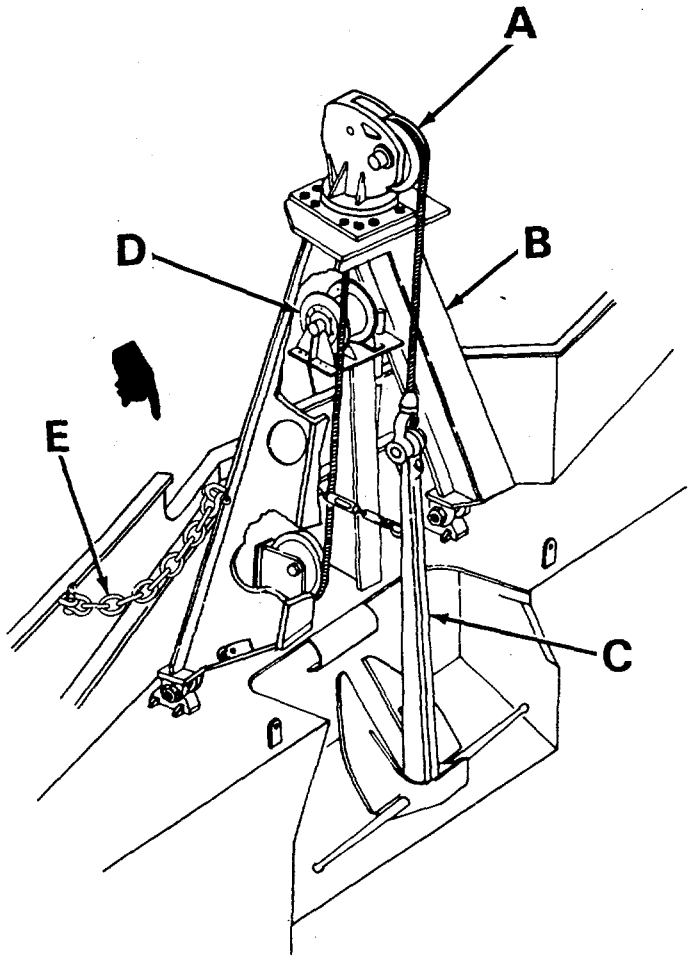


Figure 1-57. Anchor Winch And Slackpuller

1-57. "A" FRAME.

a. The Anchor "A" Frame (Figure 1-58) is a pivoted "A" shaped frame located on the Star board 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 sheave to a sheave on deck. The cable then goes below deck to the slack puller and anchor winch.

b. 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 balwark.



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A. FAIRLEAD
B. "A" FRAME
C. ANCHOR
D. HYDRAULIC "A" FRAME WINCH
E. SAFETY CHAIN

Figure 1-58. Anchor "A" Frame (Stowed Position) (Sheet 1 of 3)

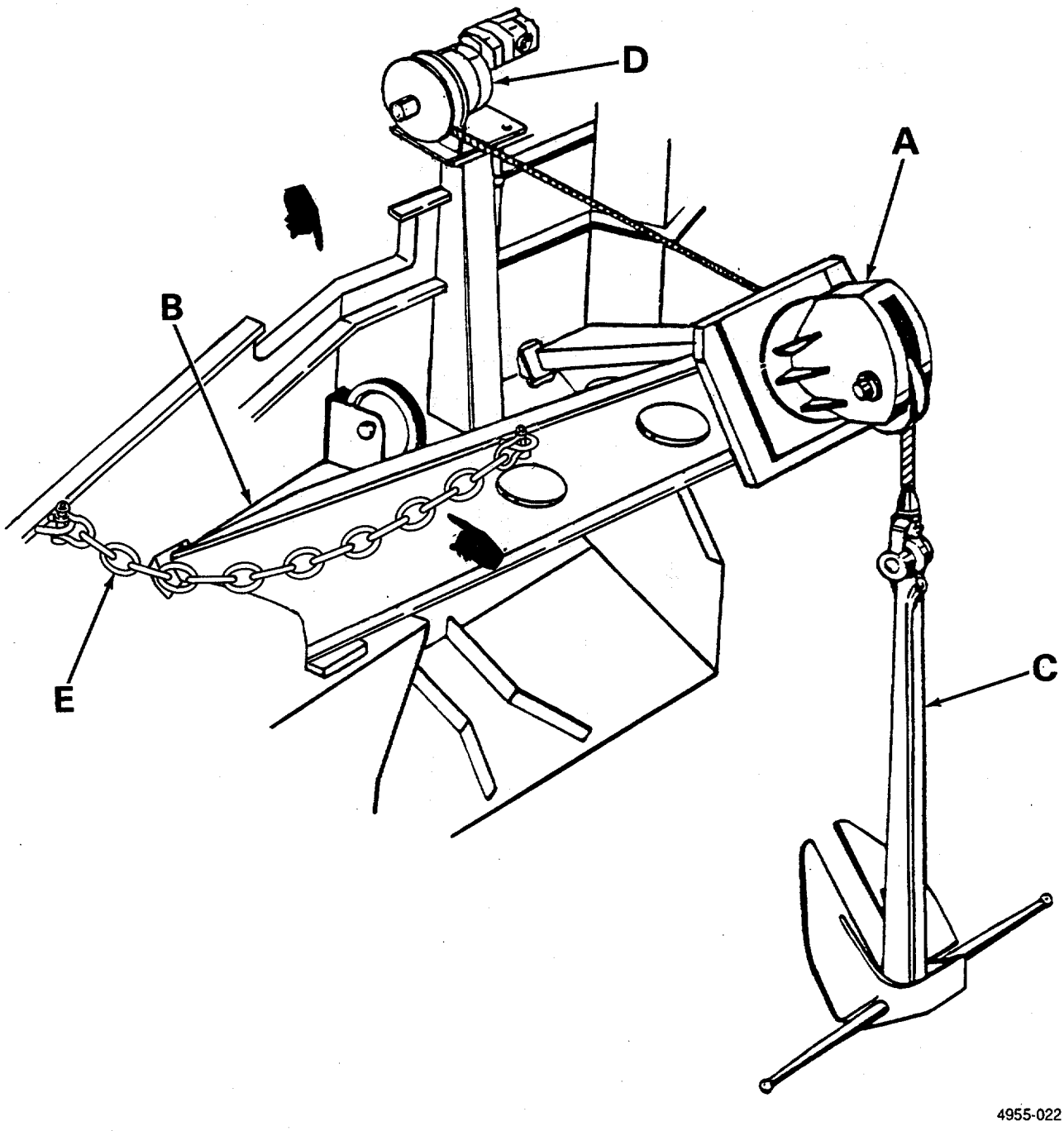


Figure 1-58. Anchor "A" Frame ("Drop Retrieve" Position) (Sheet 2 of 3)

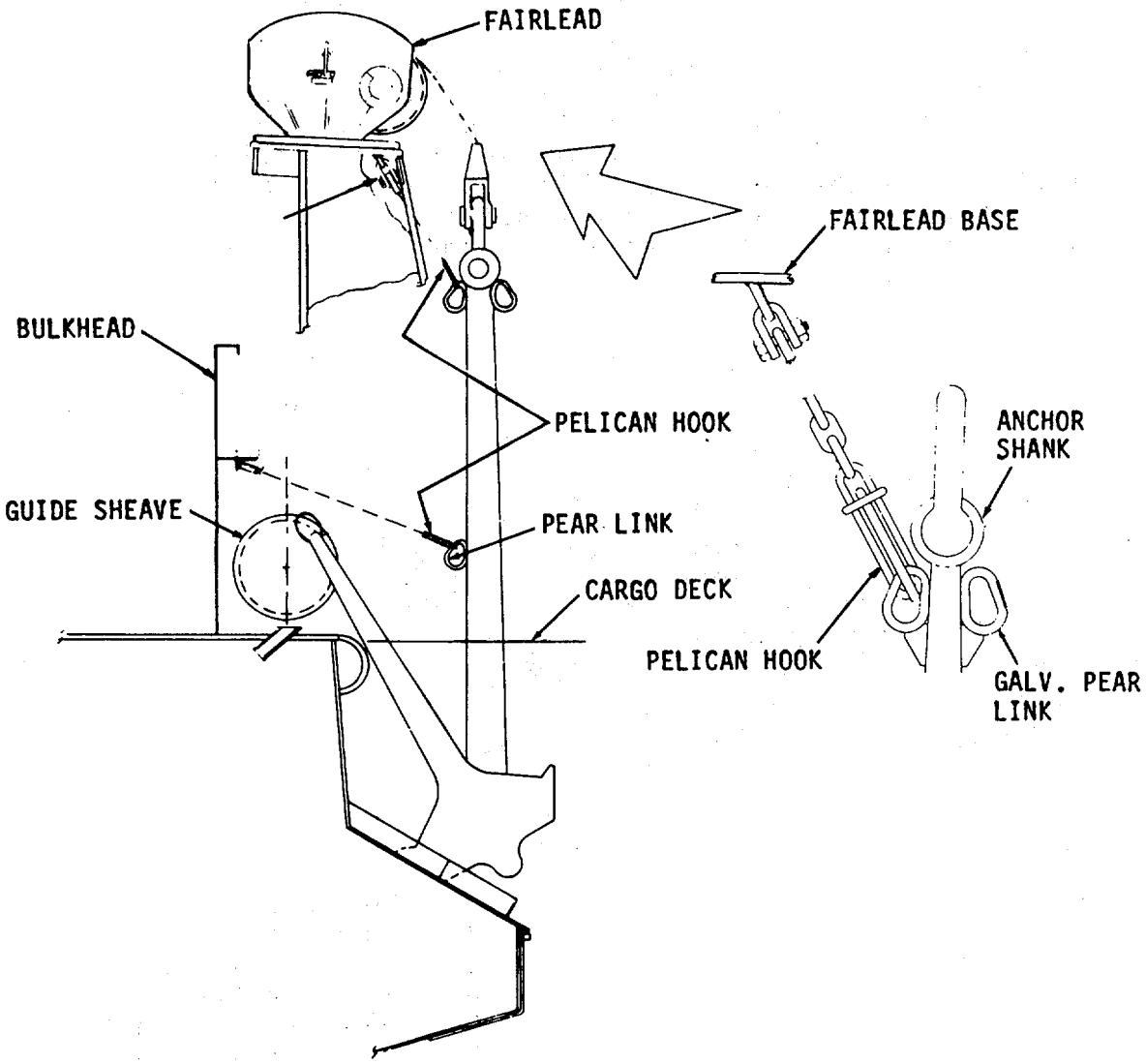


Figure 1-58. Anchor "A" Frame (Sheet 3 of 3)

1-58. BOW RAMP WINCH.

a. The Bow Ramp Winch (Figure 1-59) 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%o of the normal load. The motor has a spring- actuated solenoid-released, disc brake, integally 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 Pilothouse 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.

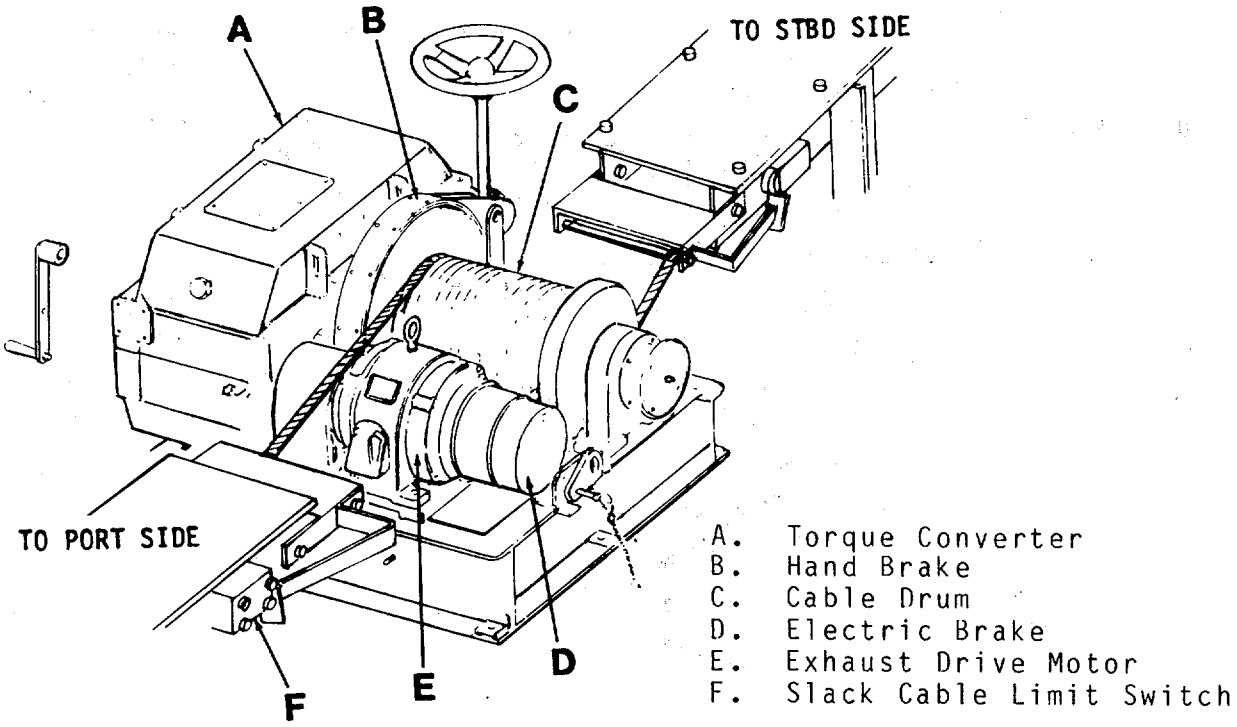


Figure 1-59. Bow Ramp Winch

1-59. SHIP'S STEERING SYSTEM.

The Ship's Steering System (Figure 1-60) consists of the following:

DESCRIPTION	PARAGRAPH NUMBER
Cub Hydraulic Pump Unit	1-60
Heading Selector	1-61
Motor Controller	1-62
Flanking Rudder Limit Switch Assembly	1-63
Steering Rudder Repeatback Unit	1-64
Rudder Angle Indicator and Transmitter	1-65

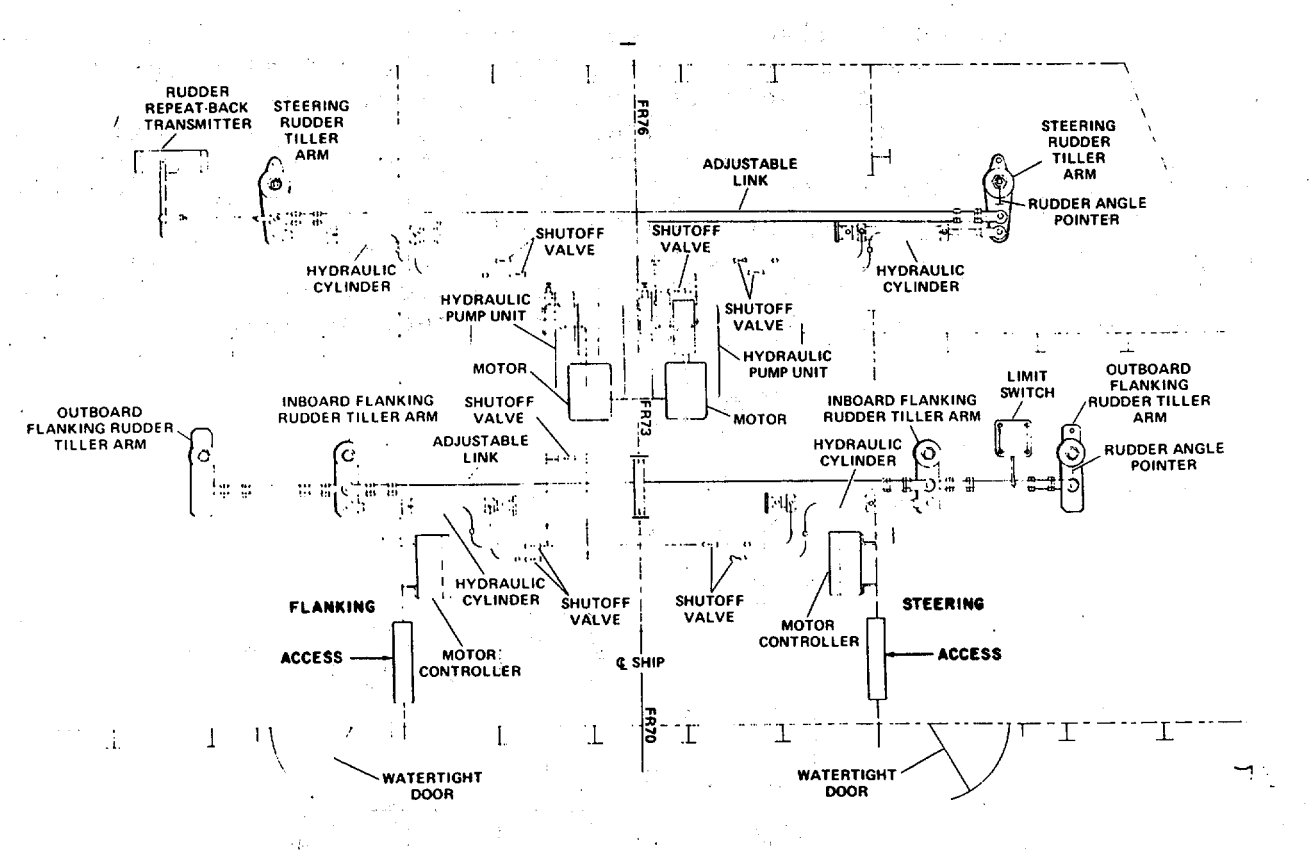


Figure 1-60. Ship's Steering System

1-60. CUB HYDRAULIC PUMP UNIT.

a. The Cub Hydraulic Pump unit (Figure 1-61) 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 gage 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 damage to the steering gear.

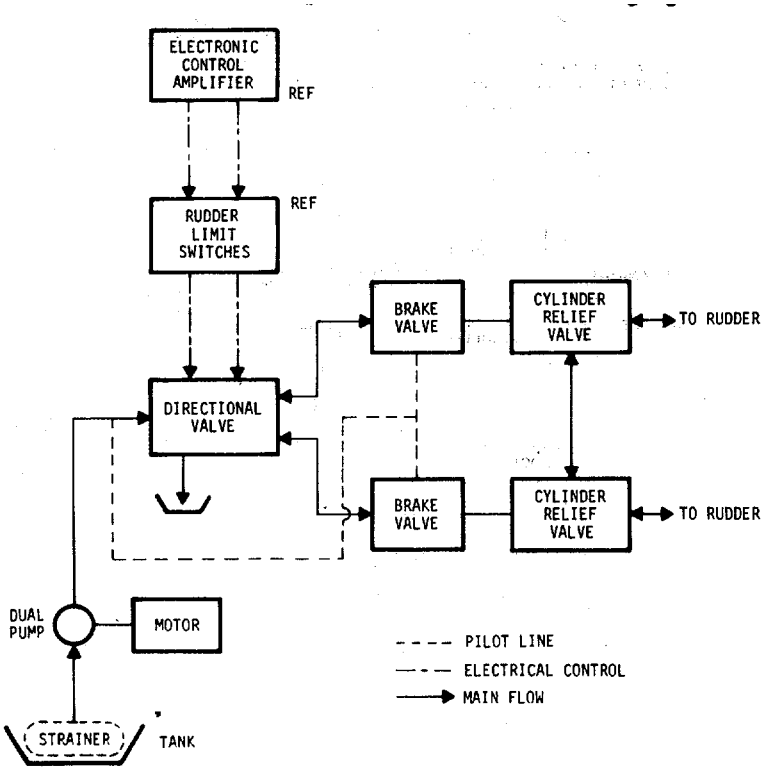


Figure 1-61. Cub Hydraulic Pump Unit

1-61. 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.

1-62. MOTOR CONTROLLER.

The Motor Controller is an AC across-the-line nonreversing unit that controls the three-phase electric motor used with the hydraulic pump on 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 the 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.

1-63. FLANKING RUDDER LIMIT SWITCH ASSEMBLY.

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

1-64. SILERING RUDDER REPEATBACK UNIT.

a. The Rudder Repeatback (Figure 1-62) consists of a followup 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.

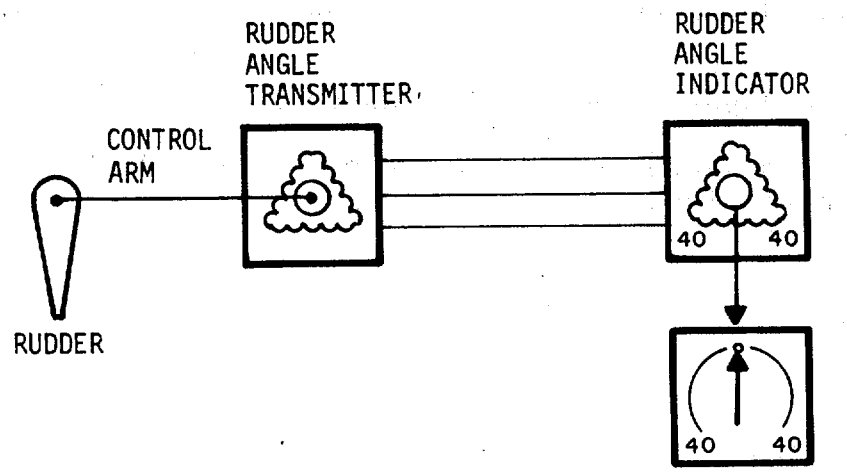


Figure 1-62. Steering Rudder Repeatback Unit

1-65. 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, 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 preceeding leg.

e. A transmitter and receiver synchro pair are operated by connecting the stator leads (S1 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.

1-66. SHIP'S PIPING SYSTEM.

The Ship's Piping System consists of the following:

DESCRIPTION	PARAGRAPH NUMBER
Engine Cooling Water System	1-67
Exhaust Piping System	1-68
Fuel System	1-69
Lube Oil Transfer System	1-70
Stand-by Lube Oil Pumps	1-71
Fresh Water System	1-72
Deck and Sanitary Drain Piping	1-73
Sewage System	1-74
Fire System	1-75
Bilge System	1-76
Ballast System	1-77
Flushing System	1-78
Oil/Water Separator System	1-79
Heating, Ventilating and Air Conditioning Systems	1-80
Centralized Hydraulic System	1-81
Halon System	1-82
Tank Level Indicating System	1-83

1-67. 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 FO-18). All keel coolers are recessed into the hull area. The port propulsion engine keel coolers also serve 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.

c. One Keel Cooler is provided for each of the diesel generators (See Figure 1-63). 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 make-up connections in the forward and aft engine rooms. Vents are provided on all back-up expansion tanks.

d. 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.

e. 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.

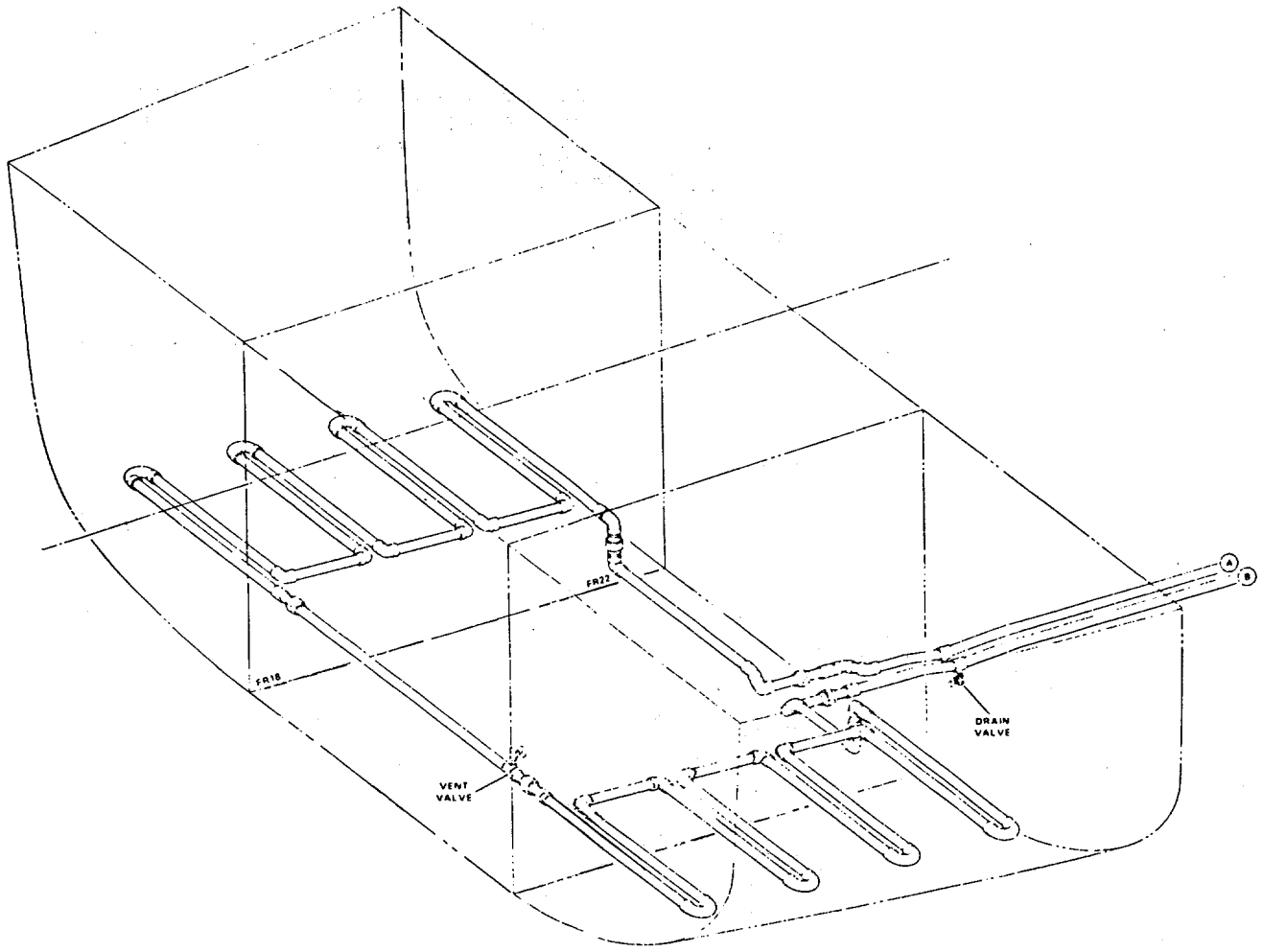


Figure 1-63. Engine Cooling System-Diesel Generator Engine

1-68. EXHAUST PIPING SYSTEMS

a. The Exhaust Piping System for the Forward Engine Room is shown in Figure 1-54 (Frame 47).

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 the starboard side.

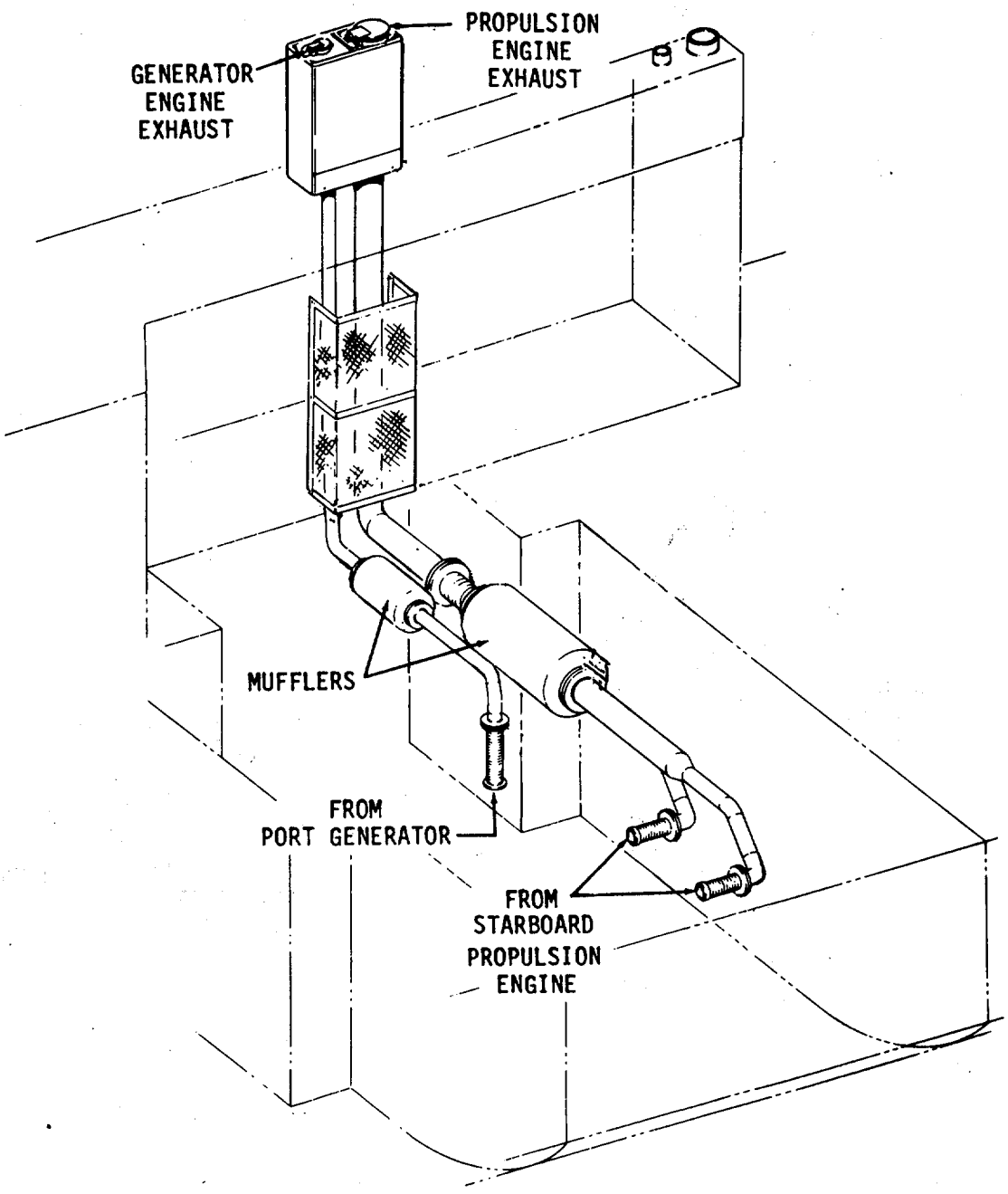


Figure 1-64. Diesel Engine Exhaust Piping/Forward Engine Room

c. The Exhaust Piping System for the Aft Engine Room is shown in Figure 1-65 (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.

d. 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.

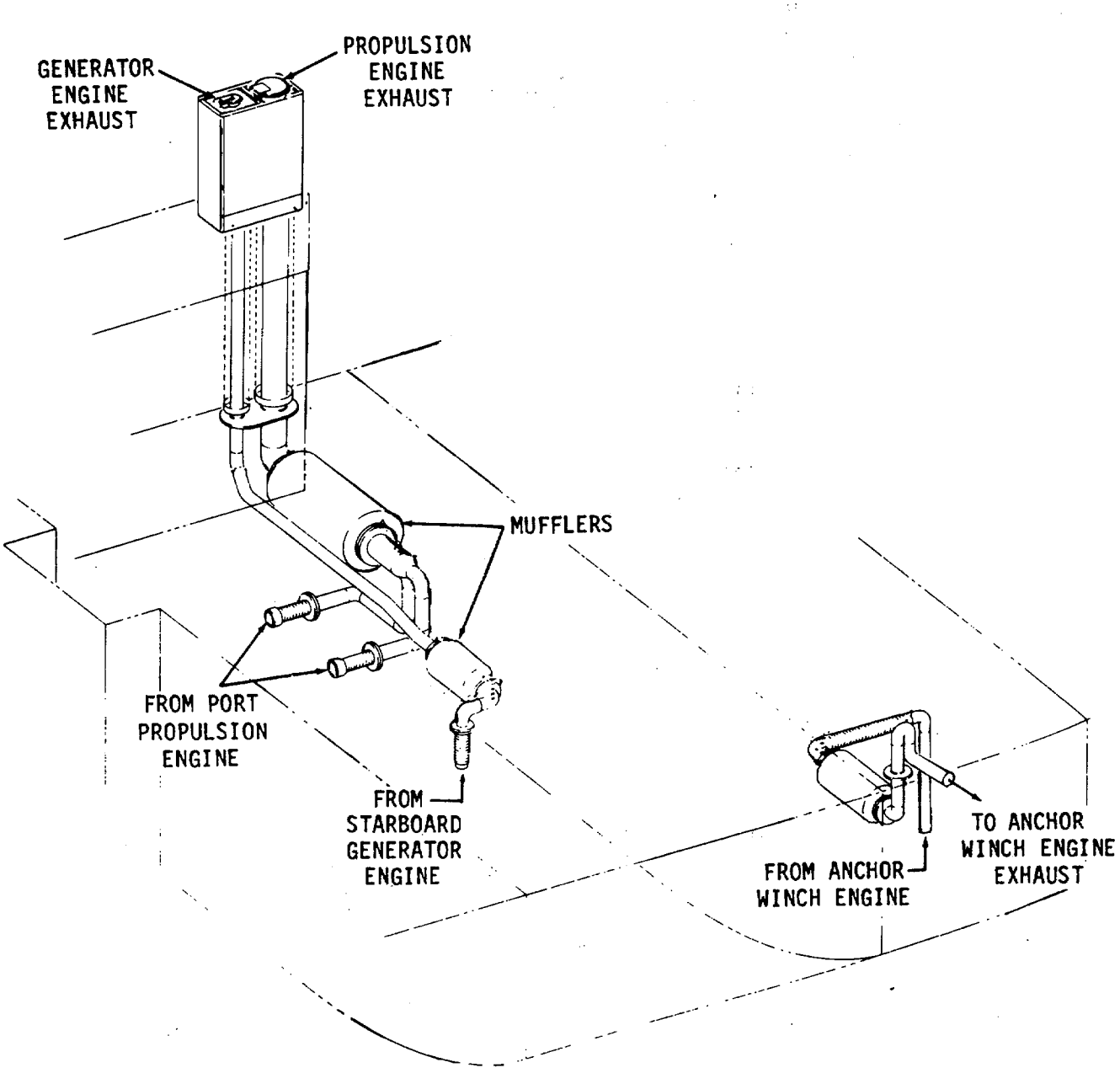


Figure 1-65. Diesel Engine Exhaust Piping/Aft at Engine Room

1-69. FUEL SYSTEM.

a. The Fuel System (Figure FO-19) supplies diesel fuel from the two storage tanks to the main propulsion engines, anchor winch engine, and diesel generator engines. The supply line is fitted with a fuel filter/water separator to remove water from the diesel fuel. Each engine is equipped with a fuel strainer, shutoff valve, and filter. Fuel return lines are fitted with check valves, and lead from each engine to the fuel storage tanks.

b. Valves are installed in the supply and return headers to return fuel to the tank. Suction is being 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. 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 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) off the 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 2-12 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 at deck level. The port tank is vented to port, and the starboard tank is vented to starboard. The vents are provided with fuel catchments to prevent fuel oil spillage overboard. Catchments are piped to allow overflow of fuel to drain into the bilge. Tank level indicating gages for the fuel tanks are located in the Engine Access Room. Each fuel tanks is also fitted with a sound pipe opening onto the main deck inboard of the bulwarks. The opening for the port tank is to port and the opening for the starboard tank is to starboard. Sounding tapes are stowed in the Aft Engine Room tool locker.

g. Each fuel tank is also provided with an 18 inch diameter drainwell and drain valve. Drain valves are located below engine room deck level on port and starboard fuel tanks. Drain valves are provided with a padlock and chains to secure in a 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.. FUEL SYSTEM.

i. The fuel filter/water separator, located between the two fuel tanks, separates water and other contaminates from the diesel fuel before it enters the supply line. These contaminants are then drained off from the separator's catch basin.

1-70. LUBE OIL TRANSFER SYSTEM.

The Lube Oil Transfer System (Figure FO-20) consists of a lube oil storage tank, manually operated transfer pump, distribution lines and supply valves and service hoses. Supply valves and service 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 gage and is located in the forward engine room starboard. The tank fill pipe is located inboard of the deckhouse on the main deck.

1-71. STANDBY LUBE OIL PUMPS.

Standby Lube Oil Pumps and related piping (Figure 1-66) are provided to lubricate the reduction gear bearings when trailing shaft. The standby lube oil pump for the starboard propulsion unit is located in the aft engine room starboard. The standby lube oil pump for the port propulsion unit is located in the forward engine room port.

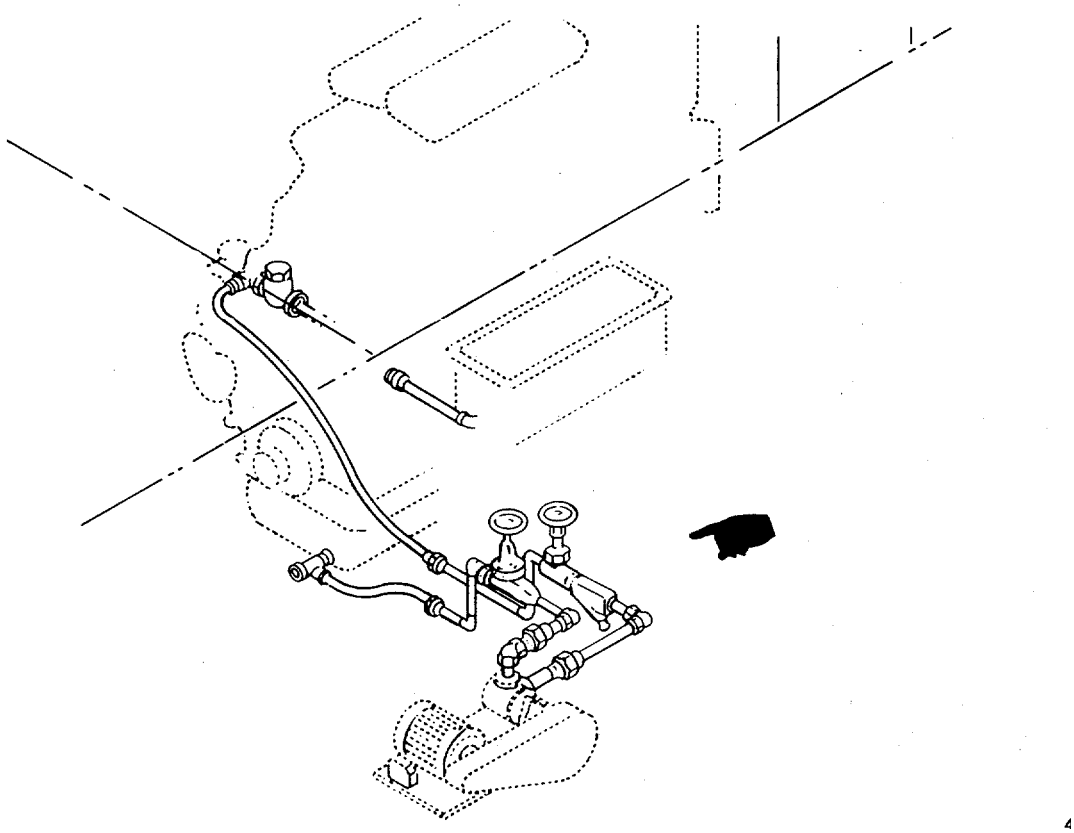


Figure 1-66. Standby Lube Oil Pump

1-72. FRESH WATER SYSTEM PIPING.

a. The Fresh Water System (Figure FO-21) 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 wye strainer is also installed in this line. The height of water in the tank can be determined by reading the tank level indicating gage 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 electrically driven pump unit, a pressure tank with sight gage, a pressure switch for automatic control of the system, automatic air volume control, 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 gage 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).

1-73. DECK AND SANITARY DRAIN PIPING.

The Drainage System (Figure 1-67) 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.

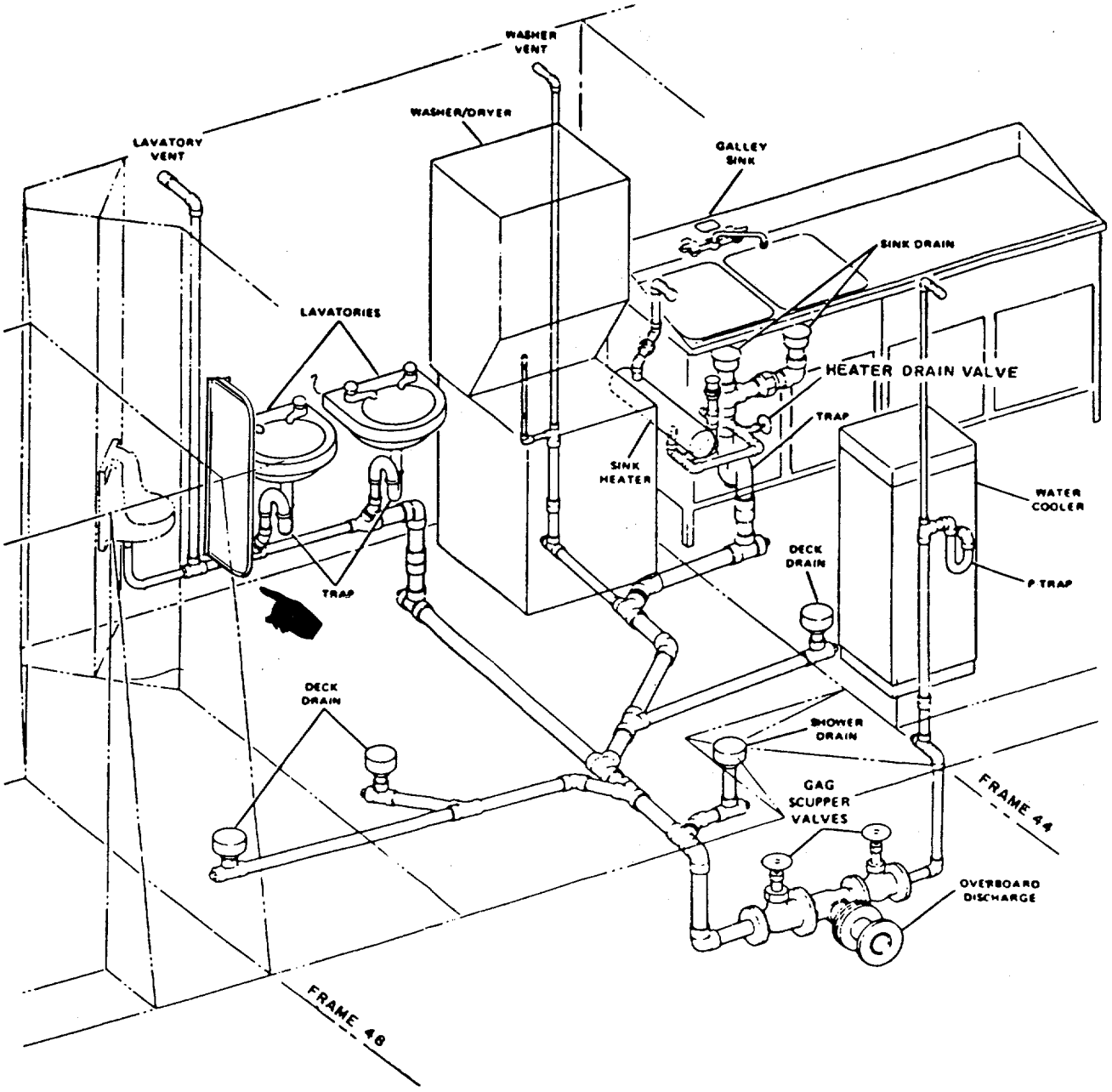


Figure 1-67. Deck And Sanitary Drain Piping

1-74. SEWAGE SYSTEM PIPING.

a. The Sewage System (Figure FO-22) consists of one urinal, two water closets, one holding tank, port and starboard deck connections with valves for the sewage discharge hose, an overboard discharge with gagged scupper, two three-way two-port valves, a discharge pump, two vacuum pumps, and piping and fittings. The urinal and water closets are located in the wash and shower rooms in the deckhouse. They are flushed by salt water from the salt water flushing system.

b. The Holding Tank is located at Frame 47 between the two diesel oil tanks. The tank has connections for sewage-in, sewage discharge, a vent, and flushing by water from the firemain. The tank includes two one-horsepower vacuum pumps, one five-horsepower sewage discharge pump, and a controller for the pumps. The controller and pumps are located beside the tank. The sewage discharge pump is located at port end of holding tank.

c. Located at Frame 43-1/2, starboard, between the deckhouse and the bulwark is a vent with a ball check valve for the holding tank and a capped 4-inch connection for the sewage discharge hose. A valve is also provided at this hose connection point. A similar connection for the sewage discharge hose is provided at Frame 42 on the port side outside the bulwark.

d. A three-way plug valve is provided in the discharge pipe from the sewage pump. It is located just forward of the port diesel oil tank, about 14 inches (35.6 cm) below the vehicle deck and 5 feet (1.5 cm) to port of centerline. The valve allows the sewage discharge pipe to be closed, or to opened to the port or starboard discharge point. There is another plug valve at Fram 45-1/2, port. This valve allows the port discharge to be directed to the overboard discharge or the port discharge point.

e. A tank flushing valve is located in the flushing line from the firemain to the holding tank at Fram 48, above the port end of the holding tank.

f. 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.

g. 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. A liquid level, time delay sensor in the pump controller box controls 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.

1-75. FIRE SYSTEM PIPING.

a. The Fire Pump (Figure FO-23) 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 gm (359.6 1pm).

b. The Fire Pump is supplied by the sea chest valve starboard side or by the cross connection with the ballast system. The pump takes suction through a duplex 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 bleedline overboard must be open before starting the pump. A check valve is installed in the fire pump discharge line to prevent back flow. Shutoff valves are also provide for the fire stations.

1-76. BILGE SYSTEM PIPING.

The Bilge System (Figure FO-24) 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 is removed from the bilge and 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 as 90 psig (6327.6 gm sq cm) from the fire pump to operate.

1-77. BALLAST SYSTEM PIPING.

a. The Ballast System (Figure FO-25) 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 11-1/2. The portable fire pump may be used to drain the peak ballast tank.

1-78. FLUSHING SYSTEM PIPING.

The Flushing System (Figure 1-68) 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 connection, a pressure, switch for motor control, a pressure gage and a 1/2-inch drain. There are four shutoff valves installed in the line.

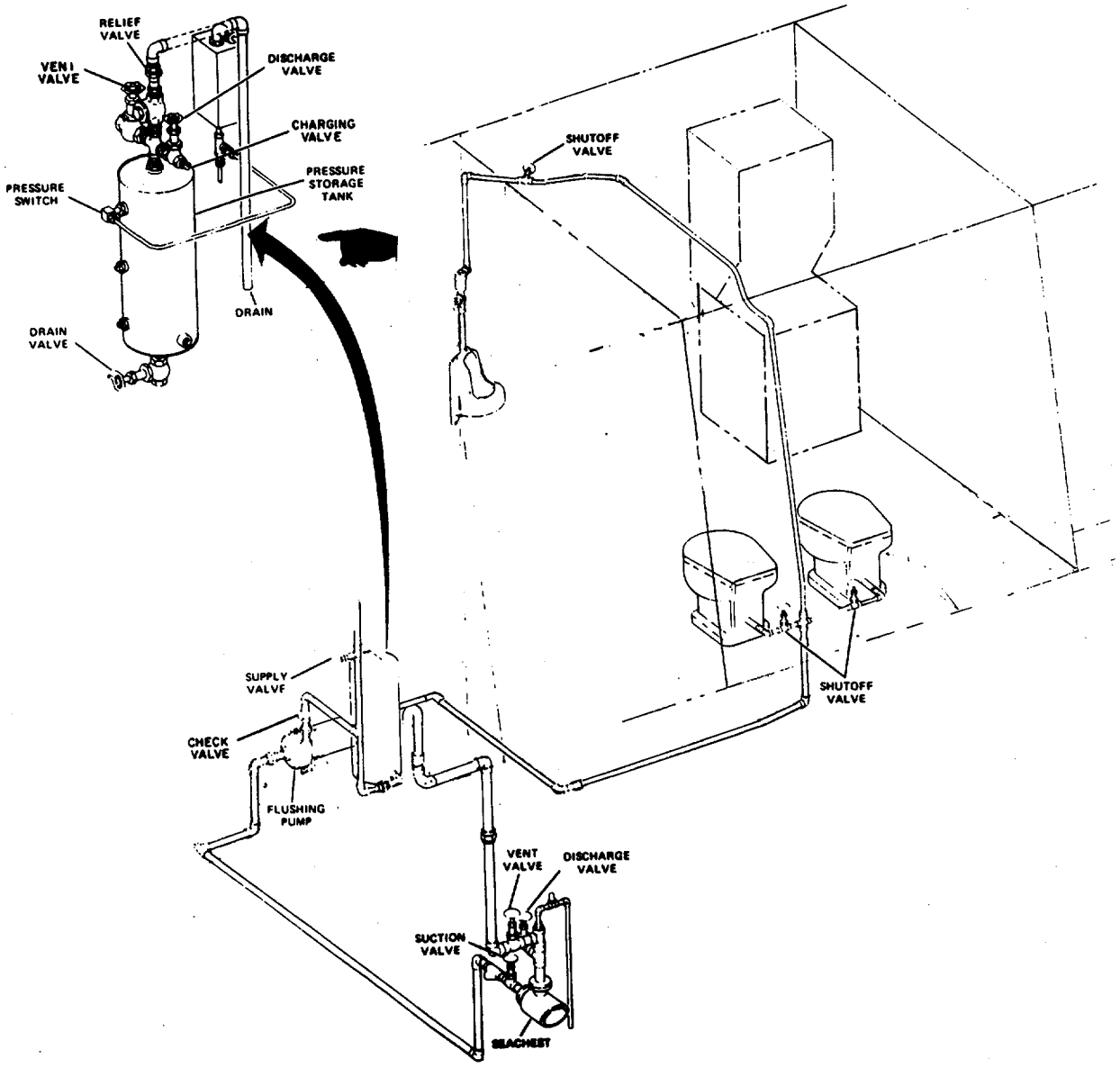


Figure 1-68. Flushing System Piping

1-79. OIL/WATER SEPARATOR SYSTEM PIPING.

The Oil/Water Separator System (Figure 1-69) is designed to separate and remove non-soluable oil, solids and air from an oil water solution. Oily water is directed through filters. The filters provide a surface where very small droplets of non-soluable 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.

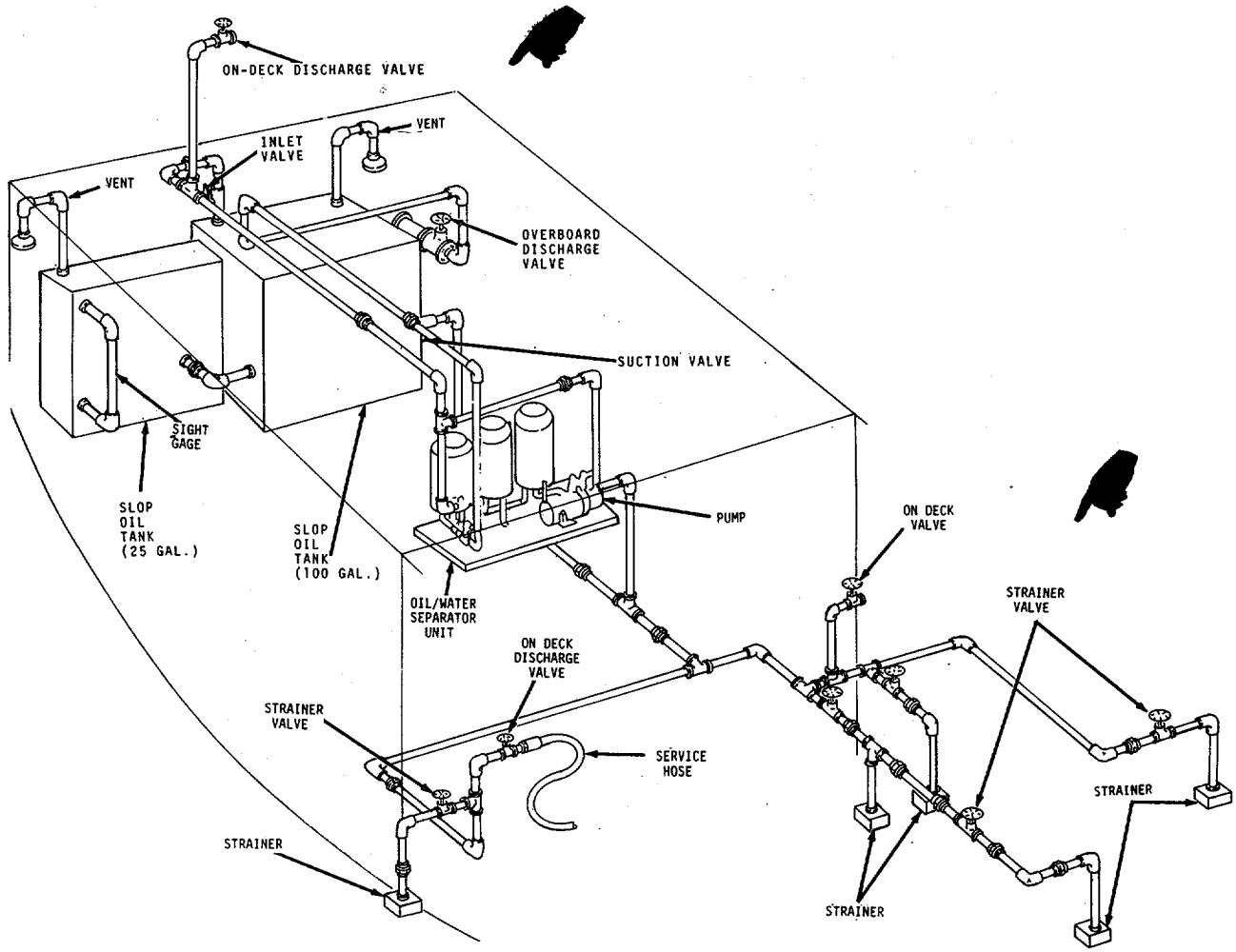


Figure 1-69. Oil/Water Separator System Piping

1-80. HEATING, VENTILATING AND AIR CONDITIONING SYSTEM (HVAC).

a. The Air Conditioning System (Figure FO-26) consists of a single air conditioning plant and suitable duct work serving the crew berthing, stateroom, pilot house, galley and mess.

b. The air conditioning plant consists of a condensing unit assembly, a heat exchanger, an air conditioning cooling coil (evaporator) and gage 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). Insure that correct refrigerant is used.

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, gage 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 to 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. 60C) .

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 for 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 pilothouse, galley mess, crew 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.

1-81. CENTRALIZED HYDRAULIC SYSTEM.

a. A Centralized Hydraulic System (Figure FO-24) consists of a pump, controls, hydraulic cylinders, and a hydraulic motor. These components raise and lower the following:

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

Refer to Figure 1-70 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.

c. The Main Mast Directional Control Valve is a manually operated valve which controls hydraulic fluid flow to the main mast cylinder by depressing the lever.

d. The Main Mast Cylinder is an hydraulic cylinder used to raise and lower the main mast by depressing the lever.

e. The Anchor "A" Frame Directional Control Valve is a manually operated valve which controls hydraulic fluid flow to the A-frame winch by depressing the lever.

f. The "A" Frame Hydraulic Winch and Winch Drum is used to swing out the Anchor "A" Frame for raising and lowering the anchor. The winch drum holds the anchor cable.

g. 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. The one control valve is located on the starboard bulwark, operating the two stern gate cylinders that raise and lower the stern gate.

h. The Inline Flow Control Valves act as hydraulic lines in the system.

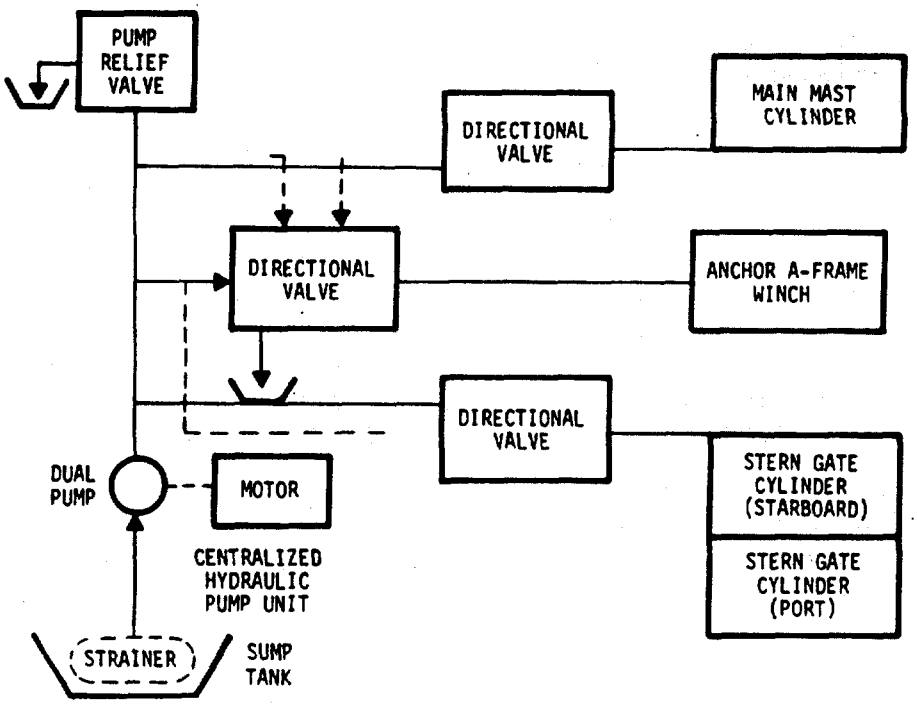


Figure 1-70. Centralized Hydraulic System (Block Diagram)

1-82. HALON SYSTEM

a. The fixed Halon Fire Extinguishing System (figure FO-15, 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).

1-82. 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.

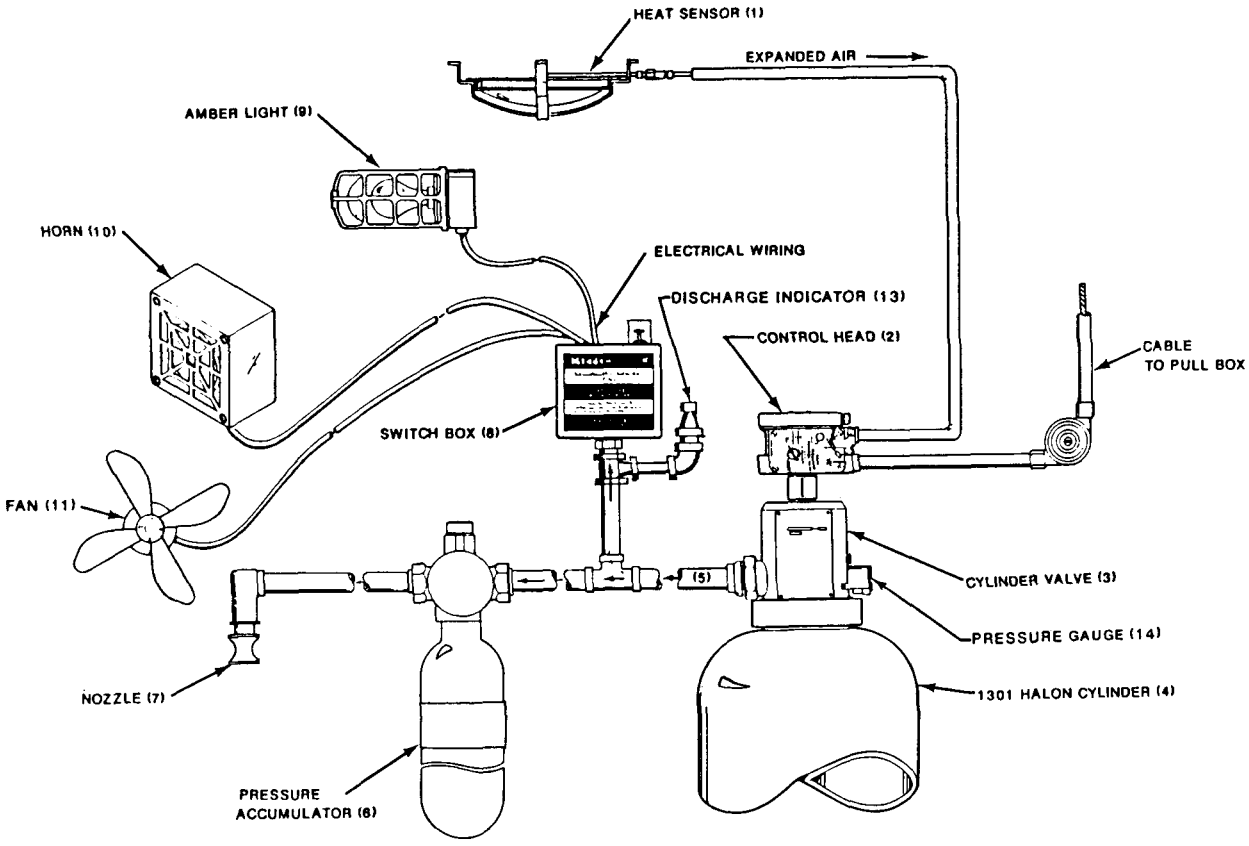


Figure 1-70.1. Fixed Halon Fire Extinguishing System

1-83. 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 indicators can be found at system components or at other shipboard locations.

b. The 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 ship's wiring and then to the receivers.

d. The Transmitter is an cylindrical float assembly located in 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 and a meter. The receiver modules are mounted in a panel that contains the circuits common to all receiver modules.

1-84. INTERIOR COMMUNICATION EQUIPMENT.

a. All Interior Communication Circuits requiring 115 volt AC power are fed from the IC panel L-107, located on the Starboard bulkhead of the Pilothouse. 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 - 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 - Gyrocompass System.

CIRCUIT 1N - Rudder Angle Indicator System.

CIRCUIT 5T - Sewage Tank High Level Alarm System.

CIRCUIT 5U - Cease Fire Signaling System.

CIRCUIT TL - Tank Level Indicating System.

CIRCUIT RMHS - Remote Magnetic Heading System.

CIRCUIT SE - Ship's Entertainment System.

c. 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 Pilothouse. Headset lockers are provided for all other headsets.

d. 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 Pilothouse on the Starboard bulkhead. The power supply is 120 volt AC single phase from the IC Distribution Panel L-107.

e. 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 Pilothouse. 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 located in ordnance stores. The circuit breaker for the 24 VDC Gyrocompass circuit is also connected to the alarm panel.

f. 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.

g. The LS-518 Intercommunication System is powered from the 115 VAC system. The Intercommunication System is used for internal communication between the Pilothouse, Forward and Aft Engine Compartments, and the Crew's Quarters.

1-85. NAVIGATION SYSTEMS.

a. The Mark 27 Gyro 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.

1-86. COMMUNICATION SYSTEMS.

a. The vessel uses communications systems located in the Pilot House. They are Transceiver AN/URC-46, Radio Set AN/URC-80, Receiver R-442, Marine VHF Transceiver DSC 500, and hand-held Portable Radios EDH/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 form the distribution panel in the Pilot House. IFF equipment is installed in the Pilot HOuse's electronics 4rack, except for the AS-1 77/UPX antenna which is located on the Main Mast.

c. The Ship's Radar System is an AN/SPS-69 (7H422) Model R41 X. It consists of Antenna, Indicator, and Sweep Amplifier. The antenna is mounted on a radar mast at the forward end of 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 volt DC distribution panel.

1-87. HYDRAUUC STARTING SYSTEM.

The Ship's Hydraulic Starting System consists of the following:

DESCRIPTION	PARAGRAPH NUMBFR
Anchor Winch Compartment	1-88
Diesel Generator and Propulsion Engine	1-89

1-88. HYDRAULIC STARTING SYSTEM - ANCHOR WINCH COMPARTMENT.

a. The Anchor Winch Compartment (Figure FO-29) 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 nay harmful effects upon the Hydraulic Starting System.

b. The Hydraulic Starting System (Figure 1-71) consists of a reservoir, an engine-driven charging pump mounted on the anchor winch engine, and a hand pump with pressure gage. It also consists of two piston type accumulators with pressure gages, a starting motor, high and low pressure filters, connecting hoses and fittings, and solenoid valves with manual overrides.

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.

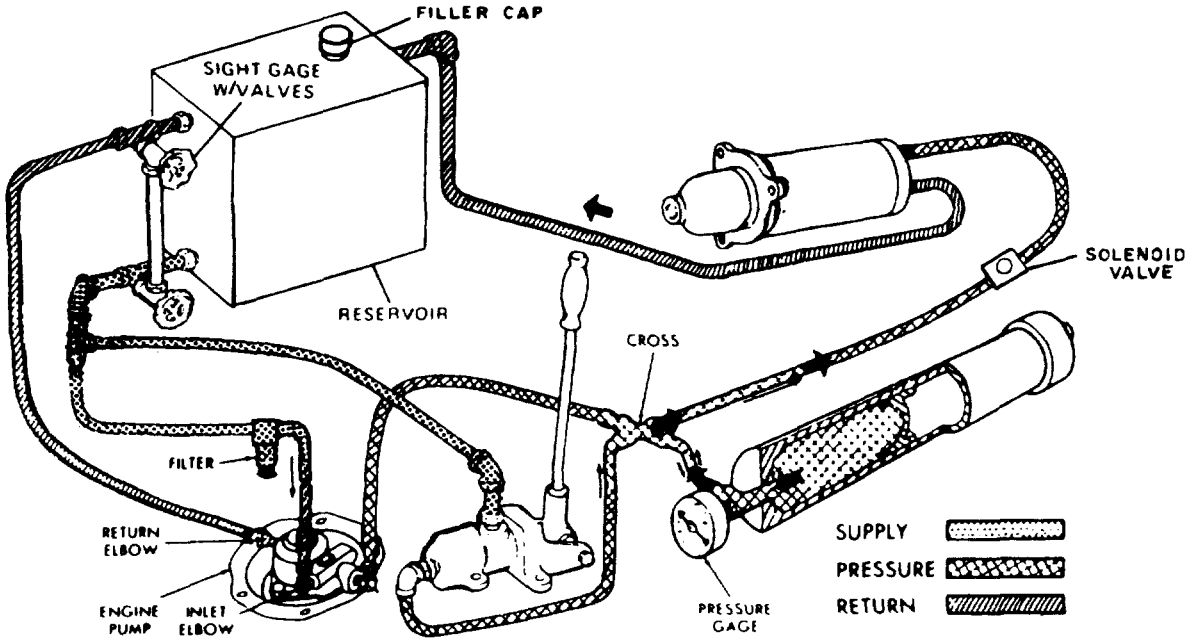


Figure 1-71. Hydraulic Starting System

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.

h. The piston-type Accumulator is precharged with nitrogen thru 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.

1-89. HYDRAULIC STARTING SYSTEM - DIESEL GENERATOR AND PROPULSION ENGINE.

a. Each of the Forward and Aft Engine Rooms (Figures FO-30 and FO-31) 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 for a long time. Hot or cold climates do not have any harmful effects upon the Hydraulic Starting System.

b. The Hydraulic Starting System (Figure I-72-) consists of a reservoir, an engine-driven charging pump mounted on the propulsion engine and diesel generator, and a hand pump with pressure gage. It also consists of two piston-type accumulators with pressure gages, a starting motor, high and low pressure filters, connecting hoses and fittings, and solenoid valves with manual overrides.

c. Hydraulic fluid flows by gravity or slight vacuum from the reservoir to the engine-driven pump inlet or the hand pump inlet. The hand pump supplies the initial charge and 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.

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 X 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.

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.

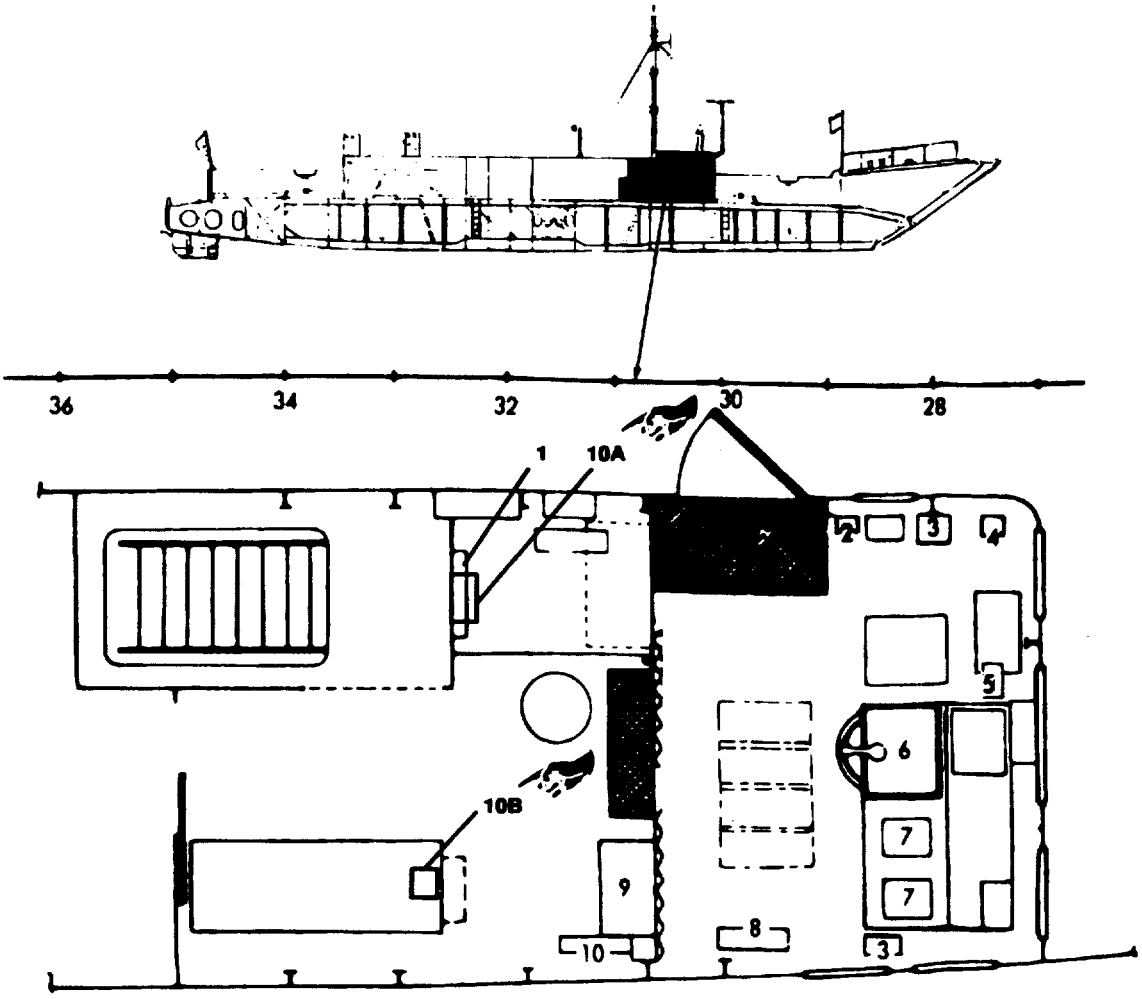
This Section contains the Operator's Controls and Indicators arranged by location. The following is an index of compartments and areas in which the controls and indicators are located. Before you operate any device be sure you know the location and operation of all controls.

DESCRIPTION	PARAGRAPH
Pilot House	2-2
Galley and Mess Room	2-3
Wash Room, Water Closet, and Shower	2-4
Engine Room Access	2-5
Ramp Handling Machinery Compartment and Bow Ramp	2-6
Air Conditioning Machinery Room	2-7
Lighting Panel (L-109)	2-8
Crew and Transient Berthing Heater Distribution Panel (P-410)	2-9
Distribution Panels, Sewage Treatment Plant	2-10
Forward Engine Room	2-11
Aft Engine Room	2-12
Anchor Winch Room	2-13
Steering Gear Compartment	2-14
Mast Controls	2-15
Emergency Shutdown	2-16
Anchor Winch Controls	2-17
Stern Gate Controls	2-18

2-2. PILOT HOUSE.

Refer to Figure 2-1 for the arrangement of the operational components. Figure 2-1 contains an Index to the various Operator's Controls and Indicators.

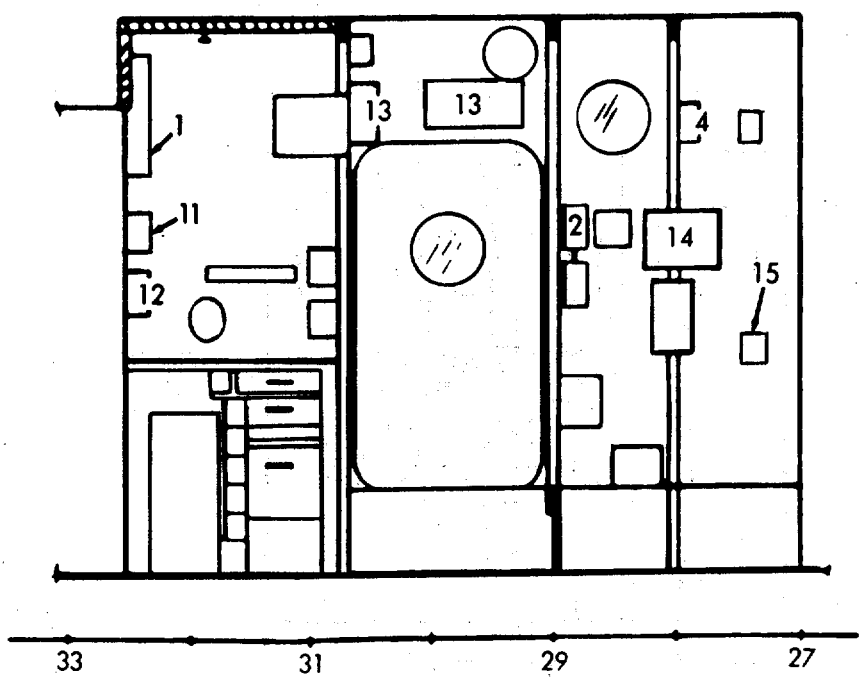
Refer to Appendix A in TM 55-1905-220-14-12 for technical manuals for the navigational and communication devices.



Plan

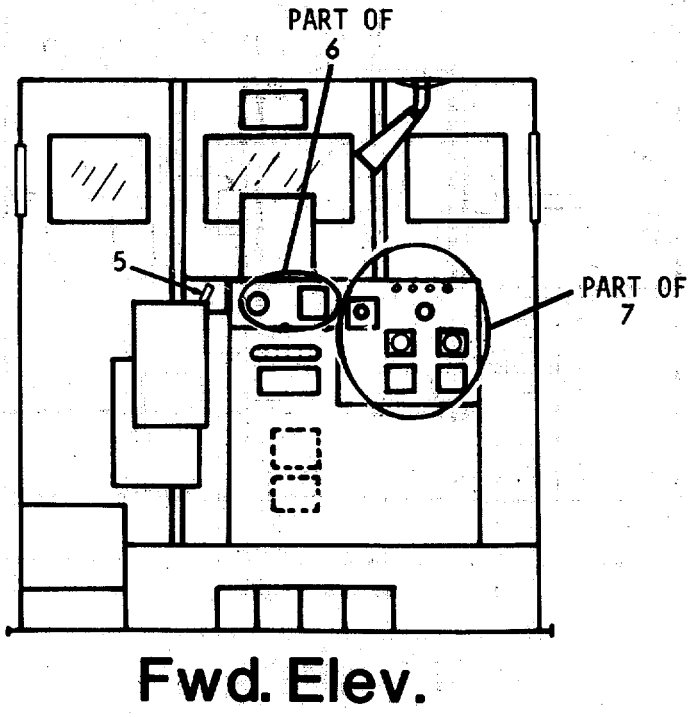
Item Number	Description	See Figure
1.	Alarm Panel	2-2
2.	Bow Ramp Controls	2-3
3.	Intercommunication System	2-4
4.	Thermostat	2-5
5.	Window Wiper Control	2-6
6.	Steering Control Panel	2-7
7.	Engine Controls	2-8
8.	Navigation Light Control Panel	2-9
9.	Battery Charger	2-10
10.	Distribution Box (L-107)	2-11
10A.	Hand Held Transceiver/Holder/Charger	
10B.	VHF Transceiver Power Supply	

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



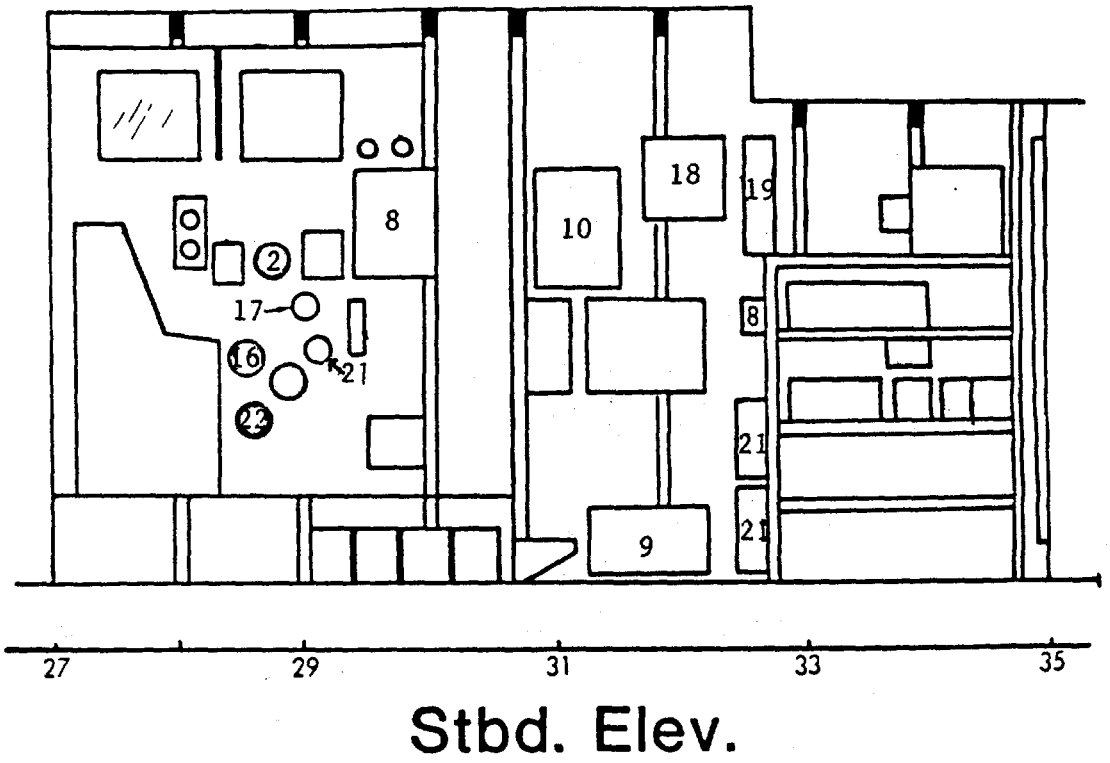
Item Number	Description	See Figure
1.	Alarm Panel	2-2
2.	Bow Ramp Controls	2-3
4.	Thermostat	2-5
11.	Air Conditioner System Emergency Stop	2-12
12.	Exhaust Fan Emergency Stop (2-20-0-A)	2-13
13.	Clinometer	2-14
14.	Halon Control Panel	2-15
15.	Battery Exhaust Switch	2-16

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



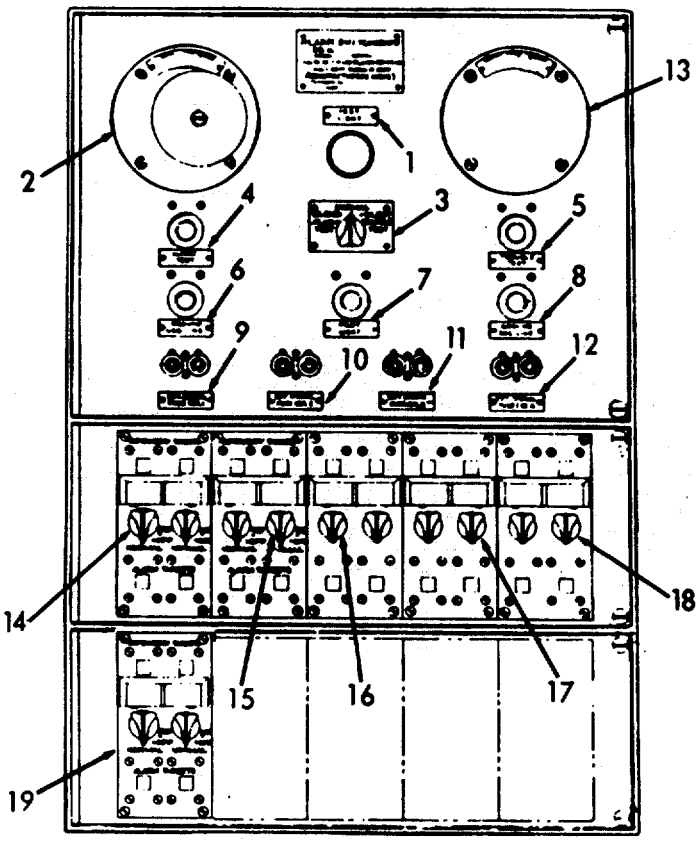
Item Number	Description	See Figure
5.	Window Wiper Control	2-6
6.	Steering Control Panel	2-7
7.	Engine Control s	2-8

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



Item Number	Description	See Figure
2.	General Alarm	2-17B
4.	Thermostat	2-5
8.	Navigation Light Control Panel	2-9
9.	Battery Charger	2-10
10.	Distribution Box (L-107)	2-11
16.	Navigation Horn Switch	2-17A
17.	Conning Station Call	2-18
18.	DC Distribution Box (P-24)	2-19
19.	Distribution Box (L-106)	2-20
20.	Heater Controls	2-21
21.	Wake Light Switch	2-22
22.	Cease Fire Switch	2-23

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



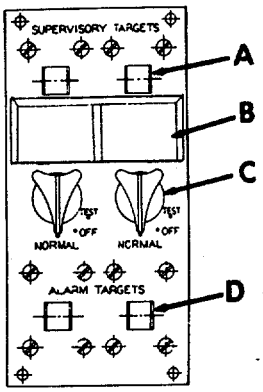


Figure 2-2. Alarm Panel.

Legend Figure 2-2.

1. TEST LIGHT - Flashes in the Silent Alarm Test or Silent Trouble test modes.
2. ALARM BELL - Audible alarm indicating a problem in the 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. LOW OIL PRESSURE - PORT PROPULSION ENGINE
    - STBD PROPULSION ENGINE

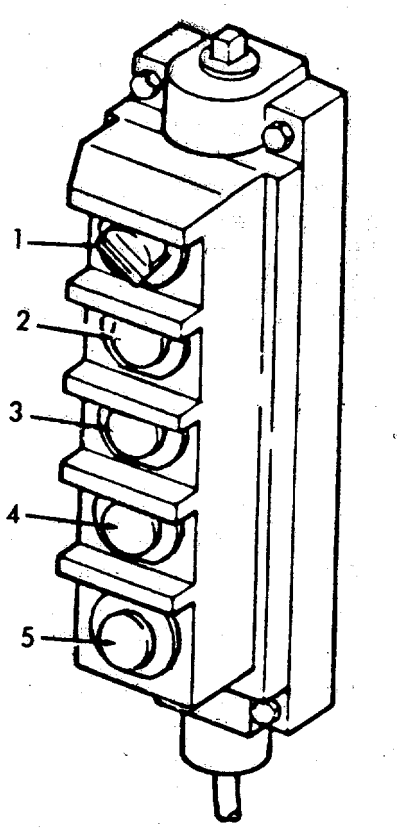
15. LOW OIL PRESSURE - STBD GENERATOR ENGINE
    - PORT GENERATOR ENGINE

16. HIGH TEMPERATURE - PORT PROPULSION ENGINE
    - STBD PROPULSION ENGINE

17. HIGH TEMPERATURE - STBD GENERATOR ENGINE
    - PORT GENERATOR ENGINE

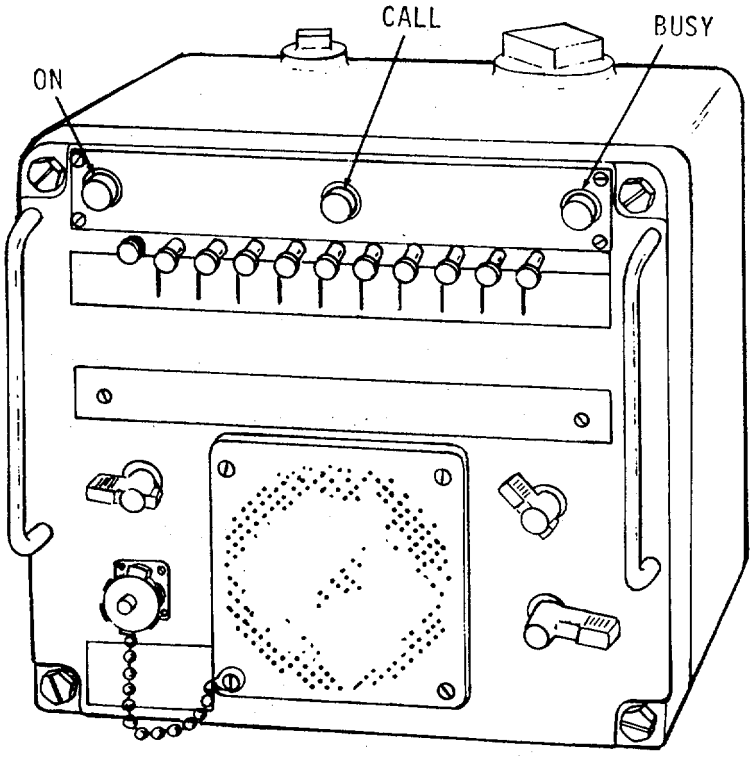
18. HIGH TEMPERATURE - MAGAZINE SPRINKLER ALARM - MAGAZINE

19. HIGH LEVEL - SEWAGE TANK POWER FAILURE - GYRO COMPASS



1. CONTROL EMERGENCY CUT-OFF - Rotary Switch that permits local operation only. (Ramp handling machinery compartment 2-12-O-Q).
2. EMERGENCY RUN (RED) - Press to operate the bow ramp in an emergency overload condition. Press this switch when pressing either RAISE or LOWER.
3. RAISE (BLACK) - Press to raise the bow ramp.
4. LOWER (BLACK) - Press to lower the bow ramp.
5. STOP (BLACK) - Press to stop either the raising or lowering of the bow ramp.

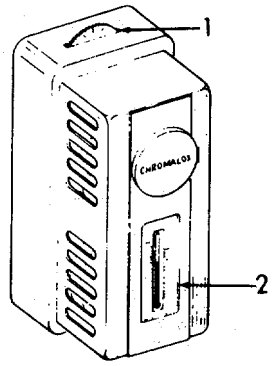
Figure 2-3. Bow Ramp Controls.



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.

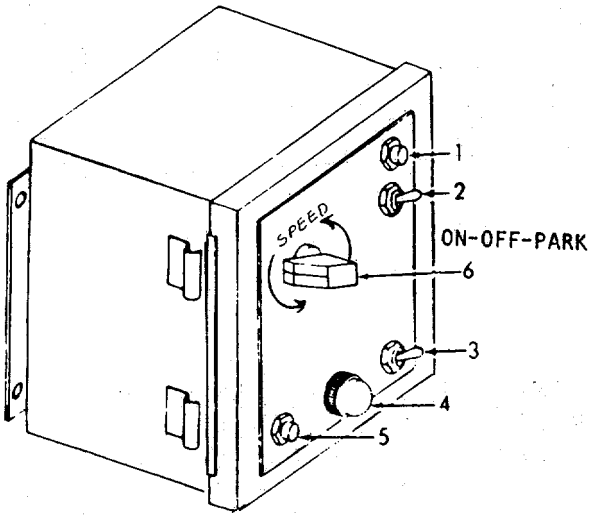
Figure 2-4. Intercommunication System.



1. TEMPERATURE SETTING - Rotate to set the desired temperature of heating'.

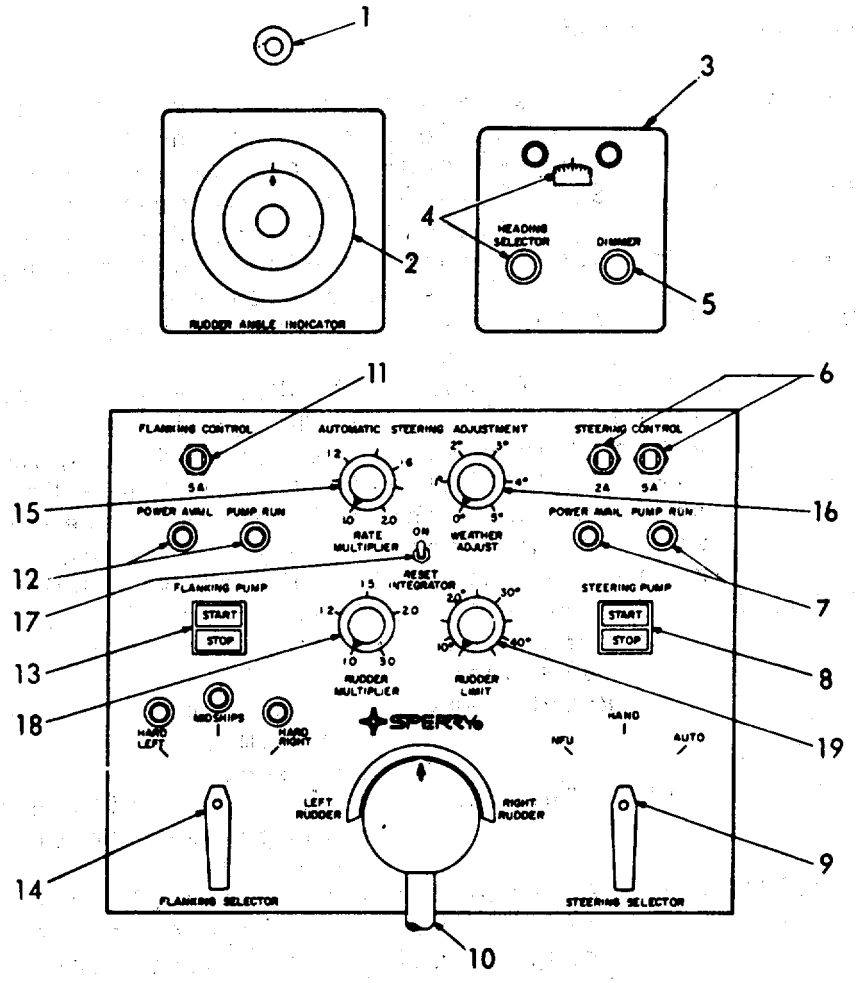
2. TEMPERATURE - Actual air temperature in room or compartment.

Figure 2-5. 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 2-6. Window Wiper Control.



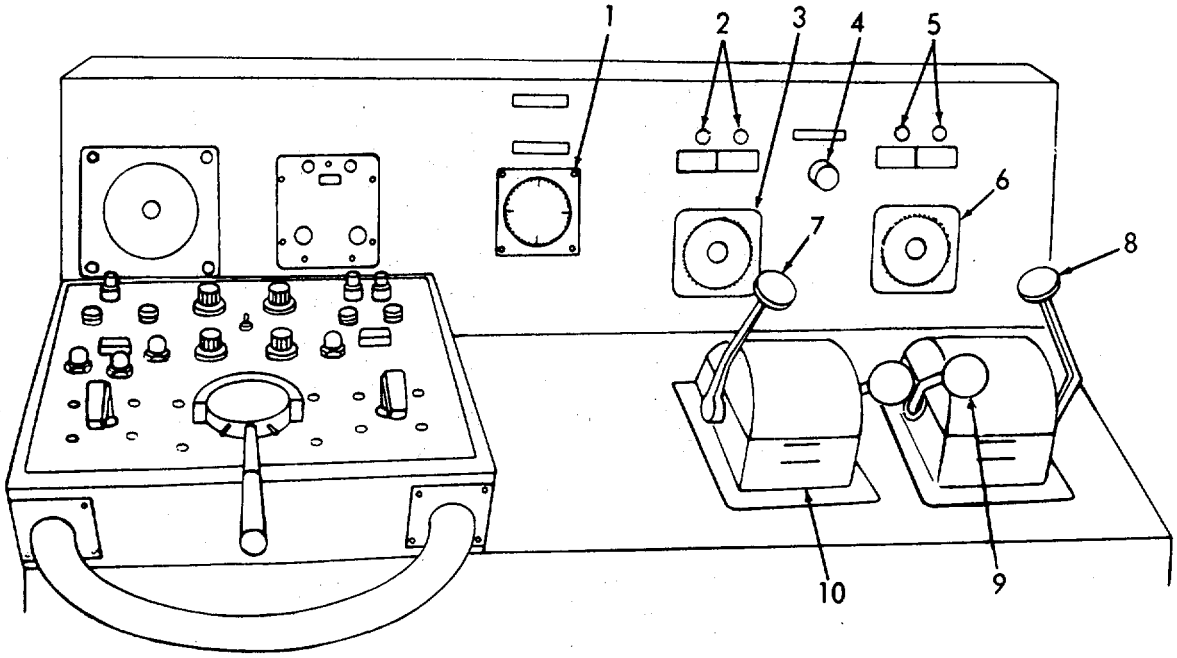
1. DIMMER - Light adjustment for Rudder Angle Indicator.
2. RUDDER ANGLE INDICATOR - Position of rudder in relationship to the center of the vessel.
3. HEADING SELECTOR UNIT - Device for automatic steering of a preset course.
4. DIAL LAMPS - Used to illuminate heading selector.
5. HEADING SELECTOR KNOB - 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. POWER AVAIL - PUMP RUN - Lights indicating steering pump running or available to run.
9. STEERING PUMP START/STOP - Pushbuttons to turn the steering pump on/off
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.)

Figure 2-7. Steering Control Panel (Sheet 1 of 2)

Legend for Figure 2-7 (Continued)

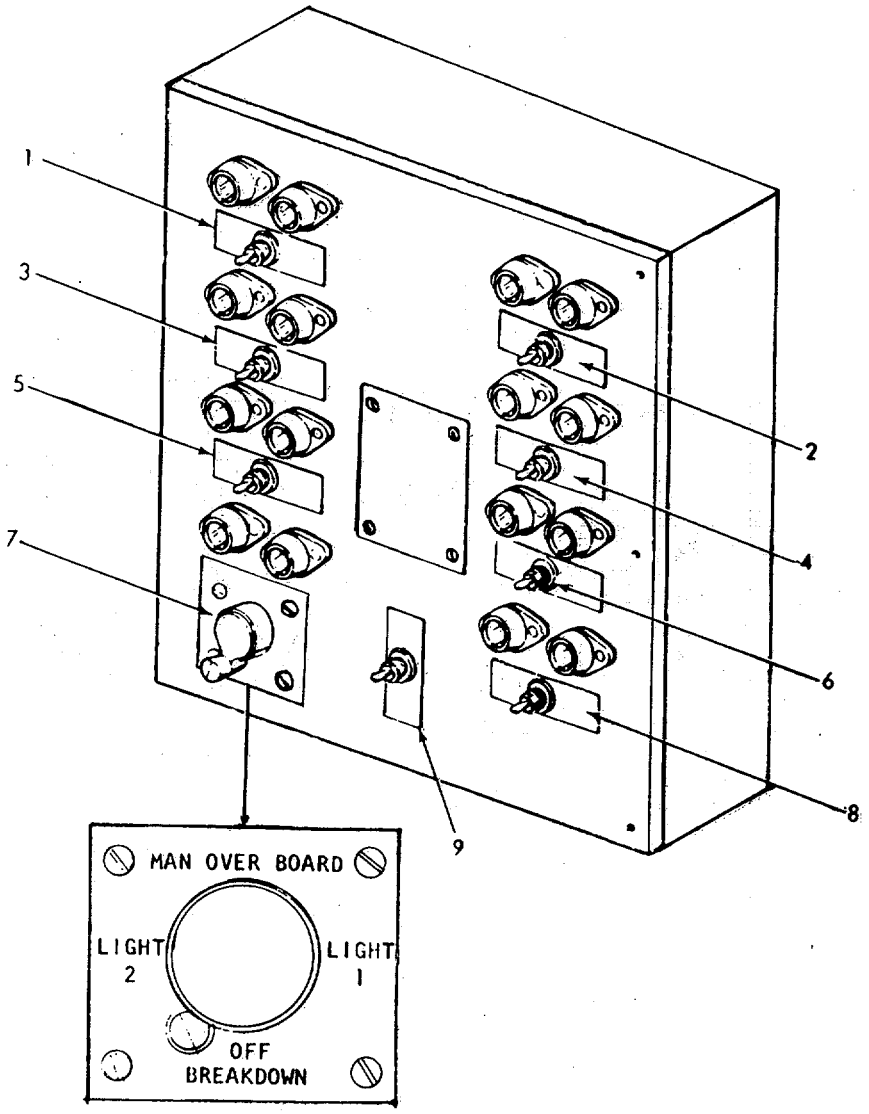
11. STEERING LEVER - Steers vessel in HAND or NFU settings of Steering Selector Switch: Clockwise for Right Rudder- counter-clockwise for Left Rudder.
12. FLANKING CONTROL FUSE - Fuse 5 amp. - Circuit protection for flanking control circuits.
13. POWER AVAIL - PUMP RUN - tights indicating flanking pump 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. INTERGRATOR 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 2-7. 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 Engine 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.

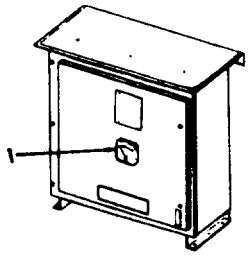
Figure 2-8. Engine Controls



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

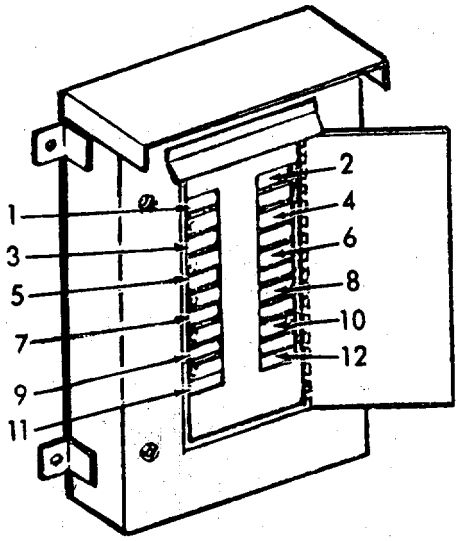
1. MASTHEAD - (Fuses 3 amps.)
2. STERN - (Fuses 3 amps.)
3. ANCHOR - (Fuses 3 amps.)
4. PORT/STBD RUNNING - (Fuses 3 amps.)
5. BLINKER - (Fuses 5 amps.)
6. TOWING - (Fuses 3 amps.)
7. MAN OVERBOARD/BREAKDOWN LIGHT 1 OR LIGHT 2 - Rotary selector switch to select either set of lights. (Fuses 3 amps.)
8.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

Figure 2-9. Navigation Light Control Panel.



1. METER - Indicates rate of charge of battery.

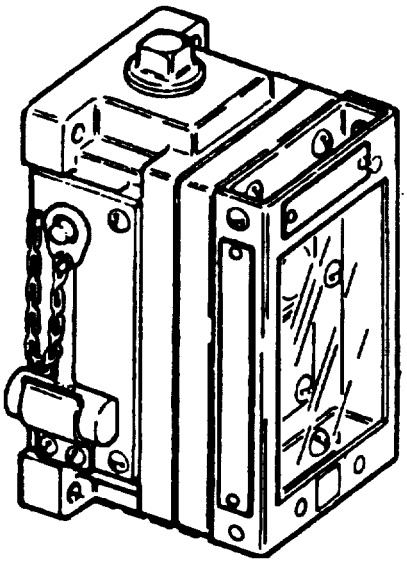
Figure 2-10. Battery Charger.



The circuit breakers on this panel turn ON/OFF the following circuits:
All circuit breakers are 10 Amps.

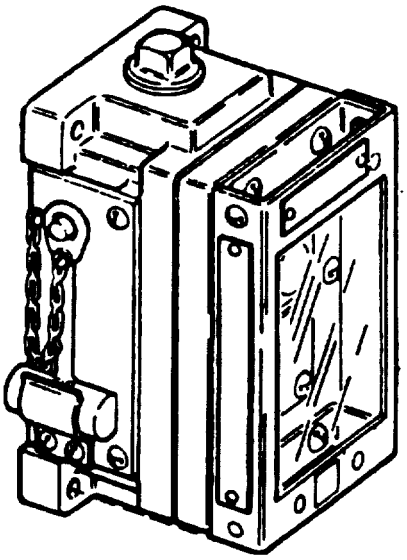
1. NAVIGATION HORN
2. ENG CALL SYSTEM
3. 390 URR RECEIVER - Entertainment System
4. CEASE FIRE HORN
5. ALARM SWBD
6. RUDDER ANGLE INDICATOR
7. WEATHERFAX- MARINEFAX
8. PORTABLE RADIO RECEPTACLE
9. TANK LEVEL INDICATOR
10. BLANK

Figure 2-11. Distribution Box (L-107).



Frame 32-1/2 - Port Side of Pilot House

Figure 2-12. Air Conditioner Emergency Stop (Breakglass).



Frame 32-1/2 - Port Side of Pilot House

Figure 2-13. Exhaust Fan Emergency Stop (Breakglass) (2-20-0-A).

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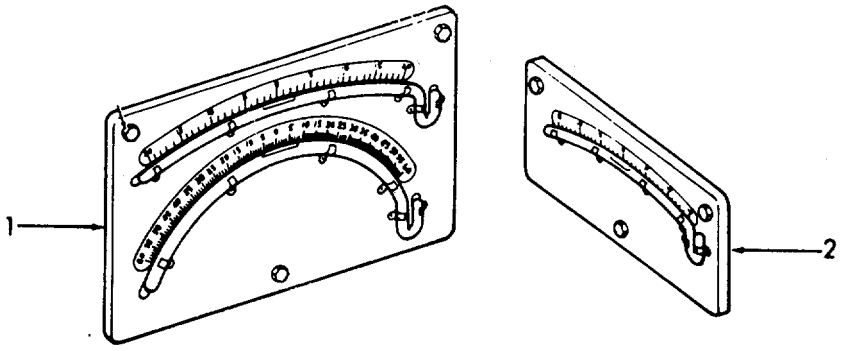
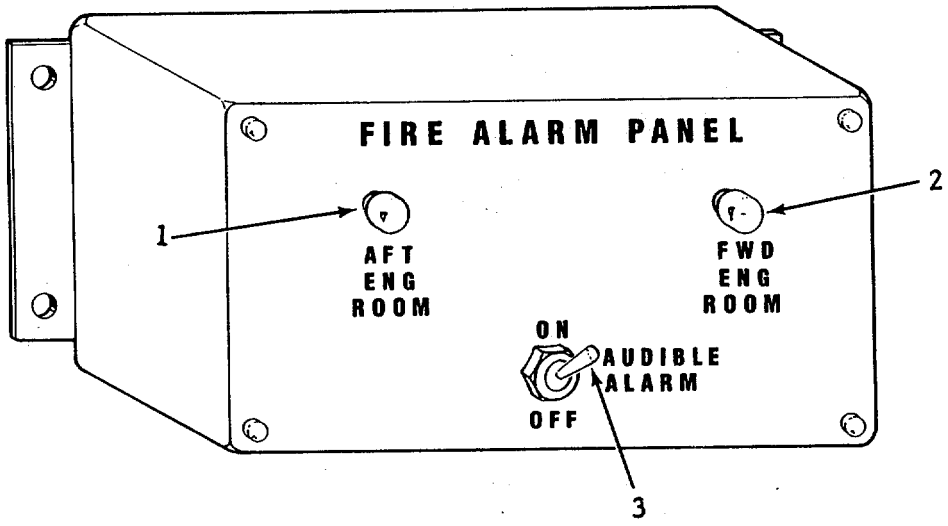


1. Indicates list port or starboard.
2. Indicates pitch bow to stern.

Figure 2-14. Clinometers.

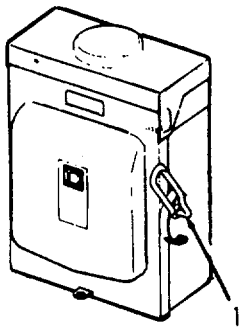


(1) FIRE ALARM LIGHT - AFT ENGINE ROOM - Amber indicator light - Fire in aft engine room.

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

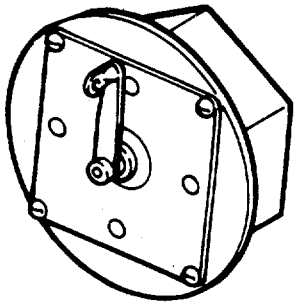
(3) AUDIBLE ALARM - ON/OFF SWITCH - Turns on/off the horn in the pilothouse.

Figure 2-15. FIRE ALARM PANEL



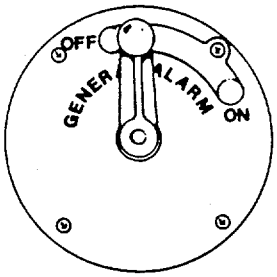
1. LEVER - Move lever to turn on/off the battery exhaust fan located in the Battery compartment.

Figure 2-16. Battery Compartment Exhaust Fan Switch



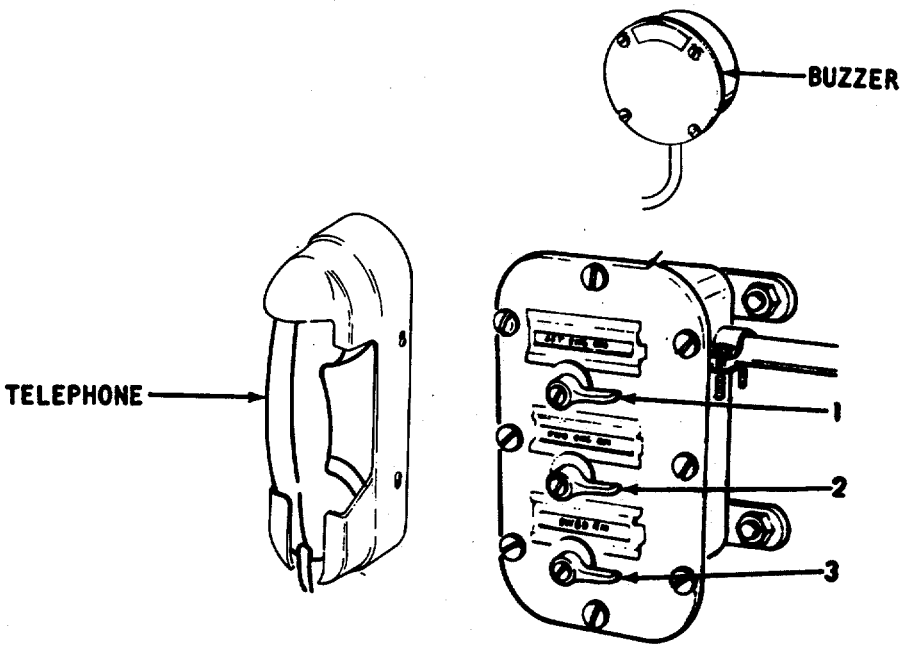
SWITCH - Operates navigational horn (electric) (Fog and Signaling).

Figure 2-17. Navigational (Electric) Horn Switch Pilothouse.



GENERAL ALARM ACTUATING Switch - Operate the general alarm system.

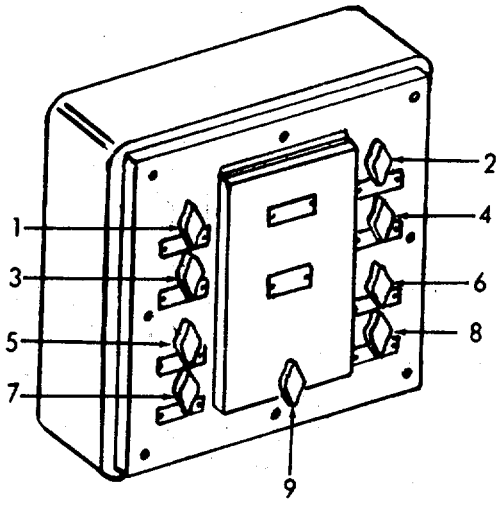
Figure 2-17A.



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

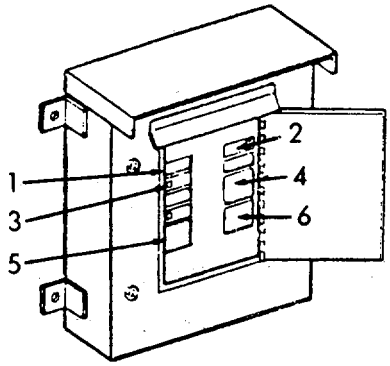
1. SWBD ROOM (Switch board in Engine Room Access)
2. FWD ENGINE ROOM
3. AFT ENGINE ROOM

Figure 2-18. Conning Station Call.



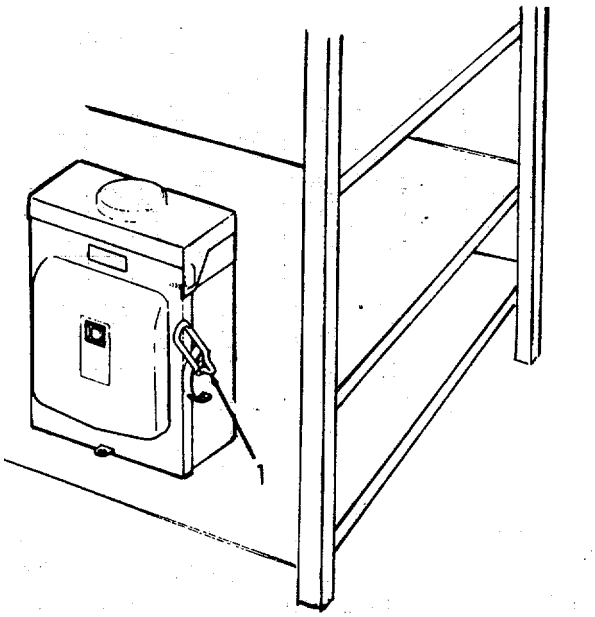
1. REMOTE MAGNETIC HEADING SYSTEM (RMHS) --Turns on/off the remote magnetic heading system. (Fuses 5 amps)
2. GYRO COMPASS SYSTEM - Turns on/off the gyro compass. (Fuses 5 amps)
3. AN/URC 80 RADIO - Turns on/off a voice communication radio. (Fuses 10 amps)
4. AN/APX-72 SYS - Turns on/off the IFF system. (Fuses 5 amps)
5. AN/VRC-46 RADIO - Turns on/off a voice communication radio. (Fuses 15 amps)
6. BLANK
7. RADAR - Turns on/off the radar system. (Fuses 15 amps)
8. ENGINE STARTING AND TACH LIGHTING - Turns on/off the engine operating controls. (Fuses 15 amps)
9. FUSE PANEL COVER RELEASE

Figure 2-19. DC Distribution box (P-24).



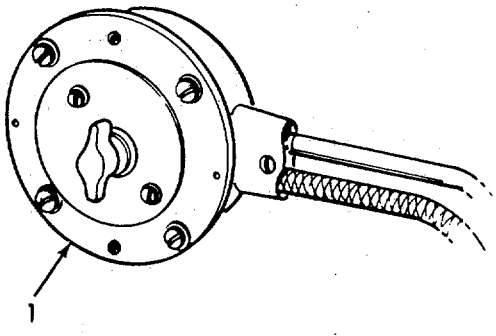
1. PILOT HOUSE AND OUTSIDE LIGHTING - (10 Amps).
2. WINDOW WIPER/HEATER - (10 Amps).
3. WAKE LIGHT - (10 Amps).
4. NAVIGATION LIGHT PANEL - (15 Amps).
5. BATTERY CHARGER AND BATTERY COMPARTMENT EXHAUST FAN - (30 Amps).
6. SPARE - (10 Amps).

Figure 2-20. Distribution Box L-106.



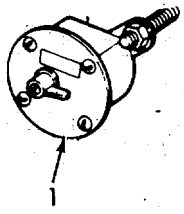
1. DISCONNECT SWITCH - Move lever to turn on/off heater.

Figure 2-21. Heater Controls.



1. WAKE LIGHT SWITCH - Turns wake light on and off.

Figure 2-22. Wake Light Switch.



1. CEASE FIRE SWITCH - Turns ON cease fire horns at gun stations.

Figure 2-23. Cease Fire-Switch.

2-3. GALLEY AND MESS.

The operator controls and indicators for the galley and mess (1-35-1-L) are shown in Figure 2-24. Figure 2-24 contains an index to the various controls and indicators on the various components.

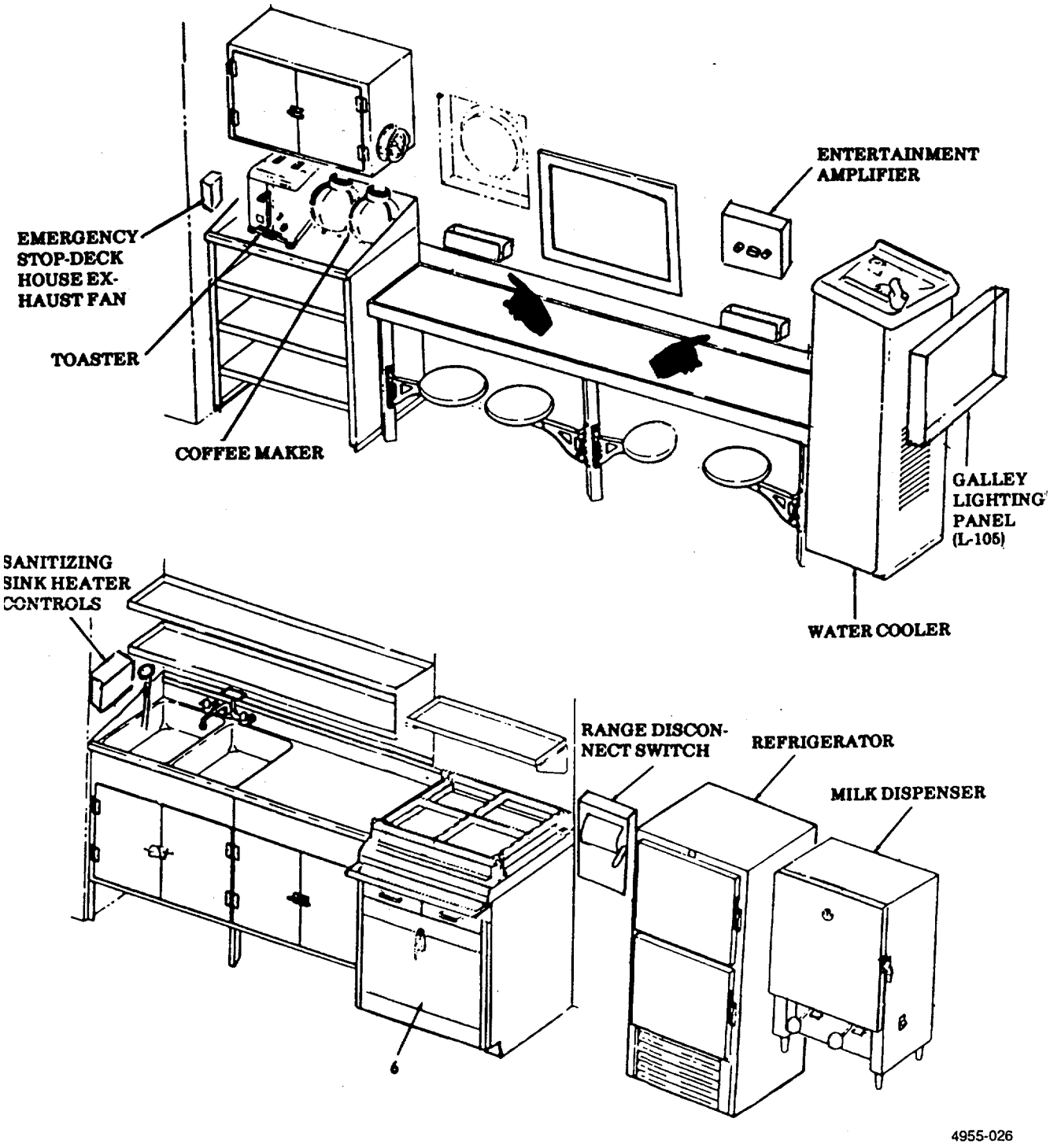
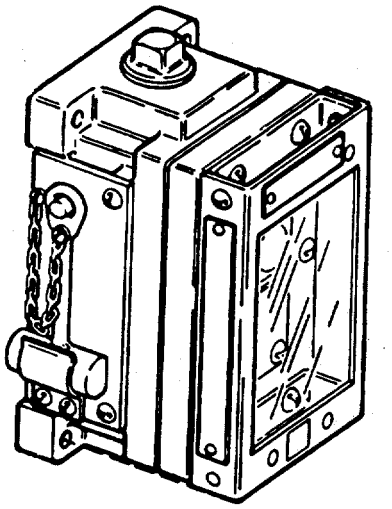
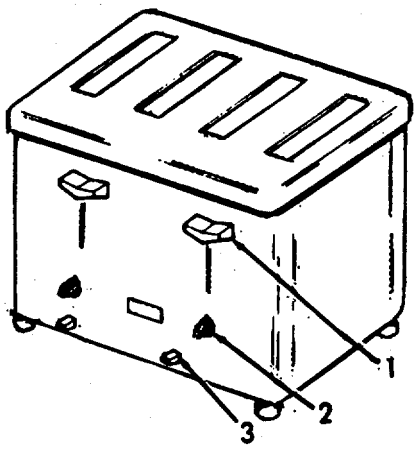


Figure 2-24. Galley Arrangement



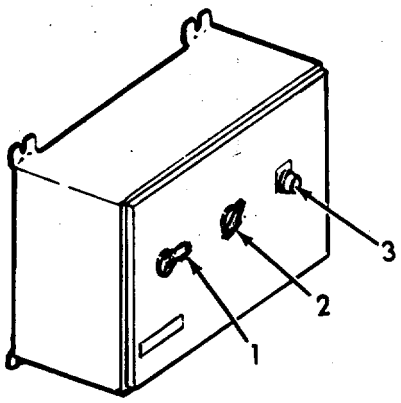
Frame 35 - Starboard side.

Figure 2-25. Emergency Stop - Deck House Exhaust Fan (Break Glass).



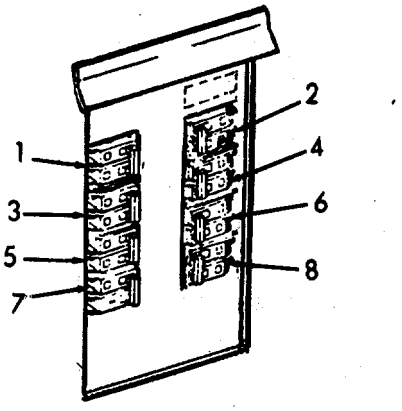
1. LEVER - Press down lever to start toaster.
2. TEMPERATURE CONTROL - Adjust for light or dark).
3. EJECT LEVER - Press to shut off toaster.

Figure 2-26. Toaster.



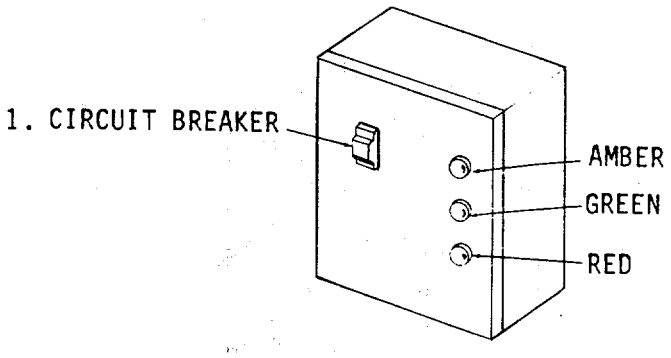
1. ON/OFF SWITCH - Turns power on/off.
2. VOLUME - Volume control.
3. LAMP - Power on indicator.

Figure 2-27. Entertainment Amplifier.



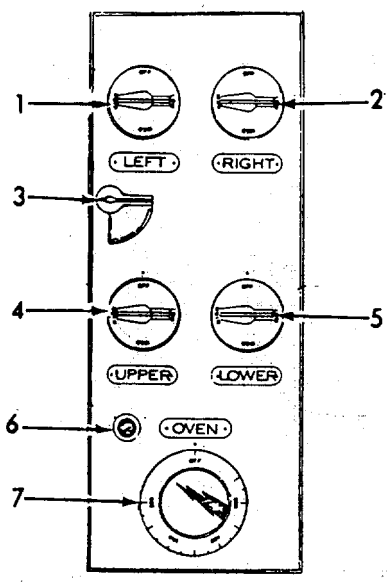
1. REFRIGERATOR - Turns on/off the refrigerator. (Circuit breaker, 15 amps)
2. WASHROOM AND SHOWER LIGHTS - Turn on/off the lights in the washroom and shower. (Circuit breaker 10 amps)
3. SINK HEATER - Turns on/off the sanitizing sink heater. (Circuit breaker 20 amps)
4. GALLEY LIGHTS - Turns on/off galley lights. (Circuit breaker 10 amps)
5. WATER COOLER - Turns on/off the water cooler. (Circuit breaker 15 amps)
6. MILK DISPENSER - Turns on/off the milk dispenser. (Circuit breaker 20 amps)
7. GALLEY LIGHTS - Turns on/off galley lights. (Circuit breaker 10 amps)
8. SPARE - (Circuit breaker 15 amps)

Figure 2-28. Galley Lighting Panel L-105.



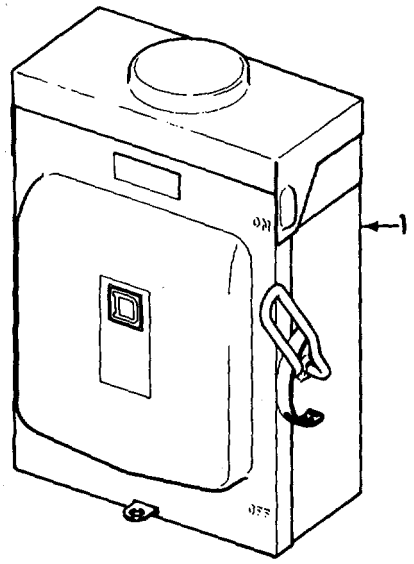
1. CIRCUIT BREAKER - Turns on and off

Figure 2-29. Sanitizing Sink Heater Controls.



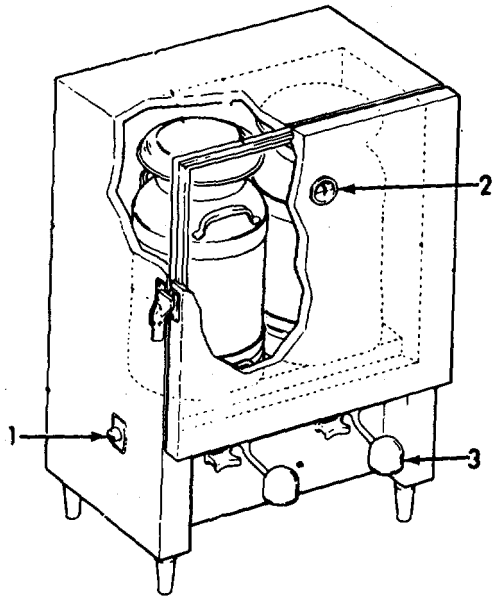
1. LEFT - HIGH-MEDIUM-LOW OFF - Turns on/off and adjusts heat on left side.
2. RIGHT - HIGH-MEDIUM-LOW-OFF - Turns on/off and' adjusts heat on right side.
3. DAMPER - Oven air damper.
4. UPPER-HIGH-MEDIUM-LOW-OFF - Turns on/off and adjusts heat in top of oven.
5. LOWER-HIGH-MEDIUM-LOW-OFF - Turns on/off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

Figure 2-30. Stove Controls.



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. WASHROOM, WATER CLOSET, URINAL, AND SHOWER.

The operator controls and indicators in the washroom, water closet, urinal, and shower compartment (1-44-1-L) are shown in Figure 2-33.

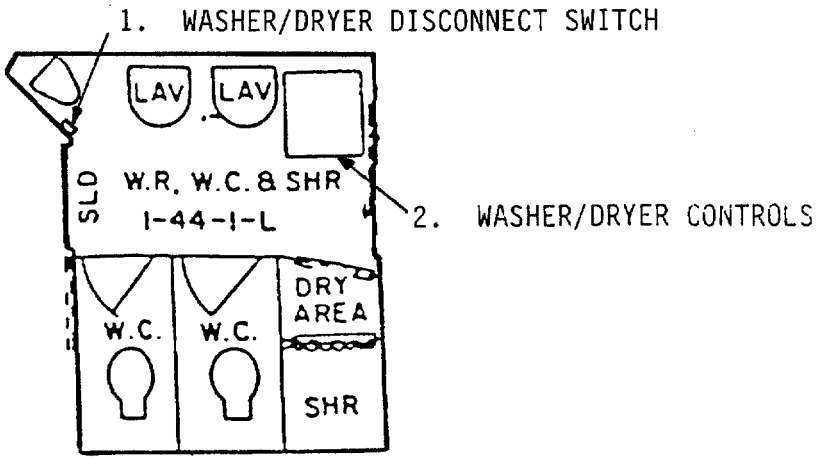
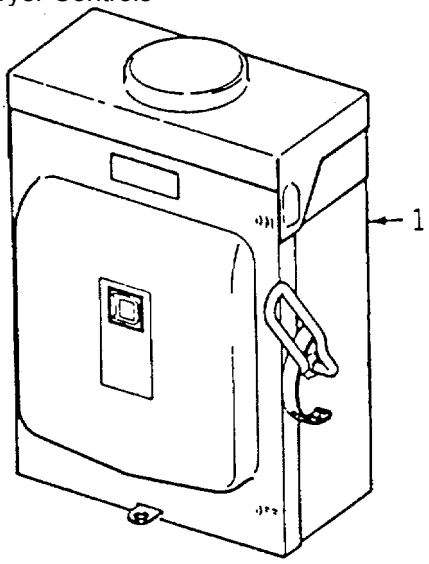


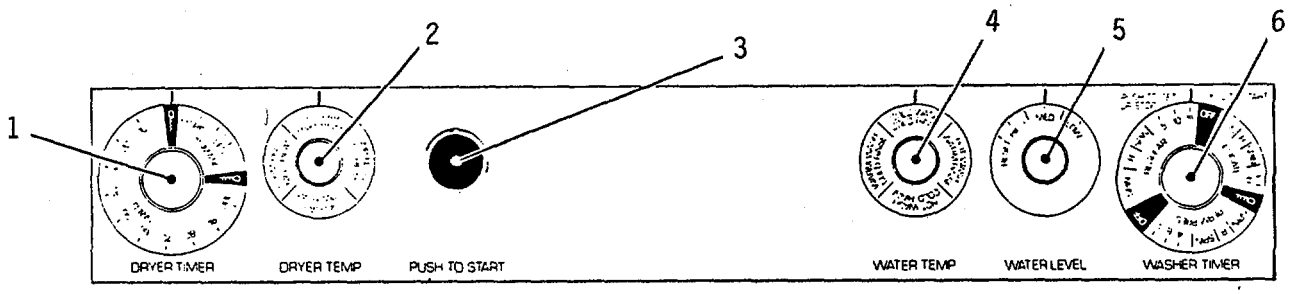
Figure 2-33. Washroom Controls and Indicators.

Item Number	Description	See Figure
1.	Washer/Dryer Disconnect Switch	2-34
2.	Washer/Dryer Controls	2-35



1. ON - Turns power on so washer and dryer will operate.
   OFF - Turns power off to washer and dryer.

Figure 2-34. Washer and Dryer Disconnect Switch.



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 also contains an index to the controls and indicators on the various components.

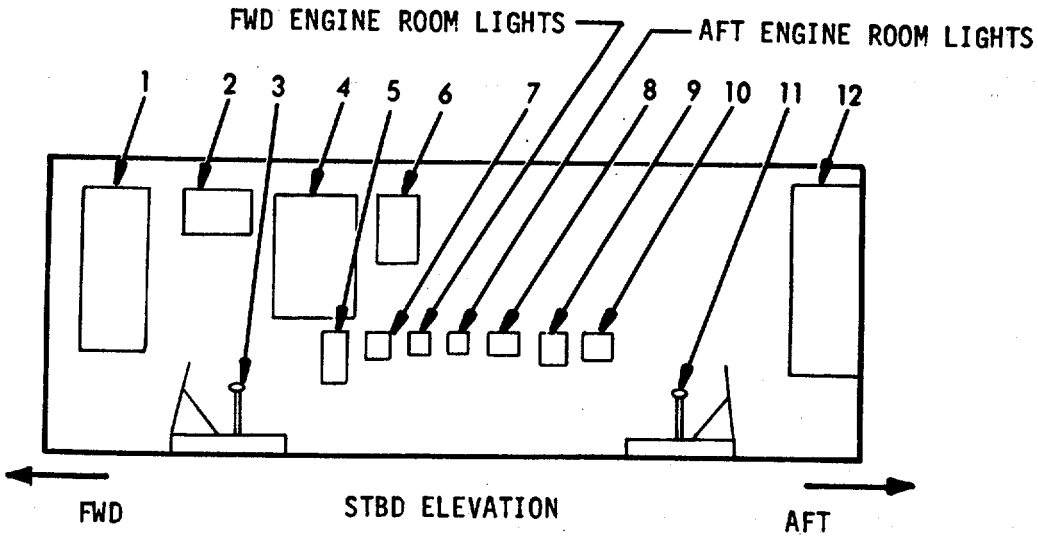
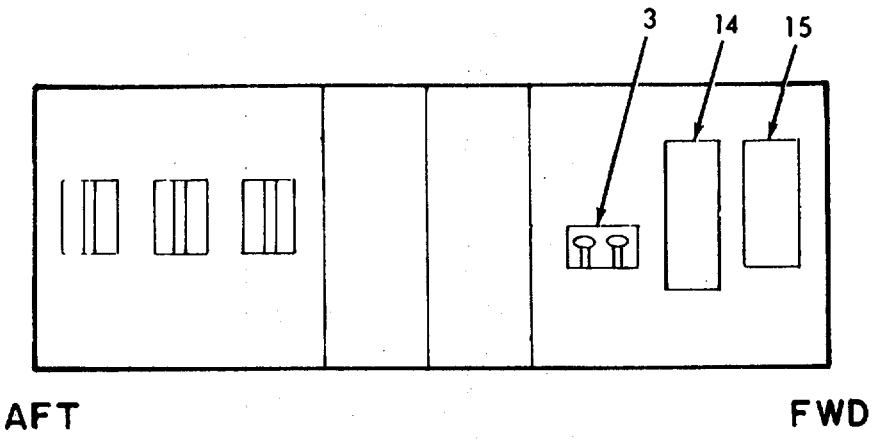


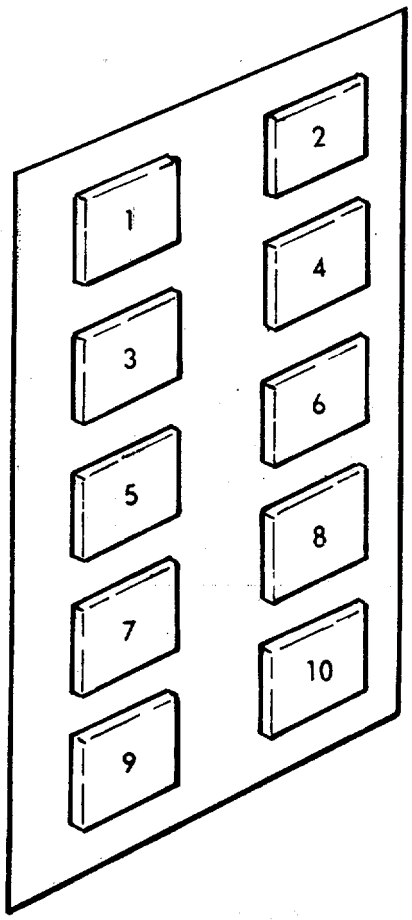
Figure 2-36. Engine Room Access (Sheet 1 of 2).



Legend Figure 2-36

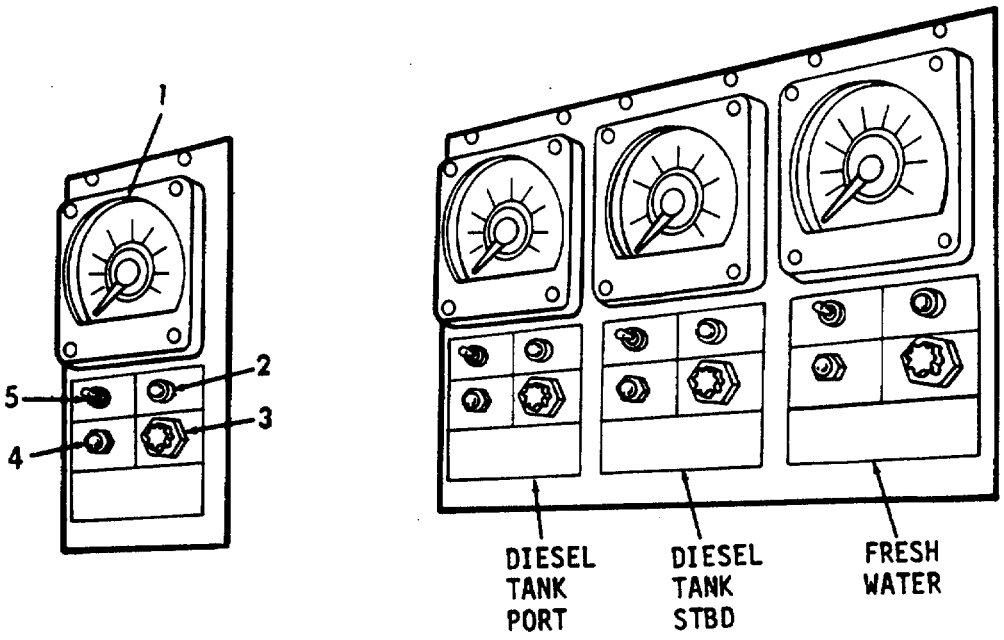
Item Number	Description	See Figure
1.	Power Distribution Panel (P400)	2-37
2.	Tank Level Indicators 2-38	
3.	Halon Emergency Release Fwd Engine Room	2-39
4.	Deck House Exhaust Fan Motor Controller	2-40
5.	Central Hydraulic System Remote Controls	2-41
6.	Deck House Exhaust Fan Motor Disconnect Switch	2-42
7.	Fwd Engine Room Exhaust Fan Motor Emergency Stop	2-43
8.	Aft Engine Room Exhaust Fan Motor Emergency Stop	2-44
9.	Fire Pump Motor Remote Controls	2-45
10.	Anchor Winch Compartment Exhaust Fan Motor Emergency Stop	2-46
11.	Halon Emergency Release Aft Engine Room	2-47
12.	Ships' Service Main Switchboard	2-48
13.	Propulsion Engine Emergency Shut-downs	2-49
14.	Lighting Distribution Panel (L-102)	2-50
15.	Lighting Distribution Panel (L-100)	2-51

Figure 2-36. Engine Room Access (Sheet 2 of 2).



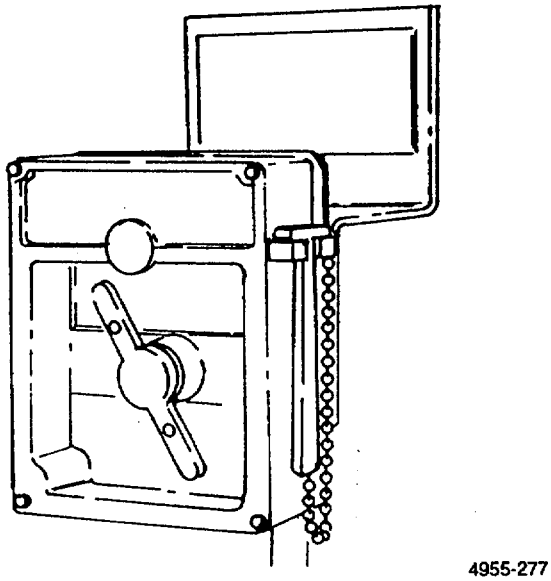
1. FWD ENGINE ROOM PWR - Distribution to panel P-401. (Circuit breaker 70 amps)
2. LIGHTING XFMR - Distribution via isolation transformer to panel L-100. (Circuit breaker 40 amps)
3. CENTRAL HYDRAULIC PUMP - Power to central hydraulic pump. (Circuit breaker 10 amps)
4. FIRE PUMP - Power to Fire Pump. (Circuit breaker 50 amps)
5. STEERING GEAR - Power to steering gear pumps. (Circuit breaker 25 amps).
6. SPARE - Circuit breaker 30 amps.
7. GALLEY RANGE - Power to galley range. (Circuit breaker 20 amps)
8. BOW RAMP WINCH - Power to Bow Ramp Winch. (Circuit breaker 30 amps)
9. AIR CONDITIONING - Distribution to panel P-40'9. (Circuit breaker 30 amps)
10. HEATING PANEL - Distribution to panel P-410. (Circuit breaker 30 amps)

Figure 2-37. Power Distribution Panel (P400).



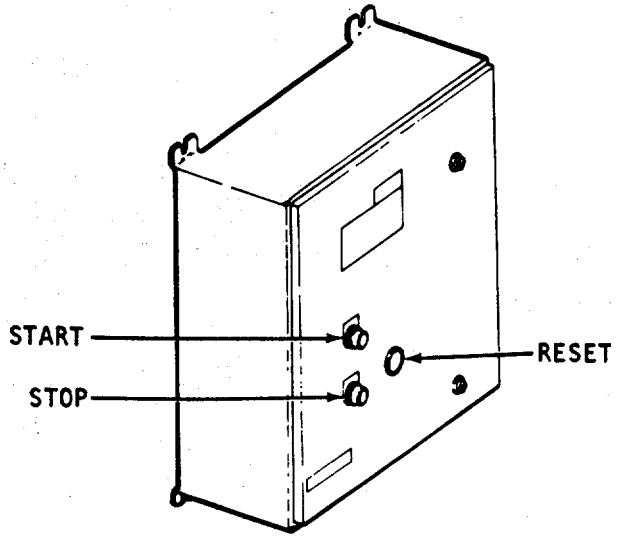
1 METER - Shows level in tank.
2. POWER - Indicator lamp showing power on.
3. FUSE - Circuit breaker protection (1 amp).
4. CALIBRATE - Adjustment used when installing and calibrating tank level meter.
5. ON/OFF/FULL REF - Switch to turn on/off/adjust the tank level indicator.

Figure 2-38. Tank Level Indicators, Engine Access Room.



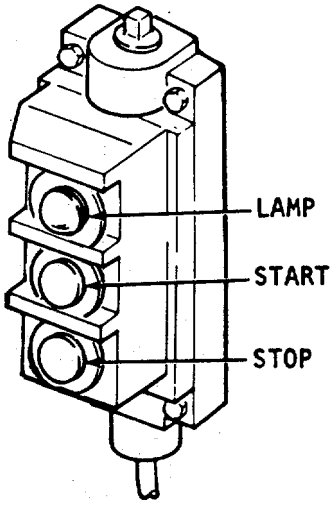
1. To release Halon in Forward Engine Room in an emergency.

Figure 2-39. Halon Emergency Release Forward Engine Room.



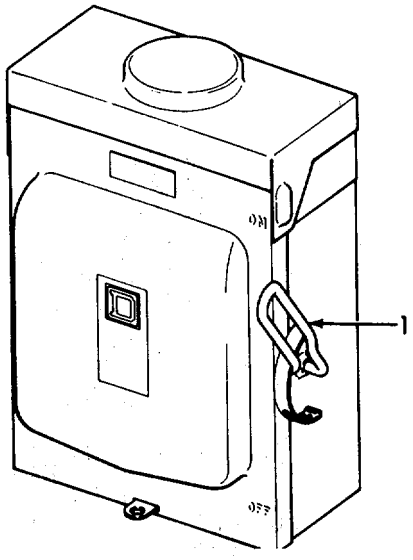
1. START - To start deck house exhaust fan motor.
2. STOP - To stop deck house exhaust fan motor.
3. RESET - To reset the controller.

Figure 2-40. Deck House Exhaust Fan-Motor Controller.



1. LAMP - Shows that the pump is in operation.
2. START - Turns pump on.
3. STOP - Turns pump off.

Figure 2-41. Remote Start/Stop Central Hydraulic System.



1. ON - Enables the deck house exhaust fan to operate.
   OFF - Stops power that enables the deck house exhaust fan to operate.

Figure 2-42. Deck House Exhaust Fan Motor Disconnect Switch.

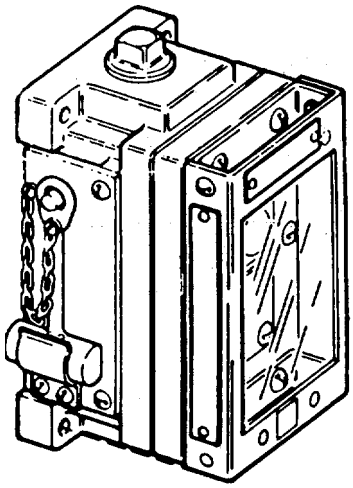


Figure 2-43. Forward Engine Room Exhaust Fan Motor [Emergency Stop (Break Glass)].

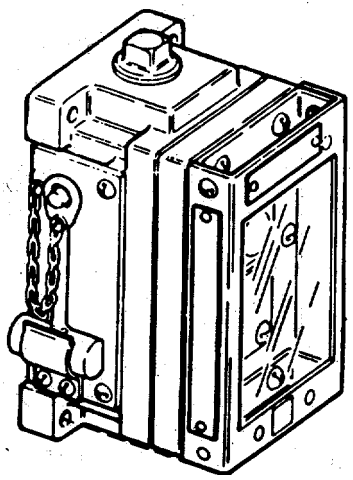
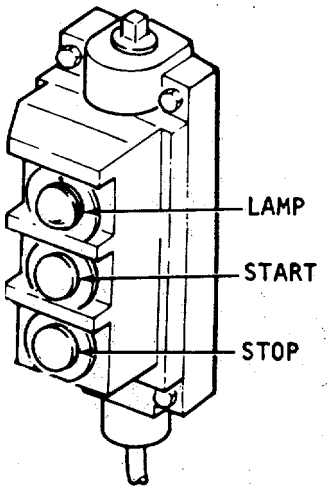
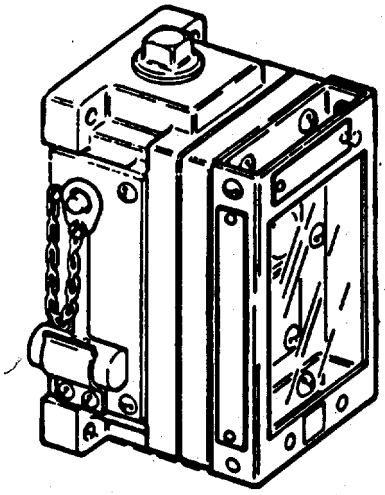


Figure 2-44. Aft Engine Room Exhaust Fan Motor
[Emergency Stop (Break Glass)].



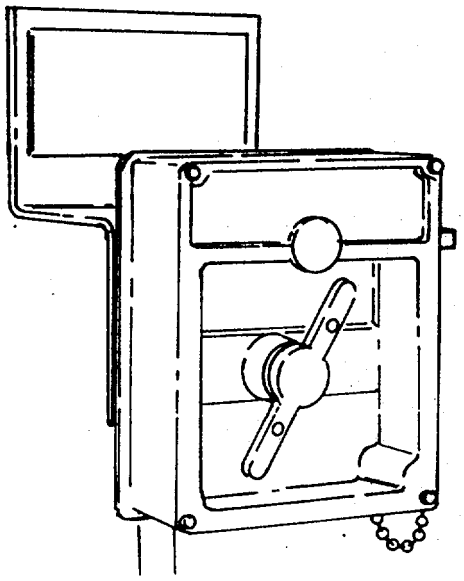
1. LIGHT - Shows that pump is in operation.
2. START - Turns fire pump on.
3. STOP - Turns fire pump off.

Figure 2-45. Fire Pump Motor Remote Control.



EMERGENCY STOP - BREAK GLASS

Figure 2-46. Anchor Winch Compartment Exhaust Fan Motor.



1. To release Halon in aft engine room in an emergency.

Figure 2-47. Halon Emergency Release Aft Engine Room.

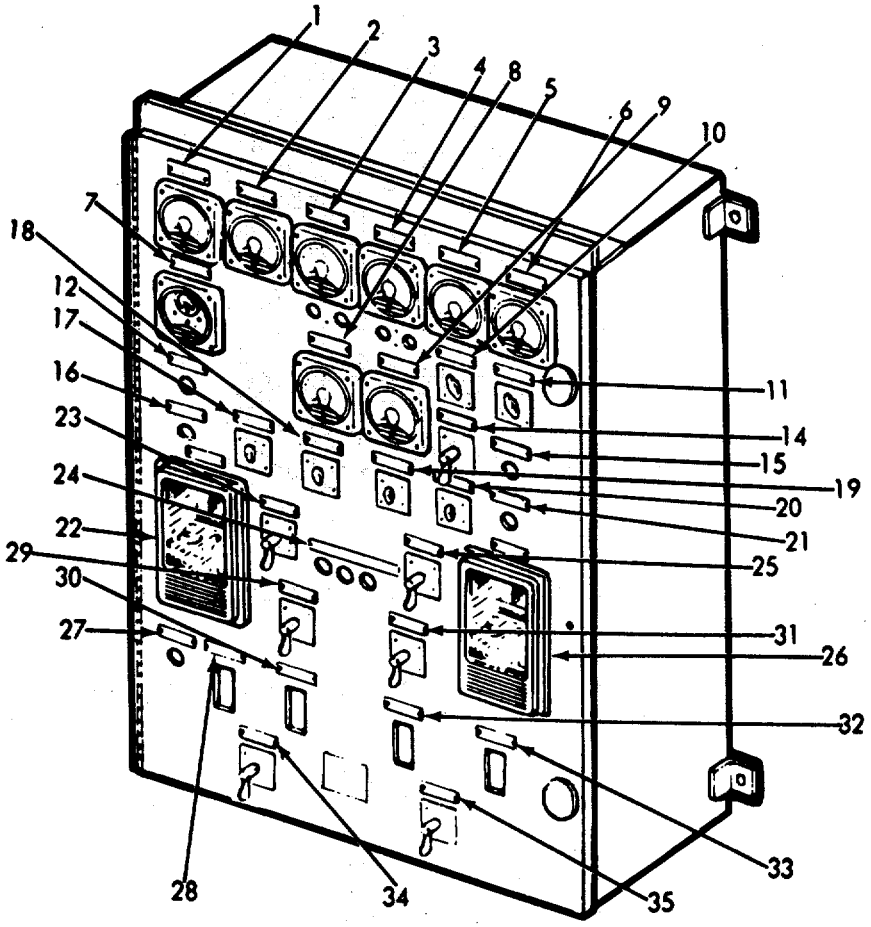
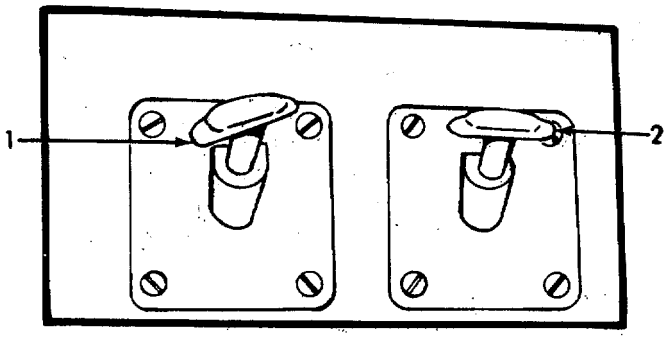


Figure 2-48. Ship's Service Main Switchboard (Sheet 1 of 2).

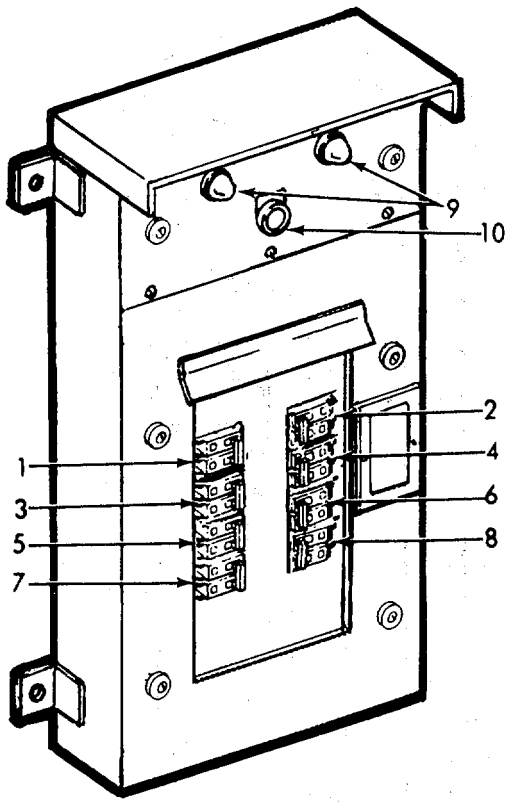
1. GENERATOR 1 VOLTMETER
2. GENERATOR 1 AMMETER
3. GENERATOR 1 WATTMETER
4. GENERATOR 2 WATTMETER
5. GENERATOR 2 SHOREPOWER AMMETER
6. GENERATOR 2 BUS SHORE PWR VOLTMETER
7. SHORE POWER PHASE SEQUENCE INDICATOR
8. FREQUENCY METER
9. SYNCHROSCOPE
10. GENERATOR 2 SHORE PWR AMMETER SWITCH
11. GENERATOR 2 BUS/SHORE PWR VOLTMETER SWITCH
12. GENERATOR 1 DROOP RHEOSTAT
13. GENERATOR 1 GOVERNOR SWITCH
14. GENERATOR 2 GOVERNOR SWITCH
15. GENERATOR 2 VOLTAGE DROOP RHEOSTAT
16. GENERATOR 1 VOLTAGE ADJUST RHEOSTAT
17. GENERATOR 1 UNIT PARALLEL SWITCH
18. FREQUENCY METER SWITCH
19. SYNCHROSCOPE SWITCH
20. GENERATOR 2 UNIT PARALLEL SWITCH
21. GENERATOR 2 VOLTAGE ADJUST RHEOSTAT
22. GENERATOR 1 REVERSE POWER RELAY
23. GENERATOR 1 AUTO/MAN SW
24. BUS GROUND LIGHTS
25. GENERATOR 2 AUTO/MAN SW
26. GENERATOR 2 REVERSE POWER RELAY
27. SHORE POWER AVAILABLE INDICATOR
28. SHORE POWER MAIN BREAKER
29. DIESEL GENERATOR 2 START SWITCH
30. GENERATOR 1 MAIN BREAKER
31. DIESEL GENERATOR 2 START SWITCH
32. GENERATOR 2 MAIN BREAKER
33. DISTRIBUTION MAIN BREAKER
34. MAN-VOLT ADJ
35. MAN-VOLT ADJ

Figure 2-48. Ship's Service Main Switchboard (Sheet 2 of 2).



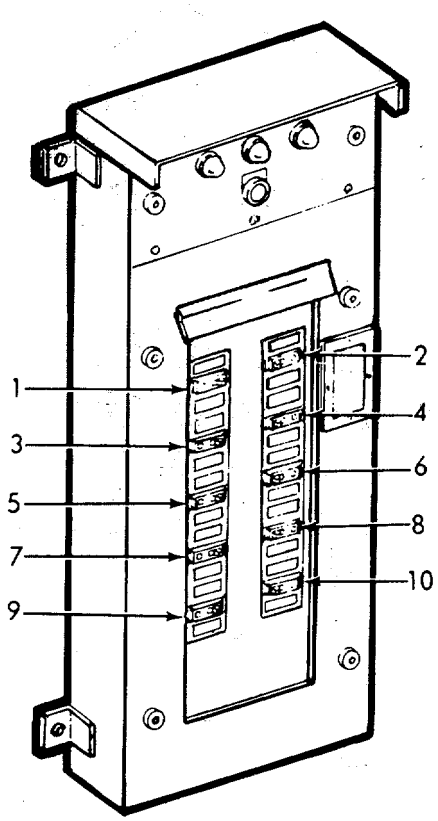
1. PORT ENGINE - Pull lever up to shutdown in an emergency.
2. STBD ENGINE - Pull lever up to shutdown in an emergency.

Figure 2-49. Propulsion Engine Emergency Shutdowns.



1. SEARCH LIGHT - Power to Searchlight. (Circuit breaker 15 amps)
2. DECK FLOODS - Power to Deck Floodlights. (Circuit breaker 15 amps)
3. UPPER DECK RECPT - Power to power receptacles located on the upper deck. (Circuit breaker 15 amps)
4. LOWER DECK RECPT - Power to receptacles located on the lower deck. (Circuit breaker 15 amps)
5. COFFEE MAKER - Power to the coffee maker. (Circuit breaker 15 amps.)
6. TOASTER - Power to the toaster. (Circuit breaker 20 amps)
7. WAKE/TOWING LIGHTS - Power to the Wake/Towing Lights. (Circuit breaker 15 amps)
8. SPARE
9. GROUND DETECTOR LAMPS
10. GROUND TEST PUSH BUTTON SWITCH

Figure 2-50. Lighting Distribution Panel (L102) (FR 54 Stbd)

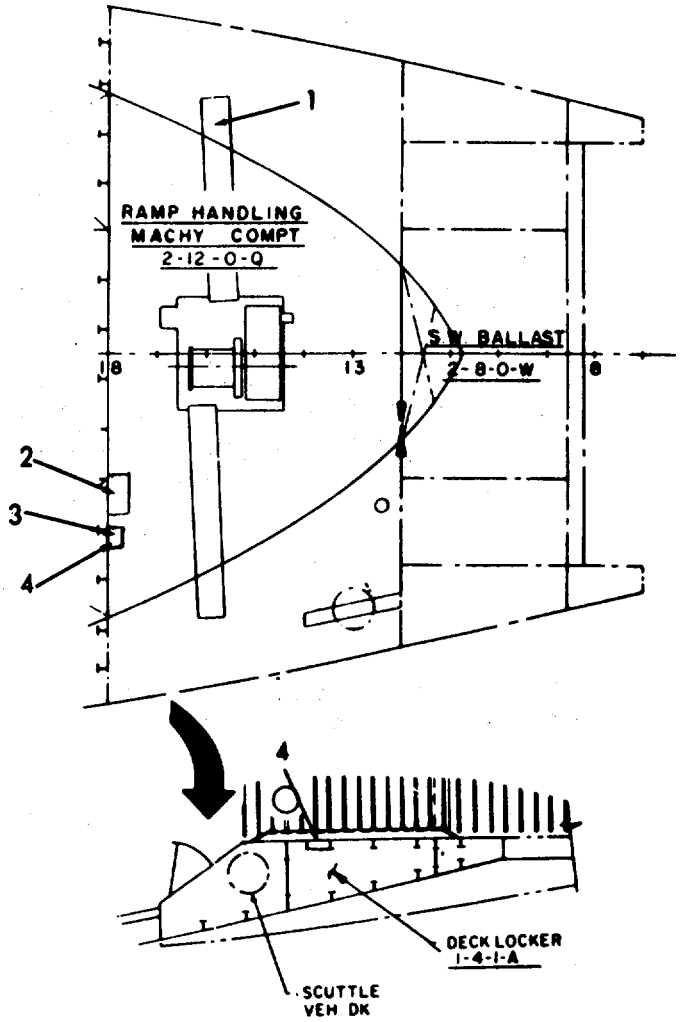


1. AFT ENG ROOM LIGHTS - Distribution to panel L-101. (Circuit breaker 30 amps)
2. ISOLATED RECPT PANEL - Distribution to panel L-102 via isolation transformers. (Circuit breaker 50A)
3. FWD ENG ROOM LIGHTS - Distribution to panel L-103. (Circuit breaker 20 amps)
4. SPARE
5. GALLEY LIGHTS - Distribution to panel L-105. (Circuit breaker 40 amps)
6. PILOT HOUSE LIGHTS - Distribution to panel L-106. (Circuit breaker 40 amps)
7. INTERNAL COMMUNICATION PANEL - Distribution panel L,-107. (Circuit breaker 30 amps)
8. SPARE
9. STOREROOM LIGHTS - Distribution panel L-109. (Circuit breaker 30 amps)
10. 120V HEATING - Distribution to panel L-11O. (Circuit breaker 40 amps)

Figure 2-51. Lighting Distribution Panel L-100 Switch Board RM.

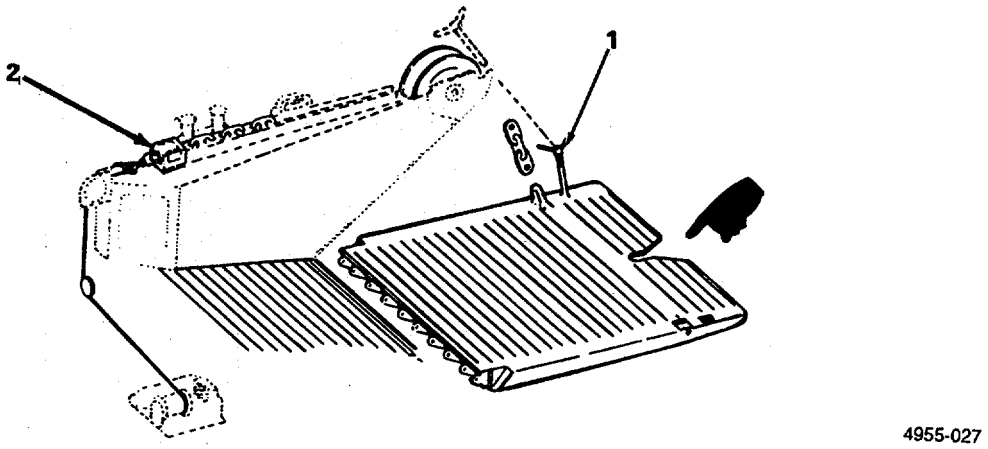
2-6. RAMP HANDLING MACHINERY COMPARTMENT AND BOW RAMP.

The operator controls and indicators for the Bow Ramp in the Ramp Handling Machinery Compartment (2-12-O-Q) are shown in Figure 2-52. Figure 2-52, Sheet 1, contains an index to the controls and indicators on the various components. Figure 2-52, Sheet 2, contains those operator controls located at the ramp.



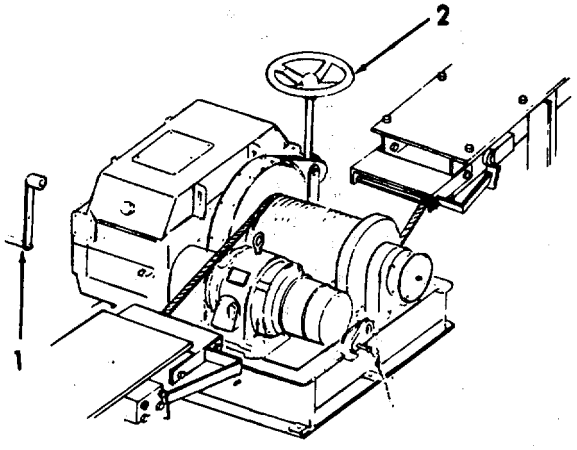
Item Number	Description	See Figure
1.	Bow Ramp Winch	2-53
2.	Bow Ramp Controller	2-54
3.	Bow Ramp Disconnect Switch	2-55
4.	Bow Ramp Remote Control	2-56

Figure 2-52. Bow Ramp Machinery and Fittings (Sheet 1 of 2).



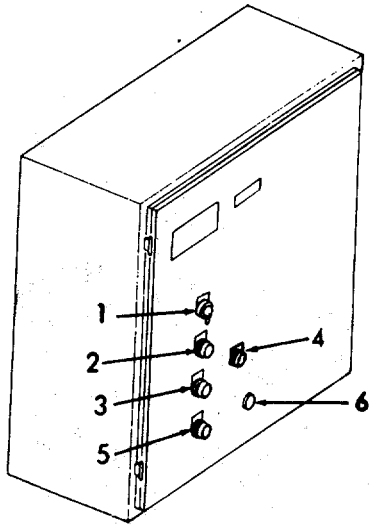
1. CHAIN STOP - Stops and locks chain in any position.
2. T-BOLT - Keeps the bow ramp in the closed position.

Figure 2-52. Bow Ramp Machinery and Fittings (Sheet 2 of 2).



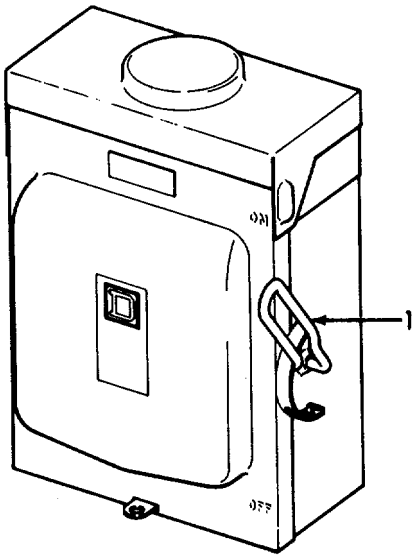
1. HAND CRANK - Used to raise or lower ramp manually.
2. HAND BRAKE - Used to slow down or stop the lowering of the ramp manually.

Figure 2-53. Bow Ramp Winch.



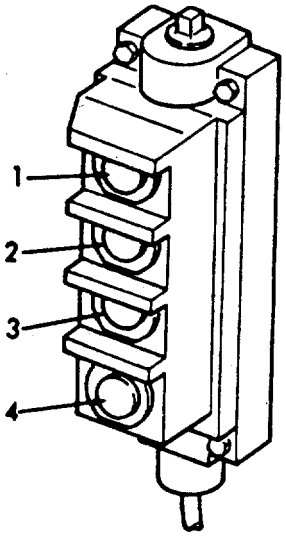
1. LOCAL-REMOTE - Selector switch for local or remote operation of the Winch.
2. RAISE - Pushbutton to raise Ramp.
3. LOWER - Pushbutton to lower Ramp.
4. EMERGENCY RUN - Pushbutton in conjunction with RAISE or LOWER in an emergency situation.
5. STOP - Pushbutton to stop Ramp Winch.
6. RE-SET- Pushbutton to re-set Winch.

Figure 2-54. Bow Ramp Winch Controller.



1. ON - Enables the Bow Ramp Controller to be operated.
   OFF - Stops the power that enables the Bow Ramp Controller to be operated.

Figure 2-55. Bow Ramp Controller Disconnect Switch.

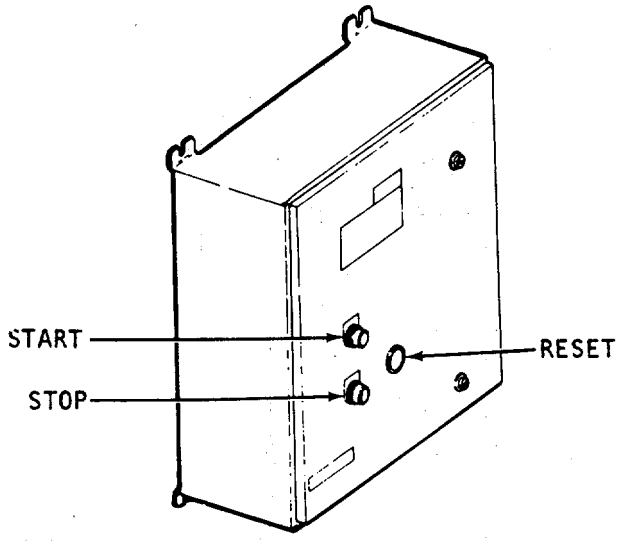


1. EMERG RUN - In an emergency, press at the same time either RAISE or LOWER buttons.
2. RAISE - Press to raise Bow Ramp.
3. LOWER - Press to lower Bow Ramp.
4. STOP - Press to stop raising or lowering Bow Ramp.

Figure 2-56. Bow Ramp Remote Control

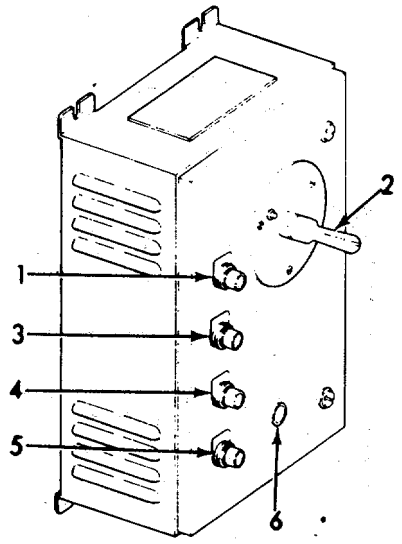
2-7. AIR CONDITIONING MACHINERY ROOM.

The operator controls and indicators for the Air Conditioning Machinery Room (2-28-1-H) are shown in FO-32. FO-32 contains an index to the components in the room. FO-32 also shows various components that are used during turn on and off operations. These components are contained in the operation section of this manual .



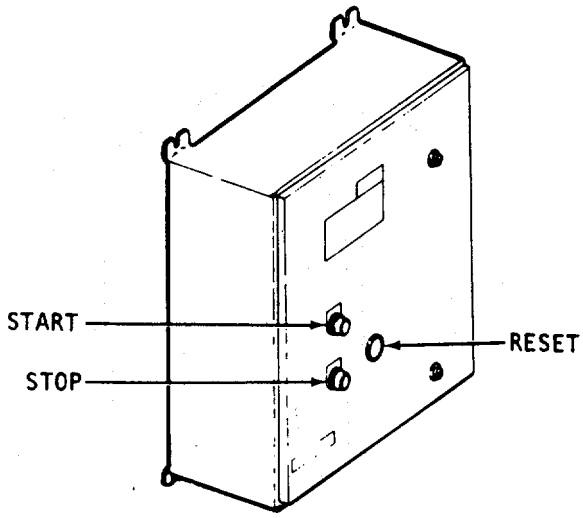
1. START - Starts the A/C fan motor.
2. STOP - Stops the A/C fan motor.
3. RESET - Resets the A/C fan motor controller.

Figure 2-57. A/C Circulating Fan Motor Controller.



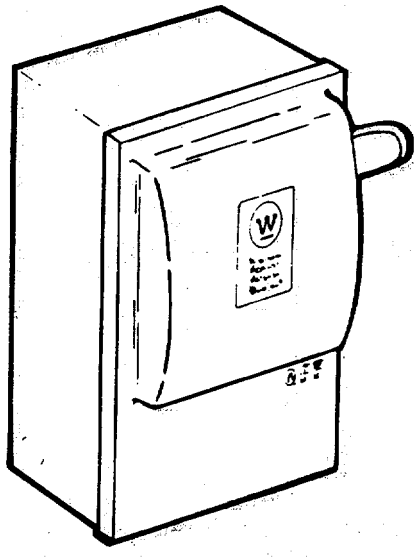
1. LP BY-PASS - Low pressure by-pass (momentary switch).
2. DISCONNECT - Stops the power that enables the A/C compressor motor to be operated.
3. START - Starts the A/C compressor motor.
4. STOP - Stops the A/C compressor motor.
5. RESET - A/C Compressor Motor Contactor Reset Push at same tine.
6. RESET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

Figure 2-58. A/C Compressor Controller.



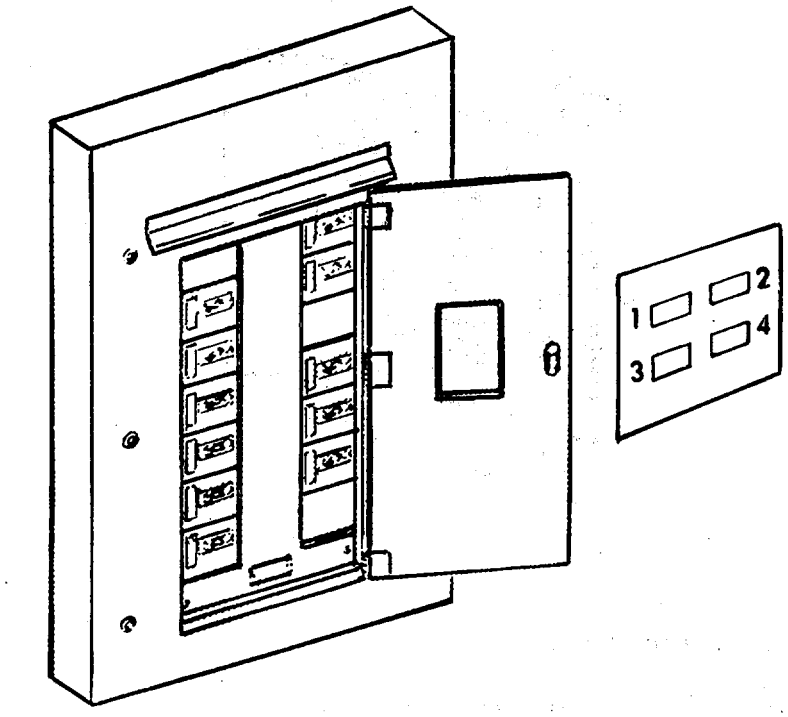
1. START - Starts the A/C sea water pump motor.
2. STOP - Stops the A/C sea water pump motor.
3. RE-SET - Resets the controller motor.

Figure 2-59. A/C Sea Water Pump Motor Controller.



ON - Enables air conditioning room heater to be operated.
OFF - Stops power that enables air conditioning room heater to be operated.

Figure 2-50. Air Conditioning Room Heater Disconnect Switch.

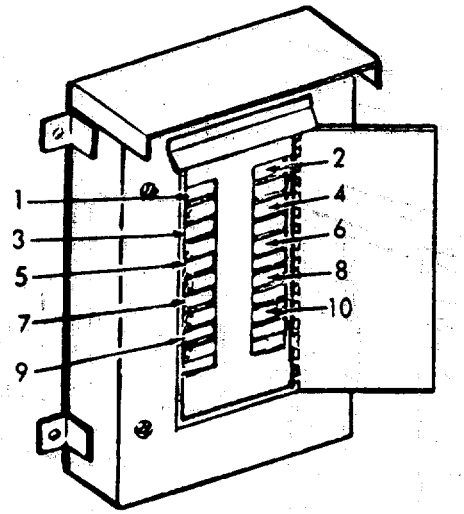


1. A/C RECIRC - Power to the circulating fan (2-30-1). (Circuit breaker 10 amps)
2. A/C SEA WATER PUMP - Power to the sea water cooling pump motor controller. (Circuit breaker 10 amps)
3. A/C COMPRESSOR - Power to the compressor motor controller. (Circuit breaker 20 amps)
4. SPARE - (Circuit breaker 15 amps)

Figure 2-61. Power Distribution Panel (P-409) Air Conditioning Room

2-8. LIGHTING PANEL (L-109).

The operator controls and indicators for the Lighting Panel (L-109) in the Equipment and Repair Parts Stores (2-28-0-A) is shown in Figure 2-62.

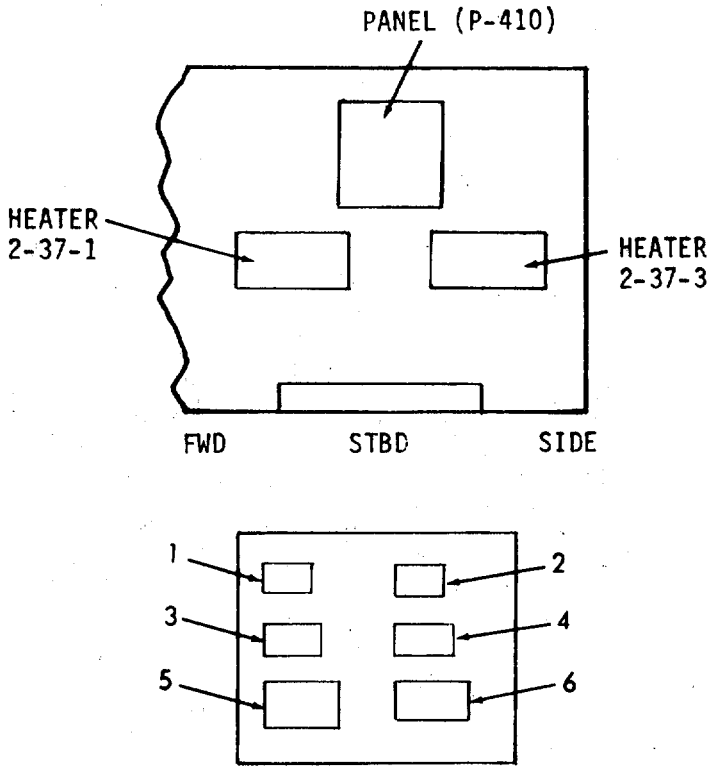


All circuit breakers are 10 amps.

1. REFRIGERATOR - Power to refrigerator #1.
2. REFRIGERATOR - Power to refrigerator #2.
3. RAMP MACH COMP FAN - Power to the ventilator fans (2-16-2) in the Ramp Handling Machinery Compartment.
4. RAMP MACH RM LIGHTS - Power to the lights in the Ramp Handling Machinery Compartment.
5. STOREROOM LIGHTS - Power to the lights in the Storeroom (2-23-2,-A).
6. STOREROOM VENT FAN - Power to the ventilator fans (2-29-2) in the Storeroom 2-23-2-A).
7. CREWS QUARTERS LIGHTS - Power to the lights in the Crews Quarters.
8. OFFICER SR LIGHTS - Power to the lights in the Officers' Stateroom.
9. DESK AND BERTH LIGHTS - Power to the lights on the decks and berths in the Crews' Quarters and the Officers' Staterooms.
10. SPARE

Figure 2-62. Lighting Panel (L-109).

2-9. CREW AND TRANSIENT BERTHING HEATER DISTRIBUTION PANEL P-410.
The operator controls and indicators for the Crew and Transient Berthing Compartment (2-33-2-L) are shown in Figure 2-63.



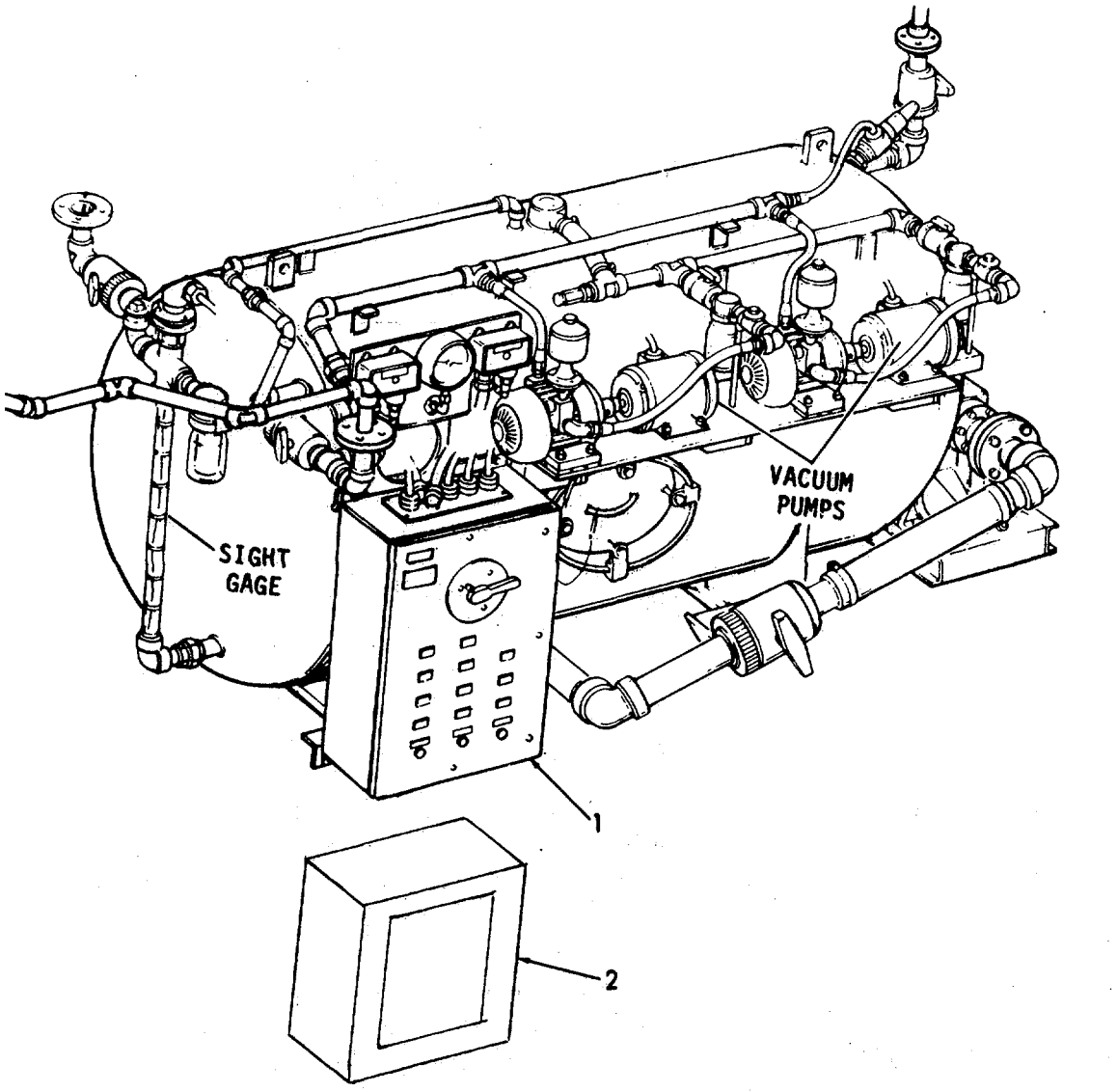
HEATER DISTRIBUTION PANEL P-410.

1. RADIO SPACE HEATER - Power to heater (1-32-1) (part of the Pilot house). (Circuit breaker 10 amps)
2. PILOT HOUSE HEATER - Power to the heater (1-29-1). (Circuit breaker 10 amps)
3. MAIN DUCT HEATER - Power to main air conditioner duct heater (2-31-1). (Circuit breaker 15 amps)
4. GALLEY HEATER - Power to the heater (1-36-1) in the Galley. (Circuit breaker 10 amps)
5. CREWS' QUARTERS HEATER - Power to the heater (2-37-1) in the Crews' Quarters. (Circuit breaker 10 amps)
6. SPARE - (Circuit breaker 15 amps)

Figure 2-63. Crew and Transient Berthing.

2.10. DISTRIBUTION PANELS, SEWAGE TREATMENT PLANT.

The operator controls and indicators for the Ordnance, Equipment and Repair Parts Stores Compartment (2-40-0-A) are shown in Figure 2-64. Figure 2-64 contains an index to the components in the compartment, and 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	See Figure
1.	MOTOR CONTROLLER - Sewage Treatment Plant.	2-65
2.	HEATER DISTRIBUTION PANEL (L-11O).	2-66

Figure 2-64. Ordnance, Equipment And Repair Parts Stores Compartment.

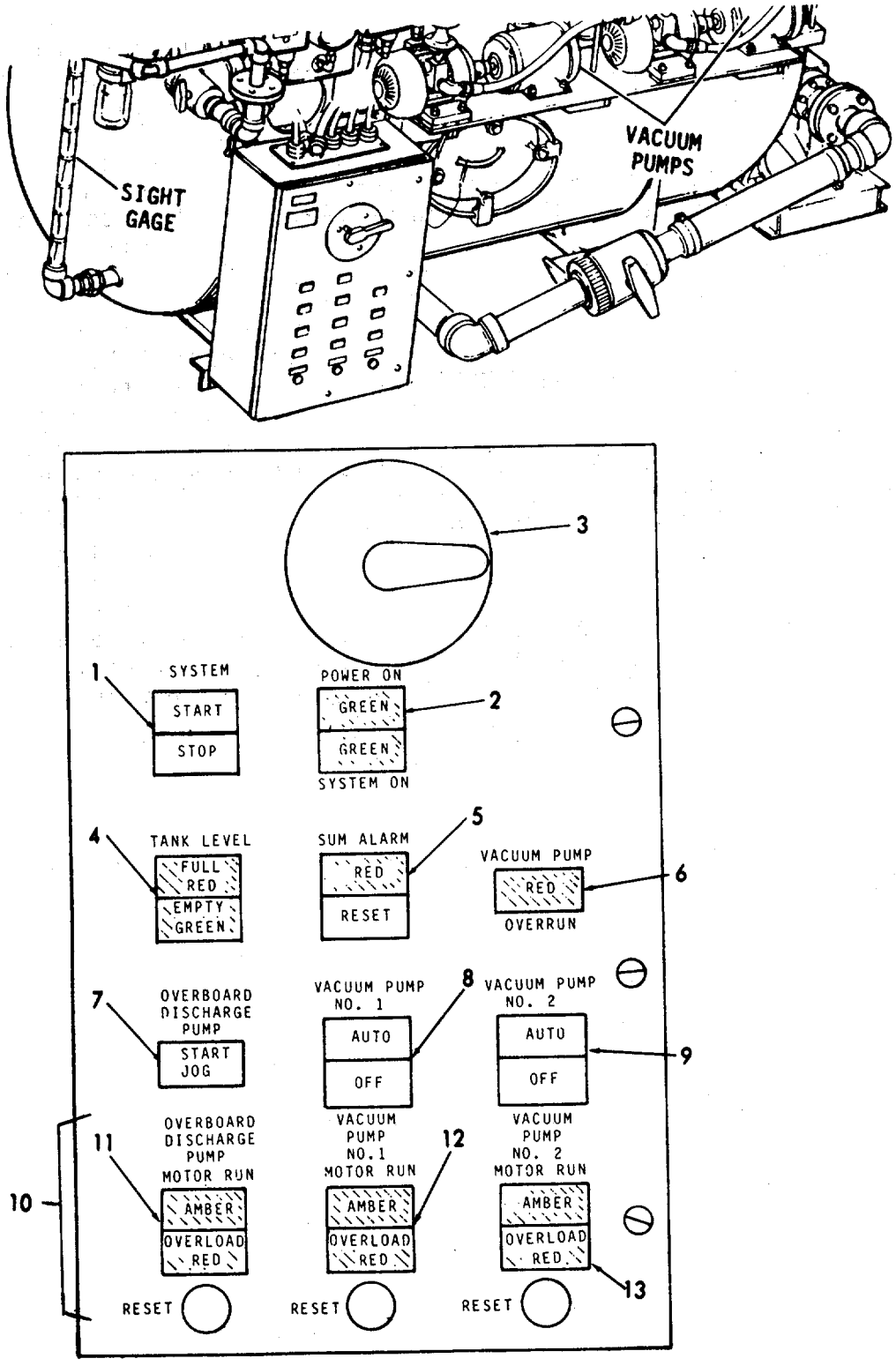
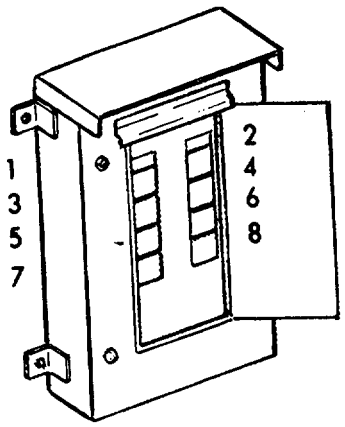


Figure 2-65. Sewage System Control Panel (Sheet 1 of 2).

Legend Figure 2-65.

1. SYSTEM START/STOP - Pushbutton start and stop switches.
2. POWER ON/SYSTEM ON (GREEN) - Power on is lit when disconnect switch is in the ON position. System on is lit when the START switch is pressed.
3. DISCONNECT - Disconnects power from the systems.
4. TANK LEVEL FULL (RED) / EMPTY (GREEN) - Liqhts indicating level of tank contents.
5. SUM ALARM (RED)/RESET - Light indicating tank level almost over full
6. VACUUM PUMP OVERRUN (RED) - Vacuum pump timer cycle over and pressure cannot be held.
7. OVERBOARD DISCHARGE PUMP/START JOG - Press to momentarily run pump to lower tank level to tank empty level.
8. VACUUM PUMP #1 AUTO/OFF -. Turns on/off a vacuum pump.
9. VACUUM PUMP #2 AUTO/OFF - Turns on/off a vacuum pump.
10. MOTOR RUN (AMBER) OVERLOAD (RED) RESET - Amber light-motor is running. Red light-motor is stopped. Press to reset motor.
11. OVERBOARD DISCHARGE PUMP - Status lamps and reset button.
12. VACUUM PUMP #1 - Status lamps and reset button.
13. VACUUM PUMP #2 - Status lamps and reset button.

Figure 2-65. Sewage System Control Panel (Sheet 2 of 2)



1. A/C ROOM - Power to Air Conditioning Room Heater. (Circuit breaker 15 amps)
2. W/R AND SHOWER - Power to Washroom and Shower heater. (Circuit breaker 20 amps)
3. FAN/HEATER INTERLOCK CKT - Power to heaters are run on fan circuit. (Circuit breaker is 10 amps)
4. OFFICER S/R - Power to Officers Stateroom heater. (Circuit breaker 15 amps)
5. STORE ROOM - Power to heaters in the Ordnance Stores, Equipment and Repair Parts Stores Compartment. (Circuit breaker 15 amps)
6. SPARE - (Circuit breaker 15 amps)
7. SPARE - (Circuit breaker 15 amps)
8. SPARE - (Circuit breaker 10 amps)

Figure 2-66. Heater Distribution Panels L-110.

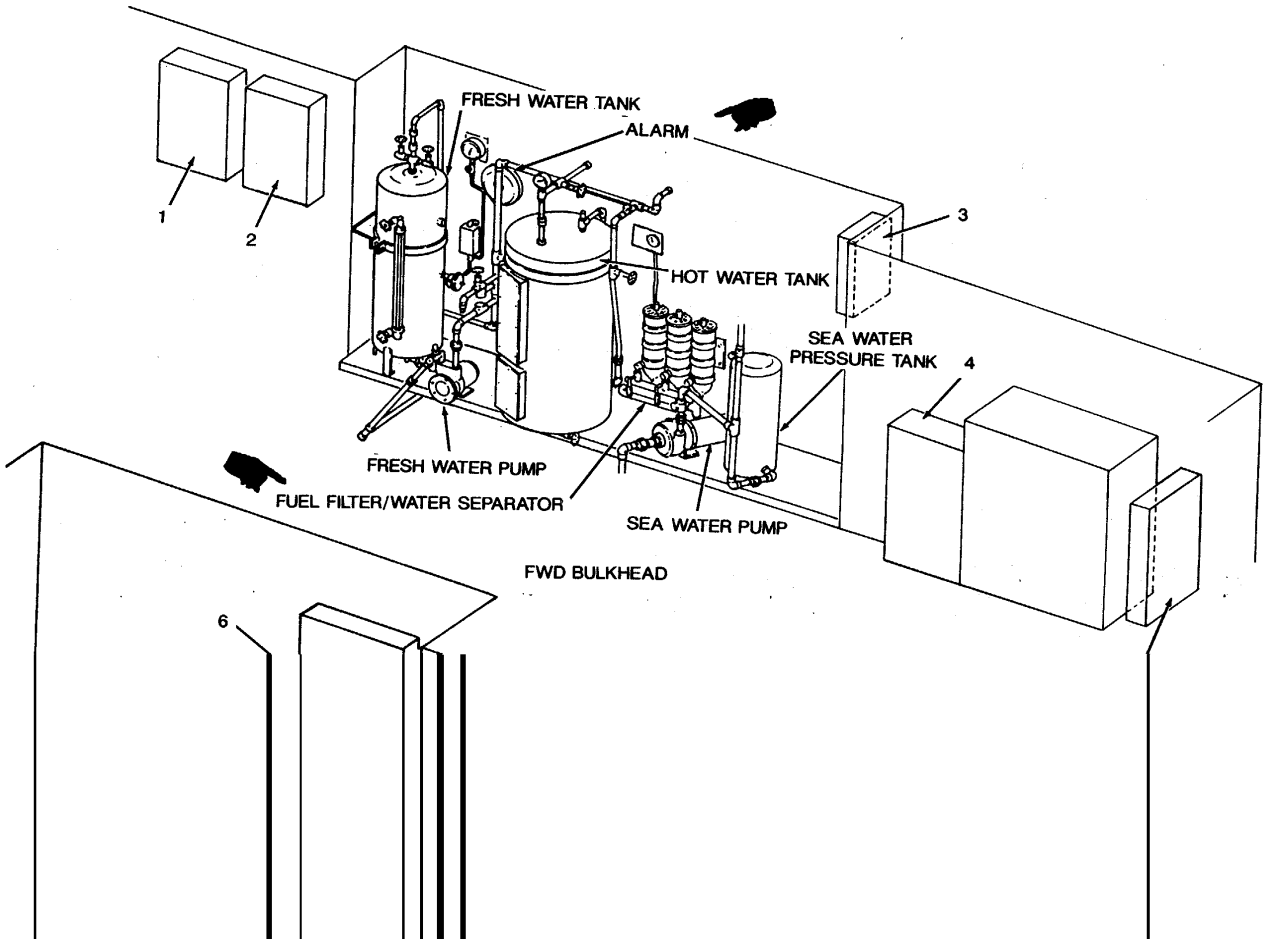


Figure 2-67. Forward Engine Room (Sheet 1 of 2)

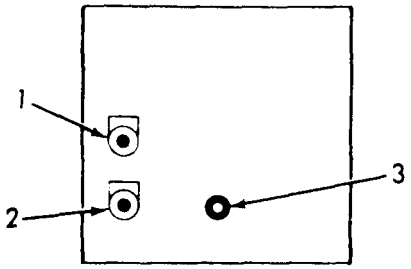
2-11. FORWARD ENGINE ROOM.
The operator controls and indicators located in the Forward Engine Room (2-50-0-E) are shown in Figure 2-67. Figure 2-67 contains an index to the components in the room.

Legend Figure 2-67.

Item Number		See Figure
1.	Forward Engine Room Exhaust Fan Motor Controller	2-68
2.	Fresh Water Pump Motor Controller	2-69
3.	Flushing Sea Water Pump Motor Controller	2-70
4.	Power Distribution Panel (P-401)	2-71
5.	Lighting Distribution Panel (L-103)	2-72
6.	Central Hydraulic System Controller	2-73
7.	Port Lube Oil Pump Controller	2-74

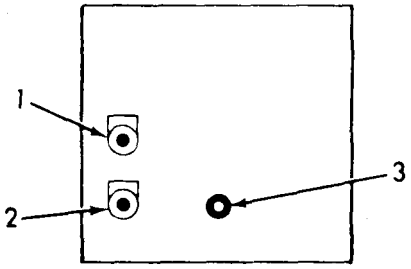
Figure 2-67. Forward Engine Room (Sheet 2 of 2).

The instrument panel for the Propulsion Engine is shown in Figure 2-75. Figure 2-76 shows the instrument panel for the Generator Engine.



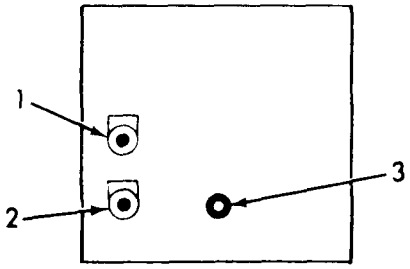
1. START - Starts exhaust fan motor.
2. STOP - Stops exhaust fan motor.
3. RESET - Resets the motor controller.

Figure 2-68. Forward Engine Room Exhaust Fan Motor Controller.



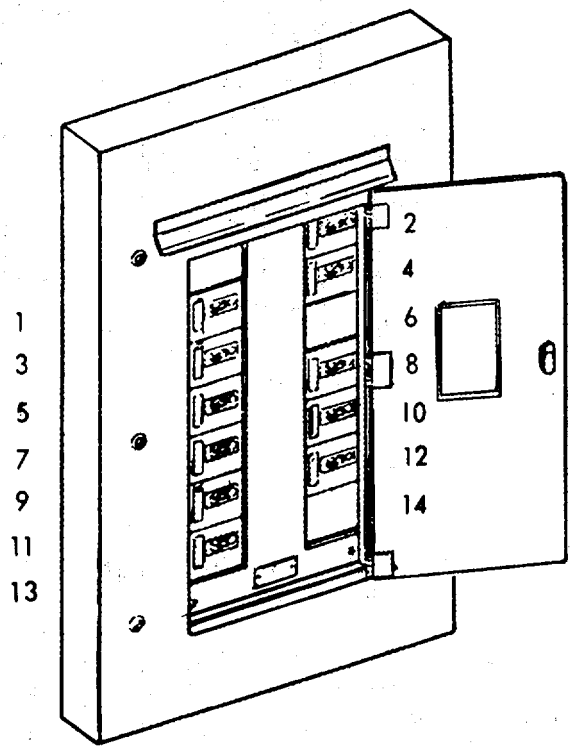
1. START - Starts the fresh water pump motor.
2. STOP - Stops the fresh water pump motor.
3. RESET - Resets the motor controller.

Figure 2-69. Fresh Water Pump Motor Controller.



1. START - Starts flushing water sea water pump motor.
2. STOP - Stops flushing water sea water pump motor.
3. RESETS - Resets the heater water pump motor controller.

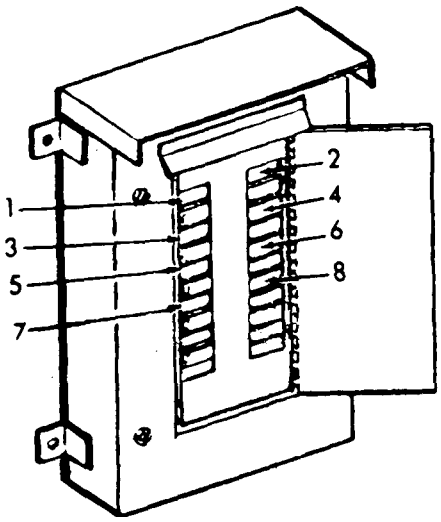
Figure 2-70. Flushing Water Sea Water Pump Motor Controller.



All in Fwd Eng RM except as noted:

1. 10A - Forward Reduction Gear Lube Oil Pump Motor Controller.
2. 10A - Flushing Pump (Sea Water Pump) Motor Controller.
3. 10A - Vent Fan Motor Controller Fwd Engine Room (2-51-2).
4. 10A - Heater Fwd Engine Room 5 kw (2-52-1).
5. 10A - Fresh Water Pump Motor Controller.
6. 15A - Hot Water Heater 9 kw.
7. 15A - Sewage Plant - Located in the Ordnance Stores, Equipment and Repair Parts Stores Compartment.
8. 15A - Washer/Dryer.
9. 10A - Vent Fan Motor Aft Engine Room (2-57-2).
10. 10A - Heater Aft Engine Room 5 kw (2-59-1).
11. 10A - Aft Reduction Gear Lube Oil Pump Motor - Aft Engine Room.
12. 10A - Sea Water Cooling Pump Motor Controller - Located in the Aft Engine Room.
13. 10A - Vestibule Fan Motor Controller (1-49-1).
14. 20A - Spare.

Figure 2-71. Power Distribution Panel (P-401) Forward Engine Room

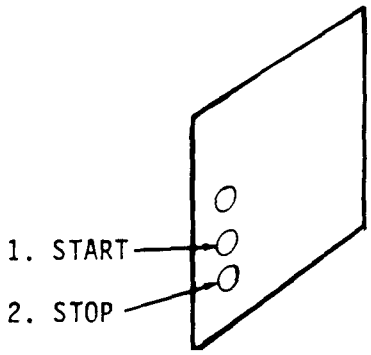


L-103

Circuit Breakers are 10 Amps.

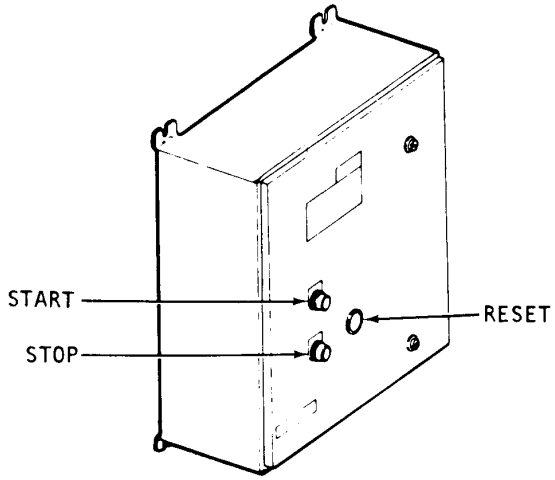
1. SPARE
2. ORD STORES LIGHTS - Power to the lights in Ordnance Stores, Armory (2-40-1-M), 1 Magazine (2-40-2-M), Equipment and Repair Parts Stores (2-40-0-A)
3. FWD ENG RM LIGHTS - Power to lights in the Forward Engine Room.
4. FWD ENG RM LIGHTS - Power to lights in the Forward Engine Room.
5. ANCHOR WINCH COMP FAN - Power to the exhaust fan motor controller (2-63-2) in the Anchor Winch Compartment.
6. SWITCH BD LIGHTS - Power to lights in the Engine Access Area, (1-50-1-Q) .
7. SWITCH BD LIGHTS - Power to lights in the Engine Access Area, (1-50-1-Q) .
8. SPARE

Figure 2-72. Lighting Distribution Panel (L-103).



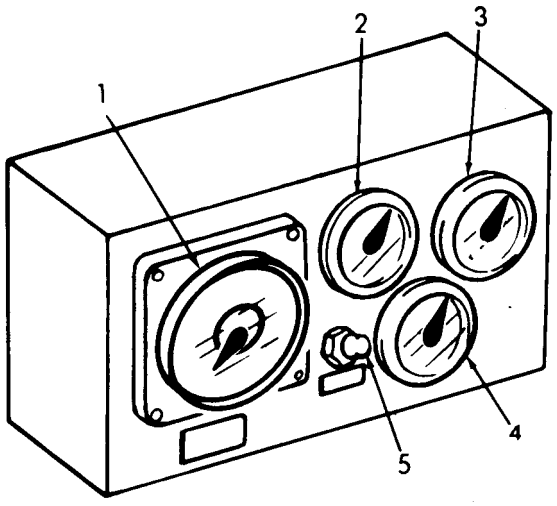
1. START - Starts Central Hydraulic System.
2. STOP - Stops Central Hydraulic System.

Figure 2-73. Central Hydraulic System Motor Controller.



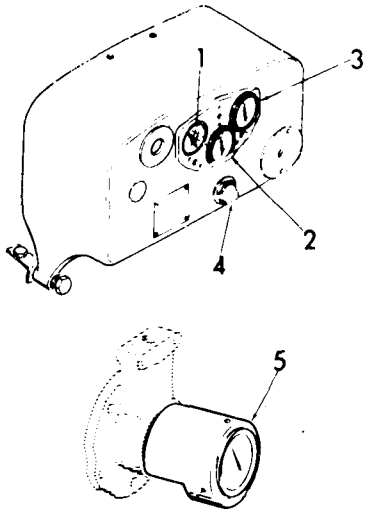
1. START - Starts lube oil pump motor.
2. STOP - Stops lube oil pump motor.
3. RESET - Resets the controller motor.

Figure 2-74. Controller for the Lube Oil Pump Motor.



1. TACHOMETER - Records the speed of the propulsion engine.
2. TEMPERATURE - Records the temperature of the propulsion engine.
3. OIL PRESSURE - Measures the oil pressure of the propulsion engine.
4. DRIVE OIL PRESSURE - Measures the oil pressure of the marine gear.
5. START SWITCH - Starts the propulsion engine.

Figure 2-75. Propulsion Engine Instrument Panel



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

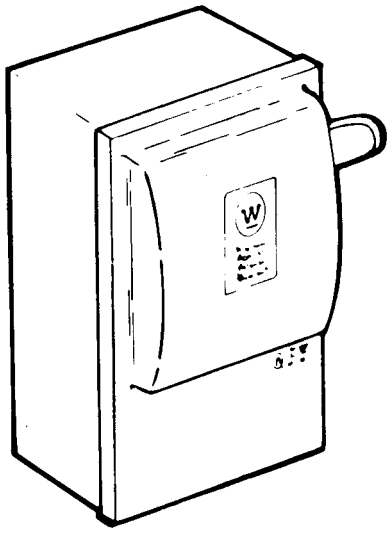
5. TACHOMETER - Measures the speed of the Generator Engine.

Figure 2-76. Instrument Panel Generator.

2-12. AFT ENGINE ROOM.

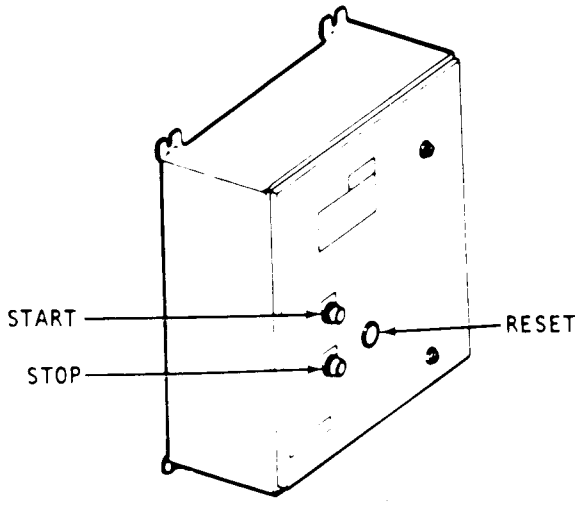
The operator controls and indicators located in the Aft Engine Room (2-56-0-E) are shown in FO-33. FO-33 contains an index of the components in the room.

The instrument panel for the Propulsion Engine is shown in Figure 2-90. Figure 2-91 shows the instrument panel for the Generator Engine.



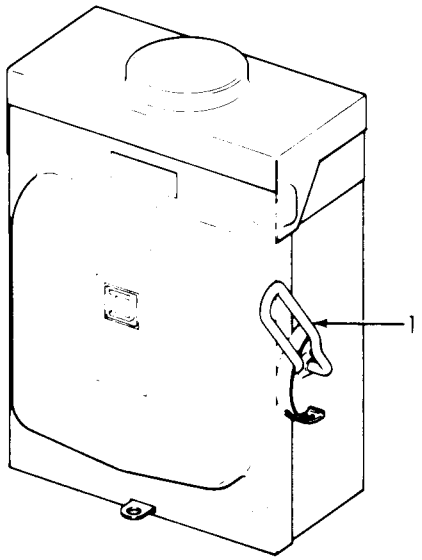
1. ON - Enables exhaust fan motor to be operated.
   OFF - Stops power that enables exhaust fan motor to be operated.

Figure 2-77. Aft Engine Room Exhaust Fan Motor Disconnect Switch.



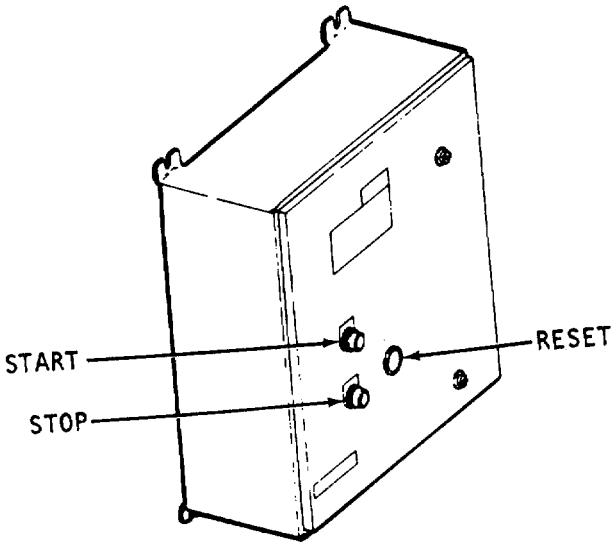
1. START - Starts the exhaust fan motor.
2. STOP - Stops the exhaust fan motor.
3. RESET - Resets the motor controller.

Figure 2-78. Aft Engine Room Exhaust Fan Motor Controller.



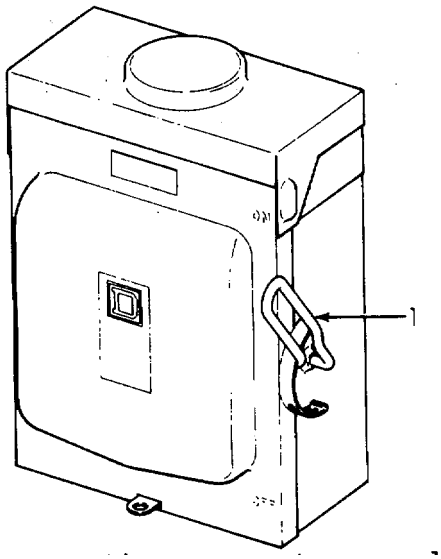
1. ON - Starts heater controller.
   OFF: - Stops heater controller.

Figure 2-79. Aft Engine Poor Heater Disconnect Switch.



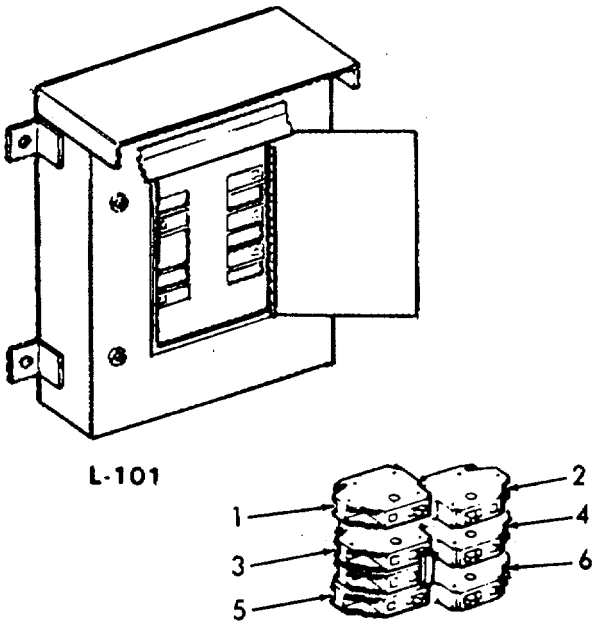
1. START - Starts the heater.
2. STOP - Stops the heater.
3. RESET - Resets the controller.

Figure 2-80. Aft Engine Room Heater Controller.



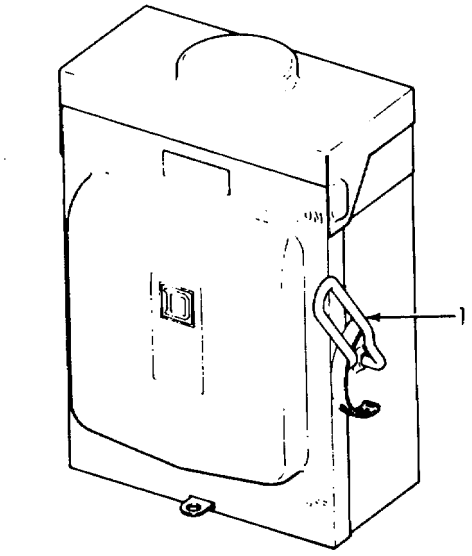
1. ON - Supplies power to the sea water cooling pump motor controller.
   OFF - Stops the power that enables the sea water cooling pump motor controller to be operated.

Figure 2-81. Sea Water Cooling Pump Motor Controller Disconnect Switch.



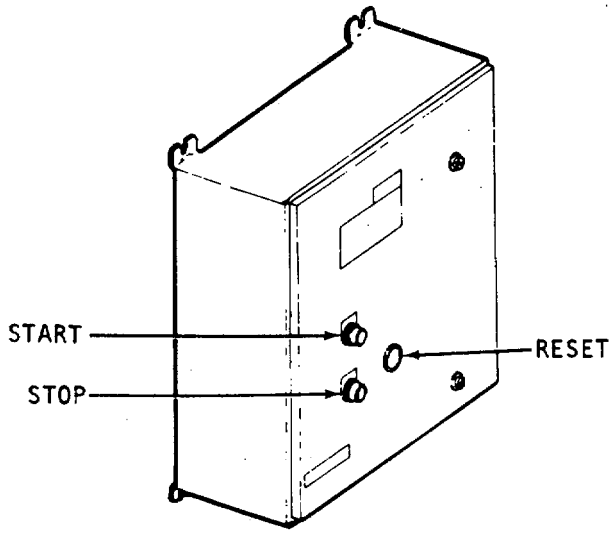
1. Aft Engine Room Lights. (Circuit breaker 10 amps)
2. Aft Engine Room Lights. (Circuit breaker 10 amps)
3. Gauged Oil/Water Separator. (Circuit breaker 20 amps)
4. Voids and STRG Gear Room Lights. (Circuit breaker 10 amps)
5. Anchor Winch Compartment Lights. (Circuit breaker 10 amps)
6.. Anchor Winch Control. (Circuit breaker 10 amps)

Figure 2-82. Lighting Panel L-101.



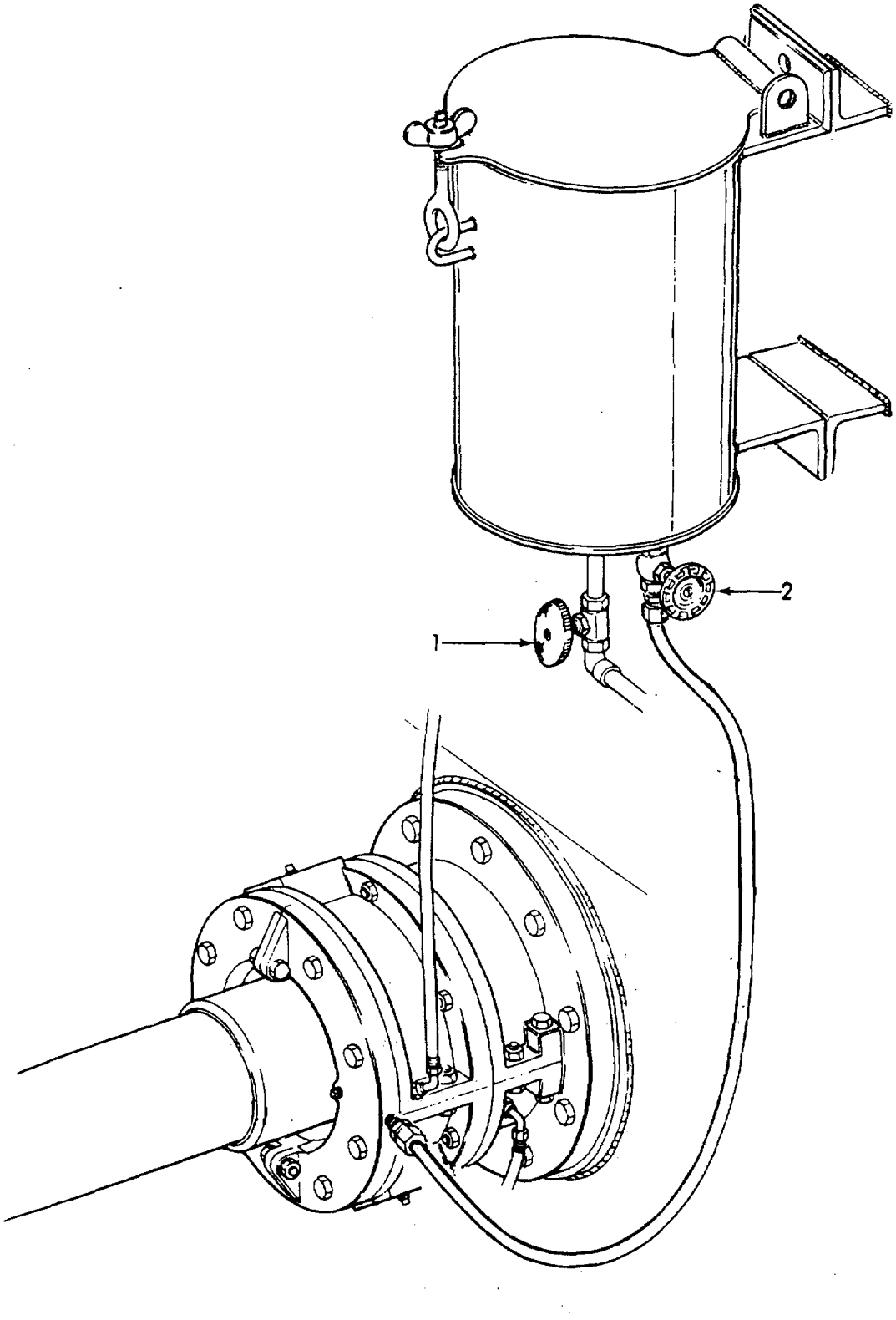
1. ON - Supplies power to the lube oil pump motor controller.
2. OFF - Stops the power that enables the lube oil pump motor controller to be operated.

Figure 2-83. Aft Lube Oil Pump Motor Controller Disconnect Switch.



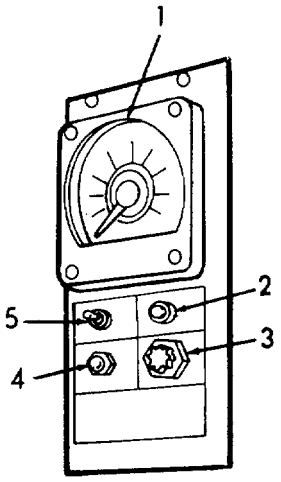
1. START - Starts the lube oil pump motor.
2. STOP - Stops the lube oil pump motor.
3. RESET - Resets lube oil pump motor controller.

Figure 2-84. Aft Lube Oil Pump Controller.



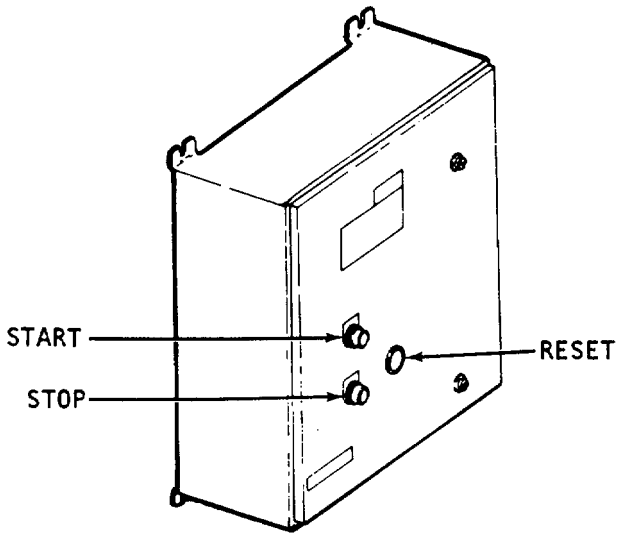
1. VALVE - Controls water input to tank.
2. VALVE - Controls water to shaft seal.

Figure 2-85. Shaft Seal Tank.



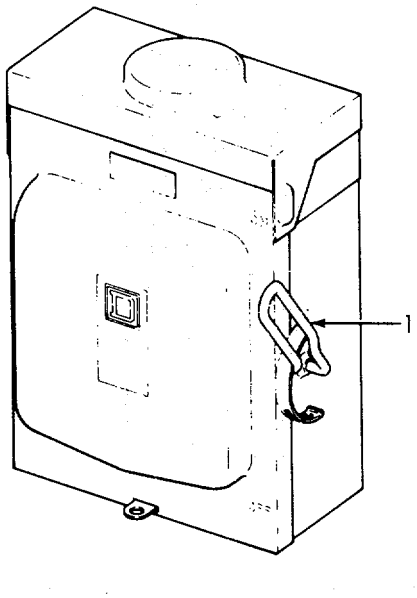
1. METER - Shows level in tank.
2. POWER - Indicator lamp showing power on.
3. FUSE - Circuit protection I amp.
4. CALIBRATE - Adjustment used when installing and calibrating tank level meter.
5. ON/OFF/FULL REF - Switch to turn on/off/adjust the tank level indicator.

Figure 2-86 Tank Level Receiver Indicator Aft Engine Room.



1. START - Starts the fire pump motor.
2. STOP - Stops the fire pump motor.
3. RESET - Resets the fire pump motor controller.

Figure 2-87. Fire Pump Motor Controller.



1. ON - Turns on the power that enables the fire pump motor controller to be operated.
   OFF - Turns off the power to the fire pump motor controller.

Figure 2-88. Fire Pump Motor Controller Disconnect Switch.

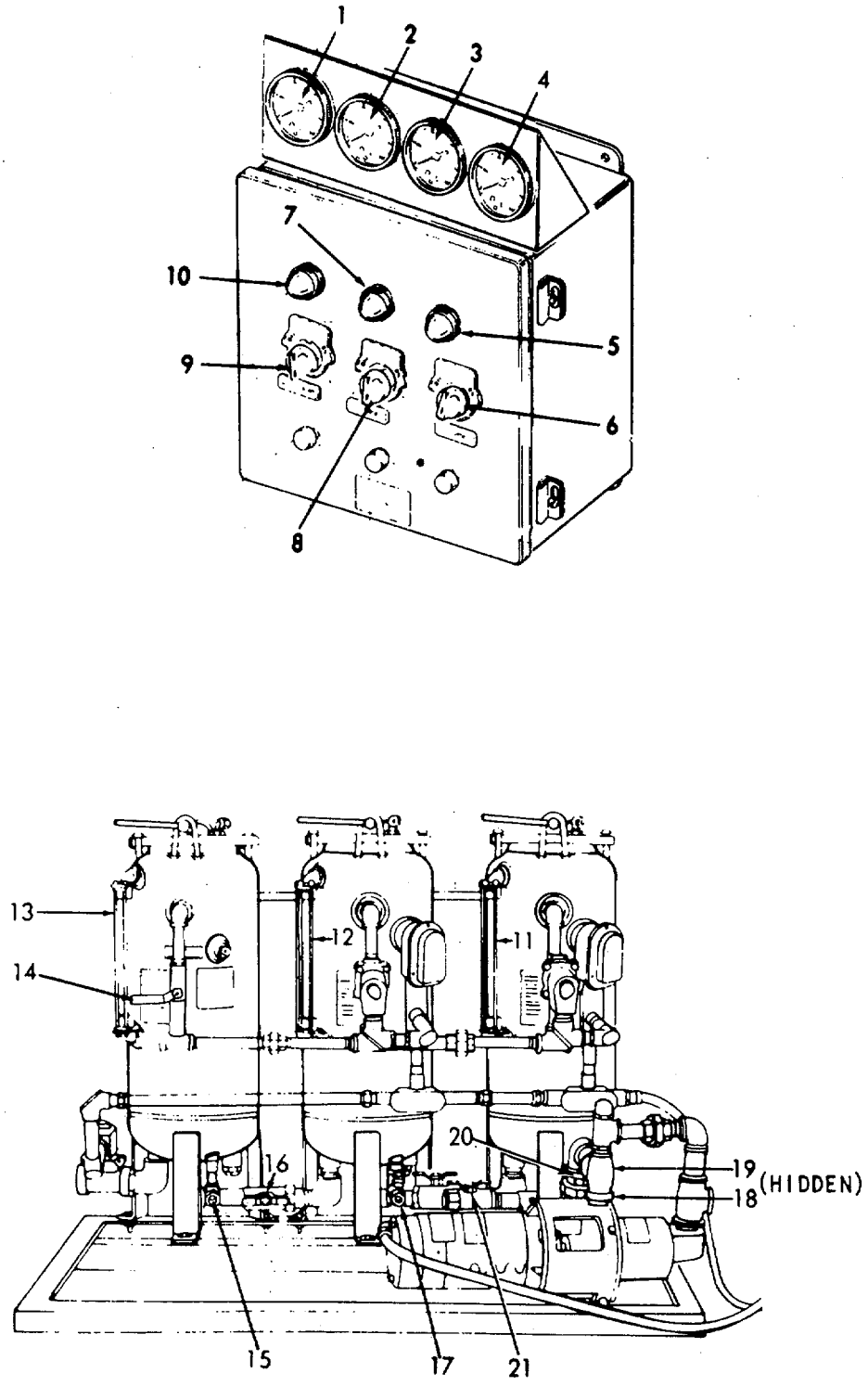
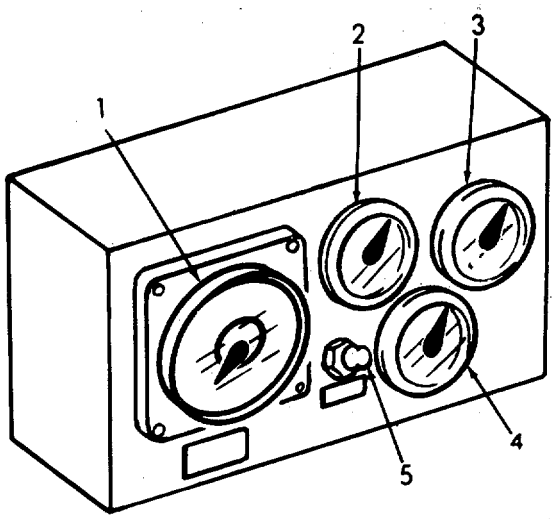


Figure 2-89. Oil/Water Separator (Sheet 1 of 2).

Legend Figure 2-89.

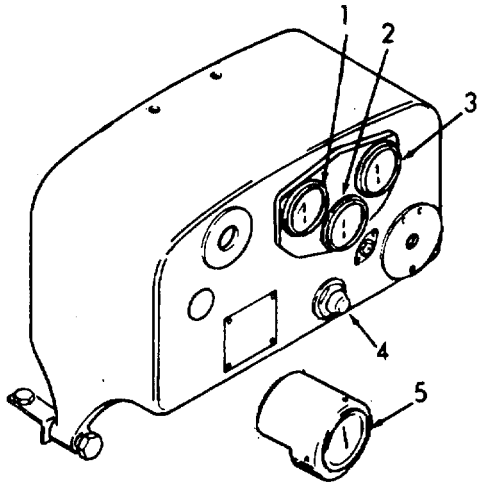
1. INLET PRESSURE GAGE - Needle points to actual fluid pressure at inlet to Prefilter Primary Separator.
2. 2ND STAGE PRESSURE GAGE - Needle points to actual fluid pressure at 2nd stage Prefilter Separator inlet.
3. 3RD STAGE PRESSURE GAGE - Needle points to actual fluid pressure at 3rd stage Separator 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 2-89. Oil/Water Separator (Sheet 2 of 2).



1. TACHOMETER - Records the speed of the Propulsion Engine.
2. TEMPERATURE - Records the temperature of the Propulsion Engine.
3. OIL PRESSURE - Measures the oil pressure of the Propulsion Engine.
4. DRIVE OIL PRESSURE - Measures the oil pressure of the Marine Gear.
5. START SWITCH - Starts the Propulsion Engine.

Figure 2-90. Propulsion Engine Instrument Panel.



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 2-91. Instrument Panel Generator.

2-13. ANCHOR WINCH ROOM.

The operator controls and indicators in the Anchor Winch Room (2-62-O-Q) are shown in Figure 2-92. Figure 2-92 also contains an index to the components in the room.

Index to Figure 2-92 *

Item Number	Description	See Figure
1.	Engine Controls	2-93
2.	Torque Converter	2-94
3.	Hydraulic Tank	2-95

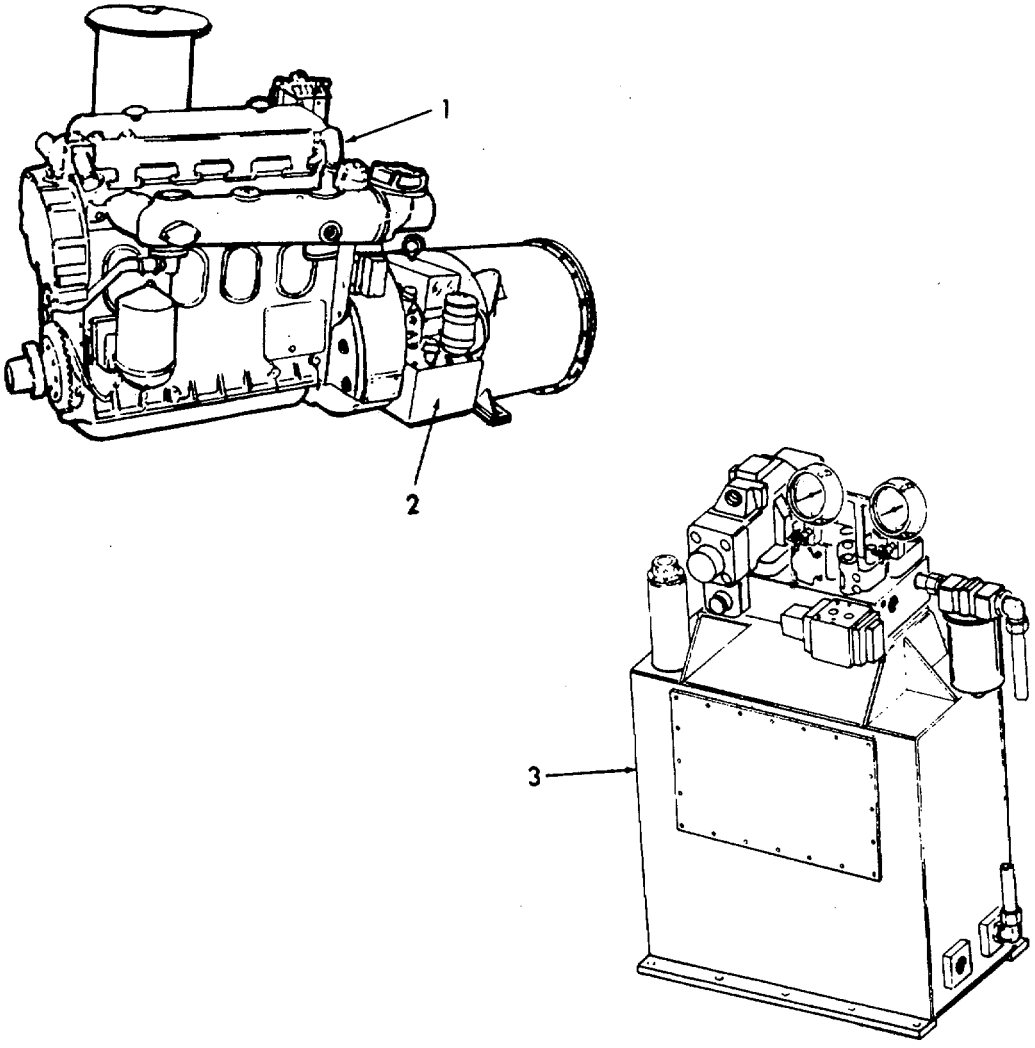
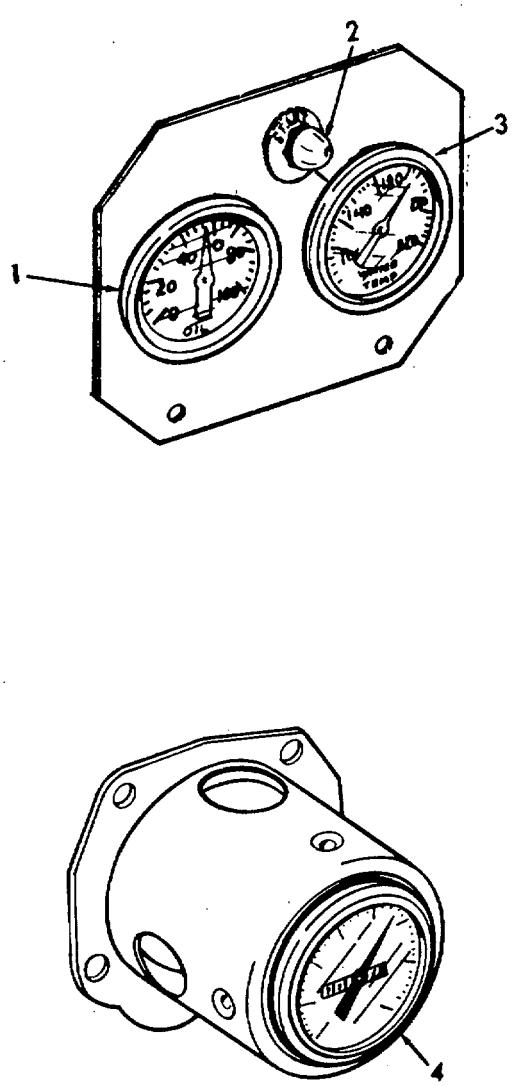
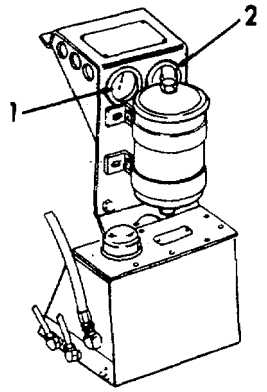


Figure 2-92. Anchor Winch Engine.



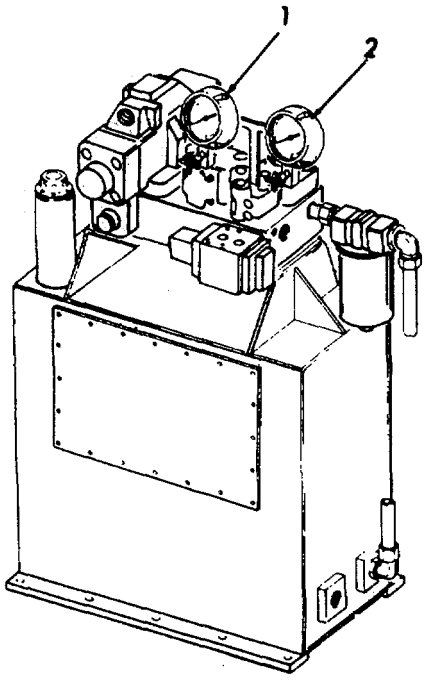
1. OIL PRESSURE - Gage indicating the oil pressure of the Anchor Winch Engine.
2. START SWITCH - Starts the Anchor Winch Engine.
3. WATER TEMPERATURE GAGE - Indicates the temperature of the water in the Anchor Winch Engine.
4. TACHOMETER - Indicates the speed of the Anchor Winch Engine.

Figure 2-93. 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 2-94. Torque Converter Indicators.

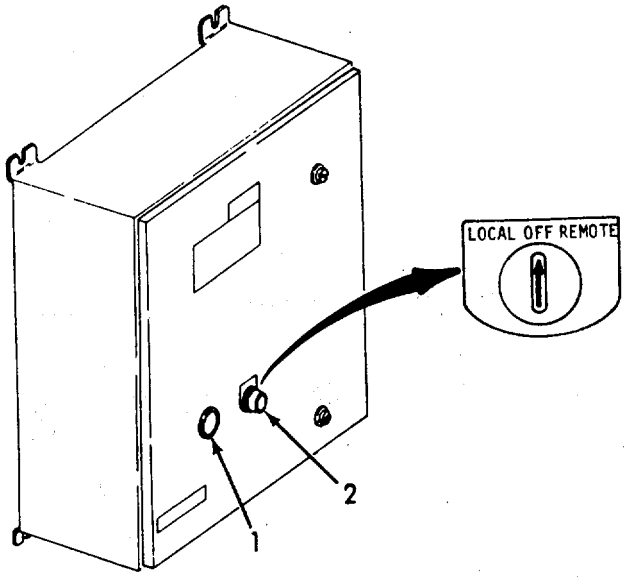


1. OIL PRESSURE GAGE (2000 PSI}
2. OIL PRESSURE GAGE (1000 PSI)

Figure 2-95. Hydraulic Tank in Anchor Winch Room.

2-14. STEERING GEAR COMPARTMENT.

The operator controls and indicators in the Steering Gear Compartment (2-70-0-Q) are shown in Figure 2-96.

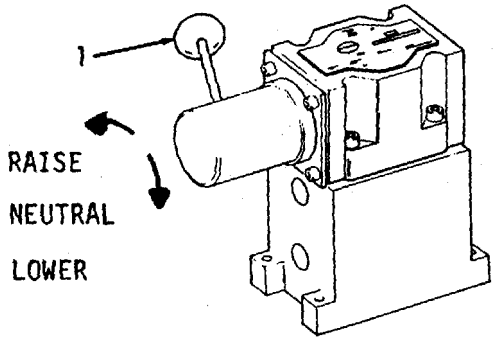


1. LOCAL/REMOTE - Rotate to select local or remote operation for the Hydraulic Pump Motor. Turn to OFF to stop Hydraulic Pump Motor.

Figure 2-96. Hydraulic Pump Motor Controller.

2-15. MAST CONTROLS.

The operator control for the Mast is shown in Figure 2-97. The control is located at Frame 38 Stbd side Cargo Deck.

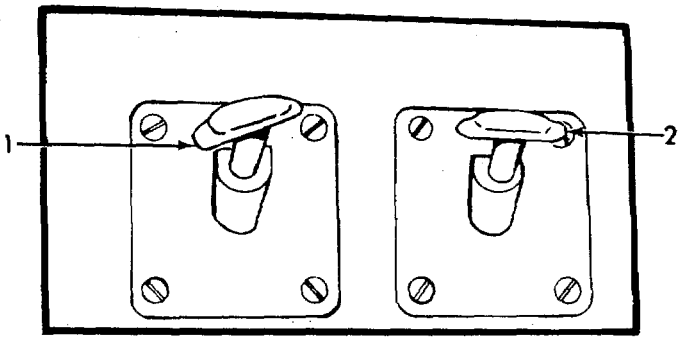


1. OPERATOR CONTROIL - RAISE - The position to raise the Mast.
LOWER - The position to lower the Mast.

Figure 2-97. Mast Directional Control Valve.

2-16. EMERGENCY SHUTDOWN.

The operator controls for emergency shutdown of the diesel Engine Generators are shown in Figure 2-98 . These controls are located at Frame 54-1/2 Stbd side Cargo Deck.



1. PORT GENERATOR ENGINE - Pull lever up to shutdown in an emergency.
2. STBD GENERATOR ENGINE - Pull lever up to shutdown in an emergency.

Figure 2-93. Generator Emergency Shutdown located on Cargo Deck.

2-17. ANCHOR CONTROLS.

The operator controls and indicators for the Anchor Winch are s. own in Figure 2-99 . The operator controls for the Anchor "A' Frame are shown in Figure 2-100.

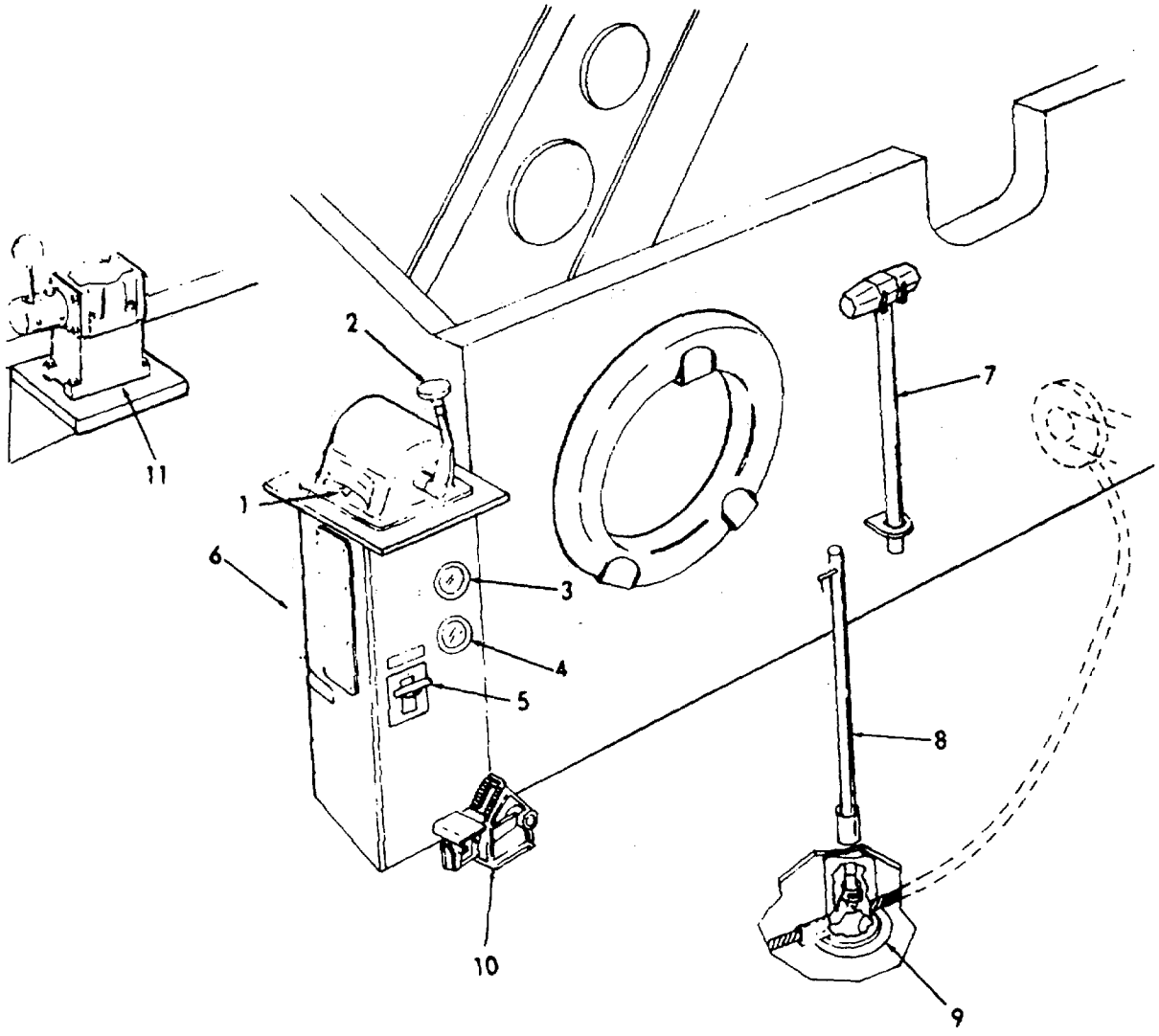
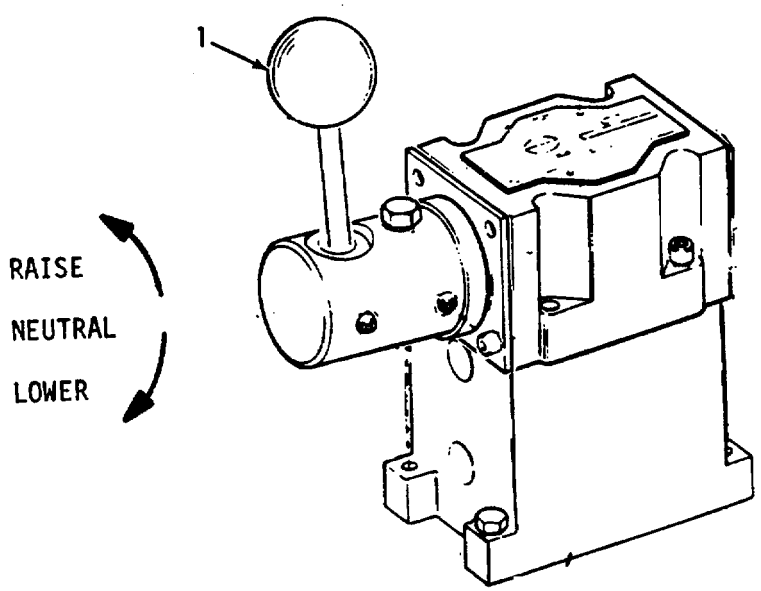


Figure 2-99. Anchor Winch Control (Sheet 1 of 2).

Legend Figure 2-99.

1. MAINLINE CONTROL SWITCH - Controls operation of the switches that activates the Hydraulic Winch valves.
2. THROTTLE - Adjusts the speed of the Anchor Winch Engine.
3. WATER TEMPERATURE GAGE - Indicates Anchor Winch Engine cooling water temperature.
4. OIL PRESSURE GAGE - Indicates Anchor Winch Engine internal oil pressure.
5. EMERGENCY STOP - Emergency Stop pull lever for Anchor Winch Engine.
6. ENGINE STOP - Pull lever to stop Anchor Winch Engine.
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 the Anchor wire rope in an emergency situation.
10. BRAKE CONTROL - Foot operated brake for the Anchor Winch.
11. HYDRAULIC CONTROL - Directional control valve used to pivot the Anchor hoist "A" Frame. Refer to Figure 2-99.
12. START - Press to start switch for Anchor Winch Engine.

Figure 2-99. Anchor Winch Control (Sheet 2 of 2).



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

NOTE

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

Figure 2-100. Anchor Winch "A" Frame Directional Control Valve.

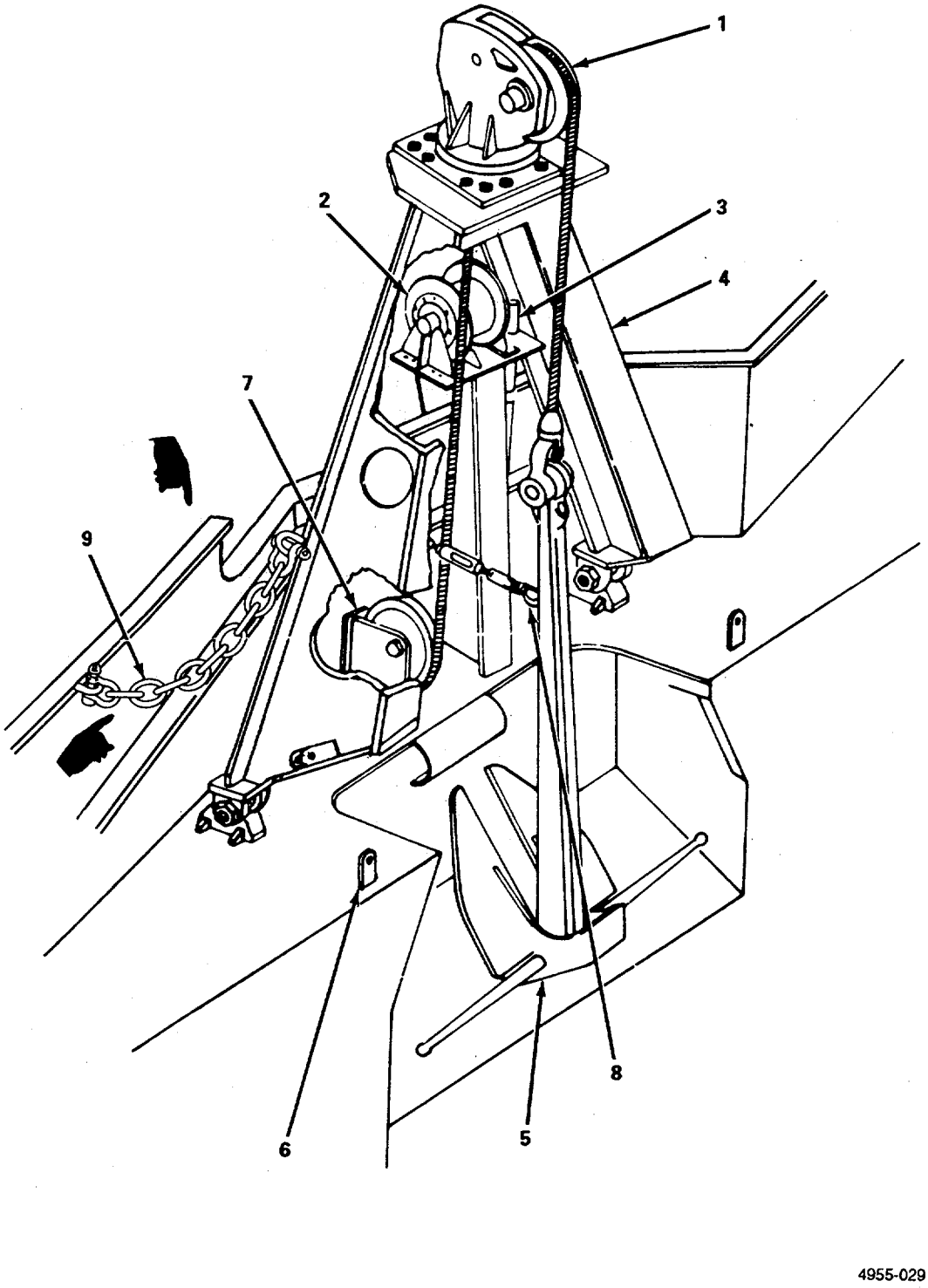


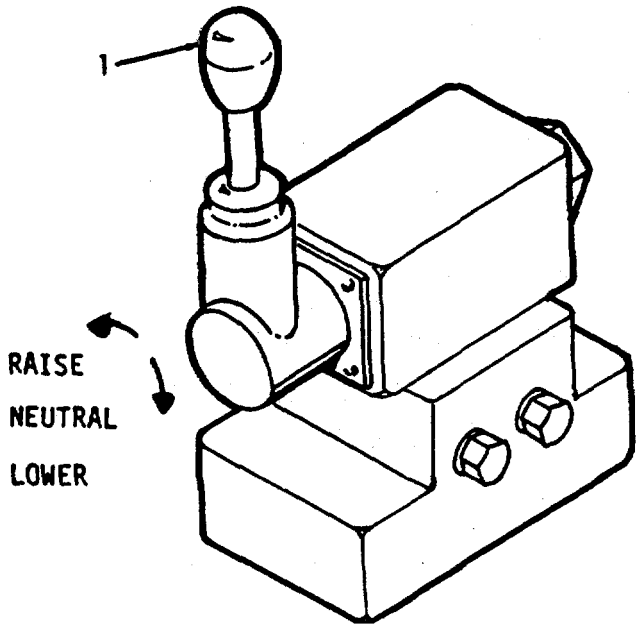
Figure 2-101. Anchor “A” Frame.

Legend Figure 2-101.

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 into 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 into the outboard position.
7. SHEAVE - Guides cable from inside vessel to top of "A" Frame.
8. PELICAN HOOKS - Quick releases for securing anchor to vessel.
9. SAFETY CHAIN - For leverage and stability while releasing or replacing pins and pelican hook.

2-18. STERN GATE CONTROL.

The operator controls for the Stern Gate are shown in Figure 2-102.



1. OPERATOR CONTROL - Move control to RAISE position to raise the Stern Gate.
   Move control to LOWER position to lower the Stern Gate.

Figure 2-102. 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'll 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 month.

g. Use DA Form 2404 (Equipment Inspection and Maintenance Worksheet) to record any faults that you discover before, during, or after operation, unless you can fix them. You DO NOT need to 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 v hen 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 clamps 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 at the component to see if it's 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 solvents contact skin. In cold weather, contact of exposed skin with cleaning solvents can cause frostbite.**

CAUTION

When cleaning engine areas, engine must be COLD (same temperature as outside air). DO NOT point water or steam directly at any electrical connection. DO NOT point water stream directly at radiator fins. DO NOT use high pressure water supply system. Damage to engine, electrical 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 clean 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 kPa).

(2) After cleaning, allow engine to air dry. Do not use compressed air to dry engine. Do not run engine to decrease drying time.

(3) Remove all component covers 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 cleaning 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 leaks 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 drops 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)

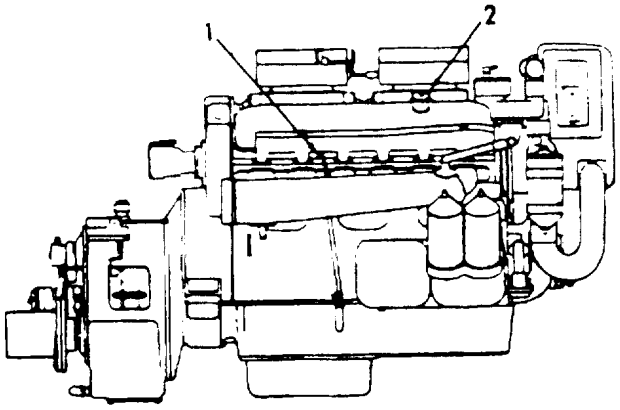
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
1	BEFORE	Engine Room	ENGINE OIL. Check the oil level before starting the engine by removing dipstick (1). Add oil, if necessary by removing oil fill cap (2). Bring oil to the proper level on the dipstick. **NOTE** Dipstick may be located on opposite side of engine. **NOTE** FULL - Engine has 34 quarts (32.2 liters) LOW - Engine has 26 quarts (24.6 liters)  	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 If :
2	BEFORE	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. **WARNING** Use eye protection when using compressed air.	Air intake is blocked or obstructed.

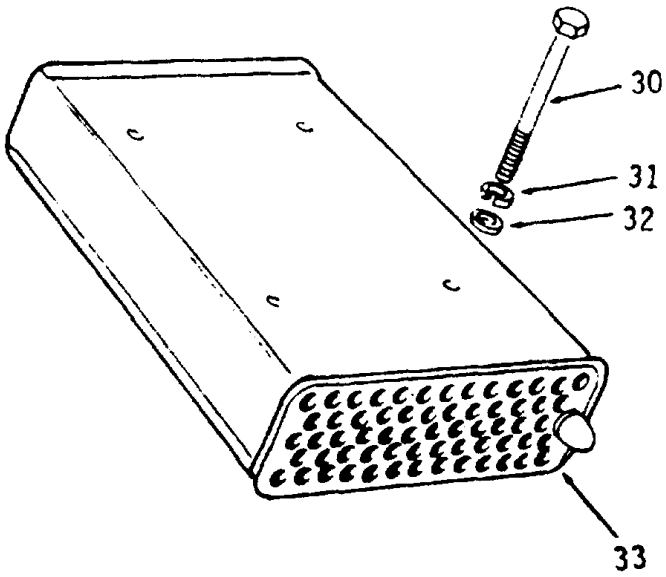


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

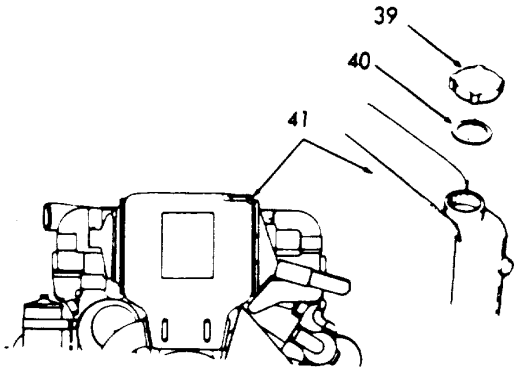
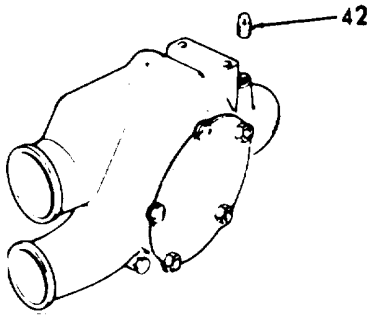
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
3	BEFORE	Engine Room	FRONT SIDE EXPANSION TANK. Remove cap (39) and gasket (40). Check the coolant level. It should be near the top of the expansion tank (41). **NOTE** Use Antifreeze, Etheyline Glycol, Type MIL-A-46153. 	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 operated with a dry pump. Remove the pipe plug (42) to let trapped air escape. 	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 If :
5	BEFORE	Engine Room	Check drive belts (90) for wear and proper tension.	Belts cracked or torn.

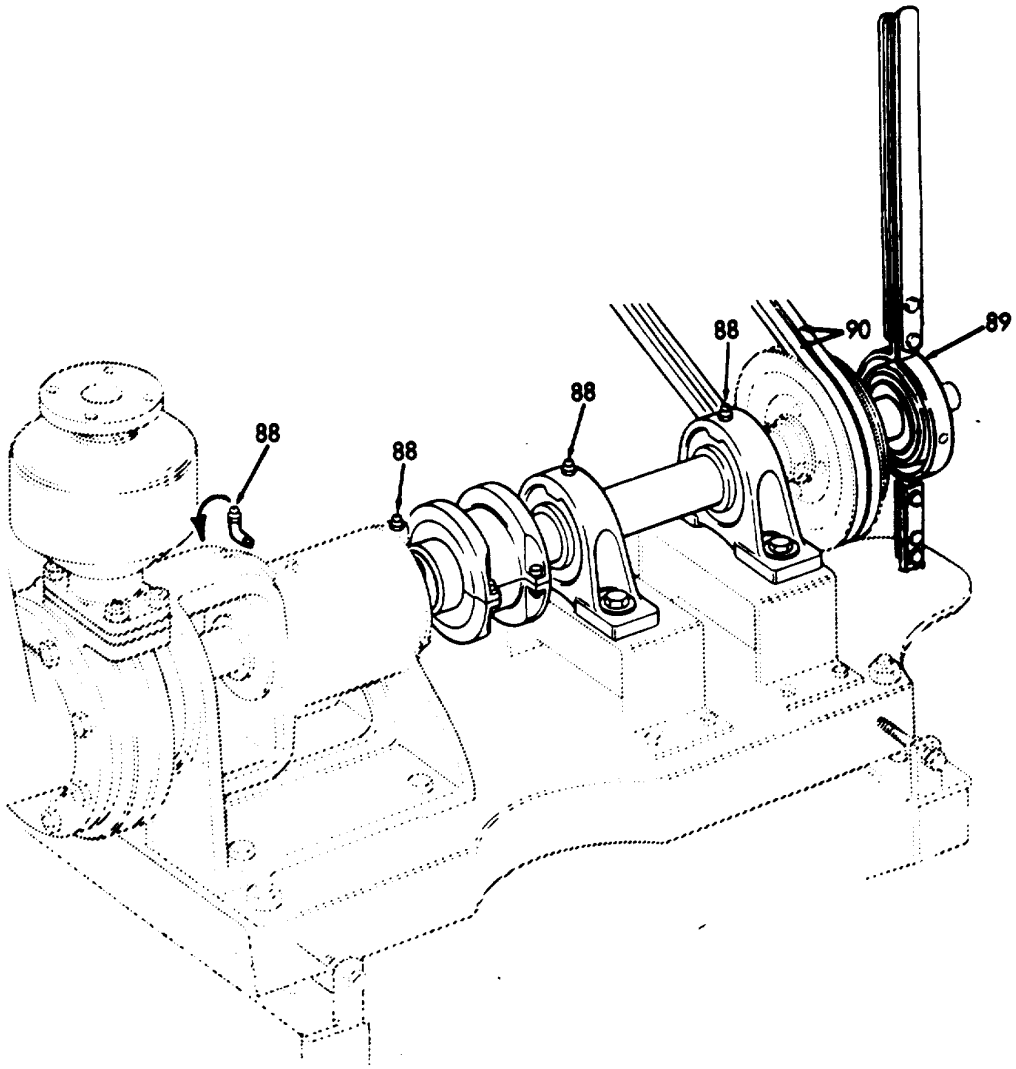


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

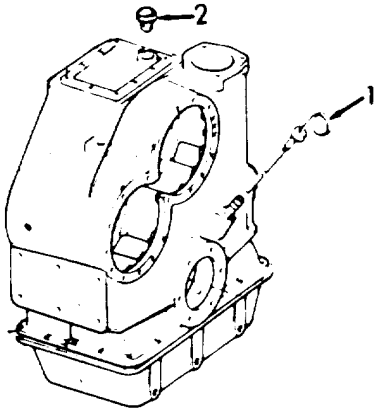
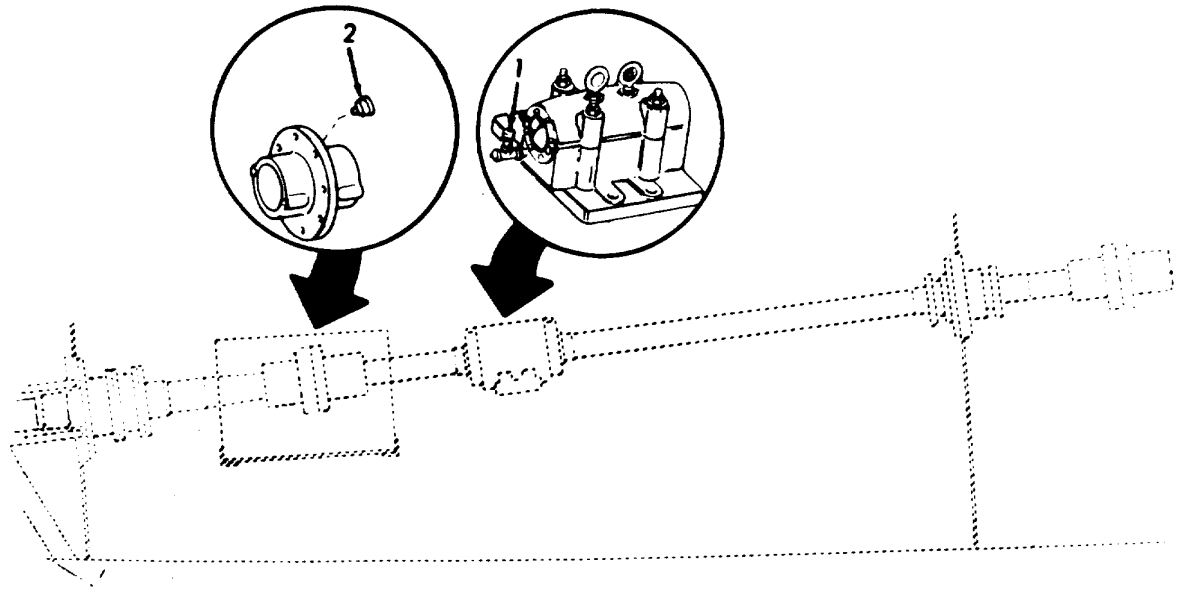
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
6	BEFORE	Engine Room	MARINE DRIVE GEAR OIL LEVEL. With the engine running at idle speed, check the oil level on dipstick (1). Remove oil breather assembly (2) and add oil as required to bring it to the proper level on 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 If :
8	BEFORE	Engine Room	PROPELLER SHAFT BEARINGS. Check level of water in tank (3). Add water as required.	Low water level.

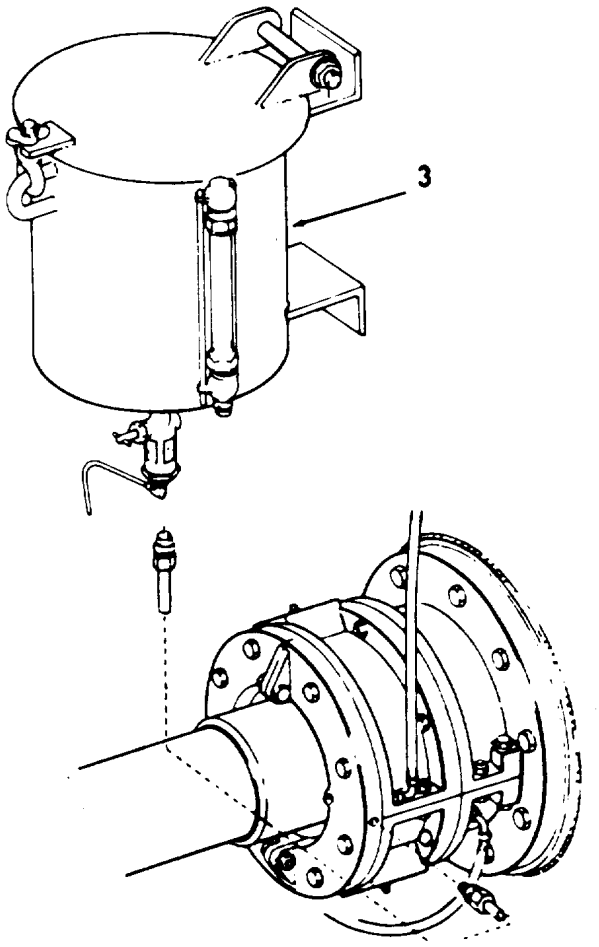


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

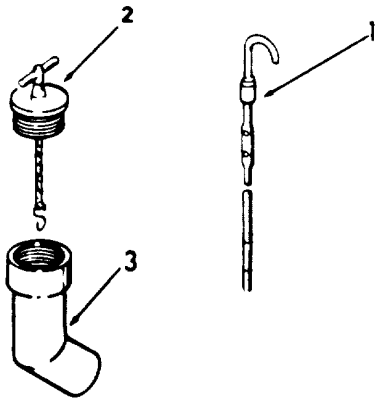
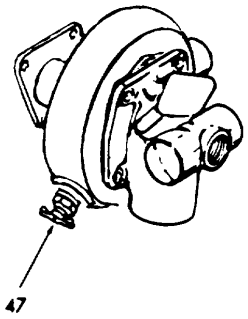
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
9	BEFORE	Engine Room (Generator)	ENGINE OIL. Check the oil level on dipstick (1) before starting the engine. If necessary, add oil by removing oil filler cap (2) from oil filler tube (3) to bring it to the proper level 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

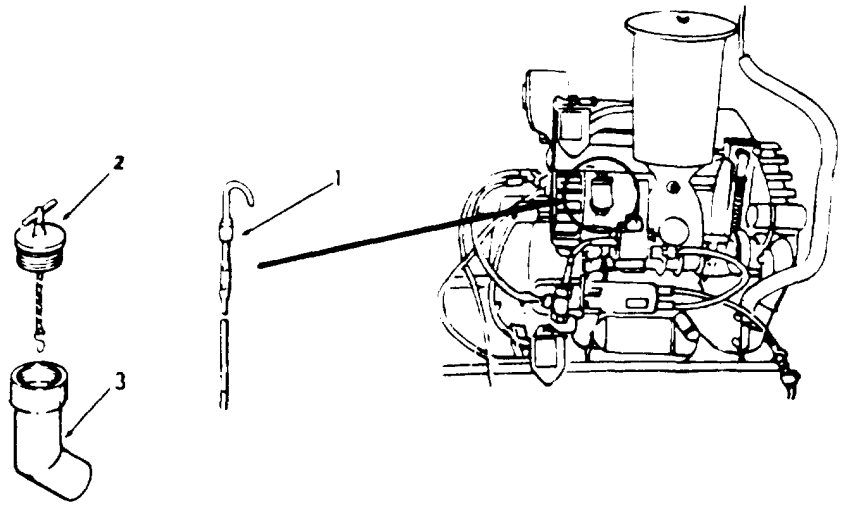
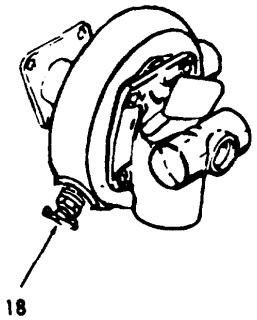
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
11	BEFORE	Anchor Winch Compartment	ENGINE OIL. Check the oil level on dipstick (1) before starting the engine. If necessary, add oil by removing oil breather cap (2) from oil filler tube (3) to bring it to the proper 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). 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

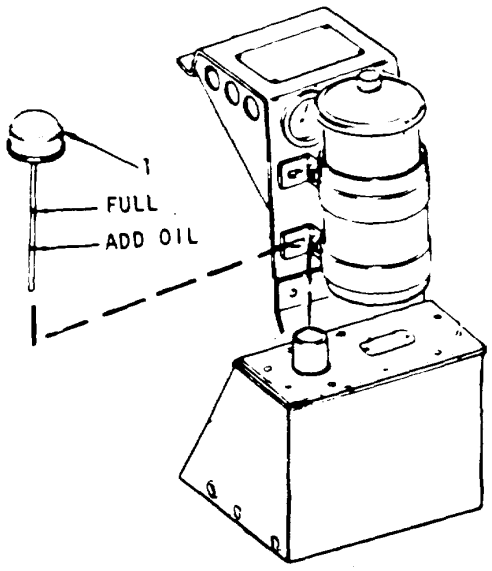
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
13	BEFORE	Anchor Winch Compartment	OIL LEVEL. Remove fluid gage (1) and check oil level. Add oil as required. **CAUTION** Make sure Anchor Winch Engine is not running.  	Low oil level.
14	BEFORE	Anchor Winch Compartment	LEVEL WIND ASSEMBLY AND GUARD: WORM SHAFT. Lubricate fittings (14) with grease (MIL-G-24139A (SH)). CARRIAGE GUIDE. Lubricate fittings (16) with grease (MIL-G-24139A (SH)). VERTICAL ROLLERS. Lubricate fittings (17) with grease (MIL-G-24139A (SH)).	Any of these gears, shafts, etc., bind or fails to function. Any of these gears, shafts, etc., bind or fails to function. 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 If :
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.

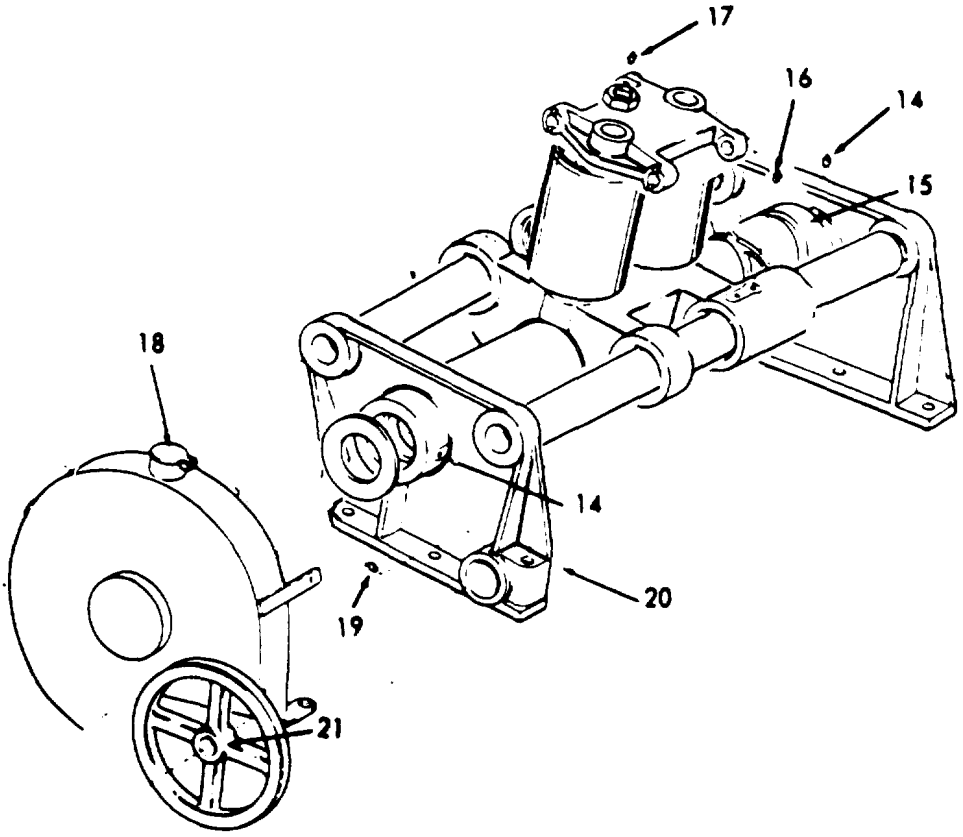


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

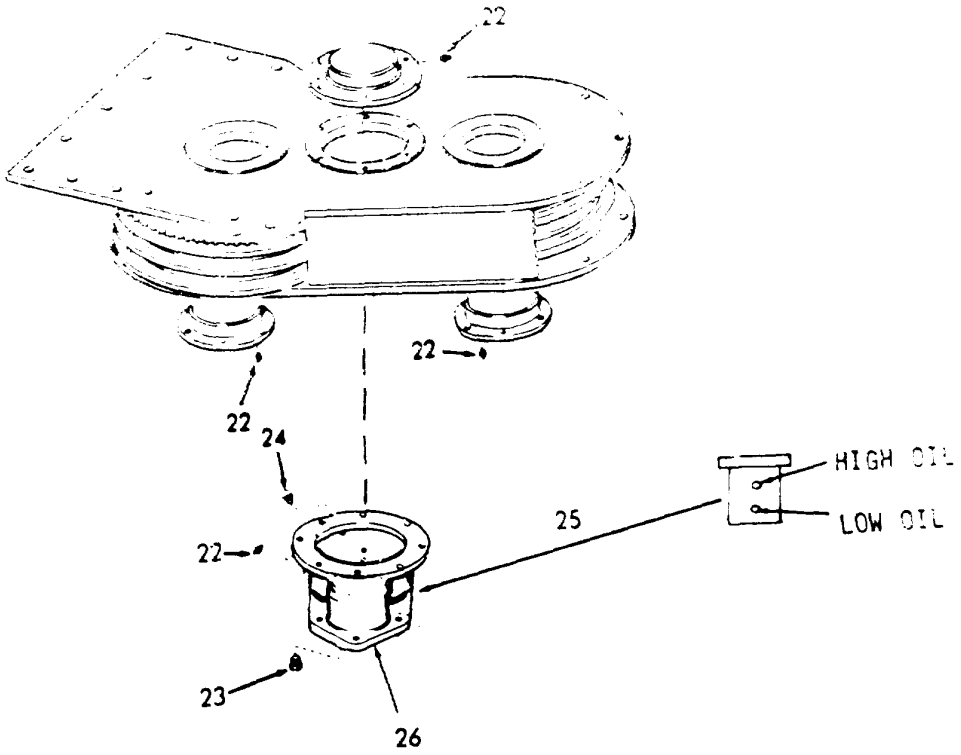
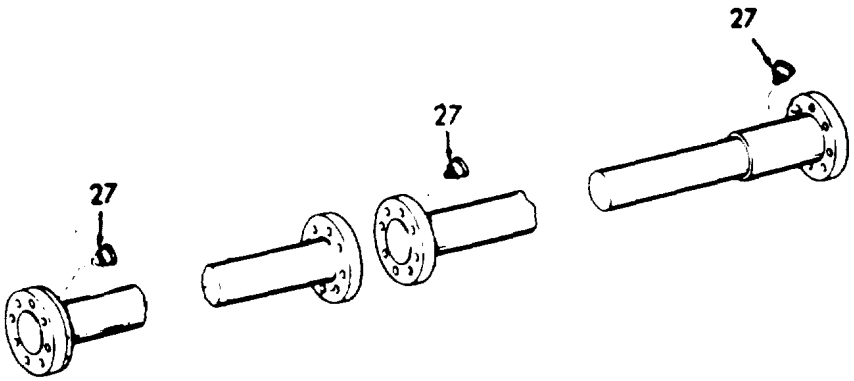
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
15	BEFORE	Anchor Winch Compartment	SLACK PULLER. Lubricate fittings (22) with grease (MIL-G-24139A (SH)).	Any of these gears, shafts, etc., bind or fails to function.
				
16	BEFORE	Anchor Winch Compartment	FLANGE FITTINGS. 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

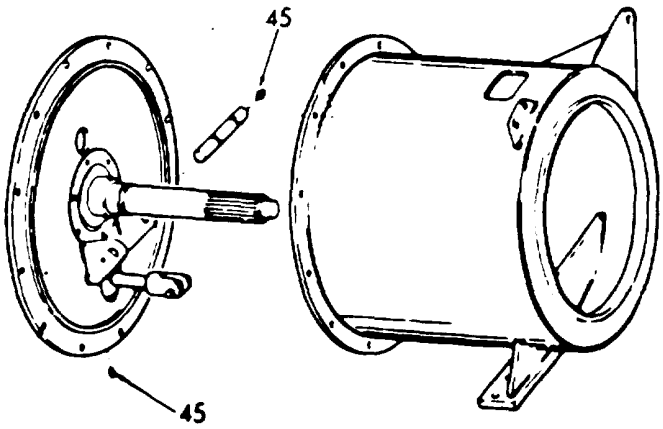
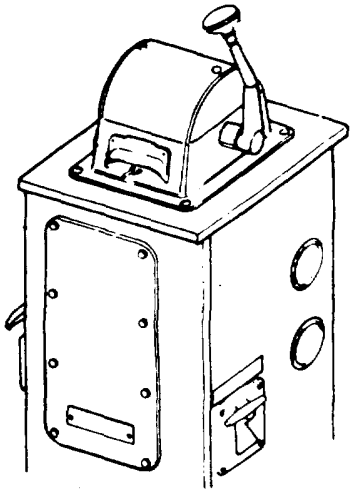
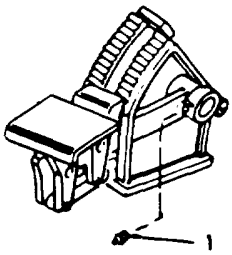
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
17	BEFORE	Anchor Winch Compartment	DISCONNECT CLUTCH. Lubricate fittings (45) with grease (MIL-G-24139A (SH)).	Clutch binds or fails to function.
				
18	BEFORE	Vehicle Deck AFT/STBD	ANCHOR WINCH BRAKE CONTROL. Lubricate 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

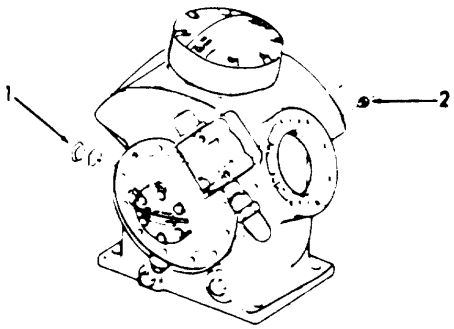
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
19	BEFORE	Air Conditioning	COMPRESSOR UNIT ASSEMBLY CHECK OIL LEVEL. While system is in operation, check oil level in crankcase by checking sight glass (1). Add oil (VV-L-825), whenever the oil level drops below normal, (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.	Low oil level.
				
			NOTE 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. **NOTE** 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 If :
20	BEFORE	Air Conditioning	SIGHT FLOW INDICATOR. Check indicator (4) for the following: Indicator Solid Column Liquid Bubbles	Low oil level. Condition Normal lack of refrigerant. See Maintenance.

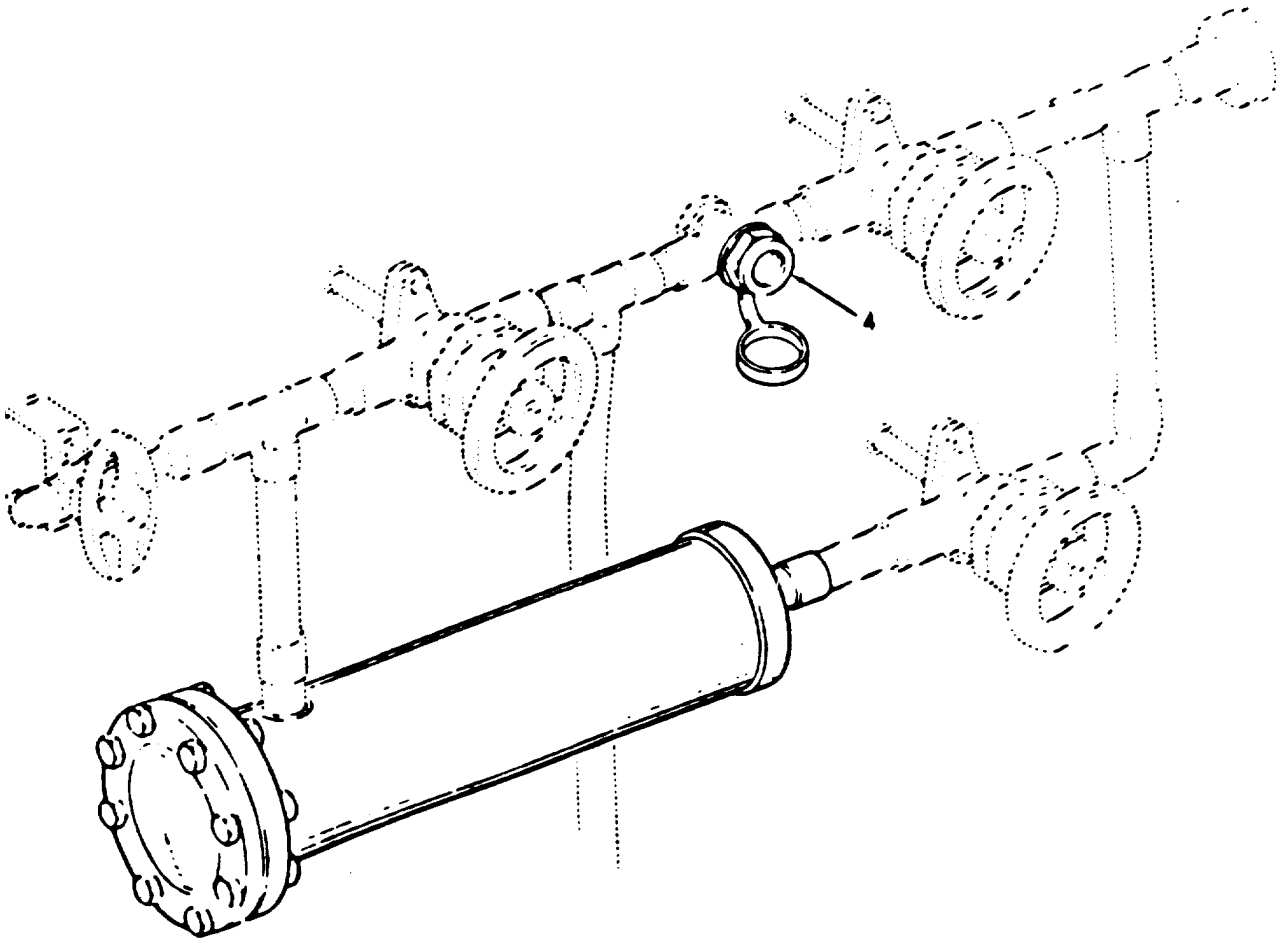


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
21	BEFORE	Portable Equipment	AIR COMPRESSOR OIL LEVEL. Remove plug (1). Add oil (MIL-L-9000H (SH)) as needed. **WARNING** Use eye protection when using compressed air. DRAIN MOISTURE. Open draincock (2).	Low oil level.

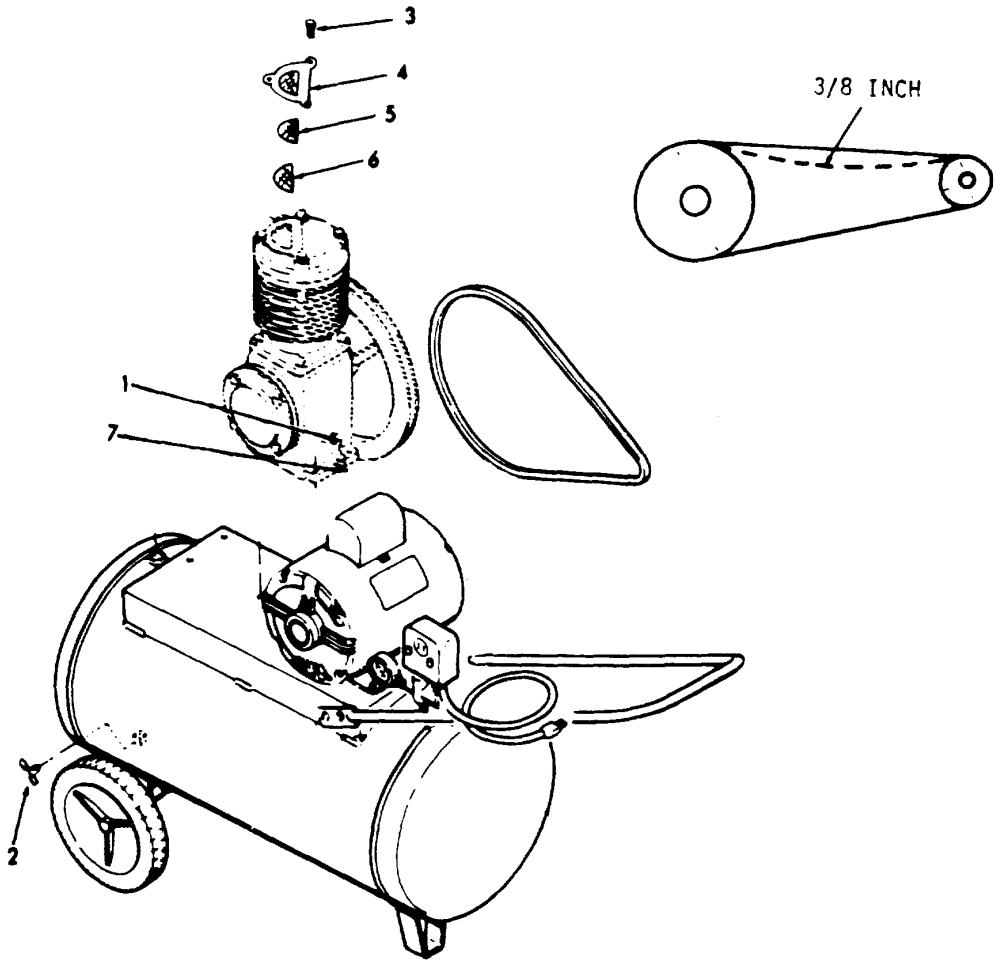


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
22	DURING	Engine Room	HOSES. Inspect all of the hoses visually and by touch for signs of deterioration, leaking and/or cracking. Variable Speed Governor Hose (69) Hose (70) Hose (71) Expansion Tank Outlet Hose (72)	Leaking, cracked, or deteriorated.
			Fuel Pump Inlet Hose (73) Fuel Pump to Filter Hose (74) Fuel Filter to Cylinder Head Hose (75) right bank Fuel Filter to Cylinder Head Hose (78) left bank Crossover Hose (76) Fuel Drain Hose (77)	

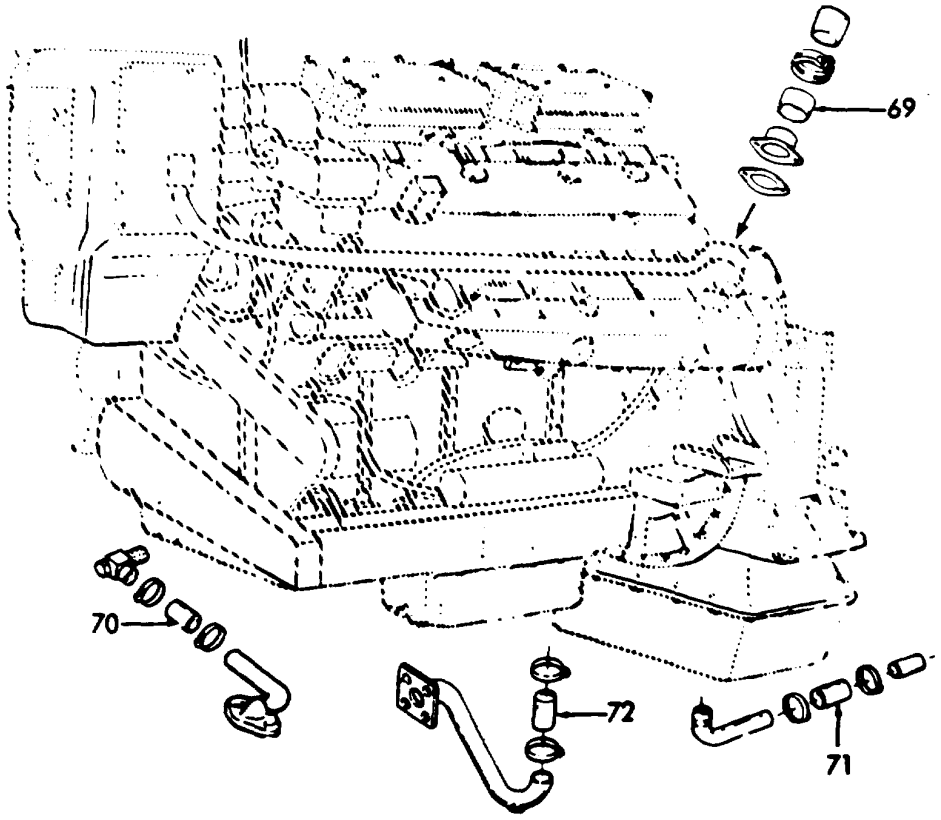
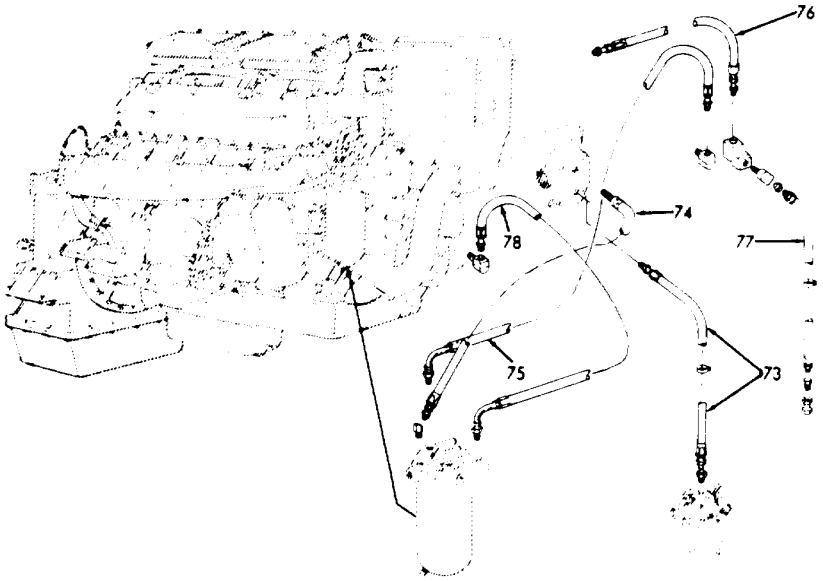


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
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 (83)
Hose (82)

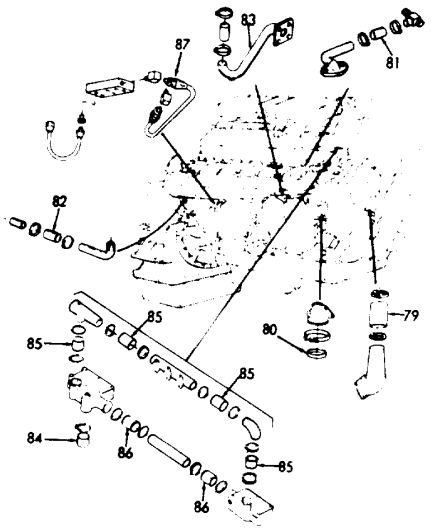


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

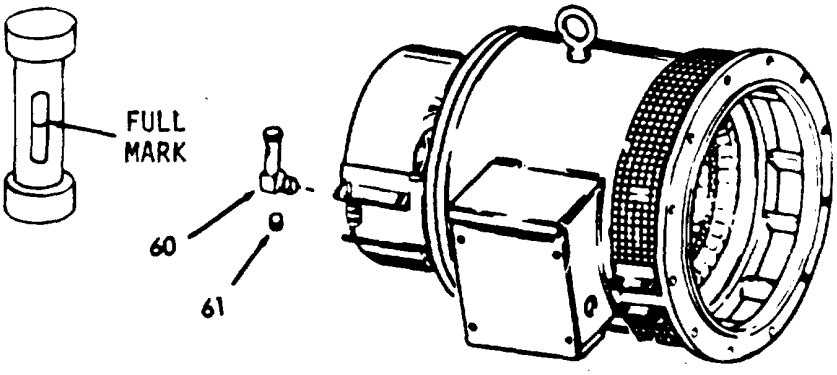
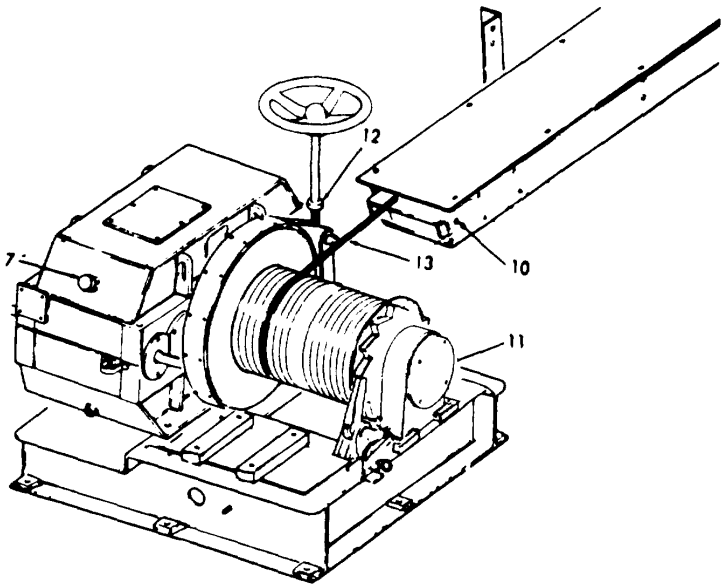
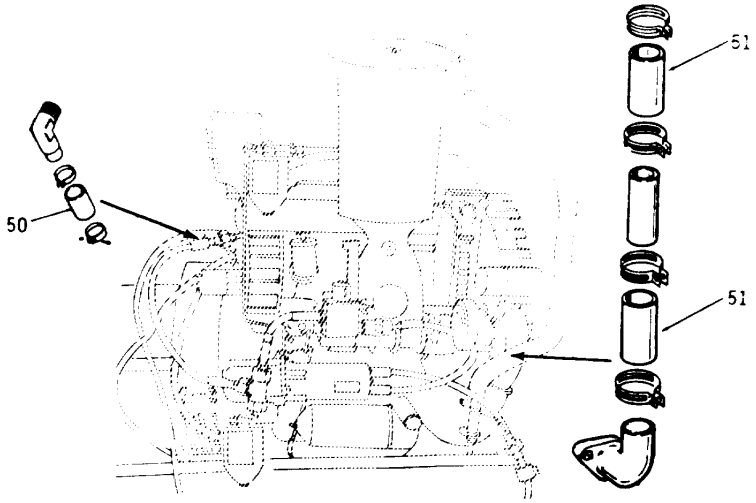
Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
23	DURING	Engine Room	CHECK. Fuel lines, fuel filters and strainers for leaks and/or cracks.	Leaking or cracked.
24	DURING	Engine Room	Check expansion tank and cap for leaks or cracks.	Leaking or cracked.
25	DURING	Engine 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 If :
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. Fresh Water Pump Hose (50) Oil Cooler Water Hoses (51) Thermostat Hose (52) Water By-Pass Hose (53) Water By-Pass Hose (54)	Leaks or cracks.



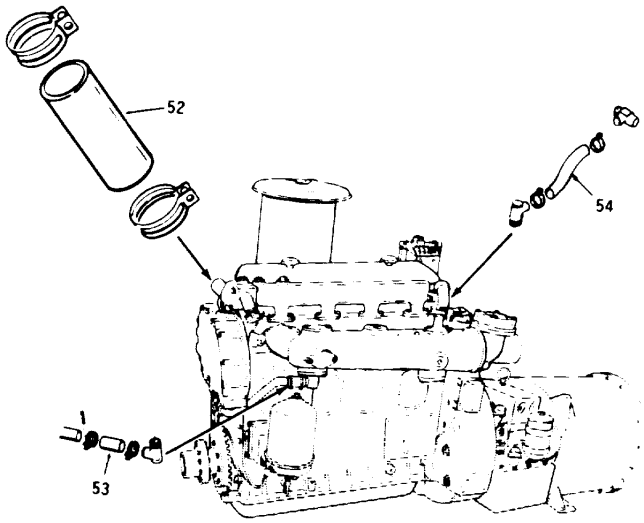


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

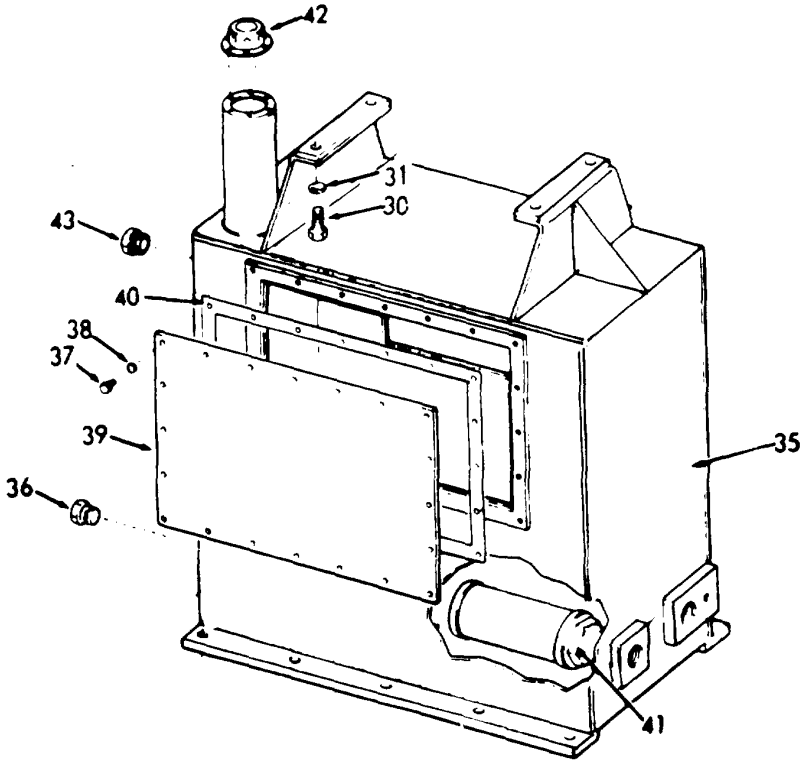
Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
28	DURING	Anchor Winch Compartment	HYDRAULIC TANK. Visually check the level of fluid on the upper sight glass (43). Add oil if required. (MIL-H-46170, Type I)	Leaking (or) low oil level.
				
29	DURING	General	Visually check boat for unsafe conditions and hazards. Be alert to unusual sounds.	

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

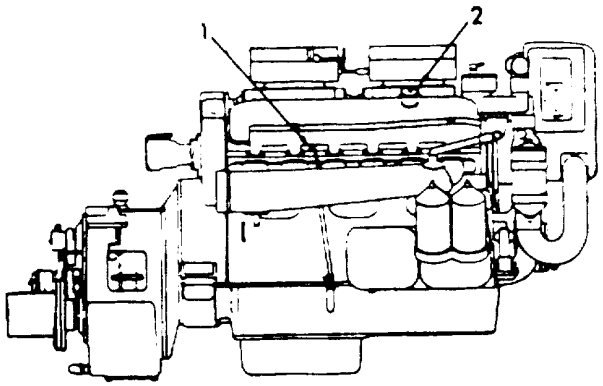
Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
30	AFTER	Engine Room	ENGINE OIL. Check the oil level, after engine has cooled, by removing dipstick (1). Add oil, if necessary by removing oil fill cap (2). Bring oil to the proper level on the dipstick. **NOTE** Dipstick may be located on opposite side of engine. **NOTE** FULL - Engine has 34 quarts (32.2 liters) LOW - Engine has 26 quarts (24.6 liters) 	Low oil level.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

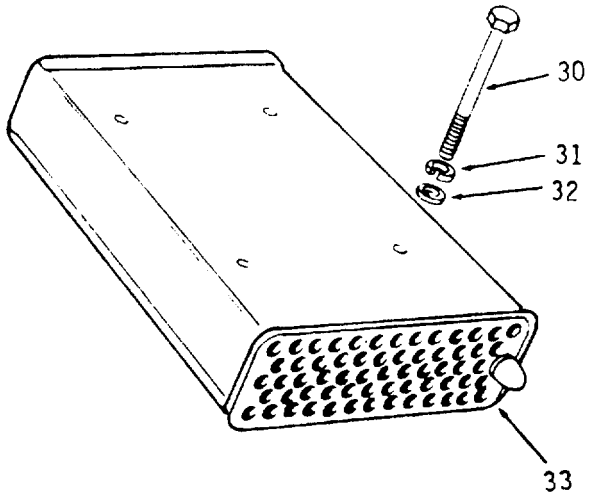
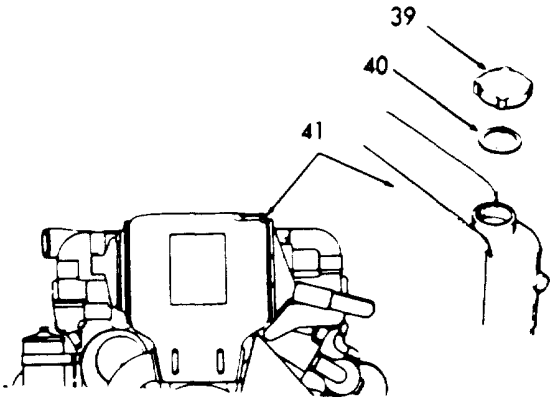
Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
31	AFTER	Engine Room	SILENCER ASSEMBLY. Remove screws (30), lock washers (31) and washers (32) in order to remove silencer assembly (33) from air inlet housing. Inspect the silencer and if necessary, clean in fuel oil. Dry with compressed air. Reassemble in reverse order. **WARNING** **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 If :
32	AFTER	Engine Room	FRONT SIDE EXPANSION TANK. Remove cap (39) and gasket (40). Check the coolant level. It should be near the top of the expansion tank (41). **NOTE** Use Antifreeze, Etheyline Glycol, Type MIL-A-46153.	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.	Pump not primed.



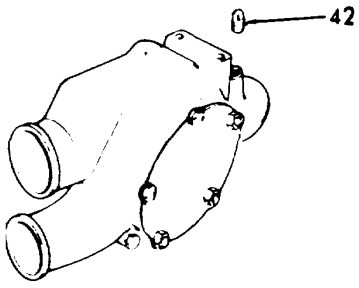


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

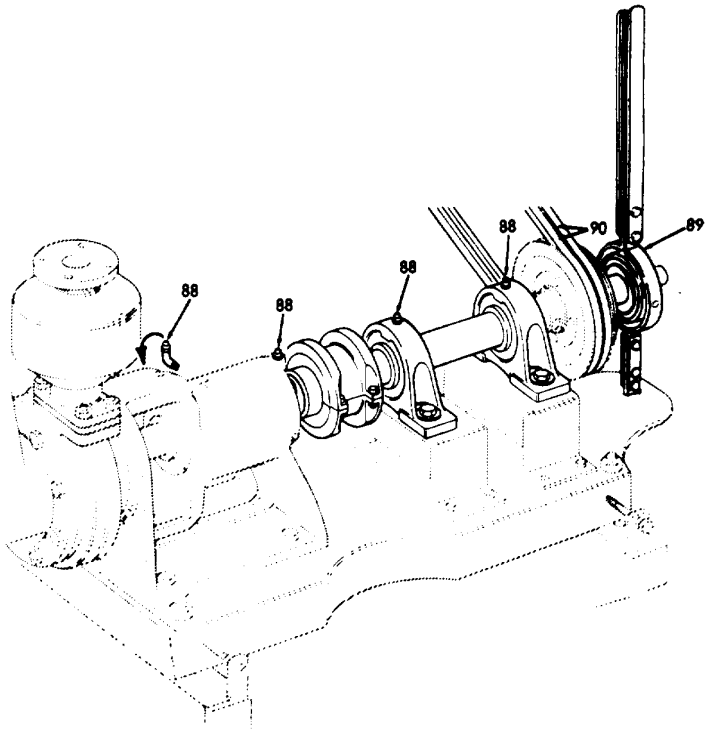
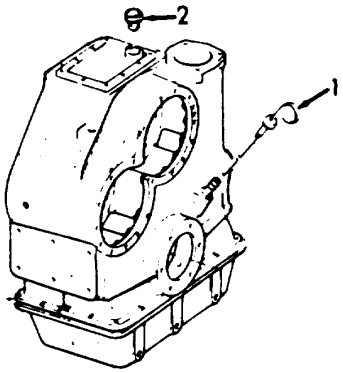
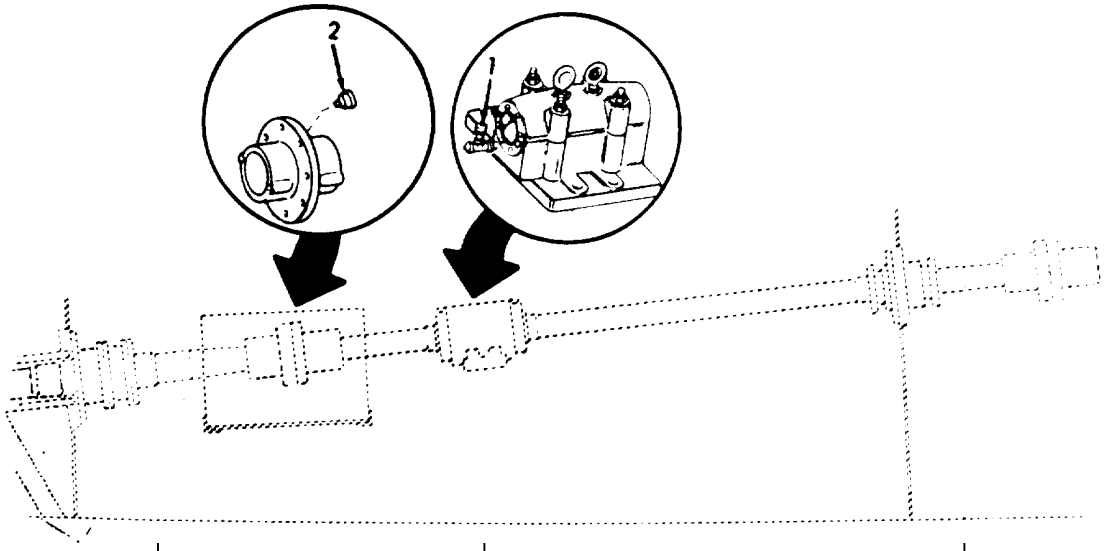
Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
34	AFTER	Engine Room	Check drive belts (90) for wear and proper tension.	Belts cracked or tom.
				
35	AFTER	Engine Room	MARINE DRIVE GEAR OIL LEVEL. With the engine running at idle speed, check the oil level on dipstick (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 If :
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.



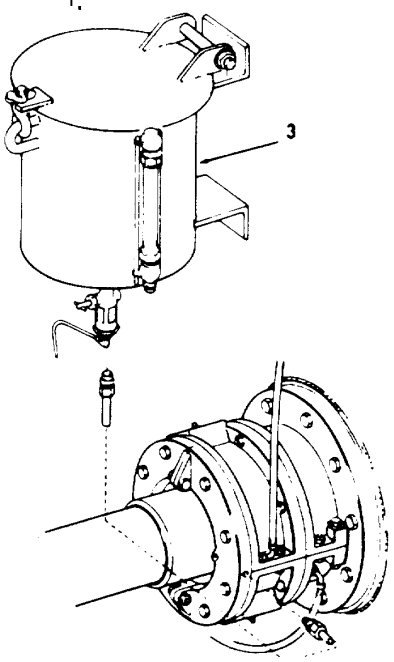


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

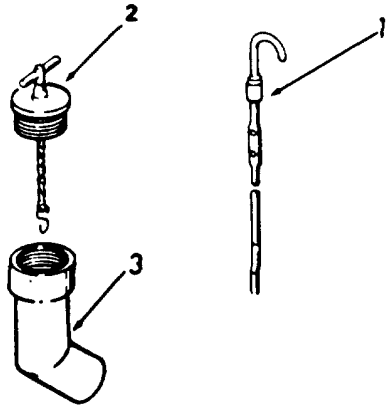
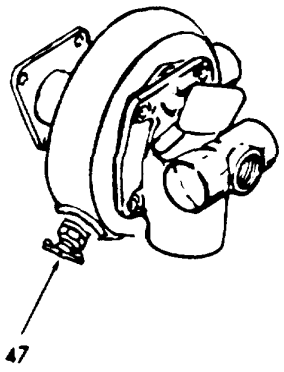
Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
38	AFTER	Engine Room (Generator)	ENGINE OIL. Check the oil level on dipstick (1) before starting the engine. If necessary, add oil by removing oil filler cap (2) from oil filler tube (3) to bring it to the proper level on the dipstick. 	Low oil level.
39	AFTER	Engine Room (Generator)	FRESH WATFR 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

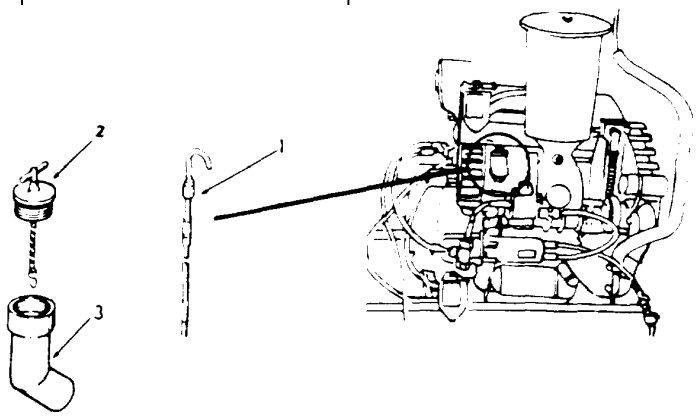
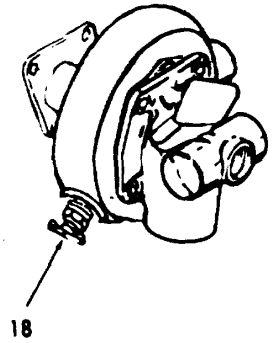
Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
40	AFTER	Anchor Winch Compartment	ENGINE OIL. Check the oil level on dipstick (1) before starting the engine. If necessary, add oil by removing oil breather cap (2) from oil filler tube (3) to bring it to the proper level on the dipstick. Use MIL-L-9000H (SH).	Low oil level.
				
41	AFTER	Anchor Winch Compartment	FRFSH 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). 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

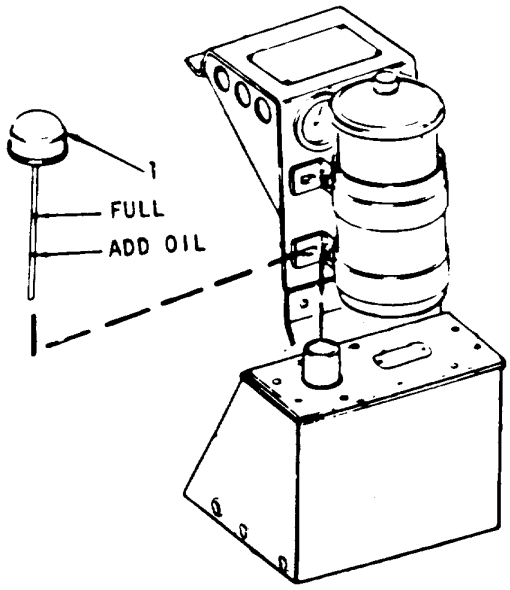
Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
42	AFTER	Anchor Winch Compartment	OIL LEVEL. Remove fluid gage (1) and check oil level. Add oil as required. (MIL-L-9000H (SH)). **CAUTION** **Make sure Anchor Winch Engine is not running.** 	Low oil level.
43	AFTER	Anchor Winch Compartment	LEVEL WIND ASSEMBLY AND GUARD: WORM SHAFT. Lubricate fittings (14) with grease (MILG-24139A (SH)). CARRIAGE GUIDE. Lubricate fittings (16) with grease (MIL-G-24139A (SH)). VERTICAL ROLLERS. Lubricate fittings (17) with grease (MILG-24139A (SH)).	 Any of these gears, shafts, etc., bind or fails to function. Any of these gears, shafts, etc., bind or fails to function. 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 If :
43 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.

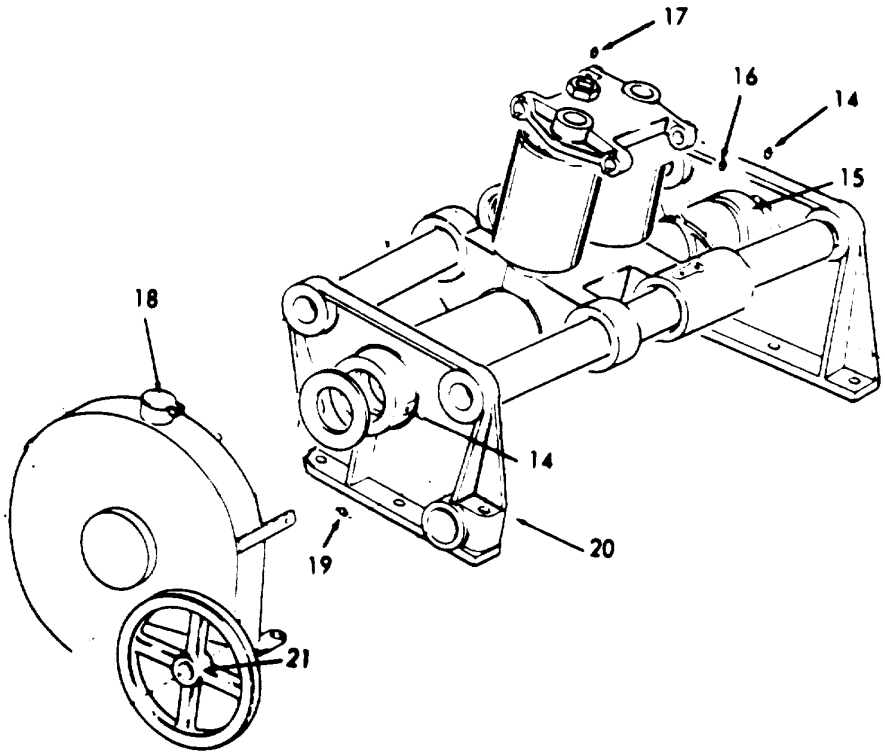


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

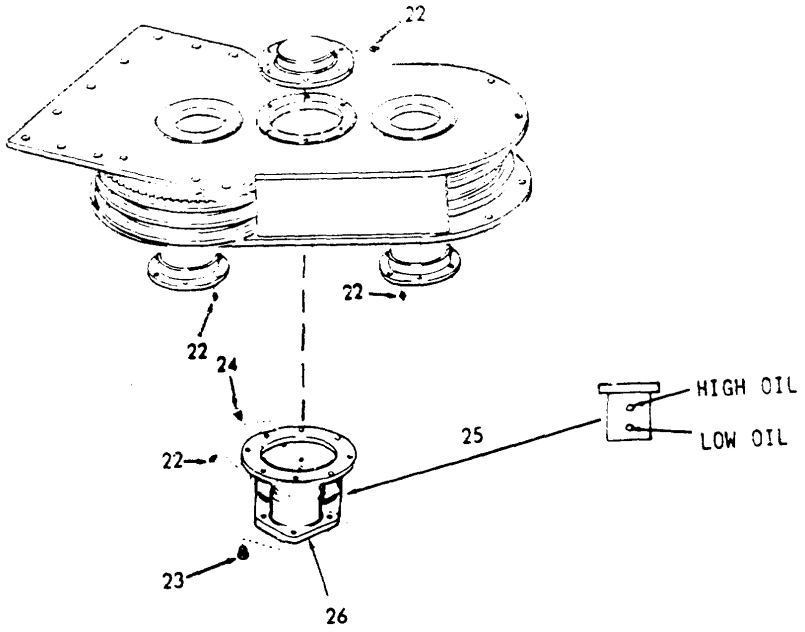
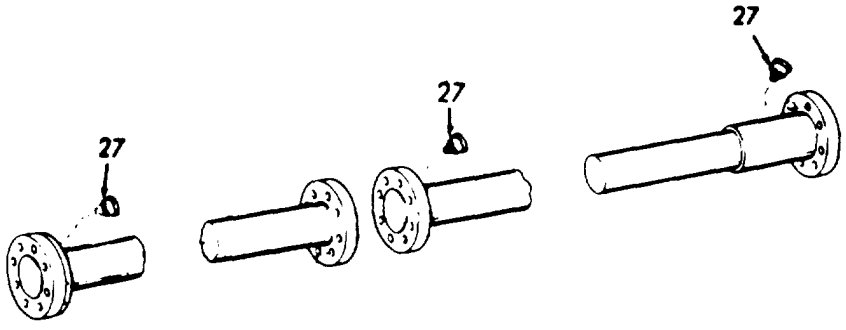
Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
44	AFTER	Anchor Winch Compartment	SLACK PULLER. Lubricate fittings (22) with grease (MIL-G-24139A (SH)).	Any of these gears, shafts, etc., bind or fails to function.
				
45	AFTER	Anchor Winch Compartment	FLANGE FITTINGS. 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

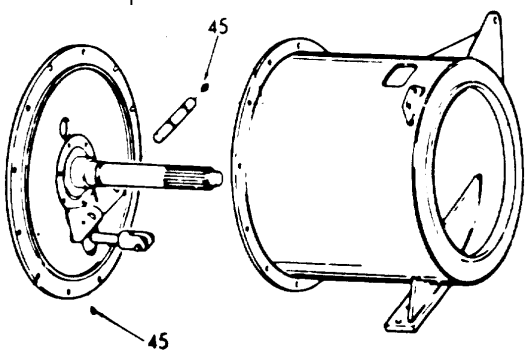
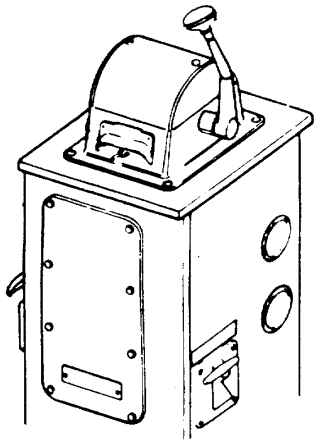
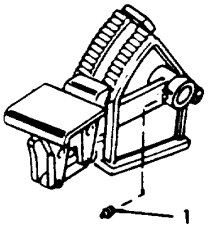
Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
46	AFTER	Anchor Winch Compartment	DISCONNECT CLUTCH. Lubricate fittings (45) with grease (MIL-G-24139A (SH)).	Clutch binds or fails to function.
				
47	AFTER	Vehicle Deck AFT/STBD	ANCHOR WINCH BRAKE CONTROL. Lubricate fittings (1) with grease (MIL-G-18458B (SH)).	Brake binds, is cracked or fails to function.
				
				

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

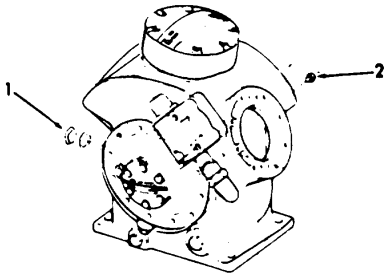
Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
48	AFTER	Air Conditioning	COMPRESSOR UNIT ASSEMBLY CHECK OIL LEVEL. While system is in operation, check oil level in crankcase by checking sight glass (1). Add oil (VV-L-825), whenever the oil level drops below normal, (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.  **NOTE** 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. **NOTE** 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 If :
49	AFTER	Air Conditioning	SIGHT FLOW INDICATOR. Check indicator (4) for the following: Indicator — Condition Solid Column — Normal lack of refrigerant. Liquid Bubbles — See Maintenance.	Low oil level.

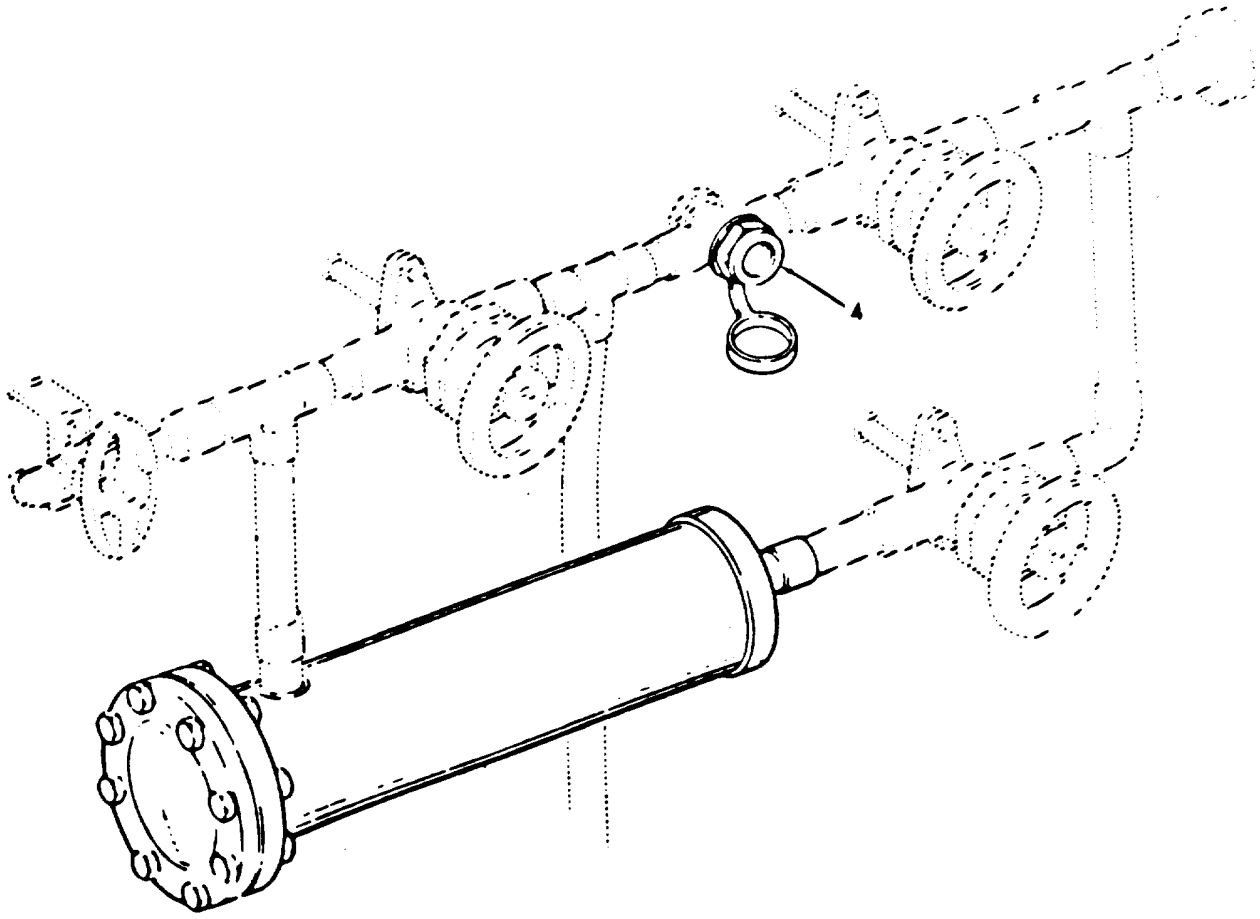


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
50	AFTER	Portable Equipment	AIR COMPRESSOR OIL LEVEL. Remove plug (1). Add oil (MIL-L-9000H (SH)) as needed. **WARNING** **Use eye protection when using compressed air.** DRAIN MOISTURE. Open draincock (2).	Low oil level.

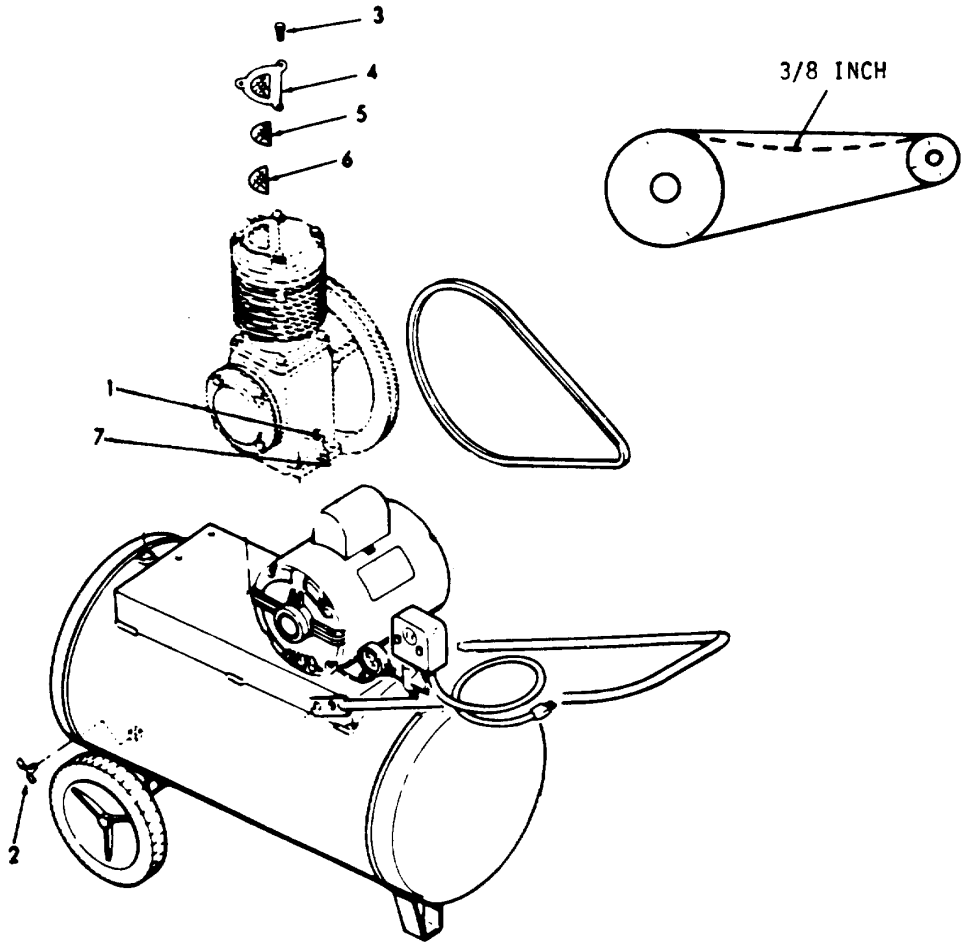


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
51	HOURLY	Engine Room	MAIN ENGINE. ENGINE OIL CHANGE. Pump oil into suitable container through tube (25). **NOTE** Use rotary hand dispensing pump NSN 4930-00-263-9886. **NOTE** Do not drain oil into bilges. Use oil separation system to collect drained oil. FULL - Engine has 34 quarts (32.2 liters) LOW - Engine has 26 quarts (24.6 liters)	*Hourly usage exceeds 250 and/or when oil sample analysis indicates need for action.

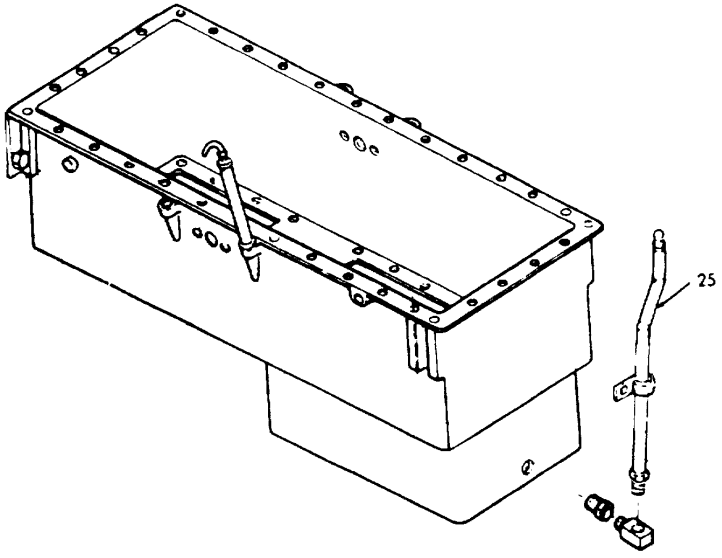


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
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

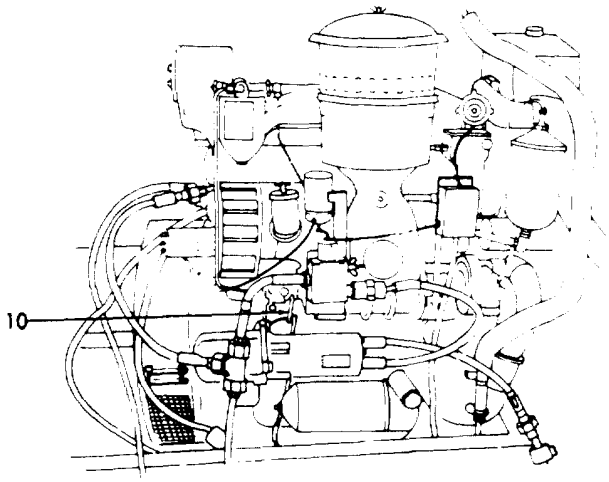
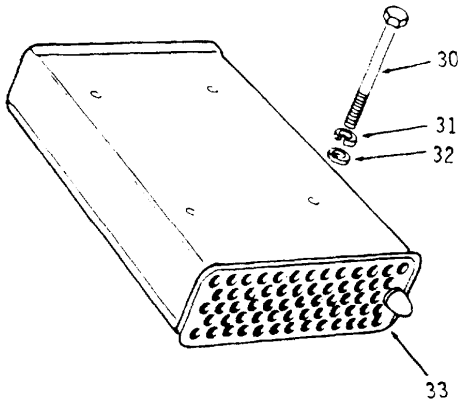
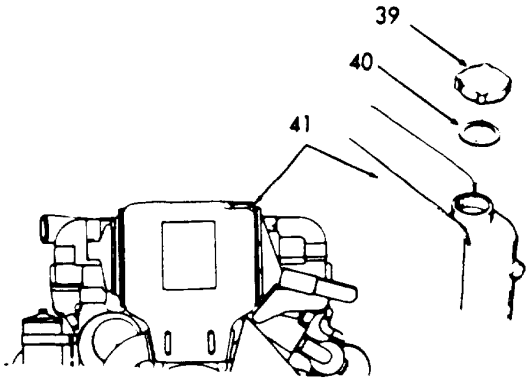
Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
52 Continued				
53	DAILY	Engine Room	SILENCER ASSEMBLY. Remove screws (30), lock washers (31) and washers (32) in order to remove silencer assembly (33) from air inlet housing. Inspect the silencer and if necessary, clean in fuel oil. Dry with compressed air. Reassemble in reverse order. **WARNING** **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 If :
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). **NOTE** Use Antifreeze, Etheyline 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.



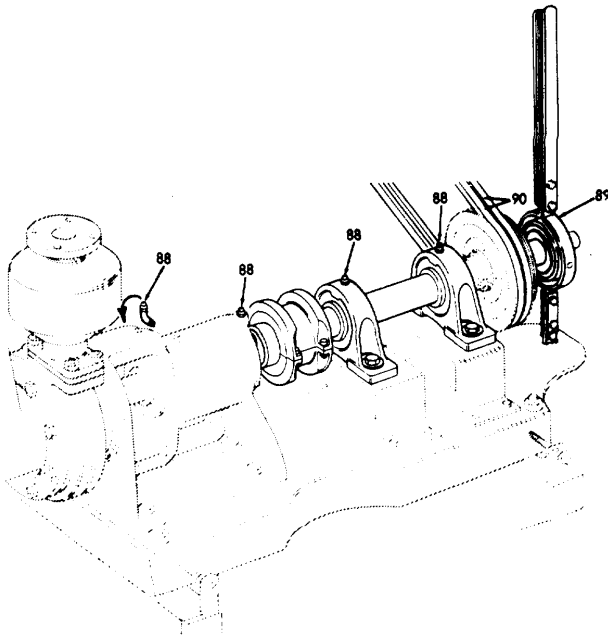
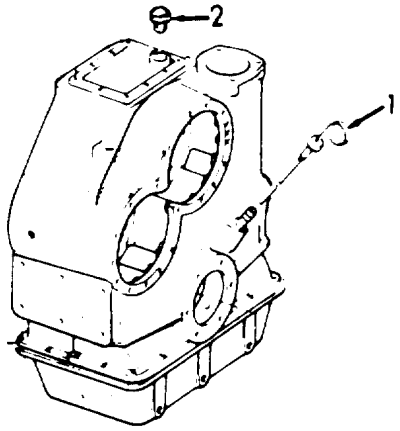


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
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.

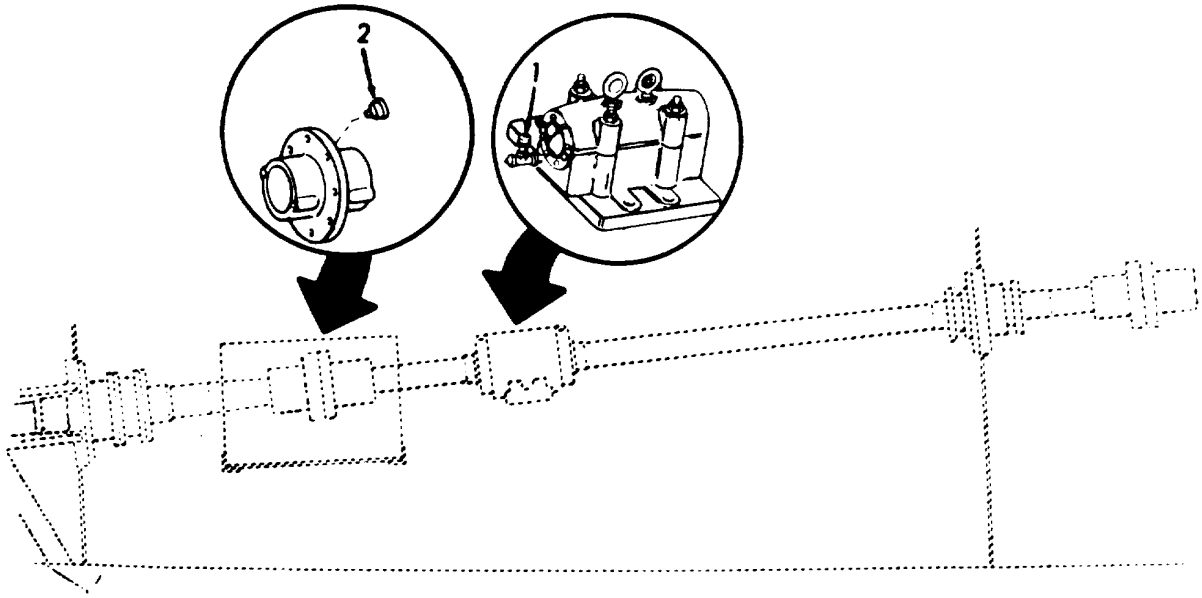


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
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 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.

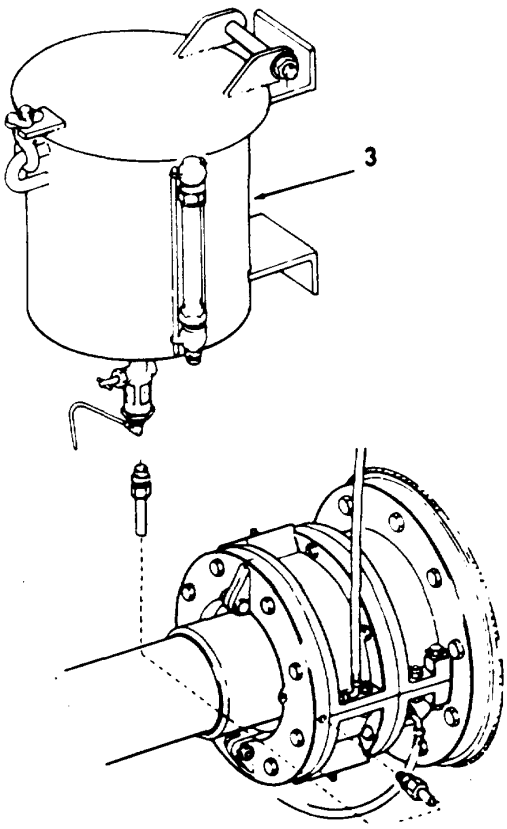


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
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.

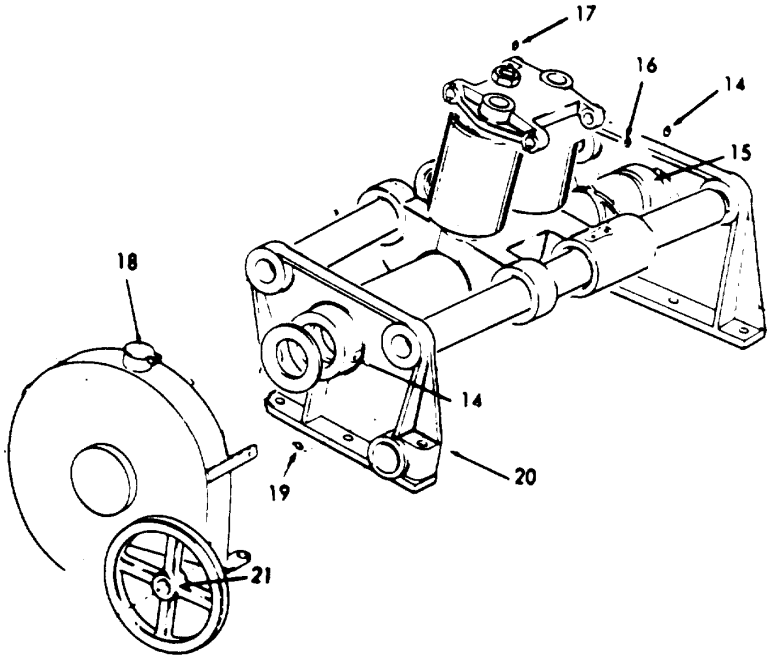


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

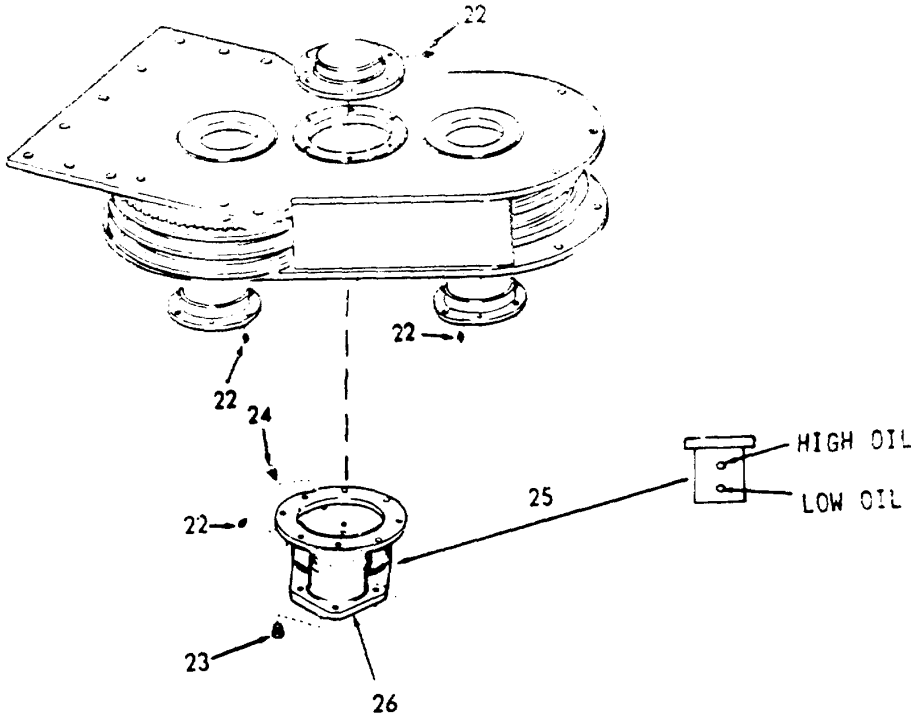
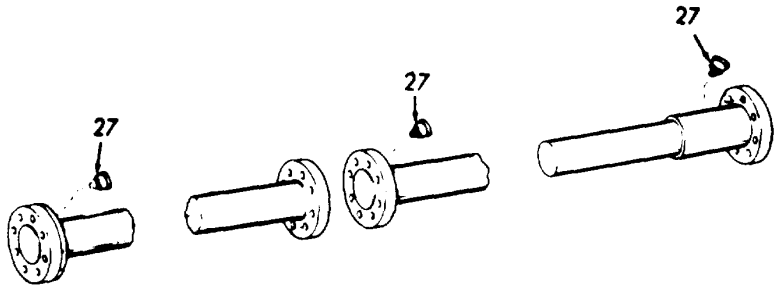
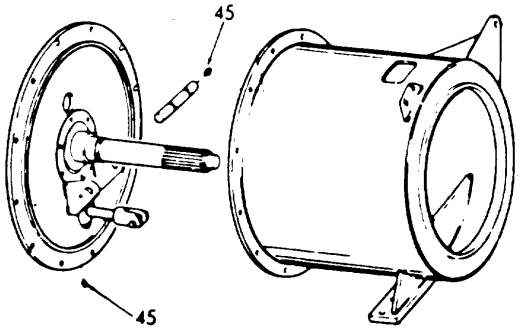
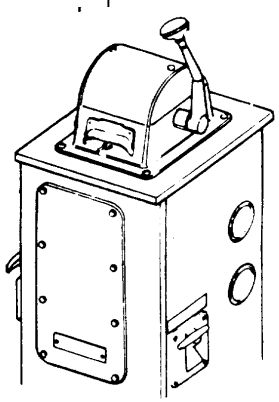
Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
61	DAILY	Anchor Winch Compartment	SLACK PULLER. Lubricate fittings (22) with grease (MIL-G-24139A (SH)).	Bind or fail to function.
				
62	DAILY	Anchor Winch Compartment	FLANGF FITTINGS. Add oil to oil can fittings on 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 If :
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.





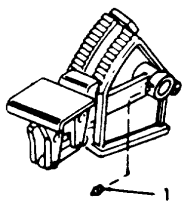


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

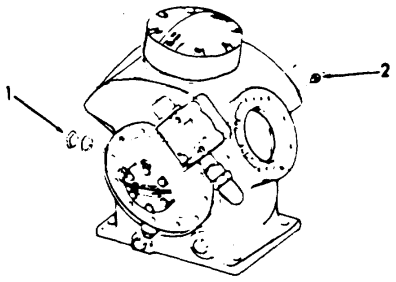
Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
65	DAILY	Air Conditioning Room	COMPRESSOR UNIT ASSEMBLY CHECK OIL LEVEL. While system is in operation, check oil level in crankcase by checking sight glass (1). Add oil (VV-L-825), whenever the oil level drops below 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.  **NOTE** 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 If :
66	DAILY	Air Conditioning Room	SIGHT FLOW INDICATOR. Check indicator (4) for the following: Indicator: Solid Column Liquid Bubbles Condition: Normal lack of refrigerant. See Maintenance.	Low oil level.

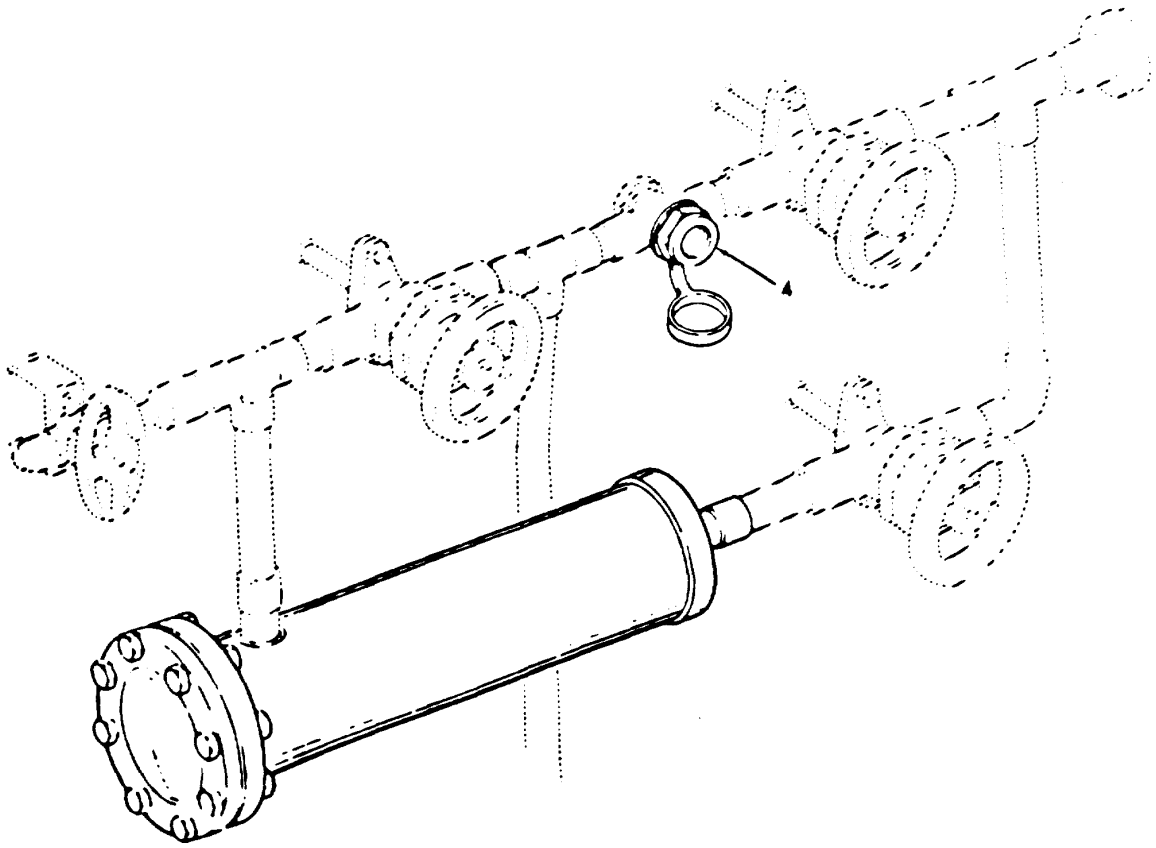


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
67	DAILY	Portable	AIR COMPRESSOR OIL LEVEL. Remove plug (1). Add oil (MIL-L-9000H (SH)) as needed.	Low oil level.

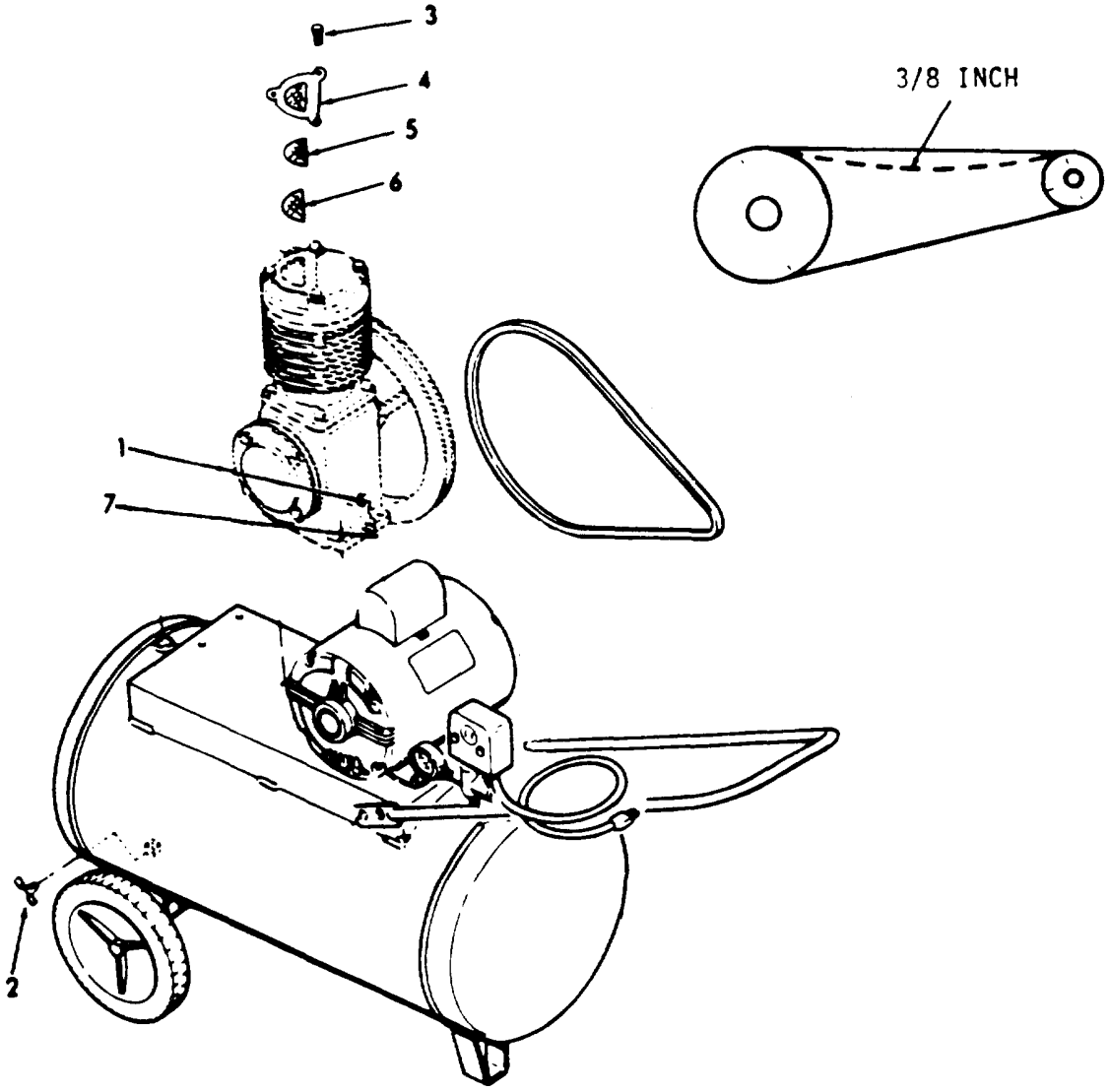


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

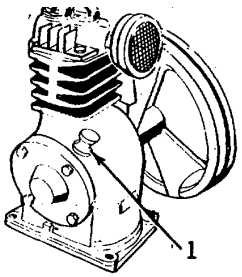
Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
68	DAILY	Equipment General	AIR HORN AIR COMPRESSOR **WARNING** **Disconnect power to compressor motor before performing any maintenance on compressor.** OIL LEVEL. Remove bayonet stick oil gauge (1). Add oil (MIL-L-9000H (SH)) as needed. The oil level must be maintained between the two marks on the gage. **CAUTION** **NEVER allow oil level to fall below lower mark on stick oil gage.** **WARNING** **Use eye protection when using compressed air.**  	

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

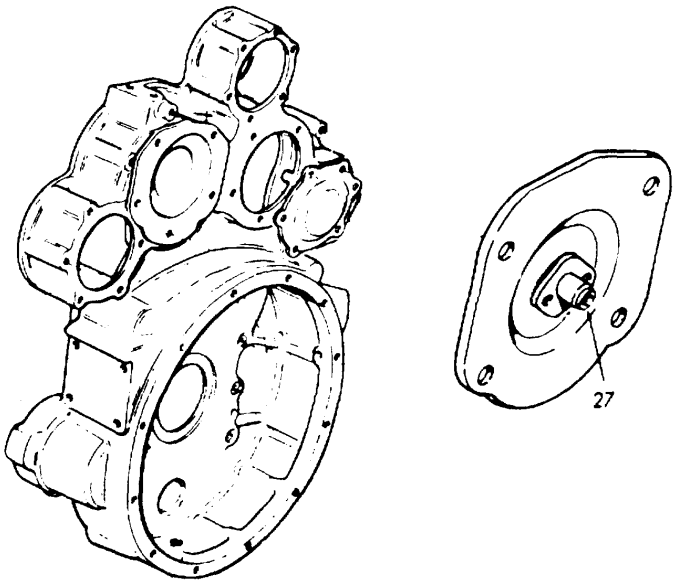
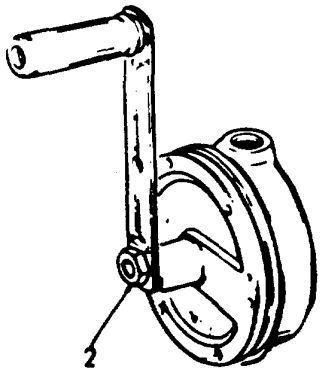
Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
69	WEEKLY	Engine Room	TACHOMETER DRIVE. Lubricate the tachometer drive (27) with grease (MIL-G-24139A (SH)).	Fails to function.
				
70	WEEKLY	Engine Room FR 51	LUBE OIL TRANSFER PUMP. Operate pump for internal lubrication.	Fails to function.
				
			Add oil to shaft (2). Use 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 If :
71	WEEKLY	Bow/Main Deck	BOW RAMP and FAIRLEAD. Lubricate four fittings (1 and 2) with grease, (MIL-G-24139A (SH)).	
			Lubricate ramp hinges (3) (10 places) with grease (MIL-G-24139A (SH)). Lubricate dog bolt threads (4) with grease (MIL-G-24139A (SH)).	Broken.
			Lubricate cable (5) with grease (MIL-G-18458B (SH)).	Frayed or broken.

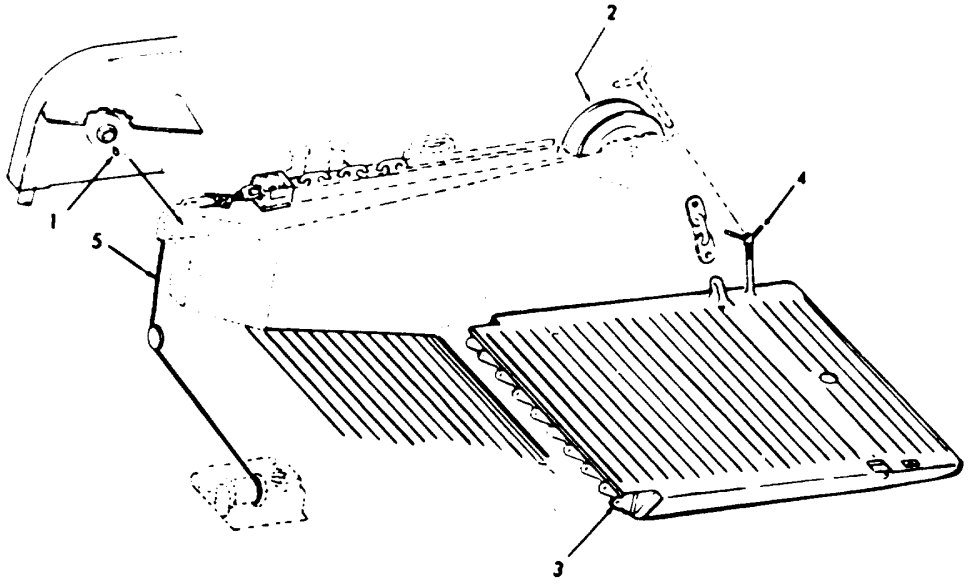


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
72	WEEKLY	Bow Ramp Winch	Lubricate lower Fairlead Sheath (10) with grease (MIL-G-24139A (SH)).	Broken.
73	WEEKLY	Bow Ramp Winch	Lubricate cables (13) with grease (MIL-G-24139A (SH)).	Frayed or broken.

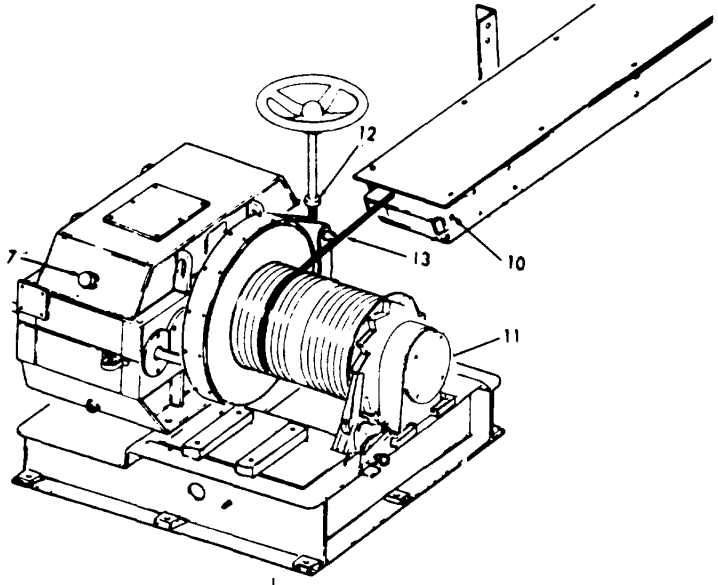


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

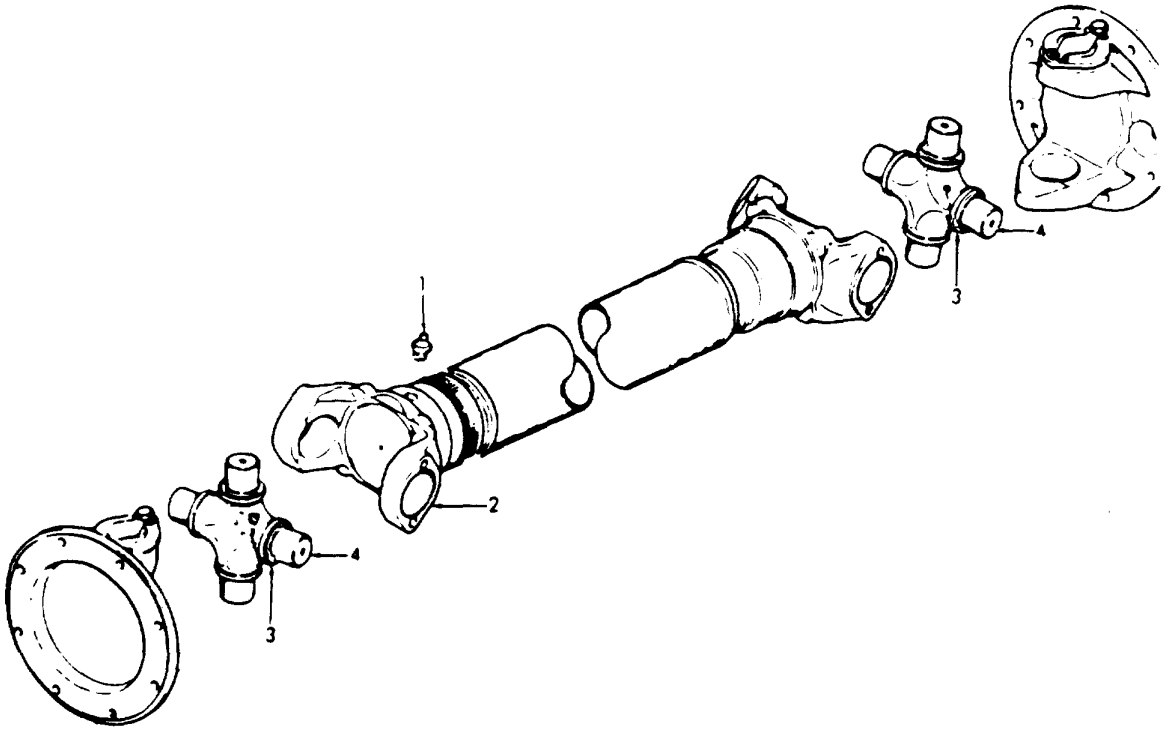
Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
74	WEEKLY	Anchor Winch Compartment	UNIVERSAL JOINT ASSEMBLY Lubricate fitting (1) on yoke assembly (2) with grease (MIL-G-24139A (SH)). Lubricate fittings (3) on cross (4) with grease (MIL-G-24139A (SH)).	Broken.
				
75	WEEKLY	Anchor Winch Compartment	LEVEL WIND ASSEMBLY AND GUARD. Lubricate worm shaft (15) with grease (MIL-G-24139A (SH)).	Any of these gears, shafts, etc., bind or fail to function. 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 If :
76	WEEKLY	Anchor Winch Compartment	FAIRLEAD GEAR. Lift cover(18) and pour oil on gear while winch is running. (MIL-L-9000H (SH)). **WARNING** 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.

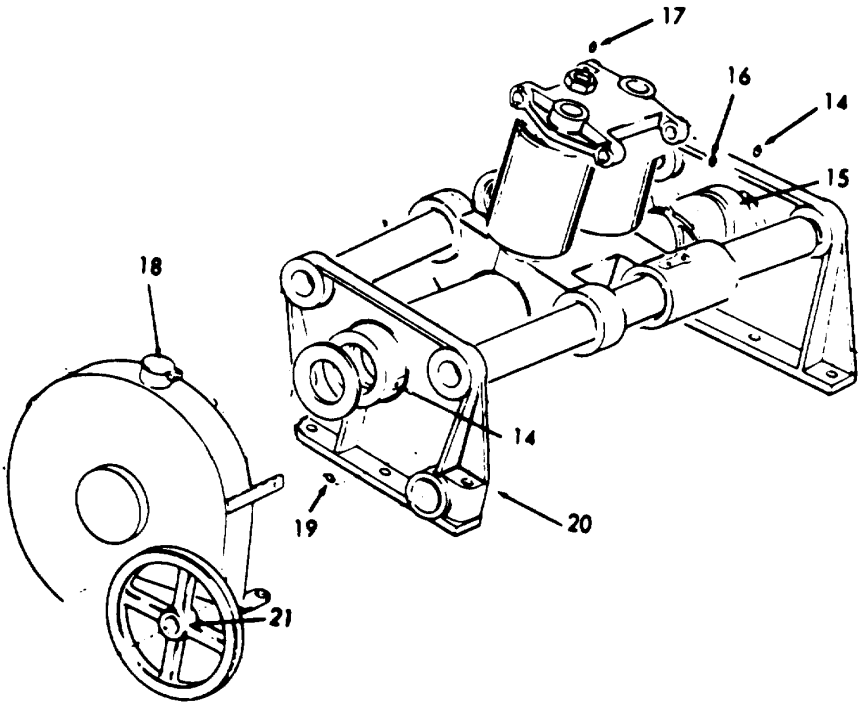


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

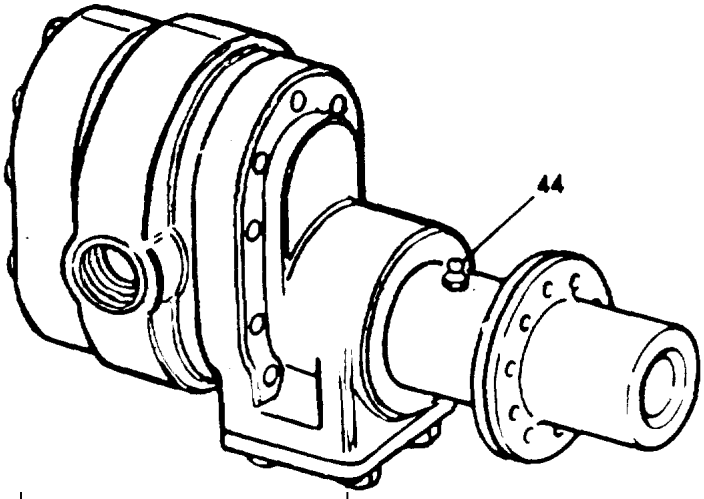
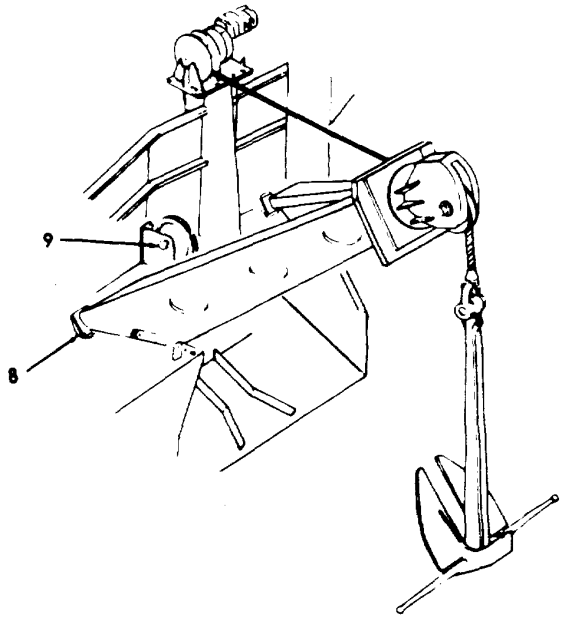
Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
78	WEEKLY	Anchor Winch Compartment	HYDRAULIC PUMP DRIVE COUPLINGS. Lubricate fitting (44) with grease (MIL-G-24139A (SH)).	Binds or tails to function.
				
79	WEEKLY	Vehicle Deck AFT/STBD	"A" FRAME HINGE PIN. Lubricate pin (8) with grease (MIL-G-18458B (SH)).	Worn to excess or binding.
80	WEEKLY	Vehicle Deck AFTISTBD	"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

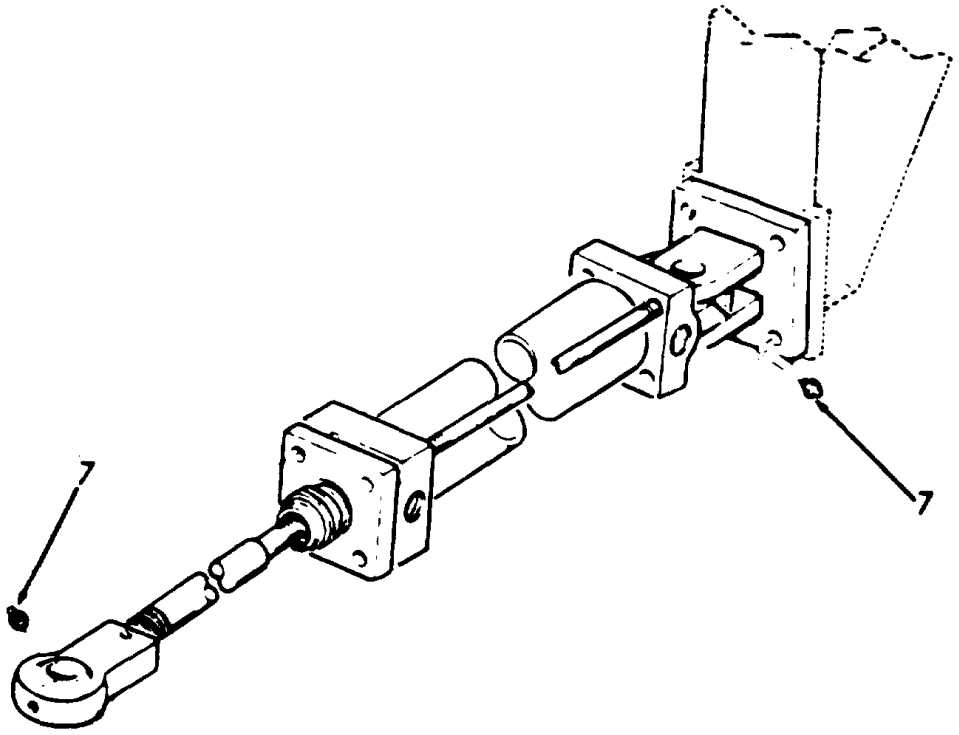
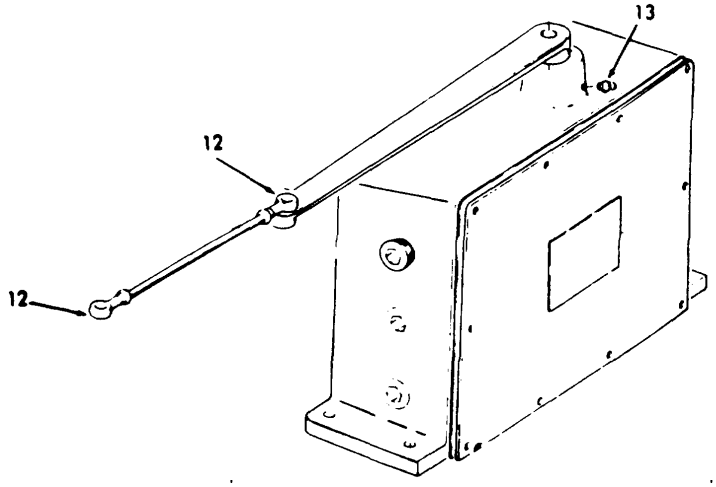
Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
81	WEEKLY	AFT/FR 70-72	STEERING HYDRAULIC CYLINDER. Lubricate fittings on four cylinders at fittings (7). Use grease (MIL-G-24139A (SH)).	Worn or leaking.
				
82	WEEKLY	AFT/FR 72-75	RUDDER REPEATBACK TRANSMITTER. Lubricate 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

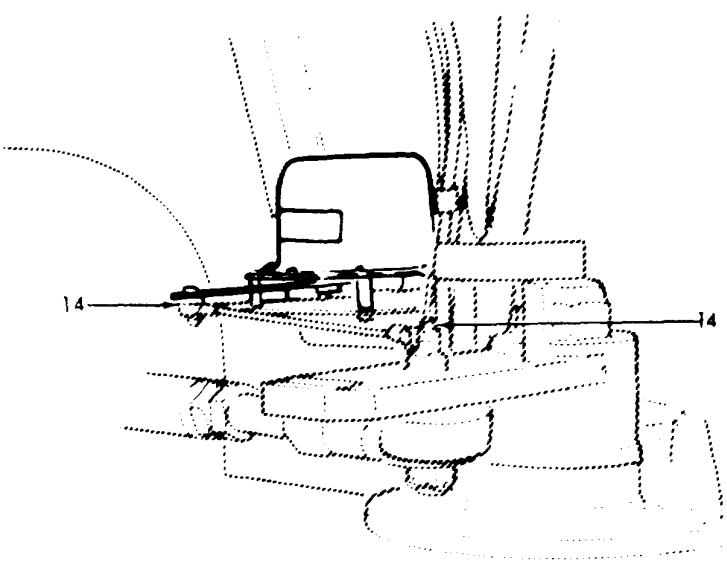
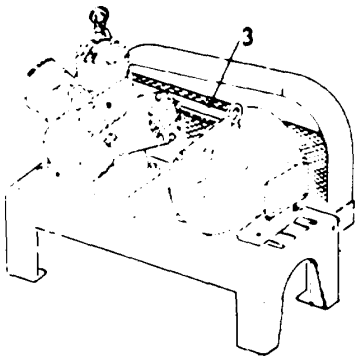
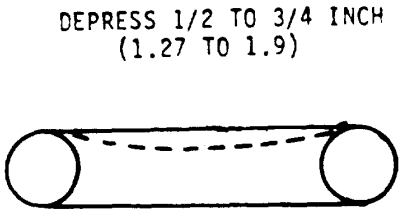
Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
83	WEEKLY	AFT	RUDDER LIMIT SWITCH. Lubricate ball joints (14) with a few drops of oil (MIL-L-9000H (SH)).	Fails to function.
				
84	WEEKLY	Equipment and Repair	COMPRESSOR UNIT ASSEMBLY. **NOTE** The compressor holds 5 1/2 pts. of oil. DRIVE BELTS. Check drive belts (3) for 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 If :
85	WEEKLY	Air Conditioning Room	LEAK TESTS GENERAL. Test all joints, valves, and components for leaks using an electronic leak detector. **NOTE** Ventilate the compartment prior to leak testing. Test sensitivity is lowered if large quantities of refrigerant are present in the air. **NOTE** If the system is loosing refrigerant and a piping leak cannot be detected, test the condenser.	Leaking.
			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.	Leaks detected.

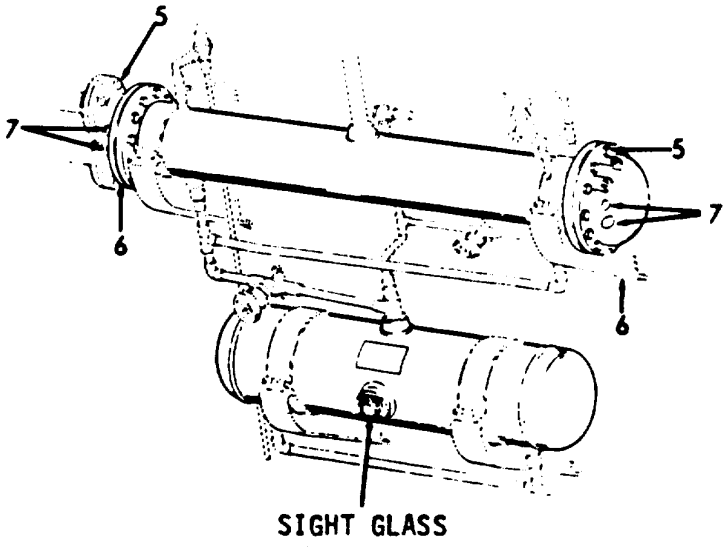


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No.	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
86	WEEKLY	Portable	AIR COMPRESSOR **WARNING** **Use eye protection when using compressed air.** DRAIN MOISTURE. Open draincock (2). AIR INTAKE FILTER. Remove screw (3), and filter 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)). DRIVE BELT. Check for wear. Check tension. A 3/8 inch play is allowed. Tighten if required.	Filter plugged. Cracked, worn or improper tension.

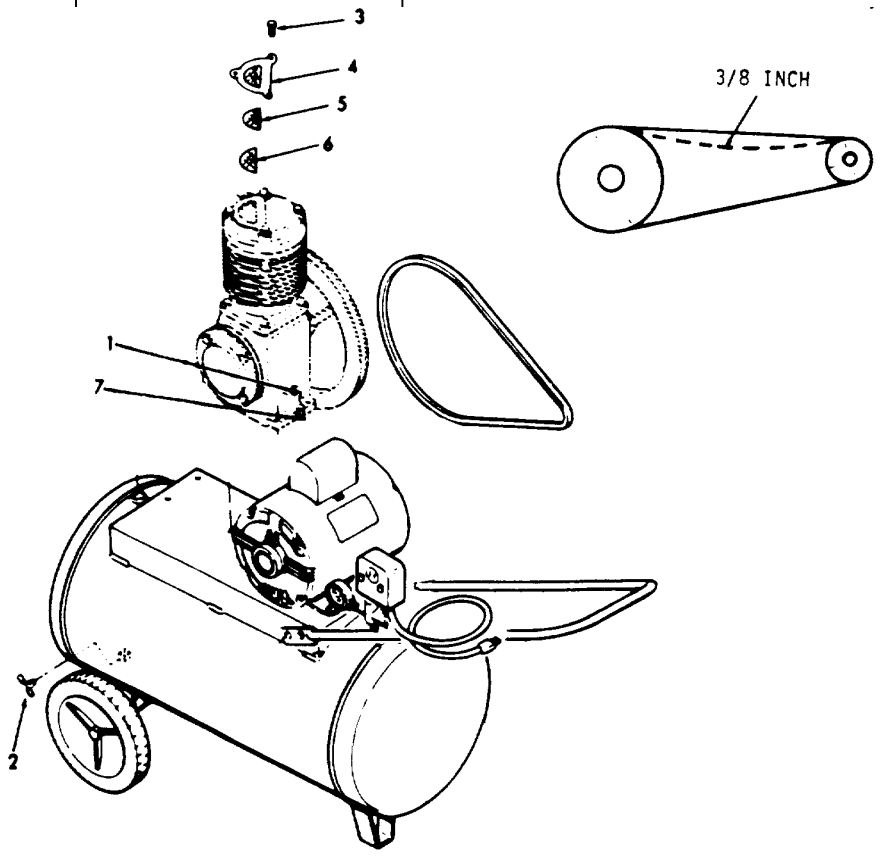


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

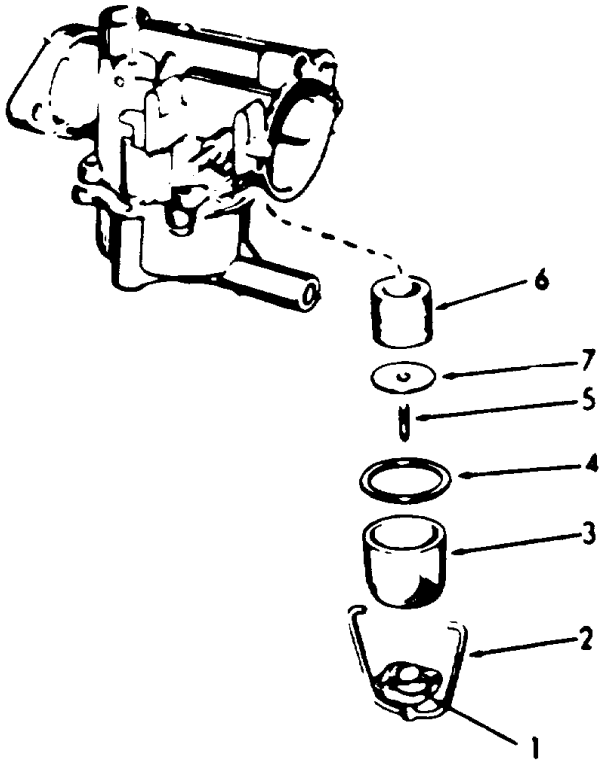
Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
87	WEEKLY	Portable	FIRE PUMP FUEL BOWL. Loosen fingernut (1). Swing bracket (2) out of way. Remove bowl (3). **WARNING** **Do not smoke or have an open flame when handling gasoline.** Remove filter nut (4) from stud (5). Remove filter (6). Clean filter (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).  	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 If :
88	WEEKLY	Main Deck	"A" FRAME HINGE PIN. Lubricate pin (8) with grease (MIL-G-1 8458B (SH)). "A" FRAME GUIDE SHEATH. Lubricate guide sheath (9) with grease (MIL-G-18458B (SH)).	Fails to function. Fails to function.

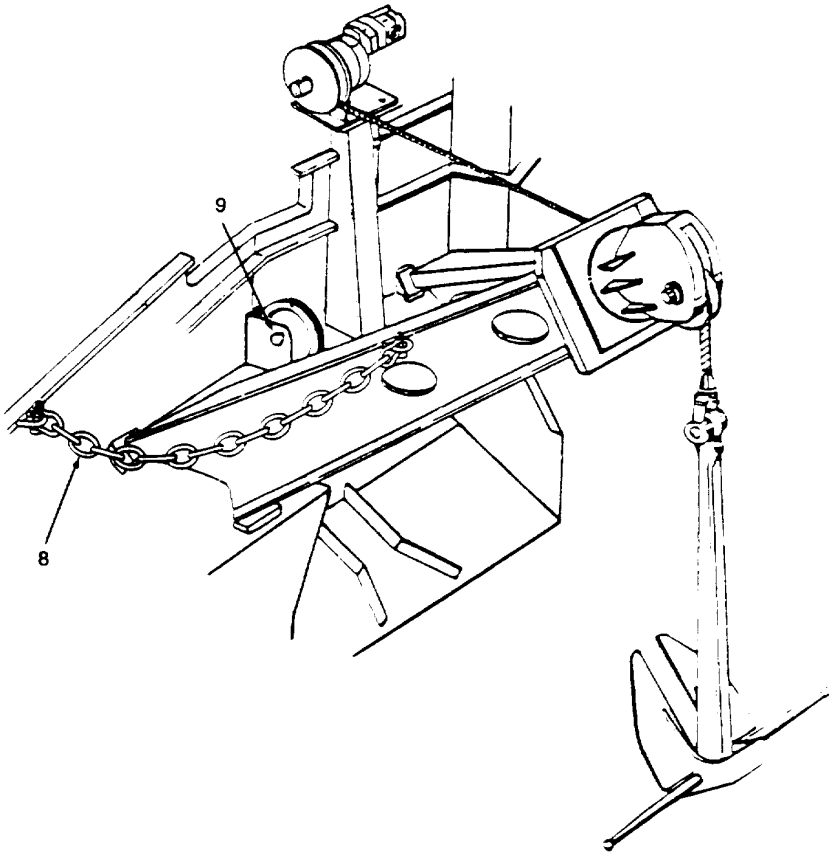


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
89	WEEKLY	Equipment General	AIR HORN COMPRESSOR DRIVE BELT. Check for wear and cracks. Check tension. A 3/8 inch play is allowed. Tighten if required. Tension on V-belt is adjusted by loosening the four bolts which hold the motor to the base. Slotted bolt holes are provided for this purpose. **CAUTION** 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. **CAUTION** 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 elements 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 filter (23) and gasket (24). **NOTE** 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 If :
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).	

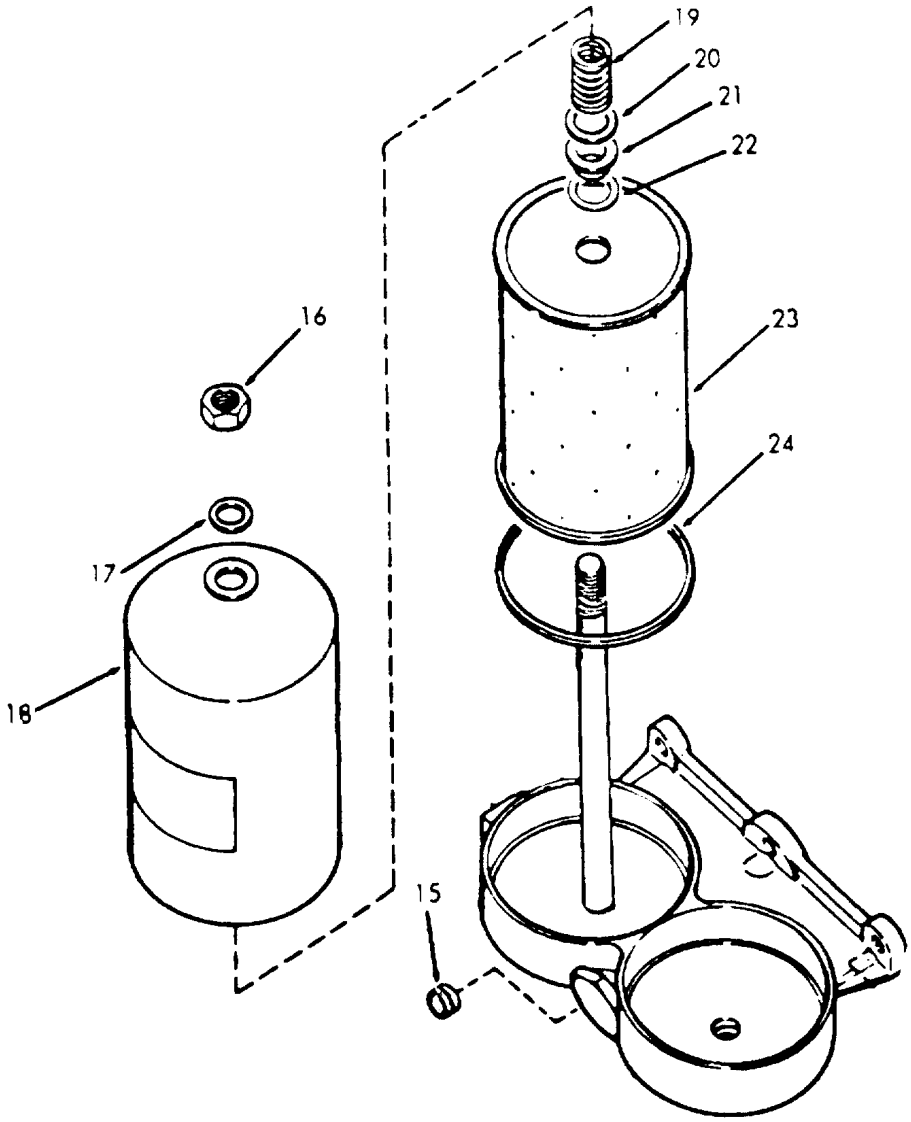


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

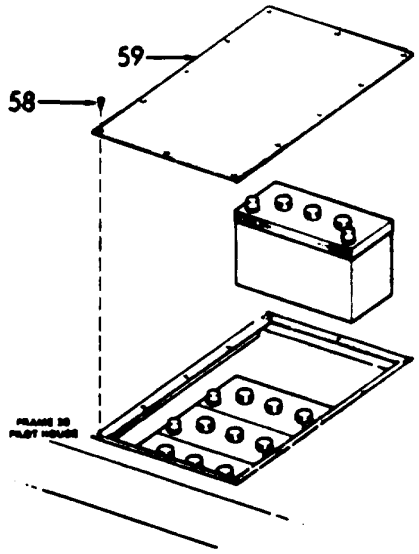
Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
91	BI-WEEKLY	Engine Room	BATTERY. Check the specific gravity of the electrolytes in the batteries. In the Pilothouse, remove 12 screws (58) and cover plate (59). Replace cover (59) after completion of servicing. **WARNING** **Battery acids are dangerous. Do not get acids on skin or in eyes. Get medical help immediately if you do.**  Inspect batteries, cables and battery terminals. Remove battery damps from terminals and dean, using battery cleaning brush. Replace battery cables after servicing.	Battery electrolyte low; or specific gravity reading lower than 1.220. Battery electrolyte low; or specific gravity reading lower than 1.220.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

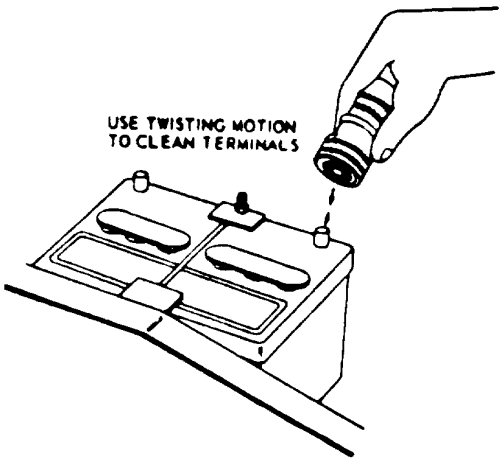
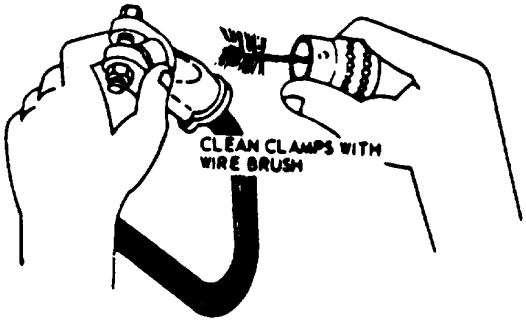
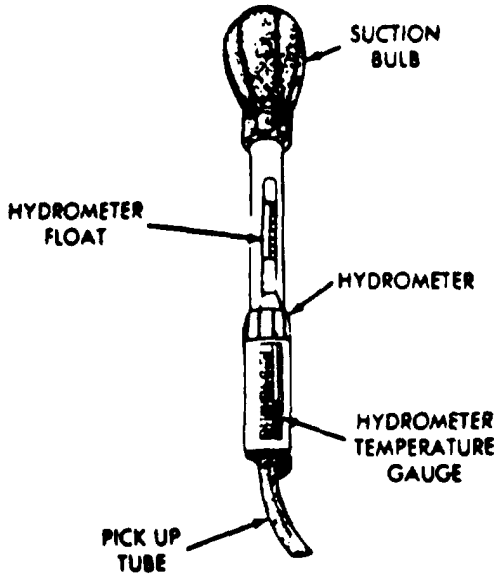
Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
91 Continued			  **NOTE** Apply a light coating of grease to terminals after cleaning. To check electrolyte in batteries, remove battery caps. Liquid level should be at bottom of each vent hole. Add mineral free water 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 If :
91 Continued			Check specific gravity 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. **<u>WARNING</u>** **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. 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.



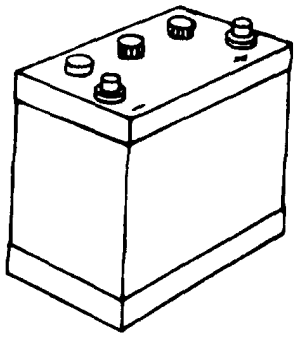
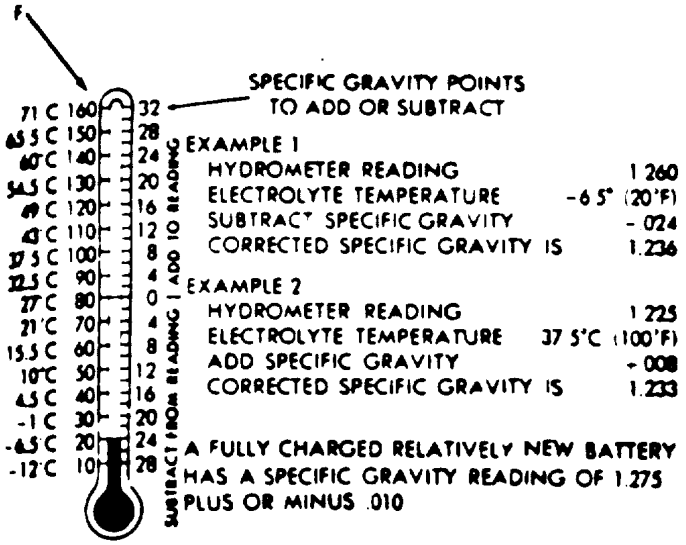


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
91 Continued			**CAUTION** **Do not get baking soda solution in battery cells, as it will damage battery.** **NOTE** 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 If :
92	BI-WEEKLY	Main Deck/AFT	STERN GATE. Lubricate hinges (1) with grease (MIL-G-24139A (SH)).	Broken.
			STERN GATE DAVITS. Lubricate davits (2) with grease (MIL-G-24139A (SH)).	Broken.

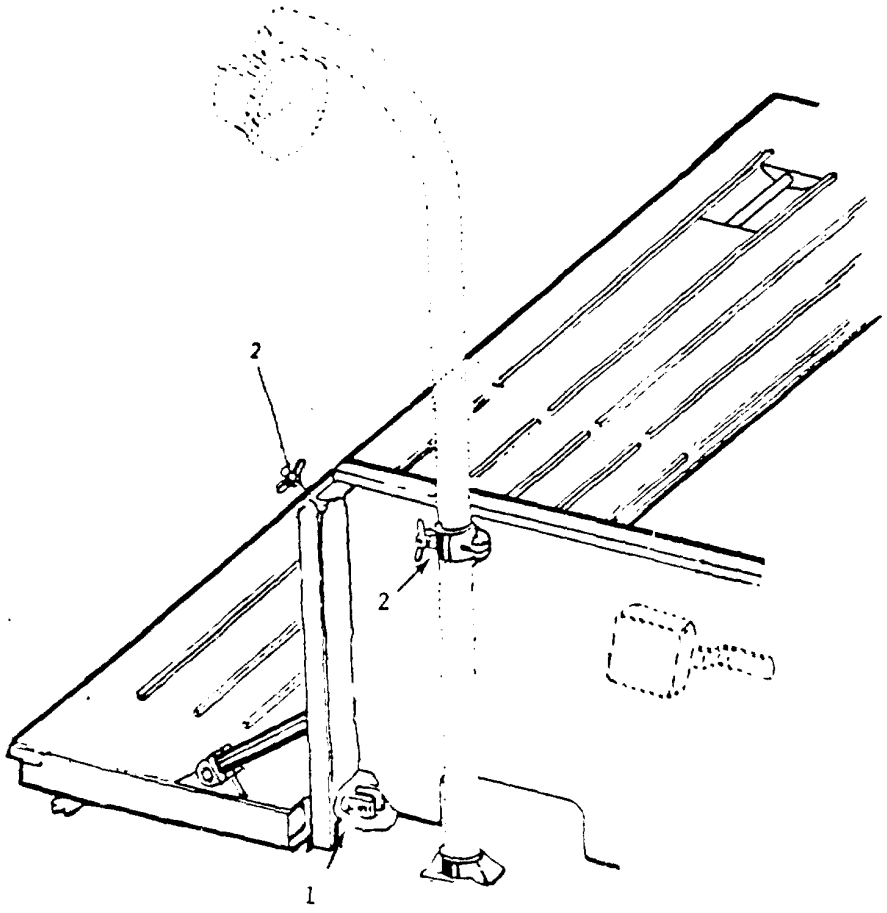


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

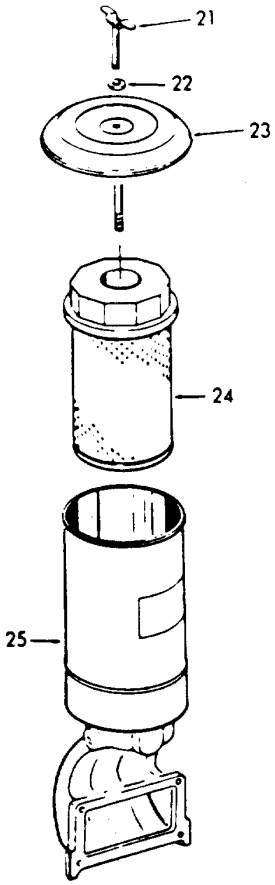
Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
93	BI-WEEKLY	Anchor Winch Compartment	AIR CLEANER. Loosen wingnut (21). Remove washer (22) and cover (23). Remove air cleaner element (24) from air cleaner body (25). Inspect for thin spots, pin holes, or ruptures. Replace if damaged. Clean air cleaner element (24) with compressed air. **WARNING** **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. Cleaner obstructed.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
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. **NOTE** Do not drain oil into bilges. Use oil separation/recovery system to collect drained oil. Remove oil filter stud and shell (27). Remove filter (28) and gasket (29). Install a new filter (28) and gasket (29). Replace shell and tighten stud (27). Replace pipe plug (26). Add engine oil (MIL-L-9000H (SH)) to oil fill as required. **NOTE** Wipe excess oil from filter shell and recover.	Filter bypass obstructed. Filter bypass obstructed.

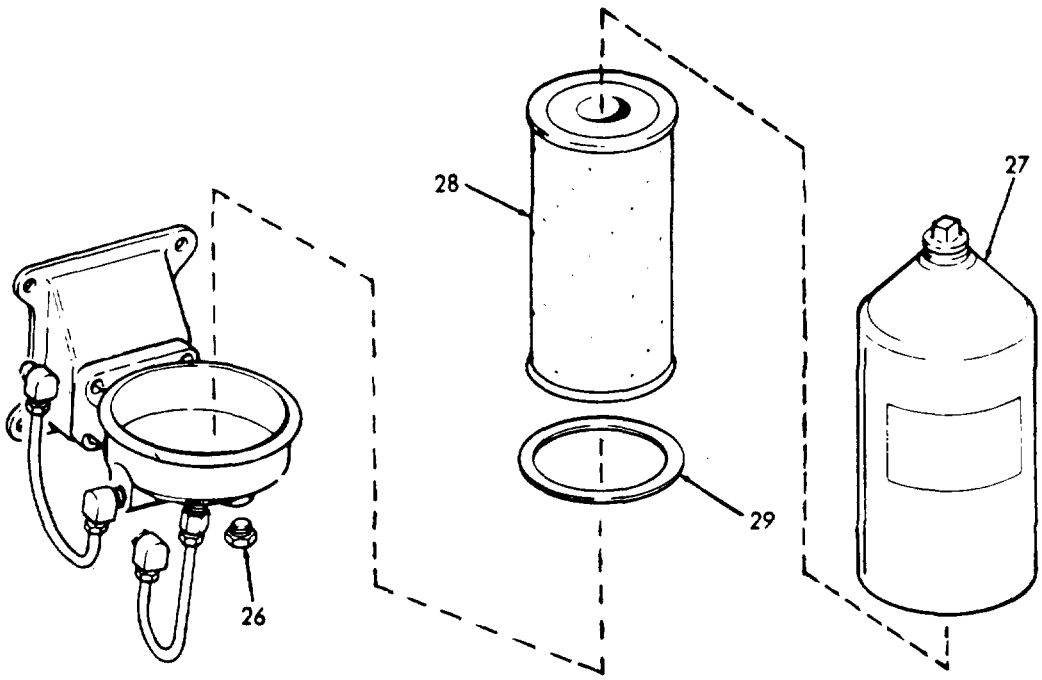


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
95	BI-WEEKLY	Vehicle Deck AFT/STBD	ENGINE CLUTCH AND THROTTLE 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)). Oil the throttle joint (5) with 2 to 4 drops of oil (MIL-L-9000H (SH)). Clutch quadrant cam (6) requires application of grease (MIL-G-24139A (SH)). Reinstall cover (3) and replace screws (2).	Clutch and/or throttle bind or fail to function. Clutch and/or throttle bind or fail to function.

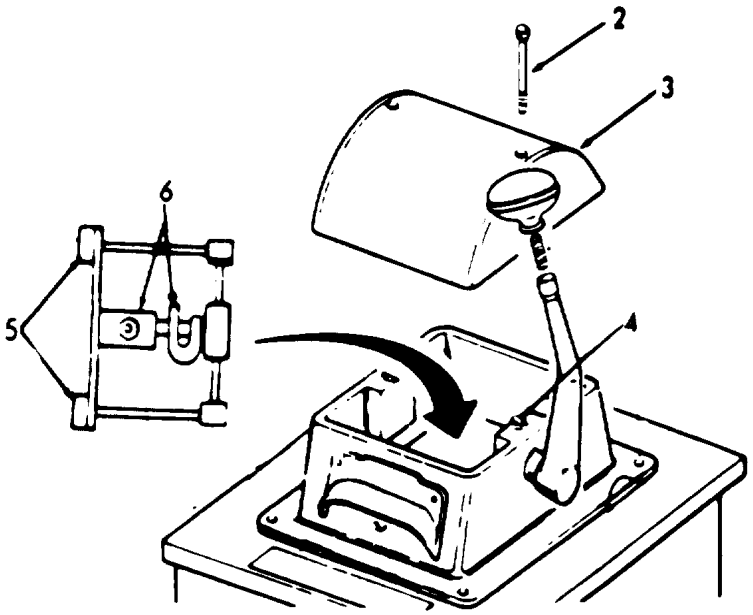


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

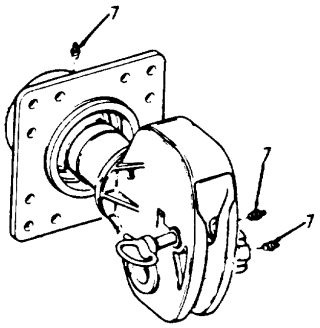
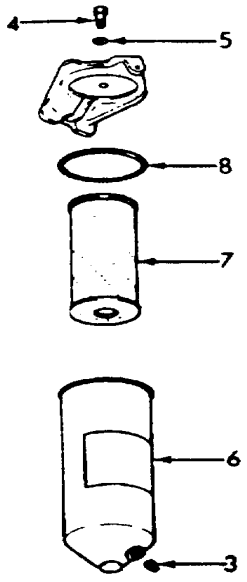
Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
96	BI-WEEKLY	Vehicle Deck AFT/STBD	ANCHOR A-FRAME FAIRLEADER. Lubricate grease fittings (7) with grease (MIL-G-18458B (SH)). 	Fails to function.
97	MONTHLY	Engine Room	FUEL FILTER. Replace monthly or when plugging is indicated. 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

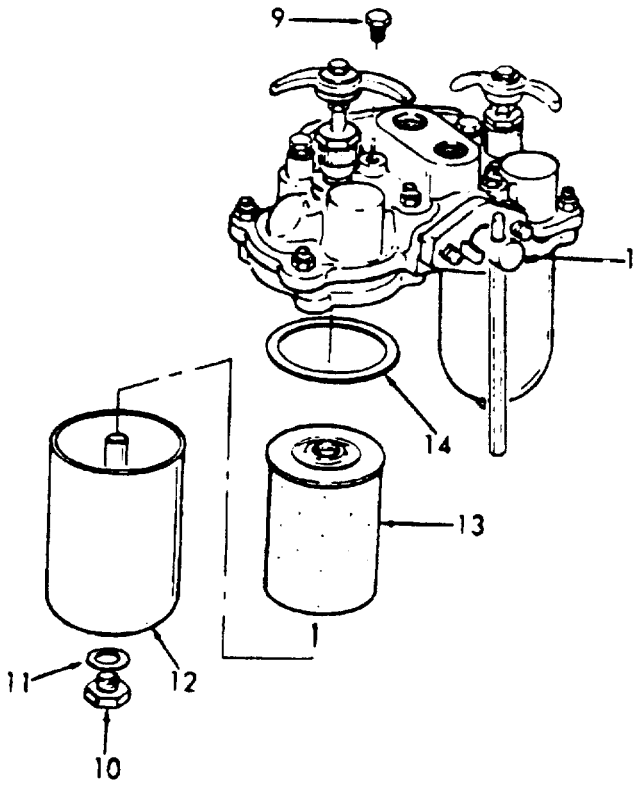
Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
98	MONTHLY	Engine Room	FUEL STRAINER. Install new elements monthly or when plugging is indicated. Remove vent plug (9). Remove screw (10) and washer (11) and drain contents into a suitable container. Remove shell (12), strainer (13), and gasket (14). Install new strainer (13) and gasket (14). Replace shell (12), washer (11), screw (10) and plug (9). **NOTE** Valve (15) can be rotated to select either the right or left strainer. **NOTE** 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

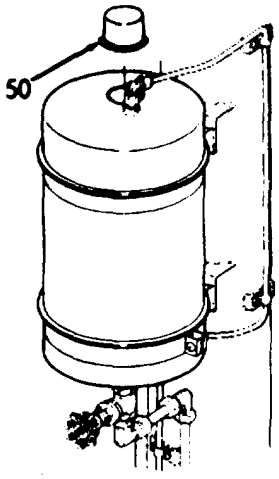
Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
99	MONTHLY	Engine Room	HYDROSTARTER RESERVOIR. Remove breather cap (50) and clean with compressed air. Check fluid level in sight gage and fill as required. **NOTE** Use Mineral Oil, MIL-L-17672, Type 2135TH. **WARNING** Use eye protection when using compressed air.  	Low fluid level.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

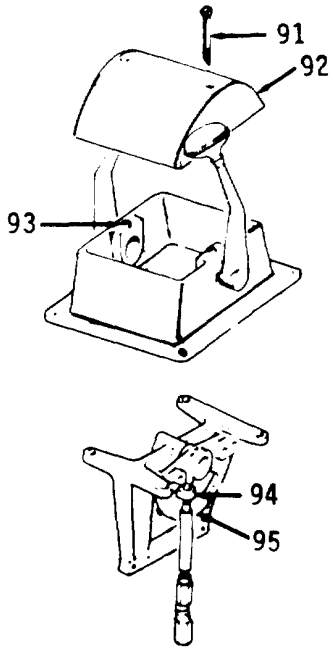
Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
100	MONTHLY	Engine Room	POSITROL STATION. Remove cover screws (91) from central station cover (92). Place a few drops of oil (MIL-L-9000H (SH)) in the cover screw holes (93) to lubricate handle bearings. Lubricate three cable swivel joints (94) with 2 to 4 drops of oil, (MIL-L-9000H (SH)). Lubricate clutch cam (95) with grease (MIL-G-24139A (SH)). 	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 is correct if finger touches oil. Add oil (MIL-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 If :
102	MONTHLY	Engine Room	OIL FILTER. Drain oil from filter by removing drain plug (11). Drain into a suitable container.	Filter obstructed.
			NOTE Do not drain oil into bilges. Use oil separation and recovery system to collect drained oil.	
			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).	Filter obstructed.
			Reinstall plug (11) and dipstick.	
			NOTE 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.	

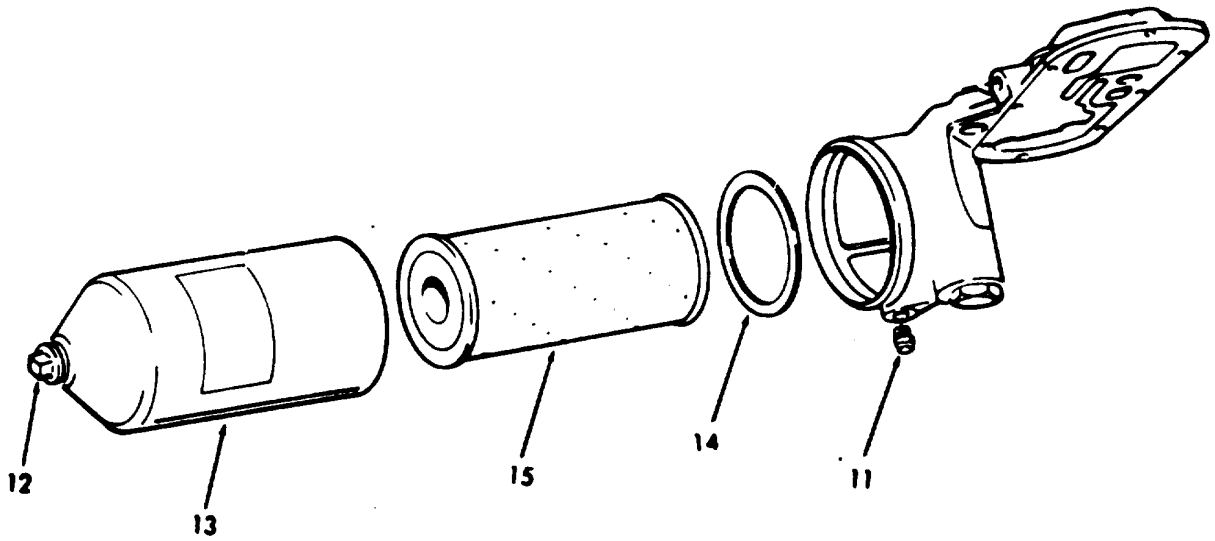


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

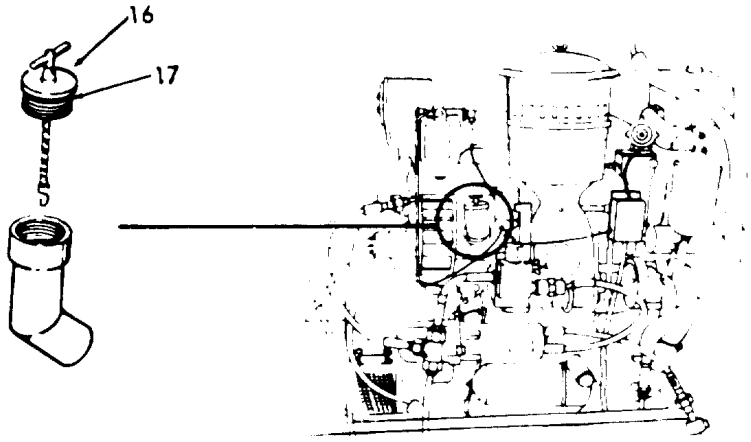
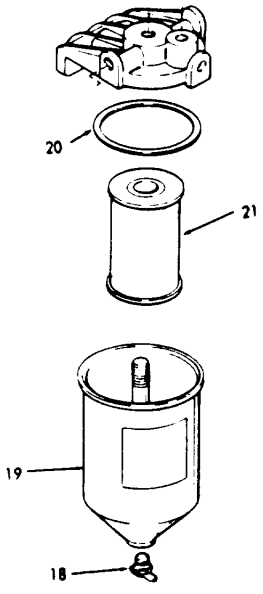
Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
103	MONTHLY	Engine Room	OIL BREATHER CAP. Remove oil breather cap (16). Clean with engine oil (MIL-L-9000H (SH)). Replace gasket (17) if necessary. Reinstall oil breather cap (16).	Air flow obstructed.
				
104	MONTHLY	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

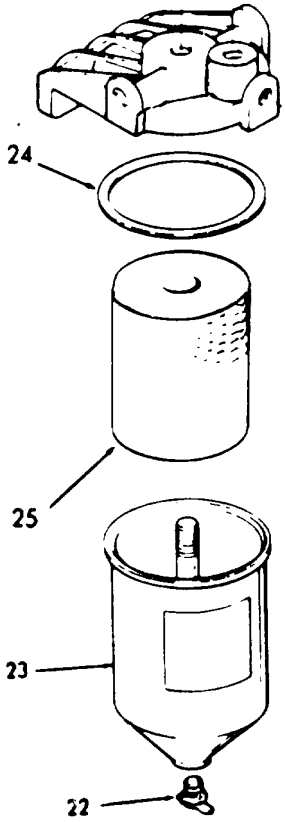
Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
105	MONTHLY	Engine Room	FUEL STRAINER. Drain fuel from filter by opening draincock (22). Remove spin-off shell (23), gasket (24) and strainer (25). Install a new strainer (25) and gasket (24). Replace spin-off shell (23) and dose draincock (22). 	Strainer obstructed.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

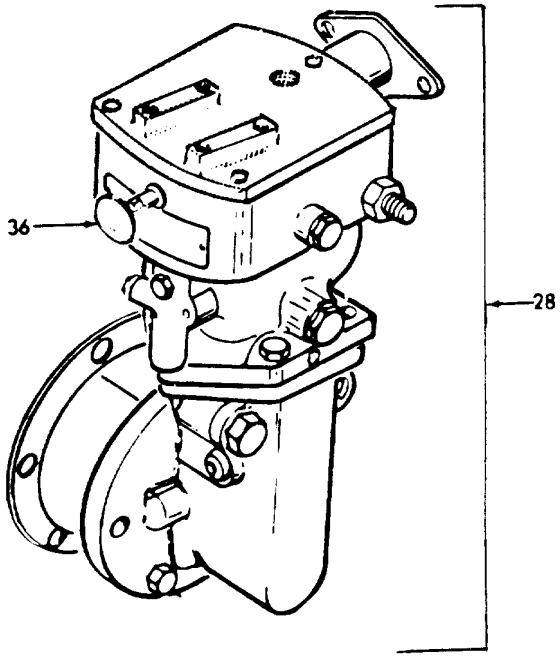
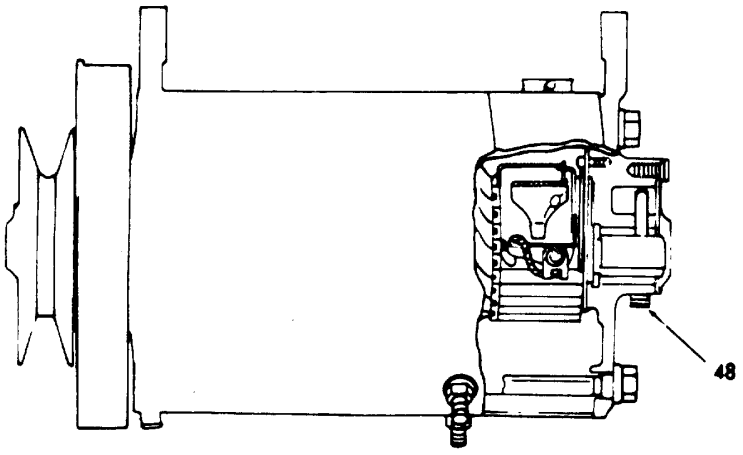
Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
106	MONTHLY	Engine Room	FUEL ROD KNOB. Lubricate the fuel rod knob (36) located on the Hydraulic Governor Assembly (28).	Broken.
				
107	MONTHLY	Engine Room	GENERATOR. Lubricate the generator bearings with 5 or 6 drops 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

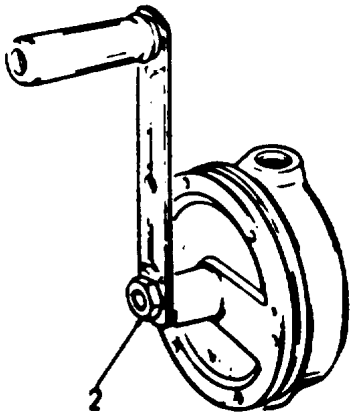
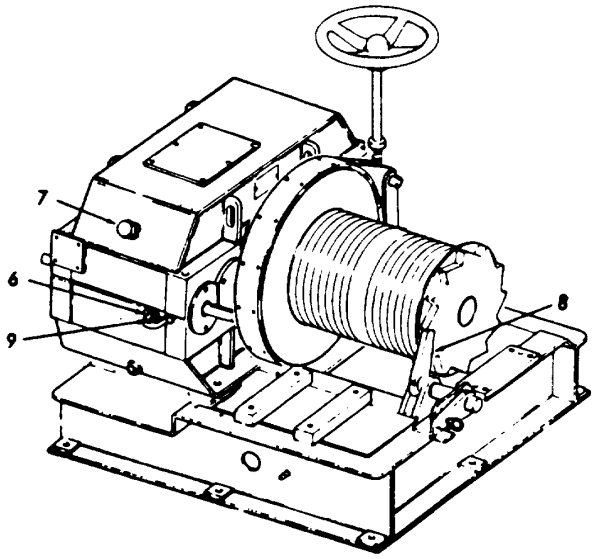
Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
108	MONTHLY	Engine Room (FR 51)	LUBE OIL TRANSFFR PUMPR Add oil to shaft (2). Use oil (MIL-L-9000H (SH)).  	Fails to function.
109	MONTHLY	Ramp Handling Machinery	BOW RAMP WINCH. Check reducer oil level. Remove dipstick (6) Compartment and check oil level. Remove vent plug (7) to add gear oil (MIL-L-2105D, GO 80/90) as needed. Lubricate pawl (8) with oil (MIL-L-9000H (SH)) as needed.  	Low oil level.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

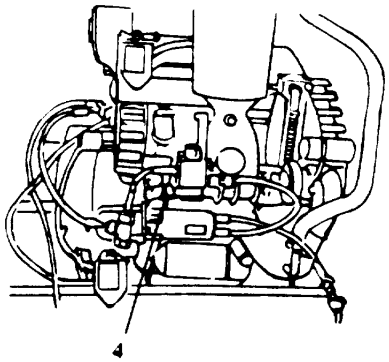
Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
110	MONTHLY	Anchor Winch Compartment	CHANGE ENGINE OIL. Pump oil through dipstick hole (4). **NOTE** Do not drain oil into bilges. Use oil separation/recovery system to collect used oil.  	Low oil level. into a suitable container
111	MONTHLY	Anchor Winch Compartment	OIL FILTER. Remove pipe plug (5) and drain oil into a suitable container. **NOTE** Do not drain oil into bilges. Use oil separation system to collect used oil. 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 filter shell (7). Tighten stud (6). Replace drain plug (5). **NOTE** Also, do oil filter by-pass. It is located on the left side. Refer to Item 94.	Filter obstructed. Filter obstructed.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

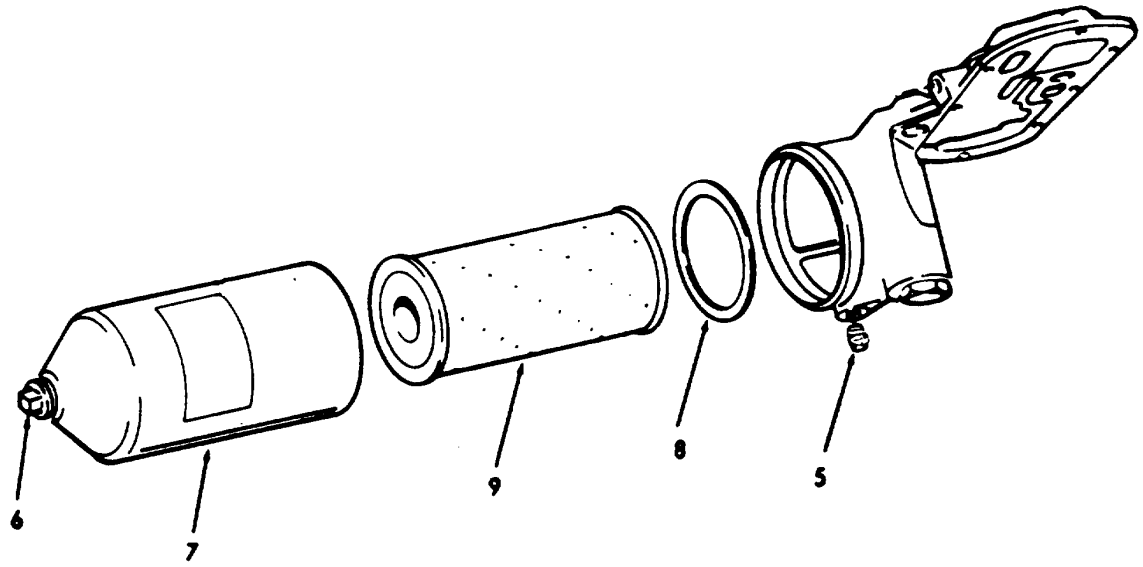
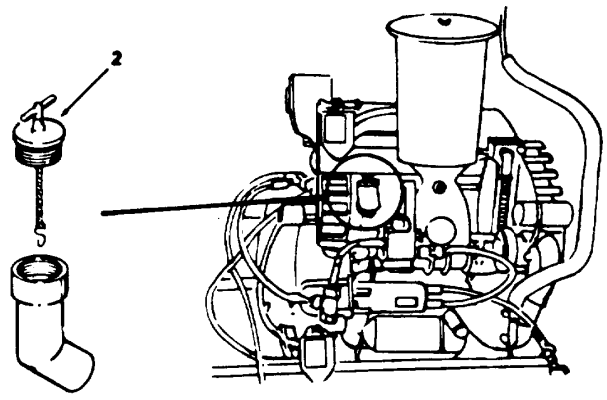
Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
111 Continued			**NOTE** Filter shell and cover should be wiped free of excess oil.	
				
112	MONTHLY	Anchor Winch Compartment	OIL BREATHER CAP. Remove oil breather cap (2). Clean with oil (MIL-L-9000H (SH)).	Cap obstructed.
				
			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

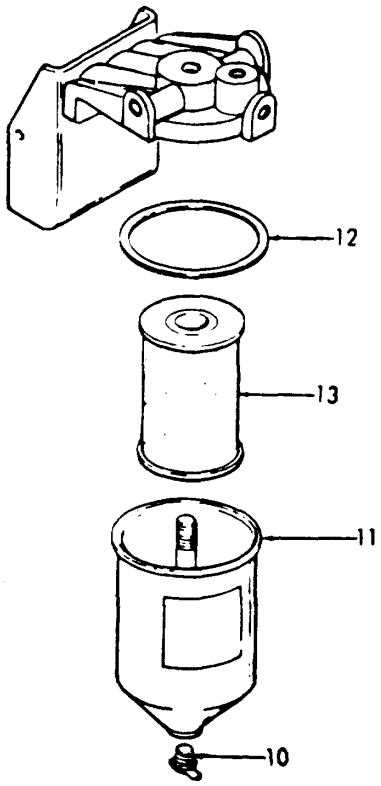
Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
113	MONTHLY	Anchor Winch Compartment	FUEL FILTER. Drain fuel from filter by opening drain cock (10). Drain into a suitable container. Remove spin-off shell (11), gasket (12) and strainer (13). Install a new strainer (13) and gasket (12). Replace spin-off shell (11) and close draincock (10). 	Filter obstructed.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

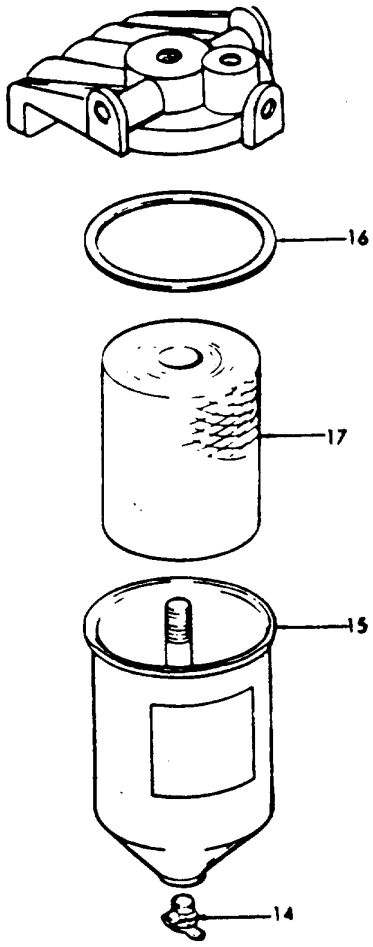
Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
114	MONTHLY	Anchor Winch Compartment	FUEL STRAINER. Drain fuel from strainer by opening draincock (14). Remove spin-off shell (15), gasket (16) and filter (17). Install a new filter (17) and gasket (16). Replace spin-off shell (15) and close draincock (14). 	Strainer obstructed.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

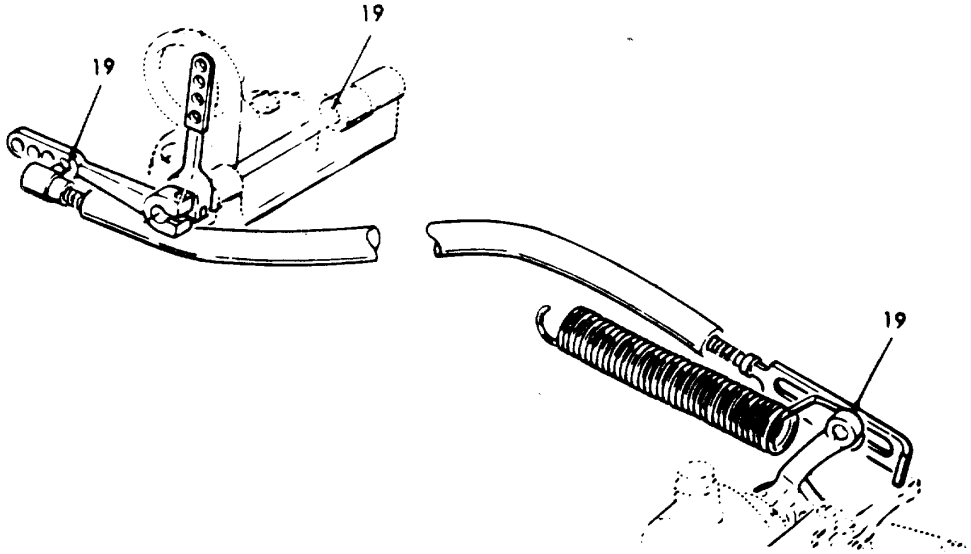
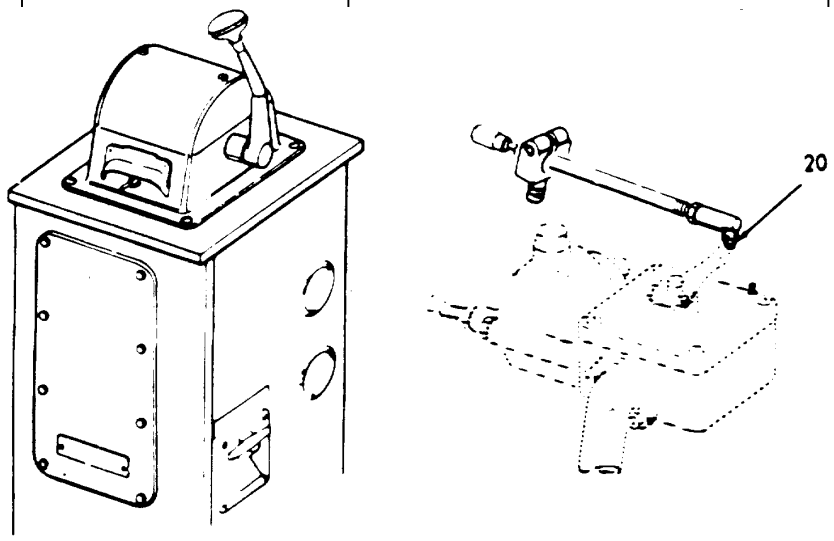
Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
115	MONTHLY	Anchor Winch Compartment	ENGINE THROTTLE CONTROL. Lubricate linkages, clevis, pins and exposed threads (19) with oil (MIL-L-9000H (SH)).	Throttle control binds or fails to function.
				
116	MONTHLY	Main Deck 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 If :
117	MONTHLY	Anchor Winch Compartment	HYDROSTARTER RESERVOIR. Remove breather cap (30), and dean with compressed air. Check fluid level in sight gage, and fill as required. **NOTE** Use mineral oil (MIL-H-46170, FRH, Type I). **WARNING** **Use eye protection when using compressed air.**	Low fluid level.

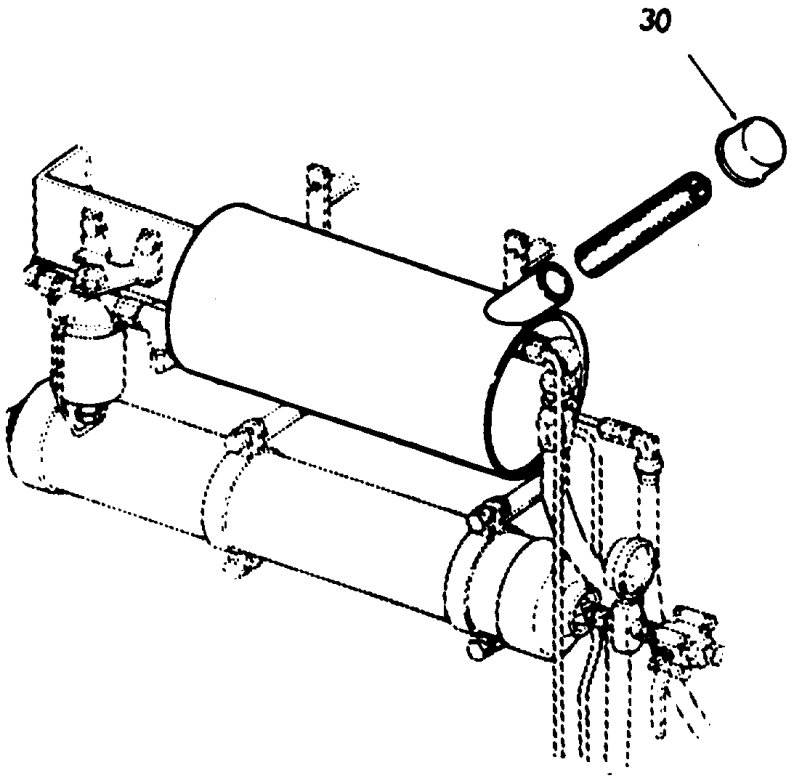


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
118	MONTHLY	Anchor Winch Compartment	SLACK PULLER. GEAR DRIVE BREATHER. Remove pipe plug (23) and breather cap (24). Drain oil into a suitable container. Replace pipe plug (23). Clean breather in fuel oil and dry with compressed air. 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. Fill gear drive (26) with oil (MIL-L-21050, GO 80/90) until it comes out of the high oil plug hole. Replace plug. Replace breather (24).	Low oil level. Low oil level. Low oil level.

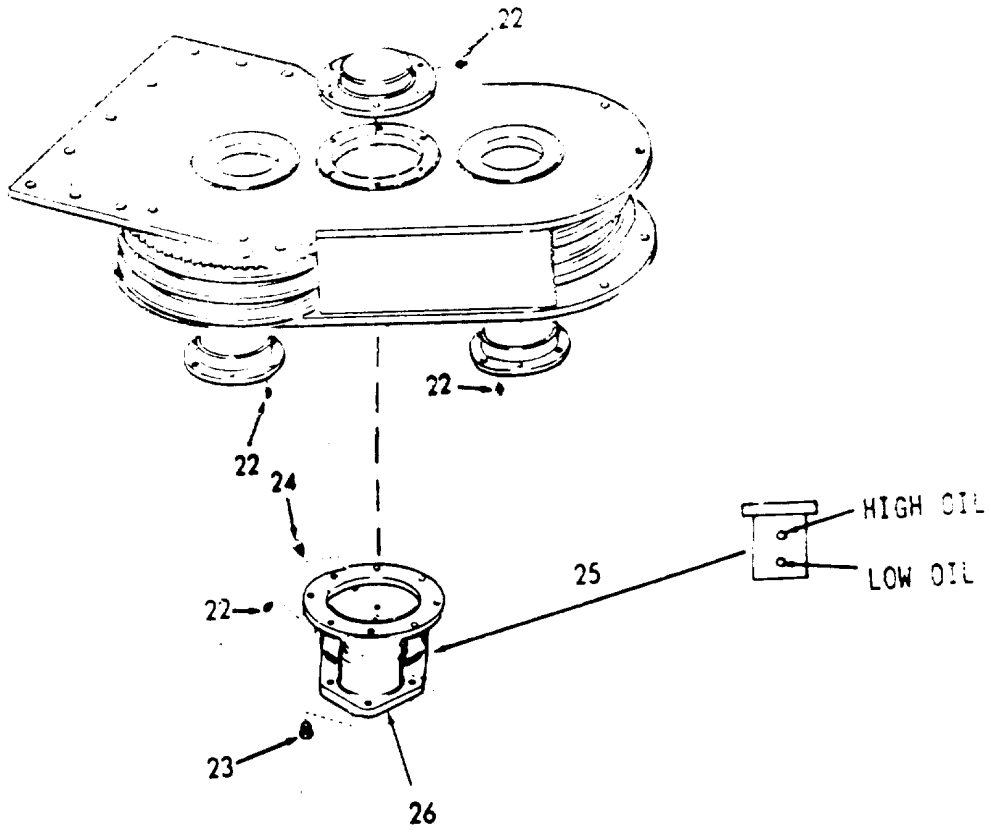


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

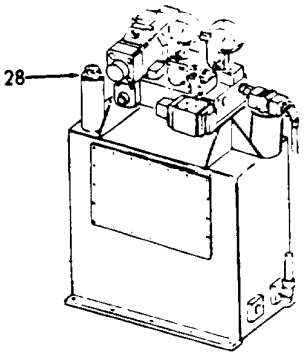
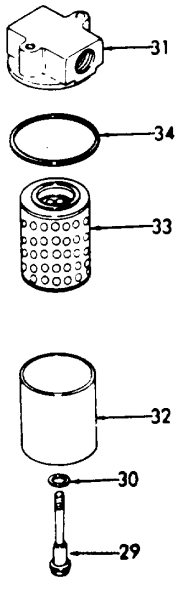
Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
119	MONTHLY	Anchor Winch Compartment	HYDRAULIC TANK BREATHER. Remove breather cap (28). Clean in fuel oil and dry with compressed air. Replace. 	Obstructed.
			HYDRAULIC FILTER. Remove bolt (29) and washer (30) from filter body (31). Remove filter shell (32) and filter element (33). Remove and discard gasket (34). Install a new filter element (33) and gasket (34). Reinstall filter shell (32), to filter body (31) using washer (30) and bolt (29). 	Filter obstructed.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

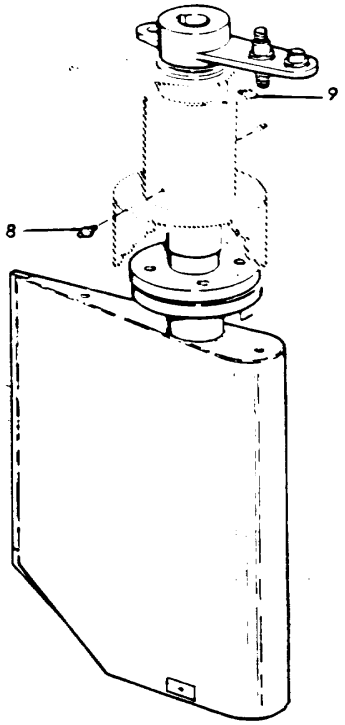
Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
120	MONTHLY	Engine Room	HYDRAULIC CUB PUMP UNIT. CHECK FLUID LFVEL. Check for proper fluid level in the hydraulic reservoir (1) by using sight gage (2). If the sight gage does not register the proper level of fluid, then 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-24139A (SH)).  	Binding.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

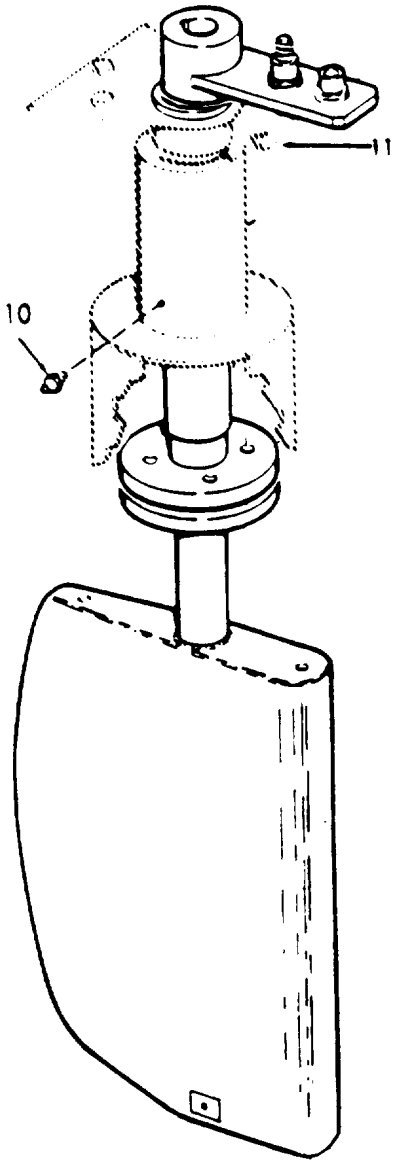
Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
121 Continued			FLANKING RUDDER STOCK ARRANGEMENT. Lubricate fittings (10) and (11) with grease (MIL-G-24139A (SH)). 	Binding.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

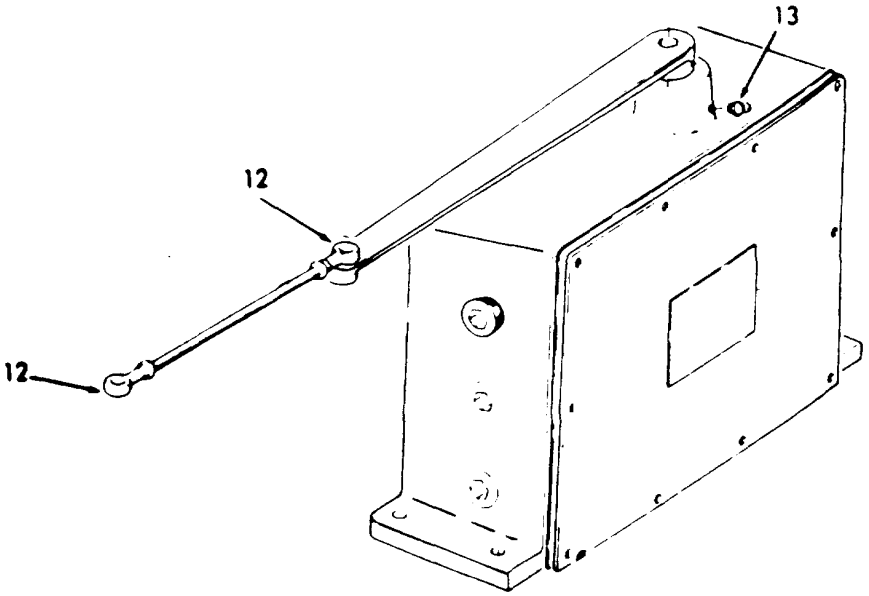
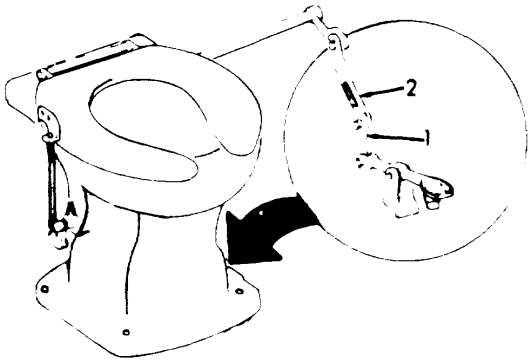
Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
122	MONTHLY	AFT/FR 72-75	STEERING LINKAGE. Lubricate ball joints (12) or steering linkage with a few drops of oil (MIL-L-9000H (SH)).	Binding or fails to function.
				
123	MONTHLY	Wash Room/ Water Closet	COMMODE. Lubricate 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 If :
124	MONTHLY	Equipment and Repair (2-40-0-A)	SEWAGE AIR PUMP. OIL SEPARATOR LEVEL. Check oil level in oil gage (6). To add oil, remove pipe plug (7). Use oil (MIL-L-9000H (SH)) (non-detergent). PUMP OIL LEVELS. Check oil levels in sight valves (8). If oil is not visible, check oil level on oil gage (6). Add oil (MIL-L-9000H (SH)) (non-detergent). Purge system by loosening fittings (9).	Low oil level. Low oil level.
125	MONTHLY	Air Conditioning Room	CONDENSER DRAINING. Drain water by opening valves (6). ZINC PROTECTORS. Remove protectors (7), check for corrosion. Clean with wire brush. Replace when badly worn.	Corroded or worn.

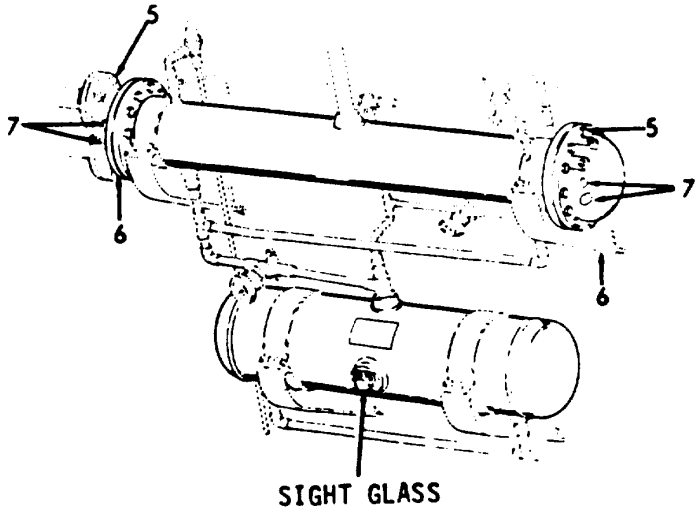


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
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). 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. Turn off water. Close valve (16). Open valve (15) and (8). Remove hose and close cap (14).	Strainer plugged. Strainer plugged.

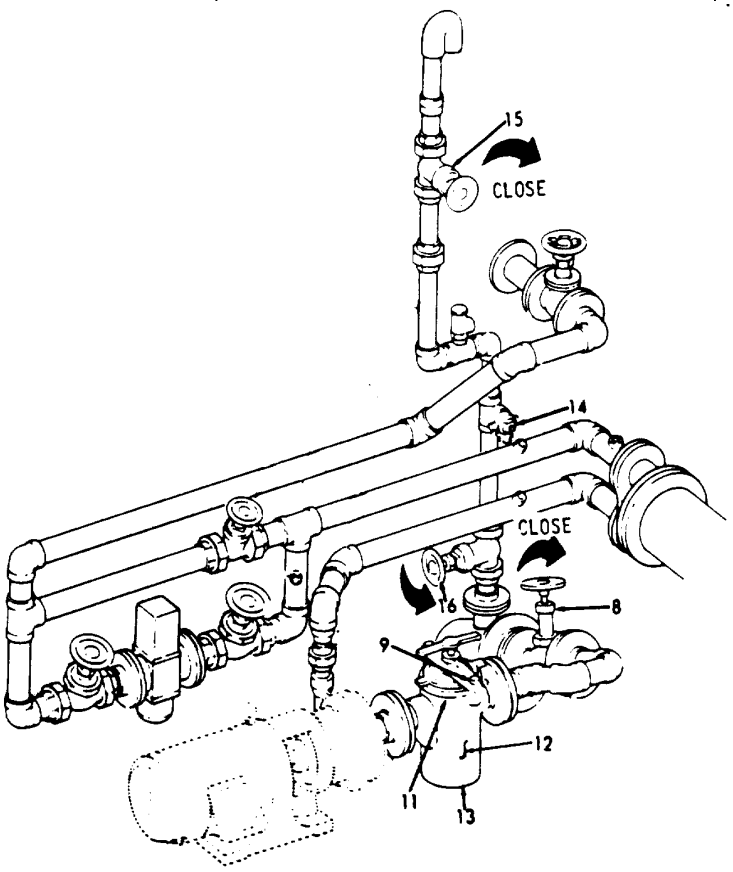
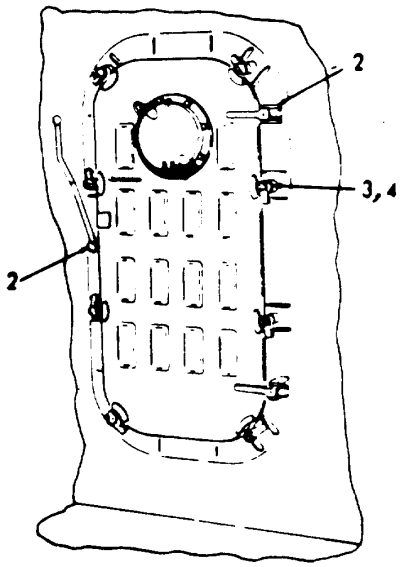


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
127	MONTHLY	At SEP. 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. Perform the functional test of the Detection System. (Refer to paragraph 2-123).	Functional test fails.
128	MONTHLY	General	DOORS, HATCHES, SCUTTLES, AND MANHOLES. **NOTE** Use grease (MIL-G-1 8458B (SH)). Doors - Lubricate hinges (2), links (3), and dogs (4). Hatches - Lubricate hinges (5), links (6), and dogs (7).	They fail to seal.



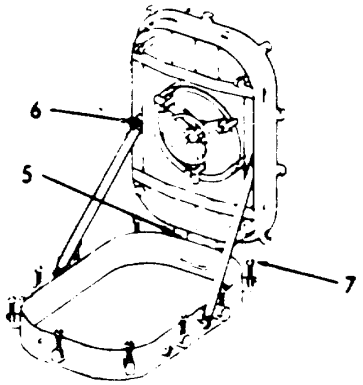
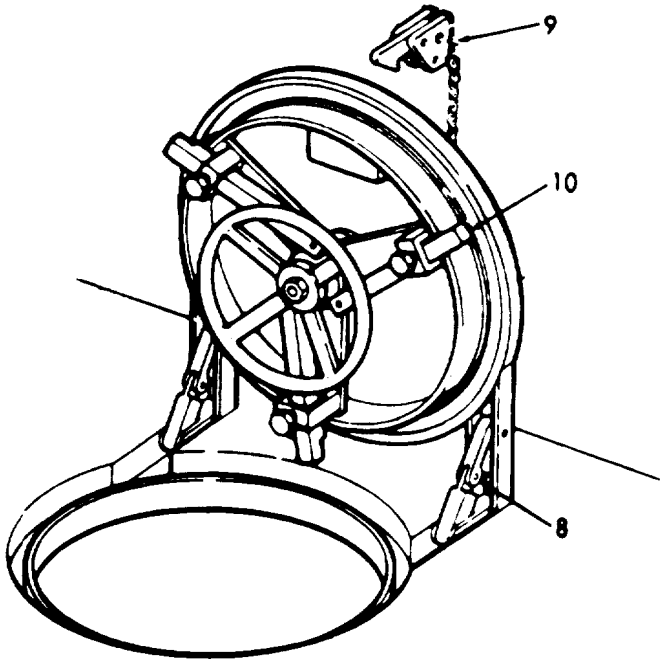


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
128 Continued			Scuttles - Lubricate hinges (8), links (9), and dogs (10). Manholes - Lubricate hinges (11) and dogs (12). **NOTE** Clean point from water tight seals. Lubricate with oil (MIL-L-9000H (SH)).	



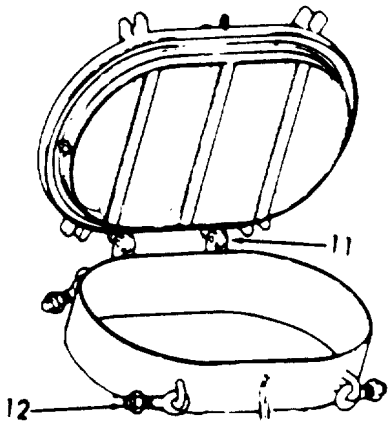


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
129	MONTHLY	Pilot House	MAIN MAST. Lubricate fittings (1) three places with grease (MIL-G-18458B (SH)).	Worn or cracked.

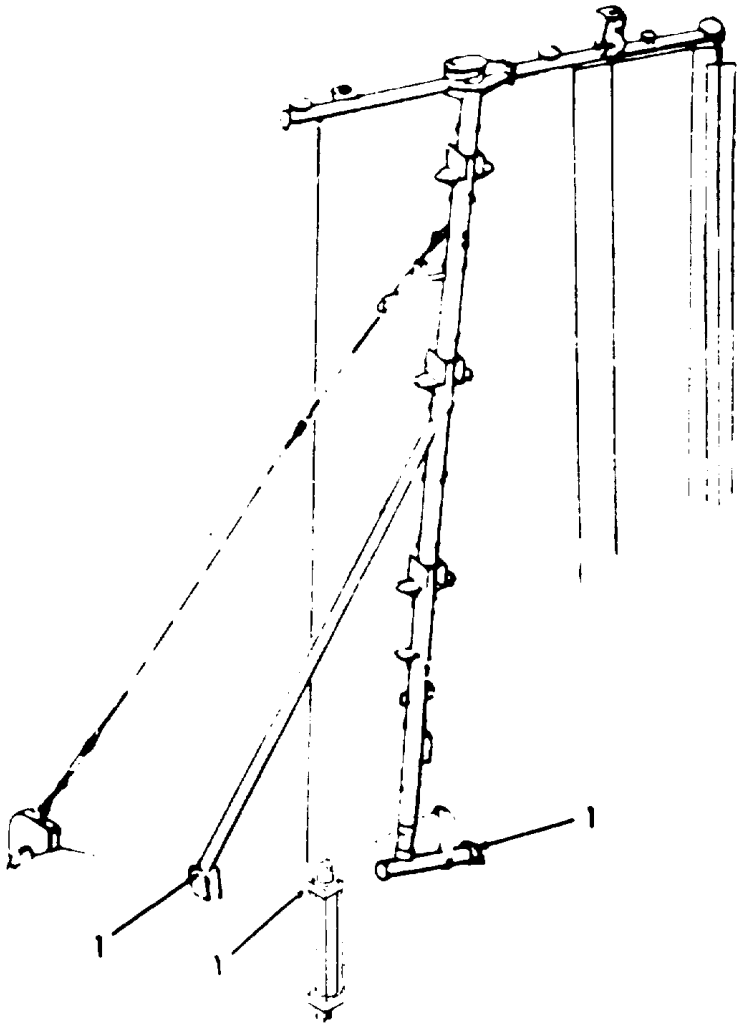


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

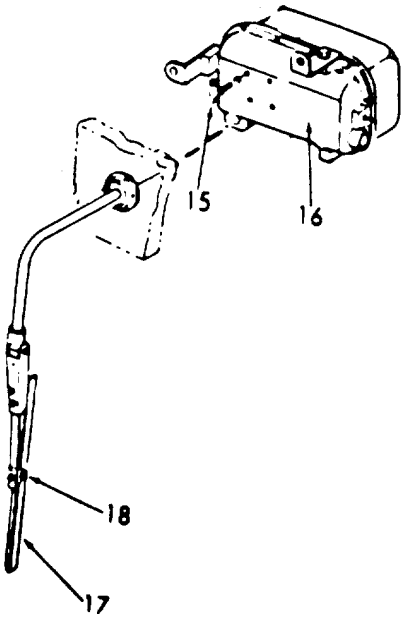
Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
130	MONTHLY	Pilot House	WINDSHIELD WIPER. Fill oil cup (15) with oil (MIL-L-9000H (SH)). Remove cover (16) and lubricate internal linkage with oil (MIL-L-9000H (SH)). Inspect wiper blade (17) and replace when damaged. Remove screw (18) to disassemble.  	Low oil level. Worn, cracked or torn.
131	MONTHLY	Above Galley and Mess	SEARCHLIGHT LUBRICATION. Lubricate trunnion bolts (24) with oil (MIL-L-9000H (SH)). Grease fitting (25) located at socket (26) with grease (MILG-18458B (SH)). Remove damps (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 If :
131 Continued			Loosen screws (30) and rotate the flange assembly (31) counter-clockwise approximately 1/4 inch. Then remove the entire assembly and lubricate shutter bearings (32) with oil (MIL-L-9000H (SH)). Replace flange assembly (31) and tighten screws (30). Replace bearing housing covers (28) and damps (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.

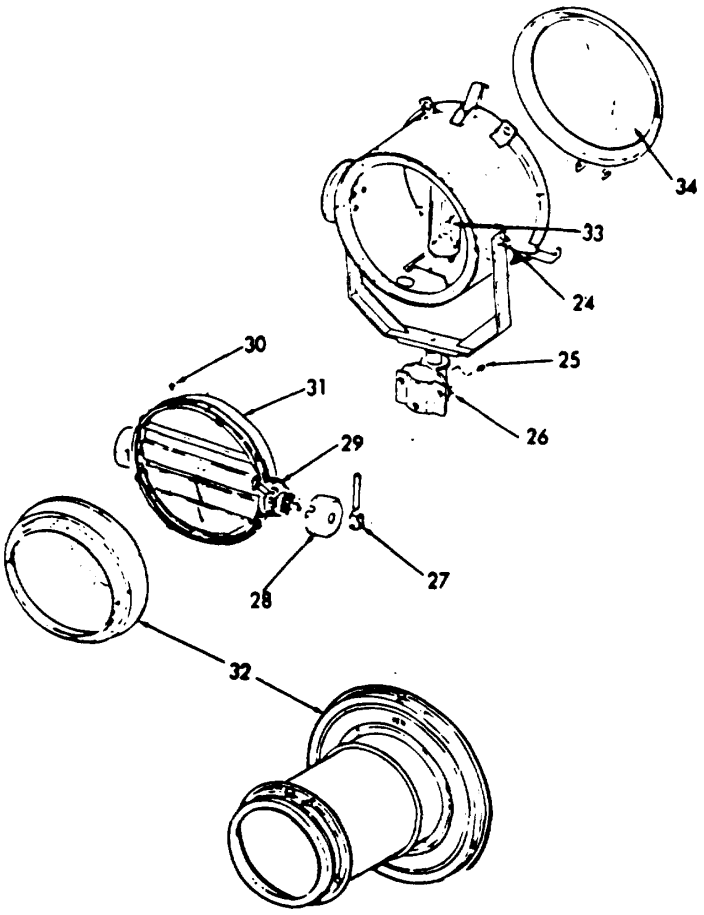


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

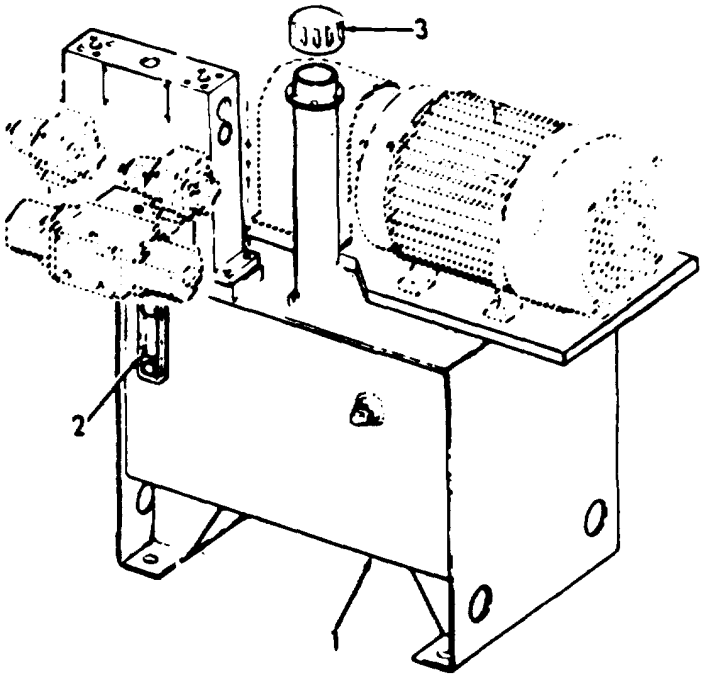
Item No	Interval	Location Item to Check/Service	Procedure	Not Mission Capable If :
133	MONTHLY	Equipment General	HYDRAULIC CUB PUMP UNIT. CHECK FLUID LEVEL. Check for proper fluid level in the hydraulic reservoir (1) by using sight gage (2). If the sight gage does not register the proper level of fluid, 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

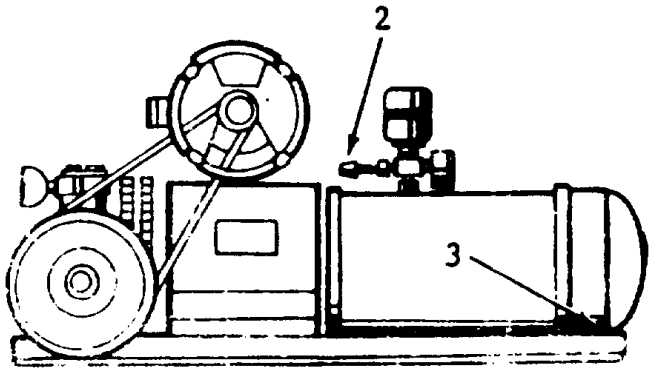
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
134	MONTHLY	Equipment General	AIR HORN AIR COMPRESSOR **WARNING** Disconnect power to compressor motor before performing any maintenance on compressor. **CAUTION** NEVER allow oil level to fall below lower mark on stick oil gage. **WARNING** Use eye protection when using compressed air. DRAIN MOISTURE. Release tank, air pressure (2) and remove drain plug (3) located at bottom of tank at end farthest compressor. **NOTE** Tank should be drained once each month or more frequently if service conditions cause greater amounts of water to accumulate.  	

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
135	MONTHLY	Equipment General	AIR HORN COMPRESSOR AIR INTAKE FILTER. Remove retaining ring (4), remove screen filter (5), felt filter (6) and second screen filter (7). Clean in an approved solvent and air dry. Reassemble filters and retaining ring in reverse order.	Fails to retain pressure.

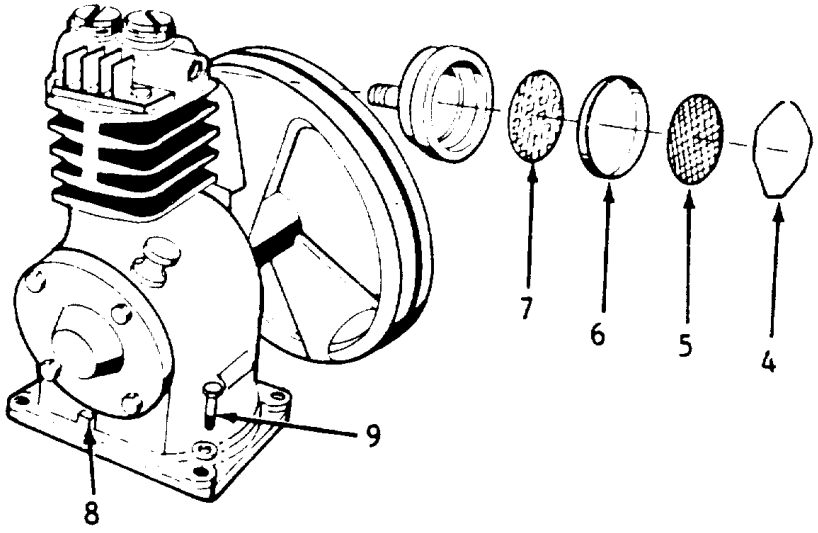


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

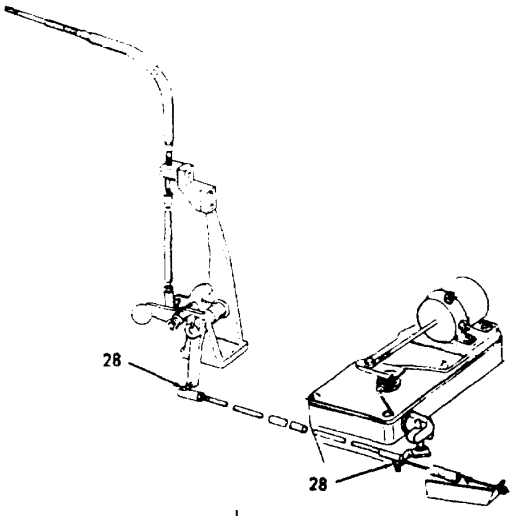
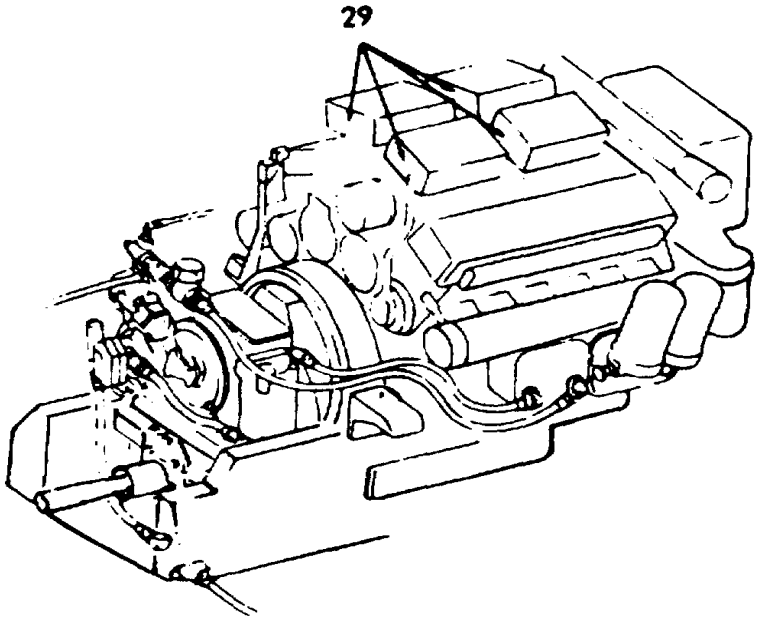
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
136	QUARTERLY	Engine Room	THROTTLE CONTROL. Lubricate the throttle control at 2 locations (28) with 2 to 4 drops of oil (MIL-L-9000H (SH)).	Throttle controls stick or bind.
				
137	QUARTERLY	Engine Room	EMERGENCY STOP 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 If :
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.

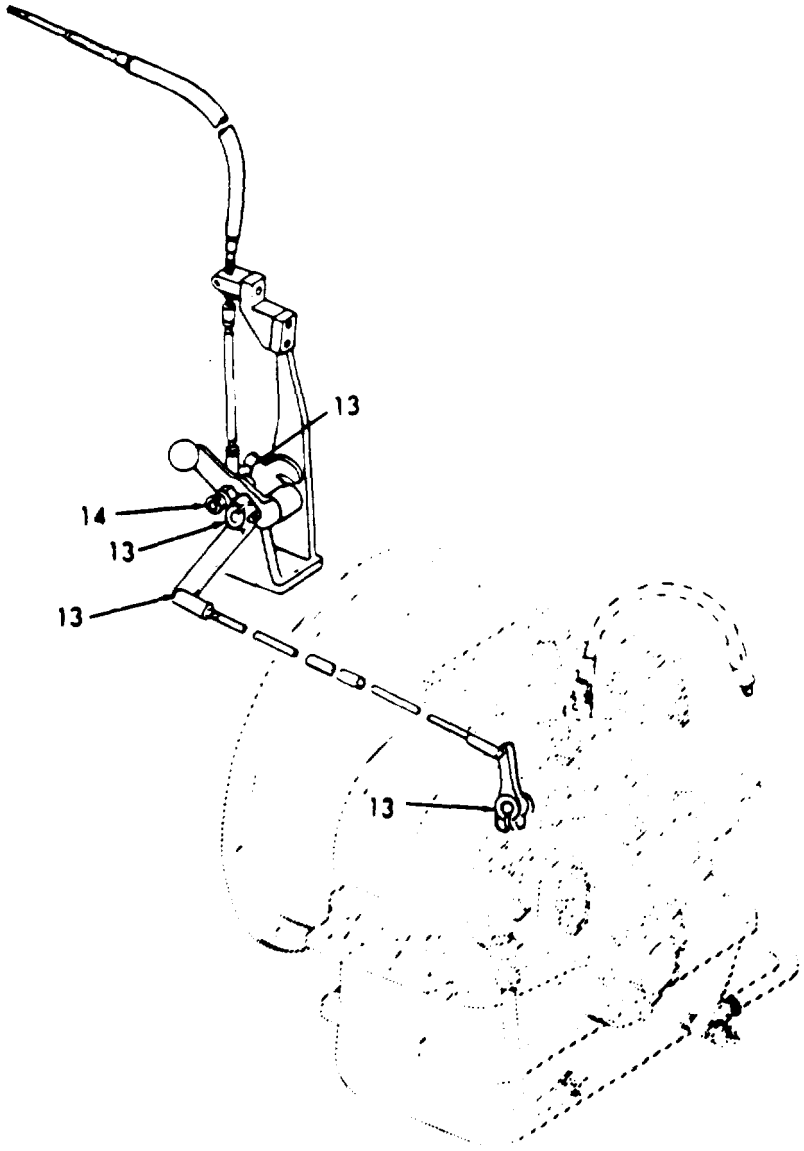


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

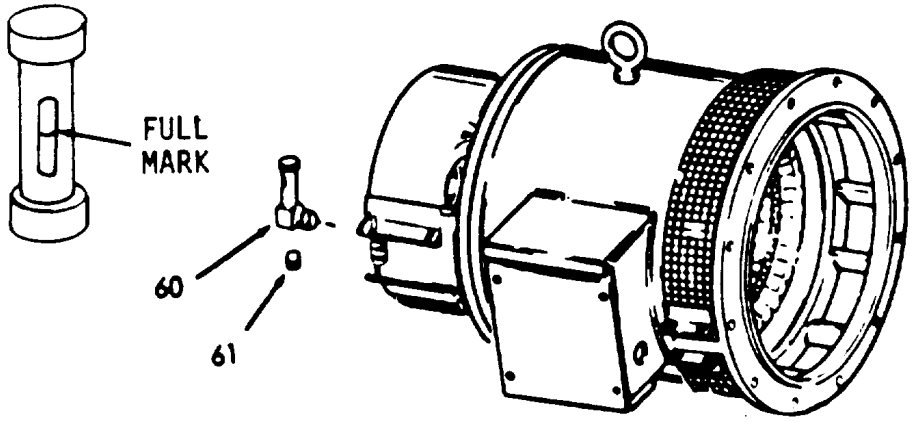
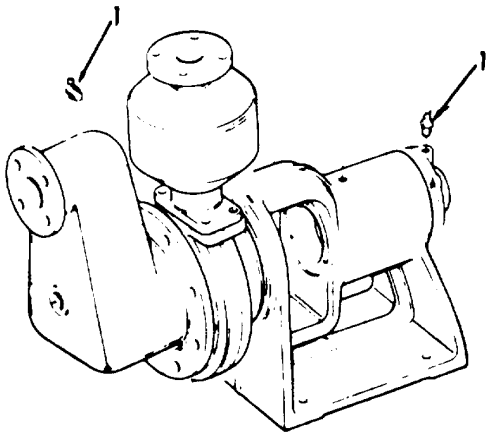
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
139	QUARTERLY	Engine Room	POWER GENERATOR. Check the oil level in the sight gage (60). Add oil, (MIL-L-9000H (SH)) if necessary, to maintain the oil level to the line on the sight gage. Do not overfill. After adding oil, run engine for several minutes. Then shutdown engine and recheck oil level. 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	BILGF 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

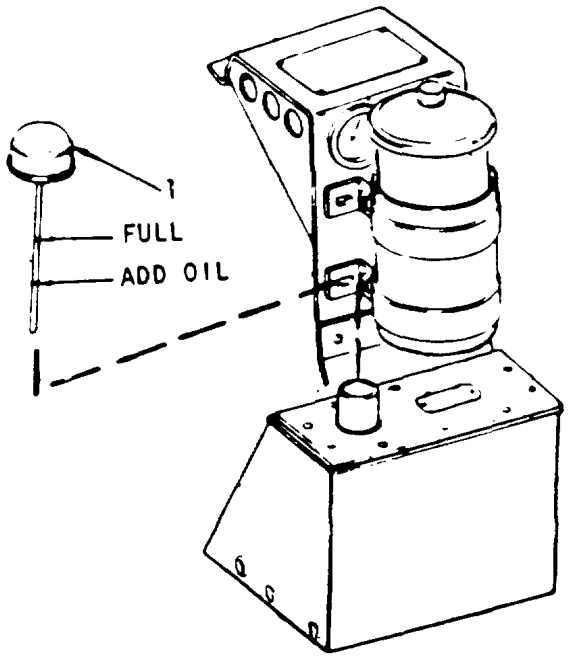
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
141	QUARTERLY	Anchor Winch Compartment	CHANGE OIL. **CAUTION** Make sure Anchor Winch Engine is not running.  **CAUTION** The winch engine must be shut off. The torque converter could be damaged. Pump oil from the reserve tank (2) into a suitable container through fluid gage hole (3). **NOTE** 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

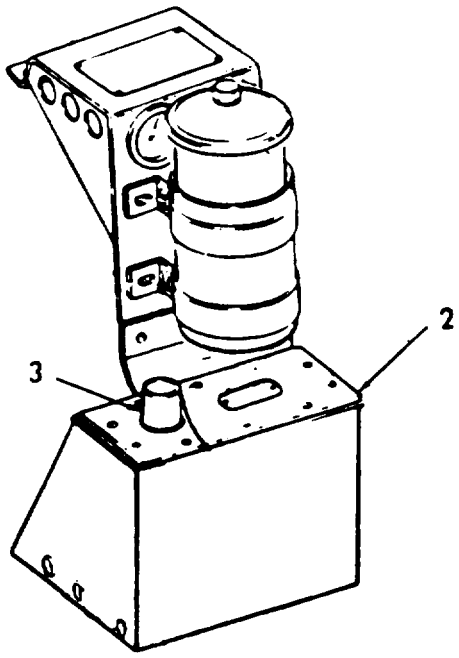
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
141 Continued				
			Drain turbine converter housing assembly (4), by removing pipe plug (5). **NOTE** The contents of the heat exchanger (6) is approximately-7 gallons (26.5 l1). Remove cover (7) from the filter assembly (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 If :
141 Continued			Remove elbow (10) from reserve tank (3). Remove nuts (11), washers (12). Remove cover plate (13) and gasket (14). Clean the screen element (15). Replace elbow (10). 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). Replace gasket (14), cover plate (13), washers (12) and nuts (11). 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). Remove cap (22). Fill with approximately 3 quarts (2.84 liters) of oil (MIL-L-9000H (SH)). **NOTE** Fill to one inch (2.54 cm) below full mark on dipstick. 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 652PSI (31.64 to 45.70 kg/cm). Check temperature gage (24). Normal operating temperature is less than 200°F (93.3°C). 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 If :
141 Continued			**NOTE** The pressure gage (23) responds instantly to oil pressure. Sluggishness indicates air in system. Open bleed valve (20).	

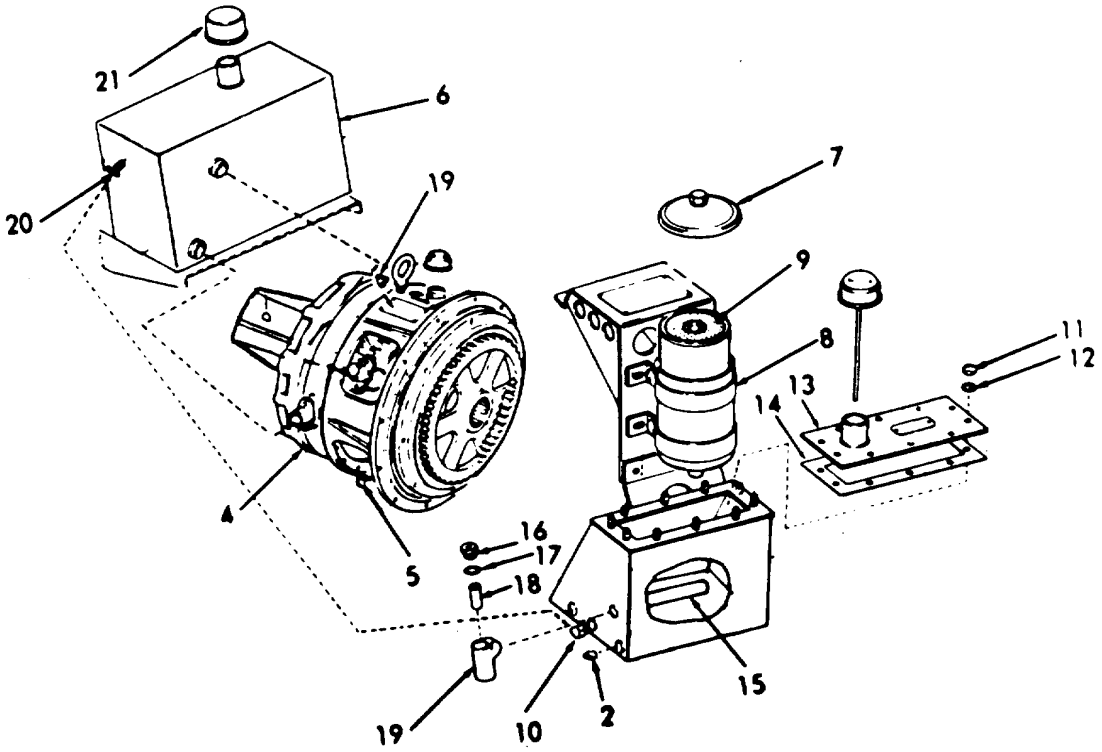


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

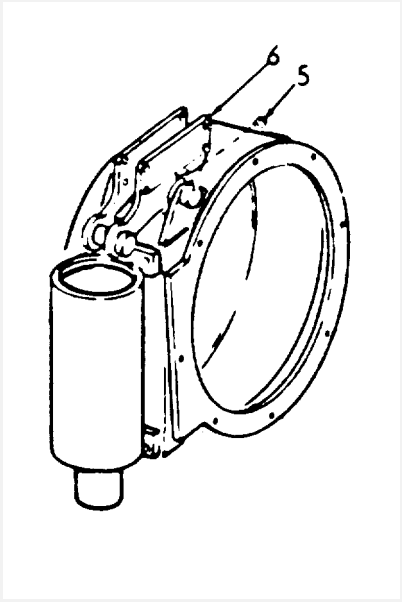
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
142	QUARTERLY	Anchor Winch Compartment	DRIVE BRAKE Lubricate fitting (5) located on drive brake double toggle (6) with grease (MIL-G-24139A (SH)). 	Binds or fails to function.
143	QUARTERLY	Anchor Winch Compartment	GEAR DRIVE GEAR HOUSING. Remove breather cap (7). Drain gear housing (8) by removing pipe plug (9). Drain into a suitable container. **NOTE** Do not drain oil into bilges. Use oil separation/recovery system to collect drained oil. Replace pipe plug (9). Refill gear housing with approximately 10 gallons (37.85 1) 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

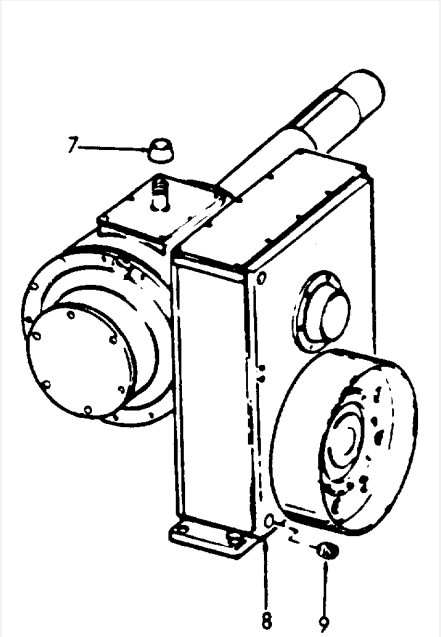
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
143 Continued				
144	QUARTERLY	Anchor Winch Compartment	INTERMIDIATE SHAFT AND DRUM GEAR. INTERMIDIATE SHAFT BEARING. Lubricate fitting (10) located on pedestal cap (11). Use grease (MIL-G-24139A (SH)). DRUM GEAR. Lift access door (12) and pour a pint of oil on gear while winch is running. **WARNING** Stay dear of operating gears and cables. Use oil (MIL-G-18458B (SH)).	Low oil level. Low oil level.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

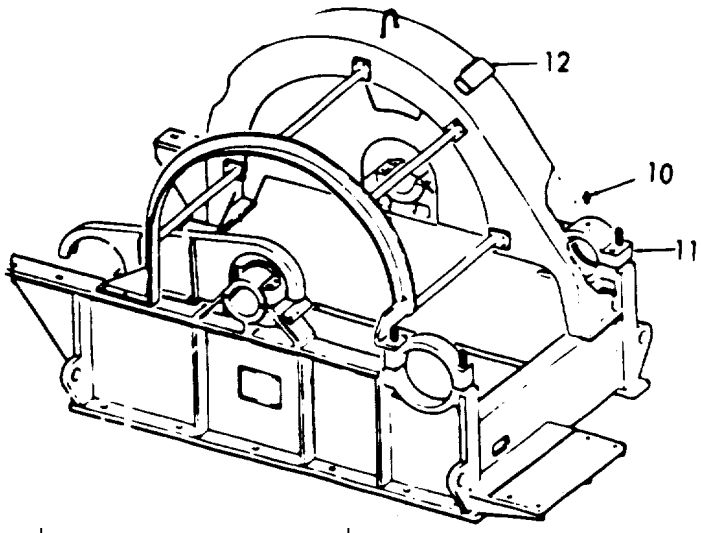
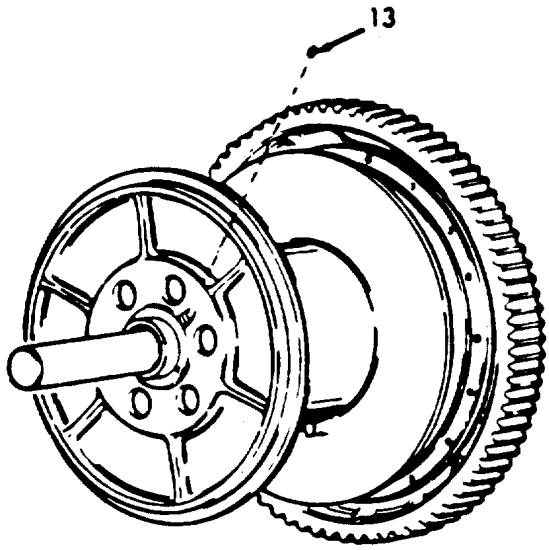
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
144 Continued				
145	QUARTERLY	Anchor Winch Compartment	DRUM ASSEMBLY. Lubricate fittings (13). Use grease (MIL-G-24139A (SH)). **WARNING** Stay dear of operating gears and cables. 	Gears slip and/or teeth damaged.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
146	QUARTERLY	Equipment and Repair (2-40-O-A)	SEWAGE AIR PUMP 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 Open drain cock (10) and drain into a suitable container.	

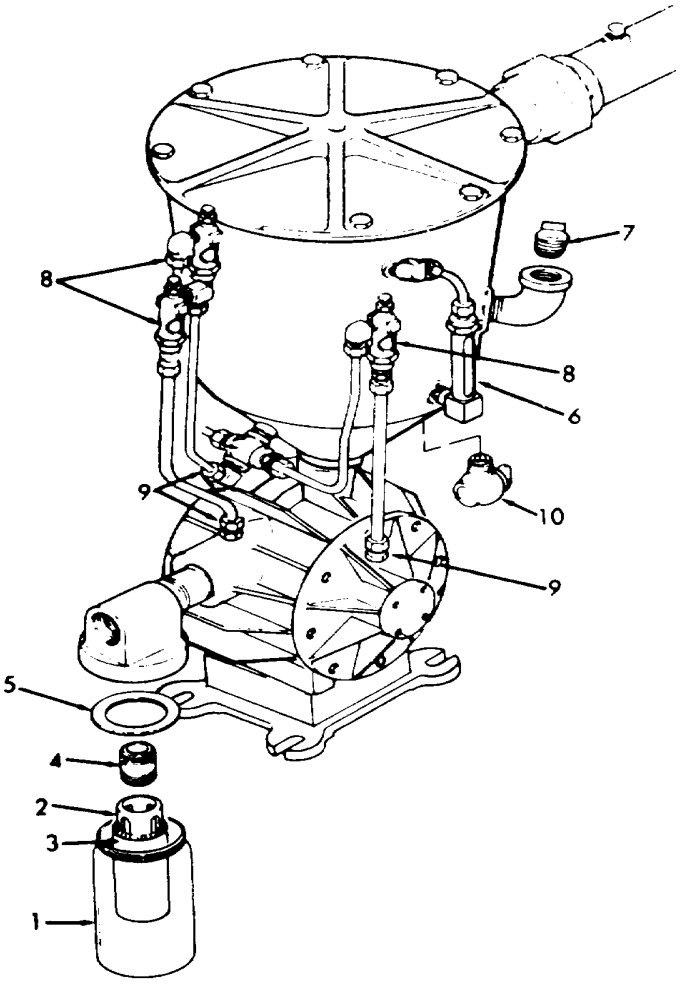
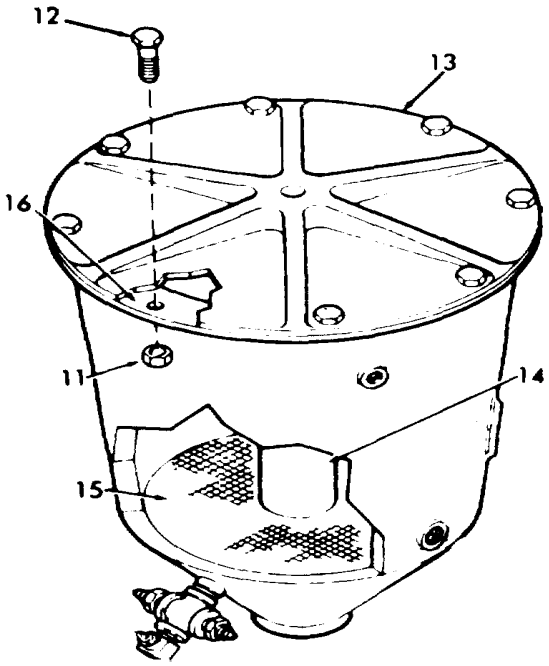


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
147 Continued			**NOTE** Do not drain oil into bilges. Use oil separation and recovery system to collect drained oil. Remove nuts (11), bolts (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 drain cock (10). 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.



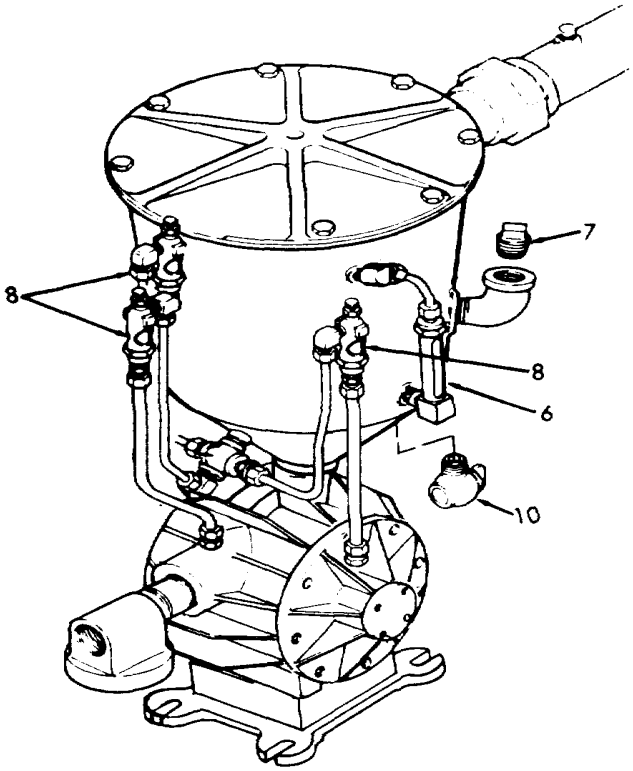


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
148	QUARTERLY	Equipment and Repair	SEWAGE PUMP Check the spring-loaded grease cup (1). The grease cup (1) must be refilled when plunger (2) bottoms on grease cup (1). 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 it is at the top of the plunger.	Plunger bottoms onto grease cup.

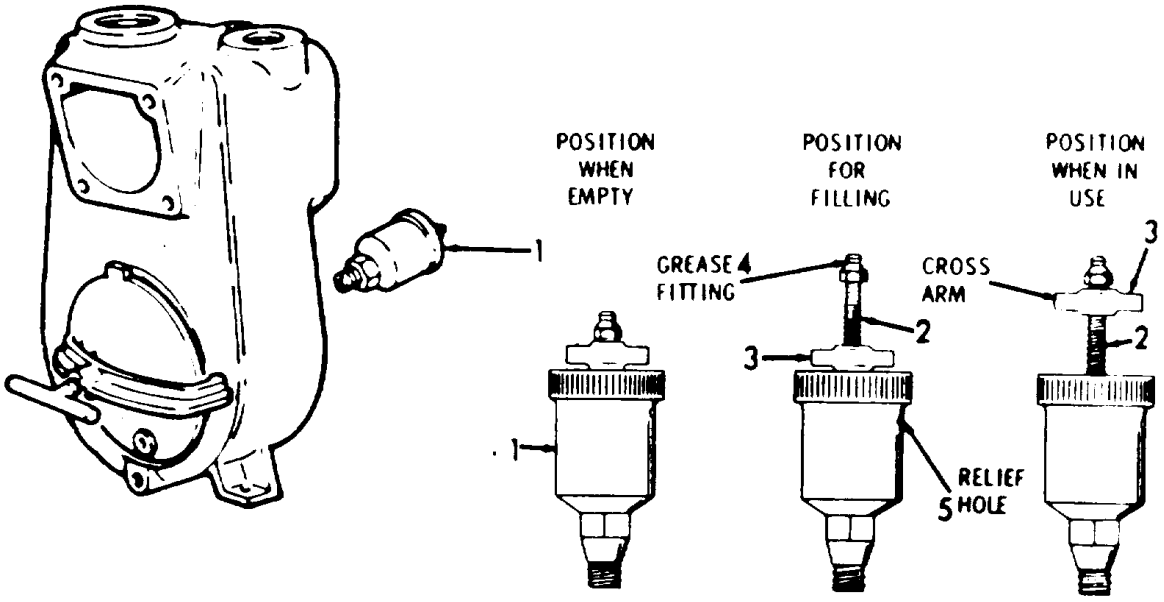


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
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)).	

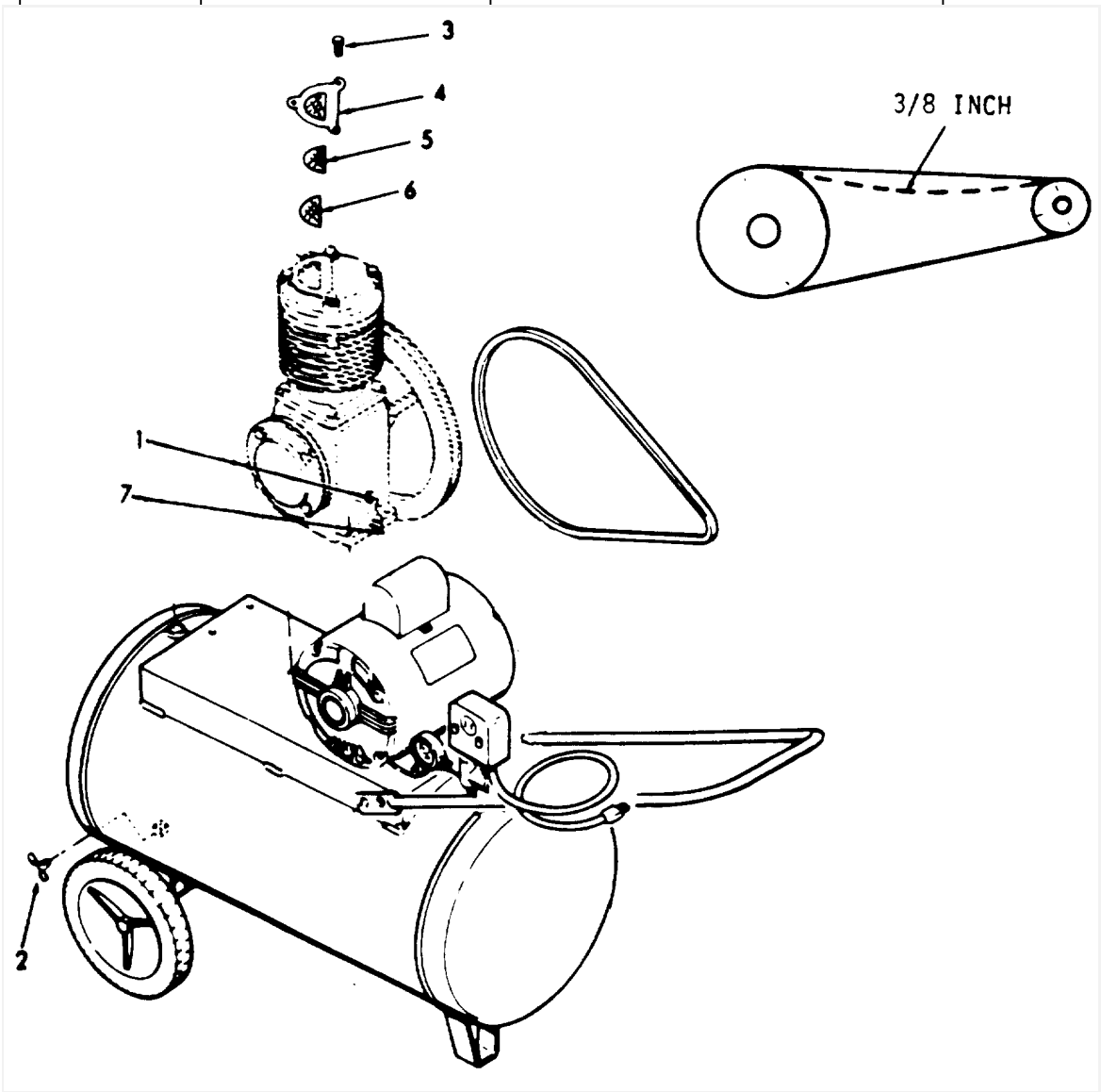


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
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 blower screen (38) and, if necessary, dean in fuel oil. Dry with compressed air. **WARNING** Wear eye protection when using compressed air.	Air intake is blocked or obstructed.

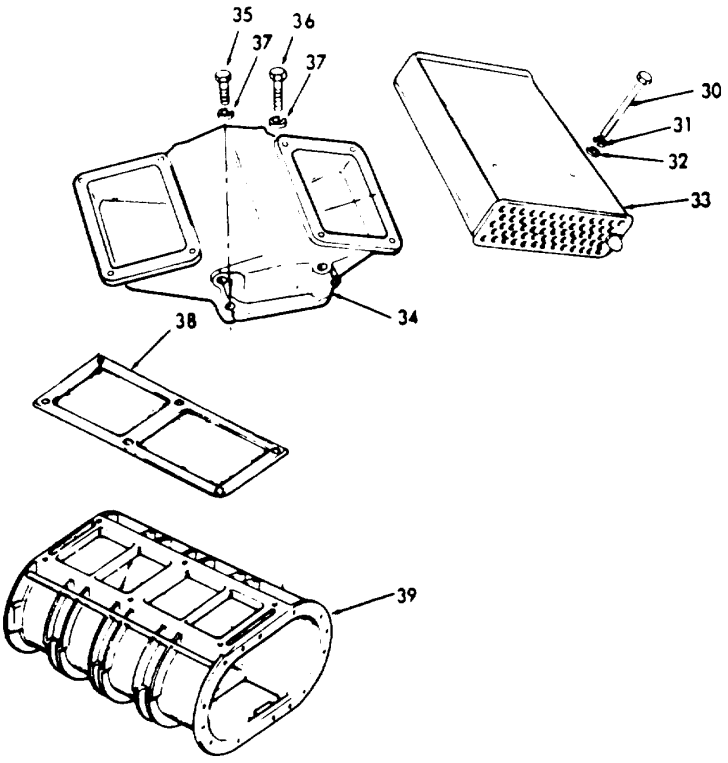


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

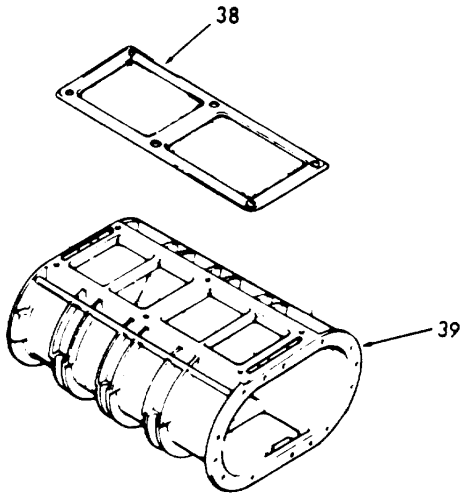
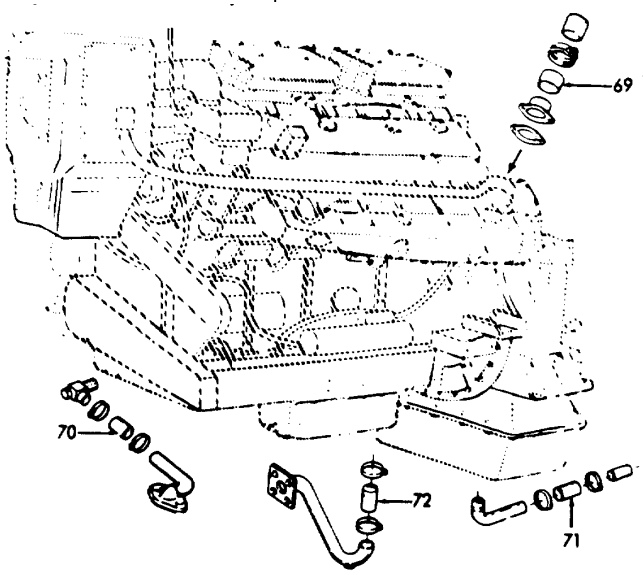
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
150 Continued				
151	SEMI-ANNUAL	Engine Room	HOSES. Inspect all of the hoses visually and by touch for signs of deterioration. Replace the hoses if necessary. Variable Speed Governor Hose (69) Hose (70) Hose (71) Expansion 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 If :
151 Continued			Fuel Pump Inlet Hose (73) Fuel Pump to Filter Hose (74) Fuel Filter to Cylinder Head Hose (75) right bank Fuel Filter to Cylinder Head Hose (78) left bank Crossover Hose (76) Fuel Drain Hose (77)	Hoses have cracks or leaks.
			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 (83) Hose (82)	Hoses have cracks or leaks.

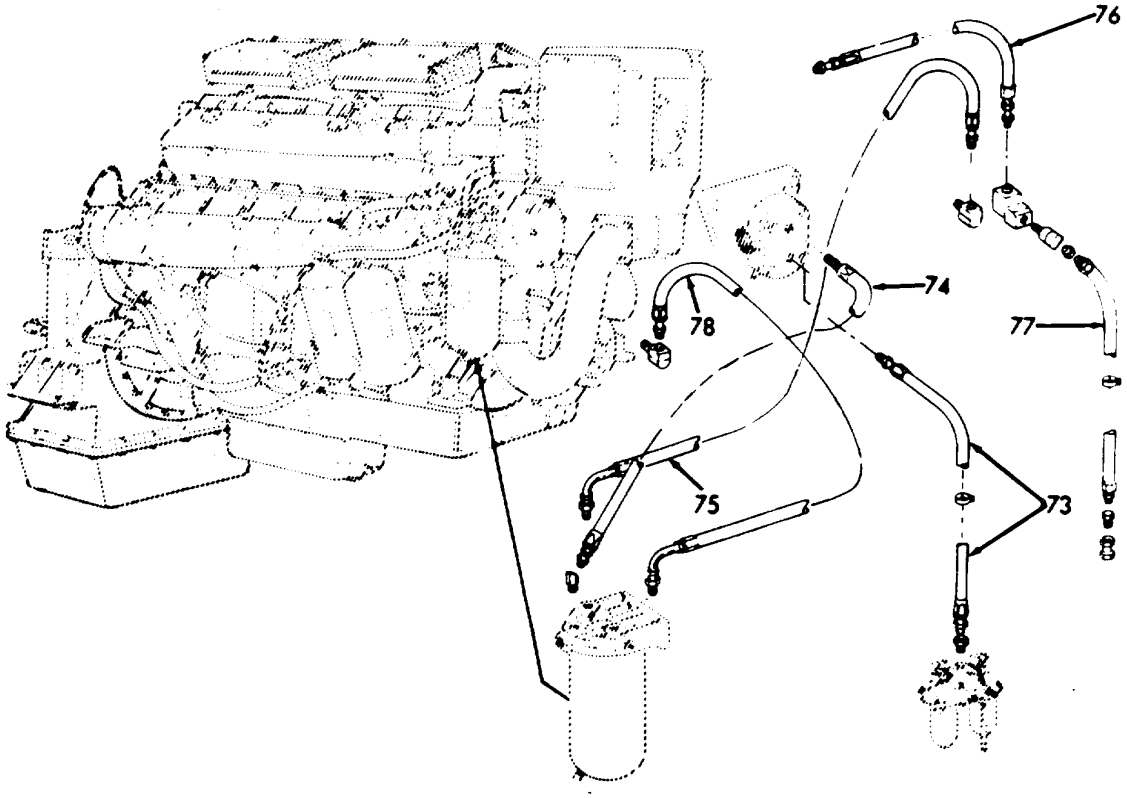


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

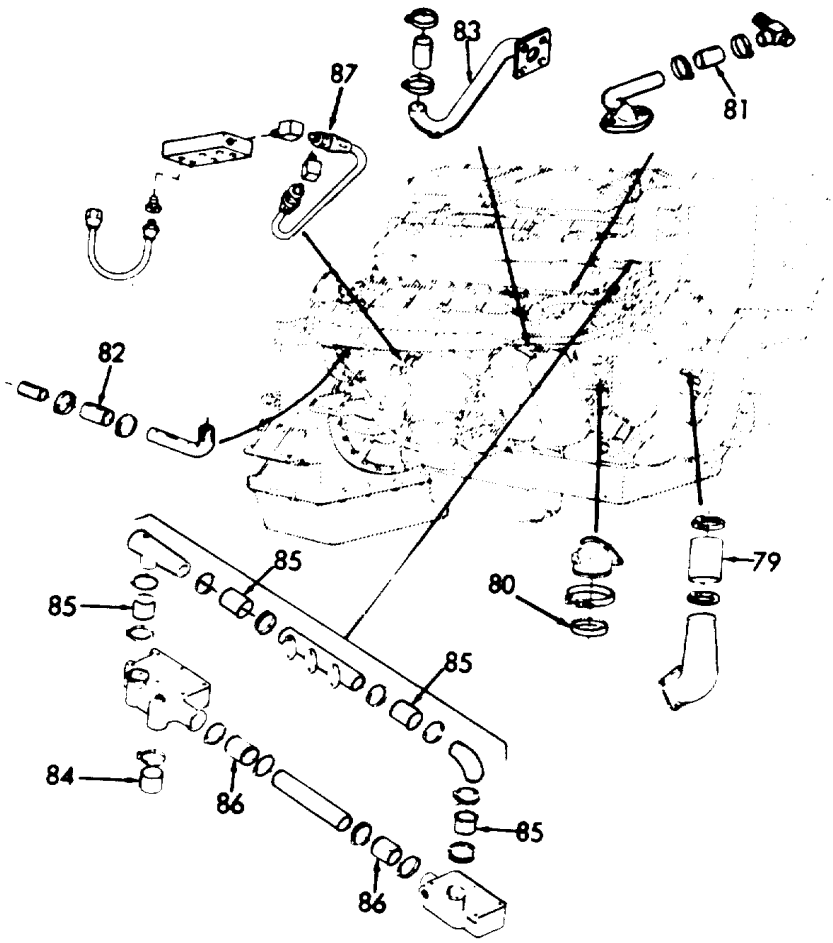
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
151 Continued				
				
152	SEMI-	Engine Room	ENGINE TUNE-UP. There is no ANNUAL scheduled interval for performing an engine tune-up. As long as the engine performance is satisfactory, no tune-up should be needed.	

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
153	SEMI-ANNUAL	Engine Room	BILGE PUMP DRIVE. Lubricate four fittings (88) with grease (MIL-G-24139A (SH)). Lubricate shifter yoke (89) with grease (MIL-G-24139A (SH)) so that it moves freely.	Shifter yoke binds.
			Check drive belts (90) for wear and proper tension.	Belts cracked or torn.

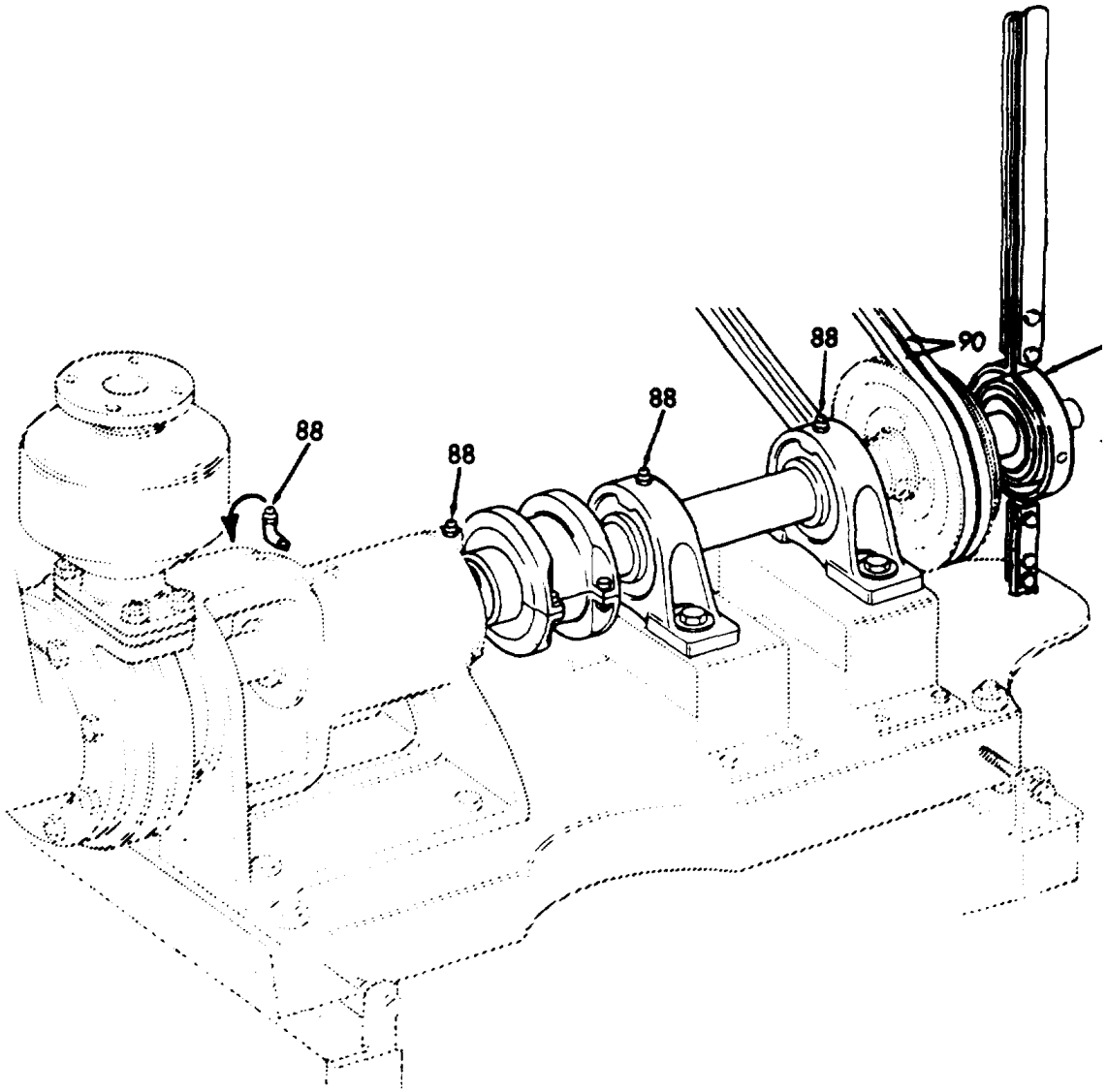


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

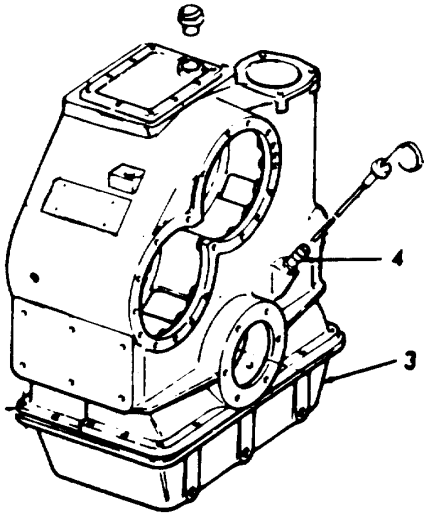
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
154	SEMI-ANNUAL	Engine Room	CHANGE MARINE DRIVE GEAR OIL. Drain the oil from bottom cover (3) by removing pipe plug (4) **NOTE** Do not drain oil into bilges. Use the oil/water separation system to collect drained oil  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). Remove pipe plug (9) and oil strainer (10) and clean using dean diesel fuel. Replace strainer (10) and pipe plug (9). Remove oil breather cap (11) and remove gasket (12). Flush cap (11) in clean diesel fuel. Install new gasket (12) on cap (11). Fill Marine Gear with oil.	

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

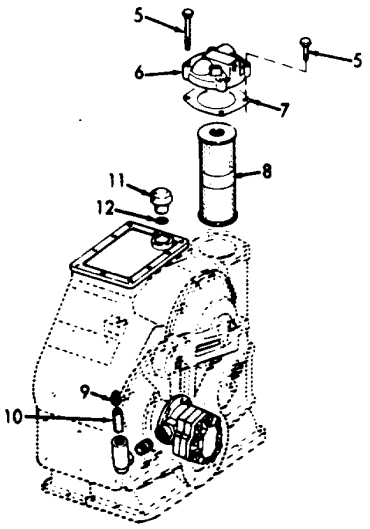
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
154 Continued			 **NOTE** Marine gear holds 24 quarts (22.7 l1) of oil. Operate engine for 5 minutes. Check for leaks. Add oil as required to bring level up to FULL on dip-stick.	
155	SEMI-ANNUAL	Engine Room	AIR CLEANER. Remove wing nut (26), bolt retainer seal (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 dean 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

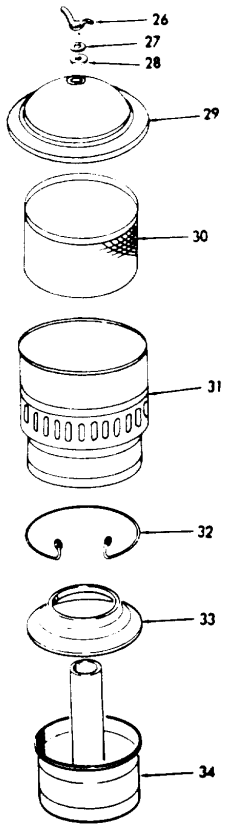
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
155 Continued			Clean filter screen with compressed air. **WARNING** **Use eye protection when using compressed air.** Place air cleaner baffle (33) on air cleaner cup (34). Install snap ring (32). Place assembly in casing (31), insert air filter screen (30). Install wing nut (26), retaining seal (27), bolt gasket seal (28) and top cover (29) on casing (31).  	

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

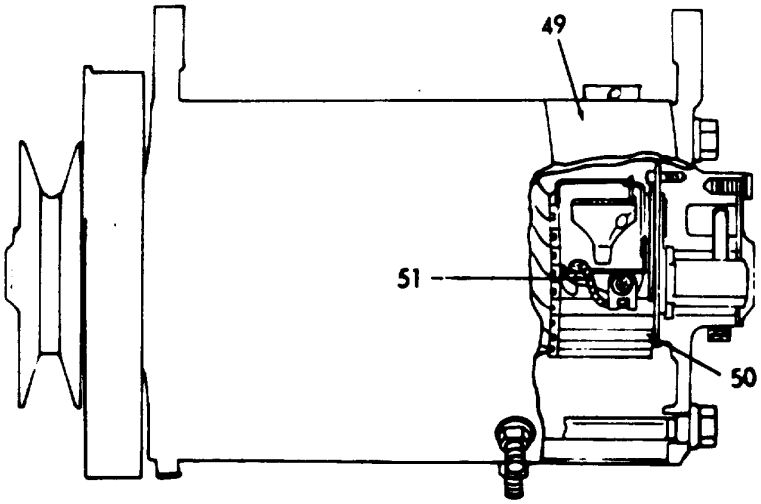
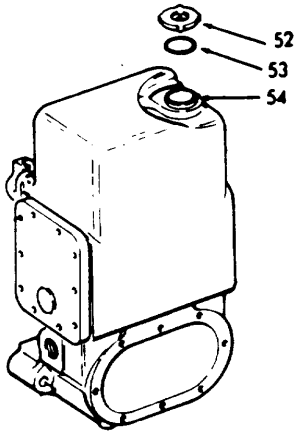
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
156	SEMI-ANNUAL	Engine Room	GENERATOR	Bearings are binding or noisy. Output isn't correct.
				
157	SEMI-ANNUAL	Engine Room	EXPANSION TANK. Remove cap (52) and gasket (53) from the expansion tank (54) and check the coolant 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. 	

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

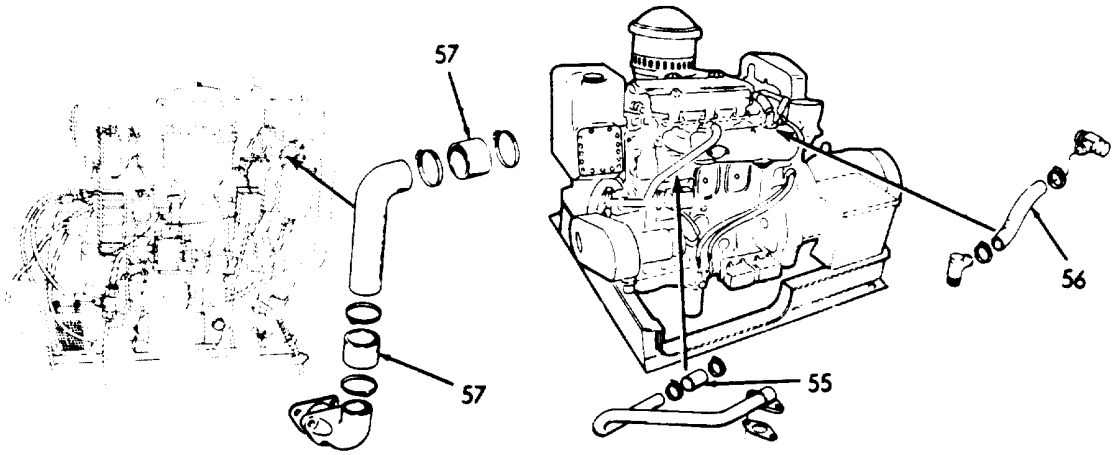
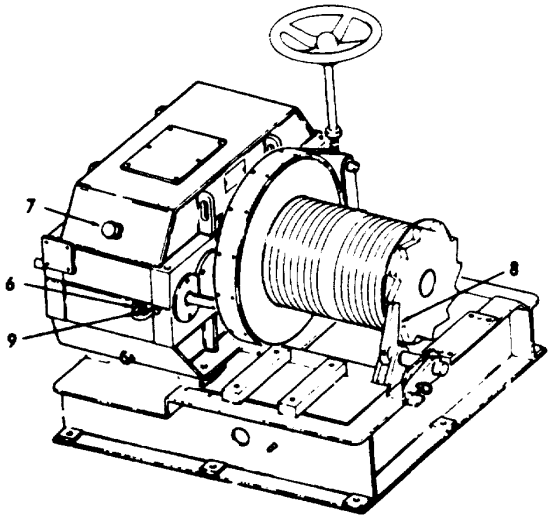
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
158	SEMI-ANNUAL	Engine Room	HOSES. Inspect (visually and by touch) all of the hoses for signs of deterioration. Replace the hoses if necessary. Water By-Pass Hose (55) Water By-Pass Exhaust Manifold Hose (56) Oil Cooler 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 If :
159 Continued			Remove vent plug (7) to add gear oil (MIL-L-2105D, GO 80/90). Capacity one gallon (3.78 liters).	
160	SEMI-ANNUAL	Anchor Winch Compartment	HOSES. Inspect (visually and by touch) all of the hoses for signs of deterioration. Replace the hoses if necessary. Fresh Water Pump Hose (50) Oil Cooler Water Hoses (51) Thermostat Hose (52) Water By-Pass Hose (53) Water By-Pass Hose (54)	Cracked and/or leaking.

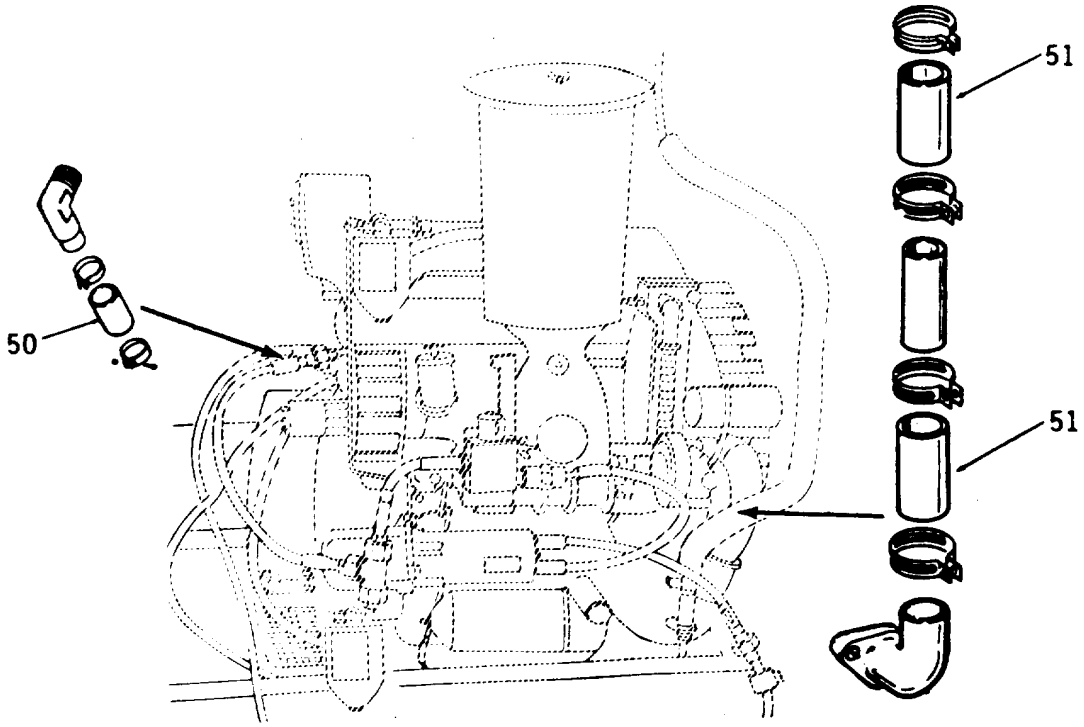
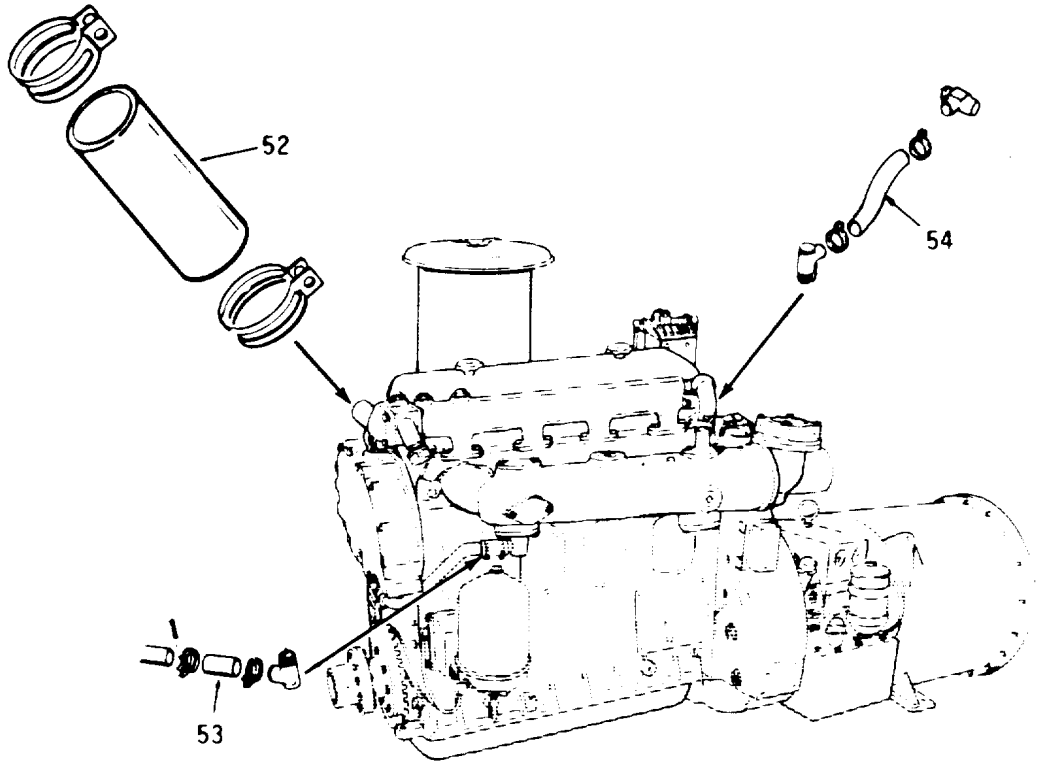


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
160 Continued				



161	SEMI-ANNUAL	AFT/FR 72-75	STEERING LINKAGE. Lubricate ball joints (12) or steering linkage with a few drops of oil (MIL-L-9000H (SH)).	

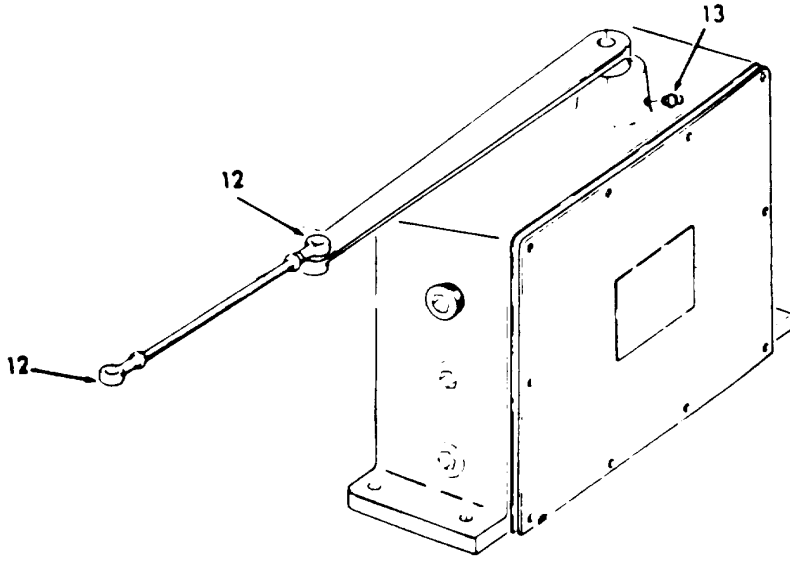


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

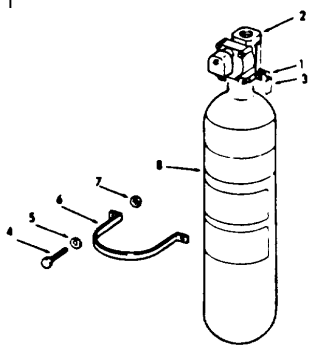
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
162	SEMI-ANNUAL	At SEP. Sites FR 12, FR 48, FR 56	HALON SYSTEM CYLINDER ASSEMBLY (Small Cylinder) **WARNING** Before performing maintenance be sure system is off and that safety pin (1) is inserted in solenoid valve (2). The system is oxygen robbing. The instruction tag (3) should be read before any maintenance is performed on the cylinder assembly. Insert safety pin (1). Remove screws (4), washers (5), bracket (6) and nuts (7) from cylinder (8). **CAUTION** Do not remove cylinder (8) from solenoid valve (2). Weigh the cylinder, valve and nozzle assembly. When filled, the cylinder assembly should weigh 12.5 lbs. (5.68 kg). Replace if below weight. Then replace nuts (7), bracket (6), washers (5) and screws (4). Remove the safety pin (1).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 If :
162 Continued			LARGE CYLINDER **WARNING** 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. 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). Weigh the cylinder and valve assembly. Filled, the assembly should weigh 213 lbs. (97 kg). Replace if below weight. Replace cylinder (16), nuts (15), bracket (14), washers (13), and screws (12). Reconnect tube assembly (11) and phenumatic control head (10). Remove locking pin (9). Turn the system on.	

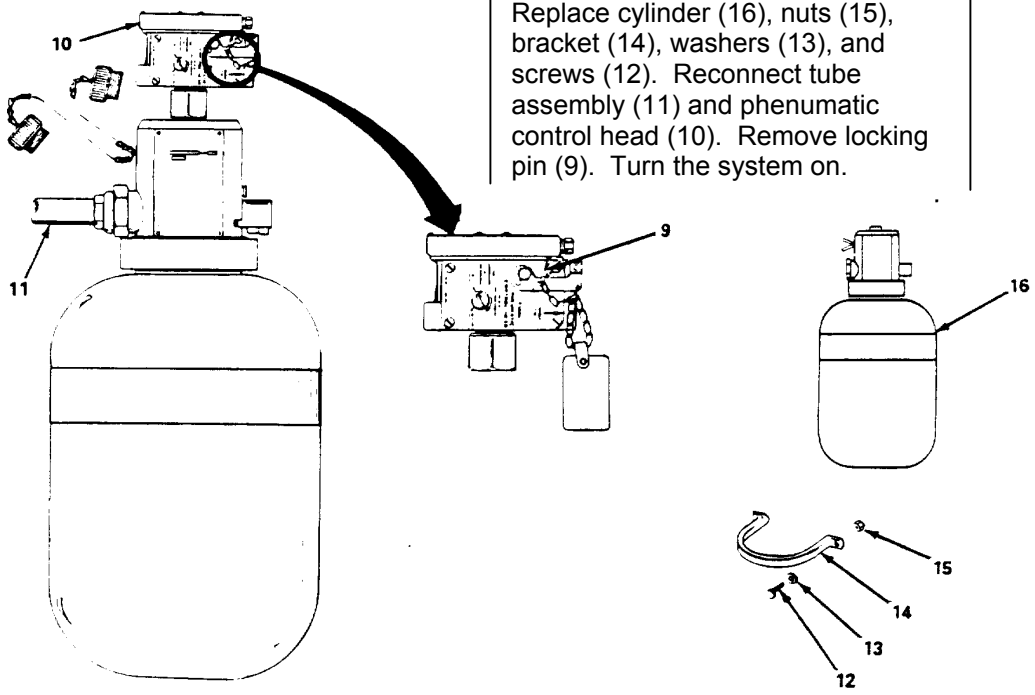


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
163	SEMI-ANNUAL	At SEP. Sites FR 12, FR 48, FR 56	CO_2 DEVICES 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-1 8458B (SH)).	Ports are cracked and/or covers are missing.

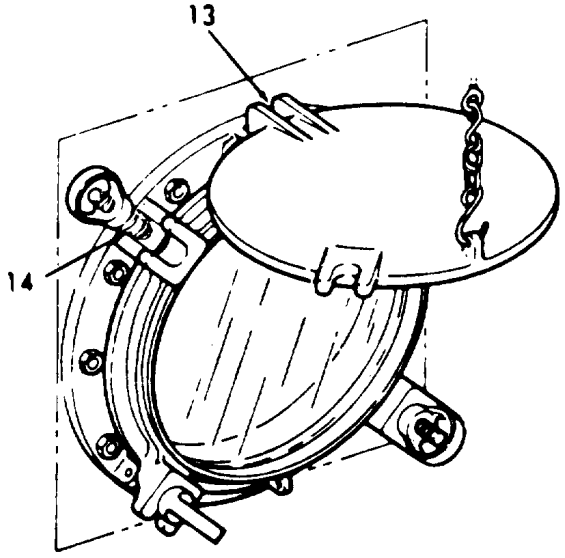


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
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-18458B (SH)).	Bent, jammed and/or non-functioning.

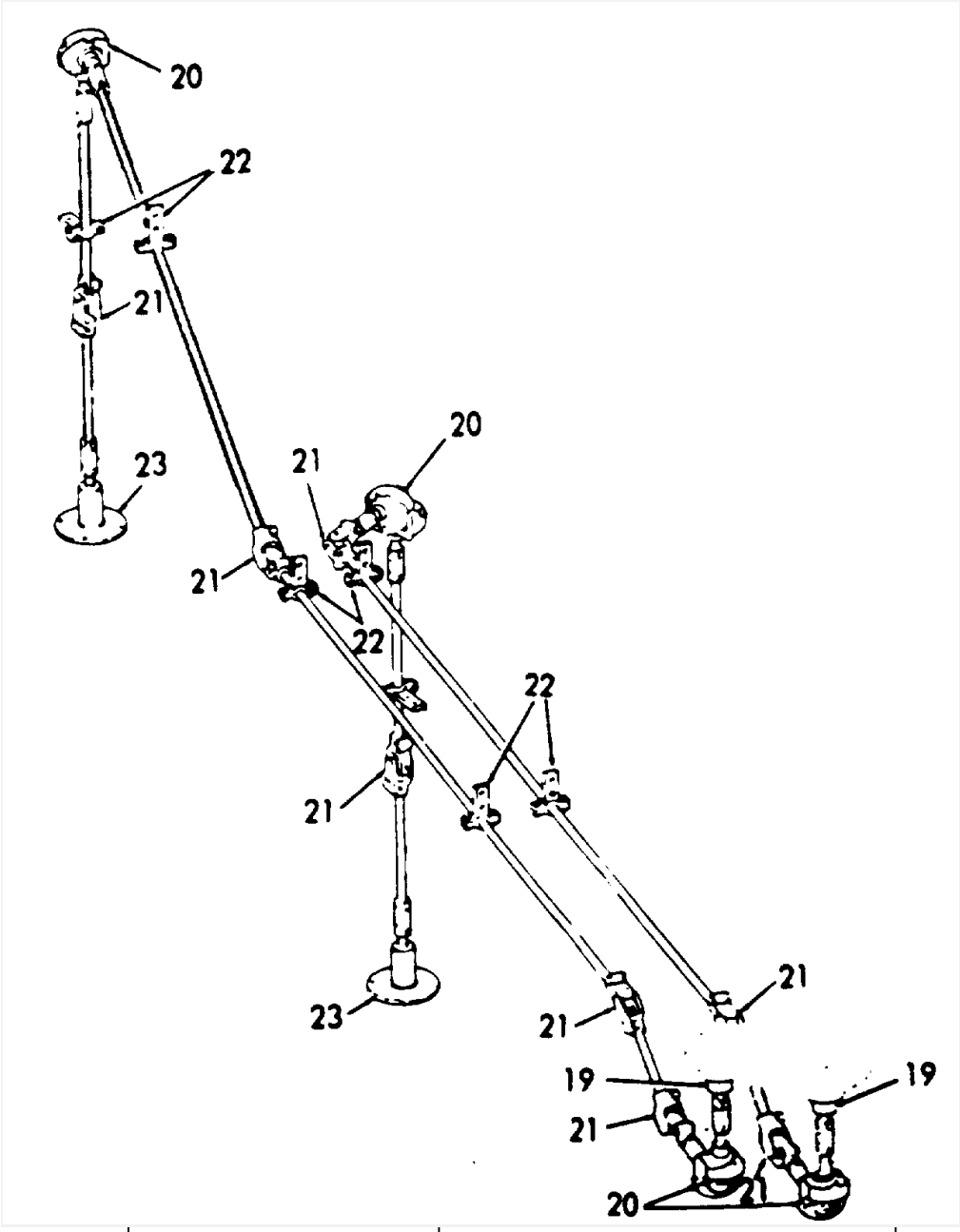


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
166	SEMI-ANNUAL	Equipment General	AIR HORN COMPRESSOR 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.

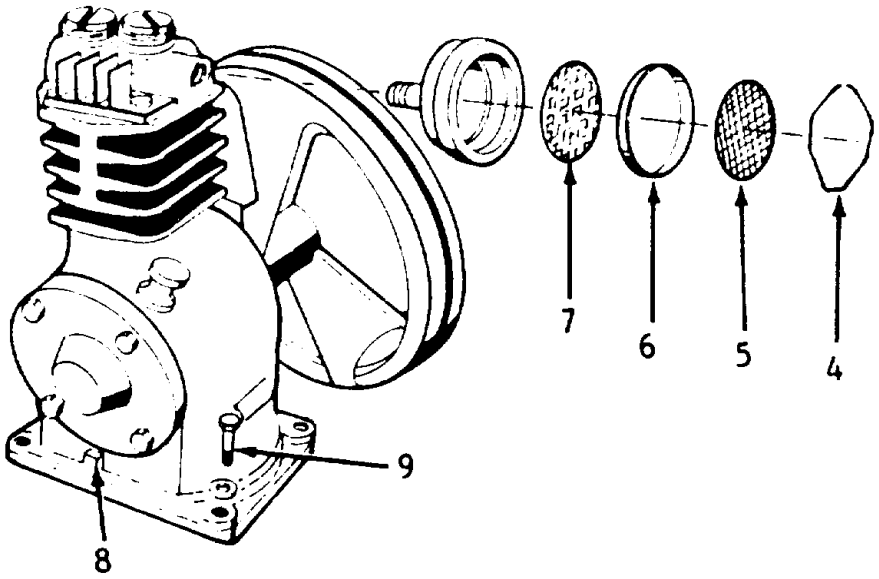


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

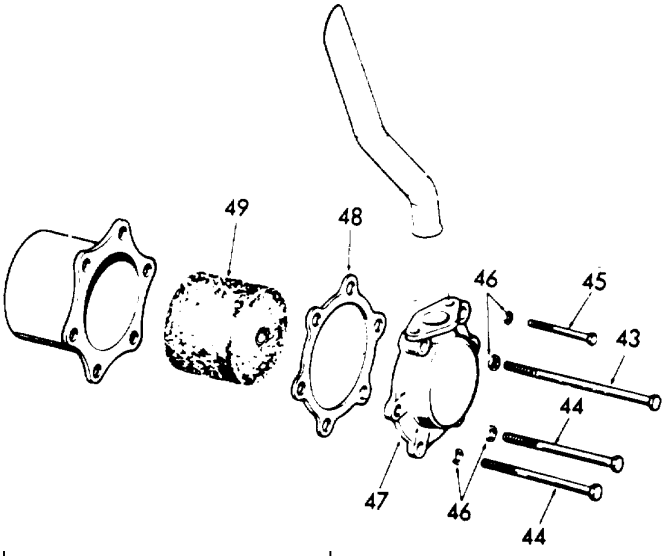
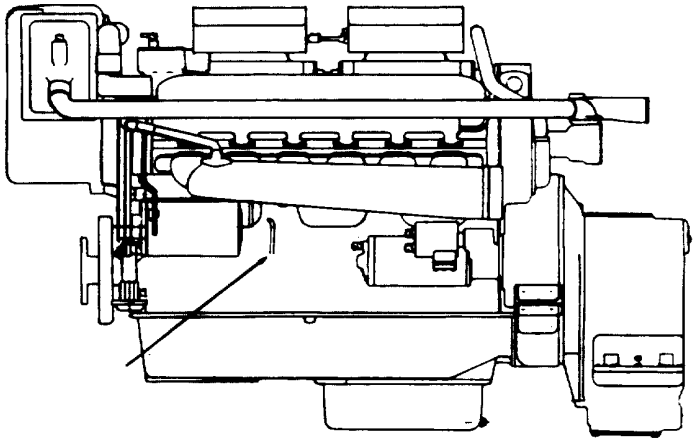
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
167	ANNUAL	Engine Room	VENTILATION. Remove screws (43, 44, 45) and washers (46). Remove cover breather (47), gasket breather (48), and filter (49). Clean the cover breather (47) in clean fuel oil. Install new filter (49) 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	Breather obstructed.
				

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

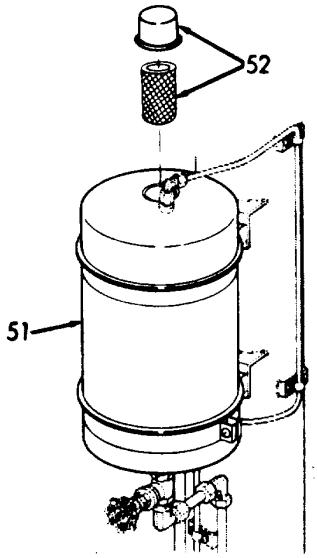
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
169	ANNUAL	Engine Room	HYDROSTARTER RESERVOIR. Drain reservoir (51) and remove breather cap and screen (52). Flush out the reservoir and clean the screen and breather cap. Clean with compressed air. Re-install the screen. **NOTE** Use mineral oil, MIL-L-17672, type 2135 TM. **WARNING** **Use eye protection when using compressed air.** 	Breather obstructed.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

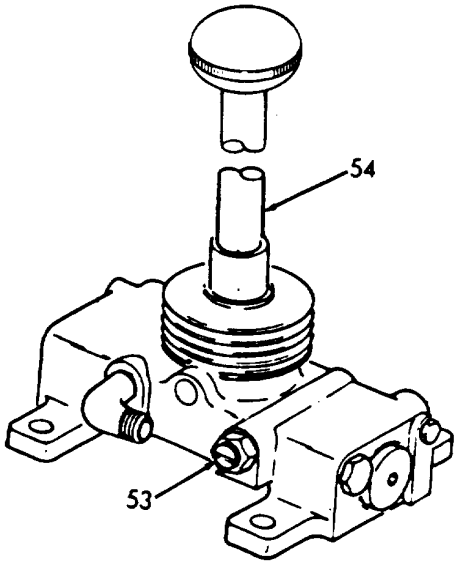
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
170	ANNUAL	Engine Room	HYDROSTARTFR FILTER. **CAUTION** Do not attempt to change filter element until the pressure in the system is released. Release pressure by loosening relief valve (53) on the hand pump (54). Loosen 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. Reinstall in reverse order. **WARNING** **Use eye protection when using compressed air.**  	Filter obstructed.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

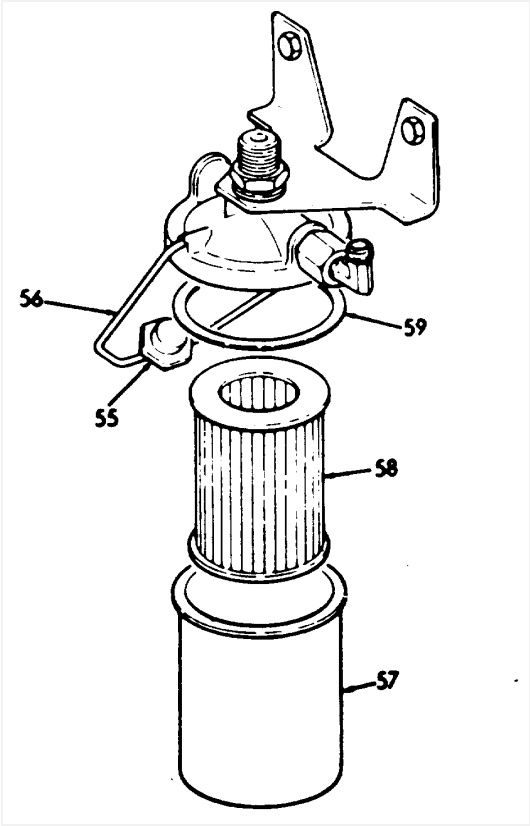
Item No	Interval	Location Item To Check/ Service	Procedure	Not Mission Capable If :
170 Continued			Install new filter (58) and gasket (59) in cup (57). Place bail (56) in position and tighten bail nut (55). Close relief valve (53) on the hand pump (54).	
				
171	ANNUAL	Engine Room	HYDROSTARTER. Remove 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). 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 If :
171 Continued			Apply a grease (MIL-G-24139A (SH)) on drive clutch pinion (65) so that it will slide freely while compressing spring. Also apply grease to the fingers of clutch fork (66) and spool of clutch yoke (67). Remove pipe plug (68) from starting motor drive housing (64) and saturate shaft oil wick (69) with engine oil. Reinstall the plug (68). After lubricating, install starting motor on the flywheel housing and recharge the accumulator with the hand pump.	

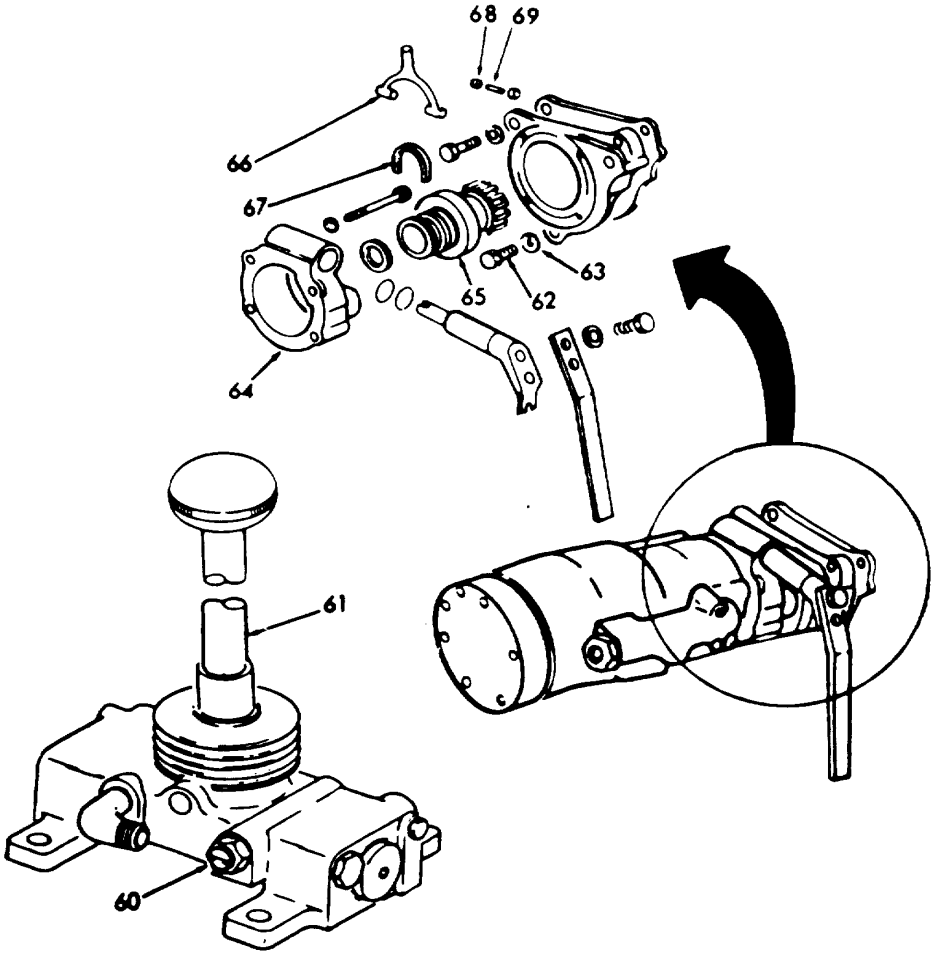


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

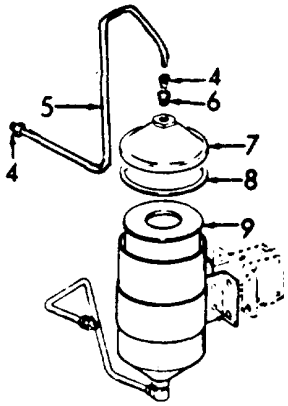
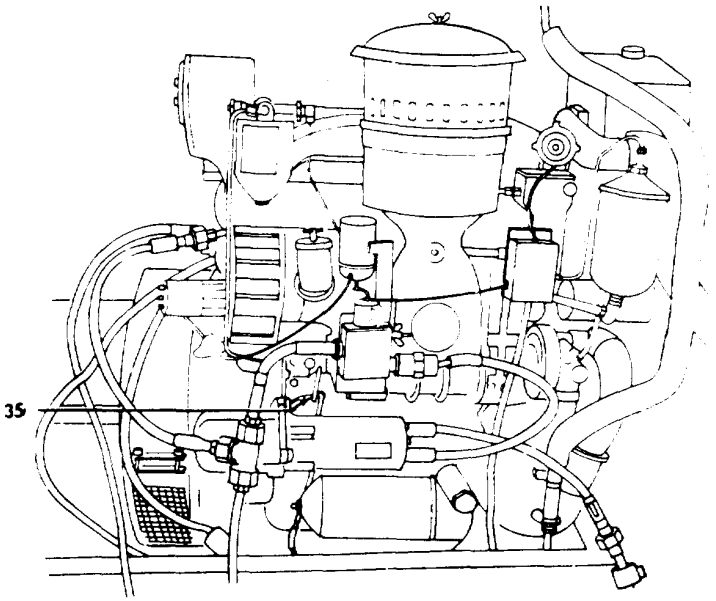
Item No	Interval	Location Item To Check/ Service	Procedure	Not Fully Mission Capable If :
172	ANNUAL	Engine Room	GOVERNOR OIL FILTER. Remove straight adapter (4), overflow reservoir tube (5), and pipe reducer (6). Remove cover (7), gasket (8) and filter (9). Install new filter (9) and gasket (8). Replace 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 dogged, 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

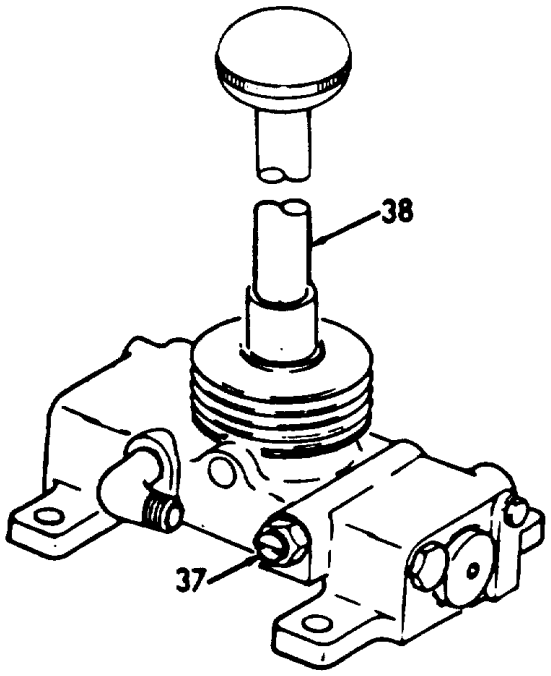
Item No	Interval	Location Item To Check/ Service	Procedure	Not Fully Mission Capable If :
174	ANNUAL	Engine Room	HYDROSTARTER SYSTEM. Refer to Table 2-1 for maintenance on the Hydraulic Reservoir. Remove the Hydrostarter from the Generator for lubrication. Before removing the Hydrostarter release the 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.	
				
			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 dutch fork (43) and on the spool of clutch yoke (44).	

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

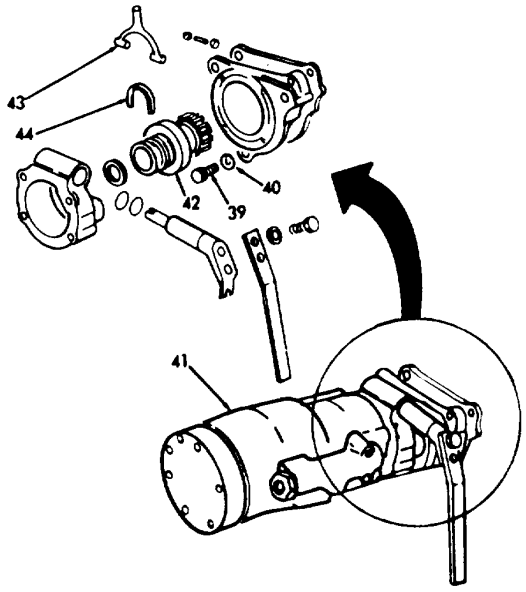
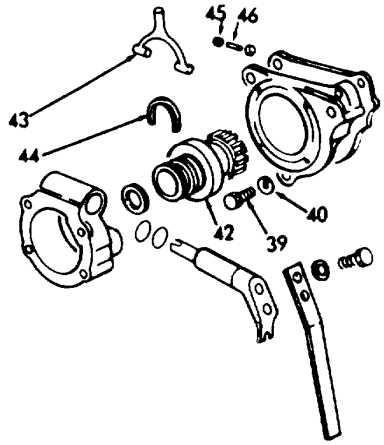
Item No	Interval	Location Item To Check/ Service	Procedure	Not Fully Mission Capable If :
174 Continued			 Remove pipe plug (45) from starting motor drive housing and saturate shaft oil wick (46) with engine oil. (MIL-L-9000H (SH)). Reinstall the plug (45). After lubricating, install starting motor on the flywheel housing and recharge the accumulator with the hand pump. Make sure relief valve is secure. 	

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item To Check/ Service	Procedure	Not Fully Mission Capable If :
175	ANNUAL	Engine Room	GENERATOR. 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). **WARNING** **Use eye protection when using compressed air.**	Fails to function.

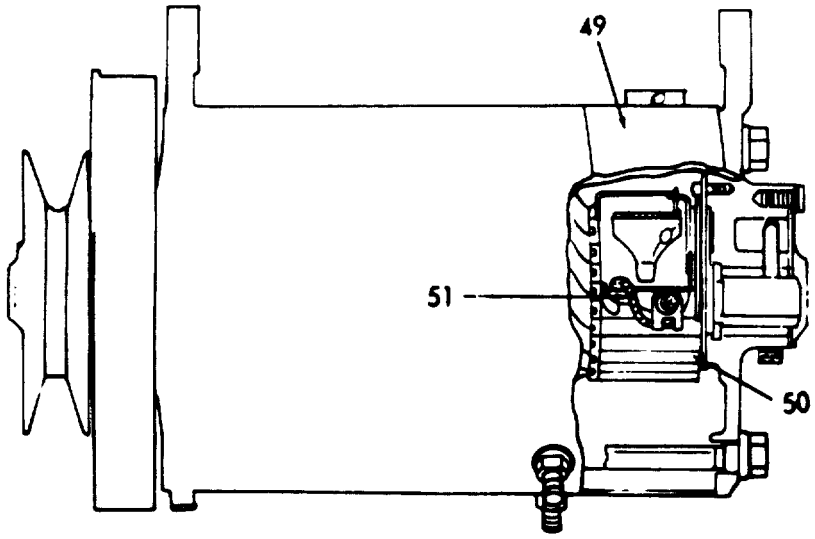


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item To Check/ Service	Procedure	Not Fully Mission Capable If :
176	ANNUAL	Engine Room	MOTORS-LARGE. These instructions apply to the following motors only: Fire Pump Salt Water Circulating Pump Reduction Gear Lube Oil Pump Air Compressor Remove plugs. Lubricate bearings at holes with grease (MIL-G-24139A (SH)). 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 (MILG-24139A (SH)).	

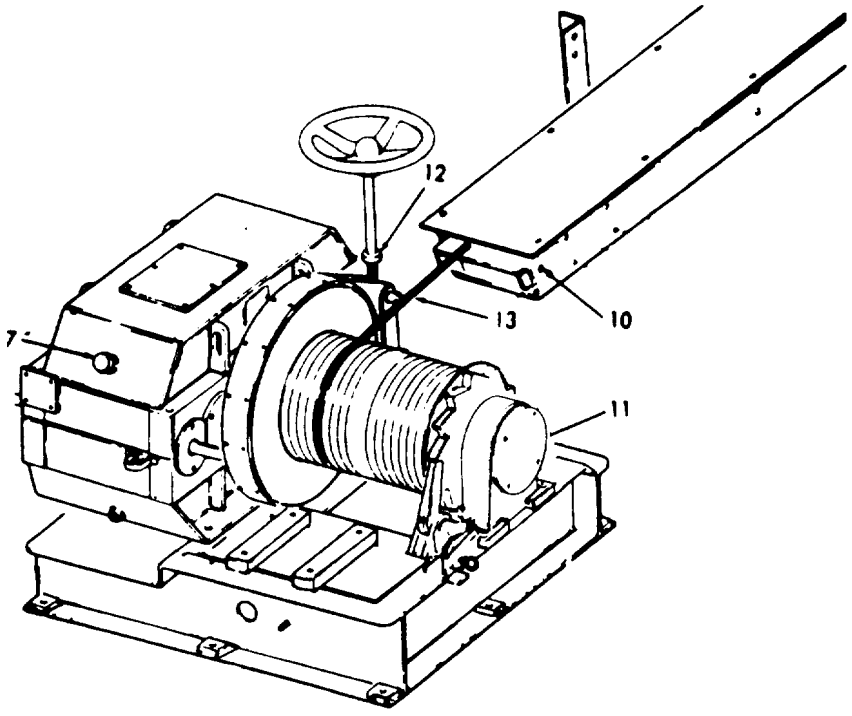


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

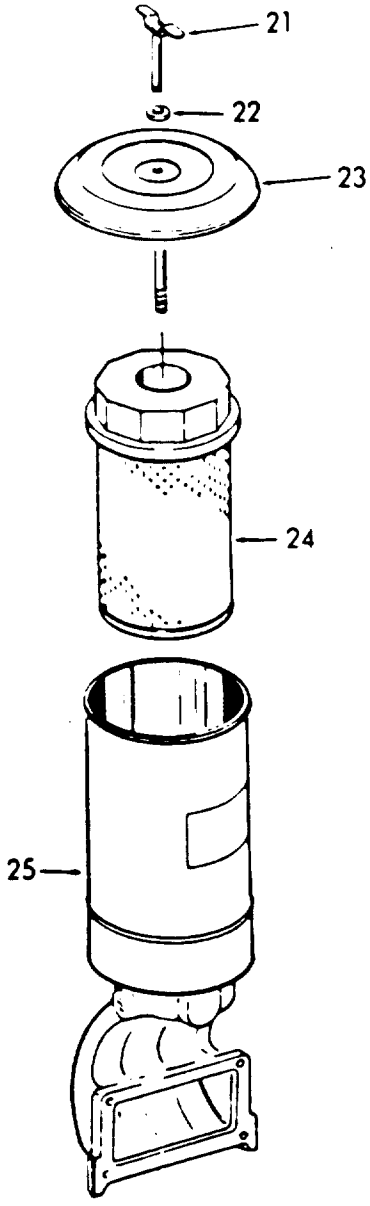
Item No	Interval	Location Item To Check/ Service	Procedure	Not Fully Mission Capable If :
178	ANNUAL	Anchor Winch Compartment	AIR CLEANER. Replace air filter element (24). 	

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item To Check/ Service	Procedure	Not Fully Mission Capable If :
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. **WARNING** **Use eye protection when using compressed air.**	

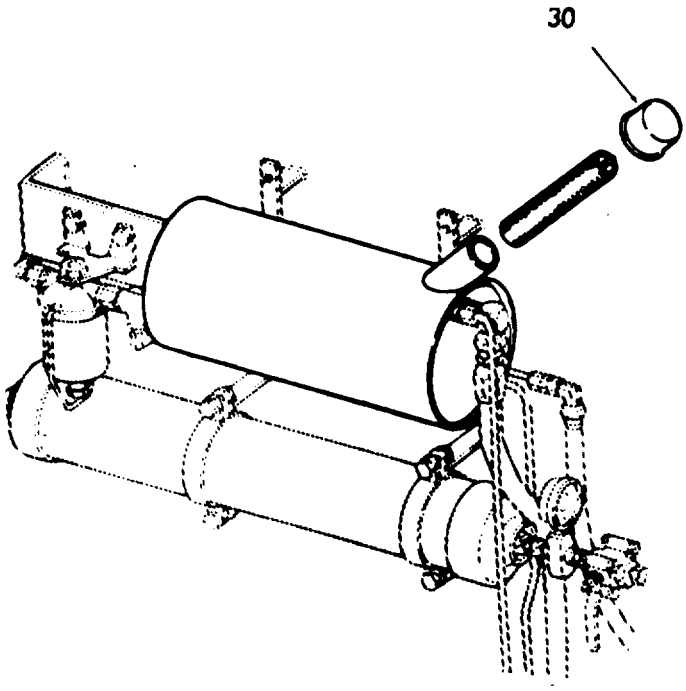
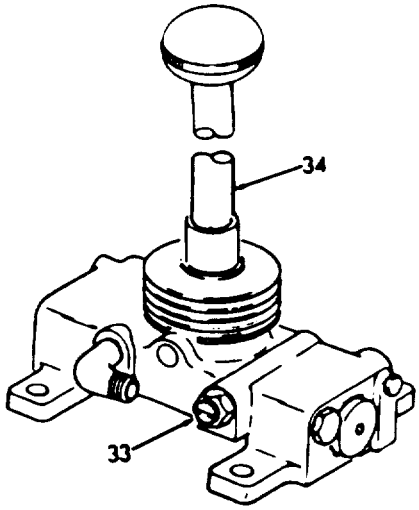


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item To Check/ Service	Procedure	Not Fully Mission Capable If :
180	ANNUAL	Anchor Winch Compartment	HYDROSTARTER FILTER. **CAUTION** **Do not attempt to change filter element until system pressure is released.** 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 filter and gasket. Clean cup (37) with compressed air. Reinstall in reverse order. 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).	



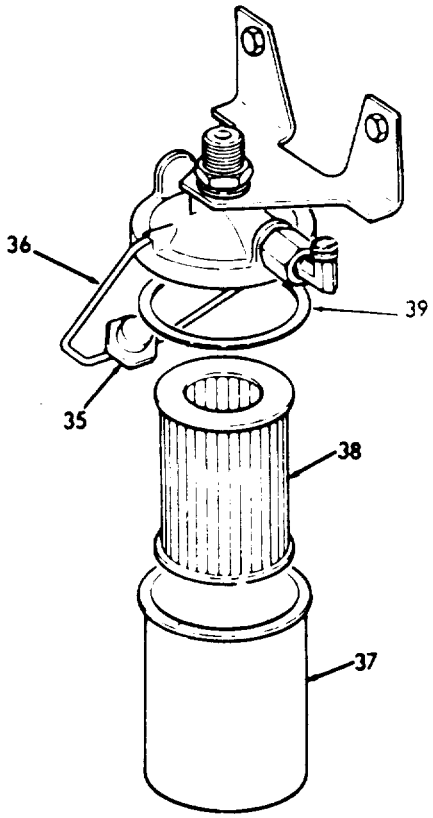
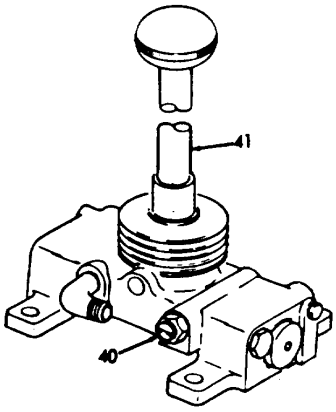


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item To Check/ Service	Procedure	Not Fully Mission Capable If :
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). 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. 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). Remove pipe plug (48) from starting motor drive housing (44) and saturate shaft oil wick (49) with engine oil. Re-install the plug (48). After lubricating, install starting motor on the flywheel housing and recharge the accumulator with the hand pump.	



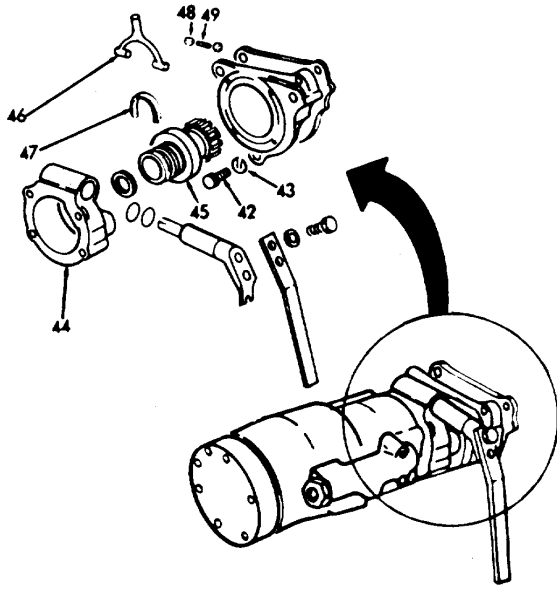


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item To Check/ Service	Procedure	Not Fully Mission Capable If :
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. **NOTE** Do not drain oil into bilges. Use oil separation/recovery system to collect the drained oil. Remove screws (37), washers (38), cover (39) and gasket (40). Unscrew strainer (41). Clean with fuel oil and dry with compressed air. **WARNING** **Use eye protection when using compressed air.** Clean inside of hydraulic tank with clean cloths. Replace strainer (41). Using a new gasket (40), replace cover (39), washers (38) and screws (37). 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. 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 Fully Mission Capable If :
182 Continued				

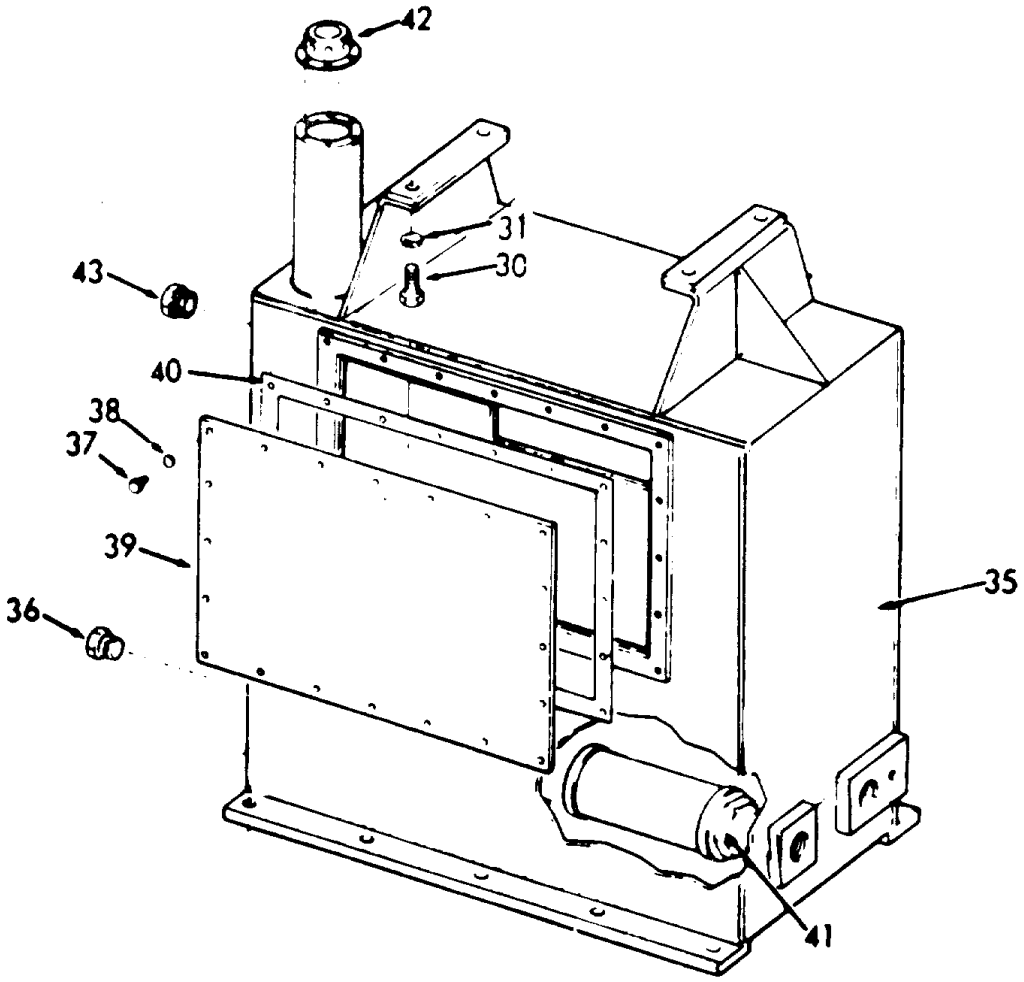
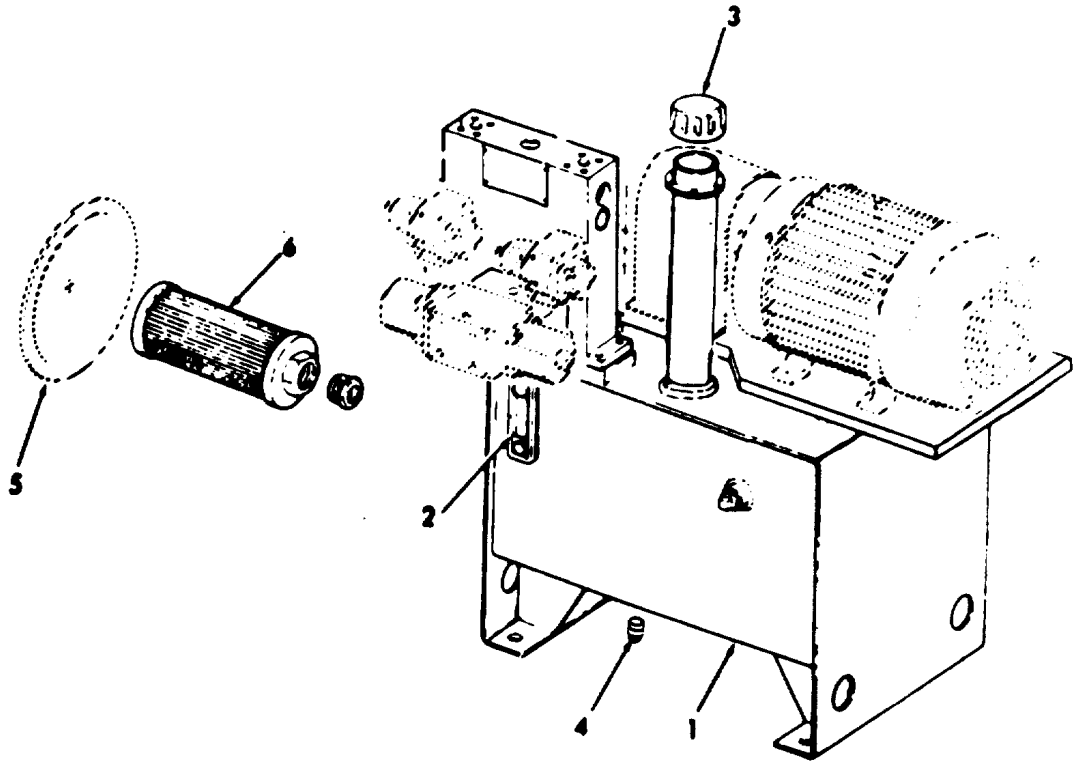


Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - continued

Item No	Interval	Location Item To Check/ Service	Procedure	Not Fully Mission Capable If :
183	*ANNUAL	Engine Room	CHANGE THE HYDRAULIC FLUID. This should be done by first operating the hydraulic system until the hydraulic fluid is warm. Then stop the pump unit and remove drain plug (4) located beneath the hydraulic reservoir (1). Drain the hydraulic fluid into a suitable container. **NOTE** Do not drain oil into bilges. Use the oil separation and recovery system to collect drained oil. 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 fluid 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 Fully Mission Capable If :
183 Continued			**NOTE** Be sure strainer is free of diesel oil before replacing. Remove filler breather cap (3) and refill hydraulic reservoir (1) with hydraulic fluid. **NOTE** Hydraulic fluid used in the pump unit is MIL-H-46170, FRH, Type 1. Replace filler breather cap (3). Operate the system and maintain the reservoir oil level. **CAUTION** 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). 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:

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General, United States Army
Chief of Staff

Official:

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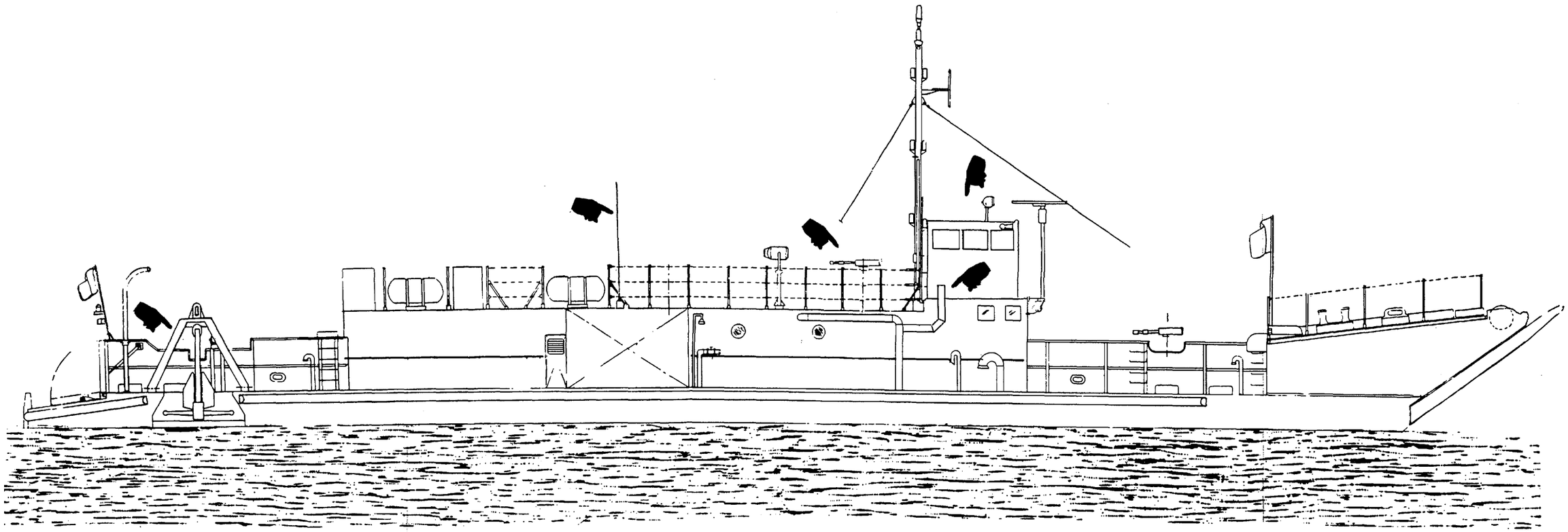

Figure FO-1. Overall View.

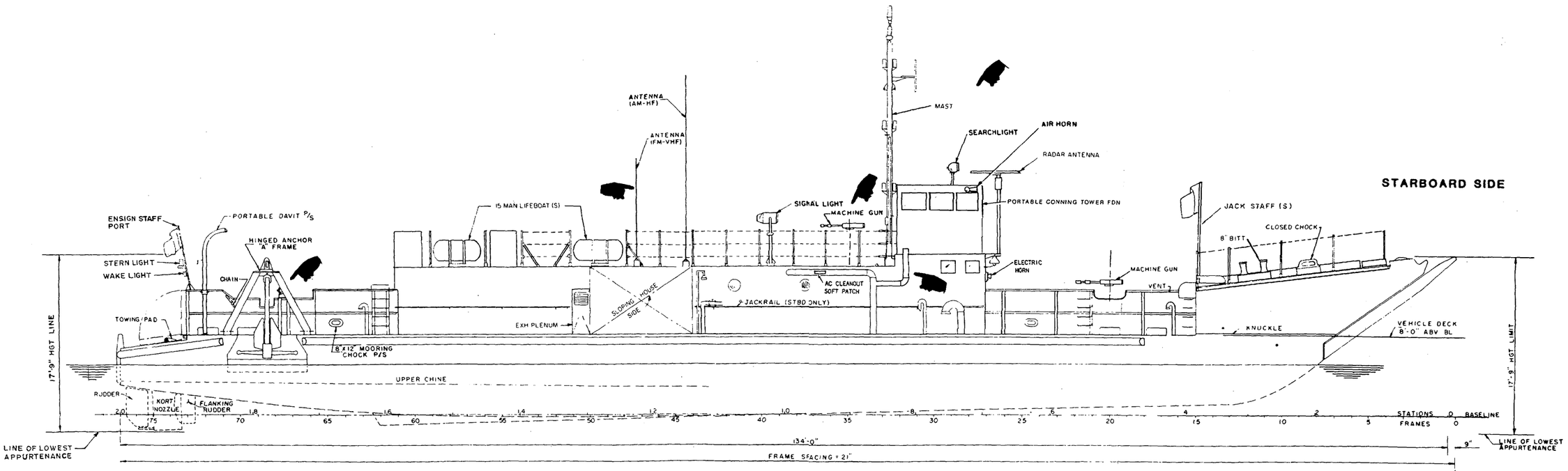

Figure FO-2. Starboard View.

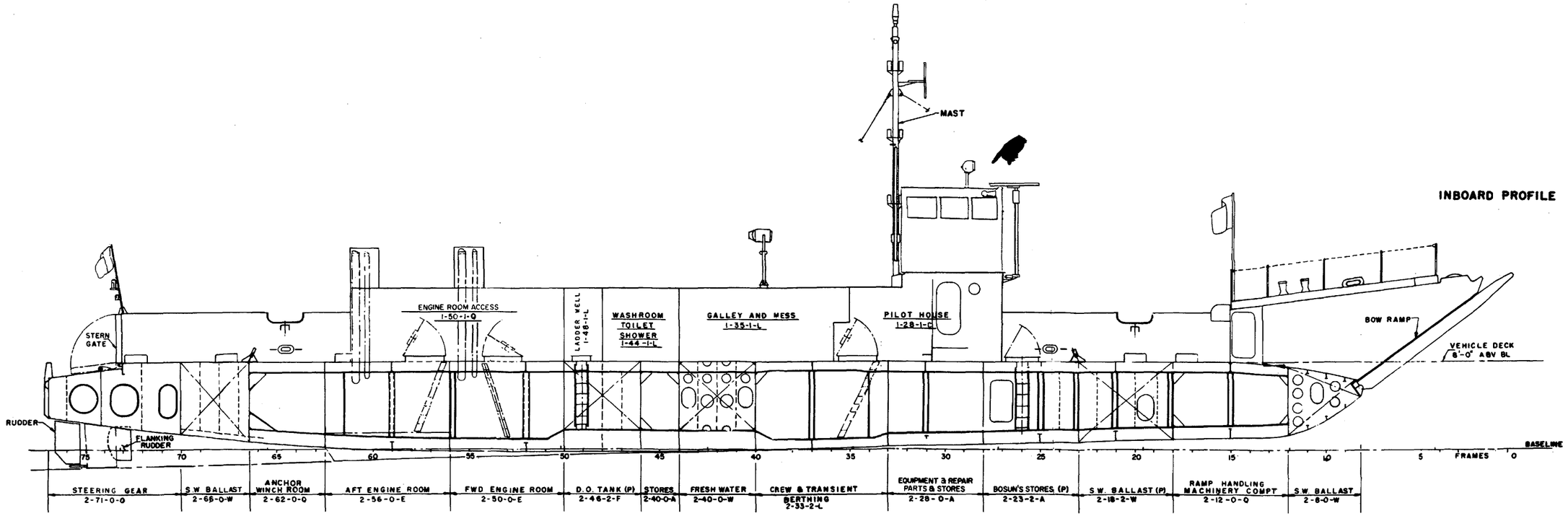

Figure FO-3. Inboard Profile View of Stbd Side

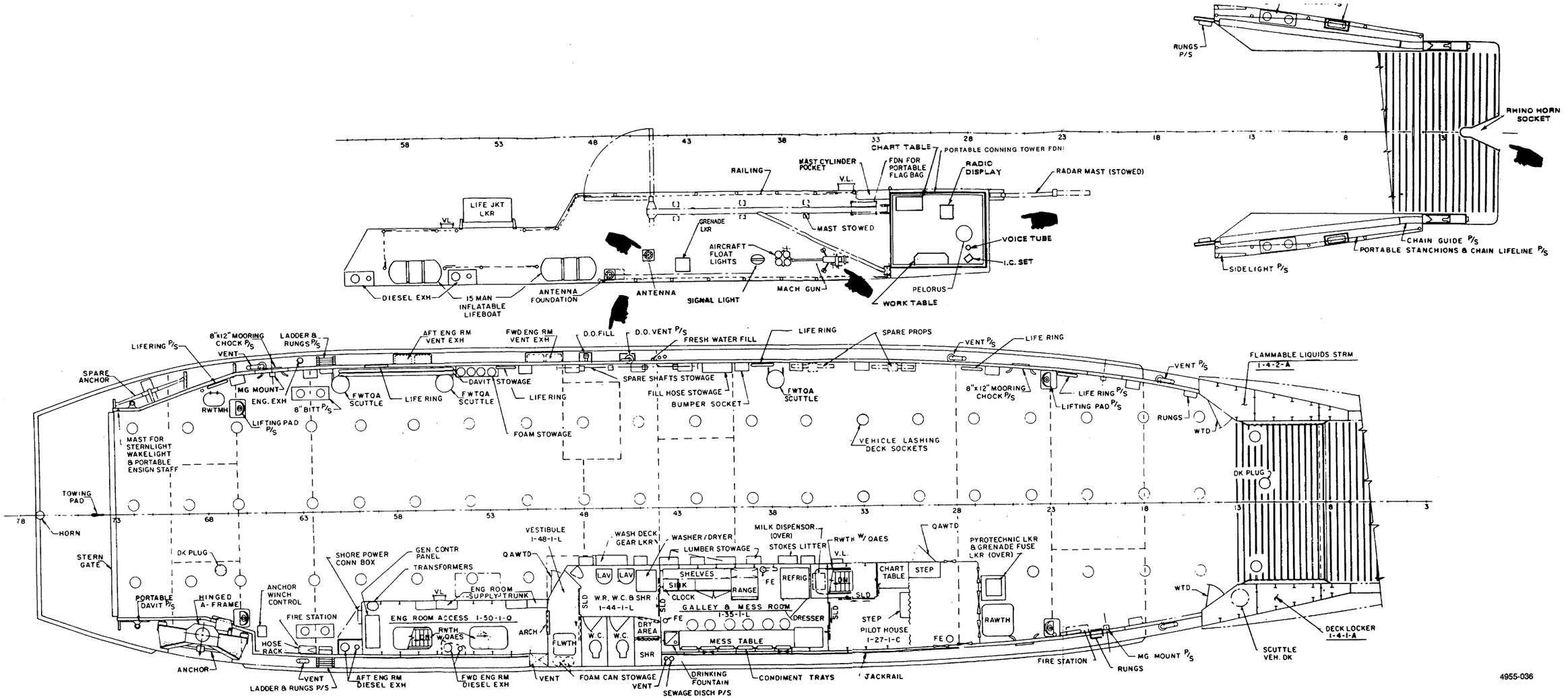

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Figure FO-4. House and Vehicle Deck.

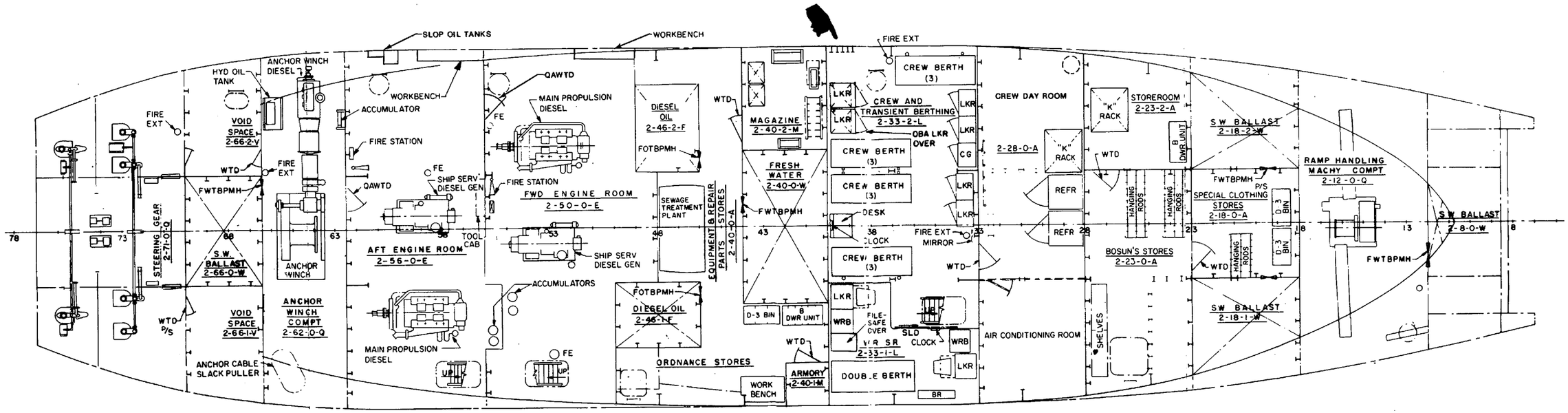

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Figure FO-5. BELOW DECK OF LANDING CRAFT..

1. RHINO HORN - Used when a causeway between two vessels is made. (See Figure 1-7).

2. TOWING PAD - Used when towing another vessel. (See Figure 1-8).

3. TOWING BRIDLE - Used for towing. (See Figure 1-8).

4. LIFTING PAD - Used when lifting vessel for transportation on another ship.

5. BUMPER SOCKET - Place to secure bumper (fender) when tying two ships together.

6. MOORING CHOCK - Through the bulkhead access for mooring lines. Lines are secured by horns.

7. BITT - For securing mooring lines.

8. CHOCK - Guide for mooring line.

9. RHINO HORN SOCKET-Hole in bow ramp used when a causeway between two vessels is made. (See Figure 1-7).

10. JACK RAIL - Hand rail on outboard side of vessel, can also be used to secure bumpers.

11. DECK SOCKET - Sockets located in the deck for securing vehicles. (See Figure 1-9 for lashing gear).

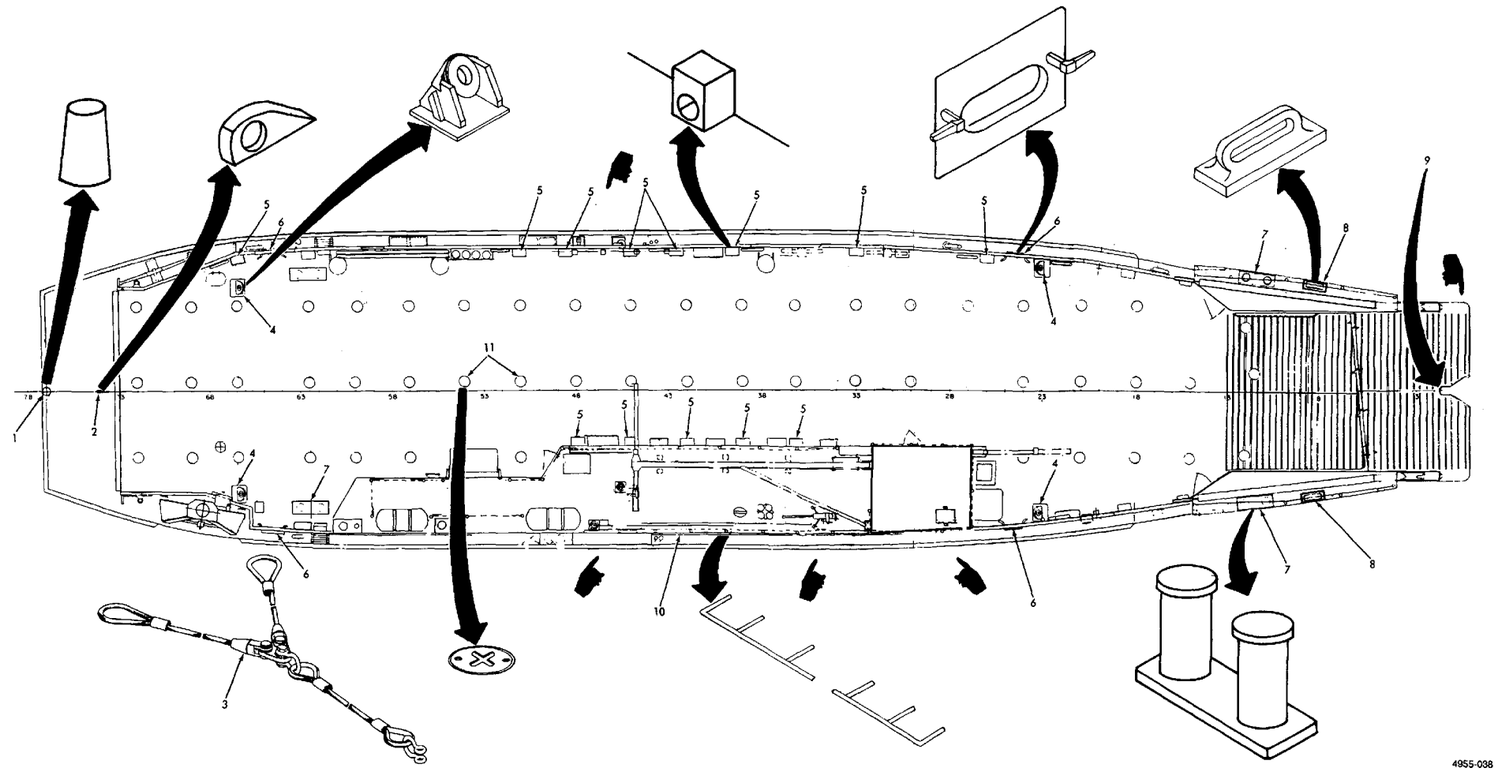


Figure FO-6. Mooring, Towing, Causeway Fittings and Lashing Gear

1- LIFE RING - Portable life ring used to throw to man overboard.
2- PYROTECHNIC LOCKER - Locker containing signal flares, 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.

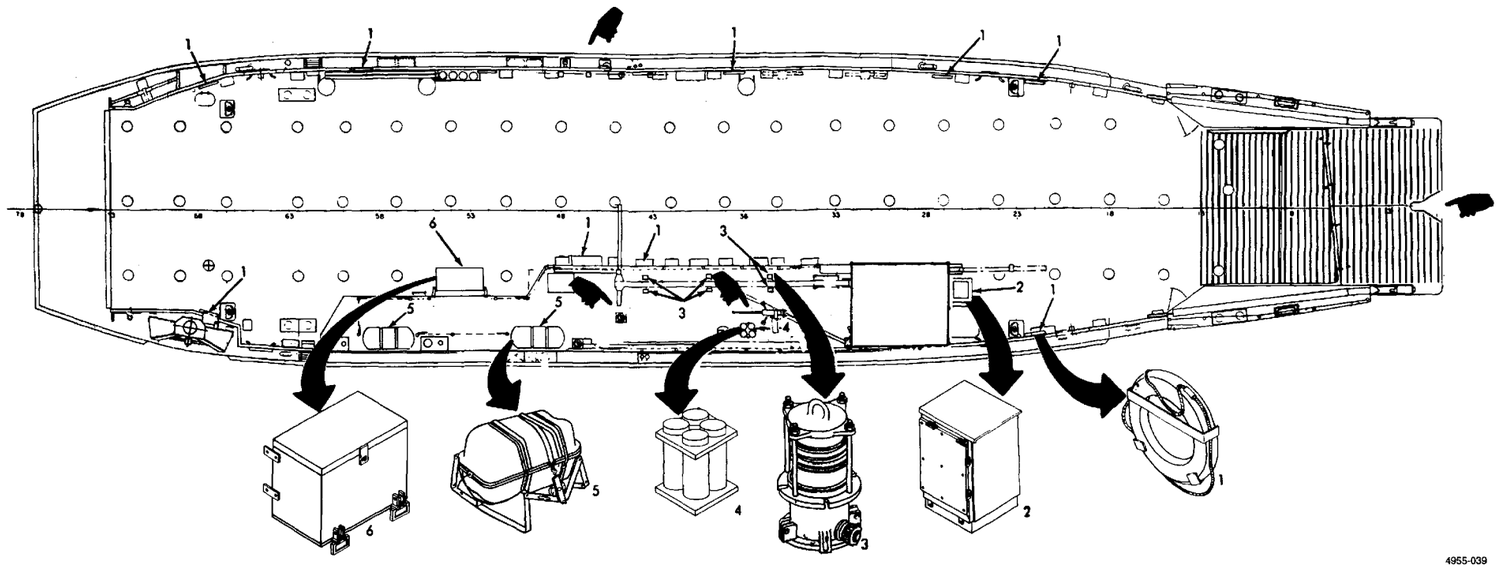


Figure FO-7. Emergency/Life Saving Equipment

1- READY SERVICE LOCKER - Locker containing ammunition for machine gun.
2- MACHINE GUN - Mount for .50 Cal machine gun.
3- GRENADE-LOCKER FUSE
4- GRENADE LOCKER

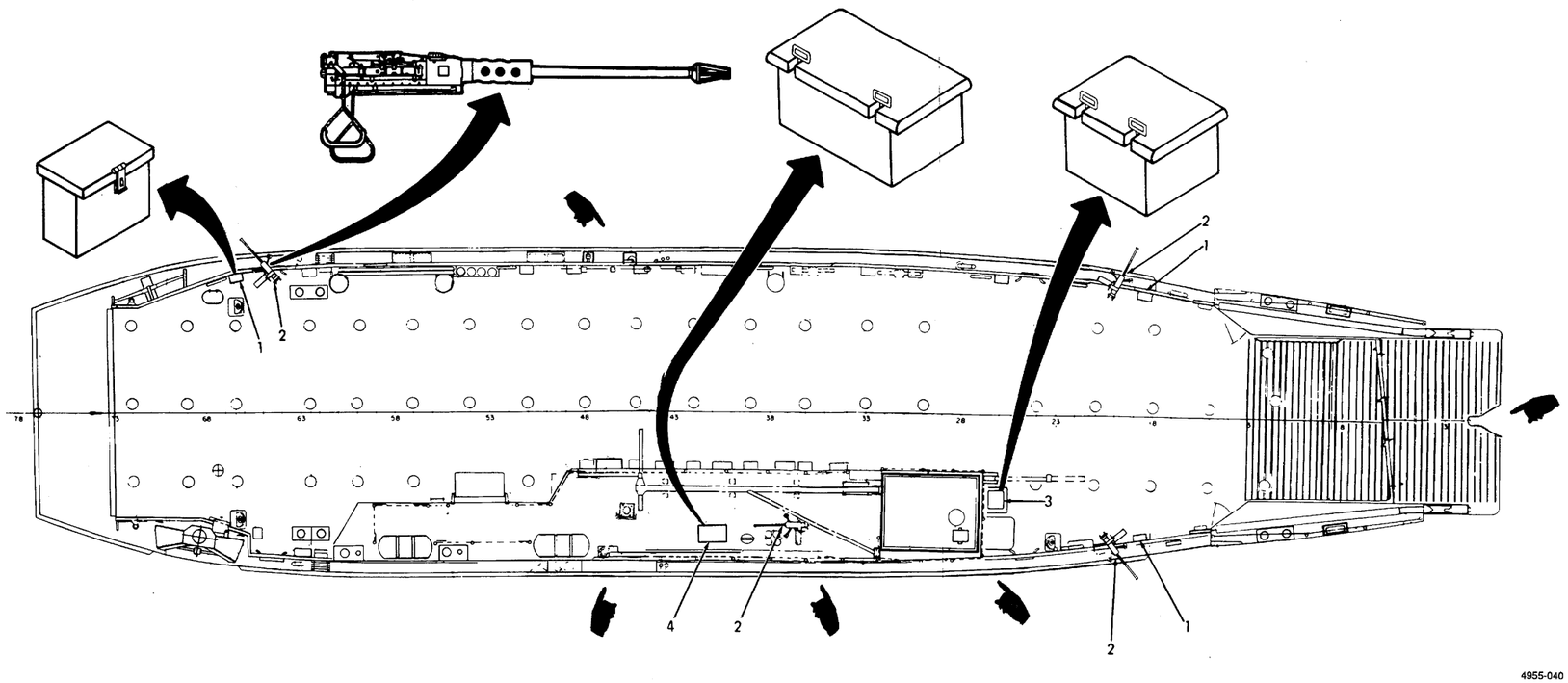


Figure FO-8. Machine Gun Ammunition and Grenade Lockers

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.

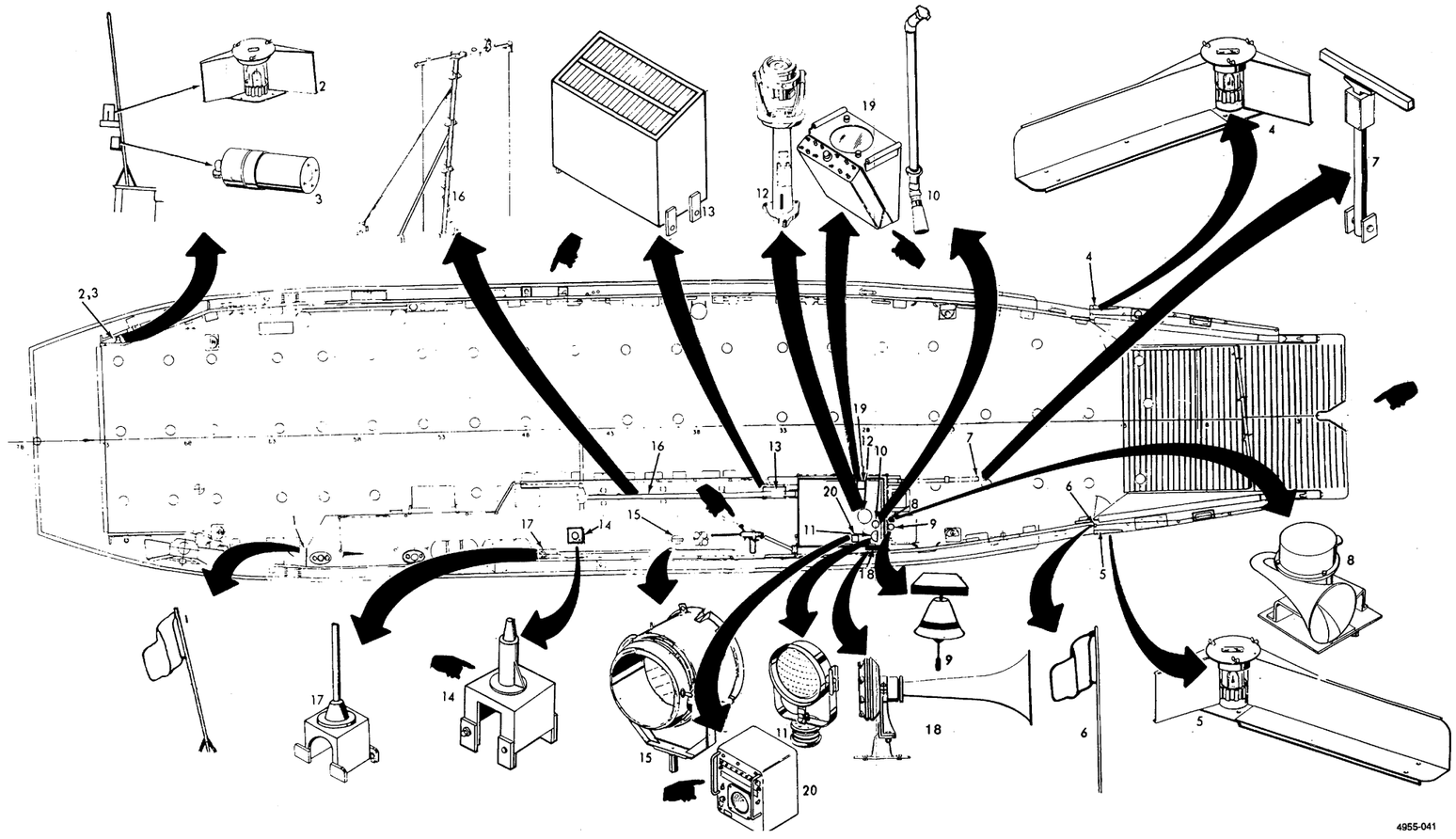


Figure FO-9. Running Lights, Peloris, Masts and Ensigns.

First Aid Equipment.

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.

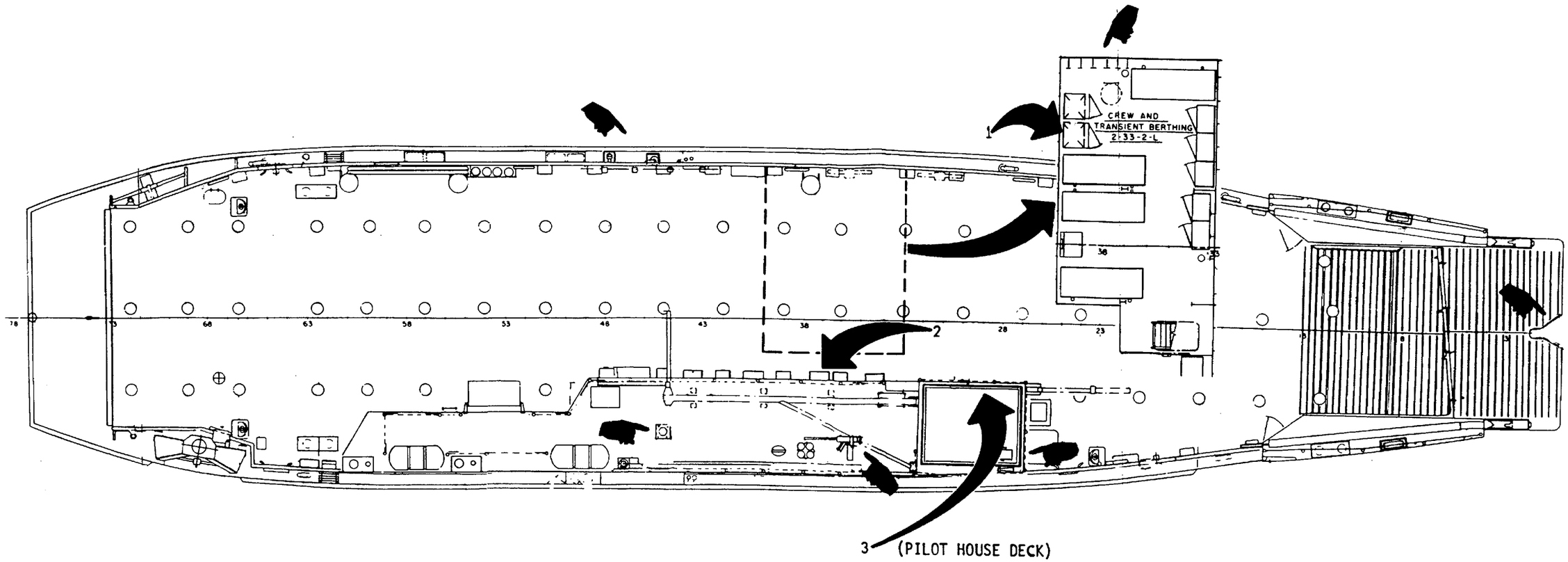


Figure FO-10. First Aid Equipment.

1- SPARE ANCHOR - Extra anchor to replace anchor at anchor "A" frame.
2- MANHOLE - Access to void space (2-66-2-V).
3- ANCHOR WINCH ENGINE EXHAUST - Exhaust of anchor winch engine.
4- LADDER - Ladder over bulkhead.
5- SCUTTLE - Emergency exit from aft engine room (2--56-0-'), for ward engine room (2-50-0-E), crew berthing compartment (2-33-2-L3and in crew area (2-28-2-L).
6- EXHAUST VENT - Exhaust ventilator fan duct for aft engine room (2-56-0-E) and forward engine room (2-50-0-E).
7- SPARE SHAFT STOWAGE - Spare propeller shafts.
8- HOSE STOWAGE - Locker for fresh water hose.
9- SPARE PROPS - Spare propellers.
10- SCUTTLE - Access to bow ramp winch room (2-12-0-Q) located in deck locker (1-4-I-A).
11- SOUND POWERED PHONE STATION - Location of sound powered phone, call switch, and cease fire horn. Located at each machine gun local tion and at anchor winch station.
12- HATCH - Access hatch to stowage compartment (2-23-0-A and 13-0-A).
13- LADDER - Access to upper deck.
14- LUMBER STOWAGE - Storage area for lumber.
15- WASH DECK GEAR LOCKER - Locker for storage of gear.
16- VENT - Ventilator fan for forward engine room (2-50-0-E).
17- EXHAUST - Exhaust for the propulsion engines and generator engines located in the engine rooms.
18- SHORE POWER CONNECTION BOX - Box connecting shore power to the vessel while in port.
19- GENERATOR EMERGENCY SHUT DOWN - Pull lever to shut down the diesel engine generators.

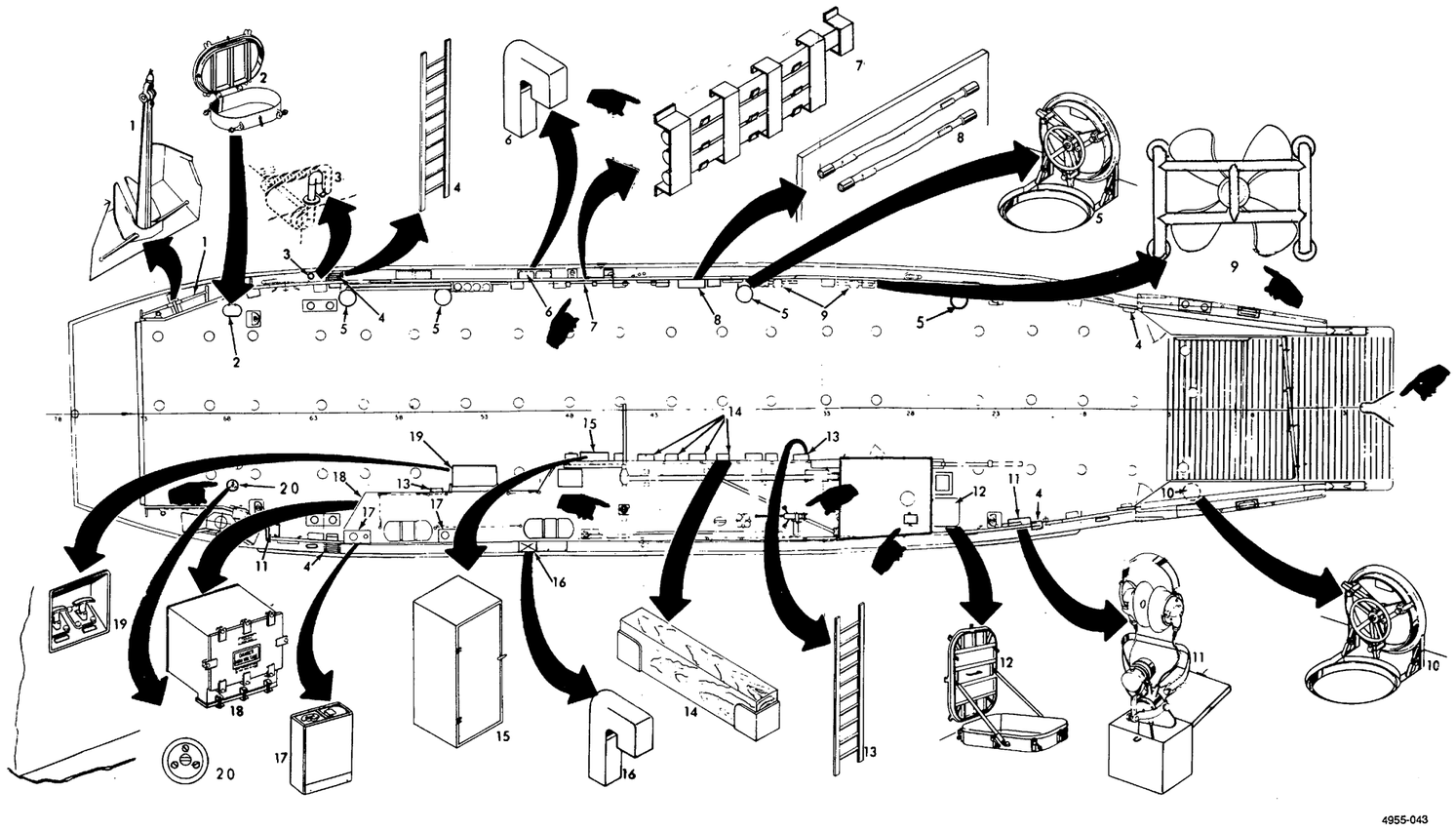


Figure FO-11. Cargo Deck (Miscellaneous Components).

Fills, Vents, Sounding Tubes And Deck Access
To Reach Rods.

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 - Reach rod shut off handwheels located at Frame 33 in Crews Berthing.
10. SEA WATER BALLAST TANK SOUNDING TUBES PORT/STBD
11. FORE PEAK SEA WATER BALLAST TANK DECK ACCESS - Provides additional access to fill either tank by fire hose after removing deck plug, or by gravity. To empty, use portable fire pump or gravity.
12. FRESH WATER VENT
13. STBD DIESEL OIL VALVE DECK ACCESS
14. PORT DIESEL OIL VALVE DECK ACCESS
15. BILGE SUCTION HEADER ISOLATION - Reach rod shut off handwheel located at Frame 56, Aft Engine Room.
16. AFTER/PEAK SEA WATER BALLAST TANK SOUNDING TUBE

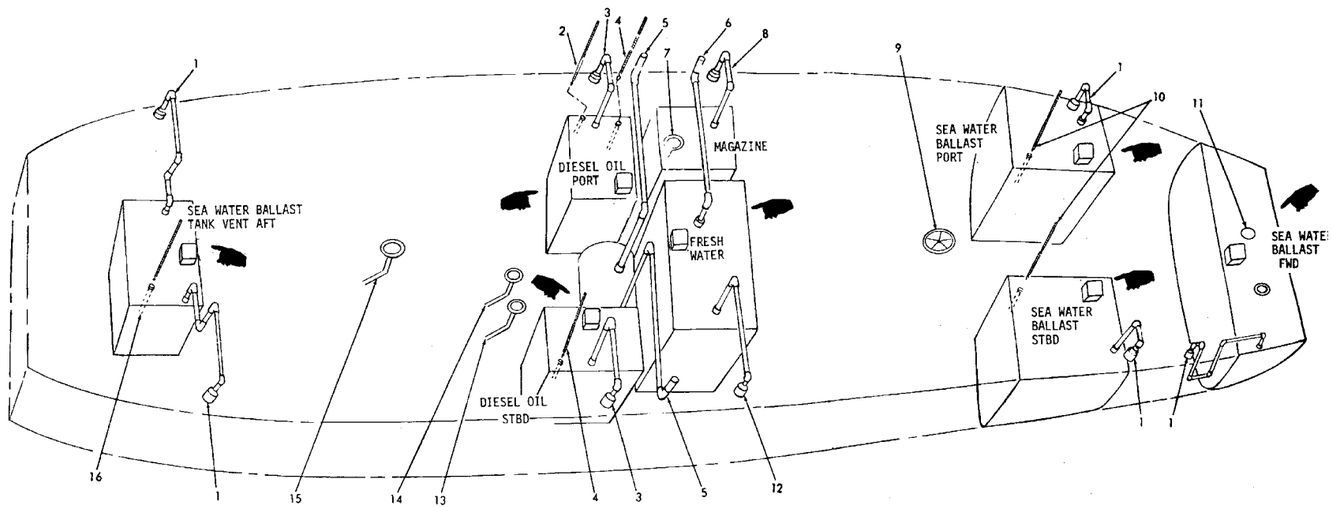


Figure FO-12. Fills, Vents, Sounding Tubes And Deck Access To Reach Rods.

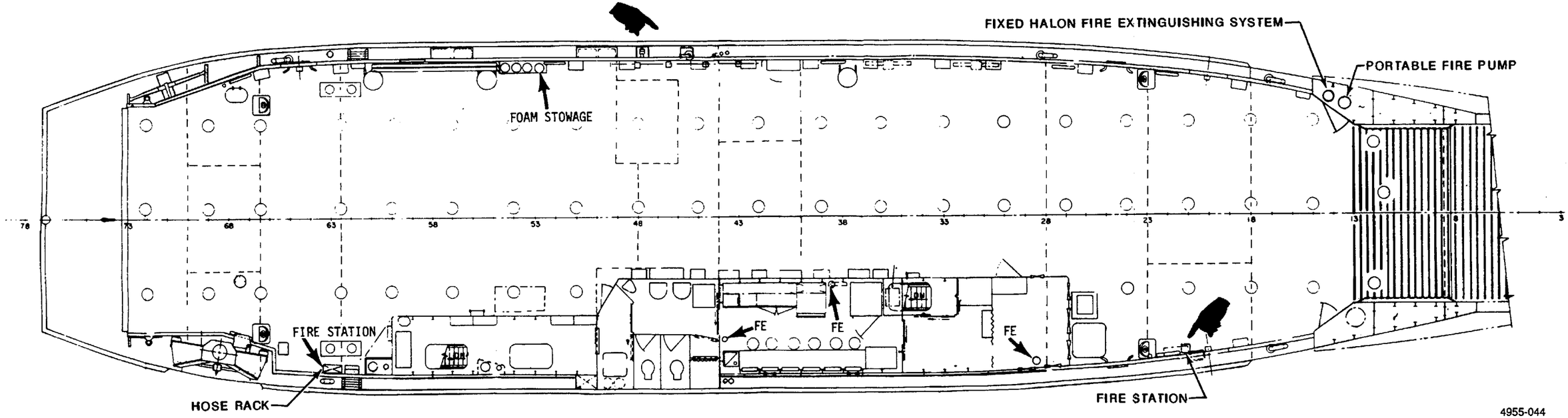


Figure FO-13.1. Fire Fighting Components (Sheet 1 of 2).

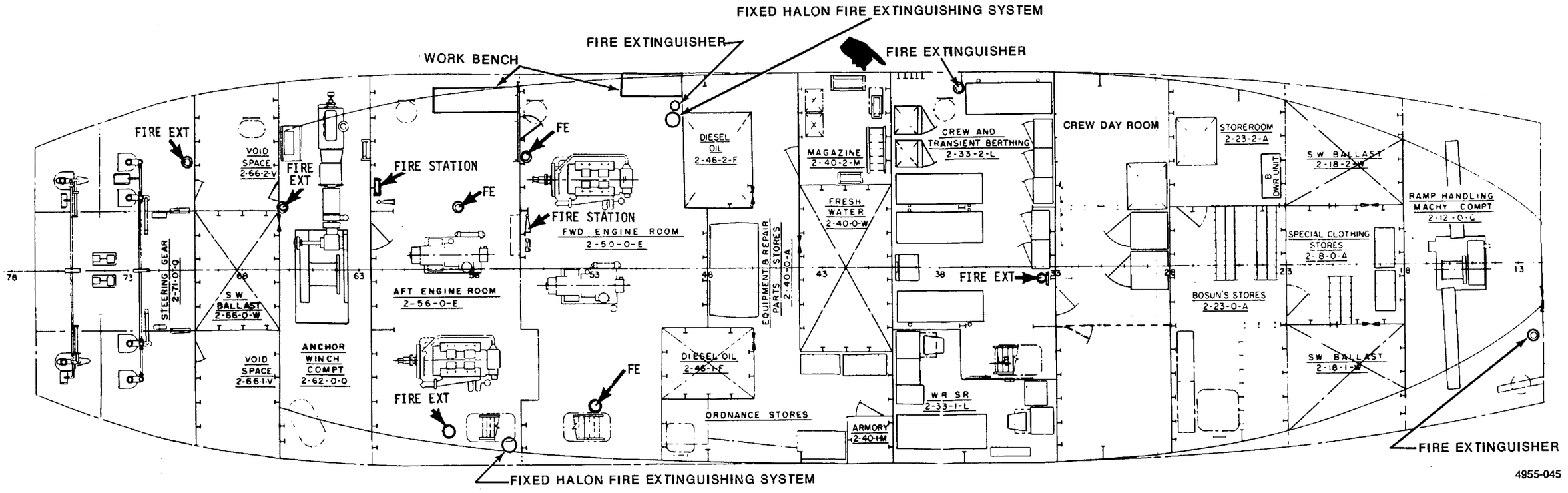


Figure FO-13.2. Fire Fighting Components (Sheet 2 of 2).

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. Cargo Deck, Aft - Frame 63, Aft end of Deck House.
b. Cargo Deck, Forward - Frame 21, Forward of Pilot House.
c. Forward Engine Room - Frame 56, Portside.
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 Shutoff Valves. The strainers are used to filter water to prevent clogging in fire nozzle.

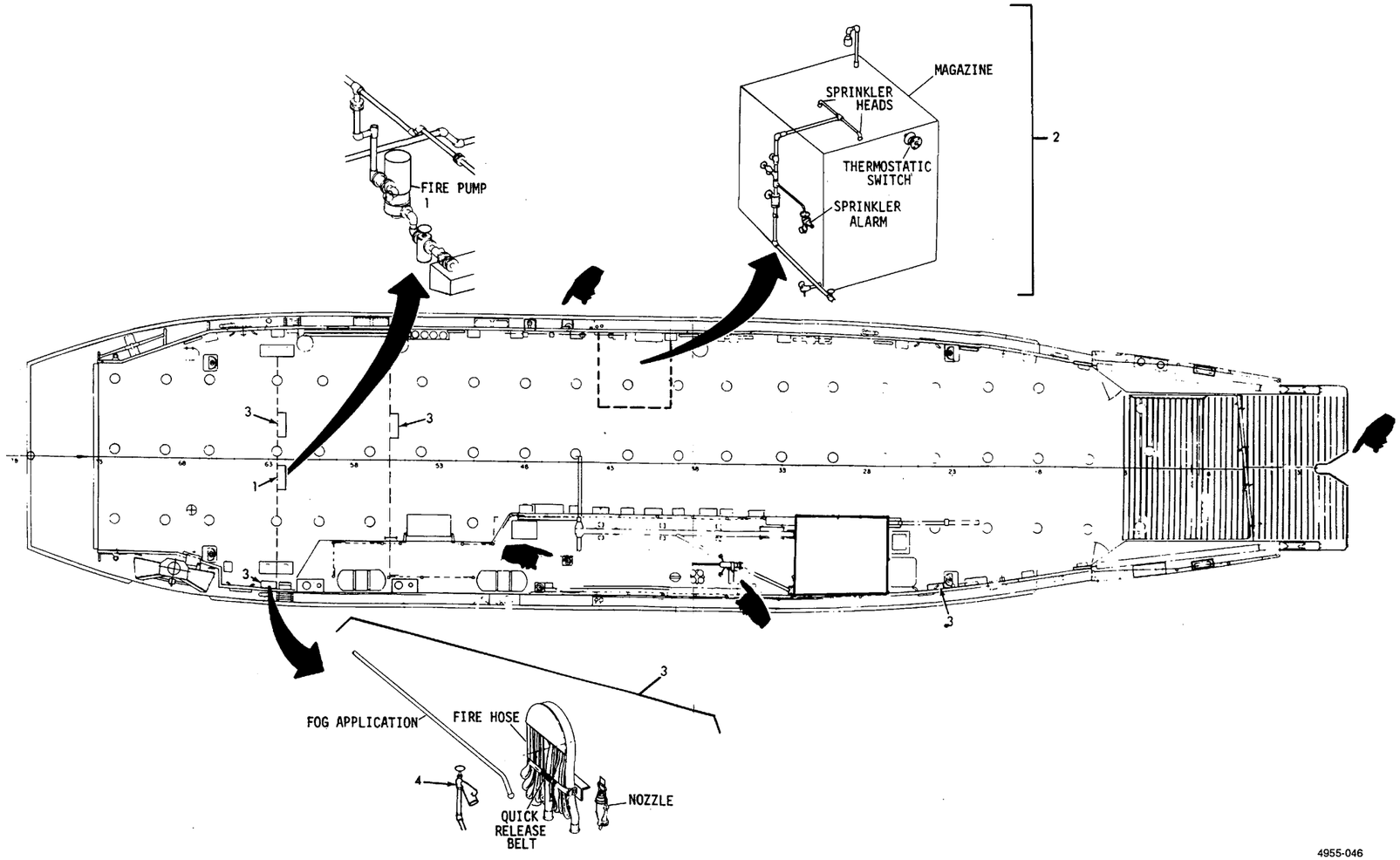


Figure FO-14. Fire Main System

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 BOX 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 SENSOR - 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.

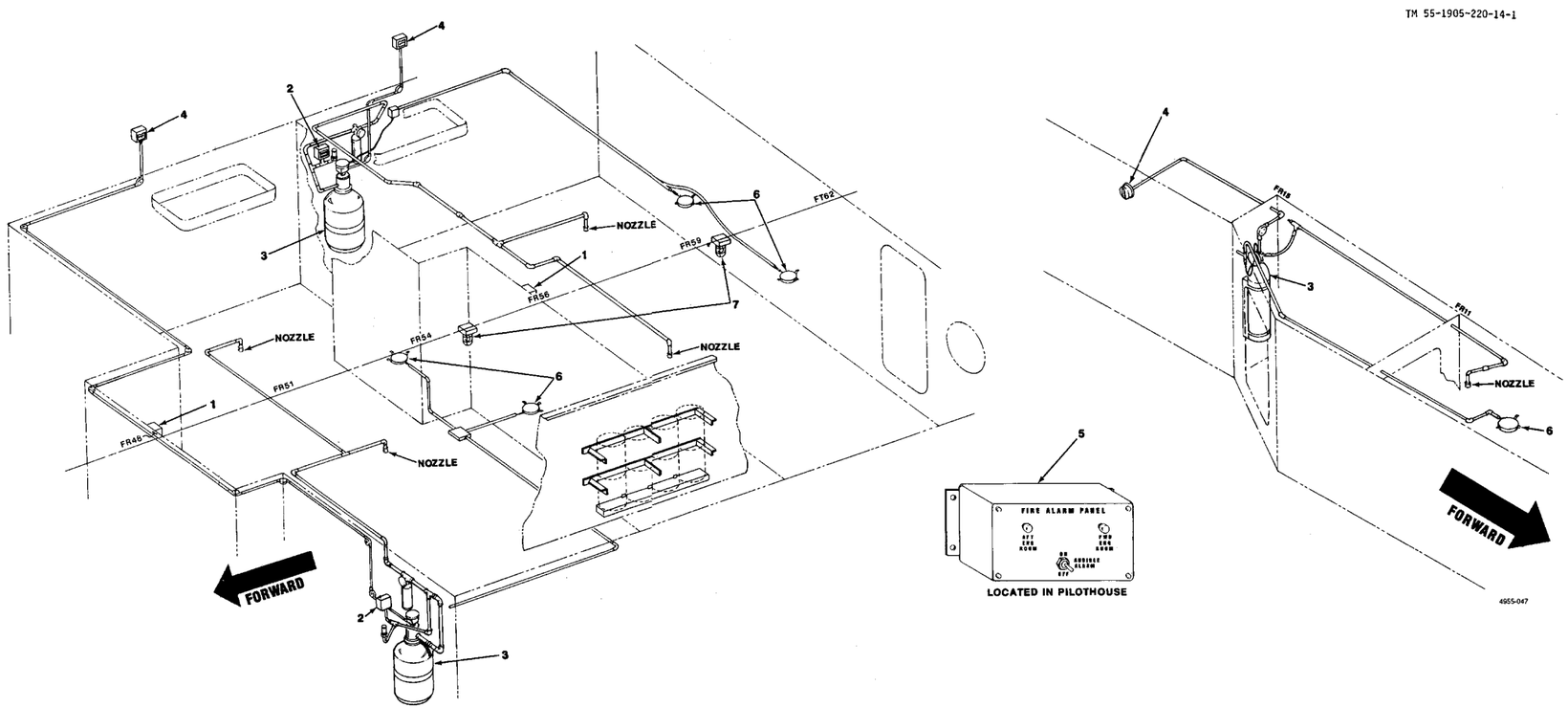


Figure FO-15. HALON SYSTEM

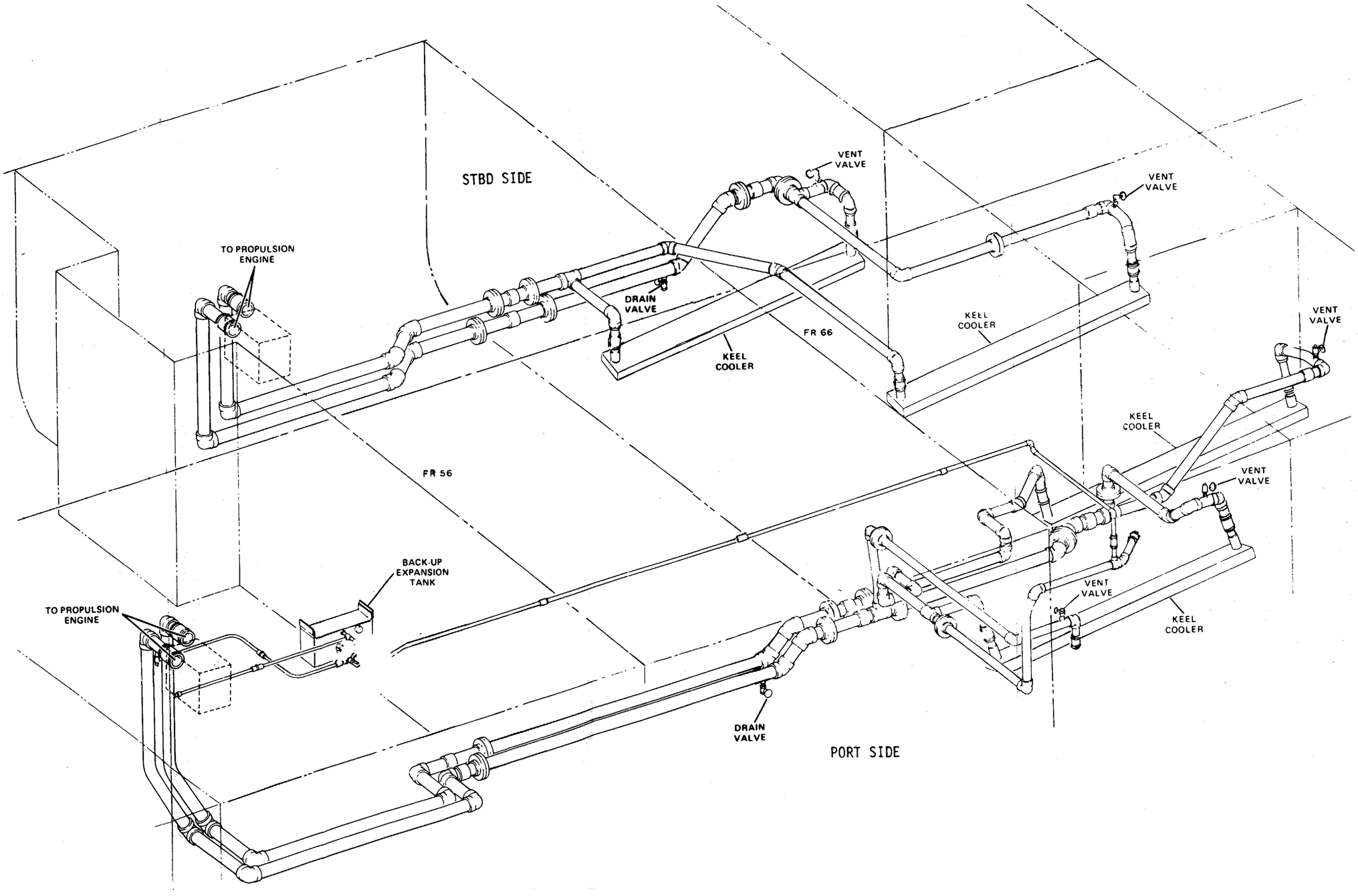


Figure FO-16. Coolant System.

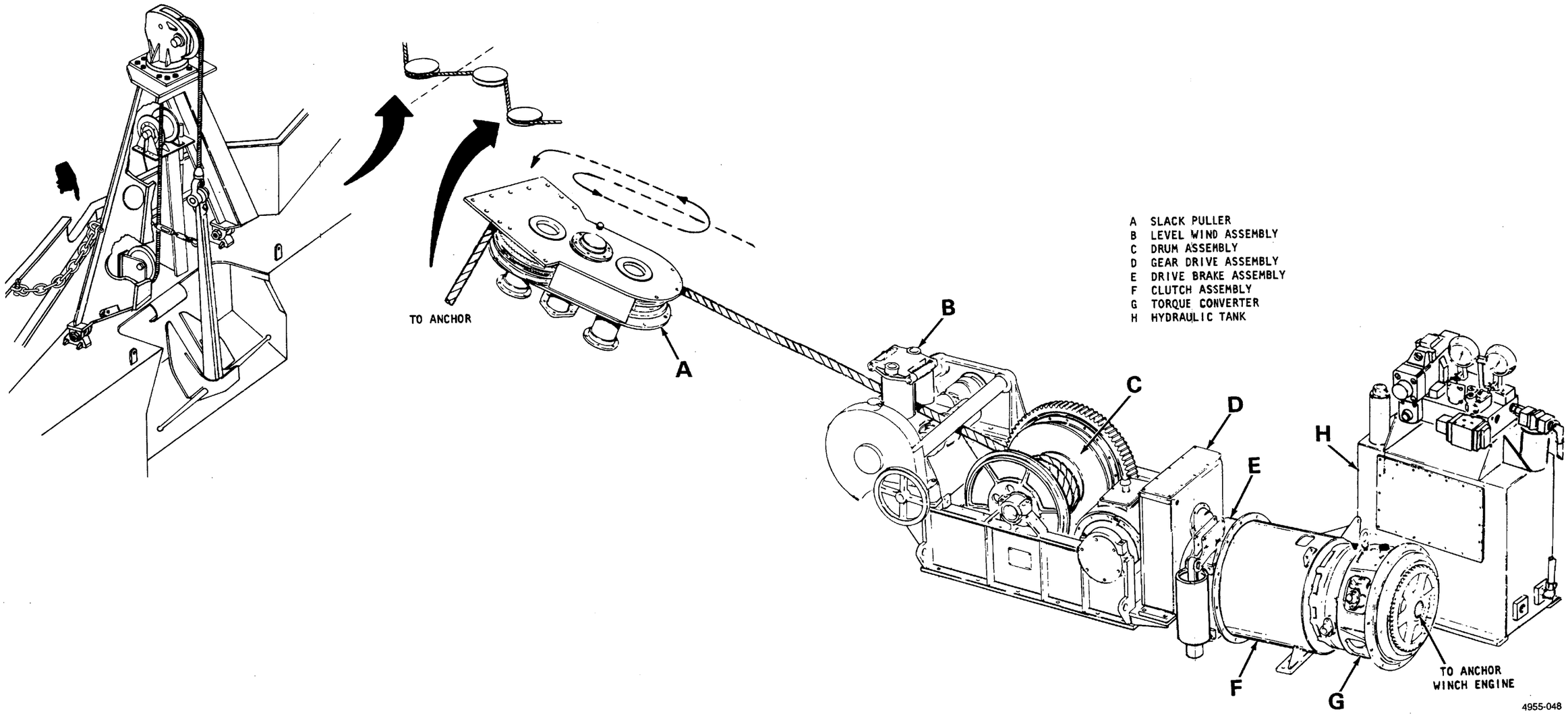


Figure FO-17. Anchor Winch System

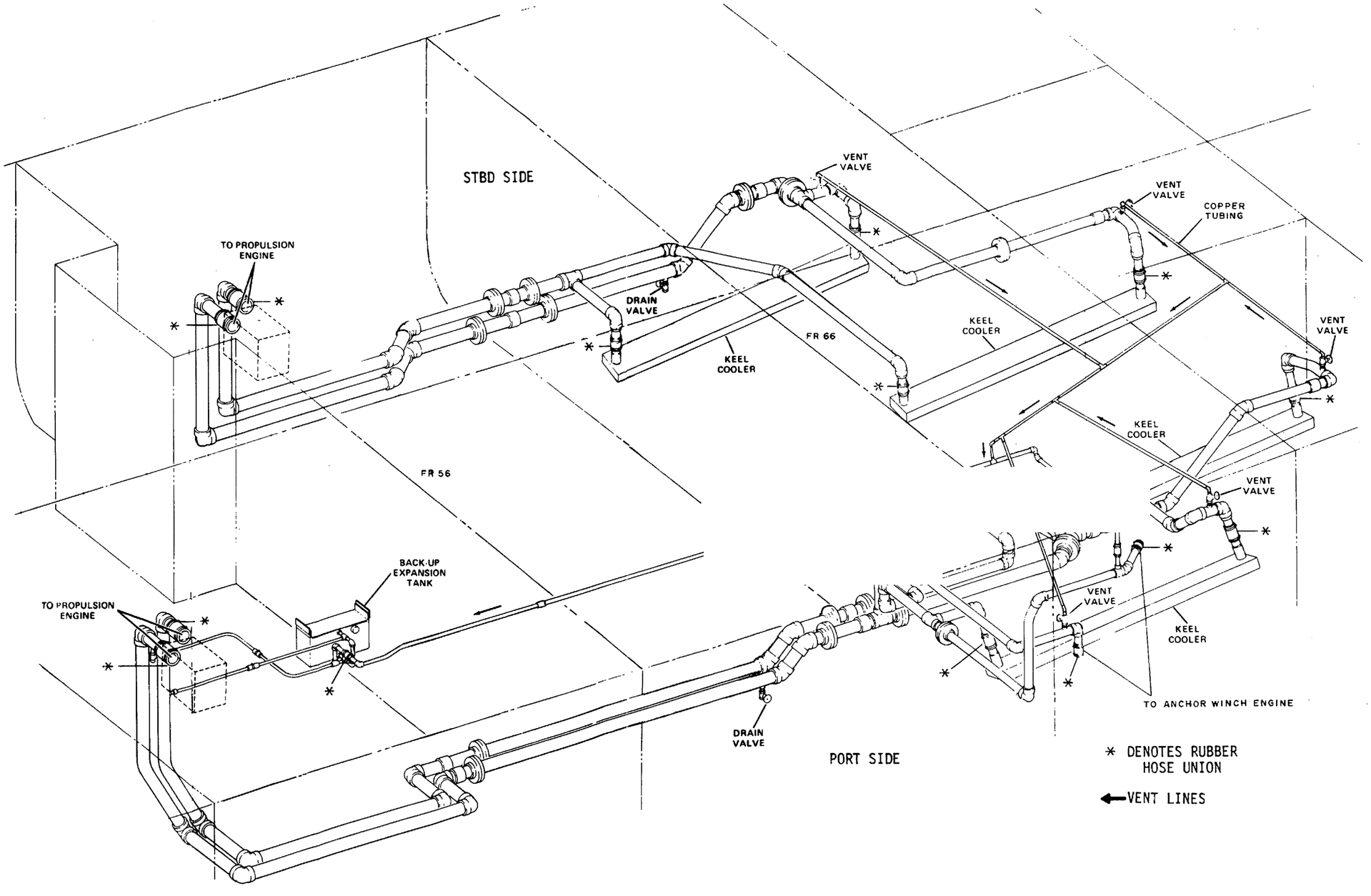


Figure FO-18. Engine Cooling System (Keel Cooler).

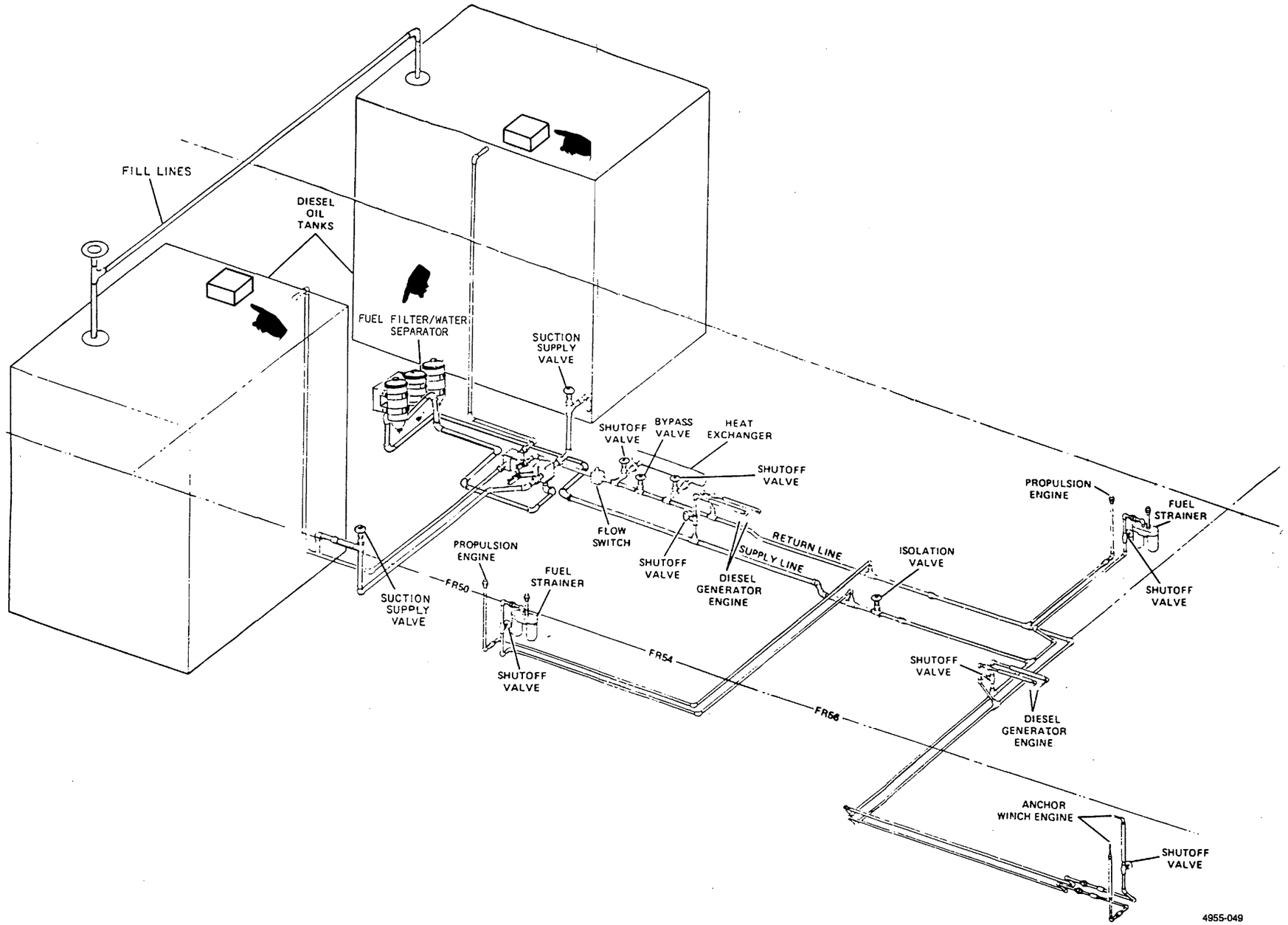


Figure FO-19. Fuel System Piping.

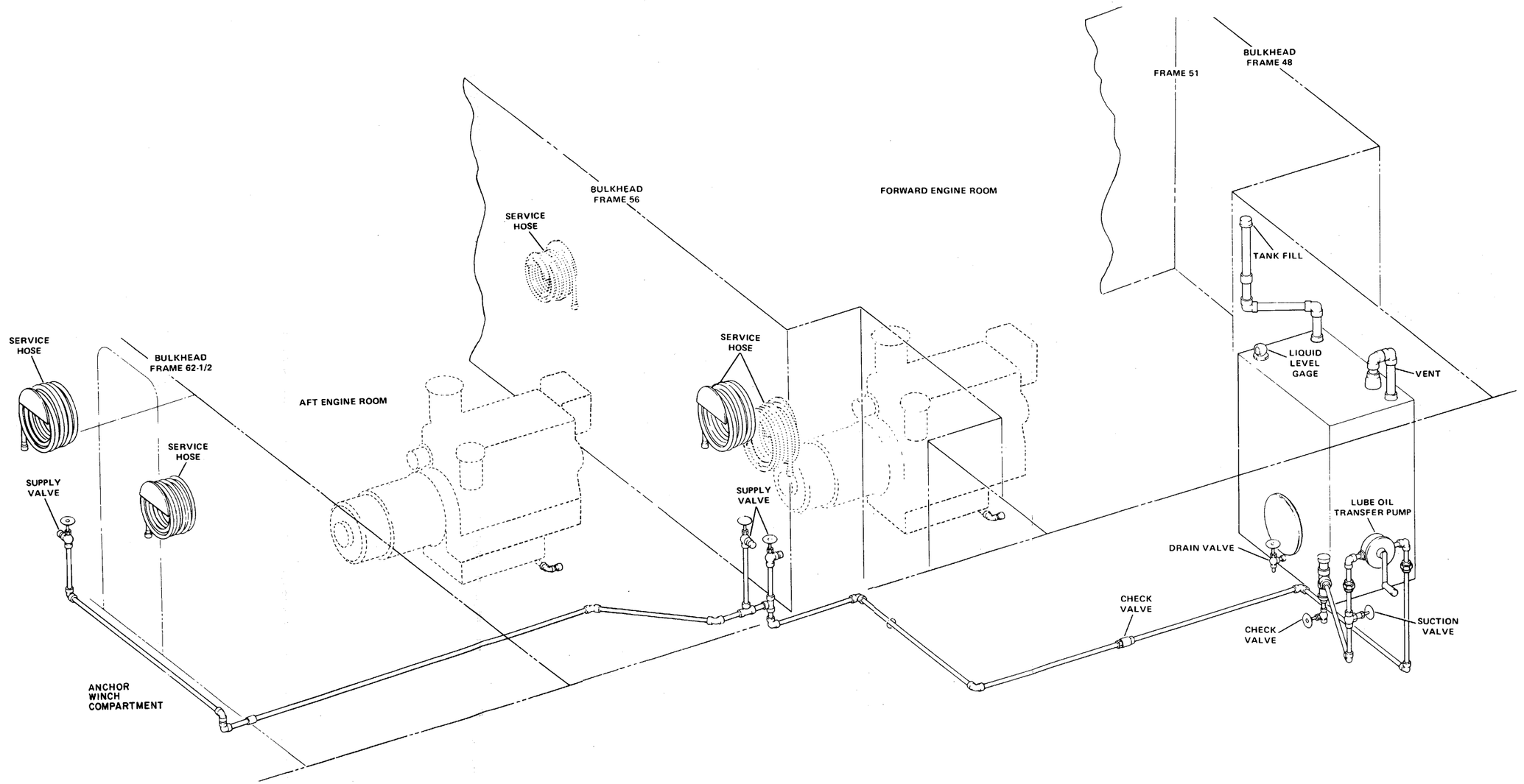


Figure FO-20. Lube Oil Transfer System.

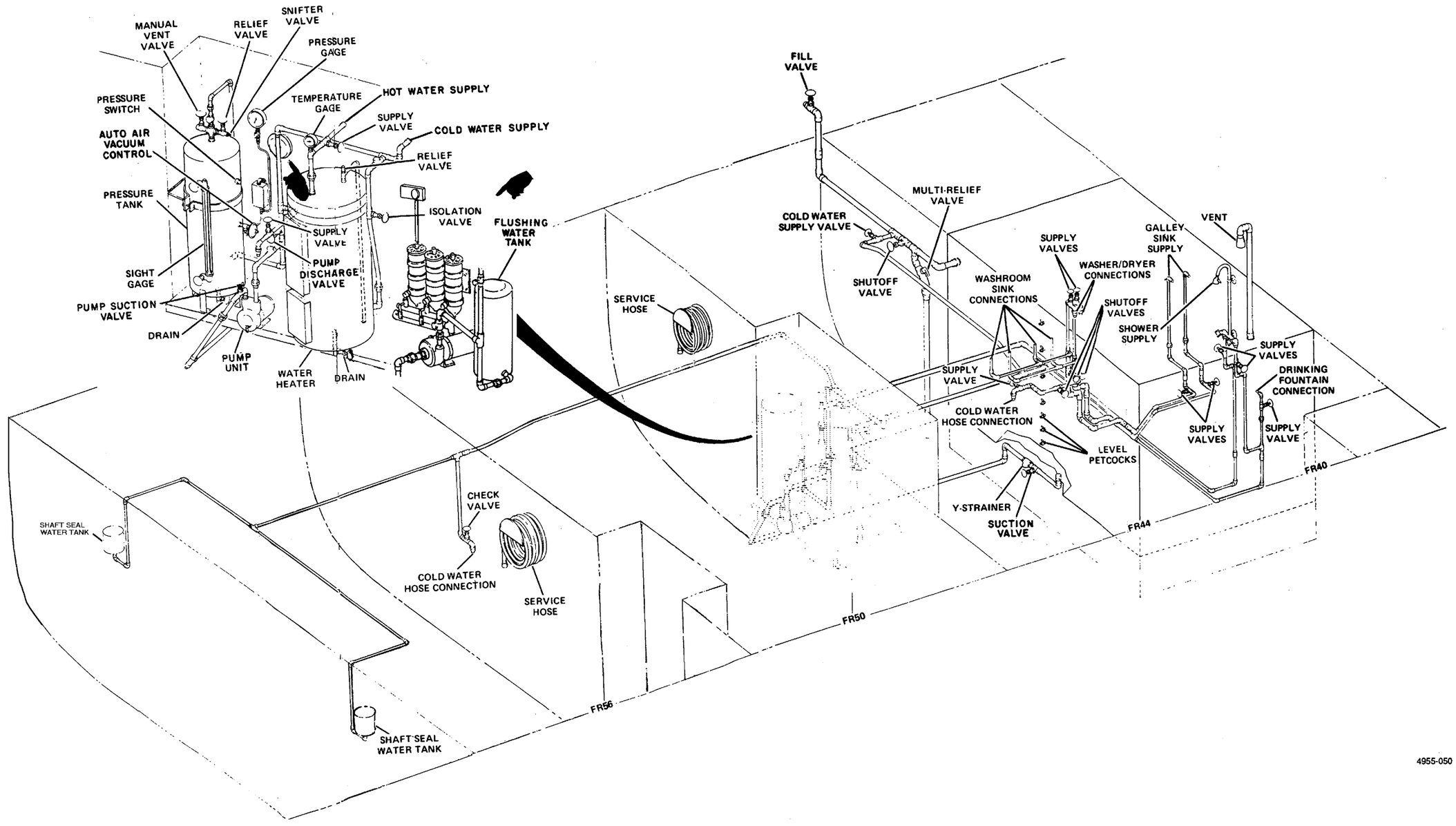


Figure FO-21. Fresh Water System Piping

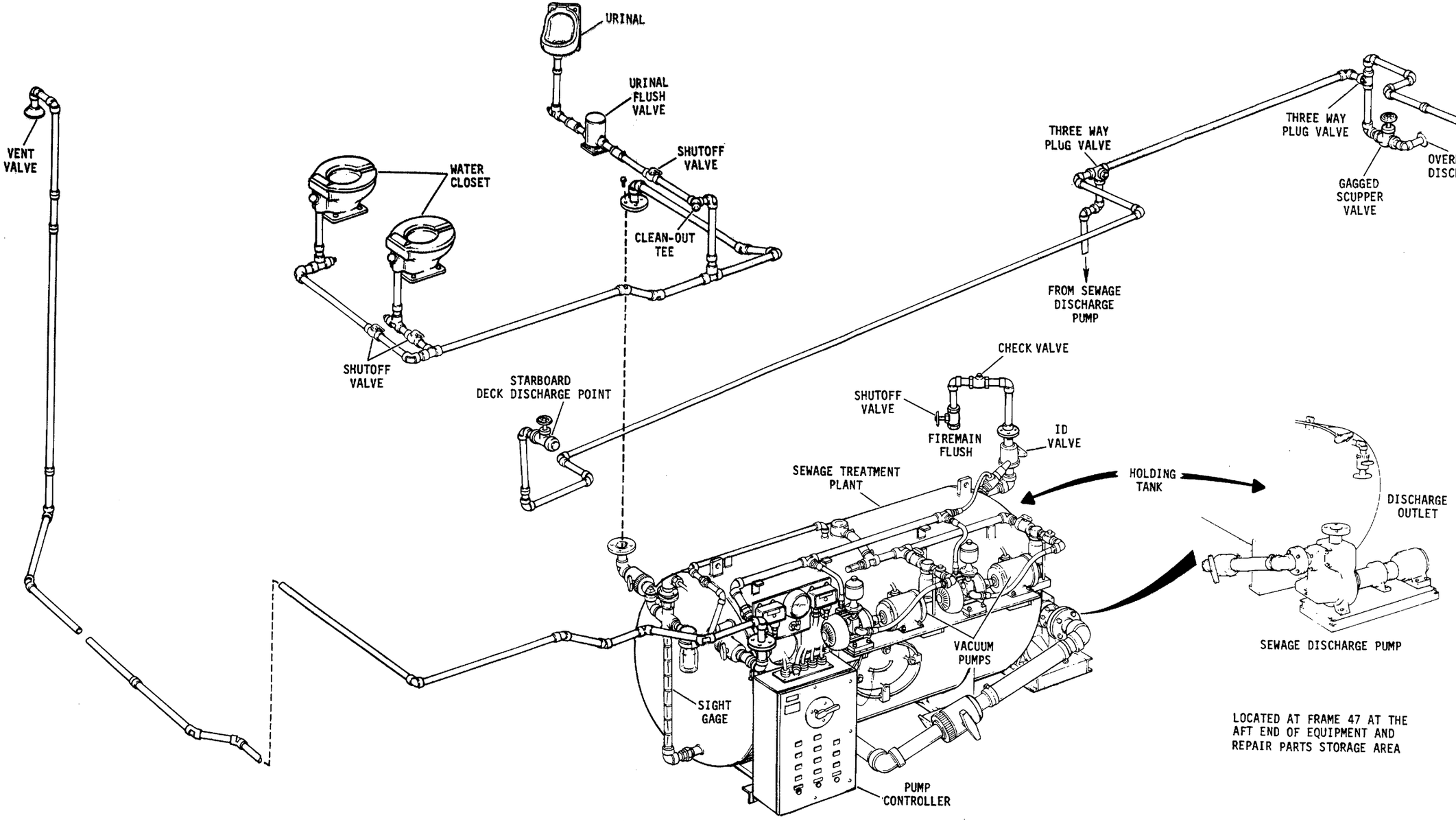
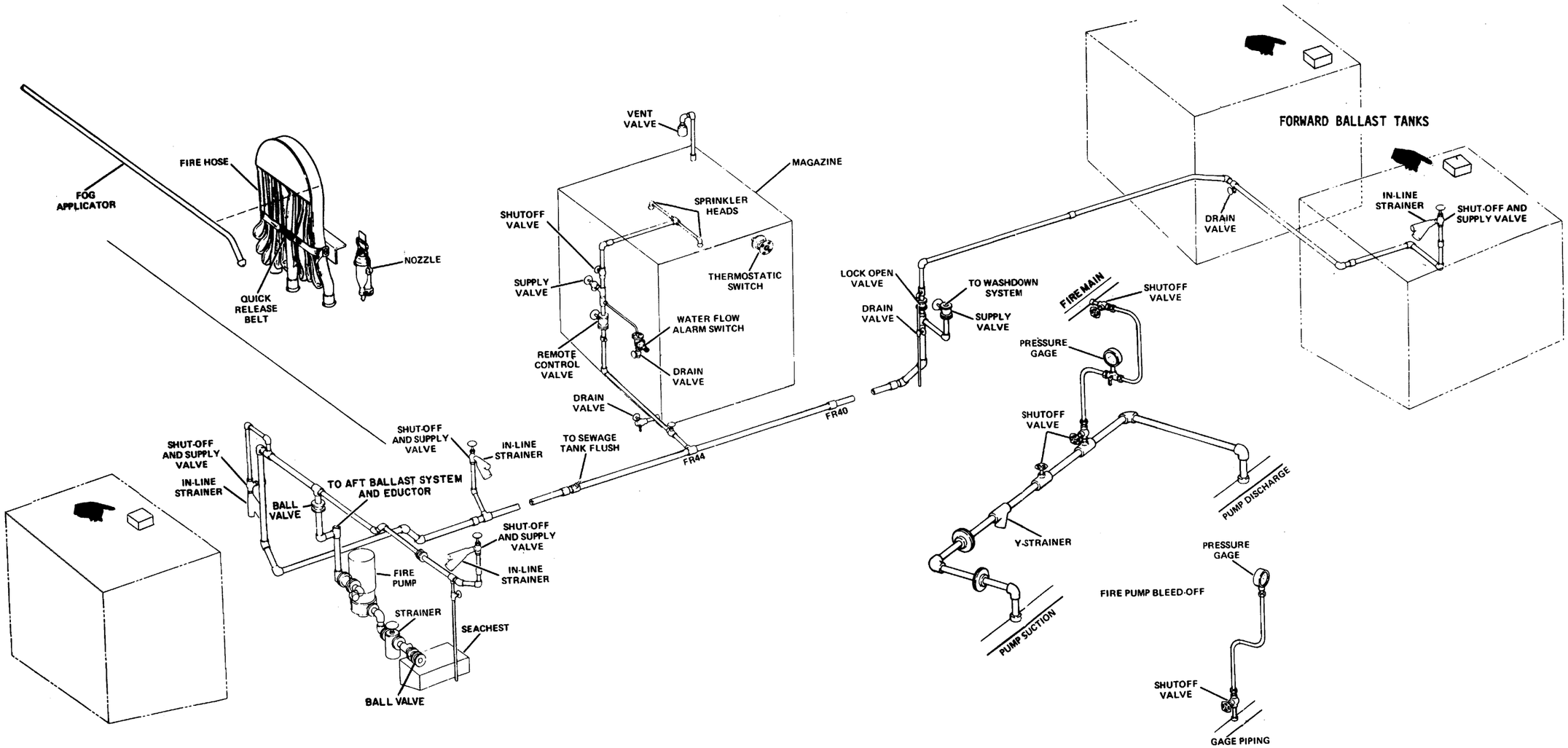


Figure FO-22. Sewage System Piping.



4955-240

Figure FO-23. Fire System Piping

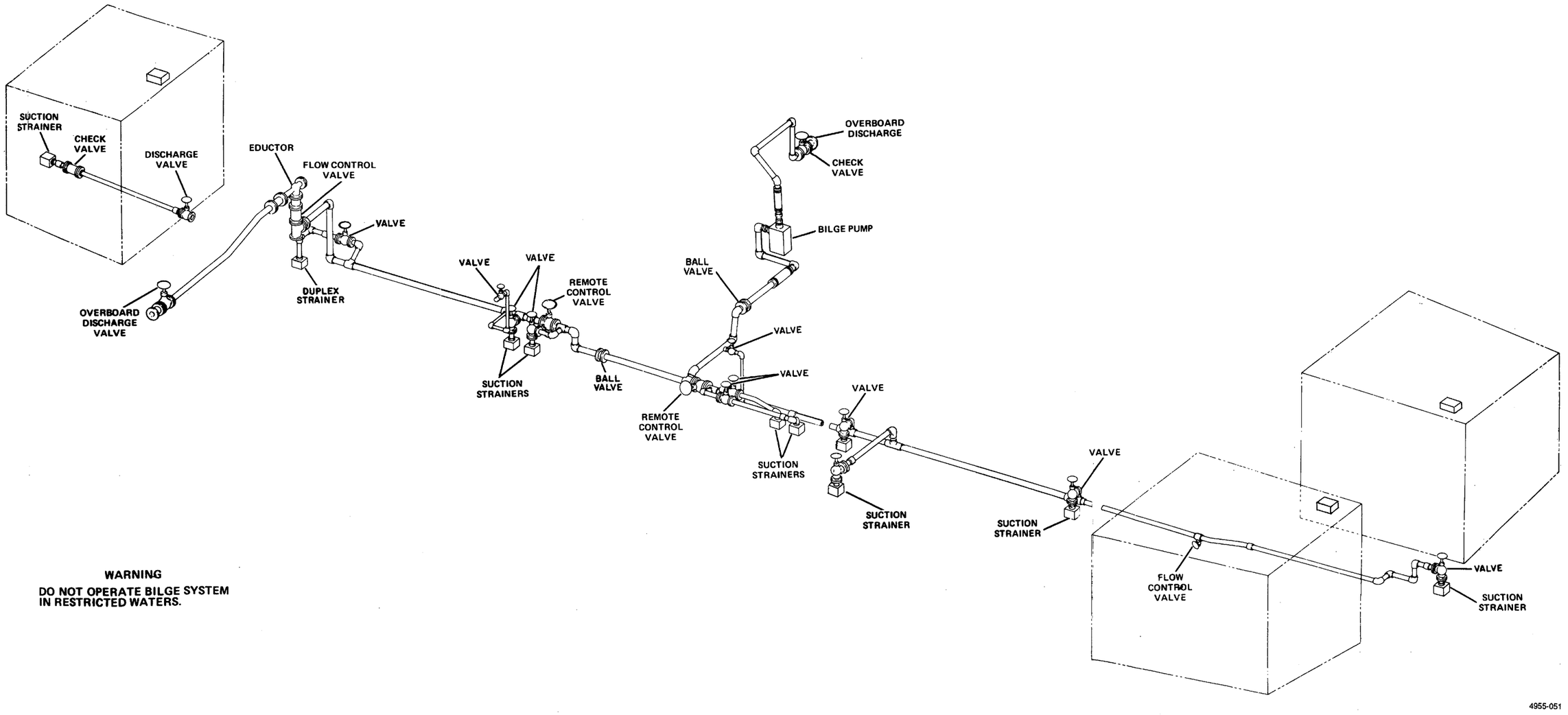


Figure FO-24. Bilge System Piping.

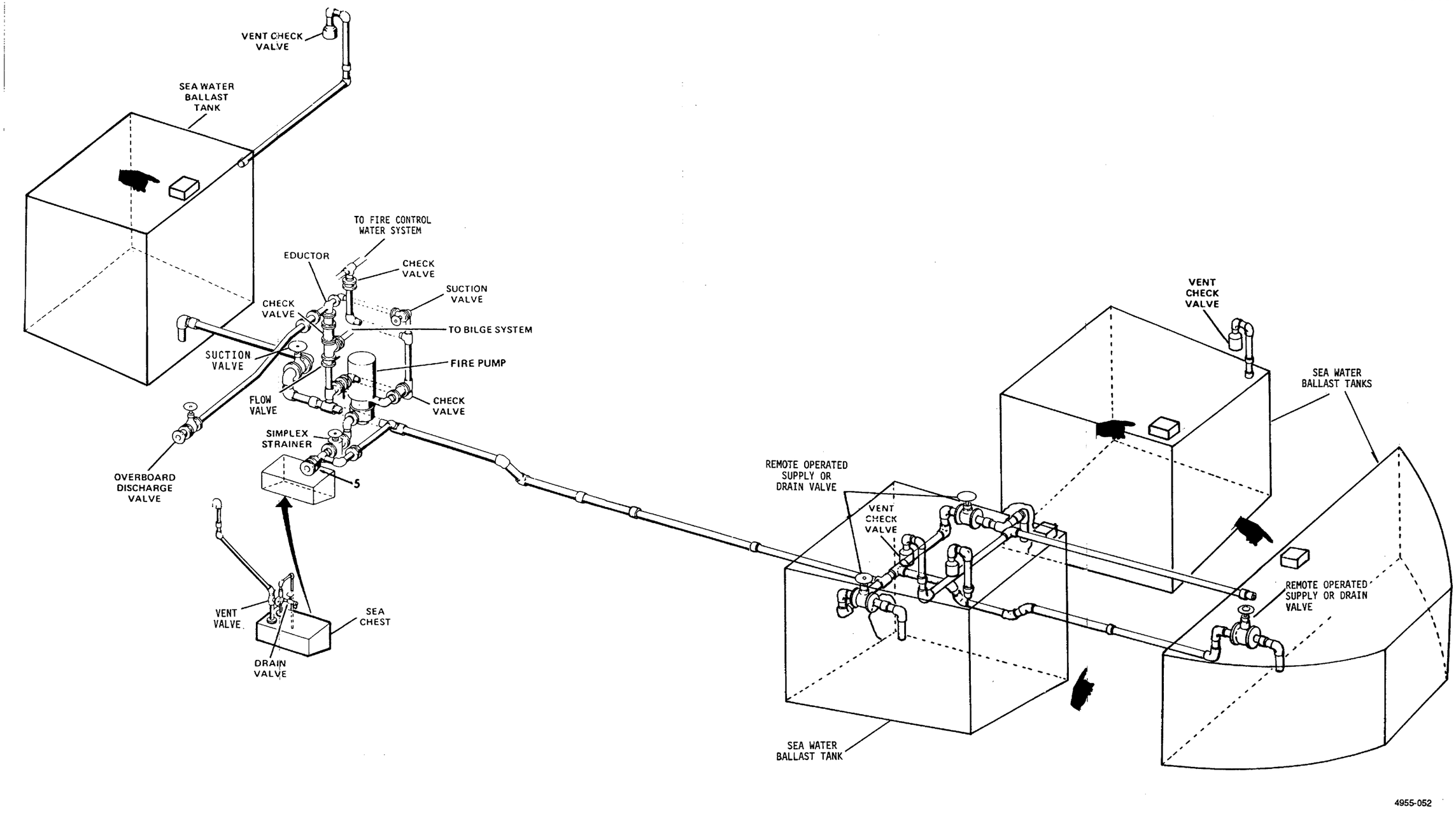


Figure FO-25. Fire System Piping.

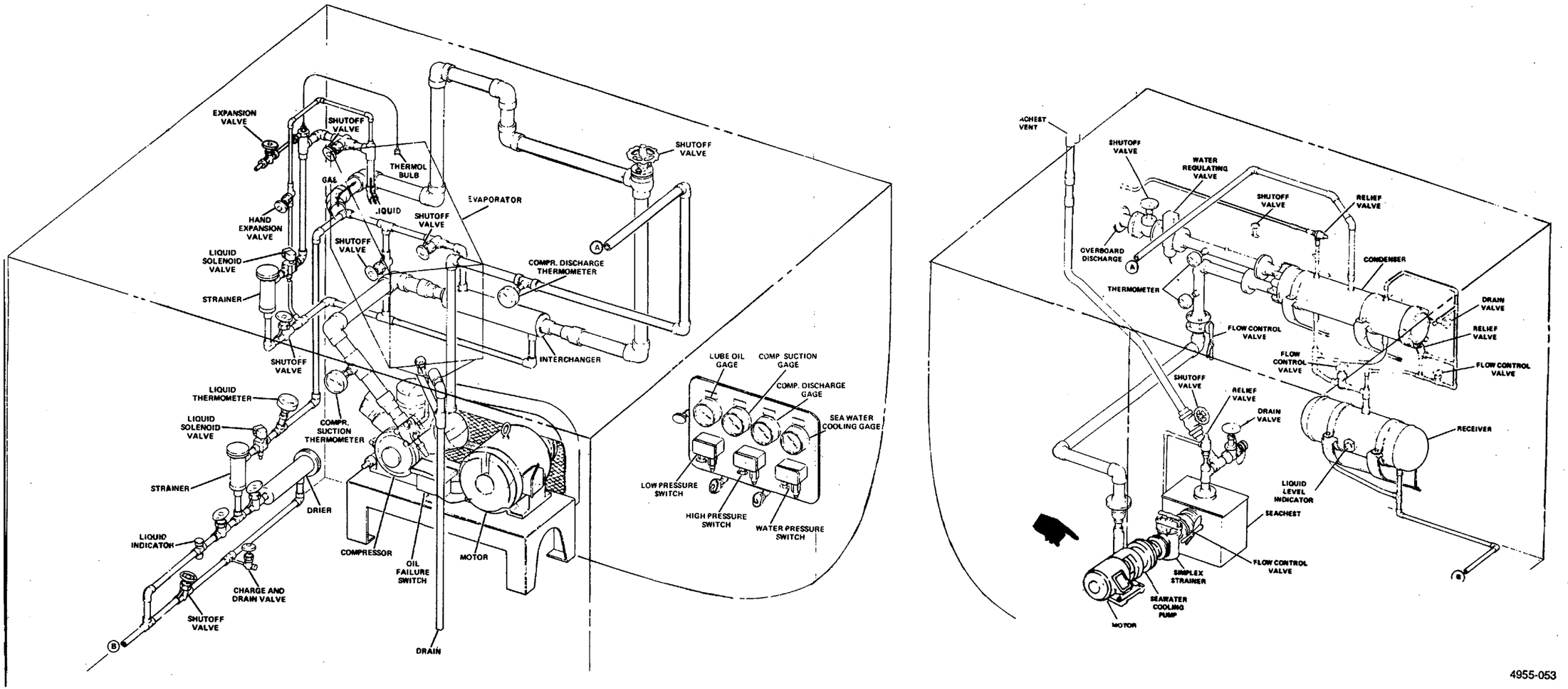


Figure FO-26. Air Conditioning System Piping.

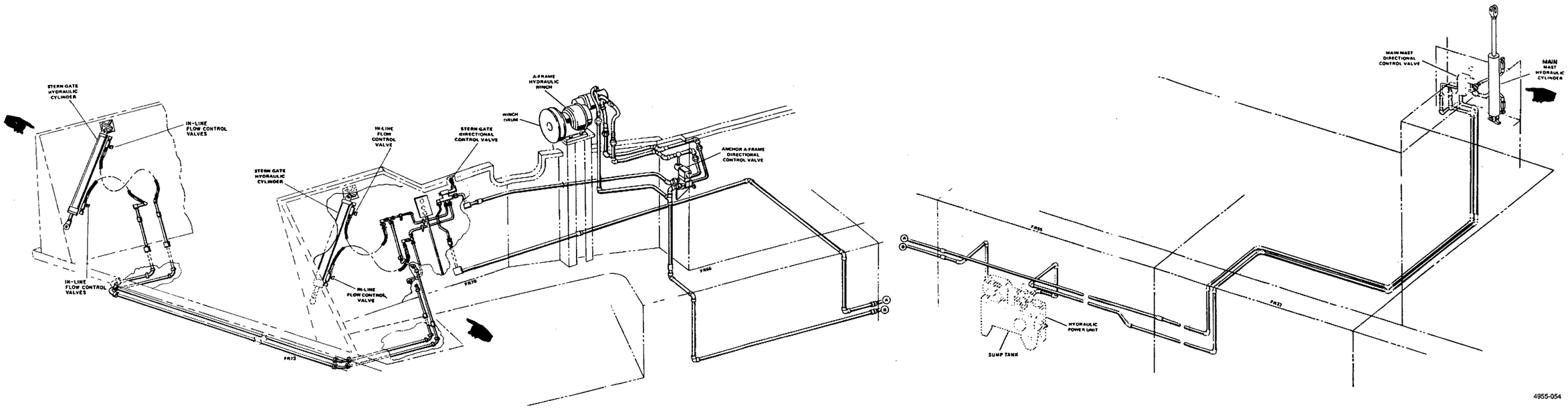


Figure FO-27. Centralized Hydraulic System .

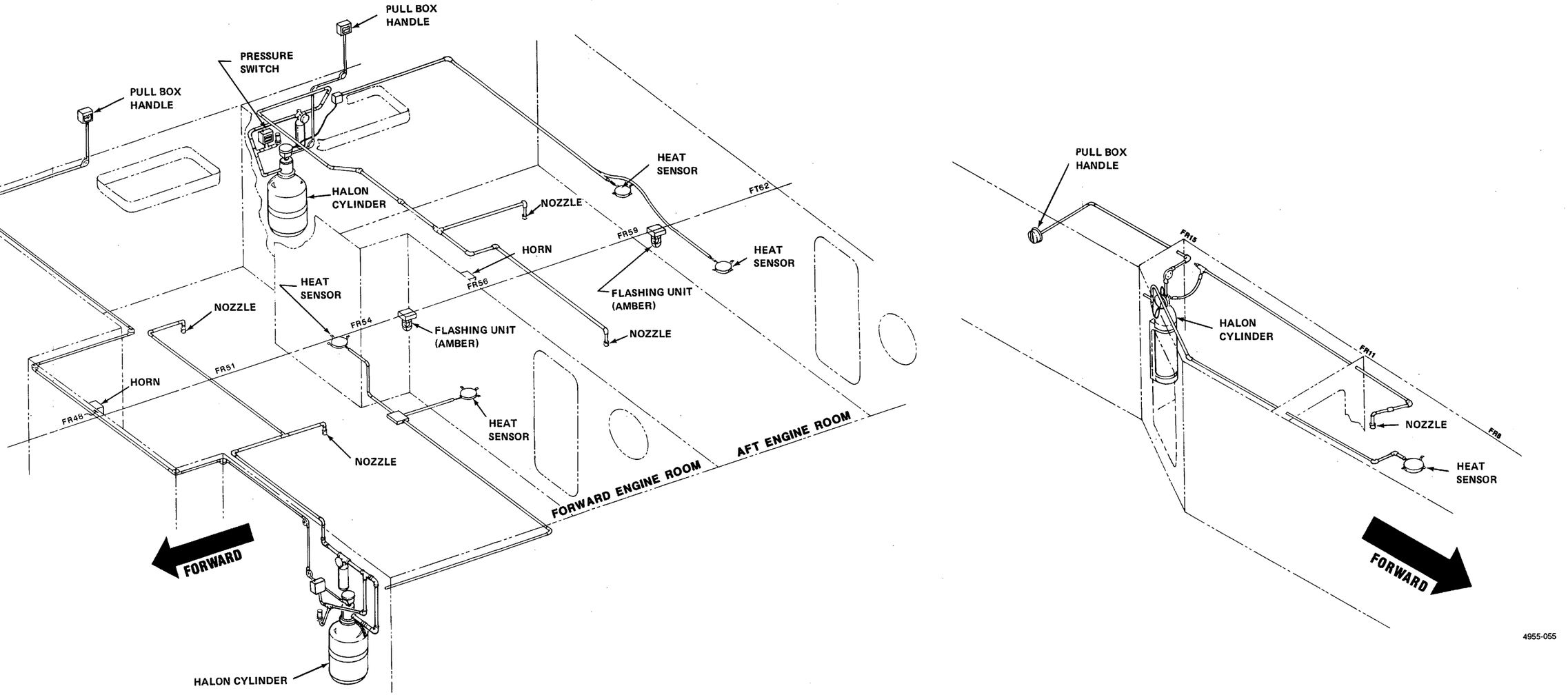
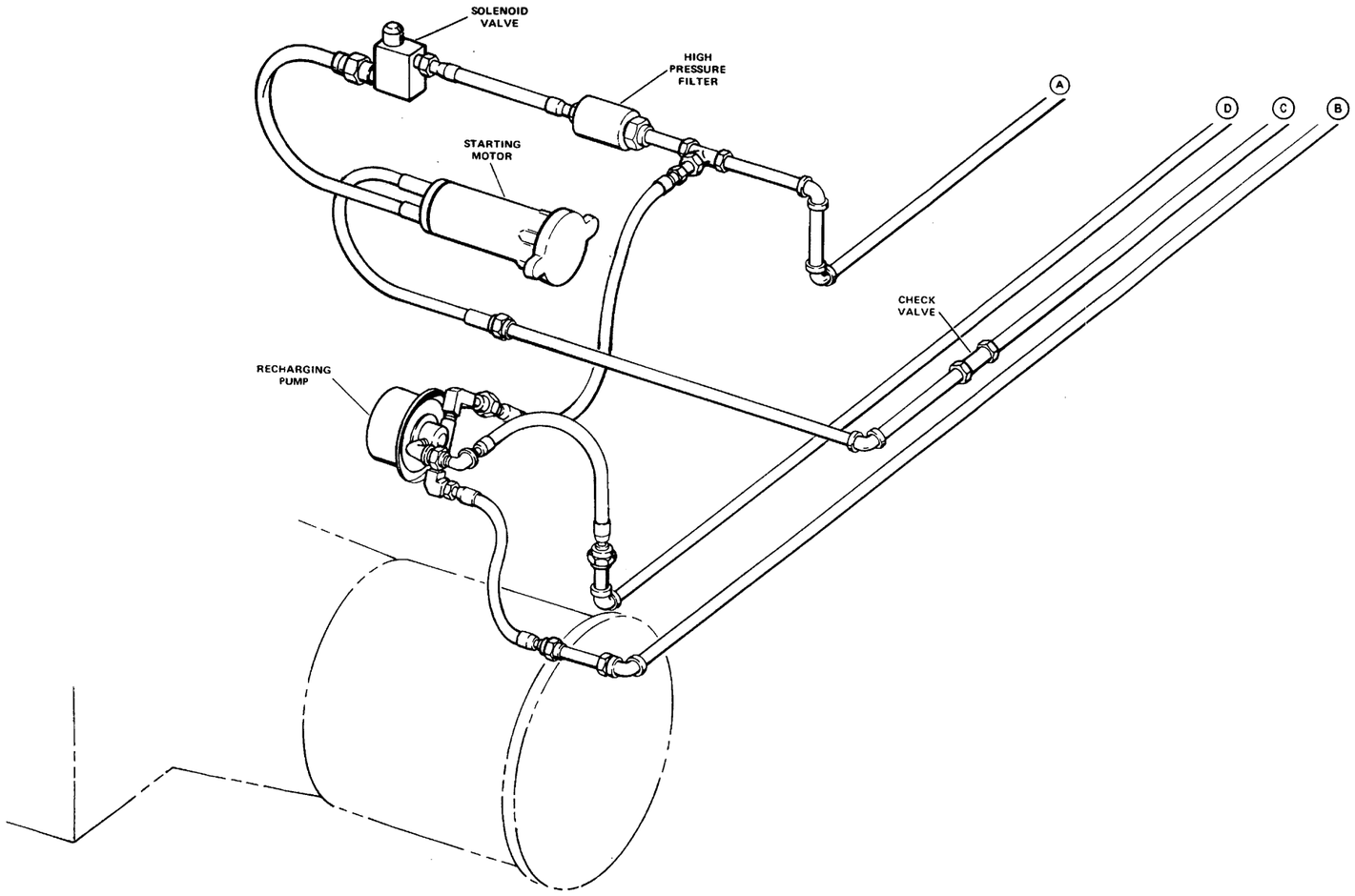


Figure FO-28. HALON SYSTEM .



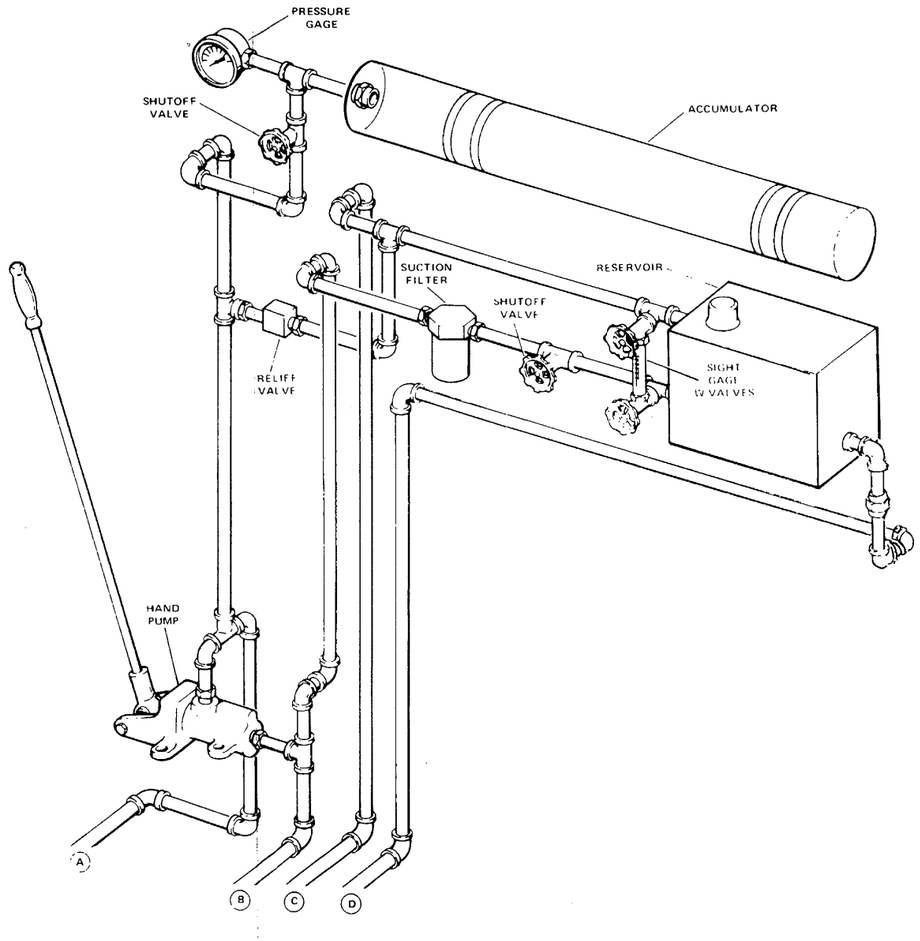
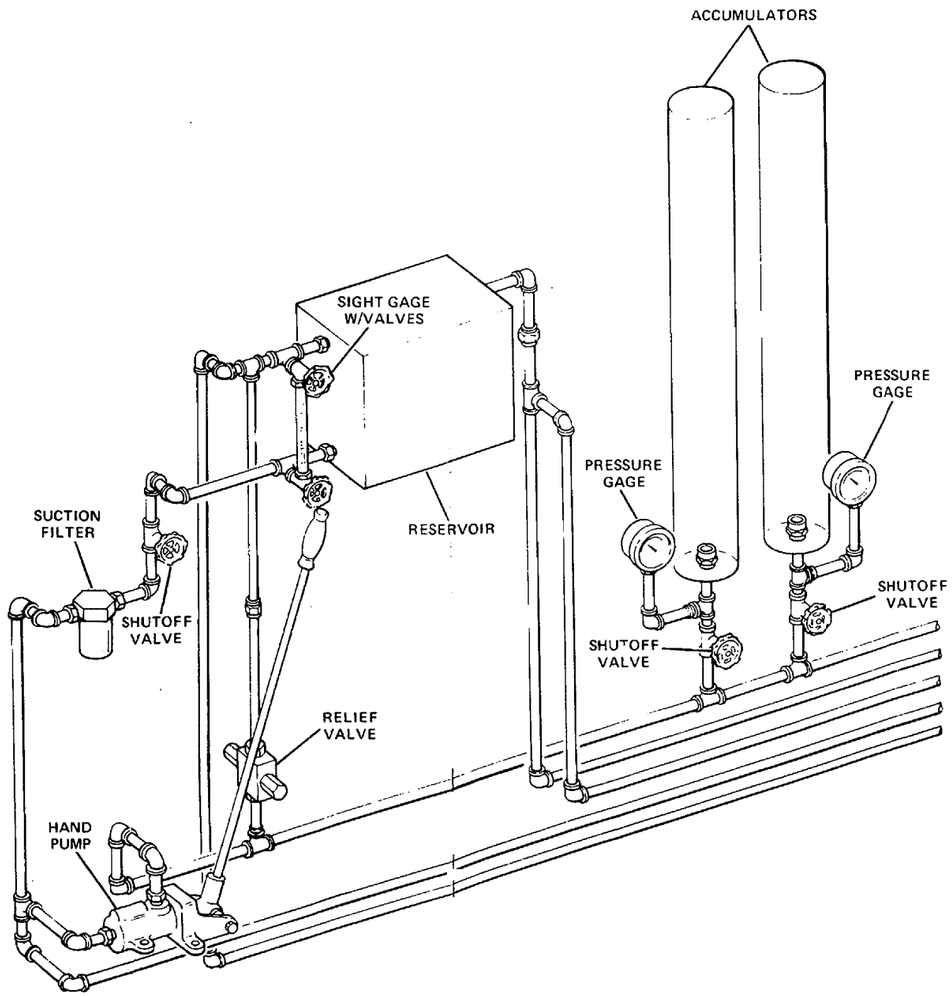
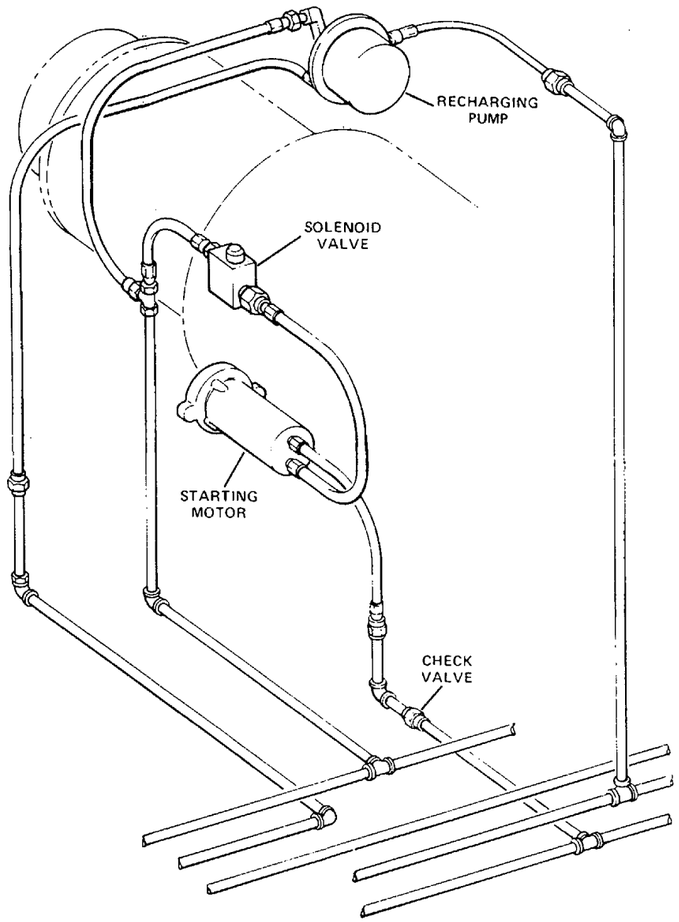
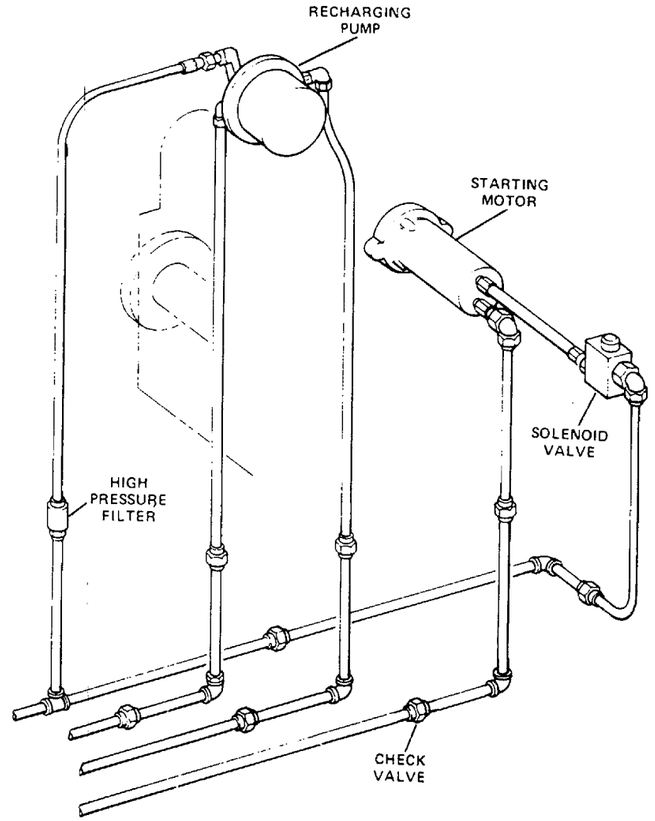


Figure FO-29. Hydraulic Starting System - Anchor Winch Compartment





DIESEL GENERATOR ENGINE CONNECTIONS



MAIN PROPULSION ENGINE CONNECTIONS

Figure FO-30. Hydraulic Starting System - Forward Engine Room.

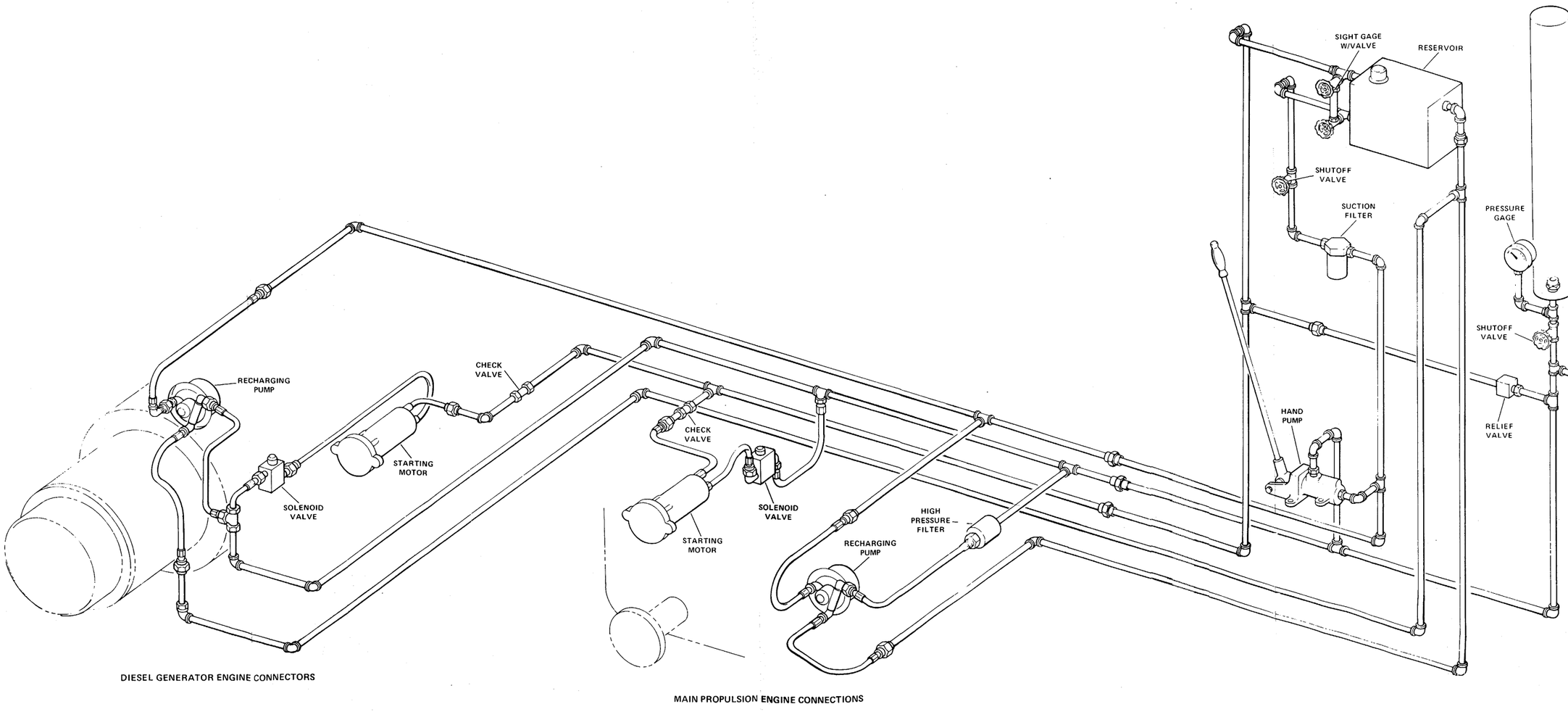


Figure FO-31. Hydraulic Starting System Shaft Engine Room.

Item Number	Description	See Figure
1.	Air Conditioning Fan Motor Controller	2-57
2.	Air Conditioning Compressor Motor Controller	2-58
3.	Air Conditioning Sea Water Pump Motor Controller	2-59
4.	Air Conditioning Heater Disconnect Switch	2-60
5.	Power Distribution Panel (P-409)	2-61

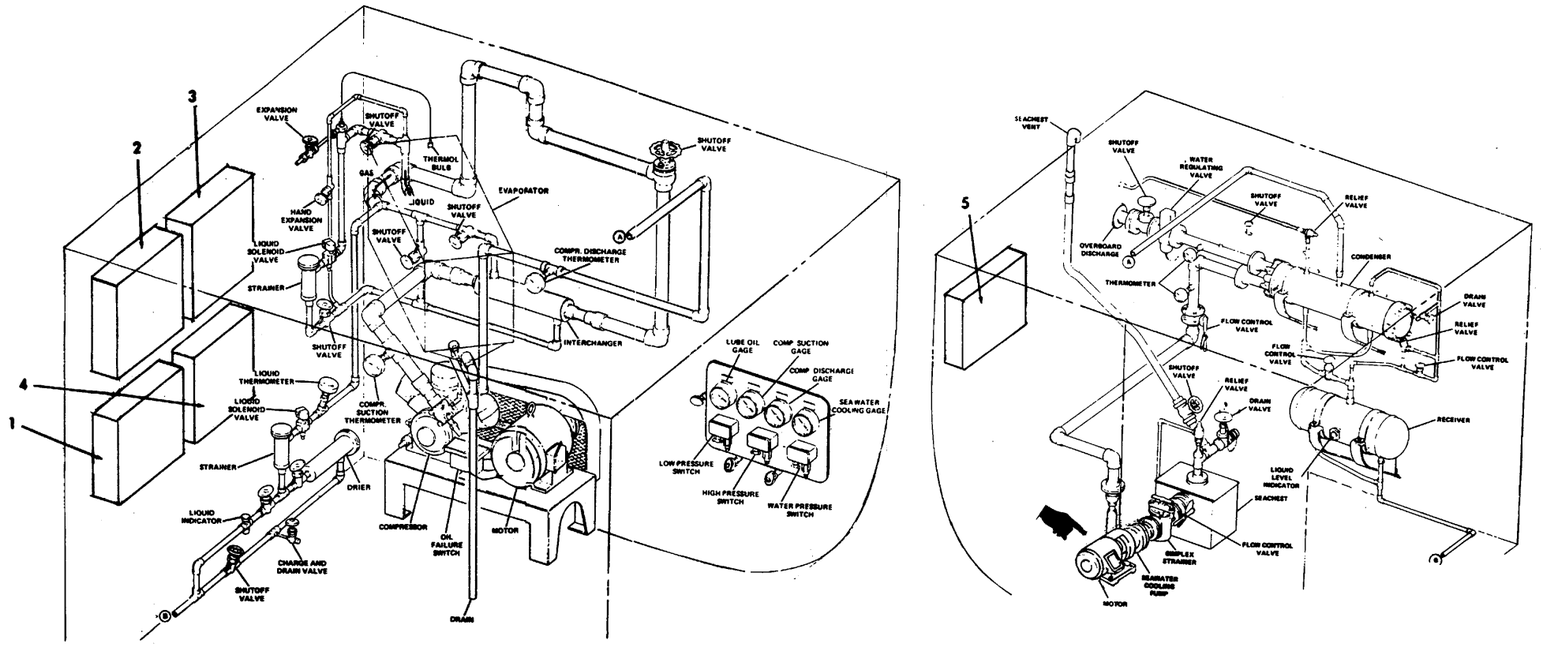


Figure FO-32. Air Conditioning Machinery Room

Item Number	Description	See Figure
1.	Aft Engine Room Exhaust Fan Motor Disconnect Switch	2-77
2.	Aft Engine Room Exhaust Fan Motor Controller	2-78
3.	Heater Aft Engine Room Disconnect Switch	2-79
4.	Heater Aft Engine Room Controller	2-80
5.	Sea Water/Cooling Water Pump Motor Disconnect Switch	2-81
6.	Lighting Distribution Panel (l-101)	2-82
7.	Aft Lube Oil Pump Motor Disconnect Switch	2-83
8.	Aft Lube Oil Pump Motor Controller	2-84
9.	Shaft Seal Tank	2-85
10.	Tank Level Indicator	2-86
11.	Fire Pump Controller	2-87
12.	Fire Pump Disconnect Switch	2-88
13.	Oil/Water Separator	2-89

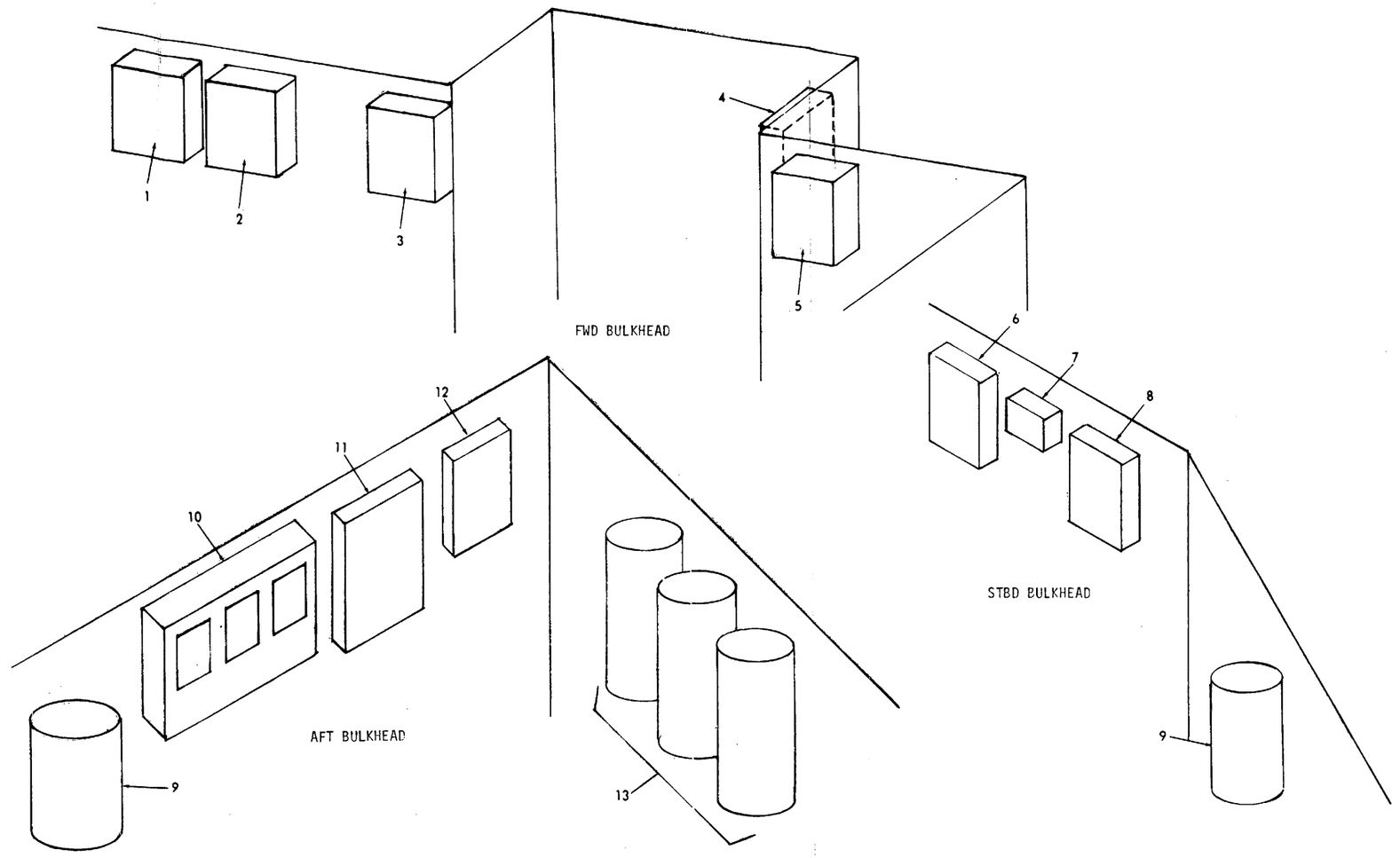


Figure FO-33. Aft Engine Room.

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 all fields must be included; however only the following fields are mandatory: 1, 3, 4, 5, 6, 7, 8, 9, 10, 13, 15, 16, 17, and 27.

From: "Whomever" <whomever@avma27.army.mil>
To: mpmt%avma280st-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-93
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.

TEAR ALONG PERFORATED LINE

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 PUBLICATION

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE

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**

PREVIOUS EDITIONS ARE OBSOLETE.

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.356	metric tons	short tons	1.102
pound-inches	newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

PIN: 064439-000