

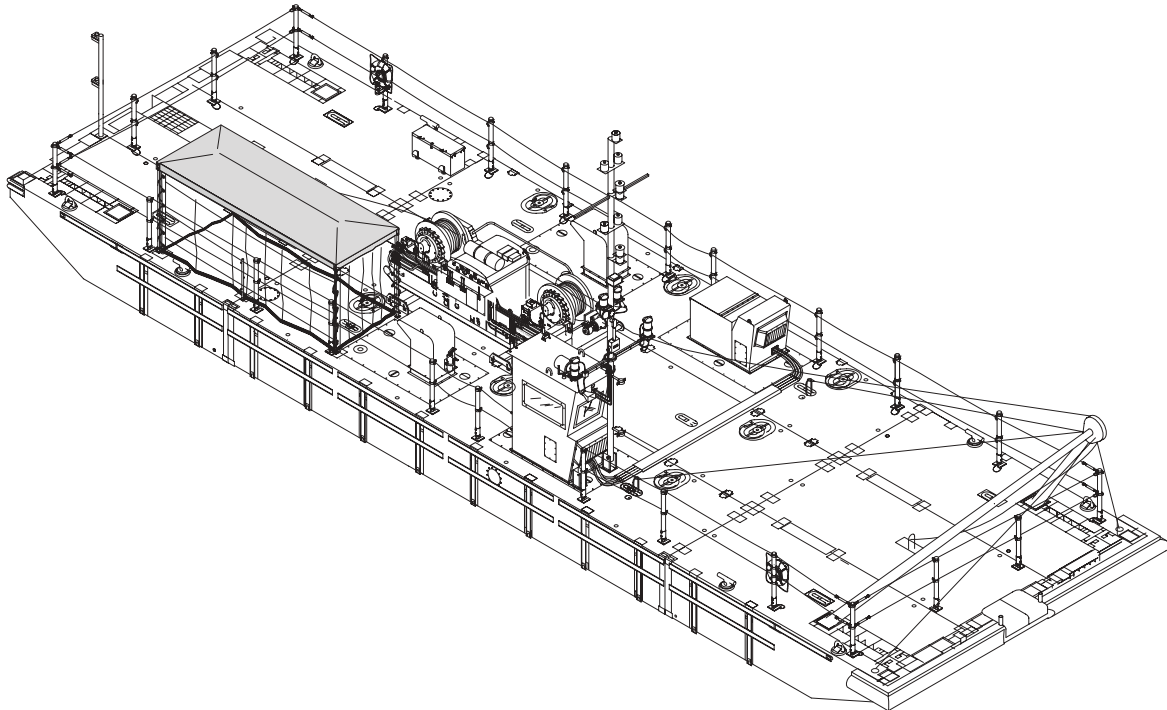
TM 55-1945-225-10

TECHNICAL MANUAL

OPERATOR'S MANUAL
FOR

**MODULAR CAUSEWAY SYSTEM (MCS)
WARPING TUG (WT)
WT-2**

NSN 1925-01-502-8772



DISTRIBUTION STATEMENT A - Approved for public release; distribution is unlimited.

**HEADQUARTERS, DEPARTMENT OF THE ARMY
JUNE 2005**

WARNING SUMMARY

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

NO SMOKING

Smoking is prohibited aboard this vessel.

JEWELRY

Remove rings, bracelets, wristwatches, and neck chains before working around or on a unit.

HEAVY OBJECTS

Handling heavily weighted objects can cause bodily injury. Do not lift materials or equipment over 50 lb without using appropriate material handling equipment.

BATTERIES

Do not smoke around batteries.

HAZARD REPORTING

Report all hazards. It is your responsibility to report hazards through your chain-of-command.

HIGH VOLTAGE

Use extreme caution when checking energized circuits. Always place power off warning tags on power supply switches so that no one will apply power while performing maintenance.

HAZARDOUS FUMES IN CONFINED SPACES

The lazaret and 40 foot storage compartments are confined spaces and may contain hazardous fumes. Refer to FM 55-502 before entering a confined space. Never enter a confined space before checking the confined space with a gas free meter. Operate the exhaust plenum ventilation fan to remove fumes.

HAZARDOUS FUMES IN MANNED SPACES

The engine and fuel compartments are manned spaces and may contain hazardous fumes. Prior to entering these compartments, operate the exhaust plenum ventilation fan to remove fumes.

NUCLEAR, BIOLOGICAL OR CHEMICAL

In the event equipment has been exposed to nuclear, biological or chemical warfare, the equipment shall be handled with extreme caution and decontaminated in accordance with FM 3-5, instructions for immediate, operational and thorough decon procedures adapted for the marine environment. Unprotected personnel can experience injury or death if residual toxic agents or radioactive material are present. If equipment is exposed to radioactive, biological or chemical agents, personnel must wear protective mask, hood, protective overgarments, chemical gloves and chemical boots in accordance with MOPP - level prescribed by the OIC or NCOIC.

WARNING SUMMARY - CONTINUED

ICE BUILDUP

Cold weather operations could create ice buildup on exposed surfaces, producing hazardous footing conditions. Use extreme care when operating under icing conditions; death or serious injury to personnel could occur.

WELDING OR GRINDING

Personnel must use a gas free meter before performing module repair that requires welding or grinding.

ISOPAK LADDER SAFETY

Care must be taken when ascending or descending the ISOPAK ladder. ISOPAK ladder rungs become very slippery when wet. Failure to comply could result in injury or death to personnel.

BATTLE LANTERNS

Personnel must memorize the location and how to access the battle lanterns above and below deck in case of a power failure or crisis situation.

T-WRENCH LOCATION

Personnel must memorize the location and how to access the t-wrench used to open the escape hatch from the machinery compartment in a crisis situation.

HEARING PROTECTION

Personnel in the engine compartment, with the engine running, must wear double hearing protection in accordance with DA PAM 40-501. Personnel on deck with the engine idle above 1,200 RPM must wear single hearing protection. Single hearing protection shall be used when the deck winches are in use.

PAINTING OF MODULES

Prior to painting, personnel should apply barrier cream to exposed skin surfaces and ensure a safety shower and eye wash station are available.

ETHER HAZARD

Smoking, open flames and sparks are strictly prohibited around the ether cold start system. Ether is very toxic, can damage eyes or skin and is harmful or fatal if swallowed or inhaled. If swallowed, do not induce vomiting. Contact a physician immediately.

CARBON DIOXIDE HAZARD

If CO₂ has been discharged below deck, Gas Free Engineering personnel (per FM 55-502) must completely clear any CO₂, test the level of oxygen and certify space is safe for personnel. After certification the push plunger on the fire suppression pressure switch, below deck, must be manually reset to operate the vent fan. Serious injury or death to personnel could result if CO₂ is inhaled.

OPERATOR CAB ROOF HAZARD

When ascending or descending from the operator cab roof using the six folding steps, care should be taken not to slip or fall, utilize the mast/mast mounting bracket as grab handles. Failure to comply could result in injury or death to personnel.

EXPLANATION OF SAFETY WARNING ICONS



EAR PROTECTION

EAR PROTECTION - Headphones over ears shows that noise level will harm ears.



EYE PROTECTION

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



HEAVY OBJECTS

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



HEAVY PARTS

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



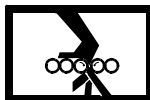
HEAVY PARTS

HEAVY PARTS 3 - Heavy object on human figure shows that heavy parts present a danger to life or limb.



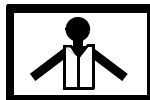
HELMET PROTECTION

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



MOVING PARTS

MOVING PARTS 2 - Hand with fingers caught between gears shows that the moving parts of the equipment present a danger to life or limb.



VEST

VEST - Life preserver on human figure shows life preserver must be worn to prevent drowning.

EXPLANATION OF HAZARDOUS MATERIAL WARNING ICONS



CHEMICAL

CHEMICALS - Drops of liquid on hand shows that the material will cause burns or irritation to human skin or tissue.



EXPLOSION

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



FIRE

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



POISON

POISON - Skull and crossbones shows that a material is poisonous or is a danger to life.



VAPOR

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

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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) website. The Internet address is <http://aeeps.ria.army.mil>. If you need a password, scroll down and click on "ACCESS REQUEST FORM". The DA Form 2028 is located in the ONLINE FORMS PROCESSING section of the AEPS. Fill out the form and click on SUBMIT. Using this form on the AEPS will enable us to respond quicker to your comments and better manage the DA Form 2028 program. You may also mail, fax or email your letter or DA Form 2028 direct to: AMSTA-LC-CI / TECH PUBS, TACOM-RI, 1 Rock Island Arsenal, Rock Island, IL 61299-7630. The email address is TACOM-TECH-PUBS@ria.army.mil. The fax number is DSN 793-0726 or Commercial (309) 782-0726.

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HOW TO USE THIS MANUAL

This manual contains certain features to improve the convenience of using this manual and increase the user's efficiency. These features include:

a. 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.

b. Illustrations

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

c. 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.

Prior to starting the procedures in this manual, the initial setup requirements are located directly above each procedure. 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.

Locating Major Components

Obtain the manual for the system to be worked on. Open to the Table of Contents located in the front of this manual. Find Chapter 1, *Description and Theory of Operation*. Under the chapter title you will find the work package titled *Location and Description of Major Components*. Turn to the work package indicated. This work package will give a brief description of the major components, and show an illustration of what the component looks like and its location.

The Alphabetical Index, located in the back of this manual, contains an alphabetical list of all sections of this manual. *Location and Description of Major Components* is found in section L. The work package 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.

Operator Instructions

To locate an operator task, open the manual to the Table of Contents located in the front of this manual. Locate the procedure that is to be performed. Next to the procedure, on the right, locate the work package number. Turn to the work package number in the manual. Perform the initial setup by obtaining the expendables, tools, materials and other items listed prior to starting the task. Perform the listed steps in order. The Alphabetical Index can also be used to locate the item and procedures to follow.

Tools: Lists all tools (standard or special) required to perform the task. Tools are identified with an item number and work package number from the *Basic Issue Items List* located in Chapter 5, *Supporting Information*.

Materials/Parts: Lists all parts or materials necessary to perform the task. Expendable and durables are identified with an item number and work package number from the Expendable and Durable Items List located in Chapter 5, *Supporting Information*.

Personnel Required: Lists all personnel necessary to perform the task.

Equipment Condition: 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.

References: Includes any other manuals 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 work package *References* in Chapter 5, *Supporting Information*.

Location of Controls and Indicators

To locate a particular control and/or indicator, open the manual to the Table of Contents located in the front of the manual. Find Chapter 2, *Operator Instructions*. Locate the work package titled *Description and Use of Operator Controls and Indicators*. Turn to the work package indicated. Locate the control and, or indicator that you are attempting to identify. Take note of the number pointing to the control or indicator. Refer to the table below the picture and find the number in the column on the far left hand side. Reading from left to right, find the number that matches the number from the picture, then read the name of the control/indicator and following function of the item, as detailed in the far right hand column.

Troubleshooting Procedures

The Table of Contents or Alphabetical Index may be used to locate sections within this manual. To locate a particular troubleshooting procedure, open the manual to the Table of Contents located in the front of this manual. Find Chapter 3, *Operator Troubleshooting Procedures*. Under this section, find a work package titled *System/Subsystem Troubleshooting Index*. Turn to the work package indicated, which lists all of the troubleshooting procedures. Look down the list until you find the appropriate work package for the problem you are trying to solve. To the right side of the procedure will be a work package number. Turn to the work package indicated and follow the steps to complete the troubleshooting procedure. The procedures list the malfunction, symptom and the corrective action. The corrective action will indicate which maintenance procedure to go to for the repair of the symptom or what level of maintenance is capable of repair of the problem. Follow the procedures indicated to complete the task. At the top of the task you will have a section called INITIAL SETUP. There are five basic headings listed under INITIAL SETUP.

Test Equipment: Lists all test equipment (standard or special) required to troubleshoot, test and inspect the equipment covered in this manual. The test equipment is identified with an item number and work package number from the *Basic Issue Items List* located in Chapter 5, *Supporting Information*.

Tools: Lists all tools (standard or special) required to perform the task. Tools are identified with an item number and work package number from the *Basic Issue Items List* located in Chapter 5, *Supporting Information*.

Personnel Required: Lists all personnel necessary to perform the task.

Equipment Condition: 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.

References: Includes any other manuals 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 work package *References* in Chapter 5, *Supporting Information*.

Maintenance Instructions

To locate a maintenance procedure, open the manual to the Table of Contents located in the front of this manual. Find Chapter 4, *Maintenance Instructions*. Look down the list and find the maintenance procedure to be accomplished. On the right side of the maintenance procedure will be a work package number. Turn to the work package indicated.

Before beginning the maintenance task, look through the procedure to familiarize yourself with the entire maintenance procedure. At the top of the task you will have a section called INITIAL SETUP. There are five basic headings listed under INITIAL SETUP.

Tools: Lists all tools (standard or special) required to perform the task. Tools are identified with an item number and work package number from the *Basic Issue Items List* located in Chapter 5, *Supporting Information*.

Materials/Parts: Lists all parts or materials necessary to perform the task. Expendable and durables are identified with an item number and work package number from the Expendable and Durable Items List located in Chapter 5, *Supporting Information*.

Personnel Required: Lists all personnel necessary to perform the task.

References: Includes any other manuals 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 work package *References* in Chapter 5, *Supporting Information*.

Equipment Condition: 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.

Test Equipment: Lists all test equipment (standard or special) required to troubleshoot, test and inspect the equipment covered in this manual. The test equipment is identified with an item number and work package number from the *Basic Issue Items List* located in Chapter 5, *Supporting Information*.

**OPERATOR MAINTENANCE
WARPING TUG
GENERAL INFORMATION**

SCOPE

This manual contains descriptions and instructions for the Warping Tug (WT).

Type of Manual: Operator's Manual.

Purpose of Equipment: The purpose of the WT is for towing, anchor mooring and recovery, craft salvage during Logistics-Over-the-Shore (LOTS) deployment and handling of supplies between ship and beach.

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 User's Manual for the Army Maintenance Management System (TAMMS) and AR 700-138, Army Logistics Readiness and Sustainability.

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If any component in your system needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368, Product Quality Deficiency Report. Mail it to the address specified in DA PAM 738-750, Functional User's Manual for the Army Maintenance Management System (TAMMS), or as specified by the acquiring activity. We will send you a reply.

HAND RECEIPT (HR) MANUALS

This manual has a companion document with a TM number followed by "-HR" (which stands for Hand Receipt). TM 55-1945-225-10-HR consists of preprinted hand receipts that list end item related equipment (i.e., COEI, BII, and AAL) that must be accounted for. As an aid to property accountability, additional HR manuals may be requisitioned through normal publication channels.

CORROSION PREVENTION AND CONTROL (CPC)

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.

While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials, such as rubber and plastic. Unusual cracking, softening, swelling or breaking of the materials may be a corrosion problem. 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 (ODS)

The continued use of ODS has been prohibited by Executive Order 12856 of 3 August 1993.

DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

The procedures for destruction of Army materiel to prevent enemy use are contained in TM 750-244-6.

PREPARATION FOR STORAGE OR SHIPMENT

Reference WP 0067 00 through WP 0070 00 for preparation for storage or shipment of the WT.

LIST OF ABBREVIATIONS/ACRONYMS

Abbreviation/Acronym	Name
A	Amps
AAL	Additional Authorization List
AC	Alternating Current
ANS	Answer
ANT	Antenna
AOAP	Army Oil Analysis Program
AR	Army Regulation
ASME	American Society of Mechanical Engineers
ASSY	Assembly
AUX	Auxiliary
AWG	American Wire Gauge
BII	Basic Issue Items
C	Centigrade
CAGEC	Commercial and Government Entity Code
CCW	Counterclockwise
CFR	Code of Federal Regulations
CHAN	Channel
CLR	Clear
cm	Centimeters
CO ₂	Carbon Dioxide
COEI	Components of End Item
CPC	Corrosion Prevention Control
CS	Causeway Section
CTA	Common Table of Allowances
CW	Clockwise
DA	Department of the Army
DA PAM	Department of Army Pamphlet
dB	Decibels
DC	Direct Current
Deg	Degrees
DSC	Digital Selective Calling
DUP	Duplex
ECM	Engine Control Module
EDIL	Expendable and Durable Items List
EIR	Equipment Improvement Recommendations
ESD	Electrostatic Discharge
F	Fahrenheit
FC	Floating Causeway
FCC	Federal Communications Commission
fl	Fluid
FM	Field Manual
FNC	Function
FREQ	Frequency
FSS	Fast Sealift Ship
ft	Feet
ft lbs	Foot Pounds
FWD	Forward
GAL	Gallon
GFI	Ground Fault Indicator
GMT	Greenwich Mean Time
GND	Ground

LIST OF ABBREVIATIONS/ACRONYMS (CONTINUED)

Abbreviation/Acronym	Name
GPH	Gallons Per Hour
GPS	Global Positioning System
H	Height
HD	Head
H/L	High/Low
HP	Horse Power
HPU	Hydraulic Power Unit
HR	Hand Receipt
Hz	Hertz
IAW	In Accordance With
ICM	Intercommunication (short-form)
ID	Identification
in.	Inches
in. lbs	Inch Pounds
INTL	International
ISO	International Standards Organization
ISOPAK	International Standards Organization Package
kg	Kilograms
kHz	Kilohertz
kPa	Kilopascal
kW	Kilowatt
L	Length
LASH	Lighter Aboard Ship
LAT/LON	Latitude/Longitude
lb	Pounds
LCD	Liquid Crystal Display
LOTS	Logistics-Over-the-Shore
M	Meters
mA	Milliampere
MCS	Modular Causeway System
MEM	Memory
mHz	Megahertz
MIM	Marine Interface Module
min	Minute
ML	Milliliters
MOPP	Mission Oriented Protective Posture
MTBE	Methyl Tertiary Butyl Ether
MTO&E	Modified Table of Organization and Equipment
NATO	North Atlantic Treaty Organization
NAV	Navigation
NBC	Nuclear, Biological, or Chemical
NCOIC	Noncommissioned Officer in Charge
NEMA	National Electrical Manufacturers Association
Ni-Cd	Nickel Cadmium
NL	Navy Lighter
N-m	Newton-Meters
NMEA	National Marine Electronic Association
NOAA	National Oceanic and Atmospheric Administration
NSA	National Security Agency
NUMB	Number
ODS	Ozone Depleting Substance

LIST OF ABBREVIATIONS/ACRONYMS (CONTINUED)

Abbreviation/Acronym	Name
OIC	Officer in Charge
oz	Ounces
PLGR	Precision Lightweight Global Positioning Receiver
PMCS	Preventive Maintenance Checks and Services
PN	Part Number
PPS-SM	Precise Positioning Service Security Module
PSI	Pounds Per Square Inch
PTT	Push To Talk
PWR	Power
Qty	Quantity
rcv	Receive
Recept.	Receptacle
RF	Radio Frequency
RPM	Revolutions Per Minute
RPSTL	Repair Parts and Special Tools List
RQD	Required
RRDF	Roll-On/Roll-Off Discharge Facility
SC	Supply Catalog
SCR	Scrambler
SF	Standard Form
SIMP	Simplex
SINCGARS	Single Channel Ground and Airborne Radio
SRA	Specialized Repair Activity
SS	Sea State
SSI	Ship Station Identity
stbd	Starboard
sw	Switch
TAMMS	The Army Maintenance Management System
TB	Technical Bulletin
TD	Technical Directive
TDA	Table of Distribution and Allowances
TEL	Telephone
TEMP	Temperature
TM	Technical Manual
TO&E	Table of Organization and Equipment
Tx	Transmit
TYP	Typical
UTC	Coordinated Universal Time
USA	United States of America
uv	Ultra Violet
V	Volts
VAC	Voltage, Alternating Current
VDC	Voltage, Direct Current
VHF/FM	Very High Frequency/Frequency Modulation
W	Width
WP	Work Package
WT	Warping Tug
XMIT	Transmit
yd	Yard

CHAPTER 1

**DESCRIPTION AND THEORY OF OPERATION
FOR
MODULAR CAUSEWAY SYSTEM (MCS)
WARPING TUG (WT)**

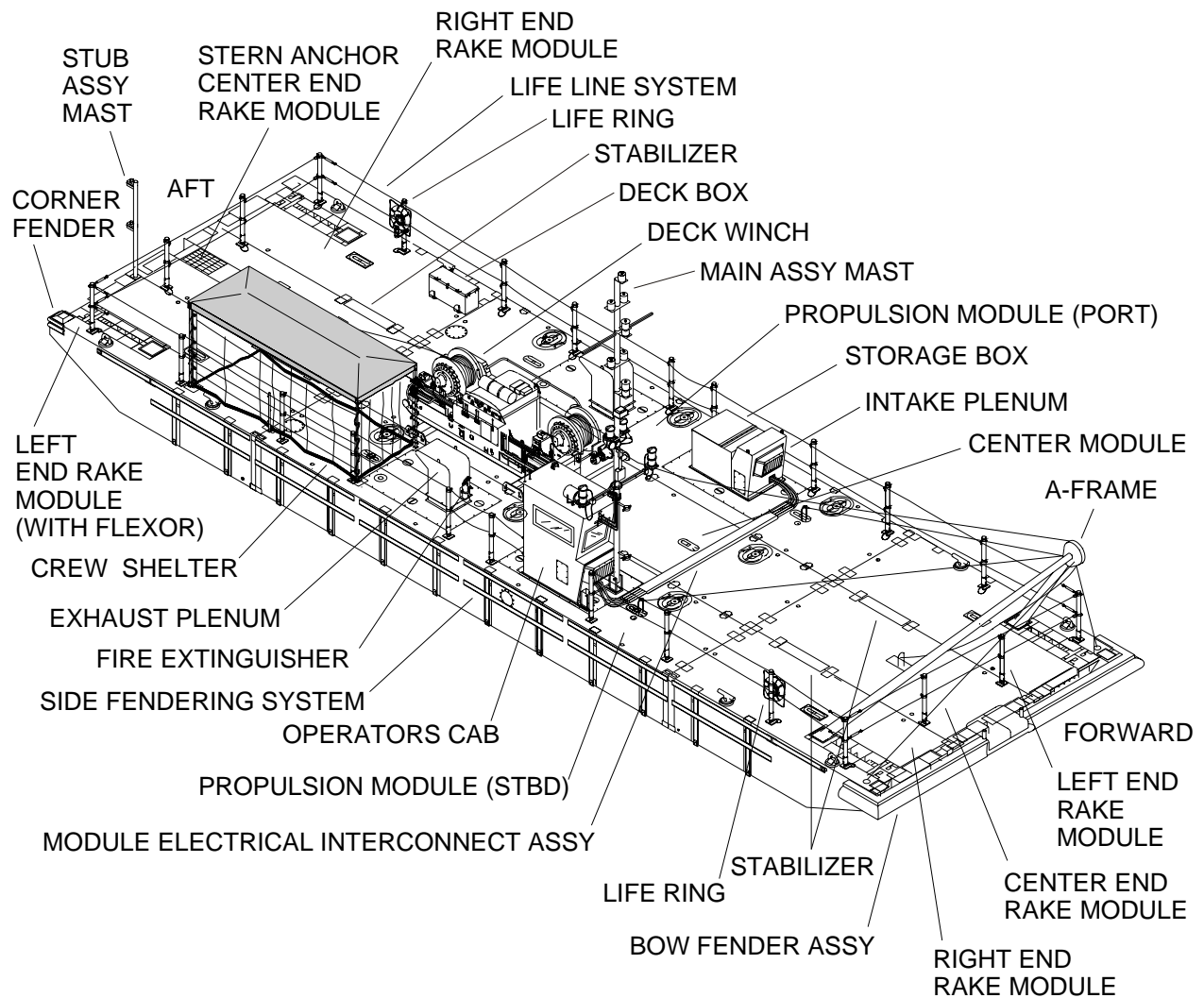
**OPERATOR MAINTENANCE
WARPING TUG
EQUIPMENT DESCRIPTION AND DATA**

EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES

WARPING TUG

The WT consists of one powered section with the application of a WT conversion kit, consisting of a diesel-hydraulic deck winch and foundation adapter, a weight-handling A-frame forward, a self-deploying/retrievable stern anchor to assist in beach retraction/salvage, and required above-deck equipment. The above-deck equipment includes the operators cab, intake and exhaust plenums, a main assembly mast, a stub assembly mast, an electrical interconnection assembly, storage boxes, life rings and stanchion mounted lifelines.

The WT is used to assist in the assembly, movement and positioning of non-powered modules, strings, sections, Floating Causeways (FCs) and Roll-On/Roll-Off Discharge Facilities (RRDFs) to set and retrieve anchor moorings for FCs, and for other weight handling and towing tasks.

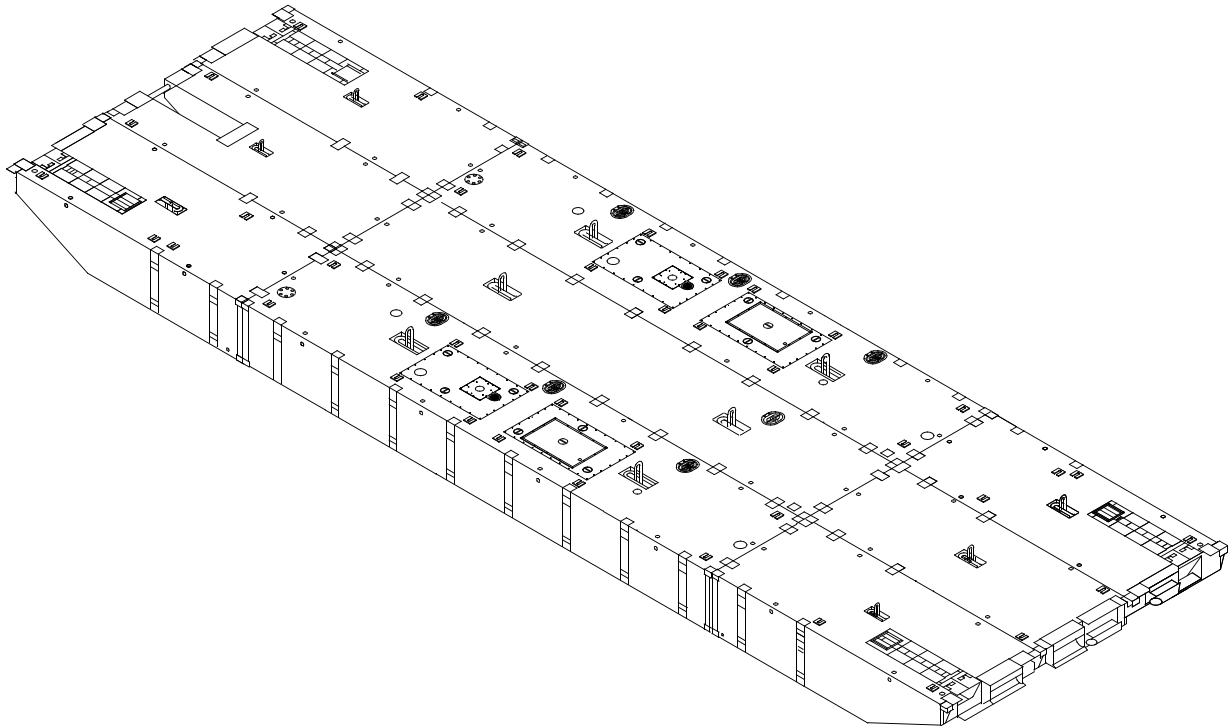


**OPERATOR MAINTENANCE
WARPING TUG
EQUIPMENT DESCRIPTION AND DATA**

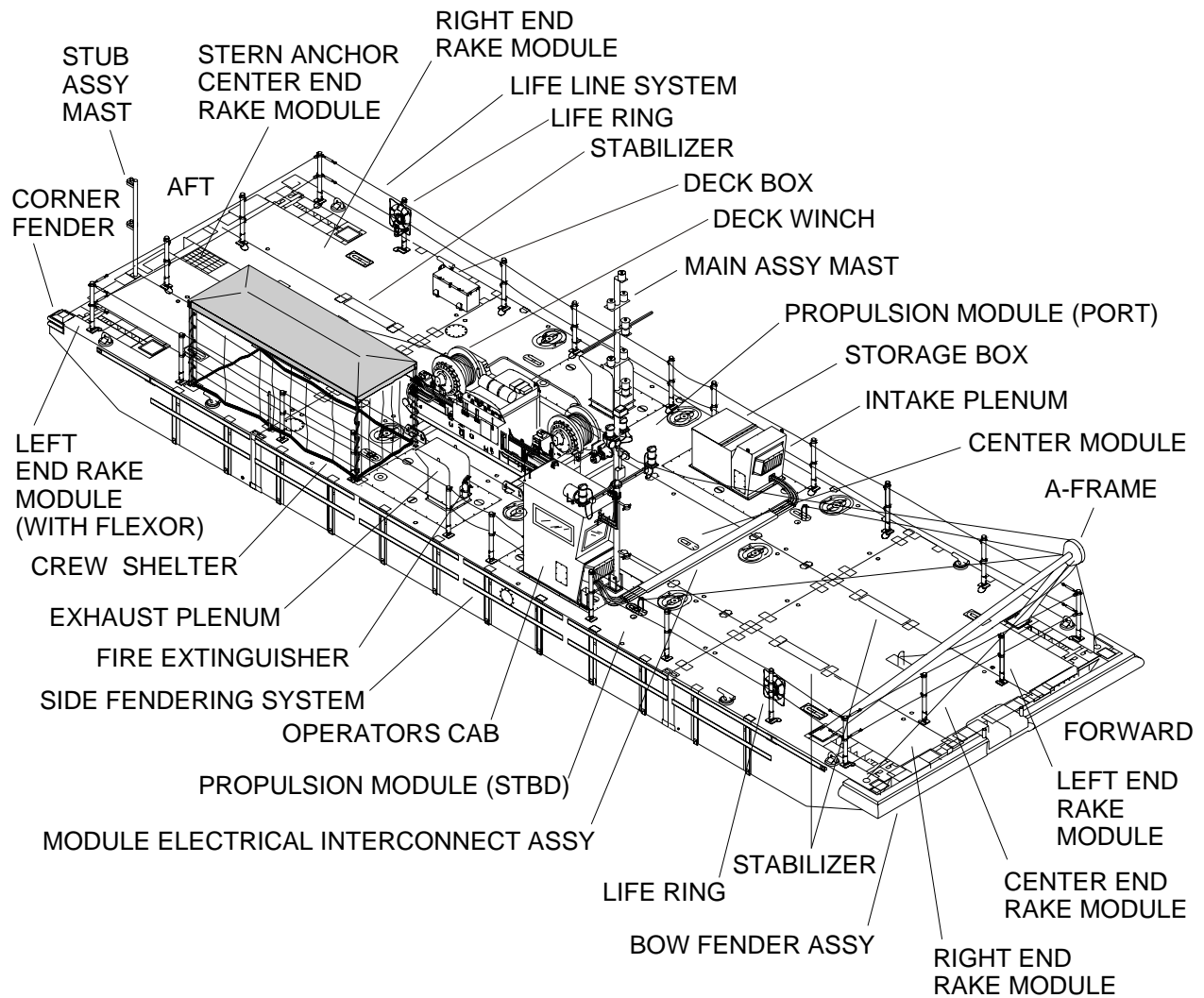
LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

WARPING TUG POWERED SECTION

The WT powered section consists of two propulsion modules, one non-powered center module, two left and two right end rake modules, a center end rake module and a stern anchor center end rake module. All modules contain drainage systems to prevent water from accumulating in the lift shackle padeye locations.

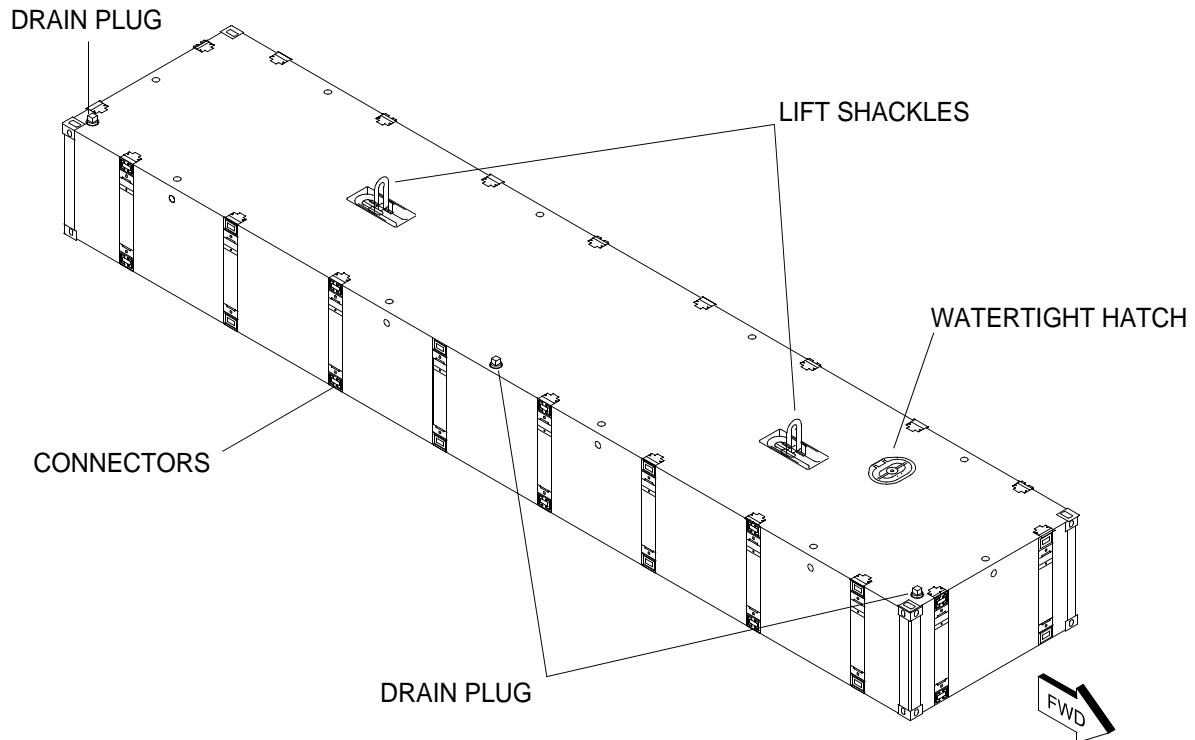


The following items complete the WT assembly. The operators cab, with controls, is a self-contained unit designed to be removed for transport and can be mounted on either port or starboard propulsion module. Plug-in type electrical connectors are provided to tie electrical control into the cab location. A module electrical interconnect assembly is the electrical control link between the cab to the propulsion module opposite the cab. Navigation lighting is provided by the main assembly mast mounted against the cab and a stub assembly mast that is installed on the aft end of the WT near the stern anchor. Both masts are removable for shipment. Air intake and exhaust plenums are installed on the propulsion modules to provide air flow through the machinery spaces. One air intake is integral to the cab. The deck equipment includes a deck winch, an A-frame and a stern anchor. The deck winch is a dual drum, diesel-hydraulic reversible winch with capstan that provides pull for the A-frame and stern anchor. Four skeg assemblies are installed, two forward and two aft, to provide some stability during operation at sea. A handheld portable fire extinguisher mounts to either exhaust plenum. A removable personnel safety railing system, made up of stanchions and life lines, is installed along the port and starboard sides and across the forward and aft ends of the WT. An equipment storage box is mounted to the air intake plenum, a deck box is mounted to the aft port side end rake and a crew shelter is mounted aft of the starboard side exhaust plenum. The WT is also equipped with side fenders, corner fenders and a bow bumper.



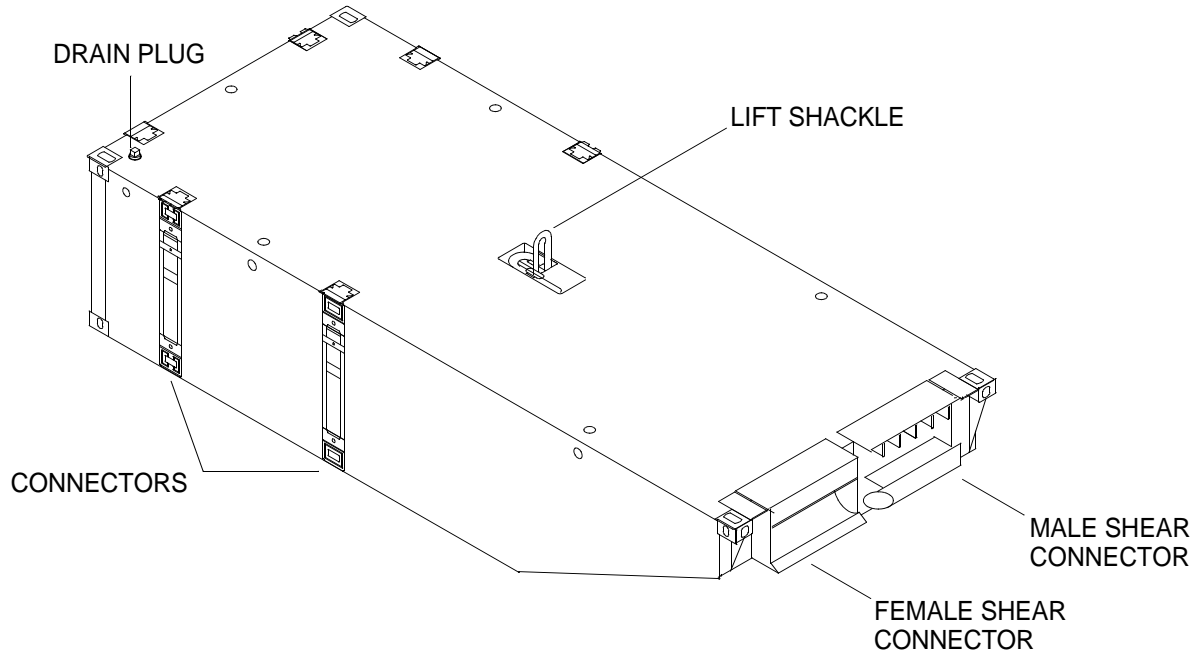
CENTER MODULE

The center module is located between the propulsion modules. The center module is a hollow structure with two 25 ton capacity lifting shackles, which are flush mounted in the deck. The textured deck and smooth bottom are free of any protrusions that might obstruct packing. Access for internal leak detection of each compartment is provided by three recessed threaded plugs located on the top of the module. Alternating male and female connectors are equally spaced along both sides and ends of the module. The lock assemblies are stowed flush with the surface and, when deployed, connect modules with minimum clearance. The center module contains a storage area below deck, which is accessible through a watertight hatch.



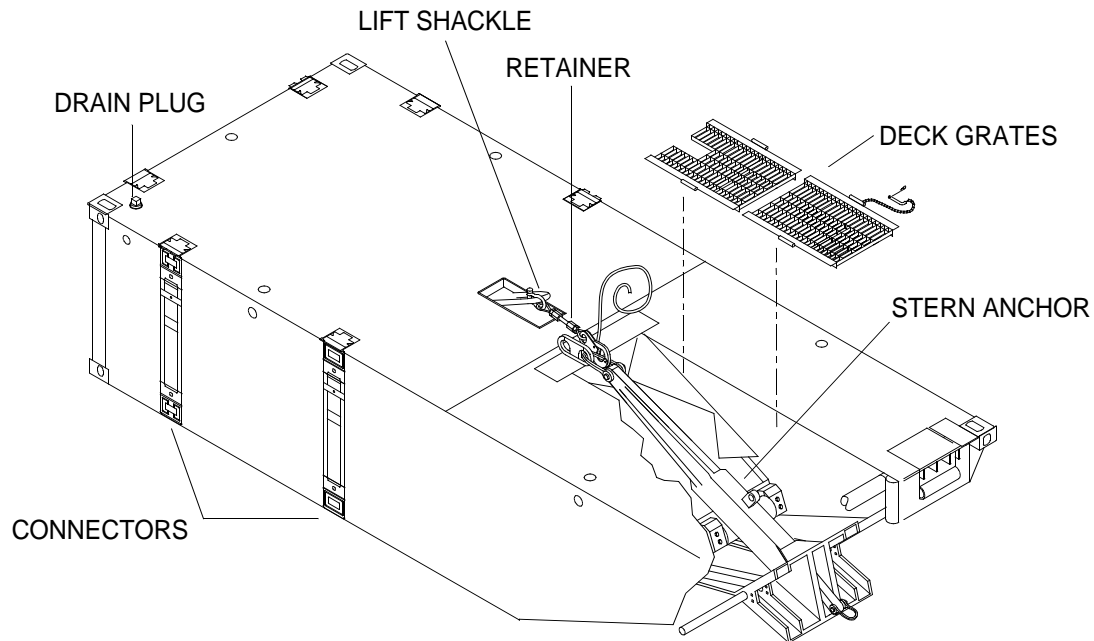
CENTER END RAKE MODULE

The center end rake module is attached on the forward end of the center module. The center end rake module is a hollow structure with one 25 ton capacity lifting shackle, which is flush mounted in the deck. The textured deck and smooth bottom are free of any protrusions that might obstruct packing. Access for internal leak detection of each compartment is provided by a recessed threaded plug located on the top of the module.



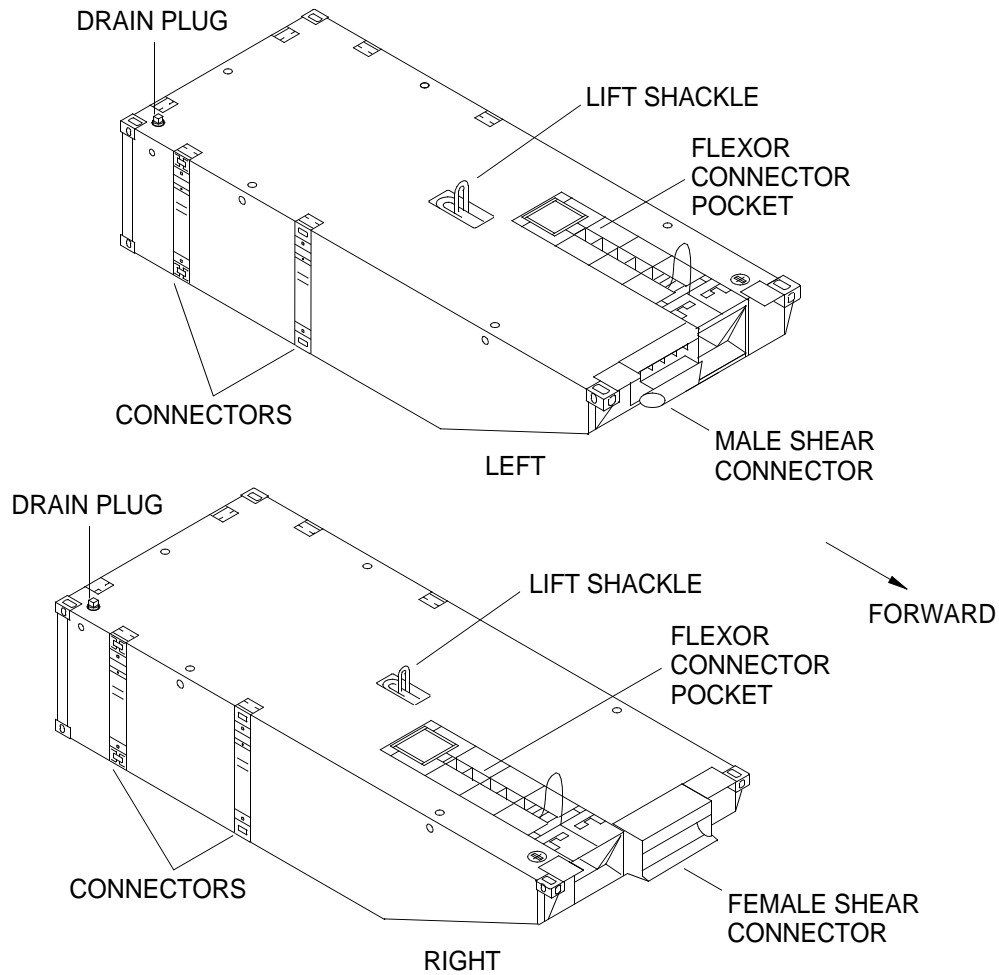
STERN ANCHOR CENTER END RAKE MODULE

The stern anchor center end rake module is attached to the aft end of the center module. The stern anchor center end rake module is a hollow structure with one 25 ton capacity lifting shackle, which is flush mounted in the deck. The textured deck and smooth bottom are free of any protrusions that might obstruct packing. Access for internal leak detection of each compartment is provided by a recessed threaded plug located on the top of the module. The module is designed with a channel for the housing, deployment and recovery of the stern anchor. The WT stern anchor is a NAVMOOR 1,000 lb anchor (dry weight = 1,120 lb). It is housed, deployed and recovered from within a channel located in the center of the module. The stern anchor is attached to the deck winch aft drum cable. Two removable grates are installed over the channel to protect personnel from stepping into the channel.



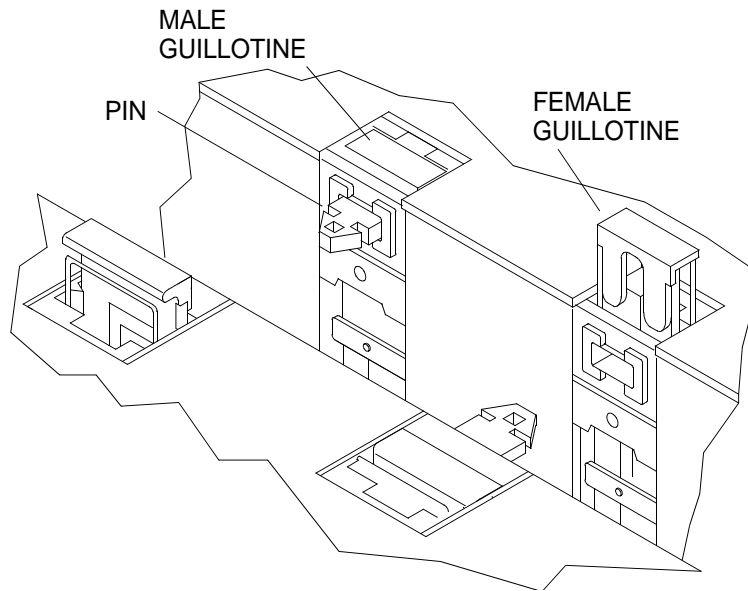
LEFT AND RIGHT END RAKE MODULES

The left and right end rake modules are attached to the end of the propulsion modules. The left and right end rake modules are hollow structures with one 25 ton capacity lifting shackle, which is flush mounted in the deck. The textured deck and smooth bottom are free of any protrusions that might obstruct packing. Access for internal leak detection of each compartment is provided by a recessed threaded plug located on the top of the module. The left and right end rake modules have flexor connector pockets for flexor connecting to other modules. The left end rake has a male shear connector and the right end rake has a female shear connector. These are used as a mating device during assembly and act as a hinge during operation.



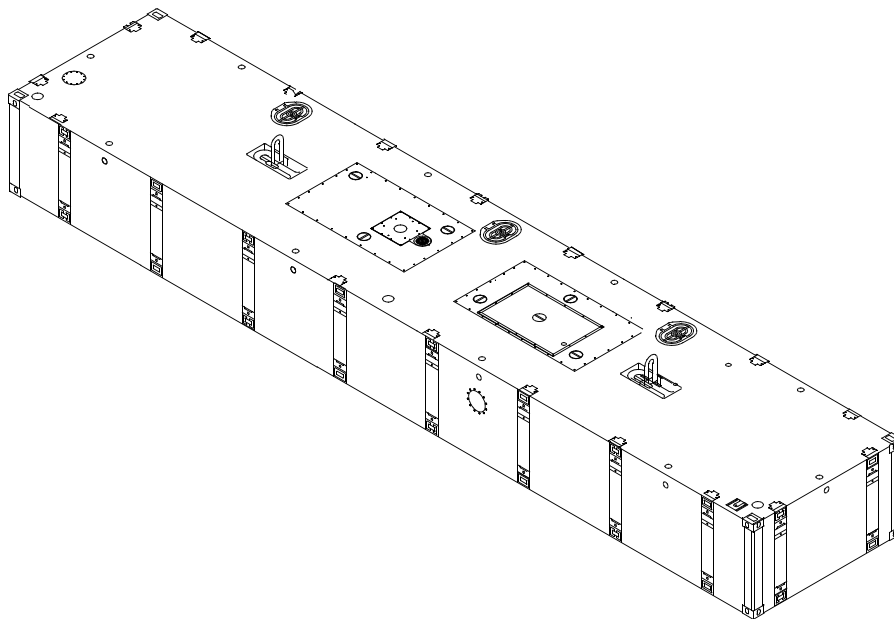
INTERCONNECT GUILLOTINES

The interconnect guillotines are mounted to the sides and ends of the modules and are used to secure the modules together during assembly of the WT. The female guillotine interlocks with the male guillotine connecting pin and locks when the guillotines are flush with the deck.



PROPULSION MODULES

The two propulsion modules are attached to the center module. The propulsion modules are the prime movers for the WT and each is propelled by an inline six cylinder, 625 HP, four cycle, water cooled, turbo charged, diesel marine engine driving a 360° steerable, 6,000 lb output pump-jet.



The propulsion module is divided into three compartments separated by watertight bulkheads with hatches. The center (machinery) compartment is the largest and contains engine cooling and exhaust components, the drive train, hydraulic system and all electrical components with the exception of one bilge pump, a single bilge pump control panel, a pressure operated switch, a light fixture and a switch that are located in the lazaret end compartment.

The drive train consists of a diesel engine, marine gear, transfer case and pump-jet. Guarded drive shafts connect the marine gear to the transfer case and the transfer case to the pump-jet.

The engine cooling and exhaust system consists of a seachest (raw water inlet integral with the structure of the module), a butterfly valve, a duplex strainer, engine raw water pump, fuel cooler, engine cooler heat exchanger, marine gear oil cooler, exhaust water shutoff valve, transfer case oil cooler, transfer case shutoff ball valve, water cooled muffler and exhaust flappers.

The hydraulic system consists of a hydraulic pump driven by the marine gear, a hydraulic motor that drives the primary steering planetary gearbox mounted on the pump-jet, a hydraulic brake which is integral to the auxiliary steering planetary gearbox mounted on the pump-jet, an electrically actuated way-valve with auxiliary manual control, manually operated ball valve, needle valve, braking valve unit, pressure filter and a hydraulic reservoir with return line filter. A manual hydraulic hand pump is also provided for manual release of the hydraulic brake in case of system malfunction.

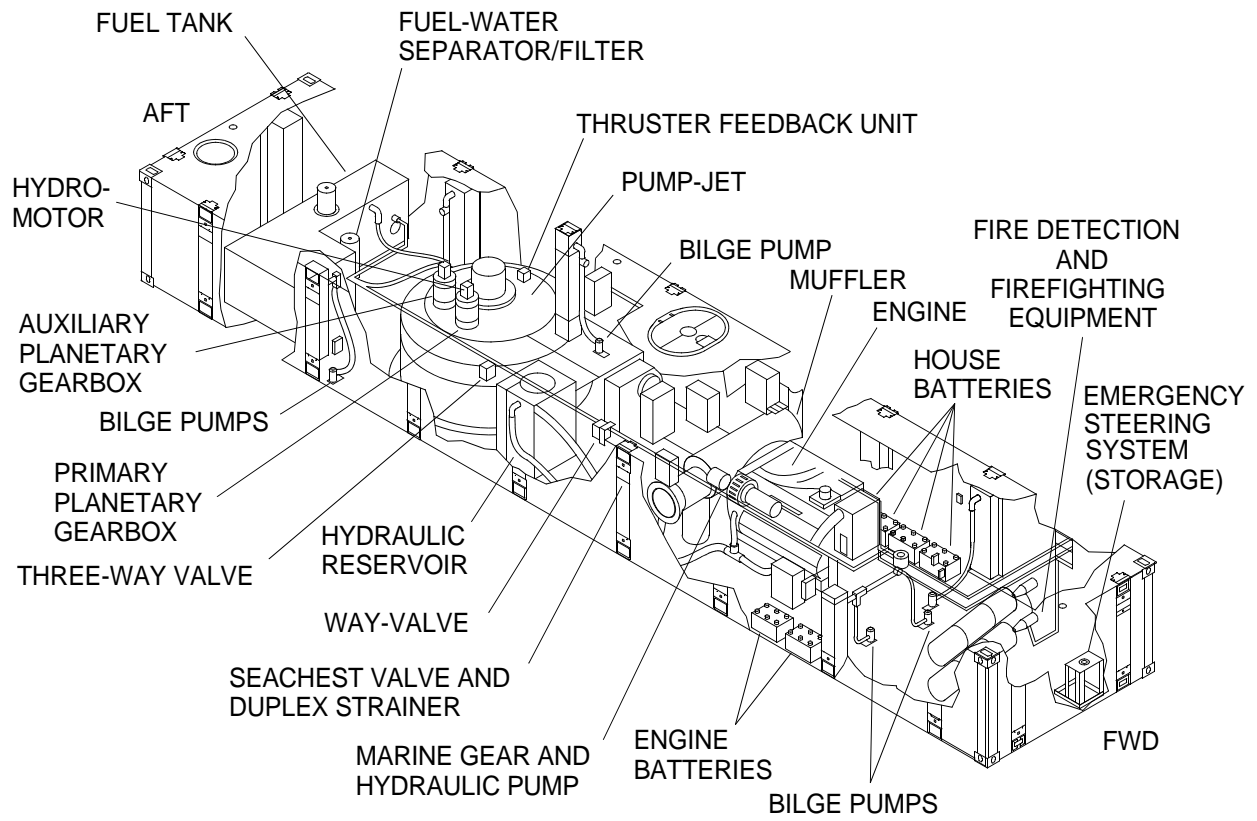
The propulsion module electrical system consists of an engine mounted alternator, six lead-acid storage batteries, propulsion module circuit breaker panel A6, bilge pump control panel A5, single bilge pump control panel A7, engine junction box with emergency stop control A4, engine mounted emergency stop pushbutton, propulsion module junction box A3, pump-jet thruster junction box A2JB2, vent fan relay enclosure A8, thruster direction/auxiliary battery junction box assembly A9, isolator junction box assembly A12, fire detection system consisting of two thermal switches and a pressure switch electrically tied into the cab controls. If the temperature inside reaches 225°F, a fire alarm will sound in the cab. In the event of a fire, a manually activated fire suppression system will flood this compartment with CO₂ and the engine and machinery space ventilation fan will shut down. This compartment is also equipped with five electrically operated bilge pumps and float switches. Two NATO receptacles are also located in the propulsion module. One receives power from the house batteries and one receives power from the engine batteries.

The aft (fuel) compartment contains the fuel tank, fuel/water separator and fuel system shutoff valves. This compartment is also protected by the fire detection system. It is important to note that there are no electrical connections, controls or operating devices in this compartment. A bilge pump is not provided in this compartment. Fire detection is accomplished by means of a probe extending through the bulkhead that separates the fuel and machinery compartments with all electrical terminations made on the machinery compartment side. In the event of fire, this compartment is flooded with CO₂ upon activation of the fire suppression system.

Both the machinery compartment and the lazaret are equipped with lighting fixtures to provide personnel with an adequate light source when working below deck. Individual light switches control the lighting in each area. Lighting switchbox A10 controls power to the machinery compartment and lighting switchbox A11 controls power to the lazaret.

The forward compartment (lazaret) contains the fire suppression system control and agent storage components and provides stowage for the emergency steering assembly when not in use. This compartment is equipped with a bilge pump and float switch and is not protected by the fire suppression system.

Each propulsion module has six 3,700 GPH, submersible bilge pumps; five in the machinery compartment and one in the lazaret. The pumps are locally controlled from control stations mounted in the machinery compartment and lazaret or remotely controlled from the operators cab in conjunction with float switches. The pump-jet is driven by the diesel engine, which delivers 625 HP at 2,300 RPM on the output shaft. Weight of the propulsion module is approximately 41,100 lb. Listed below are detailed descriptions of the major components found in each propulsion module.



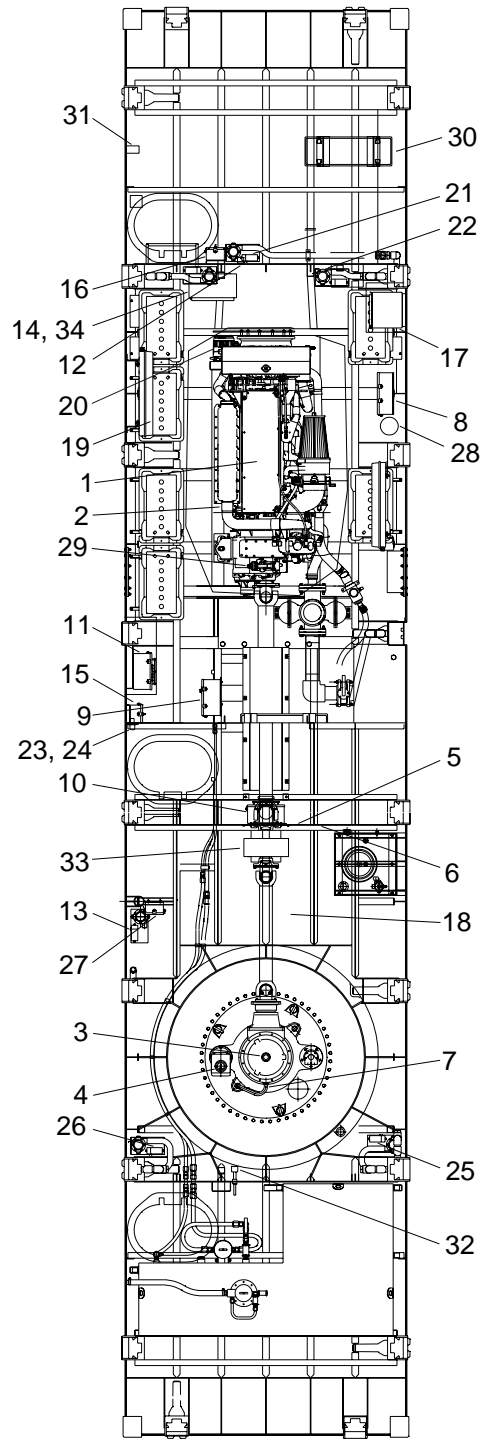


Table 1. Below Deck Equipment Locations.

KEY	DESIGNATOR	COMPONENT
1	A1	Engine and Components (Includes marine interface module, electric control module, temperature and pressure sending units. Components are wired to engine in harness KMB-1.)
2	A1B1	Engine Starter
3	A2	Thruster and Components
4	A2B1	Thruster Steering Position Synchro
5	A2JB2	Thruster Junction Box
6	A2JB1	Hydraulic Control (Note: Hydraulic control box connects to steering solenoids.)
7	A2S2	Thruster Gear Box Oil Level Switch
8	A3	Propulsion Module Junction Box
9	A4	Engine Junction Box (Contains emergency stop switch and three on/off toggle switches for the engine control module, marine interface module and engine controls.)
10	A5	Bilge Pump Control Panel (Contains five REMOTE/MANUAL toggle switches for bilge pump control in the machinery compartment.)
11	A6	Propulsion Module Circuit Breaker Panel (Contains the MAIN circuit breaker and 12 on/off toggle switches for power distribution.)
12	A7	Single Bilge Pump Control Panel (Contains one REMOTE/MANUAL toggle switch for bilge pump control in the lazaret.)
13	A8	Vent Fan Relay Enclosure for Vent Fan Motor (B1)
14	A9	Thruster DIR/AUX Battery Junction Box Assembly
15	A10	Engine Spaces Light Switch Box Assembly
16	A11	Lazaret Lights Switch Box
17	A12	Isolator Junction Box Assembly
18	B1	Vent Fan Motor
19	BT	Batteries (total 6: 4 port and 2 starboard)
20	G1	Alternator
21	JB1	Junction Box for #1 Bilge Pump (B2)
22	JB2	Junction Box for #3 Bilge Pump (B4)
23	NR-1	NATO Receptacle (Engine)
24	NR-2	NATO Receptacle (House)
25	JB5	Junction Box for #5 Bilge Pump (B6)
26	JB6	Junction Box for #6 Bilge Pump (B7)

Table 1. Below Deck Equipment Locations. (Continued)

KEY	DESIGNATOR	COMPONENT
27	JB8	Junction Box for #4 Bilge Pump (B5)
28	L1	Cold Start Solenoid
29	L2/L3	Clutch Engage Forward/Backflush Solenoids
30	DS	Light (DS1 near pump-jet, DS2 near access hatch, DS3 over port batteries, DS4 over stbd batteries and DS5 in lazaret)
31	S2	CO ₂ Pressure Switch
32	S8	Aft Fire Thermal Detector
33	S9	Middle Fire Thermal Detector
34	VR1	Regulator for Alternator

Engine

The engine is an inline six cylinder, water cooled, turbo charged, after cooled, four cycle diesel marine engine delivering 625 HP at 2,300 RPM. All operator control of the engine is accomplished from the operators cab, with the exception of below deck emergency stop pushbuttons.

Exhaust System

The propulsion module exhaust system consists of a water cooled muffler assembly with an input directly coupled to the engine turbocharger exhaust port. The muffler is supplied with two exit ports. One is plugged and one is ported to the exhaust flapper for configuration as either a port or starboard exhaust system. The piping between the turbocharger, muffler and exhaust flapper is a flexible silicon hose to accommodate for thermal expansion in the system.

Fuel System

Each propulsion module is equipped with a 400 gallon stainless steel fuel tank permanently welded inside the fuel compartment. Fuel suction and return lines are fitted with shutoff ball valves to isolate fuel to the tank when not in use or during repairs to the fuel system. A filler neck/strainer basket, located on top of the fuel tank, is accessible through a deck hatch from outside the fuel compartment. A dual purpose fuel-water separator and filter is located near the fuel tank in the fuel tank compartment at the rear of the module to remove water and contaminants from the diesel fuel. A fuel level indicator is mounted directly to the fuel tank for indicating the amount of fuel remaining in the tank.

Fuel-Water Separator/Filter

A dual purpose fuel-water separator and filter is located near the fuel tank in the fuel tank compartment at the rear of the module. Its main function is to remove water and contaminants from the diesel fuel.

Marine Gear

The marine gear provides the capability to reverse the directional rotation of the other drive train components making it possible to backflush the pump-jet. It is mounted directly to the flywheel housing of the diesel engine. The transmission is equipped with an integral hydraulic system consisting of a pump, shifting valve and internal hydraulic cylinders. The pump utilizes the transmission lubricating oil to operate hydraulic cylinders, which shifts the gears to the backflush, neutral or engaged configurations. The shifting valve is solenoid actuated from a toggle control switch in the operators cab. In addition to powering the shifting cylinders, the pump also circulates case oil through an oil cooler that is plumbed into the engine raw water cooling system. In the event of electrical power loss to the marine gear shifting solenoids, an emergency engagement capability is provided for the marine gear by actuating a lever on the side of the valve body.

Transfer Case

The transfer case compensates for offset alignment between the output flange of the marine gear and the input flange of the pump-jet. It has a 1:1 gear ratio, utilizing spur gears throughout, and is equipped with an oil pump that circulates lubricating oil from its gear case through an oil cooler plumbed off of the engine raw water cooling system and back to the top of the transfer case to lubricate the upper gearing. The transfer case is connected to the marine gear and the pump-jet via drive shafts.

Machinery Guards

Removable metal machinery guards cover the drive shafts, engine flywheel and alternator belts to protect personnel from contact with rotating parts.

Pump-Jet

Each propulsion module is equipped with a 360° steerable pump-jet propulsion unit capable of delivering 6,000 lb of thrust. Both pump-jets are controlled electrically and hydraulically from the operators cab. The pump-jet works on the principal of a rotary pump and consists of a drive shaft that drives an upper gearbox assembly, which drives an impeller. Water is sucked into the pump-jet through a feeding funnel on the bottom of the module and fed into the enclosed pressure casing, whose bottom plate is provided with three systematically arranged outlet nozzles from which water is ejected at a 13° angle. A hydraulic steering motor drives a spur gear through a planetary gearbox to rotate the pressure casing and steering nozzles, located on the bottom, in both senses of rotation without limitation. A second planetary gearbox is provided to facilitate emergency steering. The emergency steering control stand is mounted abovedeck and interfaces with the through shaft of the planetary gearbox. The emergency steering gearbox contains a spring set, hydraulically released disc brake. The brake maintains the position of the steering nozzle until rotation is called for by the operator. In the event of hydraulic system failure, the brake can be released via the hydraulic hand pump to facilitate emergency steering. An electromechanical feedback unit monitors relative steering position of the steering nozzle and transmits that position to a dial indicator in the operators cab. An electric sensor monitors the oil level in the upper gearbox and sends a signal to an indicating light in the operators cab when the oil level is below the required level.

Duplex Strainer

The duplex strainer is located by the diesel engine and is considered part of the raw water system. Its purpose is to collect debris from raw seawater and prevent it from entering the water pump.

Hydraulic System

The hydraulic system contained within each propulsion module provides the steering control for the pump-jet. The system includes an axial piston hydraulic pump mounted off the marine gear, a fixed displacement hydraulic motor mounted to the planetary gear drive off the pump-jet, hydraulic brake, control valves, filters and a 26 gallon hydraulic reservoir. The reservoir is fitted with an external sight level, in-tank suction strainer and in-tank return line filter. A pressure filter is located between the hydraulic pump and the way-valve control block. The interconnect piping between components includes a short section of hose to minimize the effects of vibration.

Hydraulic Pump

A flange mounted, axial piston hydraulic pump, driven by the marine gear, provides hydraulic pressure to operate the hydraulic steering motor and normal release of the hydraulic steering brake.

Hydraulic Motor

A fixed displacement, axial piston hydraulic motor (hydro-motor) is flange mounted on the input shaft of the pump-jet steering planetary gearbox. Hydraulic flow from the hydraulic pump is directed through the way-valve unit to drive the hydraulic motor in a clockwise or counterclockwise direction to rotate the steering nozzles.

Way-Valve Unit

The way-valve is controlled hydraulically by means of electrically operated pressure control valves or manually by means of a control lever mounted on the valve unit assembly. The way-valve directs hydraulic fluid via the load retaining valve to the hydraulic motor to control the direction in which the hydraulic motor rotates. A brake valve located on the pump-jet directs hydraulic pressure to the emergency steering planetary gearbox to release the hydraulic brake when rotation of the hydraulic motor is initiated.

Three-Way Valve

A manually operated control handle on the valve is positioned to select normal hydraulic operation or to isolate the normal hydraulics so that the emergency steering hydraulic hand pump can be used to release the hydraulic brake in the emergency steering mode.

Hydraulic Reservoir

The hydraulic reservoir is a 26 gallon holding tank for the system hydraulic fluid. The tank is equipped with a fill and drain port for replenishment of the fluid, a sight gauge to determine fluid level and a return line filter with dirt indicator to filter hydraulic fluid returning to the tank and outlet line strainer. The tank has a removable access panel to facilitate cleaning. A float switch monitors fluid level and lights an indicating light in the operators cab if the fluid level is below the required level.

Bilge Pumps

Each propulsion module is equipped with six bilge pumps, each capable of pumping 3,700 GPH in the event the propulsion module takes on water. Five are located in the machinery compartment and one in the lazaret. The pumps can be controlled remotely from the operators cab by illuminated pushbuttons when the corresponding float switch is actuated. The pumps can be tested locally at the bilge pump control panels without float switch actuation. Each pump is piped to a temporary 250 GAL holding tank, located forward of the lazaret, which receives all discharged oil/water. In an emergency, the discharged fluid can be redirected overboard.

Fire Detection and Fire Fighting Equipment

A fixed CO₂ fire suppression system is designed to flood the engine and pump-jet compartment and the fuel storage compartment with CO₂ in the propulsion module units if fire breaks out. Thermal detection probes activate an alarm in the operators cab if the temperature in the propulsion module reaches 225°F. One is mounted through the bulkhead behind the pump-jet to monitor the fuel compartment. The other one is mounted below the deck to monitor the machinery compartment. There is no thermal detector in the lazaret compartment. On the terminal strip A4, the fire alarm horn speaker will sound. The lower control panel in the operators cab has PORT FIRE ALARM and STBD FIRE ALARM red indicator lights. Abovedeck manual activation is accomplished using a remote cable pull box recessed in the deck and located directly in front of the access hatch and forward of the operators cab. Pulling the handle activates the fire suppression system and floods the compartment with CO₂. A below deck manual release is located on the upper 50 lb bottle. When any of the fire suppression controls are manually pulled, four events occur:

- Activates fixed time delayed CO₂ fire suppression system that, 30 seconds later, discharges into propulsion module to suffocate fire.
- Disconnects cable from intake plenum inner vent cover causing it to close and shut off oxygen sources.
- Cable action shuts off relay for exhaust fan in exhaust plenum.
- Activates pressure trip mechanism to shut off diesel engine.

A portable CO₂ fire extinguisher is mounted on the front of either exhaust plenum.

Emergency Steering System

Each propulsion module is equipped with an emergency steering system consisting of a mounting stand, shaft with pillow block bearing support and hand crank. It is stored in the forward lazaret and is used to manually maneuver the WT in the event of a hydraulic system failure.

Pump-Jet Thruster Junction Box (A2JB2)

The pump-jet thruster junction box is mounted opposite the personnel access hatch approximately midway in the machinery compartment. The box contains relays and circuitry necessary to operate the way-valve steering solenoids and a circuit breaker for over-current protection.

Propulsion Module Junction Box (A3)

The propulsion module junction box is located on the forward starboard side of the machinery compartment. The box is the termination point for connection of three of the four main power cables that connect the propulsion module to the cab.

Engine Junction Box (A4)

The engine junction box is located inboard near the personnel access hatch. It is a steel enclosure that contains the diesel engine control interfaces, terminal strips and two relays controlling the emergency stop air flap solenoid and the emergency malfunction bell. An engine emergency stop pushbutton and circuit breakers for the engine control module, marine interface module and engine control circuits are mounted on the enclosure cover.

Bilge Pump Control Panel (A5)

The bilge pump control panel is mounted very near the center line of the propulsion module inboard of the personnel access hatch. The panel consists of a steel enclosure with five toggle switches, one for each bilge pump located in the machinery compartment, to provide remote (from operators cab) or manual (local) operation of the bilge pumps.

Propulsion Module Circuit Breaker Panel (A6)

The propulsion module circuit breaker panel is located in the machinery compartment, opposite the engine junction box, next to the personnel access hatch. The panel is a steel enclosure with 14 circuit breakers mounted to the enclosure cover. Thirteen circuit breakers are protected by a plastic guard plate mounted with stand-offs. Access slots permit operation of the circuit breakers while protecting them from accidental shut off or damage. The propulsion module main circuit breaker (A6CB1) and operators cab circuit breaker (A6CB11) must both be in the on position for the operators cab circuit breaker panel (A3) to receive power.

Single Bilge Pump Control Panel (A7)

The single bilge pump control panel is located in the lazaret and consists of a steel enclosure mounted to the bulkhead that separates the lazaret from the machinery compartment. A single toggle switch for the lazaret bilge pump operation is mounted to the enclosure cover and provides remote (from operators cab) or manual (local) operation of the bilge pump.

Vent Fan Relay Enclosure (A8)

The vent fan relay enclosure is located in the machinery compartment, just forward of the pump-jet on the same side as the personnel access hatch. The assembly consists of a steel enclosure with a plug-in type receptacle located on the bottom. The enclosure is the power source for vent fan operation and contains the relay for fan operation. Once the exhaust plenum is mounted, the power cord that is hard wired to the fan can be plugged into the receptacle to complete the installation. A screw-on cover protects the receptacle when not in use. The power cord from the fan is equipped with a screw cap that matches the receptacle thread to secure the cord to the enclosure.

Thruster Direction/Auxiliary Battery Junction Box Assembly (A9)

The pump-jet thruster direction/auxiliary battery junction box is mounted on the machinery compartment side of the bulkhead that separates the machinery compartment and the forward lazaret. The box contains a converter, voltage regulator/battery charging circuit, two 12 VDC batteries, a control relay and two terminal blocks. The enclosure is vented due to possible off-gassing of the batteries. The two auxiliary batteries provide emergency power to the thrust indicators mounted on the middle control panel A1 in the event of power failure.

Engine Space Lights Switch Box Assembly (A10)

The engine space lights switch box assembly is located near the personnel access hatch and provides power to all machinery compartment lighting.

Lazaret Light Switch Box (A11)

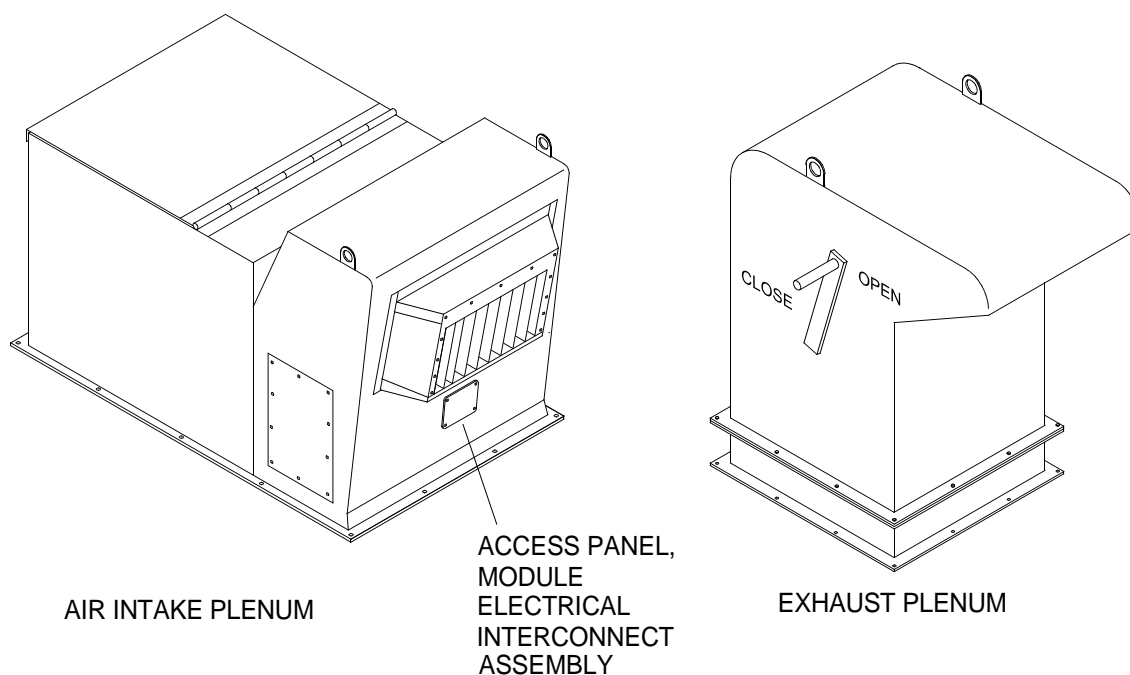
The lazaret light switch box is located near the personnel access hatch to the lazaret compartment and provides power to the below deck lighting in this area only.

Isolator Junction Box Assembly (A12)

The isolator junction box assembly is mounted on forward starboard side of the machinery compartment and contains a triple output isolator, the ammeter shunt and a power terminal block. The enclosure is vented to prevent overheating.

VENTILATION

Although not a part of the propulsion module itself, the port side intake plenum is mounted over the engine. The starboard side air intake is integral with the operators cab. The intake plenum access panel allows connection of the module electrical interconnect cable to the engine operating receptacles. The exhaust plenums are mounted over the pump-jet. The exhaust plenum fans are used to facilitate fresh air flow through the compartment and limit the engine compartment to a temperature rise of 20°F above ambient temperature. The exhaust plenum has a flapper door (damper) that is manually opened and closed. It is closed to eliminate a second source of air to any fire below deck. The port and stbd exhaust fans are controlled from the operators cab by toggle switches located on the lower control panel A2.



OPERATORS CAB

The operators cab is a portable steel fabricated unit, which can be mounted on either the port or starboard propulsion module. It houses the middle control panel A1, lower control panel A2, the operators cab circuit breaker panel A3, the terminal strip assembly A4 and the mast enclosure assembly A7 (navigation light switch box) that contains primary and spare main navigational light controls and indicators. A module electrical interconnect assembly is the electrical control link that allows control of both propulsion modules from the operators cab. The receptacles for the interconnect assembly are located within a operators cab access panel and air intake plenum access panel.

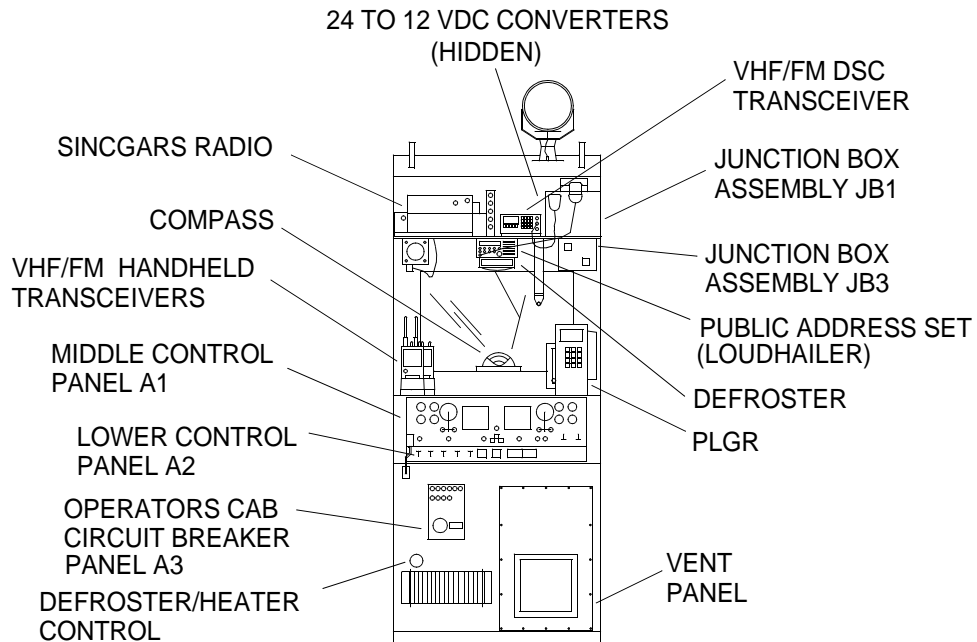
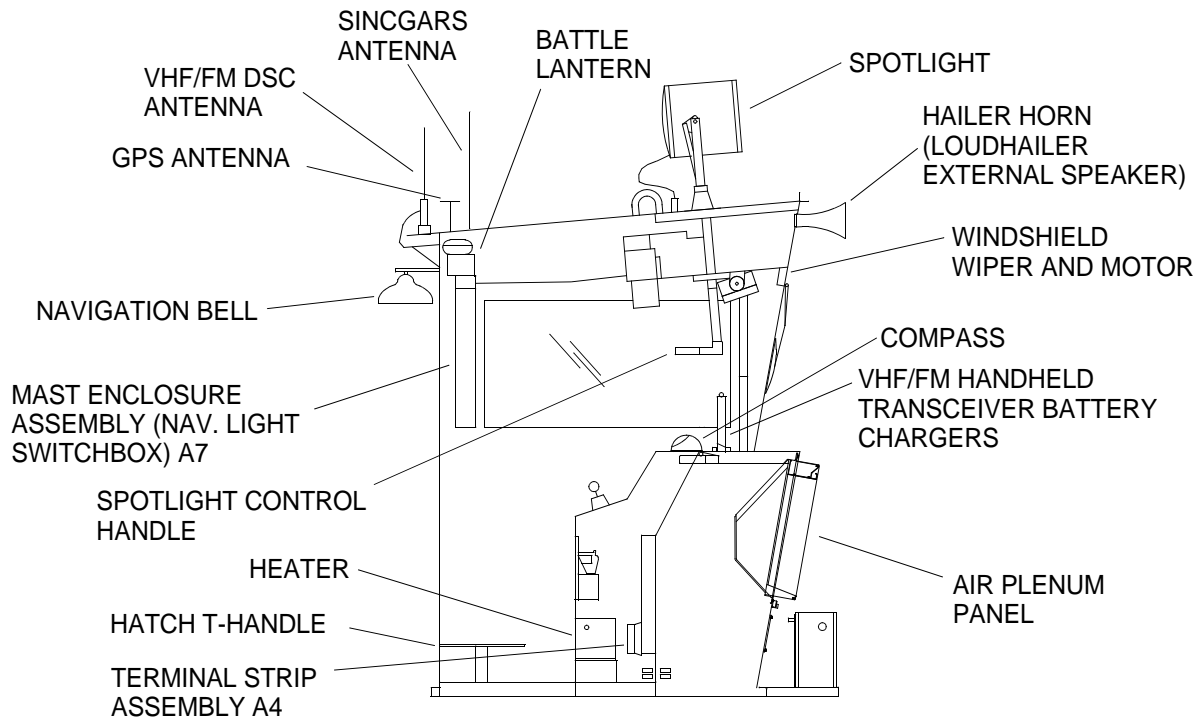
Communications and electronic equipment required to operate the WT include the VHF/FM DSC (Digital Selective Calling) transceiver programmable with weather channel, VHF/FM DSC 24 to 12 VDC converter VR1, AN/VRC-90A SINCGARS radio transmitter, two VHF/FM handheld transceivers with hands free capability and their associated battery chargers plus two additional batteries with charging buckets, public address set (loudhailer) with hailer horn (external loud speaker), AN/PSN-11(V)1 Precision Lightweight Global Positioning Receiver (PLGR) and a 24 to 12 VDC converter VR2 that supplies power to the VHF/FM handheld transceiver chargers, loudhailer and compass. The compass, located on the shelf above the middle control panel, has a remote sensor mounted on the main assembly mast. Junction box JB3 provides inline fuse protection for the PLGR, VHF/FM handheld transceiver chargers, loudhailer and compass.

Antennas for the VHF/FM DSC transceiver, AN/PSN-11(V)1 PLGR and AN/VRC-90A SINCGARS radio transmitter, along with a public address set (loudhailer), hailer horn (located forward) and a 12 inch diameter, 24 VDC marine duty spotlight are all located on the operators cab roof. The spotlight is controlled by a manual remote lever control that penetrates the operator cab roof and is activated by a toggle switch located on the middle control panel A1. The navigation horn signal is generated by depressing the FOG key on the loudhailer keying the loudhailer Push To Talk (PTT).

The operators cab contains a heater to maintain temperature at 65°F minimum in an ambient temperature of -10°F. Both the heater and the windshield defroster require hot water, which comes from the diesel engine glycol cooling system. There are hot water shutoff valves for the operators cab heating system which must be open for water to flow and the heating system on to provide heat. The defroster/heater control valve is used to determine the degree of heat which will be directed to the defroster or heater or simultaneously to both defroster and heater. With the valve fully closed, hot air will be directed only to the front window defroster. With the valve fully open, hot air will be directed to the heater. Any position of the valve between full open and full close will direct hot air to both defroster and heater. The defroster has inlet, outlet and bleeder valves. Toggle switches located on the lower control panel A2 activate the heater and defroster fans. An inline check valve on the hot water supply line and an electrically operated solenoid valve on the return line (controlled by module selector switch A4S1) maintain fluid in the heating system when the engine power is not on or the operators cab is removed from the propulsion module. Module selector switch A4S1 toggle switch is mounted on the terminal strip assembly A4 and is set to either a stbd or port position. The position of the switch depends on the operators cab location on the powered section (stbd/port). Module selector switch A4S1 receives 24 VDC from the engine junction box A4 (CB3). The electrically operated solenoid valve on the return line is normally closed when the engine power is not on and the engine control circuits are not energized.

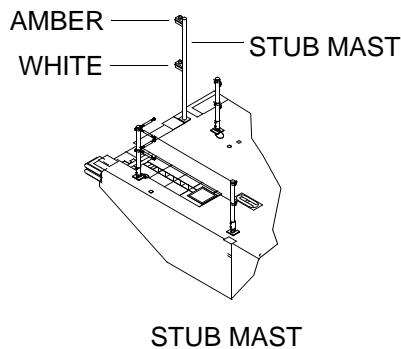
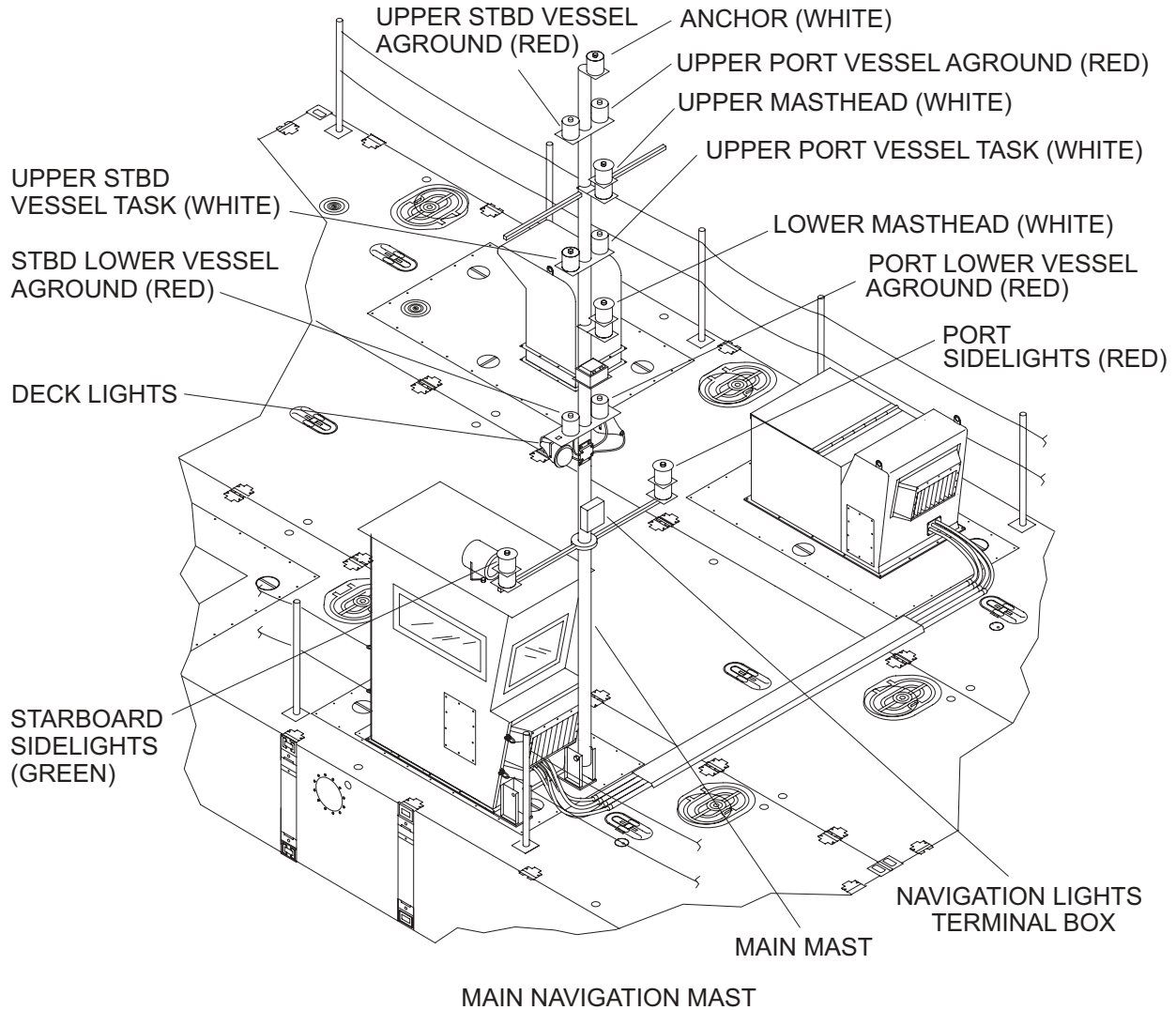
Miscellaneous operator cab equipment includes a windshield wiper that is activated by toggle switch located on the middle control panel, two handheld radios, a battery operated battle lantern and a navigation bell mounted on the rear of the operators cab.

Two deck lights attached to the main assembly mast provide abovedeck lighting for topside activity. These lights are controlled by a toggle switch/circuit breaker on the operators cab circuit breaker panel A3.



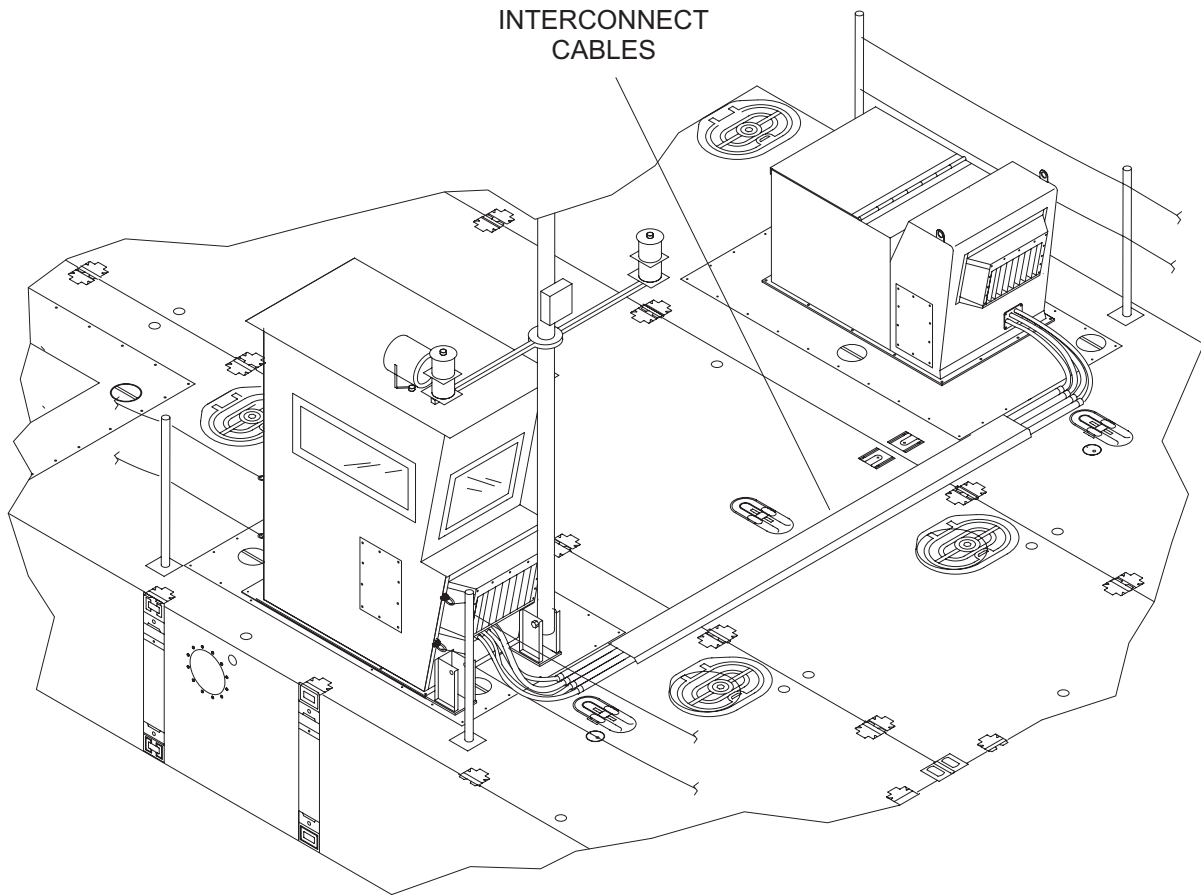
NAVIGATION LIGHTS

The main assembly mast is mounted on the front inboard side of the operators cab and the stub assembly mast is mounted on the aft starboard of the WT. These masts provide the necessary navigational running lights for signal and safety while the WT is in operation. The main assembly mast lights are activated by toggle switches located on the mast enclosure assembly A7 located inside the operators cab. The stub assembly mast contains two lights that are both battery powered and controlled by an on/off switch. Each light contains a light sensor that prevents the light from turning on when ambient light is present.



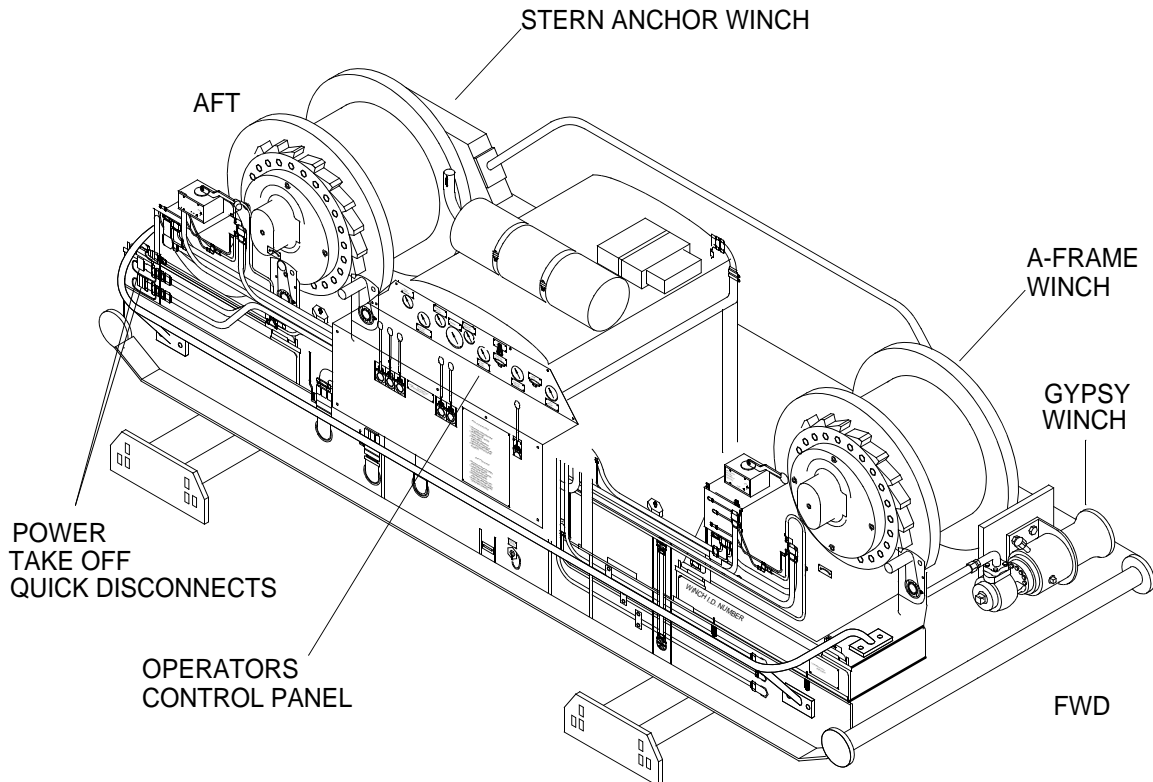
MODULE ELECTRICAL INTERCONNECT ASSEMBLY

The two propulsion modules are linked together with a reinforced set of interconnect cables that are mounted forward of the operators cab and the opposite side air intake plenum. The interconnect assembly allows operation commands to be transmitted from the operators cab to both propulsion module engines and pump-jet thrusters. The interconnect cable assembly is connected to receptacles located on front of the operators cab and the front of the intake plenum.



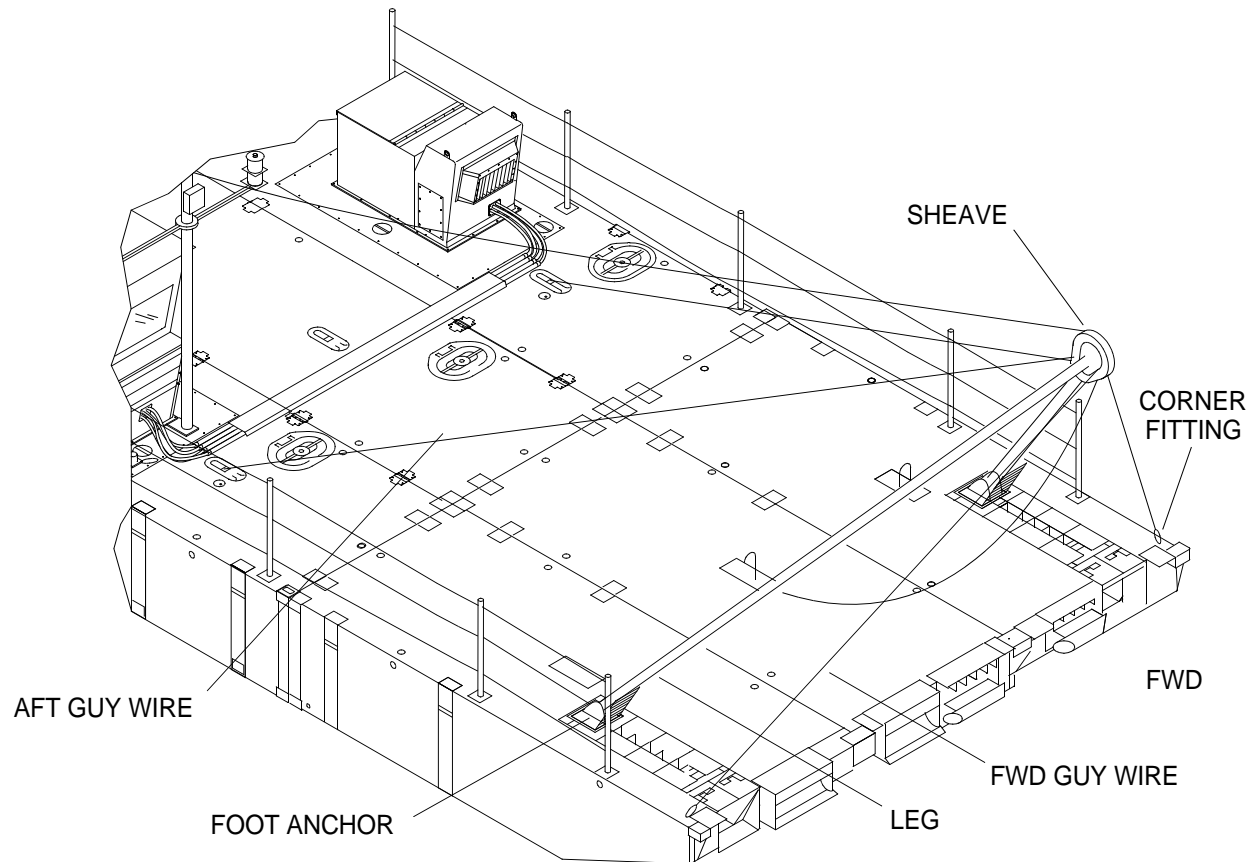
DECK WINCH

The WT primary working tool is a dual drum diesel-hydraulic reversible winch with a capstan. The winch is installed aft of the operators cab on the center module. It provides the line pull for the A-frame and the stern anchor. The forward drum is used with the A-frame and the aft drum is used with the stern anchor. The winch rated line pull is 27,000 lb bare drum and 19,500 lb full drum. Each drum carries 700 ft of 1 in. diameter wire rope. A 12 in. diameter gypsy (drum capstan) winch is located at the forward end, with a rated line pull of 5,000 lb. A power take-off is included with the winch to provide power to ancillary equipment and tools that are used on the WT.



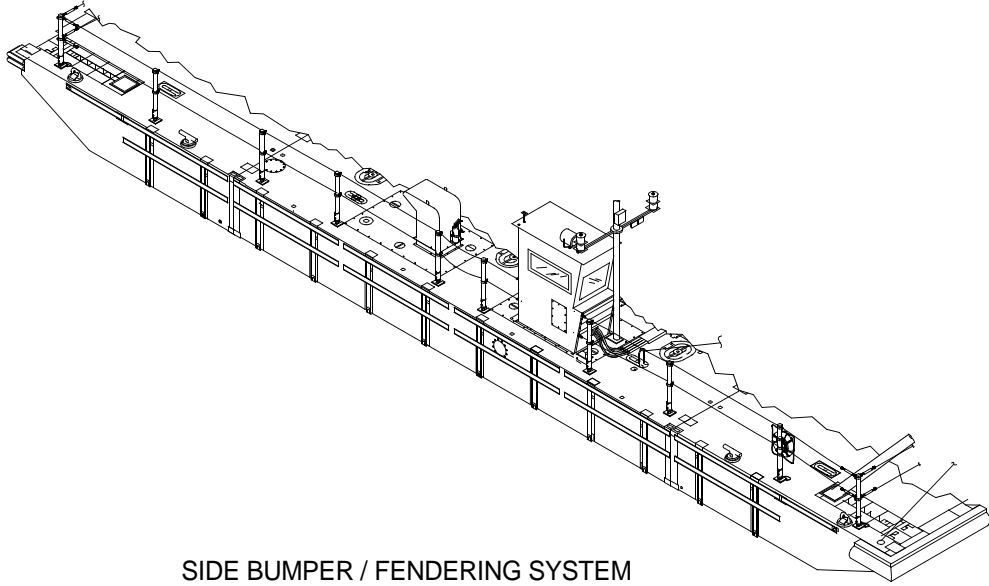
A-FRAME

The A-frame is located on the forward end of the powered section and has a lifting capacity of 27,000 lb when the load is forward of the plane of the A-frame legs. The safe working load for loads aft of the plane of the A-frame legs is 12,000 lb. The A-frame assembly includes two legs, a sheave, two foot anchors, two aft guy assemblies, two forward guy assemblies and two corner fitting lugs. An elevating pole and an elevating pole guy assembly (not illustrated) are used with the deck winch to elevate the A-frame during assembly and disassembly. Guy wire tension is adjusted using turnbuckles.

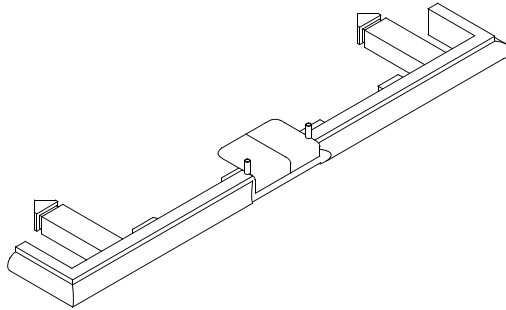


FENDERING SYSTEM

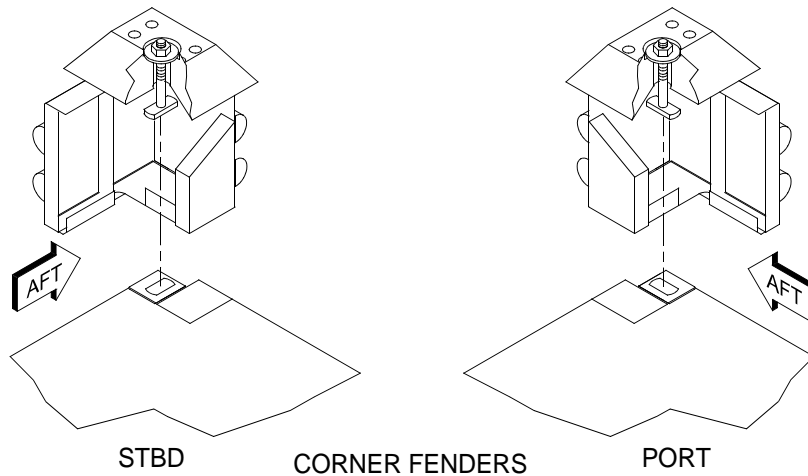
An eight piece side fendering system is attached to the guillotine fittings along each side of the WT to protect the sides from impact damage. The outboard ends of the fendering system are attached to a deck fitting on the end rake module. The bow fender assembly attaches to both end rake flexor receivers and protects the front from impact damage. The corner fenders attach to the ISO corners and protects the rear end rake corners from impact damage.



SIDE BUMPER / FENDERING SYSTEM



BOW FENDER ASSEMBLY



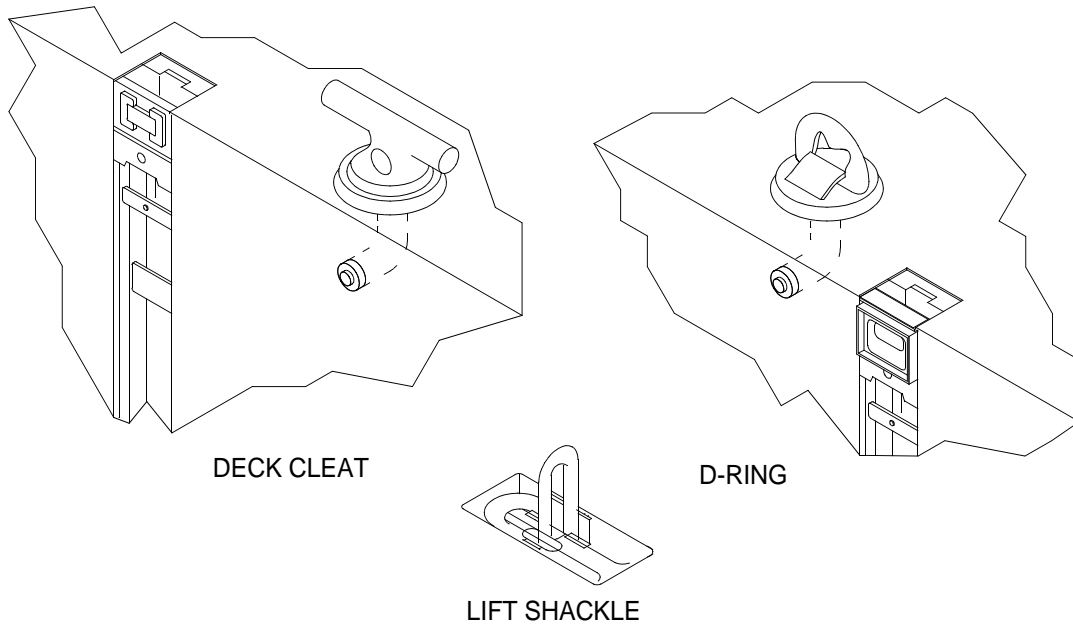
STBD

CORNER FENDERS

PORT

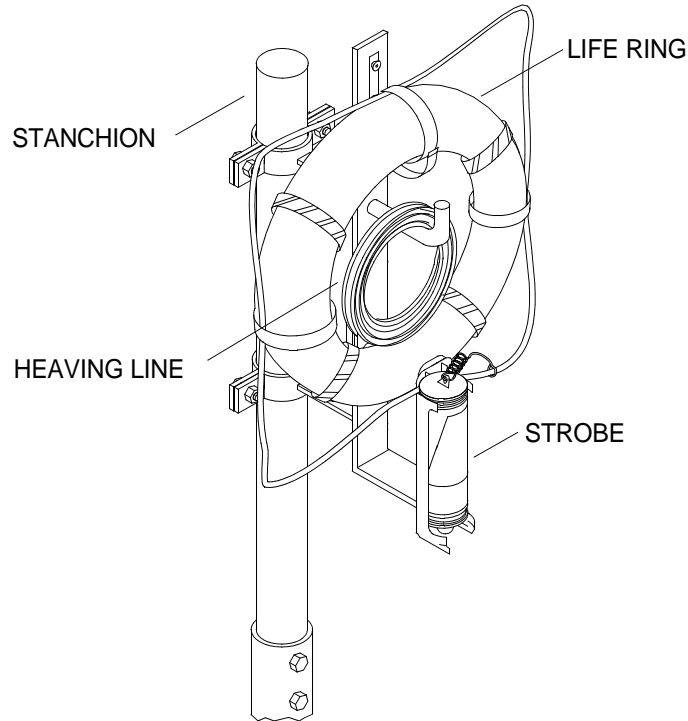
DECK FITTINGS

WT modules are provided with deck fittings to meet various operational needs. Available fittings include deck cleats and D-rings. These fittings are designed to have a working load that will exceed the breaking strength of a 5 in. (2 in 1 braid) nylon rope. There are 10 tube turns on each center and propulsion module and five on end rakes for mounting deck cleats and lash rings. The WT modules are provided with recessed lift shackles welded into the deck structure. The propulsion module lift shackles have a safe working load capacity of 35 tons. The center and end rake modules lift shackles have a safe working load capacity of 25 tons. There are two shackles on each center and propulsion module and one on the end rake. When stowed, the shackles fold down flush with the deck. Fittings are also available for the A-frame and deck winch.

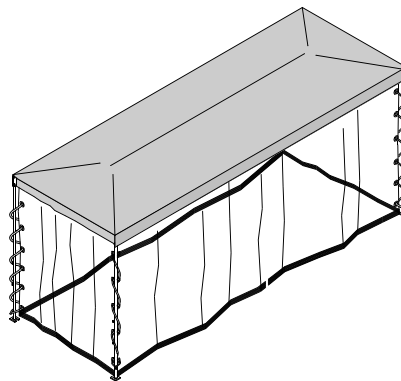


LIFE RING ASSEMBLIES

The two life ring assemblies are installed on life line stanchions of the WT and are used to assist in the rescue of personnel in the water. The life ring assemblies are mounted on the WT with one forward starboard side and one aft port side. The components of the life ring assembly consists of a donut shaped flotation device, a nylon heaving rope and strobe light mounted on a stanchion.

**CREW SHELTER**

The crew shelter is installed aft of the starboard side exhaust plenum on the WT. The crew shelter is composed of a canopy top and side panels stretched across an aluminum frame. The crew shelter provides overhead protection to personnel from the elements. Once assembled, the crew shelter is secured to the deck and attached to a life line stanchion for stability.



**OPERATOR MAINTENANCE
WARPING TUG
EQUIPMENT DESCRIPTION AND DATA**

EQUIPMENT DATA

The following tables provides data applicable to major component levels.

Table 1. WT Equipment Data.

ITEM CHARACTERISTIC	DESCRIPTION
WARPING TUG	
Length	80 ft
Beam	24 ft
Depth	4 ft 6 in.
Freeboard (unloaded)	40 ± 2 in.
Freeboard (loaded)	12 ± 2 in.
Weight	@ 95.3 tons dry, 97.2 tons wet
Maximum Speed	6 knots, Sea State 2
Cargo Capacity	350 short tons
Fuel Tank Capacity (Maximum)	800 gallons (400 per tank; 340 usable)
Deck Winch	Model 27DH50DD5G (Reference TM 55-3950-204-14&P)
A-Frame	27,000 lb capacity
Stern Anchor	1,000 lb NAVMOOR anchor
PROPULSION MODULE	
Length	40 ft
Beam	8 ft
Depth	4 ft 6 in.
Weight	40,644 lb
Engine (2 per section)	DDC 60 Series, Model 6062-7404
Rated Horse Power (each)	625 HP at @ 2,300 RPM at output shaft
Cylinders	6 (inline)
Starting System	24 volt electric
Fuel Capacity	400 gallons
Average Operating Time Per Tank Of Fuel	10 hours
Marine Gear	Twin Disc, Model MG5114SC

Table 1. WT Equipment Data. (Continued)

ITEM CHARACTERISTIC	DESCRIPTION
Pump-Jet (2 Per Section)	Model SPJ-82-T
Pump-Jet Output (Each)	6,000 lb horizontal thrust at ship speed of 6 knots
Steering	360°
Electrical System	24 VDC 200 amps
Bilge Pumps	6 each at 3,700 GPH
Fire Suppression System	Manually Activated CO ₂
CENTER MODULES	
Length	40 ft
Beam	8 ft
Depth	4 ft 6 in.
Weight	21,263 lb
ISO Compatible	Yes
Sea State Operation	SS 2
END RAKE MODULES	
Length	20 ft
Beam	8 ft
Depth	4 ft 6 in.
Weights	
Left End Rake	11,568 lb
Left End Rake (Flexor Stowed)	12,968 lb
Right End Rake	11,566 lb
Center End Rake (Forward)	10,533 lb
Center Anchor Rake (Aft)	10,943 lb
Center Anchor Rake (With Stern Anchor Installed)	11,943 lb
ISO Compatible	Yes
Sea State Operation	SS 2
SKEG ASSEMBLIES	
Length	68 in.
Width	51 in.
Thickness	0.63 in.
Weight	1,105.19 lb

Table 1. WT Equipment Data. (Continued)

ITEM CHARACTERISTIC	DESCRIPTION
SHIPPING FRAMES	
One Intake and Two Exhaust Plenums	
Weight (includes shipping frame)	7,715.2 lb
Electrical Interconnect Assembly, Four Deck Cleats and Four D-Rings	
Weight (includes shipping frame)	7,791.72 lb
Main Assembly Mast, Stub Assembly Mast and Two A-Frame Legs	
Weight (includes shipping frame)	9,396.5 lb
Side Fendering System	
Weight (includes shipping frame)	13,189.88 lb
BOW FENDER ASSEMBLY	
Weight	3,740.8 lb
ISOPAK CONFIGURATIONS	
Intake and Exhaust Plenums Shipping Frame Mounted on Propulsion Module	
Weight	48,359.2 lb
Interconnect Assembly and Deck Fittings Shipping Frame Mounted on Propulsion Module	
Weight	48,435.72 lb
Side Fender Shipping Frame Mounted on Connected Left End Rake and Right End Rake	
Weight	36,323.88 lb
Mast and Stub Assembly Masts and A-Frame Legs Shipping Frame Mounted on Connected Left End Rake and Right End Rake	
Weight	32,530.5 lb
Center End Rake and Center Anchor Rake Mounted on Center Module	
Weight	42,739 lb

**OPERATOR MAINTENANCE
WARPING TUG
THEORY OF OPERATION**

SYSTEM OPERATION

Operation of the WT revolves around the propulsion modules. Each contains a diesel engine (power) and a pump-jet for movement and direction. When the diesel engine is running, the marine gear (transmission) engages the transfer case into gear, which changes the engine speed to shaft speed. Seawater is brought into the pump-jet through the inlet grating at relatively low velocity in order to minimize ingesting debris. Seawater travels through the heliconic converter at high head and moderate velocity, thus reducing the losses due to turbulent flow. Seawater then flows through the discharge port, which contains a hydraulically actuated, specially designed steering nozzle. The accelerated water mass provides a reactive force acting on the hull of the vessel. Direction is controlled by rotation of the steering nozzle. Thrust is increased or decreased by varying the speed of the diesel engine. Controls and indicators necessary to operate the pump-jet are located in the operators cab. The following paragraphs provide the theory of operation of the WT subsystems.

DRIVE TRAIN

The drive train consists of the engine, marine gear, transfer case and pump-jet. Guarded drive shafts connect the marine gear to the transfer case and the transfer case to the pump-jet.

Engine

The engine is an inline six cylinder, water cooled, turbo charged, after cooled, four cycle, diesel marine engine, delivering 625 HP at 2,300 RPM. All operator control of the engine is accomplished from the operators cab.

Marine Gear

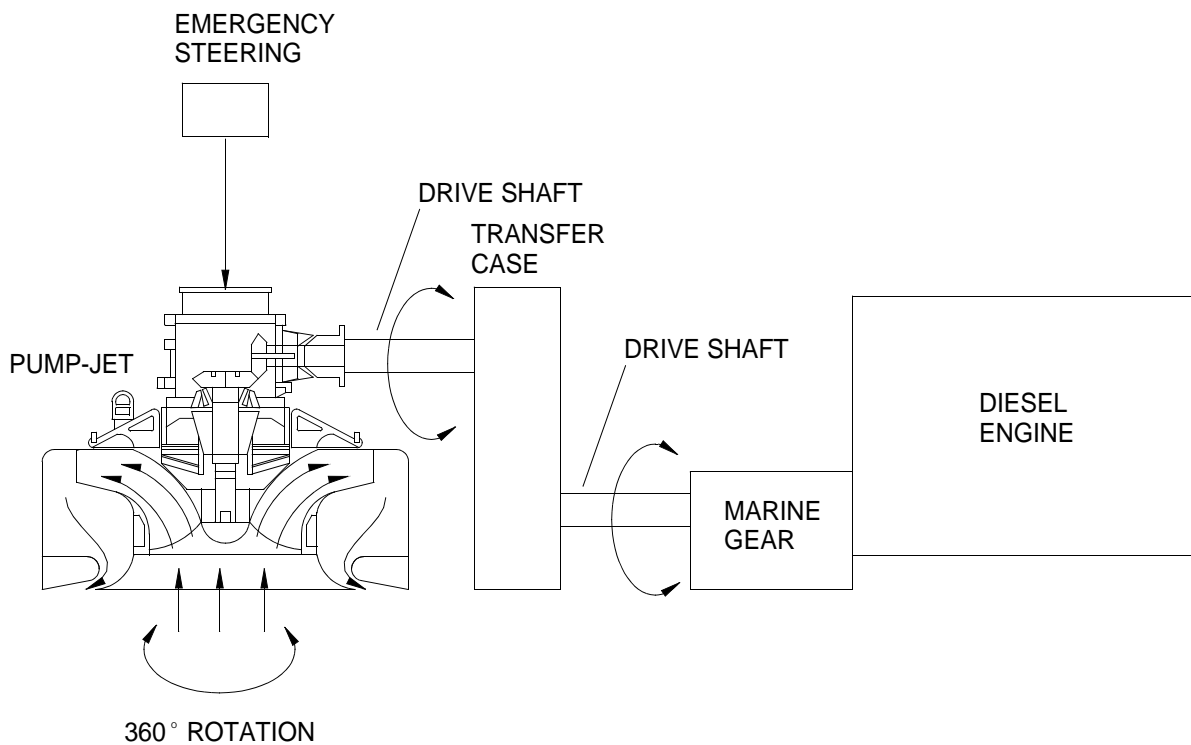
The marine gear is mounted directly to the flywheel housing of the diesel engine and provides the capability of reversing the directional rotation of the other drive train components, making it possible to backflush the pump-jet. The transmission is equipped with an integral hydraulic system consisting of a pump, shifting valve and internal hydraulic cylinders. The pump utilizes the transmission lubricating oil to operate hydraulic cylinders, which shifts the gears to the backflush, neutral or engaged configurations. The shifting valve is solenoid actuated from a toggle control switch in the operators cab. In addition to powering the shifting cylinders, the pump also circulates case oil through an oil cooler that is cooled by the engine raw water cooling system. In the event of electrical power loss to the marine gear shifting solenoids, an emergency engagement capability is provided for the marine gear by actuating a lever on the side of the valve body.

Transfer Case

The transfer case compensates for offset alignment between the output flange of the marine gear and the input flange of the pump-jet. It has a 1:1 gear ratio, utilizing spur gears throughout, and is equipped with an oil pump that circulates lubricating oil from its gearcase through an oil cooler that is cooled by the engine raw water cooling system and back to the top of the transfer case to lubricate the upper gearing. The transfer case is connected to the marine gear and the pump-jet via drive shafts.

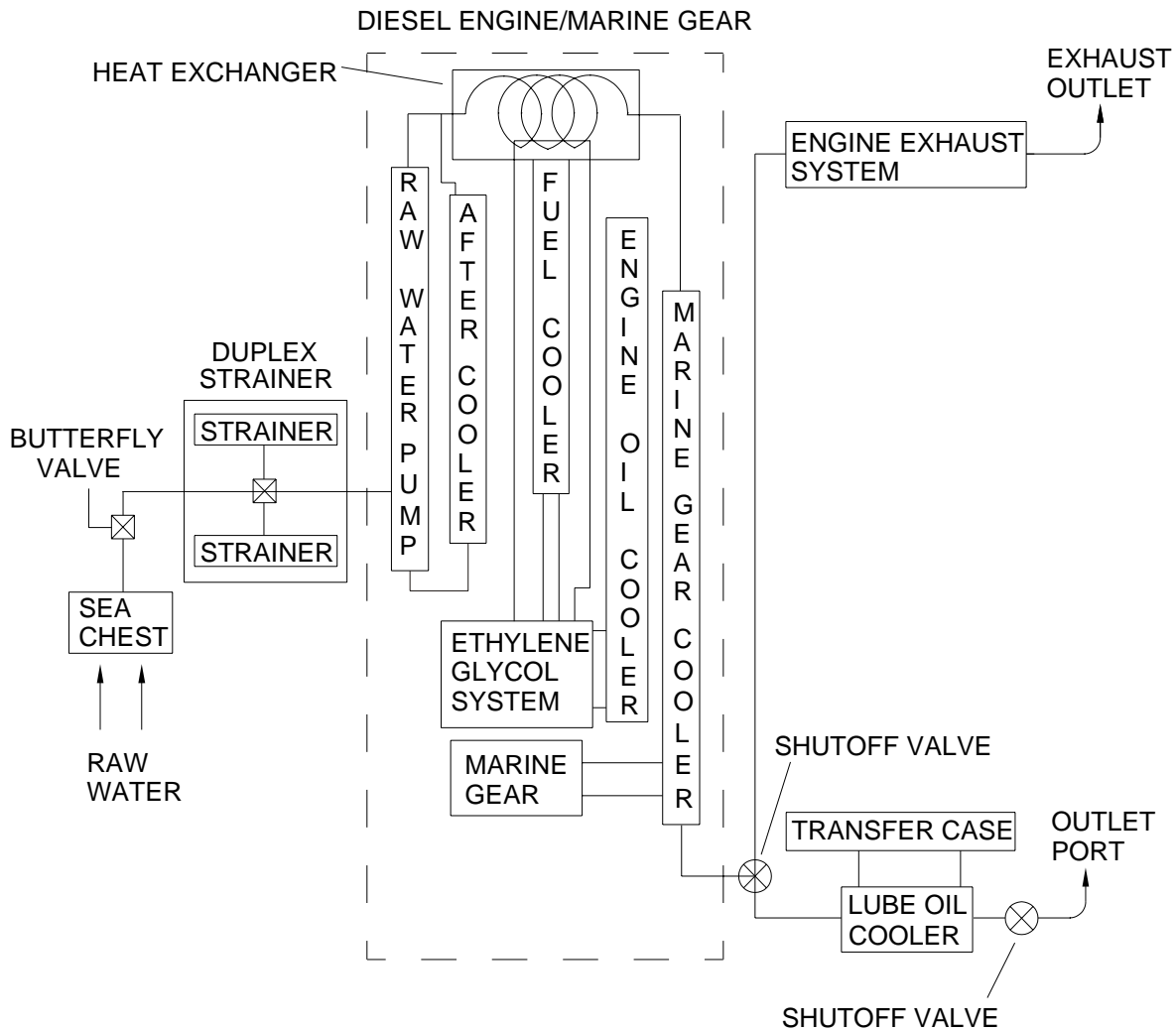
Pump-Jet

Each propulsion module is equipped with a 360° steerable pump-jet propulsion unit capable of delivering 6,000 lb of thrust. The pump-jet works on the principal of a rotary pump and consists of a drive shaft that drives an upper gearbox assembly that drives an impeller. Water is sucked into the pump-jet through a feeding funnel on the bottom of the module and fed into the enclosed pressure casing, whose bottom plate is provided with three systematically arranged outlet nozzles from which water is ejected at a 13° angle. A hydraulic steering motor drives a spur gear through a planetary gearbox to rotate the pressure casing and bottom plate (steering nozzles) in both senses of rotation without limitation. A second planetary gearbox is provided to facilitate emergency steering. The emergency steering control stand is mounted abovedeck and interfaces with the through shaft of the planetary gearbox. The emergency steering gearbox contains a spring set, hydraulically released disc brake. The brake maintains the position of the steering nozzle until rotation is called for by the operator. In the event of hydraulic system failure, the brake can be released via the hydraulic hand pump to facilitate emergency steering. An electromechanical feedback unit monitors relative steering position of the steering nozzle and transmits that position to a dial indicator in the operators cab. An electric sensor monitors the oil level in the upper gearbox and sends a signal to an indicating light in the operators cab when the oil level is below the required level.



COOLING AND EXHAUST (SEAWATER) SUBSYSTEM

The engine and exhaust system consists of the seachest (raw water inlet, integral with the structure of the module), butterfly valve, duplex strainer, engine raw water pump, aftercooler, engine coolant heat exchanger, marine gear oil cooler, exhaust water shutoff valve, transfer case oil cooler, transfer case shutoff ball valve, water cooled muffler and exhaust flappers. The water cooling system dissipates heat generated by the diesel engine, engine exhaust, marine gear and transfer case. This is accomplished by circulating raw (sea) water through the engine raw water pump, engine heat exchanger, marine gear oil cooler, transfer case oil cooler and muffler. The system is an open loop, drawing naturally cool seawater in one side and discharging heated seawater out of the other in a continuous cycle. The process requires the interaction of the following five subsystems.



Raw Water (Seawater) Subsystem

An engine driven raw water pump draws seawater from the seachest in the bottom of the hull through a duplex strainer to a heat exchanger at the front of the engine. Freshwater (ethylene glycol) cooling lines are passed through the heat exchanger. The raw water circulates around the engine coolant lines, lowering the temperature of the ethylene glycol coolant. Raw water exiting the heat exchanger is channeled through the marine gear oil cooler. Lubricating oil lines from the marine gear oil cooler is then channeled in two directions. A portion of the water is piped into the exhaust inlets to the muffler, cooling the muffler and exiting the module via the through hull assembly. The remaining water is piped through the transfer case lube oil cooler and exits the module via an outlet port.

Freshwater (Ethylene Glycol) Subsystem

Coolant is drawn by the engine water pump from the heat exchanger and is circulated through the engine lube oil cooler, cylinder block, cylinder heads and exhaust manifolds to the thermostat housings. A bypass from the thermostat housings to the inlet side of the water pump permits circulation of coolant through the engine when thermostats are closed. When the thermostats are open, the coolant flows through the heat exchanger where it is cooled. Thermostats control and regulate the flow of coolant within the freshwater cooling system to control engine temperature.

Marine Gear Oil Cooler

Raw water exiting the engine heat exchanger passes through the marine gear lube oil cooler. A gear pump, integral to the marine gear, circulates case oil from the marine gear through external lines to a heat exchanger type oil cooler and back to the transmission. Seawater passing through the oil cooler is circulated around the heat exchanger, lowering the temperature of the lube oil. The bearings, clutches and gears are lubricated and cooled by the returning lube oil.

Water Cooled Muffler

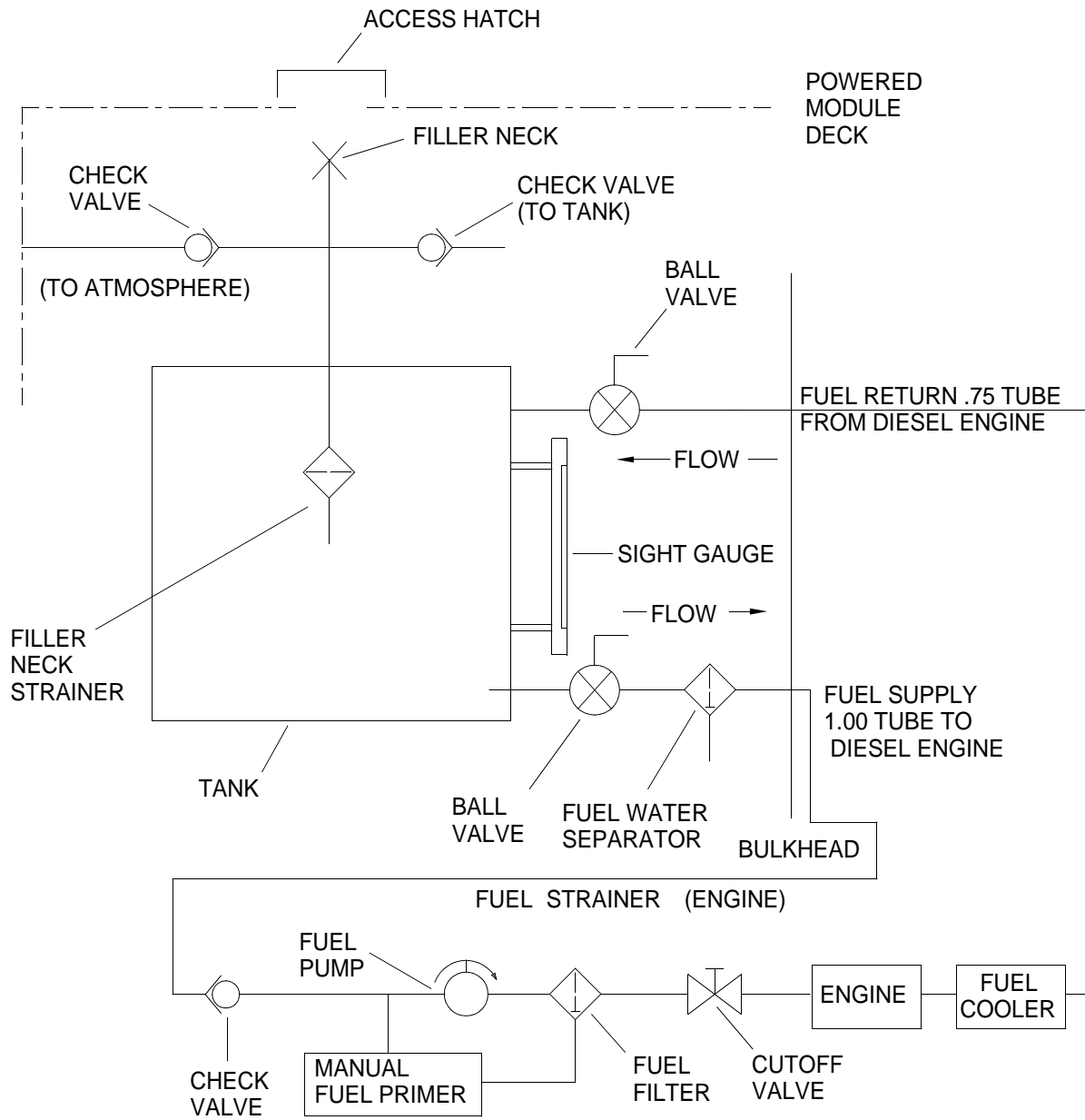
A normally open ball valve allows raw water exiting the marine gear oil cooler to be pumped into the exhaust system between the turbo charger and the muffler, filling the muffler with water and cooling prior to being expelled through the exhaust flapper port with the engine exhaust fumes. In addition to cooling the muffler, the water also acts as a noise dampening media within the muffler itself.

Transfer Case Lube Oil Cooler

A normally open ball valve allows raw water exiting the marine gear oil cooler to be pumped through the transfer case oil cooler. A gear driven pump, operated by rotation of the transfer case gearing, circulates lube oil from the transfer case through external lines to the heat exchanger type transfer case lube oil cooler and back to the transfer case. Seawater passing through the heat exchanger cools the lube oil. The cooled oil is returned to the top of the transfer case, lubricating the upper gears and bearings and cooling the unit simultaneously.

FUEL SYSTEM

The fuel system provides a filtered fuel supply to the diesel engine and is identical for port and starboard propulsion modules. A fabricated steel fuel tank stores 400 gallons of diesel fuel. The level of fuel in the tank can be viewed through a sight gauge located on the side of the tank. Fuel is added to the tank through a filler neck and filtered through a mesh strainer and plug, located on the top of the tank. The filler neck is accessible from the deck of the propulsion module through an 8 in. hatch. During refueling, air is vented from the tank through a check valve. Another check valve allows air to be drawn into the fuel tank as fuel is consumed. Fuel supply and return lines are sized to reduce fuel line pressures. During operation, fuel flows out of the tank through a one in. diameter fuel supply line to a fuel/water separator to remove water (condensation or other moisture) from the fuel. Fuel then travels through the supply line and is drawn through a secondary fuel filter mounted on the engine before entering the inlet fuel manifold, then through the fuel pipes to the inlet side of the fuel injectors. Surplus fuel returns from the outlet side of the fuel injectors to the fuel return manifold and then back to the fuel tank through a 0.75 in. diameter fuel return line. A fitting in the fuel outlet manifold in one of the cylinder heads maintains fuel system pressure. A check valve in the supply line prevents fuel from draining back to the tank when the engine is not running. Ball valves are provided on the supply and return lines to shut off the flow of fuel during maintenance and when the WT is not in operation.



VENTILATION SYSTEM

The ventilation system draws outside air and directs it below deck around the engine and other propulsion module components, removing heat and toxic fumes aft to be expelled to the atmosphere through the exhaust plenums. In addition, the intake plenum flapper door closes when the fire suppression system is activated, shutting off the supply of air to the machinery compartment. A secondary purpose of the system is to provide service access to the components below deck through large, removable deck covers. The WT ventilation system is comprised of the following components and operating mechanisms listed below.

Air Intake Plenum

The air intake plenum accepts outside air and directs it below deck to the machinery compartment. It is mounted on the engine hatch of the propulsion module facing forward. The plenum may be located on either the port or starboard side, depending on placement of the operators cab for that section. An air intake plenum is built into the front of the operators cab. The intake plenums also include the conduit entry plates for the electrical interconnect when the propulsion modules are assembled into a powered section.

Air Intake Plenum Flapper Door (Damper)

The intake plenum contains a flapper door which works in conjunction with the fire suppression system. A wire rope, attached to the flapper door within the intake plenum, is released when the fire suppression system is activated. This allows the flapper door to fall due to its own weight and rotate about 45° downward, closing the door and preventing oxygen from feeding a fire within the machinery compartment of the propulsion module.

Ventilation Fan (Exhaust Fan)

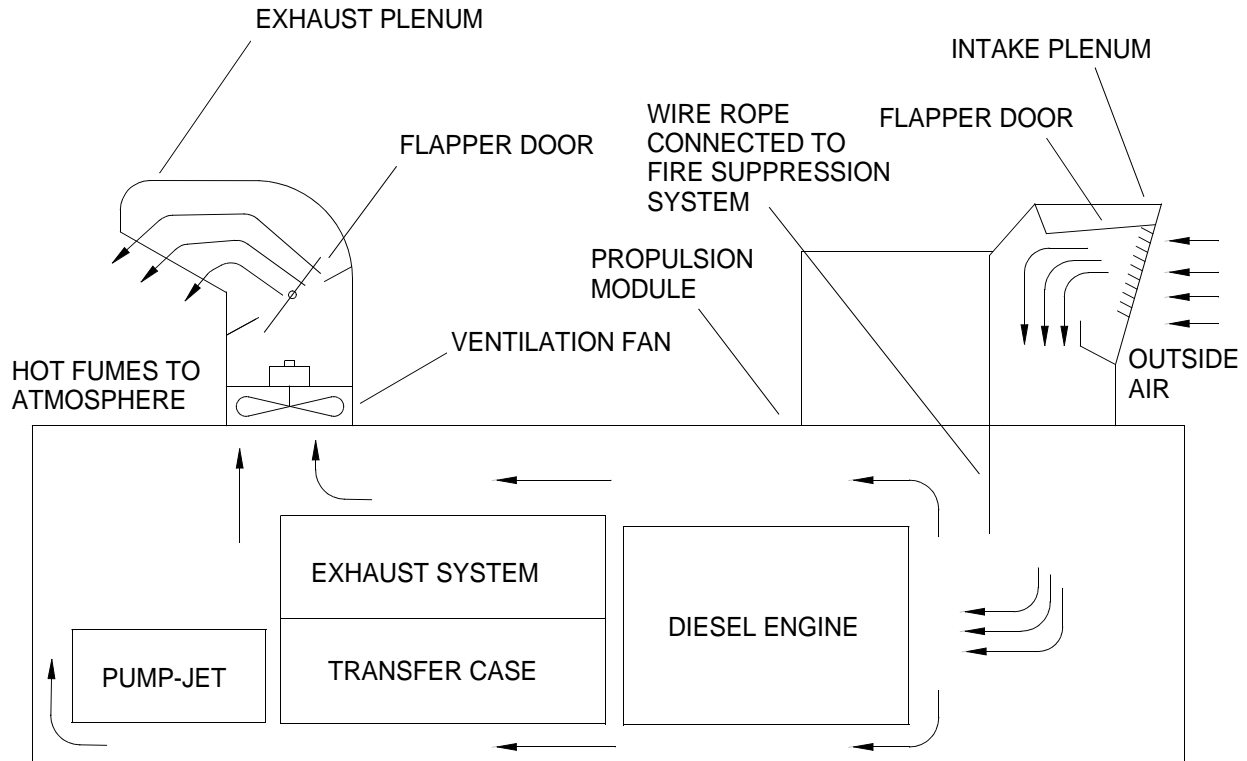
A ventilation fan draws hot fumes from below deck within the machinery compartment of the propulsion module. The blower moves air through the exhaust plenum at 3,075 cubic ft per minute. It removes heat from the engine, pump-jet and drive train components, forcing the hot fumes abovedeck and expelling them to the atmosphere. The marine duty 18 in. inner diameter ventilation fan has a cast aluminum alloy fan and is located at the intake side of the exhaust plenum. The blower has a ¾ HP, 24 VDC motor and runs at 1,750 RPM. Under normal operating conditions, the blower is controlled from a toggle switch located in the operators cab. If the fire suppression system is activated, power to the blower is disconnected automatically.

Exhaust Plenum

A welded metal structure, the exhaust plenum contains a ventilation fan and a flapper door. It is mounted on the thruster hatch of the propulsion module facing aft and provides ventilation for the machinery compartment of the propulsion module. A ventilation fan at the intake end of the plenum draws air from below deck, creating a vacuum which draws air through the intake plenum and expels hot, toxic fumes to the atmosphere.

Exhaust Plenum Flapper Door (Damper)

A hinged flapper is housed within the plenum. It is manually opened and closed. If the fire suppression system is activated, the flapper has to be closed manually, eliminating a second source of air to any fire below deck.



WT ELECTRICAL SYSTEM

The WT electrical system is provided with 24 VDC power from three separate power sources, identified as engine, house and auxiliary.

The engine power source consists of two 12 VDC batteries (BT7 and BT8), connected in series, which are located on the starboard side of the propulsion module. These provide power to the engine starting circuitry, through the engine junction box (A4), for engine related alarms and control functions, through the Engine Control Module (ECM) and Marine Interface Module (MIM), and to a NATO receptacle (NR-1 Engine).

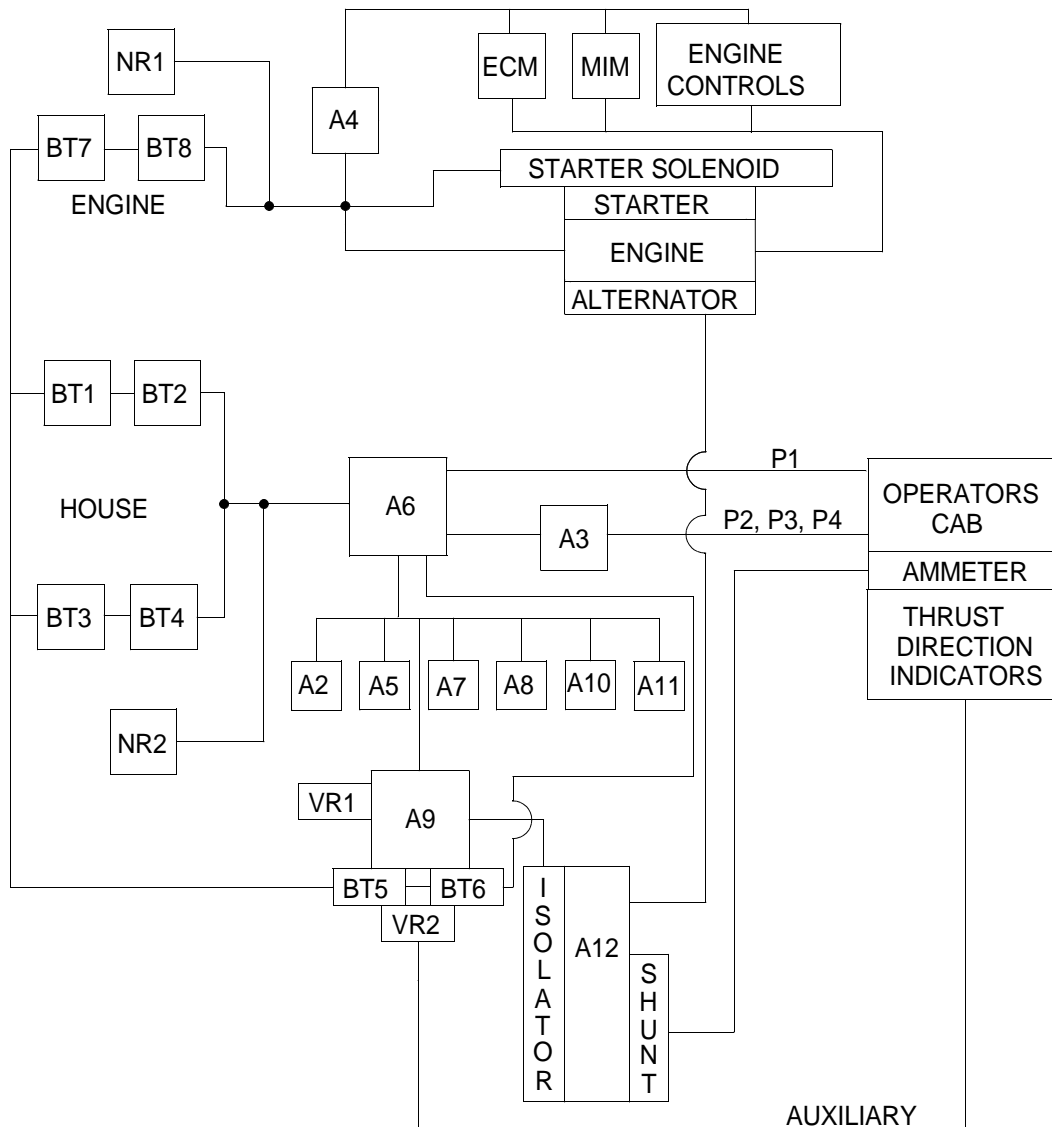
The house power source consists of four 12 VDC batteries (BT1, BT2, BT3 AND BT4), connected in series parallel, which are located on the port side of the propulsion module. These provide power to the propulsion module circuit breaker panel (A6) and a NATO receptacle (NR-2 House). From A6 and the propulsion module junction box (A3), power is distributed to the operators cab, the bilge pump control panel (A5), the single bilge pump control panel (A7), the pump jet (A2) control system, the vent fan relay enclosure (A8), the engine space light switch box (A10) and the lazaret (lights) switch (A11).

The auxiliary power source consists of two 12 VDC batteries (BT5 and BT6), connected in series, and a voltage regulator (VR2) all located in the thruster direction/auxiliary battery junction box assembly (A9). These provide emergency power to the operator cab thrust direction indicators in the event of power loss from A6.

All three power sources are charged from the engine alternator via a triple output isolator located in the isolator junction box assembly (A12) and a voltage regulator (VR1) located in A9. The alternator output current is displayed on an ammeter that is shunt-driven and located on the middle control panel of the operators cab.

To interface both port and starboard propulsion modules with the operators cab, the port side control cabling from A3 (P2, P3, P4) and A6 (P1) are connected, through the air intake plenum, to the electrical interconnect assembly, which in turn is connected to the A6 receptacle on the front interior of the operators cab. The starboard side control cabling from A3 (P2, P3, P4) and A6 (P1) are connected to the A5 receptacle on the front interior of the operators cab. Both the A5 and A6 receptacles are accessible through side panels on the exterior of the operators cab.

In the event of a battery source loss, the 50 ft NATO slave cable can be connected from an exterior power source to NR-1 to start the engine and charge the batteries or NR-2 to power the house circuitry. The NATO receptacles can also work in the opposite direction, allowing a propulsion module, via the NATO slave cable, to provide battery power to another piece of equipment, such as the generator container on the RRDF.



A2 Pump-Jet
 A3 Propulsion Module Junction Box
 A4 Engine Junction Box
 A5 Bilge Pump Control Panel
 A6 Propulsion Module Circuit Breaker Panel
 A7 Single Bilge Pump Control Panel

A8 Vent Fan Relay Enclosure
 A9 Thruster Direction/Auxiliary Battery Junction Box
 A10 Engine Space Lighting Switch
 A11 Lazaret Light Switch
 A12 Isolater Junction Box Assembly
 BT1-8 Batteries
 NR-1&2 NATO Receptacles

Ventilation

Both port and starboard units are equipped with a ventilation system. This system circulates outside air from the intake plenum through the engine compartment and out the exhaust plenum. The ventilation system is operated by a blower equipped with a $\frac{3}{4}$ HP, 24 VDC motor. The unit is powered by the 24 VDC house batteries, main circuit breaker, branch breaker, CO₂ pressure switch, operator switch and vent fan relay enclosure A8K1 relay.

Bilge Flood Warning and Control System (Port or Starboard)

The bilge system is powered by the 24 VDC house batteries. The power is fed through the propulsion module circuit breaker panel A6 to the bilge pump control panel A5 and single bilge pump control panel A7 up to the cab control. The float switches enable the pumps and provide a signal to the cab control that allows the operator to hear the alarm and check the red activated indicator(s) for location of flooding. The alarm silence switch should also be activated. The pump run switch provides remote operation from the operators cab to power the pump start relay contacts that start the pump and activates the green indicating lamp on the lower control panel A2. The pumps can be locally operated at the A5 and A7 control panels without having the float switches actuated.

Communications

AN/VRC-90A SINCGARS RADIO. The AN/VRC-90A SINCGARS radio receives 24 VDC power from the house batteries via the operators cab circuit breaker panel A3. The signal output of the transmitter is generated from the outdoor antenna.

VHF/FM DSC TRANSCEIVER. The VHF/FM DSC transceiver receives 12 VDC power from the house batteries via the VHF/FM DSC transceiver 24 to 12 VDC converter (VR1). This circuit is protected by a 10 amp fuse in JB1 and an inline ferrite line interference conditioner. The signal output of the transceiver is generated from the transceiver antenna.

VHF/FM HANDHELD TRANSCEIVER. Each VHF/FM handheld transceiver receive power from a self-contained, replaceable and rechargeable nickel-cadmium battery pack. The battery packs are recharged by battery chargers. The battery chargers receive 12 VDC power from the house batteries via a 24 to 12 VDC converter (VR2). The circuit is protected by a one amp fuse in JB3.

Public Address Set (Loudhailer). The loudhailer receives 12 VDC power from the house batteries via a 24 to 12 VDC converter (VR2). The circuit is protected by a six amp fuse in JB3 and an inline ferrite line interference conditioner.

VHF/FM DSC TRANSCEIVER 24 TO 12 VDC CONVERTER (VR1). The 24 VDC to 12 VDC voltage converter receives 24 VDC power from the house batteries and reduces the voltage to 12 VDC to power the VHF/FM DSC transceiver.

24 VDC TO 12 VDC CONVERTER (VR2). The 24 VDC to 12 VDC voltage converter receives 24 VDC power from the house batteries and reduces the voltage to 12 VDC to power the loudhailer, VHF/FM handheld transceiver battery chargers and the compass.

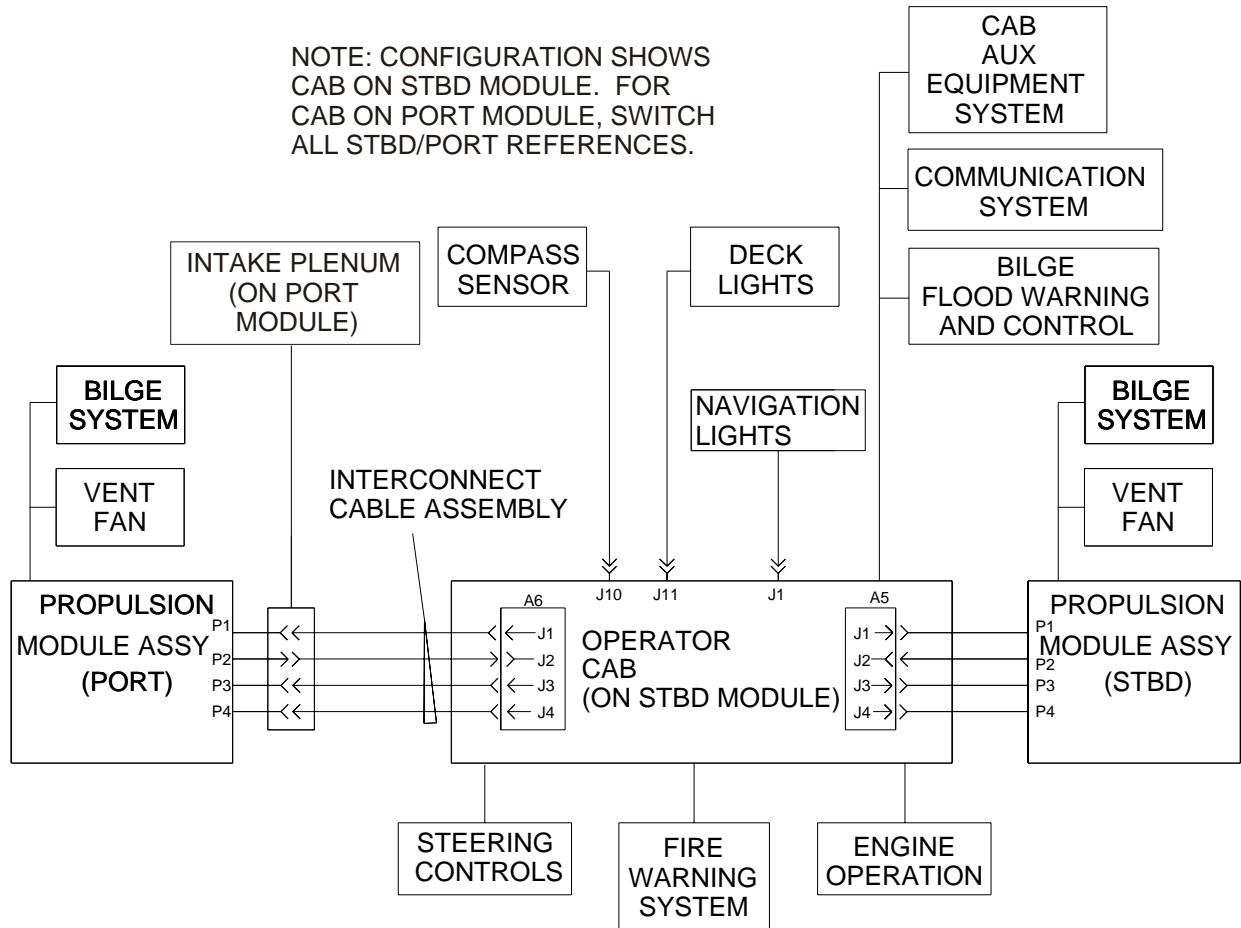
AN/PSN-11(V)1 PRECISION LIGHTWEIGHT GLOBAL POSITIONING RECEIVER (PLGR). The AN/PSN-11(V)1 PLGR receives 24 VDC power from the house batteries. The circuit is protected by a one amp fuse in JB3.

Navigation System

NAVIGATION LIGHTS. The main assembly mast lights receive 24 VDC power from the house batteries via the operators cab circuit breaker panel A3 through the mast enclosure assembly A7. The enclosure contains the switches, warning lights and alarm system for controlling the main assembly mast primary and spare lights. The stub assembly mast lights are each powered by four 6 VDC batteries.

COMPASS. The compass receives 12 VDC power from the house batteries via a 24 to 12 VDC converter (VR2). It contains a backlight that is powered from the panel dimmer switch fed by the operators cab circuit breaker panel A3. The compass also has a remote sensor mounted on the main assembly mast. The circuit is protected by a one amp fuse in JB3.

SPOTLIGHT. The spotlight receives 24 VDC power from the receive 24 VDC power from the house batteries via the operators cab circuit breaker panel A3 and the operator control switch on the middle control panel A1.



Diesel Engine

The Series 60 Diesel Engine used to power the WT is a four-stroke cycle, high speed, diesel engine. For complete operation of this diesel engine, refer to TM 55-1945-222-14&P.

Engine Operation (Port and Starboard)

The engine receives 24 VDC power from the engine batteries to operate the engine starter motor, starter contact B1, and engine starter solenoids L3. During cold weather conditions (+25°F or less), an engine cold pack starting aid automatically supplies ether into the air inlet housing of the blower. In case of extreme cold weather starting conditions, the engine power system is also equipped with a NATO receptacle. The engine contains the following operation switches and sending units that provide signals to the operator controls listed below.

Engine Control Module (ECM)

The engine control module receives electronic inputs from sensors mounted on the engine to control engine operation and also controls the solenoid operated valves in the fuel injection system. The engine sensors monitor water temperature, oil temperature and oil pressure.

WATER TEMP SENSOR. The water temperature sensor A1MT1 provides a signal to operators cab water temperature gauge. If the water temperature rises above 210°F (96°C), the engine malfunction relay A1K5 is energized via the ECM to activate the engine alarm bell and indicator.

OIL TEMP SENSOR. The oil temperature sensor A1MT2 provides a signal to operators cab oil temperature gauge. If the oil temperature rises above 240°F (116°C), the engine malfunction relay A1K5 is energized via the ECM to activate the engine alarm bell and indicator.

OIL PRESS SENSOR. The oil pressure sensor A1MT3 provides a signal to operators cab oil pressure gauge. If the oil pressure drops below 20 PSI (138 kPa), the engine malfunction relay A1K5 is energized via the ECM to activate the engine alarm bell and indicator.

Marine Interface Module (MIM)

The marine interface module provides an interface between the ECM, engine control box and engine related sensors. During normal operation, the MIM ignition indicator will light green. When the engine ignition is initially activated, the orange and red indicators will flash momentarily then go out. A flashing orange light indicates an engine condition that requires maintenance personnel to perform an engine diagnostic test. The red indicator light represents a major engine malfunction requiring the operator to shutdown the engine to prevent damage. The MIM also provides maintenance personnel with a connection point for diagnosing engine malfunctions with test equipment.

Miscellaneous Engine Controls

ENGINE NORMAL STOP PUSHBUTTON. The engine normal stop pushbuttons, located in the operators cab and on the engine control box below deck, disconnects the 24 VDC signal to the ignition relay that will stop the engine under normal conditions.

ENGINE HOUR METER. The engine hour meter, located on the engine control box below deck, receives 24 VDC power from the engine batteries and is energized when the engine is running.

Engine Alternator

The engine alternator provides power to recharge the house, engine and auxiliary battery systems. It is controlled by the thruster direction/auxiliary junction box assembly A9VR1 voltage regulator and distributed through the A12S1 isolation diode. The operators console ammeter(s) indicate the alternator output.

Operator Engine Control, Alarms and Indicator System

The following items extend the engine system for engine operation.

ENGINE GAUGES. The engine gauges in the operators cab receive their signals from the engine sensors and are powered from the 24 VDC engine batteries via the engine controls circuit breaker located on the engine junction box (A4).

ENGINE POWER SWITCHES. The engine power switches provide power from the engine batteries for gauge operation via the engine controls circuit breaker located on the engine junction box (A4) and enables the engine start pushbuttons.

ENGINE START SWITCHES. The engine start switches provide power to the engine start relay A1K1 from the engine batteries through the clutch deenergized normally closed relay (A4K2/A4K3). If the clutch switch is in either the forward or backflush positions, the engine will not start.

ENGINE ALARM WARNING/INDICATING SYSTEM. The engine alarm warning/indicating system, upon receiving an alarm from the ECM, will activate an indicating light and bell. At this point, the alarm/silence/test switch can be actuated.

ENGINE ALARM/SILENCE/TEST SWITCH. The alarm/silence/test switch, when moved from the alarm to the silence position, removes power from the alarm bell only. When the alarm condition is cleared, the indicating light will go out and the switch can be moved back to the alarm position. The test position provides power to the bell and the indicating light. This test position is a momentary contact.

ENGINE THROTTLE CONTROL. The engine throttle control provides a signal to the ECM/MIM that tells the engine to speed up or to slow down. The power source for this control comes from the MIM.

MARINE GEAR (FORWARD/DISENGAGED/BACKFLUSH). The marine gear (forward/disengaged/backflush) provides power to shift the gear solenoids. This power comes from the propulsion module circuit breaker panel A6 and activates the forward solenoid or backflush solenoid. The operator cab A4K2 port and A4K3 starboard relays activate an indicating light on the lower control panel A2. If the clutch switch is in the forward or backflush position, the engine starting system will not work because the clutch relay contacts in the starting circuit will be open and the engine will not start.

Lighting System

OPERATOR STATIONS. The operator station middle and lower control panel lights receive 24 VDC power from the house batteries via the cab circuit breaker panel A3. The lights are activated by their switch control source and controlled by a dimmer switch. Red indicator lights are used for alarm conditions and are not dimmable. Gauge backlights are dimmable from the dimmer switch.

CAB SPOTLIGHT. The cab spotlight receives 24 VDC power from the house batteries via the cab circuit breaker panel A3 and the operator control switch mounted on the middle control panel. The spotlight is used for deck night work and navigation buoy night identification.

ABOVEDECK LIGHTING. The deck lighting receives 24 VDC power from the house batteries via the cab circuit breaker panel A3. These lights are activated by a toggle switch on the operators cab circuit breaker panel A3.

BELOWDECK LIGHTING. The machinery and lazaret compartments lighting systems receive 24 VDC power from the house batteries via the propulsion module circuit breaker panel A6. Each compartment has a light switch to activate the area lighting, A10 in the machinery compartment and A11 in the lazaret.

BATTLE LANTERNS. The battle lanterns are powered by two 6 VDC batteries. The cab light has a red lens and below deck lights have white lenses.

Steering (Port and Starboard) Systems

PUMP-JET THRUSTER DIRECTIONAL CONTROL. The pump-jet thruster directional controls are manually controlled levers on the operator console, receiving 24 VDC power from the house batteries via the main circuit breaker panel A6 and the thruster junction box breaker to direct port and starboard pump-jet thrusters. The levers move forward and backward only, which energizes the clockwise and counterclockwise rotation relays and contacts K1 and K2 that operate the hydraulic power units thruster solenoids A2JB1-L4 and L5. The steering speed can be adjusted by variable resistors A2JB2-R1 and R2.

PUMP-JET THRUSTER DIRECTIONAL INDICATORS. The pump-jet thruster directional indicators receive 24 VDC power from the alternator and the auxiliary 24 VDC battery supply through the propulsion module circuit A6CB14 and are activated by the A9K1 relay contact, which is controlled by the engine starting system. The 24 VDC power to the pump-jet thruster directional signal and indicator has a line converter that stabilizes the 24 VDC power source. The pump-jet thruster directional signal comes from the feedback potentiometer.

FIRE ALARM SYSTEM (PORT AND STARBOARD). The fire alarm system (port and starboard) receives 24 VDC power from the propulsion module circuit breaker A6CB4. The circuit is activated by two temperature switches S8 and S9 that send signals up to the operator console and activate the fire alarm horn and warning light. The circuit also has an alarm/silence/test switch which, when moved from the alarm to the silence position, cuts power to the alarm horn and provides power to the indicating light. When the alarm condition has cleared, the indicating light will go out and the switch can be moved back to the alarm position. The test position will provide power to the horn and indicating light via the cab circuit breaker panel. This test position is a momentary contact.

Cab Auxiliary Systems

HYDRAULIC OIL LOW LEVEL INDICATOR (PORT AND STARBOARD) UNITS. The hydraulic oil low level indicators (port and starboard units) receive a signal from a float switch sending unit in the hydraulic tank, which provides a signal up to the operator console via the 24 VDC house batteries.

PUMP-JET GEARCASE LOW OIL LEVEL INDICATOR. The pump-jet gearcase low oil level indicator receives its signal from the oil level sending unit. The power comes from the 24 VDC house batteries through the sending unit and activates the low level indicator.

WINDSHIELD WIPER. The operator control switch provides power to the wiper motor from the cab circuit breaker panel A3 and 24 VDC house batteries.

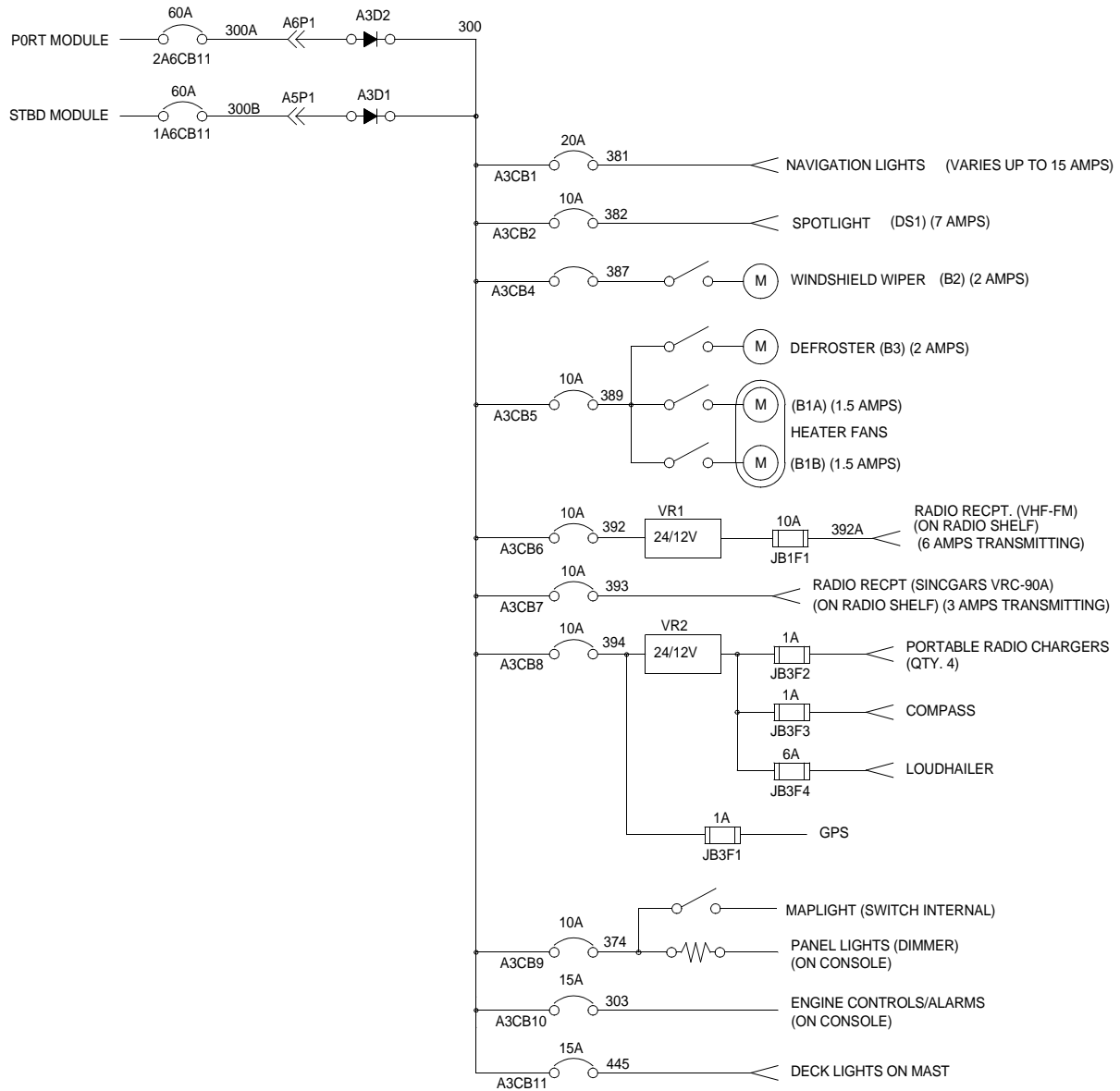
CAB HEATER. Water, heated by the engine cooling system, is circulated through the cab heater. The operator control switch low/off/high provides power to the heater blower motor from the 24 VDC house batteries through the cab breaker panel A3. The blower moves air around the heater coils, heats it and circulates the hot air through the cab. The heater supply line valve controls the amount of hot water dispersed between the heater and defroster.

WINDOW DEFROSTER. Water, heated by the engine cooling system, provides defrosted air. The operator control switch turns 24 VDC on or off to the blower motor from the cab breaker panel via the 24 VDC house batteries.

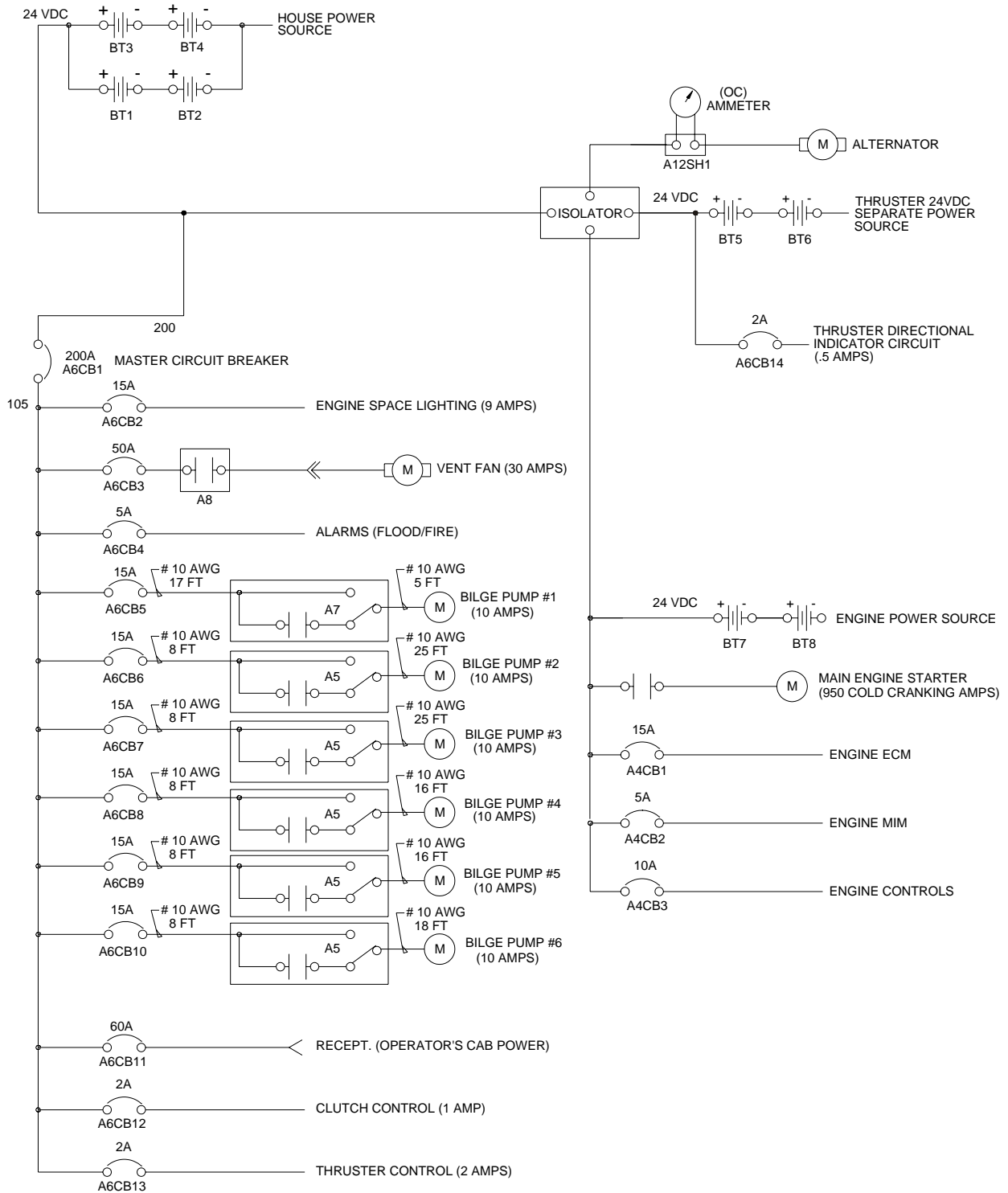
CAB CIRCUIT BREAKER TEST PANEL. The operators cab circuit breaker panel provides circuit protection for all electrical circuits in the operators cab. The panel also provides testing jacks and test point selector switch for testing the operators cab electrical circuits.

Electrical Interconnect System

The electrical interconnect assembly provides power and signal information between the cab twist lock plug/receptacles A5/A6 and the air intake plenum twist lock plug/receptacles A5/A6. Interconnection is determined by operators cab location port or starboard.



(SHEET 1 of 2)



(SHEET 2 of 2)

HYDRAULIC SYSTEM

Powered (Normal) Operation

The hydraulic system contained within each propulsion module provides the steering power and control for rotation of the pump-jet discharge nozzle. The four subsystems comprising this system include: 1) the reservoir system that stores, cools and filters the hydraulic fluid being pumped through the system; 2) the pump drive system, which provides the power to the steering motor; 3) the way-valve assembly, which protects the hydraulic system from overpressurization and controls the actuation of the hydraulic steering motor and; 4) the hydraulic steering motor drive system, which turns the discharge nozzle through 360° continuous rotation in both directions.

Emergency (Manual) Operation

In the event of loss of steering control at the cab due to an electrical failure, the steering system can be manually operated by one of two methods: 1) the use of a manual control lever on the way-valve unit and; 2) the fit-up of the emergency steering unit on the auxiliary planetary gearbox with manual release of the hydraulic brake.

Hydraulic Reservoir

In addition to storing the system hydraulic fluid, the hydraulic reservoir also cools 26 gallons of fluid with open air to all sides, including top and bottom. It also filters the oil through the suction line strainer, return line filter and filler neck screen. The reservoir is equipped with an external sight level gauge to determine actual fluid level and an in-tank float switch to monitor fluid level within and to notify the operator via an indicating light in the cab when it falls below the required level.

Hydraulic Pump

The axial piston hydraulic pump provides the power to drive the hydraulic motor. The pump is driven off the marine gear and is fitted with a flow control regulator. The drive shaft of the hydraulic pump drives a cylinder block causing the pistons within to move in an axial direction. The stroke of the pistons is limited by an internal swash plate which adjusts around the vertical axis of the input shaft, varying the displacement of oil flow infinitely.

Way-Valve Unit

The proportional way-valve is controlled by means of the electrically operated proportional pressure valves or manually by means of the lever on the valve unit. The way-valve guides the hydraulic oil via the dual braking valve to the hydraulic motor.

Dual Braking Valve

The dual braking valve (load retaining valve) avoids uncontrolled rotation of the hydraulic motor caused by negative loads and locks the lines to the hydraulic motor tightly when the way-valve is in the rest position.

Hydraulic Motor

The hydraulic motor is mounted on the input shaft of the pump-jet steering planetary gearbox. The axial piston motor is a constant speed unit with fixed oblique discs supporting nine pistons configured as a rotor.

Three-Way Valve

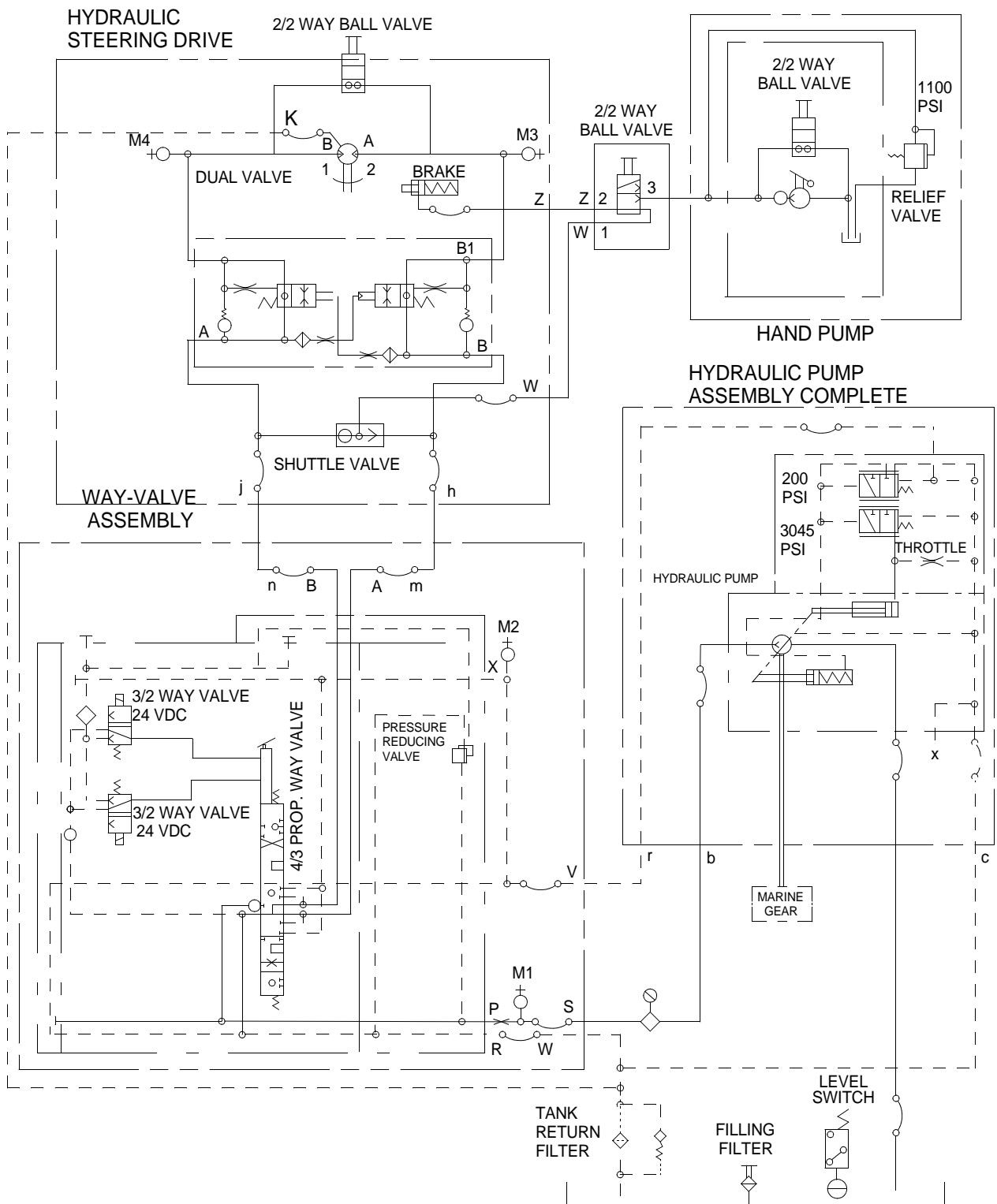
A manually operated, lever actuated, three-way valve is positioned to select normal hydraulic operation or to isolate the normal hydraulic system, so the manual hydraulic hand pump can be used to release the hydraulic brake for emergency steering operation.

Two-Way Valve

A two-way (needle) valve in the closed position during normal operation must be opened to allow for the manual releasing of the hydraulic brake via the hydraulic hand pump.

Manual Hydraulic Hand Pump

The hydraulic hand pump used to release the hydraulic brake for emergency steering operation is equipped with its own small hydraulic reservoir, pressure relief valve, oil fill and oil drain ports.



FIRE SUPPRESSION SYSTEM

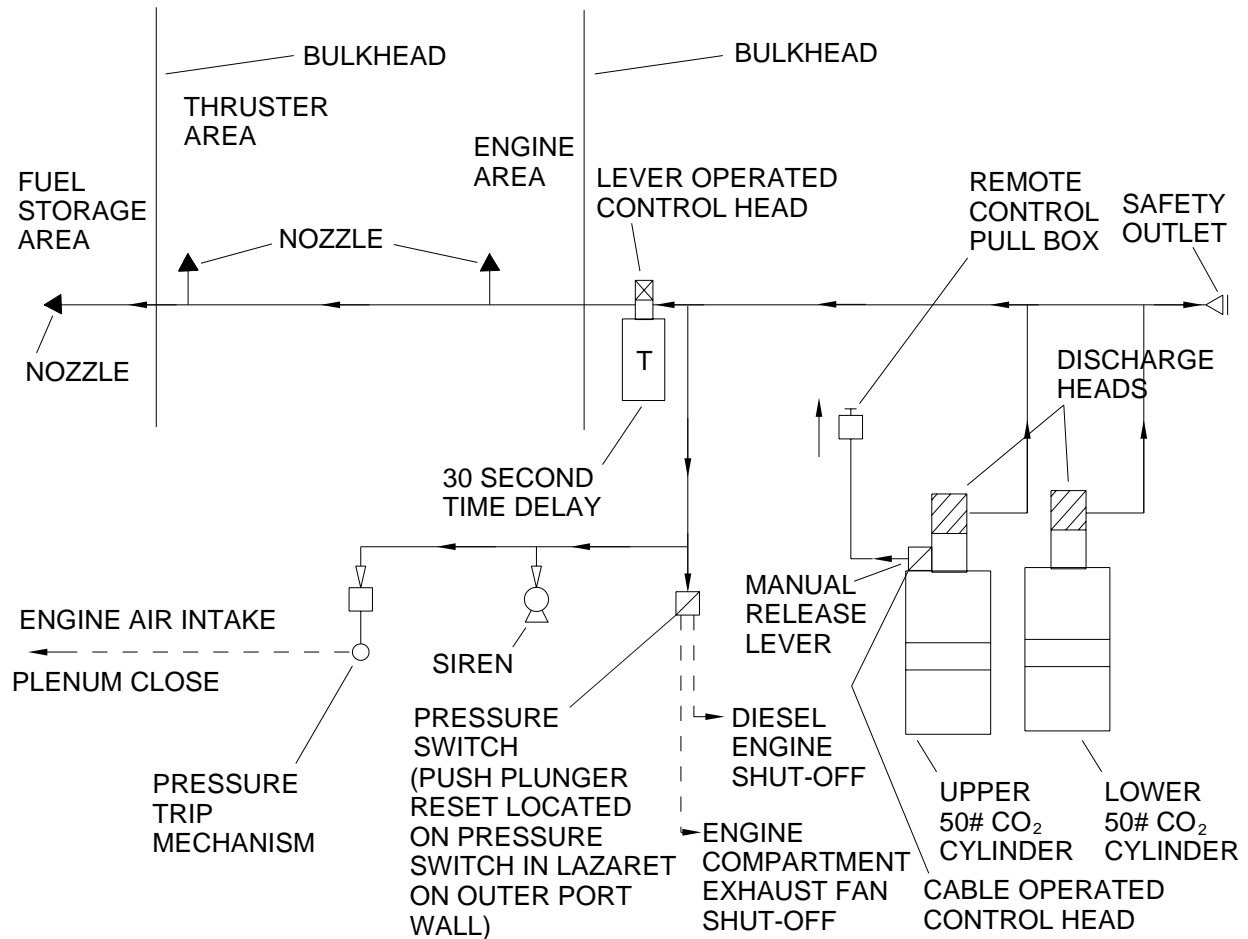
The fire suppression system is designed to flood the propulsion module machinery and fuel storage compartments with carbon dioxide (CO₂) if a fire occurs. System activation is accomplished manually using a remote control pull box recessed in the deck directly forward of the operators cab and air intake plenum.

WARNING

Do not activate fire suppression system if hatch between lazaret and machinery compartment is open. Failure to comply may result in death or injury to personnel.

Manual activation is also provided below deck in the lazaret, where the agent is stored, but not dispersed. The upper 50 lb CO₂ cylinder is equipped with a manual release lever, which initiates discharge the same way as the remote control pull box handle. The 30 second time delay device is also equipped with a manual release handle. However, actuation using this control will bypass the 30 second time delay. Upon activation, CO₂ is released into the system. The discharged CO₂ is directed down two circuit paths. One circuit directs the agent to a pressure operated switch, which immediately shuts off the diesel engine and machinery compartment exhaust fan. The flow of CO₂ also activates a warning siren and operates a pressure trip mechanism to close off the machinery compartment air intake plenum opening. The second circuit directs CO₂ to a 30 second time delay device to allow evacuation time for personnel prior to CO₂ discharge into the protected compartments via the three nozzles. It also provides the delay time needed for the other circuit to shut down the engine and close all air intake and exhaust systems.

After CO₂ has been discharged below deck, Gas Free Engineering personnel (per FM 55-502) must completely clear



any CO₂, test the level of oxygen and certify space is safe for personnel. Next, the CO₂ Pressure Switch push plunger must be depressed to reset system. Once Pressure Switch is reset, the fire suppression system is fully operational.

DECK EQUIPMENT

Equipment onboard the deck of WTs include a diesel powered winch, A-frame, stern anchor and fittings for the assemblies.

Deck Winch

A WT primary working tool is a dual drum diesel-hydraulic reversible winch with a capstan. The winch is installed aft of the operators cab on the centerline. It provides the line pull for the A-frame and the stern anchor. The winch rated line pull is 27,000 lb bare drum and 19,500 lb full drum. Each drum carries 700 ft of 1 in. diameter wire rope. The deck winch also has a 12 in. diameter gypsy at the forward end. The gypsy rated line pull is 5,000 lb. A power take-off is included with the winch to provide power to ancillary equipment and tools that are used on the WT.

A-Frame

The WT A-frame has a lifting capacity of 27,000 lb when the load is forward of the plane of the A-frame legs. The safe working load for loads aft of the plane of the A-frame legs is 12,000 lb. The A-frame assembly includes two legs, a sheave, two foot anchors, two aft guy assemblies, two forward guy assemblies and two ISO corner lug fittings. An elevating pole and elevating pole guy assembly are used for lifting the A-frame during assembly and disassembly, then removed and stowed.

Stern Anchor

The WT stern anchor is a NAVMOOR 1,000 lb anchor (Dry weight = approximately 1,120 lb). It is housed, deployed and recovered from a channel located in the aft center rake module. Movement of the stern anchor is provided by the aft drum winch cable.

Deck Fittings

WT assemblies are provided with deck fittings to meet various operational needs. Available fittings include deck cleats and D-rings. These fittings have a 30,000 lb load capacity. There are 10 tube turns per non-propulsion nodule and five per end rake. The WT modules are provided with recessed lift shackles welded into the deck structure. Shackles have a safe working load capacity of 35 tons. There are two shackles per center and propulsion module and one per end rake. When stowed, the shackles fold down flush with the deck. Each lift shackle recess is provided with a drain system to limit water accumulation.

CHAPTER 2

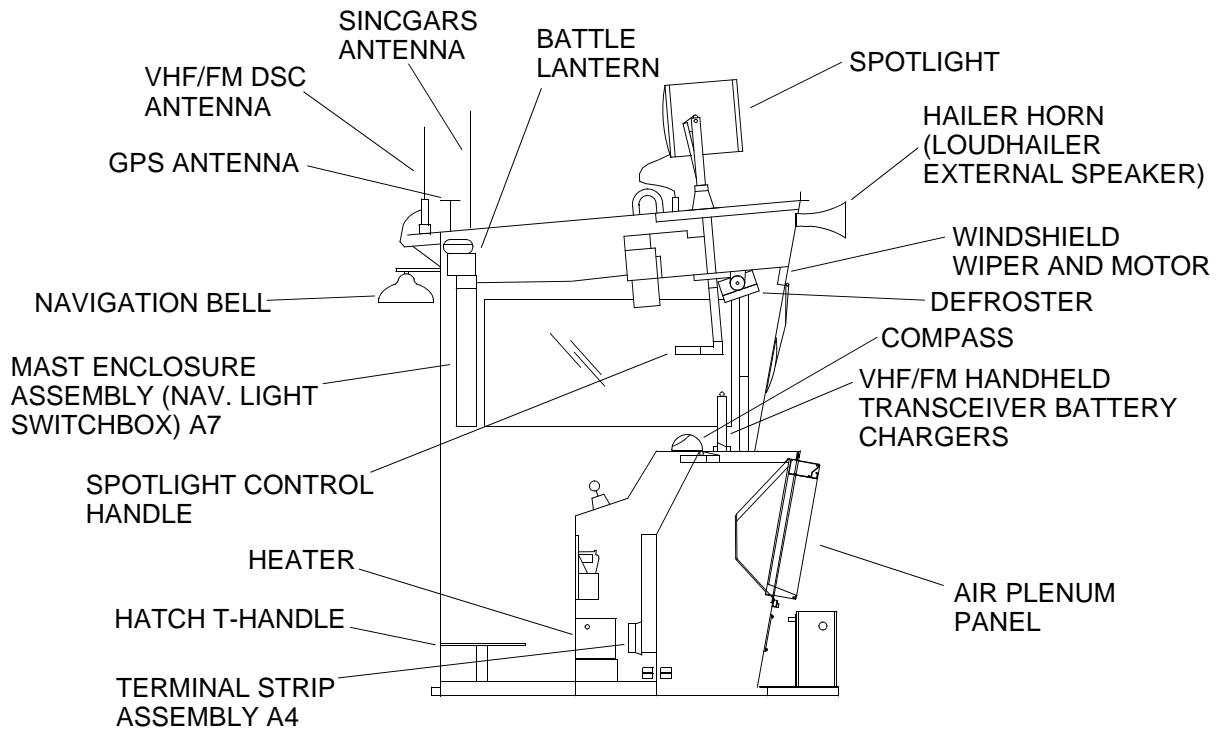
**OPERATOR INSTRUCTIONS
FOR
MODULAR CAUSEWAY SYSTEM (MCS)
WARPING TUG (WT)**

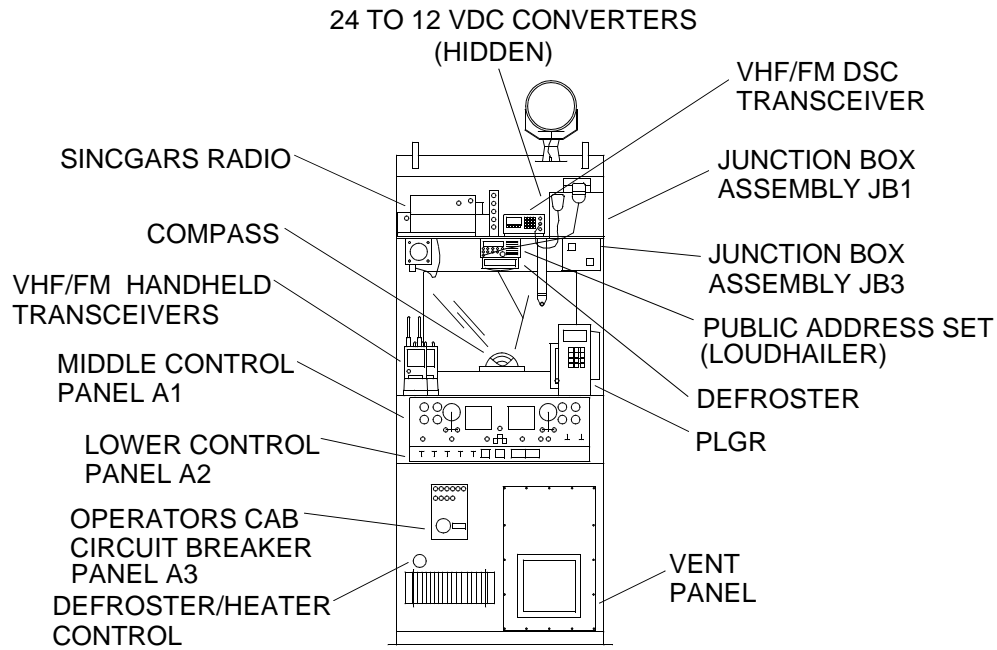
**OPERATOR MAINTENANCE
WARPING TUG
OPERATOR INSTRUCTIONS
DESCRIPTION AND USE OF OPERATOR CONTROLS AND INDICATORS**

INTRODUCTION

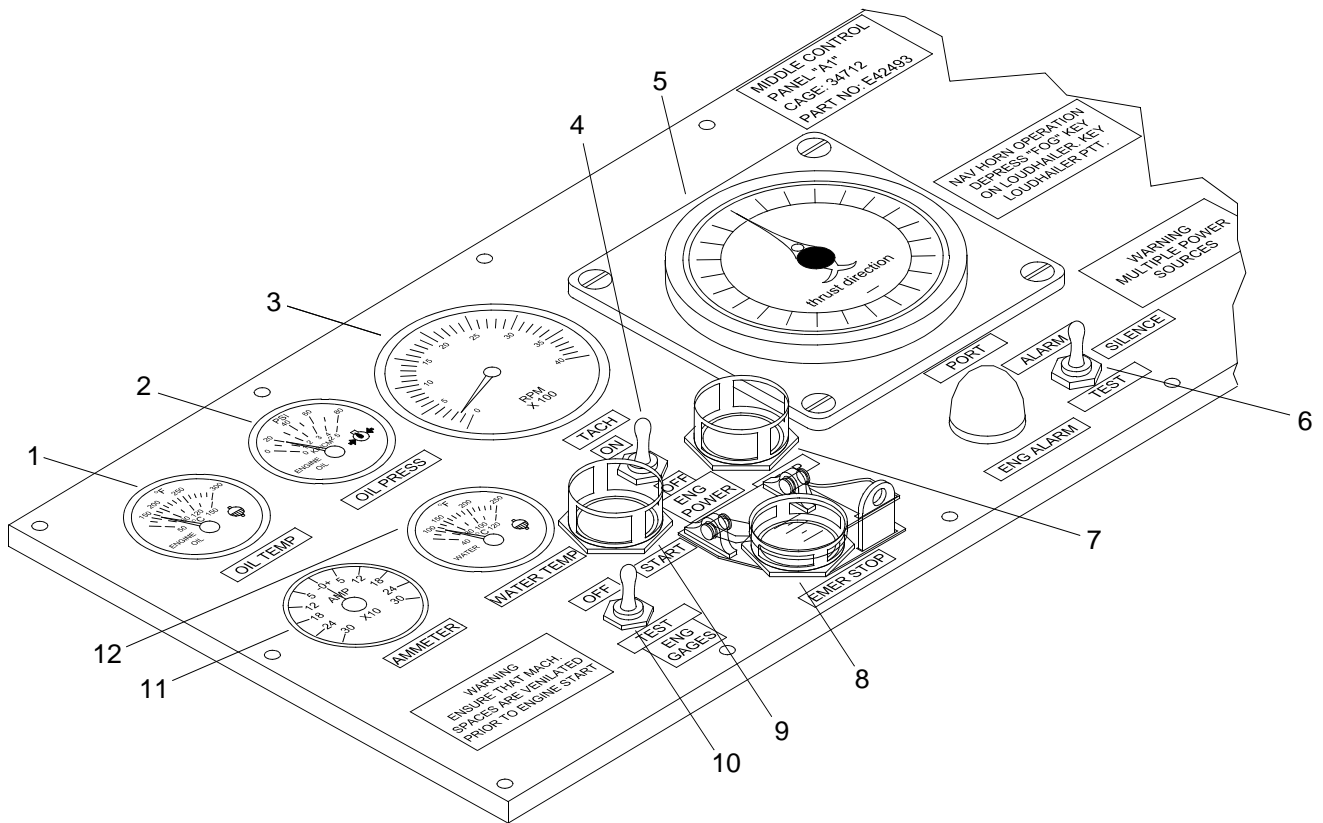
The following paragraphs contain illustrations that show the location of each control and indicator for operation of the WT, broken down into three major areas: operators cab, above and below deck and emergency equipment. Each control and indicator is clearly labeled as it appears on the equipment. Numbers on illustrations are keyed to the tabular listing which contains the name, based on the equipment markings, and the functional description of each control and indicator.

OPERATORS CAB AND ABOVEDECK CONTROLS AND INDICATORS (OVERVIEW)





DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, MIDDLE CONTROL PANEL (A1)



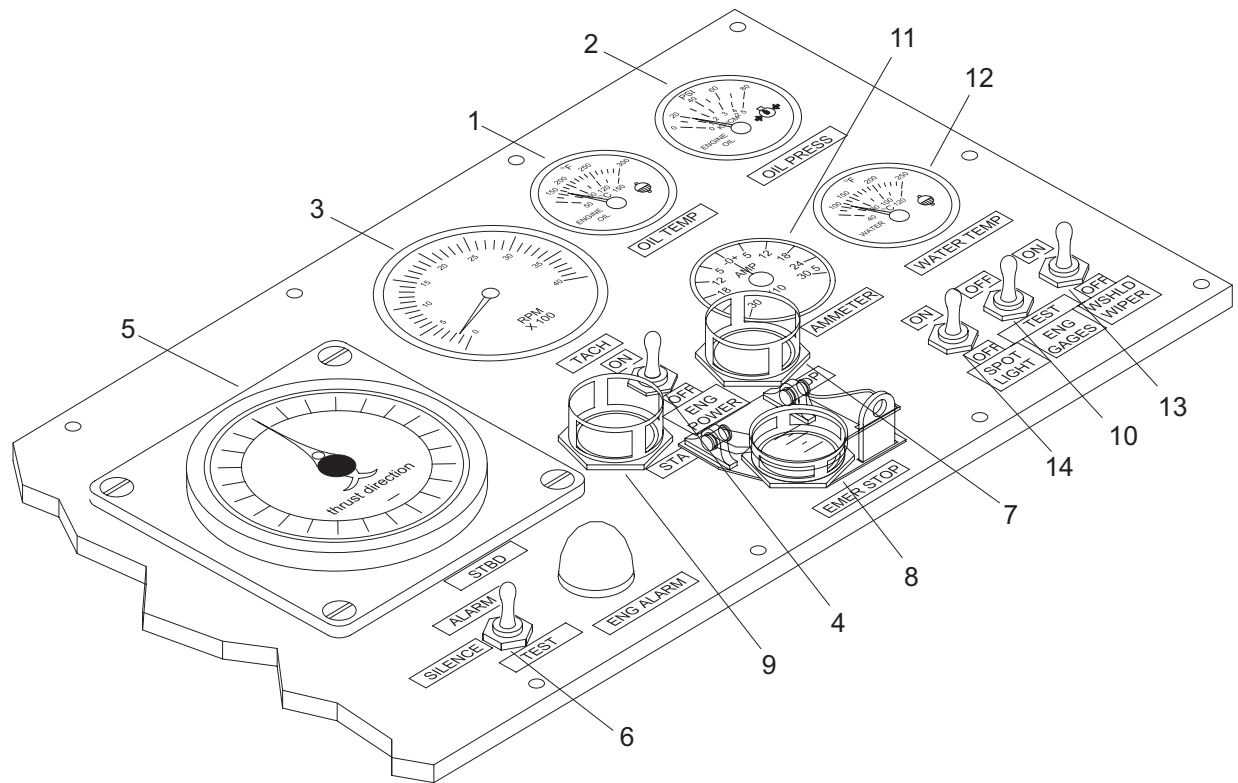


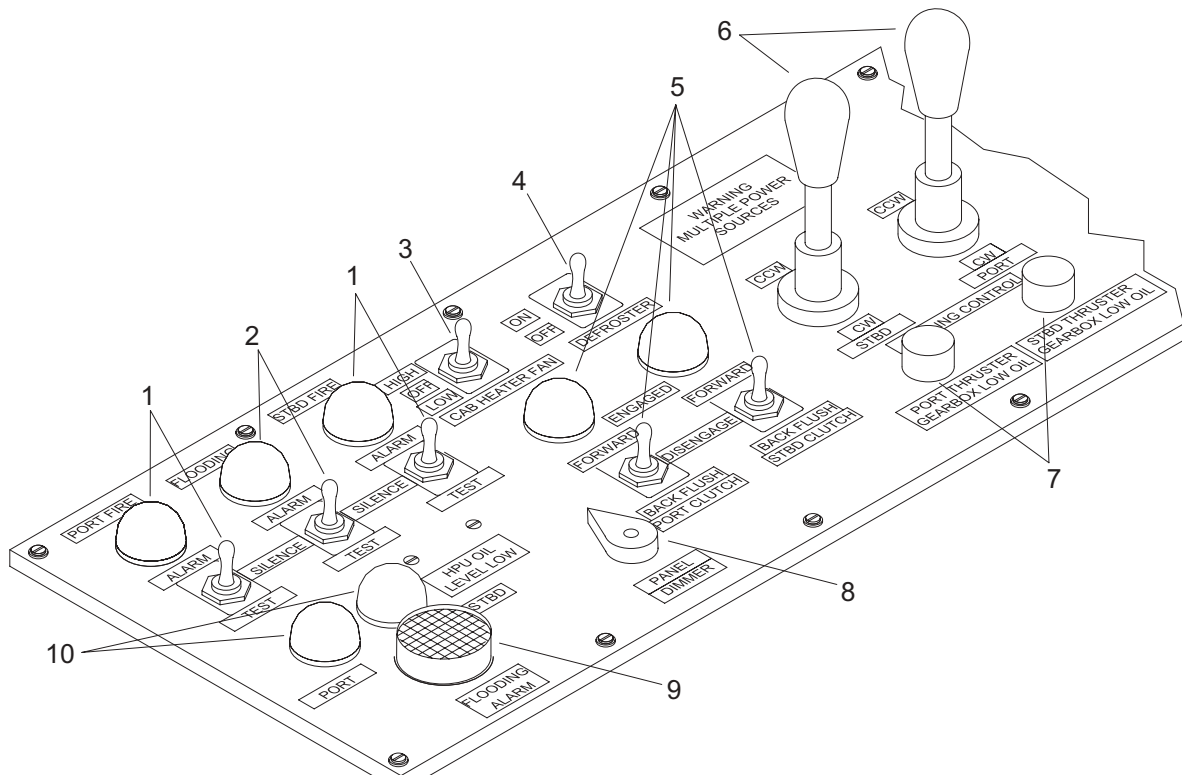
Table 1. Middle Control Panel (A1) Controls and Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	OIL TEMP Gauges (Port and Starboard)	Indicates engine oil temperature (normal operating 215-230°F).
2	OIL PRESS Gauges (Port and Starboard)	Indicates engine oil pressure (normal operating 50-70 PSI).
3	TACH Gauges (Port and Starboard)	Indicates engine speed (0-4,000 RPM).
4	ENG POWER Toggle Switches (Port and Starboard)	Turns power ON/OFF for gauge operation and for starting and stopping the engines.
5	THRUST DIRECTION Dial Indicators (Port and Starboard)	Indicates direction of the thrust by the pump-jet thrusters (clockwise and counterclockwise) that control WT movement.
6	Engine ALARM Toggle Switches with Red Indicator Lights (Port and Starboard)	Engine Alarm System. Audible alarm bell sounds and red light illumination indicates low oil pressure or high water temperature. If alarm is sounded, operator must visually observe port and starboard engine alarm indicator lights to determine which engine is indicating a problem. ALARM = bell sounds and red light on. SILENCE = bell alarm silenced, red light remains on. TEST (momentary) = bell sounds, red light goes on.
7	STOP Pushbuttons (Port and Starboard)	When pushbutton is depressed, shuts down electrical circuit to stop the engine.

Table 1. Middle Control Panel (A1) Controls and Indicators. (Continued)

KEY	CONTROL/INDICATOR	FUNCTION
8	EMER STOP Pushbuttons (Port and Starboard)	When cover is lifted and pushbutton is depressed, shuts down engine by cutting off air supply.
9	START Pushbuttons (Port and Starboard)	When pushbutton is depressed, completes electrical circuit to start engine.
10	ENG GAGES Toggle Switches (Port and Starboard)	In TEST (momentary) position, the engine gauges indicating oil pressure, water temperature and amperage can be read without engine(s) running. Otherwise, toggle is left in OFF position.
11	AMMETER Gauges (Port and Starboard)	Indicates ammeter output current (-300 to +300 AMPS).
12	WATER TEMP Gauges (Port and Starboard)	Indicates engine water temperature (normal operating 170-185°F).
13	WSHLD WIPER Toggle Switch	Turns power ON/OFF to windshield wiper.
14	SPOTLIGHT Toggle Switch	Turns power ON/OFF to spotlight.

DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, LOWER CONTROL PANEL (A2)



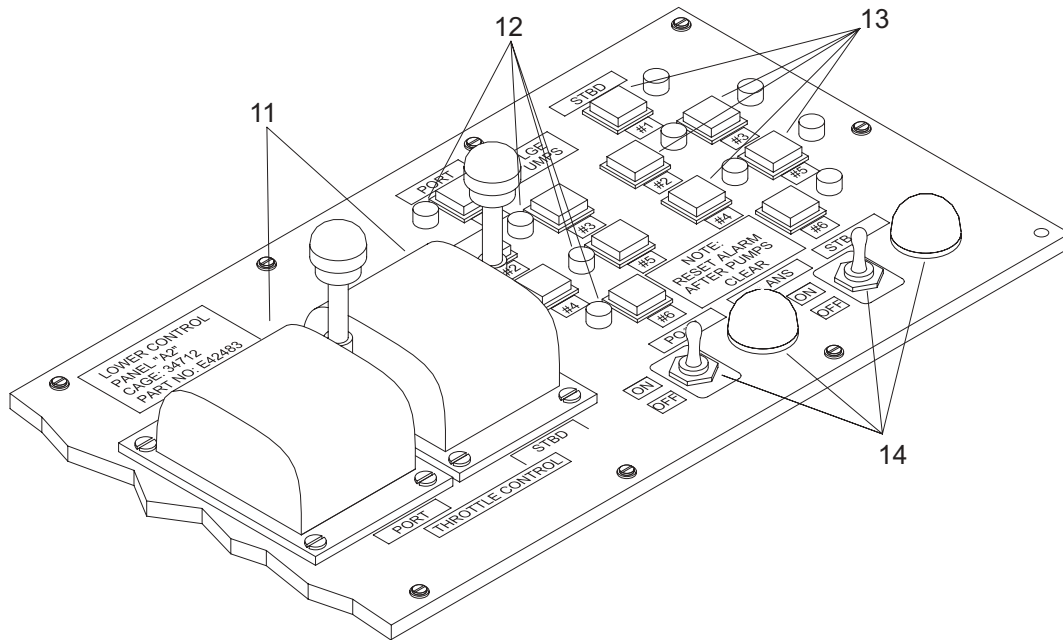


Table 2. Lower Control Panel (A2) Controls and Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	PORT FIRE and STBD FIRE Toggle Switches with Red Indicator Lights	Audible alarm (horn) indicates below deck temperature above 225°F. Indicates a possible fire in port and/or starboard propulsion module. ALARM = horn sounds and red light on. SILENCE = horn silenced, red light remains on. TEST (momentary) = horn sounds, red light goes on. Reset to ALARM when normal conditions exist.
2	FLOODING Toggle Switch with Red Indicator Light	Audible alarm (pulse beeper) indicates possible flooding in port and/or starboard propulsion module. ALARM = pulse beeper sounds and red light on. SILENCE = pulse beeper is silenced, red light on. TEST (momentary) = pulse beeper sounds, red light on. Reset to ALARM when normal conditions exist.
3	CAB HEATER FAN Toggle Switch	Turns power ON/OFF to operators cab heater fan. HIGH = high speed control of heater fan. OFF = heater fan is off. LOW = low speed control of heater fan.
4	DEFROSTER Toggle Switch	Turns power ON/OFF to operators cab defroster fan.
5	PORT and STBD CLUTCH Toggle Switches with Amber (ENGAGED) Indicator Lights	Controls clutch engagements. To engage clutch FORWARD, position toggle switch up. Amber light comes on. To DISENGAGE, return toggle to center position. Amber light goes off. To engage clutch to BACK FLUSH, lift up on switch handle and position toggle switch down. Amber light comes on.

Table 2. Lower Control Panel (A2) Controls and Indicators. (Continued)

KEY	CONTROL/INDICATOR	FUNCTION
6	PORT and STBD STEERING CONTROL Levers	Control directional rotation of the pump-jet steering nozzles. Pull level back to produce clockwise rotation. Push lever forward to produce counterclockwise rotation. Thrust direction indicators located on the middle control panel will rotate accordingly.
7	PORT and STBD THRUSTER GEARBOX LOW OIL Red Indicator Lights	Red light illuminates when pump-jet gearbox oil level is below required operating level.
8	PANEL DIMMER Rotating Switch	Controls brightness of green and amber indicator lights, thrust direction dial indicator lights, compass and gauge control lights on both middle and lower panels for night operations.
9	FLOODING ALARM Pulse Beeper w/Speaker	Audible pulse beeper that sounds when flooding of the propulsion module occurs and the FLOODING toggle switch is set to ALARM (Item 2).
10	HPU OIL LEVEL LOW Red Indicator Lights (Port and Starboard)	Red light illuminates when Hydraulic Power Unit (HPU) oil level is below required operating level.
11	PORT and STBD THROTTLE CONTROL Levers	Levers control engine RPMs which are indicated on tachometer gauges. Push forward for higher RPMs or pull back to reduce RPMs.
12	Bilge Pump Red Indicator Lights (Port and Starboard)	Six red indicator lights for each module (total of 12 on the control panel) illuminate when a float switch is tripped by water to indicate flooding in a particular area.
13	PORT and STBD BILGE PUMPS Pushbuttons with Green Indicator Lights	Six green pushbuttons for each module (total of 12 on the control panel) control the operation of bilge pumps and illuminate the green indicator light when pump(s) are functioning. When a float switch resumes a normal position, the green indicator light will go out and shuts off the pump.
14	PORT and STBD VENT FANS Toggle Switches with Green Indicator Lights	Turns power ON/OFF to control exhaust plenum vent fans. Green light is illuminated when switch is on and vent fans are functioning.

DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, OPERATORS CAB CIRCUIT BREAKER PANEL (A3)

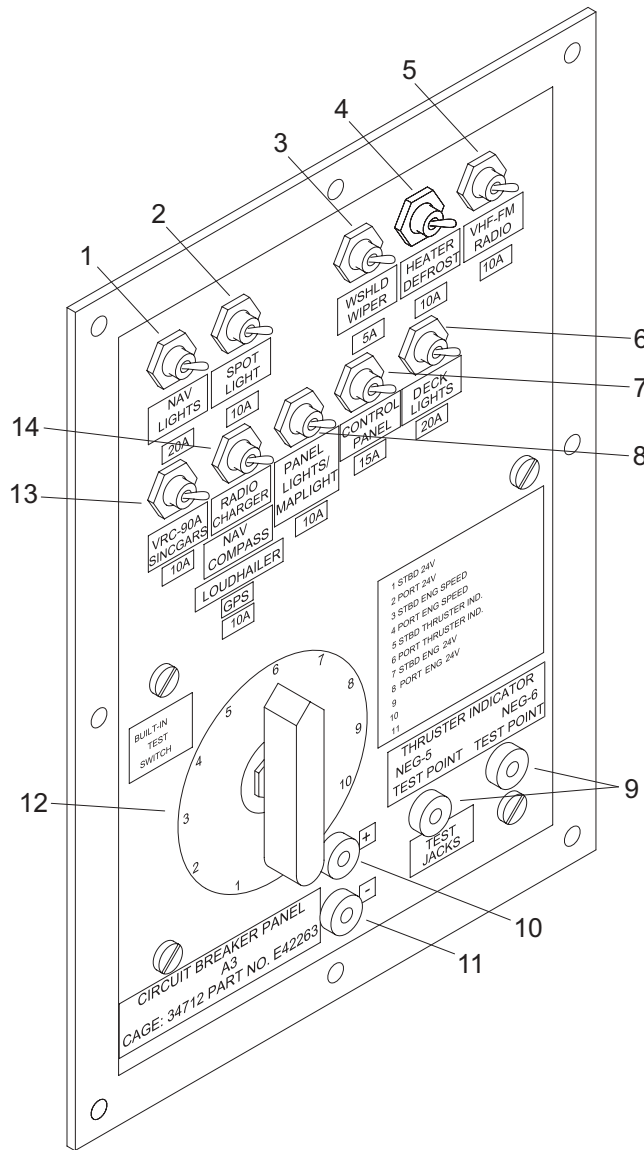


Table 3. Operators Cab Circuit Breaker Panel (A3) Controls and Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	NAV LIGHTS Circuit Breaker, 20A	Turns power ON/OFF to control electrical power to the mast enclosure.
2	SPOTLIGHT Circuit Breaker, 10A	Turns power ON/OFF to control electrical power to the spotlight toggle switch.
3	WSHLD WIPER Circuit Breaker, 5A	Turns power ON/OFF to control electrical power to windshield wiper toggle switch.
4	HEATER DEFROST Circuit Breaker, 10A	Turns power ON/OFF to control electrical power to the cab heater fan and defroster toggle switches.

Table 3. Operators Cab Circuit Breaker Panel (A3) Controls and Indicators. (Continued)

KEY	CONTROL/INDICATOR	FUNCTION
5	VHF-FM RADIO Circuit Breaker, 10A	Turns power ON/OFF to control electrical power to VHF/FM DSC transceiver.
6	DECK LIGHTS Circuit Breaker, 15A	Turns power ON/OFF to control electrical power to abovedeck lighting.
7	CONTROL PANEL Circuit Breaker, 15A	Turns power ON/OFF to control electrical power to alarms, emergency stops and bilge pumps.
8	PANEL LIGHTS/MAPLIGHT Circuit Breaker, 10A	Turns power ON/OFF to control electrical power to panel lights dimmer control switch and provides power to maplight.
9	THRUSTER INDICATOR NEG-5 and NEG-6 Jack Plug TEST JACKS	Negative Plug ins = Two connections for diagnostic tester.
10	+ Jack Plug (Positive)	Positive Plug in = Connection for diagnostic tester.
11	- Jack Plug (Negative)	Negative Plug in = Connection for diagnostic tester.
12	BUILT IN TEST SWITCH	Eleven rotary contact function switch to troubleshoot controls.
13	VRC-90A SINCGARS Circuit Breaker, 10A	Turns power ON/OFF to control electrical power to SINCGARS radio transmitter.
14	RADIO CHARGER, NAV COMPASS, LOUDHAILER, GPS, 10A	Turns power ON/OFF to control electrical power to the radio charger, NAV compass, loudhailer and GPS.

**DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS,
VHF/FM DSC TRANSCEIVER**

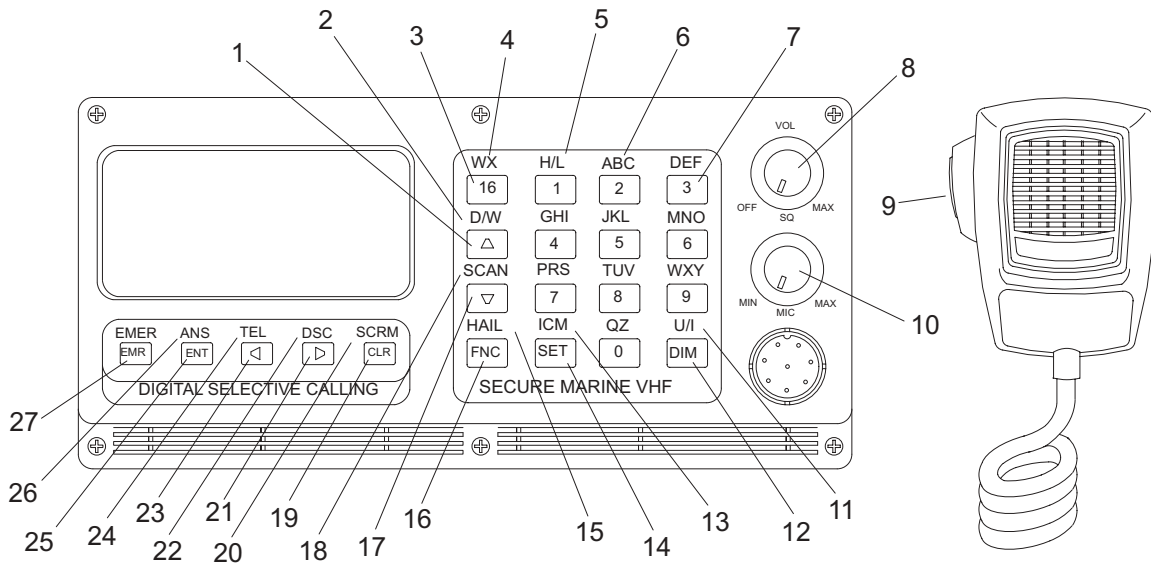


Table 4. VHF/FM DSC Transceiver Controls and Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	Up Arrow Key	Used to select the next higher channel number or move selection bar upward in menus.
2	D/W Key	Dual Watch. Allows any two channels to be selected and monitored simultaneously.
3	16 Key	Sets the transceiver to transmit and receive on channel 16 and overrides any other function when pressed.
4	WX Key	Allows 10 weather channels to be selected individually or scanned.
5	H/L Key	High/Low. Selects HIGH (25 watt) or LOW (1 watt) transmit power. Also selects LOCAL or DISTANCE receive mode.
6	Letter Keys	Used for entry of names into directories.
7	Number Keys	Used for channel selection and entry of numeric values.
8	Off/Volume Knob	Turns power on and off. Adjusts speaker volume level.
9	Microphone PUSH TO TALK Button	Press the button to transmit. Release button to receive. A transmit timer limits continuous transmission to 5 minutes.
10	Squelch Knob	Sets the threshold level (squelch) of received signals that will produce audio output from the speaker.
11	U/I Key	USA or International. Selects USA or International frequency sets.
12	DIM Key	Selects any of four display backlighting levels; Low, Medium, High or Off.

Table 4. VHF/FM DSC Transceiver Controls and Indicators. (Continued)

KEY	CONTROL/INDICATOR	FUNCTION
13	ICM Key	Intercom. Activates the INTERCOM mode. Remote station speakers required.
14	SET Key	Displays USER SETUPS menu. Choose from Clock, Viewing Angle, User Options, NMEA Position and Security Code.
15	HAIL Key	Activates the HAIL mode. Remote speaker required.
16	FNC Key	Function key. Selects the second function for a key. The second function is shown above the key. Does not select the letters above keys 2 thru 0.
17	Down Arrow Key	Used to select the next lower channel number or move selection bar downward in menus.
18	SCAN Key	Displays SCAN SELECTION menu. Choose MEMORY SCAN, ALL CHANNELS or SCAN REVIEW.
19	CLR Key	Clear key. Clears erroneous entries. Clears displayed channel from MEMORY SCAN memory. Stops call ringing.
20	SCRM Key	Scrambler. Displays the SCRAMBLER selections menu. Choose INDIVIDUAL, GROUP SCRAMBLE or SEARCH for directory entry.
21	Right Arrow Key	Used to change pages in multiple page menus and advance the entry position when entering or editing data.
22	DSC Key	Displays the DSC CALLING and several other menus regarding DSC operations. Use arrow keys to make selection.
23	Left Arrow Key	Used to change pages in multiple page menus and backspace the entry position when entering or editing data.
24	TEL Key	Displays the TELEPHONE and COAST STATION menus. Choose any existing entry, new entry or search for individual telephone numbers and coast station DSC ID numbers.
25	ENT Key	Enter. Used to complete selections and terminate multiple key entries. Enter displayed channel into MEMORY SCAN memory.
26	ANS Key	Answer. Displays the CALL WAITING menu. Select any entry to respond.
27	EMR Key	Emergency key. Displays the EMERGENCY menu. When SEND DISTRESS is selected and button is pushed and held in for five seconds, transmits emergency message on channel 70.

**DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, AN/VRC-88D
SINGARS RADIO TRANSMITTER**

For SINGARS controls and indicators, refer to AN/VRC-88D SINGARS Radio Operators Manual, TM 11-5820-890-10-8.

DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, VHF/FM HANDHELD TRANSCEIVER

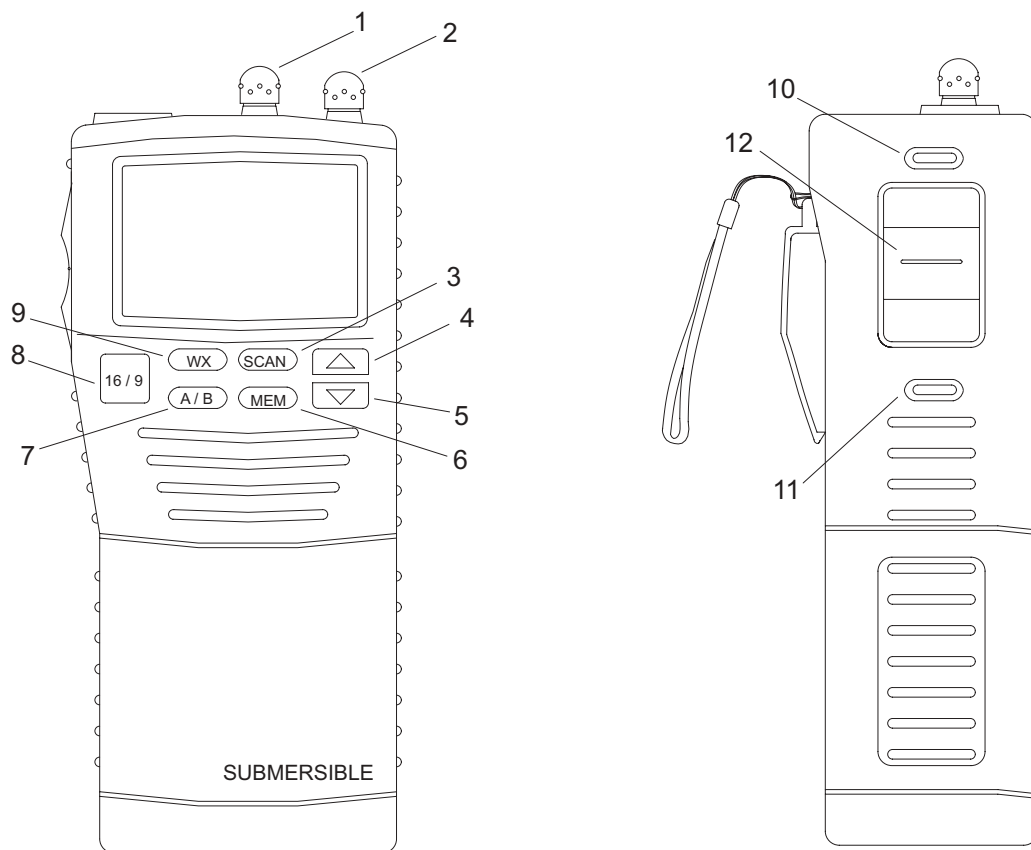


Table 5. VHF/FM Handheld Transceiver Controls and Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	SQUELCH CONTROL Knob	Sets the threshold level of signals that will produce audio output from the speaker.
2	POWER/VOLUME Knob	Turns power on and off. Adjusts speaker level.
3	SCAN Key	Starts scanning programmed channels. Press key for at least one second to turn on and off priority scan during scan.
4	Up Arrow Key	Selects the desired channel. Each press increases the channel number. When held down, the channels increase continuously.
5	Down Arrow Key	Selects the desired channel. Each press decreases the channel number. When held down, the channels decrease continuously.
6	MEM Key	Memorizes the selected channel. When pressed again, deletes the selected channel.
7	A/B Key	Immediately recalls two user assigned channels from any channel location.

Table 5. VHF/FM Handheld Transceiver Controls and Indicators. (Continued)

KEY	CONTROL/INDICATOR	FUNCTION
8	16/9 Key	Immediately recalls channel 16 from any channel location. Holding this key down recalls channel 9. When the WX key is pressed while holding this key, the mode toggles between USA, International and Canada.
9	WX Key	Immediately recalls a weather channel from any channel location. Recalls the previous channel when the WX key is pressed again.
10	LAMP/KEY LOCK Key	Turns the display lamp on and off. Hold down key to lock the displayed channel. Key symbol appears in display. Hold down until key symbol in display disappears to unlock.
11	H/L Key	Toggles between high and low power. To change from low power to high power, hold down key on Canada channel 13, USA channel 13 or 67.
12	Microphone PUSH TO TALK (PTT) Switch	Press the PUSH TO TALK switch to transmit. Release button to receive. A transmit timer limits continuous transmissions to 5 minutes.

DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, PUBLIC ADDRESS SET (LOUDHAILER)

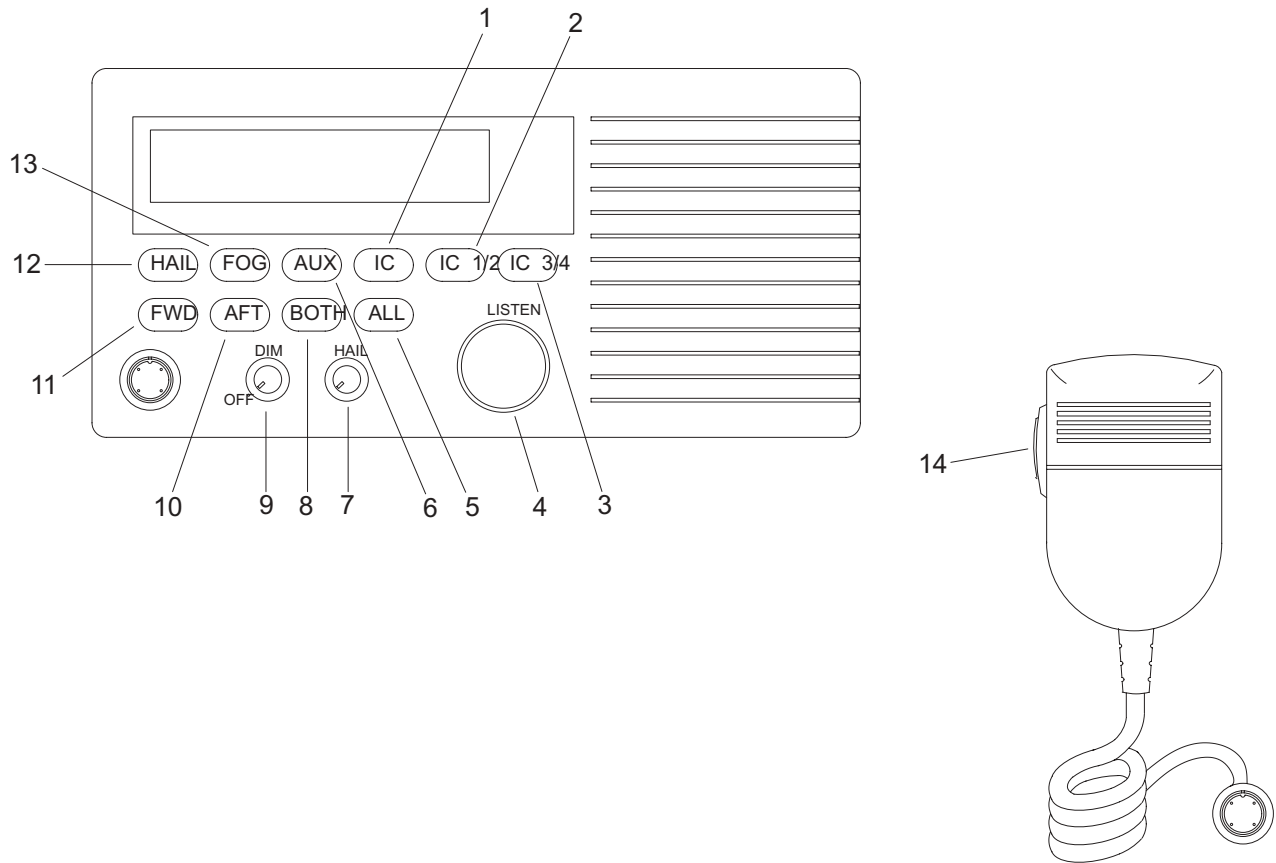


Table 6. Public Address Set (Loudhailer) Controls and Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	IC Key	Intercom. Pressing this key puts the loudhailer in the intercom mode.
2	IC 1/2 Key	Selects between intercom station one and two.
3	IC 3/4 Key	Selects between intercom station three and four.
4	LISTEN Control Knob	Rotating the knob clockwise increases the volume to the internal speaker, rotating the knob counterclockwise decreases the volume to the internal speaker.
5	ALL Key	Selects the input/output circuitry to all speaker stations for use simultaneously during foghorn, hailer, or public address operations. When selecting intercom operations, select ALL intercom stations only.
6	AUX Key	When pressed, allows radio transmissions received on VHF/FM DSC transceiver to be monitored using the loudhailer external horn.

Table 6. Public Address Set (Loudhailer) Controls and Indicators. (Continued)

KEY	CONTROL/INDICATOR	FUNCTION
7	HAIL Output Knob	Rotating the knob clockwise increases the volume to the hailer horns, rotating the knob counterclockwise decreases the volume to the hailer horn.
8	BOTH Key	Selects both forward and aft loudhailer horns.
9	ON/OFF and DIM Knob	Rotating the knob clockwise turns the loudhailer on, rotating the knob counterclockwise turns the loudhailer off. Rotating the knob adjusts the display backlighting level.
10	AFT Key	Selects the aft loudhailer horn.
11	FWD Key	Selects the forward loudhailer horn.
12	HAIL Key	Pressing this key puts the loudhailer into the HAIL mode. HAILER is displayed on the LCD.
13	FOG Key	Pressing the FOG key sequentially selects one of nine different horn or automatic fog signals.
14	Microphone PUSH TO TALK Switch	When pressed, allows operator to transmit. Allows listening when not pressed.

DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, AN/PSN-11(V)1 PRECISION GLOBAL POSITIONING RECEIVER (PLGR)

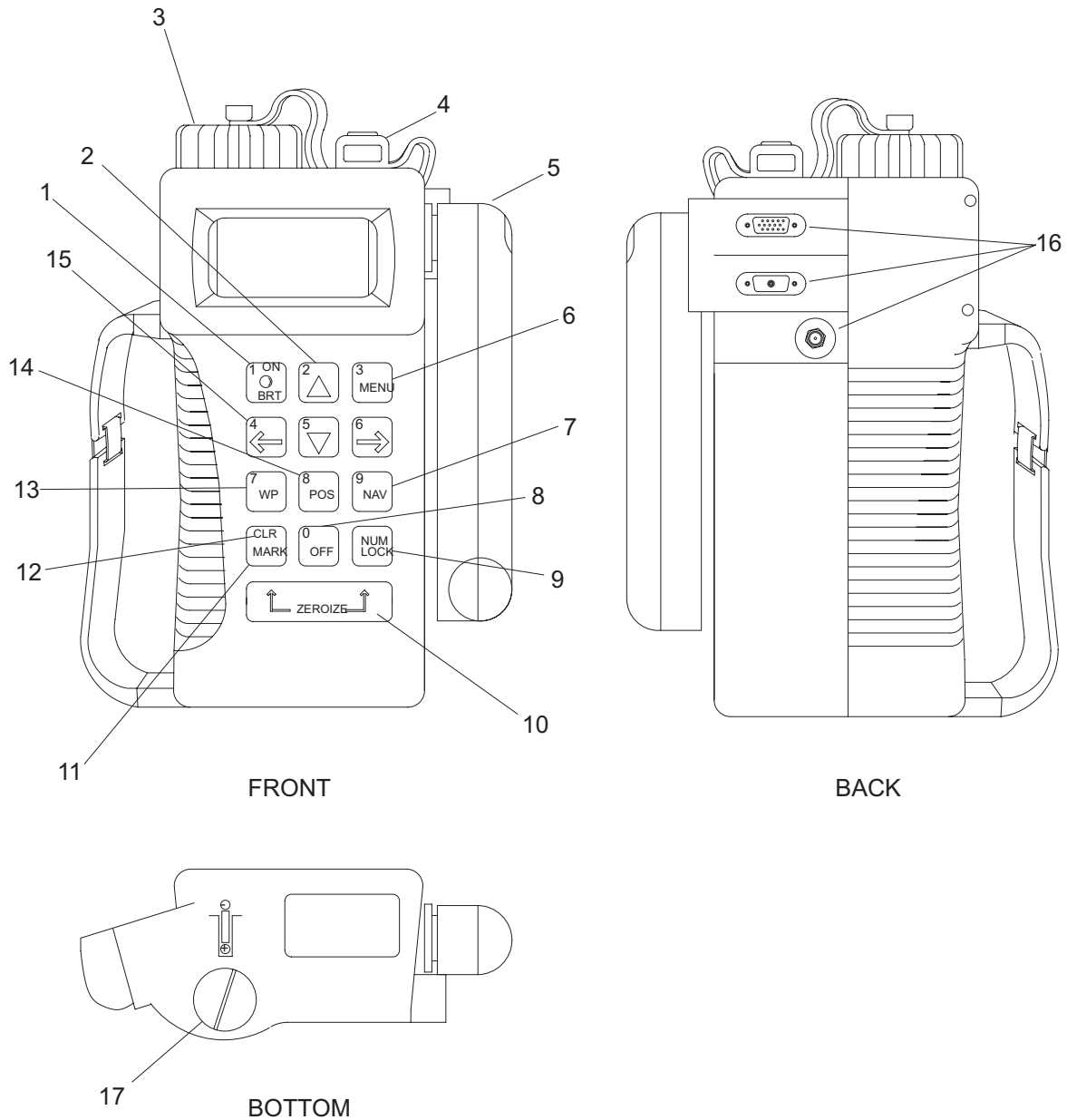


Table 7. AN/PSN-11(V)1 PLGR Controls and Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	ON/BRT Key	Turns the PLGR on. Also adjusts the brightness of the display backlighting.
2	Up and Down Arrow Keys	Used to change display pages, change alphanumeric field values and activate functions.
3	Battery Compartment	Powers the PLGR when external power is not used. Battery must be removed before external power is applied.

Table 7. AN/PSN-11(V)1 PLGR Controls and Indicators. (Continued)

KEY	CONTROL/INDICATOR	FUNCTION
4	KYK-13 Encryption Port	When loaded, allows user to receive or read encrypted data.
5	Integral Antenna	Receives GPS signal when external antenna is not used.
6	MENU Key	Displays the system menu. Changes to new menu page.
7	NAV Key	Brings up the NAV menu displays. Key is inoperable until waypoints are loaded.
8	OFF Key	Turns the PLGR off.
9	NUM LOCK Key	Toggles the keyboard between control mode and numeric mode.
10	ZEROIZE Key	Destroys all data that has been entered into, collected or stored by the PLGR.
11	MARK Key	Activates the MARK and Man Overboard waypoint selection page.
12	CLR KEY	Used in numeric mode. Moves the cursor to the left.
13	WP Key	Displays the WAYPOINT menu.
14	POS Key	Brings up the POSITION menu. Changes position display pages.
15	Left and Right Arrow Keys	Moves the cursor from field to field in the display.
16	J2, J3 and J4 Ports	Allows PLGR to be used with external power and provides external output of GPS data. J2 = NEMA cable (interface cable to VHF/FM DSC transceiver) J3 = GPS antenna connection J4 = 24 VDC power connection
17	Memory Battery Compartment	Contains memory battery which retains PLGR memory when the PLGR is turned off.

**DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, VHF/FM HANDHELD
TRANSCEIVER BATTERY CHARGER**

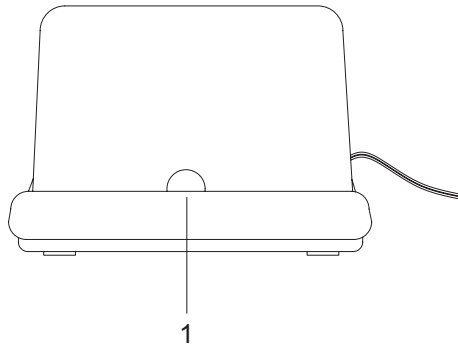


Table 8. VHF/FM Handheld Transceiver Battery Charger Controls and Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	Recharging Red Indicator Light	Red light indicates the handheld radio is charging.

DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, MAST ENCLOSURE ASSEMBLY A7

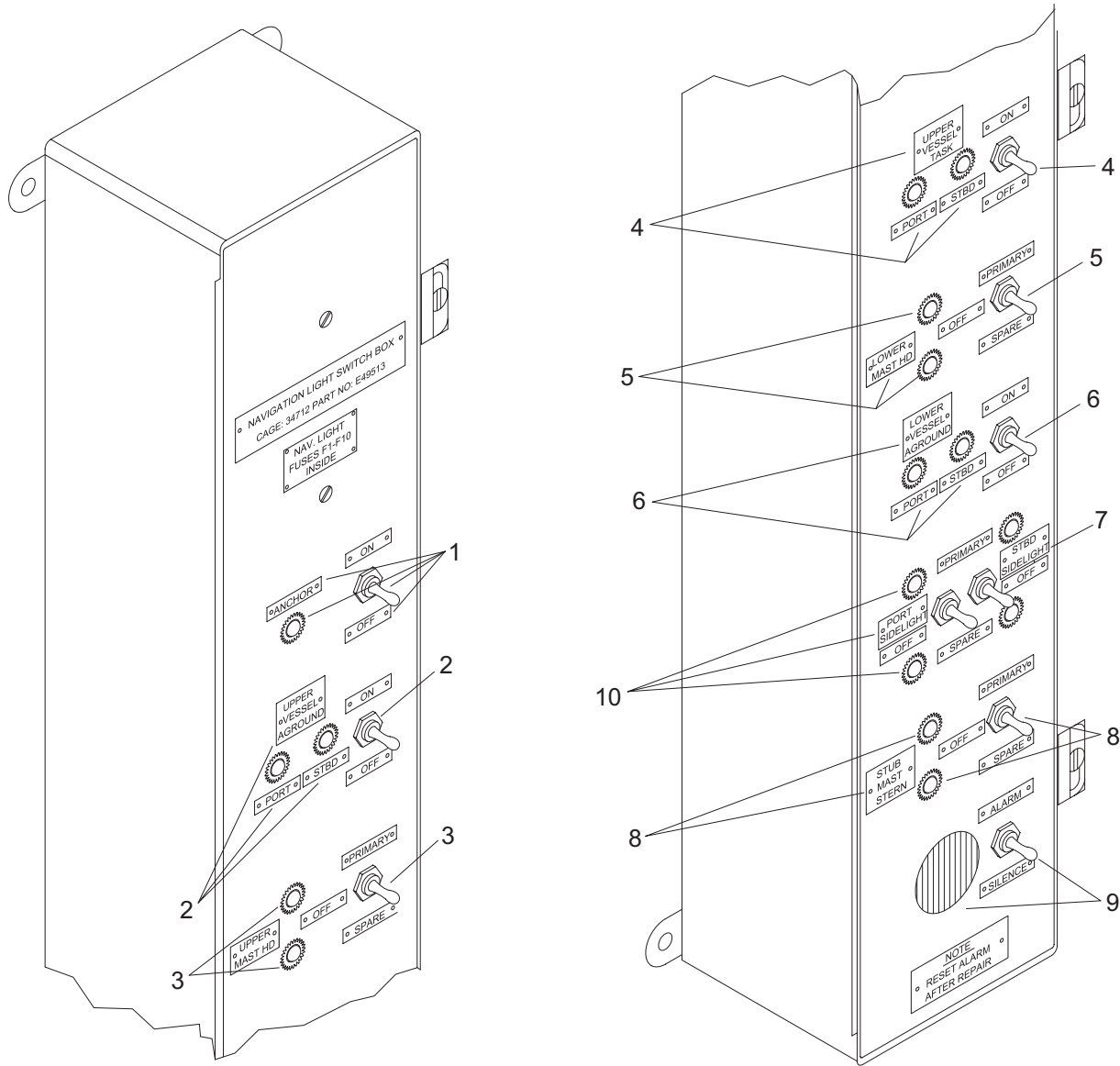


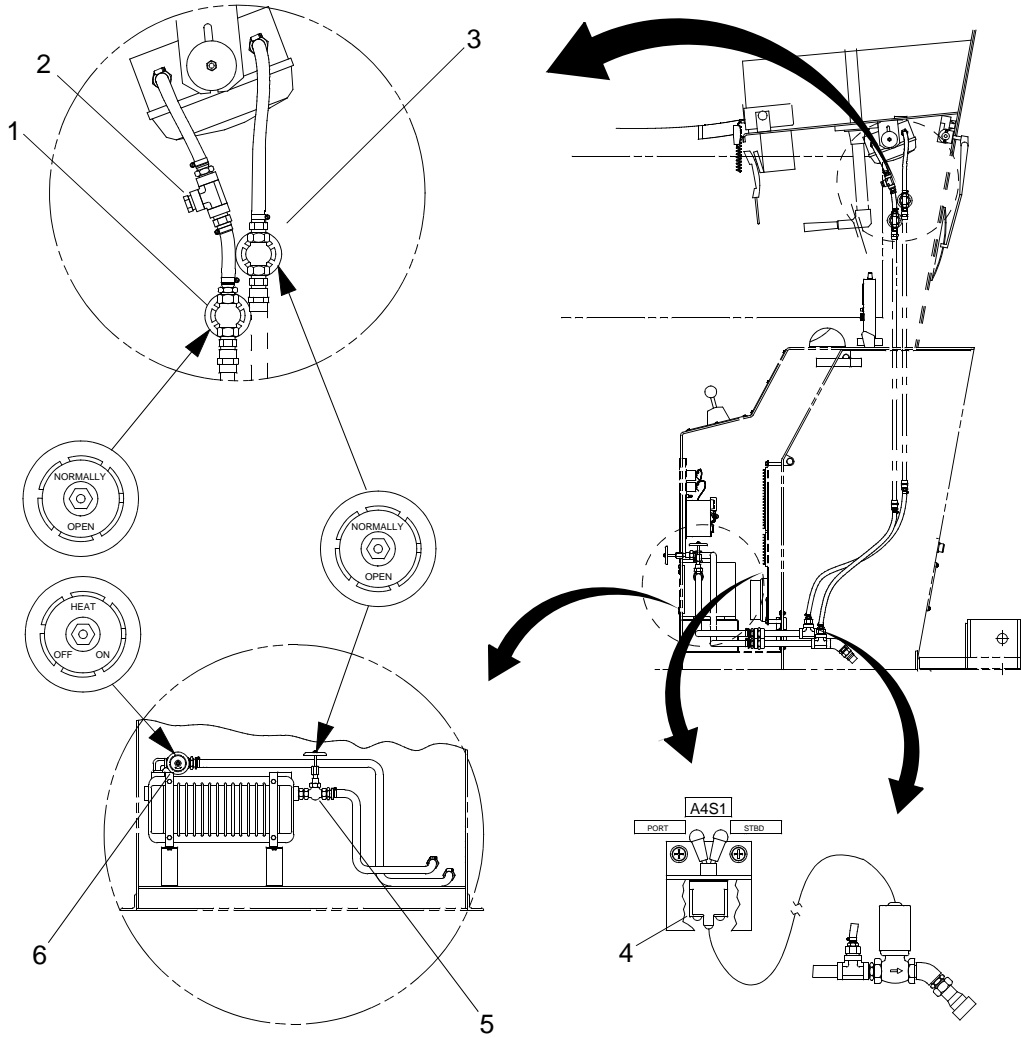
Table 9. Mast Enclosure Assembly A7 Controls and Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	ANCHOR Toggle Switch with Red Indicator Light	ON = illuminates anchor navigation light. OFF = light is extinguished.
2	UPPER VESSEL AGROUND Toggle Switch with Red Indicator Lights	ON = illuminates upper port and starboard vessel aground lights. OFF = lights are extinguished.
3	UPPER MAST HD Toggle Switch with Red Indicator Lights	PRIMARY = illuminates primary upper mast head light. OFF = light is extinguished. SPARE = illuminates spare upper mast head light.
4	UPPER VESSEL TASK Toggle Switch with Red Indicator Lights	ON = illuminates port and starboard task lights, OFF = lights are extinguished.

Table 9. Mast Enclosure Assembly A7 Controls and Indicators. (Continued)

KEY	CONTROL/INDICATOR	FUNCTION
5	LOWER MAST HD Toggle Switch with Red Indicator Lights	PRIMARY = illuminates primary lower mast head light. OFF = light is extinguished. SPARE = illuminates spare lower mast head light.
6	LOWER VESSEL AGROUND Toggle Switch with Red Indicator Lights	ON = illuminates port and starboard lower vessel aground lights. OFF = lights are extinguished.
7	STBD SIDELIGHT Toggle Switch with Red Indicator Lights	PRIMARY = illuminates primary starboard sidelight. OFF = light is extinguished. SPARE = illuminates spare starboard sidelight.
8	STUB MAST STERN Toggle Switch with Red Indicator Lights	This toggle switch is no longer used for operating the stub mast.
9	ALARM/SILENCE Toggle Switch with Speaker	ALARM = pulse beeper alarm activates if a primary mast light becomes inoperative. SILENCE = pulse beeper audible alarm deactivated.
10	PORT SIDELIGHT Toggle Switch with Red Indicator Lights	PRIMARY = illuminates primary port sidelight. OFF = light is extinguished. SPARE = illuminates spare port sidelight.

DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, ACCESSORIES



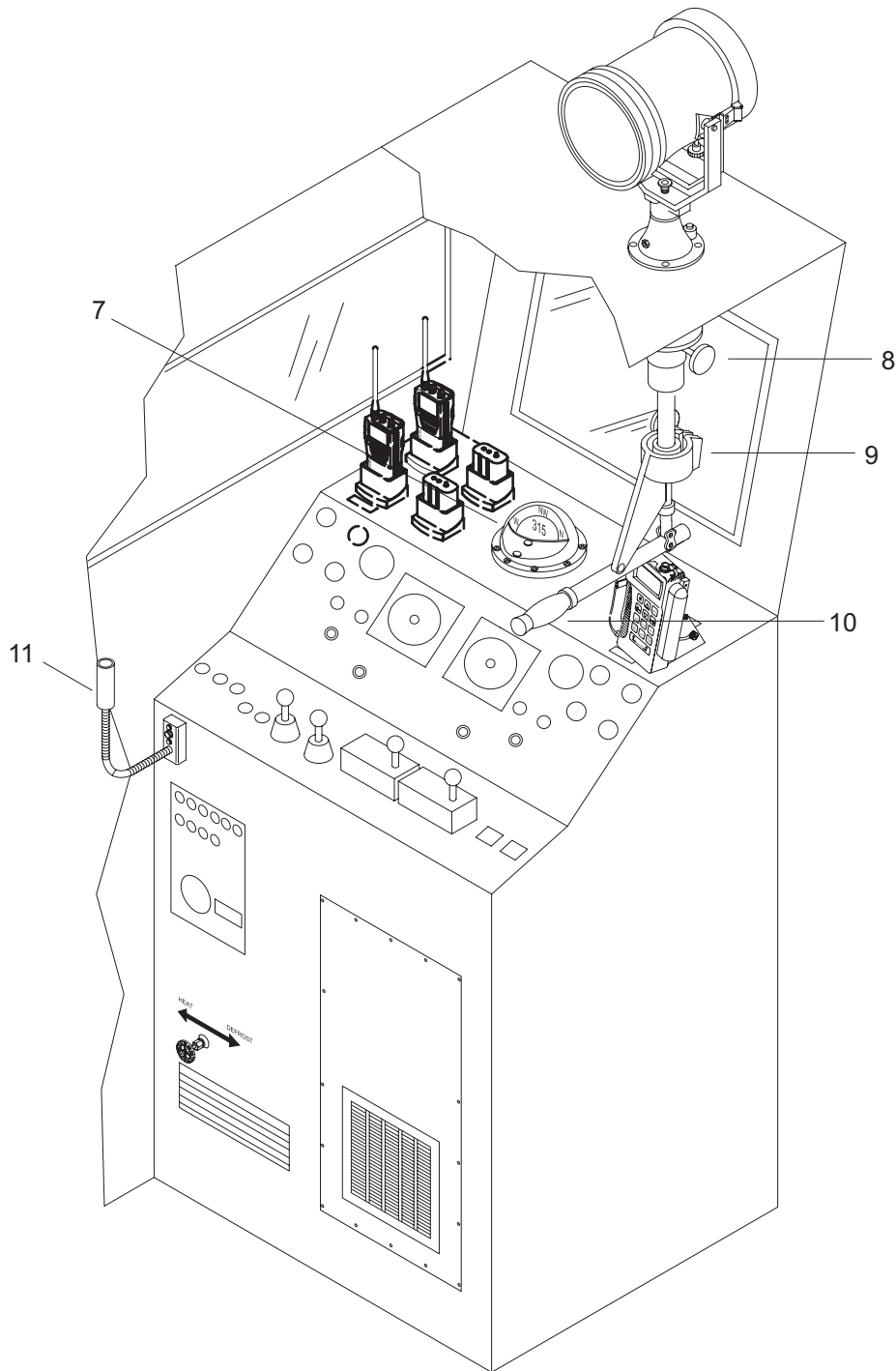


Table 10. Accessory Controls and Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	NORMALLY OPEN Valve (Defroster Supply Line)	Allows antifreeze mixture to flow into defroster core from engine fresh water system.
2	Bleeder Valve (Defroster)	Allows air to be bled from the defroster system.

Table 10. Accessory Controls and Indicators. (Continued)

KEY	CONTROL/INDICATOR	FUNCTION
3	NORMALLY OPEN Valve (Defroster Return Line)	Allows antifreeze mixture to return to engine fresh water system.
4	Heater Switch Assembly (PORT/STBD)	Two position toggle switch on terminal strip assembly (A4) supplies power to an electrically activated solenoid valve. Switch position is determined by operators cab location on the powered section.
5	NORMALLY OPEN Valve (Heater Return Line)	Allows antifreeze mixture to return to engine fresh water system.
6	HEAT ON/OFF Valve (Heater)	Allows antifreeze mixture to flow into cab heater core from engine fresh water system. Approximate position 1/3 turn open from fully closed.
7	Compass	Operator directional indicator.
8	Spotlight Angle Lock Knob	Holds vertical angle of spotlight to WT deck.
9	Spotlight Up and Down Lock Knob	Holds left/right (port/starboard) position of spotlight.
10	Spotlight Control Handle	Allows vertical and horizontal movement of spotlight from inside the cab when the lock knobs are not locked down.
11	Maplight	Provides operator with cab lighting for reading maps.

BELOW DECK CONTROLS AND INDICATORS (OVERVIEW)

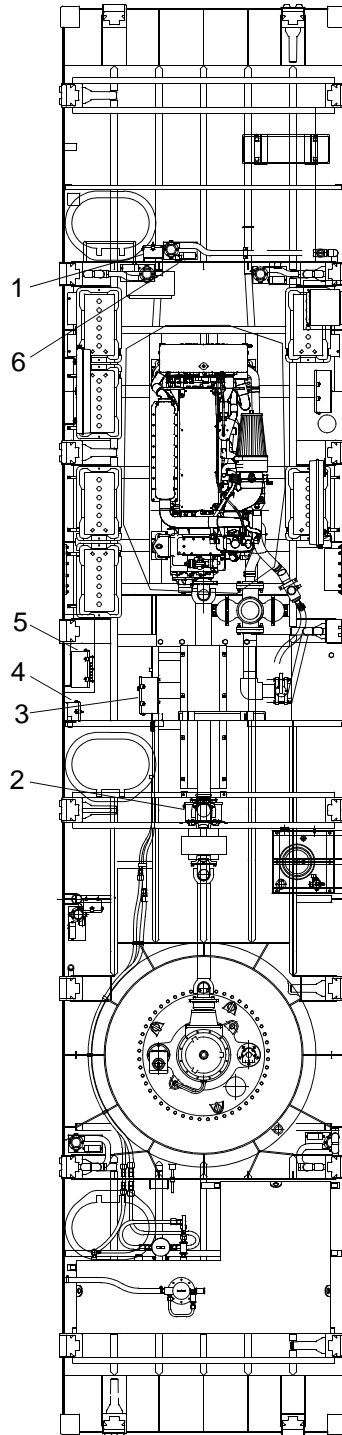


Table 11. Below Deck Controls and Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	A11	Lazaret Lights Switch Box (Controls below deck lighting in lazaret compartment.)
2	A5	Bilge Pump Control Panel (Contains five REMOTE/MANUAL toggle switches for bilge pump control in the machinery compartment.)
3	A4	Engine Junction Box (Contains emergency stop switch and three on/off toggle switches for the engine control module, marine interface module and engine controls.)
4	A10	Engine Spaces Light Switch Box Assembly (Controls below deck lighting in the machinery compartment.)
5	A6	Propulsion Module Circuit Breaker Panel (Contains the MAIN circuit breaker and 12 on/off toggle switches for power distribution.)
6	A7	Single Bilge Pump Control Panel (Contains one REMOTE/MANUAL toggle switch for bilge pump control in the lazaret.)

**DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, PROPULSION MODULE
CIRCUIT BREAKER PANEL (A6)**

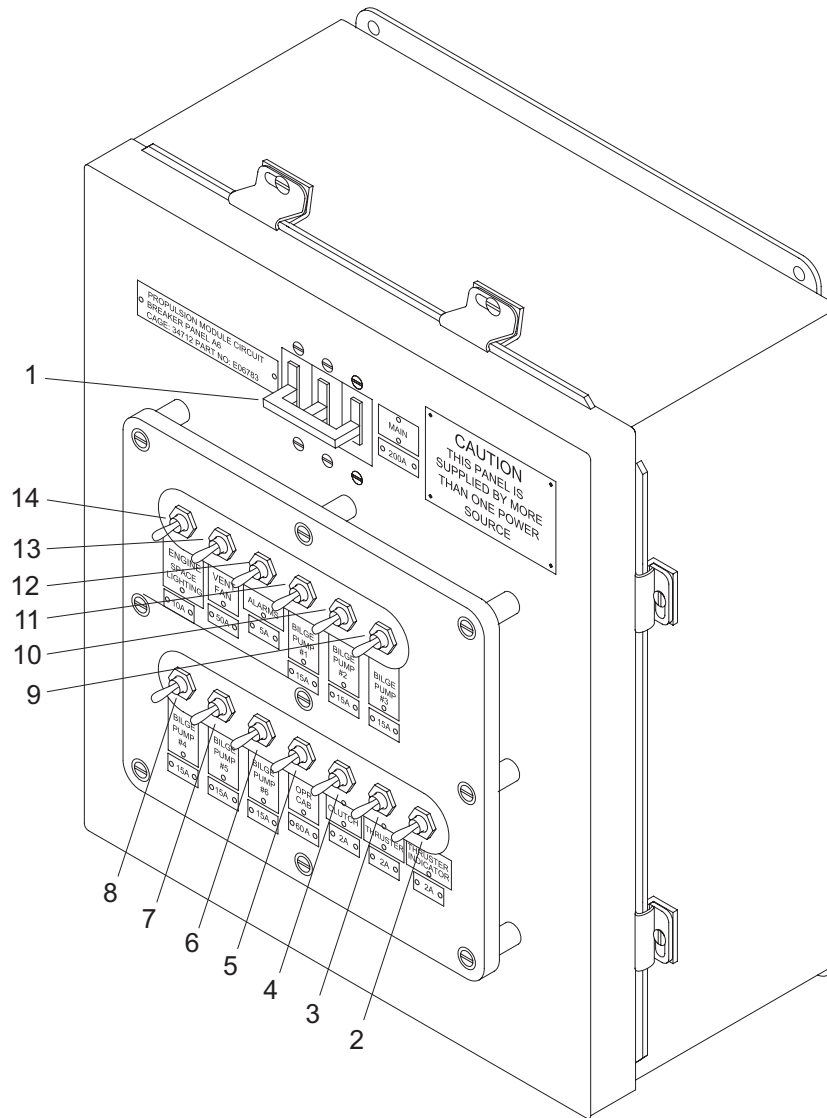


Table 12. Propulsion Module Circuit Breaker Panel (A6) Controls and Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	MAIN Circuit Breaker, 200A	Turns power on/off to control all electrical power distribution through the propulsion module.
2	THRUSTER INDICATOR Circuit Breaker, 2A	Turns power on/off to control electrical power to operators cab for port and starboard pump-jet thruster direction indicators (located on middle control panel).
3	THRUSTER Circuit Breaker, 2A	Turns power on/off to control electrical power to operators cab for port and starboard pump-jet thruster steering control levers (located on lower control panel).

Table 12. Propulsion Module Circuit Breaker Panel (A6) Controls and Indicators. (Continued)

KEY	CONTROL/INDICATOR	FUNCTION
4	CLUTCH Circuit Breaker, 2A	Turns power on/off to control electrical power to operators cab for port and starboard clutch engagement switches (located on lower control panel).
5	OPR CAB Circuit Breaker, 60A	Turns power on/off to control electrical power to panels in operators cab.
6	BILGE PUMP #6 Circuit Breaker, 15A	Turns power on/off to control electrical power to operators cab for aft port machinery compartment bilge pump #6 (located on lower control panel).
7	BILGE PUMP #5 Circuit Breaker, 15A	Turns power on/off to control electrical power to operators cab for aft stbd machinery compartment bilge pump #5 (located on lower control panel).
8	BILGE PUMP #4 Circuit Breaker, 15A	Turns power on/off to control electrical power to operators cab for center port machinery compartment bilge pump #4 (located on lower control panel).
9	BILGE PUMP #3 Circuit Breaker, 15A	Turns power on/off to control electrical power to operators cab for fwd stbd machinery compartment bilge pump #3 (located on lower control panel).
10	BILGE PUMP #2 Circuit Breaker, 15A	Turns power on/off to control electrical power to operators cab for fwd port machinery compartment bilge pump #2 (located on lower control panel).
11	BILGE PUMP #1 Circuit Breaker, 15A	Turns power on/off to control electrical power to operators cab for lazaret bilge pump #1 (located on lower control panel).
12	ALARMS Circuit Breaker, 5A	Turns power on/off to control electrical power to operators cab for alarm system switches port and starboard (located on middle and lower control panels).
13	VENT FAN Circuit Breaker, 50A	Turns power on/off to control electrical power to operators cab for Vent Fan switches port and starboard (located on lower control panel).
14	ENGINE SPACE LIGHTING Circuit Breaker, 10A	Turns power on/off to control electrical power to light switch boxes in both the machinery and lazaret compartments.

DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, ENGINE JUNCTION BOX ASSEMBLY (A4)

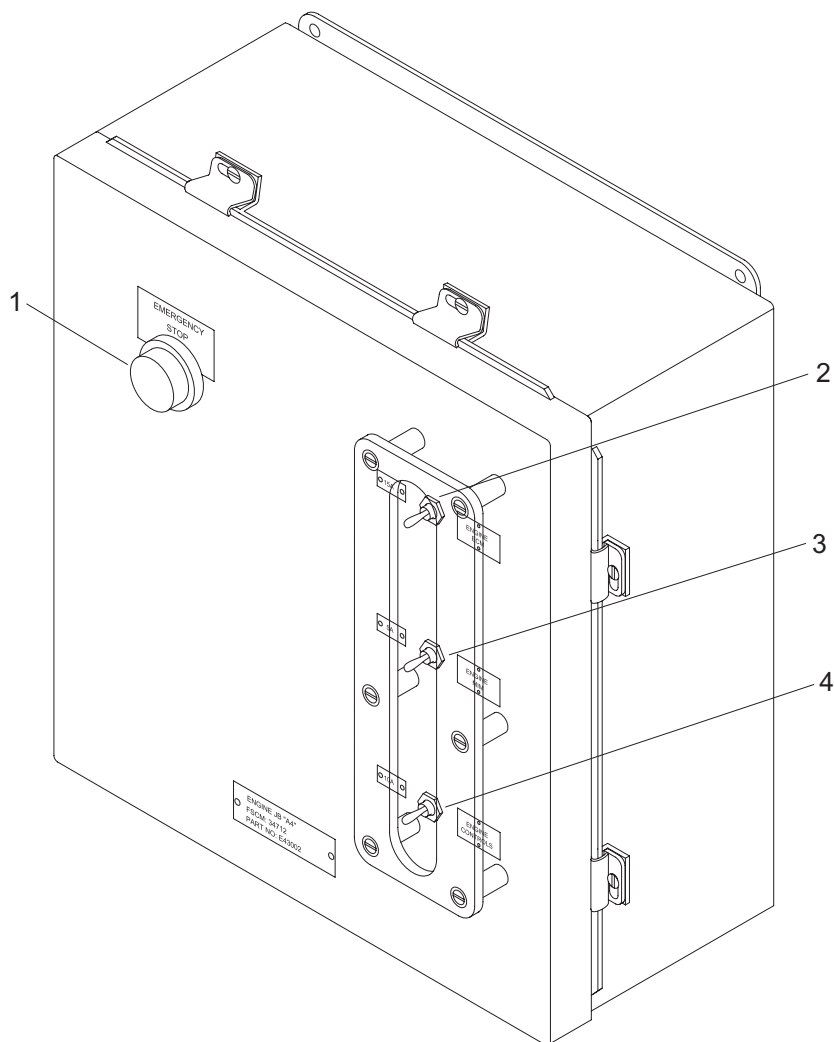
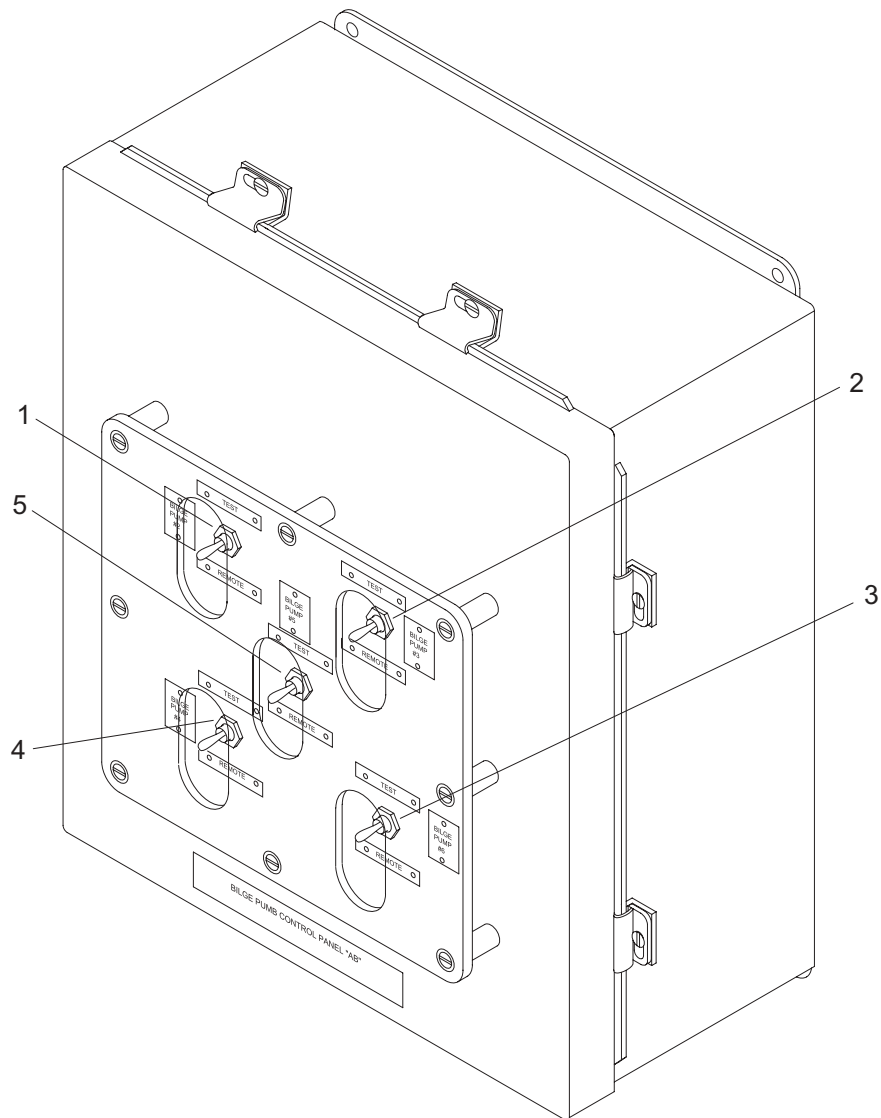


Table 13. Engine Junction Box Assembly (A4).

KEY	CONTROL/INDICATOR	FUNCTION
1	EMERGENCY STOP (Red) Pushbutton	When depressed, closes air shutoff valve to eliminate air supply to engine, stopping engine. This should only be used in an extreme emergency.
2	ECM Toggle Switch	Turns power on/off to control electrical power to engine control module.
3	MIM Toggle Switch	Turns power on/off to control electrical power to marine interface module.
4	ENGINE CONTROLS Toggle Switch	Turns power on/off to control electrical power to engine controls.

DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, BILGE PUMP CONTROL PANEL ASSEMBLY (A5)

Table 14. Bilge Pump Control Panel Assembly (A5) Controls and Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	BILGE PUMP #2 Toggle Switch	TEST = allows momentary, local operation of bilge pump #2 located fwd port in machinery compartment. REMOTE = allows operation from operators cab.
2	BILGE PUMP #3 Toggle Switch	TEST = allows momentary, local operation of bilge pump #3 located fwd stbd in machinery compartment. REMOTE = allows operation from operators cab.
3	BILGE PUMP #6 Toggle Switch	TEST = allows momentary, local operation of bilge pump #6 located aft stbd in machinery compartment. REMOTE = allows operation from operators cab.

Table 14. Bilge Pump Control Panel Assembly (A5) Controls and Indicators. (Continued)

KEY	CONTROL/INDICATOR	FUNCTION
4	BILGE PUMP #4 Toggle Switch	TEST = allows momentary, local operation of bilge pump #4 located center port in machinery compartment. REMOTE = allows operation from operators cab.
5	BILGE PUMP #5 Toggle Switch	TEST = allows momentary, local operation of bilge pump #5 located aft port in machinery compartment. REMOTE = allows operation from operators cab.

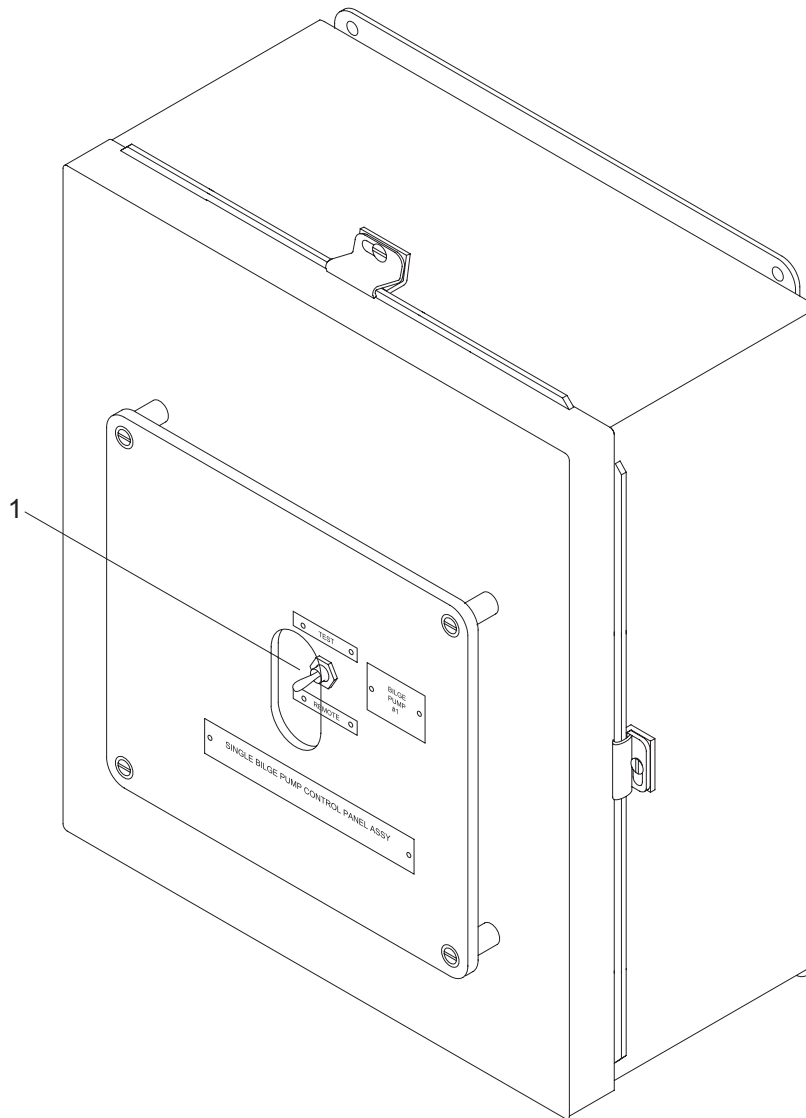
DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, SINGLE BILGE PUMP CONTROL PANEL ASSEMBLY (A7)


Table 15. Single Bilge Pump Control Panel Assembly (A7) Controls and Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	BILGE PUMP #1 Toggle Switch	TEST = allows momentary, local operation of bilge pump #1 in lazaret compartment. REMOTE = allows operation from operators cab.

DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, HYDRAULIC STEERING SYSTEM

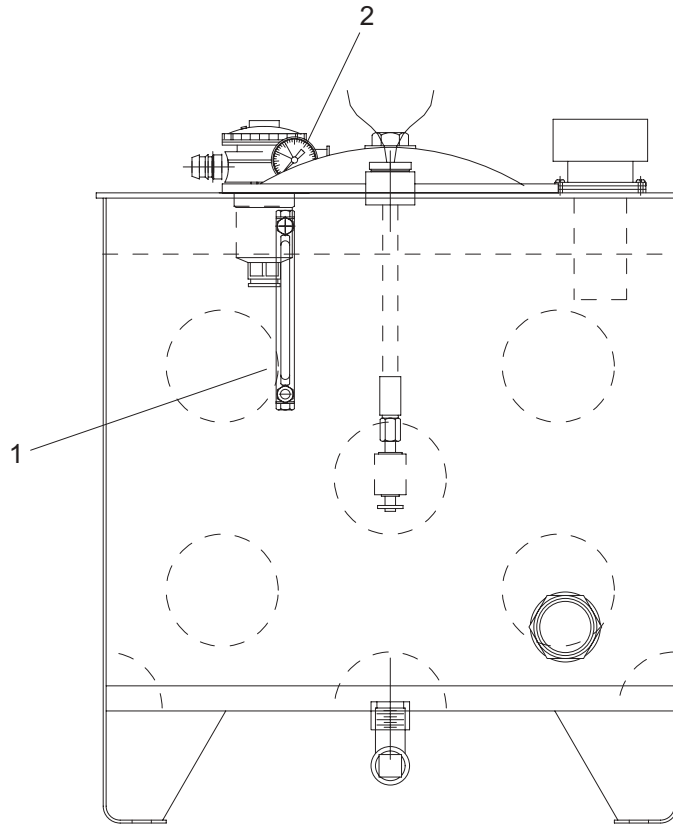


Table 16. Hydraulic Steering System Controls and Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	Sight Gauge	Indicates the level of hydraulic fluid in the storage reservoir.
2	Dirt Indicator, Return Filter	Indicates that when the arrow is in the red zone, the hydraulic reservoir fluid filter is dirty and needs replacing.

DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, FUEL SYSTEM

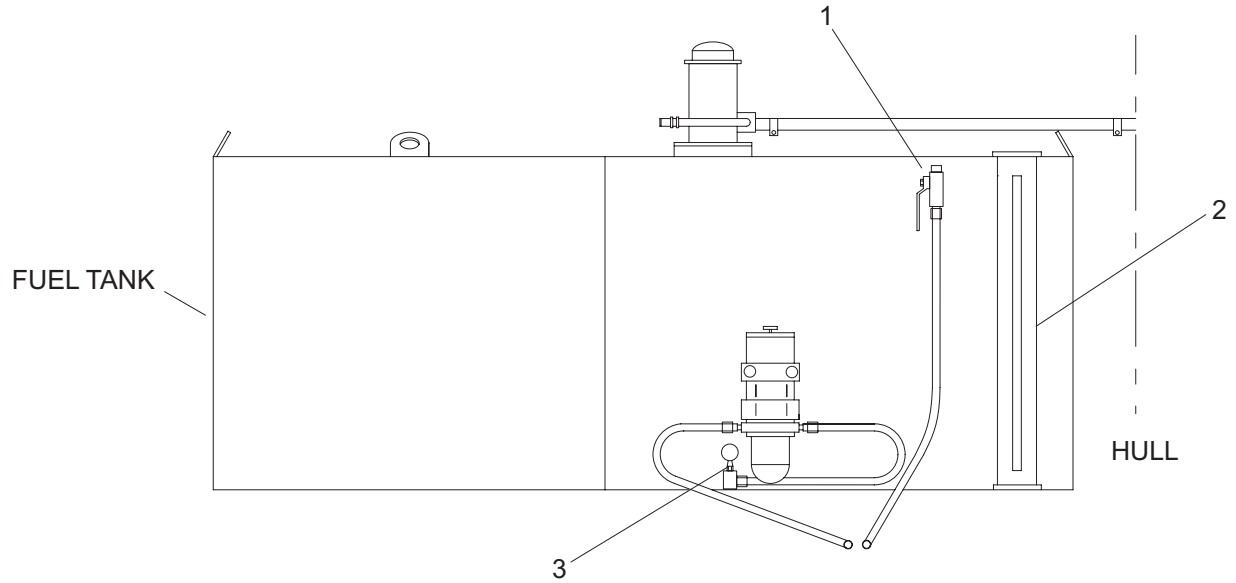


Table 17. Fuel System Controls and Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	Fuel Ball Valve (Return)	Allows return of unused fuel back into fuel tank.
2	Sight Gauge	Indicates level of fuel in the fuel tank.
3	Fuel Ball Valve (Supply)	Allows fuel to be transferred to the diesel engine.

DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, RAW WATER SYSTEM

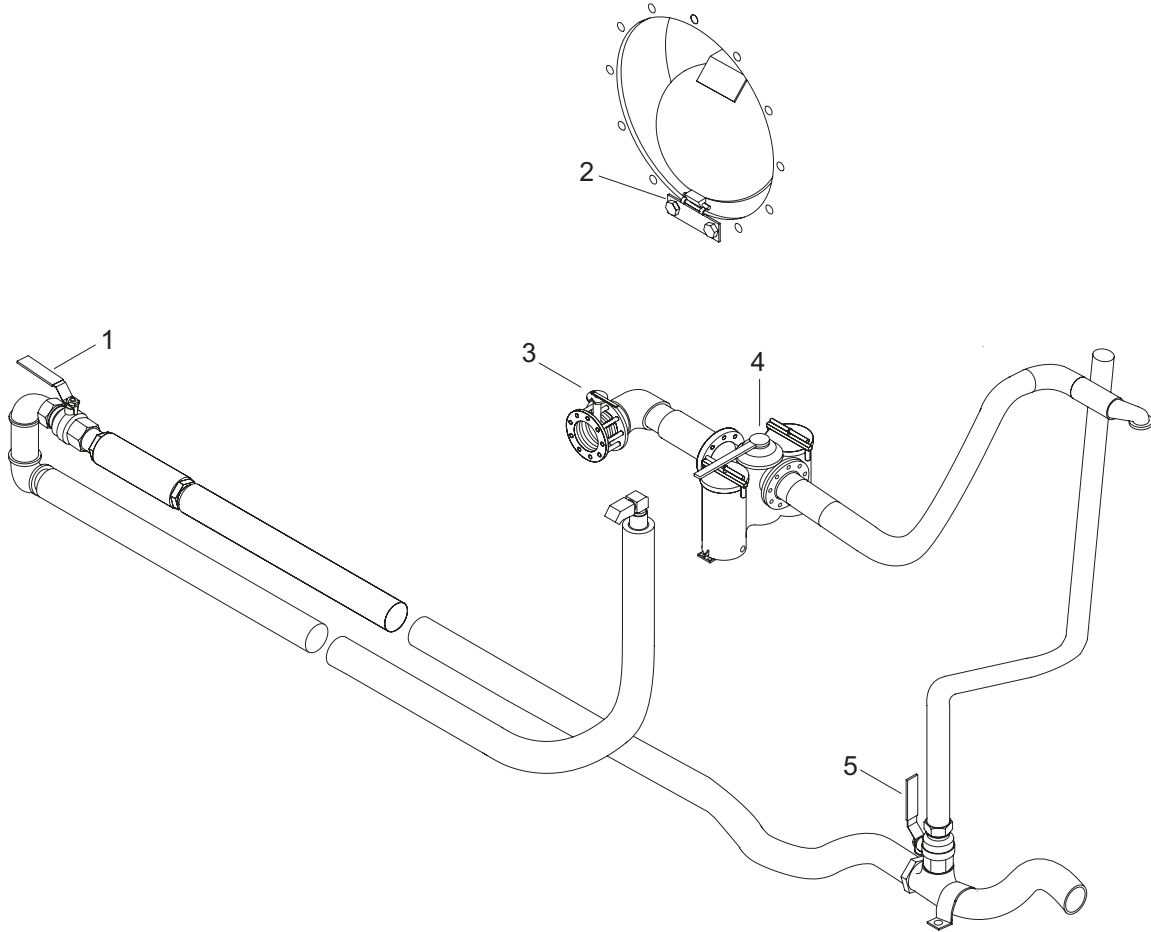
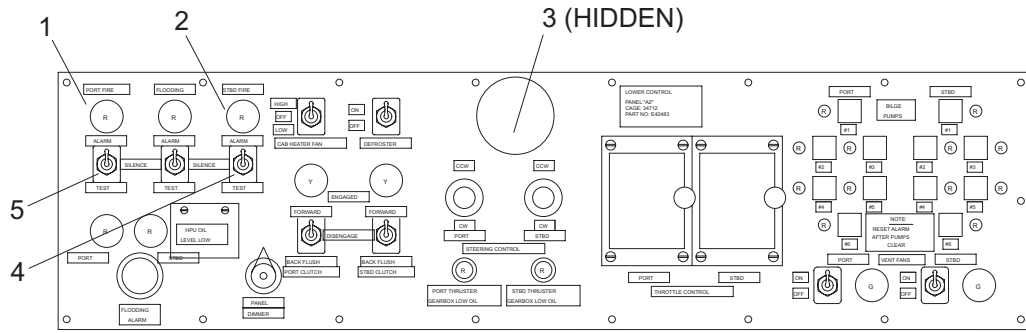


Table 18. Raw Water System Controls and Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	Raw Water System Transfer Case Valve	Allows the flow of raw water into the transfer case.
2	Exhaust Port Flapper Latch	Holds flapper closed when the propulsion module is not in use.
3	Seachest Butterfly Valve	When in the OPEN position, allows seawater to be drawn from the seachest into the raw water cooling system.
4	Duplex Strainer Valve	Selects between two strainer baskets. This allows on-the-run changing of strainers if one strainer becomes clogged. In center position, water is drawn through both at the same time.
5	Raw Water System Exhaust Valve	Allows the flow of raw water into the exhaust system.

DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, FIRE DETECTION SYSTEM



LOWER CONTROL PANEL CONTROLS AND INDICATORS

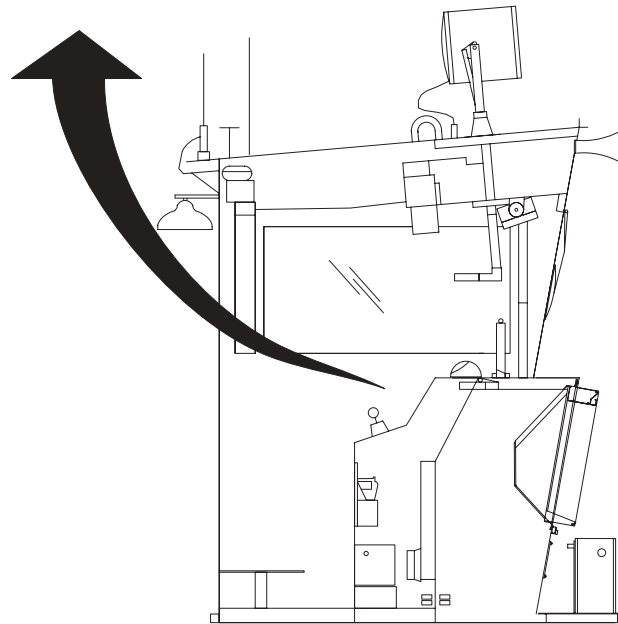


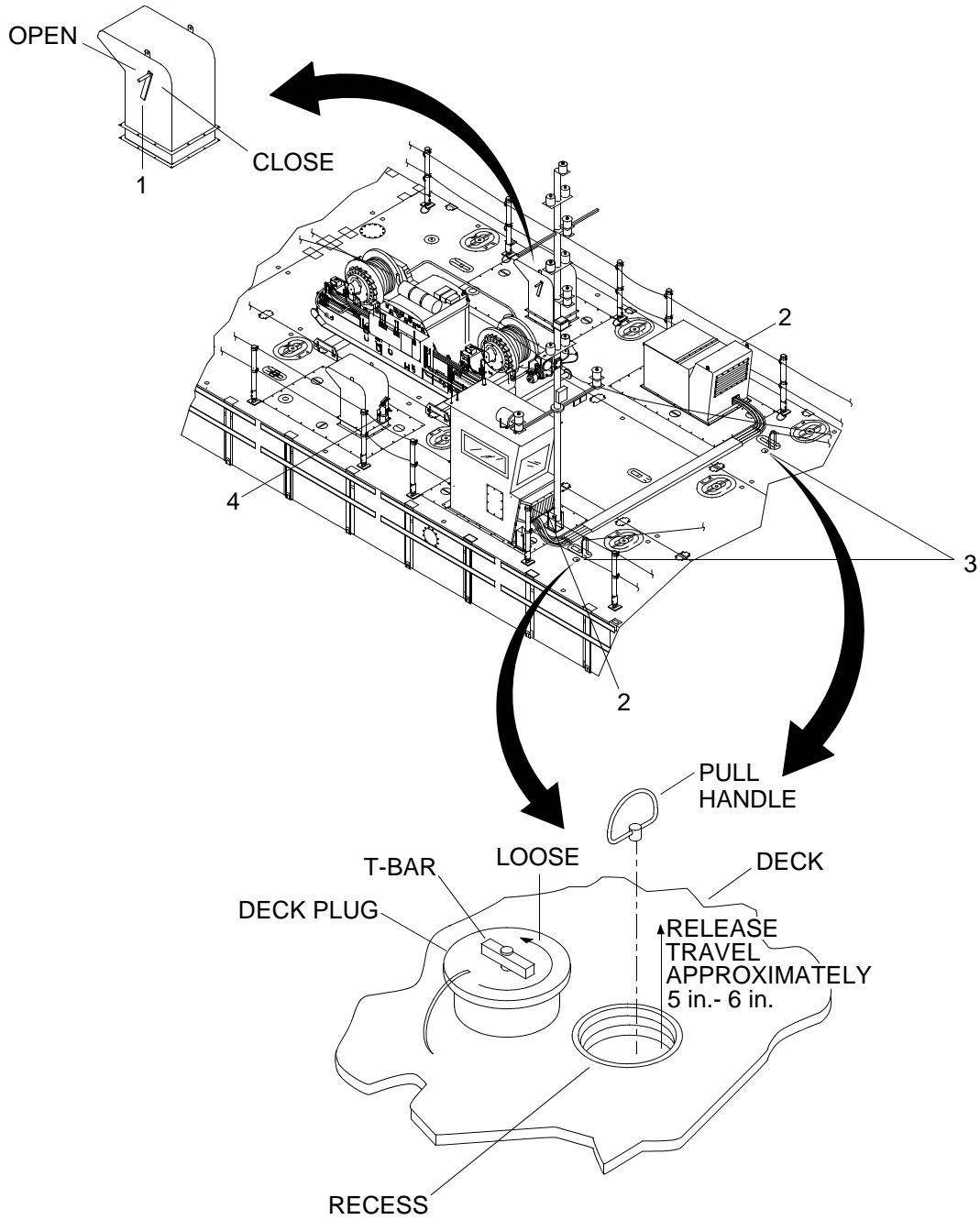
Table 19. Fire Detection System Controls and Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	PORT FIRE Alarm Red Indicating Light	Illuminates when port side thermal detector senses 225°F.
2	STBD FIRE Alarm Red Indicating Light	Illuminates when port side thermal detector senses 225°F.
3	ALARM Horn	Horn sounds when thermal detectors sense ambient temperature of 225°F in either propulsion module.

Table 19. Fire Detection System Controls and Indicators. (Continued)

KEY	CONTROL/INDICATOR	FUNCTION
4	STBD FIRE ALARM/SILENCE/ TEST Toggle Switch	Audible alarm (horn) indicates below deck temperature above 225°F or possible onboard fire in starboard propulsion module. ALARM = horn sounds and red light illuminates in operators cab. SILENCE = alarm horn silenced, red light remains illuminated. TEST (momentary) = alarm horn sounds and red light illuminates. Reset to ALARM when normal conditions exist.
5	PORT FIRE ALARM/SILENCE/ TEST Toggle Switch	Audible alarm (horn) indicates below deck temperature above 225°F or possible onboard fire in port propulsion module. ALARM = horn sounds and red light illuminates in operators cab. SILENCE = alarm horn silenced, red light remains illuminated. TEST (momentary) = alarm horn sounds and red light illuminates. Reset to ALARM when normal conditions exist.

DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, FIRE SUPPRESSION SYSTEM



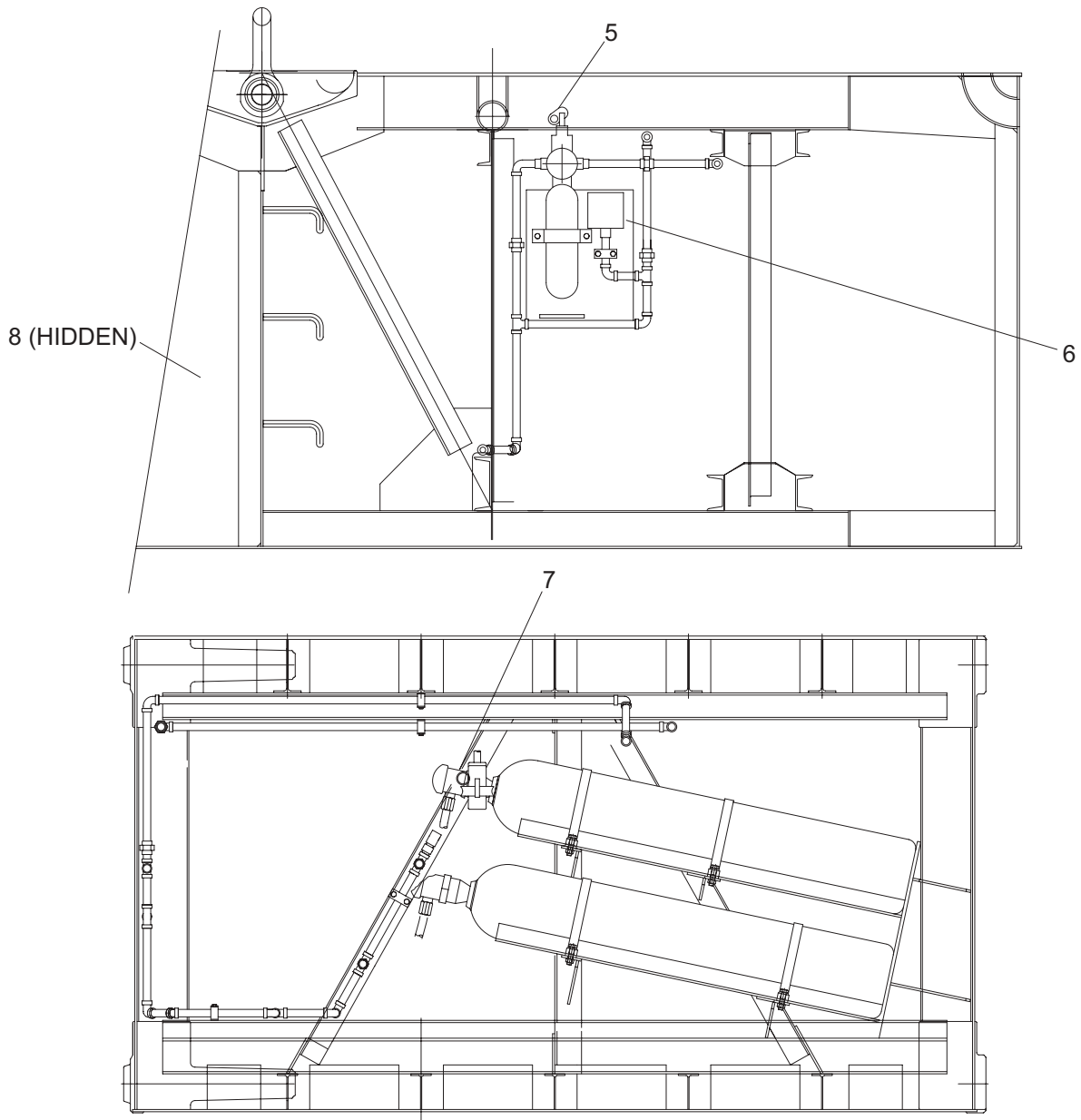


Table 20. Fire Suppression System Controls and Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	Exhaust Plenum Vent Control Handle	Place handle in CLOSED position to shut off oxygen source.
2	Air Intake Plenum	CO ₂ pressure automatically actuates the pressure trip mechanism to close vent flap. Vent flap must be manually reset to open position before resuming normal operation.
3	Remote Cable Pull Handle	Pull handle, fire suppression system activated. 30 seconds later CO ₂ will discharge.
4	Portable Fire Extinguisher	Located on the exhaust plenum aft of operators cab. Point nozzle at base of flame, remove lock pin and squeeze handle.

Table 20. Fire Suppression System Controls and Indicators. (Continued)

KEY	CONTROL/INDICATOR	FUNCTION
5	Control Head Lever, Time Delay	Pull pin, pull lever, fire suppression system activated. 30 second time delay will be disabled.
6	Pressure Switch	Senses pressure and actuates engine emergency stop. Must be manually reset when normal conditions exist.
7	Control Head Lever, 50 lb Bottle with Safety Pin	Pull pin, pull lever, fire suppression system activated. 30 second time delay is disabled.
8	Alarm Siren	Siren in machinery compartment is activated by CO ₂ pressure.

**DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, DIESEL ENGINE
EMERGENCY STOP**

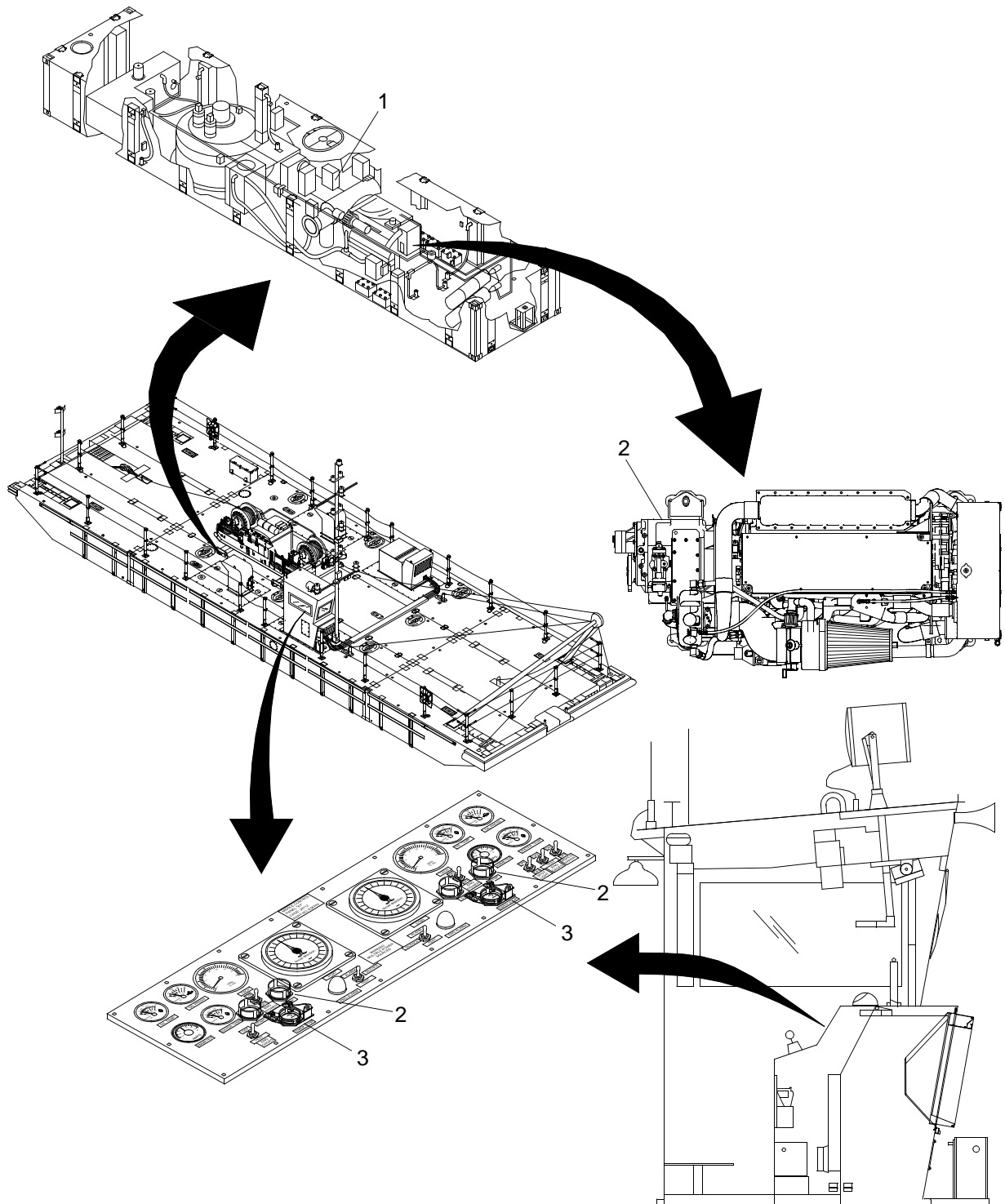


Table 21. Diesel Engine Emergency Stop Controls and Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	EMERGENCY STOP, Engine Junction Box Assembly (A4)	When red pushbutton is depressed, the air shutoff valve closes, stopping engine.
2	(Emergency) Normal STOP Pushbuttons, Engine Hourmeter, Middle Control Panel (Port and Starboard) and Engine Control Box	When red pushbutton is depressed, it shuts down electrical circuit to stop the engine. Engine hourmeter indicates hours of engine operation and is located on the engine control box near the marine gear. Engine stop pushbuttons are located on the engine control box and on the middle control panel (port and starboard).
3	EMER STOP Pushbuttons, Middle Control Panel (Port and Starboard)	When cover is lifted and red pushbutton is depressed, it closes the air shutoff valve, stopping engine.

DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, BILGE PUMP SYSTEM

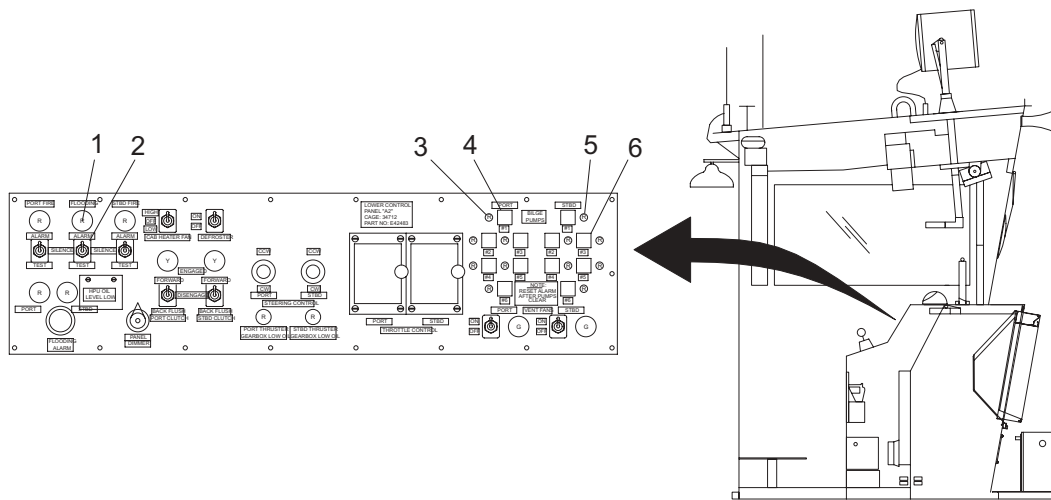
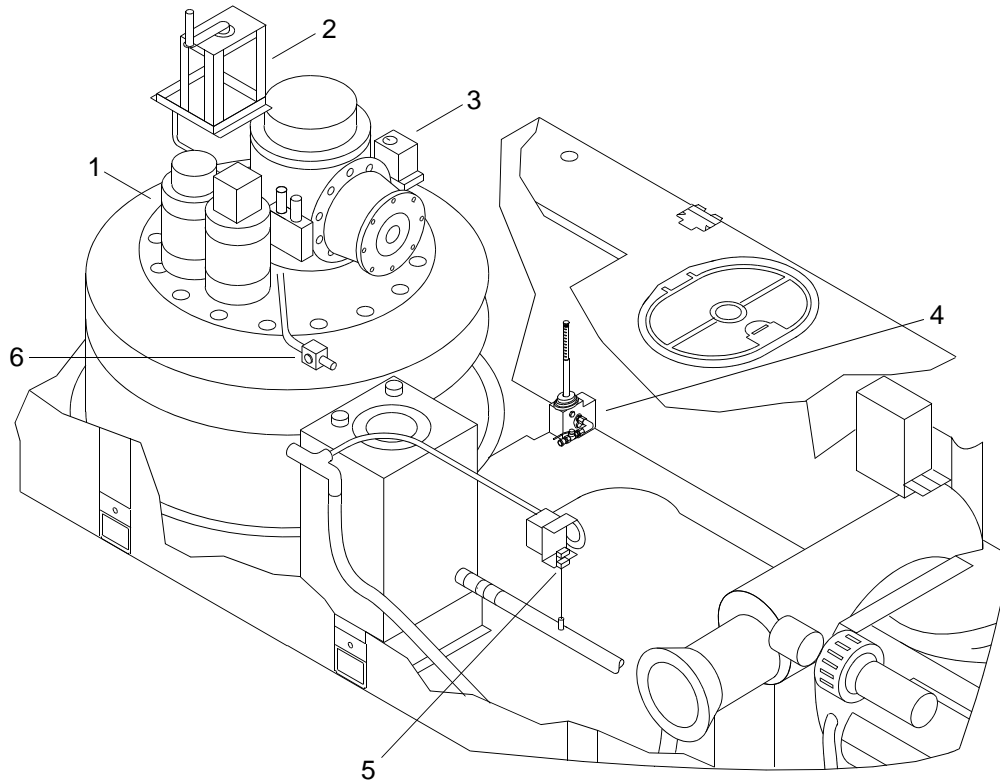


Table 22. Bilge Pump System Controls and Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	FLOOD ALARM Red Indicator Light	Illuminates when a bilge pump float switch is actuated. Illuminates until bilge pump float switch is deactivated, indicating dry bilges.
2	FLOODING ALARM SILENCE/TEST Toggle Switch	Audible alarm (pulse beeper) indicates possible flooding in port and/or starboard propulsion module. ALARM = pulse beeper sounds and red light illuminates. SILENCE = pulse beeper is silenced, red light illuminates. TEST (momentary) = pulse beeper sounds, red light illuminates. Reset to ALARM when normal conditions exist.
3	PORT BILGE PUMP(s) Red Indicator Light(s)	Light(s) will illuminate indicating flooded bilge location(s) within the port propulsion module via activated bilge pump float switch(s).
4	PORT BILGE PUMP Pushbutton(s) with Green Indicator Light(s)	Controls operation of bilge pumps in port propulsion module, illuminates when depressed, indicating each pump is working. Allows any bilge pump to be energized that has a red illuminated light (flood location). Green indicator goes out when float switch resumes normal position and bilge pump turns off.
5	STBD BILGE PUMP(s) Red Indicator Light(s)	Light(s) will illuminate indicating flooded bilge location(s) within the stbd propulsion module via activated bilge pump float.
6	STBD PORT BILGE PUMP Pushbutton(s) with Green Indicator Light(s)	Controls operation of bilge pumps in starboard propulsion module, illuminates when depressed, indicating each pump is working. Allows any bilge pump to be energized that has a red illuminated light (flood location). Green indicator goes out when float switch resumes normal position and bilge pump turns off.

**DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, EMERGENCY
SHIFTING AND STEERING**



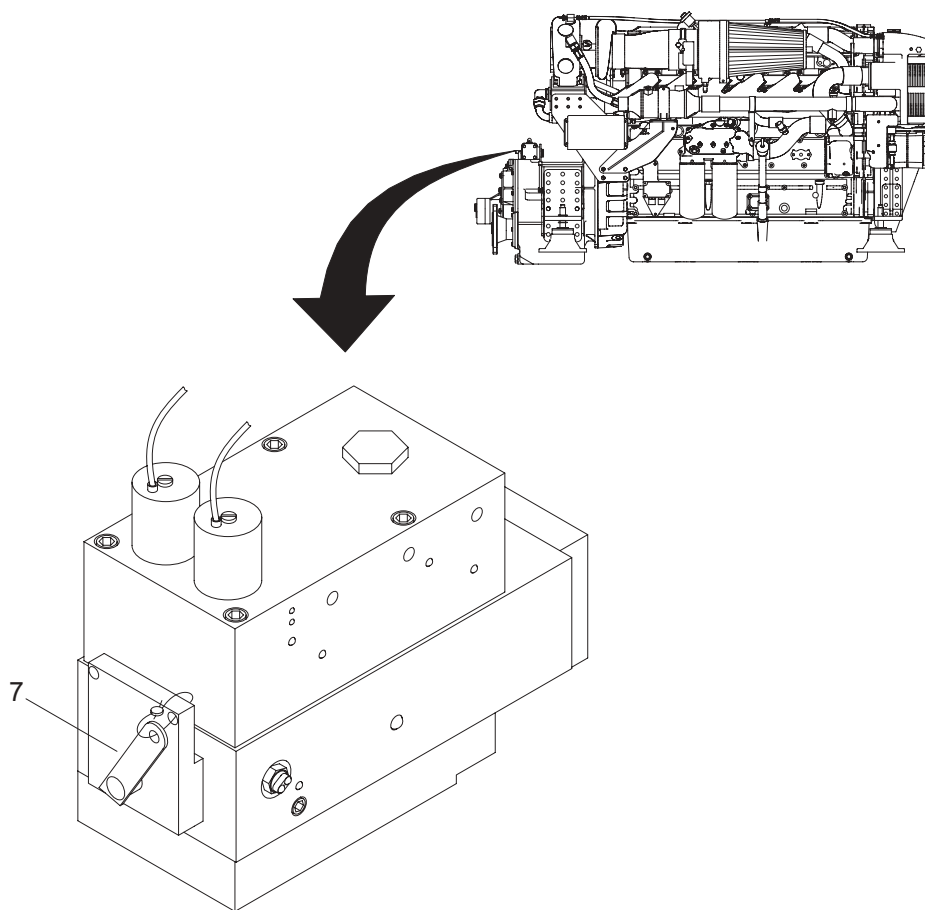


Table 23. Emergency Shifting and Steering Controls and Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	Needle Valve (Normally Closed)	This valve opens to allow manual steering with the portable tiller arm.
2	Emergency Steering Handle	Found in lazaret compartment, this handle assembly is fitted with an assembly socket for the 1.5 in. square head on the top of the pump-jet steering motor so that the directional pump-jet thruster nozzle can be manually positioned clockwise or counter-clockwise in the event power is interrupted.
3	Feedback Unit	Mechanical link to the pump-jet nozzle and allows operator of steering handle assembly to observe positioning of pump-jet nozzle as it is being rotated.
4	Hand Pump	Generates the hydraulic pressure to release the pump-jet hydraulic brake.
5	Way-Valve	Allows manual override of steering controls.
6	3/2 Ball Valve	Accommodates hand pump by shutting off rest of system so hydraulic pressure generated by the hand pump goes directly to the hydraulic brake.
7	Manual Override Lever	On marine gear selector valve, allows marine gear to be manually engaged for thrust and backflush conditions when the electrical solenoids do not operate.

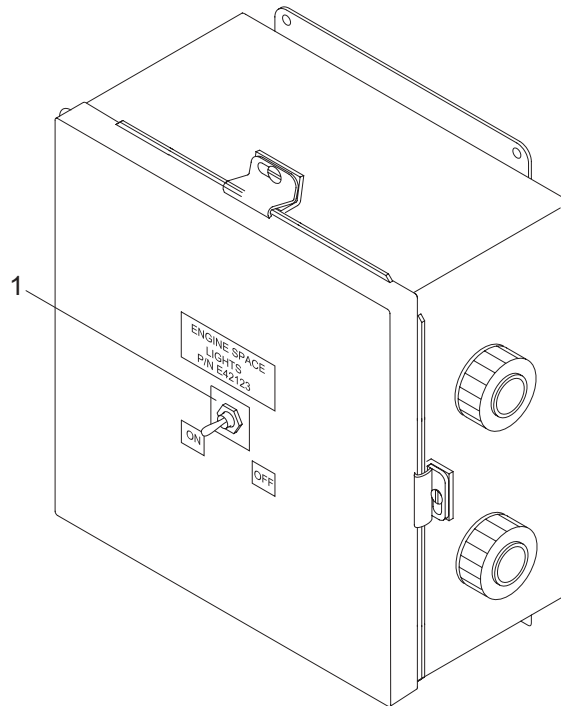
DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, ENGINE SPACE LIGHTS SWITCH BOX ASSEMBLY (A10)


Table 24. Engine Space Lights Switch Box Assembly (A10) Controls and Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	ENGINE SPACE LIGHTS Toggle Switch	Turns power ON/OFF to the below deck lighting in the machinery compartment.

DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, LAZARET LIGHTS SWITCH BOX ASSEMBLY (A11)

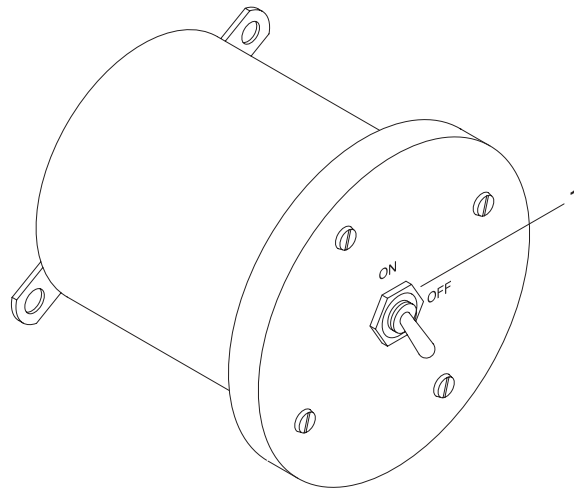


Table 25. Lazaret Lights Switch Box Assembly (A11) Controls and Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	Lazaret Light Toggle Switch	Turns power ON/OFF to the below deck lighting in the lazaret.

DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, COMPASS

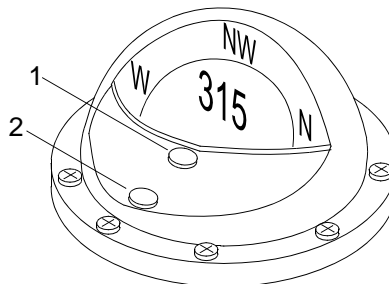


Table 26. Compass Controls and Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	Mode Select Switch	Selects compass mode.
2	Set Switch	Locks compass mode.

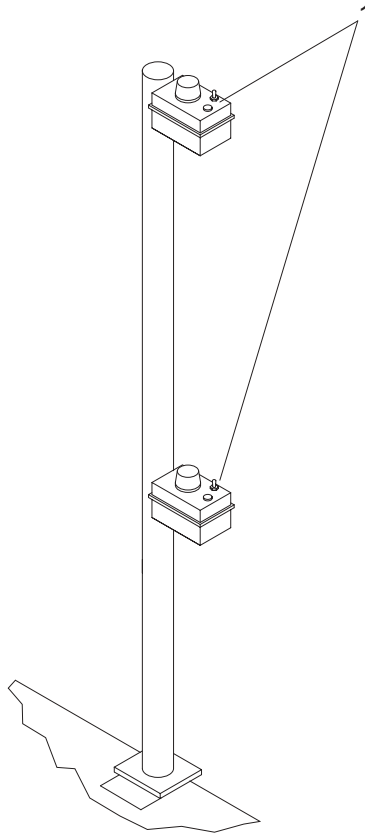
**DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, STUB ASSEMBLY
MAST LIGHT**


Table 27. Stub Assembly Mast Light Controls and Indicators.

KEY	CONTROL/INDICATOR	POSITION/FUNCTION
1	ON/OFF Switch	Two position switch that turns stub assembly mast light on or off. Lights are equipped with a sensor that prevents light from illuminating during daylight hours.

DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS, DECK WINCH

For the winch engine controls and indicators, refer to Operator's Manual for Detroit Diesel Engine Series 53, TM 5-2815-258-10. For the winch controls and indicators, refer to Operator, Unit, Direct Support and General Maintenance Manual for Winch, Warring Tug, TM 55-3950-204-14&P.

**OPERATOR MAINTENANCE
WARPING TUG
PLACING IN SERVICE**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
Goggles, Industrial: Clear Lens, Chipping (Cabinet B4) (Item 35, WP 0112 00)
Respirator, Air Filtering (WP 0113 00)
Pan, Drain (WP 0113 00)
Pump, Oil Suction (WP 0113 00)
Wrench, Strap (WP 0113 00)
Drum, Shipping and Storage (55 GAL) (WP 0113 00)

Materials/Parts

Gloves, Rubber Industrial (Item 26, WP 0114 00)
Test Kit, Antifreeze (Item 57, WP 0114 00)
Fuel, Diesel (Item 24, WP 0114 00)
Primer, Fuel System (Item 47, WP 0114 00)
Lubricating Oil, Engine (Item 37, WP 0114 00)
Lubricating Oil, Engine (Item 39, WP 0114 00)
Lubricating Oil, Gear (Item 40, WP 0114 00)
Lubricating Oil, General Purpose (Item 41, WP 0114 00)
Tape, Antiseizing (Item 55, WP 0114 00)
Antifreeze (Item 2, WP 0114 00)
Cloth, Cleaning (Item 13, WP 0114 00)
Preservation Oil (Item 46, WP 0114 00)

Personnel Required

Seaman 88K

References

TB 55-1900-207-24
TM 9-6140-200-14
TM 11-5820-890-10-8
TM 55-3950-204-14&P

PLACE WT SYSTEM EQUIPMENT IN SERVICE**INSPECT CHAINS, SLINGS AND SHACKLES**

WARNING

The existence of any of the following conditions will require that chain, slings and shackles be immediately removed from service. Failure to observe these precautions could result in serious injury or death to personnel.

1. Inspect chain for excessive wear or stretching.
2. Inspect chain for bent or twisted links.
3. Inspect chain for defective welds.
4. Inspect chain for nicks and gouges.

-
5. Inspect all attaching shackles and hardware for corrosion, nicks, cuts, scratches or breaks.
 6. Inspect hoist attachment or terminal ring for distortion.
 7. Inspect web slings for marks or codes that show rated capacities and type of synthetic web material.
 8. Inspect web slings for uniform thickness and width.
 9. Inspect web slings for selvage edges splitting from webbings width.
 10. Inspect web slings for snags, punctures, tears or cuts.
 11. Inspect web slings for broken or worn stitches.
 12. Inspect web slings for distortion of fittings.
 13. Inspect web sling fittings for sharp edges that could damage webbing.
 14. Inspect web sling surface for evidence of melting or charring from acid or burns.
 15. Inspect hooks and shackles for proper position and function of safety closure latch.
 16. Inspect hooks and shackles for cracks or corrosion.
 17. Inspect hooks and shackles for a throat opening of more than 15% of original dimensions.
 18. Inspect hooks and shackles for wear exceeding 10% of original dimensions.
 19. Inspect hooks for more than a 10° twist from plane of unbent hook.
 20. Inspect shackle pin for cracks, corrosion or excessive wear.

NOTE

New hooks should have all paint removed prior to being placed in service.

21. Inspect hooks for paint that covers small stress cracks from metal fatigue.

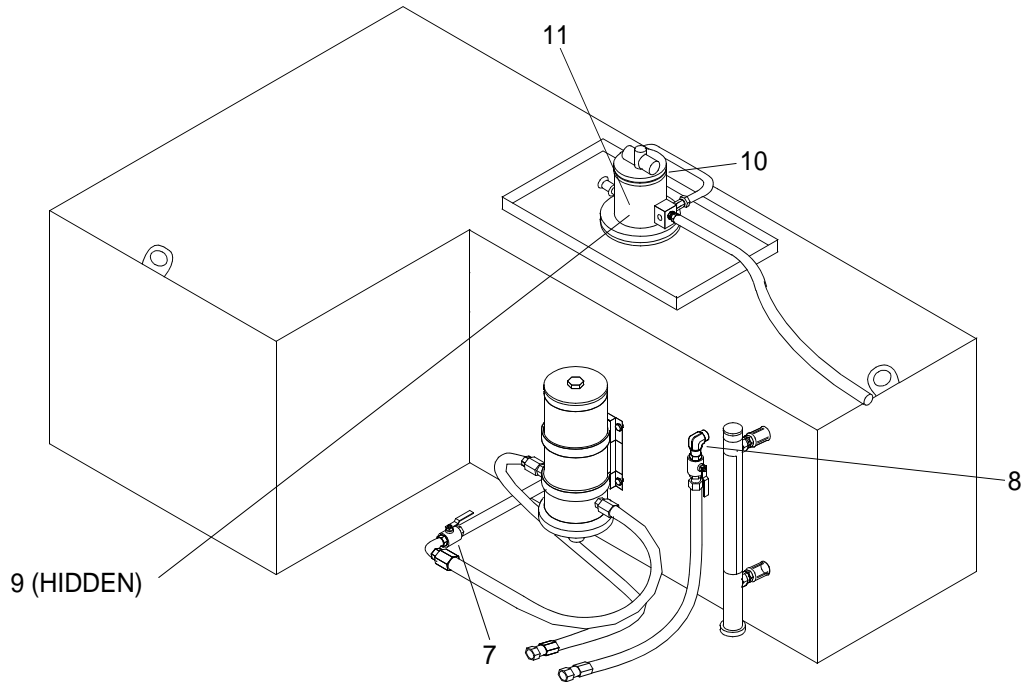
PLACE DIESEL ENGINE IN SERVICE

1. If diesel engine has attached tag stating "CHECK FOR PROPER OIL LEVEL PRIOR TO OPERATION OF DIESEL ENGINE.", check oil level on dipstick with diesel engine off. If needed, fill with engine lubricating oil (Grade 40). (WP 0105 00)
2. If diesel engine has attached tag stating "ENGINE PRESERVED FOR LONG TERM STORAGE WITH GRADE 30 PRESERVATIVE ENGINE LUBRICATING OIL. CHECK FOR PROPER OIL LEVEL PRIOR TO OPERATION OF DIESEL ENGINE. AT FIRST SCHEDULED OIL CHANGE, REPLACE PRESERVATIVE OIL WITH OIL CONFORMING TO MIL-L-2104 GRADE 40.", check oil level on dipstick with diesel engine off. If needed, fill with preservative engine lubricating oil (Grade 30). (WP 0105 00)
3. Verify coolant level is full. (WP 0105 00)
4. Using antifreeze test kit, test and inspect diesel engine cooling system. (TB 55-1900-207-24, TM 55-1945-222-14&P)

WARNING

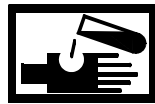
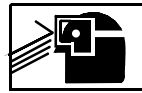
**CHEMICAL****EYE PROTECTION**

5. If concentration is low, service cooling system as required. (TB 55-1900-207-24, TM 55-1945-222-14&P)
6. Restore fuel system to operation. (WP 0105 00)
 - a. Position fuel system supply (7) and return (8) ball valves to open.



- b. Access filler neck strainer (9) beneath access hatch on top of module.

WARNING

**CHEMICAL****EYE PROTECTION**

- c. Remove filler neck cover (10) from filler neck (11).

WARNING

**CHEMICAL****EYE PROTECTION**

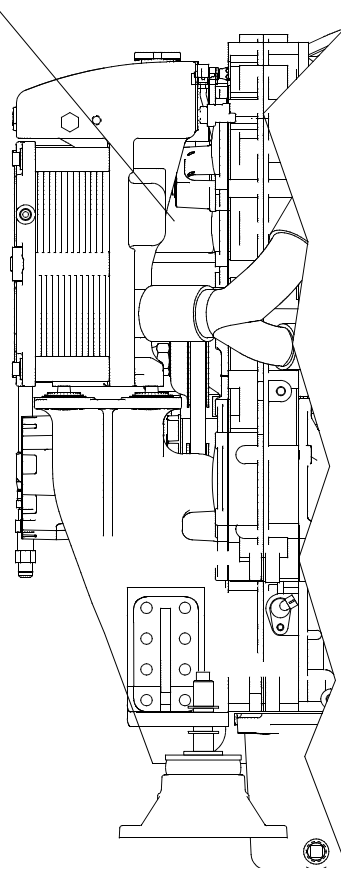
- d. Fill fuel tank with diesel fuel, as required (fuel tank capacity is 400 gallons).
- e. Install filler neck cover (10) on filler neck (11) and install access hatch.

NOTE

The water pump is located behind the heat exchanger.

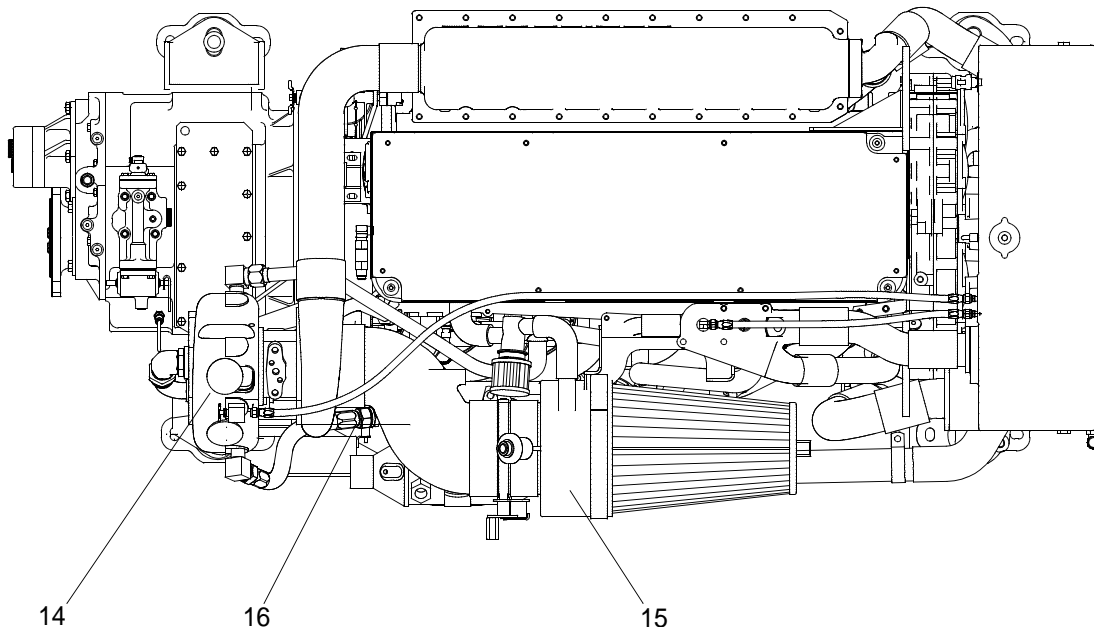
7. Install drain plugs (12) in water pump (13).

12, 13 (HIDDEN)



- a. Remove drain plugs (12) from bag attached to side of diesel engine near water pump (13).
 - b. Install drain plugs (12) in bottom of water pump (13).
 - c. Remove and discard yellow caution tag and bag.
8. Remove heavy paper strips from between diesel engine pulleys and belt drives.

9. If diesel engine was preserved for long term storage, re-tighten engine drive belts before starting engine. Contact unit maintenance.
10. Remove and discard yellow caution tag.
11. Lubricate turbocharger (14). Contact unit maintenance.



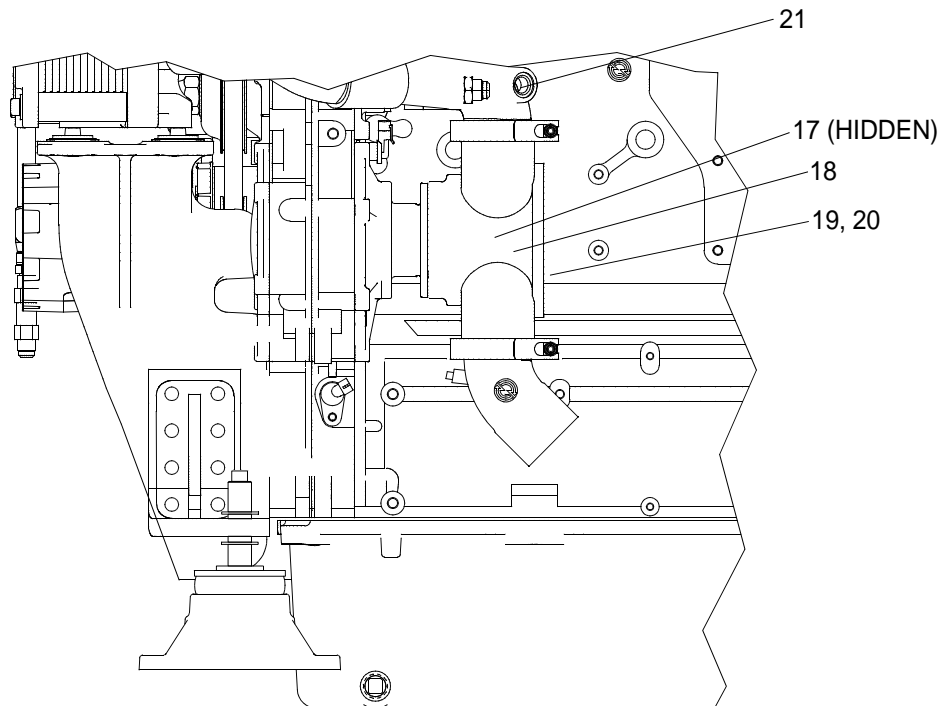
- a. Remove air clean assembly (15) at its interface to turbocharger (14).
- b. Disconnect oil pressure line (16) to turbocharger (14).
- c. Using an oil can, pre-lube bearings of turbocharger (14) with engine lubricating oil (Grade 40).
- d. While pre-lubing bearings, turn turbocharger (14) by hand.
- e. Fill the turbo bearing housing cavity with approximately one pint of engine lubricating oil (Grade 40).
- f. Reconnect oil pressure line (16) to turbocharger (14).
- g. Install air clean assembly (15) on interface to turbocharger (14).

CAUTION

It is essential that the raw water pump be properly primed prior to starting the diesel engine. Failure to do so will result in immediate and severe pump damage.

12. Install raw water pump impeller (17) and prime raw water pump (18). Contact unit maintenance.

- a. Remove raw water pump cover (19), gasket (20) from raw water pump (18).



- b. Remove impeller (17) from bag attached to side of diesel engine near raw water pump (18).
- c. Install impeller (17) in raw water pump (18). Be sure vane of impeller (17) is turned in correct direction.
- d. Install raw water pump cover (19) and new gasket (20) on raw water pump.
- e. Remove zinc anode (21) on discharge side of raw water pump (18).
- f. Prime raw water pump (18) to prevent pump running dry by pouring at least one pint of water into raw water pump.
- g. Install zinc anode (21) and tighten.
- h. Remove and discard yellow caution tag and bag.

13. Start diesel engine. (WP 0024 00)

NOTE

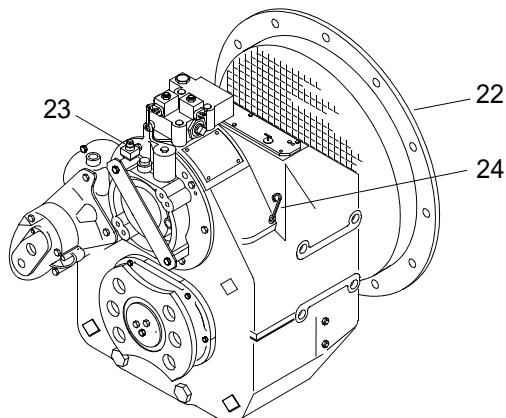
If the diesel engine is being placed into service after a period of short or long term storage, it is likely the secondary fuel filter was changed as part of preservation procedures. If the diesel engine fails to start after this filter replacement, the fuel system will require priming using fuel system primer.

- a. To prevent serious damage to starter, do not crank diesel engine over 15 seconds at a time.
- b. After diesel engine has started, immediately observe oil pressure gauge. If there is no oil pressure indicated within 10 to 15 seconds, stop diesel engine and check lube oil system.

- c. Before subjecting diesel engine to a load or high speed, it is advisable to allow diesel engine to reach normal operating temperature.
- d. Operate diesel engine at idle, engaging marine gear forward and reverse to ensure complete circulation of oil.

PLACE MARINE GEAR IN SERVICE

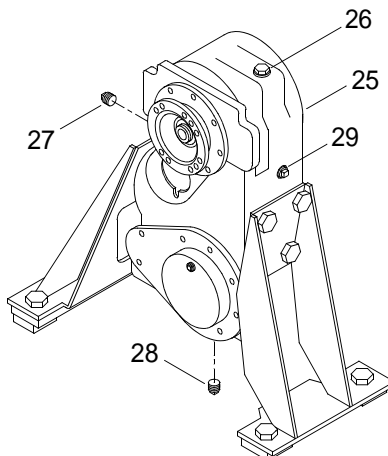
1. Remove plastic bag covering marine gear (22) breather cap (23).



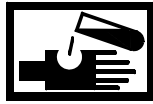
2. Check marine gear (22) oil level using oil level gauge (24). Check oil level with engine at idle speed and marine gear (22) in “neutral”. Oil level must be maintained at the “Full” mark on the oil level gauge (24). Add engine lubricating oil (Grade 40) as required. (WP 0105 00)
3. Remove and discard yellow caution tags and plastic bag.

PLACE TRANSFER CASE IN SERVICE

1. Remove plastic bag covering transfer case (25) breather (26).
2. Check transfer case (25) oil level and fill with engine lubricating oil (Grade 30) as required.

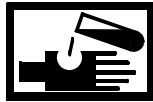


WARNING

**CHEMICAL****EYE PROTECTION**

- a. Remove check plug (27) from side of transfer case (25).
- b. Position drain pan beneath transfer case (25).

WARNING

**CHEMICAL****EYE PROTECTION**

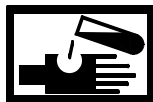
- c. Remove drain plug (28) from bottom of transfer case (25) and drain oil into drain pan until oil level is even with check plug (27) location.

WARNING

**CHEMICAL****EYE PROTECTION**

- d. Fill transfer case with engine lubricating oil (Grade 30) at fill plug location (29) if required.

WARNING

**CHEMICAL****EYE PROTECTION**

- e. Install drain plug (28) and check plug (27).

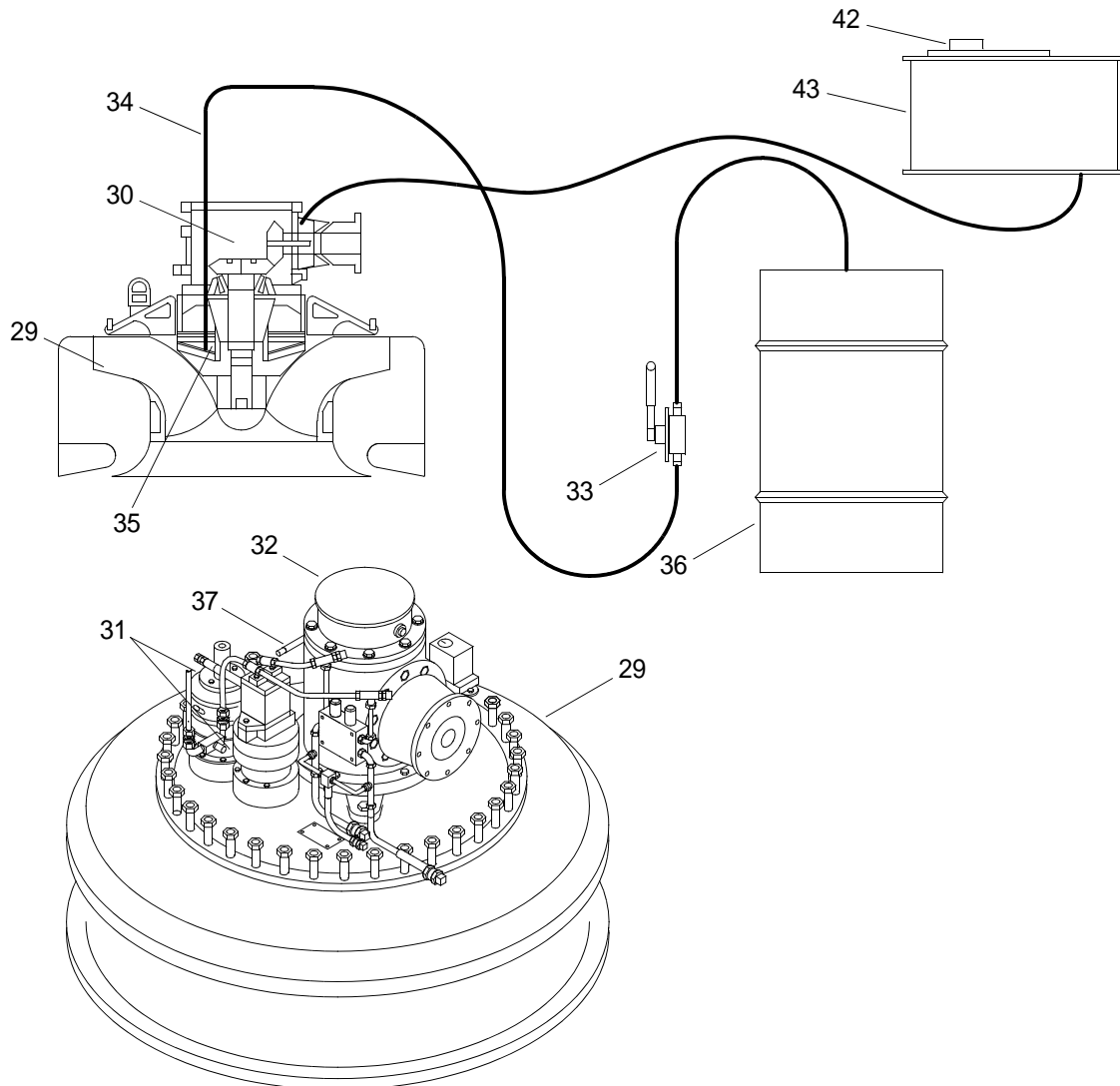
WARNING

**CHEMICAL****EYE PROTECTION**

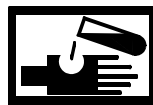
- f. Remove drain pan and dispose of contents per local procedures.
3. Remove and discard yellow caution tags and plastic bag.

PLACE PUMP-JET IN SERVICE

1. If pump-jet (29) has been in short term storage, drain excess oil from gearcase (30) and both planetary gearboxes (31) in 55 GAL drum.



WARNING



CHEMICAL



EYE PROTECTION

- a. Remove cover (32) on top of gearcase (30).

 WARNING



CHEMICAL



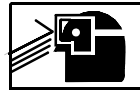
EYE PROTECTION

- b. Using bulkhead mounted rotary pump (33) near pump-jet (29), slide attached suction tube (34) up to limit stop into impeller shaft (35).

 WARNING



CHEMICAL



EYE PROTECTION

- c. Pump excess oil into a 55 GAL drum (36) until level reaches middle of sight gauge (37).

 WARNING



CHEMICAL



EYE PROTECTION

- d. Dispose of used oil per local procedures.

 WARNING



CHEMICAL



EYE PROTECTION

- e. Install cover (32) on top of gearcase (30).

NOTE

The following steps are typical for both planetary gearboxes.

- f. Position drain pan beneath planetary gearbox (31).

 WARNING



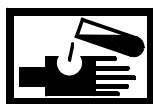
CHEMICAL



EYE PROTECTION

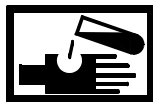
- g. Remove check tube plug (38) and drain plug (39) from planetary gearbox (31).

WARNING

**CHEMICAL****EYE PROTECTION**

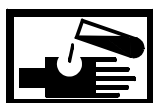
- h. Drain oil into drain pan until level is even with top of check tube (40).

WARNING

**CHEMICAL****EYE PROTECTION**

- i. Install drain plug (39) and check tube plug (38).

WARNING

**CHEMICAL****EYE PROTECTION**

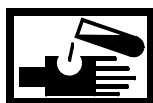
- j. Remove drain pan and dispose of contents per local procedures.
2. If pump-jet (29) has been in long term storage, drain preservative anti-corrosion oil from gearcase (30) and both planetary gearboxes (31). Contact unit maintenance.

WARNING

**CHEMICAL****EYE PROTECTION**

- a. Remove cover (32) on top of gearcase (30).

WARNING

**CHEMICAL****EYE PROTECTION**

- b. Using bulkhead mounted rotary pump (33) near pump-jet (29), slide attached suction tube (34) up to limit stop into impeller shaft (35).

 WARNING



CHEMICAL



EYE PROTECTION

- c. Pump all oil into a 55 GAL drum (36) until level reaches middle of sight gauge (37).

 WARNING



CHEMICAL



EYE PROTECTION

- d. Dispose of used oil in accordance with local procedures.

 WARNING



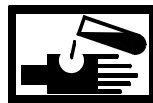
CHEMICAL



EYE PROTECTION

- e. Pump in new gear lubricating oil (Grade 80W90) or pour directly into top of gearcase (30) (oil capacity is approximately 17.5 gallons). Gearbox (30) is full when oil level reaches middle of sight gauge (37).

 WARNING



CHEMICAL



EYE PROTECTION

- f. Install cover (32) on top of gearcase (30).

NOTE

The following steps are typical for both planetary gearboxes.

- g. Position drain pan beneath planetary gearbox (31).

 WARNING

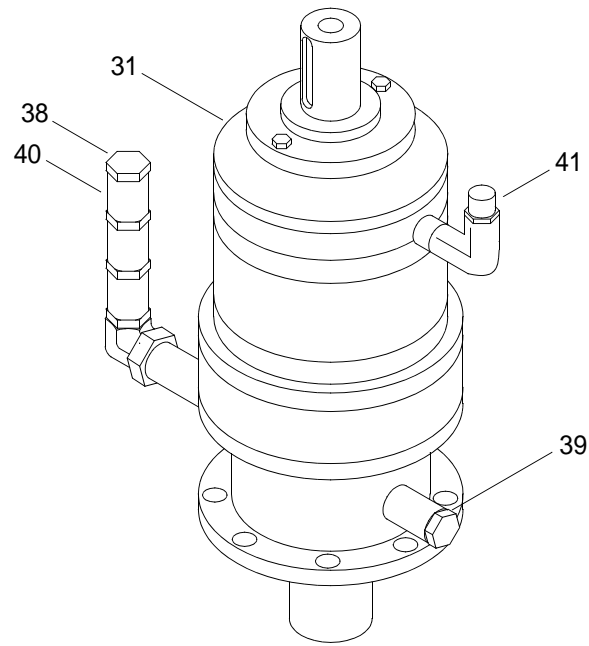


CHEMICAL



EYE PROTECTION

- h. Remove drain plug (39) from planetary gearbox (31) and drain preservative anti-corrosive oil into drain pan.



WARNING



CHEMICAL



EYE PROTECTION

- i. Install drain plug (39).

WARNING



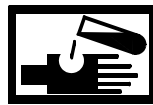
CHEMICAL



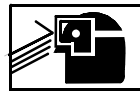
EYE PROTECTION

- j. Remove fill plug (41) and check plug (38).

WARNING



CHEMICAL



EYE PROTECTION

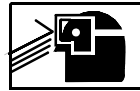
- k. Fill planetary gearbox (31) with new gear lubricating oil (Grade 80W90) at “fill” location (41). Planetary gearbox (31) is full when oil rises to top of “check” outlet (40).

WARNING

**CHEMICAL****EYE PROTECTION**

1. Install fill plug (41) and check plug (38).

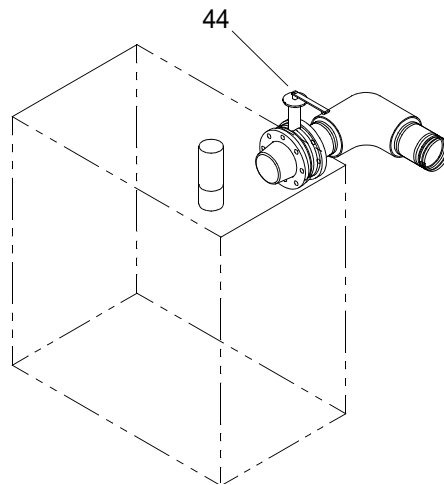
WARNING

**CHEMICAL****EYE PROTECTION**

- m. Remove drain pan and dispose of contents per local procedures.
3. Verify nothing is covering breather (42) on expansion tank (43).

PLACE SEACHEST IN SERVICE

1. Gain access to machinery compartment.
2. Ensure seachest valve (44) is OPEN prior to running diesel engine. (WP 0105 00)



PLACE FIRE SUPPRESSION SYSTEM IN SERVICE

WARNING

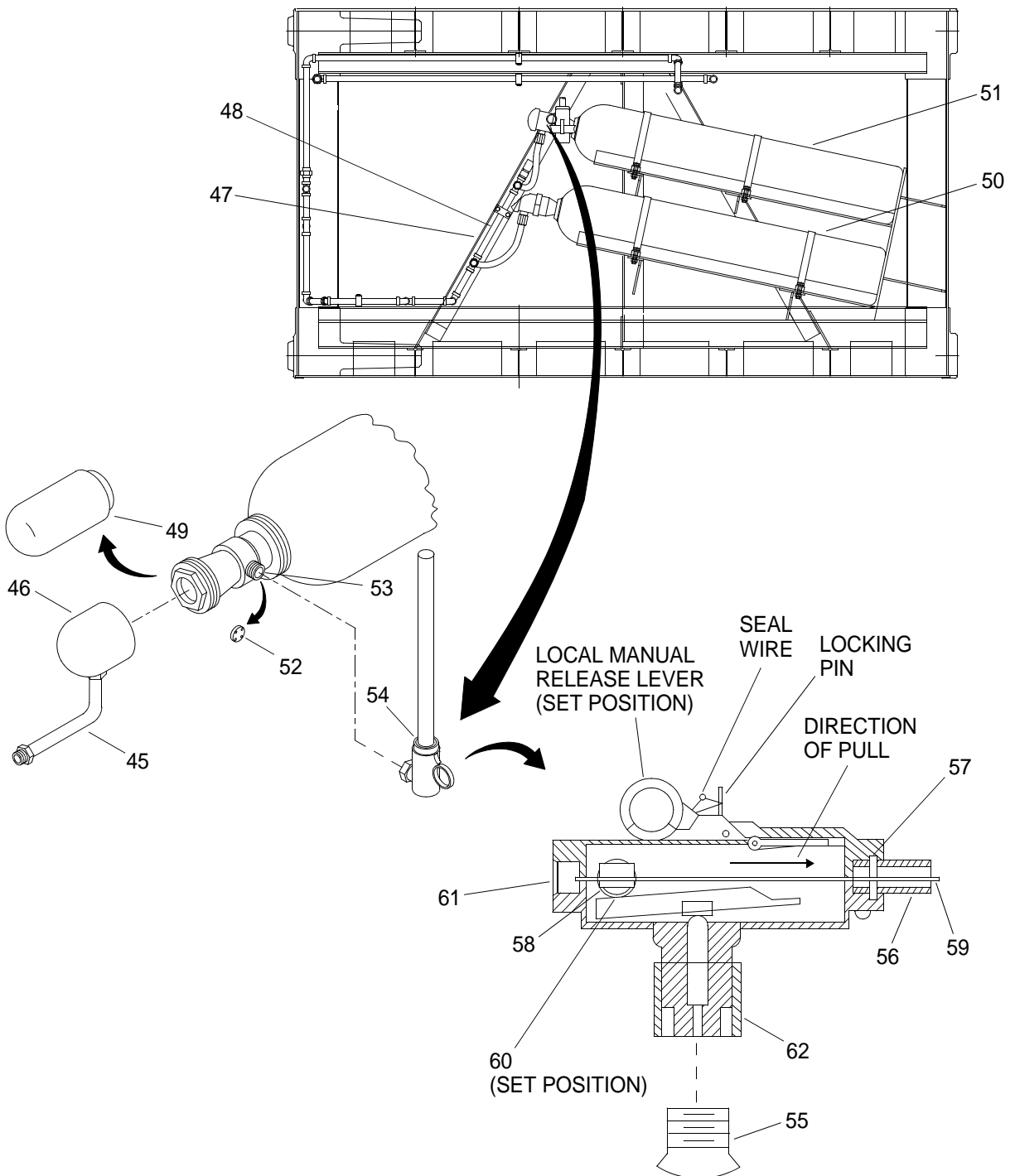
All personnel shall be clear of the machinery and fuel storage compartments and all hatches left open while CO₂ disconnects are being made. The carbon dioxide gas used in this system is stored in cylinders under extremely high pressure, equipped with high rate discharge valves, which when actuated, will open, remain open, and cannot be closed. An uncontrolled release of this high pressure gas from an accidental discharge, improper handling, or damage to parts can result in a violent and rapid propulsion of the cylinder(s), capable of causing severe equipment damage, personal injury, or death to personnel. Use extreme caution.

Because CO₂ reduces the available oxygen in the atmosphere, it will not support life. Extreme caution must be used when handling components in this system. Accidental discharge of this agent can cause serious injury or death to personnel.

NOTE

Antiseizing tape shall be used on all threaded pipe joints.

1. Thread flexible discharge hoses (45) with attached discharge heads (46) into inlet tees (47) of hard pipe agent discharge plumbing (48).



2. Remove and stow cylinder caps (49).
3. Beginning with lower cylinder (50), thread discharge heads (46) onto cylinders (50, 51).
4. Remove protective cover (52) from control port (53) of upper cylinder (51). Retain protective cover (52).
5. Remove cover from control head (54). Making sure plunger is below surface of control head (54) body, position control head (54) at cylinder valve port (55) with arrow pointing in direction of pull.

- Place cable pipe (56) with cable lock nut (57) in position to control head (54) body. Make sure cable wheel (58) on control cable (59) is in "set" position with wheel assembly (60) positioned at start of stroke. Insert closure disk (61) and replace cover on control head (54). Control head (54) is now armed.

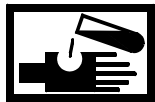
WARNING

To ensure that the manual lever does not snag or trap the cable, the local manual release lever must be in the SET position with the locking pin and seal wire installed before assembling control head cover to body. Failure to comply may result in inadvertent discharge of CO2 system.

- Assemble control head (54) to cylinder valve actuation port (55). Tighten swivel nut (62) securely.
- Remove and discard red warning tag.

PLACE HYDRAULIC OIL TANK IN SERVICE

WARNING



CHEMICAL



EYE PROTECTION



VAPOR

- Remove cover from top of hydraulic tank.
- Position drain pan beneath hydraulic tank.

WARNING



CHEMICAL



EYE PROTECTION



VAPOR

- Drain hydraulic tank of oil until level reaches full mark on sight gauge.

WARNING



CHEMICAL



EYE PROTECTION



VAPOR

- Install cover on top of hydraulic tank.
- Remove yellow caution tag and discard.

PLACE BATTERIES (ENGINE AND HOUSE) IN SERVICE

1. If necessary, install new batteries. Contact unit maintenance.

WARNING

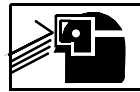
To avoid possible electrical shock, disconnect the main circuit breaker prior to connecting any jumper. Failure to comply will result in injury to personnel.

2. Connect battery jumpers and cables.
3. Fully charge batteries. (TM 9-6140-200-14)

PLACE PROPULSION MODULE ELECTRICAL ENCLOSURES IN SERVICE

1. Remove pressure sensitive tape from all electrical enclosures.
2. Open covers on all nine below deck electrical enclosures.

WARNING

**CHEMICAL****EYE PROTECTION**

3. Remove all foam corrosive inhibitors and desiccant bags and discard per local procedures.
4. Close covers on all nine below deck electrical enclosures.
5. Remove and discard yellow caution tags.

PLACE PROPULSION MODULE MAIN ELECTRICAL CIRCUIT BREAKER IN SERVICE

1. Gain access to machinery compartment.
2. Ensure MAIN circuit breaker on propulsion module circuit breaker panel A6 is positioned to on prior to operation. (WP 0105 00)

PLACE BATTLE LANTERNS IN SERVICE
NOTE

Batteries stored in BII drawer A4 are wrapped and labeled. The label indicates where battery should be reinstalled.

3. Retrieve propulsion module battle lantern batteries from BII container, drawer A4.
4. Unwrap and install batteries in battle lanterns. (WP 0022 00)
5. Install all three battle lanterns below deck in propulsion module.

PLACE EXHAUST SYSTEM IN SERVICE

1. Open exhaust flapper retainer prior to operation. (WP 0105 00)
2. Turn exhaust raw water shutoff valve to open position before operation. (WP 0105 00)
3. Remove pressure sensitive tape from all exhaust system openings and discard tape.

PLACE PROPULSION MODULE IN SERVICE

1. If propulsion module was preserved for long term storage, remove wrap.
2. Remove pressure sensitive tape from all access and soft hatches.
3. Remove pressure sensitive tape from fuel tank vent.
4. Remove pressure sensitive tape from sludge tank vent.

WARNING

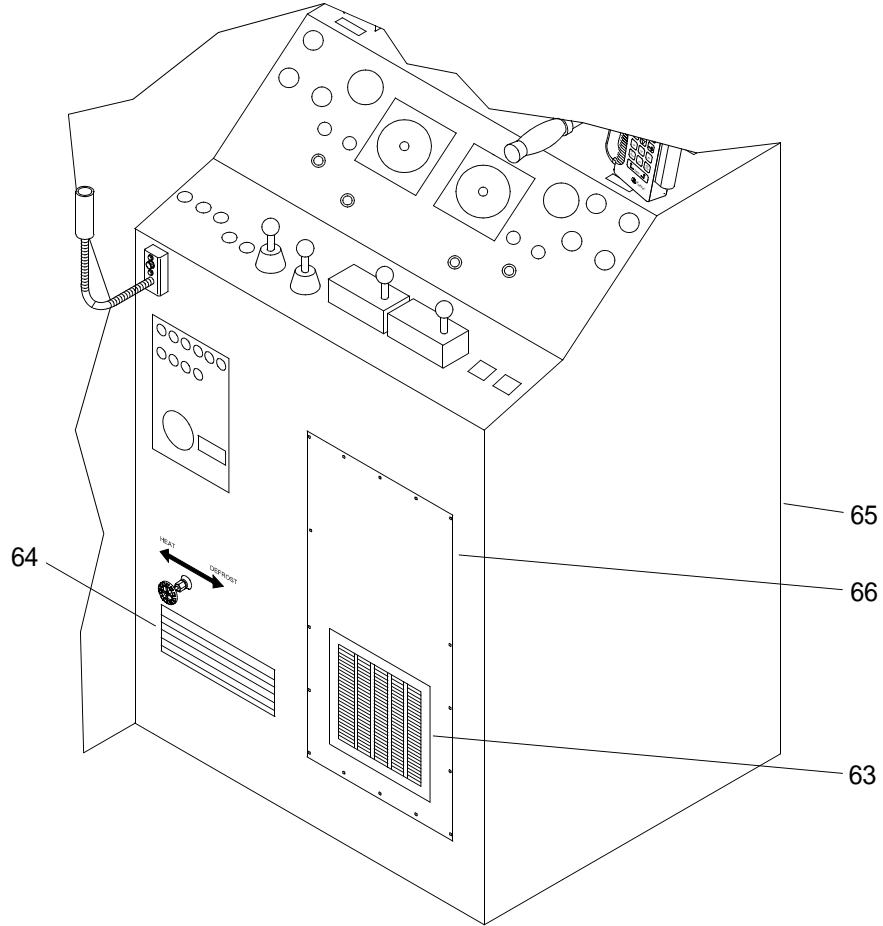
**CHEMICAL****EYE PROTECTION**

5. Remove all desiccant bags and humidity-indicating cards and discard per local procedures.
6. Remove and discard all yellow caution tags and red warning tag once all de-preservation has been accomplished.

PLACE OPERATORS CAB IN SERVICE

1. If operators cab was preserved for long term storage, remove wrap.

2. Remove pressure sensitive tape covering doors and windows, air intake vent, filter grill (63) and heater (64).



—————
WARNING
—————



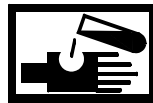
CHEMICAL



EYE PROTECTION

3. Remove all desiccant bags and humidity-indicating card from inside operators cab and discard per local procedures.

—————
WARNING
—————



CHEMICAL



EYE PROTECTION

4. Remove desiccant bags and foam corrosion inhibitors from inside operators console (65).
- a. Remove access cover (66) from front of operators console (65).

- b. Remove desiccant bag and foam corrosion inhibitor from inside operators console (65) and discard per local procedures.
- c. Install access cover (66) on front of operators console (65).

WARNING



CHEMICAL



EYE PROTECTION

5. Open enclosure cover to mast enclosure assembly A7 and remove desiccant bags and foam corrosion inhibitors. Discard per local procedures
6. Remove and discard all yellow caution tags.
7. Unwrap and install windshield wiper blade on wiper assembly. Retain packing material.

NOTE

Batteries stored in BII drawer A4 are wrapped and labeled. The label indicates where battery should be reinstalled.

8. Retrieve cab battle lantern batteries from BII container, drawer A4 and unwrap.
9. Install batteries in emergency battle lantern and install lantern in operators cab. (WP 0022 00).
10. Unwrap VHF-FM handheld radios. Retain packing material.

NOTE

Batteries stored in BII drawer A4 are wrapped and labeled. The label indicates where battery should be reinstalled.

11. Retrieve VHF-FM handheld radio battery packs from BII container, drawer A4 and unwrap.
12. Install battery packs into VHF-FM handheld radios and install on cab dash.
13. Unwrap Ross radio and install on dash.
14. Install and connect spotlight on operators cab. (WP 0019 00)
15. Install and connect SINCGARS Antenna on operators cab. (WP 0019 00)
16. Install and connect SINCGARS radio transmitter in operators cab. (TM 11-5820-890-10-8)
17. Install navigation bell on operators cab. (WP 0019 00)
18. Install and connect VHF-FM antenna on operators cab. (WP 0019 00)
19. Install and connect loudhailer external horn on operators cab. (WP 0019 00)

PLACE NON-POWERED CENTER MODULE IN SERVICE

1. If non-powered center module was preserved for long term storage, remove wrap.
2. Remove pressure sensitive tape from access hatch.

WARNING

**CHEMICAL****EYE PROTECTION**

3. Remove all desiccant bags and humidity-indicating card and discard per local procedures.
4. Remove and discard yellow caution tag.

PLACE DIESEL/HYDRAULIC DOUBLE DRUM WINCH IN SERVICE

1. If winch has been shrink wrapped, remove shrink wrapping.
2. If winch is encased in Corrosion Intercept cover, remove cover.
 - a. Unzip both the anchor and a-frame end zippers.
 - b. Work one corner off of winch until cover slides up over one end.
 - c. Slide cover off of other end.
3. Fold cover and place in its storage bag. Store Corrosion Intercept cover bag in deck box.
4. If unit has tag attached stating "CHECK FOR PROPER OIL LEVEL PRIOR TO OPERATION OF DIESEL ENGINE", ensure engine oil level is at operating level with MIL-L-9000H (9250) 30W lubricating oil. (TM 55-3950-204-14&P)
5. If necessary, add MIL-L-9000H (9250) 30W lubricating oil. (TM 55-3950-204-14&P)
6. If unit has attached tag stating "ENGINE OIL IN UNIT FOR PRESERVATION OR SHORT ENGINE 'EXCERSIZING' DURING STORAGE ONLY. BEFORE PLACING UNIT INTO OPERATION, OIL MUST BE DRAINED AND REPLACED WITH OPERATING OIL", engine oil must be drained prior to operation.

WARNING

**CHEMICAL****EYE PROTECTION**

- a. Drain engine oil. (TM 55-3950-204-14&P)
- b. Replace oil filters. (TM 55-3950-204-14&P)

 WARNING



CHEMICAL



EYE PROTECTION

- c. Fill engine to operating level with MIL-L-9000H (9250) 30W lubricating oil. (TM 55-3950-204-14&P)
7. Remove plastic bags and tape as required sealing air intake and exhaust openings. (55-3950-204-14&P)
8. Fill fuel tank with MIL-H17672, or MIL-L-212600 (fuel tank capacity is 100 gallons). (TM 55-3950-204-14&P)
9. Tension fan belts. (TM 55-3950-204-14&P)

PLACE BII STOWAGE CONTAINER IN SERVICE

1. Remove tape from container door.
2. Replace 6 VDC batteries.
3. Replace D-sized batteries.

NOTE

The desiccant may be reactivated or “dried out” for future use.

Refer to reactivation instructions attached to each bag for information on the temperature and time interval over which reactivation occurs.

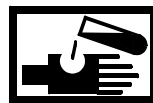
If entry into container is required and doors are difficult to open, relieve container vacuum pressure by opening the vent at the bottom of the vent cover assembly.

4. Open container door and remove eighty one unit size silica gel desiccant bags.

PLACE INTAKE PLENUM ASSEMBLY IN SERVICE

1. Remove wrap from intake plenum assembly.

 WARNING



CHEMICAL



EYE PROTECTION

2. Remove desiccant bags and humidity-indicating card and discard per local procedures.
3. Remove and discard yellow caution tag

PLACE EXHAUST PLENUM ASSEMBLY IN SERVICE

1. Remove wrap from intake plenum assembly.

WARNING

**CHEMICAL****EYE PROTECTION**

2. Remove desiccant bags and humidity-indicating card and discard per local procedures.
3. Remove and discard yellow caution tag

PLACE MAIN ASSEMBLY MAST IN SERVICE

1. Remove wrap from main assembly mast.
2. Remove all light bulbs from original shipping containers and packing material that are attached to shipping rack. Retain packing material.
3. Install all light bulbs in main assembly mast lighting fixtures. Contact unit maintenance.
4. Connect electrical cable connectors at terminal box and secure two cables to lower yardarms. (WP 0021 00)
5. Connect bottom mast subassembly from upper mast subassembly. (WP 0021 00)
6. Remove wrap from all light housings and compass sensor.

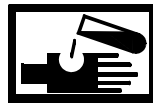
PLACE STUB ASSEMBLY MAST IN SERVICE

1. Remove all light bulbs from original shipping containers and packing material that are attached to shipping rack. Retain packing material.
2. Install all light bulbs in stub assembly mast lighting fixtures. Contact unit maintenance.

PLACE ELECTRICAL INTERCONNECT ASSEMBLY IN SERVICE

1. Remove wrap.

WARNING

**CHEMICAL****EYE PROTECTION**

2. Remove desiccant bags from cable harness metal guard and discard per local procedures.

PLACE BII SIX-VOLT AND D-SIZED BATTERIES IN SERVICE

If BII has been placed in long term storage, all six-volt batteries and D-sized batteries need to be replaced.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
MODULE ISOPAKS
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
 Ladder, ISOPAK (Storage Room) (Item 49, WP 0112 00)
 Sling, Endless: 8400LB, 20' Yellow (Cabinet A9) (Item 82, WP 0112 00)
 Qty 4
 Sling, Endless: 53000LB, 25' Brown (Storage Room Hooks) (Item 78, WP 0112 00)
 Qty 2
 Sling, 66,000LB, 30FT (Olive) (Storage Room) (Item 77, WP 0112 00)
 Qty 4
 Chain Sling, 36,000 lb Adjustable (Item 11, WP 0112 00)
 Qty 4

Materials/Parts

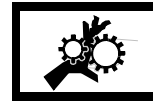
Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

Seaman 88K (2)

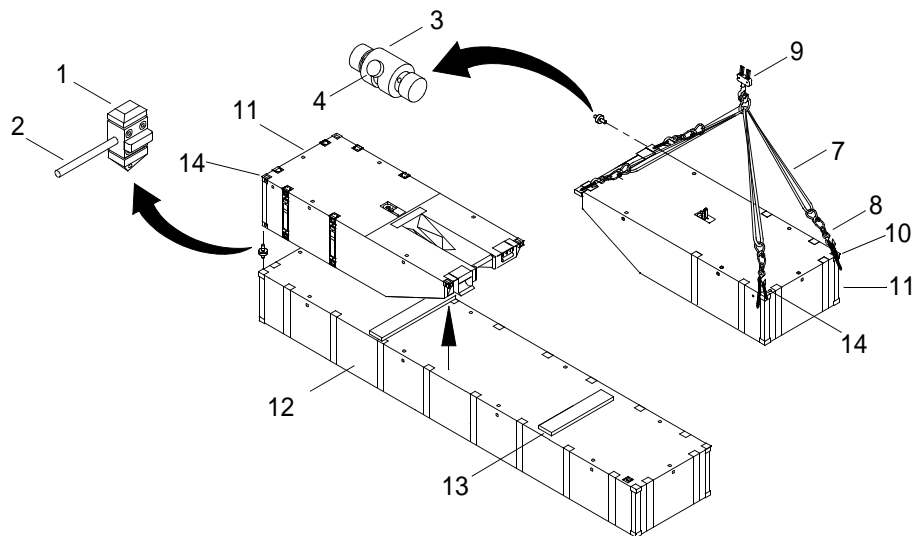
PREPARATION FOR USE - DISASSEMBLE ISOPAKS**REMOVE END RAKES FROM CENTER MODULE**

WARNING

**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

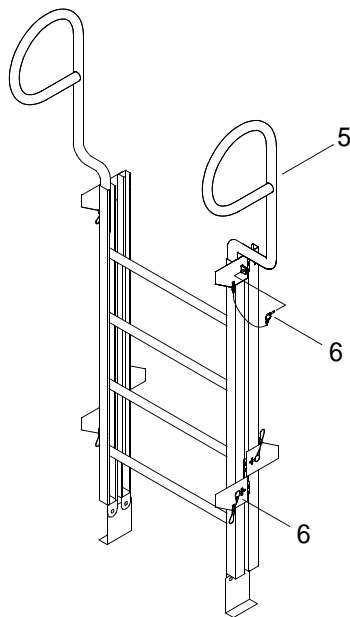
1. Inspect chains, slings and shackles. (WP 0007 00)
2. Unlock vertical connectors (1) by rotating lever (2).



NOTE

Center modules and center rake anchor modules are rigged and lifted in same manner.

3. Unlock two horizontal twist locks (3) by rotating lever (4).
4. Assemble ISOPAK ladder (5).



- a. Remove ISOPAK ladder (5) from BII container.
- b. Remove quick release pins (6) from ISOPAK ladder (5) securing it in stowed position.
- c. Unfold ISOPAK ladder (5).
- d. Lean ISOPAK ladder (5) against ISOPAK.

WARNING

Care must be taken when ascending or descending the ISOPAK ladder. ISOPAK ladder rungs become very slippery when wet. Failure to comply could result in injury or death to personnel.

5. Using ISOPAK ladder (5), climb on top of module ISOPAK.
6. Attach four 8,400 lb slings (7) and 36,000 lb adjustable chain slings (8) from crane (9) to ISO corners (10) on end rake module (11).

WARNING

Care must be taken when ascending or descending the ISOPAK ladder. ISOPAK ladder rungs become very slippery when wet. Failure to comply could result in injury or death to personnel.

7. Using ISOPAK ladder (5), descend from top of module ISOPAK.

WARNING

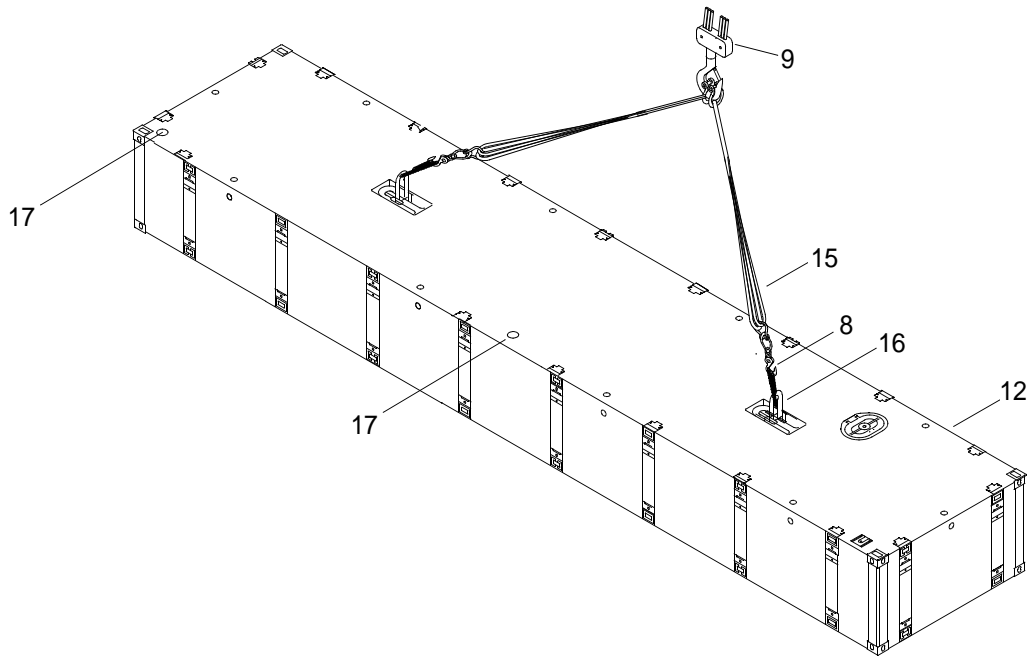


HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

8. Using slings (7 and 8) and crane (9), lift end rake module (11) from top of center module (12) and position in assembly location.
9. Remove 8,400 lb slings (7) and 36,000 lb adjustable chain slings (8) from corners (10) on end rake module (11).
10. Remove four vertical connectors (1) from corners of center module (12).
11. Remove two horizontal twist locks (3) or bridge locks (4) from end rake modules (11).
12. Remove dunnage (13) from top of center module (12).
13. Verify drain plugs (14) on end rake modules (11) are installed and tight.

14. Attach two 53,000 lb slings (15) and 36,000 lb adjustable chain slings (8) from crane (9) to padeyes (16) on center module (12).



WARNING



HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

15. Using slings (8 and 15) and crane (9), lift center module (12) and position in assembly location.
16. Remove 36,000 lb adjustable chain slings (8) from padeyes (16) on center module (12).
17. Remove 53,000 lb slings (15) from crane (9).
18. Verify drain plugs (17) on center module (12) are installed and tight.

REMOVE SHIPPING FRAME FROM PROPULSION MODULE**WARNING**

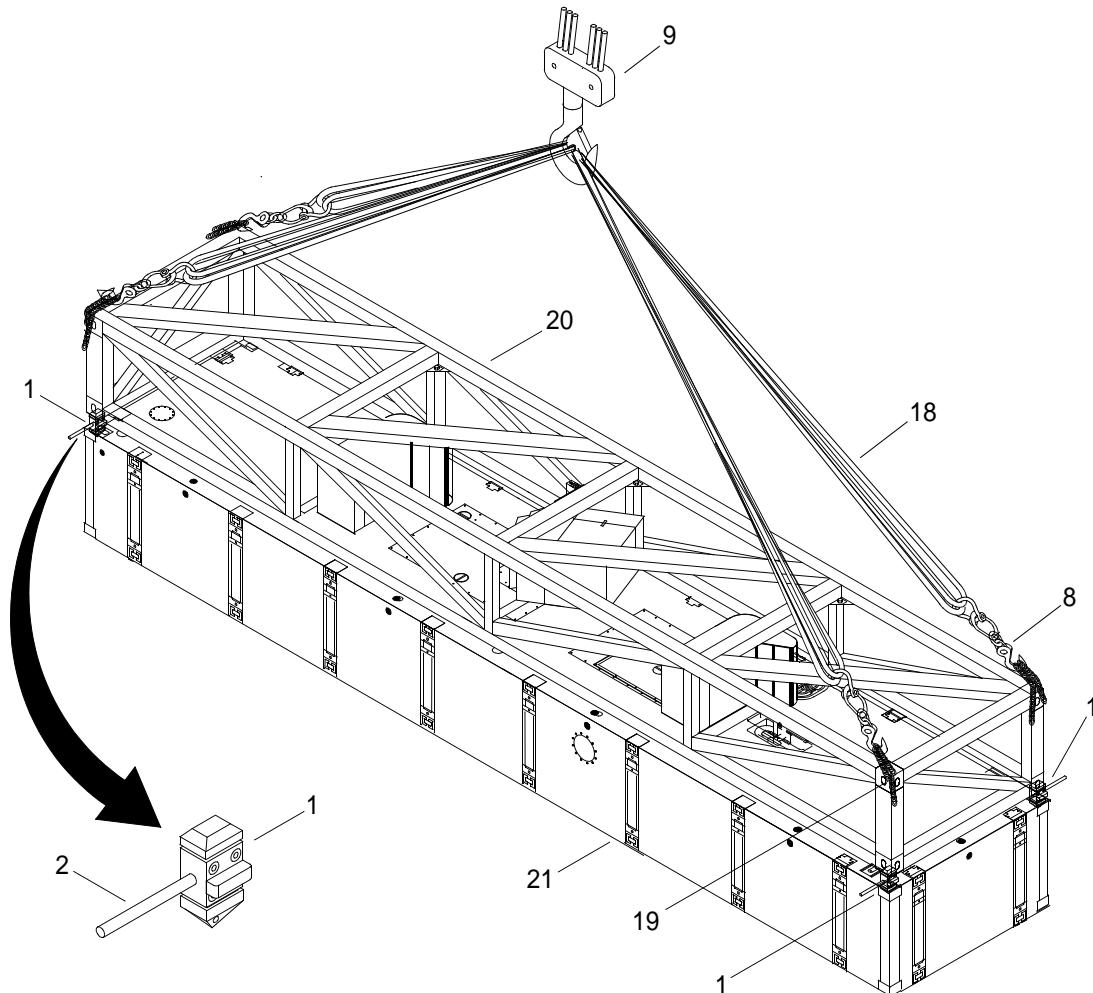
Care must be taken when ascending or descending the ISOPAK ladder. ISOPAK ladder rungs become very slippery when wet. Failure to comply could result in injury or death to personnel.

1. Using ISOPAK ladder (5), climb on top of module ISOPAK shipping frame (20).
2. Attach four 66,000 lb slings (18) and 36,000 lb adjustable chain slings (8) from crane (9) to ISO corners (19) on shipping frame (20).

WARNING

Care must be taken when ascending or descending the ISOPAK ladder. ISOPAK ladder rungs become very slippery when wet. Failure to comply could result in injury or death to personnel.

3. Using ISOPAK ladder (5), descend from top of module ISOPAK shipping frame (20).
4. Unlock four ISOPAK vertical connectors (1) on corners of propulsion module (21) by rotating lever (2).



WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

5. Using crane and slings, remove shipping frame (20) from propulsion module (21).
6. Remove 36,000 lb adjustable chain slings (8) from ISO corners (19) on shipping frame (20).
7. Remove 66,000 lb slings (18) from crane (9).
8. Remove four ISOPAK vertical connectors (1) from corners of propulsion module (21).

REMOVE SHIPPING FRAME FROM END RAKE MODULES

WARNING

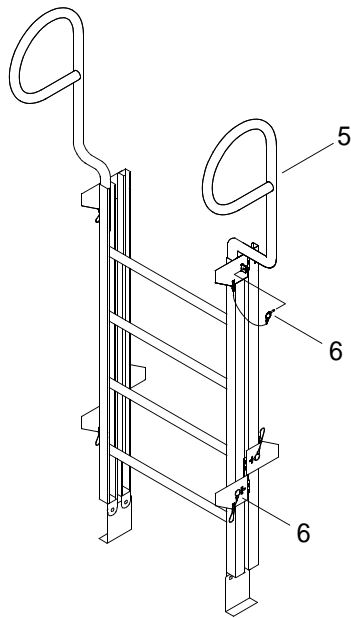
Care must be taken when ascending or descending the ISOPAK ladder. ISOPAK ladder rungs become very slippery when wet. Failure to comply could result in injury or death to personnel.

1. Using ISOPAK ladder (5), climb on top of shipping frame (20).
2. Attach four 66,000 lb slings (18) and 36,000 lb adjustable chain slings (8) from crane (9) to ISO corners (19) on shipping frame (20).

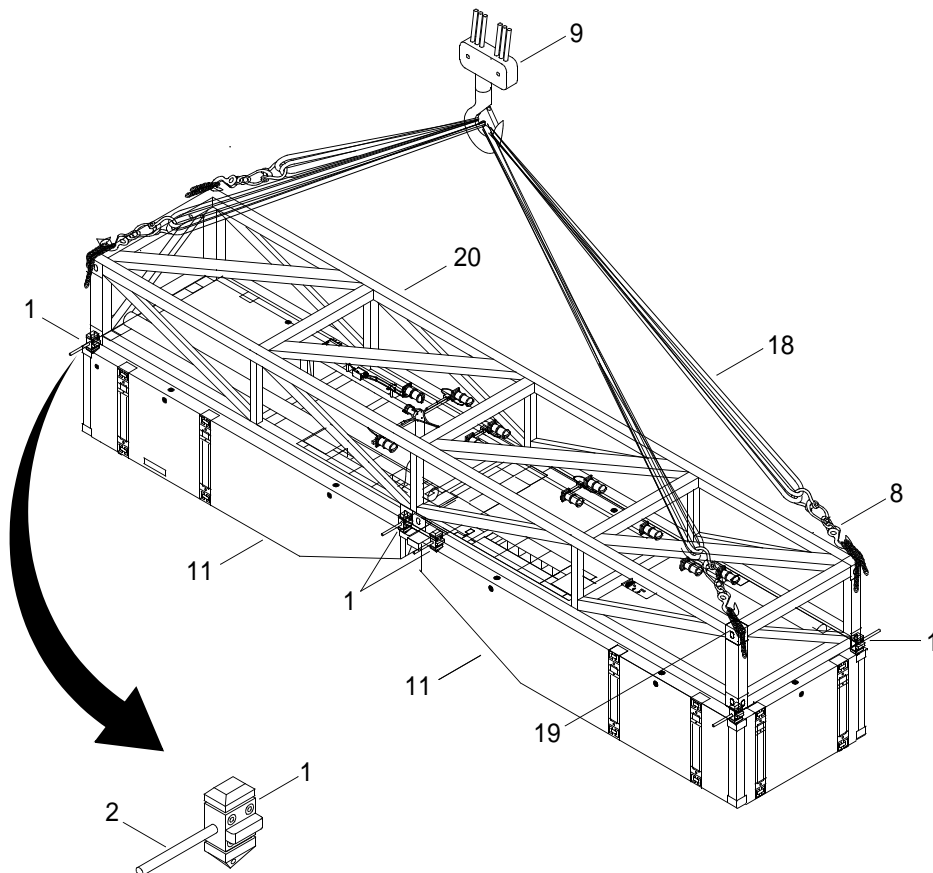
WARNING

Care must be taken when ascending or descending the ISOPAK ladder. ISOPAK ladder rungs become very slippery when wet. Failure to comply could result in injury or death to personnel.

3. Using ISOPAK ladder (5), descend from top of shipping frame (20).



4. Fold ISOPAK ladder (5) into stowed position.
5. Install quick release pins (6) to secure ISOPAK ladder (5) in stowed position.
6. Stow ISOPAK ladder (5) in BII container.
7. Unlock eight ISOPAK vertical connectors (1) on corners of end rake (11) by rotating lever (2).



WARNING

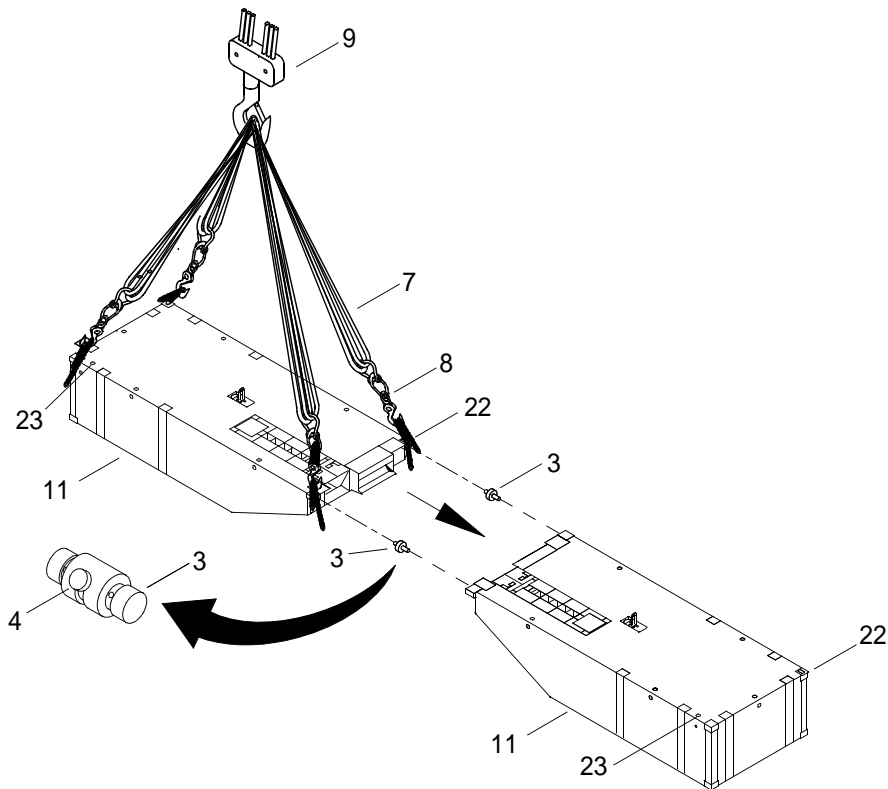
**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

8. Using crane and slings, remove shipping frame (20) from end rakes (11).
9. Remove 36,000 lb adjustable chain slings (8) from ISO corners (19) on shipping frame (20).
10. Remove 66,000 lb slings (18) from crane (9).
11. Remove eight ISOPAK vertical connectors (1) from end rakes (11).

SEPARATING END RAKES

1. Unlock two horizontal ISOPAK twist locks (3) by rotating lever (4).

**NOTE**

Left and right modules are rigged and lifted in same manner.

2. Attach four 8,400 lb slings (7) and 36,000 lb adjustable chain slings (8) from crane (9) to ISO corners (22) on end rake module (11).

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

3. Using slings (7 and 8) and crane (9), lift end rake module (11) and position in assembly location.
4. Remove 8,400 lb slings (7) and 36,000 lb adjustable chain slings (8) from ISO corners (22) on end rake module (11).
5. Remove ISOPAK horizontal twist locks (3).

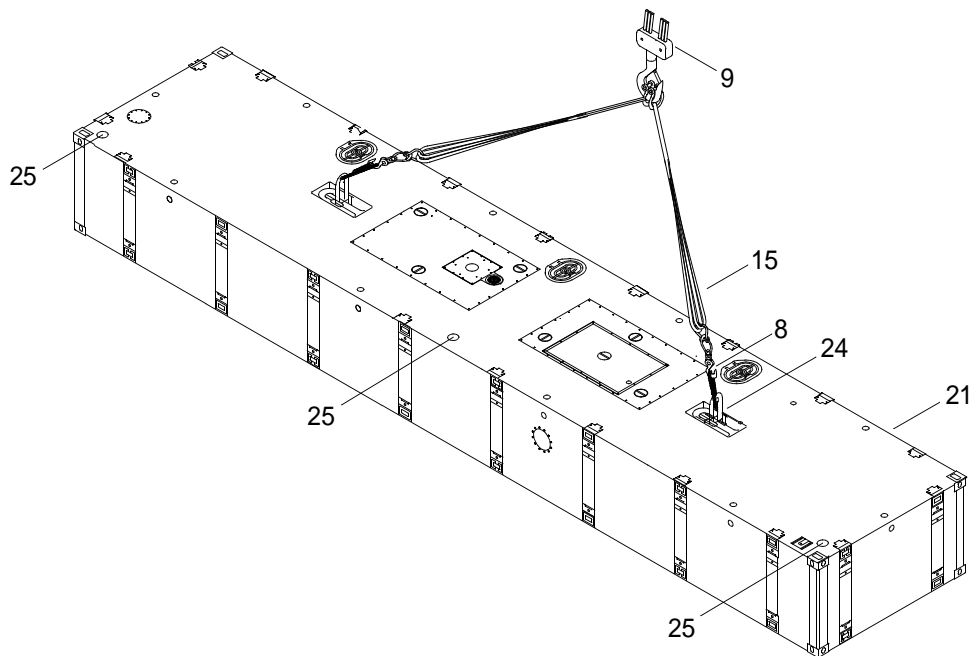
NOTE

Drain plug location may vary.

6. Inspect modules to ensure drain plugs (23) are installed and tight in all end rake modules (11).

LIFT PROPULSION MODULE

1. Attach two 53,000 lb slings (15) and 36,000 lb adjustable chain slings (8) from crane (9) to padeyes (24) on propulsion module (21).



WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

2. Using slings (8 and 15) and crane (9), lift propulsion module (21) and position in assembly location.
3. Remove 36,000 lb adjustable chain slings (8) from padeyes (24) on propulsion module (21).
4. Remove 53,000 lb slings (15) from crane (9).
5. Verify drain plugs (25) on propulsion module (21) are installed and tight.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
MALE AND FEMALE GUILLOTINE CONNECTORS
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
 Crowbar (60" Long) (Fender Rack) (Item 13, WP 0112 00)
 Hammer, Hand: 10 LBS Sledge (Cabinet Rack) (Item 39, WP 0112 00)

Materials/Parts

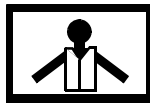
Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

Seaman 88K

PREPARATION FOR USE - MALE AND FEMALE GUILLOTINE CONNECTORS**OPERATE MALE AND FEMALE GUILLOTINE CONNECTORS**

WARNING

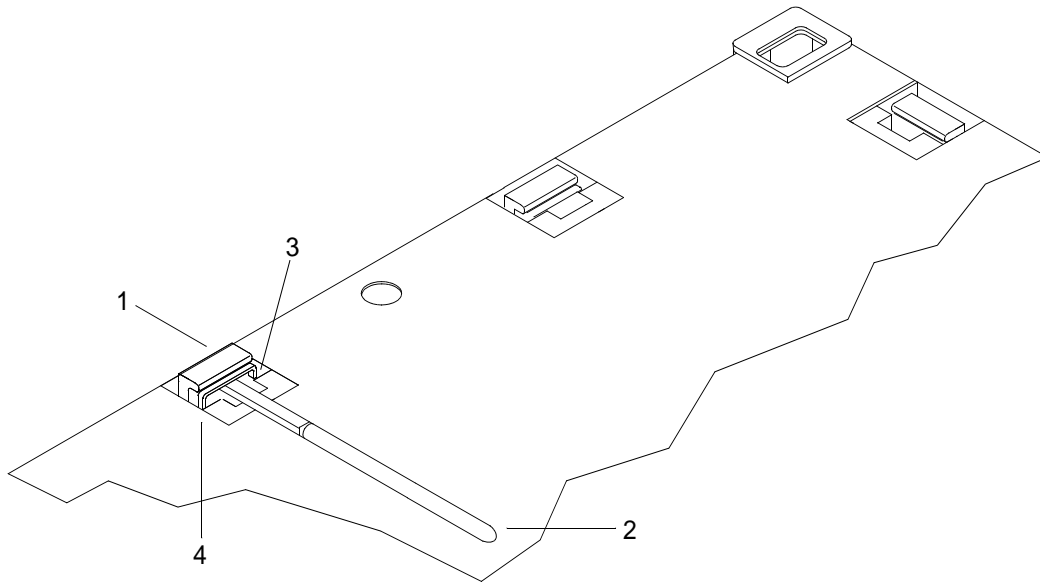
**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

NOTE

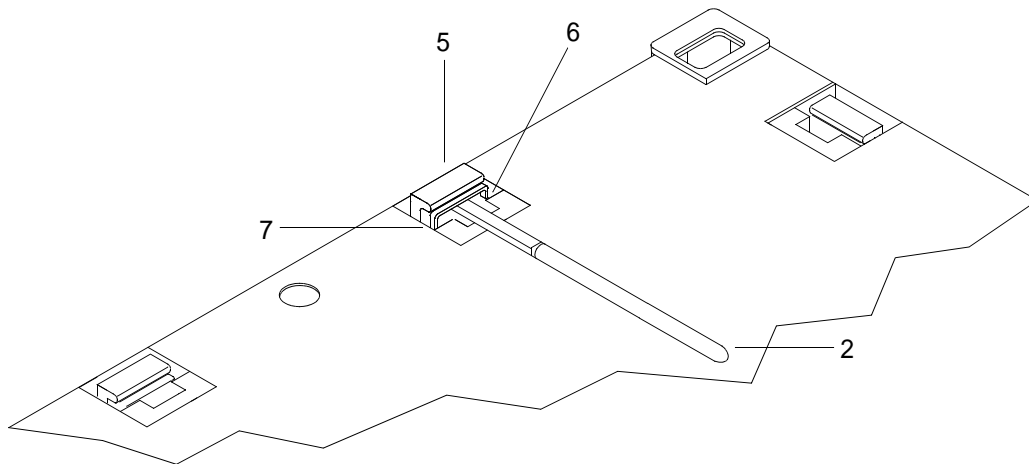
The following procedure is typical for all module side and end connectors.

1. Raise female guillotine connector (1).



- a. Insert crowbar (2) behind spring bar (3) under female guillotine connector (1).
- b. Rotate crowbar (2) downward to clear spring bar (3) from deck overhangs (4) and allow female guillotine connector (1) to move upward.
- c. Raise female guillotine connector (1) approximately 6 in. until it stops.

2. Raise male guillotine connector (5).

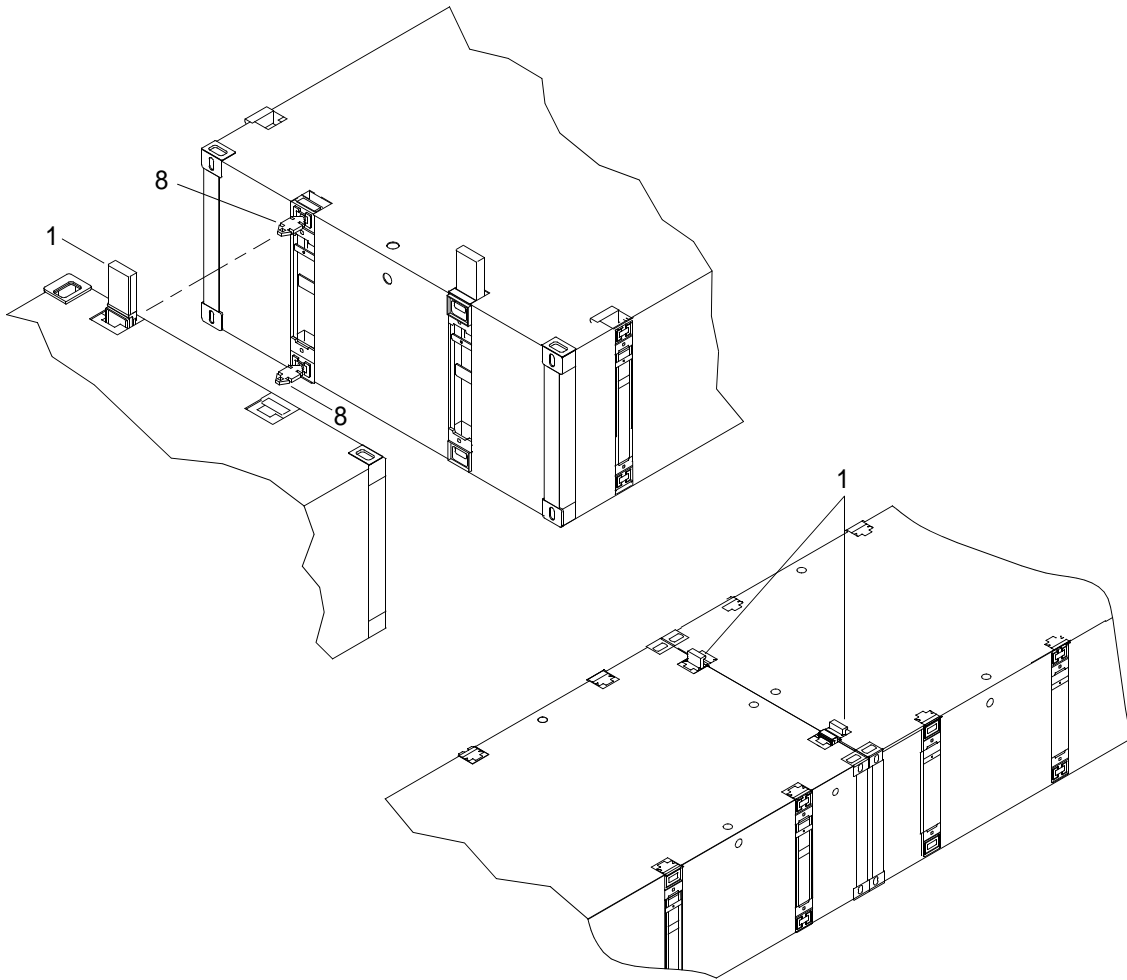


- a. Insert crowbar (2) behind spring bar (6) under male guillotine connector (5).
- b. Rotate crowbar (2) downward to clear spring bar (6) from deck overhangs (7) and allow male guillotine connector (5) to move upward.

NOTE

Personnel should hear two clicks as both pins extend or, if the module is in the water, personnel should see the first pin extend and continue to pull up until one can hear or feel the second lower pin extend.

- c. Raise male guillotine connectors (5) approximately 6 in. until it stops, allowing male connector pins to fully extend.
 - d. Remove crowbar (2).
 - e. Drive male guillotine connector (5) back into stowed position using a sledgehammer to secure the male connector pins (8) in the fully extended position.
3. Position the modules to be connected so male connector pins (8) and female guillotine connectors (1) are aligned.



4. Using a sledgehammer, drive each female guillotine connector (1) down.

-
5. If female guillotine connector does not close completely, lift female guillotine connector (1) fully.
 6. Raise male guillotine connector (5) two to three inches to allow play in male connector pin (8).
 7. Using a sledgehammer, drive male guillotine connector (5) down.
 8. Using a sledgehammer, drive female guillotine connector (1) down.

MALE GUILLOTINE CONNECTOR PIN REMOVAL FOR SIDE FENDER INSTALLATION

NOTE

This procedure must be accomplished prior to the port and starboard modules being placed in the water.

This procedure is typical for removal of the upper and lower male connector pins from the outboard sides of the port and starboard modules to facilitate side fender installation.

1. Insert crowbar (2) behind spring bar (6) under male guillotine connector (5).
2. Rotate crowbar (2) downward to clear spring bar (6) from deck overhangs (7) and allow male guillotine connector (5) to move upward.
3. While assistant holds male guillotine connector (5) in fully raised position, push up on retainer located on underside of male connector pins (8) and remove from male guillotine connector (5).
4. Using a sledgehammer, drive male guillotine connector (5) down.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
D-RING AND DECK CLEAT FITTINGS
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

Seaman 88K (2)

**PREPARATION FOR USE - INSTALLATION OF D-RING AND DECK
CLEAT FITTINGS**

WARNING

**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS****HEAVY OBJECTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

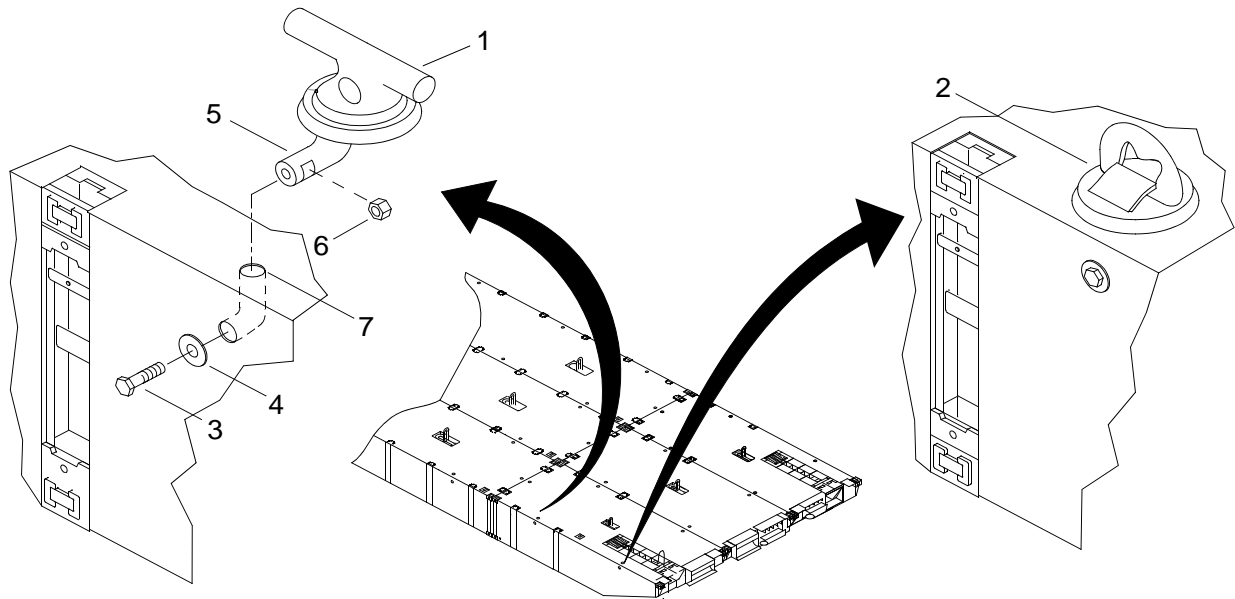
Beware of other craft or objects coming alongside while working outboard installing bolt and washer. Serious injury may result if body parts are crushed between module and other craft or objects.

Use extreme caution while working outboard and lifting heavy objects as the possibility of falling overboard exists, which could cause serious injury or death.

NOTE

This task is typical for installation of deck cleats and D-ring fittings.

1. Using assistant, remove deck cleat (1) and D-ring (2) deck fittings from stowage box on interconnect assembly shipping frame.



2. Remove bolt (3) and keeper plate (4) from tailpiece (5) of deck fitting (1 and 2).

WARNING



HEAVY OBJECTS

**Deck fittings weigh more than 34 lb, use an assistant when handling a deck fittings.
failure to comply may cause injury to personnel**

3. Using assistant, position deck fittings (1 and 2) with nut (6) in tailpiece (5) into module turn tube (7).
4. Install bolt (3) and keeper plate (4) into end of tailpiece (5) to secure deck fitting (1 and 2) in module turn tube (7). Tighten bolt (3).

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
MODULE STRINGS
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
 Sling, Endless: 8400LB, 20' Yellow (Cabinet A9) (Item 82, WP 0112 00)
 Qty 4
 Sling, Endless: 53000LB, 25' Brown (Storage Room Hooks) (Item 78, WP 0112 00)
 Qty 2
 Sling, Endless: 5300LB, 6' Green (Cabinet A6) (Item 81, WP 0112 00)
 Qty 4
 Chain Sling, 36,000 lb Adjustable (Item 11, WP 0112 00)
 Qty 4

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

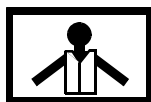
Seaman 88K (2)

Equipment Condition

Module ISOPAK Disassembled. (WP 0008 00)

PREPARATION FOR USE - ASSEMBLY OF MODULE STRINGS

WARNING

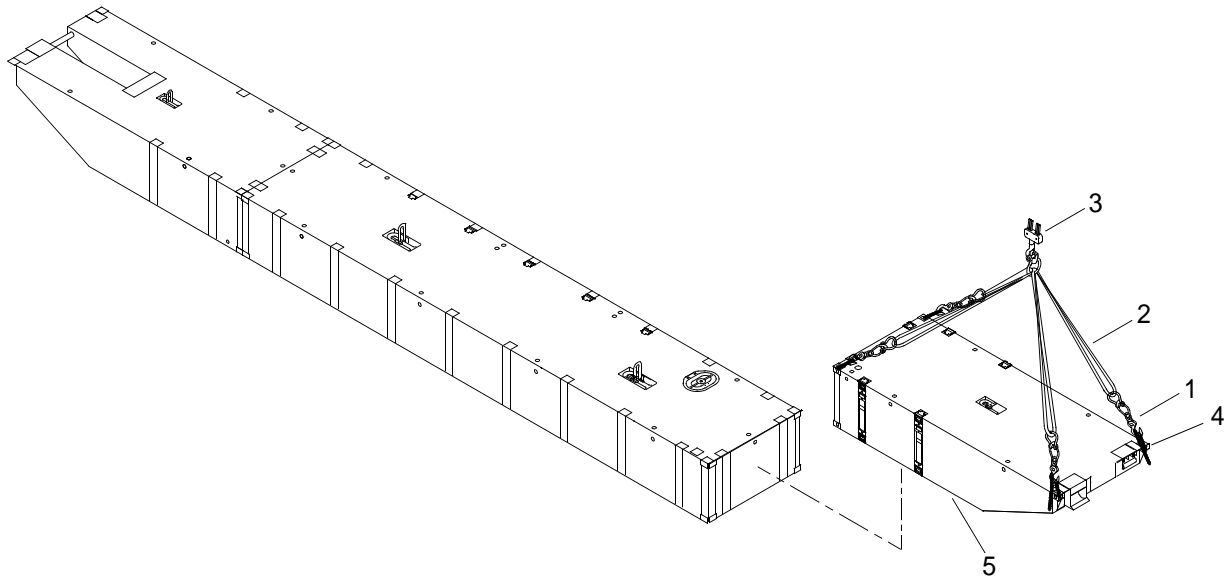
**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

ASSEMBLY OF CENTER MODULE STRING ON DECK OF SEALIFT VESSEL**NOTE**

This procedure is typical of attaching center rake, or center rake anchor modules to center modules.

1. Inspect chains, slings and shackles. (WP 0007 00)
2. Attach four 36,000 lb adjustable chain slings (1), four 8,400 lb slings (2) to crane (3) and ISO corner fittings (4) on end rake module (5).



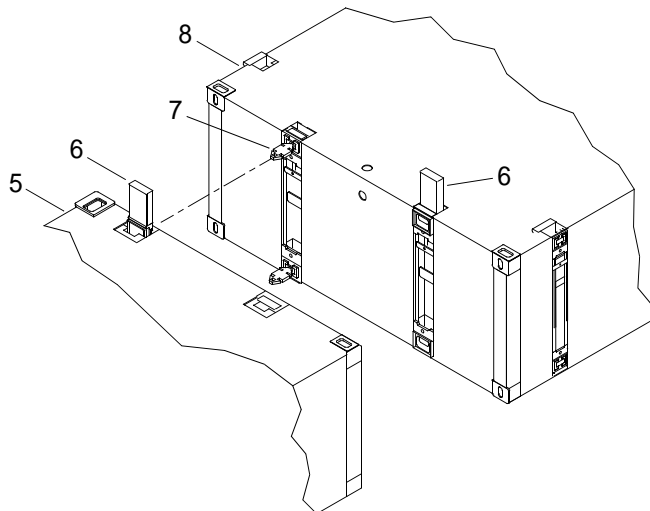
WARNING



HEAVY PARTS

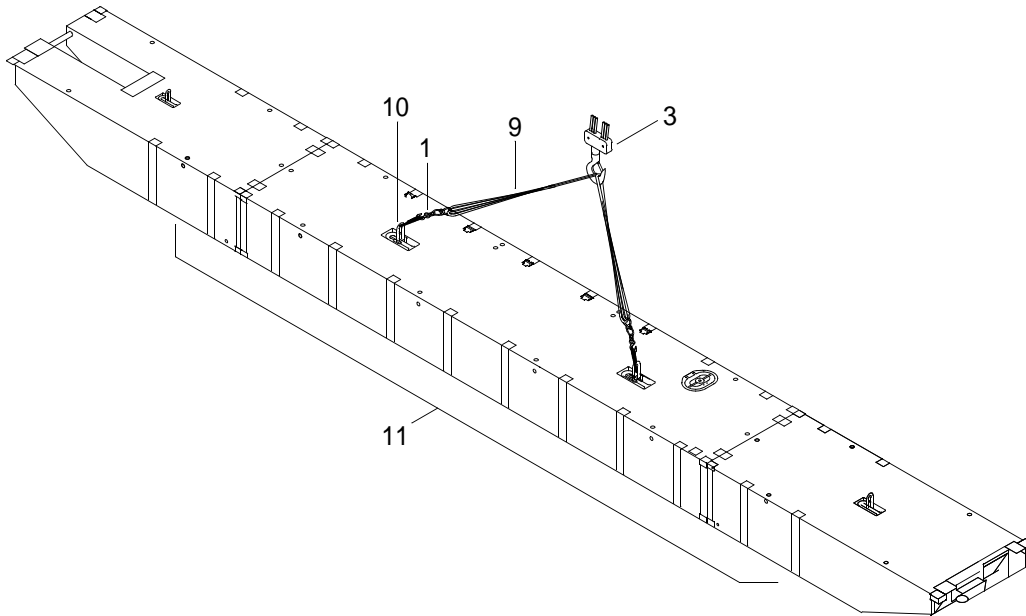
Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

3. Lift end rake module (5).
4. Position one end rake module (5) so that female connectors (6) align with male connectors (7) on center module (8).



5. Remove four 36,000 lb adjustable chain slings (1), four 8,400 lb slings (2) from crane (3) and ISO corner fittings (4) on end rake module (5).

6. Operate male and female guillotine connectors. (WP 0009 00)
7. Attach two 53,000 lb slings (9) and 36,000 lb adjustable chain slings (1) from crane (3) to padeye shackles (10) on module string (11).



WARNING

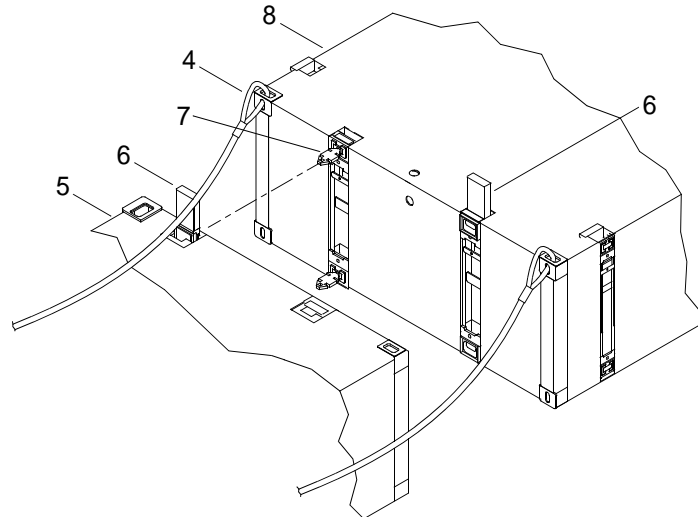
**HEAVY PARTS**

- Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.**
8. Using slings (1 and 9) and crane (3), lift module string (11).
 9. Remove 36,000 lb adjustable chain slings (1) from padeye shackles (10) on module string (11).
 10. Remove 53,000 lb slings (9) from crane (3).

ASSEMBLY OF CENTER MODULE STRING IN WATER**NOTE**

This procedure is typical of attaching center or center rake anchor modules to center modules.

1. Attach taglines to ISO corner fittings (4).



WARNING

Place hands on top or on outside of ropes/lines so that in an emergency lines can be released quickly to preclude being pulled into equipment. Failure to observe these precautions could result in serious injury or death.

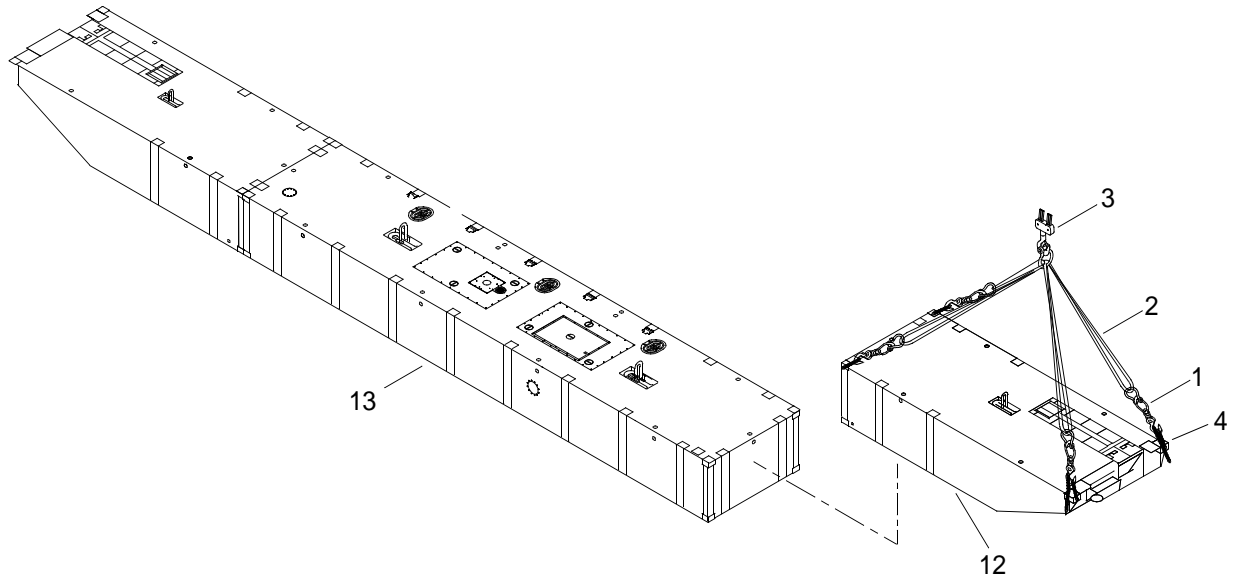
2. Using tag lines, maneuver end rake module (5) so that female connectors (6) align with male connectors (7) on center module (8).
3. Operate male and female guillotine connectors. (WP 0009 00)
4. Remove tag lines.

ASSEMBLY OF PROPULSION MODULE STRING ON DECK OF SEALIFT VESSEL

NOTE

This procedure is typical of attaching left, or right end rake modules to propulsion modules.

1. Attach four 36,000 lb adjustable chain slings (1), four 8,400 lb slings (2) and crane (3) to ISO corner fittings (4) on end rake module (12).



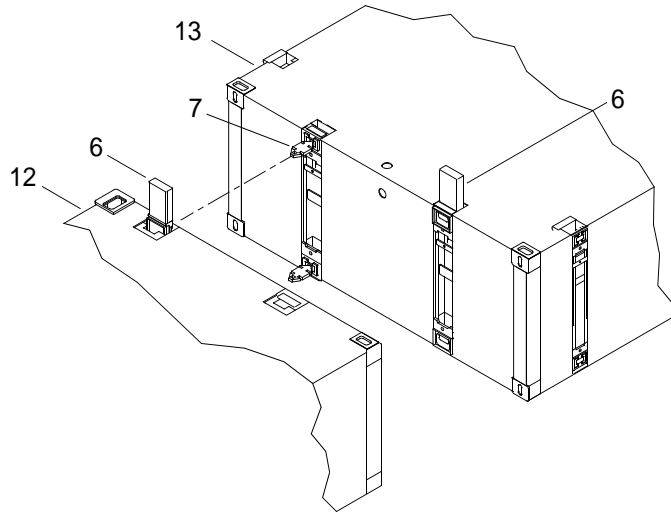
WARNING

**HEAVY PARTS**

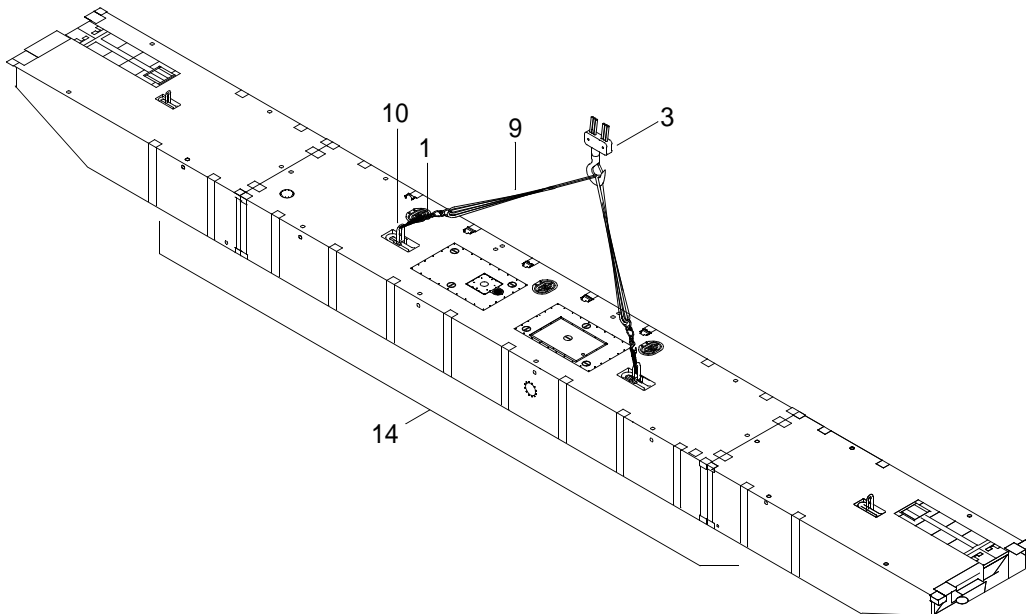
Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

2. Lift end rake module (12).

3. Position one end rake module (12) so that female connectors (6) align with male connectors (7) on propulsion module (13).



4. Remove four 36,000 lb adjustable chain slings (1), four 8,400 lb slings (2) and crane (3) from ISO corner fittings (4) on end rake module (12).
5. Operate male and female guillotine connectors. (WP 0009 00)
6. Attach two 53,000 lb slings (9) and 36,000 lb adjustable chain slings (1) and crane (3) to padeye shackles (10) on propulsion module string (14).



 WARNING



HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

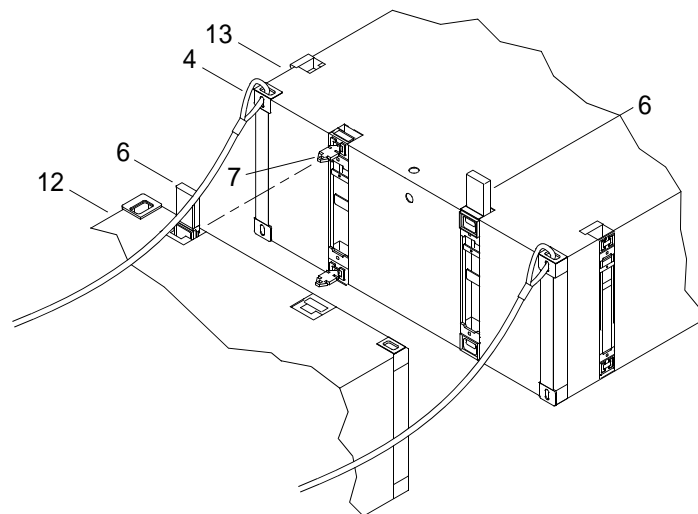
7. Using slings (1 and 9) and crane (3), lift module string (14).
8. Remove 36,000 lb adjustable chain slings (1) from padeye shackles (10) on module string (14).
9. Remove 53,000 lb slings (9) from crane (3).

ASSEMBLY OF A PROPULSION MODULE STRING IN WATER

NOTE

This procedure is typical of attaching left or right end rake to propulsion modules.

1. Attach taglines to ISO corner fittings (4).



2. Level propulsion module (13).

 WARNING

Place hands on top or on outside of ropes/lines so that in an emergency lines can be released quickly to preclude being pulled into equipment. Failure to observe these precautions could result in serious injury or death.

3. Using taglines, maneuver end rake module (12) so that female connectors (6) align with male connectors (7) on propulsion module (13).
4. Operate male and female guillotine connectors. (WP 0009 00)
5. Remove taglines.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
ASSEMBLY OF WARPING TUG ON DECK OF SEALIFT VESSEL
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
 Sling, Endless: 8400LB, 20' Yellow (Cabinet A9) (Item 82, WP 0112 00)
 Sling, 66,000LB, 30FT (Olive) (Storage Room) (Item 77, WP 0112 00)
 Qty 4
 Shackle: 1/2" 2 Ton (Cabinet B7) (Item 69, WP 0112 00)
 Qty 1
 Shackle: 1-3/4", 40 Ton (Storage Room Hooks) (Item 70, WP 0112 00)
 Qty 4

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

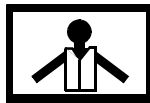
Seaman 88K (2)

Equipment Condition

Module Isopak Disassembled. (WP 0008 00)
 Male And Female Guillotine Connectors Operated. (WP 0009 00)
 D-Ring And Deck Cleat Fittings Installed. (WP 0010 00)
 Module Strings Assembled. (WP 0011 00)

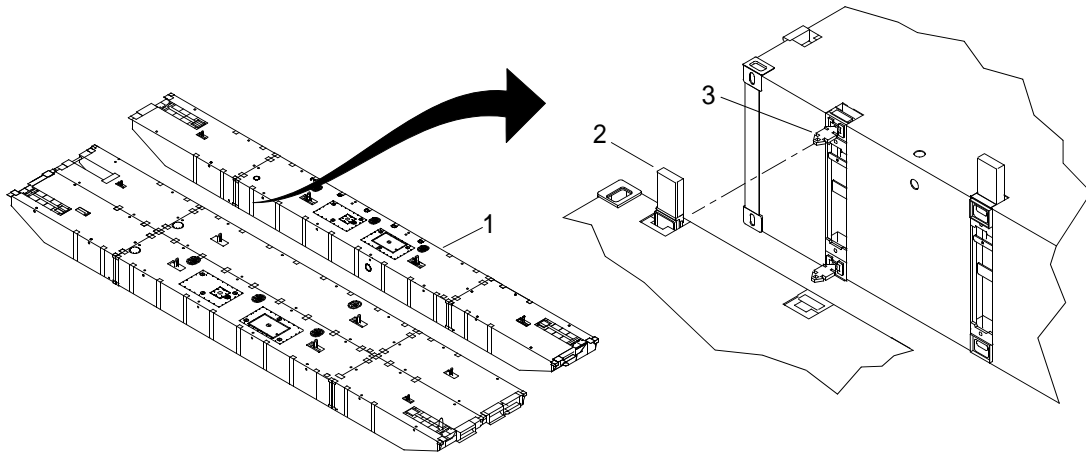
PREPARATION FOR USE - ASSEMBLY OF WARPING TUG ON DECK OF SEALIFT VESSEL

WARNING

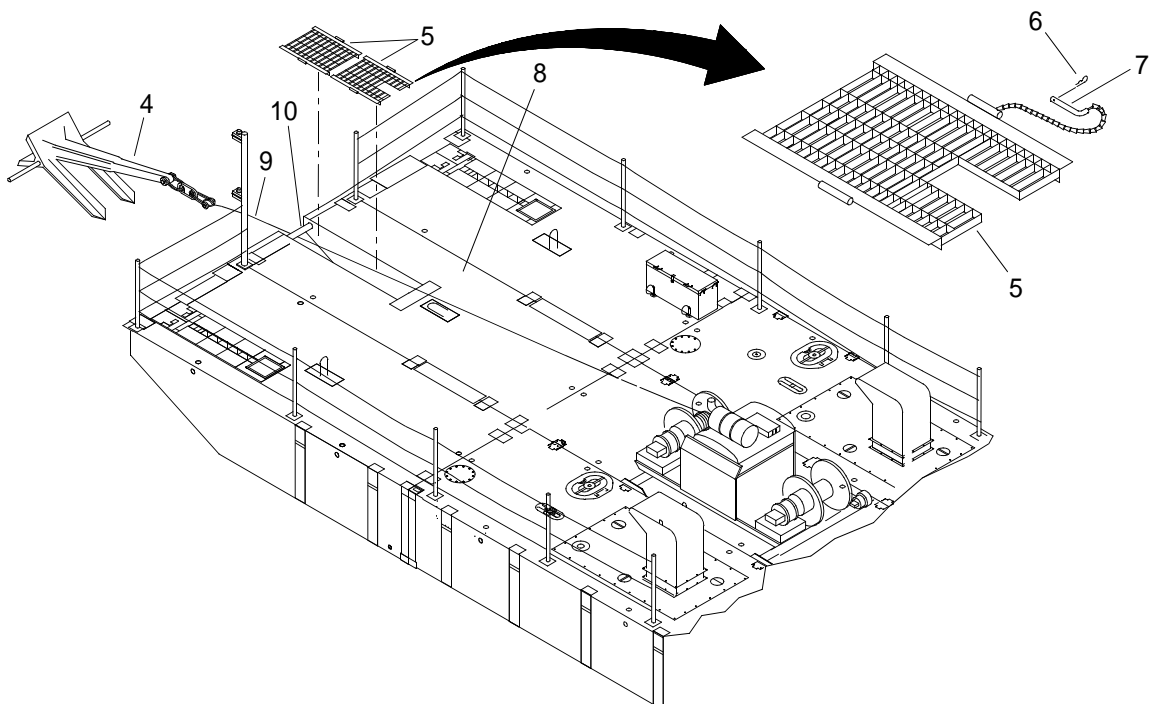
**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

1. Inspect chains, slings and shackles. (WP 0007 00)
2. Position module string (1) so that female connectors (2) align with male connectors (3) on other module strings (1).



3. Operate male and female connectors. (WP 0009 00)
4. Install warping tug skleg assemblies. (WP 0014 00)
5. Install deck winch. (WP 0015 00)
6. Install deck winch mounting plates. (WP 0016 00)
7. Install abovedeck equipment. (WP 0019 00)
8. Install stub assembly mast. (WP 0020 00)
9. Install fenders. (WP 0017 00)
10. Install safety equipment. (WP 0022 00)
11. Install 1,000 lb NAVMOOR anchor (4).

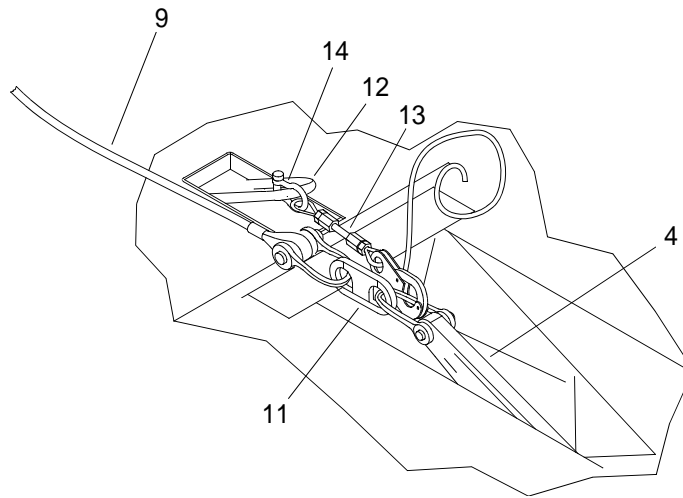


WARNING

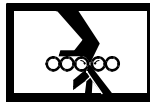
**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

- a. Using crane, 8,400 lb sling and ½ in. anchor shackle, remove 1,000 lb NAVMOOR anchor (4) from WT conversion kit container and place on ships deck aft of WT.
- b. Remove sling and shackle.
- c. Remove deck grates (5).
 - (1) Remove hairpin cotters (6) from hinge pins (7).
 - (2) Remove hinge pins (7) securing deck grates (5) to stern center anchor rake module (8).
 - (3) Lift and remove deck grates (5).
- d. Route aft winch drum wire (9) under upper stabilizer pipe (10) to anchor (4).
- e. Connect aft winch drum wire (9) to connecting link (11).



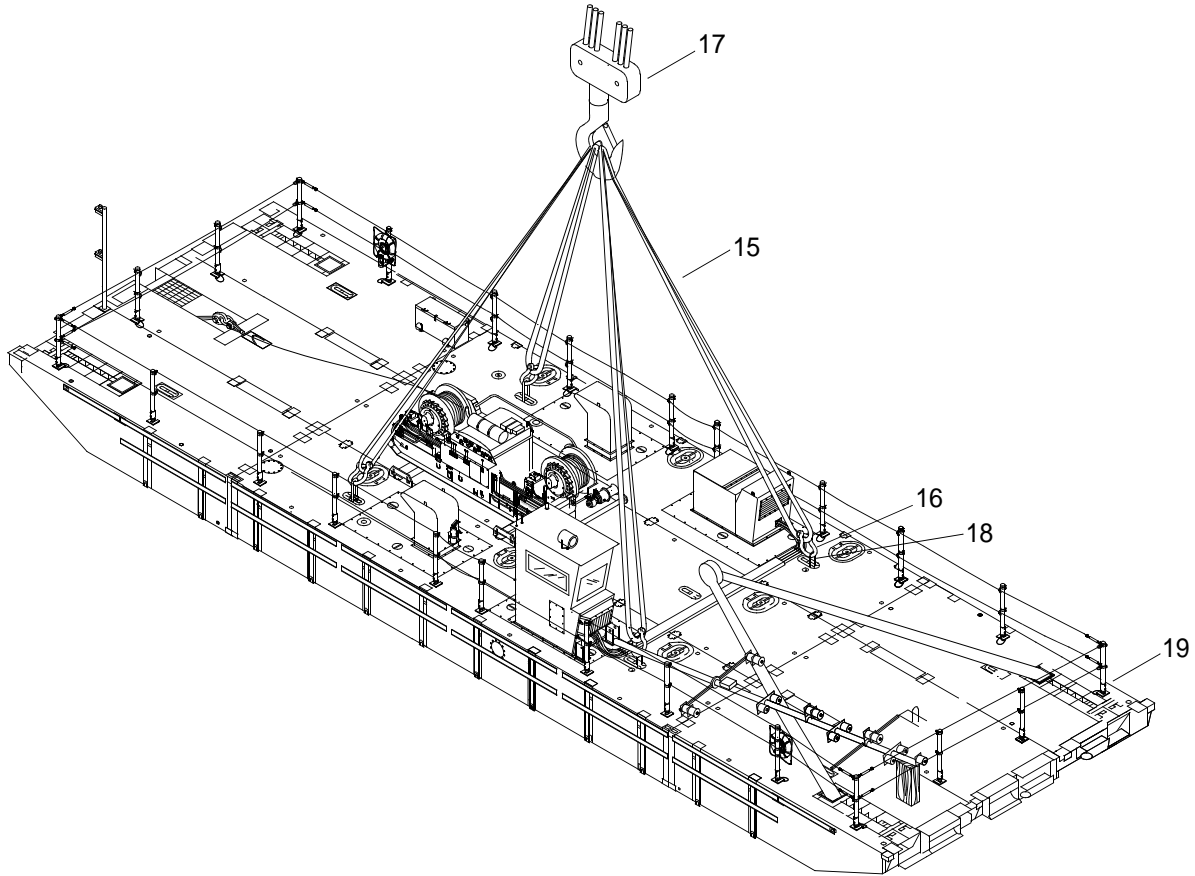
WARNING

**MOVING PARTS****CAUTION**

Use care when hauling in anchor assembly as damage to center anchor rake module could occur from anchor flukes contacting hull.

- f. Using aft winch drum wire (9), haul anchor (4) into position on stern center anchor rake module (8).
 - g. Secure anchor (4) to padeye shackle (12) with quick release assembly (13) and shackle (14).
 - h. Release tension on aft winch drum wire (9).
 - i. Install two deck grates (5).
 - (1) Position deck grates (5) over channel of stern center anchor rake module (8).
 - (2) Install hinge pins (7) to secure deck grates (5) to stern center anchor rake module (8).
 - (3) Install cotter hairpins (6) on hinge pins (7).
12. Assemble A-frame. (WP 0018 00)
13. Assemble main assembly mast. (WP 0021 00)

14. Attach 66,000 lb slings (15) and 1 ¾ in. shackles (16) from crane (17) to padeye shackles (18).



WARNING



HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

15. Using slings (15), shackles (16) and crane (17), lift WT (19) and place in water.
16. Remove slings (15) and shackles (16).
17. Raise main assembly mast. (WP 0021 00)
18. Install A-frame elevating pole. (WP 0018 00)
19. Elevate A-frame. (WP 0018 00)

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
ASSEMBLY OF WARPING TUG IN WATER
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:

Tools

- Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
- Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
- Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
- Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)

Materials/Parts

- Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

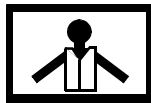
- Seaman 88K (2)

Equipment Condition

- Male And Female Guillotine Connectors Operated. (WP 0009 00)
 - D-Ring And Deck Cleat Fittings Installed. (WP 0010 00)
 - Module Strings Assembled. (WP 0011 00)
-

PREPARATION FOR USE - ASSEMBLY OF A WARPING TUG IN WATER

WARNING



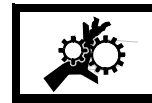
VEST



HELMET PROTECTION



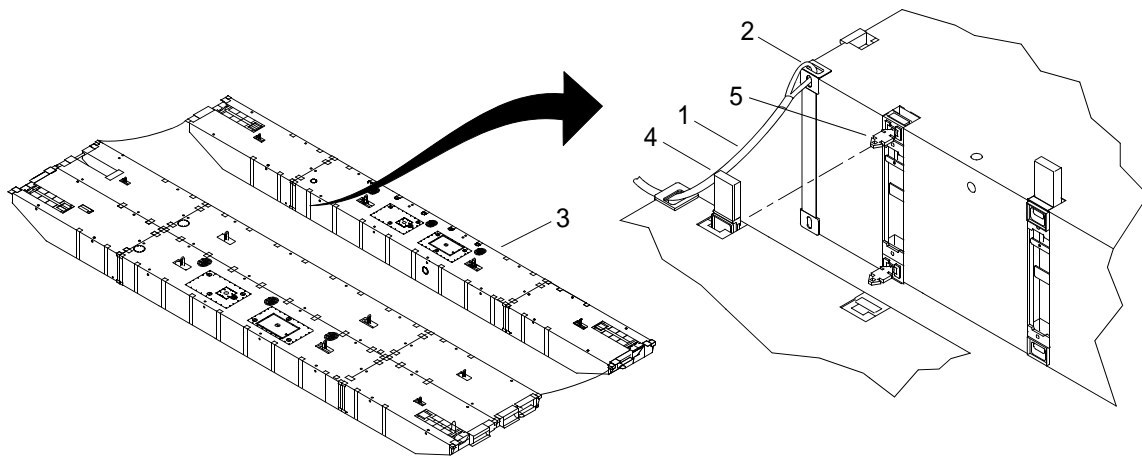
HEAVY PARTS



MOVING PARTS

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

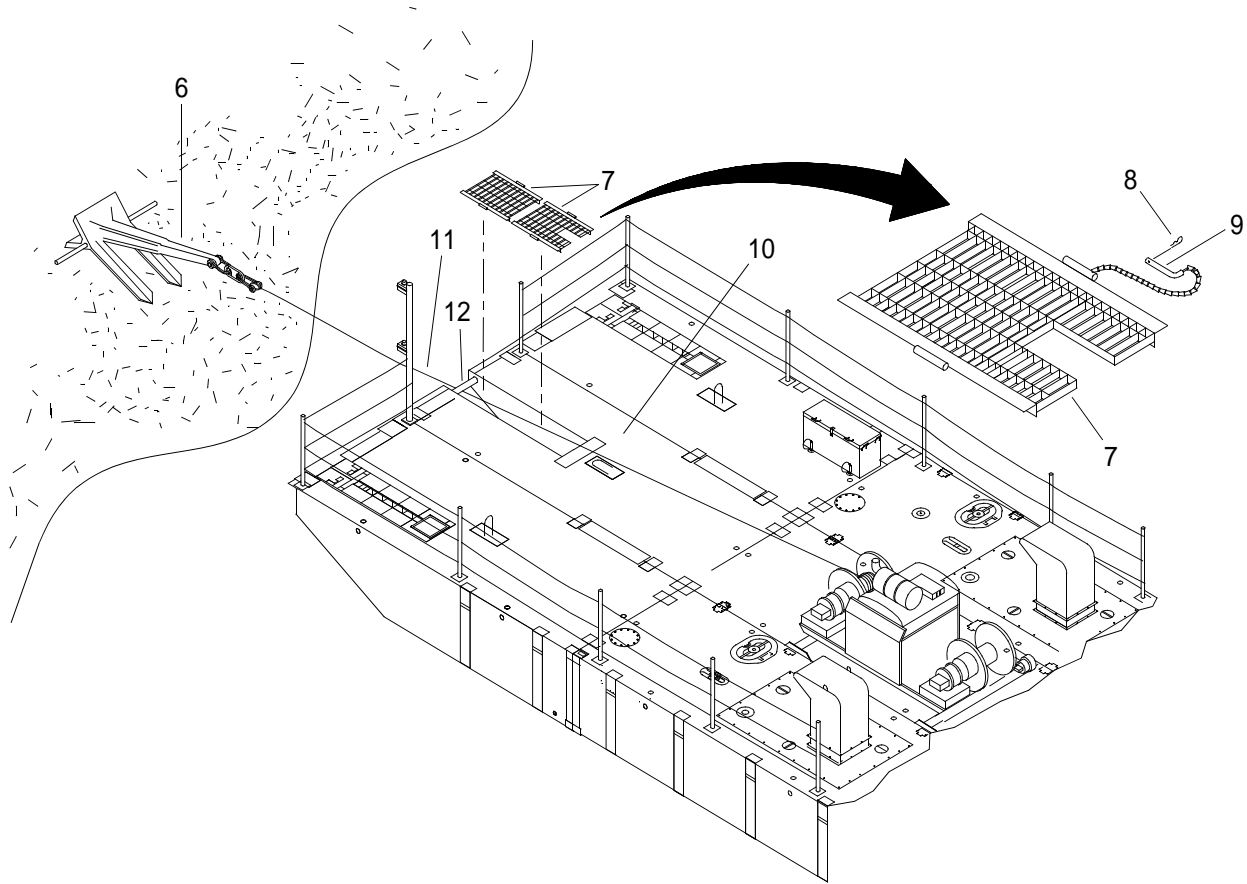
1. Attach taglines (1) to ISO corner fittings (2).



2. Level module (3).

3. Position module string (3) so that female connectors (4) align with male connectors (5) on other module strings (3).
4. Operate male and female connectors to connect module strings. (WP 0009 00)
5. Install warping tug skeg assemblies. (WP 0014 00)
6. Install deck winch. (WP 0015 00)
7. Install deck winch mounting plates. (WP 0016 00)
8. Install fenders. (WP 0017 00)
9. Install abovedeck equipment. (WP 0019 00)
10. Install stub assembly mast. (WP 0020 00)
11. Install safety equipment. (WP 0022 00)
12. Install a-frame. (WP 0018 00)
13. Install main mast. (WP 0021 00)

14. Install 1,000 lb NAVMOOR anchor (6).

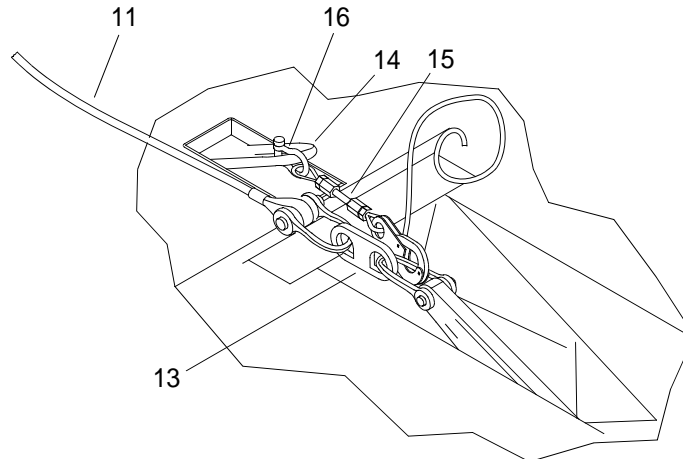


WARNING

**HEAVY PARTS**

- a. Using forklift, remove 1,000 lb NAVMOOR anchor (6) from WT conversion kit container and place on beach.
- b. Back WT as close to beach as possible.
- c. Remove deck grates (7).
 - (1) Remove hairpin cotters (8) from hinge pins (9).
 - (2) Remove hinge pins (9) securing deck grates (7) to stern center anchor rake module (10).
 - (3) Lift and remove deck grates (7).
- d. Route aft winch drum wire (11) under upper stabilizer pipe (12) to anchor (6).

- e. Connect aft winch drum wire (11) to connecting link (13).



CAUTION

Use care when hauling in anchor assembly as damage to center anchor rake module could occur from anchor flukes contacting hull.

- f. Using aft winch drum wire (11), haul anchor (6) off of beach into position on stern center anchor rake module (10).
- g. Secure anchor (6) to padeye shackle (14) with quick release assembly (15) and shackle (16).
- h. Release tension on aft winch drum wire (11).
- i. Release tension on aft winch drum wire (9).
- j. Install two deck grates (7).
- (1) Position deck grates (7) over channel of stern center anchor rake module (10).
 - (2) Install hinge pins (9) to secure deck grates (5) to stern center anchor rake module (10).
 - (3) Install hairpin cotters (8) on hinge pins (9).

15. Install crew shelter. (WP 0023 00)

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
SKEG ASSEMBLIES
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
 Crowbar (60" Long) (Fender Rack) (Item 13, WP 0112 00)
 Hammer, Hand: 10 LBS Sledge (Cabinet Rack) (Item 39, WP 0112 00)
 Shackle: 3/4", 4.75 Ton (Cabinet B7) (Item 71, WP 0112 00)
 Sling, Endless: 5300LB, 6' Green (Cabinet A6) (Item 81, WP 0112 00)

Materials/Parts

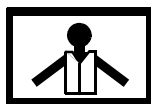
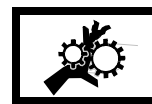
Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

Seaman 88K

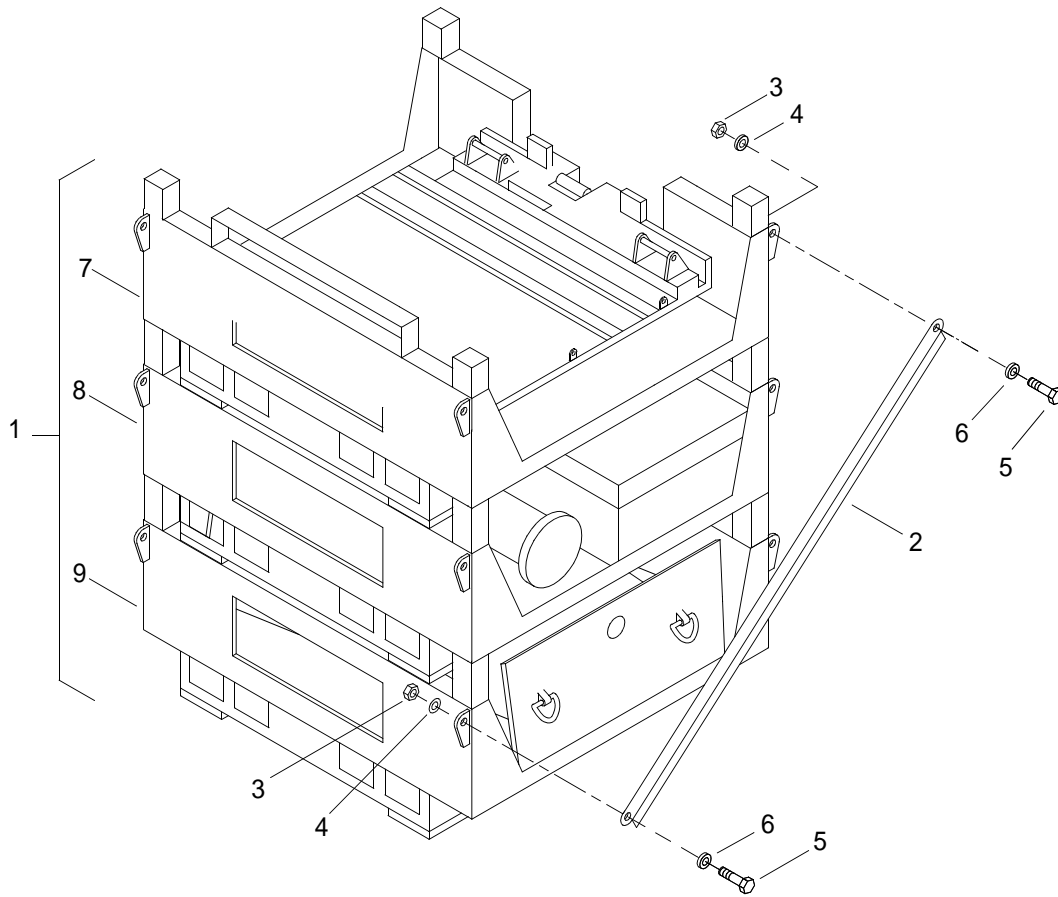
PREPARATION FOR USE - INSTALL WARPING TUG SKEG ASSEMBLIES**REMOVE WARPING TUG CONVERSION KIT PALLETS FROM ISO CONTAINER**

WARNING

**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

1. Loosen ratchet straps securing pallet stack (1) to ISO container.

**WARNING****HEAVY PARTS**

2. Using a forklift, remove pallet stack (1) from ISO container.
3. Remove pallet tie bar (2).
 - a. Remove two nuts (3) and washers (4).
 - b. Remove two bolts (5) and washers (6).
 - c. Remove tie bar (2).
4. Repeat steps to remove tie bar (2) from opposite side of pallet.

WARNING

**HEAVY PARTS**

5. Using a forklift, remove top pallet (7) from ISO container.

WARNING

**HEAVY PARTS**

6. Using a forklift, remove center pallet (8).

WARNING

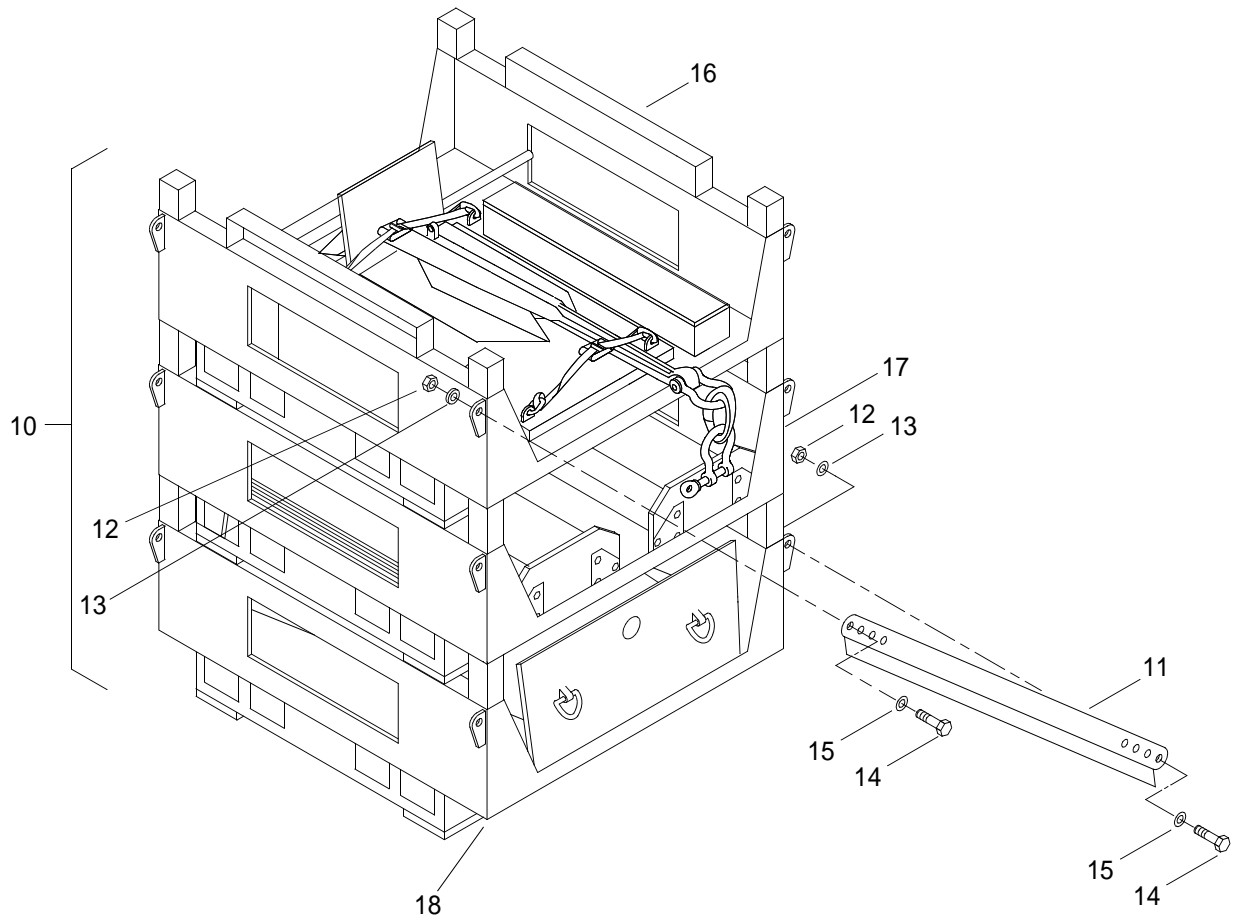
**HEAVY PARTS**

7. Using a forklift, remove bottom pallet (9).
8. Loosen ratchet straps securing pallet stack (10) to ISO container.

WARNING

**HEAVY PARTS**

9. Using a forklift, remove pallet stack (10) from ISO container.



10. Remove pallet tie bar (11).
 - a. Remove two nuts (12) and washers (13).
 - b. Remove two bolts (14) and washers (15).
 - c. Remove tie bar (11).
11. Repeat steps to remove tie bar (11) from opposite side of pallet stack (10).

WARNING



HEAVY PARTS

12. Using a forklift, remove top pallet (16) from ISO container.

WARNING

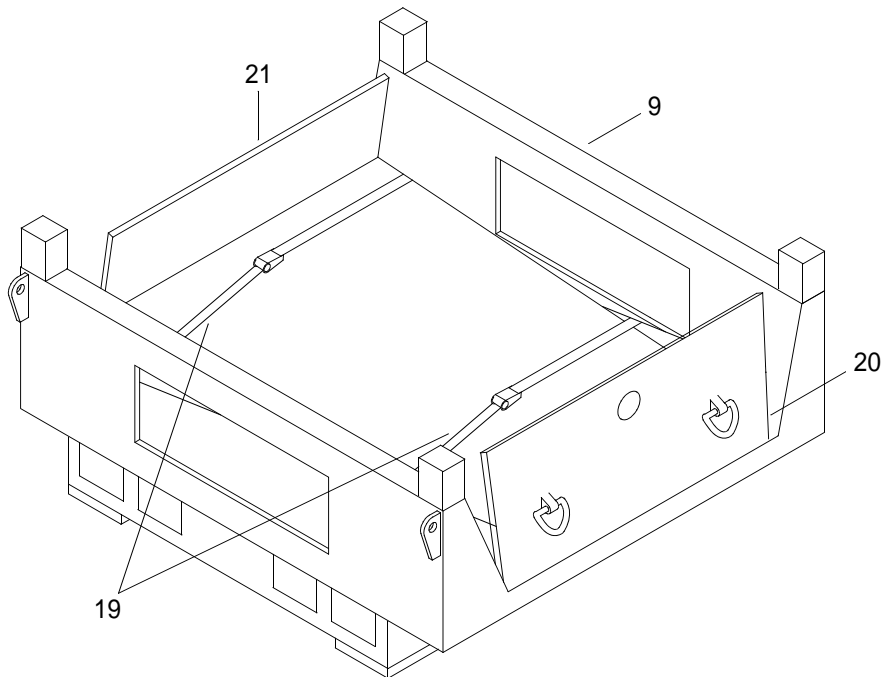
**HEAVY PARTS**

13. Using a forklift, remove center pallet (17) from bottom pallet (18).

REMOVE WARPING TUG SKEG ASSEMBLIES**NOTE**

This procedure is typical for removing skeg assemblies from either pallet.

1. Remove two ratchet straps (19) securing skeg assemblies to pallet.



WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

2. Using crane, slings and shackles, remove first skeg assembly (20) from pallet (9).
3. Remove slings and shackles.

WARNING

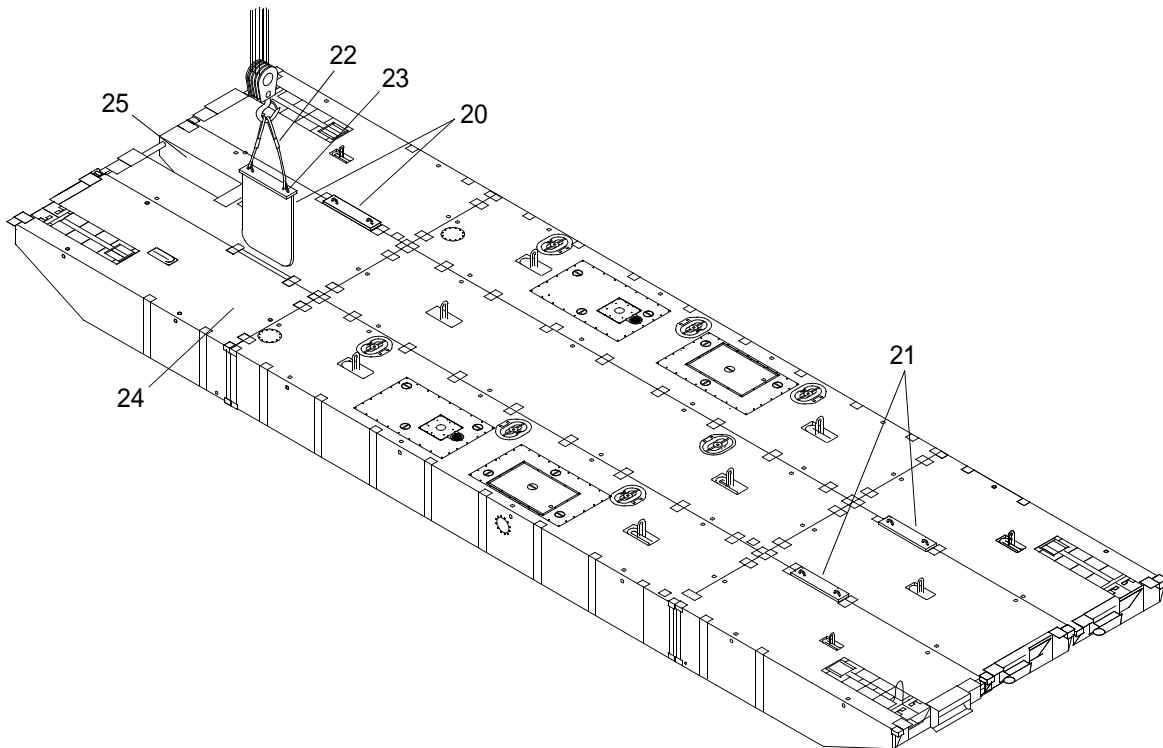
**HEAVY PARTS**

4. Using crane, slings and shackles, remove second skeg assembly (21) from pallet (9).
5. Remove slings and shackles.

INSTALL SKEG ASSEMBLIES ON WARPING TUG**NOTE**

This procedure is typical for installation of all skeg assemblies.

1. Attach ships slings (22) and shackles to lifting eyes (23) of skeg assemblies (20 or 21).



WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

2. Using crane slings and shackles, lower skeg assemblies (20 or 21) into space between outboard end rake (24) and center end rake (25).
3. Remove slings and shackles.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
WINCH
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:

Tools

- Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
- Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
- Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
- Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
- Sling, Endless: 8400LB, 20' Yellow (Cabinet A9) (Item 82, WP 0112 00)
- Qty 4
- Shackle: 3/4", 4.75 Ton (Cabinet B7) (Item 71, WP 0112 00)
- Qty 4

Materials/Parts

- Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

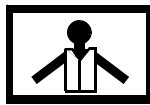
- Seaman 88K (2)

Equipment Condition

- Warping Tug Assembled On Sealift Vessel (WP 0012 00)
 - Warping Tug Assembled In Water (WP 0013 00)
-

PREPARATION FOR USE - INSTALL WINCH

WARNING



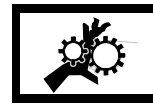
VEST



HELMET PROTECTION



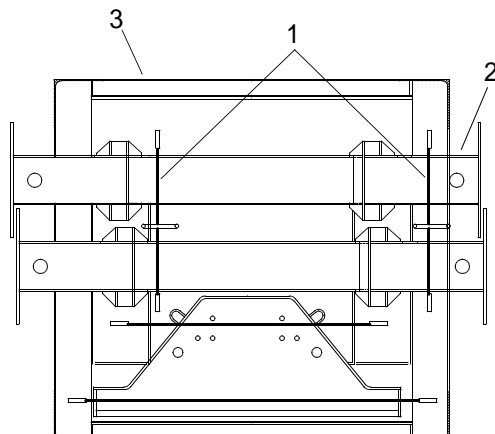
HEAVY PARTS



MOVING PARTS

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

1. Remove two ratchet straps (1) securing transverse beams (2) to stowage pallet (3).

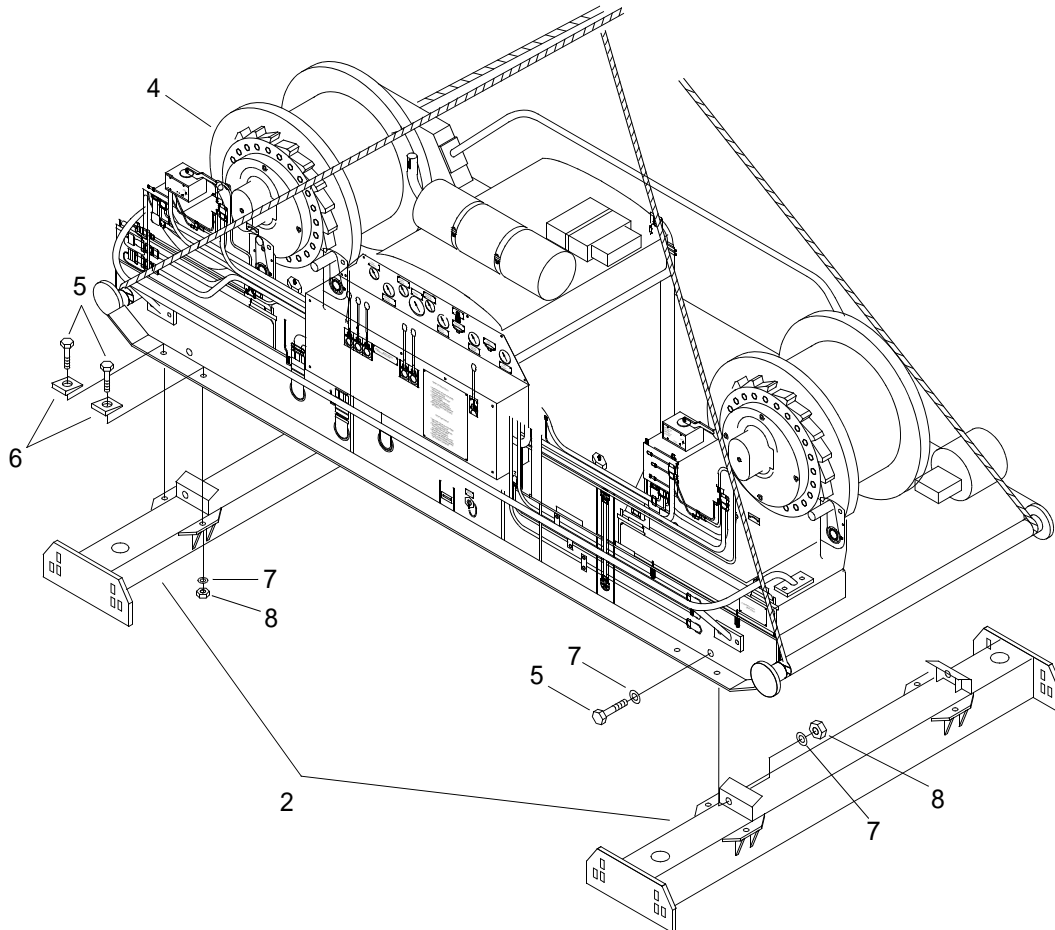


WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

- Using crane, sling and shackles, remove winch foundation transverse beams (2) from stowage pallet (3) and place on deck dunnage for attachment on deck winch (4).



-
3. Remove bolts (5), tapered washer plates (6), washers (7) and nuts (8) from mounts on transverse beams (2).

WARNING



HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

4. Using crane, slings and shackles, position deck winch (4) on top of transverse beams (2). Verify all bolt holes align between deck winch (4) and transverse beams (2).
5. Install bolts (5), tapered washer plates (6), washers (7) and nuts (8) to secure deck winch (4) to transverse beams (2). Tighten nuts (8).

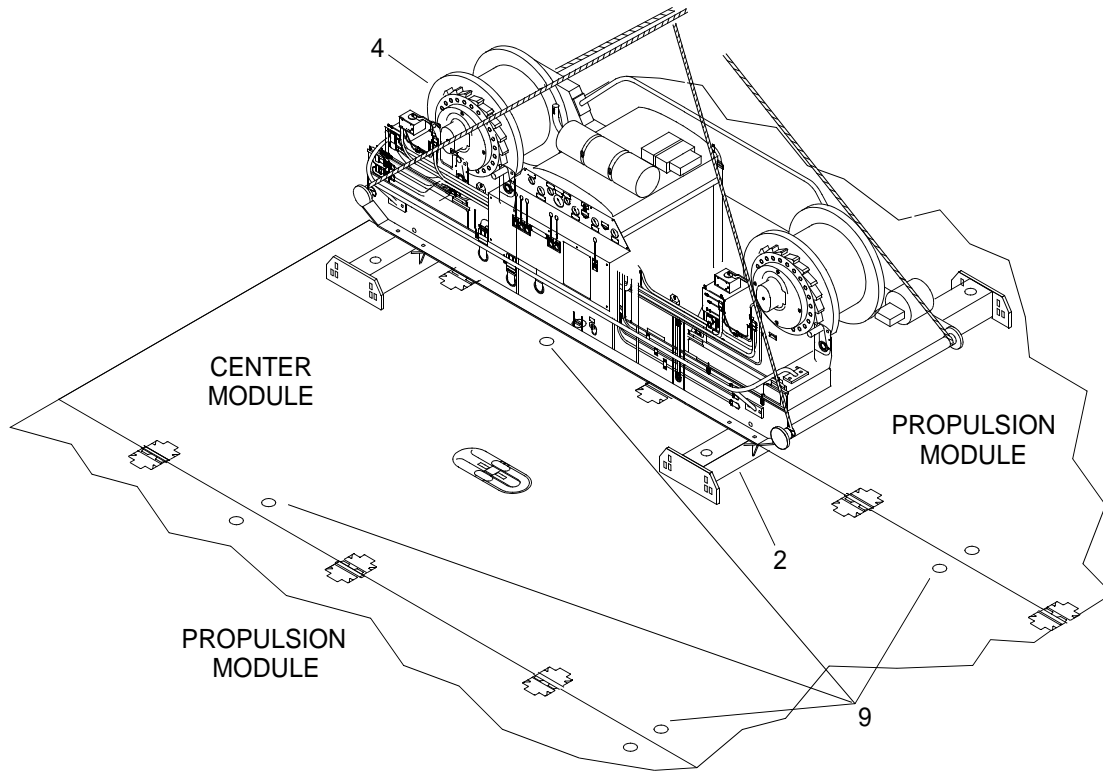
WARNING



HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

6. Using crane, slings and shackles, position deck winch (4) on WT center module so transverse beams (2) bottom locator pins fit into turn tube holes (9).



7. Remove slings and shackles.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
WINCH MOUNTING PLATES
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
 Crowbar (60" Long) (Fender Rack) (Item 13, WP 0112 00)
 Qty 2

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

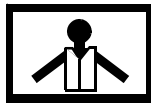
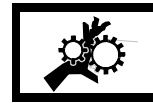
Seaman 88K

Equipment Condition

Winch Installed. (WP 0015 00)

PREPARATION FOR USE - INSTALL WINCH MOUNTING PLATES

WARNING

**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

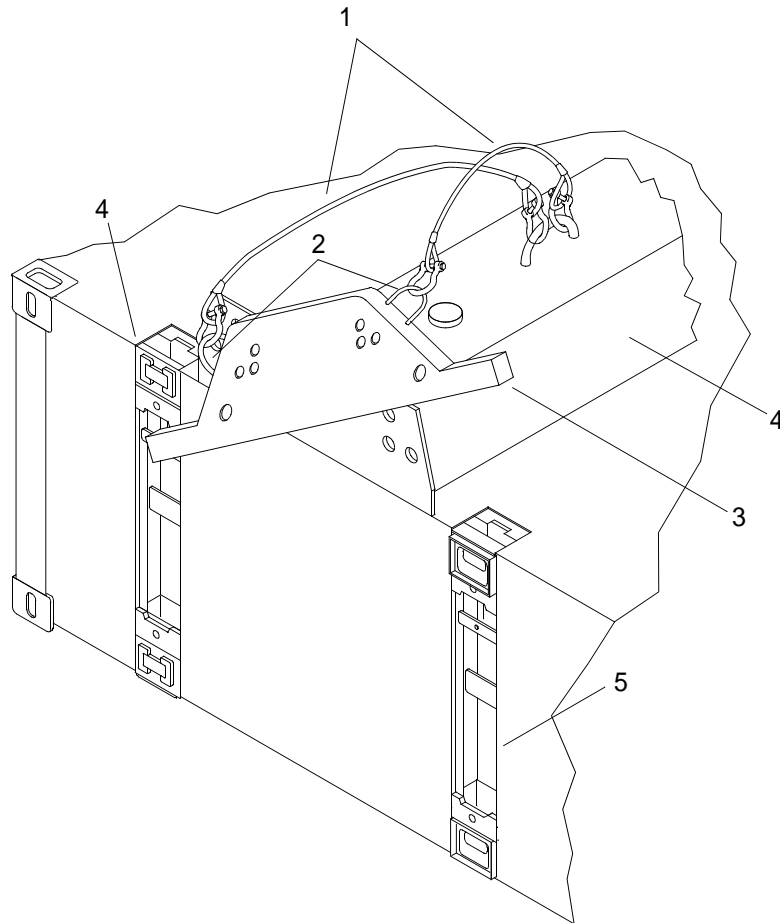
All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

NOTE

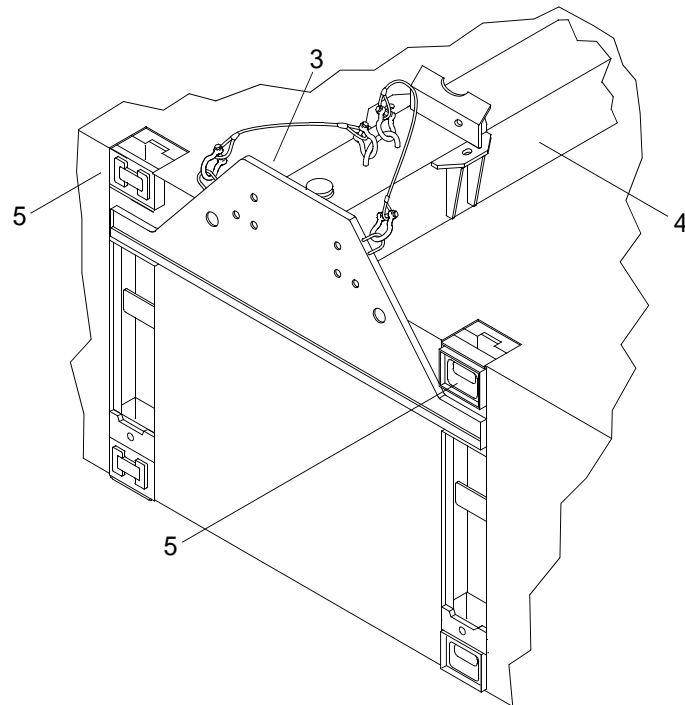
The four mounting plate assemblies are installed between the center module and the propulsion modules. The mounting plate fits under the lock castings of the module side connector assembly.

This task is typical for installation of the mounting plates.

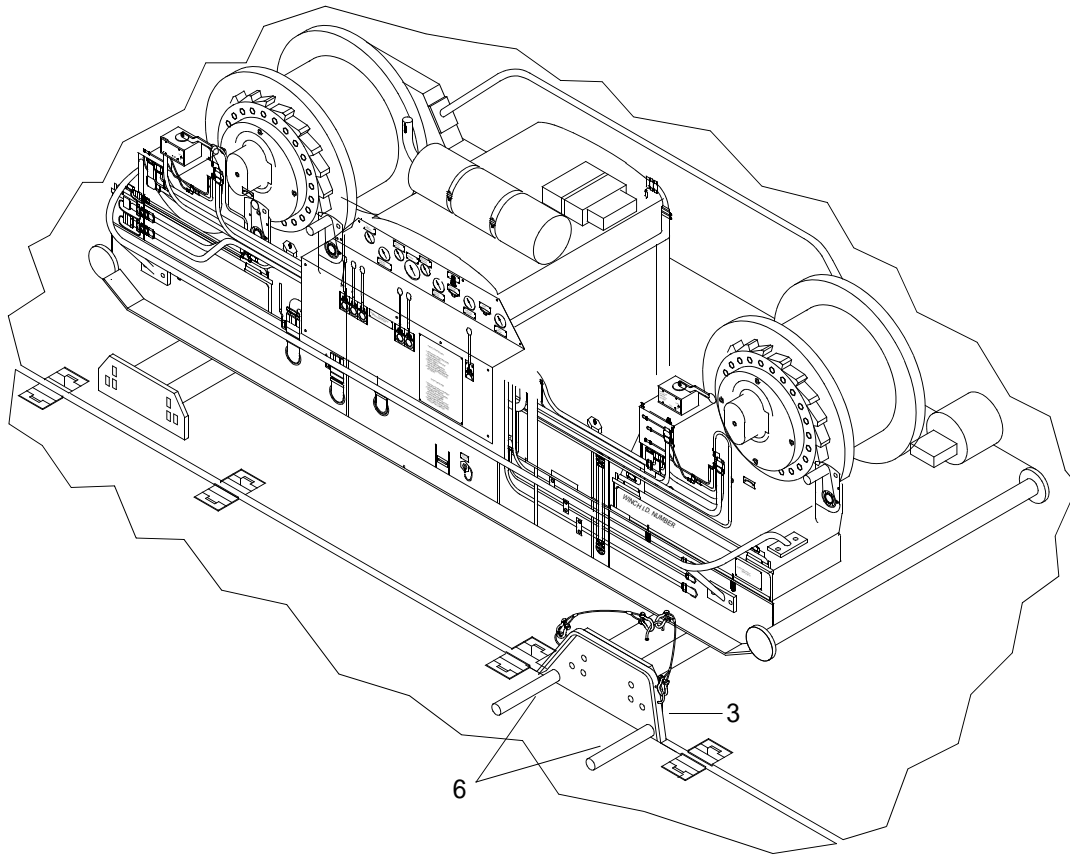
1. Using shackles, connect lifting lines (1) between lifting eyes (2) on mounting plates (3) and brackets on top ends of transverse beams (4)
2. Using lifting lines (1), lift and install mounting plate (3) by allowing one end of mounting plate to dip downward between appropriate lock castings (5) far enough so mounting plate (3) can be rotated to a horizontal position under two adjoining lock castings (5). Spacer plates welded and part of mounting plate (3) shall face inboard.



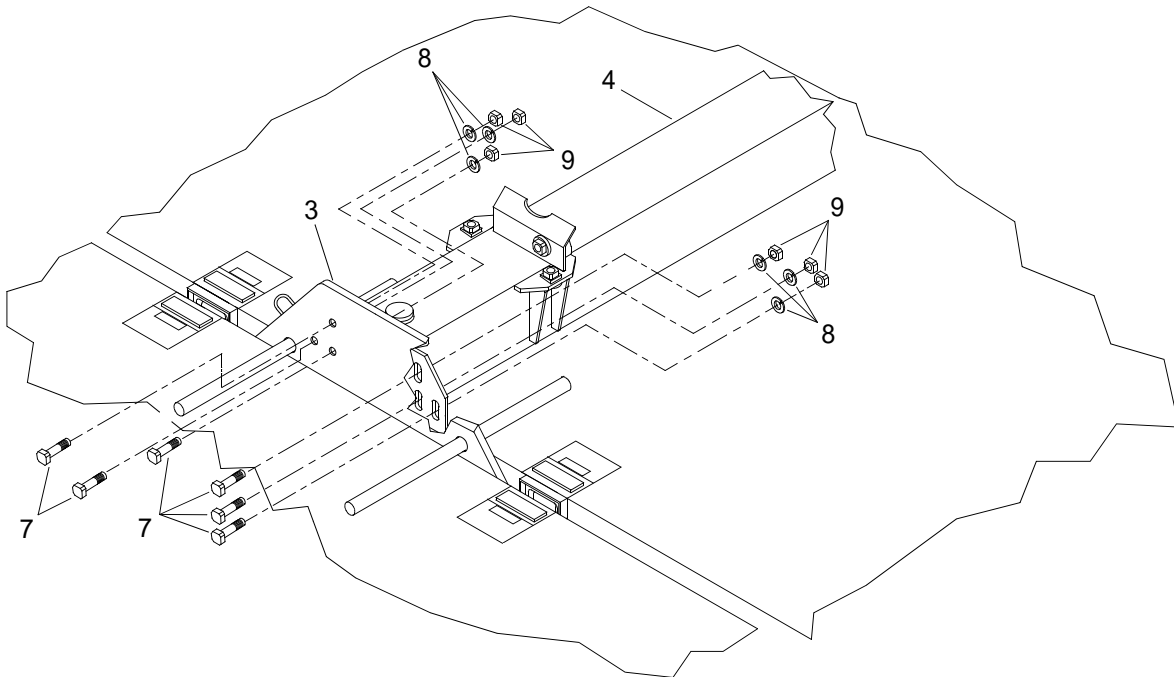
3. Lift mounting plate (3) until it contacts bottom surface of two lock castings (5).



- Place two crowbar handles (6) through holes in mounting plate (3) to hold it in position while installing mounting plate hardware.

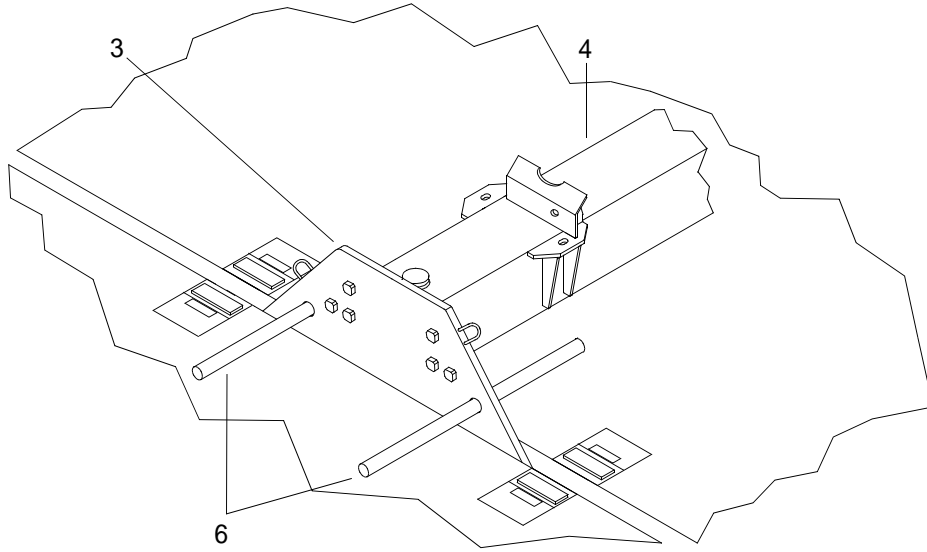


- Position spacer plate welded as part of mounting plate (3) facing inboard making contact with transverse beam (4).



- Install three bolts (7) into mounting plate (3) and transverse beam (4).

-
7. Install lock washers (8) and nuts (9) finger tight.
 8. Tighten nuts (9) until snug, then tighten an additional 1/3 turn (120°).



9. Remove crowbars (6).

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
FENDERS
OPERATION UNDER USUAL CONDITION**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
 Sling, Endless: 5300LB, 6' Green (Cabinet A6) (Item 81, WP 0112 00)
 Sling, Endless: 8400LB, 20' Yellow (Cabinet A9) (Item 82, WP 0112 00)
 Qty 2
 Shackle: 1/2" 2 Ton (Cabinet B7) (Item 69, WP 0112 00)
 Qty 4
 Crowbar (60" Long) (Fender Rack) (Item 13, WP 0112 00)
 Qty 2
 Hammer, Hand: 10 LBS Sledge (Cabinet Rack) (Item 39, WP 0112 00)
 Socket, Socket Wrench (Storage Room) (Item 83, WP 0112 00)
 Adapter, Socket Wrench (Storage Room) (Item 1, WP 0112 00)

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)
 Rope, Fibrous (Item 49, WP 0114 00)

Personnel Required

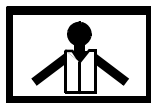
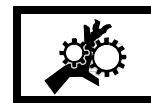
Seaman 88K (3)

Equipment Condition

Warping Tug Assembled On Sealift Vessel (WP 0012 00)
 Warping Tug Assembled In Water (WP 0013 00)
 Male Guillotine Connector Pins Removed. (WP 0009 00)

PREPARATION FOR USE - INSTALLATION OF FENDERS

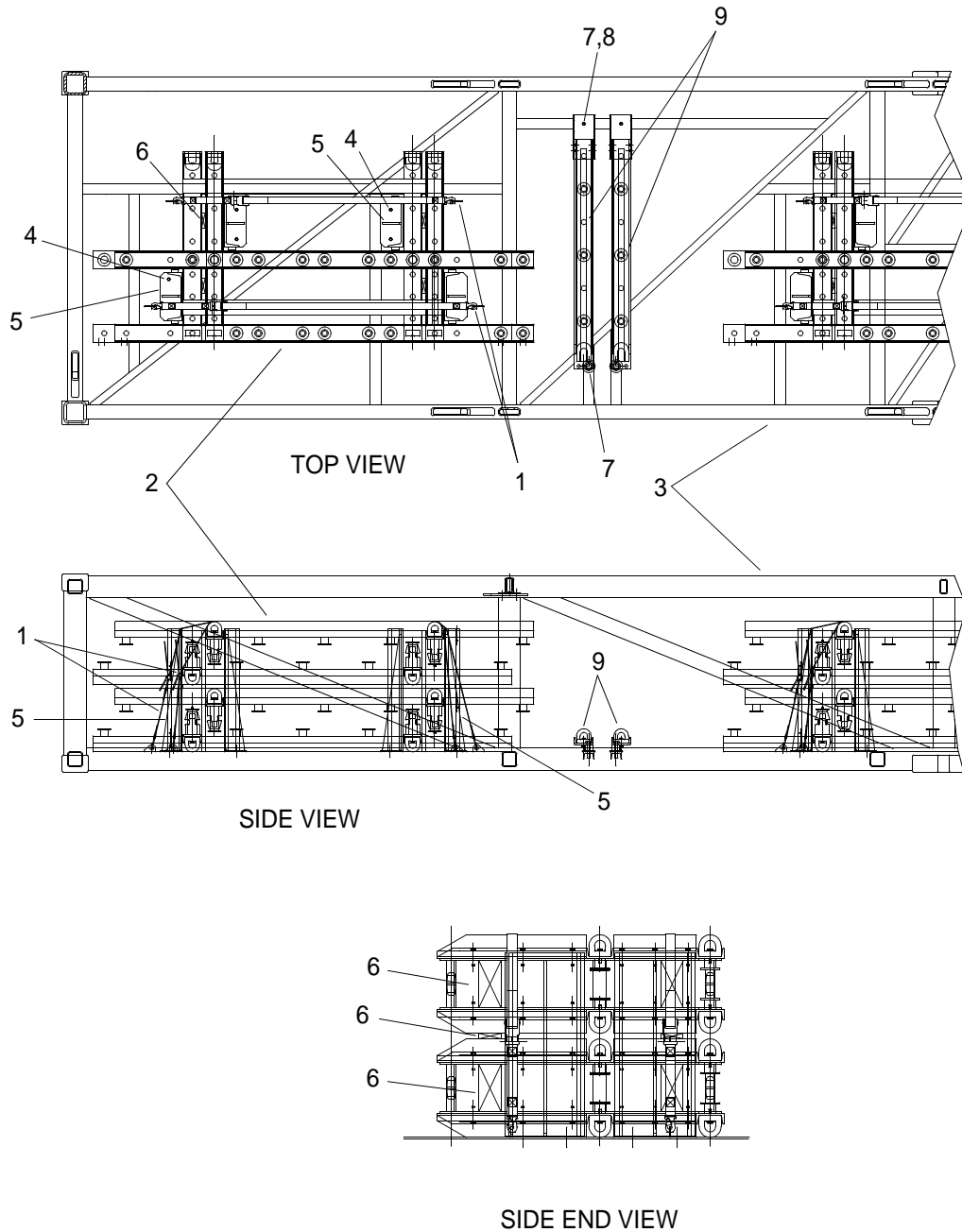
WARNING

**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

REMOVE SIDE FENDERING SYSTEM FROM SHIPPING FRAME

1. Inspect chains, slings and shackles. (WP 0007 00)
2. Remove all tie downs (1) securing side fenders (2) to shipping frame (3).



3. Remove hex head capscrews (4) securing vertical supports (5) to shipping frame (3).

WARNING



HEAVY OBJECTS

4. Using assistant, remove vertical supports (5) from shipping frame (3).

WARNING

**HEAVY PARTS**

5. Remove side fenders (2) from shipping frame (3).

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

NOTE

The side fenders are stacked in three piles of four each and are separated with dunnage for spacing.

These steps are typical for removing side fenders.

- a. Using crane, slings and shackles, remove side fender (2) from shipping frame (3).
- b. Remove slings and shackles from side fender (2).

WARNING

**HEAVY OBJECTS**

- c. Remove layer of dunnage (6) from top of next side fender (2).

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

- d. Remove remaining side fenders (2) from shipping frame (3).

WARNING

**HEAVY OBJECTS**

6. Install vertical supports (5) in shipping frame (3) and secure with hex head capscrews (4). Tighten hex head capscrews (4).

WARNING

**HEAVY OBJECTS**

7. Secure all removed dunnage with tie downs (4) to shipping frame (3).
8. Remove hex head capscrews (7) and flat washers (8) securing fender extension (9) to shipping frame (3).

WARNING

**HEAVY OBJECTS**

9. Using assistant, remove fender extensions (9) from shipping frame (3).

 WARNING



HEAVY OBJECTS

10. Remove remaining fender extensions (7) from shipping frame (3).
11. Install hex head capscrews (7) and flat washers (8) in shipping frame (3). Tighten hex head capscrews (7).

INSTALL SIDE FENDERING SYSTEM

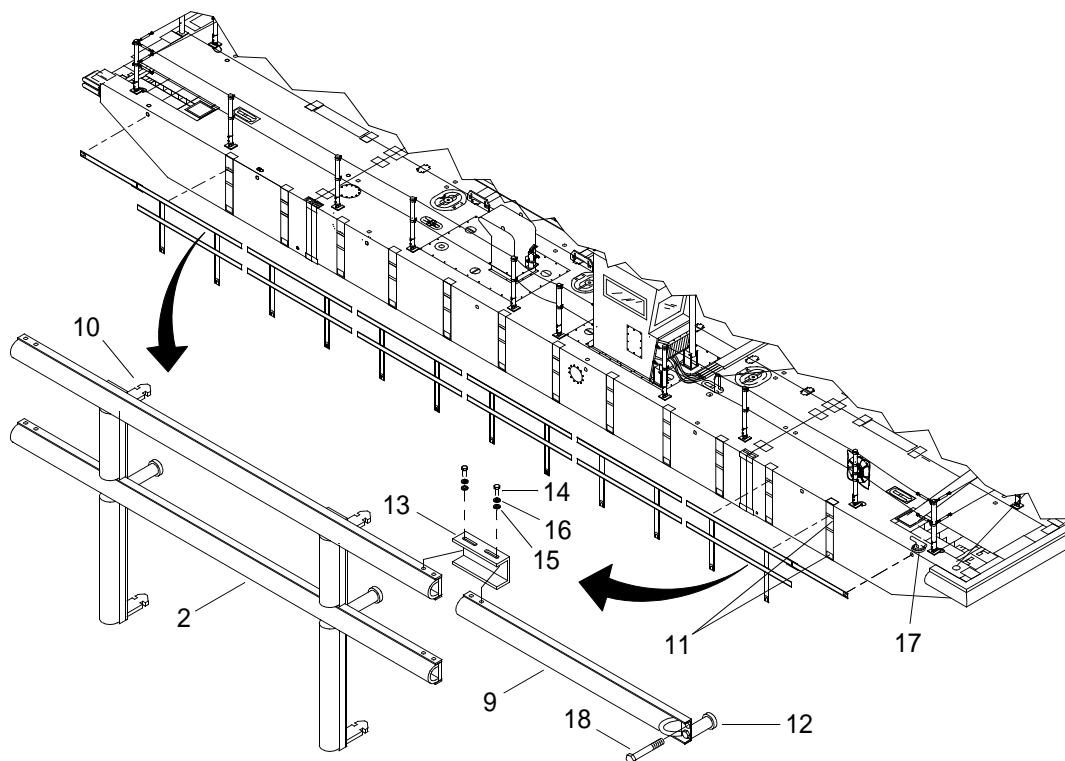
 WARNING



HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

1. Using crane, slings and shackles, position side fender (2) on side of WT so pins (10) align with guillotine top and bottom connectors (11).



2. Operate male and female connectors. (WP 0009 00)
3. Remove slings and shackles.

-
4. Install remaining side fenders (2).

WARNING



HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

5. Using crane, slings and shackles, position fender extension (9) on side of WT.
6. Verify standoff (12) on fender extension (9) is located in bottom hole of outboard end.
7. Attach fender extension (9) to outboard side fender (1) using connector (13), capscrews (14), washers (15) and lock washers (16). Tighten capscrews (15).

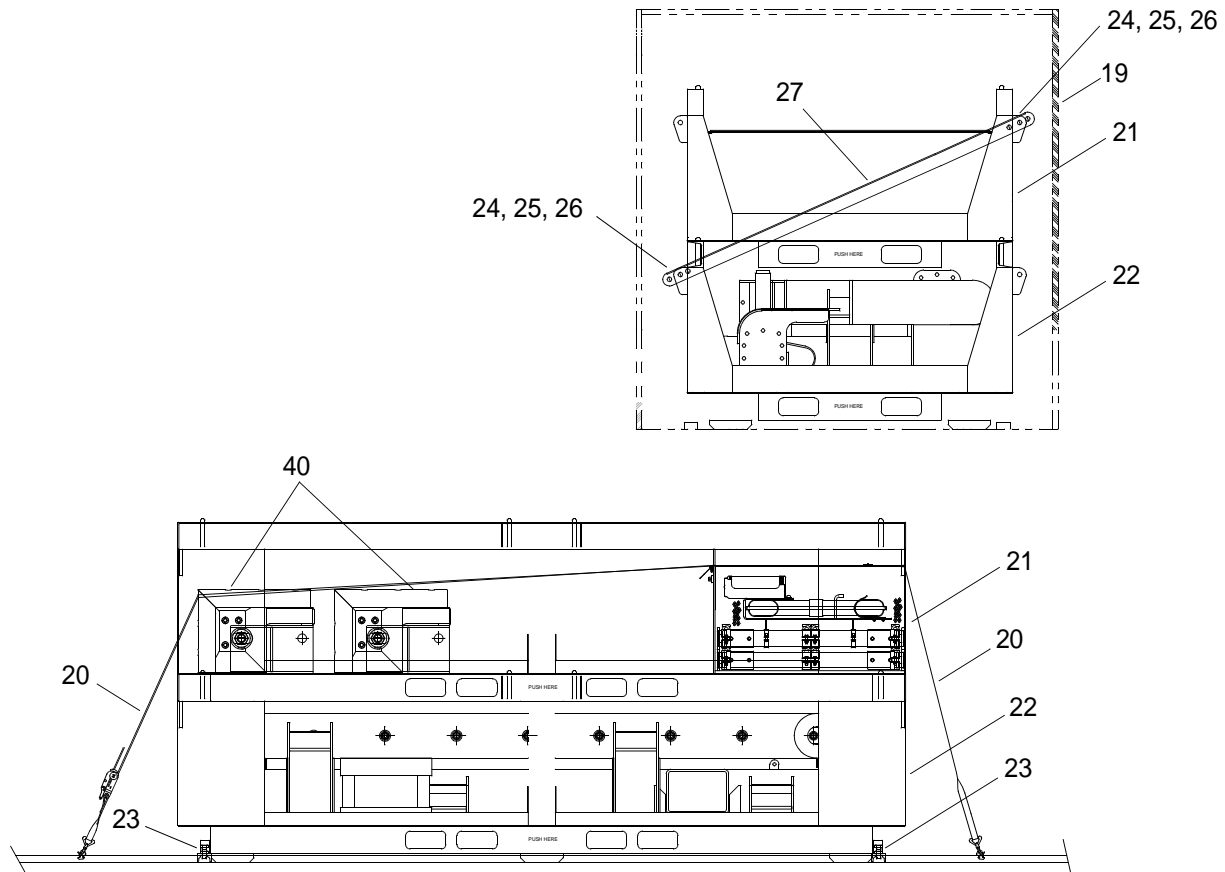
NOTE

The deck cleat bolts are used to secure outboard end of fender extensions to the side of the WT.

8. Connect fender extension (9) to deck cleat (17) using deck cleat bolt (18). Tighten deck cleat bolt (18).
9. Remove slings and shackles.
10. Install remaining fender extensions (9).

INSTALL BOW FENDER ASSEMBLY

1. Unlatch and open side doors of miscellaneous container (19).

**WARNING**

Door must be secured and latched in open position. Failure to comply could result in injury to personnel.

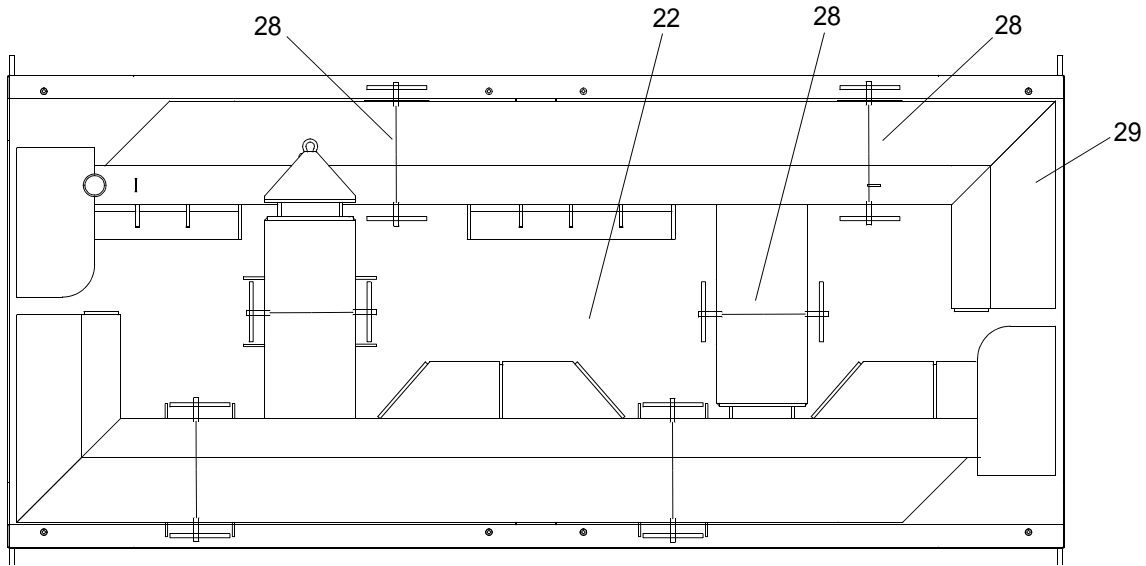
2. Secure miscellaneous container (19) side doors open with locking bars and pins.
3. Remove tiedowns (20) securing connected life line/corner fender pallet (21) and bow fender pallet (22) to trackstops (23) of miscellaneous container (19).
4. Remove trackstops (23) holding connected life line/corner fender pallet (21) and bow fender pallet (22) in center of miscellaneous container (19).
5. Remove hex nuts (24), flat washers (25), hex head capscrews (26) and tie bars (27) securing life line/corner fender pallet (21) to bow fender pallet (22). Remove tie bars.

 WARNING

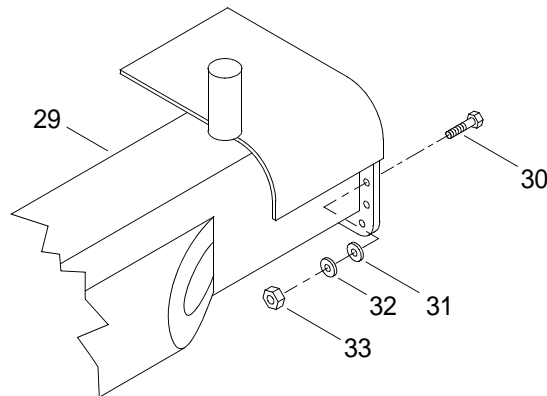


HEAVY PARTS

6. Using forklift, remove life line/corner fender pallet (21) from on top of bow fender pallet (22) and set aside.
7. Remove tiedowns (28) securing halves of bow fender assembly (29) to bow fender pallet (22).



8. Remove bolts (30), washers (31), lockwashers (32) and nuts (33) from one half of bow fender assembly (29).



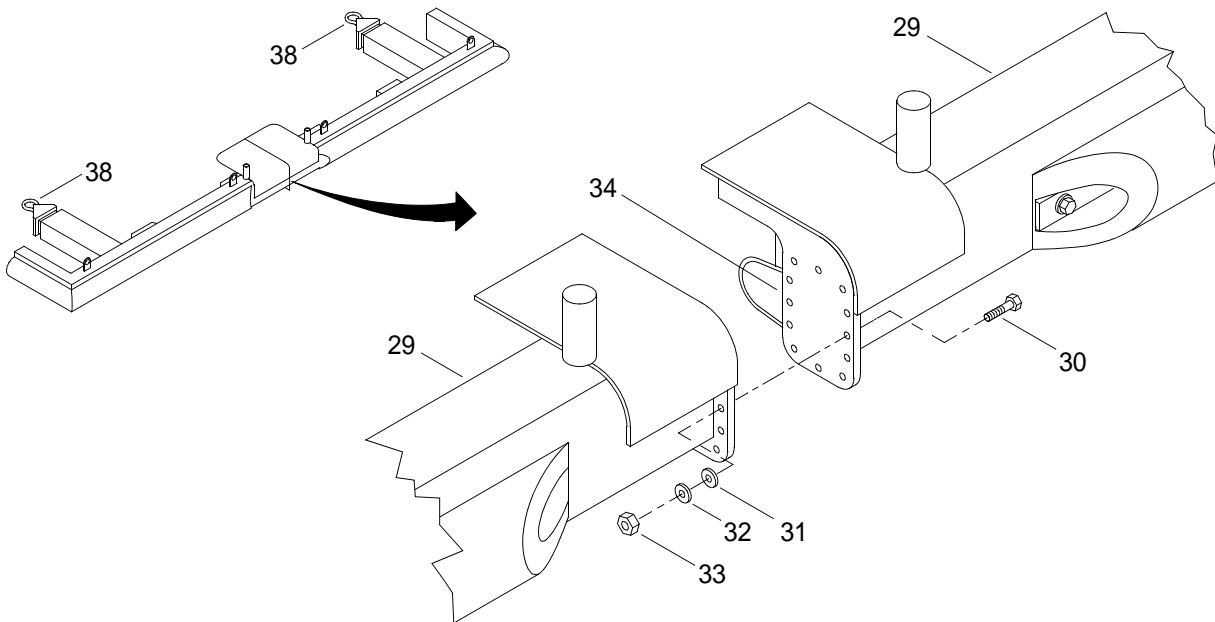
 WARNING



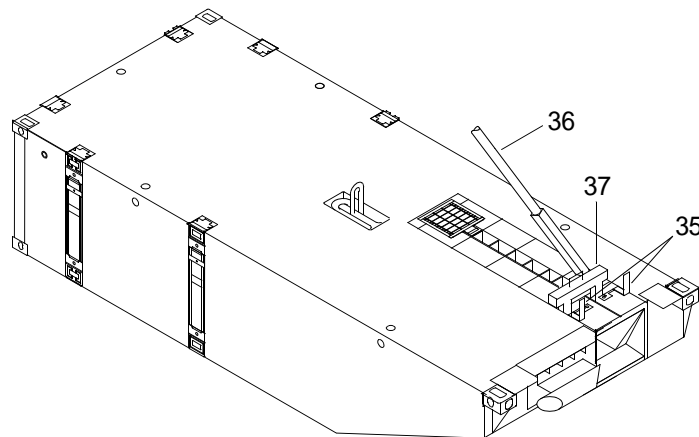
HEAVY PARTS

9. Using forklift, slings and shackles, separately remove halves of bow fender assembly (29) and position close together, aligning holes (34).

10. Install bolts (30), washers (31), lockwashers (32) and nuts (33) to secure halves of bow fender assembly (29). Tighten nuts (33).

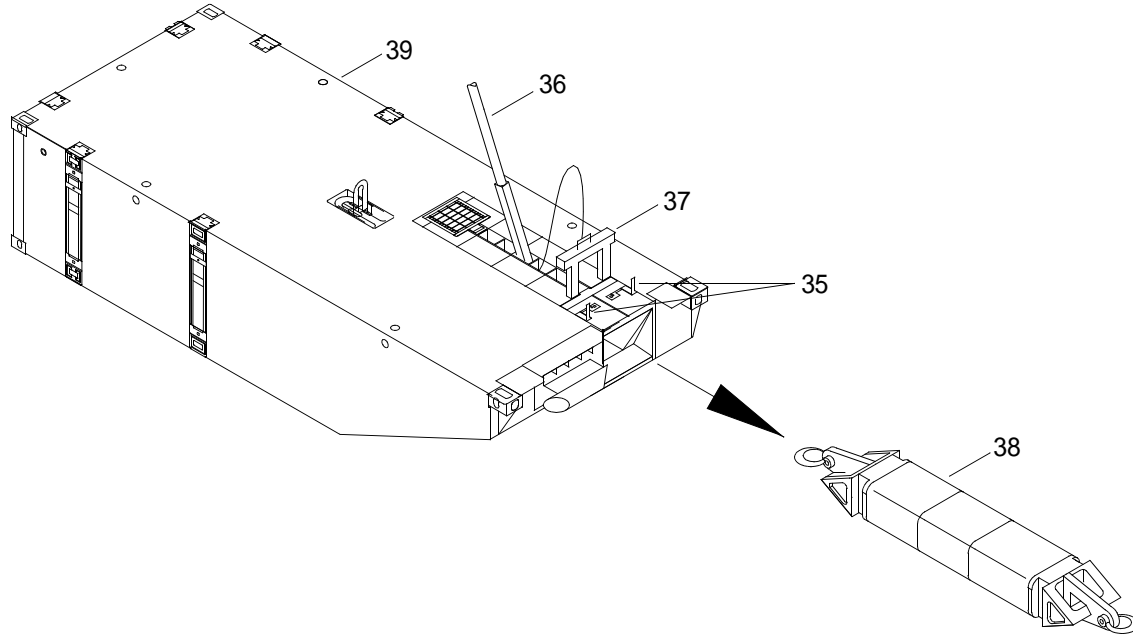


11. Rotate chute bolt (35) and pull handle to unlocked position on both left and right end rakes.



12. Using a crowbar (36), lift guillotine plate (37) up from flexor connector slots on both left and right end rakes.

13. Move flexor (38) forward using a crowbar (36).



WARNING



HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

14. Using crane, sling and shackle, remove flexor (38) from left end rake module (39).

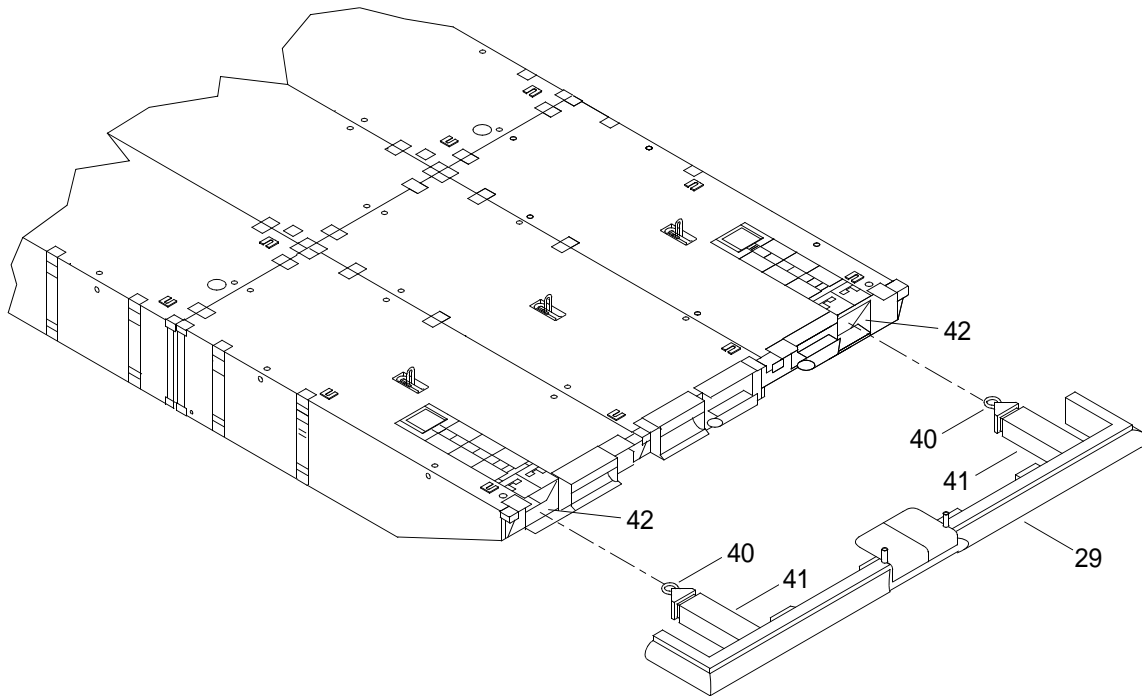
15. Install fibrous rope on shackles (40) of flexor receiver inserts (41) on assembled bow fender assembly (29) and route fibrous ropes through flexor wells to assist with installing bow fender assembly (29) in left and right end rake flexor receivers (42) on front of WT.

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

16. While assistants pull on fibrous rope, use crane, slings and shackles, position flexor receiver inserts (41) into both left and right end rake flexor receivers (42).

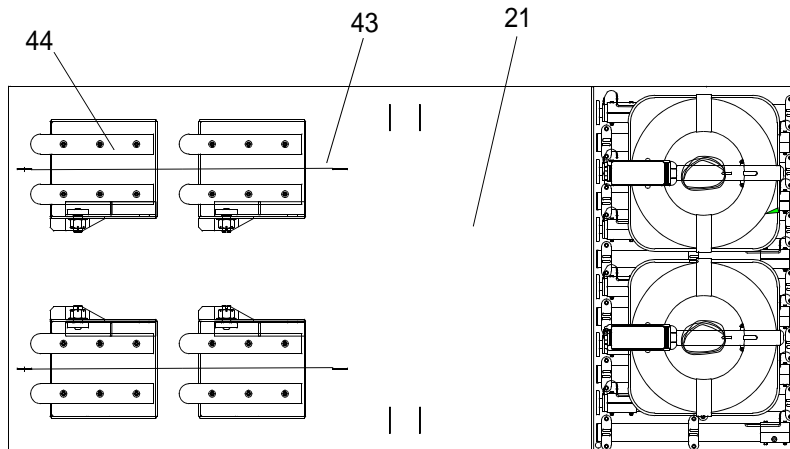


17. Using fibrous rope and crowbars, pull inward on bow fender assembly (29) until flexor receiver inserts (41) are fully stowed in left and right end rake flexor receivers (42).
18. Insert guillotine plates (37) into flexor slots on both left and right end rakes.
19. Using sledge hammer, drive guillotine plates (37) down on both left and right end rake.
20. Push chute bolt (35) to locked position and rotate handle to closed position on both left and right end rakes.
21. Remove fibrous rope, slings and shackles from bow fender assembly (29).

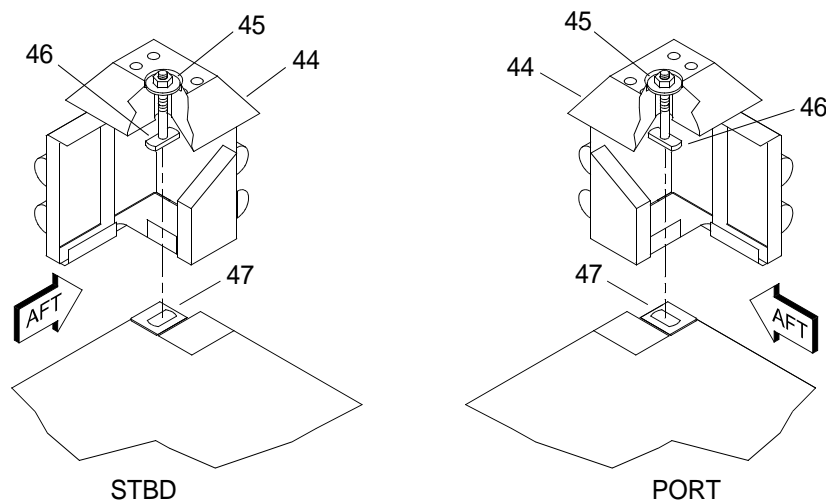
INSTALL CORNER FENDERS**NOTE**

This task is typical for the installation of corner fenders on aft left and right end rake ISO corners.

1. Remove tiedowns (43) securing corner fenders (44) to life line/corner fender pallet (21).

**WARNING****HEAVY OBJECTS**

2. Using assistant, remove corner fenders (44) from life line/corner fender pallet (21).



3. Loosen nut (45) on tee bolt (46), and remove.
4. Secure a fibrous rope between corner fender (44) and any deck fitting to prevent accidental loss of corner fender (44) overboard.

WARNING

**HEAVY OBJECTS**

5. Using assistant, install corner fender (44) over ISO fitting (47) until tee bolt (46) enters slot in ISO fitting (47).
6. Turn tee bolt (46) ¼ turn to hold tee bolt (46) with pry bar against ISO corner fitting (47).
7. Using socket wrench adapter and socket wrench, tighten nut (45) to secure corner fender (44) on ISO corner (47).
8. Remove rope from corner fender (44) and deck fitting.

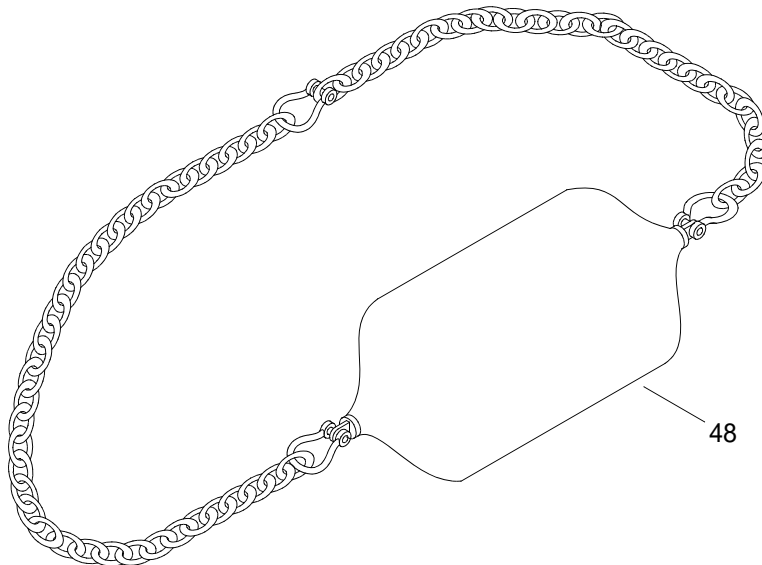
INSTALL 2 FT BY 4 FT FENDERS

WARNING

**HEAVY PARTS****NOTE**

This task is typical for the installation of 2 ft by 4 ft fenders on WT.

1. Using forklift, slings and shackles, remove 2 ft by 4 ft fenders (48) from BII container.



WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

2. Using crane, slings and shackles, install 2 ft by 4 ft fenders (48) on deck fitting of WT as required.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
A-FRAME
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Plug, Ear (Cabinet B4) (Item 55, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
 Sling, Endless: 5300LB, 6' Green (Cabinet A6) (Item 81, WP 0112 00)
 Qty 2
 Shackle: 3/4", 4.75 Ton (Cabinet B7) (Item 71, WP 0112 00)
 Qty 2

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)
 Rope, Fibrous (Item 49, WP 0114 00)
 Lumber, Softwood, Dimension (Item 43, WP 0114 00)

Personnel Required

Seaman 88K (4)

Equipment Condition

Winch Mounting Plates Installed. (WP 0016 00)

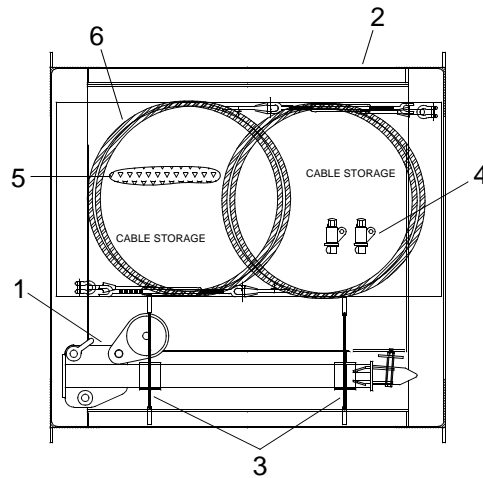
PREPARATION FOR USE - INSTALL A-FRAME**ASSEMBLE A-FRAME**

WARNING

**EAR PROTECTION****VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Single hearing protection shall be used when the deck winches are in use. Failure to observe these precautions could result in serious injury or death.

1. Inspect chains, slings and shackles. (WP 0007 00)
2. Remove A-frame elevating pole (1) from stowage pallet (2).



- a. Remove two ratchet straps (3) securing A-frame elevating pole (1) in storage pallet (2).

WARNING



HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

- b. Using crane, sling and shackle, remove elevating pole (1) and place on WT deck.
 - c. Remove slings and shackles.
3. Remove two A-frame corner fittings (4) from stowage pallet storage box (5).

WARNING

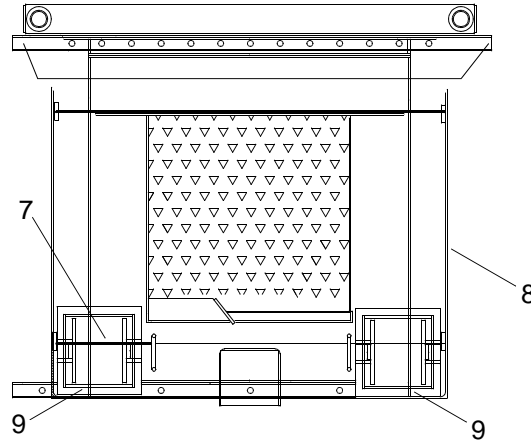


HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

4. Using crane and sling, remove four A-frame cables (6) from stowage pallet storage box (5).

5. Remove A-frame foot assemblies (7) from stowage pallet (8).



- a. Remove two ratchet straps (9) securing A-frame foot assemblies (7) in stowage pallet (8).
- b. Lift grate coverings (10) over forward outboard flexor wells (11).

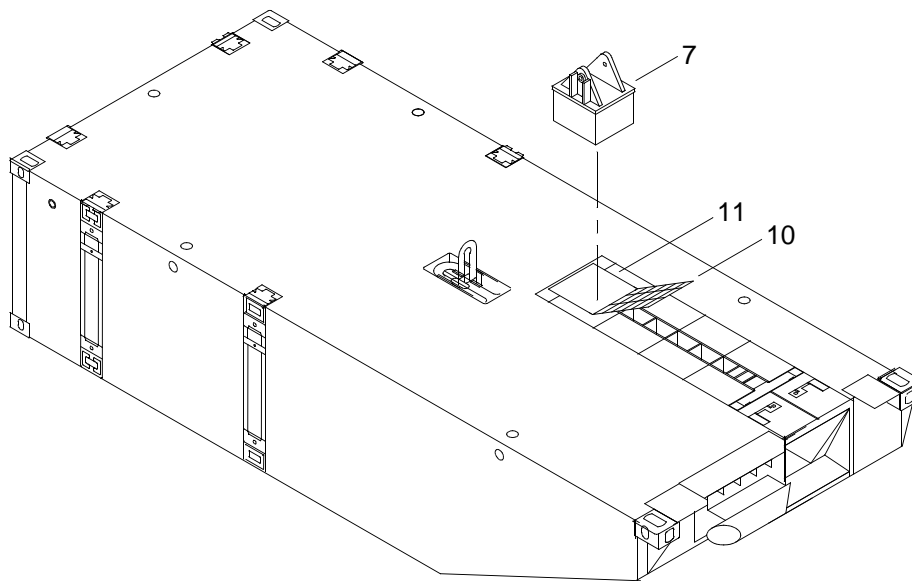
WARNING



HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

- c. Using crane, sling and shackle, remove two A-frame foot assemblies (7) from stowage pallet (8) and install in forward flexor wells (11).



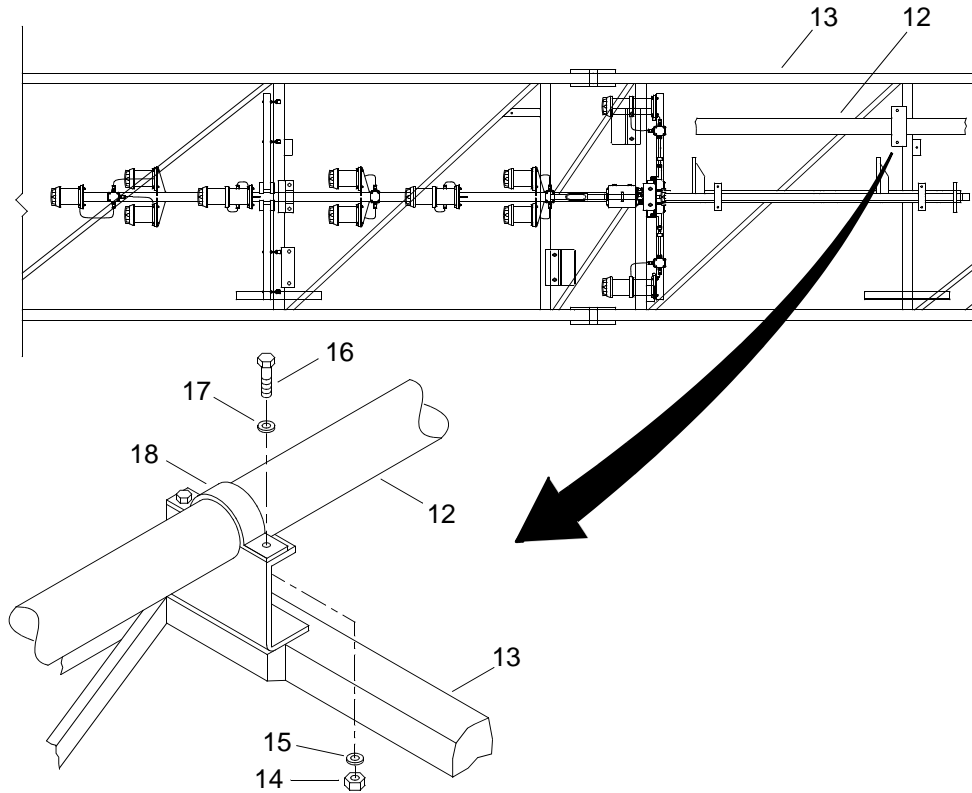
- d. Remove slings and shackles.

NOTE

The following procedure is typical for installation of both A-frame legs.

Removal of shipping frame top crossbars will assist personnel with removal of hardware from the shipping frame.

6. Remove A-frame leg (12) from shipping frame (13).



WARNING



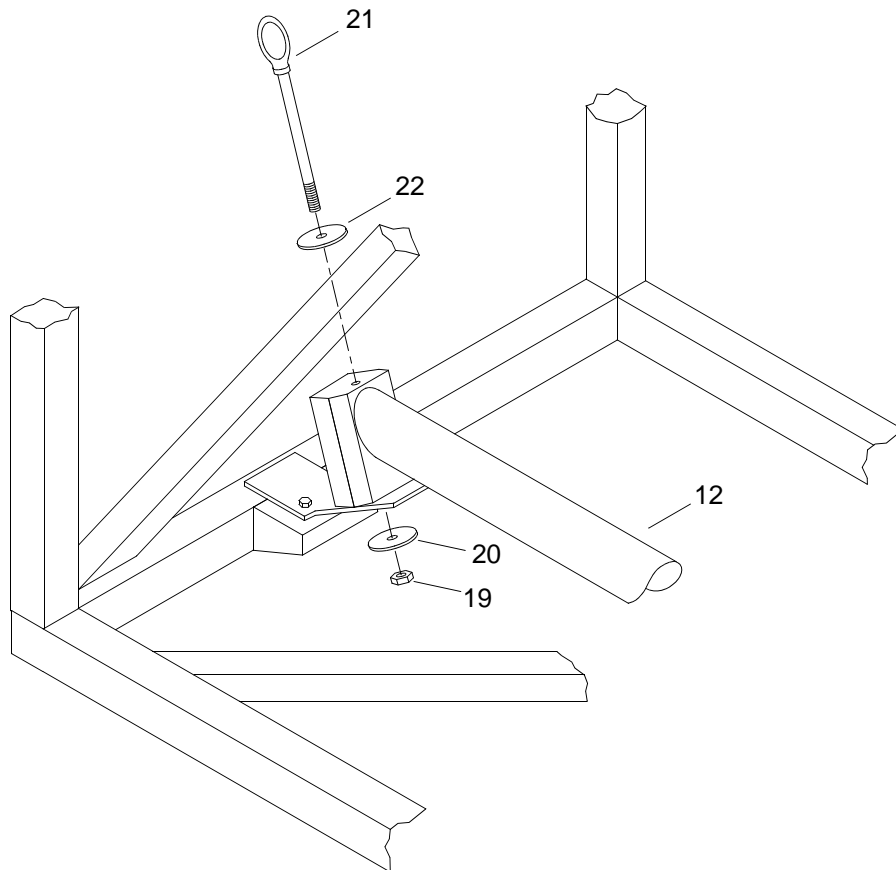
HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

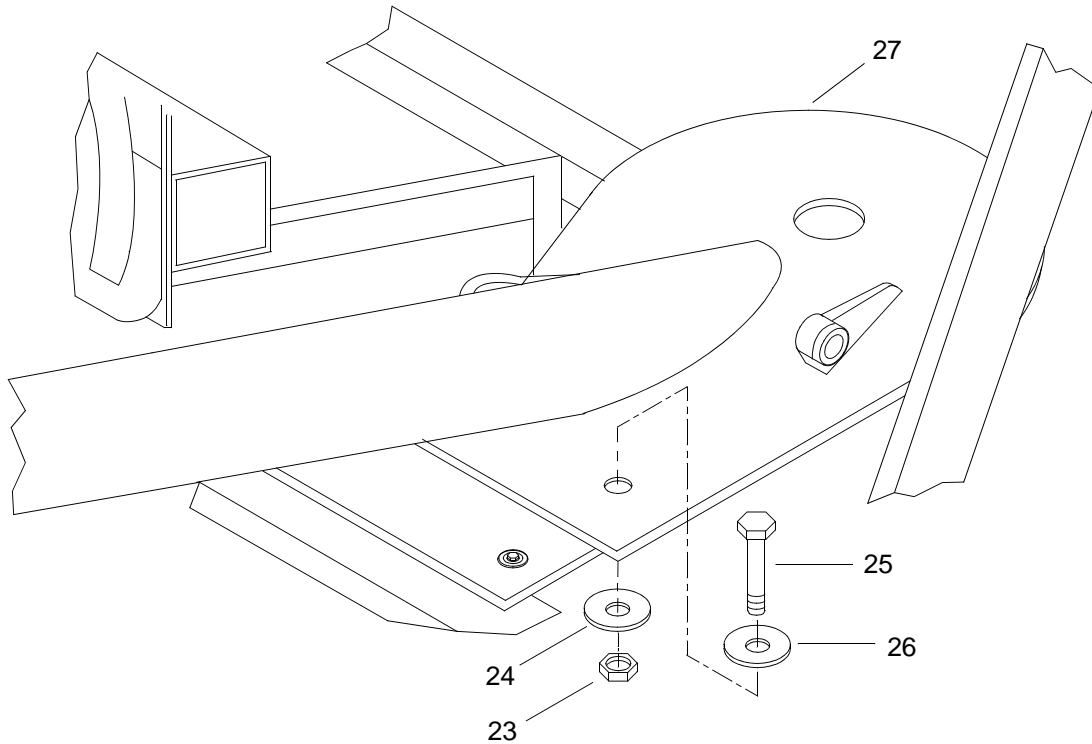
- a. Attach crane, slings and shackles to A-frame leg (12).
- b. Remove two self-locking nuts (14) and washers (15).
- c. Remove two bolts (16) with washers (17) from clamp (18).

- d. Remove clamp (18).
- e. Remove nut (19) and washer (20) from eyebolt (21).



- f. Remove eyebolt (21) and washer (22) from A-frame leg (12).

- g. Remove two self-locking nuts (23) and washers (24).



- h. Remove two bolts (25) with washers (26) from A-frame sheave plate (27).

WARNING



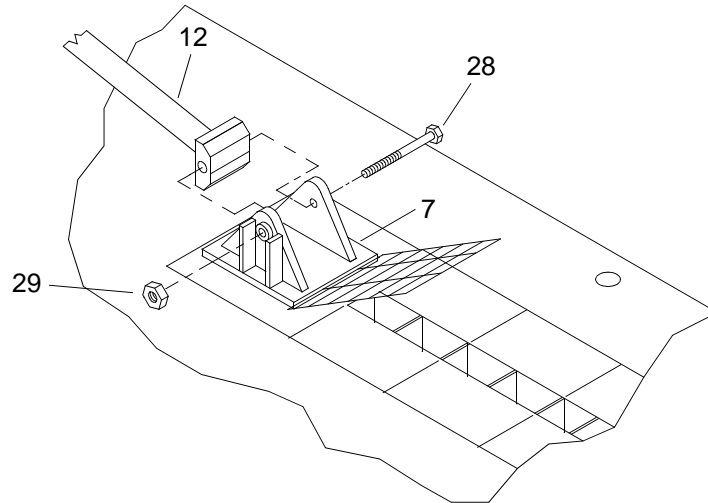
HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

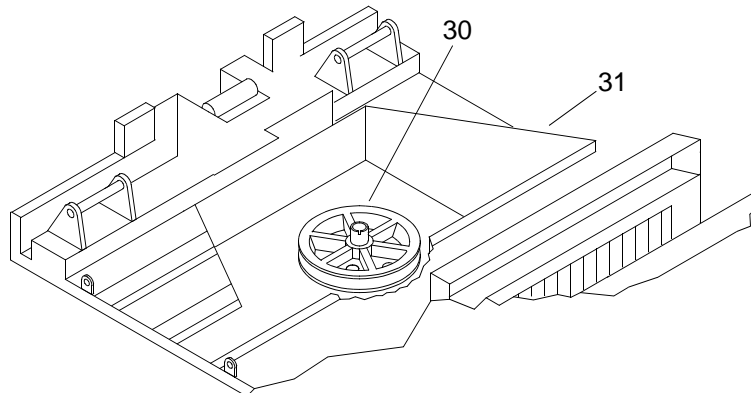
When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

- i. Using crane, slings and shackles, remove A-frame leg (12) from shipping frame (13) and place on WT deck, supporting top end of A-frame leg on dunnage.

- j. Position A-frame leg (12) into A-frame foot assembly (7) and align holes.



- k. Install bolt (28) into foot assembly (7) and leg (12).
- l. Install nut (29) and tighten until bolt (28) threads are just exposed.
- m. Remove slings and shackles.
7. Remove A-frame sheave (30) from stowage pallet stowage box (31).



- a. Remove sheave attaching hardware from stowage box (31).

WARNING

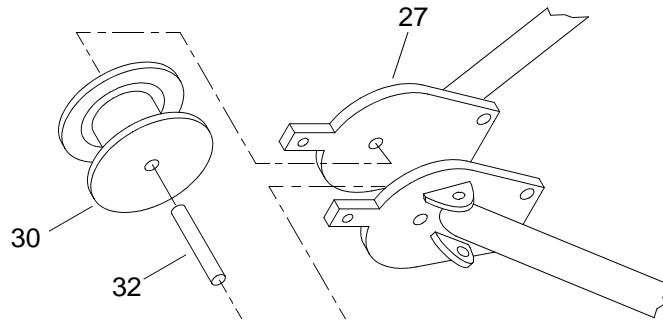


HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

- b. Using crane and sling, remove A-frame sheave (30) from stowage box (31) and place on WT deck.

8. Install sheave (30) into sheave plate (27).
 - a. Install bushing (32) into sheave (30).



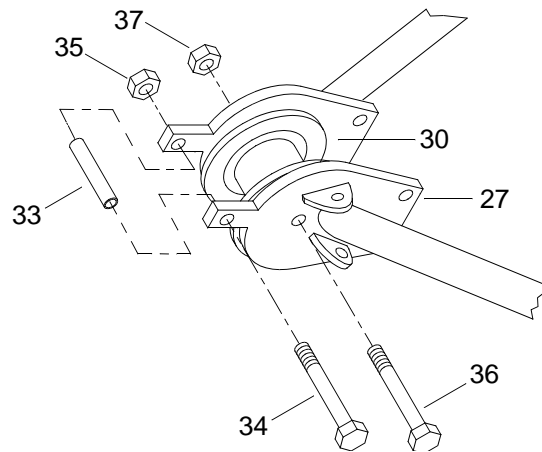
WARNING



HEAVY PARTS

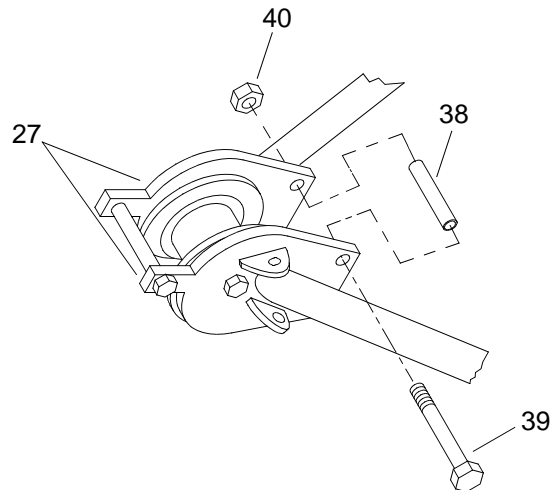
Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

- b. Using crane and sling, position A-frame sheave (30) between sheave plates (27).
- c. Install and hold upper spacer (33) between sheave plates (27).



- d. Install bolt (34), draw sheave plates (27) together and install nut (35) finger tight.
- e. Install bolt (36) into sheave plate (27) and sheave (30).
- f. Install nut (37) finger tight.

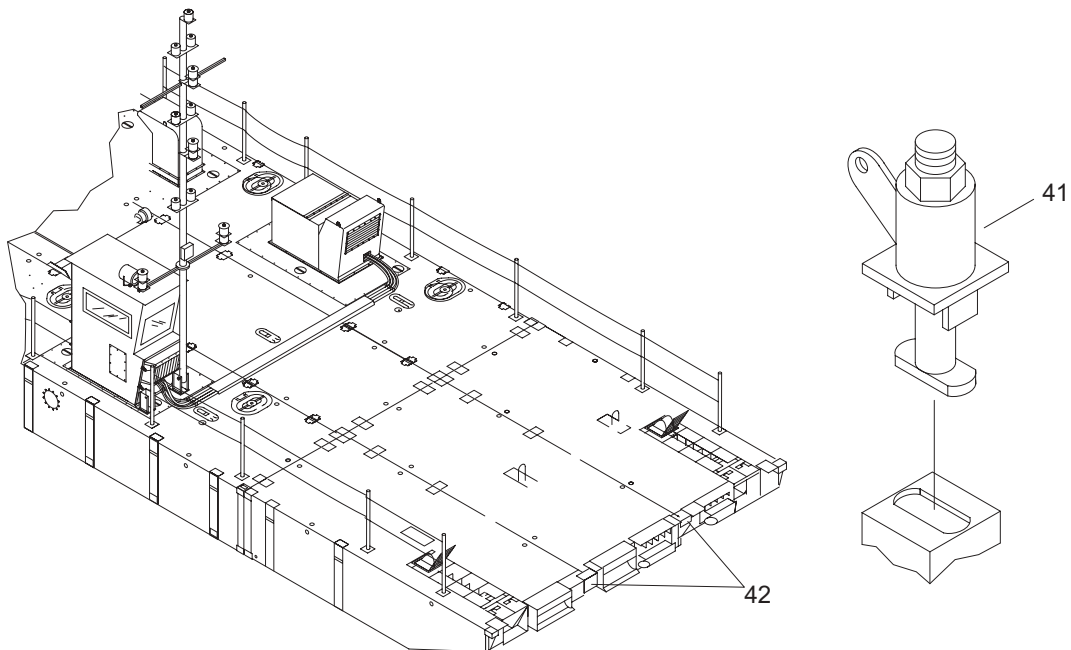
- g. Install two lower spacers (38) and hold in place.



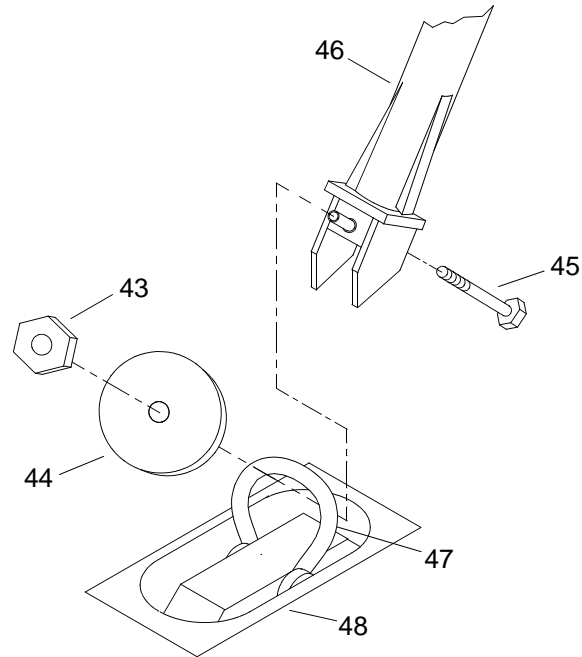
- h. Install two bolts (39) into sheave plates (27) and spacer (38).
- i. Install two nuts (40) finger tight.
- j. Tighten A-frame leg nuts (29), sheave plate nuts (37 and 40) and sheave nut (35) until snug, then tighten each an additional 1/3 turn (120°).
- k. Remove sling.

INSTALL A-FRAME ELEVATING POLE

1. Install a corner fitting lug assembly (41) into both center rake module ISO corner fittings (42).



2. Remove nut (43) and large washer plate (44) and bolt (45) from foot of elevating pole (46).



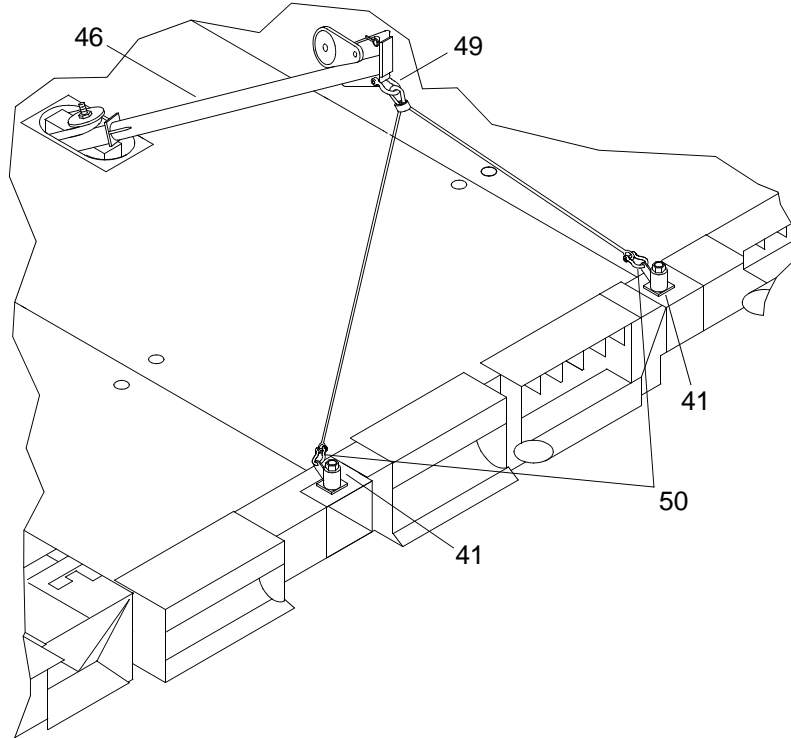
WARNING



HEAVY PARTS

3. Lift center rake modules lifting shackle (47) and insert elevating pole foot (46) into lifting lug casting (48).
4. Install bolt (45) through elevating pole foot (46) and lifting shackle (47).
5. Install washer plate (44) and nut (43).

6. Attach elevating pole guy wire center shackle (49) to top lower mount on elevating pole (46).

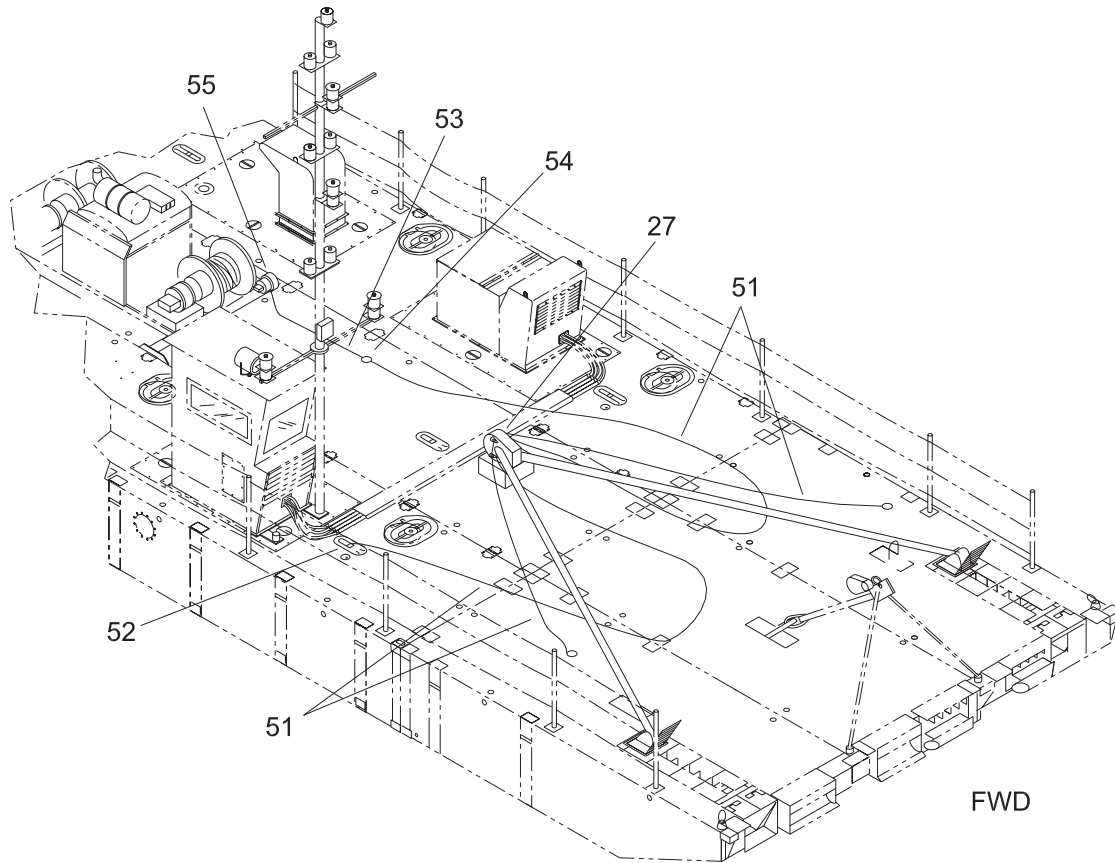


7. Install guy wire end shackles (50) to two center rake module corner fittings (41).

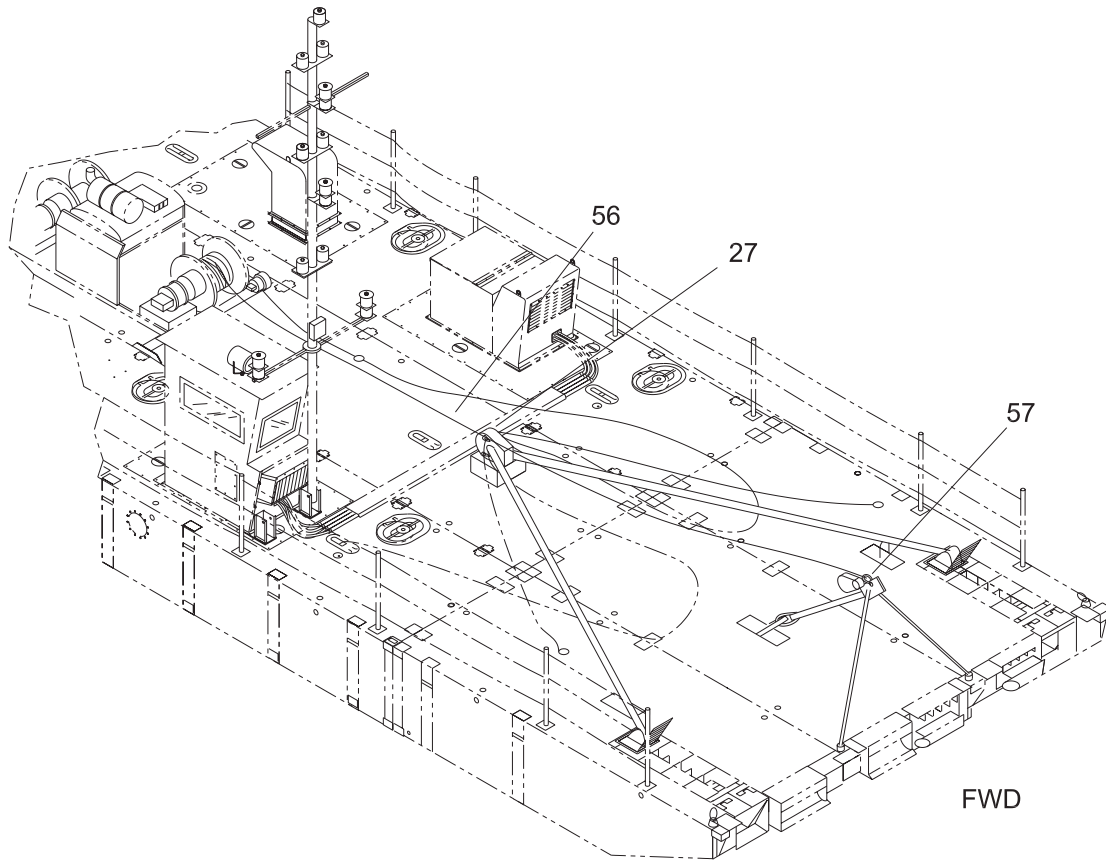
ELEVATE A-FRAME

1. Secure four guy assembly shackles (51) to A-frame sheave plates (27).
2. Secure starboard aft guy assembly (51) to starboard propulsion module forward lifting lug (52).

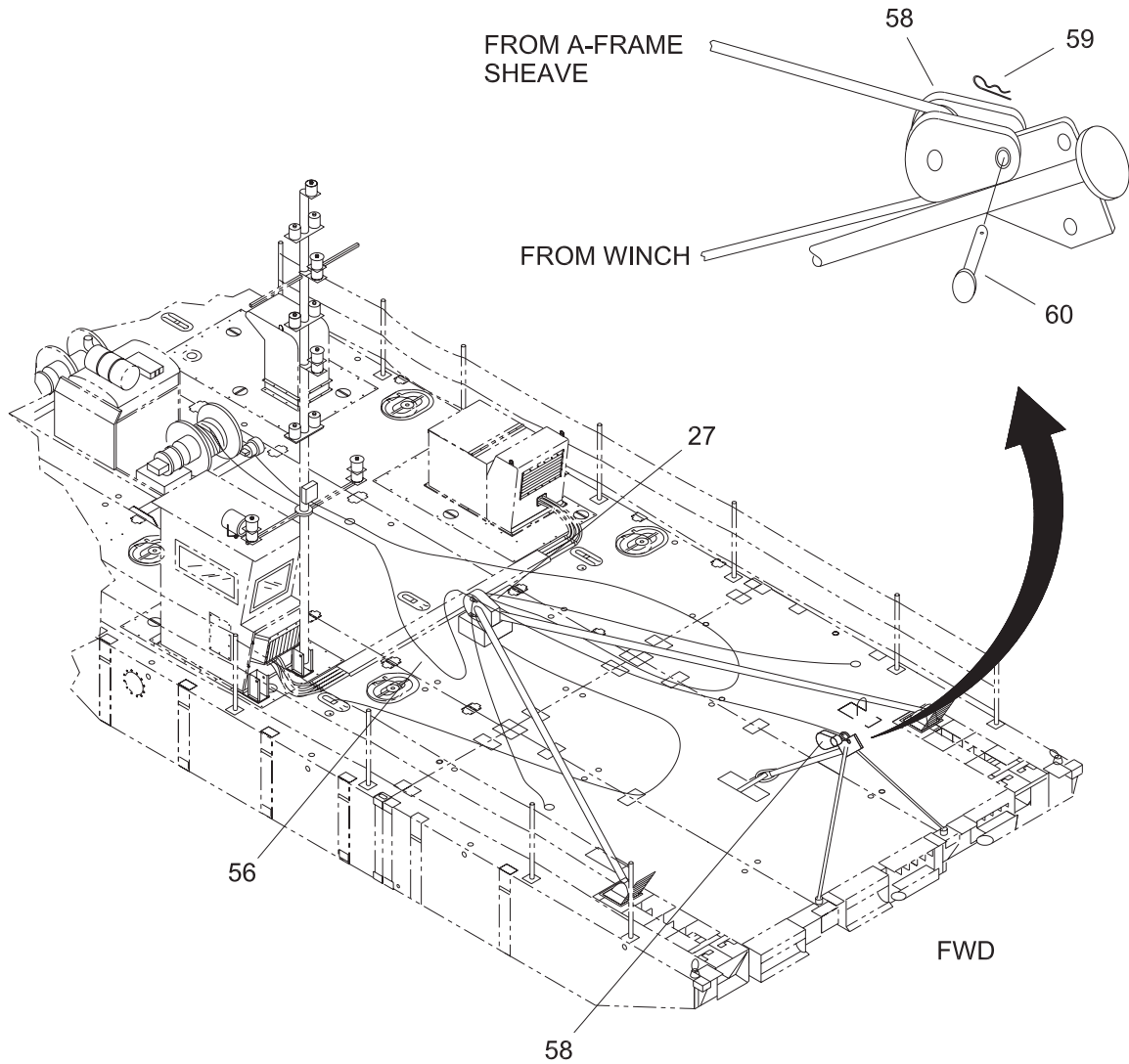
3. Secure a 1 in. diameter nylon line (53) to turnbuckle (54) of port after guy assembly (51) and route to gypsy winch (55) to be tended as a preventer line while elevating A-frame.



4. Lead forward winch drum cable (A-wire) (56) over A-frame sheave (27) to elevating pole upper eye (57) and secure it.

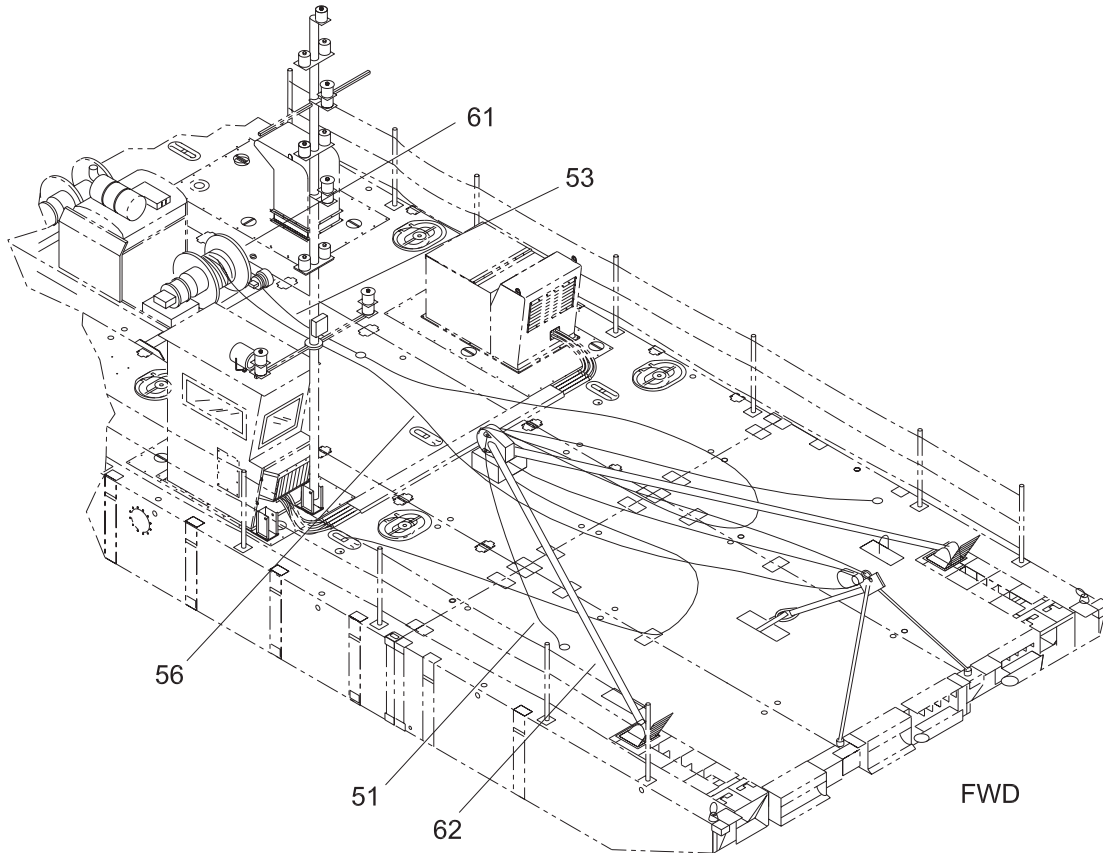


5. Take a bight of winch drum A-wire (56) under A-frame sheave (27) and capture it in 8 in. elevating pole snatch block (58).



- a. Remove cotter pin (59).
- b. Holding snatch block (58), remove pin (60).
- c. Loop A-wire (56) on snatch block (58) with end from winch drum entering snatch block from bottom.
- d. Position snatch block (56) in place and install pin (60).
- e. Install cotter pin (59).

6. Ensure all shackles are secure before raising A-frame.



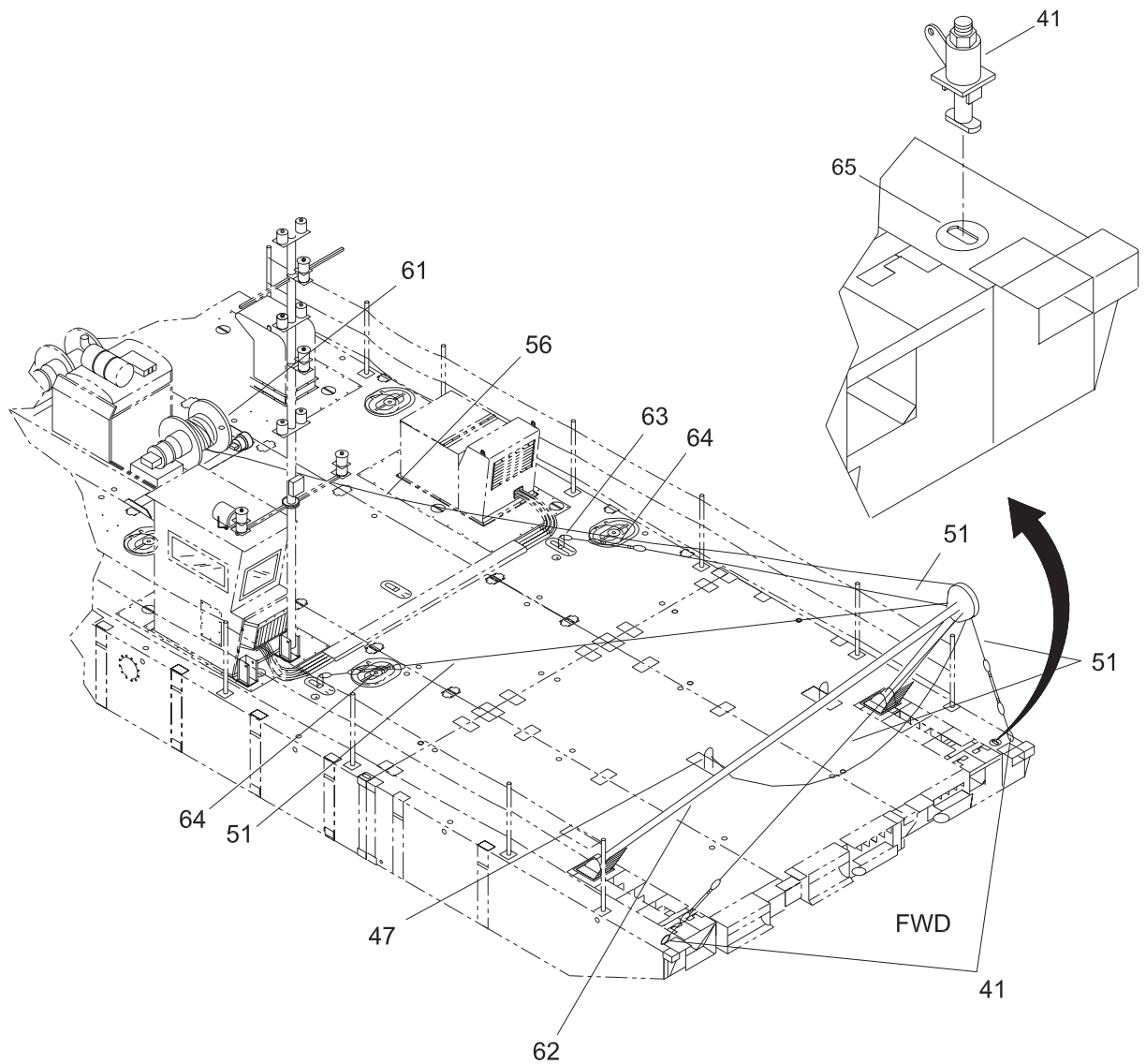
WARNING



EAR PROTECTION

Single hearing protection shall be used when the deck winches are in use.

7. Using winch (61), haul on A-wire (56) to raise A-frame (62).
8. Tend preventer line (53) on gypsy as A-frame (62) is raised and passes through vertical position.
9. Using preventer line (53) lower A-frame (62) into operating position (approximately 60° past vertical) until it is supported by starboard after guy assembly (51).



10. Remove preventer line (53) from port after guy assembly (51).
11. Attach port guy assembly (51) to port propulsion module forward lifting lug (63).
12. Remove A-wire (56) from elevating pole snatch block (58).
13. Remove A-wire (56) from elevating pole upper eye (57).
14. Attach A-wire (56) to end rake center module lifting shackle (47).

WARNING

**EAR PROTECTION**

Single hearing protection shall be used when the deck winches are in use.

15. Using winch (61) remove slack on A-wire (56) and make taut.
16. Remove guy wire shackles (50) from corner fitting lugs (41).
17. Remove corner fitting lugs (41) and install in left and right end rake modules closure assemblies (65).
18. Secure A-frame forward guy wires (51) to corner fitting lugs (41).
19. Remove slack from A-frame forward guy wires (51) by tightening after guy wire turnbuckles (64) until taut.
Balance tension between port and starboard, until no slack is present.
20. Remove elevating pole (46) and stow it.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
ABOVEDECK EQUIPMENT
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
Goggles, Industrial: Clear Lens, Chipping (Cabinet B4) (Item 35, WP 0112 00)
Sling, Endless: 5300LB, 6' Green (Cabinet A6) (Item 81, WP 0112 00)
Qty 4
Shackle: 3/4", 4.75 Ton (Cabinet B7) (Item 71, WP 0112 00)
Qty 4

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)
Gloves, Rubber Industrial (Item 26, WP 0114 00)
SST Bolt and SST Washer (Item 53, WP 0114 00)
Sealant, Gasket (Item 51, WP 0114 00)
Qty 3
Cleaning Compound, Solvent (Item 11, WP 0114 00)
Antiseize Compound (Item 3 WP 0114 00)
Adhesive (Item 1, WP 0114 00)
Rag, Wiping (Item 48, WP 0114 00)

Personnel Required

Seaman 88K

References

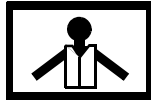
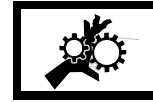
TM 11-5820-890-10-8

Equipment Condition

Warping Tug Skeg Assemblies Installed. (WP 0014 00)
A-Frame Installed. (WP 0018 00)

PREPARATION FOR USE - INSTALLATION OF WARPING TUG ABOVEDECK EQUIPMENT**INSTALL OPERATORS CAB**

WARNING

**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

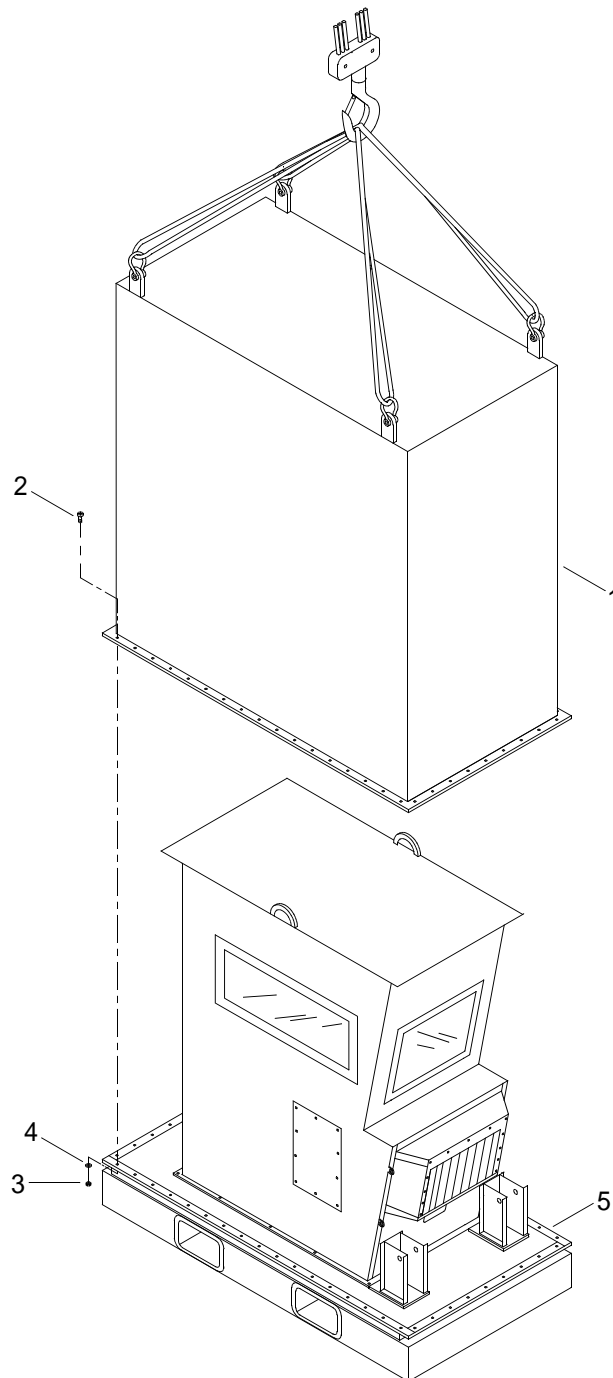
All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

Attempting to assemble WT in higher sea conditions than Sea State 0 could cause injury or possible death to personnel and/or damage equipment.

NOTE

The operators cab is normally installed on starboard side. If required, operators cab may be installed on port side. This procedure is typical for installation on starboard side, unless otherwise noted.

1. Inspect chains, slings and shackles. (WP 0007 00)
2. Attach slings and shackles to operators cab container lid (1).



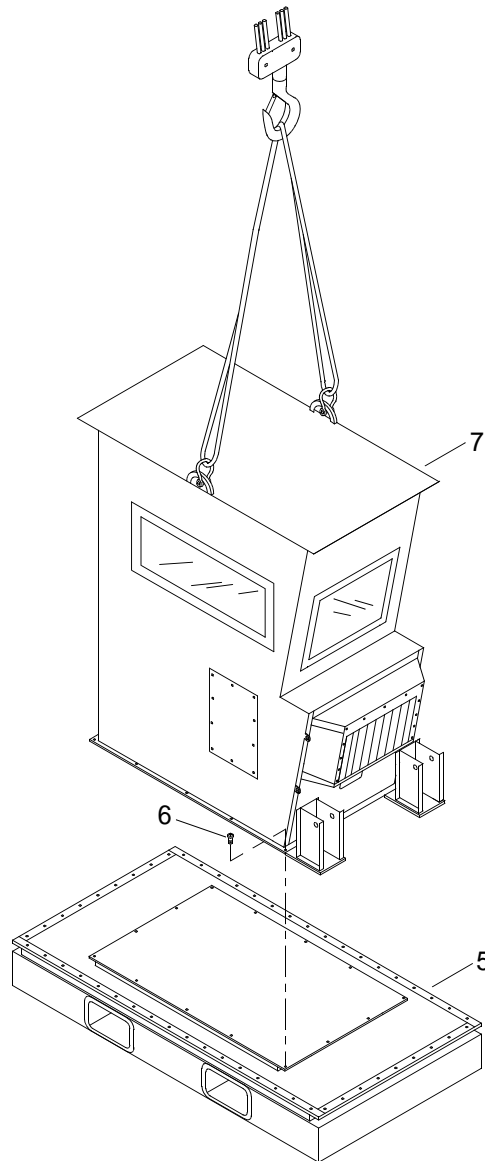
3. Remove bolts (2), hex nuts (3) and lock washers (4) securing operators cab container lid (1) to operators cab stowage pallet (5).

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

4. Using crane, slings and shackles, lift operators cab container lid (1) from operators cab stowage pallet (5).
5. Remove slings and shackles from operators cab container lid (1).
6. Remove bolts (6) securing operators cab (7) to operators cab stowage pallet (5).



7. Attach slings and shackles to operators cab (7).

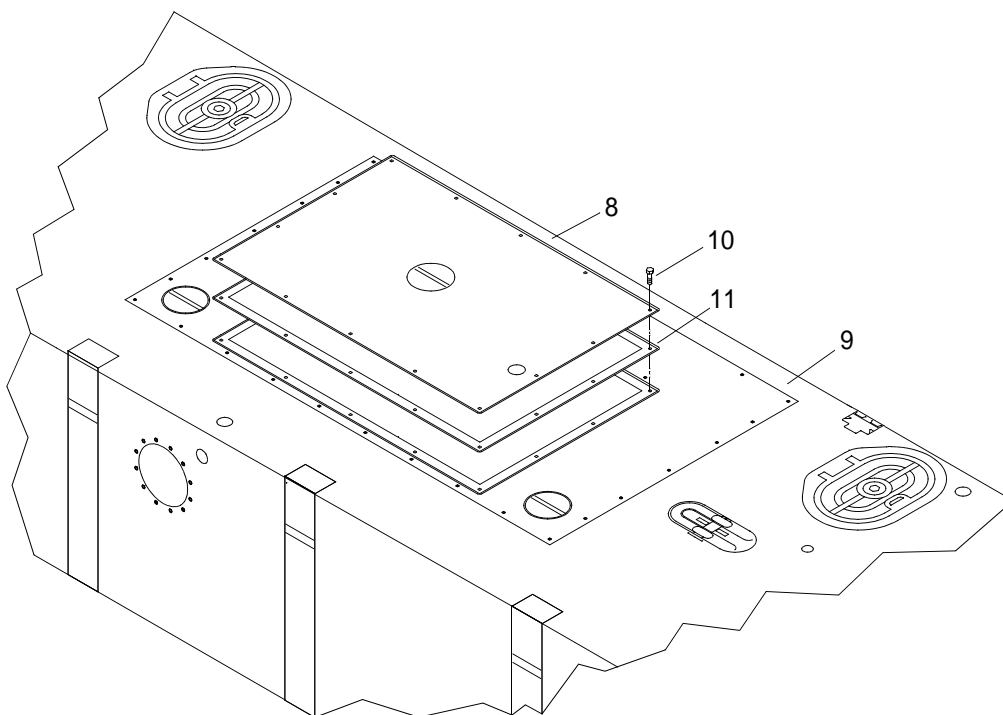
 WARNING



HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

8. Using crane, slings and shackles, lift operators cab (7) from operators cab stowage pallet (5) and place on deck of warping tug.
9. Remove crane, slings and shackles from operators cab (7).
10. Remove starboard propulsion module shipping plate (8) from engine hatch (9).



- a. Remove bolts (10) securing shipping plate (8) to starboard propulsion module engine hatch (9) and retain for reuse.

 WARNING



HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

- b. Using crane, slings and shackles, remove starboard engine hatch shipping plate (8) and place on operators cab stowage pallet (5).

NOTE

When removing engine hatch plate, gasket will remain on engine hatch.

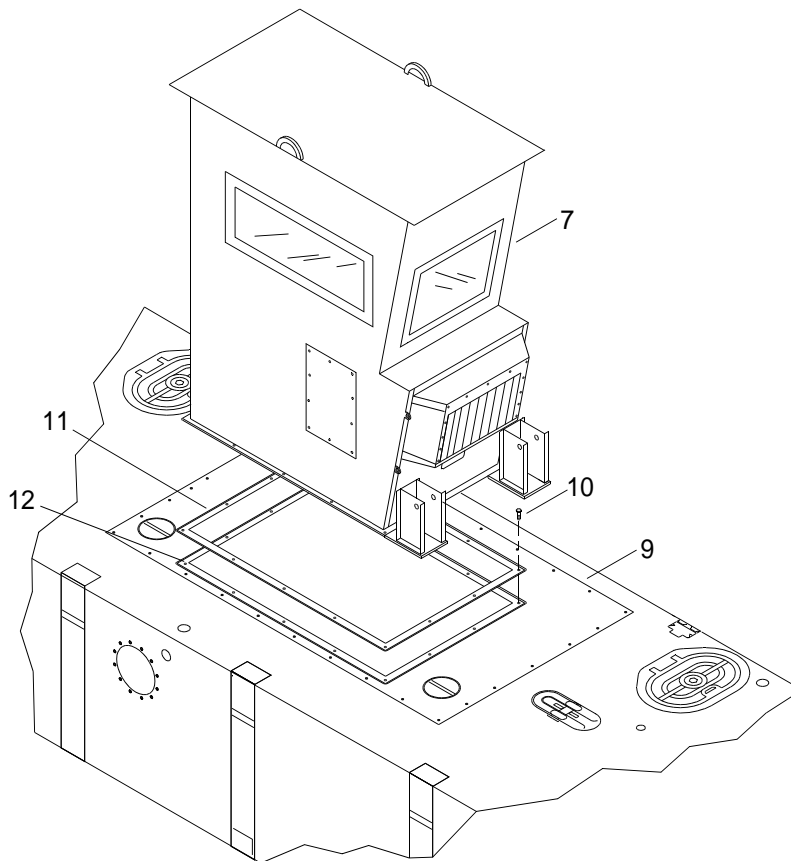
11. Inspect and remove gasket (11), if damaged.
12. Remove sling and shackle.

WARNING

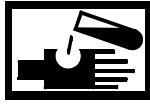
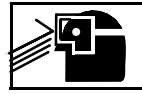
**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

13. Using crane, slings and shackles, install operators cab (7) on starboard propulsion module engine hatch (9).



WARNING

**CHEMICAL****EYE PROTECTION**

- a. Apply adhesive to lip (12) on starboard propulsion module engine hatch (9) and install new gasket (11) if gasket (11) was removed.

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

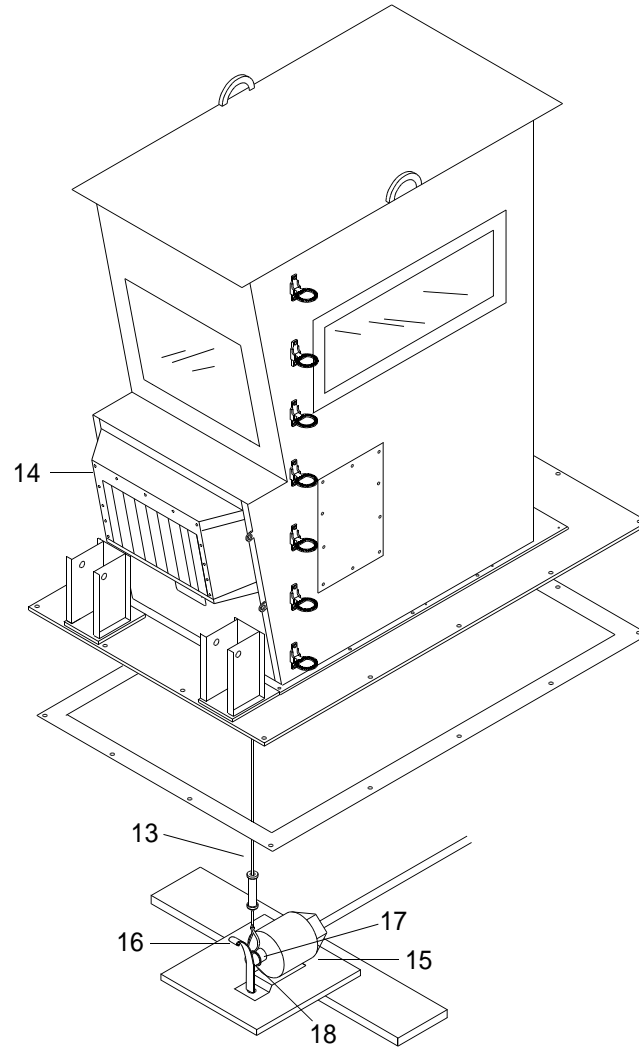
- b. Using crane, slings and shackles, align operators cab mounting holes and lower cab on engine hatch (9).

WARNING

**CHEMICAL****EYE PROTECTION**

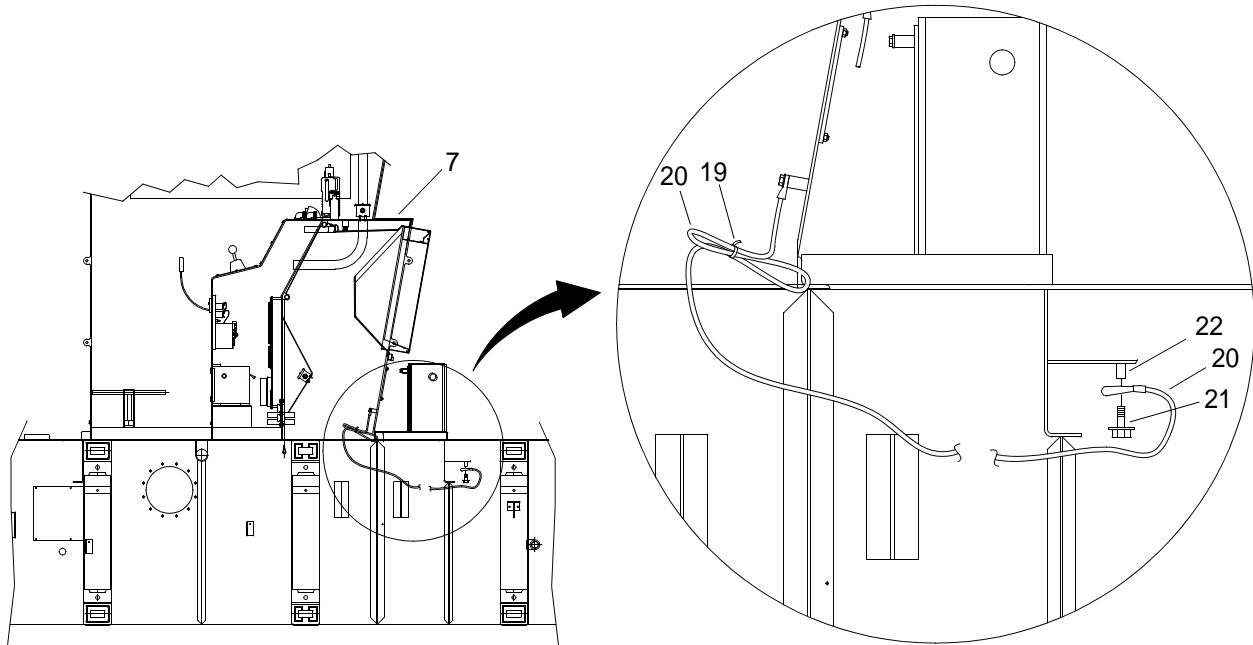
- c. Apply antiseize compound to threads of bolts (10) removed from shipping plates (8).
- d. Install bolts (10) to secure operators cab (7) to engine hatch (9).
- e. Tighten bolts (10) using cross method.
- f. Remove slings and shackles.

- g. Connect wire rope (13) in operators cab intake plenum (14) to fire suppression trip mechanism (15).



- (1) Move fire suppression solenoid spring flange (16) away from solenoid shaft (17).
- (2) Install wire rope ring (18) on fire suppression solenoid shaft (17).
- (3) Release flange (16).

h. Ground operators cab assembly (7).



- (1) Cut tie wrap (19) securing ground cable (20) to inside of operators cab (7).
- (2) Remove and discard bolt and washer (21) from propulsion module boss (22).

WARNING



EYE PROTECTION

- (3) Using a wire brush, remove all corrosion and paint from top of propulsion module boss (22).

WARNING



CHEMICAL



EYE PROTECTION

- (4) Using cleaning compound, clean top and threads of propulsion module boss (22).

WARNING



CHEMICAL



EYE PROTECTION

- (5) Apply antiseize compound to mating surfaces of propulsion module boss (22), ground cable (20) and new bolt and washer (21).

- (6) Position ground cable (20) on propulsion module boss (22).
- (7) Install bolt and washer (21) securing ground cable (20) to propulsion module boss (22) and tighten.

WARNING



CHEMICAL



EYE PROTECTION

- (8) Using wiping rag, clean off excess antiseize compound.

WARNING

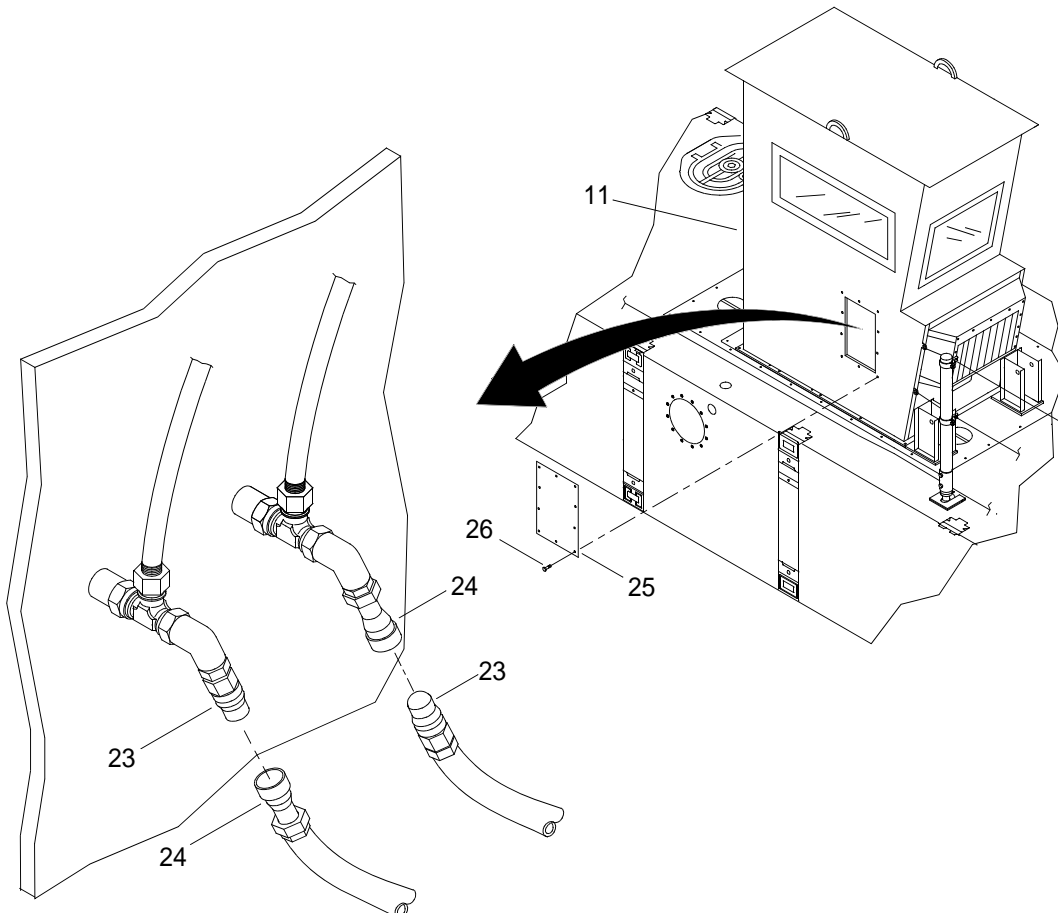


CHEMICAL

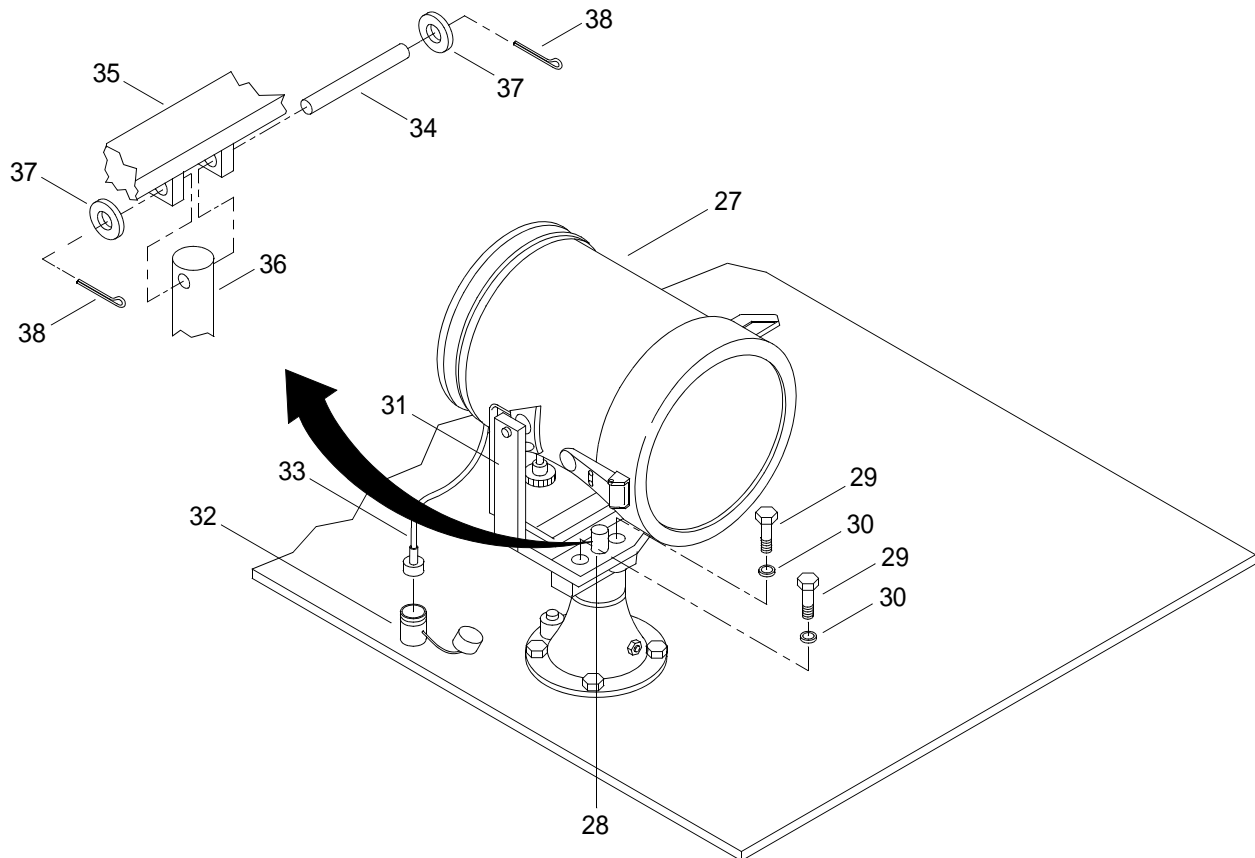


EYE PROTECTION

- (9) Apply a thin bead of sealant to terminating edges, sealing bolt and washer (21), ground cable (20) and propulsion module boss (22).
- i. Connect heating system male (23) and female (24) quick disconnect water hoses. Ensure there are no kinks in lines.



- (1) Remove operators cab side access panel (25).
 - (a) Remove bolts (26).
 - (b) Remove access panel (25).
- (2) Connect heating system male (23) and female (24) quick disconnect water hoses.
- j. Remove SINGARS antenna, spotlight and navigation bell from inside operators cab (7).
- k. Gain access to top of operators cab.
- l. Install SINGARS antenna. (TM 11-5820-890-10-8)
- m. Install operators cab spotlight (27).



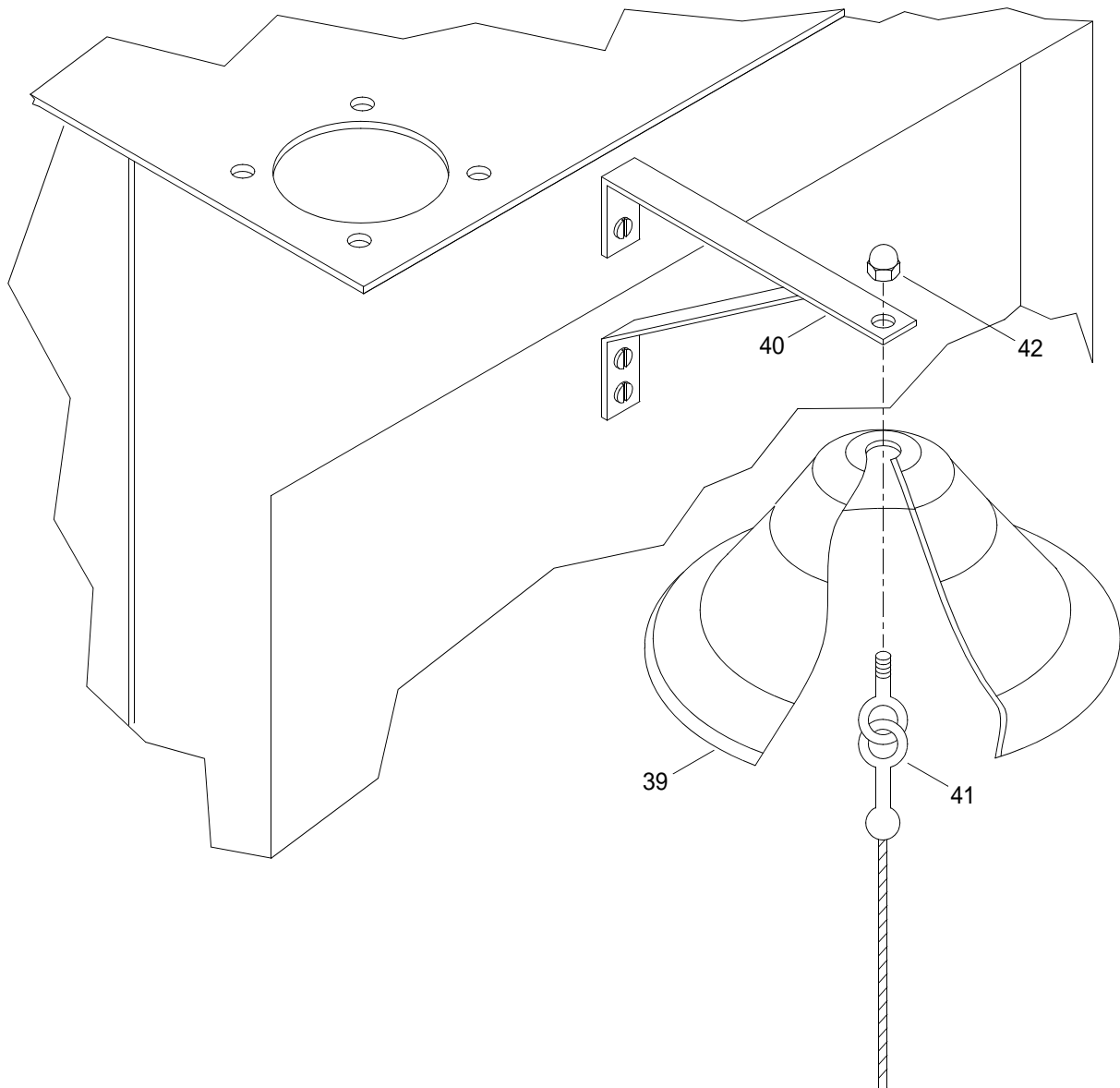
 WARNING


HEAVY PARTS

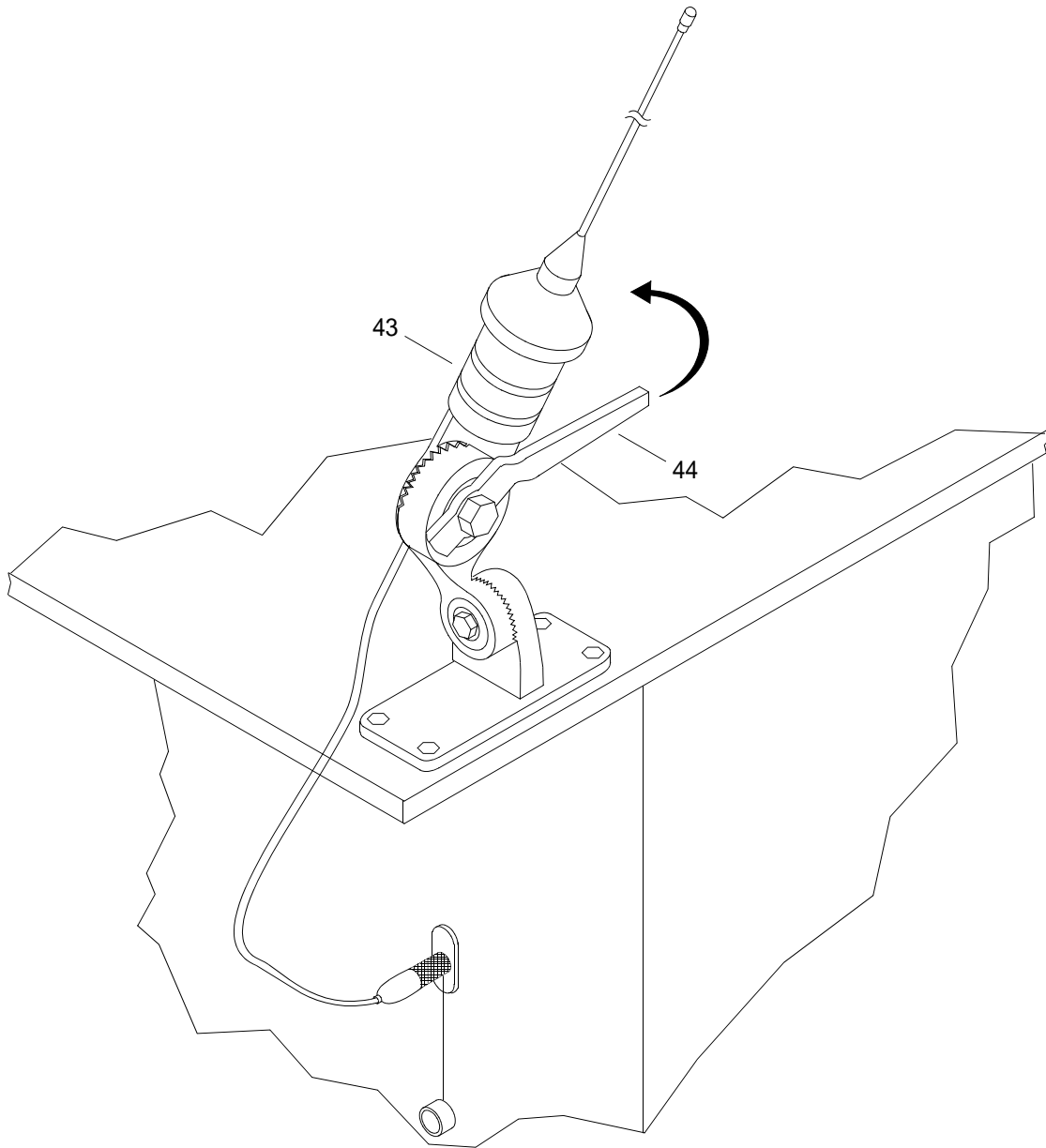
Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

- (1) Using crane, sling and shackle, position spotlight (27) on spotlight flange tube (28).

- (2) Install bolts (29) with washers (30) through spotlight harp (31) to spotlight flange tube (28).
 - (3) Tighten bolts (29).
 - (4) Remove sling and shackle.
 - (5) Remove dust cap from receptacle (32) and connect spotlight electrical connector (33).
 - (6) Install clevis pin (34) through yolk (35) and push rod (36).
 - (7) Install flat washers (37) and cotter pins (38) on ends of clevis pin (34).
- n. Install navigation bell (39).

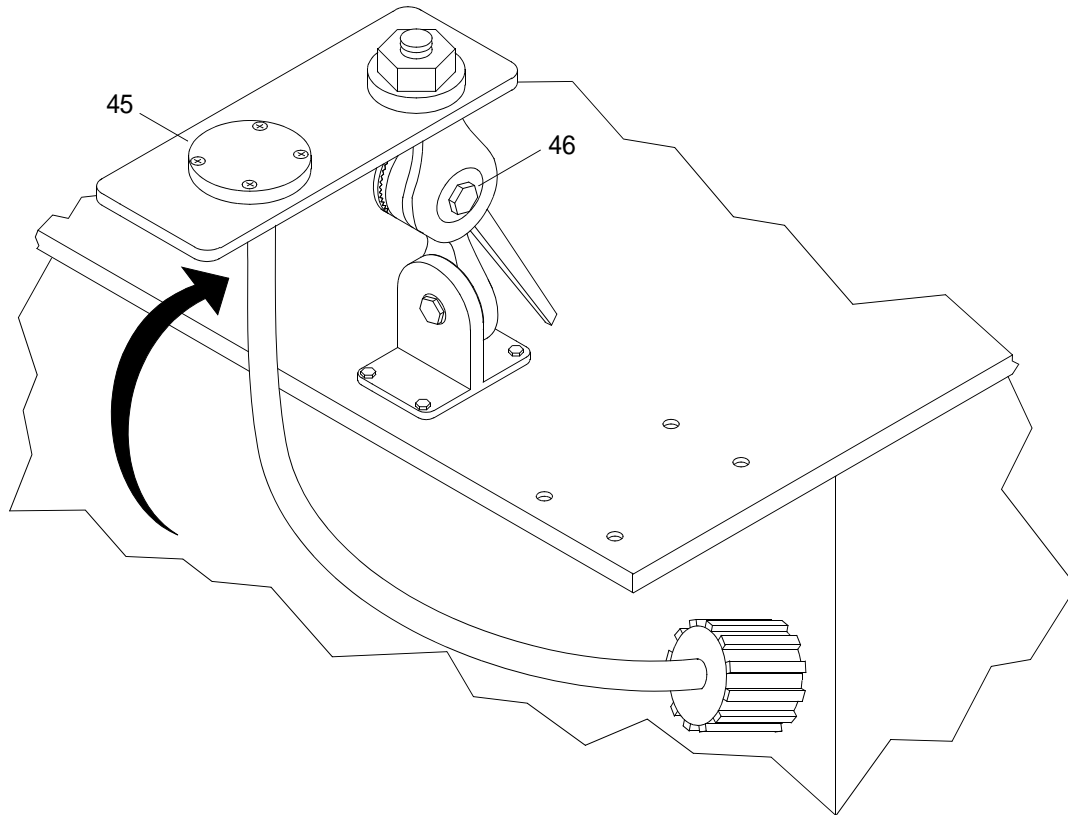


- (1) Align hole in top of navigation bell (39) with hole in mounting bracket (40).
 - (2) Install clapper bolt (41) through bell (39) and mounting bracket (40).
 - (3) Install nut (42) and tighten.
- o. Reposition VHF/FM DSC transceiver antenna (43).



- (1) Rotate handle (44) on VHF/FM DSC transceiver antenna ratchet mount counterclockwise to rotate antenna (43) to vertical position.
- (2) Rotate handle (44) on VHF/FM DSC transceiver antenna ratchet mount clockwise to secure mount.

p. Reposition GPS antenna (45).

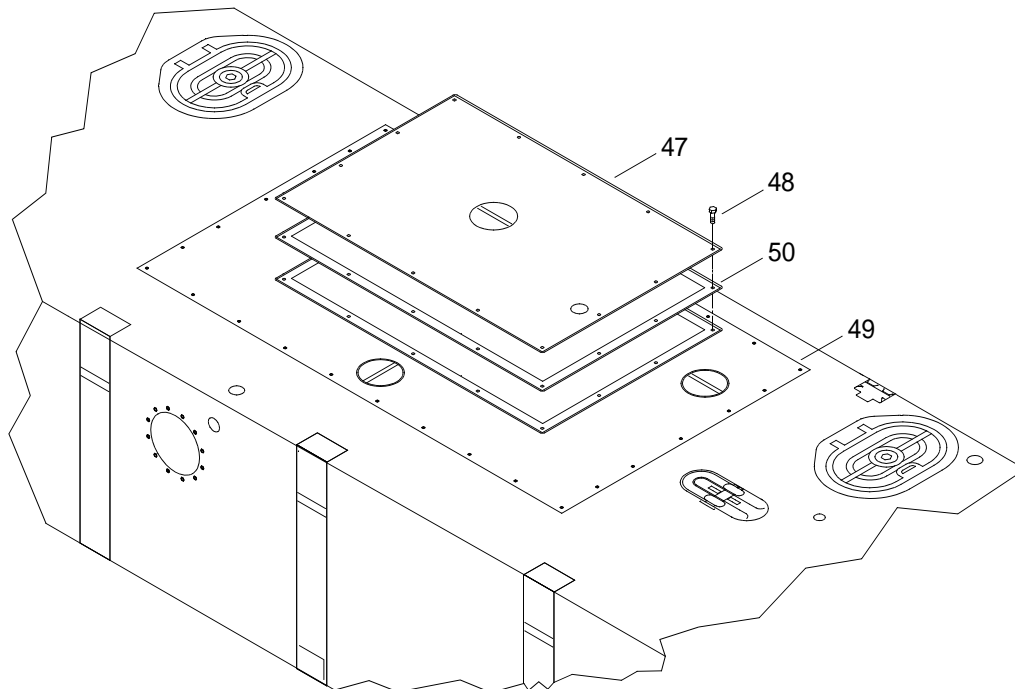


- (1) Rotate handle (46) on GPS antenna ratchet mount counterclockwise to rotate antenna mount plate to horizontal position.
- (2) Rotate handle (46) on GPS antenna ratchet mount clockwise to secure mount.

14. Place operators cab in service. (WP 0007 00)

INSTALL AIR INTAKE PLENUM

1. Remove port propulsion module engine hatch shipping plate (47).



- a. Remove bolts (48) securing shipping plate (47) to port propulsion module engine hatch (49) and retain for reuse.

WARNING

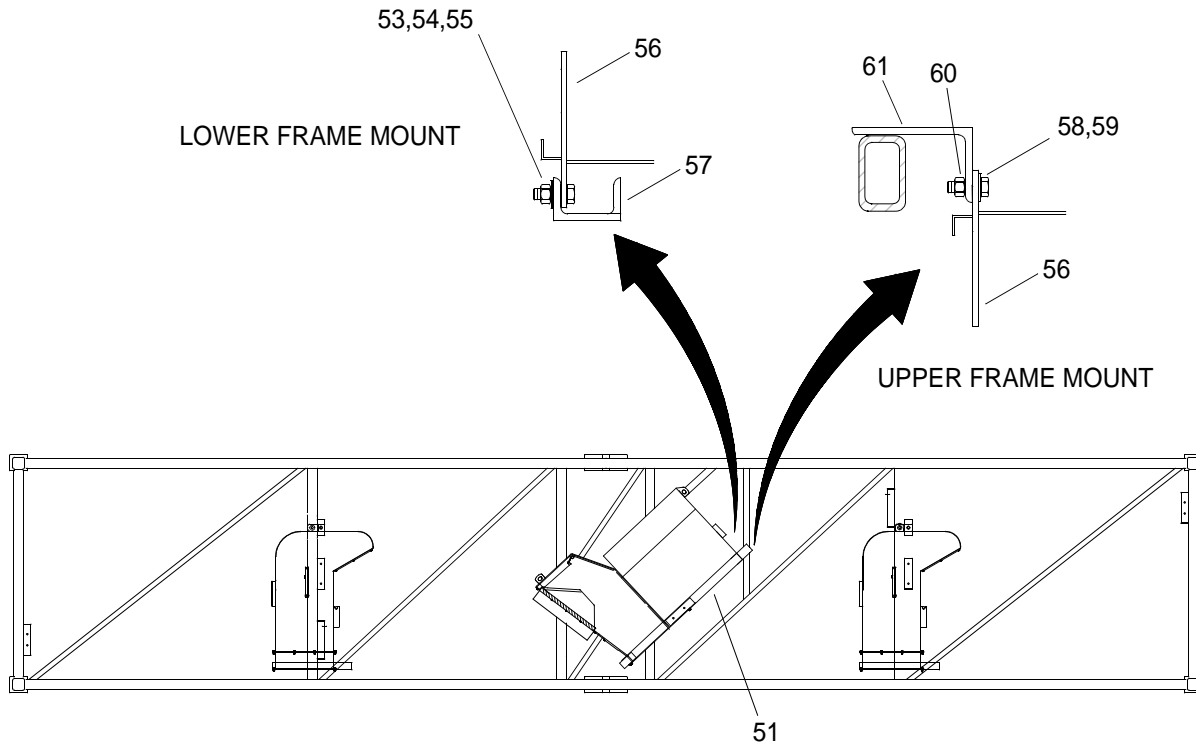
**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

- b. Using crane, sling and shackle, remove port engine hatch plate (47) and place on operators cab stowage pallet (5).
2. Remove gasket (50), if damaged.
 3. Remove sling and shackle.

4. Remove intake plenum (51) from shipping rack frame (52).



WARNING



HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

NOTE

Removal of shipping frame top crossbars will assist personnel with removal of hardware from the shipping frame.

- Remove attaching bolts (53) and shipping frame crossbar (54) from top of shipping rack frame (52).
- Using crane, slings and shackles, support intake plenum (51) in preparation of removal from shipping rack frame (52).
- Remove hex nut (53), washer (54) and hex head capscrew (55) securing base (56) of intake plenum (51) to lower weldment (57) of shipping rack frame (52).
- Remove washers (58) and hex head capscrews (59) from captive nut (60) securing base (56) of intake plenum (51) to upper weldment (61) of shipping rack frame (52).

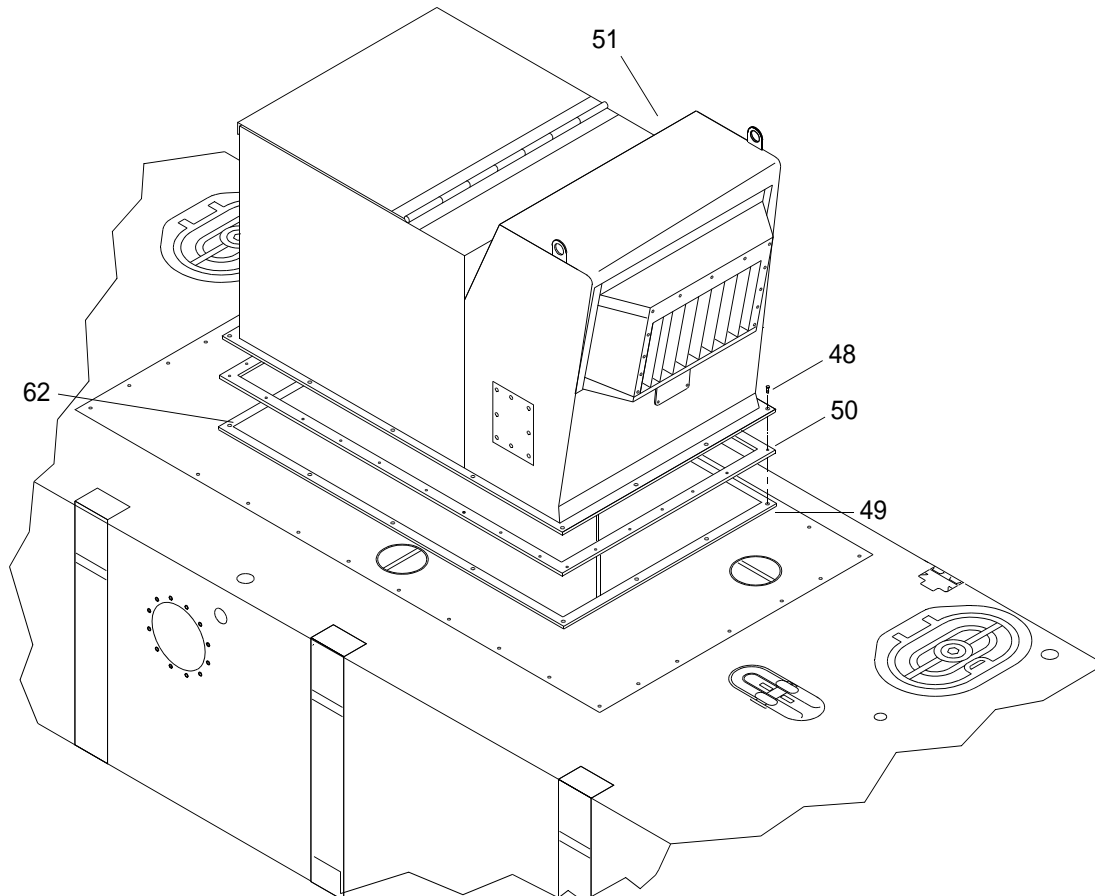
WARNING

**HEAVY PARTS**

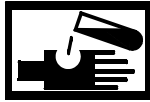
Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

- e. Using crane, slings and shackles, remove plenum (51) from shipping rack frame (52).
 - f. Install plenum mounting hardware (53, 54, 55, 58, 59) onto shipping rack frame (52).
 - g. Install attaching bolts (53) and shipping frame crossbar (54) on top of shipping rack frame (52).
5. Place intake plenum in service. (WP 0007 00)
 6. Install intake plenum (51) on port propulsion module engine hatch (49).



WARNING

**CHEMICAL****EYE PROTECTION**

- a. Apply adhesive to lip (62) of port propulsion module engine hatch (49) and install intake plenum (51) if gasket (50) was removed.

WARNING

**HEAVY PARTS**

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When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

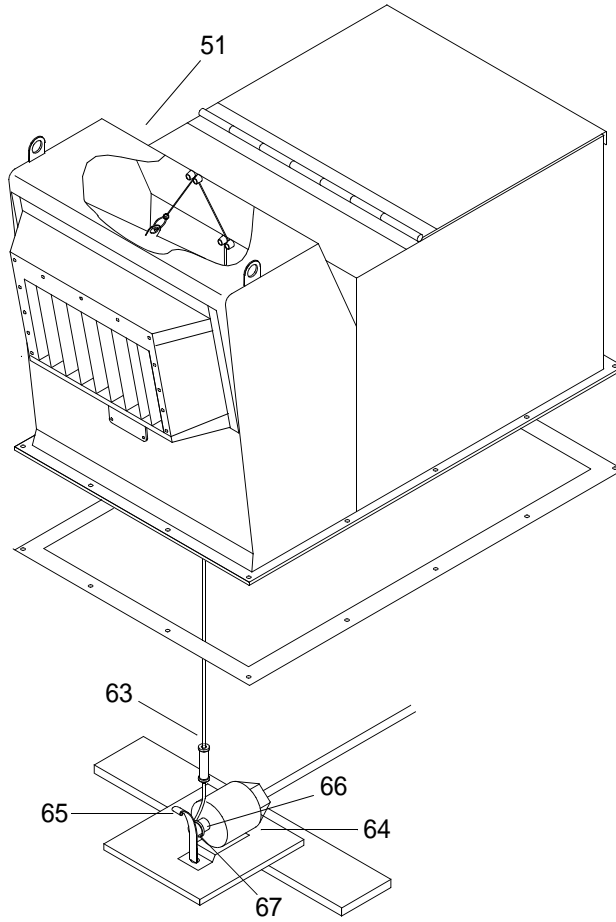
- b. Using crane, slings and shackles, align intake plenum mounting holes and lower intake plenum onto engine hatch (49).

WARNING

**CHEMICAL****EYE PROTECTION**

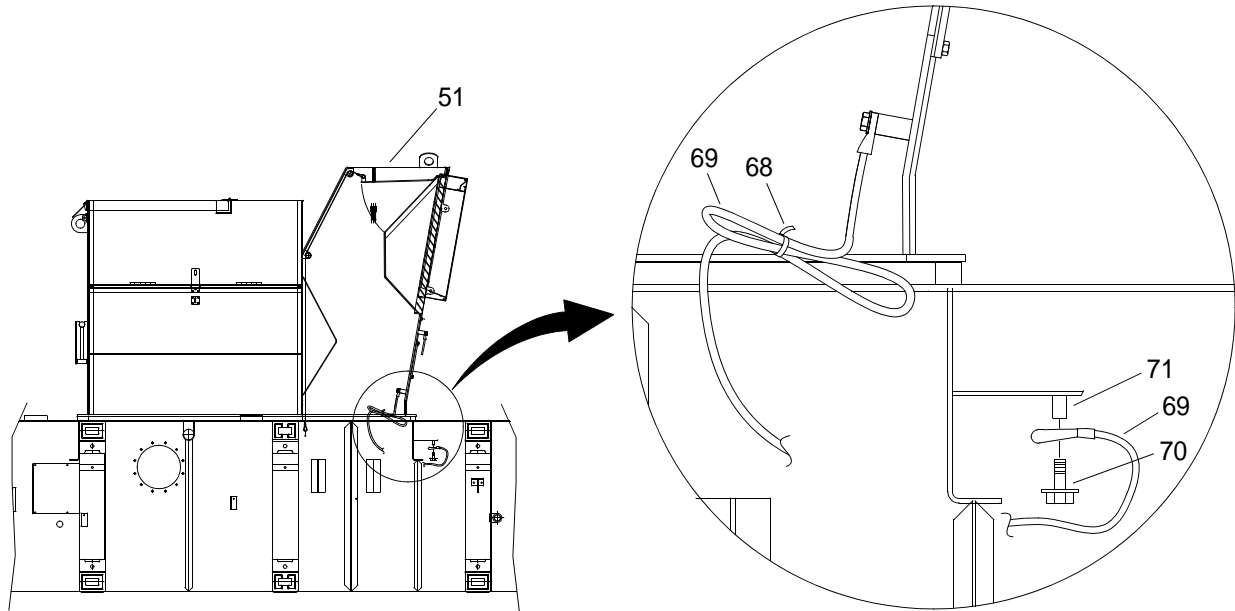
- c. Apply antiseize compound to threads of bolts (48) removed from shipping plate (47).
- d. Install bolts (48), to secure plenum (51) to engine hatch (49).
- e. Tighten bolts (48) using cross method.
- f. Remove slings and shackles.

- g. Connect wire rope (63) in intake plenum (51) to fire suppression trip mechanism (64).



- (1) Move fire suppression solenoid spring flange (65) away from solenoid shaft (66).
- (2) Install wire rope ring (67) on fire suppression solenoid shaft (66).
- (3) Release flange (65).

 h. Ground intake plenum assembly (51).



- (1) Cut tie wrap (68) securing ground cable (69) to inside of intake plenum assembly (51).
- (2) Remove and discard bolt and washer (70) from propulsion module boss (71).

 WARNING



EYE PROTECTION

- (3) Using a wire brush, remove all corrosion and paint from top of propulsion module boss (71).

 WARNING



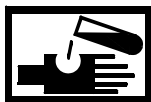
CHEMICAL



EYE PROTECTION

- (4) Using cleaning compound, clean top and threads of propulsion module boss (71).

 WARNING



CHEMICAL



EYE PROTECTION

- (5) Apply antiseize compound to mating surfaces of propulsion module boss (71), ground cable (69) and new bolt and washer (70).

-
- (6) Position ground cable (69) on propulsion module boss (71).
- (7) Install bolt and washer (70) securing ground cable (69) to propulsion module boss (71) and tighten.

WARNING



CHEMICAL



EYE PROTECTION

- (8) Using wiping rag, clean off excess antiseize compound.

WARNING



CHEMICAL

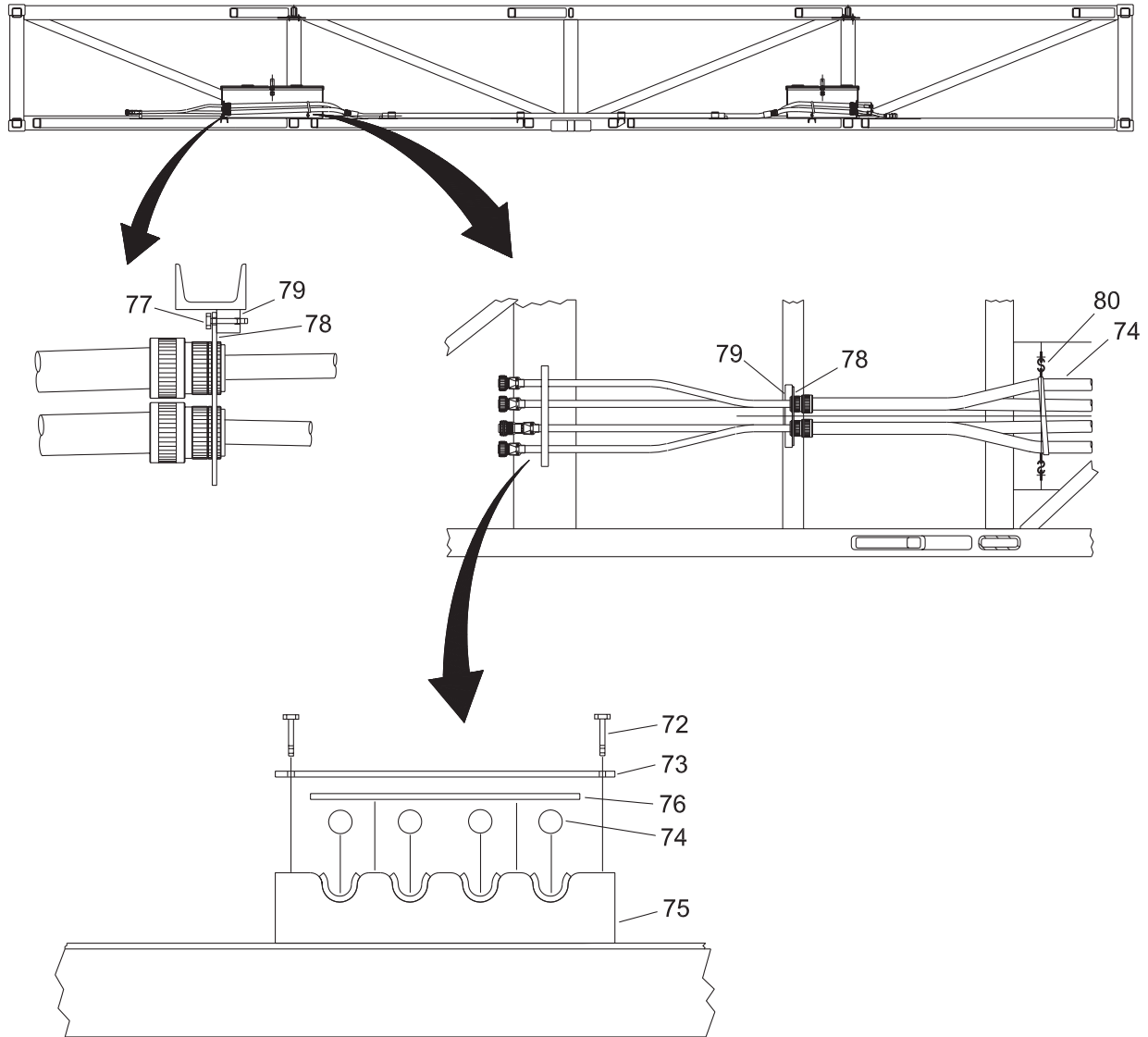


EYE PROTECTION

- (9) Apply a thin bead of sealant to terminating edges, sealing bolt and washer (70), ground cable (69) and propulsion module boss (71).

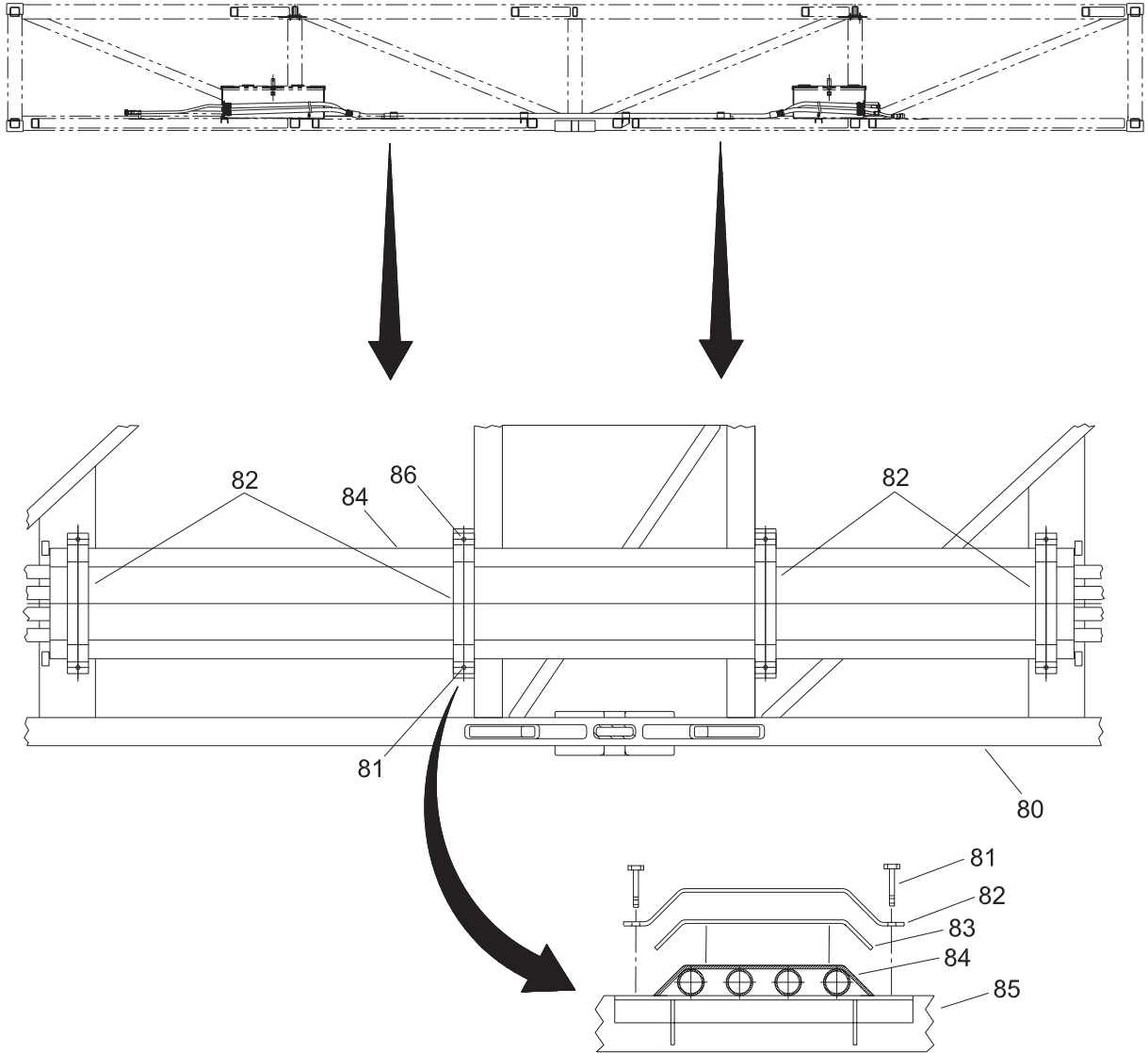
INSTALL MODULE ELECTRICAL INTERCONNECT ASSEMBLY

1. Remove bolts (72) securing metal tiedown strap (73) and interconnect assembly (74) to shipping rack frame mounting bracket (75).



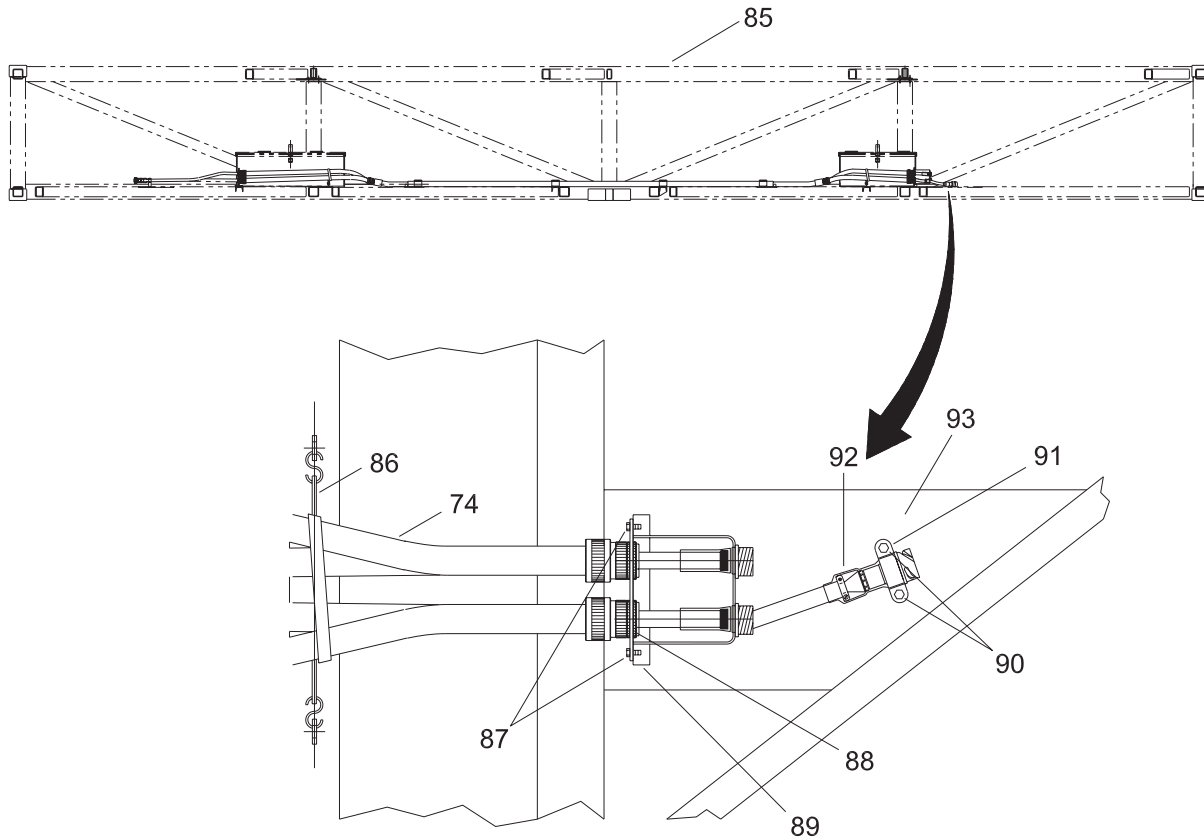
2. Remove metal tiedown strap (73).
3. Remove rubber pad (76).
4. Remove four interconnect assemblies (74) from shipping rack frame mounting bracket (75).
5. Install rubber pad (76) on shipping rack frame mounting bracket (75).
6. Position metal tiedown strap (73) on shipping rack frame mounting bracket (75).
7. Install bolts (72) securing metal tiedown strap (73) and rubber pad (76) to shipping rack frame mounting bracket (75).
8. Remove bolts (77) securing interconnect mounting plate (78) to mounting bracket (79).

9. Remove interconnect mounting plate (78) from mounting bracket (79).
10. Remove tiedown strap (80).
11. Remove bolts (81) securing four strap clamps (82), rubber pads (83) and cable guard (84) to shipping rack frame (85).



12. Remove four strap clamps (82) from rubber pads (83) and cable guard (84).
13. Remove four rubber pads (83) from cable guard (84).

14. Remove tiedown strap (86).



15. Remove bolts (87) securing interconnect mounting plate (88) to mounting bracket (89).
16. Remove interconnect mounting plate (88) from mounting bracket (89).
17. Remove bolts (90) securing strap clamp (91) and interconnect cable end (92) to shipping rack mounting plate (93).
18. Remove strap clamp (91) from interconnect cable end (92).
19. Remove interconnect cable end (92) from shipping rack mounting plate (93).

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

NOTE

Removal of shipping frame top crossbars will assist personnel with removal of hardware from the shipping frame.

20. Using crane, slings and shackles, remove interconnect assembly (74) from shipping rack frame (85).

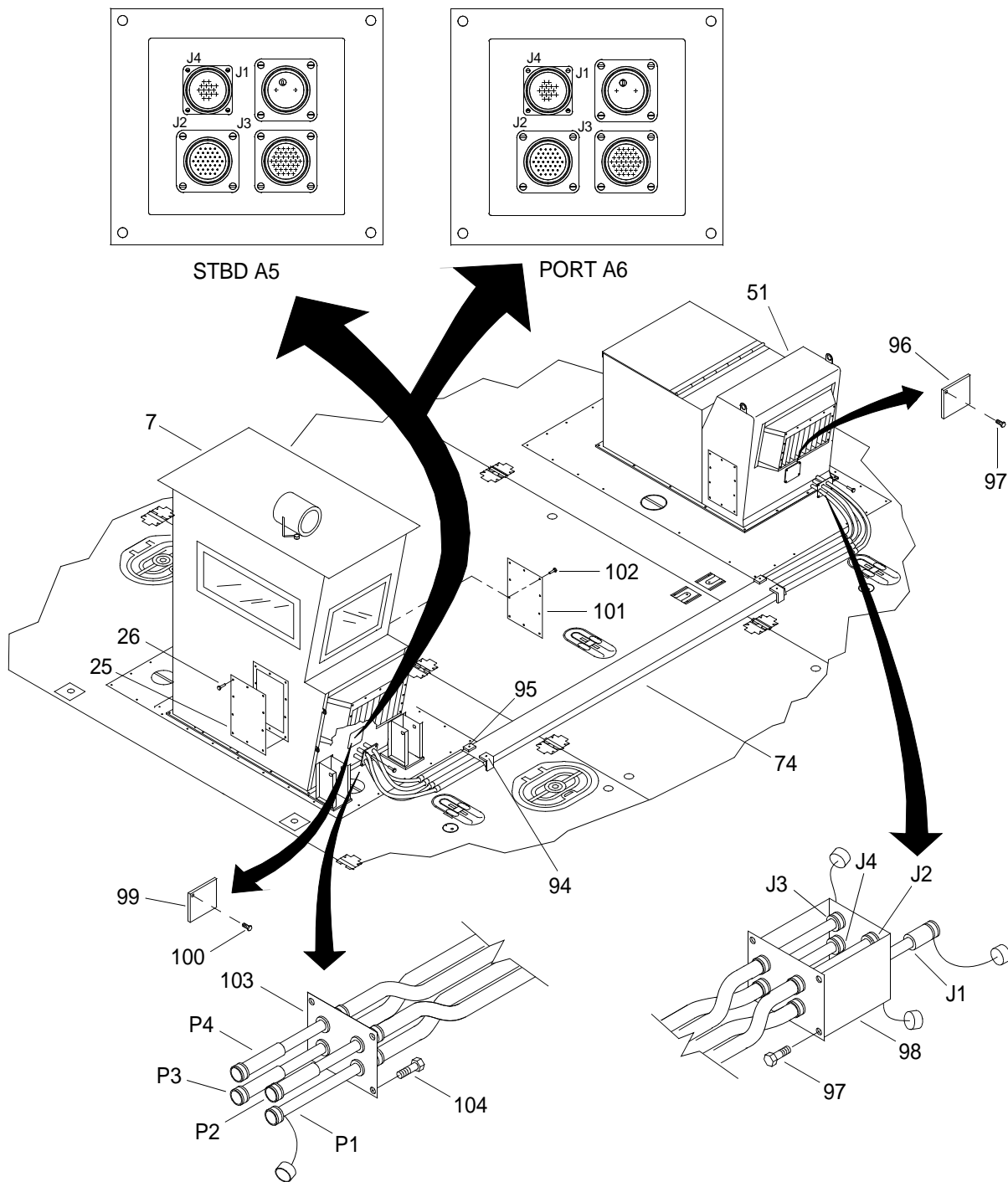
WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

21. Using crane, slings and shackles, lower interconnect assembly (74) onto WT, between operators cab (7) and intake plenum (51).



22. Remove slings and shackles.

NOTE

The forward clamp socket head capscrews are 2.00 in. long and the aft clamp socket head capscrews are 1.75 in. long.

23. Install four clamps (94) and socket head capscrews (95) to secure interconnect assembly on deck. Tighten socket head capscrews (95)

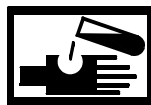
CAUTION

When installing operators cab on starboard side, interconnect cable must be connected to operators cab port receptacle (A6) to ensure operators control of port engine. Failure to make proper connection could result in damage to equipment.

When connecting interconnect cables, do not use excessive force, as damage to equipment could occur.

24. Connect interconnect cables to intake plenum receptacles.
- Remove intake plenum front access panel (96).
 - Remove bolts (97) securing front access panel (96) to intake plenum (51).
 - Remove access panel (96).
 - Insert cables into intake plenum (51) front access.
 - From below deck, connect power module cables to interconnect cable receptacles.
 - Remove dust cap and connect power module junction box A3, P2 to interconnect cable, J2.
 - Remove dust cap and connect power module junction box A3, P4 to interconnect cable, J4.
 - Remove dust cap and connect power module junction box A3, P3 to interconnect cable, J3.
 - Remove dust cap and connect power module A6, P1 to interconnect cable, J1.
 - Install conduit entry plate (98) on air intake plenum (51).
 - Align entry plate holes with holes in intake plenum (51).

WARNING

**CHEMICAL****EYE PROTECTION**

- Apply antiseize to threads of bolts (97).
- Install bolts (97) through plate (98) into intake plenum (51).
- Tighten bolts (97).

25. Connect interconnect cables to operators cab receptacle.

- a. Remove operators cab front access panel (99).
 - (1) Remove bolts (100) securing front access panel (99) to operators cab (7).
 - (2) Remove access panel (99).
- b. Remove portside operators cab side access panel (101).
 - (1) Remove bolts (102) securing side access panel (101) to operators cab (7).
 - (2) Remove access panel (101).
- c. Insert cables through operators cab (7) front access.
- d. Connect interconnect cables to operators cab PORT receptacle A6.
 - (1) Connect P2 to PORT A6, J2.
 - (2) Connect P4 to PORT A6, J4.
 - (3) Connect P3 to PORT A6, J3.
 - (4) Remove dust cap and connect P1 to PORT A6, J1.
- e. From below deck, bring power module A6, cable P1 and power module junction box A3, cables P2, P3 and P4 up through bottom of operators cab intake plenum area.
- f. Connect power module cables to STBD receptacle A5.
 - (1) Connect power module A6, P2 to STBD A5, J2.
 - (2) Connect power module A6, P4 to STBD A5, J4.
 - (3) Connect power module A6, P3 to STBD A5, J3.
 - (4) Connect power module A3, P1 to STBD A5, J1.
- g. Secure conduit entry plate (103) to operators cab (7).
 - (1) Align entry plate holes with holes in operators cab (7).

WARNING



CHEMICAL



EYE PROTECTION

- (2) Apply antiseize to threads of bolts (104).

(3) Install four bolts (104) through conduit entry plate (103) into operators cab (7).

(4) Tighten bolts (104).

h. Install both operators cab side access panels (25 and 101).

(1) Align panel (101) holes with holes in operators cab (7).

WARNING



CHEMICAL



EYE PROTECTION

(2) Apply antiseize to threads of bolts (102).

(3) Install bolts (102) through side access panel (101) into operators cab (7).

(4) Tighten bolts (102).

(5) Align panel (25) holes with holes in operators cab (7).

WARNING



CHEMICAL



EYE PROTECTION

(6) Apply antiseize to threads of bolts (26).

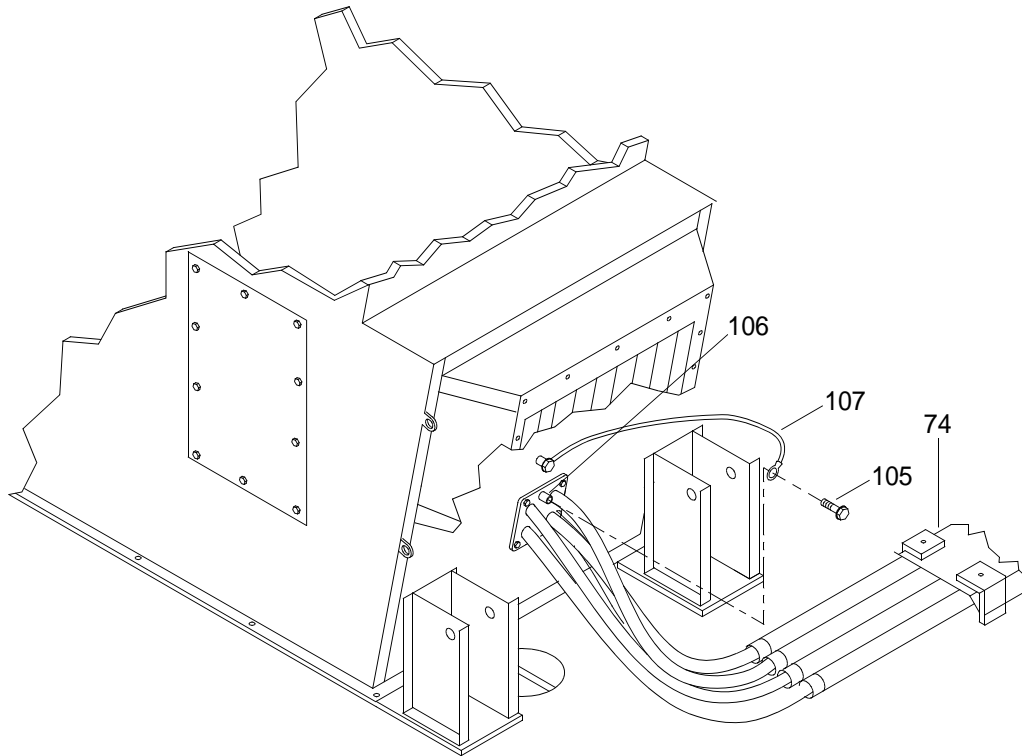
(7) Install bolts (26) through side access panel into operators cab (7).

(8) Tighten bolts (26).

NOTE

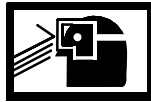
Grounding of interconnect assembly is typical for both ends of interconnect assembly.

26. Ground interconnect assembly (74).



- a. Remove and discard bolt and washer (105) from interconnect assembly boss (106).

WARNING



EYE PROTECTION

- b. Using a wire brush, remove all corrosion and paint from top of interconnect assembly boss (106).

WARNING



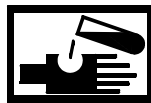
CHEMICAL



EYE PROTECTION

- c. Using cleaning compound, clean top and threads of interconnect assembly boss (106).

WARNING



CHEMICAL

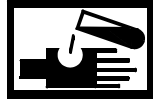


EYE PROTECTION

- d. Apply antiseize compound to mating surfaces of interconnect assembly boss (106), ground cable (107) and new bolt and washer (105).

- e. Position ground cable (107) on interconnect assembly boss (106).
- f. Install bolt and washer (105) securing ground cable (107) to interconnect assembly boss (106) and tighten.

WARNING



CHEMICAL



EYE PROTECTION

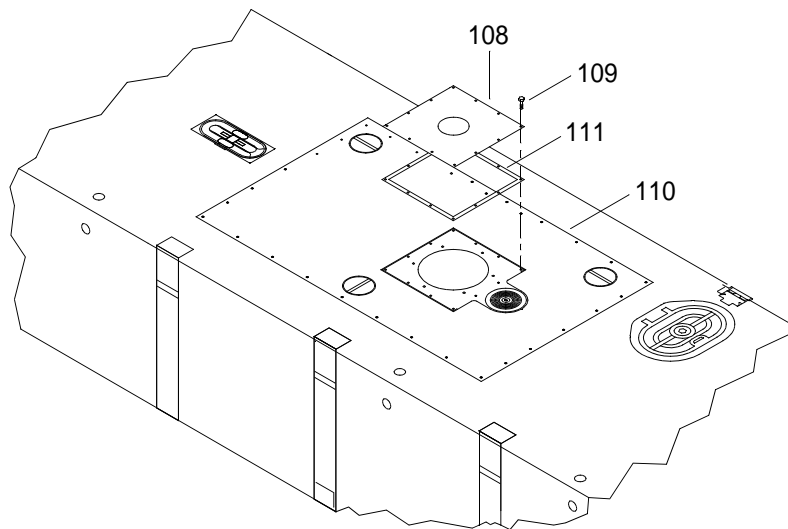
- g. Apply a thin bead of sealant to terminating edges, sealing bolt and washer (105), ground cable (107) and interconnect assembly boss (106).

INSTALL PORT AND STARBOARD EXHAUST PLENUMS

NOTE

The following procedure is typical for both port and starboard exhaust plenums installation.

1. Remove propulsion module pump-jet thruster hatch shipping plate (108).



- a. Remove bolts (109) securing shipping plate (108) to propulsion module pump-jet thruster hatch (110) and retain for reuse.

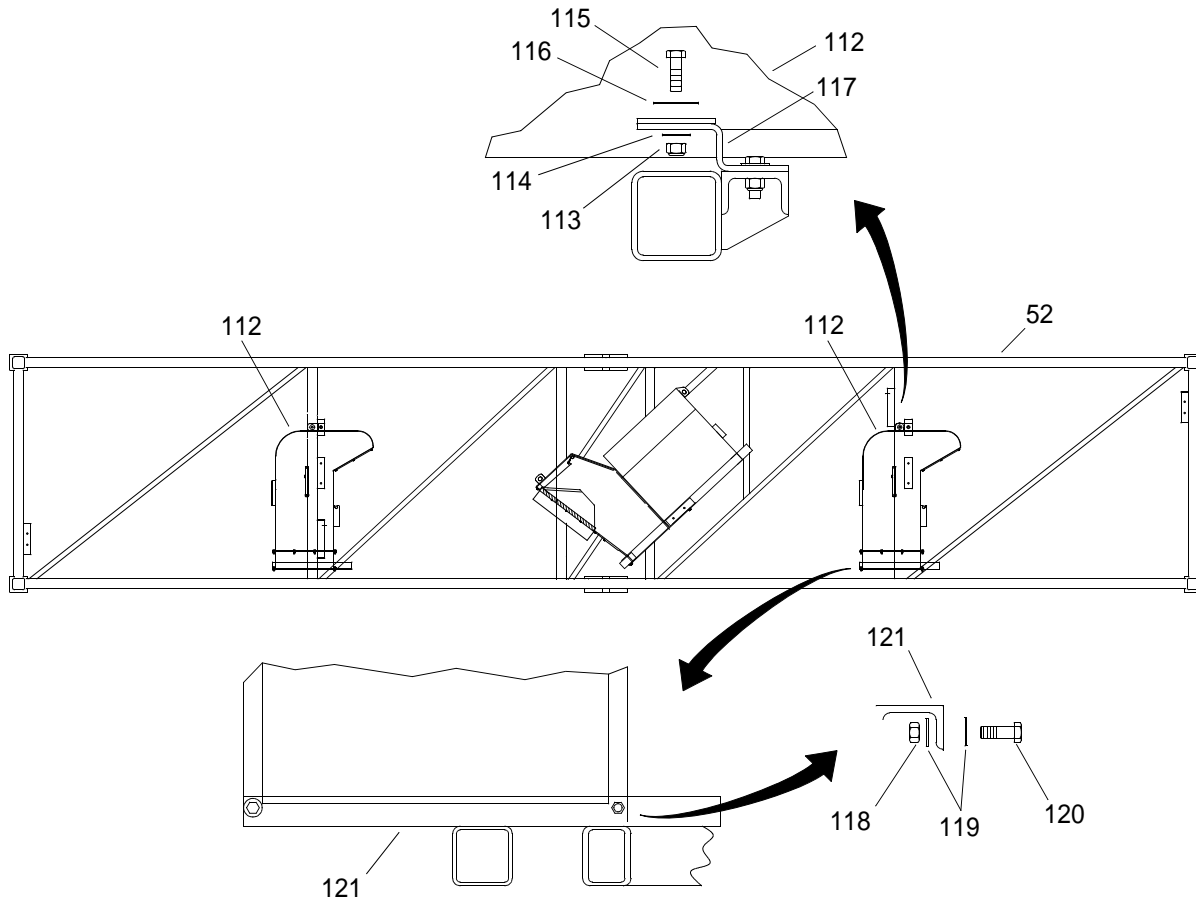
WARNING



HEAVY OBJECTS

- b. Remove port pump-jet thruster hatch shipping plate (108).
- c. Remove gasket (111), if damaged.
- d. Stow shipping plate (108) on operators cab stowage pallet (5).

2. Remove propulsion module exhaust plenum (112) from shipping rack frame (52).



WARNING



HEAVY PARTS

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When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

NOTE

Removal of shipping frame top crossbars will assist personnel with removal of hardware from the shipping frame.

- a. Using crane, slings and shackles, support propulsion module exhaust plenum (112) in preparation of removal from shipping rack (52).
- b. Remove nut (113), washer (114), bolt (115) and fender washer (116) securing top of plenum (112) to stowage frame bracket (117).

- c. Remove nuts (118), washers (119) and bolts (120) securing bottom of plenum (112) to stowage frame bracket (121).

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

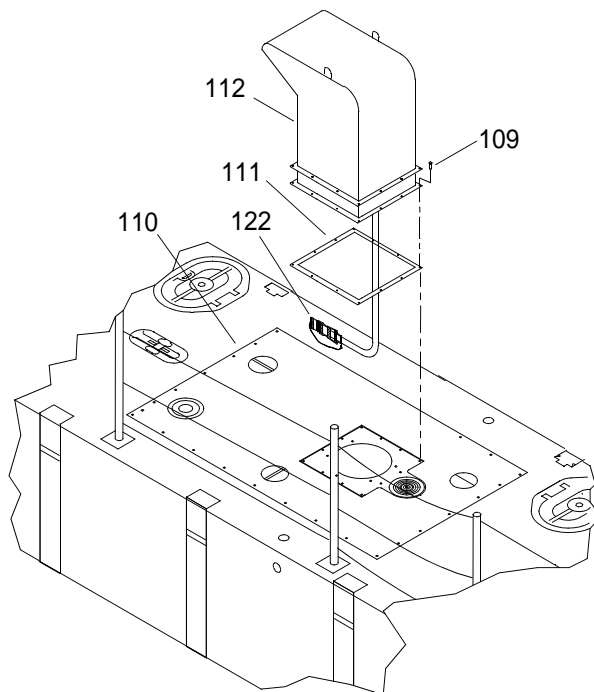
When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

- d. Using crane, slings and shackles, remove propulsion module exhaust plenum (112) from shipping rack (52).
 - e. Install exhaust plenum mounting hardware (113, 114, 115, 116, 117, 118, 119 and 120) into shipping rack frame (52).
3. Place exhaust plenum in service. (WP 0007 00)

WARNING

**HEAVY PARTS**

4. Position exhaust plenum (112), with grating facing aft, over pump-jet thruster hatch (110).



-
5. Install exhaust plenum (112) on pump-jet thruster hatch (110).
- a. Align holes in base of exhaust plenum (112) with holes in pump-jet thruster hatch (110).

WARNING



CHEMICAL



EYE PROTECTION

- b. Apply adhesive and install new gasket (111), if removed.

WARNING



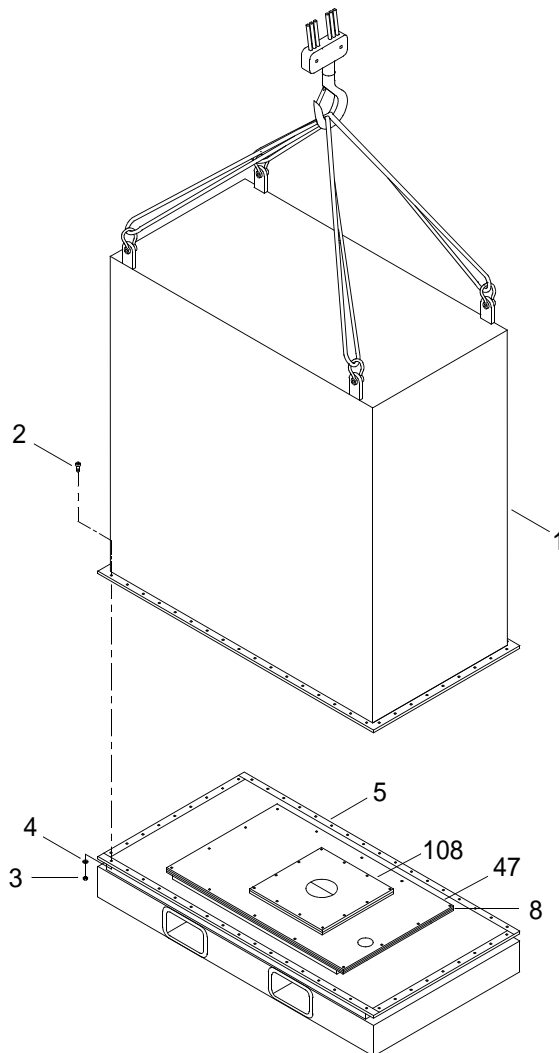
CHEMICAL



EYE PROTECTION

- c. Apply antiseize compound to threads of bolts (109) removed from shipping plate (108).
- d. Install bolts (109) through exhaust plenum (112) into holes in pump-jet thruster hatch (110).
- e. Tighten bolts (109).
- f. Remove slings and shackles.
6. Connect exhaust plenum fan cable (122) to vent fan relay enclosure A8.

7. Attach slings and shackles to operators cab container lid (1).



WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

8. Using crane, slings and shackles, place operators cab container lid (1) over shipping plates (8, 47 and 108) on stowage pallet (5).
9. Install bolts (2), hex nuts (3) and lock washers (4) securing operators cab container lid (1) to operators cab stowage pallet (5).
10. Remove slings and shackles from operators cab container lid (1).

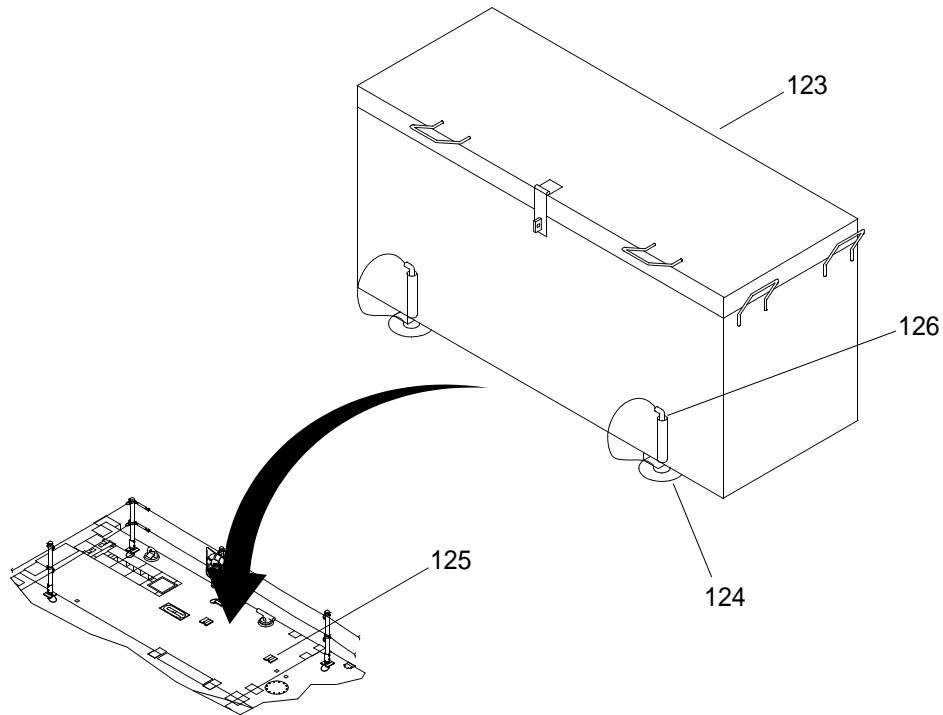
INSTALL DECK BOX ASSEMBLY

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

1. Using crane, slings and shackles, position deck box assembly (123) on deck to WT.

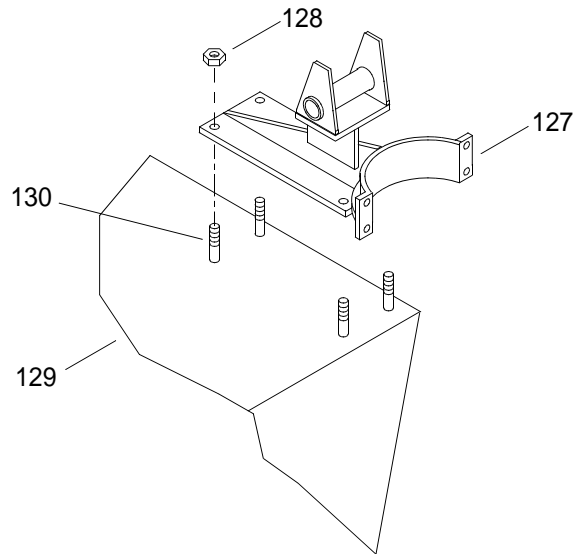
**NOTE**

The retaining pins are stored in tubes on the outside of the deck box assembly.

2. Slide inboard feet (124) of deck box assembly (123) into deck fittings (125) and secure with pins (126).
3. Remove slings and shackles from deck box assembly (123).

INSTALL MAIN ASSEMBLY MAST MOUNT ON ROOF OF OPERATORS CAB

1. Remove main assembly mast mount (127) and hex nuts (128) from BII container.



2. Gain access to roof of operators cab (129).
3. Position main assembly mast mount (127) over studs (130) on roof of operators cab (129).
4. Install hex nuts (128) to secure main assembly mast mount (127) to roof of operators cab (129). Tighten hex nuts (128).

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
STUB ASSEMBLY MAST
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
 Goggles, Industrial: Clear Lens, Chipping (Cabinet B4) (Item 35, WP 0112 00)

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)
 Gloves, Rubber Industrial (Item 26, WP 0114 00)
 Battery, Nonrechargeable (Item 7, WP 0114 00)

Personnel Required

Seaman 88K (2)

Equipment Condition

Warping Tug Abovedeck Equipment Installed. (WP 0019 00)

PREPARATION FOR USE - INSTALLATION OF STUB ASSEMBLY MAST

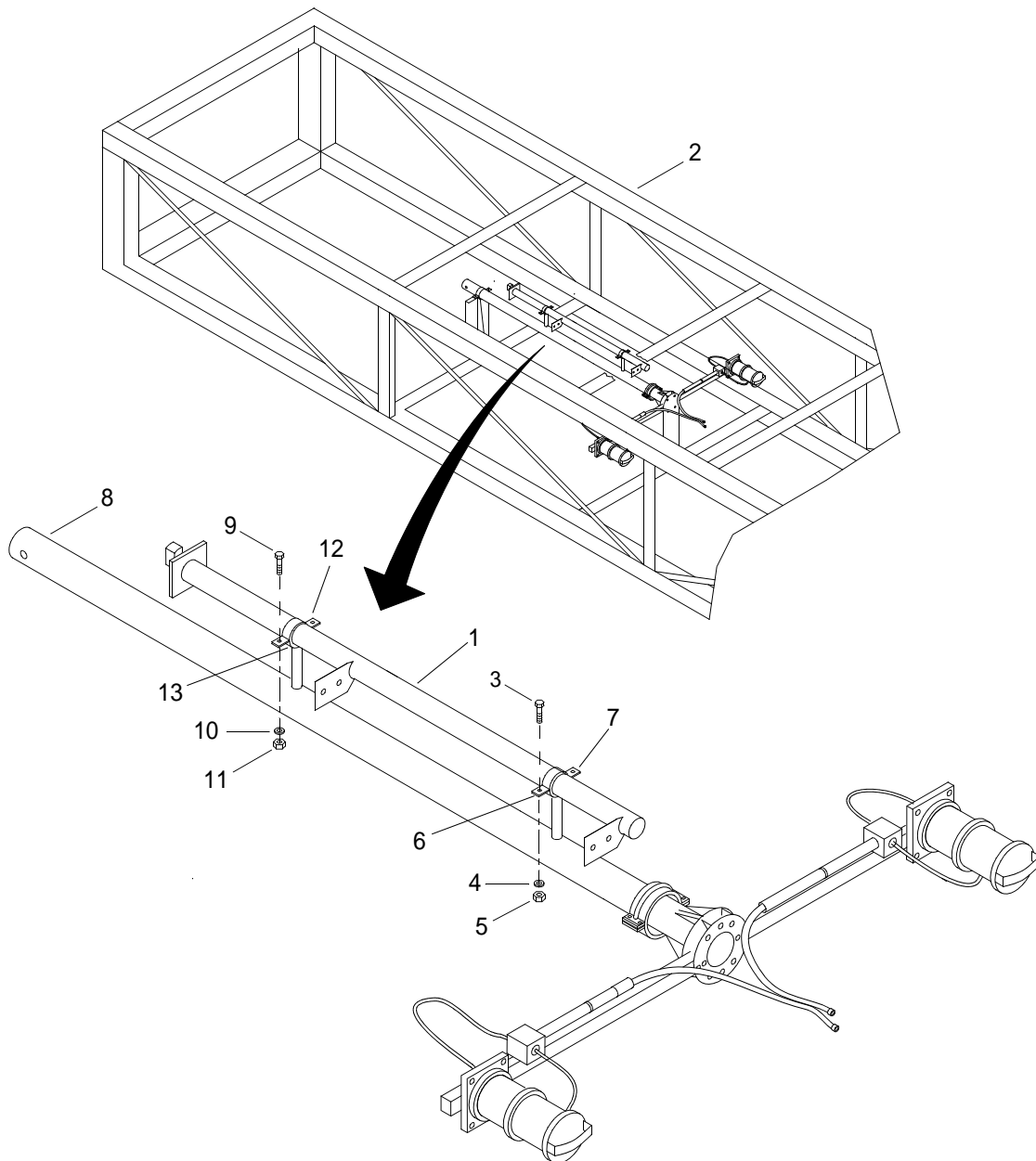
WARNING

**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

INSTALL STUB ASSEMBLY MAST

1. Remove stub assembly mast (1) from shipping frame (2).



- a. Remove two bolts (3), washers (4) and nuts (5) from clamp halves (6 and 7) attaching upper end of stub assembly mast (1) to lower main assembly mast (8).
- b. Remove two bolts (9), washers (10) and nuts (11) from clamp halves (12 and 13) attaching lower end of stub assembly mast (1) to lower main assembly mast (8).

WARNING



HEAVY OBJECTS

- c. Using assistant, remove stub assembly mast (1) from shipping frame (2).

d. Install clamp half (7) on clamp half (6) on lower main assembly mast shipping fixture.

(1) Align removable clamp half (7) holes with fixed clamp half (6) holes.

(2) Install two bolts (3), washers (4) and nuts (5).

(3) Tighten nuts (5).

e. Install clamp half (12) on clamp half (13) on lower main assembly mast shipping fixture.

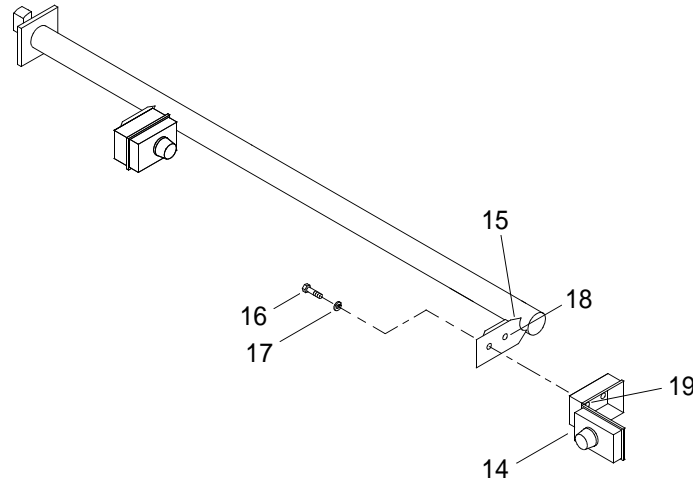
(1) Align removable clamp half (12) holes with fixed clamp half (13) holes.

(2) Install two bolts (9), washers (10) and nuts (11).

(3) Tighten nuts (11).

2. Remove both stub assembly mast lights (14) with mounting hardware and eight 6 VDC batteries from BII container.

3. Position both stub assembly mast lights (14) on stub assembly mast light mounting plates (15).



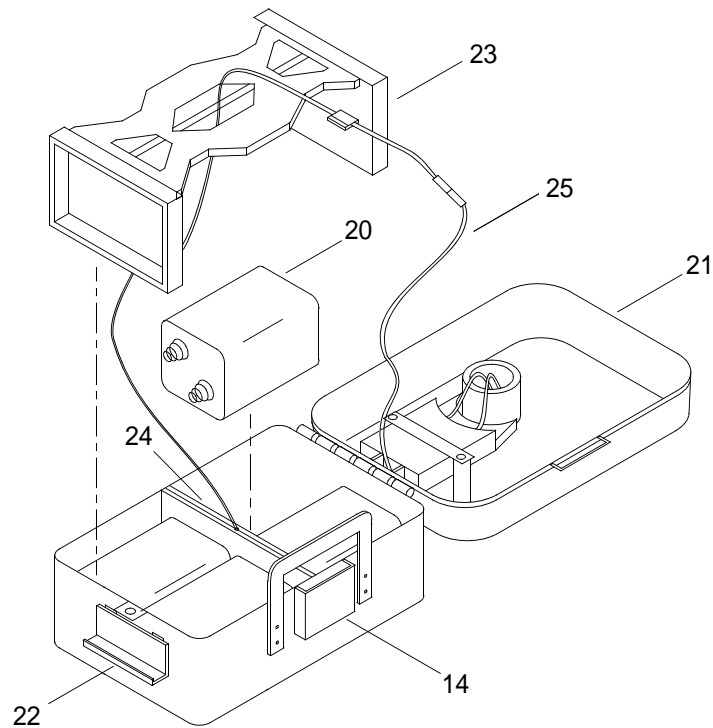
4. Install hex head capscrews (16) and lock washers (17) through holes (18) in stub assembly mast light mounting plates (15) into inserts (19) inside assembly mast lights (14) to secure assembly mast lights (14) to stub assembly mast light mounting plates (15). Tighten hex head capscrews (16).

5. Place stub assembly mast (1) in service. (WP 0007 00)

NOTE

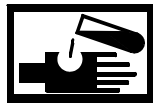
These steps are typical for installing the batteries in both stub assembly mast lights.

6. Install batteries (20) in stub assembly mast light (14).

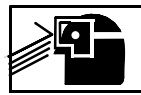


- a. Open light cover (21) by unlatching clasp (22).
- b. Remove battery bracket (23).
- c. Remove conductor plate (24).

WARNING



CHEMICAL



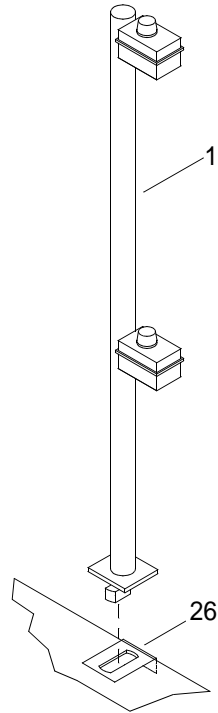
EYE PROTECTION

- d. Position four batteries (20) in stub assembly mast light (14).
- e. Install conductor plate (24).
- f. Install battery bracket (23).
- g. Position wire (25) away from edges of stub assembly mast light (14).
- h. Close light cover (21) and latch clasp (22).

WARNING

**HEAVY OBJECTS**

7. Position stub assembly mast (1) at mounting location on aft starboard side of end rake ISO fitting (26).



8. Insert base of the stub assembly mast (1) into corner ISO fitting (26).
9. Rotate stub assembly mast (1) 90° to lock into ISO fitting (26) with stub assembly mast (1) aimed aft.
10. Operate stub assembly mast lights by positioning switch(s) to on. (WP 0006 00)

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
MAIN ASSEMBLY MAST
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
Goggles, Industrial: Clear Lens, Chipping (Cabinet B4) (Item 35, WP 0112 00)
Sling, Endless: 8400LB, 20' Yellow (Cabinet A9) (Item 82, WP 0112 00)
Qty 2
Shackle: 3/4", 4.75 Ton (Cabinet B7) (Item 71, WP 0112 00)
Qty 2

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)
Gloves, Rubber Industrial (Item 26, WP 0114 00)
Lumber, Softwood, Dimension (Item 43, WP 0114 00)
Qty 4
SST Bolt and SST Washer (Item 53, WP 0114 00)
Sealant, Gasket (Item 51, WP 0114 00)
Cleaning Compound, Solvent (Item 11, WP 0114 00)
Antiseize Compound (Item 3, WP 0114 00)
Rag, Wiping (Item 48, WP 0114 00)

Personnel Required

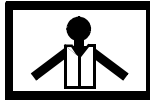
Seaman 88K (2)

Equipment Condition

Stub Assembly Mast Installed. (WP 0020 00)

PREPARATION FOR USE - INSTALL MAIN ASSEMBLY MAST

WARNING



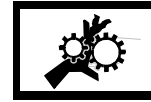
VEST



HELMET PROTECTION



HEAVY PARTS



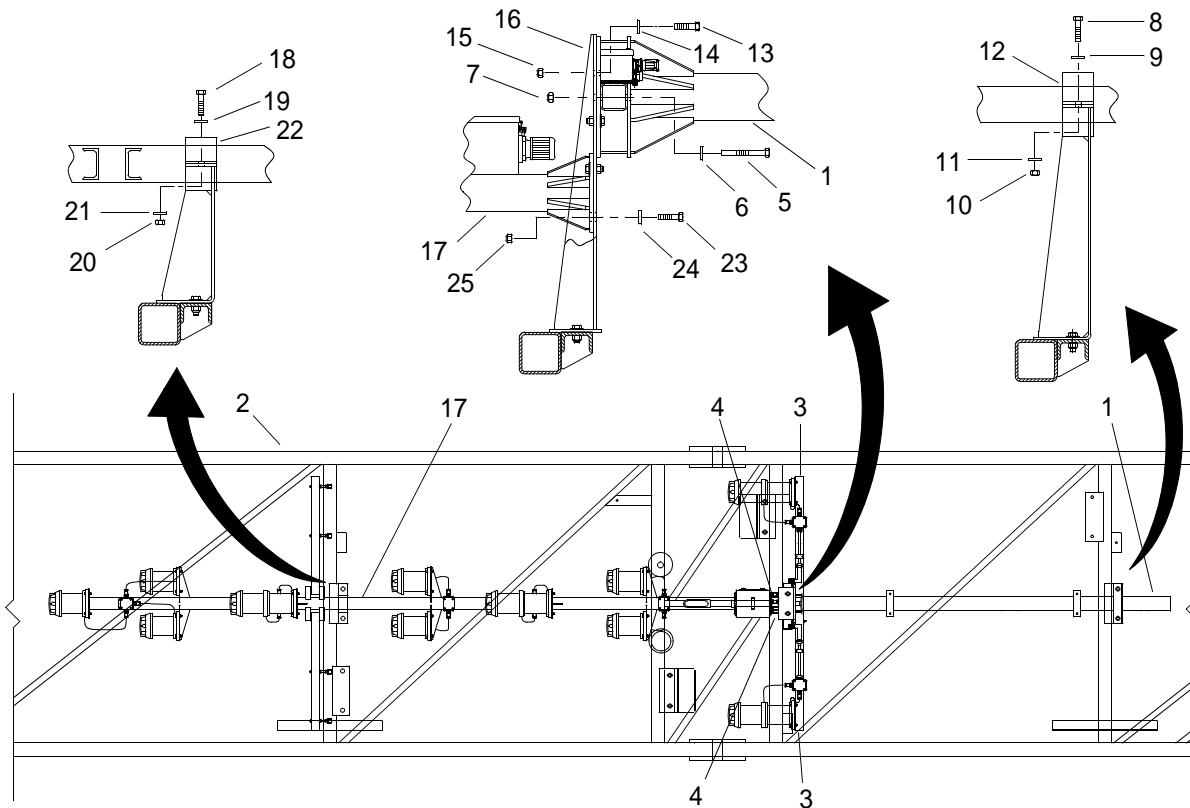
MOVING PARTS

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

Attempting to assemble WT in higher sea conditions than Sea State 0 could cause injury or possible death to personnel and/or damage equipment.

ASSEMBLE MAIN ASSEMBLY MAST

1. Inspect chains, slings and shackles. (WP 0007 00)
2. Remove lower main assembly mast (1) from shipping frame (2).



NOTE

This step is typical for removal of both port and starboard yardarms.

- a. Remove lower main assembly mast yardarm (3).
 - (1) Remove yardarm electrical cable connector (4).
 - (2) Remove bolts (5), washers (6) and nuts (7) securing lower main assembly mast yardarm (3) to lower main assembly mast (1). Retain hardware for installation of yardarms during assembly.
 - (3) Remove yardarm (3).
- b. Remove bolts (8), washers (9), nuts (10) and washers (11) securing upper end of lower main assembly mast (1).
- c. Remove upper clamp half (12).

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

NOTE

Removal of shipping frame top crossbars will assist personnel with removal of hardware from the shipping frame.

- d. Using crane, slings and shackles to support lower main assembly mast (1), remove bolts (13), washers (14) and nuts (15) securing base of lower main assembly mast (1) to stowage frame bracket (16).

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

- e. Using crane, slings and shackles, remove lower main assembly mast (1) from shipping frame (2) and position on shoring blocks for assembly.

-
- f. Remove slings and shackles.
3. Remove upper main assembly mast (17) from shipping frame (2).
 - a. Remove bolts (18), washers (19), nuts (20) and washers (21) securing upper end of upper main assembly mast (17).
 - b. Remove upper clamp half (22).

WARNING



HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

NOTE

Removal of shipping frame top crossbars will assist personnel with removal of hardware from the shipping frame.

- c. Using crane, slings and shackles to support upper main assembly mast (17), remove bolts (23), washers (24) and nuts (25) securing upper main assembly mast (17).

WARNING



HEAVY PARTS

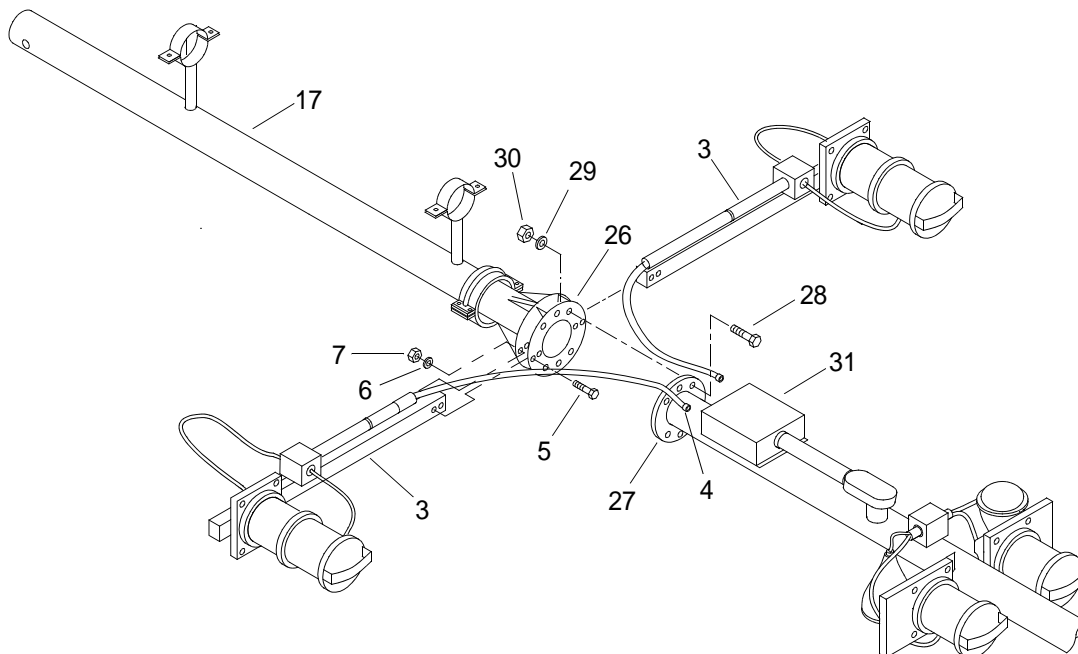
Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

- d. Using crane, slings and shackles, remove upper main assembly mast (17) from shipping frame (2) and position on shoring blocks for assembly.
- e. Remove slings and shackles.
- f. Install upper clamp (12) on shipping frame (2) using bolts (8), washers (9), nuts (10) and washers (11).
- g. Install upper clamp (22) on shipping frame (2) using bolts (18), washers (19), nuts (20) and washers (21).

4. Assemble main assembly mast.

- a. Align holes in lower main assembly mast weldment (26) with holes in upper main assembly mast weldment (27).



- b. Install bolts (28), washers (29) and nuts (30) to secure upper main assembly mast weldment (26) to lower main assembly mast weldment (27). Do not tighten nuts (30).

NOTE

This step is typical for installation of both port and starboard yardarms.

- c. Install lower main assembly mast yardarm (3).
- (1) Position lower main assembly mast yardarm (3) into lower main assembly mast weldment (26).
 - (2) Align holes and position bolts (5) through lower main assembly mast weldment (26) and lower main assembly mast yardarm (3).
 - (3) Install washers (6) and nuts (7) on bolts (5). Tighten all nuts (7 and 30).
 - (4) Connect yardarm electrical cable connectors (4) to assembly mast junction box (31).

5. Place main assembly mast in service. (WP 0007 00)

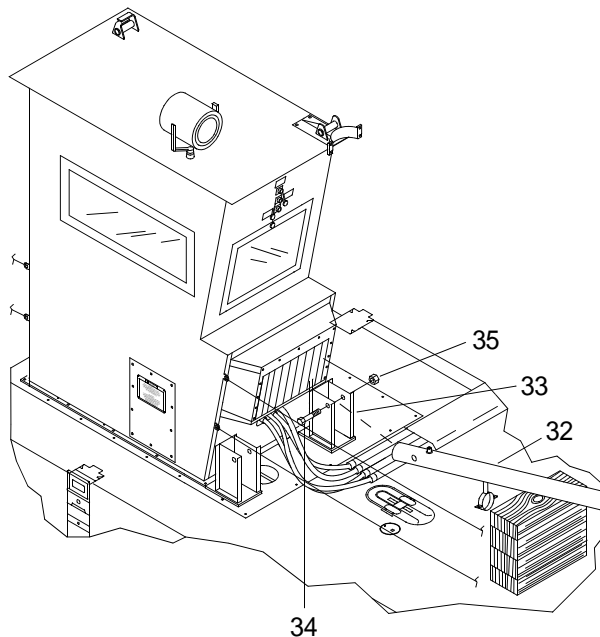
WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

- Using crane, sling and shackle, lift main assembly mast (32) and position base into deck holder (33).



- Align holes in base of main assembly mast (32) with holes in deck holder (33).

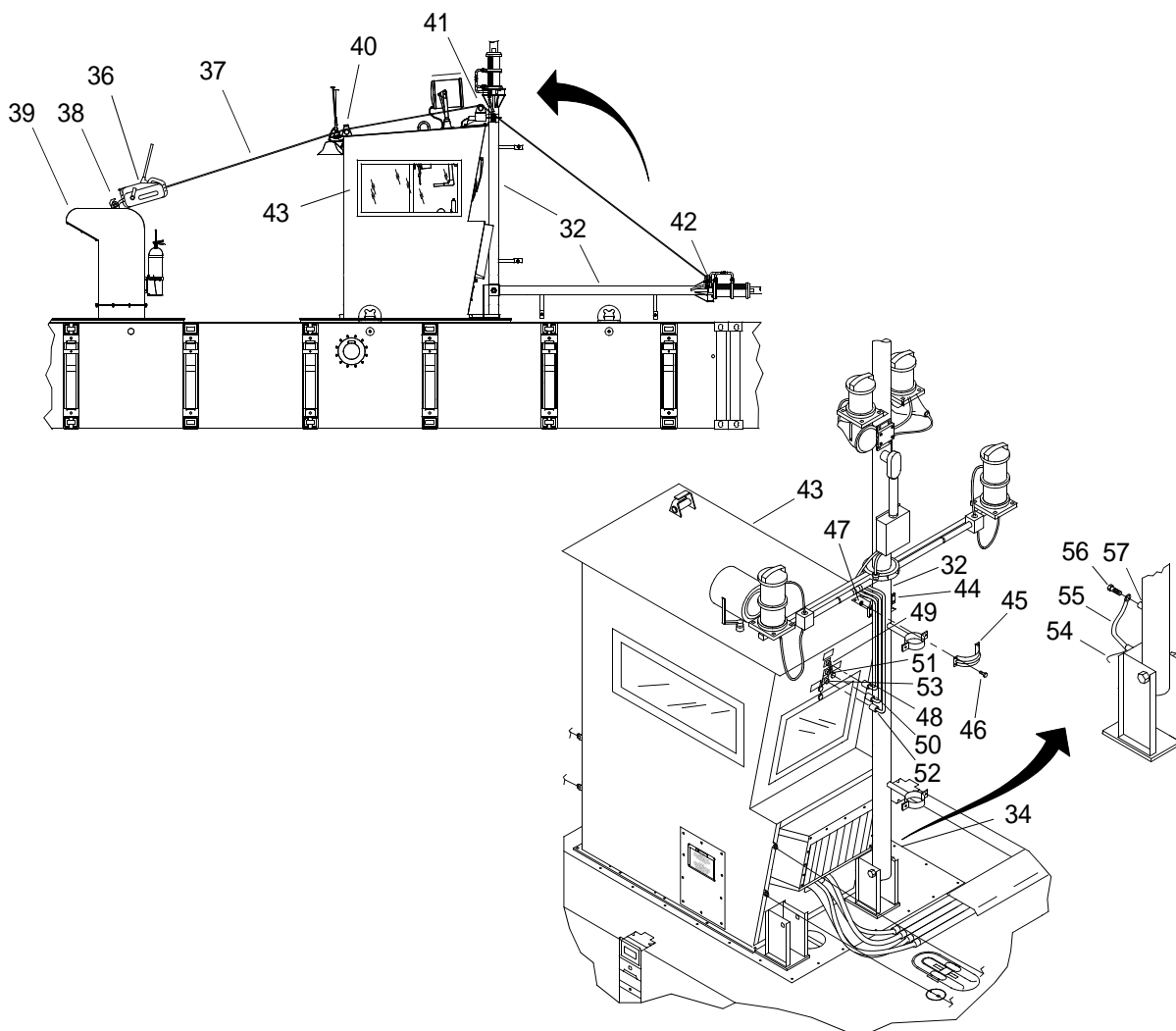
NOTE

The main assembly mast base nut and bolt are stored in the BII container.

- Install bolt (34) and hex nut (35). Do not tighten hex nut (35).
- Support main assembly mast (32) with shoring blocks.

RAISE MAIN ASSEMBLY MAST MANUALLY

1. Install cable hoist (36) and cable (37).



- a. Attach cable hoist (36) on inboard lifting bracket (38) of starboard exhaust plenum (39).
- b. Route cable (37) through flanges on aft guide (40) and over forward guide (41).

WARNING**HEAVY PARTS**

Ensure shackle is attached to mast with threaded pin bottomed out on shackle and safety catch on wire rope cable hook is fully engaged around shackle. Failure to comply could result in death or injury to personnel.

- c. Connect cable (37) to shackle (42) on main assembly mast (32).

-
2. Operate cable hoist (36) until tension is on cable (37).

WARNING



HEAVY PARTS

3. Using cable hoist (36), cable (37) and shackle (42), raise main assembly mast (32) until assembly mast contacts operators cab assembly mast clamp half (44).
4. Gain access to top of operators cab (43).

NOTE

The clamp outer half, capscrews and hex nuts are stored in the BII container.

5. Install clamp outer half (45) using capscrews (46) and hex nuts (47). Tighten hex nuts (47).
6. Tighten hex nut (35) on bolt (34).
7. Remove cable (37) from shackle (42) from main assembly mast (32).
8. Connect navigation lights connector (48) to operators cab connector J1 (49).
9. Connect deck lights connector (50) to operators cab connector J11 (51).
10. Connect navigation compass connector (52) to operators cab connector J10 (53).
11. Descend from operators cab (44).
12. Ground main assembly mast (32).
 - a. Cut tie wrap (54) securing ground cable (55) to deck holder (33).
 - b. Remove and discard bolt and washer (56) from main assembly mast boss (57).

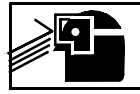
WARNING



EYE PROTECTION

- c. Using a wire brush, remove all corrosion and paint from main assembly mast boss (57).

WARNING

**CHEMICAL****EYE PROTECTION**

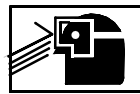
- d. Using cleaning compound, clean top and threads of main assembly mast boss (57).

WARNING

**CHEMICAL****EYE PROTECTION**

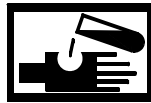
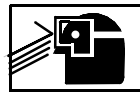
- e. Apply antiseize compound to mating surfaces of main assembly mast boss (57), ground cable (55) and new bolt and washer (56).
- f. Position ground cable (55) on main assembly mast boss (57).
- g. Install bolt and washer (56) to secure ground cable (55) to main assembly mast boss (57). Tighten bolt and washer (56).

WARNING

**CHEMICAL****EYE PROTECTION**

- h. Using wiping rag, clean off excess antiseize compound.

WARNING

**CHEMICAL****EYE PROTECTION**

- i. Apply a thin bead of gasket sealant to terminating edges, sealing bolt and washer (56), ground cable (55) and main assembly mast boss (57).

13. Remove and store cable hoist (36) and cable (37).

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
SAFETY EQUIPMENT
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
Goggles, Industrial: Clear Lens, Chipping (Cabinet B4) (Item 35, WP 0112 00)

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)
Gloves, Rubber Industrial (Item 26, WP 0114 00)
Battery, Nonrechargeable (Item 7, WP 0114 00)
Qty 12

Personnel Required

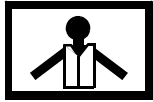
Seaman 88K

Equipment Condition

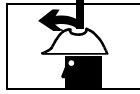
Fenders Installed. (WP 0017 00)
Main Assembly Mast Installed. (WP 0021 00)

PREPARATION FOR USE - INSTALLATION OF SAFETY EQUIPMENT

WARNING



VEST



HELMET PROTECTION



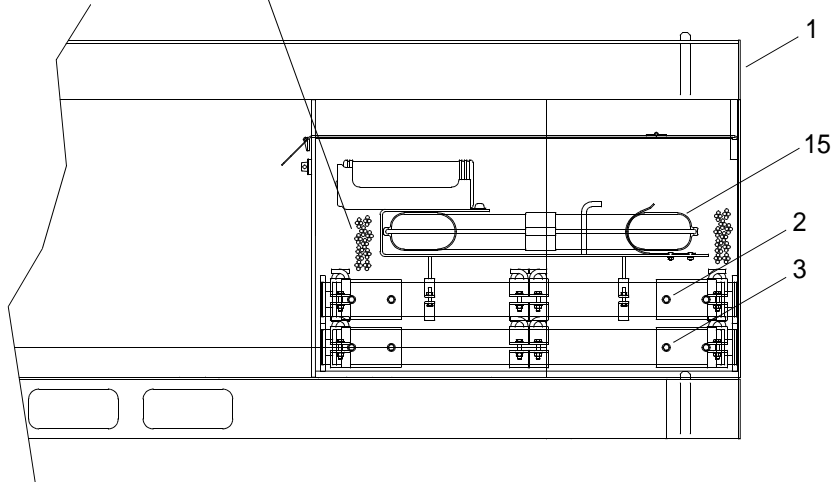
HEAVY PARTS

All personnel must wear personal flotation device, hard hat, and safety shoes during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

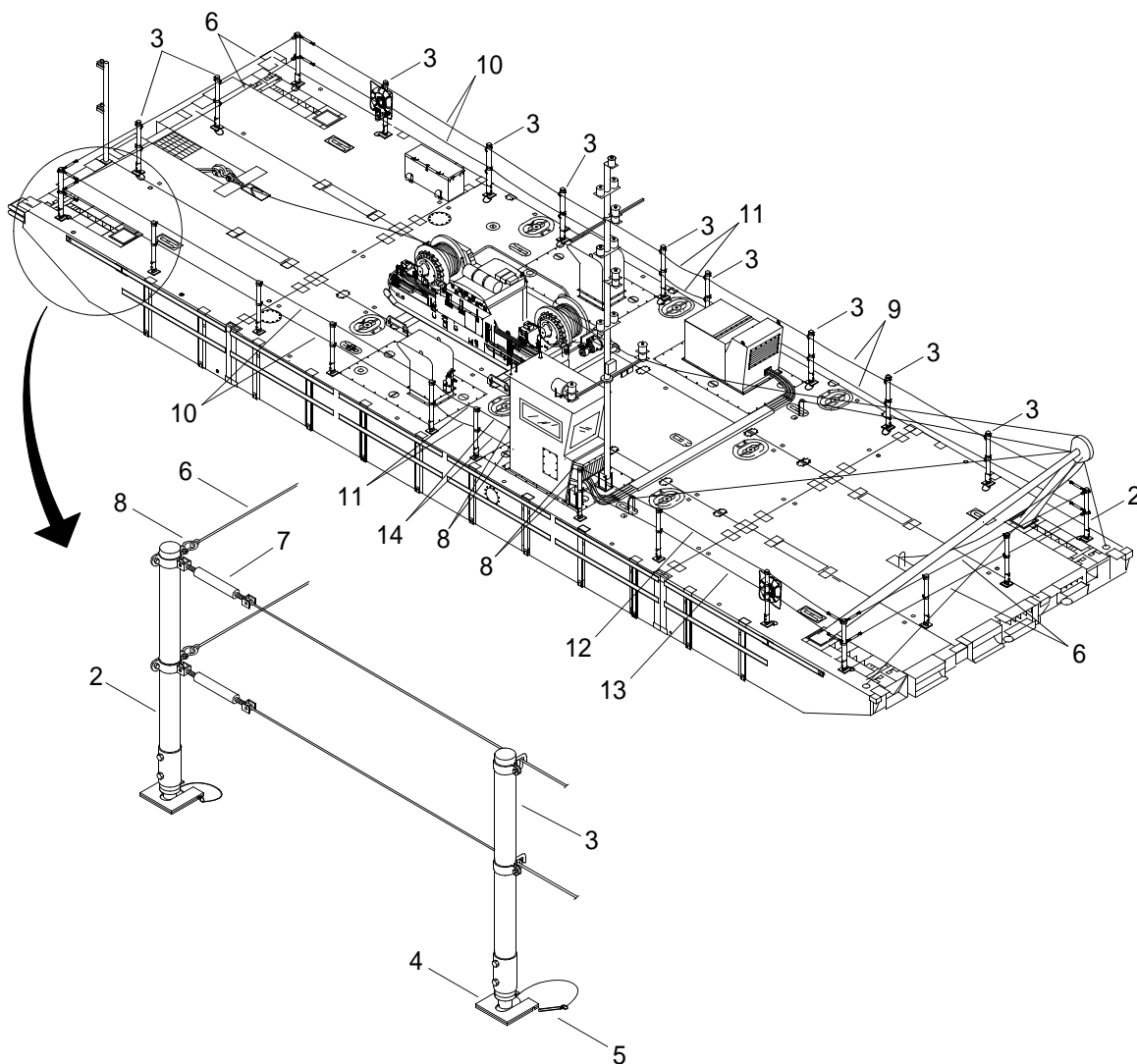
LIFE LINE STANCHION INSTALLATION

1. Remove all safety equipment from inside storage box on life line/corner fender pallet (1).

6,7,8,9,10,11,12,13,14



2. Install corner life line stanchions (2) and stanchion assemblies (3) into deck fittings (4) and secure with attached pins (5).



FORWARD AND AFT END LIFE LINE INSTALLATION

1. Route forward and aft, upper and lower 237 ½ in. cable railing assemblies (6) through stanchion assemblies (3).
2. Connect forward and aft, upper and lower 237 ½ in. cable railing assemblies (6) between forward corner life line stanchions (2) with turnbuckles (7) and shackles (8). Tighten all turnbuckles (7).

PORT SIDE LIFE LINE INSTALLATION

1. Route upper and lower 404 ½ in. cable railing assemblies (9) through stanchion assemblies (3).
2. Connect upper and lower 404 ½ in. cable railing assemblies (9) to forward port corner life line stanchion (2) with turnbuckles (7).
3. Route upper and lower 396 ½ in. cable railing assemblies (10) through stanchion assemblies (3).

-
4. Connect upper and lower 396 ½ in. cable railing assemblies (10) to aft port corner life line stanchion (2) with turnbuckles (7).

NOTE

Enough play should be left in side life lines to allow removal of snap hook life lines.

5. Connect upper and lower 54 in. cable railing assemblies (11) between upper and lower cable railing assemblies (9, 10). Tighten all turnbuckles (7), as required.

STARBOARD SIDE LIFE LINE INSTALLATION

1. Route upper 307 in. cable railing assembly (12) through stanchion assemblies (3).
2. Connect upper 307 in. cable railing assembly (12) between front of operators cab with shackles (8) and forward starboard corner life line stanchion (2) with turnbuckles (7). Tighten all turnbuckles (7).
3. Route lower 313 in. cable railing assembly (13) through stanchion assemblies (3).
4. Connect lower 313 in. cable railing assembly (13) between front of operators cab with shackles (8) and forward starboard corner life line stanchion (2) with turnbuckles (7). Tighten all turnbuckles (7).
5. Connect upper and lower 25 ¾ in. cable railing assemblies (14) to rear of operators cab and stanchion assembly with shackles (8).
6. Route upper and lower 396 ½ in. cable railing assemblies (10) through stanchion assemblies (3).
7. Connect upper and lower 396 ½ in. cable railing assemblies (10) to aft starboard corner stanchion (2) with turnbuckles (7).

NOTE

Enough play should be left in side life lines to allow removal of snap hook life lines.

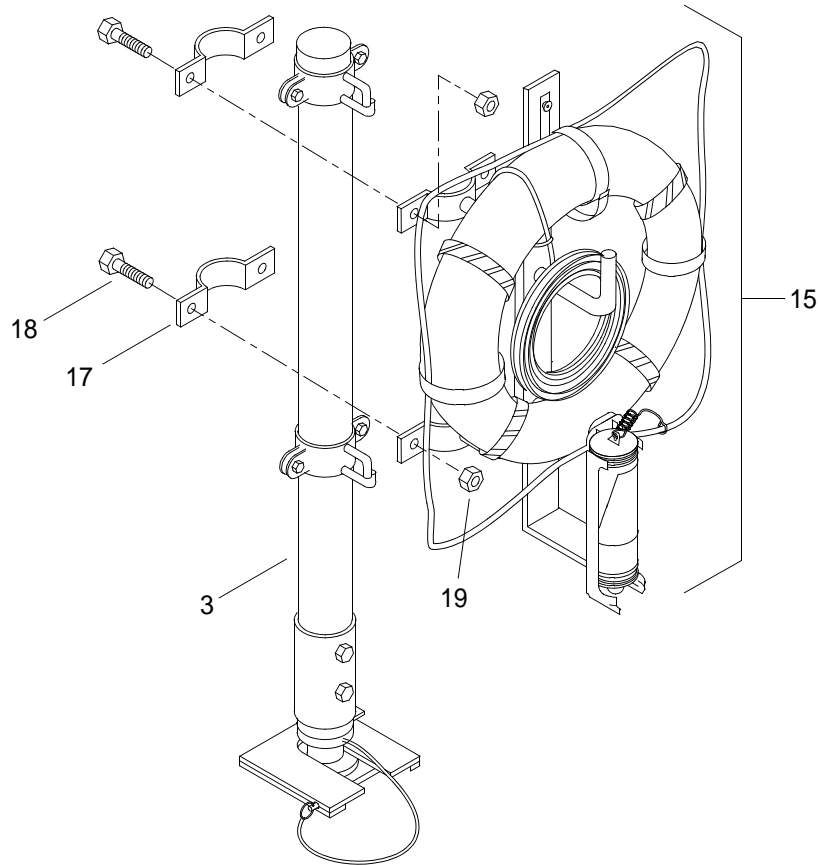
8. Connect upper and lower 54 in. cable railing assemblies (11) between cable railing assemblies (10, 14). Tighten all turnbuckles (7), as required.

LIFE RING ASSEMBLY INSTALLATION**NOTE**

Life ring assemblies are mounted facing inboard on forward starboard and aft port side/end stanchions of the WT.

These steps are typical for the installation of life ring assemblies.

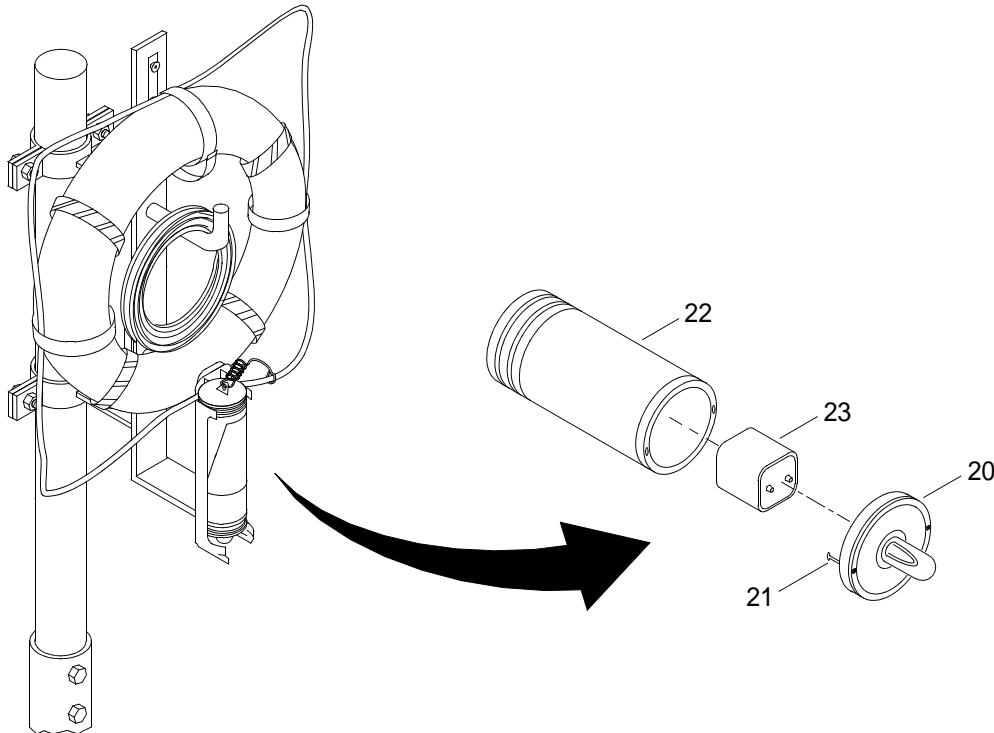
1. Position inner clamps of life ring assembly (15) on stanchion assembly (3).



2. Install outer clamps (17), bolts (18) and nuts (19) to secure life ring assembly (15) to stanchion assembly (3). Tighten nuts (19).

LIFE RING STROBE LIGHT BATTERY INSTALLATION

1. While depressing strobe light cover (20), turn locks (21) 90° to unlock strobe light cover (20) from strobe light housing (22).



2. Remove strobe light cover (20) from strobe light housing (22).

WARNING

**CHEMICAL****EYE PROTECTION****NOTE**

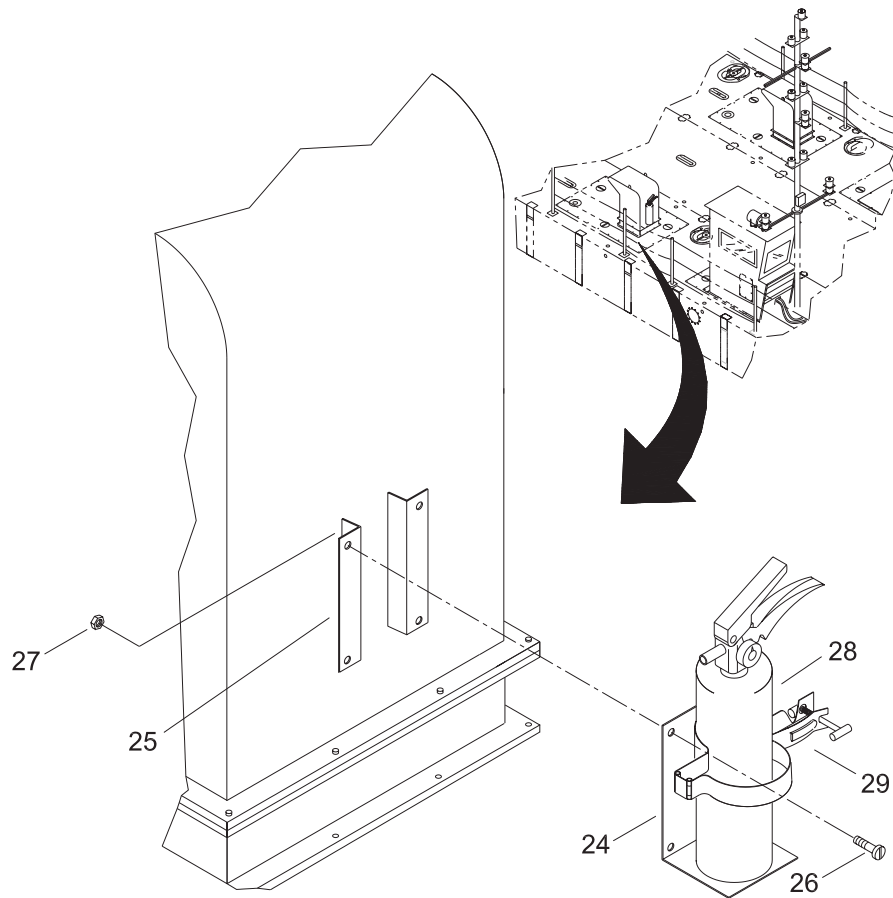
6VDC batteries are stowed in the BII container.

3. Position battery (23) inside strobe light housing (22).
4. Position strobe light cover (20) on strobe light housing (22).
5. While depressing strobe light cover (20), turn locks (21) 90° to lock strobe light cover (20) to strobe light housing (22).

PORTABLE FIRE EXTINGUISHER INSTALLATION**NOTE**

The portable fire extinguisher, bracket and attaching hardware are stowed in the BII container.

1. Attach fire extinguisher bracket (24) to exhaust plenum mounting brackets (25) using hex head capscrews (26) and hex nuts (27). Tighten hex nuts (27).
2. Position portable CO₂ fire extinguisher (28) on fire extinguisher bracket (24).

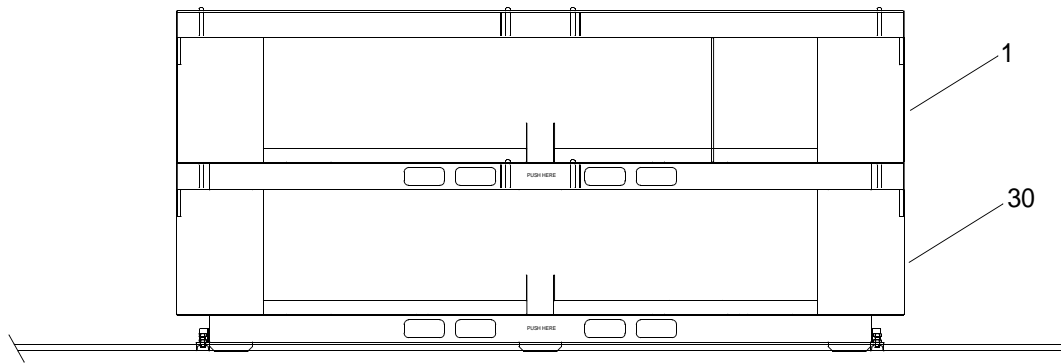
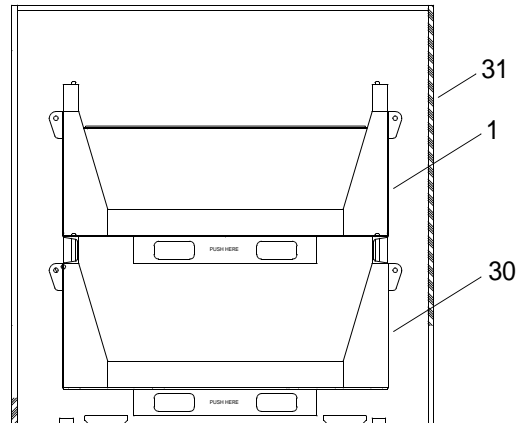


3. Secure portable CO₂ fire extinguisher (28) to fire extinguisher bracket (24) by closing and latching clamp (29).

 WARNING

**HEAVY PARTS**

4. Using forklift, position life line/corner fender pallet (1) on top of bow fender pallet (30).



 WARNING

**HEAVY PARTS**

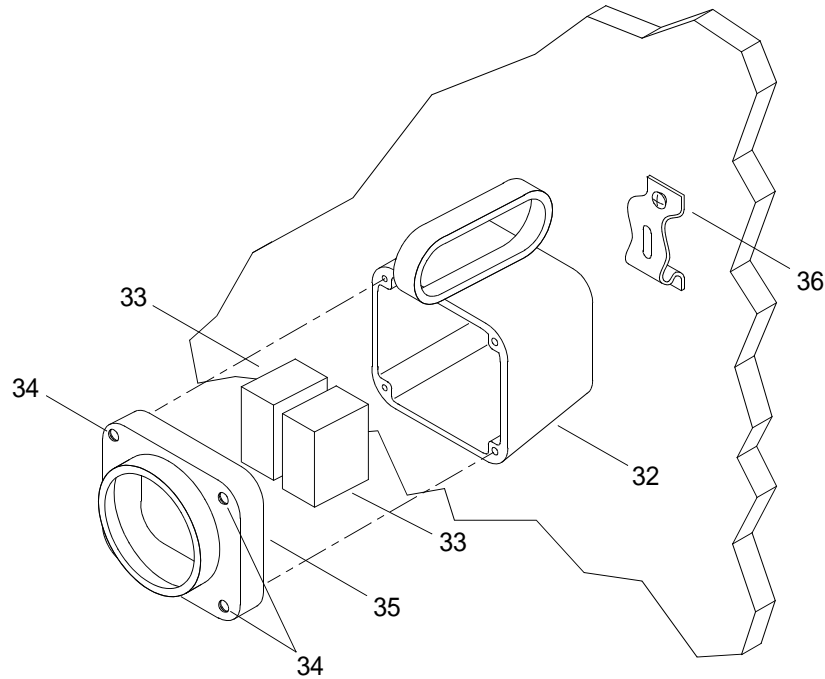
5. Using forklift, position stacked life line/corner fender pallet (1) and bow fender pallet (30) in miscellaneous container (31).
6. Place all loose hardware on top of life line/corner fender pallet (1).
7. Remove locking bars and pins to close side doors of miscellaneous container (31).
8. Latch and secure side doors of miscellaneous container (31).

INSTALL BATTLE LANTERNS ON WT**NOTE**

This task is typical for preparing the battle lanterns for use.

The battle lanterns are to be placed inside the operators cab above the door, in the machinery compartment above house battery BT3 and in the lazaret above the escape hatch.

1. Remove battle lanterns (32) and 6 VDC batteries (33) from BII container.



2. Loosen four captive screws (34) on cover (35).
3. Remove cover (35).
4. Place battle lantern (32) face up on flat surface.
5. Install two batteries (33) inside battle lantern (32).
6. Install cover (35) and tighten four captive screws (34).
7. Position battle lantern (32) sideways on bulkhead bracket (36) and rotate 90° to lock in place.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
CREW SHELTER
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

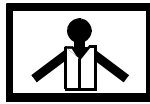
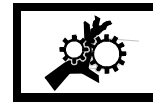
Seaman 88K (2)

Equipment Condition

Warping Tug Assembled On Sealift Vessel (WP 0012 00)
 Warping Tug Assembled In Water (WP 0013 00)
 Warping Tug Abovedeck Equipment Installed. (WP 0019 00)
 Warping Tug Safety Equipment Installed. (WP 0022 00)

PREPARATION FOR USE - INSTALL CREW SHELTER

WARNING

**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

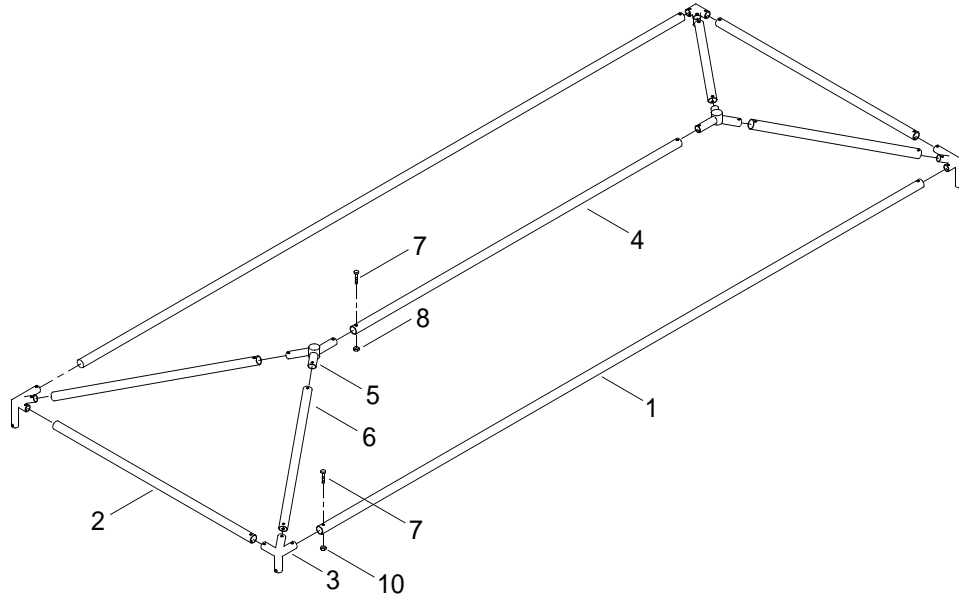
All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

NOTE

Assembly of the crew shelter canopy should be performed on deck of WT and then placed onto upper aluminum pipe legs.

1. Remove crew shelter canopy, hardware and aluminum pipes from BII container.

2. Position side aluminum pipes (1) on deck of WT approximately five feet apart.



3. Position end aluminum pipes (2) at ends of side aluminum pipes (1).
4. Position corner fittings (3) between aluminum pipes (1 and 2).
5. Position center aluminum pipe (4) in center of side aluminum pipes (1) and end aluminum pipes (2).
6. Position center Y-fittings (5) at ends of center aluminum pipe (4).
7. Position diagonal aluminum pipes (6) at ends of center Y-fittings (5) and corner fittings (3).

NOTE

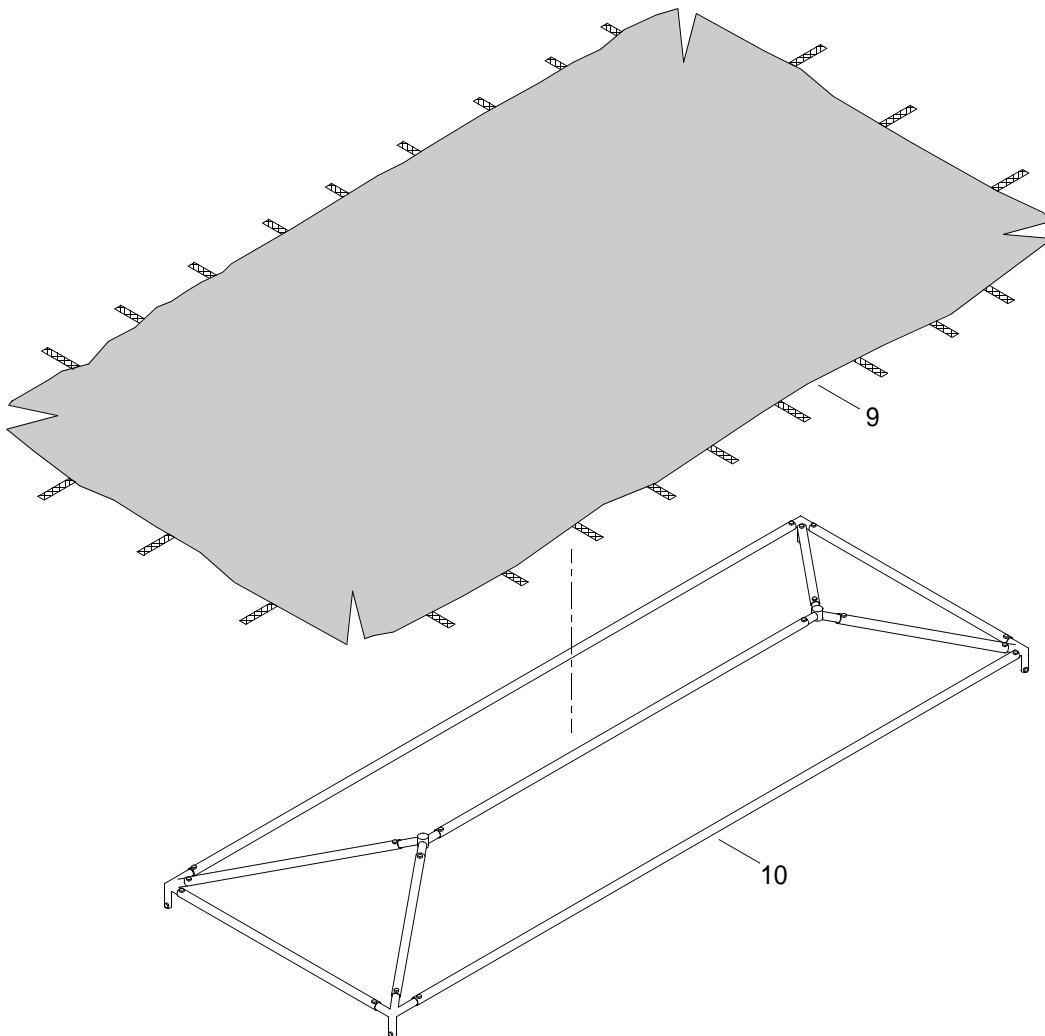
The following steps are typical for the installation of corner fittings.

8. Install side aluminum pipe (1) into corner fitting leg (3).
9. Install carriage bolt (7) through side aluminum pipe (1) and corner fitting leg (3).
10. Install hex head nut (8) on carriage bolt (7) and tighten.
11. Install end aluminum pipe (2) into corner fitting leg (3).
12. Install carriage bolt (7) through end aluminum pipe (2) and corner fitting leg (3).
13. Install hex head nut (8) on carriage bolt (7) and tighten.
14. Install diagonal aluminum pipe (6) into corner fitting leg (3).
15. Install carriage bolt (7) through diagonal aluminum pipe (6) and corner fitting leg (3).
16. Install hex head nut (8) on carriage bolt (7).

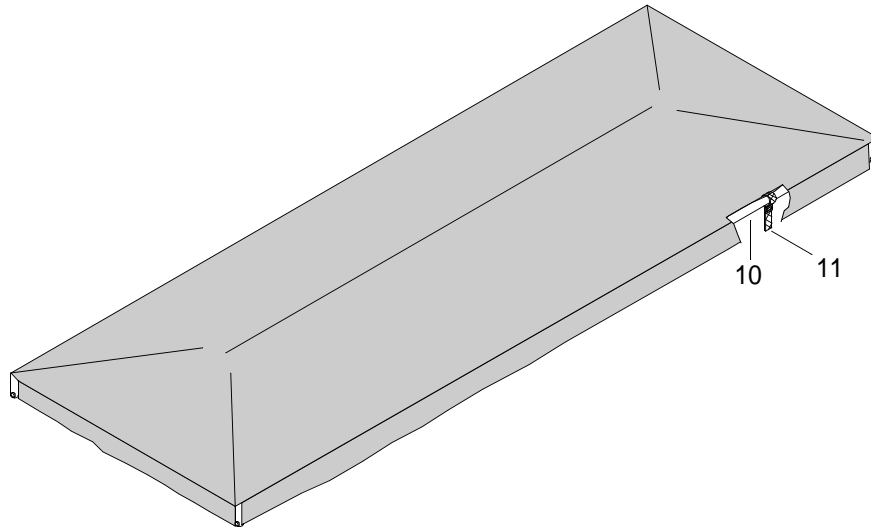
NOTE

The following steps are typical for the installation of Y-fittings legs onto Y-fittings.

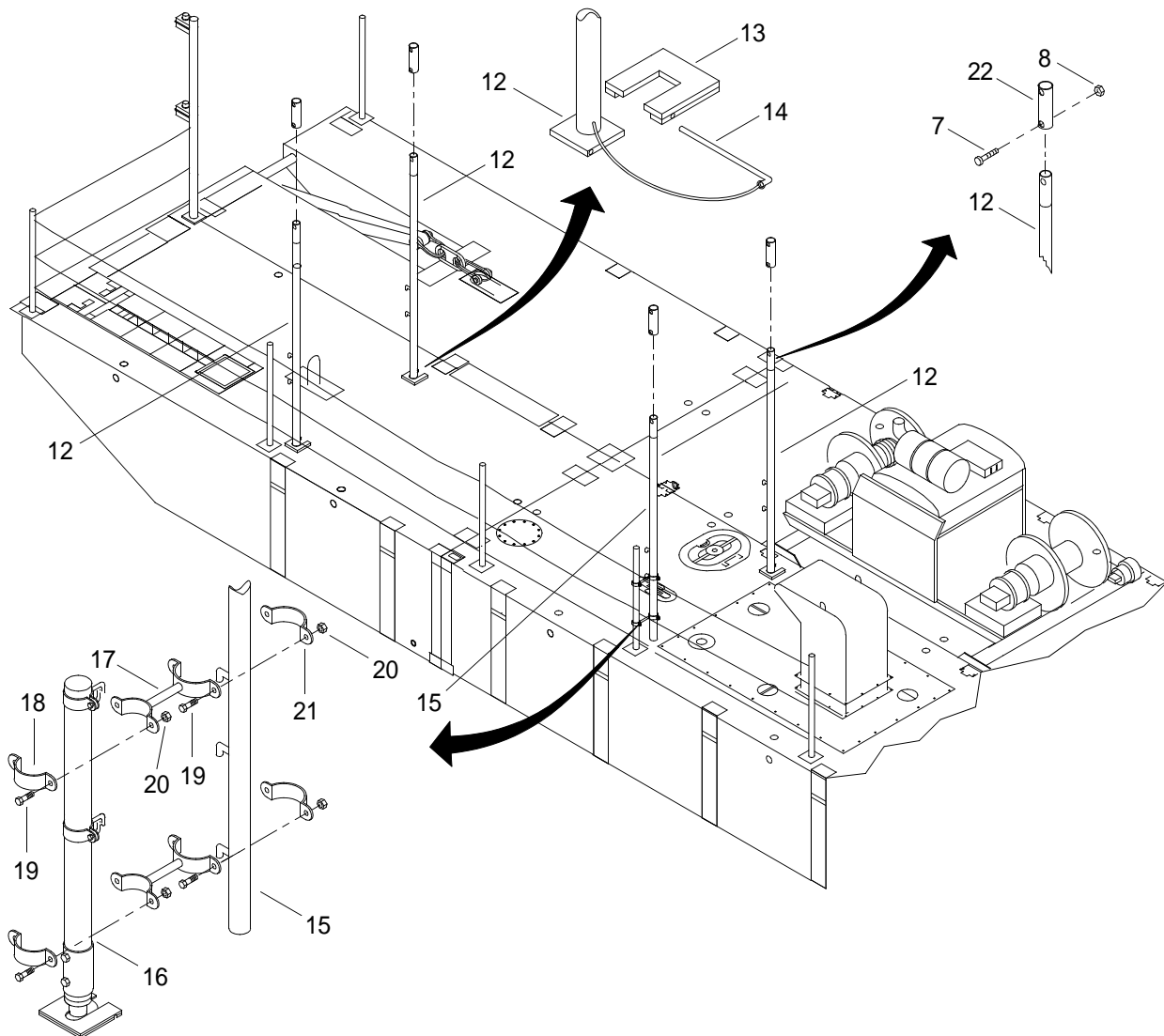
17. Install diagonal aluminum pipes (6) into Y-fitting legs (5).
18. Install carriage bolt (7) through diagonal aluminum pipe (6) and Y-fitting leg (5).
19. Install hex head nut (8) onto carriage bolt (7) and tighten.
20. Install center aluminum pipe (4) into Y-fitting leg (5).
21. Install carriage bolt (7) through center aluminum pipe (4) and Y-fitting leg (5).
22. Install hex head nut (8) onto carriage bolt (7) and tighten.
23. Using assistant, lay canopy cover (9) over the top of crew shelter frame (10).



24. Attach tiedown straps (11) to crew shelter frame (10).



25. Install lower aluminum pipe legs (12) onto stanchion fittings (13).



-
- a. Slide lower aluminum pipe legs (12) into stanchion fittings (13).
 - b. Install locking pin (14) into stanchion fittings (13).
26. Install lower aluminum pipe leg (15) onto life line stanchion (16).
- a. Position two standoff weldments (17) against life line stanchion (16).
 - b. Position two hanger brackets (18) opposite two standoff weldments (17) against life line stanchion (16).
 - c. Install hex head capscrews (19) through two hanger brackets (18) opposite two standoff weldments (17).
 - d. Install self-locking hex nuts (20) on hex head capscrews (19) and tighten.
 - e. Position lower aluminum pipe leg (15) against two standoff weldments (17).
 - f. Position two hanger brackets (21) against aluminum pipe leg (15) opposite two standoff weldments (17).
 - g. Install hex head capscrews (19) through two hanger brackets (18) opposite two standoff weldments (17).
 - h. Install self locking hex nuts (20) on hex head capscrews (19) and tighten.
27. Install upper aluminum pipe legs (22) on lower aluminum pipe legs (12 and 15).
28. Install carriage bolts (7) through upper and lower aluminum pipe legs (12, 15 and 22).
29. Install hex head nuts (8) on carriage bolts (7) and tighten.

WARNING

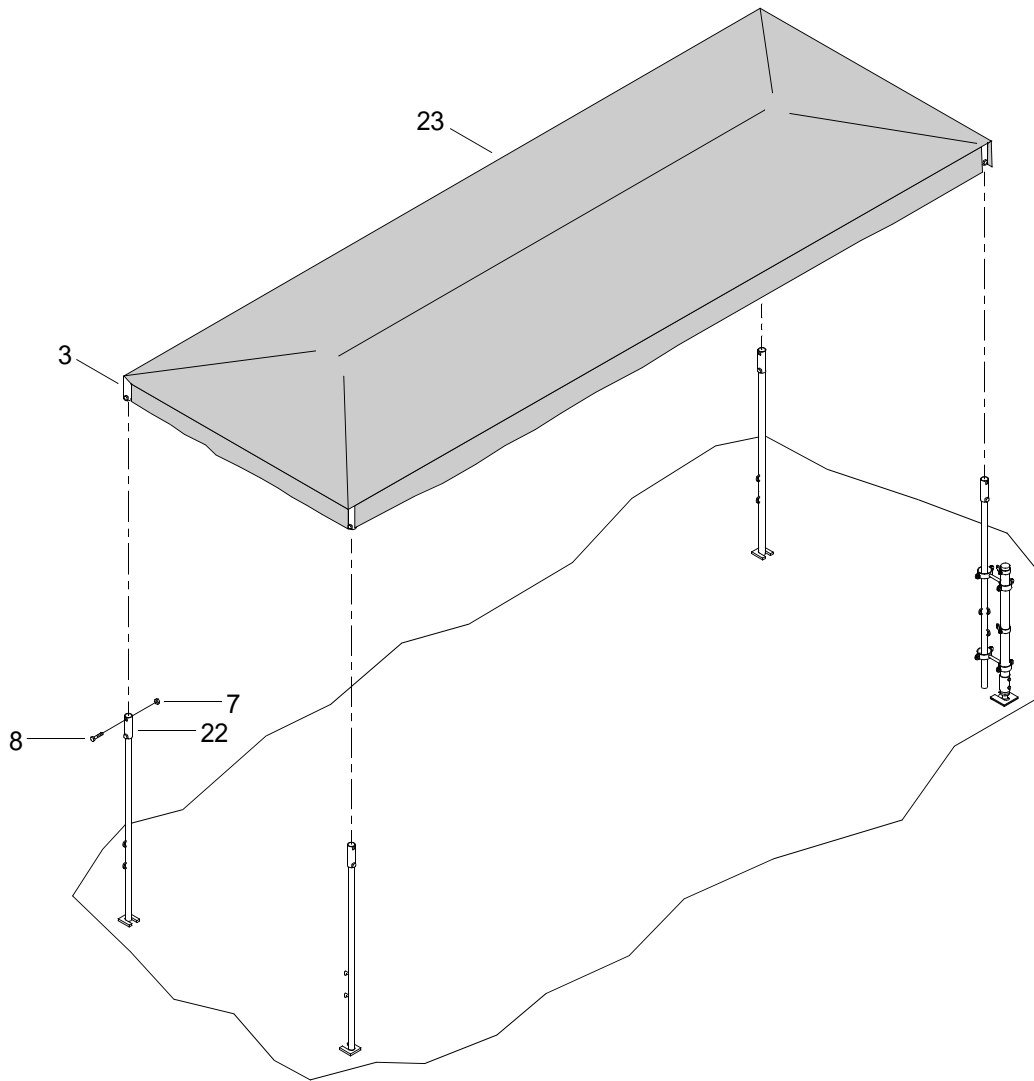


HEAVY OBJECTS

NOTE

The following steps are typical for installation of the corner connection legs onto the aluminum pipe legs.

30. Using assistant, install crew shelter canopy assembly (23) onto upper aluminum pipe legs (22).

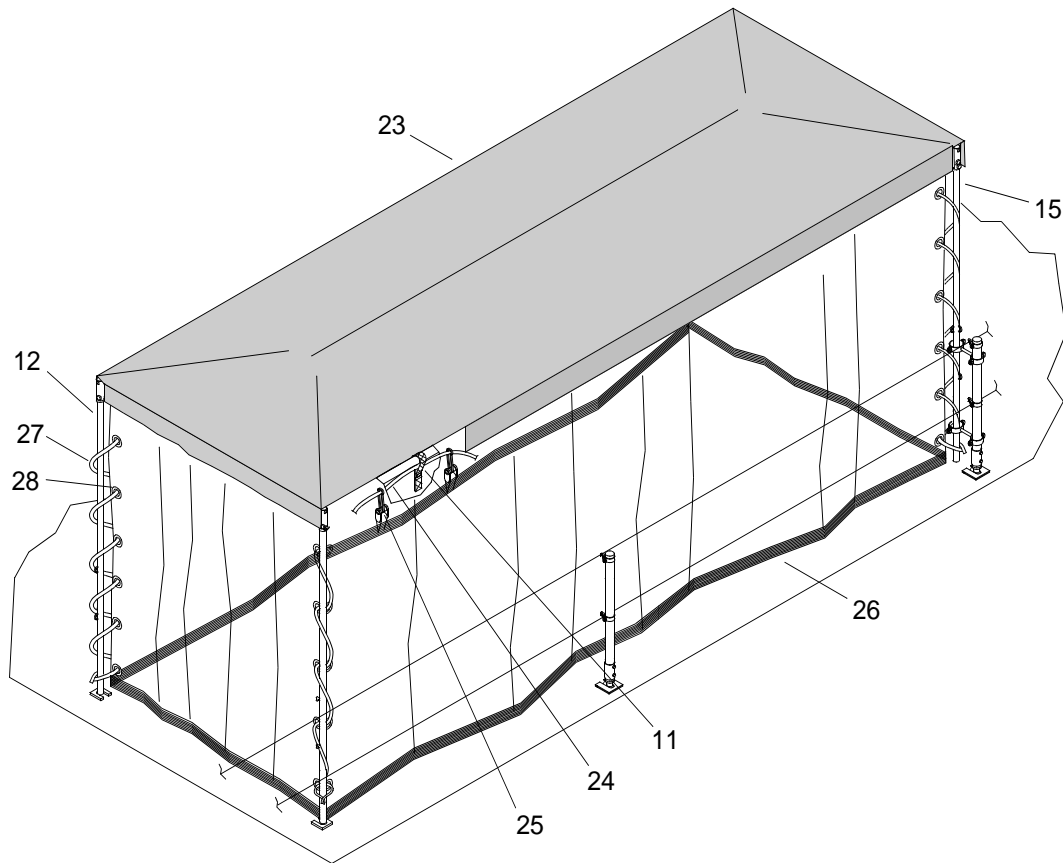


31. Install carriage bolt (8) through upper aluminum pipe legs (22) and corner fittings (3).
32. Install hex head nut (7) on carriage bolt (8) and tighten.

NOTE

The following steps are typical for installation of the side panels.

33. Thread line (24) through tiedown straps (11) on crew shelter canopy assembly (23).

**NOTE**

The panels, when installed, will be located inside of the stanchions.

Velcro is used to fasten the panels together at each corner of the crew shelter.

34. Attach snap hooks (25) of panels (26) to line (24).
35. Fasten panels (26) together.
36. Thread line (27) through grommets (28), around lower aluminum pipe legs (12 and 15) and tie off.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Personnel Required**

Seaman 88K

Engineer 88L

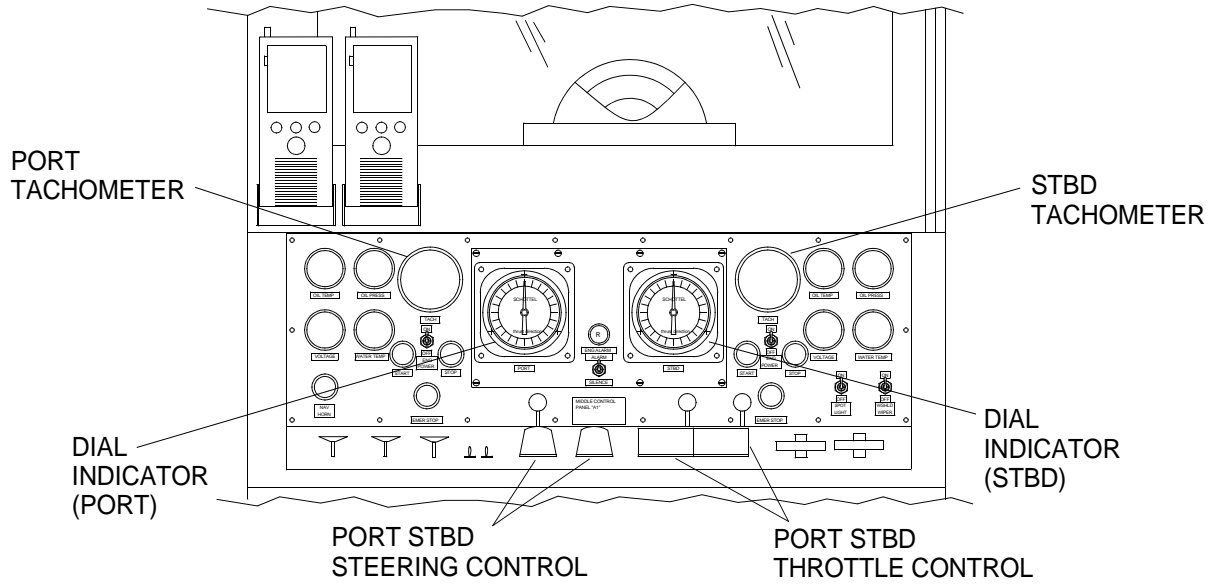
OPERATING PROCEDURES FOR WARPING TUG**CONDUCT OPERATOR STARTUP CHECKS****Table 1. WT Operator Starting Checklist.**

ITEM NO.	PROCEDURE	INITIAL WHEN COMPLETED
1	On the Propulsion Module Circuit Breaker Panels (A6), position the MAIN circuit breaker switch to on (closed). Position all remaining circuit breaker switches are to on (closed) position.	
2	On Engine Junction Box Assembly (A4), verify ENGINE CONTROLS circuit breaker switch is off (open) to prevent the engines from starting.	
3	Position both port and stbd exhaust plenum door handles to OPEN.	
4	On the Lower Control Panel (A2), position the PORT and STBD VENT FAN toggle switches to ON (closed). Green indicator lights will come on. Verify exhaust fans operating. Wait five minutes to clear machinery compartment of fumes.	
5	Position both VENT FAN toggle switches to OFF. Green indicator lights will go out.	
6	Perform BEFORE OPERATION PMCS (WP 0105 00).	
7	On Engine Junction Box Assembly (A4), position ENGINE CONTROLS circuit breaker switch to on (closed). Ensure that no personnel are below deck before starting the engines.	
8	Verify all Operators Cab Circuit Breaker Panel (A3) toggle switches are on (closed), except decklights unless required for night operations.	
9	On Middle Control Panel (A1), position both port and stbd ENG POWER toggle switches to ON (closed).	
10	On Lower Control Panel (A2), verify both PORT and STBD THROTTLE CONTROL levers are in idle (all the way back) position.	
11	On Lower Control Panel (A2), verify both PORT and STBD CLUTCH toggle switches are in DISENGAGED position (centered).	
12	On the Middle Control Panel (A1), depress the START button to start engine. Release pushbutton as soon as engines start. Engines must be started separately.	
13	Verify water is coming out of exhaust and discharge ports.	

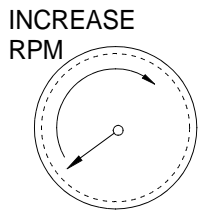
Table 1. WT Operator Starting Checklist. (Continued)

ITEM NO.	PROCEDURE	INITIAL WHEN COMPLETED
14	Run both engines at 650 RPM without a load for approximately five minutes while monitoring gages.	
15	Position both VENT FAN toggle switches to ON (closed).	
16	On Middle Control Panel (A1), observe engine oil pressure is 40 - 70 PSI normal operating or 32 PSI minimum.	
17	On Middle Control Panel (A1), observe engine oil temperature is 215 - 230°F.	
18	On Middle Control Panel (A1), observe engine water temperature after warm up is 150 - 185°F.	
19	Ensure engine startup times are entered in engine logs.	
20	On Middle Control Panel (A1), observe that tachometer is between 900 - 1,000 RPM (engine warm).	
21	On Middle Control Panel (A1), observe that ammeter is between +0 to +250 amps.	
22	Listen for any unusual noises and look for unusual smoke.	
23	Return engines to idle (650 - 750 RPM) and recheck marine gear oil level. Oil level should register full on dipstick when warm.	
24	On Lower Control Panel (A2), operate both PORT and STBD STEERING CONTROL levers and observe PORT and STBD steering indicators on the Middle Control Panel (A1). Rotate clockwise (push) and counterclockwise (pull).	
25	On Lower Control Panel (A2), position both PORT CLUTCH toggle switch to FORWARD. Amber ENGAGED light will come on. If pump-jet wake/movement matches steering indicator, repeat this step for starboard side. If wake/direction of movement does not match indicator, disengage clutch. Amber light will go out and contact unit maintenance.	
26	Position both PORT and STBD CLUTCH toggle switches to DISENGAGE (centered). The amber ENGAGED light will go out.	
27	Ensure all hatches and deck equipment are secured for sea.	
NAME and RANK (Print) SIGNATURE: DATE:		
CHIEF ENGINEER		
NAME and RANK (Print) SIGNATURE: DATE:		
VESSEL MASTER		
NAME and RANK (Print) SIGNATURE: DATE:		

OPERATE AND CONTROL MOVEMENT OF WT

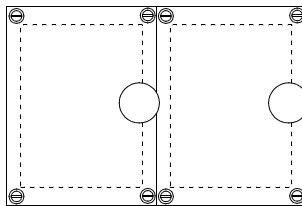


PORT TACHOMETER



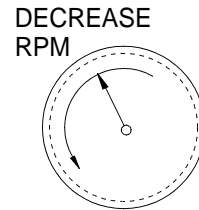
PUSH

THROTTLE CONTROLS

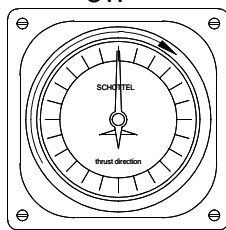


PULL

STBD TACHOMETER



PORT DIAL INDICATOR
CW



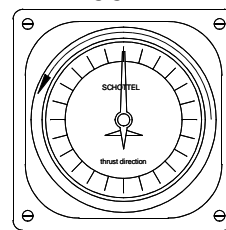
PUSH

STEERING CONTROL LEVERS



PULL

STBD DIAL INDICATOR
CCW



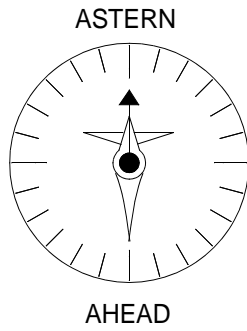
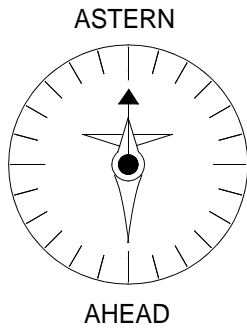
NOTE

When the WT is comprised of one propulsion module powered by a 60 Series engine and one propulsion module powered by a 92 Series engine, pump-jet thrust will vary. The throttle controls must be carefully operated to keep both engines RPM equal.

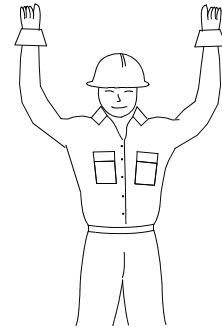
If a propulsion module powered by a 60 Series engine is replaced by a propulsion module powered by a 92 Series engine, it will be required to reset the steering indicator to match the replacement propulsion module. Contact unit maintenance to reset steering indicator.

1. Engage the marine gear clutches.
 - a. Push the CLUTCH toggle switches forward to engage the clutch.
 - b. Center the CLUTCH toggle switches to disengage the clutch.
 - c. Pull the CLUTCH toggle switches aft to engage clutch and backflush the pump-jet.
2. Operate steering control levers to control direction of travel.
 - a. If the PORT and STBD dial indicators are pointing forward, the WT will move forward.
 - b. If the PORT and STBD dial indicators are pointing aft, the WT will move aft.
 - c. Push the PORT and STBD STEERING CONTROL levers forward to rotate the steering nozzle in counterclockwise direction to move the WT to the right (starboard).
 - d. Pull the PORT and STBD STEERING CONTROL levers aft to rotate the steering nozzle in clockwise direction to move the WT to the left (port).
3. Operate throttle control levers to increase or decrease speed.
 - a. To increase speed, push PORT and STBD THROTTLE CONTROL levers forward to increase both engine RPM and pump-jet thrust. Monitor engine RPM on the middle control panel A1 TACHometers (port and stbd).
 - b. To decrease speed, pull PORT and STBD THROTTLE CONTROL levers aft to decrease both engine RPM and pump-jet thrust.
4. Perform DURING OPERATION PMCS. (WP 0105 00)

5. Use hand signals to communicate movement instructions to the pilot of the WT.

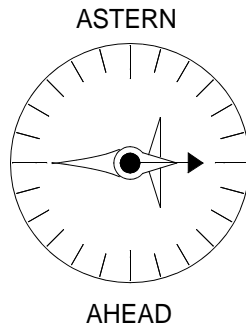
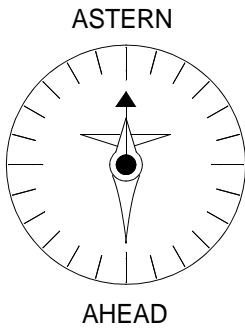


STRAIGHT
BACK



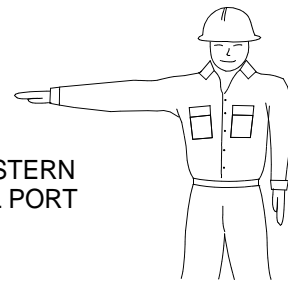
STRAIGHT BACK

< PORT SIDE INDICATORS >

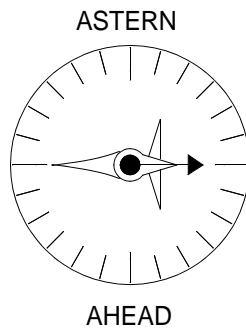
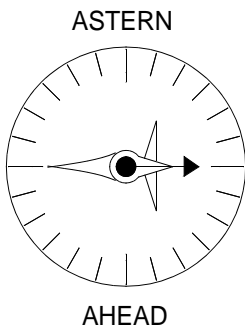


< STARBOARD SIDE INDICATORS >

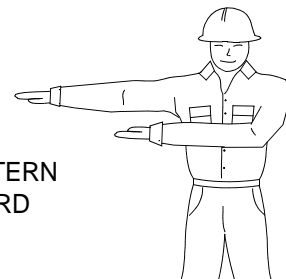
SWING STERN
TO FULL PORT



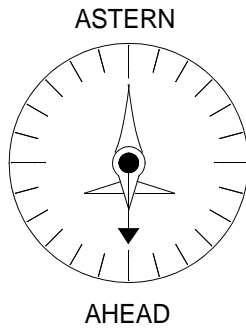
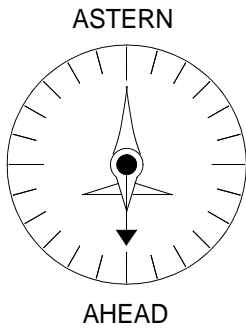
SWING STERN
PORT FULL



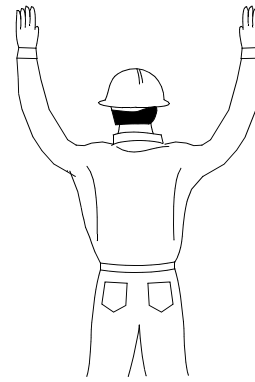
SWING STERN
PORT HARD



SWING STERN
PORT HARD

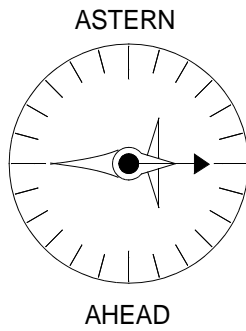
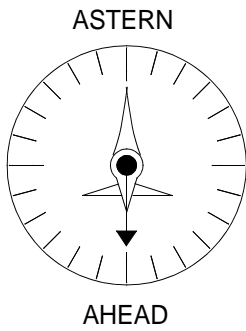


STRAIGHT
AHEAD



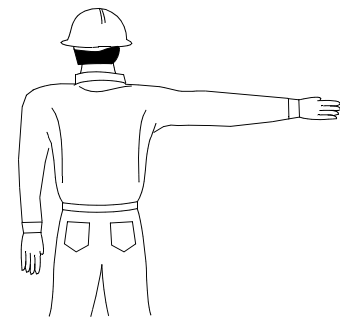
STRAIGHT AHEAD

< PORT SIDE INDICATORS >

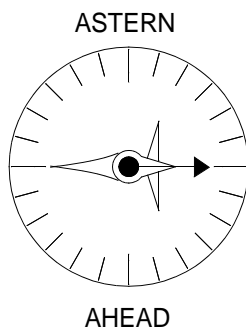
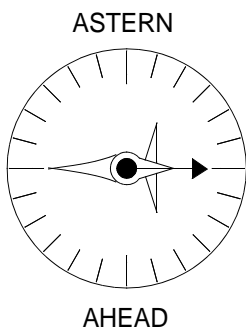


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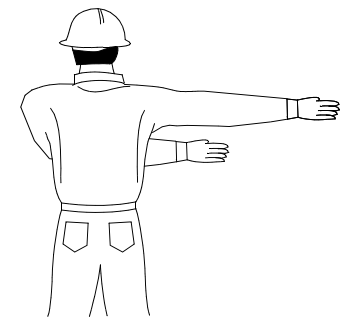
RIGHT
FULL
TURN



STARBOARD FULL

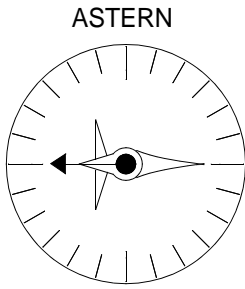


RIGHT
HARD
TURN

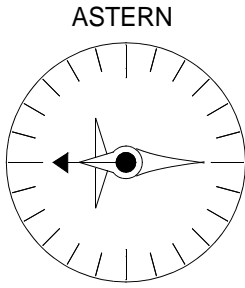


STARBOARD HARD

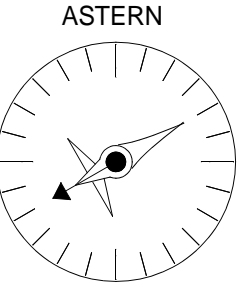
< PORT SIDE INDICATORS >



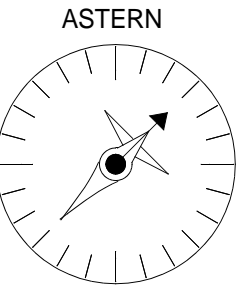
AHEAD



AHEAD

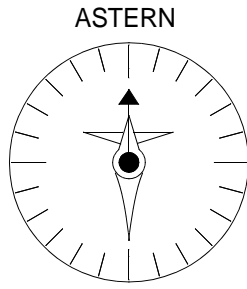


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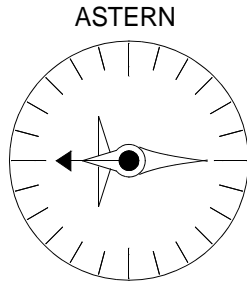


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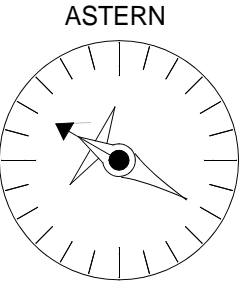
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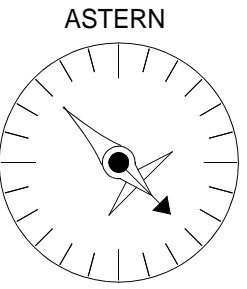
AHEAD



AHEAD



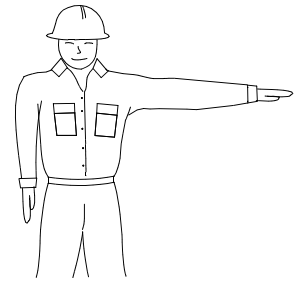
AHEAD



AHEAD

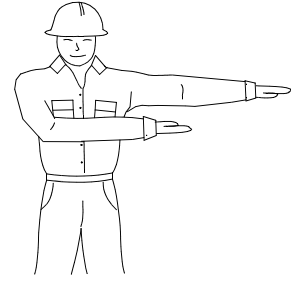
< STARBOARD SIDE INDICATORS >

SWING STERN TO STARBOARD FULL



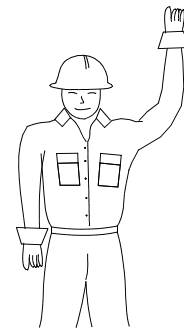
SWING STERN TO STARBOARD FULL

SWING STERN TO STARBOARD HARD



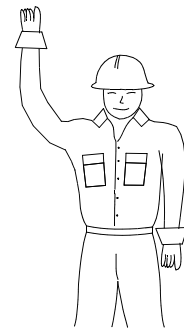
SWING STERN STARBOARD HARD

WALK STARBOARD

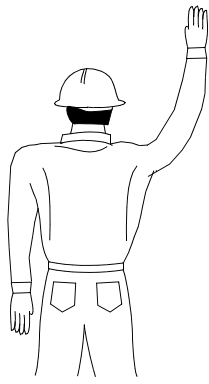


SWING STERN STARBOARD EASY

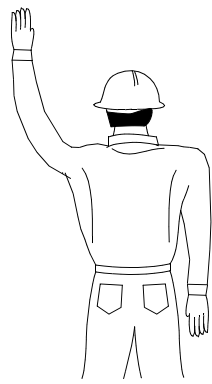
WALK PORT



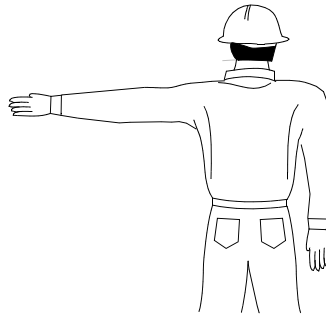
SWING STERN PORT EASY



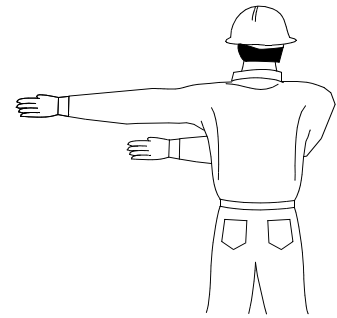
STARBOARD



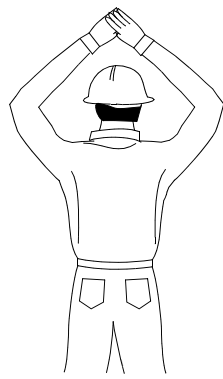
PORT EASY



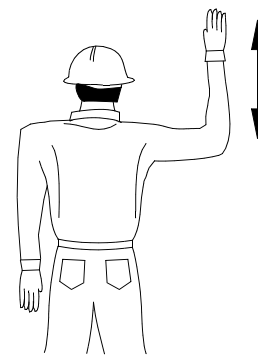
PORT FULL



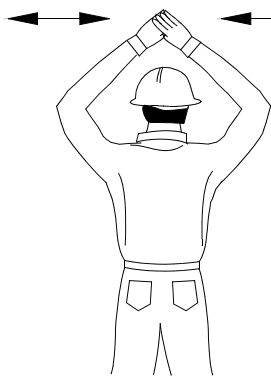
PORT HARD



DISENGAGE ENGINES

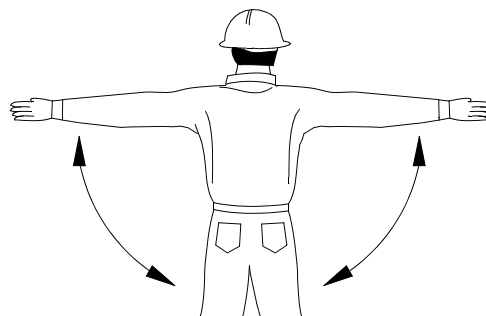


APPROPRIATE
WHISTLE
SIGNAL

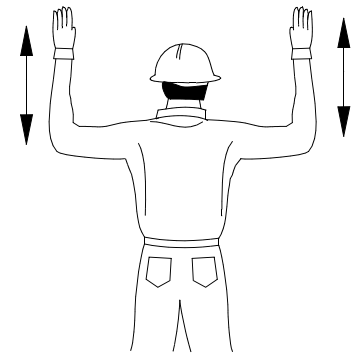


STOP HEADWAY

STOP HEADWAY



SLOW DOWN



SPEED UP

CONDUCT OPERATOR SHUTDOWN CHECKS

Table 2. WT Operator Engine Shutdown Checklist.

ITEM NO.	PROCEDURE	INITIAL WHEN COMPLETED			
1	On Lower Control Panel (A2), position both PORT and STBD THROTTLE CONTROL levers to the idle position (all the way back).				
2	On Lower Control Panel (A2), position both CLUTCH toggle switches to BACKFLUSH (back) position for five minutes at 790 to 800 engine RPM, before engine shutdown.				
3	On Lower Control Panel (A2), position both CLUTCH toggle switches to DISENGAGE (centered).				
4	On Middle Control Panel (A2), separately depress STOP pushbuttons to shut down each engine (port and stbd). Release pushbuttons when engines stop.				
5	On Middle Control Panel (A1), position both port and stbd ENG POWER toggle switches to OFF (open).				
6	On Lower Control Panel (A2), position both PORT and STBD VENT FAN toggle switches to OFF (open).				
7	On Engine Junction Box Assembly (A4), position ENGINE CONTROLS circuit breaker switch to off (open) to prevent the engines from starting.				
8	Perform after operation PMCS. (WP 0105 00)				
9	Position all circuit breakers on Propulsion Module Circuit Breaker Panel (A6) to off (open).				
10	Check below deck to ensure no personnel are present below deck.				
11	Verify all propulsion module access hatches are closed and dogged.				
12	Remove communications equipment from operators cab, as necessary.				
13	Remove or secure all tools and crew equipment.				
14	Secure and lock operators cab windows and door.				
<table border="0" style="width: 100%;"> <tr> <td style="width: 40%;">NAME and RANK (Print)</td> <td style="width: 40%;">SIGNATURE:</td> <td style="width: 20%;">DATE:</td> </tr> </table>			NAME and RANK (Print)	SIGNATURE:	DATE:
NAME and RANK (Print)	SIGNATURE:	DATE:			
<p>CHIEF ENGINEER</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 40%;">NAME and RANK (Print)</td> <td style="width: 40%;">SIGNATURE:</td> <td style="width: 20%;">DATE:</td> </tr> </table>			NAME and RANK (Print)	SIGNATURE:	DATE:
NAME and RANK (Print)	SIGNATURE:	DATE:			
<p>VESSEL MASTER</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 40%;">NAME and RANK (Print)</td> <td style="width: 40%;">SIGNATURE:</td> <td style="width: 20%;">DATE:</td> </tr> </table>			NAME and RANK (Print)	SIGNATURE:	DATE:
NAME and RANK (Print)	SIGNATURE:	DATE:			

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
VHF/FM HANDHELD TRANSCEIVER
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

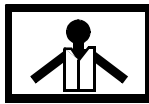
Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)

Personnel Required

Seaman 88K

OPERATING PROCEDURES - OPERATE THE VHF/FM HANDHELD TRANSCEIVER**INITIAL SETUP OF VHF/FM HANDHELD TRANSCEIVER**

WARNING

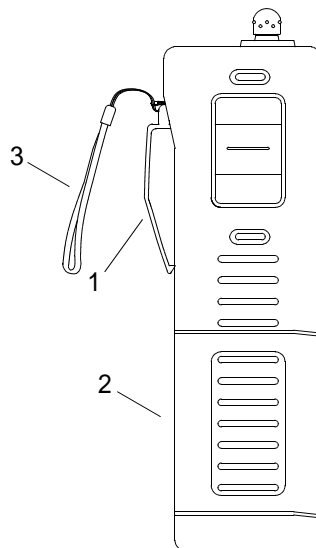


VEST

All personnel must wear personal flotation device during WT operations and maintenance. Failure to observe this precaution could result in serious injury or death.

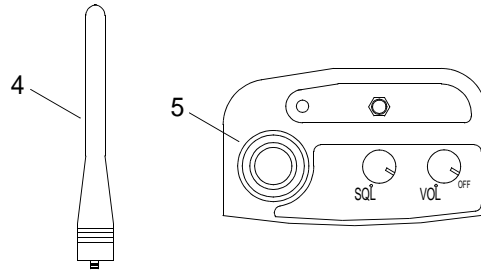
To avoid the risk of explosion, do not operate radio where explosive vapors may be present. Failure to observe these precautions could result in serious injury or death.

1. Install the belt clip (1) on the transceiver (2), if desired.



2. Install the nylon strap (3) on the belt clip (1), if desired.

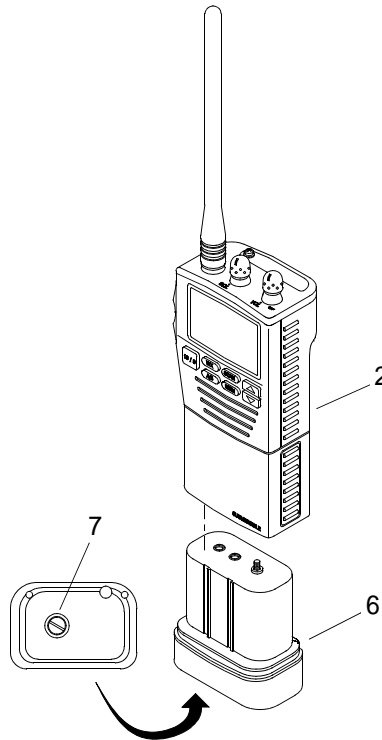
3. Install the antenna (4) in the transceiver antenna receptacle (5).



WARNING

A metal object shorting the terminals may cause the battery to explode. Failure to observe this precaution could result in serious injury or death.

4. Install the CNB350 nickel cadmium battery pack (6) in the transceiver (2).



- a. Slide the battery pack (6) into the battery cavity.
- b. Rotate the battery lock screw (7) counterclockwise two revolutions prior to tightening.
- c. Turn the battery lock screw (7) clockwise until hand tight.

BATTERY CHARGING**WARNING**

Shorting the battery terminals that charge the transceiver can cause sparks, severe overheating, burns and battery damage. Do not place an uninstalled battery pack in the vicinity of metal objects that may short the terminals. Failure to observe this precaution could result in serious injury or death.

To avoid risk of explosion and injury, do not operate radio where explosive vapors may be present. Failure to observe these precautions could result in serious injury or death.

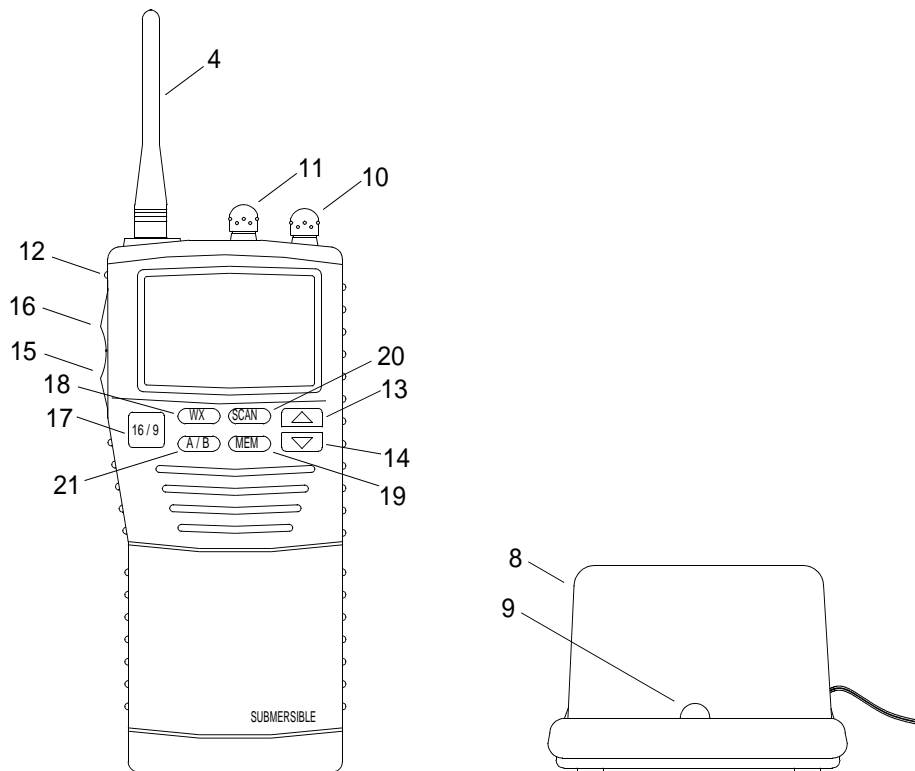
NiCad batteries must be disposed of properly. Battery may explode if incinerated, causing injury or death. Contact unit supply for proper disposal instructions.

CAUTION

Never plug the power supply to the CCA250 charge adaptor except with a CAW240, CWC230 or CWC232 adaptor. Damage to power supply could occur.

Charging the transceiver battery for more than 16 hours with the battery charge system can shorten battery life and cause other components to fail. Battery packs may be left in the CSA280 chargers without harm to either the battery pack or charger.

1. Insert the transceiver (2) into the charger (8) to light charge indicator (9) and to begin charging.



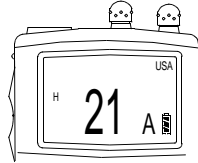
2. Remove the transceiver (2) from the charger (8) when battery charge time has elapsed.

TURNING RADIO ON**NOTE**

Water resistance of the transceiver is assured only when the battery pack and antenna are attached to the transceiver.

Never key the transceiver without the antenna attached. Damage to the transceiver will occur.

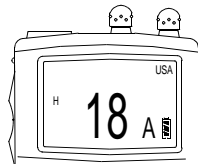
1. Turn the POWER/VOLUME knob (10) clockwise to turn the transceiver on.



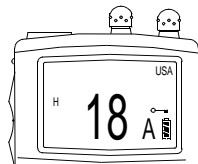
2. Rotate the SQUELCH CONTROL knob (11) fully counterclockwise to the SQUELCH OFF position.
3. Rotate the POWER/VOLUME CONTROL knob (10) until the noise or audio from the speaker can be heard.
4. Select a channel that has no voice transmissions occurring.
5. To find the squelch threshold, rotate the SQUELCH CONTROL knob (11) clockwise until the noise stops.
6. To turn on the radio light for five seconds, press the LAMP key (12)
7. To turn off the light sooner than five seconds, press the LAMP key (12).

RECEIVING RADIO TRANSMISSIONS

1. Press the UP ARROW key (13) or DOWN ARROW key (14) to change channels.

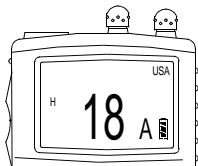


2. Press the LAMP/KEY LOCK key (12) for one second to lock the channel in the operating mode.
3. Ensure that the key lock symbol appears on the display to indicate that the channel is locked.



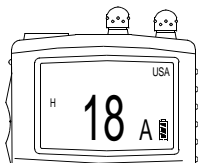
4. To unlock the channel, press the LAMP/KEY LOCK key (12) for one second.

5. Ensure that the key lock symbol disappears from the display to indicate that the channel is unlocked.

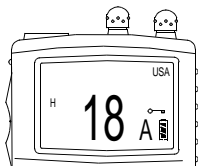


TRANSMITTING

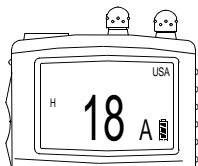
1. Press the UP ARROW key (13) or DOWN ARROW key (14) to change channels.



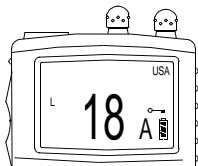
2. Adjust squelch as required.
3. Press the LAMP/KEY LOCK key (12) for one second to lock the channel in the operating mode.



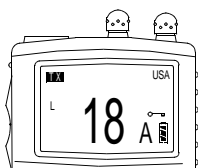
4. To unlock the channel, press the LAMP/KEY LOCK key (12) for one second.



5. Press the H/L key (15) until L is displayed for transmissions over a short distance.



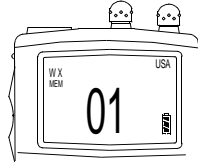
6. If low power is not effective, press the H/L key (15) until H is displayed.
7. Press the PTT switch (16) to transmit.



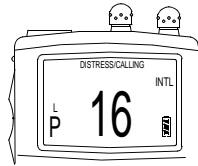
8. Release the PTT switch (16) when transmission is completed.

OPERATING MODES

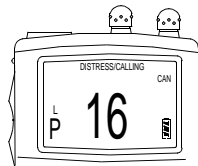
1. To access the USA operating mode, hold down the 16/9 key (17) and press the WX key (18) to change the mode of the receiver to USA.



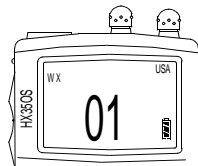
2. To access the INTERNATIONAL operating mode, hold down the 16/9 key (17) and press the WX key (18) to change the mode of the receiver to INTL.



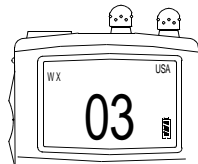
3. To access the CANADIAN operating mode, hold down the 16/9 key (17) and press the WX key (18) to change the mode of the receiver to CAN.


NOAA WEATHER CHANNELS

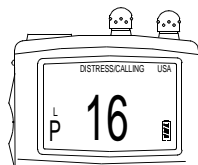
1. Press the WX key (18) to receive a weather channel.



2. Press the UP ARROW key (13) or DOWN ARROW key (14) to change to other weather channels.

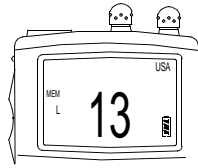


3. Press the WX key (18) to exit from the weather channels and return to the previous non-weather channel.



SCANNING

1. Select the desired channel to be scanned using the UP ARROW key (13) or DOWN ARROW key (14).
2. Press the MEM key (19) to store the channel into the transceiver's memory.



3. Repeat steps one and two until all channels to be scanned are stored in the transceiver's memory.
4. Press the SCAN key (20) to start scan.
5. Press the SCAN key (20) to stop the scan.

DELETE SCAN MEMORY

1. To delete a channel from the transceiver's scan memory, select the desired channel using the UP ARROW key (13) or DOWN ARROW key (14).
2. Press the MEM key (19) while the channel number to be deleted from the scan memory is displayed.
3. Delete the complete scan memory by resetting the transceiver's microprocessor.
 - a. Turn the transceiver off using the POWER/VOLUME CONTROL knob (10).
 - b. To return to the factory default settings, press the SCAN key (20) and the WX key (18) while turning on the transceiver.

PRIORITY SCAN

1. To change from channel 16 to channel 09 and set the priority channel, hold down the 16/9 key (17) and press the MEM key (19).
2. Press MEM key (19) to change to channel number programmed as A channel.
3. Press MEM key (19) to change to channel number programmed as B channel.
4. Press the SCAN key (20) at least one second for priority scanning during normal scanning.

WEATHER ALERT**NOTE**

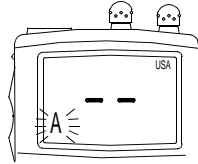
A loud tone will indicate that the transceiver is in the weather alert mode. When a weather alert is received, scanning stops and the transceiver enters the weather alert mode.

1. Press the SCAN key (20) to start scanning the memorized weather channels along with the other regularly scanned channels.
2. Press the WX key (18) to stop the alert tone and receive the voice information on the weather channel.

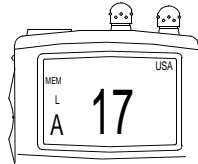
CHANNEL A/B INSTANT ACCESS**NOTE**

Ensure that a blinking letter A and dashes appear on the display to indicate that no channel has been selected for A.

1. Press the A/B key (21) and turn the transceiver on.



2. Using the UP ARROW key (13) and DOWN ARROW key (14), enter the desired channel.
3. Press the MEM key (19) to stop displayed A blinking and display the A channel.



4. Turn the radio off and back on using the POWER/VOLUME knob (10) to return to normal radio mode.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
PUBLIC ADDRESS SET (LOUDHAILER)
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

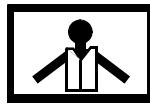
Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)

Personnel Required

Seaman 88K

OPERATING PROCEDURES - OPERATE THE PUBLIC ADDRESS SET (LOUDHAILER)**LCD DISPLAY AND CONTROL KNOBS**

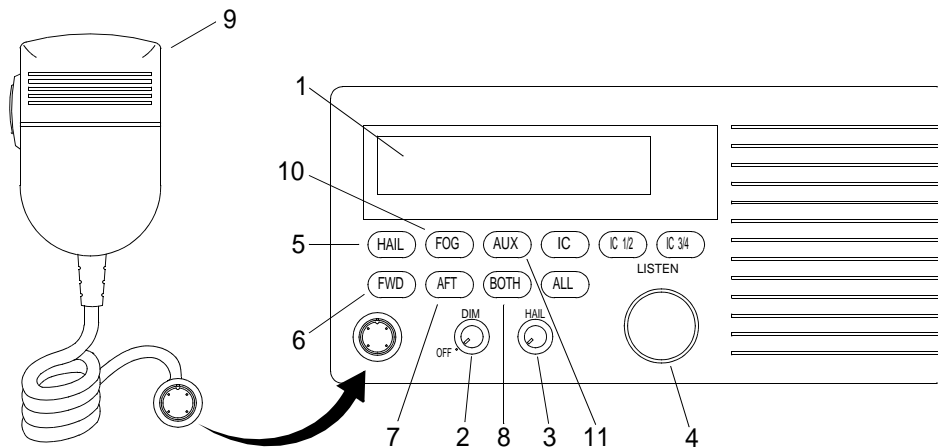
WARNING

**VEST**

All personnel must wear personal flotation device during WT operations and maintenance. Failure to observe this precaution could result in serious injury or death.

NOTE

The LCD display (1) shows the operation status of the loudhailer in bright bold letters. The display is illuminated in a blue green color with adjustable backlighting for optimal viewing in all light conditions.

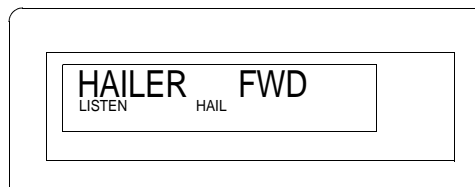


1. Turn power on or off and control the display lighting level.
 - a. Rotate the ON/OFF/DIM control knob (2) clockwise to turn the loudhailer on. Adjust ON/OFF/DIM control knob (2) to adjust the display lighting level.
 - b. Rotate the ON/OFF/DIM control knob (2) counterclockwise to turn the loudhailer off.

2. Adjust the volume level to the hailer horns.
 - a. Turn the HAIL volume control knob (3) clockwise to increase the volume to the hailer horns.
 - b. Turn the HAIL volume control knob (3) counterclockwise to reduce the volume to the hailer horns.
3. Adjust the listening volume.
 - a. Turn the LISTEN volume control knob (4) clockwise to increase the volume.
 - b. Turn the LISTEN volume control knob (4) counterclockwise to decrease the volume.

OPERATING IN THE LOUDHAILER MODE

1. Press the HAIL key (5). The loudhailer is now in the HAIL mode. HAILER appears in the LCD display operating mode window.



2. Press the FWD speaker key (6), AFT speaker key (7) or BOTH (8) to select the forward speaker, aft speaker or both, as applicable. FWD, AFT or BOTH will appear in the LCD display speaker station window.
3. Press the microphone PUSH TO TALK switch (9). TALK will appear in the LCD display speaker station window.
4. Adjust the HAIL volume knob (3) to the desired sound level.

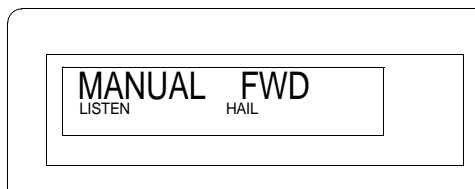
OPERATING IN THE FOG MODE

1. Press the FOG key (10) to select the type of fog signal to be transmitted. Repeatedly pressing the key will allow access to nine different fog signals. The type of fog alarm will appear in the LCD display.

NOTE

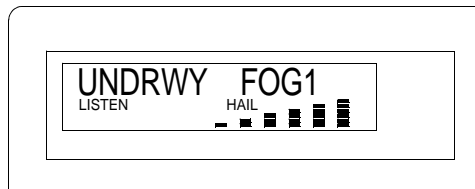
The manual type of fog signal is a manually controlled signal used as a horn signal for passing, etc. as described in 'Rules of the Road' - Section 35.

2. Select manual type of fog signal. In this mode, the horn sounds when the microphone is pressed. The length and timing of the horn blasts are controlled with the PUSH TO TALK switch (9).



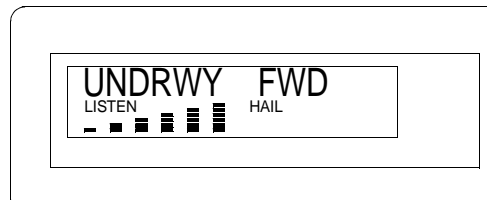
- a. Press the PUSH TO TALK switch (9) to sound the horn. MANUAL will appear in the LCD display.
- b. Control the length and timing of the horn blasts by pushing and releasing the PUSH TO TALK switch (9).

3. Select UNDERWAY FOG for a programmed automatic fog signal used to signal when a powered vessel is underway. UNDRWY and FOG 1 will appear in the display when selected.

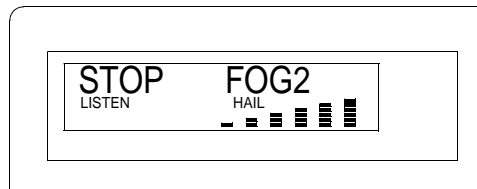


NOTE

After one second FOG 1 will disappear and UNDRWY and FWD will appear. The FOG 1 alarm pattern is one 5 second blast at 2 minute intervals.

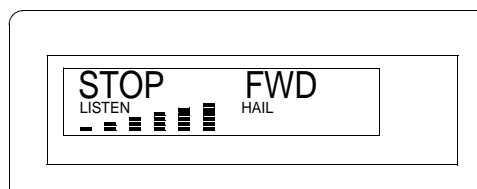


4. Select STOP FOG 2 for a programmed automatic fog signal used to signal that a vessel is not moving. STOP and FOG 2 will appear in the display when selected.

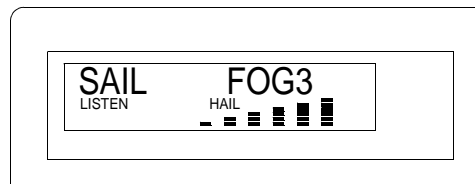


NOTE

After one second FOG 2 will disappear and STOP and FWD will appear. The FOG 2 alarm pattern is: Two 5 second blasts, with a 2 second interval between each blast repeated every 2 minutes.

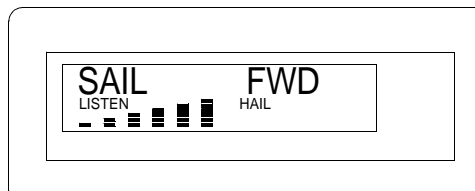


5. Select SAIL FOG 3 for a programmed automatic fog signal for sailboats, fish boats or towboats. SAIL and FOG 3 will appear in the display when selected.

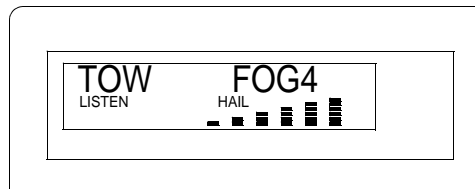


NOTE

After one second FOG 3 will disappear and SAIL and FWD will appear. The FOG 3 alarm pattern is: One 5 second blast followed by two 1 second blasts, at 2 second intervals, repeated every 2 minutes.

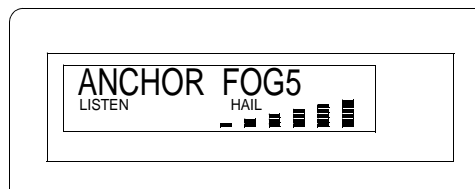


6. Select TOW FOG 4 for a programmed automatic fog signal used to signal that a vessel is under tow. TOW and FOG 4 will appear in the display when selected.

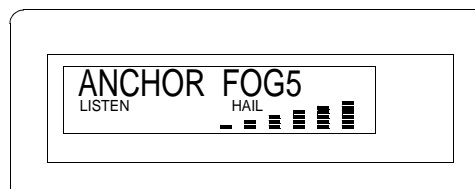


NOTE

After one second FOG 4 will disappear and TOW and FWD will appear. The FOG 4 alarm pattern is: One 5 second blast followed by three 1 second blasts, at 2 second intervals, repeated every 2 minutes.

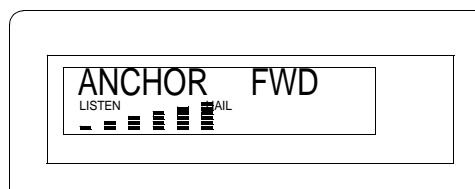


7. Select ANCHOR FOG 5 for a programmed automatic fog signal for a vessel at anchor. ANCHOR and FOG 5 will appear in the display when selected.

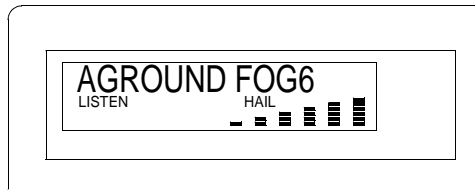


NOTE

After one second FOG 5 will disappear and ANCHOR and FWD will appear. The FOG 5 alarm pattern is: A rapidly ringing bell tone will sound for a duration of at least 5 seconds, with a repetition interval not to exceed 1 minute.

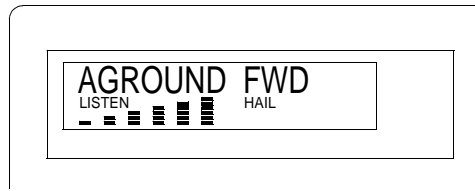


- Select AGROUND FOG 6 for a programmed automatic fog signal for a vessel aground. AGROUND and FOG 6 will appear in the display when selected.

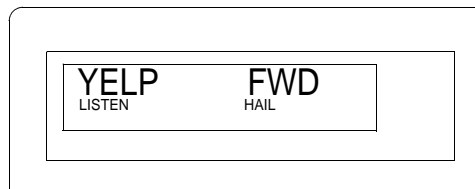


NOTE

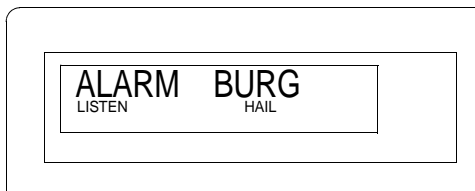
After one second FOG 6 will disappear and AGROUND and FWD will appear. The FOG 6 alarm pattern is: Three bell tone sounds, at 1 second intervals, followed by a rapidly ringing bell for a duration of 5 seconds, followed again by three bell tone sounds, at 1 second intervals. This signal is repeated once every minute.



- Select YELP for a manually activated signal for regulatory vessels such as: Police, Fish and Game, US Coast Guard, etc. YELP will appear in the display when selected. Press the PUSH TO TALK switch (9) on the microphone to create the YELP sound.

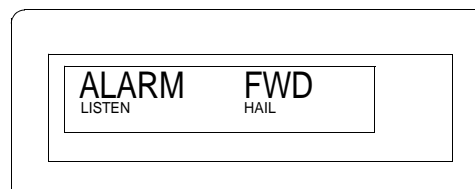


- Select ALARM for an automatic signal used as a burglar alarm when activated. ALARM will appear in the display when selected.



NOTE

After one second ALARM will disappear and ALARM and FWD will appear. An external, normally open type, sensor is required to operate this feature. This feature is not used on the mobile causeway.



- Select AUX to allow the crew to monitor the VHF/FM DSC transceiver when not in the operators cab. VHF/FM radio transmissions received are broadcast through the hailer horns.



NOTE

The speaker station display indicates which speaker station has been selected; FWD, AFT, BOTH or ALL (not used). In the FOG mode the speaker station display will temporarily indicate which FOG mode number has been selected when the FOG key is pushed. One second later, the normal speaker station selection will reappear.

12. Press the microphone PUSH TO TALK key (9) in the HAIL or INTERCOM modes and ensure that TALK appears in the speaker station display confirming that voice transmission is possible by speaking into the microphone.



OPERATING IN THE AUXILIARY MODE

1. Press the PUSH TO TALK switch (9) on the microphone to control manual operation. Manual operation is used for MANUAL and YELP modes only.
2. Press the FWD speaker key (6) to select the forward speaker, AFT speaker key (7) to select the aft speaker or BOTH (8) to select both forward and aft speakers, as applicable. FWD, AFT or BOTH will appear in the LCD display speaker station window.
3. Adjust the HAIL volume knob (3) to the desired sound level.
4. Press the AUX key (11). The loudhailer is now in the AUX mode. AUX appears in the LCD display operating mode window.
5. Press the FWD speaker key (6) to select the forward speaker, AFT speaker key (7) to select the aft speaker or BOTH (8) to select both forward and aft speakers, as applicable. FWD, AFT or BOTH will appear in the LCD display speaker station window.
6. Adjust the HAIL volume knob (3) to the desired sound level.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
AN/VRC-88D SINGGARS RADIO
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)

Personnel Required

Seaman 88K

References

TM 11-5820-890-10-8

OPERATING PROCEDURES - OPERATE THE AN/VRC-88D SINGGARS RADIO

WARNING



VEST

All personnel must wear personal flotation device during WT operations and maintenance. Failure to observe this precaution could result in serious injury or death.

Refer to the AN/VRC-88D SINGGARS Radio Operators Manual, TM 11-5820-890-10-8, for operating procedures.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
VHF/FM DSC TRANSCEIVER
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:

Tools

Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)

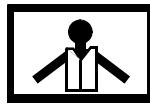
Personnel Required

Seaman 88K

OPERATING PROCEDURES - PERFORM INITIAL SETUP OF THE VHF/FM DSC TRANSCEIVER

ENTER USER DIGITAL SELECTIVE CALL (DSC) ID NUMBER

WARNING



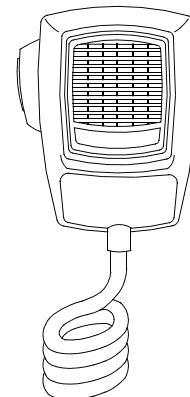
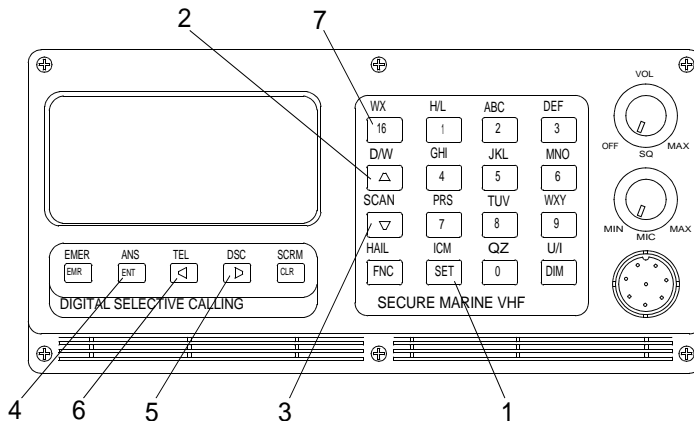
VEST

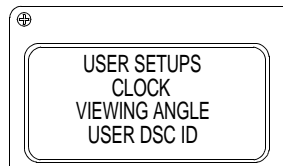
All personnel must wear personal flotation device during WT operations and maintenance. Failure to observe this precaution could result in serious injury or death.

NOTE

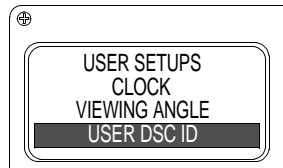
A Ship Station Identity number may be entered or changed only one time. Any further attempts to change the number will cause USER DSC ID CAN NO LONGER BE CHANGED to appear in the display and the last ID number entered will become permanent. The transceiver must be returned to the factory or authorized dealer to clear this condition.

1. To enter your Ship Station Identity number, press the SET key (1). The USER SETUPS menu will appear.

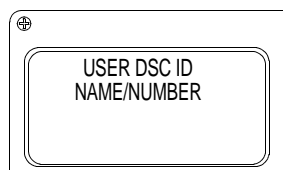




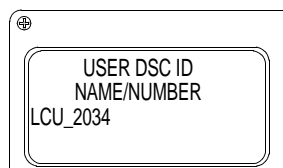
2. Press the UP ARROW KEY (2) or DOWN ARROW key (3) to select USER DSC ID with the selection bar.



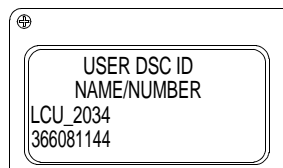
3. Press the ENT key (4). Ensure that the DSC ID, NAME/NUMBER page appears with the lower two lines of the display showing dashes unless a name and number have been previously entered.



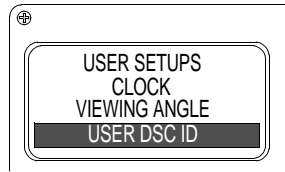
4. Enter a letter into the name line of the display.
- Press the appropriate number key repeatedly until the desired letter or the number appears in the character position.
 - Press the next key to be entered and the entry point will move to the next position automatically.
 - Press the RIGHT ARROW key (5) to move the entry point to the next character position if more than one letter from the same key must be entered in succession.
 - Press the LEFT ARROW key (6) to backspace and correct an entry if necessary.
 - Press the DOWN ARROW key (3) to move the entry point to the ID number line when the name is complete.



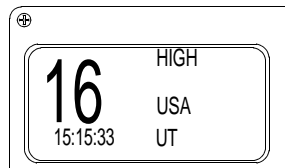
5. Press the appropriate number keys to enter the Ship Station Identification number. To correct an entry, press the LEFT ARROW key (6) to backspace. To skip a digit, press the RIGHT ARROW key (5).



6. When all information is displayed correctly, press the ENT key (4) to complete the operation and return to the USER SETUPS menu.



7. Press the WX key (7) to return to normal operation.



8. Perform user setups. (WP 0030 00)

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
VHF/FM DSC TRANSCEIVER
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:

Tools

Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)

Personnel Required

Seaman 88K

OPERATING PROCEDURES - OPERATE THE VHF/FM DSC TRANSCEIVER

MODEL IDENTIFICATION

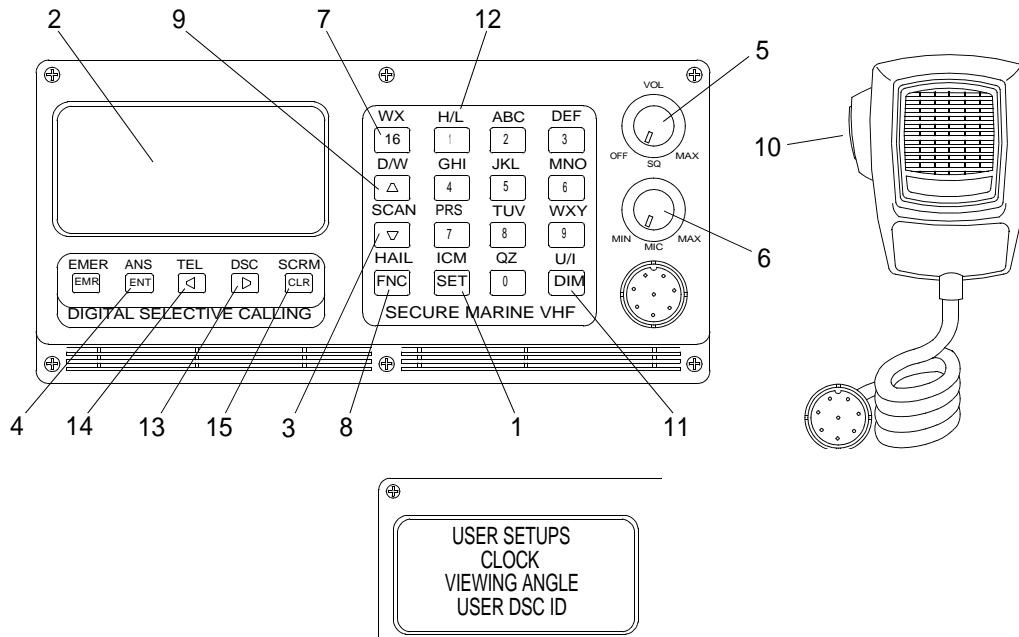
WARNING



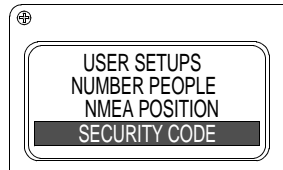
VEST

All personnel must wear personal flotation device during WT operations and maintenance. Failure to observe this precaution could result in serious injury or death.

- To determine the type of transceiver installed, military specification or non-military specification, press the SET key (1). The USER SETUPS menu will appear in the LCD display (2).



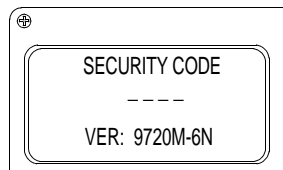
2. Press the DOWN ARROW key (3) until SECURITY CODE is highlighted.



NOTE

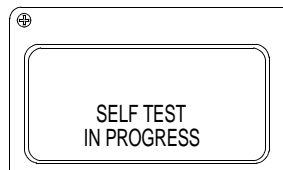
A software version number appears on the bottom line of the display. The letter “M” after the four numerical digits denotes that the transceiver has been manufactured to military specification. Absence of the letter “M” denotes that the transceiver has not been manufactured to military specification.

3. Press the ENT key (4).



POWER ON AND VOLUME

1. Rotate the VOLUME KNOB (5) clockwise to turn the power on.



2. Rotate the knob further clockwise to adjust the audio output level. If a self-test fails, a message describing the failure will be displayed.

POWER OFF

1. Rotate the knob further counterclockwise to decrease the audio output level.
2. Rotate the VOLUME KNOB (5) counterclockwise until it clicks to turn the power off. The display becomes blank and the transceiver does not receive any calls.

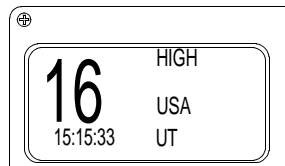
SQUELCH

1. Rotate the SQUELCH KNOB (6) counterclockwise until background noise is heard.
2. Adjust the knob clockwise until slightly beyond the point where noise is muted.

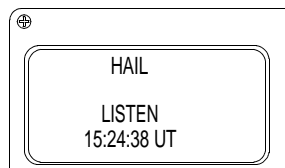
PRIMARY MODE**NOTE**

The PRIMARY mode is the basic communication mode of the transceiver. In voice contacts, both calling and routine communications use the PRIMARY mode. Even when a DSC call is placed or received, the routine communications that follow the DSC operations use the PRIMARY mode.

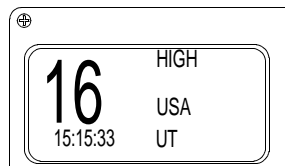
1. Press the 16 key (7), and any function, active or pending, is canceled and the PRIMARY mode display appears with channel 16 selected.



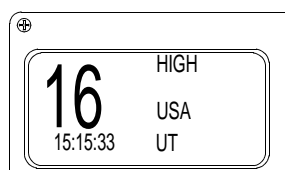
2. Press two channel number keys, and in all modes, except open edits where alphanumeric entry is expected. Pressing two channel number keys invokes the PRIMARY mode and selects the entered channel number.
3. Press the function keys for the current active mode again. For example, to select the HAIL mode, press the FNC/HAIL key (8) twice. The HAIL display appears.



4. To cancel the HAIL mode, press the FNC/HAIL key (8) twice again and the PRIMARY mode display will appear.

**CHANGING CHANNELS**

1. To select the calling and safety channel, press the 16 key (7). The PRIMARY mode display appears with channel 16 selected as the working channel.

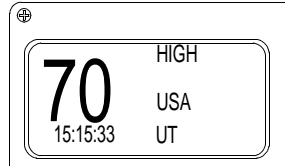


2. To select a working channel, press the UP ARROW key (9) or DOWN ARROW key (3) or two number keys for the desired channel when the PRIMARY mode is active.

NOTE

If the transceiver has another mode active, the scan menu for example, two options are available to select a new channel.

- Pressing the functions keys for the active mode returns to the PRIMARY mode with the current working channel active. Press the arrow keys or two number keys to select the desired channel.

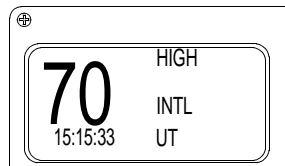
**TRANSMITTING**

- To transmit, hold the microphone near your lips and press the PUSH TO TALK button (10) on the microphone.
- If a bad antenna condition is detected, the alarm message ANT FAULT appears in the lower line of the display as long as transmission is attempted. Note that the transceiver continues to attempt transmission even though the alarm message appears.

USA OR INTERNATIONAL FREQUENCIES**NOTE**

The DSC may be operated on either the USA or INTERNATIONAL frequencies. The current selection appears in the PRIMARY mode display.

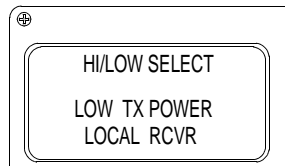
- To change the current frequency set, press the FNC key (8) and U/I key (11) while the PRIMARY mode is active. The annunciator toggles between USA and INTL each time the keys are pressed.



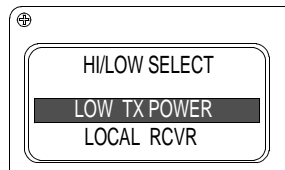
- Press the FNC key (8) and U/I key (11) to toggle the annunciator between USA and INTL.

TRANSMITTER POWER SETTING

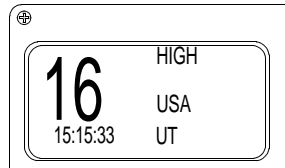
- To change the current power setting, select the PRIMARY mode. Press the FNC key (8) and H/L key (12). The HI/LOW SELECT menu appears in the display.



- Press the UP ARROW key (9) or DOWN ARROW key (3) to position the selection bar on TX POWER. Observe that the setting appearing in the display is the opposite of the current setting.



- Press the ENT key (4).



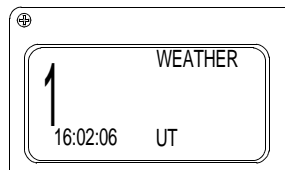
NOTE

The transmit power control for channels 13 and 67 operate differently than all others. These channels are normally low power and the power setting cannot be changed.

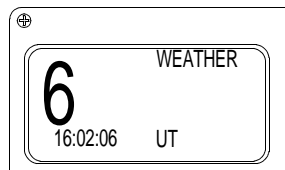
- To transmit on high power, the FNC key (8) and H/L (12) keys must be pressed and held while the microphone's PUSH TO TALK button (10) is pressed. The HIGH annunciator appears in the display while transmitting at 25 watts.

WEATHER

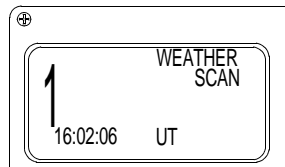
- Press the FNC key (8) and WX key (7) to receive recorded weather broadcasts. The WEATHER display will appear and the last used channel will be selected.



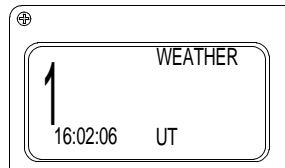
- Press the UP ARROW key (9), DOWN ARROW key (3) or a number key to select a different weather channel.



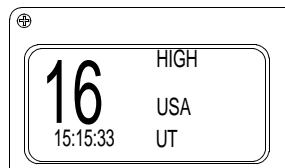
- Press the FNC key (8) and SCAN key (3) to scan all weather channels.



- Press the UP ARROW key (9) to force scanning to resume. To stop scanning and return to a weather channel, press the FNC key (8) and SCAN key (3) again.

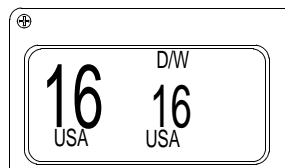


- To return to the PRIMARY mode, press the FNC key (8) and WX key (7). To select any other mode, press the function key(s) for that mode.



DUAL WATCH

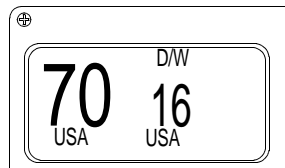
- Press the FNC key (8) and D/W key (9). The current working channel and last used priority channel numbers appear in the display.



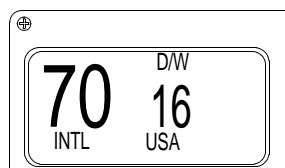
NOTE

The priority channel number appears in the smaller center digits of the display. The larger digits on the left of the display show the working channel. When activity is detected on the priority channel, the priority channel becomes the active channel. This will occur whether or not there is activity on the working channel. The radio will transmit only on the channel number displayed in the larger digits.

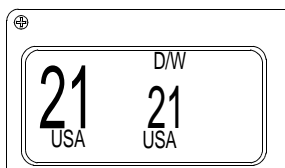
- Pressing the PUSH TO TALK button (10) will cancel the DUAL WATCH mode.
- To change the working channel, press the UP ARROW key (9) or DOWN ARROW key (3) or appropriate number keys to select a working channel. A three beep tone will sound if an invalid channel is selected.



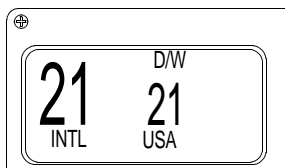
- Press the FNC key (8) and U/I key (11) to change between USA and INTL frequencies.



- To select or change the priority channel, press the RIGHT ARROW key (13). The smaller priority channel digits will begin flashing. The scan is halted while the digits are flashing. Press the UP ARROW key (9) or DOWN ARROW key (3) or appropriate number keys to select a priority channel.



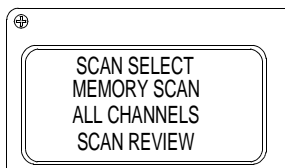
- Press the FNC key (8) and U/I key (11) to change between USA and INTL frequencies for the priority channels. Press the LEFT ARROW key (14) or RIGHT ARROW key (13) to complete the priority channel selection.



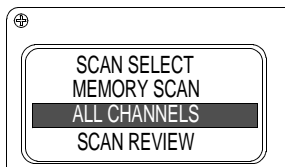
- Pressing the PUSH TO TALK button (10) on either channel will cancel the DUAL WATCH mode.
- Press the 16 key (7) to return to the PRIMARY mode.

ALL CHANNEL SCAN

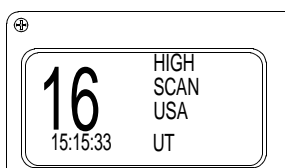
- Press the FNC key (8) and SCAN key (3). The SCAN SELECT display will appear.



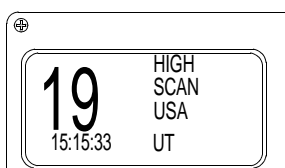
- Press the UP ARROW key (9) or DOWN ARROW key (3) to select ALL CHANNELS with selection bar.



- Press the ENT key (4) to initiate channel scanning. All channels will be scanned in sequence.



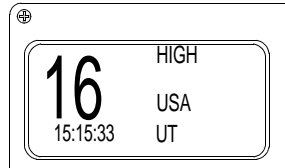
- Press the UP ARROW key (9) to override the active channel and resume scanning.



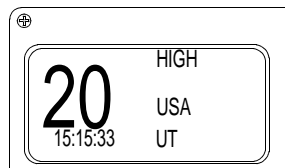
- Pressing the PUSH TO TALK button (10) or entering a channel number will cancel the ALL CHANNEL SCAN mode and select the PRIMARY mode.

SCAN MEMORY

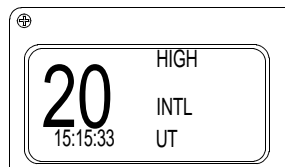
- Press the 16 key (7) to select the calling channel. The PRIMARY mode display will appear.



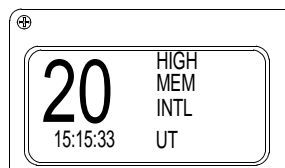
- Press the UP ARROW key (9) or DOWN ARROW key (3) or appropriate number keys to select a desired channel.



- Press the FNC key (8) and U/I key (11) to change between USA and INTL frequencies, if necessary.



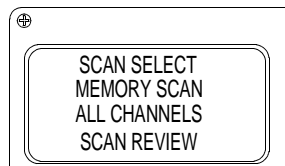
- Press the ENT key (4) to enter the selected channel into Scan Memory. MEM will appear in the display.



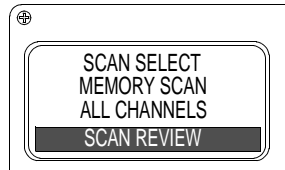
- Press the CLR key (15) to remove a previously selected channel from SCAN MEMORY. MEM will not appear in display.

SCAN REVIEW

- Press the FNC key (8) and SCAN key (3). The SCAN SELECT display will appear.



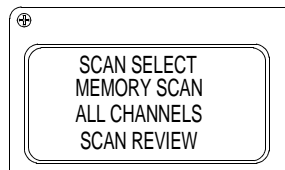
- Press the UP ARROW key (9) or DOWN ARROW key (3) to select SCAN REVIEW with selection bar.



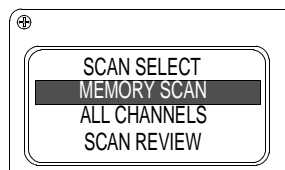
- Press the ENT key (4) to initiate SCAN REVIEW. Each channel in SCAN MEMORY will be displayed for 1 second. Two beeps will sound at the end of the list.

MEMORY SCAN

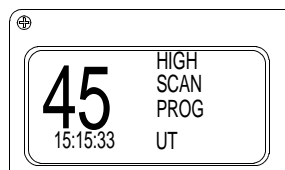
- Press the FNC key (8) and SCAN key (3). The SCAN SELECT display will appear.



- Press the UP ARROW key (9) or DOWN ARROW key (3) to select MEMORY SCAN with selection bar.



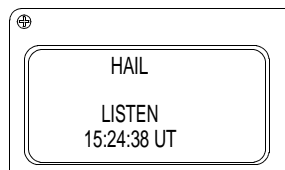
- Press the ENT key (4) to initiate scanning. Only channels previously assigned to SCAN MEMORY will be scanned. Press the UP ARROW key (9) to override an active channel and resume scanning.



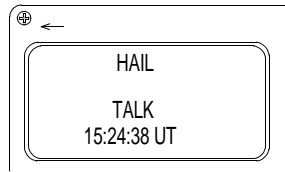
- Press the CLR key (15) while the scan is stopped on the channel this will remove an excessively active channel from SCAN MEMORY.
- Pressing the PUSH TO TALK button (10) or entering a channel number will cancel the MEMORY SCAN mode and select the PRIMARY mode. If the channel number is valid, the channel entered will be selected. If not valid, the channel being scanned at the first number key entry will become active.

HAIL

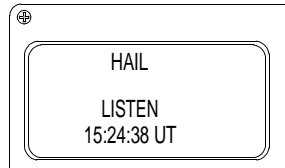
- Press FNC/HAIL key (8) to select the HAIL mode.



- Press the PUSH TO TALK button (10) to speak through the hail speaker. TALK will appear in the display.



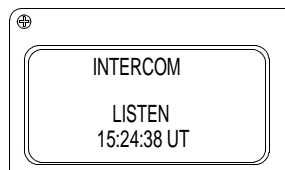
- Release the PUSH TO TALK button (10) to listen through hail speaker. LISTEN will appear in the display.



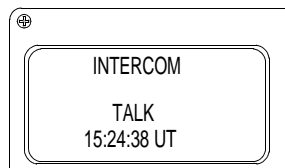
- Use the VOLUME KNOB (5) to adjust the talk and listen levels. Press the FNC/HAIL key (8) again or enter a valid channel number to exit the HAIL mode and resume PRIMARY mode operation.

INTERCOM

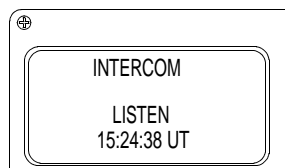
- Press the FNC key (8) and ICM key (1) to select the INTERCOM mode. The INTERCOM display will appear.



- Press the PUSH TO TALK button (10) to speak through the intercom speaker. TALK will appear in the display.



- Release the PUSH TO TALK button (10) to listen through intercom speaker. LISTEN will appear in the display.



- Use the VOLUME KNOB (5) to adjust the talk and listen levels. Press the FNC key (8) and ICM key (1) again or enter a valid channel number to exit the INTERCOM mode and resume PRIMARY mode operation.

Table 1. VHF Marine Channels and Frequencies.

CHAN NUMB	SIMP USA	DUP INTL	USA CHANNEL ASSIGNMENT	INTL CHANNEL ASSIGNMENT	RECEIVE (USA) FREQ. MHZ	RECEIVE (INTL) FREQ. MHZ	TRANSMIT FREQ. MHZ
01	S	D	Port Operations	Port Operations	156.050	160.650	156.050
02	S	D	Port Operations	Port Operations	156.100	160.700	156.100
03	S	D	Intership & Coast-Coast	Public Correspondence	156.150	160.750	156.150
04	S	D	Port Operations	Port Operations	156.200	160.800	156.200
05	S	D	Port Ops. (Intership/ Ship-Coast)	Port Operations	156.250	160.850	156.250
06	S	S	Ship-Ship Safety Only	Intership Safety	156.300	156.300	156.300
07	S	D	Commercial (Intership/ Ship-Coast)	Public Correspondence	156.350	160.950	156.350
08	S	S	Commercial (Intership)	Commercial	156.400	156.400	156.400
09	S	S	Comm./Non Comm. (Intership/ Ship-Coast)	Port Operations	156.450	156.450	156.450
10	S	S	Commercial (Intership/ Ship-Coast)	Port Operations	156.500	156.500	156.500
11	S	S	Commercial (Intership/ Ship-Coast)	Port Operations	156.550	156.550	156.550
12	S	S	Port Operations (Intership/ Ship-Coast)	Port Operations	156.600	156.600	156.600
13	S	S	Navigation (Ship-Ship)	Port Operations	156.650	156.650	156.650
14	S	S	Port. Ops. (Intership/ Ship-Coast)	Port Operations	156.700	156.700	156.700
15	S	S	Environmental	On-Board Communications	156.750	156.750	156.750
16	S	S	Distress, Safety, and Calling	Distress, Safety, and Calling	156.800	156.800	156.800
17	S	S	State Control	On-Board Communications	156.850	156.850	156.850

Table 1. VHF Marine Channels and Frequencies. (Continued)

CHAN NUMB	SIMP USA	DUP INTL	USA CHANNEL ASSIGNMENT	INTL CHANNEL ASSIGNMENT	RECEIVE (USA) FREQ. MHZ	RECEIVE (INTL) FREQ. MHZ	TRANSMIT FREQ. MHZ
18	S	D	Commercial (Intership/ Ship-Coast)	Port Operations	156.900	161.500	156.900
19	S	D	Commercial (Intership/ Ship-Coast)	Port Operations	156.950	161.550	156.950
20	D	D	Port Ops. (Intership/ Ship-Coast)	Port Operations	161.600	161.600	157.000
21	S	D	U. S. Government Only	Port Operations	157.050	161.650	157.050
22	S	D	Coast Guard Only	Port Operations	157.100	161.700	157.100
23	S	D	U. S. Government Only	Public Correspondence	157.150	161.750	157.150
24	D	D	Public Correspondence (Ship-Coast)	Public Correspondence	161.800	161.800	157.200
224	D	D	-	-	161.8125	161.8125	157.2125
25	D	D	Public Correspondence (Ship-Coast)	Public Correspondence	161.850	161.850	157.250
225	D	D	-	-	161.8625	161.8625	157.2625
26	D	D	Public Correspondence (Ship-Coast)	Public Correspondence	161.900	161.900	157.300
226	D	D	-	-	161.9125	161.9125	157.3025
27	D	D	Public Correspondence (Ship-Coast)	Public Correspondence	161.950	161.950	157.350
227	D	D	-	-	161.9625	161.9625	157.3625
28	D	D	Public Correspondence (Ship-Coast)	Public Correspondence	162.000	162.000	157.400
228	D	D	-	-	162.0125	162.0125	157.4125
60	D	D	-	Port Operations	160.625	160.625	156.025
61	D	D	-	Port Operations	160.675	160.675	156.075

Table 1. VHF Marine Channels and Frequencies. (Continued)

CHAN NUMB	SIMP USA	DUP INTL	USA CHANNEL ASSIGNMENT	INTL CHANNEL ASSIGNMENT	RECEIVE (USA) FREQ. MHZ	RECEIVE (INTL) FREQ. MHZ	TRANSMIT FREQ. MHZ
62	D	D	Public Correspondence	Public Correspondence	160.725	160.725	156.125
63	S	D	Port Operations	Port Operations	156.175	160.775	156.175
64	D	D	-	-	160.825	160.825	156.225
65	D	D	Port Ops. (Intership/ Ship-Coast)	Special Emergency	156.275	160.875	156.275
66	S	D	Port Ops. (Intership/ Ship-Coast)	-	156.325	160.875	156.325
67	S	S	Commercial Miss. River	Port Operations	156.375	157.375	157.375
68	S	S	Non-Commercial	Port Operations	156.425	156.425	156.425
69	S	S	Non-Commercial	Port Operations	156.475	156.475	156.475
70	S	S	Digital Selective Calling	Commercial	156.525	156.525	156.525
71	S	S	Non-Commercial	Port Operations	156.575	156.575	156.575
72	S	S	Non-Commercial	Commercial	156.625	156.625	156.625
73	S	S	Port Ops. (Intership/ Ship-Coast)	Port Operations	156.675	156.675	156.675
74	S	S	Port Ops. (Intership/ Ship-Coast)	Port Operations	156.725	156.725	156.725
75	S	S	Guard Channel	-	156.775	156.775	156.775
76	S	S	Guard Channel	-	156.825	156.825	156.825
77	S	S	Port Ops. (Intership)	Commercial	156.875	156.875	156.875
78	S	D	Non. Commercial	Port Operations	156.925	161.525	156.925
79	S	D	Commercial	Port Operations	156.975	161.575	156.975
80	S	D	Commercial	Port Operations	157.025	161.625	157.025
81	S	D	U. S. Government Only	Port Operations	157.075	161.675	157.075
82	S	D	U. S. Government Only	Port Operations	157.125	161.725	157.125

Table 1. VHF Marine Channels and Frequencies. (Continued)

CHAN NUMB	SIMP USA	DUP INTL	USA CHANNEL ASSIGNMENT	INTL CHANNEL ASSIGNMENT	RECEIVE (USA) FREQ. MHZ	RECEIVE (INTL) FREQ. MHZ	TRANSMIT FREQ. MHZ
83	S	D	U. S. Government Only	Public Correspondence	157.175	161.775	157.175
283	D	D	-	-	161.7875	161.7875	157.1875
84	S	D	U. S. Government Only	Public Correspondence	157.275	161.825	157.225
284	D	D	-	-	161.8375	161.8375	157.2375
85	D	D	Public Correspondence (Ship-Coast)	Public Correspondence	161.875	161.875	157.275
285	D	D	-	-	161.8875	161.8875	157.2875
86	D	D	Public Correspondence (Ship-Coast)	Public Correspondence	161.925	161.925	157.325
286	D	D	-	-	161.9375	161.9375	157.3375
87	D	D	Public Correspondence (Ship-Coast)	Public Correspondence	161.975	161.975	157.375
287	D	D	-	-	161.9875	161.9875	157.3875
88	S	D	Commercial (Intership)	Public Correspondence	157.425	162.025	157.425

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
VHF/FM DSC TRANSCEIVER
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:

Tools

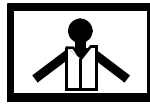
Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)

Personnel Required

Seaman 88K

**OPERATING PROCEDURES - PERFORM USER SETUPS FOR THE
VHF/FM DSC TRANSCEIVER**

WARNING



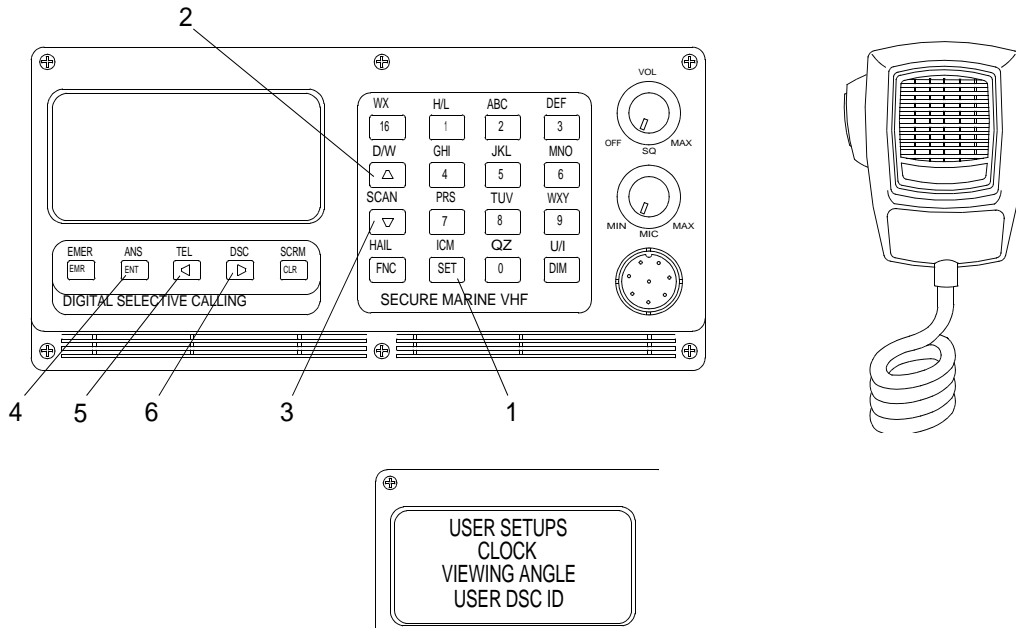
VEST

All personnel must wear personal flotation device during WT operations and maintenance. Failure to observe this precaution could result in serious injury or death.

NOTE

USER SETUPS allow certain characteristics of the DSC to be set or changed according to the user's preference. Once the preferences have been set, they will be retained in memory until again changed by the user.

1. Press the SET key (1). The USER SETUPS menu will appear.



2. Press the UP ARROW key (2) or DOWN ARROW key (3) to position the selection bar on the desired selection.
3. Press the ENT key (4) to complete the selection. The appropriate setup page will appear.
4. Press LEFT ARROW key (5) or RIGHT ARROW key (6) to select the character to be changed.
5. Press the UP ARROW key (2), DOWN ARROW key (3) or a NUMBER KEY to change a value.

NOTE

If the ENT key is not pressed to complete an operation, the new setup information will not be remembered.

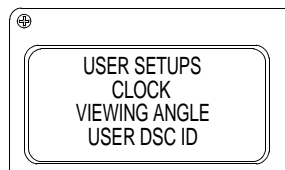
6. Press the ENT key (4) to complete the operation and return to the USER SETUPS menu.

CLOCK SETUP

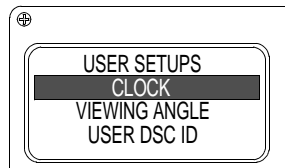
NOTE

The CLOCK SETUP page allows the user to choose how the time of day will appear in certain displays. The time may be displayed as either local time or UTC time. Local time may be displayed in AM/PM or 24 hour format. UTC time is always displayed in 24 hour format.

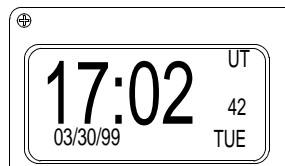
1. Press the SET key (1). The USER SETUPS menu will appear.



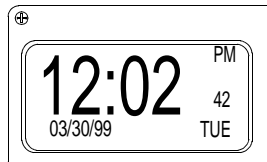
2. Press the UP ARROW key (2) to highlight CLOCK.



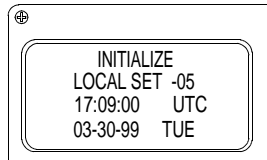
3. Press the ENT key (4). The CLOCK display will appear. The date and day of the week appear in the lower line of the display. The large digits display the hours and the minutes. Seconds are displayed to the lower right. The two letters in the upper right hand corner of the display indicate how the time is displayed. AM or PM indicates 12 hour format, MT indicates 24 hour military format and UT indicates Universal Coordinated Time. Universal Coordinated Time (UTC) has been known as Greenwich Mean Time (GMT) or Zulu time.



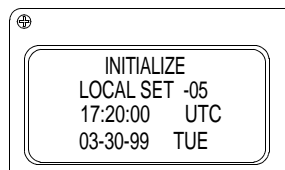
4. Press either the UP ARROW key (2), DOWN ARROW key (3), LEFT ARROW key (5) or RIGHT ARROW key (6) to change between AM/PM or MT or UT.



5. Press the CLR key (7). The INITIALIZE page will appear to change the time, date, day of week, or local offset from UTC,. The UTC time, date and day of the week appear in the lower two lines of the display. The LOCAL SET line in the display show the offset from UTC to local time as + or D the number of hours from your location to the Greenwich meridian. The + or D sign will be flashing.



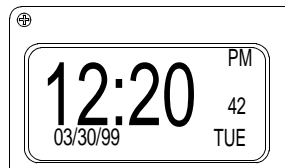
6. Press the UP ARROW key (2) to change the sign.
7. Press the RIGHT ARROW key (6) to select the next digit in the offset field. Enter the correct number of hours. As each digit is entered, the flashing digit will move to the next position.



NOTE

If this is the first time you have set the clock, you may want to set the time several minutes ahead to allow for following the instructions.

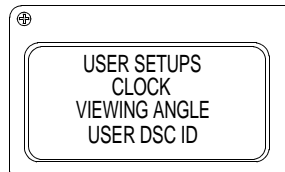
8. To correct an entry, press the LEFT ARROW key (5) to backspace.
9. To skip a digit, press the RIGHT ARROW key (6). Enter the correct UTC time in hours and minutes. As each digit is entered, the flashing digit will move to the next position.
10. After the time is set, the flashing digit will move to the first digit on the lower line of the display. Press the appropriate number keys to enter the date.
11. When the date is complete, press the UP ARROW key (2) repeatedly to select the day of the week.
12. When all information is displayed correctly, press the ENT key (4).



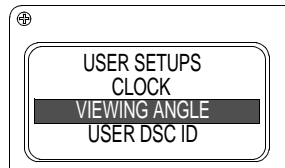
13. The UTC time will be corrected by the AN/PSN-11(V)1 PLGR if the system is operational.
14. Press the 16 key to return to the PRIMARY mode.

VIEWING ANGLE

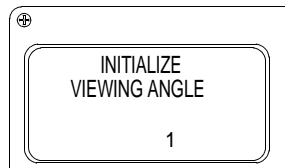
1. Press the SET key (1). The USER SETUPS menu will appear.



2. Press the UP ARROW key (2) or DOWN ARROW key (3) to select VIEWING ANGLE with the selection bar.



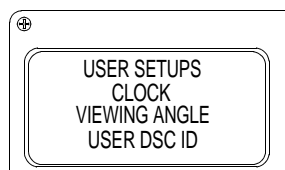
3. Press the ENT key (4). The INITIALIZE VIEWING ANGLE page will appear.



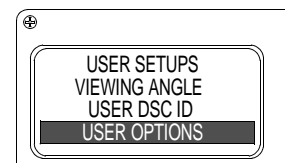
4. Press the UP ARROW key (2) or DOWN ARROW key (3) or an appropriate number key (0-7) to change the contrast between the background and the displayed character.
5. Press the ENT key (4) to complete the operation and return to the USER SETUPS menu.
6. Press the 16 key to return to the PRIMARY mode.

USER OPTIONS

1. Press the SET key (1). The USER SETUPS menu will appear.

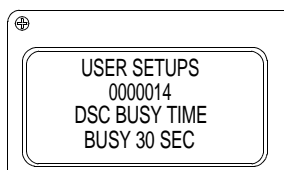


2. Press the UP ARROW key (2) or DOWN ARROW key (3) to select USER OPTIONS with the selection bar.

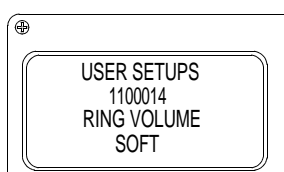


3. Press the ENT KEY (4), the USER OPTIONS page will appear with a seven digit number in the second line of the display.
4. Press the LEFT ARROW key (5) or RIGHT ARROW key (6) to select a digit position. The active digit position will flash.

5. Press the UP ARROW key (2) or DOWN ARROW key (3) repeatedly to change to the desired value.
6. Press the ENT key (4) to complete the operation and return to the USER SETUPS menu.
7. Press the RIGHT ARROW key (6) to select the first digit position.
8. Press the UP ARROW key (2) or DOWN ARROW key (3) repeatedly to change to the desired DSC BUSY TIME: The amount of time, after the release of the PUSH TO TALK button (8), that the transceiver will respond to a DSC call with a busy signal.



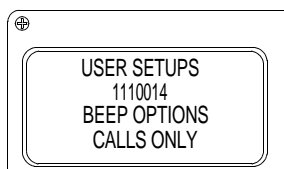
9. Press the RIGHT ARROW key (6) to select the second digit position.



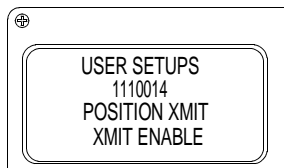
10. Press the UP ARROW key (2) or DOWN ARROW key (3) repeatedly to change to the desired ring volume.
11. Press the RIGHT ARROW key (6) to select the third digit position. Press the UP ARROW key (2) or DOWN ARROW key (3) repeatedly to change to ALL ON, CALLS ONLY or ALL OFF. The distress signal will sound with any option.

NOTE

If a distress signal is sent, position coordinates will be transmitted with either option selected, provided the AN/PSN-11(V)1 PLGR is operational.



12. Press the RIGHT ARROW key (6) to select the fourth digit position.

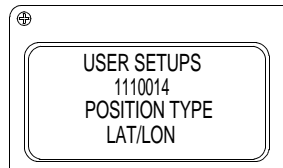


13. Press the UP ARROW key (2) or DOWN ARROW key (3) repeatedly to select POSITION XMIT or XMIT ENABLE.

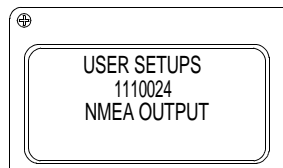
NOTE

LATITUDE/LONGITUDE should always be selected in the fifth position of the USER SETUP menu.

14. Press the RIGHT ARROW key (6) to select the fifth digit position.

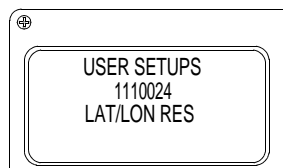


15. Press the UP ARROW key (2) or DOWN ARROW key (3) repeatedly to select POSITION XMIT or XMIT ENABLE
16. Press the RIGHT ARROW key (6) to select the sixth digit position.
17. Press the UP ARROW key (2) or DOWN ARROW key (3) repeatedly to select NMEA output sentences available from the data interface.


NOTE

Each selection provides one or more sentences to facilitate connection to plotters, displays, or personal computers. OPTION 0: Outputs the \$LCGLL sentence for any LAT/LON position received from another vessel. OPTION 1: Outputs \$CDWPL and \$CDBWC sentences for LAT/LON positions received from another vessel. OPTION 2: Repeats every 5 seconds a \$CDGLL sentence for any LAT/LON position received through the NMEA data input to the DSC. Also outputs \$CDWPL and \$CDBWC sentences each time a LAT/LON position received through the NMEA data input to the DSC. Also outputs \$CDWPL and \$CDBWC sentences each time a LAT/LON position is received from another vessel. OPTION 3: Proprietary. OPTION 4: Repeats character \$GPGGA, \$xxVTG, and \$GPGSV sentences received through the NMEA data input.

18. Press the RIGHT ARROW key (6) to select the seventh digit position.

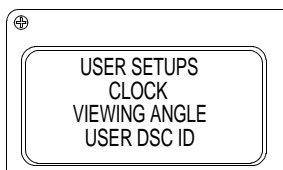


19. Press the UP ARROW key (2) or DOWN ARROW key (3) repeatedly to select LAT/LON RESOLUTION to set the number of decimal places in LAT/LON position.
20. Press the 16 key to return to the PRIMARY mode.

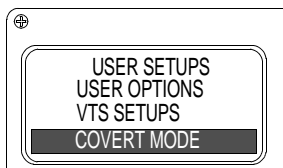
COVERT MODE**NOTE**

Only military specification transceivers are equipped with the COVERT mode option.

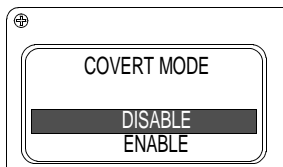
1. The COVERT mode, when enabled, prevents the DSC transceiver from being interrogated by another vessel requesting position.
2. Press the SET key (1). The USER SETUPS menu will appear.



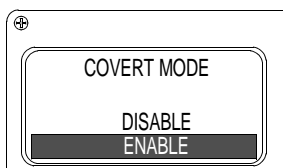
3. Press the DOWN ARROW key (3) to select COVERT mode with the selection bar.



4. Press the ENT key (4), the COVERT mode page will appear.



5. Press the DOWN ARROW key (3) to select ENABLE.

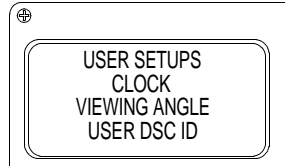


6. Press the ENT key (4). The display returns to the USER SETUPS menu.
7. Press the 16 key to return to the PRIMARY mode.

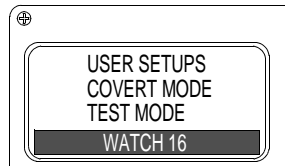
WATCH 16**NOTE**

The WATCH 16 mode, when enabled, allows the operator to select a working channel other than channel 16 while monitoring channel 16. Any activity on channel 16 will cause the transceiver to change to channel 16 until the activity ceases. The transceiver then changes back to the operator assigned working channel

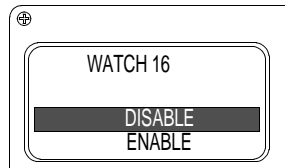
1. Press the SET key (1). The USER SETUPS menu will appear.



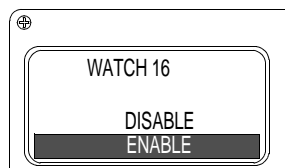
2. Press the DOWN ARROW key (3) to select WATCH 16 with the selection bar.



3. Press the ENT key (4), the WATCH 16 page will appear.



4. Press the DOWN ARROW key (3) to select ENABLE.

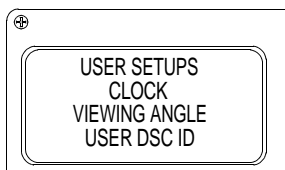


5. Press the ENT key (4). The display returns to the USER SETUPS menu.
6. Press the 16 key to return to the PRIMARY mode.

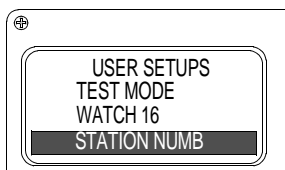
STATION NUMBER**NOTE**

Only transceivers manufactured to military specification have the STATION NUMBER mode.

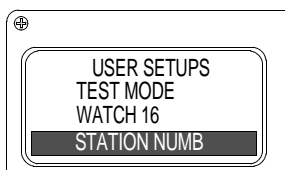
1. Press the SET key (1). The USER SETUPS menu will appear.



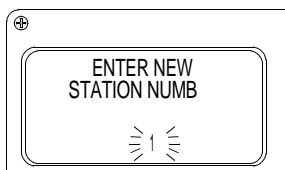
2. Press the DOWN ARROW key (3) to select STATION NUMB with the selection bar.



3. Press the ENT key (4), the STATION NUMB page will appear.



4. Enter the preferred STATION NUMBER.

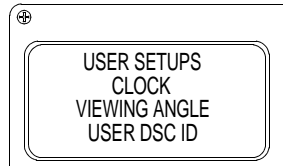


5. Press the ENT key (4). The display returns to the USER SETUPS menu.
6. Press the 16 key to return to the PRIMARY mode.

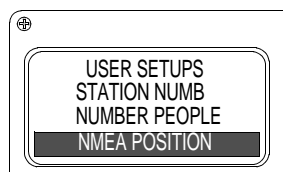
NMEA POSITION
NOTE

The NMEA POSITION function displays the position coordinates from the AN/PSN-11(V)1 PLGR.

1. Press the SET key (1). The USER SETUPS menu will appear.

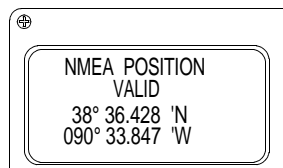


2. Press the UP ARROW key (2) or DOWN ARROW key (3) to select NMEA POSITION with the selection bar.

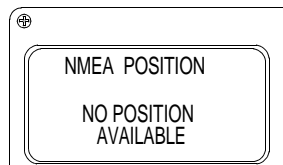
**NOTE**

The DSC protocol specifies LAT/LON coordinates for reporting. The DSC is capable of using both TD and LAT/LON coordinates, depending upon the POSITION TYPE setting on the USER OPTIONS page. Ensure that POSITION TYPE is set up for LAT/LON.

3. Press the ENT key (4). The NMEA POSITION page will appear. If position information is available from the AN/PSN-11(V)1 PLGR, the coordinates will appear.



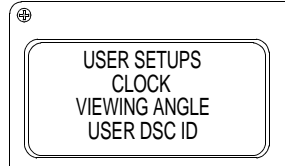
4. If position information is not available from AN/PSN-11(V)1 PLGR, NO POSITION AVAILABLE will appear in the lower two lines of the display.



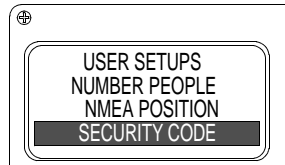
5. Press the 16 key to return to the PRIMARY mode.

SECURITY CODE

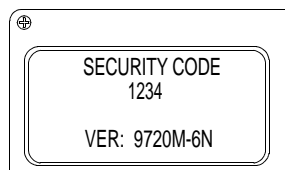
1. Press the SET key (1). The USER SETUPS menu will appear.



2. Press the UP ARROW key (2) or DOWN ARROW key (3) to select SECURITY CODE with the selection bar.

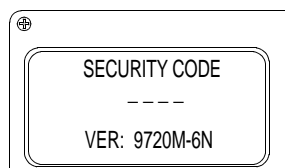


3. Press the ENT key (4). The SECURITY page will appear.

**NOTE**

Four dashes appear on the second line of the display if no code has been entered. The software version number, VER: #-#, appears in the lower line of the display. If a four digit number appears in the second line, it may be changed or deleted or left as is.

4. Press the CLR key (7) twice to clear an existing entry. Four dashes will appear in the display. To change an existing code or enter a new one, press the desired number keys. Four digits without spaces must be entered.



5. To correct an entry, press the LEFT ARROW key (5) to backspace. To skip a digit, press the RIGHT ARROW key (6).

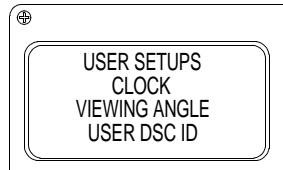
NOTE

When all information is displayed correctly, record the code number in a safe place. The next time the transceiver is turned on, you must know the code. If a security code is entered and not remembered, the transceiver's advanced features will not function. Contact manufacturer to restore the unit to full operation.

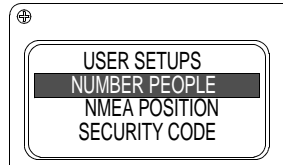
6. Press the ENT key (4) to complete the operation and return to the USER SETUPS menu.
7. Press the 16 key to return to the PRIMARY mode.

NUMBER OF PEOPLE

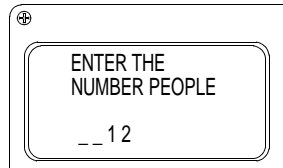
1. Press the SET key (1). The USER SETUPS menu will appear.



2. Press the UP ARROW key (2) or DOWN ARROW key (3) to select NUMBER PEOPLE with the selection bar and press the ENT key (4).



3. Enter the number of people using the digit keys on the keypad, press the ENT key (4) to save the information. This option is saved when the unit is turned off as with all USER SETUPS options.



4. Press the 16 key to return to the PRIMARY mode.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
VHF/FM DSC TRANSCEIVER
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:

Tools

Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)

Personnel Required

Seaman 88K

**OPERATING PROCEDURES - OPERATE THE DSC FUNCTIONS FOR THE
VHF/FM DSC TRANSCEIVER**

DSC MODE MENU ARRANGEMENT

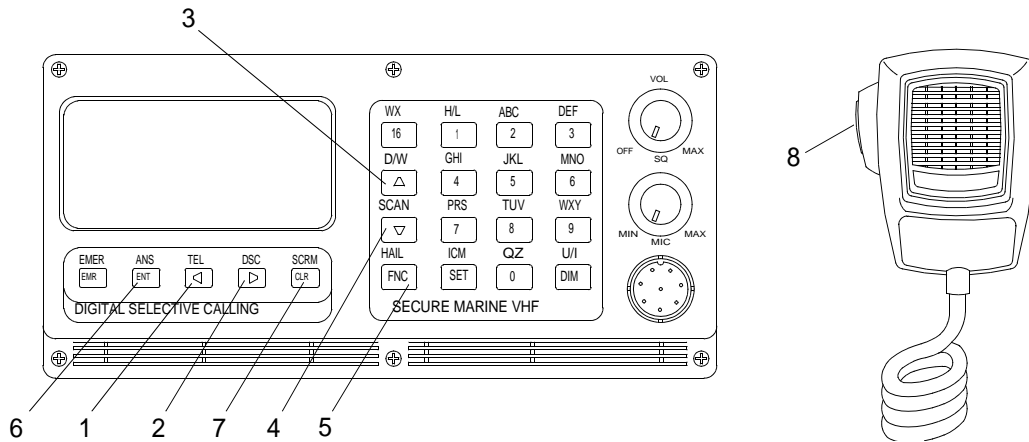
WARNING



VEST

All personnel must wear personal flotation device during WT operations and maintenance. Failure to observe this precaution could result in serious injury or death.

1. Access the DSC mode.



2. Press the LEFT ARROW key (1) to access the desired menu; DSC CALLING, DSC STANDBY, ALL SHIPS, DISTRESS DATA, GROUP POSITION, GROUP CALLING, REQUEST POSITION, and SEND POSITION.
3. Press the RIGHT ARROW key (2) to scroll through the menus and their data pages.
4. Press the LEFT ARROW key (1) to scroll through the DSC functions menu.

NOTE

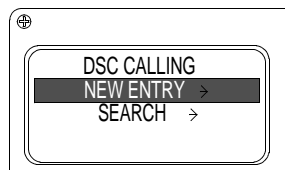
When certain selections are activated, another page will appear which either presents more information or allows the user to enter information into the page.

5. Press the UP and DOWN ARROW keys (3 and 4) to highlight the desired selection with the menu bar.

DSC CALLING DIRECTORY**NOTE**

The basic procedure for entering names and numbers into directories is the same for all directories except CALL WAITING and DISTRESS DATA. These two directories automatically receive DSC calls and do not accept user entries from the keypad. However, logged entries may be cleared as desired from the CALL WAITING directory. The contents of all directories are protected from loss by an internal memory battery.

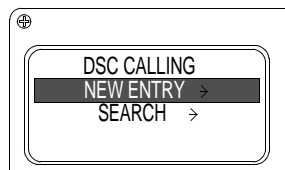
1. Press the FNC key (5) and DSC keys (2) to access the DSC CALLING directory. The DSC CALLING menu will appear in the display.



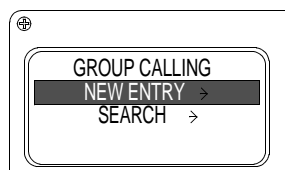
2. Select NEW ENTRY or SEARCH.

DSC GROUP CALLING DIRECTORY

1. Press the FNC key (5) and DSC keys (2) to access the DSC GROUP CALLING directory. The DSC CALLING menu will appear in the display.



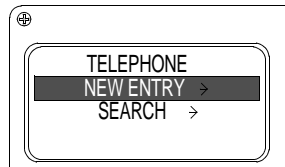
2. Press the RIGHT ARROW key (2) repeatedly until the GROUP CALLING menu is displayed.



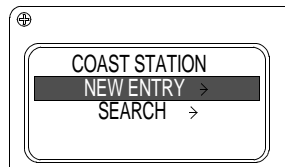
DSC COAST STATION DIRECTORY**NOTE**

The DSC COAST STATION directory will accept 50 entries of station names and their ID numbers. The name may be one to ten characters and the ID number must be nine digits. Letters, numbers and spaces may be used in the name but at least one character must be entered. An ID number without a name will not be accepted.

1. To access the DSC COAST STATION directory, press the FNC key (5) and TEL key (1). The TELEPHONE menu will appear in the display.



2. Press the RIGHT ARROW key (2). The COAST STATION menu will appear in the display.

**DSC TELEPHONE DIRECTORY****NOTE**

The DSC TELEPHONE directory will accept 200 entries of individual names and their telephone numbers. The telephone number may be up to 16 digits long, while the name may not exceed 10 characters. Letters, numbers and spaces may be used in the name but at least one character must be entered. A telephone number without a name will not be accepted. Letters are not accepted in telephone numbers.

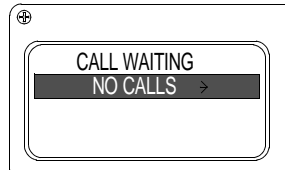
1. Press the FNC key (5) and TEL key (1) to access the DSC TELEPHONE directory. The TELEPHONE menu will appear in the display.



2. Select NEW ENTRY or SEARCH.

DSC CALL WAITING DIRECTORY

1. Press the FNC key (5) and ANS key (6) to access the DSC CALL WAITING directory. The CALL WAITING menu will appear in the display.



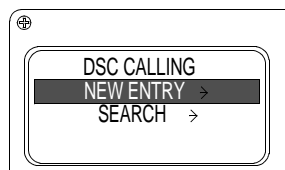
2. Select the call to be returned.

BUILDING DIRECTORIES

1. Press the FNC key (5) and TEL key (1) to select the TELEPHONE mode.



2. Access the DSC calling or group calling directories by entering the DSC mode.



3. Press the FNC key (5) and DSC key (2). When the desired mode is active, press the RIGHT ARROW key (2) to select the desired entry.

NOTE

The ENTER NEW NAME/NUMBER page will appear. Dashes will appear in the lower two lines of the display.

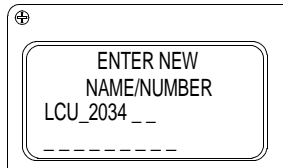


4. Press the UP ARROW key (3) or DOWN ARROW key (4) to position the selection bar on NEW ENTRY. Press the ENT key (6).

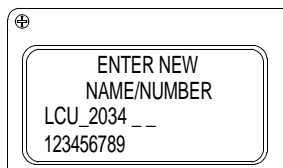
NOTE

A name must be entered on the second line from the bottom of the display and the ID number must be entered on the lower line. A name may be one or more alphanumeric characters but the ID number must be nine digits. Alphabetic entries are allowed only on certain pages for entering names into directories. At other times, pressing a number key will enter a numeric value only.

5. To enter a letter into the name line of the display, press the appropriate number key until the desired letter or the number appears in the character position.



6. Press the next key to be entered and the entry point will move to the next position automatically.
7. Press the RIGHT ARROW key (2) to move the entry point to the next character position if more than one letter from the same key must be entered in succession.
8. Press the LEFT ARROW key (1) to backspace and correct an entry if necessary.
9. Press the DOWN ARROW key (4) to move the entry point to the ID number line when the name is complete.
10. Press the appropriate number keys to enter the Ship Station Identification number. To correct an entry, press the LEFT ARROW key (1) to backspace. To skip a digit, press the RIGHT ARROW key (2).



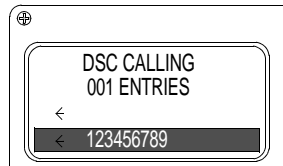
11. When all information is displayed correctly, press the ENT key (6) to complete the operation.

NOTE

The DSC CALLING menu will appear and the newest entry name will appear with the selection bar in the lower line of the display.



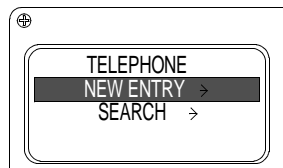
12. To check the ID number for the name, press the RIGHT ARROW key (2). The corresponding ID number will appear with the selection bar in the lower line of the display. To return to the name, press the LEFT ARROW key (1).



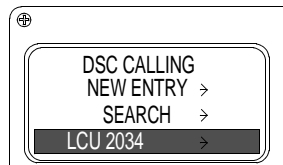
13. Use the LEFT ARROW (1) and RIGHT ARROW (2) keys to switch back and forth between a name page and a number page.
14. Press the UP ARROW key (3) and DOWN ARROW key (4) as appropriate to recall other names and numbers in the directory.
15. Press and hold down the appropriate ARROW key to scroll through the directory list.
16. Select NEW ENTRY from the menu and repeat the above entry procedure to add more entries to the directory.
17. Press the appropriate function keys again or enter a valid channel number to exit the directory and return to the PRIMARY mode.
18. Press the function keys for the desired mode to exit the directory and select another mode.

CHANGE OR REMOVE AN EXISTING DIRECTORY ENTRY

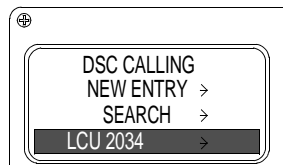
1. To access a directory, first select the appropriate mode. To access the TELEPHONE and COAST STATION directories, enter the TELEPHONE mode. Press the FNC key (5) and TEL key (1).



2. To access the DSC CALLING or GROUP CALLING directories, enter the DSC mode.



3. Press the FNC key (5) and DSC key (2).
4. Press the RIGHT ARROW key (2) as necessary to select the desired directory.
5. Press the UP ARROW key (3) or DOWN ARROW key (4) to position the selection bar on the entry you want to change or remove.



6. Press the CLR key (7). The ENTER NEW page will appear with the selected entry information displayed. The first character in the name will be flashing.

7. To remove the selection from the directory, press the CLR key (7) twice. Dashes will appear in the name line of the display.



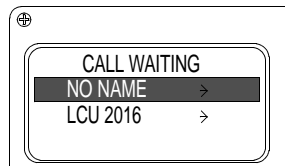
8. Press the ENT key (6). Both the name and ID number have been cleared from the directory.



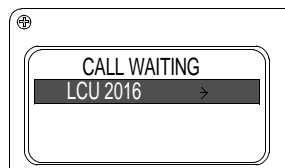
9. Change the name or ID number.
- Press the UP ARROW key (3), DOWN ARROW key (4), LEFT ARROW key (1) or RIGHT ARROW key (2) to move the flashing entry point to the character to be changed.
 - Press the appropriate number keys to make the desired changes.
 - When all information is displayed correctly, press the ENT key (6) to complete the operation and enter the changes into the directory.

TRANSFER OR CLEAR FROM CALL WAITING

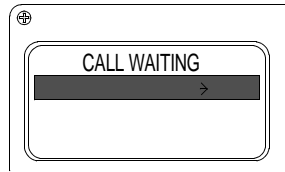
1. Press the FNC key (5) and ANS key (6) to access the DSC CALL WAITING directory. The CALL WAITING menu will appear in the display.



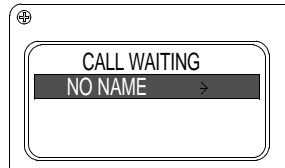
2. Press the UP ARROW key (3) or DOWN ARROW key (4) to position the selection bar on the entry you want to transfer or clear. If the selection has a name and you want to remove it from the directory, press and hold the CLR key (7) for two seconds. The selection will be cleared and the next entry in the directory will appear with the selection bar.



3. If no more entries exist in the directory, NO CALLS will appear in the display.



4. If the selection is NO NAME, press and hold the CLR key (7) for two seconds.



NOTE

The ENTER NEW NAME/NUMBER page will appear. The ID number will appear in the lower line of the display and dashes will appear in the line above the ID number. The first dash will be flashing.

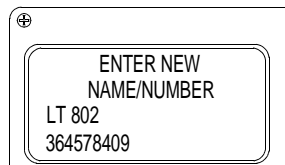


5. Press the ENT key (6) to clear the entry. The entry is cleared.

NOTE

A name must be entered in order to transfer the selected entry. A name may be one or more letters or numbers and may include spaces. At least one character must be entered. Names are entered by pressing the number key that is associated with the letters of the alphabet printed above them. The number for that key may be used as part of the name also.

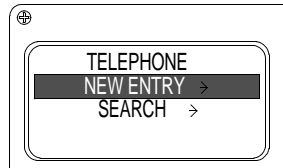
6. Press the appropriate number keys to enter a name. When all information is displayed correctly, press the ENT key (6). The new name and its corresponding ID number have been added to the DSC calling directory also.



SEARCHING DIRECTORIES**NOTE**

To search a directory, first select the appropriate mode.

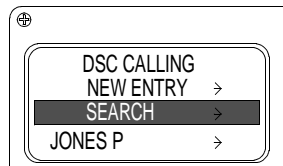
1. Press the FNC key (5) and TEL key (1) to access the TELEPHONE and COAST STATION directories.



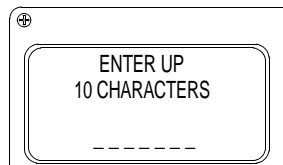
2. Press the FNC key (5) and DSC key (2) to access the DSC CALLING and GROUP CALLING directories.



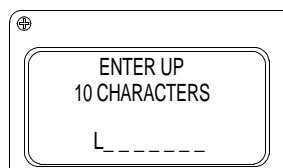
3. Press the RIGHT ARROW key (2) as necessary to select the desired directory.



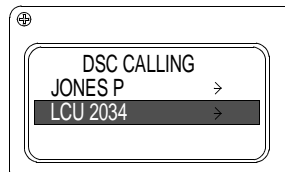
4. Press the UP ARROW key (3) or DOWN ARROW key (4) to position the selection bar on SEARCH in the DIRECTORY menu.
5. Press the ENT key (6).



6. Press the appropriate key to enter one or more characters of the name to be found.



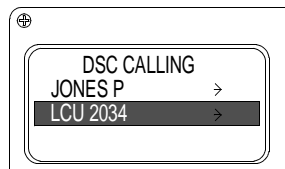
- Press the ENT key (6) to complete the operation. The name alphabetically nearest to the search character(s) will appear in the display with the selection bar.



- Press the UP ARROW key (3) or DOWN ARROW key (4) to position the selection bar on another entry if necessary. Once the desired entry is found, any appropriate function may be activated using the entry.

PLACING A DSC INDIVIDUAL CALL

- Select the PRIMARY mode by exiting any other active function. Press the appropriate number keys to select the desired working channel. A three beep tone will sound if an invalid channel number is entered. Press the FNC key (5) and DSC key (2). The DSC calling menu will appear in the display.



NOTE

One of four status messages will appear when placing a call. These status messages are:

ANSWERED. Contact with the called vessel was established. After several seconds, the transceiver will switch to the PRIMARY mode and the selected working channel will be active. Normal communications may begin immediately. The called party's name will appear in the lower line of the display. The time of day will return to the lower line of the display after one minute.

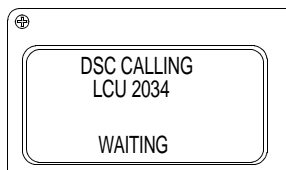
NO RESPONSE. Contact with the other vessel could not be established. After several seconds, the DSC calling directory will reappear with the called party's name at the top of the list. You may call again later or select another party to call.

BUSY. Contact was established but the transceiver was busy. Your call will be logged into the other transceiver's call waiting directory. After several seconds, the DSC calling directory will reappear with the called party's name at the top of the list. You may call again later or select another party to call.

UNATTENDED. Contact was established with the other vessel. The other vessel's transceiver is set to reply with the unattended message. For some reason an operator is not available to respond. Your call will be logged into the other transceiver's call waiting directory. After several seconds, your DSC calling directory will reappear with the called party's name at the top of the list. You may call again later or select another party to call.

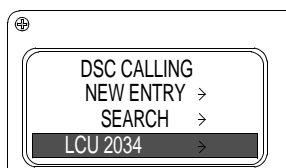
- Press the UP ARROW key (3) or DOWN ARROW key (4) to select the desired party from the directory. A three or four beep tone will sound and a status message will appear in the display.

- Press the ENT key (6) to initiate the call. The called party's name and WAITING will appear in the display.

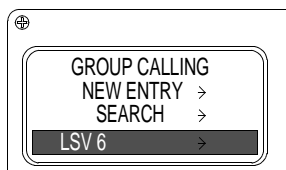


PLACING A DSC GROUP CALL

- Select the PRIMARY mode by exiting any other active function. Press the appropriate number keys to select the desired working channel. A three beep tone will sound if an invalid channel number is entered.
- Press the FNC (5) and DSC (2) keys. The DSC CALLING menu will appear in the display.



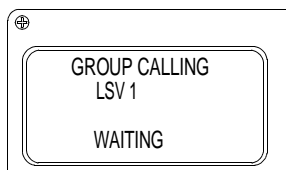
- Press the RIGHT ARROW key (2) repeatedly until the GROUP CALLING menu appears. Press the DOWN ARROW key (4) to highlight the desired group name.



NOTE

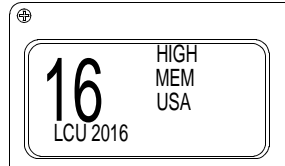
On group calls, there is no acknowledgement from the called vessels. After several seconds, the transceiver switches to the PRIMARY mode and the selected working channel is active. The group name will appear in the lower line of the display. Normal communication may begin immediately and a voice poll or roll call should be made to confirm which group members are present. The time of day will return to the lower line of the display after one minute.

- Press the ENT key (6) to initiate the call. The called group's name and WAITING will appear in the display.



DSC ANSWERING AND CALL WAITING
NOTE

Calls received while idle are signaled by short Hi/Lo beeps. RECEIVED DSC CALL FROM with the caller's name or DSC call sign will appear in the display for five seconds. The PRIMARY mode display will appear with the caller's name or DSC call sign in the lower line. The channel number displayed will be the caller's working channel. The sound will repeat every 8 seconds until the call is answered or until the call is logged into the CALL WAITING directory after 60 seconds.

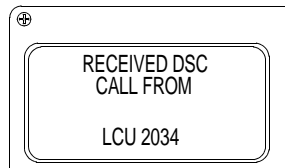


1. Press the PUSH TO TALK button (8) on the microphone and acknowledge the call verbally. To silence the beeps without answering the call, press the CLR key (7). The call will not be logged.

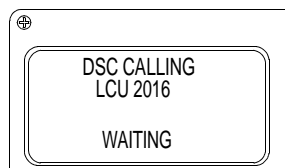
NOTE

Calls received while busy or unattended are signaled by short Hi/Lo beeps that will sound only once. The call will be logged into the CALL WAITING directory if the call is not answered within 60 seconds. The vessel that called will appear flashing in the lower line of the PRIMARY mode display. When you are able to return the call, press the appropriate number keys to select the desired working channel. A three beep tone will sound if an invalid channel number is entered.

2. Press the UP ARROW key (3) or DOWN ARROW key (4) to select the desired caller from the directory.

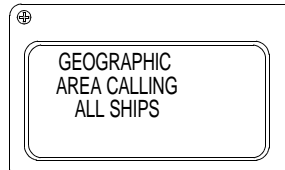


3. Press the ENT key (6) to answer the call on the current working channel of your radio. The called party's name and WAITING will appear in the display.

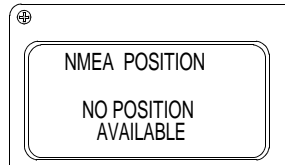


GEOGRAPHIC AREA CALLING

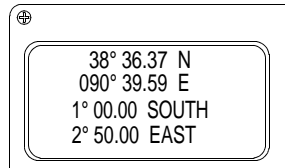
1. Access the DSC directory. Press the LEFT ARROW key (2) until the title GEOGRAPHIC AREA CALLING ALL SHIPS is displayed.



2. Press the ENT key (6) to open the edit to make a geographic area call.



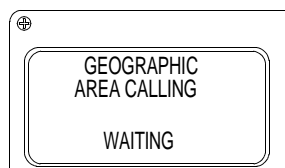
3. Enter the latitude of the reference point on line one and the longitude reference point on line two. Enter the number of degrees and minutes of the North-to-South side on line three and the West-to-East side on line four.



NOTE

The geographical area call will switch all vessels within the defined area to the calling radio's working channel just like a DSC GROUP CALL.

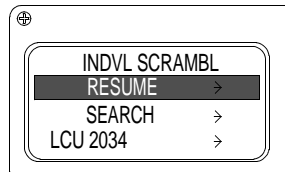
4. Press the ENT key (6) to activate the DSC call.



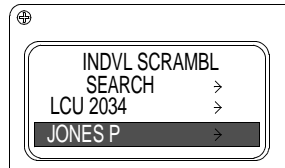
SCRAMBLER MODE

1. Place an individual scrambled call.
 - a. Select the PRIMARY mode by exiting any other active function.
 - b. Press the appropriate number keys to select the desired working channel. A three beep tone will sound if an invalid channel is selected.

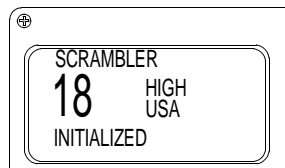
- c. Press the FNC key (5) and SCRM key (7). The INDIVIDUAL SCRAMBLER menu will appear in the display.



- d. Press the UP ARROW key (3) or DOWN ARROW key (4) to select the desired party from the directory.

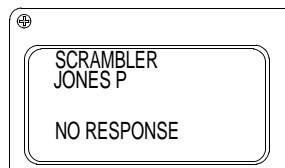


- e. Press the ENT key (6) to initiate the call. SCRAMBLER will appear in the upper line of the display and INITIALIZED will appear in the lower line. Working channel information will also be displayed.



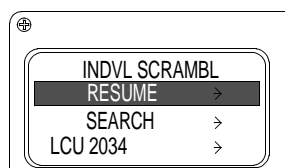
NOTE

A three or four beep tone will sound and either the called party's name or a status message will appear in the display. If the called party's name appears, the call was completed and scrambled voice communication may proceed.

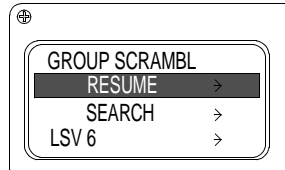


2. Place a scrambled group call.

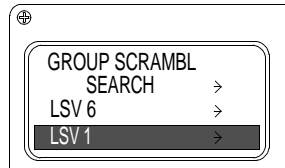
- a. Select the PRIMARY mode by exiting any other active function.
- b. Press the appropriate number keys to select the desired working channel. A three beep tone will sound if an invalid channel is selected.
- c. Press the FNC key (5) and SCRM key (7). The INDIVIDUAL SCRAMBLE menu will appear in the display.



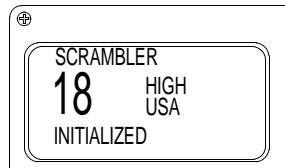
- d. Press the RIGHT ARROW key (2). The SCRAMBLER GROUP menu will appear in the display.



- e. Press the UP ARROW key (3) or DOWN ARROW key (4) to select the desired party from the directory.



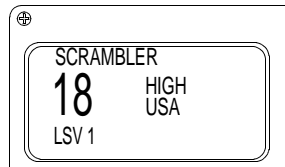
- f. Press the ENT key (6) to initiate the call. SCRAMBLER will appear in the upper line of the display and INITIALIZED will appear in the lower line. Working channel information will also be displayed.



NOTE

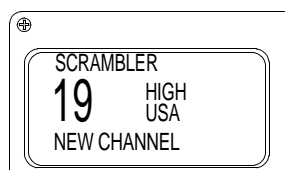
In group calls there is no acknowledgement from the called vessels. A voice poll or role call should be made to confirm which group members are present.

When the group name appears in the lower line of the display, voice contact may be initiated.

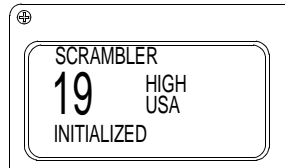


3. Change scrambler channels.

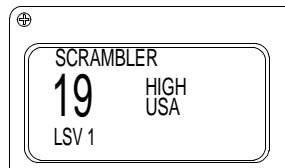
- a. Press the UP ARROW key (3) or DOWN ARROW key (4) or press the appropriate number keys to select a different working channel. A three beep tone will sound if an invalid channel is selected. NEW CHANNEL will appear in the lower line of the display.



- b. Press the ENT key (6) to complete the operation. INITIALIZED will appear in the lower line of the display.



- c. When the called party 's name returns to the lower line of the display, the channel change is complete and scrambled voice contact may resume.



- d. Ensure that the PUSH TO TALK button (8) is not pressed before pressing the ENT key (6) or the SCRAMBLER mode will be cancelled and the PRIMARY mode will become active.

4. Cancel SCRAMBLE mode.

- a. Press the FNC key (5) and SCRM key (7) again or change channels and press the PUSH TO TALK button (8) instead of the ENT key (6).
- b. The SCRAMBLE mode may also be cancelled by pressing the appropriate function keys to activate another mode.

NOTE

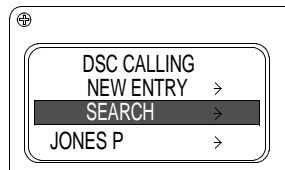
The resume feature allows the user to interrupt scrambled conversation to use the transceiver for other communication and return to the scrambled conversation without having to initialize. The working channel and scramble codes are memorized by the transceiver. The resume feature may be used in both individual and group scramble communication.

5. Resume SCRAMBLE mode.

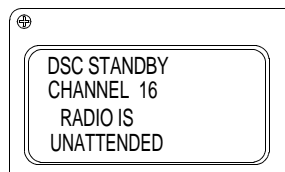
- a. Press the FNC key (5) and SCRM key (7) to resume a scrambled call. The scramble menu will appear.
- b. Press the RIGHT ARROW key (2) to select GROUP.
- c. Press the UP ARROW key (3) to select RESUME.
- d. Press the ENT key (6). The SCRAMBLER display will appear showing the working channel and the other vessel's name.

DSC STANDBY

1. Press the appropriate number keys to select the desired channel to monitor. A three beep tone will sound if an invalid channel is selected. Press the FNC key (5) and DSC key (2). The DSC CALLING menu will appear in the display.



2. Press the LEFT ARROW key (1) two times until the DSC STANDBY menu appears. DSC STANDBY, CHANNEL number and RADIO IS UNATTENDED will appear in the display with the selected monitor channel number.

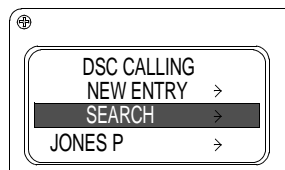
**NOTE**

When a DSC call is received, the radio will respond with the unattended message informing the caller that an operator is not available to answer the call. Calls received will be logged into the CALL WAITING directory.

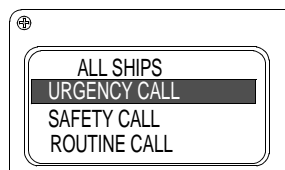
3. Enter a valid channel number or press the PUSH TO TALK button (8) to cancel the DSC STANDBY mode and switch to the PRIMARY mode.

ALL SHIPS CALL

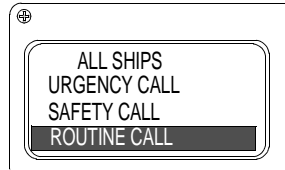
1. Press the appropriate number keys to select the desired working channel. A three beep tone will sound if an invalid channel is selected. Press the FNC key (5) and DSC key (2). The DSC CALLING menu will appear in the display.



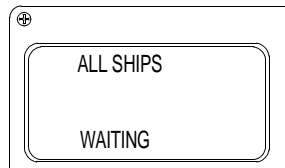
2. Press the RIGHT ARROW key (2) repeatedly until ALL SHIPS menu appears.



- Press the UP ARROW key (3) or DOWN ARROW key (4) to select the priority for the call.



- Press the ENT key (6) to initiate the ALL SHIPS call. DSC transceivers aboard vessels receiving the call will ring and ALL SHIPS will appear in their display.



- The vessel initiating an all ships call should make a voice call to alert the other vessels.

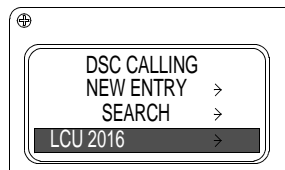
SENDING POSITION

NOTE

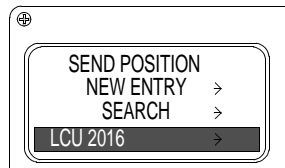
The send position function will override the POSITION XMIT DISABLE.

The type of position coordinates sent, either LAT/LON or Loran TD's is determined by the POSITION TYPE USER OPTION in the USER SETUPS mode.

- To send the current position, press the FNC (5) and DSC (2) keys. The DSC CALLING menu will appear in the display.



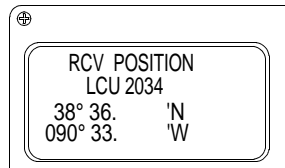
- Press the RIGHT ARROW key (2) repeatedly until the END POSITION menu appears.



- Press the UP ARROW key (3) or DOWN ARROW key (4) to select the desired name from the directory. Press the ENT key (6) to initiate the call. There is no acknowledgement from the other vessel that the position was received.

RECEIVE A POSITION

1. Be alert for four beeps that will sound when a SEND POSITION call is received from another vessel. RCV POSITION will appear in the upper line of the display.

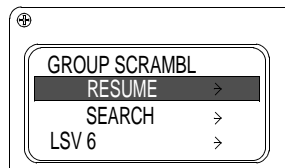
**NOTE**

The calling vessel's name or Ship Station Identity number will appear in the second line and the calling vessel's coordinates will appear in the lower two lines of the display. At the same time as the position coordinates are displayed, the position information is output through the data interface. The interface may be connected to any device capable of receiving the information.

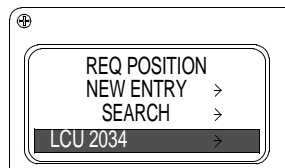
2. Press the ENT key (6) if the receiving device was not ready to accept the data. Each time the key is pressed, the position coordinated will be output to the data interface.
3. The display will remain until a valid channel number is entered or the PUSH TO TALK button (8) is pressed or another function is selected.

REQUEST POSITION

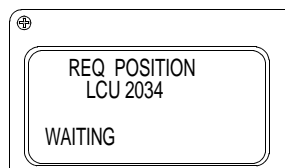
1. Press the FNC key (5) and DSC key (2) to request the position of another vessel. The DSC CALLING menu will appear in the display.



2. Press the RIGHT ARROW key (2) repeatedly until the REQ POSITION menu appears.



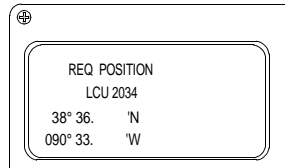
3. Press the UP ARROW key (3) or DOWN ARROW key (4) to select the desired name from the directory.



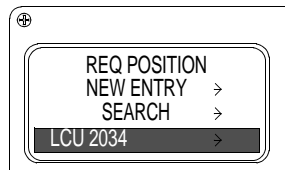
4. Press the ENT (6) key to initiate the call. The called vessel's name and WAITING will appear in the display.

NOTE

Three or four beeps will sound and either the called vessel's coordinates or a status message will appear in the display.



5. Press the ENT key (6) if the receiving device was not ready to accept the data. Each time the key is pressed, the position coordinates will be output to the data interface.
6. To return to the REQUEST POSITION menu, press the CLR key (7).



7. To return to the PRIMARY mode, enter a valid channel number, press the PUSH TO TALK button (8) or select another mode by pressing the appropriate function keys.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
PRECISION LIGHTWEIGHT GLOBAL POSITIONING RECEIVER (PLGR)
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)

Personnel Required

Seaman 88K

References

TM 11-5825-291-13

**OPERATING PROCEDURES - PERFORM INITIAL SETUP OF THE PRECISION
LIGHTWEIGHT GLOBAL POSITIONING RECEIVER (PLGR)**

SETUP PLGR

WARNING

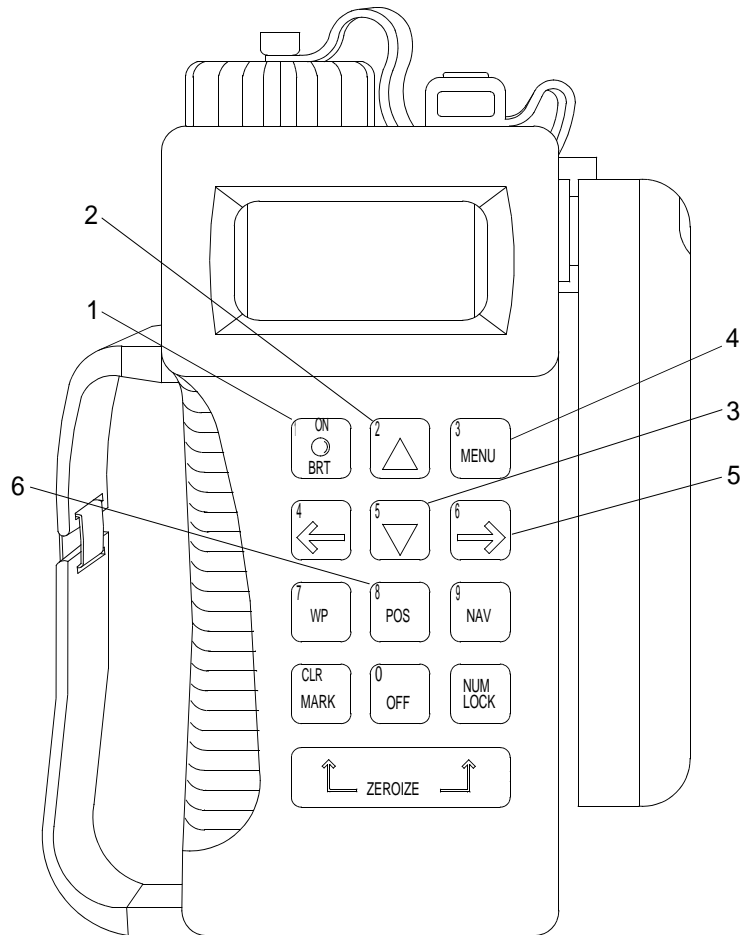


VEST

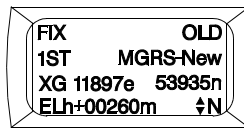
All personnel must wear personal flotation device during WT operations and maintenance. Failure to observe this precaution could result in serious injury or death.

Remove BA-5800 battery before applying external power. Failure to comply will result in injury to personnel and damage to equipment.

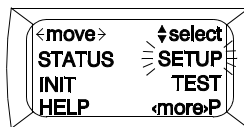
1. Press the ON key (1) to turn the PLGR on.



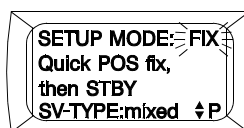
- Adjust the display backlighting by simultaneously pressing the ON/BRT key (1) and the UP ARROW key (2) to increase lighting or the DOWN ARROW key (3) to decrease lighting.



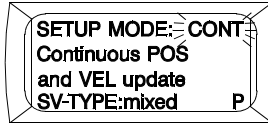
- Press the MENU key (4).
- Ensure SETUP is flashing. If STATUS is flashing, press the RIGHT ARROW key (5).



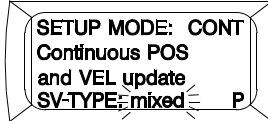
- Press the DOWN ARROW key (3).
- Press the RIGHT ARROW key (5). Ensure that FIX is flashing in SETUP mode.



- Press the UP ARROW key (2) or DOWN ARROW key (3) until CONT is flashing in SETUP mode.



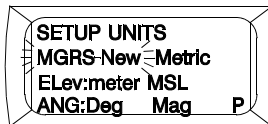
- Press the RIGHT ARROW key (5) to save CONT and move to next selection.
- Press the UP ARROW key (2) or DOWN ARROW key (3) until MIXED is flashing in SV-TYPE.



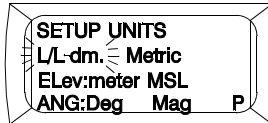
- Press the RIGHT ARROW key (5) to save MIXED.

SETUP UNITS

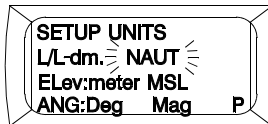
- Press the DOWN ARROW key (3) to advance to SETUP UNITS.
- Press the RIGHT ARROW key (5) to start selection flashing.



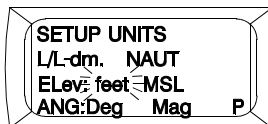
- Press the UP ARROW key (2) or DOWN ARROW key (3) until L/L-dm. is flashing.



- Press the RIGHT ARROW key (5) to save L/L-dm. and move to next selection.
- Press the UP ARROW key (2) or DOWN ARROW key (3) until NAUT is flashing.



- Press the RIGHT ARROW key (5) to save NAUT and move to next selection.
- Press the UP ARROW key (2) or DOWN ARROW key (3) until feet is flashing for Elev.



- Press the RIGHT ARROW key (5) to save feet and move to next selection.

9. Press the UP ARROW key (2) or DOWN ARROW key (3) until MSL is flashing.

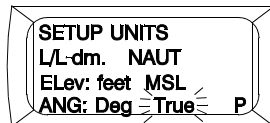
10. Press the RIGHT ARROW key (5) to save MSL and move to next selection.

11. Press the UP ARROW key (2) or DOWN ARROW key (3) until Deg is flashing for ANG.



12. Press the RIGHT ARROW key (5) to save Deg and move to next selection.

13. Press the UP ARROW key (2) or DOWN ARROW key (3) until True is flashing for vessels with a gyro compass. For vessels without a gyro compass, select Mag.

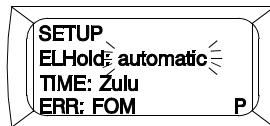


SETUP ELHOLD, TIME AND ERR

1. Press the DOWN ARROW key (3) twice to advance to SETUP.

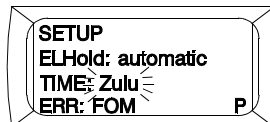
2. Press the RIGHT ARROW key (5) to start selection flashing.

3. Press the UP ARROW key (2) or DOWN ARROW key (3) until automatic is flashing for ELHold.



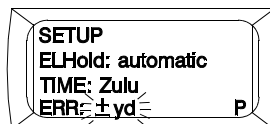
4. Press the RIGHT ARROW key (5) to save automatic and move to next selection.

5. Press the UP ARROW key (2) or DOWN ARROW key (3) until Zulu is flashing for TIME.



6. Press the UP ARROW key (2) or DOWN ARROW key (3) to save Zulu and move to next selection.

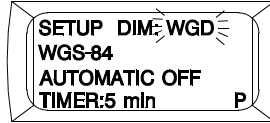
7. Press the UP ARROW key (2) or DOWN ARROW key (3) until ± yd is flashing for ERR.



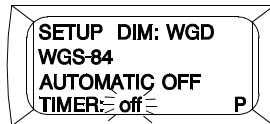
8. Press the RIGHT ARROW key (5) to save ± YD and end selection flashing.

SETUP DTM AND AUTOMATIC OFF TIMER

1. Press the DOWN ARROW key (3) to advance to SETUP.
2. Press the RIGHT ARROW key (5) to start selection flashing.
3. Press the UP ARROW key (2) or DOWN ARROW key (3) until WGD is flashing.



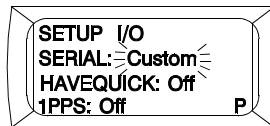
4. Press the RIGHT ARROW key (5) to save WGD WGS-84 and move to next selection.
5. Press the UP ARROW key (2) or DOWN ARROW key (3) until off is flashing for TIMER.



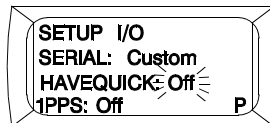
6. Press the RIGHT ARROW key (5) to save off and end selection flashing.

SETUP I/O SERIAL, HAVEQUICK AND 1PPS

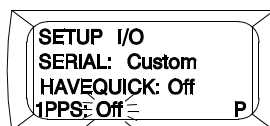
1. Press the DOWN ARROW key (3) to advance to SETUP I/O.
2. Press the RIGHT ARROW key (5) to start selection flashing.
3. Press the UP ARROW key (2) or DOWN ARROW key (3) until Custom is flashing for SERIAL.



4. Press the RIGHT ARROW key (5) to save Custom and move next selection.
5. Press the UP ARROW key (2) or DOWN ARROW key (3) until Off is flashing for HAVEQUICK.



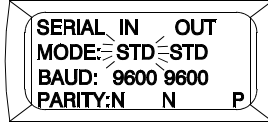
6. Press the RIGHT ARROW key (5) to save Off and move to next selection.
7. Press the UP ARROW key (2) or DOWN ARROW key (3) until Off is flashing for 1PPS.



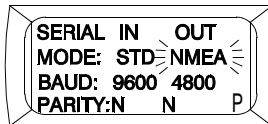
8. Press the RIGHT ARROW key (5) to save Off and end selection flashing.

SERIAL IN OUT SETUP

1. Press the DOWN ARROW key (3) to advance to SERIAL IN OUT.
2. Press the RIGHT ARROW key (5) to start selection flashing.
3. Press the UP ARROW key (2) or DOWN ARROW key (3) until STD is flashing for SERIAL IN mode.



4. Press the RIGHT ARROW key (5) to save STD and move to next selection.
5. Press the UP ARROW key (2) or DOWN ARROW key (3) until NMEA is flashing for SERIAL OUT mode.



6. Press the RIGHT ARROW key (5) to save NMEA and end selection flashing.

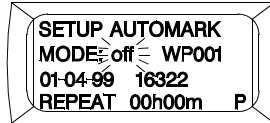
SETUP NMEA SENTENCE STRING

1. Press the DOWN ARROW key (3) to advance to SETUP.
2. Press the RIGHT ARROW key (5) to start selection flashing.
3. Enter the seven required NMEA sentence strings.
 - a. Press the UP ARROW key (2) or DOWN ARROW key (3) to change the sentence string.
 - b. After entering each three letter group sentence string, press the RIGHT ARROW key (5) to advance to the next string.
 - c. Continue until all letter groups are entered.
 - d. Ensure that sentence string is [RMC] [GGA] [GLL] [GSA] [RMB] [XTE] [VTG].


SETUP AUTO MARK MODE

1. Press the DOWN ARROW key (3) to advance to SETUP AUTOMARK.
2. Press the RIGHT ARROW key (5) to start selection flashing.

3. Press the UP ARROW key (2) or DOWN ARROW key (3) until Off is flashing for MODE.



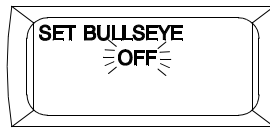
4. Press the RIGHT ARROW key (5) four times to save Off and end selection flashing.

SET BULLSEYE

NOTE

The bull's-eye menu will only activate when waypoint data is entered.

1. Press the DOWN ARROW key (3) to advance to SET BULLSEYE.
2. Press the RIGHT ARROW key (5) to start selection flashing.



3. Press the UP ARROW key (2) or DOWN ARROW key (3) to select flashing OFF.
4. Press the RIGHT ARROW key (5) to save OFF and end selection flashing.

SETUP OPERATOR ID

1. Press the DOWN ARROW key (3) to advance to SETUP OPERATOR ID.
2. Press the RIGHT ARROW key (5) to start selection flashing.
3. Press the UP ARROW key (2) or DOWN ARROW key (3) to enter the operator ID.
4. After each letter/number is entered, press the RIGHT ARROW key (5) to advance to the next letter/number position.
5. Press the UP ARROW key (2) or DOWN ARROW key (3) to change the letter/number.
6. Continue until the complete operator ID is entered.
7. Press the RIGHT ARROW key (5) until the double arrow symbol appears in the right lower corner of the display to the left of P.

SETUP APPROACH

1. Press the DOWN ARROW key (3) to advance to SETUP APPROACH.
2. Verify default settings.
3. Press the POS key (6) to end setup and return to POSITION SCREEN.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
PRECISION LIGHTWEIGHT GLOBAL POSITIONING RECEIVER (PLGR)
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)

Personnel Required

Seaman 88K

**OPERATING PROCEDURES - SETUP WAYPOINTS USING THE PRECISION
LIGHTWEIGHT GLOBAL POSITIONING RECEIVER (PLGR)****ENTERING WAYPOINTS**

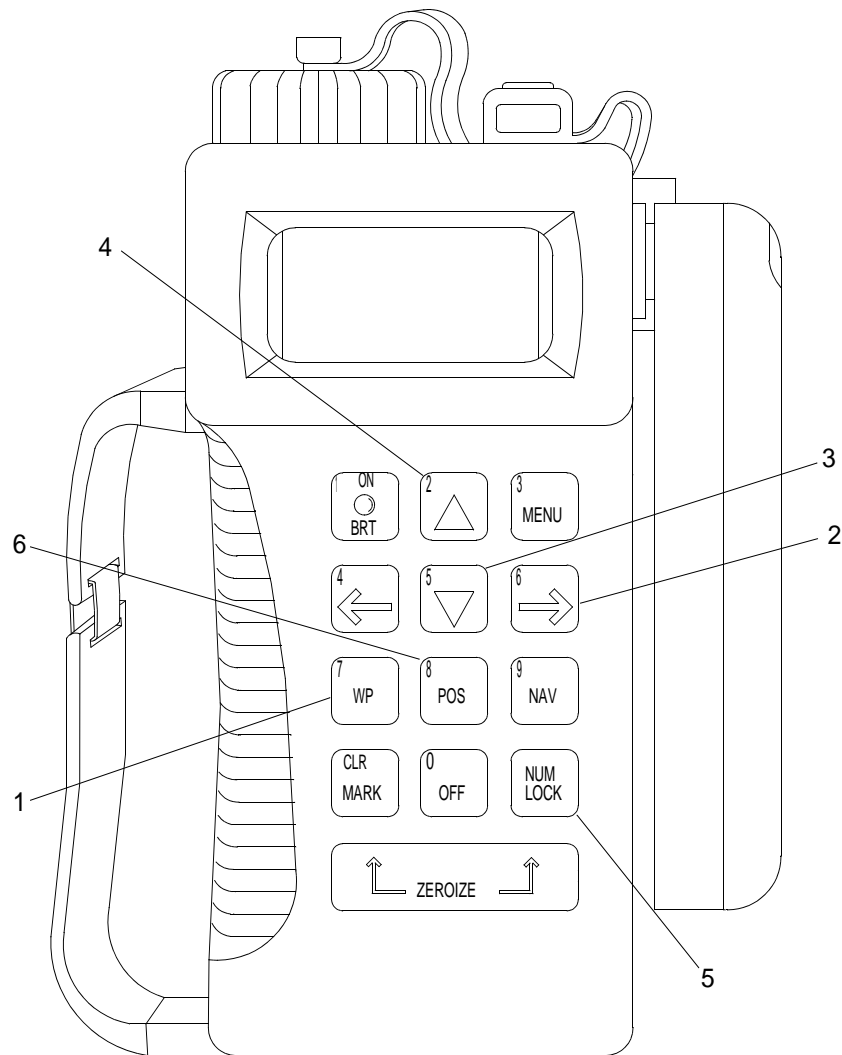
WARNING



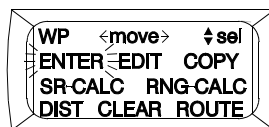
VEST

All personnel must wear personal flotation device during WT operations and maintenance. Failure to observe this precaution could result in serious injury or death.

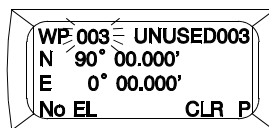
1. Press the WP key (1) to access the WAYPOINTS OPTIONS menu.



2. Press the RIGHT ARROW key (2) until ENTER is flashing.



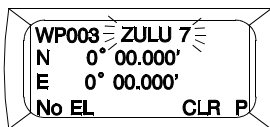
3. Press the DOWN ARROW key (3).
4. Press the RIGHT ARROW key (2) to start the waypoint number field in the upper left corner flashing.



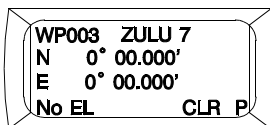
NOTE

Waypoint numbers range from 000 to 999. Present position is always waypoint 000.
Waypoint 000 cannot be edited.

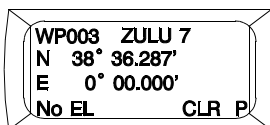
5. Change the waypoint number as desired using the UP ARROW key (4) or DOWN ARROW key (3).
6. Press the RIGHT ARROW key (2) twice to start the waypoint label field flashing.



7. Press the DOWN ARROW key (3) to start the first letter/number position flashing.
8. Use the UP ARROW key (4) or DOWN ARROW key (3) to change the first letter/number in the waypoint label.
9. Press the RIGHT ARROW key (2) to advance to the next letter/number position.
10. Use the UP ARROW key (4) or DOWN ARROW key (3) to change the letter/number. Continue until the complete waypoint name is entered. Waypoint names may not exceed ten characters.
11. Press the RIGHT ARROW key (2) as necessary to move to the latitude field.

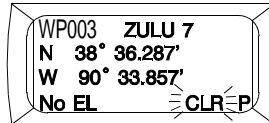


12. Toggle between N or S using the UP ARROW key (4).
13. Press the RIGHT ARROW key (2) to move to the first numeric latitude number.
14. Use the UP ARROW key (4) or DOWN ARROW key (3) to change the number.
15. Progress to each number using the RIGHT ARROW key (2) until the complete latitude of the waypoint is entered.
16. Press the RIGHT ARROW key (2) to move to the longitude field. Toggle between W or E using the UP ARROW key (4). Press the RIGHT ARROW key (2) to move to the first numeric longitude number. Use the UP ARROW key (4) or DOWN ARROW key (3) to change the number. Progress to each number using the RIGHT ARROW key (2) until the complete longitude of the waypoint is entered.

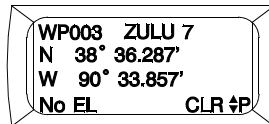


17. Toggle between W or E using the UP ARROW key (4).
18. Press the RIGHT ARROW key (2) to move to the first numeric longitude number.
19. Use the UP ARROW key (4) or DOWN ARROW key (3) to change the number. Progress to each number using the RIGHT ARROW key (2) until the complete longitude of the waypoint is entered.

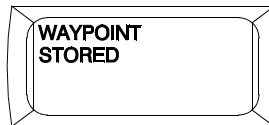
20. Press the RIGHT ARROW key (2) twice. CLR will be flashing.



21. Press the NUM LOCK key (5) to change the PLGR to the CONTROL mode. A P will be displayed in the lower right hand corner of the display. Press the RIGHT ARROW key (2) to move the cursor next to the P. An UP and DOWN ARROW symbol will appear next to the letter P.



22. Press the DOWN ARROW key (3) and observe the display. WAYPOINT STORED will appear and the PLGR will automatically default to page 2 of waypoints.



23. For vessels without a gyro compass, press the RIGHT ARROW key (2) until NO MAGVAR is flashing. Enter the magnetic variation from the chart used for the waypoint. Press the RIGHT ARROW key (2) three times.

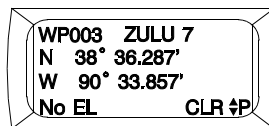
24. Press the DOWN ARROW key (3) to enter another waypoint or exit by pressing the POS key (6).

EDITING A WAYPOINT

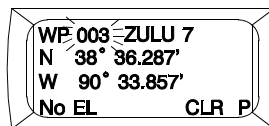
1. Press the WP key (1).
2. Press the RIGHT ARROW key (2) until EDIT is flashing.



3. Press the UP ARROW key (4). A waypoint will appear on the display.



4. Press the RIGHT ARROW key (2). The waypoints number field will be flashing. Use the UP ARROW key (4) or DOWN ARROW key (3) to change the waypoint number or press the NUM LOCK key (5) and enter the number of the waypoint.

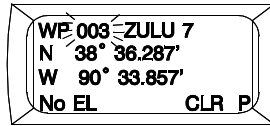


5. Change the waypoint data using the procedures for entering a waypoint.

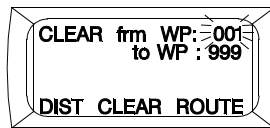
CLEARING A WAYPOINT**NOTE**

Clearing a waypoint will also clear any routes that contain this waypoint.

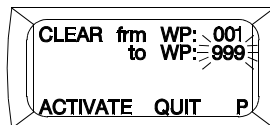
1. Press the WP key (1).
2. Press the RIGHT ARROW key (2) until CLEAR is flashing.



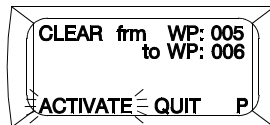
3. Press the UP ARROW key (4).
4. Press the RIGHT ARROW key (2) until FRM: WP number is flashing.



5. Press the UP ARROW key (4) to start the first number position of the waypoint number flashing.
6. Press the RIGHT ARROW key (2) to enter the next digit of the waypoint to be deleted. Continue until the complete waypoint number is entered.
7. Press the RIGHT ARROW key (2) until TO: WP number is flashing.

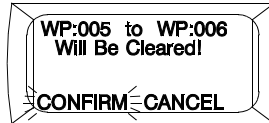


8. Press the UP ARROW key (4) to start the first number position of the waypoint number flashing.
9. Press the RIGHT ARROW key (2) to enter the next digit of the waypoint to be deleted. Continue until the complete waypoint number is entered.
10. Press the RIGHT ARROW key (3) until ACTIVATE is flashing.

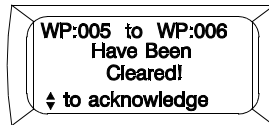


11. Press the UP ARROW key (1).

12. Press the RIGHT ARROW key (3) until CONFIRM is flashing.



13. Press the UP ARROW key (4). The display will advise the operator of the waypoints that will be deleted.



14. Press the POS key (6) to return to the POS display.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
PRECISION LIGHTWEIGHT GLOBAL POSITIONING RECEIVER (PLGR)
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)

Personnel Required

Seaman 88K

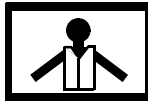
References

TM 11-5825-291-13

**OPERATING PROCEDURES - SETUP ROUTE NAVIGATION USING THE PRECISION
LIGHTWEIGHT GLOBAL POSITIONING RECEIVER (PLGR)**

PLANNING A ROUTE

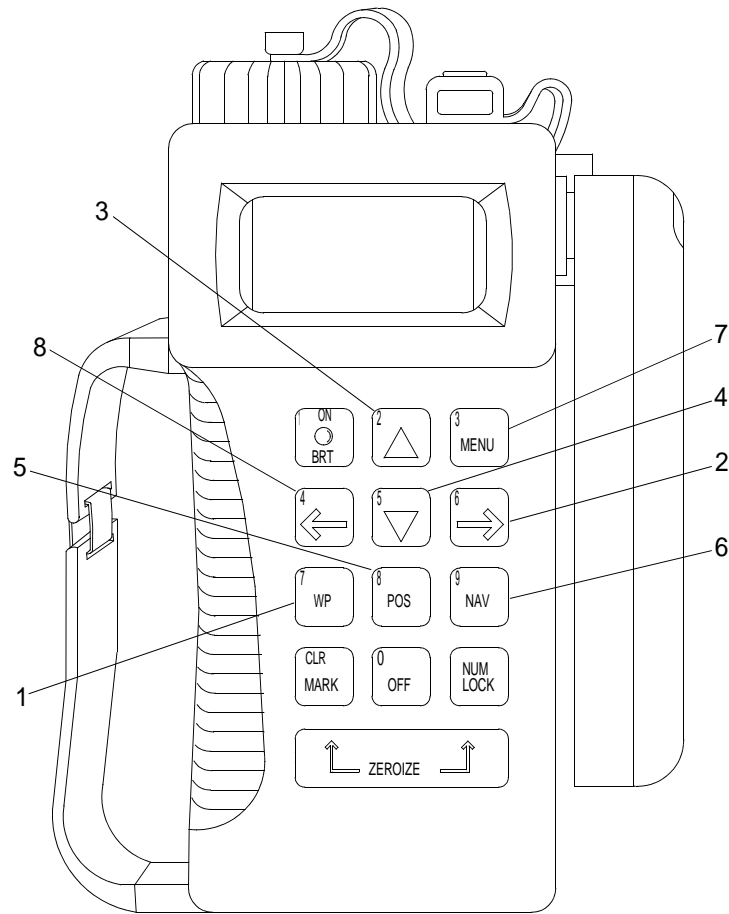
WARNING



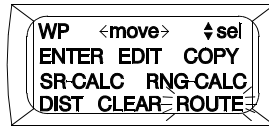
VEST

All personnel must wear personal flotation device during WT operations and maintenance. Failure to observe this precaution could result in serious injury or death.

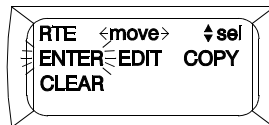
1. Press the WP key (1).



2. Press the RIGHT ARROW key (2) until ROUTE is flashing.

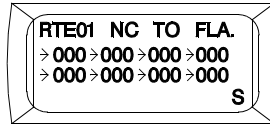


3. Press the UP ARROW key (3) to select ROUTE.
4. ENTER will be flashing. Press the UP ARROW key (3) to select ENTER.

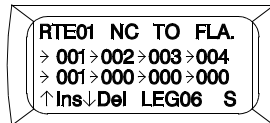


5. Using the UP ARROW key (3) or DOWN ARROW key (4), assign a route number to the new route.

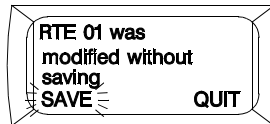
6. Press the RIGHT ARROW key (2) to highlight the route name field. Press the UP ARROW key (3) to select the first letter of the route name. Use the UP ARROW key (3) or DOWN ARROW key (4) to change to the desired letter. Press the RIGHT ARROW key (2) to advance to the next letter position. Repeat until the route name is entered.



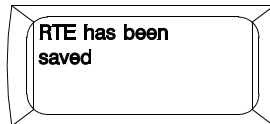
7. Press the RIGHT ARROW key (2) until the arrow left of the first group of three digits is flashing.
8. Press the UP ARROW key (3) or DOWN ARROW key (4) to change to the desired letter.
9. Press the RIGHT ARROW key (2) to advance to the next letter position. Repeat until the route name is entered.
10. Press the RIGHT ARROW key (2) until the arrow left of the first group of three digits is flashing.
11. Press the RIGHT ARROW key (2) to start the first group of three digits flashing.
12. Press the UP ARROW key (3) to select the first waypoint number.
13. Press the RIGHT ARROW key (2). Press the UP ARROW key (3) to enter the next waypoint. Continue to add waypoints until all waypoints have been entered.



14. After all waypoints have been entered, exit the display by pressing the WP key (1), POS key (5), NAV key (6) or MENU key (7). The display informs the user that the route has not been saved. SAVE will be flashing.

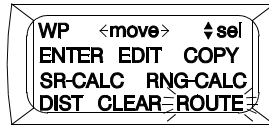


15. Press the UP ARROW key (3) to save the route.



EDITING A ROUTE

1. Press the WP key (1). Press the RIGHT ARROW key (2) until ROUTE is flashing.



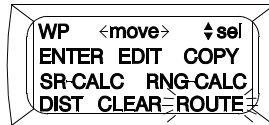
2. Press the UP ARROW key (3) to select ROUTE. Press the RIGHT ARROW key (2) until EDIT is flashing.



3. Press the UP ARROW key (3) to select EDIT.
4. Using the UP ARROW key (3) or DOWN ARROW key (4), select the route number to be edited. Follow the procedures for planning a route to edit the route as required.

COPYING A ROUTE

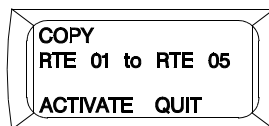
1. Press the WP key (1).
2. Press the RIGHT ARROW key (2) until ROUTE is flashing.



3. Press the UP ARROW key (3).
4. Press the RIGHT ARROW key (2) until COPY is flashing.



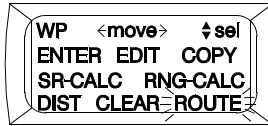
5. Press the UP ARROW key (3).
6. Enter the route numbers for copying to/from using the RIGHT ARROW key (2) or LEFT ARROW key (8) to select to/from and the UP ARROW key (3) or DOWN ARROW key (4) to change the route numbers.
7. Press the RIGHT ARROW key (2) until ACTIVATE is flashing.



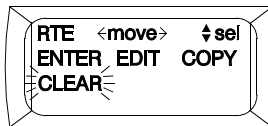
8. Press the UP ARROW key (2).
9. Press the POS key (6) to exit the WP menu.

CLEARING A ROUTE

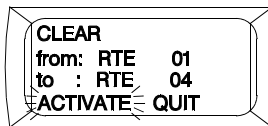
1. Press the WP key (1).
2. Press the RIGHT ARROW key (2) until ROUTE is flashing.



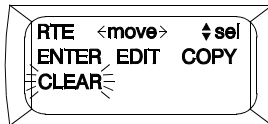
3. Press the UP ARROW key (3).
4. Press the RIGHT ARROW key (2) until CLEAR is flashing.



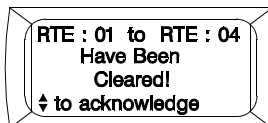
5. Press the UP ARROW key (3).
6. Press the RIGHT ARROW key (2) until the FROM: RTE number is flashing. Enter the starting route number to be deleted using the UP ARROW key (3).
7. Press the RIGHT ARROW key (2) until the TO: RTE number is flashing. Enter the ending route number to be deleted using the UP ARROW key (3).
8. Press the RIGHT ARROW key (2) until ACTIVATE flashes.



9. Press the UP ARROW key (3).
10. Press the RIGHT ARROW key (2) until CONFIRM flashes.



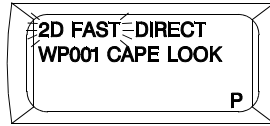
11. Press the UP ARROW key (3).



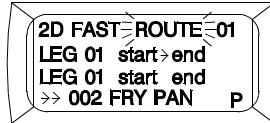
12. Press the POS key (5) to return to POS display.

NAVIGATING A COURSE

1. Press the NAV key (6). Press the RIGHT ARROW key (2) to start the type of navigation flashing.
2. Press the UP ARROW key (3) to start 2D FAST flashing.



3. Press the RIGHT ARROW key (2) to advance to the next field. Press the DOWN ARROW key (4) until ROUTE is flashing.



4. Press the RIGHT ARROW key (2) to advance to the route number field. Use the UP ARROW key (3) or DOWN ARROW key (4) to change the route number to the desired route.
5. Press the RIGHT ARROW key (2) to advance to the leg number field. Use the UP ARROW key (3) or DOWN ARROW key (4) to change the leg number.
6. Press the RIGHT ARROW key (2) to advance to the START - END/END - START field. Use the UP ARROW key (3) or DOWN ARROW key (4) to change START - END or END - START.
7. Press the RIGHT ARROW key (2) to complete programming the route.

NOTE

PLGR display, pages 2 and 4, provides information on destination, slant range, track, ground speed, azimuth and north reference, elevation angle and cross track error.
 PLGR display page 3 provides information on range, time to go, elevation difference and minimum miss distance.

8. Refer to PLGR display, pages 2, 3 or 4 if more navigational information is necessary.
9. Press the POS key (5) to exit the NAV display.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
PRECISION LIGHTWEIGHT GLOBAL POSITIONING RECEIVER (PLGR)
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)

Personnel Required

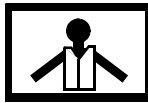
Seaman 88K

References

TM 11-5825-291-13

OPERATING PROCEDURES - PERFORM CRYPTO VARIABLE OPERATIONS**CRYPTO KEY ENTRY USING THE KYK-13**

WARNING



VEST

All personnel must wear personal flotation device during WT operations and maintenance. Failure to observe this precaution could result in serious injury or death.

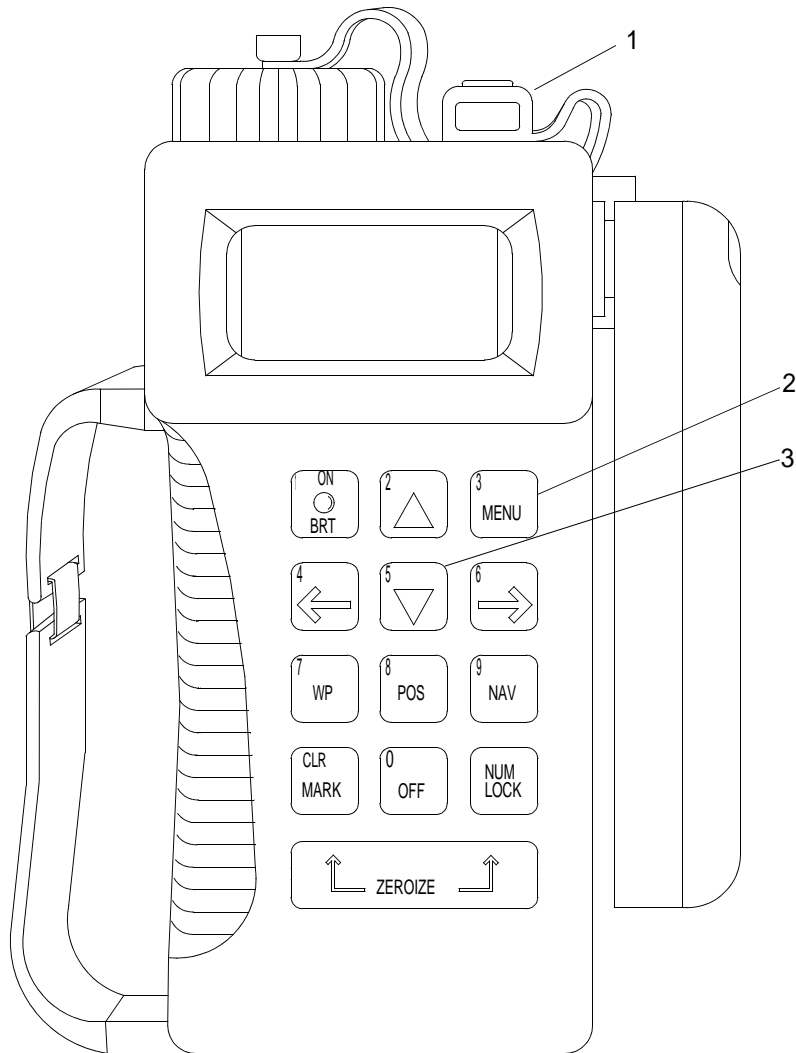
All shipboard PLGRs must be keyed using the correct crypto key prior to combat operations. Failure to observe these precautions could result in loss of life.

NOTE

The PLGR has a National Security Agency (NSA) module that stores the crypto keys. Since the crypto keys are stored in this tamper proof module (called a Precise Positioning Service Security Module, or PPS-SM), the PLGR is not classified when crypto keys are installed.

The PPS-SM does not protect classified waypoints. When classified waypoints are stored in the PLGR, the PLGR is classified at the same level as the waypoints.

1. Connect the KYK-13 to the J1 port (1) on the PLGR. Ensure that the PLGR is turned on and not performing a self-test.



2. Set the KYK-13 selector switch to the position that contains the crypto key.
3. Set the KYK-13 mode switch to ON. The light on the KYK-13 flashes showing a successful crypto load.

CRYPTO KEY ENTRY USING KOI-18

1. Connect the KOI-18 to the J1 port (1) on the PLGR. Ensure that the PLGR is turned on and not performing a self-test.
2. Press the MENU key (2) until the menu display with KOI-18 appears. Select and activate the KOI-18.
3. Select and activate LOAD. Immediately pull the paper tape through the KOI-18.
4. After loading, select and activate QUIT.

-
5. Bring up the CRYPTO pages from the system menu.
 6. Verify the crypto key status.
 - a. Select menu second page.
 - b. Ensure that crypto is displayed on line 4 or crypto keys are not installed or are not valid.
 7. Remove the KOI-18 from the PLGR.

CRYPTO KEY ENTRY USING AN/CYZ-10 (SPECIAL ANCD)

1. Turn on the ANCD, read RADIO/SOI/SUPERVISOR.
2. Enter RADIO, read SEND/RECEIVE/DATABASE/SETUP/COMSEC/TIME.
3. Enter COMSEC, read VG/LD/RV/AK/MK/VU.
4. Enter LD, read SELECT TEK/KEK.
5. Enter TEK.
6. Select the desired GPS key, then press ENTER.
7. Enter QUIT, read CONNECT ANCD TO RT - DO NOT COMPLY.
8. Press the DOWN ARROW key (3), read Press LOAD ON RT- DO NOT COMPLY.
9. Turn the PLGR on, wait for self-test to complete.
10. Connect ANCD to the J1 port (1) on the PLGR. GPS key transfers automatically.
11. The ANCD reports: 1 KEYS TRANSFERRED. The PLGR reports KEY LOADED.
12. Disconnect ANCD from the J1 port (1) on the PLGR.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
PROPULSION MODULE
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
 Gloves, Electrical Workers' (Cabinet B5) (Item 32, WP 0112 00)
 Cable Assembly, Power, Electrical: NATO Slave (Storage Room) (Item 9, WP 0112 00)

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

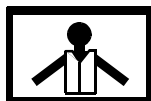
Seaman 88K

References

TM 9-6140-200-14

OPERATING PROCEDURES - SLAVING OF WARPING TUG

WARNING



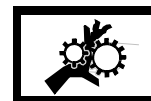
VEST



HELMET PROTECTION



HEAVY PARTS



MOVING PARTS

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

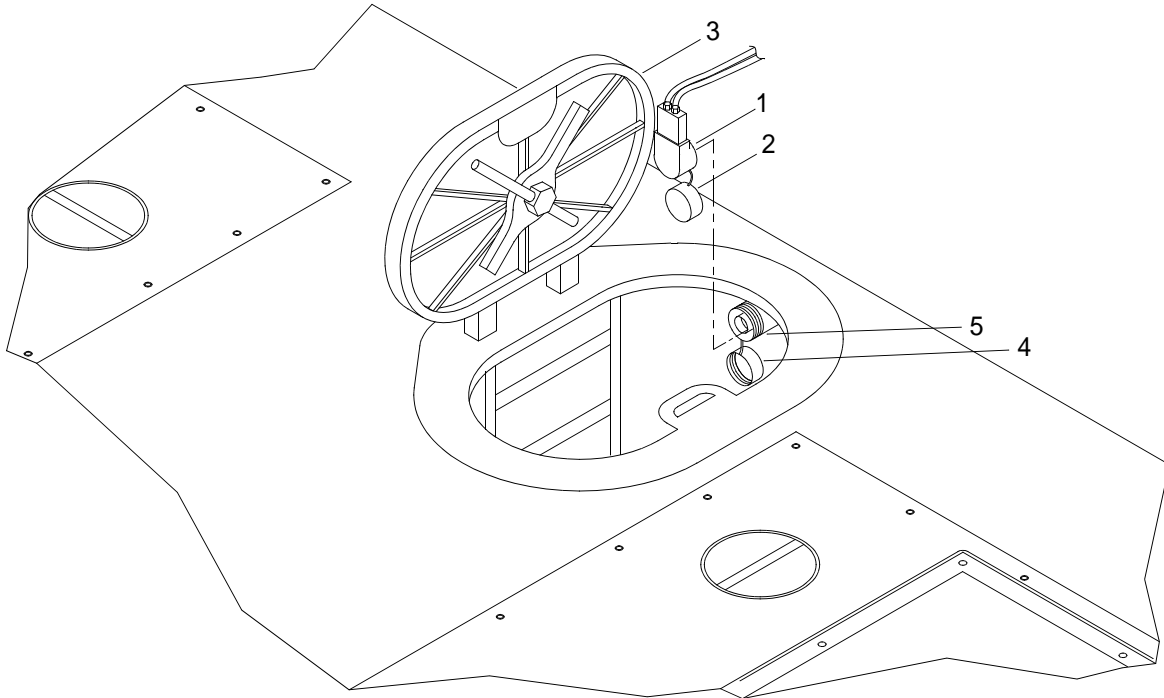
NOTE

All equipment containing a North Atlantic Treaty Organization (NATO) receptacle may be used as an auxiliary power source for slaving power.

The NATO slave cable is stored in the BII container.

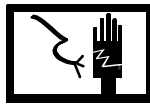
1. Check and service batteries prior to slaving power. (TM 9-6140-200-14)

- Route NATO slave cable (1) between WT and power source.



- Remove protective caps (2) from both connector ends of NATO slave cable (1).

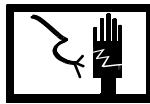
WARNING



ELECTRICAL

- Connect one end of NATO slave cable (1) to power source.
- Open propulsion module aft machinery compartment hatch (3).

WARNING



ELECTRICAL

- Feed NATO slave cable (1) through propulsion module aft machinery compartment hatch (3) opening to below deck.
- Remove protective cap (4) from NATO receptacle (5).
- Connect NATO slave cable (1) to NATO receptacle (5) on outboard bulkhead of WT.
- Start engine. (WP 0024 00)

WARNING

**ELECTRICAL**

10. Remove NATO slave cable (1) from NATO receptacle (5) on WT.
11. Install protective cap (4) on NATO receptacle (5).
12. Remove NATO receptacle (5) from below deck and shut propulsion module aft machinery compartment hatch (3).

WARNING

**ELECTRICAL**

13. Remove NATO slave cable (1) from WT and disconnect from power source.
14. Install protective caps (2) on both connector ends of NATO slave cable (1).
15. Stow NATO slave cable (1) in BII container. (WP 0070 00)

NOTE

Once engine is running, engine alternator will fully charge batteries.

16. Monitor middle control panel A1 ammeter reading for battery charge. (WP 0024 00)
17. When full battery charge is indicated, shut down engine. (WP 0024 00)

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
STERN ANCHOR
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
 Protector, Hearing (Cabinet B4) (Item 63, WP 0112 00)

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

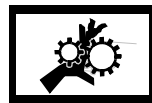
Seaman 88K

References

TM 55-3950-204-14&P

OPERATING PROCEDURES - DEPLOYMENT AND RECOVERY OF STERN ANCHOR

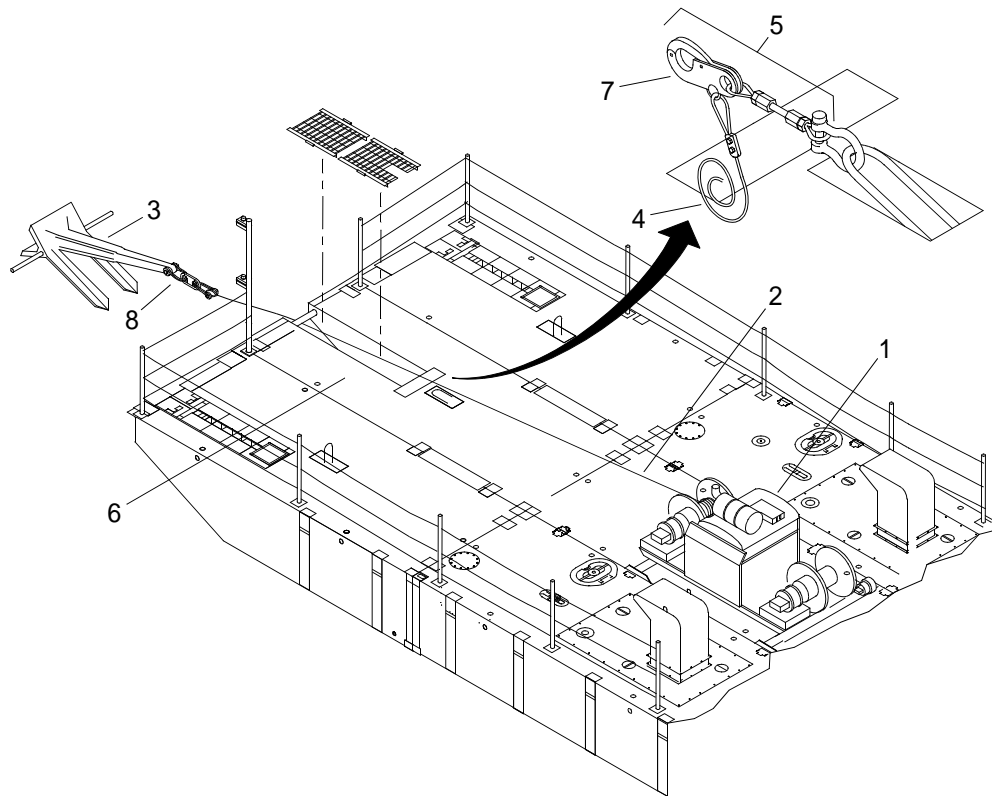
WARNING

**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS****EAR PROTECTION**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

DEPLOY STERN ANCHOR

1. Using deck winch (1), take up slack in aft drum cable (2) attached to stern anchor (3). (TM 55-3950-204-14&P)



2. Pull nylon rope (4) on quick release assembly (5) to release stern anchor (3) from anchor center rake module (6).
3. Using deck winch (1), deploy stern anchor (3) from WT. (TM 55-3950-204-14&P)

RECOVER STERN ANCHOR

1. Using deck winch (1), recover stern anchor (3) into anchor center rake module (6). (TM 55-3950-204-14&P)
2. Secure stern anchor (3) to anchor center rake module (6) by attaching hook (7) of quick release assembly (5) to stern anchor shackle (8).
3. Using deck winch (1), release tension from aft drum cable (2). (TM 55-3950-204-14&P)

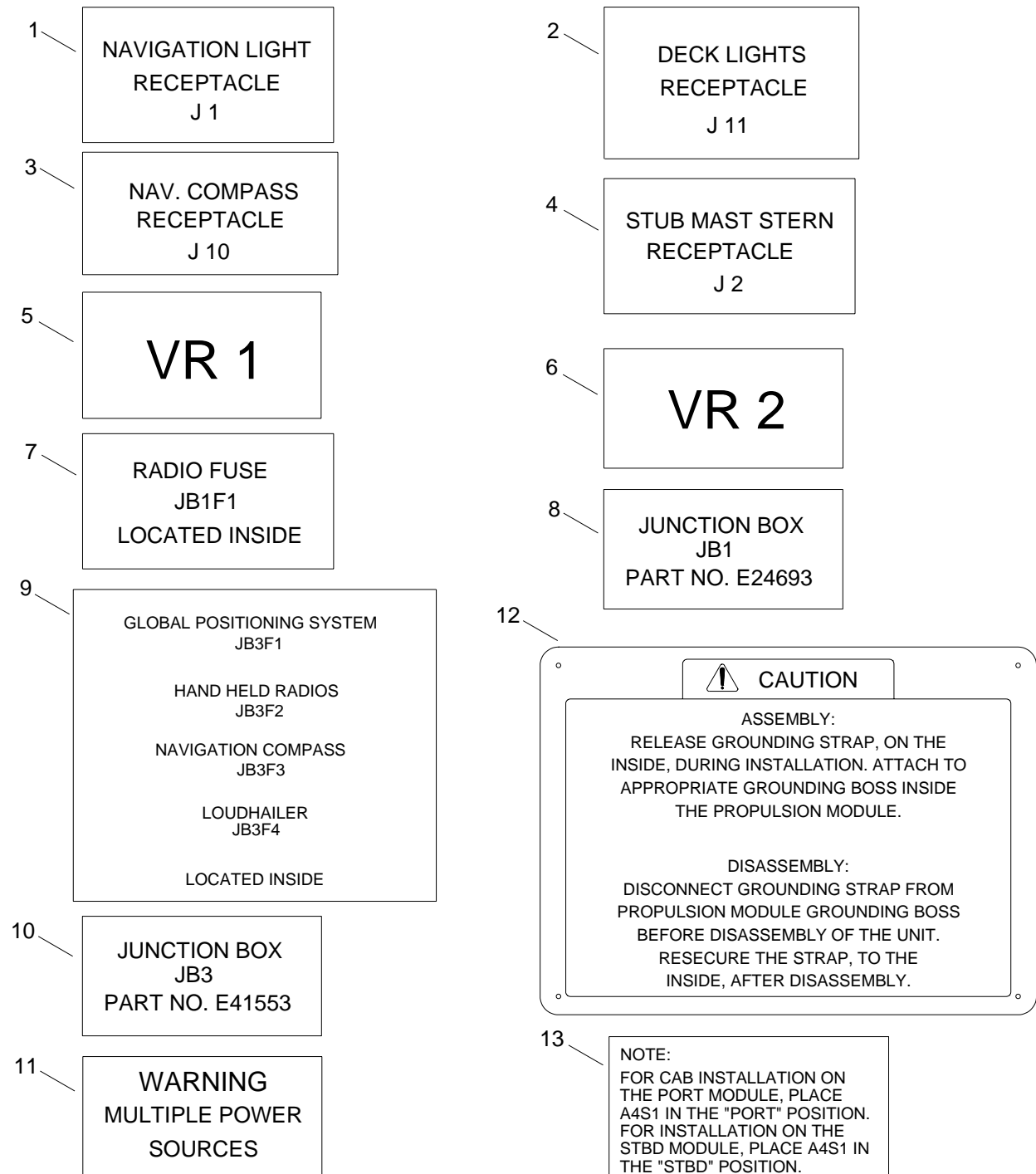
END OF WORK PACKAGE

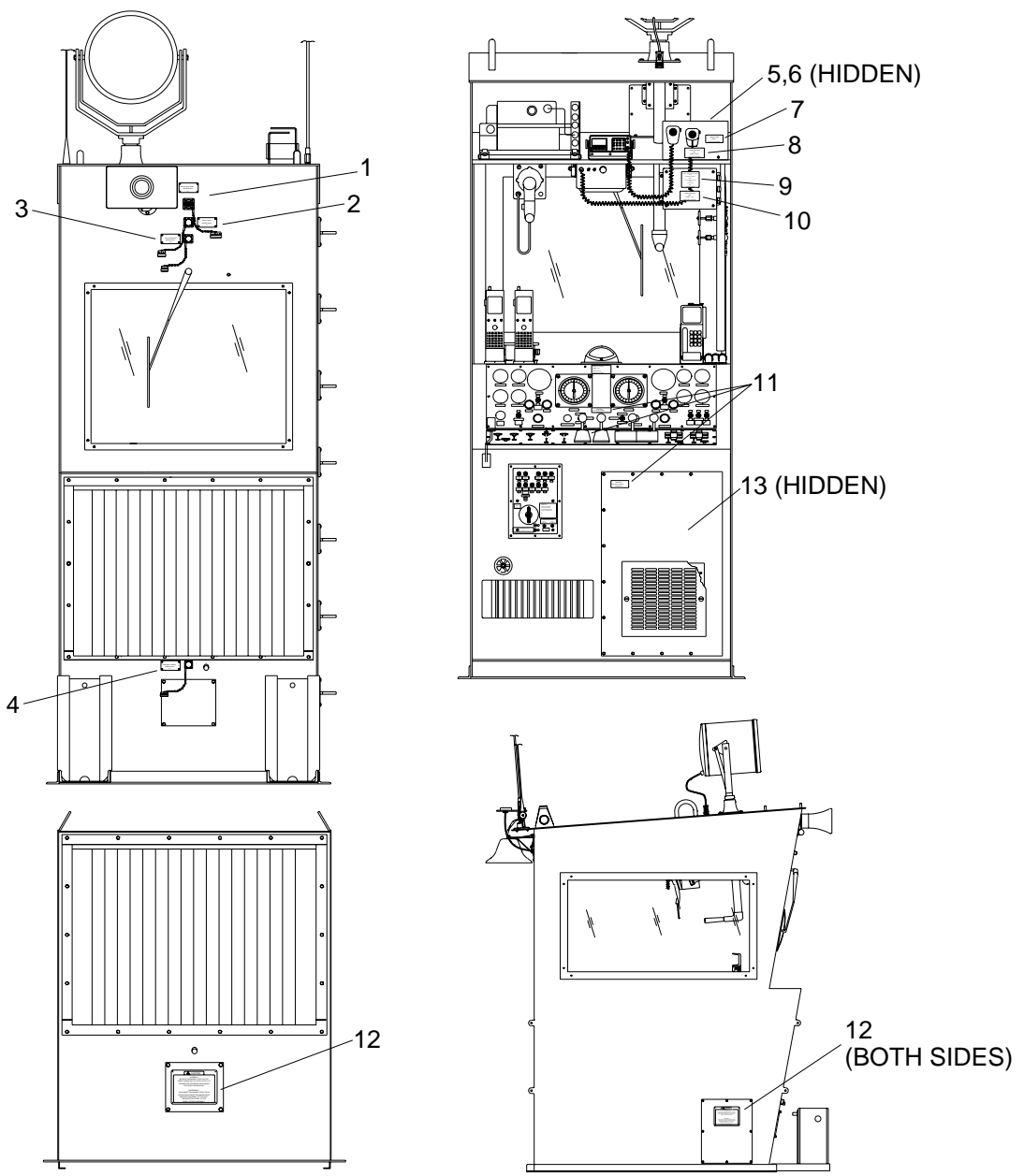
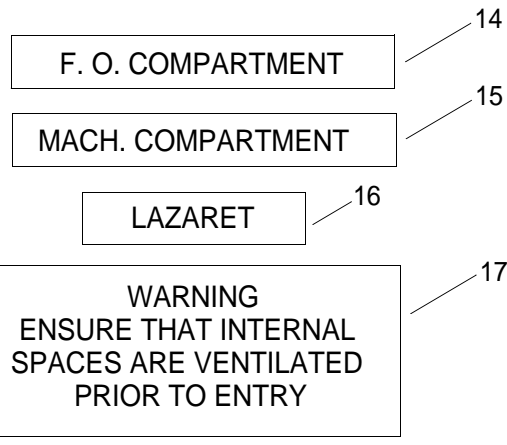
**OPERATOR MAINTENANCE
WARPING TUG
DECALS AND INSTRUCTION PLATES
OPERATION UNDER USUAL CONDITIONS**

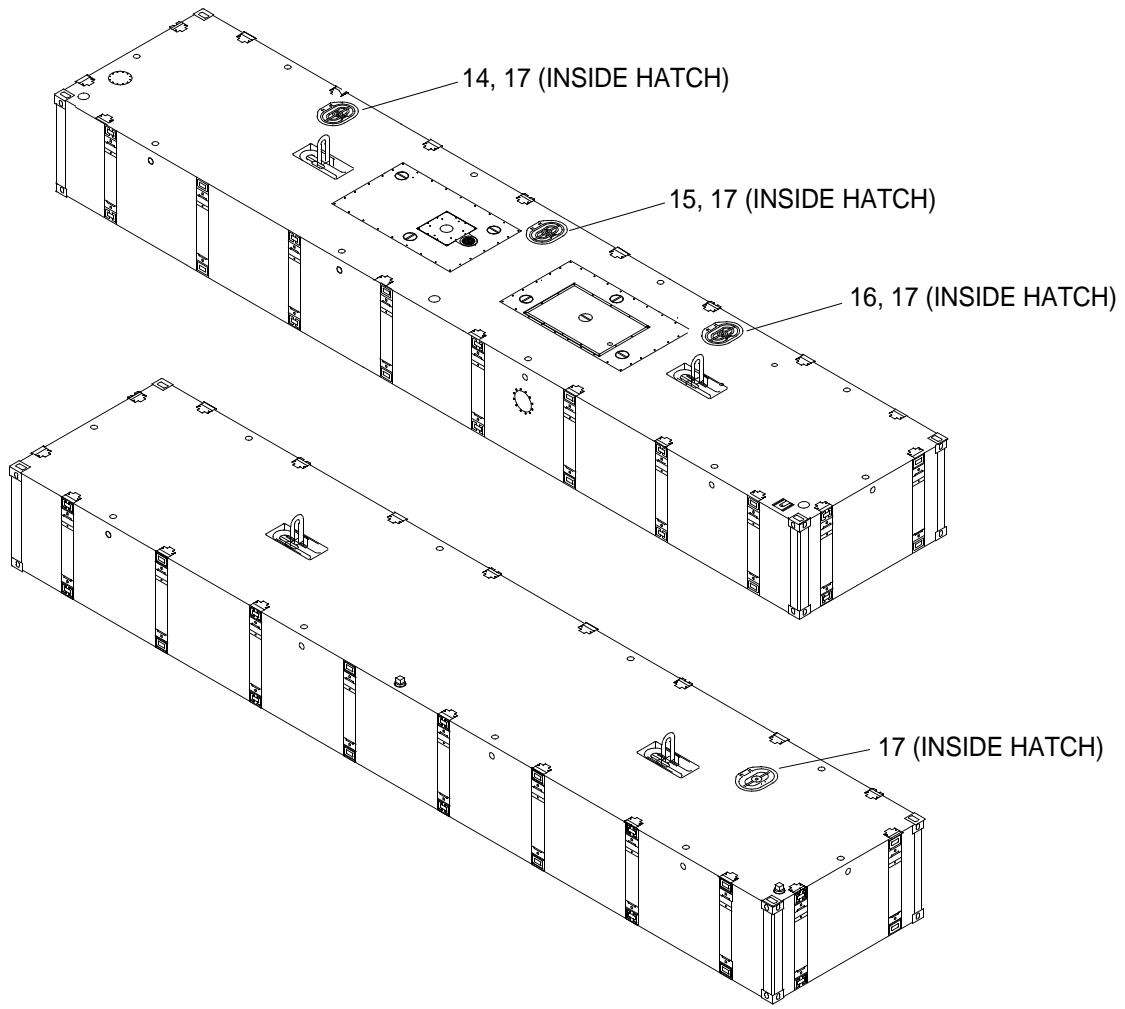
DECALS AND INSTRUCTION PLATE LOCATIONS FOR WARPING TUG

This work package is provided to inform operator of the location and description of decals and instruction plates.

Refer to controls and indicators (WP 0006 00) for additional decals and instruction plate information.







**OPERATOR MAINTENANCE
WARPING TUG
CREW SHELTER
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)

Materials/Parts

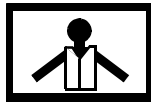
Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

Seaman 88K (2)

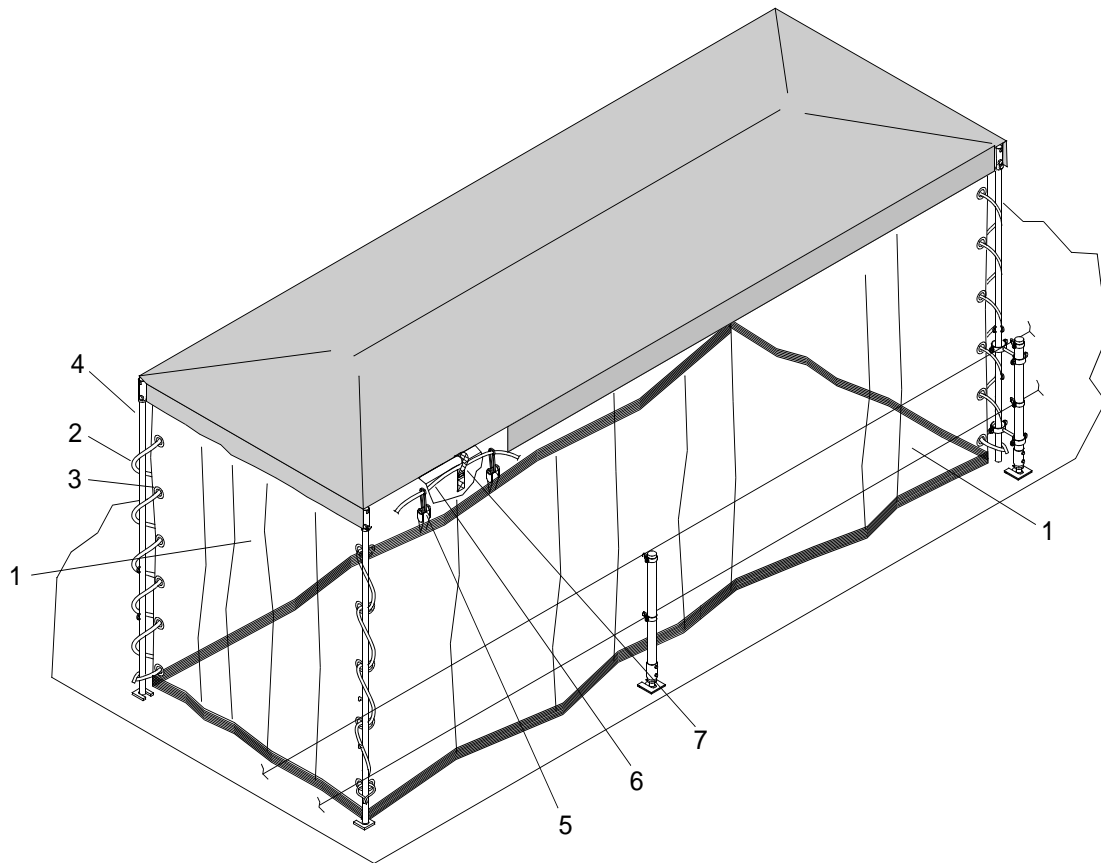
PREPARATION FOR MOVEMENT - REMOVE CREW SHELTER

WARNING

**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

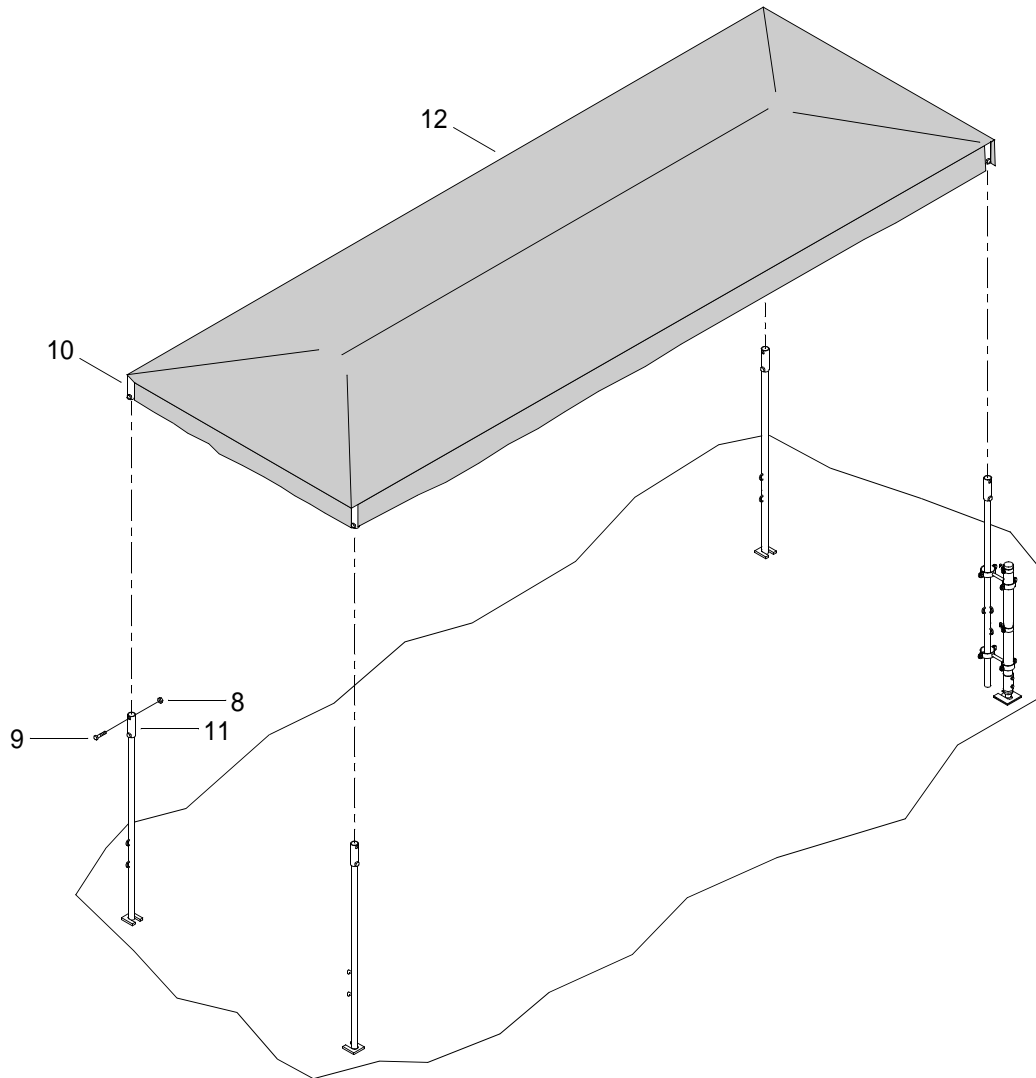
All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

1. Unfasten all panels (1).



- a. Remove line (2) securing panel grommets (3) to lower aluminum pipe legs (4).
 - b. Unsnap panel hooks (5) from canopy line (6).
 - c. Using assistant, fold all panels (1).
2. Remove canopy line (6) from tiedown straps (7).

3. Remove hex head nuts (8) and carriage bolts (9) securing corner fitting leg (10) to upper aluminum pipe legs (11).



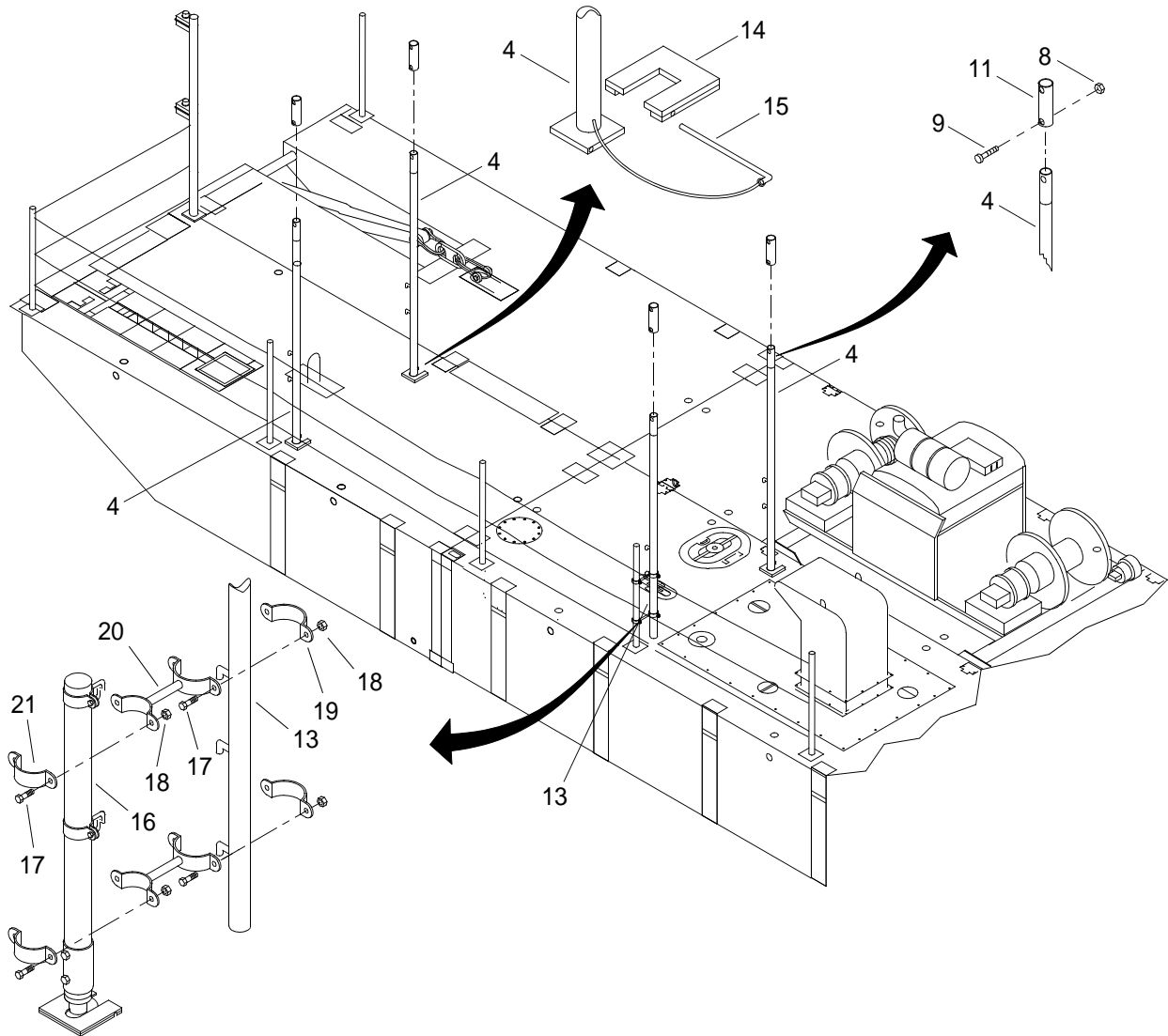
WARNING



HEAVY OBJECTS

4. Remove canopy and frame assembly (12) from upper aluminum pipe legs (11).

5. Remove hex head nut (8) from carriage bolt (9).



6. Remove carriage bolt (9) from upper and lower aluminum pipe legs (11, 4).

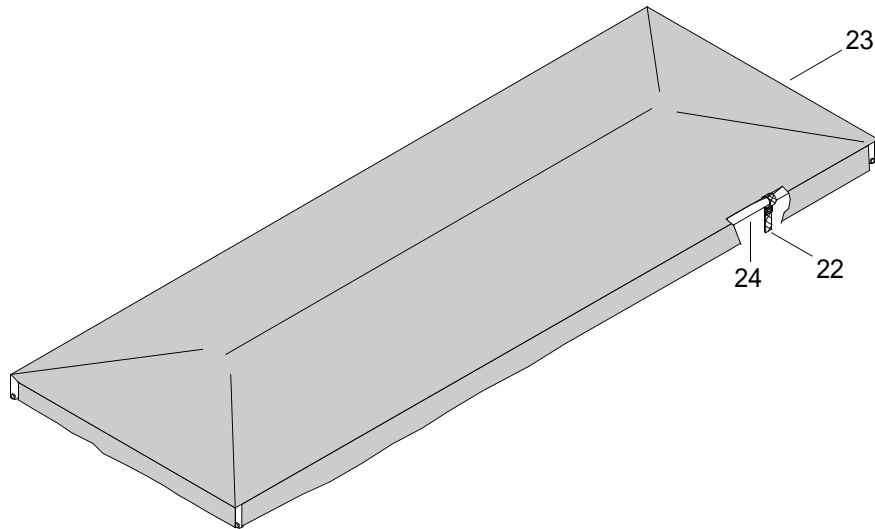
7. Remove upper aluminum pipe legs (11) from lower aluminum pipe legs (4 and 13).

8. Remove lower aluminum pipe legs (4) from stanchion fittings (14).

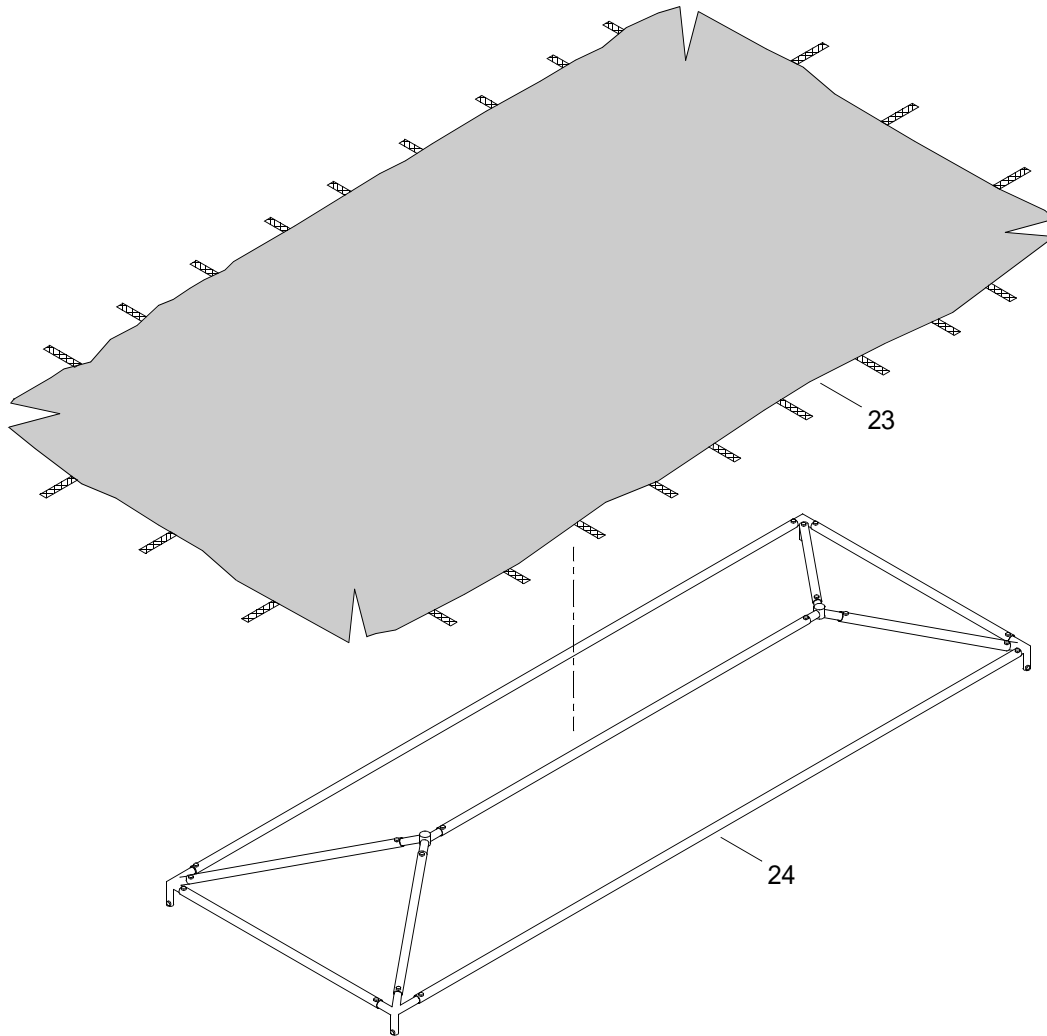
a. Remove locking pin (15) from stanchion fitting (14).

b. Slide lower aluminum pipe legs (4) out of stanchion fittings (14).

9. Remove lower aluminum pipe leg (13) from life line stanchion (16).
 - a. Remove hex head capscrews (17) and self-locking hex nuts (18) securing two hanger brackets (19) to opposite two standoff weldments (20).
 - b. Remove two hanger brackets (19).
 - c. Remove lower aluminum pipe leg (13) from two standoff weldments (20).
 - d. Remove hex head capscrews (17) and self-locking hex nuts (18) securing two hanger brackets (21) to opposite two standoff weldments (20).
 - e. Remove two hanger brackets (21).
 - f. Remove two standoff weldments (20) from life line stanchion (16).
 - g. Using hex head capscrews (17) and self-locking hex nuts (18) secure hangar brackets (19, 20) to standoff weldments (20).
10. Release tiedown straps (22) securing canopy (23) to frame (24).



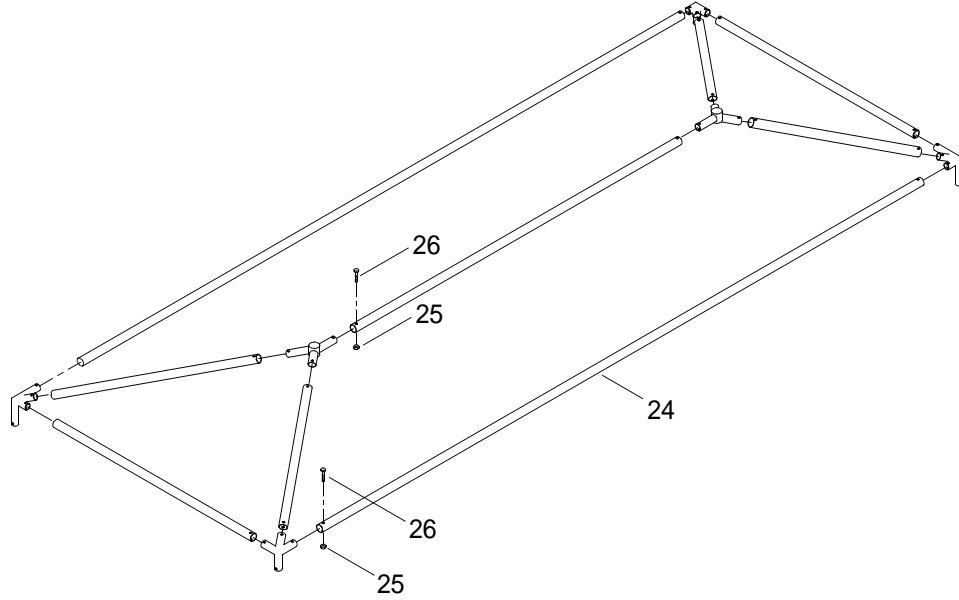
11. Using assistant, remove canopy (23) from frame (24).



12. Rinse canopy (23) with fresh water and allow to air dry.

13. Fold canopy (23) and stow.

14. Remove all hex head nuts (25) and carriage bolts (26) from frame (24).



15. Separate all components of frame (24).

16. Rinse all components of frame (24) with fresh water and allow to air dry.

17. Stow all components of frame (24).

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
SAFETY EQUIPMENT
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
 Goggles, Industrial: Clear Lens, Chipping (Cabinet B4) (Item 35, WP 0112 00)

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)
 Gloves, Rubber Industrial (Item 26, WP 0114 00)

Personnel Required

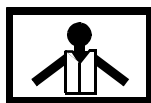
Seaman 88K

Equipment Condition

Crew Shelter Removed. (WP 0039 00)

PREPARATION FOR MOVEMENT - REMOVAL OF SAFETY EQUIPMENT

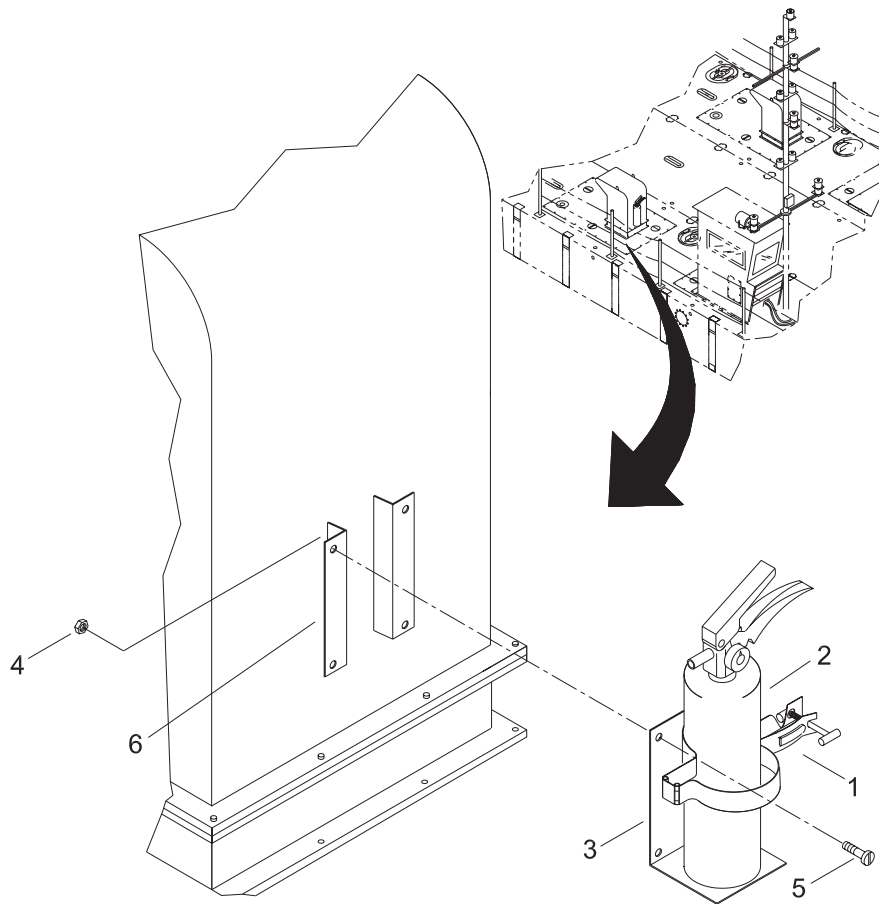
WARNING

**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

REMOVE PORTABLE FIRE EXTINGUISHER

1. Open latching clamp (1) securing portable CO₂ fire extinguisher (2) to bracket (3).

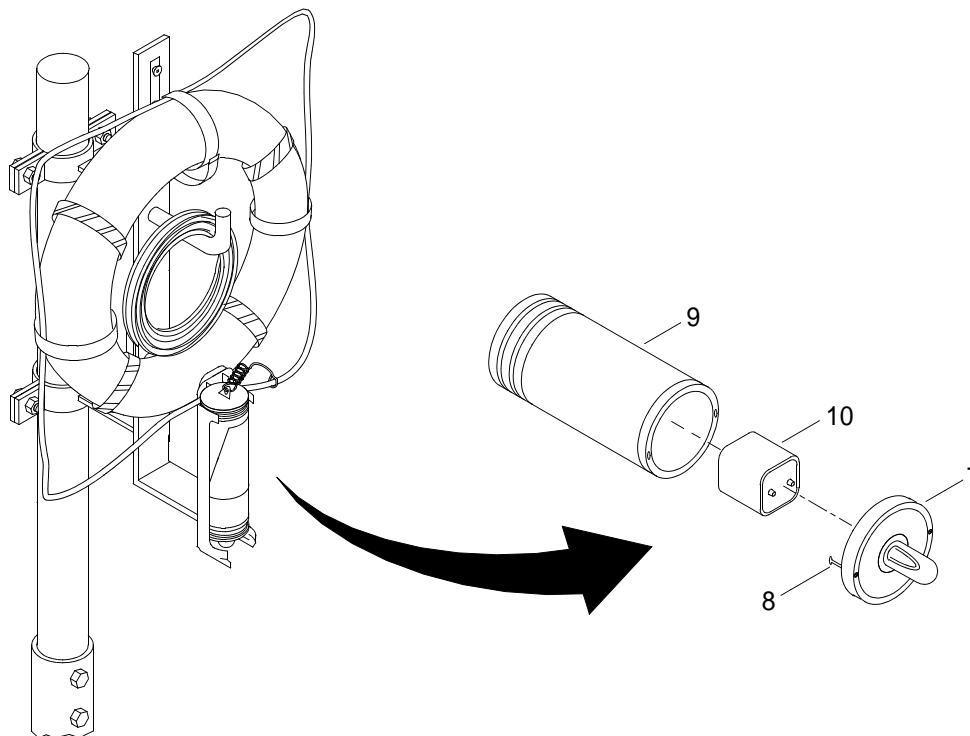


2. Remove portable CO₂ fire extinguisher (2) from bracket (3).
3. Close and lock latching clamp (1).
4. Remove hex nuts (4) and hex head capscrews (5) securing bracket (3) to exhaust plenum mounting brackets (6).
5. Stow portable CO₂ fire extinguisher (2) and bracket with hardware (3, 4, 5) in BII container. (WP 0070 00)

REMOVE LIFE RING STROBE LIGHT BATTERY**NOTE**

These steps are typical for the removal of life ring strobe light batteries.

1. While depressing strobe light cover (7), turn locks (8) 90° to unlock strobe light cover (7) from strobe light housing (9).



2. Remove strobe light cover (7) from strobe light housing (9).

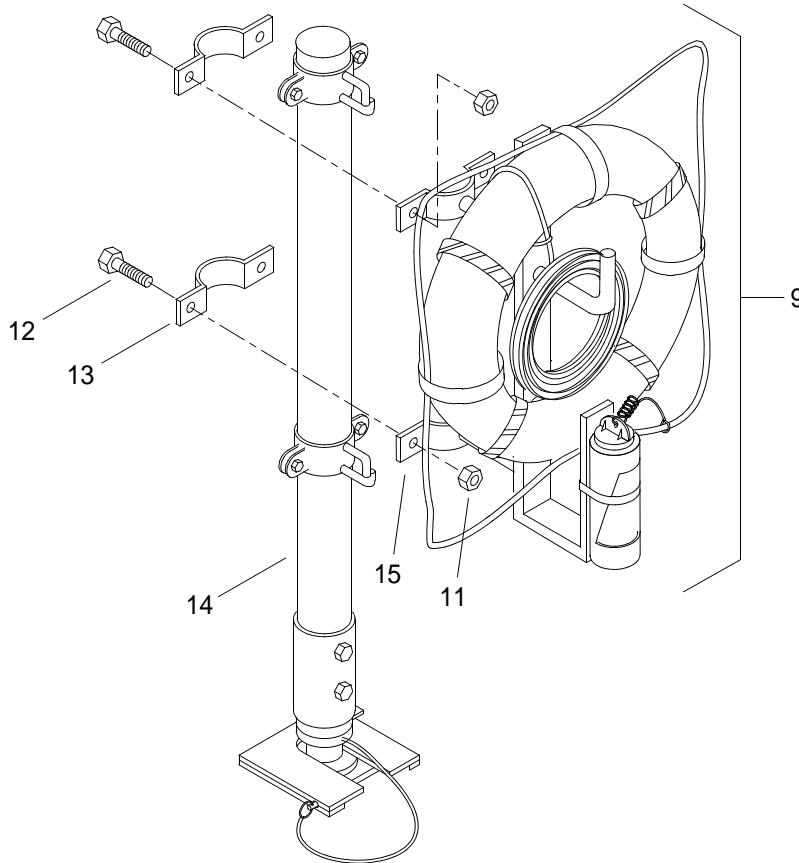
WARNING**CHEMICAL****EYE PROTECTION**

3. Remove battery (10) from inside strobe light housing (9).
4. Position strobe light cover (7) on strobe light housing (9).
5. While depressing strobe light cover (7), turn locks (8) 90° to lock strobe light cover (7) to strobe light housing (9).
6. Stow battery (10) in BII container. (WP 0070 00)

REMOVE LIFE RING ASSEMBLY**NOTE**

These steps are typical for the removal of life ring assemblies from side stanchions.

1. Remove nuts (11), bolts (12) and outer clamp (13) securing life ring assembly (9) to life line stanchion (14).

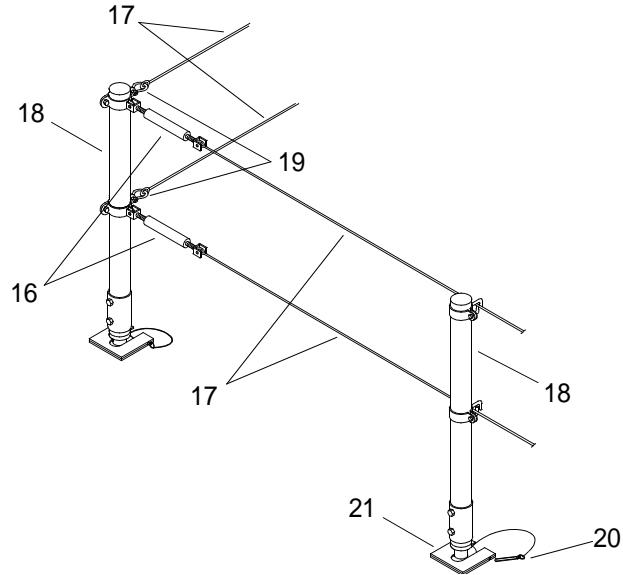


2. Install outer clamp (13), bolts (12) and nuts (11) on inner clamp (15). Tighten nuts (11).
3. Stow life ring assembly (9) in miscellaneous container. (WP 0071 00).

REMOVE LIFE LINES AND LIFE LINE STANCHIONS**NOTE**

These steps are typical for removal of life lines and life line stanchions.

1. Loosen and remove all turnbuckles (16) securing life lines (17) to life line stanchions (18).



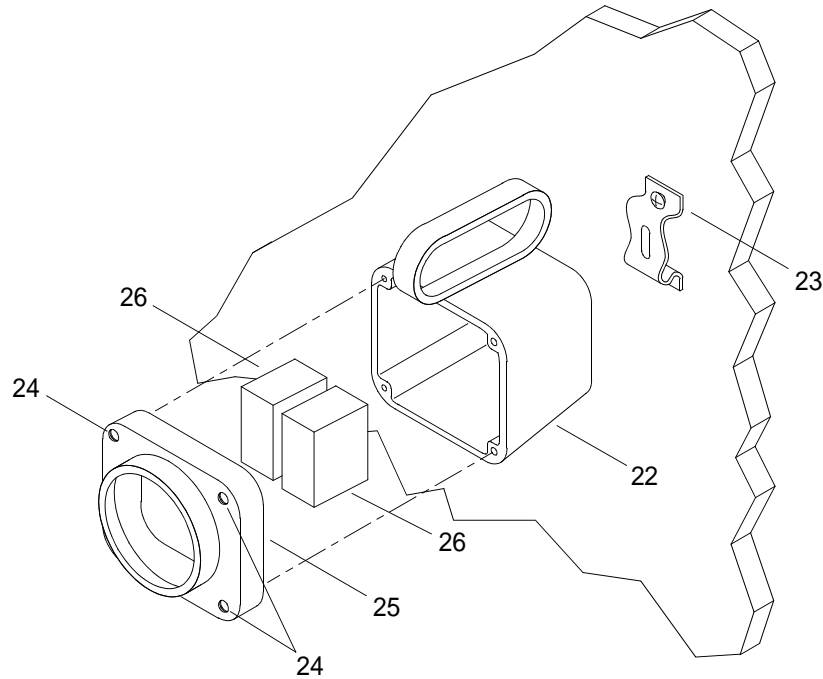
2. Remove all shackles (19) securing life lines (17) to life line stanchions (18).
3. Remove all life lines (17) from all life line stanchions (18).
4. Remove pins (20) from deck fittings (21) of life line stanchions (18).
5. Remove life line stanchions (18) from deck fittings (21).
6. Stow life lines (17) and life line stanchions (18) in miscellaneous container. (WP 0071 00)

REMOVE BATTLE LANTERNS ON WT**NOTE**

This task is typical for preparing the battle lanterns for storage.

The battle lanterns are located inside the operators cab above the door, in the machinery compartment above house battery BT3 and in the lazaret above the escape hatch.

1. Rotate battle lantern (22) 90° to remove from on bulkhead bracket (23).



2. Place battle lantern (22) face up on flat surface.
3. Loosen four captive screws (24) on cover (25).
4. Remove cover (25).
5. Remove two batteries (26) inside battle lantern (22).
6. Install cover (25) and tighten four captive screws (24).
7. Store battle lanterns (22) and batteries (26) from BII container.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
A-FRAME
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Plug, Ear (Cabinet B4) (Item 55, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
 Sling, Endless: 5300LB, 6' Green (Cabinet A6) (Item 81, WP 0112 00)
 Qty 2
 Shackle: 3/4", 4.75 Ton (Cabinet B7) (Item 71, WP 0112 00)
 Qty 2

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)
 Rope, Fibrous (Item 49, WP 0114 00)
 Lumber, Softwood, Dimension (Item 43, WP 0114 00)

Personnel Required

Seaman 88K (4)

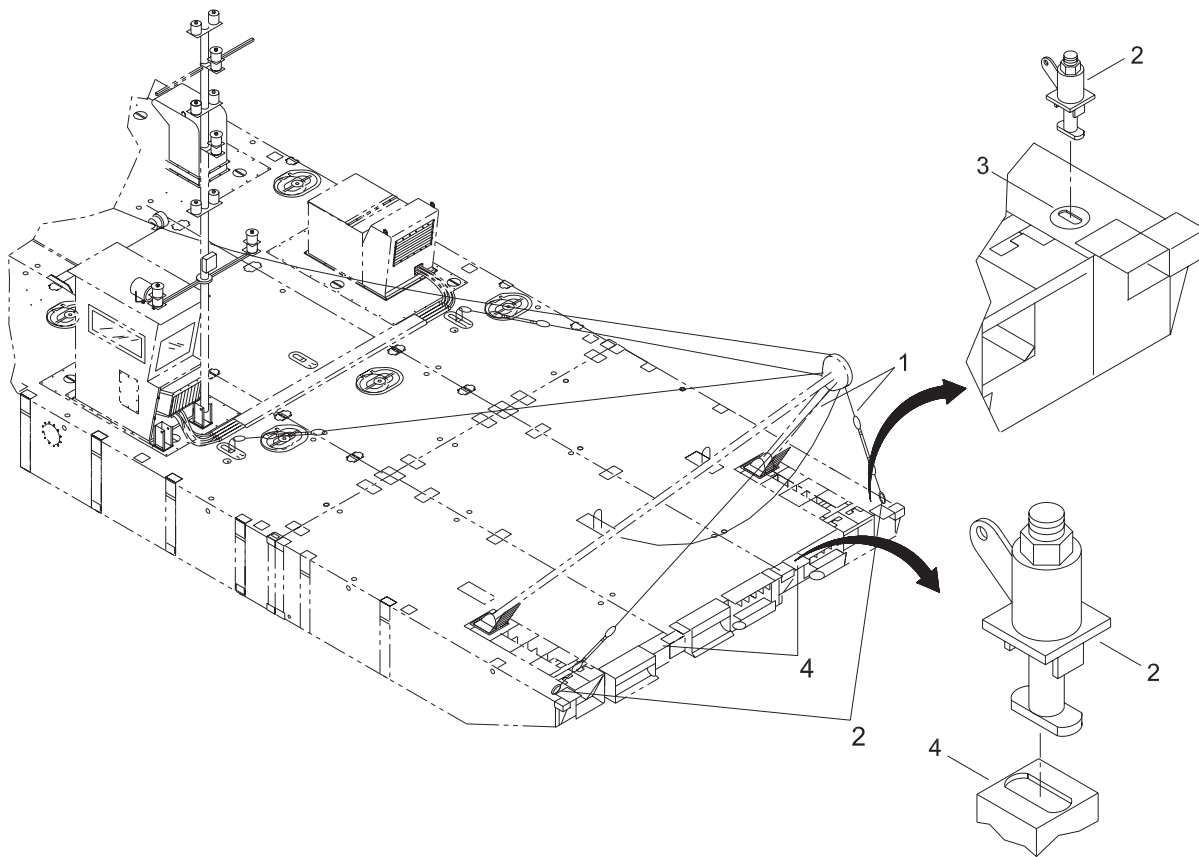
PREPARATION FOR MOVEMENT - REMOVAL OF A-FRAME**INSTALL A-FRAME ELEVATING POLE**

WARNING

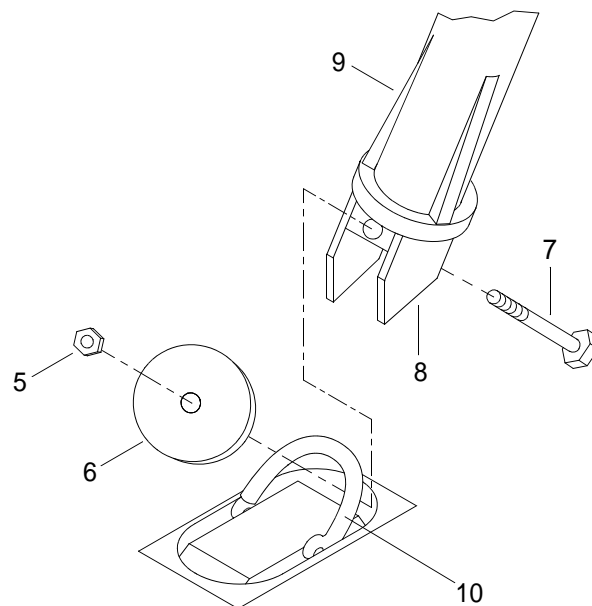
**EAR PROTECTION****VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Single hearing protection shall be used when the deck winches are in use. Failure to observe these precautions could result in serious injury or death.

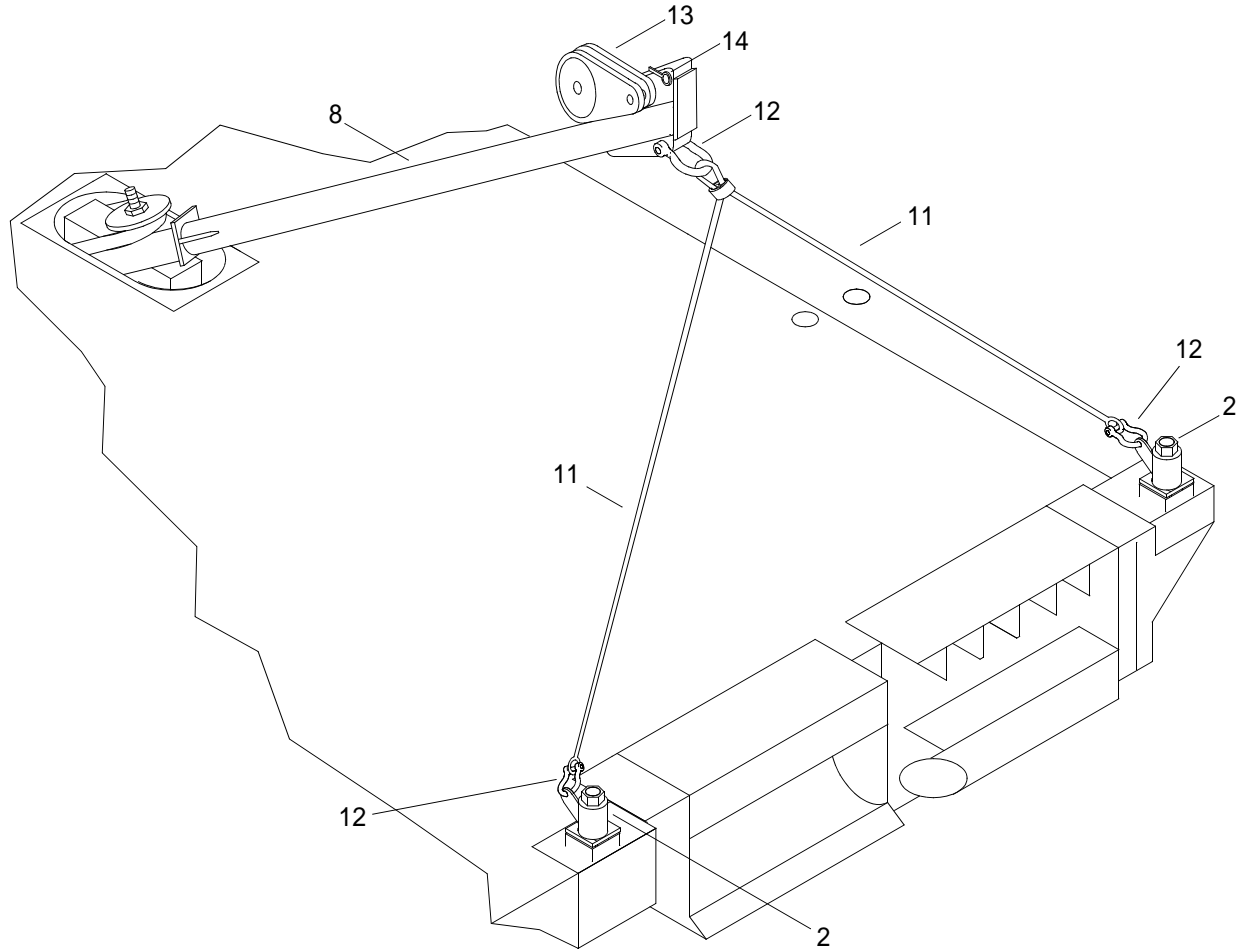
1. Inspect chains, slings and shackles. (WP 0007 00)
2. Remove forward guy wires (1) from corner fitting lug assembly (2).



3. Remove corner fitting lug assembly (2) from left and right end rake modules closure assemblies (3).
4. Move and install two corner fitting lug assemblies (2) in both center rake module ISO corner fittings (4).
5. Remove nut (5), large washer plate (6) and bolt (7) from foot (8) of elevating pole (9).



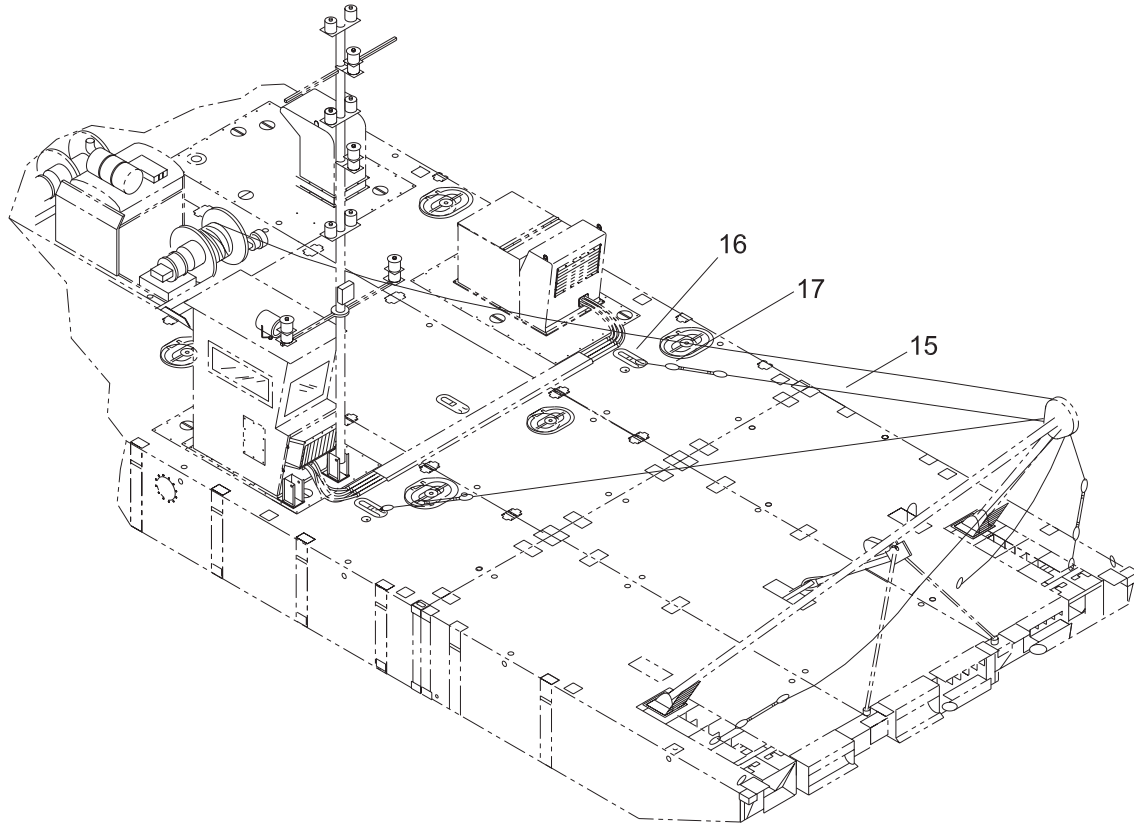
6. Position elevating pole (9) into center rake modules lifting lug shackle (10).
7. Install bolt (7) through elevating pole foot (8) and shackle (10) and secure with washer plate (6) and nut (5).
8. Attach elevating pole guy wire assembly (11) with shackles (12) to forward hole of elevating pole (8) and at two corner fitting lug assemblies (2).



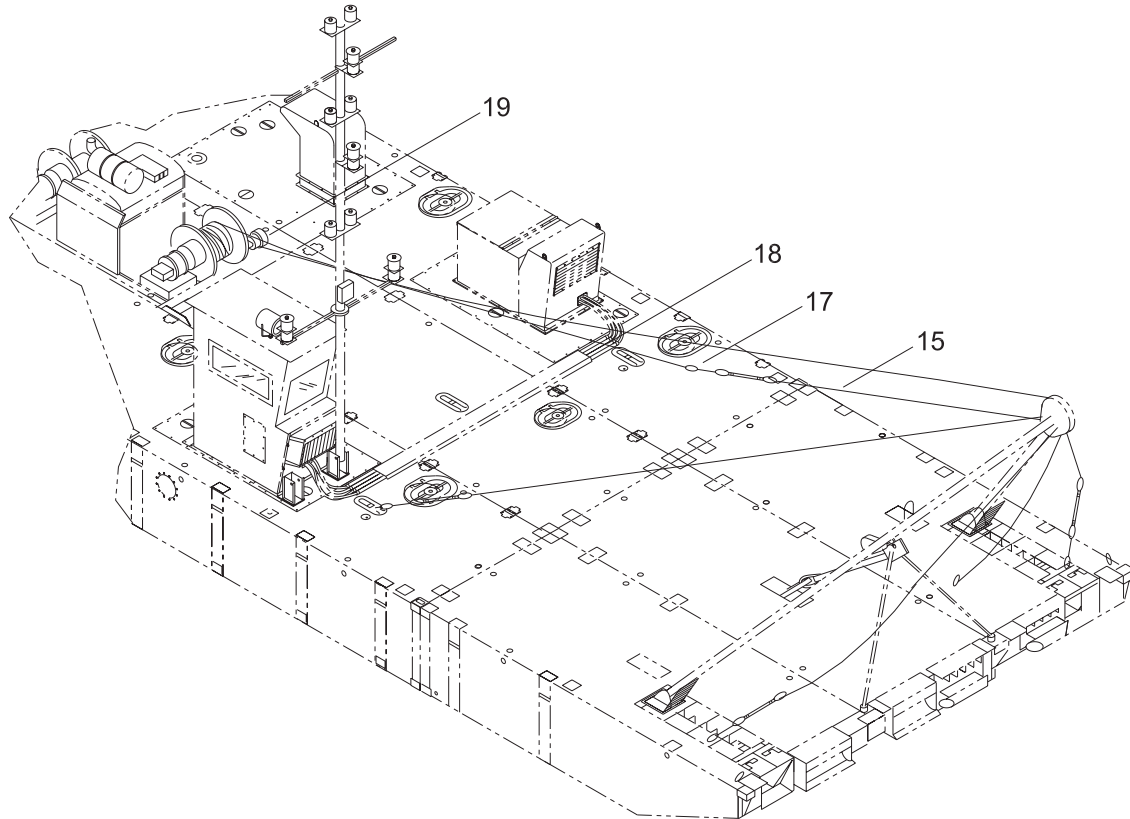
9. Position and attach 8 in. snatch block (13) to lower aft hole (14) of elevating pole head.

LOWER A-FRAME

1. Remove port after guy assembly (15) from forward lifting lug (16) of port propulsion module by turning turnbuckle (17) to release tension.



2. Secure a fibrous rope (18) to turnbuckle (17) of port after guy assembly (15).

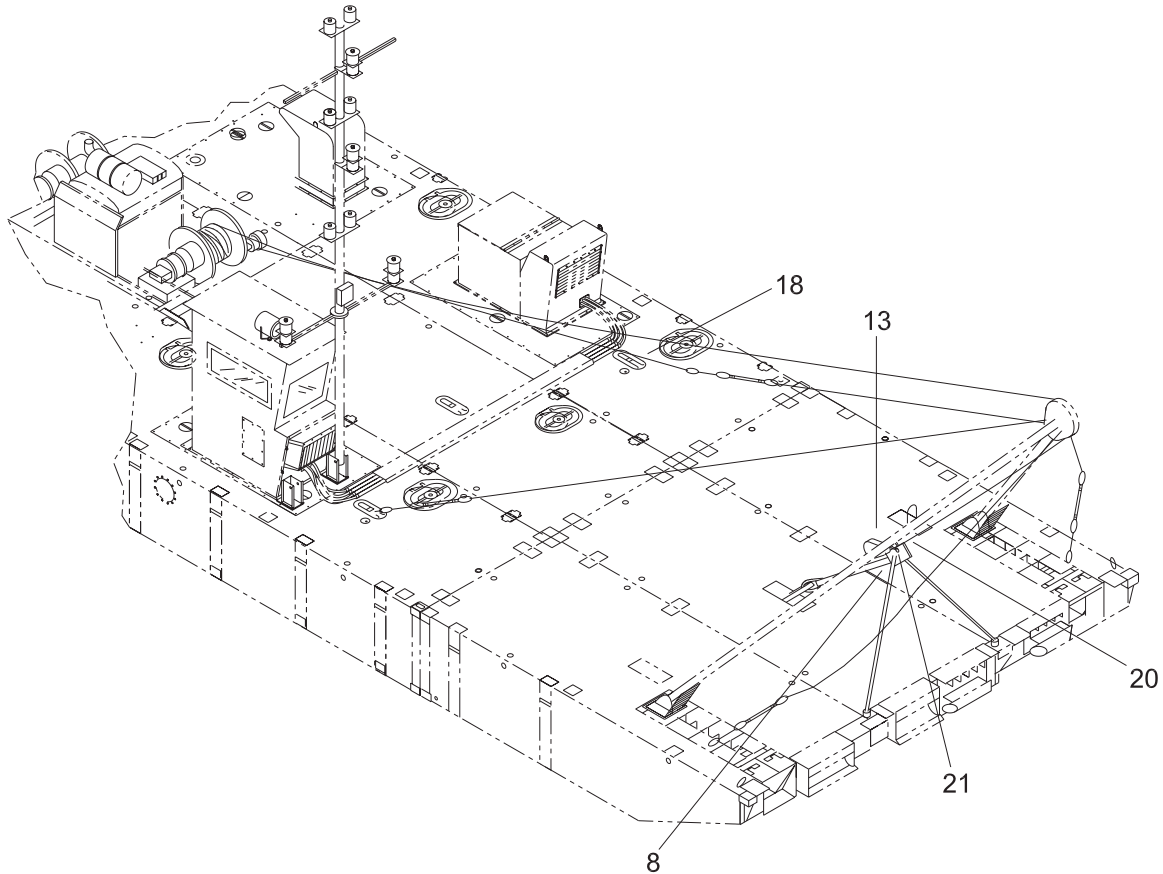


NOTE

The fibrous rope is used to pull A-frame back past top dead center during lowering.

3. Take fibrous rope (18) to gypsy winch (19).

4. Run forward winch drum wire (20) out and secure end to upper eye (21) on top of elevating pole (8).



5. With slack in forward winch drum wire (20), capture it in 8 in. snatch block (13) on elevating pole (8), entering snatch block (13) from bottom.
6. Draw up on both forward winch drum wire (20) and fibrous rope (18) until both wire and fibrous rope are tight.

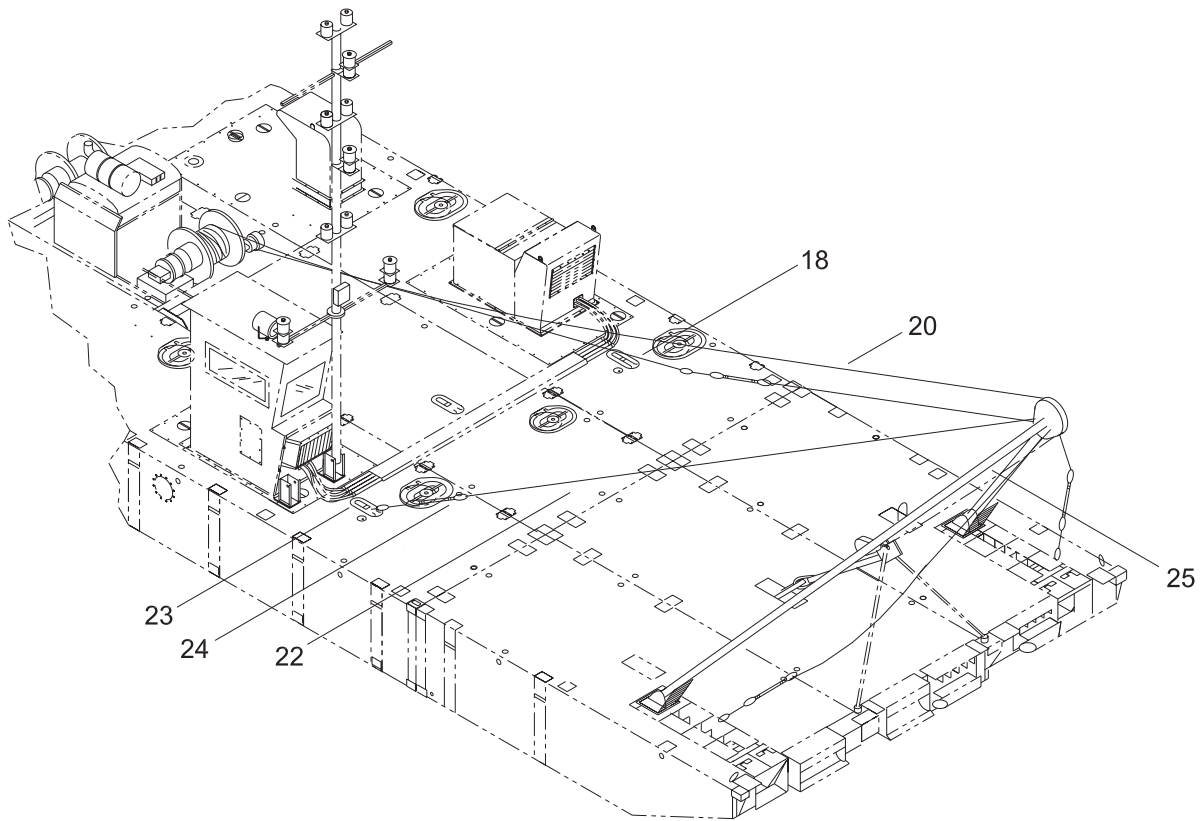
WARNING



HEAVY PARTS

Tension must be maintained on both gypsy winch fibrous rope and forward drum winch wire to prevent A-frame from falling forward. Failure to comply will result in injury to personnel and damage to equipment.

7. Remove starboard after guy assembly (22) from forward lifting lug (23) of starboard propulsion module by turning turnbuckle (24) to release tension.



 WARNING



HEAVY PARTS

NOTE

The fibrous rope attached to gypsy winch is used to pull A-frame back past vertical. Once achieved, forward winch wire looped through elevating pole supports weight of A-frame until it is lowered to deck.

 WARNING

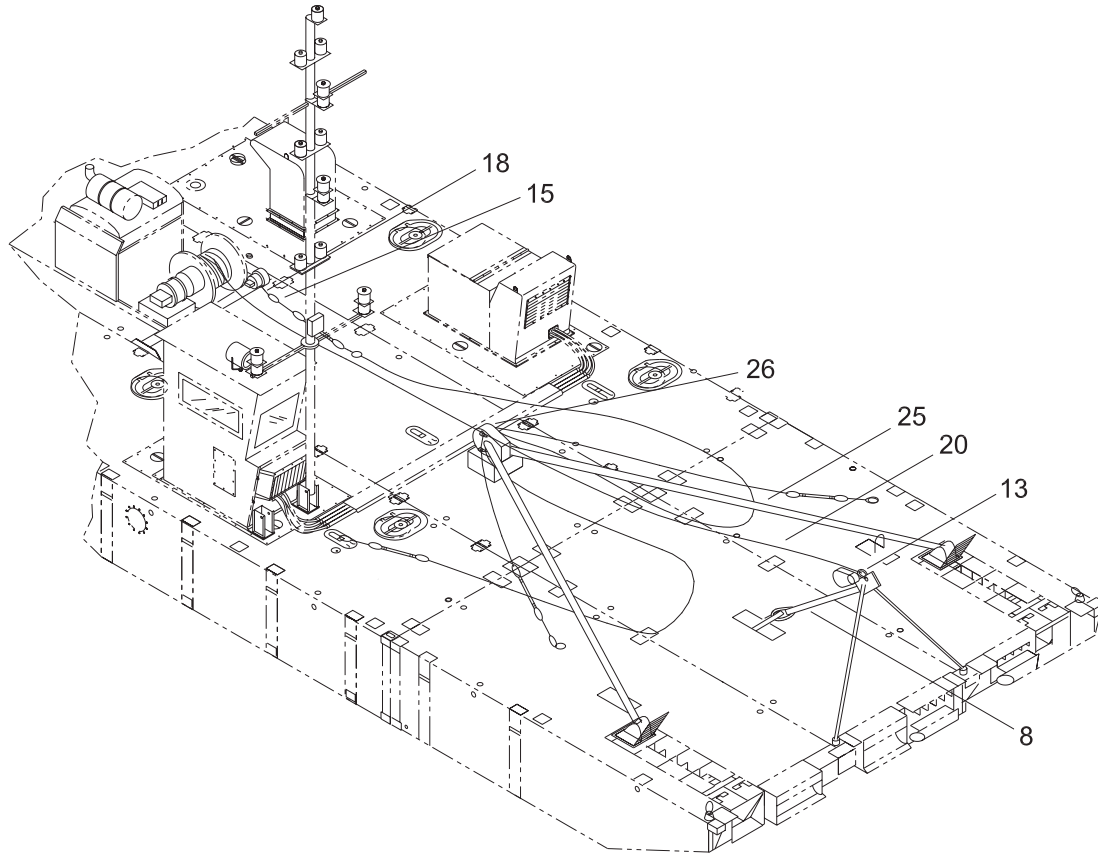


EAR PROTECTION

Single hearing protection shall be used when the deck winches are in use.

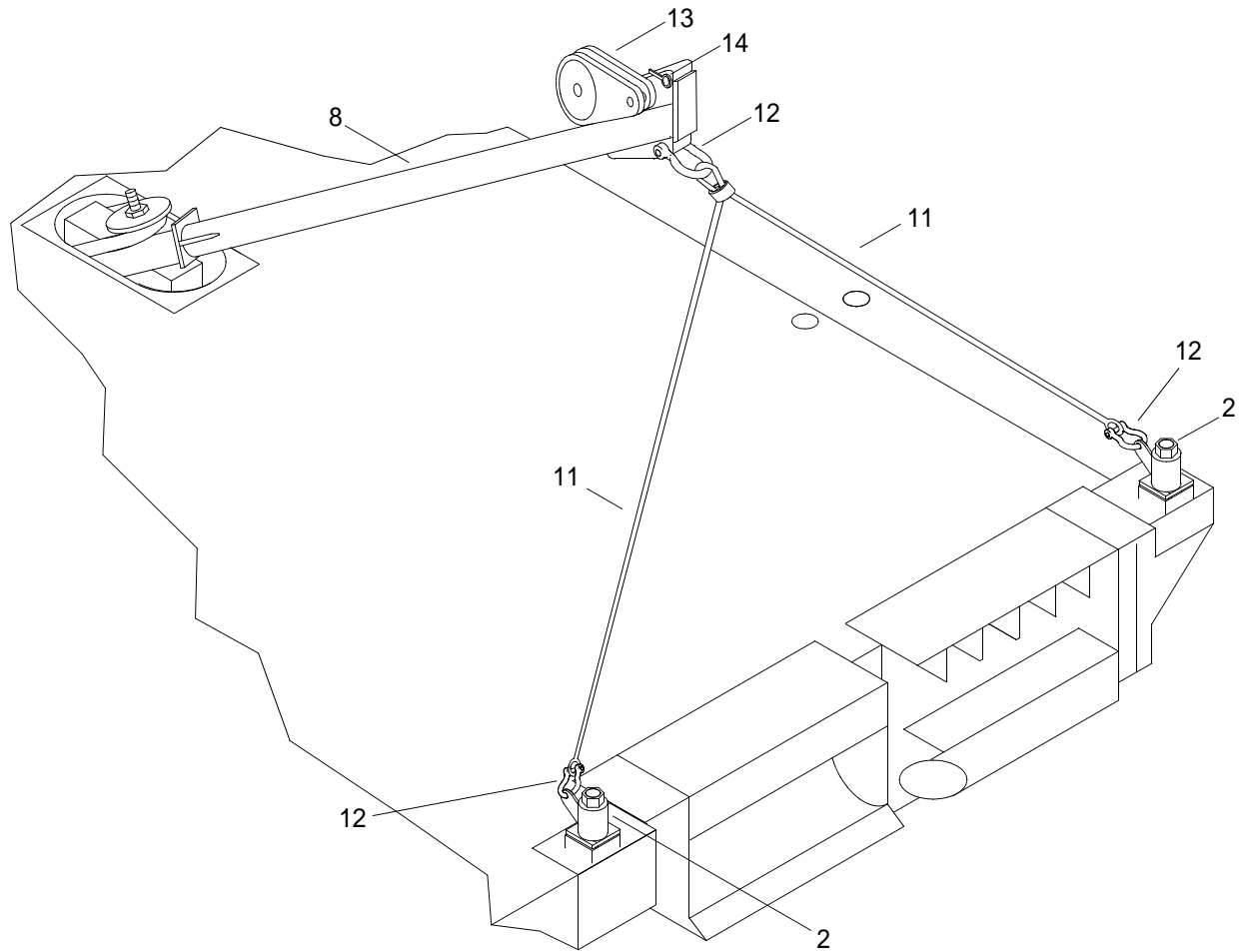
8. Using both winches, slowly take in fibrous rope (18) while letting out winch drum wire (20) until A-frame (25) is levered backwards and lowered towards deck.

9. Place a shoring blocks beneath A-frame (25) to protect sheave (26).



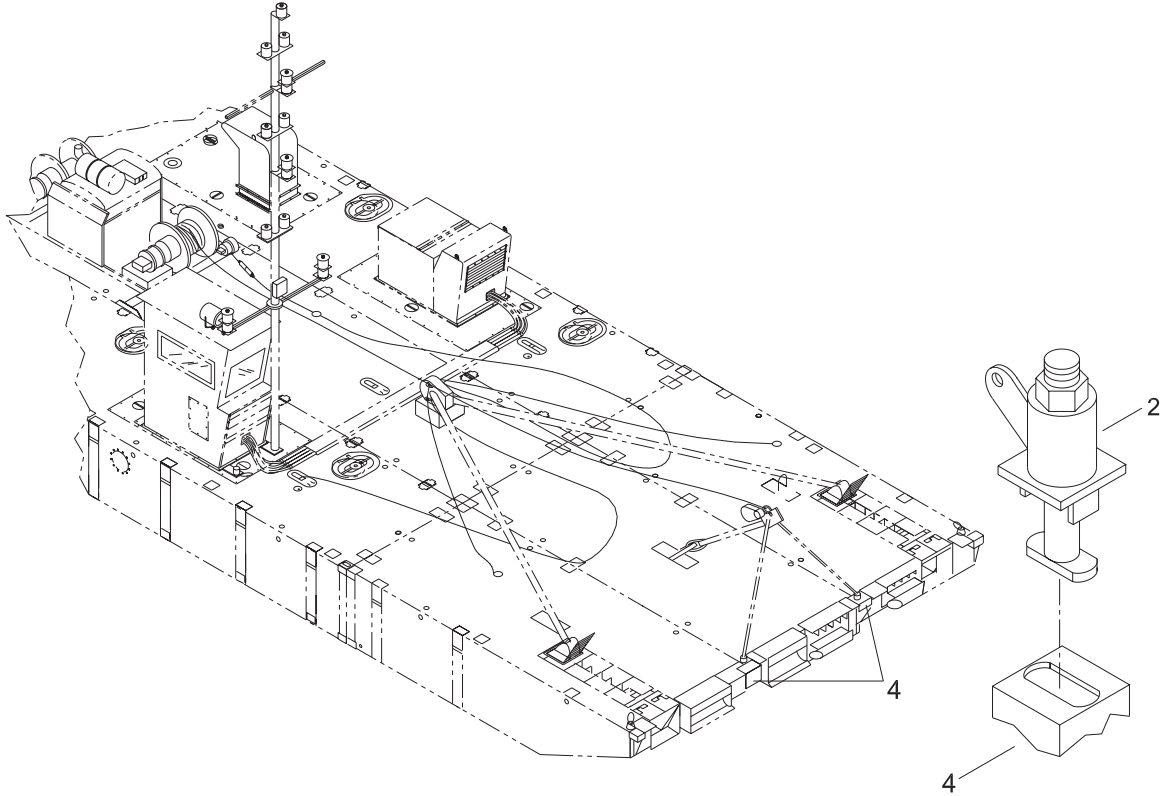
10. Continue lowering A-frame (25) until sheave (26) rests on a shoring block.
11. Slacken drum wire (20).
12. Remove fibrous rope (18) from port after guy assembly (15).
13. Remove forward winch drum wire (20) from snatch block (13) on elevating pole (8).

14. Remove 8 in. snatch block (13) from elevating pole (8).



15. Remove guywire assembly (11) from elevating pole (8) and corner fitting lug assemblies (2).

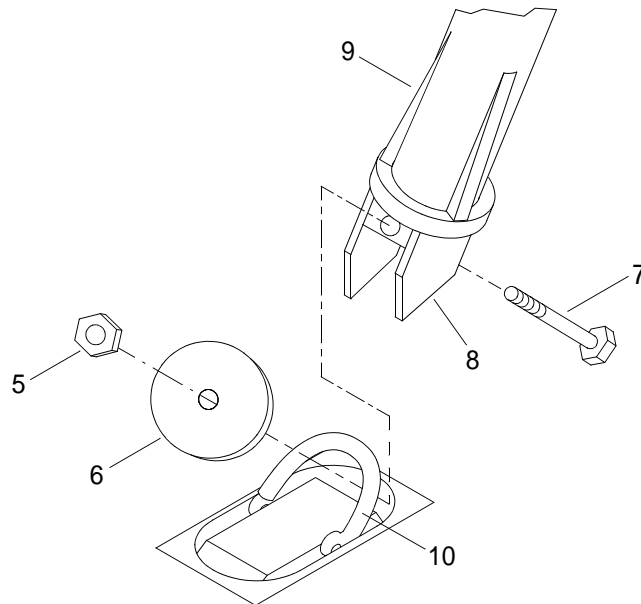
16. Remove two corner fitting lug assemblies (2) from both center rake module ISO corner fittings (4).



17. Rotate corner lug fittings (2) in ISO corner fittings (4) to unlock it.

18. Remove corner lug fittings (2).

19. Remove nut (5), large washer plate (6) and bolt (7) from foot (8) of elevating pole (9).



20. Remove elevating pole (9) from center rake modules lifting lug shackle (10).
21. Install bolt (7), washer plate (6) and nut (5) into elevating pole foot (8).
22. Remove elevating pole (9).

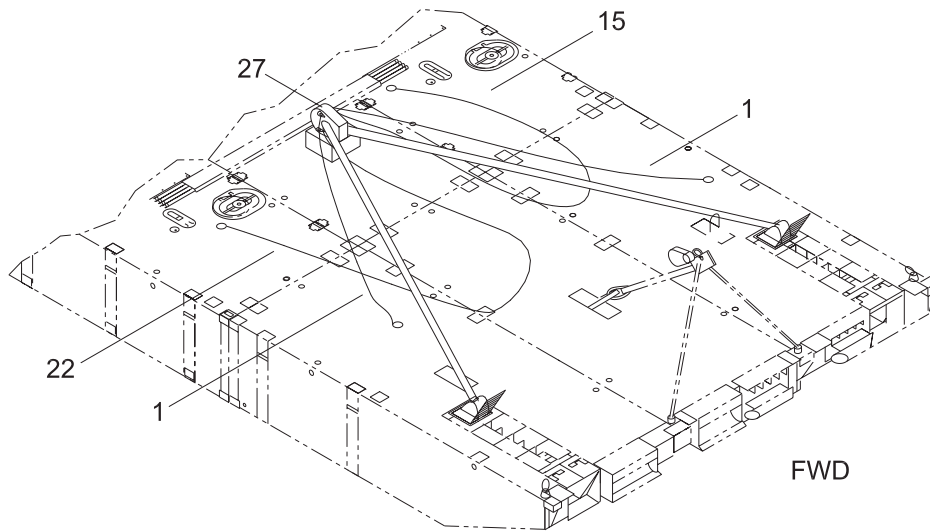
DISASSEMBLE A-FRAME

WARNING

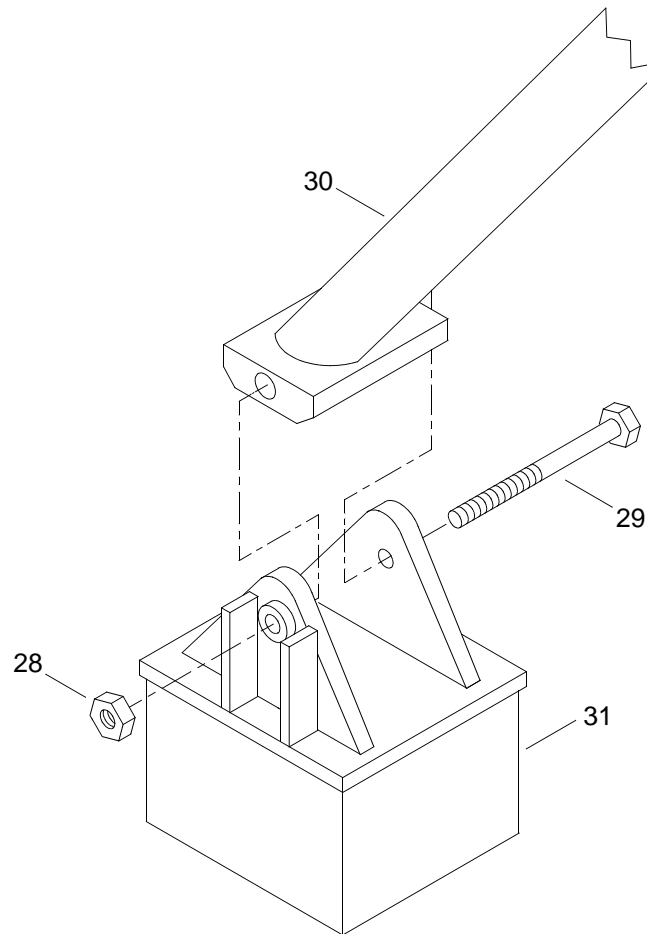


HEAVY PARTS

1. Remove four guy assemblies (1, 15 and 22) from eyes on A-frame heads (27).



2. Remove two nuts (28) and bolts (29) securing A-frame legs (30) to foot assemblies (31).



WARNING

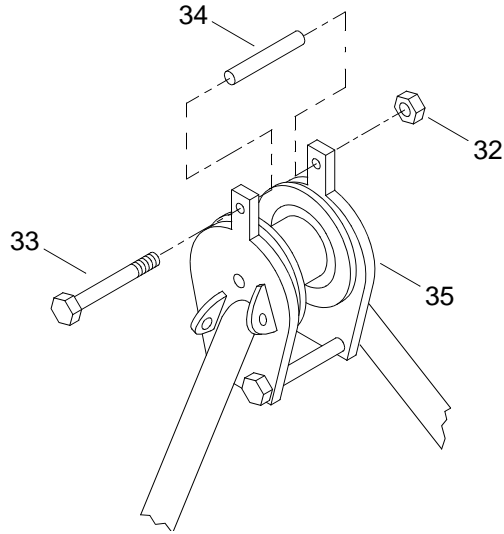


HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

3. Using crane, sling and shackle, remove each foot assembly (31).
4. Remove sling and shackle.

- Remove nut (32), bolt (33) and upper spacer (34) from A-frame heads (35).



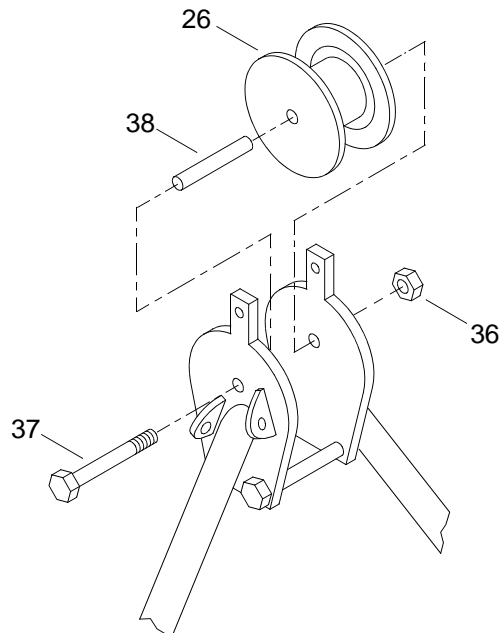
WARNING



HEAVY PARTS

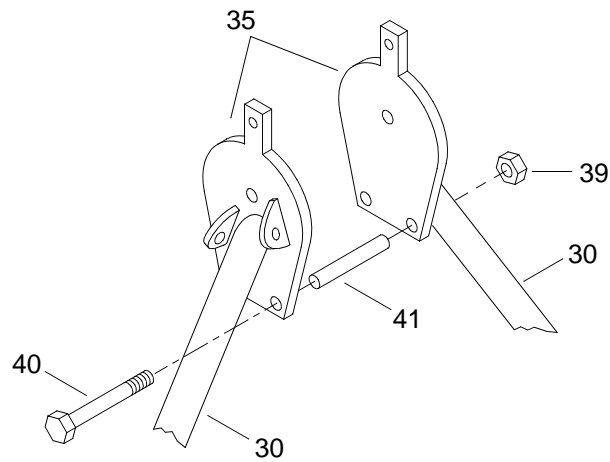
Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

- Supporting weight of sheave (26) with crane, sling and shackles, remove nut (36), bolt (37) and bushing (38).



- Remove sheave (26).

8. Remove sling and shackles from sheave (26).
9. Remove two nuts (39), bolts (40) and lower spacers (41) from A-frame heads (35).



WARNING



HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

10. Using crane, slings and shackles, separately remove two A-frame legs (30).
11. Remove slings and shackles.
12. Stow A-frame components. (WP 0068 00)

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
FENDERS
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
 Sling, Endless: 5300LB, 6' Green (Cabinet A6) (Item 81, WP 0112 00)
 Sling, Endless: 8400LB, 20' Yellow (Cabinet A9) (Item 82, WP 0112 00)
 Qty 2
 Shackle: 1/2" 2 Ton (Cabinet B7) (Item 69, WP 0112 00)
 Qty 4
 Crowbar (60" Long) (Fender Rack) (Item 13, WP 0112 00)
 Qty 2
 Hammer, Hand: 10 LBS Sledge (Cabinet Rack) (Item 39, WP 0112 00)
 Socket, Socket Wrench (Storage Room) (Item 83, WP 0112 00)
 Adapter, Socket Wrench (Storage Room) (Item 1, WP 0112 00)

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)
 Rope, Fibrous (Item 49, WP 0114 00)

Personnel Required

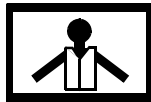
Seaman 88K (2)

Equipment Condition

Safety Equipment Removed. (WP 0040 00)
 A-Frame Removed. (WP 0041 00)

PREPARATION FOR MOVEMENT - REMOVAL OF FENDERS**REMOVE SIDE FENDERING SYSTEM**

WARNING

**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

NOTE

This task is typical for removal of side fendering system on both port and starboard sides of WT.

1. Inspect chains, slings and shackles. (WP 0007 00)

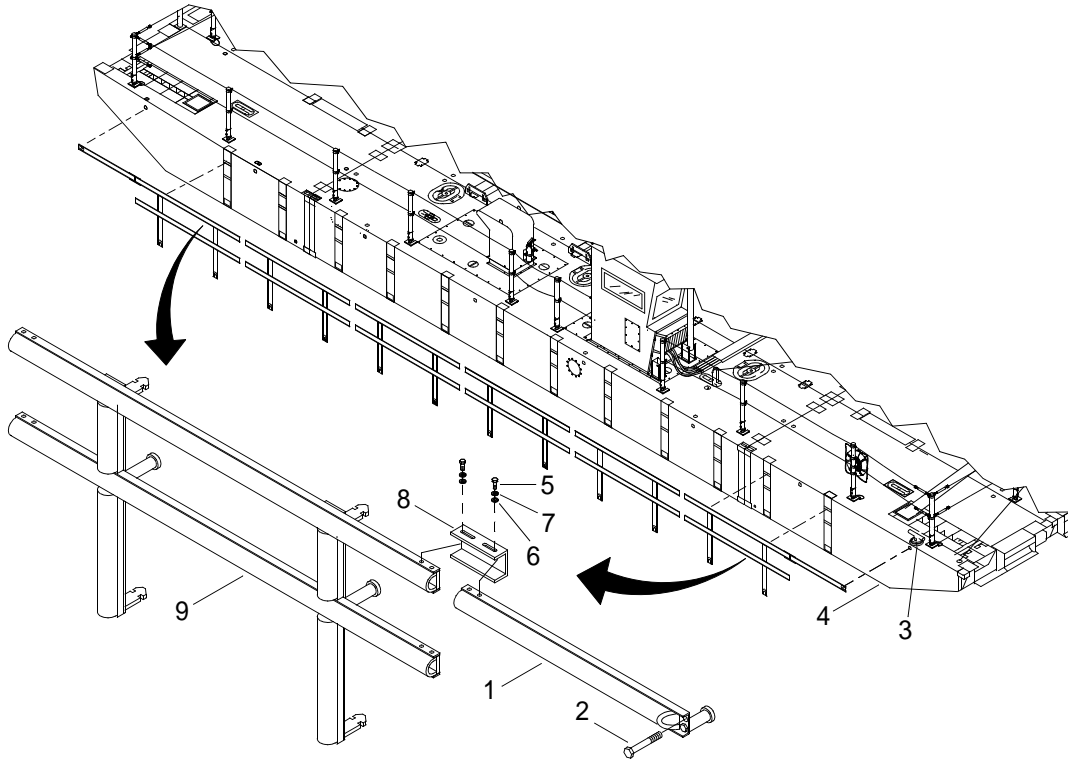
 WARNING



HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

- Using crane, sling and shackles, support fender extension (1) during removal.



- Remove deck cleat bolt (2) securing fender extension (1) to deck cleat (3) in side of end rake (4).
- Remove capscrews (5), washers (6), lock washers (7) and connector (8) securing fender extension (1) to outboard side fender (9).

 WARNING



HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

- Using crane, slings and shackles, remove fender extension (1).
- Remove slings and shackles.

7. Install deck cleat bolt (2) in deck cleat (3).
8. Repeat steps 1 through 5 for remaining fender extensions (1).
9. Install connector (8) with two capscrews (5), washers (6) and lock washers (7) to ends of fender extensions (1) prior to stowage.

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

10. Using crane, slings and shackles, support side fender (9) during removal.
11. Operate male and female connectors. (WP 0009 00)

WARNING

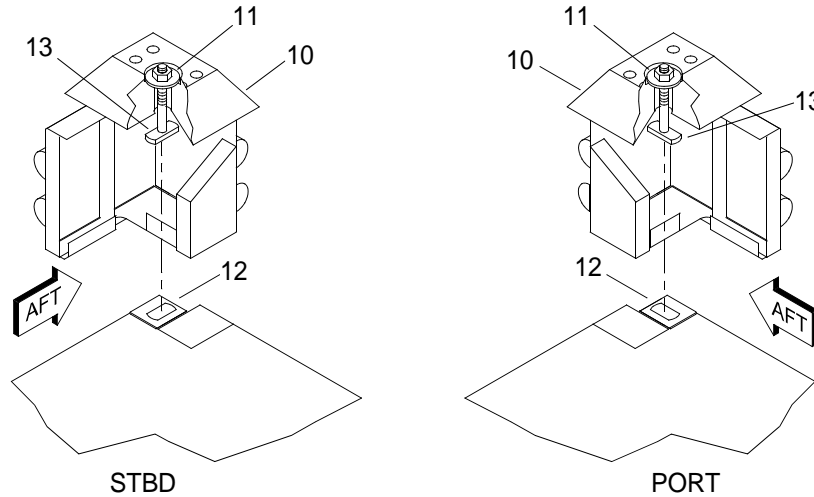
**HEAVY PARTS**

12. Using crane, slings and shackles, remove side fender assembly (9) on side of WT.
13. Operate male and female connectors. (WP 0009 00)
14. Remove slings and shackles.
15. Repeat steps 8 thru 12 for remaining side fender assemblies (9).
16. Install remaining two capscrews (5), washers (6) and lock washers (7) from fender extension (1) removal to ends of side fender (9) prior to stowage.
17. Rinse all side fendering system components with fresh water before packing. Allow to thoroughly air dry.
18. Stow side fendering system components in shipping rack. (WP 0068 00)

REMOVE CORNER FENDERS**NOTE**

This task is typical for the removal of corner fenders on aft left and right end rake ISO corners.

1. Secure a tagline between corner fender (10) and any deck fitting to prevent accidental loss of equipment overboard.



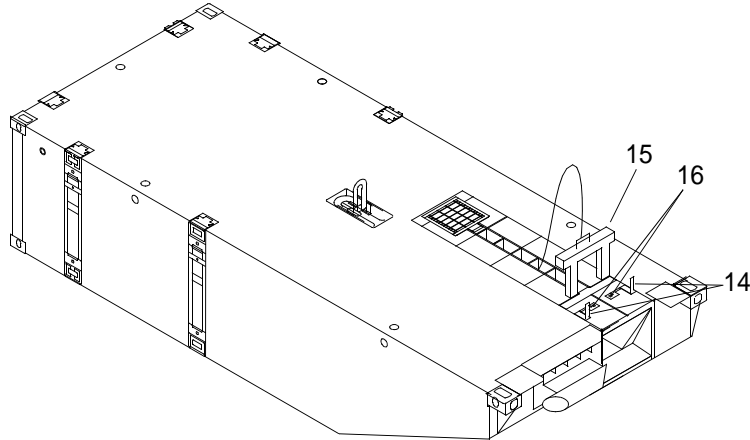
2. Using socket wrench and adapter, loosen nut (11) securing corner fender (10) to ISO corner (12).
3. Holding tee bolt (13) end threads, turn tee bolt (13) ¼ turn to free tee bolt (13) from ISO corner fitting (12).

WARNING**HEAVY OBJECTS**

4. Using assistant, remove corner fender (10) from ISO fitting (12).
5. Tighten nut (11) on tee bolt (13).
6. Rinse all corner fender components with fresh water before packing. Allow to thoroughly air dry.
7. Stow corner fenders (10) in miscellaneous container. (WP 0071 00)

REMOVE BOW FENDER ASSEMBLY

1. Rotate and pull the chute bolts (14) to unlocked position on left and right end rakes.



2. Lift guillotines (15) from flexor slots (16) on left and right end rakes.

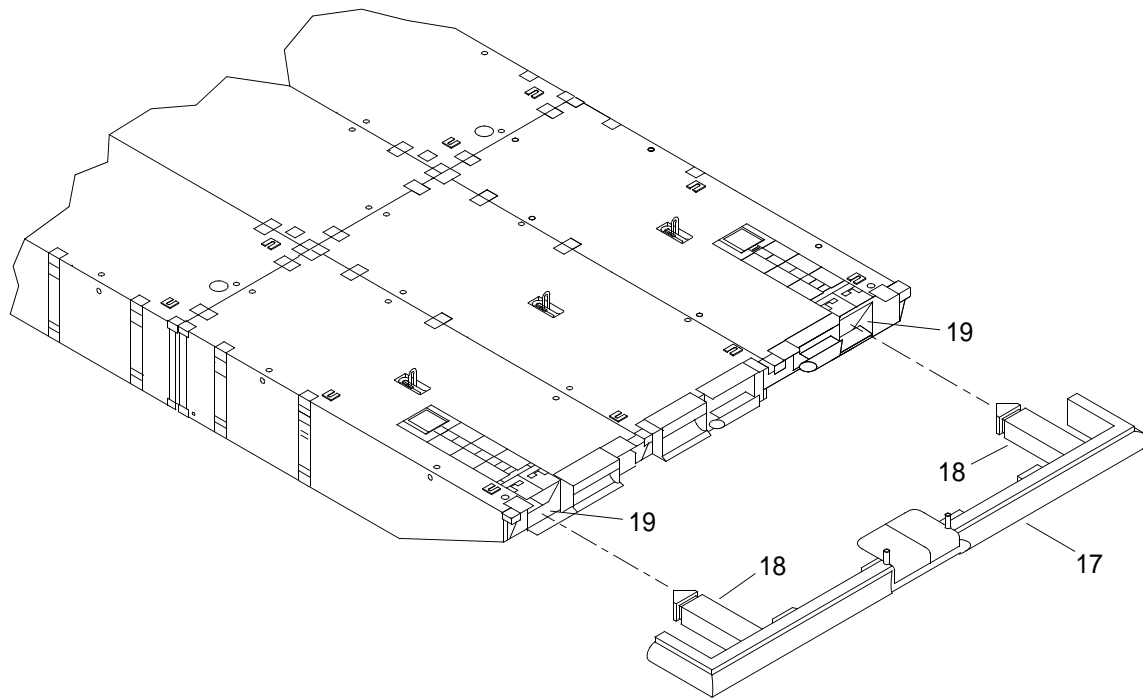
WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

3. Using crane, slings and shackles, support bow fender assembly (17) during removal.

- Using crowbars, push outwards on flexor receiver insert subassemblies (18) until clear of both left and right end rake flexor receivers (19).



WARNING



HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

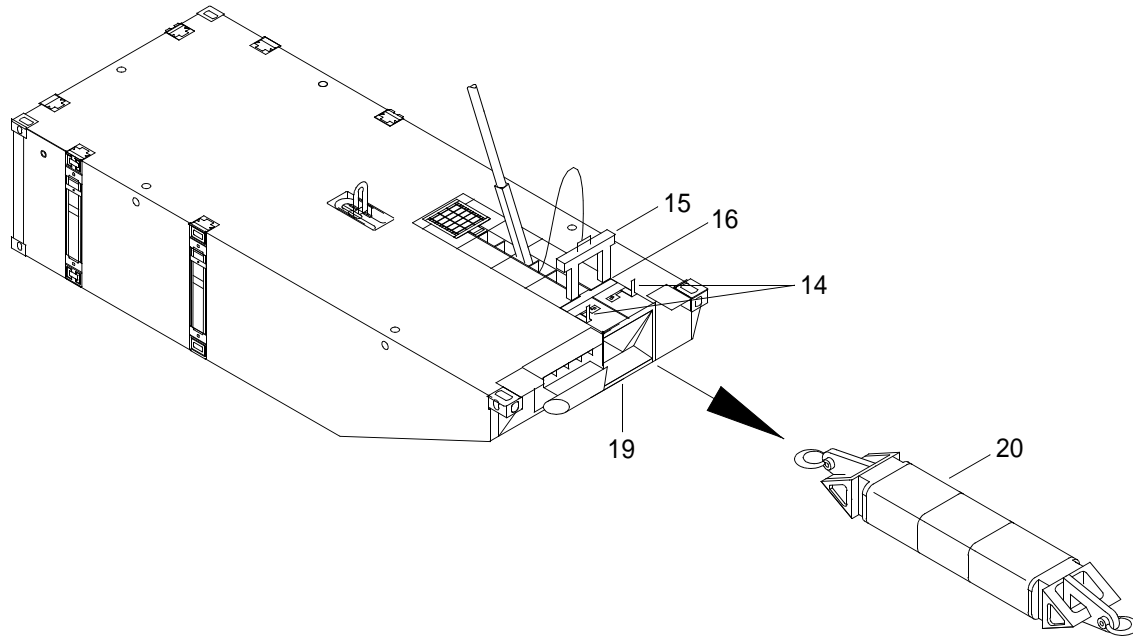
- Using crane, slings and shackles, remove bow fender assembly (17) and place on deck of WT.

WARNING

**HEAVY PARTS**

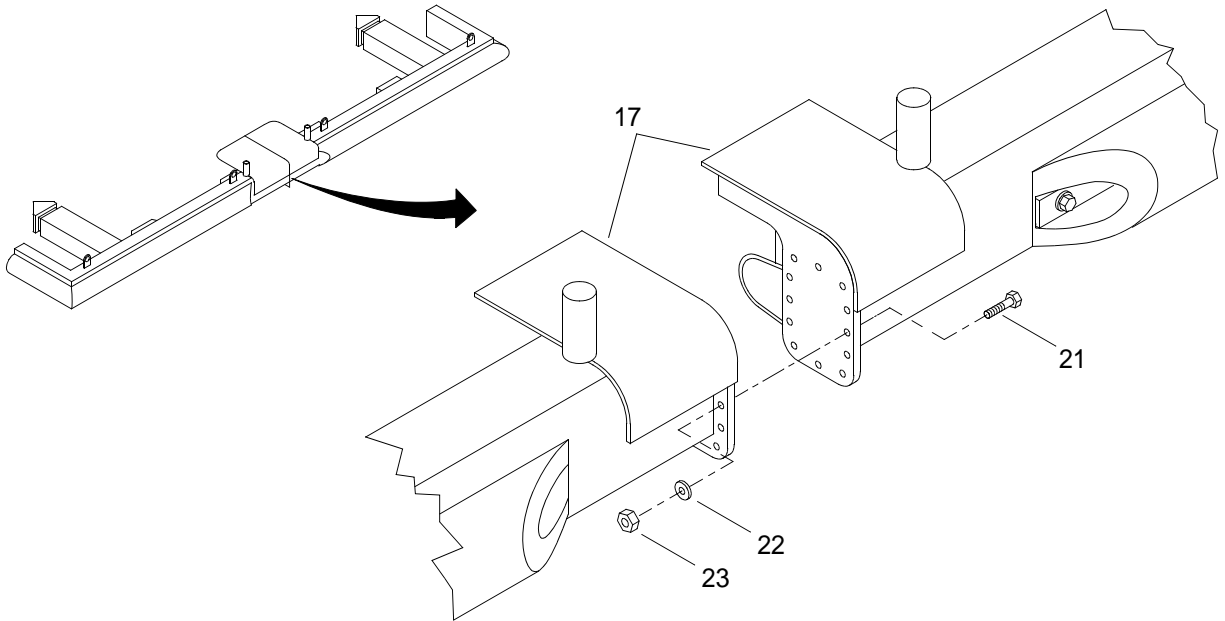
Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

- Using crane, slings and shackles, install flexor (20) in left end rake flexor receiver (19).



- Insert guillotines (15) into flexor slots (16) on left and right end rakes.
- Using sledge hammer, drive guillotines (15) into flexor slots (16) on left and right end rakes.
- Push chute bolts (14) to locked position and rotate to closed position on left and right end rakes.
- Remove slings and shackles from bow fender assembly (17).

11. Remove bolts (21), washers (22) and nuts (23) securing halves of bow fender assembly (17).



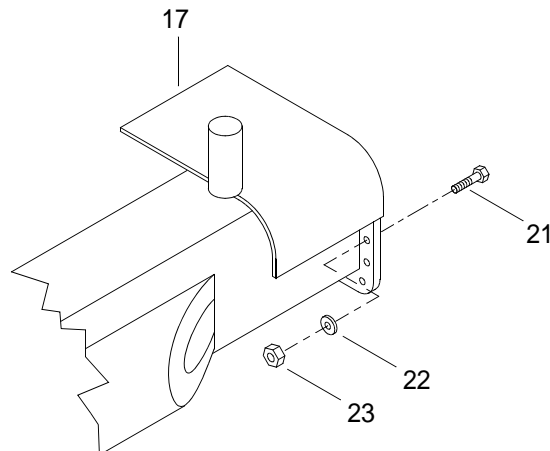
WARNING



HEAVY PARTS

12. Using forklift, separate halves of bow fender assembly (17).

13. Install bolts (21), washers (22) and nuts (23) in one half of bow fender assembly (17) and tighten.



14. Rinse all bow fender assembly components with fresh water before packing. Allow to thoroughly air dry.

15. Stow bow fender assembly in miscellaneous container. (WP 0071 00)

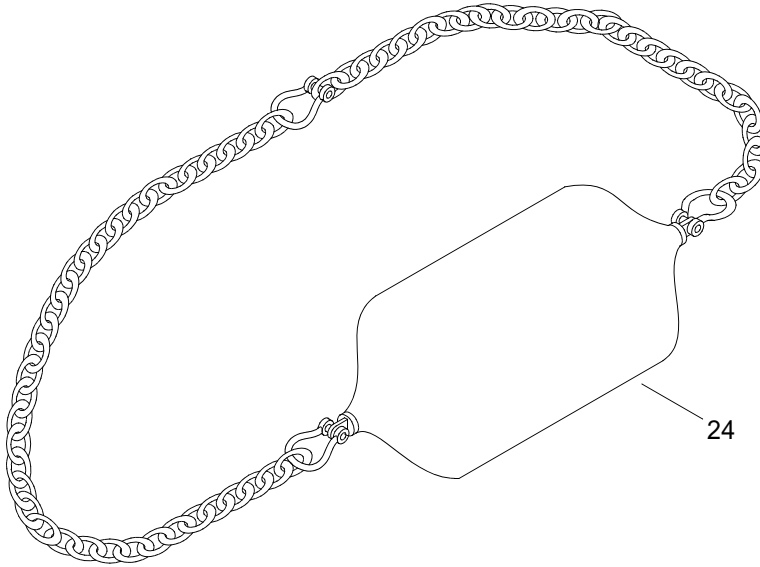
REMOVE 2 FT BY 4 FT FENDERS

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

1. Using crane, slings and shackles, remove 2 ft by 4 ft fenders (24) from deck fitting on WT as required.



2. Stow 2 ft by 4 ft fenders (24) in BII container.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
D-RING AND DECK CLEAT FITTINGS
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)

Materials/Parts

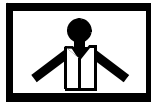
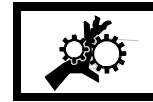
Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

Seaman 88K (2)

PREPARATION FOR MOVEMENT - REMOVAL OF D-RING AND DECK CLEAT FITTINGS

WARNING

**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

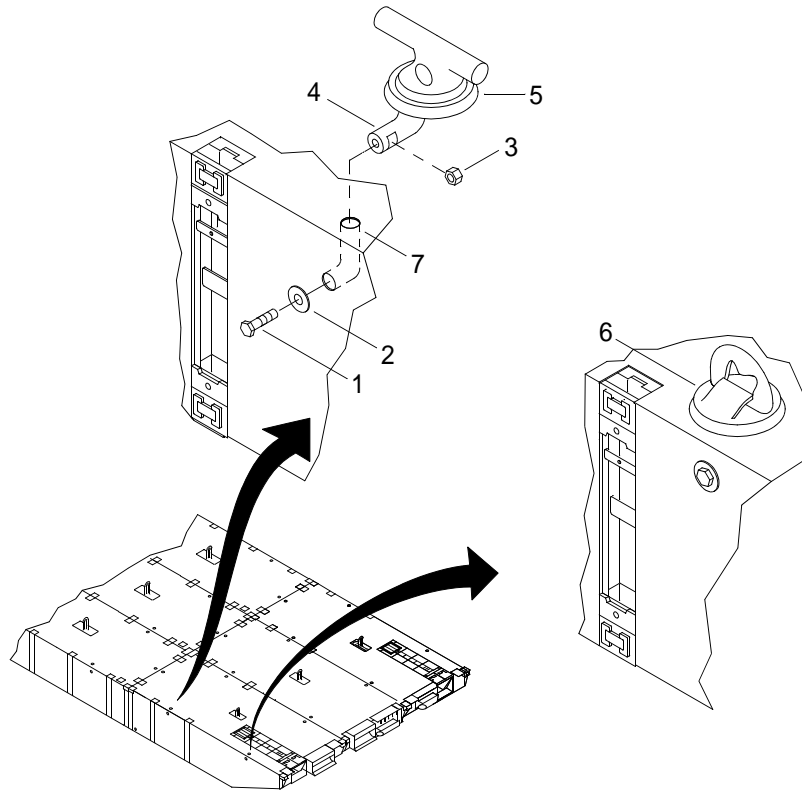
Beware of other craft or objects coming alongside while working outboard installing bolt and washer. Serious injury may result if body parts are crushed between module and other craft or objects.

Use extreme caution while working outboard and lifting heavy objects as the possibility of falling overboard exists, which could cause serious injury or death.

NOTE

This task is typical for removing deck cleats and D-ring fittings.

1. Remove bolt (1) and keeper plate (2) from nut (3) in tailpiece (4).



WARNING



HEAVY OBJECTS

Deck fittings weigh more than 34 lb, use an assistant when handling deck fittings, failure to comply may cause injury to personnel

2. Using an assistant, remove deck fittings (5 and 6) from module turn tube (7).
3. Install bolt (1) through keeper plate (2) and thread it into nut (3) in tailpiece (4).
4. Stow deck fitting (5 and 6). (WP 0069 00)

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
STUB ASSEMBLY MAST
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
 Goggles, Industrial: Clear Lens, Chipping (Cabinet B4) (Item 35, WP 0112 00)

Materials/Parts

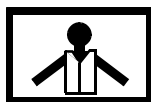
Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)
 Gloves, Rubber Industrial (Item 26, WP 0114 00)

Personnel Required

Seaman 88K (2)

PREPARATION FOR MOVEMENT - REMOVAL OF STUB ASSEMBLY MAST

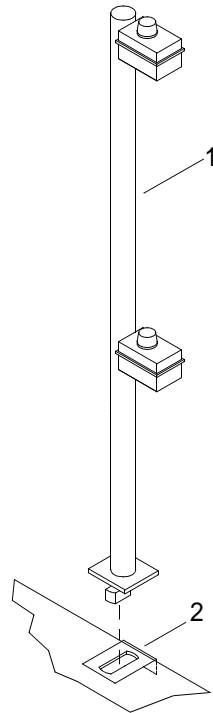
WARNING

**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

REMOVE STUB ASSEMBLY MAST

1. Rotate stub assembly mast (1) 90° to unlock from ISO fitting (2).



WARNING



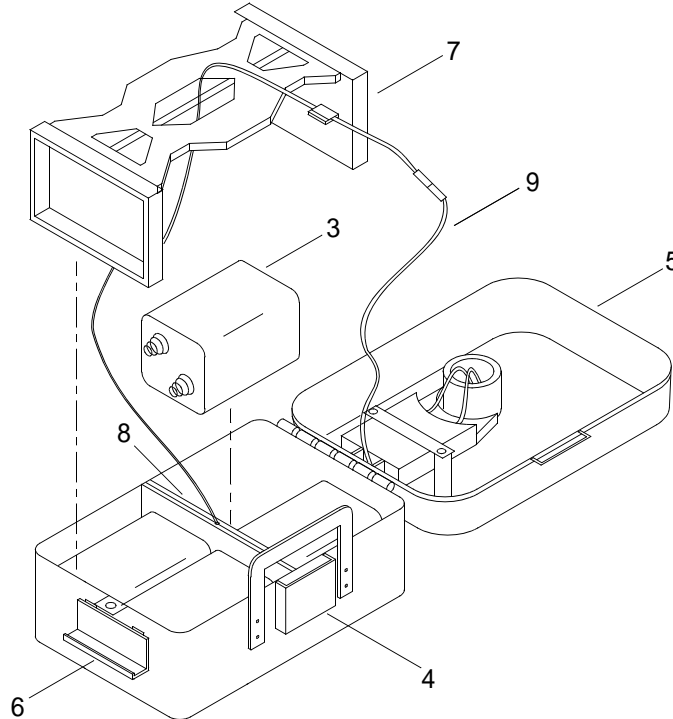
HEAVY OBJECTS

2. Using assistant, remove stub assembly mast (1) from ISO fitting (2).
3. Rinse stub assembly mast (1) with fresh water before packing. Allow to thoroughly air dry.

REMOVE STUB ASSEMBLY MAST LIGHT BATTERIES**NOTE**

This procedure is typical for removing the batteries from both stub assembly mast lights.

1. Remove batteries (3) from stub assembly mast light (4).



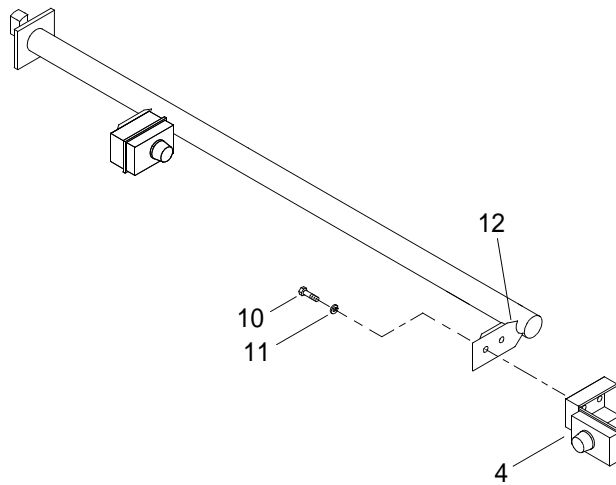
2. Open stub assembly mast light cover (5) by unlatching clasp (6).
3. Remove battery bracket (7).
4. Remove conductor plate (8) and place wire (9) out of way.

WARNING

**CHEMICAL****EYE PROTECTION**

5. Remove four batteries (3) from stub assembly mast light (4).

6. Remove hex head capscrews (10) and lock washers (11) securing assembly mast lights (4) to stub assembly mast light mounting plates (12).



7. Remove stub assembly mast lights (4) from stub assembly mast (1).
8. Install conductor plate (8).
9. Install battery bracket (7).
10. Position wire (9) away from edges of stub assembly mast light (4).
11. Close stub assembly mast light cover (5) and latch clasp (6).
12. Stow batteries (3), hex head capscrews (10), lock washers (11) and stub assembly mast lights (4) in BII container.
13. Prepare stub assembly mast for storage or shipment. (WP 0067 00)
14. Stow stub assembly mast (1). (WP 0069 00)

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
REMOVAL OF STERN ANCHOR
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
 Sling, Endless: 8400LB, 20' Yellow (Cabinet A9) (Item 82, WP 0112 00)
 Shackle: 1-3/4", 40 Ton (Storage Room Hooks) (Item 70, WP 0112 00)

Materials/Parts

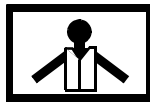
Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

Seaman 88K

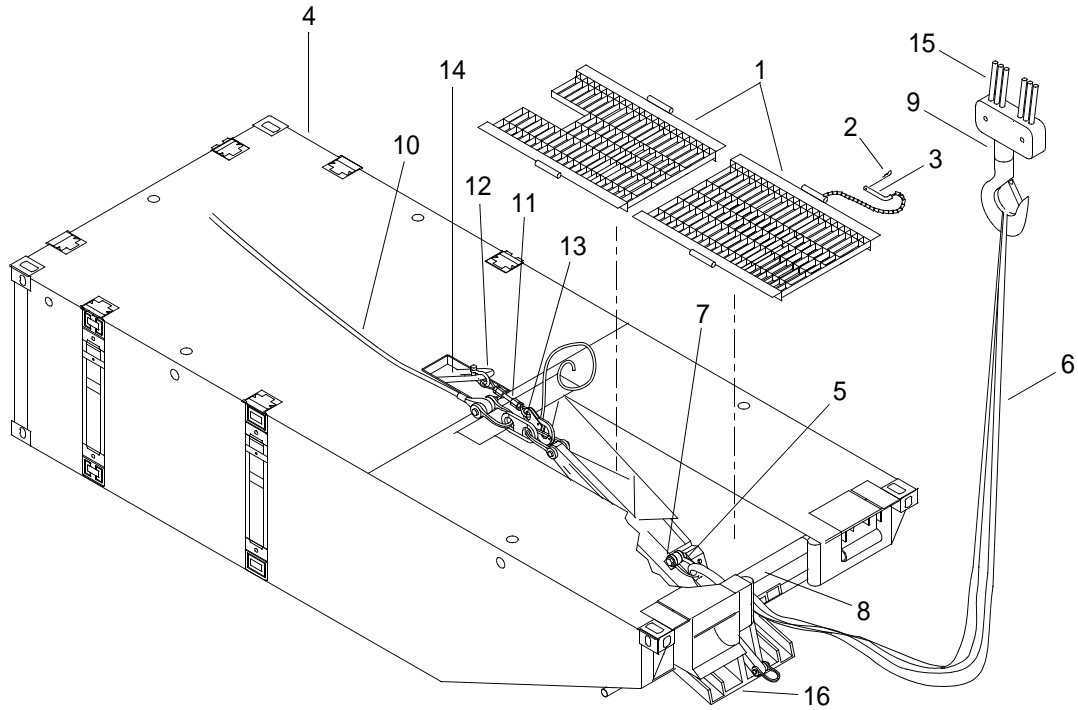
PREPARATION FOR MOVEMENT - REMOVE STERN ANCHOR

WARNING

**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

1. Inspect chains, slings and shackles. (WP 0007 00)

 2. Remove deck grates (1).


- a. Remove hairpin cotters (2) from hinge pins (3).
 - b. Remove hinge pins (3) securing deck grates (1) to stern center anchor rake module (4).
 - c. Lift and remove deck grates (1).
3. Attach shackle (5) and sling (6) to stern anchor lifting padeye (7).
 4. Feed other end of sling (6) under stiffening pipe (8) and place loop over crane hook (9).
 5. Using deck winch, take up slack on aft winch cable (10).
 6. Remove quick release assembly (11) and shackle (12) from between connecting link (13) and stern center anchor rake module (4) lifting padeye (14).

 WARNING


HEAVY PARTS

7. While paying out on aft winch cable (10), haul in on crane cable (15) until stern anchor (16) is clear of WT.

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

8. Using crane, shackle (5) and sling (6), place stern anchor (16) on deck of WT.
9. Remove aft winch cable (10) from connecting link (13).
10. Haul in aft winch cable (10).
11. Install two deck grates (1).
 - a. Position deck grates (1) over channel of stern center anchor rake module (4).
 - b. Install hinge pins (3) to secure deck grates (1) to stern center anchor rake module (4).
 - c. Install hairpin cotters (2) on hinge pins (3).

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

12. Using crane, shackle (5) and sling (6), place stern anchor (16) in a suitable location for stowage.
13. Remove shackle (5) and sling (6) from stern anchor (16).
14. Stow anchor. (WP 0068 00)

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
WINCH MOUNTING PLATES
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
 Crowbar (60" Long) (Fender Rack) (Item 13, WP 0112 00)
 Qty 2

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

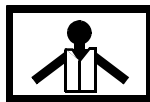
Seaman 88K

Equipment Condition

A-Frame Removed. (WP 0041 00)

PREPARATION FOR MOVEMENT - REMOVAL OF WINCH MOUNTING PLATES**REMOVE WINCH MOUNTING PLATES**

WARNING

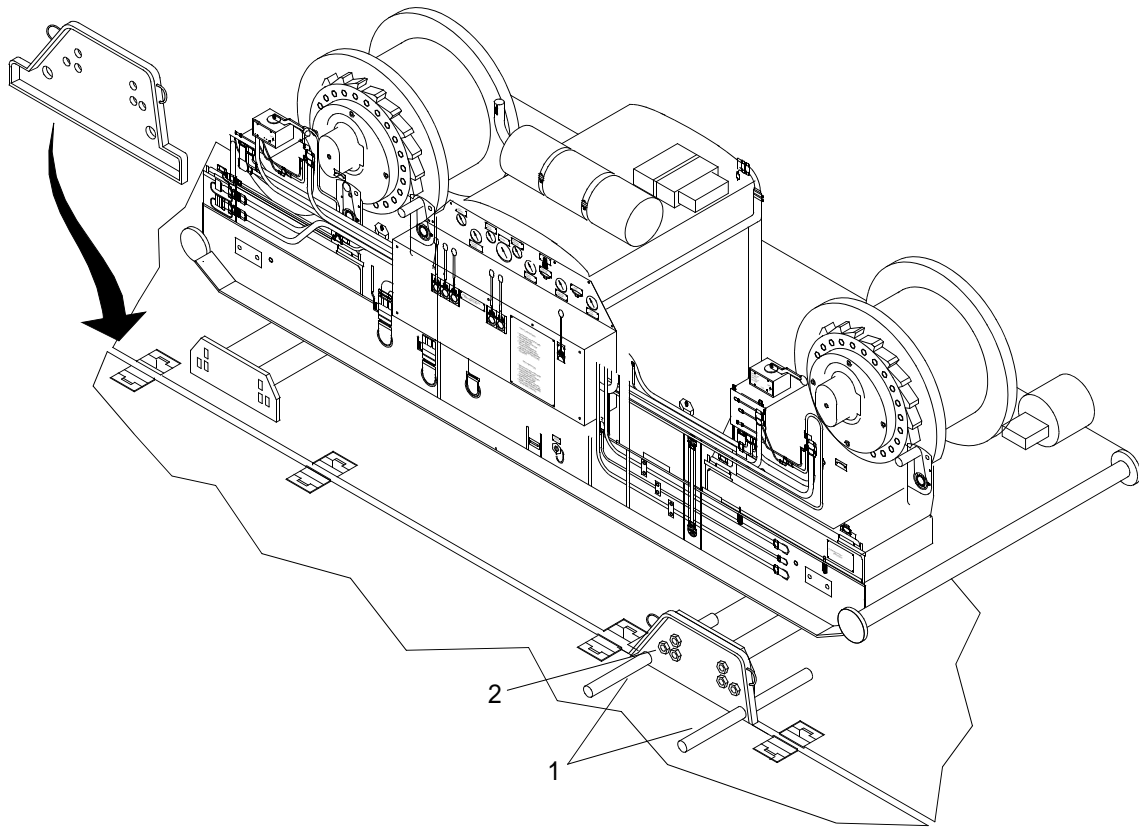
**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

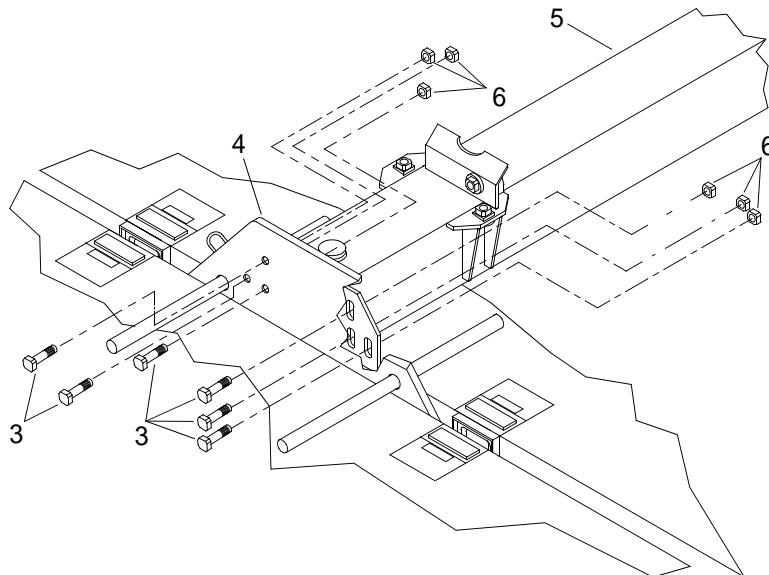
NOTE

Four mounting plate assemblies are installed between center module and outer modules. The mounting plate fits under lock castings of side connector assembly of modules. The removal procedures are shown below.

1. Insert two crowbar handles (1) through holes in mounting plate (2) to hold it in position while removing mounting plate bolting hardware.



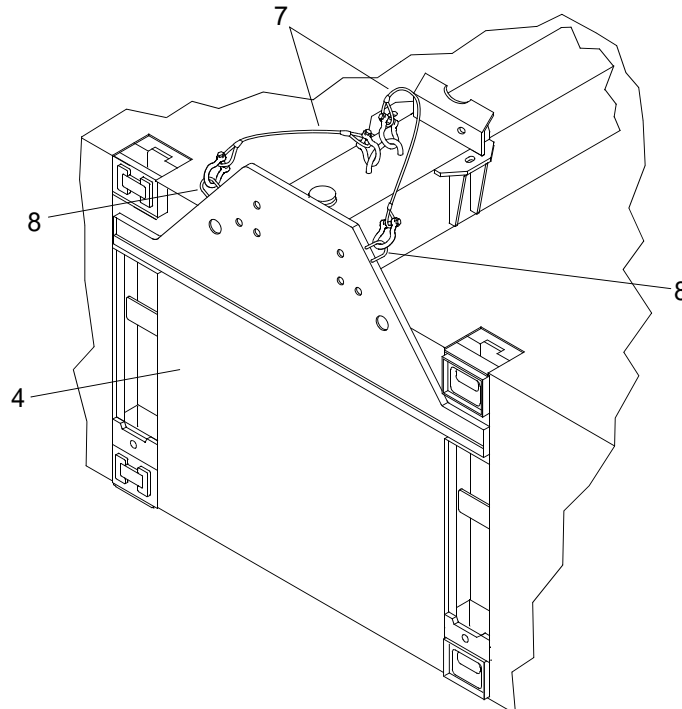
2. Remove six high-strength bolts (3) from mounting plate (4), transverse beam (5) and six nuts (6).



WARNING

**HEAVY OBJECTS**

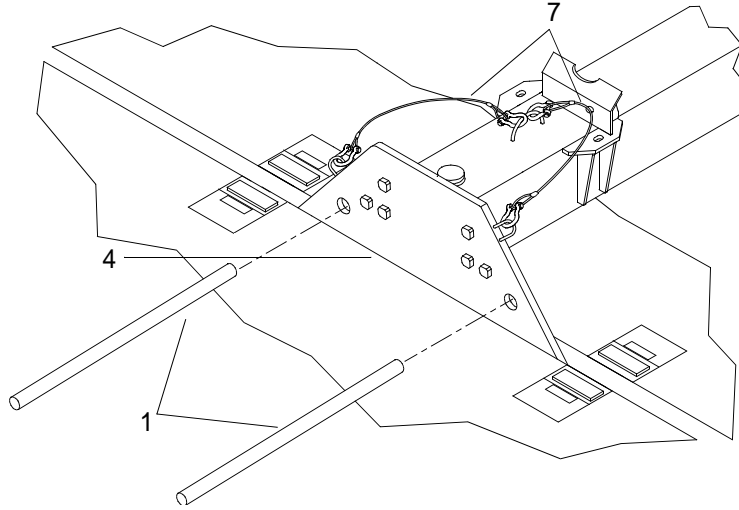
3. Hold mounting plate (4) by using lifting lines (7) attached to mounting plate lifting eyes (8) of mounting plate (4).



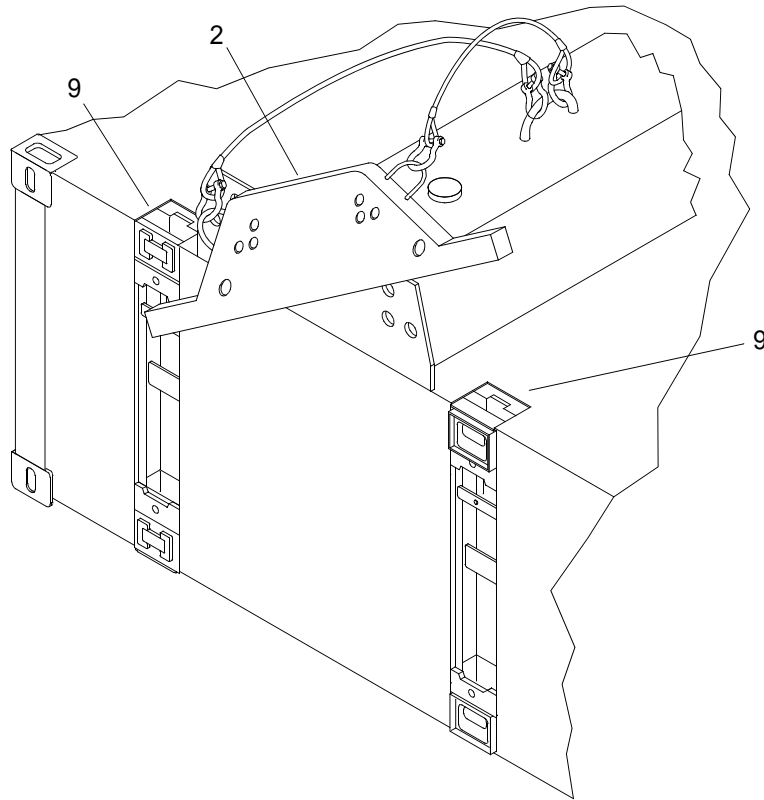
WARNING

**HEAVY OBJECTS**

4. Hold mounting plate (4) in position with lifting lines (7) and remove crowbar handles (1) from holes in mounting plate (4).



5. Remove mounting plate (4) by allowing one end of mounting plate (4) to dip downward between appropriate lock castings (9) far enough so that mounting plate (4) can be rotated to a vertical attitude and removed from adjoining lock castings (9).



6. Install six high-strength bolts (3) and six nuts (6) on transverse beam (5) for storage.
7. Repeat above steps for three remaining mounting plates (4).
8. Remove shackles and lifting lines (7) from mounting plates (4) and transverse beams (5).

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
WINCH
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
 Sling, Endless: 8400LB, 20' Yellow (Cabinet A9) (Item 82, WP 0112 00)
 Qty 4
 Shackle: 3/4", 4.75 Ton (Cabinet B7) (Item 71, WP 0112 00)
 Qty 4

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

Seaman 88K (2)

Equipment Condition

Winch Mounting Plates Removed. (WP 0046 00)

PREPARATION FOR MOVEMENT - REMOVAL OF WINCH**REMOVE WINCH**

WARNING

**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

The deck winch weighs approximately 10,000 lbs. Use proper hoisting and lifting equipment to prevent possible injury to personnel and/or damage to equipment.

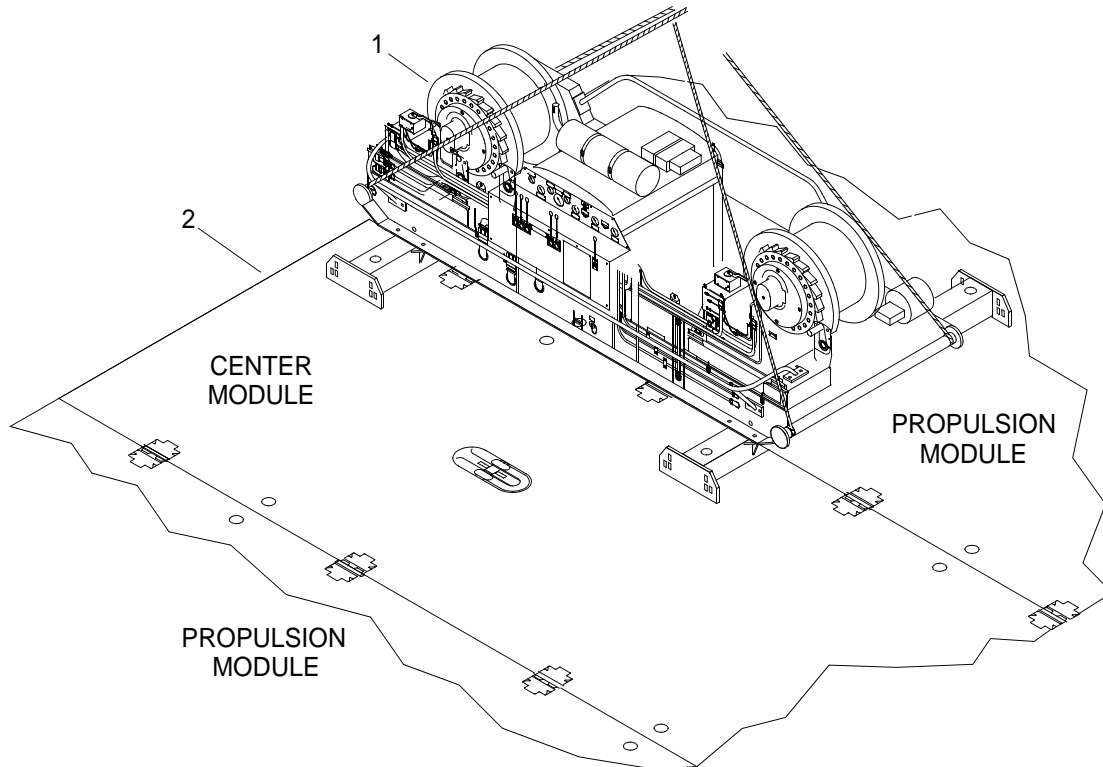
1. Inspect chains, slings and shackles. (WP 0007 00)

WARNING

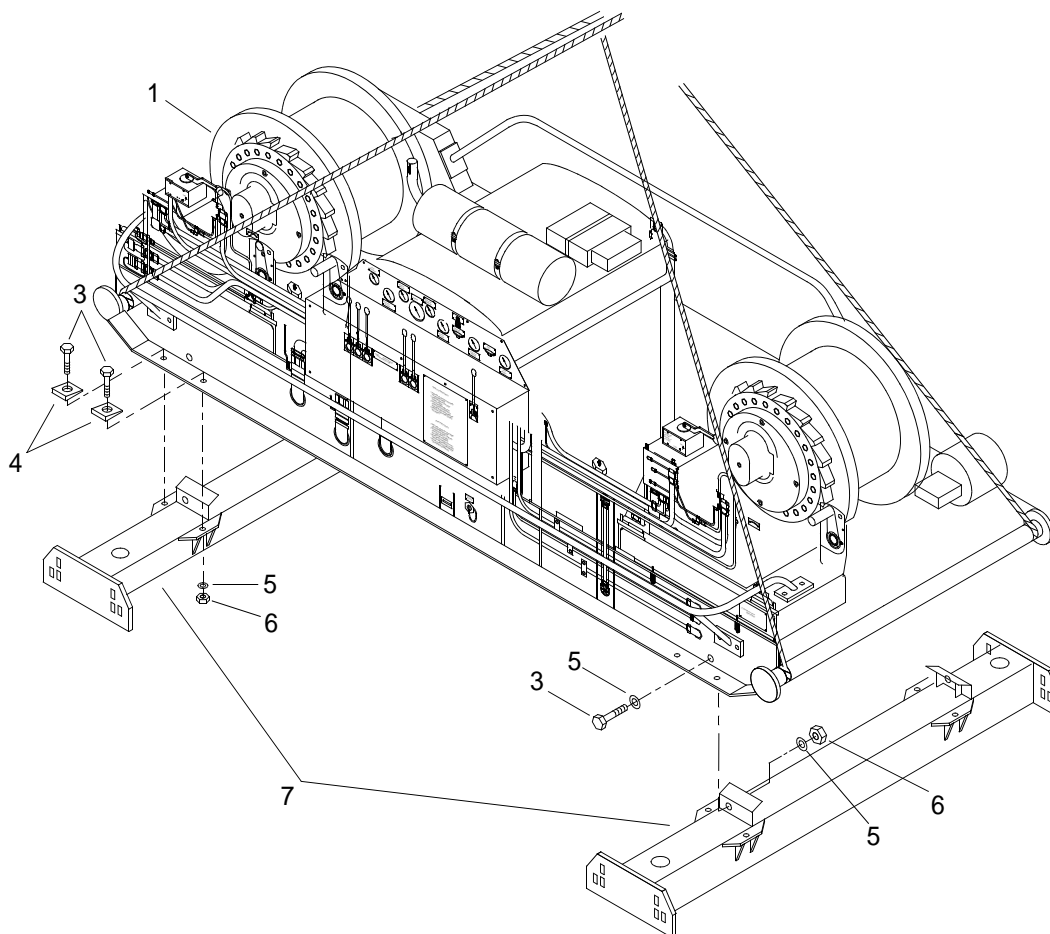
**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

2. Using a crane, slings and shackles, remove deck winch (1) from deck of WT (2).



- Remove bolts (3), tapered washer plates (4), washers (5) and nuts (6) securing deck winch (1) to transverse beams (7).



WARNING



HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

- Using crane, slings and shackles, lift deck winch (1) off transverse beams (7).
- Install bolts (3), tapered washer plates (4), washers (5) and nuts (6) on mounts of transverse beams (7).
- Remove slings and shackles.
- Prepare deck winch (1) for storage or shipment. (WP 0067 00)
- Stow transverse beams (7). (WP 0068 00)

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
MAIN ASSEMBLY MAST
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
 Goggles, Industrial: Clear Lens, Chipping (Cabinet B4) (Item 35, WP 0112 00)
 Sling, Endless: 8400LB, 20' Yellow (Cabinet A9) (Item 82, WP 0112 00)
 Qty 2
 Shackle: 3/4", 4.75 Ton (Cabinet B7) (Item 71, WP 0112 00)
 Qty 2

Materials/Parts

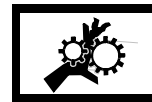
Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)
 Gloves, Rubber Industrial (Item 26, WP 0114 00)
 Lumber, Softwood, Dimension (Item 43, WP 0114 00)
 Qty 4

Personnel Required

Seaman 88K (2)

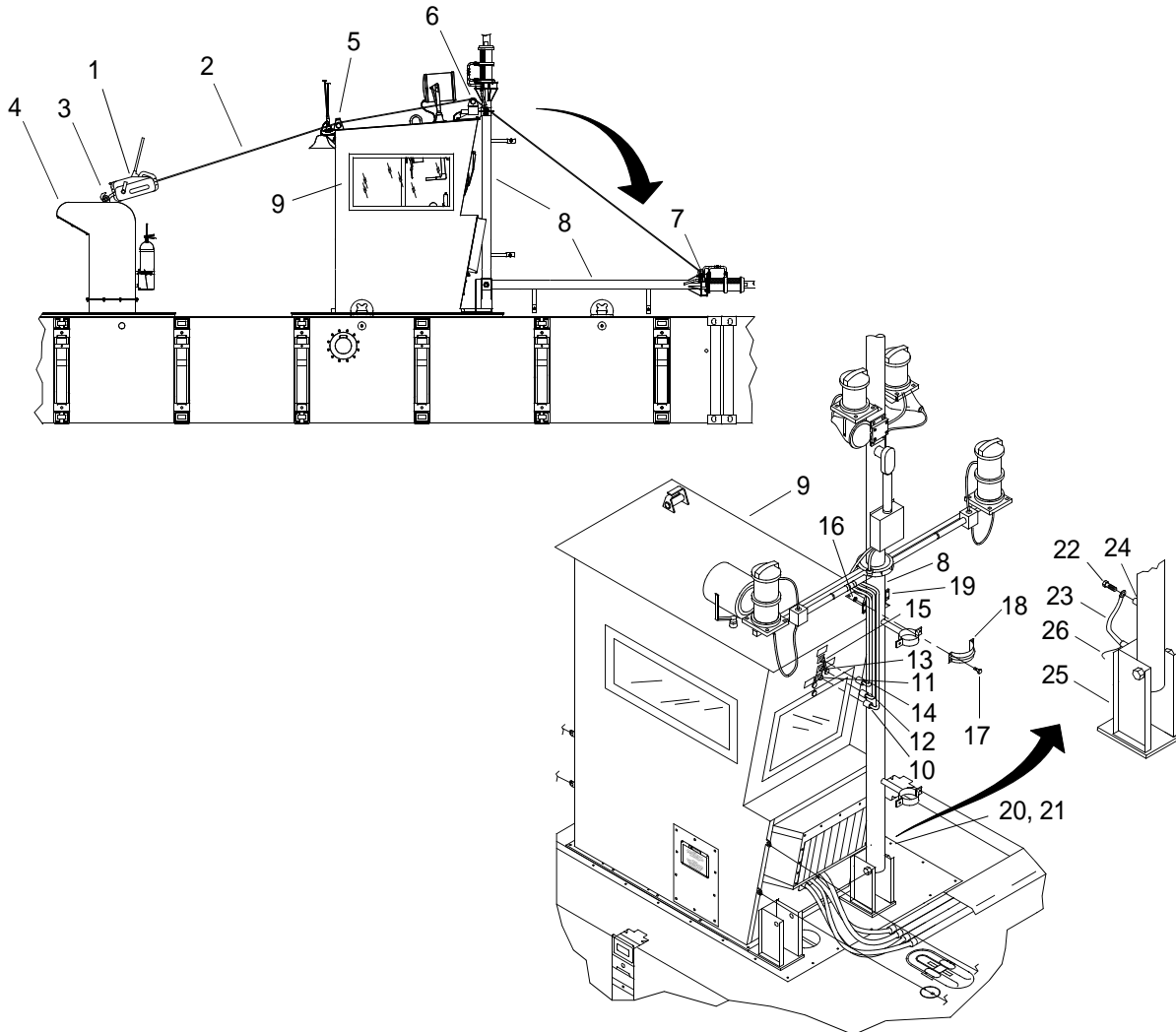
PREPARATION FOR MOVEMENT - REMOVAL OF MAIN ASSEMBLY MAST

WARNING

**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

1. Inspect chains, slings and shackles. (WP 0007 00)
2. Install cable hoist (1) and cable (2).



- a. Attach cable hoist (1) on inboard lifting bracket (3) of starboard exhaust plenum (4).
- b. Route cable (2) through flanges on aft guide (5) and over forward guide (6).

WARNING



HEAVY PARTS

Ensure shackle is attached to mast with threaded pin bottomed out on shackle and safety catch on wire rope cable hook is fully engaged around shackle. Failure to comply could result in death or injury to personnel.

- c. Connect cable (2) to shackle (7) on main assembly mast (8).
3. Operate cable hoist (1) until tension is on cable (2).
4. Gain access to top of operators cab (9).

5. Remove navigation compass connector (10) from operator cab connector J10 (11).
6. Remove deck lights connector (12) from operator cab connector J11 (13).
7. Remove navigation lights connector (14) from operator cab connector J1 (15).
8. Remove hex nuts (16), capscrews (17) and outer clamp half (18) from operators cab assembly mast clamp half (19).
9. Descend from top of operators cab (9).
10. Loosen hex nut (20) on bolt (21).
11. Remove bolt and washer (22) securing ground strap (23) to main assembly mast boss (24).
12. Secure ground strap (23) to deck holder (25) with tie wrap (26).
13. Install bolt and washer (22) in main assembly mast boss (24). Tighten bolt and washer (22).

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

14. Using cable hoist (1), cable (2) and shackle (7), lower main assembly mast (8) onto shoring blocks.
15. Disconnect cable (2) from shackle (7) on main assembly mast (8).
16. Remove cable hoist (1) from inboard lifting bracket (3) of starboard exhaust plenum (4).
17. Remove and store cable hoist (1) and cable (2).
18. Remove hex nut (20) and bolt (21) securing main assembly mast (7) to deck holder (25).

WARNING

**HEAVY PARTS**

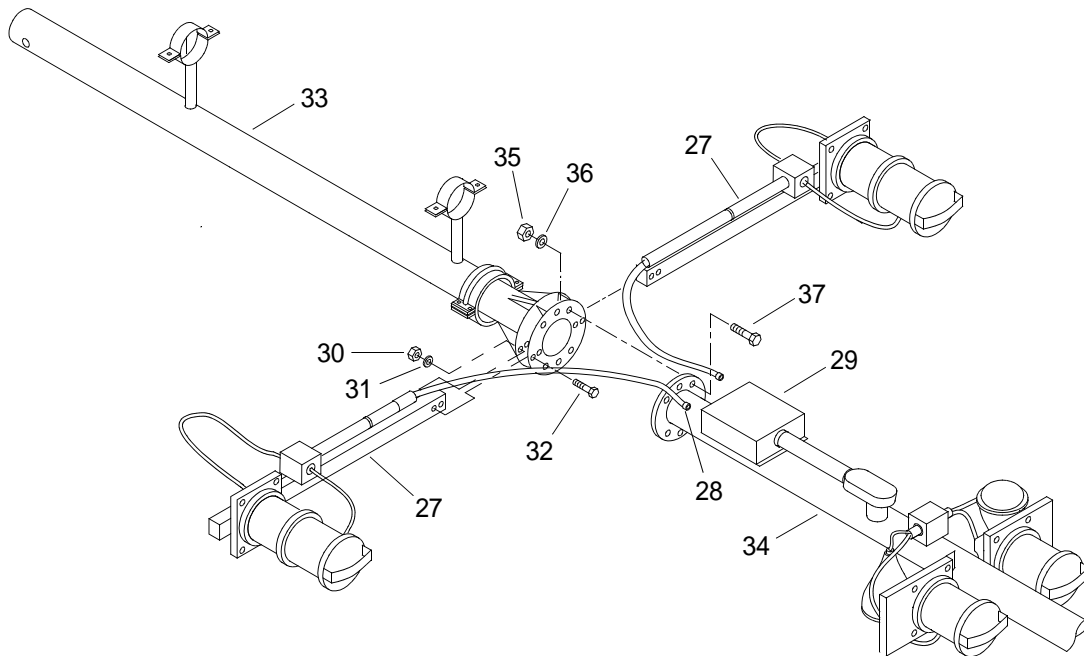
Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

19. Using crane, slings and shackles, remove main assembly mast (7) from WT and position on shoring blocks.

NOTE

This step is typical for both port and starboard yardarms.

- a. Remove lower main assembly mast yardarm (27).



- b. Remove yardarm electrical cable connector (28) from main assembly mast junction box (29).
- c. Remove nuts (30), washers (31) and bolts (32) securing lower main assembly mast yardarm (27) to lower main assembly mast (33). Retain hardware for installation of yardarms during stowage.
- d. Remove lower main assembly mast yardarm (27) from lower main assembly mast (33).

WARNING



HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

20. Remove lower main assembly mast (33) from upper main assembly mast (34).
- a. Remove nuts (35), washers (36) and bolts (37) securing lower main assembly mast (33) to upper main assembly mast (34).
- b. Separate lower main assembly mast (33) from upper main assembly mast (34).
- c. Install nuts (35), washers (36) and bolts (37) on lower main assembly mast (33). Tighten nuts (35).

-
21. Store hex nuts (16), capscrews (17), outer clamp half (18), hex nut (20) and bolt (21) in BII container.
 22. Prepare main assembly mast for storage or shipment. (WP 0067 00)
 23. Stow components of main assembly mast (13). (WP 0069 00)

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
ABOVEDECK EQUIPMENT
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
 Goggles, Industrial: Clear Lens, Chipping (Cabinet B4) (Item 35, WP 0112 00)
 Sling, Endless: 8400LB, 20' Yellow (Cabinet A9) (Item 82, WP 0112 00)
 Qty 2
 Shackle, 1-1/2" 30 Ton Shackle (Storage Room Hooks) (Item 68, WP 0112 00)
 Qty 4

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)
 Gloves, Rubber Industrial (Item 36, WP 0114 00)
 Strap, Tiedown (Item 54, WP 0114 00)
 Adhesive (Item 1, WP 0114 00)

Personnel Required

Seaman 88K

References

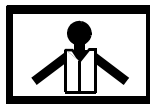
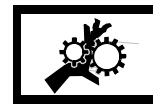
TM 11-5820-890-10-8

Equipment Condition

Main Assembly Mast Removed. (WP 0048 00)

PREPARATION FOR MOVEMENT - REMOVAL OF WARPING TUG ABOVEDECK EQUIPMENT

WARNING

**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

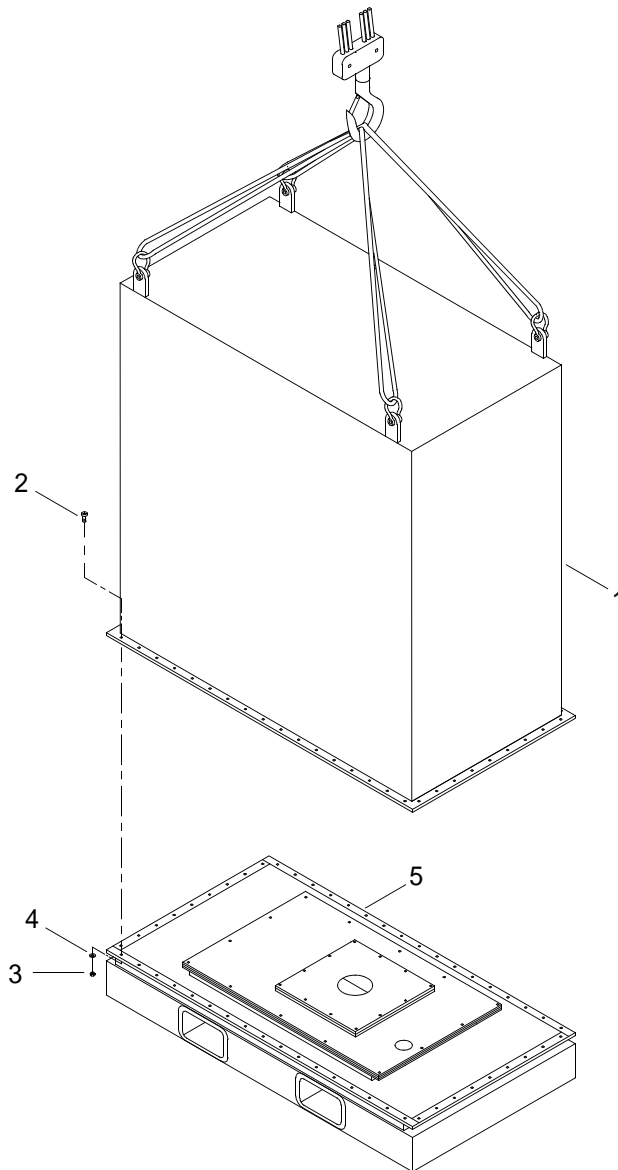
All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

REMOVE PORT AND STARBOARD PROPULSION MODULE EXHAUST PLENUMS

NOTE

The following procedure is typical for both port and starboard exhaust plenums.

1. Attach slings and shackles to operators cab container lid (1).



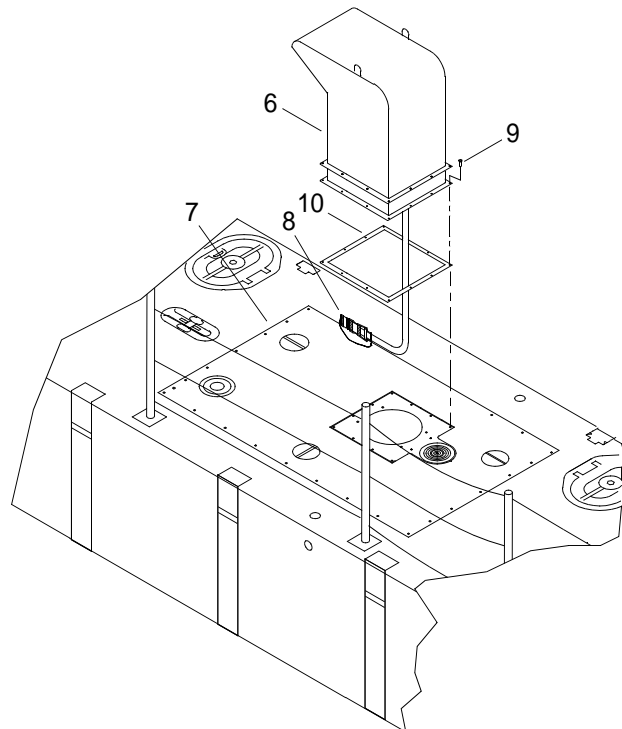
2. Remove bolts (2), hex nuts (3) and lockwashers (4) securing operators cab container lid (1) to operators cab stowage pallet (5).

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

3. Using crane, lift operators cab container lid (1) from operators cab stowage pallet (5).
4. Remove slings and shackles from operators cab container lid (1).
5. Remove propulsion module exhaust plenum (6) from pump-jet thruster hatch (7).



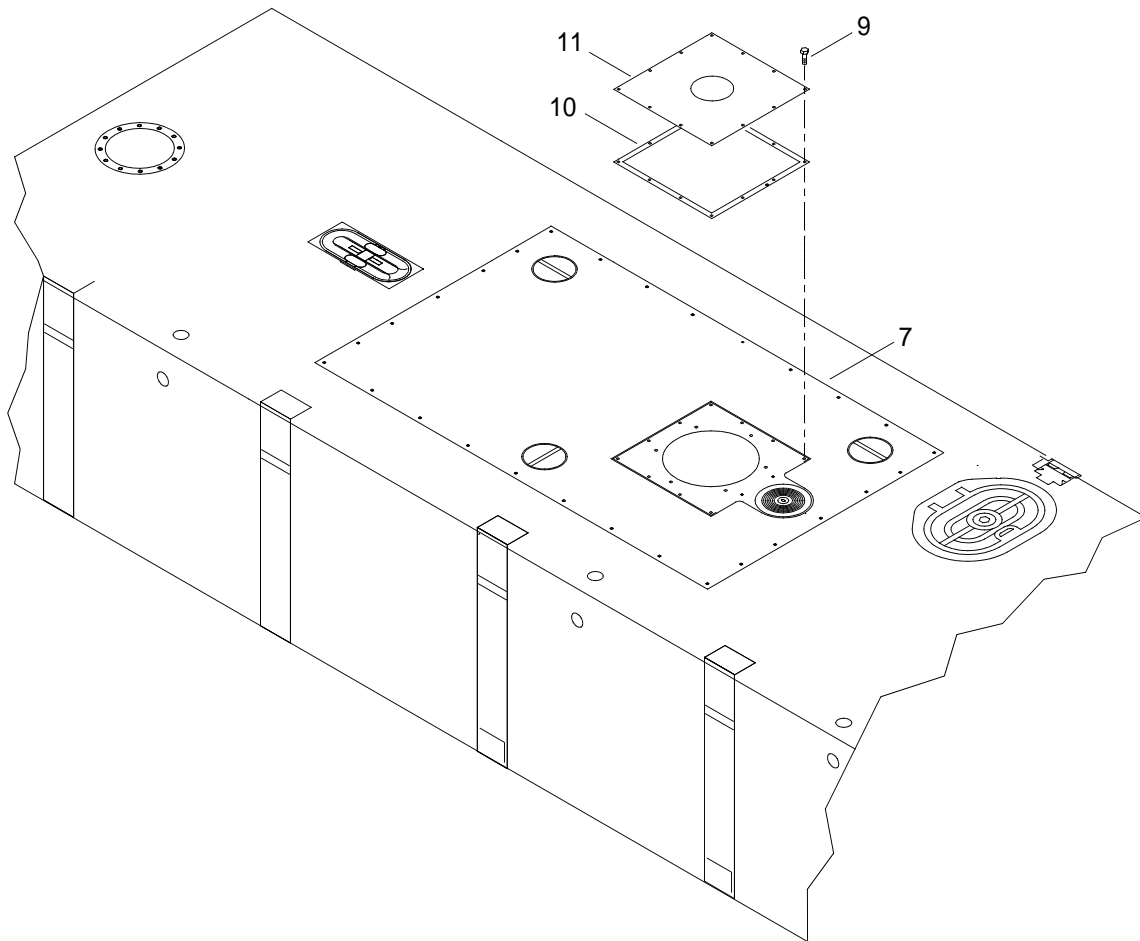
- a. Remove exhaust plenum fan cable (8) from vent fan relay panel A8.
- b. Remove bolts (9) attaching exhaust plenum (6) to pump-jet thruster hatch (7).
- c. Remove plenum gasket (10), if damaged.
- d. Secure exhaust plenum fan cable (8) inside of propulsion module exhaust plenum (6).

WARNING

**HEAVY PARTS**

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- e. Using crane, slings and shackles, lift propulsion module exhaust plenum (6) from pump-jet thruster hatch (7).
 - f. Stow propulsion module exhaust plenum. (WP 0069 00)
6. Install propulsion module pump-jet thruster hatch shipping plate (11).

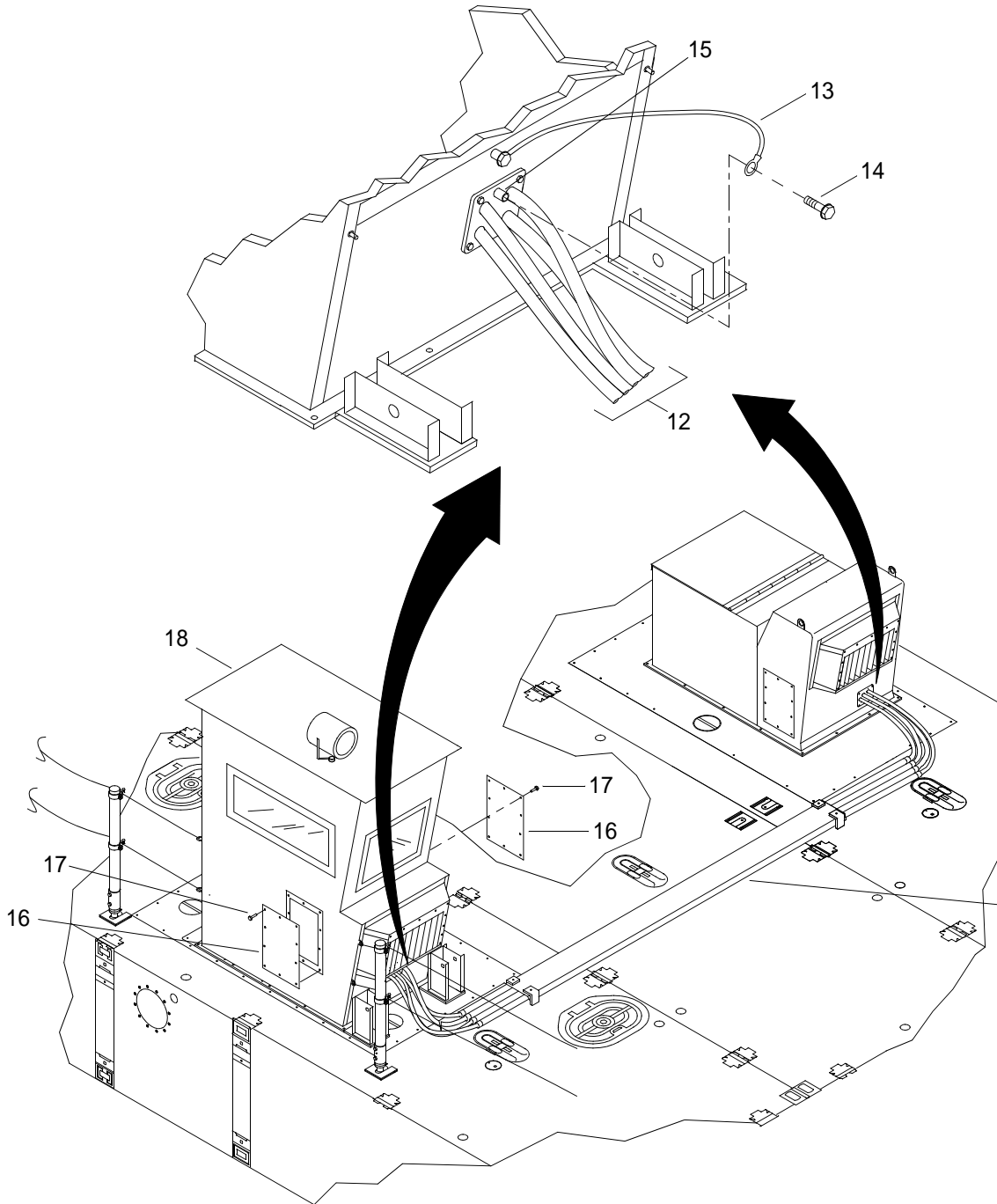


- a. Install new gasket (10) if old gasket was damaged.
- b. Remove propulsion module pump-jet thruster hatch shipping plate (11) from operators cab stowage pallet (5).

- c. Align holes in propulsion module pump-jet thruster hatch shipping plate (11) with holes in port pump-jet thruster hatch (7).
- d. Install bolts (9) to secure propulsion module pump-jet thruster hatch shipping plate (11) to port propulsion module pump-jet thruster hatch (7).

REMOVE MODULE ELECTRICAL INTERCONNECT ASSEMBLY

1. Remove electrical interconnect assembly (12).

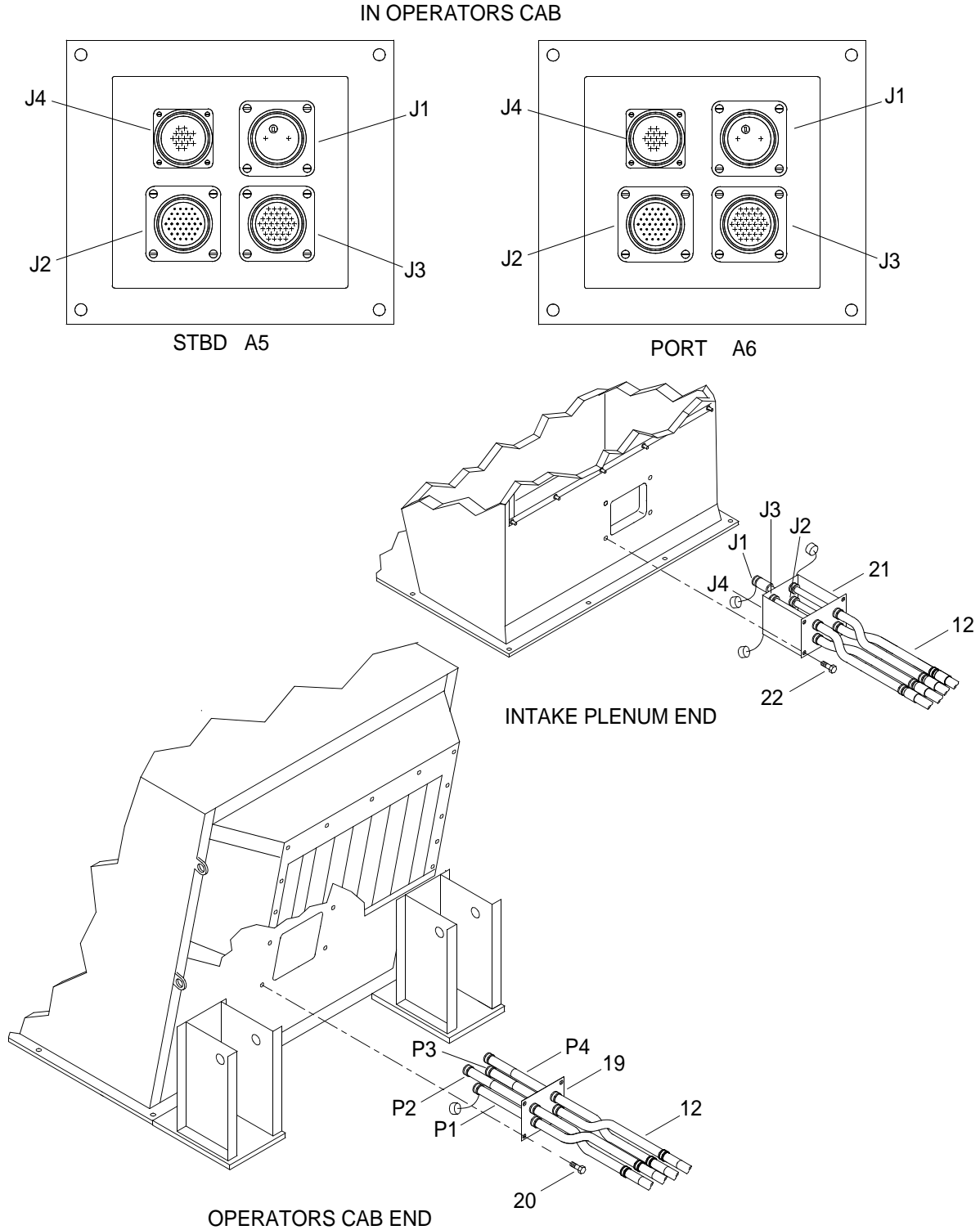


NOTE

Removing of interconnect assembly ground is typical for both ends of interconnect assembly.

- a. Remove interconnect assembly ground cable (13).
 - (1) Remove bolt and washer (14) securing ground cable (13) to interconnect assembly boss (15).
 - (2) Remove ground cable (13) from interconnect assembly boss (15).
 - (3) Install bolt and washer (14) in interconnect assembly boss (15).
- b. Remove both inboard and outboard operators cab side access panels (16).
 - (1) Disconnect life line from operator cab.
 - (2) Remove bolts (17) attaching inboard and outboard side access panels (16) to operators cab (18).
 - (3) Remove inboard and outboard side access panels (16).

c. Remove operators cab conduit entry plate (19).



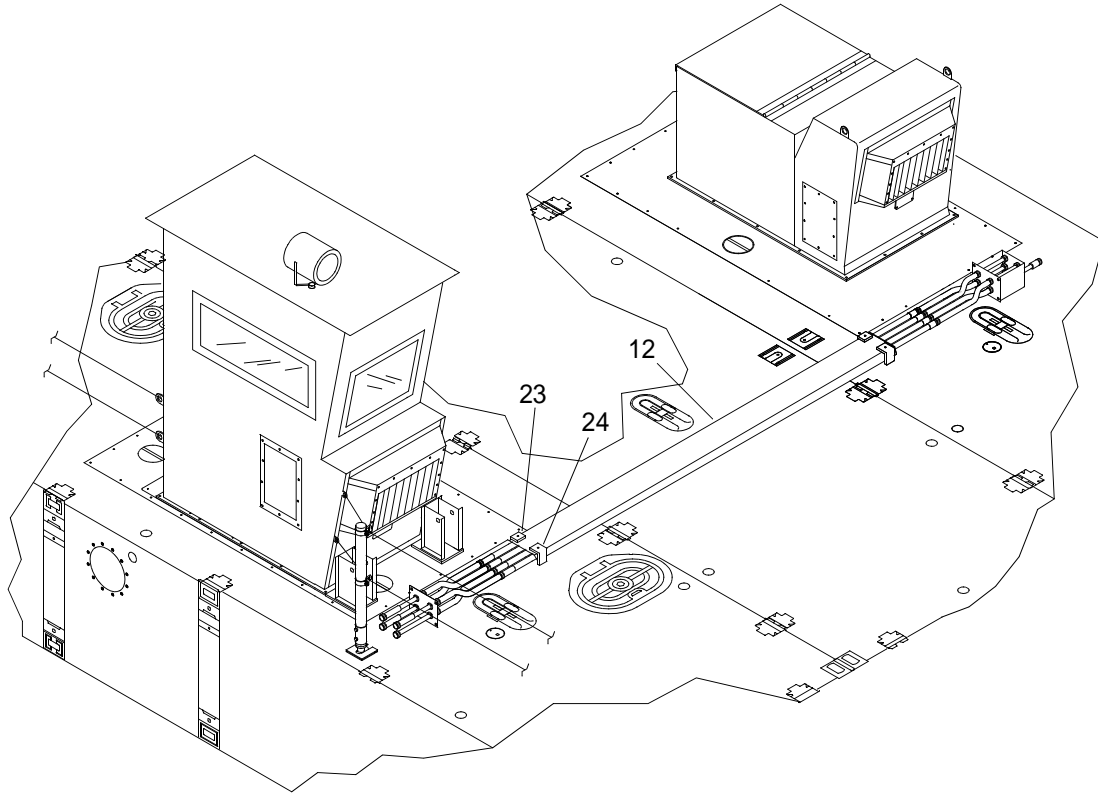
- (1) Remove bolts (20) attaching conduit entry plate (19) to operators cab (18).
- (2) Remove entry plate (19).

NOTE

The following steps provide removal of interconnect assembly when operators cab is installed on starboard side. When installed on port side STBD and PORT receptacles will be reversed.

- d. Remove power module cables from STBD receptacle A5.
 - (1) Remove power module A3, P1 from STBD A5, J1.
 - (2) Remove power module A6, P3 from STBD A5, J3.
 - (3) Remove power module A6, P4 from STBD A5, J4.
 - (4) Remove power module A6, P2 from STBD A5, J2.
- e. Remove interconnect cables from PORT receptacle A6.
 - (1) Remove P4 from PORT receptacle A5, J4.
 - (2) Remove P3 from PORT receptacle A5, J3.
 - (3) Remove P2 from PORT receptacle A5, J2.
 - (4) Remove P1 from PORT receptacle A5, J1 and install dust cap.
- f. From below deck, remove power module cable from interconnect cable receptacles.
 - (1) Remove power module A6, P1 from interconnect cable, J1 and install dust cap.
 - (2) Remove power module junction box A3, P2 from interconnect cable, J2 and install dust cap.
 - (3) Remove power module junction box A3, P3 from interconnect cable, J3 and install dust cap.
 - (4) Remove power module junction box A3, P4 from interconnect cable, J4 and install dust cap.
- g. Remove intake plenum conduit entry panel (21).
 - (1) Remove bolts (22).
 - (2) Remove intake plenum conduit entry panel (21).

2. Remove electrical interconnect assembly (12).



- a. Remove socket head capscrews (23) and hold down clamps (24) securing electrical interconnect assembly (12) to deck and stow in BII container.

WARNING



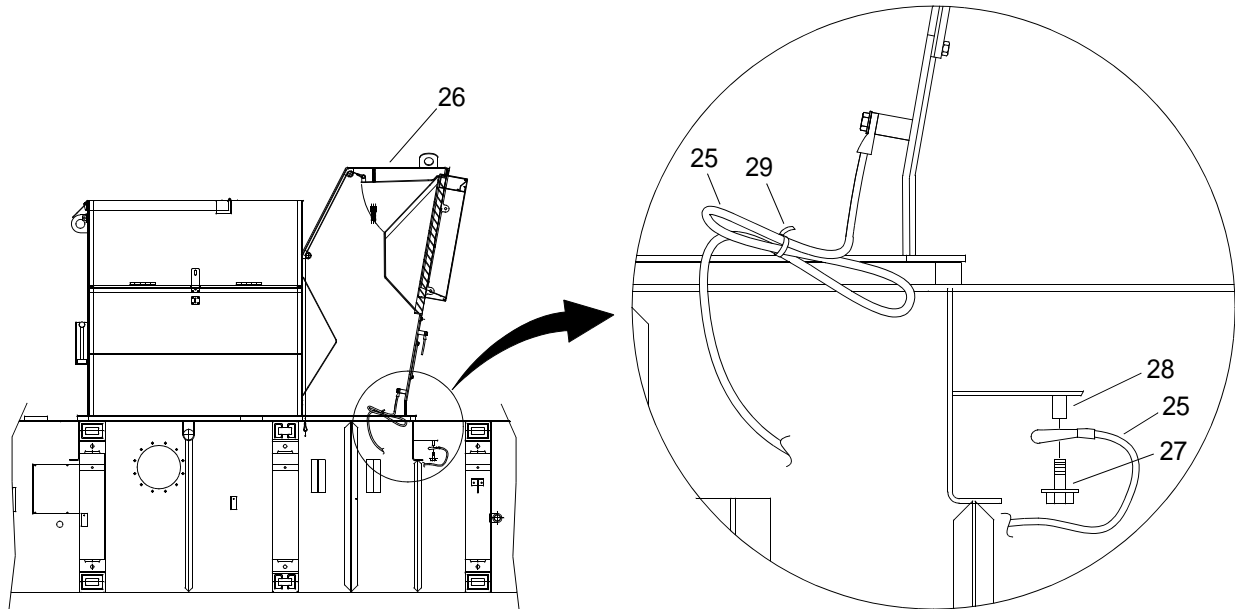
HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

- b. Using crane, slings and shackles, remove electrical interconnect assembly (12) from deck.
- c. Remove slings and shackles.
- d. Stow electrical interconnect assembly. (WP 0069 00)

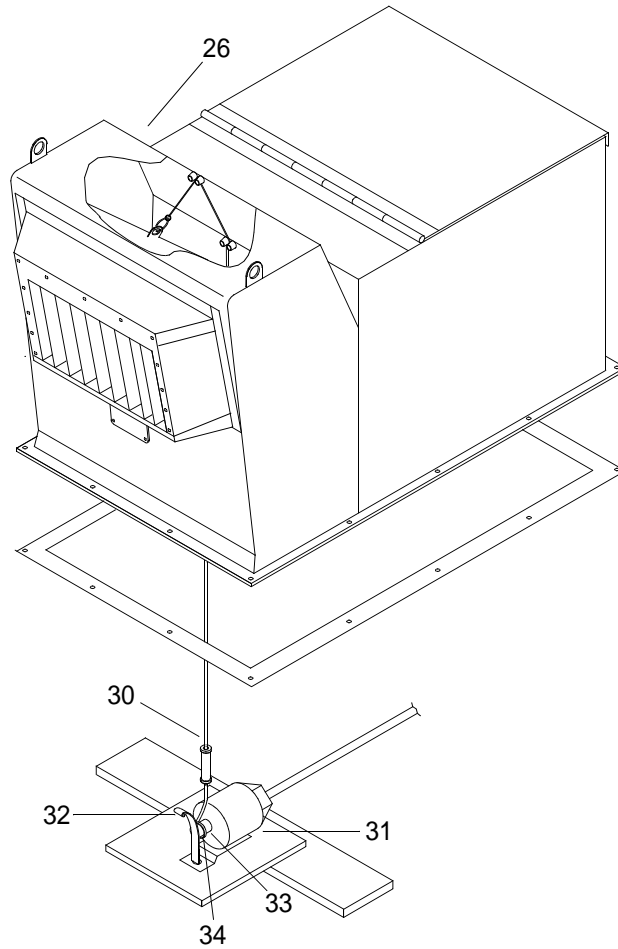
REMOVE AIR INTAKE PLENUM

1. Remove air intake plenum ground cable (25) from air intake plenum (26).



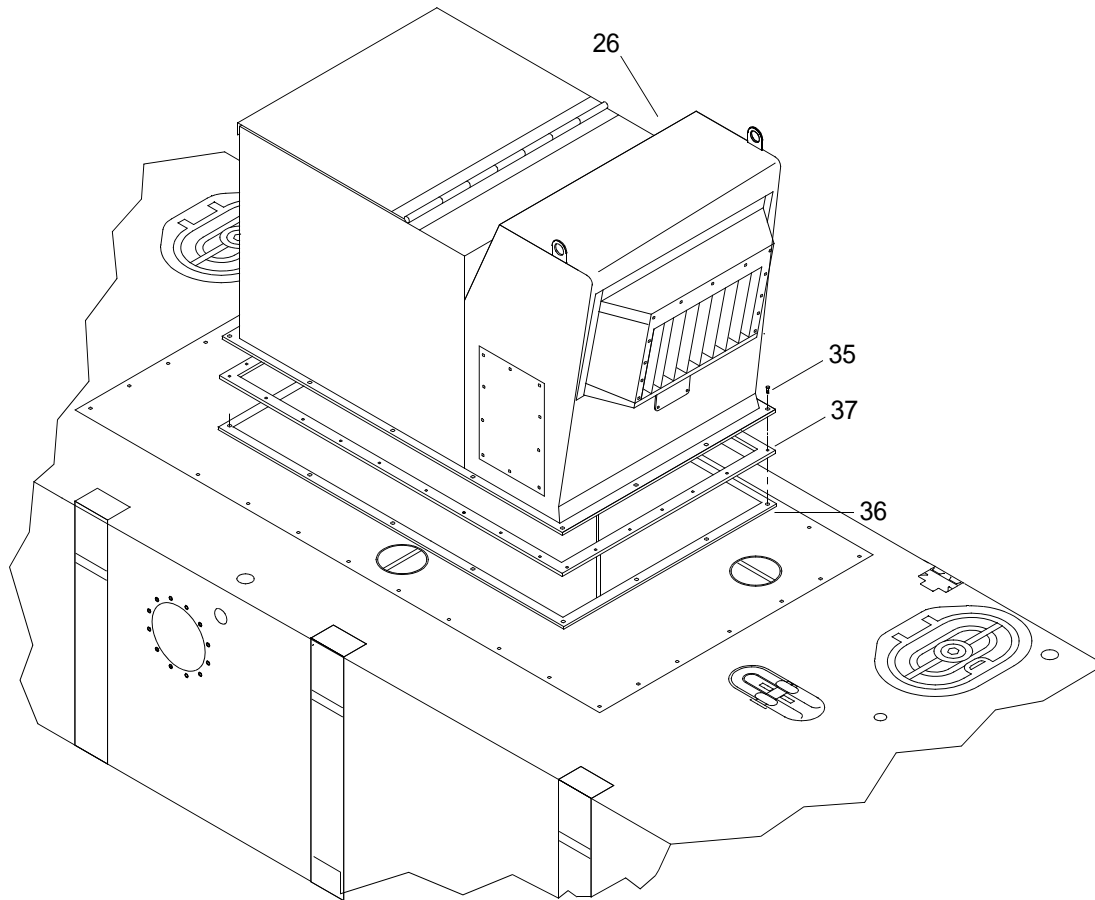
- a. Remove bolt and washer (27) securing ground cable (25) to propulsion module boss (28).
- b. Remove ground cable (25) from propulsion module boss (28).
- c. Coil ground cable (25) and secure inside of air intake plenum (26) with tie wrap (29).
- d. Install bolt and washer in (27) in propulsion module boss (28).

2. Remove wire rope (30) in intake plenum (26) from fire suppression trip mechanism (31).



- a. Move fire suppression solenoid spring flange (32) away from solenoid shaft (33).
- b. Remove wire rope ring (34) from fire suppression solenoid shaft (33).
- c. Release flange (32).

3. Remove bolts (35) attaching intake plenum (26) to port propulsion module engine hatch (36).



4. Remove air intake plenum gasket (37), if damaged.

WARNING

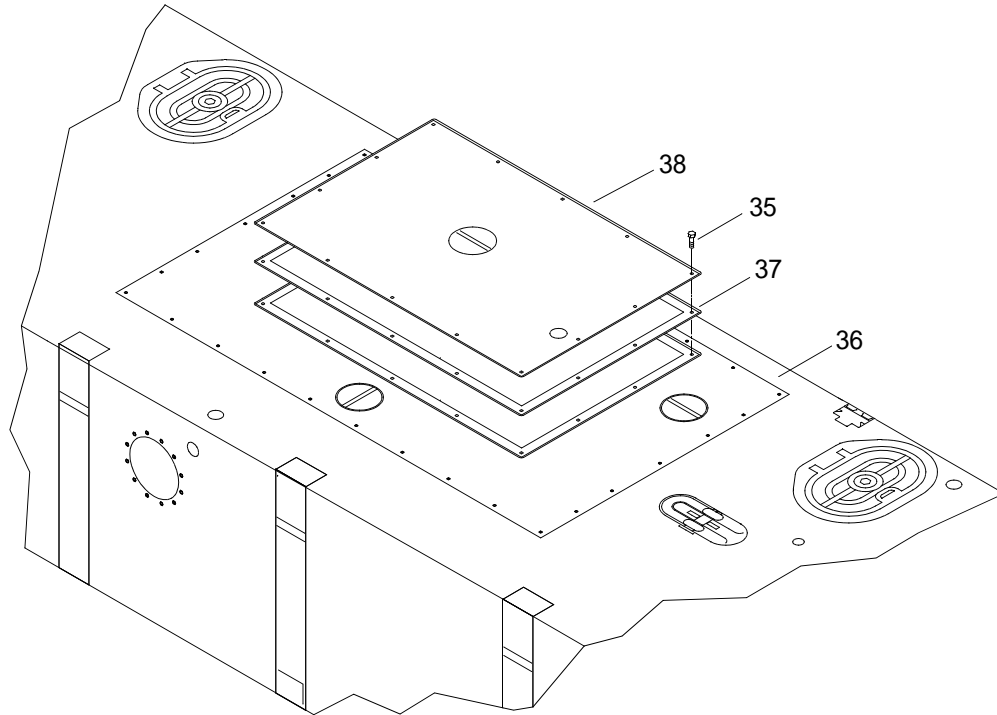


HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

5. Using crane, slings and shackles, remove intake plenum (26) from port propulsion module engine hatch (36).

6. Install port propulsion module engine hatch shipping plate (38).



- a. Install new gasket (37) if old gasket was damaged.
- b. Remove port propulsion module engine hatch shipping plate (38) from operators cab stowage pallet (5).

WARNING

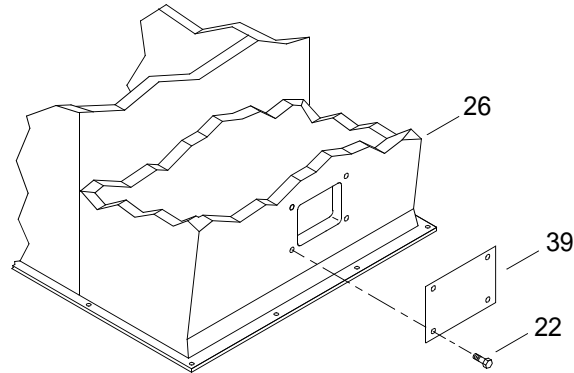


HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

- c. Using crane, slings and shackles, lower port propulsion module engine hatch shipping plate (38) onto port propulsion module engine hatch (36).
- d. Install bolts (35) to secure port propulsion module engine hatch shipping plate (38) to port propulsion module engine hatch (36).
- e. Tighten bolts (35).
- f. Remove slings and shackles.

7. Install electrical interconnect shipping plate (39) on intake plenum (26).



- a. Align holes in shipping plate (39) with holes in intake plenum (26).

WARNING



CHEMICAL



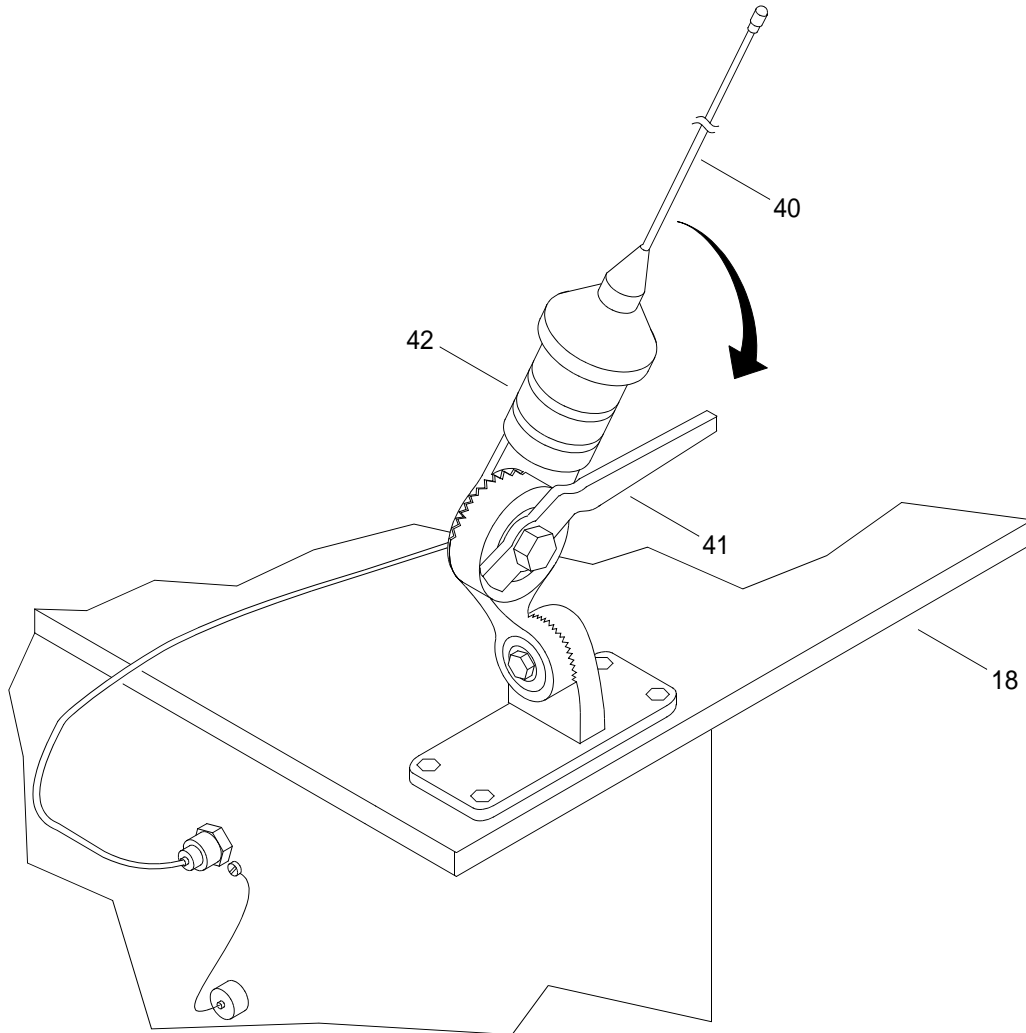
EYE PROTECTION

- b. Apply adhesive to threads of bolts (22).
- c. Install bolts (22) to secure plate (39) to intake plenum (26).
- d. Tighten bolts (22).
- e. Stow intake plenum. (WP 0069 00)

REMOVE OPERATORS CAB

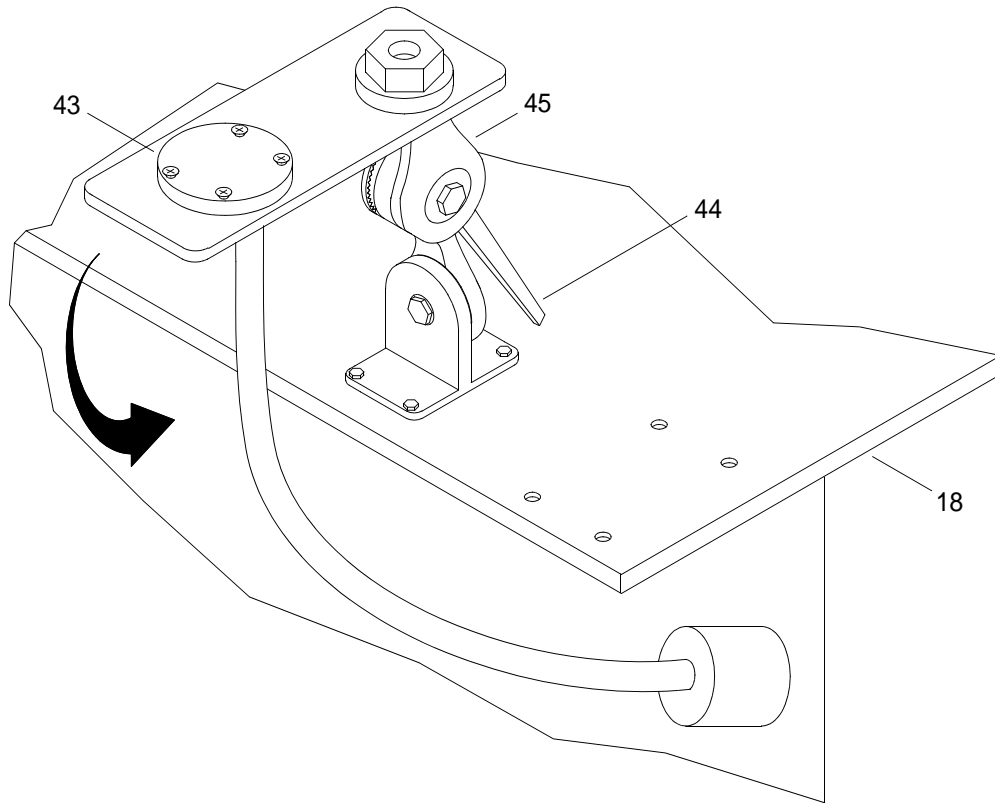
1. Remove equipment from operators cab (18).
 - a. Gain access to top of operators cab.
 - b. Remove SINCGARS antenna. Refer to TM 11-5820-890-10-8.
 - c. Stow SINCGARS antenna inside operators cab.

- d. Reposition VHF/FM DSC transceiver antenna (40).



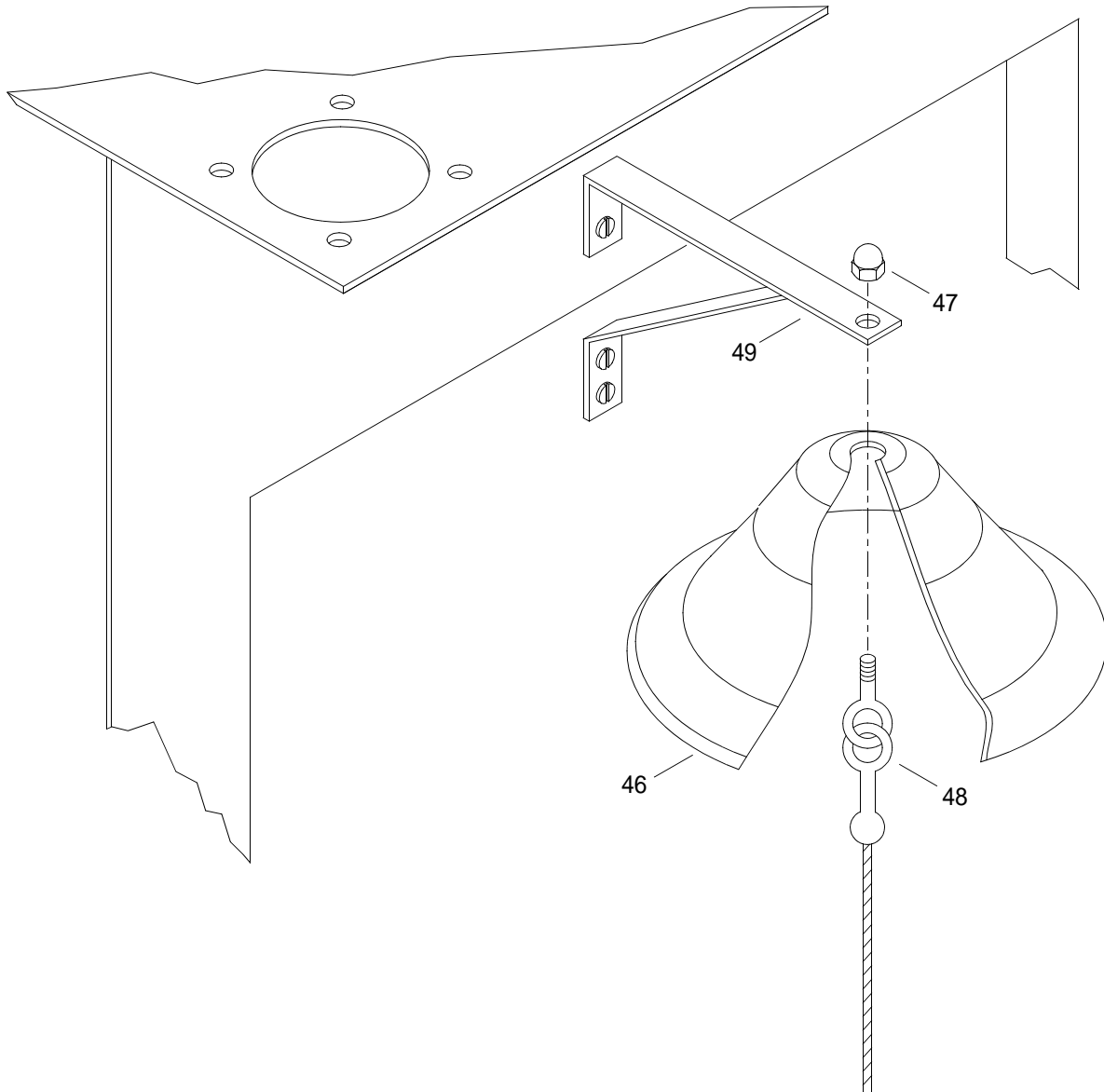
- (1) Rotate handle (41) on VHF/FM DSC transceiver antenna ratchet mount (42) counterclockwise to allow rotation of antenna (40) to horizontal position.
- (2) Rotate handle (41) on VHF/FM DSC transceiver antenna ratchet mount (42) clockwise to secure antenna (40).

-
- e. Reposition GPS antenna (43).



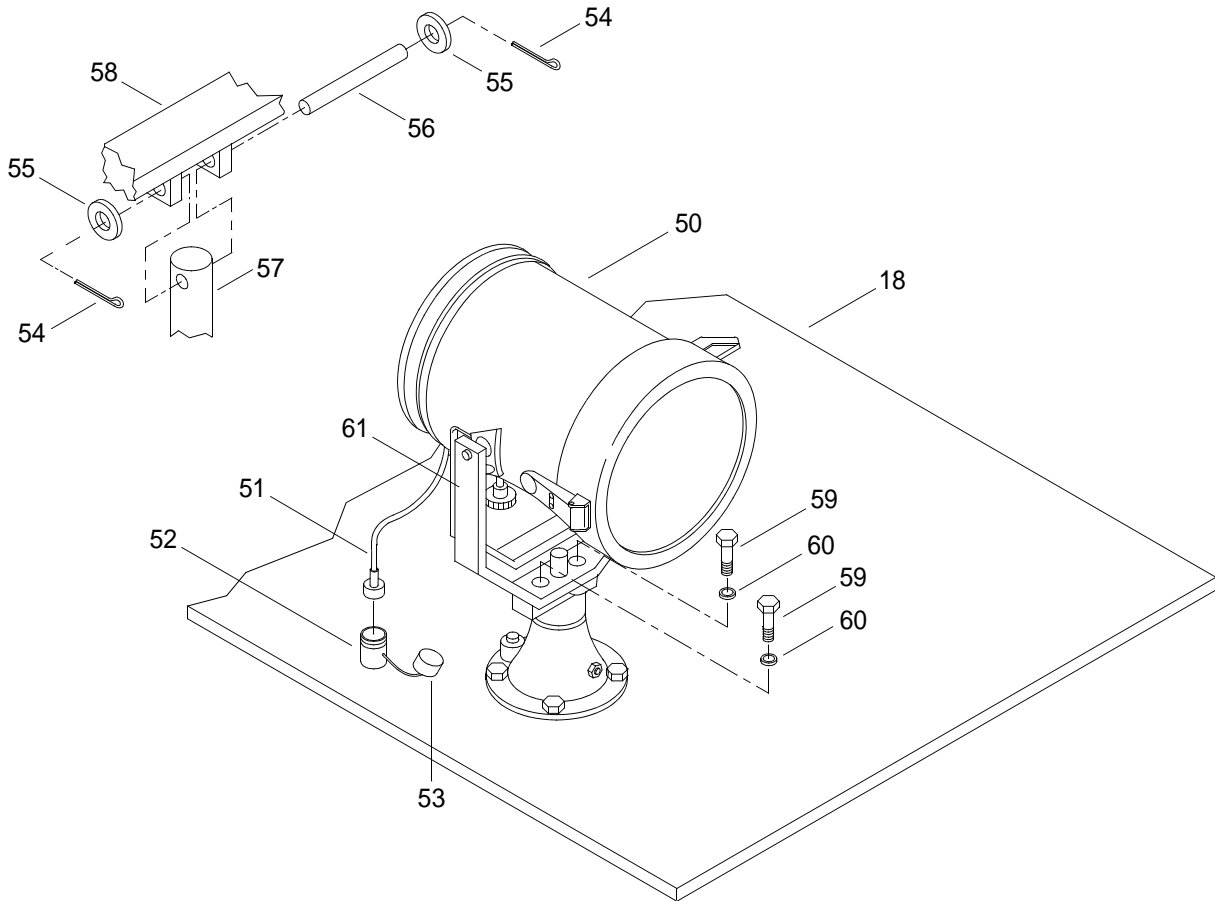
- (1) Rotate handle (44) on GPS antenna ratchet mount (45) counterclockwise to allow rotation of antenna mount plate downward to operators cab (18) roof.
- (2) Rotate handle (44) on GPS antenna ratchet mount (45) clockwise to secure mount.

f. Remove navigation bell (46).



- (1) Remove acorn nut (47) from clapper (48) and lower navigation bell (46) from mounting bracket (49).
- (2) Install acorn nut (47) on clapper (48).
- (3) Stow navigation bell (46) inside operators cab.

g. Remove operators cab spotlight (50).



- (1) Remove spotlight electrical connector (51) from receptacle (52) on roof of operators cab (18).
- (2) Install spotlight electrical receptacle dust cap (53).
- (3) Remove two cotter pins (54) and two flat washers (55) from clevis pin (56) in spotlight push rod (57) at base of yoke (58)
- (4) Remove and retain clevis pin (56).
- (5) Remove bolts (59) and washers (60).

WARNING



HEAVY PARTS

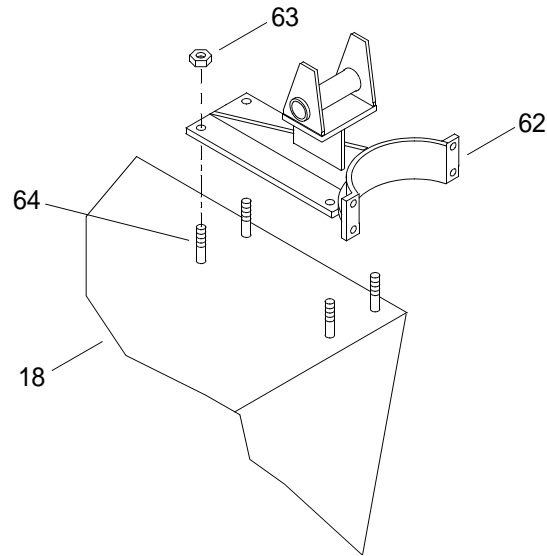
Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

- (6) Using crane, sling and shackle, remove spotlight (50) from spotlight harp (61).

(7) Remove sling and shackle.

(8) Stow spotlight (50) inside operators cab (18).

h. Remove main assembly mast mount (62) from roof of operators cab (18).



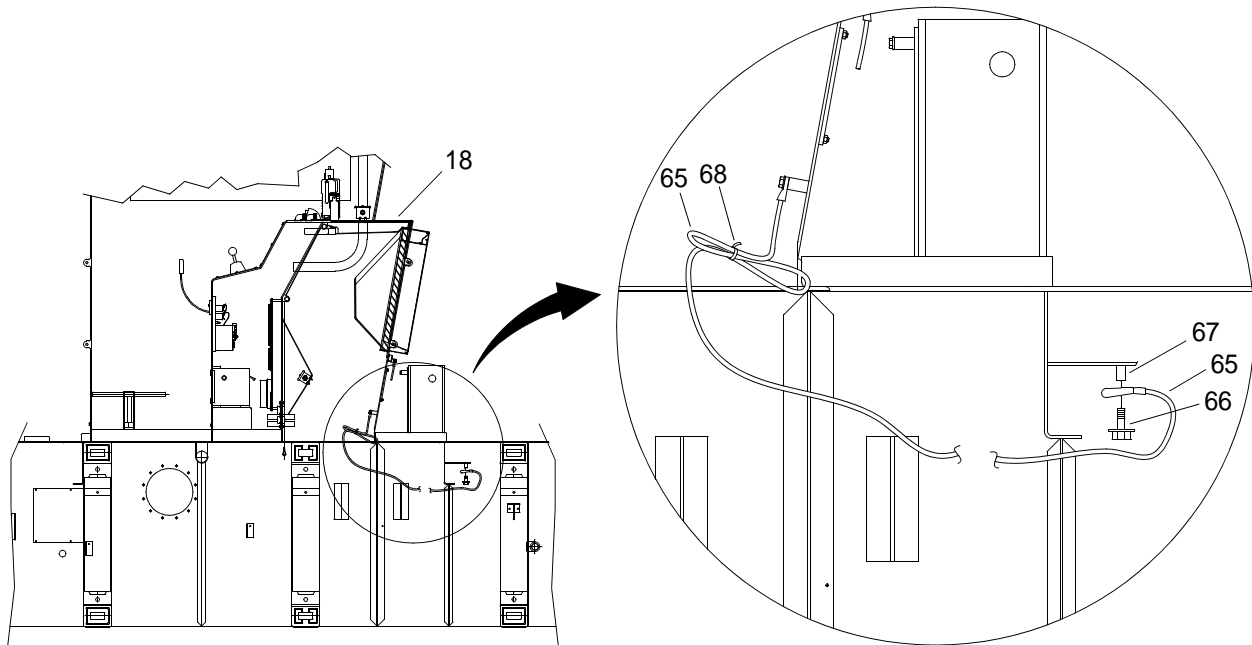
(1) Remove hex nuts (63) securing main assembly mast mount (62) to studs (64) on roof of operators cab (18).

(2) Remove main assembly mast mount (62) from roof of operators cab (18).

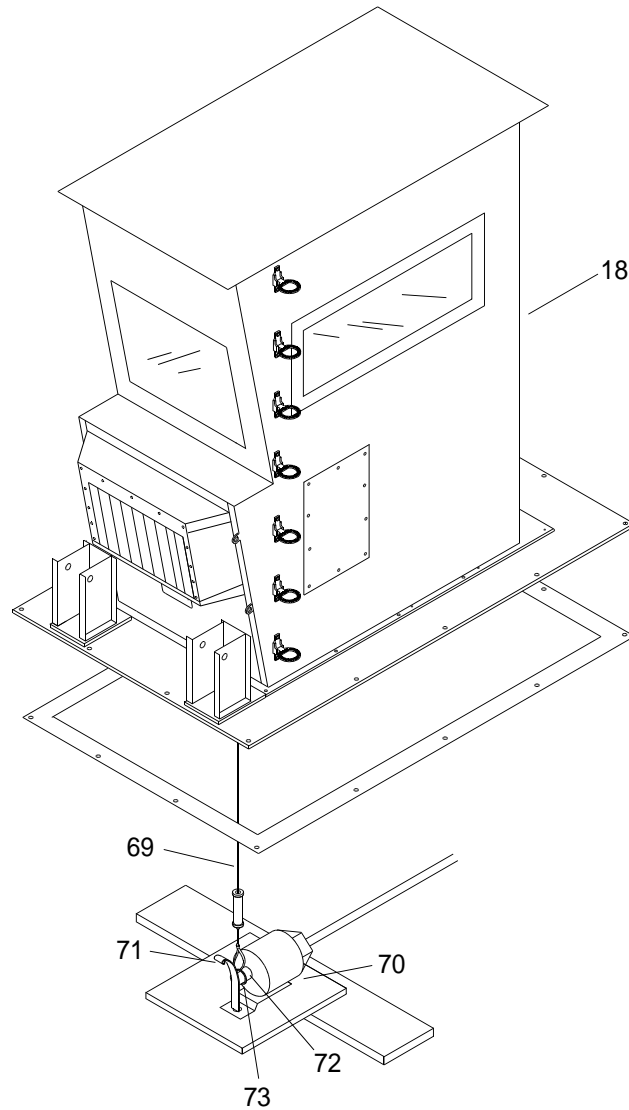
(3) Descend from roof of operators cab (18).

(4) Stow hex nuts (63) and main assembly mast mount (62) BII container.

i. Remove operators cab ground cable (65).

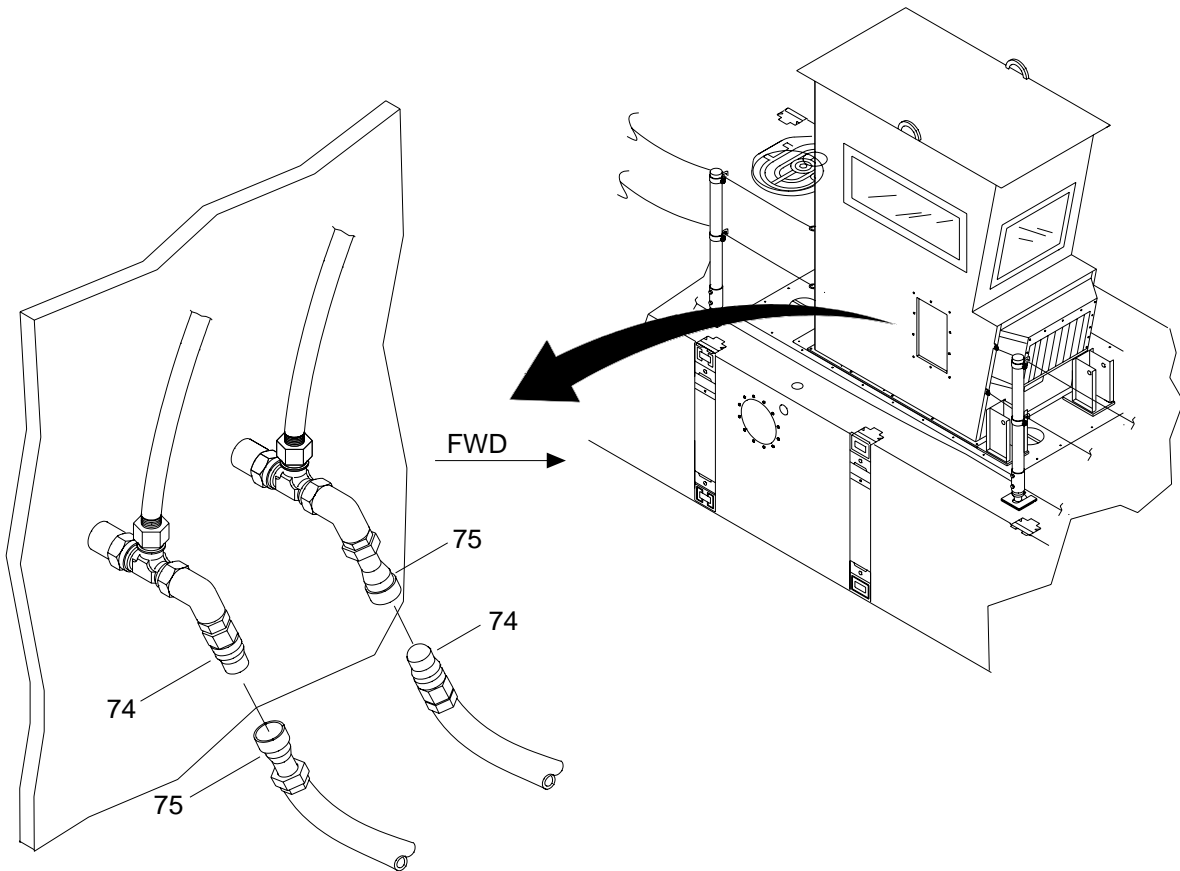


- (1) Remove steel bolt and washer (66) securing operators cab ground cable (65) to propulsion module boss (67).
 - (2) Remove operators cab ground cable (65) from propulsion module boss (67).
 - (3) Coil operators cab ground cable and secure inside of operators cab (18) with tie wrap (68).
 - (4) Install bolt and washer (66) in propulsion module boss (67).
- j. Remove wire rope (69) in operators cab (18) from fire suppression trip mechanism (70).

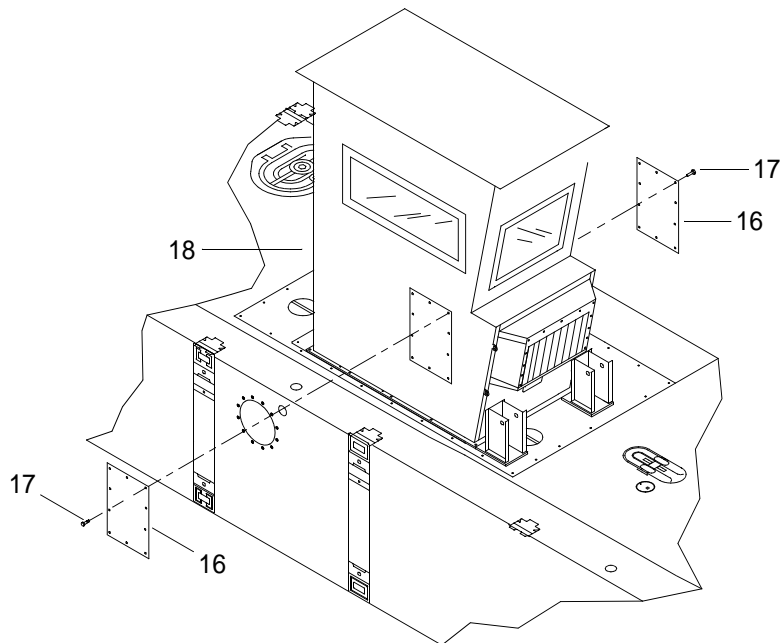


- (1) Move fire suppression solenoid spring flange (71) away from solenoid shaft (72).
- (2) Remove wire rope ring (73) from fire suppression solenoid shaft (72).
- (3) Release flange (71).

- k. Through operators cab starboard access, disconnect heating system male (74) and female (75) quick disconnect water hoses.

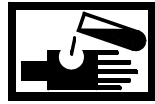


- l. Install both inboard and outboard operators cab side access panels (16).

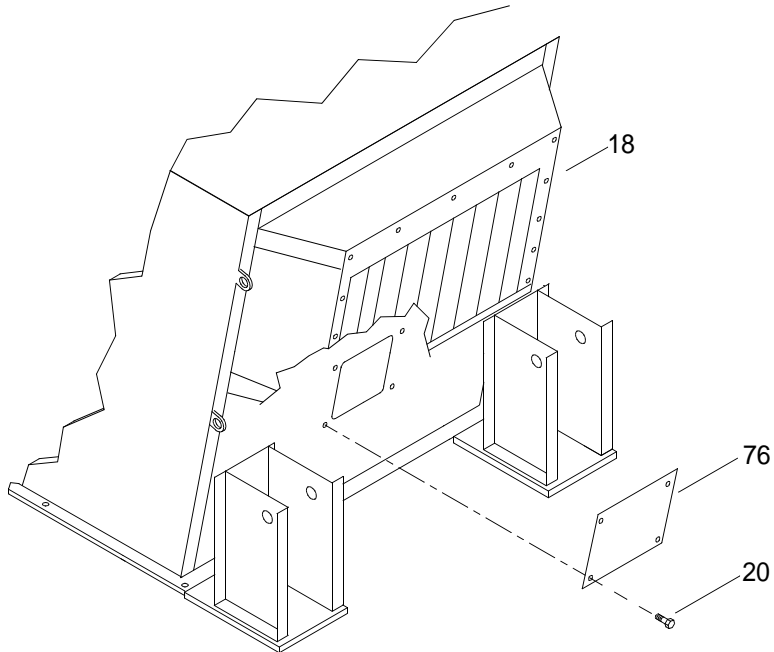


- (1) Align holes in inboard and outboard access panels (16) with holes in operators cab (18).

WARNING

**CHEMICAL****EYE PROTECTION**

- (2) Apply adhesive to threads of bolts (17).
 - (3) Install bolts (17) to secure inboard and outboard side access panels (16).
- m. Install electrical interconnect shipping plate (76).



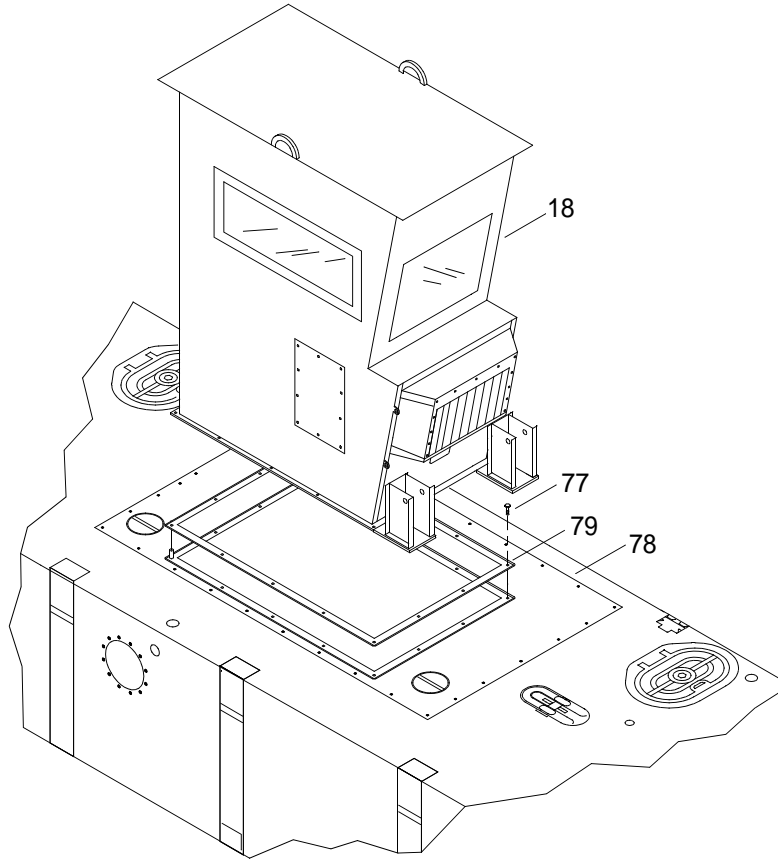
- (1) Align holes in shipping plate (76) with holes in operators cab (18).

WARNING

**CHEMICAL****EYE PROTECTION**

- (2) Apply adhesive to threads of bolts (20).
- (3) Install bolts (20) to secure shipping plate (76).

- n. Remove bolts (77) attaching operators cab (18) to starboard propulsion module engine hatch (78).



WARNING

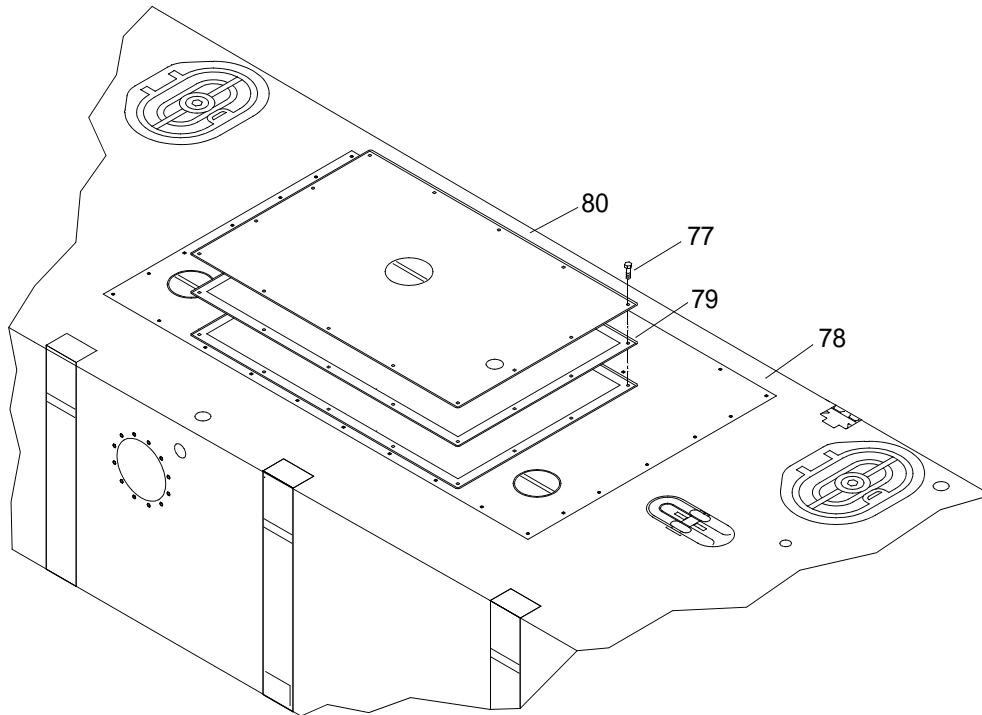


HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

- o. Using crane, slings and shackles, lift operators cab (18) from starboard propulsion module engine hatch (78).
- p. Remove gasket (79), if damaged.
- q. Remove slings and shackles.

2. Install starboard propulsion module engine hatch shipping plate (80).



- a. Install new gasket (79) if old gasket was damaged.
- b. Remove starboard propulsion module engine hatch shipping plate (80) from operators cab stowage pallet (5).

WARNING

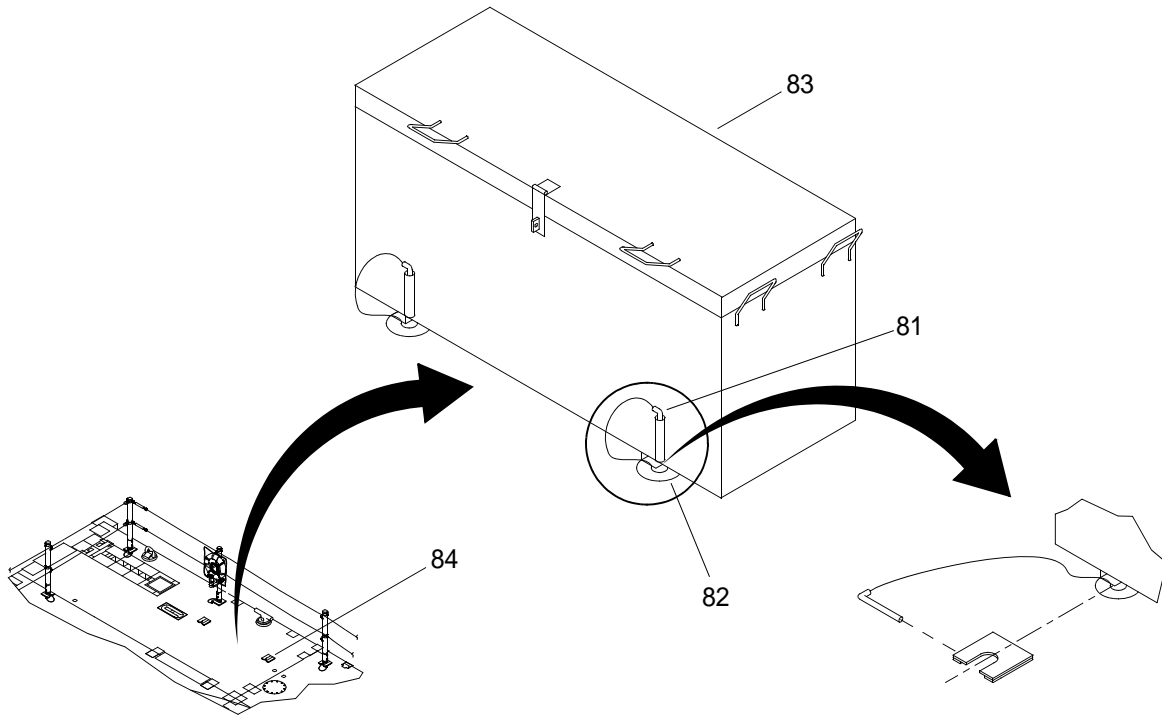


HEAVY PARTS

- c. Using crane, slings and shackles, align bolt holes in starboard propulsion module engine hatch shipping plate (80) with holes in starboard propulsion module engine hatch (78).
- d. Install bolts (77) to secure starboard propulsion module engine hatch shipping plate (80) to starboard propulsion module engine hatch (78).
- e. Tighten bolts (77).
- f. Remove slings and shackles.
- g. Stow operators cab. (WP 0069 00)

REMOVE DECK BOX ASSEMBLY

1. Remove pins (81) securing inboard feet (82) of deck box assembly (83) to deck fittings (84).



WARNING

**HEAVY PARTS**

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2. Using crane, slings and shackles, slide inboard feet (82) of deck box assembly (83) out of deck fittings (84) and remove deck box assembly (83) from deck to WT.
3. Remove slings and shackles from deck box assembly (83).

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
SKEG ASSEMBLIES
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
 Sling, Endless: 8400LB, 20' Yellow (Cabinet A9) (Item 82, WP 0112 00)
 Qty 2
 Shackle, 1-1/2" 30 Ton Shackle (Storage Room Hooks) (Item 68, WP 0112 00)
 Qty 4

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

Seaman 88K

Equipment Condition

Warping Tug Abovedeck Equipment Removed. (WP 0049 00)

PREPARATION FOR MOVEMENT - REMOVAL OF WARPING TUG SKEG ASSEMBLIES

WARNING

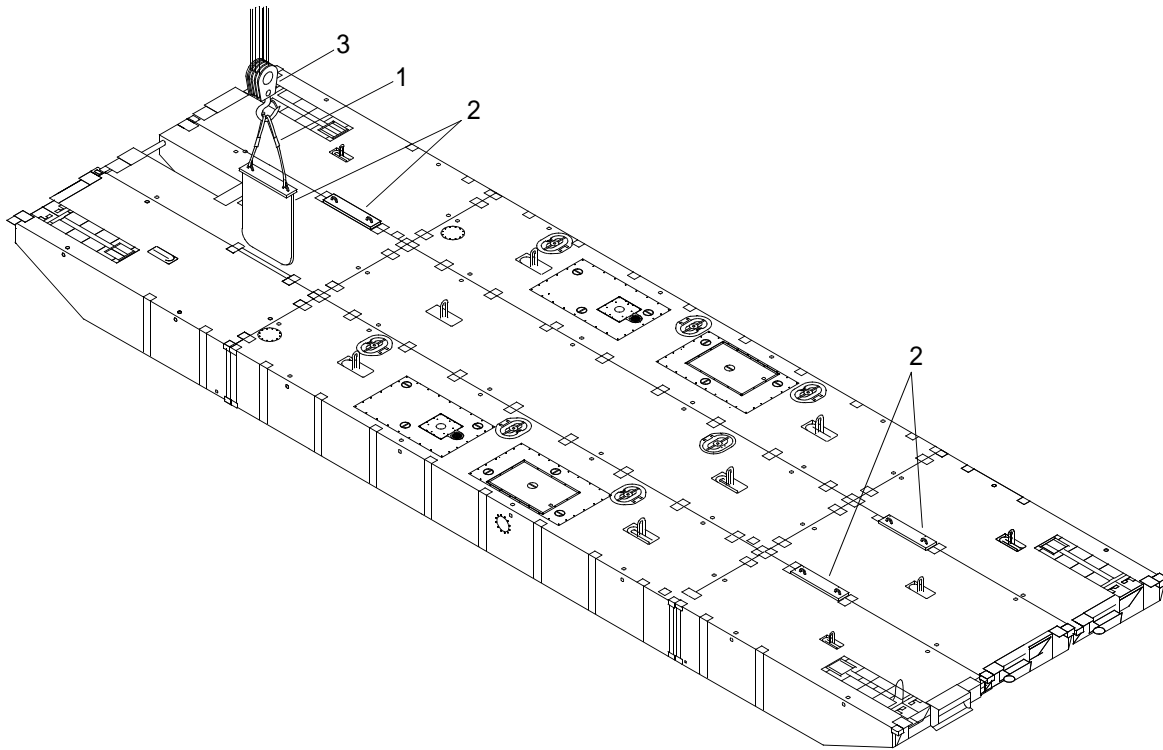
**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

REMOVE SKEG ASSEMBLIES**NOTE**

This procedure is typical for removal of all skeg assemblies.

1. Inspect chains, slings and shackles. (WP 0007 00)
2. Attach slings and shackles (1) to skeg assembly (2).



WARNING

**HEAVY PARTS**

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3. Using crane (3), lift skag assembly (2) from warping tug (4).
4. Stow skag assemblies. (WP 0068 00)

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
 Crowbar (60" Long) (Fender Rack) (Item 13, WP 0112 00)
 Sling, 66,000LB, 30FT (Olive) (Storage Room) (Item 77, WP 0112 00)
 Qty 4
 Shackle, 1-1/2" 30 Ton Shackle (Storage Room Hooks) (Item 68, WP 0112 00)
 Qty 4

Materials/Parts

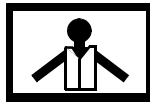
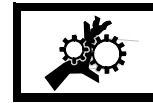
Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

Seaman 88K (2)

PREPARATION FOR MOVEMENT - DISASSEMBLE WARPING TUG

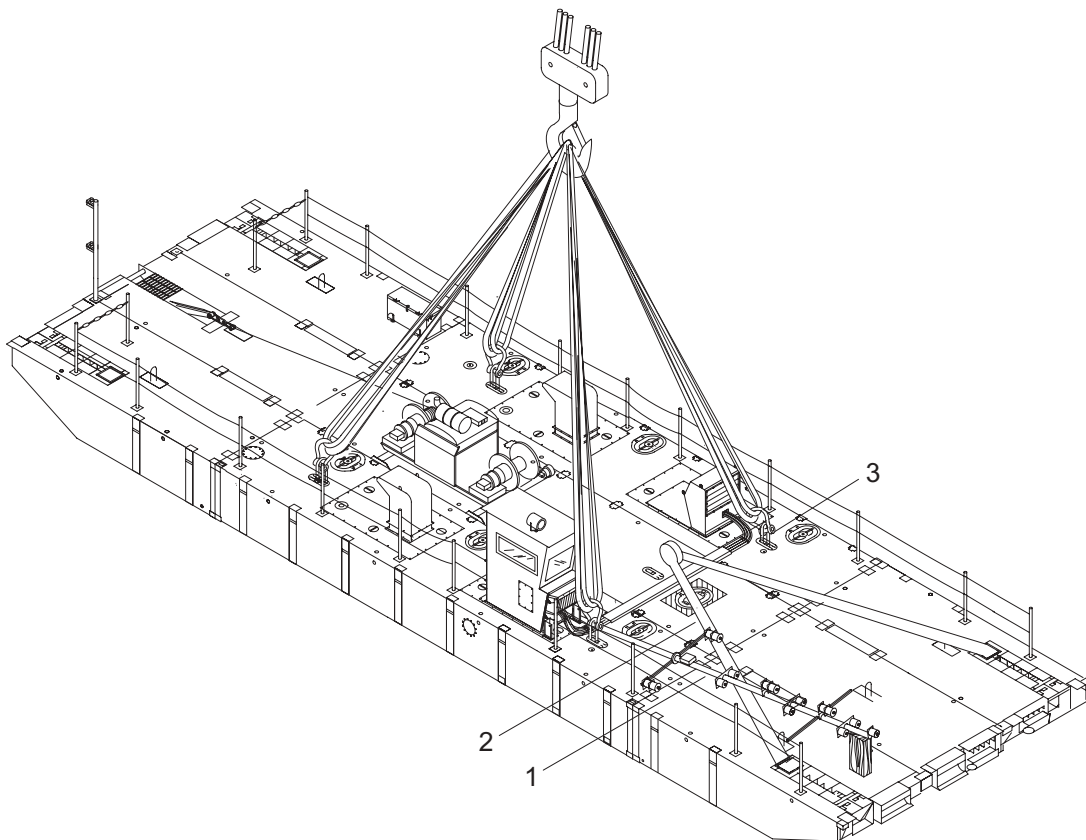
WARNING

**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

DISASSEMBLE WARPING TUG ON DECK OF SEALIFT VESSEL

1. Inspect chains, slings and shackles. (WP 0007 00)
2. In water, lower A-frame (2) onto deck of WT. (WP 0041 00)
3. In water, lower main assembly mast (1) onto deck of WT. (WP 0048 00)
4. Remove crew shelter. (WP 0039 00)
5. Attach slings and shackles to both sets of propulsion module lifting shackle padeyes (3).



WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

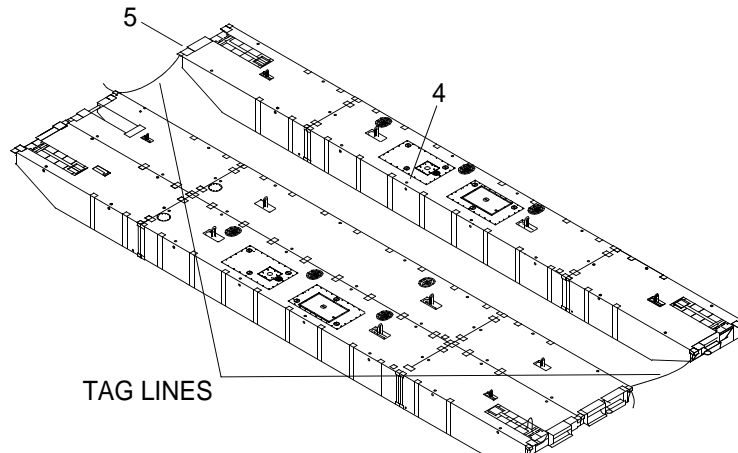
6. Using crane, slings and shackles, remove WT from water and position on deck of sealift vessel.
7. Remove slings and shackles from WT.
8. Remove safety equipment. (WP 0040 00)
9. Remove fenders. (WP 0042 00)
10. Remove D-ring and deck cleat fittings. (WP 0043 00)
11. Remove stub assembly mast. (WP 0044 00)
12. Remove stern anchor. (WP 0045 00)
13. Remove main assembly mast. (WP 0048 00)
14. Remove A-frame. (WP 0041 00)

-
15. Remove winch mounting plates. (WP 0046 00)
 16. Remove winch. (WP 0047 00)
 17. Remove WT abovedeck equipment. (WP 0049 00)
 18. Remove skeg assemblies. (WP 0050 00)
 19. Operate female guillotine connectors. (WP 0009 00)
 20. Using crowbar, separate WT into module strings.
 21. Stow male and female guillotine connectors. (WP 0053 00)
 22. Disassemble module strings. (WP 0052 00)

DISASSEMBLY OF WARPING TUG IN WATER

1. Remove crew shelter. (WP 0039 00)
2. Remove safety equipment. (WP 0040 00)
3. Remove fenders. (WP 0042 00)
4. Remove D-ring and deck cleat fittings. (WP 0043 00)
5. Remove stub assembly mast. (WP 0044 00)
6. Remove stern anchor. (WP 0045 00)
7. Remove main assembly mast. (WP 0048 00)
8. Remove A-frame. (WP 0041 00)
9. Remove winch mounting plates. (WP 0046 00)
10. Remove winch. (WP 0047 00)
11. Remove WT abovedeck equipment. (WP 0049 00)
12. Remove skeg assemblies. (WP 0050 00)

13. Attach tag lines to turn tubes (4) and ISO corner fittings (5).



14. Operate female guillotine connectors. (WP 0009 00)

15. Using crowbar, separate WT into module strings.

WARNING

Place the hands on top or on the outside of ropes/lines so that in an emergency the lines can be released quickly to preclude being pulled into the equipment. Failure to observe these precautions could result in serious injury or death.

16. Using tag lines, maneuver module strings (8) into position for disassembly.

17. Stow male and female guillotine connectors. (WP 0053 00)

18. Disassemble module strings. (WP 0052 00)

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
MODULE STRINGS
OPERATION UNDER USUAL CONDITION**

INITIAL SETUP:**Tools**

Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
 Crowbar (60" Long) (Fender Rack) (Item 13, WP 0112 00)
 Sling, Endless: 53000LB, 25' Brown (Storage Room Hooks) (Item 78, WP 0112 00)
 Qty 2
 Chain Sling, 36,000 lb Adjustable (Item 11, WP 0112 00)
 Qty 4

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

Seaman 88K (2)

Equipment Condition

Warping Tug Disassembled. (WP 0051 00)

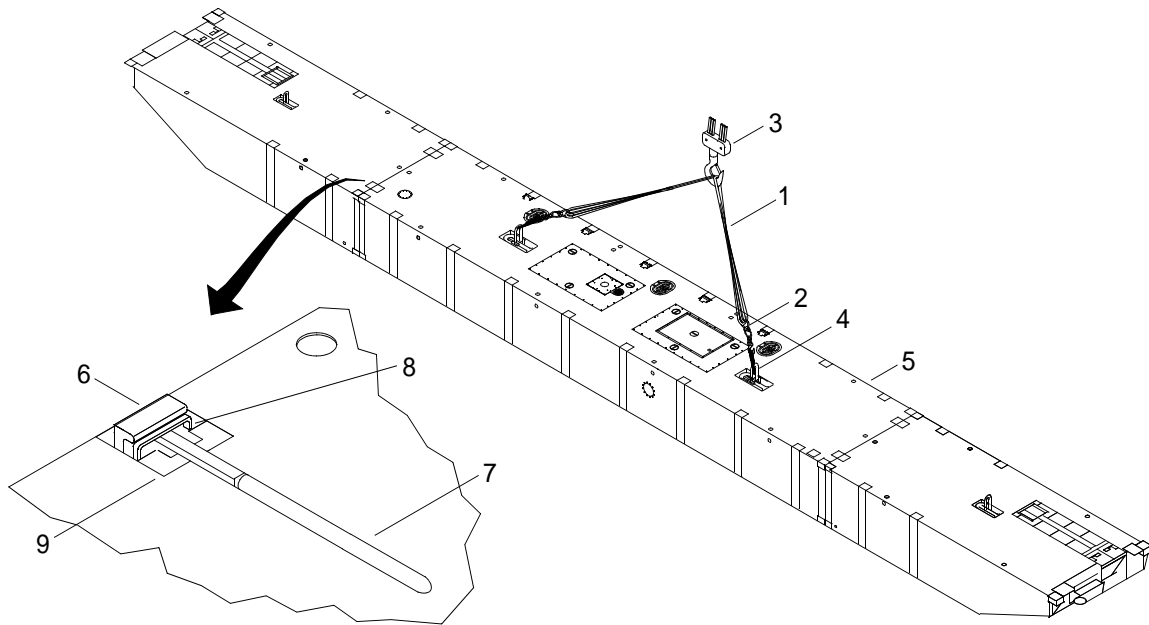
PREPARATION FOR MOVEMENT - DISASSEMBLY OF MODULE STRINGS

WARNING

**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

1. Inspect chains, slings and shackles. (WP 0007 00)
2. Attach two 53,000 lb slings (1) and 36,000 lb adjustable chain slings (2) from crane (3) to padeyes (4) on module string (5).



WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

3. Using slings (1 and 2) and crane (3), lift module string (5) and place in desired location for disassembly.
4. Remove 36,000 lb adjustable chain slings (2) from padeyes (4) on module string (5).
5. Remove 53,000 lb slings (1) from crane (3).
6. Raise female guillotine connectors (6).
 - a. Insert crowbar (7) behind spring bar (8) under female guillotine connectors (6).
 - b. Rotate crowbar (7) downward to clear spring bar (8) from deck overhangs (9) and allow female guillotine connectors (6) to move upward.
 - c. Raise female guillotine connectors (6) approximately 6 in. until it stops.
7. Using crowbar, separate modules.
8. Stow male and female guillotine connectors. (WP 0053 00)
9. Assemble module ISOPAK. (WP 0054 00)

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
MALE AND FEMALE GUILLOTINE CONNECTORS
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
 Crowbar (60" Long) (Fender Rack) (Item 13, WP 0112 00)
 Hammer, Hand: 10 LBS Sledge (Cabinet Rack) (Item 39, WP 0112 00)
 Inserter and Remover, Pin (Storage Room) (Item 46, WP 0112 00)

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

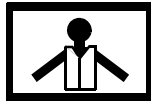
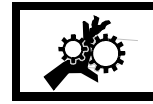
Personnel Required

Seaman 88K

**PREPARATION FOR MOVEMENT - STOWAGE OF MALE AND FEMALE
GUILLOTINE CONNECTORS**

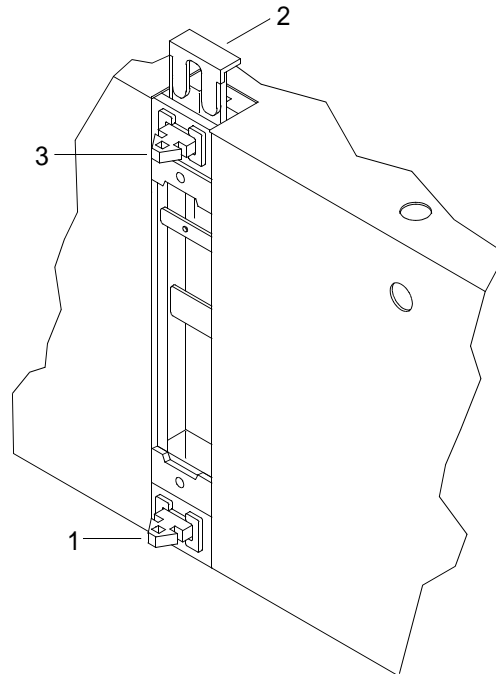
STOW MALE CONNECTORS

WARNING

**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

1. While holding lower male lock pin (1) fully inward against its deployment spring, lower guillotine connector (2) with sledgehammer to partially engage and restrain lower male lock pin (1).



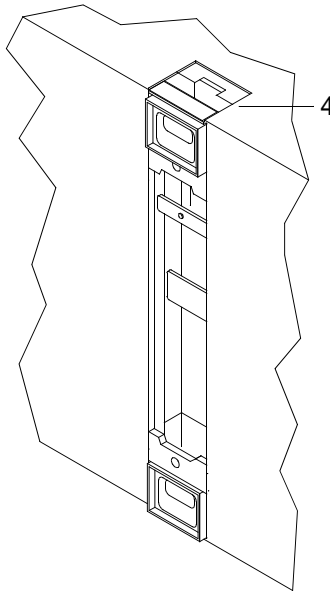
2. While holding upper lock pin (3) inward against deployment spring, complete lowering guillotine connector (2) with sledgehammer to engage and restrain both pins (1, 3).

STOW FEMALE CONNECTORS

NOTE

Guillotine connectors are properly stowed when flush with module deck.

1. Using sledgehammer, strike guillotine (4) of female connectors until flush with deck.

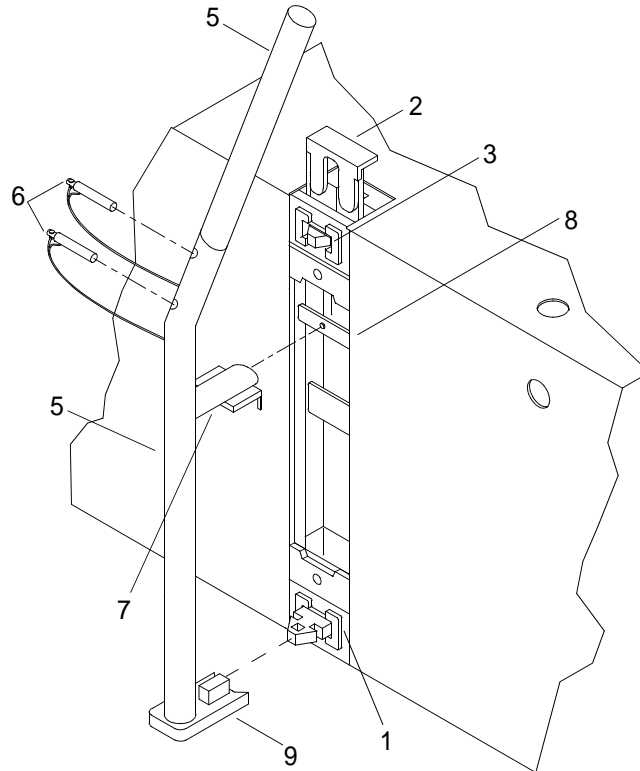


2. Verify all guillotines (4) are flush with module deck.

STOW LOWER MALE CONNECTORS USING PIN RETRACTION TOOL**NOTE**

If module is in water and lower pins (1) require stowage, use pin retraction tool (5).

1. Assemble two piece pin retraction tool (5) and secure with two quick release pins (6).



2. Rest pin retraction tool support fitting (7) on guillotine cross bracket (8).
3. Position foot (9) of pin retraction tool (5) over lower pin (1) and press inwards by levering pin retraction tool (5) upwards.
4. Lower guillotine (2) with sledgehammer to partially engage and restrain lower pin (1).
5. Remove pin retraction tool (5).
6. While holding upper lock pin (3) inward against deployment spring, complete lowering guillotine connector (2) with sledgehammer to engage and restrain both pins (1, 3).

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
MODULE ISOPAKS
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
 Ladder, ISOPAK (Storage Room) (Item 49, WP 0112 00)
 Sling, Endless: 8400LB, 20' Yellow (Cabinet A9) (Item 82, WP 0112 00)
 Qty 2
 Chain Sling, 36,000 lb Adjustable (Item 11, WP 0112 00)
 Qty 4

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)
 Lumber, Softwood, Dimension (Item 43, WP 0114 00)

Personnel Required

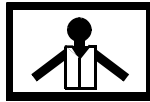
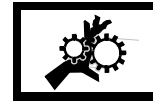
Seaman 88K (2)

Equipment Condition

Warping Tug Disassembled. (WP 0051 00)

PREPARATION FOR MOVEMENT - ASSEMBLE MODULE ISOPAKS**ASSEMBLY OF CENTER MODULE ISOPAK**

WARNING

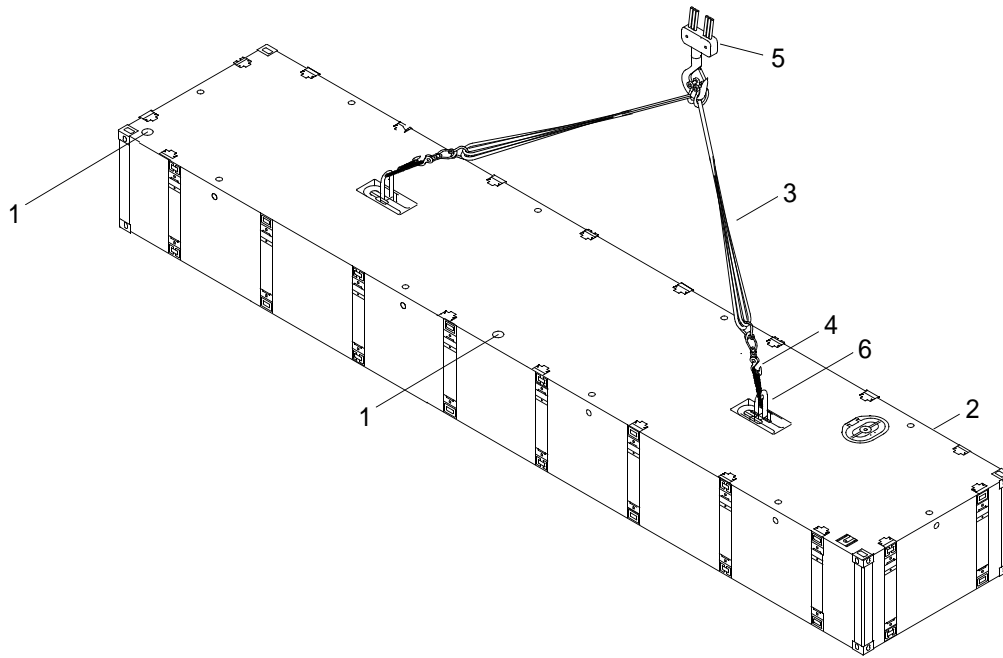
**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

NOTE

For ISOPAK assembly configurations, refer to WT Equipment Data. (WP 0004 00)

1. Verify drain plugs (1) on center module (2) are installed and tight.



2. Inspect chains, slings and shackles. (WP 0007 00)
3. Attach two 53,000 lb slings (3) and 36,000 lb adjustable chain slings (4) from crane (5) to padeyes (6) on center module (2).

WARNING

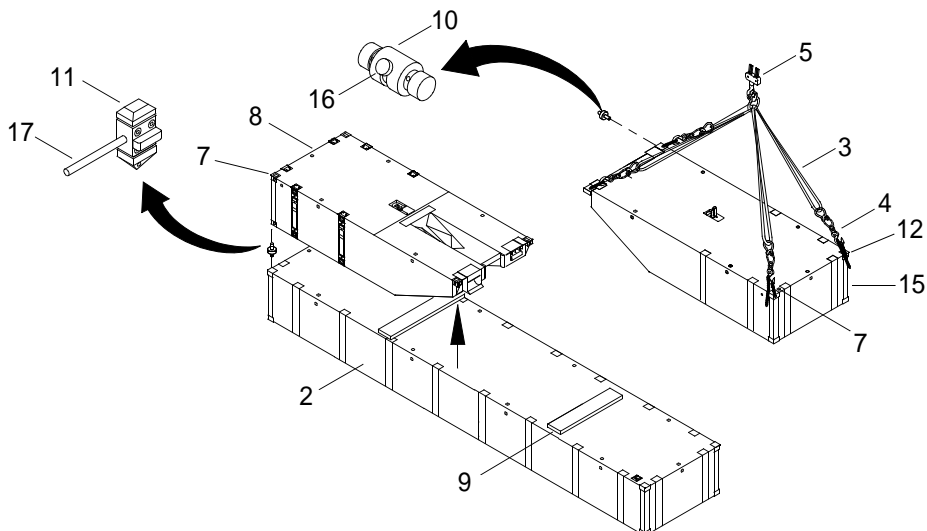


HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in injury or death to personnel.

4. Using slings (3 and 4) and crane (5), lift center module (2) and position for assembly.
5. Remove 36,000 lb adjustable chain slings (4) from padeyes (6) on center module (2).
6. Remove 53,000 lb slings (3) from crane (5).

7. Verify drain plugs (7) on end rake modules (8) are installed and tight.



8. Install dunnage (9) on top of center module (2).
9. Install two horizontal connectors (10) into end rake modules (8).
10. Install four vertical connectors (11) into ISO corner fittings (12) of center module (2).
11. Attach four 53,000 lb slings (3) and 36,000 lb adjustable chain slings (4) from crane (5) to ISO corner fittings (12) on center anchor rake module (8).

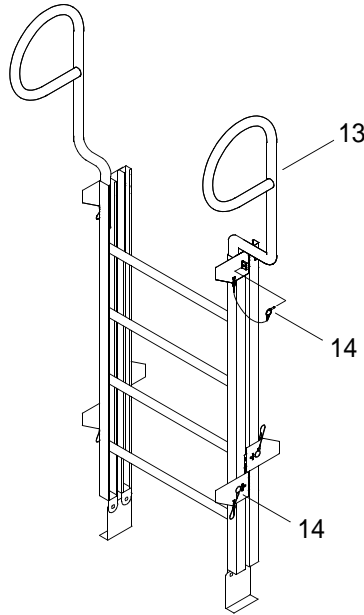
WARNING



HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in injury or death to personnel.

12. Using slings (3 and 4) and crane (5), lift center anchor rake module (8) onto top of center module (2).

 13. Assemble ISOPAK ladder (13).


- a. Remove ISOPAK ladder (13) from BII container.
- b. Remove quick release pins (14) from ISOPAK ladder (13) securing it in stowed position.
- c. Unfold ISOPAK ladder (13).
- d. Lean ISOPAK ladder (13) against ISOPAK.

 WARNING

Care must be taken when ascending or descending the ISOPAK ladder. ISOPAK ladder rungs become very slippery when wet. Failure to comply could result in injury or death to personnel.

14. Using ISOPAK ladder (13), climb on top of module ISOPAK.
15. Remove 53,000 lb slings (3) and 36,000 lb adjustable chain slings (4) from ISO corner fittings (12) on center anchor rake module (8).

 WARNING

Care must be taken when ascending or descending the ISOPAK ladder. ISOPAK ladder rungs become very slippery when wet. Failure to comply could result in injury or death to personnel.

16. Using ISOPAK ladder (13), descend from top of module ISOPAK.
17. Attach four 53,000 lb slings (3) and 36,000 lb adjustable chain slings (4) from crane (5) to ISO corner fittings (12) on center end rake module (15).

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in injury or death to personnel.

18. Using slings (3 and 4) and crane (5), lift center end rake module (15) onto top of center module (2).

WARNING

Care must be taken when ascending or descending the ISOPAK ladder. ISOPAK ladder rungs become very slippery when wet. Failure to comply could result in injury or death to personnel.

19. Using ISOPAK ladder (13), climb on top of module ISOPAK.
20. Remove 53,000 lb slings (3) and 36,000 lb adjustable chain slings (4) from ISO corner fittings (12) on end rake module (8).

WARNING

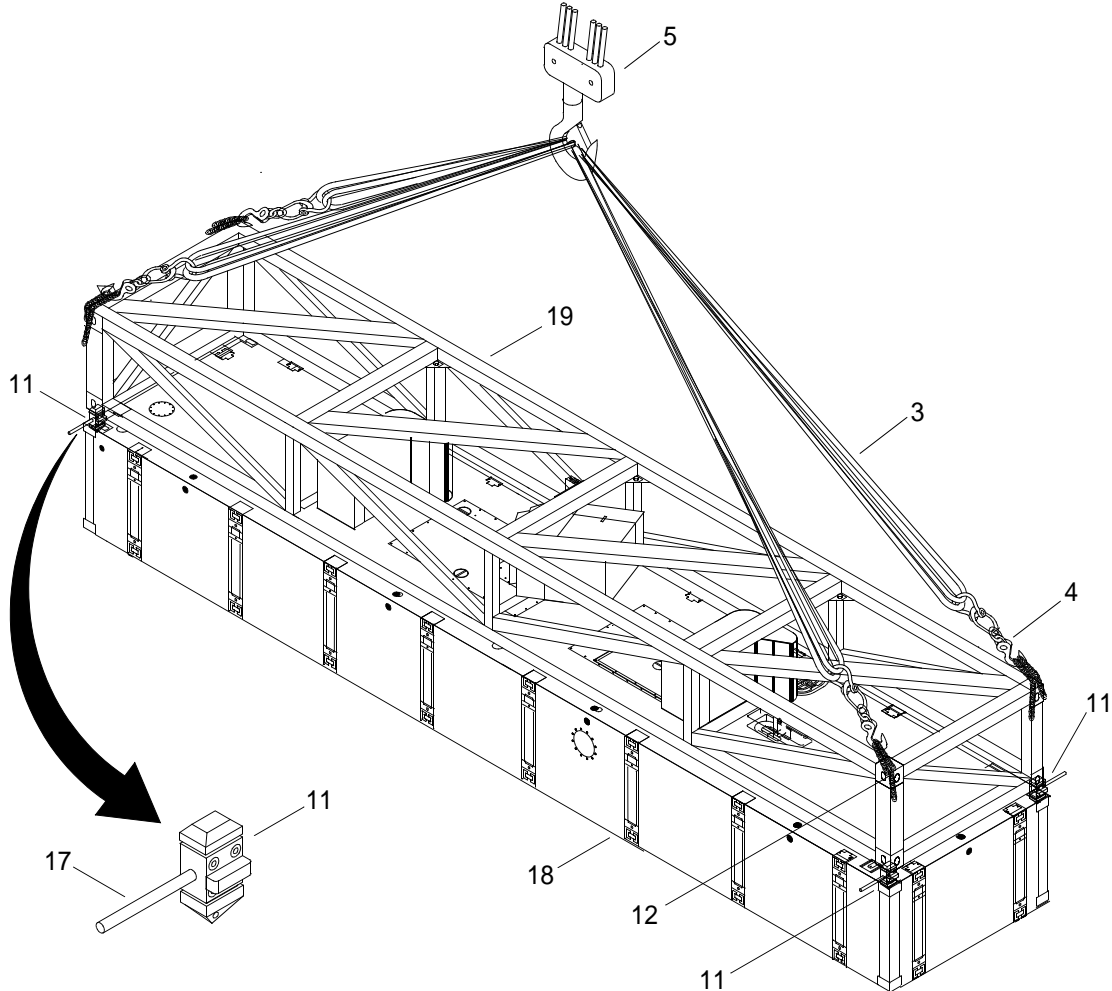
Care must be taken when ascending or descending the ISOPAK ladder. ISOPAK ladder rungs become very slippery when wet. Failure to comply could result in injury or death to personnel.

21. Using ISOPAK ladder (13), descend from top of module ISOPAK.
22. Lock two horizontal twist locks (10) by rotating levers (16).
23. Lock four vertical connectors (12) by rotating levers (17).

INSTALL SHIPPING FRAME ON PROPULSION MODULE
NOTE

This procedure is typical for both propulsion modules.

1. Install four ISOPAK vertical connectors (11) on ISO corner fittings (12) of propulsion module (18).



2. Attach four 53,000 lb slings (3) and 36,000 lb adjustable chain slings (4) from crane (5) to ISO corner fittings (12) on shipping frame (19).

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in injury or death to personnel.

3. Using crane and slings, lift shipping frame (19) and place on top of propulsion module (18).

- Lock four ISOPAK vertical connectors (11), one at each ISO corner fittings (12), by rotating lever (17).

WARNING

Care must be taken when ascending or descending the ISOPAK ladder. ISOPAK ladder rungs become very slippery when wet. Failure to comply could result in injury or death to personnel.

- Using ISOPAK ladder (13), climb on top of shipping frame (19).
- Remove 53,000 lb slings (3) and 36,000 lb adjustable chain slings (4) from padeyes (6) on propulsion module (19).

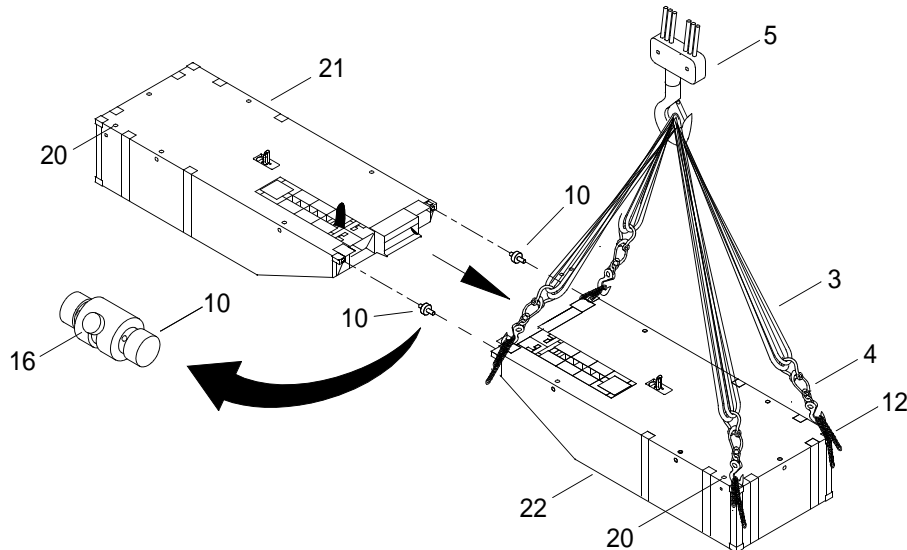
WARNING

Care must be taken when ascending or descending the ISOPAK ladder. ISOPAK ladder rungs become very slippery when wet. Failure to comply could result in injury or death to personnel.

- Using ISOPAK ladder (13), descend from top of module ISOPAK.

INSTALL SHIPPING FRAME ON END RAKE MODULES

- Verify drain plugs (20) on end rake modules (21) are installed and tight.



NOTE

Either horizontal twist locks or bridge locks are used to connect two end rake modules.

Left and right end rake modules are rigged and lifted in same manner.

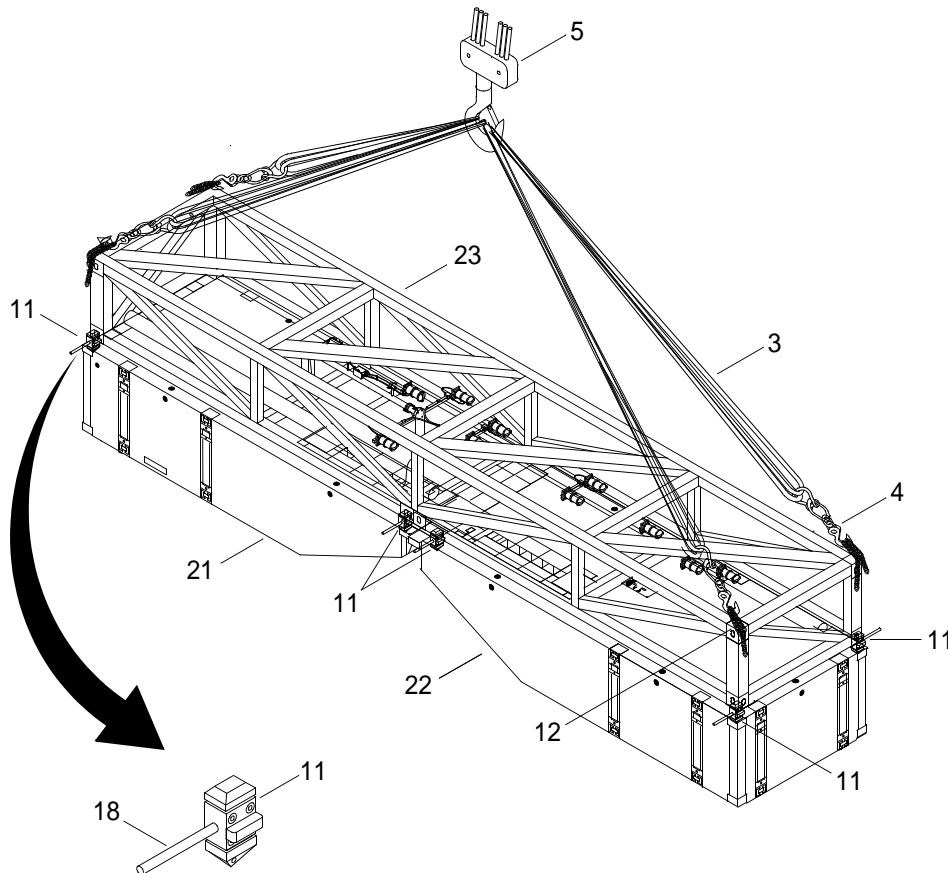
- Install two horizontal connectors (10) into one end rake module (21).
- Attach four 53,000 lb slings (3) and 36,000 lb adjustable chain slings (4) from crane (5) to ISO corner fittings (12) on end rake module (22).

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in injury or death to personnel.

4. Using slings (3 and 4) and crane (5), lift end rake module (22) and position two end rake modules (22 and 23) nose to nose.
5. Connect end rake modules (22 and 23) end to end with two horizontal ISOPAK connectors (10).
6. Lock two ISOPAK connectors (10) by rotating levers (16).
7. Remove 53,000 lb slings (3) and 36,000 lb adjustable chain slings (4) from ISO corner fittings (12) on end rake module (22).
8. Install eight ISOPAK vertical connectors (11) on ISO corner fittings (12) of end rake modules (22 and 23).



9. Attach four 53,000 lb slings (3) and 36,000 lb adjustable chain slings (4) from crane (5) to ISO corner fittings (12) on shipping frame (23).

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in injury or death to personnel.

10. Using crane and slings, lift shipping frame (23) and place on top of end rake modules (22 and 23).
11. Lock eight ISOPAK vertical connectors (11), one at each ISO corner fitting (12), by rotating lever (17).

WARNING

**SLICK FLOOR**

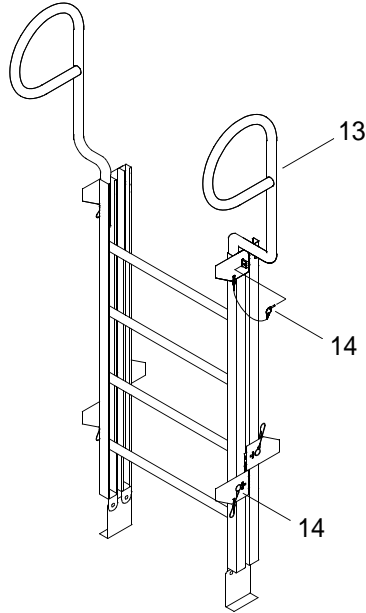
Care must be taken when ascending or descending the ISOPAK ladder. ISOPAK ladder rungs become very slippery when wet. Failure to comply could result in injury or death to personnel.

12. Using ISOPAK ladder (13), climb on top of shipping frame (23).
13. Remove 36,000 lb adjustable chain slings (4) from ISO corner fittings (12) on shipping frame (32).
14. Remove 53,000 lb slings (3) from crane (5).

WARNING

Care must be taken when ascending or descending the ISOPAK ladder. ISOPAK ladder rungs become very slippery when wet. Failure to comply could result in injury or death to personnel.

15. Using ISOPAK ladder (13), descend from top of shipping frame (23).



16. Fold ISOPAK ladder (13) into stowed position.
17. Install quick release pins (14) securing ISOPAK ladder (13) in stowed position.
18. Stow ISOPAK ladder (13) in BII container.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
OPERATION UNDER UNUSUAL CONDITIONS**

INITIAL SETUP:**Personnel Required**

Seaman 88K
Engineer 88L

References

TM 9-6140-200-14

UNUSUAL ENVIRONMENT/WEATHER

WARNING

It is critical for safety purposes to keep engine hatch covers closed when engines are running, except when engine maintenance is being performed. Failure to do so could result in injury to personnel.

1. During extreme heat, perform following steps.
 - a. Keep engine coolant at proper level.
 - b. Do not fill fuel tank above full mark. Allow room for expansion of fuel. Max fuel/only go 90% of capacity.
 - c. Increase battery PMCS. Keep electrolytes at proper level. (TM 9-6140-200-14)
 - d. Verify engine exhaust fans are on keeping engine room compartment temperature from rising 20°F above ambient temperature.

CAUTION

Follow drainage procedures for raw water system, as required, in daily PMCS during freezing weather conditions below 32°F. Failure to do so will result in severe damage to system.

2. During extreme cold, perform following steps:
 - a. Inspect water discharge outlets, connectors, deck, deck fittings, hatch latches and any other areas or components that may have operational or safety factors affected by ice buildup.
 - b. Check bilge pumps frequently for operation. If necessary, use hot air or hot water to thaw pumps.
 - c. Keep engine coolant mixture at proper mixture to prevent freeze up. (TM 9-6140-200-14)
3. In the event WT must be operated with only one engine, report problem and return to shore as soon as possible for repairs.

4. In the event WT loses power to both engines, perform the following steps:
 - a. Deploy stern anchor to avoid drifting.
 - b. Radio for emergency help.

5. In the event weather conditions rise above Sea State condition 2, perform following steps:
 - a. Proceed with caution to a safe harbor and deploy stern anchor.
 - b. If movement is not possible, deploy stern anchor and abandon WT, to safe location if possible, until sea conditions improve.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
DIESEL ENGINE
OPERATION UNDER UNUSUAL CONDITIONS**

INITIAL SETUP:**Personnel Required**

Seaman 88K

EMERGENCY PROCEDURE - EMERGENCY SHUTDOWN OF THE ENGINE

WARNING

It is critical for safety purposes to keep engine hatch covers closed when engines are running, except when engine maintenance is being performed. Failure to do so can result in personal injury.

CAUTION

Emergency shutdown should be used only when engine does not respond to normal stopping procedure. Use of emergency shutdown can cause lubricating oil to be sucked past oil seals and into blower housing and/or cause damage to turbocharger.

To ensure positive closure should another emergency shutdown be required, shutdown must be checked and required repairs or adjustments made. Failure to comply may permit engine run-on when emergency shutdown is activated.

NOTE

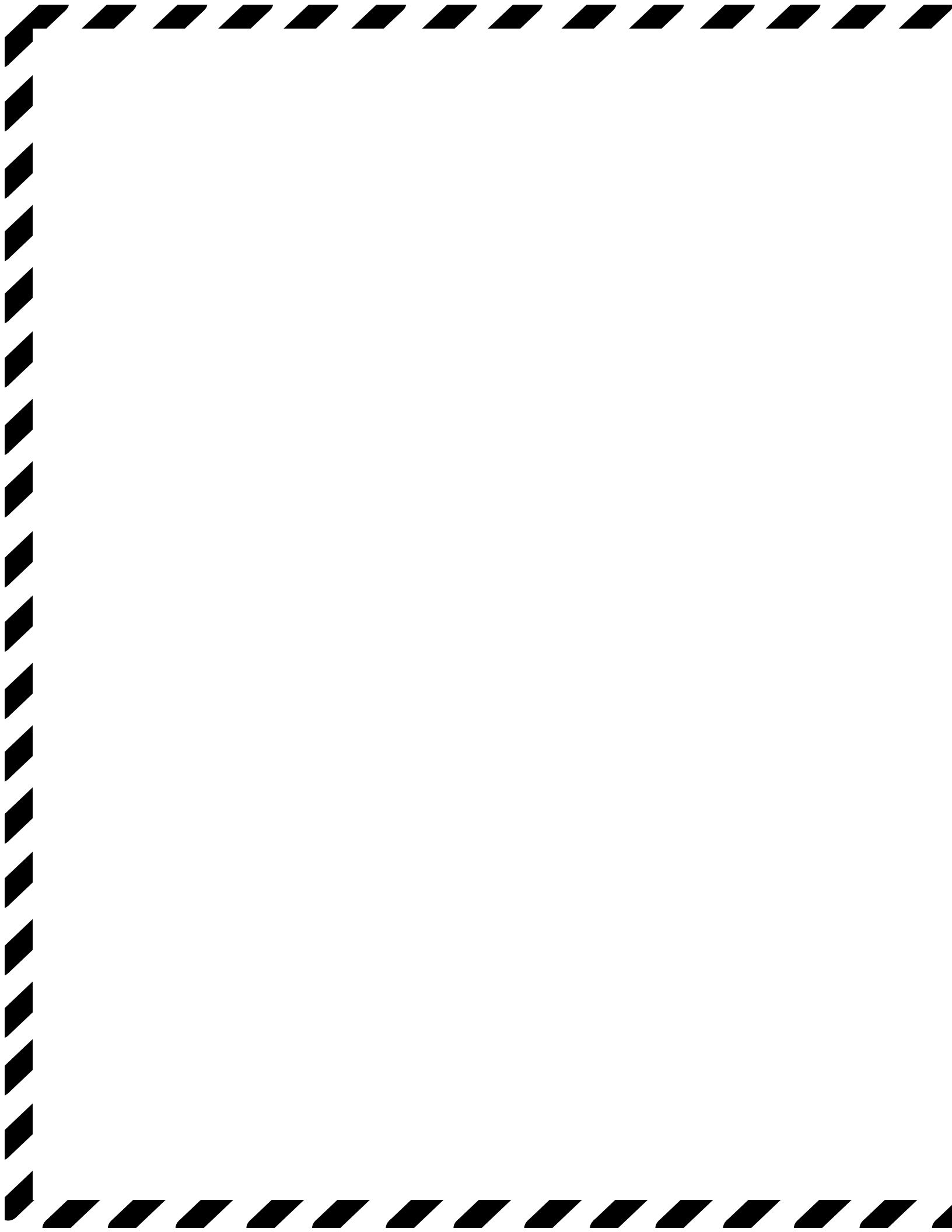
Engine emergency stop is automatic when fire suppression system is actuated or on an overspeed condition.

Air manifold intake flapper door must be manually reset by moving reset lever downward when normal conditions resume.

Emergency stop can be activated from either the operators cab or below deck.

1. Press EMERGENCY STOP button. (WP 0006 00)
2. After emergency shutdown, contact unit maintenance to check for engine damage and proper operation before WT is returned to service.
3. Reset air shutdown mechanism, located on air inlet housing. (WP 0006 00)

END OF WORK PACKAGE



**OPERATOR MAINTENANCE
WARPING TUG
FIRE SUPPRESSION SYSTEM
OPERATION UNDER UNUSUAL CONDITIONS**

INITIAL SETUP:**Test Equipment**

Gas Free Meter (Cabinet B6) (Item 30, WP 0112 00)

Tools

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

Seaman 88K

References

FM 55-502

EMERGENCY PROCEDURE - MANUALLY OPERATE THE FIRE SUPPRESSION SYSTEM
ACTIVATE FIRE SUPPRESSION FROM ABOVEDECK

WARNING

**VAPOR****VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

Fire below deck or accidental activation of the CO₂ system while personnel occupy the compartments could result in serious injury or death to personnel if CO₂ is released.

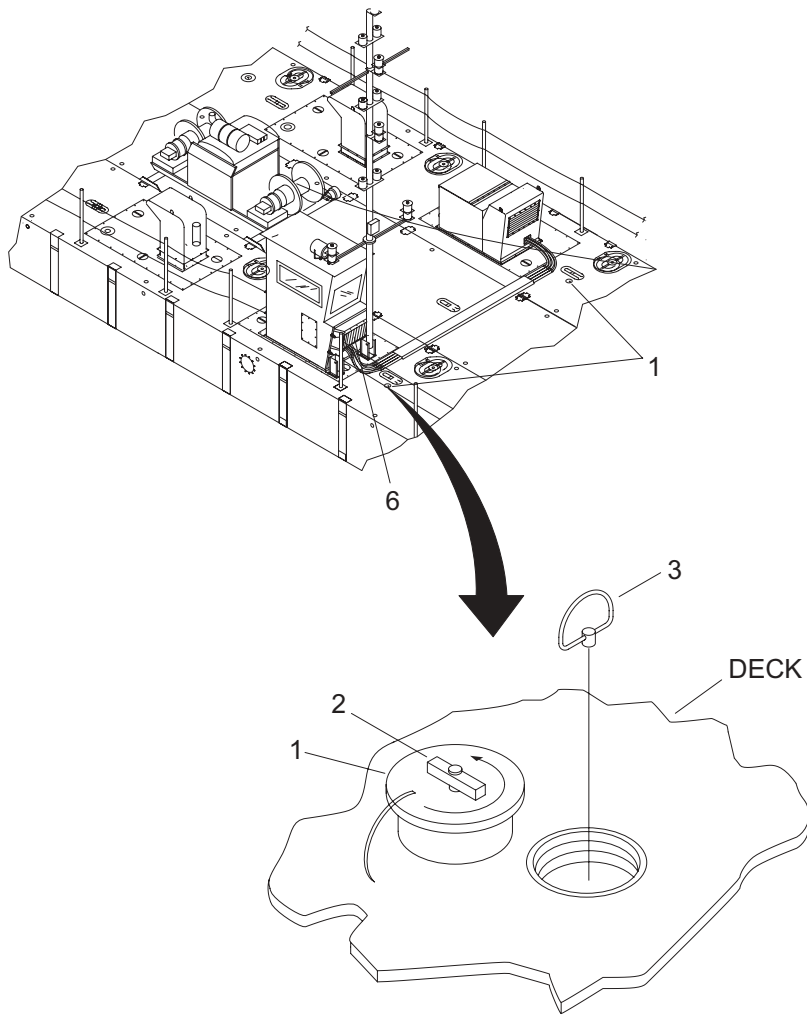
Do not depress fire suppression control head lever during normal maintenance. Serious injury or death to personnel could result if CO₂ is inhaled.

After CO₂ has been discharged below deck, all compartments shall be completely cleared of any CO₂ that may remain. Serious injury or death to personnel could result if CO₂ is inhaled.

NOTE

In case of fire, activate fire suppression system and/or use portable fire extinguisher (located abovedeck).

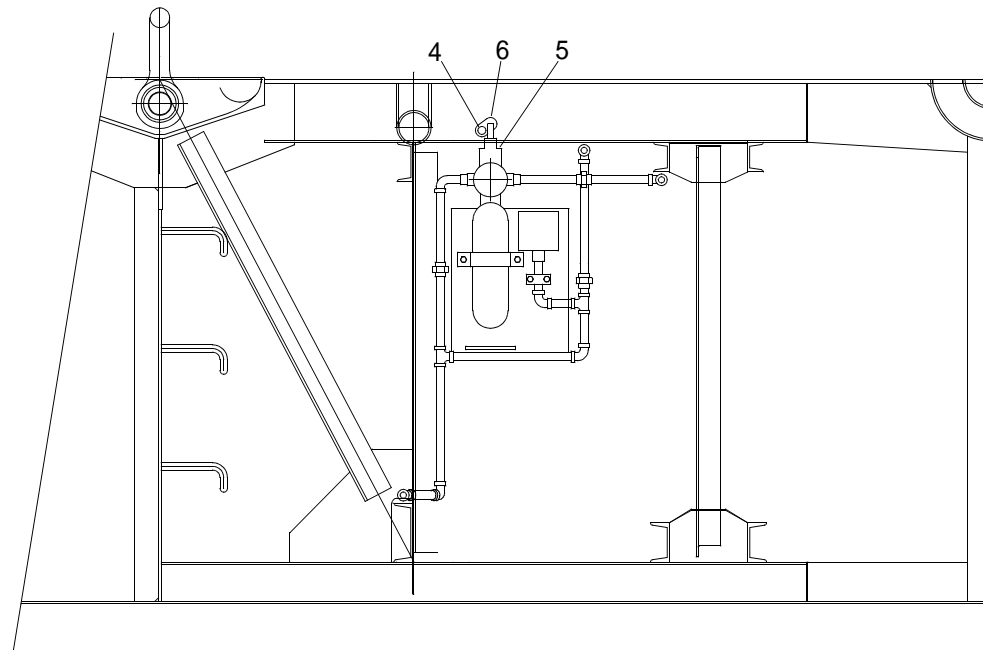
1. Remove deck soft plug (1).



- a. Turn T-bar (2) counterclockwise to loosen.
 - b. Pull deck soft plug (1) from deck.
2. Pull fire suppression handle (3) to activate fire suppression system. A 30 second delay will occur before CO₂ is discharged.

ACTIVATE FIRE SUPPRESSION SYSTEM FROM TIME DELAY CYLINDER

1. Pull pin (4) from time delay cylinder (5).

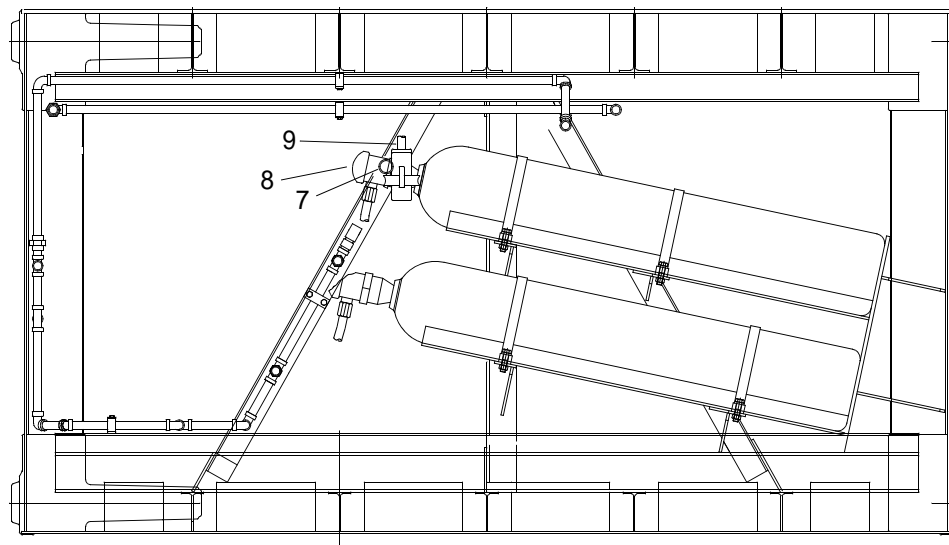
**WARNING**

Evacuate space immediately after activation of fire suppression system. Failure to comply will result in serious injury or death.

2. Pull lever (6) to actuate fire suppression system. A 30 second delay will occur before CO₂ is discharged.

ACTIVATE FIRE SUPPRESSION SYSTEM FROM CO₂ CYLINDER

1. Pull pin (7) from CO₂ cylinder (8).



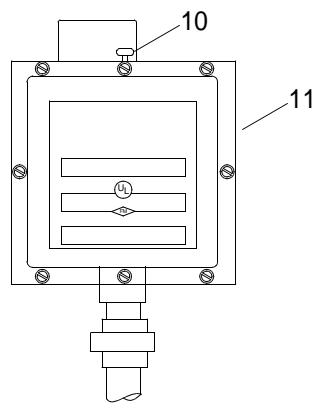
WARNING

Evacuate space immediately after activation of fire suppression system. Failure to comply will result in serious injury or death.

2. Pull lever (9) to actuate fire suppression system. A 30 second time delay will occur before CO₂ is discharged.

DESMOKING, ATMOSPHERIC TESTING AND REMANNING OF SPACES AFTER FIRE SUPPRESSION SYSTEM ACTIVATION

1. Refer to FM 55-502 for desmoking, atmospheric testing and remanning procedures. Use gas-free meter for compartment testing.
1. After activation, push plunger (10) on top of pressure switch (11) down to reset fire suppression system and to allow for vent fan operation.



END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
BILGE CONTROL SYSTEM
OPERATION UNDER UNUSUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)

Materials/Parts

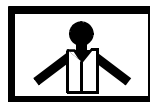
Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

Seaman 88K

EMERGENCY PROCEDURE - FLOODING OF VESSEL**ACTIVATE BILGE CONTROL SYSTEM FROM OPERATORS CAB**

WARNING

**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

NOTE

Ensure lines are set to pump into holding tank, not overboard unless major flooding is occurring.

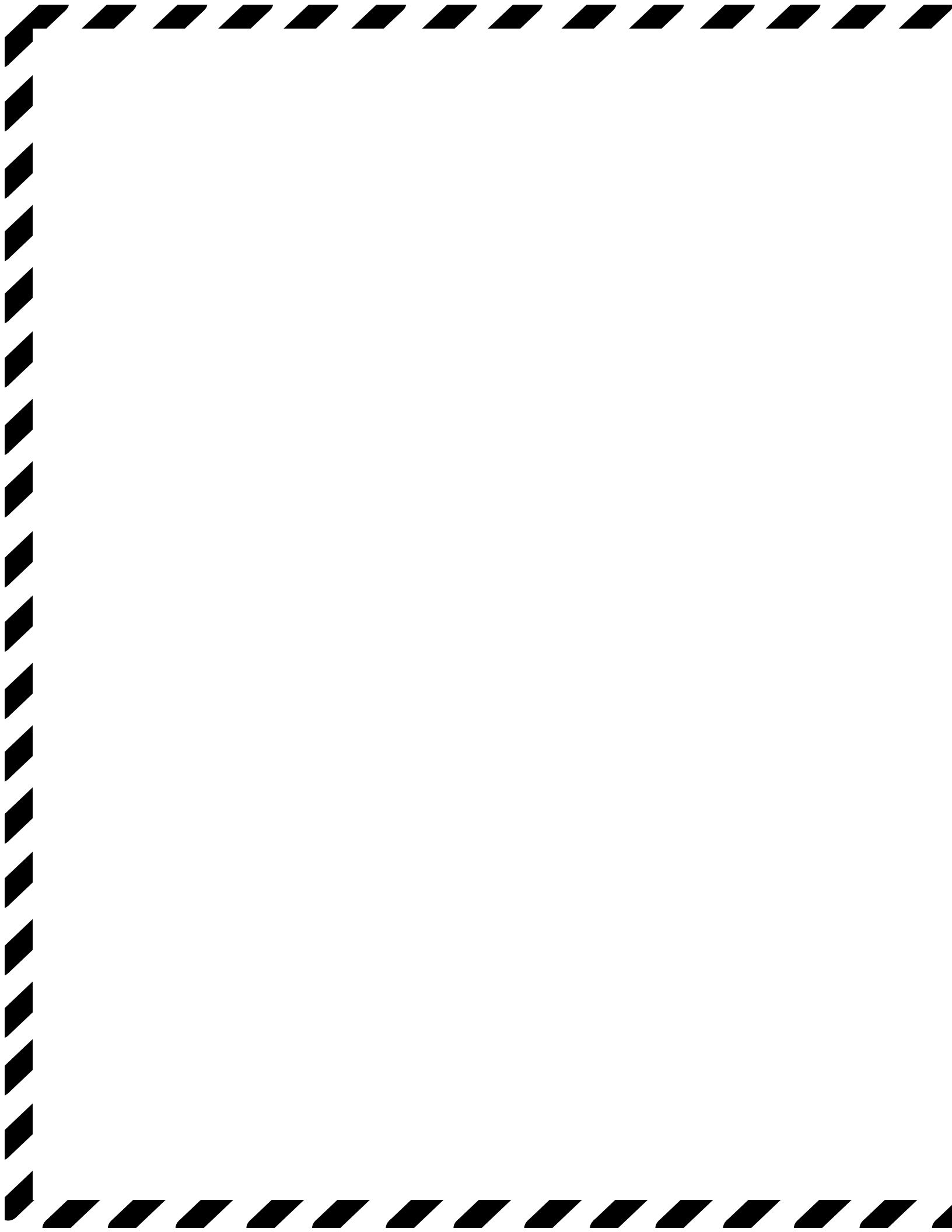
1. When the FLOODING red indicator light (1) illuminates, the FLOODING ALARM audible pulse beeper (2) sounds and a red indicator light (3) illuminates next to the associated BILGE PUMP pushbutton (4).

NOTE

When the tripped float switch for the activated bilge pump returns to its normal position, the green bilge pump indicator light and red indicator light (3) and the FLOODING red indicator light (1) will all go out. The bilge pump also turn off automatically.

4. Position the FLOODING toggle switch (6) on the lower control panel A2 (5) to ALARM to reset the system.

END OF WORK PACKAGE



**OPERATOR MAINTENANCE
WARPING TUG
STEERING SYSTEM
OPERATION UNDER UNUSUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)

Materials/Parts

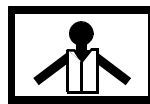
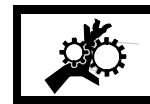
Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

Seaman 88K (2)

EMERGENCY PROCEDURE - EMERGENCY STEERING

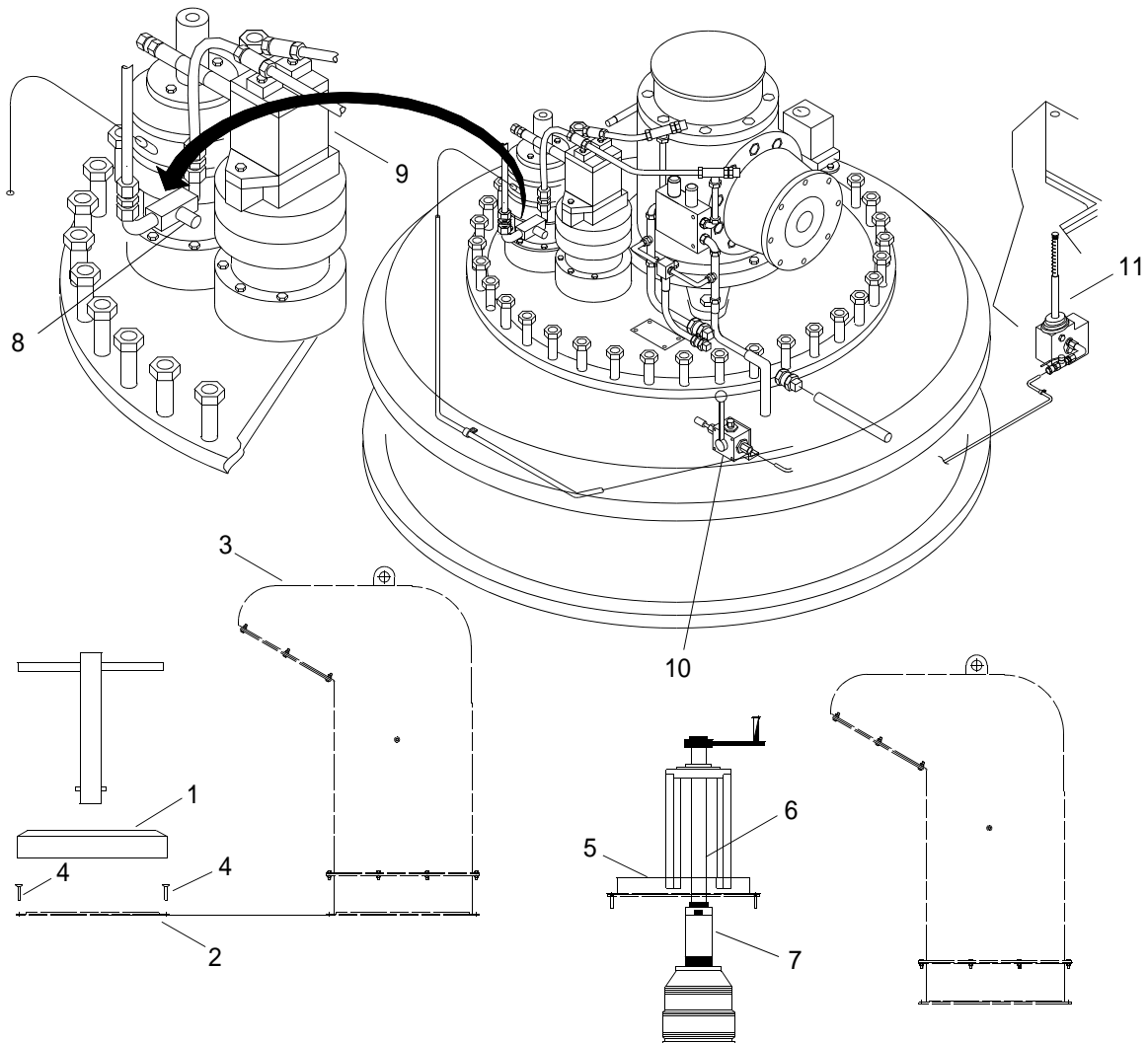
WARNING

**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

1. Remove emergency steering unit from lazaret compartment (forward hatch of propulsion module).

2. Remove emergency steering hatch cover (1) on propulsion module pump-jet thruster hatch (2) located aft of exhaust plenum (3).



3. Remove three flat head screws (4) from pump-jet thruster hatch (2).
4. Set support (5) on pump-jet thruster hatch (2) and install three flat head screws (4) through slotted holes in support (5). Do not tighten.
5. Install drive shaft (6) on hydraulic steering motor shaft (7).
 - a. Align drive shaft (6) with hydraulic steering motor shaft (7).

NOTE

Ensure that drive shaft (6) and hydraulic steering motor shaft (7) are not binding.

- b. Check steering assembly for proper vertical alignment of drive shaft (6) with steering motor shaft (7).
6. Tighten three flat head screws (4) securing support (5) to pump-jet thruster hatch (2).

CAUTION

Do not attempt to operate steering hydraulically with needle valve closed and emergency steering shaft connected. Serious damage to gearbox, shaft or motor may result.

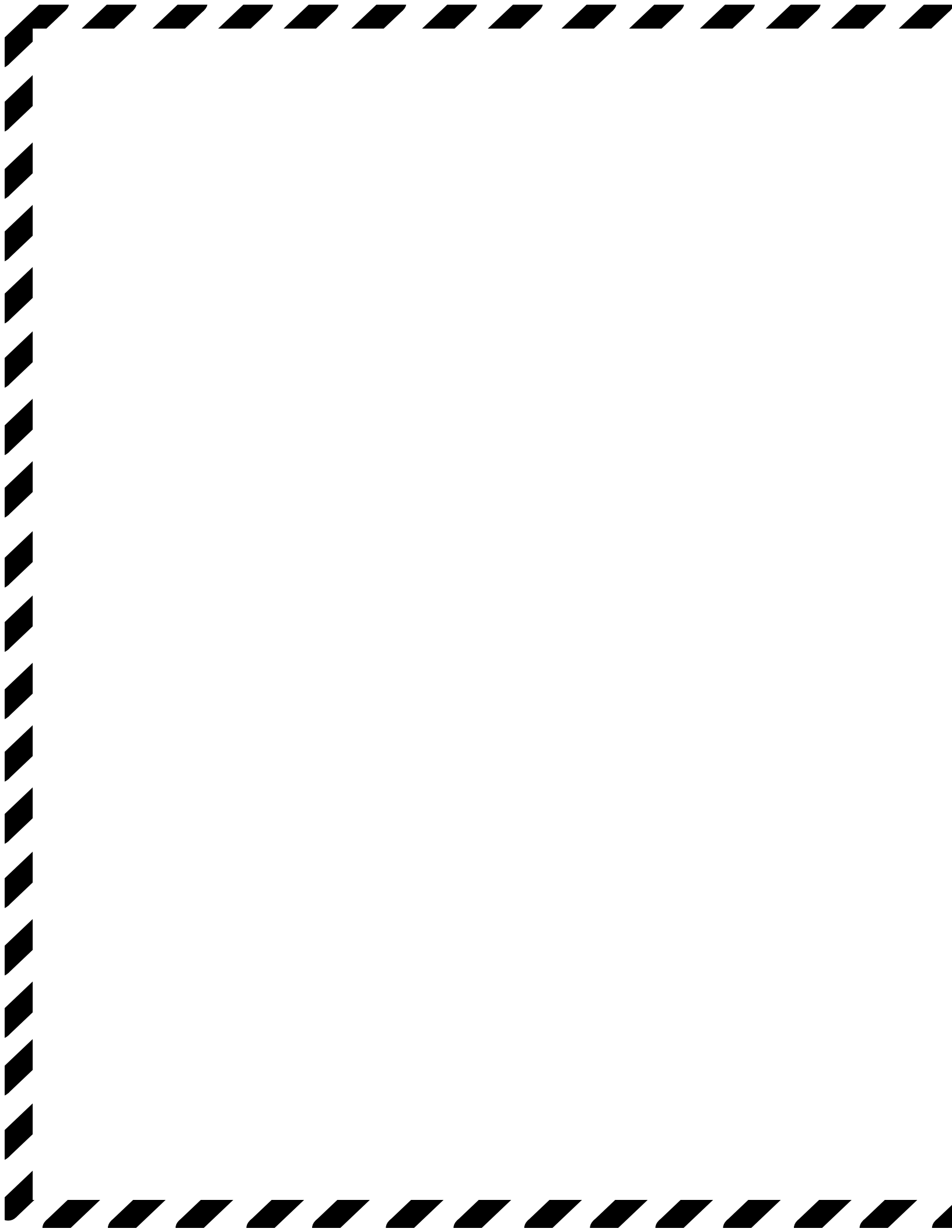
7. Open emergency steering needle valve (8) on hydraulic steering motor (9).
8. Turn 3/2 way-valve (10) so that valve handle is in the vertical position.
9. Release brake with hand pump (11).

NOTE

During emergency steering operation, operator in operators cab will instruct crewman operating hand crank to turn crank based on thrust dial indicator reading.

10. Rotate hand crank CCW to move pump-jet thruster nozzle and move WT to starboard.
11. Rotate hand crank CW to move pump-jet thruster nozzle and move WT to port.

END OF WORK PACKAGE



**OPERATOR MAINTENANCE
WARPING TUG
STEERING SYSTEM
OPERATION UNDER UNUSUAL CONDITIONS**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)

Materials/Parts

Seal, Antipilferage (Item 50, WP 0114 00)

Personnel Required

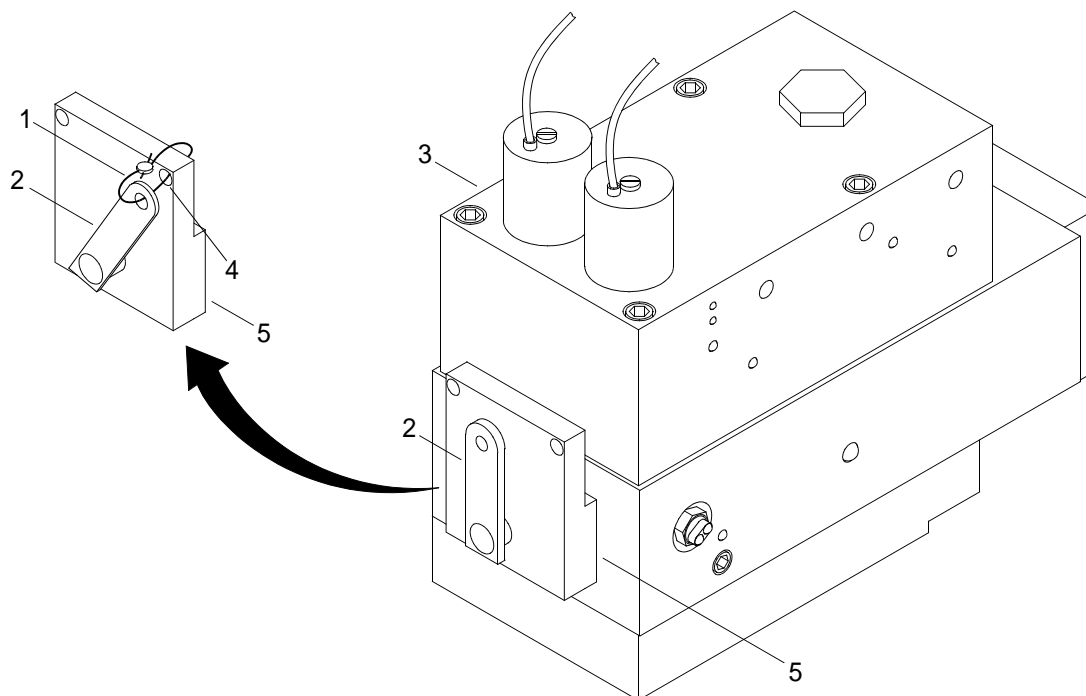
Seaman 88K

Equipment Condition

Engine Shut Down. (WP 0024 00)

EMERGENCY PROCEDURE - EMERGENCY ENGAGEMENT OF MARINE GEAR

1. Cut antipilferage seal (1) and discard.



2. Rotate manual override lever (2) counterclockwise to its vertical position.
3. Pull manual override lever (2) straight out from control valve assembly (3).
4. Rotate manual override lever (2) counterclockwise to engage thrust.
5. Rotate manual override lever (2) clockwise to engage backflush.
6. Upon completion of mission, contact unit maintenance for repair of fault condition.

-
7. Rotate manual override lever (2) to its vertical position.
 8. Push manual override lever (2) in.
 9. Rotate manual override lever (2) clockwise.
 10. Install new antipilferage seal (1) to secure manual override lever (2) to hole (4) in cover assembly (5).

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
PRECISION LIGHTWEIGHT GLOBAL POSITIONING RECEIVER
OPERATION UNDER UNUSUAL CONDITION**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)

Materials/Parts

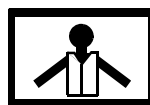
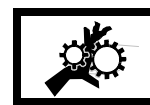
Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

Seaman 88K

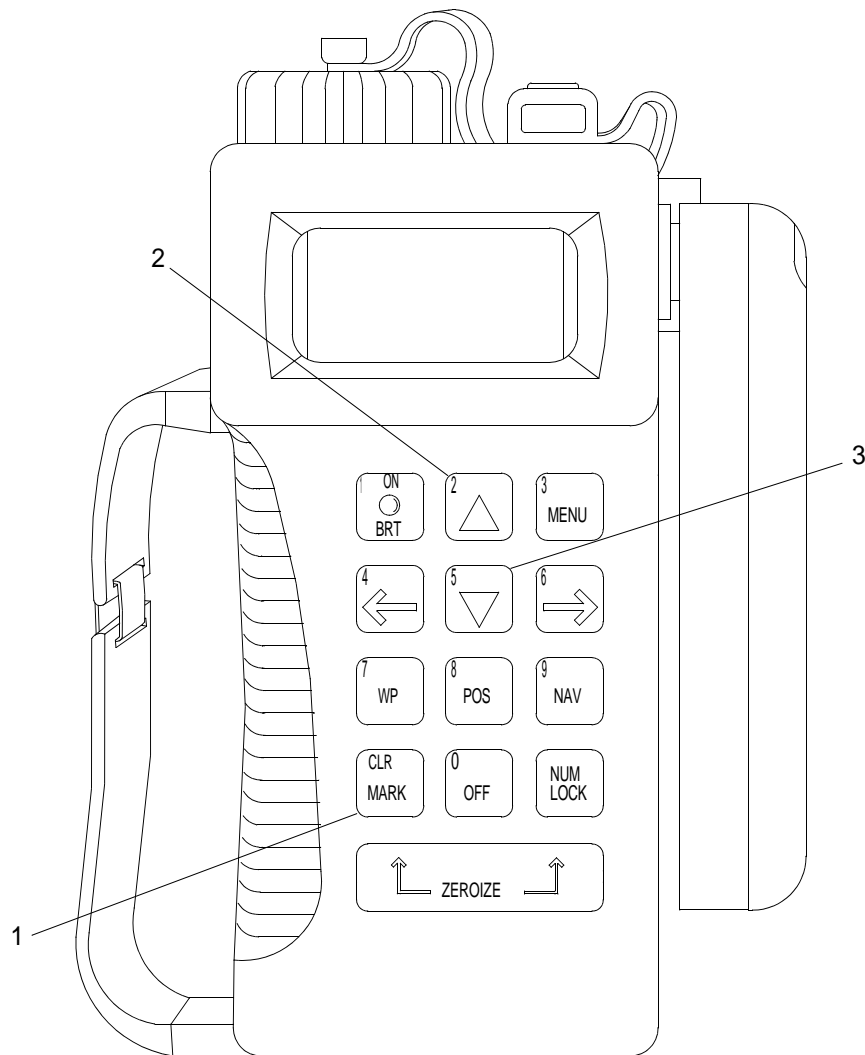
EMERGENCY PROCEDURE - MARK POSITION OF MAN OVERBOARD

WARNING

**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

1. Man overboard selection is utilized using MARK key (1). When notified that a man is overboard, immediately press MARK key (1). Pressing MARK key (1) freezes current position.



2. When MARK key (1) is pressed first time, MARK POS display will appear. Waypoints field will be flashing. You may keep this waypoint number or assign a different designation using UP ARROW key (2) or DOWN ARROW key (3).

MARK POS	WP : 005
MARK :	saveas
NAV :	ManOverbrd
ON :	cancel

3. If a waypoint number is chosen that already exists, OVERWRITES will appear on display.
4. To store man overboard information, press MARK key (1) again.
5. Navigate WT to man overboard marked position to rescue man overboard.

WP 005	MOB005
RNG	0.2yds
AZ	360.0° T
↓	to return

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
VHF/FM DSC TRANSCEIVER
OPERATION UNDER UNUSUAL CONDITIONS**

INITIAL SETUP:

Tools

- Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
- Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
- Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)

Materials/Parts

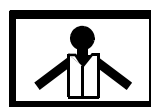
- Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

- Seaman 88K

EMERGENCY PROCEDURE - SEND DISTRESS USING VHF/FM DSC TRANSCEIVER

WARNING



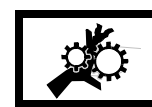
VEST



HELMET PROTECTION



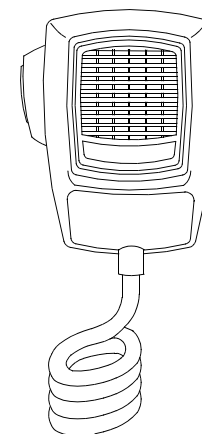
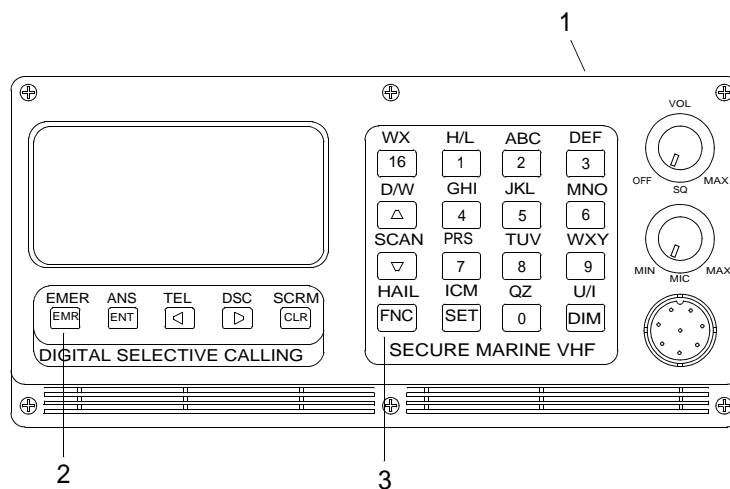
HEAVY PARTS



MOVING PARTS

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

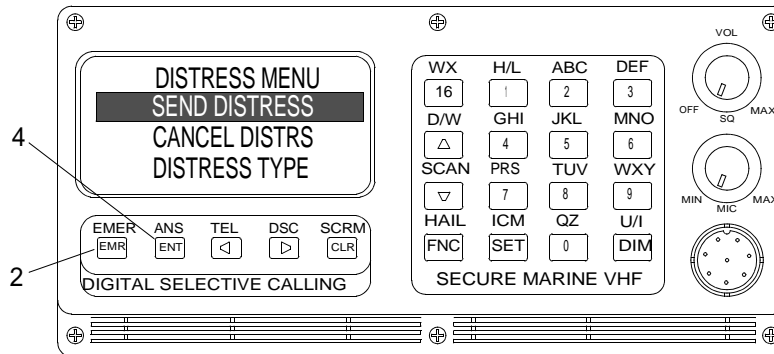
1. EMERGENCY mode may be used to send a distress call. Distress call automatically includes vessels DSC call sign and LAT/LON position. Vessels position can be sent only if PLGR is operational.
2. To access EMERGENCY functions of transceiver (1), press EMR key (2) or press FNC key (3) and EMR key (2).



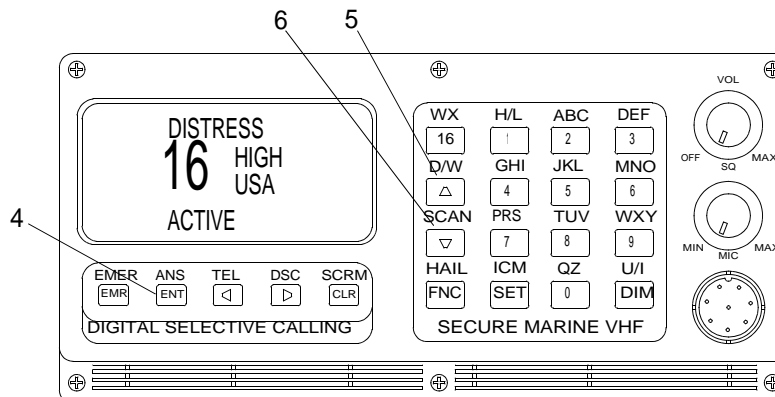
SEND DISTRESS**NOTE**

Menu selection by default is "send distress" option.

- To access and send a distress call, first go to DISTRESS MENU by pressing EMR key (2).



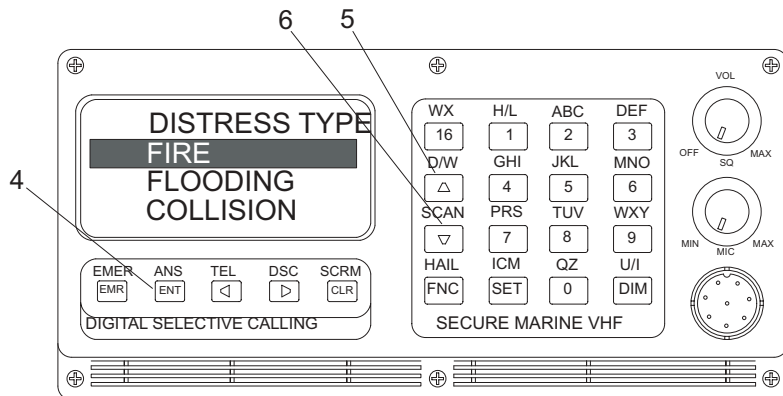
- From DISTRESS MENU, press and hold EMR key (2) or ENT key (4). Display prompts user to HOLD KEY TO SEND DISTRESS and has a countdown indicator on bottom line displaying number of seconds until transmission of distress call. EMR key (2) or ENT key (4) must be held for five seconds before distress call will be transmitted. If key is released before distress call is sent, transmit timer will restart at five seconds.



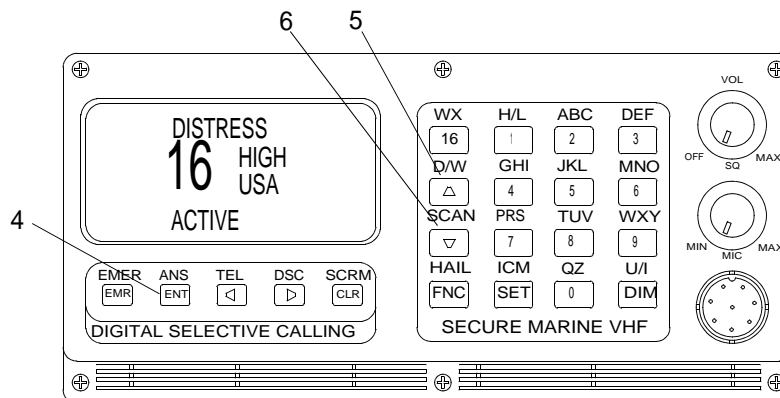
- To specify type of distress, select DISTRESS TYPE menu option with UP ARROW key (5) or DOWN ARROW key (6) and press ENT key (4). Menu options are:

FIRE
FLOODING
COLLISION
GROUNDING
CAPSIZING
SINKING
ADRIFT
UNDESIGNATED (default if none selected)
ABANDONING
PIRACY
MAN OVERBOARD

- Select type of distress with UP ARROW key (5) or DOWN ARROW key (6) and press ENT key (4). Selected distress type will remain active until radio is turned off.



5. DISTRESS will appear in upper line of display and ACTIVE will appear in lower line while waiting for an acknowledgement. If a DSC acknowledgement is not received from a shore station within two minutes, distress call will be automatically repeated. If, after five minutes from second call, a shore station has not acknowledged distress call or cancelled by sender, distress will be rebroadcast with an updated position. Distress will continue to be rebroadcast every five minutes until either acknowledged or cancelled. When acknowledgement is received, DISTRESS CALL ACKNOWLEDGEMENT PRESS ANY KEY will be displayed and distress call will be automatically cancelled.



- a. Other functions of transceiver may be used while EMERGENCY mode is active.
 - b. As a reminder that EMERGENCY mode is active, distress tone will sound for five seconds every thirty seconds.
6. Select LAT/LON ENTRY option from MAIN DISTRESS MENU. Use UP ARROW key (5) or DOWN ARROW key (6) and press ENT key (4). If transceiver has no position from PLGR, screen will be blank. Enter latitude and longitude for current position. To enter hemisphere, press corresponding key where alpha character is located.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
VHF/FM DSC TRANSCEIVER
OPERATION UNDER UNUSUAL CONDITIONS**

INITIAL SETUP:

Tools

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)

Materials/Parts

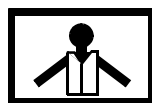
Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

Seaman 88K

EMERGENCY PROCEDURE - RECEIVE DISTRESS USING THE VHF/FM DSC TRANSCEIVER

WARNING



VEST



HELMET PROTECTION



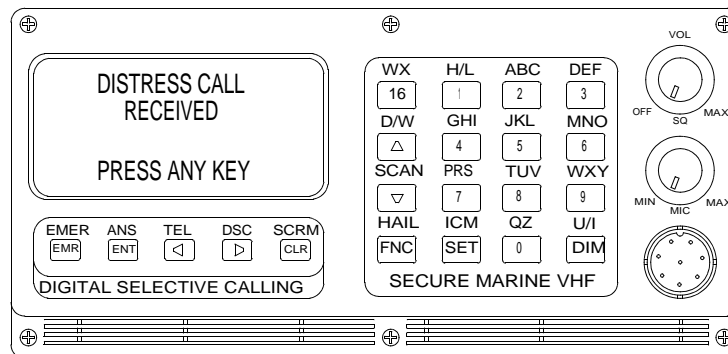
HEAVY PARTS



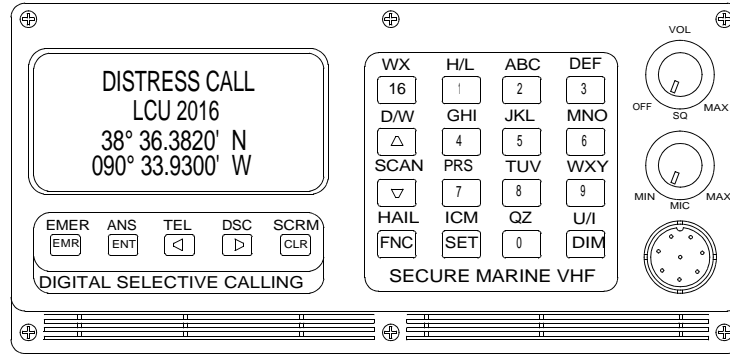
MOVING PARTS

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

1. When a distress is received, a distress tone will be heard on radio. VHF/FM DSC transceiver will default to distress display. Press any key.



- Vessel position and identification will appear in transceiver display.

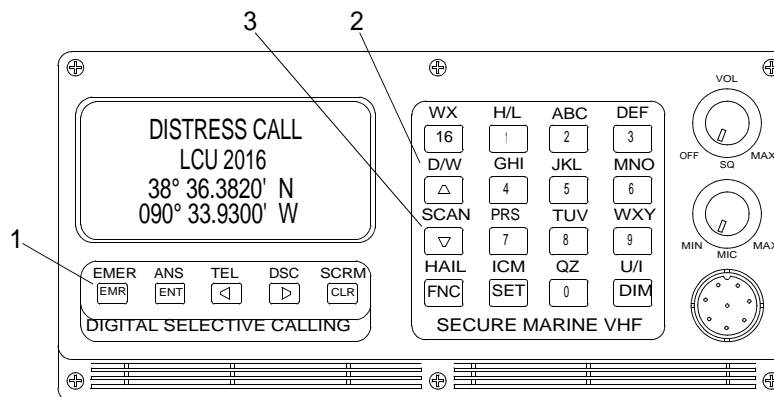


ACKNOWLEDGE DISTRESS

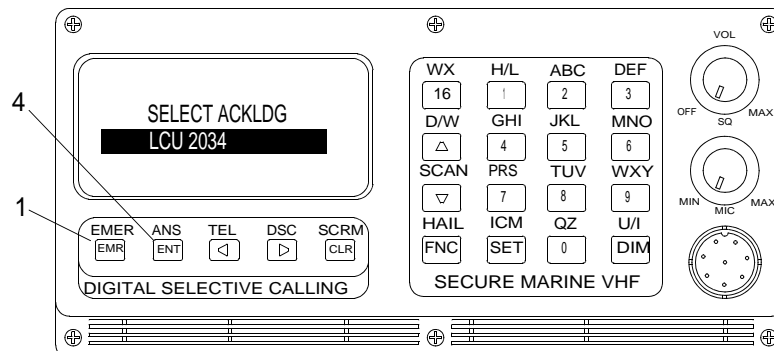
NOTE

A distress call cannot be acknowledged for first 80 seconds after receiving call. This allows time for shore base stations to respond to distress call.

- Press EMER key (1) to acknowledge a distress call that transceiver has received. Select DISTRESS ACK key option from main distress menu with UP ARROW key (2) or DOWN ARROW key (3).

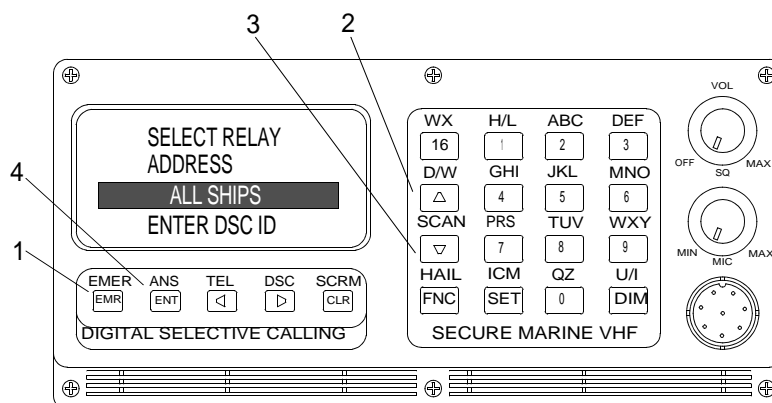


- Press ENT key (4). Next display will be DISTRESS LOG. Select distress log entry which corresponds to distress call that is to be acknowledged and press ENT key (4).

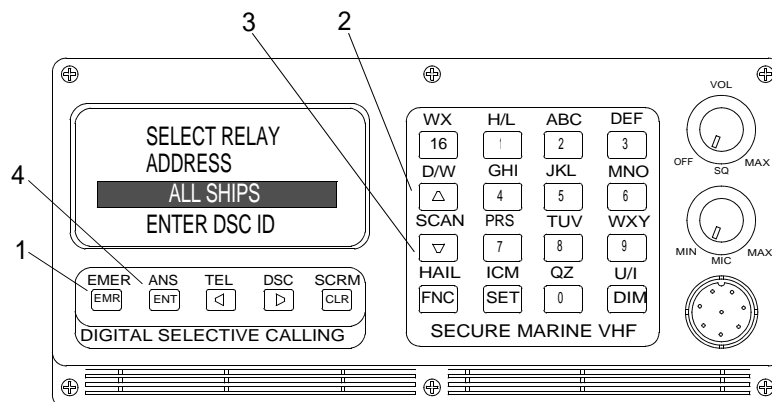


DISTRESS RELAY

1. Press EMER key (1) to relay a distress call received by transceiver. Select DISTRS RELAY from main distress menu with UP ARROW key (2) or DOWN ARROW key (3) and press ENT key (4). Distress log will be displayed. Select distress log entry which corresponds to distress call that is to be relayed. Press ENT key (4).



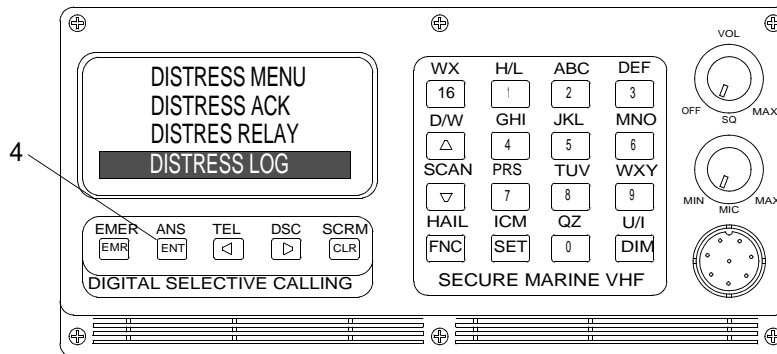
2. Next example is used to specify destination of relay distress call and contains selection of either ALL SHIPS or DSC ID. Default is to ALL SHIPS and should be used if an official coast station's DSC ID is not known. With ALL SHIPS option selected, press ENT key (4) to send distress relay.



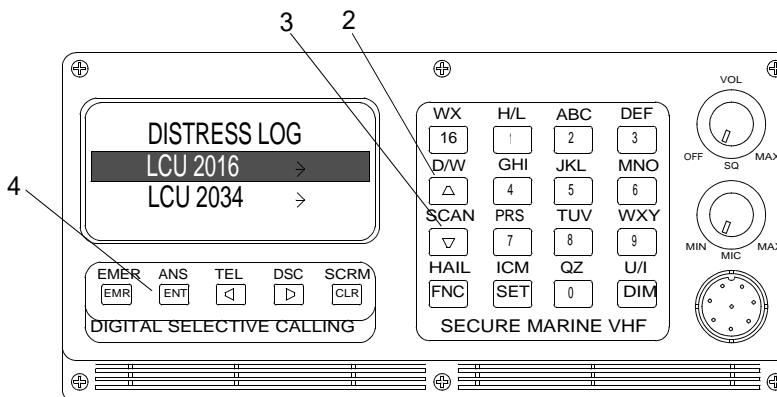
3. If DSC ID of coast station is known, select DSC ID option. Press ENT key (4). Enter DSC ID key in space provided. Press ENT key (4) to send distress relay.
4. DISTRESS RELAY option is not available for distress calls that have already been acknowledged.

DISTRESS LOG

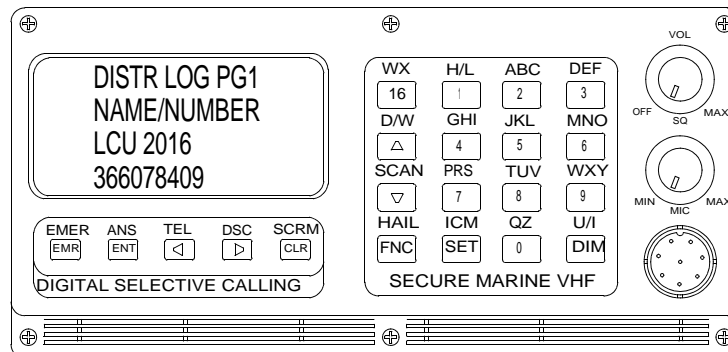
- Information and status of last 20 distress calls received or generated is recorded in distress log. Information is saved while transceiver is turned off. To view distress log, select DISTRESS LOG from main distress menu and press ENT key (4).



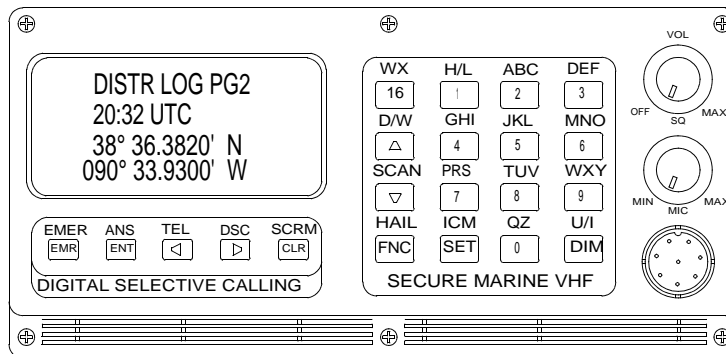
- Distress log directory displays a list of names or DSC number of ENT key (4). Select a name or number from log using UP ARROW key (2) or DOWN ARROW key (3). To select, press ENT key (4). Once selected, use RIGHT ARROW key (2) to move through rest of distress log pages.



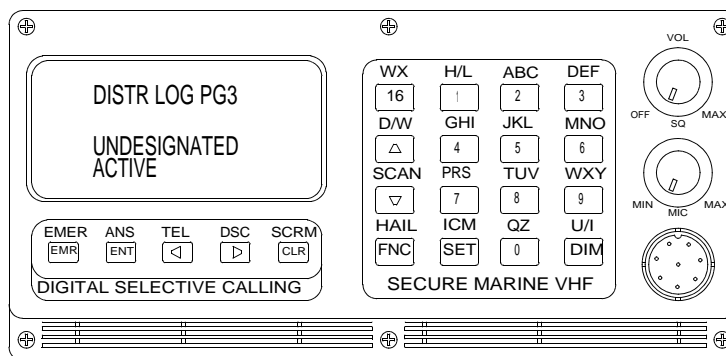
- Distress log page 1 displays name and DSC ID number of vessel that sent distress call. If there is no name associated with DSC ID (not in DSC directory), then this page is not available.



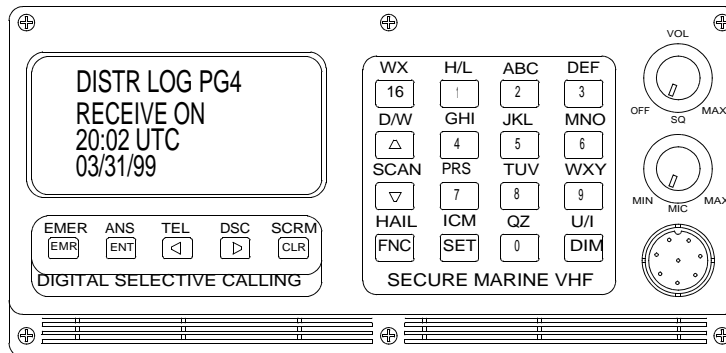
4. Distress log page 2 displays latitude, longitude and time of position as received from distress call.



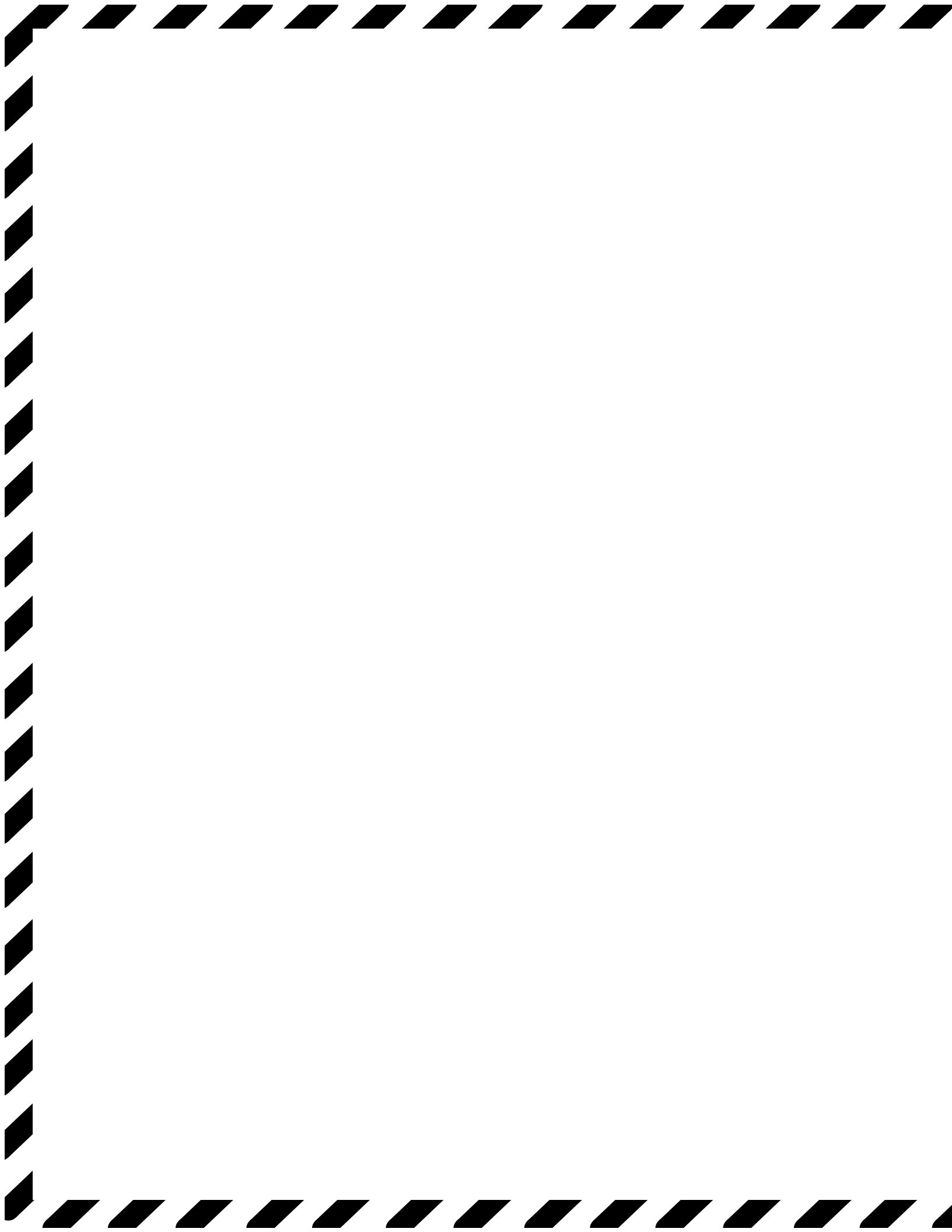
5. Distress log page 3 displays status and other information about distress call. If provided, Number of People is displayed on line 2. Type of distress is displayed on line 3 and status of call is displayed on line 4. Status can be one of following: Active, Relay, Acknowledged and Cancelled.



6. Distress log page 4 can only be accessed if distress call has been acknowledged. This page displays name and DSC ID number of station that acknowledged distress call.



END OF WORK PACKAGE



**OPERATOR MAINTENANCE
WARPING TUG
VHF/FM DSC TRANSCEIVER
OPERATION UNDER UNUSUAL CONDITIONS**

INITIAL SETUP:

Tools

- Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
- Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
- Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)

Materials/Parts

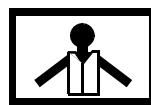
- Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

- Seaman 88K

EMERGENCY PROCEDURE - CANCEL DISTRESS USING THE VHF/FM DSC TRANSCEIVER

WARNING



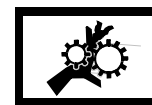
VEST



HELMET PROTECTION



HEAVY PARTS

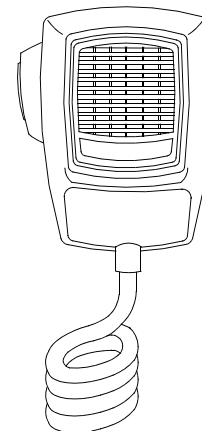
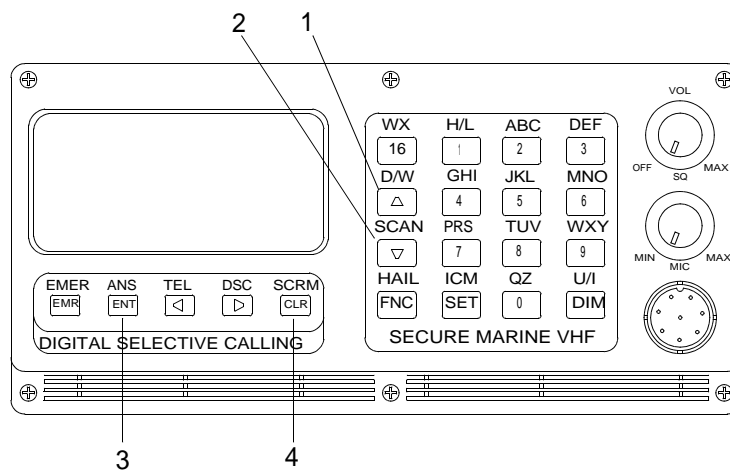


MOVING PARTS

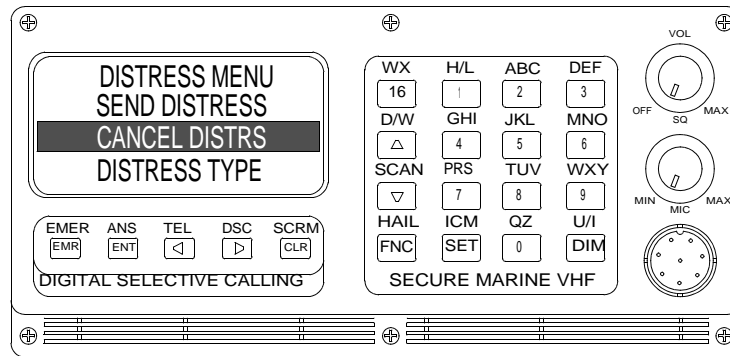
All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

NOTE

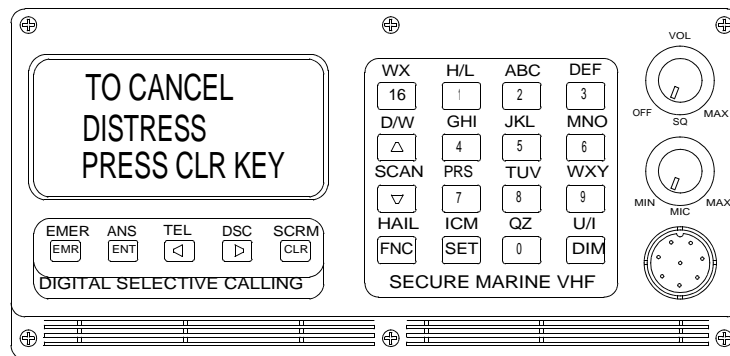
If a distress call is made by mistake, CANCEL DISTRESS function can be used to cancel active distress.



1. Use UP ARROW key (1) or DOWN ARROW key (2) to select CANCEL DISTRS and press ENT key (3).



2. Press CLR key (4) to cancel distress. This function is not available if there is not an active distress being transmitted. CANCEL DISTRESS function sends out a DISTRESS ACKNOWLEDGEMENT with DSC ID as source and destination.



3. Tune transceiver to channel that distress was transmitted on.
4. Broadcast cancellation message to ALL STATIONS with required information.

VHF/FM message example:

All Stations, All Stations, All Stations
 This is NAME (vessel) CALL SIGN,
 DSC NUMBER, POSITION.
 Cancel my distress alert of
 DATE, TIME UTC,
 = Master NAME, CALL SIGN,
 DSC NUMBER, DATE, TIME UTC.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
PUBLIC ADDRESS SET (LOUDHAILER)
OPERATION UNDER UNUSUAL CONDITIONS**

INITIAL SETUP:

Tools

- Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
- Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
- Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)

Materials/Parts

- Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

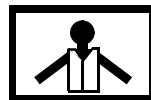
Personnel Required

- Seaman 88K

EMERGENCY PROCEDURE - PUBLIC ADDRESS SET (LOUDHAILER) EMERGENCY OPERATION

OPERATE FOG HORN AFTER RUNNING AGROUND IN FOG

WARNING



VEST



HELMET PROTECTION



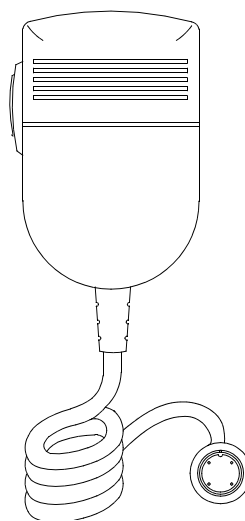
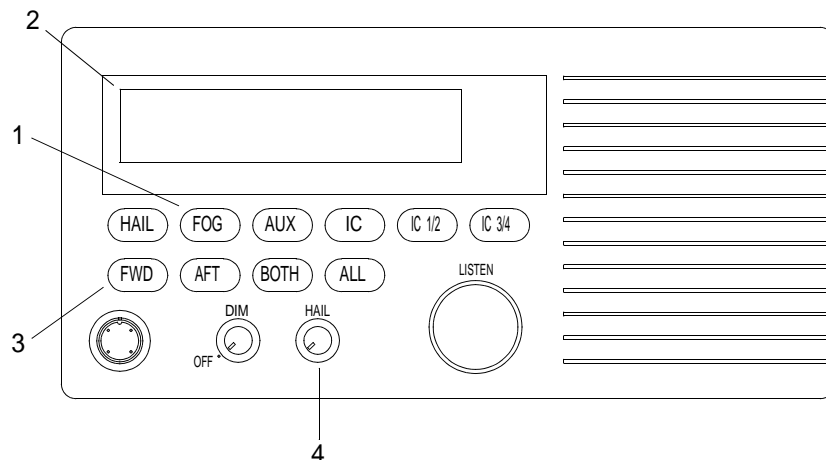
HEAVY PARTS




MOVING PARTS

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

1. Press FOG key (1) repeatedly until AGROUND FOG6 appears in LCD display speaker station window (2).





AGROUND FOG6
LISTEN HAIL

2. Press FWD speaker key (3) to select forward speaker. FWD will appear in LCD display speaker station window (2).



AGROUND FWD
LISTEN HAIL

3. Adjust HAIL volume knob (4) to desired sound level.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
OPERATION UNDER UNUSUAL CONDITIONS**

INITIAL SETUP:**Tools**

Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

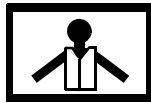
Seaman 88K

References

FM 3-4
FM 3-5

NUCLEAR, BIOLOGICAL OR CHEMICAL DECONTAMINATION

WARNING



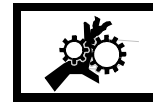
VEST



HELMET PROTECTION



HEAVY PARTS



MOVING PARTS

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

In the event equipment has been exposed to Nuclear, Biological or Chemical warfare, the equipment shall be handled with extreme caution and decontaminated in accordance with FM 3-5, titled "NBC Decontamination". Unprotected personnel can experience injury or death if residual toxic agents or radioactive material are present. If equipment is exposed to radioactive, biological or chemical agents, personnel must wear protective mask, hood, protective overgarments, chemical gloves and chemical boots in accordance with MOPP level prescribed by the OIC or NCOIC. MOPP analysis and levels are described in detail in FM 3-4, titled "NBC Protection". Personnel should contact a Class A Army vessel which has the capabilities for fresh water washdown. The Class A Vessel can also assist in the evacuation of soldiers who have been exposed and provide space and shelter for exchanging MOPP suits.

1. Decontaminate equipment per FM 3-5.
2. Perform operational check of all equipment after decontamination.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
PREPARATION FOR STORAGE OR SHIPMENT**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Goggles, Industrial: Clear Lens, Chipping (Cabinet B4) (Item 35, WP 0112 00)
 Compressor, Reciprocating (WP 0113 00)
 Respirator, Air Filtering (WP 0113 00)
 Pan, Drain (WP 0113 00)
 Pump, Oil Suction (WP 0113 00)
 Wrench, Strap (WP 0113 00)
 Brush, Stencil (Soft Bristle) (WP 0113 00)
 Drum, Shipping and Storage (55 GAL) (WP 0113 00)

Materials/Parts

Gloves, Rubber Industrial (Item 36, WP 0114 00)
 Cleaning Kit, Air Filter (Item 12, WP 0114 00)
 Test Kit, Antifreeze (Item 57, WP 0114 00)
 Fuel, Diesel (Item 23, WP 0114 00)
 Lubricating Oil, Engine (Item 37, WP 0114 00)
 Lubricating Oil, Engine (Item 39, WP 0114 00)
 Lubricating Oil, General Purpose (Item 41, WP 0114 00)
 Lubricating Oil, Gear (Item 40, WP 0114 00)
 Preservation Oil (Item 45, WP 0114 00)
 Preservation Oil (Item 46, WP 0114 00)
 Distilled Water, Reagent (Item 18, WP 0114 00)
 Antifreeze (Item 2, WP 0114 00)
 Primer, Fuel System (Item 47, WP 0114 00)
 Grease, Automotive and Artillery (Item 28, WP 0114 00)
 Grease, Ball and Roller Bearing (Item 29, WP 0114 00)
 Grease, Aircraft (Item 27, WP 0114 00)
 Grease, Laboratory (Item 32, WP 0114 00)
 Compound, Corrosion Preventative (Item 14, WP 0114 00)
 Compound, Silicone (Item 15, WP 0114 00)
 Cloth, Cleaning (Item 13, WP 0114 00)
 Bag, Plastic (Item 4, WP 0114 00)
 Bag, Plastic (Item 5, WP 0114 00)
 Tape, Pressure Sensitive, Adhesive (Item 56, WP 0114 00)
 Barrier Material, Greaseproofed-Waterproofed, Flexible (Item 6, WP 0114 00)
 Shrink Wrap, Corrosion Intercept (Item 52, WP 0114 00)
 File Backer, Paper (Item 19, WP 0114 00)
 Desiccant, Activated (Item 17, WP 0114 00)
 Inhibitor, Foam Corrosion (Item 35, WP 0114 00)
 Card, Humidity Indicator (Item 9, WP 0114 00)
 Cushioning Material, Packing (Item 16, WP 0114 00)
 Indicator, Air Restriction (Item 34, WP 0114 00)
 Filter Element, Oil Separator (Item 21, WP 0114 00)
 Filter Element, Vacuum Regulator (Item 22, WP 0114 00)
 Filter Element, Fluid (Item 20, WP 0114 00)

Qty 2

Personnel Required

Seaman 88K (2)
Cargo Specialist 88H
Engineer 88L

References

TB 43-0144
TB 55-1900-207-24
TM 9-6140-200-14
TM 11-5820-890-10-8
TM 55-3950-204-14&P

PREPARE WT SYSTEM EQUIPMENT FOR STORAGE OR SHIPMENT**GENERAL INFORMATION**

This work package identifies instructions necessary for the proper packaging of the components of the COEI for the WT. Packaging, as defined in ASTM D996 "Standard Terminology of PACKaging and Distribution Environments", is the "processes and procedures used to protect material from deterioration and damage from the time manufacturing is completed until ultimate use of disposal". This includes, as applicable, cleaning, drying, preserving, packing, unitization and marking.

This work package provides packing instructions for shipping and for short and long term storage. For the WT COEI, packing instructions are typically the same for short or long term storage. Where they are not, it is noted. Preservation instructions often differ between short and long term storage, and the differences are clearly noted. This work package differentiates between long term packing/preservation instructions as a function of the environment in which the storage occurs.

NOTE

Short Term Storage - Shipment within continental United States (CONUS) or storage up to 90 days.

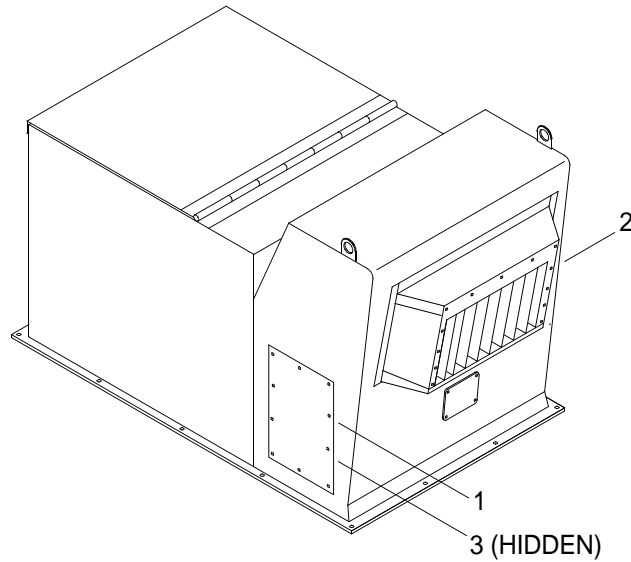
Long Term Level A - Storage in a non-humidity controlled environment for up to 36 months, such as abovedeck storage on an ocean going vessel.

Long Term Level B - Storage in a humidity controlled environment for up to 36 months, such as may be found below deck in an ocean going vessel where humidity is restricted to less than 50%.

PRESERVE DIESEL ENGINE FOR SHORT TERM STORAGE OR SHIPMENT

1. Drain and fill crankcase with lubricating oil and replace oil filters.

- a. Remove side access panel (1) from either intake plenum assembly (2) or operators cab, as applicable, to access upper FLOCS quick disconnect (3).



WARNING

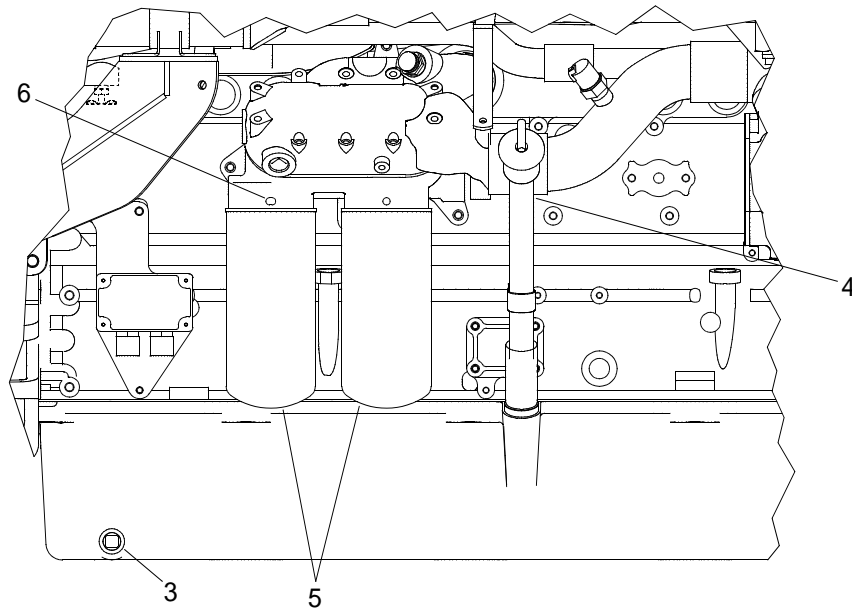


CHEMICAL



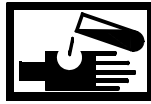
EYE PROTECTION

- b. Remove dipstick (4) prior to suctioning oil from engine oil pan.



- c. Remove oil suction pump from BII container.
- d. Connect oil suction pump to upper FLOCS quick disconnect.

WARNING

**CHEMICAL****EYE PROTECTION**

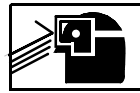
- e. Using oil suction pump, drain diesel engine lubricating oil into drain pan.

WARNING

**CHEMICAL****EYE PROTECTION**

- f. Using strap wrench, remove two oil filter cartridges (5).

WARNING

**CHEMICAL****EYE PROTECTION**

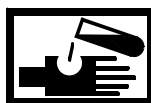
- g. Clean filter adapter (6) with cleaning cloth.

WARNING

**CHEMICAL****EYE PROTECTION**

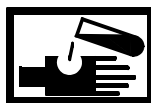
- h. Lightly coat filter gaskets (seals) with engine lubricating oil (Grade 40).

WARNING

**CHEMICAL****EYE PROTECTION**

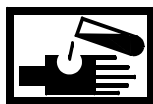
- i. Install new oil filters (5) on filter adapter (6) and tighten by hand until gaskets touch mounting adapter head.
j. Tighten oil filters (5) an additional two-thirds turn by hand.

WARNING

**CHEMICAL****EYE PROTECTION**

- k. Install dipstick (4).

 WARNING



CHEMICAL



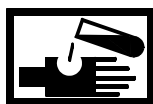
EYE PROTECTION

 CAUTION

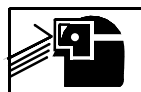
Do not overfill. Oil may blow out through crankcase breather if crankcase is overfilled. Failure to comply may result in damage to equipment.

- l. Using oil suction pump, add new engine lubricating oil (Grade 40) as required (oil capacity is 38 quarts).

 WARNING



CHEMICAL



EYE PROTECTION

- m. Remove dipstick (4) and verify oil level is at FULL mark on dipstick. Add additional oil as required.

 WARNING



CHEMICAL



EYE PROTECTION

- n. Install dipstick (4).
- o. Run diesel engine hot two minutes at 1,200 RPM at no load, checking for oil leaks at drain plug (3) (lower FLOCS connection) and oil filters (5).
- p. Stop diesel engine long enough for oil to drain back into crankcase (approximately 20 minutes).

 WARNING



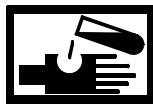
CHEMICAL



EYE PROTECTION

- q. Remove dipstick (4) and add additional oil as required to bring level to proper mark on dipstick (4).

 WARNING



CHEMICAL



EYE PROTECTION

- r. Install dipstick (4).

- s. Disconnect oil suction pump from upper FLOCS quick disconnect (3).
- t. Stow oil suction pump in BII container.
- u. Install side access panel (1) on intake plenum assembly (2) or operators cab, as applicable.

WARNING



CHEMICAL



EYE PROTECTION

- v. Remove drain pan and old oil filters and dispose of per local procedures.
2. Hang yellow caution tag on diesel engine stating:

“CHECK FOR PROPER OIL LEVEL PRIOR TO OPERATION OF DIESEL ENGINE.”
 3. Inspect general condition of interior of propulsion module around diesel engine, being alert for concentrations of dust, dirt or other contaminants that may be sucked into oil separator element Clean as necessary to remove these contaminants from around diesel engine.

CAUTION

Failure to properly clean interior of propulsion module may allow loose debris to plug air separator elements. Plugging can lead to high air inlet restriction, causing reduced diesel engine performance and/or diesel engine damage caused by diesel engine overheating.

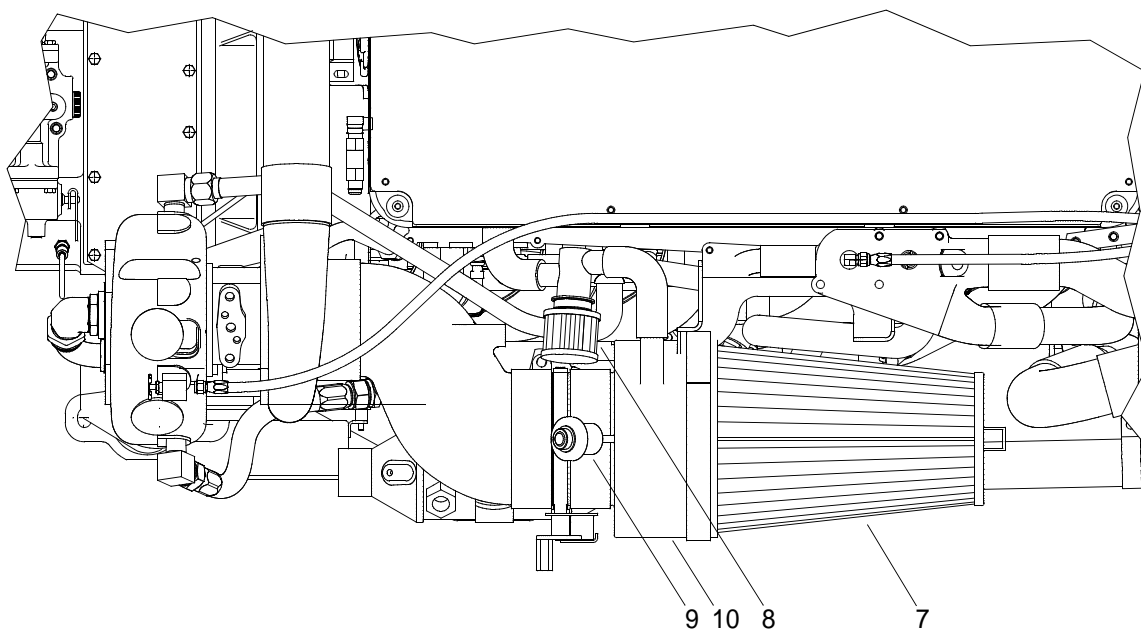
Failure to clean oil separator filter element and vacuum regulator filter element will affect the operation of the air filtering system and may cause damage to the diesel engine from overheating.

NOTE

Detroit Diesel is aware of attempts to use air cleaner elements made of foam or fabric matting material soaked with a sticky substance to improve dirt-holding capability. In some installations, this substance has been found to transfer from the filter media, coating the inside surfaces of air ducts and engine air inlet systems, blowers and air boxes. The result has been reduced preservative lubricating oil performance and a change in diesel engine operating conditions. Always use the proper replacement filter elements, cleaners and filter lubricating oils as specified.

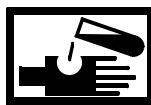
A filter that is damaged or clogged with soot due to an exhaust leak may not be able to be cleaned to maximum air flow condition. Replacement of the element may be necessary.

4. Check oil separator filter element (7) and vacuum regulator filter element (8). If restriction gauge (9) shows red, service both filters (7, 8).



- a. Pre-clean oil separator filter element (7) by removing from element housing (10) and tapping filter element to dislodge any large embedded particles of dirt. Then gently brush filter element with a soft bristle brush.

WARNING



CHEMICAL



EYE PROTECTION

CAUTION

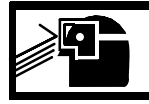
To avoid filter damage, DO NOT use the following methods or liquids for cleaning the oil separator filter element: no gasoline cleaning, no steam cleaning, no caustic cleaning solutions, no strong detergents, no high pressure water or air and no parts-cleaning solvents.

- b. Clean oil separator filter element (7) by spraying cleaning solution from air filter cleaning kit on filter element (7) and let stand for 10 minutes. Large filter elements (7) may be rolled or soaked in a shallow pan of solution for 10 minutes (dilute solution with a small amount of water).
- c. Rinse off oil separator filter element (7) with low water pressure, using fresh (not salt) water). Tap water is O.K. Always flush clean side (inside) to dirty side to remove particles and dirt and not drive dirt into filter (7).
- d. Shake off all excess water and let filter element (7) air dry naturally (leaving outside in sun will speed up process).

 WARNING



CHEMICAL



EYE PROTECTION

 CAUTION

DO NOT use any of the following lubricants to re-oil the filter element: never use automatic transmission fluid, motor oil, diesel fuel or any other lightweight oil. Failure to comply will result in damage to equipment.

NOTE

Always re-oil filter element. The effectiveness of air filter is greatly reduced if it is used without oiling.

- e. Sparingly squeeze small amounts of oil out of bottle from air filter cleaning kit across top of each pleat of filter element (7). Let oil wick into filter element (7) for 20 minutes. Then re-oil any white spots that are still showing.

 WARNING



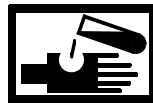
CHEMICAL



EYE PROTECTION

- f. Install oil separator filter element (7) on element housing (10).

 WARNING



CHEMICAL



EYE PROTECTION

- g. Clean and oil vacuum regulator (7) following same steps (a - e) used for oil separator filter element (7).
5. If oil separator filter element (7) has been previously cleaned three times, replace with new oil separator filter element (7).
 6. Replace vacuum filter element (8) every 1,000 engine hours or every two years, whichever comes first.

 CAUTION

Failure to vacuum check air intake restriction indicator after cleaning oil separator filter element and vacuum regulator filter element may lead to inefficient diesel engine operation and/or damage.

7. To ensure proper operation, always vacuum check air intake restriction indicator (9) after cleaning of oil separator filter element (7) and vacuum regulator filter element (8). If indicator (9) is faulty, replace with new air intake restriction indicator (9).

-
8. Using antifreeze test kit, test and inspect diesel engine cooling system. (TB 55-1900-207-24, TM 55-1945-222-14&P)

WARNING



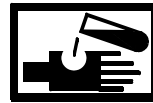
CHEMICAL



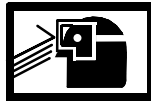
EYE PROTECTION

9. If coolant (antifreeze and distilled water) concentration or level is low, service cooling system with coolant (coolant capacity is 60 quarts). (TB 55-1900-207-24, TM 55-1945-222-14&P)

WARNING



CHEMICAL



EYE PROTECTION

Do not exceed 40 PSI (276 kPa) air pressure.

10. Clean exterior of diesel engine with diesel fuel and dry with compressed air.

WARNING



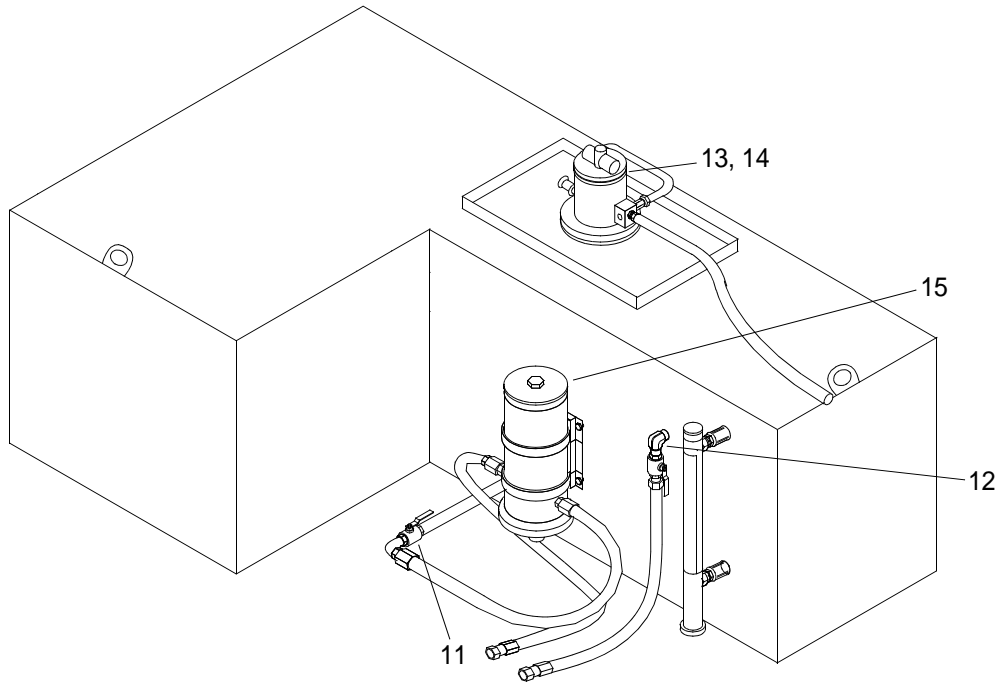
CHEMICAL



EYE PROTECTION

11. Disassemble, clean with cleaning cloth, dry with compressed air, and install fuel/water separator (15).

12. Drain fuel (fuel tank capacity is 400 gallons).



- a. Verify fuel system supply (11) and return (12) ball valves are closed.
- b. Access filler neck strainer (13) beneath access hatch on top of module.

WARNING



CHEMICAL



EYE PROTECTION

- c. Remove filler neck strainer cover (14) and filler neck strainer (13).

WARNING



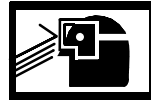
CHEMICAL



EYE PROTECTION

- d. Pump out fuel.

WARNING

**CHEMICAL****EYE PROTECTION**

13. Flush fuel tank and dry with compressed air.

WARNING

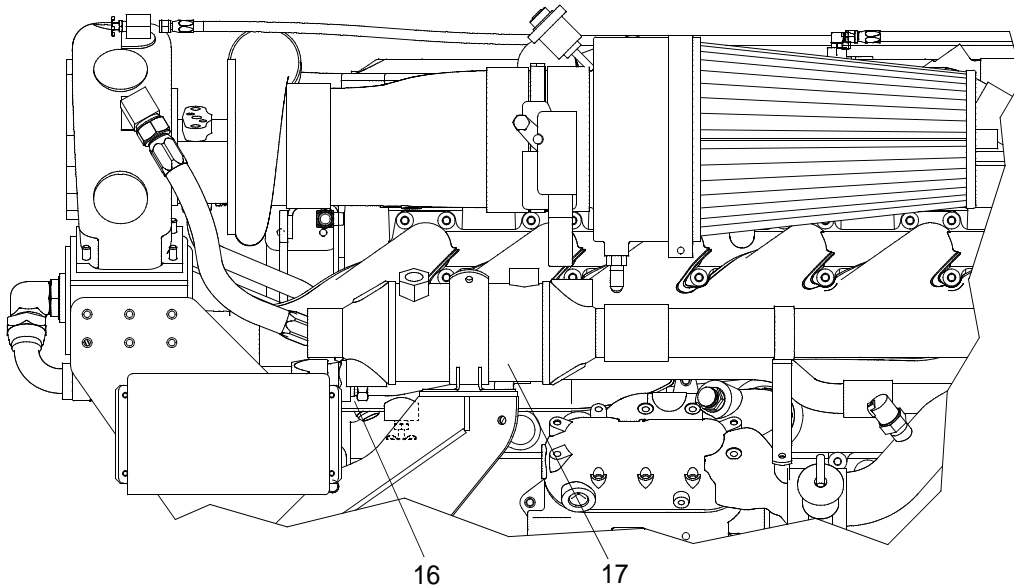
**CHEMICAL****EYE PROTECTION**

14. Disassemble, clean with cleaning cloth, dry with compressed air, and install fuel/water separator (15).
15. Install filler neck strainer (13) and filler neck cover (14) on top of fuel tank and install access hatch.

CAUTION

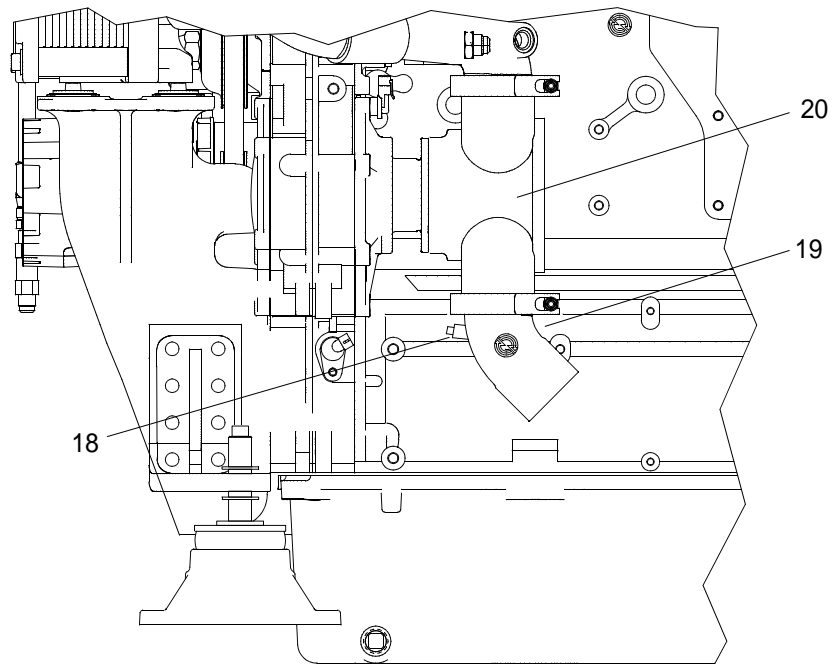
The raw water system must be drained to prevent damage due to freezing water.

16. Drain raw water system.
- a. Remove drain plug (16) from marine gear cooler (17), allowing raw water to drain into drain pan.

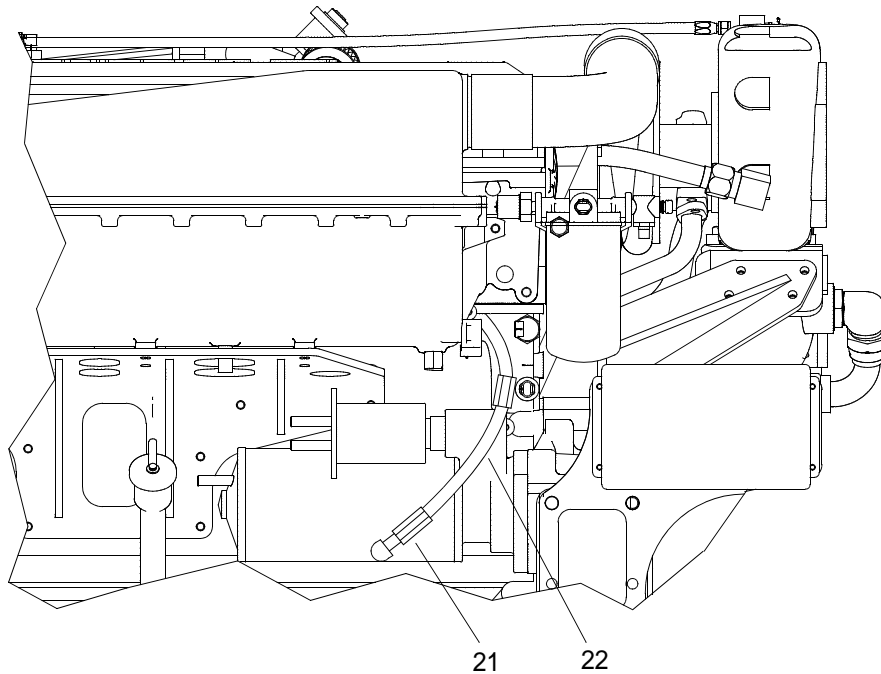


- b. Remove drain pan and dispose of contents per local procedures.

- c. Remove drain plug (18) from elbow (19) on intake side of raw water pump (20), allowing raw water to drain into drain pan.



- d. Remove drain pan and dispose of contents per local procedures.
- e. Remove check valve (21) from charge air cooler drain hose (22), allowing raw water to drain into drain pan or pump water out.

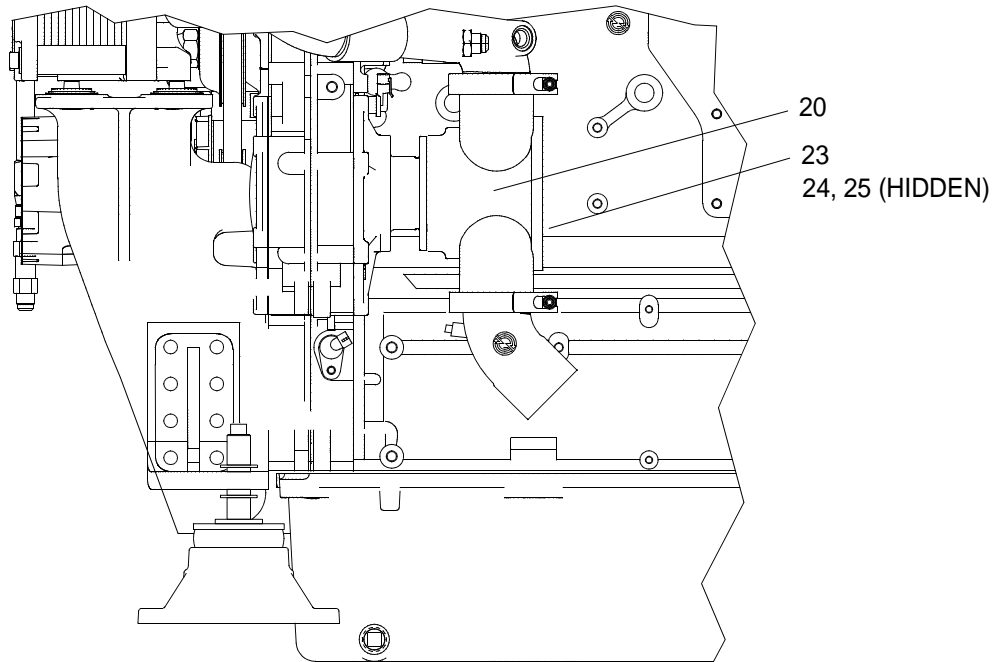


- f. Remove drain pan and dispose of contents per local procedures.

CAUTION

The blade of the impeller bent against the cam may take a set during long storage time. Additionally, if the diesel engine is started without the raw water pump properly primed, the impeller may be seriously damaged very quickly.

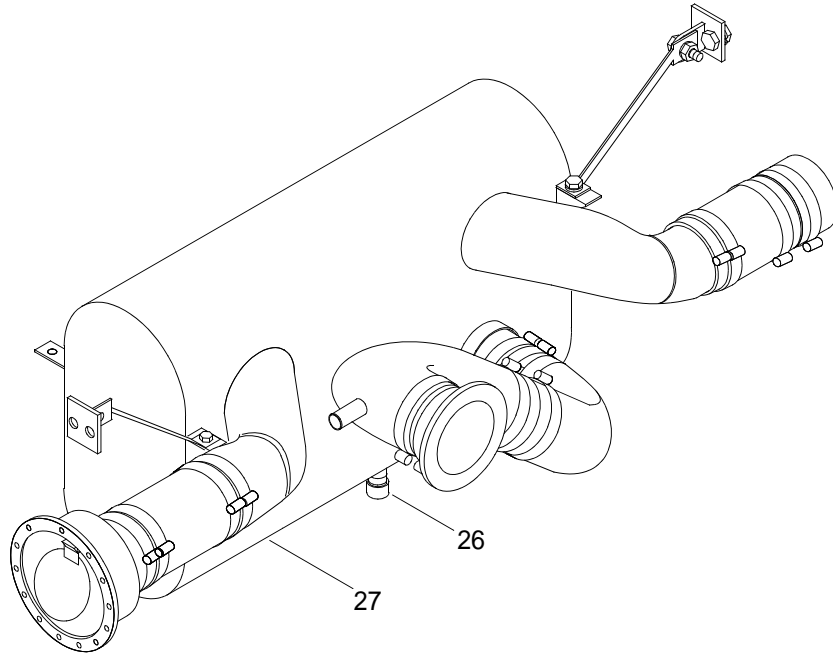
- g. Remove raw water pump cover (23), gasket (24) and impeller (25). Place impeller (25) in plastic bag and secure in plastic bag to diesel engine.



- h. Install raw water pump gasket (24) and cover (23).
- i. Hang yellow caution tag in operators cab stating:

“RAW WATER IMPELLER REMOVED FROM PUMP. INSTALL IMPELLER AND PRIME PUMP BEFORE STARTING DIESEL ENGINE.”

- j. Remove drain plug (26) from muffler (27), allowing raw water to drain into drain pan.



- k. Remove drain pan and dispose of contents per local procedures.
- l. When all raw water has drained, install drain plugs (16, 18, 26) and check valve (21).
17. Insert heavy paper strips between alternator pulleys and drive belts to prevent sticking.
18. Hang yellow caution tag in operators cab stating:

“REMOVE HEAVY PAPER STRIPS FROM BETWEEN ALTERNATOR PULLEYS AND DRIVE BELTS BEFORE STARTING DIESEL ENGINE.”

PRESERVE DIESEL ENGINE FOR LONG TERM STORAGE (LEVEL A AND B)

WARNING

To avoid injury from the expulsion of hot coolant, never remove the cooling system pressure cap while the diesel engine is at operating temperature. Remove the cap slowly to relieve pressure. Wear adequate protective clothing (face shield or safety goggles, rubber gloves, apron, and boots). Failure to comply will result in injury to personnel.

1. Drain cooling system.

NOTE

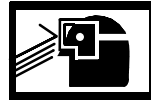
The water pump is located behind the heat exchanger.

- a. Allow diesel engine to cool.

WARNING



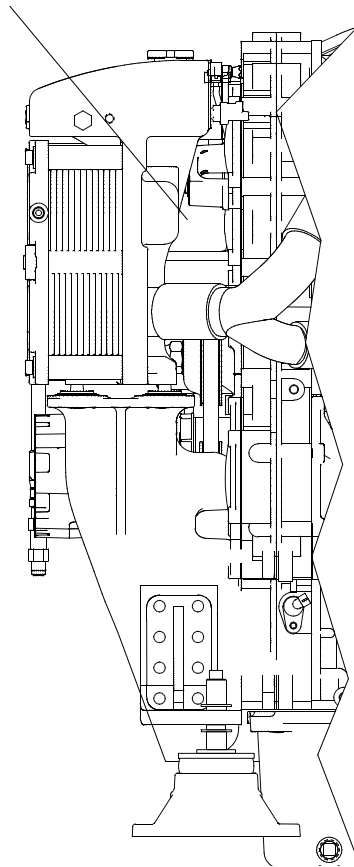
CHEMICAL



EYE PROTECTION

- b. Remove drain plugs (28) from bottom of water pump (29), located on forward/starboard side of diesel engine and drain coolant into drain pan.

28, 29 (HIDDEN)



WARNING



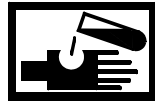
CHEMICAL



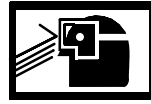
EYE PROTECTION

- c. Remove drain pan and dispose of contents per local procedures.

 WARNING



CHEMICAL

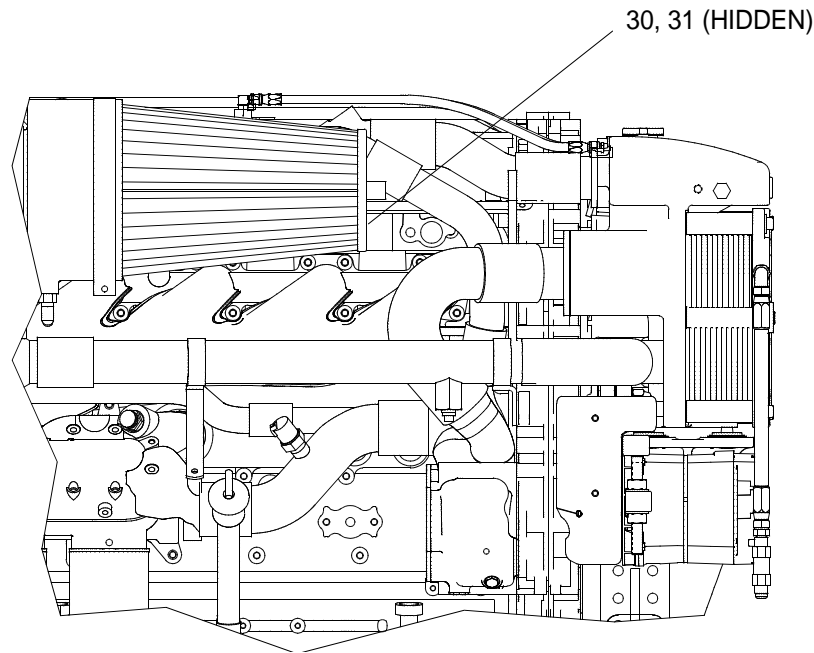


EYE PROTECTION

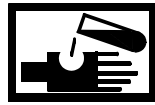
NOTE

The thermostat housing is located behind the air filter.

- d. Remove drain plug (30) from bottom of thermostat housing (31), located on starboard side of diesel engine and drain coolant into drain pan.



 WARNING



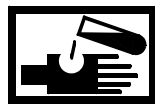
CHEMICAL



EYE PROTECTION

- e. Remove drain pan and dispose of contents per local procedures.

 WARNING

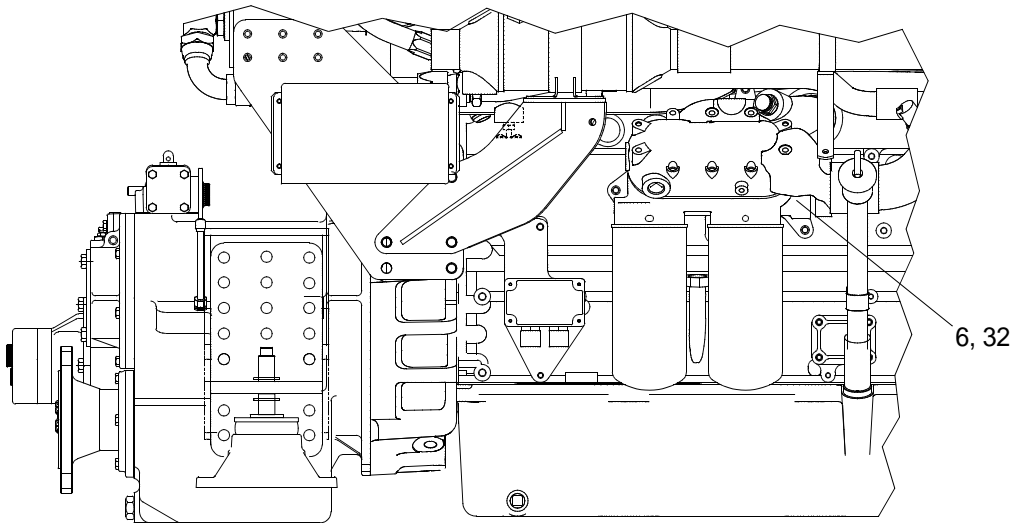


CHEMICAL



EYE PROTECTION

- f. Remove drain plug (32) from bottom of oil cooler adapter (6), located just above oil filters, and drain coolant into drain pan.



WARNING



CHEMICAL



EYE PROTECTION

- g. Remove drain pan and dispose of contents per local procedures.

WARNING

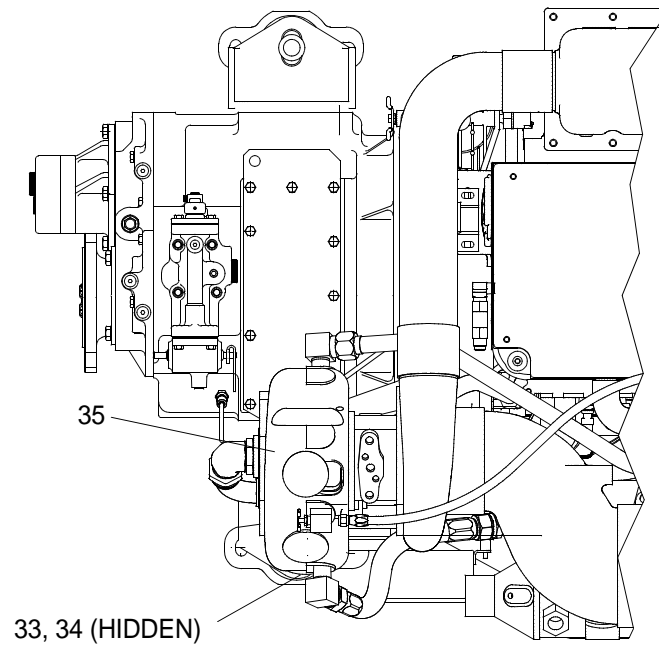


CHEMICAL



EYE PROTECTION

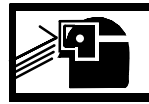
- h. Remove drain plugs (33, 34) from bottom on both sides of turbocharger (35) and drain coolant into drain pan.



WARNING



CHEMICAL



EYE PROTECTION

- i. Remove drain pan and dispose of contents per local procedures.

WARNING

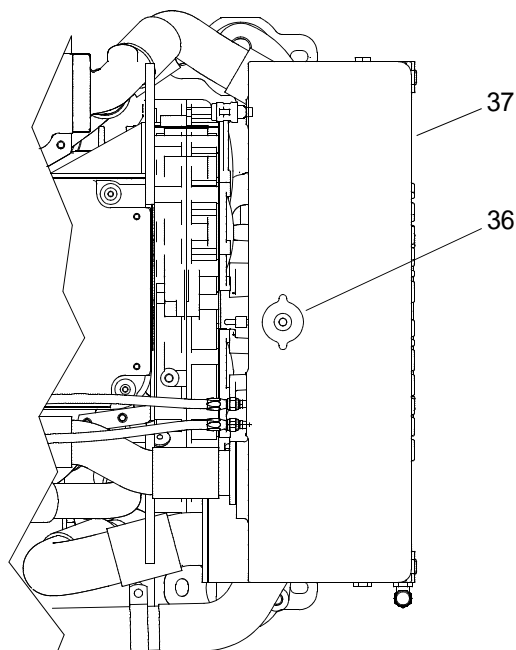


CHEMICAL



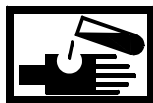
EYE PROTECTION

- j. Remove heat exchanger pressure cap (36) from top of heat exchanger (37).



- k. When cooling system is drained, replace all drain plugs (28, 30, 32, 33, 34) and heat exchanger pressure cap (36).

WARNING



CHEMICAL



EYE PROTECTION

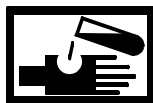
2. Flush cooling system with clean, fresh water.

NOTE

If diesel engine is hot, fill slowly to prevent rapid cooling and distortion of diesel engine castings.

- a. Refill diesel engine with soft clean water.
- b. Start diesel engine and operate it for 15 minutes after thermostats have opened to thoroughly circulate water.

WARNING



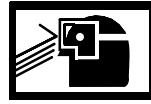
CHEMICAL



EYE PROTECTION

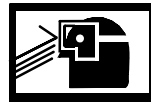
- c. Stop diesel engine and drain the unit completely per steps 1a through 1k into drain pan at each location.

WARNING

**CHEMICAL****EYE PROTECTION**

- d. Remove drain pan at each location and dispose of contents per local procedures.
- e. If diesel engine is hot, refill slowly with clean water and operate for 15 minutes after thermostats have opened.
- f. Stop diesel engine and drain the unit completely per steps 1a through 1k into drain pan at each location.

WARNING

**CHEMICAL****EYE PROTECTION**

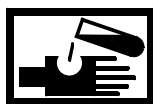
- g. Remove drain pan at each location and dispose of contents per local procedures.

WARNING

**CHEMICAL****EYE PROTECTION**

- 3. Fill cooling system with coolant (antifreeze and distilled water). (TB 55-1900-207-24, TM 55-1945-222-14&P)
 - a. If diesel engine is hot, fill slowly with required engine coolant.
 - b. Purge air entrapped by allowing diesel engine to warm-up without pressure cap installed.
 - c. With transmission (marine gear) in neutral, increase diesel engine speed above 1,000 RPM.
 - d. Add additional coolant as required at heat exchanger pressure cap opening.
 - e. Allow diesel engine to cool.
 - f. Install pressure cap (36).

 WARNING

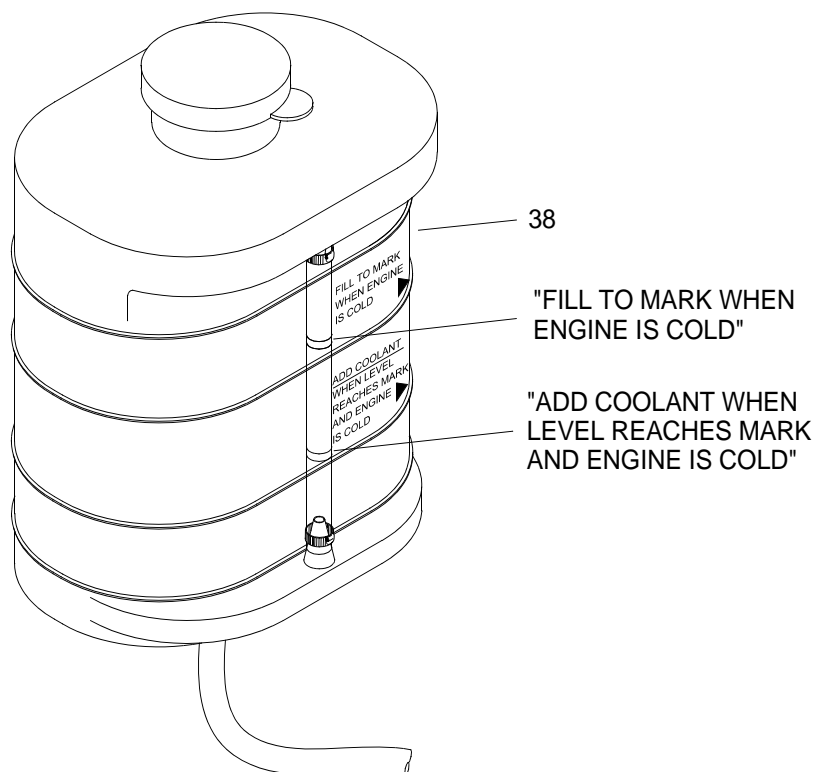


CHEMICAL

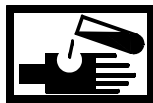


EYE PROTECTION

- g. Fill coolant recovery system overflow bottle (38) to the “Fill to Mark When diesel engine is Cold” mark.



 WARNING



CHEMICAL



EYE PROTECTION

NOTE

Before draining engine oil, take oil sample in accordance with AOAP procedures.

4. Drain crankcase oil, replace oil filters (5) and fill crankcase with preservative engine lubricating oil (Grade 30).
 - a. Remove dipstick (4) prior to suctioning oil from drain pan.
 - b. Remove side access panel (1) from either intake plenum assembly (2) or operators cab, as applicable, to access upper FLOCS quick disconnect (3).
 - c. Remove oil suction pump from BII container.

-
- d. Connect oil suction pump to upper FLOCS quick disconnect (3).
 - e. Using oil suction pump, drain diesel engine crankcase of oil into drain pan.
 - f. Using strap wrench, remove two oil filters (5).
 - g. Clean filter adapter (6) with cleaning cloth.
 - h. Lightly coat filter gaskets (seals) with preservative engine lubricating oil (Grade 30).
 - i. Install new oil filters (5) on filter adapter (6) and tighten by hand until gaskets touch mounting adapter head.
 - j. Tighten oil filters (5) an additional two-thirds turn by hand.
 - k. Install dipstick (4).

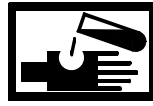
CAUTION

Do not overfill. Oil may blow out through crankcase breather if crankcase is overfilled. Failure to comply may result in damage to equipment.

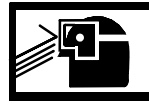
- l. Using oil suction pump, add preservative engine lubricating oil (Grade 30) as required (oil capacity is 38 quarts).
 - m. Remove dipstick (4) and verify oil level is at FULL mark on dipstick (4). Add additional oil as required.
 - n. Run diesel engine hot two minutes at 1,200 RPM at no load, checking for oil leaks at drain plug (3) (lower FLOCS connection) and oil filters (5).
 - o. Stop diesel engine long enough for oil to drain back into crankcase (approximately 20 minutes).
 - p. Remove dipstick (4) and add additional oil as required to bring level to proper mark on dipstick (4).
 - q. Install dipstick (4).
 - r. Disconnect oil suction pump from upper FLOCS quick disconnect (3).
 - s. Stow oil suction pump in BII container.
 - t. Install side access panel (1) on intake plenum assembly (2) or operators cab, as applicable.
 - u. Remove drain pan and old oil filters and dispose of per local procedures.
5. Attach a tag to diesel engine in a visible location that states the following:

“ENGINE PRESERVED FOR LONG TERM STORAGE WITH GRADE 30 PRESERVATIVE ENGINE LUBRICATING OIL. CHECK FOR PROPER OIL LEVEL PRIOR TO OPERATION OF DIESEL ENGINE. AT FIRST SCHEDULED OIL CHANGE, REPLACE PRESERVATIVE OIL WITH OIL CONFORMING TO MIL-L-2104 GRADE 40.”

WARNING

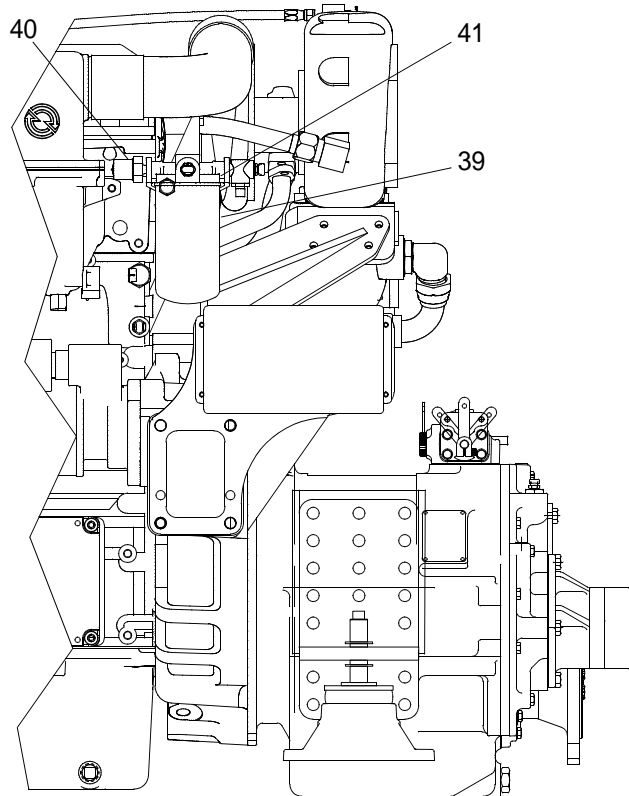


CHEMICAL



EYE PROTECTION

6. Replace secondary fuel filter (39).



- a. With diesel engine shut down, position drain pan beneath secondary fuel filter (39).
- b. Turn fuel shutoff valve (40) on discharge side of secondary fuel filter (39) to CLOSED position (perpendicular to valve).
- c. Using strap wrench, remove secondary fuel filter (39).
- d. Dispose of secondary fuel filter (39) per local procedures.

NOTE

To improve engine starting, have replacement filter filled with diesel fuel ready to install immediately after the filter is removed. This will prevent possible siphoning and fuel system aeration.

- e. Fill new secondary fuel filter (39) with diesel fuel and coat gaskets lightly with diesel fuel.

NOTE

Overtightening the filter may crack or distort the adaptor.

- f. Thread secondary fuel filter (39) onto adaptor (41) until it makes full contact with gasket and no side movement is evident. Then rotate an additional 1/2 turn by hand.
- g. Turn fuel shutoff valve (40) on discharge side of secondary fuel filter (39) to OPEN position (inline with valve).

CAUTION

Under no circumstances should the starting motor and fuel pump be used to prime the secondary fuel filter. Prolonged use of the starting motor and fuel pump to prime the fuel system can result in damage to the starter, fuel pump and injectors and cause erratic running of the diesel engine because of air in the lines and filters.

- h. Start diesel engine and check for leaks.
- i. If diesel engine fails to start after secondary fuel filter (39) replacement, prime fuel system using fuel system primer.

NOTE

The remaining preservation instruction for the diesel engine assumes the engine is run only briefly to introduce preservative oil into the fuel system. Further running of engine after the fuel system has been preserved should be avoided. Because the engine must be run as part of the marine gear preservation procedure, the marine gear should be preserved before continuing diesel engine preservation.

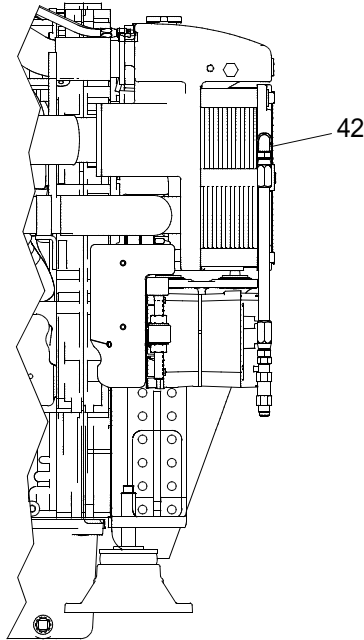
- 7. Preserve marine gear according to the instruction provided following this procedure under "PRESERVE MARINE GEAR FOR STORAGE (SHORT OR LONG TERM)".

WARNING

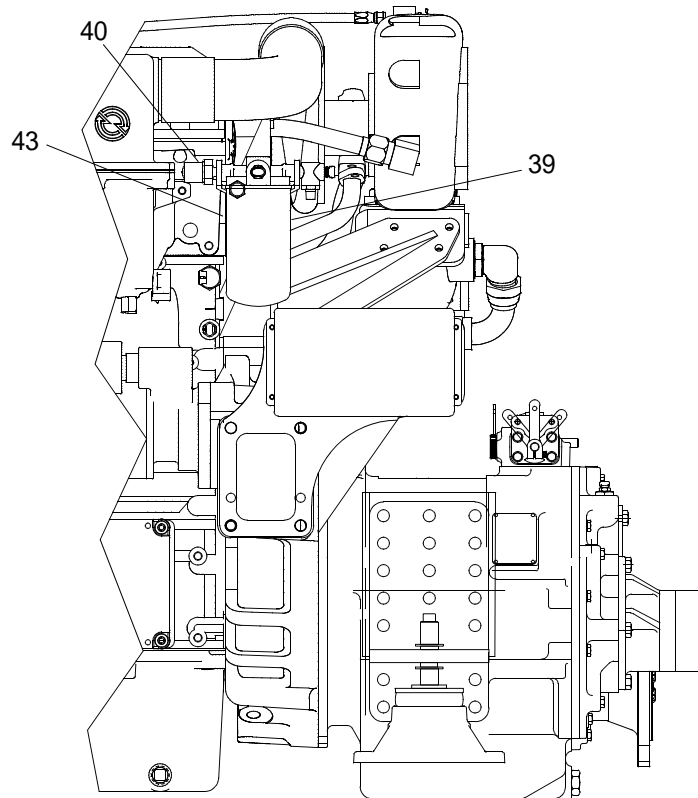
**CHEMICAL****EYE PROTECTION**

- 8. Introduce preservative lubricating oil into fuel system.

- a. Disconnect fuel cooler return line (42) at forward/starboard side of diesel engine.



- b. Turn fuel shutoff valve (40) on discharge side of fuel filter to CLOSED position (perpendicular to valve).
- c. Disconnect fuel supply line (43) from secondary fuel filter (39).



- d. Fill container with preservative engine lubricating oil (Grade 10) for fuel system.
- e. Provide a connection from container with preservative oil to fuel supply line (43).

NOTE

Collected fuel mixture should not be used for preserving other engines. Discard in accordance with local procedures.

- f. Run diesel engine at approximately 1/2 governed speed, without load, until undiluted preservative oil is flowing out fuel cooler return line (42).

WARNING

**CHEMICAL****EYE PROTECTION**

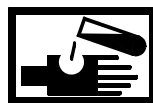
9. Introduce preservative lubricating oil into diesel engine combustion chamber and valves.
- Using container with preservative engine lubricating oil (Grade 10), purge fuel intake line (43) using a gravity or pressure feed and place throttle in full fuel position.
 - Crank diesel engine through 145 to 155 revolutions at no less than 150 RPM. Do not exceed 30 seconds of cranking at one interval. Stop for short period or periods of time and proceed again as necessary.
 - Attach fuel supply line (43) and fuel cooler return line (42).
 - Turn fuel shutoff valve (40) on discharge side of fuel filter to OPEN position (inline with valve).
 - Dispose of container with preservative engine lubricating oil contents per local procedures.

WARNING

**CHEMICAL****EYE PROTECTION**

10. Drain, flush, clean, dry, and preserve fuel tank.
- Verify fuel system supply (11) and return (12) ball valves are closed.
 - Access filler neck strainer (13) beneath access hatch on top of module.
 - Remove filler neck strainer cover (14) and filler neck strainer (13).
 - Pump out fuel.

WARNING

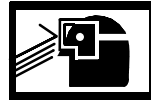
**CHEMICAL****EYE PROTECTION**

- Flush fuel tank and dry with compressed air.

 WARNING



CHEMICAL



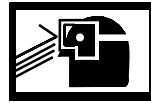
EYE PROTECTION

- f. Spray inside of tank with atomized preservation oil (MIL-PRF-2160 Grade 10).
- g. Install filler neck strainer (13) and filler neck cover (14) on top of fuel tank and install access hatch.

 WARNING



CHEMICAL



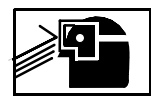
EYE PROTECTION

- 11. Disassemble, clean with cleaning cloth, dry with compressed air, and install fuel/water separator (15).

 WARNING



CHEMICAL

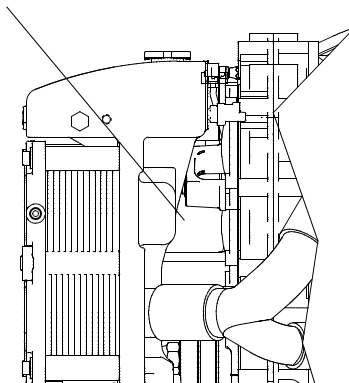


EYE PROTECTION

 CAUTION

Incomplete draining of the water pump may result in rusting of the impeller to the pump body during extended storage, especially if inadequate inhibitor was used in the coolant. To ensure complete pump drainage, always remove the drain plugs from the bottom of the pump before extended storage.

28, 29 (HIDDEN)



- 12. Remove drain plugs (28) from water pump (29) and drain completely of coolant into drain pan.

WARNING

**CHEMICAL****EYE PROTECTION**

13. Remove drain pan and dispose of contents per local procedures.
14. Place drain plugs (28) in bag and attach to side of diesel engine near water pump.
15. Hang yellow caution tag in operators cab stating:

“DRAIN PLUGS REMOVED FROM WATER PUMP. INSTALL DRAIN PLUGS IN WATER PUMP BEFORE STARTING DIESEL ENGINE.”

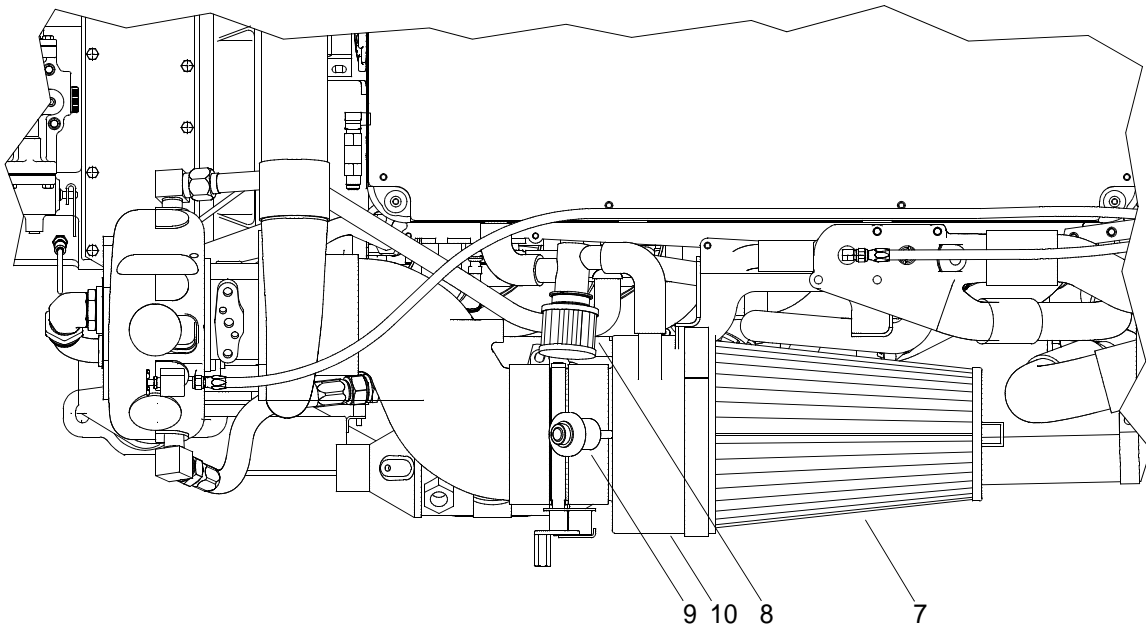
WARNING

**CHEMICAL****EYE PROTECTION****NOTE**

Detroit Diesel is aware of attempts to use air cleaner elements made of foam or fabric matting material soaked with a sticky substance to improve dirt-holding capability. In some installations, this substance has been found to transfer from the filter media, coating the inside surfaces of air ducts and engine air inlet systems, blowers and air boxes. The result has been reduced preservative lubricating oil performance and a change in diesel engine operating conditions. Always use the proper Walker replacement filter elements, cleaners and filter lubricating oils as specified.

A filter that is damaged or clogged with soot due to an exhaust leak may not be able to be cleaned to maximum air flow condition. Replacement of the element may be necessary.

16. Service oil separator filter element (7) and vacuum regulator filter element (8). If restriction gauge (9) shows red, service both filters (7, 8).



- a. Pre-clean oil separator filter element (7) by removing from element housing (10) and tapping filter element (7) to dislodge any large embedded particles of dirt. Then gently brush filter element (7) with a soft bristle brush.

CAUTION

To avoid filter damage, DO NOT use the following methods or liquids for cleaning the oil separator filter element: no gasoline cleaning, no steam cleaning, no caustic cleaning solutions, no strong detergents, no high pressure water or air and no parts-cleaning solvents.

- b. Clean oil separator filter element (7) by spraying cleaning solution from air filter cleaning kit on filter element (7) and let stand for 10 minutes. Large filter elements (7) may be rolled or soaked in a shallow pan of solution for 10 minutes (dilute solution with a small amount of water).
- c. Rinse off oil separator filter element (7) with low water pressure, using fresh (not salt) water). Tap water is O.K. Always flush clean side (inside) to dirty side to remove particles and dirt and not drive dirt into filter (7).
- d. Shake off all excess water and let filter element (7) air dry naturally (leaving outside in sun will speed up process).

CAUTION

DO NOT use any of the following lubricants to re-oil the filter element: never use automatic transmission fluid, motor oil, diesel fuel or any other lightweight oil. Failure to comply will result in damage to equipment.

NOTE

Always re-oil filter element before using. The effectiveness of air filter is greatly reduced if it is used without oiling.

- e. Sparingly squeeze small amounts of oil out of bottle from air filter cleaning kit across top of each pleat of filter

element (7). Let oil wick into filter element (7) for 20 minutes. Then re-oil any white spots that are still showing.

- f. Install oil separator filter element (7) on element housing (10).
- g. Clean and oil vacuum regulator (8) following same steps (a - e) used for oil separator filter element (7).

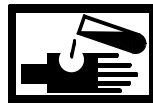
CAUTION

Failure to vacuum check air intake restriction indicator after cleaning oil separator filter element and vacuum regulator filter element may lead to inefficient diesel engine operation and/or damage.

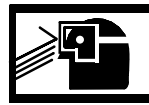
- 17. To ensure proper operation, always vacuum check air intake restriction indicator (9) after cleaning of oil separator filter element (7) and vacuum regulator filter element (8). If indicator (9) is faulty, replace with new air intake restriction indicator (9).
- 18. Loosen alternator drive belts to prevent sticking.
- 19. Hang yellow caution tag in operator cab stating the following:

“DRIVE BELTS LOOSED. TIGHTEN BEFORE STARTING DIESEL ENGINE.”

WARNING



CHEMICAL



EYE PROTECTION

- 20. Clean and dry exterior painted surfaces of diesel engine and spray with corrosion preventative compound. External shafts, flanges and seals should be coated with corrosion preventive compound.
- 21. Drain raw water system into drain pan and dispose of contents per local procedures whenever drain pan is full.
 - a. Remove drain plug (16) from marine gear cooler (17).
 - b. Remove drain plug (18) from elbow (19) on intake side of raw water pump (20).
 - c. Remove check valve (21) from charge air cooler drain hose (22).
 - d. Remove raw water pump cover (23), gasket (24) and impeller (25). Place impeller (25) in plastic bag and secure in plastic bag to diesel engine.
 - e. Install raw water pump gasket (24) and cover (23).
 - f. Hang yellow caution tag in operators cab stating:

“RAW WATER IMPELLER REMOVED FROM PUMP. INSTALL IMPELLER AND PRIME PUMP BEFORE STARTING DIESEL ENGINE.”
 - g. Remove drain plug (26) from muffler (27).
 - h. When all raw water has drained, install drain plugs (16, 18, 26) and check valve (21).

22. Disconnect exhaust and seal opening with plastic bag and pressure sensitive tape.
23. Seal all openings to diesel engine including dipstick tubes, air inlets and outlets with barrier wrap and pressure sensitive tape.
24. Hang red warning tags stating:

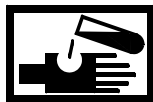
“DIESEL ENGINE MUST BE DE-PRESERVED BEFORE OPERATION.”

INSPECTION AND EXERCISING INSTRUCTIONS FOR DIESEL ENGINE DURING LONG TERM STORAGE

1. Check diesel engine periodically, not less than once per year.
2. If any indication of rust or corrosion are found, take corrective actions to prevent damage to diesel engine parts.

PRESERVE MARINE GEAR FOR STORAGE (SHORT OR LONG TERM)

WARNING



CHEMICAL

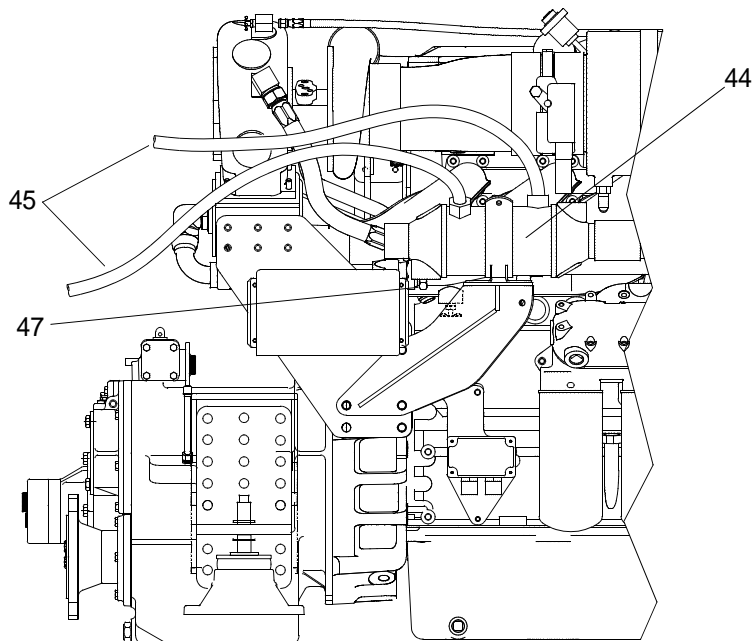


EYE PROTECTION

NOTE

When a complete change of hydraulic system oil is required, it is necessary to drain oil from the oil heat exchanger and connecting hoses as well as the marine transmission sump.

1. Drain lubricating oil from marine gear oil cooler (44).



- a. Remove both inlet and outlet hoses (45) attached to marine gear oil cooler (44).

- b. Elevate ends of both inlet and outlet hoses (45) so oil flows into marine gear (46).
- c. Remove drain plug (47) from bottom of marine gear oil cooler (44) and drain oil into drain pan.
- d. When drained, remove drain pan and dispose of contents per local procedures.
- e. Install drain plug (47) in bottom of marine gear oil cooler.
- f. Attach inlet and outlet hoses (45) to marine gear oil cooler (44).

WARNING

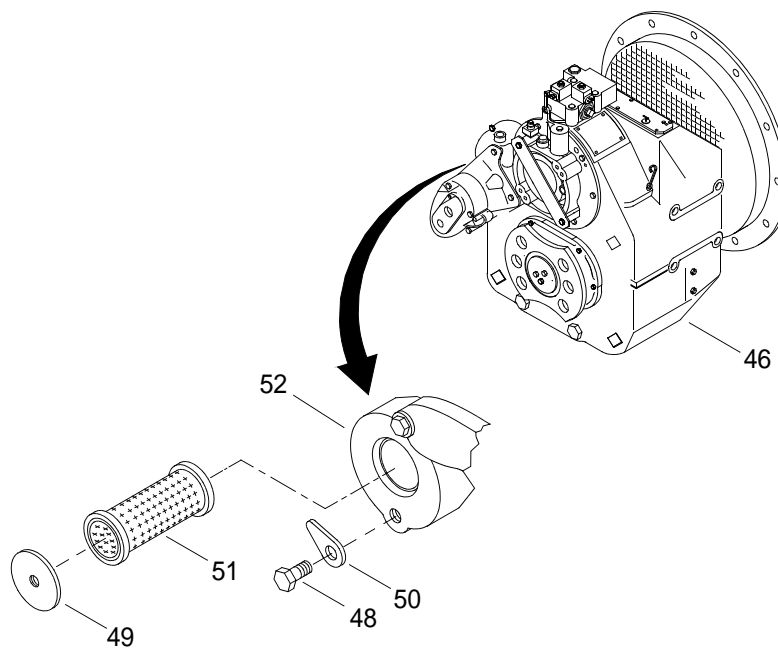


CHEMICAL



EYE PROTECTION

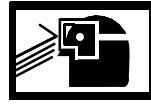
2. Drain lubricating oil from marine gear sump.
 - a. Remove side access panel (1) from either intake plenum assembly (2) or operators cab, as applicable, to access upper FLOCS quick disconnect (3).
 - b. Remove oil suction pump from BII container.
 - c. Connect oil suction pump to upper FLOCS quick disconnect (3).
 - d. Using oil suction pump, drain marine gear (46) sump of oil into drain pan.
 - e. Remove drain pan and dispose of contents per local procedures.
3. Remove hex head capscrew (48), washer (49), cover plate (50) and filter screen with gasket (51) from manifold assembly (52).



 WARNING



CHEMICAL



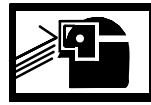
EYE PROTECTION

4. Clean filter screen in diesel fuel ensuring that all foreign matter is removed from holes in screen.
5. Install filter screen with gasket (51), cover plate (50), washer (49) and hex head capscrew (48) in manifold assembly (52).

 WARNING



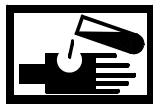
CHEMICAL



EYE PROTECTION

6. Using oil suction pump, fill marine gear (46) with new engine lubricating oil (Grade 40) as required (oil capacity is 2.8 gallons).
7. After filling, start diesel engine and permit oil to attain proper operating temperature.
8. Run diesel engine at 600 RPM for 10 minutes to coat all internal parts of marine gear (46) with oil. Also, shift marine gear (46) several times in “forward” and “reverse” positions.

 WARNING

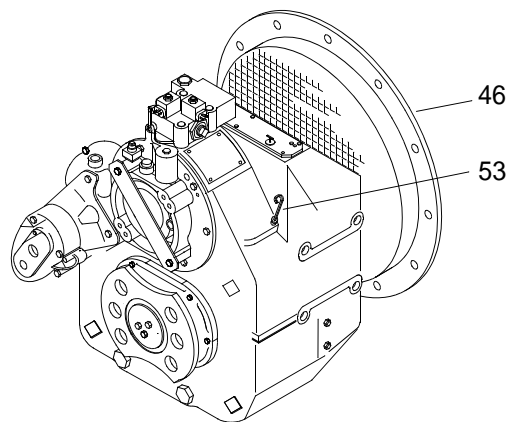


CHEMICAL



EYE PROTECTION

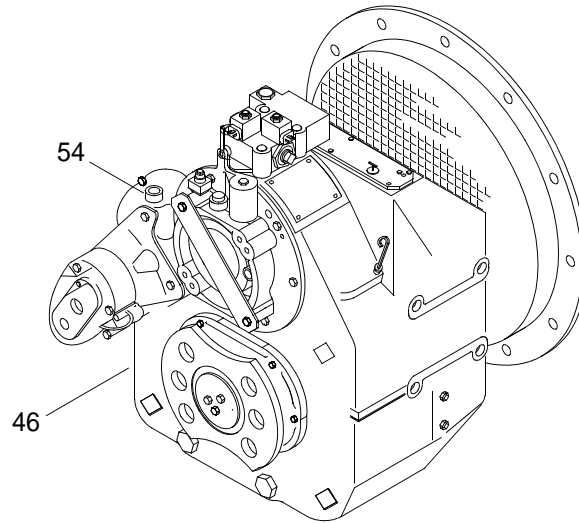
9. Check marine gear (46) oil level using oil level gauge (53). Check oil level with engine at idle speed and marine gear in “neutral”. Oil level must be maintained at the “Full” mark on the oil level gauge (53). Add oil as required.



10. Hang yellow caution tag stating:

“CHECK FOR PROPER OIL LEVEL IN MARINE GEAR PRIOR TO OPERATION.”

11. Install plastic bag over breather cap (54) on top of marine gear (46).



12. Hang yellow caution tag stating:

“REMOVE PLASTIC BAG FROM BREATHER CAP PRIOR TO OPERATION.”

13. Stow oil suction pump in BII container.

PRESERVE TRANSFER CASE FOR SHIPMENT AND STORAGE (SHORT OR LONG TERM)

WARNING

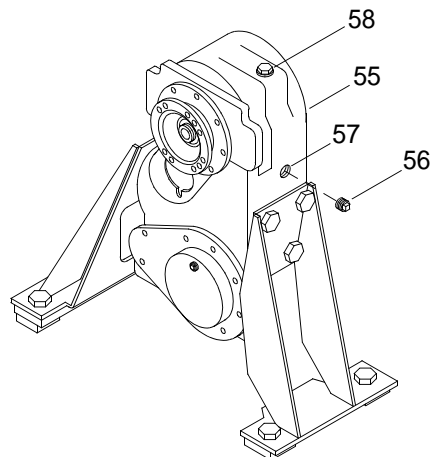


CHEMICAL



EYE PROTECTION

1. Drain and fill gear oil in transfer case (55).



- a. Remove fill plug (56) from side of transfer case (55) and drain gear oil into drain pan.
- b. Overfill transfer case with engine lubricating oil (Grade 30) until fluid overflows fill plug hole (57).

- c. Install fill plug (56).
 - d. Remove drain pan and dispose of contents per local procedures.
2. Hang yellow caution tag stating:

“DRAIN GEAR OIL FROM TRANSFER CASE TO OPERATING LEVEL PRIOR TO OPERATION.”
 3. Install plastic bag over transfer case breather (58).
 4. Hang yellow caution tag stating:

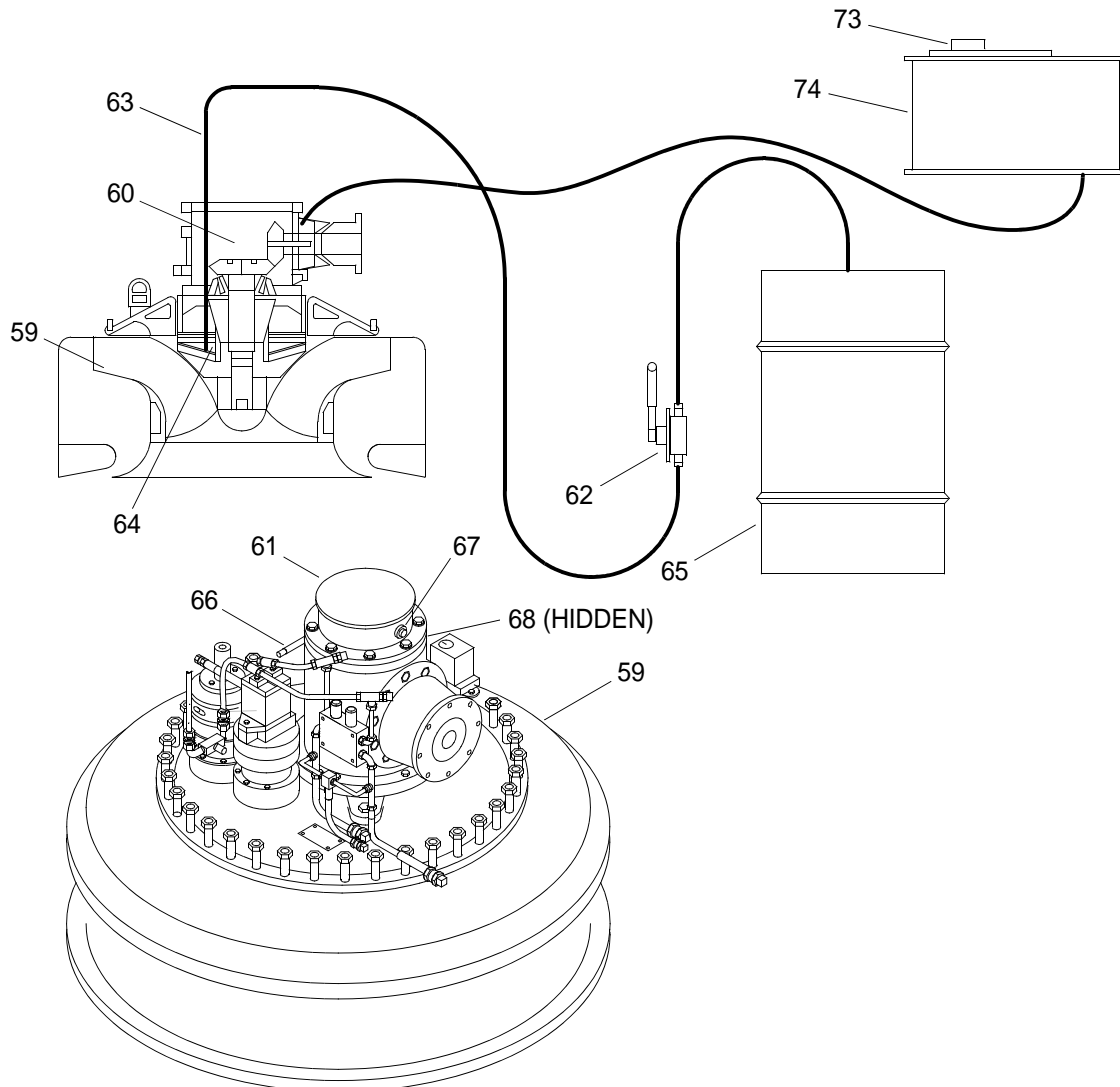
“REMOVE PLASTIC BAG FROM BREATHER CAP PRIOR TO OPERATION.”

PRESERVE PUMP-JET FOR SHORT-TERM STORAGE

WARNING

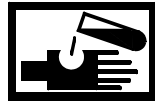
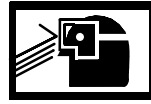
**CHEMICAL****EYE PROTECTION**

1. Drain pump-jet (59) gearcase (60).



- a. Remove cover (61) on top of gearcase (60).
- b. Using bulkhead mounted rotary pump (62) located near pump-jet (59), slide attached suction tube (63) up to limit stop into impeller shaft (64).
- c. Pump used oil into a 55 GAL drum (65) and dispose of contents per local procedures.

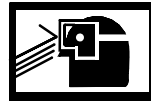
WARNING

**CHEMICAL****EYE PROTECTION**

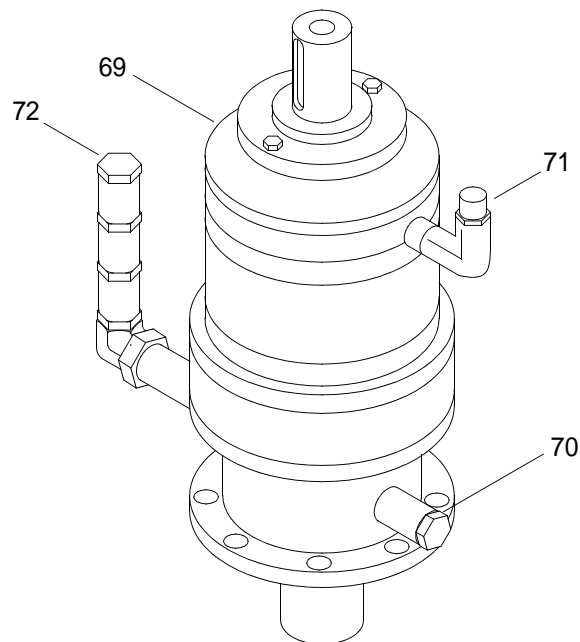
2. Using bulkhead mounted rotary pump (62), pump in new gear lubricating oil (Grade 80W90) or pour directly into top of gearcase (60) (oil capacity is approximately 17.5 gallons). Gearbox (60) is full when oil level reaches middle of sight gauge (66). However, due to minimized water condensation during storage, fill gearcase (60) with oil to the mounting flange of upper gearcase cover (67).
3. Hang yellow caution tag stating:

“DRAIN OIL FROM PUMP-JET GEAR CASE TO OPERATING LEVEL PRIOR TO OPERATION.”
4. Install gearcase cover (61), replacing seal (68) if required.

WARNING

**CHEMICAL****EYE PROTECTION**

5. Change oil in primary and auxiliary planetary gearboxes (69).

**NOTE**

The following steps are typical for both planetary gearboxes.

- a. Remove drain plug (70) and drain oil into drain pan.
- b. Install drain plug (70).

- c. Fill planetary gearbox (69) with new gear lubricating oil (Grade 80W90) at “fill” location (71) until it runs out “fill” hole (oil capacity is 0.48 gallons). Normally, the planetary gearbox is full if oil rises to top of “check” outlet (72). However, in order to minimize condensation during storage, oil is filled until it comes out “fill” orifice (71).
 - d. Remove drain pan and dispose of contents per local procedures.
6. Hang yellow caution tags stating:
- “DRAIN OIL FROM PUMP-JET GEAR CASE TO OPERATING LEVEL PRIOR TO OPERATION.”
7. Verify that nothing is covering the vent cap (73) on expansion tank (74). The vent cap (73) is located over a pressure compensated vent and should not be covered during shipment and storage.

PRESERVATION EXERCISES FOR PUMP-JET DURING SHORT TERM STORAGE

WARNING



HEAVY OBJECTS

NOTE

The pump-jet gears must be turned several times by hand at least once per month.

1. Using assistant, remove drive train transfer case to pump-jet machinery guard.

WARNING



HEAVY OBJECTS

2. Using assistant, remove drive train transfer case to pump-jet drive shaft.
3. Manually operate pump-jet gearcase to lubricate internal gearing.

WARNING



HEAVY OBJECTS

4. Using assistant, install drive train transfer case to pump-jet drive shaft.

 WARNING



HEAVY OBJECTS

5. Using assistant, install drive train transfer case to pump-jet machinery guard.

PRESERVE PUMP-JET FOR LONG TERM STORAGE (LEVEL A AND B)

 WARNING



CHEMICAL



EYE PROTECTION

1. Drain pump-jet (59) gearcase (60).
 - a. Remove cover (61) on top of gearcase (60).
 - b. Using bulkhead mounted rotary pump (62) located near pump-jet (59), slide attached suction tube (63) up to limit stop into impeller shaft (64).
 - c. Pump used oil into a collection reservoir (65) and dispose of used oil in accordance with local procedures.

 WARNING



CHEMICAL



EYE PROTECTION

2. Using bulkhead mounted rotary pump (62), pump in new preservative engine lubricating oil (Grade 30) to mounting flange of cover (61) or pour directly into top of gearcase (60) (oil capacity is approximately 17.5 gallons). Gearbox (60) is full when oil level reaches middle of sight gauge (66). However, due to minimized water condensation during storage, fill gearcase (60) with oil to the mounting flange of upper gearcase cover (67).
3. Rotate gears in pump-jet (59) to ensure all internal gears are splashed with preservative oil.
4. Hang yellow caution tag stating:

“DRAIN OIL FROM PUMP-JET GEAR CASE TO OPERATING LEVEL PRIOR TO OPERATION.”
5. Install gearcase cover (61).
6. Remove drain plugs from both planetary gearboxes.

WARNING

**CHEMICAL****EYE PROTECTION**

7. Change oil in primary and auxiliary planetary gearboxes (69).

NOTE

The following steps are typical for both planetary gearboxes.

- a. Remove drain plug (70) and drain oil into drain pan.
 - b. Install drain plug (70).
 - c. Fill planetary gearbox (69) with new preservative engine lubricating oil (Grade 30) at “fill” location (71) until it runs out “fill” hole (oil capacity is 0.48 gallons). Normally, the planetary gearbox is full if oil rises to top of “check” outlet (72). However, in order to minimize condensation during storage, oil is filled until it comes out “fill” orifice (71).
 - d. Remove drain pan and dispose of contents per local procedures.
8. Hang yellow caution tags stating:

“DRAIN OIL FROM PLANETARY GEARBOXES TO OPERATING LEVELS PRIOR TO OPERATION.”

PRESERVATION EXERCISES FOR PUMP-JET DURING LONG TERM STORAGE

WARNING

**HEAVY OBJECTS****NOTE**

The pump-jet gears must be turned several times by hand at least once per year.

1. Using assistant, remove drive train transfer case to pump-jet machinery guard.

WARNING

**HEAVY OBJECTS**

2. Using assistant, remove drive train transfer case to pump-jet drive shaft.
3. Manually operate pump-jet gearcase to lubricate internal gearing.

 WARNING



HEAVY OBJECTS

- Using assistant, install drive train transfer case to pump-jet drive shaft.

 WARNING

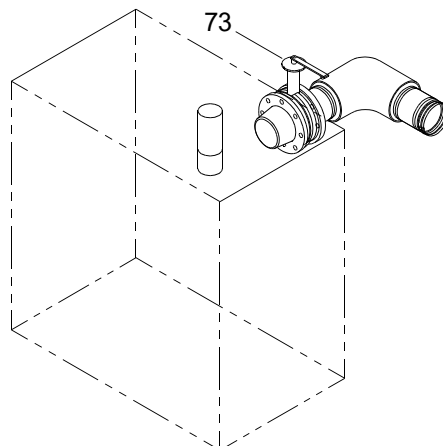


HEAVY OBJECTS

- Using assistant, install drive train transfer case to pump-jet machinery guard.

PRESERVE SEACHEST FOR SHORT AND LONG TERM STORAGE

- Gain access to machinery compartment.
- Ensure seachest valve (73) is CLOSED prior to shipment or storage.

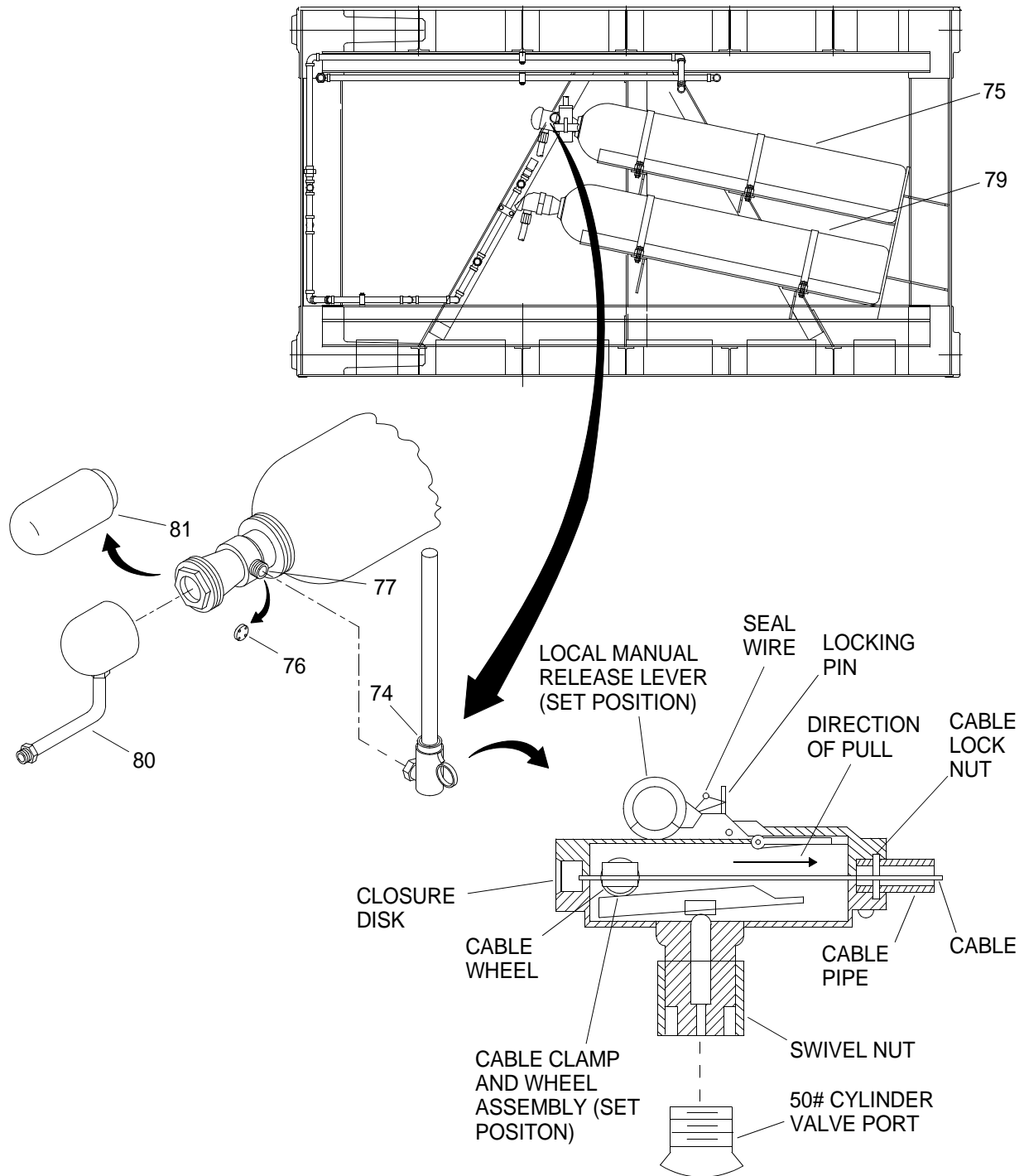
**PRESERVE FIRE SUPPRESSION SYSTEM FOR SHORT AND LONG TERM STORAGE**

 WARNING

All personnel shall be clear of the machinery and fuel storage compartments and all hatches left open while CO₂ disconnects are being made. The carbon dioxide gas used in this system is stored in cylinders under extremely high pressure, equipped with high rate discharge valves, which when actuated, will open, remain open, and cannot be closed. An uncontrolled release of this high pressure gas from an accidental discharge, improper handling, or damage to parts can result in a violent and rapid propulsion of the cylinder(s), capable of causing severe equipment damage, personal injury, or death to personnel. Use extreme caution.

Because CO₂ reduces the available oxygen in the atmosphere, it will not support life. Extreme caution must be used when handling components in this system. Accidental discharge of this agent can cause serious injury or death to personnel.

1. Disconnect cable control head (74) from upper CO2 cylinder (75) in lazaret compartment.



2. Rotate control head (74) upward and secure to overhead piping.
3. Attach control port protective cover (76) over control port (77).
4. Remove lever control discharge heads (78) from both upper (75) and lower (79) CO2 cylinders, leaving discharge hoses (80) attached.

5. Store discharge heads (78) with attached hoses (80) in a bag and place near CO2 cylinders (75, 79).
6. Screw shipping caps (81) onto CO2 cylinders (75, 79).
7. Hang red warning tag stating:

“RECONNECT LEVER CONTROL HEAD, DISCHARGE HEADS AND DISCHARGE HOSES PRIOR TO OPERATION.”

PRESERVE HYDRAULIC OIL TANK FOR SHORT AND LONG TERM STORAGE

WARNING



CHEMICAL



EYE PROTECTION



VAPOR

1. Remove cover from top of hydraulic tank.

WARNING



CHEMICAL



EYE PROTECTION



VAPOR

2. Drain and overfill hydraulic tank with new general purpose lubricating oil until level reaches top of sight gauge.

WARNING



CHEMICAL



EYE PROTECTION



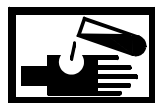
VAPOR

3. Install cover on top of hydraulic tank.
4. Hang yellow caution tag stating:

“DRAIN OIL FROM HYDRAULIC TANK TO OPERATING LEVEL PRIOR TO OPERATION.”

PRESERVE DRIVE SHAFTS FOR SHORT AND LONG TERM STORAGE

WARNING



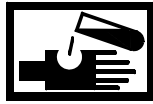
CHEMICAL



EYE PROTECTION

1. Coat all exposed shafting with corrosion preventive compound.

 WARNING



CHEMICAL



EYE PROTECTION

2. Insure drive shaft grease fittings are thoroughly greased with ball and roller bearing grease.

PRESERVE BATTERIES (ENGINE AND HOUSE) FOR SHORT TERM STORAGE

 WARNING

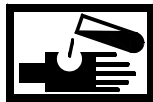
Disconnect main circuit breaker prior to removing any battery jumper. Failure to comply will result in injury to personnel.

NOTE

Remove negative jumper before removing positive jumper from battery.

1. Disconnect all battery jumpers and cables.

 WARNING



CHEMICAL



EYE PROTECTION

2. Coat ends of all battery jumpers and cables with automotive and artillery grease.
3. Fully charge all batteries. (TM 9-6140-200-14)

PRESERVE BATTERIES (ENGINE AND HOUSE) FOR LONG TERM STORAGE (LEVEL A AND B)

 WARNING

Disconnect main circuit breaker prior to removing any battery jumper or cable. Failure to comply will result in injury to personnel.

NOTE

Remove negative jumper before removing positive jumper from battery.

1. Disconnect all battery jumpers and cables.

 WARNING



CHEMICAL



EYE PROTECTION

2. Coat ends of all battery jumpers and cables with automotive and artillery grease.
3. Remove all batteries and turn into unit maintenance per local procedures. Contact unit maintenance.

PRESERVE PROPULSION MODULE ELECTRICAL ENCLOSURES FOR SHORT AND LONG TERM STORAGE

1. Open covers on all nine below deck electrical enclosures.

 WARNING



CHEMICAL



EYE PROTECTION

2. Place one desiccant bag and one foam corrosion inhibitor in each electrical enclosure.

 WARNING



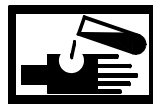
CHEMICAL



EYE PROTECTION

3. Place one extra desiccant bag in isolator junction box assembly A12 and thruster direction/auxiliary junction box assembly A9.

 WARNING



CHEMICAL



EYE PROTECTION

4. Place one extra foam corrosion inhibitor in thruster direction/auxiliary junction box assembly A9. Contact unit maintenance.
5. Close covers on all nine below deck electrical enclosures.
6. Hang yellow caution tag on each electrical enclosure stating:

“REMOVE DESICCANT BAGS AND FOAM CORROSION INHIBITORS PRIOR TO OPERATION.”

7. Seal all nine electrical enclosures with pressure sensitive tape.

PRESERVATION EXERCISES FOR PROPULSION MODULE ELECTRICAL ENCLOSURES DURING STORAGE

1. Open covers on all nine below deck electrical enclosures.

WARNING

**CHEMICAL****EYE PROTECTION**

2. Replace foam corrosive inhibitors yearly.
3. Close covers on all nine below deck electrical enclosures.
4. Hang yellow caution tag on each electrical enclosure stating:

“REMOVE DESICCANT BAGS AND FOAM CORROSION INHIBITORS PRIOR TO OPERATION.”

5. Seal all nine electrical enclosures with pressure sensitive tape.

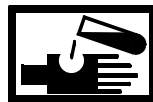
PRESERVE PROPULSION MODULE MAIN ELECTRICAL CIRCUIT BREAKER

1. Gain access to machinery compartment.
2. Ensure MAIN circuit breaker on propulsion module circuit breaker panel A6 is positioned to off.

PRESERVE EMERGENCY STEERING UNIT FOR SHORT AND LONG TERM STORAGE

1. Gain access to lazaret.

WARNING

**CHEMICAL****EYE PROTECTION**

2. Ensure that emergency steering unit, stored in lazaret, is properly greased.

PRESERVE BATTLE LANTERNS FOR SHORT TERM STORAGE

1. Remove batteries from all battle lanterns. (WP 0107 00)
2. Individually wrap each battery and mark on wrapping battery's location prior to removal.
3. Store wrapped batteries in BII container, drawer A4.

PRESERVE BATTLE LANTERNS FOR LONG TERM STORAGE

1. Remove batteries for all battle lanterns and discard. (WP 0107 00)

-
2. Store battle lanterns in BII container.

PRESERVE INTERCONNECT CABLES FOR SHORT AND LONG TERM STORAGE

1. Secure interconnect cables (below deck) to tubular hanger on underside of engine hatch.

WARNING



CHEMICAL



EYE PROTECTION

2. Coat pins and receptacles with laboratory grease.

PRESERVE HEATER HOSES FOR SHORT AND LONG TERM STORAGE

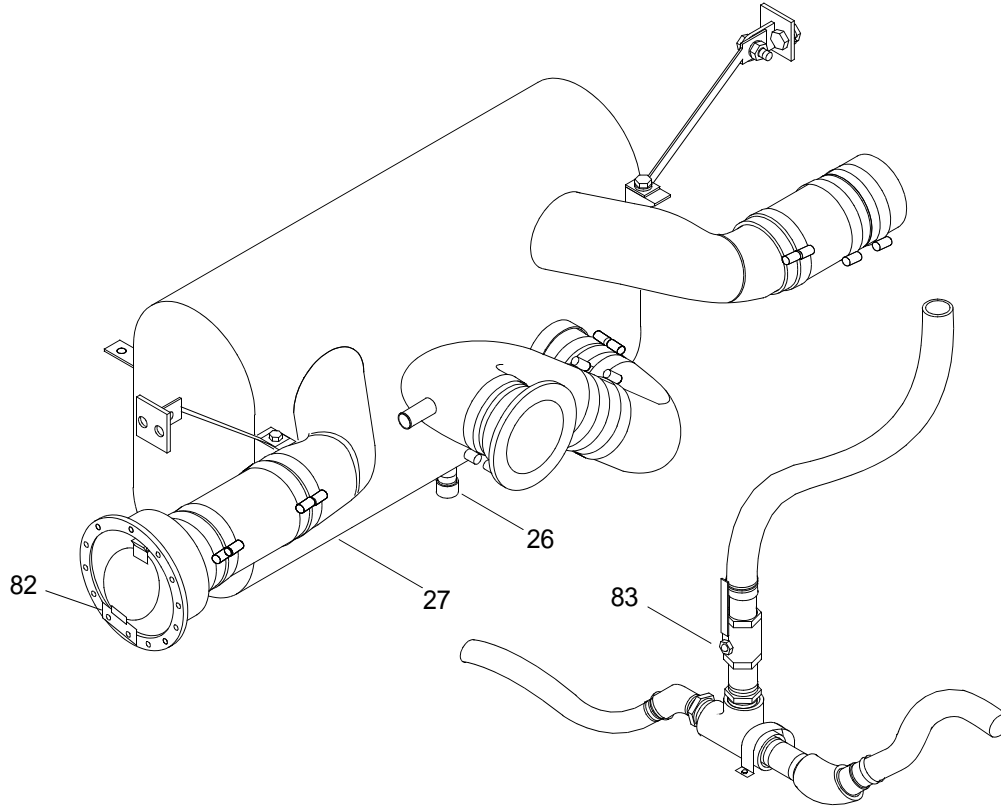
1. Gain access to machinery compartment.
2. Drape heater hoses down to floor and secure to prevent damage from shipping.

PRESERVE LAZARET-STORED ITEMS FOR SHORT AND LONG TERM STORAGE

1. Gain access to lazaret.
2. Ensure all stored components in lazaret are secure.

PRESERVE EXHAUST SYSTEM FOR SHORT AND LONG TERM STORAGE

1. Secure exhaust flapper retainer (82) in closed position to seal out any contaminants from entering exhaust system. (WP 0105 00)



2. Turn exhaust raw water shutoff valve (83) to closed position. (WP 0105 00)

WARNING

**CHEMICAL****EYE PROTECTION**

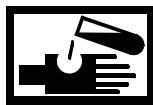
3. Fully drain exhaust system.
 - a. Remove drain plug (26) from bottom of muffler (27) and allow raw water to drain into drain pan.
 - b. Install drain plug (26) in bottom of muffler (27).
 - c. Remove drain pan and dispose of contents per local procedures.
4. Seal openings with pressure sensitive tape.

PRESERVE PROPULSION MODULE FOR SHORT TERM STORAGE

1. Wash down all underwater surfaces with clean freshwater to remove all marine growth, slime and salt spray. Extreme care shall be taken to prevent damage to underwater paint systems during wash down.

2. Inspect and exercise all external hardware (guillotines, pins, D-rings) to ensure they are greased and work correctly.
3. All disturbed exterior steel surfaces shall have surface preserved, spot primed and painted. (TB 43-0144)
4. Ensure fuel system supply and return valves from fuel tank are closed. (WP 0105 00)

WARNING

**CHEMICAL****EYE PROTECTION**

5. Pump fuel tank dry and wipe clean. Ensure fuel tank access covers are installed properly.
6. Use pressure sensitive tape to cover fuel tank vent.

WARNING

**CHEMICAL****EYE PROTECTION**

7. Visually inspect sludge tank. Pump sludge tank dry and wipe clean with cleaning cloth if any liquid is discovered.
8. Use pressure sensitive tape to cover sludge tank vent.
9. Ensure raw water duplex strainer baskets are clean and leave system drain cocks open. (WP 0105 00)
10. Hang yellow caution tag stating:

“CLOSE DRAIN COCKS ON DUPLEX STRAINER PRIOR TO OPERATION.”

WARNING

**CHEMICAL****EYE PROTECTION**

11. External shafts, flanges, seals and engine controls should be coated with corrosion preventative compound. Painted surfaces should be protected with corrosion preventative compound.
12. Ensure module is clean, free of trash and bilges are completely dry.

 WARNING



CHEMICAL



EYE PROTECTION

13. All exposed pipe hanger nuts and bolts, unpainted fittings, CO₂ bottles and any other bare metal surfaces shall be coated with corrosion preventive compound.
14. Close and securely lock all access and soft hatches and seal with pressure sensitive tape.
15. Hang red warning tags stating:

“PROPULSION MODULE MUST BE DE-PRESERVED BEFORE IT IS READY FOR SERVICE.”

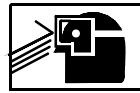
PRESERVE PROPULSION MODULE FOR LONG TERM STORAGE (LEVEL A AND B)

1. Perform short term preservation to propulsion module.

 WARNING



CHEMICAL



EYE PROTECTION

2. Place 110 desiccant bags inside propulsion module. Desiccant shall be located to expose all areas of propulsion module to dehydrating action of desiccant. Locate so no desiccant bag come in contact with critical surfaces.
3. Install a humidity-indicating card inside each of propulsion module three access hatches. Ensure humidity-indicating cards are not placed directly adjacent to any desiccant and can be easily observed from deck surface when access hatch is opened.
4. Hang yellow tags stating:

“REMOVE DESICCANT BAGS AND HUMIDITY-INDICATOR CARDS PRIOR TO OPERATION OF PROPULSION MODULE.”
5. Wrap propulsion module in Corrosion Intercept Shrink Wrap per established procedures with a minimum of two layers.

PRESERVATION EXERCISES FOR PROPULSION MODULE FOR LONG TERM STORAGE

1. Perform visual inspection of equipment every 30 days to check for damage to plastic sheeting and equipment.
2. Open and inspect material condition of propulsion module once every 12 months. Perform required equipment exercising at this time.

PRESERVE OPERATORS CAB FOR SHORT TERM STORAGE

1. Wash and dry exterior surfaces.

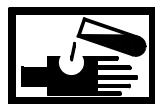
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2. Prime and paint all disturbed exterior steel surfaces. (TB 43-0144)

WARNING

**CHEMICAL****EYE PROTECTION**

3. Coat rubber seal on door with silicone compound.
4. Remove windshield wiper blade from wiper assembly, place in original packing material and store inside operators cab prior to packaging of operators cab.
5. Remove emergency battle lantern from operators cab. Remove batteries.
6. Wrap lantern individually, label for shipment and store inside operators cab. Individually wrap each lantern battery and mark on wrapping battery's location prior to removal.
7. Store wrapped lantern batteries in BII container, drawer A4.
8. Remove VHF-FM handheld radios and battery packs from radios.
9. Wrap handheld radios, label for shipment and store inside operators cab.
10. Individually wrap each handheld radio battery pack and mark on wrapping battery's location prior to removal.
11. Store wrapped handheld radio battery packs in BII container, drawer A4.
12. Disconnect, remove and store spotlight inside operators cab.
13. Disconnect, remove and store SINCGARS Antenna inside operators cab.

WARNING

**CHEMICAL****EYE PROTECTION**

14. Remove Ross radio from dash. Spray silicone compound on Ross radio's electrical connectors.
15. Wrap Ross radio in barrier material and tape shut with pressure sensitive tap. Store inside operators cab.
16. Disconnect, remove and store VHF-FM antenna inside operators cab.
17. Disconnect, remove and store loudhailer external horn inside operators cab.

WARNING

**CHEMICAL****EYE PROTECTION**

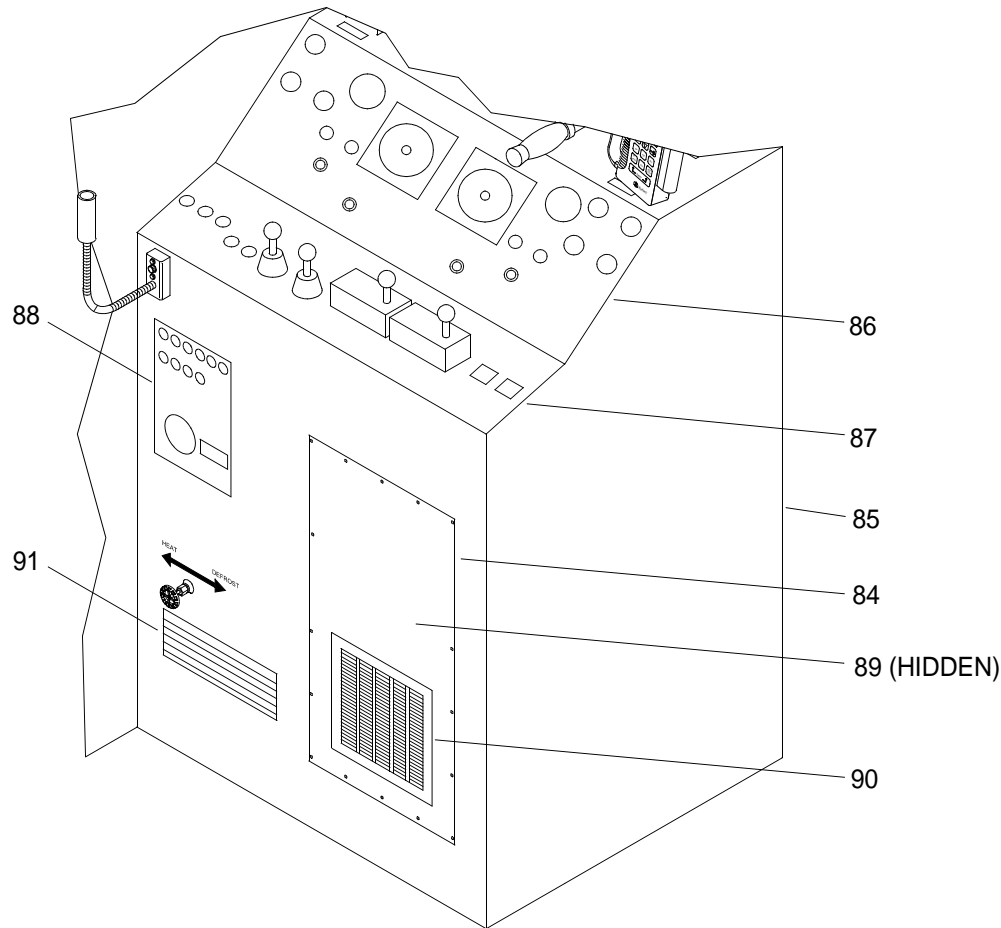
18. Apply a film of aircraft grease to air intake louver door hinges on operators cab.
19. Cover air intake opening with plastic sheeting and secure with pressure sensitive tape.
20. Disconnect and remove SINCGARS radio transmitter from operators cab. (TM 11-5820-890-10-8)
21. Open cover to mast enclosure assembly A7.

WARNING

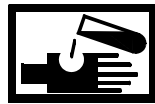
**CHEMICAL****EYE PROTECTION**

22. Place one desiccant bag and one foam corrosion inhibitor inside mast enclosure assembly A7.
23. Close cover on mast enclosure assembly A7.

24. Remove access cover (84) from front of operators console (85).



WARNING



CHEMICAL



EYE PROTECTION

25. Place 19 desiccant bags and 15 foam corrosion inhibitors inside operators console (85) to protect middle control panel A1 (86), lower control panel A2 (87), operators cab circuit breaker panel A3 (88) and terminal strip assembly A4 (89).

26. Install access cover (84) on front of operators console (85).

27. Seal filter grill (90) on access cover (84) and heater (91) with pressure sensitive tape.

28. Hang yellow caution tag on mast enclosure assembly A7 stating:

“REMOVE DESICCANT BAGS AND FOAM CORROSION INHIBITORS PRIOR TO OPERATION.”

29. Hang yellow caution tag on front of operators console stating:

“REMOVE DESICCANT BAGS AND FOAM CORROSION INHIBITORS PRIOR TO OPERATION AND REMOVE SEALS FROM HEATER AND FILTER GRILL.”

 WARNING



CHEMICAL



EYE PROTECTION

30. Coat exterior electrical connector pins with laboratory grease and install dust caps.
31. Hang red warning tag stating:

“OPERATORS CAB MUST BE DE-PRESERVED BEFORE IT IS READY FOR SERVICE.”

PRESERVE OPERATORS CAB FOR LONG TERM STORAGE

1. Perform short term preservation to operators cab.

 WARNING



CHEMICAL



EYE PROTECTION

2. Place 12 desiccant bags inside operators cab. Locate desiccant bags to prevent bags from shifting during transport or coming in contact with critical surfaces.

NOTE

Situate humidity indicator card inside cab glass so it can be seen through observation window to be installed after shrink wrapping.

3. Using tape, secure humidity-indicating card inside operators cab. Ensure humidity-indicating card is not placed directly adjacent to any desiccant and can be easily observed from outside operators cab.
4. Hang yellow tag stating:

“REMOVE DESICCANT BAGS AND HUMIDITY-INDICATOR CARD PRIOR TO INSTALLING OPERATORS CAB.”

5. Lock doors and windows. Seal door and windows with pressure sensitive tape.

NOTE

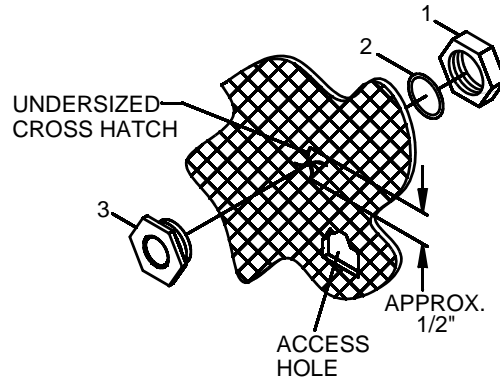
Before wrapping cab in Corrosion Intercept Shrink Wrap, make a note of location of humidity-indicating card inside cab. This information is needed later when deciding where to install observation window.

6. Wrap operators cab in Corrosion Intercept Shrink Wrap per established procedures with a minimum of two layers. Use pressure sensitive tape on all mounting holes to prevent tearing and punch out all mounting bolt holes.
7. Install observation window through Corrosion Intercept Shrink Wrap encasing operators cab.

NOTE

The observation window should be installed so that when looking through it, the humidity indicating card inside the cab can be observed.

- a. Cut an undersized cross hatch through shrink wrap (approx. 1/2 in. long).



- b. Cut access hole into shrink wrap sufficiently large to pass hand through.
- c. Remove outer nut (1) and gasket (2) from observation window (3).
- d. Carefully insert the observation window (3) through the undersized cross hatch for a snug fit.
- e. Holding the assembled observation window (3) with one hand, reach through the access hole with the other hand and slide the gasket (2) and outer nut (1) onto the observation window (3) threads.
- f. Snug the outer nut (1) onto the observation window (3).
- g. Seal the access hole with tape.

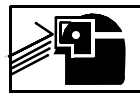
INSPECTION AND EXERCISING INSTRUCTIONS FOR OPERATORS CAB DURING LONG TERM STORAGE

1. Perform visual inspection of equipment every 30 days to check for damage to plastic sheeting and equipment.
2. Open and inspect material condition of operators cab once every 12 months.

WARNING



CHEMICAL



EYE PROTECTION

3. Replace foam corrosion inhibitors yearly.

**PRESERVE NON-POWERED MODULES FOR SHORT AND LONG TERM STORAGE
(LEVEL B)**
NOTE

Non-powered modules include the left end rake, right end rake, center end rake, stern anchor center end rake and center module (40ft manned module).

1. Wash down all underwater surfaces with clean freshwater to remove all marine growth, slime and salt spray. Extreme care shall be taken to prevent damage to underwater paint systems during wash down.
2. Inspect and exercise all external hardware (guillotines, pins, D-rings) to ensure they are greased and work correctly.
3. All disturbed exterior steel surfaces shall have surface preserved, spot primed and painted. (TB 43-0144)
4. On center module, ensure storage compartment is clean and dry.

**PRESERVE NON-POWERED CENTER MODULE FOR LONG TERM STORAGE
(LEVEL A)**

1. Perform short term preservation to non-powered center module.

WARNING

**CHEMICAL****EYE PROTECTION**

2. Place desiccant bags inside storage compartment. Desiccant shall be located to expose all areas of compartment to dehydrating action of desiccant. Locate desiccant bags to prevent bags from shifting during transport or come in contact with critical surfaces.
3. Install a humidity-indicating card inside storage compartment. Ensure humidity-indicating card is not placed directly adjacent to any desiccant and can be easily observed from deck surface when access hatch is opened.
4. Hang yellow caution tag stating:

“REMOVE DESICCANT BAGS AND HUMIDITY-INDICATOR CARD PRIOR TO
USING COMPARTMENT.”
5. Close access hatch and seal with pressure sensitive tape.
6. Wrap center module in Corrosion Intercept Shrink Wrap per established procedures with a minimum of two layers.
7. Cut closeable inspection opening in Corrosion Intercept Shrink Wrap encasing center module so access hatch can be entered at a later time for inspection purposes. Tape opening closed.

**INSPECTION INSTRUCTIONS FOR NON-POWERED CENTER MODULE FOR LONG
TERM STORAGE**

1. Gain access to center module.

2. Inspect storage compartment every 12 months to determine if moisture levels are within acceptable criteria.

PRESERVE DIESEL/HYDRAULIC DOUBLE DRUM WINCH FOR SHORT TERM STORAGE

WARNING

**CHEMICAL****EYE PROTECTION**

1. Drain engine oil. (TM 55-3950-204-14&P)
2. Replace oil filters. (TM 55-3950-204-14&P)

WARNING

**CHEMICAL****EYE PROTECTION**

3. Fill engine to operating level with MIL-L-9000H (9250) 30W lubricating oil. (TM 55-3950-204-14&P)
4. Attach a tag to the unit in a visible location that states the following:

“CHECK FOR PROPER OIL LEVEL PRIOR TO OPERATION OF DIESEL ENGINE.”
5. Using antifreeze test kit, test and inspect diesel engine cooling system. (TM 55-3950-204-14&P)
6. If concentration is low, service cooling system with A-46153 (Ethylene Glycol; coolant capacity is 13 quarts). (TM 55-3950-204-14&P)
7. Clean, inspect, and lubricate throttle, governor, and clutch controls. (TM 55-3950-204-14&P)
8. Lubricate tachometer drive. (TM 55-3950-204-14&P)
9. Lubricate all wire rope with grease (MIL-G-18458). (TM 55-3950-204-14&P)
10. Using MIL-PRF-2104 (Grade 30) engine oil, lubricate all linkage, control valves, engine controls and hydraulic valve springs. (TM 55-3950-204-14&P)
11. Check oil level in gear reducers.
12. Fill gear reducers as required with lubricating oil (MIL-L-2105) GO-80/90. (TM 55-3950-204-14&P)
13. Drain fuel tank (fuel tank capacity is 100 gallons). (TM 55-3950-204-14&P)
14. Flush tank interior with dry, compressed air.

NOTE

The Corrosion Intercept Cover's fabric is designed to protect the winch from direct contact with sea water and UV rays associated with an ocean environment. Fused to the cover interior is a resin containing self-sacrificing copper that offers protection against corrosive gases.

The cover's corrosive element protection is designed to last up to 12 years. When the cover's interior changes from dark brown to black, the cover should be replaced.

15. Fit Corrosion Intercept Cover on winch.
 - a. Remove the cover from storage bag.
 - b. Unfold cover.
 - c. Locate the a-frame end of the cover (gypsy pocket at that end).
 - d. Close the a-frame end zipper.
 - e. Fit the gypsy pocket over the gypsy winch.
 - f. Fit the remaining a-frame end of cover onto winch.
 - g. Fit the anchor end of cover over remainder of winch.
 - h. Close the anchor end zipper.

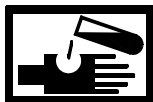
PRESERVE DIESEL/HYDRAULIC DOUBLE DRUM WINCH FOR LONG TERM STORAGE (LEVEL B)

WARNING

**CHEMICAL****EYE PROTECTION**

1. Drain engine oil. (TM 55-3950-204-14&P)
2. Replace oil filters. (TM 55-3950-204-14&P)

WARNING

**CHEMICAL****EYE PROTECTION**

3. Fill engine to operating level with preservation oil (MIL-PRF-21260, Grade 30). Engine oil capacity is 14.5 quarts. (TM 55-3950-204-14&P)

4. Attach a tag to the unit in a visible location that states the following:

“ENGINE OIL IN UNIT FOR PRESERVATION OR SHORT ENGINE ‘EXCERSIZING’ DURING STORAGE ONLY. BEFORE PLACING UNIT INTO OPERATION, OIL MUST BE DRAINED AND REPLACED WITH OPERATING OIL.”

—————
WARNING
—————

To avoid injury from the expulsion of hot coolant, never remove the cooling system pressure cap while the diesel engine is at operating temperature. Remove the cap slowly to relieve pressure. Wear adequate protective clothing (face shield or safety goggles, rubber gloves, apron, and boots). Failure to comply will result in injury to personnel.

5. Drain, flush, and fill cooling system. (TM 55-3950-204-14&P)

—————
WARNING
—————



CHEMICAL



EYE PROTECTION

- a. Drain radiator. (TM 55-3950-204-14&P)

NOTE

If diesel engine is hot, fill slowly to prevent rapid cooling and distortion of diesel engine castings.

- b. Refill diesel engine with soft clean water. (TM 55-3950-204-14&P)
- c. Start diesel engine and operate it for 15 minutes after thermostats have opened to thoroughly circulate water.

—————
WARNING
—————



CHEMICAL



EYE PROTECTION

- d. Stop diesel engine and drain radiator. (TM 55-3950-204-14&P)

—————
WARNING
—————



CHEMICAL



EYE PROTECTION

NOTE

If diesel engine is hot, fill slowly to prevent rapid cooling and distortion of diesel engine castings.

- e. Fill cooling system with proper mix of ethylene glycol (A-46153) and water. Tank capacity is 13 quarts. (TM 55-3950-204-14&P)
 - f. Purge air entrapped by allowing diesel engine to warm-up without pressure cap installed.
 - g. Add additional coolant as required. (TM 55-3950-204-14&P)
 - h. Allow diesel engine to cool.
 - i. Install pressure cap. (TM 55-3950-204-14&P)
6. Clean, inspect, and lubricate throttle, governor, and clutch controls. (TM 55-3950-204-14&P)
 7. Lubricate tachometer drive. (TM 55-3950-204-14&P)
 8. Lubricate all wire rope with grease (MIL-G-18458). (TM 55-3950-204-14&P)
 9. Using MIL-PRF-2104 (Grade 30) engine oil, lubricate all linkage, control valves, engine controls and hydraulic valve springs. (TM 55-3950-204-14&P)
 10. Check oil level in gear reducers.
 11. Fill gear reducers as required with lubricating oil (MIL-L-2105) GO-80/90. (TM 55-3950-204-14&P)
 12. Remove all fuel injectors and fog with preservation oil (MIL-PRF-21260, Grade 30). (TM 55-3950-204-14&P)
 13. Install fuel injectors. (TM 55-3950-204-14&P)
 14. Introduce preservative lubricating oil into the fuel system.

 WARNING



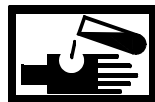
CHEMICAL



EYE PROTECTION

- a. Disconnect fuel intake line at fuel tank fitting. (TM 55-3950-204-14&P)

 WARNING



CHEMICAL



EYE PROTECTION

- b. Disconnect fuel return line from the fuel tank and allow fuel to drain into drain pan. (TM 55-3950-204-14&P)

WARNING

**CHEMICAL****EYE PROTECTION**

- c. Fill a container with operating fuel. (TM 55-3950-204-14&P)

WARNING

**CHEMICAL****EYE PROTECTION**

- d. Fill a container with preservation oil. (P-10, MIL-PRF-21260 Grade 10)
- e. Place the fuel intake line in the container holding fuel. (TM 55-3950-204-14&P)
- f. Start the engine and run for four minutes. (TM 55-3950-204-14&P)

NOTE

Note any color difference between the preservation oil and the operating fuel as an aid to determining when preservation oil is exiting the fuel return line.

- g. Move the fuel intake line to the container holding the preservation oil and shut down engine when preservation oil is seen exiting the fuel return line. (TM 55-3950-204-14&P)
- h. Connect fuel intake line at fuel tank fitting. (TM 55-3950-204-14&P)
- i. Connect fuel return line to the fuel tank. (TM 55-3950-204-14&P)

NOTE

To avoid engine hydrostatic lockup when preserving combustion chambers and valves, do not atomize more than one and one half ounce of preservation oil per cylinder (six ounces total).

15. Preserve combustion chambers and valves.
- a. Access intake manifold inlet. (TM 55-3950-204-14&P)

WARNING

**CHEMICAL****EYE PROTECTION****NOTE**

Do not exceed 25 psi for atomizing spray pressure.

Atomize 1/2 of the total of one and one half ounces of preservation oil per cylinder (three ounces total).

- b. Spray atomized preservation oil (PE-10, MIL-PRF-21260 Grade 10) into air inlet while turning engine over for one minute.
- c. Reassemble air intake manifold as required. (TM 55-3950-204-14&P)
- d. Remove the air cleaner element.

WARNING

**CHEMICAL****EYE PROTECTION****NOTE**

Do not exceed 25 psi for atomizing spray pressure.

Atomize 1/4 of the total of one and one half ounces of preservation oil per cylinder (one and one half ounce total).

- e. Spray atomized preservation oil (P-10, MIL-PRF-21260 Grade 10) through air cleaner housing while turning engine over for 30 seconds.
- f. Install air cleaner element.

WARNING

**CHEMICAL****EYE PROTECTION****NOTE**

Do not exceed 25 psi for atomizing spray pressure.

Atomize 1/4 of the total of one and one half ounces of preservation oil per cylinder (one and one half ounce total).

- g. Spray atomized preservation oil (P-10, MIL-PRF-21260 Grade 10) into muffler outlet for 30 seconds.

16. Seal the air intake and exhaust openings with plastic bags as required and pressure sensitive tape. (55-3950-204-14&P)
17. Drain fuel tank (fuel tank capacity is 100 gallons). (TM 55-3950-204-14&P)
18. Flush tank interior with dry, compressed air.

WARNING



CHEMICAL



EYE PROTECTION

19. Spray inside of tank with atomized preservation oil (MIL-PRF-2160 Grade 10).
20. Loosen fan belts. (TM 55-3950-204-14&P)
21. Install a tag on the winch in a visible location that states:

FAN BELTS LOOSE. TENSION BEFORE OPERATION.

NOTE

The Corrosion Intercept Cover's fabric is designed to protect the winch from direct contact with sea water and UV rays associated with an ocean environment. Fused to the cover interior is a resin containing self-sacrificing copper that offers protection against corrosive gases.

The cover's corrosive element protection is designed to last up to 12 years. When the cover's interior changes from dark brown to black, the cover should be replaced.

22. Fit Corrosion Intercept Cover on winch.
 - a. Remove the cover from storage bag.
 - b. Unfold cover.
 - c. Locate the a-frame end of the cover (gypsy pocket at that end).
 - d. Close the a-frame end zipper.
 - e. Fit the gypsy pocket over the gypsy winch.
 - f. Fit the remaining a-frame end of cover onto winch.
 - g. Fit the anchor end of cover over remainder of winch.
 - h. Close the anchor end zipper.
23. If winch is stored outdoors, block winch up off ground, allowing three to four inches of clearance for air flow.

INSPECTION AND EXERCISING INSTRUCTIONS FOR WINCH DURING LONG TERM STORAGE (LEVEL B)

1. Once each year, remove the Corrosion Intercept cover.
 - a. Unzip both the anchor and a-frame end zippers.
 - b. Work one corner off of winch until cover slides up over one end.
 - c. Slide cover off of other end.
2. Annually, start and run the winch diesel engine. After engine reaches operating temperature, run it for an additional half hour.

NOTE

The Corrosion Intercept Cover is designed to protect the winch from corrosive gases, direct contact with sea water, and UV rays associated with an ocean environment.

3. Fit Corrosion Intercept Cover on winch.
 - a. Remove the cover from storage bag.
 - b. Unfold cover.
 - c. Locate the a-frame end of the cover (gypsy pocket at that end).
 - d. Close the a-frame end zipper.
 - e. Fit the gypsy pocket over the gypsy winch.
 - f. Fit the remaining a-frame end of cover onto winch.
 - g. Fit the anchor end of cover over remainder of winch.
 - h. Close the anchor end zipper.

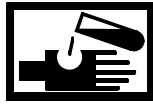
PRESERVE DIESEL/HYDRAULIC DOUBLE DRUM WINCH FOR LONG TERM STORAGE (LEVEL A)

WARNING

**CHEMICAL****EYE PROTECTION**

1. Drain engine oil. (TM 55-3950-204-14&P)
2. Replace oil filters. (TM 55-3950-204-14&P)

 WARNING



CHEMICAL



EYE PROTECTION

3. Fill engine to operating level with preservation oil (MIL-PRF-21260, Grade 30). Engine oil capacity is 14.5 quarts. (TM 55-3950-204-14&P)
4. Attach a tag to the unit in a visible location that states the following:

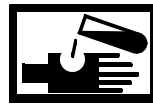
“ENGINE OIL IN UNIT FOR PRESERVATION OR SHORT ENGINE ‘EXCERSIZING’ DURING STORAGE ONLY. BEFORE PLACING UNIT INTO OPERATION, OIL MUST BE DRAINED AND REPLACED WITH OPERATING OIL.”

 WARNING

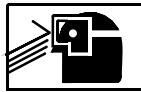
To avoid injury from the expulsion of hot coolant, never remove the cooling system pressure cap while the diesel engine is at operating temperature. Remove the cap slowly to relieve pressure. Wear adequate protective clothing (face shield or safety goggles, rubber gloves, apron, and boots). Failure to comply will result in injury to personnel.

5. Drain, flush, and fill cooling system. (TM 55-3950-204-14&P)

 WARNING



CHEMICAL



EYE PROTECTION

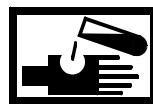
- a. Drain radiator. (TM 55-3950-204-14&P)

NOTE

If diesel engine is hot, fill slowly to prevent rapid cooling and distortion of diesel engine castings.

- b. Refill diesel engine with soft clean water. (TM 55-3950-204-14&P)
- c. Start diesel engine and operate it for 15 minutes after thermostats have opened to thoroughly circulate water.

 WARNING



CHEMICAL



EYE PROTECTION

- d. Stop diesel engine and drain radiator. (TM 55-3950-204-14&P)

 WARNING



CHEMICAL



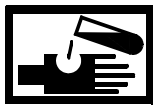
EYE PROTECTION

NOTE

If diesel engine is hot, fill slowly to prevent rapid cooling and distortion of diesel engine castings.

- e. Fill cooling system with proper mix of ethylene glycol (A-46153) and water. Tank capacity is 13 quarts. (TM 55-3950-204-14&P)
 - f. Purge air entrapped by allowing diesel engine to warm-up without pressure cap installed.
 - g. Add additional coolant as required. (TM 55-3950-204-14&P)
 - h. Allow diesel engine to cool.
 - i. Install pressure cap. (TM 55-3950-204-14&P)
6. Clean, inspect, and lubricate throttle, governor, and clutch controls. (TM 55-3950-204-14&P)
 7. Lubricate tachometer drive. (TM 55-3950-204-14&P)
 8. Lubricate all wire rope with grease (MIL-G-18458). (TM 55-3950-204-14&P)
 9. Using MIL-PRF-2104 (Grade 30) engine oil, lubricate all linkage, control valves, engine controls and hydraulic valve springs. (TM 55-3950-204-14&P)
 10. Check oil level in gear reducers.
 11. Fill gear reducers as required with lubricating oil (MIL-L-2105) GO-80/90. (TM 55-3950-204-14&P)
 12. Remove all fuel injectors and fog with preservation oil (MIL-PRF-21260, Grade 30). (TM 55-3950-204-14&P)
 13. Install fuel injectors. (TM 55-3950-204-14&P)
 14. Introduce preservative lubricating oil into the fuel system.

 WARNING



CHEMICAL



EYE PROTECTION

- a. Disconnect fuel intake line at fuel tank fitting. (TM 55-3950-204-14&P)

 WARNING



CHEMICAL



EYE PROTECTION

- b. Disconnect fuel return line from the fuel tank and allow fuel to drain into drain pan. (TM 55-3950-204-14&P)

 WARNING



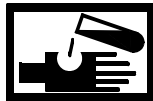
CHEMICAL



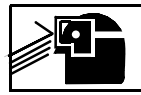
EYE PROTECTION

- c. Fill a container with operating fuel. (TM 55-3950-204-14&P)

 WARNING



CHEMICAL



EYE PROTECTION

- d. Fill a container with preservation oil. (P-10, MIL-PRF-21260 Grade 10)
- e. Place the fuel intake line in the container holding fuel. (TM 55-3950-204-14&P)
- f. Start the engine and run for four minutes. (TM 55-3950-204-14&P)

NOTE

Note any color difference between the preservation oil and the operating fuel as an aid to determining when preservation oil is exiting the fuel return line.

- g. Move the fuel intake line to the container holding the preservation oil and shut down engine when preservation oil is seen exiting the fuel return line. (TM 55-3950-204-14&P)
- h. Connect fuel intake line at fuel tank fitting. (TM 55-3950-204-14&P)
- i. Connect fuel return line to the fuel tank. (TM 55-3950-204-14&P)

NOTE

To avoid engine hydrostatic lockup when preserving combustion chambers and valves, do not atomize more than one and one half ounce of preservation oil per cylinder (six ounces total).

15. Preserve combustion chambers and valves.
- a. Access intake manifold inlet. (TM 55-3950-204-14&P)

WARNING

**CHEMICAL****EYE PROTECTION****NOTE**

Do not exceed 25 psi for atomizing spray pressure.

Atomize 1/2 of the total of one and one half ounces of preservation oil per cylinder (three ounces total).

- b. Spray atomized preservation oil (PE-10, MIL-PRF-21260 Grade 10) into air inlet while turning engine over for one minute.
- c. Reassemble air intake manifold as required. (TM 55-3950-204-14&P)
- d. Remove the air cleaner element.

WARNING

**CHEMICAL****EYE PROTECTION****NOTE**

Do not exceed 25 psi for atomizing spray pressure.

Atomize 1/4 of the total of one and one half ounces of preservation oil per cylinder (one and one half ounce total).

- e. Spray atomized preservation oil (P-10, MIL-PRF-21260 Grade 10) through air cleaner housing while turning engine over for 30 seconds.
- f. Install air cleaner element.

WARNING

**CHEMICAL****EYE PROTECTION****NOTE**

Do not exceed 25 psi for atomizing spray pressure.

Atomize 1/4 of the total of one and one half ounces of preservation oil per cylinder (one and one half ounce total).

- g. Spray atomized preservation oil (P-10, MIL-PRF-21260 Grade 10) into muffler outlet for 30 seconds.

16. Seal the air intake and exhaust openings with plastic bags as required and pressure sensitive tape. (55-3950-204-14&P)
17. Drain fuel tank (fuel tank capacity is 100 gallons). (TM 55-3950-204-14&P)
18. Flush tank interior with dry, compressed air.

—————
WARNING
 —————



CHEMICAL



EYE PROTECTION

19. Spray inside of tank with atomized preservation oil (MIL-PRF-2160 Grade 10).
20. Loosen fan belts. (TM 55-3950-204-14&P)
21. Install a tag on the winch in a visible location that states:

FAN BELTS LOOSE. TENSION BEFORE OPERATION.

22. Enclose winch in Corrosion Intercept Shrink Wrap per established procedures with a minimum of two layers.

**INSPECTION INSTRUCTIONS FOR WINCH DURING LONG TERM STORAGE
 (LEVEL A)**

1. Annually, inspect shrink wrap covering, ensuring it has not been torn open, exposing the winch to ambient air.
1. If shrink wrap is damaged, repair per established procedures.

PRESERVE SHIPPING RACK ARRANGEMENTS FOR SHORT AND LONG TERM STORAGE

1. Ensure that all components are cleaned and dry.
2. All disturbed exterior steel surfaces shall be primed and painted. (TB 43-0144)

PRESERVE CONVERSION KIT STOWAGE CONTAINER FOR SHORT TERM STORAGE.

1. Ensure that all components are cleaned and dry.
2. All disturbed exterior steel surfaces shall be primed and painted. (TB 43-0144)

PRESERVE CONVERSION KIT STOWAGE CONTAINER FOR LONG TERM STORAGE.

1. Ensure that all components are cleaned and dry.
2. All disturbed exterior steel surfaces shall be primed and painted. (TB 43-0144)
3. Spray all unpainted metal surfaces of interior stowed components with preservation oil (MIL-PRF-21260, Grade 30)

PRESERVE BII CONTAINER FOR SHORT TERM STORAGE OR SHIPMENT

1. Inspect ISO container. (MIL-HDBK-138)

PRESERVE BII CONTAINER FOR LONG TERM STORAGE OR SHIPMENT (LEVEL-B)

1. Inspect ISO container. (MIL-HDBK-138)
2. Remove rust and corrosion from surfaces of containers. (TB 43-0144)
3. Paint surfaces of containers. (TB 43-0144)
4. Remove 6 VDC batteries.
5. Remove D-sized batteries.

PRESERVATION EXERCISES DURING LONG TERM STORAGE OR SHIPMENT OF BII CONTAINER (LEVEL-B)**NOTE**

If entry into container is required and doors are difficult to open, relieve container vacuum pressure by opening the vent at the bottom of the vent cover assembly.

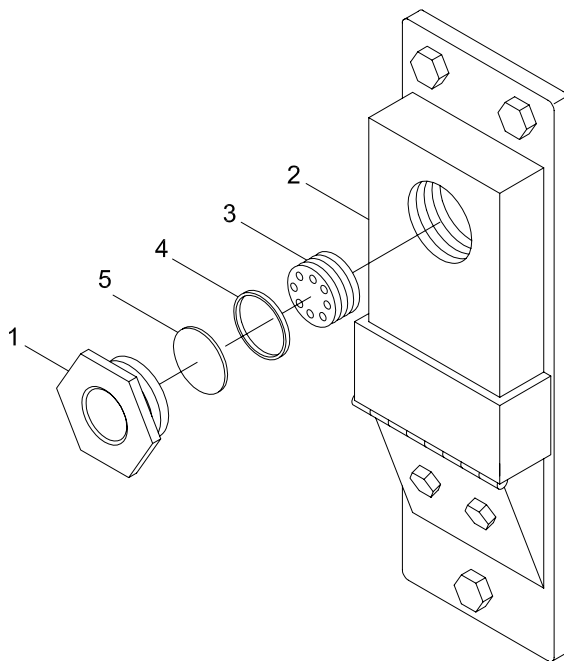
1. Annually, open container and inspect equipment.

PRESERVE BII CONTAINER FOR LONG TERM STORAGE OR SHIPMENT (LEVEL-A)

1. Inspect ISO container. (MIL-HDBK-138)
2. Remove rust and corrosion from surfaces of container. (TB 43-0144)
3. Paint surfaces of container. (TB 43-0144)
4. Remove 6 VDC batteries.
5. Remove D-sized batteries.
6. Place eight 80 unit size silica gel desiccant bags inside container on floor.
7. Close container doors and seal with tape.
8. Install humidity indicator cards in observation windows.

NOTE

This procedure is typical for both vent cover assemblies.



- a. Locate vent cover assembly with observation window (1) in upper exterior of container.
- b. Unscrew observation window (1) from vent cover (2).

NOTE

When removing lock screw and teflon spacer from inside of observation window, ensure loose transparent window and retaining seal remain seated in the bottom of the observation window.

- c. Using 1/2 in. hex head wrench, unthread lock screw (3) from inside of observation window (1).
- d. Remove lock screw (3) and teflon spacer (4) from observation window (1).
- e. Situate humidity indicator card (5) down inside the observation window (1) with text facing down. Ensure rubber seal immediately beneath the indicator card (5) and the transparent window beneath the seal are properly situated in the observation window.
- f. Position teflon spacer (4) on top of the indicator card (5).
- g. Thread lock screw (3) into observation window (1), compressing the teflon spacer (4) and indicator card (5) against the rubber seal and transparent window.
- h. Using the 1/2 in. hex head wrench, apply approx. 30 in-lbs. of torque to the lock screw (3), providing a seal against outside air.
- i. Screw the observation window (1) into the vent cover (2) with about 30 in-lbs. of torque.

PRESERVATION EXERCISES DURING LONG TERM STORAGE OR SHIPMENT OF BII CONTAINER (LEVEL-A)

1. Monthly, inspect reversible humidity indicator cards.
 - a. The humidity indicator card is divided into three equal pie sectors showing 20, 40 and 60 percent relative humidity values. The current relative humidity inside the container may be roughly determined by observing the coloration of the indicator card. Blue coloration of a pie sector indicates the internal humidity level is below the value shown in the sector. Lavender sector color indicates the humidity level is approaching the sector humidity value. Pink sector color indicates the relative humidity is at or has exceeded the sector value.
 - b. The internal humidity level should not exceed 50%. As long as the "60" pie sector is blue, or only slightly lavender, the internal relative humidity has not yet reached 50%.

NOTE

Saturated desiccant may be reactivated or "dried out" for reuse. Reactivated desiccant should retain 80% of its original water vapor adsorption rate and 90% of its original adsorption capacity.

Refer to the reactivation instructions attached to each bag for information on the temperature and time interval over which reactivation occurs.

The humidity indicator cards are most accurate for temperatures around 75° F. Temperatures significantly higher or lower require a small adjustment factor (only about 2% for each 10° F). For high temperatures in excess of 75° F, the card will indicate a lower humidity than is actually the case; for temperatures significantly below 75° F the card will indicate a higher humidity level than is actually the case.

The humidity indicator cards are reversible. When container relative humidity falls, the coloration of the disk sector will change from pink, to lavender, to blue.

If entry into container is required and doors are difficult to open, relieve container vacuum pressure by opening the vent at the bottom of the vent cover assembly.

- c. When the "60" pie sector turns lavender or slightly pink, the internal relative humidity is around 50% or higher. Replace desiccant as necessary to bring the humidity level back down below 50%.

NOTE

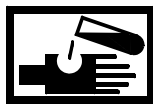
If entry into container is required and doors are difficult to open, relieve container vacuum pressure by opening the vent at the bottom of the vent cover assembly.

2. Annually, open container and inspect equipment.

PRESERVE INTAKE PLENUM ASSEMBLY FOR SHORT TERM STORAGE

1. Position intake plenum on side to gain access to interior.

WARNING

**CHEMICAL****EYE PROTECTION**

2. Apply a coating of aircraft grease to intake plenum hinges.

PRESERVE INTAKE PLENUM ASSEMBLY FOR LONG TERM STORAGE

1. Perform short term preservation to intake plenum assembly.

WARNING

**CHEMICAL****EYE PROTECTION**

2. Place three desiccant bags inside intake plenum assembly.

NOTE

Situate humidity indicator card on plenum so it can be seen through observation window to be installed after shrink wrapping.

3. Using tape, secure humidity-indicating card on exterior of intake plenum assembly. Ensure humidity-indicating card is not placed directly adjacent to any desiccant.
4. Hang yellow tag stating:

“REMOVE DESICCANT BAGS AND HUMIDITY-INDICATOR CARD PRIOR TO OPERATION.”

NOTE

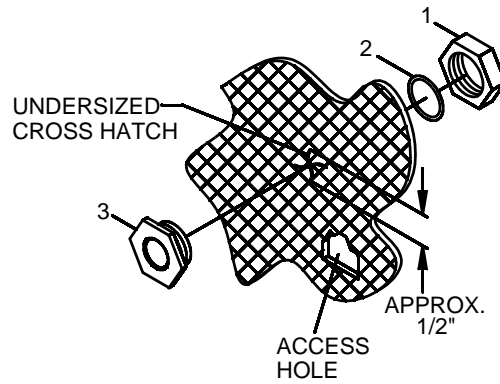
For items stowed in shipping racks, it may be preferable to shrink wrap the item after installation in shipping rack.

5. Enclose intake plenum assembly in Corrosion Intercept Shrink Wrap per established procedures with a minimum of two layers.
6. Install observation window through Corrosion Intercept Shrink Wrap encasing intake plenum assembly.

NOTE

The observation window should be installed so that when looking through it, the humidity indicating card attached to plenum exterior can be observed.

- a. Cut an undersized cross hatch through shrink wrap (approx. 1/2 in. long).

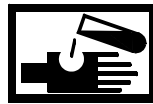


- b. Cut access hole into shrink wrap sufficiently large to pass hand through.
- c. Remove outer nut (1) and gasket (2) from observation window (3).
- d. Carefully insert the observation window (3) through the undersized cross hatch for a snug fit.
- e. Holding the assembled observation window (3) with one hand, reach through the access hole with the other hand and slide the gasket (2) and outer nut (1) onto the observation window (3) threads.
- f. Snug the outer nut (1) onto the observation window (3).
- g. Seal the access hole with tape.

PRESERVE EXHAUST PLENUM ASSEMBLY FOR SHORT TERM STORAGE

1. Position exhaust plenum on side to gain access to interior.

WARNING



CHEMICAL



EYE PROTECTION

2. Apply a coating of aircraft grease to exhaust plenum hinges.

PRESERVE EXHAUST PLENUM ASSEMBLY FOR LONG TERM STORAGE

1. Perform short term preservation to exhaust plenum assembly.

WARNING



CHEMICAL



EYE PROTECTION

2. Place three desiccant bags inside exhaust plenum assembly.

NOTE

Situate humidity indicator card on plenum so it can be seen through observation window to be installed after shrink wrapping.

3. Using tape, secure humidity-indicating card on exterior of exhaust plenum assembly. Ensure humidity-indicating card is not placed directly adjacent to any desiccant.
4. Hang yellow tag stating:

“REMOVE DESICCANT BAGS AND HUMIDITY-INDICATOR CARD PRIOR TO OPERATION.”

NOTE

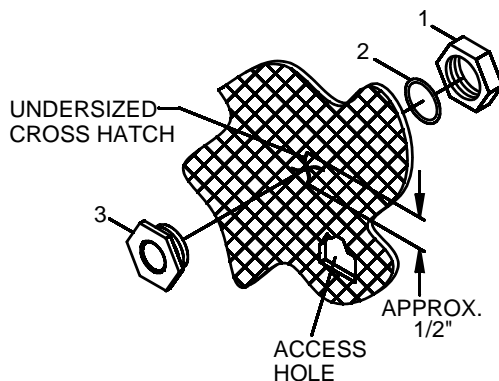
For items stowed in shipping racks, it may be preferable to shrink wrap the item after installation in shipping rack.

5. Enclose exhaust plenum assembly in Corrosion Intercept Shrink Wrap per established procedures with a minimum of two layers.
6. Install observation window through Corrosion Intercept Shrink Wrap encasing exhaust plenum assembly.

NOTE

The observation window should be installed so that when looking through it, the humidity indicating card attached to plenum exterior can be observed.

- a. Cut an undersized cross hatch through shrink wrap (approx. 1/2 in. long).



- b. Cut access hole into shrink wrap sufficiently large to pass hand through.
- c. Remove outer nut (1) and gasket (2) from observation window (3).
- d. Carefully insert the observation window (3) through the undersized cross hatch for a snug fit.
- e. Holding the assembled observation window (3) with one hand, reach through the access hole with the other hand and slide the gasket (2) and outer nut (1) onto the observation window (3) threads.
- f. Snug the outer nut (1) onto the observation window (3).
- g. Seal the access hole with tape.

PRESERVE MAIN ASSEMBLY MAST FOR SHORT TERM STORAGE

1. Remove all light bulbs from main assembly mast lighting fixtures. Bulbs should be packaged in their original shipping container with original packing and secured inside mast shipping rack.
2. Disconnect electrical cable connectors at terminal box and secure two cables to lower yardarms.
3. Disconnect bottom mast subassembly from upper mast subassembly by removing mounting hardware. Mounting hardware should remain with upper mast subassembly during shipping.

WARNING

**CHEMICAL****EYE PROTECTION**

4. Spray all electrical connectors with laboratory grease.
5. Wrap light housings and compass sensor with bubble wrap.

PRESERVE MAIN ASSEMBLY MAST FOR LONG TERM STORAGE**NOTE**

For items stowed in shipping racks, it may be preferable to shrink wrap the item after installation in shipping rack.

6. Wrap main assembly mast upper subassembly in Corrosion Intercept Shrink Wrap per established procedures with a minimum of two layers.

NOTE

For items stowed in shipping racks, it may be preferable to shrink wrap the item after installation in shipping rack.

7. Wrap main assembly mast lower subassembly in Corrosion Intercept Shrink Wrap per established procedures with a minimum of two layers.

PRESERVE STUB ASSEMBLY MAST FOR SHORT AND LONG TERM STORAGE

1. Remove all light bulbs from stub assembly mast lighting fixtures.
2. Pack bulbs in their original shipping container with original packing and secure inside mast shipping rack

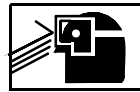
PRESERVE ELECTRICAL INTERCONNECT ASSEMBLY FOR SHORT TERM STORAGE

 WARNING

**CHEMICAL****EYE PROTECTION**

1. Coat electrical interconnect assembly pins with laboratory grease.

 WARNING

**CHEMICAL****EYE PROTECTION**

2. Coat electrical interconnect assembly receptacles with laboratory grease.

PRESERVE ELECTRICAL INTERCONNECT ASSEMBLY FOR LONG TERM STORAGE

1. Perform short term preservation to electrical interconnect assembly.

 WARNING

**CHEMICAL****EYE PROTECTION**

2. Secure two desiccant bags to cable harness metal guard.

NOTE

For items stowed in shipping racks, it may be preferable to shrink wrap the item after installation in shipping rack.

3. Secure cable ends to metal guard and wrap entire deck cable harness in Corrosion Intercept Shrink Wrap per established procedures with a minimum of two layers.

PRESERVE BATTLE LANTERN FOR SHORT AND LONG TERM STORAGE

1. Batteries in storage will discharge over time and emit gases, which can cause corrosive problems. This can result in damage to battle lantern or difficulty of use due to corrosion on contacts.
2. For short term storage, remove batteries from all battle lanterns and wrap each individually. Mark on wrapping battery's location prior to removal.
3. Store wrapped batteries in BII container, drawer A4.
4. Discard batteries for long term storage.

PRESERVE WATERTIGHT FLASHLIGHT FOR SHORT AND LONG TERM STORAGE

1. Batteries in storage will discharge over time and emit gases, which can cause corrosive problems. This can result in damage to battle lantern or difficulty of use due to corrosion on contacts.
2. For short term storage, remove batteries from all watertight flashlights and wrap each individually. Mark on wrapping battery's location prior to removal.
3. Store wrapped batteries in BII container, drawer A4.
4. Discard batteries for long term storage per local procedures.

PRESERVE SIX-VOLT AND D-SIZED BATTERIES FOR LONG TERM STORAGE

1. Use all BII six-volt batteries and two cases of D-sized batteries or discard per local procedures.
2. Replace all BII six-volt batteries and two cases of D-sized batteries during de-preservation.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
CONVERSION KIT
STOWAGE**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
Sling, Endless: 8400LB, 20' Yellow (Cabinet A9) (Item 82, WP 0112 00)
Qty 2
Shackle, 1-1/2" 30 Ton Shackle (Storage Room Hooks) (Item 68, WP 0112 00)
Qty 4

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

Seaman 88K (2)

Equipment Condition

Equipment Prepared for Storage or Shipment. (WP 0067 00)

INTRODUCTION**Scope**

This work package covers stowage of WT conversion kit into WT conversion kit container and shipping frames.

General

Various components are stowed on pallets and secured with ratchet straps to longitudinal track stops in front of container. Track stops are placed in front and behind the pallet stacks to prevent movement.

The side bumper/fenders are stacked, stowed and secured with ratchet straps in a shipping frame.

The A-frame legs are stowed in a shipping rake that holds the main and stub assembly masts.

All components are fresh water rinsed, allowed to thoroughly air dry and preserved prior to stowage into the container.

STOW SKEG ASSEMBLIES ON STOWAGE PALLET

1. Inspect chains, slings and shackles. (WP 0007 00)
2. Unlatch and open container doors.

WARNING

Doors must be secured in the open position. Failure to comply could result in death or injury to personnel.

3. Secure container doors open with locking bars, pins or hooks.

 WARNING



HEAVY PARTS

4. Using forklift and pushrod, remove all shipping pallets from inside container and place all pallets on flat surface.

 WARNING



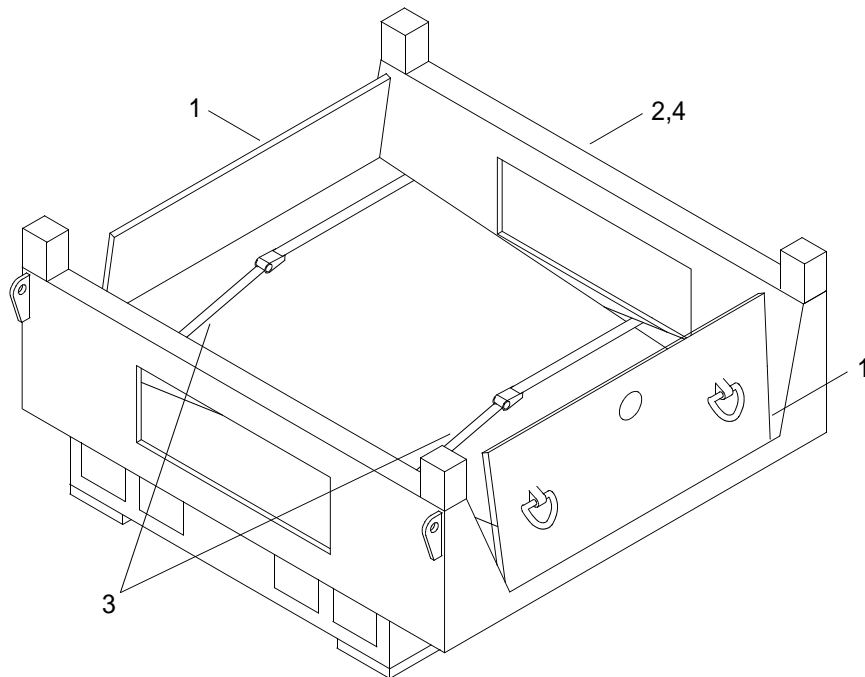
HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

NOTE

Two provided 9 in. x 9 in. x 24 in. wooden blocks support each skleg off the bottom of the stowage pallet.

5. Using forklift, sling and shackle, separately position skleg assemblies (1) on wooden blocks on stowage pallets (2 and 4).



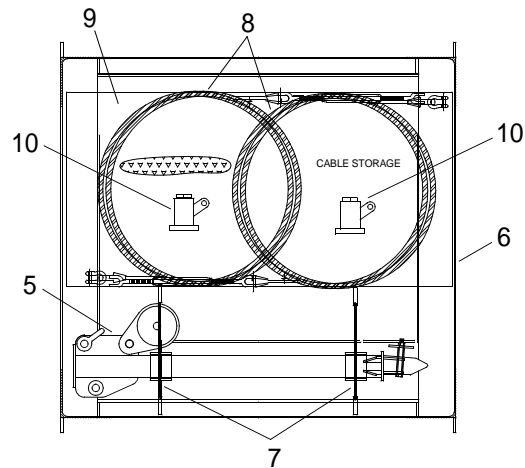
6. Remove sling and shackle.
7. Secure skleg assemblies (1) to stowage pallets (2 and 4) with two ratchet straps (3). Tighten ratchet straps (3).

STOW A-FRAME COMPONENTS ON STOWAGE PALLETS

WARNING

**HEAVY OBJECTS**

1. Using assistant, position A-frame elevating pole (5) on stowage pallet (6).



2. Secure A-frame elevating pole (5) to stowage pallet (6) with two ratchet straps (7). Tighten ratchet straps (7).

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

3. Using forklift, sling and shackle, position A-frame cables and rigging (8) in opened storage box (9) of stowage pallet (6).
4. Remove sling and shackle.
5. Position A-frame corner fitting lug assemblies (10) in storage box (9) of stowage pallet (6).
6. Close storage box (9).

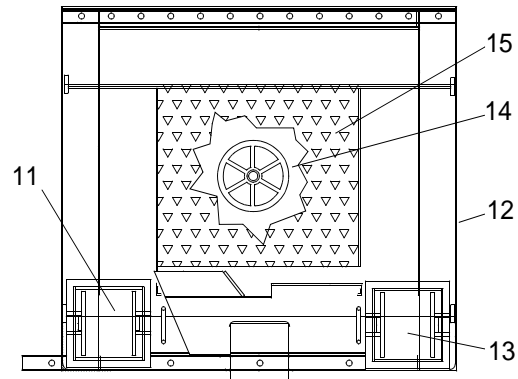
 WARNING



HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

7. Using forklift, sling and shackle, position A-frame foot assembly (11) on stowage pallet (12).



8. Remove sling and shackle.
9. Repeat steps 6 and 7 for second A-frame foot assembly (11).
10. Secure both A-frame foot assemblies (11) to stowage pallet (12) with ratchet straps (13). Tighten ratchet straps (13).

 WARNING



HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

11. Using forklift, sling and shackle, position A-frame sheave and components (14) in opened stowage box (15) of stowage pallet (12).
12. Close stowage box (15).

STOW DECK WINCH COMPONENTS

WARNING

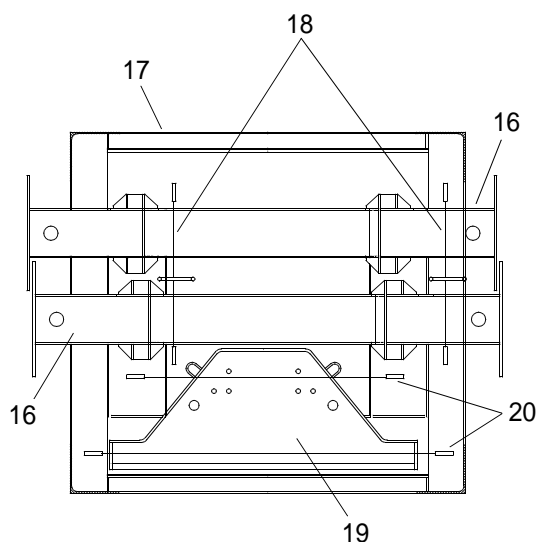
**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

NOTE

This task is typical for all transverse beams.

1. Using forklift, slings and shackles, position foundation transverse beams (16) on stowage pallet (17).



2. Remove slings and shackles.
3. Install second foundation transverse beams (16).
4. Secure foundation transverse beams (16) to stowage pallet (17) with ratchet straps (18). Tighten ratchet straps (18).

WARNING

**HEAVY OBJECTS**

5. Using assistant, position four end brackets (19) on storage pallet (17).
6. Secure four brackets (19) to stowage pallet (17) with ratchet straps (20). Tighten ratchet straps (20).

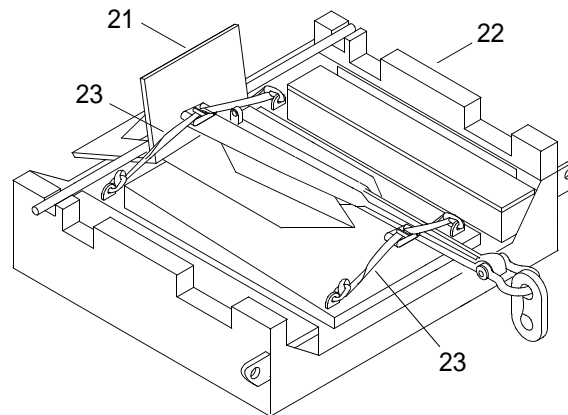
STOW STERN ANCHOR ON STOWAGE PALLET

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

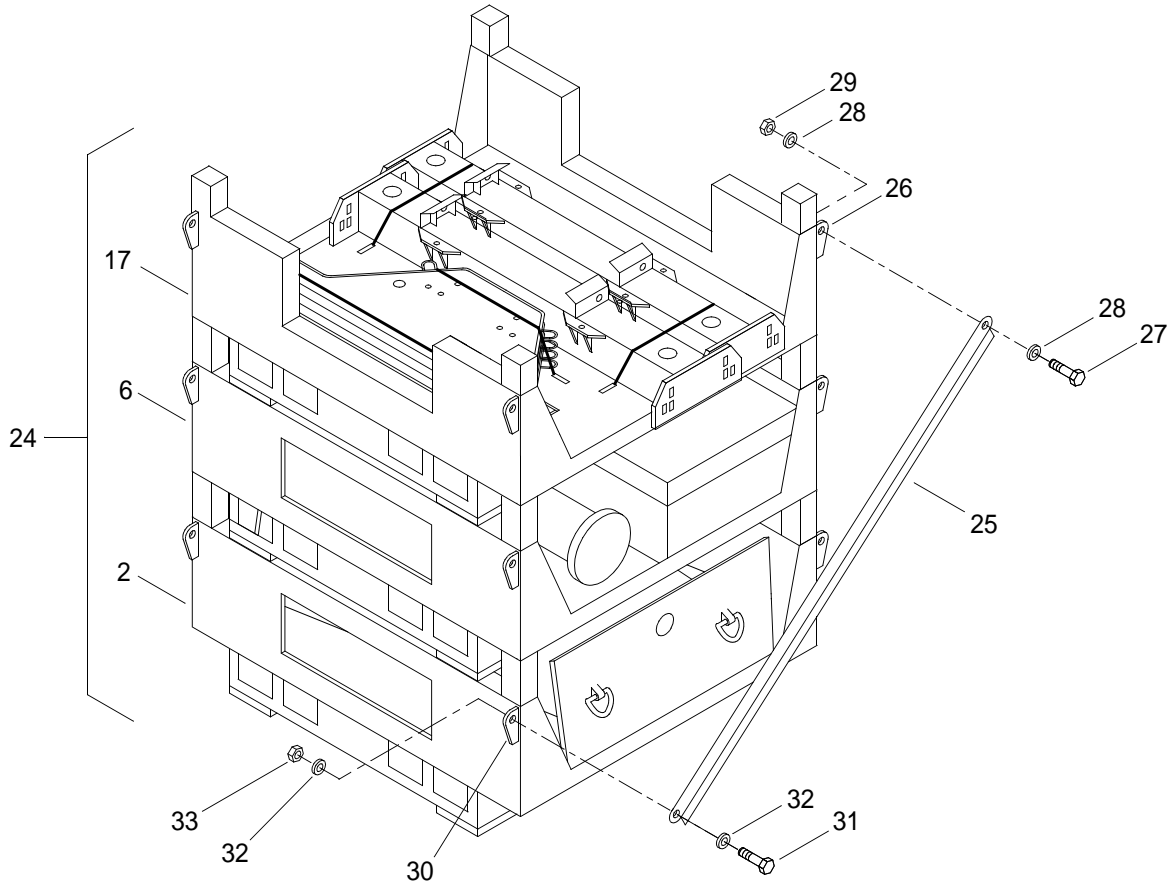
1. Using forklift, sling and shackle, position stern anchor (21) on stowage pallet (22).



2. Remove sling and shackle.
3. Secure stern anchor (21) to stowage pallet (22) with ratchet straps (23). Tighten ratchet straps (23).

ASSEMBLE PALLET STACKS FOR STOWAGE

1. Assemble first pallet stack (24).



WARNING



HEAVY PARTS

- a. Using a forklift, position stowage pallet (2) on flat surface.

WARNING



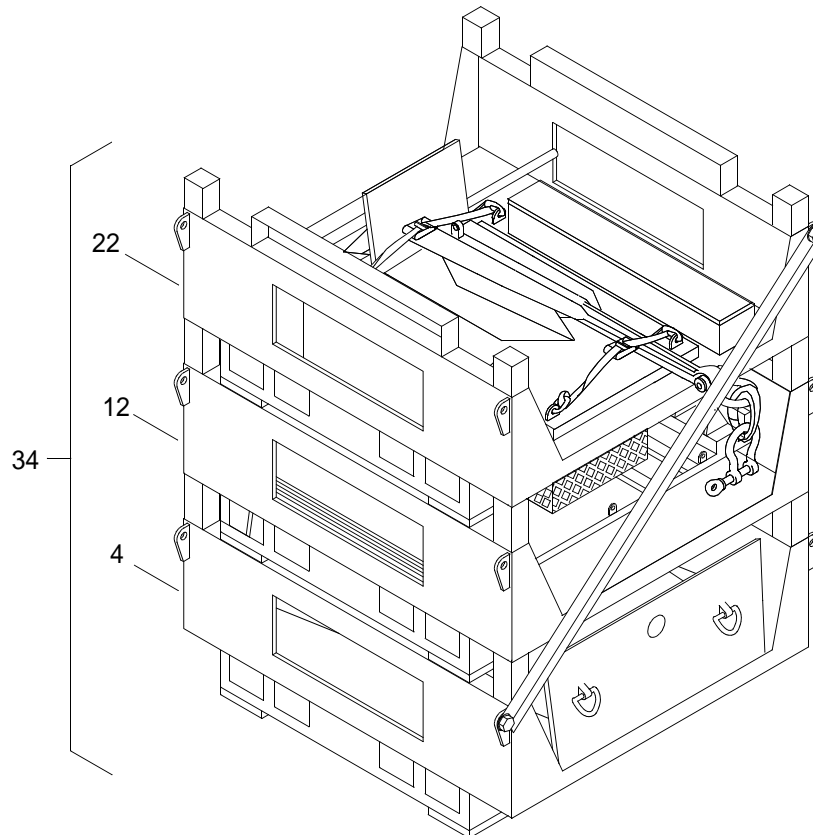
HEAVY PARTS

- b. Using a forklift, position stowage pallet (6) on stowage pallet (2).

WARNING

**HEAVY PARTS**

- c. Using a forklift, position stowage pallet (17) on top of A-frame rigging pallet (6).
2. Connect first pallet stack (24) together.
 - a. Align hole in upper end of tie bar (25) with hole in stowage pallet (17) tie bar bracket (26).
 - b. Install bolt (27), washers (28) and nut (29) through tie bar (25) and tie bar bracket (26).
 - c. Align hole in lower end of tie bar (25) with hole in stowage pallet (2) tie bar bracket (30) so that tie bar (25) runs diagonally across side of pallet stack (24).
 - d. Install bolt (31), washers (32) and nut (33) through tie bar (25) and stowage pallet (2) tie bar bracket (30).
 - e. Tighten both tie bar nuts (29, 33).
 - f. Install tie bar (25) on opposite side of first pallet stack (24).
 3. Assemble second pallet stack (34).



WARNING

**HEAVY PARTS**

- a. Using a forklift, position stowage pallet (4) on flat surface.

WARNING

**HEAVY PARTS**

- b. Using a forklift, position stowage pallet (12) on top of stowage pallet (4).

WARNING

**HEAVY PARTS**

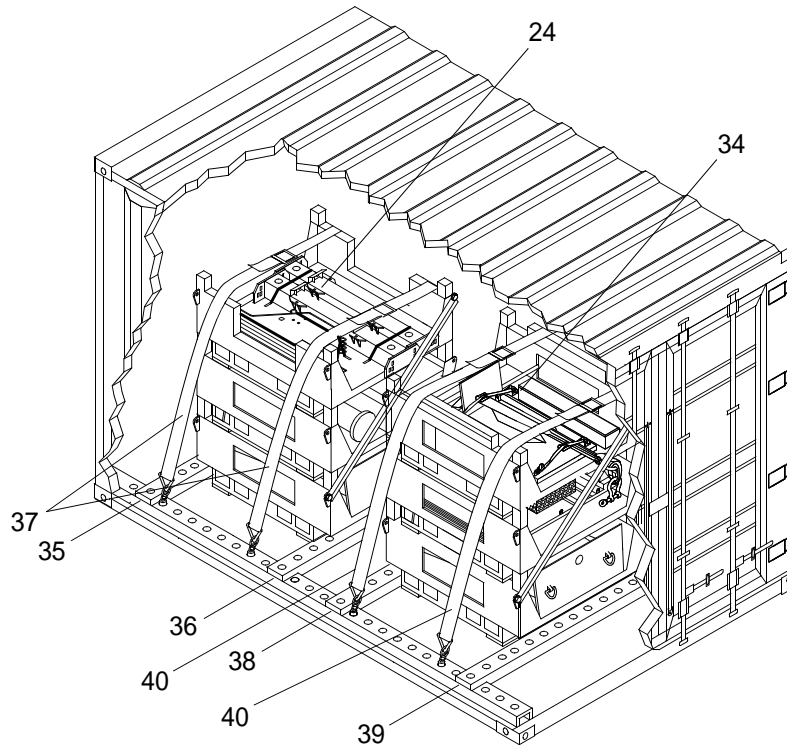
- c. Using a forklift, position stowage pallet (22) on top of deck winch foundation pallet (12).
4. Connect second pallet stack (34) together in same manner as first pallet stack (24).
 - a. Align hole in upper end of tie bar (25) with hole in stowage pallet (22) tie bar bracket (26).
 - b. Install bolt (27), washers (28) and nut (29) through tie bar (25) and tie bar bracket (26).
 - c. Align hole in lower end of tie bar (25) with hole in stowage pallet (4) tie bar bracket (30) so that tie bar (25) runs diagonally across side of pallet stack (34).
 - d. Install bolt (31), washers (32) and nut (33) through tie bar (25) and stowage pallet (4) tie bar bracket (30).
 - e. Tighten both tie bar nuts (29, 33).
 - f. Install tie bar (25) on opposite side of second pallet stack (34).

WT CONVERSION KIT CONTAINER STOWAGE

WARNING

**HEAVY PARTS**

1. Using forklift and pushrod, position first pallet stack (24) in container against welded track stop (35).



2. Install track stop (36) in front of first pallet stack (24).
3. Secure first pallet stack (24) to container with ratchet straps (37). Tighten ratchet straps (37).

WARNING

**HEAVY PARTS**

4. Using forklift and pushrod, position second pallet stack (34) in container against track stop (38).
5. Install track stop (39) in front of second pallet stack (34).
6. Secure second pallet stack (34) to container with ratchet straps (40). Tighten ratchet straps (40).
7. Remove locking bars and pins and latch shut container doors.

STOW A-FRAME LEGS IN SHIPPING RACK**WARNING****HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

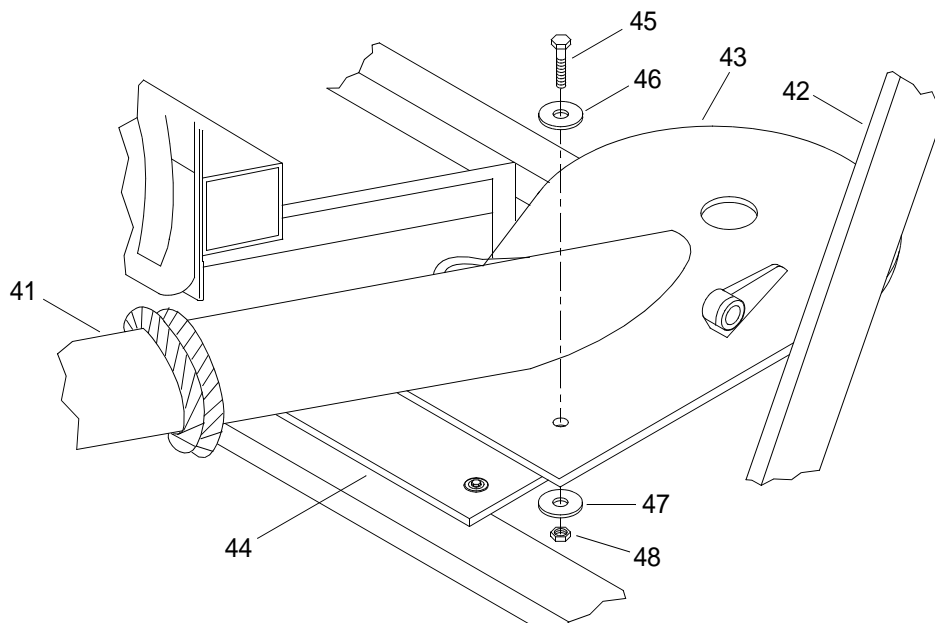
When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

NOTE

This procedure is typical for installation of both A-frame legs in shipping rack.

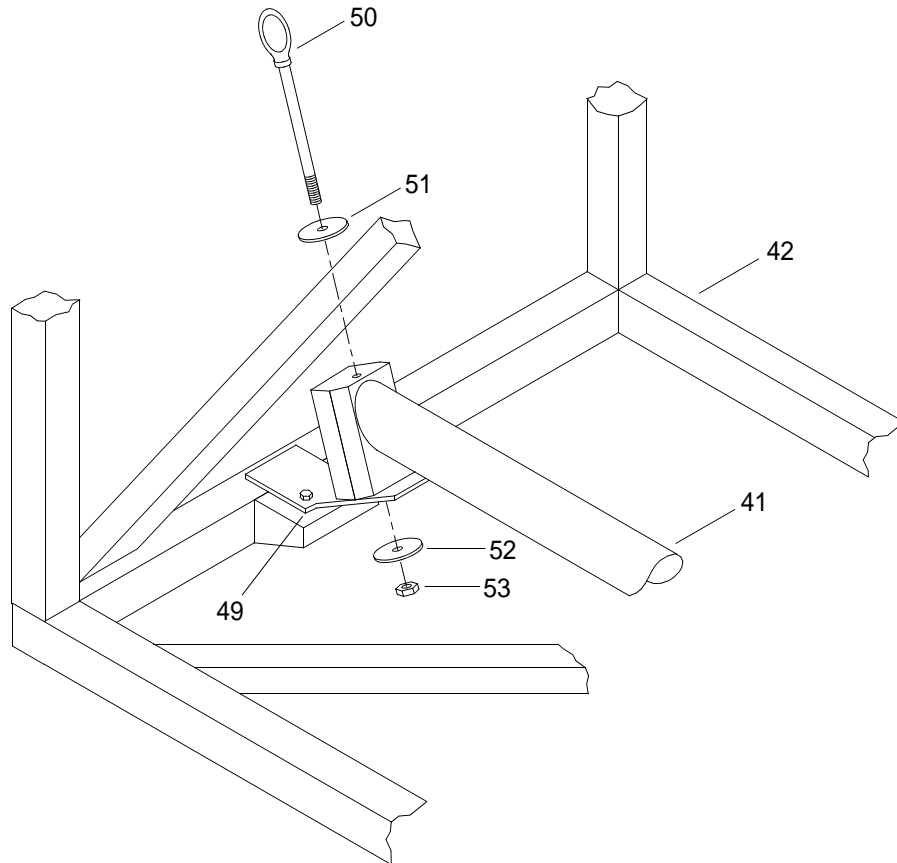
Removal of shipping frame top crossbars will assist personnel with installation of hardware into the shipping frame.

1. Using crane, slings and shackles, lower A-frame leg (41) into shipping frame (42).



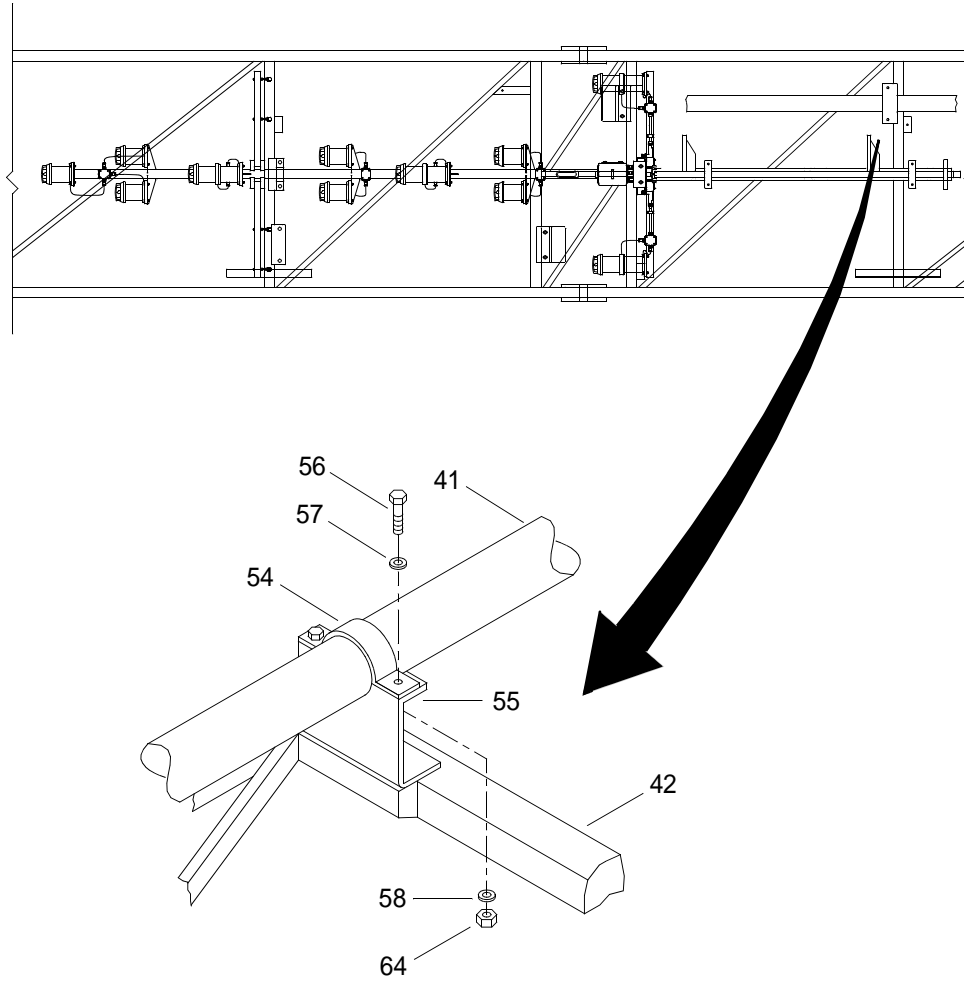
2. Attach A-frame sheave plate (43) to shipping frame (42).
 - a. Align holes in sheave plate (43) with holes in shipping bracket (44).
 - b. Install bolts (45) and washers (46) through sheave plate (43) and shipping bracket (494).
 - c. Install washers (47) and self-locking nuts (48). Tighten self-locking nuts (48).

3. Attach lower end of A-frame leg (41) to shipping frame (42).



- a. Align hole in lower end of A-frame leg (41) with hole in shipping bracket (49).
- b. Install eyebolt (50) and washer (51) through lower A-frame leg (41) and shipping bracket (49).
- c. Install washer (52) and nut (53) on eyebolt (50). Tighten nut (53).
- d. Remove slings and shackles.

4. Clamp A-frame leg (46) in shipping frame (47).



- a. Position upper clamp half (59) over A-frame leg (46).
- b. Align holes in upper clamp half (59) with holes in lower clamp half (60).
- c. Install bolts (61) and washers (62) through holes in upper clamp half (59) and lower clamp half (60).
- d. Install washers (63) and self-locking nuts (64) on bolts (61). Tighten self-locking nuts (64).

STOW SIDE FENDERING SYSTEM IN SHIPPING RACK

WARNING

**HEAVY OBJECTS****NOTE**

This procedure is typical for all side fenders and extensions.

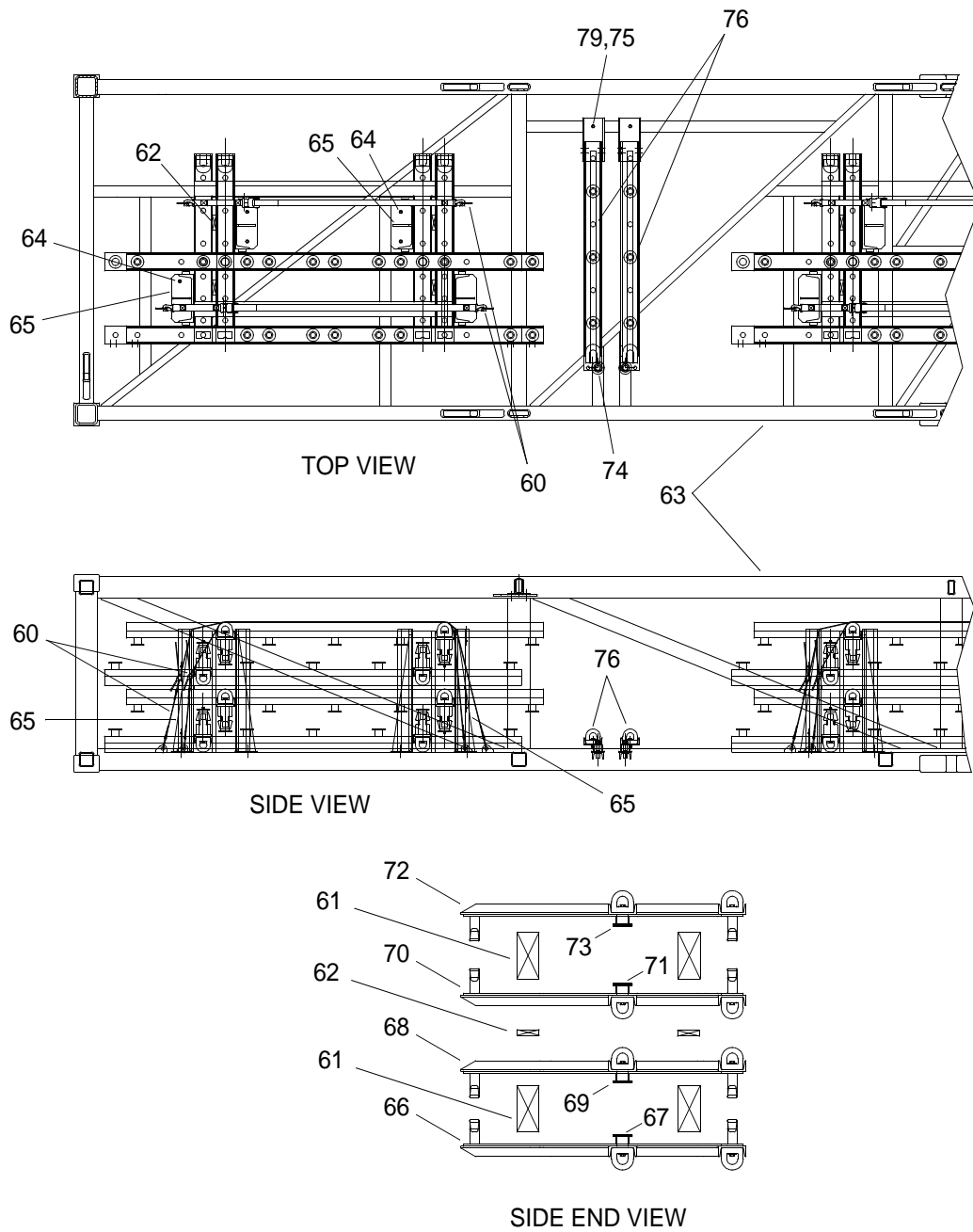
Removal of shipping frame top crossbars will assist personnel with installation of hardware into the shipping frame.

Dunnage of three sizes is used to separate the side fenders when stowed in the shipping frame. The large dunnage is 4 x 10 x 71 inches. The thin dunnage are 1 x 4 x 71 inches (long) and 1 x 4 x 34 inches (short).

WARNING

**HEAVY PARTS**

1. Remove all tie downs (60), large dunnage (61) and thin dunnage (62) from shipping frame (63).



2. Remove all hex head capscrews (64) securing all vertical supports (65) to shipping frame (63).

WARNING



HEAVY OBJECTS

3. Remove all vertical supports (65) from shipping frame (63).

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

NOTE

The side fenders are stacked in three piles of four each and are separated with dunnage for spacing.

4. Using crane, slings and shackles, position first side fender (66) in shipping frame (63) with standoffs (67) pointing upwards.
5. Remove slings and shackles from first side fender (66).

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

6. Position two large dunnage (61) across legs of first side fender (66).

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

7. Using crane, slings and shackles, position second side fender (68) on top of large dunnage (61) with standoffs (69) pointing downwards.
8. Remove slings and shackles from second side fender (68).
9. Position two long, thin dunnage (62) across legs of second side fender (68).

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

10. Using crane, slings and shackles, position third side fender (70) on top of thin dunnage (62) with standoffs (71) pointing upwards.
11. Remove slings and shackles from third side fender (750).

WARNING

**HEAVY OBJECTS**

12. Position two large dunnage (61) across legs of third side fender (70).

WARNING

**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

13. Using crane, slings and shackles, position fourth side fender (72) on top of large dunnage (61) with standoffs (73) pointing downwards.
14. Remove slings and shackles from fourth side fender (72).
15. Position four short, thin dunnage (62) vertically between legs of all four side fenders (66).

WARNING

**HEAVY OBJECTS**

16. Install vertical supports (65) on shipping frame (63) and secure with hex head capscrews (64). Tighten hex head capscrews (69).
17. Install two tie downs (61) to secure stack of side fenders (66, 68, 70, 72) to shipping frame (63). Tighten tie downs (61).
18. Install remaining eight side fenders.
19. Remove all hex head capscrews (74) and flat washers (75) used for securing fender extensions (76) from shipping frame (63).

WARNING

**HEAVY OBJECTS**

20. Using assistant, position fender extension (76) in shipping frame (63).

NOTE

A hex head capscrew and flat washer secures the connector end of the fender extension to the shipping frame. Only a hex head capscrew secures the standoff end of the fender extension to the shipping frame.

21. Install hex head capscrews (74) and flat washers (75), as required, to secure fender extension (76) on shipping frame (63). Tighten hex head capscrews (74).
22. Install remaining three fender extensions (76).

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
ABOVEDECK EQUIPMENT
STOWAGE**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
Goggles, Industrial: Clear Lens, Chipping (Cabinet B4) (Item 35, WP 0112 00)
Sling, Endless: 8400LB, 20' Yellow (Cabinet A9) (Item 82, WP 0112 00)
Qty 2
Shackle, 1-1/2" 30 Ton Shackle (Storage Room Hooks) (Item 68, WP 0112 00)
Qty 4

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)
Gloves, Rubber Industrial (Item 36, WP 0114 00)
Antiseize Compound (Item 3, WP 0114 00)

Personnel Required

Seaman 88K

Equipment Condition

Abovedeck Equipment Removed. (WP 0049 00)

INTRODUCTION**Scope**

This work package covers stowage of WT abovedeck equipment into shipping racks.

General

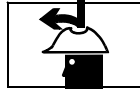
WT abovedeck equipment is stowed in shipping racks and secured with nuts, bolts, metal straps, tiedown straps and rubber pads.

All components are freshwater rinsed, allowed to thoroughly air dry and preserved prior to stowage in shipping racks.

WARNING



VEST



HELMET PROTECTION



HEAVY PARTS

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

STOW PORT AND STARBOARD PROPULSION MODULE EXHAUST PLENUMS**NOTE**

The following procedure is typical for both port and starboard exhaust plenums.

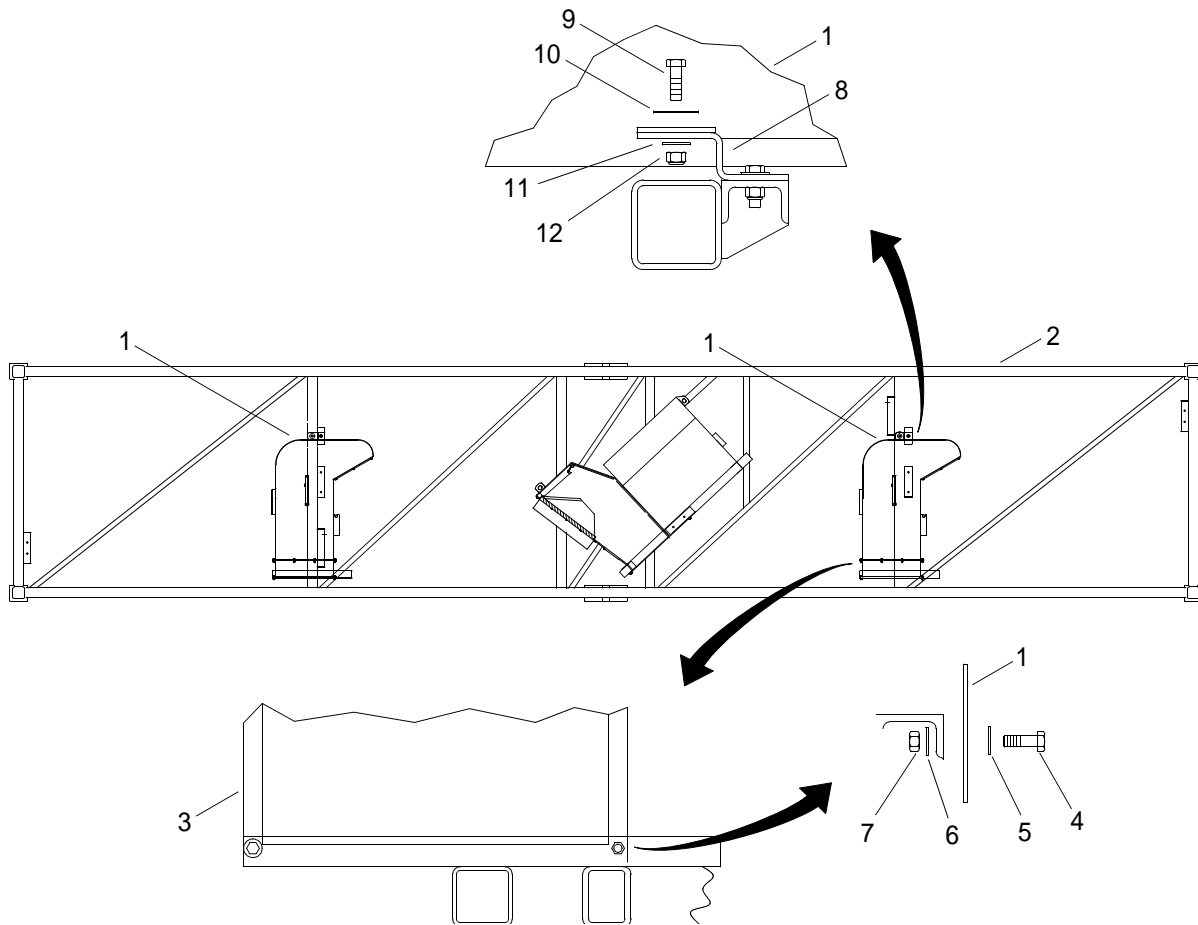
Removal of shipping frame top crossbars will assist personnel with installation of hardware into the shipping frame.

1. Inspect chains, slings and shackles. (WP 0007 00)

WARNING

When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

2. Using crane, slings and shackles, position exhaust plenum (1) in shipping rack frame (2).



3. Align holes in base of exhaust plenum (1) with holes in shipping rack frame bracket (3).
4. Install bolts (4) and washers (5) through base of exhaust plenum (1) and shipping rack frame bracket (3).
5. Install washers (6) and nuts (7) on bolts (4).
6. Align hole in top of exhaust plenum (1) with hole in shipping rack frame bracket (8).
7. Install bolt (9) and fender washer (10) through top of exhaust plenum (1) and shipping rack frame bracket (8).
8. Install washer (11) and nut (12) on bolt (9).
9. Tighten nuts (7 and 12).
10. Remove slings and shackles.

STOW MODULE ELECTRICAL INTERCONNECT ASSEMBLY

WARNING



HEAVY PARTS

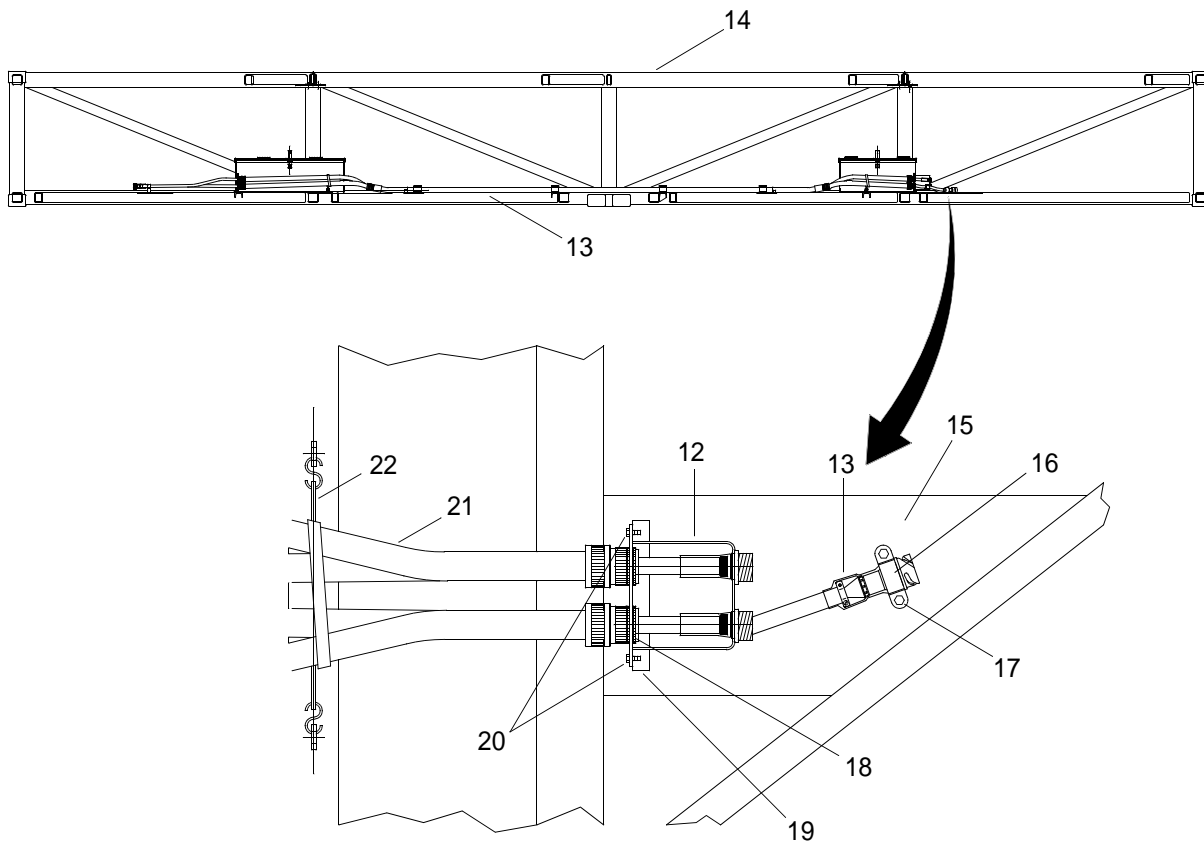
Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

NOTE

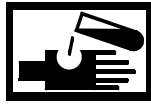
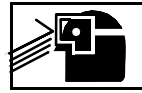
Removal of shipping frame top crossbars will assist personnel with installation of hardware into the shipping frame.

1. Using crane, shackles and slings position interconnect assembly (13) in shipping rack frame (14).



2. Position interconnect cable end (13) on shipping rack mounting plate (15).
3. Position strap clamp (16) over interconnect cable end (13).

WARNING

**CHEMICAL****EYE PROTECTION**

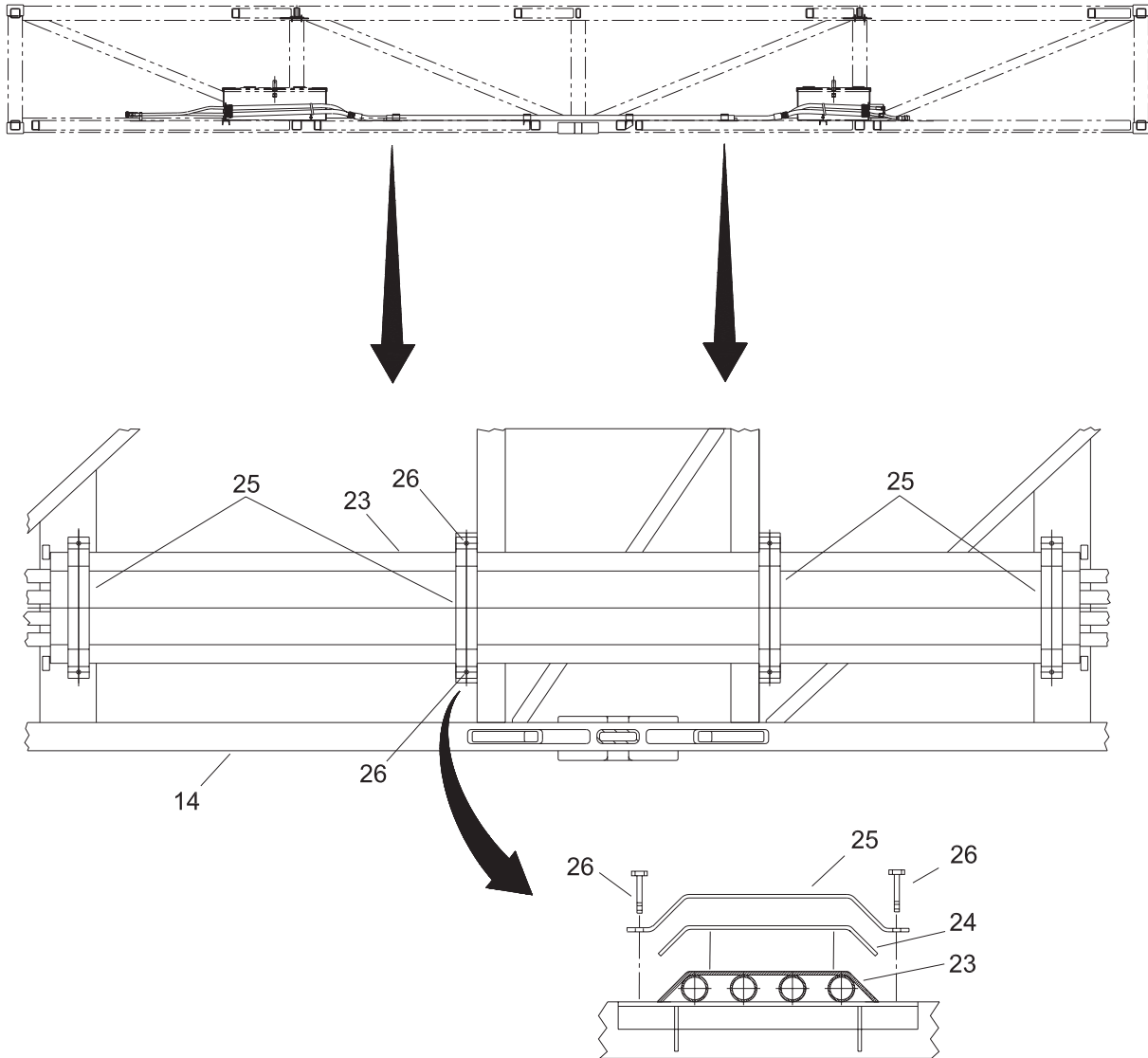
4. Apply antiseize compound to threads of two bolts (17).
5. Install bolts (17) to secure strap clamp (16) and interconnect cable end (13) to shipping rack mounting plate (15).
6. Tighten bolts (17).
7. Position interconnect mounting plate (18) on mounting bracket (19).

WARNING

**CHEMICAL****EYE PROTECTION**

8. Apply antiseize compound to threads of bolts (20).
9. Install bolts (20) to secure interconnect mounting plate (18) to mounting bracket (19).
10. Tighten bolts (20).
11. Secure cables (21) to shipping rack frame (14) using tiedown strap (22).

12. Position cable guard (23) between mounting holes in shipping rack frame (14).



13. Position rubber pads (24) on cable guard (23).

14. Position strap clamps (25) on rubber pads (24) and cable guard (23).

WARNING



CHEMICAL



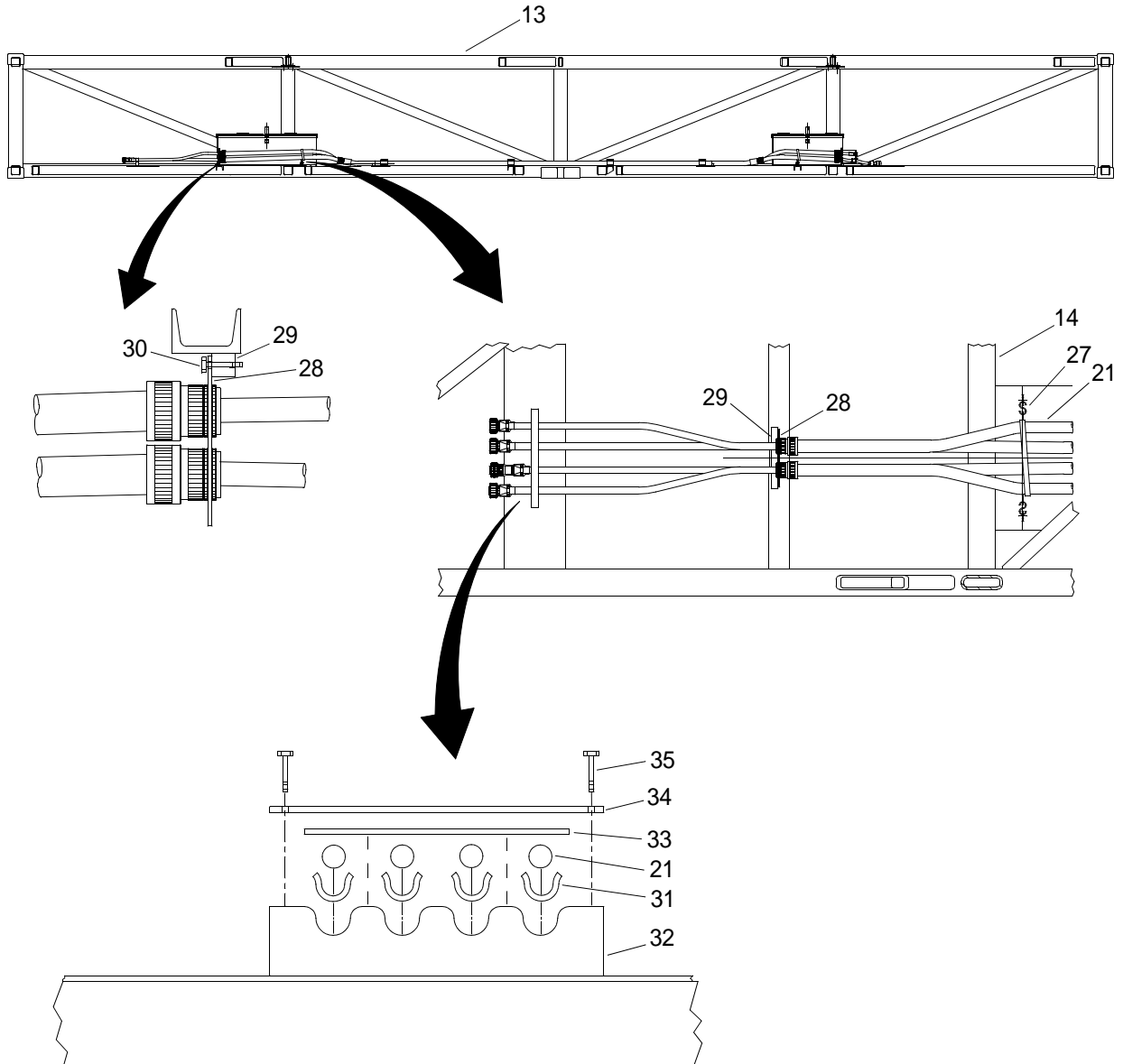
EYE PROTECTION

15. Apply antiseize compound to threads of bolts (26).

16. Install bolts (26) to secure strap clamps (25), rubber pads (24) and cable guard (23) to shipping rack frame (14).

17. Tighten bolts (26).

18. Secure cables (21) to shipping rack frame (14) using tiedown strap (27).



19. Position interconnect mounting plate (28) on mounting bracket (29).

WARNING



CHEMICAL



EYE PROTECTION

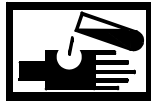
20. Apply antiseize compound to threads of bolts (30).

21. Install bolts (30) to secure interconnect mounting plate (28) to mounting bracket (29).

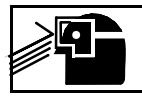
22. Tighten bolts (30).

-
23. Install rubber pads (31) in shipping rack frame mounting bracket (32).
 24. Position interconnect cables (21) in shipping rack frame mounting bracket (32).
 25. Install rubber pad (33) over interconnect cables (21).
 26. Position metal tiedown strap (34) over interconnect cables (21).

WARNING



CHEMICAL



EYE PROTECTION

27. Apply antiseize compound to threads of bolts (35).
28. Install bolts (35) securing metal tiedown strap (34) and interconnect cables (21) to shipping rack frame mounting bracket (32).
29. Tighten bolts (35).

STOW AIR INTAKE PLENUM

WARNING



HEAVY PARTS

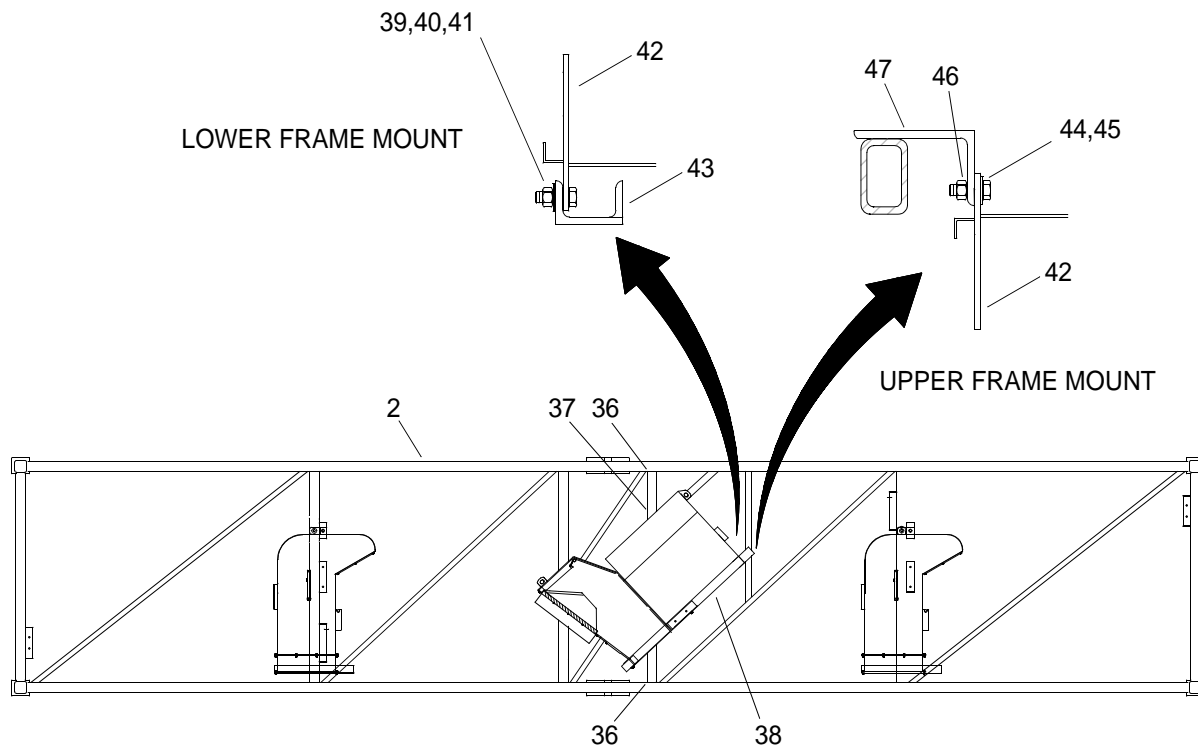
Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

NOTE

Removal of shipping frame top crossbars will assist personnel with installation of hardware into the shipping frame.

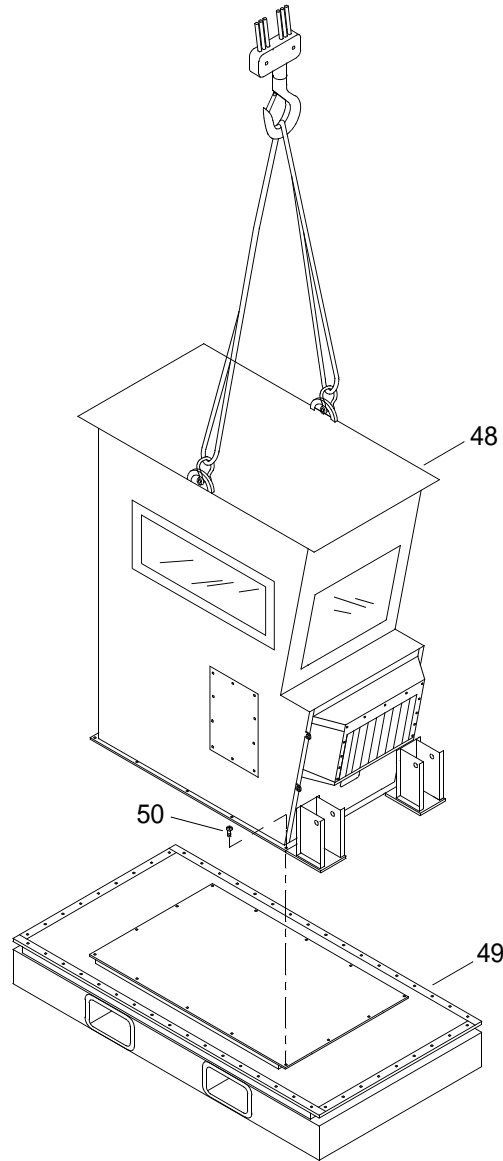
1. Remove attaching bolts (36) and shipping frame crossbar (38) from top of shipping rack frame (2).



1. Using crane, slings and shackles, position intake plenum (38) in shipping rack frame (2).
2. Install hex nuts (39), washers (40) and hex head capscrews (41) to secure base (42) of intake plenum (38) to lower weldment (43) of shipping rack frame (2). Tighten hex nuts (39).
3. Install washers (44) and hex head capscrews (45) into captive nuts (46) to secure base (42) of intake plenum (38) to upper weldment (47) of shipping rack frame (2). Tighten hex head capscrews (45).
4. Remove slings and shackles.
5. Install attaching bolts (36) and shipping frame crossbar (38) on top of shipping rack frame (2).

STOW OPERATORS CAB

1. Attach slings and shackles to operators cab (48).



WARNING

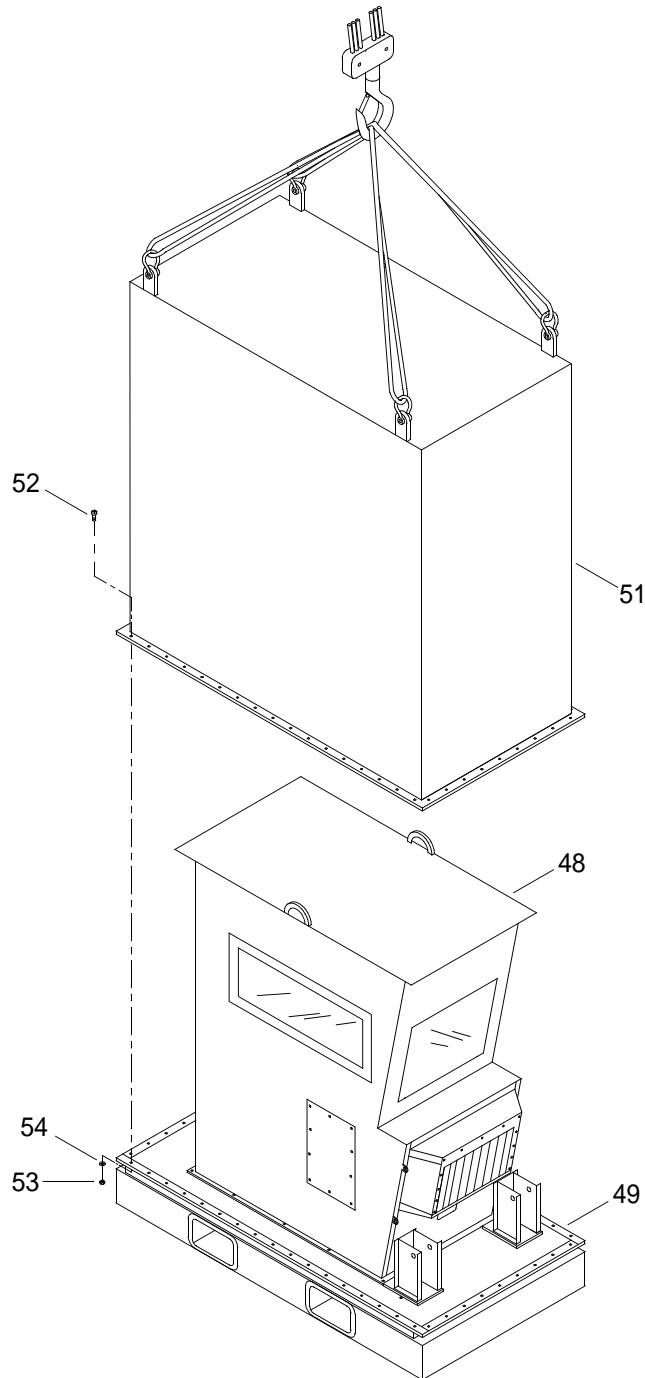


HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

2. Using crane, slings and shackles, lift operators cab (48) from deck of warping tug and place on operators cab stowage pallet (49).

3. Install bolts (50) securing operators cab (48) to operators cab stowage pallet (49).
4. Remove slings and shackles from operators cab (48).
5. Attach slings and shackles to operators cab container lid (51).



 WARNING



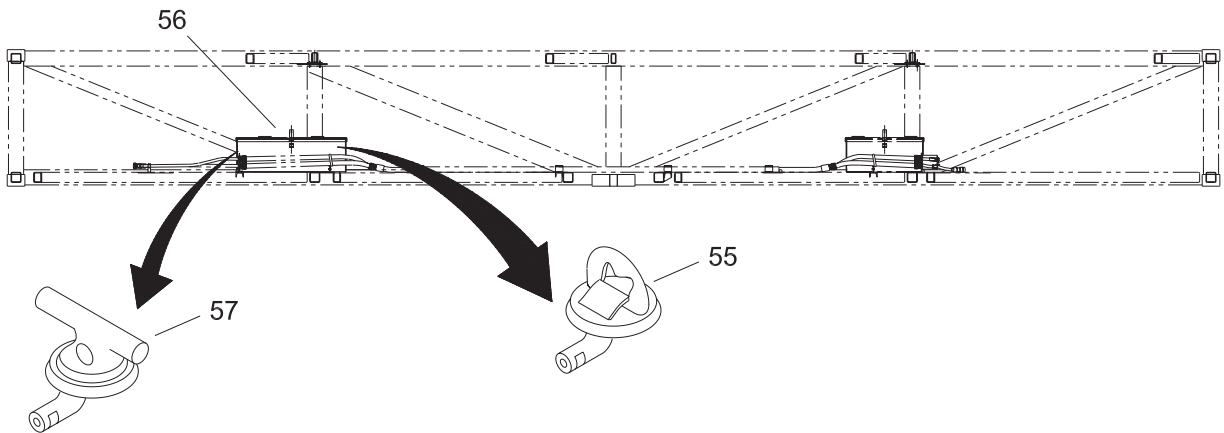
HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

6. Using crane, slings and shackles, place operators cab container lid (51) over operators cab (48) on stowage pallet (49).
7. Install bolts (52), lock washers (53) and hex nuts (54) to secure operators cab container lid (51) to operators cab stowage pallet (49).
8. Remove slings and shackles from operators cab container lid (51).

STOW D-RINGS FITTINGS AND DECK CLEATS

1. Stow D-rings fittings (55) in electrical interconnect shipping rack storage box (56).



 WARNING



HEAVY OBJECTS

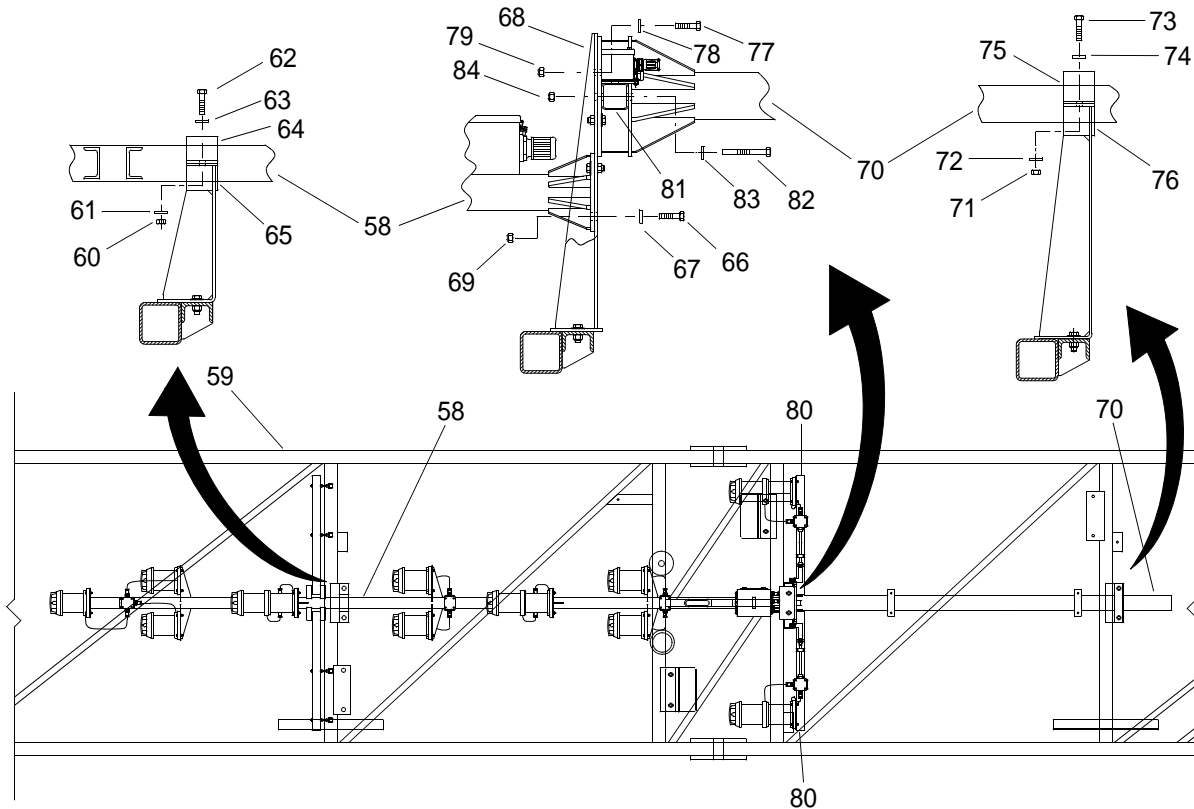
Deck fittings weigh more than 34 lb, use an assistant when handling a deck fittings. failure to comply may cause injury to personnel

2. Stow deck cleats (57) in electrical interconnect shipping rack storage box (56).

STOW MAIN ASSEMBLY MAST**NOTE**

Removal of shipping frame top crossbars will assist personnel with installation of hardware into the shipping frame.

1. Install upper main assembly mast (58) in shipping rack frame (59).



- a. Remove nuts (60), washers (61), bolts (62) and washers (63) securing upper (64) and lower (65) clamp halves.

WARNING**HEAVY PARTS**

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

- b. Using crane, slings and shackles, position upper main assembly mast (58) into shipping rack frame (59).
- c. Install bolts (66) with washers (67) through stowage frame bracket (68) and base of upper main assembly mast (58).

-
- d. Install nuts (69) on bolts (66). Tighten nuts (69).
 - e. Install upper clamp half (64) over lower clamp half (65).
 - f. Install bolts (62) with washers (63) into clamp halves (64 and 65).
 - g. Install washers (61) and nuts (60) on bolts (63). Tighten nuts (60).
 - h. Remove slings and shackles from upper main assembly mast (58).
2. Install lower main assembly mast (70) in shipping rack frame (59).
 - a. Remove nuts (71), washers (72), bolts (73) and washers (74) securing upper (75) and lower (76) clamp halves.

WARNING



HEAVY PARTS

Do not stand beneath suspended loads. Failure to comply could result in death or injury to personnel.

When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack. Failure to comply could result in death or injury to personnel.

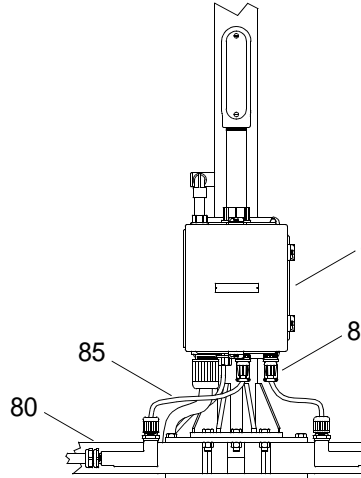
- b. Using crane, slings and shackles, position lower main assembly mast (70) into shipping rack frame (59).
- c. Install bolts (77) with washers (78) through stowage frame bracket (68) and base of lower main assembly mast (70).
- d. Install nuts (79) on bolts (77). Tighten nuts (79).
- e. Install upper clamp half (75) over lower clamp half (76).
- f. Install bolts (73) with washers (74) into clamp halves (75 and 76).
- g. Install washers (72) and nuts (71) on bolts (73). Tighten nuts (71).
- h. Remove slings and shackles from lower main assembly mast (70).

NOTE

This step is typical for both port and starboard yardarms, except port yardarm must be installed facing toward bottom of lower main assembly mast.

- i. Install lower main assembly mast yardarms (80).
 - (1) Position and align holes in yardarm (80) with holes (81) in base of lower main assembly mast (70).
 - (2) Install bolts (82) with washers (83) into base of lower main assembly mast (70) and yardarm (80).
 - (3) Install nuts (84) on bolts (82). Tighten nuts (84).

- j. Connect yardarm electrical cable connectors (85) to main assembly mast junction box (86).



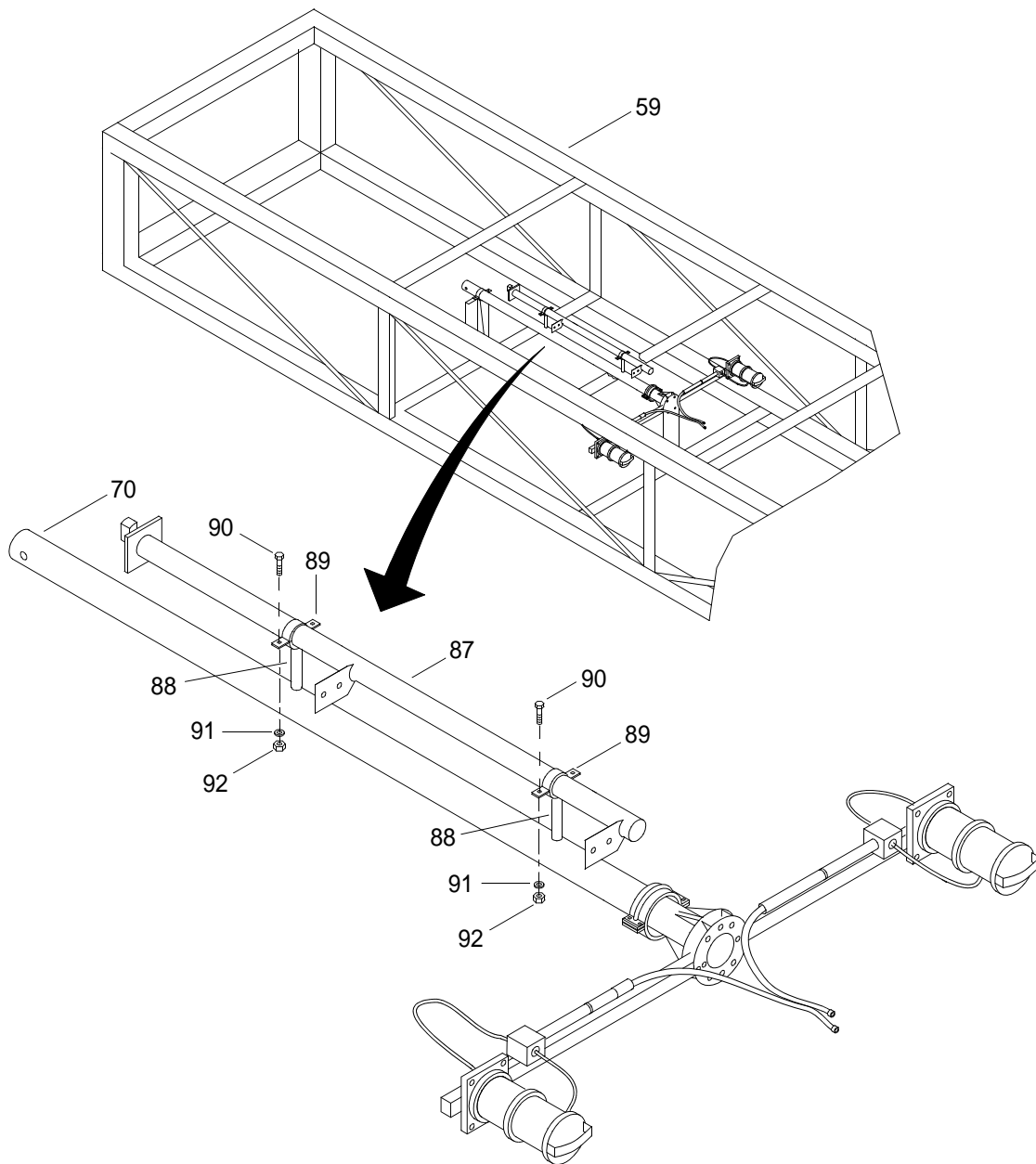
STOW STUB ASSEMBLY MAST IN SHIPPING FRAME

WARNING



HEAVY OBJECTS

1. Position stub assembly mast (87) on lower main assembly mast (70) lower clamp supports (88) in shipping rack frame (59).



2. Position upper bracket clamp halves (89) over stub mast assembly (87).
3. Install bolts (90), washers (91) and nuts (92) through clamps (88 and 89) to secure stub assembly mast (87) to lower main assembly mast (70). Tighten nuts (92).

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
BASIC ISSUE ITEMS (BII) AND EQUIPMENT
STOWAGE**

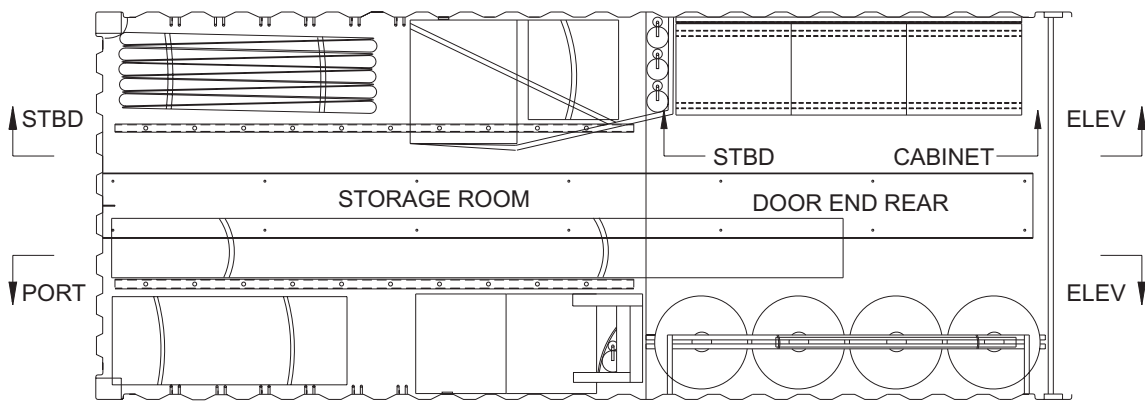
INTRODUCTION

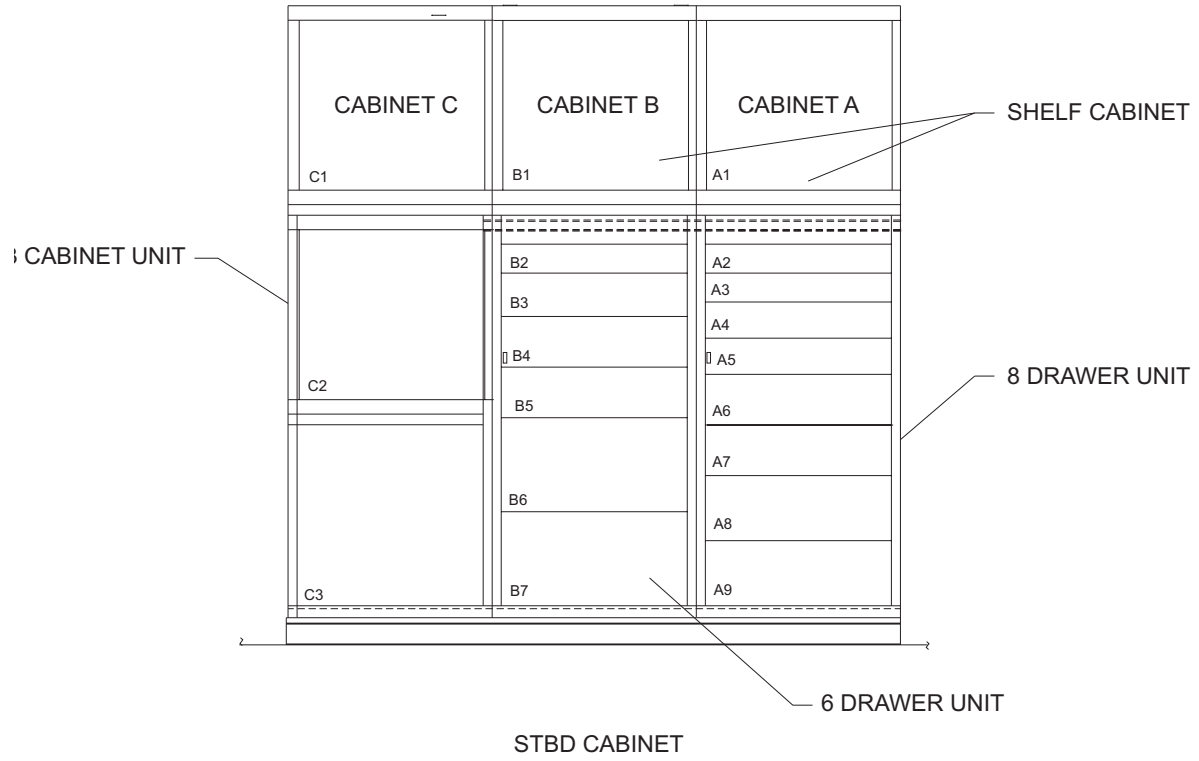
Scope

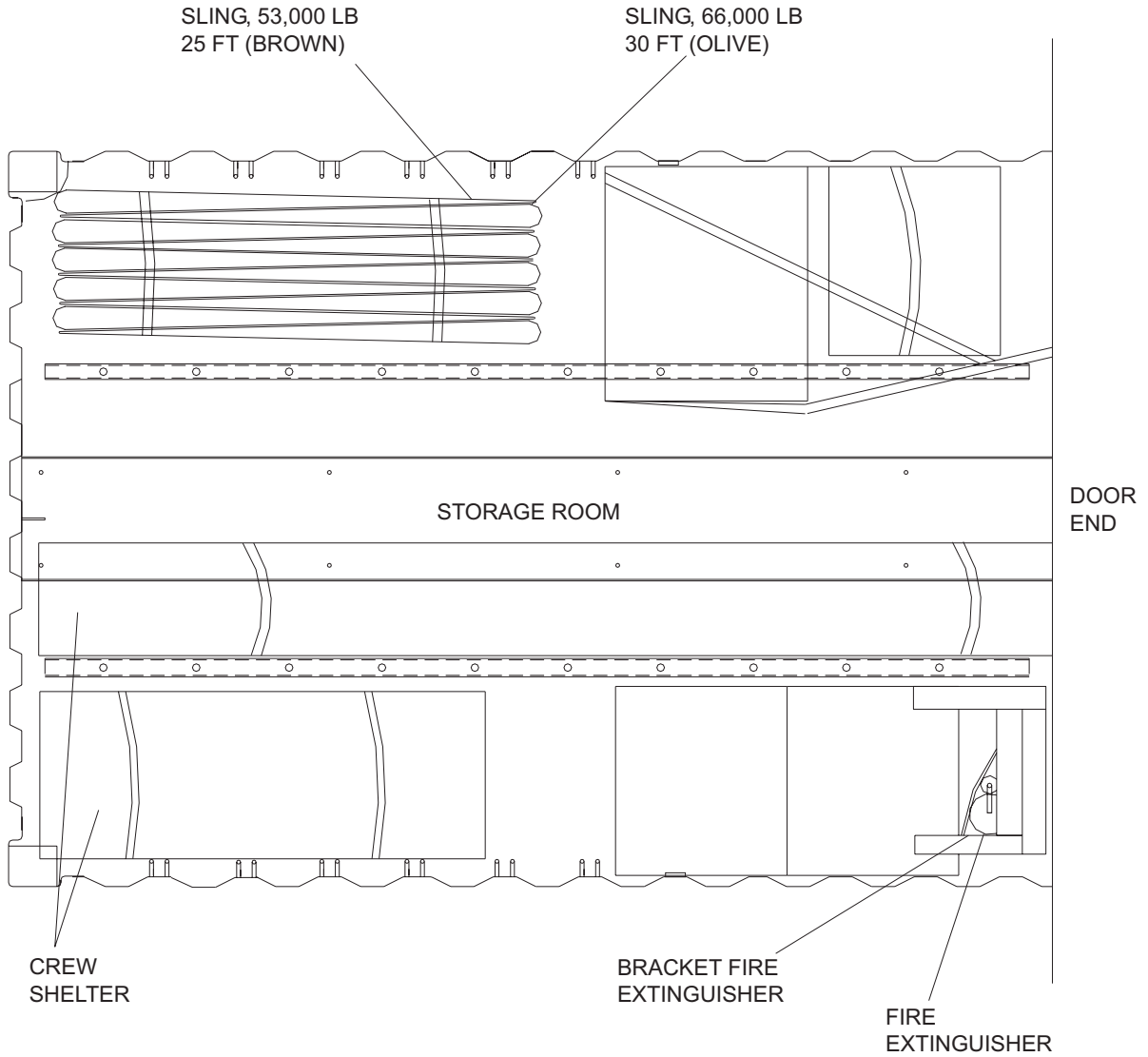
This work package covers stowage of the BII.

The BII for the WT is stowed in the BII container. The BII components are stowed in two sets of cabinet drawers and shelves for smaller items, and in a separate storage room provided with cargo nets and ratcheting tie down straps for large or bulky items. The packing list in the BII container may be consulted for additional information.

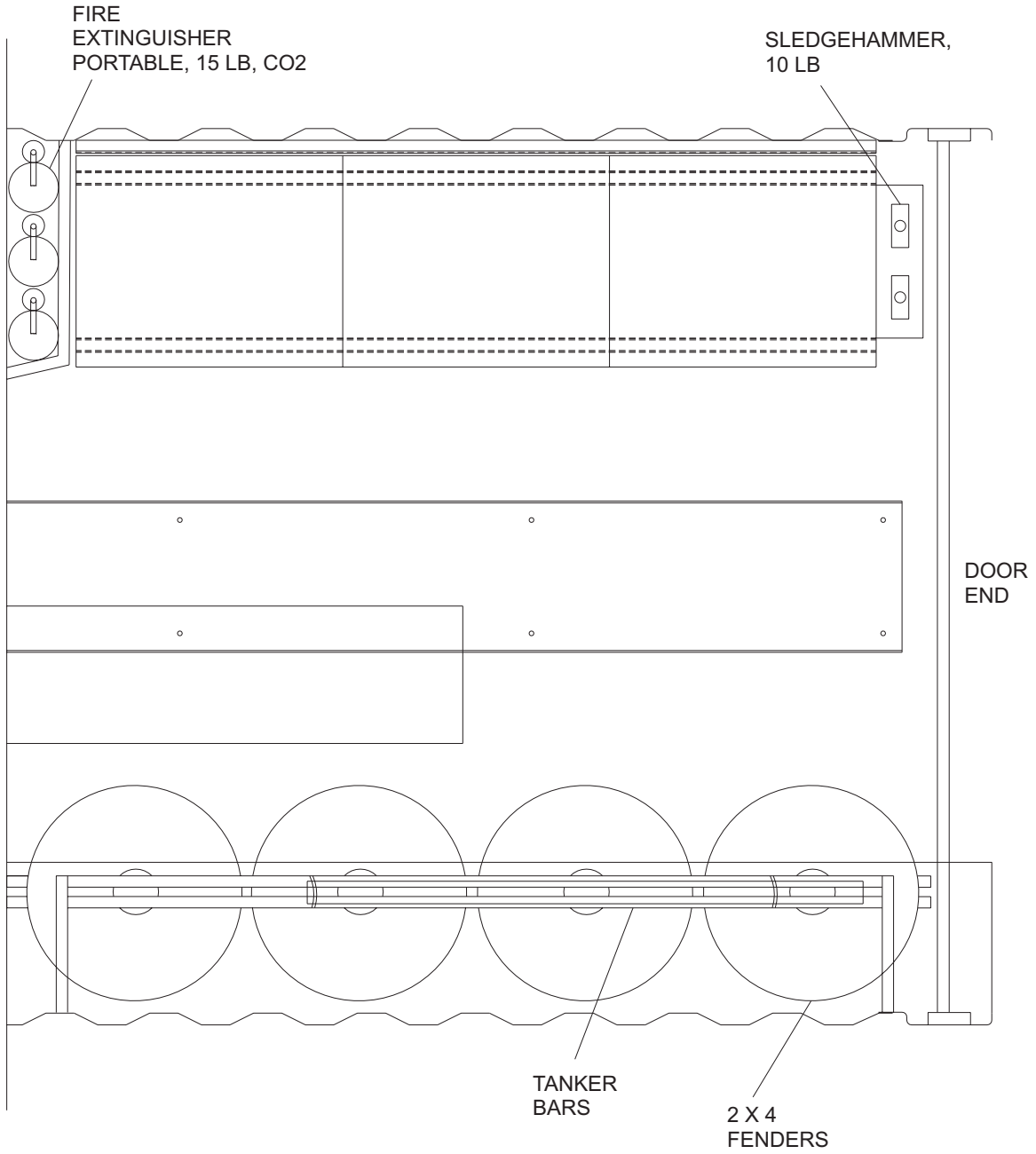
STOWAGE OF BII



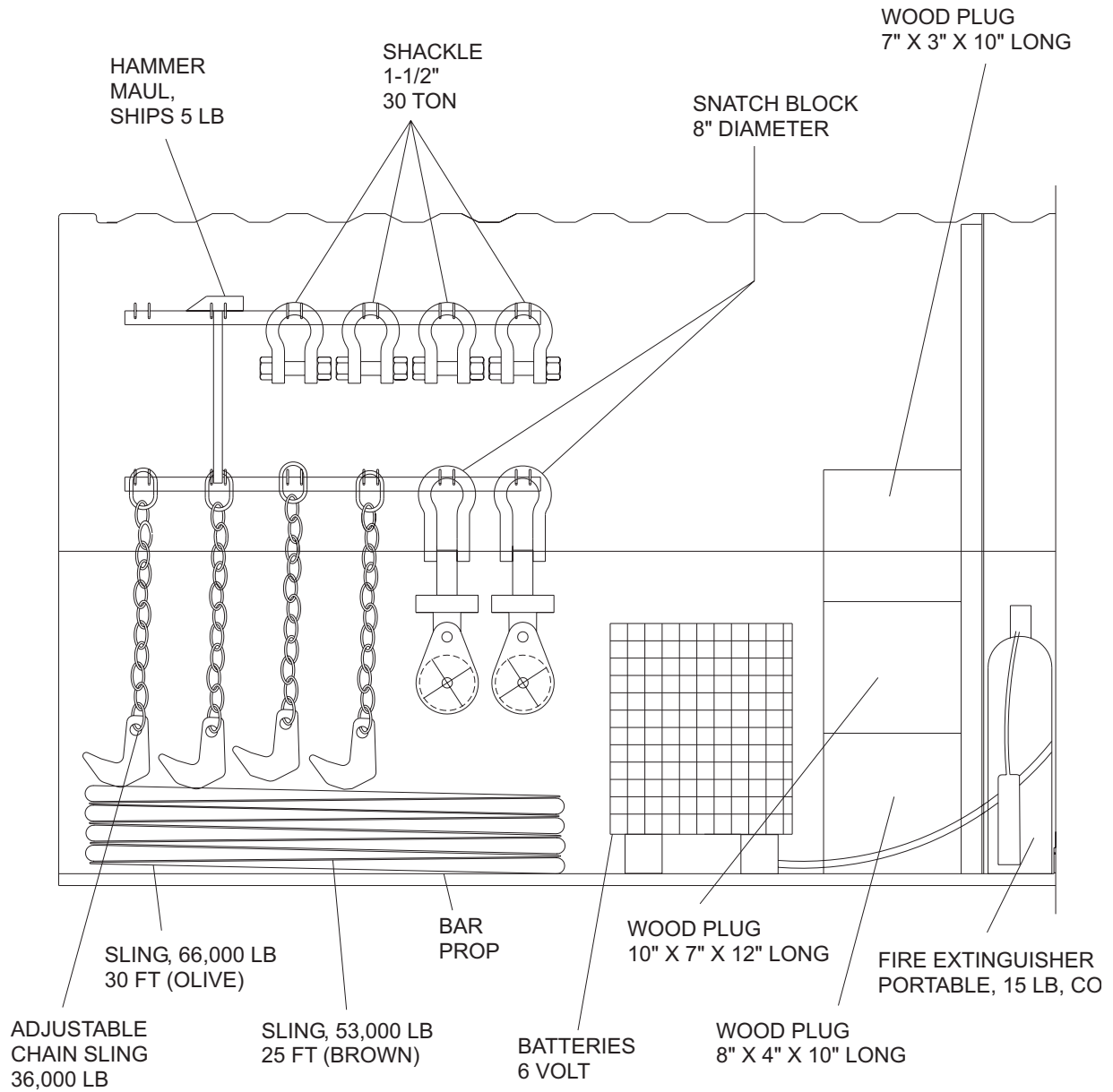




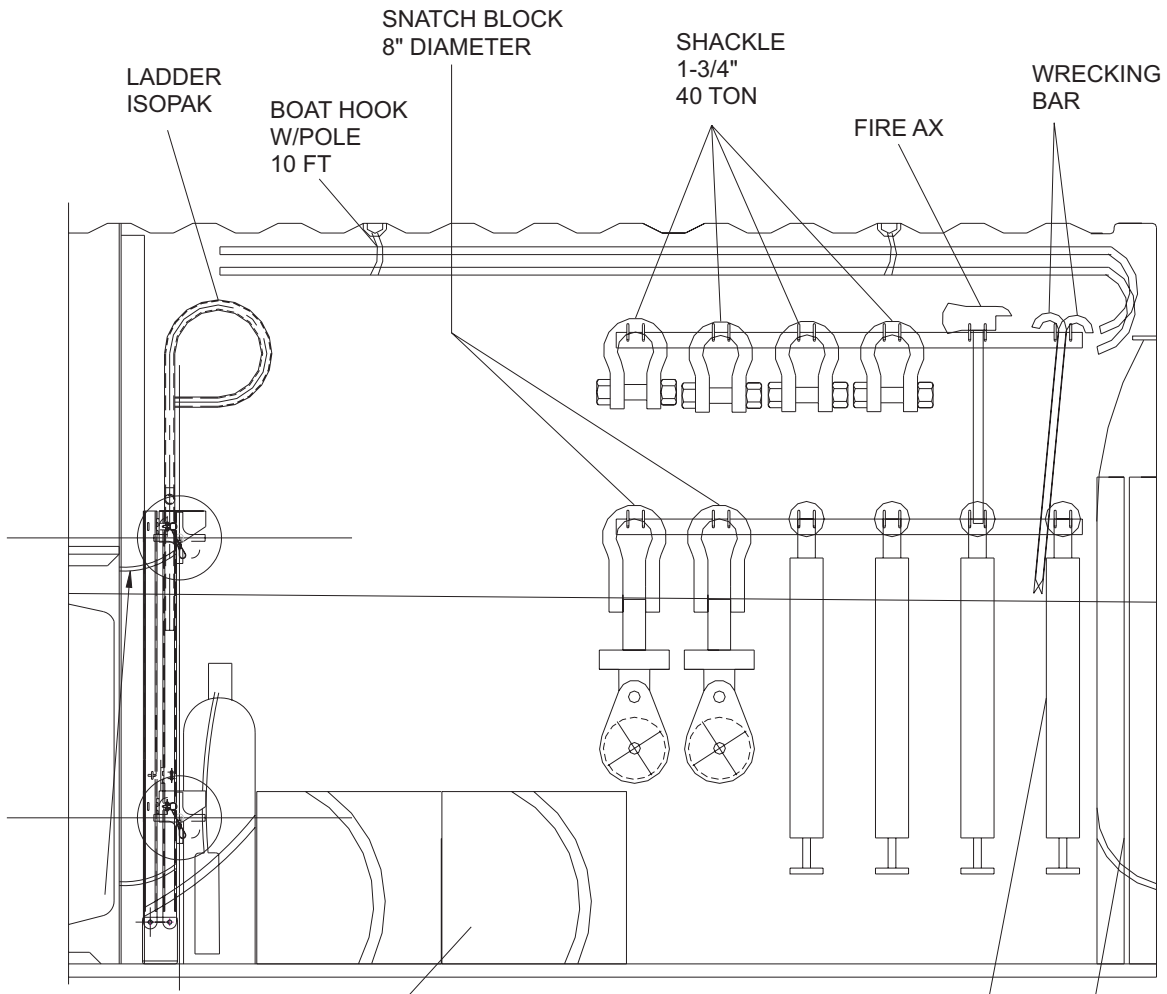
PLAN VIEW 2
STORAGE ROOM ONLY



PLAN VIEW 3
CABINET ROOM ONLY



STARBOARD ELEVATION



- HATCH HANDLING ASSEMBLY
- CLEVIS PIN
 - SUPPORT, HATCH WELD
 - SUPPORT, HATCH WELD
 - COTTER, HAIRPIN
 - BRACKET, WELDMENT
 - BRACKET, WELDMENT
 - FLATHEAD HEX SOCKET CAPSCREW
 - HEX NUT
 - BASE, PADEYE
 - HEX HEAD CAPSCREW

- STEEL SHORING ADJUSTABLE SHORT 3' TO 5'
- PIN INVERTER AND REMOVER

PORT ELEVATION

Table 1. BII Stowage Location.

DESCRIPTION	QTY	LOCATION
Adapter, Socket Wrench	1	Storage Room
Apron, Utility	2	Cabinet A3
Ax, Pick Head	1	Storage Room Hooks
Bag, Tools and Spare Parts	1	Storage Room
Bar, Wrecking: 36" Long	2	Storage Room Hooks
Battery, Nonrechargeable, 6 volt (Case)	6	Storage Room and Cabinets
Battery, Nonrechargeable, D Cell (Case)	2	Storage Room and Cabinets
Blanket, Fire 72" x 60"	1	Cabinet C1
Block, Tackle: 8" Diameter	4	Storage Room Hooks
Bracket Assembly, Lantern, Hand	3	Cabinet A8
Cable Assembly, Power, Electrical: NATO Slave	1	Storage Room
Can, Water, Military: 5 Gallon	2	Cabinet C1
Chain Sling, Adjustable, 36, 000 lbs	4	Storage Room Hooks
Clips, Halyard (Box)	2	Cabinet A5
Crowbar (60" Long)	2	Fender Rack
Dressing, Burn Kit, Topical Dressing	1	Cabinet B2
Extinguisher, Fire: Portable, 15LBS. CO2 CAOP	3	Storage Room
Faceshield, Industrial	6	Cabinet B3
Fast Lube Oil Change System (FLOCS), Pump & Hoses	1	Storage Room
Fiber Rope Assembly, Single Leg: Heaving, Safety, 100"	2	Cabinet A4
Fid: 12" Wood	2	Storage Room
Filter, Light, General Purpose: Red Filter	1	Cabinet A8
First Aid Kit	2	Cabinet B3
Flag, Signal: A Intn'l Code Size 6	1	Cabinet A5
Flag, Signal: B Intn'l Code Size 6	1	Cabinet A5
Flag, Signal: O Intn'l Code Size 6	1	Cabinet A5

Table 1. BII Stowage Location. (Continued)

DESCRIPTION	QTY	LOCATION
Flag, Signal: U Intn'l Code Size 6	1	Cabinet A5
Flag, Signal: V Intn'l Code Size 6	1	Cabinet A5
Flag, Signal: W Intn'l Code Size 6	1	Cabinet A5
Flag, Signal: Y Intn'l Code Size 6	1	Cabinet A5
Flashlight: Watertight	2	Cabinet A4
Gas Free Meter	2	Cabinet B6
Gloves, Antiflash	6	Cabinet B5
Gloves, Electrical Workers'	6	Cabinet B5
Gloves, Men's and Women's: Leather Palm	6	Cabinet B5
Gloves, Rubber, Industrial	2	Cabinet B5
Goggles, Industrial: Clear Lens, Chipping	6	Cabinet B4
Goggles, Industrial: No Vents	2	Cabinet B4
Goggles, Sun, Wind and Dust	6	Cabinet B4
Grip, Handle	3	Cabinet A8
Hammer, Hand: 10 LBS Sledge	2	Cabinet Rack
Hammer, Hand: Maul, Ships 5 LB	1	Storage Room Hooks
Harness, Safety, Torso	6	Cabinet A7
Helmet, Safety: Blue	2	Cabinet C1
Helmet, Safety: Brown	4	Cabinet C1
Holder, Light	3	Cabinet A8
Hook, Boat: W/Pole	2	Storage Room Hooks
Insertter and Remover, Pin	2	Storage Room
Jumper Cable Assembly	1	Storage Room
Kit, Lockout/Tagout, Pig	1	Cabinet B3
Ladder, ISOPAK	1	Storage Room
Lantern, Electric	3	Cabinet A8
Lanyard, Safety Harness	6	Cabinet A7

Table 1. BII Stowage Location. (Continued)

DESCRIPTION	QTY	LOCATION
Life Preserver, Vest: Inherently Buoyant W/ Collar	8	Cabinet B1
Life Preserver, Vest: Sterns Work Vest	8	Cabinet A1
Light, Chemiluminescent (Box)	24	Cabinet A2
Plug, Ear (Box)	1	Cabinet B4
Plug, Wood, 3" TO 0" X 8" Long	5	Cabinet A3
Plug, Wood: 1" TO 0" x 3" Long	5	Cabinet A3
Plug, Wood: 10" X 7" X 12" Long	5	Storage Room
Plug, Wood: 2" TO 0" X 4" Long	5	Cabinet A3
Plug, Wood: 7" X 3" X 10" Long	5	Storage Room
Plug, Wood: 8" X 4' X 10" Long	5	Storage Room
Pneumatic Test Kit (Provided With Schottel Waterjet)	1	Cabinet A2
Protector, Hearing	6	Cabinet B4
Pump, Sampler	1	Cabinet A2
Repair Kit, Pipe, Emergency Damage Control	1	Cabinet B7
Rope, Fibrous: Halyard, Nylon, 1/4" x 300'	1	Cabinet B6
Rope, Fibrous: Retrieving, Ring Bouy 900' Roll	1	Cabinet C1
Shackle, 1-1/2" 30 Ton Shackle	4	Storage Room Hooks
Shackle: 1/2" 2 Ton	8	Cabinet B7
Shackle: 1-3/4", 40 Ton	4	Storage Room Hooks
Shackle: 3/4", 4.75 Ton	8	Cabinet B7
Shackle: 5/8", 3.25 Ton	8	Cabinet B7
Shape, Day, Maritime: Ball Black, 2' DIA. 4" Long	2	Storage Room
Shape, Day, Maritime: Diamond, Black, 2' x 4'	1	Storage Room
Shoring, Damage Control, Adjustable: Steel, Short 3' to 5'	4	Storage Room Hooks
Signal, Smoke and Illumination: Distress, Orange Smoke, Red Illuminator	12	Cabinet B3

Table 1. BII Stowage Location. (Continued)

DESCRIPTION	QTY	LOCATION
Sling, 66,000LB, 30FT (Olive)	4	Storage Room
Sling, Endless: 53000LB, 25' Brown	4	Storage Room Hooks
Sling, Endless: 5300LB, 4' Green	4	Cabinet A6
Sling, Endless: 5300LB, 5' Green	4	Cabinet A6
Sling, Endless: 5300LB, 6' Green	4	Cabinet A6
Sling, Endless: 8400LB, 20' Yellow	4	Cabinet A9
Socket, Socket Wrench	1	Storage Room
Sterns Work Suit	8	Cabinet C2, C3
Tape, Reflective: 3" X 50 Yards, Adhesive Backed	1	Cabinet B3
Tool Kit, General Mechanic's: Marine And Rail	1	Cabinet B7
Wedge, Wood: Plug, Tapered, Hardwood, 2" x 2" X 8" Long	5	Cabinet A3
Wedge, Wood: Shoring, Tapered, 1 1/2" X 2" x 12" Long	5	Cabinet A3
Whistle, Ball: Plastic Ball W/Lanyard	24	Cabinet A2
LOOSE HARDWARE STORED IN BII CONTAINER		
Battery (Primary)	14	Cabinets
Fire Extinguisher	1	Storage Room
Bracket, Fire Extinguisher (Mounts on Plenum)	1	Storage Room
Capscrew, Hex Head (.375-16UNC X .75 in.) (Used with Fire Extinguisher Bracket)	6	Cabinets
Nut, Hex Head (.375-16UNC) (Used with Fire Extinguisher Bracket)	6	Cabinets
Capscrew, Hex Head (1.50-6UNC X 7 in.) (Used to Mount Main Assembly Mast Lower Weldment to Deck)	1	Cabinets
Nut, Hex Head (1.5-6UNC, SST) (Used to Mount Main Assembly Mast Lower Weldment to Deck)	1	Cabinets
Clamp, Forward (Used to Mount Forward Side of Interconnect Assembly to Deck)	2	Cabinets

Table 1. BII Stowage Location. (Continued)

DESCRIPTION	QTY	LOCATION
Capscrew, Socket Head (.500-13UNC X 2 in.) (Used with Forward Clamp)	2	Cabinets
Clamp, Aft (Used to Mount Forward Side of Interconnect Assembly to Deck)	2	Cabinets
Clamp, Mast Upper (Outer Clamp Half Used to Mount Main Assembly Mast to Operators Cab)	1	Storage Room
Capscrew, Hex Head (.500-13UNC X 2 in.) (Used with Mast Upper Clamp)	4	Cabinets
Nut, Hex Head (.500-13UNC) (Used with Mast Upper Clamp)	4	Cabinets
Mount Weldment (Inner Clamp Half Roof Mount with Wire Rope Guide Used to Mount Main Assembly Mast to Operators Cab)	1	Storage Room
Nut, Hex Head (.500-13UNC) (Used with Mount Weldment)	4	Cabinets
Navigation Light (Used with Stub Mast Weldment)	2	Cabinets
Light Lens (Clear Lens Used with Stub Mast Lower Navigation Light)	1	Cabinets
Capscrew, Hex Head (.375-16UNC X 1 in.) (Used with Stub Mast Navigation Light)	4	Cabinets
Washer, Flat (.375 NOM) (Used with Stub Mast Navigation Light)	4	Cabinets
Standoff Assembly (Used to Mount Crew Shelter to Life Line Stanchion)	2	Storage Room
Hoist, Wire Rope Grip	1	Storage Room
Shackle, Anchor (Used with Wire Rope Hoist for Raising and Lowering Main Assembly Mast)	1	Cabinets
Crew Shelter	1	Storage Room
2 FT x 4 FT Fenders	4	Cabinet Area
Hatch Handling Assembly (Consisting of *)		Storage Room
* Bar Prop	4	
* Bar Prop	4	
* Pin, Clevis (.50 NOM)	12	

Table 1. BII Stowage Location. (Continued)

DESCRIPTION	QTY	LOCATION
* Cotter, Hairpin	12	
* Bracket, Weldment	2	
* Bracket, Weldment	2	
* Capscrew, Flathead Hex Socket (.500-13UNC X 1.75 in.)	8	
* Nut, Hex Socket (.500-13UNC)	16	
* Base, Padeye	4	
* Capscrew, Hex Head (.500-13UNC X 1.75 in.)	8	
* Support, Hatch Weldment	2	
* Support, Hatch Weldment	2	
Battle Lantern (for below deck)	3	Cabinet Area

**OPERATOR MAINTENANCE
WARPING TUG
MISCELLANEOUS CONTAINER
STOWAGE**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)

Sling, Endless: 8400LB, 20' Yellow (Cabinet A9) (Item 82, WP 0112 00)

Qty 2

Shackle, 1-1/2" 30 Ton Shackle (Storage Room Hooks) (Item 68, WP 0112 00)

Qty 4

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)

Personnel Required

Seaman 88K (2)

INTRODUCTION**Scope**

This work package covers stowage of bow fender assembly, corner fenders, life lines, life line stanchions and life ring buoy assemblies into the miscellaneous container.

General

All life lines, life line stanchions and life ring buoy assemblies are stowed inside a storage box mounted on the life line/corner fender pallet.

The corner fenders are stowed and secured with ratchet straps to the life line/corner fender pallet.

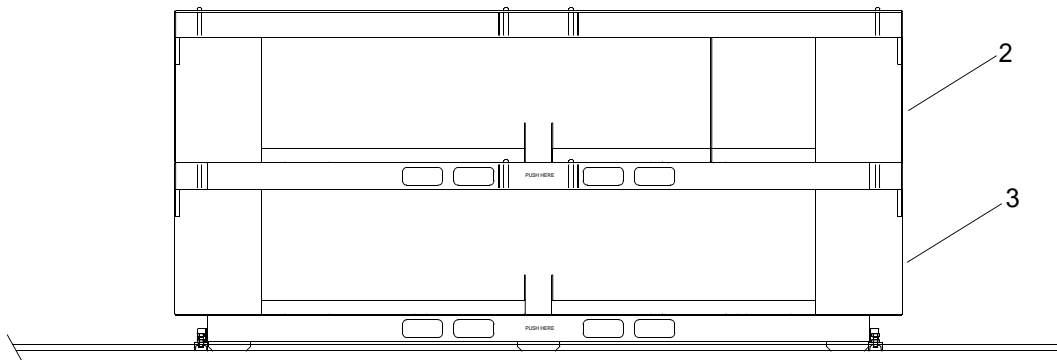
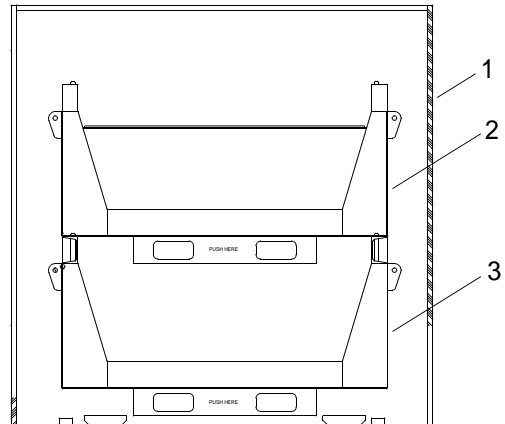
Both halves of the bow fender assembly are stowed and secured with ratchet straps to the bow fender pallet.

The life line/corner fender pallet and bow fender pallet are secured together then secured with ratchet straps to longitudinal track stops in the center of the container. Track stops are placed in front and behind the pallet stack to prevent movement.

All components are fresh water rinsed, allowed to thoroughly air dry and preserved prior to stowage into the container.

STOW BOW FENDER ASSEMBLY PALLET

1. Inspect chains, slings and shackles. (WP 0007 00)
2. Unlatch and open side doors on miscellaneous container (1).



WARNING

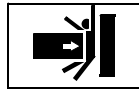
Doors must be secured in the open position. Failure to comply could result in death or injury to personnel.

3. Secure side doors open with locking bars, pins or hooks.

 WARNING



HEAVY PARTS



HEAVY PARTS

When removing or installing items in the miscellaneous container, extreme care must be taken not to become entrapped between the moving component and the miscellaneous container.
When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack.
Failure to comply could result in death or injury to personnel. Failure to comply could result in death or injury to personnel.

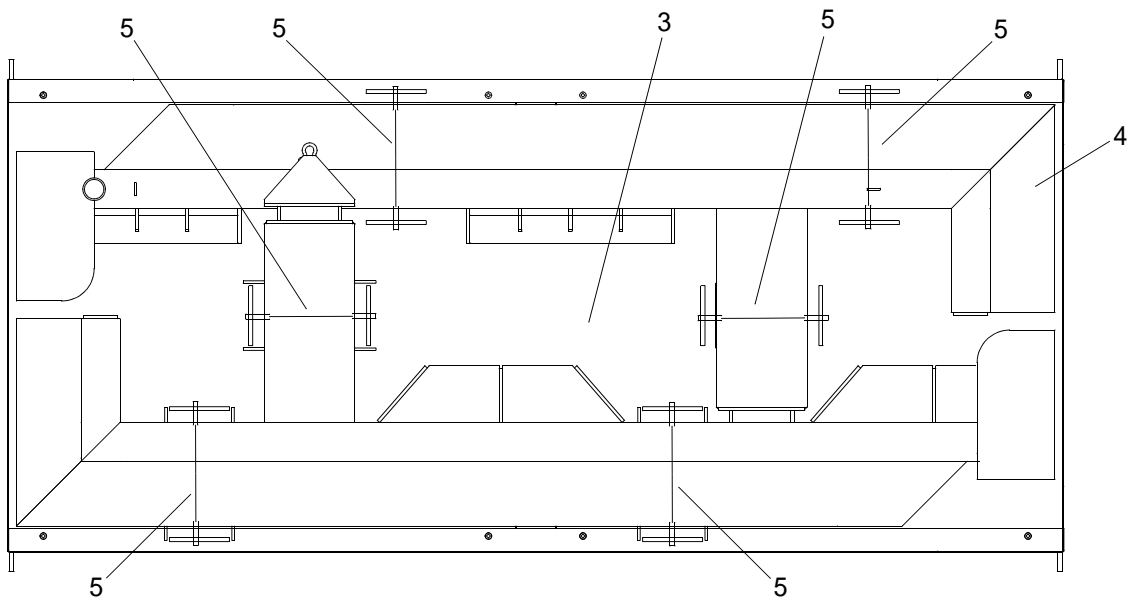
- Using forklift, remove stacked life line/corner fender pallet (2) and bow fender pallet (3) from inside miscellaneous container (1) and place on flat surface.

 WARNING



HEAVY PARTS

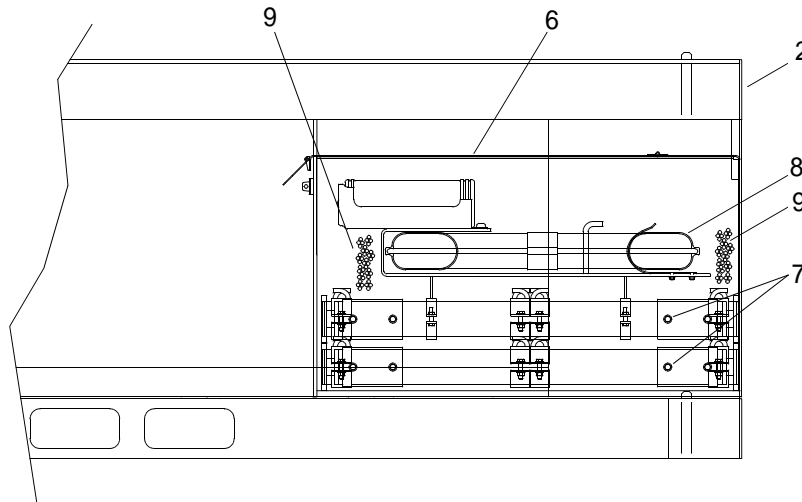
- Using forklift, remove life line/corner fender pallet (2) from on top of bow fender pallet (3) and place on flat surface.
- Remove all loose hardware stowed on life line/corner fender pallet (2).
- Using forklift, slings and shackles, individually position both halves of bow fender assembly (4) on bow fender pallet (3).



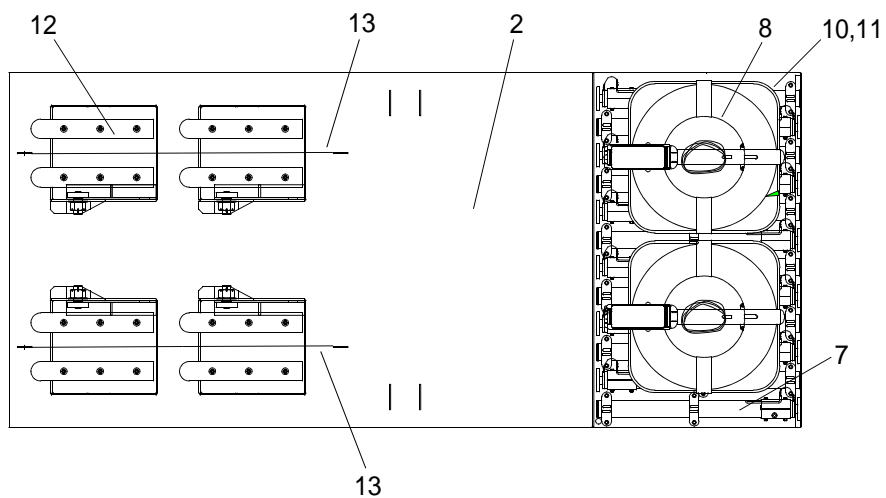
8. Remove slings and shackles.
9. Secure both halves of bow fender assembly (4) on bow fender pallet (3) with ratchet straps (5). Tighten ratchet straps (5).

STOW LIFE LINE/CORNER FENDER PALLET

1. Open lid of storage box (6) on life line/corner fender pallet (2).



2. Position all life line stanchions (7) inside storage box (6) on life line/corner fender pallet (2). When one row is completed, turn life line stanchions (7) 180° for second row and continue alternating rows until all life line stanchions (7) are stowed.
3. Position both life ring buoy assemblies (8) on top of life line stanchions (7).
4. Coil all life lines (9) and stow inside storage box (6) on life line/corner fender pallet (2).
5. Stow all life line turnbuckles (10) and shackles (11) inside storage box (6) on life line/corner fender pallet (2).



6. Close lid of storage box (6) on life line/corner fender pallet (2).

WARNING



HEAVY OBJECTS

7. Using assistant, individually position corner fenders (12) on life line/corner fender pallet (2).
8. Secure all corner fenders (12) on life line/corner fender pallet (2) with ratchet straps (13). Tighten ratchet straps (13).

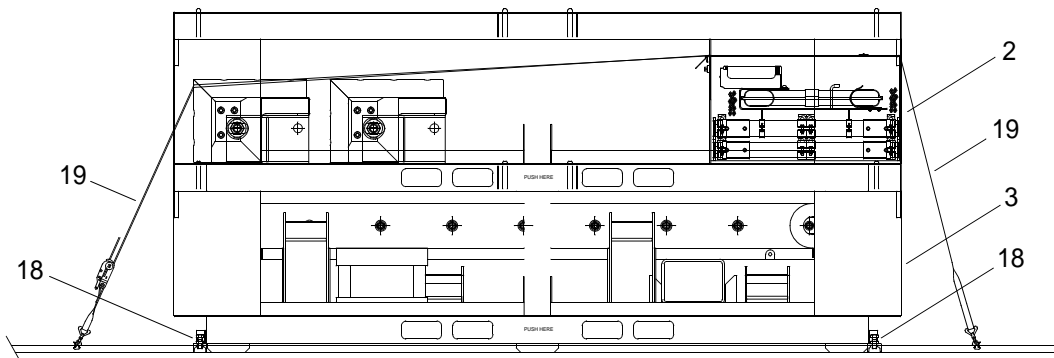
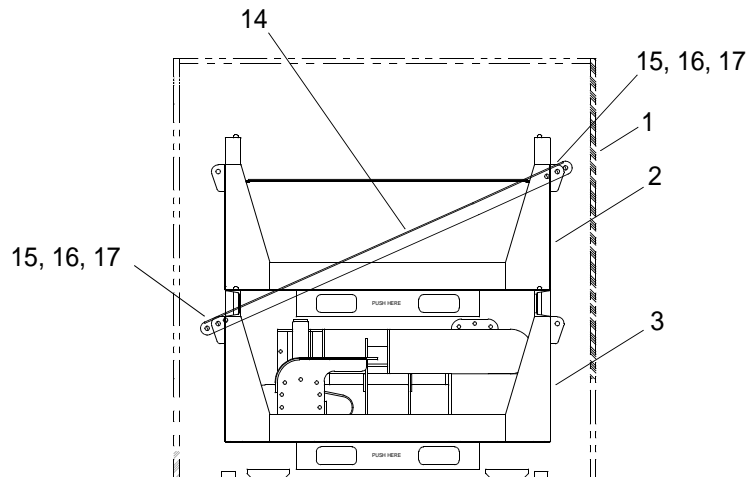
STOW LIFE LINE/CORNER FENDER PALLET AND BOW FENDER ASSEMBLY PALLET IN MISCELLANEOUS CONTAINER

WARNING



HEAVY PARTS

1. Using forklift, position life line/corner fender pallet (2) on top of bow fender pallet (3).



2. Position tie bars (14) diagonally on both ends between life line/corner fender pallet (2) and bow fender pallet (3).
3. Install hex head capscrews (15), flat washers (16) and hex nuts (17) to secure life line/corner fender pallet (2) to bow fender pallet (3). Tighten hex nuts (17).

WARNING



HEAVY PARTS



HEAVY PARTS

When removing or installing items in the miscellaneous container, extreme care must be taken not to become entrapped between the moving component and the miscellaneous container.
When removing or installing items in the shipping rack, extreme care must be taken not to become entrapped between the moving component and the shipping rack.
Failure to comply could result in death or injury to personnel. Failure to comply could result in death or injury to personnel.

4. Using forklift, position connected life line/corner fender pallet (2) and bow fender pallet (3) inside center of miscellaneous container (1).
5. Install track stops (18) on both ends of connected life line/corner fender pallet (2) and bow fender pallet (3) to prevent movement.
6. Install ratchet straps (19) over top of connected life line/corner fender pallet (2) and bow fender pallet (3) and attach to track stops (18). Tighten ratchet straps (19).
7. Remove locking bars and pins to close side doors of miscellaneous container (1).
8. Latch and secure side doors of miscellaneous container (1).

END OF WORK PACKAGE

CHAPTER 3

**OPERATOR TROUBLESHOOTING PROCEDURES
FOR
MODULAR CAUSEWAY SYSTEM (MCS)
WARPING TUG (WT)**

**OPERATOR MAINTENANCE
WARPING TUG
SYSTEM/SUBSYSTEM TROUBLESHOOTING INDEX**

MALFUNCTION/SYMP TOM**TROUBLESHOOTING PROCEDURE****ABOVEDECK SYSTEMS**

Exhaust Plenum Vent Fan Will Not Operate	WP 0073 00
Navigation Light(s) Will Not Function	WP 0074 00
Stub Assembly Mast Light Not Functioning	WP 0075 00

HYDRAULIC SYSTEM

Hydraulic System Has No Pressure	WP 0076 00
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OPERATORS CAB

Accessories Do Not Function	WP 0077 00
Ammeter Indicates Discharging Of System	WP 0078 00
Clutch Status Light Not Operational	WP 0079 00
Engine Audible Alarm and Warning Light On (Normal Operation)	WP 0080 00
Engine Oil Pressure Gauge Reads Above 70 PSI (Normal Operation)	WP 0081 00
Mast Enclosure A7 Sonalert Beeper Sounds	WP 0082 00
No Power To Operators Cab Control Panels	WP 0083 00
No Steering From Operators Cab	WP 0084 00
No Steering Control Indication For Pump-Jet	WP 0085 00
Engine Overheating (Audible Alarm And Warning Light On	WP 0086 00

PRECISION LIGHTWEIGHT GLOBAL POSITIONING RECEIVER (PLGR)

PLGR Does Not Display A Valid Position	WP 0087 00
PLGR Has Cleared Memory	WP 0088 00
PLGR Has No Power	WP 0089 00

MALFUNCTION/SYMPTOMTROUBLESHOOTING PROCEDURE**PROPULSION MODULE**

Below Deck Lighting Does Not Function	WP 0090 00
Bilge Pumps Will Not Function	WP 0091 00
Drive Train Does Not Operate Freely And Smoothly; Excessive Vibration Is Experienced During Operation	WP 0092 00
Marine Gear Clutch Will Not Engage In Engage/Backflush Directions	WP 0093 00
No Propulsion From Pump-Jet	WP 0094 00
No Steering Control From Pump-Jet	WP 0095 00
Pump-Jet Can Only Develop A Small Amount Of Thrust (Not Enough Water Is Being Delivered)	WP 0096 00
Steering Reacts Sluggishly	WP 0097 00

PUBLIC ADDRESS SET (LOUDHAILER)

Public Address Set (Loudhailer) Has No Power	WP 0098 00
Public Address Set (Loudhailer) Will Not Transmit Voice To Hailer Horn (Loudhailer External Speaker)	WP 0099 00

VHF/FM DSC TRANSCEIVER

VHF/FM DSC Transceiver Does Not Display Valid Position	WP 0100 00
VHF/FM DSC Transceiver Has No Power	WP 0101 00
VHF/FM DSC Transceiver Will Not Receive	WP 0102 00
VHF/FM DSC Transceiver Will Not Transmit	WP 0103 00

**OPERATOR MAINTENANCE
WARPING TUG
ABOVEDECK SYSTEMS
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Engineer 88L

TROUBLESHOOTING PROCEDURE

EXHAUST PLENUM VENTILATION FAN WILL NOT OPERATE

NOTE

This troubleshooting procedure is typical for both starboard and port ventilation fans.

SYMPTOM

Ventilation fan does not operate.

MALFUNCTION

VENT FANS toggle switch on lower control panel (A2) is OFF.

CORRECTIVE ACTION

Position VENT FANS toggle switch on lower control panel (A2) to ON.

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

VENT FAN circuit breaker on propulsion module circuit breaker panel (A6) is off (open).

CORRECTIVE ACTION

Position VENT FAN circuit breaker on propulsion module circuit breaker panel (A6) to on (closed).

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

Loose or disconnected exhaust fan power cable on vent fan relay enclosure (A8).

CORRECTIVE ACTION

Tighten or connect exhaust fan power cable on vent fan relay enclosure (A8).

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

Pressure switch for the fire suppression system in lazaret is tripped.

CORRECTIVE ACTION

Manually reset pressure switch in lazaret.

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

Ventilation fan still does not operate.

CORRECTIVE ACTION

Contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
ABOVEDECK SYSTEMS
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Seaman 88K

TROUBLESHOOTING PROCEDURE

NAVIGATION LIGHT(S) WILL NOT FUNCTION

SYMPTOM

No illumination from navigation light(s).

MALFUNCTION

NAV LIGHTS circuit breaker located on operators cab circuit breaker panel A3 is off (open).

CORRECTIVE ACTION

Position NAV LIGHTS circuit breaker to on (closed). (WP 0006 00)

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

OPR CAB circuit breaker located on propulsion module circuit breaker panel A6 is off (open).

CORRECTIVE ACTION

Position OPR CAB circuit breaker to on (closed). (WP 0006 00)

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

A blown fuse is found in mast enclosure assembly.

CORRECTIVE ACTION

Contact unit maintenance.

MALFUNCTION

Navigation light(s) still do not illuminate.

CORRECTIVE ACTION

Contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
ABOVEDECK SYSTEMS
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Seaman 88K

TROUBLESHOOTING PROCEDURE

STUB ASSEMBLY MAST LIGHT NOT FUNCTIONING

SYMPTOM

Stub assembly mast light not functioning.

MALFUNCTION

Defective battery.

CORRECTIVE ACTION

Replace battery. (WP 0108 00)

Perform operational check of stub assembly mast. (WP 0020 00)

MALFUNCTION

Defective bulb.

CORRECTIVE ACTION

Replace bulb. (WP 0109 00)

Perform operational check of stub assembly mast. (WP 0020 00)

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
HYDRAULIC SYSTEM
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Seaman 88K

TROUBLESHOOTING PROCEDURE

HYDRAULIC SYSTEM HAS NO PRESSURE

NOTE

This troubleshooting procedure is typical for both hydraulic systems.

SYMPTOM

No hydraulic steering system pressure.

MALFUNCTION

Hydraulic fluid level is low.

CORRECTIVE ACTION

Add hydraulic fluid to proper level. (WP 0105 00)

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

Hydraulic steering system still has no pressure.

CORRECTIVE ACTION

Contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
OPERATORS CAB
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Seaman 88K

TROUBLESHOOTING PROCEDURE

ACCESSORIES DO NOT FUNCTION

SYMPTOM

Operators cab accessories are not functioning.

MALFUNCTION

MAIN circuit breaker on propulsion module circuit breaker panel (A6) is in off (open) position.

CORRECTIVE ACTION

Position MAIN circuit breaker to on (closed). (WP 0006 00)

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

OPR CAB circuit breaker on propulsion module circuit breaker panel (A6) is in off (open) position.

CORRECTIVE ACTION

Position OPR CAB circuit breaker to on (closed). (WP 0006 00)

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

Individual accessory circuit breakers located on operators cab circuit breaker panel A3 are in off (open) position.

CORRECTIVE ACTION

Position accessory circuit breakers to on (closed). (WP 0006 00)

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

Operators cab accessories are still not functioning.

CORRECTIVE ACTION

Contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
OPERATORS CAB
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Seaman 88K

TROUBLESHOOTING PROCEDURE

AMMETER INDICATES NO ALTERNATOR OUTPUT

NOTE

This troubleshooting procedure is typical for both starboard and port engines.

SYMPTOM

System discharge is indicated on ammeter.

MALFUNCTION

Alternator belts loose, worn or broken or defective alternator.

CORRECTIVE ACTION

Contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
OPERATORS CAB
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Seaman 88K

TROUBLESHOOTING PROCEDURE

CLUTCH STATUS LIGHT NOT OPERATIONAL

NOTE

This troubleshooting procedure is typical for both marine gears.

SYMPTOM

Light for clutch status not operational.

MALFUNCTION

CLUTCH circuit breaker on propulsion module circuit breaker panel A6 is off (open).

CORRECTIVE ACTION

Position CLUTCH circuit breaker to on (closed). (WP 0006 00)

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

Indicator light bulb failed.

CORRECTIVE ACTION

Contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
OPERATORS CAB
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Seaman 88K

TROUBLESHOOTING PROCEDURE

ENGINE AUDIBLE ALARM AND WARNING LIGHT ON (NORMAL OPERATION)

NOTE

This troubleshooting procedure is typical for both starboard and port engines.

SYMPTOM

Audible engine alarm and warning light is on.

MALFUNCTION

OIL PRESSURE gauge on middle control panel A1 reads below 32 PSI (2.2 kPa).

CORRECTIVE ACTION

Stop engine, allow engine to cool down and add oil to engine. (WP 0105 00)

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

WATER TEMP gauge on middle control panel A1 reads above 185°F (83°C).

CORRECTIVE ACTION

WARNING



HOT AREA

Cooling system is hot. Do not touch cap with your bare hands. Never take off cap while engine is overheated. Failure to comply may result in serious personnel injury.

Stop engine, allow engine to cool down and add coolant. (WP 0105 00)

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

Audible engine alarm and warning light remains on.

CORRECTIVE ACTION

Contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
OPERATORS CAB
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Seaman 88K

TROUBLESHOOTING PROCEDURE

ENGINE OIL PRESSURE GAUGE READS ABOVE 70 PSI (NORMAL OPERATION)

NOTE

This troubleshooting procedure is typical for both starboard and port engines.

SYMPTOM

Engine oil pressure gauge reads above 70 PSI.

MALFUNCTION

Oil pressure gauge on middle control panel A1 pressure reading above maximum pressure of 70 PSI indicating clogged oil filter or clogged lines.

CORRECTIVE ACTION

Stop engine and contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
OPERATORS CAB
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Seaman 88K

TROUBLESHOOTING PROCEDURE

MAST ENCLOSURE A7 SONALERT BEEPER SOUNDS

SYMPTOM

Sonalert beeper sounds, indicating one or more navigation lights not working.

MALFUNCTION

Light bulb in a navigation light has failed.

CORRECTIVE ACTION

Check for burned out primary navigation light. Move toggle switch from PRIMARY to SPARE on mast enclosure assembly A7. (WP 0006 00)

Perform operational check of WT. (WP 0024 00)

If primary bulb is burned out, contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
OPERATORS CAB
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Seaman 88K

TROUBLESHOOTING PROCEDURE

NO POWER TO OPERATORS CAB CONTROL PANELS

SYMPTOM

Operators cab control panels are not receiving power.

MALFUNCTION

MAIN circuit breaker propulsion module circuit breaker panel (A6) is in off (open) position.

CORRECTIVE ACTION

Position MAIN circuit breaker to on (closed). (WP 0006 00)

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

OPR CAB circuit breaker on propulsion module circuit breaker panel (A6) is in off (open) position.

CORRECTIVE ACTION

Position OPR CAB circuit breaker to on (closed). (WP 0006 00)

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

There is still no power to control panels in operators cab.

CORRECTIVE ACTION

Contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
OPERATORS CAB
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Engineer 88L

TROUBLESHOOTING PROCEDURE**NO STEERING FROM OPERATORS CAB****NOTE**

This troubleshooting procedure is typical for both steering systems.

SYMPTOM

No steering from operators cab.

MALFUNCTION

THRUSTER circuit breaker on propulsion module circuit breaker panel (A6) is not on (closed).

CORRECTIVE ACTION

Position THRUSTER circuit breaker to on (closed). (WP 0006 00)

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

3/2 ball valve is not properly set.

CORRECTIVE ACTION

Set 3/2 ball valve handle to proper position. (WP 0105 00)

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

Bypass needle valve is opened.

CORRECTIVE ACTION

Close bypass needle valve. (WP 0105 00)

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

Failed steering control lever.

CORRECTIVE ACTION

Contact unit maintenance.

MALFUNCTION

Hydraulic system not functioning.

CORRECTIVE ACTION

Contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
OPERATORS CAB
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Seaman 88K

TROUBLESHOOTING PROCEDURE

NO STEERING CONTROL INDICATION FOR PUMP-JET

NOTE

This troubleshooting procedure is typical for both starboard and port pump-jets.

SYMPTOM

Pump-jet has no steering control indication.

MALFUNCTION

THRUSTER INDICATOR circuit breaker on propulsion module circuit breaker panel A6 is in off (open) position.

CORRECTIVE ACTION

Position THRUSTER circuit breaker to on (closed) position. (WP 0006 00)

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

Low voltage is being supplied by thruster directional/auxiliary battery junction box assembly A9 batteries.

CORRECTIVE ACTION

Contact unit maintenance.

MALFUNCTION

Failed feedback unit on pump-jet.

CORRECTIVE ACTION

Contact unit maintenance.

MALFUNCTION

Pump-jet still has no steering control indication.

CORRECTIVE ACTION

Contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
OPERATORS CAB
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Seaman 88K

TROUBLESHOOTING PROCEDURE

ENGINE OVERHEATING (AUDIBLE ALARM AND WARNING LIGHT ON)

WARNING

**HOT AREA**

Cooling system is hot. Do not touch cap with your bare hands. Never take cap off while engine is overheated. Contact unit maintenance. Failure to comply may result in serious personnel injury.

NOTE

This troubleshooting procedure is typical for both starboard and port engines.

SYMPTOM

Audible engine alarm and engine warning light is on.

MALFUNCTION

No raw water overboard discharge.

CORRECTIVE ACTION

Open raw water valves. (WP 0105 00)

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

Engine is overheating.

CORRECTIVE ACTION

Reduce engine speed to idle. (WP 0024 00)

CAUTION

**Do not use emergency stop to shut off engine. This action shuts off air to engine.
Failure to comply will result in serious damage to engine.**

Turn off engine by means of engine STOP pushbutton on middle control panel (A1) for affected engine. (WP 0024 00)

Contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
PRECISION LIGHTWEIGHT GLOBAL POSITIONING RECEIVER (PLGR)
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Seaman 88K

TROUBLESHOOTING PROCEDURE

PLGR DOES NOT DISPLAY A VALID POSITION

SYMPTOM

Current position shown in PLGR display is not valid.

MALFUNCTION

Initial setup procedures are incorrectly entered.

CORRECTIVE ACTION

Perform initial set up of PLGR. (WP 0032 00)

Perform operational check of PLGR. (WP 0032 00)

MALFUNCTION

PLGR antenna cable connection on back of PLGR not secure.

CORRECTIVE ACTION

Securely attach antenna cable connector to antenna connector receptacle on back of PLGR.

Perform operational check of PLGR. (WP 0032 00)

MALFUNCTION

Current position shown in PLGR display is still invalid.

CORRECTIVE ACTION

Contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
PRECISION LIGHTWEIGHT GLOBAL POSITIONING RECEIVER (PLGR)
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Seaman 88K

TROUBLESHOOTING PROCEDURE

PLGR HAS CLEARED MEMORY

SYMPTOM

While observing PLGR display, "WARNING, The receiver has cleared memory", appears in display.

MALFUNCTION

Memory battery voltage low or memory battery not installed.

CORRECTIVE ACTION

Replace memory battery. Contact unit maintenance.

Perform initial set up of PLGR. (WP 0032 00)

MALFUNCTION

PLGR still has a cleared memory.

CORRECTIVE ACTION

Replace PLGR unit. Contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
PRECISION LIGHTWEIGHT GLOBAL POSITIONING RECEIVER (PLGR)
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Seaman 88K

TROUBLESHOOTING PROCEDURE

PLGR HAS NO POWER

SYMPTOM

No indication of power displayed in PLGR display window.

MALFUNCTION

PLGR power is not turned on.

CORRECTIVE ACTION

Press the ON button on the PLGR. (WP 0032 00)

MALFUNCTION

PLGR cable not secure to PLGR connector.

CORRECTIVE ACTION

Securely attach PLGR cable to PLGR connector. (WP 0032 00)

Perform operational check of PLGR. (WP 0032 00)

MALFUNCTION

Still no power to PLGR.

CORRECTIVE ACTION

Contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
PROPULSION MODULE
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Engineer 88L

TROUBLESHOOTING PROCEDURE

BELOW DECK LIGHTING DOES NOT FUNCTION

SYMPTOM

Below deck lights will not come on.

MALFUNCTION

Light switch is OFF.

CORRECTIVE ACTION

Position light switch to ON. (WP 0006 00)

Perform operational check of below deck lighting. (WP 0105 00)

MALFUNCTION

ENGINE SPACE LIGHTS circuit breaker on propulsion module circuit breaker panel A6 is off.

CORRECTIVE ACTION

Position ENGINE SPACE LIGHTS circuit breaker on propulsion module circuit breaker panel A6 to on. (WP 0006 00)

Perform operational check of below deck lighting. (WP 0105 00)

MALFUNCTION

Defective fluorescent light bulb(s).

CORRECTIVE ACTION

Contact unit maintenance.

MALFUNCTION

Defective light switch.

CORRECTIVE ACTION

Contact unit maintenance.

MALFUNCTION

Defective ENGINE SPACE LIGHTS circuit breaker on propulsion module circuit breaker panel A6.

CORRECTIVE ACTION

Contact unit maintenance.

MALFUNCTION

Batteries do not have sufficient charge or are defective.

CORRECTIVE ACTION

Contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
PROPULSION MODULE
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Seaman 88K

TROUBLESHOOTING PROCEDURE

BILGE PUMP(S) WILL NOT FUNCTION

NOTE

This troubleshooting procedure is typical for all bilge pumps.

SYMPTOM

Bilge pump will not function.

MALFUNCTION

CONTROL PANEL circuit breaker located on operators cab circuit breaker panel A3 is off (open).

CORRECTIVE ACTION

Position CONTROL PANEL circuit breaker to on (closed). (WP 0006 00)

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

A BILGE PUMP circuit breaker located on propulsion module circuit breaker panel A6 in machinery compartment is off (open).

CORRECTIVE ACTION

Position BILGE PUMP circuit breaker to on (closed). (WP 0006 00)

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

BILGE PUMP circuit breaker on bilge pump control panel (A5 or A7) is off (open).

CORRECTIVE ACTION

Position BILGE PUMP circuit breaker on A5 or A7 to REMOTE (closed). (WP 0006 00)

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

Bilge pump(s) faulty.

CORRECTIVE ACTION

Contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
PROPULSION MODULE
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Engineer 88L

TROUBLESHOOTING PROCEDURE

DRIVE TRAIN DOES NOT OPERATE FREELY AND SMOOTHLY; EXCESSIVE VIBRATION IS EXPERIENCED DURING OPERATION

NOTE

This troubleshooting procedure is typical for both starboard and port marine gears.

SYMPTOM

Excessive vibration is experienced during operation of drive train.

MALFUNCTION

Foreign objects in pump-jet water inlet.

CORRECTIVE ACTION

Perform backflush. (WP 0024 00)

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

Vibration still present after backflush.

CORRECTIVE ACTION

Contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
PROPULSION MODULE
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Seaman 88K

TROUBLESHOOTING PROCEDURE

MARINE GEAR CLUTCH WILL NOT ENGAGE IN ENGAGE/BACKFLUSH DIRECTIONS

NOTE

This troubleshooting procedure is typical for both marine gears.

SYMPTOM

Marine gear clutch will not engage in engage/backflush directions.

MALFUNCTION

CLUTCH circuit breaker on propulsion module circuit breaker panel (A6) is not in on (closed) position.

CORRECTIVE ACTION

Move CLUTCH circuit breaker to on (closed) position. (WP 0006 00)

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

Oil level in marine gear is low.

CORRECTIVE ACTION

Add oil to proper level on dipstick. (WP 0105 00)

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

Marine gear filter screen is clogged.

CORRECTIVE ACTION

Contact unit maintenance.

MALFUNCTION

Clutch solenoid is not functioning properly.

CORRECTIVE ACTION

Contact unit maintenance

MALFUNCTION

Marine gear clutch still will not engage in engage/backflush directions.

CORRECTIVE ACTION

Contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
PROPULSION MODULE
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Seaman 88K

TROUBLESHOOTING PROCEDURE**NO PROPULSION FROM PUMP-JET****NOTE**

This troubleshooting procedure is typical for both starboard and port pump-jets.

SYMPTOM

Pump-jet has no propulsion.

MALFUNCTION

Diesel engine is not running.

CORRECTIVE ACTION

Start diesel engine. (WP 0024 00)

MALFUNCTION

Marine gear is not engaged.

CORRECTIVE ACTION

Engage marine gear. (WP 0024 00)

MALFUNCTION

Clutch is not engaged.

CORRECTIVE ACTION

Check to ensure CLUTCH switch on lower control panel A2 is in either FORWARD or BACKFLUSH position. (WP 0024 00)

MALFUNCTION

Pump-jet intake is clogged with foreign objects.

CORRECTIVE ACTION

Backflush pump-jet to clear intake. (WP 0024 00)

MALFUNCTION

Pump-jet still not delivering propulsion.

CORRECTIVE ACTION

Contact specialized repair activity.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
PROPULSION MODULE
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Seaman 88K

TROUBLESHOOTING PROCEDURE**NO STEERING CONTROL FROM PUMP-JET****NOTE**

This troubleshooting procedure is typical for pump-jet in both starboard and port propulsion modules.

SYMPTOM

Pump-jet has no steering control.

MALFUNCTION

THRUSTER circuit breaker on propulsion module circuit breaker panel (A6) is not on (closed).

CORRECTIVE ACTION

Position THRUSTER circuit breaker on propulsion module circuit breaker panel to on (closed) position. (WP 0006 00)

Perform operational check of WT. (WP 0024 00)

MALFUNCTION

No hydraulic pressure.

CORRECTIVE ACTION

Check that HPU OIL LEVEL LOW light is not lit on lower control panel A2. (WP 0006 00).

Perform operational check of WT. (WP 0024 00)

If HPU OIL LEVEL LOW light is lit, contact unit maintenance.

MALFUNCTION

Pump-jet is still not delivering steering control.

CORRECTIVE ACTION

Contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
PROPULSION MODULE
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Engineer 88L

TROUBLESHOOTING PROCEDURE

PUMP-JET CAN ONLY DEVELOP A SMALL AMOUNT OF THRUST (NOT ENOUGH WATER IS BEING DELIVERED)

NOTE

This troubleshooting procedure is typical for both starboard and port pump-jets.

SYMPTOM

Only a small amount of thrust from pump-jet.

MALFUNCTION

Diesel engine is not operating at required speed.

CORRECTIVE ACTION

Increase speed of diesel engine. (WP 0024 00)

MALFUNCTION

Pump-jet intake or impeller is clogged with foreign objects.

CORRECTIVE ACTION

Disengage pump-jet and backflush to clear debris. (WP 0024 00)

MALFUNCTION

Pump-jet still delivers only a small a small amount of thrust.

CORRECTIVE ACTION

Contact specialized repair activity.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
PROPULSION MODULE
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Engineer 88L

TROUBLESHOOTING PROCEDURE

STEERING REACTS SLUGGISHLY

NOTE

This troubleshooting procedure is typical for both starboard and port steering systems.

SYMPTOM

Steering is reacting sluggishly.

MALFUNCTION

Air in hydraulic system or low hydraulic pressure.

CORRECTIVE ACTION

Contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
PUBLIC ADDRESS SET (LOUDHAILER)
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Seaman 88K

TROUBLESHOOTING PROCEDURE

PUBLIC ADDRESS SET (LOUDHAILER) HAS NO POWER

SYMPTOM

No indication of power displayed in loudhailer display window.

MALFUNCTION

Loudhailer power is not turned on.

CORRECTIVE ACTION

Rotate OFF/DIM knob clockwise to turn loudhailer power on. (WP 0024 00).

Perform operational check of loudhailer. (WP 0024 00)

MALFUNCTION

LOUDHAILER circuit breaker on operators cab circuit breaker panel A3 is off.

CORRECTIVE ACTION

Position LOUDHAILER circuit breaker on operators cab circuit breaker panel A3 to on. (WP 0006 00)

MALFUNCTION

Still no indication of power displayed in loudhailer display window.

CORRECTIVE ACTION

Contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
PUBLIC ADDRESS SET (LOUDHAILER)
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Seaman 88K

TROUBLESHOOTING PROCEDURE

PUBLIC ADDRESS SET (LOUDHAILER) WILL NOT TRANSMIT SOUND TO HAILER HORN
(LOUDHAILER EXTERNAL SPEAKER)

SYMPTOM

No sound is being transmitted through external speaker.

MALFUNCTION

No power to loudhailer.

CORRECTIVE ACTION

Turn loudhailer on. Rotate OFF/DIM knob clockwise on loudhailer. (WP 0026 00)

MALFUNCTION

No indication of HAILER in display.

CORRECTIVE ACTION

Press HAL key. (WP 0026 00)

MALFUNCTION

No indication of TALK in display when microphone push to talk switch is pressed.

CORRECTIVE ACTION

Replace microphone. Contact unit maintenance.

MALFUNCTION

No indication of FWD in display after TALK appeared in display.

CORRECTIVE ACTION

Press FWD key to select forward external speaker. (WP 0026 00)

MALFUNCTION

External speaker wiring not connected to loudhailer.

CORRECTIVE ACTION

Check that speaker wires are securely attached to forward terminal screws on back of loudhailer.

Perform operational check of loudhailer. (WP 0026 00)

MALFUNCTION

Still no sound is being transmitted through external speaker.

CORRECTIVE ACTION

Contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
VHF/FM DSC TRANSCEIVER
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Seaman 88K

TROUBLESHOOTING PROCEDURE

VHF/FM DSC TRANSCEIVER DOES NOT DISPLAY A VALID POSITION

SYMPTOM

Alarm will sound if current position shown in transceiver display is invalid.

MALFUNCTION

Transceiver initial setup procedures are incorrectly entered.

CORRECTIVE ACTION

Perform initial set up of transceiver. (WP 0028 00)

MALFUNCTION

PLGR initial setup procedures are incorrectly entered.

CORRECTIVE ACTION

Perform initial set up of PLGR. (WP 0032 00)

MALFUNCTION

OPERATE/PROGRAM switch on AN/PSN-11 interface and switchbox is in PROGRAM position.

CORRECTIVE ACTION

Position OPERATE/PROGRAM switch to OPERATE. (WP 0029 00)

MALFUNCTION

PLGR cable not secure to PLGR connector.

CORRECTIVE ACTION

Securely attach PLGR cable to PLGR connector.

Perform operational check of transceiver. (WP 0029 00)

MALFUNCTION

PLGR cable not secure to back of PLGR.

CORRECTIVE ACTION

Securely attach PLGR cable to PLGR.

Perform operational check of transceiver. (WP 0029 00)

MALFUNCTION

Current position in transceiver display is still invalid.

CORRECTIVE ACTION

Contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
VHF/FM DSC TRANSCEIVER
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Seaman 88K

TROUBLESHOOTING PROCEDURE

VHF/FM DSC TRANSCEIVER HAS NO POWER

SYMPTOM

No indication of power displayed in transceiver display window.

MALFUNCTION

VHF/FM transceiver is not turned on.

CORRECTIVE ACTION

Rotate VOL knob clockwise to turn transceiver power on. (WP 0029 00)

MALFUNCTION

VHF-FM RADIO circuit breaker on operators cab circuit breaker panel A3 is off.

CORRECTIVE ACTION

Position VHF-FM RADIO circuit breaker to on. (WP 0006 00)

Perform operational check of transceiver. (WP 0029 00)

MALFUNCTION

Still no indication of power to transceiver displayed in display window.

CORRECTIVE ACTION

Contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
VHF/FM DSC TRANSCEIVER
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Seaman 88K

TROUBLESHOOTING PROCEDURE

VHF/FM DSC TRANSCEIVER WILL NOT RECEIVE

SYMPTOM

Transceiver will not receive a message.

MALFUNCTION

Transceiver will not receive messages.

CORRECTIVE ACTION

Check for transceiver receiving power. (WP 0029 00)

MALFUNCTION

Antenna cable is not secure at connection.

CORRECTIVE ACTION

Tighten antenna cable connector. (WP 0029 00)

Perform operational check of transceiver. (WP 0029 00)

MALFUNCTION

Transceiver still will not receive messages.

CORRECTIVE ACTION

Contact unit maintenance.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
VHF/FM DSC TRANSCEIVER
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:**Personnel Required**Seaman 88K

TROUBLESHOOTING PROCEDURE

VHF/FM DSC TRANSCEIVER WILL NOT TRANSMIT

SYMPTOM

Transceiver will not transmit a message.

MALFUNCTION

Transceiver will not transmit messages.

CORRECTIVE ACTION

Ensure transceiver power is on. (WP 0029 00)

MALFUNCTION

Signal strength does not appear in display when microphone is keyed.

CORRECTIVE ACTION

Check microphone for proper operation. (WP 0029 00)

MALFUNCTION

Antenna cable is not secure at connection.

CORRECTIVE ACTION

Tighten antenna cable connector. (WP 0029 00)

Perform operational check of transceiver. (WP 0029 00)

MALFUNCTION

Transceiver still will not transmit a message.

CORRECTIVE ACTION

Contact unit maintenance.

END OF WORK PACKAGE

CHAPTER 4

**OPERATOR MAINTENANCE INSTRUCTIONS
FOR
MODULAR CAUSEWAY SYSTEM (MCS)
WARPING TUG (WT)**

**OPERATOR MAINTENANCE
WARPING TUG
PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)
PROCEDURES INTRODUCTION**

INTRODUCTION

General

Preventive Maintenance Checks and Services (PMCS) are performed to keep the WT equipment in operating condition. The checks are used to find, correct or report problems. Crew members are to perform the PMCS as shown in the PMCS table. PMCS is performed every day the equipment is operated, using the PMCS table. Pay attention to WARNING and CAUTION statements. A WARNING means someone could be hurt. A CAUTION means equipment could be damaged.

Before you begin operating the equipment, perform "Before PMCS".

During operation, perform "During PMCS".

After operation, perform "After PMCS".

Once a week perform "Weekly PMCS". If the equipment has not been operated in a week, also perform "Before PMCS" at the same time.

Perform "Monthly PMCS" once a month. If the equipment has not been operated in a month, also perform "After PMCS" at the same time.

If you are operating the equipment for the first time, perform the "Monthly PMCS" the first time you do your "Before PMCS".

If you find something wrong when performing PMCS, fix it if you can, using troubleshooting procedures and/or maintenance procedures.

The right-hand column of the PMCS table lists conditions that make the vessel not fully mission capable. 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.

Leakage Definition

CAUTION

Equipment operation is allowed 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. Failure to maintain proper fluid levels could result in damage to equipment.

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 equipment. The following are definitions of the classes of leakage an operator or crew member needs to know to be able to determine the condition of the leak. Learn and then be familiar with them and REMEMBER - WHEN IN DOUBT, ASK YOUR SUPERVISOR.

Leakage definitions for Crew/Operator PMCS.

CLASS I - Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.

CLASS II - Leakage of fluid great enough to form drops, but not enough to cause drops to drip from item being checked.

CLASS III - Leakage of fluid great enough to form drops that fall from the item being checked.

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 equipment.

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 all over the equipment. 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, contact unit maintenance.
2. Welds: Many items on the equipment 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.

Lubrication Service Intervals - Normal Conditions

For safer, more trouble free operations, make sure that your equipment is serviced when it needs it. For the proper lubrication and service intervals, see the PMCS section of this manual.

Lubrication Service Intervals - Unusual Conditions

Your equipment will require extra service and care when you operate under unusual conditions. High or low temperatures or long periods of hard use will break down the lubricant, requiring you to add or change lubricant more often.

Lubrication Intervals

The following lubrication interval symbols are used in the PMCS table:

D - daily	W - weekly
M - monthly	Q - quarterly
S - semiannually	H - hours operated
A - annually	

Lubrication Symbols

The following lubrication symbols are used in the PMCS table:

WTR - Grease, aircraft, general purpose, wide temperature.

GAA - Grease, Lithium Base, L0189.001.

GGP - Grease, General Purpose, MIL-G-23549

MILA46153 - Antifreeze, ethylene glycol inhibited, heavy duty, MIL-A-46153. Temperature Range -25° - 150°F.

Oil Filters

Oil filters shall be serviced/cleaned/changed, as applicable, when:

They are known to be contaminated or clogged.

Service is recommended by AOAP laboratory analysis.

At prescribed hard time intervals.

Army Oil Analysis Program (AOAP)

The WT diesel engines, marine transmission gearcases, transfer cases, hydraulic systems and winch engine oil are enrolled in the AOAP. Refer to DA PAM 738-750 for the AOAP. WT components will be sampled at the following intervals:

Warping Tug Engines - Sample crankcase oil every 90 days or 100 operating hours, whichever occurs first, as prescribed by DA PAM 738-750.

Marine Transmission Gearcases - Sample oil every 90 days or 100 operating hours, whichever occurs first, as prescribed by DA PAM 738-750.

Transfer Cases - Sample oil every 90 days or 100 operating hours, whichever occurs first, as prescribed by DA PAM 738-750.

Hydraulic Systems - Sample oil every 180 days, as prescribed by DA PAM 738-750.

Warping Tug Winch Engine - Sample oil every 90 days or 100 operating hours, whichever occurs first, as prescribed by DA PAM 738-750.

Warranty Information

For equipment under manufacturer's warranty, hard time oil service intervals shall be followed. Intervals shall be shortened if lubricants are known to be contaminated or if operation is under adverse conditions, such as longer than usual operating hours, extended idling period or extreme dust.

Cleaning And Lubrication

Proper cleaning and lubrication can aid in avoiding possible problems or trouble, so make it a habit to perform the following:

CAUTION

Follow all cleaning and lubrication instructions carefully, failure to do so can result in damage to equipment.

1. Thoroughly wash all equipment exposed to salt spray with clean, fresh water.
2. Clean parts to be lubricated with cleaner, Type II, MIL-C-29602 or equivalent. Do not use fluid or semi-fluid lubricant on SFD coated surface. Wipe surface dry before lubricating.
3. Clean grease fittings before lubrication.
4. Lubricate all equipment at conclusion of the operation before equipment storage.
5. Always use the PMCS lubrication instructions as a guide.
6. Never use too much lubricant.
7. Never use the wrong type or grade of lubricant.
8. Lubricate more during constant use and less during inactive periods.
9. Use the correct grade of lubricant for seasonal temperature expected.

Corrosion Prevention And Control (CPC)

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 is typically associated with rusting of metals or galvanic corrosion which produces a white powder. The category of corrosion also includes deterioration of other materials, such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of the materials may be a corrosion problem. 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.

**OPERATOR MAINTENANCE
WARPING TUG
PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)
AND LUBRICATION PROCEDURES**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
Goggles, Industrial: Clear Lens, Chipping (Cabinet B4) (Item 35, WP 0112 00)
Apron, Utility (Cabinet A3) (Item 2, WP 0112 00)
Respirator, Air Filtering (WP 0113 00)
Lubricating Gun, Hand (WP 0113 00)
Oiler, Hand (WP 0113 00)
Pan, Drain (WP 0113 00)
Compressor, Reciprocating (WP 0113 00)

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)
Gloves, Rubber Industrial (Item 36, WP 0114 00)
Antifreeze (Item 2, WP 0114 00)
Cleaner (Item 10, WP 0114 00)
Fuel, Diesel (Item 23, WP 0114 00)
Grease, General Purpose (Item 30, WP 0114 00)
Grease, Aircraft (Item 27, WP 0114 00)
Grease, Automotive and Artillery (Item 28, WP 0114 00)
Grease, Wire Rope - Exposed Gear (Item 33, WP 0114 00)
Lubricating Oil, Engine (Item 37, WP 0114 00)
Lubricating Oil, Engine (Item 39, WP 0114 00)
Lubricating Oil, General Purpose (Item 41, WP 0114 00)
Lubricating Oil, Mobilgear 629 (Item 42, WP 0114 00)
Water, Reagent Distilled (Item 58, WP 0114 00)
Mop (Item 44, WP 0114 00)
Rag, Wiping (Item 48, WP 0114 00)

Personnel Required

Seaman 88K
Engineer 88L

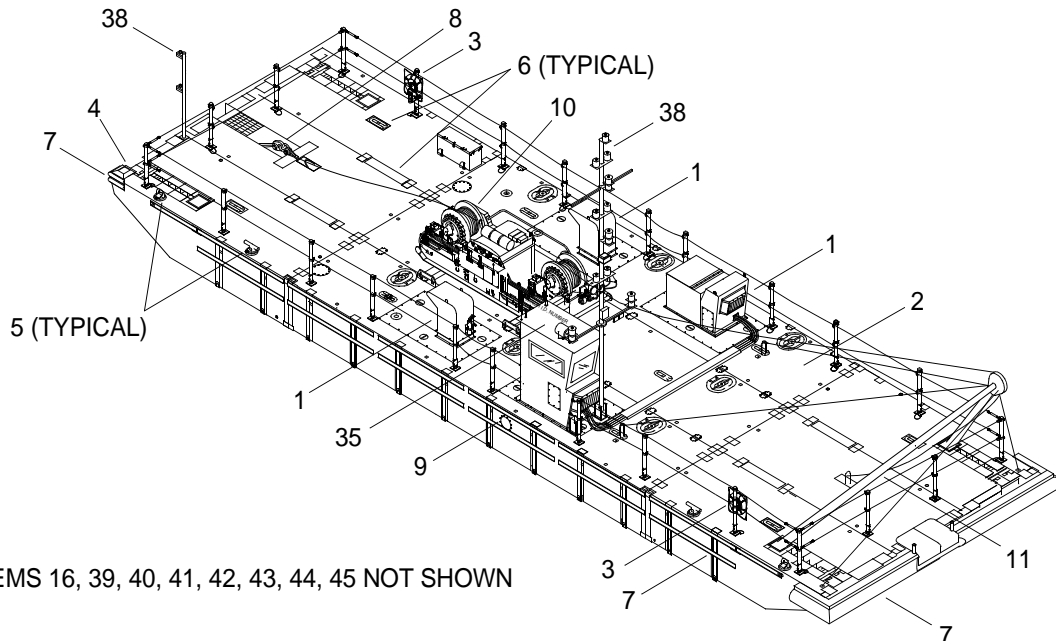
References

TM 5-2815-258-10
TM 55-1945-205-24-3-4
TM 55-1945-223-14&P
TM 55-3950-204-14&P
DA PAM 738-750
29 CFR Parts 1919.16, 1919.27 and 1919.36
46 CFR Parts 91.25.20 and 97.15.60

NOTE

Below deck PMCS for all interval categories is accomplished on both the port and starboard propulsion modules.

- | | |
|--|---|
| 1. Intake and Exhaust Plenums | 24. Transfer Case |
| 2. Propulsion Module | 25. Drive Shafts |
| 3. Life Lines & Life Ring Stanchions | 26. Hydraulic System |
| 4. Flexor | 27. Hydraulic Reservoir |
| 5. Deck Fittings | 28. Emergency Steering Hand Pump |
| 6. Lift Shackles and Skeg Assemblies | 29. Pump-Jet |
| 7. Fenders | 30. Fuel System |
| 8. Stern Anchor | 31. Bilge Pump System (Lazaret) |
| 9. Exhaust Flapper Valves | 32. Emergency Steering Control Stand |
| 10. Deck Winch and Deck Winch Engine | 33. Fire Suppression System |
| 11. Winch A-Frame | 34. Operators Cab Circuit Breaker Panel A3 |
| 12. Machinery Compartment Light Switch | 35. Operators Cab |
| 13. Propulsion Module Circuit Breaker Panel A6 | 36. Lower Control Panel A2 |
| 14. Engine Junction box Assembly A4 | 37. Middle Control Panel A1 |
| 15. Bilge Pump System (Machinery Compartment) | 38. Navigation Masts and Lights |
| 16. Electrical Junction and Terminal Boxes | 39. Bilge Pumps |
| 17. Raw Water Cooling System | 40. Powered Section |
| 18. Diesel Engine | 41. Lifting Slings |
| 19. Diesel Engine Alternator | 42. Powered and Non-Powered Modules |
| 20. Diesel Engine Cooling System | 43. Steel Weight Lifting Chains, Rings, Hooks, Shackles and Swivels |
| 21. Diesel Engine Intake and Exhaust | 44. Module Interlock Connector (Male Locking Pin) |
| 22. Batteries | 45. Horizontal and Vertical Connectors |
| 23. Marine Gear | |



ITEMS 16, 39, 40, 41, 42, 43, 44, 45 NOT SHOWN

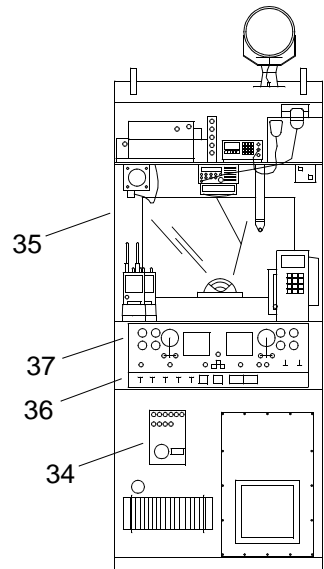
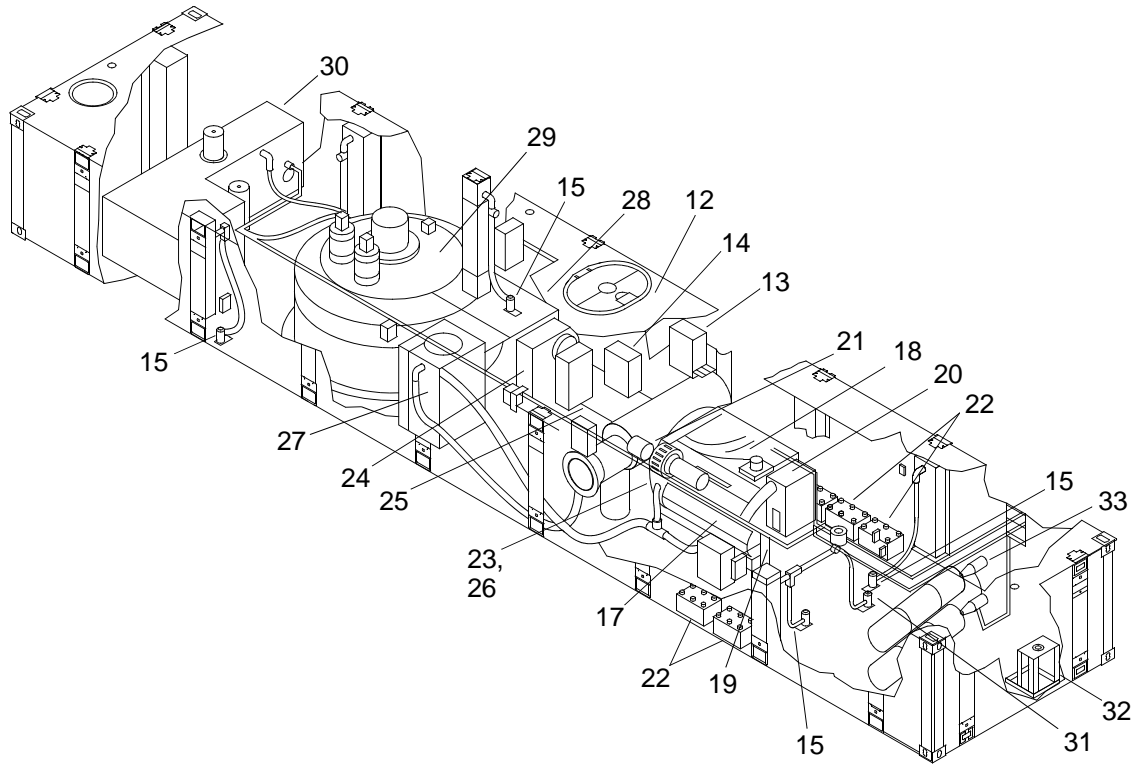


Table 1. Preventive Maintenance Checks and Services for the Warping Tug.

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
1	Before	0.5	Intake Plenums and Exhaust Plenums	<p>1. Ensure all plenums are secured to deck. If plenums are loose, attach plenums to deck.</p> <p>2. Check electrical interconnect cables for secure attachment to operators cab receptacles A5/A6. If cable connections are disconnected or loose, connect or tighten cables.</p> <p>3. Check for loose hardware. If found, contact unit maintenance.</p> <p>4. Inspect portable fire extinguisher for discharge nozzle obstruction, proper mounting, tag signed within the last month and that all seals and pins are in place. Record completion of the inspection in the deck logbook. If discharge nozzle is obstructed, fire extinguisher mounting is loose, tag is not signed within the last month or seals or pins are missing, contact unit maintenance.</p>	

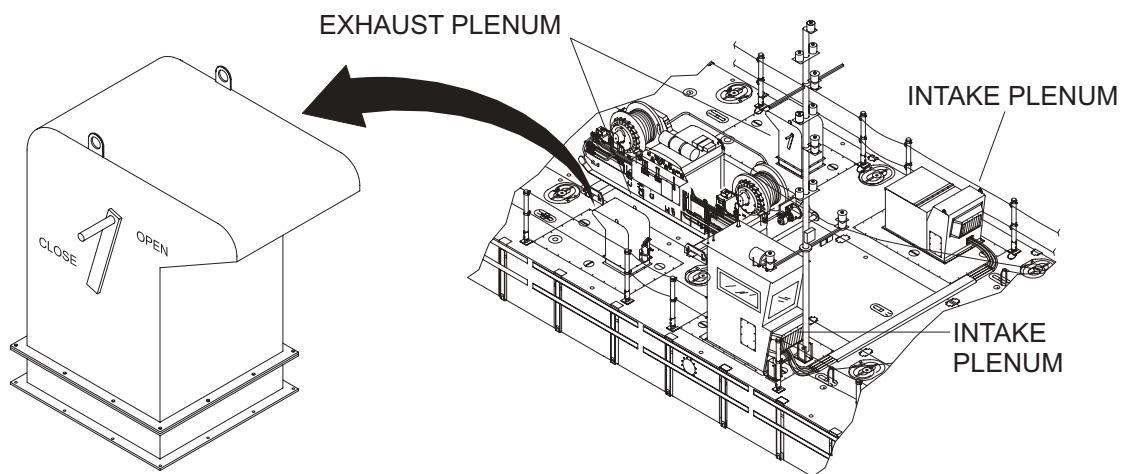


Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
2	Before	0.1	Propulsion Module	<p>1. Ensure all soft patches are secured for sea operation, including exhaust port patches (opposite exhaust port flapper valves). If soft patches are not secure, contact unit maintenance.</p> <p>2. Latch open all personnel access hatches for ventilation in machinery compartment, lazaret and fuel compartment.</p>	

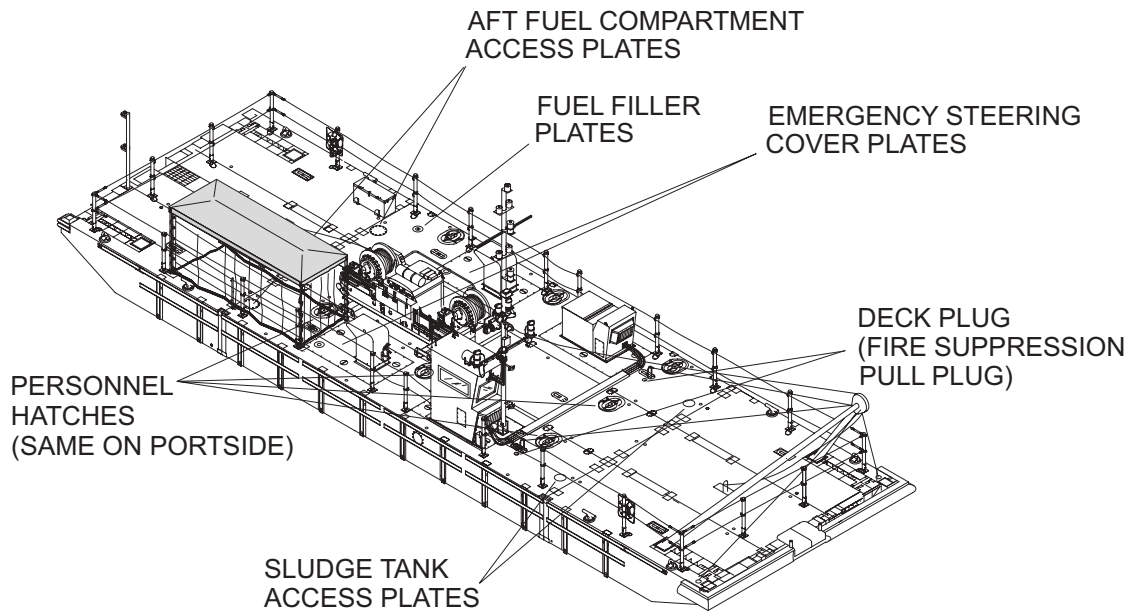


Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
3	Before	0.1	Life Lines and Life Ring Stanchions	<p>1. Inspect life line and life ring stanchions for broken welds, missing or broken bolts and damage to stanchion. If life line or life ring stanchion welds are broken, bolts are missing or broken or stanchions are damaged, contact unit maintenance.</p> <p>2. Inspect life line and life ring stanchions for proper installation (pinned) to the deck fittings. If pins are missing, contact unit maintenance.</p> <p>3. Check all cables and connection points for worn or frayed areas. If cables or connection points are frayed, contact unit maintenance.</p> <p>4. Check that all cable assemblies are tight. If cables are loose, contact unit maintenance.</p>	<p>Life line or life ring stanchions have broken welds, bolts are missing or broken or stanchions are damaged.</p> <p>Pins are missing.</p>
				<p>5. Check life rings for damage. If damage is found that would prevent proper operation of life rings, contact unit maintenance.</p> <p>6. Check life ring strobes for proper operation. If strobes do not operate, replace battery (WP 0106 00) or contact unit maintenance.</p>	

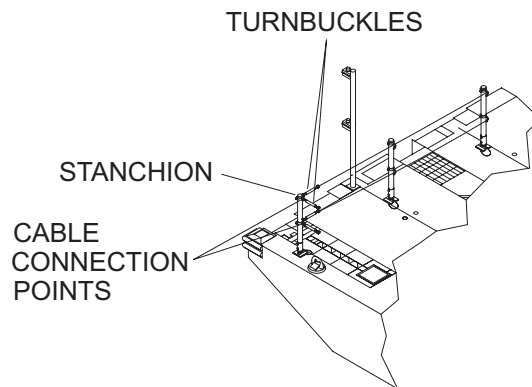


Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

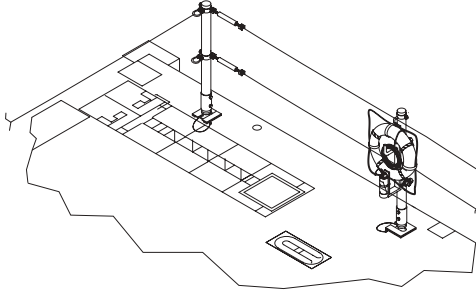
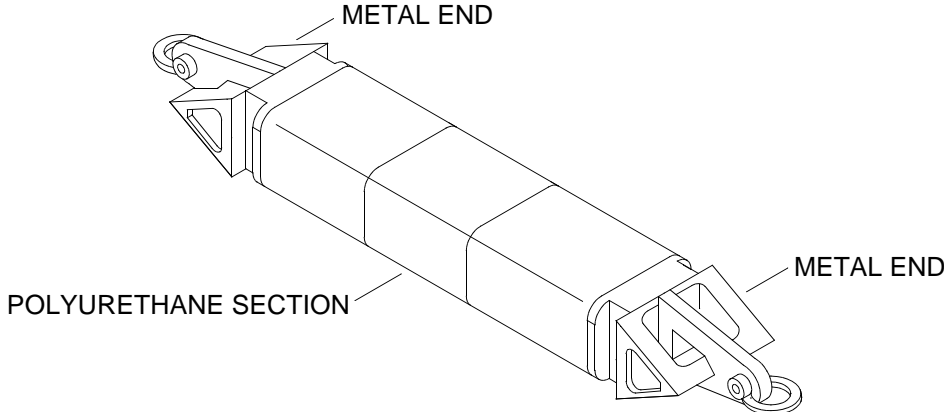
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
					
<p>NOTE Flexor is stored in rear left rake module.</p>					
4	Before	0.5	Flexor	<ol style="list-style-type: none"> 1. Inspect stowed flexor in left end rake for separation of the polyurethane material in the center. If separation of the polyurethane material in the center of the flexor is found, contact unit maintenance. 2. Inspect stowed flexor for cracks in the external weldments on the ends. If cracks in the external weldments on the ends of the flexor are found, contact unit maintenance. 	<p>Separation of the polyurethane material in the center of the flexor is found.</p> <p>Cracks are discovered in the external weldments on the ends of the flexor.</p>
					
5	Before	0.1	Deck Fittings	<p>Inspect lash rings and deck cleats for corrosion, breakage or missing parts. If corrosion is found or lash rings or deck cleats are broken or have missing parts, contact unit maintenance.</p>	

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

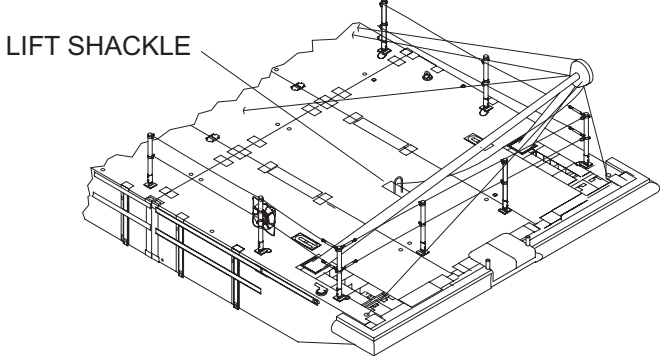
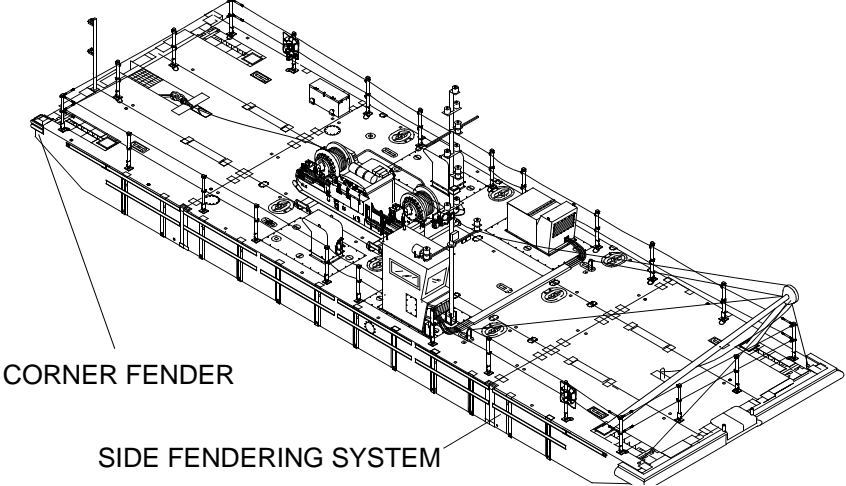
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
6	Before	1.0	Lift Shackles and Skeg Assemblies	1. Inspect lift shackle padeyes for water. If found, clean drain tube using compressed air. 2. Inspect skeg assembly lefting eyes for freedom of movement. If damaged, contact unit maintenance.	
 <p>LIFT SHACKLE</p>					
7	Before	0.2	Fenders	Inspect all fenders for damage that would prevent proper operation. If damage is found that would prevent proper operation, contact unit maintenance.	
 <p>CORNER FENDER</p> <p>SIDE FENDERING SYSTEM</p>					
8	Before	0.1	Stern Anchor	1. Inspect stern anchor center end rake for broken welds, corrosion and damaged pillow blocks or rollers. If damage is found, contact unit maintenance.	

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
8	Before	0.1	Stern Anchor (Cont.)	2. Inspect stern anchor for damage and secure installation. If damage is found, contact unit maintenance.	
9	Before	0.1	Exhaust Flapper Valves	Unlatch exhaust flapper valves on outboard side of propulsion modules.	
10	Before	0.5	Deck Winch and Deck Winch Engine	<ol style="list-style-type: none"> 1. Perform deck winch PMCS in accordance with TM 55-3950-204-14&P. 2. Perform deck winch engine PMCS in accordance with TM 5-2815-258-10. 3. Inspect deck winch mounting plates and transverse beams for cracks. If cracks are found, contact unit maintenance. 	

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
10	Before	0.5	Deck Winch and Deck Winch Engine (Cont.)	4. Check all mounting hardware for tightness. If hardware is loose, tighten the hardware. If damaged, contact unit maintenance.	
11	Before	0.3	Deck Winch A-Frame	1. Inspect A-frame mounting feet and attaching lugs for cracks and for loose bolts. If cracks or loose bolts are found, contact unit maintenance.	A-frame feet are cracked.
				<p>2. Inspect A-frame legs for cracks. If cracks are found, contact unit maintenance.</p> <p>3. Inspect A-frame guy cable for breaks or fraying. If cable breaks or fraying is found, contact unit maintenance.</p> <p>4. Inspect A-frame attachment fittings for cracks and loose bolts. If cracks or loose bolts are found, contact unit maintenance.</p> <p>5. Inspect A-frame sheave attachment points for cracks and loose bolts. If cracks or loose bolts are found, contact unit maintenance.</p> <p>6. Inspect A-frame sheave head plates for cracks. If sheave plate is cracked, contact unit maintenance.</p>	<p>A-frame legs are cracked.</p> <p>Cables are broken or frayed.</p> <p>Attachment fittings are cracked.</p> <p>Sheave is cracked.</p> <p>Sheave head plate is cracked.</p>

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

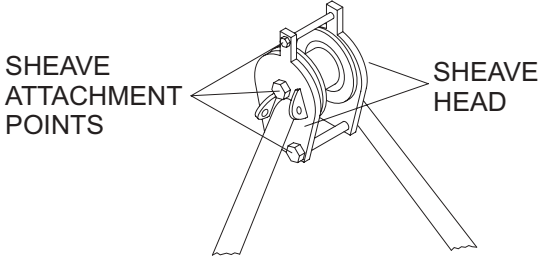
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
					
12	Before	0.1	Machinery Compartment Light Switch	Position machinery compartment lighting switch to on (closed) while performing below deck PMCS. If light switch does not function, contact unit maintenance.	
<p>WARNING</p> <p>Ensure machinery compartment has been ventilated before proceeding with below deck PMCS. Failure to comply could result in injury or death to personnel.</p>					
13	Before	0.1	Propulsion Module Circuit Breaker Panel A6	<p>1. Below deck, verify MAIN circuit breaker is on (closed). If circuit breaker does not function, contact unit maintenance.</p> <p>2. Verify all remaining circuit breakers are positioned to on (closed) position. If circuit breaker does not function, contact unit maintenance.</p>	

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
14	Before	0.1	Engine Junction Box Assembly A4	Position ECM and MIM circuit breakers to on (closed). Leave ENGINE CONTROLS circuit breaker off (open) to prevent engine starting. If circuit breaker does not function, contact unit maintenance.	

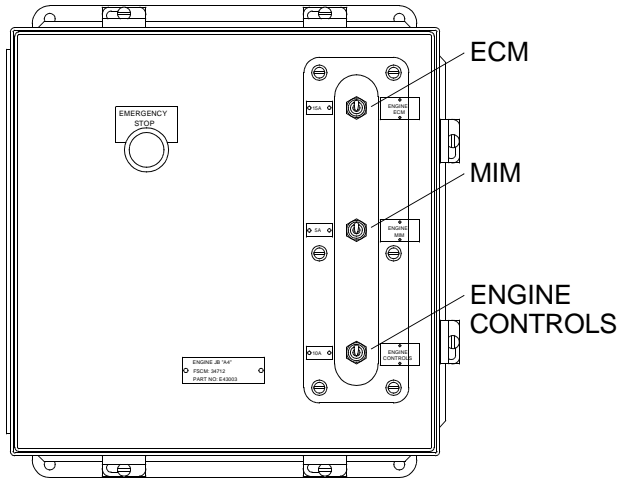
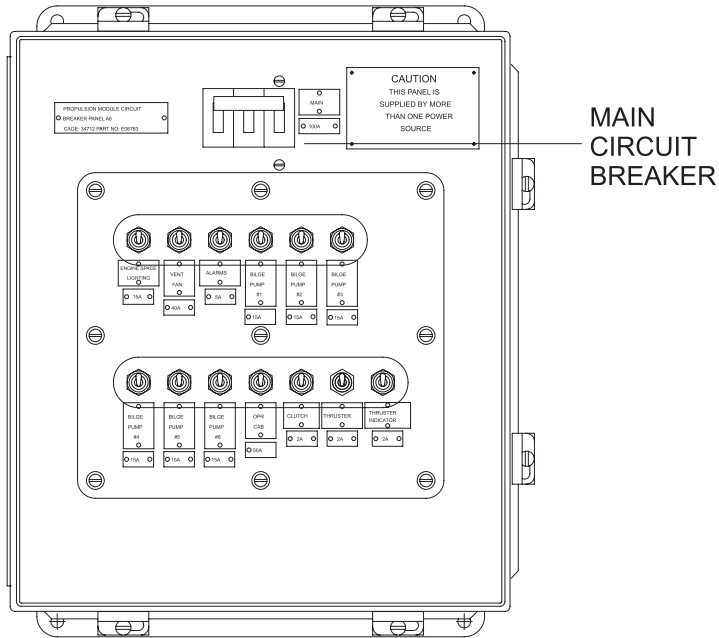


Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
15	Before	0.3	Bilge Pump System (Machinery Compartment)	<p>1. Inspect compartment for evidence of water, oil and/or fuel leaks. If leaks are found, contact unit maintenance.</p> <p>2. Verify that all bilge pump oily waste 3-way ball valves are in line for oily waste containment system and that check valve handles are aligned to point toward the sludge tank.</p> <p>3. Clean debris from the float switches and bilge pump suction inlet screens as required.</p>	Evidence of Class III leakage of water or oil or Class I fuel leakage.
NOTE					
Do not pump bilges overboard. Pump bilges into holding tank. If holding tank is full, take vessel to sludge point.					
				<p>4. If water is present in a specific area, hold the associated toggle switch on bilge pump control panel A5 to TEST to activate bilge pump. Once water is removed, release the toggle switch. The toggle switches will spring-return to the REMOTE position when released. If the toggle switches do not function or the bilge pumps are inoperative, contact unit maintenance.</p> <p>5. Test all bilge pumps by momentarily holding toggle switches in TEST position on the bilge pump control panel A5. Listen for pump operation. The toggle switches will spring-return to the REMOTE position when released. If the toggle switches do not function or the bilge pumps are inoperative, contact unit maintenance.</p>	

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

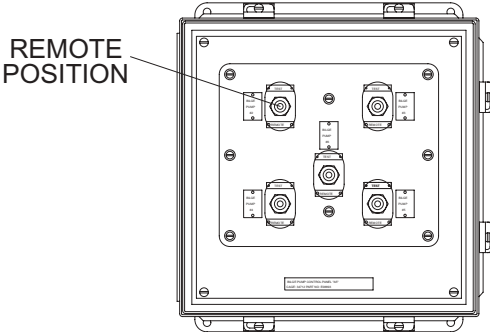
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
15	Before	0.3	Bilge Pump System (Machinery Compartment) (Cont'd)	6. Check all bilge pumps and float switches for condition and proper operation. Look for evidence of water leaks, loose pump connections and/or damage. If bilge pumps are inoperative, leak, have loose connections or are damaged, contact unit maintenance.	
 <p>The diagram shows a rectangular electrical enclosure with a hinged lid. Inside, there are several electrical components including terminal blocks, fuses, and wiring. A label 'REMOTE POSITION' with a leader line points to one of the terminal blocks on the left side of the enclosure.</p>					
16	Before	0.3	Electrical Junction and Terminal Boxes	<p>1. Inspect electrical wiring to see that it is securely connected, clean and undamaged. If electrical wiring is not securely connected or is damaged, contact unit maintenance.</p> <p>2. Check all accessible fuse terminal blocks and connections to see that they are securely connected and supported, that insulation is not cracked or chafed and that conduit and shielding are secure and in good condition. If fuse terminal blocks are not securely connected or supported, insulation is cracked or chafed, or conduit and shielding are not secure or damaged, contact unit maintenance.</p>	

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
17	Before	0.3	Raw Water Cooling System	<ol style="list-style-type: none"> 1. Pull the duplex strainer baskets and clean. 2. Open seachest butterfly valves. 3. Check the raw water system for leaks. If leaks are found, contact unit maintenance. 4. Verify that the duplex strainer valve handle is in the extreme left or right position (allowing water to flow through only one of the two strainer baskets). If handle will not operate, contact unit maintenance. 5. Verify the exhaust discharge raw water valve lever is in the OPEN position. If valve will not operate, contact unit maintenance. 6. Verify the transfer case oil cooler raw water valve lever is in the OPEN position. If valve will not operate, contact unit maintenance. 	Class II water leakage is found.

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
17	Before	0.3	Raw Water Cooling System (Cont.)	<p>7. Inspect the cooling system for leaks or excessive puddling around its base. If leakage is found, contact unit maintenance.</p> <p>8. In freezing weather (below 32°F), close all petcocks in the raw water system. Prime the raw water pump. Inspect for leaks after start-up of engine. If leaks are found, contact unit maintenance.</p>	Class III water leakage is found.

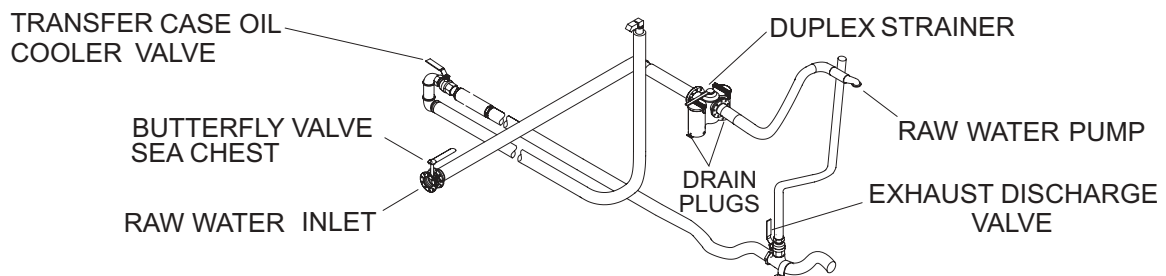
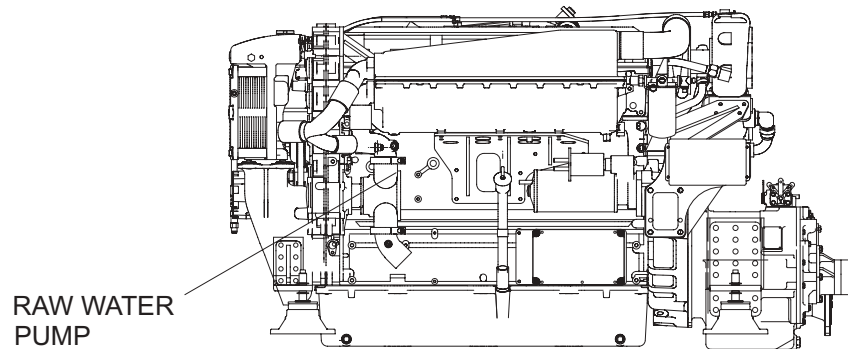


Table 1. Preventive Maintenance Checks and Services for the Warring Tug. (Continued)



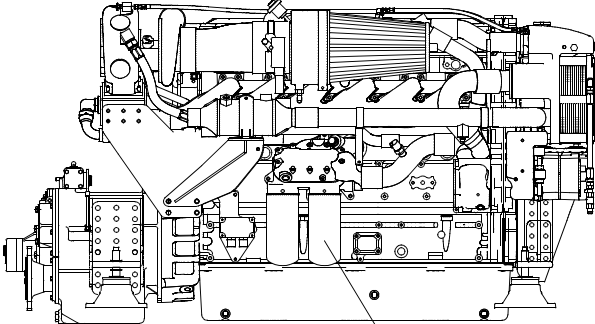
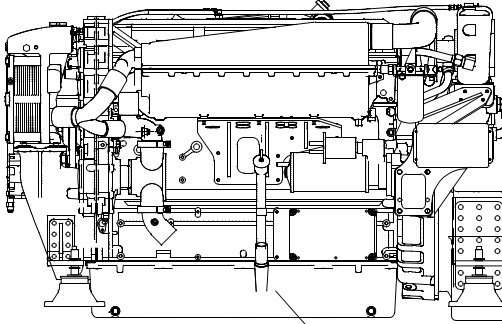
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
<p>WARNING</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>CHEMICAL</p> </div> <div style="text-align: center;">  <p>EYE PROTECTION</p> </div> </div>					
18	Before	0.4	Diesel Engine	<ol style="list-style-type: none"> 1. Check the engine oil level. Verify that it registers FULL on the dipstick. Engine must be cool when reading level. If hot, allow to cool for 20 minutes. Service with lubricating oil (grade 15W-40). DO NOT OVERFILL. 2. Make a visual inspection for oil leaks around the engine oil lines. If leaks are found, contact unit maintenance. 3. Visually inspect the oil. If metal particles are found, the oil must be completely changed. Record engine hours in logbook. 	Class III leakage is found.
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>OIL FILTER ASSEMBLY</p> </div> <div style="text-align: center;">  <p>OIL LEVEL DIPSTICK</p> </div> </div>					

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

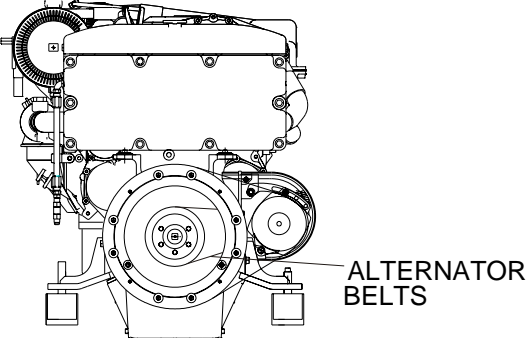



ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
19	Before	0.1	Diesel Engine Alternator	1. Check for split, dry-rotted or glazed alternator drive belts. If found, contact unit maintenance. 2. Check belt tension. Contact unit maintenance.	Belts are broken or missing. Belts have improper tension.
					
<hr/> WARNING <hr/>					
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  CHEMICAL </div> <div style="text-align: center;">  EYE PROTECTION </div> <div style="text-align: center;">  POISON </div> </div>					
20	Before	0.2	Diesel Engine Cooling System	1. Check the engine coolant level in site tube on side of recover system overflow bottle. Add proper coolant mixture as needed. Service with 50/50 water/antifreeze.	

Table 1. Preventive Maintenance Checks and Services for the Warring Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
				<p>2. Inspect the air inlet collector assemblies. If the air inlet restriction indicator is red, contact unit maintenance.</p>	<p>Air inlet restriction indicator is red.</p>

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
21	Before	0.2	Diesel Engine Intake and Exhaust	1. Check the turbocharger and exhaust connections. Visually inspect the mountings, intake and exhaust ducting and connections for leaks. In temperatures below freezing (32°F), check freeze plugs for water leaks.	Evidence of leaks or restrictions.
21	Before	0.2	Diesel Engine Intake and Exhaust	2. Inspect the engine air filtering system for leaks, torn boots and loose or damaged clamps.	

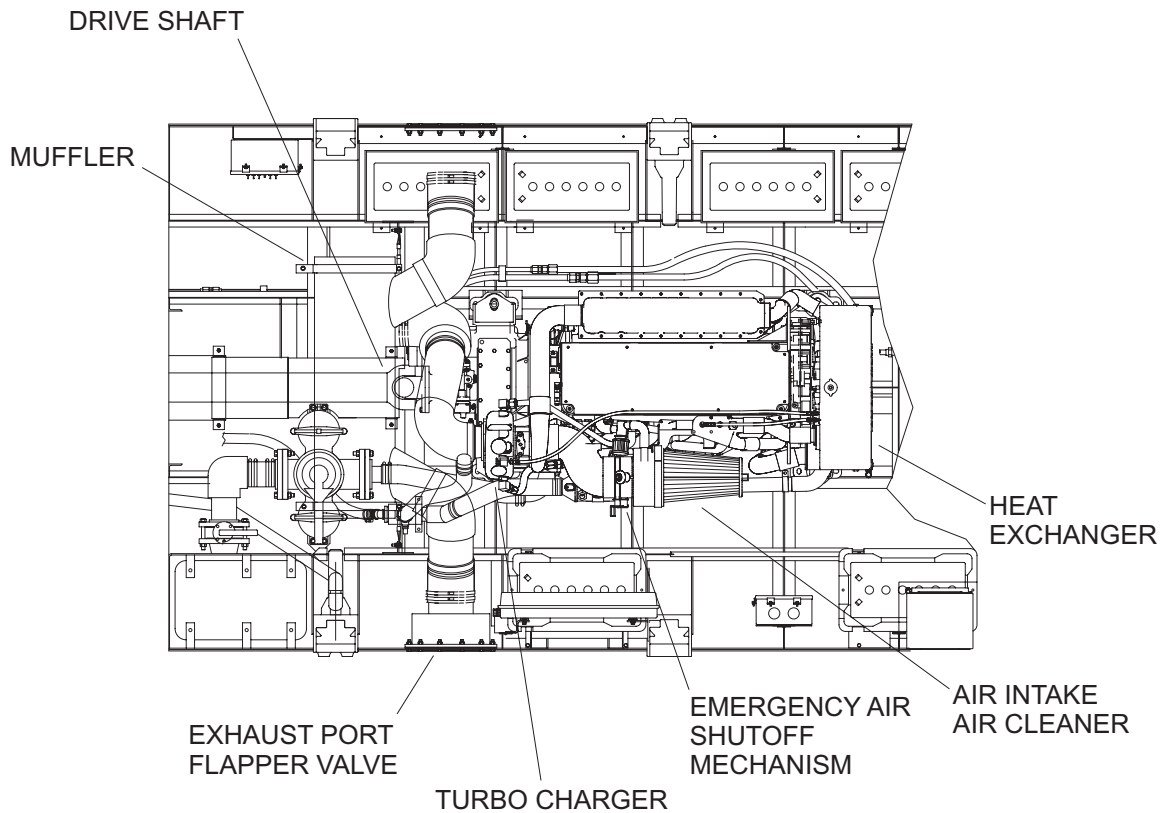


Table 1. Preventive Maintenance Checks and Services for the Warring Tug. (Continued)





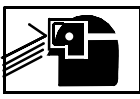
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
<hr/> WARNING <hr/>					
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  CHEMICAL </div> <div style="text-align: center;">  EYE PROTECTION </div> <div style="text-align: center;">  EXPLOSION </div> </div>					
22	Before	0.3	Batteries (Engine and House)	<ol style="list-style-type: none"> 1. Verify battery electrolyte levels completely cover the plates, without electrolyte overflowing the battery and that connections are clean and tight, both port and starboard. Add reagent distilled water, if necessary. If connections are loose, batteries are unserviceable or will not start engines, contact unit maintenance. 2. Ensure all battery cable clamps and hold downs are tight. Make sure all are secure and free of corrosion. If battery cable clamps and hold downs are loose or corroded, contact unit maintenance. 3. Inspect battery system for damage. If batteries are damaged or inoperative, contact unit maintenance. 4. Charge batteries as required. Contact unit maintenance. 	Batteries are unserviceable.
<hr/> WARNING <hr/>					
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  CHEMICAL </div> <div style="text-align: center;">  EYE PROTECTION </div> </div>					
23	Before	0.2	Marine Gear	<ol style="list-style-type: none"> 1. Check the oil level in the marine gear. Fill to "F" mark on dipstick with oil. Service with lubricating oil (grade 40). 	

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)


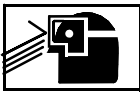
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
23	Before	0.2	Marine Gear (Cont.)	2. Inspect for leaks in the marine gear, particularly near the oil seals. If any leaks are found, contact unit maintenance. Record engine hours in logbook.	Class III leakage is found.
<p>The diagram shows a detailed view of a marine gear assembly. Labels with leader lines point to the following components: MARINE GEAR FILLER (top right), OIL FILLER BREATHER (left side), OIL DIPSTICK (right side, lower), MARINE GEAR DRAIN (bottom left), and OIL SEAL (bottom right).</p>					
<p>WARNING</p>					
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>CHEMICAL</p> </div> <div style="text-align: center;">  <p>EYE PROTECTION</p> </div> </div>					
24	Before	0.2	Transfer Case	Check oil level in transfer case. Oil should be present at bottom of check plug hole. Service with lubricating oil (grade30). DO NOT OVERFILL. (TM 55-1945-205-24-3-4)	

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
25	Before	0.1	Drive Shafts	Inspect drive shafts between marine gear and transfer case, and between pump-jet and transfer case. Inspect for physical damage or degradation. If damage or degradation is found, contact unit maintenance.	

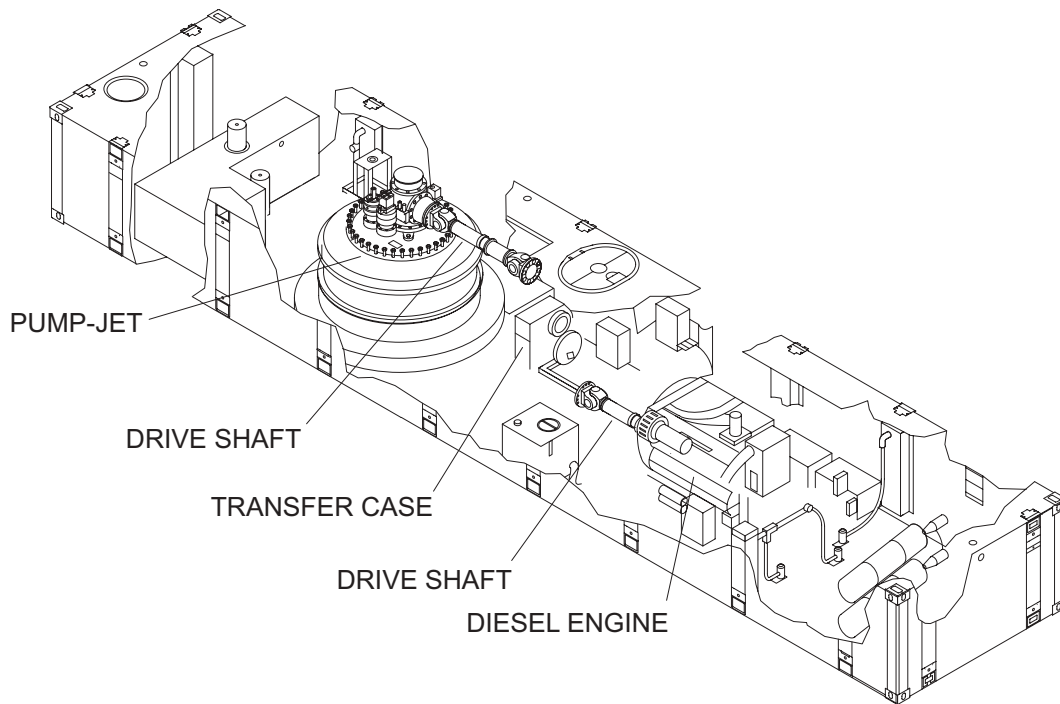


Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)



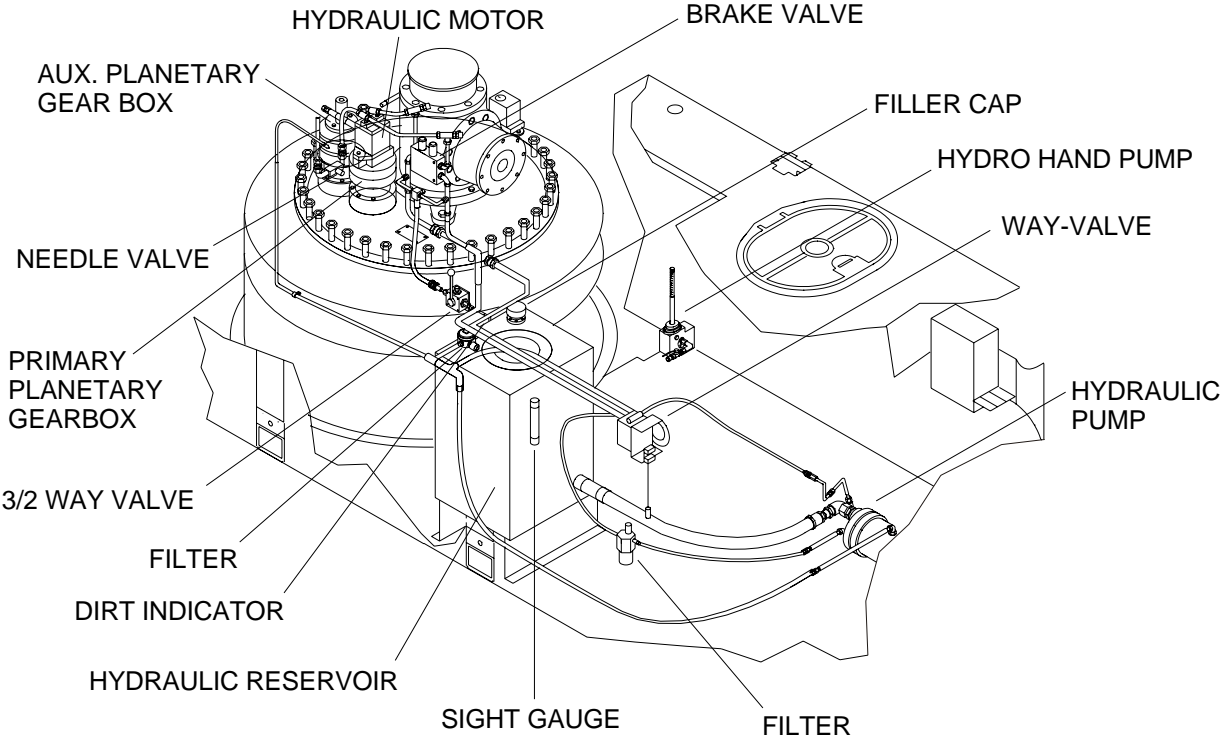
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
<p>WARNING</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>EYE PROTECTION</p> </div> <div style="text-align: center;">  <p>VAPOR</p> </div> </div>					
26	Before	0.1	Hydraulic System	<p>Inspect all hydraulic components including way-valve, hydraulic pump, hydraulic reservoir, emergency steering hand pump and pump-jet main and auxiliary planetary gear housings for evidence of hydraulic fluid leakage. If leaks are found, contact unit maintenance.</p>	Class III hydraulic leakage is found.
					

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)





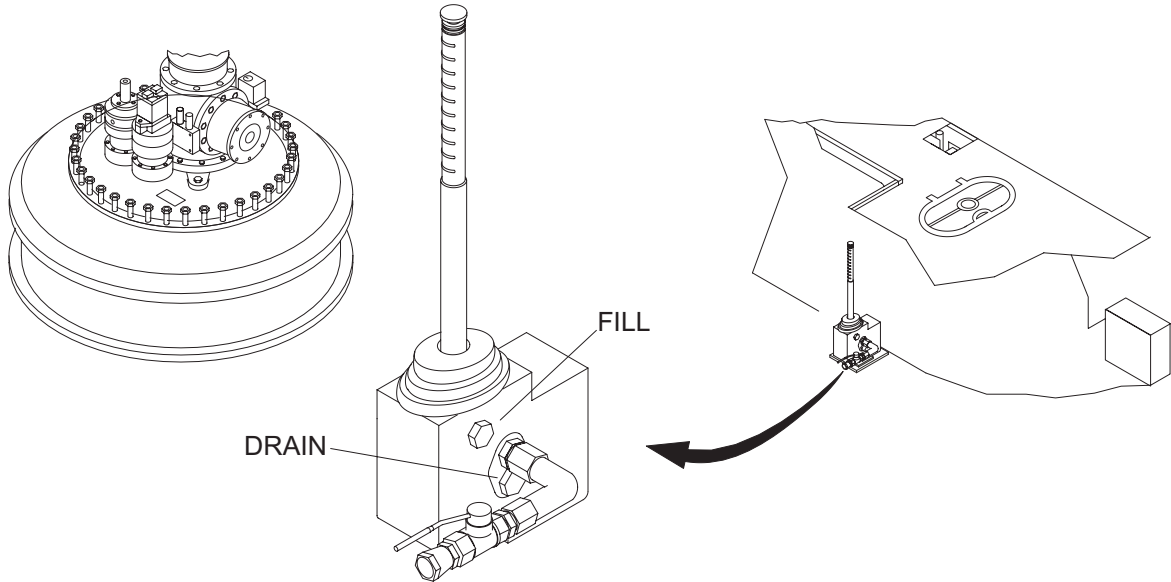
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
<p>WARNING</p> <div style="display: flex; justify-content: space-around;">   </div> <div style="display: flex; justify-content: space-around;"> <p>EYE PROTECTION</p> <p>VAPOR</p> </div>					
27	Before	0.1	Hydraulic Reservoir	Check that reservoir fluid level is more than ½ full but less than ¾ full in the sight gauge. Add lubricating oil (DTE-25). If leaks are found, contact unit maintenance.	
<p>WARNING</p> <div style="display: flex; justify-content: space-around;">   </div> <div style="display: flex; justify-content: space-around;"> <p>EYE PROTECTION</p> <p>VAPOR</p> </div>					
28	Before	0.1	Emergency Steering Hand Pump	Remove oil fill plug and ensure oil level is flush with hole. Service with lubricating oil (DTE-25). If leaks are found, contact unit maintenance.	
					

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)



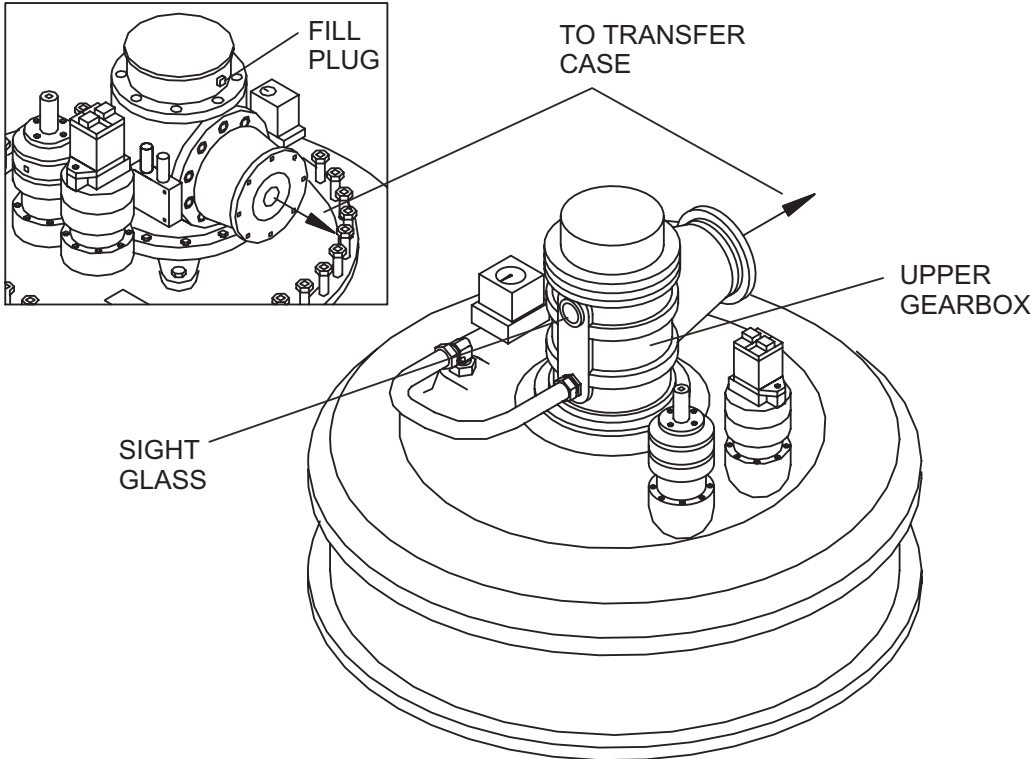
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
<p>WARNING</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>EYE PROTECTION</p> </div> <div style="text-align: center;">  <p>VAPOR</p> </div> </div>					
29	Before	0.1	Pump-Jet	<p>1. Confirm pump-jet oil level is such that oil is visible in sight glass at rear of upper gearbox with pump-jet in cold condition. Add lubricating oil (Mobilgear 626) as necessary at the fill plug until oil is visible in sight glass. Replace fill plug when finished. DO NOT OVERFILL. If leaks are found, contact unit maintenance.</p> <p>2. Check the expansion tank for leaks and loose mounting. If leaks or loose mounting is found, contact unit maintenance.</p>	<p>Class III hydraulic leakage is found.</p> <p>Class III hydraulic leakage is found.</p>
					

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)





ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
<p>WARNING</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  CHEMICAL </div> <div style="text-align: center;">  EYE PROTECTION </div> <div style="text-align: center;">  EXPLOSION </div> <div style="text-align: center;">  FIRE </div> </div> <p>Use approved procedures when cleaning up fuel spills. Take proper precautions when removing or installing any fuel system component. Failure to comply may result in serious injury or death to personnel.</p>					
30	Before	0.3	Fuel System	<ol style="list-style-type: none"> 1. Visually inspect and drain water and/or other contaminants from fuel/water separator into a drain pan. When pure fuel emerges, close drain. Dispose of fuel in accordance with local procedures. If fuel/water separator glass bowl is broken or tank has an excessive amount of water, contact unit maintenance. 2. Open the fuel supply line ball valve. 3. Open the fuel return line ball valve. 4. Check for leaks around fuel tank and fuel lines. If leaks are found, contact unit maintenance. 5. Examine fuel lines and flexible hoses for leaks. Check that fittings, clamps and tiedown straps are secure. Hoses must not be resting or touching shafts, couplings, heated surfaces, sharp edges or other areas that might sever or rupture fuel system parts. If leaks, loose fittings, clamps or tiedown straps are found or hoses are resting on shafts, couplings, heated surfaces, sharp edges or other areas that might sever or rupture fuel system parts, contact unit maintenance. 	<p>Broken fuel/water separator or water in fuel prevents engine from starting.</p> <p>Class I fuel leakage is found.</p>

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
30	Before	0.3	Fuel System (Cont'd)	6. Verify fuel tank is full by checking sight level or using a fuel stick. If necessary, add fuel. DO NOT OVER FILL. Service with diesel fuel. If tank fuel level indicator is cracked or broken or if fuel leaks are found, contact unit maintenance.	Broken fuel level indicator or Class I fuel leakage.

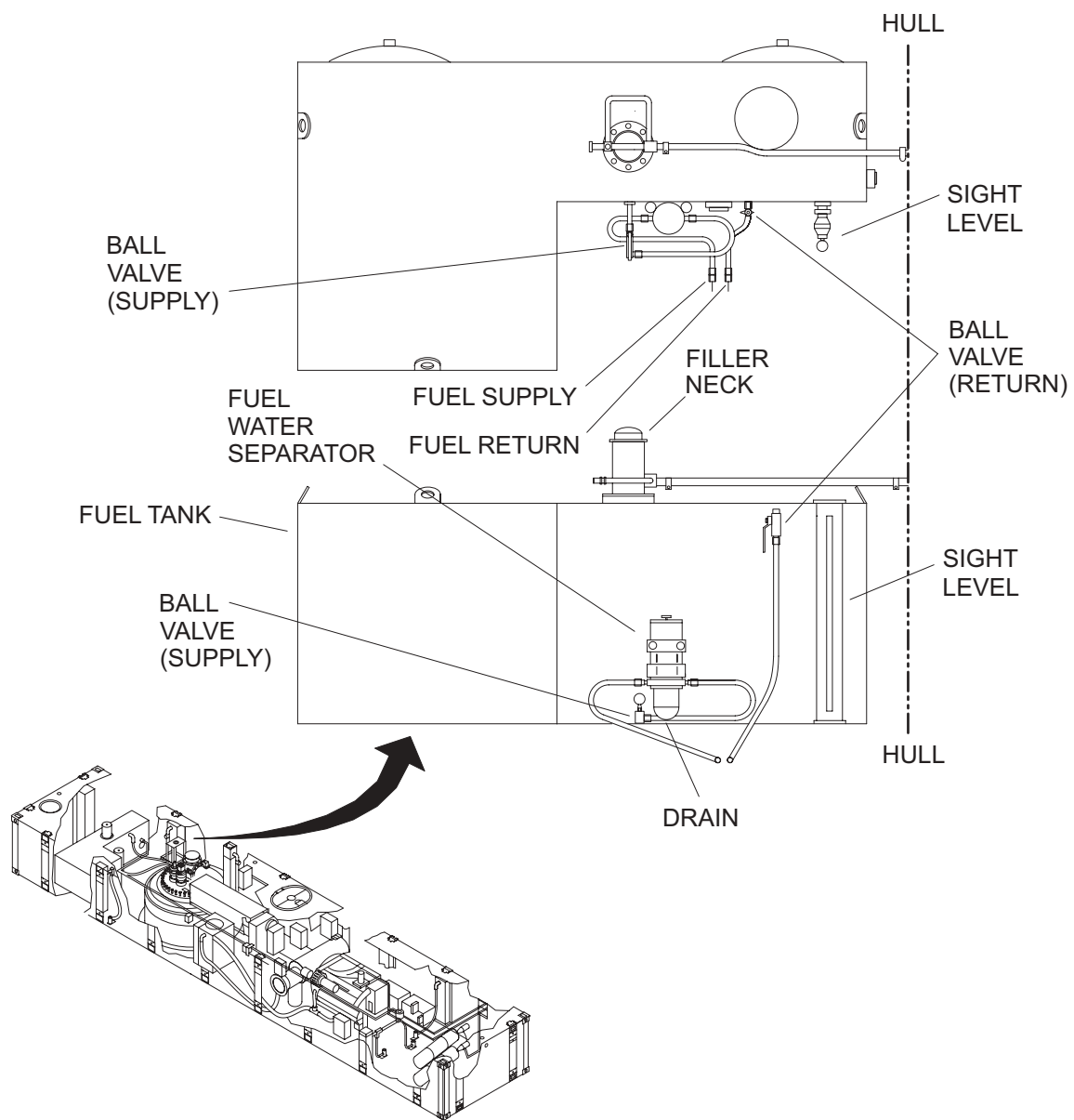


Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
31	Before	0.3	Bilge Pump System (Lazaret)	1. Inspect compartment for evidence of water. If leaks are found, contact unit maintenance. 2. Verify that all bilge pump oily waste 3-way ball valves are in line for oily waste containment system. 3. Clean debris from the float switch and bilge pump suction inlet screen as required.	Evidence of Class III leakage of water.
NOTE					
Do not pump bilges overboard. Pump bilges into holding tank. If holding tank is full, take vessel to sludge point.					
				4. If water is present in the area, hold the toggle switch on single bilge pump control panel A7 to TEST to activate bilge pump. Once water is removed, release the toggle switch. The toggle switch will spring-return to the REMOTE position when released. If the toggle switch does not function or the bilge pump is inoperative, contact unit maintenance.	

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
31	Before	0.3	Bilge Pump System (Lazaret) (Cont'd)	5. Test bilge pump by momentarily holding toggle switch in TEST position on the single bilge pump control panel A7. Listen for pump operation. The toggle switch will spring-return to the REMOTE position when released. If the toggle switch does not function or the bilge pump is inoperative, contact unit maintenance.	

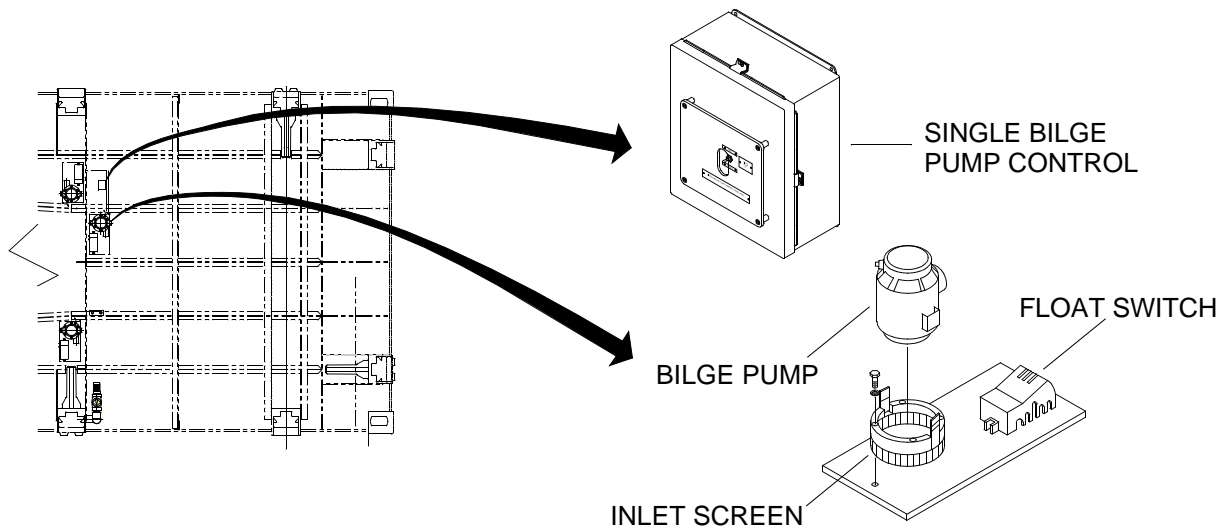
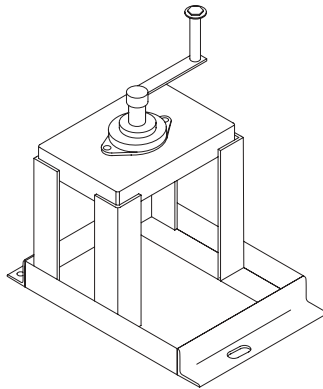


Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
32	Before	0.1	Emergency Steering Control Stand (Stowed in Lazaret)	Visually inspect control stand for obvious damage, evidence of corrosion, wear and loose or missing parts. If control stand is damaged, corroded or has loose or missing parts, contact unit maintenance.	Control stand is inoperative.



WARNING

Use extreme care when inspecting or servicing CO₂. Failure to comply could result in injury or death.

33	Before	0.1	Fire Suppression System	<p>1. Inspect for discharge, leakage, expansion or damaged or broken seals. If discharge, leakage, expansion, damaged or broken seals are found, contact unit maintenance.</p> <p>2. Check remote cabling and pulleys for damage. If damage is found, contact unit maintenance.</p>	Seals are damaged or broken, or evidence of excessive discharge is found.
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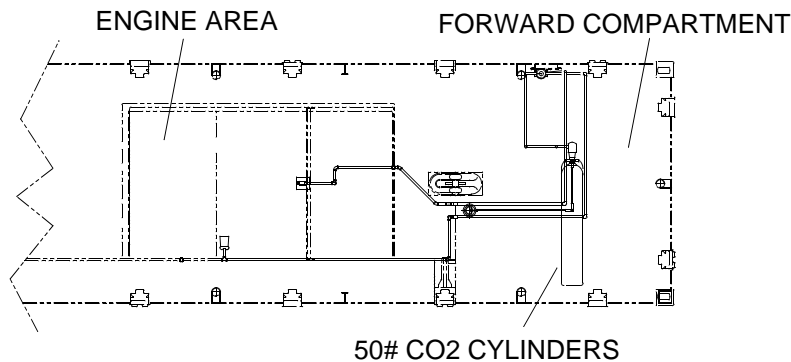


Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

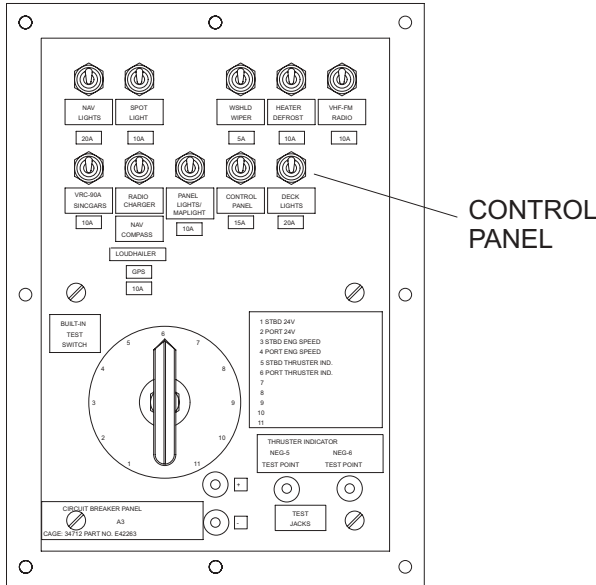
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
34	Before	0.1	Operators Cab Circuit Breaker Panel A3	Position all circuit breakers to on (closed), except DECKLIGHTS unless night operations are required.	
					
35	Before	0.3	Operators Cab	<ol style="list-style-type: none"> 1. Check operator cab structure for damage to mountings. If damage is found, contact unit maintenance. 2. Visually inspect roof mounted antennas, cabling, spotlight, bell, and main assembly mast for damage that would prevent operation. If damage is found that would prevent operation, contact unit maintenance. 3. Functionally test battle lantern by moving toggle switch to on (closed) position. Verify light comes on. If battle lantern is inoperative, contact unit maintenance. 	

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
35	Before	0.3	Operators Cab (Cont'd)	<p>4. Functionally check VHF/FM DSC transceiver. (WP 0028 00) If VHF/FM DSC transceiver is inoperative, contact unit maintenance.</p> <p>5. Functionally check public address set (loudhailer). (WP 0026 00) If loudhailer is inoperative, contact unit maintenance.</p> <p>6. Functionally test navigation horn by turning on loudhailer. (WP 0026 00) Push HAIL button one time, then FOG button one time, using the microphone PTT switch and release for each sound of the horn. Example: Push and release PTT switch three times will result in three short blasts of the horn. Adjust volume using the LISTEN control knob as required. If loudhailer is inoperative, contact unit maintenance.</p> <p>7. Functionally check Precision Lightweight Global Positioning Receiver (PLGR). (WP 0032 00) If PLGR is inoperative, contact unit maintenance.</p> <p>8. Functionally check VHF/FM handheld transceivers and battery chargers. (WP 0025 00) If transceivers or battery chargers are inoperative, contact unit maintenance.</p> <p>9. Functionally check SINCGARS radio. (WP 0027 00) If SINCGARS radio is inoperative, contact unit maintenance.</p>	VHF/FM DSC transceiver is inoperative. VHF/FM DSC transceiver is a safety requirement and must be operational.

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
35	Before	0.3	Operators Cab (Cont'd)	<p>10. Inspect all communication equipment cabling and batteries. If damage is found that would prevent operation, contact unit maintenance.</p> <p>11. Functionally test maplight. If maplight does not illuminate, contact unit maintenance.</p>	

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

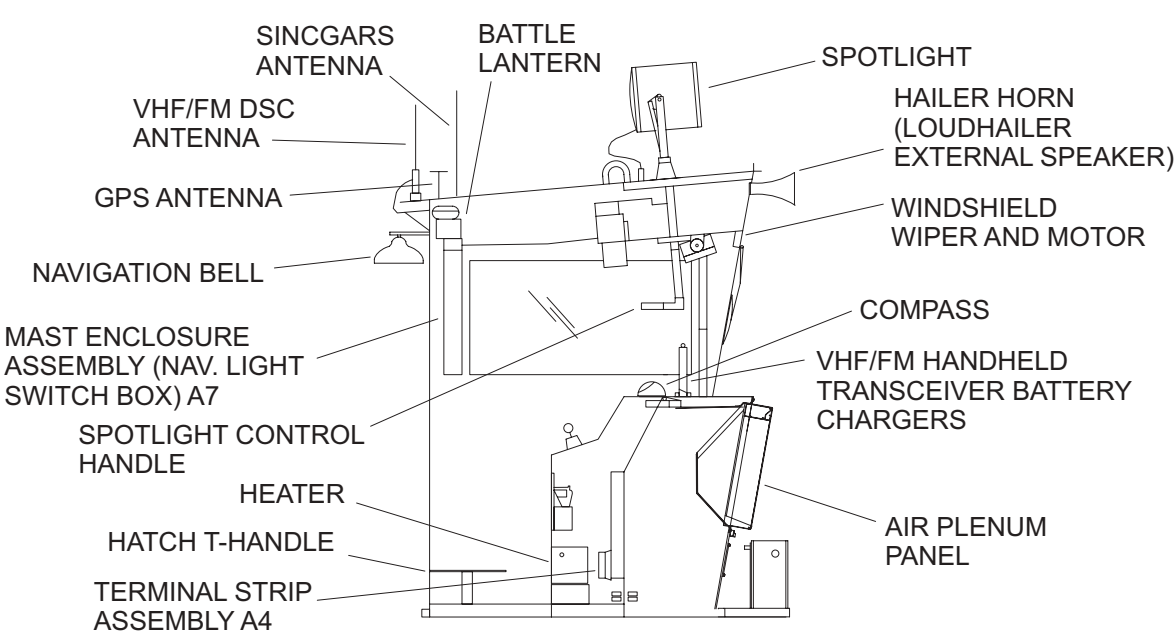
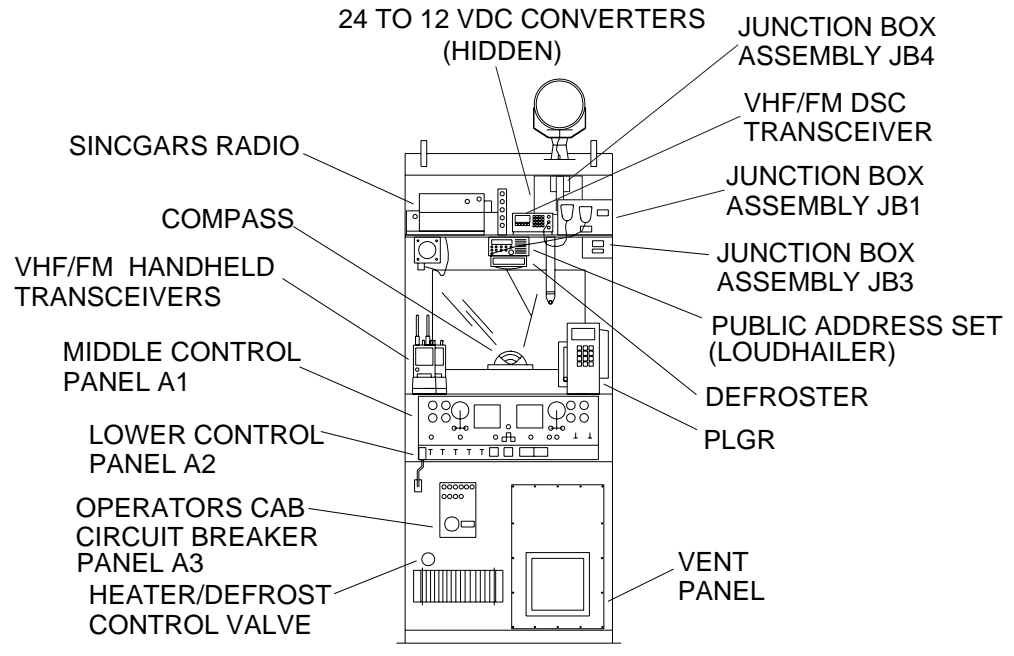
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
					
					

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
36	Before	0.4	Lower Control Panel A2	<p>1. Check all control panel switches, gages, steering levers, throttles and other controls and indicators for obvious damage. If damaged switches, gages, steering levers, throttles and other controls and indicators are found, contact unit maintenance.</p> <p>2. Verify PORT and STBD HPU OIL LEVEL LOW red indicator lights are off. If on, check and fill appropriate hydraulic tank to proper level.</p> <p>3. Verify PORT and STBD THRUSTER GEARBOX LOW OIL red indicator lights are off. If on, check and fill appropriate pump-jet gearbox to proper level.</p>	Damage or non-functioning control panels and associated switches gages, steering levers, throttle and other controls and indicators.

NOTE

At initial start-up, the thruster gearbox low oil indicators will light up red momentarily and then go out.

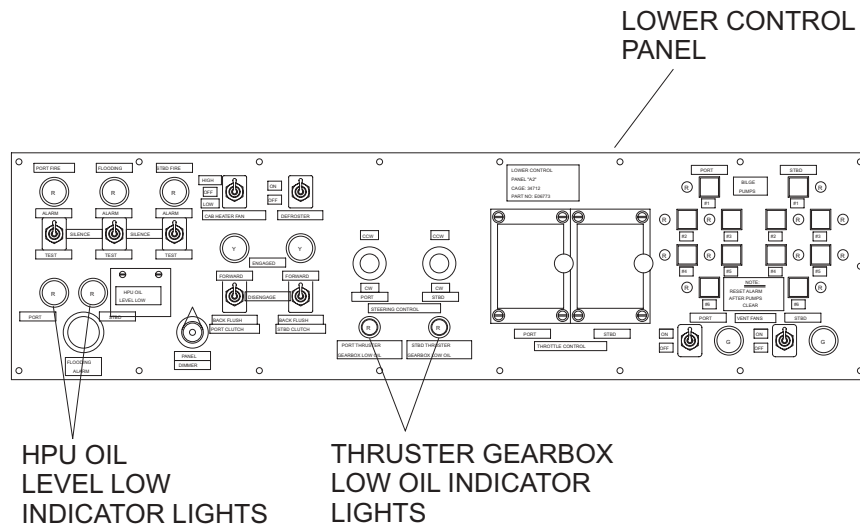


Table 1. Preventive Maintenance Checks and Services for the Warring Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
36	Before	0.4	Lower Control Panel A2 (Cont'd)	<p>4. Functionally test PORT and STBD FIRE ALARM/SILENCE/TEST switches and indicators. Select TEST position momentarily. Horn sounds, red light comes on. Return switch to ALARM position (closed). If red lights do not come on, horn does not sound or toggle switches are inoperative, contact unit maintenance.</p> <p>5. Functionally test FLOODING ALARM/SILENCE/TEST switch and indicator. Select TEST position momentarily. Horn sounds, red light comes on. Return switch to ALARM position (closed). If red light does not come on, horn does not sound or toggle switch is inoperative, contact unit maintenance.</p> <p>6. Functionally test CAB HEATER FAN toggle switch by positioning to LOW then to HIGH. If fan does not come on or if toggle switch is inoperative, contact unit maintenance.</p> <p>7. Functionally test DEFROSTER toggle switch by positioning to ON. If fan does not come on or if toggle switch is inoperative, contact unit maintenance.</p>	<p>Fire alarms are inoperative.</p> <p>Flooding alarm is inoperative.</p>

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
36	Before	0.4	Lower Control Panel A2 (Cont'd)	8. Functionally test PANEL DIMMER switch. If switch is inoperative, contact unit maintenance.	
				<p>9. Functionally test both PORT and STBD THROTTLE CONTROL levers. Check that both levers move easily forward and backwards. Return throttle controls to the idle position (fully back). If levers are binding or inoperative, contact unit maintenance.</p> <p>10. Functionally test PORT and STBD STEERING CONTROL levers. Check both levers move easily forwards and backwards. Levers return to a neutral position when released. If levers are binding or inoperative, contact unit maintenance.</p>	<p>Levers binding or inoperative.</p> <p>Levers binding or inoperative.</p>

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
36	Before	0.4	Lower Control Panel A2 (Cont'd)	<p>11. Functionally check PORT and STBD CLUTCH toggle switches and amber indicator lights.</p> <p>a. Place toggle switches in the FORWARD and then BACK FLUSH positions (closed). ENGAGED amber indicator lights will come on in both positions. If toggle switches or lights are inoperative, contact unit maintenance.</p> <p>b. Place toggle switches in the DISENGAGED position (centered). Amber indicator lights are off. If toggle switches or lights are inoperative, contact unit maintenance.</p>	Switch and/or indicator inoperative.

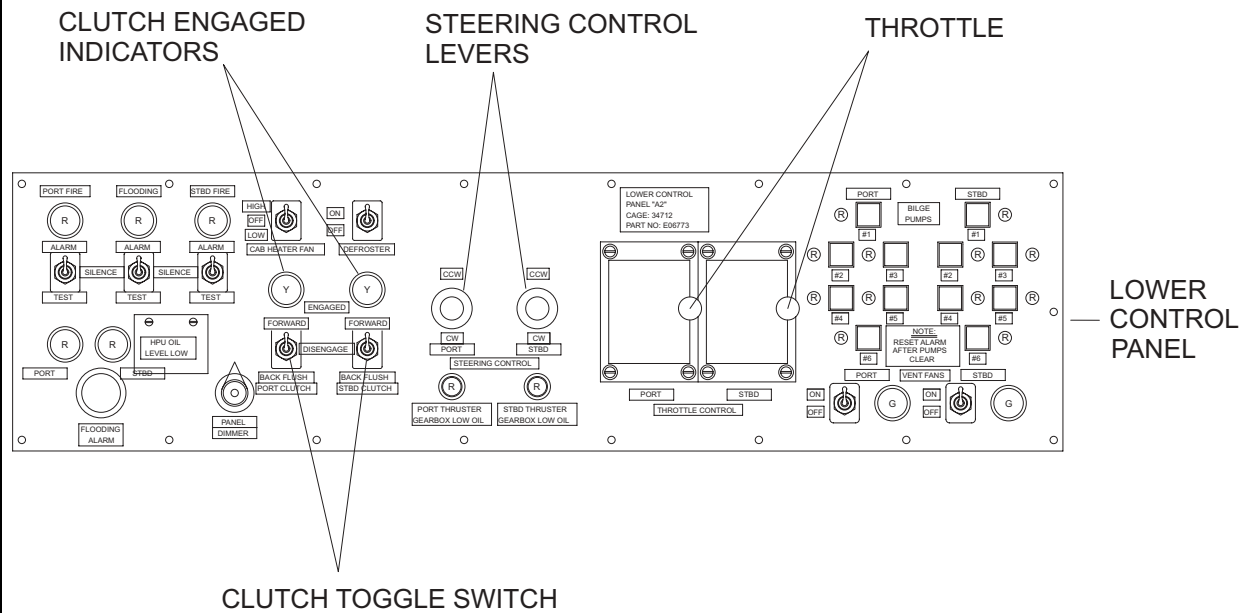


Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

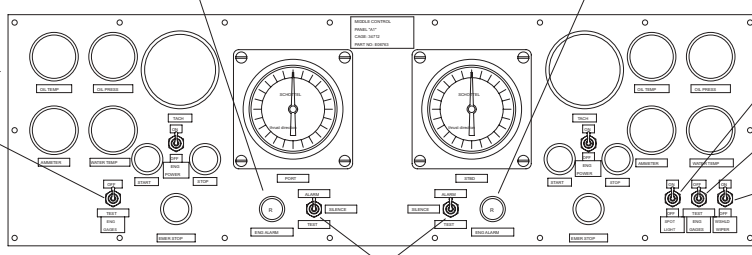
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
37	Before	0.2	Middle Control Panel A1	<p>1. Functionally test both port and stbd ENG GAGES toggle switches. Momentarily hold toggle switches in the TEST position (closed) to allow engine gages to indicate without engine running. Return toggle switches to OFF (open). If engine gages or toggle switches are inoperative, contact unit maintenance.</p>	
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>MIDDLE CONTROL PANEL</p> <p>ENG GAGES TEST SWITCH (PORT)</p> </div> <div style="text-align: center;"> <p>PORT ENG ALARM INDICATOR</p>  </div> <div style="text-align: center;"> <p>STBD ENG ALARM INDICATOR</p> <p>SPOT LIGHT ON/OFF SWITCH</p> <p>ENG GAGES TEST SWITCH (STBD)</p> <p>WSHLD WIPER ON/OFF SWITCH</p> </div> </div> <p style="text-align: center;">ENG ALARM TEST/SILENCE SWITCHES</p>					
				<p>2. Functionally test WSHLD WIPER toggle switch by positioning to ON (closed) then to OFF (open). Return switch to OFF position. If wiper or toggle switch is inoperative, contact unit maintenance.</p> <p>3. Functionally test SPOTLIGHT toggle switch by positioning to ON (closed) then to OFF (open). If spotlight or toggle switch is inoperative, contact unit maintenance.</p> <p>4. Functionally test ENG ALARM/TEST/SILENCE toggle switches and red indicator lights.</p>	<p>Alarm is not functioning.</p>

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
37	Before	0.2	Middle Control Panel A1 (Cont'd)	<p>a. Momentarily hold port and toggle switches in the TEST position. Alarm bell will sound and red indicators will come on. If toggle switches or lights are inoperative, contact unit maintenance.</p> <p>b. Return switch to the ALARM position when test is complete.</p>	Alarm bell does not sound.
<p>The diagram shows a rectangular control panel with several circular gauges and rectangular switches. Labels with lines pointing to specific components include: ENGINE OIL PRESSURE (top left), TACHOMETER (top center), ENG ON/OFF SWITCH (top right), ENGINE WATER TEMPERATURE (far right), ENGINE OIL TEMPERATURE (left side), and AMMETER (center right). Below the panel, there are labels for (ENG) START PUSHBUTTON on the left and right sides, and MIDDLE CONTROL PANEL in the center.</p>					
38	Before	0.1	Navigation Masts and Lights	<ol style="list-style-type: none"> 1. Visually inspect main assembly mast, stub assembly mast and junction boxes for evidence of corrosion, physical damage, broken welds, missing or broken bolts and/or components. If evidence of corrosion, physical damage, broken welds, missing or broken bolts and/or components is found, contact unit maintenance. 2. Visually inspect cable assemblies for loose connections and evidence of physical damage or wear. If loose connections or evidence of physical damage or wear is found, contact unit maintenance. 3. Visually inspect all navigational lights for cleanliness and evidence of physical damage. If damage is found, contact unit maintenance. 	

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
38	Before	0.1	Navigation Masts and Lights (Cont'd)	4. Functionally test all main assembly mast lights by positioning the toggle switches to ON (closed) and OFF (open) on the Mast Enclosure Assembly A7. If lights or toggle switches are inoperative, contact unit maintenance.	

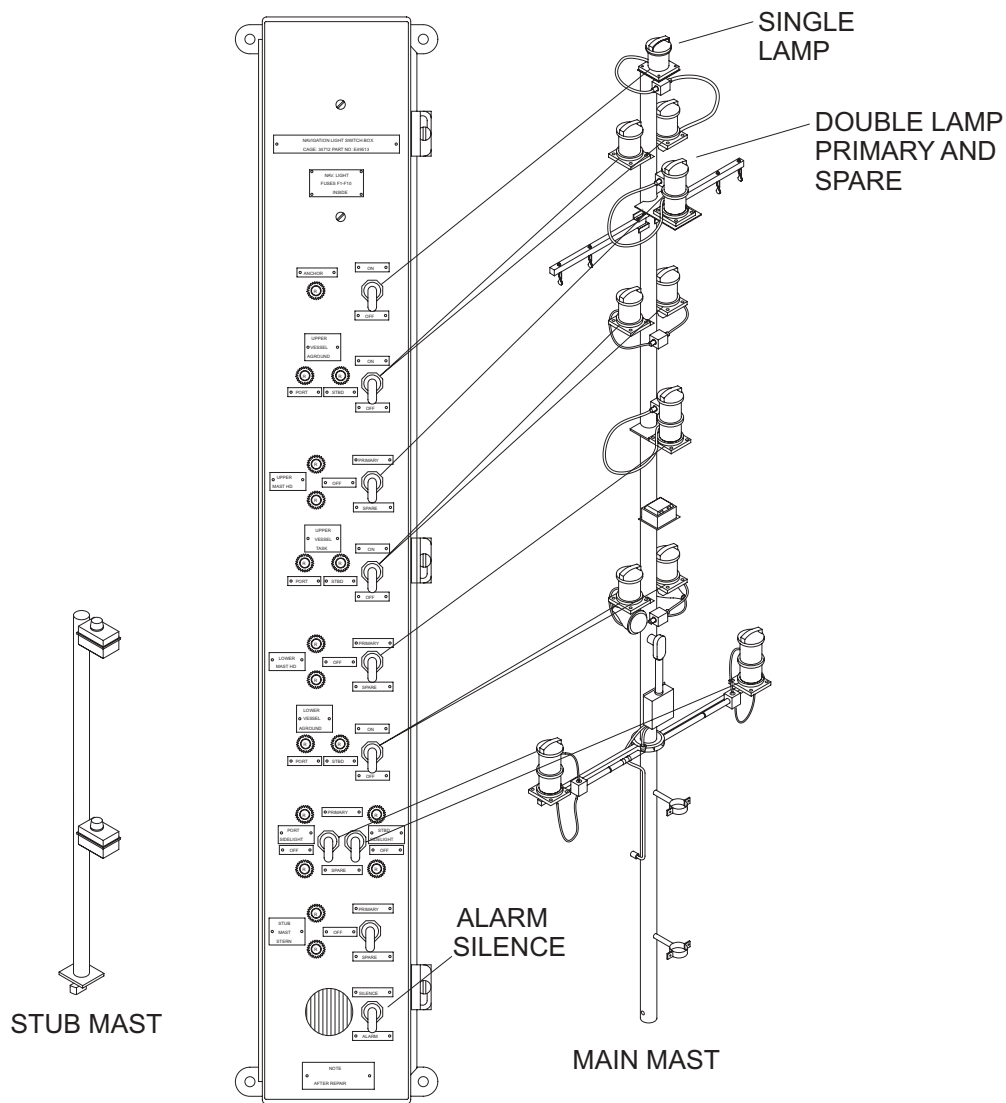


Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

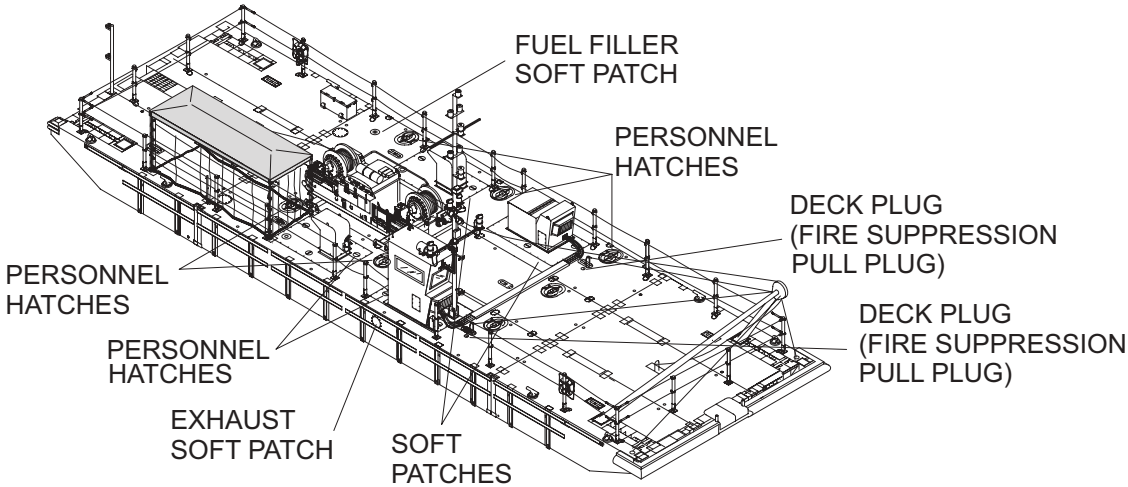
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
38	Before	0.1	Navigation Masts and Lights (Cont'd)	5. Functionally test stub assembly mast lights by positioning toggle switches on light boxes to on (closed) and holding thumb over light sensor. If batteries are defective or lights do not come on, troubleshoot below deck lighting (WP 0090 00).	
14	Before	0.1	Engine Junction Box Assembly A4	Position ENGINE CONTROLS circuit breaker to on (closed). If circuit breaker does not function, contact unit maintenance.	
2	Before	0.1	Propulsion Module	Latch close all personnel access hatches for machinery compartment, lazaret and fuel compartment in preparation for operation at sea.	
2	During	0.1	Propulsion Module	1. Ensure all soft patches are secured for sea operation. If soft patches are not secured, contact unit maintenance.	
				2. Inspect lazaret, machinery and fuel compartments for indications of water, oil or fuel leaks. Access via personnel hatches.	Class I fuel leaks or Class III water or oil leaks are found.

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

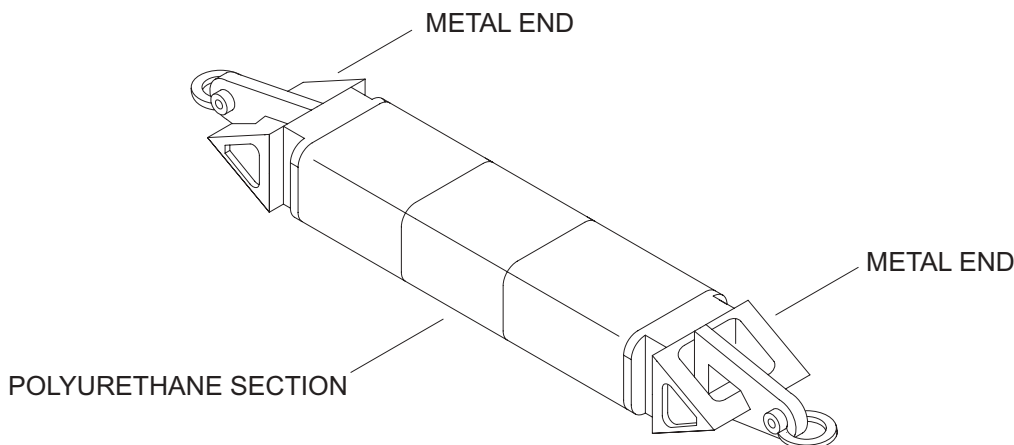
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
4	During	0.5	Flexor	<p>1. Inspect visible portions of installed flexor for separation of the polyurethane material in the center. If found, contact unit maintenance.</p> <p>2. Inspect visible portions of installed flexors for cracks in the external weldments on the ends. If found, contact unit maintenance.</p>	<p>Separation of the polyurethane material in the center of the flexor is found.</p> <p>Cracks are discovered in the external weldments on the ends of the flexor.</p>
 <p>The diagram illustrates a long, cylindrical component with a central section labeled 'POLYURETHANE SECTION' and two ends labeled 'METAL END'. The component is shown in a perspective view, highlighting its segmented structure and the attachment points at each end.</p>					
10	During	0.2	Deck Winch and Deck Winch Engine	<p>1. Perform winch engine PMCS in accordance with TM 5-2815-258-10.</p> <p>2. Perform winch PMCS in accordance with TM 55-3950-204-14&P.</p>	
19	During	0.1	Diesel Engine Alternator	<p>On first operating day after installation of new alternator belts, observe belts during operation. Be attentive to smell of burning rubber, unusual noise or belt motion.</p>	<p>Smell of burning rubber, belts appear damaged, unexpected belt noise or motion.</p>

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
27	During	0.1	Hydraulic Reservoir	Check return filter dirt indicator. Dirt level must be at acceptable level as displayed on indicator. If dirt level is out of acceptable range (in red colored area) as indicated on dirt alarm, contact unit maintenance.	Dirt level is out of acceptable range (in red colored area) as indicated on dirt alarm.
29	During	0.1	Pump-Jet	Inspect pump-jet assembly for unusual noise or vibration. If unusual noise or vibration is discovered, contact unit maintenance.	Unusual noise or vibration is discovered.
2	After	0.1	Propulsion Module	Inspect lazaret, machinery and fuel compartments for indications of water, oil or fuel leaks. Access via personnel hatches. Inspect all powered and non-powered modules for major deformation. If major deformation or leaks are found, contact unit maintenance.	Class I fuel leaks or Class III water or oil leaks are found. Major deformation is found.
3	After	0.1	Life Lines and Life Ring Stanchions	1. Inspect life line and life ring stanchions for broken welds, missing or broken bolts and damage to stanchion. If life line or life ring stanchion welds are broken, bolts are missing or broken or stanchions are damaged, contact unit maintenance.	Life line or life ring stanchions have broken welds, bolts are missing or broken or stanchions are damaged.

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
3	After	0.1	Life Lines and Life Ring Stanchions (Cont'd)	<p>2. Inspect life line and life ring stanchions for proper installation (pinned) to the deck fittings. If pins are missing, contact unit maintenance.</p> <p>3. Check all cables and connection points for worn or frayed areas. If cables or connection points are frayed, contact unit maintenance.</p> <p>4. Check that all cable assemblies are tight. If cables are loose, contact unit maintenance.</p>	Pins are missing.
				<p>5. Check life rings for damage. If damage is found that would prevent proper operation of life rings, contact unit maintenance.</p> <p>6. Check life ring strobes for proper operation. If strobes do not operate, replace batteries (WP 0106 00) or contact unit maintenance.</p>	

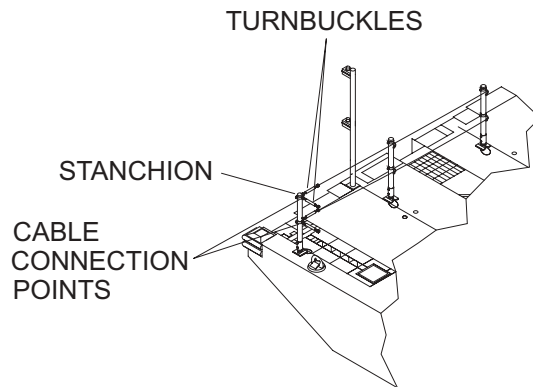


Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
3	After	0.1	Life Lines and Life Ring Stanchions (Cont'd)	7. Inspect life ring stanchions for broken welds, missing or broken bolts and broken connectors. If broken welds or broken connectors are found or bolts are broken or missing, contact unit maintenance.	
4	After	0.5	Flexor	<p>1. Inspect stowed flexor for separation of the polyurethane material in the center. If found, contact unit maintenance.</p> <p>2. Inspect stowed flexor for cracks in the external weldments on the ends. If cracks in the external weldments on the ends of the flexor are found, contact unit maintenance.</p>	<p>Separation of the polyurethane material in the center of the flexor is found.</p> <p>Cracks are discovered in the external weldments on the ends of the flexor.</p>

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

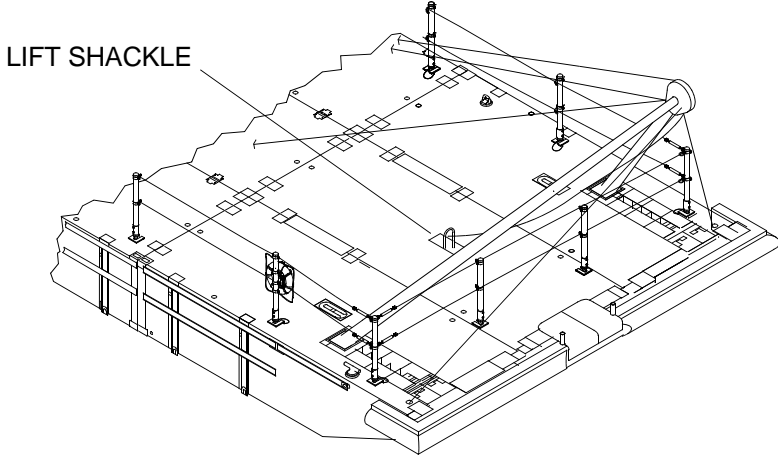
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
6	After	0.1	Lift Shackles	Lubricate lift shackles using general purpose grease and a hand lubricating gun.	
					

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

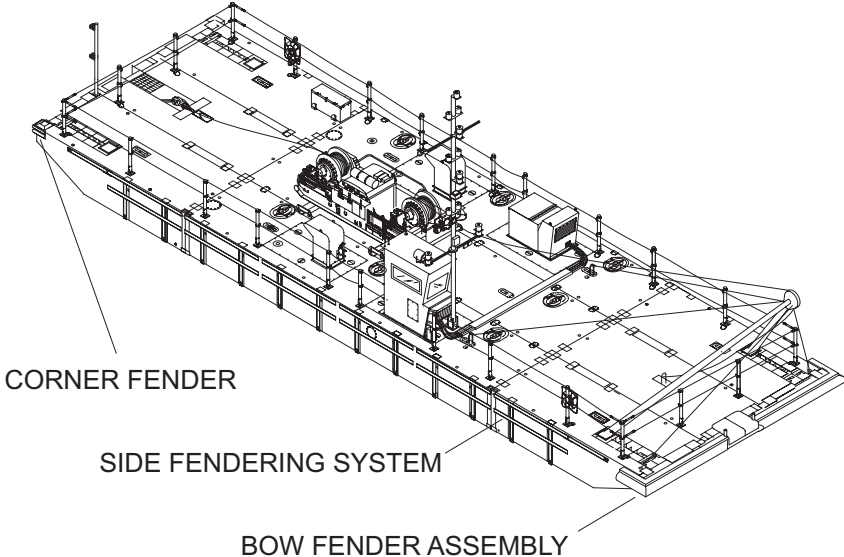
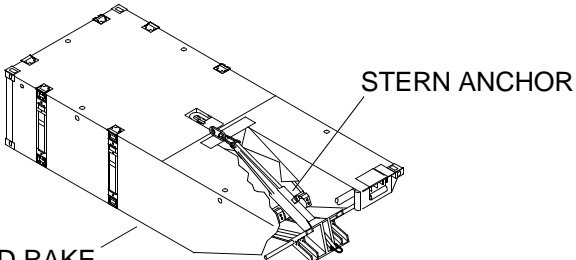
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
7	After	0.1	Fenders	Inspect all fenders for damage that would prevent proper operation. If damage is found that would prevent proper operation, contact unit maintenance.	
					
8	After	0.1	Stern Anchor	<ol style="list-style-type: none"> 1. Inspect stern anchor for any damage that may have occurred during operation. 2. Clean stern anchor and cable, if used. 	
					
10	After	0.5	Deck Winch and Deck Winch Engine	<ol style="list-style-type: none"> 1. Perform deck winch PMCS in accordance with TM 55-3950-204-14&P. 2. Perform deck winch engine PMCS in accordance with TM 5-2815-258-10. 	

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
10	After	0.5	Deck Winch and Deck Winch Engine (Cont'd)	<p>3. Inspect winch mounting plates and transverse beams for cracks. If transverse beams or mounting plates are cracked, contact unit maintenance.</p> <p>4. Check all mounting hardware for tightness. If mounting hardware is loose, contact unit maintenance.</p>	
11	After	0.3	Deck Winch A-Frame	<p>1. Inspect A-frame mounting feet and attaching lugs for cracks and for loose bolts. If mounting feet or attaching lugs are cracked or loose hardware is found, contact unit maintenance.</p>	A-frame feet are cracked or bolts are loose.
				<p>2. Inspect A-frame legs for cracks. If A-frame legs are cracked, contact unit maintenance.</p> <p>3. Inspect A-frame guy cables for breaks or fraying. If cables are broken or frayed, contact unit maintenance.</p> <p>4. Inspect A-frame attachment fittings for cracks and loose bolts. If attachment fittings are cracked or loose bolts are found, contact unit maintenance.</p>	<p>A-frame legs are cracked.</p> <p>Cables are broken or frayed.</p> <p>Attachment fittings are cracked.</p>

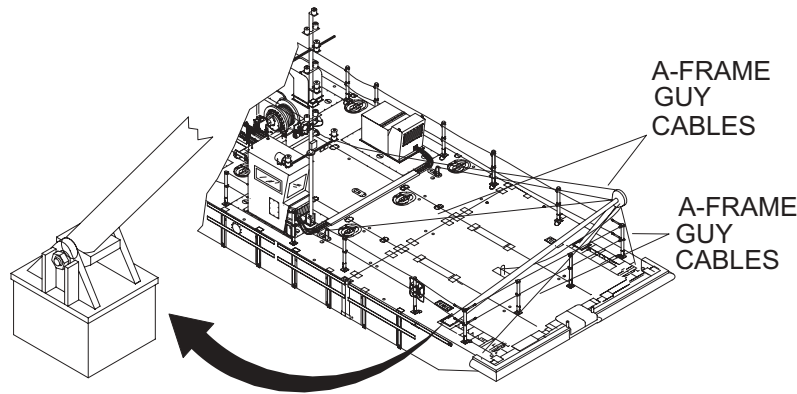


Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

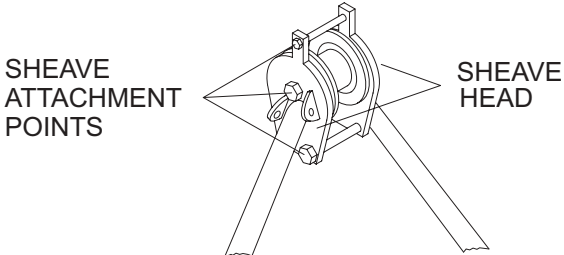
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
11	After	0.3	Deck Winch A-Frame (Cont'd)	<p>5. Inspect A-frame sheave attachment points for cracks and loose bolts. If sheave attachment points are cracked or loose bolts are found, contact unit maintenance.</p> <p>6. Inspect A-frame sheave head plates for cracks. If sheave head plates are cracked, contact unit maintenance.</p>	<p>Sheave or attachment points are cracked.</p> <p>Sheave head plate is cracked.</p>
 <p>The diagram shows a cross-section of a sheave assembly. It consists of a central hub with a groove for a rope, surrounded by a frame. Two points on the frame are labeled 'SHEAVE ATTACHMENT POINTS' with arrows pointing to them. The top part of the frame is labeled 'SHEAVE HEAD' with an arrow pointing to it.</p>					
15	After	0.1	Bilge Pump System (Machinery Compartment)	<p>1. Inspect compartment for evidence of leaks of water, oil, and/ or fuel. If leakage is found, contact unit maintenance.</p> <p>2. If only water is present, as indicated by the red flood light(s) on the lower control panel A2, remotely activate bilge pump(s) by depressing the adjacent bilge pump pushbuttons. Once water is removed, the bilge pump(s) will automatically stop. Locally, hold the associated toggle switch on bilge pump control panel A5 to TEST to activate bilge pump. Once water is removed, release the toggle switch. The toggle switches will spring-return to the REMOTE position when released. If the toggle switches do not function or the bilge pumps are inoperative, contact unit maintenance.</p>	Evidence of Class III leakage of water, oil, or Class I leakage of fuel is found.

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
15	After	0.1	Bilge Pump System (Machinery Compartment) (Cont'd)	3. Check all bilge pumps and float switches for condition and proper operation. Look for evidence of water leaks, loose pump connections and/or damage. If bilge pumps are inoperative, leak, have loose connections or are damaged, contact unit maintenance.	
16	After	0.1	Electrical Junction and Terminal Boxes	<p>1. Inspect electrical wiring to see that it is securely connected, clean and undamaged. If wiring is not securely connected, dirty or damaged, contact unit maintenance.</p> <p>2. Check all accessible fuse terminal blocks and connections to see that they are securely connected and supported, that insulation is not cracked or chafed and that conduit and shielding are secure and in good condition. If fuse and terminal blocks are not securely connected, cracked, chafed or damaged, contact unit maintenance.</p>	

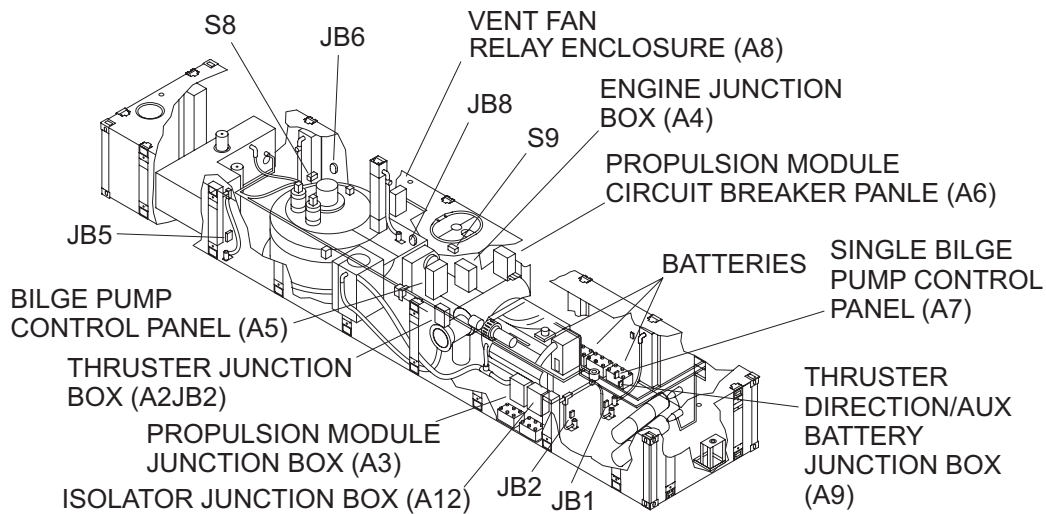


Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
<p>WARNING</p> <p>Coolant is hot and under pressure. Contact with hot coolant could cause injury to personnel.</p>					
17	After	0.1	Raw Water Cooling System	<ol style="list-style-type: none"> 1. Inspect the cooling system for leaks or excessive puddling around its base. If leaks or puddling are found, contact unit maintenance. 2. Close the seachest butterfly valves, both port and starboard. If valves are inoperative, contact unit maintenance. 	Class III leakage is found.
				<ol style="list-style-type: none"> 3. Freezing weather (below 32°F) only, drain all raw water from the raw water cooling system as follows: <ol style="list-style-type: none"> a. Open all raw water system petcock drains to drain the system. Leave petcocks open until the next start-up. If valves are inoperative, contact unit maintenance. 	

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

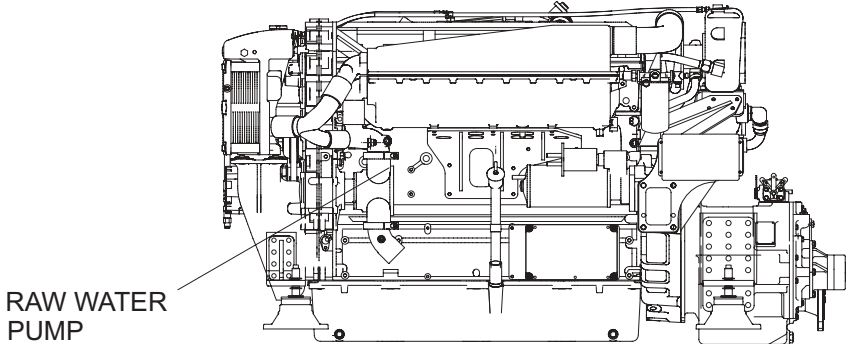
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
17	After	0.1	Raw Water Cooling System (Cont'd)	<p>b. Drain the transfer case oil cooler by disconnecting the raw water outlet hose at the lowest point. Connect hose when system has drained.</p> <p>c. Drain the raw water pump as follows: Loosen the six capscrews from the cover. Tap the cover to break the seal. Drain any water. Replace the cover and capscrews. Tighten the capscrews to secure the seal.</p>	
			 <p>RAW WATER PUMP</p>	<p>d. Drain the muffler by removing drain plugs. Install plugs when muffler has drained.</p> <p>e. Drain the duplex strainer by removing the drain plugs at the bottom of each basket housing. Replace plugs when the strainer has drained.</p> <p>f. In the event of freeze up or other damage, contact unit maintenance.</p>	

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
17	After	0.1	Raw Water Cooling System (Cont'd)	g. Operate bilge pumps to remove drained raw water.	
18	After	0.1	Diesel Engine	<p>1. Make a visual inspection for oil leaks around the filters and the external oil lines. If oil leaks are found, contact unit maintenance.</p> <p>2. Visually inspect the oil dipstick. If metal particles are found, the oil must be completely changed. Contact unit maintenance. Record engine hours in logbook and compare with oil change repair records.</p>	Class III oil leakage is found.

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)






ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
<p>WARNING</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  CHEMICAL </div> <div style="text-align: center;">  EYE PROTECTION </div> <div style="text-align: center;">  EXPLOSION </div> </div>					
22	After	0.2	Batteries	<p>1. Verify battery electrolyte levels completely cover the plates, without electrolyte overflowing the battery, and that connections are clean and tight, both port and starboard. Add reagent distilled water, if necessary. If connections are loose or batteries are unserviceable, contact unit maintenance.</p> <p>2. Inspect battery systems for damage. If damage is found, contact unit maintenance.</p>	Batteries are unserviceable.
<p>WARNING</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  EXPLOSION </div> <div style="text-align: center;">  FIRE </div> </div> <p>Fuel and engine oil are highly flammable. Sparks or open flames should be kept away. Failure to comply may result in serious injury or death to personnel.</p> <p>Provide adequate ventilation of the vessel spaces. Failure to comply may result in serious injury or death to personnel.</p> <p>Use approved procedures when cleaning up fuel spills. Take proper precautions when removing or installing any fuel system component. Failure to comply may result in serious injury to death to personnel.</p>					
30	After	0.2	Fuel System	1. Check for leaks around fuel tank and fuel lines. If leaks are found, contact unit maintenance.	Class I fuel leakage is found.

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
30	After	0.2	Fuel System (Cont'd)	<p>2. Examine fuel lines and flexible hoses for leaks. Check that fittings, clamps and ties are secure. Hoses must not be resting or touching shafts, couplings, heated surfaces, sharp edges or other areas that might sever or rupture fuel system parts. If fuel leakage is found or hoses are resting or touching shafts, couplings, heated surfaces, sharp edges or other areas that might sever or rupture fuel system parts, contact unit maintenance.</p> <p>3. Refill fuel tank. DO NOT OVER FILL. Service with diesel fuel.</p> <p>4. Visually inspect and drain water and/or other contaminants from fuel/water separator into an appropriate container. When pure fuel emerges, close drain cock. Check for leaks around tank. Ensure that fuel water separator was inspected and is operational. If fuel/water separator glass bowl is broken, tank has an excessive amount of water or fuel leaks are found, contact unit maintenance.</p> <p>5. Close fuel supply and return ball valves in both fuel compartments; port and starboard. If valves are inoperative, contact unit maintenance.</p>	<p>Class I fuel leakage is found.</p> <p>Water in fuel prevents engine from starting or, broken fuel separator or glass or Class I fuel leakage is found.</p>

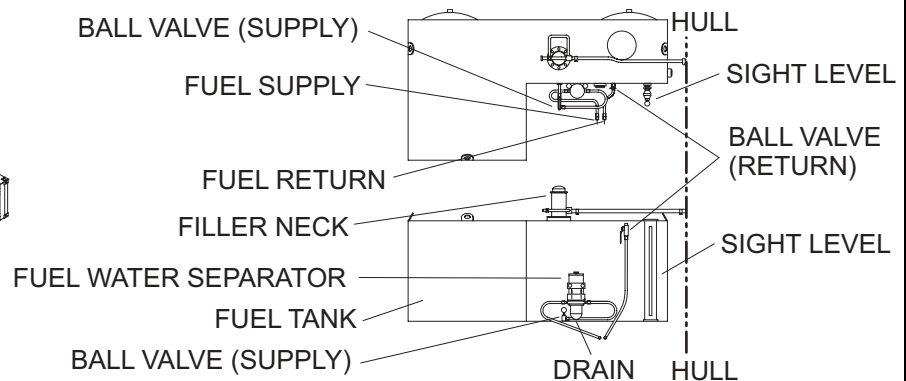
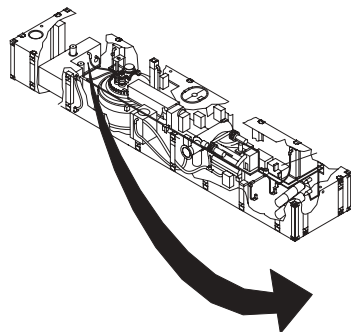


Table 1. Preventive Maintenance Checks and Services for the Warring Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
31	After	0.2	Bilge Pump System (Lazaret)	1. Check compartment for evidence of water and leaks. If leaks are found, contact unit maintenance.	Class III water leaks are found.
NOTE					
Do not pump bilges overboard. Pump bilges into holding tank. If holding tank is full, take vessel to sludge point.					
				2. If only water is present, as indicated by the red flood light(s) on the lower control panel A2, remotely activate bilge pump(s) by depressing the adjacent bilge pump pushbuttons. Once water is removed, the bilge pump(s) will automatically stop. Locally, hold the associated toggle switch on bilge pump control panel A5 to TEST to activate bilge pump. Once water is removed, release the toggle switch. The toggle switches will spring-return to the REMOTE position when released. If the toggle switches do not function or the bilge pumps are inoperative, contact unit maintenance.	
				3. Check all bilge pumps and float switches for condition and proper operation. Look for evidence of water leaks, loose pump connections and/or damage. If bilge pumps are inoperative, leak, have loose connections or are damaged, contact unit maintenance.	

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

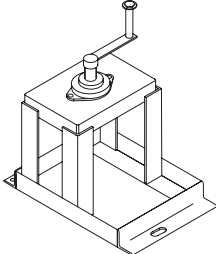
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
32	After	0.1	Emergency Steering Control Stand (Stowed in Lazaret)	Visually inspect control stand for obvious damage, evidence of corrosion, wear and loose or missing parts. If control stand is damaged, corroded, worn or has loose or missing parts, contact unit maintenance.	Control stand is inoperative.
					
35	After	0.3	Operators Cab	<ol style="list-style-type: none"> 1. Check operator cab structure for damage to mountings. If damage is found, contact unit maintenance. 2. Visually inspect roof mounted antennas, cabling, spotlight, bell, and main assembly mast for damage that would prevent operation. If damage is found that would prevent operation, contact unit maintenance. 3. Functionally test battle lantern by moving toggle switch to on (closed) position. Verify light comes on. If battle lantern is inoperative, contact unit maintenance. 4. Functionally check VHF/FM DSC transceiver. (WP 0028 00) If VHF/FM DSC transceiver is inoperative, contact unit maintenance. 5. Functionally check public address set (loudhailer). (WP 0026 00) If loudhailer is inoperative, contact unit maintenance. 	VHF/FM DSC transceiver is inoperative. VHF/FM DSC transceiver is a safety requirement and must be operational.

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
35	After	0.3	Operators Cab (Cont'd)	<p>6. Functionally test navigation horn by turning on loudhailer. (WP 0026 00) Push HAIL button one time, then FOG button one time, using the microphone PTT switch and release for each sound of the horn. Example: Push and release PTT switch will result in three short blasts of the horn. Adjust volume using the LISTEN control knob as required. If loudhailer is inoperative, contact unit maintenance.</p> <p>7. Functionally check Precision Lightweight Global Positioning Receiver (PLGR). (WP 0032 00) If PLGR is inoperative, contact unit maintenance.</p> <p>8. Functionally check VHF/FM handheld transceivers and battery chargers. (WP 0025 00) If transceivers or battery chargers are inoperative, contact unit maintenance.</p> <p>9. Functionally check SINCGARS radio. (WP 0027 00) If SINCGARS radio is inoperative, contact unit maintenance.</p> <p>10. Inspect all communication equipment cabling and batteries. If damage is found that would prevent operation, contact unit maintenance.</p> <p>11. Functionally test WSHLD WIPER toggle switch by positioning to ON (closed) then to OFF (open) on middle control panel (A1). Return switch to OFF position. If wiper or toggle switch is inoperative, contact unit maintenance.</p>	

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
35	After	0.3	Operators Cab (Cont'd)	12. Functionally test SPOTLIGHT toggle switch by positioning to ON (closed) then to OFF (open) on middle control panel (A1). If spotlight or toggle switch is inoperative, contact unit maintenance.	

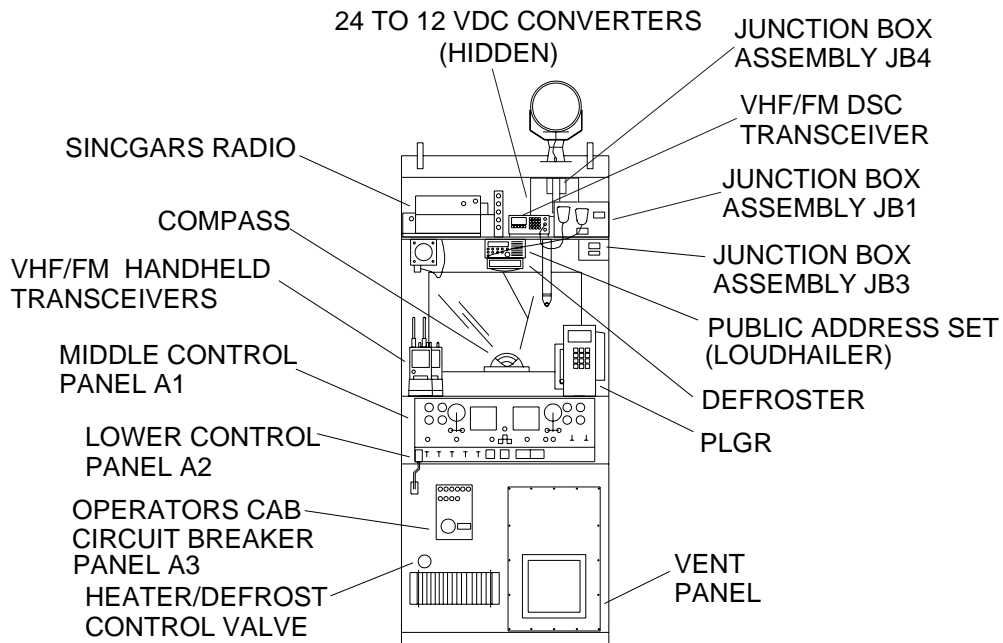
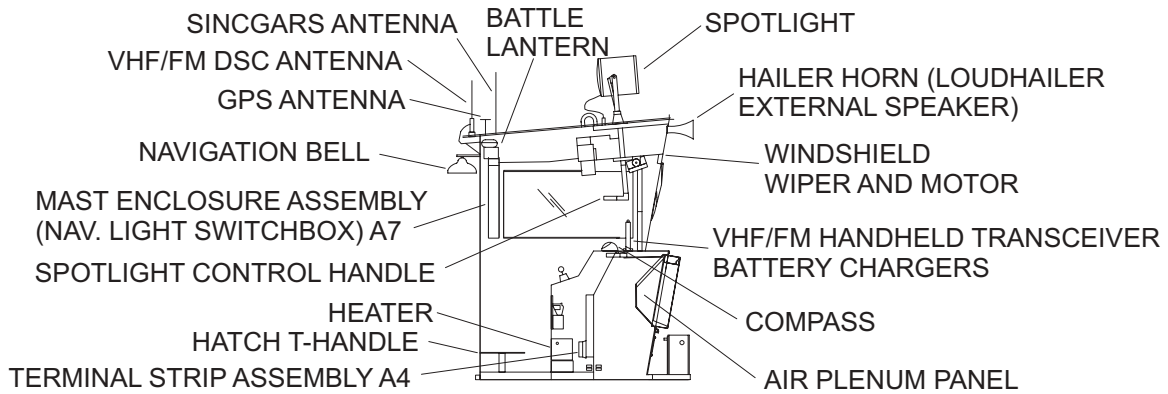


Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
38	After	0.1	Navigation Masts and Lights	<p>1. Visually inspect main assembly mast, stub assembly mast and junction boxes for evidence of corrosion, physical damage, broken welds, missing or broken bolts and/or components. If evidence of corrosion, physical damage, broken welds, missing or broken bolts and/or components is found, contact unit maintenance.</p> <p>2. Visually inspect cable assemblies for loose connections and evidence of physical damage or wear. If loose connections or evidence of physical damage or wear is found, contact unit maintenance.</p> <p>3. Visually inspect all navigational lights for cleanliness and evidence of physical damage. If damage is found, contact unit maintenance.</p> <p>4. Functionally test all main mast navigation lights by positioning the toggle switches to ON (closed) and OFF (open) on the Mast Enclosure Assembly A7. If lights or toggle switches are inoperative, contact unit maintenance.</p> <p>5. Functionally test stub assembly mast lights by positioning toggle switches on light boxes to on (closed) and holding thumb over light sensor. If batteries are defective or lights do not come on, contact unit maintenance.</p>	

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

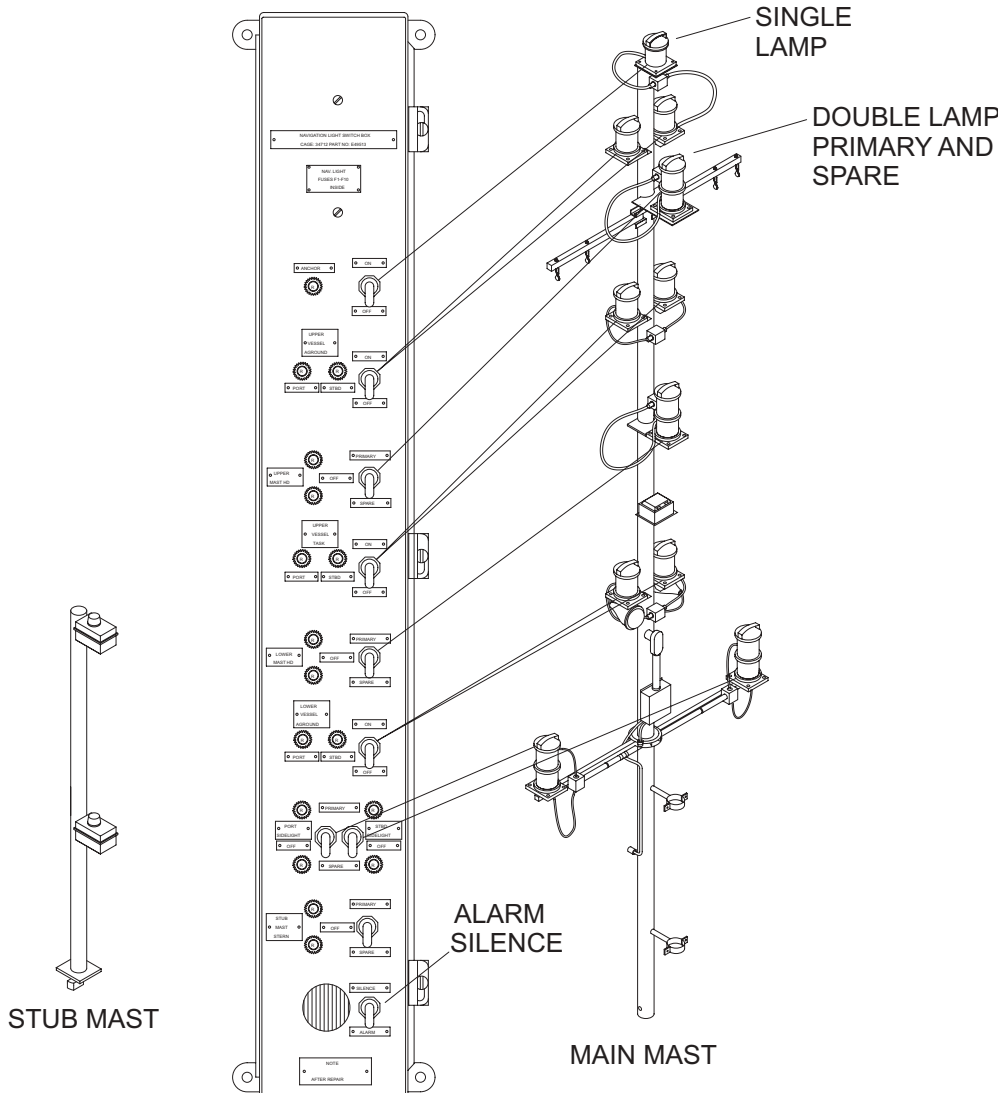


ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
40	After	0.2		<p>Using cleaner, clean engine and engine compartment with hot soapy water. Use clean cloth and mop to thoroughly dry.</p>	
WARNING					
					
		CHEMICAL		EYE PROTECTION	

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)


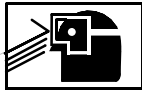
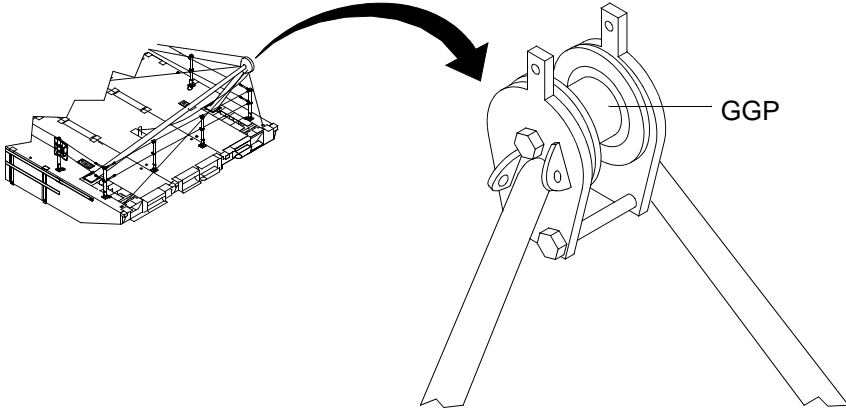

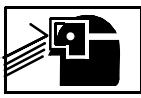

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
41	After	0.2	Lifting Slings	Check lifting slings for cuts, loose stitching and fraying.	Slings are cut, have loose stitching or frayed.
<p>WARNING</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>CHEMICAL</p> </div> <div style="text-align: center;">  <p>EYE PROTECTION</p> </div> </div>					
11	Weekly	0.5	Deck Winch A-Frame	Grease A-frame sheave. Use general purpose grease (Item 15) and a hand lubricating gun.	
					
<p>WARNING</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>CHEMICAL</p> </div> <div style="text-align: center;">  <p>EYE PROTECTION</p> </div> <div style="text-align: center;">  <p>EXPLOSION</p> </div> </div>					
22	Weekly	0.3	Batteries	1. Verify battery electrolyte levels completely cover the plates, without electrolyte overflowing the battery, and that connections are clean and tight, both port and starboard. Add reagent distilled water, if necessary. If connections are loose, batteries are unserviceable or will not start engines, contact unit maintenance.	

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
22	Weekly	0.3	Batteries (Cont'd)	<p>2. Ensure all battery cable clamps and hold downs are tight. Make sure all are secure and free of corrosion. If battery cable clamps or hold downs are loose or corroded, contact unit maintenance.</p> <p>3. Inspect battery system for damage. If batteries are damaged or inoperative, contact unit maintenance.</p> <p>4. If operating charging levels are found to be too low while starting engine, contact unit maintenance. DO NOT run battery down.</p>	<p>Batteries are unserviceable.</p> <p>Batteries will not start engines.</p>

WARNING



CHEMICAL



EYE PROTECTION

35	Weekly	0.3	Operators Cab	<p>1. Check operator cab structure for damage to mountings. If damage is found, contact unit maintenance.</p> <p>2. Visually inspect roof mounted antennas, cabling, spotlight, bell, and main assembly mast for damage that would prevent operation. If damage is found that would prevent operation, contact unit maintenance.</p> <p>3. Functionally test battle lantern by moving toggle switch to on (closed) position. Verify light comes on. If battle lantern is inoperative, contact unit maintenance.</p>	
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Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
35	Weekly	0.3	Operators Cab (Cont'd)	<p>4. Functionally check VHF/FM DSC transceiver. (WP 0028 00) If VHF/FM DSC transceiver is inoperative, contact unit maintenance.</p> <p>5. Functionally check public address set (loudhailer). (WP 0026 00) If loudhailer is inoperative, contact unit maintenance.</p> <p>6. Functionally test navigation horn by turning on loudhailer. (WP 0026 00) Push HAIL button one time, then FOG button one time, using the microphone PTT switch and release for each sound of the horn. Example: Push and release PTT switch will result in three short blasts of the horn. Adjust volume using the LISTEN control knob as required. If loudhailer is inoperative, contact unit maintenance.</p> <p>7. Functionally check Precision Lightweight Global Positioning Receiver (PLGR). (WP 0032 00) If PLGR is inoperative, contact unit maintenance.</p> <p>8. Functionally check VHF/FM handheld transceivers and battery chargers. (WP 0025 00) If transceivers or battery chargers are inoperative, contact unit maintenance.</p> <p>9. Functionally check SINCGARS radio. (WP 0027 00) If SINCGARS radio is inoperative, contact unit maintenance.</p>	VHF/FM DSC transceiver is inoperative. VHF/FM DSC transceiver is a safety requirement and must be operational.

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
35	Weekly	0.3	Operators Cab (Cont'd)	10. Inspect all communication equipment cabling and batteries. If damage is found that would prevent operation, contact unit maintenance.	

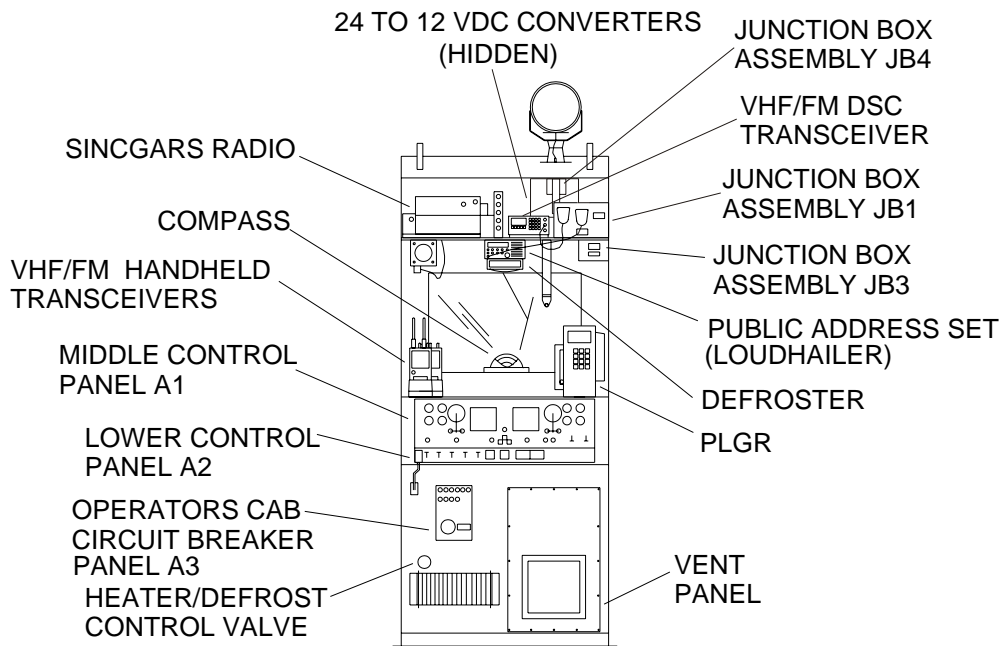
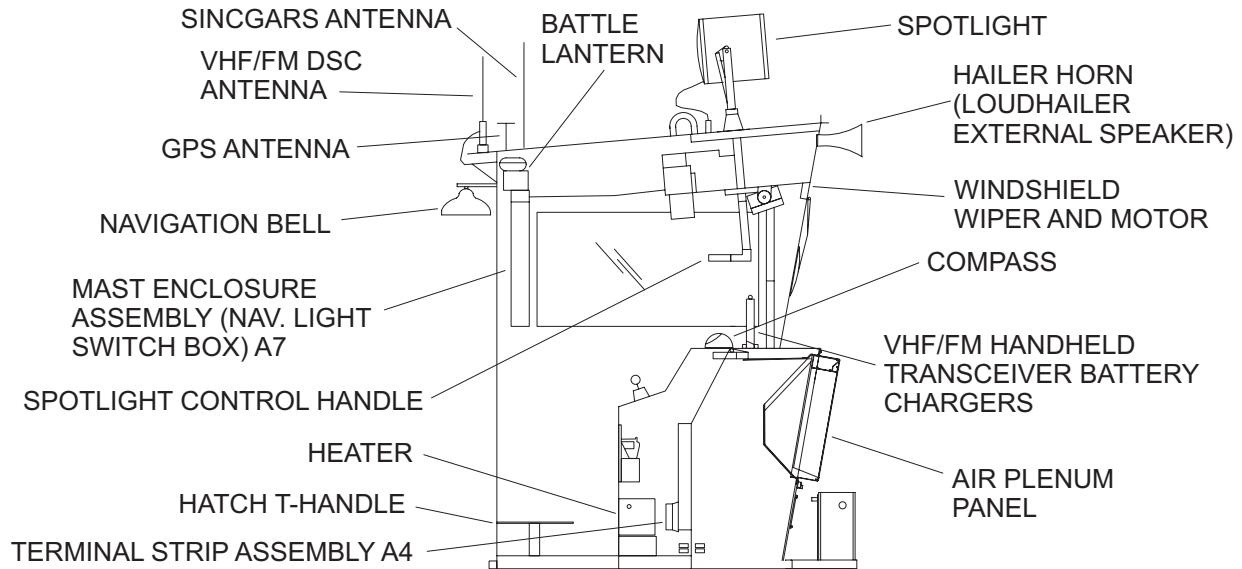


Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
36	Weekly	0.4	Lower Control Panel A2	<p>1. Check all control panel switches, gages, steering levers, throttles and other controls and indicators for obvious damage. If damaged switches, gages, steering levers, throttles and other controls and indicators are found, contact unit maintenance.</p> <p>2. Verify PORT and STBD HPU OIL LEVEL LOW red indicator lights are off. If on, check and fill appropriate hydraulic tank to proper level.</p> <p>3. Verify PORT and STBD THRUSTER GEARBOX LOW OIL red indicator lights are off. If on, check and fill appropriate pump-jet gearbox to proper level.</p>	Damage or non-functioning control panels and associated switches gages, steering levers, throttle and other controls and indicators.

NOTE

At initial start-up, the thruster gearbox low oil indicators will light up red momentarily and then go out.

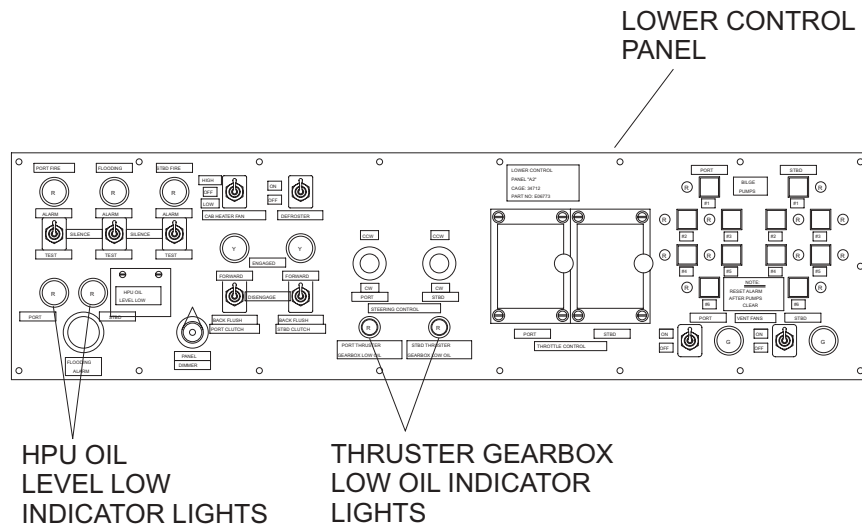


Table 1. Preventive Maintenance Checks and Services for the Warring Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
36	Weekly	0.4	Lower Control Panel A2 (Cont'd)	<p>4. Functionally test PORT and STBD FIRE ALARM/SILENCE/TEST switches and indicators. Select TEST position momentarily. Horn sounds, red light comes on. Return switch to ALARM position (closed). If red lights do not come on, horn does not sound or toggle switches are inoperative, contact unit maintenance.</p> <p>5. Functionally test FLOODING ALARM/SILENCE/TEST switch and indicator. Select TEST position momentarily. Horn sounds, red light comes on. Return switch to ALARM position (closed). If red light does not come on, horn does not sound or toggle switch is inoperative, contact unit maintenance.</p> <p>6. Functionally test CAB HEATER FAN toggle switch by positioning to LOW then to HIGH. If fan does not come on or if toggle switch is inoperative, contact unit maintenance.</p> <p>7. Functionally test DEFROSTER toggle switch by positioning to ON. If fan does not come on or if toggle switch is inoperative, contact unit maintenance.</p>	<p>Fire alarms are inoperative.</p> <p>Flooding alarm is inoperative.</p>

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
36	Weekly	0.4	Lower Control Panel A2 (Cont'd)	8. Functionally test PANEL DIMMER switch. If switch is inoperative, contact unit maintenance.	
				<p>9. Functionally test both PORT and STBD THROTTLE CONTROL levers. Check that both levers move easily forward and backwards. Return throttle controls to the idle position (fully back). If levers are binding or inoperative, contact unit maintenance.</p> <p>10. Functionally test PORT and STBD STEERING CONTROL levers. Check both levers move easily forwards and backwards. Levers return to a neutral position when released. If levers are binding or inoperative, contact unit maintenance.</p>	<p>Levers binding or inoperative.</p> <p>Levers binding or inoperative.</p>

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
36	Weekly	0.4	Lower Control Panel A2 (Cont'd)	<p>11. Functionally check PORT and STBD CLUTCH toggle switches and green indicator lights. If switches or indicators are inoperative, contact unit maintenance.</p> <p>a. Place toggle switches in the FORWARD and then BACK FLUSH positions (closed). ENGAGED green indicator lights will come on in both positions. If toggle switches or lights are inoperative, contact unit maintenance.</p> <p>b. Place toggle switches in the DISENGAGED position (centered). Green indicator lights are off. If toggle switches or lights are inoperative, contact unit maintenance.</p>	Switch and/or indicator inoperative.

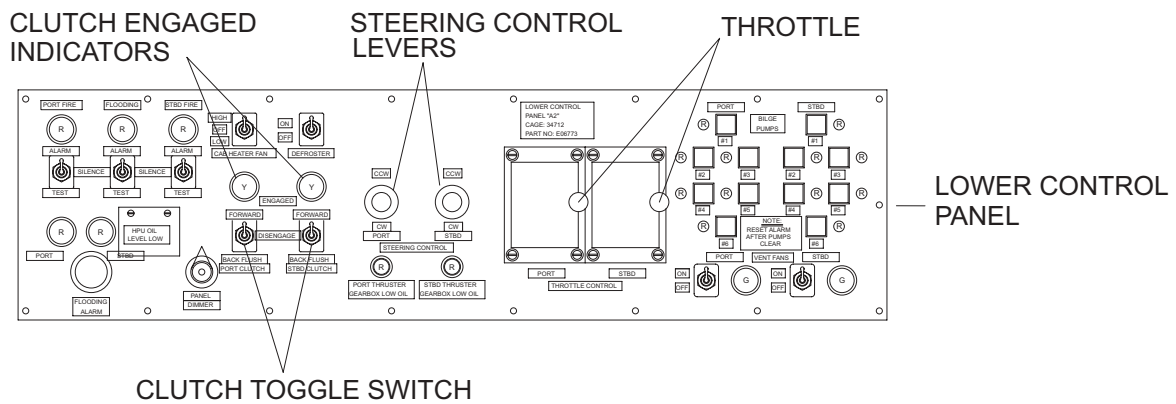


Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

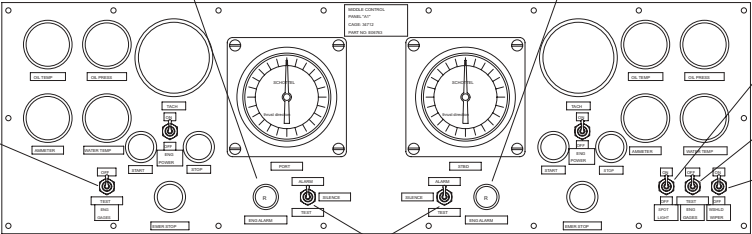
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
37	Weekly	0.4	Middle Control Panel A1	<p>1. Functionally test both port and stbd ENG GAGES toggle switches. Momentarily hold toggle switches in the TEST position (closed) to allow engine gages to indicate without engine running. Return toggle switches to OFF (open). If engine gages or toggle switches are inoperative, contact unit maintenance.</p>	
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>MIDDLE CONTROL PANEL</p>  </div> </div> <p style="text-align: center;">ENG ALARM TEST/SILENCE SWITCHES</p>					
				<p>2. Functionally test WSHLD WIPER toggle switch by positioning to ON (closed) then to OFF (open). Return switch to OFF position. If wiper or toggle switch is inoperative, contact unit maintenance.</p> <p>3. Functionally test SPOTLIGHT toggle switch by positioning to ON (closed) then to OFF (open). If spotlight or toggle switch is inoperative, contact unit maintenance.</p>	

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
37	Weekly	0.4	Middle Control Panel A1 (Cont'd)	<p>4. Functionally test ENG ALARM/TEST/SILENCE toggle switches and red indicator lights.</p> <p>a. Momentarily hold port and toggle switches in the TEST position. Alarm bell will sound and red indicators will come on. If toggle switches or lights are inoperative, contact unit maintenance.</p> <p>b. Return switch to the ALARM position when test is complete.</p>	<p>Alarm is not functioning.</p> <p>Alarm bell does not sound.</p>
<p>The diagram shows a rectangular control panel with several gauges and switches. From left to right, there are two gauges for engine oil pressure and temperature, a large tachometer, an ammeter, and two more gauges for engine water temperature. Below the gauges are several toggle switches and pushbuttons, including 'START', 'STOP', 'TEST', and 'SILENCE'. The panel is labeled 'MIDDLE CONTROL PANEL A1'.</p>					
38	Weekly	1.5	Navigation Masts and Lights	<p>1. Lower the main assembly mast and stub assembly mast and check for damaged or cracked lenses, bad gaskets, structural damage or inoperative condition. If damage is found, contact unit maintenance.</p> <p>2. Visually inspect main assembly mast, stub assembly mast and junction boxes for evidence of corrosion, physical damage, broken welds, missing or broken bolts and/or components. If evidence of corrosion, physical damage, broken welds, missing or broken bolts and/or components is found, contact unit maintenance.</p>	

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
38	Weekly	1.5	Navigation Masts and Lights (Cont'd)	<p>3. Visually inspect cable assemblies for loose connections and evidence of physical damage or wear. If loose connections or evidence of physical damage or wear is found, contact unit maintenance.</p> <p>4. Visually inspect all navigational lights for cleanliness and evidence of physical damage. If damage is found, contact unit maintenance.</p> <p>5. Functionally test all main assembly mast navigation lights by positioning the toggle switches to ON (closed) and OFF (open) on the Mast Enclosure Assembly A7. If lights or toggle switches are inoperative, contact unit maintenance.</p> <p>6. Functionally test stub assembly mast lights by positioning toggle switches on light boxes to on (closed) and holding thumb over light sensor. If batteries are defective or lights do not come on, contact unit maintenance.</p>	

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
				<ol style="list-style-type: none"> 1. Inspect modules for broken welds, cracks, punctures and corrosion. If found, contact unit maintenance. 2. Check all manually operated valves. Open and close valves as necessary to verify freedom of movement in both directions. If movement is limited, contact unit maintenance. 	<p>Broken welds, cracks or punctures are present.</p>
42	Weekly	2.0	<p>Powered and Non-Powered Modules</p>	<ol style="list-style-type: none"> 1. Inspect modules for broken welds, cracks, punctures and corrosion. If found, contact unit maintenance. 2. Check all manually operated valves. Open and close valves as necessary to verify freedom of movement in both directions. If movement is limited, contact unit maintenance. 	<p>Broken welds, cracks or punctures are present.</p>

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

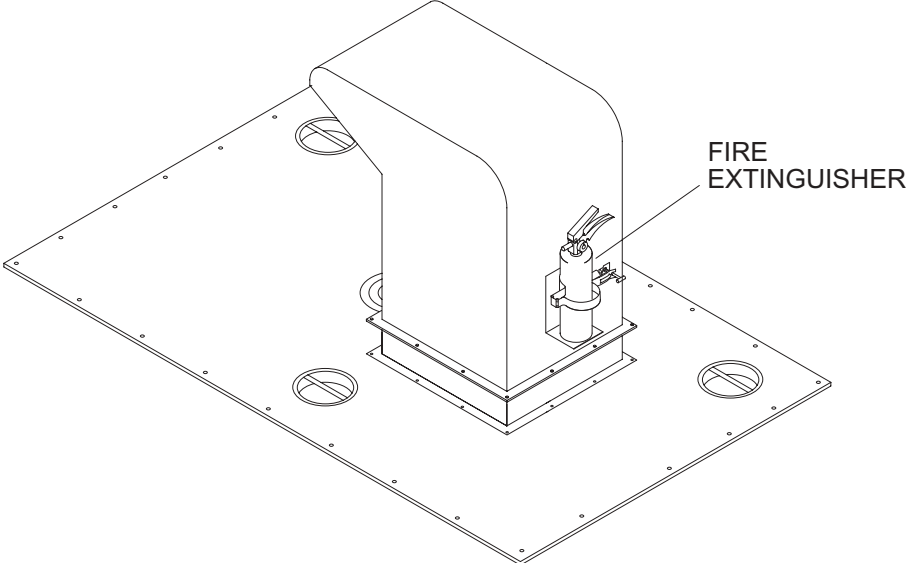
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
1	Monthly	0.5	Intake and Exhaust Plenums	<p>1. Inspect fire extinguisher for broken seal, damage to nozzle or red zone indication on gage. If seal is broken, nozzle is damaged or a red zone indication is seen on gage, contact unit maintenance.</p> <p>2. Sign and date the fire extinguisher inspection tag and record the inspection in the deck logbook.</p>	Seal is broken, nozzle is damaged or a red zone indication is seen on gage.
					
4	Monthly	1.0	Flexor	<p>1. Inspect stowed flexor for separation of the polyurethane material in the center. If found, contact unit maintenance.</p> <p>2. Inspect stowed flexor for cracks in the external welds on the ends. If found, contact unit maintenance.</p>	<p>Separation of the polyurethane material in the center of the flexor is found.</p> <p>Cracks are discovered in the external weldments on the ends of the flexor.</p>

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

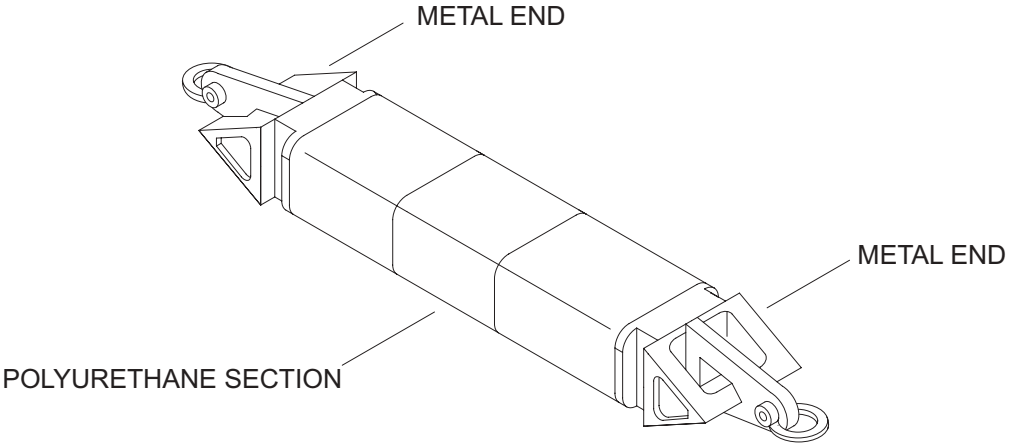


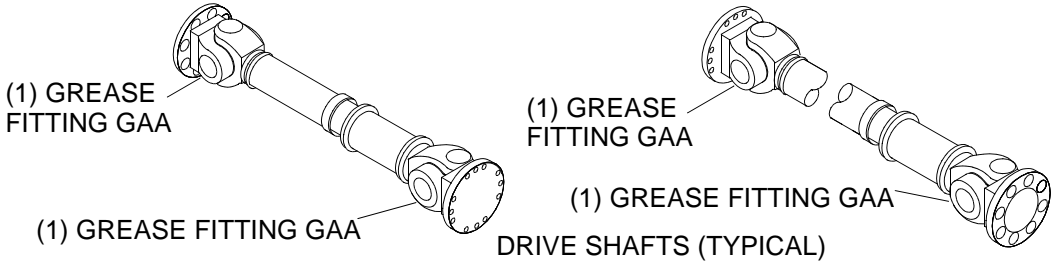
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
					
18	Monthly	1.0	Diesel Engine	Start engines to ensure components are lubricated with engine oil. If engine cannot be started every 30 days, prepare the engine for storage. (WP 0067 00)	
<p>WARNING</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>CHEMICAL</p> </div> <div style="text-align: center;">  <p>EYE PROTECTION</p> </div> </div>					
25	Monthly or 200 Hours	0.5	Drive Shafts (Cross and Bearing Grease Zerks)	Lubricate after first 200 hours of operation and monthly thereafter. Add lubricant until it appears at all journal cross bearings. Use automotive and artillery grease and a hand lubricating gun.	
					

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

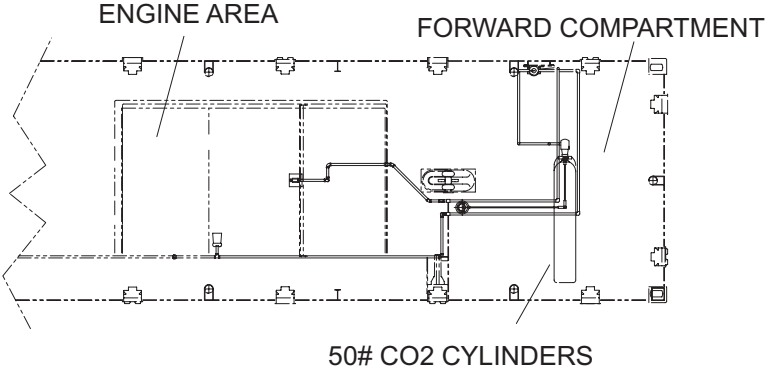
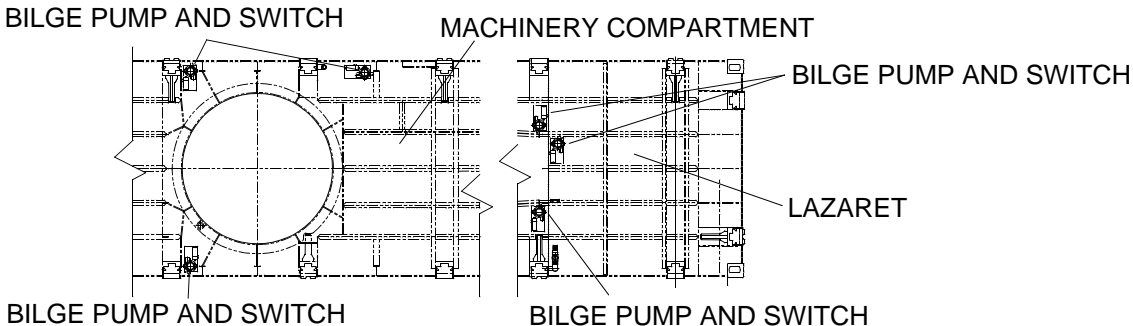
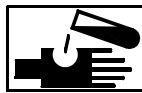
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
30	Monthly	0.5	Fuel System	Torque fuel tank inspection cover bolts. Contact unit maintenance.	
<p>WARNING</p>					
<p>Use extreme care when inspecting or servicing CO₂. Failure to comply could result in injury or death.</p>					
33	Monthly	0.1	Fire Suppression System	Inspect for discharge, leakage or expansion. Look for damaged or broken seals. If evidence of discharge, leakage, expansion or damaged or broken seals is found, contact unit maintenance.	Seals are damaged or broken, or evidence of excessive discharge is found.
					
39	Monthly	0.2	Bilge Pumps	Check all bilge pumps and float switches for condition and proper operation. Look for evidence of water leaks, loose pump connections and/or damage. If damage or leakage is found, contact unit maintenance.	
					

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

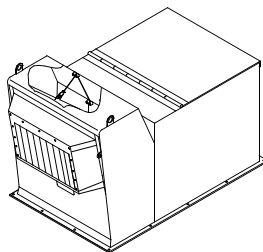
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
44	Monthly	5.0	Module Interlock Connector (Male Locking Pin)	1. Check male connector pin for deformation, twisting, bending and flatness. If any deformation of the pin is present, remove pin from service. Contact unit maintenance. 2. Check contact area where the pins seat against the guillotine bars for wear. If excessive wear is present, remove pin from service. Contact unit maintenance. 3. Check the pin to ensure stop bar is attached. If stop bar is removed, remove pin from service and replace stop bar. Contact unit maintenance. 4. Check the connector pin for cracks and/or unusual damage (missing material, notches, etc.) If any cracks and/or unusual damage is present, remove pin from service. Contact unit maintenance.	Any deformation of the pin is present. Excessive wear is present. If stop bar is removed. If any cracks and/or unusual damage is present.

WARNING



CHEMICAL

1	Quarterly	0.5	Intake Plenum Hinges	Lubricate with aircraft grease and hand lubricating gun.
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INTAKE PLENUM HINGES

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)


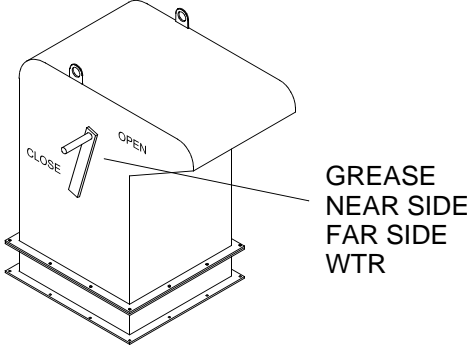

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
<p>WARNING</p>  <p>CHEMICAL</p>					
1	Quarterly	0.5	Exhaust Plenum Pivots	Lubricate with aircraft grease and hand lubricating gun.	
 <p>GREASE NEAR SIDE FAR SIDE WTR</p> <p>EXHAUST PLENUM PIVOTS</p>					
<p>WARNING</p>  <p>CHEMICAL</p>					
8	Quarterly	0.5	Stern Anchor (Roller)	Lubricate with aircraft grease and hand lubricating gun.	

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

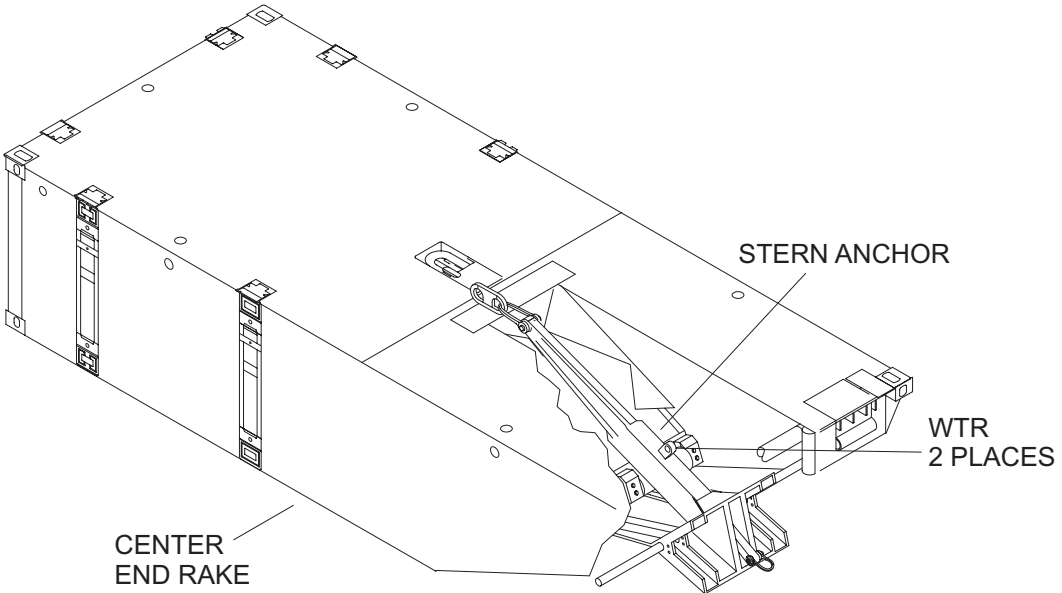


ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
					
<p>WARNING</p>					
					
					
<p>CHEMICAL</p>					
<p>EYE PROTECTION</p>					
11	Quarterly	0.7	Winch A-Frame	Service A-frame guy cables by hand with wire rope-exposed gear grease.	
18	Quarterly	1.0	Diesel Engine	Perform AOAP sampling every 90 days or 100 hours, whichever comes first, as prescribed by DA PAM 738-750.	
23	Quarterly	1.0	Marine Gear	Perform AOAP sampling every 90 days or 100 hours, whichever comes first, as prescribed by DA PAM 738-750.	
24	Quarterly	0.5	Transfer Case	Perform AOAP sampling every 90 days or 100 hours, whichever comes first, as prescribed by DA PAM 738-750.	

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)



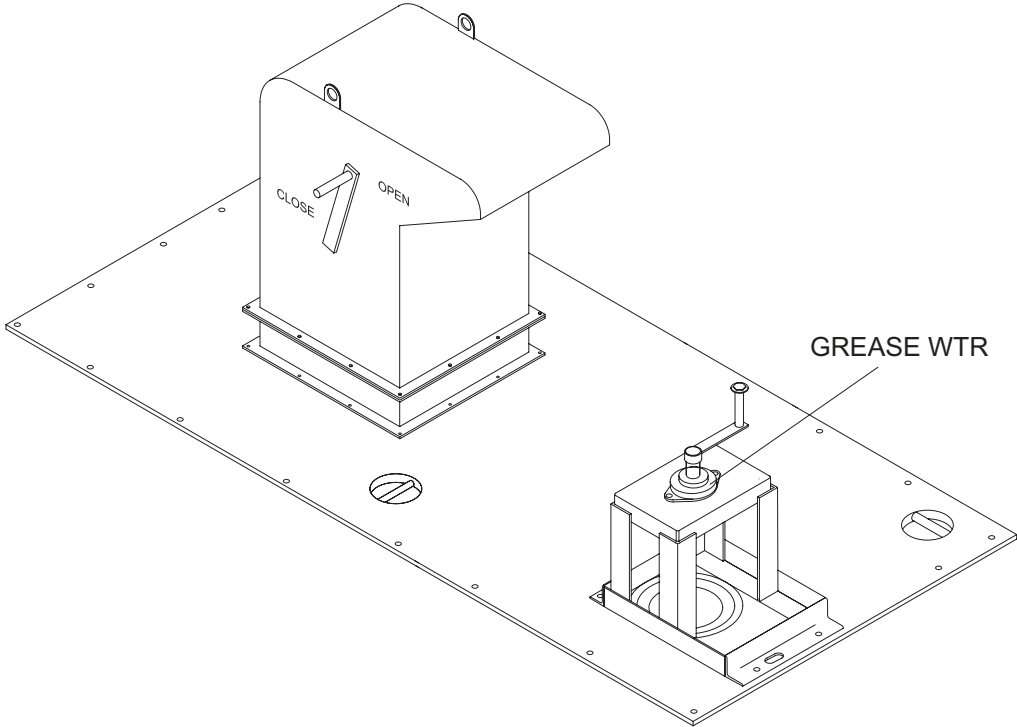
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
<p>WARNING</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>CHEMICAL</p> </div> <div style="text-align: center;">  <p>EYE PROTECTION</p> </div> </div>					
32	Quarterly	0.1	Emergency Steering Control Stand	Lubricate flange grease fittings with aircraft grease and a hand lubricating gun.	
 <p style="text-align: center;">EMERGENCY STEERING SYSTEM - FLANGE GREASE FITTINGS</p>					

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)


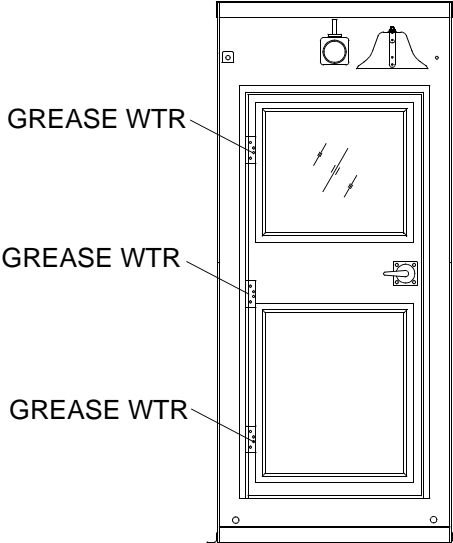
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
<p>WARNING</p>  <p>CHEMICAL</p>					
35	Quarterly	0.5	Operators Cab (Door Hinges)	Lubricate with aircraft grease and hand lubricating gun.	
 <p>OPERATOR CAB DOOR HINGES</p>					
26	Semi-annually	0.5	Hydraulic System	Perform AOAP sampling as prescribed by DA PAM 738-750.	
42	Semi-annually	0.5	Powered and Non-Powered Modules	Inspect all zinc anodes for deterioration. If 75% depleted, contact unit maintenance.	Zinc anodes 75% depleted
33	Annually	2.0	Fire Suppression System	Inspect fire suppression system in accordance with 46 CFR Parts 91.25-20 and 97.15-60. Contact Specialized Repair Activity (SRA).	
43	Annually	2.0	Steel Weight Lifting Chains, Rings, Hooks, Shackles and Swivels	Anneal all steel weight lifting chains, rings, hooks, shackles and swivels per 29 CFR Parts 1919.16 and 1919.36. Contact Specialized Repair Activity (SRA).	

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)



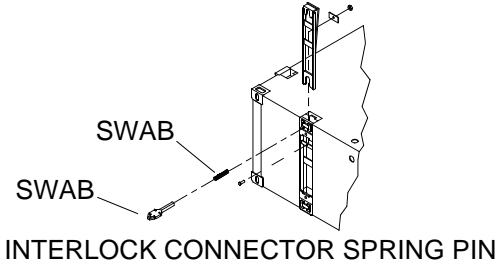


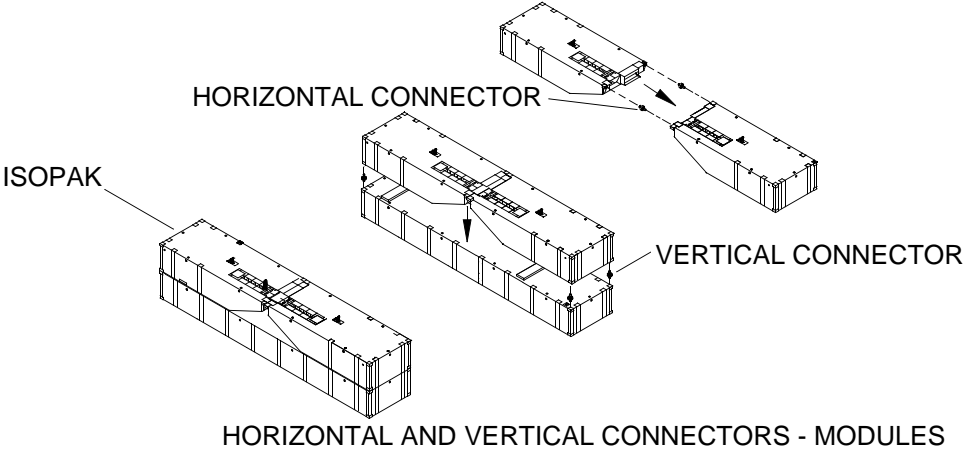




ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
<p>WARNING</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>CHEMICAL</p> </div> <div style="text-align: center;">  <p>EYE PROTECTION</p> </div> </div>					
44	Annually	0.3 each assembly	Module Interlock Connector and Spring (Male Locking Pin)	Lubricate annually and On Condition (before and after operation). Service with general purpose grease by hand.	
 <p>INTERLOCK CONNECTOR SPRING PIN</p>					
<p>WARNING</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>CHEMICAL</p> </div> <div style="text-align: center;">  <p>EYE PROTECTION</p> </div> </div>					
45	Annually	0.1 each connector	Horizontal and Vertical Connectors	Lubricate annually and On Condition (before and after operation). Service with general purpose grease.	
 <p>HORIZONTAL AND VERTICAL CONNECTORS - MODULES</p>					

Table 1. Preventive Maintenance Checks and Services for the Warping Tug. (Continued)

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
<hr/> WARNING <hr/>					
			 CHEMICAL	 EYE PROTECTION	
23	300 Hours	0.1	Marine Gear	Lubricate marine gear output seal using automotive and artillery grease and a hand lubricating gun. (TM 55-1945-223-14&P)	
<hr/> WARNING <hr/>					
			 CHEMICAL	 EYE PROTECTION	
10, 11	4 Years	5.0	Deck Winch and A-Frame	Perform proof test of winch and A-frame in accordance with 29 CFR Part 1919.27. Contact Specialized Repair Activity (SRA).	

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
LIFE RING STROBE LIGHT BATTERY
REPLACEMENT**

INITIAL SETUP:**Tools**

Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
Goggles, Industrial: Clear Lens, Chipping (Cabinet B4) (Item 35, WP 0112 00)

Materials/Parts

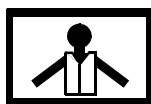
Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)
Gloves, Rubber Industrial (Item 36, WP 0114 00)
Battery, Nonrechargeable (Item 7, WP 0114 00)

Personnel Required

Engineer 88L or 88K

REMOVE LIFE RING STROBE LIGHT BATTERY

WARNING



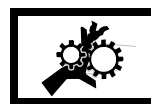
VEST



HELMET PROTECTION



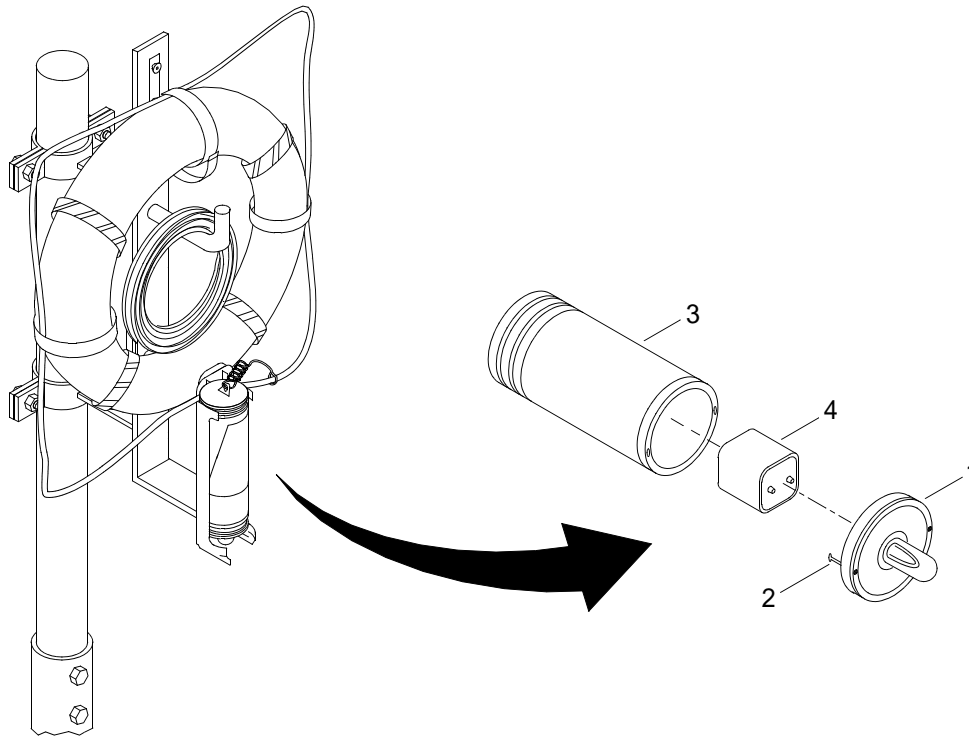
HEAVY PARTS



MOVING PARTS

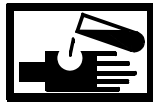
All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

1. While depressing strobe light cover (1), turn locks (2) 90° to unlock strobe light cover (1) from strobe light housing (3).

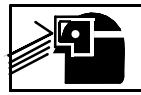


2. Remove strobe light cover (1) from strobe light housing (3).

WARNING



CHEMICAL



EYE PROTECTION

3. Remove battery (4) and dispose of per local procedures.

INSTALL LIFE RING STROBE LIGHT BATTERY

WARNING



CHEMICAL



EYE PROTECTION

NOTE

6 VDC batteries are stowed in the BII container.

1. Position new battery (4) inside strobe light housing (22).
2. Position strobe light cover (1) on strobe light housing (3).
3. While depressing strobe light cover (1), turn locks (2) 90° to lock strobe light cover (1) to strobe light housing (3).

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
HAND LANTERN BATTERIES
REPLACEMENT**

INITIAL SETUP:**Tools**

Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (Item 87, WP 0112 00)
 Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
 Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
 Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
 Goggles, Industrial: Clear Lens, Chipping (Cabinet B4) (Item 35, WP 0112 00)

Materials/Parts

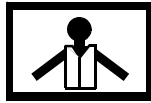
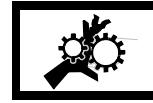
Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)
 Gloves, Rubber Industrial (Item 36, WP 0114 00)
 Battery, Nonrechargeable (Item 7, WP 0114 00)

Personnel Required

Engineer 88L or 88K

REMOVE HAND LANTERN BATTERIES

WARNING

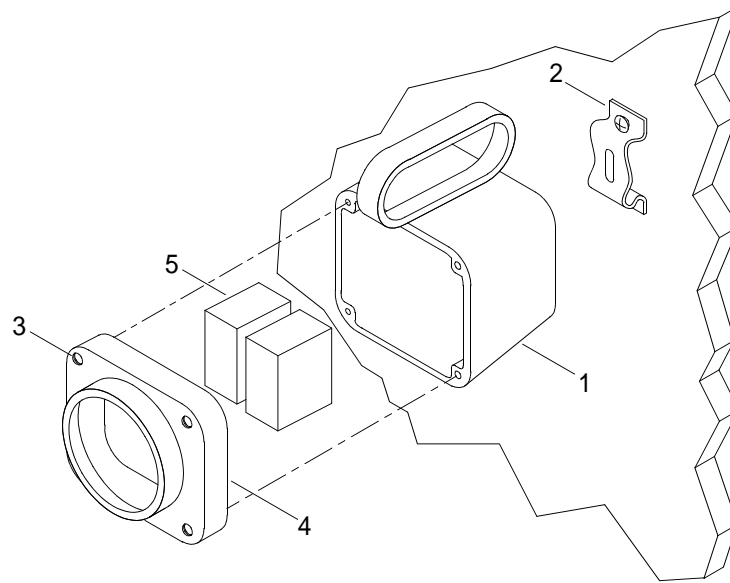
**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

NOTE

The following procedure is typical for removal and installation of hand lantern batteries.

1. Rotate hand lantern (1) 90° and remove from mounting bracket (2).



2. Loosen four captive screws (3) on cover (4).
3. Remove cover (4) and position hand lantern (1) face up on work bench.

WARNING



CHEMICAL

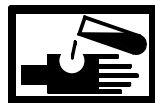


EYE PROTECTION

4. Remove two batteries (5) from hand lantern (1) and dispose of per local procedures.

INSTALL HAND LANTERN BATTERIES

WARNING



CHEMICAL



EYE PROTECTION

1. Install two new batteries (5) in hand lantern (1).
2. Position cover (4) on hand lantern (1).
3. Tighten four captive screws (3) to secure cover (4) to hand lantern (1).
4. Position hand lantern (1) on mounting bracket (2) and rotate 90°.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
STUB ASSEMBLY MAST LIGHT BATTERIES
REPLACEMENT**

INITIAL SETUP:**Tools**

Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)
Goggles, Industrial: Clear Lens, Chipping (Cabinet B4) (Item 35, WP 0112 00)

Materials/Parts

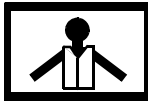
Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)
Gloves, Rubber Industrial (Item 36, WP 0114 00)
Battery, Nonrechargeable (Item 7, WP 0114 00)

Personnel Required

Engineer 88L

REMOVE STUB ASSEMBLY MAST LIGHT BATTERIES

WARNING



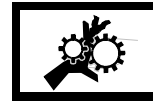
VEST



HELMET PROTECTION



HEAVY PARTS



MOVING PARTS

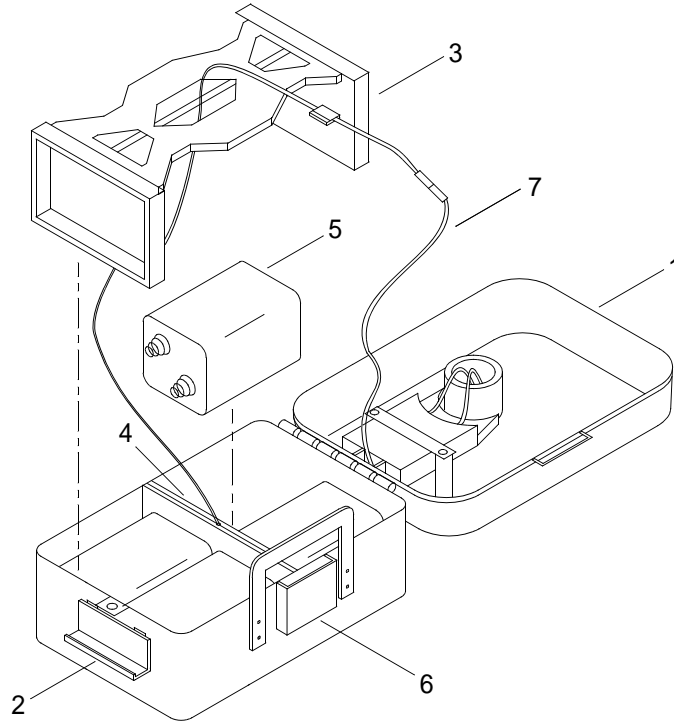
All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

NOTE

This task is typical for removing and installing the batteries from both stub assembly mast lights.

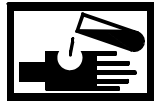
1. Stub assembly mast removed. (WP 0044 00)

2. Open stub assembly mast light cover (1) by unlatching clasp (2).



3. Remove battery bracket (3).
4. Remove conductor plate (4).

WARNING



CHEMICAL



EYE PROTECTION

5. Remove four batteries (5) from stub assembly mast light (6).

WARNING



CHEMICAL

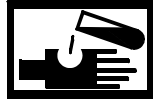


EYE PROTECTION

6. Dispose of batteries per local procedures.

INSTALL STUB ASSEMBLY MAST LIGHT BATTERIES

WARNING

**CHEMICAL****EYE PROTECTION**

1. Install four new batteries (5) in stub assembly mast light (6).
2. Install conductor plate (4).
3. Install battery bracket (3).
4. Position wire (7) away from edges of stub assembly mast light (6).
5. Close stub assembly mast light cover (1) and latch clasp (2).
6. Install stub assembly mast. (WP 0020 00)

END OF WORK PACKAGE

**OPERATOR MAINTENANCE
WARPING TUG
STUB ASSEMBLY MAST LIGHT INCANDESCENT BULB
REPLACEMENT**

INITIAL SETUP:**Tools**

Life Preserver, Vest: Inherently Buoyant W/Collar (Cabinet B1) (Item 52, WP 0112 00)
Goggles, Sun, Wind, and Dust (Cabinet B4) (Item 37, WP 0112 00)
Helmet, Safety: Brown (Cabinet C1) (Item 43, WP 0112 00)

Materials/Parts

Gloves, Men's and Women's (Leather Palm) (Item 25, WP 0114 00)
Lamp, Incandescent (Item 36, WP 0114 00)

Personnel Required

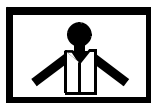
Seaman 88K

Equipment Condition

Stub Assembly Mast Removed. (WP 0044 00)

REMOVE STUB ASSEMBLY MAST LIGHT INCANDESCENT BULB

WARNING

**VEST****HELMET PROTECTION****HEAVY PARTS****MOVING PARTS**

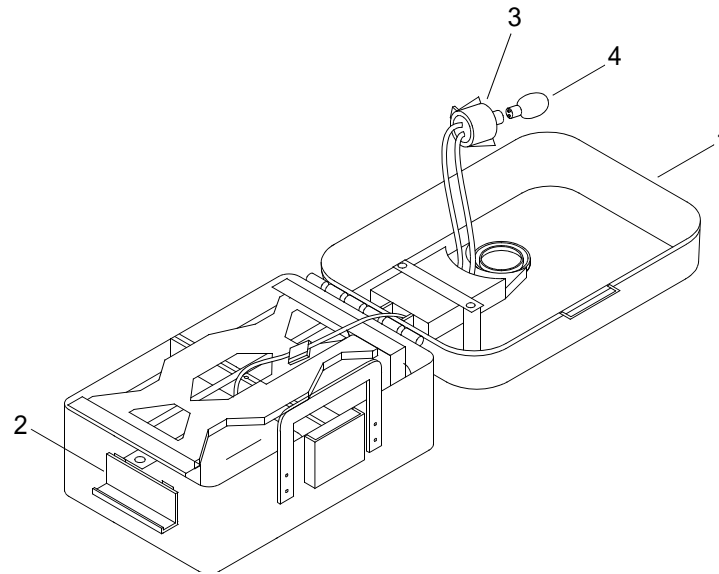
All personnel must wear personal flotation device, hard hat, safety shoes and gloves during WT operations and maintenance. Failure to observe these precautions could result in serious injury or death.

NOTE

This task is typical for removal and installation of stub assembly mast light incandescent bulbs.

A spare bulb is located in each light case.

1. Open stub assembly mast light cover (1) by unlatching clasp (2).



2. Remove bulb holder (3) from stub assembly mast light cover (1) by rotating counterclockwise and pulling out.
3. Remove bulb (4) from bulb holder (3) by pushing down, rotating counterclockwise and pulling out. Discard bulb (4).

INSTALL STUB ASSEMBLY MAST LIGHT INCANDESCENT BULB

1. Install new bulb (4) into bulb holder (3) by pushing down and rotating clockwise.
2. Install bulb holder (3) into stub assembly mast light cover (1) by pushing down and rotating clockwise.
3. Close stub assembly mast light cover (1) and latch clasp (2).
4. Install stub assembly mast. (WP 0020 00)

END OF WORK PACKAGE

CHAPTER 5

**OPERATOR SUPPORTING INFORMATION
FOR
MODULAR CAUSEWAY SYSTEM (MCS)
WARPING TUG (WT)**

**OPERATOR MAINTENANCE
WARPING TUG
REFERENCES**

SCOPE

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

CODE OF FEDERAL REGULATIONS

29 CFR Labor, Parts 1911 to 1925

46 CFR Shipping, Parts 90 to 139

DA PAMPHLETS

DA PAM 40-501 Hearing Conservation Program

DA PAM 738-750 Functional User's Manual For The Army Maintenance Management System (TAMMS)

FIELD MANUALS

FM 3-4 NBC, Protection

FM 3-5 NBC, Decontamination

FM 55-502 Army Watercraft Safety

FORMS

DA Form 2028 Recommended Changes to Equipment Technical Publications

DA Form 2404 Equipment Inspection and Maintenance Worksheet

SF 368 Product Quality Deficiency Report

MISCELLANEOUS

ASME Y14.38-1999 The American Society of Mechanical Engineers Abbreviations and Acronyms

CTA 8-100 Common Table of Allowances, Army Medical Department Expendable/Durable Items

CTA 50-970 Common Table of Allowances, Expendable/Durable Items (Except Medical, Class V Repair Parts, and Heraldic Items)

SUPPLY CATALOG

SC 4910-95-A68 Shop Equipment, Automotive Equipment and Repair, Field Maintenance
SC 4910-95-A72 Shop Equipment, Automotive Equipment and Repair, Organizational Maintenance

TECHNICAL BULLETINS

TB 43-0144 Painting of Watercraft
TB 55-1900-207-24 Treatment of Cooling Water in Marine Diesel Engines

TECHNICAL MANUALS

TM 5-2815-258-10 Operators Manual for Detroit Diesel Engine Series 53
TM 5-805-7 Welding: Design, Procedures and Inspection, for Minor Weld Repairs
TM 9-6140-200-14 Operator's, Unit, Direct Support and General Support Maintenance Manual for Lead-Acid Storage Batteries
TM 11-5820-890-10-8 SINGARS Operators Manual
TM 11-5825-291-13 Operations and Maintenance Manual, Satellite Signals Navigation Sets
TM 55-1945-205-24-3-4 Unit, Direct Support and General Support Maintenance Manual for Transfer Case
TM 55-1945-219-14&P Operator, Unit, Direct Support and General Support Maintenance Manual (including Repair Parts and Special Tools List) for Incinerator Toilet
TM 55-1945-222-14&P Operator, Unit, Direct Support and General Support Maintenance Manual (including Repair Parts and Special Tools List) for Diesel Engine
TM 55-1945-223-14&P Operator, Unit, Direct Support and General Support Maintenance Manual (including Repair Parts and Special Tools List) for Marine Gear
TM 55-1945-225-10-HR Hand Receipt, Covering Contents of Components of End Item (COEI), Basic Issue Items (BII) and Additional Authorization List (AAL) for Warming Tug
TM 55-3950-204-14&P Operation and Maintenance Instructions With Parts List for Winch, Side-Loadable Warming Tug
TM 750-244-6 Procedures for Destruction of Tank-Automotive Equipment

**OPERATOR MAINTENANCE
WARPING TUG
COMPONENTS OF END ITEM (COEI) LIST**

INTRODUCTION

Scope

This work package lists COEI for the WT to help you inventory items for safe and efficient operation of the equipment.

General

This list is for information purposes only and is not authority to requisition replacements. These items are part of the WT. 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.

Explanation of Columns in the COEI 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 followed by a minimum description when needed. The stowage location of COEI 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 Measure (U/M). Indicates the physical measurement or count of the item as issued per the National Stock Number shown in column (2).

Column (6) - Qty Rqd. Indicates the quantity required.

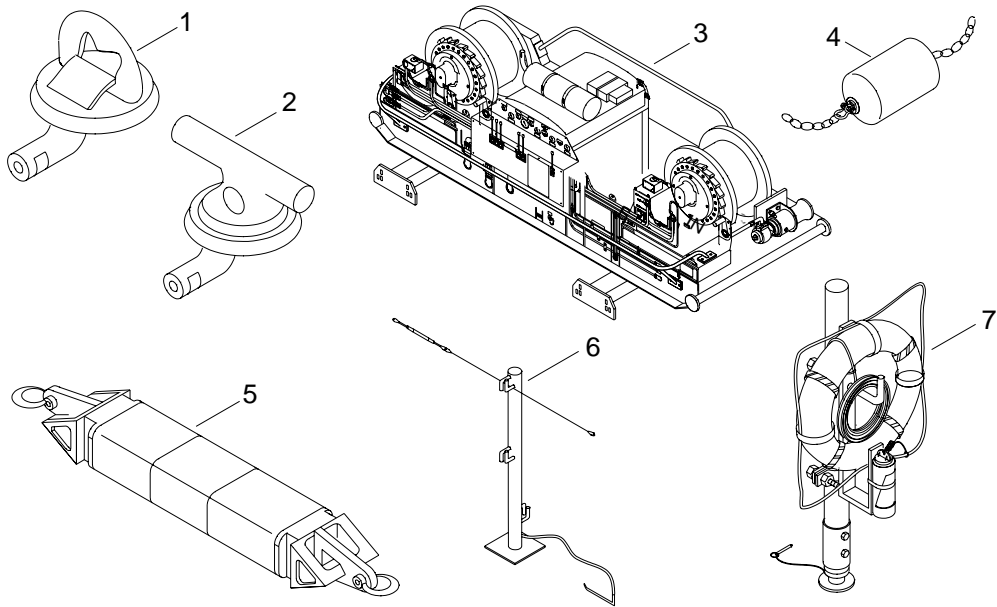


Table 1. Component of End Item. (COEI)

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC AND PART NUMBER	(4) USABLE ON CODE	(5) U/M	(6) QTY RQD
1		D-Ring Fitting (34712) E07803		EA	4
2		Deck Cleat (34712) E07723		EA	4
3		Deck Winch (80091) 6304148 & 6304149		EA	1
4		Fender Assembly (2 ft by 4 ft) (34712) E33008		EA	4
5	2040-01-092-3081	Flexor Coupling, Pontoon Causeway (80091) 6138992		EA	2
6		Life Lines (handrail installation) (34712) E36186		SYS	1
7		Life Ring w/Light and Stanchion (34712) E40353		EA	2

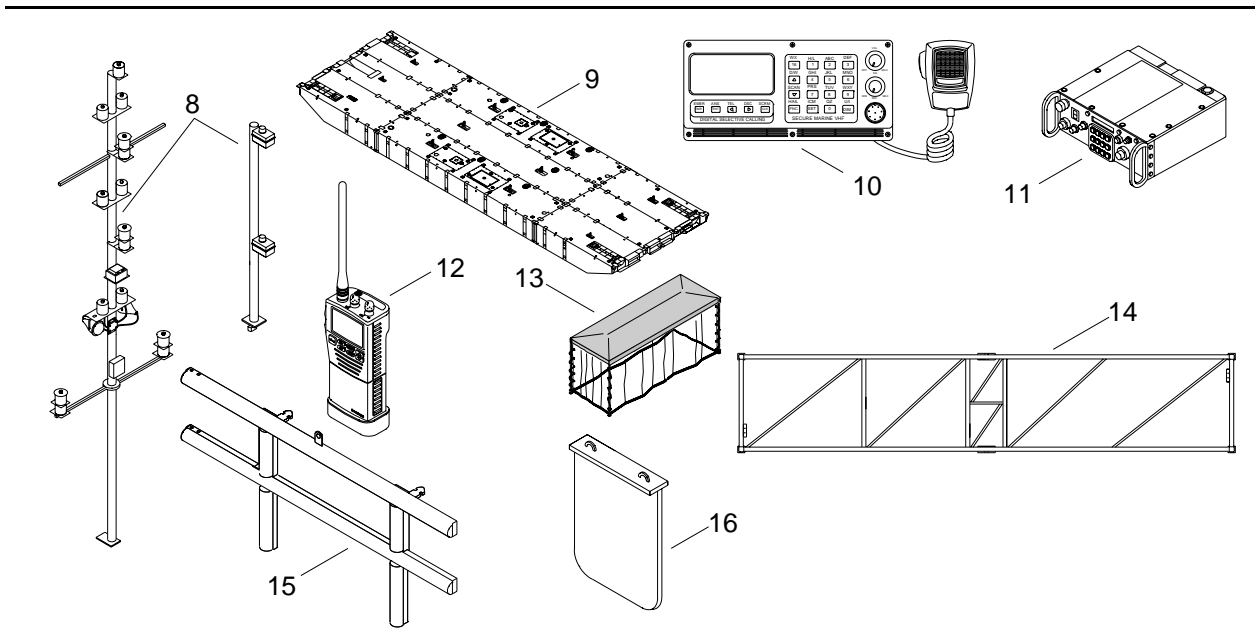


Table 1. Component of End Item. (COEI) (Continued)

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC AND PART NUMBER	(4) USABLE ON CODE	(5) U/M	(6) QTY RQD
8		Navigation Light Set (main assembly mast & stub assembly mast) (34712) E39273 & E36683		SET	1
9		Powered Section (80 ft x 24 ft x 4.5 ft) (34712) E36113		EA	1
10	5825-01-471-0269	Radio Set (commercial communications) (0WF67) DSC 500		EA	1
11	5820-01-267-9479	Radio Set (tactical communications) (80063) A3080229-1		EA	1
12	5820-01-501-5502	Receiver/XMTR (interpersonal) (0JDM6) 50-200029		EA	2
13		Shelter, Crew (34712) E46328		EA	1
14		Shipping Rack (34712) E37273		EA	4
15		Side Bumpers/Fendering (34712) E36093		SET	1
16		Skeg (34712) E37283		EA	4

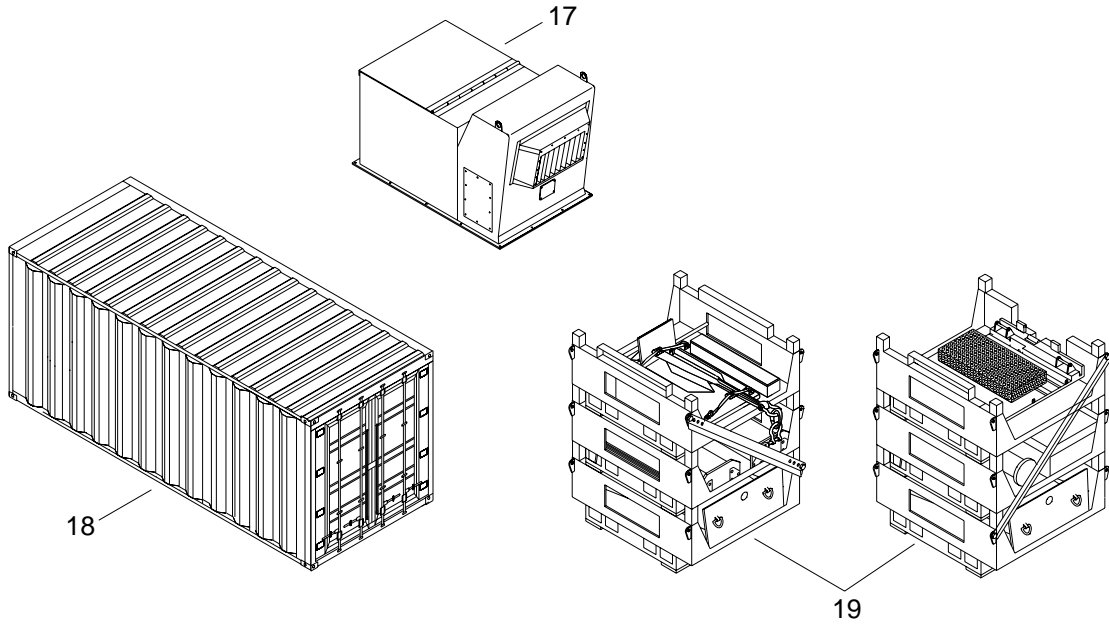


Table 1. Component of End Item. (COEI) (Continued)

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC AND PART NUMBER	(4) USABLE ON CODE	(5) U/M	(6) QTY RQD
17		Storage Box (mounted to intake plenum) (34712) E34442		EA	1
18		Storage Containers (20 ft open end) (34712) E32958		EA	AR
19		Warping Tug Conversion Kit (34712) E36123		EA	1

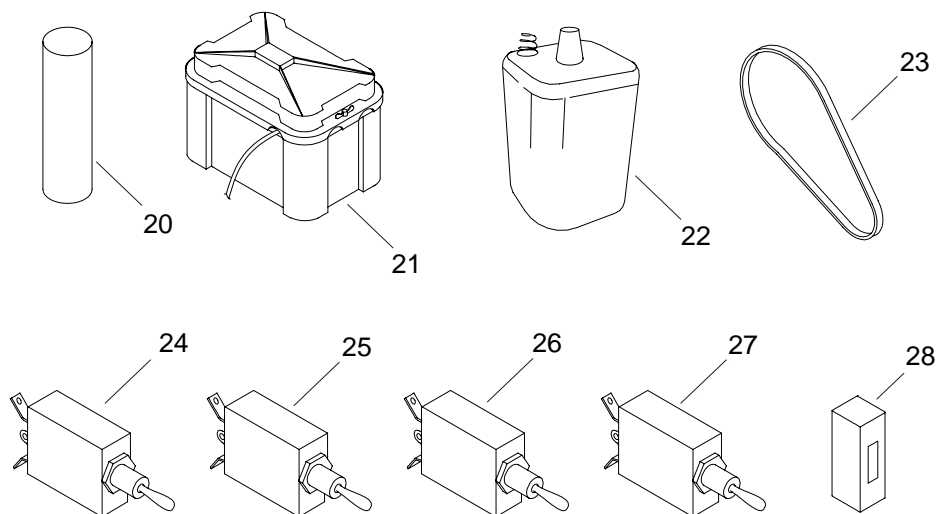


Table 1. Component of End Item. (COEI) (Continued)

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC AND PART NUMBER	(4) USABLE ON CODE	(5) U/M	(6) QTY RQD
ON BOARD SPARES					
20	6135-01-395-9089	Battery (GPS Memory) (13499) 221-0500-020		EA	1
21	6140-01-457-4243	Battery, Lead Acid (04056) 908D		EA	1
22		Battery, Primary (1VZM8) 27C4887		EA	1
23		Belt Set, Alternator (0L9X3) 06K01B0226		SET	1
24	5925-00-241-1441	Breaker (10 Amp Circuit) (77342) W31X2M1G-10		EA	3
25	5925-00-947-8312	Breaker (15 Amp Circuit) (77342) W31X2M1G-15		EA	3
26	5925-00-308-3468	Breaker (2 Amp Circuit) (77342) W31X2M1G-2		EA	1
27	5925-00-855-3987	Breaker (20 Amp Circuit) (77342) W31X2M1G-20		EA	1
28		Breaker (200 Amp Circuit) (81541) LELHPK111-32225-200		EA	1

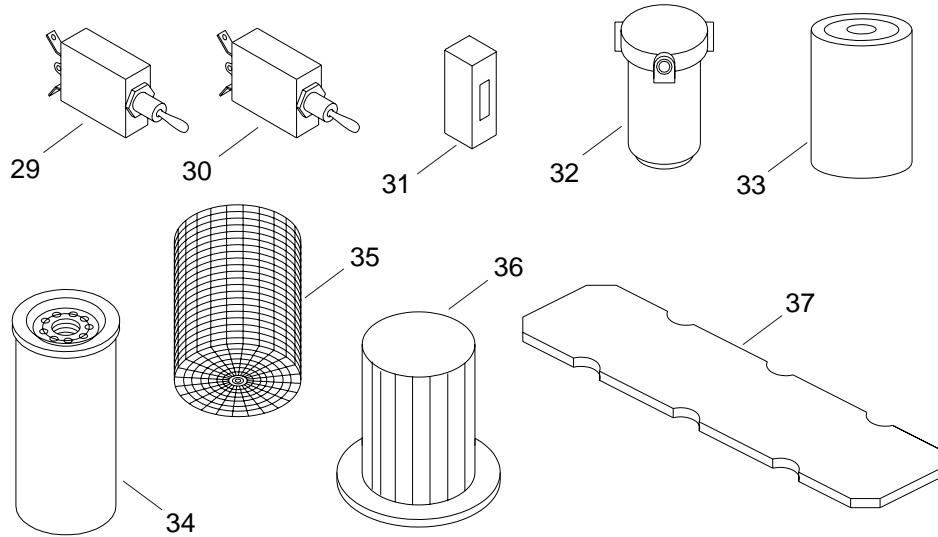


Table 1. Component of End Item. (COEI) (Continued)

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC AND PART NUMBER	(4) USABLE ON CODE	(5) U/M	(6) QTY RQD
29	5925-00-869-1175	Breaker (5 Amp Circuit) (77342) W31X2M1G-5		EA	3
30	5925-00-199-9565	Breaker (50 Amp Circuit) (77342) W31X2M1G-50		EA	1
31		Breaker (60 Amp Circuit) (81541) IULNK1-1-52-60.0K		EA	1
32	2910-01-022-8183	Element, Fuel Filter (72582) 25013794		EA	1
33	2910-01-022-8183	Filter (Secondary Fuel System Filter) (72582) 23518482		EA	1
34	2940-01-412-5275	Filter, Oil (72582) 23527033		EA	2
35		Filter, Pressure, Hydraulic (1572X) NF301N10SD5		EA	1
36		Filter, Return, Hydraulic (1572X) GT4G10Y6		EA	1
37		Gasket, Oil Pan (06E00) 23422279		EA	1

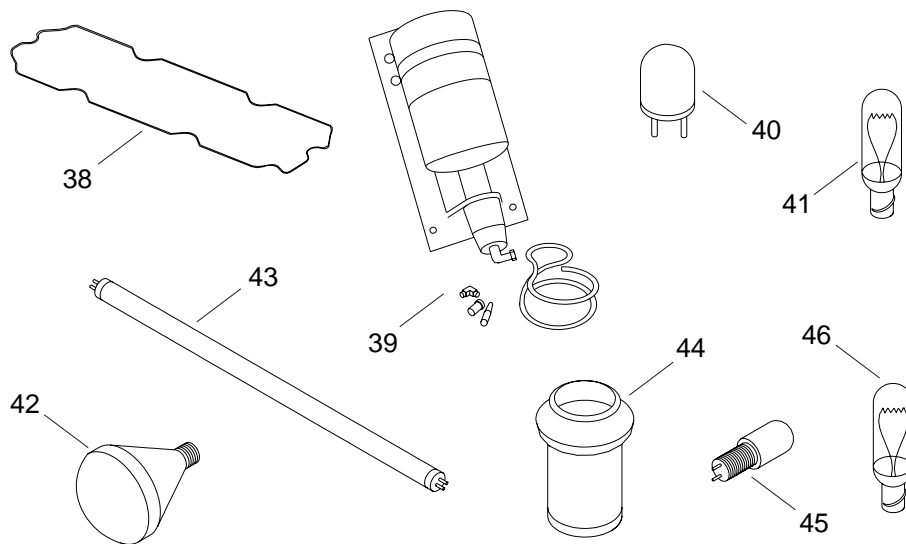


Table 1. Component of End Item. (COEI) (Continued)

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC AND PART NUMBER	(4) USABLE ON CODE	(5) U/M	(6) QTY RQD
38		Gasket, Rocker Cover (06E00) 2351191		EA	1
39		Kit, Ether Start (53203) 64017		EA	1
40		Lamp (24 volt, 150 watt High Intensity) (81349) 4212400		EA	1
41	6240-01-186-9975	Lamp (24 volt, 40 Watt) (61204) 90400171		EA	6
42		Lamp (26 Par, 150 Watt, 24-28 VDC) (81493) 4203300		EA	1
43		Lamp, Flourescent (1FW98) F20T12/30U		EA	1
44		Lens, Light, Navigation (ODT98) 11-00803		EA	1
45	6210-01-015-7493	Light, Indicator (83330) 249-7872-3731-504		EA	1
46		Light, Navigation (ODT98) 98-23400		EA	1

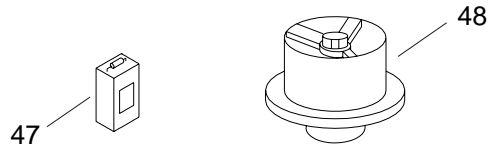


Table 1. Component of End Item. (COEI) (Continued)

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC AND PART NUMBER	(4) USABLE ON CODE	(5) U/M	(6) QTY RQD
47	5945-01-381-0294	Relay (40 Amp) (77342) VF415H-11		EA	3
48		Thermostat (06E00) 23503827		EA	1

**OPERATOR MAINTENANCE
WARPING TUG
BASIC ISSUE ITEMS (BII) LIST**

INTRODUCTION

Scope

This work package lists BII for the warping tug to help you inventory items for safe and efficient operation of the equipment.

General

These essential items are required to place the warping tug in operation, operate it, and to do emergency repairs. Although shipped separately packaged, BII must be with the WT 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 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 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 Measure (U/M). Indicates the physical measurement or count of the item as issued per the National Stock Number shown in column (2).

Column (6) - Qty Rqd. Indicates the quantity required.

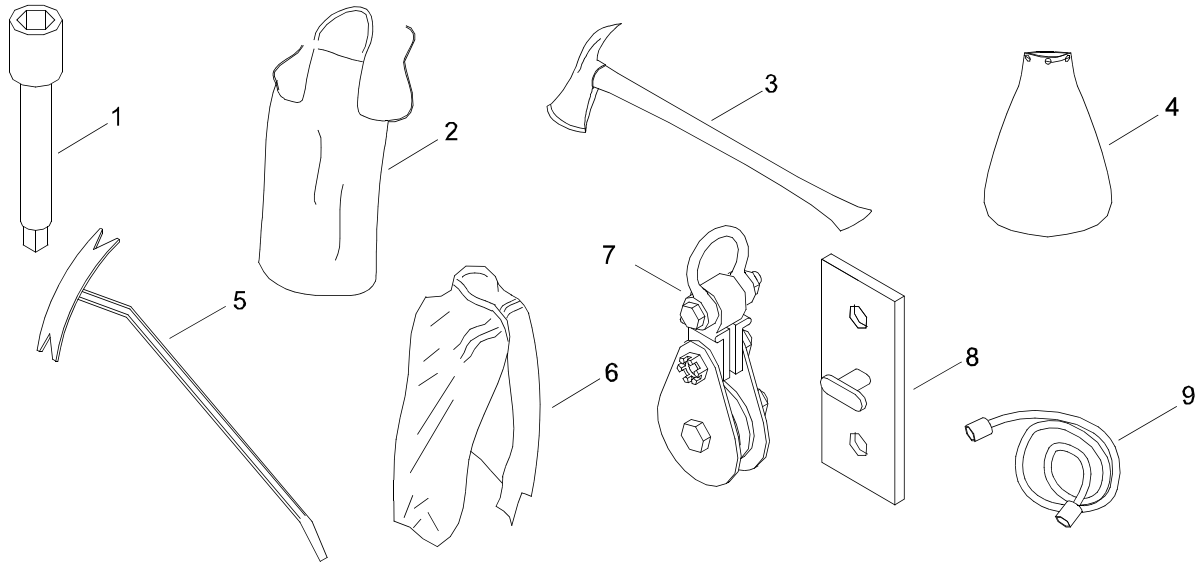


Table 1. Basic Issue Items. (BII)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC AND PART NUMBER	(4) USABLE ON CODE	(5) U/I	(6) QTY RQD
1	5120-00-144-5207	Adapter, Socket Wrench (Storage Room) (07BY4) 5523A38		EA	1
2	8415-00-082-6108	Apron, Utility (Cabinet A3) (58536) A-A-5506		EA	2
3	4210-00-142-4949	Ax, Pick Head (Storage Room Hooks) (88044) AN8020-1		EA	1
4	8105-01-438-9279	Bag, Tools and Spare Parts (Storage Room) (39428) 6565A11		EA	1
5	5120-00-242-0762	Bar, Wrecking: 36" Long (Storage Room Hooks) (58536) A-A-2566		EA	2
6		Blanket, Fire 72" x 60" (Cabinet C1) (1BJ97) 7280		EA	1
7	3940-01-500-1241	Block, Tackle: 8" Diameter (Storage Room Hooks) (75535) 121022		EA	4
8	6230-00-968-7831	Bracket Assembly, Lantern, Hand (Cabinet A8) (81349) M16377/53-003		EA	3
9	6150-01-248-9555	Cable Assembly, Power, Electrical: NATO Slave (Storage Room) (19207) 11682336-6		EA	1

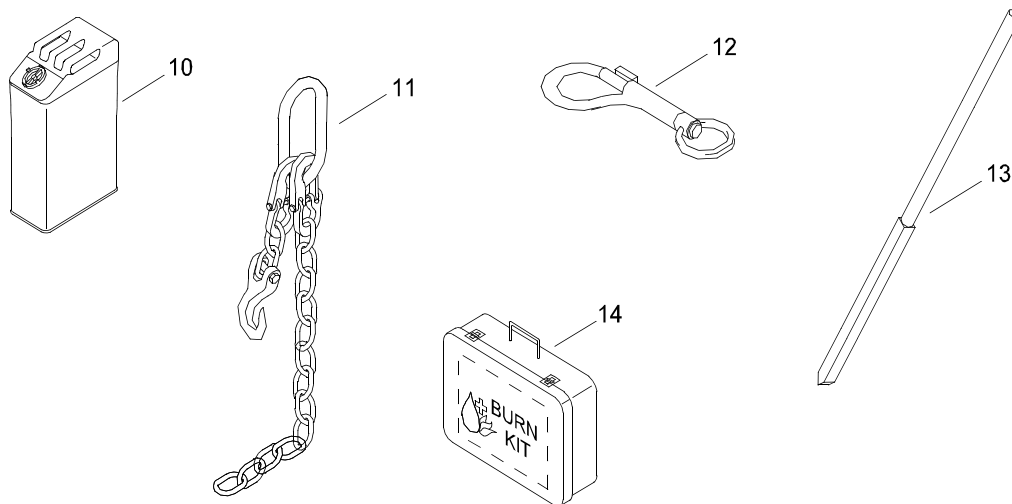


Table 1. Basic Issue Items. (BII) (Continued)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC AND PART NUMBER	(4) USABLE ON CODE	(5) U/I	(6) QTY RQD
10	7240-00-089-3827	Can, Water, Military: 5 Gallon (Cabinet C1) (56161) 10502791		EA	2
11		Chain Sling, 36,000 lb Adjustable Consisting Of:		EA	4
	4010-01-477-8666	Link, Chain, End: 1 1/4" Oblong (75535)1014342		EA	1
	4010-01-500-7624	Chain, Welded: 5/8", 54" Long (75535)273563		EA	1
	4030-01-500-9386	Hook, Grab: 5/8" Clevis (75535)1027695		EA	1
	2040-01-442-4055	Connecting, Link: 5/8" (75535)1014723		EA	2
		(Storage Room Hooks) (34712) E38563-81			
12		Clips, Halyard (Cabinet A5) (16457) 8351-403-18		BX	2
13	5120-00-224-1390	Crowbar (60" Long) (Fender Rack) (58536) A-A-2563		EA	2
14		Dressing, Burn Kit, Topical Dressing (Cabinet B2) (06345) V-BM715		EA	1

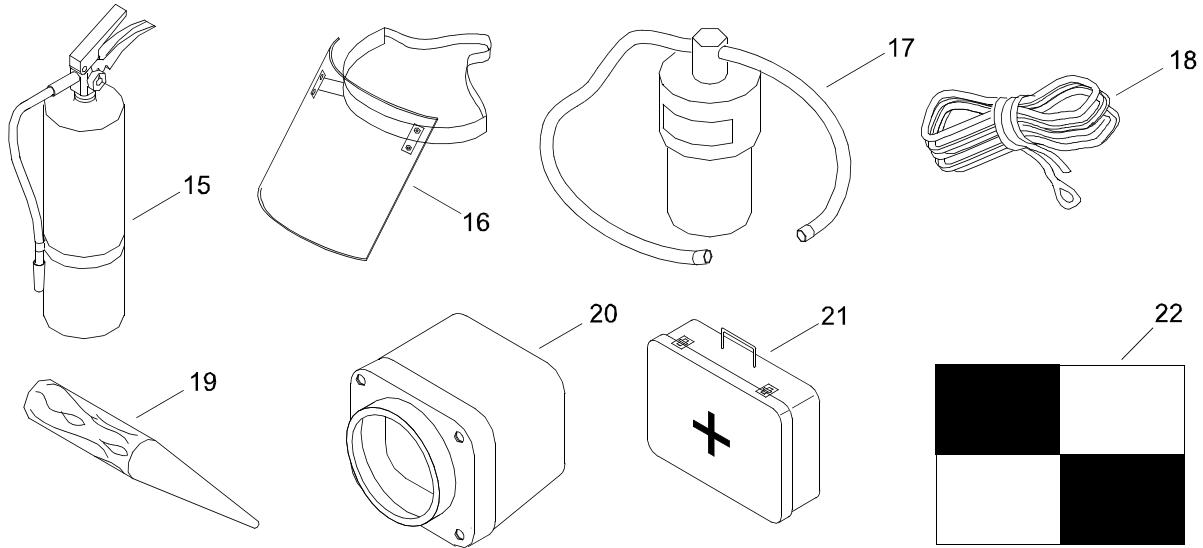


Table 1. Basic Issue Items. (BII) (Continued)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC AND PART NUMBER	(4) USABLE ON CODE	(5) U/I	(6) QTY RQD
15	4210-00-203-0217	Extinguisher, Fire: Portable, 15LBS. CO2 CAOP (Storage Room) (81349) MIL-E-24269		EA	3
16	4240-00-542-2048	Faceshield, Industrial (Cabinet B3) (58536) A-A-1770		EA	6
17		Fast Lube Oil Change System (FLOCS), Pump & Hoses (Storage Room) (0ARV4) 1P893		KT	1
18	4020-01-344-0552	Fiber Rope Assembly, Single Leg: Heaving, Safety, 100" (Cabinet A4) (0GU87) NIS-G-0213		EA	2
19	5120-00-223-8921	Fid: 12" Wood (Storage Room) (58536) A-A-52129		EA	2
20	6230-00-969-3918	Filter, Light, General Purpose: Red Filter (Cabinet A8) (81349) M16377/43-001		EA	1
21		First Aid Kit (Cabinet B3) (64616) 63-1371		EA	2
22	8345-00-935-0445	Flag, Signal: A Intn'l Code Size 6 (Cabinet A5) (81349) MIL-F-2692-A		EA	1

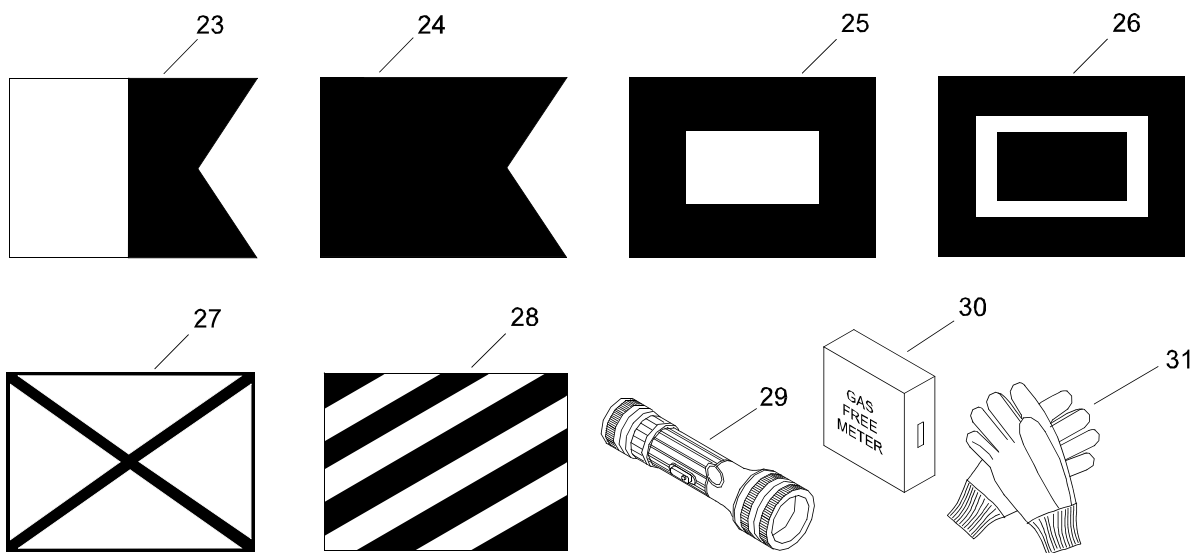


Table 1. Basic Issue Items. (BII) (Continued)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC AND PART NUMBER	(4) USABLE ON CODE	(5) U/I	(6) QTY RQD
23	8345-00-926-6803	Flag, Signal: B Intn'l Code Size 6 (Cabinet A5) (81349) MIL-F-2692-B		EA	1
24	8345-00-935-0451	Flag, Signal: O Intn'l Code Size 6 (Cabinet A5) (81349) MIL-F-2692-O		EA	1
25	8345-00-926-6814	Flag, Signal: U Intn'l Code Size 6 (Cabinet A5) (81349) MIL-F-2692-U		EA	1
26	8345-00-935-0455	Flag, Signal: V Intn'l Code Size 6 (Cabinet A5) (81349) MIL-F-2692-V		EA	1
27	8345-00-935-0456	Flag, Signal: W Intn'l Code Size 6 (Cabinet A5) (81349) MIL-F-2692-W		EA	1
28	8345-00-935-0457	Flag, Signal: Y Intn'l Code Size 6 (Cabinet A5) (81349) MIL-F-2692-Y		EA	1
29	6230-00-264-8261	Flashlight: Watertight (Cabinet A4) (U4207) E/N47		EA	2
30		Gas Free Meter (Cabinet B6) (00VT4) A-5ST-3210L-1A0-B0-P42-110010		EA	2
31	8415-01-267-9661	Gloves, Antiflash (Cabinet B5) (81349) MIL-G-2874		PR	6

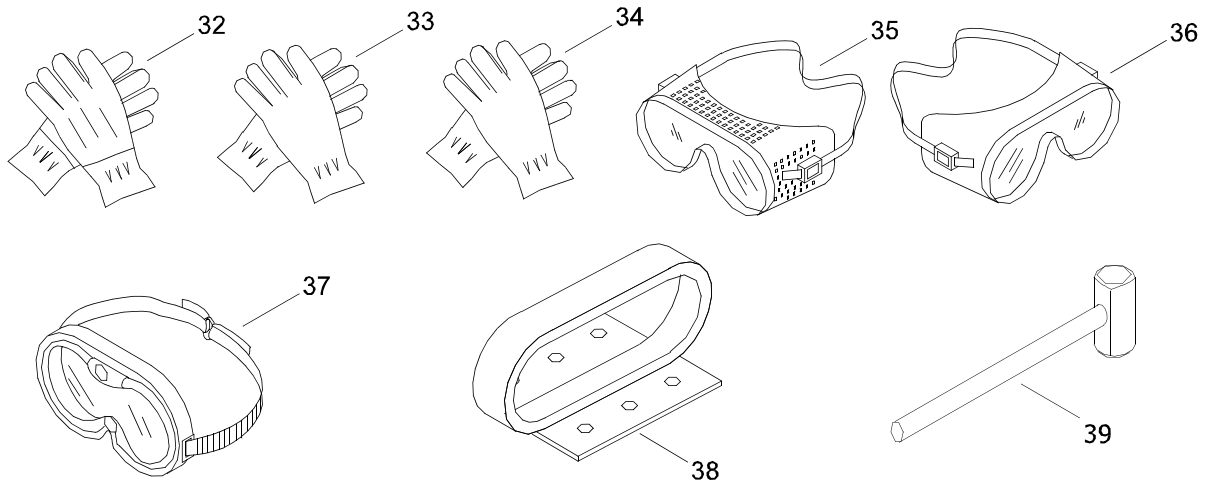


Table 1. Basic Issue Items. (BII) (Continued)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC AND PART NUMBER	(4) USABLE ON CODE	(5) U/I	(6) QTY RQD
32	8415-00-266-8691	Gloves, Electrical Workers' (Cabinet B5) (81348) ZZ-G-401		PR	6
33	8415-00-634-4658	Gloves, Men's and Women's: Leather Palm (Cabinet B5) (58536) A-A-50021		PR	6
34	8415-00-266-8677	Gloves, Rubber, Industrial (Cabinet B5) (81348) ZZ-G-381		PR	2
35	4240-00-052-3776	Goggles, Industrial: Clear Lens, Chipping (Cabinet B4) (58536) A-A-1110		PR	6
36	4240-00-190-6432	Goggles, Industrial: No Vents (Cabinet B4) (81348) GGG-G-521		PR	2
37	8465-01-004-2893	Goggles, Sun, Wind, and Dust (Cabinet B4) (81349) MIL-G-43914		PR	6
38	5340-00-776-5920	Grip, Handle (Cabinet A8) (81349) M16377-53-002		EA	3
39	5120-00-243-2957	Hammer, Hand: 10 LBS Sledge (Cabinet Rack) (58536) A-A-1293		EA	2

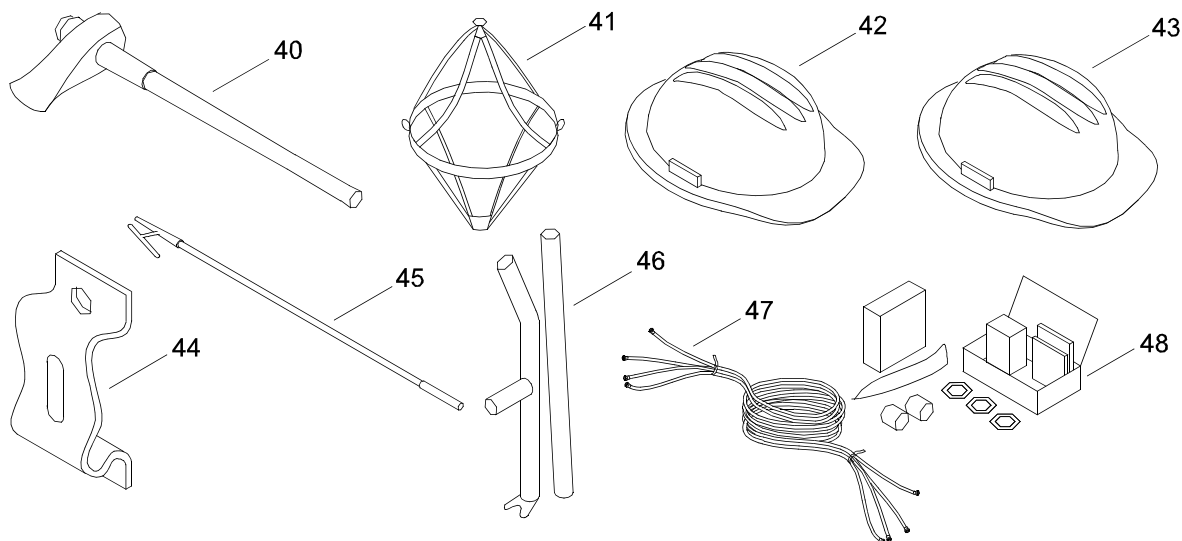


Table 1. Basic Issue Items. (BII) (Continued)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC AND PART NUMBER	(4) USABLE ON CODE	(5) U/I	(6) QTY RQD
40	5120-00-255-1476	Hammer, Hand: Maul, Ships 5 LB (Storage Room Hooks) (58536) A-A-1285		EA	1
41		Harness, Safety, Torso (Cabinet A7) (81349) ANSI A10, 14CL3		EA	6
42	8415-00-279-2205	Helmet, Safety: Blue (Cabinet C1) (58536) A-A-2269		EA	2
43	8415-00-935-1904	Helmet, Safety: Brown (Cabinet C1) (81348) GGG-H-142		EA	4
44	6230-00-578-7401	Holder, Light (Cabinet A8) (81349) MIL-F-16377/54		EA	3
45	2040-00-268-9250	Hook, Boat: W/Pole (Storage Room Hooks) (D1166) H389		EA	2
46	5120-01-501-6717	Inserter and Remover, Pin (Storage Room) (06101) MCS-99-673-001-132		EA	2
47		Jumper Cable Assembly (Storage Room) (34712) E44023		EA	1
48		Kit, Lockout/Tagout, Pig (Cabinet B3) (0KEV6) GEN367C		KT	1

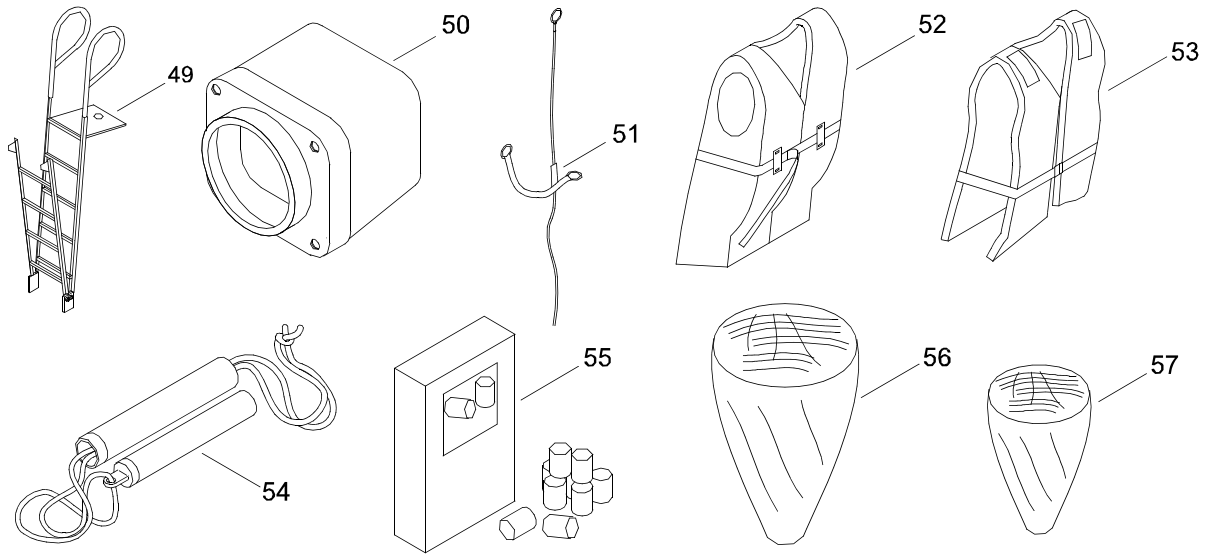


Table 1. Basic Issue Items. (BII) (Continued)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC AND PART NUMBER	(4) USABLE ON CODE	(5) U/I	(6) QTY RQD
49		Ladder, ISOPAK (Storage Room) (34712) E32973		EA	1
50	6230-01-141-2901	Lantern, Electric (Cabinet A8) (81349) M16377/53-100.2		EA	3
51	4240-00-022-2518	Lanyard, Safety Harness (Cabinet A7) (80204) ANSI Z359.1		EA	6
52	4220-01-485-1135	Life Preserver, Vest: Inherently Buoyant W/ Collar (Cabinet B1) (63806) Model I600-ORG-NAV		EA	8
53	4220-00-276-8926	Life Preserver, Vest: Sterns Work Vest (Cabinet A1) (81349) MILL17653		EA	8
54	6260-01-086-8077	Light, Chemiluminescent (Cabinet A2) (0BY83) 9-27058		BX	24
55	6515-00-137-6345	Plug, Ear (Cabinet B4) (89875) 4-375		BX	1
56		Plug, Wood, 3" TO 0" X 8" Long (Cabinet A3) (80064) S8800-461043/3"		EA	5
57	5510-00-260-8953	Plug, Wood: 1" TO 0" x 3" Long (Cabinet A3) (80064) 803-461043/1"		EA	5

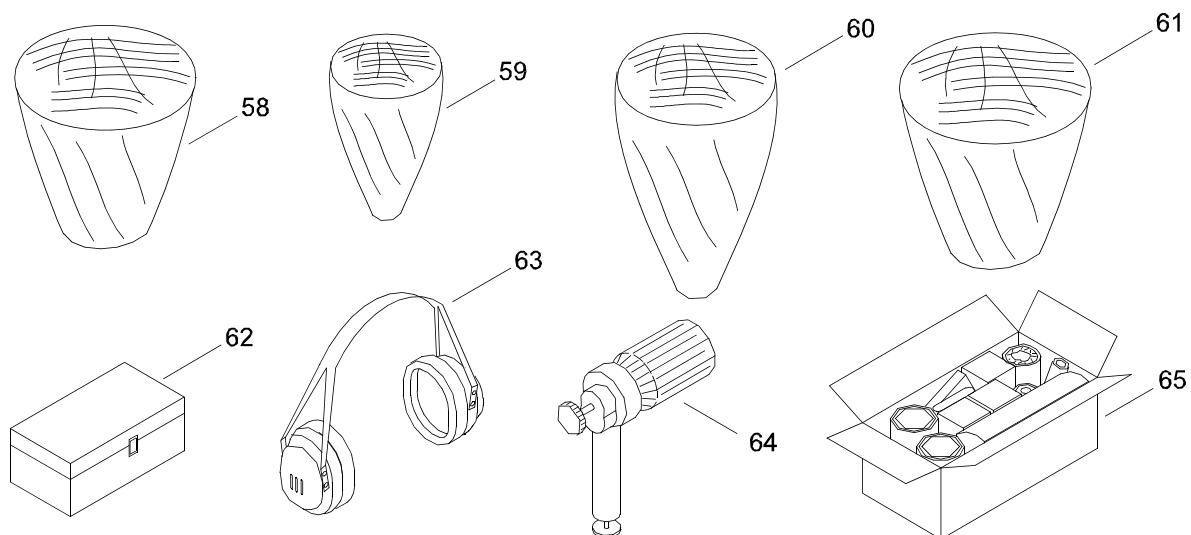


Table 1. Basic Issue Items. (BII) (Continued)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC AND PART NUMBER	(4) USABLE ON CODE	(5) U/I	(6) QTY RQD
58	5510-00-260-8949	Plug, Wood: 10" X 7" X 12" Long (Storage Room) (80064) S8800-461043/10"		EA	5
59	5510-00-260-8958	Plug, Wood: 2" TO 0" X 4" Long (Cabinet A3) (80064) S8800-461043/2"		EA	5
60	5510-00-260-8969	Plug, Wood: 7" X 3" X 10" Long (Storage Room) (80064) 803-461043/7"		EA	5
61	5510-00-260-8973	Plug, Wood: 8" X 4' X 10" Long (Storage Room) (80064) S8800-461043/8"		EA	5
62		Pneumatic Test Kit (Provided With Schottel Waterjet) (Cabinet A2) (34712) E28943		EA	1
63	4240-00-022-2946	Protector, Hearing (Cabinet B4) (58536) A-A-58084		EA	6
64	4930-01-119-4030	Pump, Sampler (Cabinet A2) (81349) MIL-V-64051		EA	1
65	4730-00-542-3359	Repair Kit, Pipe, Emergency Damage Control (Cabinet B7) (81349) MILR17882B		EA	1

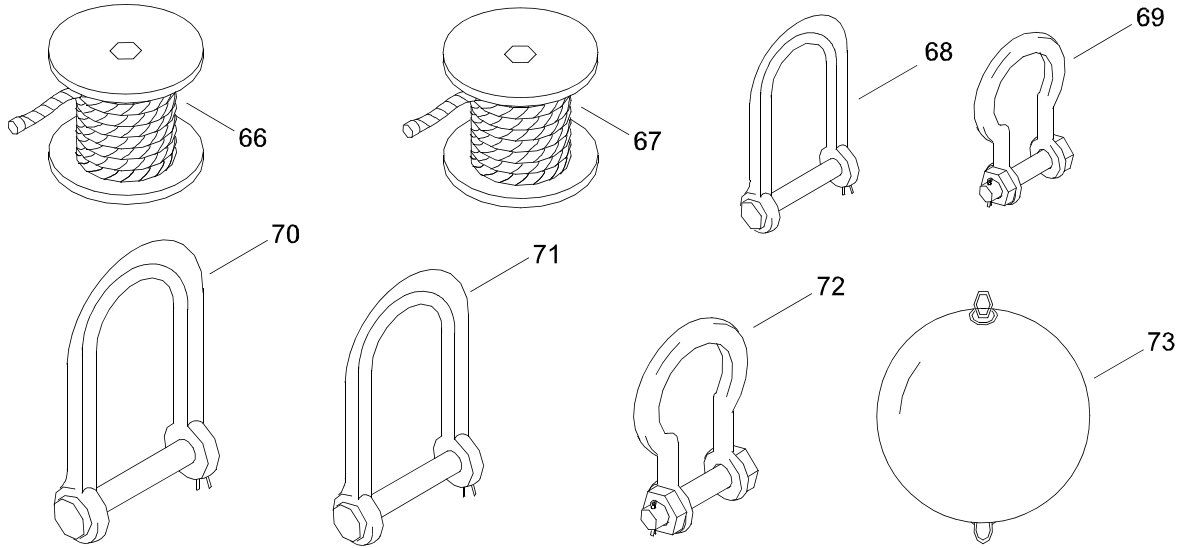


Table 1. Basic Issue Items. (BII) (Continued)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC AND PART NUMBER	(4) USABLE ON CODE	(5) U/I	(6) QTY RQD
66	4020-00-240-2161	Rope, Fibrous: Halyard, Nylon, 1/4" x 300' (Cabinet B6) (81349) MIL-H-226		EA	1
67	4020-00-530-0698	Rope, Fibrous: Retrieving, Ring Bouy 900' Roll (Cabinet C1) (81349) MIL-R-24049		RL	1
68		Shackle, 1-1/2" 30 Ton Shackle (Storage Room Hooks) (75535) 1021110		EA	4
69	4030-01-499-9284	Shackle: 1/2" 2 Ton (Cabinet B7) (75535) 1019472		EA	8
70	4030-01-255-6640	Shackle: 1-3/4", 40 Ton (Storage Room Hooks) (75535) 1021138		EA	4
71	4030-00-343-5433	Shackle: 3/4", 4.75 Ton (Cabinet B7) (75535) 1019515		EA	8
72	4030-01-251-7677	Shackle: 5/8", 3.25 Ton (Cabinet B7) (75535) 10-19490		EA	8
73	8345-00-174-0453	Shape, Day, Maritime: Ball Black, 2' DIA. 4" Long (Storage Room) (81349) MIL-S-29108		EA	2

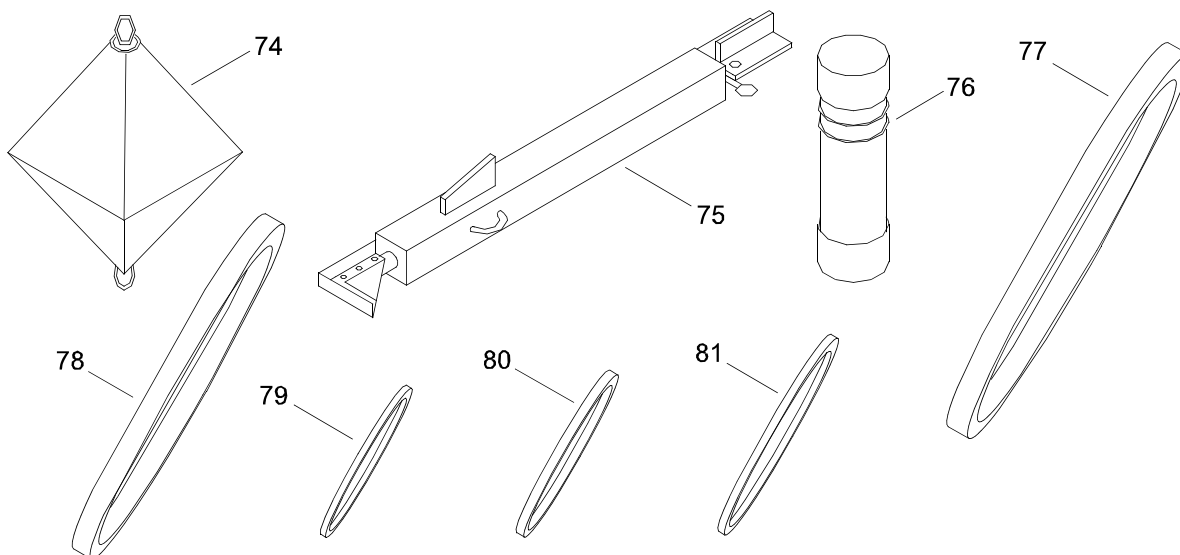


Table 1. Basic Issue Items. (BII) (Continued)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC AND PART NUMBER	(4) USABLE ON CODE	(5) U/I	(6) QTY RQD
74	8345-01-101-1101	Shape, Day, Maritime: Diamond, Black, 2' x 4' (Storage Room) (81349) MIL-S-29134		EA	1
75	2090-00-058-3737	Shoring, Damage Control, Adjustable: Steel, Short 3' TO 5' (Storage Room Hooks) (81349) MIL-S-23965 MODEL 3-5		EA	4
76	1370-01-030-8330	Signal, Smoke and Illumination: Distress, Orange Smoke, Red Illuminator (Cabinet B3) (10001) DL3139734		EA	12
77		Sling, 66,000LB, 30FT (Olive) (Storage Room) (23755) EN800X30FT		EA	4
78	3940-01-501-1210	Sling, Endless: 53000LB, 25' Brown (Storage Room Hooks) (3AJ34) EN600X25FT		EA	4
79	3940-01-501-0980	Sling, Endless: 5300LB, 4' Green (Cabinet A6) (3AJ34) EN60X4FT		EA	4
80	3940-01-501-1220	Sling, Endless: 5300LB, 5' Green (Cabinet A6) (3AJ34) EN60X5FT		EA	4
81	3940-01-501-0972	Sling, Endless: 5300LB, 6' Green (Cabinet A6) (3AJ34) EN60X6FT		EA	4

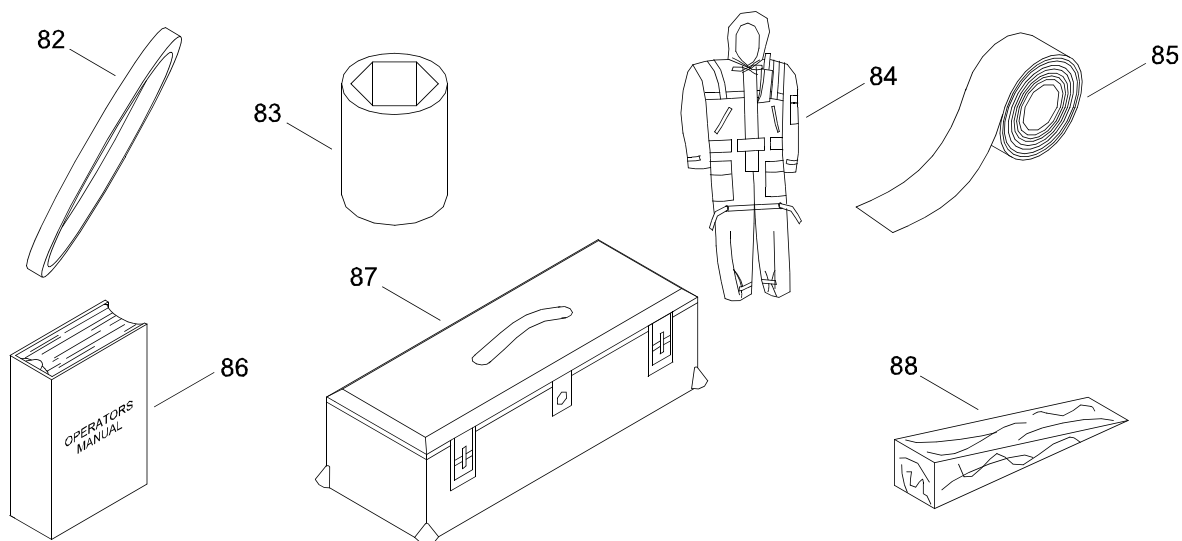


Table 1. Basic Issue Items. (BII) (Continued)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC AND PART NUMBER	(4) USABLE ON CODE	(5) U/I	(6) QTY RQD
82	3940-01-501-1216	Sling, Endless: 8400LB, 20' Yellow (Cabinet A9) (3AJ34) EN90X20FT		EA	4
83	5120-01-514-2231	Socket, Socket Wrench (Storage Room) (45225) 1923		EA	1
84		Sterns Work Suit (Cabinet C2, C3) (63806) I580CGS		EA	8
85	9390-01-078-8660	Tape, Reflective: 3" X 50 Yards, Adhesive Backed (Cabinet B3) (63156) FD 1402 PRESSURE SENSITIVE		RL	1
86		Technical Manual, Operators Manual For Module Causeway System Warping Tug TM 55-1945-225-10		EA	1
87	5180-00-629-9783	Tool Kit, General Mechanic's: Marine And Rail (Cabinet B7) (81966) SM55-4-5180S02		EA	1
88	5510-00-268-3479	Wedge, Wood: Plug, Tapered, Hardwood, 2" x 2" X 8" Long (Cabinet A3) (80064) S8800-461043/8" WEDGE		EA	5

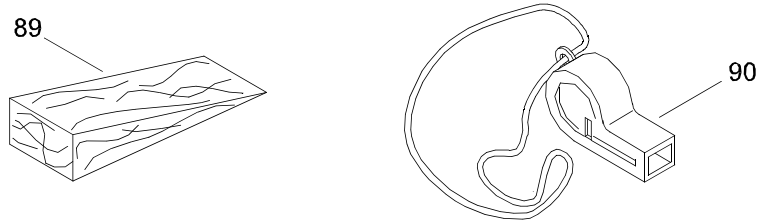


Table 1. Basic Issue Items. (BII) (Continued)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC AND PART NUMBER	(4) USABLE ON CODE	(5) U/I	(6) QTY RQD
89	5510-00-268-3475	Wedge, Wood: Shoring, Tapered, 1 1/2" X 2" x 12" Long (Cabinet A3) (80064) S8800-461043/12" WEDGE		EA	5
90	8465-00-254-8803	Whistle, Ball: Plastic Ball W/Lanyard (Cabinet A2) (58536) A-A-55106		EA	24

**OPERATOR MAINTENANCE
WARPING TUG
ADDITIONAL AUTHORIZATION LIST (AAL)**

ADDITIONAL AUTHORIZATION LIST

This work package lists additional items you are authorized for the support of the WT.

General

This list identifies items that do not have to accompany the warping tug and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

Explanation of Columns in the AAL

Column (1) - National Stock Number (NSN). Identifies the stock number of the item to be used for requisitioning purposes.

Column (2) - Description, Commercial and Government Entity Code (CAGEC), and Part Number (PN). Identifies the Federal item name, in all capital letters, followed by a minimum description when needed. The last line below the description is the CAGEC, in parentheses, and the part number.

Column (3) - Usable On Code. When applicable, gives you a code if an item you need is not the same for different models of equipment.

Column (4) - Unit of Measure (U/M). Indicates the physical measurement or count of the item as issued per the National Stock Number shown in column (1).

Column (5) - Qty Recm. Indicates the quantity recommended.

ADDITIONAL AUTHORIZATION LIST ITEMS

Table 1. Additional Authorization List.

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION, CAGEC AND PART NUMBER	(3) USABLE ON CODE	(4) U/M	(5) QTY RECM
4310-01-375-0660	Compressor, Reciprocating (3L907) 30-15T2		EA	1
4930-00-965-0288	Lubricating Gun, Hand (77335) 30415		EA	1
4930-00-274-5713	Oiler, Hand (58536) A-A-50477B		EA	1
4910-00-287-2944	Pan, Drain (81349) MILP45819		EA	1
4240-01-088-8546	Respirator, Air Filtering (79687) 14130047		EA	1
4320-00-049-7564	Pump, Oil Suction (90099) D15-619-A-47		EA	1

Table 1. Additional Authorization List. (Continued)

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION, CAGEC AND PART NUMBER	(3) USABLE ON CODE	(4) U/M	(5) QTY RECM
5120-01-160-8863	Wrench, Strap (0B853) 3397929		EA	1
7520-00-223-8000	Brush, Stencil (Soft Bristle) (58536) A-A-2903		EA	1
8110-00-418-1634	Drum, Shipping and Storage (55 GAL) (61599) 17C 55GAL DOT FRH		EA	1
9330-01-492-5537	Heat Gun, Electric (83284) 10008		EA	1

**OPERATOR MAINTENANCE
WARPING TUG
EXPENDABLE AND DURABLE ITEMS LIST (EDIL)**

INTRODUCTION**Scope**

This work package lists expendable and durable items that you will need to operate and maintain the WT. 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 antiseize compound. (Item 3, WP 0106 00)).

Column (2) - Level. This column identifies the lowest level of maintenance that requires the listed item. (C = Operator/Crew, O = Unit/AVUM, F = Direct Support/AVIM, 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 (PN). This column provides the other information you need to identify the item.

Column (5) - Unit of Measure (U/M). This code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

EXPENDABLE AND DURABLE ITEMS LIST**Table 1. Expendable and Durable Items List. (EDIL)**

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) ITEM NAME, DESCRIPTION, CAGEC AND PART NUMBER	(5) U/M
1	C	8040-01-250-3969	Adhesive, general purpose, medium strength, threadlocker (05972) 242	EA
2	C	6850-00-181-7933	Antifreeze, blue green with boiling point of 300°F (81349) MILA46153	CN
3	C	8030-01-044-5034	Antiseize Compound, MIL-T-5544C, graphite and petroleum, one pound can for use on threaded fasteners and fittings (6X798) MIL-T-5544	CN
4	C	8105-00-054-0939	Bag, Plastic, 24 in. x 36 in. (81348) PPP-B-26	EA
5	C	8105-00-054-0939	Bag, Plastic, 8 in. x 10 in. (8C914) 2110R	EA

Table 1. Expendable and Durable Items List. (EDIL) (Continued)

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) ITEM NAME, DESCRIPTION, CAGEC AND PART NUMBER	(5) U/M
6	C	8135-00-224-8885	Barrier Material, Greaseproofed-Waterproofed, Flexible (81349) MIL-PRF-121	ROLL
7	C	6135-00-643-1310	Battery, Nonrechargeable, 6 volt battery (83740) EV90	PKG
8	C	6135-00-835-7210	Battery, Nonrechargeable, D size battery (90303) MN1300	PKG
9	O	6685-01-280-3475	Card, Humidity Indicator, (08992) TA356-HC-246P	EA
10	C	6850-01-431-9025	Cleaner, Type II, 50 lb container (81349) MIL-C-29602	CO
11	C		Cleaning Compound, Solvent (21267) ES7308	BX
12	C	2815-01-454-2017	Cleaning Kit, Air Filter, (69502) DDF 9000	EA
13	C	7920-00-044-9281	Cloth, Cleaning, (58536) A-A-59323	BE
14	C	8030-00-244-1297	Compound, Corrosion Preventative, (80244) MIL-PRF-16173	CN
15	C	6850-00-702-4297	Compound, Silicone, (00CE9) G-697	CN
16	C	8135-01-245-8463	Cushioning Material, Packing, (81349) PPP-C-795	EA
17	C		Desiccant, Activated, (08992) 3787	EA
18	C	6550-01-310-1677	Distilled Water, Reagent, (07TA6) C4350-1A	GAL
19	C	7510-00-285-2567	File Backer, Paper, Heavy Paper Strips (91520) LB311	EA
20	C	2940-01-412-5275	Filter Element, Fluid, Oil Filter (72582) 23527033	EA
21	C		Filter Element, Oil Separator, (69502) CD185	EA
22	C		Filter Element, Vacuum Regulator, (69502) CD180	EA

Table 1. Expendable and Durable Items List. (EDIL) (Continued)

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) ITEM NAME, DESCRIPTION, CAGEC AND PART NUMBER	(5) U/M
23	C	9140-01-412-1311	Fuel, Diesel, (81348) A-A-52557	GAL
24	C	9140-01-413-7511	Fuel, Diesel, summer grade DF2 low sulfur (81348) VV-F-800	GL
25	C	8415-00-634-4658	Gloves, Men's and Women's (Leather Palm) (90142) 37G2940	PR
26	C	8415-00-266-8677	Gloves, Rubber Industrial (81348) MIL-DTL-32066	PR
27	C	9150-00-145-0268	Grease, Aircraft, Grade 2, resistant to corrosion, water, low evaporation and oxidation (81349) 001450268	CN
28	C	9150-01-197-7689	Grease, Automotive and Artillery, 6.5 lb can, conforms to PPP-C-96, Type V Class 2 (81349) MIL-G-10924-D	CN
29	C	9150-01-095-5512	Grease, Ball and Roller Bearing, lithium soap, temperature range -35° to 325°F (-54° to 163°C) (White Lithium Grease) (73219) L0189.001	CN
30	C	9150-00-929-7946	Grease, General Purpose, 14 oz cartridge, oxidation, corrosion, water, salt water, wear and extreme pressure resistant (76736) DURA-LITH GREASE EP 2	CA
31	C	9150-00-235-5555	Grease, General Purpose, mineral oil and molybdenum disulfide, low evaporations, corrosive and salt water resistive (81349) MIL-G-23549	CN
32	C	9150-00-598-7445	Grease, Laboratory, (01139) G623	CN
33	C	9150-00-530-6814	Grease, Wire Rope - Exposed Gear, 35 lb can, petroleum oil based, corrosion and water resistant (81349) MIL-G-18458	CN
34	C		Indicator, Air Restriction, (69502) CD714	EA
35	C		Inhibitor, Foam Corrosion, 3 in. x 1.25 in. x 0.25 in. (1WSN4) A-HCIIDV	EA

Table 1. Expendable and Durable Items List. (EDIL) (Continued)

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) ITEM NAME, DESCRIPTION, CAGEC AND PART NUMBER	(5) U/M
36	C		Lamp, Incandescent (ODT98) ML-9414	EA
37	C	9150-00-189-6730	Lubricating Oil, Engine, 1 qt can, internal combustion engine, MIL-L-2104, 40 Grade (81349) MILL2104	QT
38	C	9150-01-152-4118	Lubricating Oil, Engine, 5 gallon can, internal combustion engine, MIL-PRF-2104, 15W-40 Grade (81349) MIL-PRF-2104	CN
39	C	9150-01-186-6681	Lubricating Oil, Engine, 5 gallon can, internal combustion engine, MIL-PRF-2104, 30 Grade (81349) MIL-PRF-2104	CN
40	C	9150-01-035-5392	Lubricating Oil, Gear, 1 qt can, 80W90 Grade (81349) M2105-1-80W90	QT
41	C	9150-00-993-6621	Lubricating Oil, General Purpose, 55 gallon drum, conforms to PPP-D-729, Type 2 (19135) DTE-25	DR
42	C		Lubricating Oil, Mobilgear 629, 55 gallon drum, amber color, for use in all types of industrial enclosed gears (0AHK0) 610857-00	DR
43	C	5510-00-220-6146	Lumber, Softwood, Dimension, (4 in. X 4 in. X 6 ft) (81348) MM-L-751	BF
44	C	7920-00-224-8726	Mop, Wet (83421) 7920-00-224-8726	EA
45	C	9150-00-111-0208	Preservation Oil, Grade 10 (81349) MIL-PRF-21260	CN
46	C	9150-00-111-0210	Preservation Oil, Grade 30 (81349) MIL-PRF-21260	CN
47	C	4910-00-402-9623	Primer, Fuel System, (33287) J 5956	CN
48	C	7920-00-205-1711	Rag, Wiping, cotton, contains 50 lbs, mixed colors (80244) 7920-00-205-1711	BE
49	C	4020-00-240-2161	Rope, Fibrous (81349) MILH226	RL
50	C	5340-00-298-9466	Seal, Antipilferage, (Wire with Lead Seal) (14153) 00321	EA

Table 1. Expendable and Durable Items List. (EDIL) (Continued)

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) ITEM NAME, DESCRIPTION, CAGEC AND PART NUMBER	(5) U/M
51	C		Sealant, Gasket (MIL-S-45180, 3 oz tube, gasket sealant #2 black paste) (05972) 30514	TU
52	C		Shrink Wrap, Corrosion Intercept (48884) ISF-14-175	ROLL
53	C		SST Bolt and SST Washer (34712) E45588-4	EA
54	C	5975-00-156-3253	Strap, Tiedown, plastic 13.350 in. Comp A, Type 1 (56501) TY-28M	HD
55	C	8030-01-187-1791	Tape, Antiseizing, (84147) 3012A	EA
56	C	7510-00-079-7905	Tape, Pressure Sensitive, Adhesive, 3 in. x 60 yd (81346) ASTM D5486	EA
57	C	6630-01-011-5039	Test Kit, Antifreeze, (1BY35) 311521	EA
58	C	6550-01-310-1677	Water, Reagent Distilled, four 1 gallon per package (07TA6) C4350-1A	PG

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TM 55-1945-225-10

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.

TM 55-1945-225-10

<p>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</p> <p>For use of this form, see AR 310-1; the proponent agency is the US Army Adjutant General Center.</p>						<p>Use Part II (<i>reverse</i>) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).</p>	<p>DATE: Date form is filled out.</p>
<p>TO: (<i>Forward to proponent of publication or form</i>) (<i>Include ZIP Code</i>) Mailing address found on title block page.</p>						<p>FROM: (<i>Activity and location</i>) (<i>Include ZIP Code</i>) Your mailing address.</p>	
<p>PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS</p>							
<p>PUBLICATION/FORM NUMBER: TM X-XXXX-XXX-XXX</p>						<p>DATE: Date of the TM.</p>	<p>TITLE: Title of TM.</p>
ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.	FIGURE NO.	TABLE NO.	<p>RECOMMENDED CHANGES AND REASON (Exact wording of recommended change must be given)</p>	
	0019 00 1	3	1	1		<p>Step No. 2 says to secure doors open with locking bar or hooks from where to what? The bars or hooks are not identified.</p>	
	0019 00 4	4	1	1		<p>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?</p>	
<p>SAMPLE</p>							
<p>* Reference to line numbers within the paragraph or subparagraph.</p>							
<p>TYPED NAME, GRADE OR TITLE Doe, John, CPL</p>				<p>TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION 755-1313</p>		<p>SIGNATURE CPL John Doe</p>	

TM 55-1945-225-10

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: TM X-XXXX-XXX-XXX					DATE: Date of the TM.		TITLE: 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 Doe, John, CPL			TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION 755-1313			SIGNATURE CPL John Doe		

SAMPLE

TM 55-1945-225-10

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS						Use Part II (<i>reverse</i>) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE:
For use of this form, see AR 310-1; the proponent agency is the US Army Adjutant General Center.							
To: AMSTA-LC-CI / TECH PUBS, TACOM-RI, 1 Rock Island Arsenal, Rock Island, IL 61299-7630						FROM:	
PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS							
PUBLICATION/FORM NUMBER: TM 55-1945-225-10						DATE: 15 JUNE 2005	TITLE: Operator's Manual for Modular Causeway System (MCS) Warring Tug (WT)
ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON (Exact wording of recommended change must be given)	
* Reference to line numbers within the paragraph or subparagraph.							
TYPED NAME, GRADE OR TITLE				TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		SIGNATURE	

TM 55-1945-225-10

TO: <i>(Forward to proponent of publication or form) (Include ZIP Code)</i>			FROM: <i>(Activity and location) (Include ZIP Code)</i>			DATE:		
PART II- REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS								
PUBLICATION/FORM NUMBER:					DATE:		TITLE:	
PAGE NO.	COLM NO.	LINE NO.	FEDERAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION
<p align="center">PART III - REMARKS <i>(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.)</i></p>								
* Reference to line numbers within the paragraph or subparagraph.								
TYPED NAME, GRADE OR TITLE				TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION			SIGNATURE	

TM 55-1945-225-10

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS						Use Part II (<i>reverse</i>) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE:
For use of this form, see AR 310-1; the proponent agency is the US Army Adjutant General Center.							
To: AMSTA-LC-CI / TECH PUBS, TACOM-RI, 1 Rock Island Arsenal, Rock Island, IL 61299-7630						FROM:	
PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS							
PUBLICATION/FORM NUMBER: TM 55-1945-225-10						DATE: 15 JUNE 2005	TITLE: Operator's Manual for Modular Causeway System (MCS) Warping Tug (WT)
ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON (Exact wording of recommended change must be given)	
* Reference to line numbers within the paragraph or subparagraph.							
TYPED NAME, GRADE OR TITLE				TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		SIGNATURE	

TM 55-1945-225-10

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:		
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.								
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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

0410301

DISTRIBUTION: To be distributed in accordance with the Initial Distribution Number (IDN) 256790 requirements for TM 55-1945-225-10.

The Metric System and Equivalents

Linear Measure

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

Weights

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

Liquid Measure

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

Square Measure

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

Cubic Measure

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

Approximate Conversion Factors

<i>To change</i>	<i>To</i>	<i>Multiply by</i>	<i>To change</i>	<i>To</i>	<i>Multiply by</i>
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29.573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.356	metric tons	short tons	1.102
pound-inches	newton-meters	.11296			

Temperature (Exact)

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