TM 55-1925-292-14&P

This manual supersedes TM 55-1925-292-14&P, dated 16 August 1991

TECHNICAL MANUAL

OPERATOR, UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST FOR FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS

INLAND AND COASTAL LARGE TUG (LT)
NSN 1925-01-509-7013 (EIC XAG)

HEADQUARTERS, DEPARTMENT OF THE ARMY

30 NOVEMBER 2005

WARNING SUMMARY

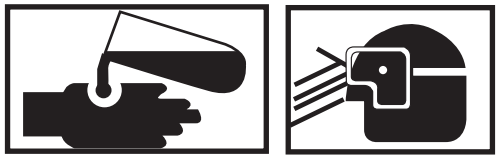
FIRST AID

Although the 128' Large Tug is normally assigned a medic, first aid is still an important skill for all crewmembers. The ability to promptly administer first aid to another crewmember could mean the difference between life and death for that crewmember. First aid procedures for soldiers are contained in FM 4-25.11.

WARNING SUMMARY CONTENT

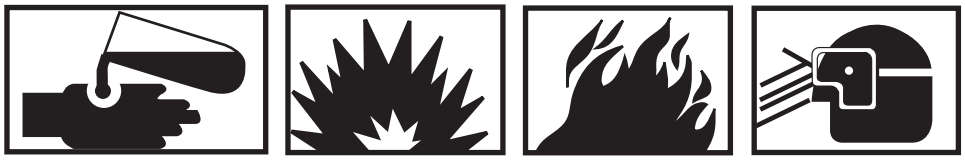
This warning summary contains general safety warnings and hazardous materials warnings that must be understood and applied during operation and maintenance of this vessel and its equipment. Failure to observe these precautions could result in serious injury to or death of personnel. Also included are explanations of safety and of hazardous materials used within the technical manual.

BATTERY ELECTROLYTE



Batteries are filled with a sulfuric acid based electrolyte. This electrolyte is extremely corrosive to human tissue and to many other materials. Chemical protective nitrile gloves, chemical protective goggles, face shield, and chemical protective apron must be worn at all times when the batteries are being serviced. If electrolyte comes in contact with clothing or other material, wash the affected area with large volumes of fresh water. If electrolyte comes in contact with the skin, flush the area with large volumes of water. If the electrolyte comes in contact with the eyes, flush them with large volumes of water. Continue flushing the affected area until medical assistance arrives.

OILS/CLEANING SOLVENTS



Do not allow hydraulic fluid, engine oil, or cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to follow these precautions can result in illness or serious injury.

Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to follow these precautions can result in death or serious injury.

Removing components by means of wire brushing produces flying particles. These particles can cause serious injury to personnel. Protective goggles, gloves, and long sleeves must be worn at all times during wire brushing operations. Failure to comply with this warning can result in serious injury to personnel.

CRANES/LIFTING

All personnel in the vicinity of the lifting operations should wear appropriate safety equipment including gloves, hard hat, and safety shoes. Death or serious injury can result from failure to heed this warning.

Heavy loads can crush. Do not allow any body parts to come under the load or between the load and a stationary object. Death or serious injury can result.

ELECTRICAL

Take great care when working around energized electrical equipment. Contact between unprotected body parts and electrical conductors can cause serious injury or death. Do not wear jewelry or other conductive items while servicing energized electrical equipment. Failure to comply with these precautions can cause serious injury or death.

Replace or repair components only after the affected circuit has been secured, locked out, and tagged out. Performing replacement with the circuit energized may result in injury.

HOT WORK, WELDING, GRINDING, AND DRILLING

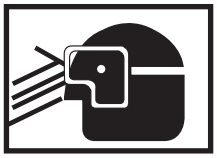
Removing components by means of grinding or cutting produces hot, flying particles. These particles can cause serious injury to personnel. These hot particles can also ignite fires in the work area and in adjacent spaces. During and after removal, the work area will be very hot. A fire watch must be posted whenever grinding or cutting operations are taking place. Failure to comply with this warning can result in serious injury or death to personnel and serious damage to the vessel.

Drilling operations produce high velocity flying debris which can become lodged in the skin or in the eyes. All personnel working in the area must wear protective eyewear, gloves, and long sleeves when performing drilling operations. Failure to comply can result in serious injury to personnel.

LOCKING HARDWARE

Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.

COMPRESSED AIR



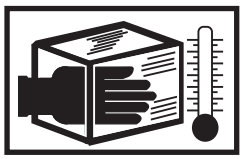
Do not exceed 25 PSI (1.7 bar) nozzle pressure when using compressed air to dry parts. Wear goggles for eye protection. Do not direct air stream toward self or other personnel. Failure to comply with this warning may cause severe injury to personnel.

SEACOCK

The seacock for the affected system must be closed before beginning replacement of any raw water system piping, hoses, and/or valves. Failure to observe this warning can result in flooding of the space, resulting in injury or death to personnel and damage to the vessel.

EXPLANATION OF SAFETY WARNING ICONS

CHEMICAL - drops of liquid on hand show that the material will cause burns or irritation to human skin or tissue.



CRYOGENIC - hand in block of ice shows that the material is extremely cold and can injure human skin or tissue.

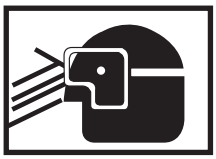
EAR PROTECTION - headphones over ears show that noise level will harm hearing.

ELECTRICAL - electrical wire to arm with electricity symbol running through human body shows that shock hazard is present.

ELECTRICAL - electrical wire to hand with electricity symbol running through hand shows that shock hazard is present.

EXPLANATION OF SAFETY WARNING ICONS (continued)

EXPLOSION - rapidly expanding symbol shows that the material may explode if sub jected to high temperatures, sources of ignition, or high pressure.



EYE PROTECTION - person with goggles shows that the material will injure the eyes.

FALLING PARTS - arrow bouncing off human shoulder and head shows that falling parts present a danger to life or limb.

FIRE - flame shows that a material may ignite and cause burns.

FLYING PARTICLES - arrows bouncing off face show that particles flying through the air will
harm face.

FLYING PARTICLES - arrows bouncing off face with face shield show that particles flying through the air will harm face.

HEAVY OBJECT - human figure stooping over heavy object shows physical injury potential from improper lifting technique.

HEAVY PARTS - hand with heavy object on top shows that heavy parts can crush and harm.

HEAVY PARTS - foot with heavy object on top shows that heavy parts can crush and harm.

EXPLANATION OF SAFETY WARNING ICONS (continued)

HEAVY PARTS - heavy object on human figure shows that heavy parts present a danger to life or limb.

HEAVY PARTS - heavy object pinning human figure against wall shows that heavy, moving parts present a danger to life or limb.

HELMET PROTECTION - arrow bouncing off head with helmet shows that falling parts present a danger.

HOT AREA - hand over object radiating heat shows that part is hot and can burn.

MOVING PARTS - human figure with an arm caught between gears shows that the moving parts of the equipment present a danger to life or limb.

MOVING PARTS - hand with fingers caught between gears shows that the moving parts of the equipment present a danger to life or limb.

MOVING PARTS - hand with fingers caught between rollers shows that the moving parts of the equipment present a danger to life or limb.

SHARP OBJECT - pointed object in hand shows that a sharp object presents a danger to limb.

SHARP OBJECT - pointed object in hand shows that a sharp object presents a danger to limb.

EXPLANATION OF SAFETY WARNING ICONS (continued)

SHARP OBJECT - pointed object in foot shows that a sharp object presents a danger to limb.

SLICK FLOOR - wavy line on floor with legs prone shows that slick floor presents a danger for falling.

VAPOR - human figure in a cloud shows that material vapors present a danger to life or health.

LIST OF EFFECTIVE PAGES/WORK PACKAGES

NOTE: The portion of text affected by the changes is indicated by a vertical line in the outer margins of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by shaded areas.

Date of original issue for this manual is:

Original 30 November 2005

TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 28 AND TOTAL NUMBER OF WORK PACKAGES IS 50, CONSISTING OF THE FOLLOWING:

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A	0
B blank	0
i-v	0
vi blank	0
Chp 1 title page	0
WP 0001 00 (4 pgs)	0
WP 0002 00 (28 pgs)	0
WP 0003 00 (22 pgs)	0
Chp 2 title page	0
WP 0004 00 (14 pgs)	0
WP 0005 00 (24 pgs)	0
WP 0006 00 (8 pgs)	0
Chp 3 title page	0
WP 0007 00 (4 pgs)	0
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Chp 4 title page	0
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Chp 5 title page	0
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WP 0049 00 (12 pgs)	0
WP 0050 00 (2 pgs)	0
Glossary-1-Glossary-2	0
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DA 2028	0
Authentication Page	0
Rear Cover	0

* Zero in this column indicates an original page or work package

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 30 NOVEMBER 2005

TECHNICAL MANUAL

OPERATOR, UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST FOR FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS

INLAND AND COASTAL LARGE TUG (LT)
NSN 1925-01-509-7013 (EIC XAG)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this publication. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Submit your DA Form 2028 (Recommended Changes to Equipment Technical Publications) through the Internet on the Army Electronic Product Support (AEPS) Web site. The Internet address is https://aeps.ria.army.mil. The DA Form 2028 is located under the Public Applications section on the AEPS public home page. Fill out the form and click on SUBMIT. Using this form on the AEPS site will enable us to respond quicker to your comments and better manage the DA Form 2028 program. You may also mail, fax, or e-mail your letter or DA Form 2028 directly to: AMSTA-LC-LPIT / TECH PUBS, TACOM-RI, 1 Rock Island Arsenal, Rock Island, IL 61299-7630. The e-mail address is TACOM-TECH-PUBS@ria.army.mil. The fax number is DSN 793-0726 or Commercial (309) 782-0726.

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This manual supersedes TM 55-1925-227-24&P, dated 16 August 1991

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TABLE OF CONTENTS (continued)

WP Sequence No.

HOW TO USE THIS MANUAL

USING THIS MANUAL

When using this manual, read and understand the entire maintenance action before performing the task. Also, read and understand all warnings, cautions, and notes as well as general safety precautions that apply to the task to be performed. The warning summary will inform personnel of hazards associated with the equipment to be worked on. However, the summary is not all inclusive and personnel should be aware at all times of hazardous conditions that may arise.

ACCESSING INFORMATION

Information is accessed by referring to the table of contents, located in the front of this manual, or by looking in the alphabetical index, located in the back of this manual.

To locate information using the table of contents, first scan the chapter titles to determine the general area in which your information will be contained. After locating the proper chapter, look beneath the chapter title to find the desired informational or procedural work package title. To the right of the work package title is a work package sequence number. This work package sequence number will direct you to the proper work package. Work packages are arranged in numerical order in this manual.

To locate information using the alphabetical index, look down the subject column on the left side of the page until you find the desired subject. To the right of the subject is the work package sequence number and page number. Go to the indicated work package and indicated page number to find the desired information.

INITIAL SETUP

Initial setup requirements are located directly above many of the procedures in this manual. The information is given to ensure all materials, expendables, tools and any other equipment necessary are readily available for use. The initial setup will be accomplished prior to starting the actual steps of each maintenance procedure. There are five basic headings listed under the initial setup:

Tools and Special Tools: This section lists all tools (standard or special) required to perform the task. Tools are identified with an item number and work package number from table 2 of the Maintenance Allocation Chart (MAC).

Materials/Parts: This section lists all of the materials and parts required to perform the task. If the material or part is needed each time the work package is used, then it is listed here. If the part is optional, replaced on a conditional basis, or is only needed for certain specific procedures within the work package it is not listed.

Personnel Required: This section lists all personnel necessary to perform the task. When a specific MOS or other personnel qualification is required, this MOS or additional requirement is also indicated.

Equipment Condition: This section notes the conditions that must exist before starting the task. The equipment condition will also include any prerequisite maintenance tasks to be performed with reference to the work package number or to the TM number that contains the required maintenance task.

References: This section lists any other publications necessary to complete the task. When there are no references listed, all steps necessary to complete the task are contained within this manual. A listing of reference materials is contained in the Supporting Information chapter at the rear of this manual.

ILLUSTRATIONS

Various visual methods are used to locate and repair components. Locator illustrations in Controls and Indicator tables, Preventive Maintenance Checks and Services (PMCS) tables, exploded views, and cut-away diagrams make the information in the manual easier to understand and follow.

LOCATING MAJOR COMPONENTS

This work package gives a brief description of the major components, and provides illustrations showing the location of the components. Knowing the major components of the system is the first step to understanding system operation and maintenance.

THEORY OF OPERATION

This work package contains the theory of operation for the system. Theory of operation is provided to familiarize the user with system operating principles. Once the operating principles are understood, the user is better equipped to operate, troubleshoot, and maintain the system.

DESCRIPTION AND USE OF OPERATOR CONTROLS AND INDICATORS

This work package describes all of the operator controls and indicators contained in the system. Use of the operator controls and indicators is also described. Turn to the figure that shows the desired control or indicator. Note the key number corresponding to the control or indicator. Refer to the table below the illustration and find the desired key number in the column on the far left hand side. The center column contains the name of the control or indicator and the right hand column briefly describes the control or indicator's function.

OPERATOR INSTRUCTIONS

Work packages are included in this manual to describe operation under usual conditions as well as operation under unusual conditions. Prior to performing any operating procedure, perform the initial setup by obtaining the expendables, tools, materials and other items listed prior to starting the task. Always perform the listed steps in the listed order.

TROUBLESHOOTING PROCEDURES

A troubleshooting index work package is contained in this manual to permit easy location of troubleshooting procedures. Full directions for using the troubleshooting index and the accompanying troubleshooting procedures are contained in the troubleshooting index work packages. The troubleshooting procedure work package(s) immediately follow the troubleshooting index.

MAINTENANCE PROCEDURES

To locate a maintenance procedure, consult the table of contents or the alphabetical index. Each level of maintenance (operator, unit, direct support, and general support) has a chapter dedicated to maintenance procedures for the appropriate level of maintenance. Each maintenance work package contains complete maintenance procedures, starting with initial setup and continuing through follow on service as appropriate. Always ensure that all of the initial setup is complete before beginning a maintenance procedure and always ensure that all warnings, cautions, and notes are heeded.

MAINTENANCE ALLOCATION CHART

The MAC lists all of the authorized maintenance for the system assigns that maintenance to the appropriate maintenance level (operator, unit, direct support, general support). Use of the MAC is explained fully in the Maintenance Allocation Chart Introduction work package.

REPAIR PARTS AND SPECIAL TOOLS LIST (RPSTL)

The RPSTL lists all of the repair parts authorized for the system. Illustrations are provided to assist in locating the desired repair parts. Full instructions for use of the RPSTL are contained in the Repair Parts and Special Tools List Introduction work package. Always follow the directions contained in this work package when using the RPSTL.

ALPHABETICAL INDEX

The Alphabetical Index, located in the back of this manual, contains an alphabetical list of all sections of this manual. For example, Location and Description of Major Components is found in section L. The work package sequence number is found on the right side of the title where the Location and Description of Major Components is located. Turn to the work package indicated to find the description and location of each component.

Chapter 1

General Information, Equipment Description, and Theory of Operation for Firefighting, Fire Alarm, and Fire Suppression Systems

Inland and Coastal Large Tug (LT)

OPERATOR, UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT) GENERAL INFORMATION

SCOPE

The information in this manual applies to all Inland and Coastal Large Tugs (LT) with the FM-200 fire suppression system and the lowered pilothouse configuration. This manual contains operator instructions and maintenance procedures for the firefighting system, the fire and smoke detection system, the Aqueous Film Forming Foam (AFFF) pump, the FM-200 fire suppression system, the Engine Room Water Washdown System (ERWWS), and the diesel engine-driven firefighting pump.

MAINTENANCE FORMS, RECORDS, AND REPORTS

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

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

You can help improve this publication. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Submit your DA Form 2028 (Recommended Changes to Equipment Technical Publications) through the Internet on the Army Electronic Product Support (AEPS) Web site. The Internet address is https://aeps.ria.army.mil. The DA Form 2028 is located under the Public Applications section on the AEPS public home page. Fill out the form and click on SUBMIT. Using this form on the AEPS site will enable us to respond quicker to your comments and better manage the DA Form 2028 program. You may also mail, fax, or e-mail your letter or DA Form 2028 directly to: AMSTA-LC-LMIT / TECH PUBS, TACOM-RI, 1 Rock Island Arsenal, Rock Island, IL 61299-7630. The e-mail address is TACOM-TECH-PUBS@ria.army.mil. The fax number is DSN 793-0726 or Commercial (309) 782-0726.

CORROSION PREVENTION AND CONTROL (CPC)

Corrosion Prevention and Control (CPC) of Army materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items.

Corrosion specifically occurs with metals. It is an electrochemical process that causes the degradation of metals. It is commonly caused by exposure to moisture, acids, bases, or salts. An example is the rusting of iron. Depending on the metal, corrosion damage in metals can be seen as tarnishing, pitting, fogging, surface residue, and/or cracking.

Plastics, composites, and rubbers can also degrade. Degradation is caused by thermal (heat), oxidation (oxygen), solvation (solvents), or photolytic (light, typically UV) processes. The most common exposures are excessive heat or light. Damage from these processes will appear as cracking, softening, swelling, and/or breaking.

If a corrosion problem is identified, it can be reported using SF 368 (Product Quality Deficiency Report). Use of key words such as “corrosion,” “rust,” “deterioration,” or “cracking” will ensure that the information is identified as a CPC problem. The form should be submitted to the address specified in DA PAM 738-750, Functional Users Manual for The Army Maintenance Management System (TAMMS).

OZONE DEPLETING SUBSTANCES

There are no Ozone Depleting Substances (ODS) contained in the firefighting, fire alarm, and fire suppression systems.

DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

For procedures to destroy this equipment to prevent its use by the enemy, refer to TM 750-244-6, Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use.

PREPARATION FOR STORAGE OR SHIPMENT

Detailed procedures for preparing the firefighting, fire alarm, and fire suppression systems for storage or shipment are contained in TB 740-97-4, Preservation of Vessels for Storage and TM 38-470, Storage and Maintenance of Army Prepositioned Stock Materiel. The firefighting, fire alarm, and fire suppression systems must be prepared for storage or shipment in accordance with that publication.

WARRANTY INFORMATION

Unit maintenance maintains records of the warranty status of equipment on the firefighting, fire alarm, and fire suppression systems. The warranty starts on the date found in block 23 of DA Form 2408-9 (Equipment Control Record). Report all defects to your supervisor, who will take appropriate action.

LIST OF ABBREVIATIONS/ACRONYMS

Abbreviation/Acronym	Name
°C	Degrees Centigrade
°F	Degrees Fahrenheit
A	Amp(s)
AAL	Additional Authorization List
AEPS	Army Electronic Product Support
AFFF	Aqueous Film Forming Foam
AMS	Auxiliary Machinery Space
BC	Battery Charger
BII	Basic Issue Items
BOI	Basis of Issue
cm	Centimeter(s)
COEI	Components of End Item
COTS	Commercial Off the Shelf
COV	Cutoff Valve
CPC	Corrosion Prevention and Control
CRSVR	Crossover
dc	Direct Current
DC	Damage Control
DISCH	Discharge
DR	Drive
EDG	Emergency Diesel Generator
EIR	Equipment Improvement Recommendations
ENG	Engine
EOS	Enclosed Operating Station
ER	Engine Room
ERWWS	Engine Room Water Washdown System
ESD	Electrostatic Discharge

LIST OF ABBREVIATIONS/ACRONYMS (continued)

Abbreviation/Acronym	Name
FF	Firefighting
FGC	Functional Group Code
FM	Fire Main
ft	Foot(feet)
ft^2	Square foot(feet)
ft^3/min	Cubic feet per minute
GA	Gauge
GS	General Service
HF	Hydrogen Fluoride
in	Inch(es)
in^3	Cubic Inch(es)
L	Liter(s)
LED	Light Emitting Diode
L/min	Liters per minute
lb	Pound(s)
lb-ft	Pounds Feet (torque)
LT	Large Tug
m	Meter(s)
m^2	Square meter(s)
MAC	Maintenance Allocation Chart
MM	Meter Module
NCO	Noncommissioned Officer
Nm	Newton Meter
NSN	National Stock Number
ODS	Ozone Depleting Substance(s)
PMCS	Preventive Maintenance Checks and Services
PPE	Personal Protective Equipment
PPM	Parts Per Million
PMP	Pump
P/N	Part Number
PS	Power Supply
PS	Pressure Switch
PSI	Pounds per Square Inch
PTO	Power Take-Off
RPSTL	Repair Parts and Special Tools List
SEASUCT	Sea Suction
SMR	Source, Maintainability, Recoverability
STBD	Starboard
STG	Starting
SSDG	Ship's Service Diesel Generator
SUCT	Suction
SVCE	Service

LIST OF ABBREVIATIONS/ACRONYMS (continued)

Abbreviation/Acronym	Name
TAMMS	The Army Maintenance Management System
TK	Tank
TM	Technical Manual
TMDE	Test, Measurement, and Diagnostic Equipment
UOC	Usable On Code
UV	Ultraviolet
Vac	Volts, Alternating Current
Vdc	Volts, Direct Current
WP	Work Package
WWS	Water Washdown System

QUALITY OF MATERIAL

Material used for replacement, repair, or modification must meet the requirements of this manual. If quality of material requirements are not stated in this manual, the material must meet the requirements of the drawings, standards, specifications, or approved engineering change proposals applicable to the subject equipment.

SAFETY, CARE, AND HANDLING

The following procedures should be observed when handling all Electrostatic Discharge (ESD) sensitive components and units containing such components. Failure to observe all of these precautions can cause permanent damage to the electrostatic device. This damage can cause the device to fail immediately or at a later date when exposed to an adverse environment.

1. Turn off and /or disconnect all power, signal sources, and loads used with the unit.

2. Place the unit on a grounded, non-conductive work surface.

3. Ground the repair operator using a non-conductive wrist strap or other device using 1 megaohm series resistor to protect the operator.

4. Ground any tools (including soldering equipment) that will contact the unit. Contact with the operator’s hand provides a sufficient ground for tools that are otherwise electrically isolated.

5. All electrostatic sensitive replacement components are shipped in non-conductive foam or tubes and must be stored in the original shipping container until installed.

6. When these devices and assemblies are removed from the unit, they should be placed on the non-conductive work surface or in non-conductive containers.

7. When not being worked on, place disconnected circuit boards in plastic bags that have been coated or impregnated with a non-conductive material.

8. Do not handle these devices unnecessarily or remove them from their packages until actually used or tested.

END OF WORK PACKAGE

OPERATOR, UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT) EQUIPMENT DESCRIPTION AND DATA

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

The Large Tug's (LT) firefighting, fire alarm, and fire suppression capabilities are provided by several independent systems. These include a fire alarm system, a FM-200 fire suppression system, a galley fire suppression system, a raw water firefighting system, an Engine Room Water Washdown System (ERWWS), an arms locker drenching system, an Aqueous Film Forming Foam (AFFF) pump, and a diesel engine-driven firefighting pump. Each system is described in the following paragraphs. The technical characteristics of these systems are detailed in the Equipment Data section in this work package. The theory of operation is outlined in WP 0003 00.

FIRE ALARM SYSTEM

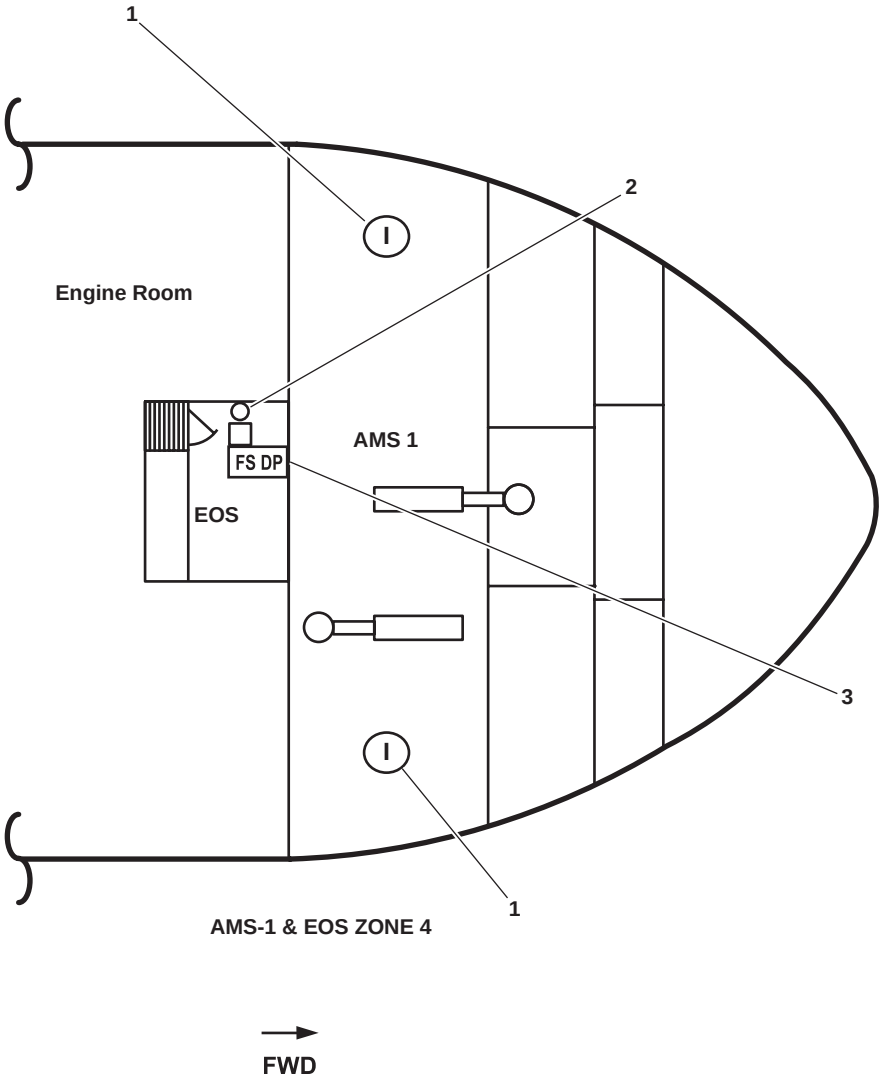
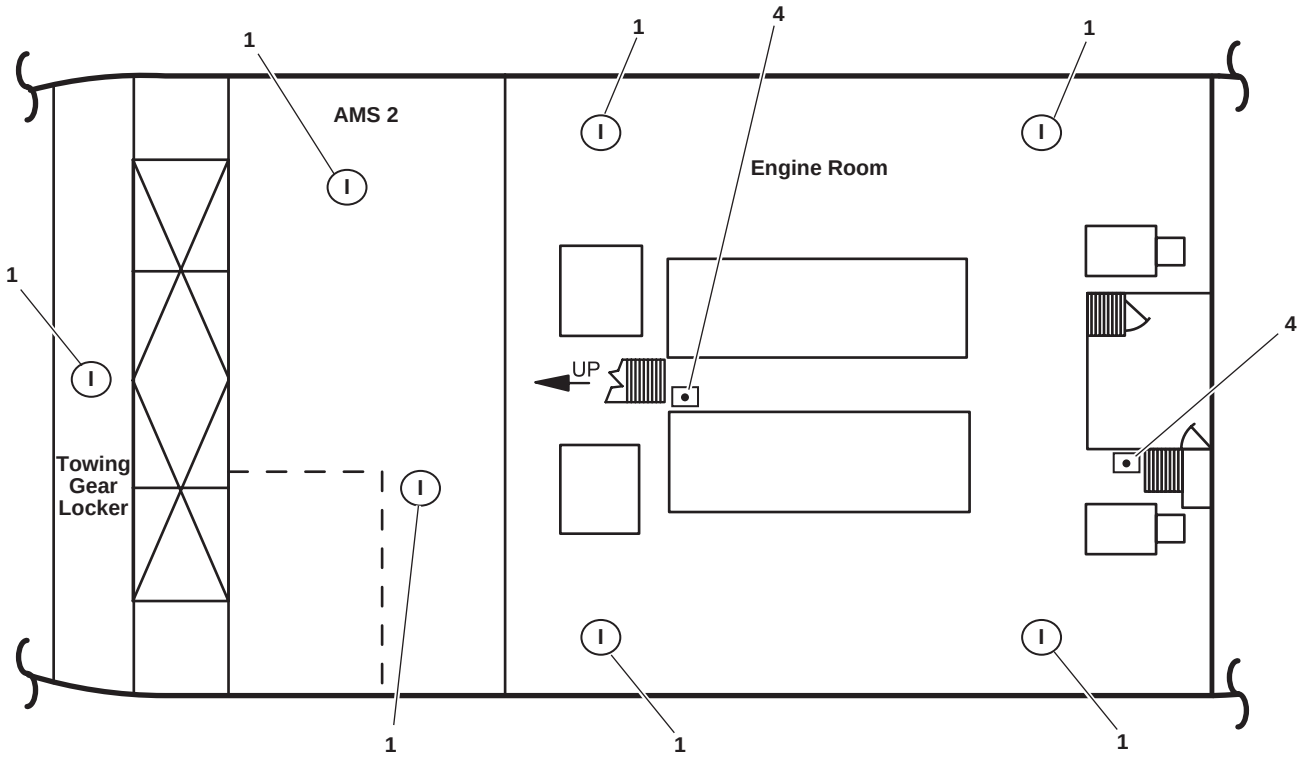
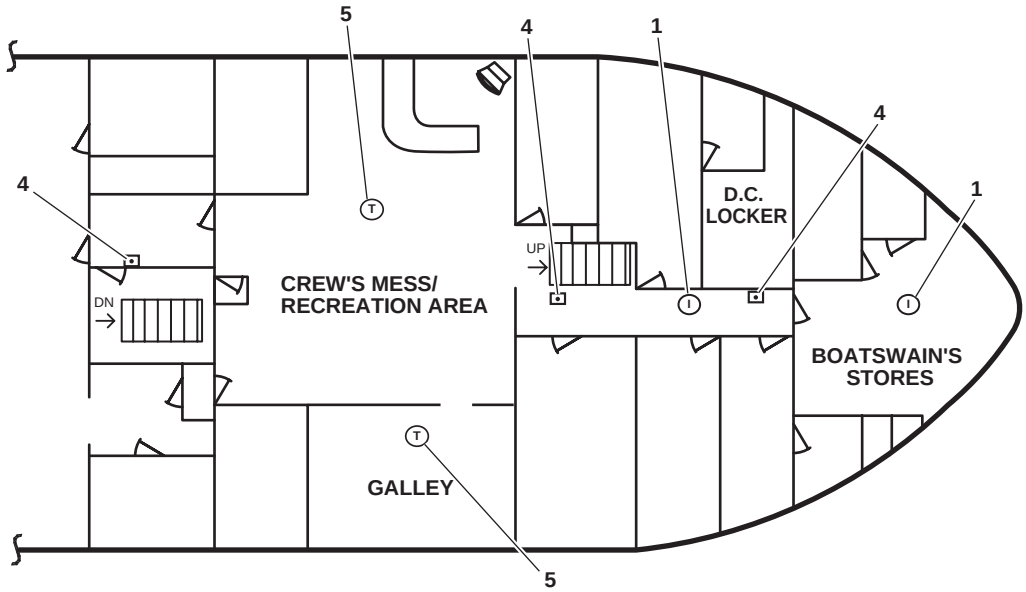


Figure 1. Fire Alarm System Component Locations (Sheet 1 of 4)



ENGINE ROOM, AMS 2 AND TOWING GEAR LOCKER ZONE 4

FWD



MAIN DECK ZONE 3

FWD

Figure 1. Fire Alarm System Component Locations (Sheet 2 of 4)

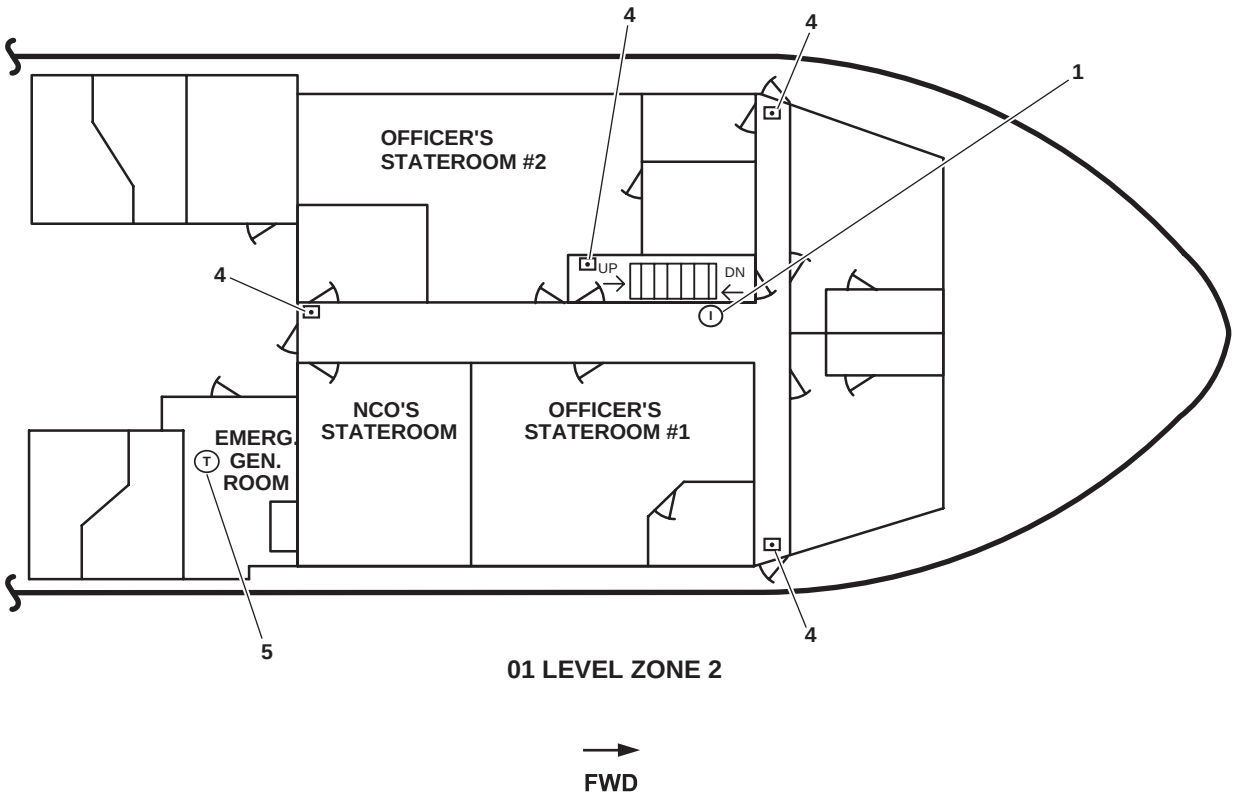


Figure 1. Fire Alarm System Component Locations (Sheet 3 of 4)

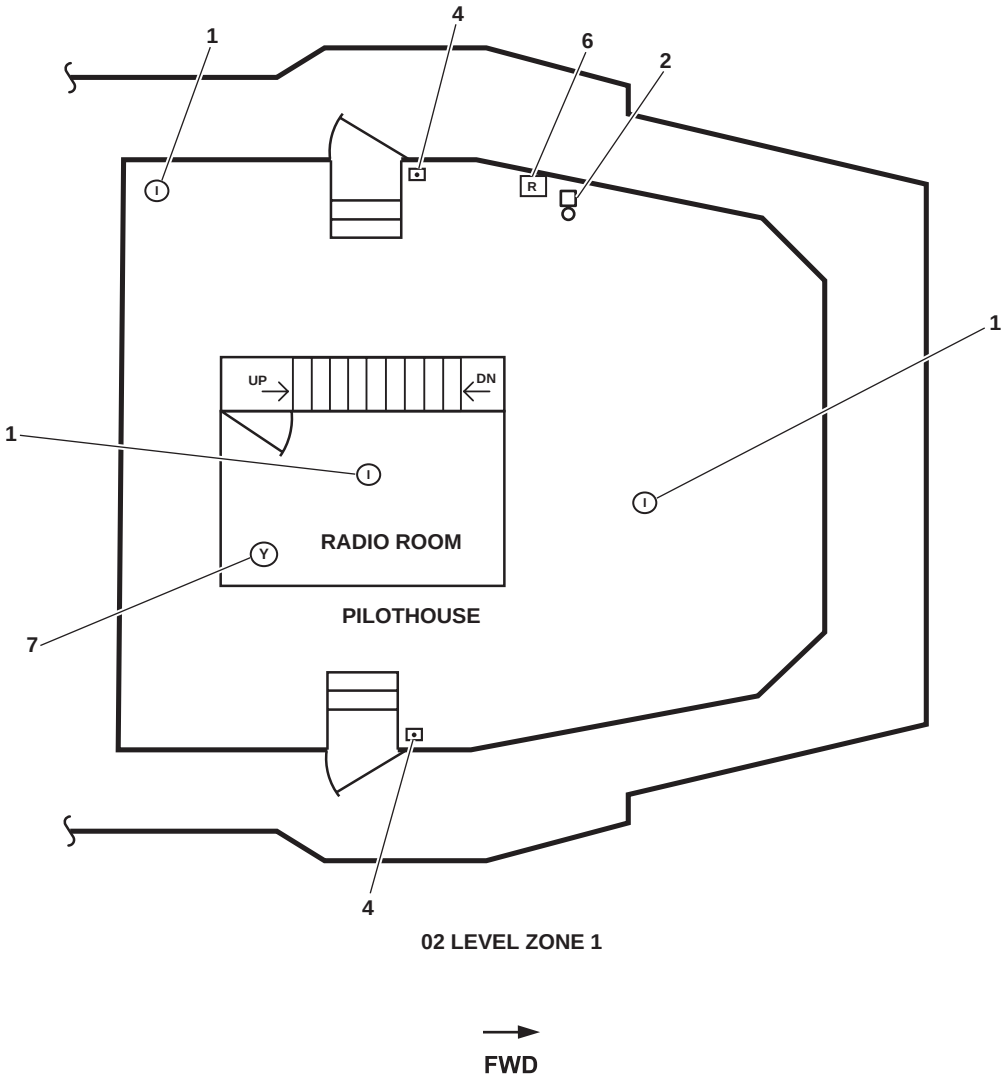


Figure 1. Fire Alarm System Component Locations (Sheet 4 of 4)

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

1. Ionization Smoke Detectors (figure 1, item 1). These are located throughout the vessel: two in Auxiliary Machine Space (AMS) 1, two in AMS 2, one in the towing gear locker, four in the engine room, one in the boatswain's storeroom, one in the main deck passageway, one in the 01 level passageway, two in the pilothouse, and one in the radio room. These detectors sense the presence of smoke in the protected space.

2. Alarm Bells (figure 1, item 2). These are located adjacent to the fire and smoke detection panel in the Enclosed Operating Station (EOS) and in the pilothouse. These bells give an audible warning during an alarm condition.

3. Fire and Smoke Detection Panel (figure 1, item 3). This panel, located in the EOS, gives a readout of system operating conditions and any existing alarm or fault condition.

4. Fire Alarm Pull Stations (figure 1, item 4). These are located throughout the vessel: two in the engine room, two in main deck passageway, one in engine room vestibule, one located at the bottom of the 01 level stair well, three on 01 level (one at each entrance), and two in the pilothouse (one at each entrance). These units permit the crew to manually actuate the fire alarm system.

5. Thermal Heat Detectors (figure 1, item 5). There are three: one in the crew's mess/recreation area, one in the galley, and one in the emergency generator room. These detectors sense temperatures in excess of 135 °F (55.2 °C).

6. Remote Indicator Panel (figure 1, item 6). This panel, located in the pilothouse, gives a remote indication of any fire alarm condition aboard the LT.

7. Fire Alarm Beacon (Red) (figure 1, item 7). This beacon, located in the radio room, gives a visual warning during a fire alarm condition.

FM-200 FIRE SUPPRESSION SYSTEM

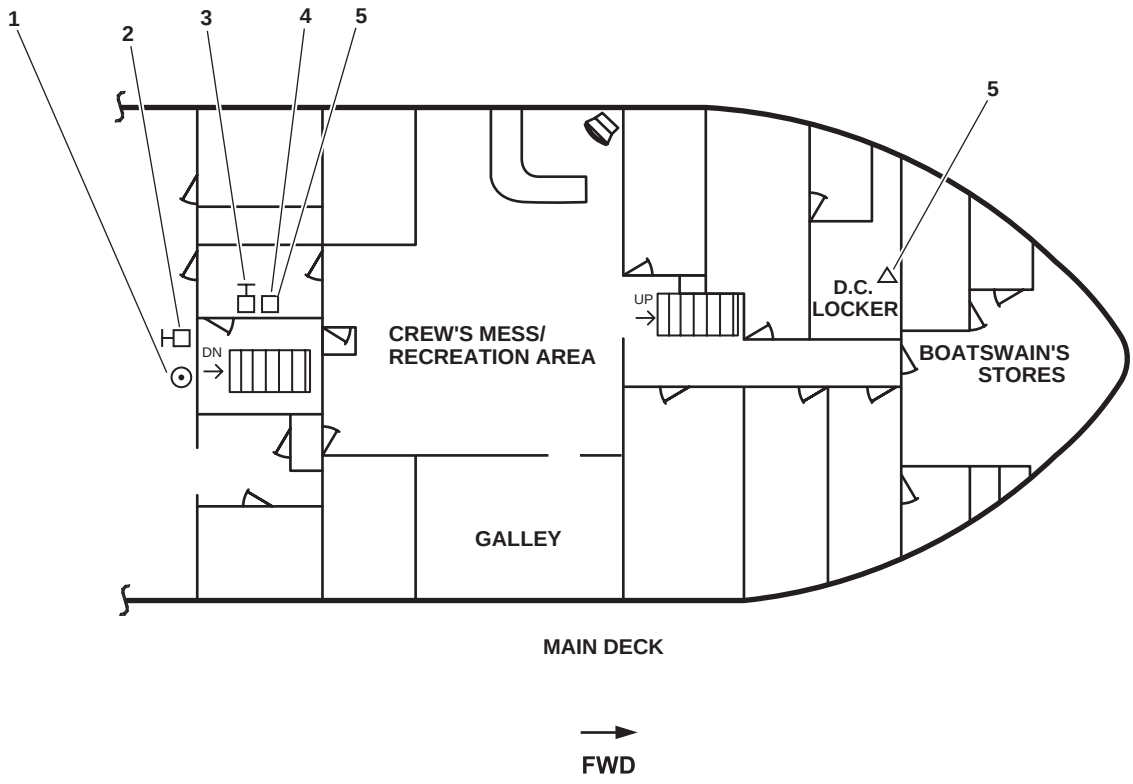
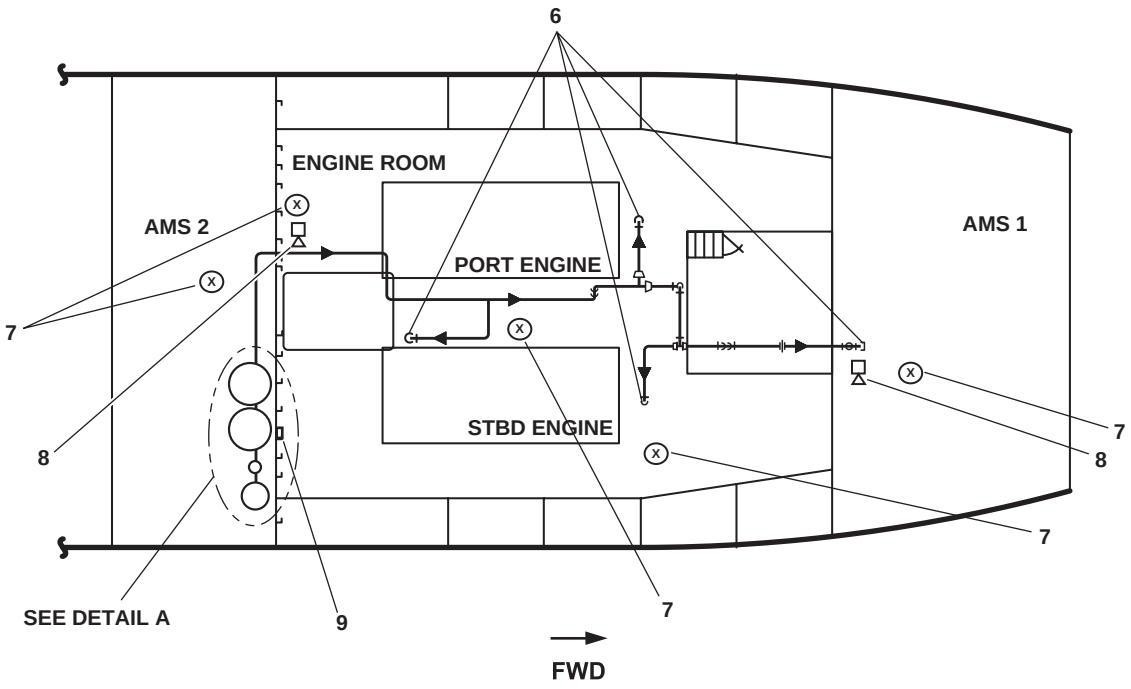


Figure 2. FM-200 Fire Suppression System (Sheet 1 of 3)



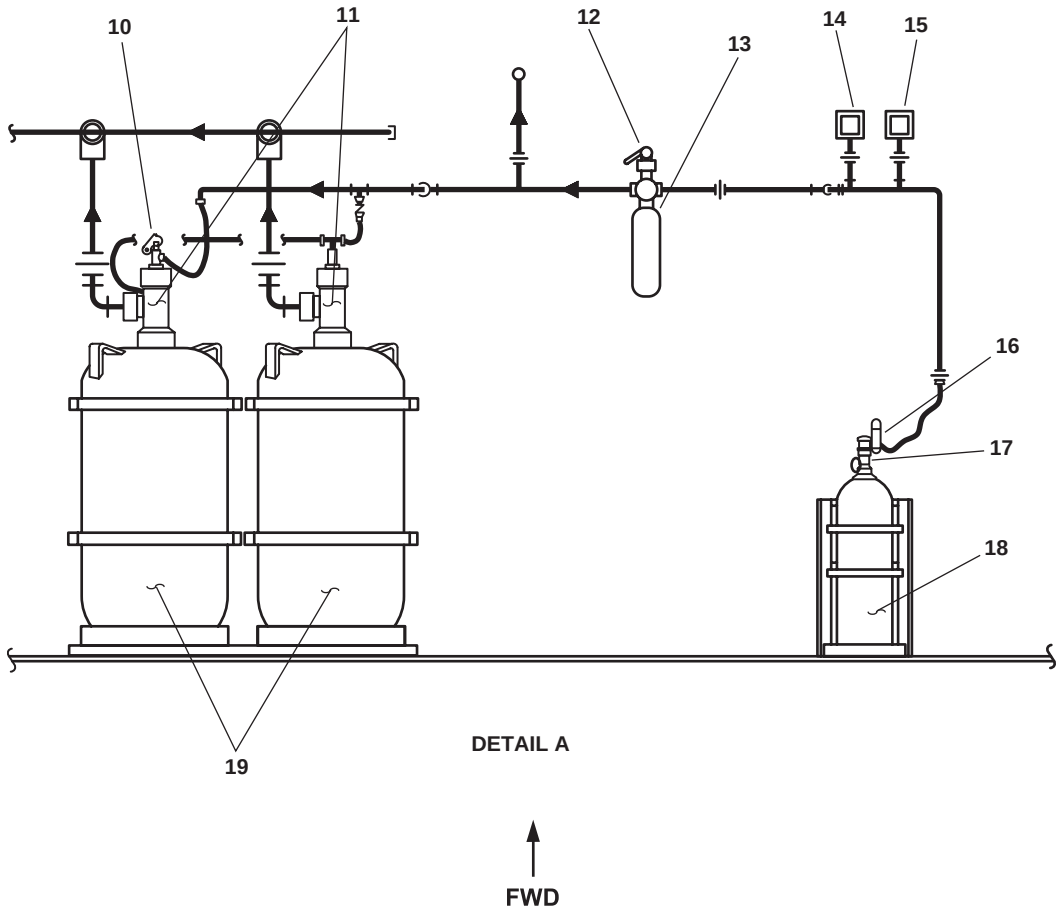
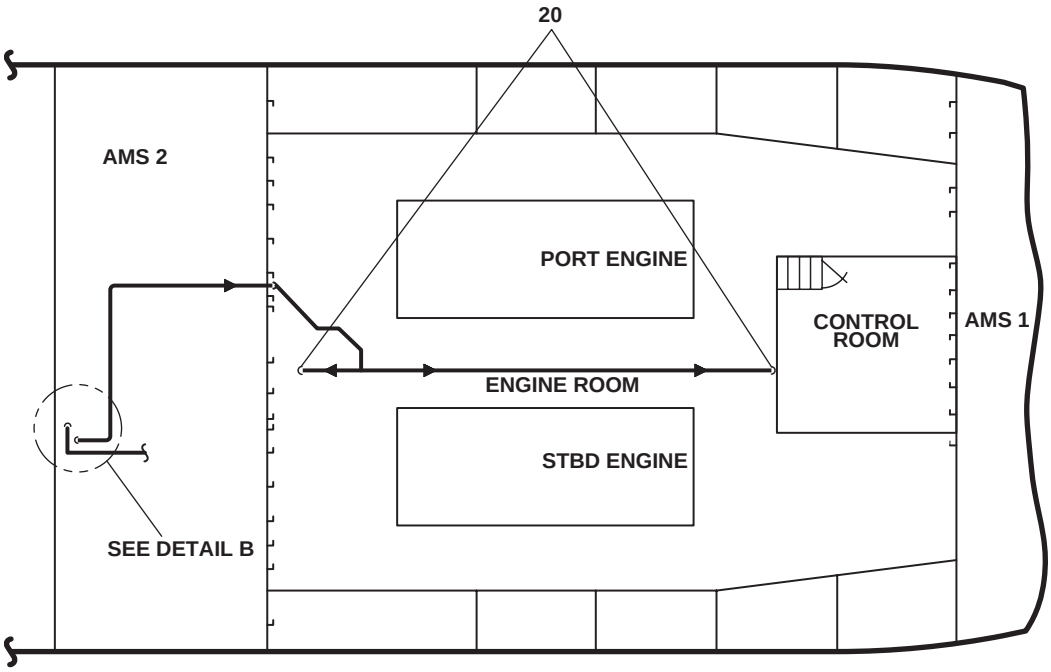
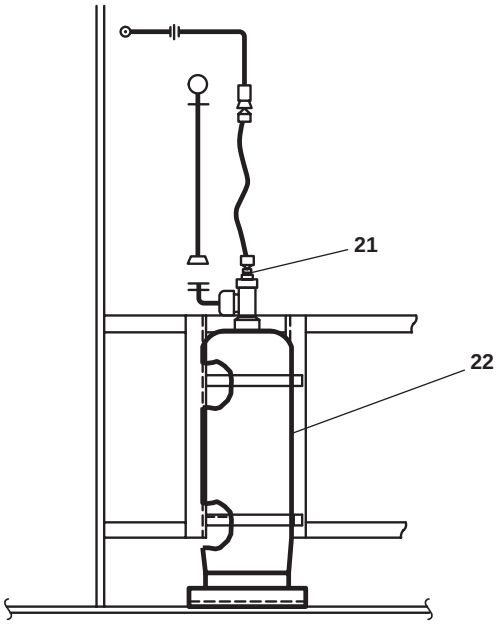


Figure 2. FM-200 Fire Suppression System (Sheet 2 of 3)



DETAIL A

FWD



DETAIL B

Figure 2. FM-200 Fire Suppression System (Sheet 3 of 3)

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

1. FM-200 Engine Room Alarm Bell (figure 2, item 1). This engine room alarm bell indicates that pressure switch PS-1 has been activated and FM-200 will be released into the protected spaces in 60 seconds.

2. FM-200 Manual Pull Boxes (figure 2, items 2 and 3). These pull boxes provide the means for normal remote actuation of the FM-200 fire suppression system.

3. Water Washdown Station (figure 2, item 4). This water washdown station permits raw water to flow from the fire main system to the engine room water washdown system.

4. Hydrogen Fluoride (HF) Gas Sampling Port (figure 2, item 5). This port allows sampling of the atmosphere in the protected space.

5. Overhead Discharge Nozzles (figure 2, item 6). These nozzles deliver the FM-200 agent to the upper areas of AMS 1 and the engine room.

6. FM-200 Strobe Lights (figure 2, item 7). These strobe lights are activated by pressure switch PS-1 and indicate that the FM-200 system will be activated within 60 seconds.

7. FM-200 Warning Horns (figure 2, item 8). These warning horns are activated by pressure switch PS-1A and indicate that the FM-200 system will be activated in 60 seconds.

8. FM-200 Relay Box (figure 2, item 9). This relay box houses the relays required to shut down the systems when PS-1 is activated.

9. Manual/Pressure Operated Control Head (figure 2, item 10). This control head permits both manual and pressure actuation of the FM-200 discharge delay valve. When activated manually, FM-200 discharge is activated without warning horns, strobe lights, or the FM-200 bell sounding.

10. FM-200 Discharge Valve (figure 2, item 11). This discharge valve permits the discharge of FM-200 fire suppression agent from the 600 lb cylinders.

11. Discharge Delay Valve (figure 2, item 12). When CLOSED, the 60-second delay is active. When OPENED, the 60-second delay is overridden.

12. Discharge Delay Cylinder (figure 2, item 13). This discharge delay cylinder enables the 60-second delay when the discharge delay valve is CLOSED.

13. Pressure Activated Switch PS-1 (figure 2, item 14). When the FM-200 system is actuated, PS-1 automatically secures engine room and AMS 1 ventilation, Ship's Service Diesel Generator (SSDG) 1, SSDG 2, the bow thruster engine, the pump drive engine, and the fuel oil transfer pumps. PS-1 also sounds an alarm bell and energizes the amber strobe lights.

14. Pressure Activated Switch PS-1A (figure 2, item 15). When the FM-200 system is actuated, PS-1A energizes the warning horns in the engine room and AMS 1, and the amber strobe lights in the engine room, AMS 1, and AMS 2.

15. Cable Operated Control Head (figure 2, item 16). When the release T handle is pulled, this control head releases CO_2 gas that controls the discharge of FM-200 from the cylinders.

16. Discharge Valve (figure 2, item 17). This discharge valve controls the discharge of CO_2 gas from the CO_2 cylinder.

17. CO_2 Cylinder (figure 2, item 18). This cylinder stores the CO_2 gas that controls actuation of the FM-200 system.

18. 600 lb (272.2 kg) FM-200 Cylinders (figure 2, item 19). These cylinders store the FM-200 fire suppression agent for the overhead system in the engine room and AMS 1.

19. Bilge Discharge Nozzles (figure 2, item 20). These bilge discharge nozzles deliver FM-200 agent to the lower/bilge areas of the engine room.

20. Discharge Valve (figure 2, item 21). This discharge valve permits the discharge of FM-200 fire suppression agent from the 200 lb (90.7 kg) cylinder.

21. 200 lb (90.7 kg) FM-200 Cylinder (figure 2, item 22). This cylinder stores the FM-200 fire suppression agent for the bilge discharge system.

GALLEY FIRE SUPPRESSION SYSTEM

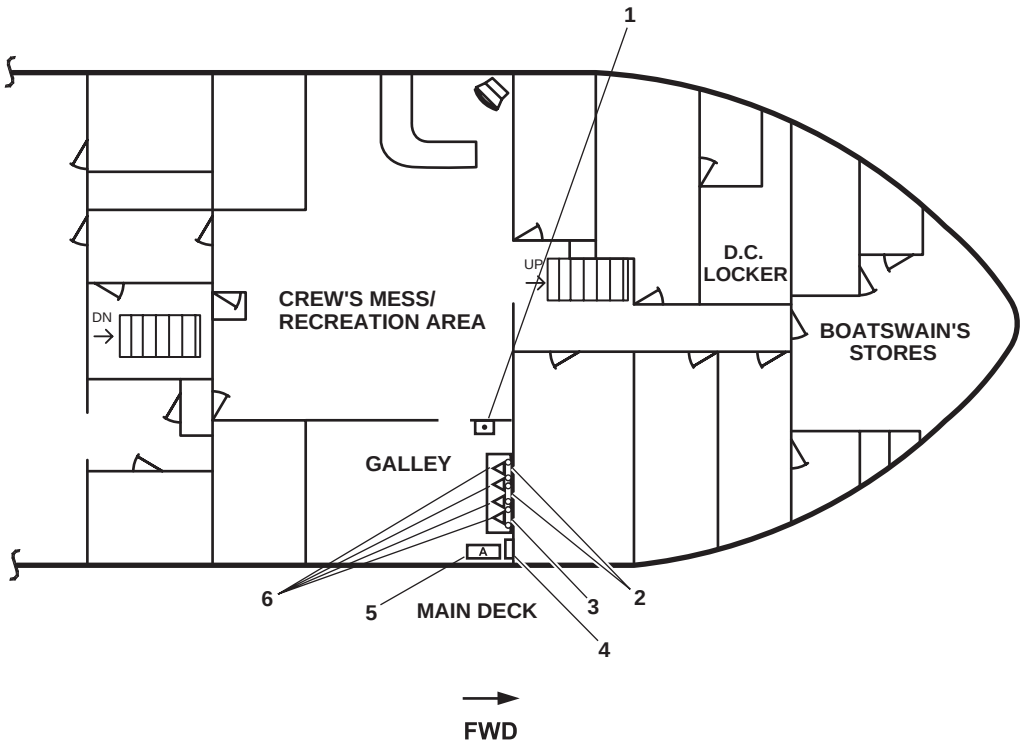


Figure 3. Galley Fire Supression System

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

1. Fire Alarm Pull Station (figure 3, item 1). The manual pull box allows the crew to manually activate the galley fire suppression system.

2. Fusible Links (figure 3, item 2). These fusible links are activated at 500 °F (260 °C) and are located over the solid hot top and flat griddle.

3. Fusible Link (figure 3, item 3). This fusible link is activated at 360 °F (182 °C) and is located over the deep fat fryer.

4. Gaylord Washdown System (figure 3, item 4). This system is activated when the galley fire suppression system is activated.

5. Galley Fire Suppression System (figure 3, item 5). This cabinet houses the galley fire extinguishing agent.

6. Distribution Nozzles (figure 3, item 6). These nozzles deliver the galley fire suppression extinguishing agent to the galley heat producing equipment.

FIREFIGHTING SYSTEM

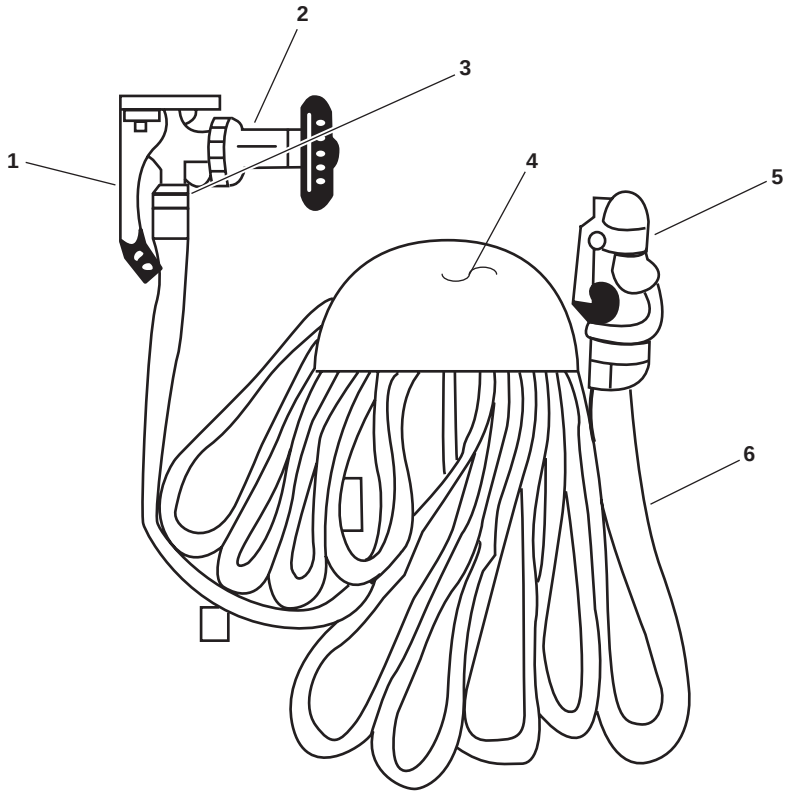


Figure 4. Fire Station Components

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

1. Spanner Wrench (figure 4, item 1). This wrench provides the operator with a ready service tool for tightening and loosening hoses and nozzles. The spanner wrench is necessary when adding additional lengths of hose and draining the hose for storage.

2. Cutoff Valve (figure 4, item 2). This cutoff valve controls the flow of raw water to the hose.

3. International Thread Adapter (figure 4, item 3). This adapter allows international threaded fire hoses to be connected to U.S. national threaded valves.

4. Storage Rack (figure 4, item 4). This storage rack stores the hose in a ready service condition. Proper use of the storage rack will prevent the dry hose from kinking in an emergency.

5. All Purpose Nozzle (figure 4, item 5). This nozzle controls the flow of raw water out of the hose. It has the capability of shooting a solid stream of high velocity fog. The nozzle can also be rigged with a low velocity applicator.

6. Hose (figure 4, item 6). This hose is a standard 1.5 inch hose, and it is 50 feet (15.2 meters) in length. The fire stations are capable of shooting 70 gallons (265 liters) of water per minute (in a solid stream) approximately 75 feet (23 meters) when pressurized to 100 PSI (6.9 bar). Total reach of a fire station is approximately 125 feet (38 meters).

FIRE STATION LOCATIONS

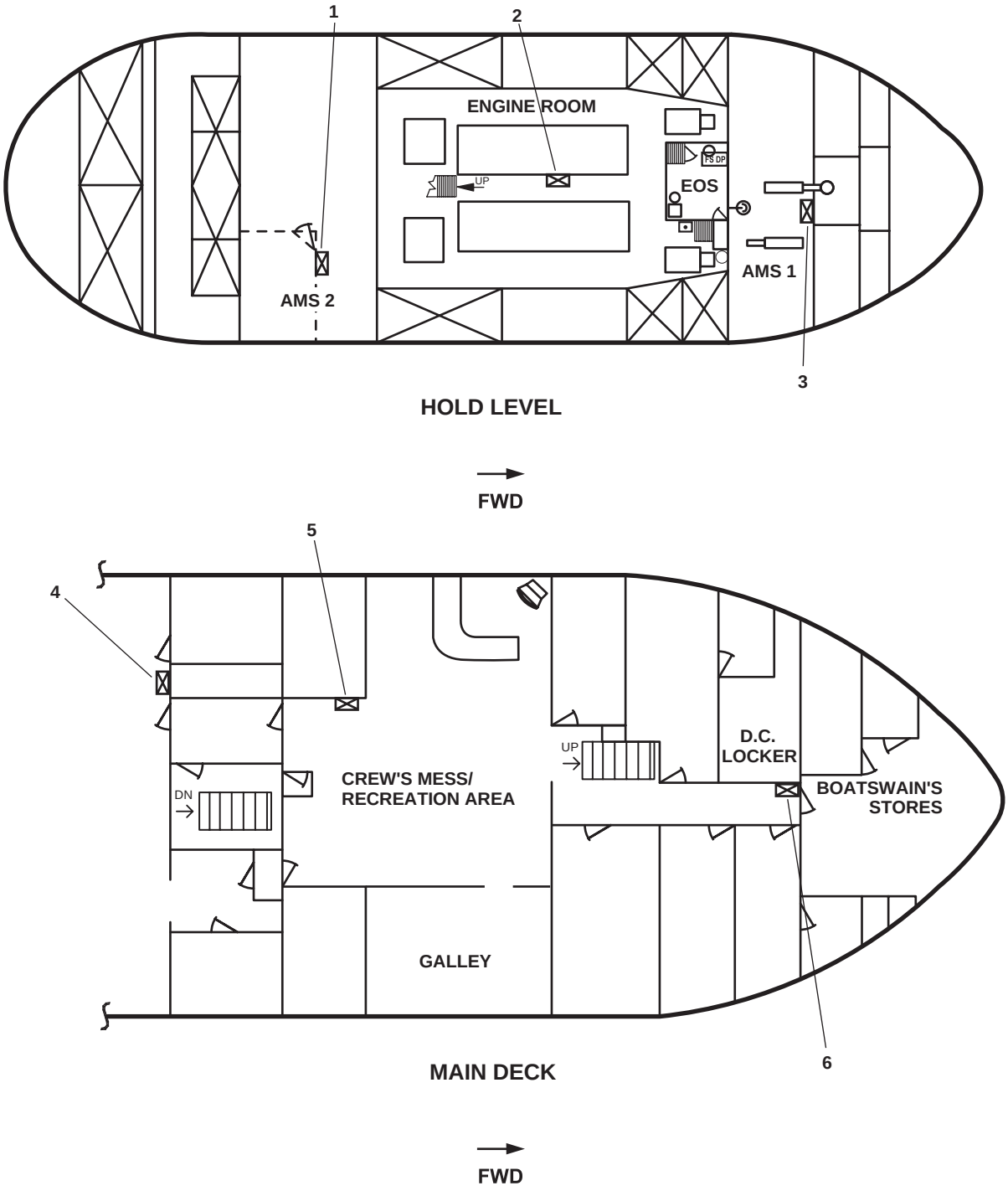


Figure 5. Fire Station Locations (Sheet 1 of 2)

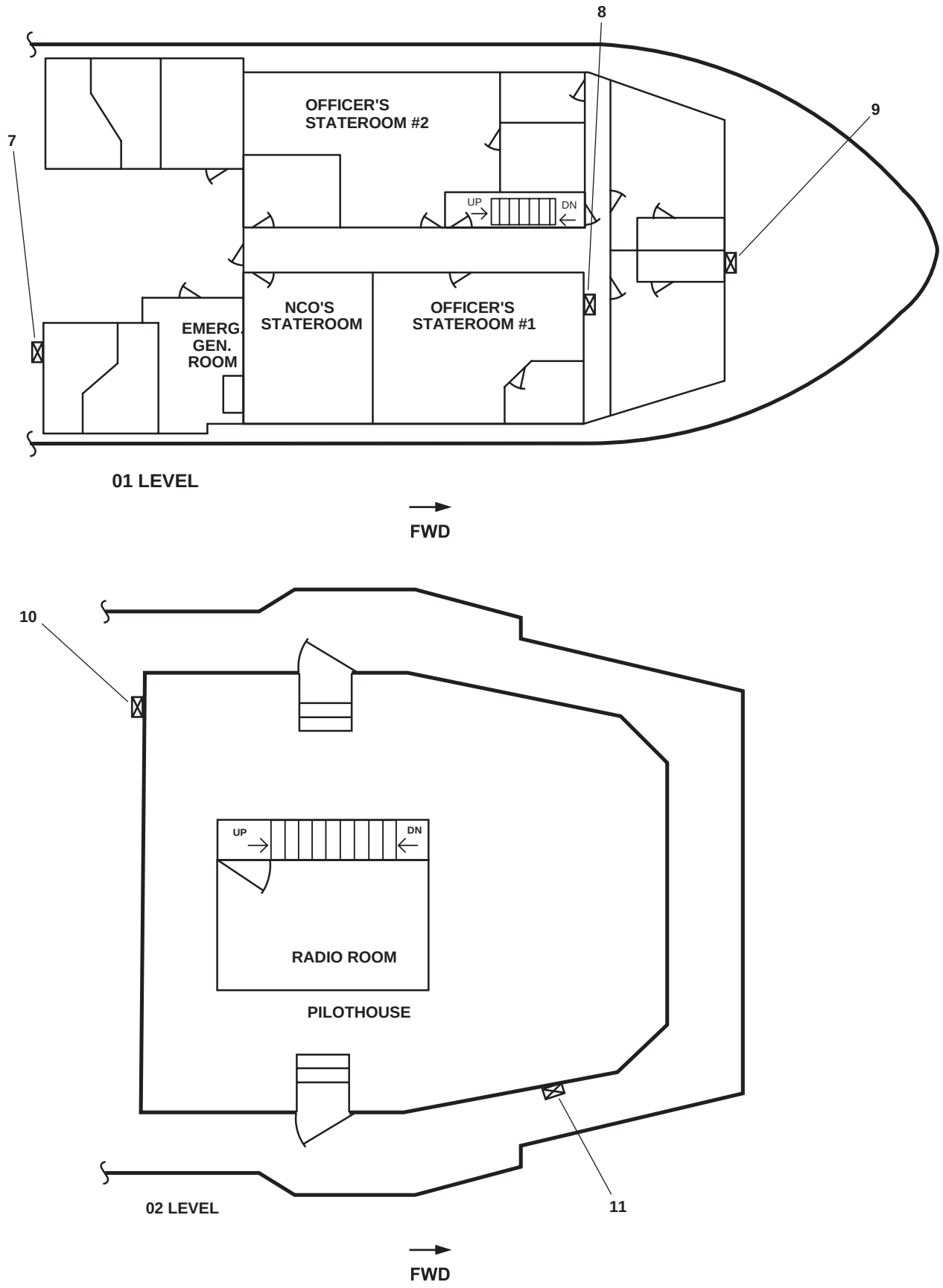


Figure 5. Fire Station Locations (Sheet 2 of 2)

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

1. Fire Station No. 1 (figure 5, item 1). This station is located in AMS 2 at frame 14.
2. Fire Station No. 2 (figure 5, item 2). This station is located in the engine room at frame 32.
3. Fire Station No. 3 (figure 5, item 3). This station is located in AMS 1 at frame 54.
4. Fire Station No. 4 (figure 5, item 4). This station is located on the main deck at frame 21.
5. Fire Station No. 5 (figure 5, item 5). This station is located on the main deck at frame 28.
6. Fire Station No. 6 (figure 5, item 6). This station is located on the main deck at frame 53
7. Fire Station No. 7 (figure 5, item 7). This station is located on 1 level at frame 24.
8. Fire Station No. 8 (figure 5, item 8). This station is located on 1 level at frame 45.
9. Fire Station No. 9 (figure 5, item 9). This station is located on 1 level at frame 54.
10. Fire Station No. 10 (figure 5, item 10). This station is located on 2 level at frame 37.
11. Fire Station No. 11 (figure 5, item 11). This station is located on 2 level at frame 50.

FIRE MONITORS

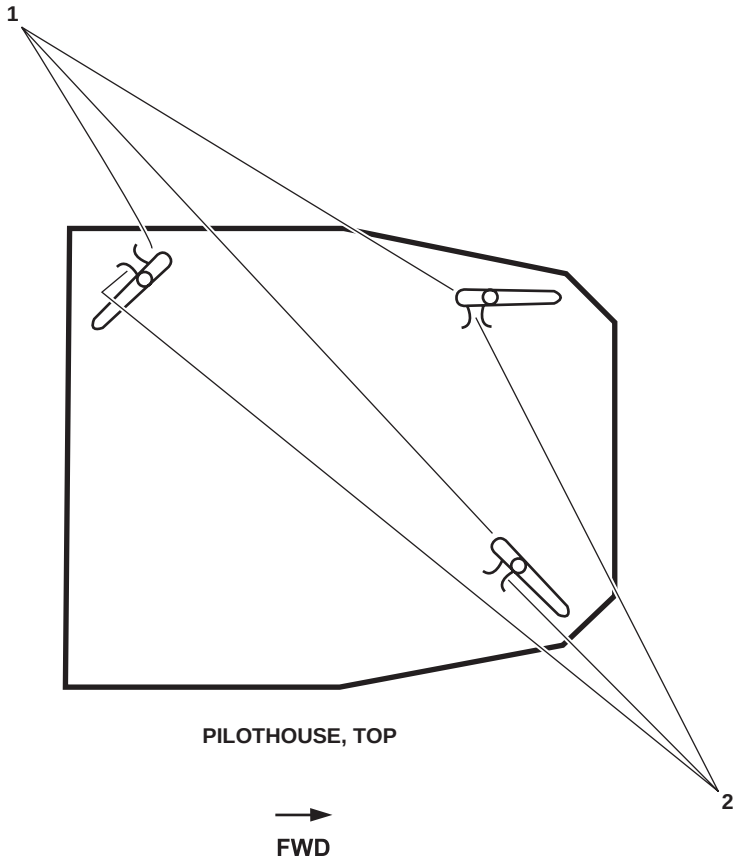


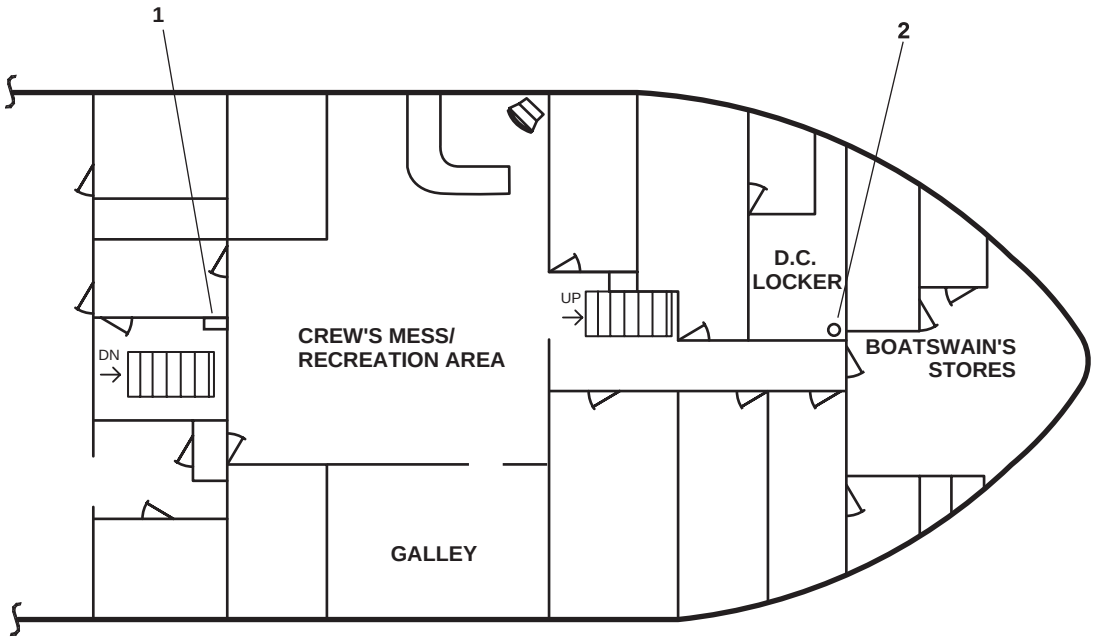
Figure 6. Fire Monitor Locations

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

1. Fire Monitors (figure 6, item 1). There are three fire monitors located on top of the pilothouse. The fire monitors can spray Aqueous Film Forming Foam (AFFF) to assist in fighting fires on other vessels.

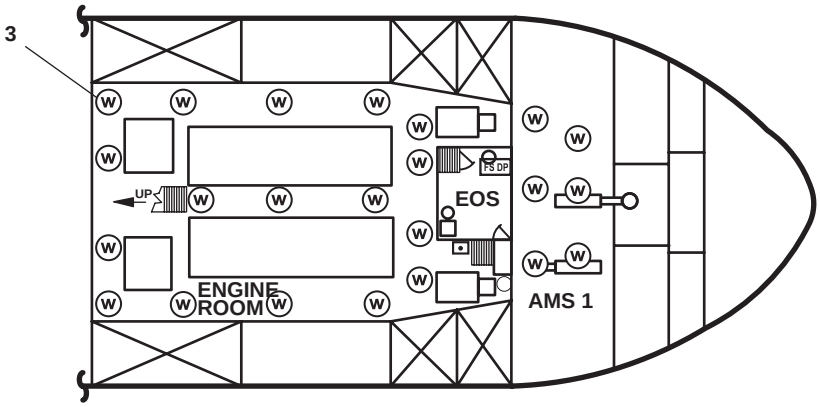
2. Cutoff Valve (figure 6, item 2). This valve controls the raw water to the fire monitors.

ENGINE ROOM WATER WASHDOWN SYSTEM (ERWWS)



MAIN DECK

FWD



HOLD LEVEL

FWD

Figure 7. ERWWS Component Locations

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

1. Control Station (figure 7, item 1). This control station houses the main cutoff valve for the raw water supplied to the engine room sprinkler heads and allows for Hydrogen Fluoride (HF) testing.

2. Forward HF Gas Sampling Tube (figure 7, item 2). Located in the damage control locker, this station allows for HF gas sampling.

3. Sprinkler Heads (figure 7, item 3). These sprinkler heads are located throughout the engine room and AMS 1 and provide raw water to cool the spaces after the FM-200 fire suppression system has been activated.

AQUEOUS FILM FORMING FOAM (AFFF) SYSTEM

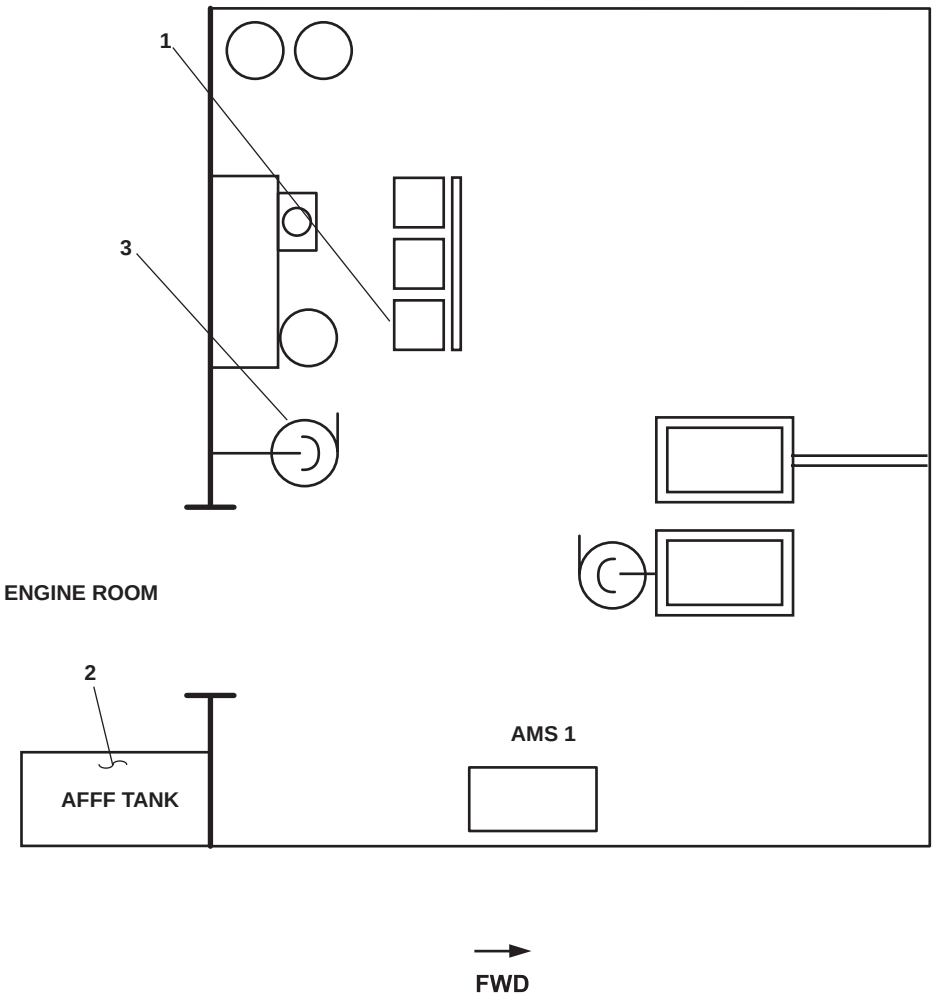


Figure 8. AFFF Pump Component Locations

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

1. AFFF Motor Controller (figure 8, item 1). This motor controller controls the power to the AFFF pump.
2. AFFF Tank (figure 8, item 2). This tank stores the AFFF. The tank will hold 525 gallons (1,987 liters).
3. AFFF Pump (figure 8, item 3). This pump sends AFFF to the fire monitors.

DIESEL ENGINE-DRIVEN FIREFIGHTING PUMP

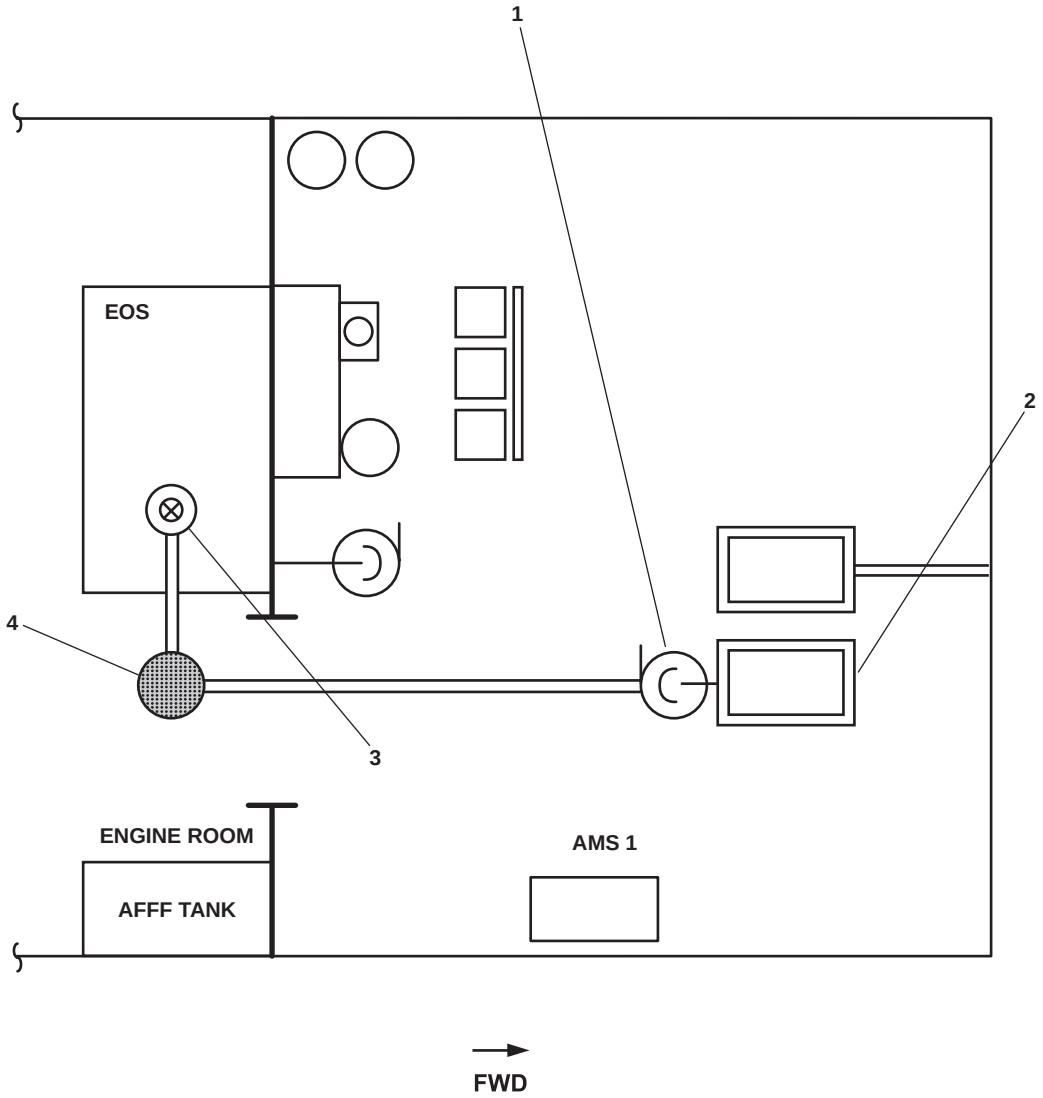


Figure 9. Diesel Engine-Driven Firefighting Pump Component Locations

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

1. Diesel Engine-Driven Firefighting Pump (figure 9, item 1). This pump provides raw water to the fire monitors and can be used to pressurize the fire main if the fire and general service pumps are not available.

2. Pump Driven Engine (figure 9, item 2). This engine is the prime mover for the diesel engine-driven firefighting pump.

3. Forward Sea Chest (figure 9, item 3). Raw water is drawn from this sea chest to provide firefighting water to the diesel engine-driven firefighting pump.

4. Simplex Strainer (figure 9, item 4). This strainer removes solids from the raw water prior to being delivered to the diesel engine-driven firefighting pump.

ARMS LOCKER DRENCHING SYSTEM

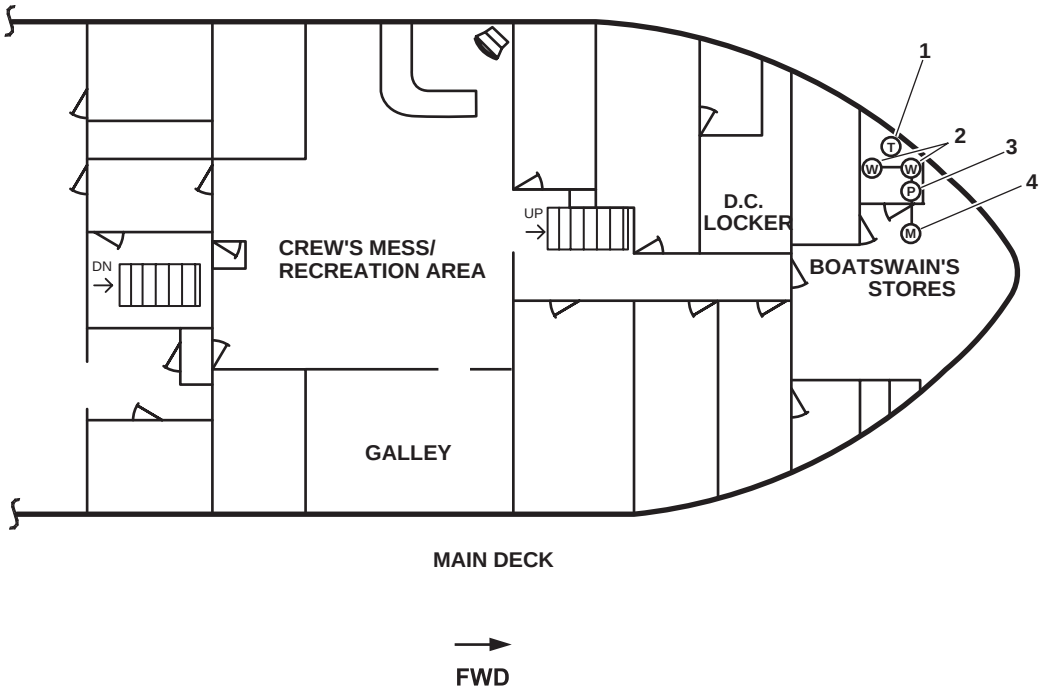


Figure 10. Arms Locker Drenching System

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

1. Thermal Seat Detector (figure 10, item 1). This detector is activated at 105 °F and sounds an alarm in the pilothouse.

2. Sprinkler Heads (figure 10, item 2). These two sprinkler heads provide raw water to the arms locker after the manual activation valve has been OPENED.

3. Pressure Switch (figure 10, item 3). This switch sends an alarm to the pilothouse once the sprinkler heads have been activated.

4. Manual Activation Valve (figure 10, item 4). This valve controls the supply of raw water to the arms locker. The valve can be operated from the boatswain's locker (local) or from the 01 level (remote) by the use of a reach rod valve system.

DIFFERENCES BETWEEN MODELS

This manual is applicable only to vessels outfitted with the FM-200 fire suppression systems and the lowered pilothouse. At the time of issue, LT-803 has received both of these modifications. As additional vessels are modified, differences between models will be identified.

EQUIPMENT DATA

FIRE AND SMOKE DETECTION PANEL

The fire and smoke detection panel is part of the fire alarm system. The fire alarm system automatically alerts the crew by sounding an alarm when sensors detect smoke or fire. The fire alarm system consists of the fire and smoke detection panel, the remote indicator unit, smoke detectors, thermal fire detectors, and fire alarm pull stations. The fire and smoke detection panel is located in the EOS and alerts the crew to any fire detector faults in the fire detection system as well as alarm indications via Light Emitting Diode (LED) indicators.

The technical characteristics of the fire and smoke detection panel are contained in table 1.

Table 1. Fire And Smoke Detection Panel Technical Characteristics

Item	Data
Manufacturer	Pyrotronics
Model	CP-35
Series	3060
Type	Basic two zone/expandable
Voltage	120 Vac 24 Vdc
Amperage	5 A

REMOTE INDICATOR PANEL

The remote indicator panel is part of the fire alarm system. It is located in the pilothouse and is used to alert the bridge crew to the presence of a fire alarm condition. The four indicators on the panel will illuminate the appropriate zone indicator for which the fire or smoke is detected.

The technical characteristics of the remote indicator unit are contained in table 2.

Table 2. Remote Indicator Unit Technical Characteristics

Item	Data
Manufacturer	Pyrotronics
Type	Four indicator
Voltage	24 Vdc

IONIZATION SMOKE DETECTORS

The smoke detectors are part of the fire alarm system. There are 15 24-volt ionization smoke detectors in various locations throughout the vessel. The ionization smoke detector's contacts close when smoke is detected. When the contacts are closed, the fire and smoke detection panel in the EOS detects the condition and sounds the alarm.

The technical characteristics of the smoke detectors are contained in table 3.

Table 3. Smoke Detectors Technical Characteristics

Item	Data
Manufacturer	Pyrotronics
Model	DI-3
Series	6119
Type	Adjustable Sensitivity/Dual Chamber
Operating Temperature	32 °F (0 °C) – 100 °F (38 °C)
Voltage	24 Vdc
Amps	80 A

THERMAL HEAT DETECTORS

There are three thermal heat detectors in the fire alarm system. One each is located in the EDG room, the galley, and the crew's mess/recreation area. The thermal heat detectors are similar to the ionization smoke detectors except the contacts close when a temperature of 135 °F (55.2 °C) is sensed.

The technical characteristics of the thermal heat detectors are contained in table 4.

Table 4. Thermal Heat Detectors Technical Characteristics

Item	Data
Manufacturer	Pyrotronics
Model	DT-135WP
Type	Weatherproof
Temperature Set Point	135 °F (57.2 °C)
Voltage	24 Vdc
Amps	1 A

BEACON

The fire alarm system beacon (red) is located in the radio room. The beacon provides a visual indication of a fire alarm condition.

The technical characteristics of the beacon are contained in table 5.

Table 5. Beacon Technical Characteristics

Item	Data
Manufacturer	Revere Plastics, Inc.
Type	Beacon, Rotating
Voltage	115 Vac 24 Vdc

BELLS

There are two bells in the fire alarm system. One is in the pilothouse and the other one is in the EOS. The bells are provided as an independent indication of a fire alarm condition.

The technical characteristics of the bells are contained in table 6.

Table 6. Bell Technical Characteristics

Item	Data
Manufacturer	Hose-McCann Telephone Co, Inc.
Model	DOTY-8
Type	Single pole
Voltage	24 Vdc
Amps	0.14 A

FIRE ALARM PULL STATIONS

The fire alarm pull stations are part of the fire alarm system. There are 11 fire alarm pull stations in various locations throughout the vessel. When pulled, a station sends an alarm signal via the zone module to the applicable fire detector panel indicators.

The technical characteristics of the fire alarm pull stations are contained in table 7.

Table 7. Fire Alarm Pull Station Technical Characteristics

Item	Data
Manufacturer	Pyrotronics
Model	MS-51
Type	Single Action
Voltage	24 Vdc
Amps	0.1 A

FM-200 FIRE SUPPRESSION SYSTEM

The FM-200 fire suppression system is a manually actuated, stand-alone, total flooding fire suppression system. It is designed to protect the engine room, frames 21 to 44, Auxiliary Machine Space (AMS) 1, and frames 44 to 54 by discharging FM-200 gas in the event of a fire in the engineering spaces. The FM-200 system consists of an upper discharge system, a lower discharge system, and an alarm system.

The upper discharge system uses two 600 lb (272 kg) cylinder assemblies to rapidly flood the areas above the bilge level with FM-200 gas. The upper discharge system also actuates the 60-second delay warning.

The lower discharge system uses a 200 lb (91 kg) cylinder assembly to flood the engine room bilges with FM-200 gas.

The FM-200 fire suppression alarm system contains two pressure operated switches located in AMS 2, five amber strobe lights located in the engine room and AMS 2, two electric horns located in AMS 1 and in the engine room, and an alarm bell installed in the engine room.

The technical characteristics of the FM-200 Fire Suppression System are contained in table 8.

Table 8. FM-200 Fire Suppression System Technical Characteristics

Item	Data
Manufacturer	Kidde
Model	B0716X002
Series	LT-128 specific
Type	CO_2 time delay activated
Rated Capacity	878 lb (398 kg) total agent
Voltage	115 Vac 24 Vdc

ENGINE ROOM WATER WASHDOWN SYSTEM (ERWWS)

The ERWWS is installed in the engine room and AMS 1 and is used in conjunction with the FM-200 fire suppression system. The ERWWS is a manually activated system that operates to quickly reduce a compartment's temperature prior to discharge of FM-200 agent, minimizing the production of Hydrogen Fluoride (HF) gas. The ERWWS is a mitigating washdown system that provides general overhead coverage to the protected spaces using an overhead sprinkler grid. The sprinkler grid is piped directly to the existing fire main and uses raw water from fire and general service pump 1. The ERWWS components are manufactured using stainless steel components.

The technical characteristics of the ERWWS are contained in table 9.

Table 9. ERWWS Technical Characteristics

Item	Data
Manufacturer	CEB, Hythe, U.K.
Model	LT-128 specific
Rated Capacity	200 gallons (757 liters) per minute at 123 PSI (8.5 bar)
Flow Requirements	140 gallons (530 liters) per minute at 80 PSI (5.5 bar)

FIRE STATIONS

The fire stations are part of the raw water firefighting system. The fire stations make pressurized firefighting water available to multiple locations on the vessel. The fire stations are capable of shooting 70 gallons (265 liters) of water per minute (in a solid stream) approximately 75 feet (23 meters) when pressurized to 100 PSI (6.9 bar).

The technical characteristics of the fire stations are contained in table 10.

Table 10. Fire Station Technical Characteristics

Item	Data
Type	1½ inch diameter
Rated Capacity	70 gallons (265 liters) per minute
Maximum Test Pressure	300 PSI (20.7 bar)
Maximum Design Pressure	200 PSI (13.8 bar)
Continuous Working Pressure	125 PSI (8.6 bar)
Maximum Fluid Temperature	125 °F (51.7 °C)

DIESEL ENGINE-DRIVEN FIREFIGHTING PUMP

The diesel engine-driven firefighting pump pressurizes the exterior firefighting system. It is located in AMS 1 and draws raw water from the sea chest through a simplex strainer to prevent clogging when pressurizing the external firefighting system. The pump is a horizontal centrifugal pump with a maximum output of 1,000 gal/min (3,785 L/min) at 170 PSI (11.7 bar).

The technical characteristics of the diesel engine-driven firefighting pump are contained in table 11.

Table 11. Diesel Engine-Driven Firefighting Pump Technical Characteristics

Item	Data
Manufacturer	Durco
Model	6 x 4/16
Type	Horizontal Centrifugal
Rated Capacity	1,000 gallons (3,785.4 liters) per minute
Maximum Pressure	177 PSI (12.2 bar)
Continuous Working Pressure	100 PSI (6.9 bar)
Maximum Fluid Temperature	125 °F (51.7 °C)

FIRE MONITORS

There are three fire monitors located on top of the pilothouse. The monitors are part of the raw water firefighting system. They are used for exterior firefighting and are pressurized by the diesel engine-driven firefighting pump. The monitors are capable of delivering AFFF or raw water when rendering aid to other vessels.

The technical characteristics of the fire monitors are contained in table 12.

Table 12. Fire Monitors Technical Characteristics

Item	Data
Manufacturer	In-Mar Systems, Inc.
Model	Skumfire
Type	2.5 inch (1.17 meter) diameter
Rated Capacity	500 gallons (1892.7 liters) per minute
Hydrostatic Test Pressure	340 PSI (23.4 bar)
Design Pressure	227 PSI (15.7 bar)
Continuous Operating Pressure	100 PSI (6.9 bar)

AQUEOUS FILM FORMING FOAM (AFFF) PUMP

The AFFF pump is an electric motor-driven horizontal gear pump that is powered from the main switchboard. Its purpose is to provide AFFF concentrate to the to the fire monitors.

The technical characteristics of the AFFF pump are contained in table 13.

Table 13. AFFF Pump Technical Characteristics

Item	Data
Manufacturer	Roper
Model	2F75
Type	Horizontal Gear
Rated Capacity	60 gallons (227.1 liters) per minute
Maximum Pressure	190 PSI (13.1 bar)
Continuous Working Pressure	125 PSI (8.6 bar)
Maximum Fluid Temperature	125 °F (51.7 °C)
Voltage	450 Vac, 60 Hz, 3 phase

GALLEY FIRE SUPPRESSION SYSTEM

The galley fire suppression system can be activated automatically by the means of a fusible link or manually by a manual pull box. The extinguishing agent is Ansul R-102, which is delivered by four distribution nozzles.

The technical characteristics of the galley fire suppression system are contained in table 14.

Table 14. Galley Fire Suppression System Characteristics

Item	Data
Manufacturer	Ansul
Model	R-102
Storage Tank Size	3 gallons (11.4 L)
Fusible Links	One at 360 °F (182 °C) Two at 508 °F (260 °C)
Regulator	100 PSI (6.9 bar)
Extinguishing Agent	Ansulex low ph 7.8 to 8.2
Operating Temperature Range	32 °F (0 °C) to 130 °F (54.4 °C)

END OF WORK PACKAGE

OPERATOR, UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR
INLAND AND COASTAL LARGE TUG (LT)
THEORY OF OPERATION

GENERAL

FIRE ALARM SYSTEM

The purpose of the fire alarm system is to automatically alert the crew by sounding an alarm when sensors detect smoke or fire. The crew can manually activate the fire alarm system by means of 11 fire alarm pull stations (figure 1) located throughout the vessel. When one of the various sensors detects an alarm condition or a fire alarm pull station is actuated, a signal is sent to the fire and smoke detection panel in the Enclosed Operating Station (EOS). The fire and smoke detection panel activates the alarm, determines in what zone the alarm condition exists, illuminates the appropriate alarm Light Emitting Diode (LED), and sends the appropriate signal to the fire alarm system remote indicating panel in the pilothouse. The remote indicating panel in the pilothouse displays the zone in which the alarm condition exists.

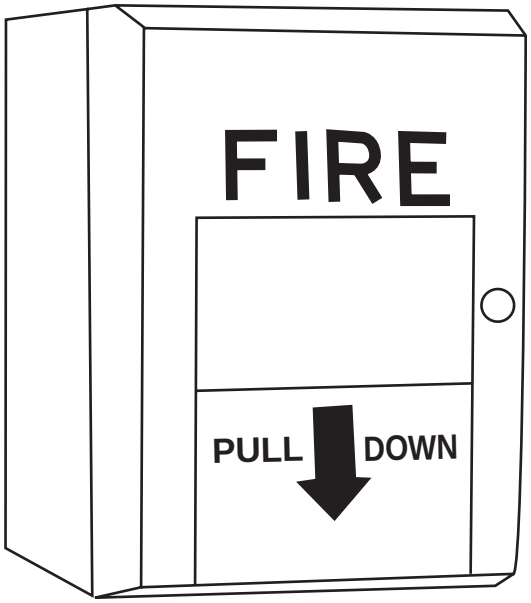


Figure 1. Fire Alarm Pull Station

FIRE AND SMOKE DETECTION PANEL

The fire and smoke detection panel is located in the EOS (figure 2). The fire alarm system remote indicating panel is located in the pilothouse (figure 3). In the event of an alarm condition, the bells in the EOS and pilothouse will continue to ring and the beacon in the radio room will flash until the circuitry is reset at the fire and smoke detection panel in the EOS.

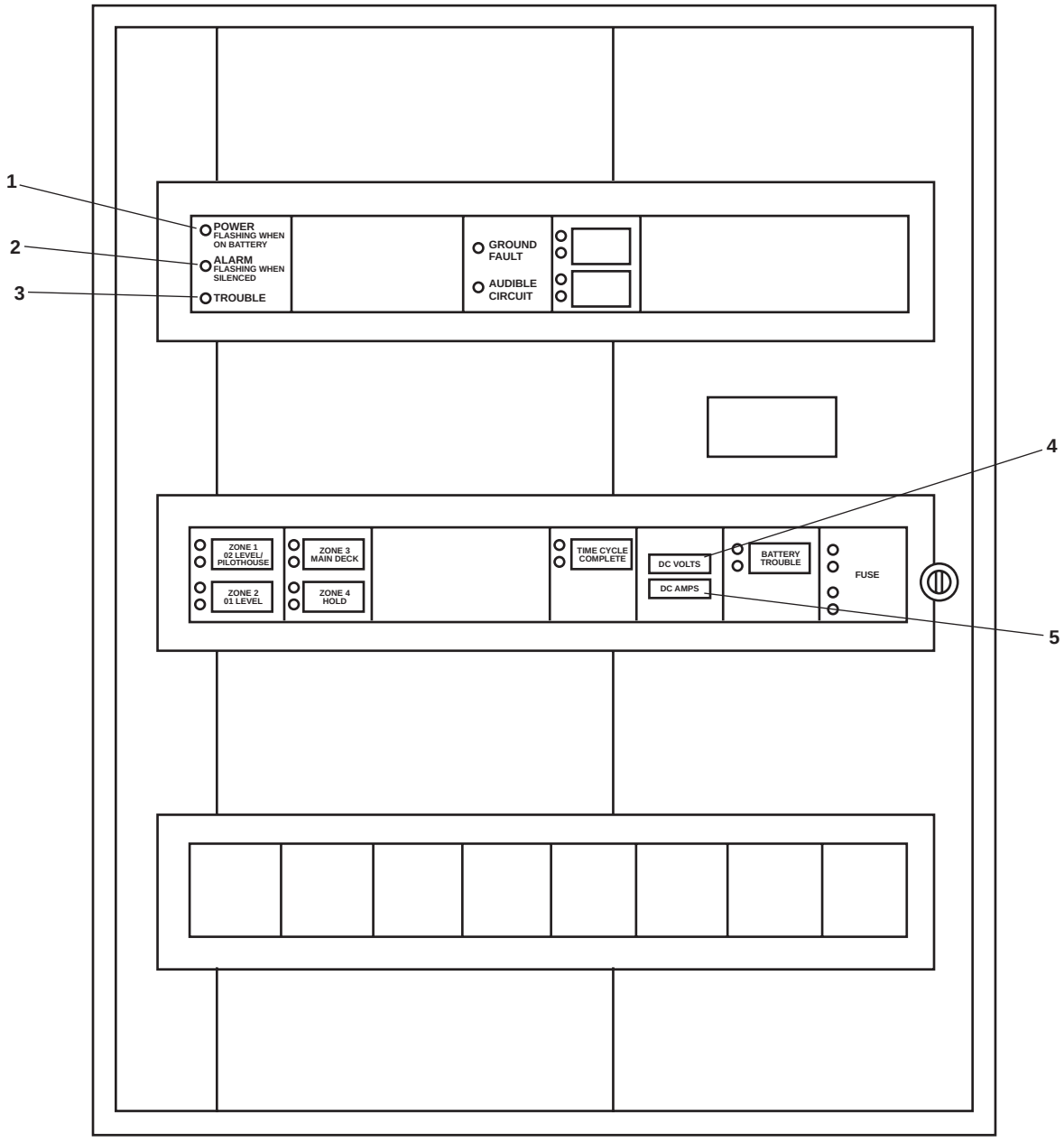


Figure 2. Fire and Smoke Detection Panel

The fire and smoke detection panel also alerts the crew to any fire detector faults in the system. The fire and smoke detection panel contains other indicators that illuminate during specific conditions. The POWER indicator (figure 2, item 1) illuminates to indicate that normal power is being supplied to the fire and smoke detection panel. It flashes when the fire and smoke detection panel is on battery power. The ALARM indicator (figure 2, item 2) illuminates when the alarm is silenced. It flashes when an alarm condition exists but the alarm is silenced. It will continue to flash as long as the audible alarm is silenced and an alarm condition is detected. The TROUBLE indicator (figure 2, item 3) illuminates when the system detects a fault in the backup battery system. The fire alarm system has its own backup battery in the fire and smoke detection panel. The DC VOLTS meter (figure 2, item 4) measures the dc voltage available to the fire and smoke detection system, and the DC AMPS meter (figure 2, item 5) indicates the dc current used by the alarm system. The voltage and current indications are necessary in determining the status of the fire alarm system. If the TROUBLE indicator illuminates and normal power is lost, the reliability of the fire alarm system may be suspect.

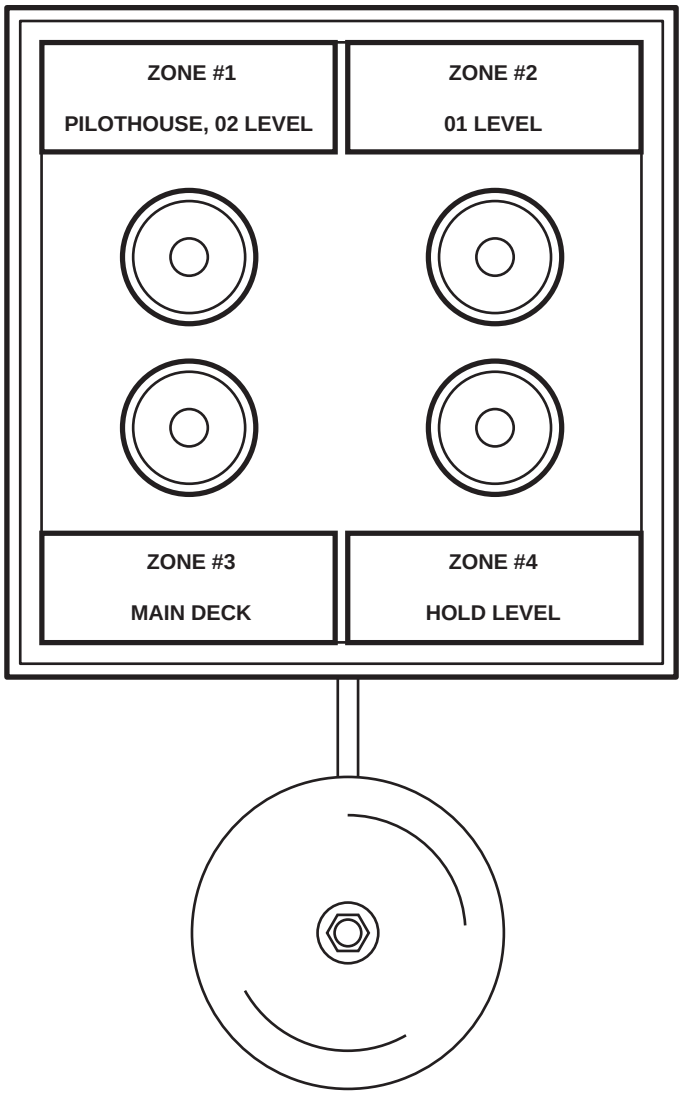


Figure 3. Fire Alarm System Remote Indicating Panel (Pilothouse)

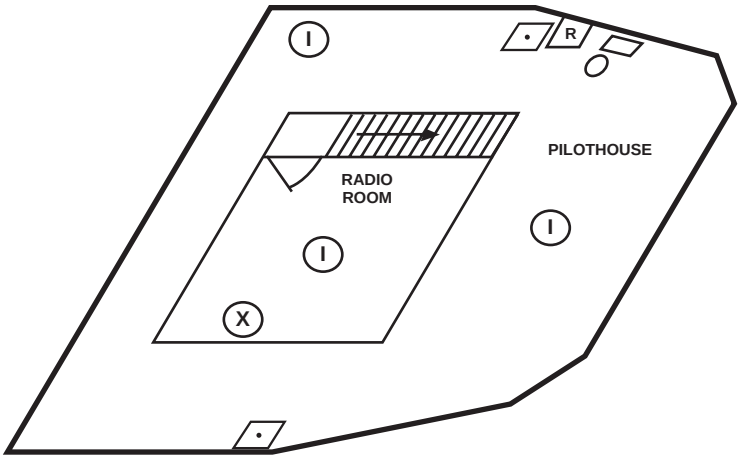
There are 15 24-volt ionization smoke detectors in various locations throughout the vessel. The 24- volt ionization smoke detectors contain a set of normally open contacts that close when smoke is detected. When the contacts are closed, the fire and smoke detection panel in the EOS detects the condition and sounds the alarm.

There are three thermal heat detectors. One each is located in the Emergency Diesel Generator (EDG) room, the galley, and the crew's mess/recreation area. The thermal heat detectors are similar to the smoke detectors except the contacts close when a temperature of 135 °F (55.2 °C) is sensed.

The fire alarm system sounds two system bells and energizes a beacon. One bell is located in the pilothouse, and the other one is in the EOS. The beacon is mounted in the radio room. The bells and beacon are provided as an independent indication of a fire alarm condition.

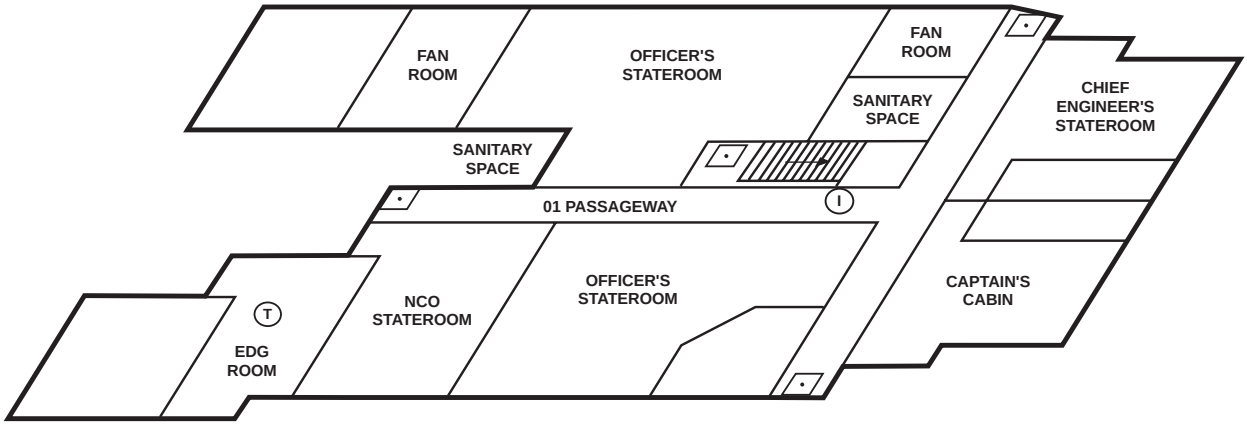
The fire alarm system is capable of detecting heat and smoke. It relies on various sensors placed throughout the vessel to detect the alarm condition. The sensors are grouped into four zones on the vessel (Refer to figure 4):

Zone 1	Pilothouse and radio room
Zone 2	01 level and Emergency Diesel Generator (EDG) room
Zone 3	Boatswain's store, main deck passageway, galley, and crew's mess area
Zone 4	Auxiliary Machine Space (AMS) 1, engine room, AMS 2, and towing gear locker



FWD

PILOTHOUSE ZONE 1



FWD

01 LEVEL ZONE 2

R REMOTE INDICATING PANEL

I IONIZATION SMOKE DETECTOR

T THERMAL HEAT DETECTOR

X RED FLASHING BEACON

BELL

FIRE ALARM PULL STATION

Figure 4. Components of the Fire Alarm Systems by Zone (sheet 1 of 3)

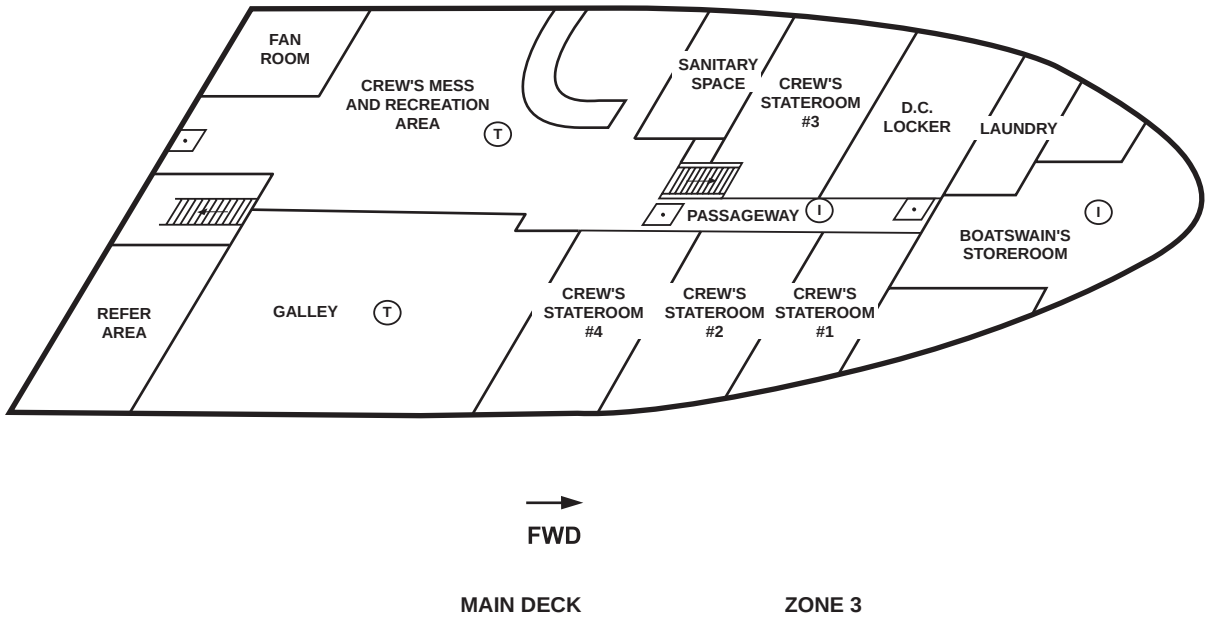


Figure 4. Components of the Fire Alarm Systems by Zone (sheet 2 of 3)

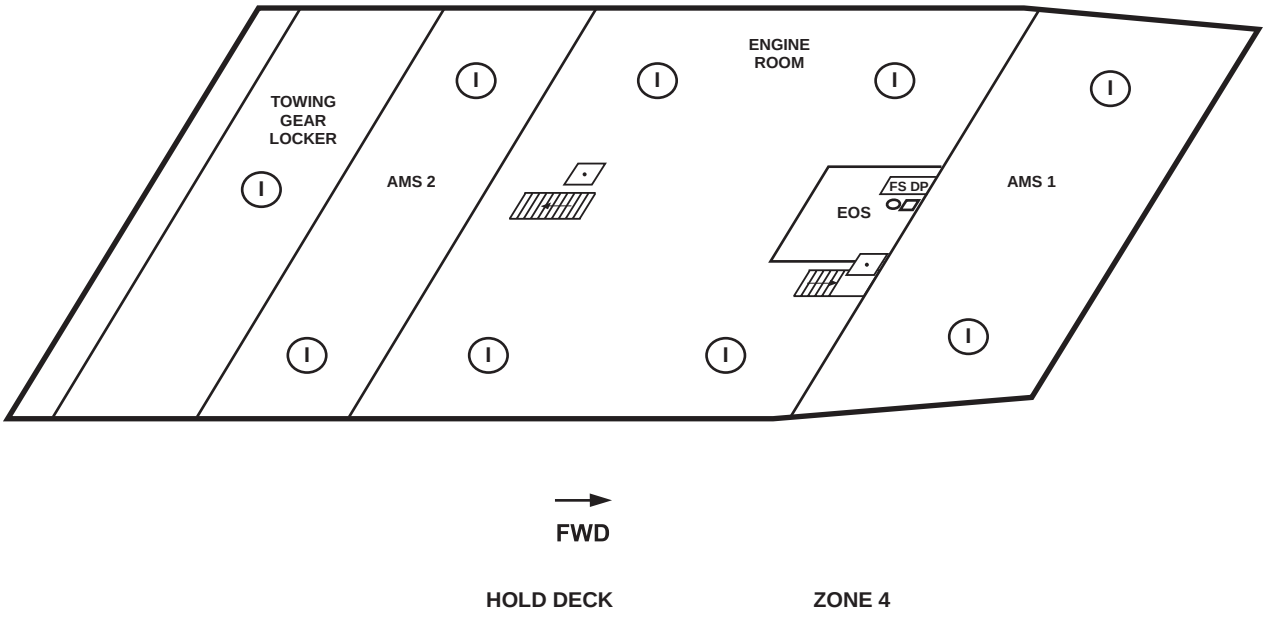
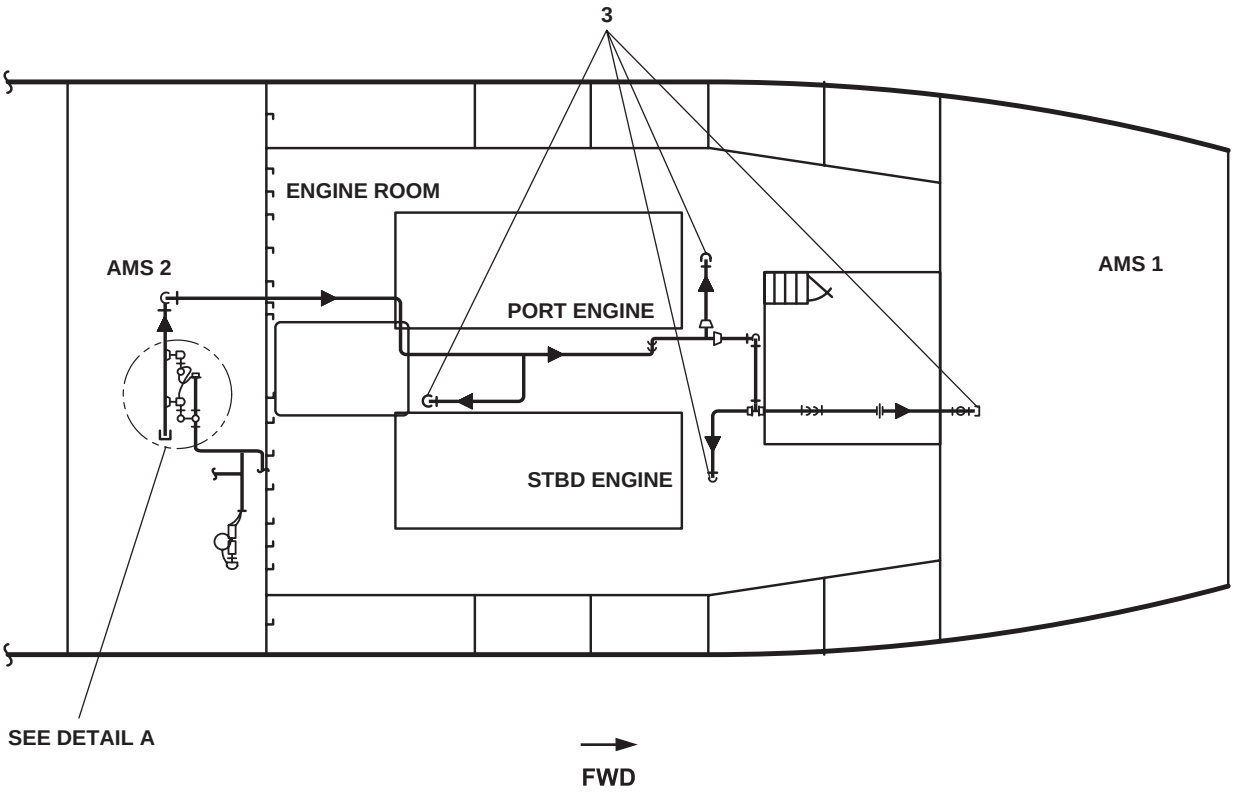


Figure 4. Components of the Fire Alarm Systems by Zone (sheet 3 of 3)

FM-200 FIRE SUPPRESSION SYSTEM

The engine room and Auxiliary Machine Space (AMS) 1 are fitted with a FM-200 fire suppression system. The system is a manually actuated, stand-alone, total flooding fire suppression system. The system is capable of extinguishing Class A, Class B, and Class C fires when properly deployed. The system consists of two 600 lb (272 kg) FM-200 cylinder assemblies (figure 5, item 1), a 200 lb (91 kg) FM-200 cylinder assembly (figure 6, item 1), control heads (figures 5 and 6, item 2), discharge nozzles (figures 5 and 6, item 3), and FM-200 pull boxes (figures 7 and 8).

When the FM-200 system is actuated, ventilation to and from the engineering spaces, the ship's service diesel generators, and the bow thruster and pump drive engines are automatically shut down to prevent FM-200 gas from being extracted from the spaces. When a FM-200 pull box is actuated, horns sound, strobes flash, and the FM-200 alarm bell sounds to alert personnel to evacuate the space. A 60-second delay is provided before the FM-200 agent is released to allow for evacuation of the engineering spaces.



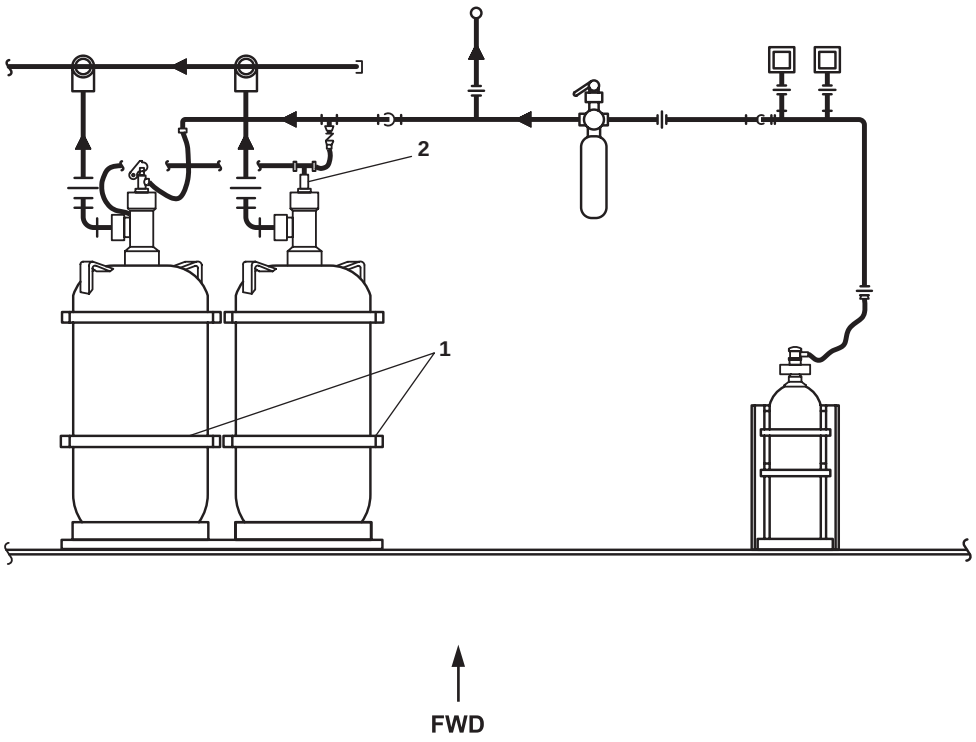


Figure 5. FM-200 Component Locations (Overhead Systems)

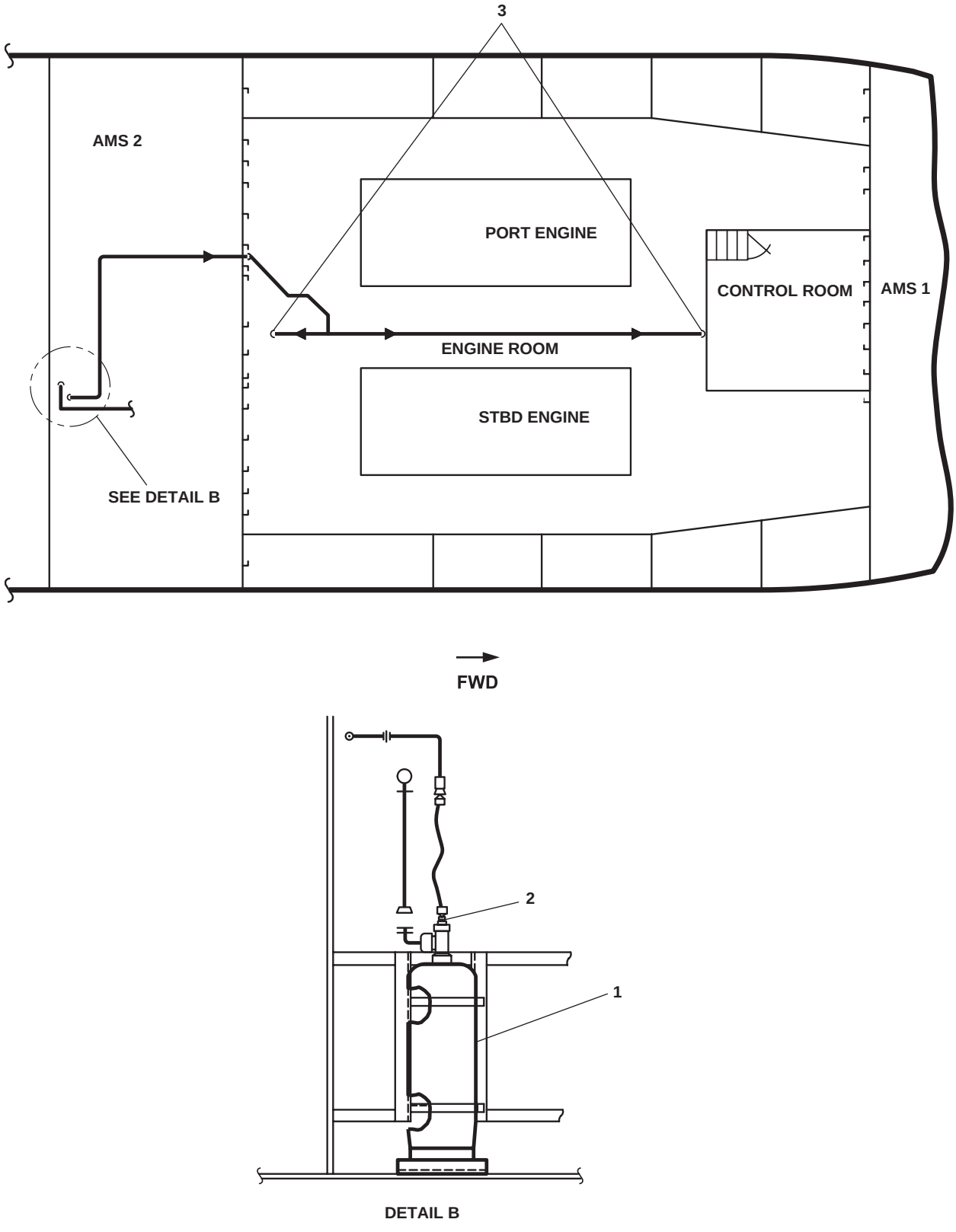


Figure 6. FM-200 Component Locations (Bilge Systems)

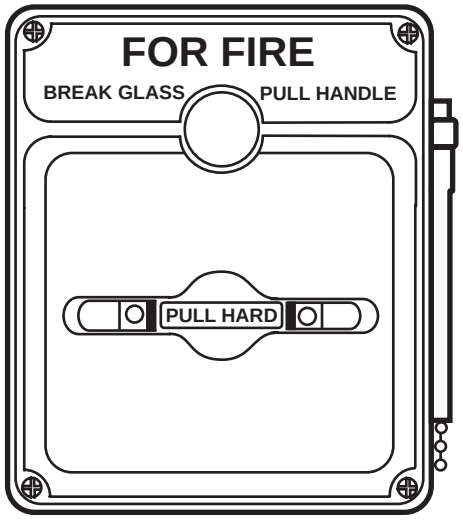


Figure 7. Interior FM-200 Manual Pull Box

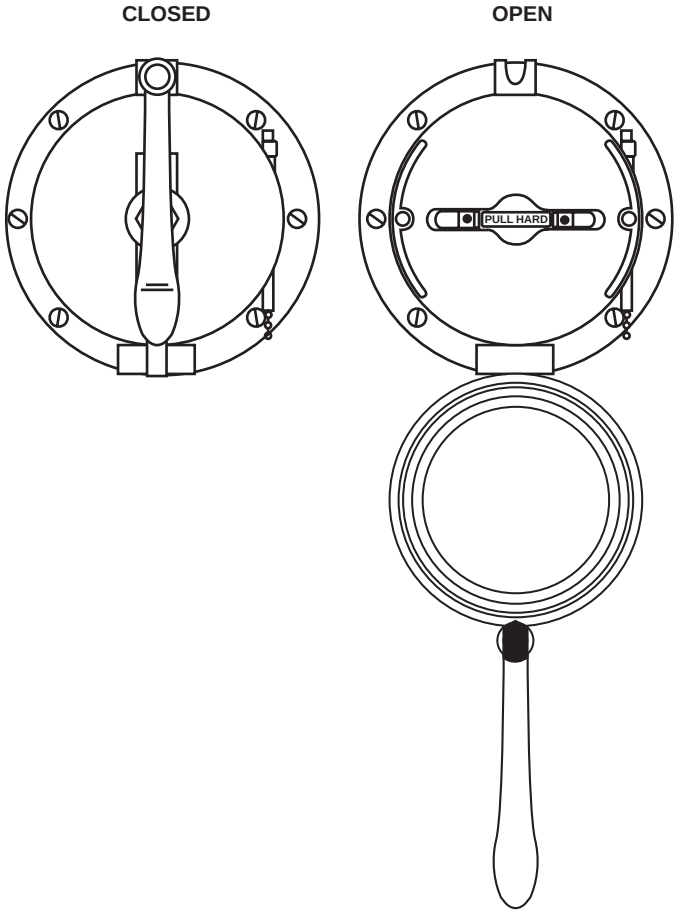


Figure 8. Exterior FM-200 Manual Pull Box

FM-200 FIRE SUPPRESSION ALARM SYSTEM

The purpose of the FM-200 fire suppression alarm system is to warn personnel on the hold deck (AMS 1, engine room, and AMS 2) that the FM-200 fire suppression system is actuating. When the FM-200 fire suppression alarm sounds, personnel have 60 seconds to evacuate the spaces before the FM-200 system is discharged.

The fire suppression alarm system is needed because the FM-200 agent produces Hydrogen Fluoride (HF) gas when exposed to temperatures at or above 1,300 °F (704.4 °C). When the FM-200 system is actuated, ventilation to and from the engineering spaces, the ship's service diesel generators, the fuel oil transfer pumps, and the bow thruster and pump drive engines are automatically shut down to prevent the FM-200 agent from being extracted from the spaces. Although the FM-200 agent itself is breathable, the atmosphere in the engineering spaces will rapidly degrade to a casualty condition as HF gas may be present. Personnel in these spaces must have warning to evacuate or make preparations to find breathable air.

The FM-200 fire suppression alarm system is an automatically actuated alarm system. When the FM-200 system is actuated, pressurized CO_2 from the system's actuating circuit closes the alarm switch. This switch in turn energizes the strobe lights, horns, and bell. Locations of the strobe lights, horns, and bell are illustrated in figure 9. Once the alarm begins to sound, the occupants of the engine room and AMS 1 have 60 seconds before FM-200 agent is released. The FM-200 fire suppression alarm system consists of five amber strobe lights, two horns, and one bell. Three strobe lights are mounted in the engine room, and one each in AMS 1 and AMS 2. The alarm system bell is mounted on the weather deck aft of the engine room access vestibule.

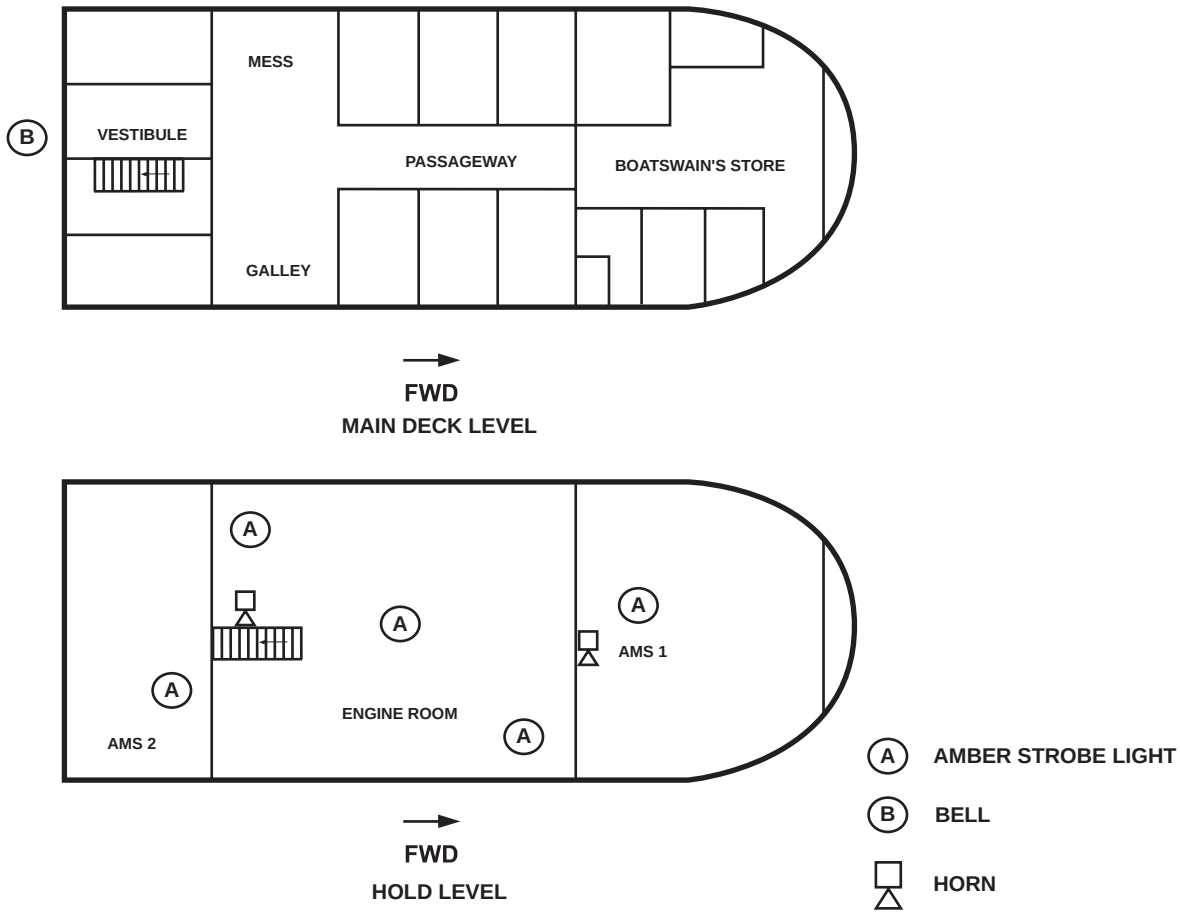


Figure 9. Components by Locations of the FM-200 Fire Suppression Alarm System

The strobe lights and bell are powered by emergency lighting panel 1 via pressure switch PS-1 (figure 10, item 1). The fire suppression alarm system has two horns. One horn is mounted in the engine room and the other in AMS 1. The horns are powered by the emergency generator battery charger circuit via pressure switch PS-1A (figure 10, item 2). As seen in figure 10, the use of two separate power sources provides greater assurance that personnel in the hold level will be warned if the FM-200 fire suppression system is activated.

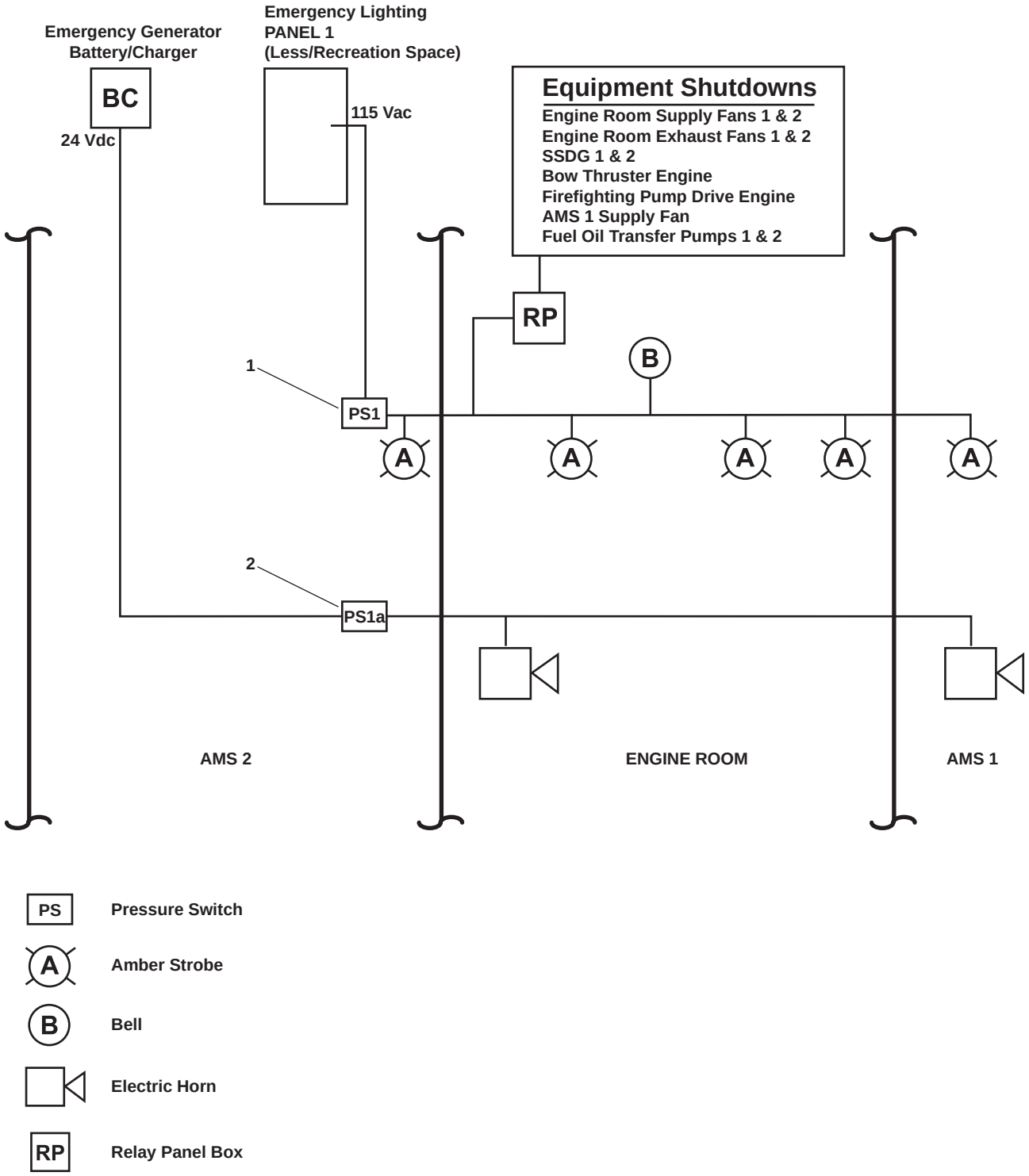


Figure 10. Fire Suppression Alarm System Schematic

ENGINE ROOM WATER WASHDOWN SYSTEM (ERWWS)

The purpose of the ERWWS is to quickly reduce the temperature in the protected space to minimize the production of Hydrogen Fluoride (HF) gas generated as a result of FM-200 agent contact with hot surfaces and flame above 1,300 °F (704.4 °C). The sprinkler water also acts to keep smoke particulate down and expedites ventilation of the compartment when the fire is extinguished. The ERWWS is not designed or intended to be a standalone fire extinguishing system. It is designed to be used in conjunction with the installed FM-200 fire suppression system. Use of the ERWWS reduces the risk of HF exposure by reducing temperatures within the protected space.

The ERWWS is constructed of all stainless steel components. In order to operate the ERWWS, the fire main must be charged and, at a minimum, fire and general service pump 1 must be online at maximum operating pressure. To provide an adequate volume of raw water for the ERWWS, valves FM-17 and FM-15 must be closed prior to activation of the ERWWS. The ERWWS requires a minimum of 145 gal/min (548.9 L/min) at 104 PSI (7.17 bar) to operate as intended.

Activation of the ERWWS is accomplished by opening WWS-1 (figure 11, item 1). WWS-1 is located in the engine room vestibule on the main deck at Frame 25. The ERWWS shall be activated prior to actuation of the FM-200 fire suppression system. The ERWWS is a Hydrogen Fluoride (HF) gas mitigating water washdown system that provides general overhead coverage to the protected spaces. The ERWWS consists of simple overhead sprinkler heads (figure 12) piped directly to the fire main. The ERWWS receives raw water directly from fire and general service pump 1. Fire and general service pump 1 is powered by the Emergency Diesel Generator (EDG) switchboard and will have to be restarted remotely from the pilothouse once the EDG comes online.

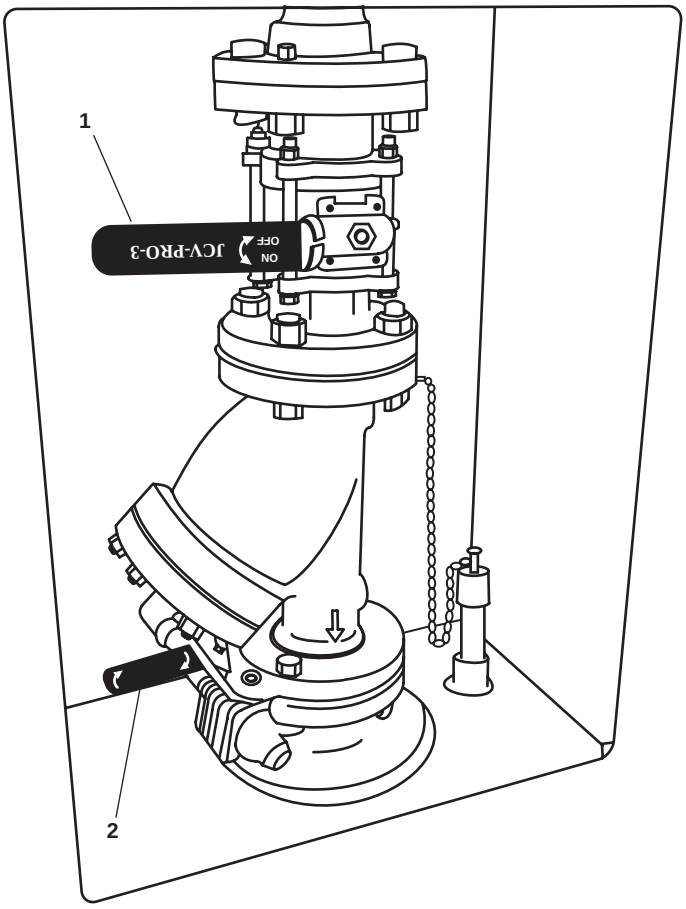


Figure 11. Engine Room Water Washdown Station

When the FM-200 fire suppression system is actuated to extinguish a fire, allow the ERWWS to operate for a minimum of fifteen minutes. During the ERWWS operating period, valve WWS-2 (figure 11, item 2) should be OPENED for ten seconds every three minutes. WWS-2 is the ERWWS strainer blow off and will flush foreign matter from the inline strainer basket during operation of the ERWWS. The ERWWS operating instructions (figure 13) are posted above the ERWWS station valves in the main deck vestibule.

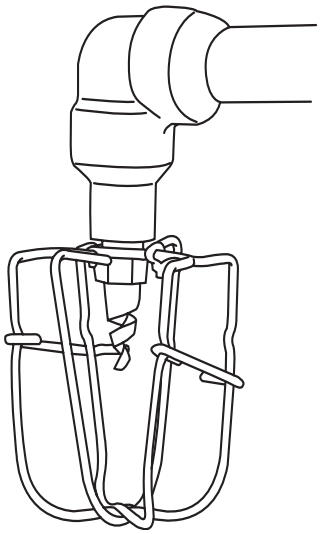


Figure 12. Engine Room Water Washdown System Sprinkler Head

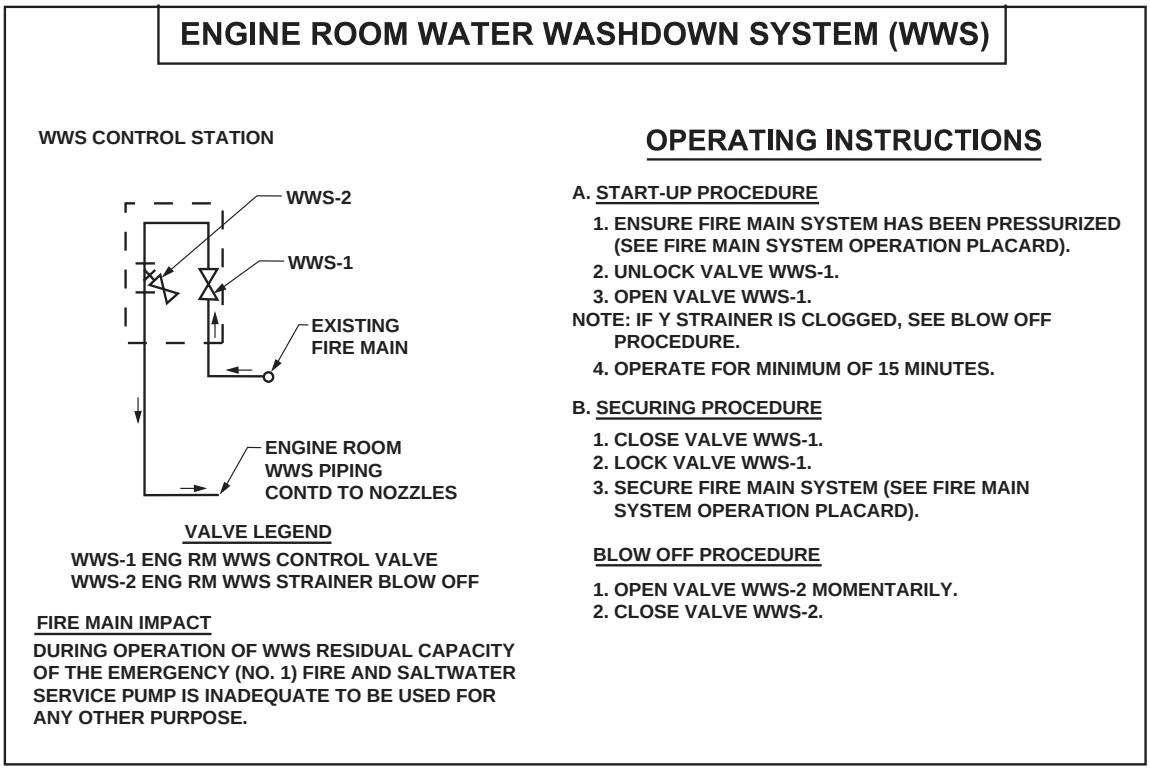


Figure 13. Engine Room Water Washdown System Operating Instructions

FIREFIGHTING SYSTEM

The firefighting system consists of raw water supplied equipment and includes the fire stations, the fire monitors, the AFFF pump, and the diesel engine-driven firefighting pump.

FIRE STATIONS

The purpose of the fire stations is to make pressurized firefighting water available to multiple locations on the vessel. The fire stations are capable of shooting 70 gallons (265 liters) of water per minute (in a solid stream) about 75 feet (23 meters) when pressurized to 100 PSI (6.9 bar). There are 11 fire stations located throughout the vessel. Each is provided with 50 feet (5.2 meters) of 1½ inch diameter high pressure fire hose, a spanner wrench, an international thread adapter, and an all purpose nozzle. Refer to table 1 for fire station locations.

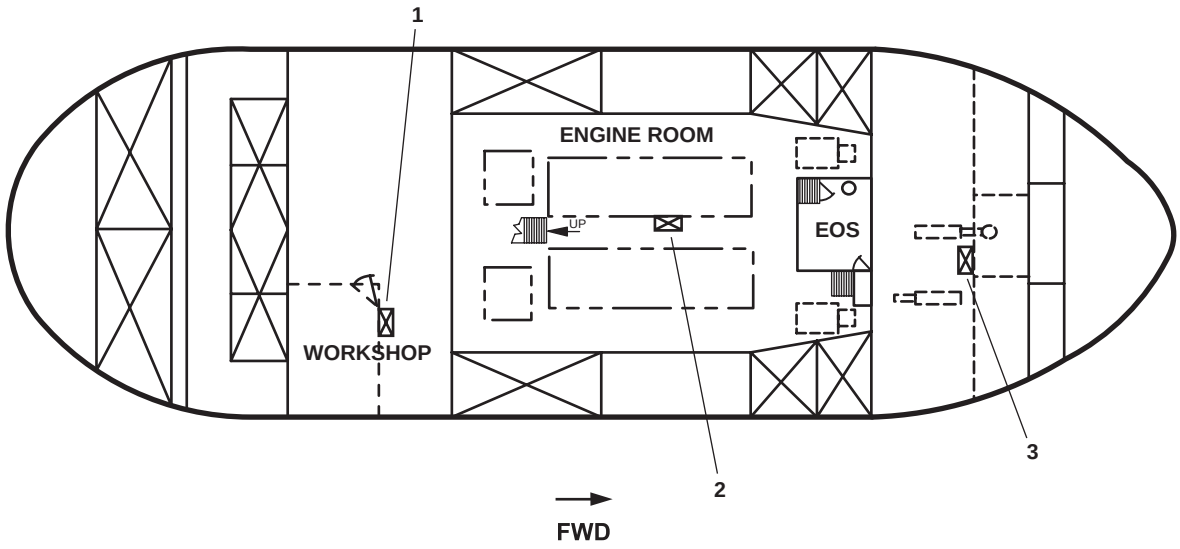
Table 1. Fire Station Locations

Interior fire stations:

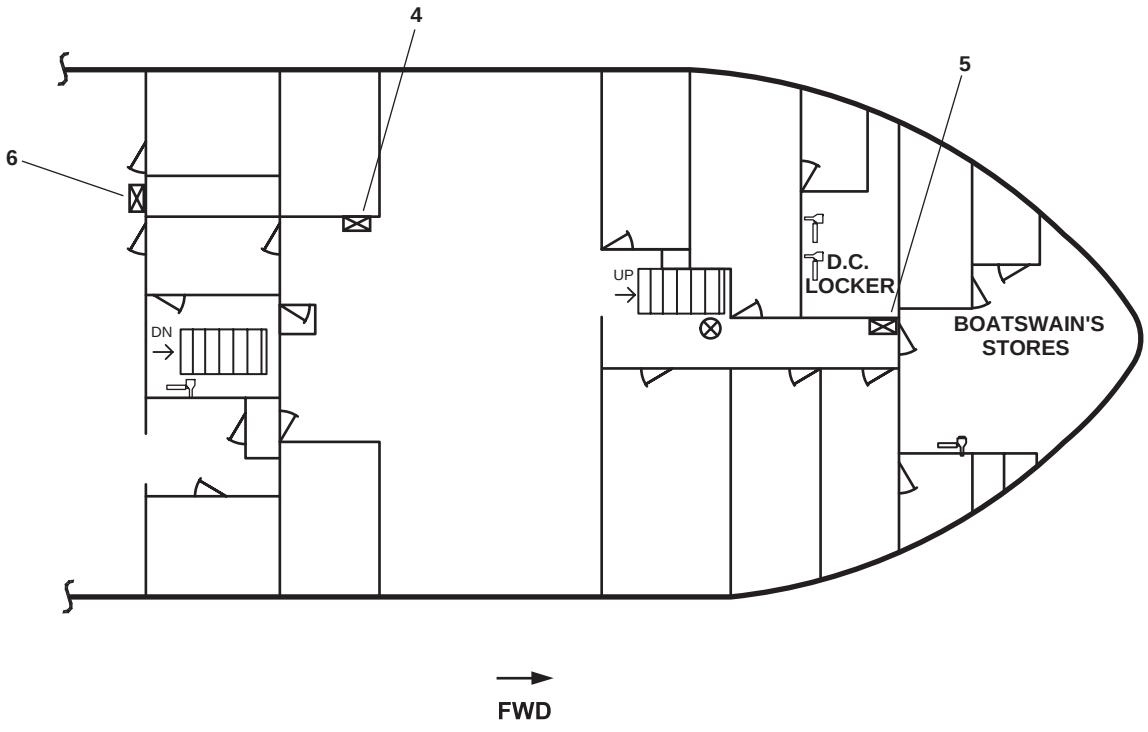
Number	Location
1 (figure 14, item 1)	AMS-2, Starboard side aft of steering hydraulic station, Frame 14
2 (figure 14, item 2)	Engine Room, Amidships between main engines, Frame 32
3 (figure 14, item 3)	AMS-1, Forward bulkhead between auxiliary engines, Frame 54
5 (figure 14, item 4)	Main Deck, Crew's Mess, Frame 28
6 (figure 14, item 5)	Main Deck, Amidships outside damage control center, Frame 53
8 (figure 15, item 1)	01 Level, Starboard side aft of Captain's Cabin, Frame 45

Exterior fire stations:

Number	Location
4 (figure 14, item 6)	Main Deck, Weather, Port side below stack, Frame 21
7 (figure 15, item 2)	01 Level, Weather, Starboard side aft of stack, Frame 24
9 (figure 15, item 3)	01 Level, Weather, Starboard, Frame 54 (removed when underway)
10 (figure 15, item 4)	02 Level, Weather, Port side aft of pilothouse, Frame 37
11 (figure 15, item 5)	02 Level, Weather, Starboard side, Frame 50

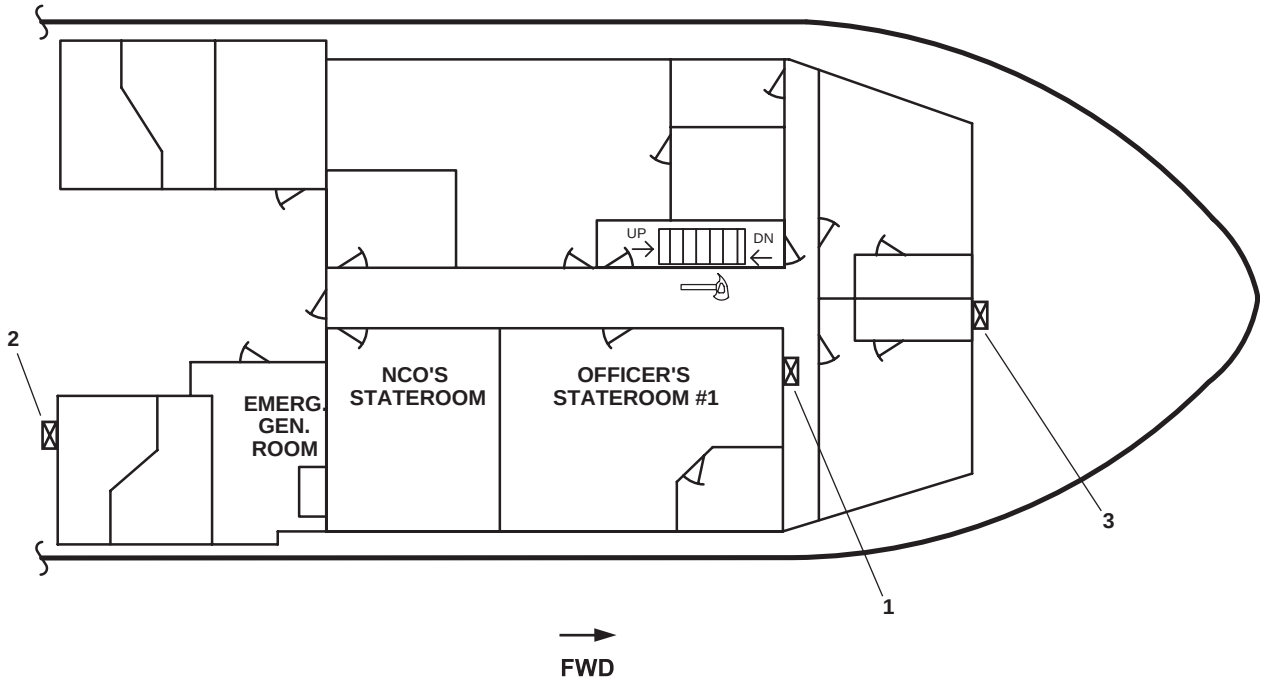


BELOW MAIN DECK

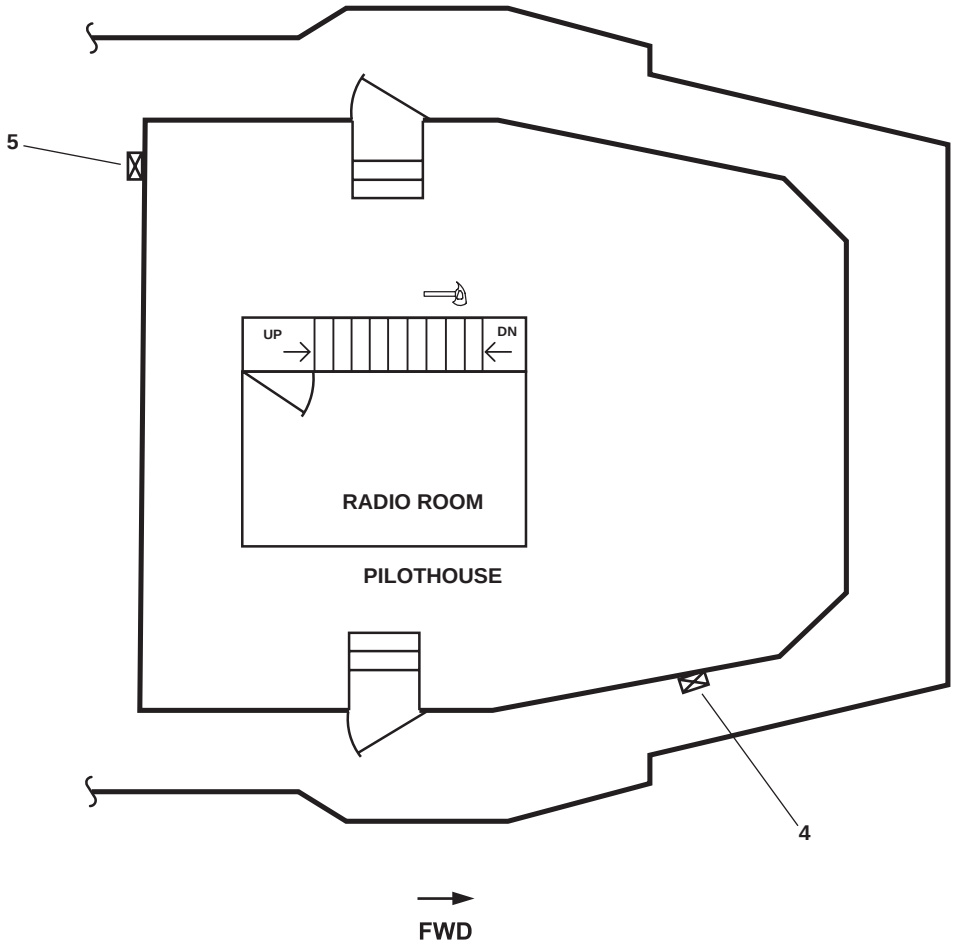


MAIN DECK

Figure 14. Main Deck and Below Main Deck Fire Station Locations



01 LEVEL



02 LEVEL

Figure 15. Pilothouse and 01 Level Fire Station Locations

FIRE MONITORS

Three fire monitors (figure 16) are provided primarily to fight fires on other vessels when rendering aid. The fire monitors are located on the top of the pilothouse to provide 360-degree coverage of the vessel. Each fire monitor is rated at 500 gal/min (1,893 L/min) with a 100 PSI (6.9 bar) discharge pressure. The fire monitors are capable of directional and elevation control, and they can dispense both raw water and Aqueous Film-Forming Foam (AFFF). The diesel engine-driven firefighting pump is the primary supply for the fire monitors.

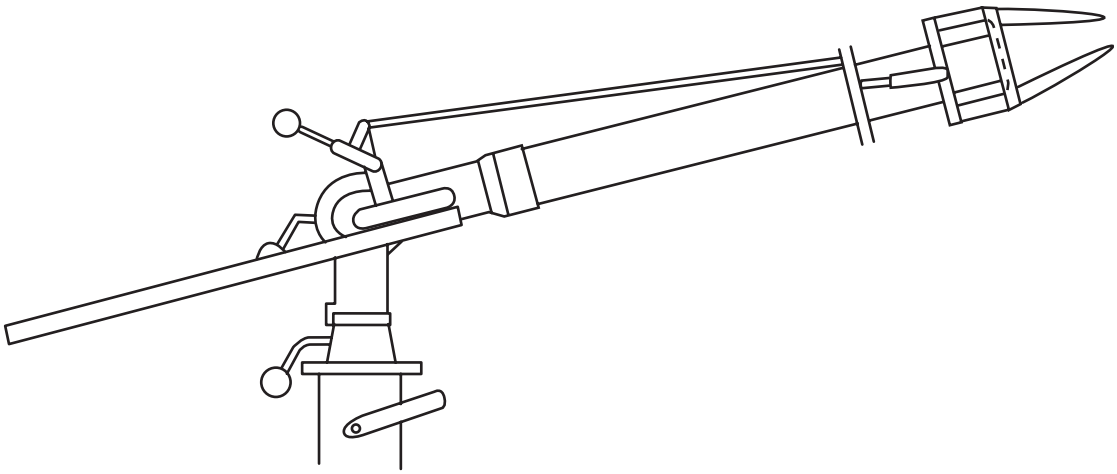


Figure 16. Fire Monitor

AQUEOUS FILM FORMING FOAM (AFFF) PUMP

The AFFF pump (figure 17) is located in AMS 1. It is a horizontal gear pump with a rated capacity of 60 gallons (227.1 liters) per minute. Normal operating pressure is 125 PSI (8.6 bar). The AFFF pump is part of a system that includes a ready service tank, the AFFF pump, a proportioner, and piping specifically suited for the delivery of AFFF. AFFF can only be expended from the fire monitors. AFFF is stored in its own tank in concentrate form. The pump is used to force AFFF concentrate through the proportioner into the fire main at a rate of 6 parts foam concentrate to 94 parts raw water. When in use, the 525-gallon tank is capable of producing 13,344 gallons of AFFF. One or more fire monitors shooting AFFF will expend the ready service tank in less than nine minutes.

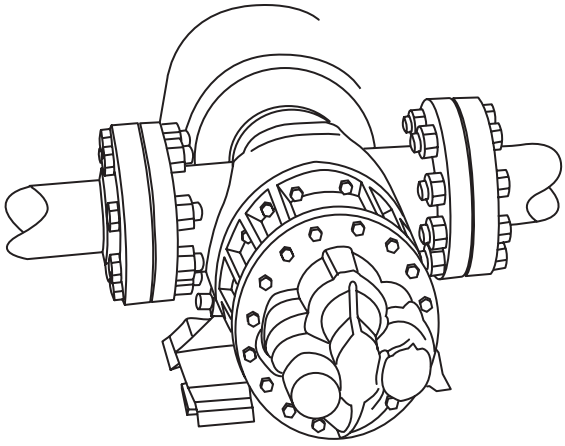


Figure 17. AFFF Pump

DIESEL ENGINE-DRIVEN FIREFIGHTING PUMP

The diesel engine-driven firefighting pump (figure 18) is located in AMS 1. Its rated capacity is 1000 gal/min (3785 L/min) with a discharge pressure of 125 PSI (8.6 bar). Its primary purpose is to provide raw water to the fire monitors. The secondary purpose of the pump is to pressurize the fire main and general service system in the event of a malfunction of the fire and general service pumps.

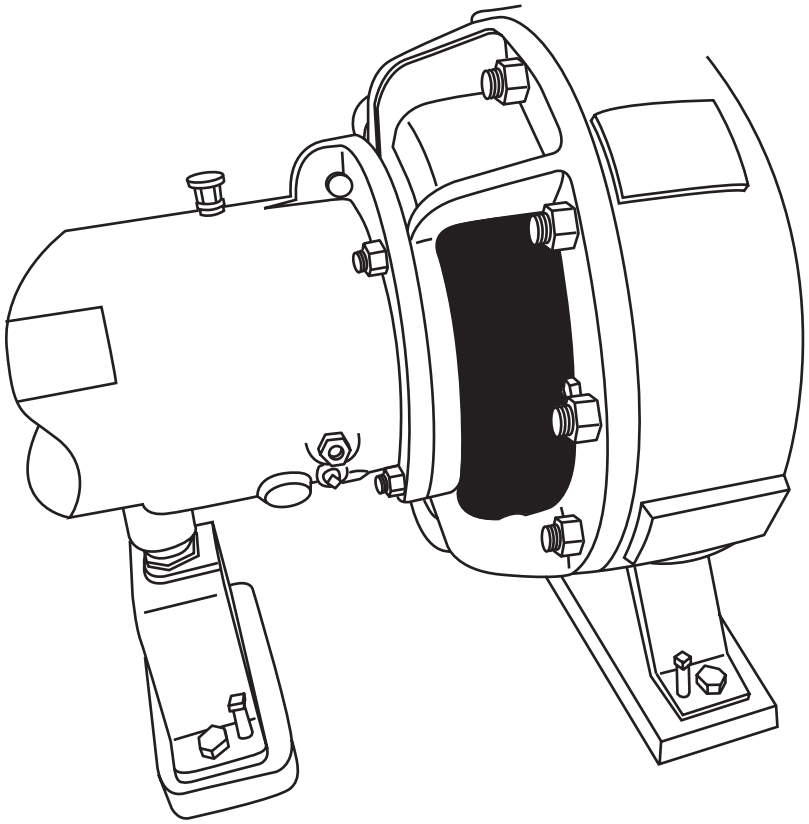


Figure 18. Diesel Engine-Driven Firefighting Pump

GALLEY FIRE SUPPRESSION SYSTEM

The galley fire suppression system is designed to extinguish fires that originate in the galley and the galley cooking equipment. The galley fire suppression system is a pre-engineered, wet chemical, cartridge operated, regulated pressure type extinguishing system. The system is capable of manual activation through the use of a fire alarm pull station (figure 19, item 1) or automatic actuation through the use of fusible links (figure 19, items 2 and 3) rated at 500 °F (260 °C) and 360 °F (182 °C), respectively.

The extinguishing agent is formulated with an aqueous solution of organic salts with a ph range between 7.8 and 8.2. It is designed for flame knock down and foam coverage of grease related fires. The wet chemical agent is stored in a 3-gallon (11.3 liter) carbon steel tank housed in a stainless steel enclosure (figure 19, item 4) mounted on the starboard bulkhead of the galley. The storage tank has a working pressure of 100 PSI (6.9 bar). The extinguishing agent is propelled by the use of a gas cartridge of carbon dioxide or nitrogen gas and delivered to the distribution nozzles (figure 19, item 5). The distribution nozzle tips have blow off caps to keep the nozzle orifices free of cooking grease buildup.

Activation of the galley fire suppression system is accomplished manually by pulling the fire alarm pull station (figure 19, item 1) or automatically by the melting of a fusible link (figure 19, items 2 and 3). Once the system has been manually or automatically activated, the gas charge propels the extinguishing agent (figure 19, item 4) to the distribution nozzles (figure 19, item 5). The electrical source for the protected equipment is not shut off, and the agent and the hot grease mix to form foam. This foam temporarily seals the combustible vapors, helping to inhibit re-ignition. The crew must secure the galley heat producing equipment. Once the galley fire suppression system has been activated, the Gaylord washdown system (figure 19, item 6) is activated in the fire cycle and sprays water into the Gaylord hood ventilation ductwork. Ventilation ducts are automatically secured by the activation of the Gaylord washdown system.

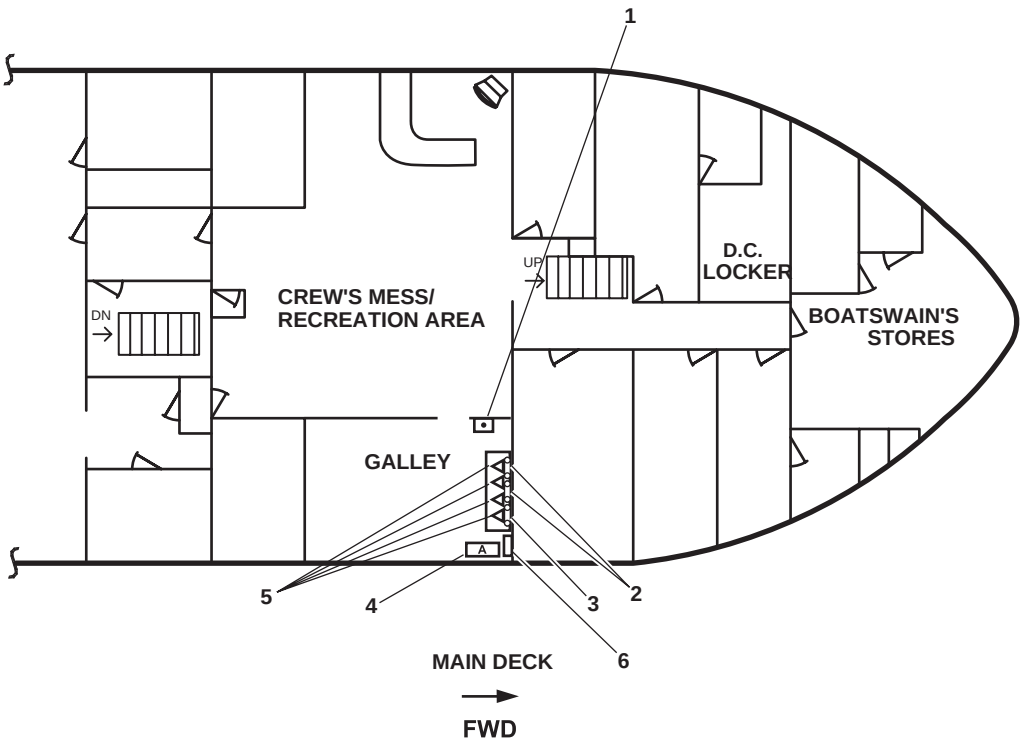


Figure 19. Galley Fire Suppression System

ARMS LOCKER DRENCHING SYSTEM

The arms locker drenching system is connected to the fire main system. The system is designed to provide raw water to the arms locker in the event of a fire or excessive high temperatures. The arms locker drenching system must be manually activated once the fire main has been charged. The system can be activated in the boatswain's store (local) or from the 0-1 level (remote) at the bow by means of a reach rod valve system.

System activation occurs when the thermal heat detector (figure 20, item 1) senses a temperature above 105 °F (40.5 °C). The thermal heat detector sends an alarm signal to the pilothouse indicating high temperature conditions in the arms locker. The crew shall then investigate the situation and, if necessary, the fire main system would be charged. Once it is determined that the alarm condition exists and the fire main system is charged, the manual activation valve (figure 20, item 2) is OPENED either locally or remotely. As raw water enters the piping system in the arms locker, a pressure switch (figure 20, item 3) activates an alarm in the pilothouse to indicate that the arms locker drenching system has been activated. The raw water from the fire main flows into the arms locker and out of two sprinkler heads (figure 20, item 4). Once activated, the system will continue the flow of raw water into the arms locker until the manual activation valve is closed or the fire main system is secured.

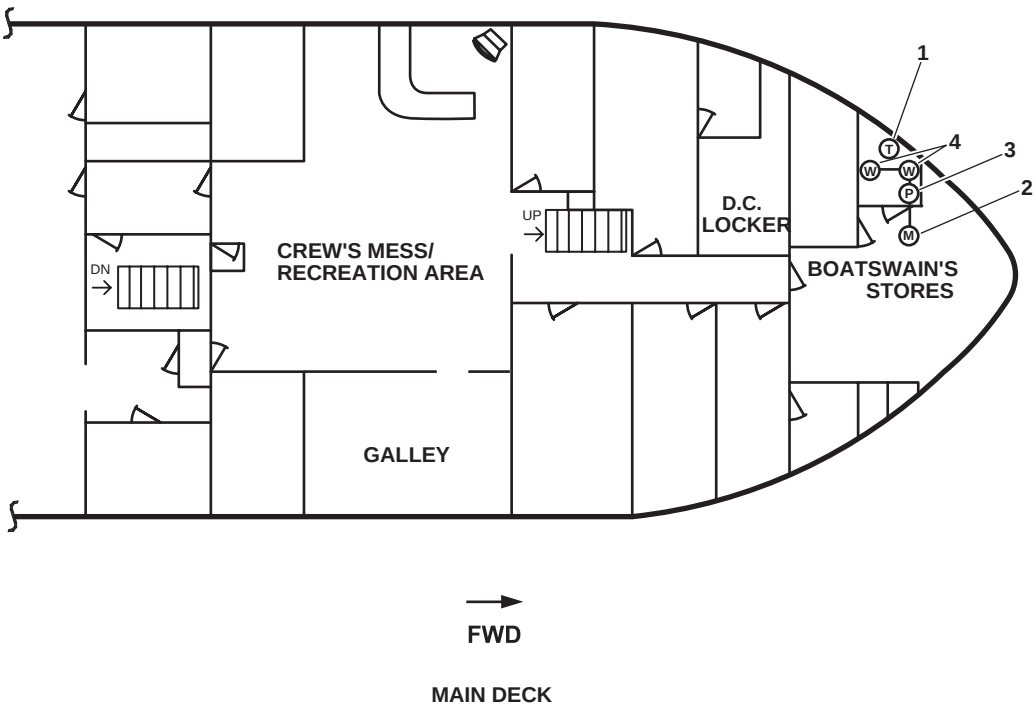


Figure 20. Arms Locker Drenching Systems

END OF WORK PACKAGE

Chapter 2

Operator Instructions for Firefighting, Fire Alarm, and Fire Suppression Systems

Inland and Coastal Large Tug (LT)

OPERATOR, UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR
INLAND AND COASTAL LARGE TUG (LT)
DESCRIPTION AND USE OF OPERATOR CONTROLS AND INDICATORS

02 LEVEL GENERAL ARRANGEMENT

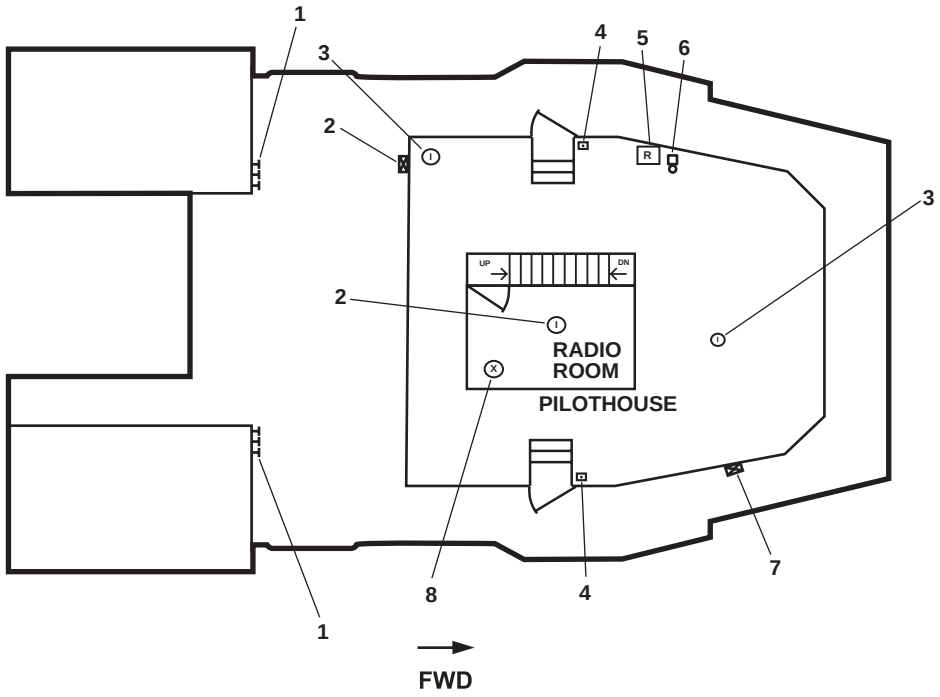


Figure 1. 02 Level General Arrangement

Table 1. 02 Level General Arrangement (refer to figure 1)

Key	Control/Indicator	Function
1	Engine Room Ventilation and Main Engine Combustion Air Fire Flap T Handles	PULL these T handle controls to actuate the engine room ventilation and main engine comustion air fire flaps.
2	Fire Station 11 Cutoff Valve	This valve controls the raw water supply to fire station 11.
3	Ionization Smoke Detectors	These detectors sense the presence of smoke in the protected spaces.
4	Fire Alarm Pull Station (refer to table 5)	This provides the crew with the means to manually activate the fire alarm system.
5	Remote Indicating Panel (refer to table 6)	This panel provides the bridge crew with an indication in which zone the alarm condition is located.
6	Pilothouse Bell	The bell provides an independent audible indication of a fire alarm condition.
7	Fire Station 10 Cutoff Valve	This valve controls the raw water supply to fire station 10.
8	Fire Alarm Beacon (red)	The beacon provides an independent visual indication of a fire alarm condition.

01 LEVEL GENERAL ARRANGEMENT

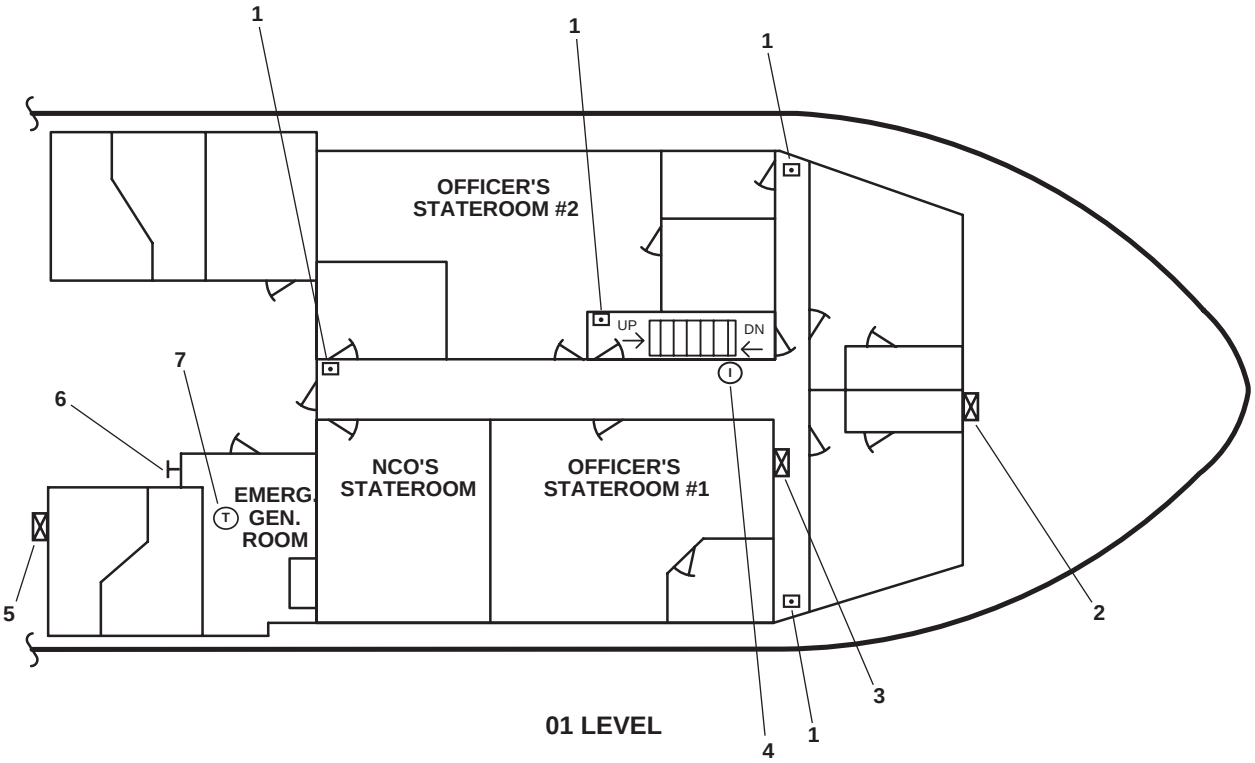


Figure 2. 01 Level General Arrangement

Table 2. 01 Level General Arrangement (refer to figure 2)

Key	Control/Indicator	Function
1	Fire Alarm Pull Station (refer to table 5)	This provides the crew with the means to manually activate the fire alarm system.
2	Fire Station 9 Cutoff Valve	This valve controls the raw water supply to fire station 9.
3	Fire Station 8 Cutoff Valve	This valve controls the raw water supply to fire station 8.
4	Ionization Smoke Detectors	These detectors sense the presence of smoke in the protected spaces.
5	Fire Station 7 Cutoff Valve	This valve controls the raw water supply to fire station 7.
6	EDG Room Fire Flap T Handles	PULL these T handles to actuate the Emergency Diesel Generator (EDG) room fire flaps.
7	Thermal Heat Detectors	This detector senses temperatures in excess of 135 °F (55.2 °C).

MAIN DECK GENERAL ARRANGEMENT

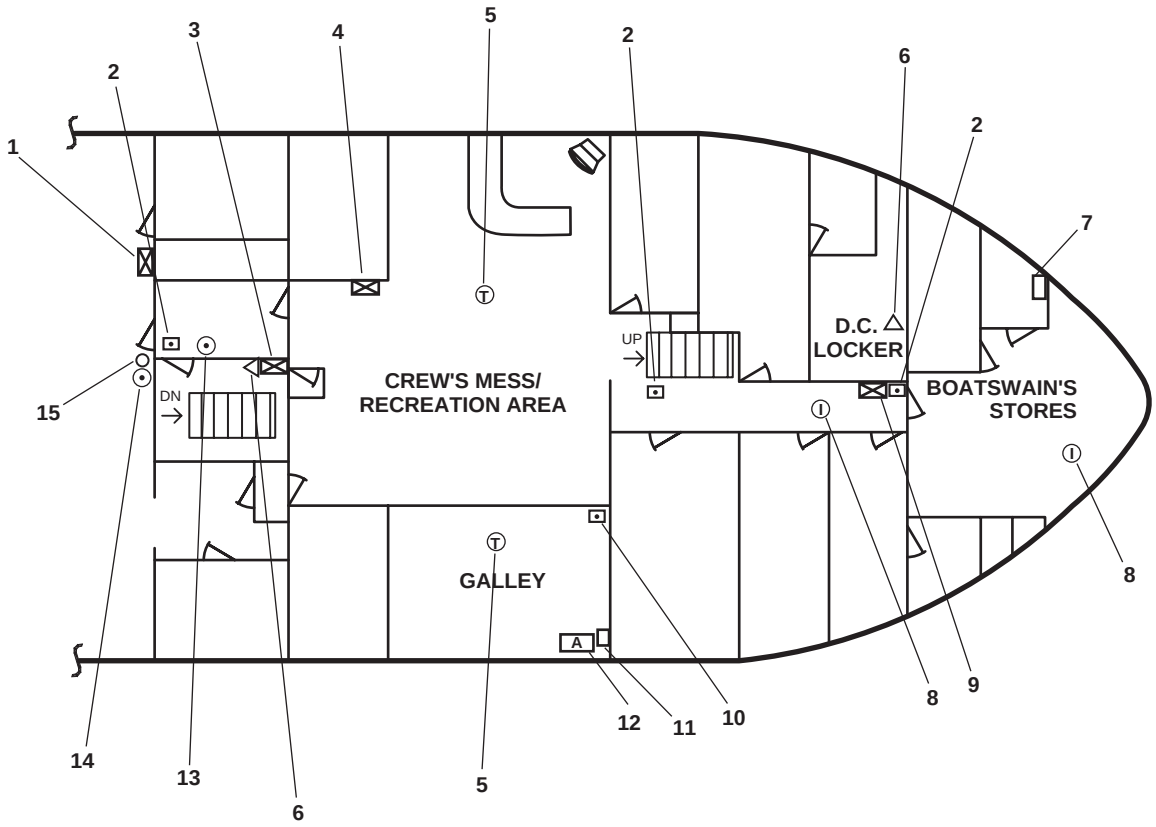


Figure 3. Main Deck General Arrangement

Table 3. Main Deck General Arrangement (refer to figure 3)

Key	Control/Indicator	Function
1	Fire Station 4 Cutoff Valve	This valve controls the raw water supply to fire station 4.
2	Fire Alarm Pull Station (refer to table 5)	This provides the crew with the means to manually activate the fire alarm system.
3	Engine Room Water Washdown System (refer to table 7)	This station contains the valves necessary to actuate the Engine Room Water Washdown System (ERWWS).
4	Fire Station 5 Cutoff Valve	This valve controls the raw water supply to fire station 5.
5	Thermal Heat Detectors	These detectors sense temperature in excess of 135 °F (55.2 °C).
6	HF Gas Sounding Tube	This tube allows for the testing of Hydrogen Fluoride (HF) gas.
7	Arms Locker Drenching System (refer to table 11)	This system is designed to provide raw water to the arms locker in the event of fire or excessive high temperature.

Table 3. Main Deck General Arrangement (refer to figure 3) (continued)

Key	Control/Indicator	Function
8	Ionization Smoke Detectors	These detectors sense the presence of smoke in the protected spaces.
9	Fire Station 6 Cutoff Valve	This valve controls the raw water supply to fire station 6.
10	Galley Fire Suppression System Fire Alarm Pull Station	This provides the crew with the means to manually activate the galley fire suppression system
11	Gaylord Washdown System	This system provides an exhaust, wash, and a fire cycle. The fire cycle is activated when the galley fire suppression system is activated.
12	Galley Fire Suppression System	This system provides the crew with the means to extinguish fires that start on or in galley cooking equipment.
13	Interior FM-200 Actuation Station	This provides the crew with the means to remotely actuate the FM-200 fire suppression system from inside the vessel.
14	Exterior FM-200 Actuation Station	This provides the crew with the means to remotely actuate the FM-200 fire suppression system from the weather deck.
15	FM-200 Engine Room Alarm Bell	This bell sounds when Pressure Switch PS-1 is activated, signaling the release of the FM-200 into the protected spaces.

HOLD LEVEL GENERAL ARRANGEMENT

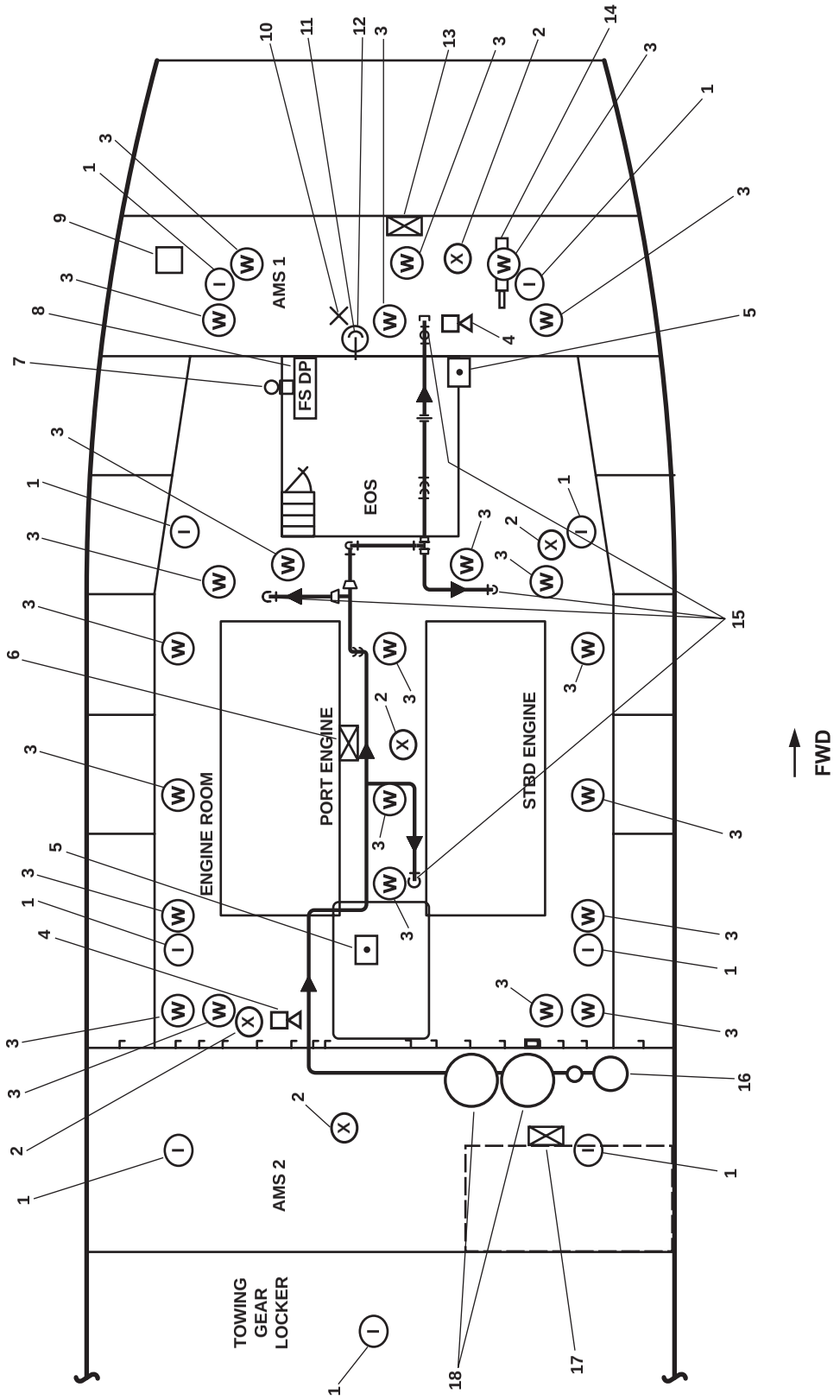


Figure 4. Hold Level General Arrangement

Table 4. Hold Level General Arrangement (refer to figure 4)

Key	Control/Indicator	Function
1	Ionization Smoke Detectors	These detectors sense the presence of smoke in the protected spaces.
2	FM-200 Amber Strobe Light	This light is activated by pressure switch PS-1 and indicates that the FM-200 system will be activated within 60 seconds.
3	Engine Room Water Washdown System Sprinkler Heads	These heads supplement the FM-200 system. They act to cool the protected spaces to lessen the production of Hydrogen Fluoride (HF) gas during FM-200 system operation.
4	FM-200 Warning Horn	This horn is activated by pressure switch PS-1A and indicates that the FM-200 system will be activated within 60 seconds.
5	Fire Alarm Pull Station (refer to table 5)	This provides the crew with the means to manually activate the fire alarm system.
6	Fire Station 2 Cutoff Valve	This valve controls the raw water supply to fire station 2.
7	Alarm Bell	The bell provides an independent audible indication of a fire alarm condition.
8	Fire and Smoke Detection System Panel (refer to table 9)	This panel controls and provides power to the components of the fire alarm system. The panel also alerts the crew to any faults in the system. The panel contains indicators that illuminate during specific conditions.
9	AFFF Pump Motor Controller (refer to table 10)	This provides the switches and indicators necessary to control power to the AFFF pump.
10	FM-13, F.F. TO F.M. CRSVR Valve	This valve allows the diesel engine-driven firefighting pump to supply the fire main with raw water.
11	AFFF Pump Discharge Pressure Gauge	The gauge indicates the discharge pressure of the AFFF pump.
12	AFFF Pump Discharge	This pump provides AFFF concentrate to the fire monitors.
13	Fire Station 3 Cutoff Valve	This valve controls the raw water supply to fire station 3.
14	Diesel Engine-Driven Firefighting Pump	This pump is the primary source of raw water for the vessel's fire monitors.
15	FM-200 Overhead Discharge Nozzles	These nozzles deliver the FM-200 agent to the upper areas of AMS 1 and the engine room.
16	Local FM-200 Actuation Station (refer to table 8)	This provides the crew with the means to locally actuate the FM-200 fire suppression system, and to manually override the 60-second time delay.
17	Fire Station 1 Cutoff Valve	This valve controls the raw water supply to fire station 1.
18	FM-200 600 lb Cylinder	This cylinder stores the FM-200 agent.

FIRE ALARM PULL STATION

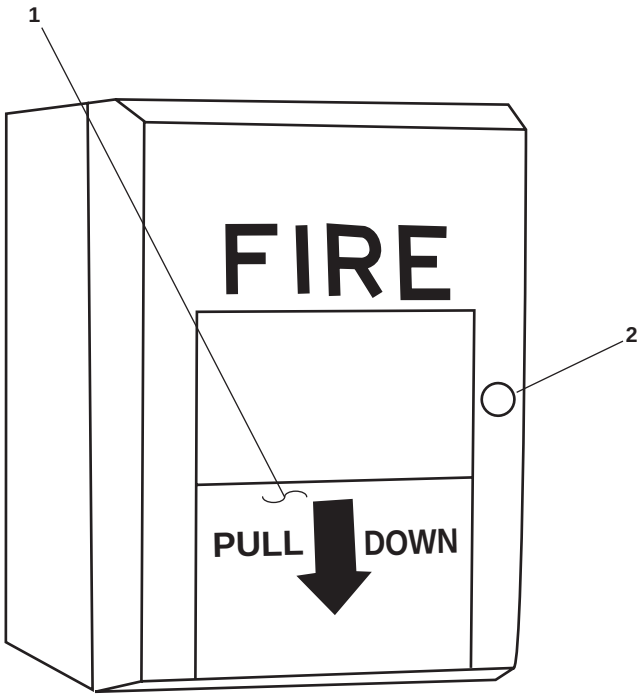


Figure 5. Fire Alarm Pull Station

Table 5. Fire Alarm Pull Station (refer to figure 5)

Key	Control/Indicator	Function
1	Pull Station Actuator	Pulling down on the actuator completes the circuit and manually signals a fire alarm condition at the fire alarm panel.
2	Hex Key Reset	This key is used to reset the pull box after it has been activated.

REMOTE INDICATOR PANEL

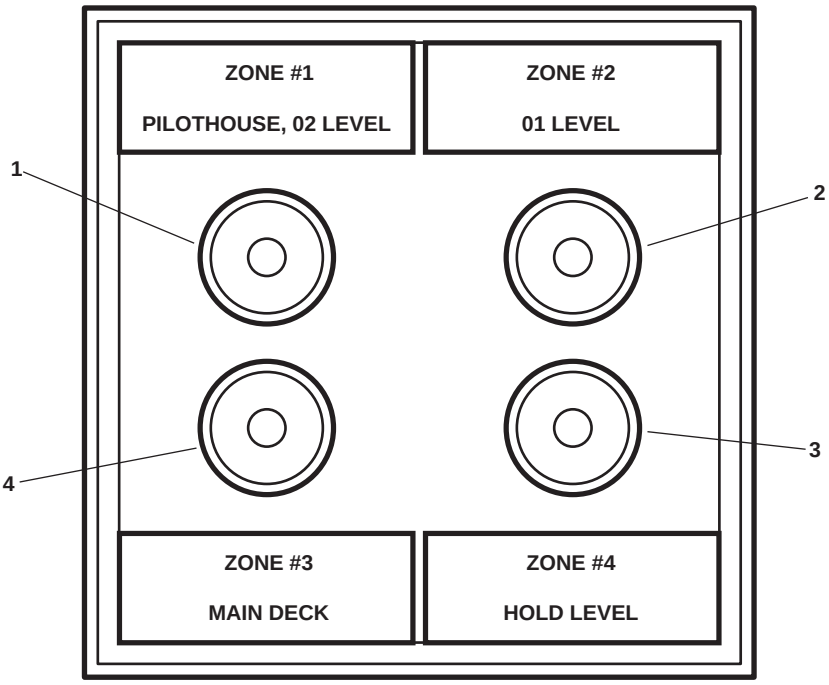


Figure 6. Remote Indicator Panel

Table 6. Remote Indicator Panel (refer to figure 6)

Key	Control/Indicator	Function
1	Zone 1 Alarm Indicator	When illuminated, this indicates a fire alarm condition in the pilothouse.
2	Zone 2 Alarm Indicator	When illuminated, this indicates a fire alarm condition on the 01 level.
3	Zone 4 Alarm Indicator	When illuminated, this indicates a fire alarm condition on the hold level.
4	Zone 3 Alarm Indicator	When illuminated, this indicates a fire alarm condition on the main deck level.

ENGINE ROOM WATER WASHDOWN SYSTEM (ERWWS) STATION

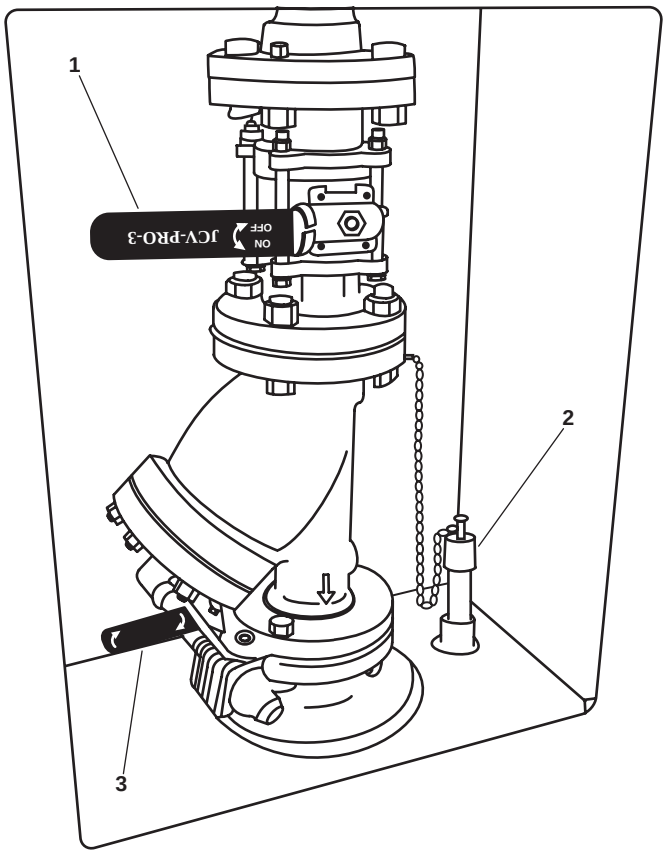


Figure 7. Engine Room Water Washdown System (ERWWS) Station

Table 7. Engine Room Water Washdown System (ERWWS) Station (refer to figure 7)

Key	Control/Indicator	Function
1	WWS 1	This valve controls the flow of fire main water to the Water Washdown System (WWS).
2	HF Sampling Port	This connection is OPENED to allow Hydrogen Fluoride (HF) gas sampling with the Kwik Draw sampling pump.
3	WWS 2	This valve is OPENED to allow the system strainer to be flushed during operation of the WWS.

FM-200 LOCAL ACTUATION COMPONENTS

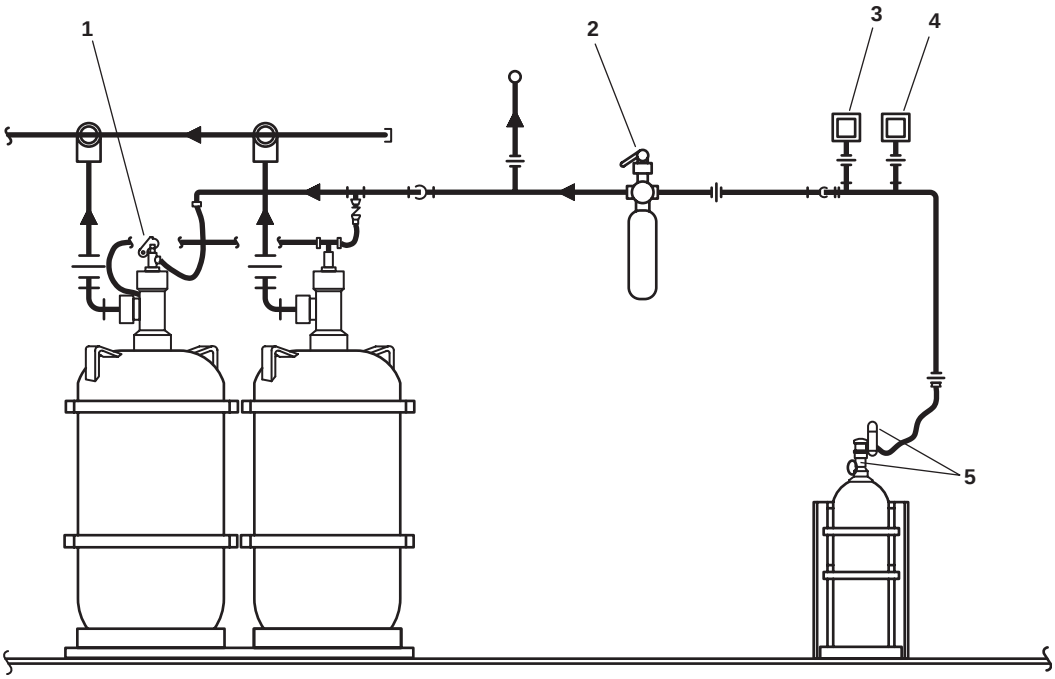


Figure 8. FM-200 Local Actuation Components

Table 8. FM-200 Local Actuation Components (refer to figure 8)

Key	Control/Indicator	Function
1	Manual/Pressure Operated Control Head	This control head permits both manual and pressure actuation of the FM-200 discharge delay valve. When activated manually, FM-200 discharge is activated without warning horns, strobe lights or the FM-200 bell sounding.
2	Discharge Delay Valve	This valve determines the status of the 60-second delay. When OPEN, the 60-second delay is overridden. When CLOSED, the 60-second delay is active.
3	Pressure Switch PS-1	When the FM-200 system is actuated, PS-1 automatically secures engine room and AMS 1 ventilation, Ship's Service Diesel Generator (SSDG) 1, SSDG 2, the bow thruster engine, the pump drive engine, and the fuel oil transfer pumps. PS-1 also sounds an alarm bell and energizes the amber strobe lights.
4	Pressure Switch PS-1A	When the FM-200 system is actuated, PS-1A energizes the warning horns in the engine room and AMS 1, and the amber strobe lights in the engine room, AMS 1, and AMS 2.
5	CO_2 Discharge Valve	This valve controls the discharge rate of the CO_2 gas from the cylinder that actuates the FM-200 system.

FIRE AND SMOKE DETECTION PANEL

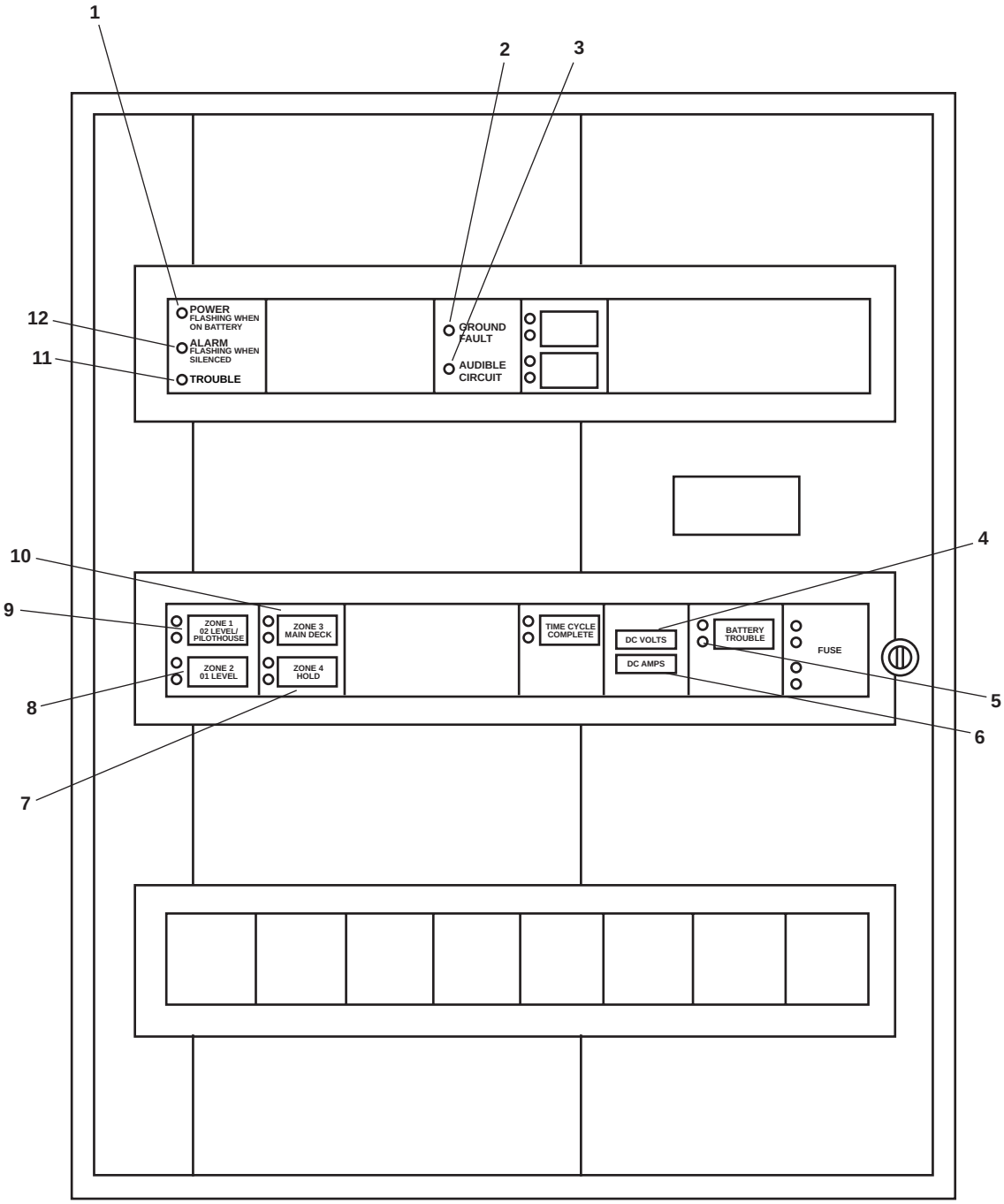


Figure 9. Fire and Smoke Detection Panel

Table 9. Fire Alarm Detection Panel (refer to figure 9)

Key	Control/Indicator	Function
1	POWER Indicator	When steady, this indicates that normal power is available. When flashing, this indicates that the fire alarm system is operating on battery power.
2	GROUND FAULT Indicator	This indicator illuminates to indicate a ground fault condition.
3	AUDIBLE CIRCUIT Indicator	This indicator illuminates to indicate that the audible alarm circuitry is activated. Alarm bells should sound unless alarms are silenced at the alarm panel.
4	DC VOLTS Indicator	This indicator illuminates to indicate dc Volts from the battery charging power supply.
5	BATTERY TROUBLE Indicator	This indicator illuminates to indicate the battery will not charge.
6	DC AMPS Indicator	This indicator illuminates to indicate the dc Amps from the battery charging power supply.
7	ZONE 4 HOLD Indicator	When illuminated, this indicates a fire alarm condition on the hold level.
8	ZONE 2 01 LEVEL Indicator	When illuminated, this indicates a fire alarm condition on the 01 level.
9	ZONE 1 PILOTHOUSE 02 LEVEL Indicator	When illuminated, this indicates a fire alarm condition in the pilothouse.
10	ZONE 3 MAIN DECK Indicator	When illuminated, this indicates a fire alarm condition on the main deck.
11	TROUBLE Indicator	This indicator illuminates to indicate a fault in the fire alarm panel circuitry.
12	ALARM Indicator	When steady, this indicates that an alarm condition exists in the fire alarm system. When flashing, indicates that an alarm condition exists, but the audible alarm is silenced.

AFFF PUMP MOTOR CONTROLLER

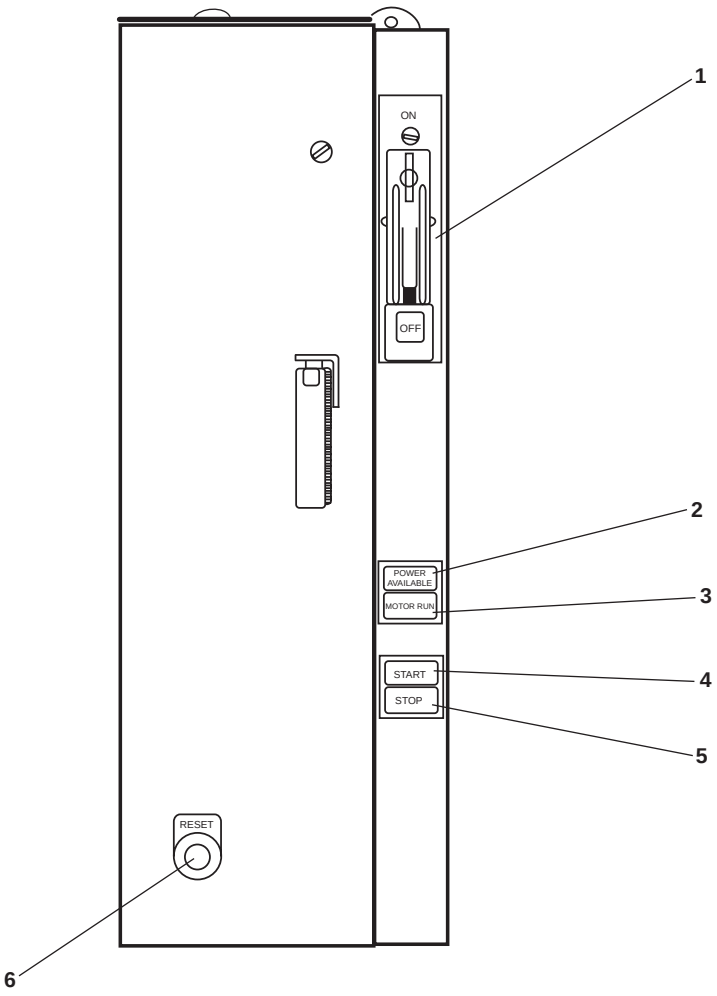


Figure 10. AFFF Pump Motor Controller

Table 10. AFFF Pump Motor Controller (refer to figure 10)

Key	Control/Indicator	Function
1	ON/OFF Switch	The switch controls the application of power to the AFFF pump motor controller.
2	POWER AVAILABLE Indicator	This indicator illuminates when power is available to the AFFF pump motor controller.
3	MOTOR RUN Indicator	This indicator illuminates to indicate that the AFFF pump motor is running.
4	START Switch	This switch is pressed to start the AFFF pump motor.
5	STOP Switch	This switch is pressed to stop the AFFF pump motor.
6	Reset Switch	This switch is pressed to reset the AFFF pump motor.

ARMS LOCKER DRENCHING SYSTEM

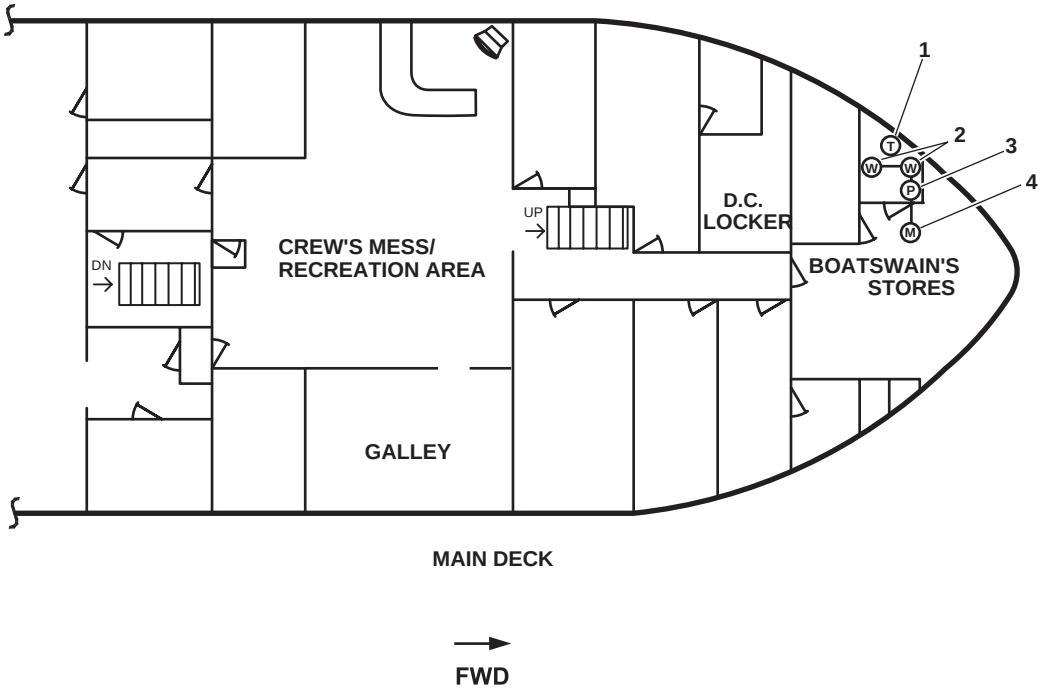


Figure 11. Arms Locker Drenching System

Table 11. Arms Locker Drenching System (refer to figure 11)

Key	Control/Indicator	Function
1	Thermal Heat Detectors	These detectors sense temperatures in excess of 135 °F (55.2 °C).
2	Arms Locker Drenching System Sprinkler Heads	These heads, when manually activated, release raw water to cool or extinguish fires in the arms locker.
3	Pressure Switch	This switch alarms the pilothouse when the drenching system is activated.
4	Manually Activated Valve	This valve activates the arms locker drenching system. It can be activated from the arms locker (local) or the 0-1 level (remote) at the bow by way of a reach rod valve system.

END OF WORK PACKAGE

OPERATOR, UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT) OPERATION UNDER USUAL CONDITIONS

INITIAL SETUP:

Tools and Special Tools:
Sampling Pump (Item 4, Table 2, WP 0046 00)

Personnel Required:
Six Crewmembers, Any MOS

References:
TM 55-1925-273-10
TM 55-1925-273-SDC
WP 0006 00
WP 0046 00

SECURITY MEASURES FOR ELECTRONIC DATA

No electronic data is used or stored in the firefighting, fire alarm, and fire suppression systems aboard the LT.

FM-200 FIRE SUPPRESSION SYSTEM ACTUATION

The following steps must be accomplished prior to system actuation:

1. Evacuate all personnel from the engine room and AMS 1.
2. CLOSE the watertight doors between the engine room, AMS 1, and AMS 2 (TM 55-1925-273-10).
3. Align fire and general service pump 1 as the online fire pump (TM 55-1925-273-10).

⚠ CAUTION

FM-17 and/or FM-15 supplies raw water to various shipboard systems including the refrigeration plant, the air conditioning plant, and the water maker. Failure to secure power to these systems prior to closing the valves will cause damage to the equipment.

4. CLOSE the following valves:
   a. FM-17, FIRE/G.S. PMP NO. 1 DISCH TO G.S. (figure 1, item 1)
   b. FM-15, FIRE/G.S. PMP NO. 2 DISCH TO G.S. (figure 1, item 2)
5. OPEN WWS-1 (figure 2, item 1), located in the main deck vestibule, starboard side, to activate the Engine Room Water Washdown System (ERWWS).
6. CLOSE the following:
   a. PORT engine room supply fan intake damper (figure 3, item 1)
   b. PORT engine room exhaust fan outlet damper (figure 3, item 2)
   c. STBD engine room supply fan intake damper (figure 4, item 1)
   d. STBD engine room exhaust fan outlet damper (figure 4, item 2)
   e. AMS 1 supply fan intake hinged cover (figure 5, item 1)

f. AMS 1 exhaust hinged cover (figure 6, item 1)

g. Engine room entrance door engine room vestibule (figure 7, item 1)

h. EOS emergency escape scuttle (figure 8, item 1)

i. AMS 1 emergency escape scuttle (figure 9, item 1)

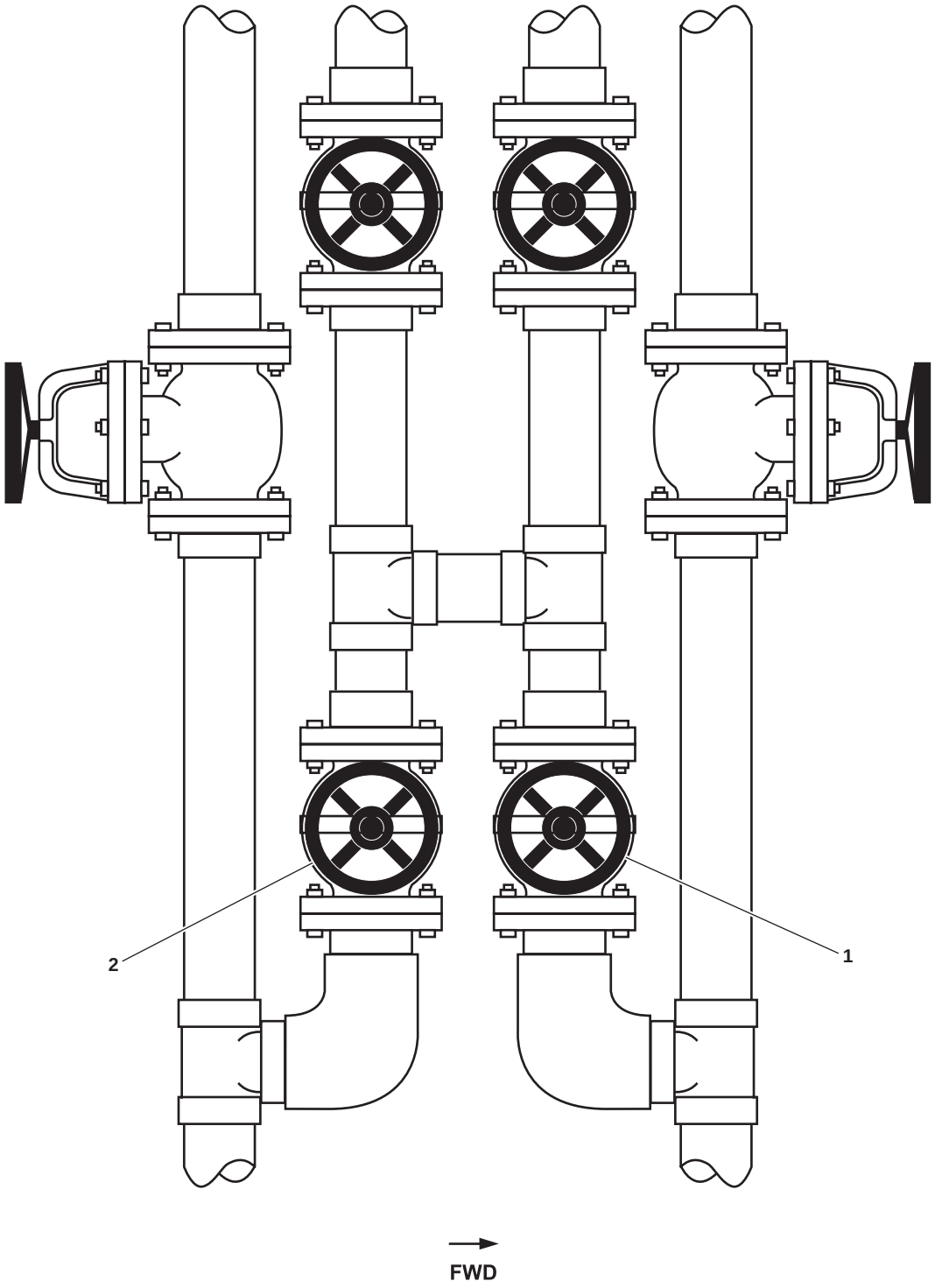


Figure 1. Fire and General Service Pump Valves

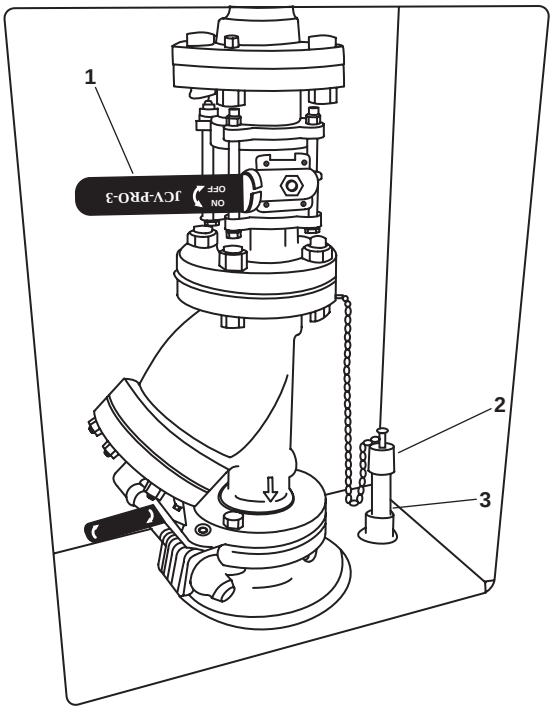


Figure 2. Engine Room Water Washdown Station

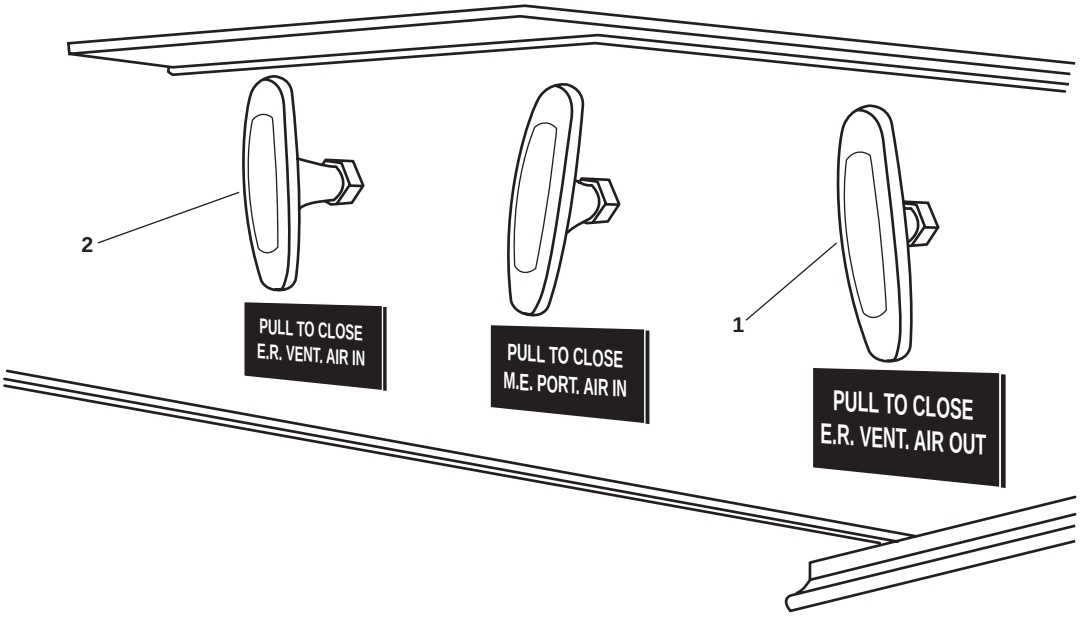


Figure 3. PORT Engine Room Fire Flap Quick Release T Handles

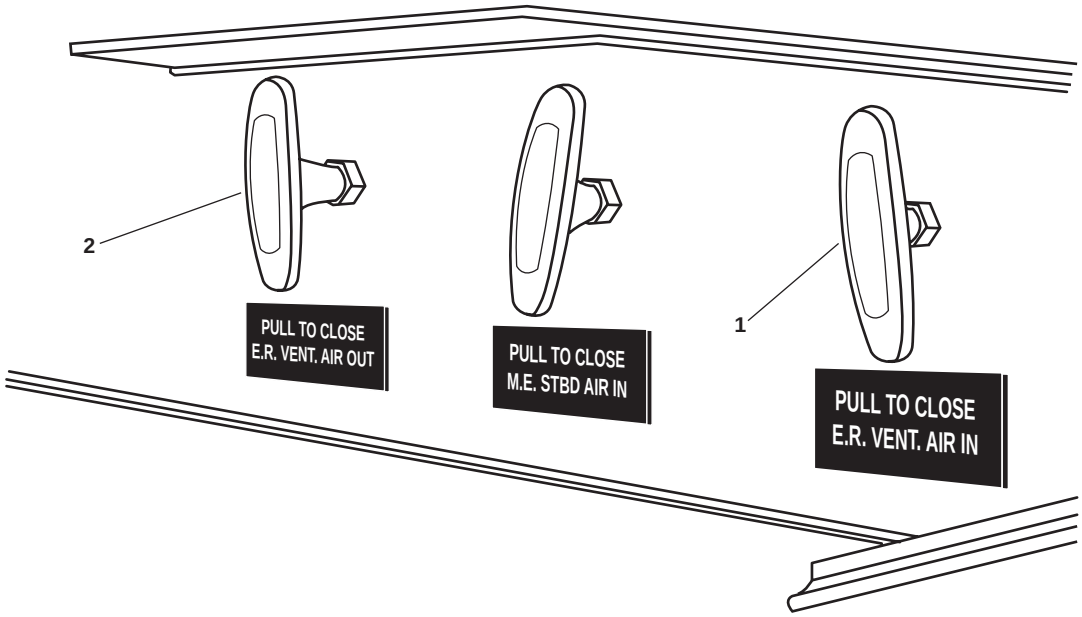


Figure 4. STBD Engine Room Fire Flap Quick Release T Handles

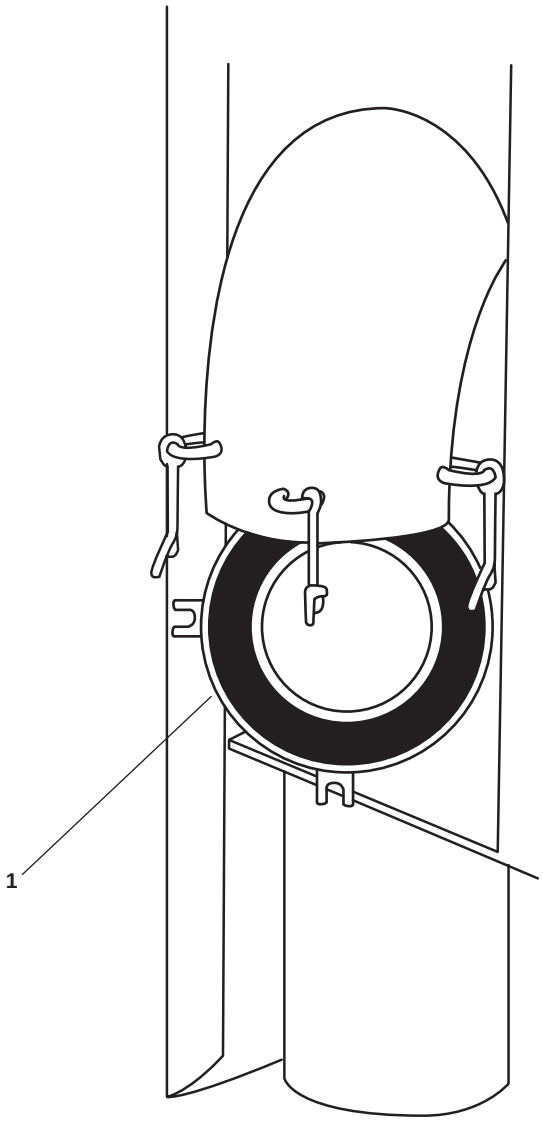


Figure 5. AMS 1 Supply Fan Intake Hinged Cover

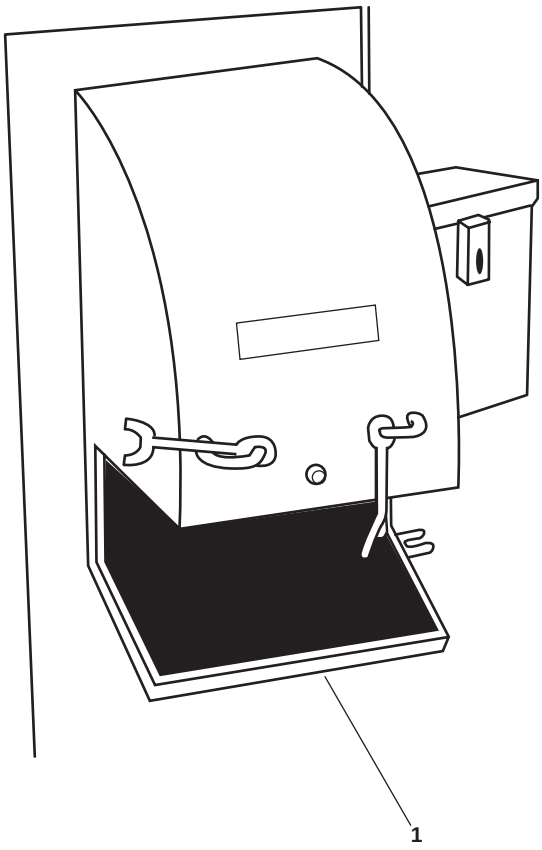


Figure 6. AMS 1 Exhaust Hinged Cover

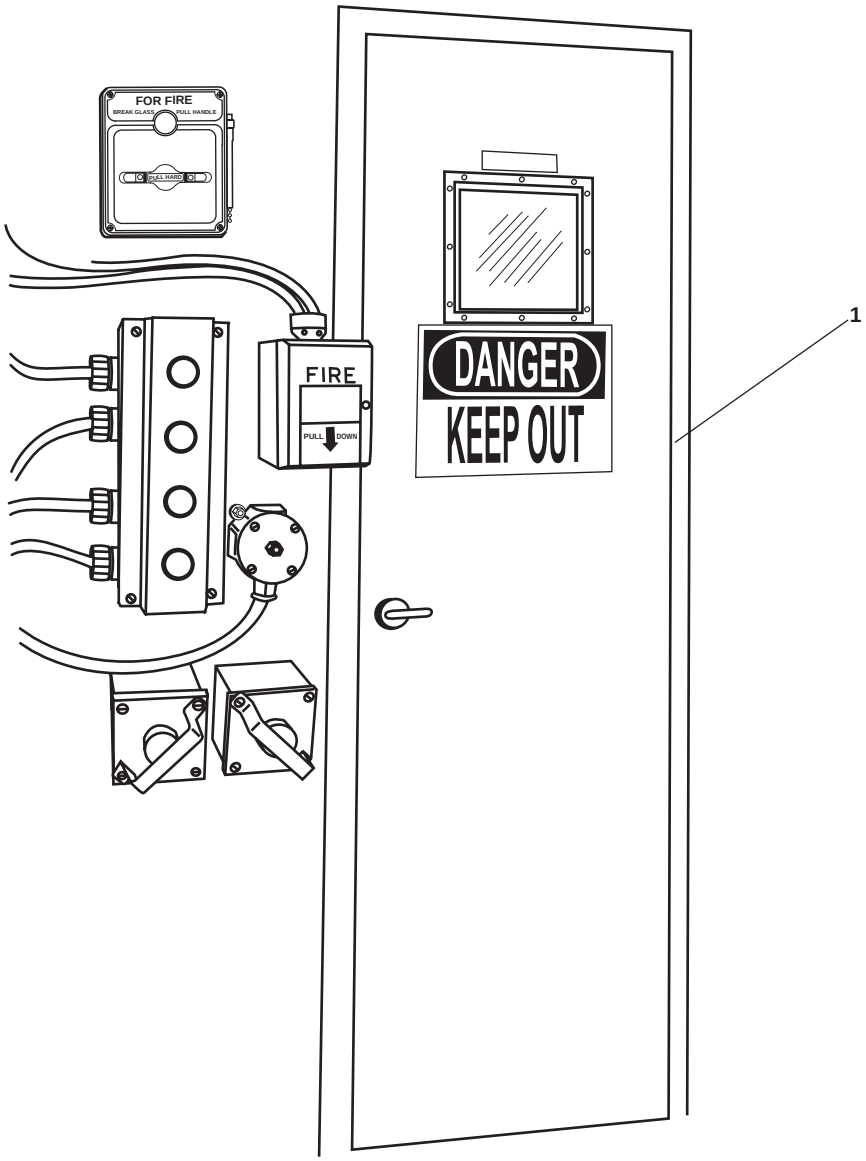


Figure 7. Engine Room Entrance Door

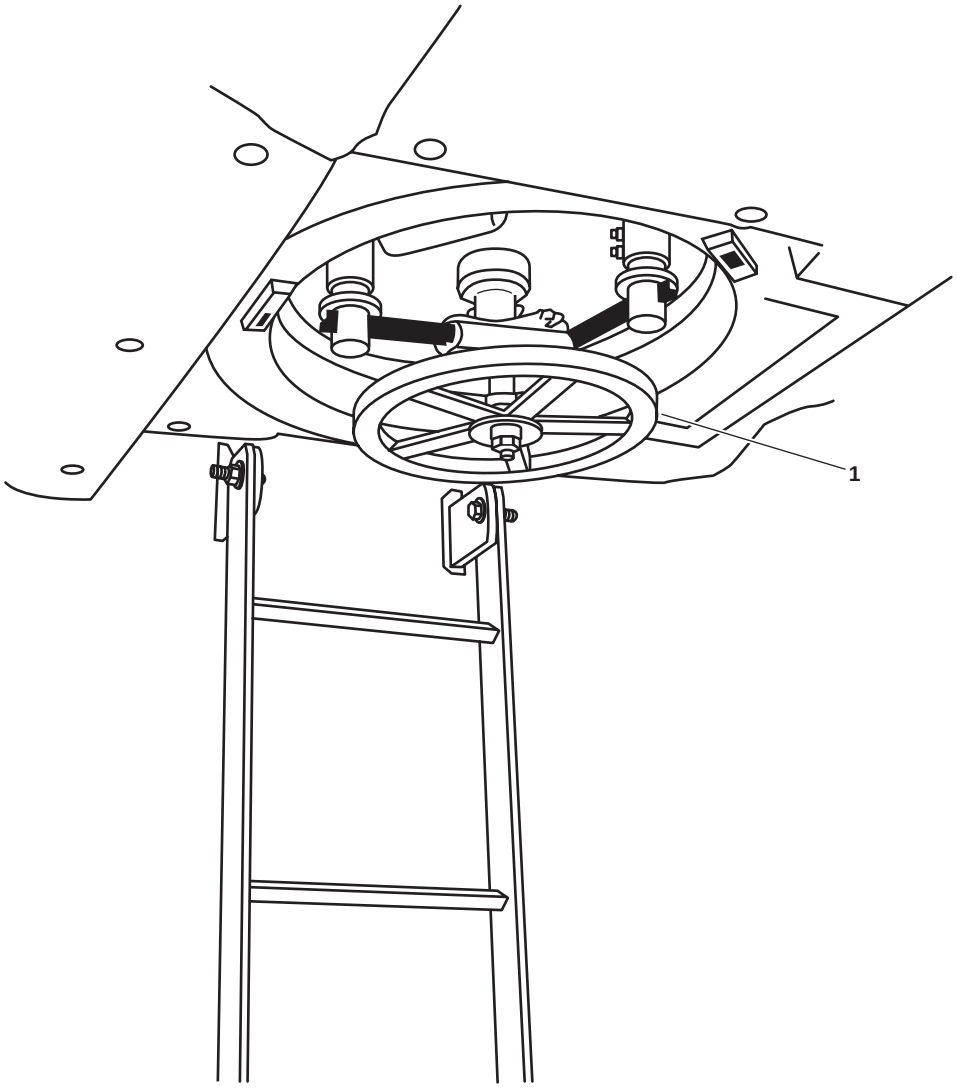


Figure 8. EOS Emergency Escape Scuttle

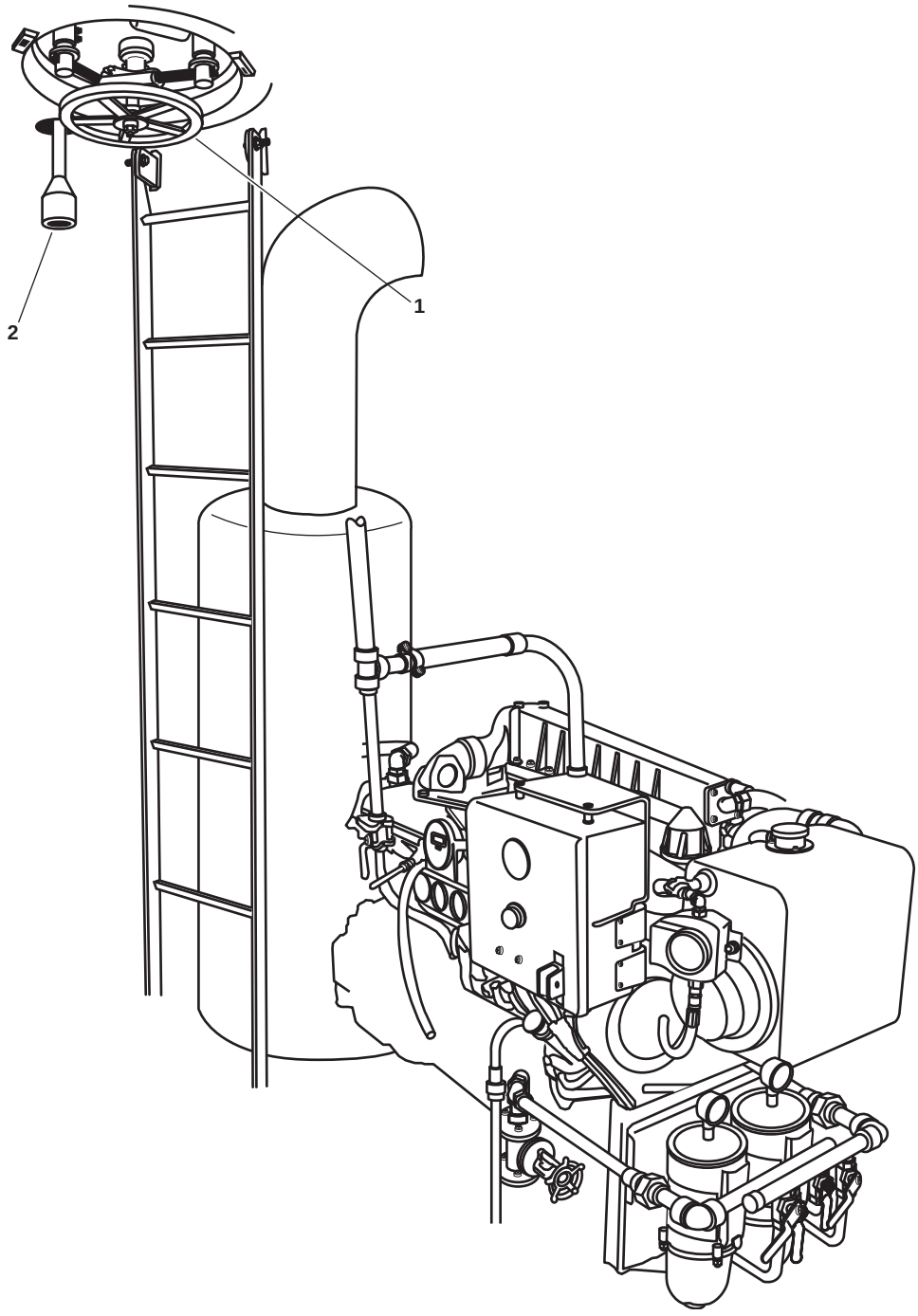


Figure 9. AMS 1 Emergency Escape Scuttle

NOTE

The ERWWS will shut down once the FM-200 system has been activated. Restart fire and general service pump 1 remotely (pilothouse) once the emergency generator has come online.

7. Break the glass on one of the FM-200 manual pull boxes (figure 10 or 11, item 1). Pull boxes are found in the following locations:

   a. Engine room vestibule, main deck, 01 level, frame 23

   b. Main deck, on the weather deck, starboard of the engine room vestibule entrance door, frame 21. This exterior watertight pull box requires opening the watertight cover to expose the glass.

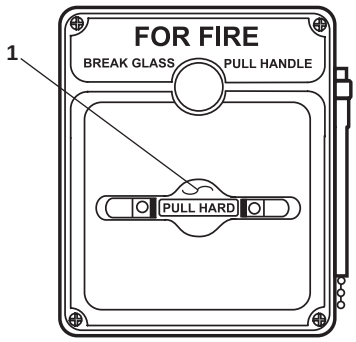


Figure 10. Interior FM-200 Manual Pull Box

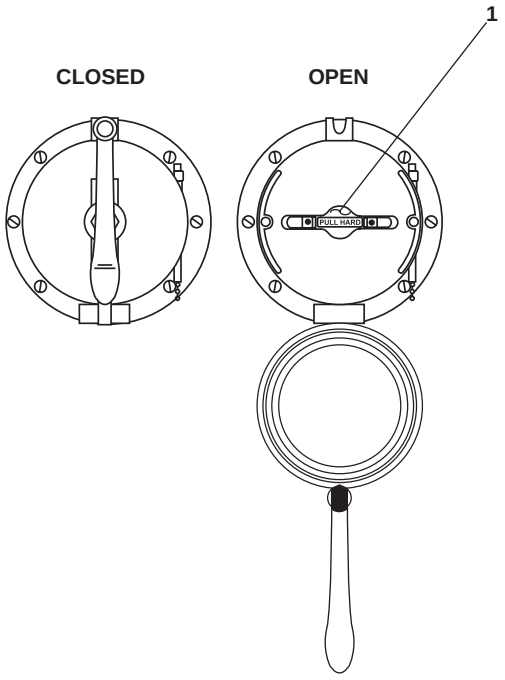


Figure 11. Exterior FM-200 Manual Pull Box

8. Pull the handle (figure 10 or 11, item 1) to actuate the FM-200 system. The handle is designed to require less than 40 pounds (18.14 kg) force and 14 in (35.6 cm) of pull to operate. If the FM-200 system fails to actuate, proceed to the FM-200 cylinder location, AMS 2, frame 22, and follow the emergency discharge instructions posted at the FM-200 cylinder location and in WP 0006 00. Enter and evacuate AMS 2 using the emergency escape scuttle.

9. Verify that the emergency generator has come online and start fire and general service pump 1 at the remote start located in the pilothouse.

10. Wait a minimum of 15 minutes after FM-200 system actuation before initiating reentry procedures. The water washdown system should be allowed to operate continuously during this time. Allow no one to enter the protected spaces until reentry procedures are complete and permission is granted to do so.

11. Actuation of the FM-200 fire suppression system will result in the automatic shutdown of the auxiliary engines and ventilation fan motors affecting the protected spaces. Verify that the following fans, engines, and pumps are shut down:

    a. Fan Motors:

        (1) PORT engine room supply fan

        (2) PORT engine room exhaust fan

        (3) STBD engine room supply fan

        (4) STBD engine room exhaust fan

        (5) AMS 1 supply fan

    b. Engines:

        (1) SSDG 1

        (2) SSDG 2

        (3) Pump drive engine

        (4) Bow thruster engine

    c. Pumps:

        (1) Fuel oil transfer pump 1

        (2) Fuel oil transfer pump 2

REENTRY PROCEDURES

WARNING

Following a fire and actuation of the engine room fire suppression system, the engine room may contain a dangerous level of Hydrogen Fluoride (HF) gas, which is dangerous to humans. Do not reenter the engine room until the post-fire re-entry procedure has been performed. Death or serious injury can result from unprotected entry into this space prior to completion of the post-fire reentry procedure.

1. Wait at least 15 minutes after extinguishing the fire before performing this procedure. The natural decay rate for Hydrogen Fluoride (HF) gas is approximately 15 minutes after a fire is extinguished.

2. Perform HF gas sampling as follows:

   a. Remove the cap (figure 2, item 2) from the aft HF sampling port (figure 2, item 3) located in the main deck vestibule or the forward HF sampling port (figure 9, item 2) located in the damage control locker.

   b. Zero the stroke counter (figure 12, item 1).

   c. Install the rubber hose (figure 12, item 2) on the pump by sliding one end of the rubber hose over the tube holder (figure 12, item 3).

   d. Break off both tips (figure 12, item 4) of the detector tube (figure 12, item 5) using the breaker (figure 12, item 6) on the sampling pump (figure 12, item 7).

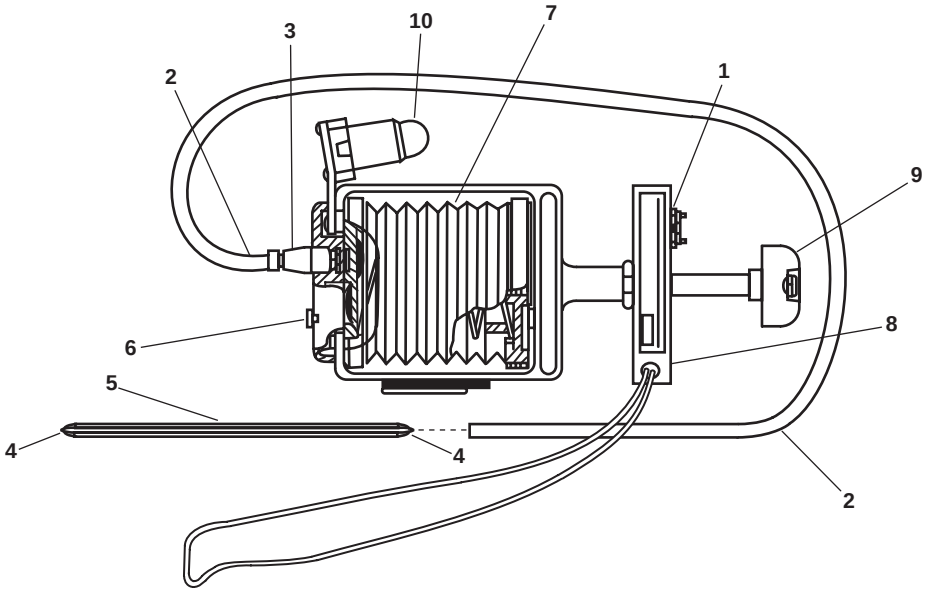


Figure 12. Sampling Pump

e. Install the detector tube (figure 12, item 5) into the rubber hose (figure 12, item 2) with the arrow on the detector tube pointing toward the sampling pump (figure 12, item 7).

f. Insert the detector tube (figure 12, item 5) into the HF sampling port (figure 2, item 3). Ensure that all of the rubber hose (figure 12, item 2) is inserted into the HF sampling port.

NOTE

Determine the number of strokes required for a proper sample by checking the detector tube instructions that are in the box of detector tubes or the detector tube itself. The tube will be labeled as n=number of strokes.

g. With all four fingers on the handle (figure 12, item 8), fully press the knob (figure 12, item 9) with the palm of the hand until the stroke counter (figure 12, item 1) changes number.

h. Release the knob (figure 12, item 9).

i. Verify that the end of stroke indicator (figure 12, item 10) has turned a high visibility yellow. Once the pump has consumed 100 cc of the sample, the end of stroke indicator will return to its black color.

j. Repeat steps f-i until the proper number of strokes has been performed.

k. Remove the detector tube (figure 12, item 5) from the HF sampling port (figure 2, item 3).

l. Install the cap (figure 2, item 2) on the HF sampling port (figure 2, item 3).

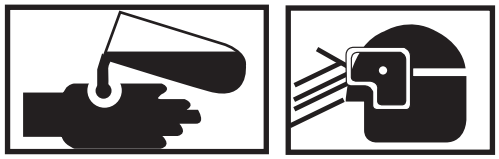
m. Observe the color of the detector tube and read the scale printed on the detector tube. Record the reading.

n. Remove the detector tube (figure 12, item 5) from the hose (figure 12, item 2).

o. Wait two minutes and repeat steps a-m above using a new detector tube.

p. When three consecutive readings of 3 parts per million (ppm) are obtained, the engine room is safe for reentry.

WARNING



Residue from FM-200 fire suppression is a minor irritant to the skin, the eyes, and the respiratory tract. All personnel who may come in contact with this residue must wear Personal Protective Equipment (PPE), which prevents the FM-200 residue from contacting the skin, eyes, and/or respiratory tract.

3. After ensuring that no reflash risks exist, the engine room must be ventilated in accordance with TM 55-1925-273-SDC and the following procedure:

a. If explosive or flammable gases are present, desmoke using the water-driven blower. Desmoke using the water-driven blower until no flammable gases are detected.

b. If no explosive or flammable gases are present, desmoke using the ventilation exhaust fans in high speed.

c. When the smoke has cleared, restart the ventilation supply fans in high speed.

d. When all smoke is cleared and air quality is at normal levels, return all ventilation fans to their normal operating speed.

e. Ventilate the engine room for at least 15 minutes before proceeding to the cleanup phase.

4. After the engine room has been ventilated and has cooled down, wash down the engine room interior and all equipment with fresh water.

NOTE

Bilge water which has been exposed to FM-200 fire extinguishing agent while extinguishing a fire shall be classified and treated as hazardous waste.

5. Use the oily water collection system to remove all contaminated bilge water from the engine room. Discharge this contaminated water only to a suitable treatment facility.

6. Return the equipment to the desired readiness condition.

PRESSURIZE FIRE MAIN

1. Align fire and general service pump no. 1 as the online fire and general service pump (TM 55-1925-273-10).

2. CLOSE valve FM-17, FIRE/G.S. PMP NO. 1 DISCH TO FM (figure 13, item 1).

3. OPEN valve FM-16, FIRE/G.S. PMP NO. 1 DISCH TO FM (figure 13, item 2).

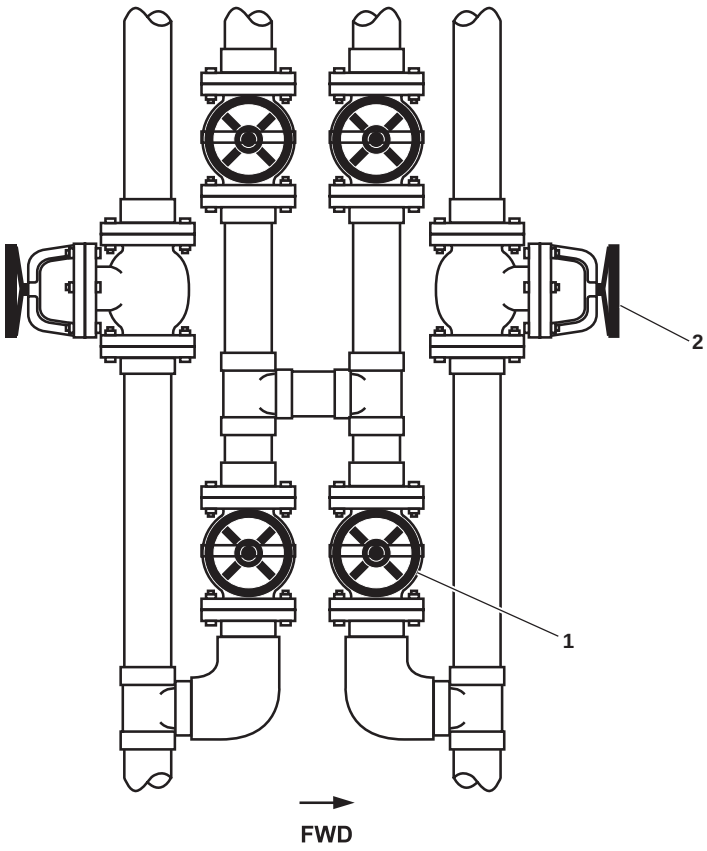


Figure 13. Pressurize Fire Main

FIRE STATION OPERATION

1. Perform the Pressurize the Fire Main procedure in this work package.
2. Ensure that the fire hose (figure 14, item 1) is connected to the fire station cutoff valve (figure 14, item 2).

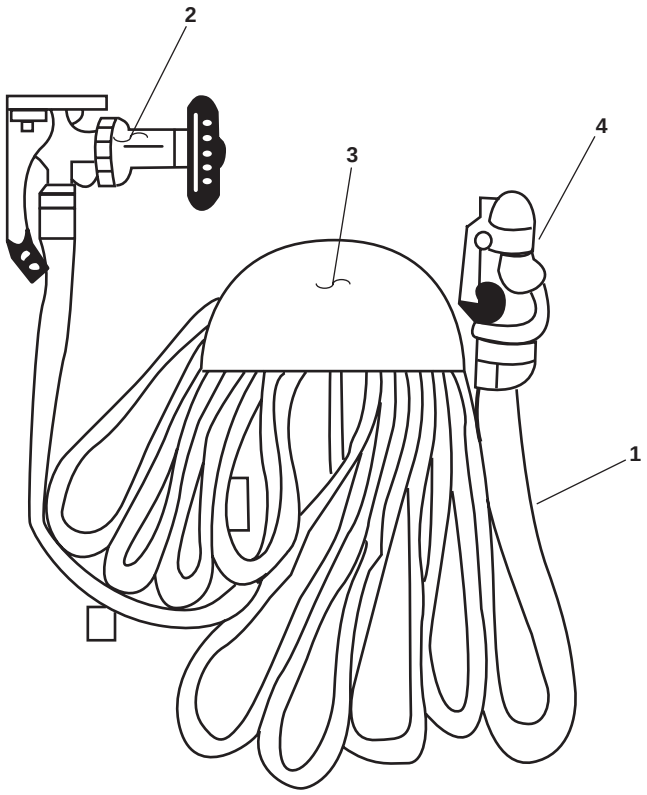


Figure 14. Fire Station

3. Remove the fire hose (figure 14, item 1) from the hose storage rack (figure 14, item 3).
4. Lay the hose (figure 14, item 1) out and extend it to its full length.
5. Verify that the nozzle valve (figure 14, item 4) is CLOSED.
6. Slowly OPEN the fire station cutoff valve (figure 14, item 2) and pressurize the fire hose.
7. Firmly grasp the fire hose nozzle (figure 14, item 4) and direct it at the base of the fire.

WARNING

When operating a pressurized fire hose, hold the nozzle with a firm grip. If not held firmly, the nozzle will thrash about and may cause serious injury or death to personnel.

8. Slowly OPEN the nozzle valve (figure 14, item 4) and direct the water stream at the base of the fire.

FIRE STATION SHUTDOWN

1. CLOSE the nozzle valve (figure 14, item 4).
2. CLOSE the fire station cutoff valve (figure 14, item 2).
3. Slowly OPEN the nozzle valve (figure 14, item 4) to relieve the pressure in the fire hose (figure 14, item 1).
4. Disconnect the fire hose (figure 14, item 1) from the fire station cutoff valve (figure 14, item 2) and place the fire station end of the fire hose in a lower area than the nozzle end.
5. Drain the water from the hose by raising the nozzle (figure 14, item 4) end of the fire hose (figure 14, item 1) above head level and walking it back to the fire station end. The water in the hose should gravity drain.
6. Inspect the fire hose (figure 14, item 1) for damage.
7. Properly stow the hose (figure 14, item 1) on the hose storage rack (figure 14, item 3).
8. Connect the fire hose (figure 14, item 1) to the fire station cutoff valve (figure 14, item 2).
9. CLOSE the nozzle valve (figure 14, item 4).

FIRE MONITOR OPERATION

1. Start the pump drive engine (TM 55-1925-273-10).
2. OPEN valve FM-1, SEASUCT, F.F. PMP., located beneath the EOS.
3. Prime the diesel engine-driven firefighting pump by placing the following valves in the OPEN position:
   a. GS-111, FF PMP PRM EDUCTOR DISCH (figure 15, item 1), located in AMS 1 on the PORT side, near the fire pump
   b. CA-73, SVCE AIR TO FF PMP PRM EDUCTOR (figure 15, item 2), to start the eductor
4. When water discharges from the overflow lines (figure 15, item 3), CLOSE the following valves:
   a. CA-73, SVCE AIR TO FF PMP PRM EDUCTOR (figure 15, item 2), to stop the eductor
   b. GS-111, FF PMP PRM EDUCTOR DISCH (figure 15, item 1)
5. Engage the Power Take-Off (PTO) (TM 55-1925-273-10) to start the pump.
6. Direct (aim) the monitor (figure 16, item 1) to place foam/water at the base of the fire.
7. OPEN the cutoff valve (figure 16, item 2) for the desired monitor.

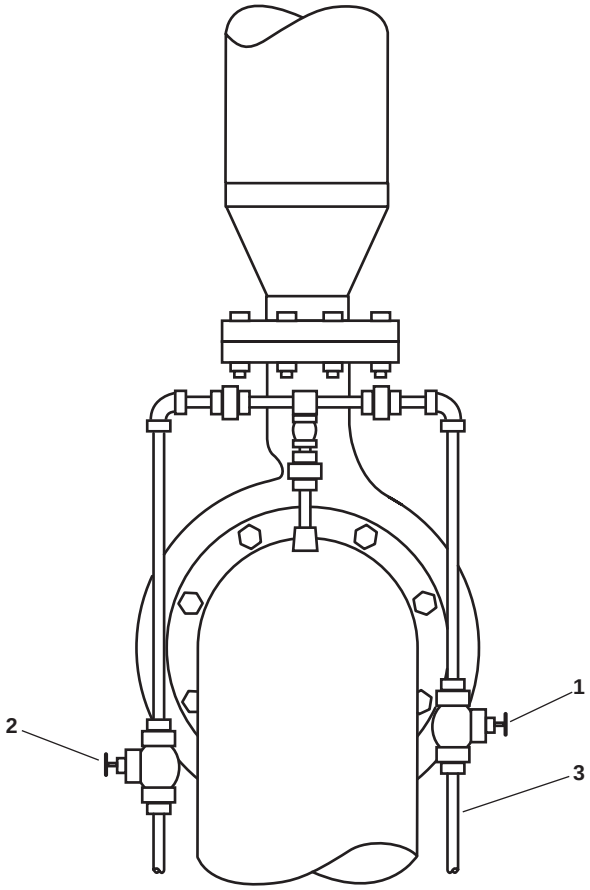


Figure 15. Diesel Engine-Driven Firefighting Pump Priming Valves

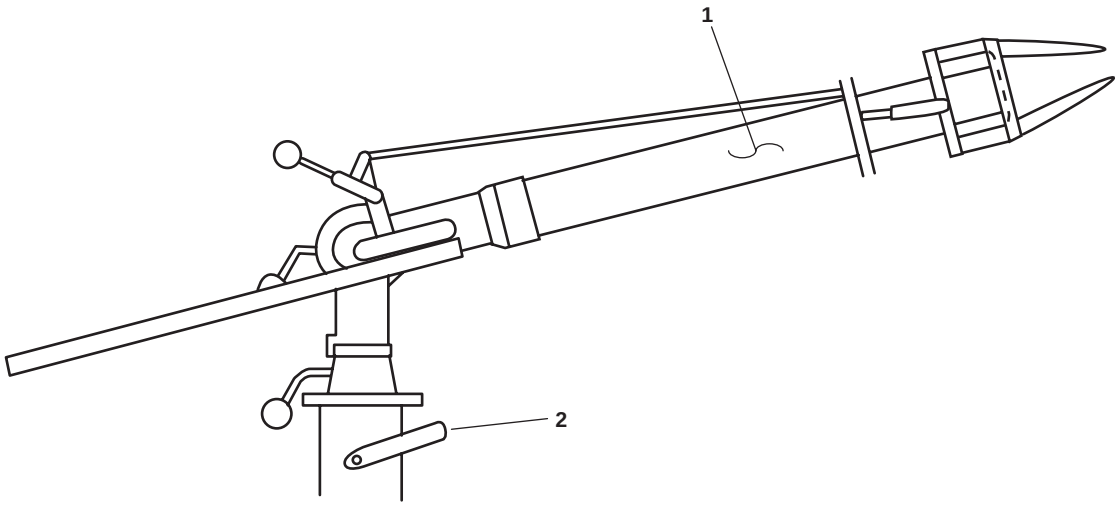


Figure 16. Fire Monitor

AQUEOUS FILM FORMING FOAM (AFFF) SYSTEM ACTIVATION

NOTE

The AFFF system must only be operated in conjunction with the diesel engine-driven fire pump.

1. Perform the Fire Monitor Operation procedure in this work package.

2. OPEN valve FM-84 (figure 17, item 1), AFFF TK SUCT. This valve is located below the deckplate.

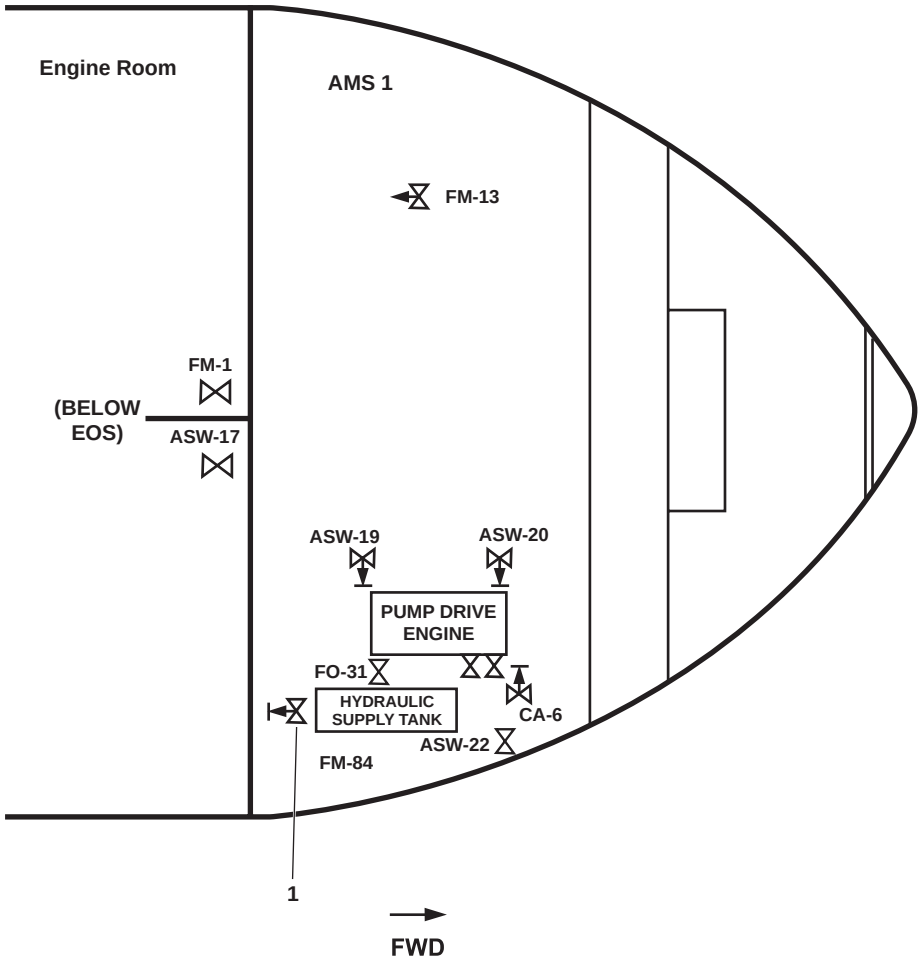


Figure 17. AFFF Tank Suction Valve Location

3. Start the AFFF pump by completing the following actions:

   a. At the main switchboard in the EOS, set the AFFF PUMP circuit breaker (figure 18, item 1) to ON.

   b. At the AFFF pump motor controller (figure 19) complete the following actions:

      (1) Set the ON-OFF switch (figure 19, item 1) to ON.

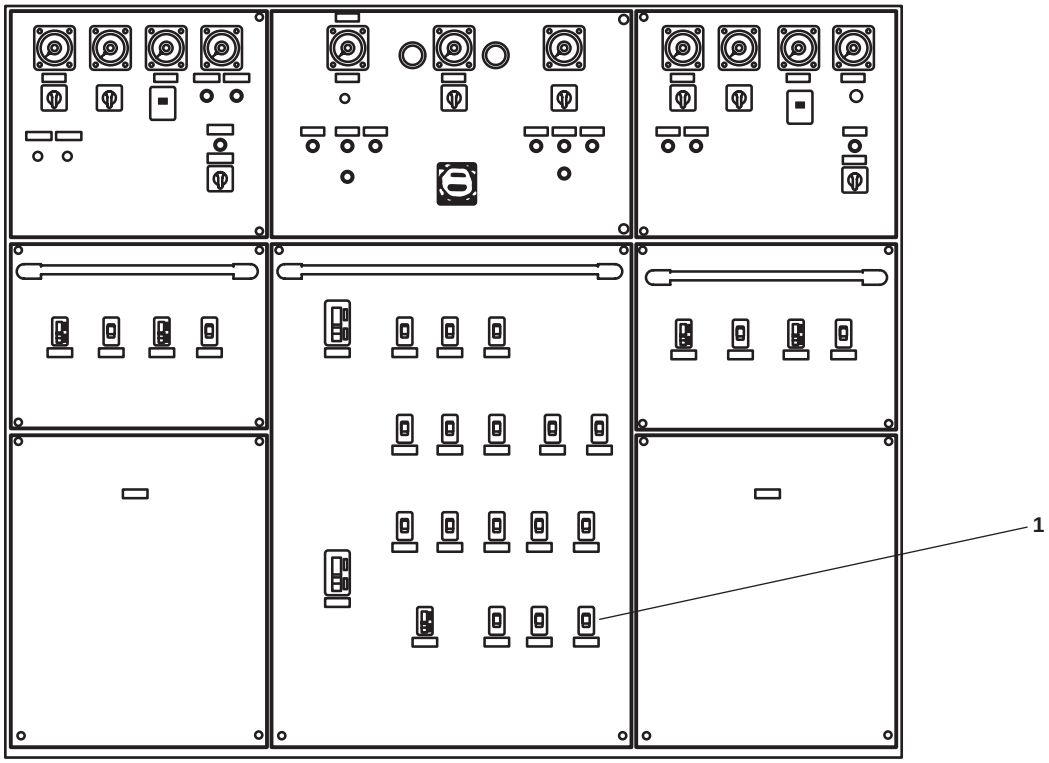


Figure 18. EOS Main Switchboard

(2) Verify that the POWER AVAILABLE indicator (figure 19, item 2) is illuminated.

(3) Press the START pushbutton (figure 19, item 3).

(4) Verify that the MOTOR RUN indicator (figure 19, item 4) is illuminated.

(5) Verify that the AFFF DIFF. PRESS gauge is 5 PSI (0.34 bar) higher than the fire main pressure.

c. AFFF will now be discharged through the fire monitors.

FOAM SYSTEM SHUTDOWN

1. At the AFFF pump motor controller complete the following actions:

   a. Press the STOP pushbutton (figure 19, item 5).

   b. Observe that the MOTOR RUN indicator (figure 19, item 4) goes out.

   c. Set the ON-OFF switch (figure 19, item 1) to OFF.

   d. Observe that the POWER AVAILABLE indicator (figure 19, item 2) goes out.

2. CLOSE valve FM-84 (figure 17, item 1), AFFF TK SUCT.

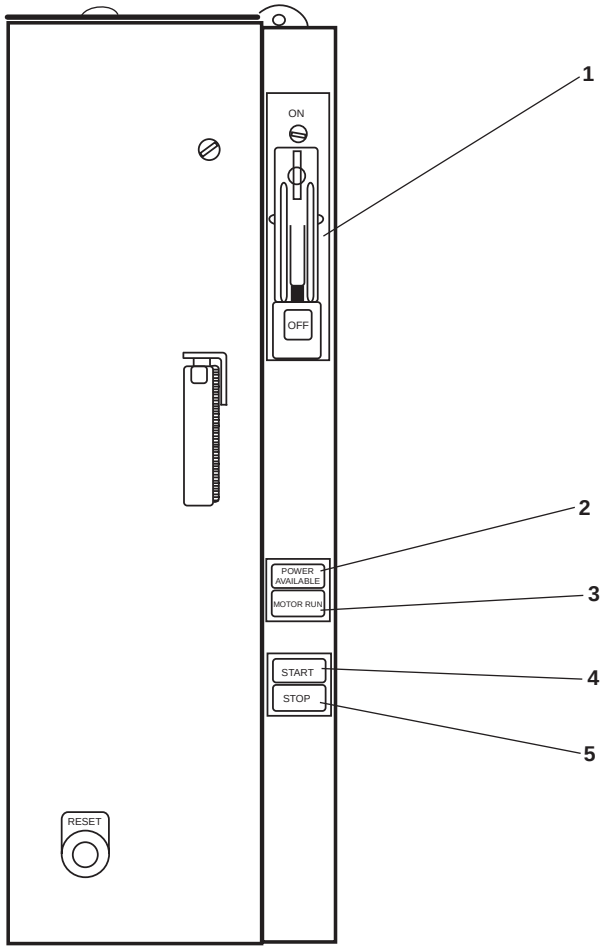


Figure 19. AFFF Pump Motor Controller

FIRE MONITOR SHUTDOWN

1. If AFFF was discharged, keep the fire monitor cutoff valve (figure 16, item 2) OPEN and maintain output flow until clear raw water is discharging from the fire monitor (figure 16, item 1).

2. CLOSE the fire monitor cutoff valve (figure 16, item 2) for the desired monitor.

3. Secure the pump drive engine (TM 55-1925-273-10) if it is not required for other operations.

FIRE ALARM SYSTEM OPERATION

NOTE

During normal operation, all switches should be in the normal position and the POWER lamp should be on. The system alarm and all other indicators should be OFF.

1. Set to ON the FIRE DETECTION SYSTEM. circuit breaker (figure 20, item 1) in 120V emergency distribution panel No. 1.

2. At the fire and smoke detection panel in the EOS, verify that the POWER indicator (figure 21, item 1) is illuminated and that all other illuminated indicators are green.

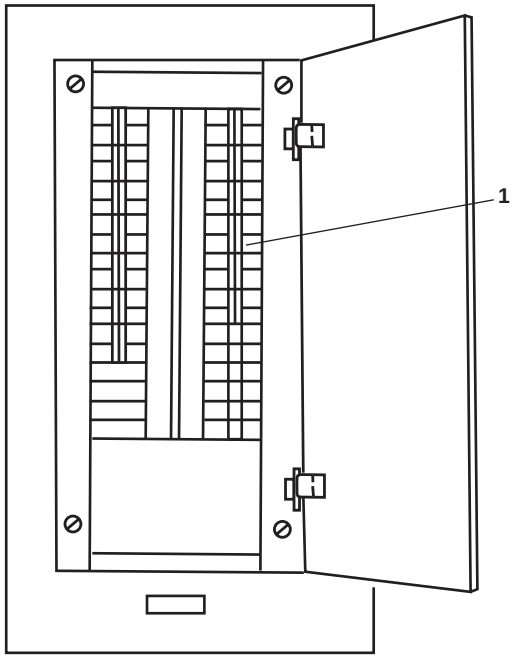


Figure 20. 120V Emergency Distribution Panel No. 1

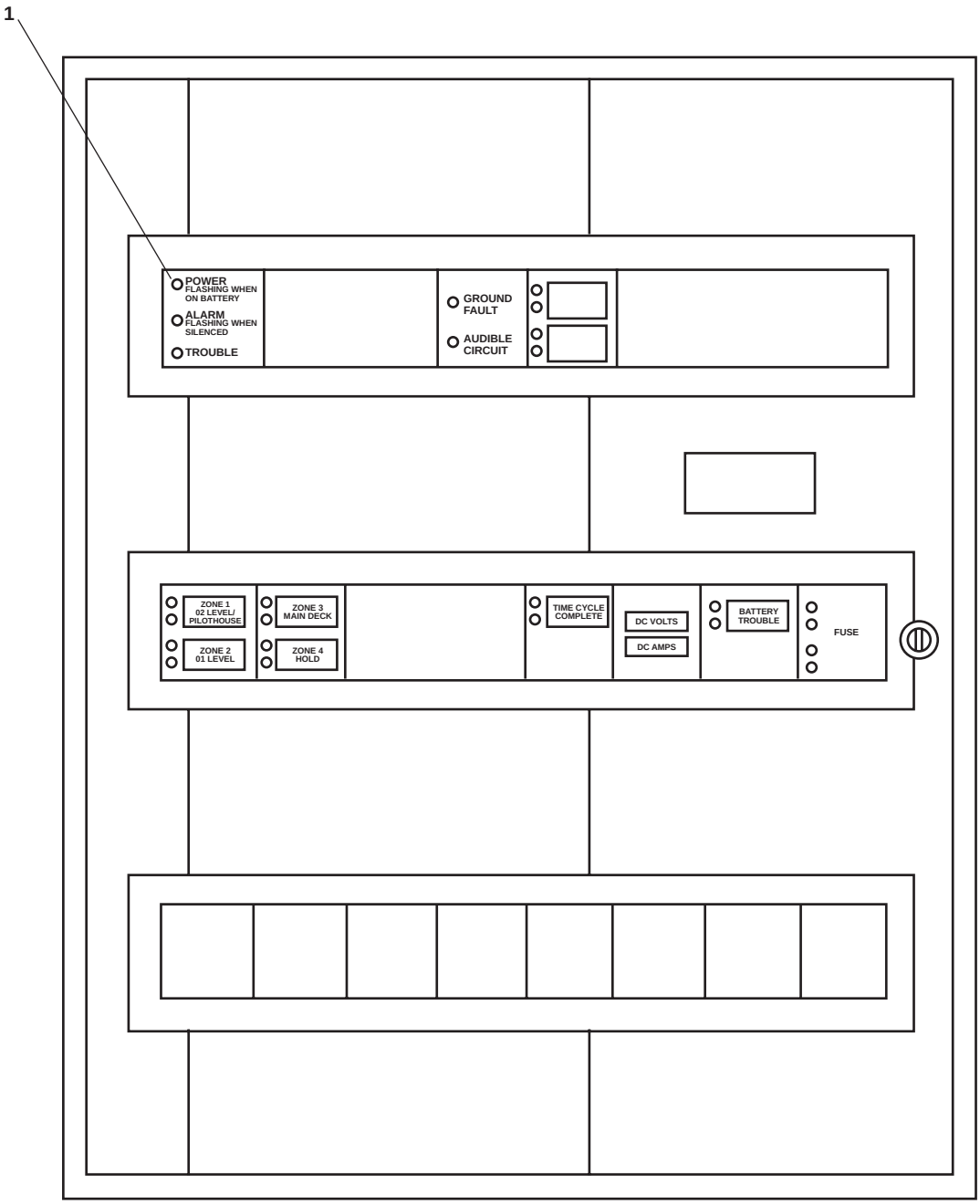


Figure 21. Fire and Smoke Detection Panel

EMERGENCY DIESEL GENERATOR (EDG) ROOM FIRE FLAP OPERATION

DEPLOY THE EDG ROOM FIRE FLAPS

1. Ensure that all personnel are clear of the EDG room.
2. Secure the watertight door to the EDG room (figure 22, item 1).
3. Pull OUT on both T handles (figure 22, item 2) to deploy the EDG room fire flaps (figure 22, items 3 and 4).
4. Notify the pilothouse of the fire condition.

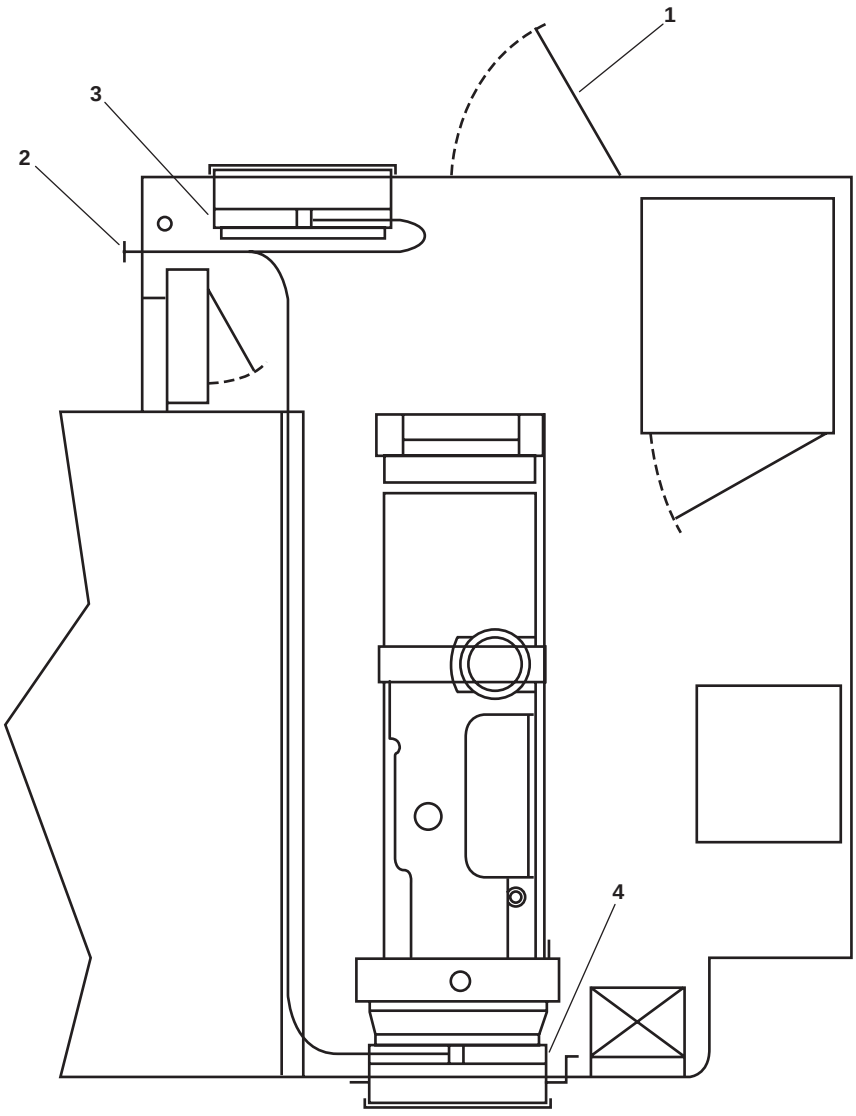


Figure 22. Emergency Diesel Generator (EDG) Room Fire Flap Operation

RESET THE EDG ROOM FIRE FLAPS

1. Ensure that the fire is out and that the proper command authority has authorized entry into the space.

2. After the space has been ventilated, and the appropriate damage control measures have been completed, the EDG room fire flaps (figure 22, items 3 and 4) may be reset.

3. Reset the EDG room fire flaps (figure 22, items 3 and 4) by pulling up from the bottom. The sections for the EDG room fire flap should fold up like a fan (figure 23) as they are raised. Once the EDG room fire flaps are fully raised, they will latch into place.

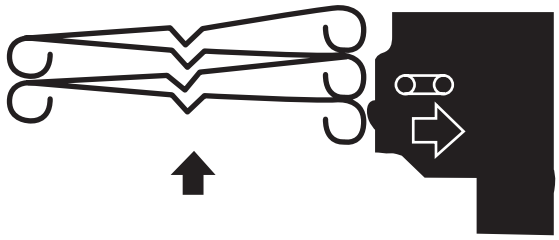


Figure 23. Resetting the EDG Room Fire Flaps

END OF WORK PACKAGE

OPERATOR, UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT) OPERATION UNDER UNUSUAL CONDITIONS

INITIAL SETUP:

Personnel Required:
One Watercraft Engineer, 88L
Two Crewmembers, Any MOS

References:
S6226-NM-MMC-010/15852 REV B
TM 55-1925-273-10
WP 0005 00

SECURITY MEASURES FOR ELECTRONIC DATA

No electronic data is used or stored in the firefighting, fire alarm, and fire suppression systems aboard the LT.

UNUSUAL ENVIRONMENT/WEATHER

There are no environmental or weather conditions that will prevent the firefighting systems from operating.

PRESSURIZE THE FIRE MAIN WITH THE ENGINE-DRIVEN FIREFIGHTING PUMP

NOTE

This procedure is to be accomplished only upon the loss of fire and general service pumps 1 and 2.

1. In AMS 2, at the fire and general service pumps, CLOSE the following valves:
   a. FM-16, FIRE/G.S. NO.1 DISCH TO FM (figure 1, item 1)
   b. FM-14, FIRE/G.S. NO.2 DISCH TO FM (figure 1, item 2)

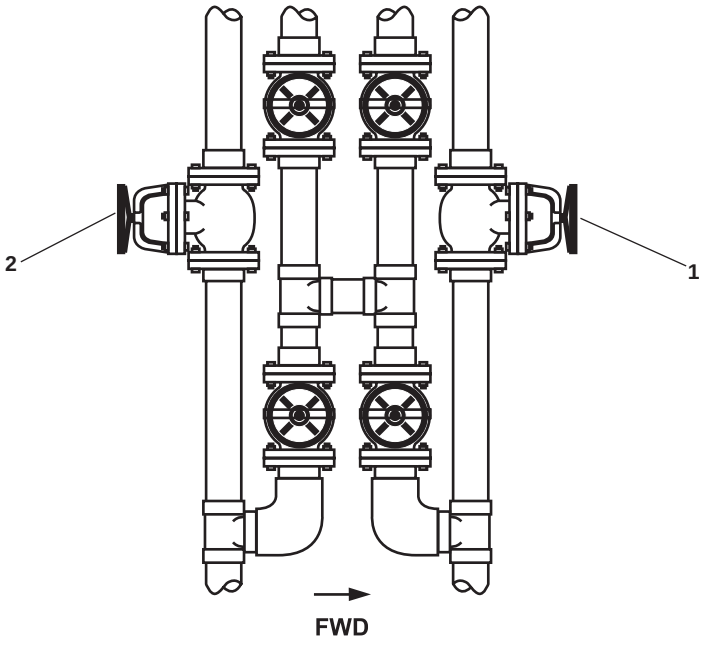


Figure 1. Fire and General Service Pump Valves

2. OPEN valve FM-1, SEA SUCT, F.F. PMP (figure 2, item 1), located beneath the EOS.

3. Start the pump drive engine (TM 55-1925-273-10).

4. Prime the diesel engine-driven firefighting pump by placing the following valves in the OPEN position:

   a. GS-111, FF PMP PRM EDUCTOR DISCH (figure 3, item 1)

   b. CA-73, SVCE AIR TO FF PMP PRM EDUCTOR (figure 3, item 2)

5. When water discharges from the overflow line (figure 3, item 3), CLOSE the following valves:

   a. CA-73, SVCE AIR TO FF PMP PRM EDUCTOR (figure 3, item 2)

   b. GS-111, FF PMP PRM EDUCTOR DISCH (figure 3, item 1)

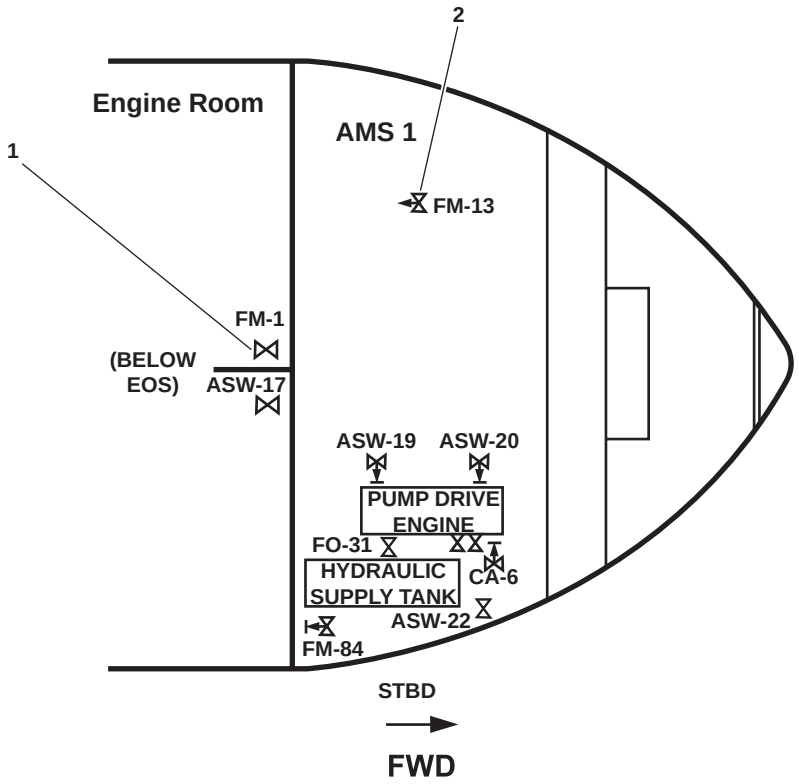


Figure 2. Valve Locations

6. Engage the Power Take-Off (PTO) (TM 55-1925-273-10).

7. OPEN FM-13, F.F. TO F.M. CRSVR (figure 2, item 2), fire pump to fire main cross connect, located in the overhead in AMS 1.

8. To return the fire and general service pump(s) to normal service, perform the following steps:

   a. Secure the pump drive engine (TM 55-1925-273-10).

   b. CLOSE FM-13, F.F. TO F.M. CRSVR (figure 2, item 2).

   c. OPEN FM-14, FIRE/G.S. NO.2 DISCH TO FM (figure 1, item 2) or FM-16, FIRE/G.S. NO.1 DISCH TO FM (figure 1, item 1) as required for the online fire and general service pump.

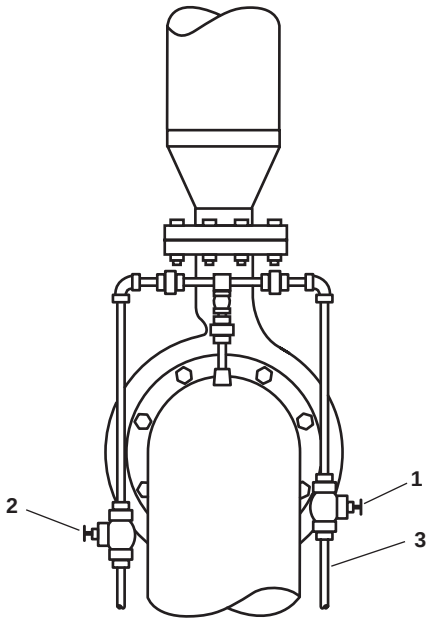


Figure 3. Diesel Engine-Driven Firefighting Pump Priming Valves

FIRE MONITOR OPERATION WITH FIRE AND GENERAL SERVICE PUMPS

NOTE

In order to operate the fire monitors with the fire and general service pumps, both pumps must be operating at full capacity. The operation of one fire monitor equals the full capacity of both fire and general service pumps.

1. In the engine room, below the EOS, CLOSE FM-1, SEA SUCT, F.F. PMP.
2. In AMS 2, at the fire and general service pumps, OPEN the following valves:
   a. FM-16, FIRE/G.S. NO.1 DISCH TO FM (figure 1, item 1)
   b. FM-14, FIRE/G.S. NO.2 DISCH TO FM (figure 1, item 2)
3. START fire and general service pumps 1 and 2 (TM 55-1925-273-10).
4. OPEN FM-13, F.F. TO F.M. CRSVR (figure 2, item 2), fire pump to fire main cross connect.
5. Direct (aim) the fire monitor (figure 4, item 1) to place foam/water at the base of the fire.
6. OPEN the cutoff valve (figure 4, item 2) for the desired monitor.
7. When operation is complete:
   a. CLOSE the cutoff valve (figure 4, item 2) for the monitor.
   b. CLOSE FM-13, F.F. TO F.M. CRSVR (figure 2, item 2), fire pump to fire main cross connect.
   c. Return the fire and general service system to normal operation, and align the fire main to operate with the standby fire and general service pump (TM 55-1925-273-10).

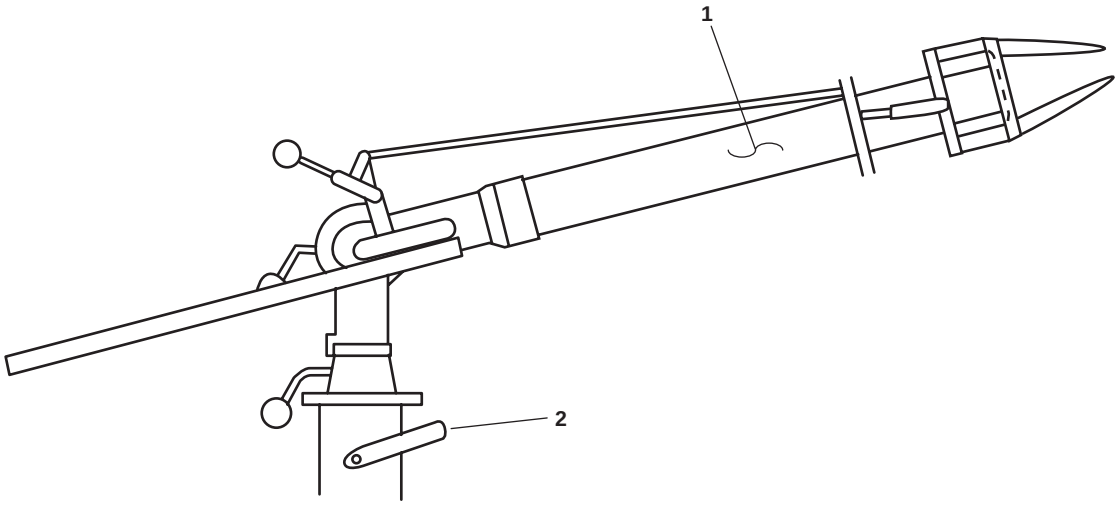


Figure 4. Fire Monitor

PRESSURIZE FIRE HOSES WITH THE P-100 PORTABLE PUMP

NOTE

When used for firefighting, the P-100 pump draws water from the sea. The water is then pumped through individual fire hoses. If no other pumps on the vessel are operational, the P-100 can be rigged to charge the fire main.

1. Attach a 3 inch suction line (figure 5, item 1) to pump suction fitting (figure 5, item 2).
2. Lower the suction hose section into the water making sure that the foot valve/strainer unit (figure 5, item 3) remains submerged at least 1 foot throughout the operating period.
3. Attach a wye-gate (figure 5, item 4) to the pump discharge (figure 5, item 5) fitting by using a short 2½ inch diameter extension hose (figure 5, item 6).
4. Attach one or two 1½ inch fire hoses (figure 5, item 7) with nozzles (figure 5, item 8) to the wye-gate (figure 3, item 4).
5. If in a poorly ventilated area, attach a maximum of 20 feet of exhaust hose to the exhaust fitting.
6. Start the P-100 portable pump (S6226-NM-MMC-010/15852 REV B).
7. Verify that the fire hose(s) pressurize and are ready for use.

PRESSURIZE THE FIRE MAIN WITH THE P-100 PORTABLE PUMP

NOTE

Perform this procedure only if no other pumps on the vessel are operational. It is recommended that the exterior fire stations be used when performing this procedure.

1. Attach a 3 inch suction line (figure 5, item 1) to the pump suction fitting (figure 5, item 2).

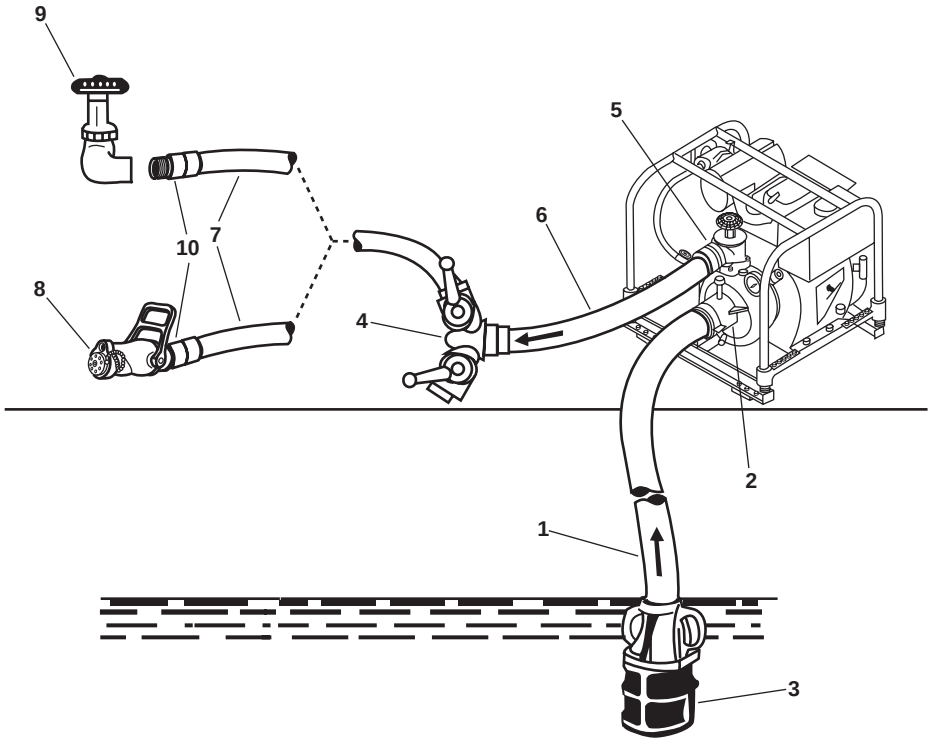


Figure 5. P-100 Portable Pump

2. Lower the suction hose section into the water making sure that the foot valve/strainer unit (figure 5, item 3) remains submerged at least 1 foot throughout operating period.

3. Attach a wye-gate (figure 5, item 4) to the pump discharge (figure 5, item 5) fitting by using a short 2½ inch diameter extension hose (figure 5, item 6).

4. Attach a 1½ inch fire hose (figure 5, item 7) to the wye-gate (figure 5, item 4).

5. Attach the 1½ inch fire hose (figure 5, item 7) to the fire station cutout valve (figure 5, item 9) by using a 1½ inch male to female adapter (figure 5, item 10).

6. If in a poorly ventilated area, attach a maximum of 20 feet of exhaust hose to the exhaust fitting.

7. In AMS 2, at the fire and general service pumps, CLOSE the following valves:

   a. FM-16, FIRE/G.S. NO.1 DISCH TO FM (figure 1, item 1)

   b. FM-14, FIRE/G.S. NO.2 DISCH TO FM (figure 1, item 2)

8. Start the P-100 portable pump (S6226-NM-MMC-010/15852 REV B).

9. Pressurize a maximum of two fire hoses attached to the fire main.

FM-200 LOCAL ACTUATION

NOTE

Perform this procedure only in extreme emergency. If the situation is not extreme, actuate the FM-200 fire suppression system from the main deck.

1. Perform all steps necessary for normal FM-200 fire suppression system actuation (WP 0005 00).

2. Remove the locking pin (figure 6, item 1) and OPEN the CO_2 discharge valve (figure 6, item 2) by pulling the handle (figure 6, item 3) and rotating it clockwise 180°.

3. Wait 15 minutes and then begin reentry procedures (WP 0005 00).

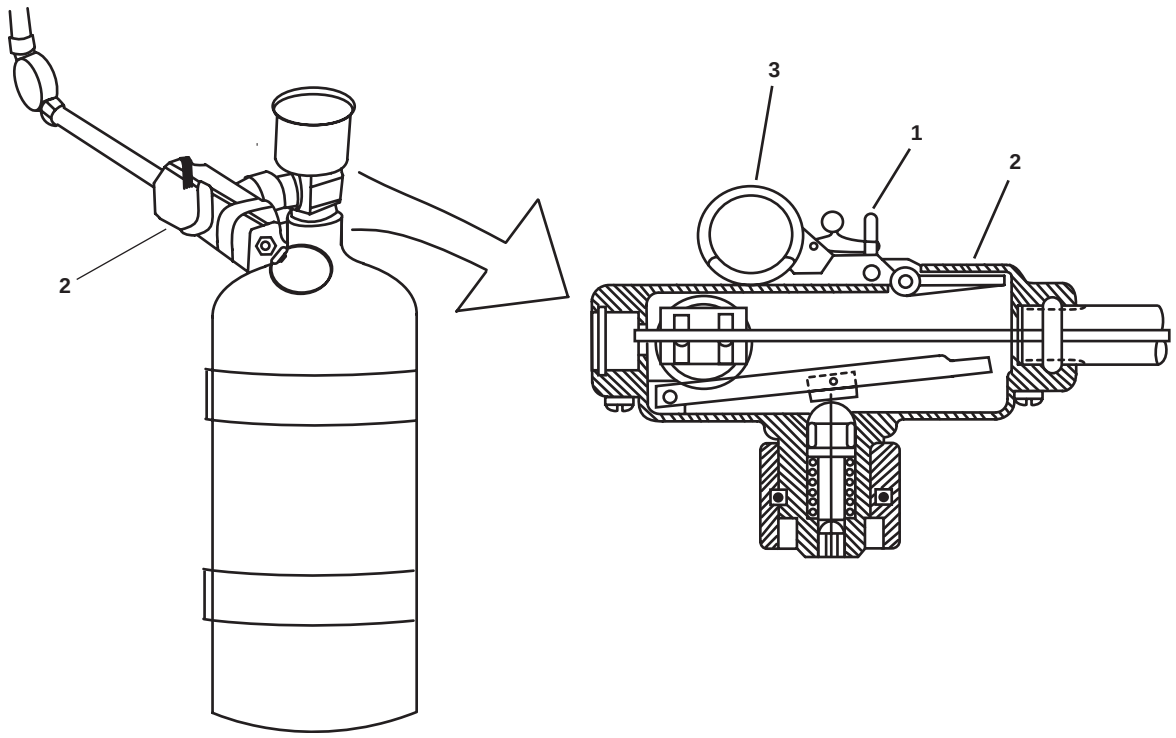


Figure 6. CO_2 Discharge Valve

BYPASS FM-200 DISCHARGE DELAY

1. Remove the locking pin (figure 7, item 1) on the discharge delay valve (figure 7, item 2).

2. OPEN the discharge delay valve (figure 7, item 2) by rotating the handle (figure 7, item 3) to the OPEN position.

3. The FM-200 system will now discharge without the 60-second delay.

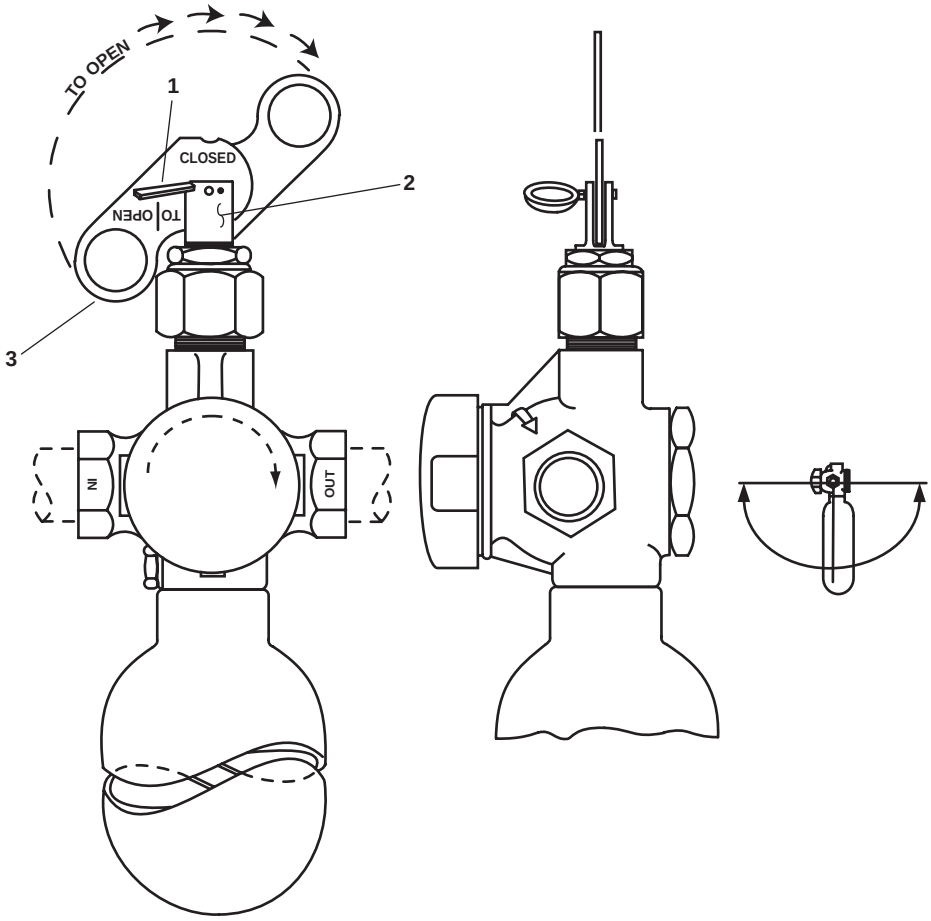


Figure 7. FM-200 Discharge Valve

END OF WORK PACKAGE

Chapter 3

Troubleshooting Procedures for Firefighting, Fire Alarm, and Fire Suppression Systems

Inland and Coastal Large Tug (LT)

OPERATOR AND UNIT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
TROUBLESHOOTING INDEX

USE OF THE INDEX

Troubleshooting begins by identifying the equipment and the malfunction. Table 1 contains the operator troubleshooting procedures, and table 2 contains the unit troubleshooting procedures. The equipment list is contained in the left column of the tables, and the malfunctions are listed in the center column of the tables. Once the correct equipment and malfunction are located, look immediately to the right for the work package and procedure that correspond to the malfunction. After locating the appropriate work package and procedure, turn to that procedure, and follow the instructions in the paragraph that follows.

USE OF TROUBLESHOOTING PROCEDURES

Functional flow logic tree troubleshooting procedures are used for all troubleshooting procedures in this manual. In this troubleshooting style, a pill shaped symbol (figure 1) is used to depict the beginning or end point of a procedure. Decision points are depicted by diamond shaped symbols (figure 2). Action points, as well as warnings, cautions, and notes are contained in rectangular symbols (figure 3). Procedures that are too large for one page are joined together by the circular shaped connector symbols (figure 4). The connector symbol will denote which page and step to go to (or come from) on another page. Finally, when flowchart lines cross, the technician must ensure that the correct path is followed. Crossing lines (figure 5) indicate that the points connect. Lines that cross with a jump symbol in the center (figure 6) indicate that the points do not connect. The technician must correctly follow the arrows to complete the troubleshooting procedure.

Look for the pill shaped beginning symbol in the upper left corner of the procedure. This symbol should contain the identified malfunction or symptom. Starting from this point, follow the arrowed lines through the procedure. Remember that the diamond shaped symbols denote a decision step. At each of these points you will be required to make a decision and to follow the appropriate line for that decision. Continue to follow the arrowed lines through the procedure until the malfunction or symptom is corrected.

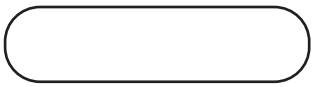


Figure 1. Pill Shaped Symbol

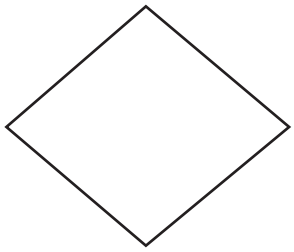


Figure 2. Diamond Shaped Symbol

Figure 3. Rectangle Shaped Symbol

Figure 4. Circular Shaped Symbol

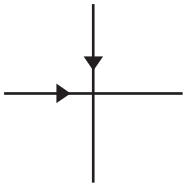


Figure 5. Crossed Lines Are Connected

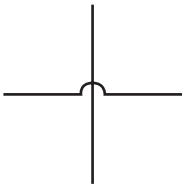


Figure 6. Crossed Lines Are Not Connected

Table 1. Operator Troubleshooting Procedures

Equipment	Symptom	Work Package, Procedure
Firefighting Systems	AFFF pump will not deliver liquid	WP 0008 00, Procedure 3
	Diesel engine-driven firefighting pump does not supply water	WP 0008 00, Procedure 8
	Fire monitor does not spray firefighting water	WP 0008 00, Procedure 2
	Fire monitor will not swivel and/or rotate	WP 0008 00, Procedure 1
FM-200 System	FM-200 system discharges with no 60-second delay	WP 0008 00, Procedure 6
	FM-200 system does not discharge when actuated locally	WP 0008 00, Procedure 5
	FM-200 system does not discharge when actuated remotely	WP 0008 00, Procedure 4
Sprinkler System	Engine room water washdown system does not supply water to the sprinkler heads	WP 0008 00, Procedure 7

Table 2. Unit Troubleshooting Procedures

Equipment	Symptom	Work Package, Procedure
AFFF Pump	AFFF pump leaks	WP 0009 00, Procedure 2
	AFFF pump does not run	WP 0009 00, Procedure 3
Fire Alarm System	Fire detection system activates with no alarm condition present	WP 0009 00, Procedure 8
	Fire detection system does not alarm when activated manually	WP 0009 00, Procedure 9
	Fire detection system fails to activate when an alarm condition is present	WP 0009 00, Procedure 10
Firefighting Systems	Diesel engine-driven firefighting pump leaks	WP 0009 00, Procedure 11
	Diesel engine-driven firefighting pump will not turn	WP 0009 00, Procedure 12
	Fire monitor leaks	WP 0009 00, Procedure 1

Table 2. Unit Troubleshooting Procedures (continued)

Equipment	Symptom	Work Package, Procedure
FM-200 Fire Suppression System	Amber strobe light does not flash when the FM-200 system is actuated	WP 0009 00, Procedure 4
	Auxiliary diesel engines, ventilation fans and/or fuel oil transfer pumps do not shut down when the FM-200 system is actuated	WP 0009 00, Procedure 5
	Electric horn does not sound when the FM-200 system is actuated	WP 0009 00, Procedure 7
	Engine room FM-200 alarm bell does not sound when the FM-200 system is actuated	WP 0009 00, Procedure 6

END OF WORK PACKAGE

OPERATOR MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
OPERATOR TROUBLESHOOTING PROCEDURES

INITIAL SETUP:

Tools and Special Tools:
Tool Kit, General Mechanic's (Item 1, Table 2, WP 0046 00)

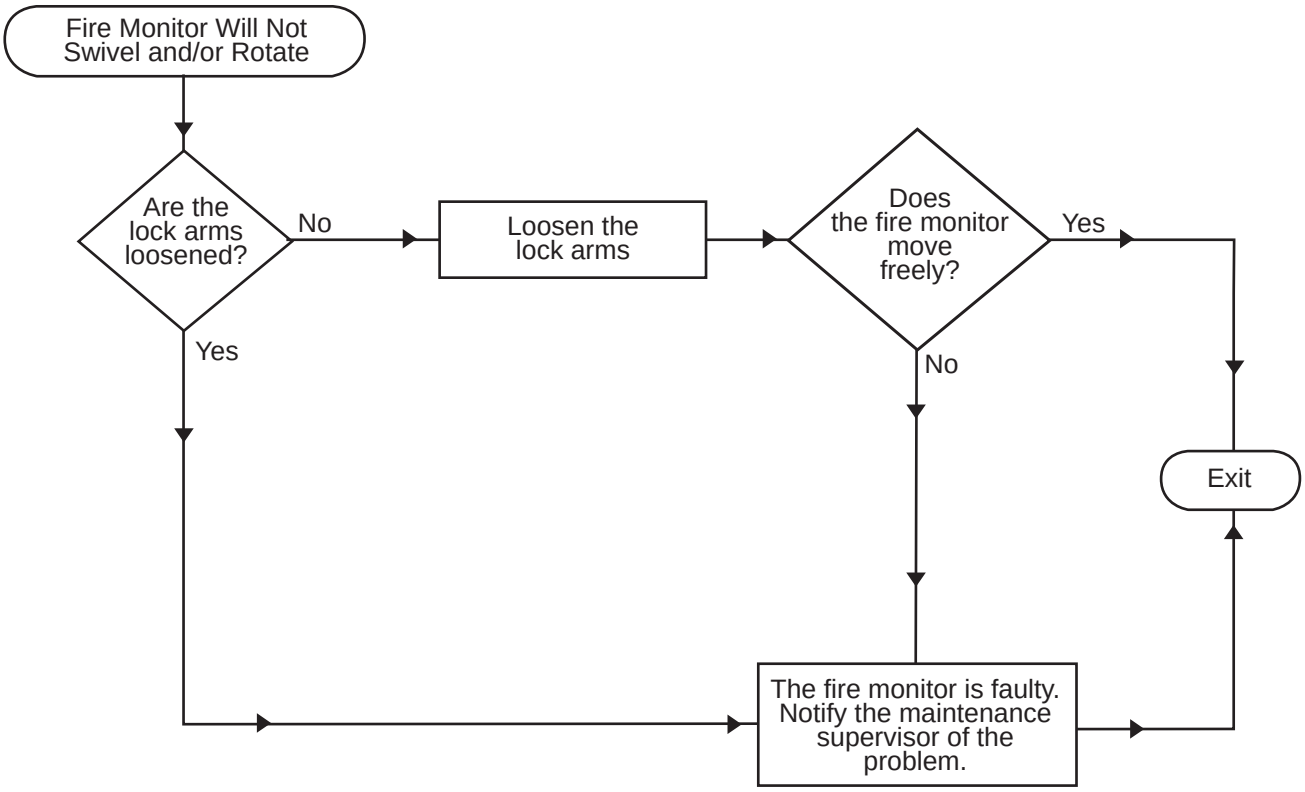
Personnel Required:
Two Watercraft Engineers, 88L

References:
WP 0005 00
WP 0006 00
WP 0015 00
WP 0046 00

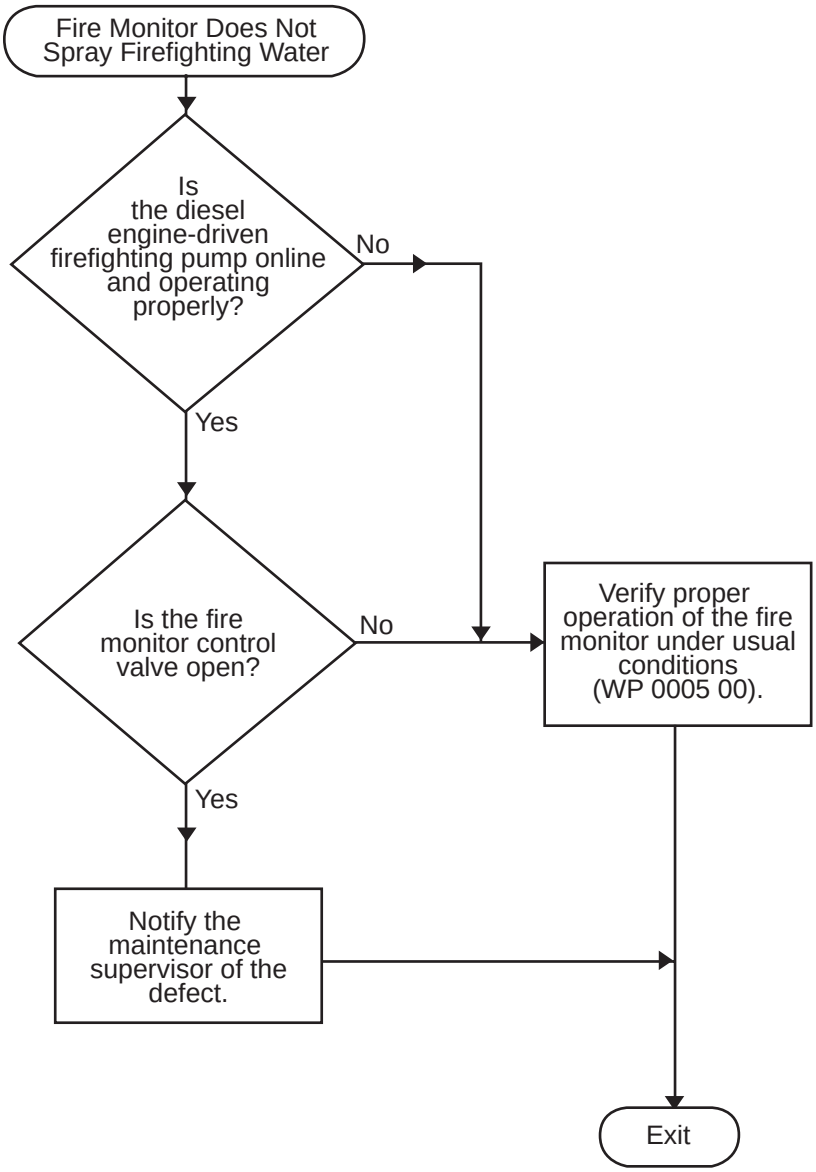
INTRODUCTION

The following operator troubleshooting procedures are included in this work package:

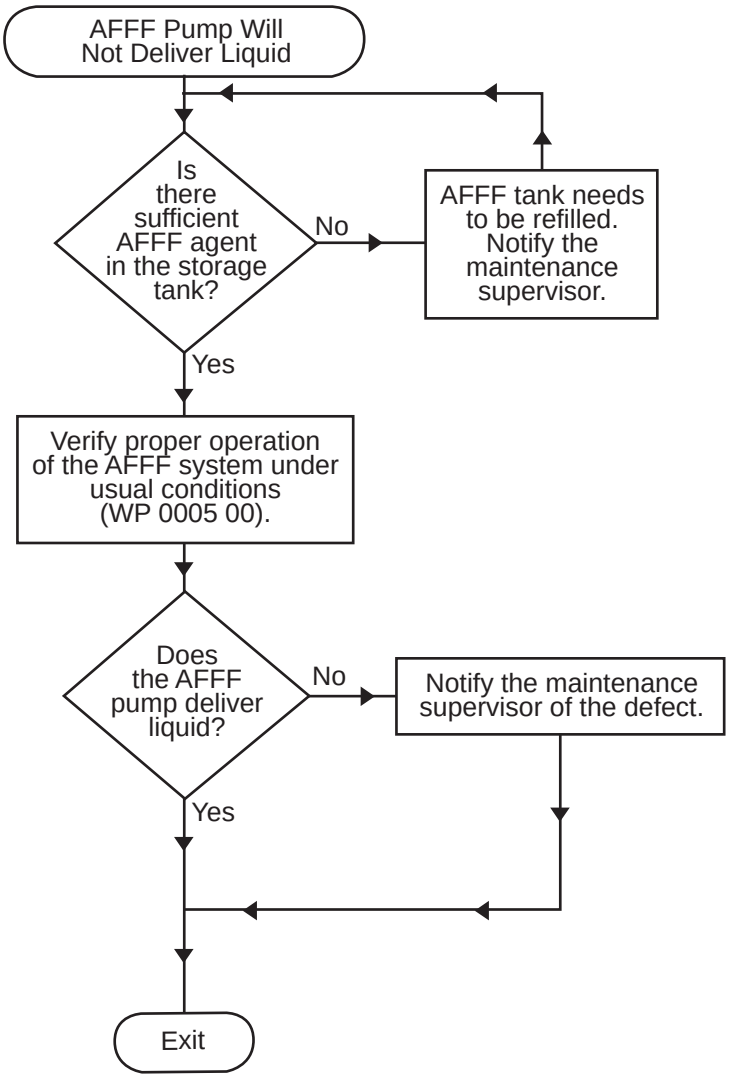
TROUBLESHOOTING PROCEDURES



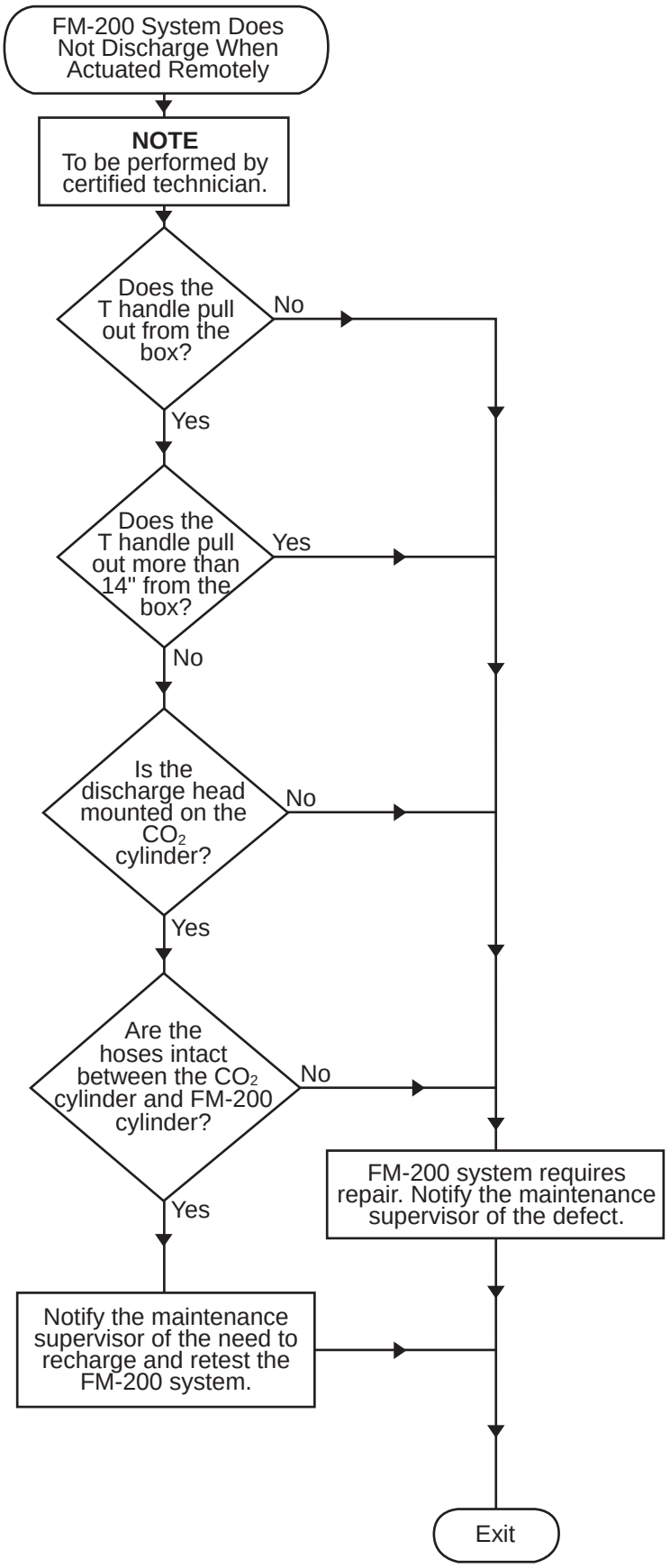
Procedure 1. Fire Monitor Will Not Swivel and/or Rotate



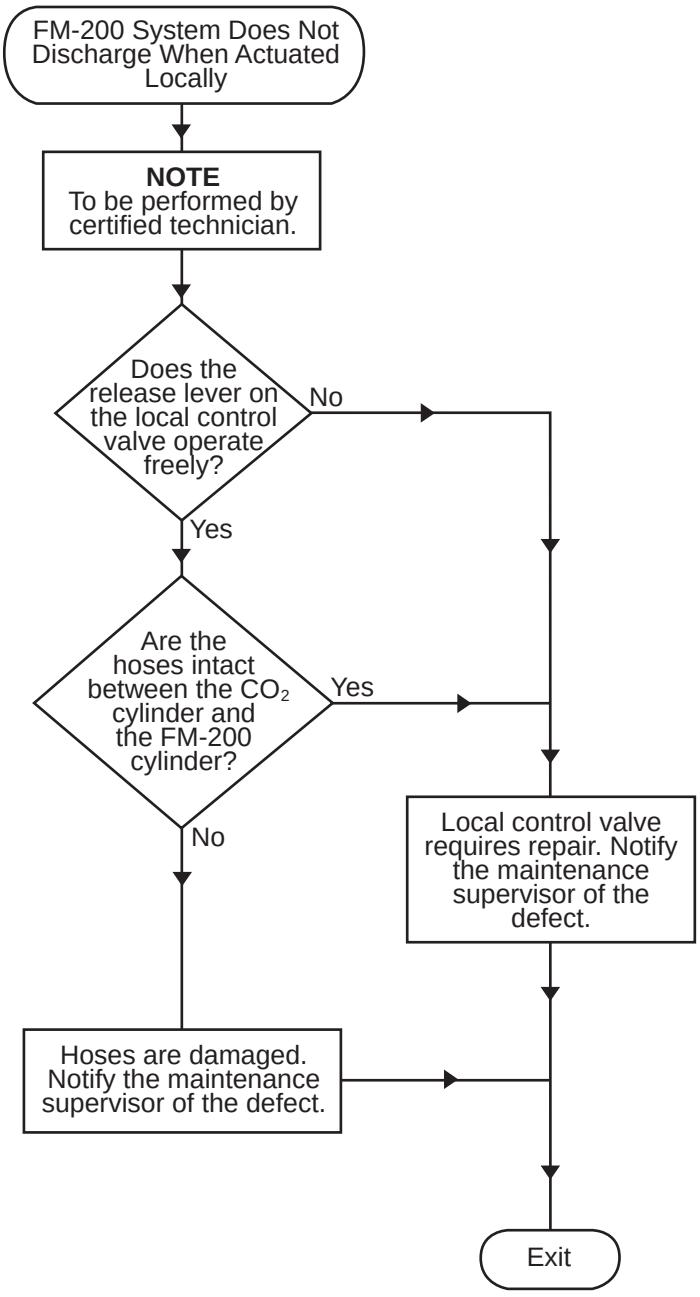
Procedure 2. Fire Monitor Does Not Spray Firefighting Water



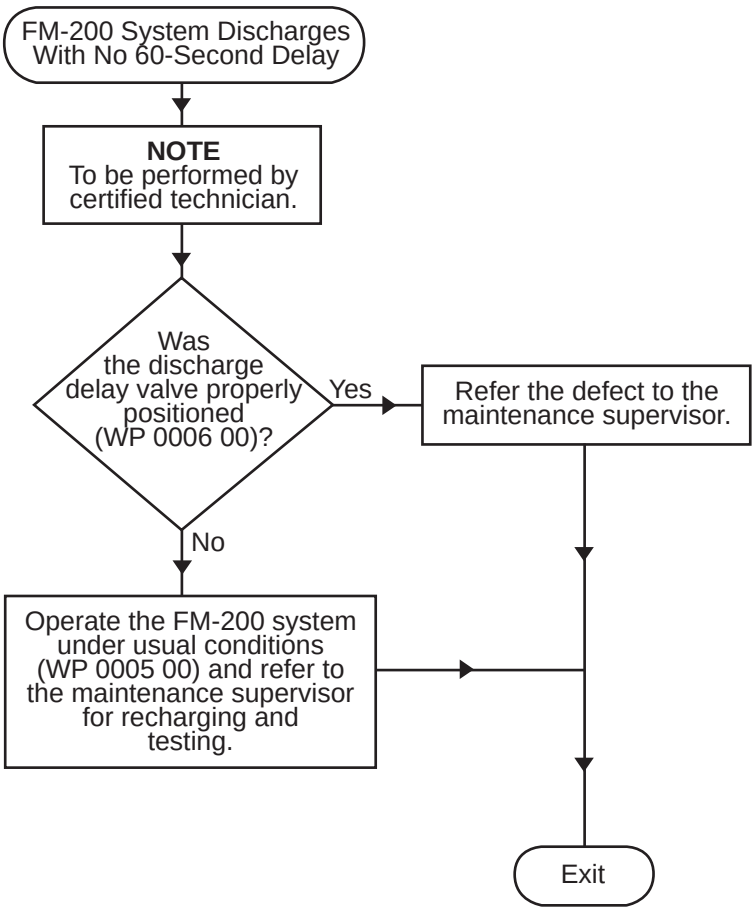
Procedure 3. AFFF Pump Will Not Deliver Liquid



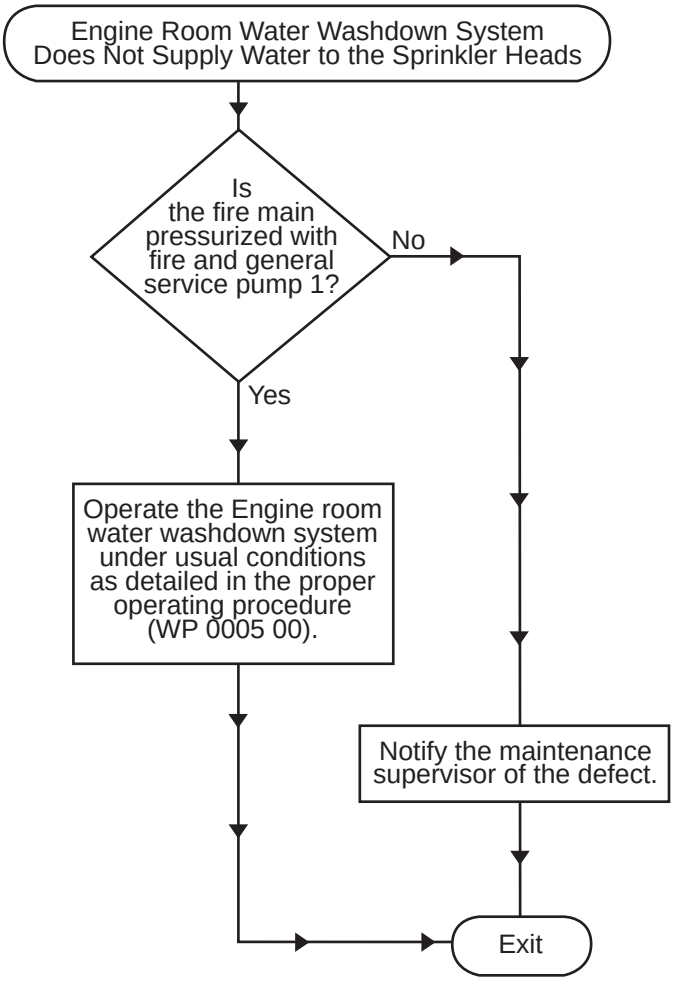
Procedure 4. FM-200 System Does Not Discharge When Actuated Remotely



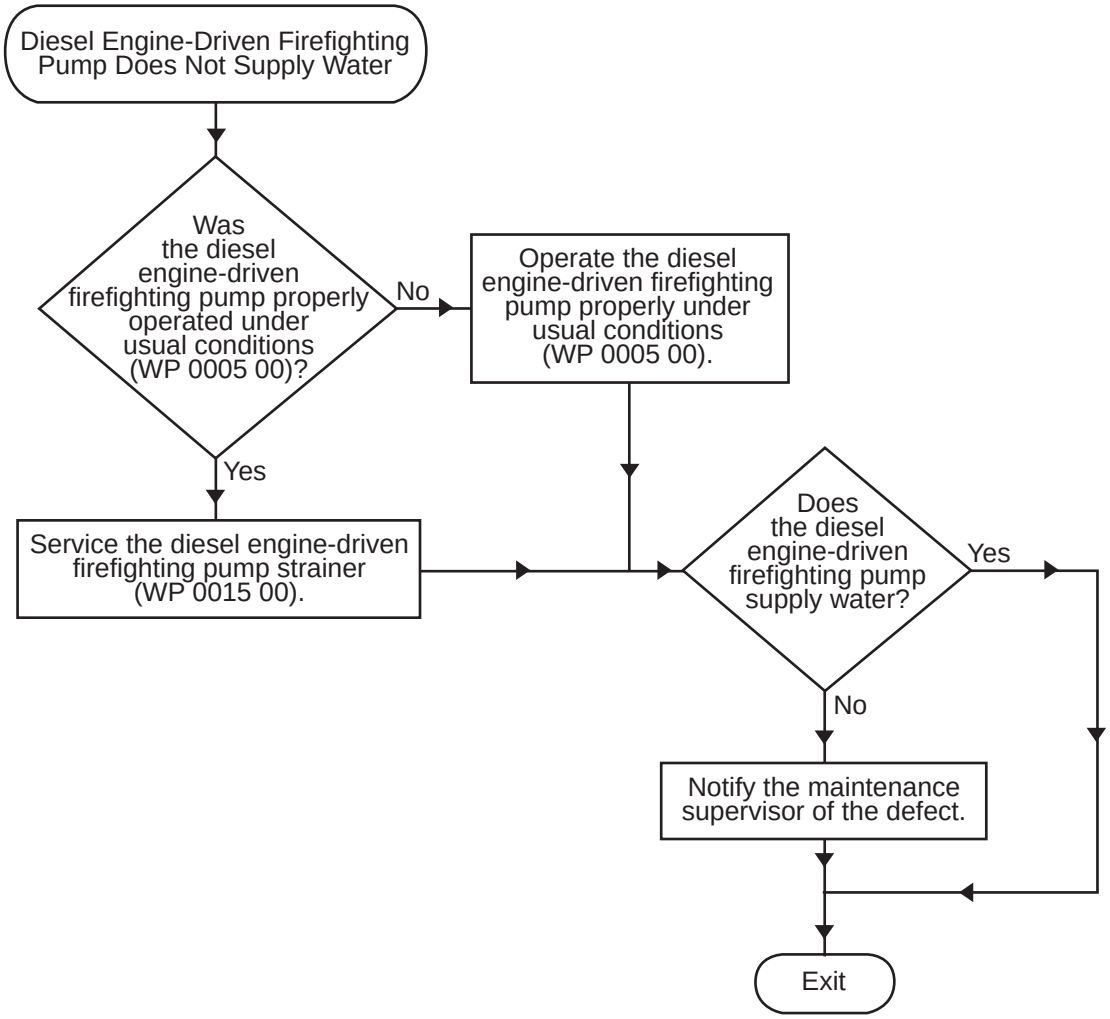
Procedure 5. FM-200 System Does Not Discharge When Actuated Locally



Procedure 6. FM-200 System Discharges With No 60-Second Delay



Procedure 7. Engine Room Water Washdown System Does Not Supply Water to the Sprinkler Heads



Procedure 8. Diesel Engine-Driven Firefighting Pump Does Not Supply Water

END OF WORK PACKAGE

UNIT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
UNIT TROUBLESHOOTING PROCEDURES

INITIAL SETUP:

Tools and Special Tools:
Tool Kit, General Mechanic's (Item 1, Table 2, WP 0046 00)
Multimeter (Item 3, Table 2, WP 0046 00)

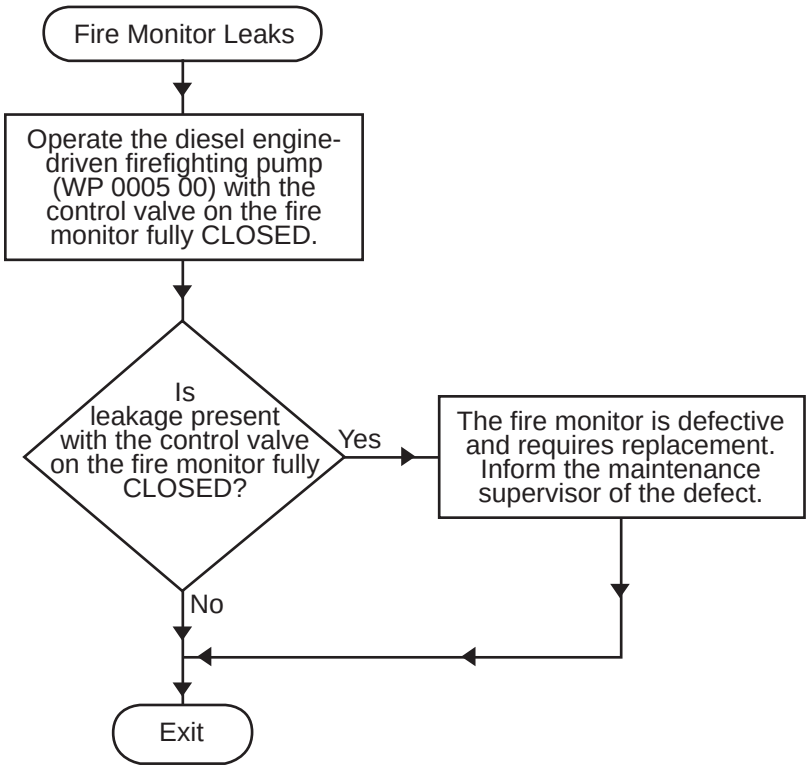
Personnel Required:
Two Watercraft Engineers, 88L

References:
TM 55-1925-273-24&P
TM 55-1925-277-14
WP 0005 00
WP 0018 00
WP 0020 00
WP 0046 00

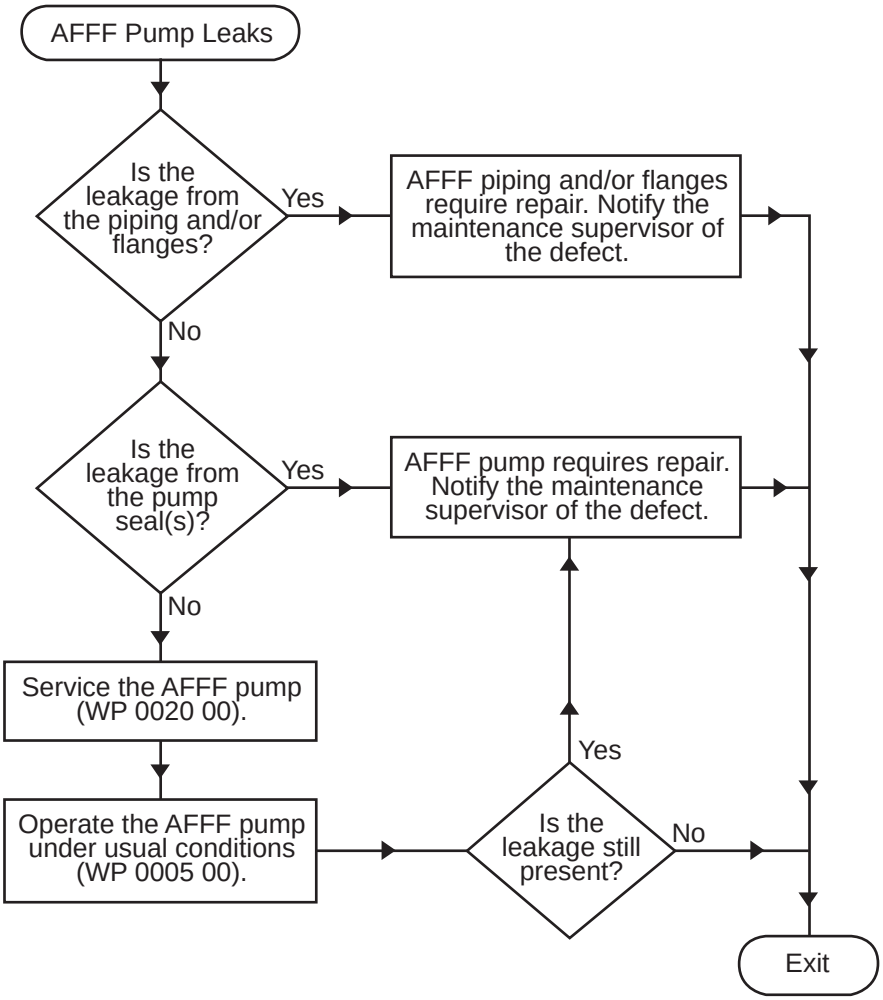
INTRODUCTION

The following unit troubleshooting procedures are included in this work package:

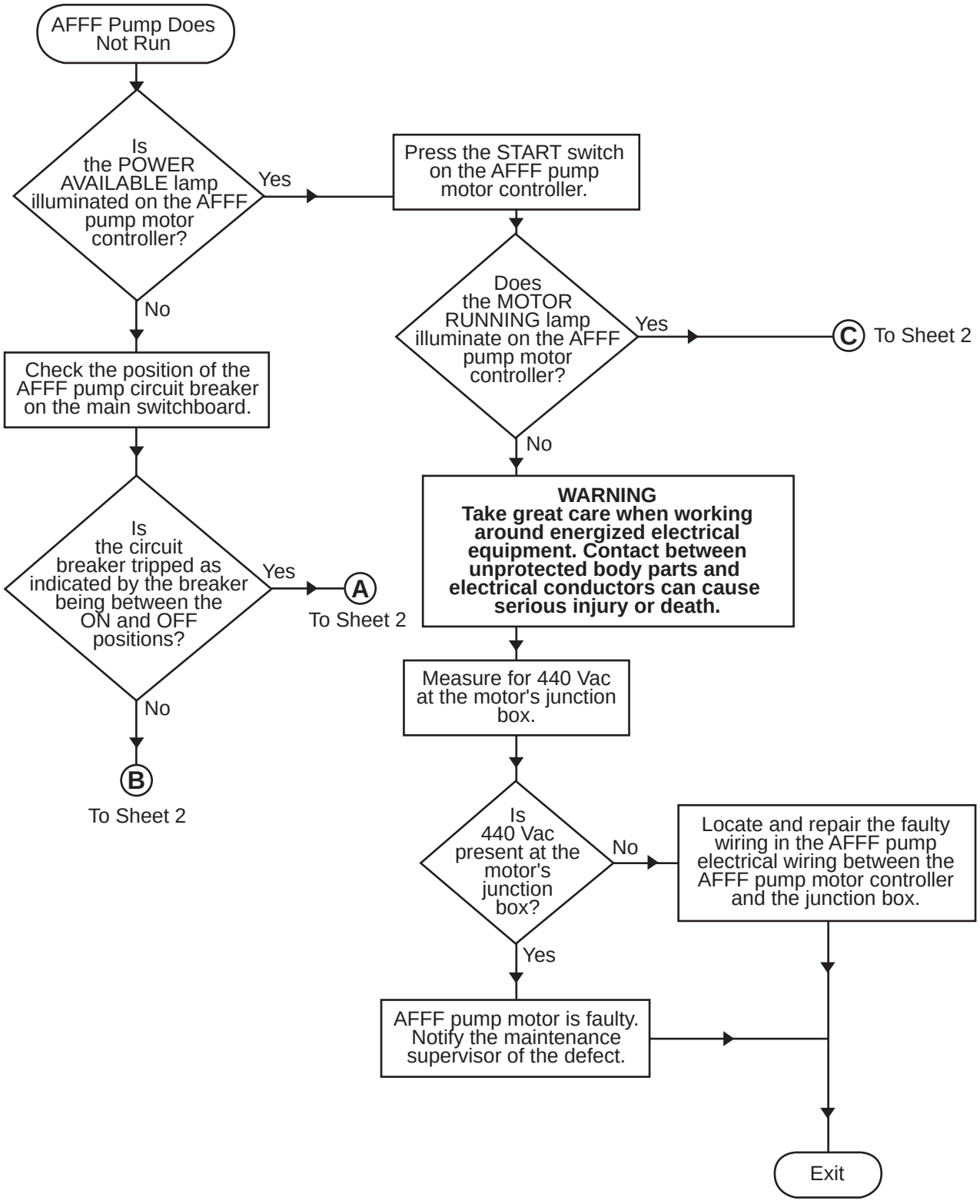
TROUBLESHOOTING PROCEDURES



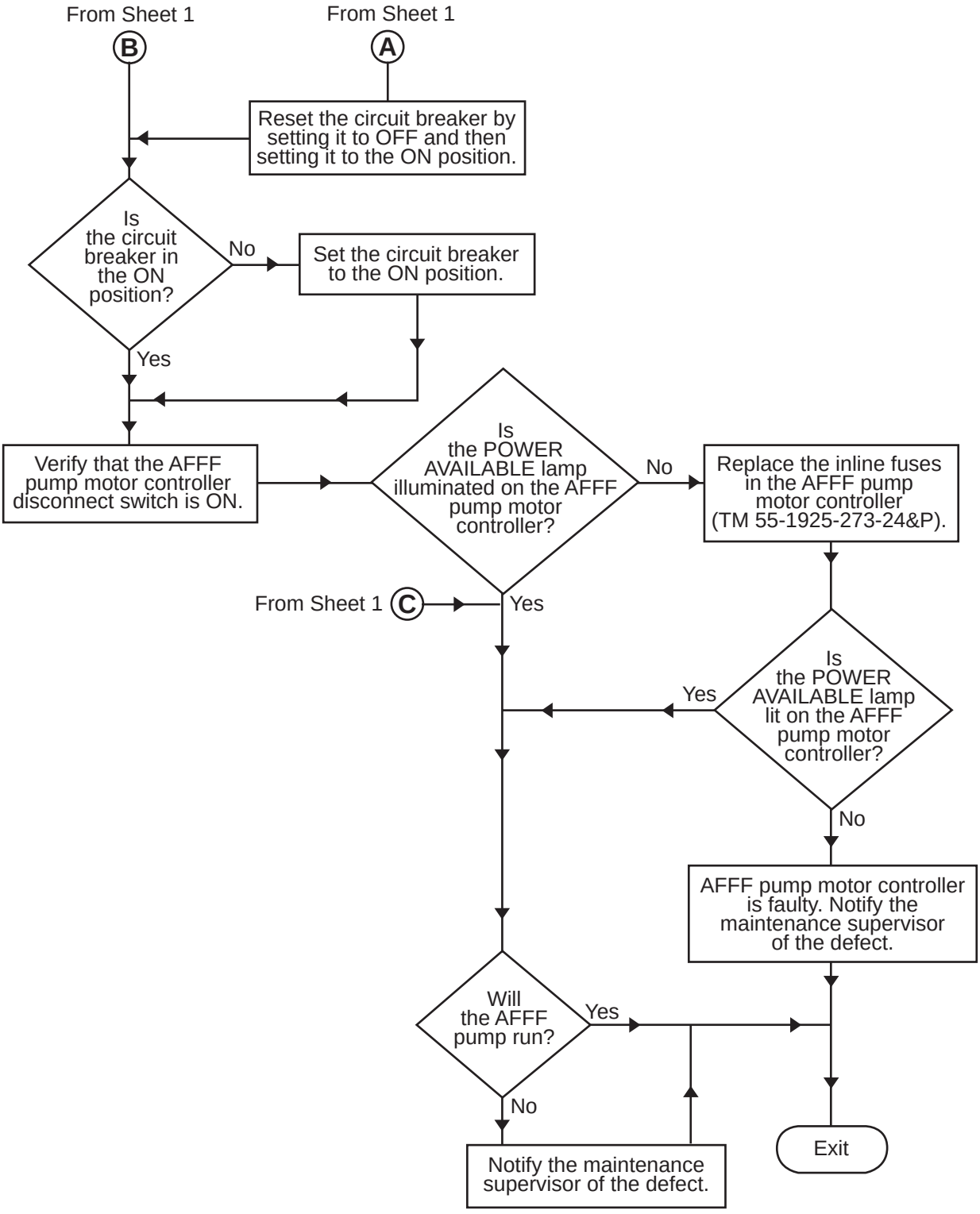
Procedure 1. Fire Monitor Leaks



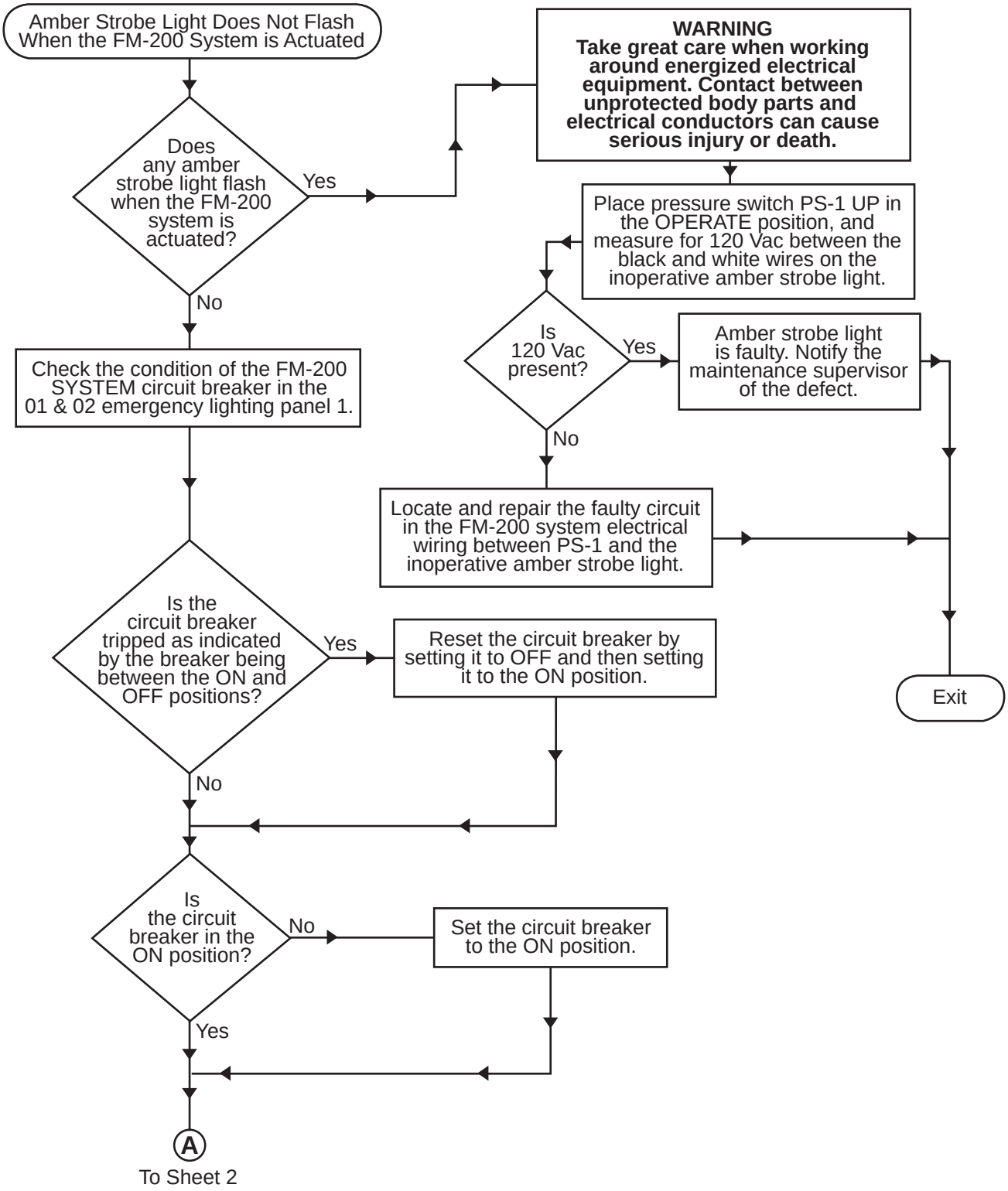
Procedure 2. AFFF Pump Leaks



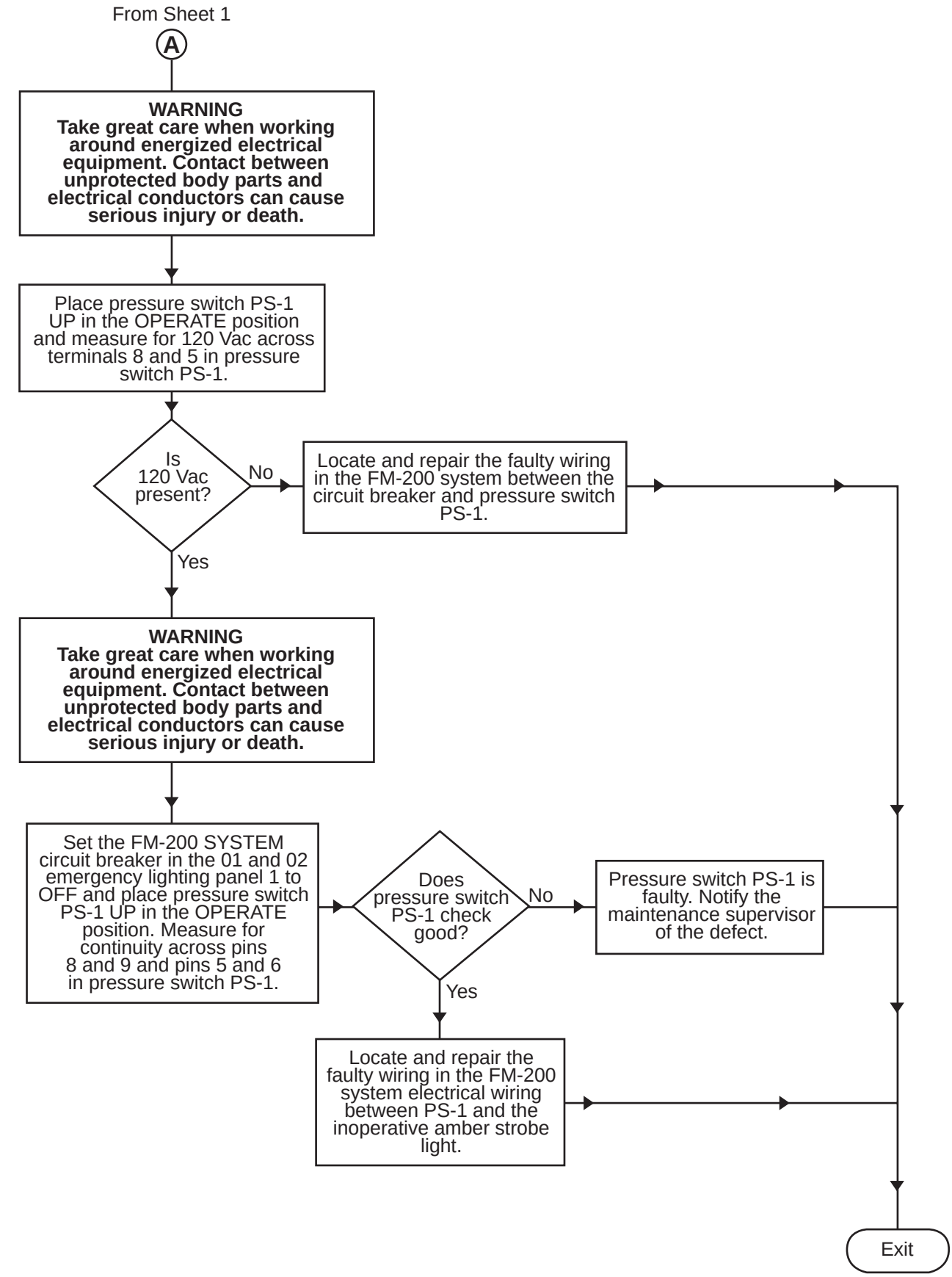
Procedure 3. AFFF Pump Does Not Run (Sheet 1 of 2)



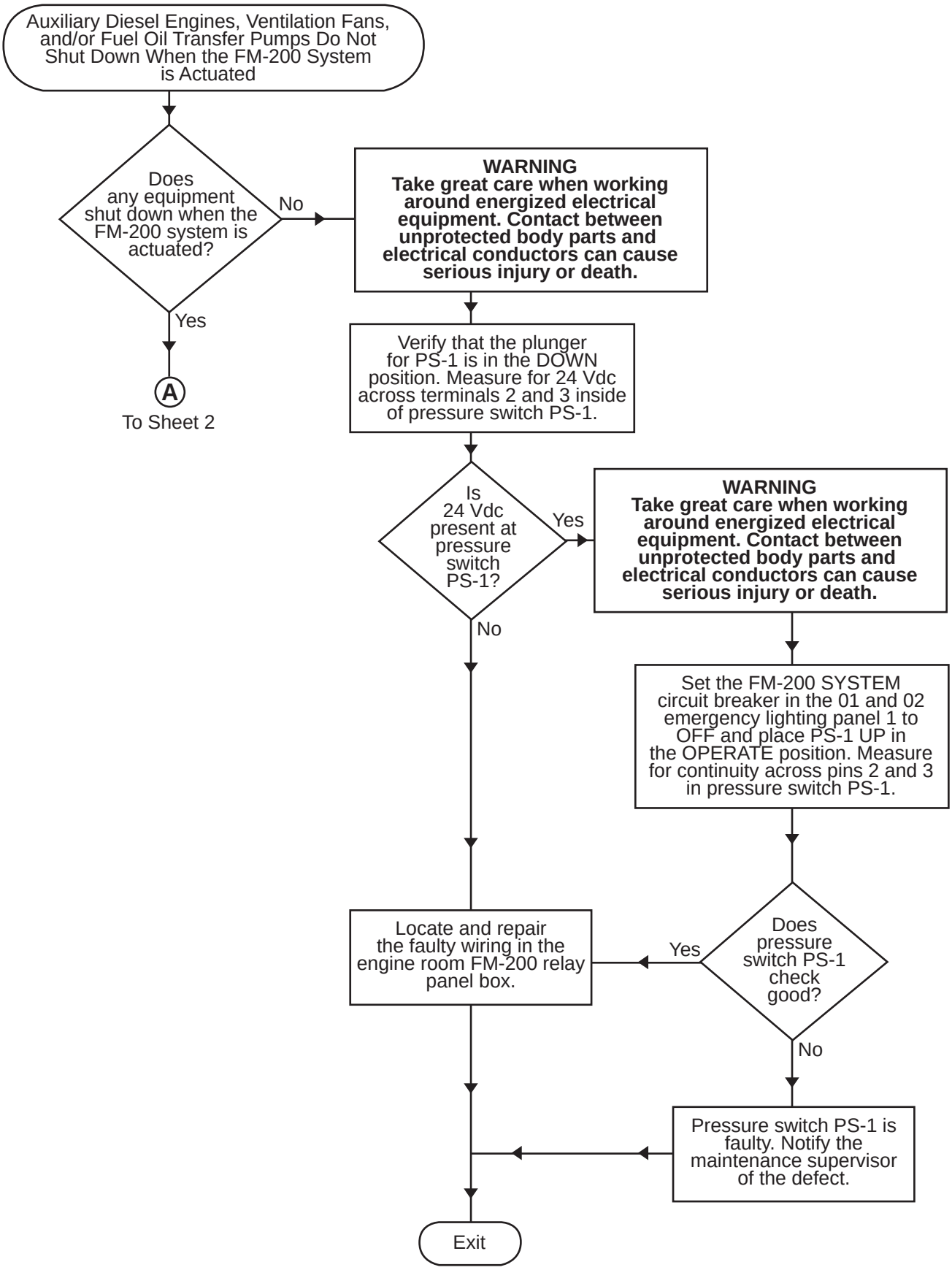
Procedure 3. AFFF Pump Does Not Run (Sheet 2 of 2)



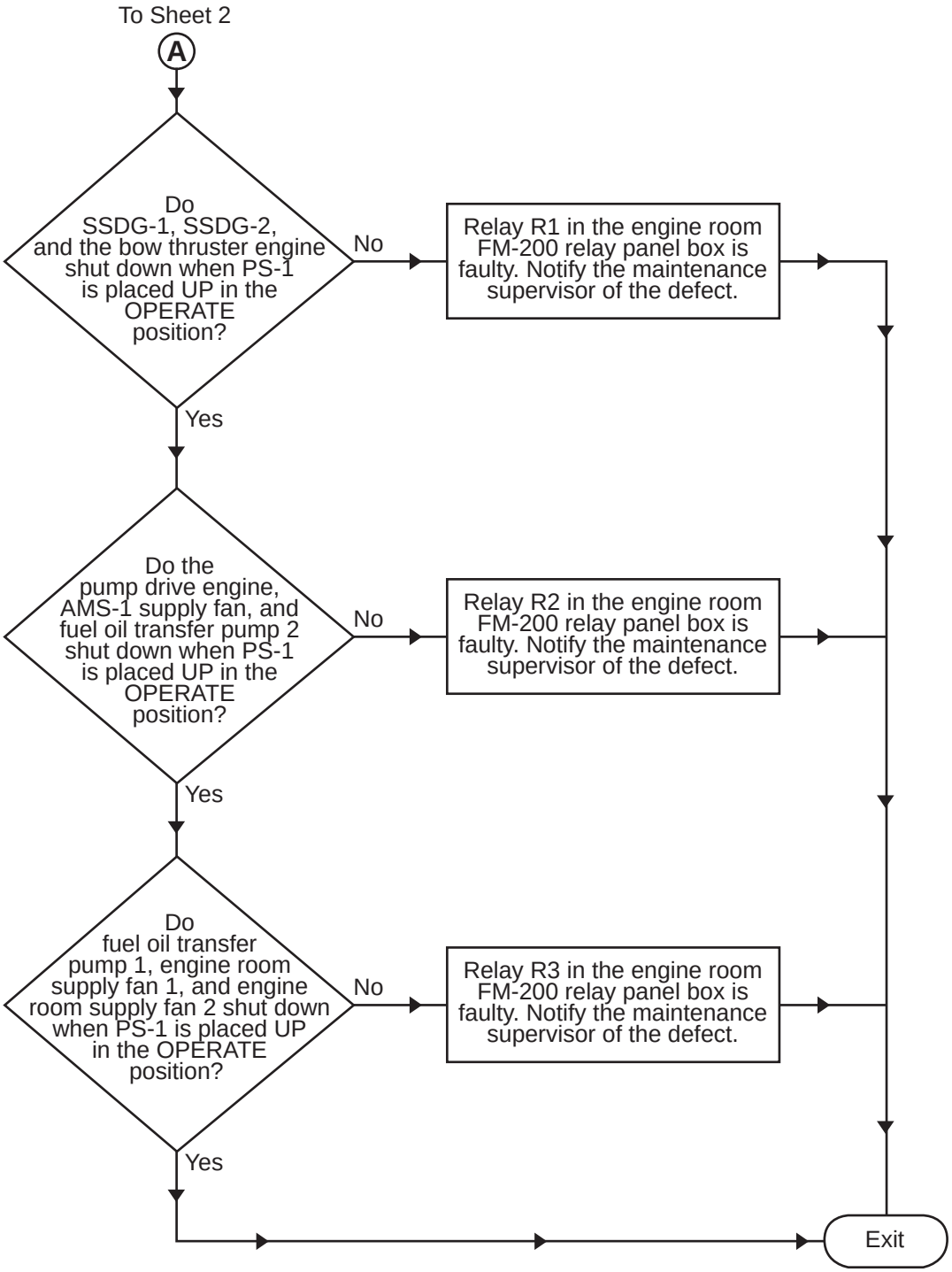
Procedure 4. Amber Strobe Light Does Not Flash When The FM-200 System Is Actuated (Sheet 1 of 2)



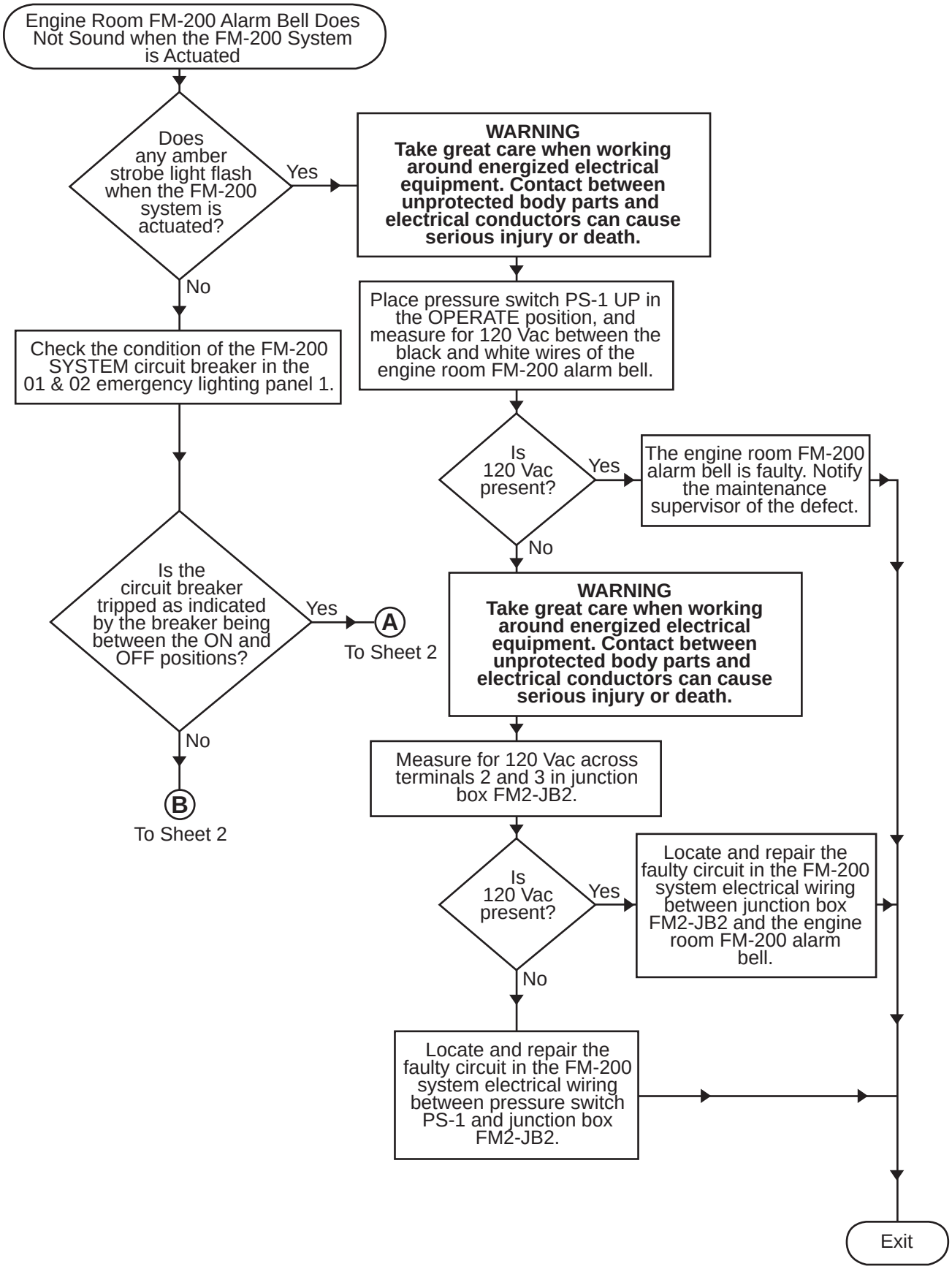
Procedure 4. Amber Strobe Light Does Not Flash When The FM-200 System Is Actuated (Sheet 2 of 2)



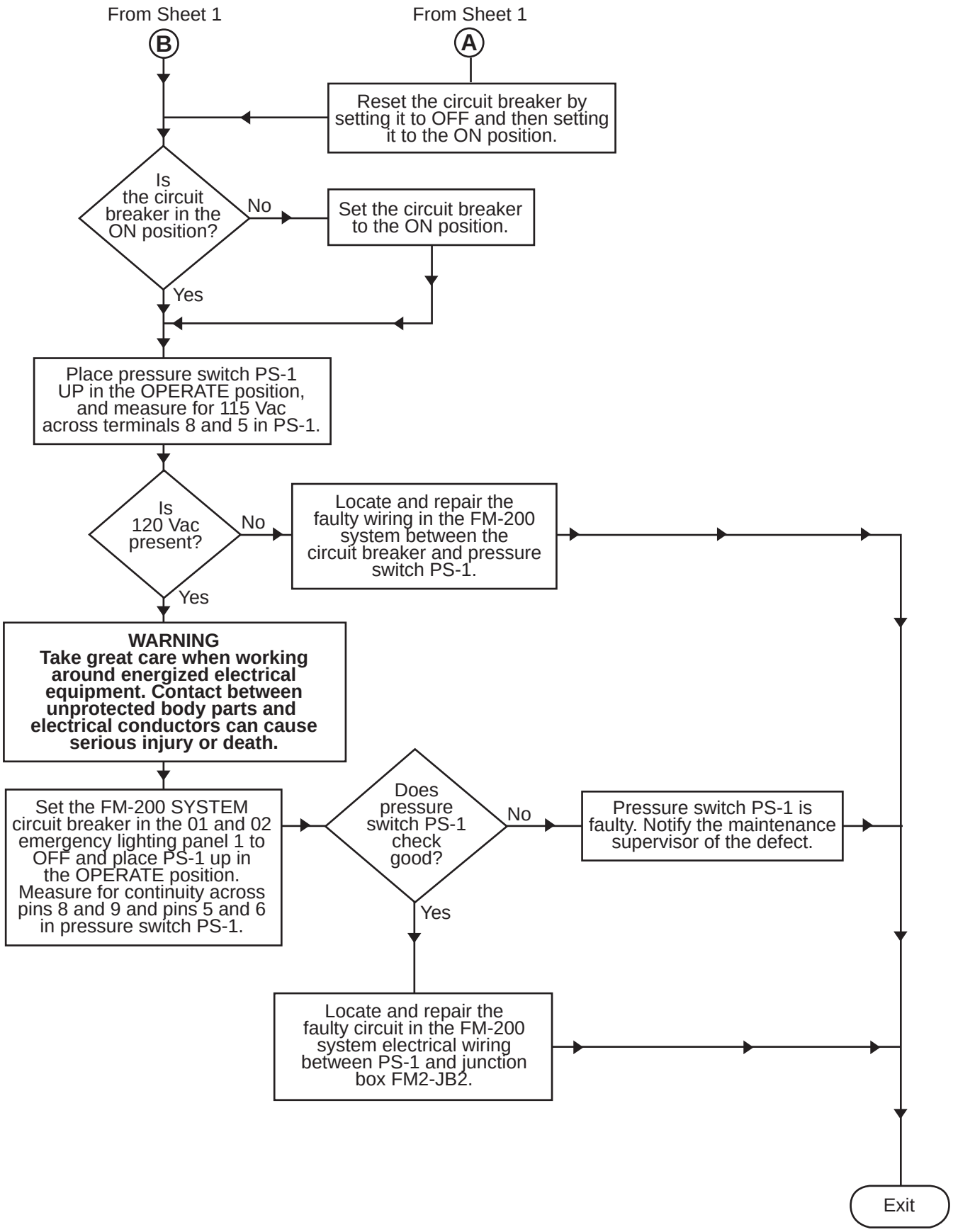
Procedure 5. Auxiliary Diesel Engines, Ventilation Fans, And/Or Fuel Oil Transfer Pumps Do Not Shut Down When The FM-200 System Is Actuated (Sheet 1 of 2)



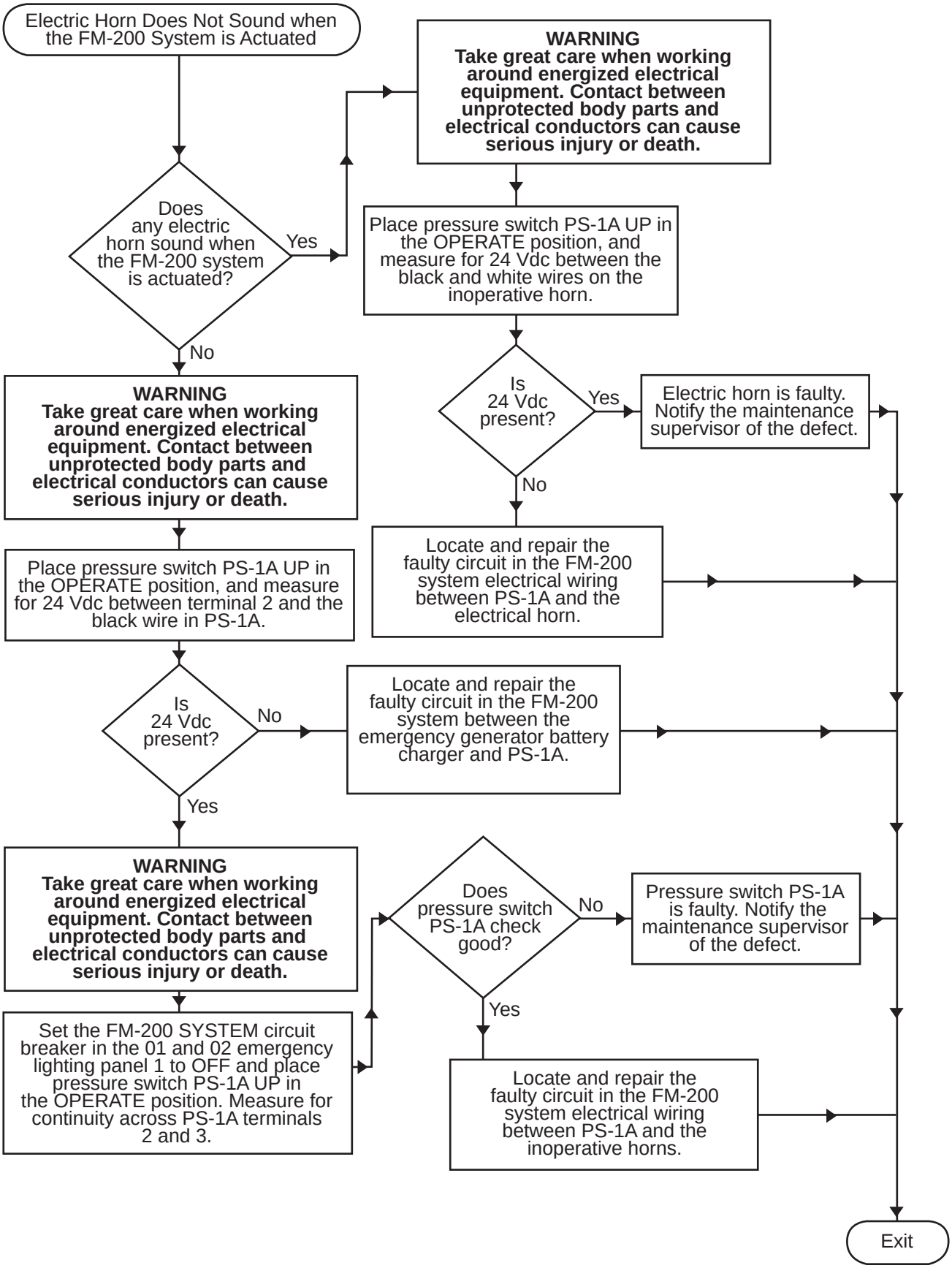
Procedure 5. Auxiliary Diesel Engines, Ventilation Fans, And/Or Fuel Oil Transfer Pumps Do Not Shut Down When The FM-200 System Is Actuated (Sheet 2 of 2)



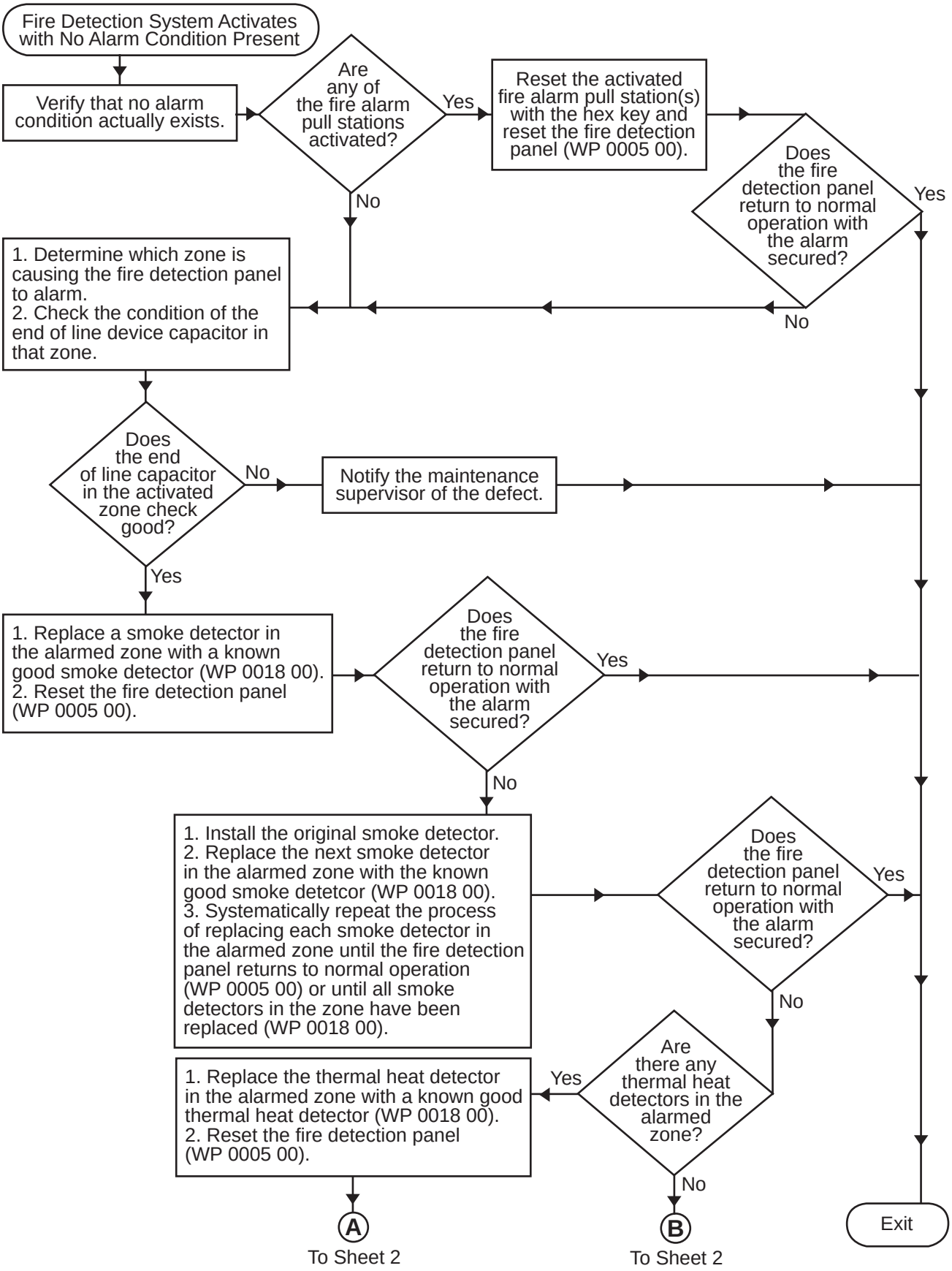
Procedure 6. Engine Room FM-200 Alarm Bell Does Not Sound When The FM-200 System is Actuated (Sheet 1 of 2)



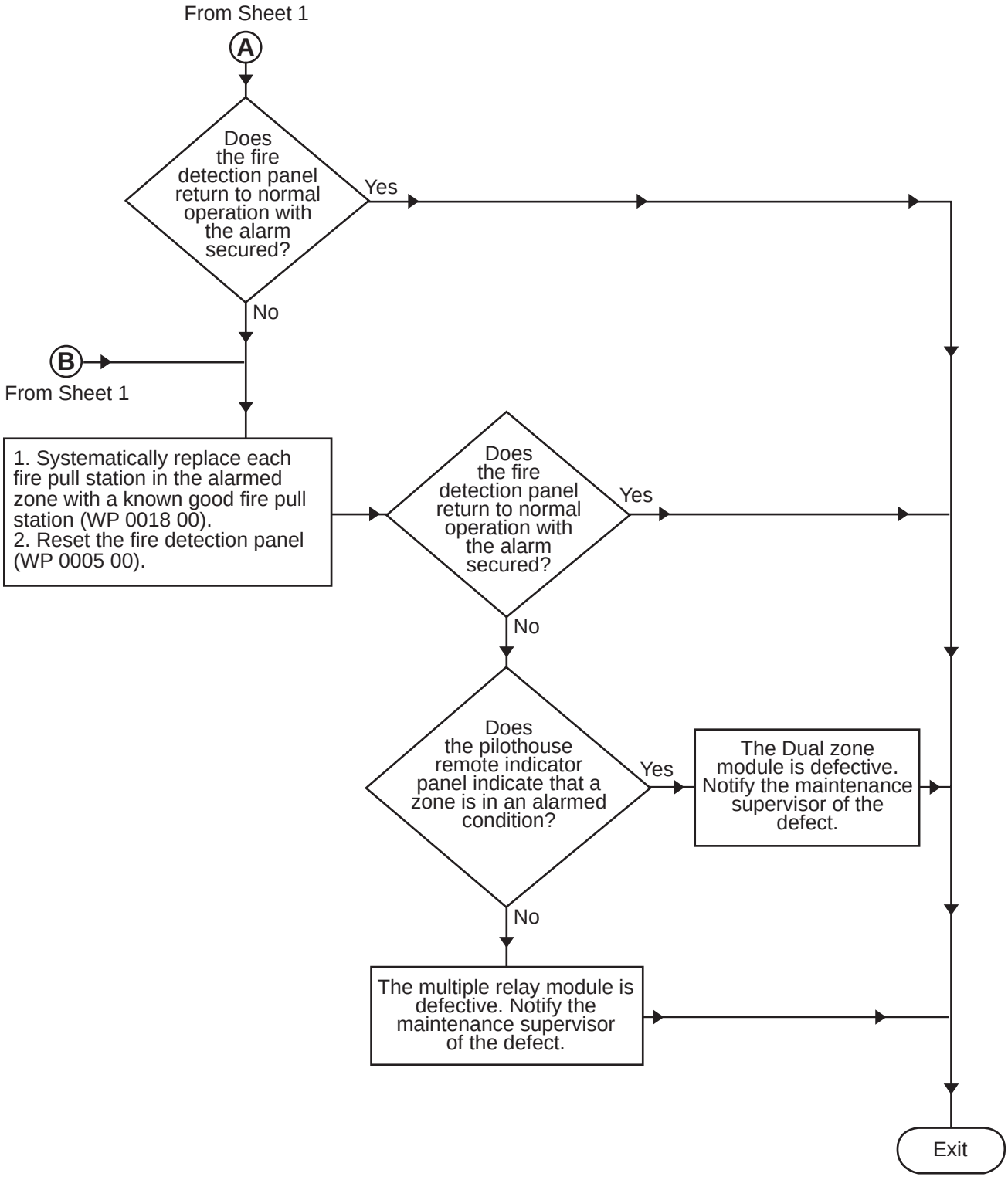
Procedure 6. Engine Room FM-200 Alarm Bell Does Not Sound When The FM-200 System is Actuated (Sheet 2 of 2)



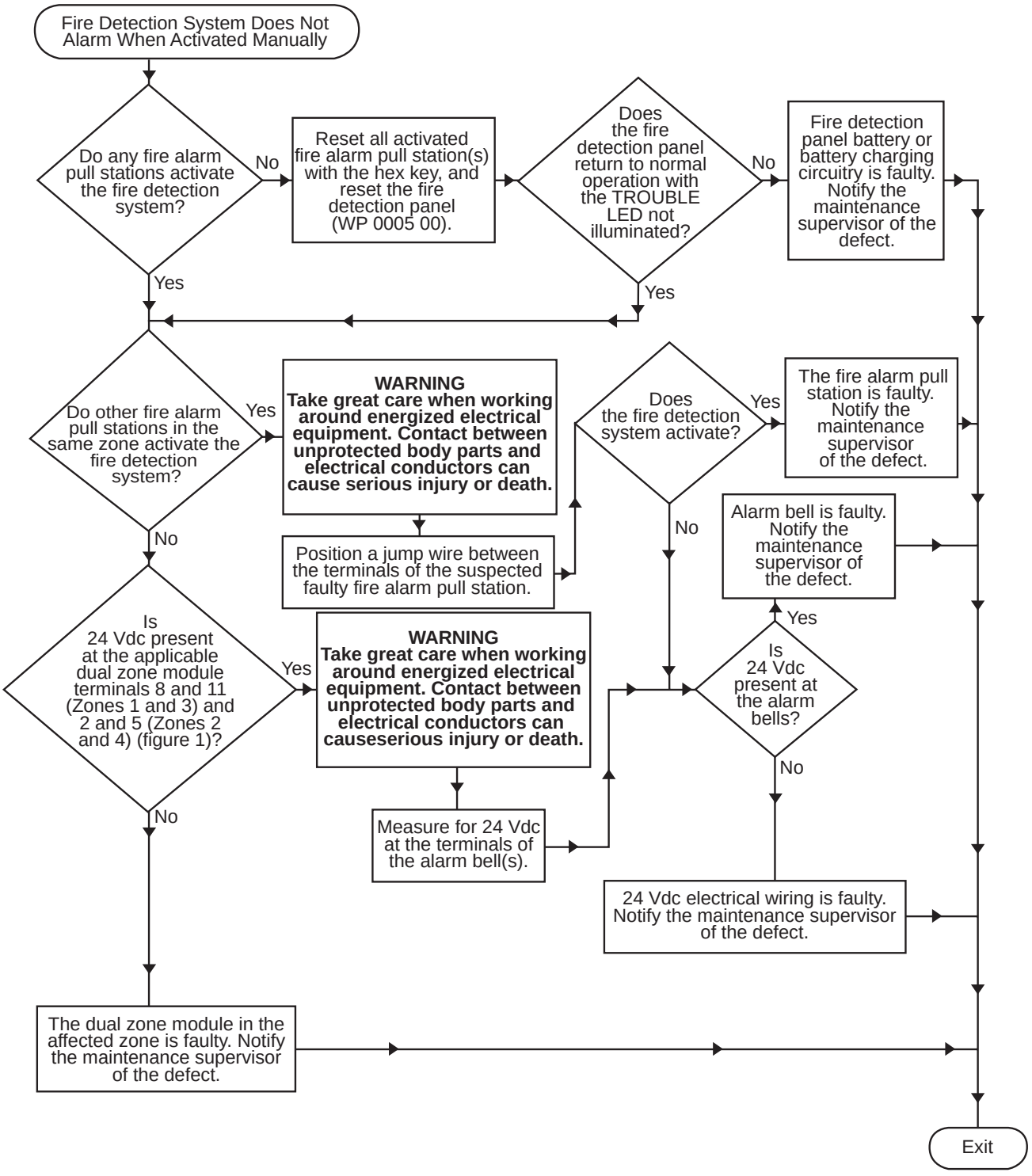
Procedure 7. Electric Horn Does Not Sound When the FM-200 System is Actuated



Procedure 8. Fire Detection Activates With No Alarm Condition Present (Sheet 1 of 2)



Procedure 8. Fire Detection Activates With No Alarm Condition Present (Sheet 2 of 2)



Procedure 9. Fire Dectection System Does Not Alarm When Activated Manually

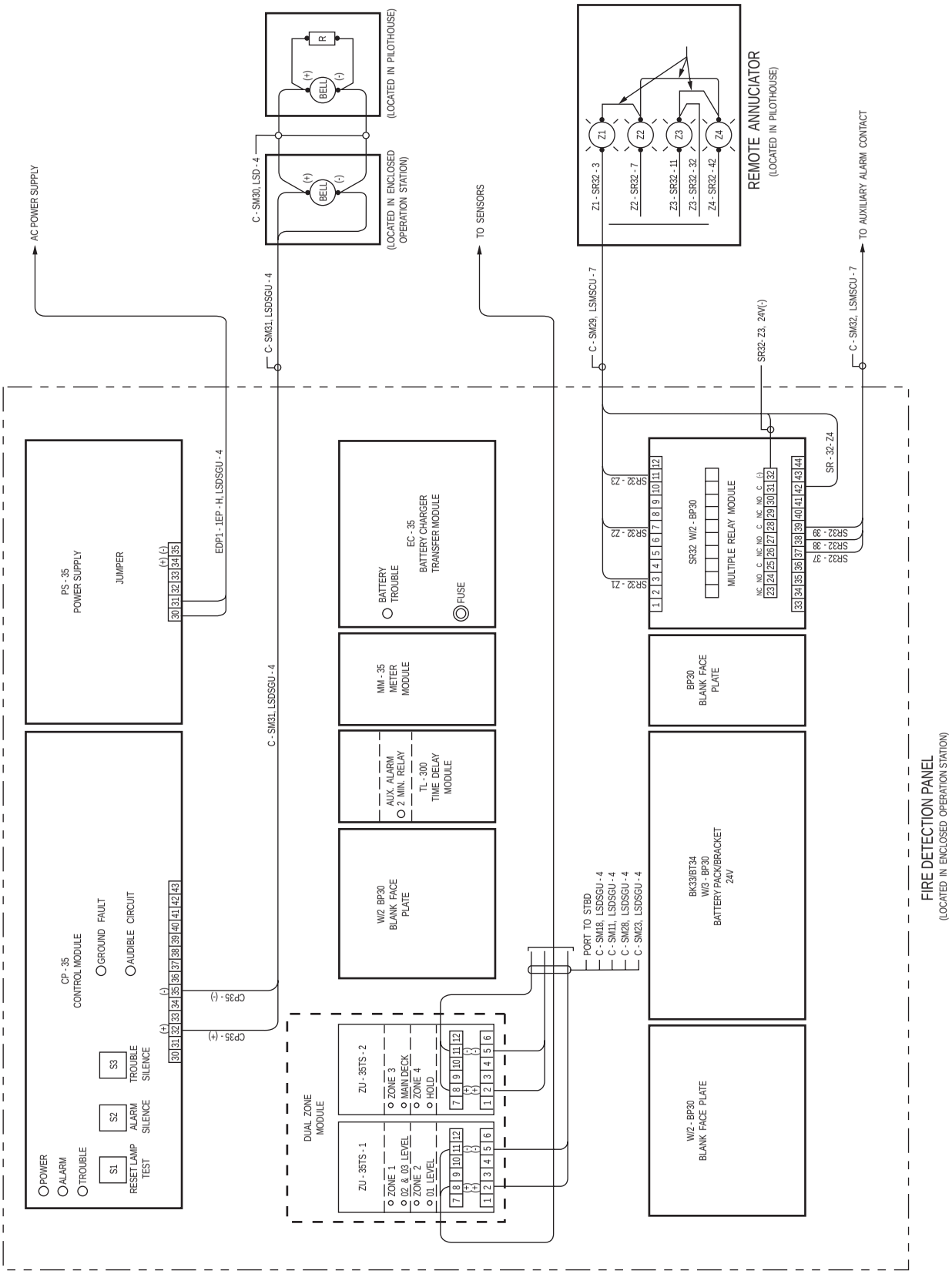
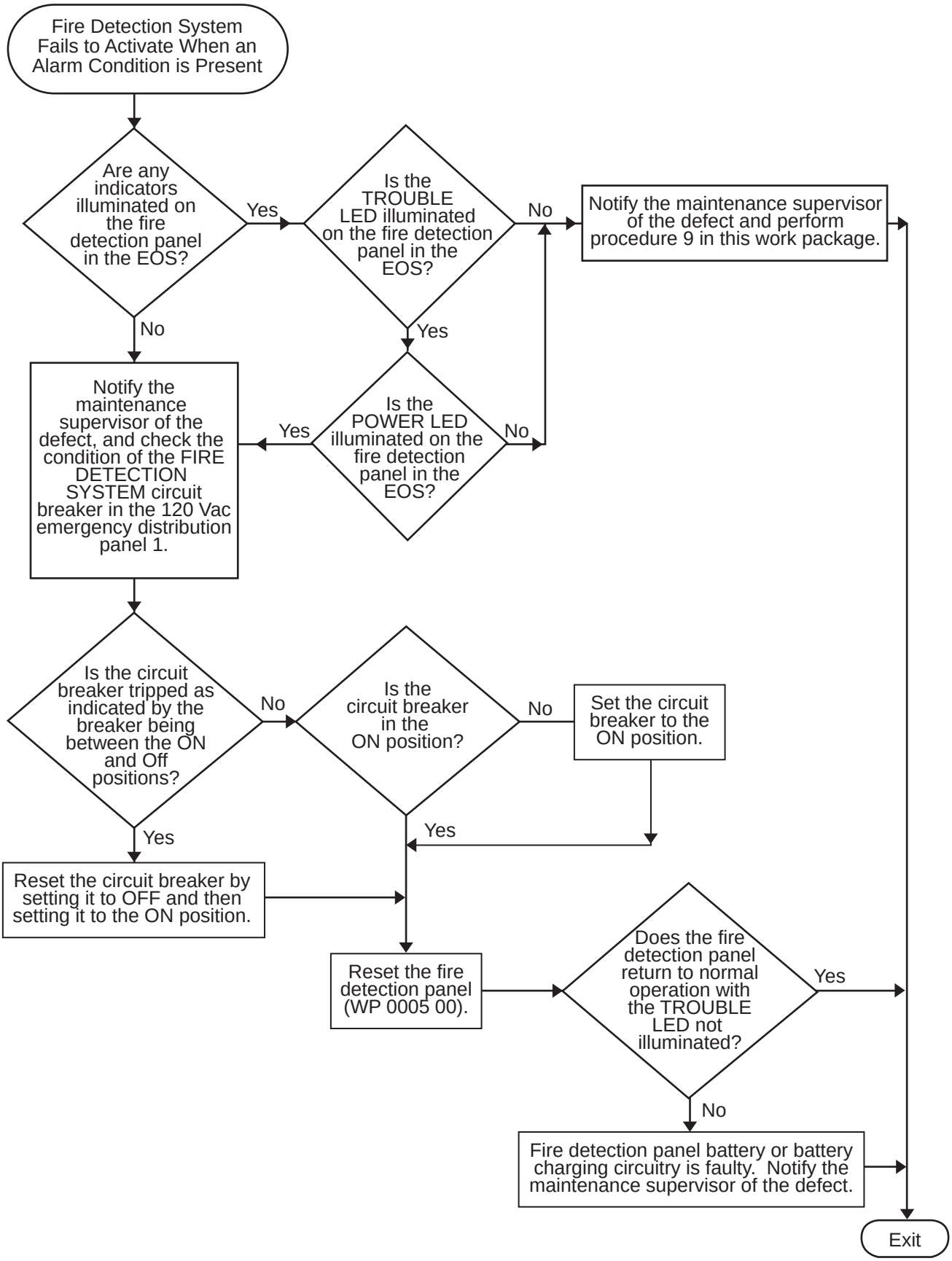
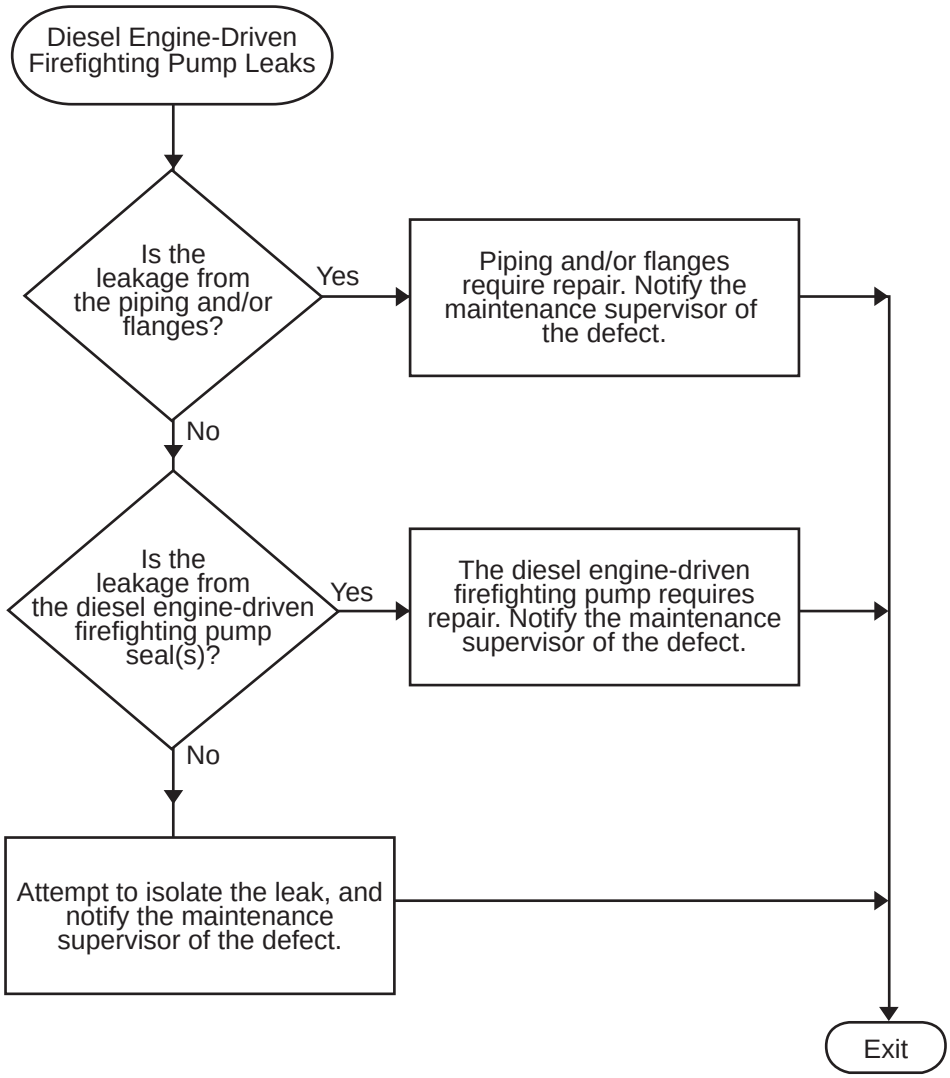


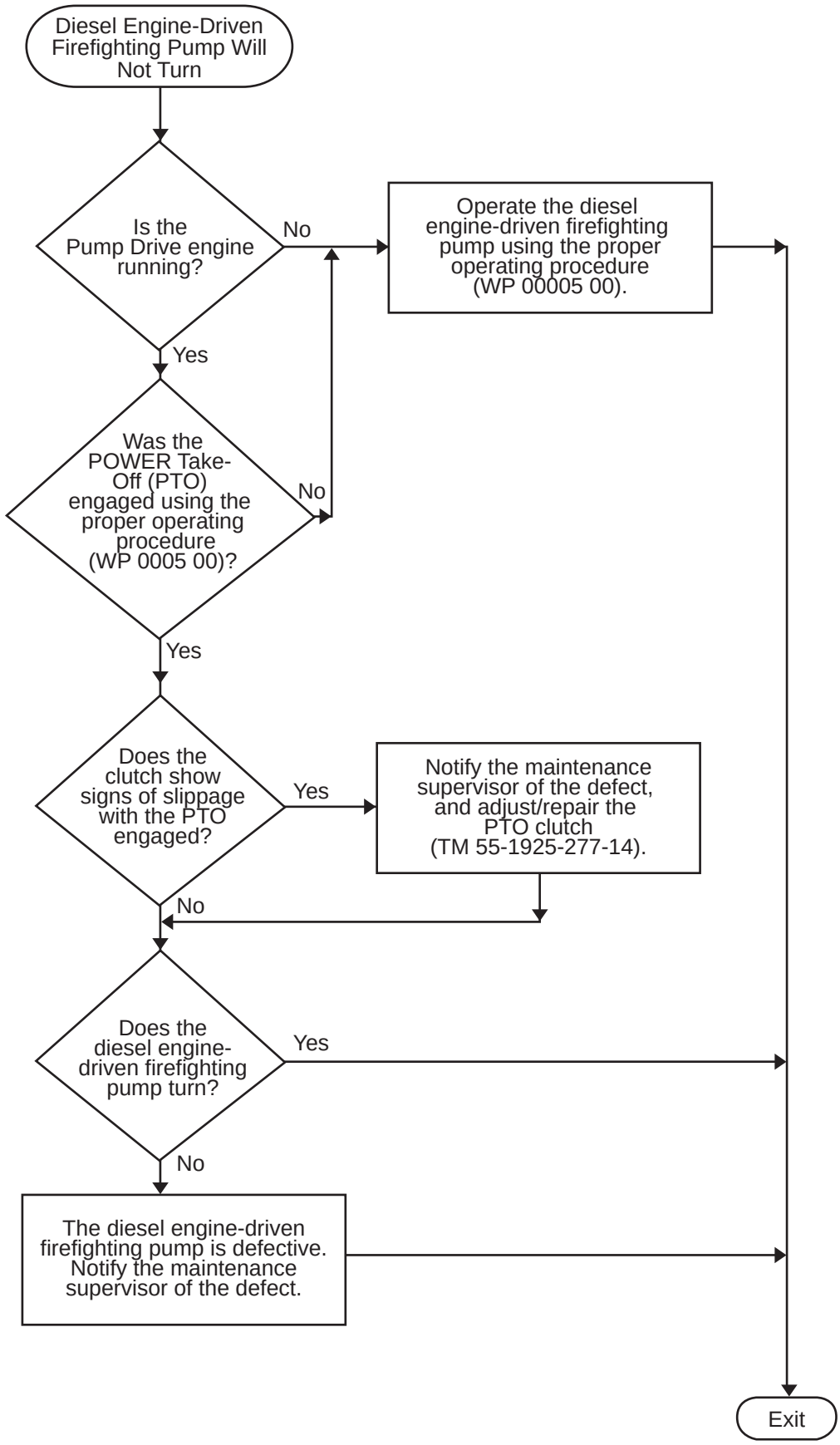
Figure 1. Fire Detection Panel Simplified Schematic



Procedure 10. Fire Detection System Fails To Activate When An Alarm Condition Is Present



Procedure 11. Diesel Engine-Driven Firefighting Pump Leaks



Procedure 12. Diesel Engine-Driven Firefighting Will Not Turn

END OF WORK PACKAGE

Chapter 4

Maintenance Instructions for Firefighting, Fire Alarm, and Fire Suppression Systems

Inland and Coastal Large Tug (LT)

OPERATOR AND UNIT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
SERVICE UPON RECEIPT AND PREPARATION FOR STORAGE

INITIAL SETUP:

Personnel Required:
Two Watercraft Engineers, 88L

References:
TB 740-97-4
WP 0012 00
WP 0013 00

SERVICE UPON RECEIPT

SHELTER REQUIREMENTS

Most components of the firefighting, fire alarm, and fire detection systems are mounted in interior spaces out of the weather. Those components that are mounted on weather decks are designed to withstand this environment. However, interior components can still become wet during compartment cleaning or during service of other systems such as the potable water systems. If there is a possibility that interior components could become wet due to cleaning or equipment maintenance operations, cover them with waterproof tarps or other protective coverings until cleaning or maintenance is complete.

PRELIMINARY SERVICING OF EQUIPMENT AND PRELIMINARY CHECKS AND ADJUSTMENTS OF EQUIPMENT

Perform all operator and unit PMCS up through, and including, the annual level. Operator PMCS procedures are contained in WP 0012 00. Unit PMCS procedures are contained in WP 0013 00.

PREPARATION FOR STORAGE OR SHIPMENT

The firefighting, fire alarm, and fire detection systems are prepared for storage or shipment along with the remainder of the Large Tug (LT). Complete instructions for this preparation are contained in TB 740-97-4, Preservation of Vessels for Storage.

END OF WORK PACKAGE

OPERATOR AND UNIT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
PMCS INTRODUCTION

PURPOSE AND USE OF PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) DATA

PMCS is performed to keep the firefighting, fire alarm, and fire suppression systems in operating condition. The checks are used to find, correct, and report problems so that defects may be discovered and corrected. PMCS is to be accomplished each day the firefighting, fire alarm, and fire suppression systems are operated using the appropriate work packages. Pay attention to all WARNINGS, CAUTIONS, and NOTES that precede individual steps. WARNINGS indicate possible danger to personnel. CAUTIONS indicate possible damage to equipment. NOTES are for clarification and additional information. An explanation is prepared for each PMCS check entry, and for any general checks and services common to an entire piece of equipment or system. An explanation of PMCS chart columns follows:

ITEM NUMBER COLUMN

The checks and services are numbered within a specific work package in chronological order.

INTERVAL

This column indicates the periodicity of the check or service.

1. Before firefighting, fire alarm, and fire suppression systems operation, do Before PMCS.
2. During firefighting, fire alarm, and fire suppression systems operation, do During PMCS.
3. After firefighting, fire alarm, and fire suppression systems operation, do After PMCS.
4. Once a week do Weekly PMCS.
5. Do Monthly PMCS once a month. If equipment has not been operated in a month, also do During PMCS at the same time as Monthly PMCS.
6. Do Quarterly PMCS once a quarter. If the equipment has not been operated in a quarter, also do After PMCS at the same time as Quarterly PMCS.
7. Do Semiannual PMCS once every six months. If the equipment has not been operated within the last six months, also do the Monthly PMCS at the same time as Semiannual PMCS.
8. Do Annual PMCS once a year.
9. If a deficiency is noted when performing PMCS, fix it, if possible, using troubleshooting procedures and/or maintenance procedures. If the deficiency cannot be corrected, write up the items not fixed on DA Form 2404 for unit maintenance. For further information on how to use this form, see DA PAM 738-750.

MANHOUR

This column indicates the projected amount of time that is expected to take to complete the check or service. Checks and services that require additional personnel include a cumulative amount of time.

ITEM TO BE CHECKED OR SERVICED

This column lists the equipment or item to be checked or serviced.

PROCEDURE COLUMN

This column contains a brief description of how to perform the checks and services, or it contains the reference to the work package or technical manual that contains the procedural information. Carefully follow the instructions. If the necessary tools are not available, or if the procedure tells you to, have organizational maintenance do the work.

EQUIPMENT NOT READY/AVAILABLE IF

Lists the criteria that will limit the use of equipment, or make it not ready for use. Depending on the severity of the limitations, the firefighting, fire alarm, and fire suppression systems may not be able to operate and perform their primary mission. The terms "ready/available" and "mission capable" refer to the same status: Equipment is on hand and can perform its combat mission. If tools required to perform PMCS are not listed in the work package, notify unit maintenance. Write up items not fixed on DA Form 2404 for unit maintenance. For further information on how to use this form, see DA PAM 738-750.

DOCUMENTATION OF PMCS ITEM FAILURES

PMCS item failures are to be recorded on DA Form 2404, Equipment Inspection, and Maintenance Worksheet, and forwarded to Unit Maintenance via the vessel's Chief Engineer. Documentation of PMCS item failures must include the compartment location and item number within the work package to ensure proper dissemination. All corrected faults will be recorded on DA Form 4640 (Harbor Boat Deck Department Log for Class A&B Vessels) and DA Form 4993 (Harbor Boat Engine Department Log for Class A and C-1 Vessels). All uncorrected faults will be transcribed to a DA Form 2407, Maintenance Request, and the appropriate log entry must be made. The crew will service the LT as outlined by the intervals contained in the PMCS tables.

CORROSION PREVENTION AND CONTROL (CPC)

Corrosion Prevention and Control (CPC) of Army materiel is a continuing concern. It is important that any corrosion problems be reported so that they can be corrected and improvements made to prevent future problems. Corrosion is typically associated with rusting of metals, but it can also include deterioration of other materials, such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of materials may indicate a corrosion problem. Suspected corrosion problems should be reported using SF 368 (Product Quality Deficiency Report). Use of key words such as "corrosion," "rust," "deterioration," or "cracking" will ensure that the information is identified as a CPC problem.

LEAKAGE DEFINITION

⚠ CAUTION

Equipment operation is allowable with minor leakages (Class I or II) except for fuel leaks. Of course, consideration must be given to the fluid capacity of the item or system being checked. When in doubt, ask 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. It is necessary to know how fluid leakage affects the status of the reverse osmosis water purification unit. The following are definitions of the classes of leakage an operator or crewmember needs to know to be able to determine the condition of the leak. Learn and then be familiar with them. When in doubt, ask your supervisor.

LEAKAGE CLASSIFICATIONS I, II, III

Leakage classifications. Leakage definitions for operator/crew PMCS shall be classified as follows:

1. Class I: Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.

2. Class II: Leakage of fluid great enough to form drops but not enough to cause drops to drip from the item being checked/inspected.

3. Class III: Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

INSPECTION

Look for signs of a problem or trouble. Senses help here. You can feel, smell, hear, or see many problems. Be alert when on the vessel. Inspect to see if items are in good condition. Are they correctly assembled, stowed, secured, excessively worn, leaking, corroded, or properly lubricated? Correct any problems found or notify unit maintenance. There are some common items to check on the firefighting, fire alarm, and fire suppression systems. These include the following:

1. Bolts, clamps, nuts, and screws: Continuously check for looseness. Look for chipped paint, bare metal, rust, or corrosion around bolt and screw heads and nuts. Tighten them when you find them loose. If tools are not available, notify unit maintenance.

2. Welds: Many items on the firefighting, fire alarm, and fire suppression systems are welded. To check these welds, look for chipped paint, rust, corrosion, or gaps. When these conditions exist, notify unit maintenance on DA Form 2404.

3. Electrical wires, connectors, and harnesses: Tighten loose connectors. Look for cracked or broken insulation, bare wires, and broken connectors. If any are found, notify unit maintenance.

4. Hoses and fluid lines: Look for wear, damage, and leaks, and make sure clamps and fittings are tight. Wet spots mean a leak. A stain by a fitting or connector can also mean a leak. When you find a leak, notify unit maintenance.

GENERAL STATEMENT OF LUBRICATION REQUIREMENTS

Any lubricants called out by PMCS in this manual are identified by standard military symbols (MIL-HDBK-113 and MIL-HDBK-275).

LUBRICATION SERVICE INTERVALS - NORMAL CONDITIONS

For safer, more trouble free operations, make sure that the firefighting, fire alarm, and fire suppression systems are serviced when needed. For the proper lubrication and service intervals, see WP 0012 00 and WP 0013 00.

LUBRICATION SERVICE INTERVALS - UNUSUAL CONDITIONS

The firefighting, fire alarm, and fire suppression systems may require extra service and care when operated under unusual conditions. High or low temperatures, long periods of hard use, or continued use in a dirty environment will break down the lubricants and fluids, requiring more frequent service.

LUBRICATION UNIVERSALS

1. Always clean fittings before lubricating them. Failure to do so can force contaminants into bearings.

2. Always use the PMCS work packages as the guide for lubrication.

3. Never use the wrong type/grade of lubricant.

4. Never use too much lubricant.

END OF WORK PACKAGE

OPERATOR MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES INCLUDING LUBRICATION

Table 1. Operator Preventive Maintenance Checks and Services

ITEM NO.	INTERVAL	MAN-HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			DIESEL ENGINE-DRIVEN FIRE-FIGHTING PUMP		
1	Before	0.2	Pump	Check oil level in the sight glass. Proper oil level is in the center of the sight glass. Remove the breather and add oil as required. Refer to table 2 for the proper oil.	Oil level low.
2	Before	0.2	Fire Flap Pull Cables	Check that all fire flap pull cables are in the SET position (T handle pushed all the way IN). Check all T handles, cable ends, and attaching hardware (cotter pins, clevis pins, etc.) are installed and undamaged.	Any fire flap is deployed. Any T handle or hardware is damaged or missing.

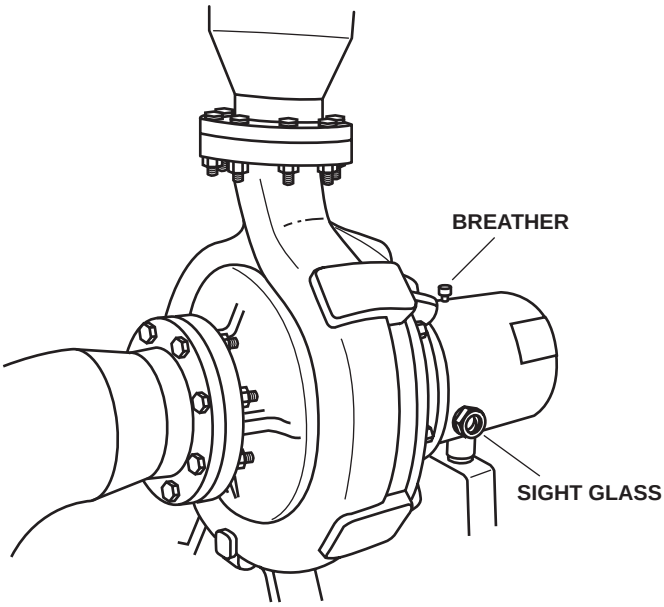


Table 1. Operator Preventive Maintenance Checks and Services (continued)

ITEM NO.	INTERVAL	MAN-HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
3	During	0.2	DIESEL ENGINE-DRIVEN FIRE-FIGHTING PUMP	a. Check pump and PTO clutch for any unusual noise or vibration.	Any unusual noise or excessive vibration.
				b. Monitor fire main pressure gauge. Pressure should be maintained by speed of the pump drive engine.	
			FM-200 SYSTEM		
4	Weekly	0.2	Cylinders	Check that the cylinders are securely mounted. Tighten mounting hardware as necessary.	
5	Weekly	0.2	Discharge heads and hoses	Check that the discharge heads and hoses are intact and undamaged.	Any discharge head or hose is damaged or missing.

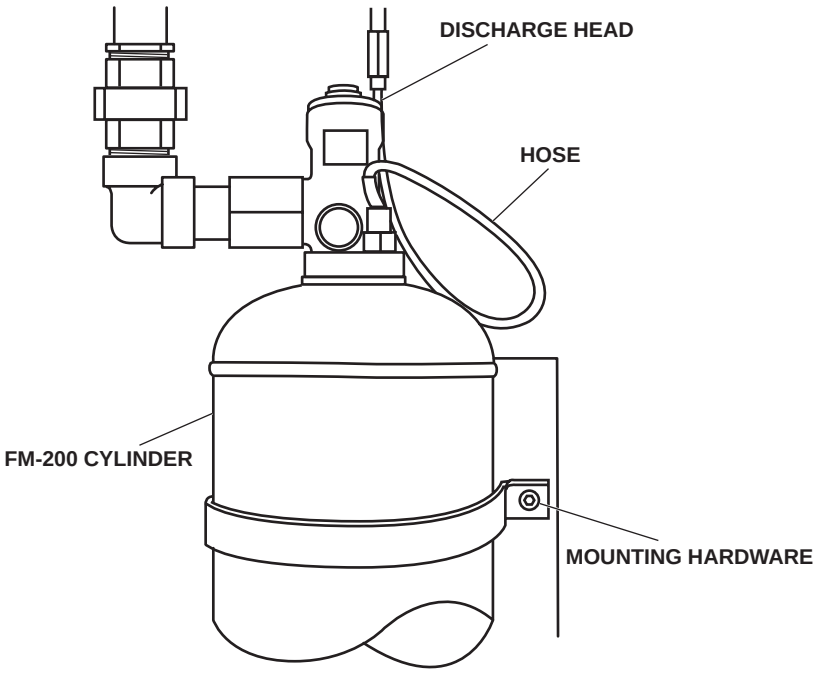


Table 1. Operator Preventive Maintenance Checks and Services (continued)

ITEM NO.	INTERVAL	MAN-HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			GALLEY FIRE SUPPRESSION SYSTEM		
6	Weekly	0.1	Piping	Check for loose piping.	Any loose or faulty piping.
7	Weekly	0.1	Blow-off caps	Check for missing discharge nozzle blow-off caps. Remove and install each blow-off cap. Ensure each blow-off cap snaps back into place on its respective nozzle.	Any missing or loose blow-off cap. Any clogged discharge nozzle.

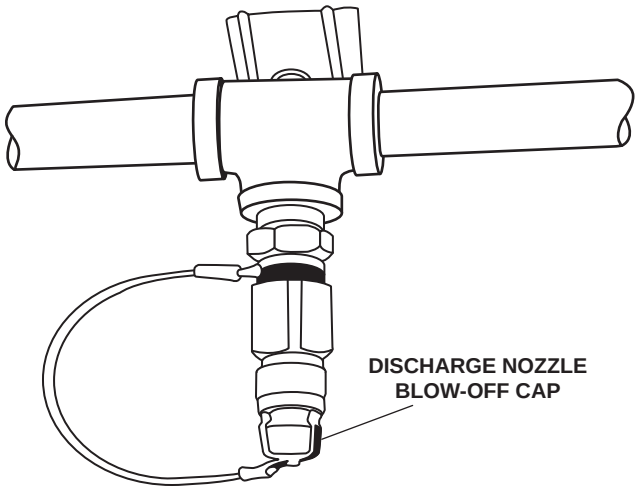
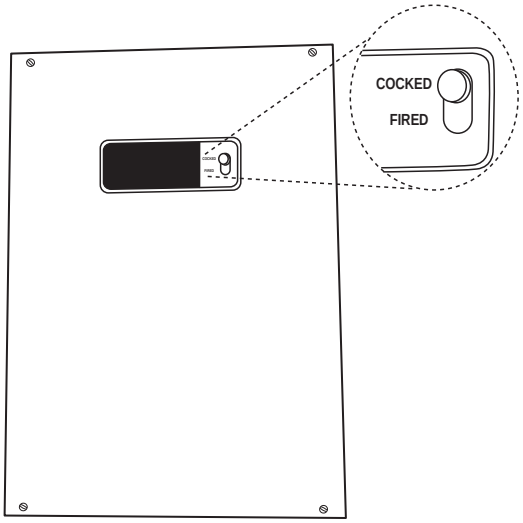


Table 1. Operator Preventive Maintenance Checks and Services (continued)

ITEM NO.	INTERVAL	MAN-HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
8	Weekly	0.1	System	Visually inspect the releasing unit to verify the system is cocked. Check that the fire alarm pull station is not obstructed, has not been tampered with, and is ready for operation.	Releasing unit not cocked. Fire alarm pull station is obstructed or inoperable.



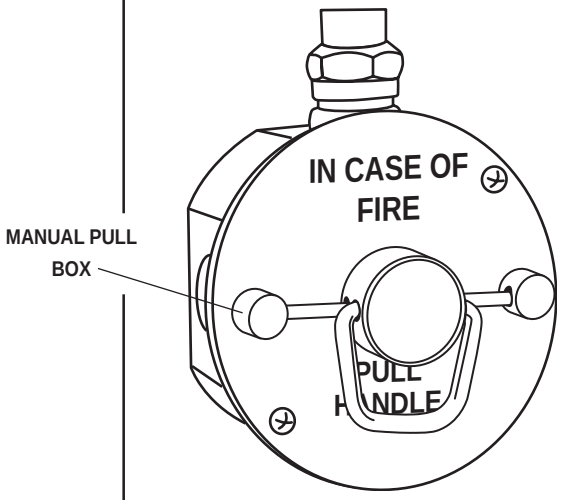


Table 1. Operator Preventive Maintenance Checks and Services (continued)

ITEM NO.	INTERVAL	MAN-HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			AFFF PUMP		
9	Monthly	0.2	Pump	Check that the AFFF Pump is securely mounted. Tighten mounting hardware as necessary. Verify that there is no sign of leakage from the flanges.	

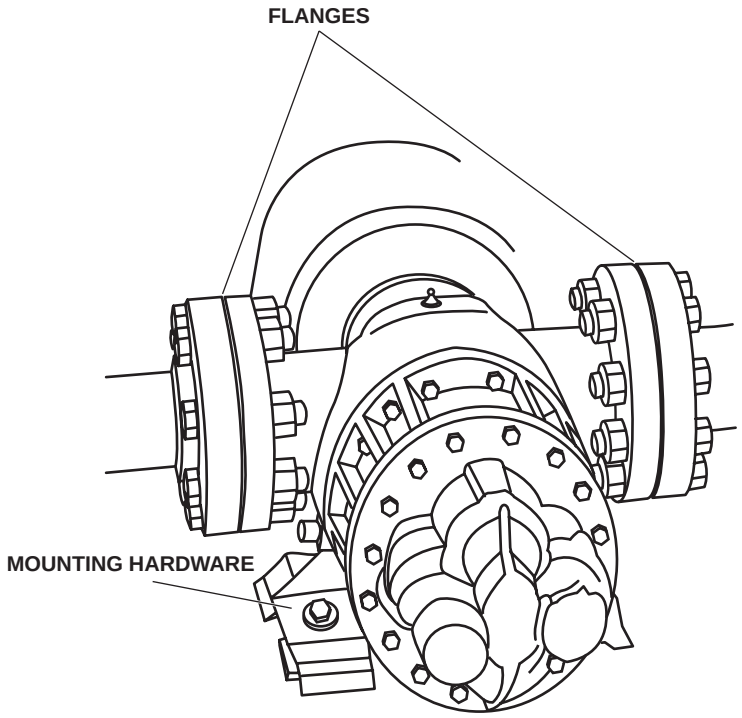


Table 1. Operator Preventive Maintenance Checks and Services (continued)

ITEM NO.	INTERVAL	MAN-HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			DIESEL ENGINE-DRIVEN FIRE-FIGHTING PUMP		
10	Monthly	0.2	Pump	Check oil level in the sight glass. Proper oil level is in the center of the sight glass. Remove the breather and add oil as required. Refer to table 2 for the proper oil.	Oil level low.
			GALLEY FIRE SUPPRESSION SYSTEM		
11	Monthly	0.3	Fusible links and cables	Check for any deterioration and/or corrosion on the fusible links and cables.	Any corrosion or damage that may render the galley fire suppression system inoperable.

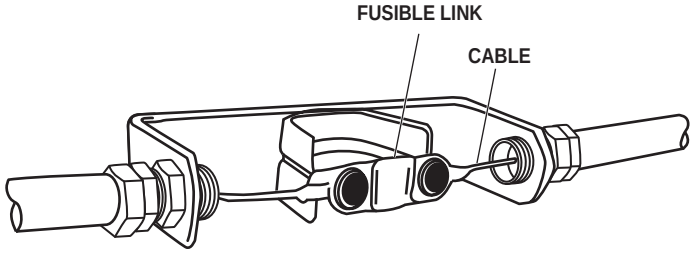


Table 1. Operator Preventive Maintenance Checks and Services (continued)

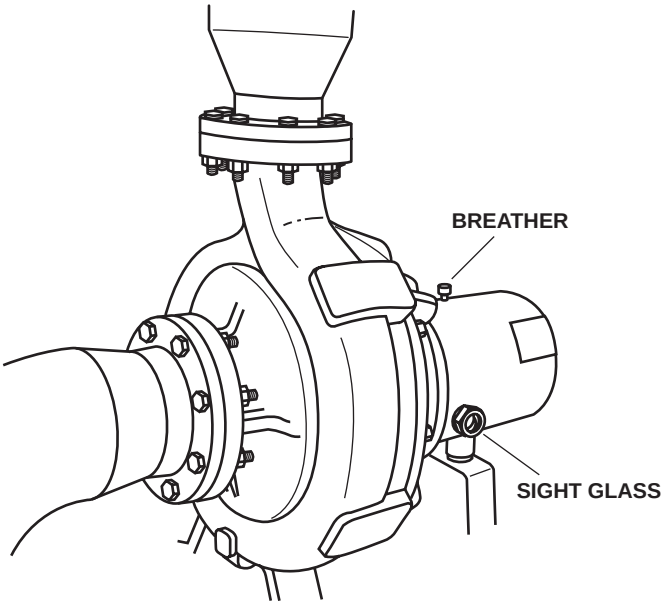
ITEM NO.	INTERVAL	MAN-HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
12	Quarterly	2.0	Pump	Service the diesel engine-driven fire-fighting pump (WP 0015 00).	
					
			FIRE DETECTION SYSTEM		
13	Semiannual	0.2	Supervisory Circuits	Move the RESET/LAMP TEST switch to RESET. All visual indicators on the control panel should light and trouble horn should sound.	Any control panel does not light, or trouble horn does not sound.
14	Annual	4.0	Fire Hoses	Pressure test (FM 55-502).	Fire hose fails pressure test.

Table 2. Diesel Engine-Driven Firefighting Pump Oil

EQUIPMENT	OIL TYPE	ISO VISCOSITY	NSN
Diesel Engine-Driven Firefighting Pump	Lubricating Oil, General Purpose	Non-Detergent 68	9150-00-027-3098

END OF WORK PACKAGE

UNIT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES INCLUDING LUBRICATION

Table 1. Unit Preventive Maintenance Checks and Services

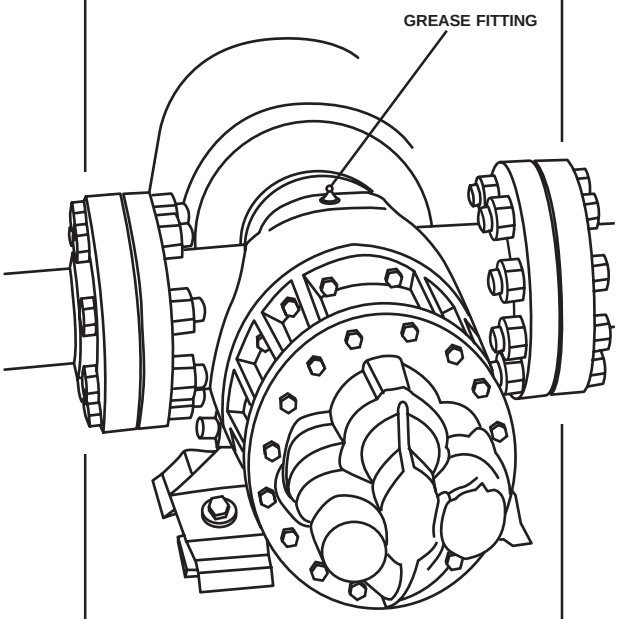
ITEM NO.	INTERVAL	MAN-HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			AFFF PUMP		
1	Monthly	0.1	Pump	Use a lubricating gun to lubricate the pump with two shots of general purpose grease at the grease fitting. Refer to table 2 for the proper grease. 	
			FIRE DETECTION SYSTEM		
2	Semiannual	2.0	Sensors	Test the fire detection system (WP 0017 00).	Any sensor is inoperative.
			GALLEY FIRE SUPPRESSION SYSTEM		
3	Semiannual	2.0	Certification	Semiannual certification of the system is required. Notify the maintenance supervisor.	System certification has expired.

Table 1. Unit Preventive Maintenance Checks and Services (continued)

ITEM NO.	INTERVAL	MAN-HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			FM-200 SYSTEM		
4	Semiannual	2.0	Alarms	Test the FM-200 system (WP 0022 00).	Any portion of the system is inoperative.
5	Annual	1.0	Certification	Annual certification of the system is required. Notify the maintenance supervisor.	System certification has expired.

Table 2. AFFF Pump Grease

GREASE TYPE	NSN
Grease, General Purpose	9150-00-180-6381

END OF WORK PACKAGE

Chapter 5

Operator Maintenance Instructions for Firefighting, Fire Alarm, and Fire Suppression Systems

Inland and Coastal Large Tug (LT)

OPERATOR MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
FIRE DETECTION SYSTEM, REPLACE

INITIAL SETUP:

Personnel Required:
One Watercraft Engineer, 88L
Fire Watches as Required

References:
TM 55-1925-273-10
WP 0005 00

NOTE

The purpose of this work package is to outline the steps that must be accomplished by the operator prior to the shutdown and subsequent removal of the fire detection system.

PREPARATION FOR REMOVAL

WARNING

While the fire detection system is secured, fire watches must be posted throughout the vessel to monitor for the presence of fire or fire conditions. Failure to comply can result in death or serious injury to personnel and serious damage to the vessel.

1. Post fire watches as required throughout the vessel.
2. Verify that portable lighting is available to the work area.

NOTE

Removal of the fire detection system requires all power to be secured to the vessel because of the location of the fire alarm panel.

3. Verify that all required preparations are made for securing power to the vessel (TM 55-1925-273-10).
4. Notify the maintenance supervisor that the system is ready for replacement.
5. After replacement has been completed and the system has been tested, secure the fire watch and return the system to normal operation (WP 0005 00).

END OF WORK PACKAGE

OPERATOR MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
DIESEL ENGINE-DRIVEN FIREFIGHTING PUMP, SERVICE

INITIAL SETUP:

Tools and Special Tools:
- Tool Kit, General Mechanic's (Item 1, Table 2, WP 0046 00)
- Torque Wrench 0-250 ft. lb. (Item 8, Table 2, WP 0046 00)
- Suitable Drain Pan

Materials/Parts:
- Dry Cleaning Solvent (Item 2, Table 1, WP 0050 00)
- Gloves, Chemical and Oil Protective (Item 7, Table 3, WP 0049 00)
- Goggles, Industrial (Item 9, Table 3, WP 0049 00)
- Lubricating Oil, General Purpose (Item 5, Table 1, WP 0050 00)
- Rags, Wiping (Item 6, Table 1, WP 0050 00)
- Tag, Danger (Item 8, Table 1, WP 0050 00)
- Tape, Antiseizing (Item 9, Table 1, WP 0050 00)
- Strainer Element (Item 27, Figure 1, WP 0048 00)
- Gasket (Item 26, Figure 1, WP 0048 00)

Personnel Required:
- Two Watercraft Engineers, 88L

References:
- FM 55-502
- WP 0005 00
- WP 0046 00
- WP 0048 00
- WP 0049 00
- WP 0050 00

Equipment Conditions:
- CLOSE valve CA-6, STG AIR TO PMP DR ENG. Lock out and tag out (FM 55-502).
- CLOSE valves FM-1, SEA SUCT, F.F. PMP and FM-13, F.F. TO F.M. CRSVR. Lock out and tag out (FM 55-502).

SIMPLEX STRAINER SERVICE

DISASSEMBLY

1. Place a suitable drain pan under the strainer (figure 1, item 1) and remove the drain plug (figure 1, item 2).

WARNING

The seacock for the affected system must be closed before beginning replacement of any raw water system piping, hoses, and/or valves. Failure to observe this warning can result in flooding of the space, resulting in injury or death to personnel and damage to the vessel.

2. Remove the ten bolts (figure 1, item 3) from the cover (figure 1, item 4) of the strainer (figure 1, item 1). Remove the cover.

3. Clean the inside of the cover (figure 1, item 4) with clean water and clean wiping rags.

4. Remove and discard the gasket (figure 1, item 5).

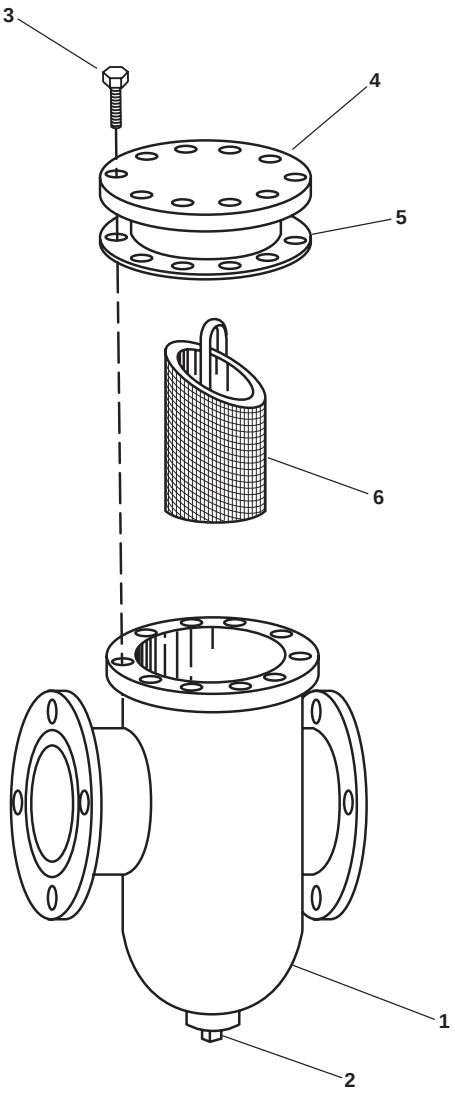
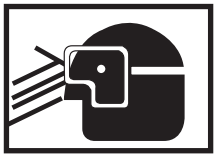


Figure 1. Firefighting Pump – Service of Simplex Strainer

5. Remove the basket (figure 1, item 6) from the strainer (figure 1, item 1).

WARNING



Removing components by means of wire brushing produces flying particles. These particles can cause serious injury to personnel. Protective goggles, gloves, and long sleeves must be worn at all times during wire brushing operations. Failure to comply can result in serious injury to personnel.

6. Clean the basket (figure 1, item 6) with clean water, a wire brush, and clean wiping rags.

7. If the basket (figure 1, item 6) is damaged, replace the basket.

ASSEMBLY

1. Install the cleaned basket (figure 1, item 6) into the strainer (figure 1, item 1).
2. Install a new gasket (figure 1, item 5) on the strainer (figure 1, item 1).
3. Install the cover (figure 1, item 4) on the strainer (figure 1, item 1) and secure it with ten bolts (figure 1, item 3).
4. Tighten the ten bolts to a torque of 75 lb-ft (101 Nm).
5. Perform the Follow-On Service procedure at the end of this work package.

FIREFIGHTING PUMP SERVICE

DISASSEMBLY

1. Place a suitable drain pan under the firefighting pump's drain plug (figure 2, item 1).

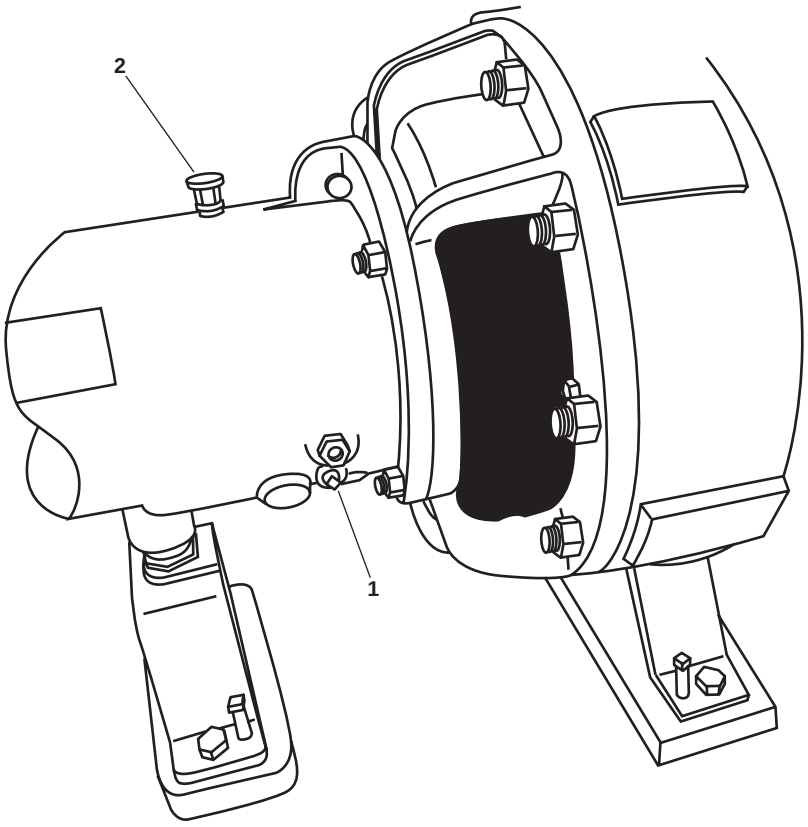
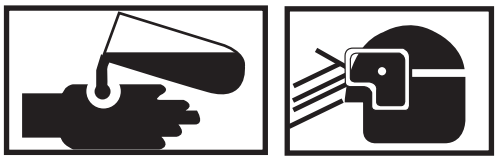


Figure 2. Diesel Engine-Driven Firefighting Pump – Drain/Vent Plugs

WARNING



Do not allow hydraulic fluid, engine oil, or cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to follow these precautions can result in illness or serious injury.

2. Remove the drain plug (figure 2, item 1), permitting the oil to drain from the pump into the suitable drain pan.

3. Remove the breather (figure 2, item 2) from the pump.

WARNING

Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to follow these precautions can result in death or serious injury.

Do not allow cleaning solvent to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling cleaning solvent. Failure to follow these precautions can result in illness or serious injury.

4. Using dry cleaning solvent and wiping rags, clean the breather (figure 2, item 2).

ASSEMBLY

1. Place antiseizing tape on the drain plug's male pipe threads (figure 2, item 1).

2. Install the drain plug (figure 2, item 1) in the diesel engine-driven firefighting pump.

3. Fill the diesel engine-driven firefighting pump with mineral oil (ISO non-detergent 68) at the breather (figure 2, item 2) until the oil level is in the center of the sight glass (figure 3, item 1).

4. Place antiseizing tape on the breather (figure 2, item 2) male pipe threads.

5. Install the breather (figure 2, item 2) on the firefighting pump.

6. Perform the Follow-On Service procedure at the end of this work package.

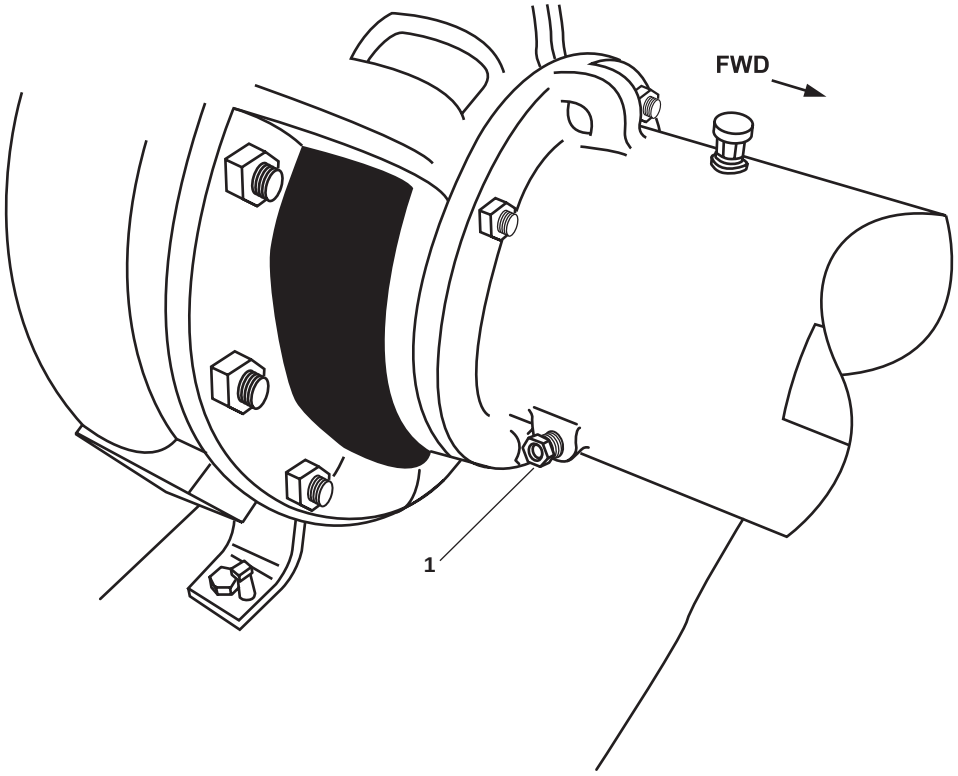


Figure 3. Diesel Engine-Driven Firefighting Pump – Oil Sight Glass

FOLLOW-ON SERVICE

1. Remove the lockouts and tagouts (FM 55-502).
2. Operate the diesel engine-driven firefighting pump (WP 0005 00) and observe that the pump operates normally, without leakage or unusual noises.
3. Return the equipment to the desired readiness condition.

END OF WORK PACKAGE

Chapter 6

Unit Maintenance Instructions for Firefighting, Fire Alarm, and Fire Suppression Systems

Inland and Coastal Large Tug (LT)

UNIT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
FIREFIGHTING SYSTEM, REPAIR

INITIAL SETUP:

Tools and Special Tools:
Tool Kit, General Mechanic's (Item 1, Table 2, WP 0046 00)
Suitable Drain Pan

Materials/Parts:
Dry Cleaning Solvent (Item 2, Table 1, WP 0050 00)
Gloves, Chemical and Oil Protective (Item 7, Table 3, WP 0049 00)
Goggles, Industrial (Item 9, Table 3, WP 0049 00)
Tag, Danger (Item 8, Table 1, WP 0050 00)
Tape, Antiseizing (Item 9, Table 1, WP 0050 00)

Personnel Required:
Two Watercraft Engineers, 88L

References:
FM 55-502
TB 43-0218
WP 0046 00
WP 0049 00
WP 0050 00

Equipment Conditions:
Set to OFF the FIRE PUMP # 1 circuit breaker on the emergency switchboard. Lock out and tag out (FM 55-502).
Set to OFF the FIRE PUMP NO. 2 circuit breaker on the main switchboard. Lock out and tag out (FM 55-502).

WARNING

Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.

NOZZLE REPLACEMENT

REMOVAL

1. Use the spanner wrench (figure 1, item 1) located on the storage rack (figure 1, item 2) to loosen the nozzle (figure 1, item 3) from the fire hose (figure 1, item 4).

2. Remove the nozzle (figure 1, item 3) from the fire hose (figure 1, item 4).

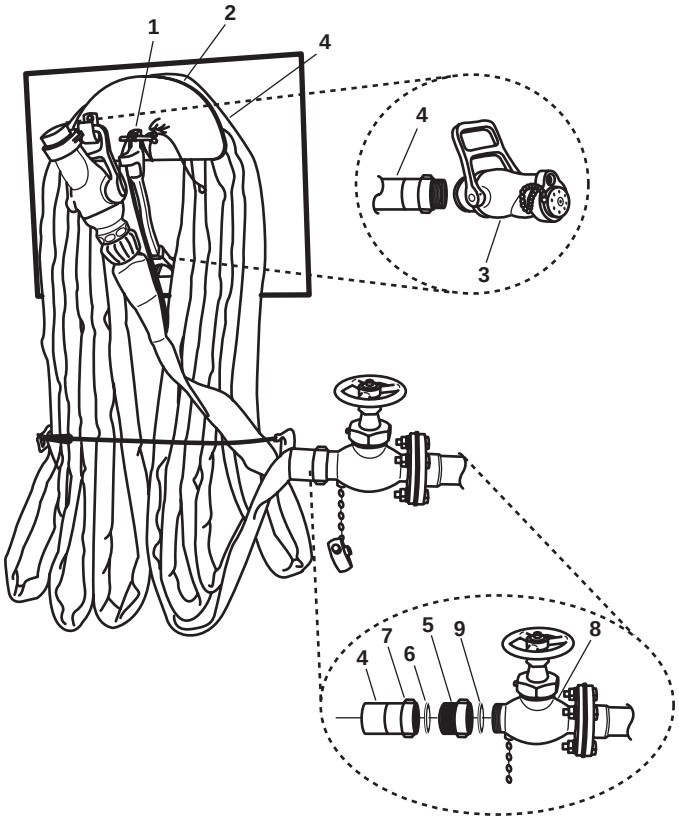


Figure 1. Typical Fire Station

INSTALLATION

1. Install the nozzle (figure 1, item 3) on the fire hose (figure 1, item 4).

2. Perform the Follow-On Service procedure at the end of this work package.

FIRE HOSE REPLACEMENT

REMOVAL

1. Perform the Nozzle Replacement Removal procedure in this work package.

2. Use the spanner wrench (figure 1, item 1) to loosen the fire hose (figure 1, item 4) from the fire hose adapter (figure 1, item 5).

3. Remove the fire hose (figure 1, item 4) from the fire hose adapter (figure 1, item 5).

4. Remove the gasket (figure 1, item 6) from the female coupling (figure 1, item 7) of the fire hose (figure 1, item 4). Discard the gasket.

INSTALLATION

1. Install a new gasket (figure 1, item 6) in the female coupling (figure 1, item 7) of the fire hose (figure 1, item 4).

2. Attach the fire hose (figure 1, item 4) to the fire hose adapter (figure 1, item 5). Tighten the connection using the spanner wrench (figure 1, item 1).

3. Perform the Nozzle Replacement Installation procedure in this work package.

4. Perform the Follow-On Service procedure at the end of this work package.

GASKET REPLACEMENT

REMOVAL

1. Use the spanner wrench (figure 1, item 1) to remove the female coupling (figure 1, item 7) of the fire hose (figure 1, item 4) from the fire hose adapter (figure 1, item 5).

2. Remove the gasket (figure 1, item 6) from the female coupling (figure 1, item 7) of the fire hose (figure 1, item 4). Discard the gasket.

INSTALLATION

1. Install a new gasket (figure 1, item 6) in the female coupling (figure 1, item 7) of the fire hose (figure 1, item 4).

2. Using the spanner wrench (figure 1, item 1), tighten the female coupling (figure 1, item 7) to the fire hose adapter (figure 1, item 5).

3. Perform the Follow-On Service procedure at the end of this work package.

FIRE HOSE ADAPTER REPLACEMENT

REMOVAL

1. Perform the Fire Hose Replacement Removal procedure in this work package.

2. Use the spanner wrench (figure 1, item 1) to loosen the fire hose adapter (figure 1, item 5) from the cutoff valve (figure 1, item 8).

3. Remove the gasket (figure 1, item 9) from the fire hose adapter (figure 1, item 5). Discard the gasket.

INSTALLATION

1. Install a new gasket (figure 1, item 9) in the new fire hose adapter (figure 1, item 5).

2. Use the spanner wrench (figure 1, item 1) to tighten the fire hose adapter (figure 1, item 5) onto the cutoff valve (figure 1, item 8).

3. Perform the Fire Hose Replacement Installation procedure in this work package.

4. Perform the Follow-On Service procedure at the end of this work package.

TYPICAL FLANGED BALL VALVE REPLACEMENT

REMOVAL

1. Partially OPNE the ball valve (figure 2, item 1) by turning the handle to vent any pressure in the valve.
2. Place a suitable drain pan under the ball valve (figure 2, item 1).
3. Remove the four bolts (figure 2, item 2) and the four nuts (figure 2, item 3).
4. Remove and discard the gasket (figure 2, item 4).
5. Remove the four bolts (figure 2, item 5) and the four nuts (figure 2, item 6) on the opposite end of the ball valve (figure 2, item 1).
6. Remove the ball valve (figure 2, item 1) from the vessel piping.
7. Remove and discard the gasket (figure 2, item 7).

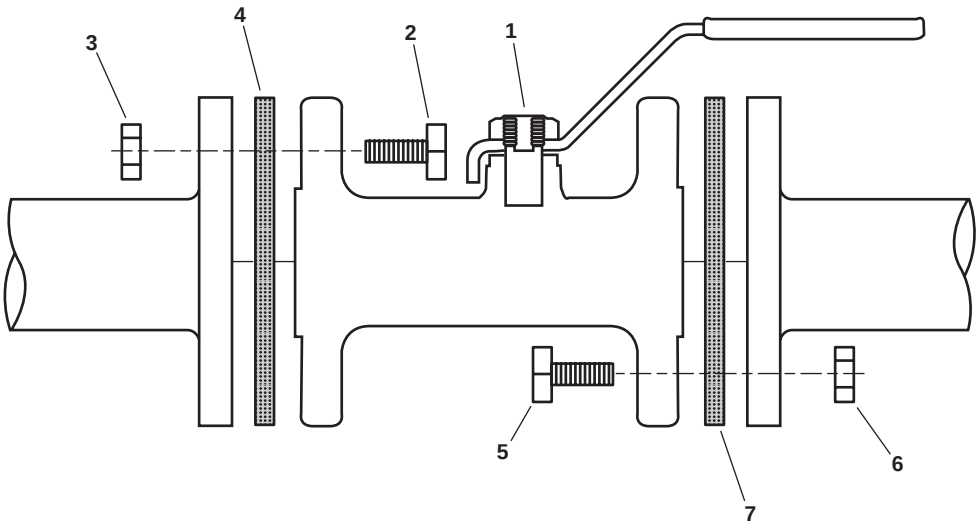
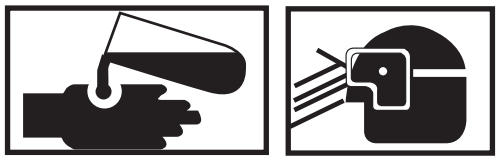


Figure 2. Typical Flanged Ball Valve

INSTALLATION

WARNING



Do not allow cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to follow these precautions can result in illness or serious injury.

Removing components by means of wire brushing produces flying particles. These particles can cause serious injury to personnel. Protective goggles, gloves, and long sleeves must be worn at all times during wire brushing operations. Failure to comply with this warning can result in serious injury to personnel.

1. Using a wire brush and dry cleaning solvent, clean the flange surfaces of the ball valve (figure 2, item 1) and the vessel piping.
2. Position the ball valve (figure 2, item 1) between the vessel piping flanges.
3. Install the new gaskets (figure 2, items 4 and 7) between the ball valve (figure 2, item 1) and the vessel piping flanges.
4. Install the four bolts (figure 2, item 2) and the four nuts (figure 2, item 3) to secure the ball valve (figure 2, item 1) to the vessel piping.
5. Install the four bolts (figure 2, item 5) and the four nuts (figure 2, item 6) to secure the opposite end of the ball valve (figure 2, item 1) to the vessel piping.
6. Perform the Follow-On Service procedure at the end of this work package.

TYPICAL THREADED GLOBE STOP CHECK VALVE REPLACEMENT

REMOVAL

1. Place a suitable drain pan under the unions (figure 3, items 1 and 2) of the threaded globe stop check valve (figure 3, item 3) to be removed.

⚠ CAUTION

Failure to use two wrenches while loosening pipe fittings, couplings, and valves may cause damage to the valves, fittings, couplings, and piping. Always use two wrenches.

2. Loosen the unions (figure 3, items 1 and 2) and allow the fluid to drain into the suitable drain pan.
3. Remove the unions (figure 3, items 1 and 2) from the piping (figure 3, items 4 and 5).
4. Remove the threaded globe stop check valve (figure 3, item 3) and the piping (figure 3, items 4 and 5) as an assembly.

5. Remove the attached piping (figure 3, items 4 and 5) from the threaded globe stop check valve (figure 3, item 3). Retain the piping for installation.

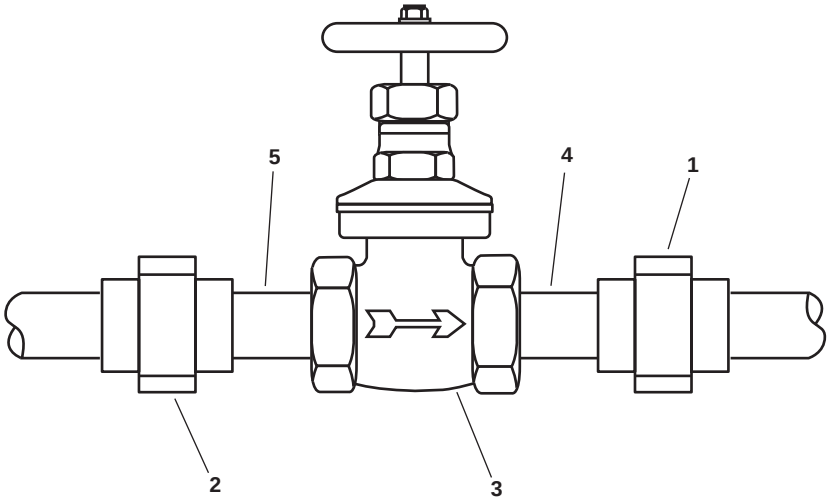
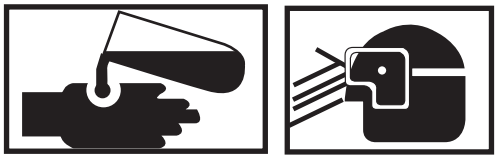


Figure 3. Typical Threaded Globe Stop Check Valve

INSTALLATION

WARNING



Do not allow cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to follow these precautions can result in illness or serious injury.

Removing components by means of wire brushing produces flying particles. These particles can cause serious injury to personnel. Protective goggles, gloves, and long sleeves must be worn at all times during wire brushing operations. Failure to comply with this warning can result in serious injury to personnel.

1. Clean the threaded ends of the piping (figure 3, items 4 and 5) with a wire brush and apply antiseizing tape to the threaded ends of the piping.

⚠ CAUTION

Failure to use two wrenches while tightening pipe fittings, couplings, and valves may cause damage to the valves, fittings, couplings, and piping. Always use two wrenches.

2. Install the piping (figure 3, items 4 and 5) in the threaded globe stop check valve (figure 3, item 3).

3. Install the threaded globe stop check valve (figure 3, item 3) and the piping (figure 3, items 4 and 5) between the unions (figure 3, items 1 and 2).

4. Tighten the unions (figure 3, items 1 and 2).

5. Perform the Follow-On Service procedure at the end of this work package.

TYPICAL FLANGED ANGLE HOSE GLOBE VALVE REPLACEMENT

REMOVAL

1. Place a suitable drain pan under the cap (figure 4, item 1).

2. Remove the cap (figure 4, item 1) and partially OPEN the valve (figure 4, item 2) to vent any pressure or fluid from the valve.

3. Place the suitable drain pan under the valve (figure 4, item 2).

4. Loosen, but do not remove, the four bolts (figure 4, item 3) and the four nuts (figure 4, item 4).

5. Allow time for any fluid to drain into the suitable drain pan.

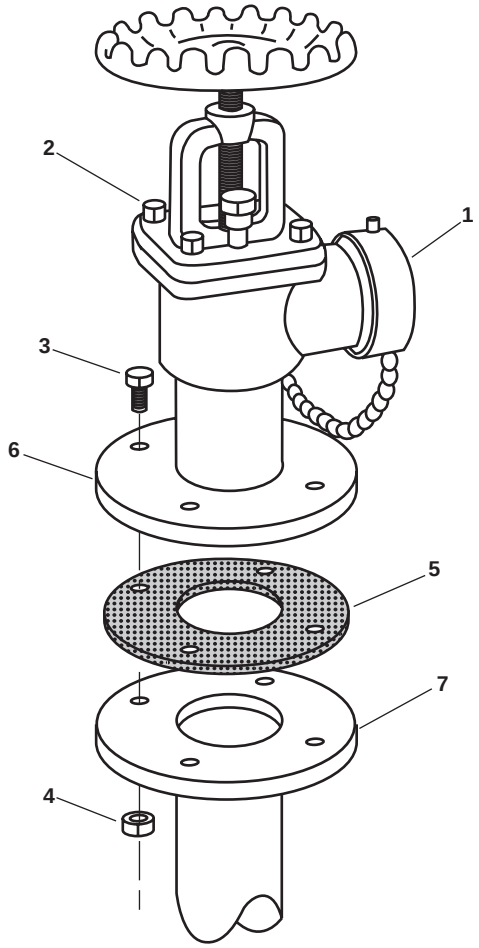


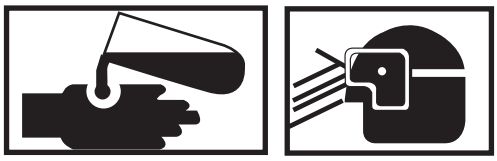
Figure 4. Typical Flanged Angle Hose Globe Valve

6. Remove the four bolts (figure 4, item 3) and the four nuts (figure 4, item 4), and remove the valve (figure 4, item 2) from the standing piping.

7. Remove and discard the gasket (figure 4, item 5).

INSTALLATION

WARNING



Do not allow cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to follow these precautions can result in illness or serious injury.

Removing components by means of wire brushing produces flying particles. These particles can cause serious injury to personnel. Protective goggles, gloves, and long sleeves must be worn at all times during wire brushing operations. Failure to comply with this warning can result in serious injury to personnel.

1. Using a wire brush and dry cleaning solvent, clean the piping flange (figure 4, item 7).

2. Install a new gasket (figure 4, item 5) on the piping flange (figure 4, item 7). Place the valve (figure 4, item 2) on the piping flange.

3. Secure the valve (figure 4, item 2) with the four bolts (figure 4, item 3) and the four nuts (figure 4, item 4).

4. Perform the Follow-On Service procedure at the end of this work package.

TYPICAL FLANGED GLOBE STOP CHECK VALVE REPLACEMENT

REMOVAL

1. Partially OPEN the valve (figure 5, item 1) to vent any pressure.

2. Place a suitable drain pan under the valve (figure 5, item 1).

3. Loosen, but do not remove, the eight bolts (figure 5, item 2) and the eight nuts (figure 5, item 3) and allow any fluid to drain into the suitable drain pan.

4. After the fluid drains from the valve (figure 5, item 1), remove the eight bolts (figure 5, item 2) and the eight nuts (figure 5, item 3).

6. Remove and discard the gaskets (figure 5, item 4), and remove the valve (figure 5, item 1) from the vessel piping.

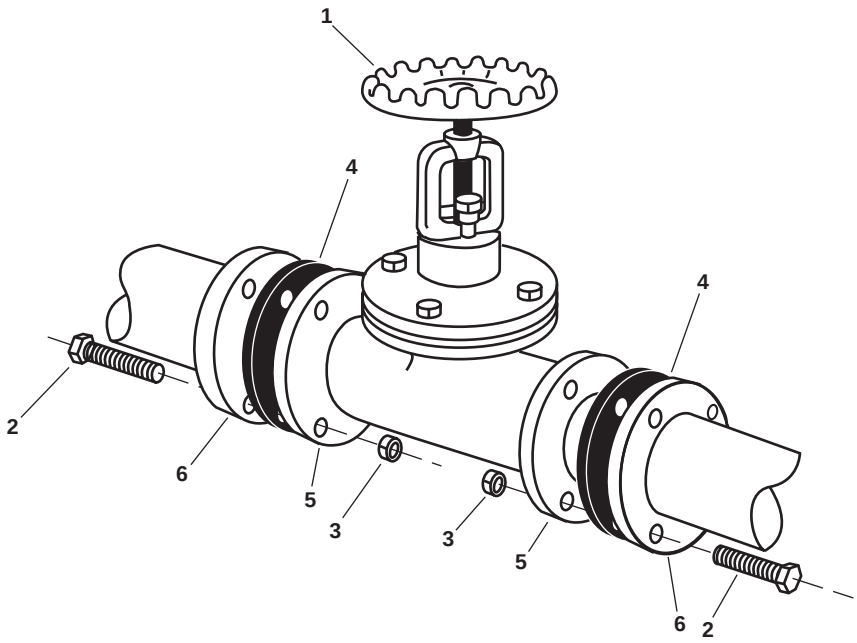
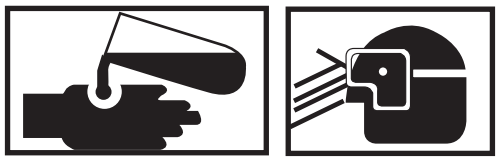


Figure 5. Typical Flanged Globe Stop Check Valve

INSTALLATION

WARNING



Do not allow cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to follow these precautions can result in illness or serious injury.

Removing components by means of wire brushing produces flying particles. These particles can cause serious injury to personnel. Protective goggles, gloves, and long sleeves must be worn at all times during wire brushing operations. Failure to comply with this warning can result in serious injury to personnel.

1. Using a wire brush and dry cleaning solvent, clean the piping flanges (figure 5, item 6) and valve flanges (figure 5, item 5).

2. Install two new gaskets (figure 5, item 4) on the piping flanges (figure 5, item 6).

3. Install the valve (figure 5, item 1) and secure it with the eight bolts (figure 5, item 4) and the eight nuts (figure 5, item 3).

5. Perform the Follow-On Service procedure at the end of this work package.

TYPICAL BALL VALVE REPAIR

DISASSEMBLY

1. Perform the Typical Flanged Ball Valve Removal procedure in this work package.

2. Remove the lever nut (figure 6, item 1) and the handle (figure 6, item 2) from the valve body (figure 6, item 3).

3. Remove the packing gland (figure 6, item 4) and the valve stem packing (figure 6, item 5) from the valve body (figure 6, item 3). Discard the valve stem packing.

4. Remove the valve stem (figure 6, item 6) and the valve stem bearing (figure 6, item 7) from the valve body (figure 6, item 3).

5. Remove the retainer (figure 6, item 8) from the valve body (figure 6, item 3).

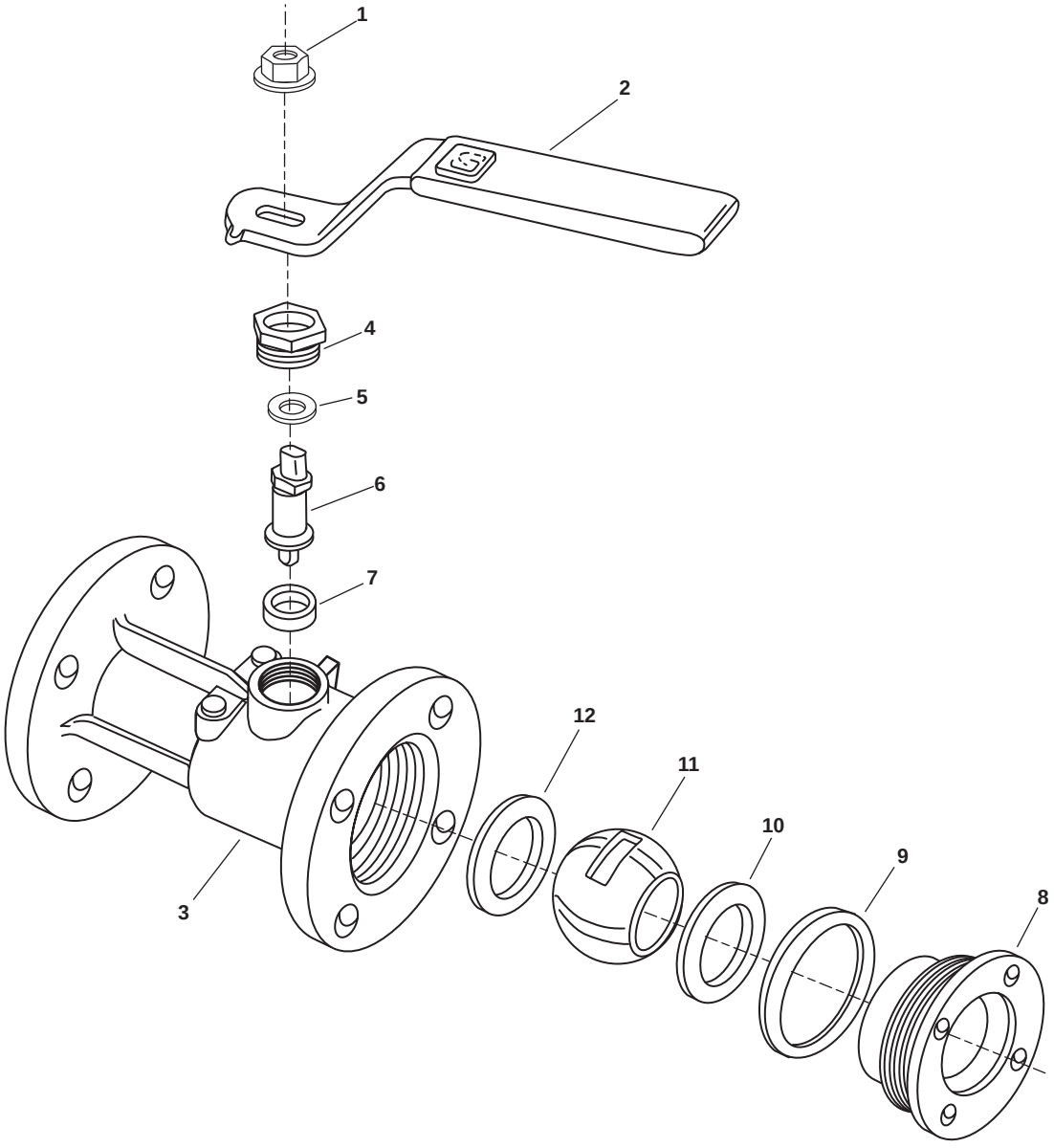


Figure 6. Typical Flanged Globe Stop Check Valve

6. Remove and discard the valve body seal (figure 6, item 9) from the valve body (figure 6, item 3).

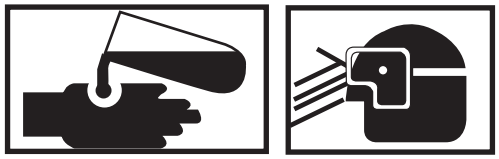
7. Remove the seat (figure 6, item 10), the ball (figure 6, item 11), and the remaining seat (figure 6, item 12) from the valve body (figure 6, item 3).

8. Inspect all component parts for unusual wear or damage.

9. Inspect for any binding, scoring, or burrs on the valve stem bearing (figure 6, items 7).

ASSEMBLY

WARNING



Do not allow cleaning solvents to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil, and cleaning solvents. Failure to follow these precautions can result in illness or serious injury.

Removing components by means of wire brushing produces flying particles. These particles can cause serious injury to personnel. Protective goggles, gloves, and long sleeves must be worn at all times during wire brushing operations. Failure to comply with this warning can result in serious injury to personnel.

1. Using a wire brush and dry cleaning solvent, clean all metal parts of the valve.

2. Install the seat (figure 6, item 12), the ball (figure 6, item 11), and the remaining seat (figure 6, item 10) in the valve body (figure 6, item 3).

3. Install a new valve body seal (figure 6, item 9) on the retainer (figure 6, item 8).

4. Install the retainer (figure 6, item 8) in the valve body (figure 6, item 3).

5. Install the valve stem bearing (figure 6, item 7) and the valve stem (figure 6, item 6) in the valve body (figure 6, item 3).

6. Install the new stem packing (figure 6, item 5) in the valve body (figure 6, item 3).

7. Install the packing gland (figure 6, item 4) in the valve body (figure 6, item 3). Tighten the packing gland.

8. Install the handle (figure 6, item 2) with the the lever nut (figure 6, item 1) on the valve body (figure 6, item 3). Tighten the lever nut.

9. Perform the Typical Ball Valve Installation procedure in this work package.

10. Perform the Follow-On Service procedure at the end of this work package.

TYPICAL GLOBE STOP CHECK VALVE REPAIR

DISASSEMBLY

1. Perform the Typical Flanged Globe Stop Check Valve Removal procedure in this work package.
2. Remove the nut (figure 7, item 1) and handwheel (figure 7, item 2) from the stem (figure 7, item 3).
3. Remove the four nuts (figure 7, item 4) and four bolts (figure 7, item 5) securing the bonnet (figure 7, item 6).
4. Remove the bonnet (figure 7, item 6), shaft (figure 7, item 3), and valve seat (figure 7, item 7) from the body (figure 7, item 8) as an assembly.
5. Remove and discard the gasket (figure 7, item 9).
6. If the valve seat (figure 7, item 7) is damaged, pitted, or corroded, remove and discard it.
7. Remove the packing gland nut (figure 7, item 10) and silicone O-ring (figure 7, item 11) and rubber O-ring (figure 7, item 12) from the bonnet (figure 7, item 6).

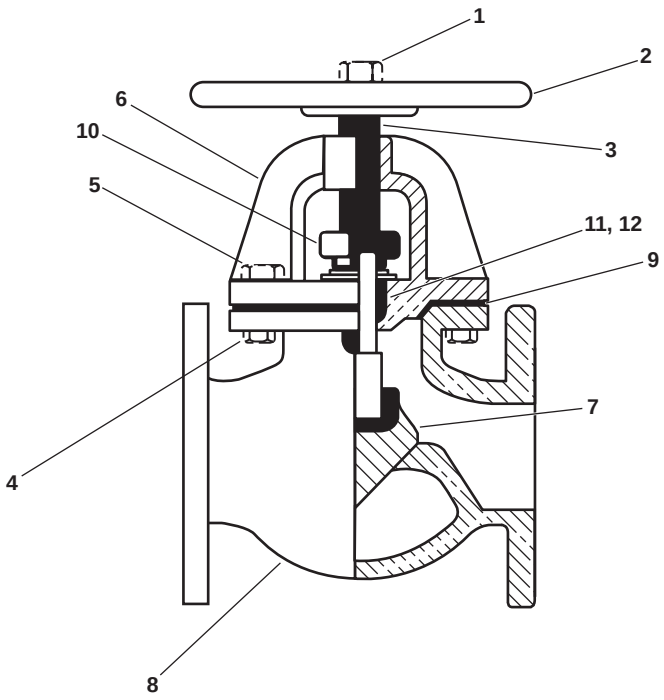


Figure 7. Typical Globe Stop Check Valve Repair

ASSEMBLY

1. Lubricate a new rubber O-ring (figure 7, item 12) with clear water and slide it over the stem (figure 7, item 3) and into the bonnet (figure 7, item 6).
2. Lubricate a new silicone O-ring (figure 7, item 11) with clear water and slide it over the stem (figure 7, item 3) and into the bonnet (figure 7, item 6).

3. Loosely install the packing gland nut (figure 7, item 10) into the bonnet (figure 7, item 6).

4. If the valve seat (figure 7, item 7) was removed during Disassembly, install a new valve seat on the stem (figure 7, item 3).

5. Position a new gasket (figure 7, item 9) on the body (figure 7, item 8).

6. Place the bonnet (figure 7, item 6), shaft (figure 7, item 3), and valve seat (figure 7, item 7) into the body (figure 7, item 8) as an assembly and secure the bonnet with the four nuts (figure 7, item 4) and four bolts (figure 7, item 5).

7. Place the handwheel (figure 7, item 2) on the stem (figure 7, item 3) and secure it with the nut (figure 7, item 1).

8. Perform the Typical Flanged Globe Stop Check Valve Installation procedure in this work package.

9. Perform the Follow-On Service procedure at the end of this work package.

FOLLOW-ON SERVICE

1. Remove the lockouts and tagouts (FM 55-502).

2. Pressurize the fire main (WP 0005 00).

3. Check for leaks and proper operation.

4. Return the equipment to the desired readiness condition.

END OF WORK PACKAGE

UNIT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
FIRE DETECTION SYSTEM, TEST

INITIAL SETUP:

Tools and Special Tools:
Tool Kit, General Mechanic's (Item 1, Table 2, WP 0046 00)
Heat Gun (Item 15, Table 2, WP 0046 00)

Materials/Parts:
Smoke (Item 7, Table 1, WP 0050 00)

Personnel Required:
Two Watercraft Engineers, 88L

References:
DA Form 4640
DA Form 4993
WP 0046 00
WP 0050 00

Equipment Conditions:
Set to ON the FIRE DETECTION SYSTEM. circuit breaker in 120V emergency distribution panel No. 1.
OPEN the fire detection panel and have the key available.

IONIZATION SMOKE DETECTOR TESTING

NOTE

Prior to initiating the ionization smoke detector test, notify the proper personnel that a test will be performed so that any alarm soundings can be ignored during the test period.

1. Activate an ionization smoke detector (figure 1, item 1) by discharging a 1 to 2 second blast of smoke (figure 1, item 2) at one of the smoke detectors.

2. Observe that the following events occur:

   a. The ionization smoke detector Light Emitting Diode (LED) (figure 1, item 3) illuminates.

NOTE

The fire detection panel has a green and red LED for each zone. The green LED indicates the system is operating normally and the red LED indicates an abnormal condition in the zone. A red LED requires an investigation by the crew to determine the cause of the abnormal condition.

   b. The audible alarm bell (figure 2, item 1) sounds in the Enclosed Operating Station (EOS) and the proper zone LED (figure 2, item 2) illuminates on the fire detection panel (figure 2, item 3).

   c. The audible alarm bell sounds in the pilothouse (figure 3, item 1) and the proper zone indicator (figure 3, item 2) illuminates on the remote indicating panel (figure 3, item 3).

3. Press the ALARM SILENCE switch (figure 4, item 1) on the CP-35 CONTROL UNIT (figure 4, item 2) and observe the following:

   a. The audible alarm bell (figure 2, item 1) has silenced in the EOS.

   b. The audible alarm bell (figure 3, item 1) has silenced in the pilothouse.

   c. The ALARM FLASHING WHEN SILENCED LED (figure 4, item 3) on the CP-35 CONTROL UNIT (figure 4, item 2) is flashing.

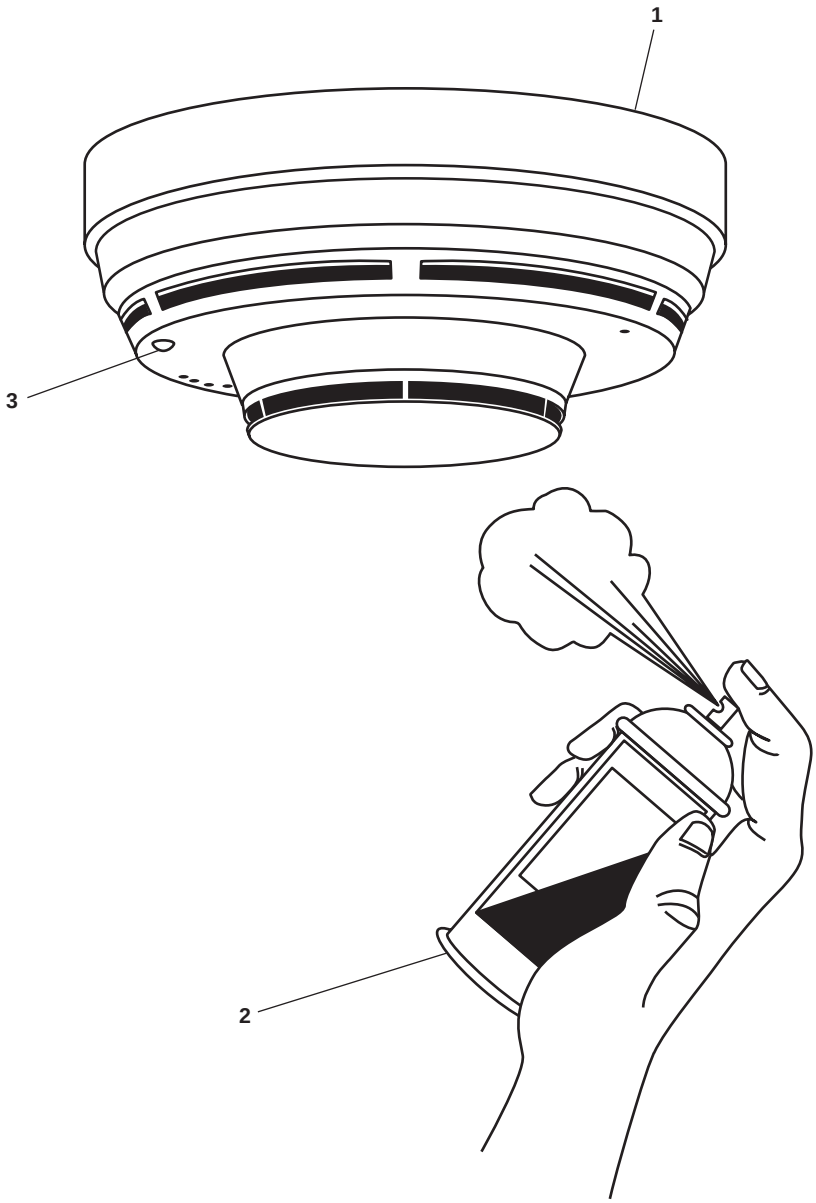


Figure 1. ionization Smoke Detector Testing

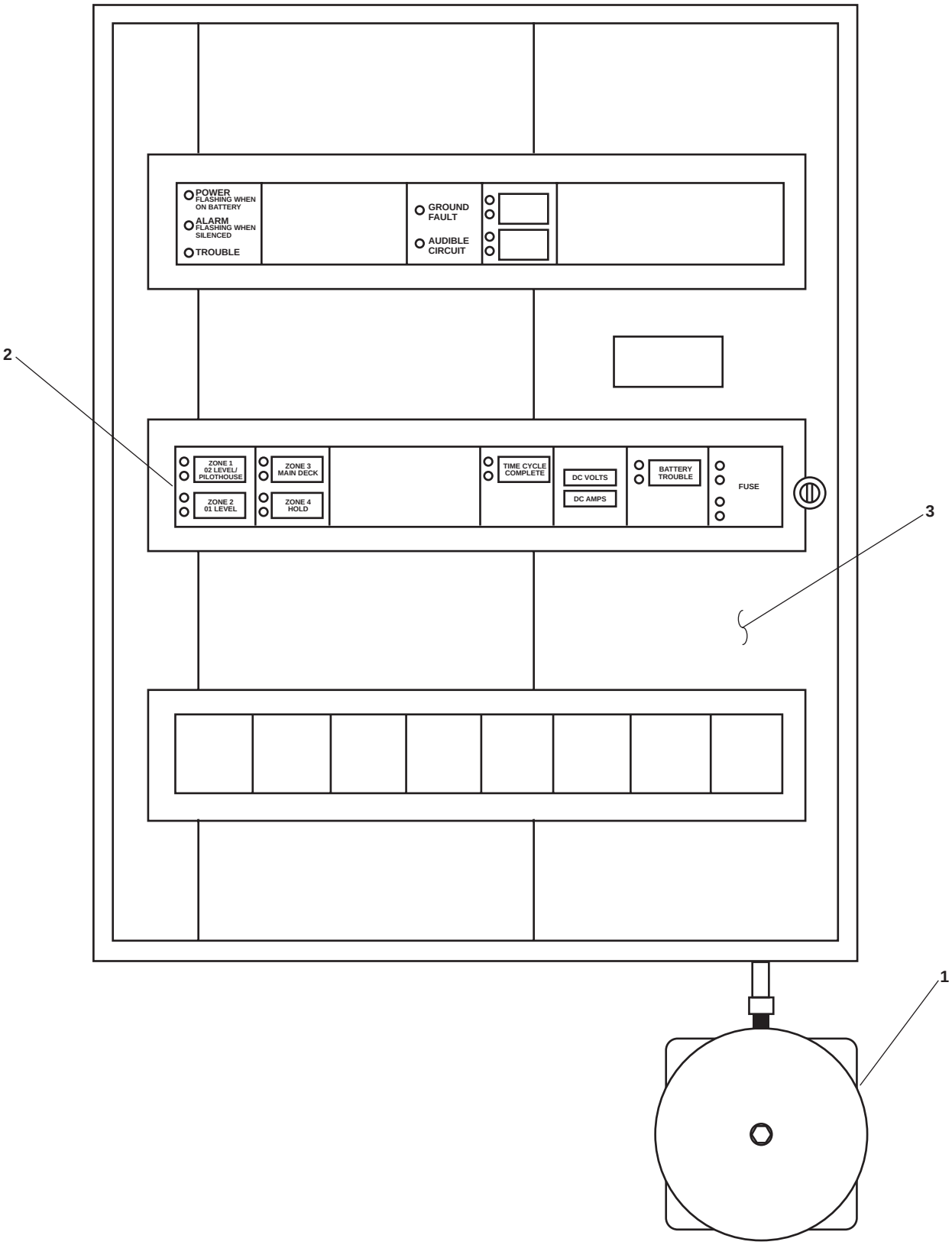


Figure 2. Fire and Smoke Detection Panel and Alarm Bell

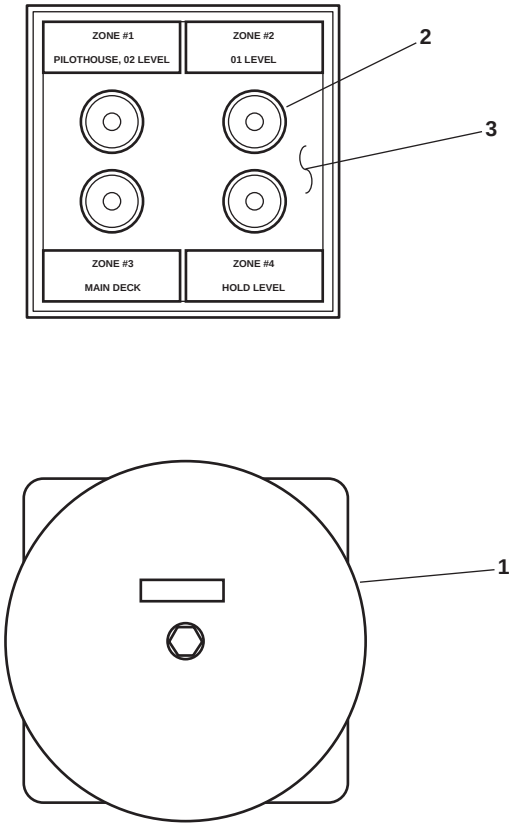


Figure 3. Remote Indicating Panel and Alarm Bell

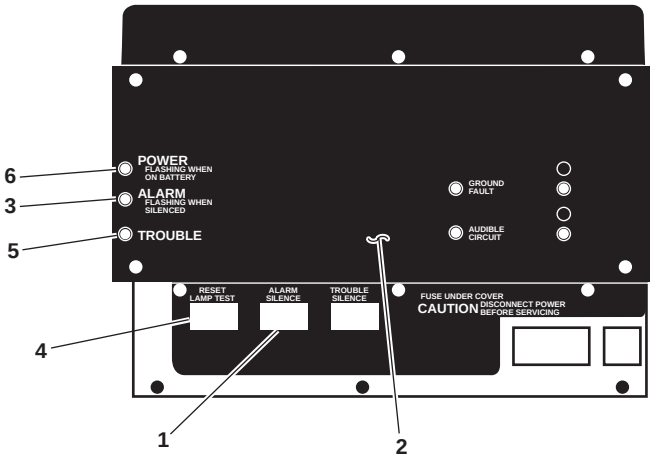


Figure 4. CP-35 Control Unit

4. Reset the fire detection control panel (figure 2, item 3) by pressing the RESET LAMP TEST switch (figure 4, item 4) on the CP-35 CONTROL UNIT (figure 4, item 2) momentarily and observe the following:

   a. The audible alarm bell (figure 2, item 1) in the EOS sounds and all zone LEDs (figure 2, item 2) illuminate on the fire detection panel (figure 2, item 3).

   b. The audible alarm bell (figure 3, item 1) in the pilothouse sounds and all zone indicators (figure 3, item 2) illuminate on the remote indicating panel (figure 3, item 3).

   c. The TROUBLE LED (figure 4, item 5) on the CP-35 CONTROL UNIT (figure 4, item 2) illuminates.

   d. All audible alarms (figures 2 and 3 item 1) silence and all LEDs (figures 2 and 3, item 2 and figure 4, items 3 and 5) extinguish.

   e. The POWER FLASHING WHEN ON BATTERY LED (figure 4, item 6) is illuminated and not flashing.

   f. All zone LEDs (figure 2, item 2) on the fire detection panel (figure 2, item 3) are illuminated with the green LED.

5. Perform the Follow-On Service procedure at the end of this work package.

THERMAL HEAT DETECTOR TESTING

NOTE

Prior to initiating the thermal heat detector test, notify the proper personnel that a test will be performed so that any alarm soundings can be ignored during the test period.

1. Activate a thermal heat detector (figure 5, item 1) using a heat gun and observe the following:

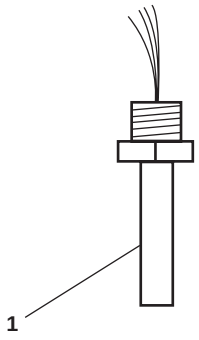


Figure 5. Thermal Heat Detector

NOTE

The fire detection panel has a green and red LED for each zone. The green LED indicates the system is operating normally and the red LED indicates an abnormal condition in the zone. A red LED requires an investigation by the crew to determine the cause of the abnormal condition.

   a. The audible alarm bell (figure 2, item 1) sounds in the Enclosed Operating Station (EOS) and the proper zone LED (figure 2, item 2) illuminates on the fire detection panel (figure 2, item 3).

   b. The audible alarm bell sounds in the pilothouse (figure 3, item 1) and the proper zone indicator (figure 3, item 2) illuminates on the remote indicating panel (figure 3, item 3).

2. Press the ALARM SILENCE switch (figure 4, item 1) on the CP-35 CONTROL UNIT (figure 4, item 2) and observe the following:

   a. The audible alarm bell (figure 2, item 1) has silenced in EOS

   b. The audible alarm bell (figure 3, item 1) has silenced in the pilothouse

   c. The ALARM FLASHING WHEN SILENCED LED (figure 4, item 3) on the CP-35 CONTROL UNIT (figure 4, item 2) is flashing

3. Reset the fire detection panel (figure 2, item 3) by pressing the RESET LAMP TEST switch (figure 4, item 4) on the CP-35 CONTROL UNIT (figure 4, item 2) momentarily and observe the following:

   a. The audible alarm bell (figure 2, item 1) in the EOS sounds and all zone LEDs (figure 2, item 2) illuminate on the fire detection panel (figure 2, item 3)

   b. The audible alarm bell (figure 3, item 1) in the pilothouse sounds and all zone indicators (figure 3, item 2) illuminate on the remote indicating panel (figure 3, item 3)

   c. The TROUBLE LED (figure 4, item 5) on the CP-35 CONTROL UNIT (figure 4, item 2) illuminates

   d. All audible alarms (figures 2 and 3, item 1) silence and all LEDs (figures 2 and 3, item 2 and figure 4, items 3 and 5) extinguish

   e. The POWER FLASHING WHEN ON BATTERY LED (figure 4, item 6) is illuminated and not flashing

   f. All zone LEDs (figure 2, item 2) on the fire detection panel (figure 2, item 3) are illuminated with the green LED

4. Perform the Follow-On Service procedure at the end of this work package.

FIRE DETECTION PANEL MANUAL FIRE ALARM PULL STATION TESTING

1. Activate the fire detection fire alarm pull station (figure 6, item 1) by grasping the pull down handle (figure 6, item 2) and pulling straight down. Observe the following:

NOTE

The fire detection panel has a green and red LED for each zone. The green LED indicates the system is operating normally and the red LED indicates an abnormal condition in the zone. A red LED requires an investigation by the crew to determine the cause of the abnormal condition.

   a. The audible alarm bell (figure 2, item 1) sounds in the Enclosed Operating Station (EOS) and the proper zone LED (figure 2, item 2) illuminates on the fire detection panel (figure 2, item 3).

   b. The audible alarm bell sounds in the pilothouse (figure 3, item 1) and the proper zone indicator (figure 3, item 2) illuminates on the remote indicating panel (figure 3, item 3).

2. Press the ALARM SILENCE switch (figure 4, item 1) on the CP-35 CONTROL UNIT (figure 4, item 2) and observe the following:

   a. The audible alarm bell (figure 2, item 1) has silenced in EOS.

   b. The audible alarm bell (figure 3, item 1) has silenced in the pilothouse.

   c. The ALARM FLASHING WHEN SILENCED LED (figure 4, item 3) on the CP-35 CONTROL UNIT (figure 4, item 2) is flashing.

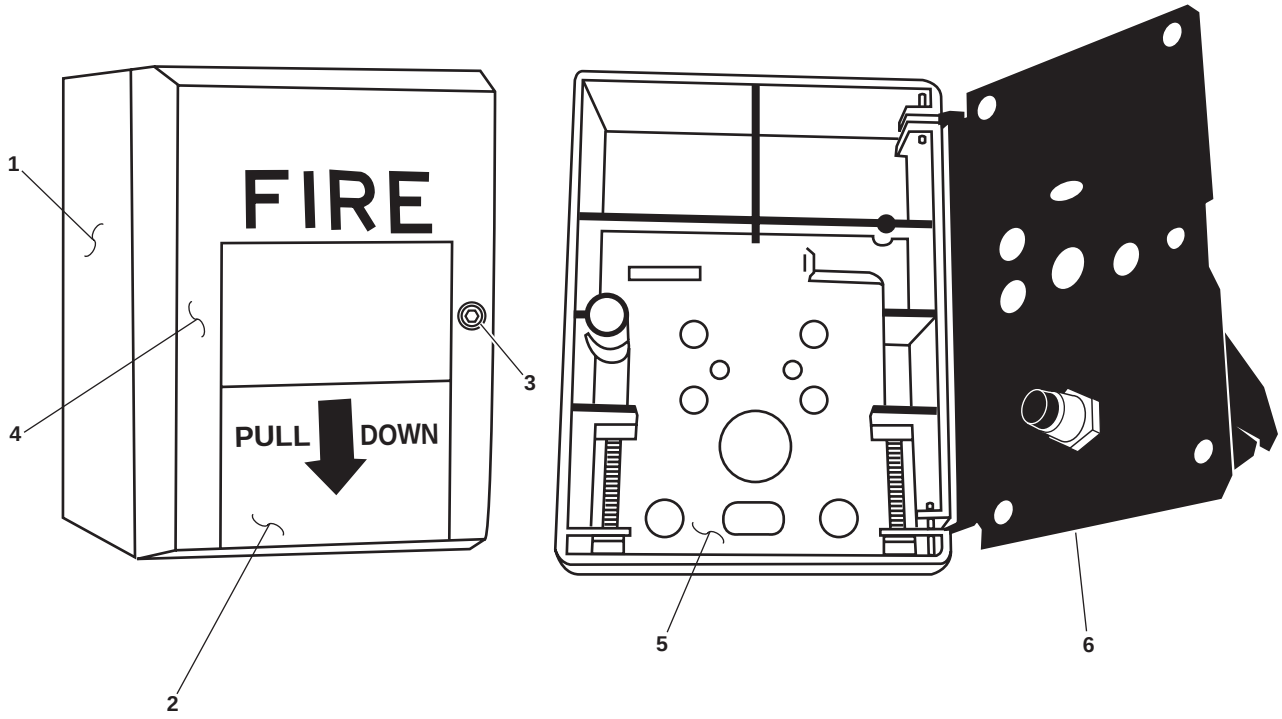


Figure 6. Fire Detection Panel Fire Alarm Pull Station

3. Reset the fire detection panel fire alarm pull station (figure 6, item 1) by loosening the locking screw (figure 6, item 3), opening the hinged cover (figure 6, item 4), locking the body (figure 6, item 5) into the back plate (figure 6, item 6), and securing the hinged cover with the locking screw.

4. Reset the fire detection panel (figure 2, item 3) by momentarily pressing the RESET LAMP TEST switch (figure 4, item 4) on the CP-35 CONTROL UNIT (figure 4, item 2) and observe the following:

    a. The audible alarm bell (figure 2, item 1) in the EOS sounds and all zone LEDs (figure 2, item 2) illuminate on the fire detection panel (figure 2, item 3).

    b. The audible alarm bell (figure 3, item 1) in the pilothouse sounds and all zone indicators (figure 3, item 2) illuminate on the remote indicating panel (figure 3, item 3).

    c. The TROUBLE LED (figure 4, item 5) on the CP-35 CONTROL UNIT (figure 4, item 2) illuminates.

    d. All audible alarms (figures 2 and 3, item 1) silence and all LEDs (figures 2 and 3, item 2 and figure 4, items 3 and 5) extinguish.

    e. The POWER FLASHING WHEN ON BATTERY LED (figure 4, item 6) is illuminated and not flashing.

    f. All zone LEDs (figure 2, item 2) on the fire detection panel (figure 2, item 3) are illuminated with the green LED.

5. Perform the Follow-On Service procedure at the end of this work package.

FOLLOW-ON SERVICE

1. Return the fire detection panel and its sensors to the desired readiness condition.

2. CLOSE and secure the fire detection panel door.

3. Notify the appropriate personnel that the fire detection system testing has been completed and that subsequent alarms are not part of the test.

4. Make the appropriate log entries in DA Form 4640 (Harbor Boat Deck Department Log for Class A&B Vessels) and DA Form 4993 (Harbor Boat Engine Department Log for Class A and C-1 Vessels) concerning the fire detection system test.

END OF WORK PACKAGE

UNIT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
FIRE DETECTION SYSTEM, REPAIR

INITIAL SETUP:

Tools and Special Tools:
Tool Kit, General Mechanic's (Item 1, Table 2, WP 0046 00)

Materials/Parts:
Tag, Danger (Item 8, Table 1, WP 0050 00)
Lamp (Item 9, Figure 2, WP 0048 00)

Personnel Required:
Two Watercraft Engineers, 88L

References:
FM 55-502
WP 0017 00
WP 0046 00
WP 0048 00
WP 0050 00

Equipment Conditions:
Set to OFF the FIRE DETECTION SYSTEM. circuit breaker in 120V emergency distribution panel No. 1. Lock out and tag out (FM 55-502).

LAMP REPLACEMENT (PILOTHOUSE)

REMOVAL

Death, serious injury, or equipment damage can result from contact with live electrical circuits. Before beginning work on this or any other electrical equipment, ensure that circuit breakers identified in the initial setup conditions are OFF, locked out, and tagged out (FM 55-502).

1. Unscrew and remove the lens cover (figure 1, item 1) from the lamp (figure 1, item 2) located on the remote indicating panel (figure 1, item 3).

2. Remove the lamp (figure 1, item 2) from the socket (figure 1, item 4) by pushing the lamp in slightly. Discard the lamp.

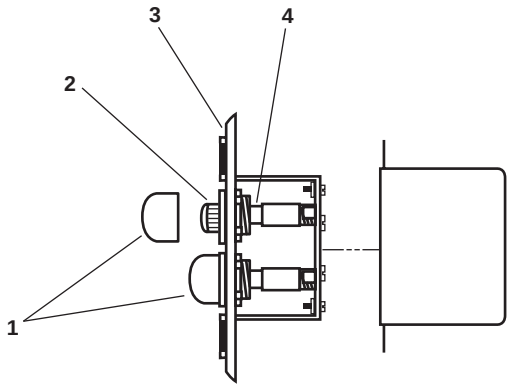


Figure 1. Fire Detection System Warning Light Replacement (Remote Indicator Panel)

INSTALLATION

1. Install the lamp (figure 1, item 2) in the socket (figure 1, item 4).
2. Install the lens cover (figure 1, item 1) over the lamp (figure 1, item 2).
3. Remove the lockouts and tagouts (FM 55-502).
4. Set to ON the FIRE DETECTION SYSTEM. circuit breaker in 120V emergency distribution panel No. 1.
5. Test the fire detection system (WP 0017 00), ensuring that the warning lights on the remote indicating panel (figure 1, item 3) are operating properly.

END OF WORK PACKAGE

UNIT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
FIRE DETECTION SYSTEM, REPLACE

INITIAL SETUP:

Tools and Special Tools:
Tool Kit, General Mechanic's (Item 1, Table 2, WP 0046 00)
Multimeter (Item 3, Table 2, WP 0046 00)

Materials/Parts:
Tag, Danger (Item 8, Table 1, WP 0050 00)

Personnel Required:
Two Watercraft Engineers, 88L

References:
FM 55-502
WP 0017 00
WP 0046 00
WP 0050 00

Equipment Conditions:
Set to OFF the FIRE DETECTION SYSTEM. circuit breaker in 120V emergency distribution panel No. 1. Lock out and tag out (FM 55-502).

IONIZATION SMOKE DETECTOR REPLACEMENT

REMOVAL

1. Turn the ionization smoke detector cover (figure 1, item 1) slightly counterclockwise and remove.

Take great care when working around electrical equipment. Contact between unprotected body parts and electrical conductors can cause serious injury or death. Do not wear jewelry or other conductive items while servicing energized electrical equipment. Failure to comply with these precautions can cause serious injury or death.

2. Take voltage readings with a multimeter at the terminals (figure 1, item 2) to ensure that the electrical circuits are deenergized. If voltage is present, ensure that the proper circuit breakers are OFF, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.

3. Label and disconnect the electrical wiring (figure 1, item 3) from the terminals (figure 1, item 2). If an end of line device (capacitor) (figure 1, item 4) is connected to the terminals, remove the capacitor and set it aside for later installation.

4. Remove the two screws (figure 1, item 5) that secure the ionization smoke detector back plate (figure 1, item 6) to the junction box (figure 1, item 7).

5. Remove the ionization smoke detector back plate (figure 1, item 6).

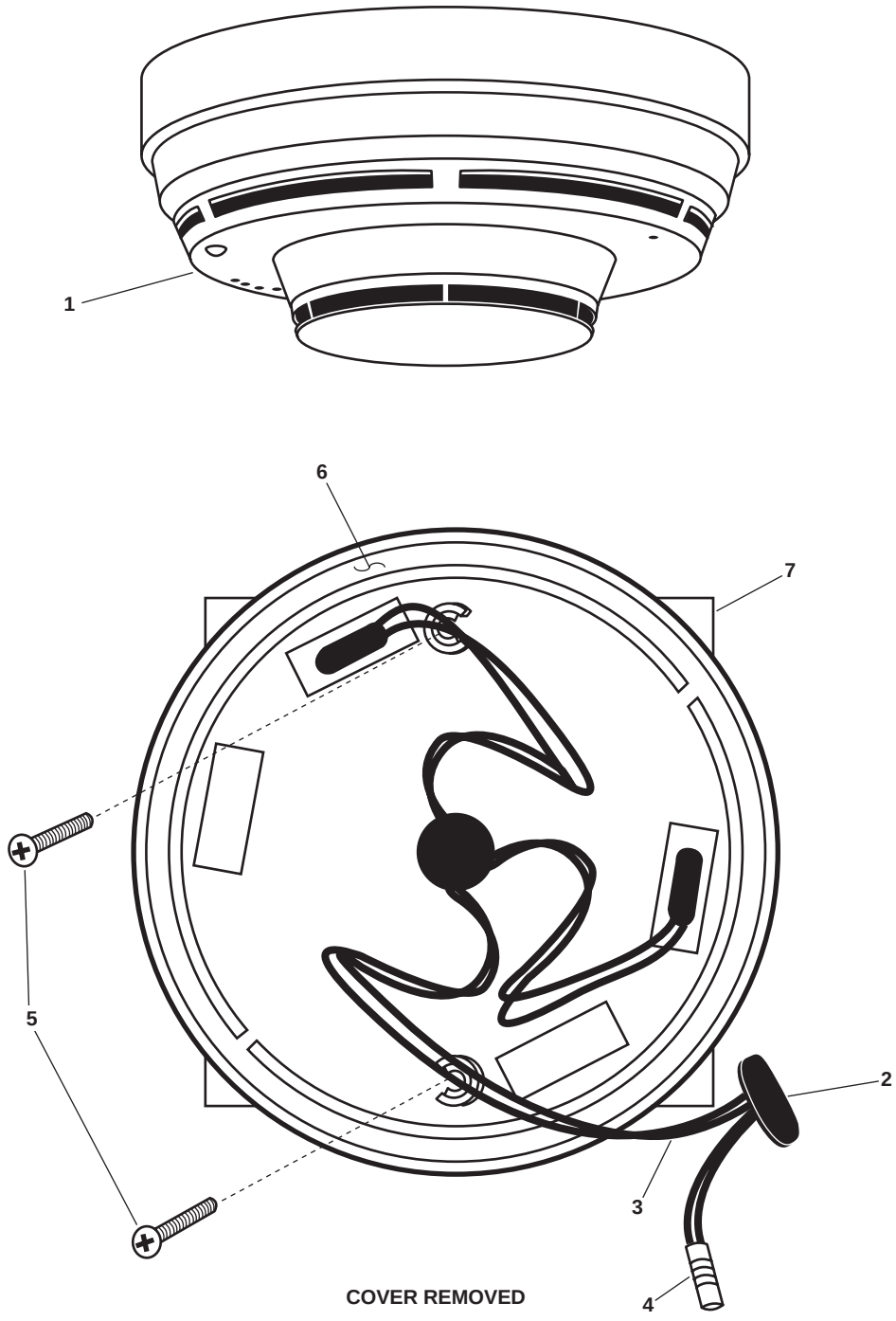


Figure 1. Ionization Smoke Detector

INSTALLATION

1. Attach the new ionization smoke detector back plate (figure 1, item 6) to the junction box (figure 1, item 7) with the two screws (figure 1, item 5).

2. Connect the electrical wiring (figure 1, item 3) to the terminals (figure 1, item 2) using the labels from step 3 of Removal as a guide. If an end of line device (capacitor) (figure 1, item 4) was removed during Removal, connect the capacitor to the terminals. Remove the labels.

3. Install the ionization smoke detector cover (figure 1, item 1).

4. Perform the Follow-On Service procedure at the end of this work package.

THERMAL HEAT DETECTOR REPLACEMENT

REMOVAL

1. Remove the two screws (figure 2, item 1) that secure the junction box cover (figure 2, item 2) to the junction box (figure 2, item 3), and remove the junction box cover.

Take great care when working around electrical equipment. Contact between unprotected body parts and electrical conductors can cause serious injury or death. Do not wear jewelry or other conductive items while servicing energized electrical equipment. Failure to comply with these precautions can cause serious injury or death.

2. Label and disconnect the wiring (figure 2, item 4).

3. Remove the retaining nut (figure 2, item 5), and remove the thermal heat detector (figure 2, item 6) from the junction box cover (figure 2, item 2).

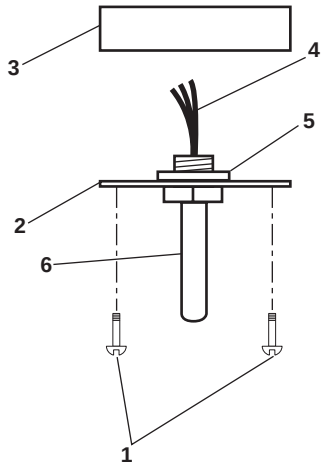


Figure 2. Thermal Heat Detector

INSTALLATION

1. Install the thermal heat detector (figure 2, item 6) into the junction box cover (figure 2, item 2), and secure it with the retaining nut (figure 2, item 5).

2. Connect the wiring (figure 2, item 4) using the labels from step 2 of Removal as a guide. Remove the labels.

3. Install the junction box cover (figure 2, item 2) on the junction box (figure 2, item 3), and secure it with the two screws (figure 2, item 1).

4. Perform the Follow-On Service procedure described at the end of this work package.

FOLLOW-ON SERVICE

1. Remove the lockouts and tagouts (FM 55-502).

2. Set to ON the FIRE DETECTION SYSTEM. circuit breaker in 120V emergency distribution panel No. 1.

3. Test the fire detection system (WP 0017 00) and observe that the system operates properly.

4. Return the equipment to the desired readiness condition.

END OF WORK PACKAGE

UNIT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
AFFF PUMP; SERVICE, REPAIR

INITIAL SETUP:

Tools and Special Tools:
Tool Kit, General Mechanic's (Item 1, Table 2, WP 0046 00)
Lubricating Gun, Hand (Item 20, Table 2, WP 0046 00)
Suitable Drain Pan

Materials/Parts:
Cloth, Abrasive (Item 1, Table 1, WP 0050 00)
Dry Cleaning Solvent (Item 2, Table 1, WP 0050 00)
Gloves, Chemical and Oil Protective (Item 7, Table 3, WP 0049 00)
Goggles, Industrial (Item 9, Table 3, WP 0049 00)
Grease, General Purpose (Item 3, Table 1, WP 0050 00)
Rags, Wiping (Item 6, Table 1, WP 0050 00)
Tag, Danger (Item 8, Table 1, WP 0050 00)

Personnel Required:
Two Watercraft Engineers, 88L

References:
FM 55-502
WP 0005 00
WP 0046 00
WP 0049 00
WP 0050 00

Equipment Conditions:
Set to OFF the AFFF PUMP circuit breaker on the main switchboard. Lock out and tag out (FM 55-502).
CLOSE valve FM-84, AFFF TK SUCT. Lock out and tag out (FM 55-502).

AFFF PUMP

SERVICE

1. Visually inspect the AFFF pump and coupling for leaks, loose connections, and damage.

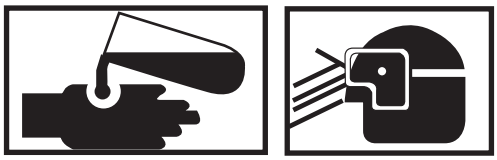
2. Inspect all external electrical wiring leading from the AFFF pump to the AFFF fire pump's motor controller panel for cracked or broken insulation, bare wires, and broken or loose connections.

Do not allow cleaning solvent to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling cleaning solvent. Failure to follow these precautions can result in illness or serious injury.

3. Clean any foreign matter from the surfaces of the AFFF pump and piping with a rag or a wire brush.

4. Remove any surface rust using an abrasive cloth.

WARNING



Do not allow general lubricating oil to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling lubricating oil. Failure to follow these precautions can result in illness or serious injury.

5. Visually observe that the outboard bearing (or the bearing cage) is sufficiently lubricated. Ensure that the bearing and/or bearing cage is lubricated once a month in daily service or equivalent in intermediate service. Perform the following steps if the bearings require lubrication:

   a. Ensure that the fitting (figure 1, item 1) is properly cleaned per above instructions.

   b. Apply two or three shots of grease to the grease fitting (figure 1, item 1) using the lubricating gun.

   c. Clean the surrounding area as necessary following greasing with clean wiping rags.

6. Perform the Follow-On Service procedure at the end of this work package.

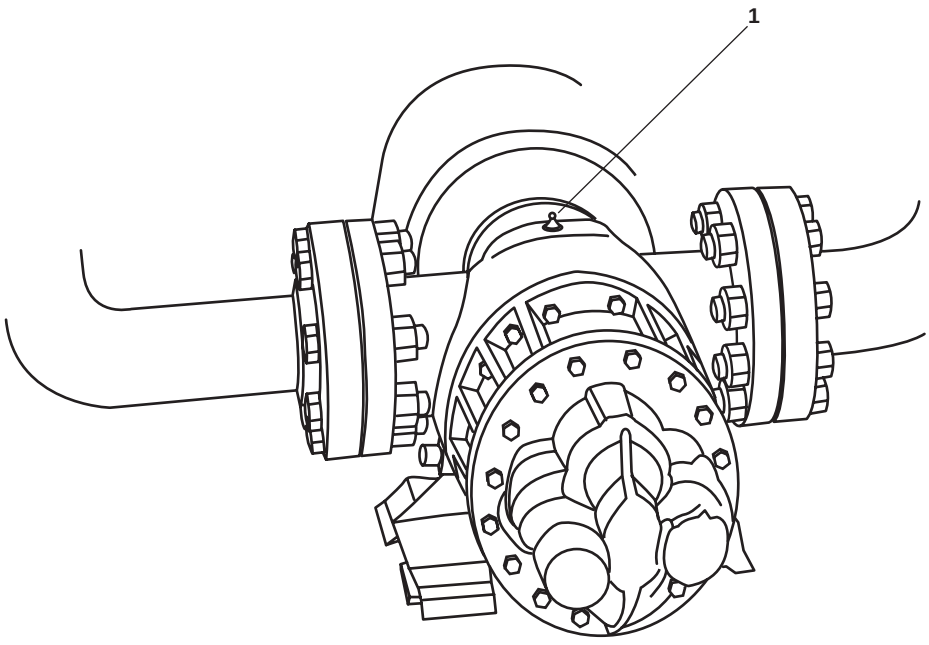


Figure 1. AFFF Pump

INLET STRAINER SERVICE

DISASSEMBLY

1. Place a suitable drain pan under the inlet strainer blow off valve (figure 2, item 1).
2. Remove the four bolts (figure 2, item 2) from the cover (figure 2, item 3), and remove the cover.

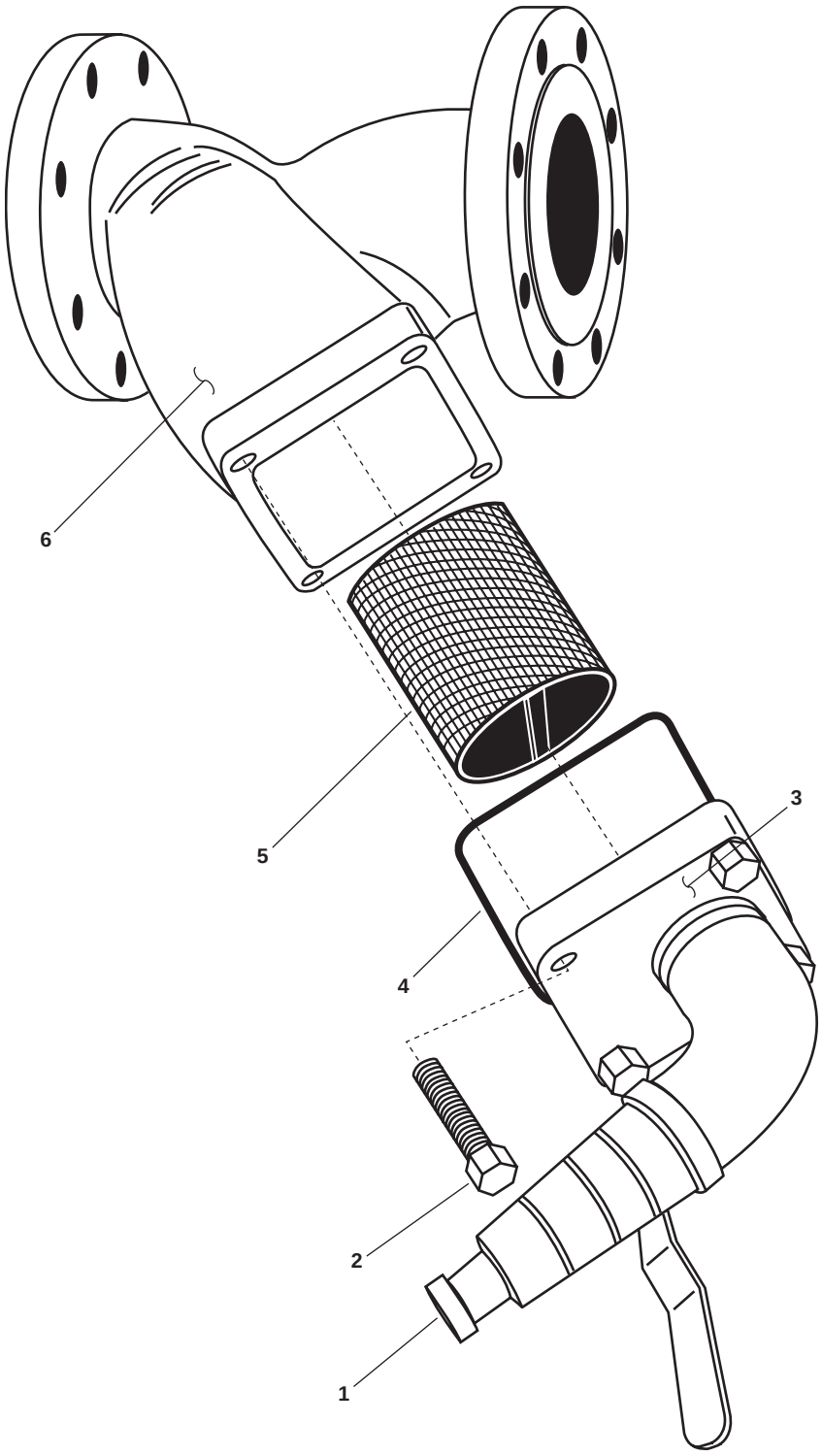


Figure 2. AFFF Pump Inlet Strainer-Service

3. Remove and discard the gasket (figure 2, item 4).

4. Slide the basket (figure 2, item 5) out of the strainer (figure 2, item 6) and clean the mesh screen with soapy water and a wire brush.

WARNING

Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to follow these precautions can result in death or serious injury.

5. If deposits or other debris are found inside the basket (figure 2, item 5), use dry cleaning solvent and a wire brush to clean the basket.

ASSEMBLY

1. Install the cleaned basket (figure 2, item 5) into the strainer (figure 2, item 6).

2. Install a new gasket (figure 2, item 4) and the cover (figure 2, item 3).

3. Secure the cover (figure 2, item 3) with the four bolts (figure 2, item 2).

4. Perform the Follow-On Service procedure at the end of this work package.

INLET STRAINER REPLACEMENT

REMOVAL

1. Remove the four bolts (figure 3, item 1) and four nuts (figure 3, item 2) from each of the flanges (figure 3, item 3).

2. Remove and discard the gaskets (figure 2, item 4) located within each of the flanges (figure 3, item 3).

3. Remove the strainer assembly (figure 2, item 5) from the piping (figure 3, item 6).

4. Thoroughly clean the flanges (figure 3, item 3).

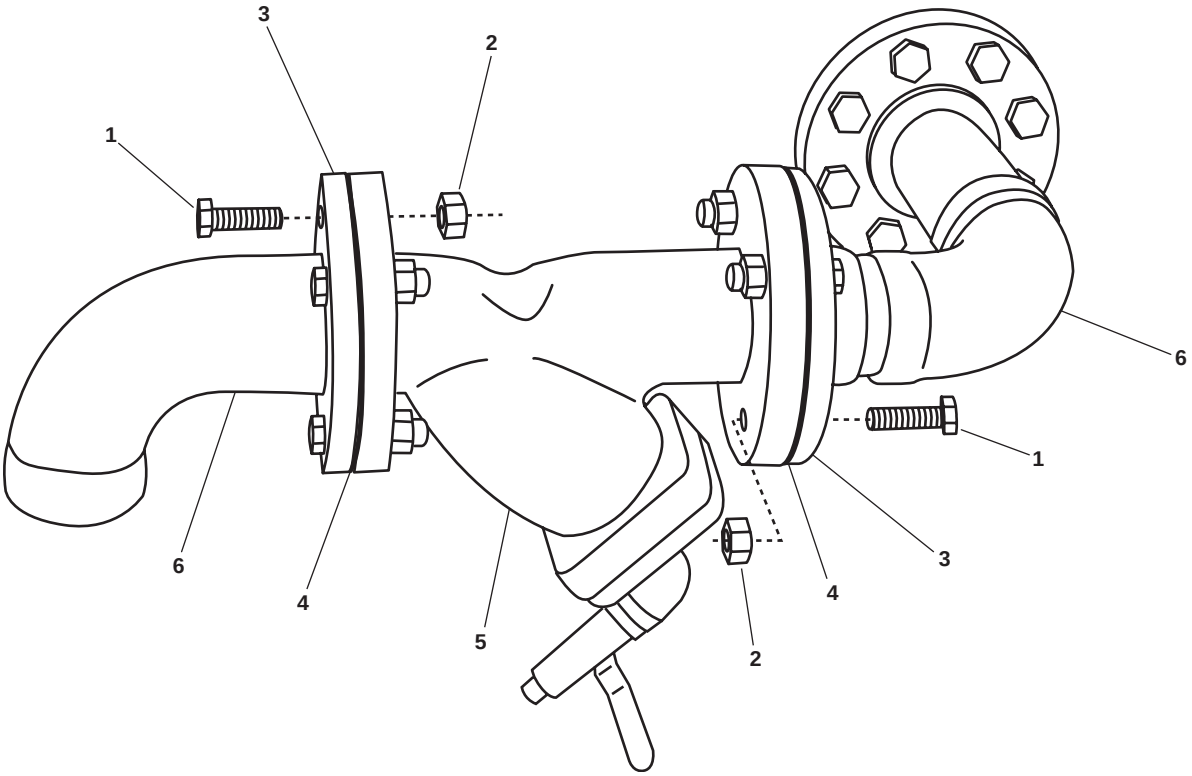


Figure 3. AFFF Pump Inlet Strainer-Replacement

INSTALLATION

1. Position the new strainer assembly (figure 3, item 5) to the piping (figure 3, item 6) with the new gaskets (figure 3, item 4), and loosely secure with the four bolts (figure 3, item 1) and four nuts (figure 3, item 2) for each flange (figure 3, item 3). Loosen the clamp on the section line as needed.

2. Ensure that the flanges (figure 3, item 3) are aligned before tightening the bolts (figure 3, item 1).

3. Tighten the four bolts (figure 3, item 1) on each flange (figure 3, item 3).

4. Perform the Follow-On Service procedure at the end of this work package.

FOLLOW-ON SERVICE

1. Remove the lockouts and tagouts (FM 55-502).

2. Set to ON the AFFF PUMP circuit breaker on the main switchboard.

3. OPEN valve FM-84, AFFF TK SUCT.

4. Operate the AFFF pump (WP 0005 00) and observe that the system operates normally without leakage or unusual noises.

5. Return the equipment to the desired readiness condition.

END OF WORK PACKAGE

UNIT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
FM-200 SYSTEM, TEST

INITIAL SETUP:

Personnel Required:
Two Watercraft Engineers, 88L

References:
DA Form 4640
DA Form 4993
TM 55-1925-273-10
WP 0005 00

Equipment Conditions:
Set to ON the FM-200 SYSTEM circuit breaker in 120V main deck, 01 & 02 emergency lighting panel No. 1.
FM-200 system set for normal operation (WP 0005 00).
SSDG 1, SSDG 2, bow thruster engine, and the pump drive engine operating normally (TM 55-1925-273-10).
EDG ready to accept a load, or vessel operating on shore power.

1. Ensure that the equipment controlled by pressure switch PS-1 (figure 1, item 1) identified below is operating normally (TM 55-1925-273-10):
   a. Engine Room Supply Fans 1 and 2
   b. Engine Room Exhaust Fans 1 and 2
   c. SSDG 1 and SSDG 2
   d. Bow Thruster Engine
   e. Pump Drive Engine
   f. AMS 1 and AMS 2 Supply Fan
   g. Fuel Oil Transfer Pumps 1 and 2
2. Ensure that all other non-essential equipment has been properly secured.

NOTE

If the vessel is operating on the ship's service diesel generator, the vessel will go dark once pressure switch PS-1 is activated and will remain dark until the emergency generator comes online.

3. Manually operate pressure switch PS-1 (figure 1, item 1) by pulling up on the plunger (figure 1, item 2) to the OPERATED position.
4. Verify that the amber strobe lights are operating in AMS 1, AMS 2, and the engine room.
5. Verify that the alarm bell sounds on the exterior main deck.
6. Verify that the equipment controlled by pressure switch PS-1 (figure 1, item 1) identified in step 1 of this work package is no longer operating.
7. Return pressure switch PS-1 (figure 1, item 1) to the SET position by pressing down on the plunger (figure 1, item 2).

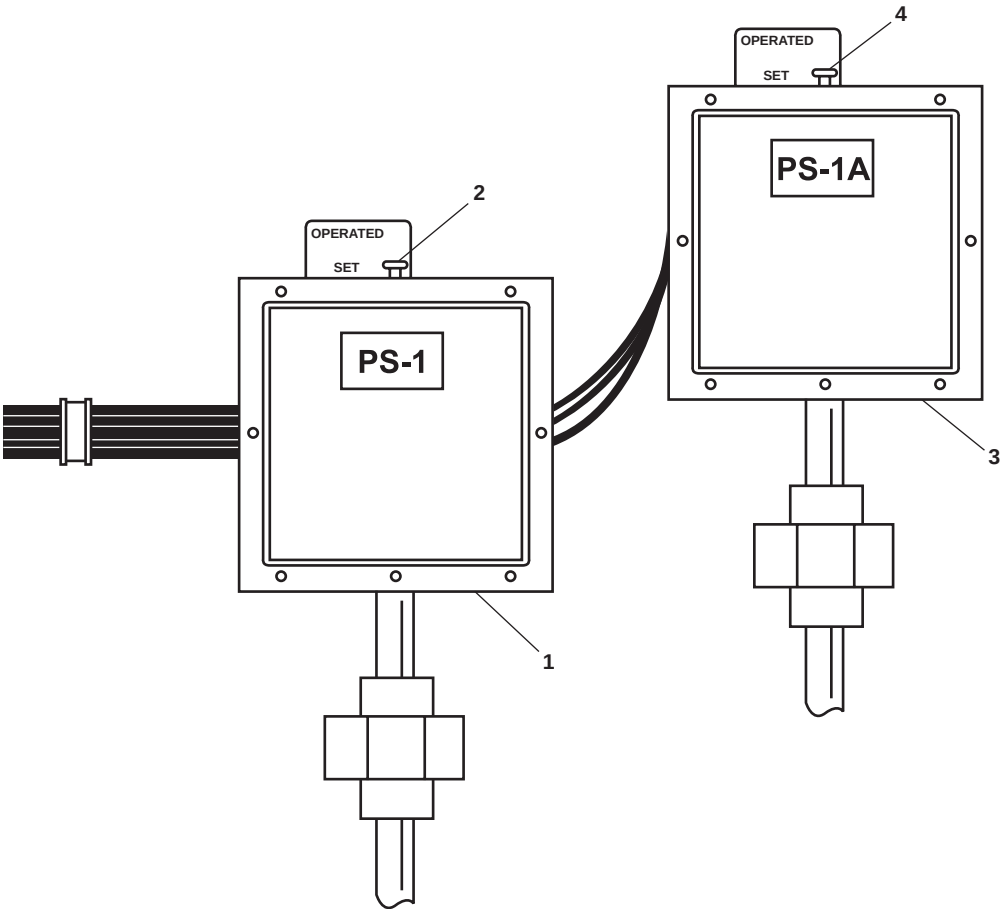


Figure 1. Testing of FM-200 Pressure Switches PS-1 and PS-1A

8. Verify that the amber strobe lights located in AMS 1, AMS 2, and the engine room have stopped flashing.

9. Verify that the alarm bell located on the exterior main deck has stopped ringing.

10. Manually operate pressure switch PS-1A (figure 1, item 3) by pulling up on the plunger (figure 1, item 4) to the OPERATED position.

11. Verify that the electric horns located in the engine room and in AMS 1 are sounding.

12. Return pressure switch PS-1A (figure 1, item 3) to the SET position by pressing down on the plunger (figure 1, item 4).

13. Verify that the electric horns located in the engine room and in AMS 1 have stopped sounding.

14. Check all FM-200 firefighting system components for any signs of corrosion and/or deterioration.

15. Make the appropriate log entries in DA Form 4640 (Harbor Boat Deck Department Log for Class A&B Vessels) and DA Form 4993 (Harbor Boat Engine Department Log for Class A and C-1 Vessels) concerning the FM-200 System Test.

16. Return the equipment to the desired readiness condition.

END OF WORK PACKAGE

UNIT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
FIRE FLAP PULL CABLES, REPLACE

INITIAL SETUP:

Tools and Special Tools:
Tool Kit, General Mechanic's (Item 1, Table 2, WP 0046 00)

Materials/Parts:
Cable (Item 4, Figure 7, WP 0048 00)
Shim (Item 2, Figure 7, WP 0048 00)

Personnel Required:
Two Watercraft Engineers, 88L

References:
FM 55-502
TM 55-1925-273-10

References (continued)
WP 0046 00
WP 0048 00

Equipment Conditions:
CLOSE valves CA-8, STG AIR TO ME #2 and CA-9, STG AIR TO ME #1. Lock out and tag out (FM 55-502).
Set to OFF circuit breakers ENG RM EXH FAN #1, ENG RM EXH FAN #2, ENG RM SUPPLY FAN #1, and ENG RM SUPPY FAN #2 on the main switchboard. Lock out and tag out (FM 55-502).

WARNING

Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lock wire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.

NOTE

This procedure describes the process for replacing any one of the eight fire flap pull cables installed onboard the Large Tug (LT). Three cables are located on the forward end of each exhaust stack, on the 02 level. The remaining two cables are located on the aft bulkhead of the Emergency Diesel Generator (EDG) room, inboard. Although the cable location may vary between cables, the replacement procedure is the same for all eight cables.

REMOVAL

1. Loosen the jam nut (figure 1, item 1) on the exterior end of the fire flap pull cable (figure 1, item 2) and unscrew the T handle (figure 1, item 3) and jam nut.
2. Remove the nut (figure 1, item 4) from the DC kit (figure 1, item 5) and remove the fire flap pull cable (figure 1, item 2), DC kit, and shim (star washer) (figure 1, item 6) from the bulkhead. Discard the star washer.
3. Remove the cotter pin (figure 1, item 7) and clevis pin (figure 1, item 8) from the clevis (figure 1, item 9) and pull the fork away from the actuator arm (figure 1, item 10). Discard the cotter pin.
4. Loosen the nut (figure 1, item 11) on the cable clamp (figure 1, item 12) and slide the fire flap pull cable (figure 1, item 2) and cable clamp free of its attachment point (figure 1,item 13)
5. Remove the nut (figure 1, item 14) and bolt (figure 1, item 15) from the DC kit (figure 1, item 5) .
6. Spread the slot in the cable end of the DC kit (figure 1, item 5) enough to permit the fire flap pull cable (figure 1, item 2) to be pulled free of the DC kit. Remove the DC kit from and fire flap pull cable.
7. Free the fire flap pull cable (figure 1, item 2) from its cable hangers along its entire length.

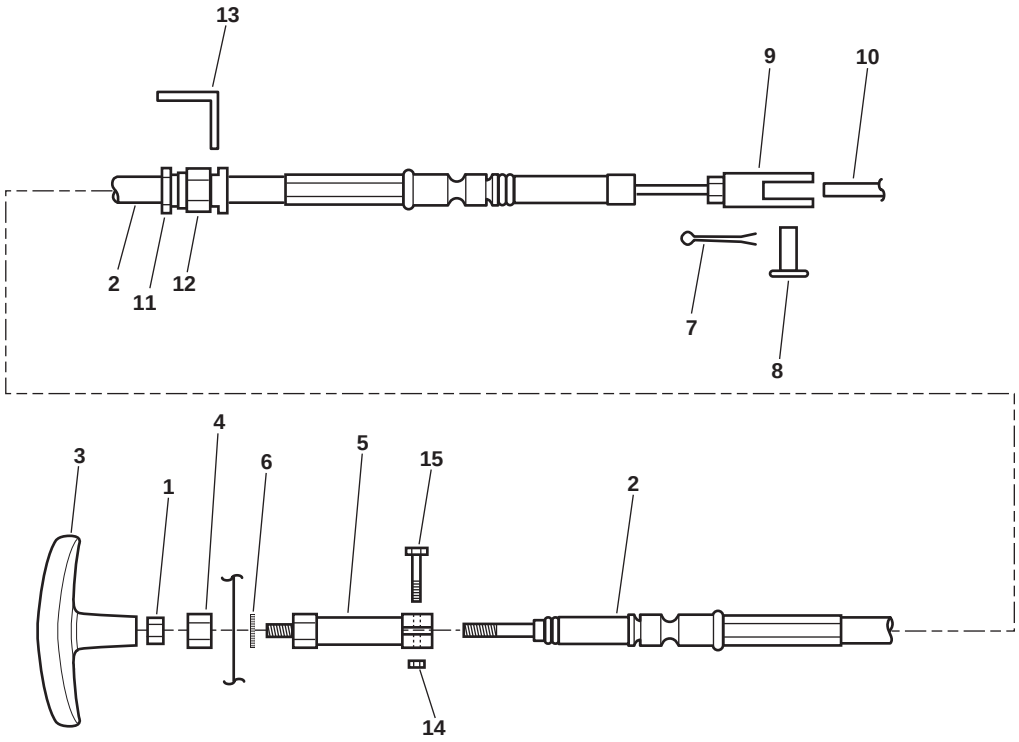


Figure 1. Fire Flap Pull Cable Replacement

INSTALLATION

1. Fasten the fire flap pull cable (figure 1, item 2) in its cable hangers along its entire length.
2. Slide the DC kit (figure 1, item 5) onto the fire flap pull cable (figure 1, item 2) and secure it with the nut (figure 1, item 14) and bolt (figure 1, item 15).
3. Position the DC kit (figure 1, item 5) in the bulkhead and secure it with the nut (figure 1, item 5) and a new star washer (figure 1, item 6).
4. Thread the jam nut (figure 1, item 1) completely onto the end of the fire flap pull cable (figure 1, item 2).
5. Thread the T handle (figure 1, item 3) onto the end of the fire flap pull cable (figure 1, item 2) and secure it with the jam nut (figure 1, item 1).
6. Position the cable clamp (figure 1, item 12) in its attachment point (figure 1, item 13) and loosely tighten the nut (figure 1, item 11).
7. Push the T handle (figure 1, item 3) all the way IN.
8. Slide the fire flap pull cable (figure 1, item 2) through the cable clamp (figure 1, item 12) until the hole in the clevis (figure 1, item 9) aligns with the hole in the actuator arm (figure 1, item 10).
9. Tighten the nut (figure 1, item 11).
10. Install the clevis pin (figure 1, item 8) in the clevis (figure 1, item 9) and secure it with a new cotter pin (figure 1, item 7).
11. Remove the lockouts and tagouts and return the equipment to the desired readiness condition.

END OF WORK PACKAGE

Chapter 7

Direct Support Maintenance Instructions for Firefighting, Fire Alarm, and Fire Suppression Systems

Inland and Coastal Large Tug (LT)

DIRECT SUPPORT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
FIREFIGHTING SYSTEM, TEST

INITIAL SETUP:

Personnel Required:
One Watercraft Engineer, 88L
One Watercraft Operator, 88K

References:
FM 55-502
WP 0005 00

Equipment Conditions:
Diesel engine-driven firefighting pump operating normally (WP 0005 00).
Fire monitors pressurized (WP 0005 00).

FIRE HOSE TEST

Testing of the fire hoses is required annually. Refer to FM 55-502 for testing requirements and procedures.

FIRE MONITORS-FUNCTIONAL TEST

1. At each fire monitor (figure 1, item 1), direct the fire monitor to place water away from the vessel using the directional control handle (figure 1, item 2).
2. OPEN the cutoff valve (figure 1, item 3).
3. Verify that the fire monitor (figure 1, item 1) operates without leaks.
4. CLOSE the cutoff valve (figure 1, item 3) and repeat steps 1-4 for the remaining fire monitors (figure 1, item 1).
5. When all monitors have been tested, return the equipment to the desired readiness condition.

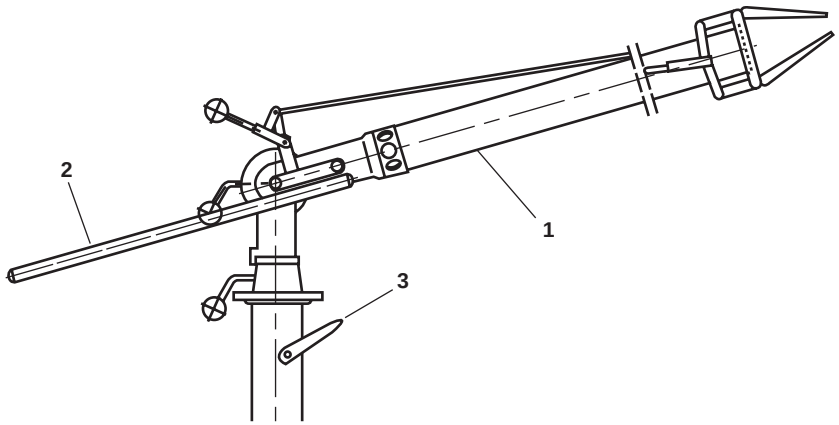


Figure 1. Fire Monitor Testing

END OF WORK PACKAGE

DIRECT SUPPORT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
FIREFIGHTING SYSTEM, REPAIR

INITIAL SETUP:

Tools and Special Tools:
Tool Kit, General Mechanic's (Item 1, Table 2, WP 0046 00)

Materials/Parts:
Tag, Danger (Item 8, Table 1, WP 0050 00)
Monitor, Fire, Manual (Item 32, Figure 1, WP 0048 00)

Personnel Required:
Two Watercraft Engineers, 88L

References:
FM 55-502
WP 0023 00

References (continued):
WP 0046 00
WP 0050 00

Equipment Conditions:
CLOSE valve CA-6, STG AIR TO PMP DR ENG. Lock out and tag out (FM 55-502).
Set to OFF the AFFF PUMP circuit breaker on the main switchboard. Lock out and tag out (FM 55-502).
CLOSE valves FM-13, F.F. TO F.M. CRSVR and FM-84, AFFF TK SUCT. Lock out and tag out (FM 55-502).

FIRE MONITOR REPLACEMENT

REMOVAL

1. Remove the four bolts (figure 1, item 1) and four nuts (figure 1, item 2) from the fire monitor flange (figure 1, item 3).

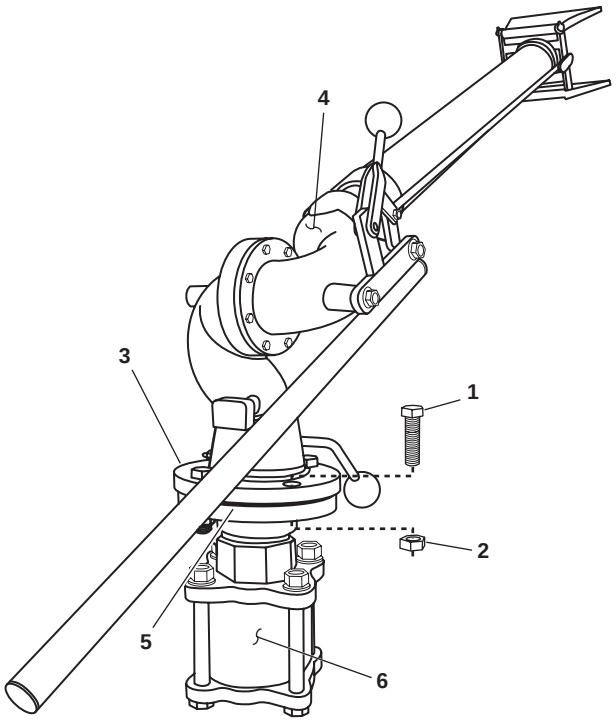


Figure 1. Fire Monitor

2. Remove the fire monitor (figure 1, item 4).

3. Remove and discard the gasket (figure 1, item 5) from the fire monitor flange (figure 1, item 3).

INSTALLATION

1. Thoroughly clean the fire monitor flange (figure 1, item 3).

2. Position a new gasket (figure 1, item 5) on the fire monitor flange (figure 1, item 3).

3. Position the fire monitor (figure 1, item 4) on the valve (figure 1, item 6) and secure it with the four bolts (figure 1, item 1) and four nuts (figure 1, item 2).

4. Remove the lockouts and tagouts (FM 55-502).

5. Test the fire monitor (WP 0023 00), and observe that the fire monitor operates normally without leakage.

6. Return the equipment to the desired readiness condition.

END OF WORK PACKAGE

DIRECT SUPPORT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
FIRE DETECTION SYSTEM, TEST

INITIAL SETUP:

Tools and Special Tools:
Tool Kit, General Mechanic's (Item 1, Table 2, WP 0046 00)

Personnel Required:
Two Watercraft Engineers, 88L

References:
WP 0017 00
WP 0046 00

Equipment Conditions:
Set to ON the FIRE DETECTION SYSTEM. circuit breaker in 120V emergency distribution panel No. 1.
OPEN the fire detection panel cabinet in the EOS and have the key available.

FIRE DETECTION COMPONENT TESTING

1. Activate an ionization smoke detector or a thermal fire detector (WP 0017 00).

2. Refer to figure 1 for the fire detection system equipment location diagram while verifying that the following indications occur after activating the detector:

   a. The proper ZONE Light Emitting Diode (LED) indicator (figure 2, item 1) illuminates on the dual zone module (figure 2, item 2).

   b. On the CP-35 control panel (figure 2, item 3), ensure that the system POWER indicator (figure 2, item 4) is illuminated while the system ALARM (figure 2, item 5), system TROUBLE (figure 2, item 6), GROUND FAULT (figure 2, item 7), and AUDIBLE CIRCUIT (figure 2, item 8) trouble LED indicators are off.

3. Deactivate the ionization smoke detector or thermal heat detector (WP 0017 00) and ensure that the ZONE LED indicator that illuminated in step 2 extinguishes.

4. Open the fire and smoke detection panel door (figure 2, item 9).

5. Set the RESET LAMP TEST switch (figure 3, item 1) on the CP-35 control panel (figure 3, item 2) to the RESET position.

6. Ensure that all the visual indicators (figure 2, items 4, 5, 6, 7, and 8) on the CP-35 control panel (figure 2, item 3) illuminate, and the trouble horn sounds when the RESET LAMP TEST switch (figure 3, item 1) is moved momentarily to the RESET position.

7. Return the RESET LAMP TEST switch to the normal position and verify that the indicators and horn that were activated in step 6 are now OFF.

8. Return the equipment to the desired readiness condition.

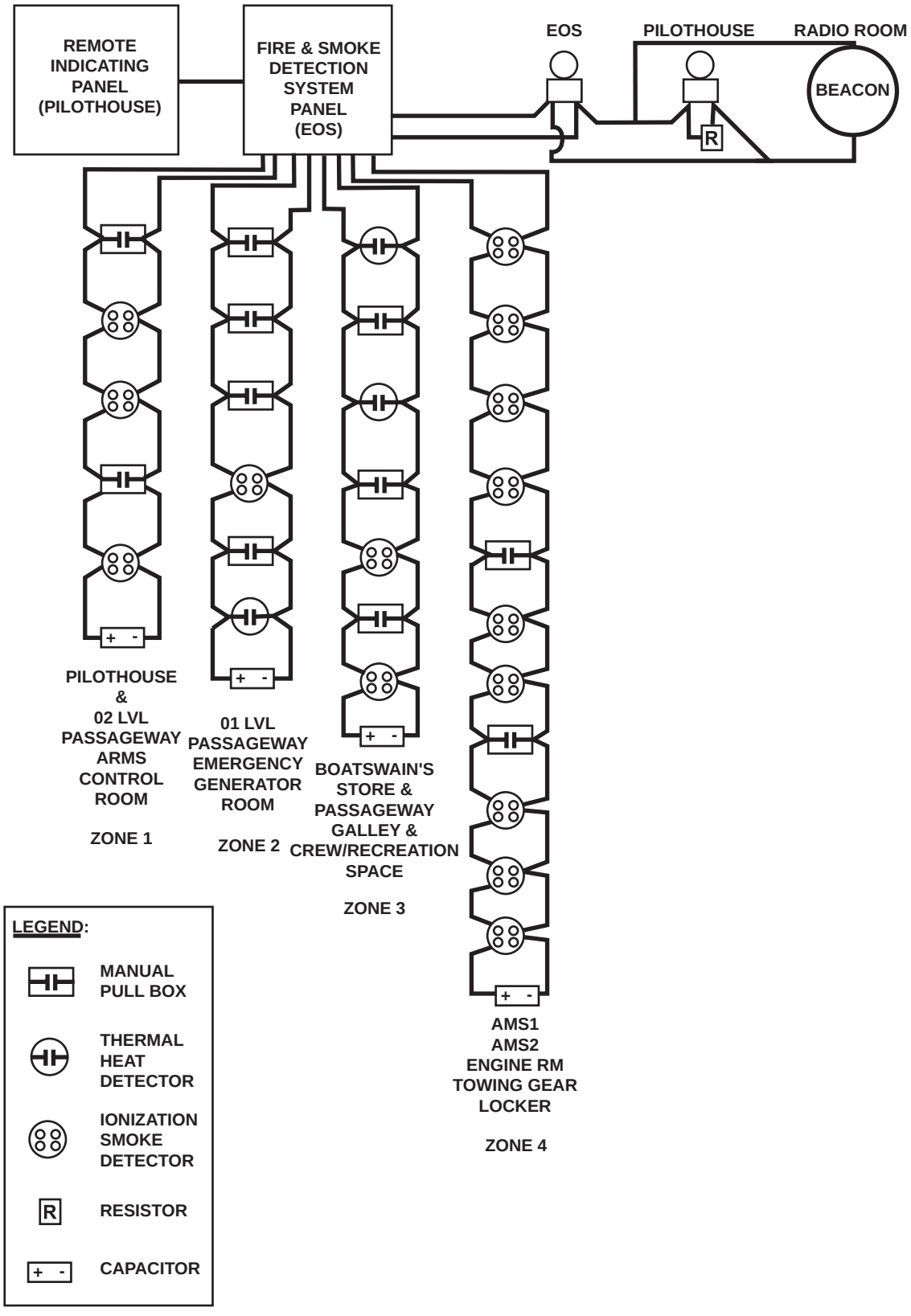


Figure 1. Fire Detection System Equipment Location

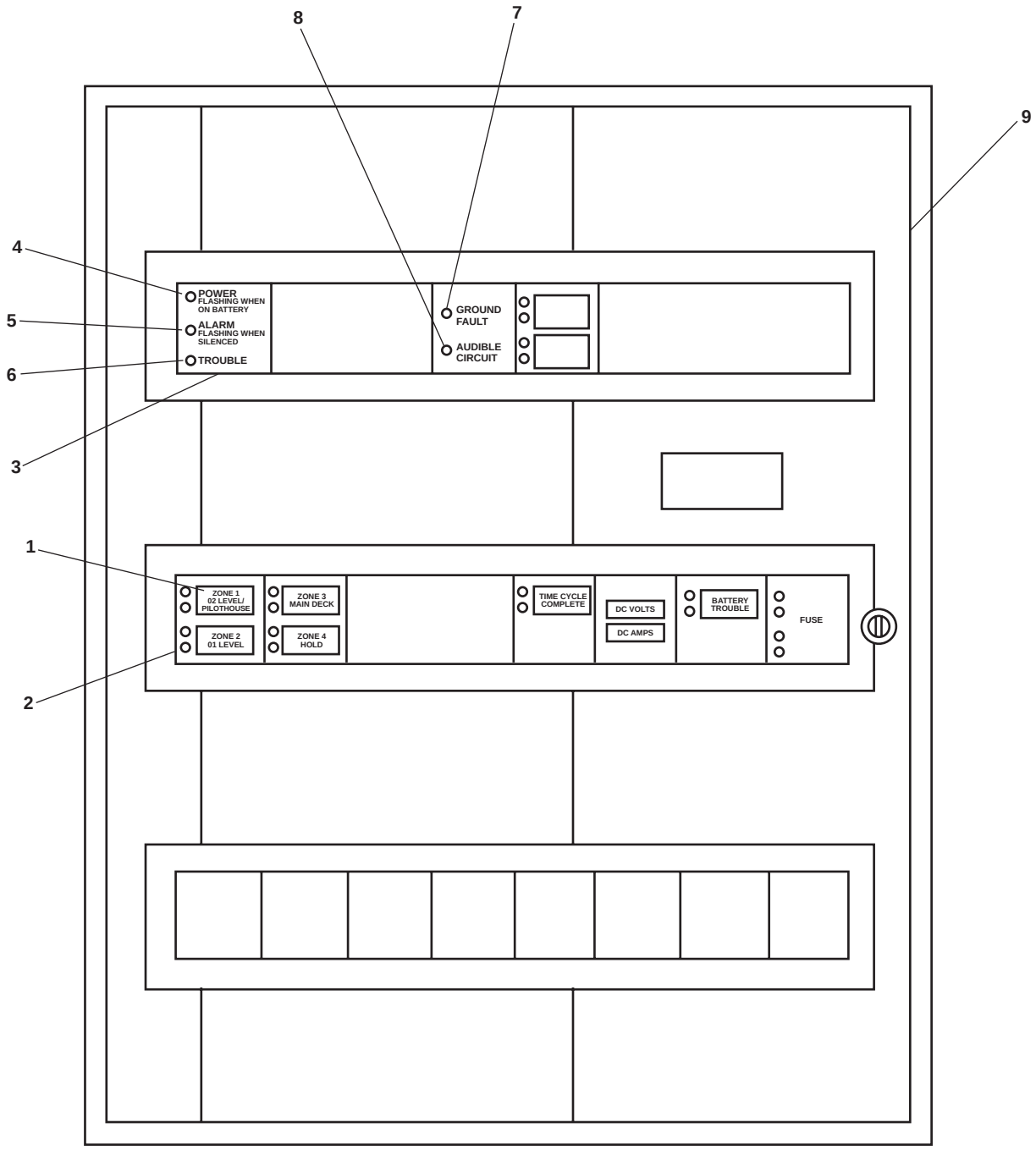


Figure 2. Fire and Smoke Detection Panel – Front View

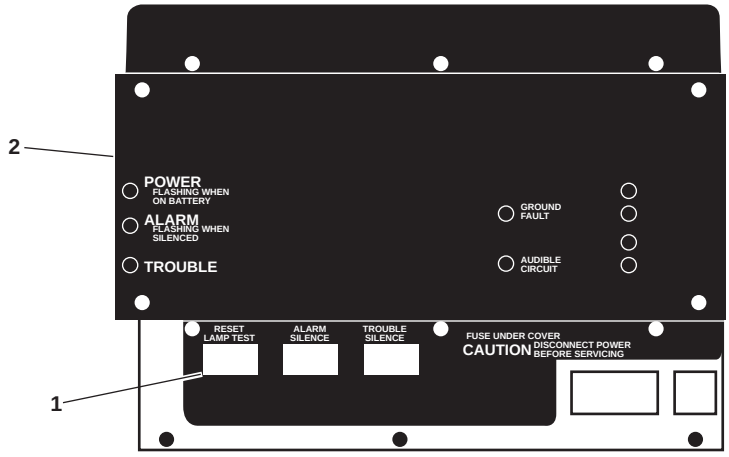


Figure 3. CP-35 Control Panel

END OF WORK PACKAGE

DIRECT SUPPORT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
FIRE DETECTION SYSTEM, REPAIR

INITIAL SETUP:

Tools and Special Tools:
Tool Kit, General Mechanic's (Item 1, Table 2, WP 0046 00)
Multimeter (Item 3, Table 2, WP 0046 00)

Materials/Parts:
Tag, Danger (Item 8, Table 1, WP 0050 00)

Personnel Required:
Two Watercraft Engineers, 88L

References:
FM 55-502
WP 0017 00
WP 0025 00
WP 0039 00
WP 0046 00
WP 0050 00

Equipment Conditions:
Set to OFF the FIRE DETECTION SYSTEM. circuit breaker in 120V emergency distribution panel No. 1. Lock out and tag out (FM 55-502).

OPEN ENCLOSURE

1. Using the proper key, OPEN the door to the fire and smoke detection panel.

Take great care when working around electrical equipment. Contact between unprotected body parts and electrical conductors can cause serious injury or death. Do not wear jewelry or other conductive items while servicing energized electrical equipment. Failure to comply with these precautions can cause serious injury or death.

2. Remove the fuse cover (figure 1, item 1) from the plastic retaining pins (figure 1, item 2).

3. Take voltage readings with a multimeter at the PS-35 TB-1 terminals 1, 2, and 3 (figure 1, item 3). If voltage is present, verify that the correct circuit breakers are OFF, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.

POWER SUPPLY PS-35 REPLACEMENT

REMOVAL

1. OPEN the enclosure following the Open Enclosure procedure of this work package.

2. Label and disconnect the wiring from terminal P1 (figure 1, item 4) and TB1 (figure 1, item 5).

3. Remove the four screws (figure 1, item 6) that secure power supply PS-35 (figure 1, item 7), and remove it from the enclosure.

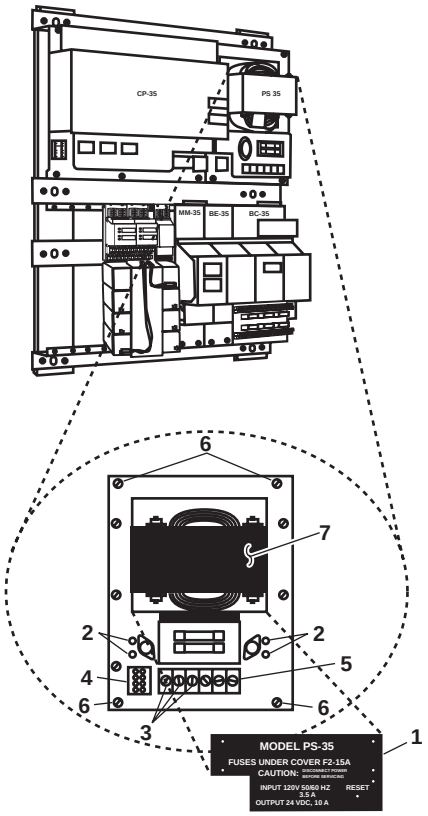


Figure 1. Power Supply PS-35 Replacement

INSTALLATION

1. Position power supply PS-35 (figure 1, item 7) in the enclosure and secure it in place with the four screws (figure 1, item 6).

2. Connect the wiring to P1 (figure 1, item 4) and TB1 (figure 1, item 5) using the labels from step 2 of Removal as a guide. Remove the labels.

3. Perform the Follow-On Service procedure at the end of this work package.

CONTROL MODULE CP-35 REPLACEMENT

REMOVAL

1. OPEN the enclosure following the Open Enclosure procedure of this work package.

2. Remove the screws (figure 2, item 1) that secure the dust cover (figure 2, item 2) to control module CP-35 (figure 2, item 3).

3. Label and disconnect the wiring plugs from connectors P1 (figure 2, item 4), P2 (figure 2, item 5), and P3 (figure 2, item 6).

4. Label and disconnect the wiring from terminals 32 (figure 2, item 7), 35 (figure 2, item 8), and 41 (figure 2, item 9).

5. Remove the eight screws (figure 2, item 10) that secure control module CP-35 (figure 2, item 3), and remove it from the enclosure.

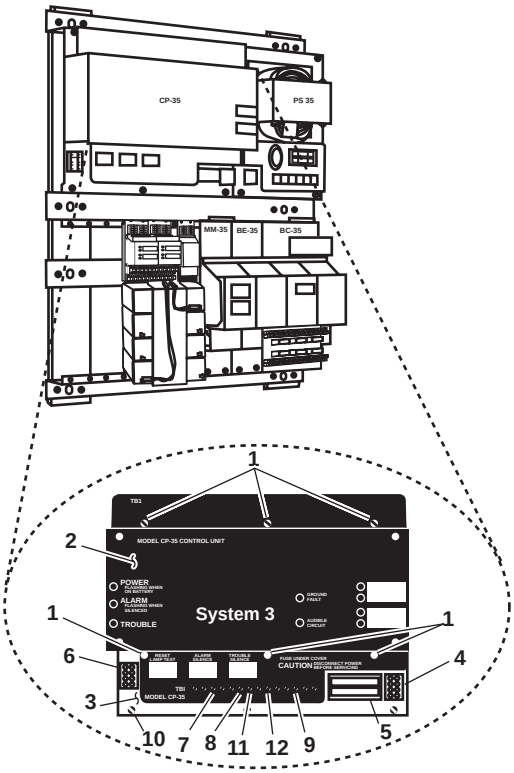


Figure 2. Control Module CP-35 Replacement

INSTALLATION

1. Position control module CP-35 (figure 2, item 3) into the enclosure and secure it with the eight screws (figure 2, item 10).

2. Verify the installation of a jumper between terminals 36 (figure 2, item 11) and 39 (figure 2, item 12). Install a jumper if one is not there.

3. Connect the wiring to terminals 32 (figure 2, item 7), 35 (figure 2, item 8), and 41 (figure 2, item 9) using the labels from step 4 of Removal as a guide. Remove the labels.

4. Connect the wiring plugs to connectors P1 (figure 2, item 4), P2 (figure 2, item 5), and P3 (figure 2, item 6).

5. Install the dust cover (figure 2, item 2), and secure it with the screws (figure 2, item 1).

6. Perform the Follow-On Service procedure at the end of this work package.

DUAL ZONE MODULE ZU-35TS REPLACEMENT

REMOVAL

1. OPEN the enclosure following the Open Enclosure procedure of this work package.

2. Label and disconnect the electrical wiring from P1 (figure 3, item 1), P2 (figure 3, item 2), and the terminal block (figure 3, item 3).

3. Remove the four screws (figure 3, item 4) that secure the dual zone module ZU-35TS (figure 3, item 5), and remove it from the enclosure.

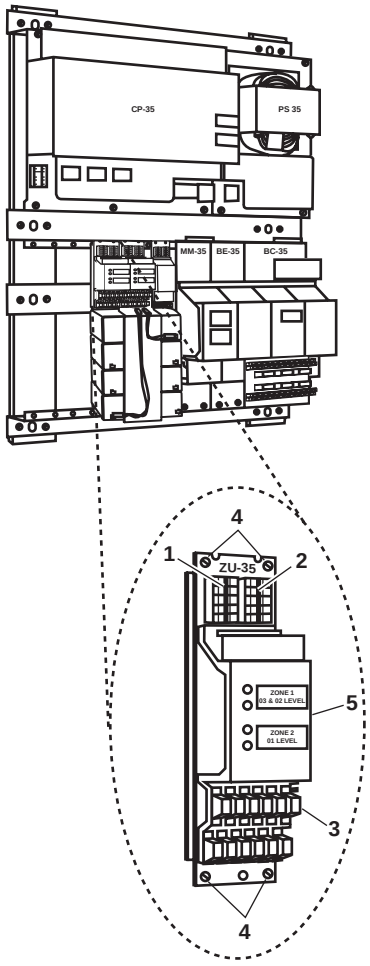


Figure 3. Dual Zone Module ZU-35TS Replacement

INSTALLATION

1. Position the dual zone module ZU-35TS (figure 3, item 5) in the enclosure and secure it in place with the four screws (figure 3, item 4).

2. Connect the electrical wiring to P1 (figure 3, item 1), P2 (figure 3, item 2), and the terminal block (figure 3, item 3) using the labels from step 2 of Removal as a guide. Remove the labels.

3. Perform the Follow-On Service procedure at the end of this work package.

TIME DELAY MODULE TL-30U REPLACEMENT

REMOVAL

1. OPEN the enclosure following the Open Enclosure procedure of this work package.

2. Label and disconnect the electrical wiring from P1 (figure 4, item 1) and P2 (figure 4, item 2).

3. Remove the four screws (figure 4, item 3) that secure time delay module TL-30U (figure 4, item 4), and remove it from the enclosure.

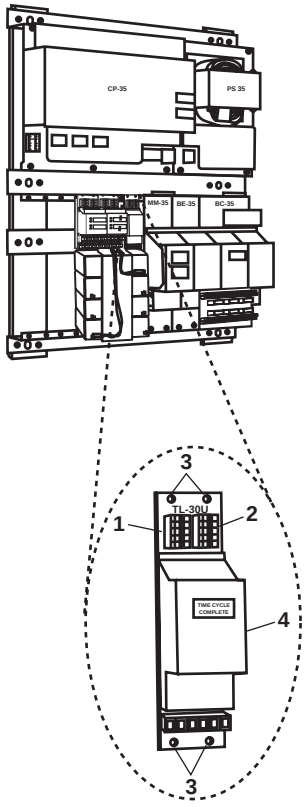


Figure 4. Time Delay Module TL-30U Replacement

INSTALLATION

1. Position time delay module TL-30U (figure 4, item 4) in the enclosure and secure it with the four screws (figure 4, item 3).

2. Connect the electrical wiring to P1 (figure 4, item 1) and P2 (figure 4, item 2) using the labels from step 2 of Removal as a guide. Remove the labels.

3. Perform the Follow-On Service procedure at the end of this work package.

METER MODULE MM-35 REPLACEMENT

REMOVAL

1. OPEN the enclosure following the Open Enclosure procedure at the of this work package.

2. Label and disconnect the electrical wiring from P1 (figure 5, item 1).

3. Remove the four screws (figure 5, item 2) that secure meter module MM-35 (figure 5, item 3), and remove it from the enclosure.

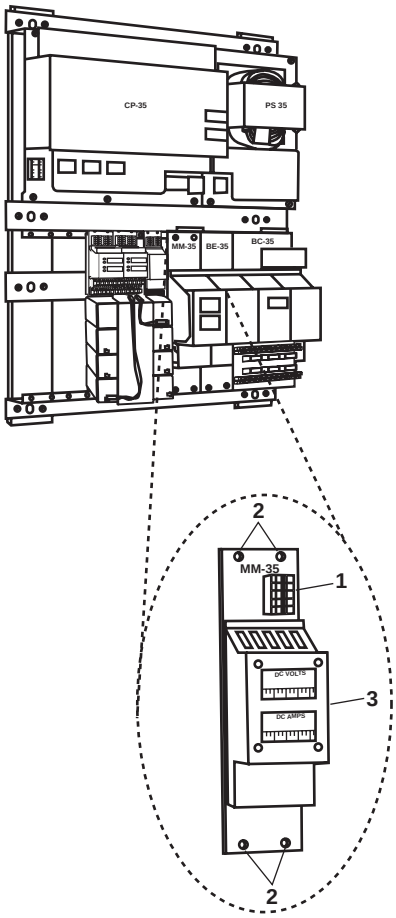


Figure 5. Meter Module MM-35 Replacement

INSTALLATION

1. Position meter module MM-35 (figure 5, item 3) in the enclosure and secure it with the four screws (figure 5, item 2).

2. Connect the electrical wiring to P1 (figure 5, item 1) using the labels from step 2 of Removal as a guide. Remove the labels.

3. Perform the Follow-On Service procedure at the end of this work package.

BATTERY CHARGER/TRANSFER MODULE BC-35 REPLACEMENT

REMOVAL

1. OPEN the enclosure following the Open Enclosure procedure of this work package.

2. Label and disconnect the electrical wiring from P1 (figure 6, item 1), P2 (figure 6, item 2), and TB1 (figure 6, item 3).

3. Remove the four screws (figure 6, item 4) that secure battery charger/transfer module BC-35 (figure 6, item 5), and remove it from the enclosure.

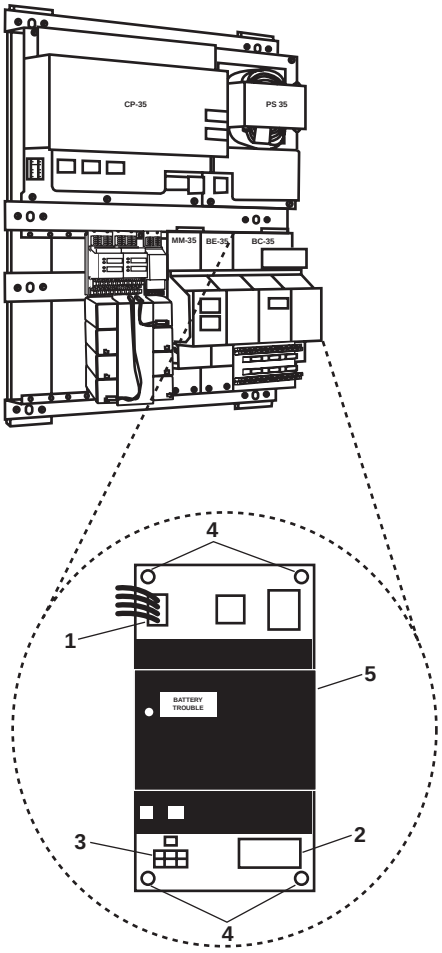


Figure 6. Battery Charger/Transfer Module BC-35 Replacement

INSTALLATION

1. Position the battery charger/transfer module BC-35 (figure 6, item 5) in the enclosure and secure it with the four screws (figure 6, item 4).

2. Connect the electrical wiring to P1 (figure 6, item 1), P2 (figure 6, item 2), and TB1 (figure 6, item 3) using the labels from step 2 of Removal as a guide. Remove the labels.

3. Perform the Follow-On Service procedure at the end of this work package.

BATTERY PACK BT-34 REPLACEMENT

REMOVAL

1. OPEN the enclosure following the Open Enclosure procedure of this work package.

2. Label and disconnect the electrical wiring from the terminal block (figure 7, item 1).

3. Remove the six screws (figure 7, item 2) that secure the battery pack BT-34 (figure 7, item 3), and remove it from the enclosure.

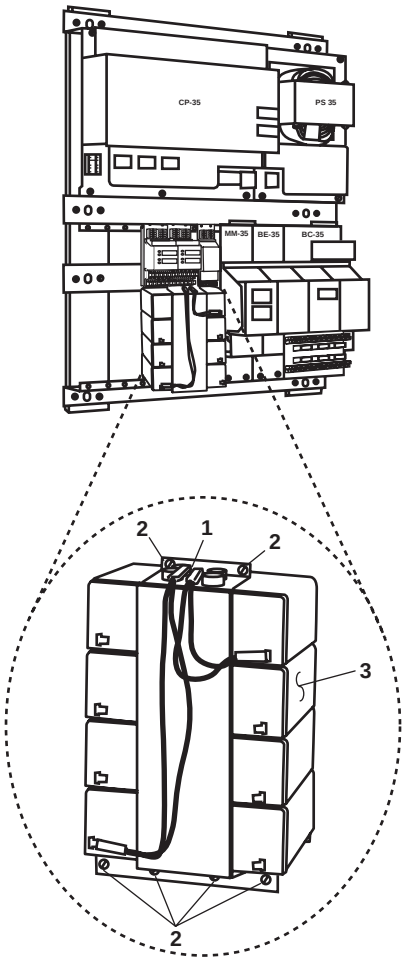


Figure 7. Battery Pack BT-34 Replacement

INSTALLATION

1. Position the battery pack (figure 7, item 3) in the enclosure and secure it in place with the six screws (figure 7, item 2).

2. Connect the electrical wiring to the terminal block (figure 7, item 1) using the labels from step 2 of Removal as a guide. Remove the labels.

3. Perform the Follow-On Service procedure at the end of this work package.

RELAY MODULE SR-32 REPLACEMENT

REMOVAL

1. OPEN the enclosure following the Open Enclosure procedure of this work package.

2. Label and disconnect the electrical wiring from the terminal blocks (figure 8, item 1).

3. Remove four screws (figure 8, item 2) that secure relay module SR-32 (figure 8, item 3), and remove it from the enclosure.

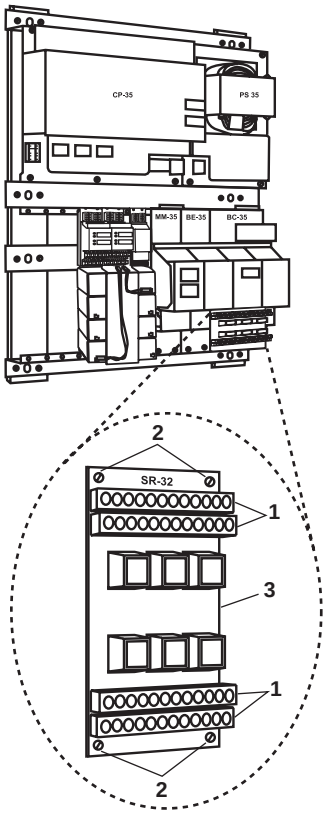


Figure 8. Relay Module SR-32 Replacement

INSTALLATION

1. Position relay module SR-32 (figure 8, item 3) in the enclosure and secure it in place with the four screws (figure 8, item 2)

2. Connect the electrical wiring to the terminal blocks (figure 8, item 1) using the labels from step 2 of Removal as a guide. Remove the labels.

3. Perform the Follow-On Service procedure at the end of this work package.

HORN/STROBE REPLACEMENT

REMOVAL

1. Remove the two screws (figure 9, item 1) that attach the horn/strobe (figure 9, item 2) to the mounting plate (figure 9, item 3).

Replace or repair components only after the affected circuit has been secured, locked out and tagged out (FM 55-502). Performing replacement with the circuit energized may result in injury.

2. Using a multimeter, check for voltage at the terminal board (figure 9, item 4). If voltage is present, ensure that the proper circuit breakers are set to OFF, locked out, and tagged out (FM 55-502). If no voltage is present, continue with this procedure.

3. Label and disconnect the wiring from the terminal board (figure 9, item 4).

4. Remove the two screws (figure 9, item 5) that secure the mounting plate (figure 9, item 3) to the junction box (figure 9, item 6), and remove the mounting plate.

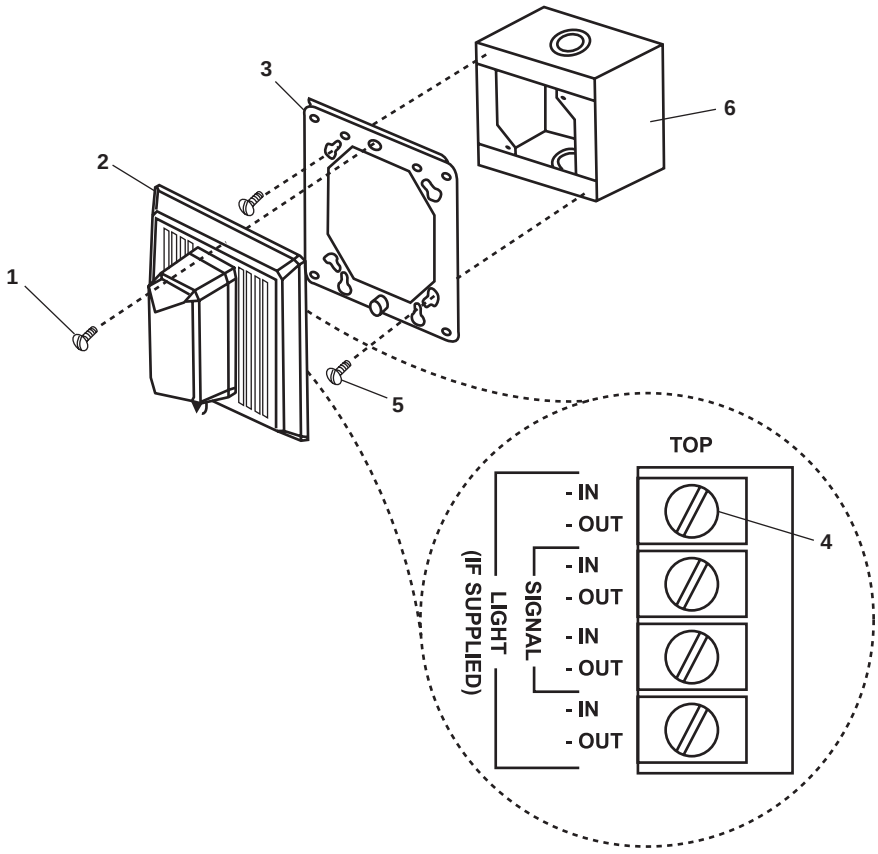


Figure 9. Horn/Strobe Replacement

INSTALLATION

1. Install the mounting plate (figure 9, item 3) to the junction box (figure 9, item 6) with the two screws (figure 9, item 5).

2. Connect the wiring to the terminal board (figure 9, item 4) using the labels from step 3 of Removal as a guide. Remove the labels.

3. Position the horn/strobe (figure 9, item 2) on the mounting plate (figure 9, item 3) and secure it with the two screws (figure 9, item 1).

4. Perform the Follow-On Service procedure at the end of this work package.

ALARM BELL REPLACEMENT

REMOVAL

1. Remove the bolt (figure 10, item 1) and washer (figure 10, item 2) that secure the gong (figure 10, item 3).

2. Remove the gong (figure 10, item 3) from the bell actuator assembly cover (figure 10, item 4).

3. Remove the six screws (figure 10, item 5) that secure the bell actuator assembly cover (figure 10, item 4).

4. Remove the bell actuator assembly cover (figure 10, item 4), and turn it over to reveal the internal electrical components (figure 10, item 6).

WARNING

Replace or repair components only after the affected circuit has been secured, locked out and tagged out (FM 55-502). Performing replacement with the circuit energized may result in injury.

5. Using a multimeter, check for voltage at the terminals (figure 10, item 7) to ensure that electrical circuits are deenergized. If voltage is present, ensure that the proper circuit breakers are set to OFF, locked out, and tagged out (FM 55-502). If no voltage is present, proceed with the procedure.

6. Label and remove the wiring from the terminals (figure 10, item 7), and remove the cover (figure 10, item 4).

7. Loosen and remove the four bolts (figure 10, item 8) and lockwashers (figure 10, item 9) that secure the actuator assembly, and remove it from the mounting bracket. Discard the lockwashers.

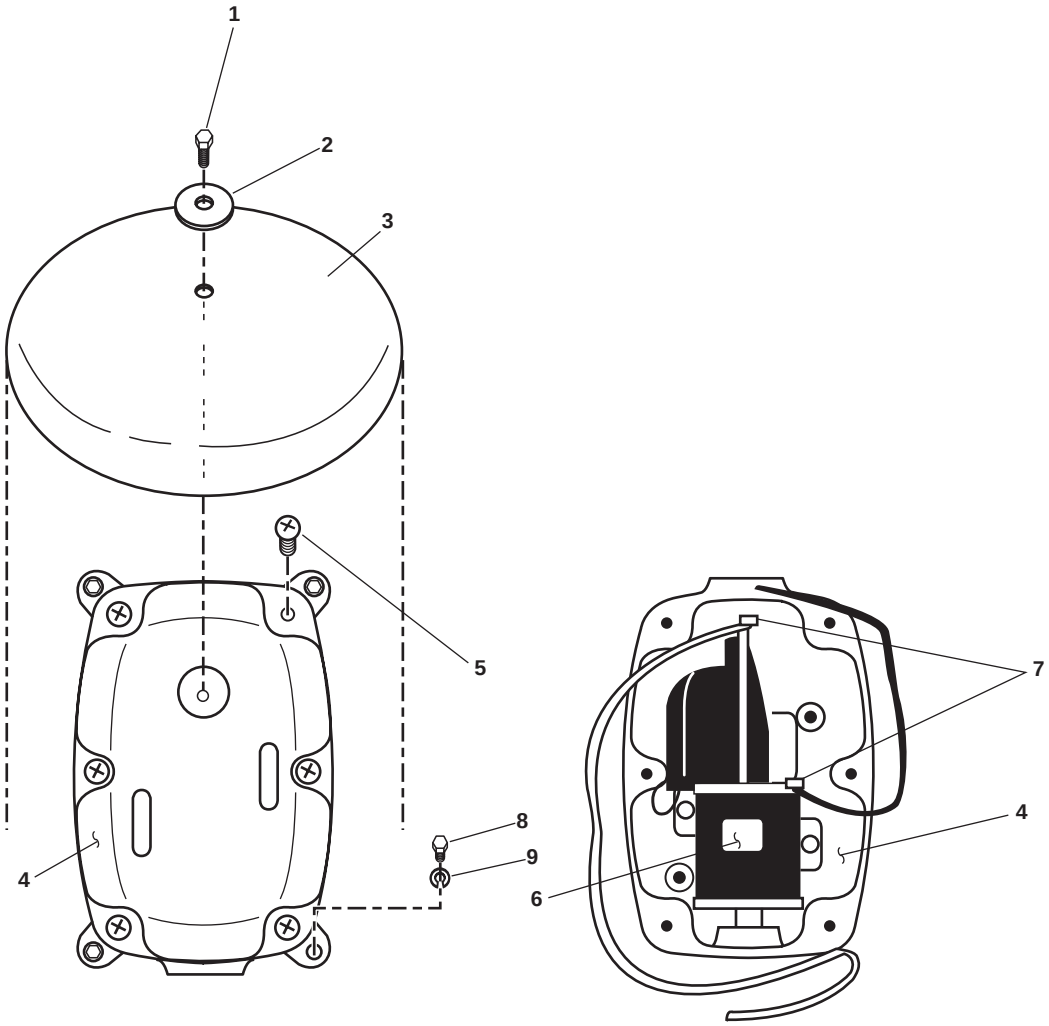


Figure 10. Alarm Bell Replacement

INSTALLATION

1. Align the actuator assembly to the mounting bracket, and secure it in place with the four bolts (figure 10, item 8) and four new lockwashers (figure 10, item 9).

2. Connect the wiring to the terminals (figure 10, item 7) using the labels from step 6 of Removal as a guide. Remove the labels.

3. Install the bell actuator assembly cover (figure 10, item 4) and secure it in place with the six screws (figure 10, item 5).

5. Install the gong (figure 10, item 3) on the bell actuator assembly cover (figure 10, item 4), and secure it with the bolt (figure 10, item 1) and washer (figure 10, item 2).

6. Perform the Follow-On Service procedure at the end of this work package.

FOLLOW-ON SERVICE

1. If removed, install the fuse cover (figure 1, item 1) over the plastic retaining pins (figure 1, item 2).

2. Remove the lockouts and tagouts (FM 55-502).

3. Set to ON the FIRE DETECTION SYSTEM. circuit breaker in 120V emergency distribution panel No. 1.

4. Test the fire detection system (WP 0017 00 and WP 0025 00) to verify that the system operates properly.

5. Using the proper key, CLOSE and lock the door to the fire and smoke detection panel.

6. After successful testing, notify the maintenance supervisor. General support maintenance assistance is required for system certification (WP 0039 00).

7. Return the equipment to the desired readiness condition.

END OF WORK PACKAGE

DIRECT SUPPORT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
FIRE DETECTION SYSTEM, REPLACE

INITIAL SETUP:

Tools and Special Tools:
Tool Kit, General Mechanic's (Item 1, Table 2, WP 0046 00)

Personnel Required:
Two Watercraft Engineers, 88L

Materials/Parts:
Tag, Danger (Item 8, Table 1, WP 0050 00)

References:
FM 55-502
TB 43-0218
WP 0014 00
WP 0017 00
WP 0025 00

References (continued):
WP 0026 00
WP 0046 00
WP 0050 00

Equipment Conditions:
CLOSE valves FO-21, F.O. SPLY TO S.S.D.G. NO. 1, FO-22, F.O. SPLY TO S.S.D.G. NO. 2, and FO-32, F.O. SPLY TO ENG. Lock out and tag out (FM 55-502).
Lock out and tag out (FM 55-502) the SHORE PWR. RCPT.
Fire detection system prepared for removal (WP 0014 00).
Fire detection panel component modules removed (WP 0026 00).

WARNING

Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lock wire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.

FIRE AND SMOKE DETECTION PANEL REPLACEMENT

REMOVAL

NOTE

The fire and smoke detection panel can only be removed by opening the main switchboard. All power to the vessel must be secured. Crewmembers will need to provide battery powered lighting for the Removal and Installation procedures of the fire and smoke detection panel.

1. Loosen the two captive screws (figure 1, item 1) on the number 2 generator control panel (figure 1, item 2) of the main switchboard (figure 1, item 3).

2. Loosen the four captive screws (figure 1, item 4) on the inboard 460 volt panel (figure 1, item 5).

WARNING

Repair or replace components only after the affected circuit has been secured, locked out and tagged out (FM 55-502). Performing replacement with the circuit energized may result in injury or death.

3. OPEN the number 2 generator control panel (figure 1, item 2).

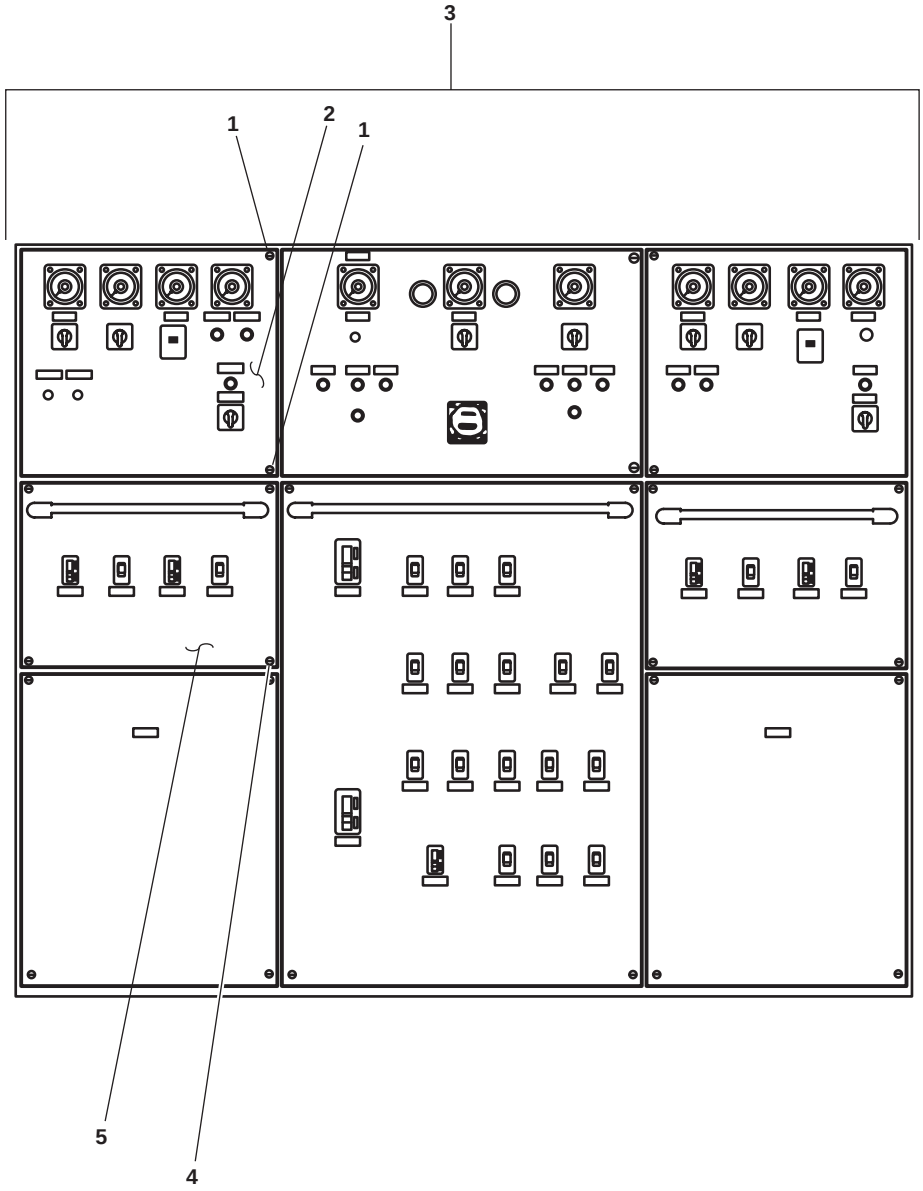


Figure 1. Main Switchboard

4. Remove the inboard 440 volt panel (figure 1, item 5) from the main switchboard (figure 1, item 3).

5. Label and remove all remaining electrical wiring (figure 2, item 1) from the enclosure.

6. Remove the six bolts (figure 2, item 2), six nuts (figure 2, item 3), 12 flat washers (figure 2, item 4), and six lockwashers (figure 2, item 5). Discard the lockwashers.

7. Remove the fire and smoke detection panel from the main switchboard (figure 1, item 3).

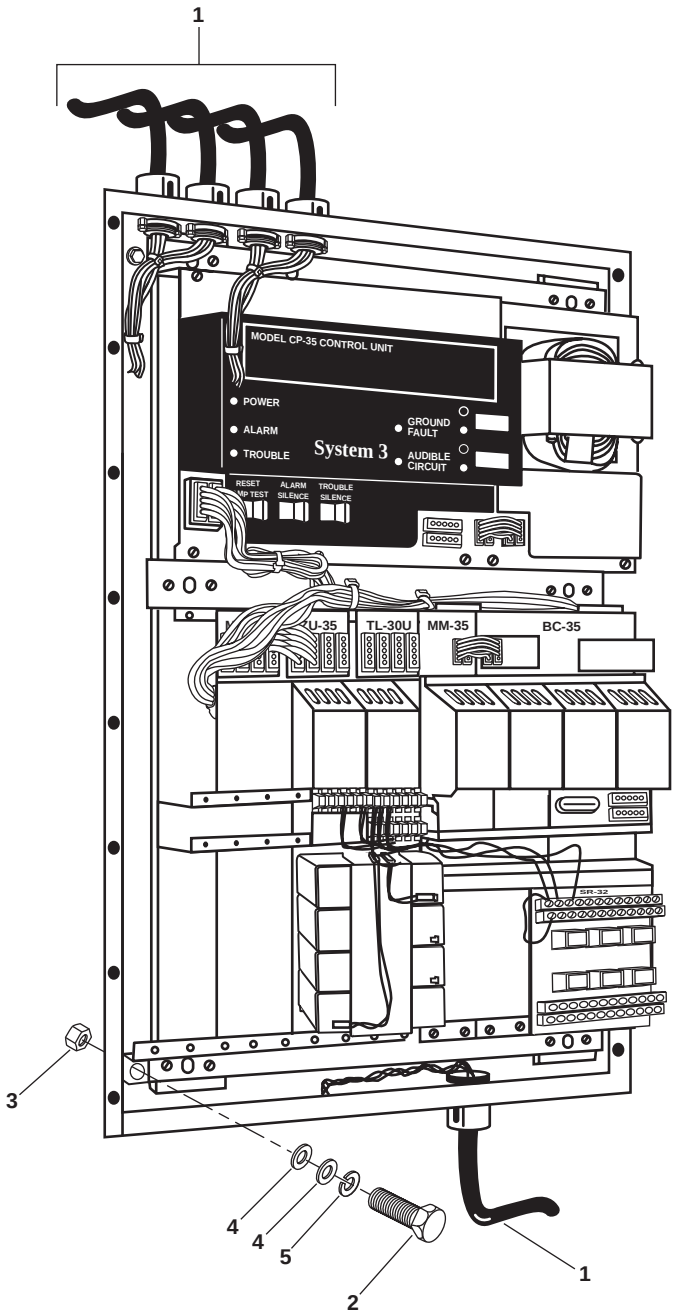


Figure 2. Fire and Smoke Detection Panel

INSTALLATION

1. Position the fire and smoke detection panel on the main switchboard and secure it in place with the six bolts (figure 2, item 2), six nuts (figure 2, item 3), 12 flat washers (figure 2, item 4), and six new lockwashers (figure 2, item 5).

2. Route and install the electrical wiring (figure 2, item 1) in the fire and smoke detection panel using the labels from step 1 of Removal as a guide. Remove the labels.

3. Install the inboard 440 volt panel (figure 1, item 5) on the main switchboard (figure 1, item 3) and secure it by tightening the four captive screws.

4. CLOSE the number 2 generator control panel (figure 1, item 2) and secure it with the two captive screws (figure 1, item 1).

5. Remove the lockouts and tagouts (FM 55-502) and return the vessel to the desired electrical readiness level.

6. Install all component modules (WP 0026 00).

7. Perform the fire detection system test (WP 0017 00 or WP 0025 00).

8. Return the equipment to the desired readiness condition.

END OF WORK PACKAGE

DIRECT SUPPORT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
AFFF PUMP, REPAIR

INITIAL SETUP:

Tools and Special Tools:
- Tool Kit, General Mechanic's (Item 1, Table 2, WP 0046 00)
- Multimeter (Item 3, Table 2, WP 0046 00)
- Chain Hoist (Item 12, Table 2, WP 0046 00)
- Sling, Endless (Item 13, Table 2, WP 0046 00)

Materials/Parts:
- Gloves, Leather (Item 8, Table 3, WP 0049 00)
- Hard Hat (Item 11, Table 3, WP 0049 00)
- Tag, Danger (Item 8, Table 1, WP 0050 00)
- Motor, Alternating Current (Item 1, Figure 3, WP 0048 00

Personnel Required:
- Two Watercraft Engineers, 88L

References:
- FM 55-502
- TB 43-0218
- WP 0005 00
- WP 0046 00
- WP 0048 00
- WP 0049 00
- WP 0050 00

Equipment Conditions:
- Set to OFF the AFFF PUMP circuit breaker on the main switchboard. Lock out and tag out (FM 55-502).

WARNING

Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lock wire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.

AFFF MOTOR REPLACEMENT

REMOVAL

1. Remove the two screws (figure 1, item 1) that secure the junction box cover (figure 1, item 2).

2. Remove the junction box cover (figure 1, item 2) from the junction box (figure 1, item 3).

WARNING

Death or serious injury can result from contact with live electrical circuits. Before beginning work on this, or any other electrical circuit or equipment, make certain electrical power is OFF, locked out, and tagged out (FM 55-502).

3. Using a multimeter, check for available voltage at the wire nuts (figure 1, item 4) in the junction box (figure 1, item 3). If voltage is present, check that the proper circuit breaker is OFF, locked out, and tagged out (FM 55-502). If no voltage is present, continue with the procedure.

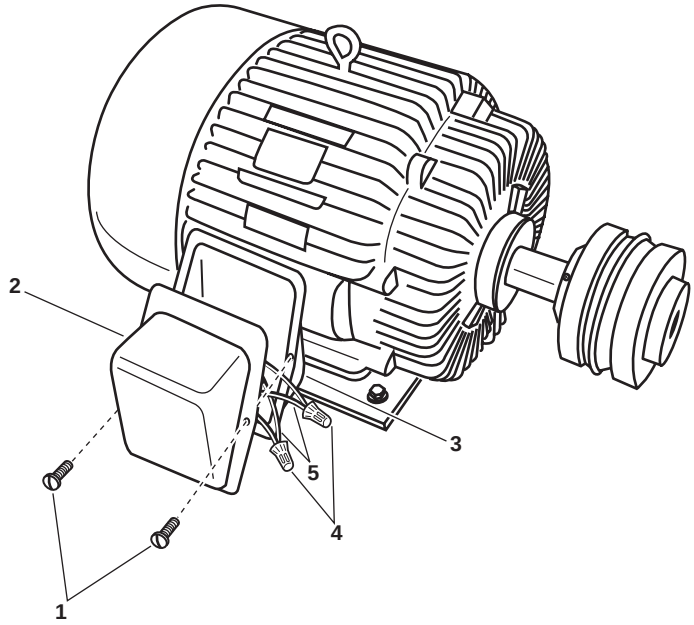


Figure 1. AFFF Pump Motor Junction Box

4. Label and disconnect the wiring (figure 1, item 5).

5. Remove the two bolts (figure 2, item 1), two lockwashers (figure 2, item 2), and two flat washers (figure 2, item 3).

6. Remove the coupling cover (figure 2, item 4), and discard the lockwashers (figure 2, item 2).

7. Loosen the motor coupling flange setscrew (figure 3, item 1).

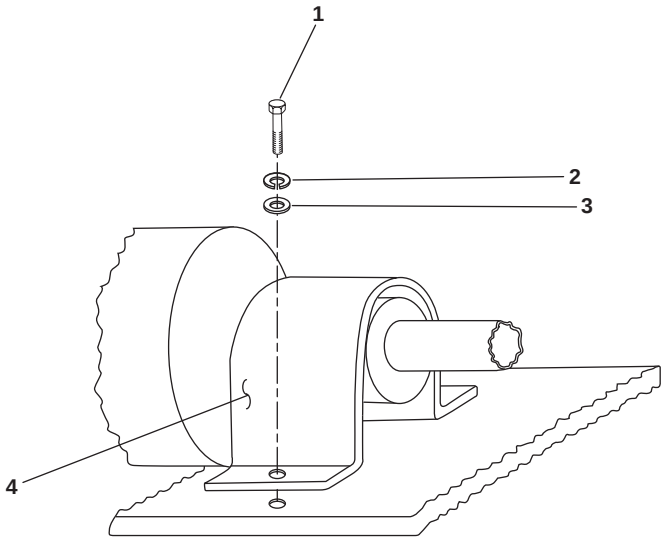


Figure 2. AFFF Pump Coupling Cover

8. Slide the motor coupling flange (figure 3, item 2) towards the AFFF pump motor (figure 3, item 3).

9. Remove the four bolts (figure 3, item 4), four lockwashers (figure 3, item 5), and four flat washers (figure 3, item 6). Discard the four lockwashers.

Heavy loads can crush. Do not allow any body parts to come under the load or between the load and a stationary object. Death or serious injury can result.

10. Use a sling and chain hoist to remove the AFFF pump motor (figure 3, item 3) from its foundation.

11. Slide the motor coupling flange (figure 3, item 2) off the motor shaft (figure 3, item 7).

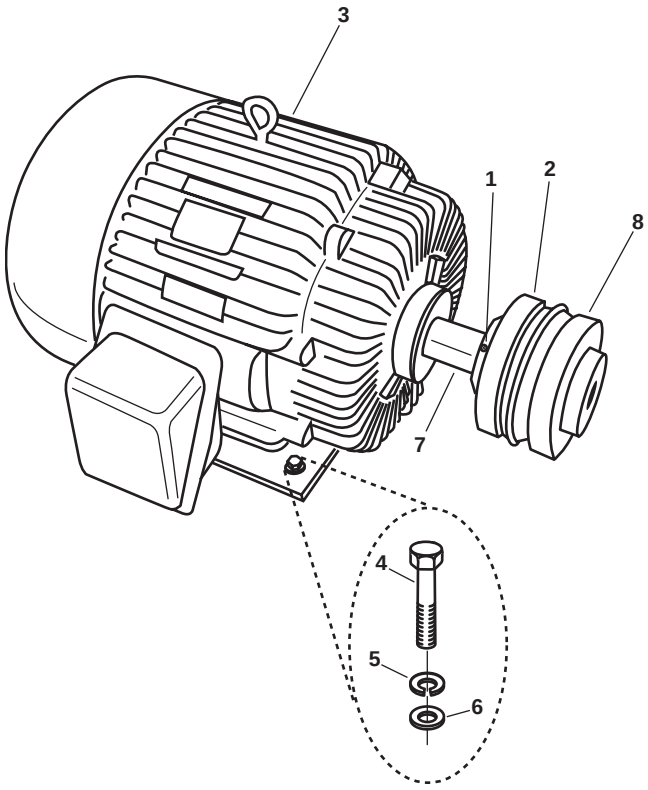


Figure 3. AFFF Pump Coupling Detail

INSTALLATION

1. Slide the motor coupling flange (figure 3, item 2) onto the motor shaft (figure 3, item 7) with the small end towards the AFFF pump motor (figure 3, item 3).

Heavy loads can crush. Do not allow any body parts to come under the load or between the load and a stationary object. Death or serious injury can result.

2. Use a sling and chain hoist to position the AFFF pump motor (figure 3, item 3) on its foundation with the mounting holes aligned.

3. Install four bolts (figure 3, item 4), four new lockwashers (figure 3, item 5), and four flat washers (figure 3, item 6). Do not tighten at this time.

4. Align the pump coupling flange (figure 3, item 8) and the motor coupling flange (figure 3, item 2) together ensuring parallel and angular alignment as shown in figure 4.

NOTE

Correct alignment of the pump coupling and motor coupling is shown in detail A of figure 4. Parallel misalignment and angular misalignment are depicted for reference only in details B and C, respectively.

5. Once the pump coupling flange (figure 3, item 8) and the motor coupling flange (figure 3, item 2) are correctly aligned per detail A of figure 4, tighten the motor coupling flange setscrew (figure 3, item 1), and the four bolts (figure 3, item 4).

NOTE

The coupling alignment may change after tightening the mounting bolts. Always re-check the coupling alignment following fastener tightening.

6. Check the coupling alignment. If the alignment is not correct, repeat steps 4 and 5.

7. Install the coupling cover (figure 2, item 4) and secure it with two bolts (figure 2, item 1), two flat washers (figure 2, item 3), and two new lockwashers (figure 2, item 2).

8. Connect the electrical wiring (figure 1, item 5) using the labels from step 4 of Removal as a guide. Remove the labels.

9. Install the junction box cover (figure 1, item 2) and secure it with the two screws (figure 1, item 1).

10. Remove the lockouts and tagouts (FM 55-502).

11. Set to ON the AFFF PUMP circuit breaker on the main switchboard.

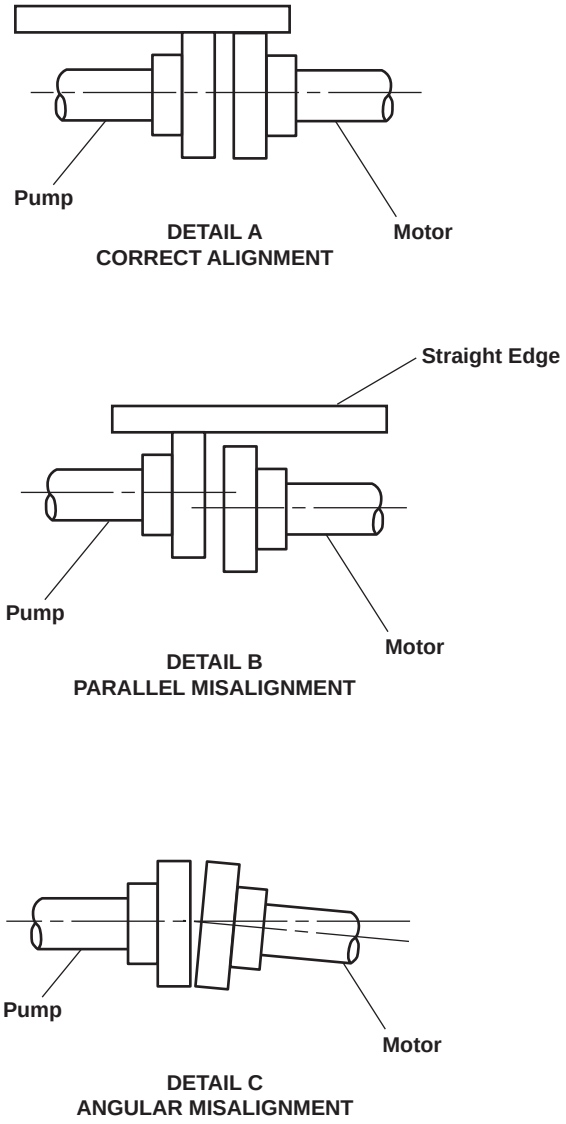


Figure 4. AFFF Pump Coupling Alignment

12. Operate the AFFF pump (WP 0005 00) and observe that the pump operates normally without unusual noise or vibration.

13. Return the equipment to the desired readiness condition.

END OF WORK PACKAGE

DIRECT SUPPORT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
AFFF PUMP, REPLACE

INITIAL SETUP:

Tools and Special Tools:
- Tool Kit, General Mechanic's (Item 1, Table 2, WP 0046 00)
- Chain Hoist (Item 12, Table 2, WP 0046 00)
- Sling, Endless (Item 13, Table 2, WP 0046 00)

Materials/Parts:
- Tag, Danger (Item 8, Table 1, WP 0050 00)
- Gasket, Flange (Qty. 2) (Item 38, Figure 3, WP 0048 00)
- Pump Unit, Rotary (Item 5, Figure 3, WP 0048 00)

Personnel Required:
- Two Watercraft Engineers, 88L
- Two Crewmembers, Any MOS

References:
- FM 55-502
- TB 43-0218
- WP 0005 00
- WP 0046 00
- WP 0048 00
- WP 0050 00

Equipment Conditions:
- Set to OFF the AFFF PUMP circuit breaker on the main switchboard. Lock out and tag (FM 55-502).
- CLOSE valve CA-6, STG AIR TO PMP DR ENG. Lock out and tag out (FM 55-502).
- CLOSE valves FM-13, F.F. TO F.M. CRSVR and FM-84, AFFF TK SUCT. Lock out and tag out (FM 55-502).

WARNING

Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lock wire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.

AFFF PUMP REPLACEMENT

REMOVAL

1. Remove the eight bolts (figure 1, item 1) and eight nuts (figure 1, item 2) from the discharge piping flange (figure 1, item 3).
2. Remove the eight bolts (figure 1, item 4) and eight nuts (figure 1, item 5) from the inlet piping flange (figure 1, item 6).
3. Remove the four bolts (figure 1, item 7) and four nuts (figure 1, item 8) from the strainer flange (figure 1, item 9).
4. Remove the inlet piping (figure 1, item 10) from the AFFF pump (figure 1, item 11).
5. Remove and discard the three gaskets (figure 1, item 12).
6. Remove the two bolts (figure 2, item 1), two lockwashers (figure 2, item 2), and two flat washers (figure 2, item 3) from the coupling cover (figure 2, item 4). Discard the lockwashers.
7. Remove the coupling cover (figure 2, item 4).

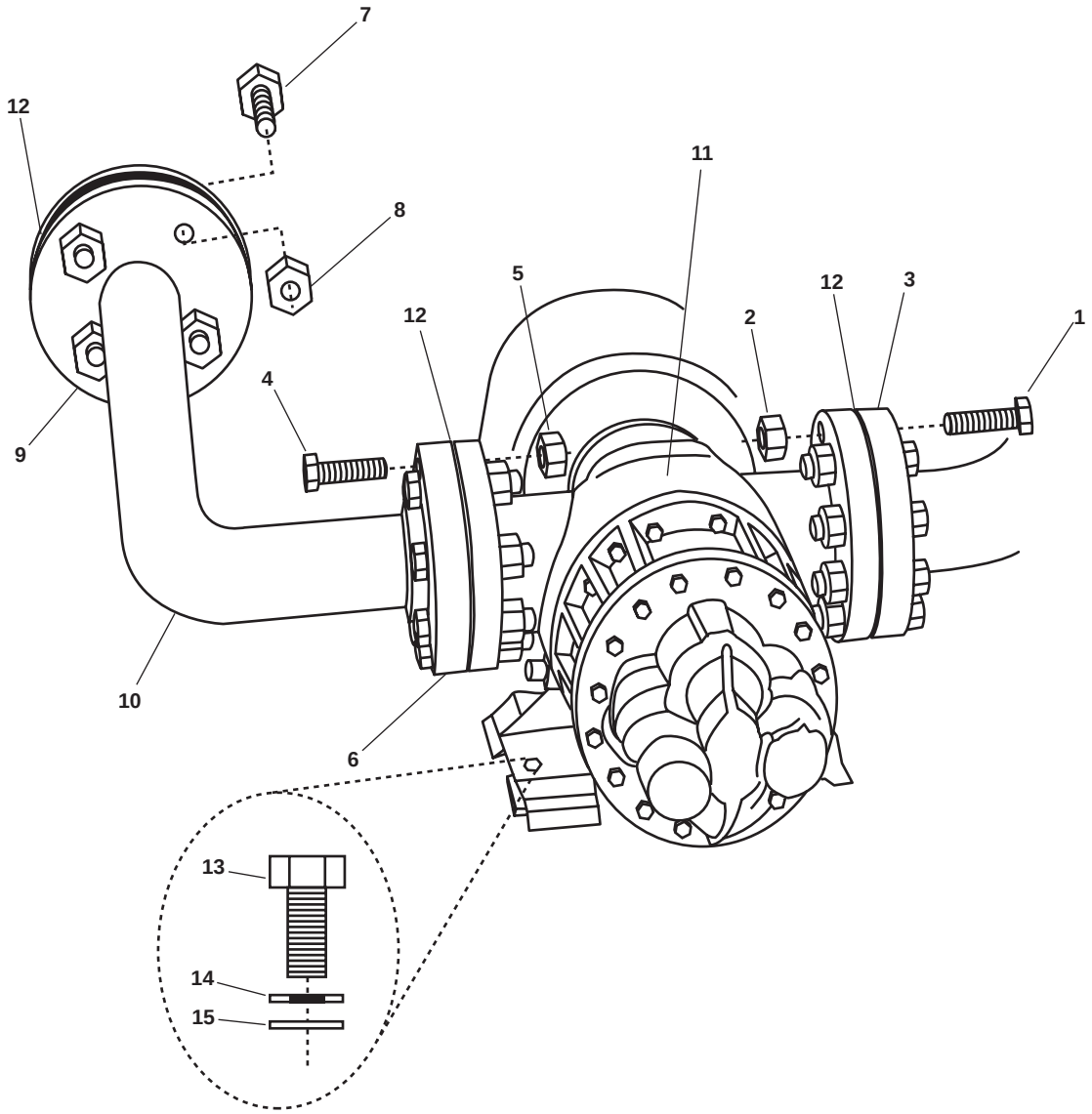


Figure 1. AFFF Pump Piping

8. Loosen the pump coupling setscrew (figure 3, item 1), and slide the pump coupling (figure 3, item 2) towards the AFFF pump (figure 3, item 3).

9. Remove the four bolts (figure 1, item 13), four lockwashers (figure 1, item 14), and four flat washers (figure 1, item 15) that secure the AFFF pump (figure 1, item 11) to its foundation. Discard the lockwashers.

10. Use an endless sling and chain hoist to lift the AFFF pump (figure 1, item 11) and remove it from its foundation.

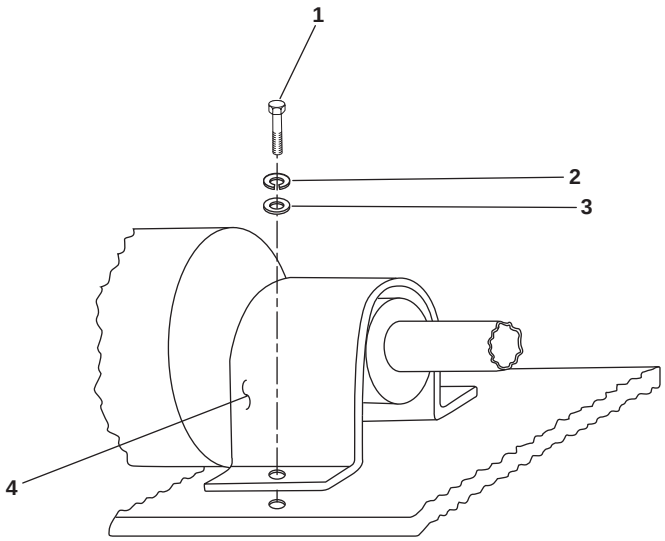


Figure 2. AFFF Pump Coupling Cover

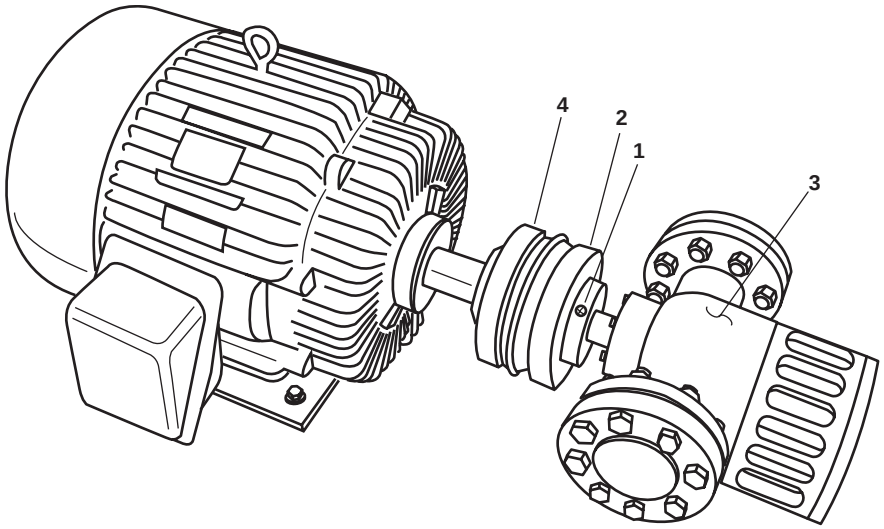


Figure 3. AFFF Pump Coupling Detail

INSTALLATION

1. Thoroughly clean all old gasket material from the three flanges (figure 1, items 3, 6, and 9).

2. Use an endless sling and chain hoist to position the AFFF pump (figure 1, item 11) onto its foundation.

3. Loosely install the four bolts (figure 1, item 13), four new lockwashers (figure 1, item 14), and four flat washers (figure 1, item 15) that secure the AFFF pump (figure 1, item 11) to its foundation.

NOTE

Correct alignment of the pump coupling and motor coupling is shown in detail A of figure 3. Parallel misalignment and angular misalignment are depicted for reference only in details B and C, respectively.

4. Align the pump coupling (figure 3, item 2) to the motor coupling (figure 3, item 4) ensuring proper parallel and angular alignment as shown in figure 4.

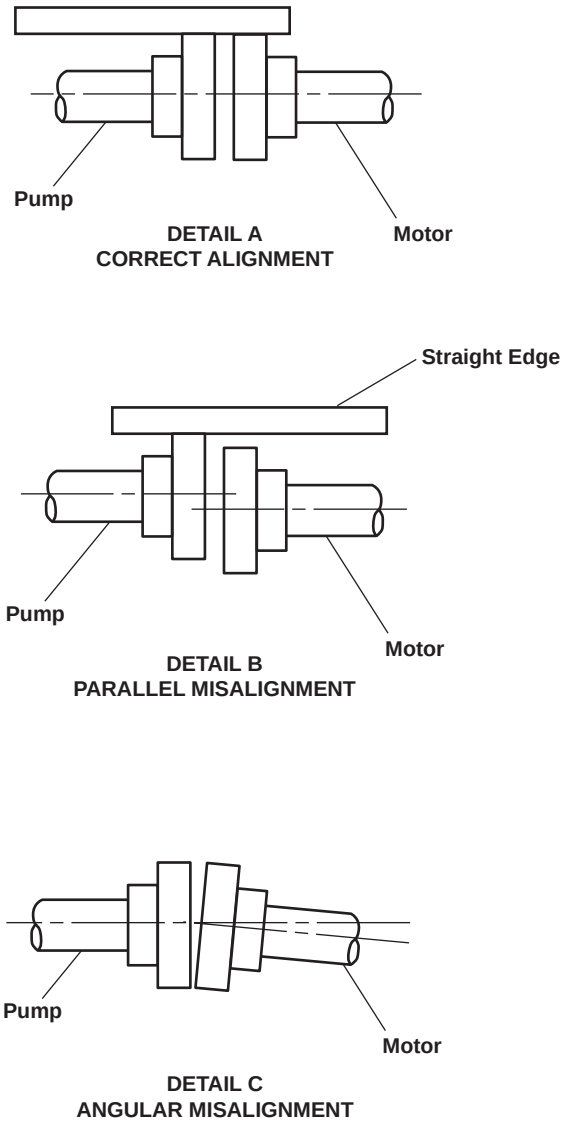


Figure 4. AFFF Pump and Motor Coupling Alignment Detail

5. Once the pump coupling (figure 3, item 2) and the motor coupling (figure 3, item 4) are correctly aligned per detail A of figure 4, tighten the pump coupling setscrew (figure 3, item 1), and tighten the pump mounting bolts (figure 1, item 13).

6. Check the alignment of the coupling again. If the alignment is not correct, repeat steps 4-6.

7. Install the coupling cover (figure 2, item 4) with two bolts (figure 2, item 1), two flat washers (figure 2, item 3), and two new lockwashers (figure 2, item 2).

8. Position the inlet piping (figure 1, item 10) and new gaskets (figure 1, item 12) into place.

9. Loosely secure with the four bolts (figure 1, item 7) , four nuts (figure 1, item 8), eight bolts (figure 1, item 4), and eight nuts (figure 1, item 5).

10. Verify that the flanges are aligned, and tighten the eight bolts (figure 1, item 4) and four bolts (figure 1, item 7).

11. Position the discharge flange (figure 1, item 3) to the pump (figure 1, item 11) using a new gasket (figure 1, item 12), and loosely secure with the eight bolts (figure 1, item 1) and eight nuts (figure 1, item 2).

12. Tighten the eight bolts (figure 1, item 1).

13. Remove the lockouts and tagouts (FM 55-502).

14. Operate the AFFF pump (WP 0005 00) and observe that the pump operates normally without unusual noise, vibration, or leakage.

15. Perform the Relief Valve Adjustment procedure in this work package.

RELIEF VALVE ADJUSTMENT

NOTE

The relief valve must be adjusted under operating conditions. Ensure that steps 1-3 are performed prior to adjusting the relief valve.

1. Set the AFFF PUMP circuit breaker on the main switchboard to ON.

2. Position a crewmember with sound powered telephone at the fire monitor on top of the pilothouse.

3. Position a crewmember with sound powered telephone at the AFFF pump.

4. Remove the seal cap (figure 5, item 1) and gasket (figure 5, item 2). Discard the gasket.

5. Loosen the lock nut (figure 5, item 3) on the adjusting screw (figure 5, item 4).

6. Back the adjusting screw (figure 5, item 4) to the point where the end of the screw will be at the maximum extension of approximately 1.06 inches (26.9 millimeters) when measured from the relief valve bonnet (figure 5, item 5).

7. Bring the diesel engine-driven fire pump online (WP 0005 00) and check that the diesel engine-driven firefighting pump discharges raw water properly at the fire monitors (WP 0005 00).

8. Set the ON/OFF switch (figure 6, item 1) on the AFFF pump motor controller to ON (figure 6, item 2).

9. Verify that the POWER AVAILABLE indicator (figure 6, item 3) is illuminated.

10. Press the START button (figure 6, item 4).

11. Verify that the MOTOR RUN indicator (figure 6, item 5) is illuminated.

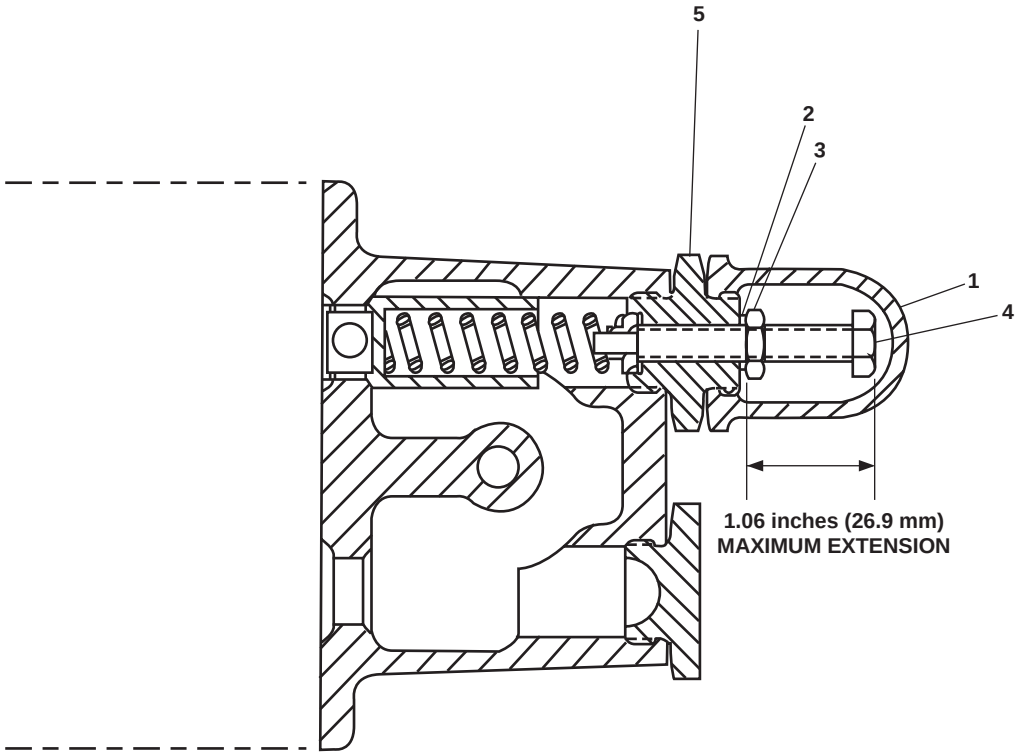


Figure 5. AFFF Pump Relief Valve

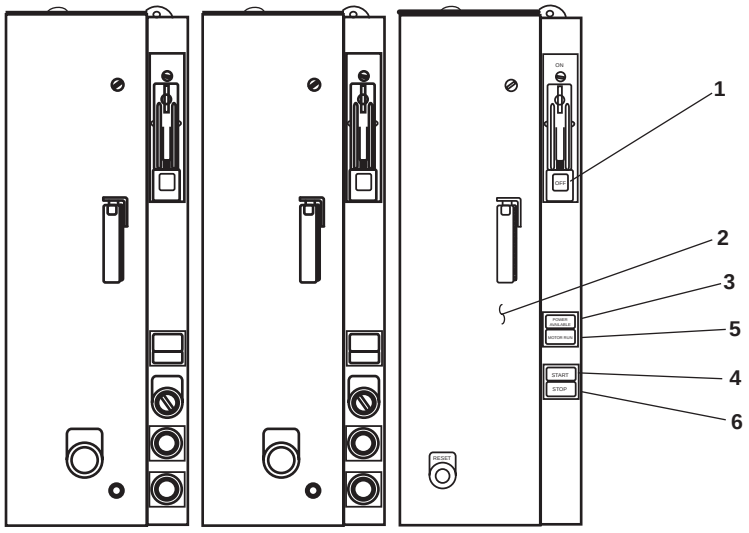


Figure 6. AFFF Pump Motor Controller

⚠ CAUTION

Do not operate the AFFF pump or the diesel engine-driven fire pump for extended periods against a dead head. Pump failure could result.

12. Signal the fire monitor operator to CLOSE the monitor discharge valve.

13. With the fire monitor discharge valve CLOSED, observe the AFFF discharge pressure gauge (figure 7, item 1).

14. Observe and record the pressure displayed on the AFFF discharge pressure gauge (figure 7, item 1) when the relief valve lifts.

15. Instruct the fire monitor operator to OPEN the fire monitor discharge valve.

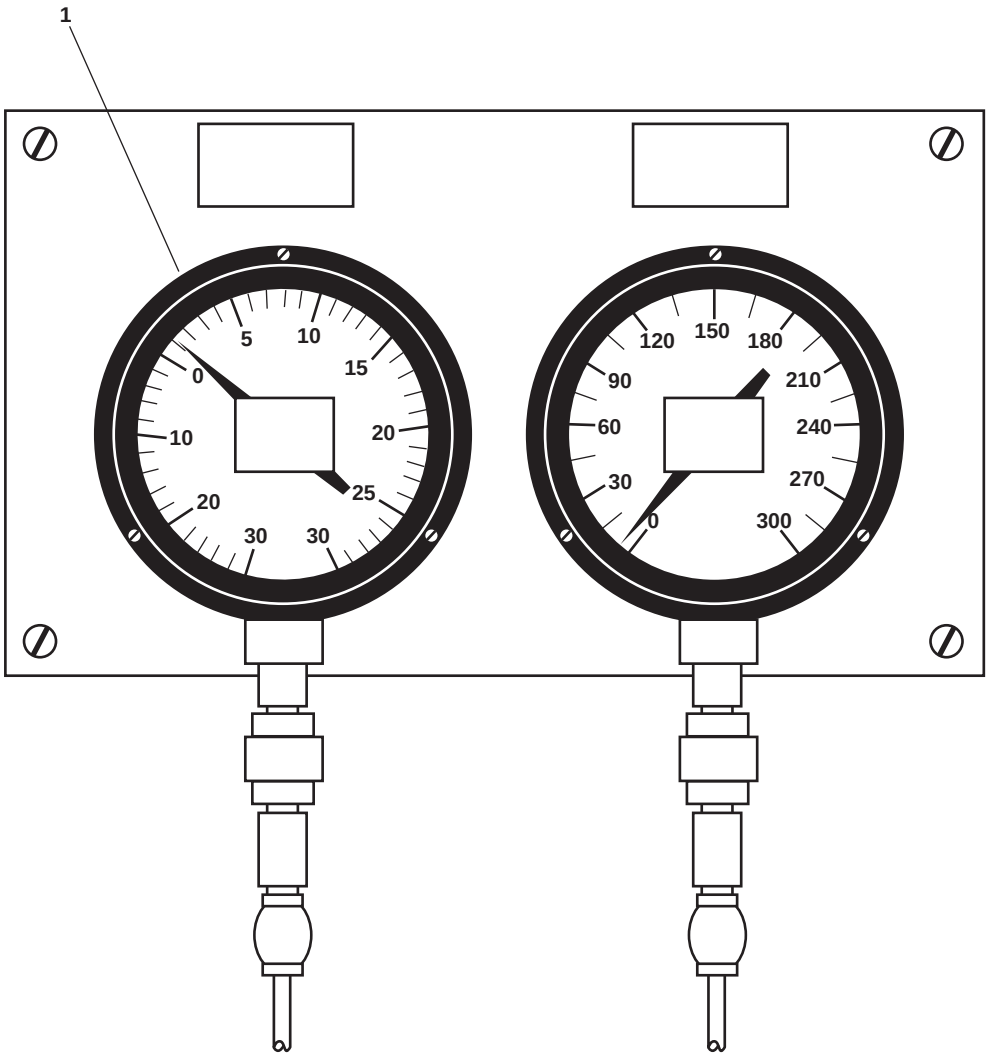


Figure 7. AFFF Discharge Pressure Gauge

WARNING

Use extreme caution when working around the rotating pump shaft. Do not allow hands or tools to come in contact with the shaft. Do not wear loose clothing, jewelry, or anything else, which might become entangled in the shaft. Failure to observe these precautions may result in death or serious injury.

NOTE

The relief valve must be adjusted under operating conditions. Ensure that steps 1-3 are performed prior to adjusting the relief valve.

16. Turn the adjusting screw (figure 5, item 4) clockwise in ½ turn increments until the relief valve lifts at the proper pressure.
17. Repeat steps 12-16 until the relief valve lifts at 190 PSI (13.1 bar).
18. Tighten the lock nut (figure 5, item 3), and recheck to discharge pressure.
19. Press the STOP button (figure 6, item 6) on the AFFF pump motor controller (figure 6, item 2).
20. Set to OFF the ON/OFF switch (figure 6, item 1) on the AFFF pump motor controller (figure 6, item 2).
21. Shut down the diesel engine-driven fire pump (WP 0005 00).
22. Install a new gasket (figure 5, item 2) in the seal cap (figure 5, item 1).
23. Return the equipment to the desired readiness condition.

END OF WORK PACKAGE

DIRECT SUPPORT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
FM-200 SYSTEM, TEST

INITIAL SETUP:

Personnel Required:
Two Watercraft Engineers, 88L

References:
DA Form 4640
DA Form 4993
TM 55-1925-273-10
WP 0005 00

Equipment Conditions:
Set to ON the FM-200 SYSTEM circuit breaker in 120V main deck, 01 & 02 emergency lighting panel No. 1.
FM-200 system set for normal operation (WP 0005 00).
SSDG 1, SSDG 2, bow thruster engine, and the pump drive engine operating normally (TM 55-1925-273-10).
EDG ready to accept a load, or vessel operating on shore power.

TEST

1. Ensure that the equipment controlled by pressure switch PS-1 (figure 1, item 1) identified below has been powered up and is operating normally (TM 55-1925-273-10):
   a. Engine Room Supply Fans 1 and 2
   b. Engine Room Exhaust Fans 1 and 2
   c. SSDG 1 and SSDG 2
   d. Bow Thruster Engine
   e. Pump Drive Engine
   f. AMS 1 Supply Fan
   g. Fuel Oil Transfer Pumps 1 and 2
2. Ensure that all other non-essential equipment has been properly secured.

NOTE

If the vessel is operating on the ship's service diesel generator, the vessel will go dark once pressure switch PS-1 is activated and will remain dark until the emergency generator comes online.

3. Manually operate pressure switch PS-1 (figure 1, item 1) by pulling up on the plunger (figure 1, item 2) to the OPERATED position.
4. Verify that the amber strobe lights are operating in AMS 1, AMS 2, and the engine room.
5. Verify that the alarm bell sounds on the exterior main deck.
6. Verify that the equipment controlled by pressure switch PS-1 (figure 1, item 1) identified in step 1 of this work package is no longer operating.

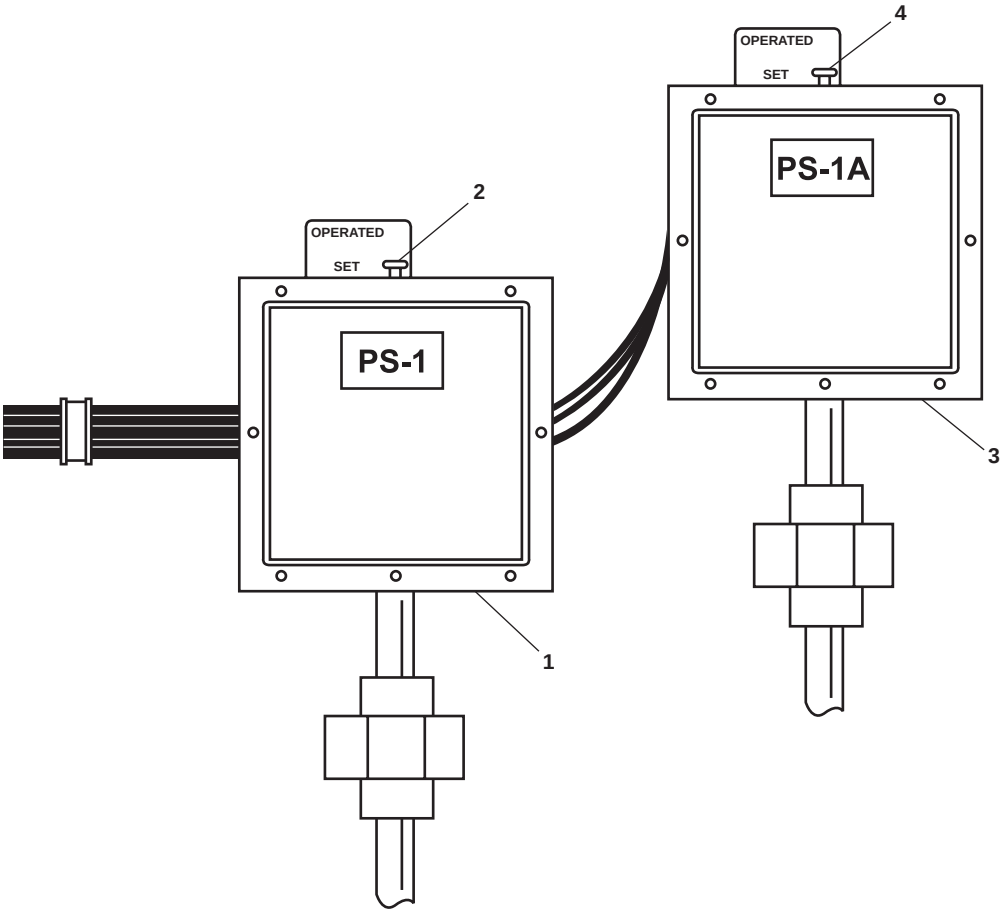


Figure 1. Testing of FM-200 Pressure Switches PS-1 and PS-1A

8. Verify that the amber strobe lights located in AMS 1, AMS 2, and the engine room have stopped flashing.

9. Verify that the alarm bell located on the exterior main deck has stopped ringing.

10. Manually operate pressure switch PS-1A (figure 1, item 3) by pulling up on the plunger (figure 1, item 4) to the OPERATED position.

11. Verify that the electric horns located in the engine room and in AMS 1 are sounding.

12. Return pressure switch PS-1A (figure 1, item 3) to the SET position by pressing down on the plunger (figure 1, item 4).

13. Verify that the electric horns located in the engine room and in AMS 1 have stopped sounding.

14. Check all FM-200 firefighting system components for any signs of corrosion and/or deterioration.

15. Make the appropriate log entries in DA Form 4640 (Harbor Boat Deck Department Log for Class A&B Vessels) and DA Form 4993 (Harbor Boat Engine Department Log for Class A and C-1 Vessels) concerning the FM-200 System Test.

16. Return the equipment to the desired readiness condition.

END OF WORK PACKAGE

DIRECT SUPPORT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
FM-200 SYSTEM, SERVICE

INITIAL SETUP:

Tools and Special Tools:
Tool Kit, General Mechanic's (Item 1, Table 2, WP 0046 00)

Materials/Parts:
Cloth, Abrasive (Item 1, Table 1, WP 0050 00)
Dry Cleaning Solvent (Item 2, Table 1, WP 0050 00)
Gloves, Chemical and Oil Protective (Item 7, Table 3, WP 0049 00)
Rags, Wiping (Item 6, Table 1, WP 0050 00)
Goggles, Industrial (Item 9, Table 3, WP 0049 00)

Personnel Required:
One Watercraft Engineer, 88L

References:
TB 43-0144
WP 0032 00
WP 0046 00
WP 0049 00
WP 0050 00

SERVICE

NOTE

An annual recertification is required for the FM-200 system. Notify the maintenance supervisor if annual recertification is necessary.

1. Visually inspect the flexible actuation hoses for loose fitting, damaged threads, cracks, distortion cuts, dirt, and frayed wire braid. Tighten loose fittings and/or replace hoses that have any stripped threads or any other damage. If necessary, perform the cleaning procedure described in the paragraph below.

2. Visually inspect the adapters, couplings, and tees at the FM-200 cylinder pilot outlets for tightness. Tighten the loose couplings if necessary.

3. Visually inspect the FM-200 cylinder pressure operated control heads for any damage, deterioration, corrosion, cracks, dirt, and loose couplings. Tighten the loose couplings and/or perform the cleaning procedure described in the paragraph below, as necessary.

4. Visually inspect the FM-200 cylinder and valve assembly for leakage, physical damage such as cracks, dents, distortion, and/or worn parts. Report any discrepancies to the maintenance supervisor. If necessary, perform the cleaning procedure described in the paragraph below.

5. Visually inspect the FM-200, CO_2, and nitrogen cylinder brackets, straps, cradles, and mounting hardware for loose, damaged, or broken parts. Repair any discrepancies found, or report them to the maintenance supervisor. If necessary, perform the cleaning procedure described in the paragraph below.

6. Visually inspect the CO_2 and nitrogen actuation lines and support brackets for continuity, physical damage, loose fittings, cracks, and/or cuts. Tighten loose fitting, replace damaged parts, and/or perform the cleaning procedure described in the paragraph below, as required.

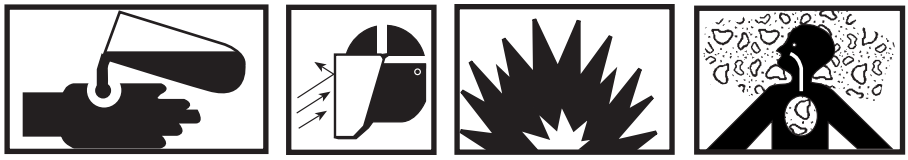
7. Visually inspect discharge nozzles for dirt and/or physical damage. If discharge nozzles are damaged, replace the applicable discharge nozzle (WP 0032 00). If discharge nozzles are dirty, perform the cleaning procedure described in the paragraph below.

8. Visually inspect all manual pull stations for cracks, broken or cracked glass plate, dirt, or distortion. Report any discrepancies to the maintenance supervisor. If necessary, perform the cleaning procedure described in the paragraph below.

9. Visually inspect the pressure switches for deformations, cracks, dirt, and/or damage. Replace the pressure switch (WP 0032 00) if damage is found. Perform the cleaning procedure described in the paragraph below as required.

CLEANING

WARNING



Do not allow cleaning solvent to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling cleaning solvent. Failure to follow these precautions can result in illness or serious injury.

Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to follow these precautions can result in death or serious injury.

1. Remove dirt from metallic parts using a clean wiping rag moistened with dry cleaning solvent.

2. Dry the metallic parts with a clean wiping rag.

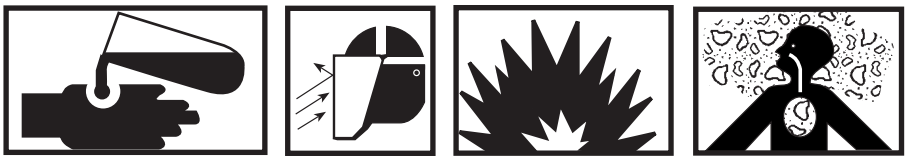
3. Wipe non-metallic parts with clean, dry lint-free cloth.

4. Remove corrosion using an abrasive cloth and paint the area (TB 43-0144).

DISCHARGE NOZZLE SERVICE

1. Clean the outside of the discharge nozzles with a rag or a soft brush.

WARNING



Do not allow cleaning solvent to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling cleaning solvent. Failure to follow these precautions can result in illness or serious injury.

Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to follow these precautions can result in death or serious injury.

2. Examine discharge orifices for damage or blockage. If the discharge nozzles appear to be obstructed, unscrew the nozzles and clean by immersing in dry cleaning solvent and drying thoroughly with a clean wiping rag.

3. Replace any damaged discharge nozzles (WP 0032 00).

END OF WORK PACKAGE

DIRECT SUPPORT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
FM-200 SYSTEM, REPAIR

INITIAL SETUP:

Tools and Special Tools:
Tool Kit, General Mechanic's (Item 1, Table 2, WP 0046 00)
Multimeter (Item 3, Table 2, WP 0046 00)

Materials/Parts:
Tag, Danger (Item 8, Table 1, WP 0050 00)
Tape, Antiseizing (Item 9, Table 1, WP 0050 00)

Personnel Required:
Two Watercraft Engineers, 88L

References:
FM 55-502
TB 43-0218

References (continued):
WP 0022 00
WP 0030 00
WP 0046 00
WP 0050 00

Equipment Conditions:
Set to OFF the FM-200 SYSTEM. circuit breaker in 120V main deck 01 & 02 emergency lighting panel No. 1. Lock out and tag out (FM 55-502).
Set to OFF the EMERGENCY DIESEL GENERATOR SET BATTERY CHARGER. circuit breaker in 120V emergency load center distribution panel. Lock out and tag out (FM 55-502).

WARNING

Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lock wire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.

DISCHARGE NOZZLE REPLACEMENT

REMOVAL

⚠ CAUTION

Never attempt to connect union connections with only one wrench. Damage to the vessel's piping or to the switch's piping could occur. Always use two wrenches.

1. Use a wrench to loosen the discharge nozzle (figure 1, item 1).
2. Remove the discharge nozzle (figure 1, item 1) from the pipe fitting (figure 1, item 2).

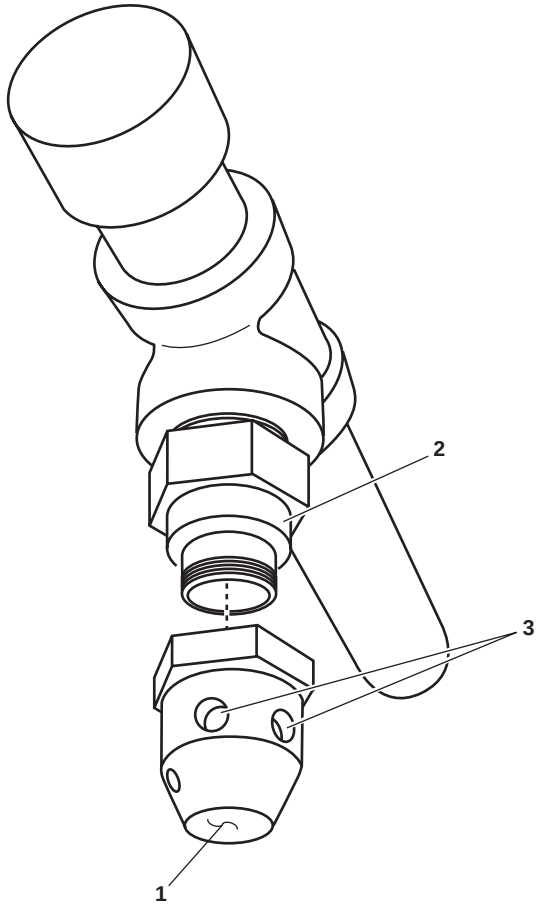


Figure 1. FM-200 Discharge Nozzle

INSTALLATION

⚠ CAUTION

Never attempt to connect union connections with only one wrench. Damage to the vessel's piping or to the switch's piping could occur. Always use two wrenches.

1. Install the discharge nozzle (figure 1, item 1) on the pipe fitting (figure 1, item 2).

NOTE

For installation of 180-degree discharge nozzles, ensure that the discharge nozzle's orifices are oriented away from the adjacent bulkhead.

2. Verify that the discharge holes (figure 1, item 3) are properly aligned.

3. Perform the Follow-On Service procedure at the end of this work package.

AMBER STROBE LIGHT REPLACEMENT

REMOVAL

1. Remove the three screws (figure 2, item 1) that attach the strobe lens (figure 2, item 2) to the strobe light base (figure 2, item 3), and remove the strobe lens.

2. Remove the four screws (figure 2, item 4) that secure the junction box cover (figure 2, item 5) to the junction box (figure 2, item 6).

3. Remove the strobe light base (figure 2, item 3) and the junction box cover (figure 2, item 5) as an assembly.

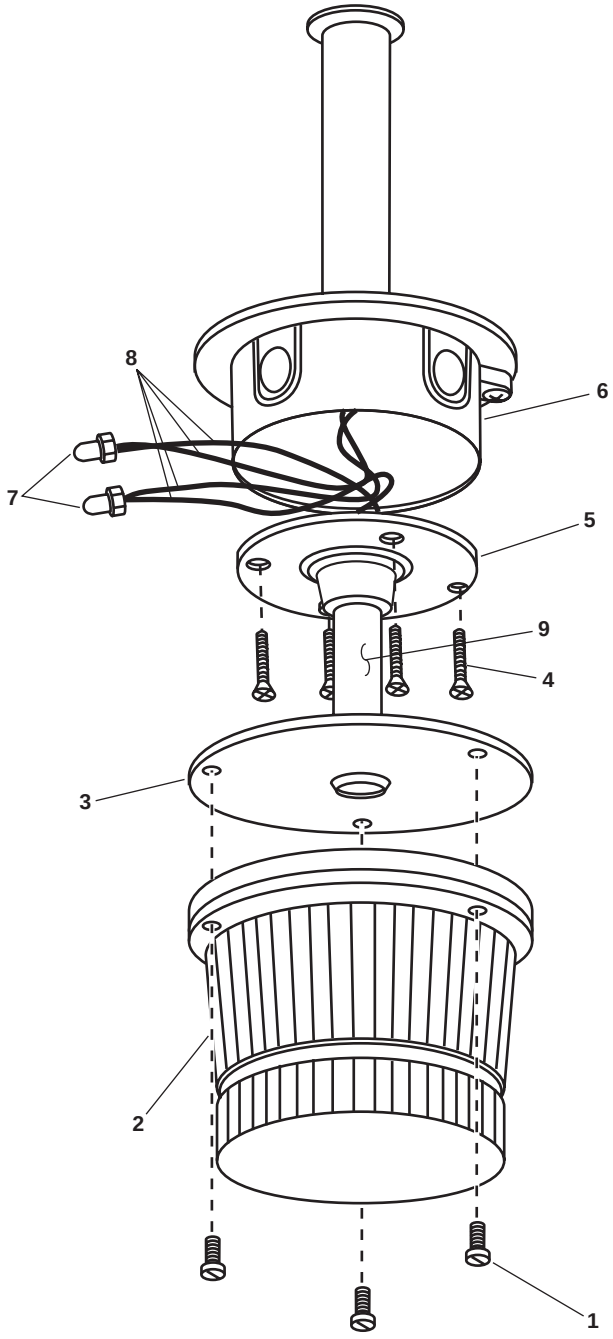


Figure 2. Amber Strobe Light

WARNING

Replace or repair components only after the affected circuit has been secured, locked out and tagged out (FM 55-502). Performing replacement with the circuit energized may result in injury.

4. Using a multimeter, check for voltage at the terminal nuts (figure 2, item 7) to ensure that electrical circuits are deenergized. If voltage is present, ensure that the proper circuit breakers are set to OFF, locked out, and tagged out (FM 55-502). If no voltage is present, continue with this procedure.

5. Label and disconnect the wiring (figure 2, item 8) from the terminal nuts (figure 2, item 7).

6. Remove the strobe light base (figure 2, item 3) from the pipe (figure 2, item 9), and remove the wiring (figure 2, item 8).

INSTALLATION

1. Install the wires (figure 2, item 8) through the pipe (figure 2, item 9) and install the strobe light base (figure 2, item 3) to the pipe.

2. Connect the wiring (figure 2, item 8) using the labels from step 5 of Removal as a guide. Remove the labels.

3. Position the strobe light base (figure 2, item 3) and the junction box cover (figure 2, item 5) as an assembly on the junction box (figure 2, item 6) and secure it with the four screws (figure 2, item 4).

4. Install the strobe lens (figure 2, item 2) on the strobe light base (figure 2, item 3) and secure it with the three screws (figure 2, item 1).

5. Perform the Follow-On Service procedure at the end of this work package.

HORN/STROBE REPLACEMENT

REMOVAL

1. Remove the two screws (figure 3, item 1) that attach the horn/strobe (figure 3, item 2) to the mounting plate (figure 3, item 3).

Replace or repair components only after the affected circuit has been secured, locked out and tagged out (FM 55-502). Performing replacement with the circuit energized may result in injury.

2. Using a multimeter, check for voltage at the terminal board (figure 3, item 4). If voltage is present, ensure that the proper circuit breakers are set to OFF, locked out, and tagged out (FM 55-502). If no voltage is present, continue with this procedure.

3. Label and disconnect the wiring from the terminal board (figure 3, item 4).

4. Remove the two screws (figure 3, item 5) that secure the mounting plate (figure 3, item 3) to the junction box (figure 3, item 6), and remove the mounting plate.

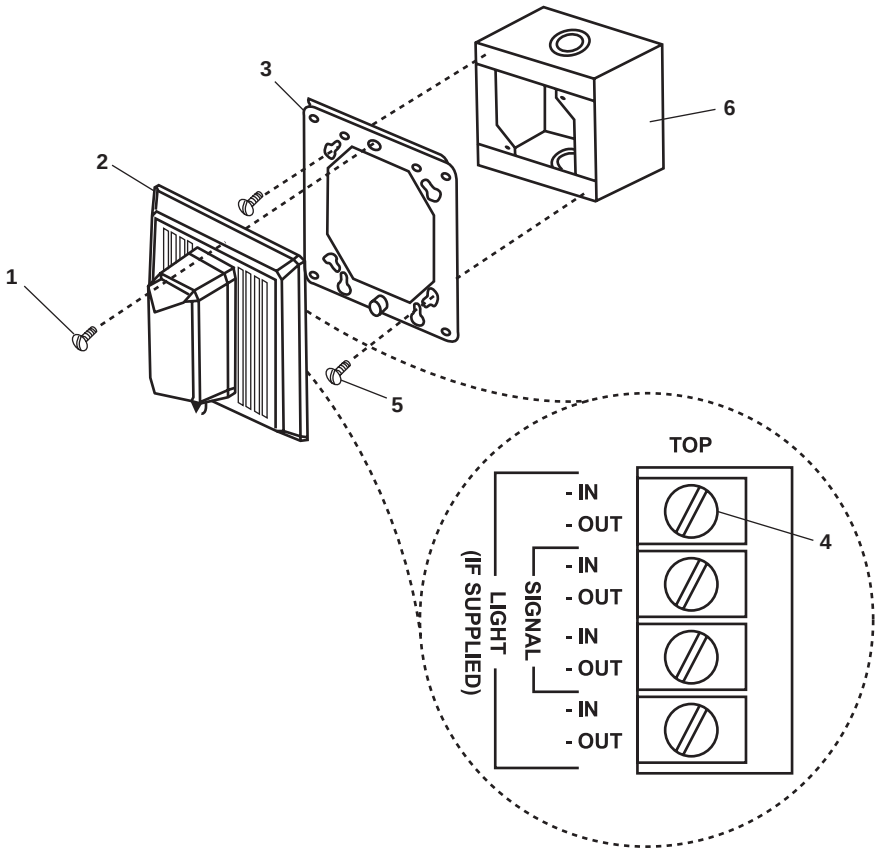


Figure 3. Horn/Strobe Replacement

INSTALLATION

1. Install the mounting plate (figure 3, item 3) to the junction box (figure 3, item 6) with the two screws (figure 3, item 5).

2. Connect the wiring to the terminal board (figure 3, item 4) using the labels from step 3 of Removal as a guide. Remove the labels.

3. Position the horn/strobe (figure 3, item 2) on the mounting plate (figure 3, item 3) and secure it with the two screws (figure 3, item 1).

4. Perform the Follow-On Service procedure at the end of this work package.

ALARM BELL, MAIN DECK EXTERIOR, REPLACEMENT

REMOVAL

1. Remove the bolt (figure 4, item 1) and washer (figure 4, item 2) that secure the gong (figure 4, item 3).

2. Remove the gong (figure 4, item 3) from the bell actuator assembly cover (figure 4, item 4).

3. Remove the six screws (figure 4, item 5) that secure the bell actuator assembly cover (figure 4, item 4).

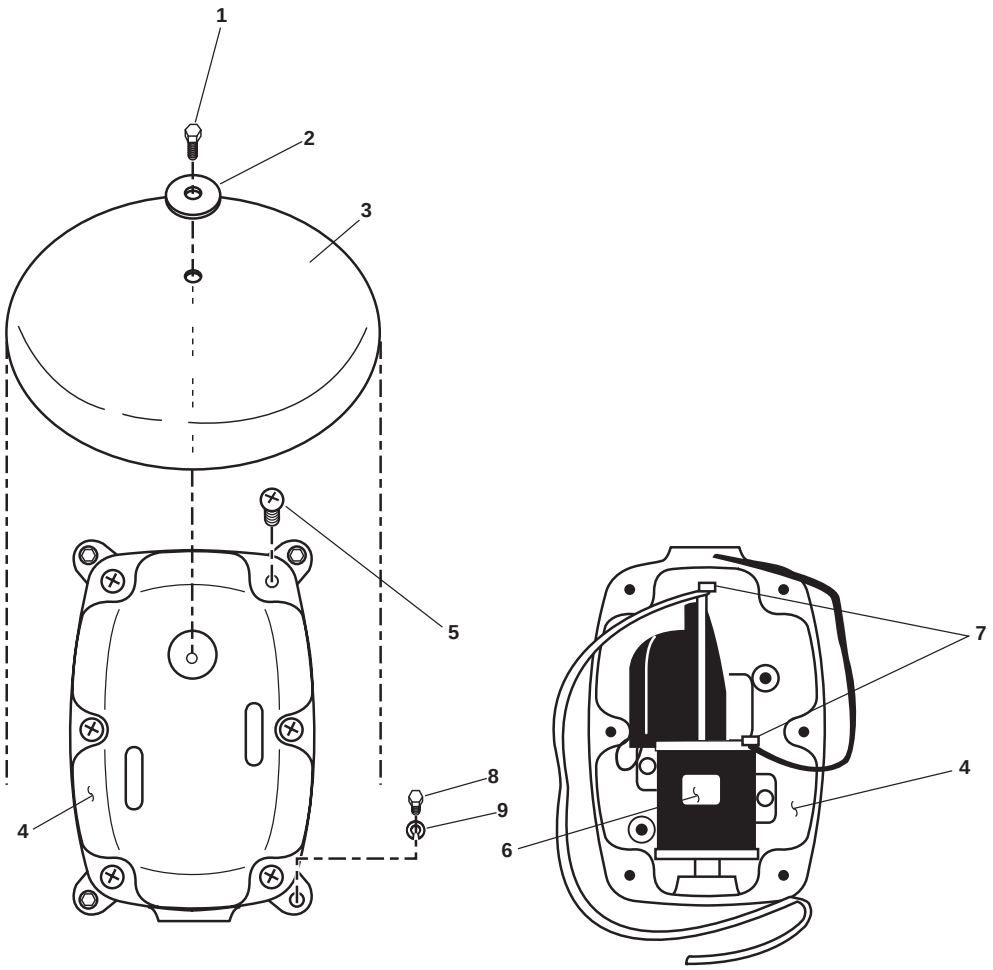


Figure 4. Engine Room Alarm Bell

4. Remove the bell actuator assembly cover (figure 4, item 4), and turn it over to reveal the internal electrical components (figure 4, item 6).

Replace or repair components only after the affected circuit has been secured, locked out and tagged out (FM 55-502). Performing replacement with the circuit energized may result in injury.

5. Using a multimeter, check for voltage at the terminals (figure 4, item 7) to ensure that electrical circuits are deenergized. If voltage is present, ensure that the proper circuit breakers are set to OFF, locked out, and tagged out (FM 55-502). If no voltage is present, proceed with the procedure.

6. Label and remove the wiring from the terminals (figure 4, item 7), and remove the cover (figure 4, item 4).

7. Loosen and remove the four bolts (figure 4, item 8) and lockwashers (figure 4, item 9) that secure the actuator assembly, and remove it from the mounting bracket. Discard the lockwashers.

INSTALLATION

1. Align the actuator assembly to the mounting bracket, and secure it in place with the four bolts (figure 4, item 8) and four new lockwashers (figure 4, item 9).

2. Connect the wiring to the terminals (figure 4, item 7) using the labels from step 6 of Removal as a guide. Remove the labels.

3. Install the bell actuator assembly cover (figure 4, item 4) and secure it in place with the six screws (figure 4, item 5).

5. Install the gong (figure 4, item 3) on the bell actuator assembly cover (figure 4, item 4), and secure it with the bolt (figure 4, item 1) and washer (figure 4, item 2).

6. Perform the Follow-On Service procedure at the end of this work package.

PRESSURE OPERATED SWITCH REPLACEMENT

REMOVAL

1. Remove the eight screws (figure 5, item 1) from the cover (figure 5, item 2) of the pressure operated switch (figure 5, item 3).

WARNING

Replace or repair components only after the affected circuit has been secured, locked out and tagged out (FM 55-502). Performing replacement with the circuit energized may result in injury.

2. Using a multimeter, check for voltage at the terminal board (figure 5, item 4) to ensure that electrical circuits are deenergized. If voltage is present, ensure that the proper circuit breakers are set to OFF, locked out, and tagged out (FM 55-502). If no voltage is present, continue with this procedure.

3. Label and disconnect the wiring from the terminal board (figure 5, item 4).

⚠ CAUTION

Never attempt to disconnect union connections with only one wrench. Damage to the vessel's piping or to the switch's piping could occur. Always use two wrenches.

4. Disconnect the union (figure 5, item 5) at the bottom of the pressure operated switch (figure 5, item 3).

5. Remove the pressure operated switch assembly from the pipe (figure 5, item 6).

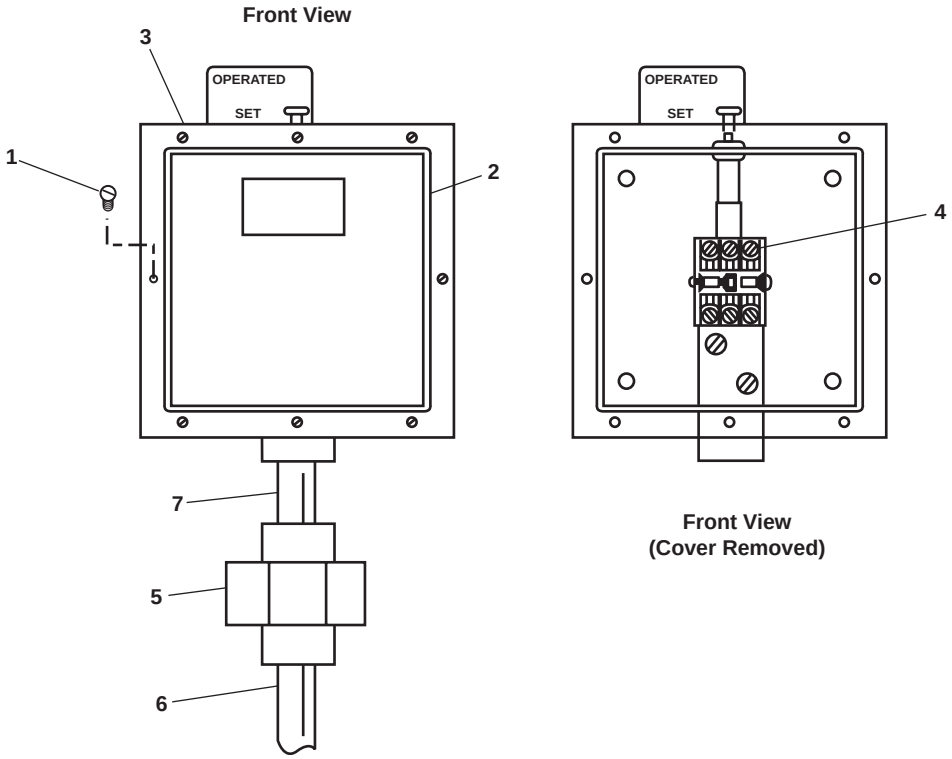


Figure 5. Pressure Operated Switch

6. Plug or tape over the exposed unions on the vessel piping to prevent contamination of the system.

7. Remove the pipe fittings (figure 5, item 7) from the switch (figure 5, item 3).

INSTALLATION

1. Apply antiseizing tape on the male pipe threads of the pipe fittings (figure 5, item 7).

2. Install the pipe fittings (figure 5, item 7) into the pressure operated switch (figure 5, item 3).

3. Connect the new pressure operated switch (figure 5, item 3) to the piping (figure 5, item 6) at the union (figure 5, item 5).

⚠ CAUTION

Never attempt to connect union connections with only one wrench. Damage to the vessel's piping or to the switch's piping could occur. Always use two wrenches.

4. Tighten the union (figure 5, item 5) using the two wrench method.

5. Connect the electrical wiring to the terminal board (figure 5, item 4) using the labels from step 3 of Removal as a guide. Remove the labels.

6. Install the eight screws (figure 5, item 1) to secure the cover (figure 5, item 2) to the pressure operated switch (figure 5, item 3).

7. Perform the Follow-On Service procedure at the end of this work package.

FOLLOW-ON SERVICE

1. Remove the lockouts and tagouts (FM 55-502).

2. Test the FM-200 fire suppression system (WP 0022 00 and WP 0030 00), and observe that all amber strobe lights, electric horns, and the engine room alarm bell operate properly.

3. Return the equipment to the desired readiness condition.

END OF WORK PACKAGE

DIRECT SUPPORT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
ENGINE ROOM WATER WASHDOWN SYSTEM, SERVICE

INITIAL SETUP:

Tools and Special Tools:
Tool Kit, General Mechanic's (Item 1, Table 2, WP 0046 00)
Suitable Drain Pan

Materials/Parts:
Tag, Danger (Item 8, Table 1, WP 0050 00)
Gasket, Cover (Item 4, Figure 5, WP 0048 00)

Personnel Required:
Two Watercraft Engineers, 88L

References:
FM 55-502
WP 0046 00
WP 0048 00
WP 0050 00

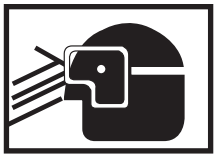
Equipment Conditions:
CLOSE valve WWS-1. Lock out and tag out (FM 55-502).

SERVICE STRAINER

DISASSEMBLY

1. Place a suitable drain pan underneath the strainer assembly (figure 1, item 1).
2. Remove the six nuts (figure 1, item 2), and six flat washers (figure 1, item 3) from the cover (figure 1, item 4) of the strainer assembly (figure 1, item 1). Remove the cover.
3. Remove and discard the gasket (figure 1, item 5).

WARNING



Removing components by means of wire brushing produces flying particles. These particles can cause serious injury to personnel. Protective goggles, gloves, and long sleeves must be worn at all times during wire brushing operations. Failure to comply can result in serious injury to personnel.

4. Slide out the basket (figure 1, item 6), and clean it with soapy water and a wire brush.

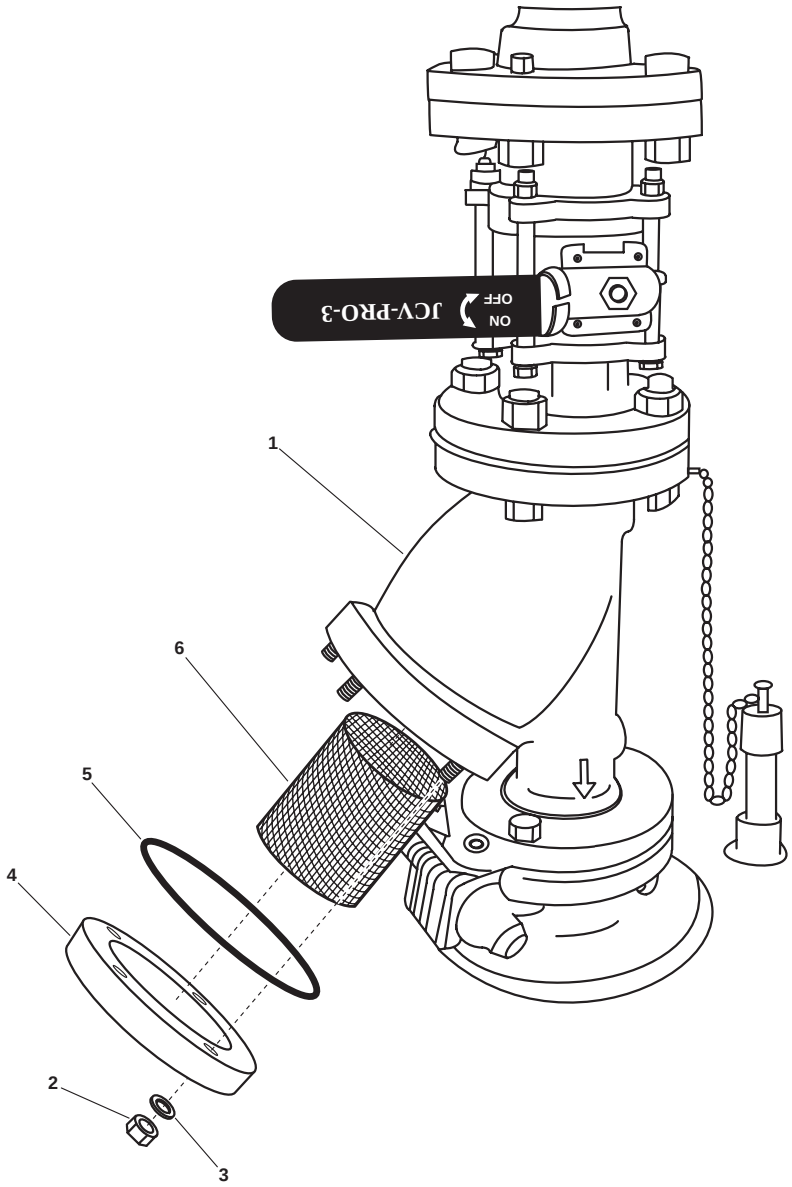


Figure 1. Engine Room Water Washdown System Strainer

ASSEMBLY

1. Install the basket (figure 1, item 6) into the strainer assembly (figure 1, item 1).
2. Install a new gasket (figure 1, item 5) and the cover (figure 1, item 4) on the strainer assembly (figure 1, item 1) and secure the cover with the six nuts (figure 1, item 2) and six flat washers (figure 1, item 3).
3. Remove the lockouts and tagouts (FM 55-502).
4. Return the equipment to the desired readiness condition.

END OF WORK PACKAGE

DIRECT SUPPORT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
DIESEL ENGINE-DRIVEN FIREFIGHTING PUMP, ALIGNMENT

INITIAL SETUP:

Tools and Special Tools:
Tool Kit, General Mechanic's (Item 1, Table 2, WP 0046 00)
Indicator, Dial (Item 9, Table 2, WP 0046 00)
Holder, Dial Indicator (Item 10, Table 2, WP 0046 00)
Holder, Dial Indicator (Item 11, Table 2, WP 0046 00)

Materials/Parts:
Tag, Danger (Item 8, Table 1, WP 0050 00)

Personnel Required:
Two Watercraft Engineers, 88L

References:
FM 55-502
TB 43-0218
WP 0005 00
WP 0046 00
WP 0050 00

Equipment Conditions:
CLOSE valve CA-6, STG AIR TO PMP DR ENG. Lock out and tag out (FM 55-502).
CLOSE valve FM-13, F.F. TO F.M. CRSVR. Lock out and tag out (FM 55-502).

WARNING

Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lock wire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.

ALIGNMENT

1. Remove the four bolts (figure 1, item 1), four nuts (figure 1, item 2), four flat washers (figure 1, item 3), and four lockwashers (figure 1, item 4) that secure the shaft guard (figure 1, item 5).

2. Remove the shaft guard (figure 1, item 5).

3. Remove the 24 bolts (figure 1, item 6) that secure the pump drive shaft (figure 1, item 7) to the Power Take-Off (PTO) output flange (figure 1, item 8) and the pump input flange (figure 1, item 9).

4. Remove the pump drive shaft (figure 1, item 7).

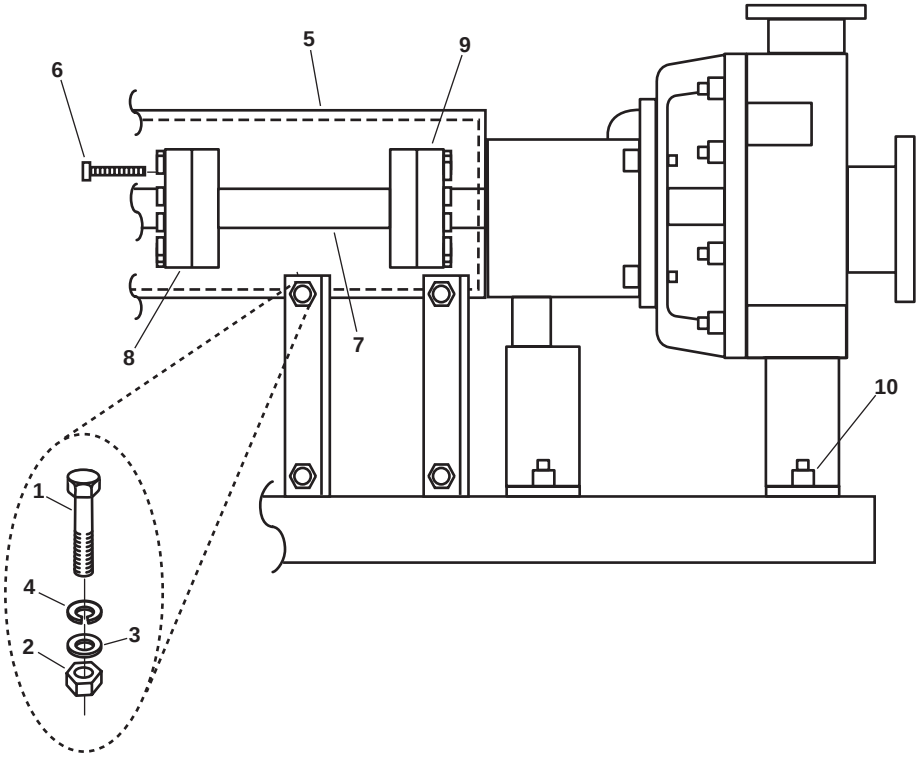
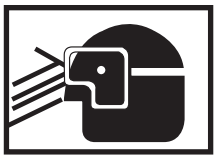


Figure 1. Firefighting Pump Alignment

WARNING



Removing components by means of wire brushing produces flying particles. These particles can cause serious injury to personnel. Protective goggles, gloves, and long sleeves must be worn at all times during wire brushing operations. Failure to comply can result in serious injury to personnel.

5. Clean the mating faces of the PTO output flange (figure 1, item 8) and the pump input flange (figure 1, item 9) with a wire brush, and ensure that both surfaces are clean, smooth, and free of corrosion.

6. Verify that the four pump mounting bolts (figure 1, item 10) are tight.

NOTE

The dial indicator fixing stand must be fastened to the pump input flange in order to obtain an accurate reading. Fastening the fixing stand to the PTO output flange will result in inaccurate readings.

7. Install the dial indicator fixing stand (figure 2, item 1) on the pump input flange (figure 2, item 2) as shown in figure 2, to check the angular alignment.

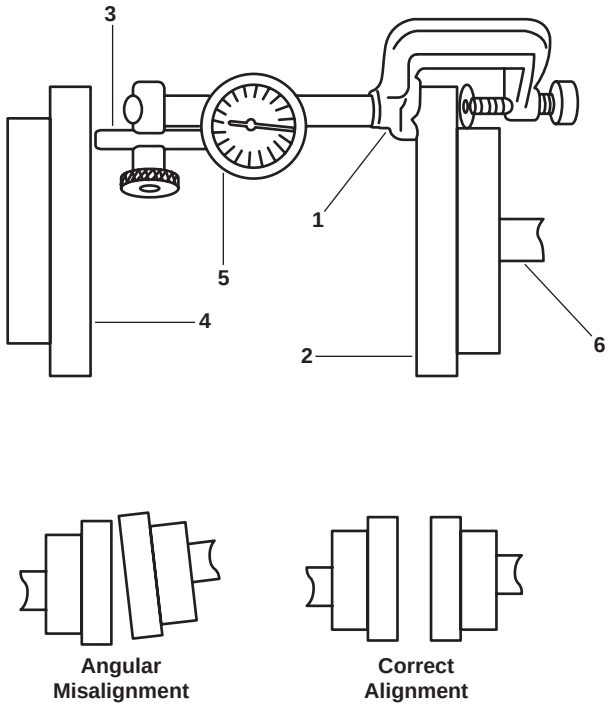


Figure 2. Dial Indicator/Angular Alignment Depiction

NOTE

The dial indicator should have a 0.200 in (5.08 mm) to 0.300 in (7.62 mm) preload when installed against the PTO output flange.

8. Position the dial indicator (figure 2, item 3) against the PTO output flange (figure 2, item 4) as shown in figure 2.

9. Place a 0.200 in (5.08 mm) to 0.300 in (7.62 mm) preload on the dial indicator.

10. Zero the dial indicator (figure 2, item 3) by twisting the indicator's bezel (figure 2, item 5).

NOTE

Observe the dial indicator's needle movement to either side of zero as the pump shaft is rotated. Add the readings on both sides of zero to determine the amount of angular misalignment. For example, if the dial indicator needle moves 0.002 in (0.05 mm) to one side of zero and 0.004 in (0.10 mm) to the other side of zero, add the two readings (0.002 in (0.05 mm) + 0.004 in (0.10 mm) = 0.006 in (0.15 mm)) to determine that the angular misalignment is 0.006 in (0.15 mm).

11. Slowly rotate the pump shaft (figure 2, item 6) while noting the dial indicator (figure 2, item 3) reading.

12. Maximum allowable angular misalignment is 0.150 in (3.80 mm). If the angular misalignment exceeds this specification, the misalignment must be corrected. Angular misalignment is corrected by loosening the pump mounting bolts (figure 1, item 6) and rotating the pump on its mounting. After adjusting the alignment, tighten the pump mounting bolts and perform steps 7-12 until the misalignment is within the maximum allowable misalignment specifications.

13. Reposition the dial indicator (figure 3, item 1) as shown in figure 3 to check the parallel alignment.

NOTE

The dial indicator should have a 0.200 in (5.08 mm) to 0.300 in (7.62 mm) preload when installed against the PTO output flange.

14. Place a 0.200 in (5.08 mm) to 0.300 in (7.62 mm) preload on the dial indicator.

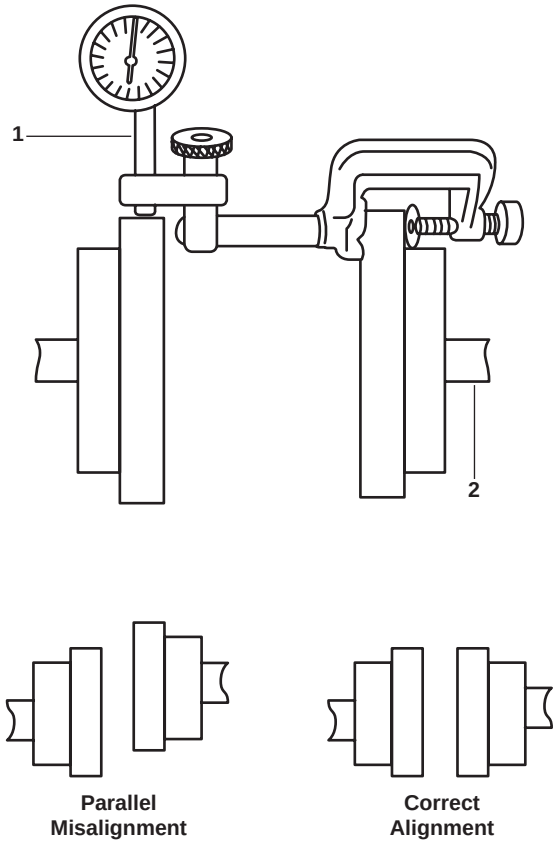


Figure 3. Dial Indicator/Parallel Alignment Depiction

NOTE

Observe the dial indicator's needle movement to either side of zero as the pump shaft is rotated. Add the readings on both sides of zero to determine the amount of parallel misalignment. For example, if the dial indicator needle moves 0.002 in (0.05 mm) to one side of zero and 0.004 in (0.10 mm) to the other side of zero, add the two readings (0.002 in (0.05 mm) + 0.004 in (0.10 mm) = 0.006 in (0.15 mm)) to determine that the parallel misalignment is 0.006 in (0.15 mm).

15. Slowly rotate the pump shaft (figure 3, item 2) while noting the dial indicator (figure 3, item 1) reading.

16. Maximum allowable parallel misalignment is 0.150 in (3.80 mm). If the parallel misalignment exceeds this specification, the misalignment must be corrected. Parallel misalignment is corrected by loosening the pump mounting bolts (figure 1, item 6), fabricating shims from shim stock, and placing the shims between the pump mounting pads and the pump mounts. After adjusting the alignment, tighten the pump mounting bolts and perform steps 13-16 until the misalignment is within the maximum allowable misalignment specifications.

17. It is frequently necessary to adjust both the angular and the parallel alignment several times before the correct alignment is obtained. Once the proper angular and parallel alignment measurements are obtained, tighten the mounting bolts (figure 1, item 6), and check the measurement again.

18. Once the final alignment has been obtained and checked, remove the dial indicator from the pump drive flanges.

19. Install the pump drive shaft (figure 1, item 7) and secure it in place with the 24 bolts (figure 1, item 6).

20. Install the shaft guard (figure 1, item 5) and secure it with the four bolts (figure 1, item 1), four nuts (figure 1, item 2), four flat washers (figure 1, item 3), and four new lockwashers (figure 1, item 4).

21. Remove the lockouts and tagouts (FM 55-502).

22. OPEN the cross-connect valve FM-13, F.F. TO F.M. CRSVR.

23. Operate the diesel-driven firefighting pump (WP 0005 00) and observe that the pump operates normally without leakage, abnormal vibration, or unusual noises.

24. Return the equipment to the desired readiness condition.

END OF WORK PACKAGE

DIRECT SUPPORT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
DIESEL ENGINE-DRIVEN FIREFIGHTING PUMP, PIPING; REPAIR

INITIAL SETUP:

Tools and Special Tools:
Tool Kit, General Mechanic's (Item 1, Table 2, WP 0046 00)
Suitable Drain Pan

Materials/Parts:
Tag, Danger (Item 8, Table 1, WP 0050 00)
Gasket (Item 17, Figure 6, WP 0048 00)

Personnel Required:
Two Watercraft Engineers, 88L

References:
FM 55-502
WP 0005 00
WP 0046 00
WP 0048 00
WP 0050 00

Equipment Conditions:
CLOSE valves CA-6, STG AIR TO PMP DR ENG, FM-1, SEA SUCT, F.F. PMP and FM-13, F.F. TO F.M. CRSVR. Lock out and tag out (FM 55-502).

DIESEL ENGINE-DRIVEN FIREFIGHTING PUMP PIPING GASKETS REPLACEMENT

REMOVAL

1. Place a suitable drain pan under the inlet piping flange (figure 1, item 1).

2. Remove the eight bolts (figure 1, item 2) and eight nuts (figure 1, item 3) from the inlet piping flange (figure 1, item 1). Remove and discard the gasket (figure 1, item 4).

3. Remove the eight bolts (figure 1, item 5) and eight nuts (figure 1, item 6) from the discharge piping flange (figure 1, item 7). Remove and discard the gasket (figure 1, item 8).

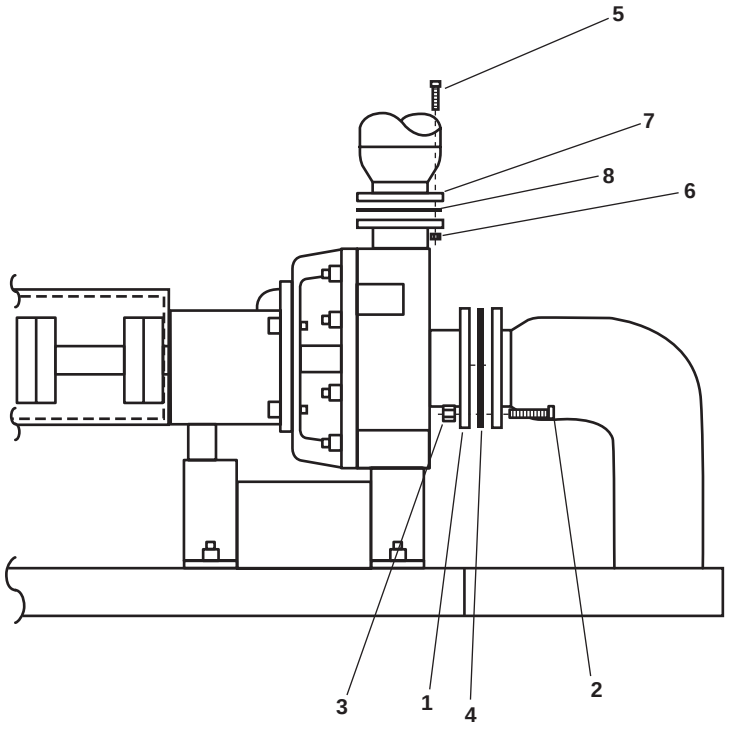


Figure 1. Diesel Engine-Driven Firefighting Pump-Gasket Replacement

INSTALLATION

1. Fabricate new gaskets from bulk stock using the inlet piping flange (figure 1, item 1) and discharge piping flange (figure 1, item 7) as templates.

2. Install a new gasket (figure 1, item 4) between the inlet piping flanges (figure 1, item 1).

3. Secure the inlet piping flange (figure 1, item 1) with the eight bolts (figure 1, item 2) and eight nuts (figure 1, item 3).

4. Install a new gasket (figure 1, item 8) between the discharge piping flanges (figure 1, item 7).

5. Secure the discharge piping flange (figure 1, item 1) with the eight bolts (figure 1, item 5) and eight nuts (figure 1, item 6).

6. Remove the lockouts and tagouts (FM 55-502).

7. Operate the diesel engine-driven firefighting pump (WP 0005 00) and observe that the pump operates normally without leakage or unusual noises.

8. Return the equipment to the desired readiness condition.

END OF WORK PACKAGE

DIRECT SUPPORT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
DIESEL ENGINE-DRIVEN FIREFIGHTING PUMP, REPLACE

INITIAL SETUP:

Tools and Special Tools:
- Tool Kit, General Mechanic's (Item 1, Table 2, WP 0046 00)
- Chain Hoist (Item 12, Table 2, WP 0046 00)
- Sling, Endless, 1" x 6' (Item 13, Table 2, WP 0046 00)
- Suitable Drain Pan

Materials/Parts:
- Tag, Danger (Item 8, Table 1, WP 0050 00)
- Tape, Antiseizing (Item 9, Table 1, WP 0050 00)
- Pump, Centrifugal (Item 1, Figure 6, WP 0048 00)
- Gasket (Qty. 2) (Item 17, Figure 6, WP 0048 00)

Personnel Required:
- Two Watercraft Engineers, 88L

References:
- FM 55-502
- TB 43-0218
- WP 0005 00
- WP 0034 00
- WP 0046 00
- WP 0048 00
- WP 0050 00

Equipment Conditions:
- CLOSE valves CA-6, STG AIR TO PMP DR ENG, FM-1, SEA SUCT, F.F. PMP., and FM-13, F.F. TO F.M. CRSVR. Lock out and tag out (FM 55-502).

WARNING

Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.

DIESEL ENGINE-DRIVEN FIREFIGHTING PUMP REPLACEMENT

REMOVAL

1. Place a suitable drain pan under the firefighting pump (figure 1, item 1).

WARNING

The seacock for the affected system must be CLOSED before beginning replacement of any raw water system piping, hoses or valves and/or valves. Failure to observe this warning can result in flooding of the space, resulting in injury or death to personnel and damage to the vessel.

2. Remove the four bolts (figure 1, item 2), four nuts (figure 1, item 3), four flat washers (figure 1, item 4), and four lockwashers (figure 1, item 5) that secure the shaft guard (figure 1, item 6). Remove the shaft guard, and discard the lockwashers.

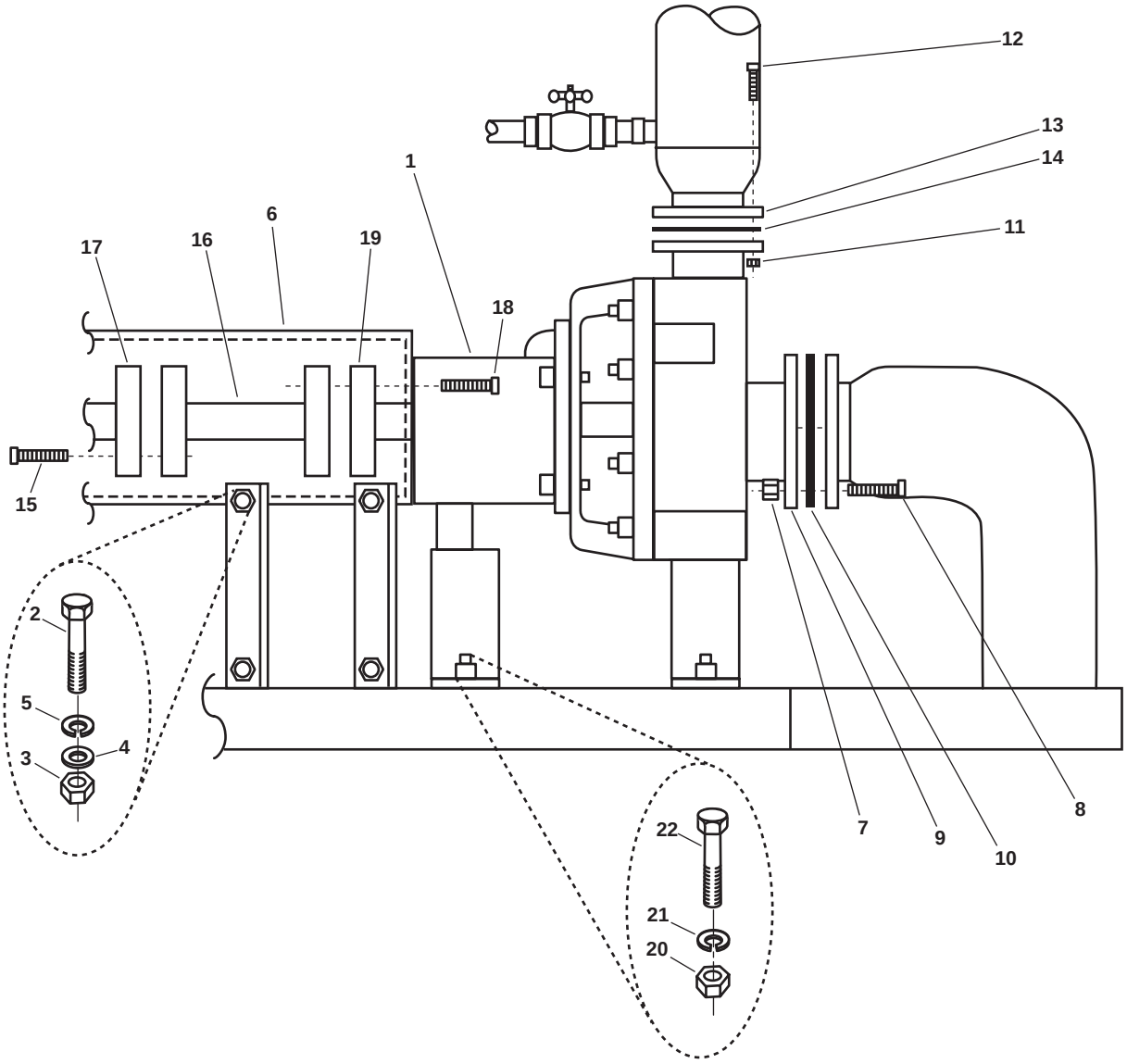


Figure 1. Diesel Engine-Driven Firefighting Pump Removal

3. Remove the eight nuts (figure 1, item 7) and eight bolts (figure 1, item 8) that secure the inlet flange (figure 1, item 9).

4. Remove and discard the gasket (figure 1, item 10).

5. Remove the eight nuts (figure 1, item 11) and eight bolts (figure 1, item 12) that secure the discharge flange (figure 1, item 13).

6. Remove and discard the gasket (figure 1, item 14).

7. Remove the 12 bolts (figure 1, item 15) that secure the pump drive shaft (figure 1, item 16) to the Power Take-Off (PTO) output flange (figure 1, item 17).

8. Remove the 12 bolts (figure 1, item 18) that secure the pump drive shaft (figure 1, item 16) to the pump drive flange (figure 1, item 19). Remove and set aside the pump drive shaft.

9. Remove the four nuts (figure 1, item 20), four lockwashers (figure 1, item 21), and four bolts (figure 1, item 22) that secure the firefighting pump (figure 1, item 1) to its foundation. Discard the lockwashers.

WARNING

All personnel in the vicinity of the lifting operations should wear appropriate safety equipment including gloves, hardhat, and safety shoes. Death or serious injury can result from failure to heed this warning.

10. Remove the firefighting pump (figure 1, item 1) from its foundation with the endless sling and chain hoist.

INSTALLATION

WARNING

All personnel in the vicinity of the lifting operations should wear appropriate safety equipment including gloves, hardhat, and safety shoes. Death or serious injury can result from failure to heed this warning.

1. Using the endless sling and chain hoist, lower the firefighting pump (figure 1, item 1) on its foundation and secure it using the four nuts (figure 1, item 20), four new lockwashers (figure 1, item 21), and four bolts (figure 1, item 22).

2. Perform the Diesel Engine-Driven Firefighting Pump Alignment procedure (WP 0034 00) for installation and alignment of the pump drive shaft (figure 1, item 16).

3. Fabricate a new gasket (figure 1, item 14) for the discharge flange (figure 1, item 13) using the discharge flange as a template. Install the new gasket in the discharge flange.

4. Install the eight nuts (figure 1, item 11) and eight bolts (figure 1, item 12) that secure the discharge flange (figure 1, item 13).

5. Fabricate a new gasket (figure 1, item 1) for the inlet flange (figure 1, item 9) using the inlet flange as a template. Install the new gasket in the inlet flange.

6. Install the eight nuts (figure 1, item 7) and eight bolts (figure 1, item 8) that secure the inlet flange (figure 1, item 9).

7. Remove the lockouts and tagouts (FM 55-502).

8. Operate the diesel engine-driven firefighting pump (WP 0005 00) and observe that the pump operates normally without leakage or unusual noises.

9. Return the equipment to the desired readiness condition.

END OF WORK PACKAGE

DIRECT SUPPORT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
DIESEL ENGINE-DRIVEN FIREFIGHTING PUMP, REPAIR

INITIAL SETUP:

Tools and Special Tools:
- Tool Kit, General Mechanic's (Item 1, Table 2, WP 0046 00)
- Torque Wrench 0-250 lb-ft (Item 8, Table 2, WP 0046 00)
- Arbor Press (Item 7, Table 2, WP 0046 00)
- Durco Tool Kit (Item 2, Table 2, WP 0046 00)
- Wrench Spanner (Item 21, Table 2, WP 0046 00)
- Suitable Drain Pan

Materials/Parts:
- Dry Cleaning Solvent (Item 2, Table 1, WP 0050 00)
- Gloves, Chemical and Oil Protection (Item 7, Table 3, WP 0049 00)
- Gloves, Leather (Item 8, Table 3, WP 0049 00)
- Goggles, Industrial (Item 9, Table 3, WP 0049 00)
- Layout Dye (Item 4, Table 1, WP 0050 00)
- Lubricating Oil, General Purpose (Item 5, Table 1, WP 0050 00)
- Gasket, Impeller (Item 12, Figure 6, WP 0048 00)
- Gasket, Rear Cover (Item 14, Figure 6, WP 0048 00)

Materials/Parts (continued):
- Lockwasher, Bearing (Item 4, Figure 6, WP 0048 00)
- Mechanical Seal (Packing Preformed) (Item 15, Figure 6, WP 0048 00)
- Oil Seal, Inboard (Item 11, Figure 6, WP 0048 00)
- Oil Seal, Outboard (Item 2, Figure 6, WP 0048 00)
- O-ring (Item 9, Figure 6, WP 0048 00)
- O-ring, Bearing Carrier (Item 3, Figure 6 WP 0048 00)

Personnel Required:
- Two Watercraft Engineers, 88L

References:
- TB 43-0218
- WP 0015 00
- WP 0036 00
- WP 0046 00
- WP 0048 00
- WP 0049 00
- WP 0050 00

Equipment Conditions:
- Diesel engine-driven firefighting pump removed (WP 0036 00).

WARNING

Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.

DISASSEMBLY

1. Mount the bearing housing foot (figure 1, item 1) to a bench to support the diesel engine-driven firefighting pump (figure 1, item 2) during disassembly.

2. Place a suitable drain pan under the diesel engine-driven firefighting pump's drain plug (figure 1, item 3). Remove the drain plug and allow the oil to drain into the suitable drain pan.

3. Remove the vent plug (figure 1, item 4) from the bearing housing (figure 1, item 5).

4. Remove the sight glass (figure 1, item 6) from the bearing housing (figure 1, item 5).

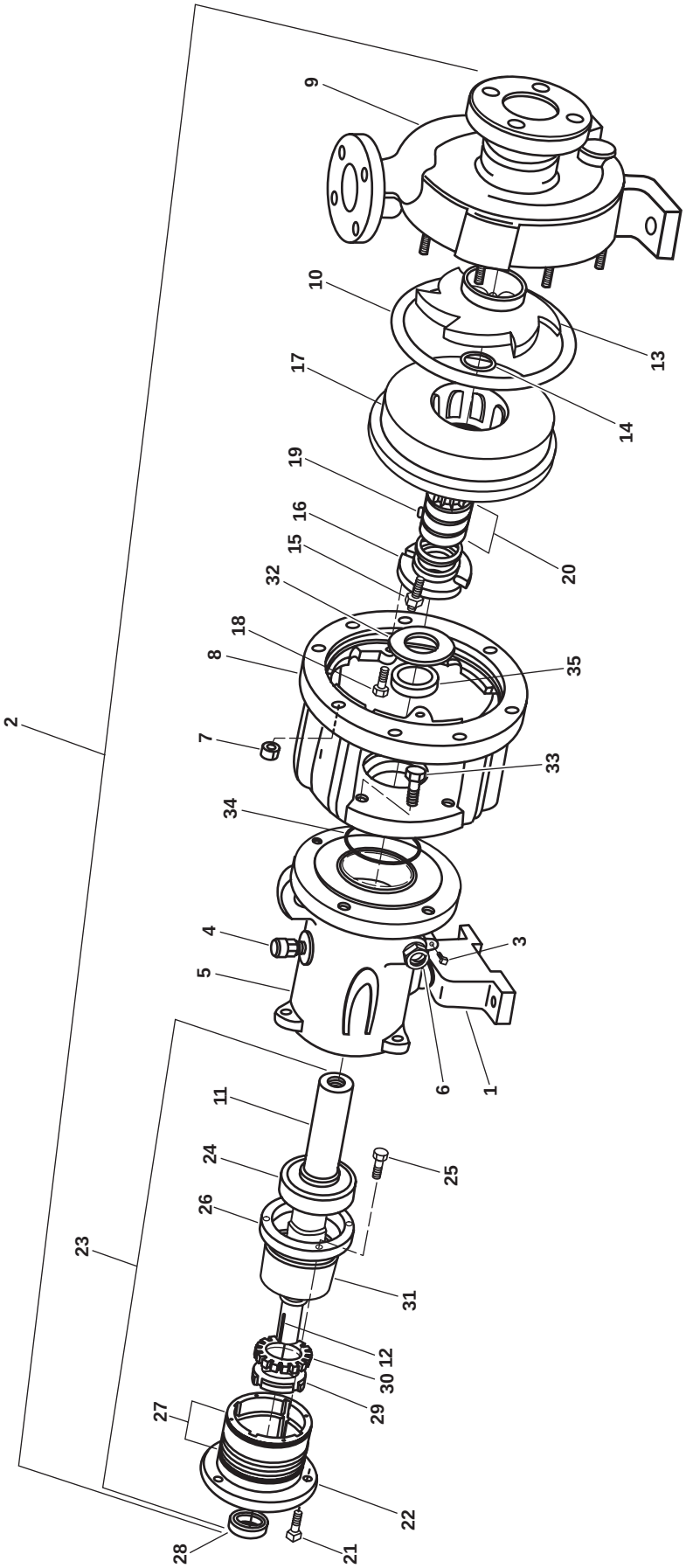


Figure 1. Diesel Engine-Driven Firefighting Pump Assembly

5. Remove the eight casing nuts (figure 1, item 7) from the bearing housing adapter (figure 1, item 8).

NOTE

Jacking bolt holes may be installed in the bearing housing adapter. If they are present, install the jacking bolts and use a combination of the jacking bolts and a roller head pry bar to remove the pump casing.

6. Remove the pump casing (figure 1, item 9) from the bearing housing adapter (figure 1, item 8).

7. Remove the rear cover gasket (figure 1, item 10) from the bearing housing adapter (figure 1, item 8).

8. Install the impeller wrench from the Durco tool kit on the shaft (figure 1, item 11).

9. Secure the impeller wrench to the shaft (figure 1, item 11) by inserting a key in the shaft keyway (figure 1, item 12).

WARNING

The impeller could have sharp edges. Wear leather gloves to protect hands when removing the impeller. Do not apply heat to the impeller to loosen it from the shaft. Failure to comply with this warning may result in severe personal injury or death.

NOTE

It may take several attempts to loosen the impeller using the impeller wrench as described below.

10. Turn the impeller (figure 1, item 13) in the clockwise direction and move the impeller wrench in the 11:00 o'clock position. Quickly spin the impeller in the counterclockwise direction causing the impeller wrench to impact the hard surfaces of the workbench. Refer to figure 2.

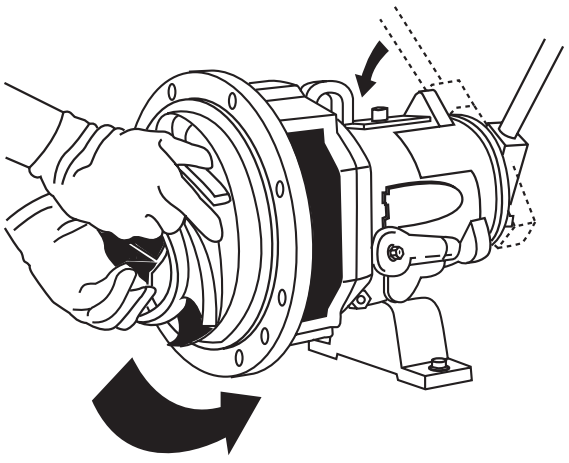


Figure 2. Impeller Removal

11. Repeat step 10 until the impeller (figure 1, item 13) is loosened.

12. Remove the impeller wrench from the shaft (figure 1, item 11).

13. Remove the impeller (figure 1, item 13) from the shaft (figure 1, item 11).

14. Remove the impeller gasket (figure 1, item 14) from the impeller (figure 1, item 13). Discard the impeller gasket.

15. Install the brass shaft guide tool from the Durco tool kit on the impeller end of the shaft (figure 1, item 11).

16. Remove the four gland nuts (figure 1, item 15) from the mechanical seal gland (figure 1, item 16). Slide the mechanical seal gland away from the rear cover plate (figure 1, item 17).

NOTE

Two guide bolts are required to assist in the removal of the rear cover plate and to prevent damage to the rear cover plate during removal. Guide bolts can be fabricated by cutting the heads off of four inch bolts that are the same thread pitch as the rear cover cap screws.

17. Remove the two rear cover cap screws (figure 1, item 18) from the rear cover plate (figure 1, item 17). Install two guide bolts.

18. Remove the rear cover plate (figure 1, item 17) from the shaft (figure 1, item 11).

19. Loosen the setscrew (figure 1, item 19) on the mechanical seal (packing preformed) (figure 1, item 20). Remove the mechanical seal and mechanical seal gland (figure 1, item 16) from the shaft (figure 1, item 11).

20. Remove the brass shaft guide tool from the shaft (figure 1, item 11).

NOTE

The bearing carrier assembly will not turn without backing off the setscrews. After loosening the setscrews, use a spanner wrench to engage the cogs on the outside diameter of the bearing carrier to loosen it from the bearing housing.

21. Loosen the three setscrews (figure 1, item 21) on the bearing carrier (figure 1, item 22). Using a spanner wrench, remove the bearing carrier assembly (figure 1, item 23) from the bearing housing (figure 1, item 5).

⚠ CAUTION

Never apply pressure to the outer race of the bearings as this exerts excess load on the balls and causes damage to the bearing.

22. Using an arbor press, remove the inboard bearing (figure 1, item 24) from the bearing carrier assembly (figure 1, item 23).

23. Remove the four cap screws (figure 1, item 25) from the bearing housing clamp ring (figure 1, item 26).

24. Remove the bearing housing clamp ring (figure 1, item 26) from the bearing carrier (figure 1, item 22) and the bearing carrier assembly (figure 1, item 23).

25. Remove the bearing carrier (figure 1, item 22) from the bearing carrier assembly (figure 1, item 23).

26. Remove the two O-rings (figure 1, item 27) from the bearing carrier (figure 1, item 22). Discard the O-rings.

27. Remove the outboard oil seal (figure 1, item 28) from the bearing carrier (figure 1, item 22). Discard the outboard seal.

NOTE

During removal of of the bearing lockwasher and bearing locknut, only the bearing lockwasher is discarded as locking hardware. Retain the bearing locknut for Assembly.

28. Remove the bearing locknut (figure 1, item 29) and bearing lockwasher (figure 1, item 30) from the shaft (figure 1, item 11). Discard the bearing lockwasher.

⚠ CAUTION

Never apply pressure to the outer race of the bearings as this exerts excess load on the balls and causes damage to the bearing.

29. Using an arbor press, remove the outboard bearing (figure 1, item 31) from the shaft (figure 1, item 11).

30. Remove the inboard deflector (figure 1, item 32) from the bearing housing adapter (figure 1, item 8).

31. Remove the four bolts (figure 1, item 33) from the bearing housing adapter (figure 1, item 8).

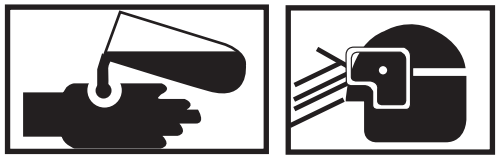
32. Remove the bearing housing adapter (figure 1, item 8) from the bearing housing (figure 1, item 5).

33. Remove the O-ring (figure 1, item 34) from the bearing housing adapter (figure 1, item 8). Discard the O-ring.

34. Remove the inboard oil seal (figure 1, item 35) from the bearing housing adapter (figure 1, item 8). Discard the inboard oil seal.

CLEAN AND INSPECT

WARNING

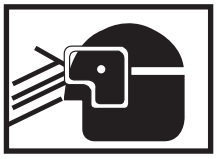


Do not allow cleaning solvent to come in contact with unprotected skin or eyes. Prolonged skin contact can cause illness or injury. Eye contact can cause serious injury. Always wear chemical protective gloves and goggles when handling cleaning solvent. Failure to follow these precautions can result in illness or serious injury.

1. Clean all metal parts with dry cleaning solvent.

2. Check for binding, scoring, galling, or rough rotation on the inboard bearing (figure 1, item 24) and the outboard bearing (figure 1, item 31). Inspect all component parts for unusual wear or damage, and replace as required.

WARNING



Do not exceed 25 PSI (1.7 bar) nozzle pressure when using compressed air to dry parts. Wear goggles for eye protection. Do not direct air stream toward self or other personnel. Failure to comply with this warning may result in severe personal injury.

CAUTION

Do not permit the ball bearings to free spin in the bearing race as the bearing is being subjected to the compressed air. Bearing failure will result.

3. Use compressed air to remove any debris from the inboard bearing (figure 1, item 24) and outboard bearing (figure 1, item 31).

ASSEMBLY

1. Install a new inboard oil seal (figure 1, item 35) in the bearing housing adapter (figure 1, item 8).

2. Install a new O-ring (figure 1, item 34) on the bearing housing adapter (figure 1, item 8).

3. Position the bearing housing adapter (figure 1, item 8) on the bearing housing (figure 1, item 5) and secure it with the four bolts (figure 1, item 33).

4. Put layout dye onto the shaft (figure 1, item 11) and scribe a line in the layout dye for the location of the inboard bearing (figure 1, item 24). Refer to figure 3.

CAUTION

Never apply pressure to the outer race of the bearings as this exerts excess load on the balls and causes damage to the bearing.

5. Press the inboard bearing (figure 1, item 24) onto the shaft (figure 1, item 11) using an arbor press. Align the edge of the inner race of the inboard bearing with the scribed line. Lubricate the inboard bearing using lubricating oil.

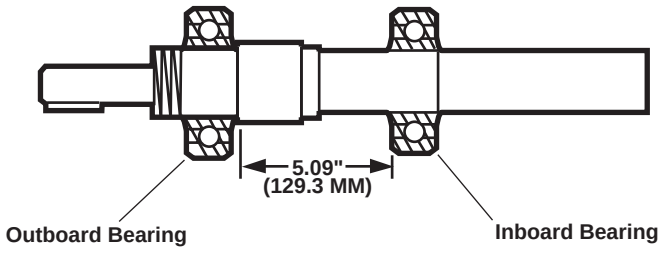


Figure 3. Bearing Placement

⚠ CAUTION

Never apply pressure to the outer race of the bearings as this exerts excess load on the balls and causes damage to the bearing.

6. Press the outboard bearing (figure 1, item 31) onto the shaft (figure 1, item 11) using an arbor press. Press the outboard bearing up to the shoulder of the shaft. Refer to figure 3. Lubricate the outboard bearing using lubricating oil.

NOTE

Ensure that the tangs of the lockwasher are bent into the locknut after completing the torque for the locknut.

7. Install a new bearing lockwasher (figure 1, item 30) and bearing locknut (figure 1, item 29) on the shaft (figure 1, item 11). Torque the locknut to 70 lb-ft (95 Nm).

8. Install a new outboard oil seal (figure 1, item 28) in the bearing carrier (figure 1, item 22).

9. Install two new O-rings (figure 1, item 27) on the bearing carrier (figure 1, item 22).

10. Install the bearing housing clamp ring (figure 1, item 26) on the shaft (figure 1, item 11).

11. Install the bearing carrier (figure 1, item 22) on the shaft (figure 1, item 11) and secure the bearing housing clamp ring (figure 1, item 26) to the bearing carrier using the four cap screws (figure 1, item 25).

12. Lubricate the bearing carrier assembly (figure 1, item 23) with lubricating oil and install it in the bearing housing (figure 1, item 5).

NOTE

The setscrews on the bearing carrier will be tightened after installing the impeller and setting the impeller clearance.

13. Using a spanner wrench, secure the bearing carrier assembly (figure 1, item 23) to the bearing housing (figure 1, item 5). Do not tighten the three setscrews (figure 1, item 21) at this time.

14. Install the brass shaft guide tool from the Durco tool kit on the shaft (figure 1, item 11).

15. Install the inboard deflector (figure 1, item 32) on the shaft (figure 1, item 11).

16. Install the mechanical seal gland (figure 1, item 16) onto the shaft (figure 1, item 11).

17. Install the mechanical seal (figure 1, item 20) on the shaft (figure 1, item 11). Do not tighten the setscrew (figure 1, item 19) at this time.

18. Remove the shaft guide tool from the shaft (figure 1, item 11).

19. Verify that the guide bolts used during step 17 of Disassembly are installed in the rear cover plate (figure 1, item 17).

20. Install the rear cover plate (figure 1, item 17) in the bearing housing adapter (figure 1, item 8).

21. Remove one of the guide bolts and install one of the rear cover cap screws (figure 1, item 18). Tighten the cap screw to 40 lb-ft (54 Nm).

22. Remove the second guide bolt and install the second rear cover cap screw (figure 1, item 18). Tighten the cap screw to 40 lb-ft (54 Nm).

23. Install the new impeller gasket (figure 1, item 14) onto the shaft (figure 1, item 11).

WARNING

The impeller could have sharp edges. Wear leather gloves to protect hands when tightening the impeller. Personal injury could result.

⚠ CAUTION

Do not attempt to tighten the impeller on the shaft by hitting the impeller with a hammer or any other object, or by inserting a pry bar between the impeller vanes. Serious damage to the impeller may result from such actions.

NOTE

It is recommended that two people install the firefighting pump impeller. The weight of this type of impeller greatly increases the chance of thread damage and subsequent lock-up concerns.

24. Install the impeller (figure 1, item 13) on the shaft (figure 1, item 11).

25. Install the impeller wrench from the Durco tool kit on the shaft (figure 1, item 11) at the bearing housing end and secure it to the shaft by inserting the key in the shaft keyway (figure 1, item 12).

26. With the impeller wrench handle to the left, grab the impeller (figure 1, item 13) with both hands and spin the impeller forcefully in a clockwise direction to impact the impeller wrench handle on the workbench. Refer to figure 4.

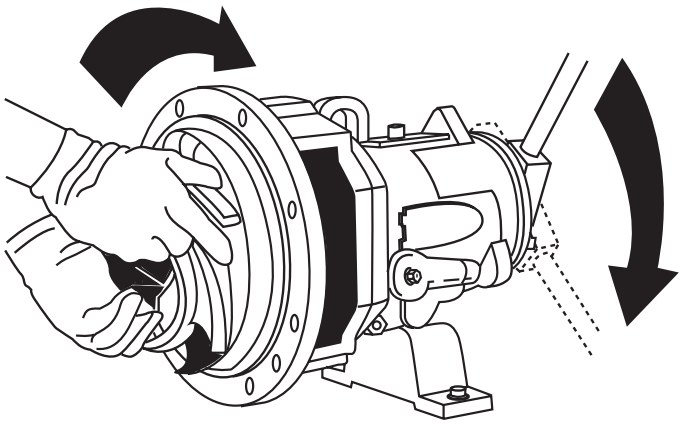


Figure 4. Impeller Installation

27. Remove the impeller wrench from the shaft (figure 1, item 11).

28. Determine the proper impeller clearance using table 1.

Table 1. Impeller Clearance Settings

Temperature – °F (°C)	Clearance to casing – in (mm)
< 200 (93)	0.018 ± 0.003 (0.46 ± 0.08)
200 to 250 (93 to 121)	0.021 (0.53)
251 to 300 (122 to 149)	0.024 (0.61)
301 to 350 (150 to 176)	0.027 (0.69)
351 to 400 (177 to 204)	0.030 (0.76)
401 to 450 (205 to 232)	0.033 (0.84)
> 450 (232)	0.036 (0.91)

NOTE

Rotating the shaft and the bearing carrier at the same time will accurately determine the zero setting.

29. Set the impeller at the zero setting by turning the bearing carrier (figure 1, item 22) counterclockwise until the impeller (figure 1, item 13) comes into light rubbing contact with the rear cover plate (figure 1, item 17).

NOTE

Rotating the bearing carrier the width of one of the indicator patterns cast into the bearing carrier moves the impeller axially 0.004 in (0.1 mm). The impeller will move 0.002 in (0.05 mm) closer to the rear cover plate when the setscrews are tightened. Take this measurement into consideration when setting the impeller clearance.

30. Determine how far to rotate the bearing carrier (figure 1, item 22) by dividing the desired impeller clearance (table 1) by 0.004 in (0.1 mm).

31. Turn the bearing carrier (figure 1, item 22) clockwise to obtain the proper impeller clearance (table 1).

NOTE

Tightening the setscrews will cause the impeller to move 0.002 in (0.05 mm) closer to the rear cover because of the internal looseness in the bearing carrier threads. This should be considered when setting the impeller clearance.

32. Tighten the three setscrews (figure 1, item 21) in the bearing carrier (figure 1, item 22) to a torque of 30 lb-ft (41 Nm).

33. Slide the mechanical seal gland (figure 1, item 16) and the mechanical seal (figure 1, item 20) towards the rear cover plate (figure 1, item 17).

34. Install the four gland nuts (figure 1, item 15) on the mechanical seal gland (figure 1, item 16) and torque the four nuts to 5 lb-ft (6.8 Nm).

35. Tighten the setscrew (figure 1, item 19) in the mechanical seal (figure 1, item 20).

36. Install a new rear cover gasket (figure 1, item 10) on the pump casing (figure 1, item 9).

37. Install the pump casing (figure 1, item 9) on the bearing housing adapter (figure 1, item 8).

38. Install the eight casing nuts (figure 1, item 7) on the pump casing (figure 1, item 9). Tighten the eight casing nuts to a torque of 15 lb-ft (20 Nm).

39. Install the sight glass (figure 1, item 6) in the bearing housing (figure 1, item 5).

40. Install the vent plug (figure 1, item 4) in the bearing housing (figure 1, item 5).

41. Install the drain plug (figure 1, item 3) in the bearing housing (figure 1, item 5).

42. Remove the mounting hardware securing the bearing housing foot (figure 1, item 1) of the diesel engine-driven firefighting pump (figure 1, item 2) to the workbench.

43. Install the diesel engine-driven firefighting pump (WP 0036 00).

44. Perform the Diesel Engine-Driven Firefighting Pump Service procedure (WP 0015 00).

END OF WORK PACKAGE

Chapter 8

General Support Maintenance Instructions for Firefighting, Fire Alarm, and Fire Suppression Systems

Inland and Coastal Large Tug (LT)

GENERAL SUPPORT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
FIREFIGHTING SYSTEM, TEST

INITIAL SETUP:

Personnel Required:
Two Watercraft Engineers, 88L

References:
DA Form 4640

References (continued):
DA Form 4993
FM 55-502
WP 0005 00

INSPECTION

1. Operate the AFFF pump, diesel engine-driven firefighting pump, the fire detection system, the firefighting system, the FM-200 fire suppression system, and the water washdown system (WP 0005 00).

2. Check the firefighting piping, valves, fittings, and hoses for any indication of leakage.

3. Replace any leaking component as required and retest the pump(s) and/or the firefighting systems that had the leaks in the above step.

ANNUAL CERTIFICATION REQUIREMENTS

1. After the inspection is completed, perform the Hydrostatic Test Hose and Coupling Pressure Test procedure contained in FM 55-502.

2. Make the appropriate log entries in DA Form 4640 (Harbor Boat Deck Department Log for Class A&B Vessels) and DA Form 4993 (Harbor Boat Engine Department Log for Class A and C-1 Vessels) indicating the results of the firefighting systems tests.

END OF WORK PACKAGE

GENERAL SUPPORT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
FIRE DETECTION SYSTEM, TEST

INITIAL SETUP:

Personnel Required:
One Watercraft Engineer, 88L
One Manufacturer Trained Certified Technician

References:
DA Form 4640
DA Form 4993
WP 0005 00

Equipment Conditions:
Set to ON the FIRE DETECTION SYSTEM circuit breaker in 120V engine room emergency distribution panel No. 1.
Fire detection system set for normal operation (WP 0005 00).

ANNUAL CERTIFICATION REQUIREMENTS:

1. A manufacturer trained certified technician shall inspect and test all fire detection system components including the smoke detectors and thermal fire detectors, as well as the equipment located within the fire and smoke detection panel (control module, power supply, battery charger/pack, the dual zone, time delay, meter, and relay modules).

2. After the inspection is completed, the manufacturer trained certified technician shall certify the fire detection system and complete the manufacturer's certification records.

3. The crew shall post the forms near the applicable fire detection system for inspection or audit purposes.

4. The manufacturer trained certified technician shall affix a signed and dated tag to the system.

5. The crew shall annotate the vessel’s DA Form 4640 (Harbor Boat Deck Department Log for Class A&B Vessels) and DA Form 4993 (Harbor Boat Engine Department Log for Class A and C-1 Vessels) indicating the results of the firefighting systems tests.

END OF WORK PACKAGE

GENERAL SUPPORT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
AFFF PUMP, REPAIR

INITIAL SETUP:

Tools and Special Tools:
Tool Kit, General Mechanic's (Item 1, Table 2, WP 0046 00)

Materials/Parts:
Dry Cleaning Solvent (Item 2, Table 1, WP 0050 00)
Gloves, Chemical and Oil Protective (Item 7, Table 3, WP 0049 00)
Goggles, Industrial (Item 9, Table 3, WP 0049 00)
Lubricating Oil, General Purpose (Item 5, Table 1, WP 0050 00)
Tape, Antiseizing (Item 9, Table 1, WP 0050 00)
Bearing, Ball (Item 36, Figure 3), WP 0048 00)
Gasket (Item 8, Figure 3, WP 0048 00)
Gasket (Item 12, Figure 3, WP 0048 00)
Gasket, Bearing Cage (Item 30, Figure 3, WP 0048 00)

Materials/Parts (continued):
Mechanical Seal (Item 31, Figure 3, WP 0048 00)
Ring, Retaining (Item 35, Figure 3, WP 0048 00)

Personnel Required:
Two Watercraft Engineers, 88L

References:
TB 43-0218
WP 0020 00
WP 0029 00
WP 0046 00
WP 0048 00
WP 0049 00
WP 0050 00

Equipment Conditions:
AFFF pump removed (WP 0029 00).

WARNING

Never reuse locking hardware. Reuse of locking hardware such as lockwashers, locking nuts, cotter pins, and lockwire can result in undetected loosening of fastening hardware causing catastrophic component failure resulting in death, injury, or damage to equipment. In accordance with TB 43-0218, ensure that all locking hardware is discarded upon removal and replaced with new.

DISASSEMBLY

1. Remove the relief valve cap (figure 1, item 1) from the relief valve (figure 1, item 2).
2. Loosen the jam nut (figure 1, item 3) and remove the adjusting screw (figure 1, item 4).
3. Remove and discard the two gaskets (figure 1, items 5 and 6) from the bonnet (figure 1, item 7).

WARNING

Do not expose body parts directly in the path of components under spring tension. Remove components under spring tension slowly, maintaining positive control of the component at all times. Failure to comply with this warning may result in severe personnel injury or death.

4. Remove the bonnet (figure 1, item 7) and gasket (figure 1, item 8) from the relief valve face plate (figure 1, item 9). Discard the gasket.

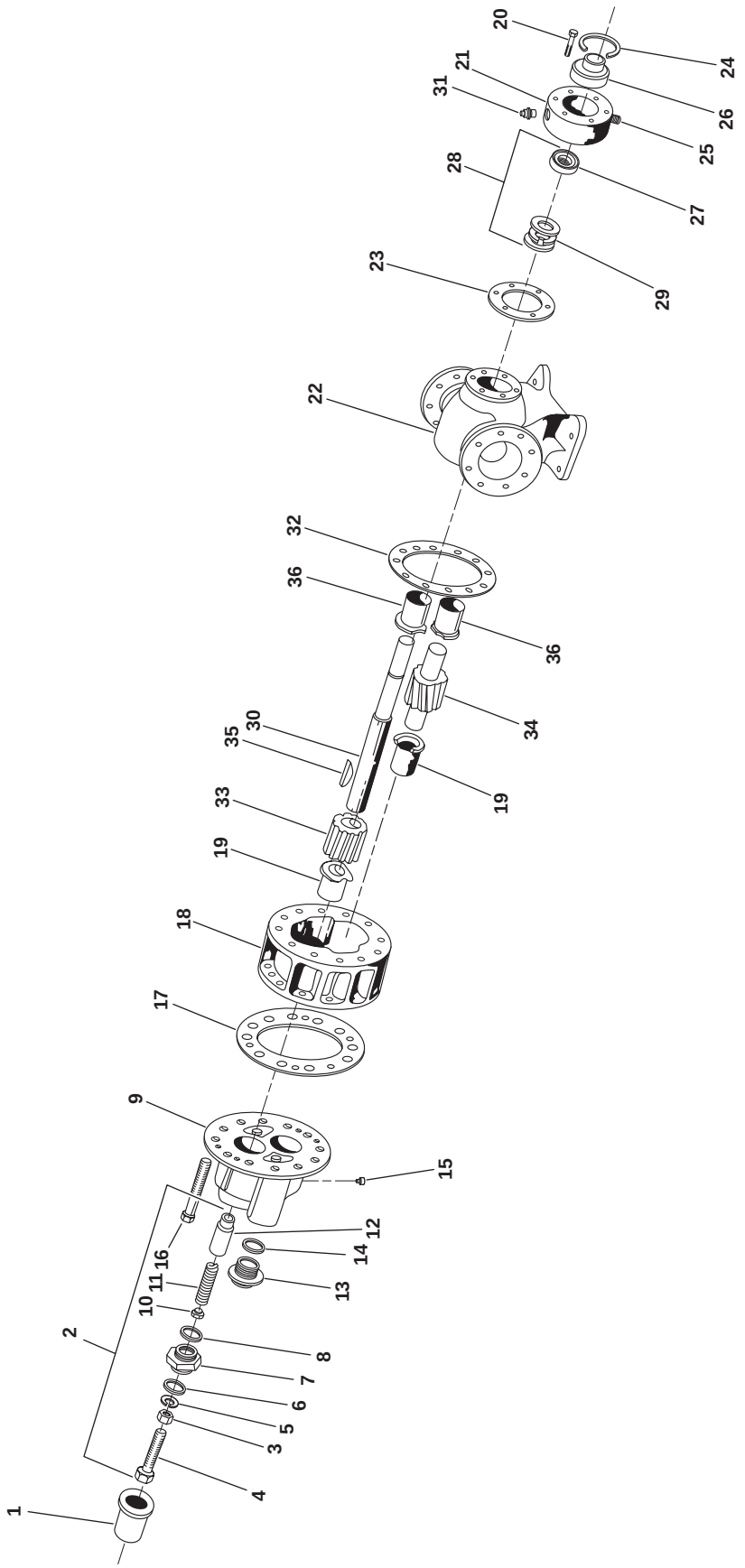


Figure 1. AFFF Pump Disassembly/Assembly

5. Remove the spring guide (figure 1, item 10), spring (figure 1, item 11), and the poppet (figure 1, item 12) from the relief valve faceplate (figure 1, item 9).

6. Remove the plug cap (figure 1, item 13) and the gasket (figure 1, item 14) from the relief valve faceplate (figure 1, item 9). Discard the gasket.

7. Remove the pipe plug (figure 1, item 15) from the relief valve faceplate (figure 1, item 9).

8. Remove the 16 bolts (figure 1, item 16) from the relief valve faceplate (figure 1, item 9) and remove the relief valve faceplate and gasket (figure 1, item 17) from the case (figure 1, item 18). Discard the gasket.

9. Remove the relief valve faceplate bushings (figure 1, item 19) from the relief valve faceplate (figure 1, item 9).

10. Remove the six bolts (figure 1, item 20) from the bearing cartridge (figure 1, item 21).

11. Remove the bearing cartridge (figure 1, item 21) from the back plate assembly (figure 1, item 22).

12. Remove the gasket (figure 1, item 23) from the back plate assembly (figure 1, item 22). Discard the gasket.

13. Remove and discard the retaining ring (figure 1, item 24) from the bearing cartridge (figure 1, item 21).

14. Loosen the setscrew (figure 1, item 25) in the bearing cartridge (figure 1, item 21) that secures the bearing (figure 1, item 26).

15. Remove the bearing (figure 1, item 26) from the bearing cartridge (figure 1, item 21).

16. Remove the stationary seat (figure 1, item 27) of the mechanical seal (figure 1, item 28) from the bearing cartridge (figure 1, item 21).

17. Remove the rotating element (figure 1, item 29) of the mechanical seal (figure 1, item 28) from the drive shaft (figure 1, item 30).

18. Remove the lubrication fitting (figure 1, item 31) from the bearing cartridge (figure 1, item 21).

19. Remove the case (figure 1, item 18) from the back plate assembly (figure 1, item 22).

20. Remove the gasket (figure 1, item 32) from the back plate assembly (figure 1, item 22). Discard the gasket.

21. Remove the drive shaft (figure 1, item 30), drive gear (figure 1, item 33), and idler gear and shaft (figure 1, item 34) from the case (figure 1, item 18).

22. Remove the key (figure 1, item 35) from the drive gear (figure 1, item 33) and the drive shaft (figure 1, item 30).

23. Remove the drive gear (figure 1, item 33) from the drive shaft (figure 1, item 30).

24. Remove the flange bushings (figure 1, items 36) from the back plate assembly (figure 1, item 22).

CLEANING AND INSPECTION

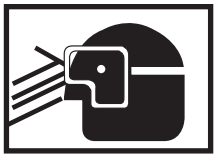
WARNING

Cleaning solvent is flammable and its vapor is potentially explosive. Do not use cleaning solvent in the vicinity of spark, open flame, or excessive heat. Do not use cleaning solvent in unventilated spaces. Failure to follow these precautions can result in death or serious injury.

1. Clean all metal parts with dry cleaning solvent and allow to air dry.

2. Check for binding, scoring, or burrs on the relief valve faceplate bushing (figure 1, item 19), the flange bushings (figure 1, item 36), the bearing (figure 1, item 26), and all other removed parts. Inspect all component parts for unusual wear or damage and replace as required.

WARNING



Do not exceed 25 PSI (1.7 bar) nozzle pressure when using compressed air to dry parts. Wear goggles for eye protection. Do not direct air stream toward self or other personnel. Failure to comply with this warning may cause severe injury to personnel.

3. Direct a stream of compressed air at the relief valve faceplate bushing (figure 1, item 19), the flange bushings (figure 1, item 36), and the bearing (figure 1, item 26) to remove any debris.

ASSEMBLY

1. Install the flange bushings (figure 1, item 36) in the back plate assembly (figure 1, item 22).

2. Install the relief valve faceplate bushings (figure 1, item 19) in the relief valve faceplate (figure 1, item 9).

3. Install a new gasket (figure 1, item 32) on the back plate assembly (figure 1, item 22).

4. Install the case (figure 1, item 18) on the back plate assembly (figure 1, item 22).

5. Install the drive gear (figure 1, item 33) on the drive shaft (figure 1, item 30) and secure it with the key (figure 1, item 35).

6. Install the drive shaft (figure 1, item 30) in the case (figure 1, item 18).

7. Install the idler gear and shaft (figure 1, item 34) in the case (figure 1, item 18). Ensure that the idler gear and the drive gear (figure 1, item 33) mesh.

8. Install a new gasket (figure 1, item 17) on the case (figure 1, item 18).

9. Install the relief valve faceplate (figure 1, item 9) on the case (figure 1, item 18).

10. Install the 16 bolts (figure 1, item 16) in the relief valve faceplate (figure 1, item 9).

11. Install the lubrication fitting (figure 1, item 31) from the bearing cartridge (figure 1, item 21).

12. Install the bearing (figure 1, item 26) in the bearing cartridge (figure 1, item 21). Do not tighten the setscrew (figure 1, item 25) at this time.

13. Lubricate the mechanical seal (figure 1, item 28) with a light coat of lubricating oil and install it on the drive shaft (figure 1, item 30).

14. Install a new gasket (figure 1, item 23) on the back plate assembly (figure 1, item 22).

15. Install the bearing cartridge (figure 1, item 21) on the back plate assembly (figure 1, item 22) and secure it with the six bolts (figure 1, item 20).

16. Install a new retaining ring (figure 1, item 24) on the drive shaft (figure 1, item 30).

17. Tighten the setscrew (figure 1, item 25) on the bearing cartridge (figure 1, item 21).

18. Apply antiseizing tape to the threads of the pipe plug (figure 1, item 15) and install it in the relief valve faceplate (figure 1, item 9).

19. Install a new gasket (figure 1, item 14) on the plug cap (figure 1, item 13).

20. Install the plug cap (figure 1, item 13) in the relief valve faceplate (figure 1, item 9).

21. Install the poppet (figure 1, item 12), spring (figure 1, item 11), and spring guide (figure 1, item 10) in the relief valve faceplate (figure 1, item 9).

22. Install a new gasket (figure 1, item 8) on the bonnet (figure 1, item 7).

23. Install the bonnet (figure 1, item 7) in the relief valve faceplate (figure 1, item 9).

24. Install the jam nut (figure 1, item 3) on the adjusting screw (figure 1, item 4).

25. Install the two gaskets (figure 1, items 5 and 6) on the adjusting screw (figure 1, item 4).

26. Loosely install the adjusting screw (figure 1, item 4) in the bonnet (figure 1, item 7). Do not tighten the adjusting screw at this time.

27. Install the relief valve cap (figure 1, item 1) on the relief valve (figure 1, item 2).

28. Perform the AFFF Pump Service procedure (WP 0020 00).

29. Perform the Replace AFFF Pump Installation procedure (WP 0029 00).

END OF WORK PACKAGE

GENERAL SUPPORT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
FM-200 SYSTEM AND GALLEY FIRE SUPPRESSION SYSTEM, TEST

INITIAL SETUP:

Personnel Required:
One Watercraft Engineer, 88L
One Manufacturer Trained Certified Technician

References:
DA Form 4640
DA Form 4993
TM 55-1925-273-10
WP 0005 00

Equipment Conditions:
Set to ON the FM-200 SYSTEM circuit breaker in 120V main deck, 01 & 02 emergency lighting panel No. 1.
FM-200 system set for normal operation (WP 0005 00).
SSDG 1, SSDG 2, bow thruster engine, and diesel engine firefighting pump engines operating unloaded (TM 55-1925-273-10).
EDG ready to accept a load, or the vessel is operating on shore power.

ANNUAL CERTIFICATION REQUIREMENTS:

A manufacturer trained and certified technician shall accomplish the following tasks:

1. Inspect all FM-200 firefighting system components, including the compressed gas cylinders, the control heads, mechanical wiring, electrical wiring, audible alarms, visible alarms, and all local and remote control stations.

2. After the inspection is completed, the manufacturer trained and certified technician shall recertify the FM-200 firefighting system by performing the following:

   a. The technician shall complete the manufacturer required forms and once completed, post the forms near the applicable firefighting system for inspection purposes.

NOTE

All compressed gas cylinders must have current hydrostatic test dates stamped into the cylinder near the valve assembly.

   b. Additionally, each FM-200 firefighting system component must have (near the control head or storage cabinet) a signed and dated tag posted by the manufacturer trained and certified technician.

3. The crew shall annotate the vessel's DA Form 4640 (Harbor Boat Deck Department Log for Class A&B Vessels) and DA Form 4993 (Harbor Boat Engine Department Log for Class A and C-1 Vessels) indicating the results of the manufacturer trained and certified technician's annual certification.

SEMIANNUAL CERTIFICATION REQUIREMENTS:

A manufacturer trained and certified technician shall accomplish the following tasks:

1. Inspect the galley fire suppression system components, including the compressed gas cylinders, the discharge nozzles, manual pull station, mechanical wiring, electrical wiring, and fusible links.

2. After the inspection is completed, the manufacturer trained and certified technician shall recertify the galley fire suppression system by performing the following:

   a. The technician shall complete the manufacturer required forms and once completed, post the forms near the control cabinet for inspection purposes.

NOTE

All compressed gas cylinders must have current hydrostatic test dates stamped into the cylinder near the valve assembly.

b. Additionally, each galley fire suppression system component must have (near the control head or storage cabinet) a signed and dated tag posted by the manufacturer trained and certified technician.

3. The crew shall annotate the vessel's DA Form 4640 (Harbor Boat Deck Department Log for Class A&B Vessels) and DA Form 4993 (Harbor Boat Engine Department Log for Class A and C-1 Vessels) indicating the results of the manufacturer trained and certified technician's annual certification.

END OF WORK PACKAGE

GENERAL SUPPORT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
DIESEL ENGINE-DRIVEN FIREFIGHTING PUMP, PIPING; REPAIR

INITIAL SETUP:

Tools and Special Tools:
Tool Kit, General Mechanic's (Item 1, Table 2, WP 0046 00)
Chain Hoist (Item 12, Table 2, WP 0046 00)
Sling, Endless, 1" x 6' (Item 13, Table 2, WP 0046 00)
Suitable Drain Pan

Materials/Parts:
Tag, Danger (Item 8, Table 1, WP 0050 00)
Strainer, Sediment (Item 25, Figure 1, WP 0048 00)

Personnel Required:
Two Watercraft Engineers, 88L

References:
FM 55-502
WP 0005 00
WP 0046 00
WP 0048 00
WP 0050 00

Equipment Conditions:
CLOSE valve CA-6, STG AIR TO PMP DR ENG. Lock out and tag out (FM 55-502).
CLOSE valves FM-1, SEA SUCT, F.F. PMP. and FM-13, F.F. TO F.M. CRSVR. Lock out and tag out (FM 55-502).

SIMPLEX STRAINER REPLACEMENT

DISSASSEMBLY

1. Place a suitable drain pan under the simplex strainer (figure 1, item 1).

WARNING

The seacock for the affected system must be closed before beginning replacement of any raw water system piping, hoses, and/or valves. Failure to observe this warning can result in flooding of the space, resulting in injury or death to personnel and damage to the vessel.

2. Remove drain plug (figure 1, item 2) and drain the simplex strainer assembly (figure 1, item 1).

3. Replace the drain plug (figure 1, item 2) after draining the strainer.

4. Support the strainer (figure 1, item 1) using the chain hoist and endless sling.

5. Remove the eight nuts (figure 1, item 3) and eight bolts (figure 1, item 4) from each of the flanges (figure 1, item 5).

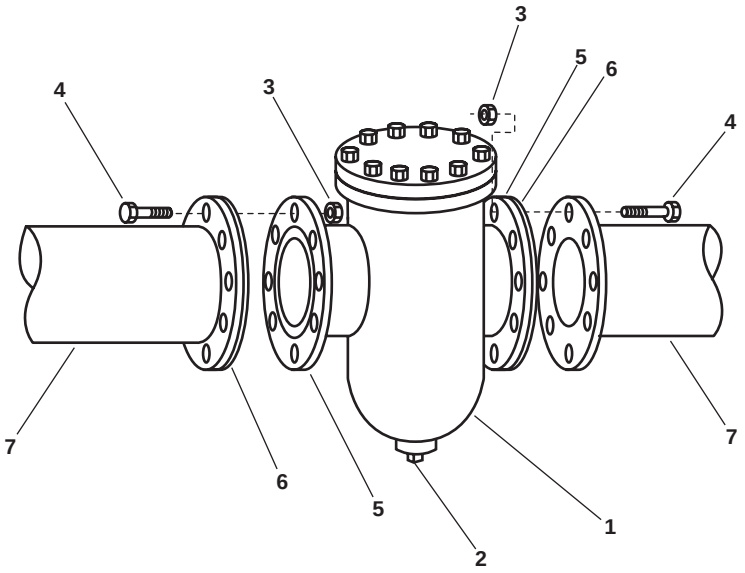


Figure 1. Simplex Strainer – Replacement

WARNING

The simplex strainer is very heavy. Use a chain hoist to remove the strainer. Failure to comply with this warning can result in serious injury to personnel and damage to equipment.

6. Remove the strainer assembly (figure 1, item 1).

7. Remove and discard the gaskets (figure 1, item 6).

ASSEMBLY

1. Thoroughly clean old gasket material from each of the flanges (figure 1, item 5).

2. Position the new strainer assembly (figure 1, item 1) to the piping (figure 1, item 7) with the new gaskets (figure 1, item 6) and loosely secure with the eight bolts (figure 1, item 4) and eight nuts (figure 1, item 3) for each flange (figure 1, item 5).

3. Tighten the eight bolts (figure 1, item 4) on each flange (figure 1, item 5).

4. Remove the lockouts and tagouts (FM 55-502).

5. Operate the diesel-engine driven firefighting pump (WP 0005 00) and observe that the system operates normally without leakage or unusual noises.

6. Return the equipment to the desired readiness condition.

END OF WORK PACKAGE

GENERAL SUPPORT MAINTENANCE
FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
DIESEL ENGINE-DRIVEN FIREFIGHTING PUMP, REBUILD

INITIAL SETUP:

Tools and Special Tools:
- Tool Kit, General Mechanic's (Item 1, Table 2, WP 0046 00)
- Durco Tool Kit (Item 2, Table 2, WP 0046 00)
- Drill, Electric, Portable (Item 16, Table 2, WP 0046 00)
- Threading Kit, Screw (Item 17, Table 2, WP 0046 00)
- Drill Set, Twist Set (Item 18, Table 2, WP 0046 00)
- Drill Set, Twist (Item 19,Table 2, WP 0046 00)

Materials/Parts:
- Gloves, Leather (Item 8, Table 3, WP 0049 00)
- Goggles, Industrial (Item 9, Table 3, WP 0049 00)

Personnel Required:
- One Machinist, 44E

References:
- WP 0037 00
- WP 0046 00
- WP 0049 00

Equipment Conditions:
- Diesel engine-driven firefighting pump disassembled (WP 0037 00).

MACHINING REPAIRS

Due to replacement part availability, expediency of repair, and other factors, it may sometimes be necessary to repair existing pump components rather than replacing them. For example, a pump shaft may be worn in the seal area, but otherwise serviceable. If a new pump shaft is unavailable, or if the unit must be returned to service with minimal down time, it may be possible to build up and re-machine the worn shaft area. The same holds true for volutes, housings, and impeller wear ring seats.

Always confer with the work center supervisor before performing machining repairs to determine the proper course of action and to determine the feasibility of the repair. No matter what form of machining repairs will be accomplished, ensure that the repairs conform to standard machine shop practices and procedures and all applicable regulations.

THREAD REPAIR

Damaged female threads may be replaced by installing thread inserts. The procedure below describes this process.

NOTE

The size of the holes drilled and tapped will vary depending upon the size of the insert used.

1. Select the proper size thread insert. The proper size thread insert should have the same size female threads as the fastener that will thread into it.

2. Measure the external thread size and pitch of the thread insert selected in step 1.

3. Select the tap that corresponds to the external thread size and pitch of the insert selected in step 1. Also select the proper size drill bit (figure 1, item 1) for use with the tap.

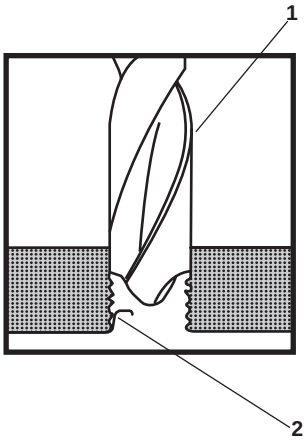


Figure 1. Removing Old Threads

Drilling operations produce high velocity flying debris which can become lodged in the skin or in the eyes. All personnel working in the area must wear protective eyewear, gloves, and long sleeves when performing drilling operations. Failure to comply can result in serious injury to personnel.

4. Drill out the damaged threads (figure 1, item 2) using the drill bit (figure 1, item 1) selected in step 3. Chamfer the hole with a standard countersink (82° to 100°).

5. Tap new threads in the hole using the tap (figure 2, item 1) selected in step 3.

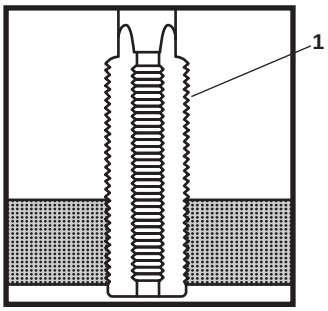


Figure 2. Tapping New Threads

6. Thread the insert (figure 3, item 1) into the new threads until the top of the insert is slightly below the surface.

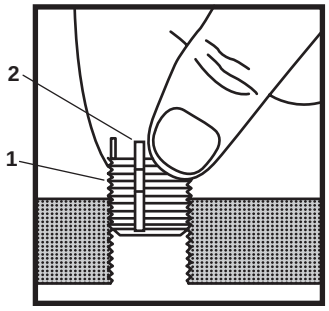


Figure 3. Installing the Insert

7. Drive down the keys (figure 3, item 2; figure 4, item 1) using the insert's installation tool (figure 4, item 2) or a round, flat driver. The keys should be flush with the surface (figure 4, item 3).

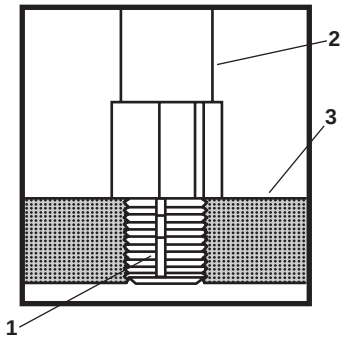


Figure 4. Drive Down the Keys

8. Thread a fastener of the desired thread size and pitch into the insert to ensure that the insert is installed properly.

END OF WORK PACKAGE

Chapter 9

Supporting Information for Firefighting, Fire Alarm, and Fire Suppression Systems

Inland and Coastal Large Tug (LT)

OPERATOR, UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT) REFERENCES

This work package lists all field manuals, forms, technical manuals, and miscellaneous publications referenced in this manual.

ARMY REGULATIONS

AR 700-138	Army Logistics Readiness and Sustainability

FIELD MANUALS

FM 4-25.11	First Aid
FM 55-502	Watercraft Safety

TECHNICAL MANUALS

S6226-NM-MMC-010/15852 REV B	P-100 Portable Pump
TM 38-470	Storage and Maintenance of Army Prepositioned Stock Materiel
TM 55-1925-273-10	Operator's Manual for Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013
TM 55-1925-273-24&P	Unit, Direct Support, and General Support Maintenance Manual including Repair Parts and Special Tools List for Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013
TM 55-1925-277-14	Operator, Unit, Direct Support, and General Support Maintenance Manual for Engine Set, Pump Drive and Bow Thruster for Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013
TM 55-1925-277-14&P	Operator, Unit, Direct Support, and General Support Maintenance Manual Repair Parts and Special Tools List for Engine Set, Pump Drive and Bow Thruster for Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013
TM 750-244-6	Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use

TECHNICAL BULLETINS

TB 43-0144	Painting of Watercraft
TB 43-0218	Inspection, Use and Tightening of Metal Fasteners Used on Tank-Automotive Equipment
TB 740-97-4	Preservation of Vessels for Storage

FORMS AND PAMPHLETS

DA Form 4640	Harbor Boat Deck Department Log for Class A&B Vessels
DA Form 4993	Harbor Boat Engine Department Log for Class A and C-1 Vessels
DA Form 2028	Recommended Changes to Equipment Technical Publications
DA Form 2404	Equipment Inspection and Maintenance Worksheet
DA Form 2407	Maintenance Request
DA Form 2408-9	Equipment Control Record
DA PAM 738-750	Functional Users Manual for The Army Maintenance Management System (TAMMS)
SF 368	Product Quality Deficiency Report

HANDBOOKS AND STANDARDS

MIL – HDBK- 113	Guide for the Selection of Lubricants, Functional Fluids, Preservatives, and Specialty Products for Use in Ground Equipment Systems
MIL –HDBK-275	Guide for the Selection of Lubricant Fluids and Compounds for Use in Flight Vehicles and Components

END OF WORK PACKAGE

OPERATOR, UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT) MAINTENANCE ALLOCATION CHART INTRODUCTION

THE ARMY MAINTENANCE SYSTEM MAC

This introduction provides a general explanation of all maintenance and repair functions authorized at various maintenance levels under the standard Army Maintenance System concept.

The MAC (immediately following the introduction) designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component shall be consistent with the capacities and capabilities of the designated maintenance levels, which are shown on the MAC in column (4) as:

Unit — includes two subcolumns, C (operator/crew) and O (unit) maintenance.
Direct Support — includes an F subcolumn.
General Support — includes an H subcolumn.
Depot — includes a D subcolumn.

The tools and test equipment requirements (immediately following the MAC) list the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from the MAC.

The remarks (immediately following the tools and test equipment requirements) contain supplemental instructions and explanatory notes for a particular maintenance function.

MAINTENANCE FUNCTIONS

Maintenance functions are limited to and defined as follows:

1. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel). This includes scheduled inspection and gagings and evaluation of cannon tubes.

2. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards on a scheduled basis, i.e., load testing of lift devices and hydrostatic testing of pressure hoses.

3. Service. Operations required periodically to keep an item in proper operating condition; e.g., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases. This includes scheduled exercising and purging of recoil mechanisms.

4. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper position, or by setting the operating characteristics to specified parameters.

5. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

6. Calibrate. (To determine and cause corrections to be made or to be adjusted on instruments of test, measuring, and diagnostic equipment used in precision measurement). Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

7. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

8. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and assigned maintenance level is shown as the third position code of the Source, Maintenance and Recoverability (SMR) code.

9. Repair. The application of maintenance services, including fault location/troubleshooting, removal/installation, disassembly/assembly procedures, and maintenance actions to identify trouble and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

NOTE

The following definitions are applicable to the "repair" maintenance function:

Services. Inspect, test, service, adjust, align, calibrate, and/or replace.

Fault location/troubleshooting. The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or Unit Under Test (UUT).

Disassembly/assembly. The step-by-step breakdown (taking apart) of a spare/functional group coded item to the level of its least component, that is assigned an SMR code for the level of maintenance under consideration (i.e., identified as maintenance significant).

Actions. Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.

10. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

11. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (e.g., hours/miles) considered in classifying Army equipment/components.

EXPLANATION OF COLUMNS IN THE MAC

Column (1) Group Number. Column (1) lists FGC numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the Next Higher Assembly (NHA).

Column (2) Component/Assembly. Column (2) contains the item names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

Column (3) Maintenance Function. Column (3) lists the functions to be performed on the item listed in column (2). (For a detailed explanation of these functions refer to "Maintenance Functions" outlined above.)

Column (4) Maintenance Level. Column (4) specifies each level of maintenance authorized to perform each function listed in column (3), by indicating work time required (expressed as manhours in whole hours or decimals) in the appropriate subcolumn. This work time figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the

listed maintenance function varies at different maintenance levels, appropriate work time figures are to be shown for each level. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the MAC. The symbol designations for the various maintenance levels are as follows:

C Operator or crew maintenance
O Unit maintenance
F Direct support maintenance
L Specialized Repair Activity (SRA)
H General support maintenance
D Depot maintenance

NOTE

The "L" maintenance level is not included in column (4) of the MAC. Functions to this level of maintenance are identified by a work time figure in the "H" column of column (4), and an associated reference code is used in the REMARKS column (6). This code is keyed to the remarks and the SRA complete repair application is explained there.

Column (5) Tools and Equipment Reference Code. Column (5) specifies, by code, those common tool sets (not individual tools), common Test, Measurement and Diagnostic Equipment (TMDE), and special tools, special TMDE and special support equipment required to perform the designated function. Codes are keyed to the entries in the tools and test equipment table.

Column (6) Remarks Code. When applicable, this column contains a letter code, in alphabetical order, which is keyed to the remarks table entries.

EXPLANATION OF COLUMNS IN THE TOOLS AND TEST EQUIPMENT REQUIREMENTS

Column (1) Tool or Test Equipment Reference Code. The tool or test equipment reference code correlates with a code used in column (5) of the MAC.

Column (2) Maintenance Level. The lowest level of maintenance authorized to use the tool or test equipment.

Column (3) Nomenclature. Name or identification of the tool or test equipment.

Column (4) National Stock Number (NSN). The NSN of the tool or test equipment.

Column (5) Tool Number. The manufacturer's part number, model number, or type number.

EXPLANATION OF COLUMNS IN THE REMARKS

Column (1) Remarks Code. The code recorded in column (6) of the MAC.

Column (2) Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC.

END OF WORK PACKAGE

OPERATOR, UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT) MAINTENANCE ALLOCATION CHART

Table 1. MAC for Firefighting, Fire Alarm, and Fire Suppression Systems for Inland and Coastal Large Tug

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			FIELD			SUSTAINMENT			
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
0515	Firefighting System	Inspect	0.8						
		Test	1.0		1.0	16.0		3	
		Repair		1.0	6.0			1	
051501	Fire Detection System	Inspect	3.0					14	
		Test	1.0	1.0	3.0	4.0		1,15	A
		Repair		1.0	8.0			1,3	
		Replace	1.0	2.0	4.0			1,3	
051502	AFFF Pump	Inspect	0.5					1	
		Service		1.0				1,20	
		Repair		2.0	6.0	8.0		1,3,12,13	
		Replace			8.0			1,12,13	
051503	FM-200 System	Inspect	1.0						
		Test		0.5	0.5	4.0			A
		Service			1.0			1,4,5,6	
		Repair			1.0			1,3	
051504	Water Wash-Down System (WWS)	Inspect	1.0						
		Service			1.0			1	
051505	Firefighting Pump, Diesel Engine-Driven	Inspect	0.6						
		Alignment			8.0			1,9,10,11	
		Service	0.6					1,8	
		Repair			3.0	6.0		1,2,7,8, 12,13,21	
05150501	Pump	Inspect	0.3						
		Service	0.3					1	
		Replace			3.0			1,12,13	
		Repair			24.0			1	
		Rebuild				24.0		1,2,16, 17,18,19	
051506	Galley Fire Suppression System	Inspect	0.3						
		Test				2.0			B

Table 1. MAC for Firefighting, Fire Alarm, and Fire Suppression Systems for Inland and Coastal Large Tug (continued)

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			FIELD			SUSTAINMENT			
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
051507	Fire Flaps	Inspect Repair	0.5				--		
05150701	Pull Cables	Inspect Replace	0.5	1.0				1	

Table 2. Tools and Test Equipment for Firefighting, Fire Alarm, and Fire Suppression Systems for Inland and Coastal Large Tug

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER	TOOL NUMBER
1	C	Tool Kit, General Mechanic's	5180-00-629-9783	SC5180-90-CL-N55 (50980)
2	F	Durco Tool Kit		AY50884A-BR (18930)
3	O	Multimeter	6625-01-265-6000	27W/ACCE (89536)
4	C	Sampling Pump	6665-01-429-8592	487500 (55799)
5	C	Detector Tube, Hydrogen Fluoride Gas (HF-1), 125 ppm Range, 3 ppm Threshold Limit Value (TLV)		804142 (7L021)
6	C	Sampling Line, 10 feet long		73076 (7L021)
7	F	Press, Arbor, Hand Operated	3444-00-223-8359	A59174-1F9 (58536)
8	C	Wrench, Torque, 0-250 ft-lb	5120-00-640-6365	B107.14M (05047)
9	F	Indicator, Dial	5210-00-277-8840	196A (57163)
10	F	Holder, Dial Indicator	5210-00-138-5333	657T (57163)
11	F	Holder, Dial Indicator	5210-00-390-5446	200M (96168)
12	F	Hoist, Chain	3950-00-235-4235	MILH904CLASSL TYPEHSTYLE1 (81349)
13	F	Sling, Endless, 1” x 6’	3940-01-183-9412	3375957 (15434)
14	C	Brush, Dusting, Bench	7920-00-165-7277	378 (45092)
15	O	Heat Gun, Electric	4940-01-316-1133	VT-750C (83284)
16	H	Drill, Electric, Portable	5130-00-889-9004	PD5130-00-889-9004 (80244)
17	H	Threading Kit, Screw	5180-00-856-3471	23614 (1JU00)
18	H	Drill Set, Twist	5133-00-293-0983	DB129B (55719)
19	H	Drill Set, Twist	5133-00-293-1161	B94.11M (05047)
20	O	Lubricating Gun, Hand	4930-00-223-3389	7584 (0FKM1)
21	F	Wrench, Spanner	5120-00-277-9076	J4749 (33287)

Table 3. Remarks for Firefighting, Fire Alarm, and Fire Suppression Systems for Inland and Coastal Large Tug

REFERENCE CODE	REMARKS
A	Annual Certification Required
B	Semiannual Certification Required

END OF WORK PACKAGE

OPERATOR, UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT) REPAIR PARTS AND SPECIAL TOOLS LIST INTRODUCTION

SCOPE

This RPSTL lists and authorizes spares and repair parts; special tools; special test, measurement, and diagnostic equipment (TMDE); and other special support equipment required for performance of operator, unit, direct support, and general support maintenance of the firefighting, fire alarm, and fire suppression systems for the Inland and Coastal Large Tug (LT). It authorizes the requisitioning, issue, and disposition of spares, repair parts, and special tools as indicated by the source, maintenance, and recoverability (SMR) codes.

GENERAL

In addition to the Introduction work package, this RPSTL is divided into the following work packages.

1. Repair Parts List Work Packages. Work packages containing lists of spares and repair parts authorized by this RPSTL for use in the performance of maintenance. These work packages also include parts which must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in ascending alphanumeric sequence, with the parts in each group listed in ascending figure and item number sequence. Sending units, brackets, filters, and bolts are listed with the component they mount on. Bulk materials are listed by item name in FIG. BULK at the end of the work packages. Repair parts kits are listed separately in their own functional group and work package. Repair parts for reparable special tools are also listed in a separate work package. Items listed are shown on the associated illustrations.

2. Special Tools List Work Packages. Work packages containing lists of special tools, special TMDE, and special support equipment authorized by this RPSTL (as indicated by Basis of Issue (BOI) information in the DESCRIPTION AND USABLE ON CODE (UOC) column). Tools that are components of common tool sets and/or Class VII are not listed.

3. Cross-Reference Indexes Work Packages. There are two cross-reference indexes work packages in this RPSTL: the National Stock Number (NSN) Index work package and the Part Number (P/N) Index work package. The National Stock Number Index work package refers you to the figure and item number. The Part Number Index work package refers you to the figure and item number.

EXPLANATION OF COLUMNS IN THE REPAIR PARTS LIST AND SPECIAL TOOLS LIST WORK PACKAGES

ITEM NO. (Column (1)). Indicates the number used to identify items called out in the illustration.

SMR CODE (Column (2)). The SMR code containing supply/requisitioning information, maintenance level authorization criteria, and disposition instruction, as shown in the following breakout:

Source Code	**Maintenance Code**		**Recoverability Code**
XX	XX		X
1st two positions: How to get an item.	3rd position: Who can install, replace, or use the item.	4th position: Who can do complete repair* on the item.	5th position: Who determines disposition action on unserviceable items.

*Complete Repair: Maintenance capacity, capability, and authority to perform all corrective maintenance tasks of the "Repair" function in a use/user environment in order to restore serviceability to a failed item.

Source Code. The source code tells you how you get an item needed for maintenance, repair, or overhaul of an end item/equipment. Explanations of source codes follow:

Source Code	Application/Explanation
PA PB PC PD PE PF PG	Stock items; use the applicable NSN to requisition/request items with these source codes. They are authorized to the level indicated by the code entered in the 3rd position of the SMR code. **NOTE** Items coded PC are subject to deterioration.
KD KF KB	Items with these codes are not to be requested/requisitioned individually. They are part of a kit which is authorized to the maintenance level indicated in the 3rd position of the SMR code. The complete kit must be requisitioned and applied.
MO-Made at unit/AVUM level MF-Made at DS/AVIM level MH-Made at GS level ML-Made at SRA MD-Made at depot	Items with these codes are not to be requisitioned/requested individually. They must be made from bulk material which is identified by the P/N in the DESCRIPTION AND USABLE ON CODE (UOC) column and listed in the bulk material group work package of the RPSTL. If the item is authorized to you by the 3rd position code of the SMR code, but the source code indicates it is made at higher level, order the item from the higher level of maintenance.
AO-Assembled by unit/AVUM level AF-Assembled by DS/AVIM level AH-Assembled by GS level AL-Assembled by SRA AD-Assembled by depot	Items with these codes are not to be requested/requisitioned individually. The parts that make up the assembled item must be requisitioned or fabricated and assembled at the level of maintenance indicated by the source code. If the 3rd position of the SMR code authorizes you to replace the item, but the source code indicates the item is assembled at a higher level, order the item from the higher level of maintenance.
XA	Do not requisition an "XA" coded item. Order the next higher assembly.(Refer to NOTE below.)
XB	If an item is not available from salvage, order it using the CAGEC and P/N.
XC	Installation drawings, diagrams, instruction sheets, field service drawings; identified by manufacturer's P/N.
XD	Item is not stocked. Order an XD-coded item through normal supply channels using the CAGEC and P/N given, if no NSN is available. **NOTE** Cannibalization or controlled exchange, when authorized, may be used as a source of supply for items with the above source codes except for those items source coded "XA" or those aircraft support items restricted by requirements of AR 750-1.

Maintenance Code. Maintenance codes tell you the level(s) of maintenance authorized to use and repair support items. The maintenance codes are entered in the third and fourth positions of the SMR code as follows:

Third Position. The maintenance code entered in the third position tells you the lowest maintenance level authorized to remove, replace, and use an item. The maintenance code entered in the third position will indicate authorization to the following levels of maintenance:

Maintenance Code	Application/Explanation
C -	Crew or operator maintenance done within unit/AVUM maintenance.
O -	Unit level/AVUM maintenance can remove, replace, and use the item.
F -	Direct support/AVIM maintenance can remove, replace, and use the item.
H -	General support maintenance can remove, replace, and use the item.
L -	Specialized repair activity can remove, replace, and use the item.
D -	Depot can remove, replace, and use the item.

Fourth Position. The maintenance code entered in the fourth position tells you whether or not the item is to be repaired and identifies the lowest maintenance level with the capability to do complete repair (perform all authorized repair functions).

NOTE

Some limited repair may be done on the item at a lower level of maintenance, if authorized by the Maintenance Allocation Chart (MAC) and SMR codes.

Maintenance Code	Application/Explanation
O -	Unit/AVUM is the lowest level that can do complete repair of the item.
F -	Direct support/AVIM is the lowest level that can do complete repair of the item.
H -	General support is the lowest level that can do complete repair of the item.
L -	Specialized repair activity (enter specialized repair activity designator) is the lowest level that can do complete repair of the item.
D -	Depot is the lowest level that can do complete repair of the item.
Z -	Nonrepairable. No repair is authorized.
B -	No repair is authorized. No parts or special tools are authorized for maintenance of "B" coded item. However, the item may be reconditioned by adjusting, lubricating, etc., at the user level.

Recoverability Code. Recoverability codes are assigned to items to indicate the disposition action on unserviceable items. The recoverability code is shown in the fifth position of the SMR code as follows:

Recoverability Code	Application/Explanation
Z -	Nonrepairable item. When unserviceable, condemn and dispose of the item at the level of maintenance shown in the third position of the SMR code.
O -	Repairable item. When uneconomically reparable, condemn and dispose of the item at the unit level.
F -	Repairable item. When uneconomically reparable, condemn and dispose of the item at the direct support level.

Recoverability Code	Application/Explanation
H -	Repairable item. When uneconomically reparable, condemn and dispose of the item at the general support level.
D -	Repairable item. When beyond lower level repair capability, return to depot. Condemnation and disposal of item are not authorized below depot level.
L -	Repairable item. Condemnation and disposal not authorized below Specialized Repair Activity (SRA).
A -	Item requires special handling or condemnation procedures because of specific reasons (such as precious metal content, high dollar value, critical material, or hazardous material). Refer to appropriate manuals/directives for specific instructions.

NSN (Column (3)). The NSN for the item is listed in this column.

CAGEC (Column (4)). The Commercial and Government Entity Code (CAGEC) is a five-digit code which is used to identify the manufacturer, distributor, or Government agency/activity that supplies the item.

PART NUMBER (Column (5)). Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items.

NOTE

When you use an NSN to requisition an item, the item you receive may have a different P/N from the number listed.

DESCRIPTION AND USABLE ON CODE (UOC) (Column (6)). This column includes the following information:

1. The federal item name, and when required, a minimum description to identify the item.

2. P/Ns of bulk materials are referenced in this column in the line entry to be manufactured or fabricated.

3. Hardness Critical Item (HCI). A support item that provides the equipment with special protection from electromagnetic pulse (EMP) damage during a nuclear attack.

4. The statement END OF FIGURE appears just below the last item description in column (6) for a given figure in both the repair parts list and special tools list work packages.

QTY (Column (7)). The QTY (quantity per figure) column indicates the quantity of the item used in the breakout shown on the illustration/figure, which is prepared for a functional group, subfunctional group, or an assembly. A "V" appearing in this column instead of a quantity indicates that the quantity is variable and quantity may change from application to application.

EXPLANATION OF CROSS-REFERENCE INDEXES WORK PACKAGES FORMAT AND COLUMNS

1. National Stock Number (NSN) Index Work Package.

STOCK NUMBER Column. This column lists the NSN in National item identification number (NIIN) sequence. The NIIN consists of the last nine digits of the NSN.

NSN (e.g., 5385-01-574-1476) NIIN	When using this column to locate an item, ignore the first four digits of the NSN. However, the complete NSN should be used when ordering items by stock number.

FIG. Column. This column lists the number of the figure where the item is identified/located. The figures are in numerical order in the repair parts list and special tools list work packages.

ITEM Column. The item number identifies the item associated with the figure listed in the adjacent FIG. column. This item is also identified by the NSN listed on the same line.

2. Part Number (P/N) Index Work Package. P/Ns in this index are listed in ascending alphanumeric sequence (vertical arrangement of letter and number combinations which places the first letter or digit of each group in order A through Z, followed by the numbers 0 through 9 and each following letter or digit in like order).

PART NUMBER Column. Indicates the P/N assigned to the item.

FIG. Column. This column lists the number of the figure where the item is identified/located in the repair parts list and special tools list work packages.

ITEM Column. The item number is the number assigned to the item as it appears in the figure referenced in the adjacent figure number column.

Fabrication Instructions. Bulk materials required to manufacture items are listed in the bulk material functional group of this RPSTL. Part numbers for bulk material are also referenced in the Description Column of the line item entry for the item to be manufactured/fabricated. Detailed fabrication instructions for items source coded to be manufactured or fabricated are found in the applicable procedure.

Index Numbers. Items which have the word BULK in the figure column will have an index number shown in the item number column. This index number is a cross-reference between the NSN / P/N index work packages and the bulk material list in the repair parts list work package.

HOW TO LOCATE REPAIR PARTS

1. When NSNs or P/Ns Are Not Known.

First. Using the table of contents, determine the assembly group to which the item belongs. This is necessary since figures are prepared for assembly groups and subassembly groups, and lists are divided into the same groups.

Second. Find the figure covering the functional group or the subfunctional group to which the item belongs.

Third. Identify the item on the figure and note the number(s).

Fourth. Look in the repair parts list work packages for the figure and item numbers. The NSNs and part numbers are on the same line as the associated item numbers.

2. When NSN Is Known.

First. If you have the NSN, look in the STOCK NUMBER column of the NSN index work package. The NSN is arranged in NIIN sequence. Note the figure and item number next to the NSN.

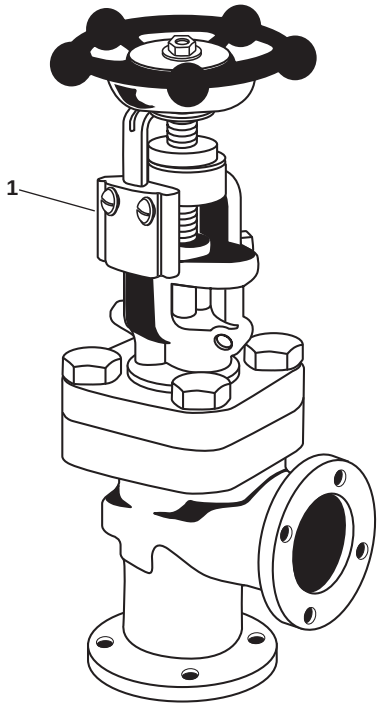
Second. Turn to the figure and locate the item number. Verify that the item is the one you are looking for.

3. When P/N Is Known.

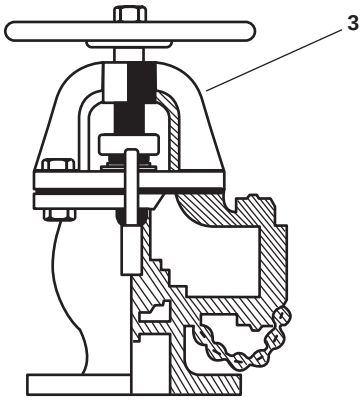
First. If you have the P/N and not the NSN, look in the PART NUMBER column of the P/N index work package. Identify the figure and item number.

Second. Look up the item on the figure in the applicable repair parts list work package.

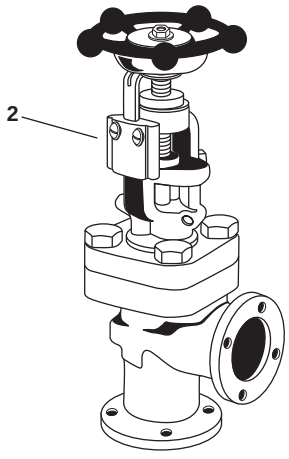
END OF WORK PACKAGE



8" ANGLE VALVE

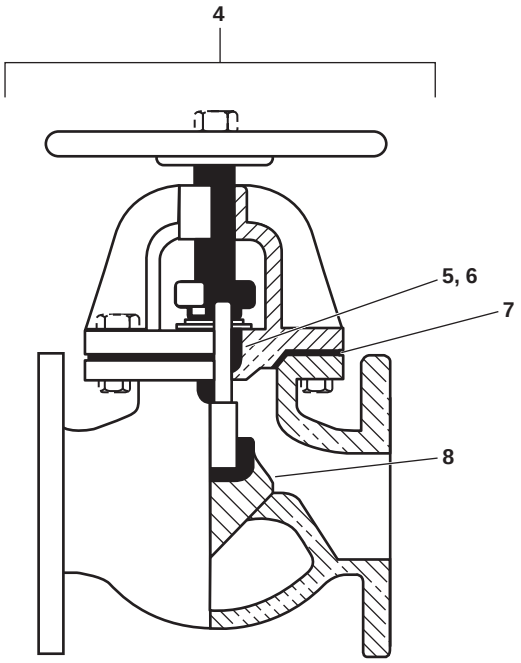


1 1/2" HOSE VALVE

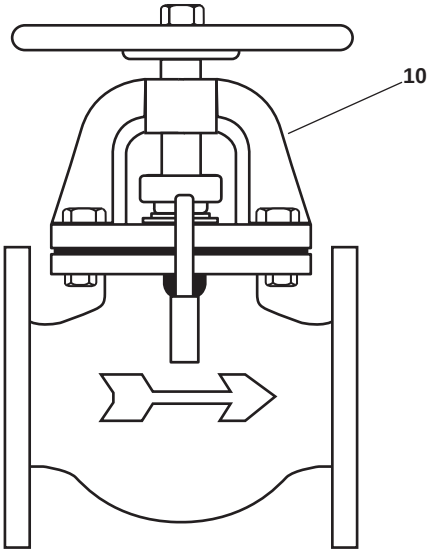


6" ANGLE VALVE

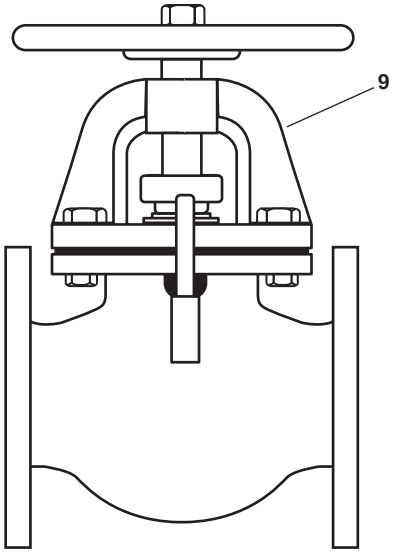
Figure 1. Firefighting System (Sheet 1 of 8)



3" GLOBE VALVE, FLANGE

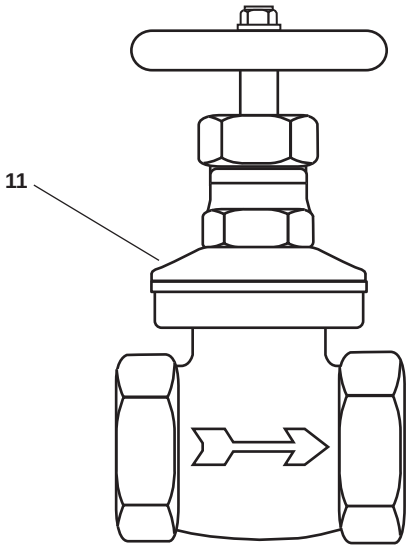


3" GLOBE STOP CHECK VALVE

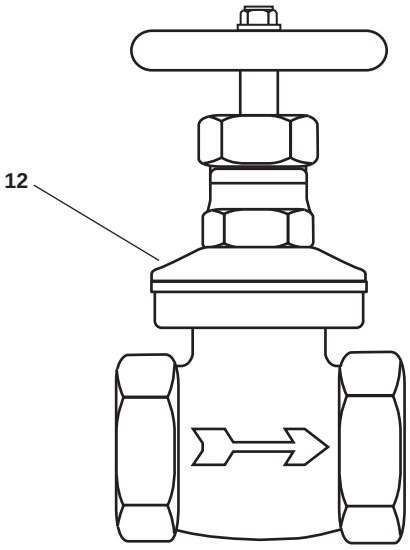


4" GLOBE VALVE, FLANGE

Figure 1. Firefighting System (Sheet 2 of 8)



1 1/2" GLOBE STOP CHECK VALVE (THREADED)



1" GLOBE STOP CHECK VALVE (THREADED)

Figure 1. Firefighting System (Sheet 3 of 8)

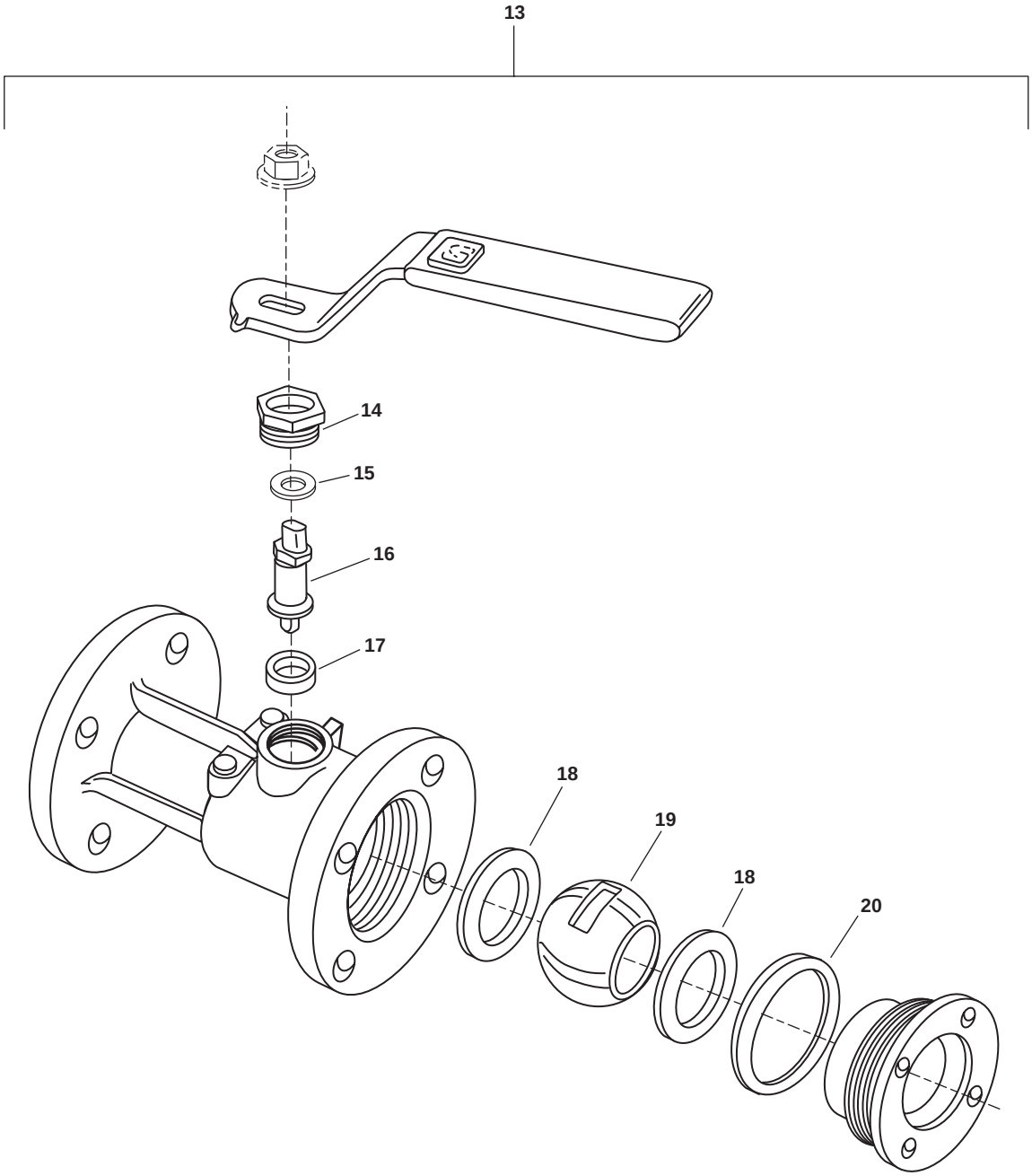
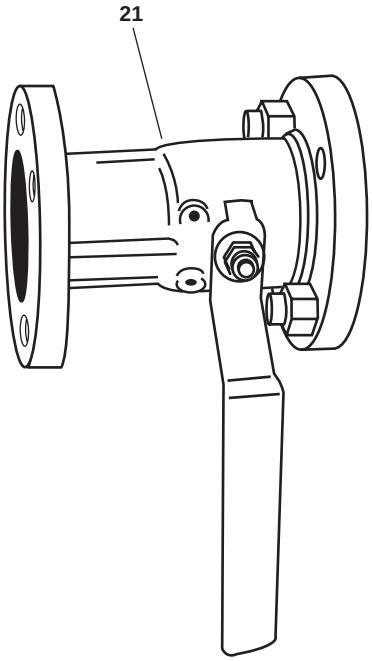
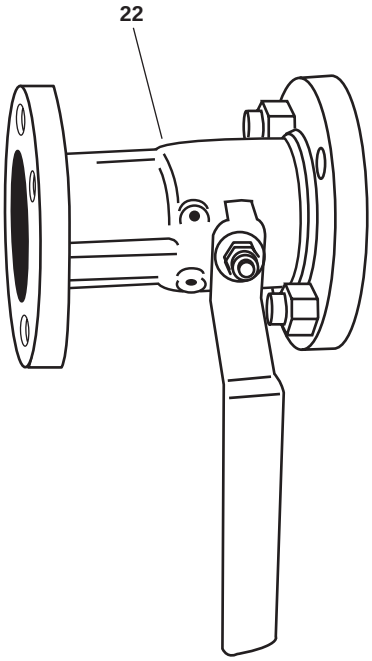


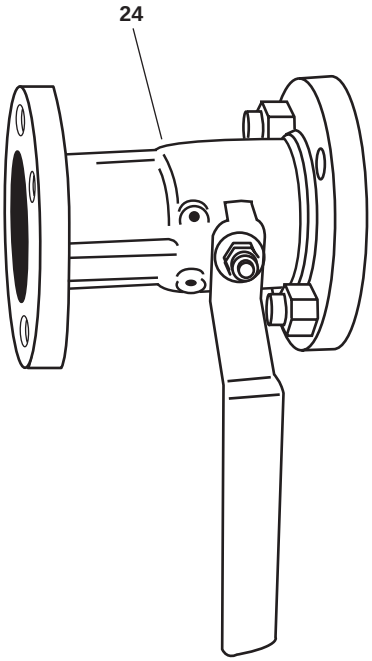
Figure 1. Firefighting System (Sheet 4 of 8)



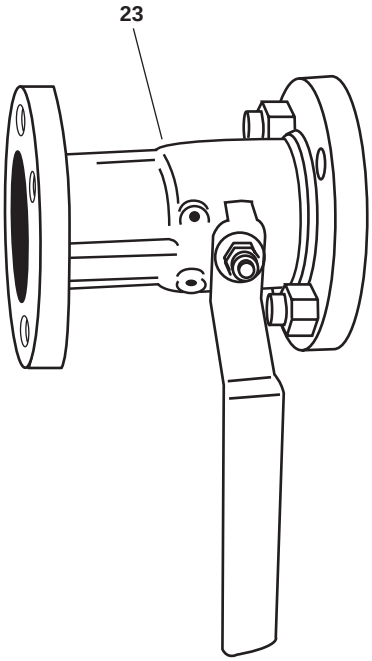
3" Flanged Ball Valve



2 1/2" Flanged Ball Valve



1 1/2" Flanged Ball Valve



2" Flanged Ball Valve

Figure 1. Firefighting System (Sheet 5 of 8)

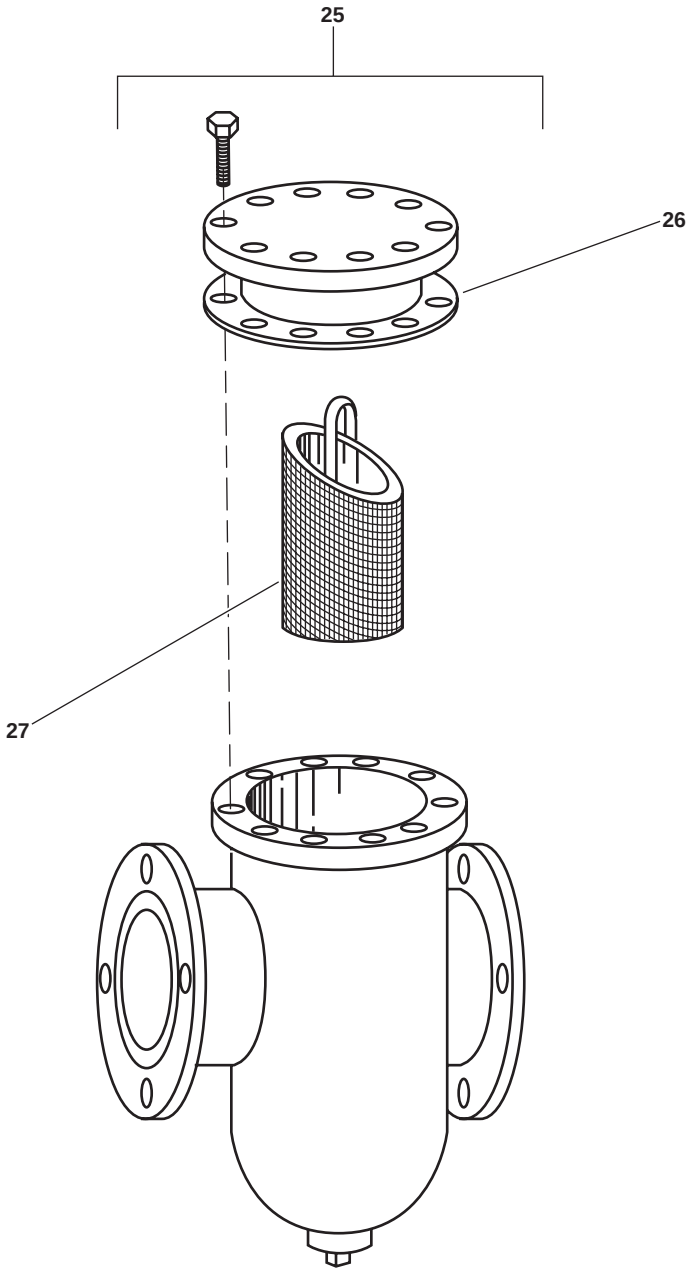


Figure 1. Firefighting System (Sheet 6 of 8)

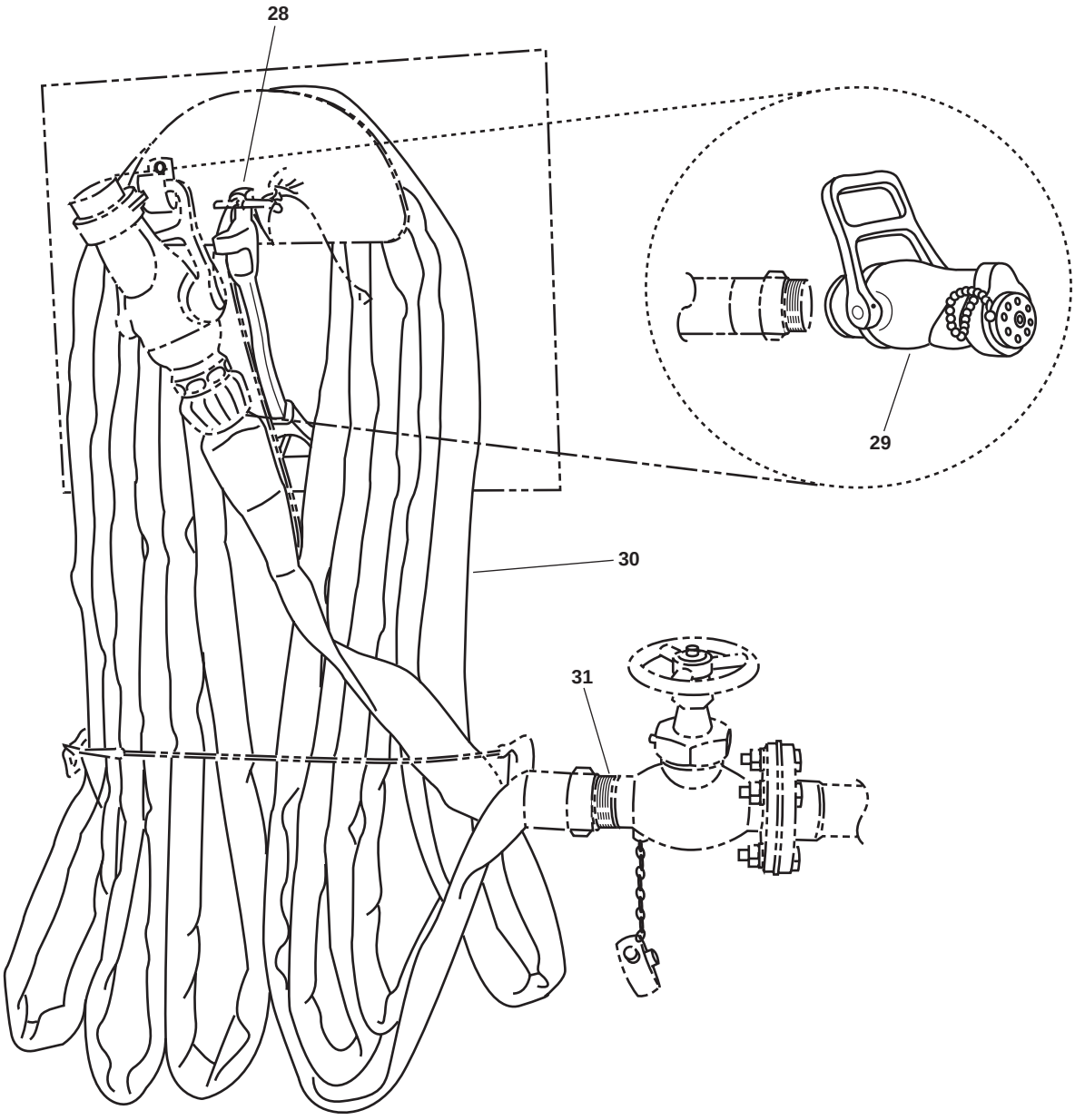


Figure 1. Firefighting System (Sheet 7 of 8)

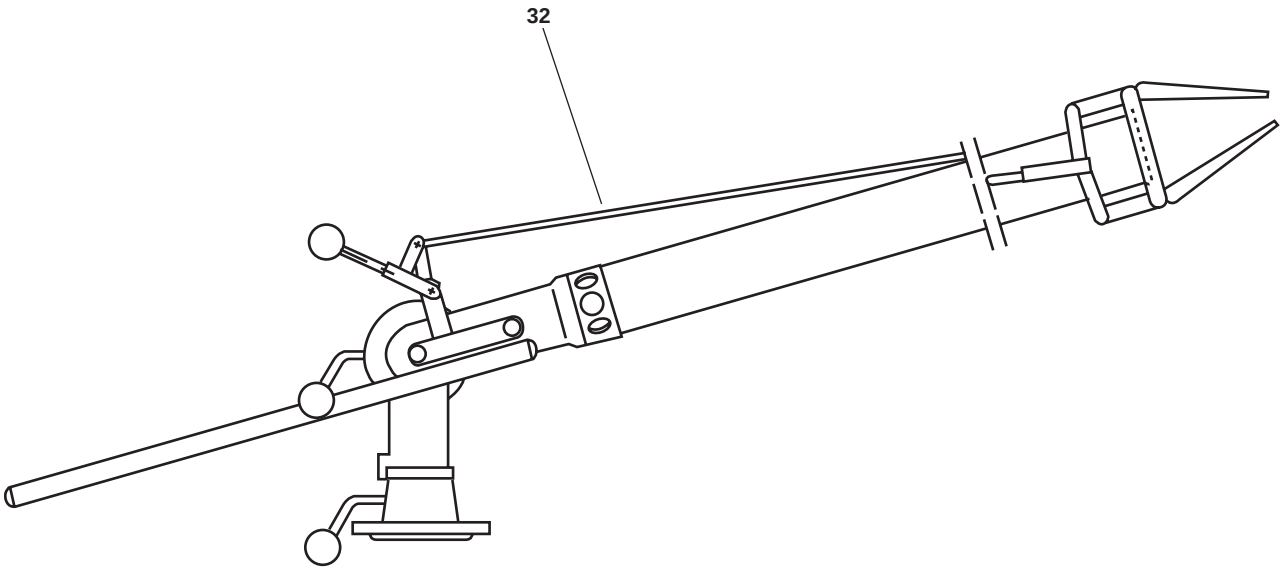


Figure 1. Firefighting System (Sheet 8 of 8)

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					GROUP 0515	
					FIG. 1 FIREFIGHTING SYSTEM	
1	XDOZZ		0WLX8	052403.750	VALVE,ANGLE	1
2	XDOZZ		0WLX8	052403.700	VALVE,ANGLE	1
3	XDOZZ		0WLX8	412471.300	VALVE,ANGLE, HOSE	12
4	PAFZZ	4820-01-307-9304	30263	B-122-A 3IN	VALVE,GLOBE	4
5	PAFZZ	5331-01-307-4224	30263	B-122-A 3IN-10	.O-RING	1
6	PAFZZ	5331-01-307-8576	30263	B-122-A 3IN-15	.O-RING	1
7	PAFZZ	5330-01-307-4245	30263	B-122-A 3IN-5	.GASKET	1
8	PAFZZ	4820-01-308-1764	30263	B-122-A 3IN-6	.SEAT,VALVE	1
9	XDOZZ		0WLX8	411311.600	VALVE,GLOBE	1
10	XDOZZ		0WLX8	052304.500	VALVE,GLOBE	4
11	XDOZZ		0WLX8	414302.300	VALVE,GLOBE	2
12	XDOZZ		0WLX8	414302.200	VALVE,GLOBE	4
13	XDOOO	4820-01-112-3152	92021	SP-B-19-SB-2	VALVE,BALL	2
14	XDOZZ	5330-01-052-2236	92021	SPK-19-6	.RETAINER,PACKING	1
15	XDOZZ	5330-01-052-2237	92021	SPK-19-10	.RETAINER,PACKING	1
16	XDOZZ	4820-01-056-3488	92021	SP19-5A	.STEM,FLUID VALVE	1
17	PAOZZ	5330-01-021-0875	92021	SP-19-13	.PACKING,PREFORMED	2
18	PFOZZ	4820-01-047-5366	92021	SP-19-8B	.SEAT,VALVE	2
19	XDOZZ	4820-01-207-3761	92021	SPB-K002	.BALL,VALVE,PORTED	1
20	XDOZZ	5330-01-048-3912	92021	SP-19-9	.PACKING,PREFORMED	1
21	XDOZZ		0WLX8	395202.500	VALVE,BALL	1
22	XDOZZ		0WLX8	385202.450	VALVE,BALL	3
23	XDOZZ		0WLX8	375332.400	VALVE,BALL	1
24	XDOZZ		0WLX8	375332.300	VALVE,BALL	1
25	XDOZZ	4730-01-289-9682	76588	165-B-8	STRAINER,SEDIMENT	1
26	PAOZZ	5330-01-291-0552	76588	TG-8.0911-B-0	.GASKET	1
27	XDOZZ	4730-01-289-9382	76588	BK-8.0-911-4-1-0 -0	.STRAINER ELEMENT,SE	1
28	PAFZZ	5120-00-277-9076	33287	J4749	WRENCH,SPANNER	0012
29	PAFZZ	4210-01-097-7536	00912	2032-US-0-1-56-0 02	NOZZLE,FIRE HOSE	12

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
30	PAOZZ	4210-01-131-0249	1JL20	40ND615	HOSE ASSEMBLY,FIRE	12
31	PAOZZ	4730-01-528-7256	39428	6523T25	ADAPTER,FIRE HOSE	1
32	XDOZZ		0BJH3	IM/HR-376	MONITOR,FIRE,MANUAL	3
					End of Figure	

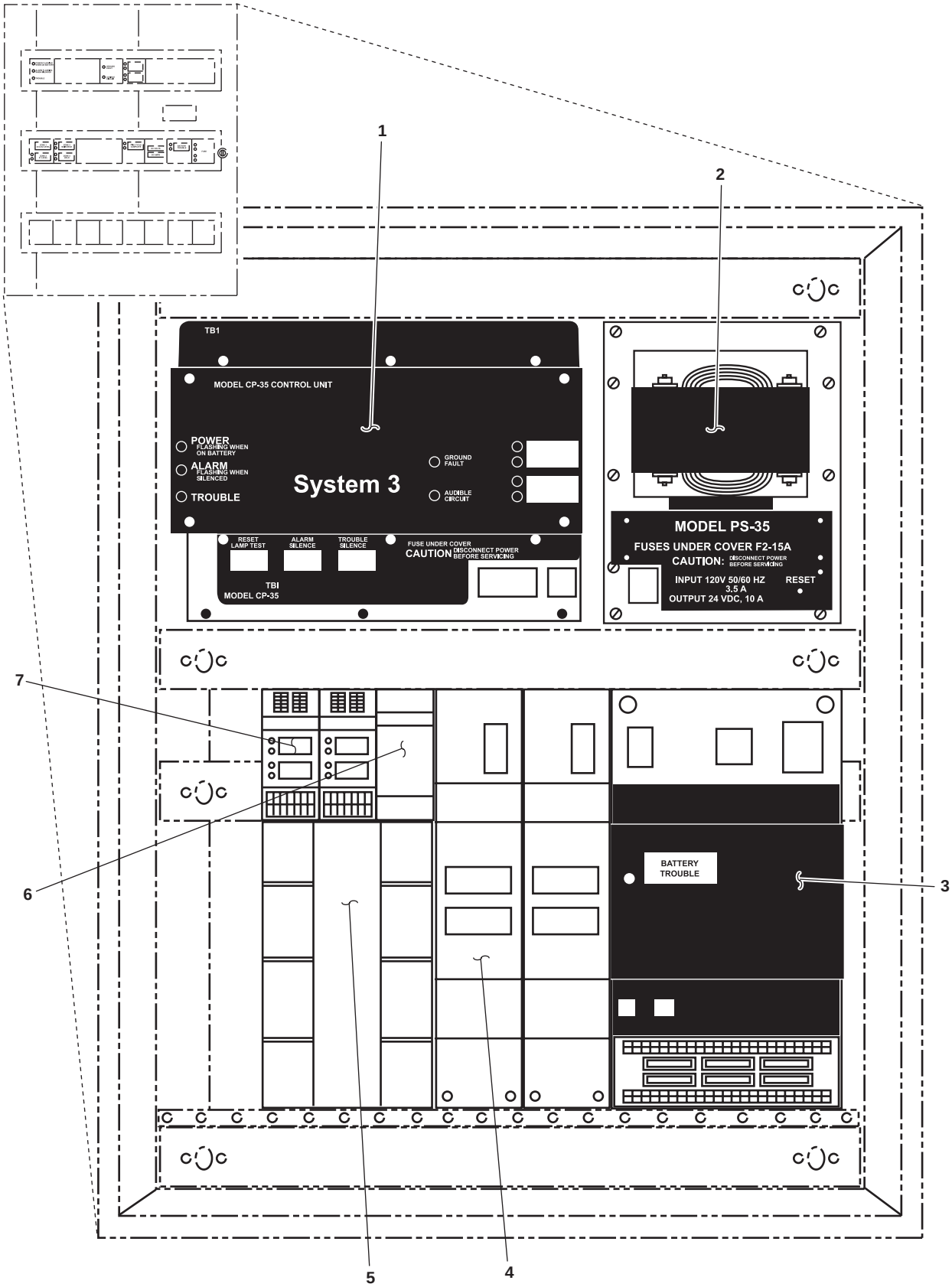


Figure 2. Fire Detection System (Sheet 1 of 4)

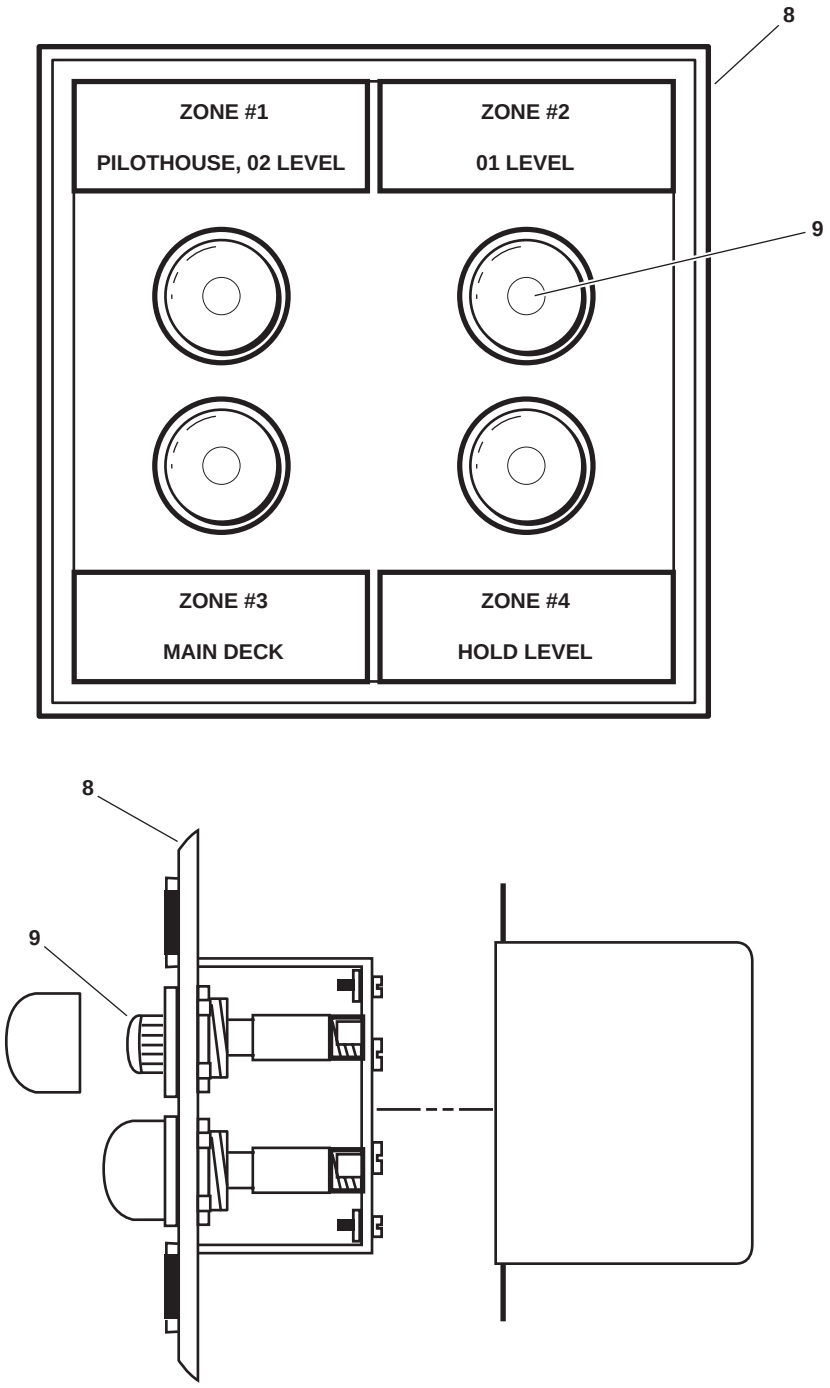


Figure 2. Fire Detection System (Sheet 2 of 4)

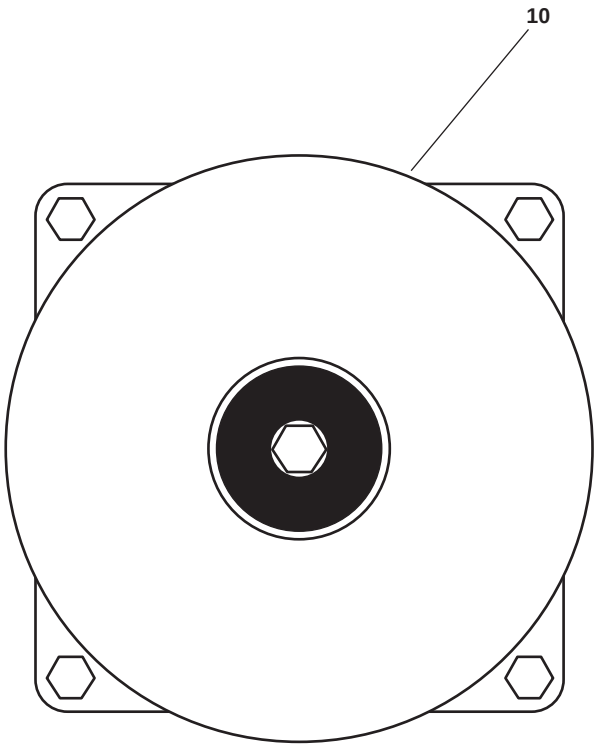
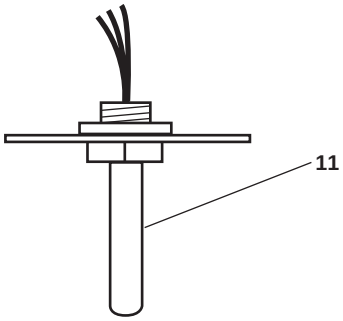
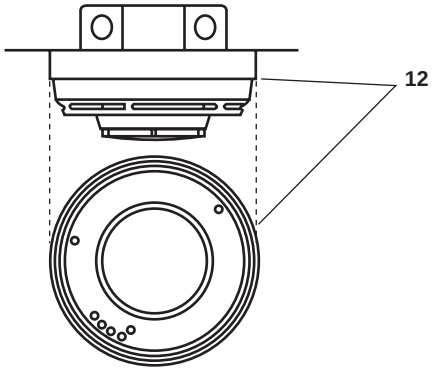
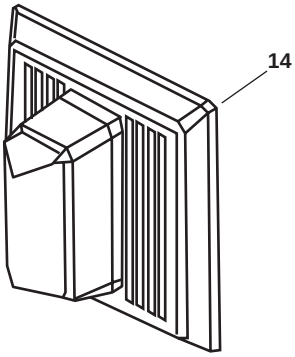


Figure 2. Fire Detection System (Sheet 3 of 4)







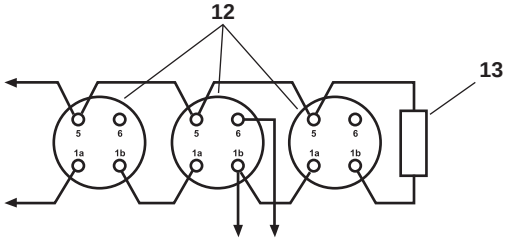


Figure 2. Fire Detection System (Sheet 4 of 4)

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					GROUP 051501	
					FIG. 2 FIRE DETECTION SYSTEM	
1	XDOFF	6320-01-283-9370	1L2H9	CP-35	PANEL,ALARM,SHIPBD	1
2	PAFZZ	6130-01-284-1575	1L2H9	PS-35	.POWER SUPPLY	1
3	PAFZZ	6130-01-223-6133	1L2H9	BC-35	.CHARGER,BATTERY	1
4	PAFZZ	6350-01-300-6267	1L2H9	MM-35	.MODULE,METER,BATTER	1
5	PAFZZ	6140-01-316-8625	1L2H9	BT-34	.BATTERY,STORAGE	1
6	PAFZZ	6930-01-126-3849	1L2H9	TL-30U	.MODULE,CONTROL	1
7	PAFZZ	6350-01-300-6268	1L2H9	ZU-35TS	.MODULE,ALARM,SMOKE	2
8	PAOOO	6695-01-528-8585	1L2H9	500-616141	PANEL,REMOTE INDICA REPLACES SIEMENS PN RLP-4.	1
9	PAOZZ	6240-01-528-6828	1L2H9	125-216154	.LAMP	4
10	PAFZZ	6350-01-036-9626	1L2H9	BDC-624	BELL,ELECTRICAL	2
11	PAOZZ	6350-01-391-2664	1L2H9	DT-135WP	DETECTOR,HEAT	3
12	PAOZZ	4210-01-185-2762	1L2H9	DI-3	FIRE DETECTOR	14
13	PAFZZ	5910-01-169-4551	0A0E0	100-115588	CAPACITOR,FIXED,PAP	5
14	PAFZZ		1F889	89SMSTRR-AQ	BEACON,WARNING,RED	1
					End of Figure	

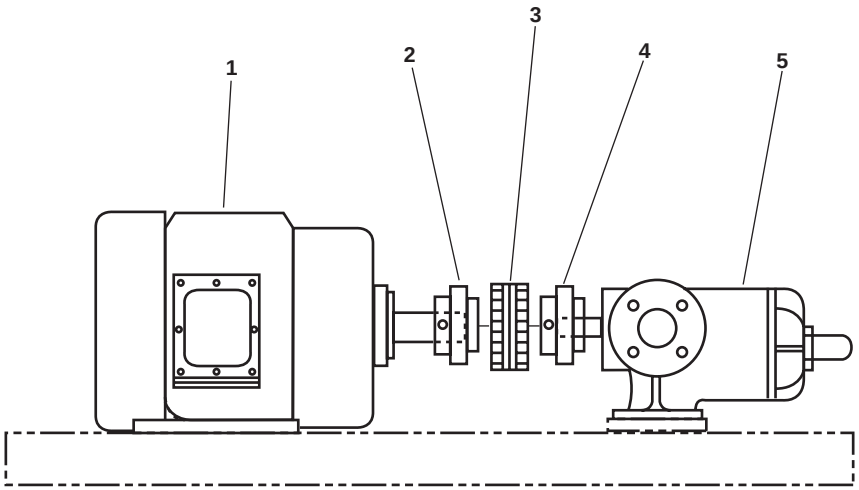


Figure 3. AFFF Pump (Sheet 1 of 3)

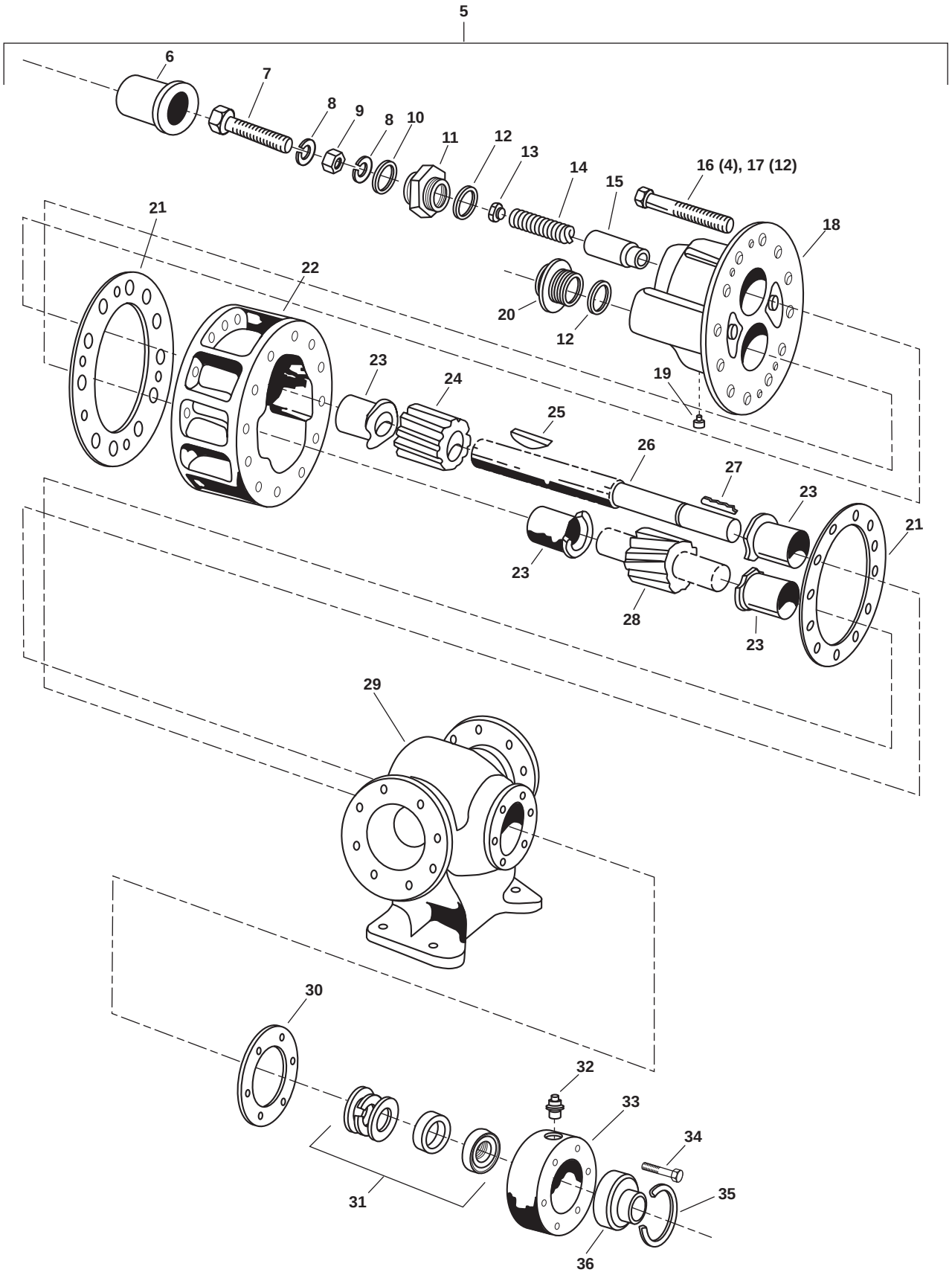


Figure 3. AFFF Pump (Sheet 2 of 3)

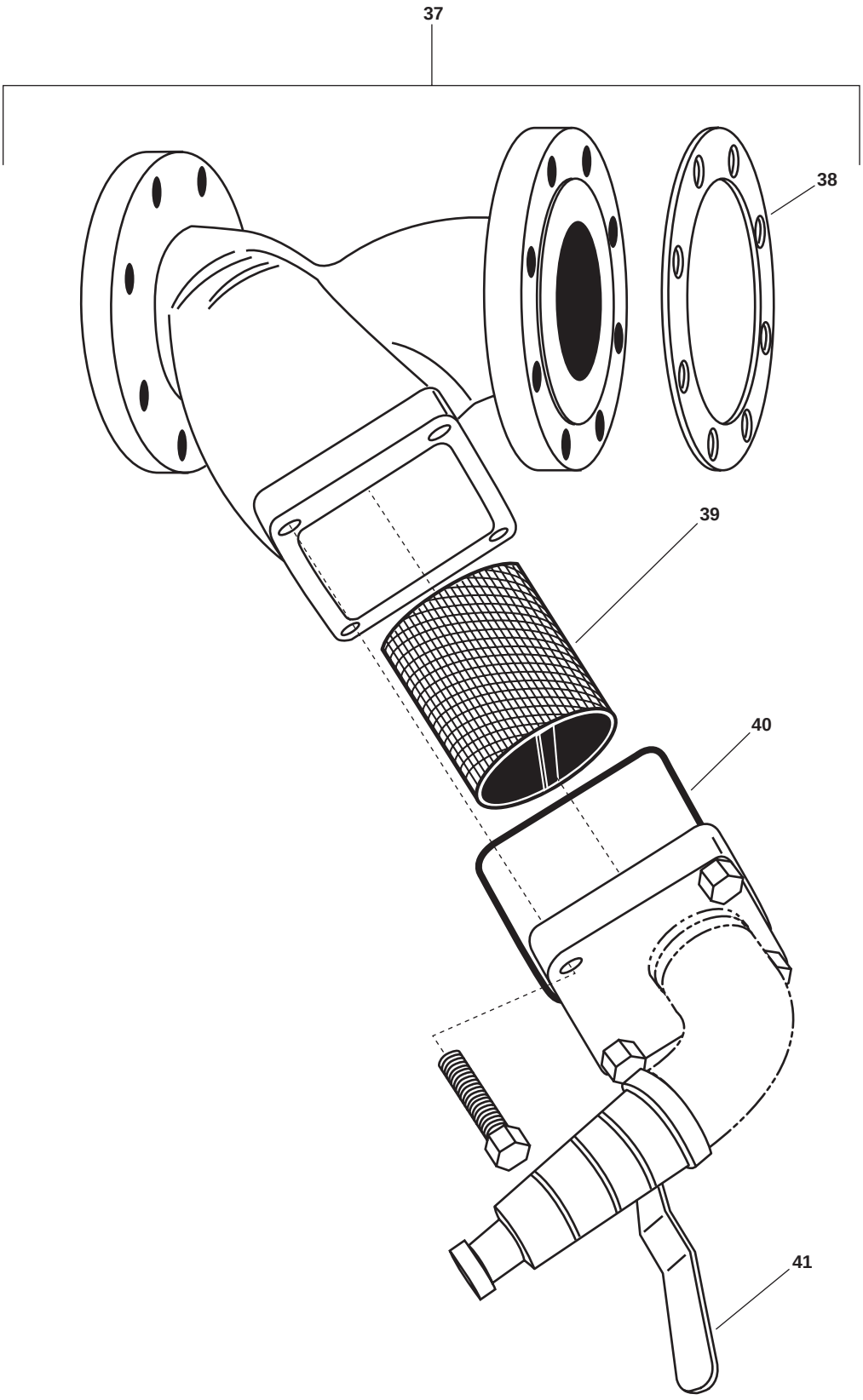


Figure 3. AFFF Pump (Sheet 3 of 3)

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					GROUP 051502	
					FIG. 3 AFFF PUMP	
1	PAFZZ	6105-01-343-1506	38151	324TTFP8104	MOTOR,ALTERNATING C	1
2	PAFZZ	4730-01-529-1174	46170	10S X 2-1/8	FLANGE,COUPLING	1
3	PAFZZ	3010-01-529-1180	46170	10E	SLEEVE,COUPLING	1
4	PAFZZ	4730-01-529-1177	46170	10S X 2-1/4	FLANGE,COUPLING	1
5	PAFHH	4320-01-341-6216	58923	2F75-17	PUMP UNIT,ROTARY AFFF PUMP	1
6	PAHZZ	5340-01-528-6595	18930	P15-8	.SEAL,CAP	1
7	PAHZZ	5305-01-528-6317	18930	D15-7	.SCREW,ADJUSTING	1
8	PAFZZ	5330-01-343-2668	18930	D11-295	.GASKET	2
9	PAFZZ	5310-01-528-6395	18930	G44-31	.NUT,HEX JAM	1
10	PAFZZ	5330-01-528-6384	18930	G11-104	.GASKET	1
11	PAHZZ	4820-01-342-0632	18930	P14-9	.BONNET	1
12	PAFZZ	5330-01-528-6385	18930	G11-105	.GASKET	2
13	PAHZZ	5340-01-528-6412	18930	D8-89	.GUIDE,SPRING	1
14	PAFZZ	4820-01-341-8574	18930	G10-233	.SPRING,STUD	1
15	PAHZZ	4820-01-341-8683	18930	D16-57	.POPPET	1
16	PAFZZ	5305-01-528-6231	18930	G45-037550	.SCREW,CAP	4
17	PAFZZ		18930	G49-037550	.SCREW,CAP	12
18	PAHZZ	5340-01-528-6311	18930	P3-169	.FACE PLATE	1
19	PAFZZ	4730-01-528-6251	18930	G56-11	.PLUG,PIPE	1
20	PAHZZ	5340-01-528-6596	18930	P17-9	.PLUG,CAP	1
21	PAHZZ	5330-01-342-5444	18930	D11-25	.GASKET,CASE	2
22	PAHZZ	4320-01-528-6286	18930	P1-163	.CASE	1
23	PAHZZ	3120-01-528-6381	18930	G5-329	.BEARING	4
24	PAHZZ	3020-01-528-6549	18930	D6-233	.GEAR,DRIVE	1
25	PAHZZ	5315-01-528-6315	18930	D30-69	.KEY,3/8" X 2.75"	1
26	PAHZZ	3040-01-528-6553	18930	D1-1233	.SHAFT,DRIVE	1
27	PAHZZ	5315-01-528-6314	18930	D30-18	.KEY,1/4" X 2.5"	1
28	PAFZZ	3040-01-528-6403	18930	N1-528	.GEAR AND SHAFT ASSY	1
29	PAHZZ	5340-01-528-6309	18930	P2-785	.BACK PLATE,FLANGED	1
30	PAHZZ	5330-01-343-2669	18930	D11-121	.GASKET,BEARING CAGE	1
31	PAFZZ	4320-00-704-3552	18930	G14-229	.MECHANICAL SEAL	1

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
32	PAFZZ	4730-01-341-7587	18930	G63-2	.FITTING,LUBRICATION	1
33	PAHZZ	3110-01-344-3829	18930	P4-74	.CAGE,BEARING	1
34	PAFZZ	5305-01-286-2530	18930	G49-037225	.SCREW,CAP	6
35	PAFZZ	5325-01-341-8800	18930	G41-5	.RING,RETAINING	1
36	PAFZZ	3110-01-343-7175	18930	G40-43	.BEARING	132

End of Figure

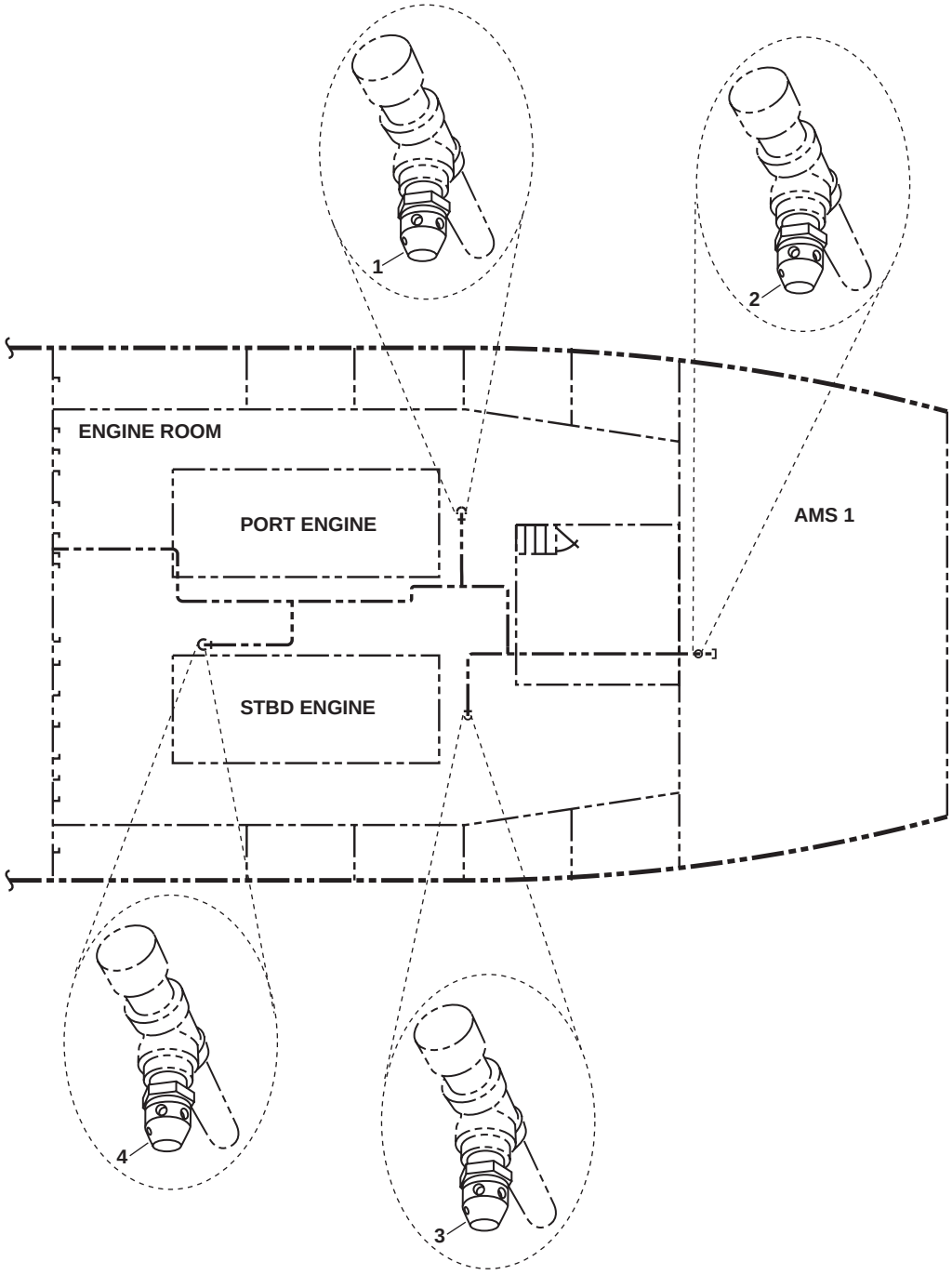
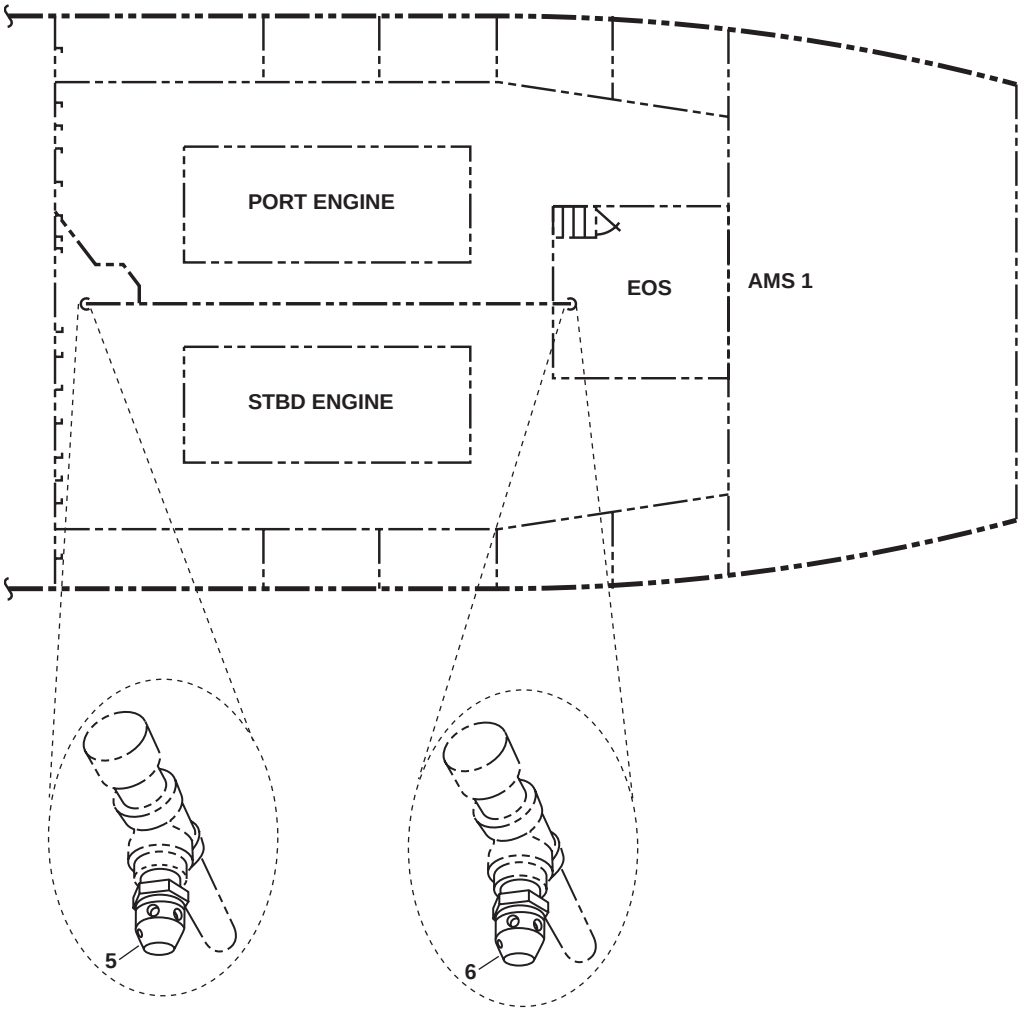


Figure 4. FM-200 System (Sheet 1 of 3)



BILGE FM-200 DISCHARGE NOZZLES

Figure 4. FM-200 System (Sheet 2 of 3)

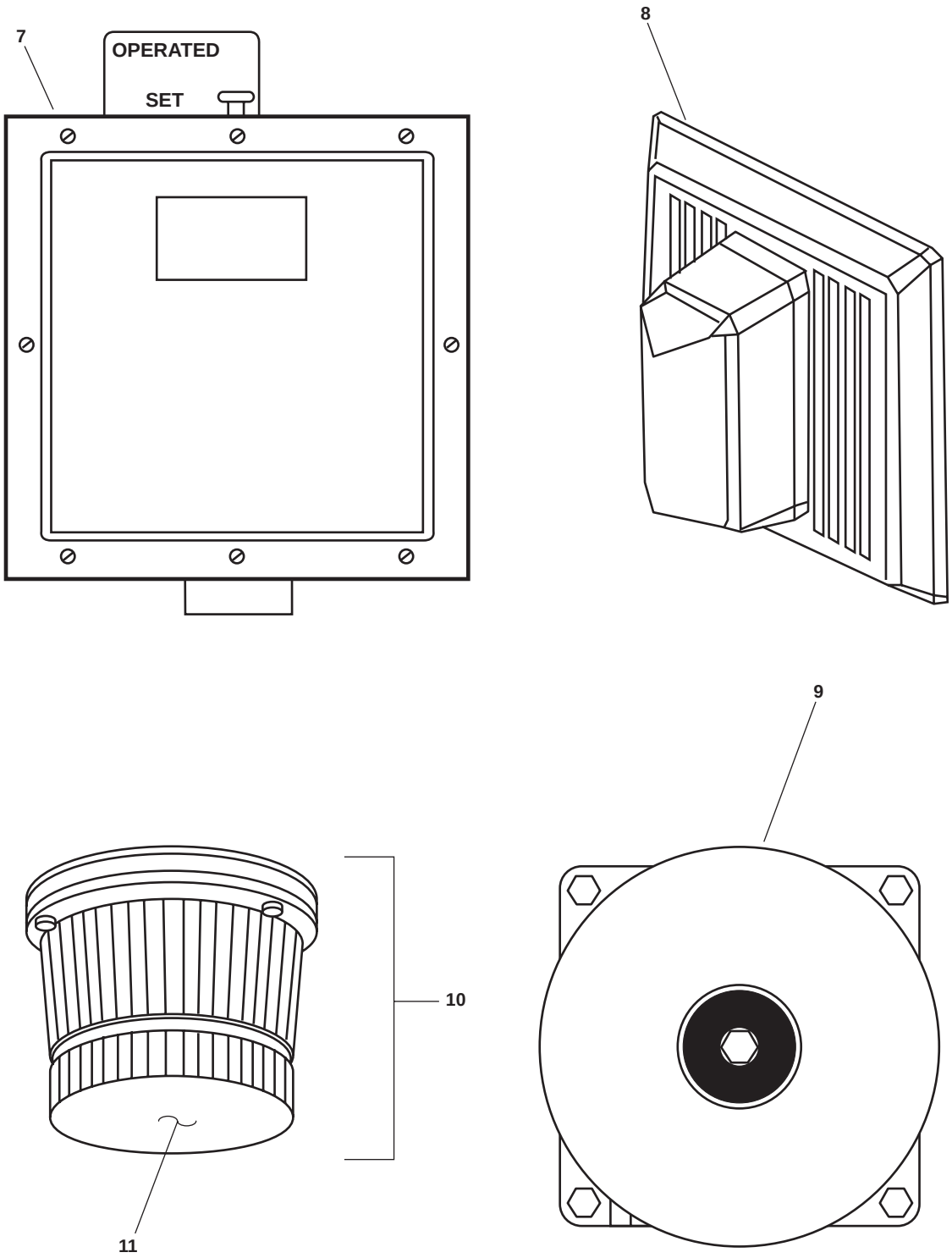


Figure 4. FM-200 System (Sheet 3 of 3)

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					GROUP 051503	
					FIG. 4 FM-200 SYSTEM	
1	PAFZZ	4210-01-528-6614	1DA54	90-194028-397	NOZZLE,DISCHARGE	1
2	PAFZZ	4210-01-528-6612	1DA54	90-194018-469	NOZZLE,DISCHARGE	1
3	PAFZZ	4210-01-528-6611	1DA54	90-194027-359	NOZZLE,DISCHARGE	1
4	PAFZZ	4210-01-528-6610	1DA54	90-194028-563	NOZZLE,DISCHARGE	1
5	PAFZZ	4210-01-528-6615	1DA54	90-194026-316	NOZZLE,DISCHARGE	1
6	PAFZZ	4210-01-528-6616	1DA54	90-194026-344	NOZZLE,DISCHARGE	1
7	PAOZZ	5930-01-157-5421	0KDP7	486536	SWITCH,PRESSURE	2
8	PAOZZ	6350-01-528-6983	7X933	867STRA-AQ	ALARM,AUDABLE/VISUA	2
9	PAOZZ	6350-01-188-0285	73274	UATV-6-115VAC	BELL,ELECTRICAL	2
10	PAOHH	6210-01-528-6216	1F889	89SMSTRA-AQ	BEACON,WARNING,AMBE	5
11	PAOZZ	6210-01-528-6982	02116	MAX-A	.LENS,LIGHT,AMBER	1
12	PAOZZ	6240-00-143-7419	08108	7C7-115-125V	..LAMP,INCANDESCENT	2
					End of Figure	

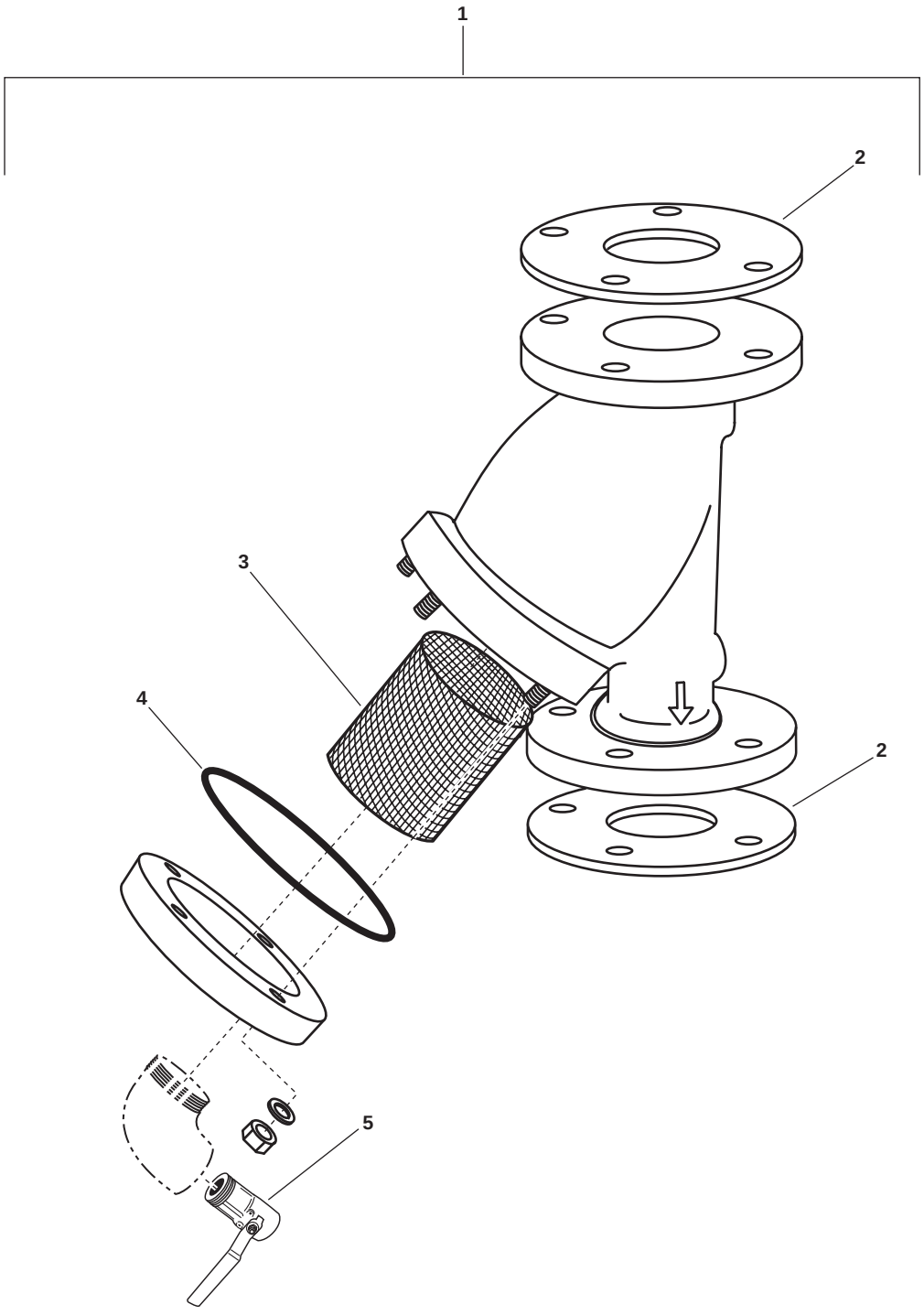


Figure 5. Water Washdown System

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					GROUP 051504	
					FIG. 5 WATER WASHDOWN SYSTEM	
1	XDOOO		BBZZZ	A050-R15-351-YLD (2",SS,Y TYPE)	STRAINER ASSEMBLY WATER WASHDOWN SYSTEM	1
2	PAOZZ	5330-01-529-2553	0B6K6	780063-020	.GASKET,FLANGE	2
3	XDOZZ		11111	SCN/F6625/040/31 6	.ELEMENT,STRAINER	1
4	XDOZZ		11111	GFL/094/075/16/C NF	.GASKET,COVER	1
5	XDFZZ		72219	85R-208-27	VALVE,BALL	1
					End of Figure	

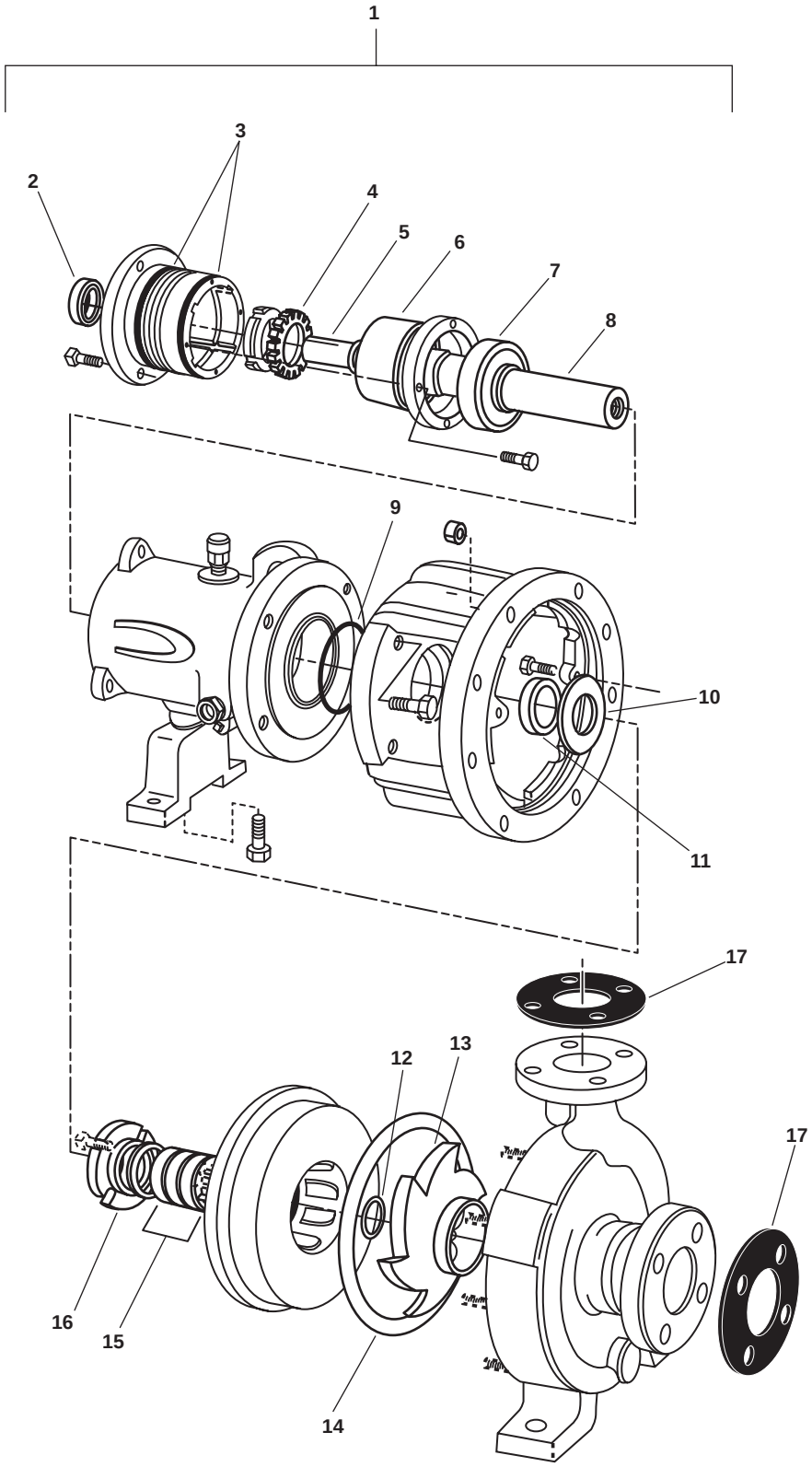


Figure 6. Firefighting Pump, Diesel Engine-Driven

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					GROUP 05150501	
					FIG. 6 FIREFIGHTING PUMP, DIESEL ENGINE-DRIVEN	
1	PAFFF	4320-01-353-7475	18930	3K6X4-16/160	PUMP,CENTRIFUGAL FIRE FIGHTING PUMP	1
2	PAFZZ	5330-01-528-5842	18930	78997079	.SEAL,OIL,OUTBOARD	1
3	XDFZZ		18930	201B	.O-RING	2
4	PAFZZ		18930	125	.LOCKWASHER	1
5	XDFZZ		18930	130	.KEY	1
6	PAFZZ	3110-01-528-7071	18930	79011961	.BEARING,BALL,OUTBD	1
7	PAFZZ	3110-01-528-7070	18930	78924222	.BEARING,BALL,INBOAR	1
8	PAFZZ	3040-01-528-7035	18930	78975216	.SHAFT	1
9	PAFZZ	5331-01-528-5838	18930	78934387	.O-RING	1
10	PAFZZ	4320-01-528-7086	18930	78997970	.SLINGER,OIL	1
11	PAFZZ	5330-01-528-5842	18930	78997079	.SEAL,OIL,OUTBOARD	1
12	PAFZZ	5330-01-528-6603	18930	78932316	.GASKET,IMPELLER	1
13	PAFZZ	5320-01-528-6601	18930	78766102	.IMPELLER	1
14	PAFZZ	5330-01-528-6604	18930	78924016	.GASKET,REAR COVER	1
15	PAFZZ	5330-01-528-7048	18930	78997772	.PACKING,PREFORMED	1
16	XDFZZ		18930	190G	.GLAND,GASKET	1
17	MOOZZ		81349	MILR2765-6 IN FLANGE GASKET	GASKET (MAKE FROM PN MILR2765)	2
					End of Figure	

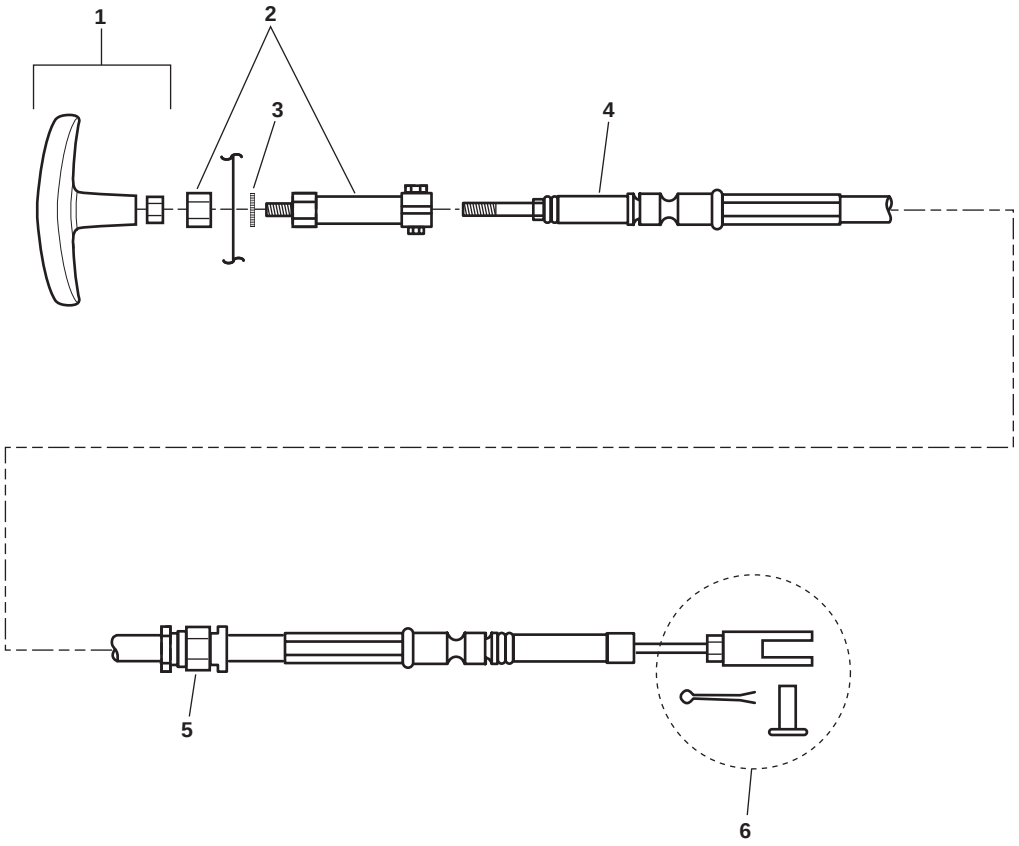


Figure 7. Fire Flap Pull Cables

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					GROUP 051506	
					FIG. 7 FIRE FLAP PULL CABLES	
1	XDOZZ		U2739	214236/1B	T-HANDLE	8
2	XDOZZ		U2739	AM164	40 SER DC KIT	8
3	XDOZZ		U2739	201040	SHIM	8
4	XDOZZ		U2739	217285/AM179	CABLE	V
5	XDOZZ		U2739	201041	CLAMP,CABLE	8
6	XDOZZ		U2739	215149	CLEVIS	8
					End of Figure	

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					GROUP 95 GENERAL USE STANDARDIZED PARTS	
					GROUP 9501 BULK MATERIAL	
					FIG. 9 BULK	
1	PAOZZ	5330-00-222-2566	81349	MILR2765	RUBBER SHEET,SOLID FLANGE GASKET MATERIAL, .062" THICK X 35"	2
					End of Figure	

NATIONAL STOCK NUMBER INDEX

STOCK NUMBER	FIG.	ITEM
6240-00-143-7419	4	12
5330-00-222-2566	8	1
5120-00-277-9076	1	28
4320-00-704-3552	3	31
5330-01-021-0875	1	17
6350-01-036-9626	2	10
4820-01-047-5366	1	18
5330-01-048-3912	1	20
5330-01-052-2236	1	14
5330-01-052-2237	1	15
4820-01-056-3488	1	16
4210-01-097-7536	1	29
4820-01-112-3152	1	13
6930-01-126-3849	2	6
4210-01-131-0249	1	30
5930-01-157-5421	4	7
5910-01-169-4551	2	13
4210-01-185-2762	2	12
6350-01-188-0285	4	9
4820-01-207-3761	1	19
6130-01-223-6133	2	3
6320-01-283-9370	2	1
6130-01-284-1575	2	2
5305-01-286-2530	3	34
4730-01-289-9382	1	27
4730-01-289-9682	1	25
5330-01-291-0552	1	26
6350-01-300-6267	2	4
6350-01-300-6268	2	7
5331-01-307-4224	1	5
5330-01-307-4245	1	7
5331-01-307-8576	1	6
4820-01-307-9304	1	4
4820-01-308-1764	1	8
6140-01-316-8625	2	5
4320-01-341-6216	3	5
4730-01-341-7587	3	32
4820-01-341-8574	3	14
4820-01-341-8683	3	15
5325-01-341-8800	3	35
4820-01-342-0632	3	11
5330-01-342-5444	3	21
6105-01-343-1506	3	1
5330-01-343-2668	3	8
5330-01-343-2669	3	30
3110-01-343-7175	3	36
3110-01-344-3829	3	33

STOCK NUMBER	FIG.	ITEM
4320-01-353-7475	6	1
6350-01-391-2664	2	11
5331-01-528-5838	6	9
5330-01-528-5842	6	2
	6	11
6210-01-528-6216	4	10
5305-01-528-6231	3	16
4730-01-528-6251	3	19
4320-01-528-6286	3	22
5340-01-528-6309	3	29
5340-01-528-6311	3	18
5315-01-528-6314	3	27
5315-01-528-6315	3	25
5305-01-528-6317	3	7
3120-01-528-6381	3	23
5330-01-528-6384	3	10
5330-01-528-6385	3	12
5310-01-528-6395	3	9
3040-01-528-6403	3	28
5340-01-528-6412	3	13
3020-01-528-6549	3	24
3040-01-528-6553	3	26
5340-01-528-6595	3	6
5340-01-528-6596	3	20
5320-01-528-6601	6	13
5330-01-528-6603	6	12
5330-01-528-6604	6	14
4210-01-528-6610	4	4
4210-01-528-6611	4	3
4210-01-528-6612	4	2
4210-01-528-6614	4	1
4210-01-528-6615	4	5
4210-01-528-6616	4	6
6240-01-528-6828	2	9
6210-01-528-6982	4	11
6350-01-528-6983	4	8
3040-01-528-7035	6	8
5330-01-528-7048	6	15
3110-01-528-7070	6	7
3110-01-528-7071	6	6
4320-01-528-7086	6	10
4730-01-528-7256	1	31
6695-01-528-8585	2	8
4730-01-529-1174	3	2
4730-01-529-1177	3	4
3010-01-529-1180	3	3
5330-01-529-2553	5	2

PART NUMBER INDEX

PART NUMBER	FIG.	ITEM
052304.500	1	10
052403.700	1	2
052403.750	1	1
100-115588	2	13
10E	3	3
10S X 2-1/4	3	4
10S X 2-1/8	3	2
125	6	4
125-216154	2	9
130	6	5
165-B-8	1	25
190G	6	16
201040	7	3
201041	7	5
201B	6	3
2032-US-0-1-56-002	1	29
214236/1B	7	1
215149	7	6
217285/AM179	7	4
2F75-17	3	5
324TTFP8104	3	1
375332.300	1	24
375332.400	1	23
385202.450	1	22
395202.500	1	21
3K6X4-16/160	6	1
40ND615	1	30
411311.600	1	9
412471.300	1	3
414302.200	1	12
414302.300	1	11
486536	4	7
500-616141	2	8
6523T25	1	31
780063-020	5	2
78766102	6	13
78924016	6	14
78924222	6	7
78932316	6	12
78934387	6	9
78975216	6	8
78997079	6	2
	6	11
78997772	6	15
78997970	6	10
79011961	6	6
7C7-115-125V	4	12
85R-208-27	5	5
867STRA-AQ	4	8
89SMSTRA-AQ	4	10
89SMSTRR-AQ	2	14
90-194018-469	4	2
90-194026-316	4	5
90-194026-344	4	6
90-194027-359	4	3
90-194028-397	4	1
90-194028-563	4	4
A050-R15-351-YLD (2",SS,Y TYPE)	5	1
AM164	7	2
B-122-A 3IN	1	4
B-122-A 3IN-10	1	5
B-122-A 3IN-15	1	6
B-122-A 3IN-5	1	7
B-122-A 3IN-6	1	8
BC-35	2	3
BDC-624	2	10
BK-8.0-911-4-1-0-0	1	27
BT-34	2	5
CP-35	2	1
D1-1233	3	26
D11-121	3	30
D11-25	3	21
D11-295	3	8
D15-7	3	7
D16-57	3	15
D30-18	3	27
D30-69	3	25
D6-233	3	24
D8-89	3	13
DI-3	2	12
DT-135WP	2	11
G10-233	3	14
G11-104	3	10
G11-105	3	12
G14-229	3	31
G40-43	3	36
G41-5	3	35
G44-31	3	9
G45-037550	3	16
G49-037225	3	34
G49-037550	3	17
G5-329	3	23
G56-11	3	19
G63-2	3	32
GFL/094/075/16/CNF	5	4
IM/HR-376	1	32
J4749	1	28

PART NUMBER INDEX (CONTINUED)

PART NUMBER	FIG.	ITEM
MAX-A	4	11
MILR2765	8	1
MILR2765-6 IN FLANGE GASKET	6	17
MM-35	2	4
N1-528	3	28
P1-163	3	22
P14-9	3	11
P15-8	3	6
P17-9	3	20
P2-785	3	29
P3-169	3	18
P4-74	3	33
PS-35	2	2
SCN/F6625/040/316	5	3
SP-19-13	1	17
SP-19-8B	1	18
SP-19-9	1	20
SP-B-19-SB-2	1	13
SP19-5A	1	16
SPB-K002	1	19
SPK-19-10	1	15
SPK-19-6	1	14
TG-8.0911-B-0	1	26
TL-30U	2	6
UATV-6-115VAC	4	9
ZU-35TS	2	7

END OF WORK PACKAGE

OPERATOR, UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT) COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS

INTRODUCTION

SCOPE

This work package lists Components of End Items (COEI) and Basic Issue Items (BII) for the firefighting, fire alarm, and fire suppression systems for the Inland and Coastal Large Tug (LT) to help you inventory items for safe and efficient operation of the equipment.

GENERAL

The COEI and BII information is divided into the following lists:

Components of End Item (COEI). This list is for information purposes only and is not authority to requisition replacements. These items are part of the firefighting, fire alarm, and fire suppression systems for the Inland and Coastal Large Tug (LT). As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Items of COEI are removed and separately packaged for transportation or shipment only when necessary. Illustrations are furnished to help you find and identify the items.

Basic Issue Items (BII). These essential items are required to place the firefighting, fire alarm, and fire suppression systems for the Inland and Coastal Large Tug (LT) in operation, operate them, and to do emergency repairs. Although shipped separately packaged, BII must be with the firefighting, fire alarm, and fire suppression systems for the Inland and Coastal Large Tug (LT) during operation and when it is transferred between property accounts. Listing these items is your authority to request/requisition them for replacement based on authorization of the end item by the TOE/MTOE. Illustrations are furnished to help you find and identify the items.

EXPLANATION OF COLUMNS IN THE COEI LIST AND BII LIST

Column (1) Illus Number. Gives you the number of the item illustrated.

Column (2) National Stock Number (NSN). Identifies the stock number of the item to be used for requisitioning purposes.

Column (3) Description, CAGEC, and Part Number. Identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The stowage location of COEI and BII is also included in this column. The last line below the description is the CAGEC (Commercial and Government Entity Code) (in parentheses) and the part number.

Column (4) Usable On Code. When applicable, gives you a code if the item you need is not the same for different models of equipment.

Column (5) Unit of Issue (U/I). Indicates the physical measurement or count of the item as issued per the National Stock Number shown in column (2).

Column (6) Qty Rqr. Indicates the quantity required.

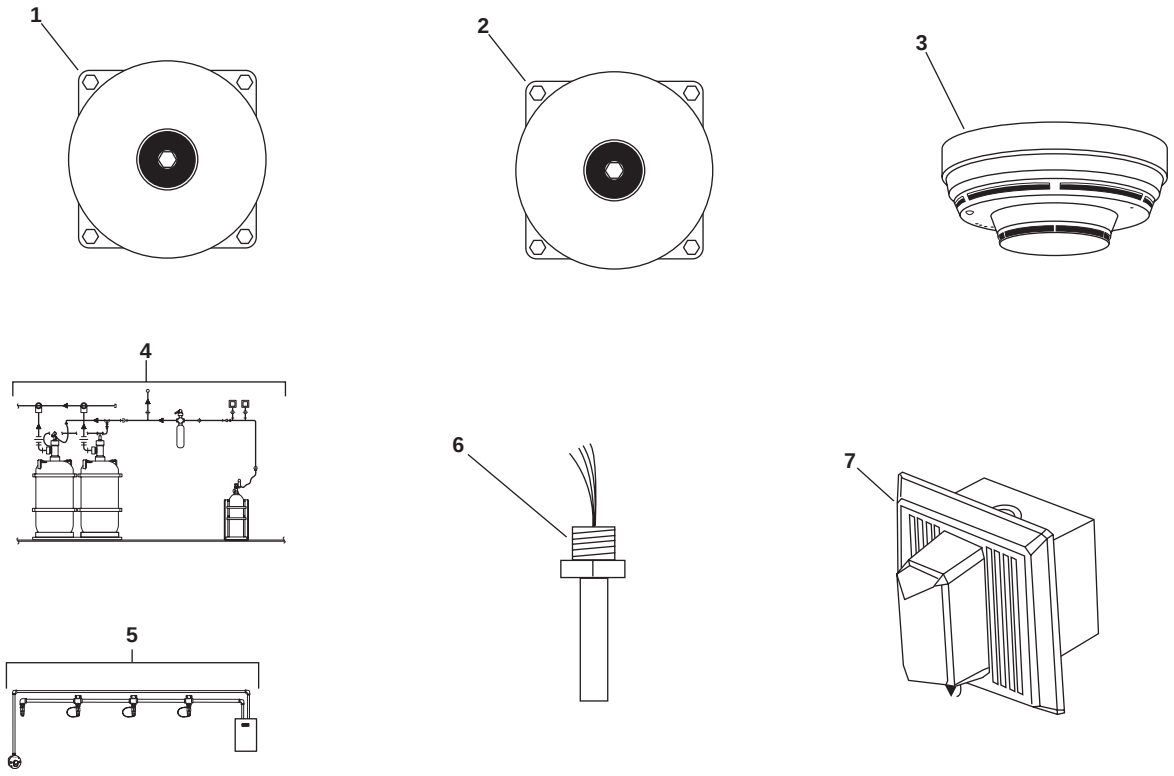


Table 1. Components of End Item List

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION CAGEC, AND PART NUMBER	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
1	6350-01-036-9626	BELL, ELECTRICAL (EOS, pilothouse) (1L2H9) BDC-624	128	EA	2
2	6350-01-188-0285	BELL, ELECTRICAL (engine room, arms locker) (73274) UATV-6-115VAC	128	EA	2
3	4210-01-185-2762	FIRE DETECTOR ((4) engine room, (2) AMS 1, (2) AMS 2, (1) tow gear locker) (1L2H9) DI-3	128	EA	14
4		FM-200 SYSTEM (engine room, AMS 2) (19207) LT-800-5553-1	128	EA	1
5		GALLEY FIRE SUPPRESSION SYSTEM (galley) (04JH1) R-102	128	EA	1
6	6350-01-391-2664	HEAT DETECTOR ((1) galley, (1) mess, (1) EDG room) (1L2H9) DT-135WP	128	EA	3
7		HORN/STROBE (AMS 1, engine room (aft)) (7X933) 867STRA-AQ	128	EA	2

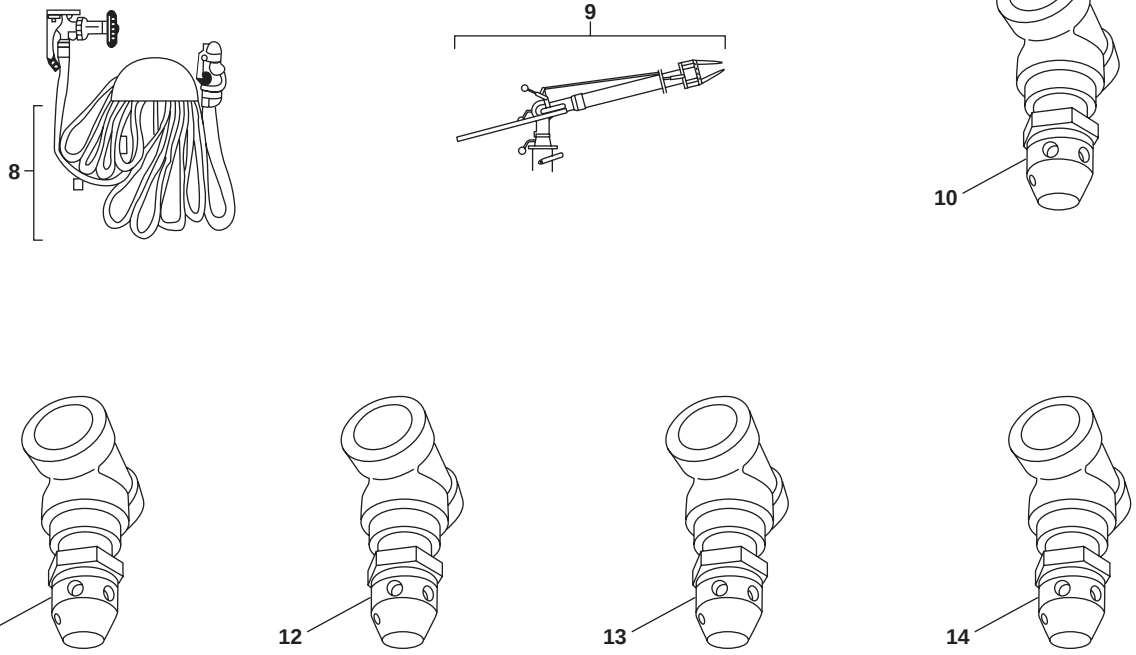


Table 1. Components of End Item List (continued)

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION CAGEC, AND PART NUMBER	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
8	4210-01-131-0249	HOSE ASSEMBLY, FIRE (12 locations on vessel)			
		(1JL20) 40ND615	128	EA	12
9		MONITOR, FIRE (top Of pilothouse)			
		(0BJH3) IM/HR-376	128	EA	3
10		NOZZLE, DISCHARGE (AMS 1)			
		(1DA54) 90-194018-469	128	EA	1
11		NOZZLE, DISCHARGE (engine room, aft of EOS)			
		(1DA54) 90-194026-316	128	EA	1
12		NOZZLE, DISCHARGE (engine room, mid aft)			
		(1DA54) 90-194026-344	128	EA	1
13		NOZZLE, DISCHARGE (engine room, forward, starboard)			
		(1DA54) 90-194027-359	128	EA	1
14		NOZZLE, DISCHARGE (engine room, forward, port)			
		(1DA54) 90-194028-397	128	EA	1

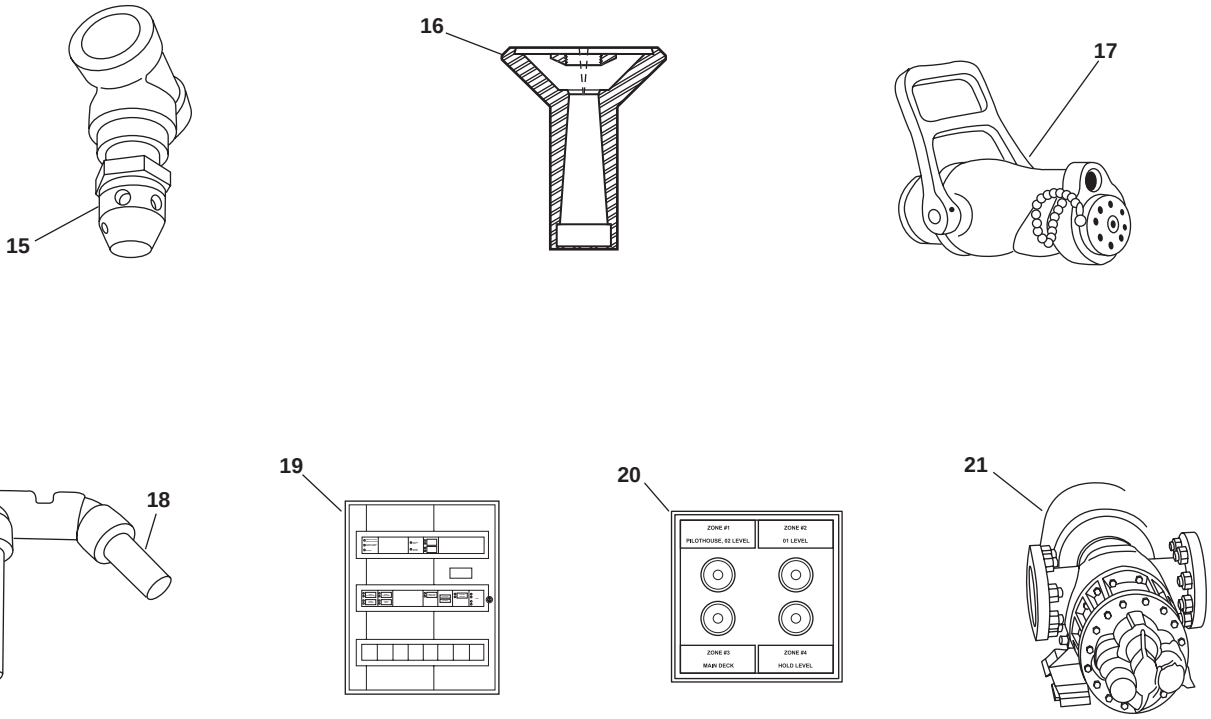


Table 1. Components of End Item List (continued)

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION CAGEC, AND PART NUMBER	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
15		NOZZLE, DISCHARGE (engine room, aft, between engines) (1DA54) 90-194028-563	128	EA	1
16	4730-01-169-9821	NOZZLE, DISTRIBUTION (water washdown system, deck nozzles) (54578) 49-556-1-012	128	EA	12
17	4210-01-097-7536	NOZZLE, FIRE HOSE (at each fire station) (00912) 2032-US-0-1-56-002	128	EA	12
18	4730-01-230-6757	NOZZLE, SPRAY, FLUID (01 level, aft, starboard) (80064) 803-1385828TYPEGBRZ	128	EA	1
19	6320-01-283-9370	PANEL, ALARM (EOS) (1L2H9) CP-35	128	EA	1
20		PANEL, REMOTE INDICATOR (FIRE ALARM) (pilothouse) (1L2H9) 500-616141	128	EA	1
21	4320-01-341-6216	PUMP UNIT, AFFF (AMS 1, centerline, aft) (58923) 2F75-17	128	EA	1

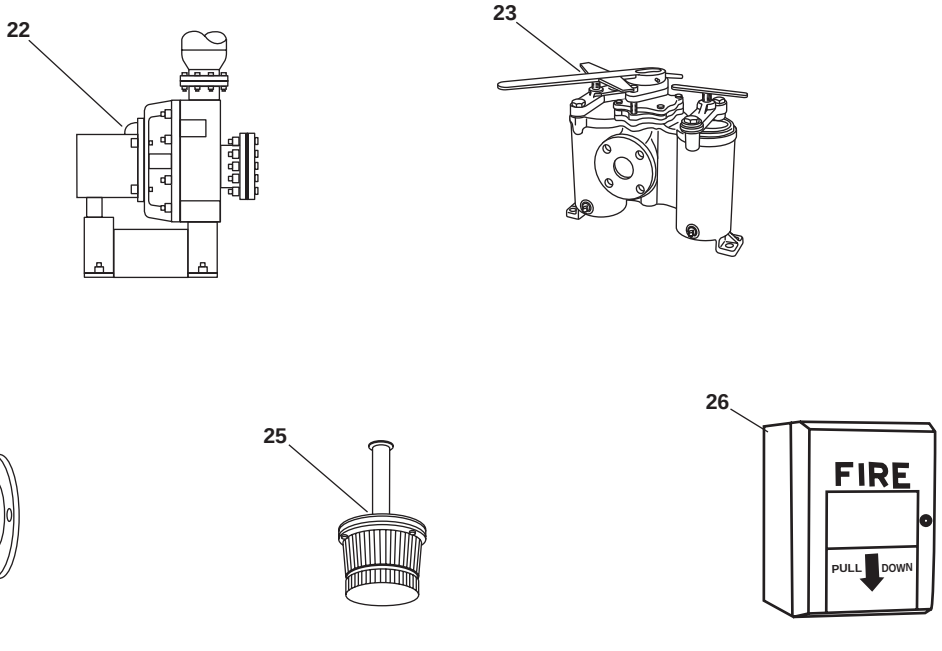


Table 1. Components of End Item List (continued)

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION CAGEC, AND PART NUMBER	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
22	4320-01-353-7475	PUMP, FIREFIGHTING (AMS 1, starboard) (18930) 3K6X4-16/160	128	EA	1
23		STRAINER, SEDIMENT (engine room, aft, under deck) (73124) ST051040BF11A/MONELB SKT1/8PERF	128	EA	1
24		STRAINER, SEDIMENT (engine room, forward, starboard, under deck) (76588) 165-B-8	128	EA	1
25		STROBE LIGHT, AMBER (AMS 1, (3) engine room, AMS 2) (02116) AC-MAXS-A	128	EA	5
26	5930-01-231-4542	SWITCH, LEVER (FIRE ALARM PULL SWITCH) (throughout the vessel) (1L2H9) MS-51	128	EA	10

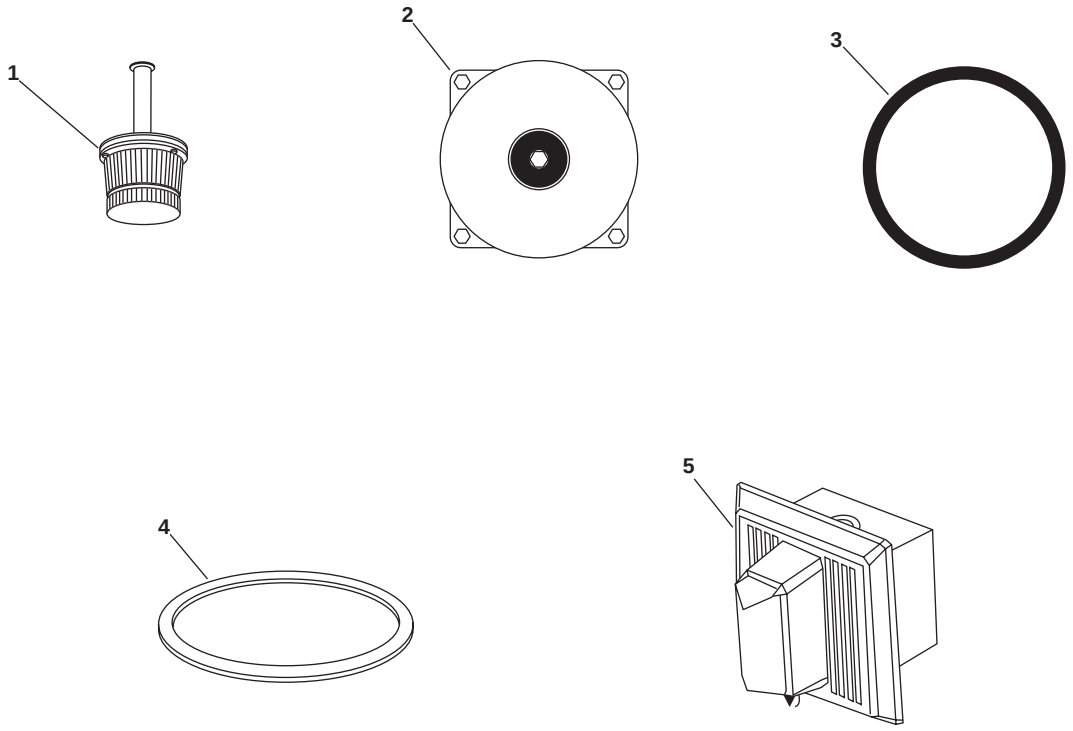


Table 2. On Board Spares List

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION CAGEC, AND PART NUMBER	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
1	6210-01-529-1166	BEACON, WARNING, RED (bosun's locker) (1F889) 89SMSTRR-AQ	128	EA	1
2	6350-01-188-0285	BELL, ELECTRICAL (bosun's locker) (73274) UATV-6-115VAC	128	EA	1
3	5330-01-291-0552	GASKET (bosun's locker) (76588) TG-8.0911-B-0	128	EA	1
4	5330-01-529-2544	GASKET, FLANGE (bow thruster compartment) (0B6K6) 760125-020	128	EA	1
5	6350-01-528-6983	HORN/STROBE (bosun's locker) (7X933) 867STRA-AQ	128	EA	1

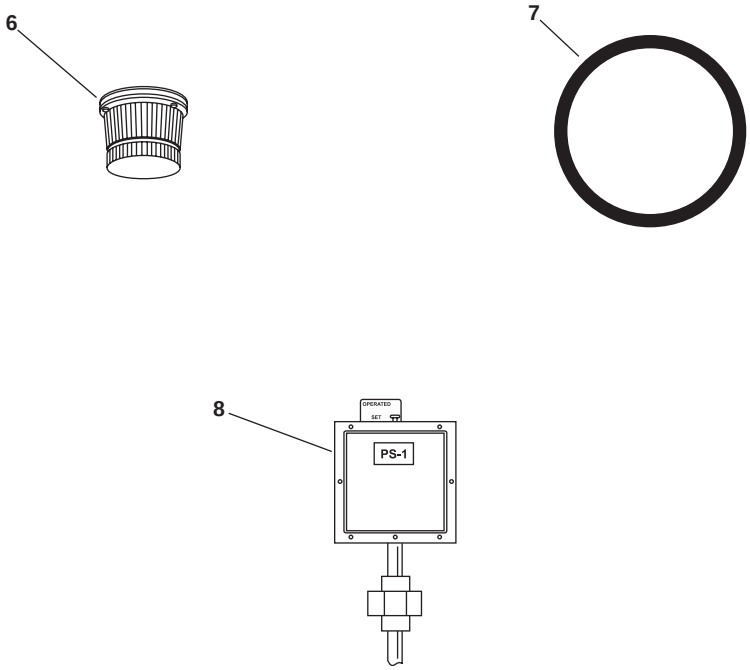


Table 2. On Board Spares List (continued)

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION CAGEC, AND PART NUMBER	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
6	6210-01-528-6982	LENS, LIGHT, AMBER (bosun's locker) (02116) MAX-A	128	EA	1
7	5330-01-021-0875	PACKING, PREFORMED (vestibule VIDMAR) (92021) SP-19-13	128	EA	2
8	5930-01-157-5421	SWITCH, PRESSURE (bosun's locker) (0KDP7) 486536	128	EA	1

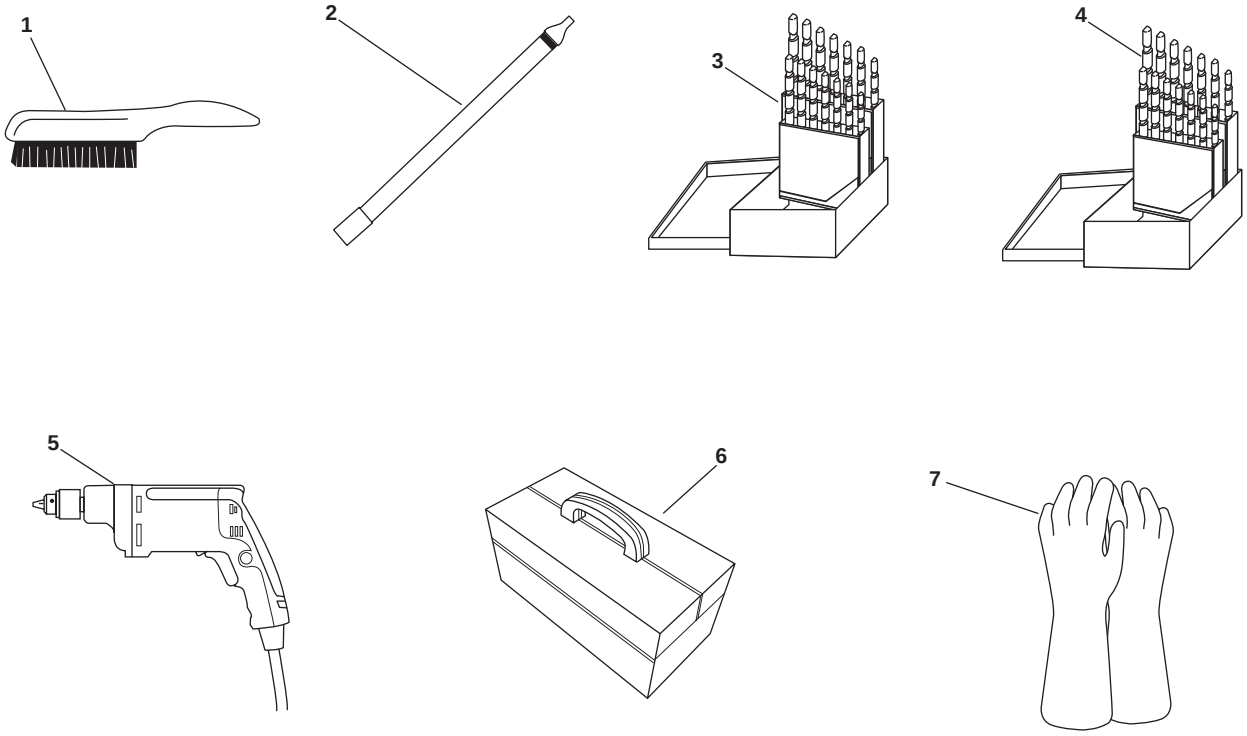


Table 3. Basic Issue Items List

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION CAGEC, AND PART NUMBER	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
1	7920-00-165-7277	BRUSH, DUSTING, BENCH (workshop, AMS 2) (45092) 378	128	EA	1
2	4720-01-521-1706	DETECTOR TUBE, HYDROGEN FLUORIDE GAS (HF-1), 125 PPM RANGE, 3PPM THRESHOLD LIMIT VALUE (TLV) (damage control center VIDMAR) (00VT4) 73067	128	EA	1
3	5133-00-293-1161	DRILL SET, TWIST (machine shop) (05047) B94.11M	128	EA	1
4	5133-00-293-0983	DRILL SET, TWIST (paint locker main deck) (55719) DB129B	128	EA	1
5	5130-00-889-9004	DRILL, ELECTRIC, PORTABLE (machine shop) (80244) 5130-00-889-9004	128	EA	1
6		DURCO TOOL KIT (machine shop) (18930) 7880689	128	EA	1
7	8415-01-013-7384	GLOVES, CHEMICAL AND OIL PROTECTIVE (bosun's locker) (81349) MIL-G-87066	128	PR	1

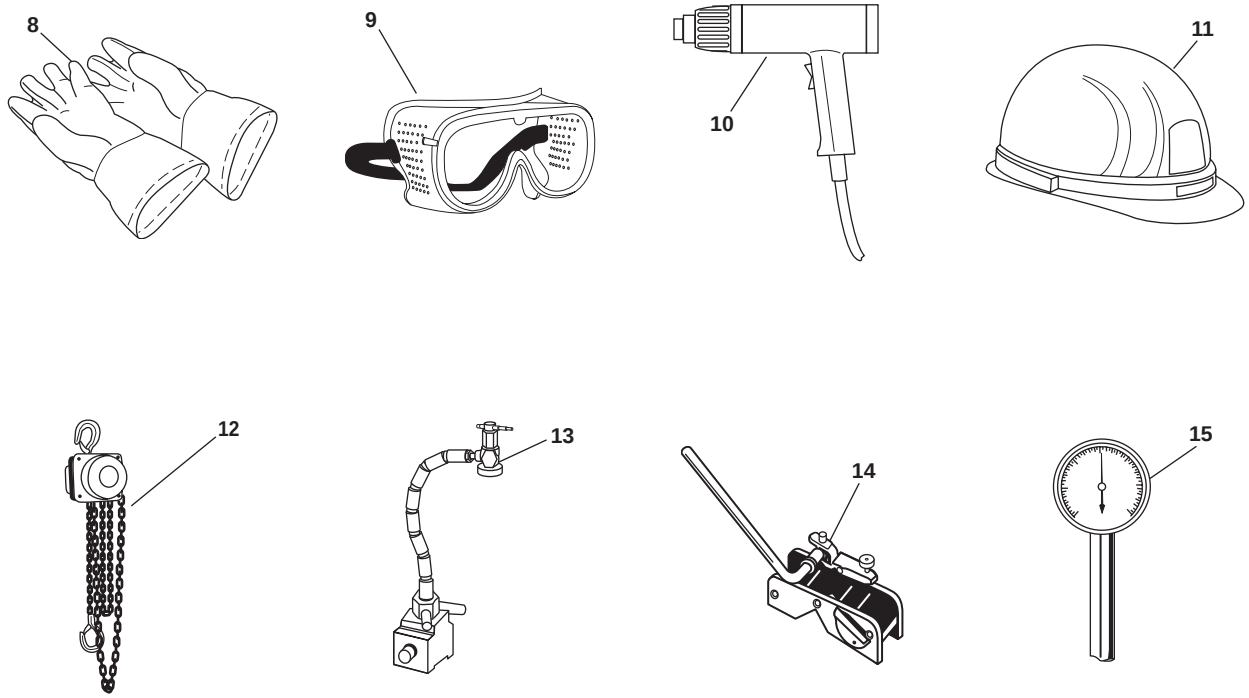


Table 3. Basic Issue Items List (continued)

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION CAGEC, AND PART NUMBER	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
8	8415-01-394-0215	GLOVES, LEATHER (bosun's locker) (04024) 6170-5	128	PR	1
9	4240-00-190-6432	GOGGLES, INDUSTRIAL (machine shop) (80204) ANSI Z87.1-1989	128	PR	1
10	4940-01-316-1133	HEAT GUN, ELECTRIC (machine shop, AMS 2) (83284) VT-750C	128	EA	1
11	8415-00-935-3139	HELMET, SAFETY (bosun's locker) (80204) ISEA/ANSI Z89.1	128	EA	1
12	3950-00-235-4235	HOIST, CHAIN (machine shop, AMS 2) (81349) MILH904CLASS1TYPEH STYLE1	128	EA	1
13	5210-00-138-5333	HOLDER, DIAL INDICATOR (machine shop) (57163) 657T	128	EA	1
14	5210-00-390-5446	HOLDER, DIAL INDICATOR (machine shop) (96168) 200M	128	EA	1
15	5210-00-277-8840	INDICATOR, DIAL (machine shop) (57163) 196A	128	EA	1

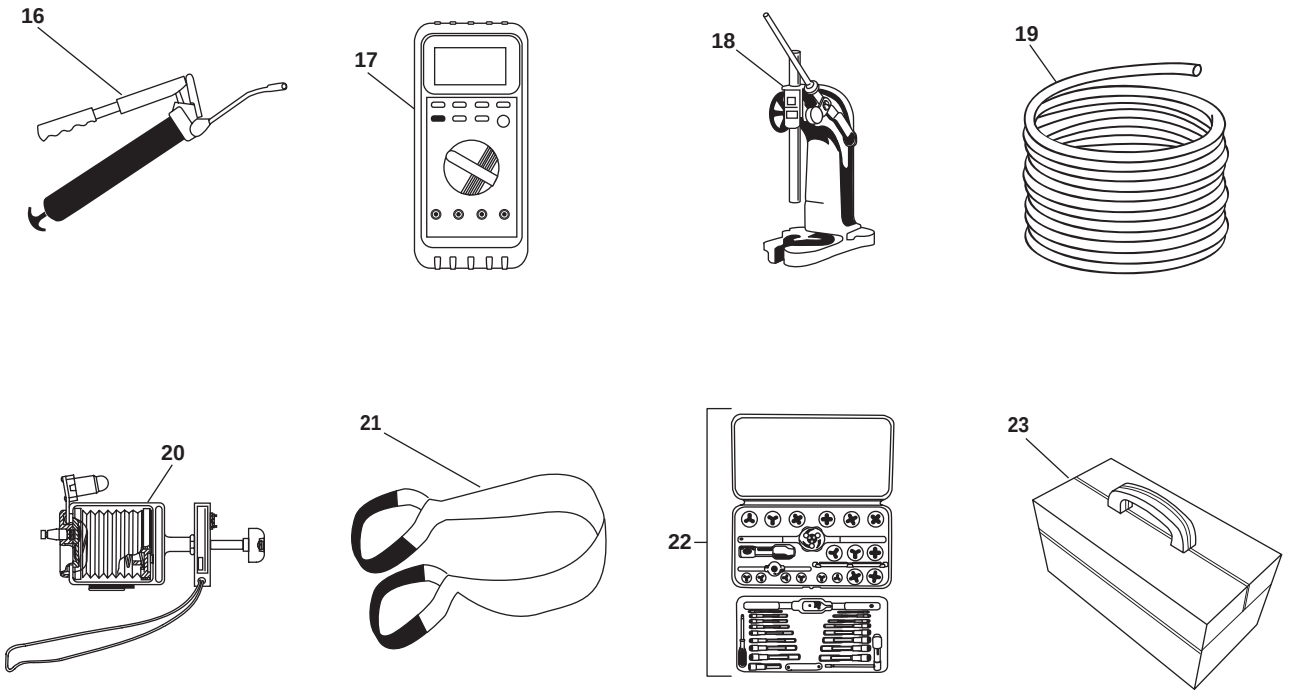
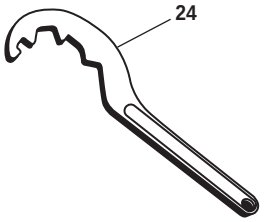


Table 3. Basic Issue Items List (continued)

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION CAGEC, AND PART NUMBER	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
16	4930-00-223-3389	LUBRICATING GUN, HAND (machine shop) (0FKM1) 7584	128	EA	1
17	6625-01-265-6000	MULTIMETER (DC locker) (89536) 27W/ACCE	128	EA	1
18	3444-00-223-8359	PRESS, ARBOR, HAND OPERATED (machine shop) (15746) 02001	128	EA	1
19	4720-01-521-1706	SAMPLING LINE, 10 FEET LONG (DC locker) (8F723) 73076	128	EA	1
20	6665-01-429-8592	SAMPLING PUMP (DC main deck) (55799) 487500	128	EA	1
21	3940-01-183-9412	SLING, ENDLESS, 1 X 6' (machine shop, AMS 2) (15434) 3375957	128	EA	1
22	5180-00-856-3471	THREADING KIT, SCREW (machine shop) (1JU00) 23614	128	EA	1
23	5180-00-629-9783	TOOL KIT, GENERAL MECHANIC'S (machine shop) (50980) SC 5180-90-CL-N55	128	KT	1



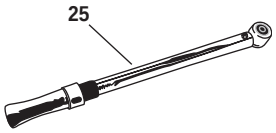


Table 3. Basic Issue Items List (continued)

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION CAGEC, AND PART NUMBER	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
24	5120-00-277-9076	WRENCH, SPANNER (machine shop) (33287) J4749	128	EA	1
25	5120-00-640-6365	WRENCH, TORQUE, 0-250 ft-lb (tool cage EOS) (05047) B107.14M TY1CLBST1	128	EA	1

END OF WORK PACKAGE

OPERATOR, UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT) EXPENDABLE AND DURABLE ITEMS LIST

INTRODUCTION

SCOPE

This work package lists expendable and durable items that you will need to operate and maintain the firefighting, fire alarm, and fire suppression systems for the Inland and Coastal Large Tug (LT). This list is for information only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V Repair Parts, and Heraldic Items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

EXPLANATION OF COLUMNS IN THE EXPENDABLE/DURABLE ITEMS LIST

Column (1) Item Number. This number is assigned to the entry in the list and is referenced in the narrative instructions to identify the item (e.g., “Use brake fluid (item 5, WP 0098 00).”).

Column (2) Level. This column identifies the lowest level of maintenance that requires the listed item (include as applicable: C = Operator/Crew, O = Unit, F = Direct Support, H = General Support, D = Depot).

Column (3) National Stock Number (NSN). This is the NSN assigned to the item, which you can use to requisition it.

Column (4) Item Name, Description, Commercial and Government Entity Code (CAGEC), and Part Number (P/N). This column provides the other information you need to identify the item.

Column (5) Unit of Issue (U/I). Indicates the physical measurement or count of the item as issued per the National Stock Number shown in column (3).

Table 1. Expendable and Durable Items List

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/I
1	O	5350-00-221-0872	CLOTH, ABRASIVE (76381) 051144-02435	PG
2	C	6850-00-281-1985	DRY CLEANING SOLVENT (02978) PS661	GL
3	O	9150-00-180-6381	GREASE, GENERAL PURPOSE (81349) MIL-PRF-24139	CN
4	O	6850-01-015-0834	LAYOUT DYE (59581) 837745-16358	CN
5	C	9150-00-027-3098	LUBRICATING OIL, GENERAL PURPOSE (77988) DTE HEAVY MEDIUM	QT
6	C	7920-00-205-1711	RAG, WIPING, 50LB BALE (80244) 7920-00-205-1711	BE
7	O	1365-01-359-7102	SMOKE (61908) 25S,ES400	EA
8	C		TAG, DANGER (USED FOR LOCKOUT/TAGOUT) (3HPE6) 0116-LF-115-4300	BX
9	C	8030-00-889-3535	TAPE, ANTISEIZING (96124) 417043-2	BX

END OF WORK PACKAGE

OPERATOR, UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT)
GLOSSARY

AFFF	Acronym for Aqueous Film Forming Foam. A synthetic foam concentrate containing detergent and fluorocarbon surfactant that forms a foam capable of producing a vapor-suppressing aqueous film on the surface of some hydrocarbon fuels. It provides rapid flame knockdown on short preburn, shallow spill fires (e.g. aircraft crash fires), but is not suited for use on long preburn, deep-seated fires (e.g. storage tank fires).
Annunciator	An alarm indicator (sound, light, bell, etc.) that signals the alarm status of alarm devices in the security system.
Arm	Activating or enabling the alarm system. See Disarm.
Audible Alarm	A sound generating alarm device such as a siren, bell, or horn used to indicate an alarm condition.
Bypass	Disabling or deactivating a zone of a security system.
Disarm	Deactivating or disabling the alarm system.
Electro-Mechanical Bell	A high decibel alarm signaling device that uses a spring driven striking mechanism upon an outer bell (as compared to a siren or electronic alarm signal).
Fire Alarm Pull Station	A device that permits crewmembers to manually actuate the fire alarm system.
Fire Detection	A system containing either or both a smoke detector and heat detector (see Smoke Detector, Heat Detector).
Fire Extinguisher	A hand held device containing an agent capable of extinguishing small fires.
Fire Monitor	A device used to direct firefighting water to extinguish fires that might not be accessible with portable hoses and nozzles.
Fixed-Temperature Heat Detectors	A fire detection device that triggers an alarm when the temperature at the detector reaches a pre-set limit.
FM-200	Chemically known as heptafluoropropane, FM-200 is a clean agent alternative to Halon 1301 which NFPA 2001 accepts for use in total flooding situations where human exposure is expected. FM-200 contains no ozone depleting chlorine or bromine.
Heat Detector	A fire detection device that detects the heat from a fire and triggers an alarm and/or a water sprinkler system.
HF Gas	Acronym for hydrogen fluoride gas. This poisonous gas is formed when FM-200 fire suppression agent contacts hot flame or components.

Ionizing Smoke Detector	A fire detection device that uses a small amount of radioactive material to detect smoke.
LED	Acronym for Light Emitting Diode. A small light found on a security control panel (or device) that indicates status (on/off, arm/disarm, alarm/normal, etc.).
Machinery Space	Main and auxiliary machinery spaces, which contain any of the following: installed fire fighting systems, oil fired boilers, internal combustion engines, gas turbines, or steam turbines.
Nozzle	A device attached to the end of the fire hose which permits the firefighter to vary the flow of water delivered from the hose.
Overhaul	An examination and cleanup operation. It includes finding and extinguishing hidden fire and hot embers and determining whether the fire has extended to other parts of the vessel.
Pull Box	A manually activated fire alarm switch.
Vapor Secure	Establishing a film or foam blanket over flammable liquid to prevent vaporization. When vapors cannot reach the flames, flame production ceases and the surface is vapor secured.
Water Washdown System	A sprinkler system installed in AMS-1 and the engine room to cool these spaces in the event of a fire. Cooling the space prevents formation of poisonous HF gas formed when FM-200 extinguishing agent contacts hot flame or components.
Zone	A protected area within a fire detection system. Can permit partial arming/disarming.

END OF WORK PACKAGE

OPERATOR, UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE FIREFIGHTING, FIRE ALARM, AND FIRE SUPPRESSION SYSTEMS FOR INLAND AND COASTAL LARGE TUG (LT) ALPHABETICAL INDEX

F

G

S

By Order of the Secretary of the Army:

PETER J. SCHOOMAKER
General, United States Army
Chief of Staff

Official:

SANDRA R. RILEY
Administrative Assistant to the
Secretary of the Army

0529220

DISTRIBUTION: To be distributed in accordance with the initial distribution requirements for IDN: 255657, requirements for TM 55-1925-292-14&P.

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: whomever@avma27.army.mil
To: TACOM-TECH-PUBS@ria.army.mil

Subject: DA Form 2028

1. ***From:*** Joe Smith
2. ***Unit:*** home
3. ***Address:*** 4300 Park
4. ***City:*** Hometown
5. ***St:*** MO
6. ***Zip:*** 77777
7. ***Date Sent:*** 19-OCT-93
8. ***Pub no:*** 55-1915-200-10
9. ***Pub Title:*** TM
10. ***Publication Date:*** 11-APR-88
11. ***Change Number:*** 12
12. ***Submitter Rank:*** MSG
13. ***Submitter Fname:*** Joe
14. ***Submitter Mname:*** T
15. ***Submitter Lname:*** Smith
16. ***Submitter Phone:*** 123-123-1234
17. ***Problem:*** 1
18. ***Page:*** 1
19. ***Paragraph:*** 3
20. ***Line:*** 4
21. ***NSN:*** 5
22. ***Reference:*** 6
23. ***Figure:*** 7
24. ***Table:*** 8
25. ***Item:*** 9
26. ***Total:*** 123
27. ***Text:***

This is the text for the problem below line 27.

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS

For use of this form, see AR 310-1; the proponent agency is the US Army Adjutant General Center.

Use Part II *(reverse)* for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).

DATE: Date form is filled out.

TO: *(Forward to proponent of publication or form) (Include ZIP Code)*

Mailing address found on title block page.

FROM: *(Activity and location) (Include ZIP Code)*

Your mailing address.

PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER:	DATE:	TITLE:
TM X-XXXX-XXX-XXX	Date of the TM.	Title of TM.

ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON (Exact wording of recommended change must be given)
	0019 00 1	3	1	1		Step No. 2 says to secure doors open with locking bar or hooks from where to what? The bars or hooks are not identified.
	0019 00 4	4	1	1		Step No. 19 states to remove locking bars, pins or hooks from where to what? The bars, pins or hooks are not identified. Where are they stored?

* Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
Doe, John, CPL	755-1313	*CPL John Doe*

TO: *(Forward to proponent of publication or form) (Include ZIP Code)*	FROM: *(Activity and location) (Include ZIP Code)*	DATE:

PART II- REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION/FORM NUMBER:	DATE:	TITLE:
TM X-XXXX-XXX-XXX	Date of the TM.	Title of TM.

PAGE NO.	COLM NO.	LINE NO.	FEDERAL STOCK NUMBER	REFERENCE NO.		FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III - REMARKS *(Any general remarks or recommendations, or suggestions for improvement of publications and*
blank forms. Additional blank sheets may be used if more space is needed.)

* Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
Doe, John, CPL	755-1313	*CPL John Doe*

☆ U.S. GOVERNMENT PRINTING OFFICE 1981 341-646/8606

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 25-30; the proponent agency is OAASA	Use Part II *(reverse)* for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
TO: *(Forward to proponent of publication or form) (Include ZIP Code)*	**FROM:** *(Activity and location) (Include ZIP Code)*	

PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE
TM 55-1925-292-14&P		Operator, Unit, Direct Support, and General Support Maintenance Manual Including Repair Parts and Special Tools List for Firefighting, Fire Alarm, and Fire Suppression Systems Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)

ITEM	PAGE	PARA-	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE

TO: *(Forward direct to addressee listed in publication)*	FROM: *(Activity and location) (Include ZIP Code)*	DATE

PART II - REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION NUMBER	DATE	TITLE
TM 55-1925-292-14&P		Operator, Unit, Direct Support, and General Support Maintenance Manual Including Repair Parts and Special Tools List for Firefighting, Fire Alarm, and Fire Suppression Systems Inland and Coastal Large Tug (LT) NSN 1925-01-509-7013 (EIC XAG)

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III - REMARKS *(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 25-30; the proponent agency is OAASA	Use Part II *(reverse)* for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
TO: *(Forward to proponent of publication or form) (Include ZIP Code)*	**FROM:** *(Activity and location) (Include ZIP Code)*	

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APD V4.00

Metric Conversion Factors

Mc x F = Cf		
Measurement to be Converted (Mc)	Factor (F)	Converted Measurement (Cf)
Meters (m)	x 39.37	= Inches (in.)
Meters (m)	x 3.281	= Feet (ft)
Meters (m)	x 1.094	= Yards (yd)
Inches (in.)	x 25.40	= Millimeters (mm)
Inches (in.)	x 2.54	= Centimeters (cm)
Inches (in.)	x 0.0254	= Meters (m)
Inches (in.)	x 25400	= Micrometers (µm)
Feet (ft)	x 0.305	= Meters (m)
Square feet (ft^2)	x 0.093	= Square meters (m^2)
Foot-Pounds	x 1.35582	= Newton meters (N m)
Newton meters (N m)	x 0.73756	= Foot Pounds
Yards (yd)	x 0.914	= Meters (m)
Square yards (yd^2)	x 0.836	= Square meters (m^2)
Square Inches (in^2)	x 6.452	= Square Centimeters (cm^2)
Cubic Inches (in^3)	x 16.39	= Cubic Centimeters (cm^3)
Cubic Centimeters (cm^3)	x 0.061	= Cubic Inches (in^3)
Cubic Feet (ft^3)	x 0.028	= Cubic Meters (cm^3)
Gallons (gal)	x 3.785	= Liters (L)
Liters (L)	x 0.2642	= Gallons (gal)
Kilometers (km)	x 0.5397	= Nautical miles (nmi)
Meters (m)	x 0.0005397	= Nautical miles (nmi)
Nautical miles (nmi)	x 1.853	= Kilometers (km)
Fluid Ounces (oz)	x 29.574	= Milliliters (mL)
Pounds (lb)	x 0.4536	= Kilograms (kg)
Kilograms (kg)	x 2.2046	= Pounds (lb)
Kilopascals (kPa)	x 0.145	= Pounds (lb) per Square Inch (psi)
Pounds per Square Inch (psi)	x 6.895	= Kilopascals (kPa)
Degrees Centigrade (°C)	(°C x 1.8) + 32	= Degrees Fahrenheit (°F)
Degrees Fahrenheit (°F)	(°F-32) ÷ 1.8	= Degrees Centigrade (°C)
Bar	x 14.5	= Pounds per Square Inch (psi)
Pounds per Square Inch (psi)	x 0.06894	= Bar
Horsepower (hp)	x 0.746	= Kilowatt (kW)
Kilowatt (kW)	x 1.341	= Horsepower (hp)

PIN: 082860-000