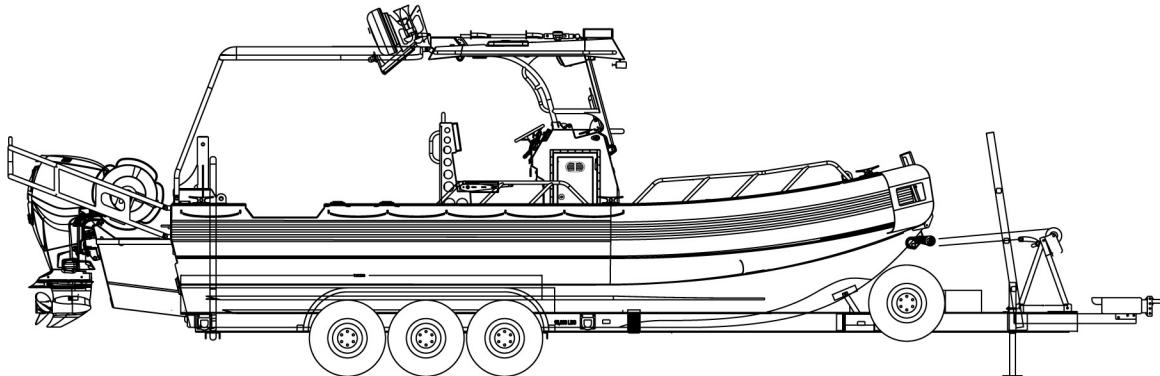


# TM 5-1940-328-10

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OPERATOR MANUAL  
FOR  
**RIGID INFLATABLE BOAT (RIB)**  
**P/N NSW8MTR-OPEN-001**  
**NSN 1940-01-646-7565**



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**HEADQUARTERS, DEPARTMENT OF THE ARMY**  
**01 JUNE 2019**



## **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 (TM).

### **FIRST AID**

For first aid, refer to TC 4-02.1, First Aid. For hazardous materials, refer to the label or Material Safety Data Sheet (MSDS).

### **GENERAL SAFETY WARNING DESCRIPTIONS**

#### **WARNING**

- Electrical shock can cause injury or death to personnel when working near, replacing, or servicing any electrical component.
- Take great care when working around energized electrical equipment. Contact between unprotected body parts and electrical conductors can cause serious injury or death.
- Keep all electrical connections clean, tight, and insulated to prevent shorting or arcing and causing an explosion.
- Failure to comply may result in injury or death to personnel.

#### **WARNING**

Ensure proper safety measures are taken during extremely hot and humid weather. Seek medical attention immediately if any of the following occur: weakness, dizziness, trouble breathing, painful muscle cramps, rapid pulse, pale skin, or weak pulse. Reference TB-MED 507 for proper work, rest, and water consumption cycle during extreme heat. Failure to follow this warning may cause injury or death.

#### **WARNING**

To avoid personal injury, get assistance when lifting components that weigh more than 40 lbs. One assistant is required for items up to 75 lbs, two assistants for items up to 100 lbs, and three assistants for items up to 130 lbs. Ensure lifting is done with the knees and not lower back. Incorrect heavy lifting could result in lower back injury or crushed extremities. Failure to comply may result in injury to personnel.

#### **WARNING**

Ensure all personnel in the vicinity and operating the outboard engine wear personal protective equipment such as hearing protection when engine is being operated to prevent against potential noise hazards. Failure to comply may cause damage or loss of hearing.

#### **WARNING**

Ensure all personnel in the vicinity and operating the horn or siren wear personal protective equipment such as hearing protection while operating to prevent against potential noise hazards. Failure to comply may result in injury to personnel

## WARNING SUMMARY - Continued

### **GENERAL SAFETY WARNING DESCRIPTIONS - Continued**

#### **WARNING**

- Do not service any part of the propeller while the outboard engine is running. Always shift the outboard engine to NEUTRAL position, turn the key switch OFF.
- Ensure the outboard engine and prop area are clear of people and objects before starting or operating outboard engine. Blades can be sharp and the propeller can continue to turn even after outboard engine is OFF. Moving parts of the equipment can cause serious injury to personnel.
- Failure to follow these warnings may result in injury or death to personnel

#### **WARNING**

To avoid pinch points between boat and trailer use of appropriate personal protective equipment such as gloves when handling the winch hook is required. Keep all body parts clear of contact points between boat and trailer winch, failure to comply may result in injury to personnel.

#### **WARNING**

To prevent falls from the sides, rear, or top of the boat, personnel should always maintain three points of contact (for example two feet and one hand) when climbing in, out, and on the boat. Failure to comply may result in injury to personnel.

#### **WARNING**

Always use the emergency stop lanyard when operating the engines to prevent runaway boat. Keep emergency stop lanyard free from obstructions and entanglements. Failure to comply may result in damage to equipment or injury to personnel.

### **EXPLANATION OF HAZARDOUS MATERIAL ICONS**



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



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



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



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



**SLICK FLOOR** - indicates slippery floor that present a danger.

## WARNING SUMMARY - Continued

### EXPLANATION OF HAZARDOUS MATERIAL ICONS - Continued



**EYE PROTECTION** - indicates hazardous situation in which eye protection should be used.

### HAZARDOUS MATERIALS WARNING DESCRIPTIONS

#### WARNING



Brake Fluid may be flammable. Keep away from heat, open flame and/or other ignition sources. Prolonged contact with brake fluid may cause a skin rash. Wear personal protective equipment such as eyewear, gloves and clothing. Remove saturated clothing immediately and thoroughly wash skin that comes in contact with brake fluid. If exposed, flush skin and/or eyes with water and seek medical attention.

Use a drain pan or suitable container to capture any draining, leaking or spilled fluid. Refer to local procedures and plans for preventing and responding to fluid spills or leaks. Immediately clean up spilled oil. Keep cloths/rags away from open flame and/or ignition sources. Comply with local procedures and environmental regulations when disposing of brake fluid, soiled/cleanup materials (such as filters and rags), and drained, leaked or spilled fluids.

Failure to comply may result in injury to personnel and/or damage to the environment.

## WARNING SUMMARY - Continued

### HAZARDOUS MATERIALS WARNING DESCRIPTIONS - Continued

#### WARNING



- Fuel is flammable and harmful to health. Keep fuel away from heat or ignition sources. DO NOT smoke within 50 feet (15 m) of a fuel source. Do not work on fuel system when engine is hot. Shut down engine before refueling. Ensure fuel nozzle is grounded to filler neck. Do not overfill fuel tank. Keep fire extinguisher nearby. Wear personal protective equipment such as gloves and eye protection and ensure adequate ventilation during refueling.
- Refer to local procedures and plans for preventing and responding to fuel spills or leaks. Use a drain pan or suitable container to capture any draining, leaking or spilled fuel. Immediately clean up spilled fuel. Keep cloths/rags away from open flame and/or ignition sources. Comply with local procedures and environmental regulations when disposing of unused fuel, soiled/cleanup materials (such as filters and rags), and drained, leaked or spilled fuel.
- Failure to comply may result in injury to personnel and/or damage to the environment.

#### WARNING



Ensure engine is operated in well ventilated area. DO NOT idle engine without proper ventilation.

- BE ALERT for exhaust poisoning symptoms. They are: Headache, Dizziness, Sleepiness, Loss of muscular control.
- If you see another person with exhaust poisoning symptoms:
  - Remove person from area.
  - Expose to fresh air.
  - Keep person warm.
  - DO NOT permit physical exercise.
  - Administer Cardiopulmonary Resuscitation (CPR) if necessary.
  - Notify a medic.

## WARNING SUMMARY - Continued

### HAZARDOUS MATERIALS WARNING DESCRIPTIONS - Continued

#### WARNING



- Lubricating Oil may be flammable. Keep away from heat, open flame and/or other ignition sources. Prolonged contact with lubricating oil may cause a skin rash. Wear personal protective eyewear, gloves and clothing. Remove saturated clothing immediately and thoroughly wash skin that comes in contact with lubricating oil. If exposed, flush skin and/or eyes with water and seek medical attention.
- Use a drain pan or suitable container to capture any draining, leaking or spilled fluid. Refer to local procedures and plans for preventing and responding to fluid spills or leaks. Immediately clean up spilled oil. Keep cloths/rags away from open flame and/or ignition sources. Comply with local procedures and environmental regulations when disposing of lubricating oil, soiled/cleanup materials (such as filters and rags), and drained, leaked or spilled fluids.
- Failure to comply may result in injury to personnel and/or damage to the environment.



**LIST OF EFFECTIVE PAGES/WORK PACKAGES**

NOTE: Zero in the "Change No." column indicates an original page or work package.

Date of issue for the original manual is:

Original 01 June 2019

**TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 32 AND TOTAL NUMBER OF WORK PACKAGES IS 63, CONSISTING OF THE FOLLOWING:**

Page/WP No.	Change No.	Page/WP No.	Change No.
Front Cover	0	WP 0035 (2 pages)	0
Blank	0	WP 0036 (2 pages)	0
a-j/blank	0	WP 0037 (4 pages)	0
i-xxxii/blank	0	WP 0038 (2 pages)	0
Chapter 1 Title Page	0	WP 0039 (8 pages)	0
Blank	0	Chapter 3 Title Page	0
WP 0001 (8 pages)	0	Blank	0
WP 0002 (8 pages)	0	WP 0040 (2 pages)	0
WP 0003 (2 pages)	0	WP 0041 (4 pages)	0
Chapter 2 Title Page	0	WP 0042 (4 pages)	0
Blank	0	WP 0043 (4 pages)	0
WP 0004 (18 pages)	0	WP 0044 (2 pages)	0
WP 0005 (8 pages)	0	WP 0045 (4 pages)	0
WP 0006 (8 pages)	0	WP 0046 (2 pages)	0
WP 0007 (4 pages)	0	WP 0047 (2 pages)	0
WP 0008 (8 pages)	0	WP 0048 (4 pages)	0
WP 0009 (2 pages)	0	WP 0049 (4 pages)	0
WP 0010 (4 pages)	0	WP 0050 (4 pages)	0
WP 0011 (4 pages)	0	WP 0051 (4 pages)	0
WP 0012 (4 pages)	0	WP 0052 (4 pages)	0
WP 0013 (2 pages)	0	Chapter 4 Title Page	0
WP 0014 (20 pages)	0	Blank	0
WP 0015 (6 pages)	0	WP 0053 (4 pages)	0
WP 0016 (22 pages)	0	WP 0054 (72 pages)	0
WP 0017 (6 pages)	0	Chapter 5 Title Page	0
WP 0018 (14 pages)	0	Blank	0
WP 0019 (10 pages)	0	WP 0055 (2 pages)	0
WP 0020 (6 pages)	0	WP 0056 (2 pages)	0
WP 0021 (8 pages)	0	WP 0057 (2 pages)	0
WP 0022 (10 pages)	0	WP 0058 (2 pages)	0
WP 0023 (4 pages)	0	WP 0059 (2 pages)	0
WP 0024 (12 pages)	0	WP 0060 (12 pages)	0
WP 0025 (4 pages)	0	Chapter 6 Title Page	0
WP 0026 (10 pages)	0	Blank	0
WP 0027 (2 pages)	0	WP 0061 (2 pages)	0
WP 0028 (10 pages)	0	WP 0062 (14 pages)	0
WP 0029 (2 pages)	0	WP 0063 (2 pages)	0
WP 0030 (2 pages)	0	FO - 01 (14 pages)	0
WP 0031 (4 pages)	0	Inside back cover	0
WP 0032 (2 pages)	0	Back cover	0
WP 0033 (2 pages)	0		
WP 0034 (2 pages)	0		



HEADQUARTERS, DEPARTMENT OF THE ARMY  
WASHINGTON, DC, 01 JUNE 2019

OPERATOR MANUAL

FOR

RIGID INFLATABLE BOAT (RIB)  
P/N NSW8MTR-OPEN-001  
NSN 1940-01-646-7565

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## TABLE OF CONTENTS

	<u>Page No.</u> <u>WP Sequence No.</u>
HOW TO USE THIS MANUAL.....	v
<b>Chapter 1 - GENERAL INFORMATION</b>	
GENERAL INFORMATION.....	WP 0001
EQUIPMENT DESCRIPTION AND DATA.....	WP 0002
THEORY OF OPERATION.....	WP 0003
<b>Chapter 2 - OPERATOR INSTRUCTIONS FOR RIGID INFLATABLE BOAT (RIB)</b>	
DESCRIPTION AND USE OF CONTROLS AND INDICATORS.....	WP 0004
OPERATING UNDER USUAL CONDITIONS PRE-START PROCEDURES.....	WP 0005
OPERATING UNDER USUAL CONDITIONS LAUNCHING BY TRAILER.....	WP 0006
OPERATING UNDER USUAL CONDITIONS STARTING PROCEDURES.....	WP 0007
OPERATING UNDER USUAL CONDITIONS DOCKING AND CASTING OFF.....	WP 0008
OPERATING UNDER USUAL CONDITIONS LOADING.....	WP 0009
OPERATING UNDER USUAL CONDITIONS OPERATION UNDERWAY AND TRIMMING.....	WP 0010
OPERATING UNDER USUAL CONDITIONS SPOTLIGHT.....	WP 0011
OPERATING UNDER USUAL CONDITIONS LOUD SPEAKER AND SIREN.....	WP 0012
OPERATING UNDER USUAL CONDITIONS VESSEL SYSTEM MONITOR.....	WP 0013
OPERATING UNDER USUAL CONDITIONS MULTI-FUNCTION DISPLAY OVERVIEW.....	WP 0014
OPERATING UNDER USUAL CONDITIONS NAVIGATION PLOTTER OPERATION.....	WP 0015
OPERATING UNDER USUAL CONDITIONS NAVIGATION POINTS AND ROUTES.....	WP 0016
OPERATING UNDER USUAL CONDITIONS NAVIGATION RADAR OPERATION.....	WP 0017
OPERATING UNDER USUAL CONDITIONS NAVIGATION SONAR OPERATION.....	WP 0018
OPERATING UNDER USUAL CONDITIONS COMMAND MICROPHONE REMOTE VHF.....	WP 0019
OPERATING UNDER USUAL CONDITIONS VHF RADIO.....	WP 0020
OPERATING UNDER USUAL CONDITIONS ENGINE MONITOR ICON.....	WP 0021
OPERATING UNDER USUAL CONDITIONS ANCHORING.....	WP 0022
OPERATING UNDER USUAL CONDITIONS DIVE PLATFORM.....	WP 0023
OPERATING UNDER USUAL CONDITIONS RECOVERY BY TRAILER.....	WP 0024
OPERATING UNDER USUAL CONDITIONS ENGINE SHUTDOWN PROCEDURES.....	WP 0025

## TABLE OF CONTENTS - Continued

	<u>Page No.</u> <u>WP Sequence No.</u>
OPERATING UNDER USUAL CONDITIONS TRANSPORT BY TRAILER.....	WP 0026
OPERATING UNDER USUAL CONDITIONS TOWING ANOTHER VESSEL.....	WP 0027
OPERATING UNDER USUAL CONDITIONS CABIN ENCLOSURE ASSEMBLY.....	WP 0028
OPERATING UNDER USUAL CONDITIONS PREPARATION FOR LONG TERM STORAGE.....	WP 0029
OPERATION UNDER UNUSUAL CONDITIONS EMERGENCY STARTING PROCEDURES.....	WP 0030
OPERATION UNDER UNUSUAL CONDITIONS BOAT IS TAKING ON WATER.....	WP 0031
OPERATION UNDER UNUSUAL CONDITIONS PARALLELING BATTERIES.....	WP 0032
OPERATION UNDER UNUSUAL CONDITIONS CAPSIZING.....	WP 0033
OPERATION UNDER UNUSUAL CONDITIONS COLLISION.....	WP 0034
OPERATION UNDER UNUSUAL CONDITIONS RUNNING AGROUND.....	WP 0035
OPERATION UNDER UNUSUAL CONDITIONS LOSS OF STEERING CONTROL.....	WP 0036
OPERATION UNDER UNUSUAL CONDITIONS MAN OVERBOARD.....	WP 0037
OPERATION UNDER UNUSUAL CONDITIONS UNUSUAL ENVIRONMENTS OR WEATHER....	WP 0038
DECALS AND INSTRUCTION PLATES.....	WP 0039

### **Chapter 3 - OPERATOR TROUBLESHOOTING FOR RIGID INFLATABLE BOAT (RIB)**

OPERATOR TROUBLESHOOTING INDEX.....	WP 0040
BILGE PUMP(S) WILL NOT OPERATE.....	WP 0041
ENGINE(S) WILL NOT CRANK.....	WP 0042
ENGINE(S) CRANKS BUT WILL NOT START OR RUN.....	WP 0043
ENGINE PRODUCING EXCESSIVE EXHAUST SMOKE.....	WP 0044
ENGINE SURGES, RUNS ROUGH, OR LOW POWER.....	WP 0045
ENGINE TEMPERATURE HIGH.....	WP 0046
ENGINE VIBRATION EXCESSIVE.....	WP 0047
ENGINE(S) WILL NOT TILT.....	WP 0048
NAVIGATION HORN WILL NOT OPERATE.....	WP 0049
LIGHT(S) WILL NOT OPERATE.....	WP 0050
SPOTLIGHT WILL NOT OPERATE.....	WP 0051
NO POWER TO CONSOLE.....	WP 0052

## TABLE OF CONTENTS - Continued

	Page No. <u>WP Sequence No.</u>
<b>Chapter 4 - PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) FOR RIGID INFLATABLE BOAT (RIB)</b>	
PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) INTRODUCTION.....	WP 0053
PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS).....	WP 0054
<b>Chapter 5 - OPERATOR MAINTENANCE FOR RIGID INFLATABLE BOAT (RIB)</b>	
SERVICE FUELING.....	WP 0055
SERVICE BRAKE RESERVOIR.....	WP 0056
SERVICE OIL RESERVOIRS.....	WP 0057
FUEL WATER SEPARATOR SERVICE.....	WP 0058
FORWARD BILGE PUMP COVER REMOVAL.....	WP 0059
TRAILER WHEEL ASSEMBLY REMOVAL.....	WP 0060
<b>Chapter 6 - SUPPORTING INFORMATION FOR RIGID INFLATABLE BOAT (RIB)</b>	
REFERENCES.....	WP 0061
COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS.....	WP 0062
EXPENDABLE AND DURABLE ITEMS LIST.....	WP 0063

## HOW TO USE THIS MANUAL

### GENERAL

This manual has been prepared and illustrated to provide operator information required to support the 8 Meter Army Rigid Inflatable Boat (RIB). Tasks are noted at the beginning of each authorized Work Package (WP). To locate a WP in the manual quickly, check the table of contents in the front of the manual. The following is a guide to using this manual for its intended purpose.

### ILLUSTRATIONS

Illustrations are used throughout this manual. Text is keyed to the illustrations by use of numbered callouts. When an item is called out in a WP, a number in parentheses in the text corresponds with a number on the illustration. In addition, exploded views and cut-away diagrams make the information in the manual easier to understand and follow. In addition, hidden parts will be identified using dashed leader lines.

### 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 performed. The warning summary will inform personnel of hazards associated with the equipment worked on. However, the summary is not all-inclusive and personnel should be aware at all times of hazardous conditions that may arise.

### ACCESSING INFORMATION

This manual is organized to help you quickly find the information you need.

**Table of Contents.** The table of contents lists, in the order of presentation, all chapters, WPs, and gives the WP sequence numbers.

### LISTS

**Metric/US Standard Measurement Chart.** Measurements in this manual are given in both metric and U.S. standard units. The table inside the back cover compares metric measurements to their equivalent U.S. standard units. Also provided are conversion factors to convert metric units to U.S. standard units.

**List of Abbreviations.** An alphabetical list of abbreviations used in the manual is located in (WP 0001).

### WORK PACKAGES

This TM has been organized using a concept called WPs. Each chapter contains a series of WPs rather than sections and paragraphs. Ideally, each WP is designed to stand alone as a complete module of information; however sometimes a WP will reference out to another WP in order to avoid copying the same information many times in the TM.

- Each WP is numbered sequentially throughout the TM using a four-digit number. Go to the Table of Contents and you will see that the first WP is numbered "0001". The second WP is numbered "0002".
- A decimal point system is used whenever it might be necessary to add a new WP in between already prepared WPs. For example if a new WP needed to be inserted between WP 0014 and WP 0015, the new WP would be numbered "0014.1".

## HOW TO USE THIS MANUAL - Continued

- The WP number is located at the top of each WP page (similar to the paragraph numbers you have seen in other TMs). It is also located at the bottom of each WP page as part of the WP page number. For example, the page number for the first page of the second WP of this TM is 0002-1.
- Each WP starts with the number 1 as shown above, and each WP starts on a right hand page. This was done so you can remove a single WP from your paper TM if needed for a particular task.
- While using the TM, one WP may refer you to another WP (e.g. WP 0008 refers to "RIB Preparation for Use (WP 0007)"). Turn to the referenced WP, complete the requested task (you may need to flip through the WP to find the task), then return to the original WP and continue with the task.

### WARNINGS, CAUTIONS, AND NOTES

Warnings are provided where injury may occur to personnel on or near the system. A warning is used to alert the user to hazardous operating and maintenance procedures, practices, conditions, statements, etc., that may result in injury to or death of personnel if not strictly observed. Warnings are preceded by the word **WARNING**.

A Caution is used to alert the user to hazardous operating or maintenance procedures, practices, conditions, statements, etc., that may result in damage to or destruction of equipment or degrade mission effectiveness if not strictly observed. Cautions are provided where equipment may be damaged but no personnel injury should result. Cautions are preceded by the word **CAUTION**.

Notes provide helpful information to operate or maintain the equipment, but there is no danger of equipment damage or personnel injury. Notes are preceded by the word **NOTE**.

### LOCATING MAJOR COMPONENTS

Refer to the Table of Contents located in the front of this manual. Find Chapter 1, General Information, Equipment Description, and Theory of Operation. Under the chapter title you will find the WP titled Equipment Description and Data. Turn to the WP indicated. This WP will give a brief description of the major components, and show an illustration of what the component looks like and its location.

### INITIAL SETUP

Each task begins with an initial setup. It tells you what you need to do the task: tools, materials, parts, and other publications. It tells you what must be done to the equipment before you begin the task and provides general safety instructions. There are six basic headings listed under INITIAL SETUP:

**Tools and Special Tools.** Lists all tools (standard or special) required to perform the task. Tools are identified with an item number and WP number from the Tool Identification List, located in Chapter 9, Supporting Information.

**Materials/Parts.** Lists all parts or materials necessary to perform the task. Expendable and durables are identified with an item number from the applicable WP located in Chapter 9, Supporting Information.

**Personnel Required.** Lists all personnel necessary to perform the task. There will be one Military Occupational Specialty (MOS) designation that will be used to complete tasks in this manual.

- Diver 12D

**References.** Includes any other publications, WPs, or information necessary to complete the task. When there are no references listed, all steps necessary to complete the task are contained within the task. A listing of reference materials is contained in the WP in Chapter 9, Supporting Information.

## HOW TO USE THIS MANUAL - Continued

**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 WP number or to the TM number.

### TROUBLESHOOTING PROCEDURES

To locate a particular troubleshooting procedure, turn to the Table of Contents in the front of this manual. Locate Chapter 3, for Operator Troubleshooting Procedures. Under these sections, find a work package titled Troubleshooting Index. Turn to the work package indicated, which is the index for all malfunctions/symptoms and associated troubleshooting procedures. Look down the list until you find the appropriate malfunction/symptom for the problem you are trying to resolve. To the right of the malfunction/symptom will be a work package page number. Turn to the work package page number indicated and follow the steps to complete the troubleshooting procedure. The corrective action will indicate which maintenance procedure (work package) to reference for the repair of the malfunction/symptom. Follow the procedures indicated to complete the task. Identify the test equipment, tools, material/parts, equipment condition, and references required to perform the task listed.

### PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

The PMCS table can be described as periodic inspection and maintenance at scheduled intervals to ensure that the equipment and its components remain mission capable and in good operating condition. This chapter explains how to inspect important components and what makes the equipment or component ready and/or available for use.

### MAINTENANCE PROCEDURES

To locate a maintenance procedure, open the manual to the Table of Contents located in the front of this manual. Locate Chapter 5 for Operator 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 WP number. Turn to the WP indicated. Before beginning the maintenance task, look through the procedure to familiarize yourself with the entire maintenance procedure. Identify the test equipment, tools, material/parts, personnel required, equipment condition, and references required to perform the task listed at the top of the WP in the INITIAL SETUP.

### REFERENCES

The References WP lists all forms, field manuals, technical manuals, and miscellaneous publications referenced in the manual and/or required for operation and maintenance of the equipment.

### BASIC ISSUE ITEMS (BII)

The BII WP lists items that must be with the RIB during operation and when it is transferred between property accounts.

### EXPENDABLE AND DURABLE ITEMS LIST

Contains a list of expendable/durable supplies and materials you will need to operate and maintain the RIB.



**CHAPTER 1**

**GENERAL INFORMATION**

**FOR**

**RIGID INFLATABLE BOAT (RIB)**



## OPERATOR GENERAL INFORMATION

### SCOPE

This technical manual provides instructions on operating, troubleshooting, and maintaining the 8 Meter Army Rigid Inflatable Boat (RIB). Information is provided on principles of operation, controls and indicators, Preventive Maintenance Checks and Services (PMCS), operation, troubleshooting, and maintenance.

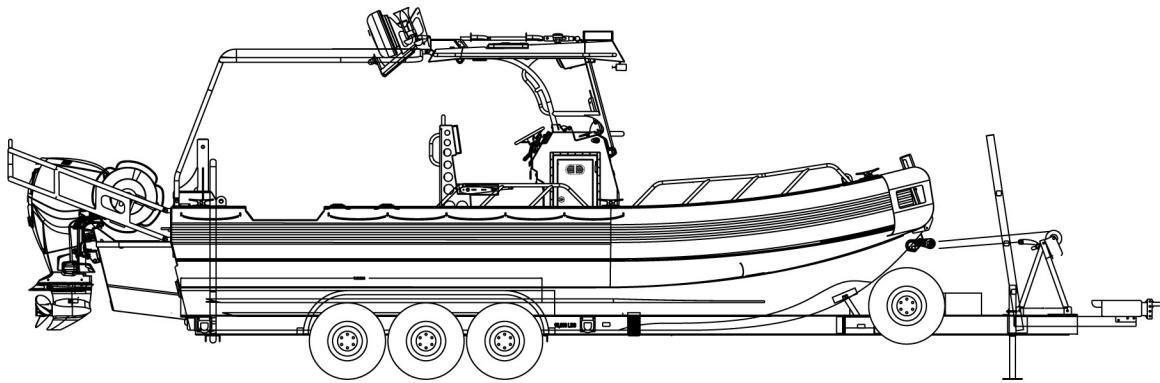


Figure 1. Rigid Inflatable Boat.

#### Type of Manual:

Operator Manual.

#### Equipment Name and Model Number:

ARMY RIGID INFLATABLE BOAT (RIB), PART NUMBER (P/N) NSW8MTR-OPEN-001, COMMERCIAL AND GOVERNMENT ENTITY CODE (CAGEC) 0ZFD4, NATIONAL STOCK NUMBER (NSN) 1940-01-646-7565.

#### Purpose of Equipment:

The boat is a rigid hull craft with 100 sq ft (9.2 sq m) of deck space with a center console design. It is capable of carrying 3,815 lbs (1730 kg) of payload with a full tank of fuel. The RIB is towed and fielded on its own Department Of Transportation (DOT) compliant trailer. The RIB provides dive units with the organic capability to conduct Self-Contained Underwater Breathing Apparatus (SCUBA) and surface supplied diving missions in areas previously unreachable due to limited range, speed, and payload of inflatable craft. This increases unit effectiveness by allowing faster response time to emergency missions and greater flexibility in location selection.

## MAINTENANCE FORMS, RECORDS, AND REPORTS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by (as applicable) DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual; DA PAM 738-751, Functional Users Manual for the Army Maintenance Management Systems - Aviation (TAMMS-A); or AR 700-138, Army Logistics Readiness and Sustainability.

## REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your boat needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you do not like about your equipment. Let us know why you do not like the design or performance. All non-Aviation/Missile EIRs and Product Quality Deficiency Report (PQDRs) must be submitted through the Product Data Reporting and Evaluation Program (PDREP) Web site. The PDREP site is: <https://www.pdrep.csd.disa.mil/>. If you do not have Internet access, you may submit your information using an SF 368 (Product Quality Deficiency Report). You can send your SF 368 using email, regular mail, or fax using the addresses/fax numbers specified in DA PAM 750-8, The Army Maintenance Management System (TAMMS) User's Manual. We will send you a reply.

## CORROSION PREVENTION AND CONTROL (CPC)

Corrosion prevention and control 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. The term "corrosion" means the deterioration of a material or its properties due to a reaction of that materiel with its chemical environment. An example is the rusting of iron. Corrosion damage in metals can be seen, depending on the metal, as tarnishing, pitting, fogging, surface residue, and/or cracking. Plastics, composites, and rubbers can also degrade (also considered to be corrosion based on the above definition of corrosion). Degradation is caused by thermal (heat), oxidation (oxygen), solvation (solvents), or photolytic (light, typically ultraviolet) processes. The most common exposures are excessive heat or light. Damage from these processes will appear as cracking, softening, swelling, and/or breaking. The US Army has defined the following nine (9) forms of corrosion used to evaluate the deterioration of metals. These shall be used when evaluating and documenting corrosion.

- UNIFORM (or general attack): Affects a large area of exposed metal surface, like rust on steel or tarnish on silver. It gradually reduces the thickness of the metal until it fails.
- CREVICE: Occurs in crevices created by rubber seals, gaskets, bolt heads, lap joints, dirt or other surface deposits. It will develop anywhere moisture or other corrosive agents are trapped and unable to drain or evaporate.
- SELECTIVE LEACHING: One element, usually the anodic element of an alloy, corrodes away, leaving the cathodic element. This can create holes in metal.
- INTERGRANULAR: Metal deterioration caused by corrosion on the bonds between or across the grain boundaries of the metal. The metal will appear to be peeling off in sheets, flaking, or being pushed apart by layers. A particular type of intergranular corrosion is exfoliation.
- PITTING: This can result from conditions similar to those for crevice corrosion. Pits can develop on various materials due to their composition. Rifle boxes are big victims of pitting.
- EROSION: Results when a moving fluid (liquid or gas) flows across a metal surface, particularly when solid particles are present in the fluid. Corrosion actually occurs on the surface of the metal, but the moving fluid washes away the corrosion and exposes a new metal surface, which also corrodes.
- FRETTING: Occurs as a result of small, repetitive movements (e.g., vibration) between two surfaces in contact with each other. It's usually identified by a black powder corrosion product or pits on the surface.
- GALVANIC: Occurs when two different types of metal come in contact with each other, like steel bolts on aluminum, for example. This is a common problem on aircraft because of their mix of metals.
- STRESS: Term used to describe corrosion cracking and corrosion fatigue.

## CORROSION PREVENTION AND CONTROL (CPC) - Continued

Where an item is not ready/available due to one of these forms of corrosion, it shall be recorded as a corrosion failure in the inspection record and the appropriate code (170) for corrosion shall be used when requesting/performing maintenance.

SF Form 368, Product Quality Deficiency Report should be submitted to the address specified in DA PAM 750-8, The Army Maintenance Management System (TAMMS) User's Manual.

## DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE

The Rigid Inflatable Boat (RIB) has four Critical components that require destruction for Prevention of Enemy Use, Navigation Console, two Outboard Engines, and Keel.

Refer to TM 750-244-3 for procedures concerning destruction of the boat to prevent enemy use.

## PREPARATION FOR STORAGE OR SHIPMENT

The Rigid Inflatable Boat (RIB) is certified to be transported by C-17 or C-5 aircraft. The trailer can be loaded using general loading procedures as listed in the respective aircraft cargo loading manual.

All HazMat to include fuel level, and batteries etc. must be prepared certified for airlift in accordance with TM 38-2501 AFMAN24-204 (1).

Refer to Preparation for Shipment and Storage this manual for information on storage and shipment preparation. Refer to (WP 0029).

## WARRANTY INFORMATION

- The boat hull under normal use and service, will be free from structural failure due to manufacturing defects and is warranted for 10 years. The boat components are free from installation workmanship defects for a period of two (2) years. The warranty starts on the date found in block 23 of DA Form 2408-9, Equipment Control Record. Report all defects to your supervisor, who will take appropriate action.
- The trailer frame, cross members, frame braces, tongue, coupler, winch stand, axles, brakes and components will be free from defects in design, material, and workmanship and is warranted for one (1) year. The warranty does not apply to normal wear of brake linings, wheel bearings, or damages to brakes or wheel bearings due to water intrusion into assemblies. This warranty does not apply to tire wear due to balance, improper inflation or alignment. The warranty starts on the date found in block 23 of DA Form 2408-9, Equipment Control Record. Report all defects to your supervisor, who will take appropriate action.
- The engines will be free from defects in material and workmanship and is warranted for 36 consecutive months. The warranty starts on the date found in block 23 of DA Form 2408-9, Equipment Control Record. Report all defects to your supervisor, who will take appropriate action.

## LIST OF ABBREVIATIONS AND SYMBOLS

A	Amperes
Amp	Amperes
A.M.A.	Audible Misfire Alert
A/H	Air horn
AR	Army Regulation
AY	Assembly
BE	Bale
BII	Basic Issue Items
BRG	Bearing
BRILL	Brilliance

**LIST OF ABBREVIATIONS AND SYMBOLS - Continued**

CAN	Canada
CAC	Common Access Card
CAGEC	Commercial and Government Entity Code
CH	Channel
CH/WX	Weather Channel
cm	Centimeters
16/C	Channel 16
X	Close/Exit
CO	Container
COEI	Components of End Item
COG	Course Over Ground
CONFIG	Configure
Cont.	Continued
CPC	Corrosion Prevention and Control
cc	Cubic Centimeters
CTA	Common Table of Allowance
CURS-SCRL	Cursor Mode/Scroll Mode
DA	Department of the Army
dB	Decibels
DD	Department of Defense
°	Degrees
DOT	Department of Transportation
DPS	Dynamic Power Steering
DSC	Digital Selective Calling
DTA	Distance to Arrival
ECO	Economy
EDIL	Expendable and Durable Items List
EDIT POS	Edit Position
e.g.	exempli gratia, for example
EIR	Equipment Improvement Recommendation
ENT	Enter
EMM	Engine Management Module
etc.	et cetera, and others, and so forth
fl. oz.	Fluid Ounce
FP	Foldout
FREQ	Frequency
ft	Feet
FUNC	Function
STBY-AUTO	Function Not Available
gal.	Gallon
GPS	Global Positioning System
GVWR	Gross Vehicle Weight Rating
HF	High Frequency
HI/LO	High Volume/Low Volume
HP	Horsepower
HD	Hundred
IAW	In Accordance With
in.	Inches
INT	International
IUID	Item Unique Identification
kg	Kilograms
km	Kilometer
kPa	Kilopascal
kt	Knots

**LIST OF ABBREVIATIONS AND SYMBOLS - Continued**

KT	Kit
L	Liter
Lat/Lon	Latitude/Longitude
lbs	Pounds
LCD	Liquid-Crystal Display
LED	Light-Emitting Diode
LF	Low Frequency
LMTV	Light Medium Tactical Vehicle
m	Meter
m <sup>2</sup>	Square Meter
Mbar	Millibar
MBDS	Master Battery Disabling Switch
mph	Miles Per Hour
MHz	Megahertz
mi.	Miles
mL	Milliliter
mm	Millimeters
MMSI	Maritime Mobile Service Identity
MOB	Man Overboard
MOS	Military Occupational Specialty
MTOE	Modified Table of Organization and Equipment
MTV	Medium Tactical Vehicle
N	Neutral
NAV	Navigation
NIIN	National Item Identification Number
NMEA	National Marine Electronics Association
No.	Number
NOAA.	National Oceanic and Atmospheric Agency
NSN	National Stock Number
oz.	Ounce
%	Percent
PAM	Pamphlet
PDREP	Product Data Reporting and Evaluation Program
PFD	Personal Flotation Device
PG	Package
PM	Project Management
PMCS	Preventive Maintenance Checks and Services
P/N	Part Number
PPE	Personnel Protective Equipment
psi	Pounds per Square Inch
PQDR	Product Quality Deficiency Report
PTT	Push-To-Talk
PWR	Power
PVC	Polyvinyl Chloride
QT	Quart
qt.	Quart
QTY	Quantity
QTY RQR	Quantity Required
RNG	Range
RIB	Rigid Inflatable Boat
rpm	Revolutions per Minute
Rqr	Required
S.A.F.E.	Speed Adjusting Failsafe Electronics
SCUBA	Self-Contained Underwater Breathing Apparatus

**LIST OF ABBREVIATIONS AND SYMBOLS - Continued**

SDS	Safety Data Sheet
SF	Standard Form
SKOT	Sets, Kits, Outfits and Tools
SOP	Standard Operating Procedures
ft <sup>2</sup>	Square Foot
in <sup>2</sup>	Square Inch
m <sup>2</sup>	Square Meter
SOP	Standard Operating Procedures
SQL	Squelch
STBD	Starboard
SYNC	Synchronization
TACOM	US Army Tank Automotive and Armaments Command
TAMMS-A	The Army Maintenance Management System - Aviation
TB	Technical Bulletin
TC	Training Circular
TEMP	Temperature
TM	Technical Manual
TOE	Table of Organization and Equipment
TULSA	TACOM Unique Logistics Support Applications
TTA	Time To Arrival
TX	Transmit
U/I	Unit of Issue
UOC	Usable On Code
US	United States
USA	United States of America
USCG	United States Coast Guard
V	Volts
VDC	Volts Direct Current
VHF	Very High Frequency
VOL	Volume
VSM	Vessel System Monitor
WP	Work Package
WX	Weather
XTE	Cross Track Error
2D	Two Dimensional
3D	Three Dimensional

**QUALITY OF MATERIAL**

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

**SAFETY, CARE, AND HANDLING**

Safe and efficient equipment repair depend on the observance of well-established safety practices and a thorough knowledge of operating procedures. Observe all warnings, safety precautions, and safety regulations in this RIB manual. Strict observance of established safety, care, and handling procedures will allow personnel to perform their duties in a safe and hazard-free environment.

Many cleaning and bonding agents are used in the repair procedures of the boat. Inhalation of the vapors can be toxic if inhaled in large amounts. Prolonged use of these materials without protection can cause skin irritation. Refer to TC 4-02.1 for first aid information.

**SAFETY, CARE, AND HANDLING - Continued**

**1. General Precautions.** The following are general safety precautions that need to be observed by all operators of the boat:

- Always be mindful of others around the equipment. Never allow horseplay or loud talking that would divert the attention of repairmen.
- Whenever in doubt concerning any operation, consult supervisor for advice.
- Be prepared for any emergencies that may arise, and be familiar with the proper action to take in event of emergencies.
- When ending daily operations, make a thorough and orderly check of the equipment to ensure that no hazards may develop during the time the work area is unattended.

**2. Controlling Fumes.** The following safety precautions are presented to aid operators of the boat in controlling toxic fumes:

- Make sure boat is properly vented at all times.
- Perform all preventive maintenance checks and services (PMCS) as stated in this TM prior to operating.

**3. Fluid Disposal.** The following safety precautions are presented to aid operators of the boat in controlling hazardous materials:

**WARNING**

- When servicing equipment, performing maintenance, or disposing of materials such as engine coolant, hydraulic fluid, lubricants, soiled rags and battery acids or batteries consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance.
- To prevent injury to personnel, wear protective eye covering and gloves.
- Failure to follow these warnings may result in injury to personnel.
- Dispose of contaminated drained fluids In Accordance With (IAW) the Standard Operating Procedures (SOP) of your unit.

**ITEM UNIQUE IDENTIFICATION**

This equipment and/or its components/parts are marked with item unique identification (IUID) markings such as data plates, decals, or etchings. These markings must be scanned during performance of procedures to remove and replace the items marked or when turning in items or receiving them from supply or another unit. For information on location of the IUID marking for the end item, refer to the decal/data plate guide contained in the operator manual for the equipment.

**SPECIAL INSTRUCTIONS FOR ADMINISTRATIVE STORAGE**

Please contact PM-SKOT usarmy.detroit.peo-cs-css.mail.pm-skot@mail.mil or TACOM Packaging tacom-lcmc.ilsc\_packaging@mail.mil for all RIB shipping, storage and special packaging instructions.

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Furuno USA 4400 NW Pacific Rim Blvd, Camas, WA 98607

Boatmaster 11950 Amedicus Lane, Fort Meyers, FL 33907

Evinrude 10101 Science Drive, Sturtevant, WI 53177

**END OF WORK PACKAGE**

**OPERATOR  
EQUIPMENT DESCRIPTION AND DATA**

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**EQUIPMENT DESCRIPTION**

The Rigid Inflatable Boat (RIB) is a rigid hull craft with a 100 sq ft (9.2 sq m) of deck space and a center console design. It is capable of carrying 3,815 lbs (1,730 kg) of payload with a full tank of fuel. Twin outboard engines are hard-mounted to the craft with sufficient power to meet payload and performance requirements. The RIB is towed and fielded on its own Department Of Transportation (DOT) compliant trailer with interchangeable pintle ring and ball type hitch with a surge type braking system to ensure interoperability between military and civilian vehicles. This trailer is compatible with the Light Medium Tactical Vehicle (LMTV) and/or Medium Tactical Vehicle (MTV) depending on mission specific payload requirements.

**CAPABILITIES AND FEATURES**

- Capable to conduct Self-Contained Underwater Breathing Apparatus (SCUBA) and surface supplied diving missions in areas previously unreachable due to limited range, speed, and payload of inflatable craft.
- Full navigation system featuring radar, Global Positioning System (GPS), and sonar control through multifunctional touchscreen.
- Engine warning systems controlled by the Engine Management Module (EMM).
- De-Watering System.
- Engine cut-off safety switch.
- Anti-corrosion anodes.

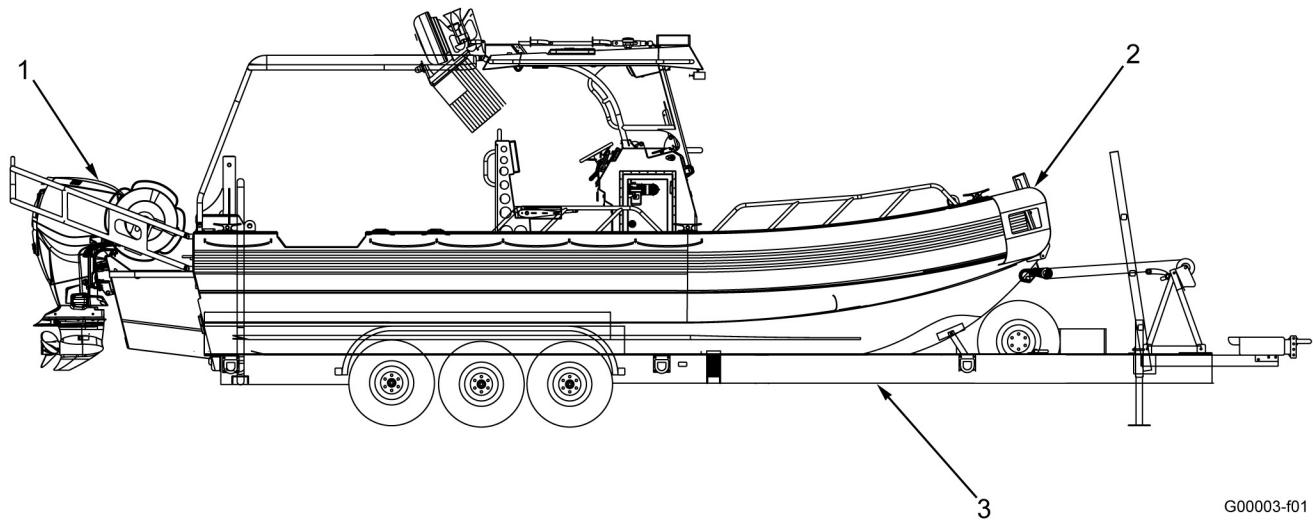
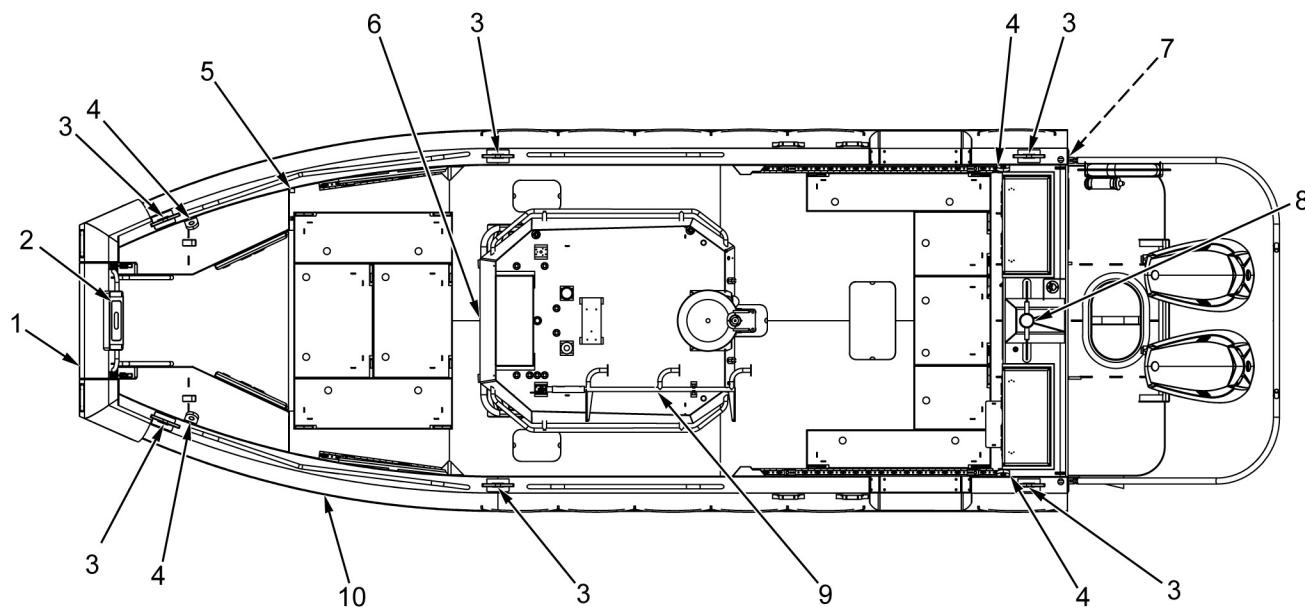
**LOCATION AND DESCRIPTION OF MAJOR COMPONENTS**

Figure 1. RIB Components.

**LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued*****Table 1. RIB Components.***

<b>Item</b>	<b>Component</b>	<b>Description</b>
1	Engines	The engines are a six cylinder, 250 HP, two stroke, gasoline operated engine. The starboard propeller has a clockwise rotation and the port propeller has a counter clockwise rotation.
2	Boat	The boat is an all-welded aluminum patrol boat with a hybrid foam/inflatable collar designed for diving operations.
3	Trailer	The trailer is an 18,000 Gross Vehicle Weight Rating (GVWR) independent three axle trailer. It is fitted with hydraulic brakes and a surge actuator with an emergency stop mechanism.

## LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued



G00003-f02

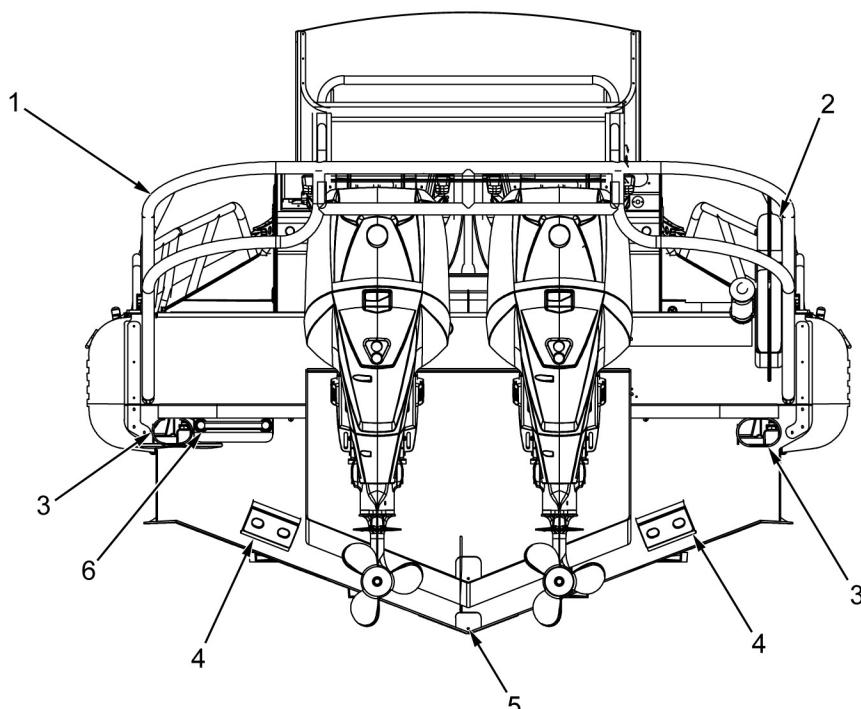
Figure 2. Hull Components.

***Table 2. Hull Components.***

Item	Component	Description
1	Dive Platform	A diver platform assembly is fitted to the bow of the boat. It is a hinged diver platform assembly that provides a flat surface close to the water. When not in use the platform can be raised and secured in an upright position.
2	Dive Ladder Assembly	The diver platform assembly is fitted with a telescoping ladder for the boarding of personnel from the water. When not in use, the telescoping ladder is collapsed and stowed inside of the dive platform.
3	Cleats	Six cleats are fitted to the port and starboard side of the boat. Cleats are used for securing lines during docking.
4	Hoisting Eye	The design hoisting weight of the boat is 15,390 lbs. including fuel and 10% margin for equipment. The lifting eyes on the boat have been designed and engineered to 150% of the design lift weight
5	Forward Bilge Discharge Port	Water drained by the forward bilge pump assembly is discharged from the outlet located on the forward starboard side.

**LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued*****Table 2. Hull Components - Continued.***

Item	Component	Description
6	Boat Hook	The boat hook is fastened to the front of the console and is used as an aid for docking and un-docking operations. It has the ability to extend and collapse.
7	Aft Bilge Discharge Port	Water drained by the aft bilge pump assembly is discharged from the outlet located on the starboard aft transom.
8	Tow Post	A tow post is located at the center aft transom. The tow post is used for securing a tow line during towing operations.
9	Dive Mast	The dive mast serves as a mount for the dive lights. It consists of 3 all-around lights in a red, white, red sequence. The mast can be folded down and stowed for transportation or raised for operations.
10	Collar	The collar is a hybrid foam filled and inflatable collar fitted to both the starboard and port side and runs the length of the boat.

**LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued**

G00003-f03

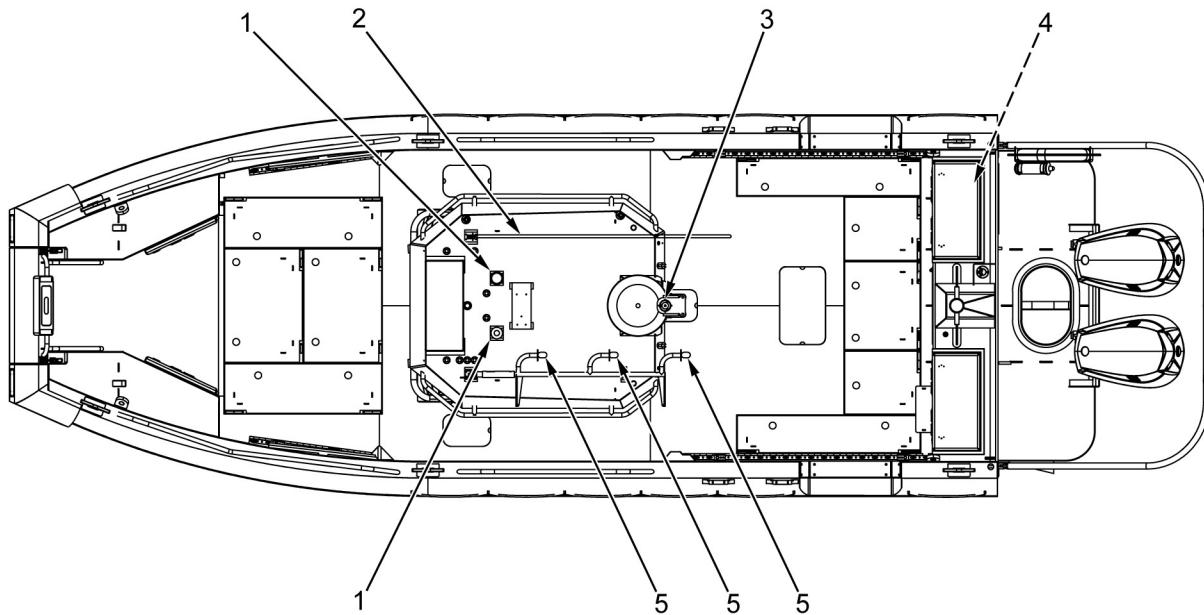
Figure 3. Rear Hull Components.

***Table 3. Rear Hull Components.***

Item	Component	Description
1	Engine Guard Frame	The engine guard frame is fitted to the stern and provides a barrier around the engines to minimize damage that could occur from contact with objects.
2	Buoy w/ Buoy Light	The buoy is an emergency personal flotation device (PFD). The buoy light is a life saving device that emits a high intensity strobe light.
3	Scupper Drain Assembly	There are two scuppers at the base of the transom, one port and one starboard, for drainage of the main deck. The scupper sleeves have a cord attached to allow them to be tied in the up position when not being used.
4	Hull Anodes	Two sacrificial anodes are fitted to the hull on each side of the stern for corrosion protection.
5	Bilge Plug	The bilge drain plug enables the bilge to be drained after the boat is removed from the water. The drain plug is located at the stern of the boat on the underside of the hull, near the centerline.

**LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued*****Table 3. Rear Hull Components - Continued.***

Item	Component	Description
6	Rear Dive Ladder	The boat is fitted with a telescoping ladder on the port aft transom for the boarding of personnel from the water. When not in use, the telescoping ladder is collapsed and stowed under the transom.

**LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued**

G00003-f04

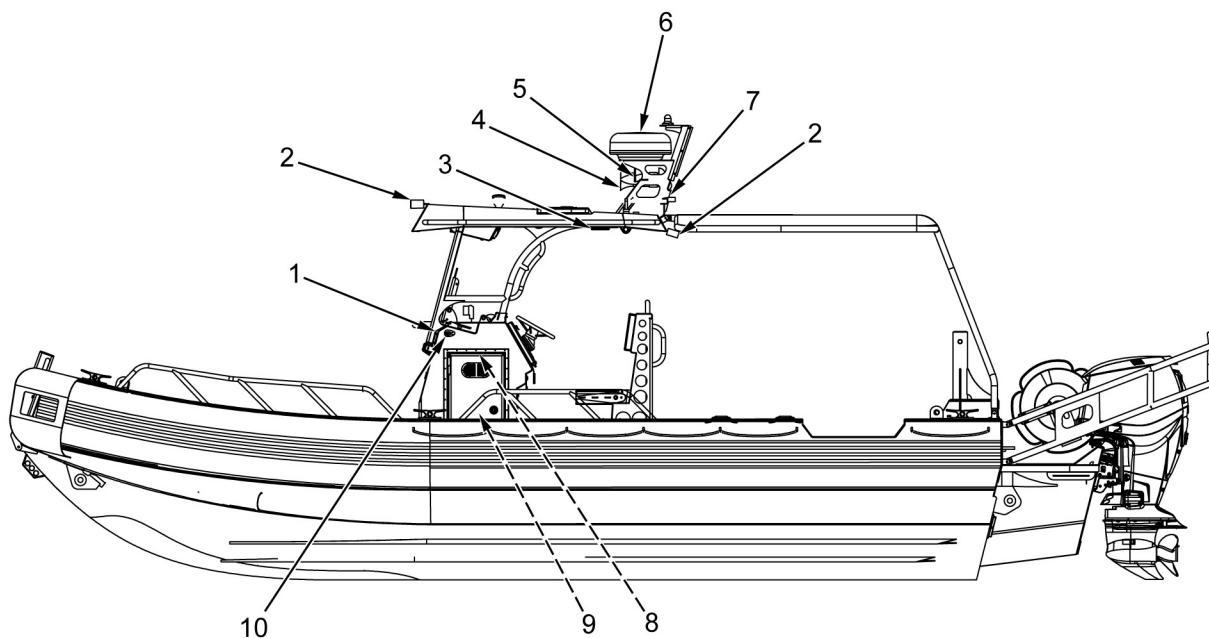
Figure 4. Hull Electrical Components.

***Table 4. Hull Electrical Components.***

Item	Component	Description
1	GPS Receivers	The Global Positioning System (GPS) receivers are located on the roof of the cabin. The GPS provides location information for the operator. Data for this comes from satellite information.
2	VHF Antenna	The Very High Frequency (VHF) antenna is located on the roof of the cabin and is used with the boats radio. The antenna can be folded down and stowed for transportation or raised for operations.
3	Anchor Light	An all-around white anchor light is located on the radome mast for anchor signaling. This light is also lit when navigation lights are on.
4	Transom Marine Battery Bank	The batteries provide electrical power to port and starboard engines. The transom battery bank, consisting of two batteries, is located in the starboard aft transom hatch. While the engines are running, each engine alternator provides charging to their respective battery.

**LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued*****Table 4. Hull Electrical Components - Continued.***

Item	Component	Description
5	Dive Lights	There are three all-around dive lights located on the dive mast in a red, white, red sequence.

**LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued**

G00003-f05

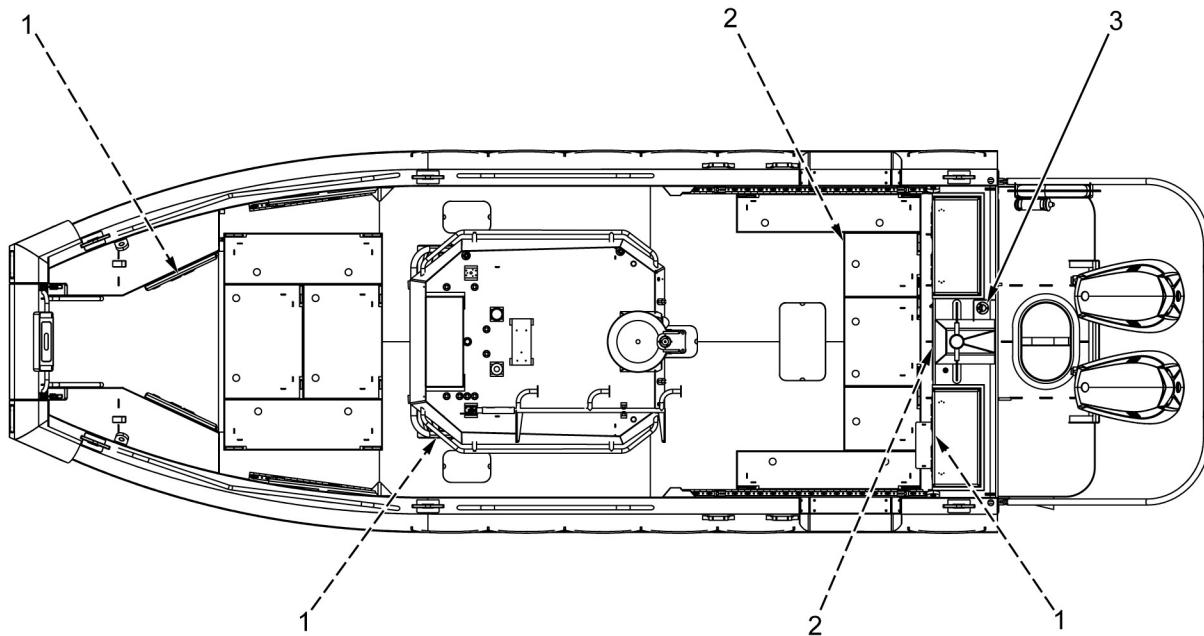
Figure 5. Electrical Components.

***Table 5. Electrical Components.***

Item	Component	Description
1	Cabin Console	The console incorporates all control and monitoring functions required for normal operation of the boat.
2	Deck Lights	There are four deck lights fitted to the cabin, two forward and two aft. The deck lights illuminate the forward and aft deck spaces.
3	Overhead Dome Lights	Two overhead dome lights are located in the cabin above the helm. The dome lights have the ability to illuminate white light or red light for night operations.
4	Navigation Horns	The navigation horns are fitted to the radome mast and provide an audible noise for signaling during operation.
5	Siren Speaker	The siren speaker is fitted to the radome mast and provides an audible noise for signaling during operation.
6	Radome	The radome is fitted to the radome mast and provides radar capabilities for the multi-function display.

**LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued*****Table 5. Electrical Components - Continued.***

7	Radome Mast	The radome mast is located on top of the cabin. It is fitted with the radome, anchor light, siren speaker, navigation horns, and U.S. flag. The mast can be folded down and stowed for transportation or raised for operations.
8	Console Dome Lights	Two console dome lights are located inside the console. The dome lights have the ability to illuminate white light or red light for night operations.
9	Console Marine Battery Bank	The batteries provide electrical power to the boat electrical components. The console battery bank, consisting of three batteries, is located inside of the console on the port side. While the engines are running, both engine alternators provide charging to the console battery bank.
10	Navigation Lights	Navigation lights are located on the port (red) and starboard side (green) of the console exterior.

**LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued**

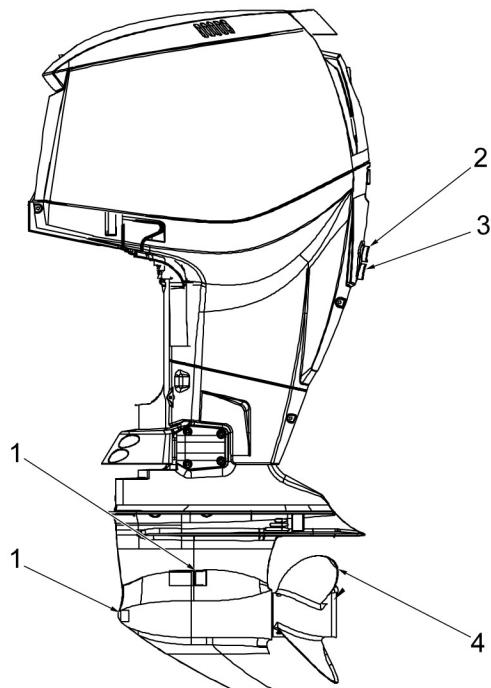
G00003-f06

Figure 6. Hull Fuel Components.

***Table 6. Hull Fuel Components.***

Item	Component	Description
1	Fire Extinguishers	Three type A size II/ type BC size I fire extinguishers are located on board. One in the forward starboard door, one in the port console door, and one in the port transom hatch.
2	Fuel Valves	There are four fuel valves onboard, two are located in the aft starboard hatch and two are located in the transom door. The fuel valves can be opened or closed to supply or shutoff fuel to the engines.
3	Fuel Fill Cap	The fuel fill cap is located on the transom near the centerline. The cap is fitted with an o-ring to seal the fuel tank from outside contaminants and has a tether attached to prevent from falling overboard.

## LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued



G00003-f07

Figure 7. Engine Components.

***Table 7. Engine Components.***

Item	Component	Description
1	Engine Water Screens	There is a set of upper and lower water screens on each engine. The engine water screens filter out large debris from the water that supplies to the inlet side of the water pump with an unrestricted and unaerated water supply.
2	Water Pump Indicator	A steady stream of water from the water pump indicator signals the water pump is working properly.
3	Flushing Port	The flushing port allows a garden hose to be threaded into the engine to flush the engine with fresh water.
4	Propeller	Transmits power by converting rotational motion into thrust. The correct propeller will allow the engine to run near the midpoint of the revolutions per minute (RPM) operating range at full throttle.

**EQUIPMENT DATA*****Table 8. RIB Equipment Data.***

<b>Hull and Inflatable Tube:</b>	
Boat Length (with Engine Guard)	31 ft 6 in. (9.6 m)
Boat Height on Trailer (mast folded down)	12 ft 5 in. (3.8 m)
Hull Length	26 ft (7.9 m)
Hull Width	10 ft 2 in. (3.1 m)
Estimated Draft at Max Load	1 ft 6 in. (45.72 cm)
Hull Material	Aluminum
Inflatable Tube Material	Polyurethane
<b>Electrical System:</b>	
Battery, Type	12 Voltage (V) Marine Battery
Battery, Number	5
Circuit Breakers:	
1x50A	Bilge Pumps
3x80A	House, Port, Starboard Batteries
1x40A	Spare
<b>Controls:</b>	
Throttle	Electronic
Propulsion	Forward, Neutral, and Reverse
Steering	Hydraulic
<b>Capacities:</b>	
Fuel	240 gal. (908.5 L)
Oil Reservoir (on Engine)	2 gal. (7.57 L)
Oil Reservoir (on Boat)	3 gal. (11.35 L)
Gearcase Lubricant (with Reservoir) – Port	44.7 oz (1321.9 mL)
Gearcase Lubricant (with Reservoir) – Starboard	45.6 oz (1348.5 mL)

**EQUIPMENT DATA - Continued*****Table 8. RIB Equipment Data - Continued.***

<b>Engine:</b>	
Model	E250Z
Type	6-cylinder, 2-stroke
Displacement	210 cu. In. (3441 cc)
Peak Output	250 HP @ 5500 RPM
Idle Speed	450-550 RPM
Maximum RPM	6000 RPM
Rotation – Port	Counter Clockwise
Rotation – Starboard	Clockwise
Fuel Type	Gasoline, Unleaded
<b>Trailer:</b>	
Model	WS8M-180
Axles	3 Axles
Gross Vehicle Weight Rating	18,000 lbs (8,165 kg)
Tire Size	245/75R16
Material	Aluminum
<b>Weights:</b>	
Trailer	3,000 lbs (1360.77 kg)
Boat (including engines with no fuel)	8,004 lbs (3630.55 kg)
Fuel Tank Gauge (4/4 - 240 gal. (908 L), 3/4 - 161 gal. (609 L), 1/2 - 82 gal. (310 L), 1/4 - 25 gal. (95 L))	240 gal. - 1,560 lbs (707 kg), 161 gal. - 1046 lbs (474 kg), 82 gal. - 533 lbs (242 kg), 25 gal. - 163 lbs (74 kg)
Boat with Full Tank of Fuel (no trailer)	9,564 lbs (4338 kg)
Boat Payload (personnel and equipment) Capacity with 82 gal (310 L) of Fuel	4,842 lbs (2197 kg)
Boat Payload (personnel and equipment) Capacity with 240 gal (908 L) of Fuel	3,815 lbs (1731 kg)

**EQUIPMENT DATA - Continued*****Table 8. RIB Equipment Data - Continued.***

Medium Tactical Vehicle Trailer Transport (boat with 240 gal (908 L) of fuel on trailer)	12,564 lbs (5699 kg)
Light Medium Tactical Vehicle Trailer Transport (boat with 82 gal (310 L) of fuel on trailer)	11,537 lbs (5233 kg)
Gross Vehicle Wieght (with trailer, full payload, and full tank of fuel)	16,379 lbs (7429 kg)

**END OF WORK PACKAGE**

## OPERATOR THEORY OF OPERATION

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### **THEORY OF OPERATION**

The theory behind the operation of the Rigid Inflatable Boat (RIB) is described in the following paragraphs. The information contained herein will assist operator personnel in understanding how the RIB functions.

### **INTRODUCTION**

The RIB is a 26 ft (7.9 m) rigid hull inflatable boat consisting of a hybrid inflatable tube and foam filled collar and two outboard engines attached to an aluminum hull for use in diving operations. The RIB is transported on a three axle aluminum trailer. The RIB is rated for operation with a maximum occupancy of eight persons.

### **DRIVE SYSTEM**

The RIB is powered by two 250 HP two-stroke gasoline outboard engines supplied by a 240 gal. fuel tank and an oil injection system. The RIB is controlled through electronic throttle, shift, and hydraulic steering mechanisms mounted to the operator's helm which includes a fuel gauge and accessory displays that allow the monitoring of temperature, RPMs, and voltage for operator to monitor performance and status of the boat.

### **ELECTRICAL SYSTEM**

Power to the port and starboard engines, and boat components such as gauges, lights, and bilge pumps is provided by three separate 12V battery systems each equipped with a Master Battery Disabling Switch (MBDS) to disable electrical current for storage and service purposes.

Bi-color navigation lights, all around white light, and a hand-held search light are used to aid visibility and navigation of the RIB.

Two bilge pumps capable of manual activation or automatic activation based on a float sensor evacuates excess water from the bilge through a bow and stern discharge port.

### **END OF WORK PACKAGE**



**CHAPTER 2**

**OPERATOR INSTRUCTIONS**

**FOR**

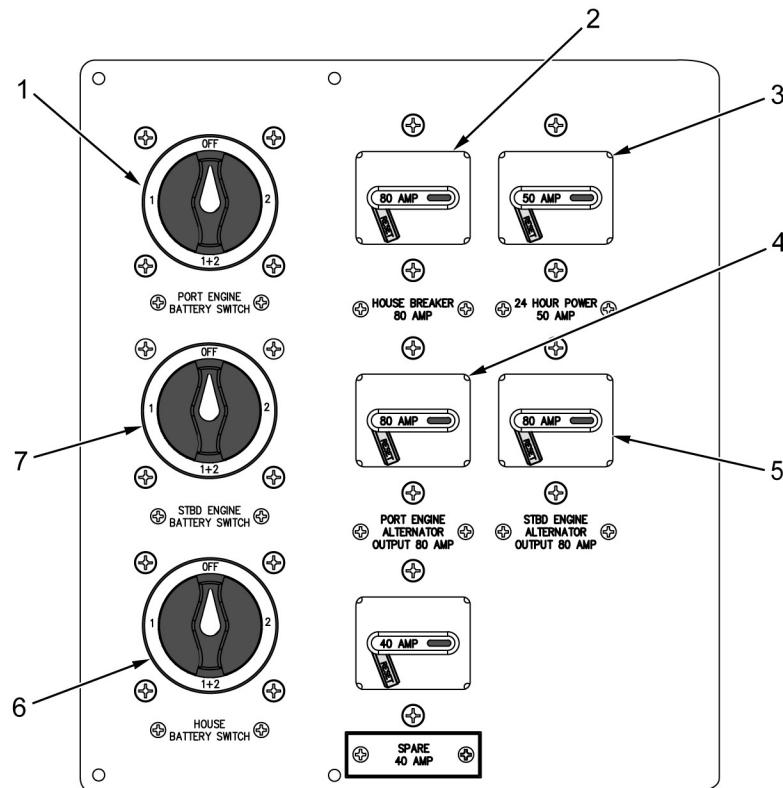
**RIGID INFLATABLE BOAT (RIB)**



**OPERATOR INSTRUCTIONS  
DESCRIPTION AND USE OF CONTROLS AND INDICATORS**

---

**CONTROLS AND INDICATORS**



000001-f01

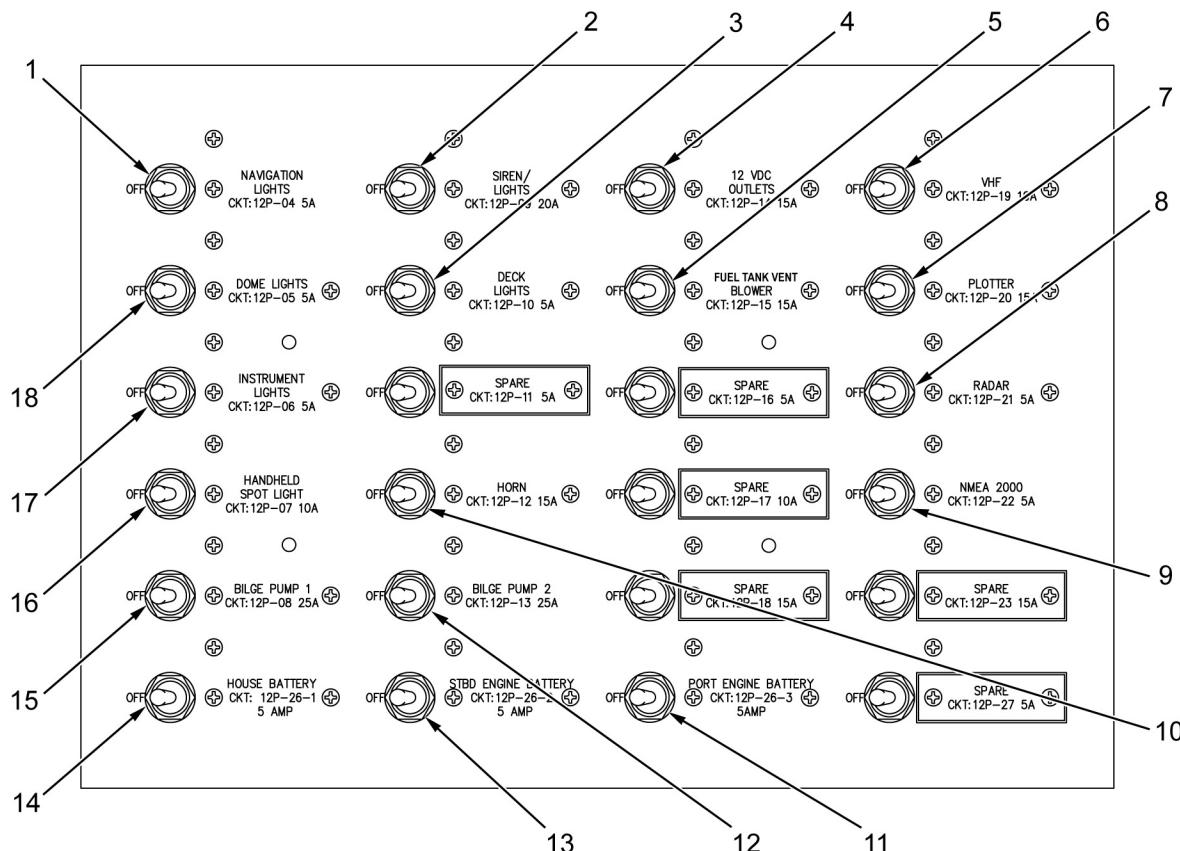
Figure 1. Battery and Breaker Controls.

Table 1. Control Panel Battery and Breaker Controls.

Key	Control/Indicator	Function
1	PORT ENGINE BATTERY SWITCH	Supplies (1) or disables (OFF) battery power to port engine electrical system.
2	HOUSE BREAKER 80 AMP	Supplies (un-tripped) or disables (tripped) power to boat electrical circuit.
3	24 HOUR POWER 50 AMP	Supplies (un-tripped) or disables (tripped) power to bilge pumps electrical circuit.
4	PORT ENGINE ALTERNATOR OUTPUT 80 AMP	Supplies (un-tripped) or disables (tripped) power to port engine electrical circuit.

**Table 1. Control Panel Battery and Breaker Controls - Continued.**

Key	Control/Indicator	Function
5	STBD ENGINE ALTERNATOR OUTPUT 80 AMP	Supplies (un-tripped) or disables (tripped) power to STBD engine electrical circuit.
6	HOUSE BATTERY SWITCH	Supplies (1) or disables (OFF) battery power to boat electrical system.
7	STBD ENGINE BATTERY SWITCH	Supplies (1) or disables (OFF) battery power to STBD engine electrical system.



O00001-F02

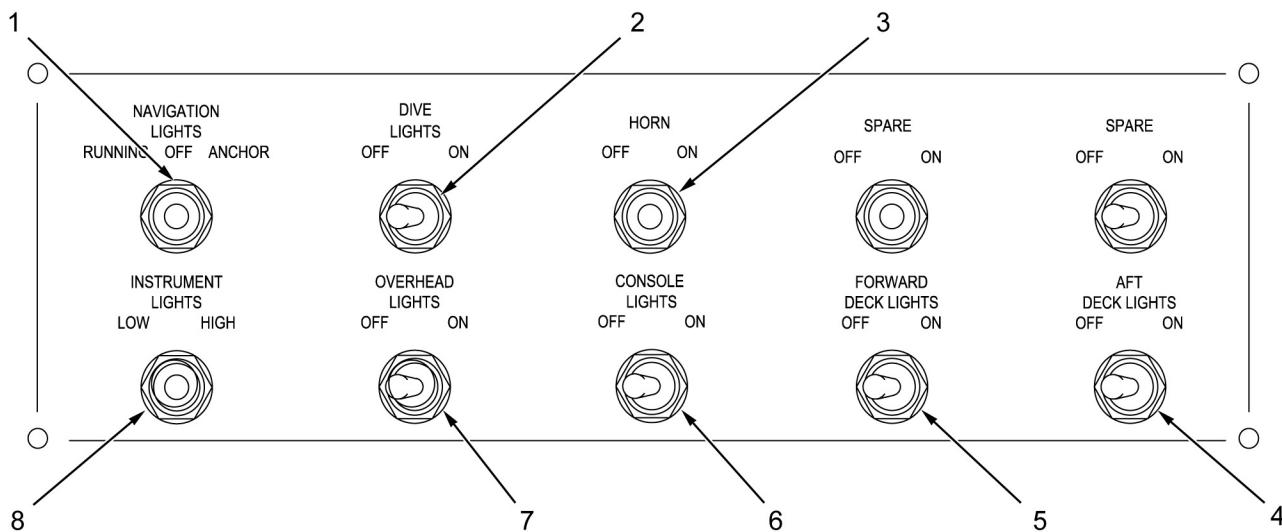
Figure 2. Control Panel Control Switches.

Table 2. Control Panel Switches.

Key	Control/Indicator	Function
1	NAVIGATION LIGHTS	Supplies (RIGHT) or disables (LEFT) power to navigation lights/dive light switches on operating switch panel 1.
2	SIREN/LIGHTS	Supplies (RIGHT) or disables (LEFT) power to Vessel System Monitor (VSM).
3	DECK LIGHTS	Supplies (RIGHT) or disables (LEFT) power to forward/aft deck lights switches on operating switch panel 1.
4	12 VDC OUTLETS	Supplies (RIGHT) or disables (LEFT) power to 12 VDC outlets.

**Table 2. Control Panel Switches - Continued.**

<b>Key</b>	<b>Control/Indicator</b>	<b>Function</b>
5	FUEL TANK VENT BLOWER	Supplies (RIGHT) or disables (LEFT) power to fuel tank ventilation blower switch on operating switch panel 2.
6	VHF	Supplies (RIGHT) or disables (LEFT) power to VHF radio.
7	PLOTTER	Supplies (RIGHT) or disables (LEFT) power to multi-function display.
8	RADAR	Supplies (RIGHT) or disables (LEFT) power to radome.
9	NMEA 2000	Supplies (RIGHT) or disables (LEFT) power to heading sensor.
10	HORN	Supplies (RIGHT) or disables (LEFT) power to horn switch on operating switch panel 1.
11	PORT ENGINE BATTERY	Supplies (RIGHT) or disables (LEFT) power to port engine.
12	BILGE PUMP 2	Supplies (RIGHT) or disables (LEFT) power to bilge pump 2 switch on operating switch panel 2.
13	STBD ENGINE BATTERY	Supplies (RIGHT) or disables (LEFT) power to starboard engine.
14	HOUSE BATTERY	Supplies (RIGHT) or disables (LEFT) battery power to boat electrical system.
15	BILGE PUMP 1	Supplies (RIGHT) or disables (LEFT) power to bilge pump 1 switch on operating switch panel 2.
16	HANDHELD SPOTLIGHT	Supplies (RIGHT) or disables (LEFT) power to handheld spotlight.
17	INSTRUMENT LIGHTS	Supplies (RIGHT) or disables (LEFT) power to instrument lights switch on operating switch panel 1.
18	DOME LIGHTS	Supplies (RIGHT) or disables (LEFT) power to overhead lights/console lights switches on operating switch panel 1.



000001-f03

Figure 3. Operating Switch Panel 1.

Table 3. Operation Switch Panel 1.

Key	Control/Indicator	Function
1	NAVIGATION LIGHTS	Toggle (RIGHT) ANCHOR light illuminates only the all-around light (white), toggle (LEFT) RUNNING lights illuminates port (red), starboard (green), and all-around light (white), toggle (CENTER) disables port, starboard, and all around lights.
2	DIVE LIGHTS	Supplies (RIGHT) or disables (LEFT) power to dive lights.
3	HORN	Supplies (RIGHT) or disables (LEFT) power to horn.
4	AFT DECK LIGHTS	Supplies (RIGHT) or disables (LEFT) power to aft deck lights.
5	FORWARD DECK LIGHTS	Supplies (RIGHT) or disables (LEFT) power to forward deck lights.
6	CONSOLE LIGHTS	Supplies (RIGHT) or disables (LEFT) power to console lights.
7	OVERHEAD LIGHTS	Supplies (RIGHT) or disables (LEFT) power to overhead lights.
8	INSTRUMENT LIGHTS	LOW (Left) and HIGH (Right) power levels for instrument lights.

*Table 3. Operation Switch Panel 1 - Continued.*

Key	Control/Indicator	Function
8	INSTRUMENT LIGHTS	Brightens (RIGHT) or dims (LEFT) compass light.

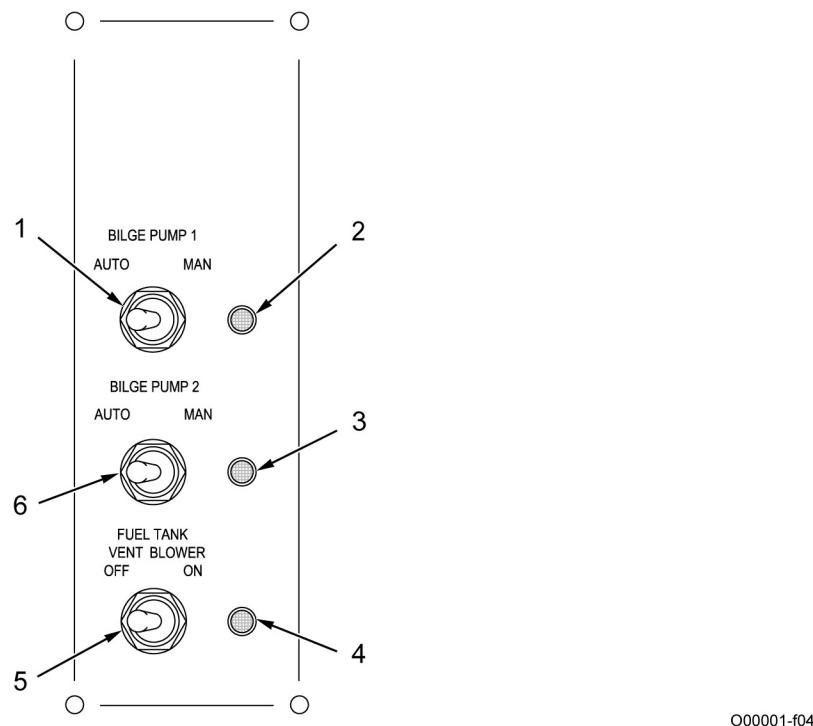


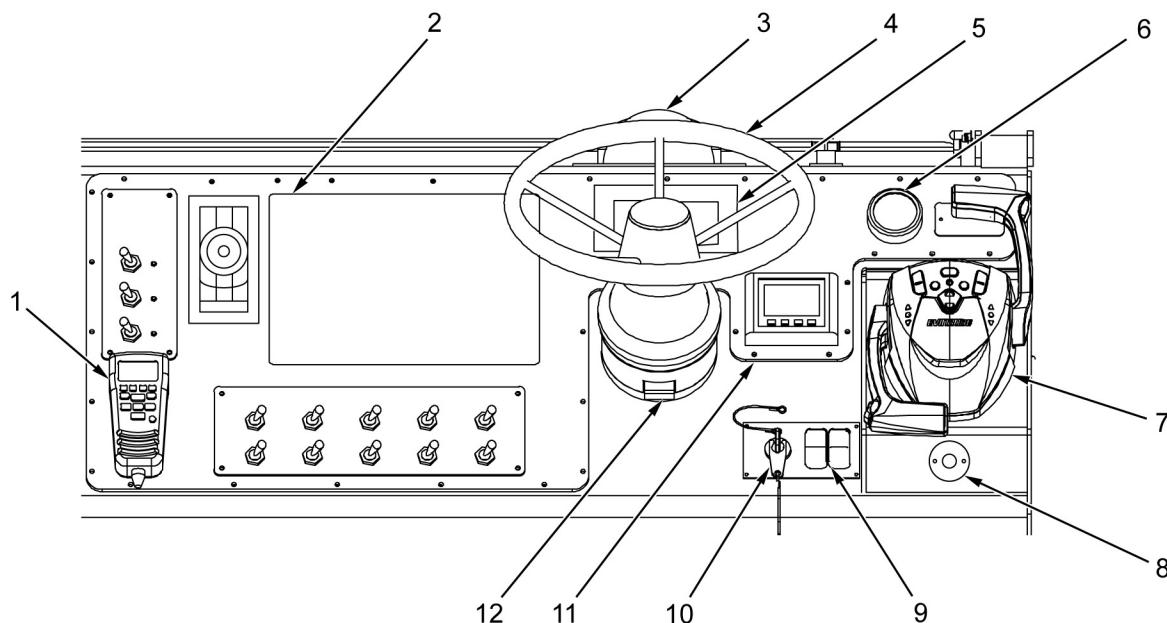
Figure 4. Operating Switch Panel 2.

**Table 4. Operation Switch Panel 2.**

Key	Control/Indicator	Function
1	BILGE PUMP 1	MANUAL (RIGHT) overrides float switch and activates bilge pump, AUTO (LEFT) automatically cycles on and off based on float switch.
2	BILGE PUMP 1 INDICATOR LIGHT	Illuminates when bilge pump is running.
3	BILGE PUMP 2 INDICATOR LIGHT	Illuminates when bilge pump is running.
4	FUEL TANK VENT BLOWER INDICATOR LIGHT	Illuminates when fuel tank vent blower is running.
5	FUEL TANK VENT BLOWER	Supplies (RIGHT) or disables (LEFT) power to fuel tank vent blower.

*Table 4. Operation Switch Panel 2 - Continued.*

Key	Control/Indicator	Function
6	BILGE PUMP 2	MANUAL (RIGHT) overrides float switch and activates bilge pump, AUTO (LEFT) automatically cycles on and off based on float switch.



000001-f05

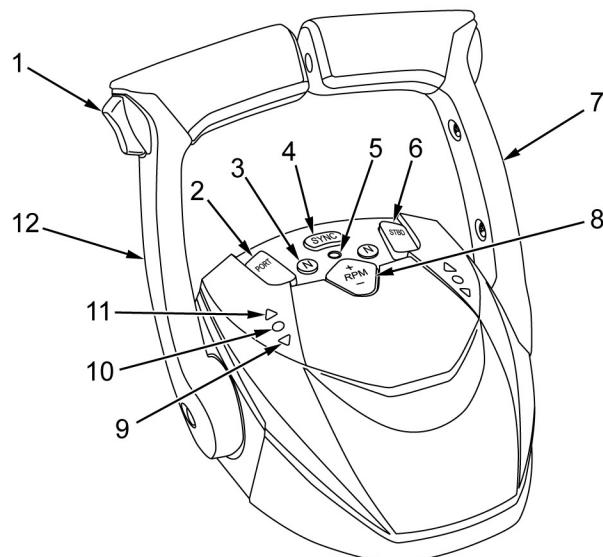
Figure 5. Cabin Console Controls.

Table 5. Cabin Console Controls.

Key	Control/Indicator	Function
1	COMMAND MICROPHONE	External microphone of the onboard VHF radio used for communication.
2	MULTI-FUNCTION DISPLAY	Touchscreen display equipped with plotter, radar, and sonar functions.
3	COMPASS	Used for navigation that shows boats heading relative to geographic directions.
4	HELM	Steers boat to port or starboard.
5	ENGINE MONITOR	Communicates with the port and starboard engines to display critical parameters such as; rpm's, mph, Temperature, Trim, Oil, etc.
6	FUEL GAUGE	Displays fuel level remaining in tank.

**Table 5. Cabin Console Controls - Continued.**

Key	Control/Indicator	Function
7	THROTTLE	Controls engine speed and trim.
8	RADIO/HEADSET PUSH-TO-TALK BUTTON (PTT)	Used in conjunction with the headset to transmit calls through the VHF radio. Push and hold to transmit.
9	START/STOP SWITCH	Key operated ignition incorporates port and starboard engine start buttons and an emergency stop switch.
10	EMERGENCY STOP SWITCH LANYARD AND IGNITION KEY	Clips to emergency stop switch and operator. If clip is dislodged from stop switch, engines stop. Ignition key supplies power to both engines.
11	VESSEL SYSTEM MONITOR (VSM)	Displays voltage levels for house, starboard engine, and port engine batteries.
12	HELM TILT LEVER	Raises/lowers helm.



000001-f06

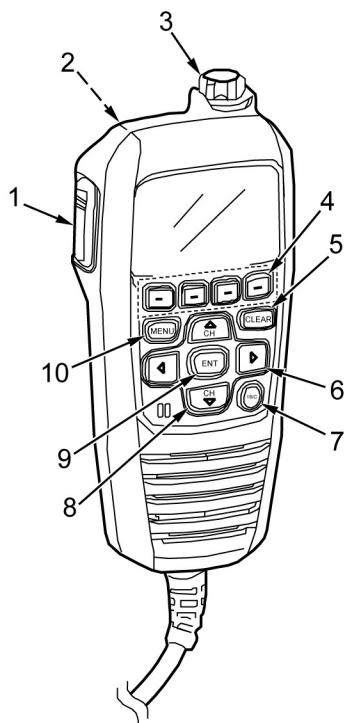
Figure 6. Throttle Controls.

**Table 6. Throttle Controls.**

Key	Control/Indicator	Function
1	MASTER TRIM AND TILT SWITCH	Press to adjust trim or tilt setting of both engines up or down simultaneously.
2	PORT TRIM AND TILT SWITCH	Press to trim the port engine up or down.
3	N (NEUTRAL) THROTTLE SWITCH	Press the NEUTRAL throttle switch (N) to disengage shift function and operate the throttle without shifting the outboard into FORWARD or REVERSE gear.
4	SYNC SWITCH	Press the SYNC button to automatically synchronize the rpm of both engines to within 75 rpm. The SYNC button also transfers control of both engines to the port lever. To cancel the SYNC function Align port and starboard throttle levers and press the SYNC switch.
5	SYNC INDICATOR Light-Emitting Diode (LED)	Turns red when SYNC is active.
6	STBD TRIM AND TILT SWITCH	Press to trim the starboard engine up or down.

***Table 6. Throttle Controls - Continued.***

Key	Control/Indicator	Function
7	STARBOARD THROTTLE LEVER	Controls shift and throttle function for starboard engine.
8	RPM SWITCH	Press the rpm + or – button to adjust engine speed up or down in 1% increments. To use the rpm adjustment feature, all control levers MUST be in FORWARD gear and engine speed must be above 500 rpm. rpm adjustment range is limited to 5% of the throttle setting. Reposition the throttle lever and start the process again for further adjustment. To cancel the rpm adjustment switch setting move the throttle lever to a faster or slower position.
9	REVERSE GEAR INDICATOR LED	Turns blue when throttle lever is shifted into REVERSE gear.
10	NEUTRAL INDICATOR LED	Turns green when throttle lever is shifted into NEUTRAL position.
11	FORWARD GEAR INDICATOR LED	Turns blue when throttle lever is shifted into FORWARD gear.
12	PORT THROTTLE LEVER	Controls shift and throttle function for port engine. Functions as the “master” throttle lever when SYNC is engaged.



000024-f01

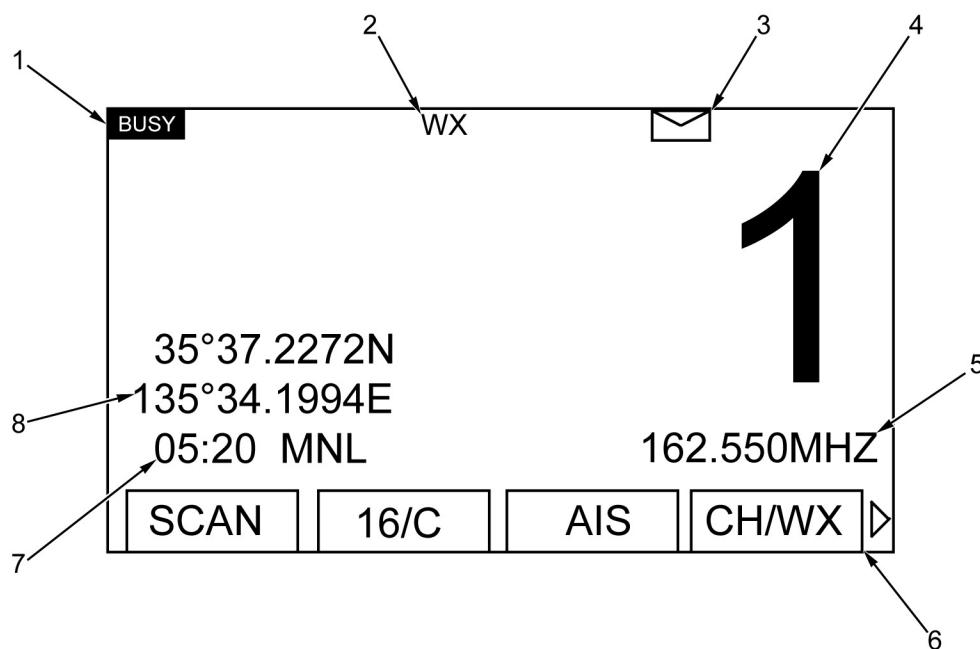
Figure 7. Command Microphone.

**Table 7. Command Microphone Controls.**

Key	Control/Indicator	Function
1	PUSH-TO-TALK (PTT) BUTTON	Hold down to transmit, release to receive.
2	DISTRESS KEY "DISTRESS"	Hold down for 3 seconds to transmit a distress call. The distress key is located on the back of the command microphone.
3	POWER KNOB "PWR"/SQUELCH DIAL "SQL"/ VOLUME DIAL "VOL"	<ul style="list-style-type: none"> <li>• When the power is OFF, hold down for 1 second to turn ON power.</li> <li>• Hold down for 1 second to turn OFF power.</li> <li>• Rotate to select the operating channels, menu items, or menu settings.</li> <li>• Push to set the input data or selected item.</li> <li>• Rotate to adjust the squelch level.</li> <li>• Rotate to adjust the volume level.</li> </ul>

**Table 7. Command Microphone Controls - Continued.**

<b>Key</b>	<b>Control/Indicator</b>	<b>Function</b>
4	SOFTKEYS	<ul style="list-style-type: none"> <li>• Scan: Push to start or stop a normal or priority scan.</li> <li>• Channel/Weather Channel: Push to select and toggle the regular channel and weather channel.</li> <li>• High/Low: Push to set the power to high or low.</li> <li>• Favorite Channel: Push to set or clear the displayed channel as a favorite. Hold down for 3 seconds to clear or set all favorite channels in the selected channel group.</li> <li>• Backlight: Push to enter the Liquid Crystal Display (LCD) and key backlight brightness adjustment mode.</li> </ul>
5	CLEAR KEY "CLEAR"	Push to cancel the entered data or return to the previous screen.
6	LEFT AND RIGHT KEYS "< / >"	<ul style="list-style-type: none"> <li>• Push to switch to the previous or next key function that is assigned to the soft keys.</li> <li>• Push to select a desired character or number in the table while in the channel name, position, or Maritime Mobile Service Identity (MMSI) code mode.</li> </ul>
7	CHANNEL 16/ CALL CHANNEL KEY	<ul style="list-style-type: none"> <li>• Push to select channel 16.</li> <li>• Hold down for 1 second to select the call channel.</li> </ul>
8	UP AND DOWN/ CHANNEL SELECT KEYS "Λ / ∨"	<ul style="list-style-type: none"> <li>• Push to select the operating channels, menu items, or menu settings.</li> <li>• While scanning, push to check favorite channels, change the scanning direction, or manually resume a scan.</li> </ul>
9	ENTER KEY "ENT"	Push to set the input data or selected item.
10	MENU KEY "MENU"	Push to enter or exit the menu screen.



000024-f02

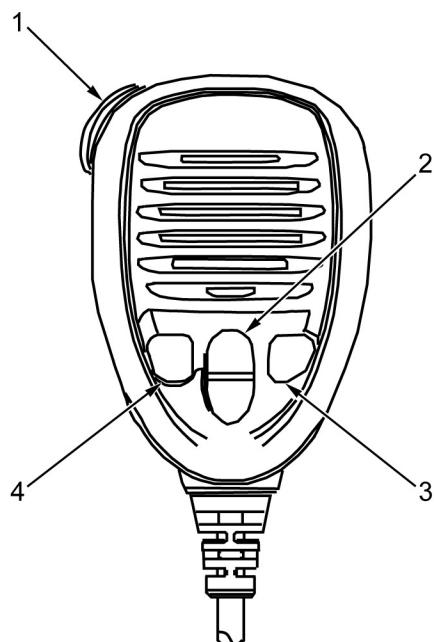
Figure 8. Command Microphone Display Overview.

***Table 8. Command Microphone Display.***

Key	Control/Indicator	Function
1	BUSY/TRANSMIT ICON	<ul style="list-style-type: none"> <li>The “BUSY” icon appears when receiving a signal or when the squelch is open.</li> <li>The “TX” icon appears while transmitting.</li> </ul>
2	CHANNEL GROUP ICON	<ul style="list-style-type: none"> <li>The selected channel group icon, “USA”, “INT”, or “CAN” appears.</li> <li>The “WX” icon appears when the weather channel is selected.</li> </ul>
3	MESSAGE ICON	Blinks when there is an unread Dynamic Selective Calling (DSC) message.
4	CHANNEL NUMBER READOUT	Shows the selected operating channel number.
5	CHANNEL NAME FIELD	The channel name appears if programmed.

*Table 8. Command Microphone Display - Continued.*

Key	Control/Indicator	Function
6	KEY ICON	Shows the programmed function of the softkeys on the front panel.
7	TIME ZONE INDICATOR	<ul style="list-style-type: none"><li>• Shows the current time when valid GPS position data is received.</li><li>• "NO TIME" appears when no GPS position data is received.</li></ul>
8	POSITION INDICATOR	<ul style="list-style-type: none"><li>• Shows the current position when valid GPS position data is received.</li><li>• "NO POSITION" appears when no GPS position data is received.</li></ul>



000025-f01

Figure 9. VHF Microphone Controls.

**Table 9. VHF Microphone Controls.**

Key	Control/Indicator	Function
1	PUSH-TO-TALK (PTT) BUTTON	Hold down to transmit, release to receive.
2	CHANNEL UP/DOWN KEYS	Push either key to check favorite channels, change scanning direction or manually resume a scan.
3	TRANSMIT POWER KEY	<ul style="list-style-type: none"> <li>• Push to toggle the power high or low.</li> <li>• While holding down key, turn ON the power to turn the microphone lock function ON or OFF.</li> </ul>
4	CHANNEL 16/CALL CHANNEL KEY	<ul style="list-style-type: none"> <li>• Push to select channel 16.</li> <li>• Hold down for 1 second to select the call channel.</li> </ul>

**END OF WORK PACKAGE**

**OPERATOR INSTRUCTIONS  
OPERATING UNDER USUAL CONDITIONS PRE-START PROCEDURES**

---

**INITIAL SETUP:**

**Personnel Required**

Diver 12D

**Equipment Condition**

Boat trailered (WP 0026)

Boat docked (WP 0008)

**References**

WP 0014

WP 0019

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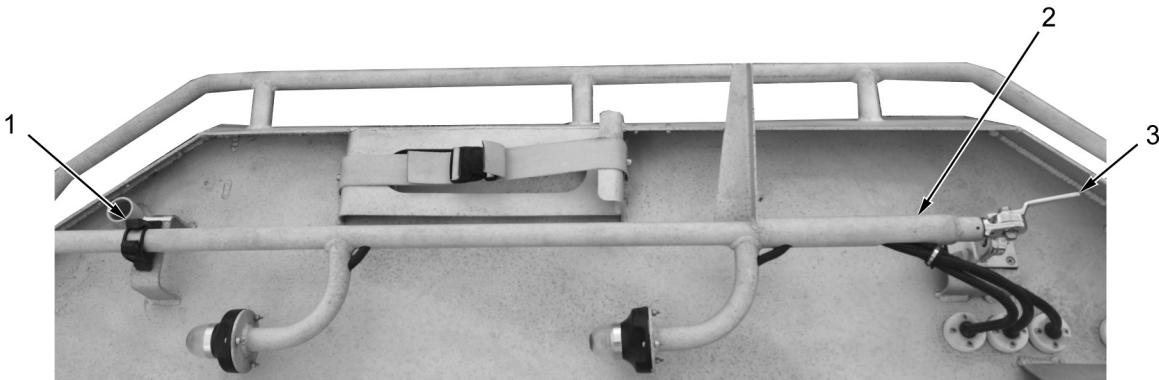
**Pre-Start Procedures**

**WARNING**

To prevent falls from the sides, rear, or top of the boat, personnel should always maintain three points of contact (for example two feet and one hand) when climbing in, out, and on the boat.

**Pre-Start Procedures - Continued**

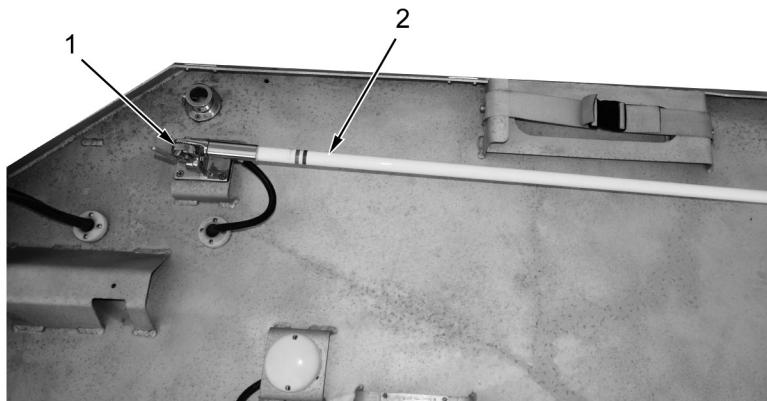
1. Secure and stow all equipment.
2. Remove retaining strap (Figure 1, Item 1) and raise dive mast (Figure 1, Item 2) to vertical position.
3. Rotate lock lever (Figure 1, Item 3) approximately 90° and lock mast (Figure 1, Item 2) into position.



000002-f01

Figure 1. Dive Mast Mount.

4. Rotate lock lever (Figure 2, Item 1) approximately 90° and unlock antenna (Figure 2, Item 2).
5. Raise antenna (Figure 2, Item 2) to vertical position.
6. Rotate lock lever (Figure 2, Item 1) approximately 90° and lock antenna (Figure 2, Item 2) into position.



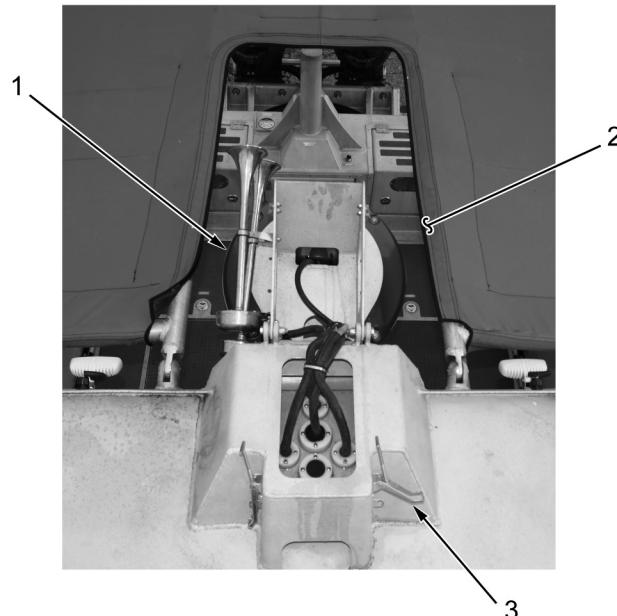
000002-f02

Figure 2. Antenna Mount.

7. Remove radome canvas cover (Figure 3, Item 2).
8. Raise radome mast (Figure 3, Item 1) into upright position and replace radome canvas cover (Figure 3, Item 2).

**Pre-Start Procedures - Continued**

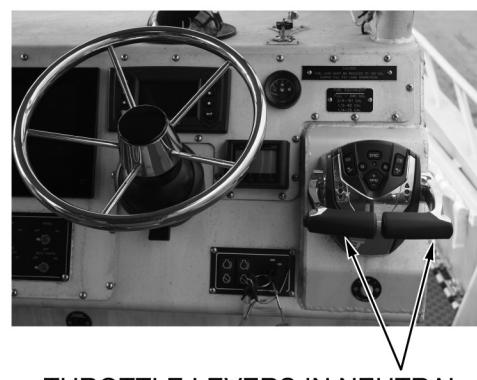
9. Engage two turnbuckle fasteners (Figure 3, Item 3) and secure radome mast (Figure 3, Item 1).



000002-f03

Figure 3. Radome Mast.

10. Verify that port and starboard engine throttle levers (Figure 4) are in NEUTRAL position.



000002-f05

Figure 4. Engine Throttles.

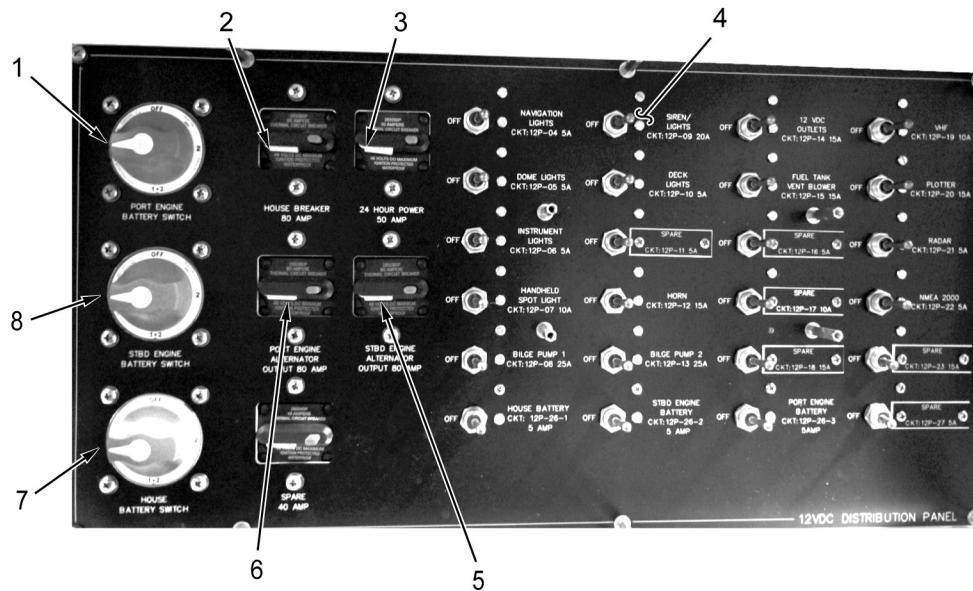
## Pre-Start Procedures - Continued

11. Turn port (Figure 5, Item 1), starboard (Figure 5, Item 8), and house (Figure 5, Item 7) battery switches to position 1.

### NOTE

Breaker is in UN-TRIPPED position when the yellow RESET arm is in line with the breaker housing. If yellow RESET arm is at a 30° angle from the breaker housing and the word "RESET" is visible, breaker is in TRIPPED position.

12. Verify house (Figure 5, Item 2), 24 hour power (Figure 5, Item 3), port engine (Figure 5, Item 6), and starboard engine alternator (Figure 5, Item 5) breakers are in the UN-TRIPPED position.
13. Ensure all control switches are in ON position (Figure 5, Item 4).



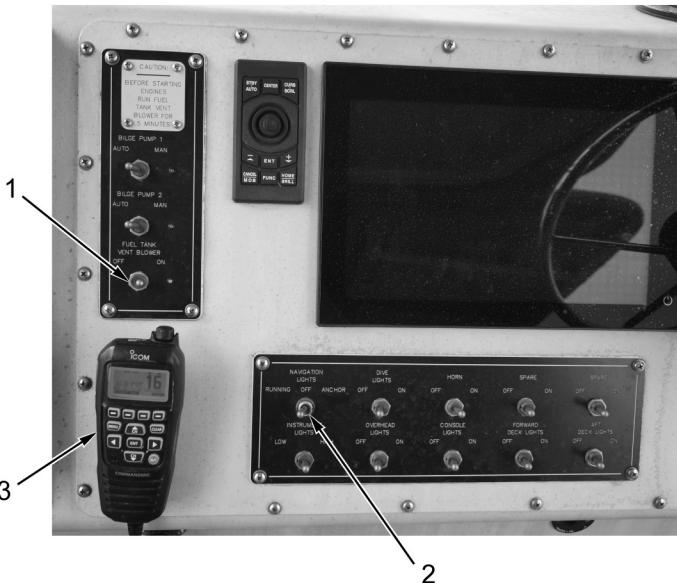
000002-f06

Figure 5. Control and Battery Switches.

**Pre-Start Procedures - Continued****WARNING**

Vapor from fuel is heavier than air and will flow to the lowest part of the boat. Ventilate bilges for at least five minutes prior to starting engines. Failure to comply may result in damage to equipment, death or injury to personnel.

14. Turn fuel tank vent blower switch (Figure 6, Item 1) to the ON position.
15. Turn navigation lights switch (Figure 6, Item 2) to the RUNNING position.
16. Set command microphone (Figure 6, Item 3) to pre-determined channel (WP 0019).



000002-f07

Figure 6. Operational Switches and Command Mic.

**Pre-Start Procedures - Continued**

17. Using multi-function display, plot points and routes for mission (WP 0016).
18. Ensure port (Figure 7, Item 1) and starboard (Figure 7, Item 2) scupper drain are in down position.



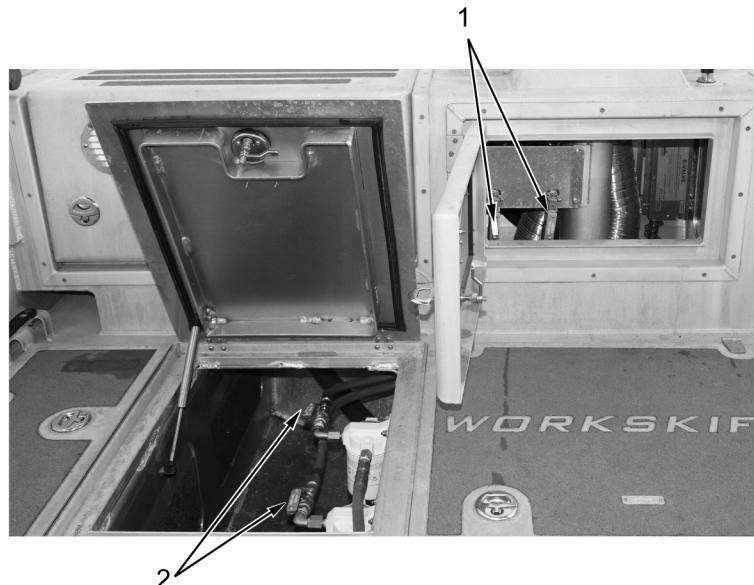
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Figure 7. Scupper Drain.

**Pre-Start Procedures - Continued****NOTE**

Fuel valves are in OPEN position when valves are in parallel with fuel lines.

19. Verify starboard compartment fuel valves (Figure 8, Item 2) and aft compartment fuel valves (Figure 8, Item 1) are in OPEN position.



000002-f04

Figure 8. Fuel Valves.

20. Turn ignition key into ON position (Figure 9, Item 1).



000002-f08

Figure 9. Ignition Key.

**END OF WORK PACKAGE**



**OPERATOR INSTRUCTIONS  
OPERATING UNDER USUAL CONDITIONS LAUNCHING BY TRAILER**

---

**INITIAL SETUP:**

<b>Tools and Special Tools</b>	<b>References</b>
Wrench, Box and Open End, Combination (WP 0062, Table 2, Item 30)	WP 0007
	WP 0008
	WP 0010
<b>Personnel Required</b>	<b>Equipment Condition</b>
Diver 12D	Pre-start procedures performed (WP 0005)
Assistant (2)	

---

**WARNING**

- DO NOT run the outboard engine indoors or without adequate ventilation or permit exhaust fumes to accumulate in confined areas. Engine exhaust contains carbon monoxide.
- To avoid pinch points between boat and trailer, wear personal protective equipment such as gloves when handling the winch hook and keep all body parts clear of contact points between boat and trailer winch.
- Boat ramps may present slippery surfaces. Ensure proper footwear is worn at all times.
- To prevent falls from the sides, rear, or top of the boat, personnel should always maintain three points of contact (for example two feet and one hand) when climbing in, out, and on the boat.
- Failure to comply may result in serious injury or death to personnel.

**WARNING**

- Do not service any part of the propeller while the outboard engine is running. Always shift the outboard engine to NEUTRAL position, turn the key switch OFF.
- Ensure the outboard engine and prop area are clear of people and objects before starting or operating outboard engine. Blades can be sharp and the propeller can continue to turn even after outboard engine is OFF.
- Failure to follow these warnings may result in injury or death to personnel

**WARNING**

Ensure personnel wear PFDs at all times during operation of boat in water. Failure to comply may result in injury or death to personnel.

**WARNING**

Ensure all personnel in the vicinity and operating the outboard engine wear personal protective equipment such as hearing protection when engine is being operated to prevent against potential noise hazards. Failure to comply may cause damage or loss of hearing.

**WARNING**

Always use the emergency stop lanyard when operating the engines to prevent runaway boat. Keep emergency stop lanyard free from obstructions and entanglements. Failure to comply may result in damage to equipment or injury to personnel.

**CAUTION**

- DO NOT run outboard engine without a water supply to the cooling system. Failure to comply can result in cooling system and/or powerhead damage.
- DO NOT attempt launching on boat ramps with 15° or greater pitch due to the probability of grounding the trailer at the transition. Failure to comply may result in damage to the trailer.

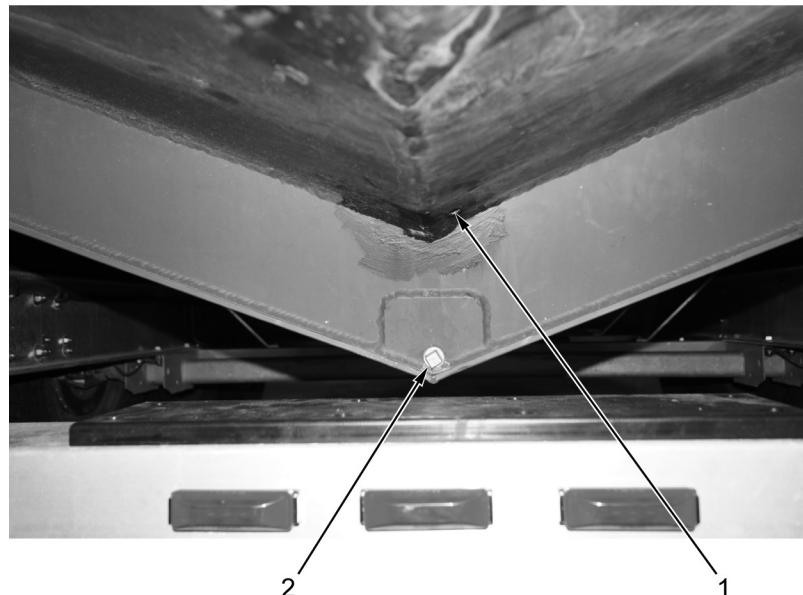
1. At staging area, remove two bow ratchet tie downs (Figure 1, Item 1) and two stern ratchet tie downs (Figure 1, Item 2) from boat and trailer. Stow tie downs in trailer tool box.



000003-f01

Figure 1. Trailer Tie Downs.

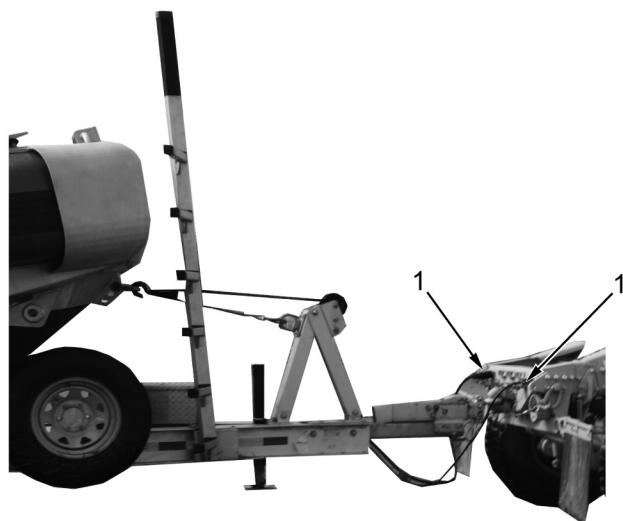
2. Inspect bilge plug (Figure 2, Item 2) and transom plug (Figure 2, Item 1) to ensure they are in place. If loose, use wrench to tighten.



O00003-f02

Figure 2. Bilge and Transom Plugs.

3. Trim engines to full UP position (WP 0010).
4. Disconnect electrical cable (Figure 3, Item 1) from prime mover.



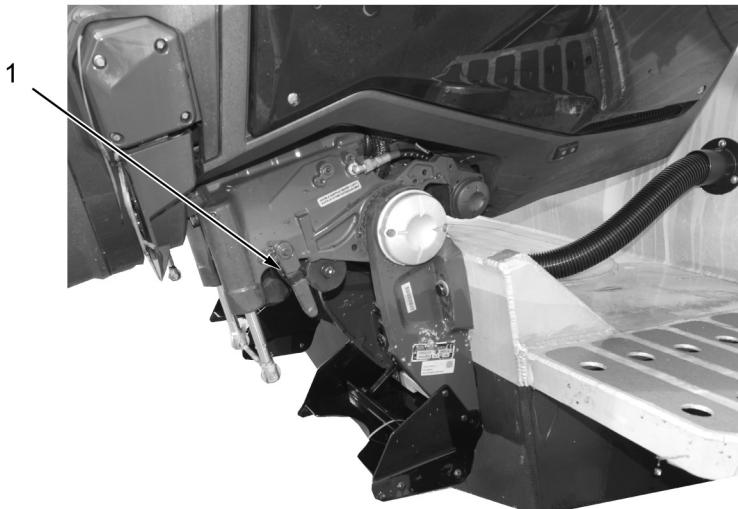
O00003-f07

Figure 3. Trailer Electrical Cables.

**NOTE**

Lock lever is shown for starboard engine. Disengagement is identical for the port engine.

5. Disengage engine lock levers (Figure 4, Item 1).



000003-f03

Figure 4. Engine Lock Lever.

**WARNING**

Ensure primary mover is placed in park with emergency brake engaged when parked on ramp during launching. Failure to comply may result in injury or death to personnel.

**CAUTION**

- Ensure the slope of the ramp is not a greater incline than the tow vehicle can overcome with boat loaded.
- Ensure the water depth is deep enough to float the boat.
- Failure to comply may result in damage to equipment.

6. Move trailered boat into position on ramp until approximately 18-24 in. (46-61 cm) of the forward end of the bunk is exposed above the water.
7. Ensure boat operator and assistant are on board.
8. Attach mooring lines to fore and aft cleats (WP 0008).

**CAUTION**

Ensure there is adequate clearance between engine and ramp prior to trimming engines.  
Failure to comply may result in damage to equipment.

9. Trim engines down until lower gear case (Figure 5, Item 1) is completely submerged (WP 0010).



O00003-f06

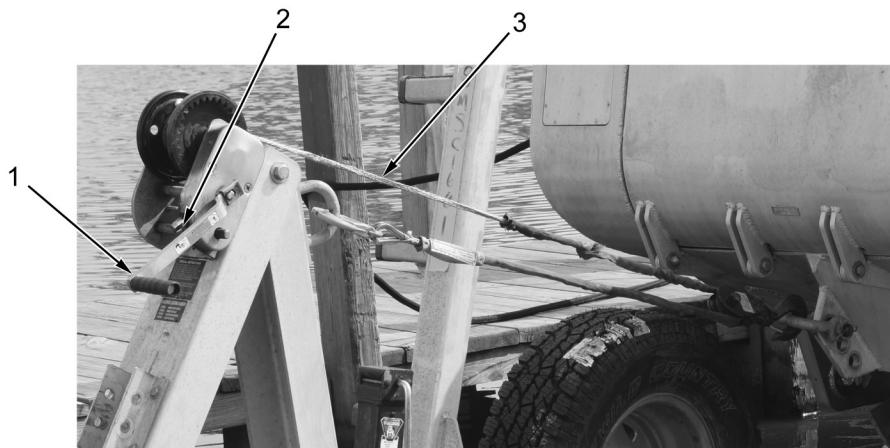
Figure 5. Engine Gear Case Submerged.

10. Perform starting procedures (WP 0007).

**WARNING**

Hold winch handle firmly when ratchet is unlocked. Spinning handle could cause serious injury. Failure to comply may result in injury to personnel.

11. Have assistant disengage winch lock lever (Figure 6, Item 2) and rotate winch handle (Figure 6, Item 1) counter clockwise to loosen line (Figure 6, Item 3).



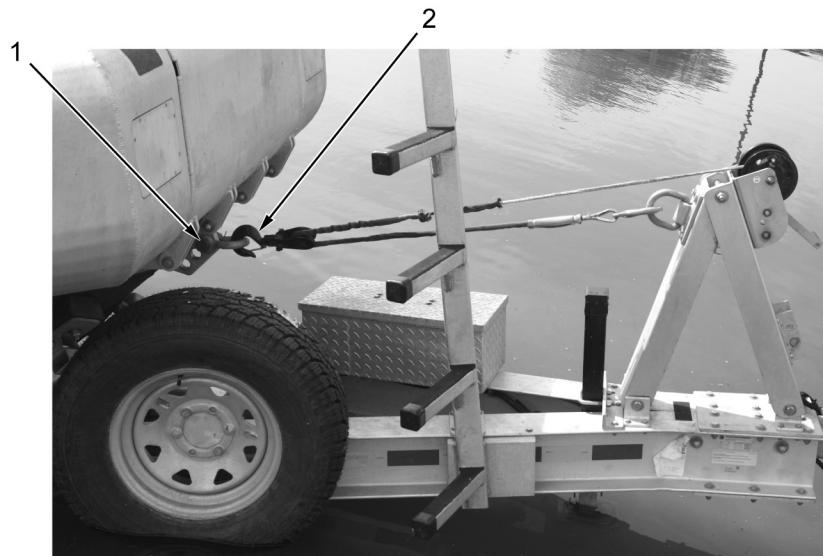
O00003-f09

Figure 6. Trailer Winch.

**CAUTION**

Do not disconnect the winch cable from the boat until the boat floats free from the trailer. Failure to comply may result in damage to equipment.

12. Have assistant, disconnect snatch block (Figure 7, Item 2) from boat bow eye (Figure 7, Item 1).



O00003-f04

Figure 7. Snatch Block.

**CAUTION**

Ensure launch ramp has adequate water depth to float the boat and trim engines down. Failure to comply may result in damage to equipment.

**NOTE**

- Trailer may need to be backed further into water to sufficiently float boat free from trailer.
- As the boat is launched, observe how far the trailer is in the water to assist with recovery.

13. Place throttle levers in REVERSE (Figure 8, Item 1) and slowly maneuver boat off trailer while adjusting trim as necessary (WP 0010).



000003-f07

Figure 8. Throttles in Reverse.

14. With assistance, maneuver the boat to the nearest docking point and tie off (WP 0008).

**END OF WORK PACKAGE**

**OPERATOR INSTRUCTIONS  
OPERATING UNDER USUAL CONDITIONS STARTING PROCEDURES**

---

**INITIAL SETUP:**

<b>Personnel Required</b>	<b>References (cont.)</b>
Diver 12D	WP 0040
Assistant	WP 0046
<b>References</b>	<b>Equipment Condition</b>
WP 0010	Pre-Start procedure performed (WP 0005)
WP 0021	

---

**WARNING**

- Fuel is flammable and harmful to health. Keep fuel away from heat or ignition sources. DO NOT smoke within 50 feet (15 m) of a fuel source. Do not work on fuel system when engine is hot. Shut down engine before refueling. Ensure fuel nozzle is grounded to filler neck. Do not overfill fuel tank. Keep fire extinguisher nearby. Wear personal protective equipment such as gloves and eye protection and ensure adequate ventilation during refueling.
- Refer to local procedures and plans for preventing and responding to fuel spills or leaks. Use a drain pan or suitable container to capture any draining, leaking or spilled fuel. Immediately clean up spilled fuel. Keep cloths/rags away from open flame and/or ignition sources. Comply with local procedures and environmental regulations when disposing of unused fuel, soiled/cleanup materials (such as filters and rags), and drained, leaked or spilled fuel.
- Failure to comply may result in injury to personnel and/or damage to the environment.

**WARNING**

Ensure personnel wear PFDs at all times during operation of boat in water. Failure to comply may result in injury or death to personnel.

**WARNING**

Ensure all personnel in the vicinity and operating the horn or siren wear personal protective equipment such as hearing protection while operating to prevent against potential noise hazards. Failure to comply may result in injury to personnel.

**WARNING**

- Do not service any part of the propeller while the outboard engine is running. Always shift the outboard engine to NEUTRAL position, turn the key switch OFF.
- Ensure the outboard engine and prop area are clear of people and objects before starting or operating outboard engine. Blades can be sharp and the propeller can continue to turn even after outboard engine is OFF.
- Failure to follow these warnings may result in injury or death to personnel.

**WARNING**

DO NOT run the outboard engine indoors or without adequate ventilation or permit exhaust fumes to accumulate in confined areas. Engine exhaust contains carbon monoxide. Hold winch handle firmly when ratchet is unlocked. Spinning handle could cause serious injury. Failure to comply may result in injury to personnel.

**WARNING**

Always use the emergency stop lanyard when operating the engines to prevent runaway boat. Keep emergency stop lanyard free from obstructions and entanglements. Failure to comply may result in damage to equipment or injury to personnel.

**CAUTION**

Water must be supplied to the outboard engines before starting. Failure to comply will result in damage to equipment.

**CAUTION**

Ensure water depth is sufficient to trim and operate the engines prior to starting engines. Failure to comply may result in damage to equipment.

1. Attach the emergency stop safety lanyard (Figure 1, Item 1) to boat operator.

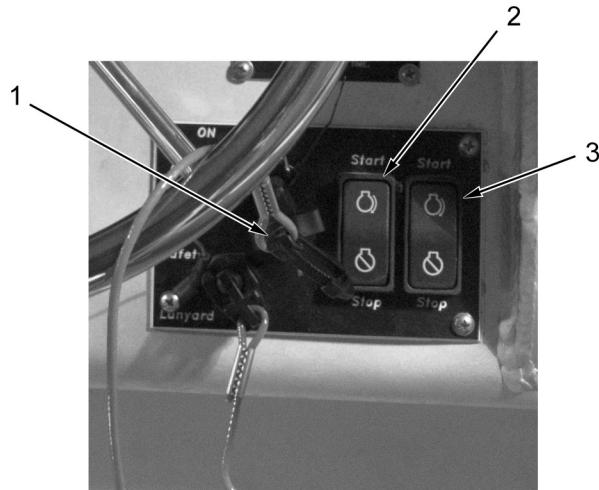
**WARNING**

Prior to starting engines, announce to crew that engines are ready for start, stay clear. Failure to comply may result in injury to personnel.

**CAUTION**

Do not hold engine start button for more than 15 seconds. Failure to comply may result in damage to equipment.

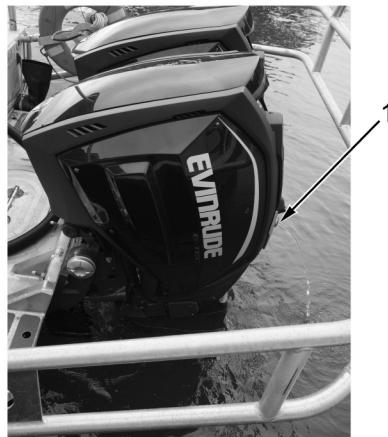
2. Push port engine start button (Figure 1, Item 2) and start engine.



000004-f01

Figure 1. Safety Lanyard and Engine Controls.

3. Have assistant observe cooling water flow from engine water pump indicator (Figure 2, Item 1). If no water is observed, shut down engines and refer to troubleshooting (WP 0046).



O00004-f02

Figure 2. Engine Water Pump Indicator.

4. Observe engine monitor for any fault codes (WP 0021).
5. Push starboard engine start button (Figure 1, Item 3) and repeat steps 3, and 4.
6. If engines fail to start after three or more attempts, refer to troubleshooting (WP 0040).
7. Allow engines to idle in NEUTRAL for one to two minutes.
8. Alert crew and using throttle lever, place port engine in FORWARD idle (Figure 3, Item 1), REVERSE idle (Figure 3, Item 3), and back to NEUTRAL (Figure 3, Item 2), ensuring engine engages and indicator lights illuminate. Repeat process for starboard engine.



O00004-f03

Figure 3. Engine Throttle Operation.

9. Alert crew and get boat underway (WP 0010).

**END OF WORK PACKAGE**

**OPERATOR INSTRUCTIONS  
OPERATING UNDER USUAL CONDITIONS DOCKING AND CASTING OFF**

---

**INITIAL SETUP:**

<b>Personnel Required</b>	<b>References (cont.)</b>
Diver 12D	WP 0010
Assistant (2)	WP 0025
<b>References</b>	<b>Equipment Condition</b>
WP 0007	Engine started (WP 0007)

---

**DOCKING PROCEDURES**

**WARNING**

Ensure boat is dock side prior to personnel disembarking. Failure to comply may cause injury to personnel.

**WARNING**

Ensure all personnel in the vicinity and operating the outboard engine wear personal protective equipment such as hearing protection when engine is being operated to prevent against potential noise hazards. Failure to comply may result in injury to personnel.

**WARNING**

Always use the emergency stop lanyard when operating the engines to prevent runaway boat. Keep emergency stop lanyard free from obstructions and entanglements. Failure to comply may result in damage to equipment or injury to personnel.

**WARNING**

Ensure personnel wear PFDs at all times during operation of boat in water. Failure to comply may result in injury or death to personnel.

**CAUTION**

Maintain idle speeds while positioning boat for docking to avoid collision. Failure to comply may result in damage to equipment.

**NOTE**

Docking procedures as outlined may change due to different environmental factors. Adjustments to docking procedures will be dictated by dock arrangement, boat traffic, weather, and sea state.

**DOCKING PROCEDURES - Continued**

1. Place throttles in FORWARD IDLE (Figure 1, Item 1) and approach docking point at a 45° angle.



Figure 1. Throttle in Forward Idle.

2. Position boat with bow alongside dock and place throttle levers in NEUTRAL (Figure 2, Item 1).

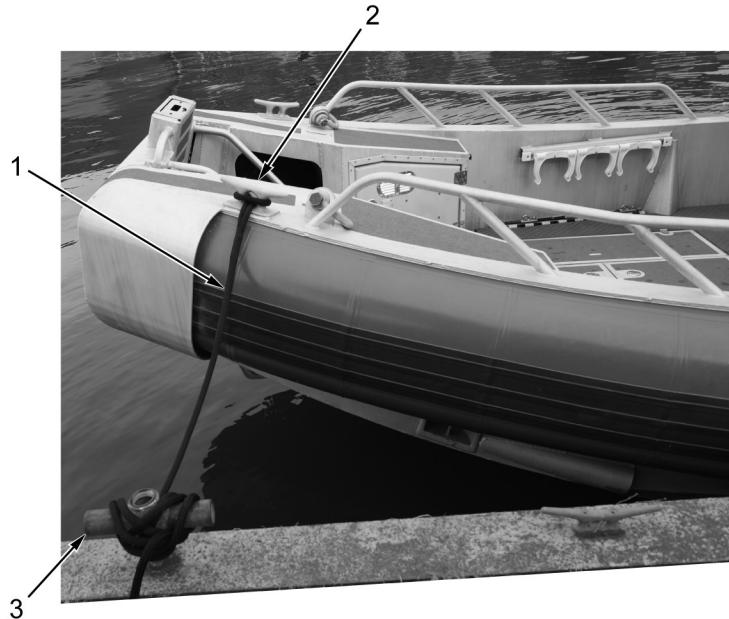


Figure 2. Throttle in Neutral.

**DOCKING PROCEDURES - Continued****NOTE**

If mooring lines were removed during operation they may need to be reattached to forward and aft cleats.

3. Have assistant pass bow line to the dock and secure line (Figure 3, Item 1) to forward boat cleat (Figure 3, Item 2) and then secure line to dock (Figure 3, Item 3).



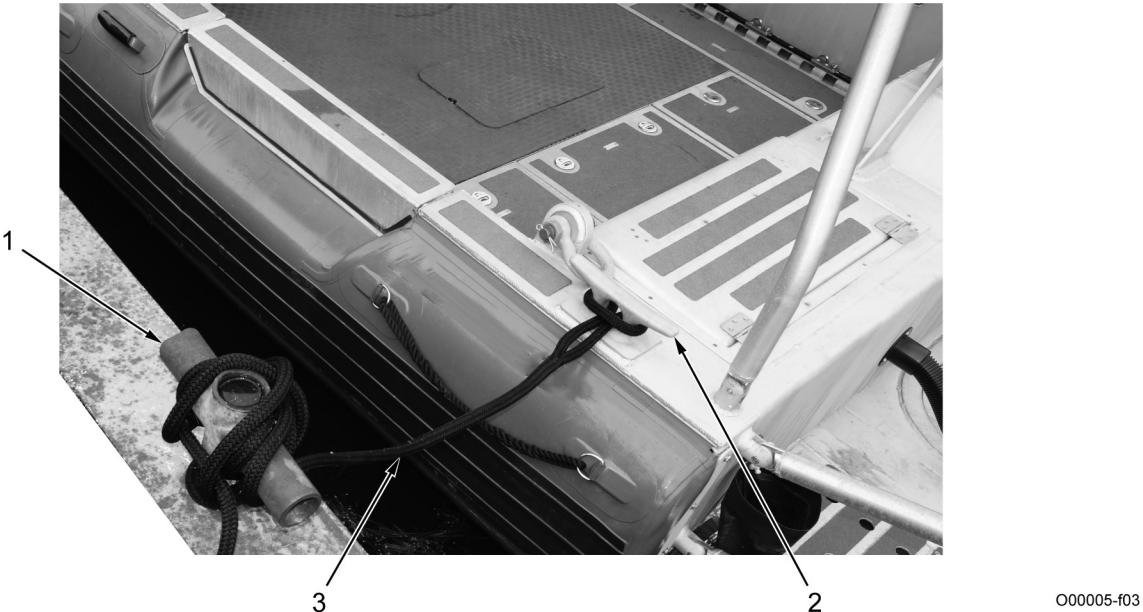
O00005-f02

Figure 3. Bow Mooring Line.

4. Maneuver stern of boat towards dock.

**DOCKING PROCEDURES - Continued**

5. Have assistant pass stern line to dock (Figure 4, Item 3) and secure line to aft boat cleat (Figure 4, Item 2) and then secure line to dock (Figure 4, Item 1).



00005-f03

Figure 4. Stern Mooring Line.

6. Turn house battery to OFF position (Figure 5, Item 1).

**DOCKING PROCEDURES - Continued**

O00005-f05

Figure 5. House Battery.

7. Perform engine shutdown procedure (WP 0025).

**CASTING-OFF PROCEDURES.**

1. Perform starting procedures (WP 0007).

**CASTING-OFF PROCEDURES - Continued.**

2. Remove stern line (Figure 6, Item 3) from dock cleat (Figure 6, Item 1) and boat cleat (Figure 6, Item 2).

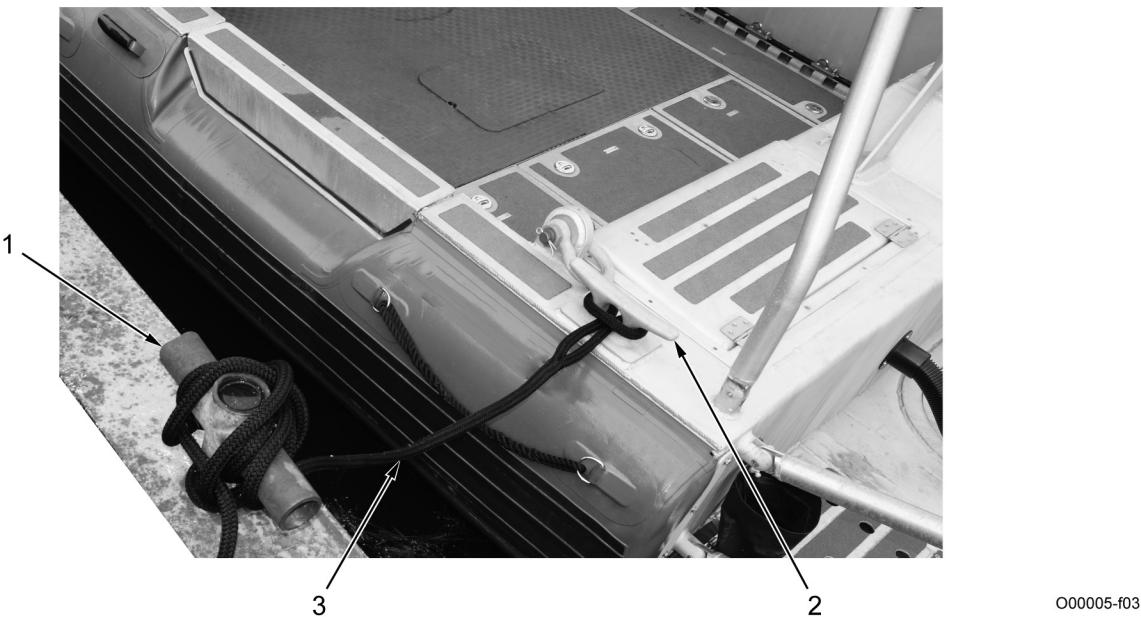
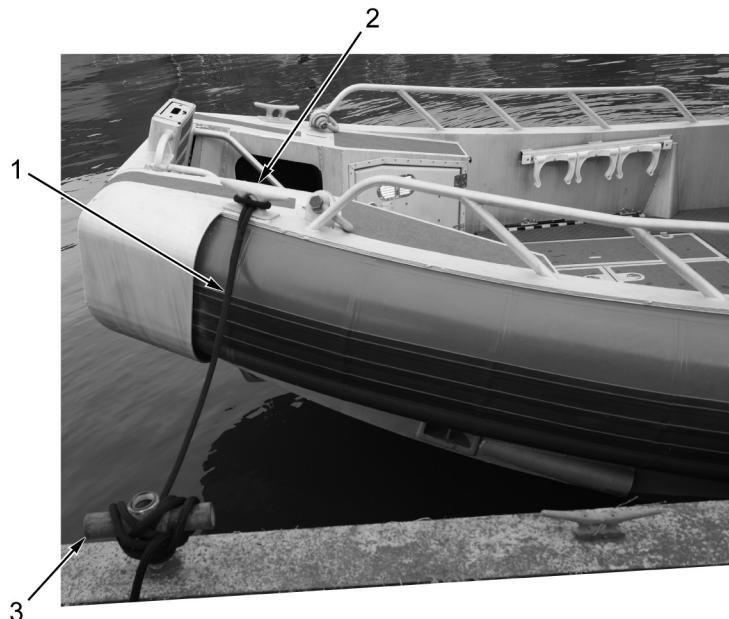


Figure 6. Stern Mooring Line.

**CASTING-OFF PROCEDURES - Continued.**

3. Maneuver boat away from dock and remove bow line (Figure 7, Item 1) from dock cleat (Figure 7, Item 3) and boat cleat (Figure 7, Item 2).



O00005-f02

Figure 7. Bow Mooring Line.

4. Stow mooring lines.
5. Get boat underway (WP 0010).

**END OF WORK PACKAGE**



**OPERATOR INSTRUCTIONS  
OPERATING UNDER USUAL CONDITIONS LOADING**

---

**INITIAL SETUP:**

**Personnel Required**

Diver 12D  
Assistant

---

**WARNING**

- Do not exceed 82 gal. (310.4 L) of fuel in boat fuel tank when trailering with Light Medium Tactical Vehicle (LMTV) as maximum tow capacity is 12,000 lbs (5443.1 kg).
- Do not trailer boat with personnel or equipment on boat.
- Do not exceed payload capacity of 3,815 lbs (1,730 kg) with 240 gal. (908.4 L) of fuel.
- Do not exceed the individual capacity for cargo rail tie downs of 2,500 lbs (1,134 kg).
- Equipment load location, crew, fuel load, weather, and sea conditions influence safe operation of boat underway.
- Ensure any gear stowed on deck or side compartments is secure.
- When loading the boat while afloat, distribute the load evenly, keep the load low and secure properly.
- Failure to comply may result in damage to equipment and injury or death to personnel.

**CAUTION**

Do not stow any equipment in compartments with electrical or electronic components, fuel tanks, or engineering controls. Failure to comply may result in damage to equipment.

**General Information**

There are four T-track slide rail deck tie down systems and total of eight D-rings (Figure 1, Item 1).

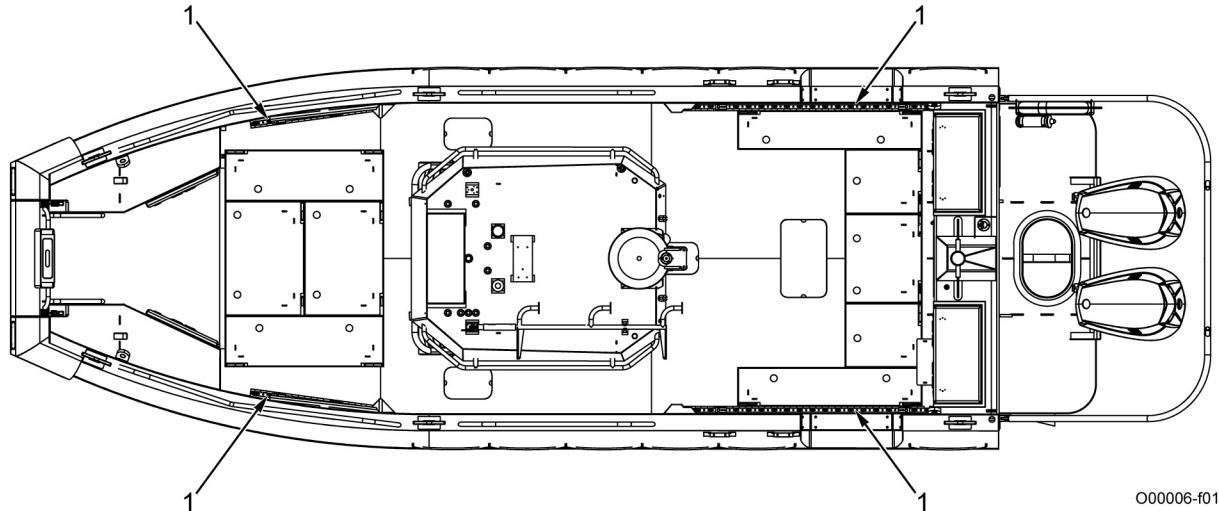


Figure 1. Tie Down Locations.

With assistant, use deck rail (Figure 2, Item 2) and D-ring (Figure 2, Item 1) tie downs to secure cargo.

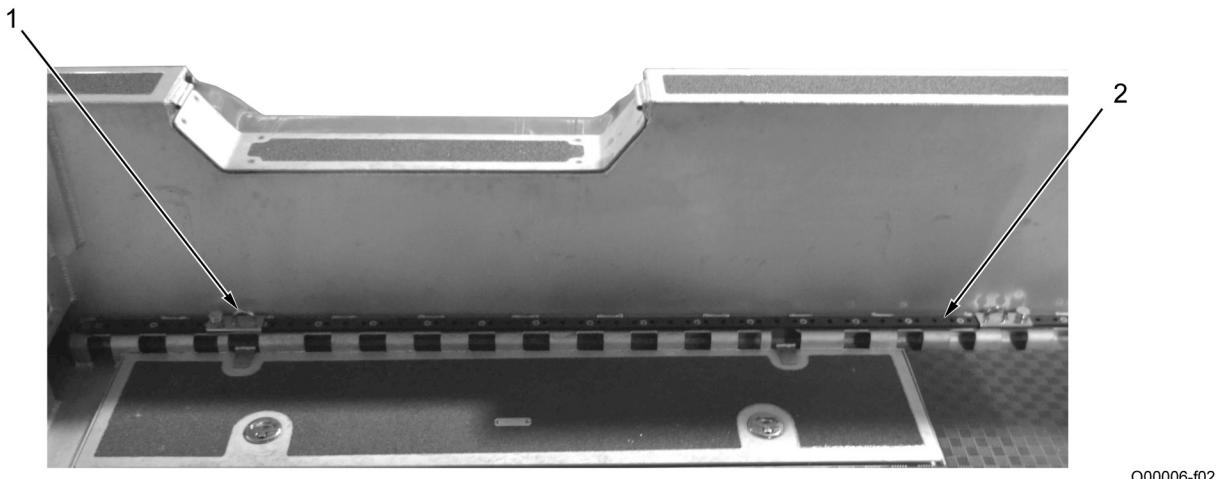


Figure 2. Cargo Tie Downs.

**END OF WORK PACKAGE**

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**OPERATOR INSTRUCTIONS  
OPERATING UNDER USUAL CONDITIONS OPERATION UNDERWAY AND TRIMMING**

---

**INITIAL SETUP:****Personnel Required**

Diver 12D

**References (cont.)**WP 0015  
WP 0022**References**WP 0005  
WP 0008**Equipment Condition**

Engines started (WP 0007)

---

**OPERATION UNDERWAY****WARNING**

Ensure load is properly secured prior to boat operation. Failure to comply may result in damage to equipment or injury to personnel.

**WARNING**

Ensure all personnel in the vicinity and operating the outboard engine wear personal protective equipment such as hearing protection when engine is being operated to prevent against potential noise hazards. Failure to comply may result in injury to personnel.

**WARNING**

Always use the emergency stop lanyard when operating the engines to prevent runaway boat. Keep emergency stop lanyard free from obstructions and entanglements. Failure to comply may result in damage to equipment or injury to personnel.

**WARNING**

Ensure personnel wear PFDs at all times during operation of boat in water. Failure to comply may result in injury or death to personnel.

**WARNING**

- Boat stability and steering torque can vary due to changing water conditions. During adverse conditions, reduce throttle and/or adjust trim to maintain control. Failure to comply may result in ejecting or otherwise serious injury of occupants.
- Operator must always announce sudden changes in throttle or steering to crew. Failure to comply may result in injury to personnel.

**OPERATION UNDERWAY - Continued**

1. Perform casting off or weighing anchor as necessary (WP 0008)(WP 0022).
2. Maintaining control of helm, slowly engage port (Figure 1, Item 1) and starboard (Figure 1, Item 2) throttles to safe operating speed.



O00009-f01

Figure 1. Port and Starboard Throttles.

3. Using multifunctional display, maintain plotted course (WP 0015).
4. Upon reaching speeds great enough to create wake, turn fuel tank vent blower to OFF position (WP 0005).
5. Upon reaching destination, gradually throttle down engines and bring boat to standstill.
6. Perform anchoring or mooring procedures as necessary (WP 0008)(WP 0022).

## TRIMMING ENGINES

### CAUTION

Do not over trim the outboard engines while underway. Over trimming will cause the propellers to exit the water. A rapid increase in the outboard engines rpms is evidence of cavitation or propellers coming out of the water. If this occurs immediately reduce throttles and trim down the engines. Failure to comply will result in damage to equipment.

The trim of the boat is the relationship between the angle of the outboard engines and the transom. Trim dictates the way the boat performs over the water and gains the greatest power and efficiency of the outboard engines as it relates to the boat. Different sea states will influence the trim levels to achieve the best planing and maneuverability of the boat.

### NOTE

When putting engines into trailering position either the trim control switch or the manual trim can be used.

1. When trimming the engines underway, trim both engines using only the trim control switch (Figure 2, Item 1).



000009-f02

Figure 2. Trim Control Switch.

2. When operating in shallow waters, trim engines UP and slow speed.
3. When accelerating, first ensure engines are trimmed fully DOWN. Then adjust trim of engines UP to achieve best boat handling .
4. If the bow is too low, the outboard engines are trimmed too far DOWN. Trim the engines UP to correct this situation.
5. If the bow is too high, the outboard engines are trimmed too far UP. Trim engines DOWN to correct this situation.

## END OF WORK PACKAGE



**OPERATOR INSTRUCTIONS  
OPERATING UNDER USUAL CONDITIONS SPOTLIGHT**

---

**INITIAL SETUP:**

**Personnel Required**

Diver 12D

**Equipment Condition**

House battery, control switches, and breakers  
powered ON (WP 0005)

---

**WARNING**

Operating the boat at night while spotlight is ON may impede operator's night vision.  
Ensure spotlight is always pointed away from operator. Failure to comply may result in  
injury or death to personnel.

**WARNING**

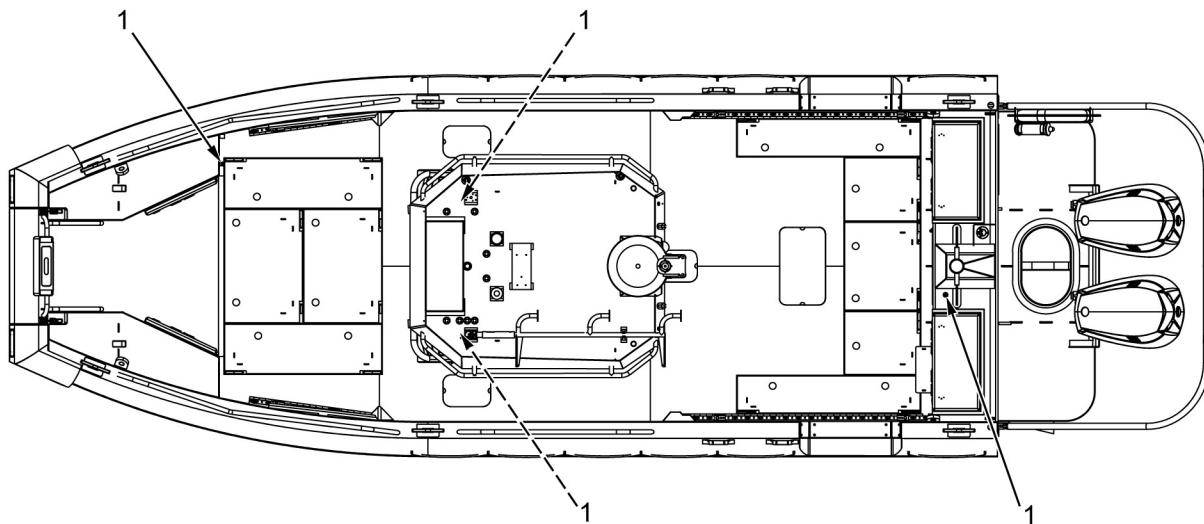
Halogen bulbs emit heat during use, avoid contact with bulb. Allow bulb to cool before  
handling. Failure to comply may result in injury to personnel.

**CAUTION**

Leaving communication, navigation, or lighting electronics in ON position while engines are  
not running can cause depletion of house battery bank. Failure to comply may cause  
equipment not to operate.

**General Information**

There are four receptacles for spotlight connection on the boat. One on aft transom, two on console, and one on starboard bow (Figure 1, Item 1).



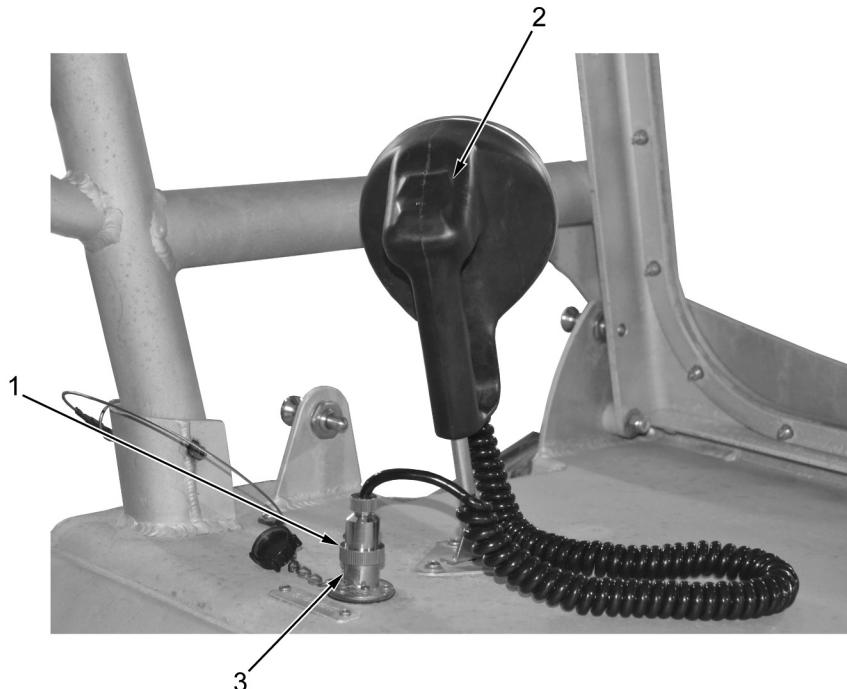
O00014-f01

Figure 1. Spotlight Receptacles.

**NOTE**

There are two posts for stationary spotlight operation on the boat. One on port side and one on starboard side of the console.

1. Connect spotlight plug (Figure 2, Item 1) to receptacle (Figure 2, Item 3).
2. Turn hand spotlight operating switch (Figure 2, Item 2) to ON position.



O00014-f02

Figure 2. Spotlight Operation Switch.

3. Turn spotlight operating switch (Figure 2, Item 2) to OFF position.
4. Disconnect spotlight plug (Figure 2, Item 1) from receptacle (Figure 2, Item 3).

**END OF WORK PACKAGE**



**OPERATOR INSTRUCTIONS  
OPERATING UNDER USUAL CONDITIONS LOUD SPEAKER AND SIREN**

---

**INITIAL SETUP:**

**Personnel Required**

Diver 12D

**Equipment Condition**

House battery, control switches, and breakers  
powered ON (WP 0005)

---

**WARNING**

Ensure all personnel in the vicinity of the speaker or siren wear personal protective equipment such as hearing protection when speaker or siren is being operated to prevent against potential noise hazards. Failure to comply may result in injury or death to personnel.

**CAUTION**

Leaving communication, navigation, or lighting electronics in ON position while engines are not running can cause depletion of house battery bank. Failure to comply may cause equipment not to operate.

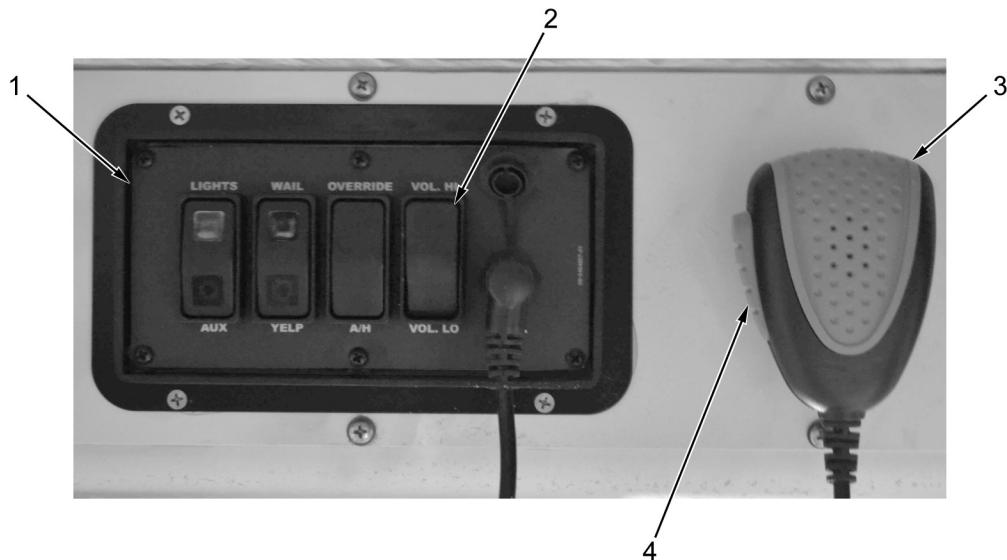
The loud speaker and siren is a three tone siren system featuring WAIL, YELP, and AIRHORN (A/H) functions.

1. Ensure microphone (Figure 1, Item 3) is connected to siren control panel (Figure 1, Item 1).
2. Select HI/LO volume button (Figure 1, Item 2) to adjust volume output.

#### NOTE

Depressing of microphone button will override all other siren functions. Release microphone button and any siren function selected will continue.

3. Depress microphone button (Figure 1, Item 4) and speak into microphone.



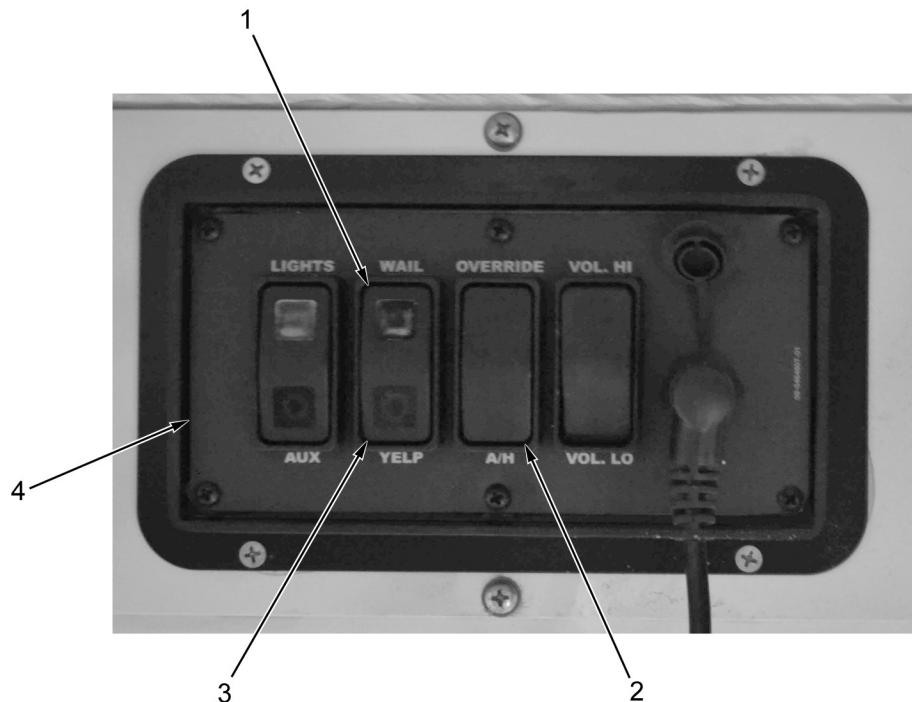
O00015-f01

Figure 1. Microphone and Control Panel.

**NOTE**

Depressing the override during the WAIL/YELP functions will change the pitch/tone of the siren.

4. Select WAIL (Figure 2, Item 1), YELP (Figure 2, Item 3) or A/H (Figure 2, Item 2) button on siren control panel (Figure 2, Item 4) to operate desired function.



O00015-f02

Figure 2. Control Panel Switches.

**END OF WORK PACKAGE**



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**OPERATOR INSTRUCTIONS  
OPERATING UNDER USUAL CONDITIONS VESSEL SYSTEM MONITOR**

---

**INITIAL SETUP:****Personnel Required**

Diver 12D

**Equipment Condition**House battery switch, breakers, control switches  
powered ON (WP 0005)**NOTE**

The Vessel System Monitor (VSM) is equipped with a backlight that turns on after a button is pressed.

The VSM (Figure 1) displays voltage status levels for house, port engine, and starboard engine batteries. When powered on the VSM will display the "System Summary". This display shows all three battery charge levels and can be used to monitor battery voltage levels.

The VSM can monitor other systems such as fuel and oil levels, however, these capabilities are NOT available and the VSM should NOT be used to monitor any system other than house, port engine, and starboard engine battery levels.



000017-f01

Figure 1. Vessel Systems Monitor.

**END OF WORK PACKAGE**



**OPERATOR INSTRUCTIONS  
OPERATING UNDER USUAL CONDITIONS MULTI-FUNCTION DISPLAY OVERVIEW**

---

**INITIAL SETUP:**

**Personnel Required**

Diver 12D

**Equipment Condition**

House battery, control switches, and breakers powered ON (WP 0005)

**References**

WP 0015  
WP 0017  
WP 0018  
WP 0037

---

**MULTI-FUNCTION DISPLAY OVERVIEW**

**CAUTION**

- Leaving communication, navigation, or lighting electronics in ON position while engines are not running can cause depletion of house battery bank. Failure to comply may cause equipment not to operate.
- Water drops on the screen can cause mis-operation and slow touch response. Ensure the screen is kept dry and free of debris.
- Multi-function display screen is made of glass. Do NOT use sharp objects, a stylus pen, or gloves to operate multi-function display.
- Failure to comply may result in damage to equipment.

**MULTI-FUNCTION DISPLAY OVERVIEW - Continued****Powering on Multi-Funtional Display****NOTE**

- The color of the power button changes according to its state. A green power button means the display is powered. An orange power button means the display is not powered but power is flowing to the display.
- When multi-function display powers on two beeps will sound and the startup screen will appear. After startup is completed a “navigation warning” screen will appear.

The multi-function display is equipped with a touch screen with multi-touch capacity. It is a networked navigation system with functions such as radar, plotter, and sonar. It has the ability to store 30,000 points and 200 routes.

1. Remove screen cover and press multi-function display power icon (Figure 1, Item 1).



000018-f01

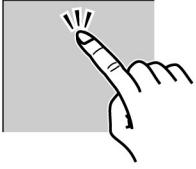
Figure 1. Display Power Button.

**NOTE**

After selecting “OK” on the navigation warning window the multi-function display will open up to the last used display.

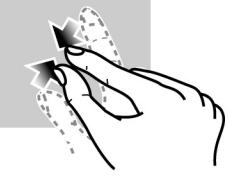
2. Read the navigation warning and select “OK”.

## Multi-Function Display Touchscreen Operation

		Function
Tap		<u>Short tap</u> <ul style="list-style-type: none"> <li>Select a menu item.</li> <li>Select an object or position to display the corresponding pop-up menu.</li> </ul> <u>Long tap</u> <ul style="list-style-type: none"> <li>Edit display icon (on home screen).</li> </ul>
Drag		<ul style="list-style-type: none"> <li>Pan the charts.</li> <li>Scroll the menu.</li> </ul>

000018-f02

Figure 2. Operation with One Finger.

Operation with two fingers		Function
Pinch	 Zoom in  Zoom out	<ul style="list-style-type: none"> <li>Zoom in or out the display range in the 2D/3D modes or weather display.</li> <li>Select radar range on the radar display.</li> </ul>
Tap		Do the function assigned to [Function Gesture], which is in the ([Settings] - [General] menu.

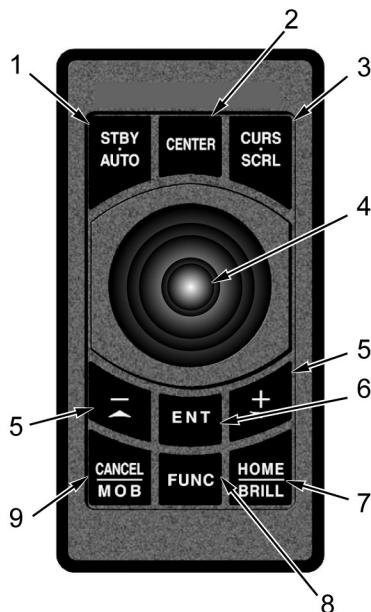
000018-f03

Figure 3. Operation with Two Fingers.

## Multi-Function Display Remote Control Operation

The remote control allows the user to operate the multi-function display without touching the screen. A cursor marks the current selection on the screen.

## Multifunction Display Remote Control Operation - Continued



O00018-f04

Figure 4. Multi-Function Remote.

**Table 1. Multi-Function Remote.**

No.	Key	Function
1	<b>STBY•AUTO</b>	Function not available.
2	<b>CENTER</b>	Returns own ship to the center of the screen (Plotter/Radar display). Cancels the echo history (Sonar display).
3	<b>CURS•SCRL</b>	Switches the joystick gesture between the cursor mode and scroll mode.
4	<b>JOYSTICK</b>	<u>Short push:</u> Works same as tap gesture. Opens the pop-up menu. Activates the item selected by the cursor. <u>Operated the Joystick:</u> <b>Cursor mode operation:</b> Moves the cursor. <b>Scroll mode operation:</b> Pans the display (Plotter/Radar display). Shifts the range and scrolls back the picture (Sonar display).
5	<b>+ , -</b>	Selects an item from slide-out/main/pop-up menu. Zooms in (+) and out (-).
6	<b>ENT</b>	Activate a selected item. Swipe function: Opens the slide-out menu, [Layers] menu, data area, quick page.
7	<b>HOME/BRILL</b>	<u>Short push:</u>

## Multi-Function Display Remote Control Operation - Continued

**Table 1. Multi-Function Remote - Continued.**

		Opens the home screen. <u>Long push:</u> Opens the [Power & Brilliance] window.
8	<b>FUNC</b>	Does the function set at [Function Gesture].
9	<b>CANCEL/MO B</b>	<u>Short push:</u> Closes the menu or dialog box. Stops the aural alarm. Ends the tool mode (End Route, End Move, etc.). <u>Long Push:</u> Enters the Man Over Board (MOB) mark at the ship's position.

## Multi-Function Display Home Screen Operation

The home screen displays time/date, sensor icons and statuses, display icons, and functions.

### NOTE

The home screen is automatically closed, and the previous operation display is restored when no operation is detected for approximately 60 seconds.

1. Tap the "Home" icon (Figure 5, Item 1) at the top left corner of any operation screen to display the home screen.



000018-f05

Figure 5. Home Screen Icon.

2. The sensor icons (Figure 6) in the top right corner of the home screen show the sensors connected and their status by color.
  - White: Sensor normal
  - Red: Sensor error
  - Gray: Sensor inactive

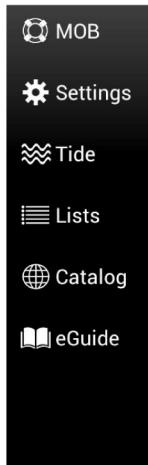


000018-f06

Figure 6. Sensor Icons.

## Multi-Function Display Home Screen Operation - Continued

3. The functions list (Figure 7) on the left side of the home screen display six features.



O00018-f07

Figure 7. Functions List.

**Table 2. Functions List.**

Name	Function
<b>MOB:</b>	Enters a Man Over Board (MOB) mark (to mark man over board location on the plotter and radar displays (WP 0037)).
<b>Settings:</b>	Menus (general, plotter, radar, sounder) for customization of the system.
<b>Tide:</b>	Function not available.
<b>Lists:</b>	Accesses the points, routes, and alarms lists.
<b>Catalog:</b>	Opens the list of charts installed.
<b>eGuide:</b>	Opens abbreviated operators manual.

4. Tap the “Plotter” icon (Figure 8) on the home screen to open the “Plotter” operation display (WP 0015).
5. Tap the “Home” icon to return to home screen.
6. Tap the “Radar” icon (Figure 8) on the home screen to open the “Radar” operation display (WP 0017).
7. Tap the “Home” icon to return to home screen.
8. Tap the “Sonar” icon (Figure 8) on the home screen to open the “Sonar” operation display (WP 0018).
9. Tap the “Home” icon to return to home screen.

## Multi-Function Display Home Screen Operation - Continued



O00018-f08

Figure 8. Display Icons.

## Multi-Function Display Hidden Functions

### NOTE

The five hidden display functions are only available when one of the Operational displays Radar, Sonar and Plotter are opened.

When using the multi-function display in any of the operation displays there are five functions that are normally hidden from view; quick page, slide-out menu, pop-up menu, layers menu, and data area. The hidden function windows can be hidden at any time by tapping on the screen outside of the window.

### NOTE

The quick page menu allows the selection of the operation display icons that are available on the home screen.

1. If display is not on the "Home screen" tap the "Home" icon (Figure 9, Item 1) at the top left corner of any operation screen to display the home screen then select the desired display icon.



O00019-f02

Figure 9. Home Icon.

2. From the home screen tap the plotter, radar, or sonar icon (Figure 10).

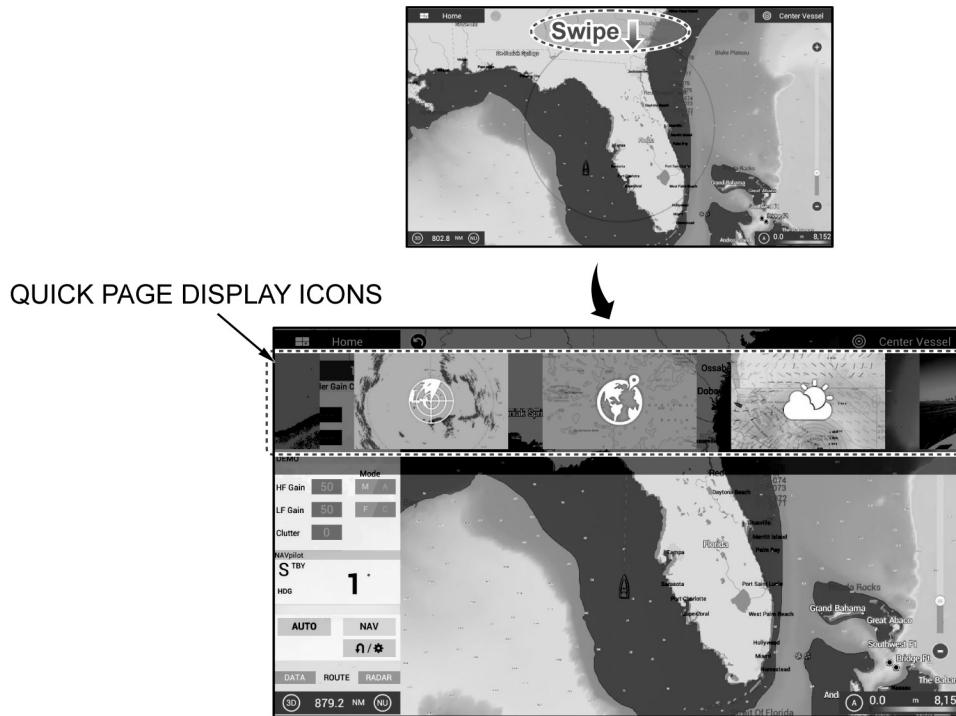


O00018-f08

Figure 10. Display Icons.

## Multi-Function Display Hidden Functions - Continued

3. Swipe from the top of the screen to the bottom to open the “Quick page” window (Figure 11).
4. Tap plotter, radar, or sonar display icons (Figure 11) to open their corresponding operational display.



O00018-F09

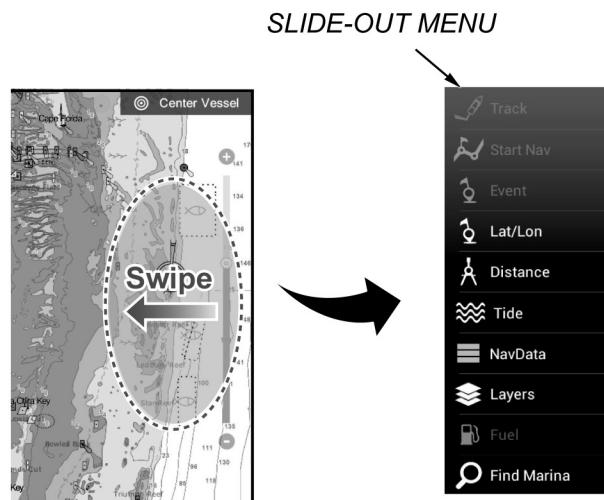
Figure 11. Quick Page Function.

### NOTE

The slide-out menu provides quick access to often-used functions in the operation display that is currently being viewed. The color of the function name changes according to its status. Unavailable functions are grayed out.

5. Swipe from the right of the screen to the left to open the “Slide-out menu” window (Figure 12).
6. Tap any of the functions (Figure 12) to open their corresponding function display.

### Multi-Function Display Hidden Functions - Continued



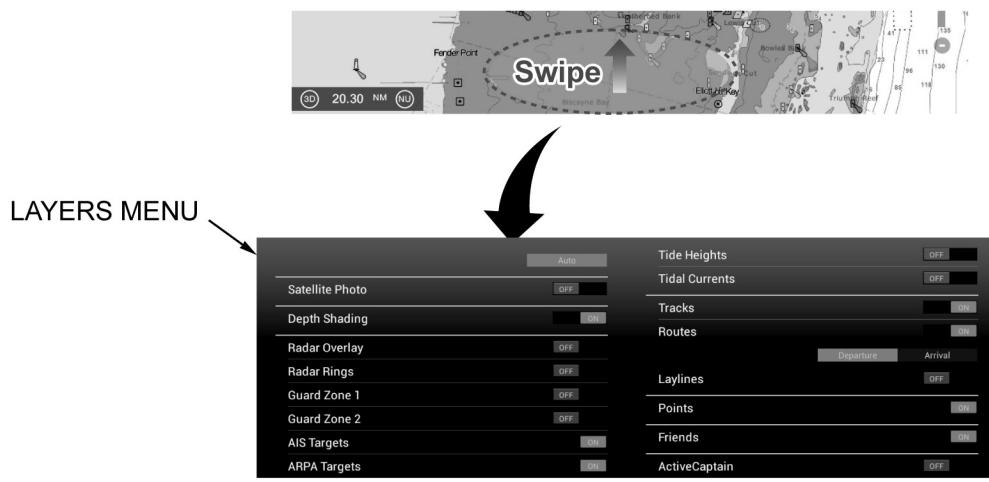
O00018-F10

Figure 12. Slide-Out Menu.

### NOTE

The layers menu controls the items that are displayed on the top layer of the active display. Unavailable functions are grayed out.

7. Swipe from the bottom of the screen to the top to open the “Layers menu” window and tap any of the functions (Figure 13) to open their corresponding function display.



O00018-F11

Figure 13. Layers Menu.

**Multi-Function Display Hidden Functions - Continued****NOTE**

The data area window shows various navigation data. Data availability will depend on the systems configuration.

8. Swipe from the left of the screen to the right to open the “Data area” window (Figure 14).

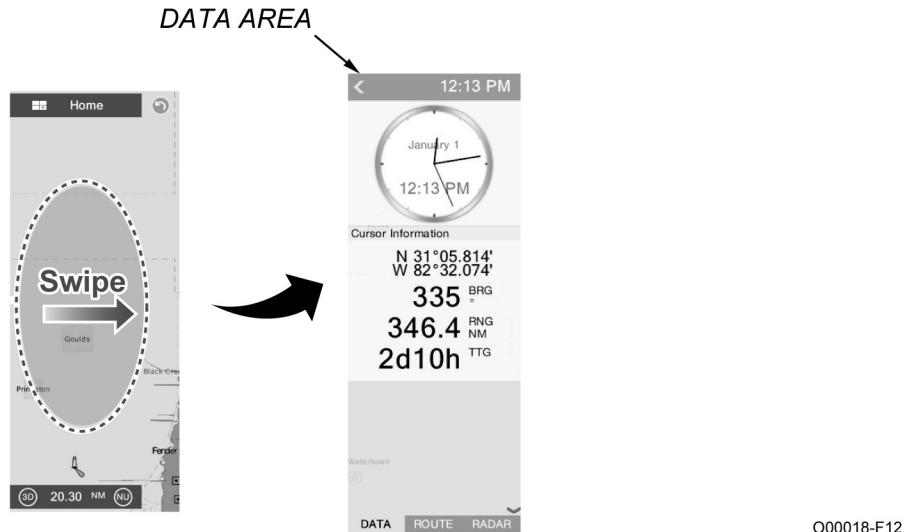


Figure 14. Data Area.

**NOTE**

The pop-up menu provides a subset of functions that are relevant to the object or location tapped. Unavailable functions are grayed out.

9. Tap anywhere on the screen to open the “Pop-up menu” window.
10. Tap any of the functions (Figure 15) to open their corresponding function display.

### Multi-Function Display Hidden Functions - Continued

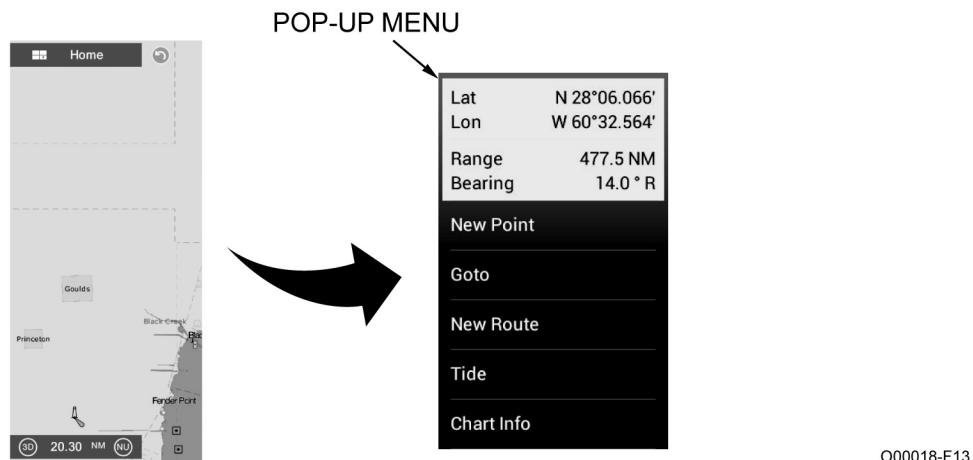


Figure 15. Pop-up Menu

### Multi-Function Display Split Screen Operation

The multi-function display has the ability to split the screen to show one, two, or three operation displays at the same time by adding a new display icon to the home screen.

1. Tap the “Home” icon (Figure 16, Item 1) at the top left corner of any operation screen to display the home screen.



Figure 16. Home Screen Icon.

### NOTE

A maximum of 16 display icons are allowed on the home screen. If the add icon is not visible on the home screen too many display icons exists. A long hold on any of the display icons will allow them to be deleted.

2. Tap the “+” icon on the home screen display to open the split screen setup window.

**Multi-Function Display Split Screen Operation - Continued**

3. Tap the desired split screen from the left side menu (Figure 17).

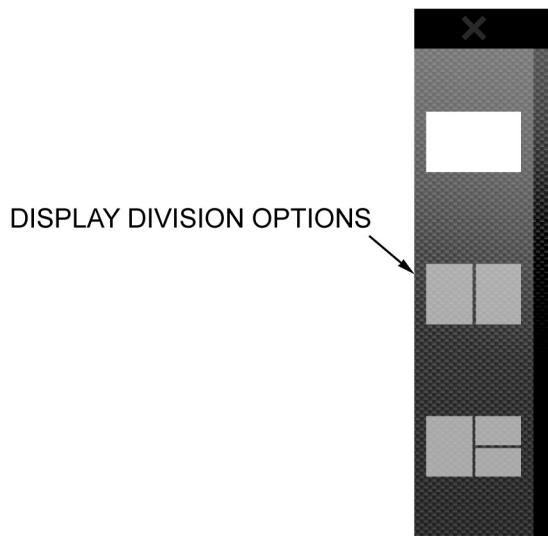


Figure 17. Display Division Options.

4. Drag the desired display icon from the right side menu (Figure 18) onto the desired screen.

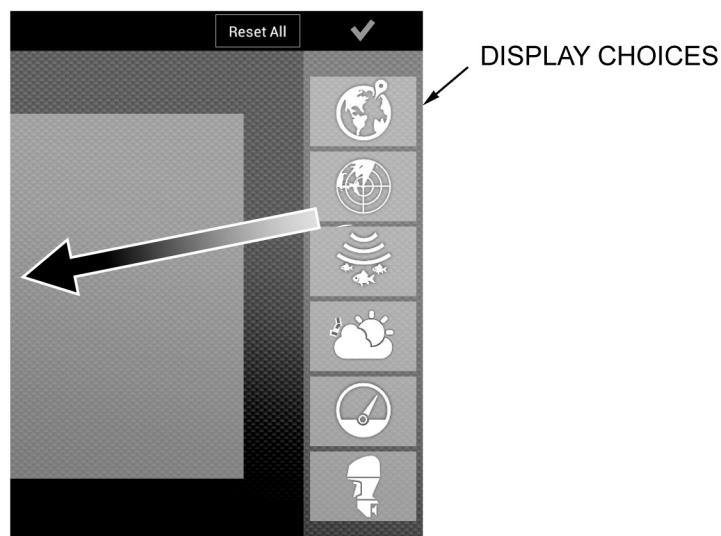


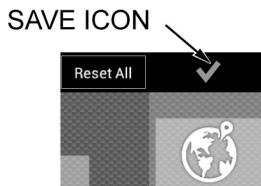
Figure 18. Split Screen Display Icons.

**NOTE**

After saving the split screen arrangement, it will be opened on the screen and the display icon will be saved to the home screen.

**Multi-Function Display Split Screen Operation - Continued**

5. Tap the “save” icon (Figure 19) in the upper right hand corner of the screen to save the split screen display



O00018-F16

Figure 19. Save Icon.

**Multi-Function Display Locking/Un-Locking Screen****NOTE**

The touchscreen can be locked to prevent unintentional operation.

1. Press the multi-function display power icon (Figure 20, Item 1) to open the “POWER & Brilliance” window.

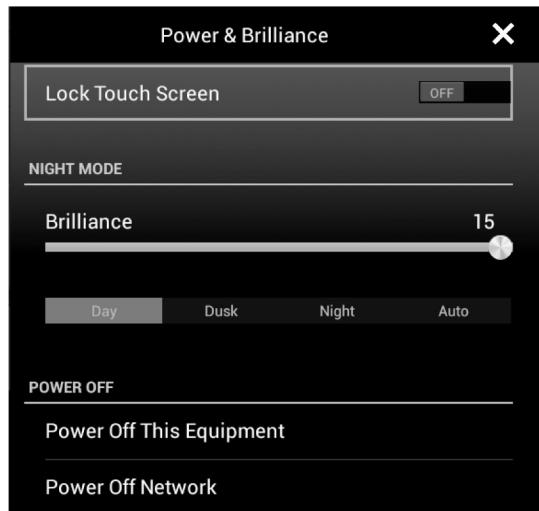


O00018-f01

Figure 20. Power Icon.

**Multi-Function Display Locking/Un-Locking Screen - Continued**

2. Set the “Lock Touch Screen” flip switch (Figure 21) to the ON position to lock the screen.
3. Set the “Lock Touch Screen” flip switch (Figure 21) to the OFF position to unlock the screen.
4. Select the “X” icon (Figure 21) to close the “Power & Brilliance” window.



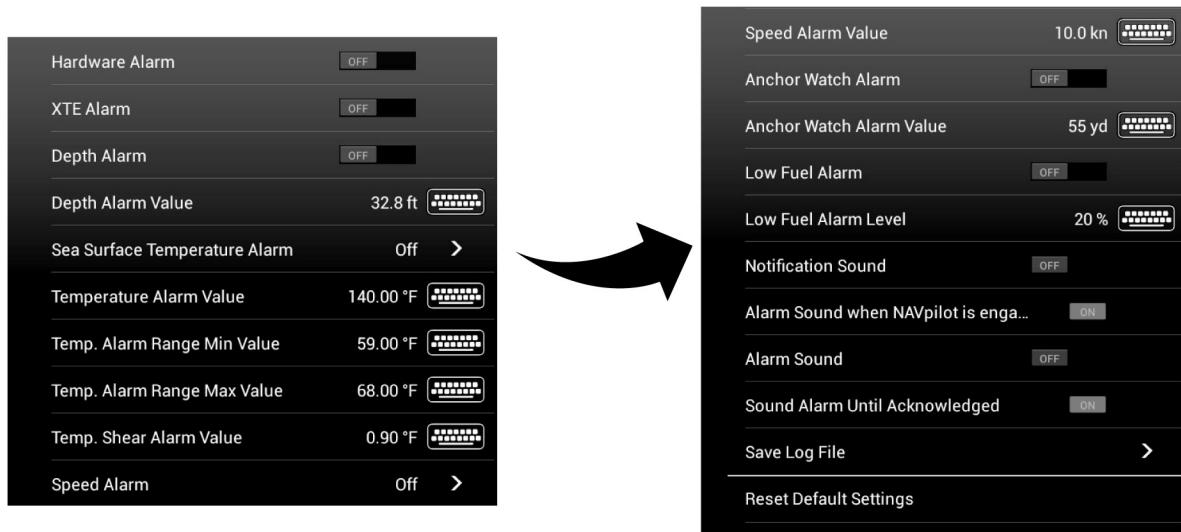
O00018-F17

Figure 21. Power and Brilliance Menu.

**Multi-Function Display Alarm Operation**

The multi-function display has the ability to set various alarms including; anchor watch alarm, depth alarm, sea surface temperature alarm, and speed alarm. When an alarm is generated, the alarm flashes in the status bar at the top of the screen and the multi-function display will beep. The bar and text color change depending on the alert category. Red bar and yellow text is a warning (alarm violation, equipment error, etc.). Yellow bar and black text is a caution (system messages, etc.). The beeping and flashing can be silenced by tapping the bar. The alert in the status bar will remain until the cause for the alert is removed.

## Multi-Function Display Alarm Operation - Continued



O00018-f18

Figure 22. Alarm Menu.

**Table 3. Alarm Menu.**

Alarm Name	Function
<b>Hardware Alarm:</b>	Option not available.
<b>Depth Alarm:</b>	Signals an alert when the depth to the sea bottom is shallower than the value set.
<b>Sea Surface Temperature Alarm:</b>	Signals an alert when the sea surface temperature is over, under, within, or out of range of the temperature value set.
<b>Speed:</b>	Signals an alert when the speed of the boat is over or under the limit set.
<b>Anchor Watch Alarm:</b>	Signals an alert when the boat has moved a greater distance than the set value when the boat must not be moving.
<b>Low Fuel Alarm:</b>	Option not available.

**Multi-Function Display Alarm Operation - Continued**

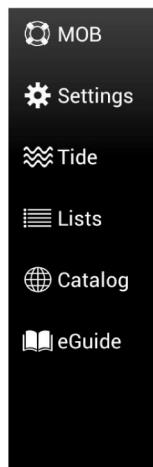
1. Tap the "Home" icon (Figure 23, Item 1) at the top left corner of any operation screen to display the home screen.



O00018-f05

Figure 23. Home Icon.

2. Tap "Settings" (Figure 24) in the "Functions" list (Figure 24) on the left side of the home screen.



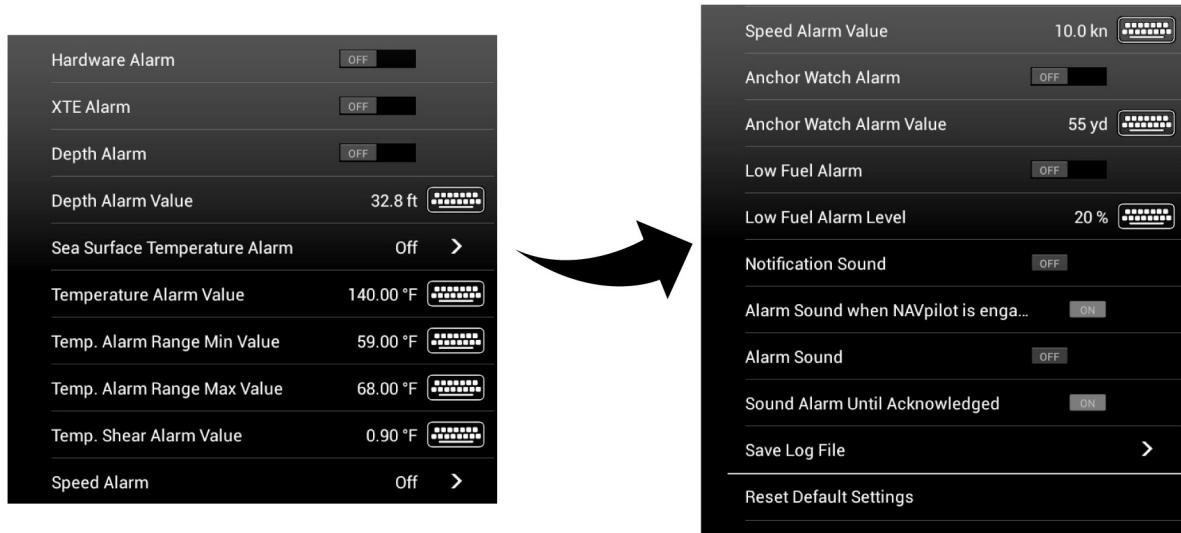
O00018-f07

Figure 24. Functions List.

3. Tap "Alarm" in the "Settings" list on the left side of the screen.
4. Set the "OFF/ON" flip switch (Figure 25) to the ON position to turn on the desired alarm.

**Multi-Function Display Alarm Operation - Continued**

5. Set the “OFF/ON” flip switch (Figure 25) to the OFF position to turn off the desired alarm.
6. Tap the “value” (Figure 25) icon of the desired alarm.



O00018-f18

Figure 25. Alarm Settings Menu.

7. Using the keyboard, input the desired value for the alarm.

**Multi-Function Display Alarm Operation - Continued**

8. Tap the “save” icon (Figure 26) to set the desired alarm value.



Figure 26. Save Icon.

9. Tap the “X” icon to close the window.

**Powering Off Multi-Function Display****CAUTION**

Do not turn off multi-function display during start-up. Wait until start-up is complete before powering off. Failure to comply may result in damage to equipment.

1. Press multi-function display power icon (Figure 27, Item 1) to open the “Power & Brilliance” window.

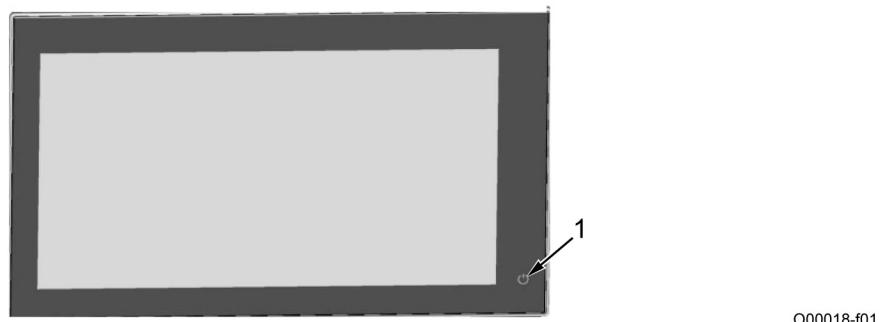
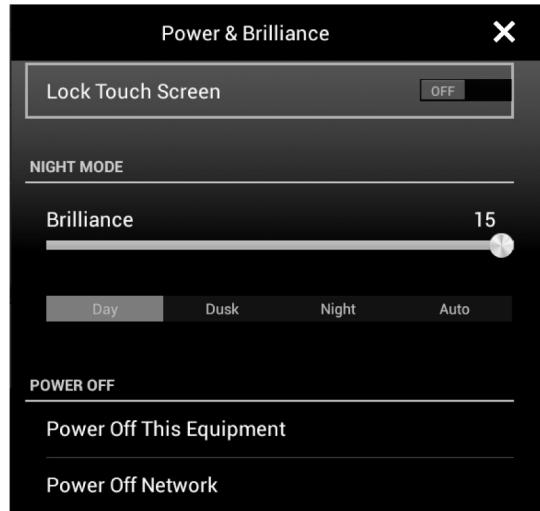


Figure 27. Power Icon.

**Powering Off Multi-Function Display - Continued****NOTE**

Fifteen seconds after the screen goes blank, the power turns off.

2. Select “Power Off This Equipment” (Figure 28) and then select “OK”.



O00018-F17

Figure 28. Power and Brilliance Menu.

3. If power cannot be turned off or the display freezes, select and hold the power icon approximately 10 seconds until the screen goes blank.
4. Install cover on screen.

**END OF WORK PACKAGE**



**OPERATOR INSTRUCTIONS  
OPERATING UNDER USUAL CONDITIONS NAVIGATION PLOTTER OPERATION**

---

**INITIAL SETUP:**

**Personnel Required**

Diver 12D

**Equipment Condition**

Multi-Function Display Powered ON (WP 0014)

---

**CAUTION**

- Leaving communication, navigation, or lighting electronics in ON position while engines are not running can cause depletion of house battery bank. Failure to comply may cause equipment not to operate.
- Water drops on the screen can cause mis-operation and slow touch response. Ensure the screen is kept dry and free of debris.
- Multi-function display screen is made of glass. Do NOT use sharp objects, a stylus pen, or gloves to operate multi-function display.
- Failure to comply may result in damage to equipment.

The multi-function display is equipped with a plotter function which receives its position data from a built in GPS receiver. The plotter provides a small world map where points and routes can be created, deleted, and edited. The position of the boat is marked on the screen with a boat icon. The plotter display (Figure 1) is a general representation of what is displayed during operation. Graphics and functions of plotter will vary depending on mode of operation.

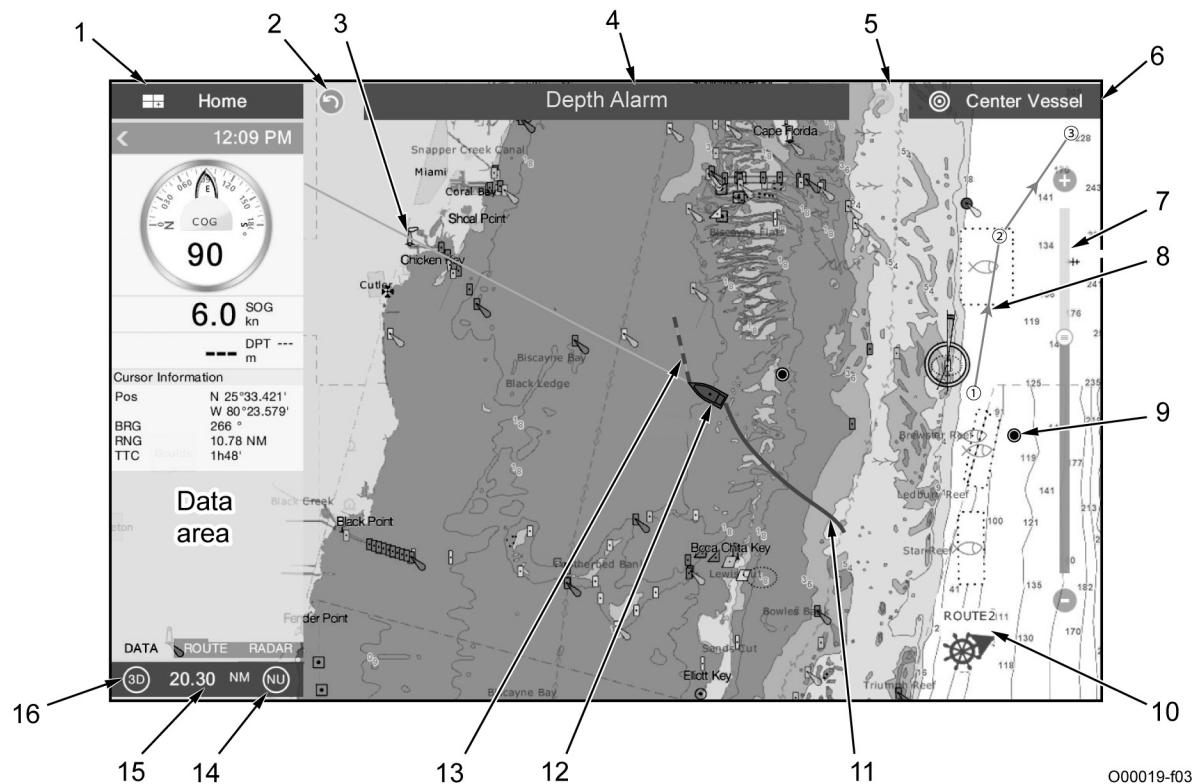


Figure 1. Plotter Display.

Table 1. Plotter Display.

Item No	Key Name	Function
1	<b>Home Icon:</b>	Displays time/date, sensor icons and statuses, display icons, and functions.
2	<b>Undo Icon:</b>	Reverses last change done.
3	<b>Heading Line:</b>	Indicates the boats heading in all orientation modes.
4	<b>Status Bar:</b>	Displays alerts of equipment status. The bar and text color change depending on the alert category. Red bar and yellow text is a warning (alarm violation, equipment error, etc.). Yellow bar and black text is a caution (system messages, etc.). When an alert exists, the multi-function display will beep, the alert will appear in the status bar, and the status bar will flash. The beeping and flashing can be silenced by tapping the bar. The alert in the status bar will remain until the cause for the alert is removed.

**Table 1. Plotter Display - Continued.**

5	<b>Redo Icon:</b>	Restore the undo action.
6	<b>Return Own Ship to Screen Center:</b>	Return the display with boat oriented in the center of screen.
7	<b>Slide Bar:</b>	Adjusts the display range. Top of slider bar is zoomed in and bottom of slider bar is zoomed out.
8	<b>Inactive Route (expanded):</b>	A route that is not currently selected.
9	<b>Point:</b>	A location marked on the plotter.
10	<b>Inactive Route (Sleeping):</b>	A route that is not currently selected.
11	<b>Track:</b>	Displays the boats movement over time.
12	<b>Boat Icon:</b>	The boat icon is displayed in red and marks the current position of the boat and moves with the boats movement.
13	<b>COG (Course Over Ground)</b>	The COG line is a dotted line that runs from the boat icon and points in the direction the boat is moving.
14	<b>Orientation Mode Switch:</b>	Change the orientation of the plotter to show a “head-up” or “north-up” orientation.
15	<b>Chart Range:</b>	Displays the range displayed in nautical miles.
16	<b>2D/3D Switch:</b>	Change the display of the plotter chart to display 2D or 3D.

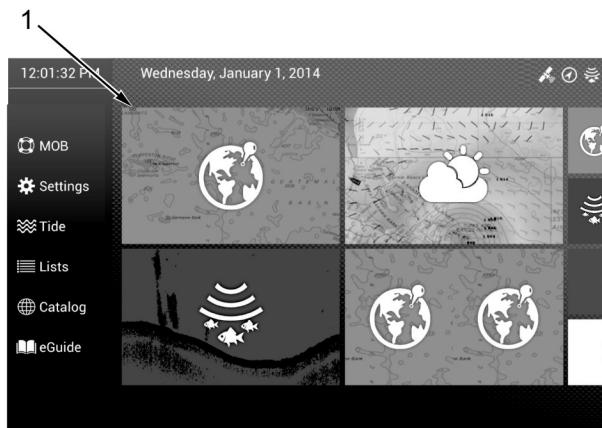
1. If display is not on the “Home screen”, tap the “Home” icon (Figure 2, Item 1) at the top left corner of any operation screen to display the home screen then select the desired display icon.



000019-f02

Figure 2. Home Icon.

2. From the "Home screen", tap the "Plotter" display icon (Figure 3, Item 1).

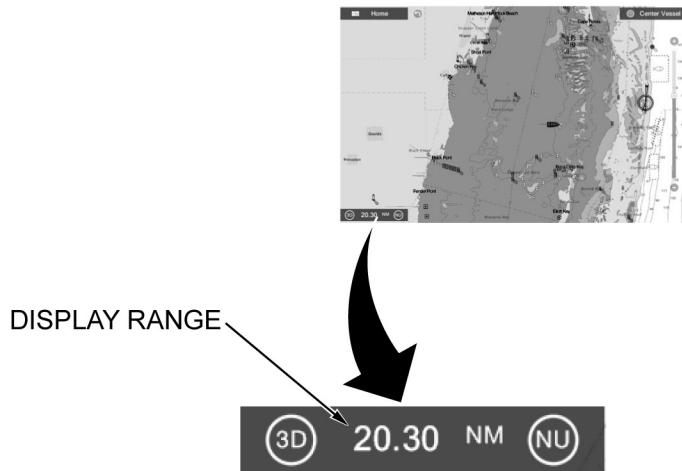


O00019-f01

Figure 3. Plotter Display Icon.

#### Adjusting Display Range of Plotter

The display range of the plotter can be adjusted to change the amount of information shown. The selected range (Figure 4) appears in the box at the bottom left corner of the screen.

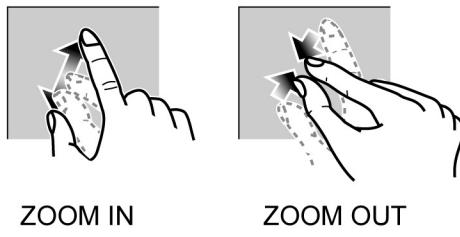


O00019-f04

Figure 4. Plotter Display Range.

**Adjusting Display Range of Plotter - Continued**

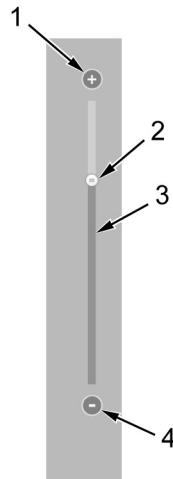
1. To zoom in and out on the plotter display using fingers, use two fingers in a pinching manner (Figure 5).



O00019-f05

Figure 5. Zooming Gestures.

2. To zoom in and out on the plotter display using the slider bar (Figure 6, Item 3) and a finger, drag the slider (Figure 6, Item 2) up to zoom in or down to zoom out.
3. To zoom in and out on the plotter display using the slider bar (Figure 6, Item 3) and the "+" or "-" icons, tap the "+" icon (Figure 6, Item 1) to zoom in or tap the "-" icon (Figure 6, Item 4) to zoom out.



O00019-f07

Figure 6. Zoom Slider.

### Adjusting Orientation of Plotter

The orientation of the plotter can be adjusted to be shown in a “head-up” or “north-up” orientation while the boat is underway. A “north-up” orientation displays the plotter chart with north at the top of the screen. A “head-up” orientation displays the plotter chart with the current compass heading at the top of the screen. The selected orientation appears in the box at the bottom left corner of the screen.

1. To change the orientation of the plotter, tap the “orientation mode switch” (Figure 7) to open the orientation mode menu.
2. Tap the desired orientation mode (Figure 7).

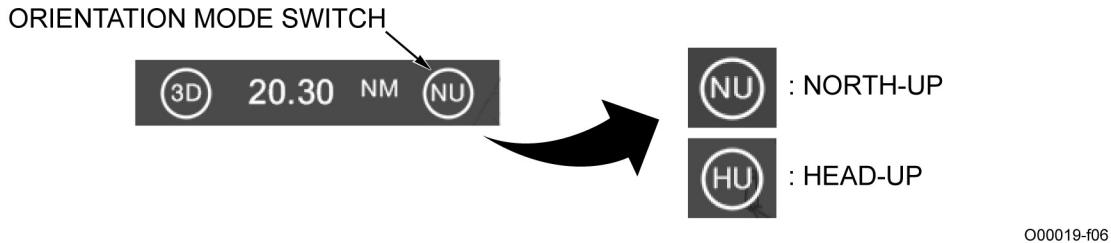


Figure 7. Plotter Orientation Settings.

**END OF WORK PACKAGE**

**OPERATOR INSTRUCTIONS  
OPERATING UNDER USUAL CONDITIONS NAVIGATION POINTS AND ROUTES**

---

**INITIAL SETUP:**

**Personnel Required**

Diver 12D

**Equipment Condition**

Multi-function display powered ON (WP 0014)

---

**CAUTION**

- Leaving communication, navigation, or lighting electronics in ON position while engines are not running can cause depletion of house battery bank. Failure to comply may cause equipment not to operate.
- Water drops on the screen can cause mis-operation and slow touch response. Ensure the screen is kept dry and free of debris. Failure to comply could result in damage to equipment.
- Multi-function display screen is made of glass. Do NOT use sharp objects, a stylus pen, or gloves to operate multi-function display. Failure to comply may result in damage to equipment.

## POINTS

The multi-function display has the ability to mark points in the plotter operation. A point is a marked location of importance used as a destination or reference during navigation. When a point is entered it will appear on the screen as a default black circle in a yellow circle. The position of the point, symbol, and color information are saved to the "Points List".

### Entering A Point From Plotter

A point can be entered on the plotter display using the selected position method or the coordinate method. The coordinate method will provide the most accurate location of a point.

1. If display is not on the "Home screen", tap the "Home" icon (Figure 1, Item 1) at the top left corner of any operation screen to display the home screen then select the plotter icon.



Figure 1. Home Screen Icon.

2. From the "Home screen", tap the plotter icon (Figure 2, Item 1).

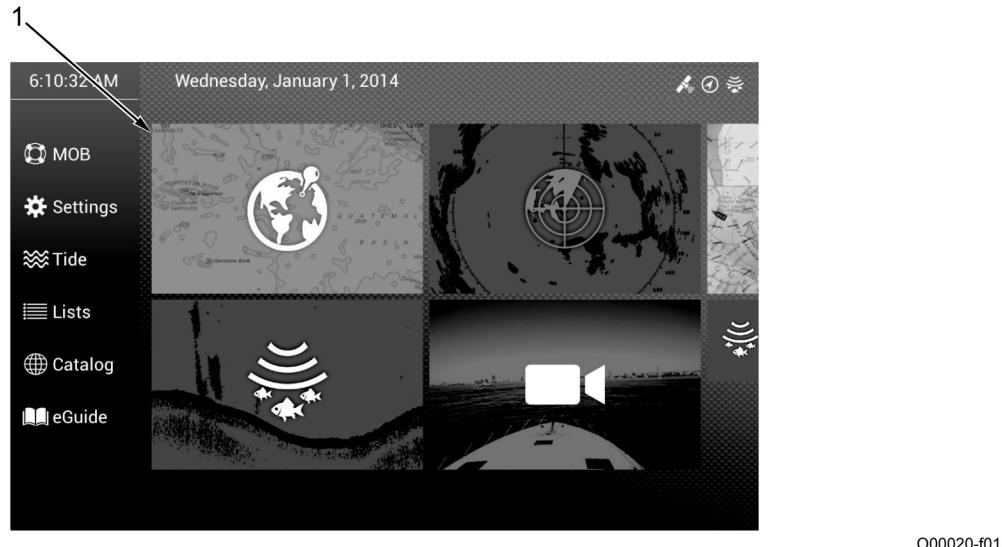


Figure 2. Home Screen.

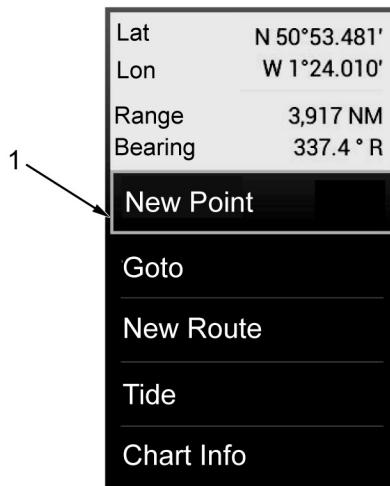
**Entering A Point At Selected Position**

1. From the plotter display, tap the position on the screen where the point is desired to open the “pop-up” menu.

**NOTE**

The new point will automatically be saved to the “points list” and the default point symbol will be used.

2. Tap “New Point” (Figure 3, Item 1) on the “pop-up” menu.



000020-f03

Figure 3. New Point.

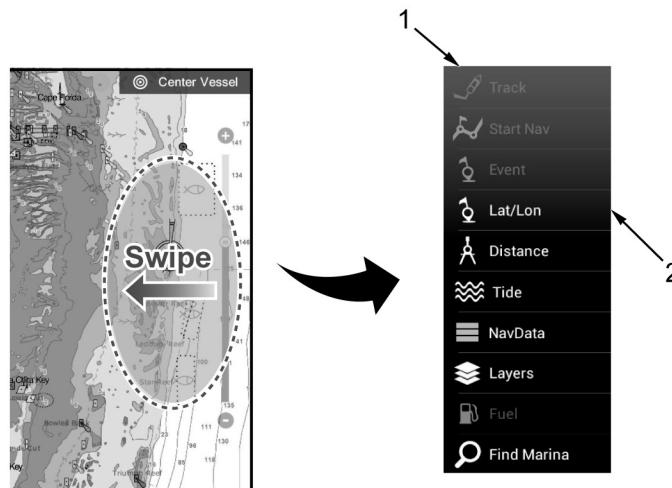
**Entering A Point Using Coordinates**

1. From the plotter display, swipe from the right edge of the screen to the left to open the “Slide-out menu” window (Figure 4, Item 1).

**NOTE**

The default position shown in the “Lat/Lon” menu is the current position of the boat.

2. Tap the “Lat/Lon” function (Figure 4, Item 2) on the “slide-out” menu (Figure 4, Item 1).



000020-f04

Figure 4. Lat/Lon Menu.

3. Using the numeric keyboard, enter the desired coordinates of the new point.

### Entering A Point Using Coordinates - Continued

- Once the desired coordinates have been entered, tap the “Save” icon (Figure 5, Item 1).

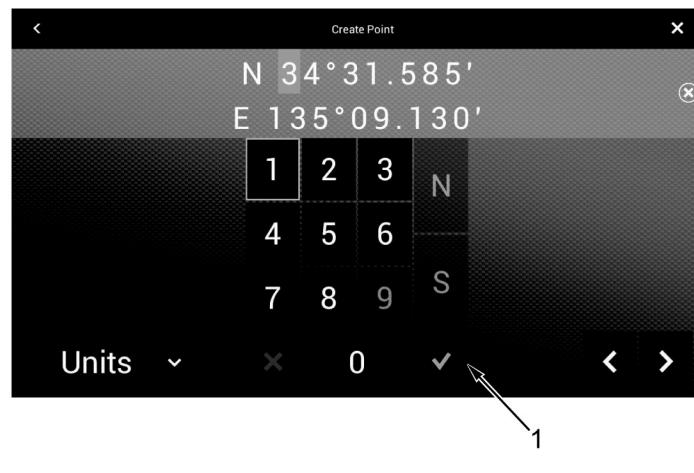


Figure 5. Numeric Keyboard.

### Displaying Point Information

- From the plotter display, tap the point icon desired to open the “point information” menu (Figure 6, Item 1).
- Tap outside of the “point information” menu (Figure 6, Item 1) to close it.

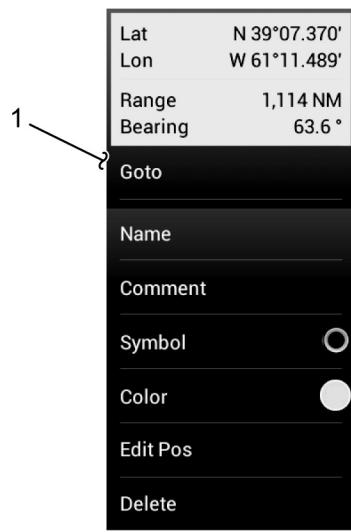


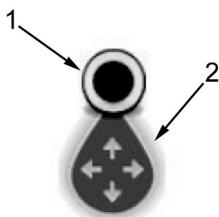
Figure 6. Point Information Menu.

## Moving A Point

A point on the plotter display can be moved using the long hold method or the edit position method. The edit position method will provide the most accurate location of a point.

### Moving A Point Using The “Long Hold” Option

1. From the plotter display, select and hold the desired point for approximately two seconds. A cursor (Figure 7, Item 2) below the point icon (Figure 7, Item 1) will appear.



000020-f07

Figure 7. Point Movement Cursor.

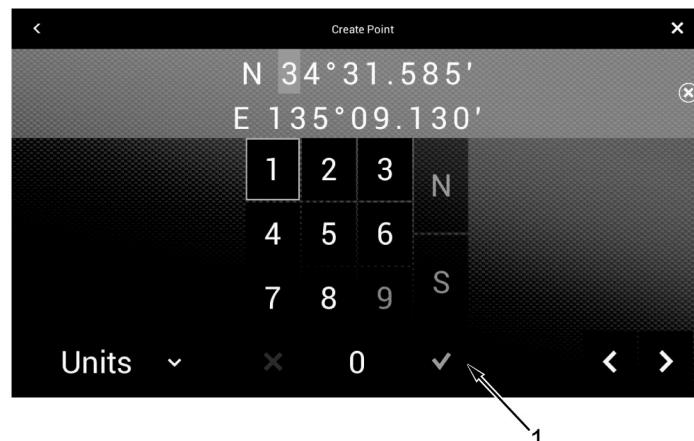
2. Drag and drop the selected point to the desired location.
3. Tap “End Move” at the top right hand corner of the screen to save the new location.

### Moving a Point Using The “Edit Pos” Option

1. From the plotter display, tap the point icon desired to open the “point information” menu.
2. Tap the “Edit Pos” option to manually input a desired coordinate.
3. Using the numeric keyboard, enter the desired coordinates of the new point location.

### Moving a Point Using The “Edit Pos” Option - Continued

- Once the desired coordinates have been entered, tap the “save” icon (Figure 8, Item 1).

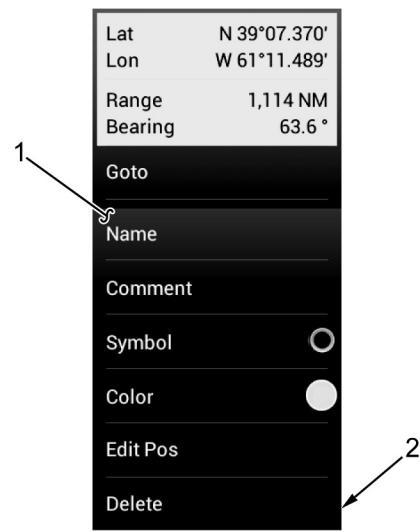


O00020-f05

Figure 8. Numeric Keyboard.

### Deleting A Point

- From the plotter display, tap the point icon desired to open the “Point Information” menu (Figure 9, Item 1).
- Scroll down and tap the “Delete” option (Figure 9, Item 2).

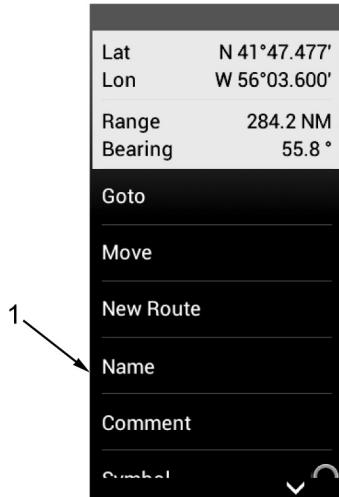


O00020-f08

Figure 9. Points Information Menu.

## Editing A Point

1. A point on the plotter display can be edited to create, change, or delete the name of a point.
2. From the plotter display, tap the point icon desired to open the “point information” menu (Figure 10, Item 1).
3. To change the name of a point, tap “Name” (Figure 10, Item 2) on the “point information” menu.



000020-f10

Figure 10. Point Information Menu.

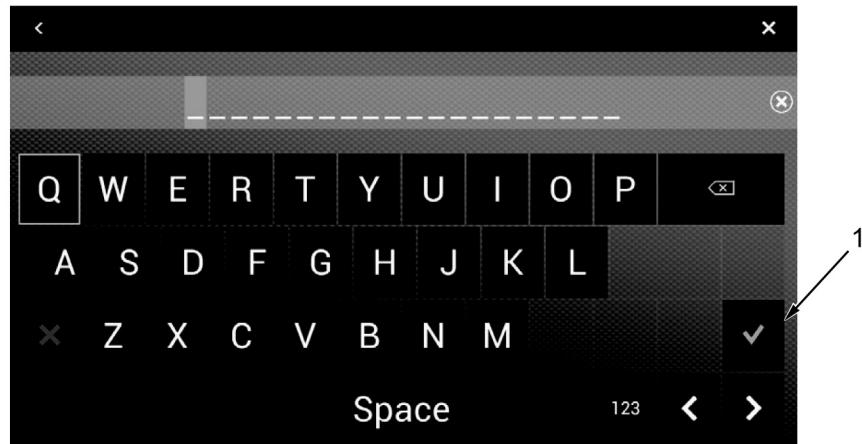
## NOTE

The maximum name length of a point is 20 characters.

4. Using the keyboard input the desired name of the point.

**Editing A Point - Continued**

5. Tap the “save” (Figure 11, Item 1) icon.



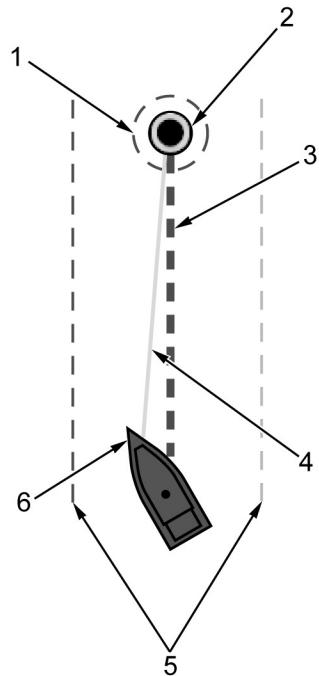
000020-f11

Figure 11. Keyboard Menu.

## Navigating To A Point

### CAUTION

Before beginning navigation to a point ensure the path is clear. Zooming in on the plotter chart can help identify hazards that appear on a smaller scale. Failure to comply may result in damage to equipment.



000020-f12

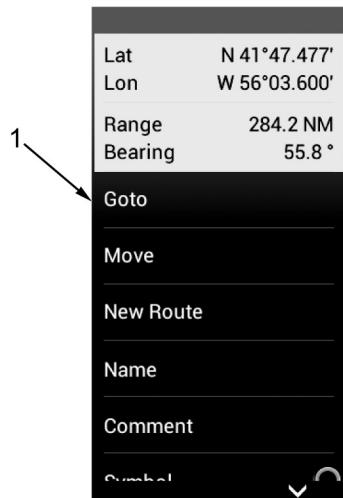
Figure 12. Navigation Screen.

**Table 1. Navigation Screen.**

Key	Graphic Icon	Function
1	Dashed Circle	Denotes arrival area for route.
2	Go To Point Icon	Active point boat is navigating towards.
3	Red Dashed Line	Course to first route point.
4	Yellow Line	Shortest course from the current position to the go-to point.
5	XTE (Cross Track Error) Lines	Green for starboard, red for port.
6	Boat Icon	Displays current position.

### Navigating To A Point Using The Plotter

1. From the plotter display, tap the point icon desired to open the “point information” menu.
2. Tap the “Goto” (Figure 13, Item 1) option.

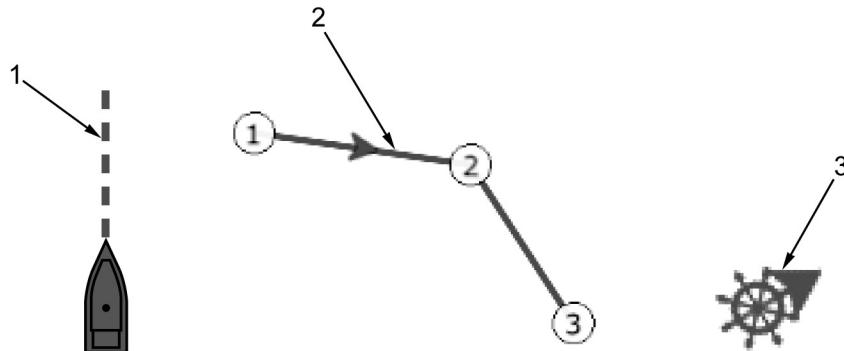


O00020-f13

Figure 13. Point Information Menu.

## ROUTES

The multi-function display has the ability to create routes in the plotter operation. A route is a series of points leading to a destination. When a route is followed the multi-function display automatically switches route points and provides relevant navigation data.



000020-f14

Figure 14. Route Icons.

**Table 2. Route Icons.**

Key	Graphic Icon	Function
1	Active Route	A route being used as navigation and is displayed as a red dashed line.
2	Inactive Route	A route not being used for navigation and is displayed as blue line.
3	Sleeping Route	When there are multiple inactive routes they are displayed with the sleeping icon.

### Creating A New Route

Creating a new route is the process of using points in the plotter display to create a route to connect from the starting point to the destination point and all points in between.

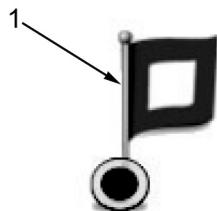
**Creating A New Route - Continued**

1. From the plotter display using points created, tap the point icon desired to be the route start point and open the “point information” menu.

**NOTE**

The route information window is hidden behind the status bar when an alarm message appears.

2. Tap the “New Route” option. A flag icon (Figure 15, Item 1) will appear on the point.



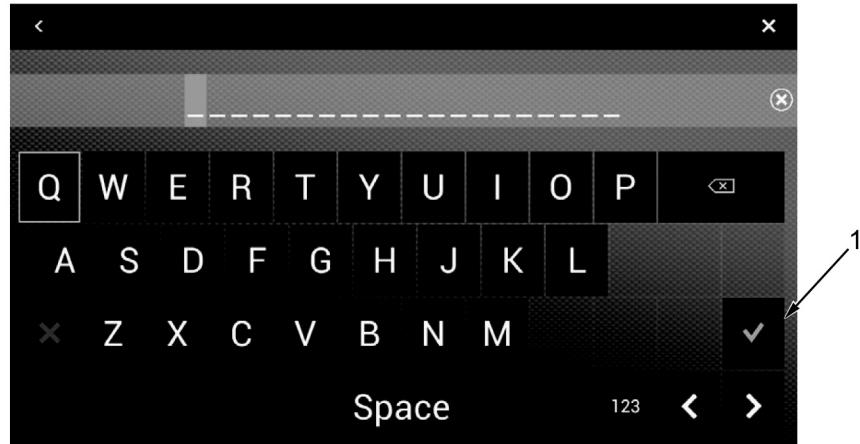
O00020-f15

Figure 15. Flag Icon.

3. Tap the next point desired in the route. A blue line with arrows pointing in the direction of the route will appear between the points.
4. Repeat step three until all route points are entered.
5. After selecting the last point in the route, tap “End Route” in the upper right hand corner of the screen to open the “Route Name” window.

**Creating A New Route - Continued**

6. Using the keyboard, enter the desired route name then tap the “Save” icon (Figure 16, Item 1).

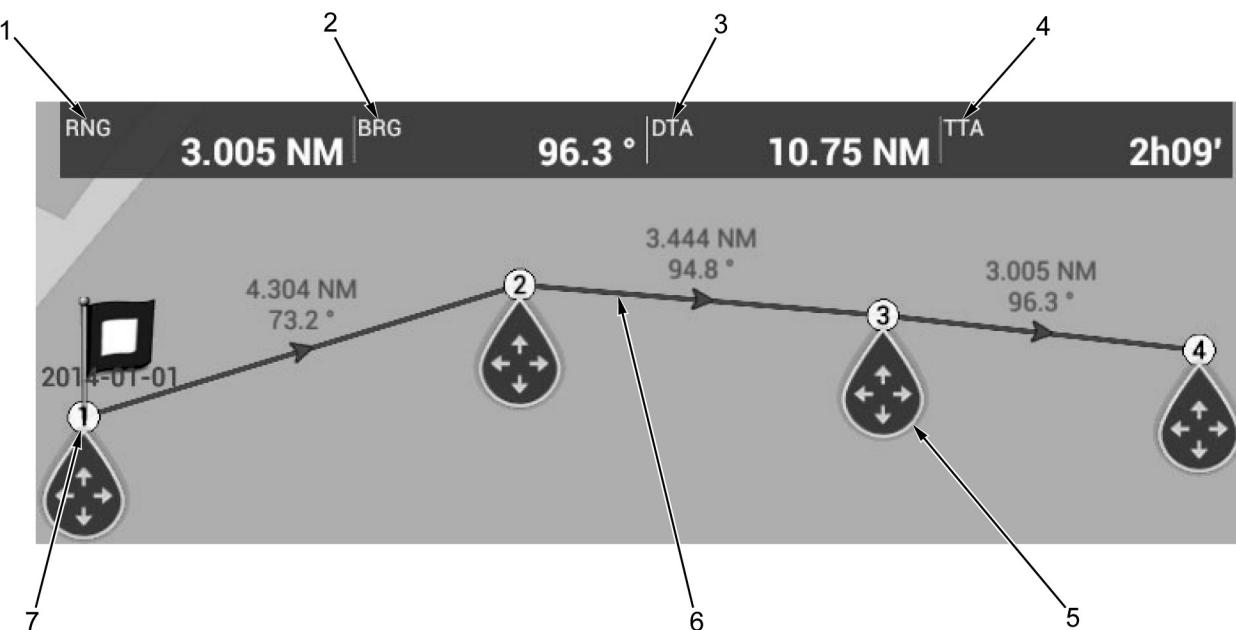


000020-f16

Figure 16. Save Icon.

7. The route information window (Figure 17) will appear at the top of the screen.

## Creating A New Route - Continued



000020-f17

Figure 17. Route Information Window.

Table 3. Route Information Menu.

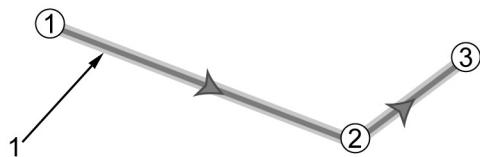
Key	Graphic Icon	Function
1	Range “RNG”	Range between last two points.
2	Bearing “BRG”	Bearing between last two points.
3	Distance to Arrival “DTA”	Distance between current boat position and destination.
4	Time to arrival “TTA”	Estimated time to destination.
5	Move Icon	Drag and drop to the change location of point.
6	Route Leg	Portion of route between two points.
7	1st Route Point	Starting point of route.

## Editing A Route

A route on the plotter display can be edited by inserting a new point, moving a point, removing a point, or extending the route.

### Inserting A Point In A Route

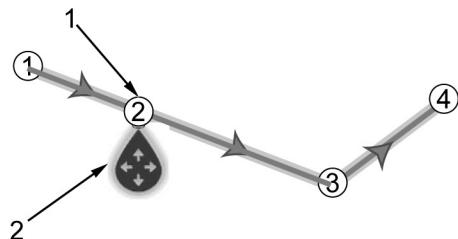
- From the plotter display using a created route, tap a position on the route line (Figure 18, Item 1) to insert desired point and open the “route information” menu.



O00020-f18

Figure 18. Route Line.

- Tap “Insert” and a numbered icon (Figure 19, Item 1) will be displayed in the route with a cursor (Figure 19, Item 2).



O00020-f19

Figure 19. Point Movement Cursor.

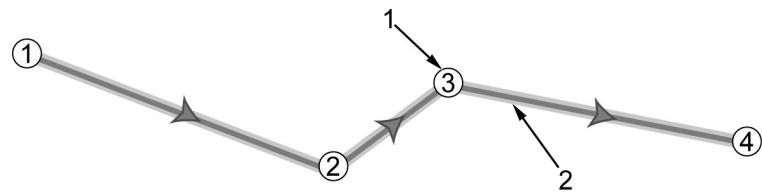
### NOTE

The new point can be dragged to a different location on the screen if desired.

- Tap “End Move” at the top right hand corner of the screen to save the new point.

### Moving A Point In A Route

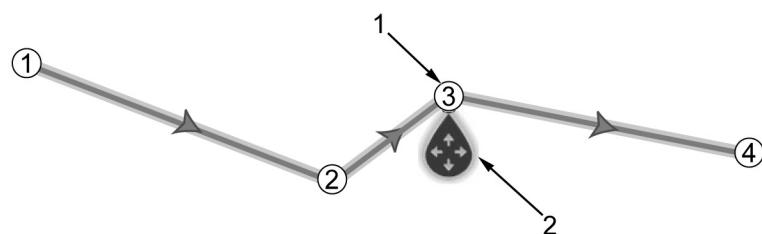
- From the plotter display using a created route, tap a point (Figure 20, Item 1) in the route (Figure 20, Item 2) to open the “route information” menu.

**Moving A Point In A Route - Continued**

000020-f20

Figure 20. Route Line.

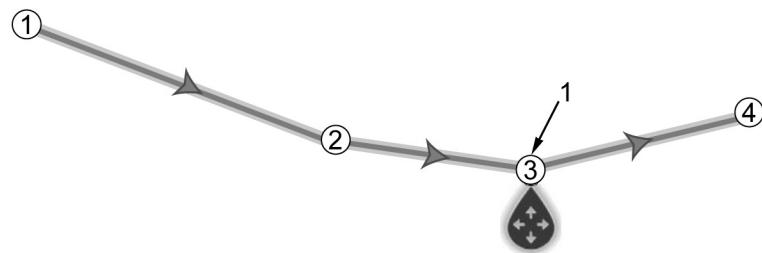
2. Tap "Move", a cursor (Figure 21, Item 2) will be displayed below the selected point (Figure 21, Item 1).



000020-f21

Figure 21. Point Selection.

3. Drag the selected point (Figure 22, Item 1) to the desired location.



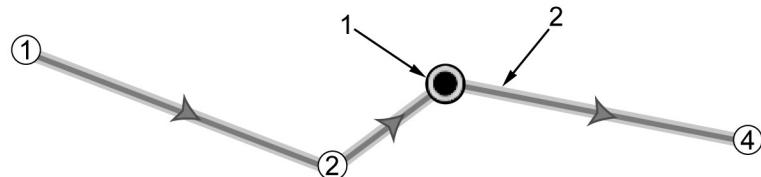
000020-f22

Figure 22. Location.

4. Tap "End Move" at the top right hand corner of the screen to save the new location.

**Deleting a Point From a Route**

1. From the plotter display using a created route, tap a point icon (Figure 23, Item 1) in the route (Figure 23, Item 2) to open the “route information” menu.



O00020-f23

Figure 23. Route Line.

2. Tap “Delete” and the point icon will be removed from the route and the remaining points will be renumbered.

**Deleting A Route**

1. From the plotter display using a created route, tap a position on the route line (Figure 24, Item 1) to open the “route information” menu.



O00020-f26

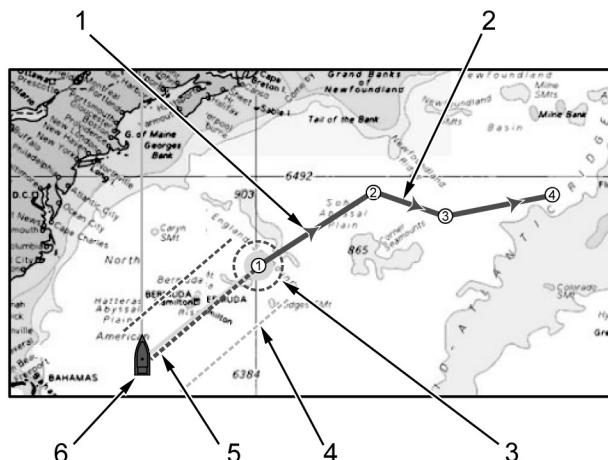
Figure 24. Route Line.

2. Tap “Delete”.

**Navigating To A Point****CAUTION**

Before beginning navigation to a point ensure the path is clear. Zooming in on the plotter chart can help identify hazards that appear on a smaller scale. Failure to comply may result in damage to equipment.

## **Navigating To A Point - Continued**



Q000020-f25

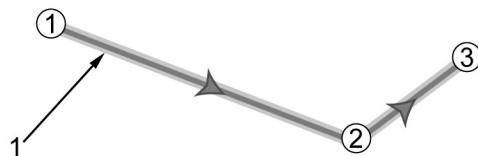
Figure 25. Point Navigation Display.

**Table 4. Point Navigation Display.**

Key	Graphic Icon	Function
1	Route Arrow	Points in direction to follow route.
2	Red Line	Route leg to follow.
3	Dashed Circle	Denotes arrival area for route.
4	XTE Line	Green for starboard, red for port.
5	Red Dashed Line	Course to first route point.
6	Boat Icon	Displays current position.

## Navigating A Route Using The Plotter

- From the plotter display using a created route, tap a position on the route line (Figure 26, Item 1) to open the “route information” menu.



000020-f27

Figure 26. Route Line.

- Tap “Start Nav” and the route line will turn red and the first route point will be highlighted.

## Restart or Cancel Route Navigation

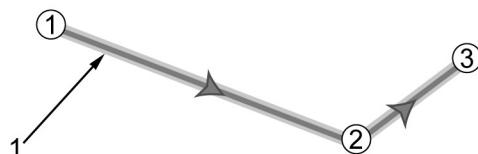
The navigation to a point can be restarted from the boats current location. If the boat is steered off course and does not need to return to the original course, the boat can be navigated to the point from its current position.

- From the plotter display, tap the red dashed or yellow line of the route to open the “Pop-up” menu.
- To restart navigation to a point, tap “Restart” and the route start position will move to the boats current position.
- To cancel navigation to a point, tap “Stop Nav” and the route lines and arrival area circle will be deleted from the screen.

## Reverse Direction Of Route

A route can be reversed to follow the same path back to the starting point. The reverse function is not available on an active route.

- From the plotter display using a created route, tap a position on the route line (Figure 27, Item 1) to open the “route information” menu.
- Tap “ Stop Nav”.
- From the plotter display using a created route, tap a position on the route line (Figure 27, Item 1) to open the “route information” menu.



000020-f27

Figure 27. Route Line.

**Reverse Direction Of Route - Continued**

4. Tap “Reverse” and the arrows on the route will change direction and the route point numbers will reorder.

**NOTE**

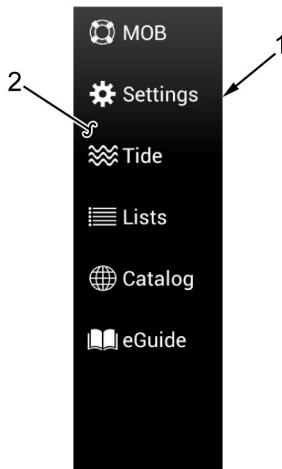
Tapping “Start Nav” option will plot a direct course to point 1.

5. Tap “Start Here” to begin reversed route.

**Deleting All Points And Routes****NOTE**

Deleting all points and routes will delete all points and routes except for the points included in the active route.

1. From the home screen, tap “Settings” (Figure 28, Item 1) on the “Functions” menu (Figure 28, Item 2).



000020-f09

Figure 28. Functions Menu.

2. Tap “Points” on the “Settings” menu.
3. Scroll to the bottom of the menu and tap “Delete All Points and Routes”.
4. Tap “OK” on the confirmation window.
5. Tap the “X” icon at the top right hand corner of the screen to return to previous display.

**END OF WORK PACKAGE**



**OPERATOR INSTRUCTIONS  
OPERATING UNDER USUAL CONDITIONS NAVIGATION RADAR OPERATION**

---

**INITIAL SETUP:**

**Personnel Required**

Diver 12D

**Equipment Condition**

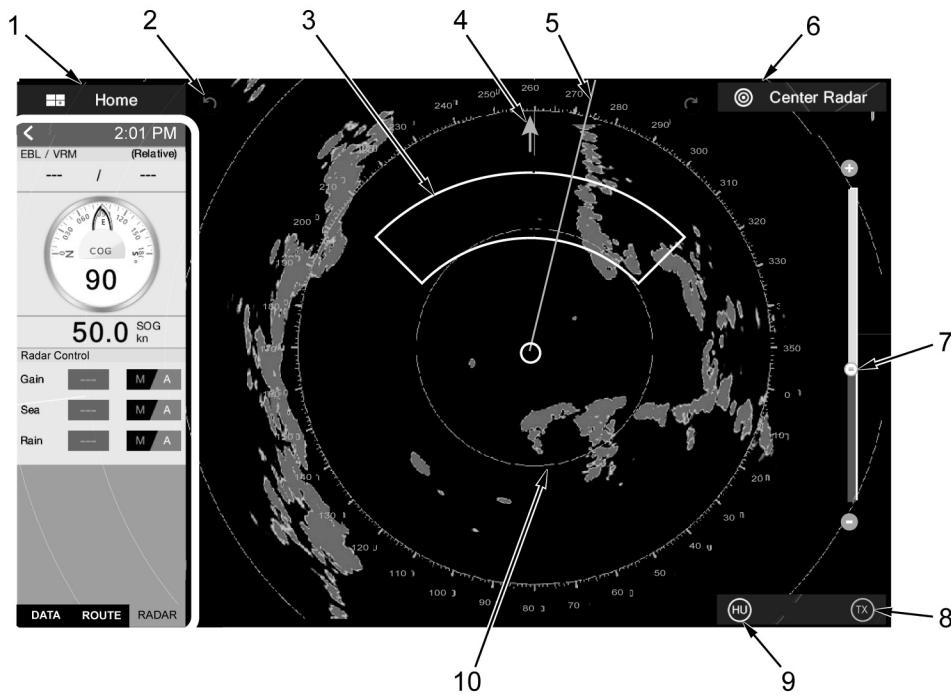
Multi-Function Display Powered ON (WP 0014)  
Radome Mast Raised (WP 0005)

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**CAUTION**

- Leaving communication, navigation, or lighting electronics in ON position while engines are not running can cause depletion of house battery bank. Failure to comply may cause equipment not to operate.
- Water drops on the screen can cause mis-operation and slow touch response. Ensure the screen is kept dry and free of debris.
- Multi-function display screen is made of glass. Do NOT use sharp objects, a stylus pen, or gloves to operate multi-function display.
- Failure to comply could result in damage to equipment.

The multi-function display is equipped with a radar function which detects the position and movement of objects. Objects are shown on the display at their measured distances and bearings in intensities according to echo strength. The radar operates in the microwave part of the radio frequency range. The radar display (Figure 1) is a general representation of what is displayed during operation. Graphics and functions of radar will vary depending on mode of operation.



000021-f03

Figure 1. Radar Display.

**Table 1. Radar Display.**

Item No.	Key Name	Function
1	<b>Home Icon:</b>	Displays time/date, sensor icons and statuses, display icons, and functions.
2	<b>Undo Icon:</b>	Reverses last change done.
3	<b>Guard Zone:</b>	Notifies when radar targets are in the area indicated.
4	<b>North Mark:</b>	Marks the position of north on the radar.
5	<b>Heading Line:</b>	Indicates the boat's heading in all orientation modes.
6	<b>Center Radar:</b>	Return the display with boat oriented in the center of screen.
7	<b>Slide Bar:</b>	Adjusts the display range. Top of slider bar is zoomed in and bottom of slider bar is zoomed out.
8	<b>TX/Standby Switch</b>	Put radar in transmit or stand-by mode.

**Table 1. Radar Display - Continued.**

9	<b>Orientation Mode Switch:</b>	Change the orientation of the plotter to show a “head-up” or “north-up” orientation.
10	<b>Fixed Range Rings:</b>	Solid circles surrounding the boats position that give a rough estimate of range to a target.

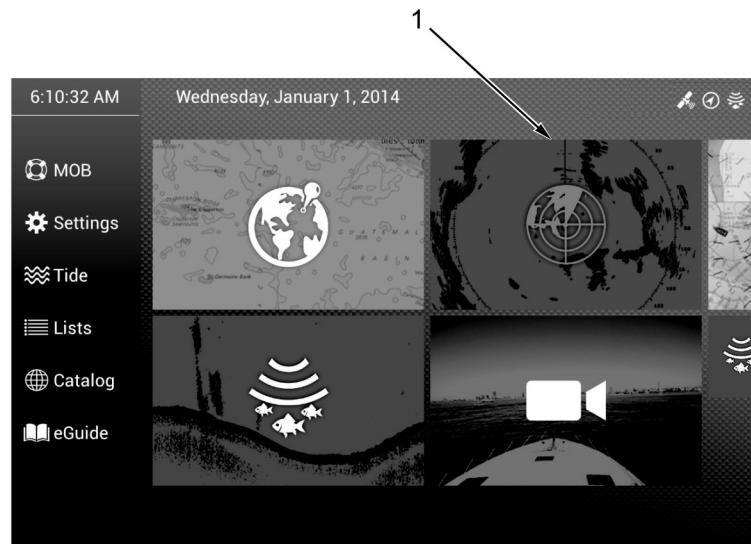
1. If display is not on the “Home screen”, tap the “Home” icon (Figure 2, Item 1) at the top left corner of any operation screen to display the home screen then select the desired display icon.



O00021-f02

Figure 2. Home Icon.

2. From the “Home screen”, tap the “Radar” display icon (Figure 3, Item 1).



O00021-f01

Figure 3. Radar Display Icon.

## Radar Transmit/Standy Mode

### NOTE

- A yellow highlighted TX icon means the radar is on and transmitting. An un-highlighted TX icon means the radar is in stand-by.
- If the radar is not required, switch the TX icon to stand-by mode to preserve the life of the radar.

From the radar display, tap the “TX” icon (Figure 4) in the bottom right hand corner to turn the radar on or off.

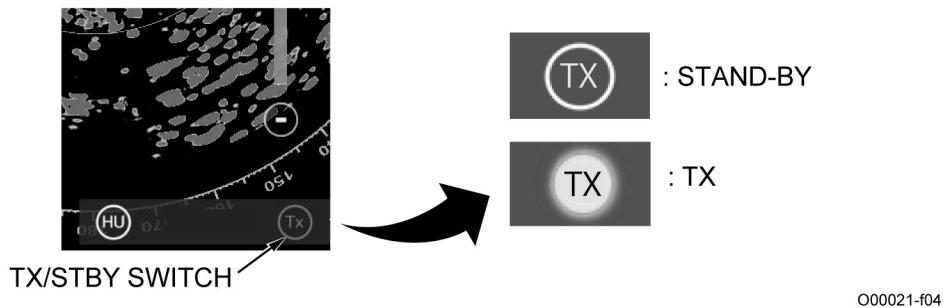


Figure 4. TX/STBY Switch.

## Adjusting Display Range of Radar

The display range of the radar can be adjusted to change the size of the area that appears on the screen. The selected range appears in the box at the bottom right corner of the screen.

1. To zoom in and out on the radar display using fingers, use two fingers in a pinching manner (Figure 5).

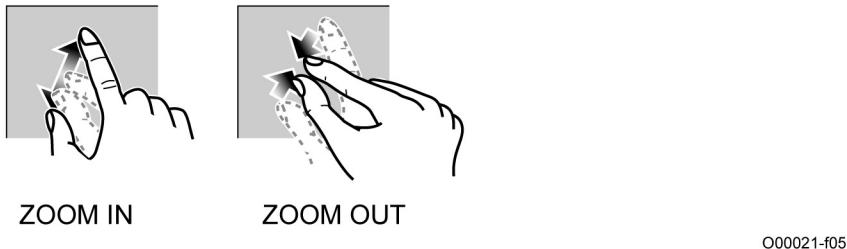
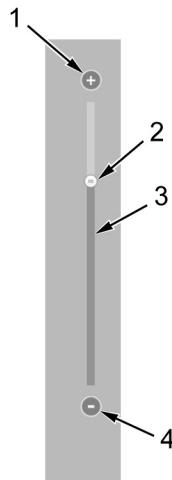


Figure 5. Zooming Gestures.

2. To zoom in and out on the radar display using the slider bar (Figure 6, Item 3) and a finger, drag the slider (Figure 6, Item 2) up to zoom in or down to zoom out.
3. To zoom in and out on the radar display using the slider bar (Figure 6, Item 3) and the “+” or “-“ icons, tap the “+” icon (Figure 6, Item 1) to zoom in or tap the “-“ icon (Figure 6, Item 4) to zoom out.

### Adjusting Display Range of Radar - Continued



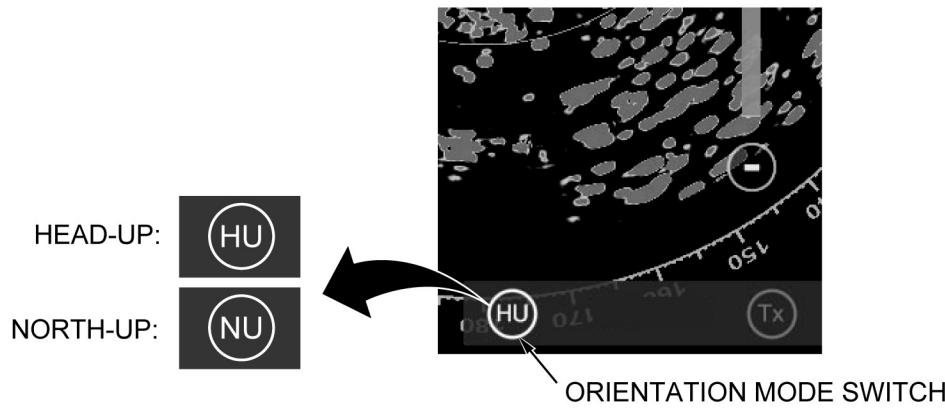
000021-f06

Figure 6. Zoom Slider.

### Adjusting Orientation of Radar

The orientation of the radar can be adjusted to be shown in a "head-up" or "north-up" orientation while boat is underway. A "north-up" orientation displays the radar with north at the top of the screen. A "head-up" orientation displays the radar with the current compass heading at the top of the screen. The selected orientation appears in the box at the bottom right corner of the screen.

1. To change the orientation of the radar, tap the "orientation mode switch" (Figure 7) to open the orientation mode menu (Figure 7).
2. Tap the desired orientation mode (Figure 7).



000021-F07

Figure 7. Radar Orientation Settings.

**Measuring Range And Bearing From Boat To Target Using Radar**

1. From the radar display, tap the object desired to measure to.
2. The range and bearing are displayed (Figure 8) at the top of the "Pop-up" window.

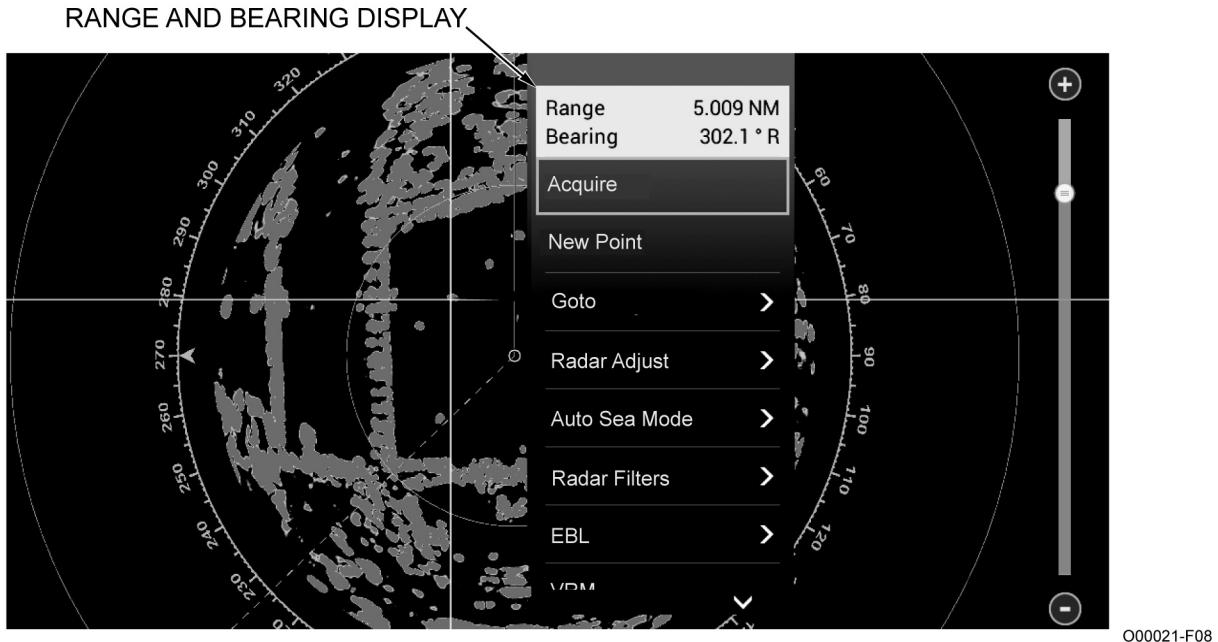


Figure 8. Range and Bearing Display.

**END OF WORK PACKAGE**

**OPERATOR INSTRUCTIONS  
OPERATING UNDER USUAL CONDITIONS NAVIGATION SONAR OPERATION**

---

**INITIAL SETUP:**

**Personnel Required**

Diver 12D

**Equipment Condition**

Multi-Function Display Powered ON (WP 0014)

---

**CAUTION**

- Leaving communication, navigation, or lighting electronics in ON position while engines are not running can cause depletion of house battery bank. Failure to comply may cause equipment not to operate.
- Water drops on the screen can cause mis-operation and slow touch response. Ensure the screen is kept dry and free of debris.
- Multi-function display screen is made of glass. Do NOT use sharp objects, a stylus pen, or gloves to operate multi-function display.
- Failure to comply may result in damage to equipment.

The multi-function display is equipped with a sonar function which displays a picture of the echoes found by the transducer and their distance to the boat (Figure 1). The pictures displayed contain a series of vertical lines. Each line is a picture of the objects under the boat. The series of pictures are put side-by-side across the screen to show the contours of the bottom and echoes from objects. Echoes are scrolled across the screen from right to left and are displayed in different colors or shades of gray according to the echo strength. Depth to the bottom is always shown. The sonar operates in the microwave part of the radio frequency range. The radar display (Figure 2) is a general representation of what is displayed during operation. Graphics and functions of radar will vary depending on mode of operation.

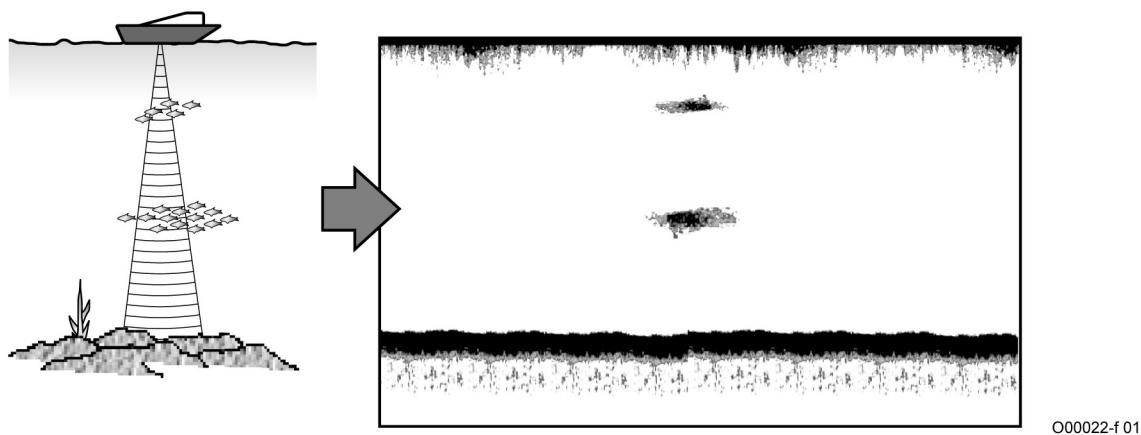
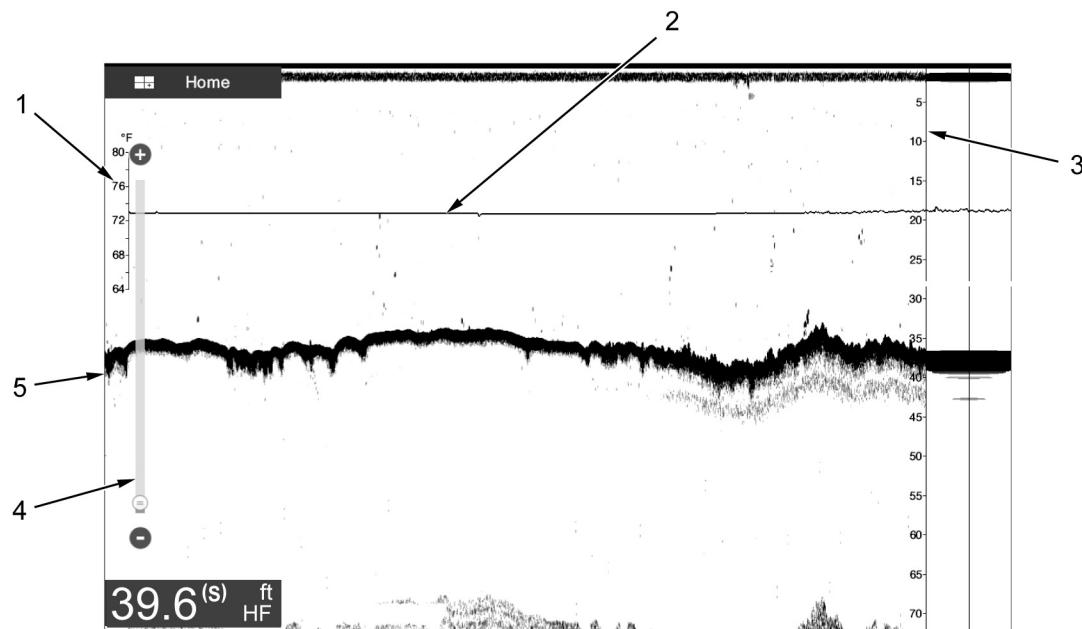


Figure 1. Sonar Operation.



O00022-f04

Figure 2. Sonar Display.

Table 1. Sonar Display.

Item No.	Key Name	Function
1	<b>Temp Scale:</b>	Displays a range of degrees to determine the sea surface temperature using the Temp Graph.
2	<b>Temp Graph:</b>	Is a line running from left to right on the screen displaying the sea surface temperature.
3	<b>Depth Scale:</b>	Displays a range of depth in feet to determine the depth to an object or the sea bottom.
4	<b>Slide Bar:</b>	Adjusts the display range. Top of slider bar is zoomed in and bottom of slider bar is zoomed out.
5	<b>Bottom Echo:</b>	Normally shown in reddish-brown or red. The colors and width change with bottom material, depth, and sea condition.

1. If display is not on the “Home screen”, tap the “Home” icon (Figure 3, Item 1) at the top left corner of any operation screen to display the home screen then select the desired display icon.



Figure 3. Home Icon.

2. From the “Home screen”, tap the “Sonar” display icon (Figure 4, Item 1).

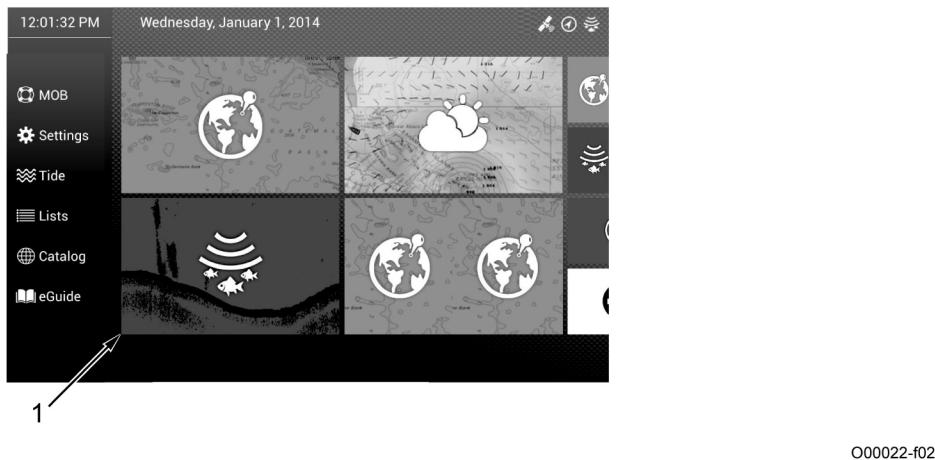


Figure 4. Sonar Display Icon.

#### Sonar Transmit/Standy Mode

1. From the sonar display, tap the screen to open the “Pop-up” menu.

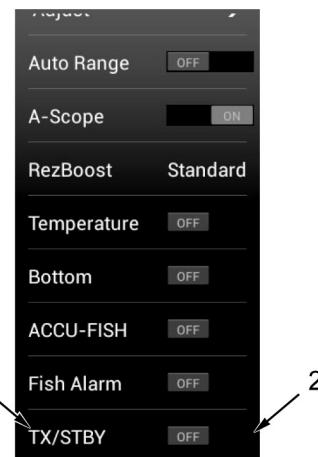
**Sonar Transmit/Standy Mode - Continued**

2. Scroll to the bottom of the menu to the "TX/STBY" (Figure 5, Item 1) option.

**NOTE**

Stand-by appears at the center of the screen when the sonar is in stand-by mode.

3. Tap the flipswitch to turn the sonar ON or OFF (Figure 5, Item 2).



000022-f05

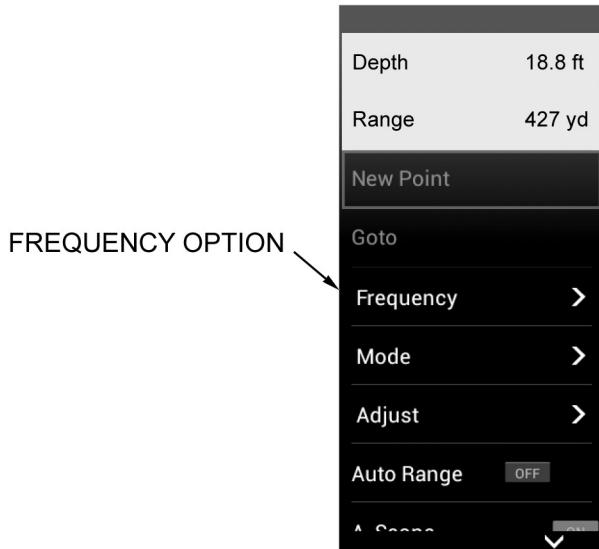
Figure 5. Transmit/Standy Mode.

**Selecting A Frequency Using The "Pop-Up" Menu**

1. From the sonar display, tap the screen to display the "Pop-up" menu.

**Selecting A Frequency Using The “Pop-Up” Menu - Continued**

2. Tap the “Frequency” option (Figure 6).



000022-F06

Figure 6. Zooming Gestures.

3. Tap the desired High Frequency “HF” (Figure 7, Item 1) or Low Frequency “LF” (Figure 7, Item 2) frequency flipswitch to turn them ON or OFF.



000022-F07

Figure 7. Frequency Flipswitch.

4. Tap on the screen outside of the window to close.

### Selecting A Frequency Using The “Depth Indication Box”

From the sonar display, tap the “Depth Indication Box” in the lower left corner of the screen to switch between high frequency and low frequency (Figure 8).



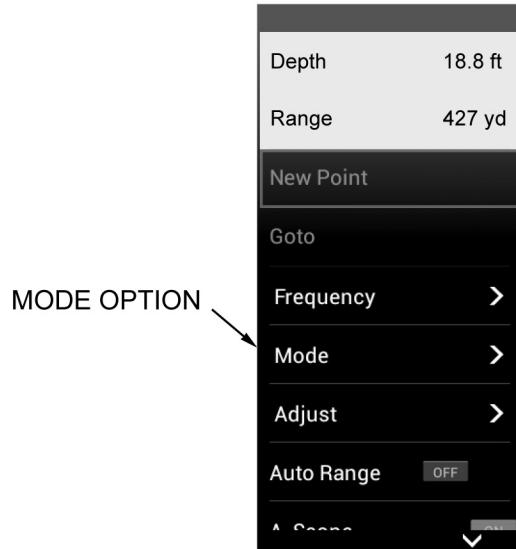
O00022-F08

Figure 8. Depth Indication Box.

### Single Frequency Display

Single frequency display shows either a high or low frequency on the screen depending on frequency selected. A low frequency gives a wide detection area and is used primarily for a general search and bottom condition detection. A high frequency gives better resolution and is used to better identify an object.

1. From the sonar display, tap the screen to open the “Pop-up” menu.
2. Tap the “Mode” option (Figure 9).



O00022-F09

Figure 9. Sonar Mode Option.

3. Tap the “Single Frequency” flipswitch to turn the single frequency display ON or OFF.
4. Tap on the screen outside of the window to close.

## Dual Frequency Display

Dual frequency display (Figure 10) shows both low and high frequency pictures on the same screen, with the low frequency on the left and high frequency on the right.

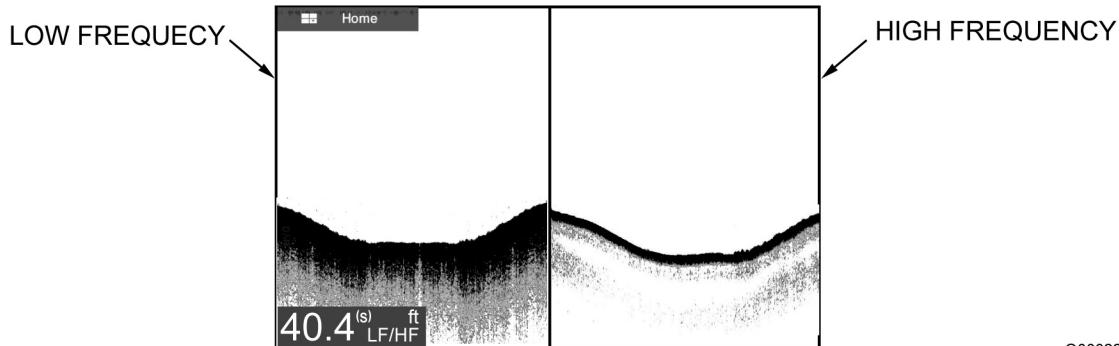


Figure 10. Dual Frequency Display.

1. From the sonar display, tap the screen to open the “Pop-up” menu.
2. Tap the “Mode” option (Figure 11).

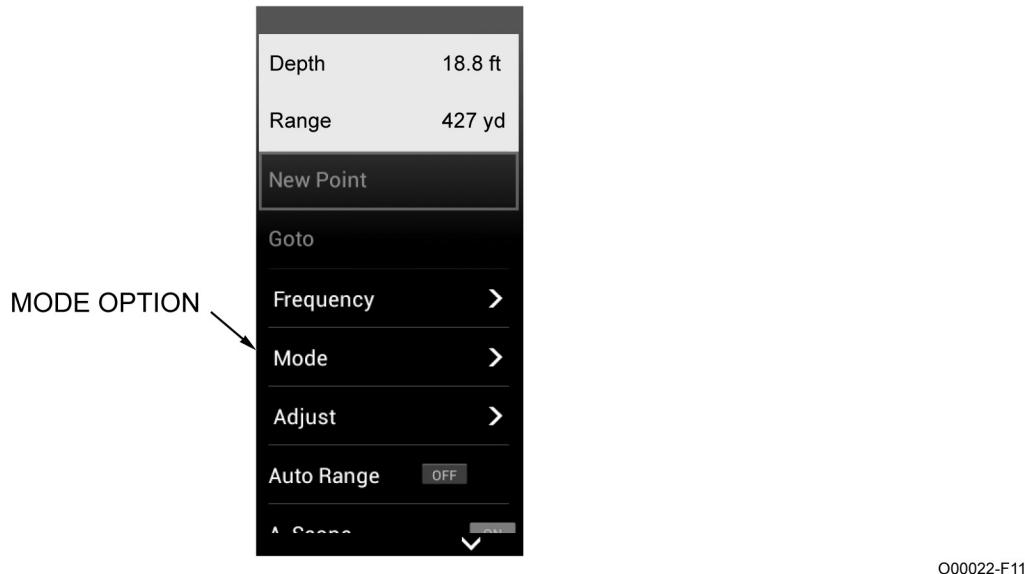
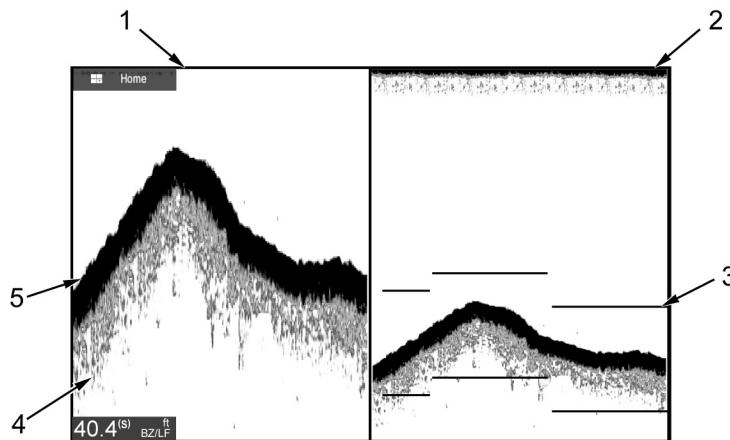


Figure 11. Sonar Mode Option.

3. Tap the “Dual Freq.” flipswitch to turn the dual frequency display ON or OFF.
4. Tap on the screen outside of the window to close.

### Bottom Zoom Display

When the bottom zoom function is selected, the bottom zoom display will display on the left side of the screen and the single frequency display will display on the right side of the screen. The bottom zoom display can assist in determining the density of the sea bottom.



O00022-f12

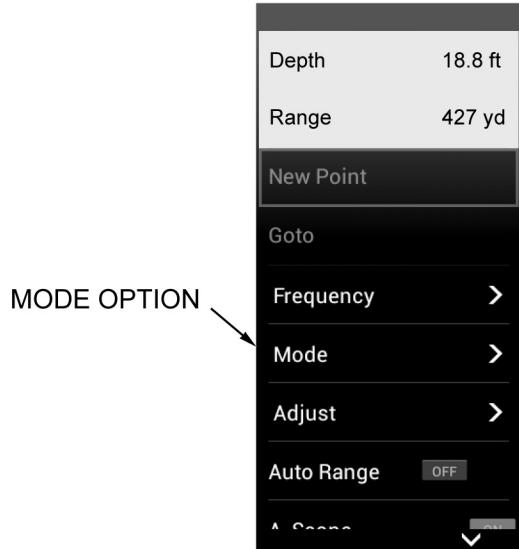
Figure 12. Bottom Zoom Display.

**Table 2. Bottom Zoom Display.**

Item No	Name	Function
1	Bottom Zoom Display	Expands the sea bottom and any object near the bottom according to the zoom range selected.
2	Single Frequency Display	Displays the single frequency view.
3	Zoom Marker	Indicates the portion displayed on the bottom zoom display window. The zoom marker automatically follows change in depth.
4	Bottom	Depth bottom.
5	Echo Tail	A short echo tail normally indicates a soft bottom and a long echo tail normally indicates a hard bottom.

**Bottom Zoom Display - Continued**

1. From the sonar display, tap the screen to open the "Pop-up" menu.
2. Tap the "Mode" option (Figure 13).



000022-F13

Figure 13. Sonar Mode Option.

3. Tap the "Bottom Zoom" flipswitch to turn the bottom zoom display ON or OFF.
4. Tap on the screen outside of the window to close.

### Bottom Lock Display

The bottom lock display can assist in separating objects near the sea bottom from the sea bottom itself.

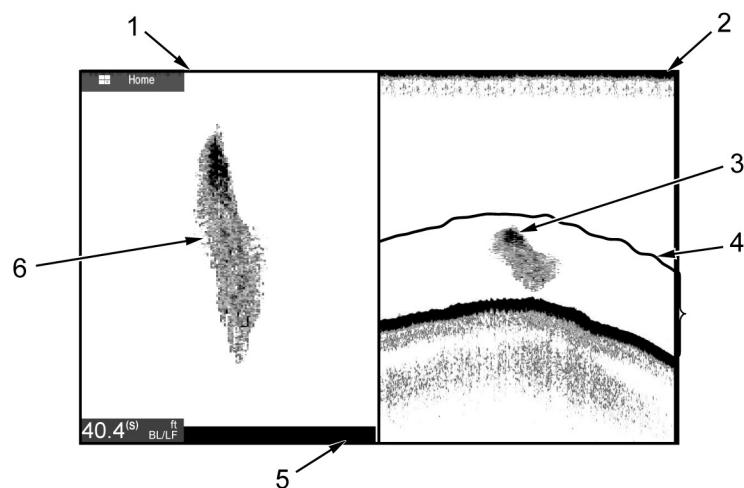


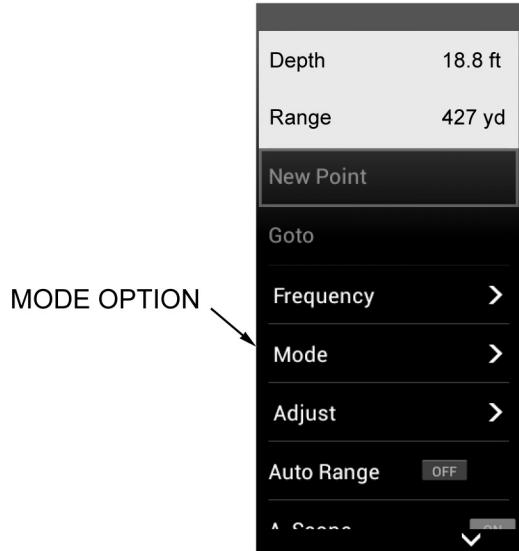
Figure 14. Bottom Lock Display.

**Table 3. Bottom Lock Display.**

Item No	Name	Function
1	Bottom Lock Display	A an expanded display of 7-400 ft (2.13-122 m) wide layer displayed on the left side.
2	Single Frequency Display	Displays a normal picture on the right side of the screen in single frequency display.
3	Object Near Bottom	Item to be zoomed in on.
4	Zoom Marker	Marker displaying the zoom area on single frequency display.
5	Bottom	Shown as a straight line on the bottom lock display.
6	Zoomed Display of Object	Displays the object from zoom marker in higher detail on bottom lock display.

**Bottom Lock Display - Continued**

1. From the sonar display, tap the screen to open the "Pop-up" menu.
2. Tap the "Mode" option (Figure 15).



000022-F15

Figure 15. Sonar Mode Option.

3. Tap the "Bottom Lock" flipswitch to turn the bottom lock display ON or OFF.
4. Tap on the screen outside of the window to close.

### Bottom Discrimination Display

Bottom discrimination display shows probable sea bottom composition. This feature should only be used when operating at or below 10 kt (11.5 mph) and depths between 16-328 ft (5-100 m).

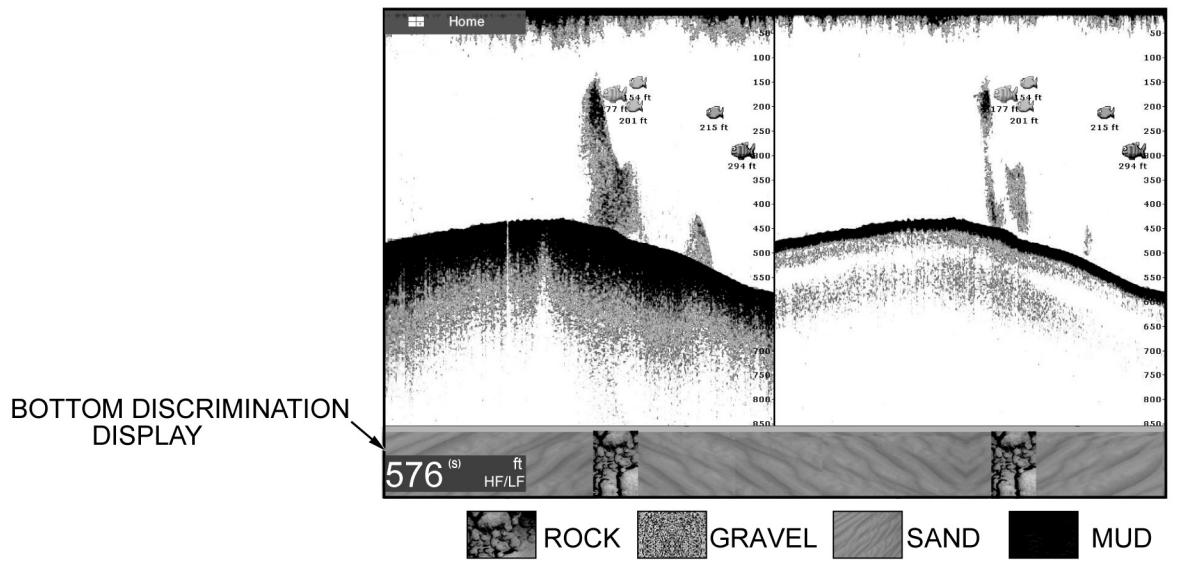


Figure 16. Bottom Discrimination Display.

1. From the sonar display, tap the screen to open the “Pop-up” menu.
2. Scroll down and tap the “Bottom” flipswitch to turn the bottom discrimination display ON or OFF.
3. Tap on the screen outside of the window to close.

**END OF WORK PACKAGE**



**OPERATOR INSTRUCTIONS  
OPERATING UNDER USUAL CONDITIONS COMMAND MICROPHONE REMOTE VHF**

**INITIAL SETUP:**

**Personnel Required**

Diver 12D

**Equipment Condition**

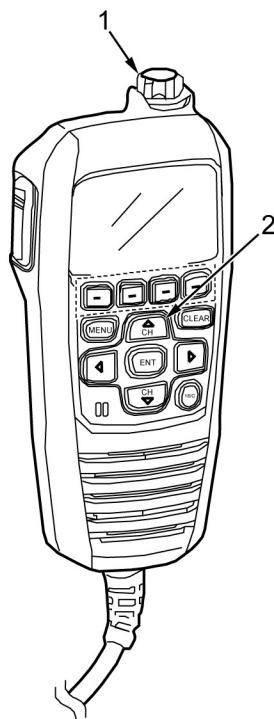
House battery switch powered ON, VHF antenna raised (WP 0005)

**Powering ON the Command Microphone Remote VHF**

**NOTE**

Each push of the power/squelch/volume dial toggles the mode between volume adjustment, squelch adjustment, and channel selection.

1. Press and hold the "PWR" knob (Figure 1, Item 1) until the radio turns on.
2. Push the "UP" or "DOWN" channel keys (Figure 1, Item 2) to select the desired channel.



O00024-f03

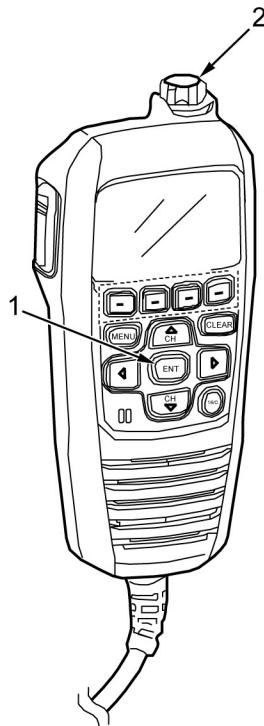
Figure 1. Command Microphone Remote.

## Adjusting the Volume on the Command Microphone

### NOTE

If no key operation is performed for approximately 5 seconds the command microphone sets the selected level and returns to normal mode.

1. Push the "VOL" dial (Figure 2, Item 2) to select the volume adjustment mode and open the "Volume" window.
2. Rotate the "VOL" dial (Figure 2, Item 2) until noise or audio from the speaker is at desired level.
3. Push the "ENT" key (Figure 2, Item 1) to set the volume level.



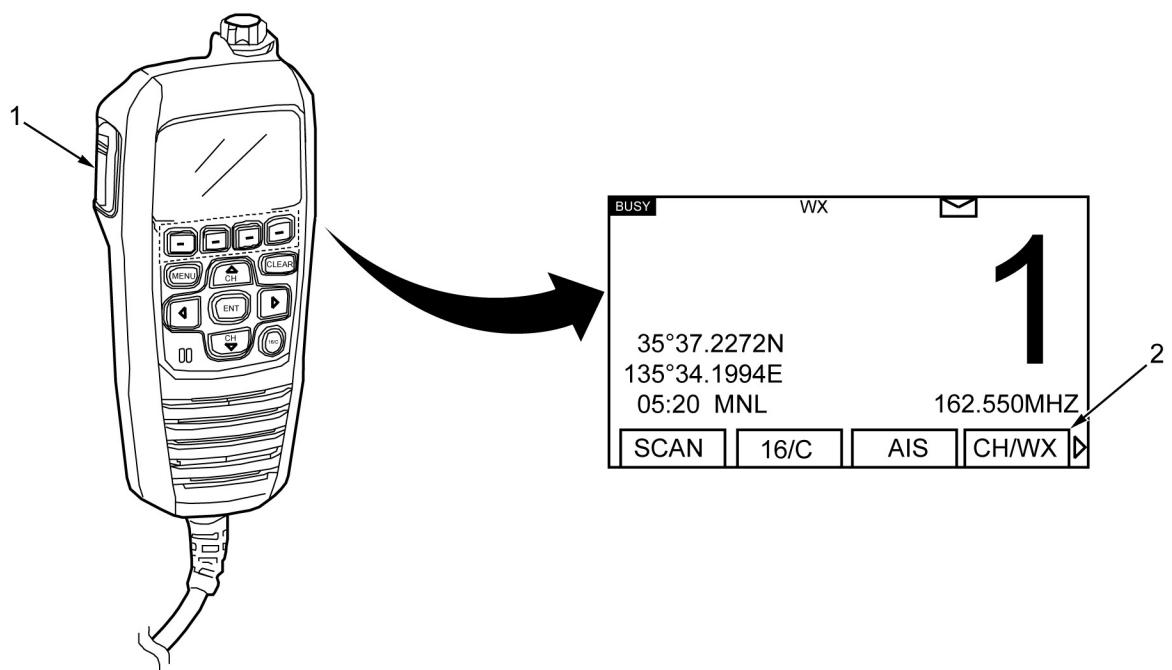
000024-f04

Figure 2. Command Microphone Volume Adjustment.

## Command Microphone Remote Transmission/Reception

### NOTE

- When the “Push-To-Talk” button is held, message transmit time is five minutes. After five minutes the radio will automatically go into receive mode. To transmit again the “Push-To-Talk” button must first be released then pressed again.
  - Transmissions can not be sent when radio is in weather (WX) mode.
1. If Command Microphone is in “WX” mode press “CH/WX” softkey (Figure 3, Item 2) to return to previously selected channel (Figure 3, Item 1).
  2. Press the “Push-To-Talk” button (Figure 3, Item 1) on the microphone. The “TX” indicator will appear on the screen.



000024-f05

Figure 3. Command Microphone Transmission/Reception.

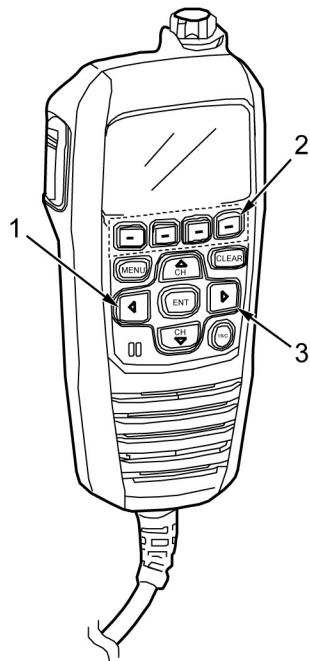
3. Speak slowly and clearly into the microphone.
4. When the transmission is finished, release the “Push-To-Talk” button.
5. When a message is received, the “BUSY” indicator will appear on the screen while the message is being received.

## Command Microphone Softkeys

Various functions can be assigned to the softkeys. When a key function is assigned, the key icon is displayed above the softkey.

### Softkey Function Selection

1. Push the "LEFT" (Figure 4, Item 1) or "RIGHT" keys (Figure 4, Item 3) to scroll to the desired function.
2. Push the softkey (Figure 4, Item 2) below the desired function to select.

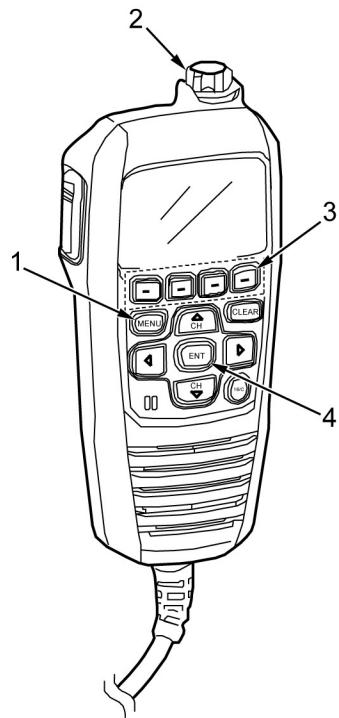


000024-f06

Figure 4. Softkey Function Selection.

### Softkey Programming

1. Push the "MENU" key (Figure 5, Item 1) to open the menu screen.
2. Rotate dial (Figure 5, Item 2) until "CONFIG" icon appears on screen.
3. Push the softkey (Figure 5, Item 3) below the "CONFIG" icon to select.
4. Rotate dial to highlight the key assignment menu.
5. Push the "ENT" key (Figure 5, Item 4).
6. Rotate dial to highlight softkey menu.
7. Push the "ENT" key.
8. Rotate dial to highlight the desired softkey to be programmed.
9. Push the "ENT" key.
10. Rotate dial to highlight the desired softkey to be programmed.
11. Rotate dial to highlight desired softkey function.
12. Push "ENT" key.
13. Push "BACK" key.
14. Repeat steps 6-10 for remaining softkeys to be programmed.
15. Push the "MENU" key to return home screen.



O00024-f07

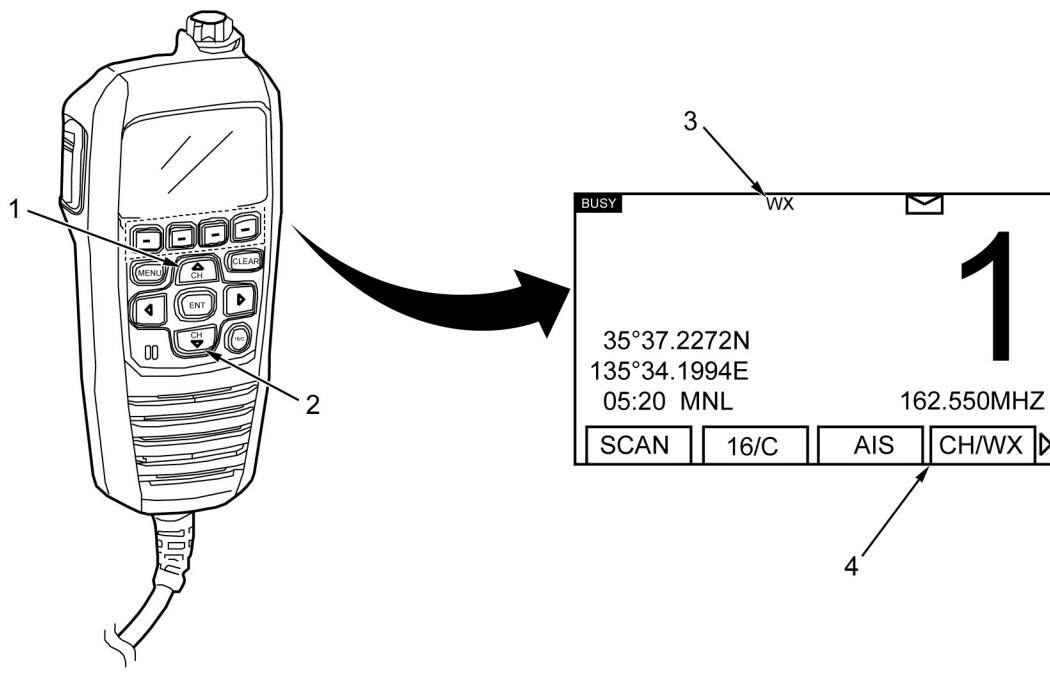
Figure 5. Softkey Programming Selection.

## National Oceanic and Atmospheric Administration (NOAA) Weather Channel Selection

### NOTE

The US National Oceanic and Atmospheric Administration (NOAA) broadcasts continuous weather reports and severe weather alerts. NOAA weather channels are only available in the US and Canada. The radio has 10 weather channels.

1. Push the "CH/WX" softkey (Figure 6, Item 4) to select the weather channel. The "WX" icon (Figure 6, Item 3) will appear on the screen.
2. Push the "UP" (Figure 6, Item 1) or "DOWN" keys (Figure 6, Item 2) to select the desired NOAA weather channel.



000024-f08

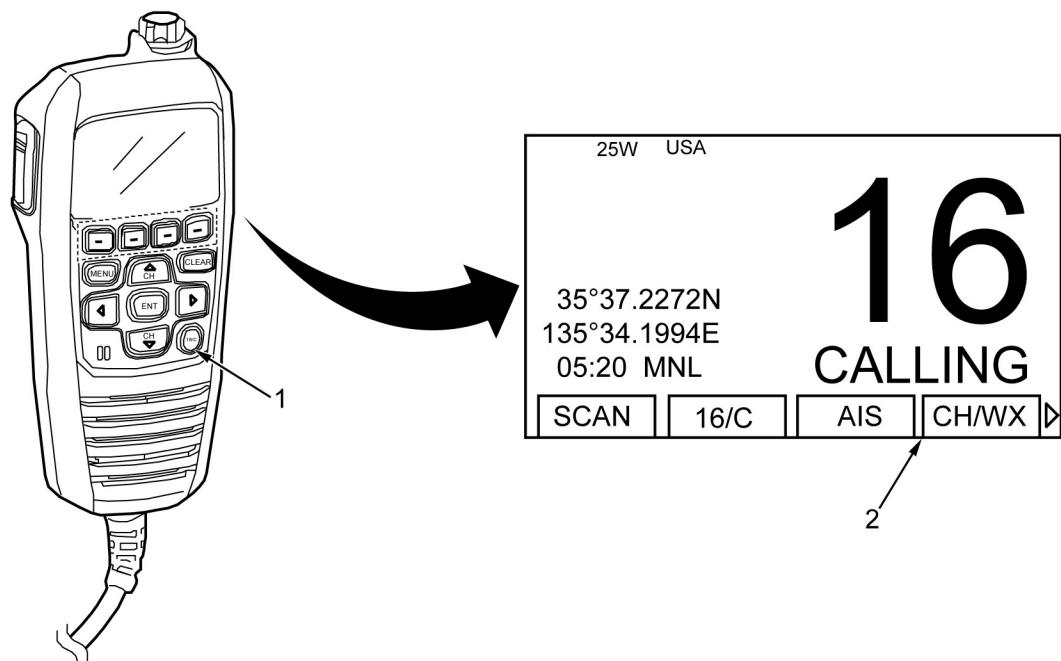
Figure 6. Weather Channel Selection Screen.

3. To exit from any NOAA weather channel, press the "CH/WX" key. The radio will return to the last selected operating channel.

### Emergency Channel 16

Channel 16 is the distress and safety channel used for emergency communications. Channel 16 should be routinely monitored during operation.

1. Push the “16/C” button (Figure 7, Item 1) to select channel 16.
2. Perform emergency broadcast instructions.
3. Push the “CH/WX” softkey (Figure 7, Item 2) to return to the previously selected channel.



000024-f09

Figure 7. Emergency Channel 16 Screen.

## Transmitting a Distress Call

A distress call should only be made when the boat or personnel are in distress and require immediate assistance. Never make a distress call if the boat or personnel are not in an emergency.

### NOTE

- Once the distress button is pressed channel 70 is automatically selected and the distress call is transmitted.
- The distress call is automatically transmitted every 3.5 to 4.5 minutes until an acknowledgment is received.

Lift cover (Figure 8, Item 1) and hold down “DISTRESS” button (Figure 8, Item 2) for three seconds to transmit a distress call.

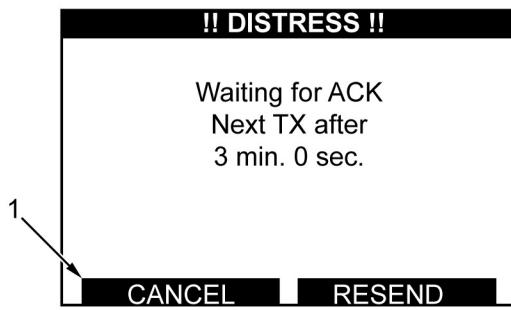


000024-f10

Figure 8. Distress Button.

## Cancelling a Distress Call

- If a distress call has been transmitted and not acknowledged, push the “CANCEL” button (Figure 9, Item 1) to cancel the distress call.



000024-f11

Figure 9. Distress Call Cancel Button.

**Cancelling a Distress Call - Continued**

2. Push the "CONTINUE" button (Figure 10, Item 1).



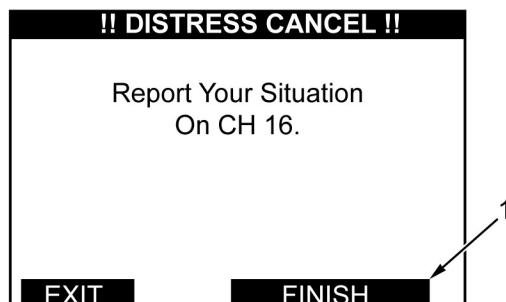
000024-f12

Figure 10. Distress Call Continue Button.

**NOTE**

After selecting the "FINISH" button channel 16 is automatically selected.

3. Push the "FINISH" button (Figure 11, Item 1).



000024-f13

Figure 11. Distress Call Finish Button.

**END OF WORK PACKAGE**



**OPERATOR INSTRUCTIONS  
OPERATING UNDER USUAL CONDITIONS VHF RADIO**

**INITIAL SETUP:**

**Personnel Required**

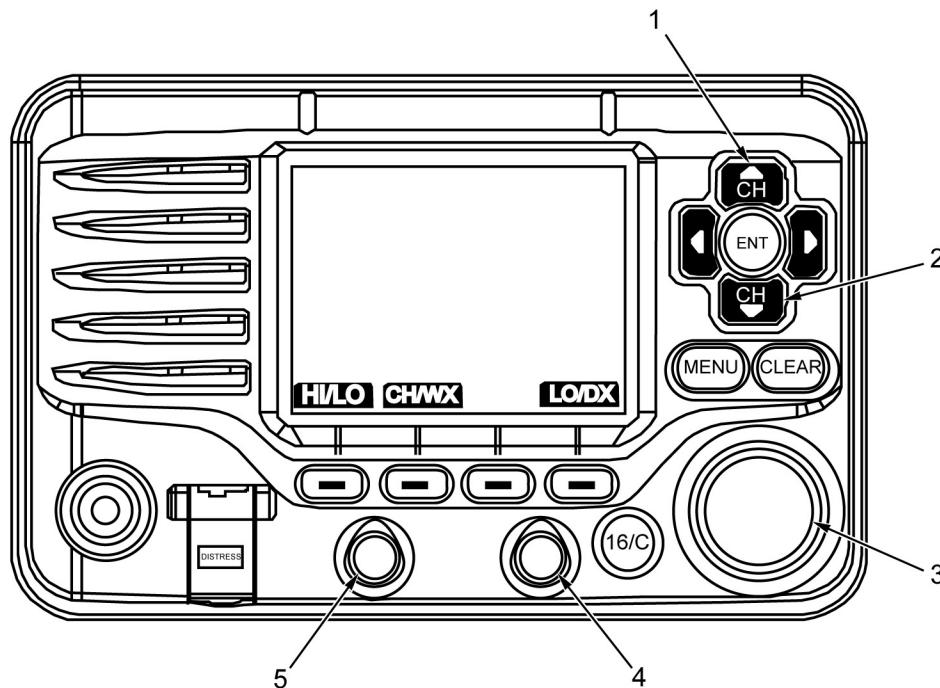
Diver 12D

**Equipment Condition**

House Battery Switch Powered ON, VHF antenna raised (WP 0005)

**Powering On The VHF Radio**

1. Press and hold the "PWR" knob (Figure 1, Item 3) until the radio turns on.
2. Turn the "SQL" dial (Figure 1, Item 4) fully counterclockwise.
3. Turn the "VOL" dial (Figure 1, Item 5) up until noise or audio from the speaker is at desired level.
4. Turn the "SQL" dial clockwise until random noise disappears.
5. Push the "UP" (Figure 1, Item 1) or "DOWN" (Figure 1, Item 2) channel keys to select the desired channel.



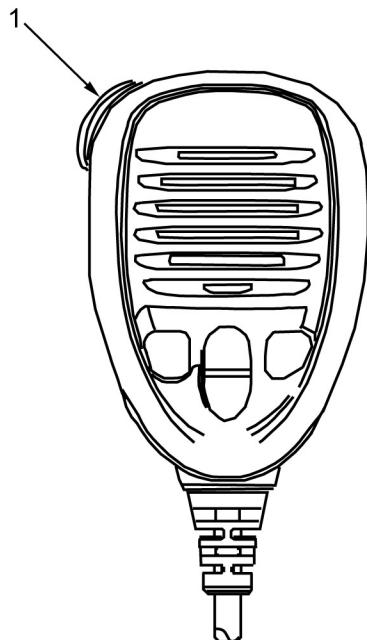
O00025-f02

Figure 1. VHF Radio

**VHF Radio Transmission****NOTE**

When the "Push-To-Talk" button is held, message transmit time is five minutes. After five minutes the radio will automatically go into receive mode. To transmit again the "Push-To-Talk" button must first be released then pressed again.

1. Press the "Push-To-Talk" button (Figure 2, Item 1) on the microphone. The "TX" indicator will appear on the screen.



000025-f03

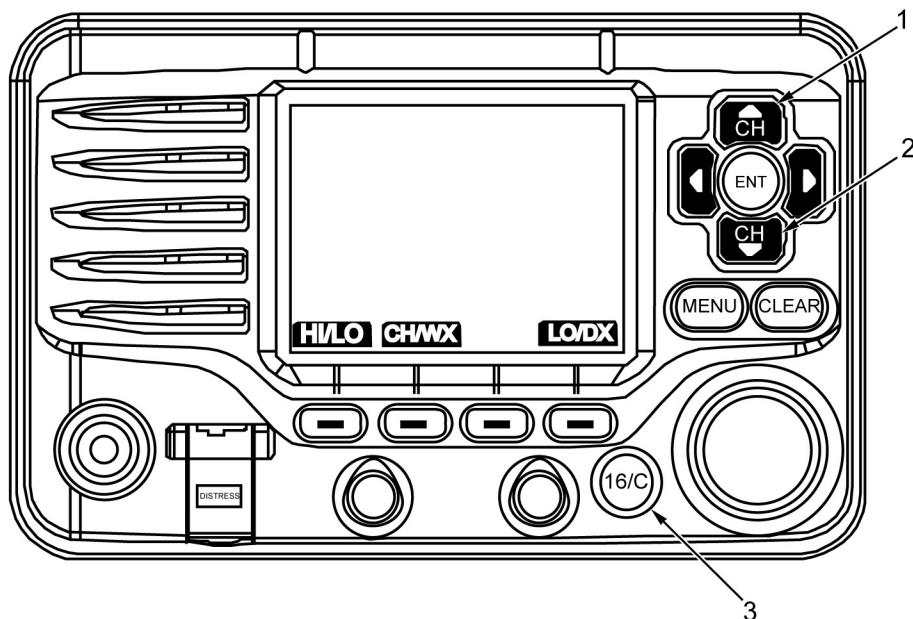
Figure 2. Mircophone PTT Button.

2. Speak slowly and clearly into the microphone.
3. When the transmission is finished, release the "Push-To-Talk" button.

## Emergency Channel 16

Channel 16 is the distress and safety channel used for emergency communications. Channel 16 should be routinely monitored during operation.

1. Push the “16/C” button (Figure 3, Item 3) to select channel 16.
2. Perform emergency broadcast instructions.
3. Push the “UP” (Figure 3, Item 1) or “DOWN” (Figure 3, Item 2) channel to return to the previously selected channel.



000025-f04

Figure 3. VHF Channel 16 Button.

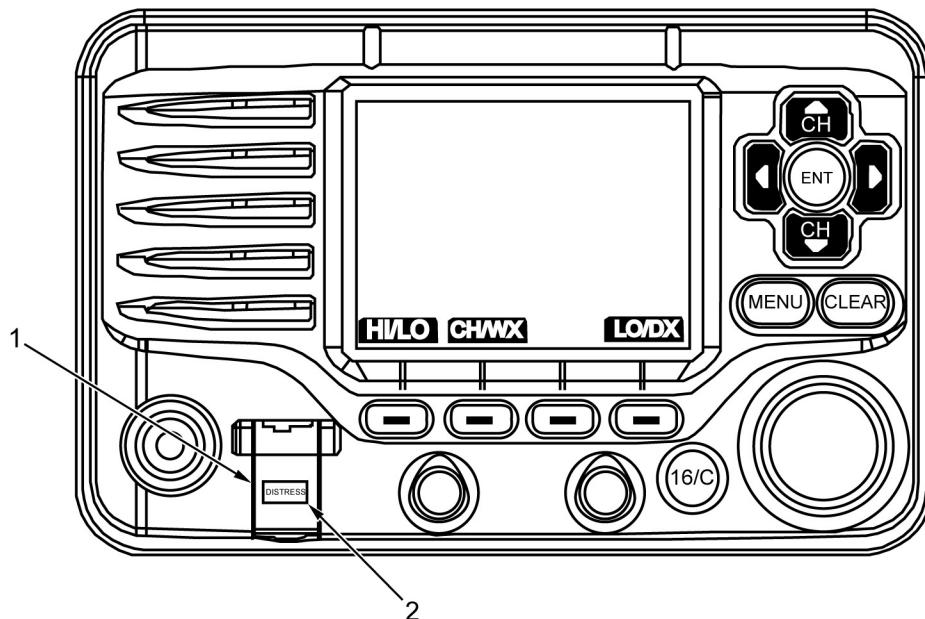
## Transmitting A Distress Call

A distress call should only be made when the boat or personnel are in distress and require immediate assistance. Never make a distress call if the boat or personnel are not in an emergency.

### NOTE

- Once the distress button is pressed channel 70 is automatically selected and the distress call is transmitted.
- The distress call is automatically transmitted every 3.5 to 4.5 minutes until an acknowledgment is received.

Lift cover (Figure 4, Item 1) and hold down “DISTRESS” button (Figure 4, Item 2) for three seconds to transmit a distress call.

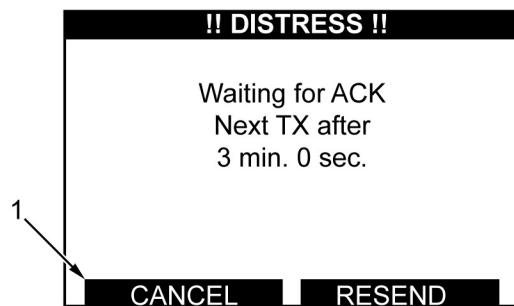


000025-f05

Figure 4. VHF Radio Distress Button.

### Cancelling A Distress Call

- When a distress call has been transmitted and not acknowledged, push the “CANCEL” button (Figure 5, Item 1).



000025-f06

Figure 5. Distress Call Cancel Button.

**Cancelling A Distress Call - Continued**

2. Push the "CONTINUE" button (Figure 6, Item 1).



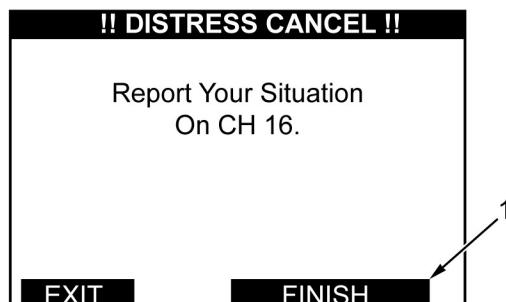
000025-f07

Figure 6. Distress Call Continue Button.

**NOTE**

After selecting the "FINISH" button channel 16 is automatically selected.

3. Push the "FINISH" button (Figure 7, Item 1).



000025-f08

Figure 7. Distress Call Finish Button.

**END OF WORK PACKAGE**



**OPERATOR INSTRUCTIONS  
OPERATING UNDER USUAL CONDITIONS ENGINE MONITOR ICON**

---

**INITIAL SETUP:**

**Tools and Special Tools**

Hose, Nonmetallic (WP 0062, Table 2, Item 19)  
Suitable Drain Pan

**Equipment Condition**

House, port engine, starboard engine battery switches, breakers, control switches, and ignition key powered ON (WP 0005)

**Personnel Required**

Diver 12D

**References**

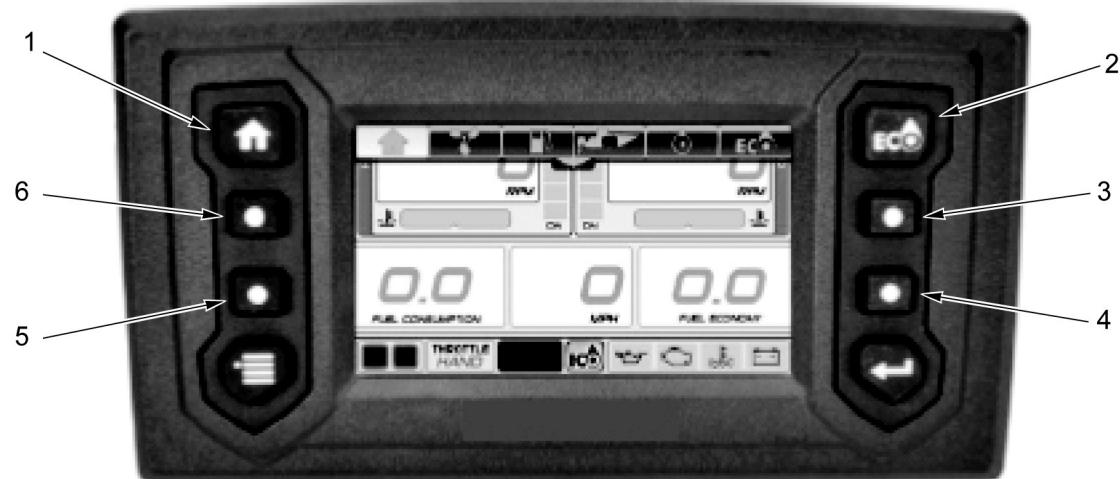
WP 0007  
WP 0010

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**Engine Monitor Overview**

The engine monitor display is designed to communicate with the throttle levers and outboard engines by means of a National Marine Electronics Association (NMEA) 2000 network. The display provides a number of user-selectable modes and configuration menus. Select modes affect display unit selection and screen appearance. Other modes interact with, and affect outboard engine and throttle lever operation and functionality. The modes are used to select specific outboard and throttle lever operational characteristics, system wide diagnostic functions, and sensor calibration functions.

## Engine Monitor Overview - Continued



000026-f01

Figure 1. Engine Monitor Display.

**Table 1. Engine Monitor Display.**

Item No.	Name	Function
1	<b>HOME</b>	The home screen shows data for port and starboard engines. Data includes rpm, coolant temperature, trim position, speed, fuel consumption, and fuel economy.
2	<b>ECO</b>	The ECO screen displays boat fuel economy data. Data includes engine trim position, fuel consumption, fuel economy, range, average, speed, and rpm.
3	<b>TRIP</b>	The trip screen shows data for a specified time or distance. Data includes distance, operating time, average speed, maximum speed, average fuel economy, and fuel consumed.
4	<b>VESSEL</b>	The vessel screen shows vessel data. Data includes; battery voltage, fuel consumption, speed, and fuel economy.
5	<b>FLUID TANKS</b>	<ul style="list-style-type: none"> <li>• Oil level data shown is from the reservoir on the engine.</li> <li>• Oil level readings are not available when the engine is in the tilt range.</li> <li>• The fluid tanks screen shows oil level of the reservoir for each engine.</li> </ul>
6	<b>OUTBOARD</b>	<ul style="list-style-type: none"> <li>• Oil level data shown is from the reservoir on the engine.</li> <li>• Oil level readings are not available when the engine is in the tilt range.</li> <li>• The outboard screen shows data for the selected engine. Touch the port or starboard engine icon to display its data. Data includes rpm, trim, engine hours,</li> </ul>

## Engine Monitor Overview - Continued

**Table 1. Engine Monitor Display - Continued.**

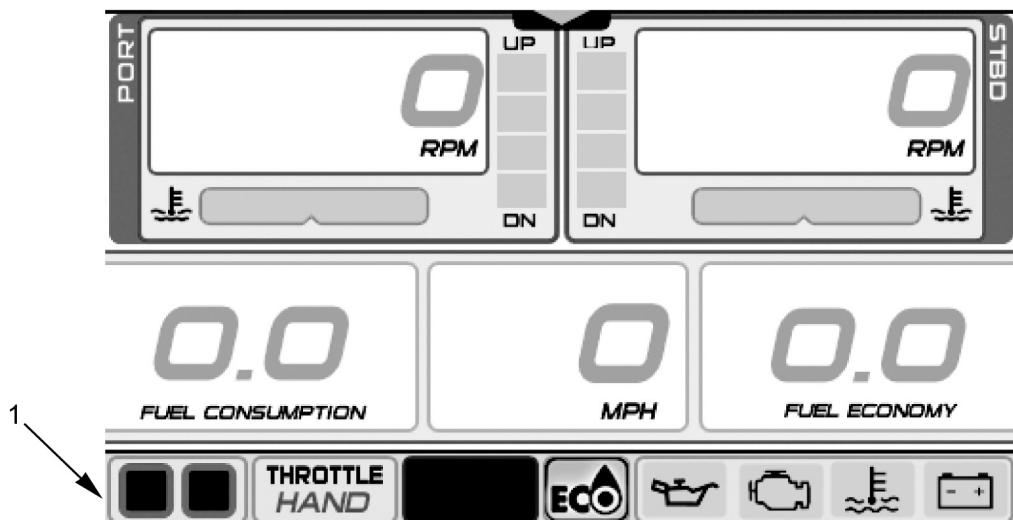
		coolant temperature, water pressure, battery voltage, oil level, fuel consumption, and throttle position.
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### System Faults

A pop-up and audible warning will remain in effect until acknowledged by the operator by touching the pop-up area. As long as the fault is active, the pop-up may be re-initiated by touching the right-hand side of the "Outboard Status Indicator" area of the "Status Bar".

System faults are generated by the outboard engines and throttle levers. When an active or current fault is broadcast on the network by the throttle levers or outboard engine, the display will:

1. Take no action unless the display is in "Diagnostic" or "System mode". In those instances, the faults will be displayed.
2. Indicate an existing warning by highlighting an "Outboard Status Indicator" on the status bar (Figure 2, Item 1).
3. Initiate a pop-up with the appropriate information displayed. The pop-up color will be yellow. In addition, the appropriate Outboard Status Indicator in the Status Bar will be highlighted.
4. Initiate a pop-up with the appropriate information displayed. In addition, the Audible Alarm Drive Output will be set to sound an audible user alert. The pop-up color will be red. In addition, the appropriate outboard status indicator in the status bar will be highlighted.



000026-f02

Figure 2. System Fault Pop Up.

### A.M.A./S.A.F.E. Mode

The outboard engine is equipped with an Audible Misfire Alert (A.M.A.) and Speed Adjusting Failsafe Electronics (S.A.F.E.). The outboard engine will operate in A.M.A. or S.A.F.E. modes as long as the fault condition exists. To recover normal operation, the sensor or switch readings must return to normal limits. A.M.A. and S.A.F.E. are outboard engine warning systems controlled by the Engine Management Module (EMM). The EMM monitors outboard engine sensors. The EMM will take the following actions for the listed conditions.

If outboard engine damage may occur, the EMM activates the A.M.A. mode which alerts the operator that a fault condition exists.

If permanent outboard engine damage may occur, the EMM activates the S.A.F.E. mode which limits the outboard engine torque output and reduces engine rpm.

If S.A.F.E. mode is activated it will be displayed on the engine monitor.

### Winterizing Engines

The winterization procedure can also be used to prime the oiling system.

The winterization mode is used to prepare the engines for long term storage. During winterization, extra oil is used to coat the internal engine components.

### Winterization Preparation

#### **WARNING**

Ensure engine is operated in well ventilated area. DO NOT idle engine without proper ventilation.

- BE ALERT for exhaust poisoning symptoms. They are: Headache, Dizziness, Sleepiness, Loss of muscular control.
- If you see another person with exhaust poisoning symptoms:
  - Remove person from area.
  - Expose to fresh air.
  - Keep person warm.
  - DO NOT permit physical exercise.
  - Administer Cardiopulmonary Resuscitation (CPR) if necessary.
  - Notify a medic.

#### **WARNING**

Ensure all personnel in the vicinity and operating the outboard engine wear personal protective equipment such as hearing protection when engine is being operated a to prevent against potential noise hazards. Failure to comply may result in injury to personnel.

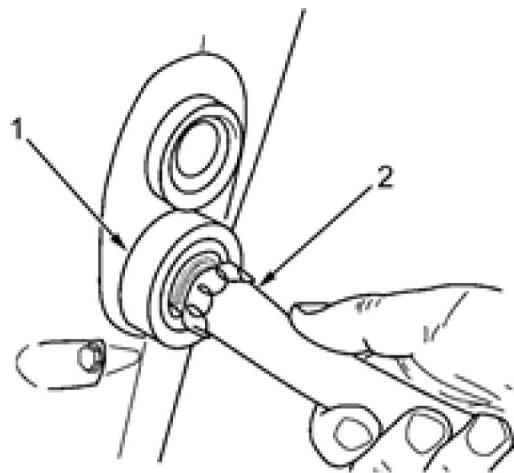
**Winterization Preparation - Continued****WARNING**

- Do not service any part of the propeller while the outboard engine is running. Always shift the outboard engine to NEUTRAL position, turn the key switch OFF.
- Ensure the outboard engine and prop area are clear of people and objects before starting or operating outboard engine. Blades can be sharp and the propeller can continue to turn even after outboard engine is OFF.
- Failure to follow these warnings may result in injury or death to personnel.

**CAUTION**

- Engines must be trimmed to the vertical (down) position to flush engine. Make sure the cooling system is drained completely before tilting engine out of the vertical (down) position. Failure to comply may result in damage to equipment.

1. If winterizing in water:
  - a. Place throttle levers in NEUTRAL position.
  - b. Ensure the water intake screens are completely submerged.
2. If winterizing out of water:
  - a. Place suitable drain pan below gearcase during winterization and duration of storage to avoid potential oil spills.
  - b. Place throttle levers in NEUTRAL position.
  - c. Trim engines to vertical (down) position on level ground (WP 0010).
  - d. Using garden hose, thread hose (Figure 3, Item 2) into flushing port (Figure 3, Item 1) place suitable drain pan under propeller and turn on water.

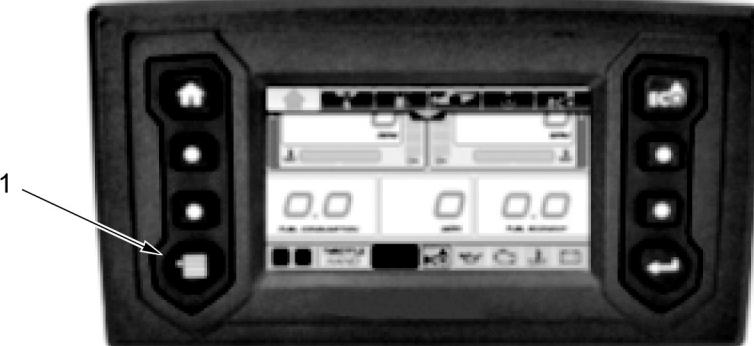


O00026-f03

Figure 3. Flushing Port.

**Winterization Procedure**

1. Perform starting procedures for the desired engine to be winterized (WP 0007).
2. Push the menu button (Figure 4, Item 1).



000026-f04

Figure 4. Engine Monitor Display.

3. Tap the settings icon (Figure 5, Item 1).



000026-f05

Figure 5. Engine Monitor Menu Tab.

### Winterization Procedure - Continued

4. Tap the winterize tab (Figure 6, Item 2).
5. Tap the desired engine icon (Figure 6, Item 1) to be winterized.
6. Tap the "Winterize Engine" icon (Figure 6, Item 3).

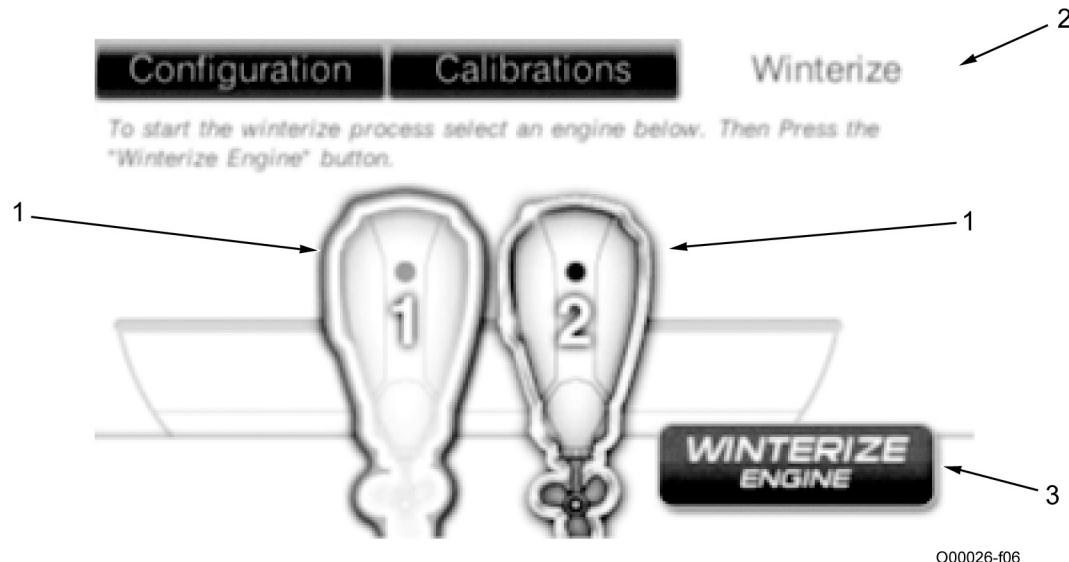


Figure 6. Winterize Engine Tab.

### NOTE

When the winterization process is complete the engine will automatically turn OFF.

7. Follow on-screen instructions to complete winterization.

### NOTE

- Leave engine in vertical position long enough to completely drain.
- Extra engine oil is used during the winterization procedure. Some excess oil may appear on the bottom of the gearcase. This is normal.

8. If winterizing out of water, turn off water and remove garden hose from flushing port.
9. Repeat steps for opposite engine.

**END OF WORK PACKAGE**



**OPERATOR INSTRUCTIONS  
OPERATING UNDER USUAL CONDITIONS ANCHORING**

---

**INITIAL SETUP:**

**Tools and Special Tools**

Fiber Rope Assembly, Single Leg (WP 0063,  
Table 1, Item 3)

**References (cont.)**

WP 0014  
WP 0015  
WP 0018  
WP 0025

**Personnel Required**

Diver 12D  
Assistant

**Equipment Condition**

Boat underway (WP 0010)

**References**

WP 0007

---

**Selecting An Anchor Site**

**WARNING**

Ensure all personnel in the vicinity and operating the outboard engine wear personal protective equipment such as hearing protection when engine is being operated a to prevent against potential noise hazards. Failure to comply may result in injury to personnel.

**WARNING**

Always use the emergency stop lanyard when operating the engines to prevent runaway boat. Keep emergency stop lanyard free from obstructions and entanglements. Failure to comply may result in damage to equipment or injury to personnel.

**WARNING**

Ensure personnel wear PFDs at all times during operation of boat in water. Failure to comply may result in injury or death to personnel.

**WARNING**

Anchor line can present a tripping hazard. Ensure anchor and anchor line is properly stowed while anchored and underway. Failure to comply could result in injury or death to personnel.

**WARNING**

The boat anchor provides holding power in winds up to 30 kt. Anchoring in winds in excess of 30 kt increases the risk of the anchor not holding. Failure to comply could result in injury to personnel or damage to equipment.

**CAUTION**

Shifting winds or currents can cause the boat to change direction suddenly. Ensure the swing circle of boat is clear. Failure to comply could result in damage to equipment.

**Selecting An Anchor Site - Continued****CAUTION**

Soft and rocky sea bottoms greatly reduce anchor holding power. Always try to anchor in sea beds with harder soils. Failure to comply could result in damage to equipment.

**NOTE**

The swing circle is the location of the anchor point and has a radius equal to the length of the boat and anchor line.

1. Ensure anchor site and swing circle is clear of all vessels, shipping lanes, obstacles, debris, and buried cables.
2. Use depth sounder to determine water depth (WP 0018).

**Determining Anchor Line Length****CAUTION**

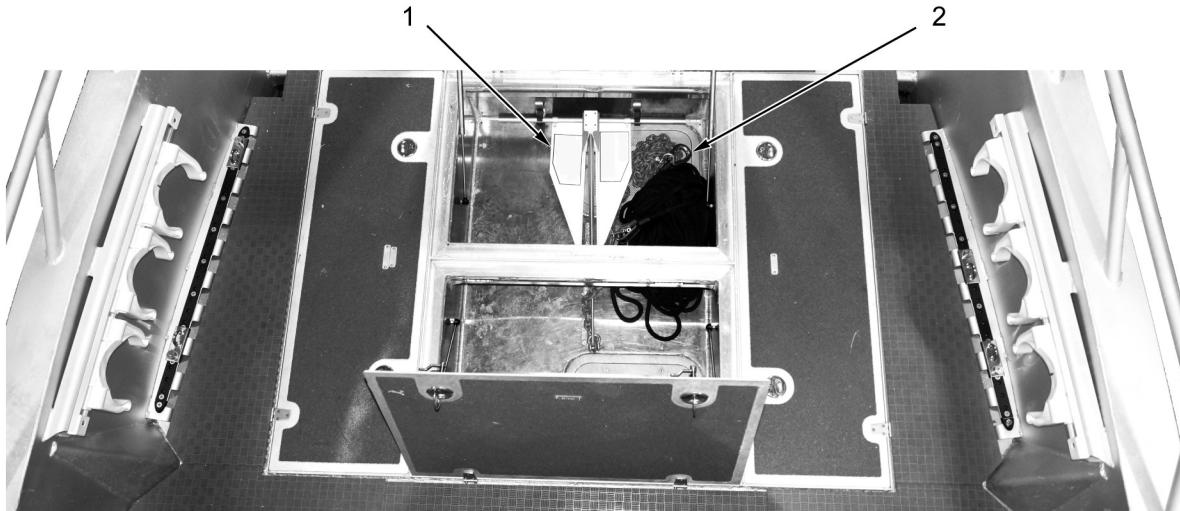
A scope of less than 5:1 will significantly decrease the anchors holding power. Failure to comply could result in damage to equipment.

Scope is the length of anchor line relative to the distance from the boat cleat to the water bottom. As the scope increases the horizontal pull on the anchor will also increase, burying the anchor deeper into the sea bottom. As the scope decreases the horizontal pull will also decrease, causing the anchor to become vertical and possibly dislodged from the sea bottom. A 5:1 scope is recommended for proper anchoring, 5 ft of anchor line for every 1 ft of water depth.

**CAUTION**

Ensure anchor chain is firmly fastened to anchor line prior to dropping anchor. Failure to comply could result in loss of equipment.

1. Have assistant remove anchor (Figure 1, Item 1), and anchor line (Figure 1, Item 2) from bow compartment .



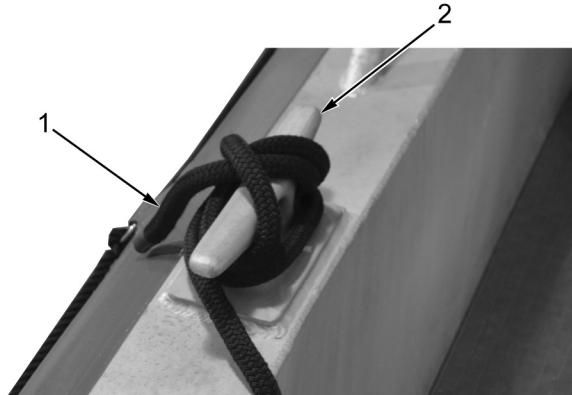
O00028-f01

Figure 1. Anchor and Anchor Line.

**WARNING**

Never attach anchor line to any rail, rail fitting, or other deck hardware. Failure to comply could result in damage to equipment or injury to personnel.

2. Attach anchor line (Figure 2, Item 1) to port or starboard mid cleat (Figure 2, Item 2).



000028-f02

Figure 2. Anchor Line and Cleat.

3. Place anchor and coil anchor line near bow to prevent knotting and fouling when dropping anchor.
4. Position boat heading into wind or current.
5. Approach anchoring site at idle speed.

6. Turn navigation lights switch to ANCHOR position (Figure 3, Item 1).
7. Once at anchoring site, place throttle levers in NEUTRAL position (Figure 3, Item 2).

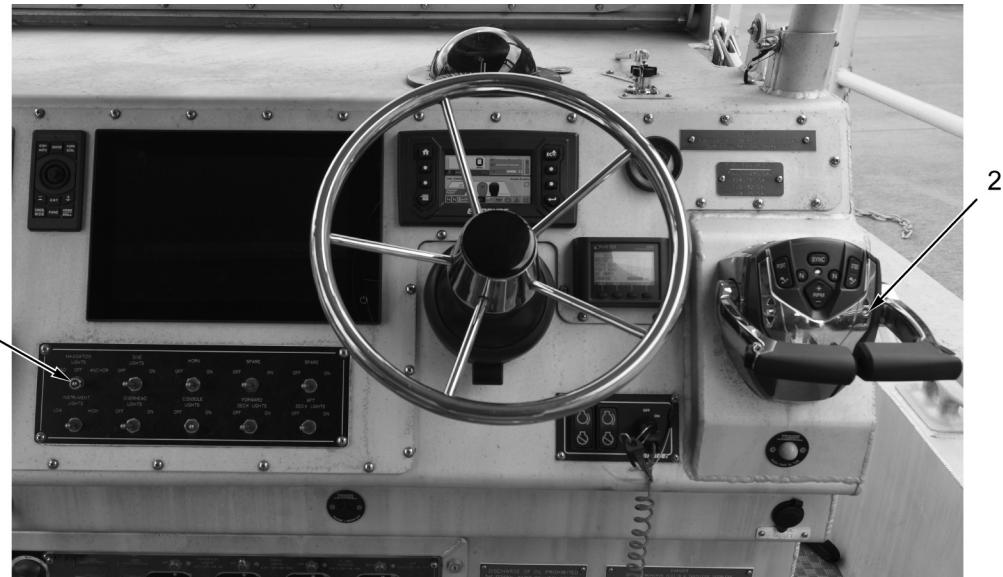


Figure 3. Throttle and Anchor Light Controls.

### Dropping Anchor

#### **CAUTION**

Do not throw anchor overboard as anchor line could become fouled. Failure to comply may result in damage to equipment.

1. From port or starboard bow, lower anchor slowly into water.
2. Maintain tension on anchor line while lowering and continue to maintain tension after anchor reaches bottom.
3. Using multi-function display, mark anchor point (WP 0015).
4. Using multi-function display, set anchor watch alarm (WP 0014).

**Dropping Anchor - Continued****WARNING**

Ensure crew is not between anchor line and side of boat. Failure to comply may result in injury to personnel.

5. Place throttle levers in REVERSE (Figure 4, Item 1) and slowly maneuver boat backward until the pre-determined scope is payed out.



O00028-f04

Figure 4. Throttles in Reverse Position.

**Dropping Anchor - Continued**

6. Place throttle levers in NEUTRAL (Figure 5, Item 1).



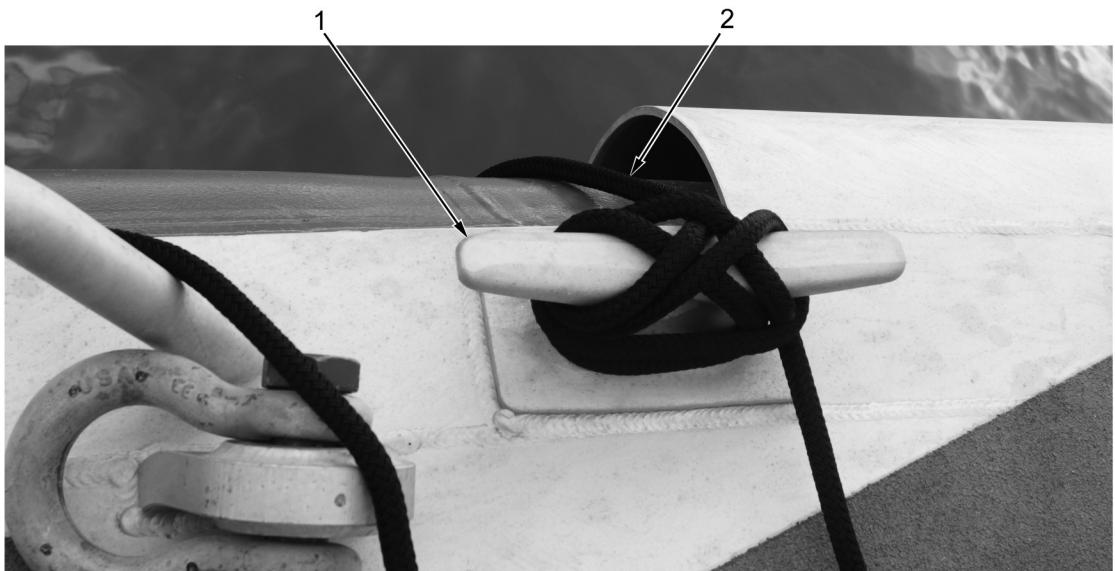
000028-f10

Figure 5. Throttles in Neutral Position.

**NOTE**

Ensure anchor line is being secured to same side as anchor line attachment.

7. Secure anchor line (Figure 6, Item 2) around port or starboard bow cleat (Figure 6, Item 1).



000028-f05

Figure 6. Anchor Line and Bow Cleat.

**Dropping Anchor - Continued**

8. Stow anchor line slack in forward open bow compartment.
9. Engage throttle levers slowly until anchor is firmly set on bottom.
10. Shutdown engines (WP 0025).
11. While anchored, monitor plotter every 30 minutes to ensure boat is not drifting and anchor is not dragging.
12. If boat is drifting outside of swing circle on plotter or anchor alarm sounds, anchor is dragging and needs to be reset. Repeat steps 1-9.

**Weighing Anchor**

1. Start outboard engines (WP 0007).
2. Place throttle levers in FORWARD (Figure 7, Item 1) and slowly maneuver boat forward over anchor while pulling in anchor line slack.



Figure 7. Throttles in Forward Position.

**Weighing Anchor - Continued**

3. Once boat is directly over anchor and anchor line is vertical, place throttle levers in NEUTRAL (Figure 8, Item 1) remove anchor line from bow cleat, and pull in slack.



000028-f10

Figure 8. Throttles in Neutral Position.

4. Re-secure anchor line to bow cleat.

**CAUTION**

Do not power the boat forward. Heavy loads could be placed on anchor and supporting hardware. Failure to comply could result in damage to equipment.

5. Slowly maneuver boat backwards to unseat anchor.
6. Pull remaining anchor line and anchor from water.

**Weighing Anchor - Continued**

7. Remove anchor line (Figure 9, Item 2) from bow cleat (Figure 9, Item 1).

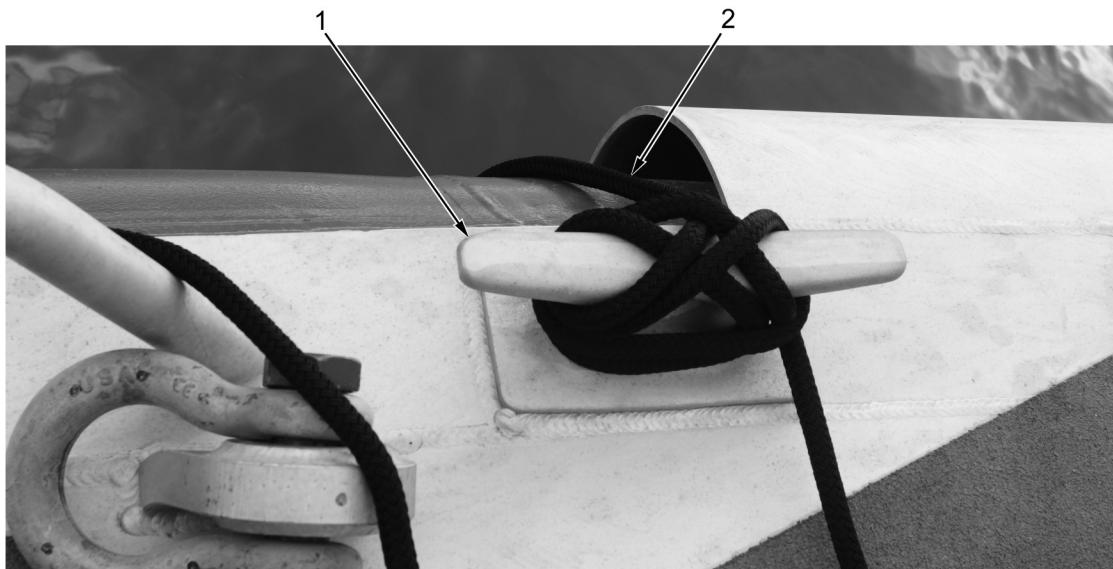


Figure 9. Anchor Line and Bow Cleat.

8. Remove anchor line (Figure 10, Item 1) from mid cleat (Figure 10, Item 2).

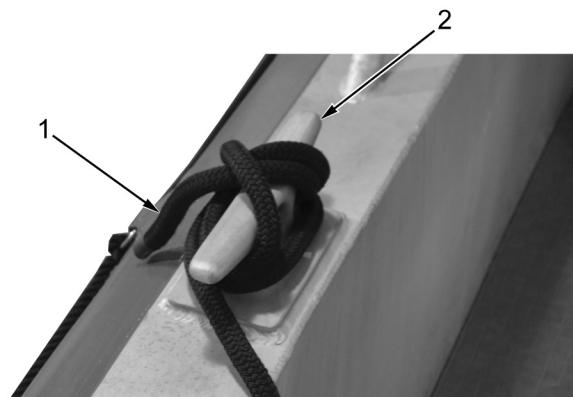
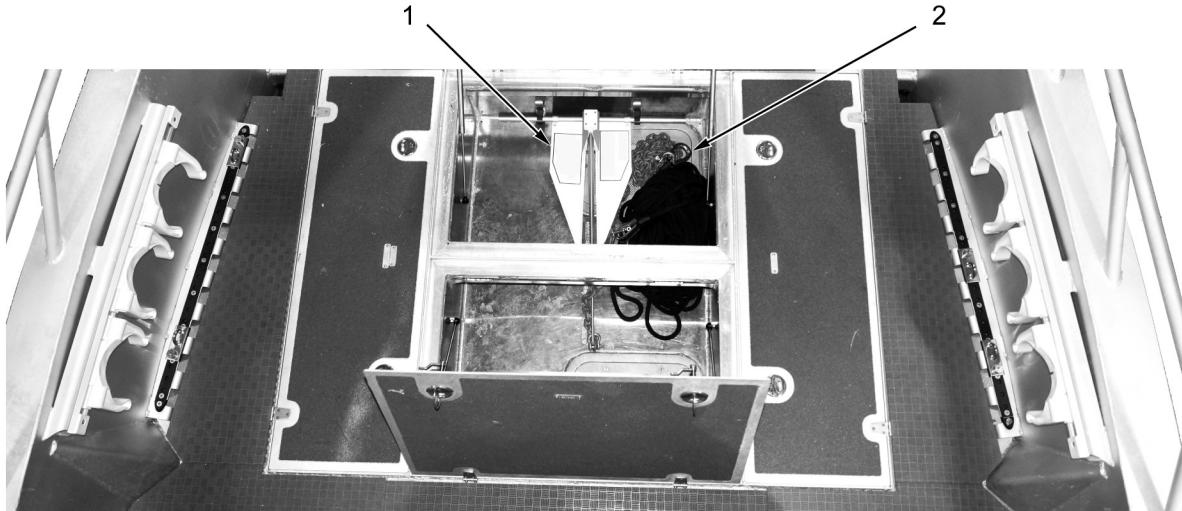


Figure 10. Anchor Line and Cleat.

**Weighing Anchor - Continued**

9. Stow anchor line (Figure 11, Item 2) and anchor (Figure 11, Item 1) in bow compartment.



O00028-f01

Figure 11. Anchor and Anchor Line Stowage.

**END OF WORK PACKAGE**

**OPERATOR INSTRUCTIONS  
OPERATING UNDER USUAL CONDITIONS DIVE PLATFORM**

---

**INITIAL SETUP:**

**Personnel Required**  
Diver 12D

**Equipment Condition**  
Boat anchored (WP 0022)

---

**Lowering Dive Platform**

**WARNING**

- Do not pull ladder out of dive platform while platform is in upright position as ladder may sway.
- While lowering ladder into water, keep hands away from ladder hinge.
- Failure to comply may result in injury to personnel.

**WARNING**

Ensure personnel wear PFDs at all times during operation of boat in water. Failure to comply may result in injury or death to personnel.

**CAUTION**

Pulling ladder out and resting ladder on dive platform while in upright position may result in damage to equipment.

**NOTE**

The Dive Platform is supported by two tension ropes. The minimum weight rating for the tension ropes is 12,380 lbs.

**Lowering Dive Platform - Continued**

1. Open port and starboard bow door turnbuckle fasteners (Figure 1, Item 1).



O00029-f01

Figure 1. Dive Platform Turnbuckle Fasteners.

2. Lower dive platform until all weight is on tension ropes (Figure 2, Item 1).
3. Turn dive ladder lock (Figure 2, Item 2) to UNLOCKED position, and extend ladder (Figure 2, Item 3).
4. Lower dive ladder into water.

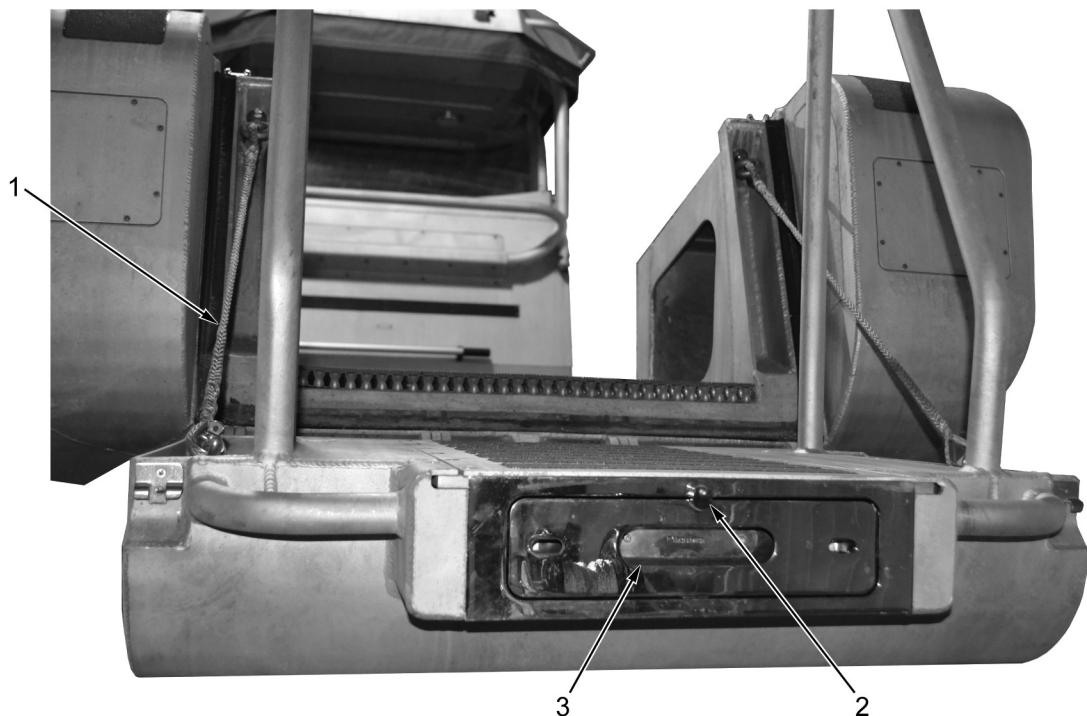
**Lowering Dive Platform - Continued**

Figure 2. Tension Ropes and Dive Ladder Lock.

**Stowing Dive Platform**

1. Pull dive ladder (Figure 2, Item 3) up, and stow.
2. Raise dive platform until closed.
3. Turn dive ladder lock (Figure 2, Item 2) to LOCKED position.
4. Latch and lock port and starboard bow door turnbuckle fasteners (Figure 1, Item 1).

**END OF WORK PACKAGE**



**OPERATOR INSTRUCTIONS  
OPERATING UNDER USUAL CONDITIONS RECOVERY BY TRAILER**

---

**INITIAL SETUP:**

<b>Tools and Special Tools</b>	<b>References</b>
Wrench, Box and Open End, Combination (WP 0062, Table 2, Item 30)	WP 0010
<b>Materials/Parts</b>	<b>Equipment Condition</b>
Tape, Antiseizing (WP 0063, Table 1, Item 9)	Boat Underway (WP 0010) Trailer attached to prime mover (WP 0026)
<b>Personnel Required</b>	
Diver 12D Assistant (2)	

---

**WARNING**

- Do not exceed 82 gal. (310.4 L) of fuel in boat fuel tank when trailering with Light Medium Tactical Vehicle (LMTV) as maximum tow capacity is 12,000 lbs (5443.1 kg).
- Do not trailer boat with personnel or equipment on boat.
- Do not exceed payload capacity of 3,815 lbs (1,730 kg) with 240 gal. (908.4 L) of fuel.
- Ensure NO pressurized cylinders are stowed on the boat or trailer while the boat is being trailered over roads.
- To avoid pinch points between boat and trailer, use of appropriate personal protective equipment such as gloves when handling the winch hook is required.
- Keep all body parts clear of contact points between boat and trailer winch.
- When trimming engine up or down, keep all body parts clear of contact points between engine and boat.
- Boat ramps may present slippery surfaces. Ensure proper footwear is worn at all times.
- To prevent falls from the sides, rear, or top of the boat, personnel should always maintain three points of contact (for example two feet and one hand) when climbing in, out, and on the boat.
- When manually trimming engines ensure personnel are clear of pinch points between engines.
- Failure to comply may result in serious injury or death to personnel.

**WARNING**

- Do not service any part of the propeller while the outboard engine is running. Always shift the outboard engine to NEUTRAL position, turn the key switch OFF.
- Ensure the outboard engine and prop area are clear of people and objects before starting or operating outboard engine. Blades can be sharp and the propeller can continue to turn even after outboard engine is OFF.
- Failure to follow these warnings may result in injury or death to personnel.

**WARNING**

Always use the emergency stop lanyard when operating the engines to prevent runaway boat. Keep emergency stop lanyard free from obstructions and entanglements. Failure to comply may result in damage to equipment or injury to personnel.

**WARNING**

Ensure all personnel in the vicinity and operating the outboard engine wear personal protective equipment such as hearing protection when engine is being operated a to prevent against potential noise hazards. Failure to comply may result in injury to personnel.

**WARNING**

Ensure personnel wear PFDs at all times during operation of boat in water. Failure to comply may result in injury or death to personnel.

**WARNING**

Hold winch handle firmly when ratchet is unlocked. Spinning handle could cause serious injury. Failure to comply may result in injury to personnel.

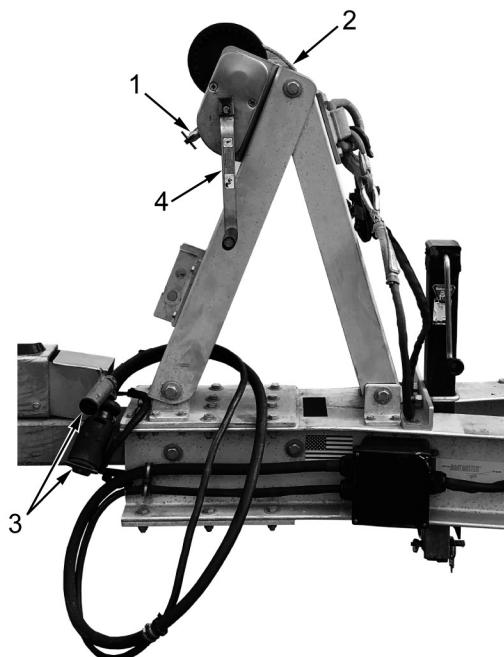
**CAUTION**

- DO NOT run outboard engine without a water supply to the cooling system. Failure to comply can result in cooling system and/or powerhead damage.
- DO NOT attempt launching on boat ramps with 15° or greater pitch due to the probability of grounding the trailer at the transition. Failure to comply may result in damage to the trailer.

**CAUTION**

- Ensure weight on trailer is evenly distributed. Excessive tongue weight will cause front end of prime mover to sway. Insufficient tongue weight will cause trailer to sway or fishtail.
- Ensure overhead obstacles such as bridges and wires are determined prior to taking trailered boat onto roads.
- Failure to comply may result in damage to equipment.

1. Disconnect electrical cable (Figure 1, Item 3) from prime mover.
2. Have assistant rotate winch lock lever (Figure 1, Item 1) 90° and rotate winch handle (Figure 1, Item 4) counterclockwise to loosen line (Figure 1, Item 2).



000030-f12

Figure 1. Trailer Winch and Electrical Cable.

### **WARNING**

Ensure primary mover is placed in park with emergency brake engaged. Failure to comply may result in damage to equipment and injury or death to personnel.

3. Have trailer and prime mover in position on ramp with approximately 18-24 in. (46-61 cm) of forward end of bunk exposed above water.

**CAUTION**

Do not accelerate up trailer bunks faster than required. Failure to comply may cause damage to trailer and boat.

**NOTE**

- If mooring lines were removed during operation they may need to be reattached to forward and aft cleats.
- Account for wind and current during trailer approach.
- Operator may ease in and out of gear several times between starting to and eventually touching onto trailer bunks.

4. Trim engines to 25% and approach recovery site with throttles in FORWARD IDLE (Figure 2, Item 1) while maneuvering boat in line with center of trailer.



O00030-f02

Figure 2. Throttles in Forward Idle.

5. The hull will self-align as it moves up the bunks. If the hull is off center or sideways, ease into reverse and back boat down, until hull aligns onto bunks.

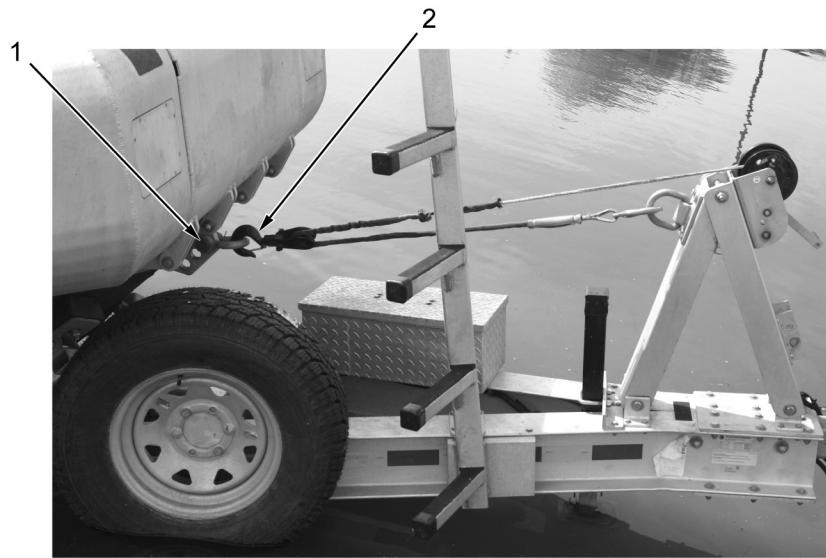
6. Place throttle levers in NEUTRAL (Figure 3, Item 1) and have two assistants use attached mooring lines to guide boat onto trailer.



O00030-f03

Figure 3. Throttles in Neutral.

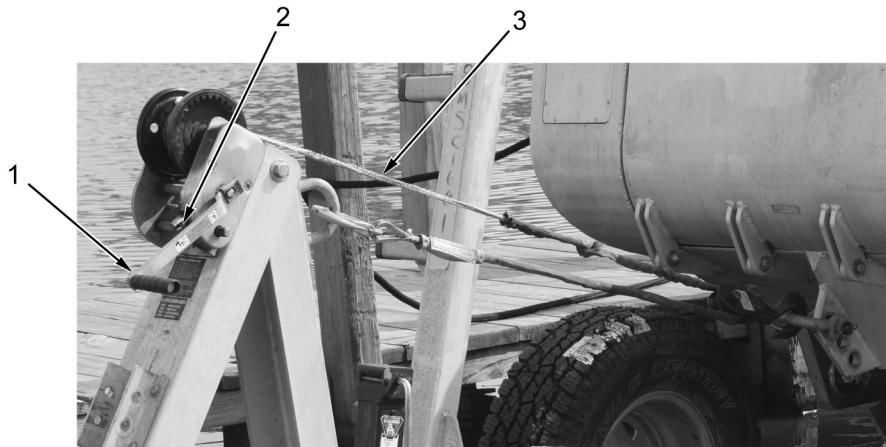
7. Have assistant connect snatch block (Figure 4, Item 2) to boat bow eye (Figure 4, Item 1).



O00030-f05

Figure 4. Boat Bow Eye.

8. Have assistant rotate winch lock lever (Figure 5, Item 2) 90° and rotate winch handle (Figure 5, Item 1) clockwise, to tighten line (Figure 5, Item 3).



000003-f09

Figure 5. Trailer Winch.

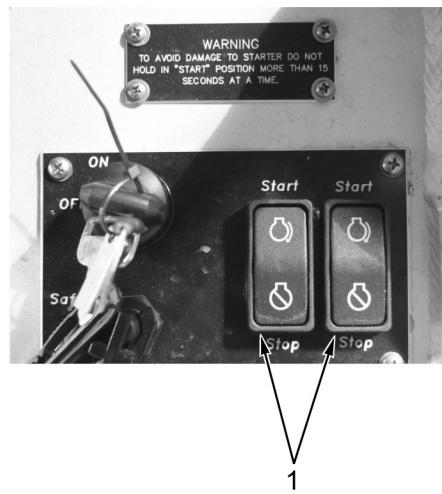
9. Winch boat (Figure 6, Item 1) forward until firmly seated onto stop bumpers (Figure 6, Item 2).



000030-f06

Figure 6. Boat Seated on Trailer.

10. Place start/stop switches in STOP position (Figure 7, Item 1).



000030-f04

Figure 7. Start/Stop Switches.

### **CAUTION**

Engines must be trimmed full UP prior to removing boat from water. Failure to comply may cause damage to engines.

11. Trim engines to full UP position (WP 0010).

### **WARNING**

The boat is not designed to house passengers during over-the-road transportation. All personnel must depart prior to trailered boat being moved. Failure to comply may result in injury or death to personnel.

12. Have all personnel disembark boat.

13. Using prime mover, move trailered boat from ramp to staging area and remove two bow and two stern tie down straps from toolbox.
14. Using two bow (Figure 8) and two stern (Figure 8) ratchet tie downs, secure boat to trailer and tighten tie downs.



STERN TIE DOWN

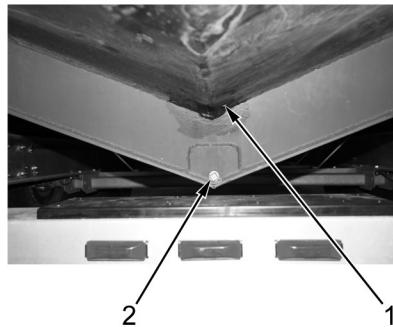


BOW TIE DOWN

O00028-f13

Figure 8. Boat Secured to Trailer.

15. Using wrench remove bilge plug (Figure 9, Item 2) and transom plug (Figure 9, Item 1) from hull and allow water to drain from bilge.
16. Using wrench and antiseizing tape reinstall bilge plug (Figure 9, Item 2) and transom plug transom plug (Figure 9, Item 1) in hull.



O00030-f10

Figure 9. Bilge Plug.

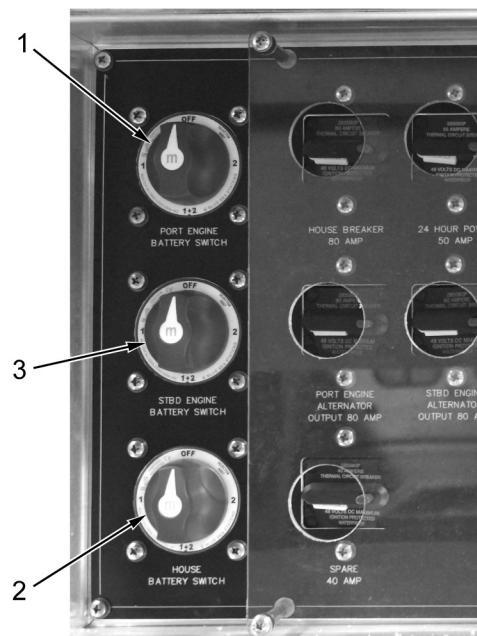
17. Engage engine lock lever (Figure 10, Item 1) and trim engines to trailering position (WP 0010).



O00030-f07

Figure 10. Engine Lock Lever.

18. Turn house (Figure 11, Item 2), port engine (Figure 11, Item 1), and starboard engine (Figure 11, Item 3) battery switches to OFF position.



O00030-f08

Figure 11. Battery Switches.

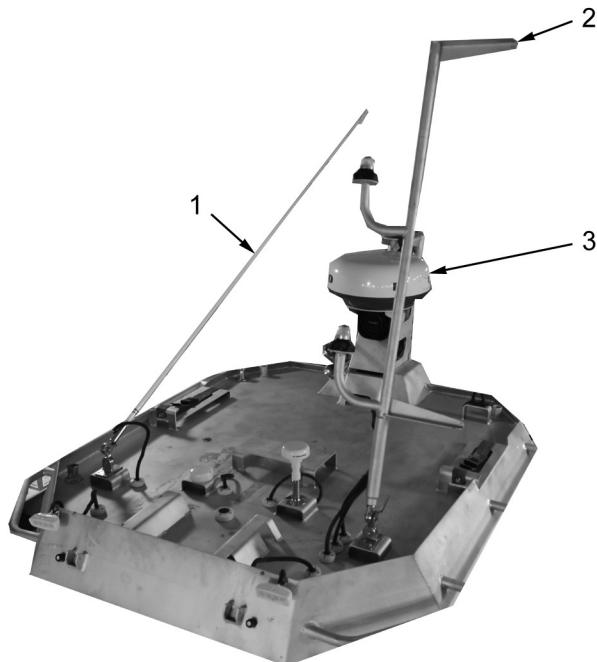
**WARNING**

Antennas and masts can conduct electricity. Ensure antenna and masts are lowered prior to transporting boat. Do not allow the antenna or masts to contact overhead power lines. Failure to comply may result in injury or death to personnel.

**CAUTION**

Antennas and masts can conduct electricity. Ensure antenna and masts are lowered prior to transporting boat. Do not allow the antenna or masts to contact overhead power lines. Failure to comply may result in damage to equipment.

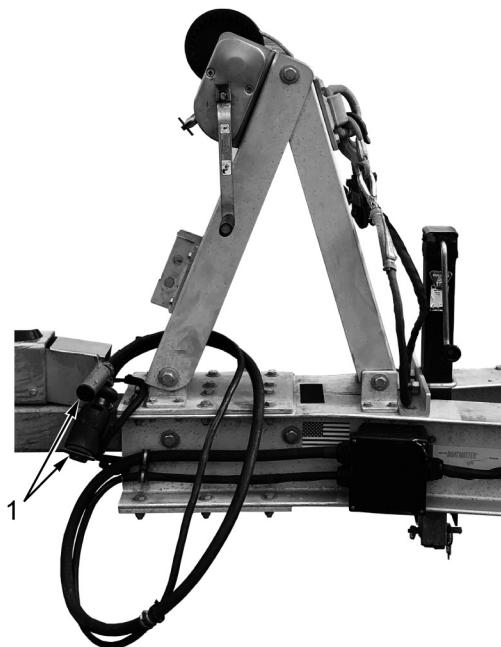
19. Lower and secure VHF antenna (Figure 12, Item 1), dive mast (Figure 12, Item 2), and radome mast (Figure 12, Item 3).



000030-f09

Figure 12. Antenna and Masts.

20. Hook trailer electrical cables (Figure 13, Item 1) to prime mover.



O00030-f14

Figure 13. Trailer Electrical Cables.

**END OF WORK PACKAGE**



**OPERATOR INSTRUCTIONS  
OPERATING UNDER USUAL CONDITIONS ENGINE SHUTDOWN PROCEDURES**

---

**INITIAL SETUP:**

**Personnel Required**  
Diver 12D

**Equipment Condition**  
Engines Started (WP 0007)

---

**ENGINE SHUTDOWN PROCEDURES**

**WARNING**

- DO NOT raise the outboard engines to the high trim or trailer position while engines are running or without allowing propellers to come to a complete stop.
- Always shift the outboard engine to NEUTRAL position, turn the key switch OFF.
- Ensure the outboard engine and prop area are clear of people and objects before starting or operating outboard engine. Blades can be sharp and the propeller can continue to turn even after outboard engine is OFF.
- Failure to follow these warnings may result in injury or death to personnel.

**WARNING**

Ensure all personnel in the vicinity and operating the outboard engine wear personal protective equipment such as hearing protection when engine is being operated a to prevent against potential noise hazards. Failure to comply may result in injury to personnel.

**WARNING**

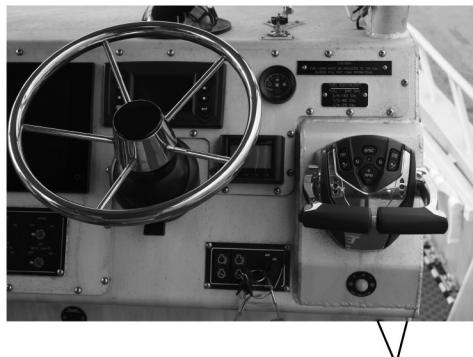
Ensure personnel wear PFDs at all times during operation of boat in water. Failure to comply may result in injury or death to personnel.

**CAUTION**

Raising the outboard engines before completing shutdown procedures will remove the water supply from the cooling system. Failure to comply will result in damage to equipment.

**ENGINE SHUTDOWN PROCEDURES - Continued**

1. Place throttle levers in NEUTRAL position (Figure 1).



THROTTLE LEVERS IN NEUTRAL

000031-f01

Figure 1. Throttles in Neutral.

**NOTE**

Conditions such as: shallow water, expected tidal changes that result in engine contact with the ground, underwater hazards, or removing the boat from the water all require raising the engines to the high trim or trailer position. Raising the engines to high trim or trailer position is not required if mooring the boat in an area where shallow water, tidal changes that result in engine contacting the bottom, or underwater hazards are not present.

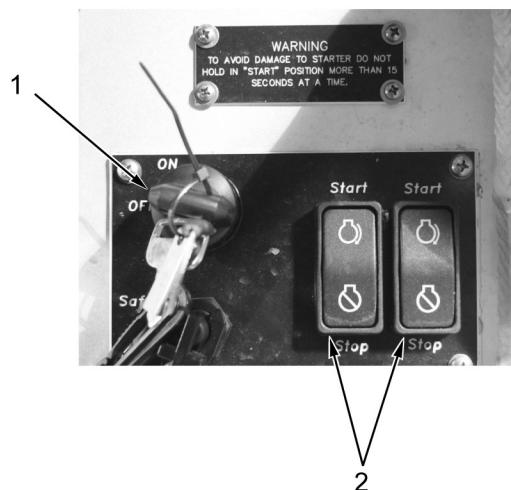
2. Using trim control (Figure 2, Item 1), adjust engines to appropriate trim level.



000031-f02

Figure 2. Trim Control Switch.

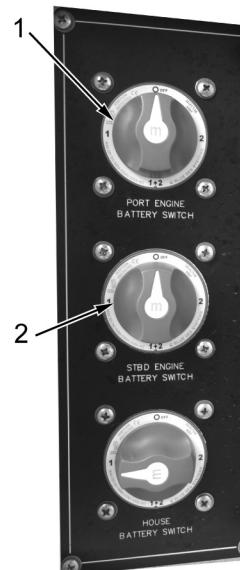
3. Place start/stop switches (Figure 3, Item 2) in STOP position.
4. Turn ignition key (Figure 3, Item 1) to OFF position.

**ENGINE SHUTDOWN PROCEDURES - Continued**

O00031-f03

Figure 3. Engine Controls.

5. Place port (Figure 4, Item 1) and starboard (Figure 4, Item 2) battery switches in OFF position.



O00031-f04

Figure 4. Battery Switches.

**END OF WORK PACKAGE**



---

**OPERATOR INSTRUCTIONS  
OPERATING UNDER USUAL CONDITIONS TRANSPORT BY TRAILER**

---

**INITIAL SETUP:****Tools and Special Tools**

Chock, Wheel-Track (WP 0062, Table 2, Item 2)

**Personnel Required**

Diver 12D  
Assistant

---

**WARNING**

- Do not exceed 82 gal. (310.4 L) of fuel in boat fuel tank when trailering with Light Medium Tactical Vehicle (LMTV) as maximum tow capacity is 12,000 lbs (5443.1 kg).
- Do not trailer boat with personnel or equipment on boat.
- Do not exceed payload capacity of 3,815 lbs (1,730 kg) with 240 gal. (908.4 L) of fuel.
- Ensure two persons (not including the prime mover operator) are available for this operation to properly guide the prime mover into position and connect the trailer. Trailer parking chocks need to be in place when guiding the prime mover into position.
- Improper trailer size and weight distribution can cause swaying and fishtailing that can result in extensive damage to trailer, boat, and towing vehicle. Swaying and fishtailing are especially dangerous at higher speeds where they can become uncontrollable.
- Do not place hands between the prime mover towing pintle and the trailer lunette eye when connecting the trailer to the prime mover.
- Ensure NO pressurized cylinders are stowed on the boat or trailer while the boat is being trailered over roads.
- Ensure weight on trailer is evenly distributed. Excessive tongue weight will cause front end of prime mover to sway. Insufficient tongue weight will cause trailer to sway or fishtail.
- Failure to comply may result in injury or death to personnel.

**WARNING**

The boat is not designed to house passengers during over-the-road transportation. All personnel must depart prior to trailered boat being moved. Failure to comply may result in injury or death to personnel.

**CAUTION**

- Ensure trailer's coupler is matched with correct size ball hitch or pintle hook.
- Ensure overhead obstacles such as bridges and wires are determined prior to taking trailered boat onto roads.
- Failure to comply may result in damage to equipment.

**NOTE**

- Trailered boat height from ground to top of folded radome mast is 12 ft 5 in. (3.8 m).
- Trailer weight will change depending on the equipment and fuel being carried at time of towing.
- 12V receptacle must be used with a commercial vehicle with a 7 pin connector.

**Attaching Trailer**

Tongue weight is measured as a percentage of the total weight of the loaded trailer on its tongue. Ideal tongue weight is not less than 5% and not more than 10% of the GVWR. For example, if the weight of the loaded trailer is 10,000 lbs (4536 kg), the weight on the tongue should be more than 500 lbs (227 kg) but less than 1,000 lbs (454 kg).

**WARNING**

Ensure trailer wheel chocks are in place prior to attaching or detaching trailer. Failure to comply may result in injury or death to personnel.

1. Using leveling support jack (Figure 1), raise trailer or lower trailer so that the pintle ring (Figure 1) is at the same height as the prime mover pintle hook.



LEVELING SUPPORT JACK

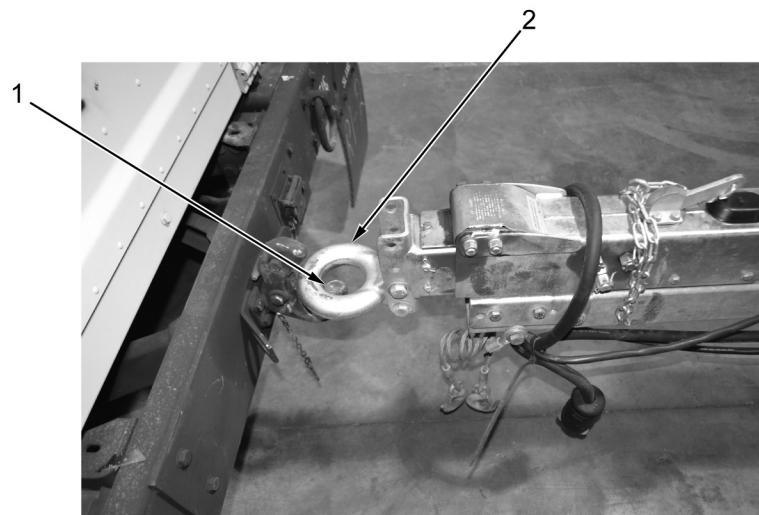


PINTLE RING

O00032-f01

Figure 1. Pintle Ring And Hook.

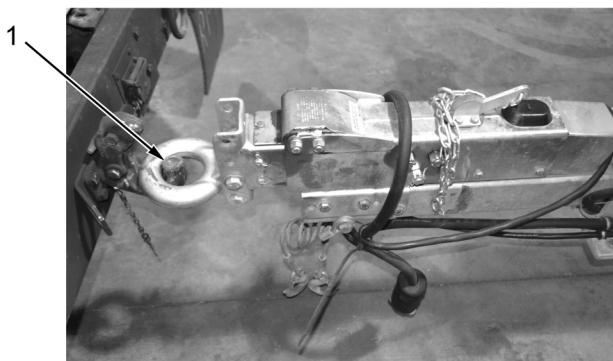
2. Guide prime mover until pintle hook (Figure 2, Item 1) is centered under pintle ring (Figure 2, Item 2).



O00032-f02

Figure 2. Pintle Ring Centered on Pintle Hook.

3. Using leveling jack, lower trailer pintle ring on pintle hook (Figure 3, Item 1).



O00032-f03

Figure 3. Pintle Ring Seated on Pintle Hook.

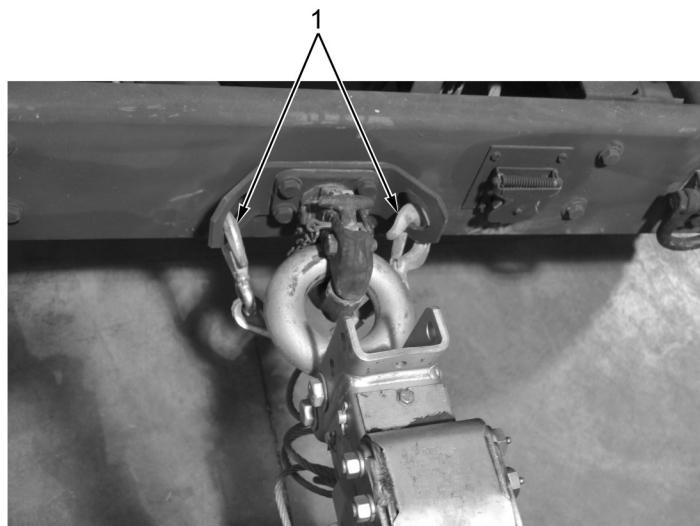
4. Close and lock pintle hook (Figure 4, Item 1).



O00032-f04

Figure 4. Pintle Hook Locked.

5. Connect safety cables in crisscross pattern with hooks (Figure 5, Item 1) facing up to prime mover.



O00032-f05

Figure 5. Safety Cables.

**CAUTION**

If the breakaway lever is not in the ready-position, do not tow the trailer. The lever must be reset before the trailer can be moved.

6. Attach trailer emergency brake chain (Figure 6, Item 1) to prime mover.

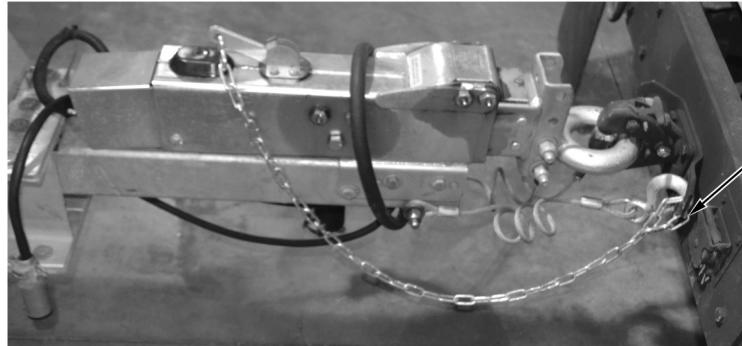


Figure 6. Emergency Brake Chain.

**CAUTION**

Failure to connect receptacle will cause brake actuator to engage while in reverse and may result in damage to equipment.

7. Connect trailer 12/24V electrical cables (Figure 7, Item 1) to prime mover.

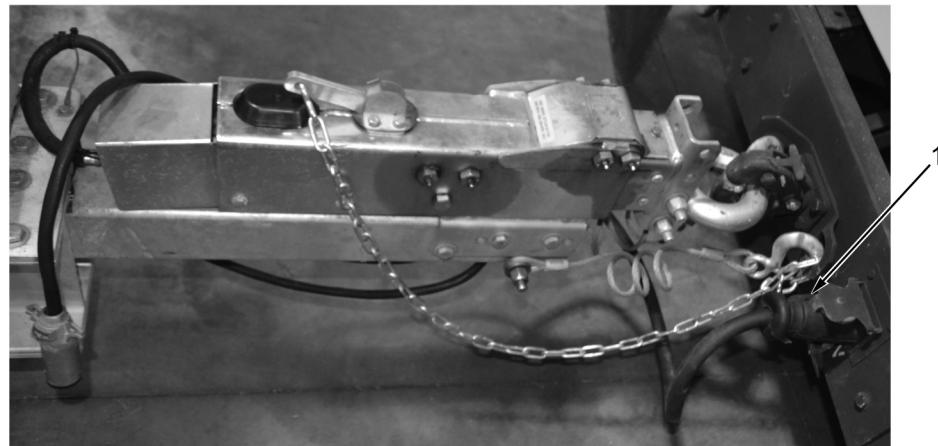
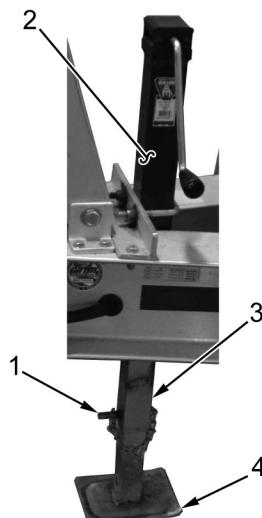


Figure 7. Trailer Electrical Cables.

8. Raise leveling support jack (Figure 8, Item 2) until skid plate (Figure 8, Item 4) is off ground.
9. Remove pin (Figure 8, Item 1) from leveling support jack (Figure 8, Item 2) and push skid plate (Figure 8, Item 4) up and install pin on post (Figure 8, Item 3).



000032-f08

Figure 8. Leveling Support Jack.

10. Remove wheel chocks.

#### **Preparation for Transport**

1. Ensure two bow (Figure 9) and two stern (Figure 9) ratchet tie downs, are secured boat to trailer.



STERN TIE DOWN

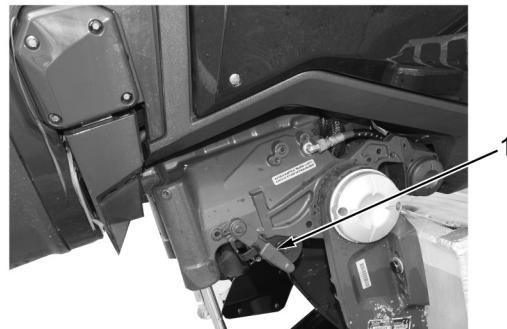


BOW TIE DOWN

000028-f13

Figure 9. Boat Secured to Trailer.

2. Ensure engine lock levers (Figure 10, Item 1) are engaged and engines are trimmed to trailering position (WP 0010).

**Preparation for Transport - Continued**

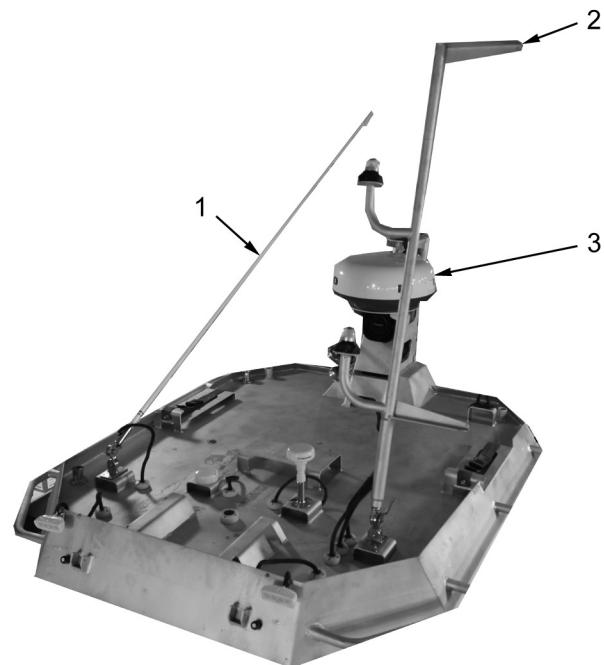
O00030-f07

Figure 10. Engine Lock Lever.

**WARNING**

Ensure antenna and masts are lowered prior to transporting boat. Do not allow the antenna or masts to contact overhead power lines. Failure to comply may result in injury or death to personnel or damage to equipment..

3. Ensure VHF antenna (Figure 11, Item 1), dive mast (Figure 11, Item 2), and radome mast (Figure 11, Item 3) are lowered and secured.

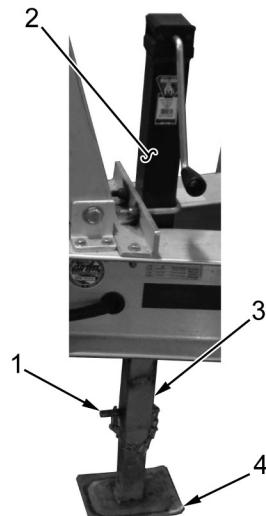


O00030-f09

Figure 11. Antenna and Mast.

**Detaching Trailer**

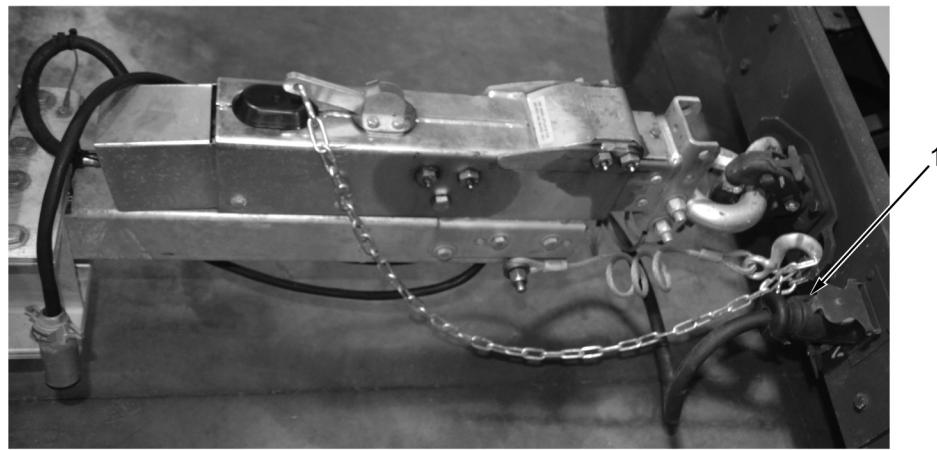
1. Remove wheel chocks from tool box and place under trailer tires.
2. Remove pin (Figure 12, Item 1) from leveling support jack (Figure 12, Item 2) and lower skid plate (Figure 12, Item 4) until desired pin setting and reinstall pin on post (Figure 12, Item 3).
3. Using leveling support jack, rotate handle counter clockwise and lower support jack to ground.



O00032-f08

Figure 12. Leveling Support Jack.

4. Remove trailer 12/24V electrical cables (Figure 13, Item 1) from prime mover.

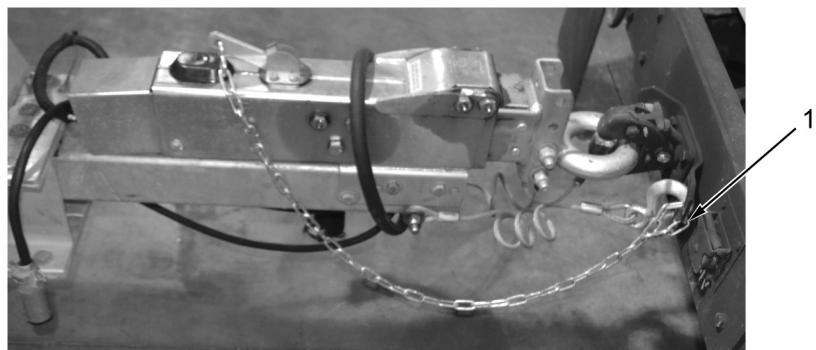


O00032-f07

Figure 13. Electrical Cables.

**Detaching Trailer - Continued**

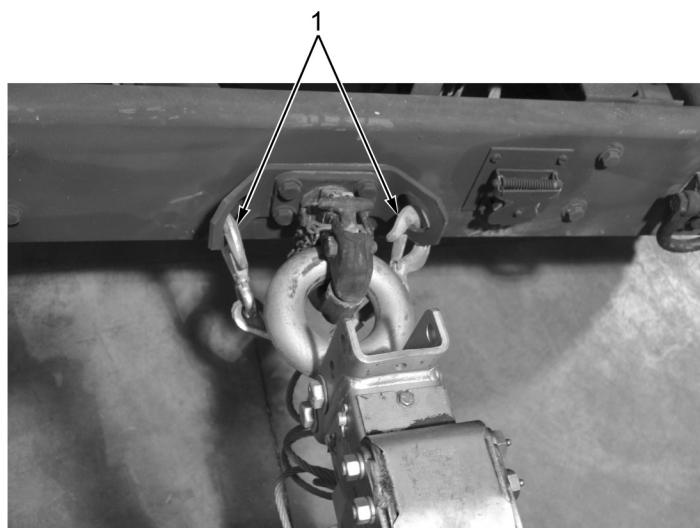
5. Remove trailer emergency brake chain (Figure 14, Item 1) from prime mover.



O00032-f06

Figure 14. Trailer Emergency Brake Chain.

6. Remove safety cables (Figure 15, Item 1) from prime mover.

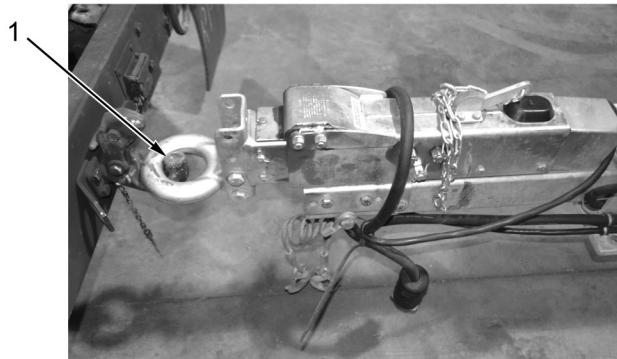


O00032-f05

Figure 15. Safety Cables.

**Detaching Trailer - Continued**

7. Unlock and lift pintle hook on prime mover (Figure 16, Item 1).



000032-f03

Figure 16. Pintle Hook.

8. Rotate leveling support jack (Figure 17) handle clockwise and raise trailer pintle ring (Figure 17) to clear prime mover.



LEVELING SUPPORT JACK



PINTLE RING

000032-f01

Figure 17. Support Jack and Pintle Ring.

9. Guide prime mover away from trailer.

**END OF WORK PACKAGE**

**OPERATOR INSTRUCTIONS  
OPERATING UNDER USUAL CONDITIONS TOWING ANOTHER VESSEL**

---

**INITIAL SETUP:**

<b>Tools and Special Tools</b>	<b>References</b>
Fiber Rope Assembly, Single Leg (WP 0062, Table 2, Item 8)	WP 0010
<b>Personnel Required</b>	<b>Equipment Condition</b>
Diver 12D Assistant	Boat Underway (WP 0010)

---

**Towing Another Vessel**

**WARNING**

Towing is a hazardous task. Operator is responsible for maintaining a safe distance from the disabled vessel. If towed equipment places personnel or RIB in danger, sever towing arrangement. Lines under tension carry a risk of breakage or 'letting go' without warning, causing the line to snap back at very high speed. Keep body parts and clothing clear of lines under tension. In the event of injury, seek medical attention. Failure to comply may result in injury to personnel.

**WARNING**

Ensure all personnel in the vicinity and operating the outboard engine wear personal protective equipment such as hearing protection when engine is being operated a to prevent against potential noise hazards. Failure to comply may result in injury to personnel.

**WARNING**

Always use the emergency stop lanyard when operating the engines to prevent runaway boat. Keep emergency stop lanyard free from obstructions and entanglements. Failure to comply may result in damage to equipment or injury to personnel.

**WARNING**

Ensure personnel wear PFDs at all times during operation of boat in water. Failure to comply may result in injury or death to personnel.

**CAUTION**

Tow post is rated for 4,788 lbs (2172 kg). Do not exceed tow post capacity. Failure to comply may result in damage to equipment.

**Towing Another Vessel - Continued**

1. Wrap tow line (Figure 1, Item 2) several times around tow post (Figure 1, Item 4).
2. Provide end of tow line to disabled boat.
3. Ensure tow line is between engine guard posts (Figure 1, Item 3).
4. While paying out tow line, maneuver boat forward to safe distance from disabled boat.
5. Using aft cleat (Figure 1, Item 1), make off remainder of tow line (Figure 1, Item 2).



000033-f01

Figure 1. Towing Arrangement.

6. Get underway and proceed slowly (WP 0010).

**END OF WORK PACKAGE**

**OPERATOR INSTRUCTIONS  
OPERATING UNDER USUAL CONDITIONS CABIN ENCLOSURE ASSEMBLY**

---

**INITIAL SETUP:**

**Personnel Required**

Diver 12D  
Assistant

---

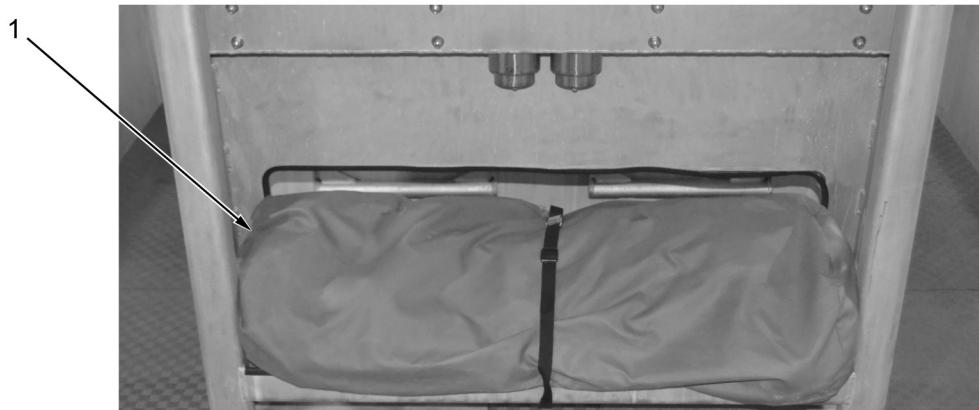
**INSTALLATION**

**NOTE**

- There are four panels that make up the enclosure. Each panel is specific to a side of the cabin.
- Entrance flaps to port and starboard side panels can be folded back and snapped to the rear panel by using the snap at the top of the entrance flap.

**INSTALLATION - Continued**

1. Remove panels from bag (Figure 1, Item 1).



000034-f05

Figure 1. Cabin Enclosure Storage Bag.

2. With assistant, zip windshield panel (Figure 2, Item 2) to collar (Figure 2, Item 1), then snap panel to front of cabin (Figure 2, Item 3).



000034-f01

Figure 2. Windshield Panel.

**INSTALLATION - Continued**

3. With assistant, zip port panel (Figure 3, Item 2) to collar (Figure 3, Item 1).
4. With assistant, zip port panel (Figure 3, Item 2) to windshield panel (Figure 3, Item 4) and snap port panel to cabin (Figure 3, Item 3).

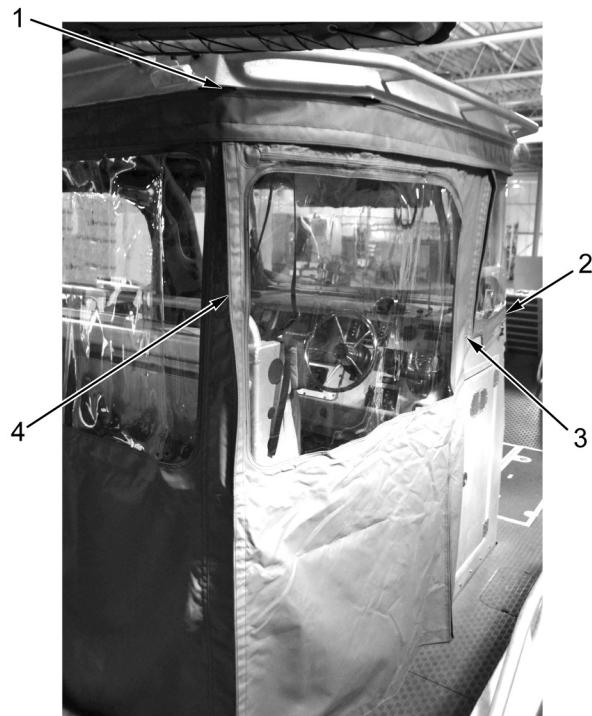


000034-f02

Figure 3. Port Panel.

**INSTALLATION - Continued**

5. With assistant, zip starboard panel (Figure 4, Item 4) to collar (Figure 4, Item 1).
6. With assistant, zip starboard panel (Figure 4, Item 4) to windshield panel (Figure 4, Item 2) and snap starboard panel to cabin (Figure 4, Item 3).



000034-f03

Figure 4. Starboard Panel.

**INSTALLATION - Continued**

7. With assistant, zip rear panel (Figure 5, Item 3) to collar (Figure 5, Item 1).
8. With assistant, zip rear panel (Figure 5, Item 3) to port side panel (Figure 5, Item 4) and starboard side panel (Figure 5, Item 2).



Figure 5. Rear Panel.

**REMOVAL**

1. With assistant, unzip rear panel (Figure 6, Item 3) from starboard side panel (Figure 6, Item 2) and unsnap from cabin.
2. With assistant, unzip rear panel (Figure 6, Item 3) from port side panel (Figure 6, Item 4) and unsnap from cabin.
3. With assistant, unzip rear panel (Figure 6, Item 3) from collar (Figure 6, Item 1).

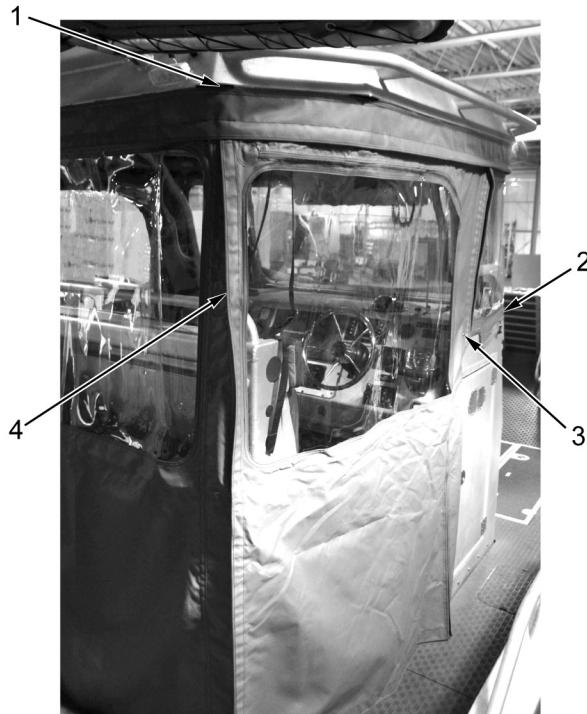


O00034-f04

Figure 6. Rear Panel.

**REMOVAL - Continued**

4. With assistant, unzip starboard panel (Figure 7, Item 4) from windshield panel (Figure 7, Item 2) and unsnap starboard panel from cabin (Figure 7, Item 3).
5. With assistant, unzip starboard panel (Figure 7, Item 4) from collar (Figure 7, Item 1).



O00034-f03

Figure 7. Starboard Panel.

**REMOVAL - Continued**

6. With assistant, unzip port panel (Figure 8, Item 2) from windshield panel (Figure 8, Item 4) and unsnap port panel from cabin (Figure 8, Item 3).
7. With assistant, unzip port panel (Figure 8, Item 2) from collar (Figure 8, Item 1).



O00034-f02

Figure 8. Port Panel

**REMOVAL - Continued**

8. With assistant, unzip windshield panel (Figure 9, Item 2) from collar (Figure 9, Item 1), then unsnap panel from front of cabin (Figure 9, Item 3).



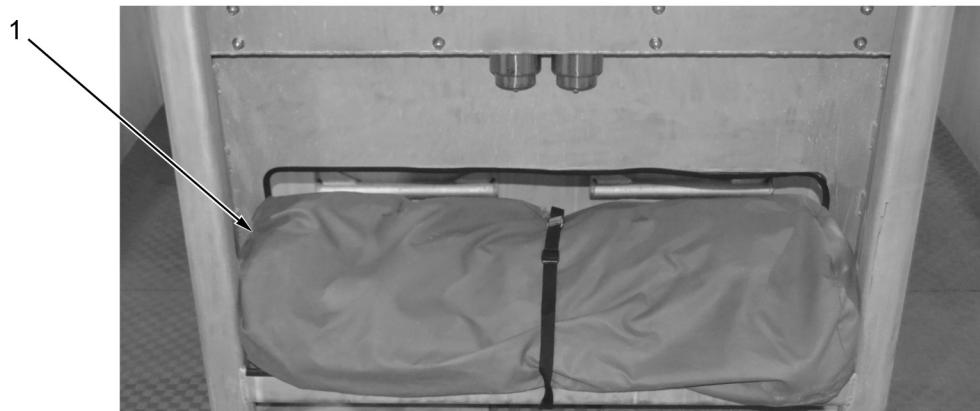
O00034-f01

Figure 9. Windshield Panel.

**REMOVAL - Continued****CAUTION**

Carefully roll panels as to not form creases in the windows. Failure to comply may result in damage to equipment.

9. Place panels into bag (Figure 10, Item 1) and securely stow.



000034-f05

Figure 10. Cabin Enclosure Storage Bag.

**END OF WORK PACKAGE**

---

**OPERATOR INSTRUCTIONS  
OPERATING UNDER USUAL CONDITIONS PREPARATION FOR LONG TERM STORAGE**

---

**INITIAL SETUP:****Materials/Parts**

Inhibitor, Corrosion, Petroleum Fuel (WP 0063,  
Table 1, Item 4)

**References (cont.)**

WP 0021  
WP 0028  
WP 0055

**Personnel Required**

Diver 12D

**Equipment Condition**

Boat Trailered (WP 0024)

**References**

WP 0005

---

**Preparation for Long Term Storage****WARNING**

- Fuel is flammable and harmful to health. Keep fuel away from heat or ignition sources. DO NOT smoke within 50 feet (15 m) of a fuel source. Do not work on fuel system when engine is hot. Shut down engine before refueling. Ensure fuel nozzle is grounded to filler neck. Do not overfill fuel tank. Keep fire extinguisher nearby. Wear personal protective equipment such as gloves and eye protection and ensure adequate ventilation during refueling.
- Refer to local procedures and plans for preventing and responding to fuel spills or leaks. Use a drain pan or suitable container to capture any draining, leaking or spilled fuel. Immediately clean up spilled fuel. Keep cloths/rags away from open flame and/or ignition sources. Comply with local procedures and environmental regulations when disposing of unused fuel, soiled/cleanup materials (such as filters and rags), and drained, leaked or spilled fuel.
- Failure to comply may result in injury to personnel and/or damage to the environment.

**Preparation for Long Term Storage - Continued**

1. Fill fuel tank (WP 0055).
2. Stabilize fuel supply by adding corrosion inhibitor following instructions on container.
3. Perform engine winterizing procedure (WP 0021).
4. Close four fuel valves (WP 0005).
5. Ensure multi-function display and engine monitor covers are installed.
6. Ensure all hatches and doors are closed and secured.
7. Install cabin enclosure assembly (WP 0028).

**END OF WORK PACKAGE**

---

**OPERATOR INSTRUCTIONS  
OPERATION UNDER UNUSUAL CONDITIONS EMERGENCY STARTING PROCEDURES**

---

**INITIAL SETUP:**

<b>Personnel Required</b>	<b>References (cont.)</b>
Diver 12D	WP 0021
Assistant	WP 0040
<b>References</b>	<b>Equipment Condition</b>
WP 0007	Pre-start procedures performed (WP 0005)

---

**EMERGENCY STARTING PROCEDURES**

**WARNING**

Prior to starting engines, announce to crew that engines are ready for start, stay clear of engines. Failure to comply may result in injury to personnel.

**WARNING**

Ensure all personnel in the vicinity and operating the outboard engine wear personal protective equipment such as hearing protection when engine is being operated to prevent against potential noise hazards. Failure to comply may result in injury to personnel.

**WARNING**

Always use the emergency stop lanyard when operating the engines to prevent runaway boat. Keep emergency stop lanyard free from obstructions and entanglements. Failure to comply may result in damage to equipment or injury to personnel.

**WARNING**

Ensure personnel wear PFDs at all times during operation of boat in water. Failure to comply may result in injury or death to personnel.

**CAUTION**

Do not hold engine start/stop switch for more than 15 seconds. Failure to comply may result in damage to equipment.

**NOTE**

Both port and starboard engines contain manual trim switches. The emergency starting process is shown for starboard engine, the procedure is identical for port engine.

**EMERGENCY STARTING PROCEDURES - Continued****General Information**

Use emergency start only when network communication between engine start button(s) and engine(s) fail. Emergency start requires pushing manual trim buttons located on starboard side of each engine. By pushing manual trim buttons and momentarily activating the trim system, a ten second window is provided allowing for engine start using engine start buttons at console.

1. Turn key to ON position (Figure 1, Item 1).



000046-f01

Figure 1. Ignition Key.

**NOTE**

Pushing manual trim switch on engine will allow ten second reset to start engine.

2. Direct assistant to push manual trim switch on starboard engine (Figure 2, Item 1).



000046-f02

Figure 2. Manual Tilt/Trim Switch.

3. Push starboard engine start button and start engine (WP 0007).
4. Observe engine monitor for any fault codes (WP 0021).
5. If engine(s) fail(s) to start or run, refer to troubleshooting (WP 0040).

**END OF WORK PACKAGE**

**OPERATOR INSTRUCTIONS  
OPERATION UNDER UNUSUAL CONDITIONS BOAT IS TAKING ON WATER**

---

**INITIAL SETUP:**

**Tools and Special Tools**

Pump, Reciprocating (WP 0062, Table 2, Item 27)

**Equipment Condition**

Boat underway (WP 0010)

**Personnel Required**

Diver 12D  
Assistant

---

**Emergency Dewatering Procedures**

**WARNING**

Boat taking on water is an extremely dangerous situation. Once water flow has been mitigated, operator should return to shore immediately at safe operating speed. Failure to comply may result in damage to equipment and injury or death to personnel.

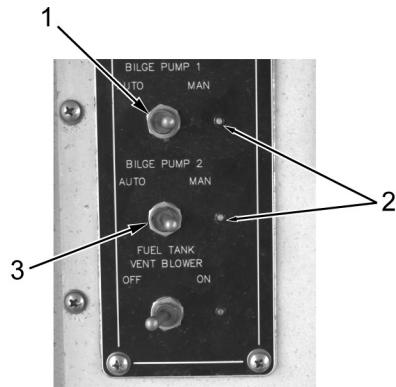
**WARNING**

Ensure personnel wear PFDs at all times during operation of boat in water. Failure to comply may result in injury or death to personnel.

### Emergency Dewatering Procedures - Continued

This section provides instructions for operation and dewatering of boat during use.

1. Ensure all crew members have donned Personal Flotation Device (PFDs).
2. Reduce throttles of boat to safe operating speed.
3. Have assistant open port, starboard, and center aft hatches and check for water intrusion and hull damage.
4. Turn bilge pump 1 (Figure 1, Item 1) and bilge pump 2 (Figure 1, Item 3) operating switches to MANUAL position and ensure operation lights illuminate (Figure 1, Item 2).



000037-f01

Figure 1. Bilge Operating Switches.

5. Ensure water is being pumped overboard at both forward (Figure 2, Item 1) and aft (Figure 2, Item 2) through-hull discharge points.

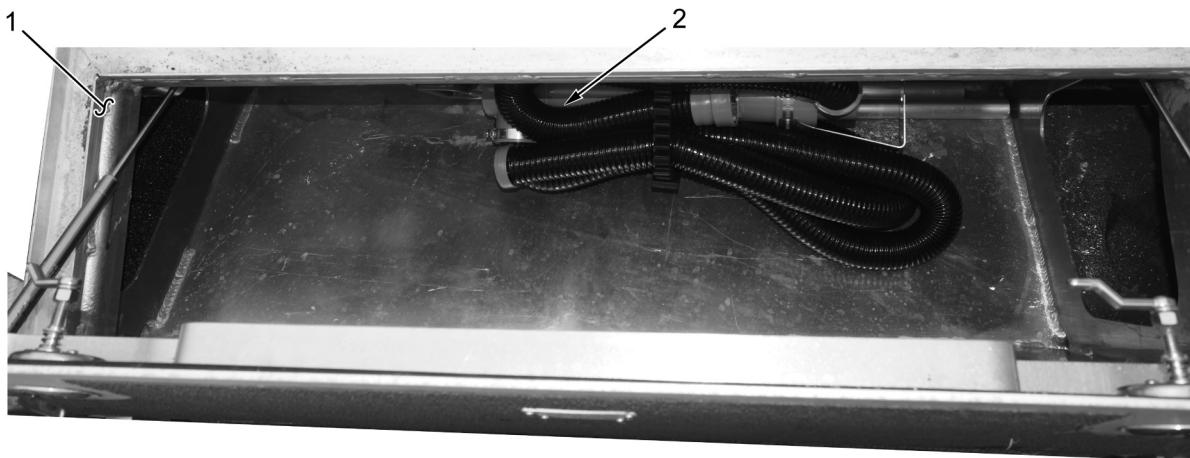


000037-f02

Figure 2. Bilge Discharge Points.

**Emergency Dewatering Procedures - Continued**

6. Retrieve manual bilge pump (Figure 3, Item 2) from port bow hatch compartment (Figure 3, Item 1).



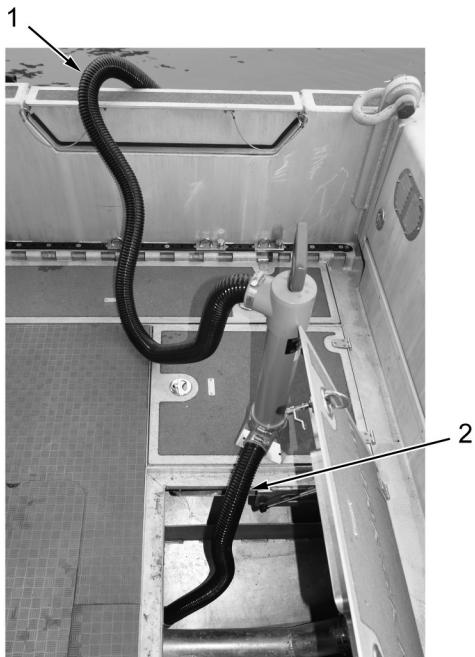
O00038-f04

Figure 3. Manual Bilge Pump Stowage.

**Emergency Dewatering Procedures - Continued****NOTE**

If boat bow is down in water, place manual bilge in forward compartment.

7. Place short suction hose (Figure 4, Item 2) into center aft hatch and place long discharge hose (Figure 4, Item 1) over side of boat.



000037-f03

Figure 4. Manual Bilge Pump.

8. Operate manual bilge pump to remove water from bilge.
9. Proceed to shore immediately.

**END OF WORK PACKAGE**

---

**OPERATOR INSTRUCTIONS  
OPERATION UNDER UNUSUAL CONDITIONS PARALLELING BATTERIES**

---

**INITIAL SETUP:**

**Personnel Required**

Diver 12D

---

**Paralleling Batteries**

**CAUTION**

Engine battery paralleling should only be used in case of emergency starting or low battery conditions. Only use parallel setting when a single battery bank is not sufficient to start the engine(s) or power the boat console. Failure to comply may result in damage to equipment.

Battery banks have parallel capability in "1+2".

Turn all battery banks to "1+2 (Figure 1).



BATTERIES SET FOR PARALLELING

O00038-f01

Figure 1. Engine Battery Switches in Parallel.

**END OF WORK PACKAGE**



**OPERATOR INSTRUCTIONS  
OPERATION UNDER UNUSUAL CONDITIONS CAPSIZING**

---

**INITIAL SETUP:**

**Personnel Required**  
Diver 12D

**Equipment Condition**  
Boat Underway (WP 0010)

---

**Emergency Procedures During Capsizing**

**WARNING**

- Boat capsizing is an extremely dangerous situation. If the boat capsizes, operator should locate all persons and direct them to stay with the boat even if the boat is upside-down.
- Do not overload greater than “BOAT INFORMATION” decal.
- Underwater dangers, hypothermia, and drowning should all be considered during a capsizing event.
- Avoid inclement winds, waves, and wakes greater than the boat can handle.
- Never follow the capsizing boat in the direction of its roll, personnel may get trapped underneath boat.
- Avoid entanglement with boat mooring lines, cabin, and canopy, and never attempt to re-enter a capsized boat.
- Avoid engine propellers as they could still be spinning.
- Failure to comply may result in injury and or death to personnel.

**WARNING**

Ensure personnel wear PFDs at all times during operation of boat in water. Failure to comply may result in injury or death to personnel.

## Emergency Procedures During Capsizing - Continued

### General Information

Capsizing is when the boat leans to one side too far and is not able to right itself or regain proper position. During capsizing, the boat will roll 90° and settle on its beam or roll 180° and settle with its keel above water. The boat is inherently buoyant and is able to remain afloat after capsizing.

1. Monitor VHF channel 16, press microphone button and broadcast emergency assistance needed.
2. Lift cover (Figure 1, Item 1) on command microphone and hold down “DISTRESS BUTTON” for three seconds to transmit a distress call.



000039-f01

Figure 1. Command Microphone Distress Button.

3. Locate crew and guide them to boat.
4. Instruct crew to hold onto boat or climb on top and to wait for assistance.

### END OF WORK PACKAGE

**OPERATOR INSTRUCTIONS  
OPERATION UNDER UNUSUAL CONDITIONS COLLISION**

---

**INITIAL SETUP:**

**Personnel Required**  
Diver 12D

**Equipment Condition**  
Boat Underway (WP 0010)

**References**  
WP 0031

---

**Emergency Procedures During Collision**

**WARNING**

- Collision can be an extremely dangerous situation. If the boat floods or begins to sink, operator should locate all persons.
- If the boat capsizes, operator should locate all persons and direct them to stay with the boat even if the boat is upside-down.
- Never follow the capsizing boat in the direction of its roll, personnel may get trapped underneath boat.
- Avoid entanglement with boat mooring lines, cabin, and canopy, and never attempt to re-enter a capsized boat.
- Avoid engine propellers as they could still be spinning.
- Failure to comply may result in injury and or death to personnel.

**WARNING**

Ensure personnel wear PFDs at all times during operation of boat in water. Failure to comply may result in injury or death to personnel.

## Emergency Procedures During Collision - Continued

### General Information

Collision is the violent striking of a boat to another boat or object, generally sustaining damage to hull, equipment and injury or death to personnel.

1. Check the condition of crew.
2. Check for damage to boat.
3. Monitor VHF channel 16, press microphone button and broadcast emergency assistance needed.
4. Prepare to assist the other vessel unless crew or boat are in danger.
5. Perform emergency dewatering procedures (WP 0031).
6. If there is an immediate danger to life, lift cover (Figure 1, Item 1) on command microphone and hold down "DISTRESS BUTTON" for three seconds to transmit a distress call.



000039-f01

Figure 1. Command Microphone Distress Button.

**END OF WORK PACKAGE**

**OPERATOR INSTRUCTIONS  
OPERATION UNDER UNUSUAL CONDITIONS RUNNING AGROUND**

---

**INITIAL SETUP:**

**Personnel Required**  
Diver 12D

**Equipment Condition**  
Boat Underway (WP 0010)

**References**  
WP 0021

---

**Emergency Procedures During Running Aground**

**WARNING**

Operating in shallow waters can present a number of hazards. Sand bars in narrow inlets are constantly shifting. Sand bars can be indicated by waves as they form into breakers when passing over sand bars. In coastal areas, tides can change water levels by as much as 30 ft (9.1 m). Check with local marinas or Coast Guard stations for tide tables and current charts. Failure to comply may result in injury or death to personnel.

**WARNING**

Ensure personnel wear PFDs at all times during operation of boat in water. Failure to comply may result in injury or death to personnel.

**CAUTION**

If tilting engines up while operating, ensure water intake screens remain below water surface and cooling water is discharging from engine water pump indicator. Failure to comply may result in damage to equipment.

### Emergency Procedures During Running Aground - Continued

Running aground may immobilize the boat. This generally occurs in shallow water preventing the boat from floating.

1. Check the condition of crew.
2. Check for damage to boat.
3. Monitor VHF channel 16 , press microphone button and broadcast emergency assistance needed.

#### NOTE

- If engine(s) vibrate excessively after striking an underwater obstruction, it may indicate a damaged propeller. If vibration is noticeable, return to port slowly or stop engine(s).
- While aground, it may be possible to rock the boat by shifting weight of passengers and gear and slightly tilting up engine(s) while reversing.

4. Observe engine monitor for engine overheat warnings (WP 0021).
5. If there is an immediate danger to life, lift cover (Figure 1, Item 1) on command microphone and hold down "DISTRESS BUTTON" for three seconds to transmit a distress call.



000039-f01

Figure 1. Command Microphone Distress Button.

**END OF WORK PACKAGE**

**OPERATOR INSTRUCTIONS  
OPERATION UNDER UNUSUAL CONDITIONS LOSS OF STEERING CONTROL**

---

**INITIAL SETUP:****Personnel Required**

Diver 12D

**References (cont.)**WP 0022  
WP 0025**References**WP 0010  
WP 0019**Equipment Condition**

Boat Underway (WP 0010)

**Partial Loss of Steering Control**

Dynamic power steering (DPS) may fail, causing resistance when changing steering directions, but will not cause total loss of steering control. During this instance it is still possible to safely operate the boat at reduced speed back to dock.

If partial loss of steering control occurs, safely decrease throttle and make way back to shore (WP 0010).

**Complete Loss Of Steering Control****WARNING**

Complete loss of steering control is a dangerous situation, alert crew and take immediate action to prevent collision, capsizing, or ejection of crew. Failure to comply may result in injury and or death to personnel.

**WARNING**

Ensure all personnel in the vicinity and operating the outboard engine wear personal protective equipment such as hearing protection when engine is being operated a to prevent against potential noise hazards. Failure to comply may result in injury to personnel.

**WARNING**

Always use the emergency stop lanyard when operating the engines to prevent runaway boat. Keep emergency stop lanyard free from obstructions and entanglements. Failure to comply may result in damage to equipment or injury to personnel.

**WARNING**

Ensure personnel wear PFDs at all times during operation of boat in water. Failure to comply may result in injury or death to personnel.

1. Safely reduce throttle until engine reaches idle speed (WP 0010).
2. Shut down engines (WP 0025).
3. Anchor boat (WP 0022).
4. Radio for assistance (WP 0019).

**END OF WORK PACKAGE**



**OPERATOR INSTRUCTIONS  
OPERATION UNDER UNUSUAL CONDITIONS MAN OVERBOARD**

---

**INITIAL SETUP:**

**Tools and Special Tools**

Ring Buoy, Lifesaving (WP 0062, Table 2, Item 28)  
Life, Marker Distress (WP 0062, Table 2, Item 20)  
Hook, Boat (WP 0062, Table 2, Item 15)

**Equipment Condition**

Boat underway (WP 0010)

**Personnel Required**

Diver 12D  
Assistant

---

**Emergency Procedures During Man Overboard**

**WARNING**

- Underwater dangers, hypothermia, and drowning should all be considered.
- Avoid entanglement with boat mooring lines and propellers.
- Failure to comply may result in injury and or death to personnel.

**WARNING**

Always use the emergency stop lanyard when operating the engines to prevent runaway boat. Keep emergency stop lanyard free from obstructions and entanglements. Failure to comply may result in damage to equipment or injury to personnel.

**WARNING**

Ensure personnel wear PFDs at all times during operation of boat in water. Failure to comply may result in injury or death to personnel.

**Emergency Procedures During Man Overboard - Continued**

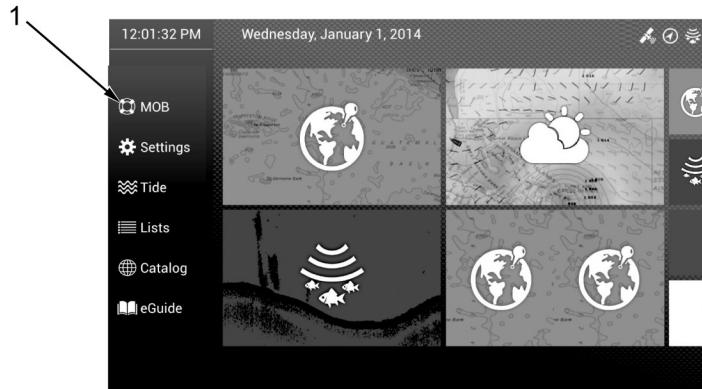
1. Shout "MAN OVERBOARD".
2. Direct assistant(s) to keep lookout and point at person in water.
3. Throw life ring and buoy light toward person in water.

**NOTE**

- "MOB" information is latitude, longitude, distance to MOB, estimated time of arrival to MOB, and water depth on PLOTTER and RADAR. A yellow line connects MOB marker and current boat location.
- "MOB" message flashes in status bar and alarm sounds, indicates "MOB" activated.

**Emergency Procedures During Man Overboard - Continued**

4. Using multifunction display, tap “MOB” icon (Figure 1, Item 1) on the functions list menu.



O00041-f01

Figure 1. MOB Function.

5. Maneuver boat to recover person and use boat hook as extension to assist recovery of person in water.
6. Monitor VHF channel 16. If unable to locate or recover person overboard, press microphone button and broadcast emergency assistance needed.
7. If there is an immediate danger to life, lift cover (Figure 2, Item 1) on command microphone and hold down “DISTRESS BUTTON” for three seconds to transmit a distress call.



O00039-f01

Figure 2. Command Microphone Distress Button.

**END OF WORK PACKAGE**



**OPERATOR INSTRUCTIONS  
OPERATION UNDER UNUSUAL CONDITIONS UNUSUAL ENVIRONMENTS OR WEATHER**

---

**INITIAL SETUP:**

<b>Personnel Required</b>	<b>References (cont.)</b>
Diver 12D	WP 0011
Assistant	WP 0015
	WP 0019
	WP 0028
<b>References</b>	WP 0033
WP 0004	

---

**WARNING**

Ensure cold weather gear is worn during operation. Prolonged exposure to rain, wind, and open water can quickly reduce core body temperature and lead to hypothermia. Recover personnel from the water as soon as possible. Provide protection from the elements to personnel who have been in the water. Failure to comply may result in injury or death to personnel.

**WARNING**

Ensure proper safety measures are taken during extremely hot and humid weather. Seek medical attention immediately if any of the following occur: weakness, dizziness, trouble breathing, painful muscle cramps, rapid pulse, pale skin, weak pulse. Reference TB-MED 507 for proper work, rest, and water consumption cycle during extreme heat. Failure to follow this warning may cause injury or death to personnel.

**WARNING**

Ensure personnel wear PFDs at all times during operation of boat in water. Failure to comply may result in injury or death to personnel.

**WARNING**

Always use the emergency stop lanyard when operating the engines to prevent runaway boat. Keep emergency stop lanyard free from obstructions and entanglements. Failure to comply may result in damage to equipment or injury to personnel.

## **General Information**

The boat and engines are capable of operating in ambient air temperatures of 20° F-120° F. The boat and engines are capable of operating in water temperatures of 28° F-100° F.

## **Cold Weather Operation**

1. Install cabin enclosure assembly (WP 0028).
2. Allow five additional minutes for engines to warm up before applying higher throttle settings.
3. Limit mission times to reduce exposure of personnel to the elements.
4. Reduce speed and be on the lookout for any ice in the water.
5. Be aware of any icing or buildup of frozen material on the boat. If material accumulates, remove it.

## **High Seas Operation**

1. Ensure all hatches and doors are closed and all equipment is secure.
2. Monitor NOAA weather channel on command microphone (WP 0019).
3. During operation, reduce speeds to prevent risk of capsizing (WP 0033).

## **Night Operation**

1. Reduce speeds to compensate for reduced visibility.
2. Using spotlight, position assistant in bow of boat as a lookout (WP 0011).
3. Navigate using a plotter (WP 0015).

## **Fog Operation**

1. Reduce speeds to compensate for reduced visibility.
2. Using spotlight, position assistant in bow of boat as a lookout (WP 0011).
3. Mark boat position on plotter intermittently (WP 0015).
4. Sound navigation horn intermittently by toggling operating switch to alert other ships (WP 0004).
5. Listen for other fog signals.

## **END OF WORK PACKAGE**

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**OPERATOR INSTRUCTIONS  
DECALS AND INSTRUCTION PLATES**

---

### **Introduction**

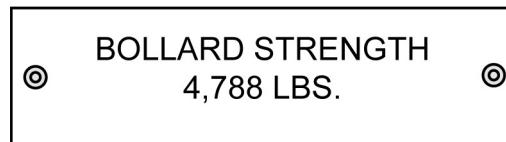
This work package identifies and describes decals used on the Rigid Inflatable Boat (RIB).

### **Decal Guide**



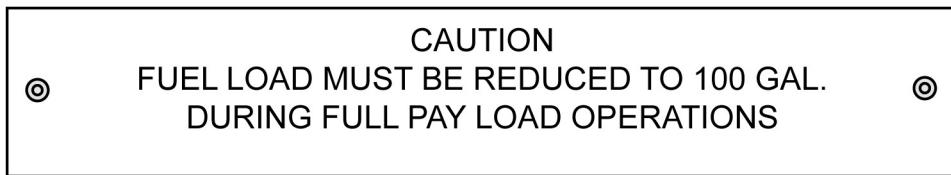
000035-f01

Figure 1. Anchor Storage Decal.



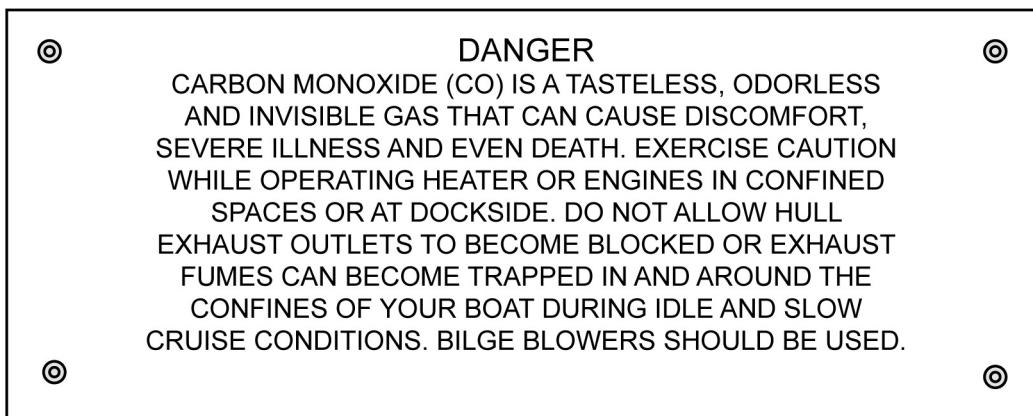
000035-f02

Figure 2. Bollard Strength Decal.



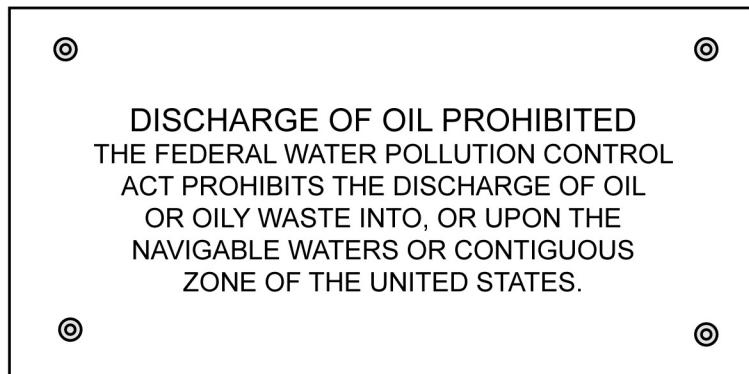
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Figure 3. Fuel Load Caution Decal.

**Decal Guide - Continued**

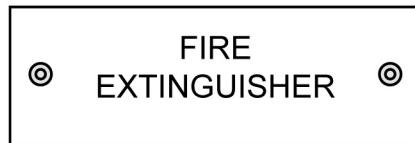
000035-f04

Figure 4. Danger Carbon Monoxide Decal.



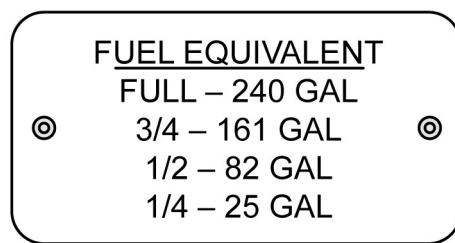
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Figure 5. Discharge of Oil Prohibited Decal.



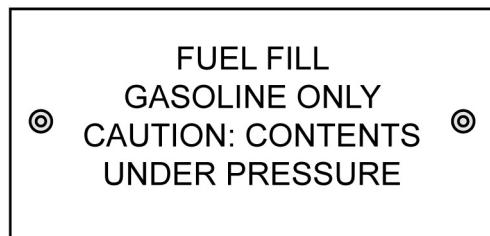
000035-f06

Figure 6. Fire Extinguisher Decal.

**Decal Guide - Continued**

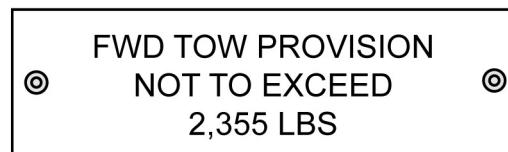
000035-f07

Figure 7. Fuel Equivalent Decal.



000035-f08

Figure 8. Fuel Fill Decal.



000035-f09

Figure 9. FWD Tow Provision Decal.



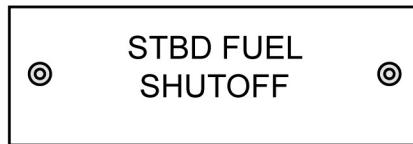
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Figure 10. Manual Bilge Pump Decal.

**Decal Guide - Continued**

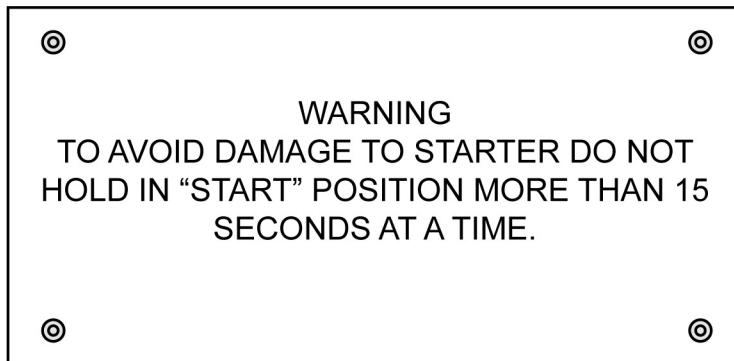
O00035-f11

Figure 11. Port Fuel Shutoff Decal.



O00035-f13

Figure 12. Starboard Fuel Shutoff Decal.



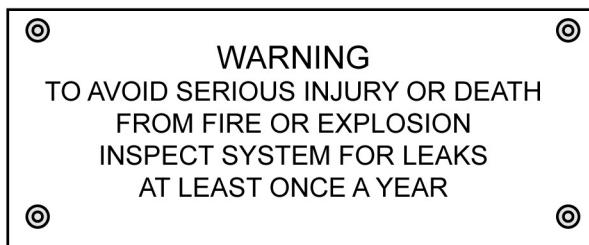
O00035-f12

Figure 13. Starter Damage Warning Decal.

**Decal Guide - Continued**

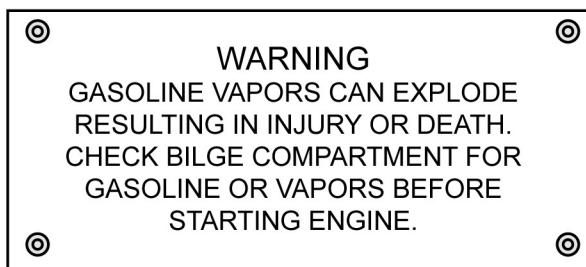
000035-f14

Figure 14. Trailer Tie Down Capacity Decal.



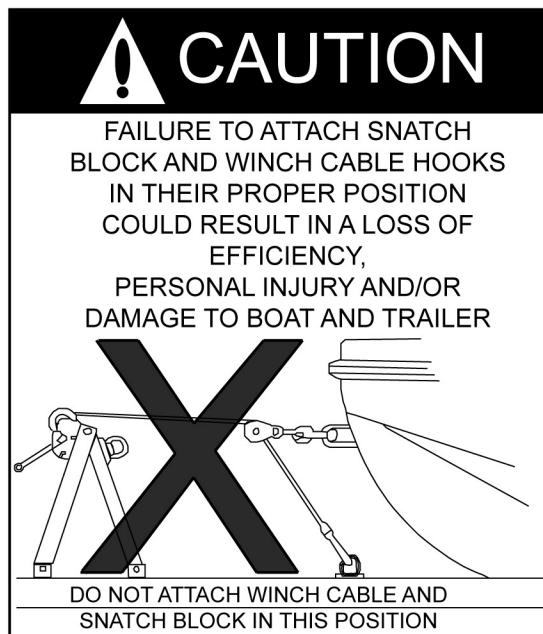
000035-f15

Figure 15. System Leak Inspection Warning Decal.



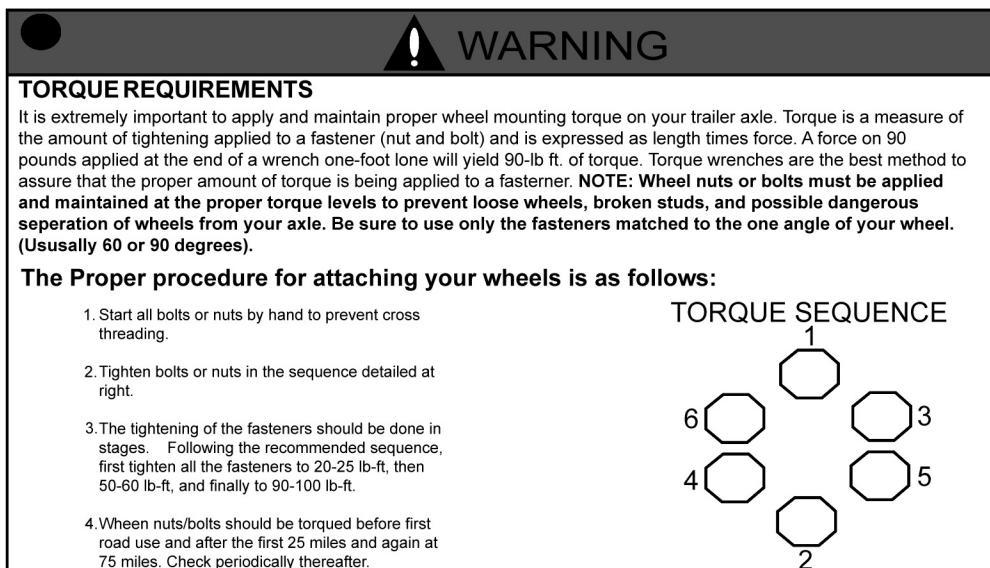
000035-f16

Figure 16. Bilge Compartment Gasoline Vapors Warning Decal.

**Decal Guide - Continued**

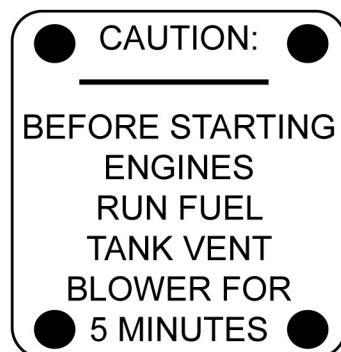
000035-f17

Figure 17. Snatch Block and Winch Cable Attachment Caution Decal.



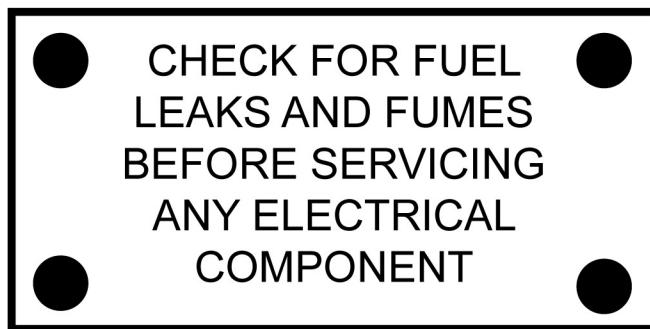
000035-f18

Figure 18. Torque Requirements Warning Decal.

**Decal Guide - Continued**

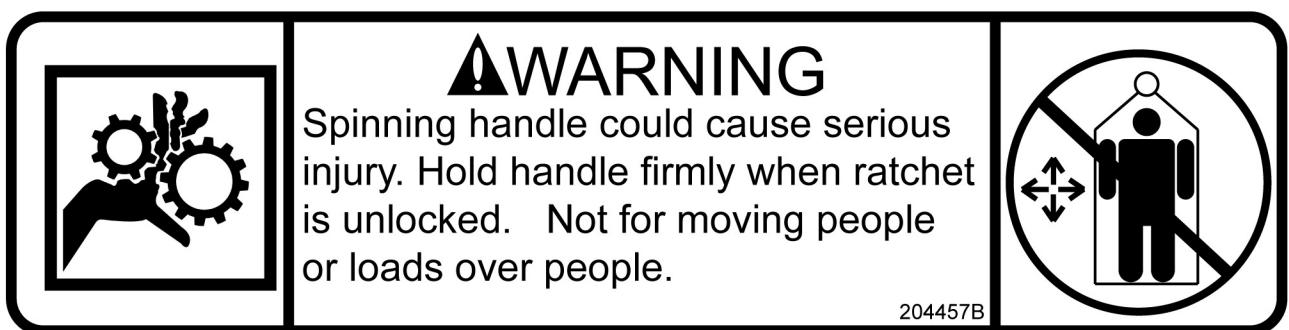
000035-f19

Figure 19. Tank Vent Blower Caution Decal.



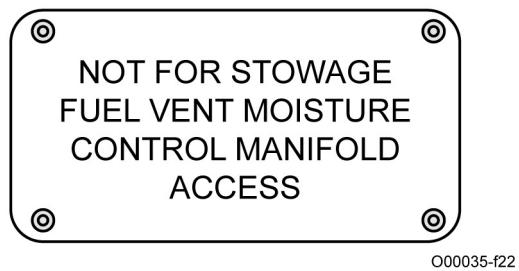
000035-f20

Figure 20. Check for Fuel Leaks and Fumes Decal.



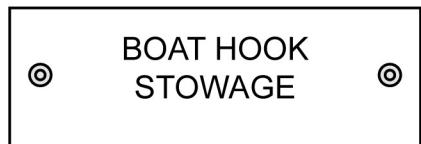
0000035-f21

Figure 21. Spinning Handle Warning Decal.

**Decal Guide - Continued**

000035-f22

Figure 22. Manifold Access.



000035-f23

Figure 23. Boat Hook.

**END OF WORK PACKAGE**

## **CHAPTER 3**

### **OPERATOR TROUBLESHOOTING FOR RIGID INFLATABLE BOAT (RIB)**



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## OPERATOR TROUBLESHOOTING OPERATOR TROUBLESHOOTING INDEX

---

### INTRODUCTION

This section contains operator troubleshooting procedures for the Rigid Inflatable Boat (RIB). Each malfunction or problem symptom is addressed, followed by a series of inspections or tests necessary to determine the probable cause and corrective action.

This chapter does not list all possible malfunctions that may occur, nor does it list all tests or inspections that may be performed or all corrective actions for each malfunction. Only those checks and tests authorized for the operator level are covered. If a malfunction is not listed, or is not remedied by corrective actions, notify maintainer maintenance personnel.

If a malfunction or failure occurs during operation or performance check, see below for the problem and applicable troubleshooting procedure.

### NOTE

This malfunction/symptom index can only be used as a general reference to troubleshooting. Always do the functional test first in order to verify the symptom. After repair, repeat the test to verify proper function.

### TROUBLESHOOTING SYMPTOM INDEX

<u>Malfunction/Symptom</u>	<u>Troubleshooting Procedure</u>
1. Bilge Pump Will Not Operate.....	WP 0041
2. Engine Cranks but Will Not Start or Run.....	WP 0043
3. Engine Producing Excessive Exhaust Smoke.....	WP 0044
4. Engine Surges / Runs Rough / Low Power.....	WP 0045
5. Engine Temperature High.....	WP 0046
6. Engine Vibration Excessive.....	WP 0047
7. Engine Will Not Crank.....	WP 0042
8. Engines Will Not Tilt.....	WP 0048
9. Lights Will Not Operate.....	WP 0050
10. Navigation Horn Inoperative.....	WP 0049
11. No Power to Console.....	WP 0052
12. Spot Light Will Not Operate.....	WP 0051

### END OF WORK PACKAGE



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## OPERATOR TROUBLESHOOTING BILGE PUMP(S) WILL NOT OPERATE

---

**INITIAL SETUP:****Personnel Required**

Diver 12D

**References (cont.)**

WP 0032

WP 0054

WP 0059

**References**

WP 0002

WP 0004

WP 0013

**Equipment Condition**

Bilge pumps in manual (WP 0004)

**General Information**

This work package contains operator information to perform symptom-based troubleshooting. Use this work package to isolate and correct symptom problems. Perform all Operator PMCS first (WP 0054).

**TROUBLESHOOTING PROCEDURE****SYMPTOM**

Bilge pump(s) will not operate

**MALFUNCTION**

24 hour power breaker is TRIPPED

**CORRECTIVE ACTION****NOTE**

Breaker is in UN-TRIPPED position when the yellow RESET arm is in line with the breaker housing. If yellow RESET arm is at a 30° angle from the breaker housing and the word "RESET" is visible, breaker is in TRIPPED position.

Reset 24 hour power breaker to UN-TRIPPED position (WP 0004).

- a. If bilge pumps operate, verify fault is corrected.
- b. If bilge pumps do not operate, proceed to next malfunction.

**MALFUNCTION**

Bilge pump control switches are OFF

**CORRECTIVE ACTION**

Turn bilge pump 1 and bilge pump 2 control switches to ON position (WP 0004).

- a. If bilge pumps operate, verify fault is corrected.
- b. If bilge pumps do not operate, proceed to next malfunction.

**MALFUNCTION**

Low or no house battery voltage

**CORRECTIVE ACTION**

1. Check house battery operating voltage (WP 0013). Voltage should read between 12.6 -13.2 VDC.
  - a. If voltage is within acceptable range, proceed to next malfunction.
  - b. If low or no voltage is found proceed to next step.
2. Perform parallel powering procedure (WP 0032).
  - a. If bilge pumps operate, notify maintenance supervisor.
  - b. If bilge pumps do not operate, proceed to next malfunction.

**MALFUNCTION**

Damaged, loose, corroded battery cable

**CORRECTIVE ACTION****WARNING**

- Electrical shock can cause injury or death to personnel when working near, replacing, or servicing any electrical component.
- Take great care when working around energized electrical equipment. Contact between unprotected body parts and electrical conductors can cause serious injury or death.
- Keep all electrical connections clean, tight, and insulated to prevent shorting or arcing and causing an explosion.
- Failure to comply may result in injury or death to personnel.

Check transom and console battery cables are not damaged, loose, or corroded (WP 0002).

- a. If cables are damaged, loose, or corroded notify maintenance supervisor.
- b. If cables are not damaged, loose or corroded, proceed to next malfunction.

**MALFUNCTION**

Clogged or damaged bilge pump strainer or float switch

**CORRECTIVE ACTION**

1. Remove forward bilge pump cover (WP 0059).
2. Check forward and aft bilge pump strainer and float switch for presence of debris.
  - a. If no debris is present, proceed to next step.
  - b. If debris exists, remove debris and verify fault is corrected.
  - c. If bilge pumps still do not operate, proceed to next step.
3. Check forward and aft bilge pump strainer and float switch for damage.
  - a. If no damage is present, proceed to next malfunction.
  - b. If bilge pump strainer or float switch are damaged, notify maintenance supervisor.

**MALFUNCTION**

Damaged, chafed, or corroded bilge pump wires

**CORRECTIVE ACTION**

1. Remove forward bilge pump cover (WP 0059).
2. Check forward and aft bilge pumps for damaged, chafed, or corroded wires.
  - a. If wires are damaged, chafed, or corroded, notify maintenance supervisor.
  - b. If wires are not damaged, chafed, corroded, or bilge pumps still do not operate, notify maintenance supervisor.

**END OF WORK PACKAGE**



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## OPERATOR TROUBLESHOOTING ENGINE(S) WILL NOT CRANK

---

**INITIAL SETUP:****Personnel Required**

Diver 12D

**References (cont.)**

WP 0030

WP 0032

WP 0054

FO-1

**References**

WP 0002

WP 0004

WP 0007

WP 0013

WP 0021

**Equipment Condition**House, port, starboard battery switches, and  
ignition key powered ON (WP 0005)**General Information**

This work package contains operator information to perform symptom-based troubleshooting. Use this work package to isolate and correct symptom problems. Perform all Operator PMCS first (WP 0054).

**TROUBLESHOOTING PROCEDURE****SYMPTOM**

Engine(s) will not crank

**MALFUNCTION**

Engine battery switch is OFF

**CORRECTIVE ACTION**

1. Turn engine battery switch to position 1 (WP 0004).
2. Perform starting procedures (WP 0007).
  - a. If engine(s) crank, verify fault is corrected.
  - b. If engine(s) does not crank, proceed to next malfunction.

**MALFUNCTION**

Engine throttle levers in gear

**CORRECTIVE ACTION**

1. Place engine throttle levers in neutral (WP 0004).
2. Perform starting procedures (WP 0007).
  - a. If engine(s) crank, verify fault is corrected.
  - b. If engine(s) does not crank, proceed to next malfunction.

**MALFUNCTION**

Loss of network communication between engine and throttle levers

**CORRECTIVE ACTION**

1. Check Neutral LED Indicator lights on throttle levers are not flashing (WP 0004).
  - a. If Neutral LED Indicator lights on throttle levers are not flashing, proceed to next malfunction.
  - b. If Neutral LED Indicator lights on throttle levers are flashing, proceed to next step.
2. Perform emergency start procedures (WP 0030).
  - a. If engine(s) does not crank, proceed to next malfunction.
  - b. If engine(s) crank, return to shore immediately and notify maintenance supervisor.

**MALFUNCTION**

Fault code(s) present

**CORRECTIVE ACTION**

View fault code(s) using engine monitor (WP 0021).

- a. If fault code(s) are present, refer to fault code chart (FO-1).
- b. If no fault code(s) are present, proceed to next malfunction.

**MALFUNCTION**

Ignition key faulty

**CORRECTIVE ACTION**

Check ignition key for operation (WP 0004).

- a. If key does not turn or is loose, notify maintenance supervisor.
- b. If key does turn and stays in ON position, proceed to next malfunction.

**MALFUNCTION**

Engine(s) start button faulty or damaged

**CORRECTIVE ACTION**

Check start buttons for operation (WP 0004).

- a. If engine(s) start button does not operate or is damaged, notify maintenance supervisor.
- b. If engine(s) start button operates, proceed to next malfunction.

**MALFUNCTION**

Low or no engine battery voltage

**CORRECTIVE ACTION**

1. Check engine batteries operating voltage on VSM (WP 0013). Voltage should read between 12.6 -13.2 VDC.
  - a. If voltage is within acceptable range, proceed to next malfunction.
  - b. If low or no voltage is found proceed to next step.
2. If low or no voltage is found, perform parallel powering procedure (WP 0032).
3. Perform starting procedures (WP 0007).
  - a. If engine(s) crank, notify maintenance supervisor.
  - b. If engine(s) does not crank, proceed to next malfunction.

**MALFUNCTION**

Damaged, loose, or corroded battery cable

**CORRECTIVE ACTION****WARNING**

- Electrical shock can cause injury or death to personnel when working near, replacing, or servicing any electrical component.
- Take great care when working around energized electrical equipment. Contact between unprotected body parts and electrical conductors can cause serious injury or death.
- Keep all electrical connections clean, tight, and insulated to prevent shorting or arcing and causing an explosion.
- Failure to comply may result in injury or death to personnel.

Check engine battery cables for damage, loose, or corroded connections (WP 0002).

- a. If cables are damaged, loose, or corroded notify maintenance supervisor.
- b. If cables are not damaged, loose, corroded, or engine(s) still does not crank, notify maintenance supervisor.

**END OF WORK PACKAGE**



**OPERATOR TROUBLESHOOTING  
ENGINE(S) CRANKS BUT WILL NOT START OR RUN**

---

**INITIAL SETUP:**

<b>Personnel Required</b>	<b>References (cont.)</b>
Diver 12D	WP 0054
<b>References</b>	WP 0055
WP 0002	WP 0058
WP 0004	FO-1
WP 0005	
WP 0007	
WP 0013	<b>Equipment Condition</b>
WP 0021	House, port, starboard, battery switches, ignition
WP 0032	key powered ON (WP 0005)

---

**General Information**

This work package contains operator information to perform symptom-based troubleshooting. Use this work package to isolate and correct symptom problems. Perform all Operator PMCS first (WP 0054).

**TROUBLESHOOTING PROCEDURE****SYMPTOM**

Engine(s) cranks but will not start or run

**MALFUNCTION**

Emergency stop switch lanyard not attached to start switch

**CORRECTIVE ACTION**

1. Attach emergency stop switch lanyard to emergency stop switch (WP 0004).
2. Perform starting procedures (WP 0007).
  - a. If engine(s) starts, verify fault is corrected.
  - b. If engine(s) does not start, proceed to next malfunction.

**MALFUNCTION**

Fault code(s) present

**CORRECTIVE ACTION**

View fault codes using engine monitor (WP 0021).

- a. If fault code(s) are present, refer to fault code chart (FO-1).
- b. If no fault code(s) are present, proceed to next malfunction.

**MALFUNCTION**

No or low fuel level

**CORRECTIVE ACTION**

1. Fill fuel tank to adequate level (WP 0055).
2. Perform starting procedures (WP 0007).
  - a. If engine(s) starts, verify fault is corrected.
  - b. If engine(s) does not start, proceed to next malfunction.

**MALFUNCTION**

Low engine battery voltage

**CORRECTIVE ACTION**

1. Check engine battery operating voltage (WP 0013). Voltage should read between 12.6 -13.2 VDC.
  - a. If voltage is within acceptable range, proceed to next malfunction.
  - b. If low voltage is found proceed to next step.
2. Perform parallel powering procedure (WP 0032).
3. Perform starting procedures (WP 0007).
  - a. If engine(s) starts, notify maintenance supervisor.
  - b. If engine(s) does not start, proceed to next malfunction.

**MALFUNCTION**

Damaged, loose, corroded battery cable

**CORRECTIVE ACTION****WARNING**

- Electrical shock can cause injury or death to personnel when working near, replacing, or servicing any electrical component.
- Take great care when working around energized electrical equipment. Contact between unprotected body parts and electrical conductors can cause serious injury or death.
- Keep all electrical connections clean, tight, and insulated to prevent shorting or arcing and causing an explosion.
- Failure to comply may result in injury or death to personnel.

Check transom and console battery cables are not damaged, loose, or corroded (WP 0002).

- a. If cables are damaged, loose, or corroded notify maintenance supervisor.
- b. If cables are not damaged, loose, or corroded, proceed to next malfunction.

**MALFUNCTION**

Fuel valve(s) are closed

**CORRECTIVE ACTION**

1. Open fuel valve(s) (WP 0005).
2. Perform starting procedures (WP 0007).
  - a. If engine(s) starts, verify fault is corrected.
  - b. If engine(s) does not start, proceed to next malfunction.

**MALFUNCTION**

Water/Contaminated Fuel

**CORRECTIVE ACTION**

1. Inspect fuel filter bowls for presence of water or contaminants.
  - a. If no water or contaminants are present, notify maintenance supervisor.
  - b. If water or contaminants are present, proceed to next step.
2. Perform fuel water separator service (WP 0058).
3. Perform starting procedures (WP 0007).
  - a. If engine(s) starts, verify fault is corrected.
  - b. If engine(s) does not start, notify maintenance supervisor.

**END OF WORK PACKAGE**



**OPERATOR TROUBLESHOOTING  
ENGINE PRODUCING EXCESSIVE EXHAUST SMOKE**

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**INITIAL SETUP:****Personnel Required**

Diver 12D

**References (cont.)**

WP 0021

WP 0054

WP 0058

FO-1

**References**

WP 0007

**General Information**

This work package contains operator information to perform symptom-based troubleshooting. Use this work package to isolate and correct symptom problems. Perform all Operator PMCS first (WP 0054).

**TROUBLESHOOTING PROCEDURE****WARNING**

Ensure engine is operated in well ventilated area. DO NOT idle engine without proper ventilation.

- BE ALERT for exhaust poisoning symptoms. They are: Headache, Dizziness, Sleepiness, Loss of muscular control.
- If you see another person with exhaust poisoning symptoms:
  - Remove person from area.
  - Expose to fresh air.
  - Keep person warm.
  - DO NOT permit physical exercise.
  - Administer Cardiopulmonary Resuscitation (CPR) if necessary.
  - Notify a medic.

**NOTE**

Excessive smoking may occur during initial startup after winterization or long term storage.

**SYMPTOM**

Excessive engine exhaust smoke

**MALFUNCTION**

Fault code(s) present

**CORRECTIVE ACTION**

View fault code(s) using engine monitor (WP 0021).

- a. If fault code(s) are present, refer to fault code chart (FO-1).
- b. If no fault code(s) are present, proceed to next malfunction.

**MALFUNCTION**

Water/Contaminated Fuel

**CORRECTIVE ACTION**

1. Inspect fuel filter bowls for presence of water or contaminants.
  - a. If no contaminants are present, notify maintenance supervisor.
  - b. If water or contaminants are present, proceed to next step.
2. Perform fuel water separator service (WP 0058).
3. Perform starting procedures (WP 0007).
  - a. If engine(s) operates normal, verify fault is corrected.
  - b. If engine(s) does not operate normal, notify maintenance supervisor.

**END OF WORK PACKAGE**

**OPERATOR TROUBLESHOOTING  
ENGINE SURGES, RUNS ROUGH, OR LOW POWER**

---

**INITIAL SETUP:****Personnel Required**

Diver 12D

**References (cont.)**

WP 0021

WP 0054

WP 0055

WP 0058

FO-1

**References**

WP 0002

WP 0005

WP 0007

**General Information**

This work package contains operator information to perform symptom-based troubleshooting. Use this work package to isolate and correct symptom problems. Perform all Operator PMCS first (WP 0054).

**TROUBLESHOOTING PROCEDURE****SYMPTOM**

Engine(s) operation erratic or inconsistent

**MALFUNCTION**

Engine(s) in S.A.F.E. mode

**CORRECTIVE ACTION**

Using engine monitor (WP 0021), verify if S.A.F.E. mode is active.

- a. If S.A.F.E. mode is active, return to shore immediately and notify maintenance supervisor.
- b. If S.A.F.E. mode is not active, proceed to next malfunction.

**MALFUNCTION**

Fault code(s) present

**CORRECTIVE ACTION**

View fault code(s) using engine monitor (WP 0021).

- a. If fault code(s) are present, refer to fault code chart (FO-1).
- b. If no fault code(s) are present, proceed to next malfunction.

**MALFUNCTION**

Low fuel level

**CORRECTIVE ACTION**

1. Fill fuel tank to adequate level (WP 0055).
2. Perform starting procedures (WP 0007).
  - a. If engine(s) operates normal, verify fault is corrected.
  - b. If engine(s) does not operate normal, proceed to next malfunction.

**MALFUNCTION**

Fuel valve(s) are closed or partially open

**CORRECTIVE ACTION**

- Open fuel valves (WP 0005).
- a. If engine(s) operates normal, verify fault is corrected.
  - b. If engine(s) does not operate normal, proceed to next malfunction.

**MALFUNCTION**

Water/Contaminated Fuel

**CORRECTIVE ACTION**

1. Inspect fuel filter bowls for presence of water or contaminants.
  - a. If no water or contaminants are present, proceed to next malfunction.
  - b. If water or contaminants are present, proceed to next step.
2. Perform fuel water separator service (WP 0058).
3. Perform starting procedures (WP 0007).
  - a. If engine(s) operates normal, verify fault is corrected.
  - b. If engine(s) does not operate normal, proceed to next malfunction.

**MALFUNCTION**

Engine water pump indicator obstructed

**CORRECTIVE ACTION**

1. Ensure engine water pump indicator is not restricted (WP 0002).
  - a. If engine(s) water pump indicator is not restricted, proceed to next malfunction.
  - b. If engine(s) water pump indicator is restricted, remove debris and proceed to next step.
2. Perform starting procedures (WP 0007).
  - a. If engine(s) operates normal, verify fault is corrected.
  - b. If engine(s) does not operate normal, proceed to next malfunction.

**MALFUNCTION**

Propeller(s) damaged

**CORRECTIVE ACTION**

Check to ensure propeller blade is not bent, chipped, or damaged.

- a. If propeller is damaged, notify maintenance supervisor.
- b. If propeller is not damaged, or engine(s) still does not operate normal, notify maintenance supervisor.

**END OF WORK PACKAGE**



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## OPERATOR TROUBLESHOOTING ENGINE TEMPERATURE HIGH

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**INITIAL SETUP:****Personnel Required**

Diver 12D

**References (cont.)**

WP 0010

WP 0021

WP 0025

WP 0054

FO-1

**References**

WP 0002

WP 0007

**General Information**

This work package contains operator information to perform symptom-based troubleshooting. Use this work package to isolate and correct symptom problems. Perform all Operator PMCS first (WP 0054).

**TROUBLESHOOTING PROCEDURE****SYMPTOM**

Engine(s) temperature high

**MALFUNCTION**

Engine(s) in S.A.F.E. mode

**CORRECTIVE ACTION**

Using engine monitor (WP 0021), verify if S.A.F.E. mode is active.

- a. If S.A.F.E. mode is active, return to shore immediately and notify maintenance supervisor.
- b. If S.A.F.E. mode is not active, proceed to next malfunction.

**MALFUNCTION**

Fault code(s) present

**CORRECTIVE ACTION**

View fault code(s) using engine monitor (WP 0021).

- a. If fault code(s) are present, refer to fault code chart (FO-1).
- b. If no fault code(s) are present, proceed to next malfunction.

**MALFUNCTION**

Engine gearcase trimmed above water line

**CORRECTIVE ACTION**

1. Ensure gearcase is trimmed below waterline.
  - a. If gearcase is below waterline, proceed to next malfunction.
  - b. If gearcase is above waterline, trim engine(s) down (WP 0010).
2. Perform starting procedures (WP 0007).
  - a. If engine temperature is normal, verify fault is corrected.
  - b. If engine temperature is still high, proceed to next malfunction.

**MALFUNCTION**

Water pump indicator obstructed

**CORRECTIVE ACTION**

1. Ensure water pump indicator is not obstructed (WP 0002).
  - a. If water pump indicator is not obstructed, proceed to next malfunction.
  - b. If water pump indicator is obstructed, remove debris and proceed to next step.
2. Perform starting procedures (WP 0007).
  - a. If engine temperature is normal, verify fault is corrected.
  - b. If engine temperature is still high, proceed to next malfunction.

**MALFUNCTION**

Water intake screens obstructed

**CORRECTIVE ACTION**

1. Perform engine shutdown procedures (WP 0020).
2. Trim engines up (WP 0010). Ensure water intake screens are not obstructed (WP 0002).
  - a. If water intake screens are not obstructed, notify maintenance supervisor.
  - b. If water intake screens are obstructed, remove debris and proceed to next step.
3. Perform starting procedures (WP 0007).
  - a. If engine temperature is normal, verify fault is corrected.
  - b. If engine temperature is still high, notify maintenance supervisor.

**END OF WORK PACKAGE**

## OPERATOR TROUBLESHOOTING ENGINE VIBRATION EXCESSIVE

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### **INITIAL SETUP:**

**Personnel Required**

Diver 12D

**Equipment Condition**

Engine shutdown (WP 0025)

**References**

WP 0007

WP 0021

WP 0054

### **General Information**

This work package contains operator information to perform symptom-based troubleshooting. Use this work package to isolate and correct symptom problems. Perform all Operator PMCS first (WP 0054).

### **TROUBLESHOOTING PROCEDURE**

**SYMPTOM**

Engine vibration excessive

**MALFUNCTION**

Engine(s) in S.A.F.E. mode

**CORRECTIVE ACTION**

Using engine monitor (WP 0021), verify if S.A.F.E. mode is active.

- a. If S.A.F.E. mode is active, return to shore immediately and notify maintenance supervisor.
- b. If S.A.F.E. mode is not active, proceed to next malfunction.

**MALFUNCTION**

Engine mounting hardware loose or missing

**CORRECTIVE ACTION**

Ensure engine mounting hardware is not loose or missing.

- a. If engine mounting hardware is not loose or missing, proceed to next malfunction.
- b. If engine mounting hardware is loose or missing, notify maintenance supervisor.

**MALFUNCTION**

Propeller(s) damaged

**CORRECTIVE ACTION**

- Ensure propeller blade is not bent, chipped, or damaged.
- a. If propeller(s) is not damaged, proceed to next malfunction.
  - b. If propeller(s) is damaged, notify maintenance supervisor.

**MALFUNCTION**

Propeller(s) is loose or slipping

**CORRECTIVE ACTION**

- Ensure propeller(s) is not loose or slipping.
- a. If propeller(s) is not loose or slipping, proceed to next malfunction.
  - b. If propeller(s) is loose or slipping, notify maintenance supervisor.

**MALFUNCTION**

Debris on propeller(s)

**CORRECTIVE ACTION**

1. Check propeller(s) for debris.
  - a. If no debris is present, notify maintenance supervisor.
  - b. If debris is present, remove debris and proceed to next step.
2. Perform starting procedures (WP 0007).
  - a. If engine(s) operates normal, verify fault is corrected.
  - b. If engine(s) does not operate normal, notify maintenance supervisor.

**END OF WORK PACKAGE**

## OPERATOR TROUBLESHOOTING ENGINE(S) WILL NOT TILT

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### **INITIAL SETUP:**

**Personnel Required**

Diver 12D

**References (cont.)**

WP 0032

WP 0030

WP 0054

FO-1

**References**

WP 0002

WP 0004

WP 0006

WP 0010

WP 0013

WP 0021

**Equipment Condition**House, port, starboard battery switches, and  
ignition key powered ON (WP 0005)

### **General Information**

This work package contains operator information to perform symptom-based troubleshooting. Use this work package to isolate and correct symptom problems. Perform all Operator PMCS first (WP 0054).

### **TROUBLESHOOTING PROCEDURE**

#### **SYMPTOM**

Engine(s) will not tilt

#### **MALFUNCTION**

Engine lock lever(s) engaged

#### **CORRECTIVE ACTION**

1. Disengage engine lock lever(s) (WP 0006).
2. Perform engine trimming procedure (WP 0010).
  - a. If engine(s) tilt, verify fault is corrected.
  - b. If engine(s) do not tilt, proceed to next malfunction.

#### **MALFUNCTION**

Trim control switch inoperative

#### **CORRECTIVE ACTION**

- Perform engine trimming procedure (WP 0010).
  - a. If engine(s) tilt, verify fault is corrected.
  - b. If engine(s) do not tilt, proceed to next malfunction.

**MALFUNCTION**

Engine battery switch is OFF

**CORRECTIVE ACTION**

1. Turn engine battery switch to position 1 (WP 0004).
2. Perform trimming procedure (WP 0010).
  - a. If engine(s) tilt, verify fault is corrected.
  - b. If engine(s) do not tilt, proceed to next malfunction.

**MALFUNCTION**

Fault code(s) present

**CORRECTIVE ACTION**

- View fault code(s) using engine monitor (WP 0021).
- a. If fault code(s) are present, refer to fault code chart (FO-1).
  - b. If no fault code(s) are present, proceed to next malfunction.

**MALFUNCTION**

No power to throttle levers

**CORRECTIVE ACTION**

- Check Neutral LED Indicator lights on throttle levers are lit (WP 0004).
- a. If lights are not lit, notify maintenance supervisor.
  - b. If lights are lit, proceed to next malfunction.

**MALFUNCTION**

Low or no engine battery voltage

**CORRECTIVE ACTION**

1. Check engine battery operating voltage (WP 0013). Voltage should read between 12.6 -13.2 VDC.
  - a. If voltage is within acceptable range, proceed to next malfunction.
  - b. If low or no voltage is found proceed to next step.
2. Perform parallel powering procedure (WP 0032).
3. Perform engine trimming procedure (WP 0010).
  - a. If engine(s) tilt, verify fault is corrected.
  - b. If engine(s) does not tilt, proceed to next malfunction.

**MALFUNCTION**

Damaged, loose, corroded battery cable

**CORRECTIVE ACTION****WARNING**

- Electrical shock can cause injury or death to personnel when working near, replacing, or servicing any electrical component.
- Take great care when working around energized electrical equipment. Contact between unprotected body parts and electrical conductors can cause serious injury or death.
- Keep all electrical connections clean, tight, and insulated to prevent shorting or arcing and causing an explosion.
- Failure to comply may result in injury or death to personnel.

Check transom and console battery cables are not damaged, loose, or corroded (WP 0002).

- a. If cables are damaged, loose, or corroded notify maintenance supervisor.
- b. If cables are not damaged, loose or corroded, proceed to next malfunction.

**MALFUNCTION**

Manual trim switch inoperative

**CORRECTIVE ACTION**

Push manual engine trim switch (WP 0030).

- a. If engine(s) does not tilt, notify maintenance supervisor.
- b. If engine(s) tilts, notify maintenance supervisor.

**END OF WORK PACKAGE**



## OPERATOR TROUBLESHOOTING NAVIGATION HORN WILL NOT OPERATE

---

### **INITIAL SETUP:**

**Personnel Required**

Diver 12D

**References (cont.)**WP 0032  
WP 0054**References**WP 0002  
WP 0004  
WP 0013**Equipment Condition**

House Battery Switch powered ON (WP 0005)

### **General Information**

This work package contains operator information to perform symptom-based troubleshooting. Use this work package to isolate and correct symptom problems. Perform all Operator PMCS first (WP 0054).

### **TROUBLESHOOTING PROCEDURE**

#### **SYMPTOM**

Navigation horn will not operate

#### **MALFUNCTION**

House battery switch is OFF

#### **CORRECTIVE ACTION**

Turn house battery switch to position 1 (WP 0004).

- a. If horn operates, verify fault is corrected.
- b. If horn does not operate, proceed to next malfunction.

#### **MALFUNCTION**

House breaker is TRIPPED

#### **CORRECTIVE ACTION**

#### **NOTE**

Breaker is in UN-TRIPPED position when the yellow RESET arm is in line with the breaker housing. If yellow RESET arm is at a 30° angle from the breaker housing and the word "RESET" is visible, breaker is in TRIPPED position.

Reset house breaker to UN-TRIPPED position (WP 0004).

- a. If horn operates, verify fault is corrected.
- b. If horn does not operate, proceed to next malfunction.

**MALFUNCTION**

Horn control switch is OFF

**CORRECTIVE ACTION**

Turn horn control switch to ON position (WP 0004).

- a. If horn operates, verify fault is corrected.
- b. If horn does not operate, proceed to next malfunction.

**MALFUNCTION**

Horn switch faulty or damaged

**CORRECTIVE ACTION**

Turn horn operation switch to ON position (WP 0004).

- a. If horn switch is damaged or does not operate, notify maintenance supervisor.
- b. If switch does operate, proceed to next malfunction.

**MALFUNCTION**

Low or no house battery voltage

**CORRECTIVE ACTION**

1. Check house battery operating voltage (WP 0013). Voltage should read between 12.6 -13.2 VDC.
  - a. If voltage is within acceptable range, proceed to next malfunction.
  - b. If low or no voltage is found proceed to next step.
2. Perform parallel powering procedure (WP 0032).
  - a. If horn operates, notify maintenance supervisor.
  - b. If horn does not operate, proceed to next malfunction.

**MALFUNCTION**

Damaged, loose, corroded battery cable

**CORRECTIVE ACTION****WARNING**

- Electrical shock can cause injury or death to personnel when working near, replacing, or servicing any electrical component.
- Take great care when working around energized electrical equipment. Contact between unprotected body parts and electrical conductors can cause serious injury or death.
- Keep all electrical connections clean, tight, and insulated to prevent shorting or arcing and causing an explosion.
- Failure to comply may result in injury or death to personnel.

Check transom and console battery cables are not damaged, loose, or corroded (WP 0002).

- a. If cables are damaged, loose, or corroded notify maintenance supervisor.
- b. If cables are not damaged, loose or corroded, proceed to next malfunction.

**MALFUNCTION**

Damage or debris in horn

**CORRECTIVE ACTION**

1. Check horn for presence of debris (WP 0002).
  - a. If debris exists, remove debris and verify fault is corrected.
  - b. If no debris is present or horn still does not operate, proceed to next step.
2. Check horn for damage.
  - a. If horn is damaged, notify maintenance supervisor.
  - b. If no damage is present or horn still does not operate notify maintenance supervisor.

**END OF WORK PACKAGE**



## OPERATOR TROUBLESHOOTING LIGHT(S) WILL NOT OPERATE

---

### **INITIAL SETUP:**

**Personnel Required**

Diver 12D

**References (cont.)**WP 0032  
WP 0054**References**WP 0002  
WP 0004  
WP 0013**Equipment Condition**

House Battery Switch powered ON (WP 0005)

### **General Information**

This work package contains operator information to perform symptom-based troubleshooting when navigation lights, all-around lights, or deck lights will not operate. Use this work package to isolate and correct symptom problems. Perform all Operator PMCS first (WP 0054).

### **TROUBLESHOOTING PROCEDURE**

#### **SYMPTOM**

Light(s) will not operate

#### **MALFUNCTION**

Light(s) operation switch is in OFF position

#### **CORRECTIVE ACTION**

Turn light(s) operation switch to ON position (WP 0004).

- a. If light(s) operates, verify fault is corrected.
- b. If light(s) does not operate, proceed to next malfunction.

#### **MALFUNCTION**

House battery switch is in OFF position

#### **CORRECTIVE ACTION**

Turn house battery switch to position 1 (WP 0004).

- a. If light(s) operates, verify fault is corrected.
- b. If light(s) does not operate, proceed to next malfunction.

**MALFUNCTION**

House breaker is TRIPPED

**CORRECTIVE ACTION****NOTE**

Breaker is in UN-TRIPPED position when the yellow RESET arm is in line with the breaker housing. If yellow RESET arm is at a 30° angle from the breaker housing and the word "RESET" is visible, breaker is in TRIPPED position.

Reset house breaker to UN-TRIPPED position (WP 0004).

- a. If light(s) operates, verify fault is corrected.
- b. If light(s) does not operate, proceed to next malfunction.

**MALFUNCTION**

Light(s) control switch(es) is in OFF position

**CORRECTIVE ACTION**

Turn light(s) control switch(es) to ON position (WP 0004).

- a. If light(s) operates, verify fault is corrected.
- b. If light(s) does not operate, proceed to next malfunction.

**MALFUNCTION**

Low or no house battery voltage

**CORRECTIVE ACTION**

1. Check house battery operating voltage (WP 0013). Voltage should read between 12.6 -13.2 VDC.
  - a. If voltage is within acceptable range, proceed to next malfunction.
  - b. If low or no voltage is found proceed to next step.
2. Perform parallel powering procedure (WP 0032).
  - a. If light(s) operate, notify maintenance supervisor.
  - b. If light(s) do not operate, proceed to next malfunction.

**MALFUNCTION**

Light(s) damaged

**CORRECTIVE ACTION**

Inspect light(s) for damage (WP 0002).

- a. If light(s) are damaged, notify maintenance supervisor.
- b. If no damage is found, proceed to next malfunction.

**MALFUNCTION**

Damaged, loose, or corroded battery cable

**CORRECTIVE ACTION****WARNING**

- Electrical shock can cause injury or death to personnel when working near, replacing, or servicing any electrical component.
- Take great care when working around energized electrical equipment. Contact between unprotected body parts and electrical conductors can cause serious injury or death.
- Keep all electrical connections clean, tight, and insulated to prevent shorting or arcing and causing an explosion.
- Failure to comply may result in injury or death to personnel.

Check house battery cables are not damaged, loose, or corroded (WP 0002).

- a. If cables are damaged, loose, or corroded, notify maintenance supervisor.
- b. If cables are not damaged, chafed, or corroded, or light(s) still does not operate, notify maintenance supervisor.

**END OF WORK PACKAGE**



## OPERATOR TROUBLESHOOTING SPOTLIGHT WILL NOT OPERATE

---

### **INITIAL SETUP:**

**Personnel Required**

Diver 12D

**References (cont.)**WP 0013  
WP 0032  
WP 0054**References**WP 0002  
WP 0004  
WP 0011**Equipment Condition**

House Battery Switch powered ON (WP 0005)

### **General Information**

This work package contains operator information to perform symptom-based troubleshooting. Use this work package to isolate and correct symptom problems. Perform all Operator PMCS first (WP 0054).

### **TROUBLESHOOTING PROCEDURE**

#### **SYMPTOM**

Spotlight will not operate

#### **MALFUNCTION**

House battery switch is OFF

#### **CORRECTIVE ACTION**

Turn house battery switch to position 1 (WP 0004).

- a. If light operates, verify fault is corrected.
- b. If light does not operate, proceed to next malfunction.

#### **MALFUNCTION**

House breaker is TRIPPED

#### **CORRECTIVE ACTION**

#### **NOTE**

Breaker is in UN-TRIPPED position when the yellow RESET arm is in line with the breaker housing. If yellow RESET arm is at a 30° angle from the breaker housing and the word "RESET" is visible, breaker is in TRIPPED position.

Reset house breaker to UN-TRIPPED position (WP 0004).

- a. If light operates, verify fault is corrected.
- b. If light does not operate, proceed to next malfunction.

**MALFUNCTION**

Spotlight control switch OFF

**CORRECTIVE ACTION**

Turn spotlight control switch to ON position (WP 0004).

- a. If light operates, verify fault is corrected.
- b. If light does not operate, proceed to next malfunction.

**MALFUNCTION**

Spotlight disconnected from receptacle

**CORRECTIVE ACTION**

Connect spotlight to receptacle (WP 0011).

- a. If light operates, verify fault is corrected.
- b. If light does not operate, proceed to next malfunction.

**MALFUNCTION**

Spotlight operating switch is OFF

**CORRECTIVE ACTION**

Turn switch to ON position (WP 0011).

- a. If light operates, verify fault is corrected.
- b. If light does not operate, proceed to next malfunction.

**MALFUNCTION**

Spotlight is damaged

**CORRECTIVE ACTION**

Check spotlight for cracked bulb or bent pins.

- a. If no damage is present, proceed to next malfunction.
- b. If spotlight is damaged, notify maintenance supervisor.

**MALFUNCTION**

Spotlight receptacle faulty

**CORRECTIVE ACTION**

Connect spotlight to another receptacle (WP 0011).

- a. If light operates, verify fault is corrected.
- b. If light does not operate, proceed to next malfunction.

**MALFUNCTION**

Low or no house battery voltage

**CORRECTIVE ACTION**

1. Check house battery operating voltage (WP 0013). Voltage should read between 12.6 - 13.2 VDC.
  - a. If voltage is within acceptable range, proceed to next malfunction.
  - b. If low or no voltage is found, proceed to next step.
2. Perform parallel powering procedure (WP 0032).
  - a. If light operates, notify maintenance supervisor.
  - b. If light does not operate, proceed to next malfunction.

**MALFUNCTION**

Damaged, loose, corroded battery cable

**CORRECTIVE ACTION****WARNING**

- Electrical shock can cause injury or death to personnel when working near, replacing, or servicing any electrical component.
- Take great care when working around energized electrical equipment. Contact between unprotected body parts and electrical conductors can cause serious injury or death.
- Keep all electrical connections clean, tight, and insulated to prevent shorting or arcing and causing an explosion.
- Failure to comply may result in injury or death to personnel.

Check transom and console battery cables are not damaged, loose, or corroded (WP 0002).

- a. If cables are damaged, loose, or corroded notify maintenance supervisor.
- b. If cables are not damaged, loose, or corroded, or spotlight does not operate, notify maintenance supervisor.

**END OF WORK PACKAGE**



## OPERATOR TROUBLESHOOTING NO POWER TO CONSOLE

---

### **INITIAL SETUP:**

**Personnel Required**

Diver 12D

**References (cont.)**WP 0032  
WP 0054**References**WP 0002  
WP 0004  
WP 0013**Equipment Condition**House, port, starboard battery switches, and  
ignition key powered ON (WP 0005)

### **General Information**

This work package contains operator information to perform symptom-based troubleshooting. Use this work package to isolate and correct symptom problems. Perform all Operator PMCS first (WP 0054).

### **TROUBLESHOOTING PROCEDURE**

#### **NOTE**

Loss of house battery power affects all electrical components except, throttle levers, fuel gauge, and engine monitor which are powered by the port engine battery.

#### **SYMPTOM**

No power to console instruments

#### **MALFUNCTION**

House and/or port engine battery switch is OFF

#### **CORRECTIVE ACTION**

Turn house and port engine battery switch to position 1 (WP 0004).

- a. If console has power, verify fault is corrected.
- b. If console has no power, proceed to next malfunction.

**MALFUNCTION**

House and/or port engine breaker is TRIPPED

**CORRECTIVE ACTION****NOTE**

Breaker is in UN-TRIPPED position when the yellow RESET arm is in line with the breaker housing. If yellow RESET arm is at a 30° angle from the breaker housing and the word "RESET" is visible, breaker is in TRIPPED position.

Reset house and port engine breaker to UN-TRIPPED position (WP 0004).

- a. If console has power, verify fault is corrected.
- b. If console has no power, proceed to next malfunction.

**MALFUNCTION**

Component control switches are OFF

**CORRECTIVE ACTION**

Turn control switches to ON position (WP 0004).

- a. If console has power, verify fault is corrected.
- b. If console has no power, proceed to next malfunction.

**MALFUNCTION**

Low or no house battery voltage

**CORRECTIVE ACTION**

1. Check house battery operating voltage (WP 0013). Voltage should read between 12.6 -13.2 VDC.
  - a. If voltage is within acceptable range, proceed to next malfunction.
  - b. If low or no voltage is found, proceed to next step.
2. Perform parallel powering procedure (WP 0032).
  - a. If console has power, notify maintenance supervisor.
  - b. If console has no power, proceed to next malfunction.

**MALFUNCTION**

Damaged, loose, or corroded battery cable

**CORRECTIVE ACTION****WARNING**

- Electrical shock can cause injury or death to personnel when working near, replacing, or servicing any electrical component.
- Take great care when working around energized electrical equipment. Contact between unprotected body parts and electrical conductors can cause serious injury or death.
- Keep all electrical connections clean, tight, and insulated to prevent shorting or arcing and causing an explosion.
- Failure to comply may result in injury or death to personnel.

Check house battery cables for damage, loose, or corroded connections (WP 0002).

- a. If cables are damaged, chafed, or corroded, notify maintenance supervisor.
- b. If cables are not damaged, chafed, corroded, or console still does not have power, notify maintenance supervisor.

**END OF WORK PACKAGE**



## **CHAPTER 4**

### **PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) FOR RIGID INFLATABLE BOAT (RIB)**



**OPERATOR MAINTENANCE  
PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)  
INTRODUCTION**

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## **GENERAL**

To ensure the Rigid Inflatable Boat (RIB) is ready for operation at all times, it must be inspected on a regular basis to find and correct problems before they result in damage, failure, or injury to personnel. The Preventive Maintenance Checks and Services (PMCS) table (WP 0054) contains systematic instructions for caring, inspecting, and servicing the RIB to keep it in good condition and to prevent breakdowns.

## **EXPLANATION OF PMCS TABLE COLUMNS**

1. **ITEM NO.** : Numbers in this column are for reference. Item numbers appear in the order in which checks and services must be performed at the intervals listed. When completing DA Form 2404, Equipment Inspection and Maintenance Worksheet, include the item number for the check or service indicating a fault.

2. **INTERVAL** : This column tells you when you must do the listed procedure. If you see rust on the item, PMCS must be done immediately. Performing PMCS at the appropriate intervals will reduce operational problems and minimize the number of repairs and replacements:

BEFORE	Once before operation
DURING	Once during operation
AFTER	Once after operation
DAILY	Once every day
WEEKLY	Once every week
MONTHLY	Once every month
SEMIANNUAL	Once every 6 months
ANNUAL	Once every 12 months
BIENNIALY	Once every 24 months

3. **ITEM TO BE CHECKED OR SERVICED** : This column identifies the item to be checked or serviced.
4. **PROCEDURE** : This column gives the procedure to check or service the listed item. This procedure is necessary to know if the equipment is ready or available for use. Carefully follow these instructions.
5. **EQUIPMENT NOT READY / AVAILABLE IF** : Information in this column tells you what faults will keep your equipment from being able to perform. "Ready" and "Available" mean the equipment is on-hand and ready to perform its mission. (See DA PAM 750-8, The Army Maintenance Management System (TAMMS) User's Manual.) If check and service procedures show faults listed in this column, do not operate the equipment. Follow standard operating procedures for maintaining the equipment or reporting failures.

## **HOW TO PERFORM PMCS**

Always observe warnings and cautions in your PMCS table. Warnings and cautions appear before procedures to which they apply. Observe warnings to prevent serious injury to yourself and others, and observe cautions to prevent your equipment from being damaged.

If anything looks wrong and you can't fix it, write it on your DA Form 2404. If you find something seriously wrong, immediately notify the Maintainer.

Before performing preventive maintenance, read all the checks required for the applicable interval and prepare all the tools you will need. You'll always need a wiping rag, or two.

## HOW TO PERFORM PMCS - Continued

Keep all of these general checks in mind every time you do your PMCS:

- a. **Keep it clean:** Dirt, grease, oil, and debris only get in the way and may cover up a serious problem. Clean as you work and as you go.
- b. **Bolts, nuts, and screws:** Check for loose, missing, bent, or broken fasteners. Also look for chipped paint, bare metal, or rust around bolt heads.
- c. **Welds:** Look for loose or chipped paint, rust, or gaps where parts are welded together.

## CORROSION PREVENTION AND CONTROL (CPC)

Corrosion prevention and control 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. The term "corrosion" means the deterioration of a material or its properties due to a reaction of that material with its chemical environment. An example is the rusting of iron. Corrosion damage in metals can be seen, depending on the metal, as tarnishing, pitting, fogging, surface residue, and/or cracking. Plastics, composites, and rubbers can also degrade (also considered to be corrosion based on the above definition of corrosion). Degradation is caused by thermal (heat), oxidation (oxygen), solvation (solvents), or photolytic (light, typically ultraviolet) processes. The most common exposures are excessive heat or light. Damage from these processes will appear as cracking, softening, swelling, and/or breaking. The US Army has defined the following nine (9) forms of corrosion used to evaluate the deterioration of metals. These shall be used when evaluating and documenting corrosion.

- **UNIFORM** (or general attack): Affects a large area of exposed metal surface, like rust on steel or tarnish on silver. It gradually reduces the thickness of the metal until it fails.
- **CREVICE:** Occurs in crevices created by rubber seals, gaskets, bolt heads, lap joints, dirt or other surface deposits. It will develop anywhere moisture or other corrosive agents are trapped and unable to drain or evaporate.
- **SELECTIVE LEACHING:** One element, usually the anodic element of an alloy, corrodes away, leaving the cathodic element. This can create holes in metal.
- **INTERGRANULAR:** Metal deterioration caused by corrosion on the bonds between or across the grain boundaries of the metal. The metal will appear to be peeling off in sheets, flaking, or being pushed apart by layers. A particular type of intergranular corrosion is exfoliation.
- **PITTING:** This can result from conditions similar to those for crevice corrosion. Pits can develop on various materials due to their composition. Rifle boxes are big victims of pitting.
- **EROSION:** Results when a moving fluid (liquid or gas) flows across a metal surface, particularly when solid particles are present in the fluid. Corrosion actually occurs on the surface of the metal, but the moving fluid washes away the corrosion and exposes a new metal surface, which also corrodes.
- **FRETTING:** Occurs as a result of small, repetitive movements (e.g., vibration) between two surfaces in contact with each other. It's usually identified by a black powder corrosion product or pits on the surface.
- **GALVANIC:** Occurs when two different types of metal come in contact with each other, like steel bolts on aluminum, for example. This is a common problem on aircraft because of their mix of metals.
- **STRESS:** Term used to describe corrosion cracking and corrosion fatigue.

Where an item is not ready/available due to one of these forms of corrosion, it shall be recorded as a corrosion failure in the inspection record and the appropriate code (170) for corrosion shall be used when requesting/performing maintenance.

**CORROSION PREVENTION AND CONTROL (CPC) - Continued**

SF Form 368, Product Quality Deficiency Report should be submitted to the address specified in DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual.

**FLUID LEAKAGE****WARNING**

Fluid spills may be slippery and cause falls. Refer to local procedures and plans for preventing and responding to fluid spills or leaks. Immediately clean up spilled fluid. Comply with local procedures and environmental regulations when disposing of cleanup materials, and drained, leaked or spilled fluids. Failure to comply may result in injury to personnel and/or damage to the environment.

It is necessary for you to know how fluid leakage affects the status of the RIB. When operating with Class I or II leaks, continue to check fluid levels as required in the PMCS. Class III leaks should be reported immediately to your Supervisor.

1. Class I. Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.
2. Class II. Leakage of fluid great enough to form drops, but not enough to cause drops to drip from item being checked/inspected.
3. Class III. Leakage of fluid great enough to form drops that fall from item being checked/inspected.

**END OF WORK PACKAGE**



**OPERATOR MAINTENANCE  
PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)**

---

**INITIAL SETUP:**

<b>Tools and Special Tools</b>	<b>Personnel Required</b>
Pump, Inflating, Manual (WP 0062, Table 2, Item 25)	Diver 12D
Hose, Nonmetallic (WP 0062, Table 2, Item 16)	
Nozzle, Garden Hose (WP 0062, Table 2, Item 23)	WP 0004
Gage, Pressure, Dial Indicating (WP 0062, Table 2, Item 14)	WP 0010
Wrench, Box and Open End, Combination (WP 0062, Table 2, Item 30)	WP 0011
Nippers, End Cutting (WP 0062, Table 2, Item 22)	WP 0012
Pump, Inflating, Manual (WP 0062, Table 2, Item 26)	WP 0013
Needle, Inflation (WP 0062, Table 2, Item 21)	WP 0014
Gage, Tire Pressure, Self Contained (WP 0062, Table 2, Item 13)	WP 0019
	WP 0020
	WP 0021
	WP 0023
	WP 0026
	WP 0056
	WP 0057
	WP 0058
Brake Fluid, Automotive (WP 0063, Table 1, Item 2)	WP 0059
Lubricating Oil, Engine (WP 0063, Table 1, Item 5)	WP 0062
Battery, Nonrechargeable (WP 0063, Table 1, Item 1)	
Pin,Cotter (WP 0063, Table 1, Item 6)	
<b>Materials/Parts</b>	<b>Equipment Condition</b>
	Boat trailered (WP 0026)
	Boat docked (WP 0008)

---

**Table 1. Operator Preventive Maintenance Checks and Services.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
<b>WARNING</b>				
<ul style="list-style-type: none"> <li>• Allow outboard engine to cool before performing PMCS maintenance. Components with metal parts can cause severe burns at operating temperature. Wear protective gloves, long sleeves, and eye protection when working with heated parts. Failure to comply may result in injury to personnel.</li> <li>• Ensure the outboard engine and prop area are clear of people and objects before starting or operating outboard engine. Do not allow anyone near a propeller, even when the outboard engine is off. Blades can be sharp and the propeller can continue to turn even after outboard engine is OFF. Moving parts of the equipment can cause serious injury to personnel. Failure to comply may result in injury to personnel.</li> <li>• DO NOT run the outboard engine indoors or without adequate ventilation or permit exhaust fumes to accumulate in confined areas. Engine exhaust contains carbon monoxide. Failure to comply may result in injury to personnel.</li> <li>• Fluid spills may be slippery and cause falls. Use a drain pan or suitable container to capture any draining, leaking or spilled fluid. Refer to local procedures and plans for preventing and responding to fluid spills or leaks. Immediately clean up spilled fluid. Comply with local procedures and environmental regulations when disposing of cleanup materials, and drained, leaked or spilled fluids. Failure to comply may result in injury to personnel and/or damage to the environment.</li> <li>• Fuel is flammable and harmful to health. Keep fuel away from heat or ignition sources. DO NOT smoke within 50 ft (15 m) of a fuel source. Do not work on fuel system when engine is hot.</li> <li>• Shut down engine before refueling. Ensure fuel nozzle is grounded to filler neck. Do not overfill fuel tank. Keep fire extinguisher nearby. Wear gloves and eye protection and ensure adequate ventilation during refueling. Failure to comply may result in injury to personnel and/or damage to the environment.</li> <li>• Lubricating Oil may be flammable. Keep away from heat, open flame and/or other ignition sources. Prolonged contact with lubricating oil may cause a skin rash. Wear protective eyewear, gloves and clothing. Remove saturated clothing immediately and thoroughly wash skin that comes in contact with lubricating oil. If exposed, flush skin and/or eyes with water and seek medical attention. Failure to comply may result in injury to personnel and/or damage to the environment.</li> <li>• To prevent falls from the sides, rear, or top of the boat, personnel should always maintain three points of contact (for example two feet and one hand) when climbing in, out, and on the boat. Failure to comply with this warning may result in injury to personnel.</li> </ul>				
1	Before	Basic Issue Items (BII)	1. Visually inspect BII is not missing and is in serviceable condition. Refer to BII list (WP 0062).	BII is missing or unserviceable.
2	Before	Cargo Tie Downs	1. Ensure two bow and two stern cargo tie downs are connected to boat and securely fastened to trailer.  2. Visually inspect cargo tie downs for damage.	Cargo tie down is missing, not secured, or damaged

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			 <b>BOW TIE DOWN</b>  <b>STERN TIE DOWN</b>	I00003-f55

Figure 1. Cargo Tie Downs.

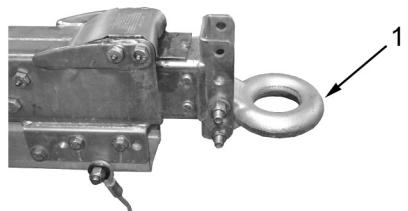
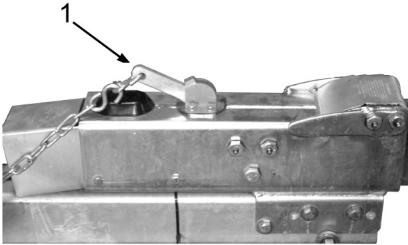
3	Before	Trailer	1. Visually inspect trailer for damage.  2. Visually inspect trailer toolbox for damage or missing hardware.	Trailer is damaged or cannot be repaired.  Toolbox is damaged or missing hardware.
4	Before	Trailer Hitch Assembly	Visually inspect trailer hitch (Figure 2, Item 1) for damage, loose or missing hardware.	Trailer hitch is damaged or missing hardware.
				I00003-f53

Figure 2. Trailer Hitch.

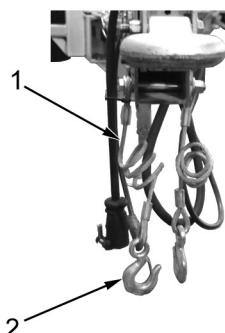
5	Before	Trailer Actuator	1. Visually inspect for broke or damaged hardware or leaks.  2. Visually inspect breakaway lever is in the ready position (Figure 3, Item 1).	Actuator is damaged or shows evidence of a Class I leak.  Breakaway lever is engaged.
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**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			 <p>I00003-f04</p> <p>Figure 3. Breakaway Lever.</p> <p><b>WARNING</b></p> <p>Brake Fluid may be flammable. Keep away from heat, open flame and/or other ignition sources. Prolonged contact with brake fluid may cause a skin rash. Wear personal protective equipment such as eyewear, gloves and clothing. Remove saturated clothing immediately and thoroughly wash skin that comes in contact with brake fluid. If exposed, flush skin and/or eyes with water and seek medical attention.</p> <p>Use a drain pan or suitable container to capture any draining, leaking or spilled fluid. Refer to local procedures and plans for preventing and responding to fluid spills or leaks. Immediately clean up spilled oil. Keep cloths / rags away from open flame and / or ignition sources. Comply with local procedures and environmental regulations when disposing of brake fluid, soiled/cleanup materials (such as filters and rags), and drained, leaked or spilled fluids.</p> <p>Failure to comply may result in injury to personnel and/or damage to the environment.</p>	

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

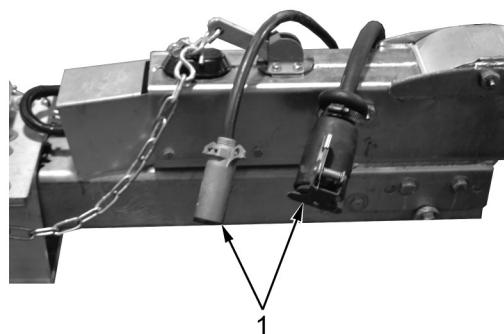
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			3. Inspect fluid reservoir level. Fill as necessary (WP 0056).	Fluid reservoir is below 3/4 full.
6	Before	Trailer Safety Cables	1. Inspect safety cables (Figure 4, Item 1) for damage or fraying.  2. Inspect hooks (Figure 4, Item 2) for damage, broken or missing safety clip.	Cables are damaged or frayed.  Hooks are damaged or missing.



I00003-f52

Figure 4. Trailer Safety Cables.

7	Before	Trailer 12/24V Electrical	1. Visually inspect electrical connectors (Figure 5, Item 1) for damage, cracked rubber casing or bent pins.	Electrical connectors are damaged.
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I00003-f25

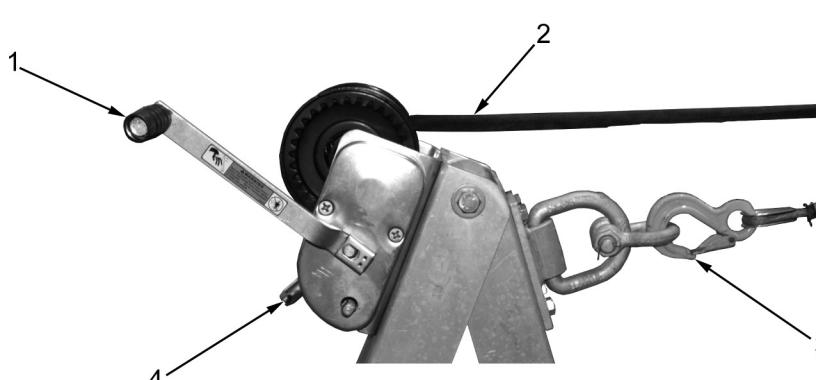
Figure 5. Trailer Electrical Connectors.

2. Visually inspect wiring harness from front to rear of trailer for wear, damage, chaffing or corrosion.	Wires are damaged, chaffed, or corroded.
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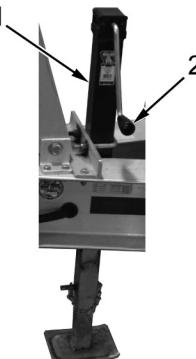
**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
8	Before	Tow Strap and Shackle	<p>Visually inspect shackle (Figure 6, Item 1) and strap (Figure 6, Item 2) for damage, missing hardware, or fraying.</p>  <p>I00003-f89</p>	
9	Before	Trailer Winch Assembly	<p><b>WARNING</b></p> <p>To avoid pinch points between boat and trailer use of appropriate personal protective equipment such as gloves when handling the winch hook is required. Keep all body parts clear of contact points between boat and trailer winch, failure to comply may result in injury to personnel.</p> <p><b>WARNING</b></p> <p>Prior to inspecting winch assembly, ensure boat is secured to trailer and all four cargo tie downs are secure.</p> <p><b>WARNING</b></p> <p>Hold winch handle firmly when ratchet is unlocked. Spinning handle could cause serious injury. Failure to comply may result in injury to personnel.</p> <ol style="list-style-type: none"> <li>1. Ensure crank handle (Figure 7, Item 1) is attached and turns freely.</li> <li>2. Inspect hook (Figure 7, Item 3) for damage, broken or missing safety clip.</li> <li>3. Rotate crank handle clockwise (Figure 7, Item 1) to relieve tension.</li> </ol>	<p>Crank handle is missing or does not turn.</p> <p>Line hook is damaged or missing.</p>

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			<p>4. While holding crank handle (Figure 7, Item 1), rotate winch lock lever 90° (Figure 7, Item 4) clockwise.</p> <p>5. Unreel line (Figure 7, Item 2) and inspect line for damage or fraying.</p>	Line is damaged or frayed.
				I00003-f22
			<p>6. Rotate winch lock lever 90° (Figure 7, Item 4) counterclockwise to lock winch.</p> <p>7. Visually inspect telltale indicator (Figure 8, Item 1) in line for fraying.</p>	Telltale is damaged or frayed.
				I00003-f23
			<p>8. Reel line in and ensure hook is securely fastened and line is taught.</p>	
10	Before	Trailer Leveling Support Jack	<p>1. Visually inspect support jack (Figure 9, Item 1) for missing, damaged, corroded, or loose hardware.</p> <p>2. Ensure crank handle (Figure 9, Item 2) turns freely.</p>	Support jack is damaged or missing hardware. Support jack cannot be raised or lowered.

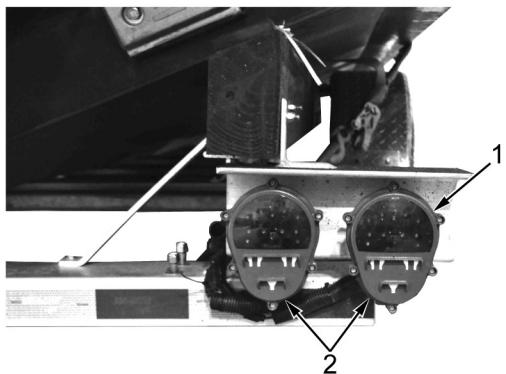
**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			 I00003-f24	
11	Before	Trailer Spare Tire and Wheel Assembly	<p><b>WARNING</b></p> <p>Operating trailer with under-inflated or defective tire may lead to tire failure and loss of traction or control. Failure to comply may cause injury to personnel.</p> <p>1. Visually inspect spare tire and wheel for:</p> <ul style="list-style-type: none"> <li>a. Uneven wear.</li> <li>b. Dry rot; check for long cracks between tread. Check for cracks on sidewall.</li> <li>c. Cuts or bulges in tread or sidewall area. Look for foreign material embedded in tread or sidewall area. DO NOT remove stones or other foreign material embedded in sidewall.</li> <li>d. Damaged, loose, or missing retaining bolts.</li> <li>e. Valve stem for damage or cracks and presence of cap.</li> <li>f. Severe corrosion, damage, dents in wheel or foreign objects lodged between wheel and tire.</li> </ul> <p>2. Using pressure gauge, inspect tire pressure is at 80 psi (551 kPa).</p>	Tire has uneven wear. Tire is dry rotted. Tire has cuts or bulges in tread or sidewall. Retaining bolt is missing or loose. Valve stem is damaged. Wheel is damaged, dented or severely corroded. Tire is under or overinflated.
12	Before	Trailer Fender Assemblies	Visually inspect fender assemblies for damage or missing components.	Fender assembly is damaged or missing components.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

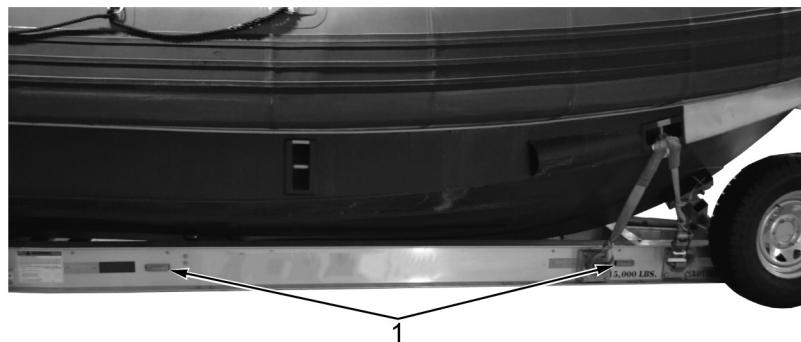
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
13	Before	Trailer Tire and Wheel Assemblies	<p><b>WARNING</b></p> <p>Operating trailer with under-inflated or defective tire may lead to tire failure and loss of traction or control. Failure to comply may cause injury to personnel.</p> <p>1. Visually inspect each tire and wheel for:</p> <ul style="list-style-type: none"> <li>a. Uneven wear.</li> <li>b. Dry rot; check for long cracks between tread. Check for cracks on sidewall.</li> <li>c. Cuts or bulges in tread or sidewall area. Look for foreign material embedded in tread or sidewall area. DO NOT remove stones or other foreign material embedded in sidewall.</li> <li>d. Damaged, loose, or missing lug nuts.</li> <li>e. Valve stem for damage or cracks and presence of cap.</li> <li>f. Severe corrosion, damage, dents in wheel or foreign objects lodged between wheel and tire.</li> </ul> <p>2. Using pressure gauge, inspect each tire pressure is at 80 psi (551 kPa).</p>	Tire has uneven wear. Tire is dry rotted. Tire has cuts or bulges in tread or sidewall. Lug nut is missing or loose. Valve stem is damaged. Wheel is damaged, dented or severely corroded. Tire is under or overinflated.
14	Before	Trailer Hub and Bearing Assemblies	<p><b>CAUTION</b></p> <p>Deflated diaphragm can allow water intrusion into hub assembly. Ensure diaphragm is fully inflated prior to operation, failure to comply may result in damage to equipment.</p> <p>Visually inspect hub assemblies for deflated diaphragm (Figure 10, Item 1) or grease leaking. Diaphragm should be extended approximately <math>\frac{3}{4}</math> in. from hub. Using hand pump and needle, inflate as necessary.</p>	Diaphragm is deflated or grease is leaking.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			 <span style="float: right;">I00003-f27</span>	
			Figure 10. Hub Assembly Diaphragm.	
15	Before	Trailer Brake System	Visually inspect brake system for leaks.	Brake system shows evidence of a Class I leak.
16	Before	Trailer Lights	1. Visually inspect turn lights (Figure 11, Item 1) for operation, cracked lenses, or damage to fixtures (WP 0026). 2. Visually inspect stop lights (Figure 11, Item 1) for operation, cracked lenses, or damage to fixtures (WP 0026). 3. Visually inspect reverse lights (Figure 11, Item 2) for operation, cracked lenses, or damage to fixtures (WP 0026).	Turn lights are damaged or inoperative. Stop lights are damaged or inoperative. Reverse lights are damaged or inoperative.
			 <span style="float: right;">I00003-f28</span>	
			Figure 11. Trailer Brake and Turn Lights	
			4. Visually inspect blackout lights for operation.	Blackout lights are inoperative.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

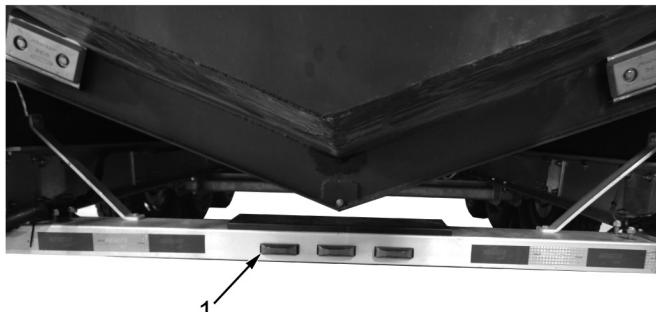
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			5. Visually inspect clearance lights (Figure 12, Item 1) for operation, cracked lenses, or damage to fixtures (WP 0026).	Clearance lights are damaged or inoperative.



I00003-f29

Figure 12. Clearance Lights.

		6. Visually inspect marker lights (Figure 13, Item 1) for operation, cracked lenses, or damage to fixtures (WP 0026).	Marker lights are damaged or inoperative.
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I00003-f30

Figure 13. Marker Lights.

17	Before	Boat	Visually inspect boat for any external damage such as cracked welds or holes or cracks in the hull.	Boat has significant damage.
18	Before	Fire Extinguishers	1. Visually inspect three fire extinguishers (Figure 14, Item 1) for damage.	Fire extinguisher is damaged.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:

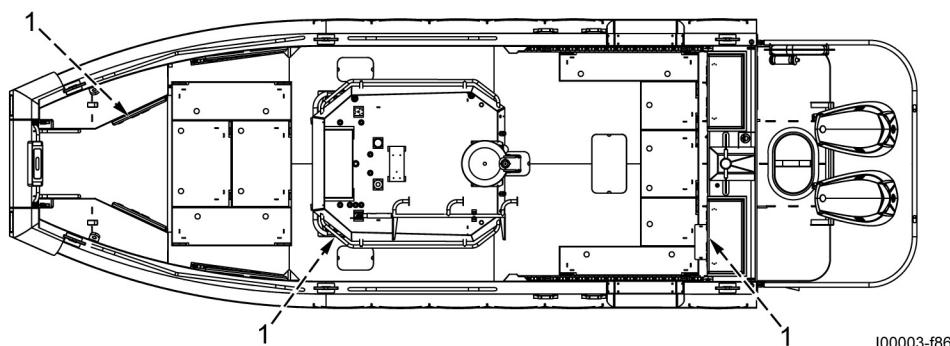


Figure 14. Fire Extinguisher Locations.

**NOTE**

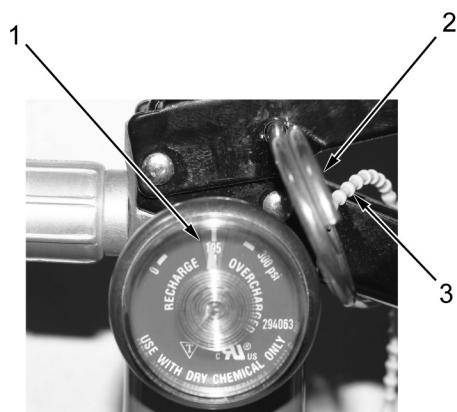
Follow all local, state, and federal regulations when inspecting fire extinguishers.

2. Visually inspect fire extinguishers to ensure status indicator is green (Figure 15, Item 1).
3. Visually inspect safety pin (Figure 15, Item 2) of extinguishers is not missing or removed.
4. Visually inspect seal (Figure 15, Item 3).

Fire extinguisher status indicator is red.

Safety pin is missing or removed.

Seal is damaged or broken.

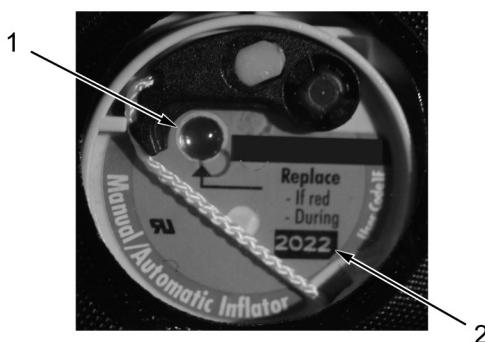


I00003-f03

Figure 15. Fire Extinguisher.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			5. Visually inspect tag for expiration. 6. Visually inspect fire extinguisher mount for damage or missing hardware.	Tag is expired. Fire extinguisher mount is damaged or missing hardware.
19	Before	Personal Flotation Devices (PFDs)	1. Ensure status indicator is green (Figure 16, Item 1).  2. Ensure replacement year (Figure 16, Item 2) on PFD is not current year or past years.	Status indicator is red.  Year displayed is replacement year or past years.



I00003-f01

Figure 16. PFD Status Indicator.

	3. Inspect zippers, hook and loop fastener, and buckles for proper operation and damage.  4. Inspect PFD for rips, tears, abrasions, holes, or loose seams.  5. Ensure oral inflator dust cap is in stowed position (Figure 17, Item 1).  6. Ensure pull cord is attached (Figure 17, Item 2).	PFD is damaged.  Pull cord is missing.
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**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

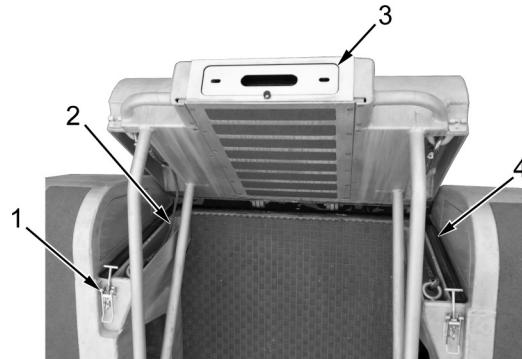
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			 I00003-f02	
20	Before	Boat Dive Platform Assembly	<p>1. Inspect dive ladder assembly (Figure 18, Item 3) for loose, missing, broken, or deteriorated hardware.</p> <p>2. Inspect dive ladder assembly for extended and retracted operation (WP 0023).</p> <p>3. Inspect turnbuckle fasteners (Figure 18, Item 1) for operation, loose, missing, broken, or deteriorated hardware.</p> <p>4. Inspect dive platform tension ropes (Figure 18, Item 2) for cuts, tears, fraying, deterioration or loose, missing, broken, or deteriorated hardware.</p> <p>5. Inspect dive platform seal (Figure 18, Item 4) for cuts, tears, damage, or deterioration.</p>	<p>Dive ladder is damaged or does not operate.</p> <p>Turnbuckle fasteners are damaged or do not operate.</p> <p>Tension ropes are damaged, frayed, or missing hardware.</p> <p>Dive platform seal is damaged.</p>
			 I00003-f05	

Figure 18. Dive Platform Assembly.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
21	Before	Boat Collar	<p style="text-align: center;"><b>NOTE</b></p> <ul style="list-style-type: none"> <li>Port valves are shown, the process for starboard valves is identical.</li> <li>Valves are located in the bow doors.</li> </ul> <p>1. Inspect port and starboard inflation valve (Figure 19, Item 2) and pressure relief valve (Figure 19, Item 1) for damage or leaks.</p>	Damage or deterioration to the inflation or pressure relief valves or signs of air leaking.



I00003-f06

Figure 19. Port Inflation and Pressure Relief Valves.

2. Ensure clear inner tube on pressure gauge (Figure 20, Item 1) is inserted in rubber plug (Figure 20, Item 2) and extends out approximately 3/4 in. Cut as necessary.



I00003-f44

Figure 20. Pressure Gauge.

3. Using pressure gauge, inspect port and starboard collar pressure are at a minimum of 5.0 PSI (344 Mbar). Using collar pump inflate as necessary.

Collar is unable to be inflated or maintain proper psi.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			<p>4. Using collar pump, inflate collar until pressure relief valve opens. Ensure pressure relief valve operates properly.</p> <p>5. Inspect boat collar for cuts, tears, or deterioration.</p>	<p>Damage or deterioration to the pressure relief valve.</p> <p>Boat collar has signs of damage or foam is exposed.</p>
22	Before	Boat SCUBA Tank Mount Assemblies	<p><b>NOTE</b></p> <p>There are two SCUBA tank mount assemblies located port and starboard in the bow of the boat.</p> <p>Inspect SCUBA tank mount assemblies (Figure 21, Item 1) for damage and deterioration.</p>	
				I00003-f31
			Figure 21. SCUBA Tank Mount Assemblies.	
23	Before	Boat Cargo Tie Down Assemblies	Inspect two bow and two stern cargo tie down assemblies (Figure 22, Item 1) for loose, missing, broken hardware or deterioration.	Cargo tie down assembly is damaged.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

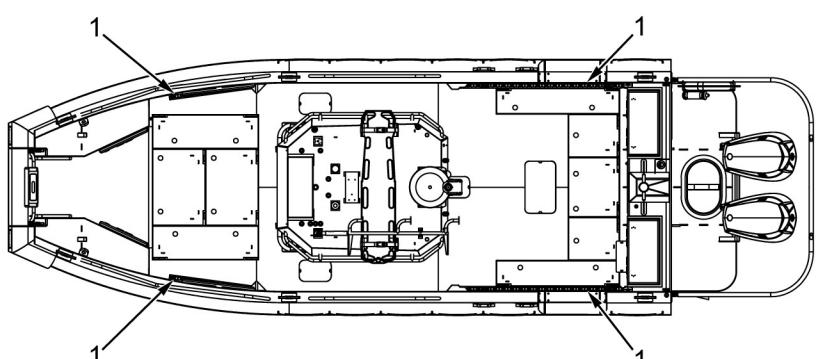
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
				I00003-f32

Figure 22. Cargo Tie Down Assemblies.

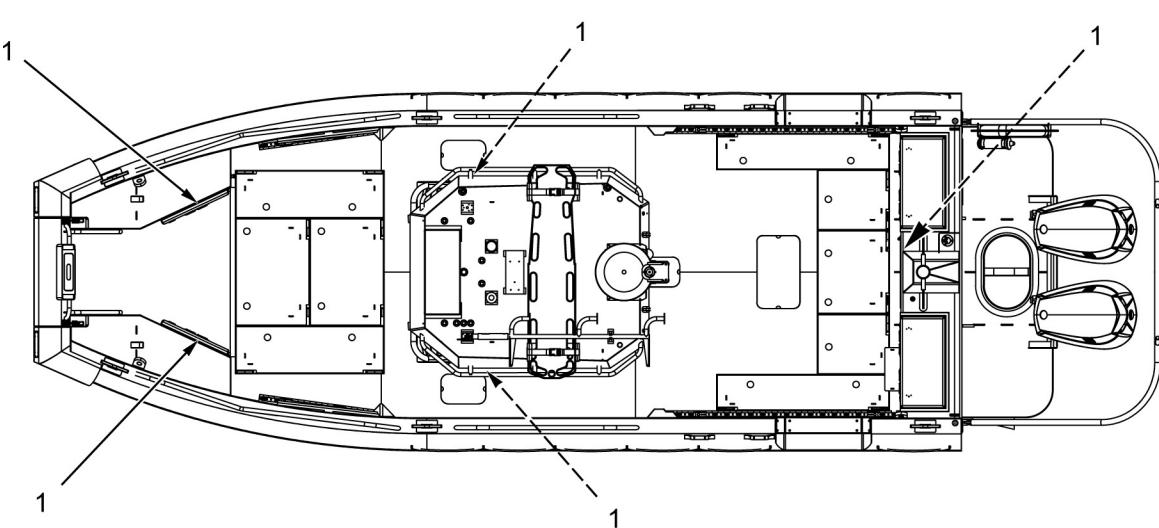
24	Before	Boat Door Assemblies	1. Inspect five door assemblies (Figure 23, Item 1) for damage.  	
			2. Inspect latch handle (Figure 24, Item 3) for operation, deterioration and loose, missing, or damaged hardware. 3. Inspect door hinge (Figure 24, Item 1) for operation, deterioration and loose, missing, or damaged hardware.	Door cannot be opened or secured.

Figure 23. Door Assemblies.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			<p>4. Inspect door seal (Figure 24, Item 4) for cuts, tears, damage, or deterioration.</p> <p>5. Inspect door vent (Figure 24, Item 2) for damage or obstructions.</p>	Door seal is damaged.
25	Before	Boat Hatch Assemblies	<p>1. Inspect 11 hatch assemblies (Figure 25, Item 1) for damage.</p>	 <p>I00003-f07</p> <p>Figure 24. Door Assembly.</p>

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

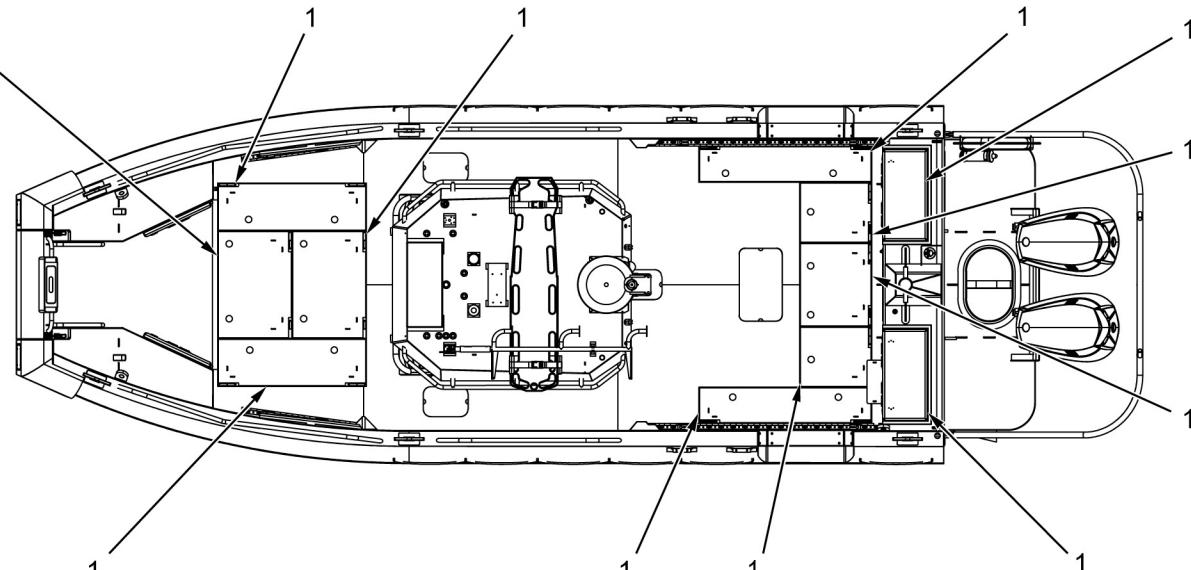
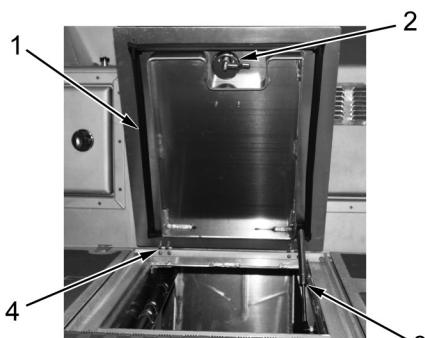
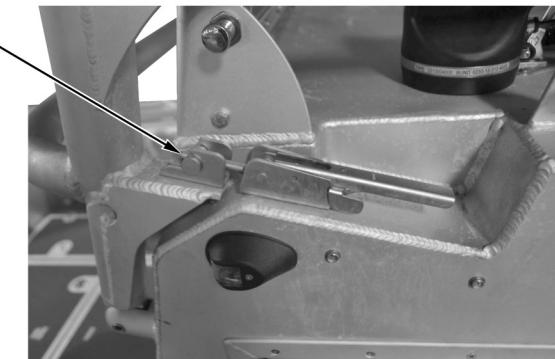
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			<p>2. Inspect hatch handle (Figure 26, Item 2) for operation, deterioration and loose, missing, or damaged hardware.</p> <p>3. Inspect hatch hinge (Figure 26, Item 4) for operation, deterioration and loose, missing, or damaged hardware.</p> <p>4. Inspect hatch seal (Figure 26, Item 1) for cuts, tears, damage, or deterioration.</p> <p>5. Inspect hatch cylinder (Figure 26, Item 3) for operation, damage or leaking.</p>	<p>Hatch cannot be opened or secured.</p> <p>Hatch seal is damaged.</p> <p>Hatch cylinder cannot support hatch or shows evidence of a Class II leak.</p>

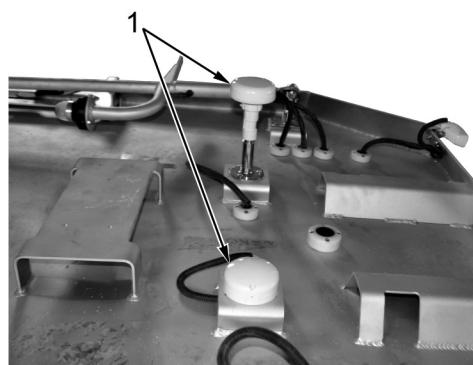
Figure 25. Boat Hatch Assemblies.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
				i00003-f08
			<p>6. Inspect hatch vent for damage or obstructions (Figure 27, Item 1).</p> 	i00003-f82
26	Before	Boat Cabin Latches	<p>Inspect two cabin latches (Figure 28, Item 1) for deterioration and loose, missing, or damaged hardware and properly secure.</p>	Cabin latch is damaged or not secure.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			 <span style="float: right;">I00003-f33</span>	
27	Before	Boat GPS Receiver Antenna	<p><b>WARNING</b></p> <p>To prevent falls from the sides, rear, or top of the boat, personnel should always maintain three points of contact (for example two feet and one hand) when climbing in, out, and on the boat. Failure to comply may result in injury to personnel.</p> <p><b>NOTE</b></p> <p>Two GPS receivers are located on the center of the console roof.</p> <p>Inspect GPS receivers (Figure 29, Item 1) for deterioration, damage and loose, missing, or damaged hardware.</p>	GPS receiver is damaged.

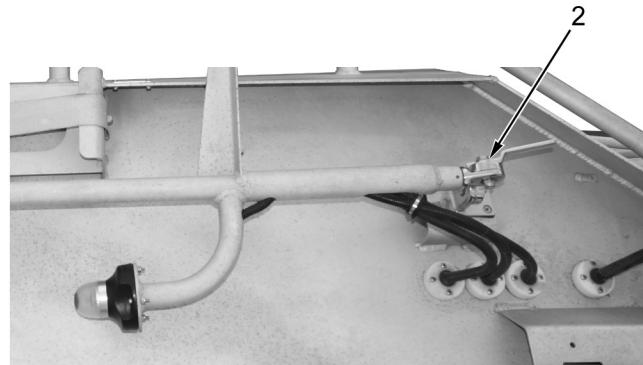
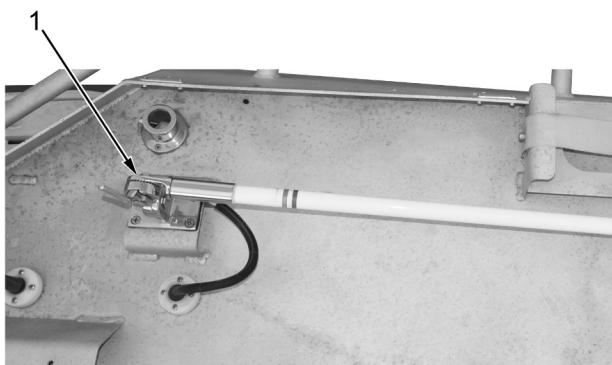


I00003-f77

Figure 29. GPS Receiver.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
28	Before	Boat Antenna and Dive Mast Mount Assemblies	<p><b>WARNING</b></p> <p>To prevent falls from the sides, rear, or top of the boat, personnel should always maintain three points of contact (for example two feet and one hand) when climbing in, out, and on the boat. Failure to comply may result in injury to personnel.</p> <p>Inspect antenna mount (Figure 30, Item 1) and dive mast mount (Figure 30, Item 2) for proper operation of locking mechanism, deterioration and loose, missing, or damaged hardware.</p>	Antenna or dive mast mounts do not operate or are damaged.
29	Before	Boat VHF Antenna	<p><b>WARNING</b></p> <p>To prevent falls from the sides, rear, or top of the boat, personnel should always maintain three points of contact (for example two feet and one hand) when climbing in, out, and on the boat. Failure to comply may result in injury to personnel.</p> <p>Inspect VHF antenna (Figure 31, Item 1) for deterioration, damage and loose, missing, or damaged hardware.</p>	VHF antenna is damaged.



I00003-f68

Figure 30. Boat Antenna.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

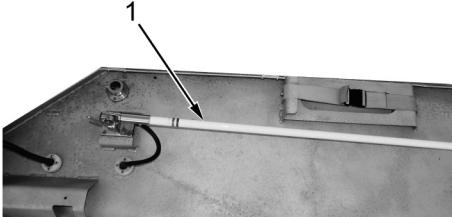
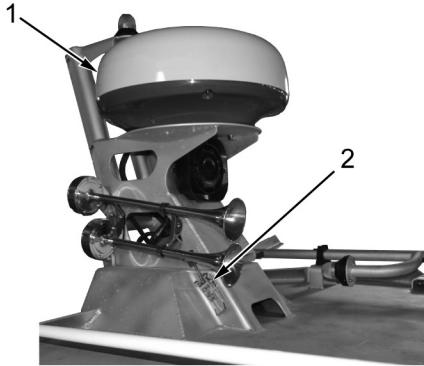
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			 I00003-f67	
30	Before	Boat Radome and Mast	<p><b>WARNING</b></p> <p>To prevent falls from the sides, rear, or top of the boat, personnel should always maintain three points of contact (for example two feet and one hand) when climbing in, out, and on the boat. Failure to comply may result in injury to personnel.</p> <ol style="list-style-type: none"> <li>1. Inspect radome (Figure 32, Item 1) for damage and loose, missing, or damaged hardware.</li> <li>2. Inspect two mast latches (Figure 32, Item 2) for deterioration and loose, missing, or damaged hardware and properly secure.</li> </ol>  I00003-f78	Radome is damaged or missing hardware. Mast latch is damaged or unsecure.

Figure 32. Radome and Mast.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
31	Before	Boat Navigation Horns	<p><b>WARNING</b></p> <p>To prevent falls from the sides, rear, or top of the boat, personnel should always maintain three points of contact (for example two feet and one hand) when climbing in, out, and on the boat. Failure to comply may result in injury to personnel.</p> <p><b>WARNING</b></p> <p>Ensure all personnel in the vicinity of the speaker or siren wear personal protective equipment such as hearing protection when speaker or siren is being operated to prevent against potential noise hazards. Failure to comply may result in injury or death to personnel.</p> <p>1. Inspect navigation horns for obstructions, deterioration, damage and loose, missing, or damaged hardware (Figure 33, Item 1).</p>	Navigation horn is obstructed, or is damaged.
			 <p>I00003-f85</p>	Figure 33. Boat Navigation Horn.
32	Before	Boat VHF Radio	<p>2. Turn house battery switch to position 1 (WP 0004).</p> <p>3. Toggle horn operation switch to inspect for operation (WP 0004).</p> <p>4. Turn house battery switch to position 0 (WP 0004).</p>	Navigation horn(s) will not operate.
33	Before	Boat Command Microphone Remote	<p>1. Inspect VHF radio for operation or damage (WP 0020).</p> <p>1. Ensure command microphone (Figure 34, Item 1) is not missing and is connected.</p>	VHF radio does not operate or is damaged.
				Command microphone is missing or disconnected.

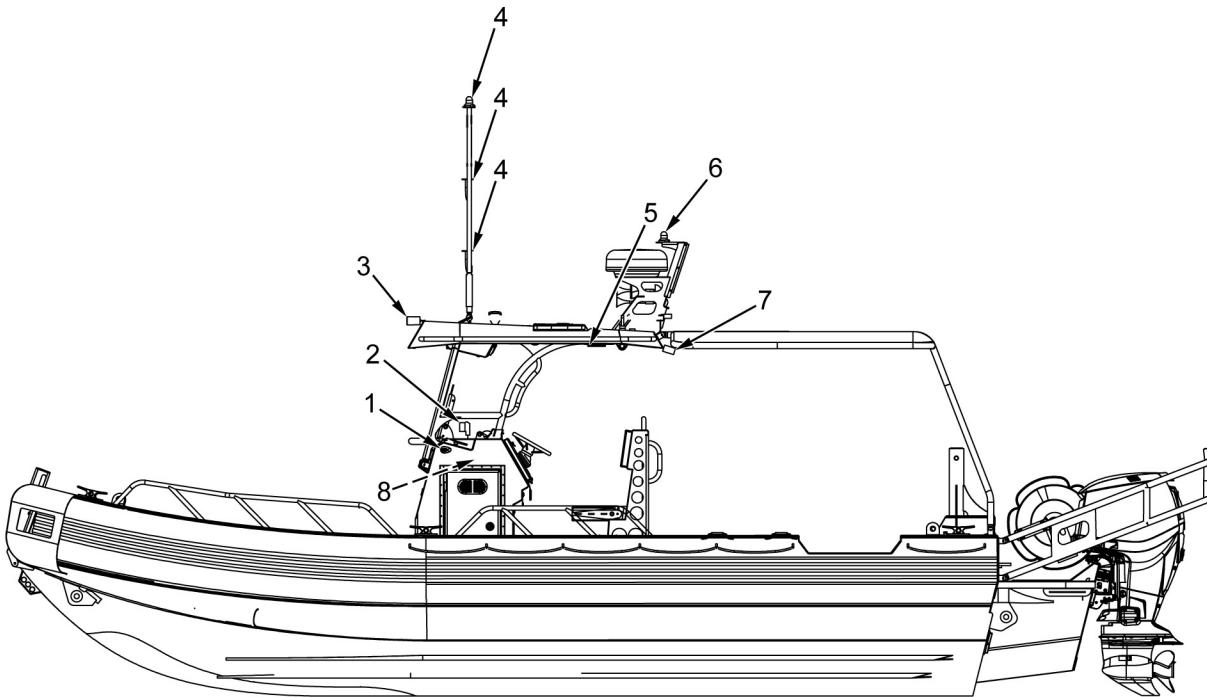
**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			 I00003-f80	
			2. Inspect command microphone for operation or damage and that audible noise can be heard from speaker(WP 0019).	Command microphone does not operate, is damaged, or no audible noise can be heard from speaker.
34	Before	Boat Multi-function Display	1. Turn house battery switch to position 1 (WP 0004). 2. Inspect multi-function display for operation, damage, or deterioration (WP 0014). 3. Turn house battery switch to position 0 (WP 0004). 4. Ensure multi-function display cover is not missing or damaged.	Multi-function display does not operate or is damaged.
35	Before	Boat Siren System	<p style="text-align: center;"><b>WARNING</b></p> <p>Ensure all personnel in the vicinity of the speaker or siren wear personal protective equipment such as hearing protection when speaker or siren is being operated to prevent against potential noise hazards. Failure to comply may result in injury or death to personnel.</p> 1. Ensure siren microphone is not missing and is connected to siren control panel. 2. Inspect siren control panel and microphone for operation, damage, or deterioration (WP 0012).	Siren microphone is missing or disconnected. Siren microphone does not operate or is damaged.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
36	Before	Boat Lighting	<p style="text-align: center;"><b>WARNING</b></p> <p>To prevent falls from the sides, rear, or top of the boat, personnel should always maintain three points of contact (for example two feet and one hand) when climbing in, out, and on the boat. Failure to comply may result in injury to personnel.</p> <ol style="list-style-type: none"> <li>1. Turn house battery switch to position 1 (WP 0004).</li> <li>2. Turn navigation light, dive light, overhead dome light, console dome light, forward deck light, and aft deck light operation switches to the ON position (WP 0004).</li> <li>3. Inspect navigation lights (Figure 35, Item 1) and anchor light (Figure 35, Item 6) for operation, deterioration, damage and loose, missing, or damaged hardware.</li> <li>4. Inspect dive lights (Figure 35, Item 4) for operation, deterioration, damage and loose, missing, or damaged hardware.</li> <li>5. Inspect two overhead dome lights (Figure 35, Item 5) for operation, deterioration, damage and loose, missing, or damaged hardware.</li> <li>6. Inspect two console dome lights (Figure 35, Item 8) for operation, deterioration, damage and loose, missing, or damaged hardware.</li> <li>7. Inspect two forward deck lights (Figure 35, Item 3) and two aft deck lights (Figure 35, Item 7) for operation, deterioration, damage and loose, missing, or damaged hardware.</li> </ol>	<p>Navigation lights do not operate or are damaged.</p> <p>Dive lights do not operate or are damaged.</p>

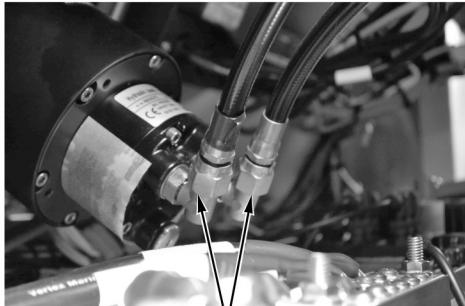
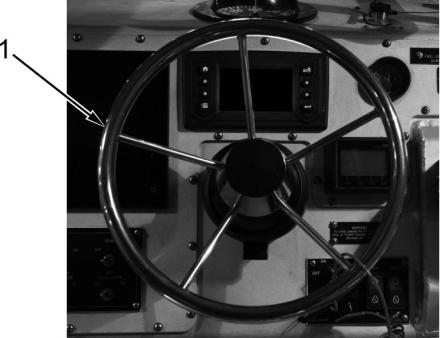
**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			 I00003-f84	
37	Before	Boat Compass	<p>8. Turn house battery switch to position 0 (WP 0004).</p> <p>9. Turn navigation light, dive light, overhead dome light, console dome light, forward deck light, and aft deck light operation switches to the OFF position (WP 0004).</p> <p>10. Inspect spotlight (Figure 35, Item 2) for operation, deterioration, or damage (WP 0011).</p> <p>1. Turn house battery switch to position 1 (WP 0004).</p> <p>2. Inspect compass for operation, damage and deterioration.</p> <p style="text-align: center;"><b>NOTE</b></p> <p style="text-align: center;">The instrument light switch will gradually increase compass light.</p> <p>3. Hold instrument light switch in high position (WP 0004).</p>	Compass does not show proper orientation or is damaged.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			4. Inspect compass light (Figure 36, Item 1) operation.	Compass light does not turn on.
				I00003-f79
			Figure 36. Compass.	
			5. Turn house battery switch to position 0 (WP 0004).	
38	Before	Boat Engine Monitor	1. Inspect engine monitor for operation, damage or deterioration (WP 0021). 2. Ensure engine monitor cover is not missing or damaged.	Engine monitor does not operate or is damaged.
39	Before	Boat Vessel System Monitor	Inspect vessel system monitor for operation, damage or deterioration (WP 0013).	Vessel system monitor does not operate or is damaged.
40	Before	Boat Helm	1. Visually inspect helm hose connections (Figure 37, Item 1) for wear, damage, deterioration, or leaks.	Steering hose connections are worn, damaged, or show evidence of a Class I leak.

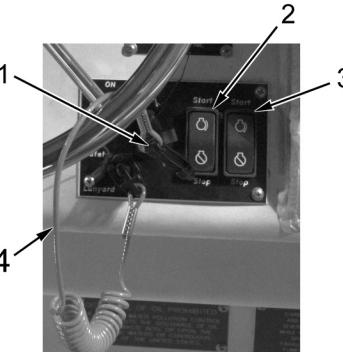
**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			 1	I00003-f48
			<p>Figure 37. Helm Hydraulic Connections</p> <p>2. Ensure helm turns freely to port and starboard while monitoring corresponding engine movement.</p> <p>3. Inspect helm (Figure 38, Item 1) for deterioration, damage and loose, missing, or damaged hardware.</p>	Helm does not turn freely or engines do not turn.
41	Before	Boat Throttle Lever Assembly	 1	I00003-f34
			<p>Figure 38. Helm.</p> <p>1. Inspect throttle lever assembly (Figure 39, Item 3) for deterioration, damage and loose, missing, or damaged hardware.</p> <p>2. Turn port and starboard battery switches to position 1 (WP 0004).</p> <p>3. Turn ignition key to ON position (WP 0004).</p>	Throttle lever assembly is damaged.

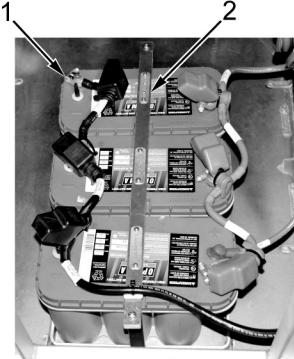
**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			<p style="text-align: center;"><b>WARNING</b></p> <p>When trimming engines keep all body parts clear of contact points between engine and boat. Failure to comply may result in injury to personnel.</p> <p>4. Check throttle lever assembly port engine trim (Figure 39, Item 1) and starboard engine trim (Figure 39, Item 2) switches for operation.</p>	Throttle lever assembly trim function does not operate.
			 I00003-f65	Figure 39. Throttle Lever Assembly.
42	Before	Boat Start/Stop Switch	<p>5. Turn ignition key to OFF position (WP 0004).</p> <p>6. Turn port and starboard battery switches to position 0 (WP 0004).</p> <p>1. Visually inspect port start/stop switch (Figure 40, Item 2) and starboard start/stop switch (Figure 40, Item 3), for deterioration, damage and loose, missing, or damaged hardware.</p> <p>2. Ensure ignition key (Figure 40, Item 1) is not missing or damaged.</p> <p>3. Ensure safety lanyard (Figure 40, Item 4) is not missing or damaged.</p>	Start/stop switch is damaged. Ignition key is missing or damaged. Safety lanyard is missing or damaged.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			 I00003-f56	
43	Before	Boat Marine Batteries	<p><b>WARNING</b></p> <ul style="list-style-type: none"> <li>• Electrical shock can cause injury or death to personnel when working near, replacing, or servicing any electrical component.</li> <li>• Take great care when working around energized electrical equipment. Contact between unprotected body parts and electrical conductors can cause serious injury or death.</li> <li>• Keep all electrical connections clean, tight, and insulated to prevent shorting or arcing and causing an explosion.</li> <li>• Failure to comply may result in injury or death to personnel.</li> </ul> <p>1. Inspect console and transom batteries for damage or deterioration.</p> <p>2. Inspect console and transom battery retention bars (Figure 41, Item 2) for loose, missing, or damaged hardware.</p> <p>3. Inspect console and transom battery terminals (Figure 41, Item 1) are tight and free of corrosion.</p>	Battery is damaged.  Battery retention bar is loose, missing or damaged.  Battery terminals are loose or corroded.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
				I00003-f76
			4. Ensure console and transom batteries maintain operating voltage of 12.6-13.2V (WP 0013).	Battery does not maintain voltage.
44	Before	Boat Bilge	Visually inspect bilge area for oil, fuel, or excess water.	Bilge area shows evidence of a Class I oil or fuel leak or excess water.
45	Before	Boat Bilge Pumps	1. Turn bilge pumps to manual position and inspect for operation (WP 0004). Listen for audible noise coming from forward and aft bilge pumps. 2. Visually inspect aft bilge pump for deterioration, damage and loose, missing, or damaged hardware. 3. Visually inspect aft bilge pump strainer (Figure 42, Item 4) for debris. 4. Visually inspect aft bilge pump discharge hose (Figure 42, Item 1) for wear, damage, deterioration or kinks. 5. Visually inspect aft bilge pump float switch (Figure 42, Item 3) for deterioration, damage, loose, missing or damaged hardware. Float switch should be free of restrictions. 6. Visually inspect aft float switch wiring (Figure 42, Item 2) for wear, damage, or corrosion.	Bilge pump does not operate or no audible noise is heard.  Bilge pump is damaged or missing components.  Remove any restriction.  Discharge hose is damaged or flow is restricted.  Float switch is damaged, missing components or restricted.  Float switch wiring is damaged, chaffed, or corroded.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
				I00003-f45

Figure 42. Bilge Pump.

			7. Ensure bilge pump switches are in "AUTO" position (WP 0004).	
46	Before	Boat Transducer	<p>1. Inspect transducer (Figure 43, Item 1) for deterioration, damage and loose, missing, or damaged hardware.</p> <p>2. Inspect transducer seal (Figure 43, Item 2) for damage or deterioration.</p> <p>3. Inspect transducer wiring (Figure 43, Item 3) for wear, damage, chaffing, or corrosion.</p>	<p>Transducer is damaged.</p> <p>Transducer seal is damaged.</p> <p>Transducer wiring is damaged, chaffed, or corroded.</p>



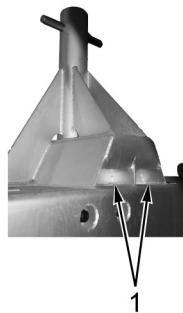
I00003-f35

Figure 43. Transducer.

47	Before	Boat Fuel Tank Vent Blower	1. Turn house battery switch to position 1 (WP 0004).	
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**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			<p>2. Turn fuel tank vent blower switch to ON position (WP 0004).</p> <p>3. Listen and feel for air blowing out of the vent outlets (Figure 44, Item 1).</p>	Fuel tank vent blower does not operate or no air is felt blowing from outlets.

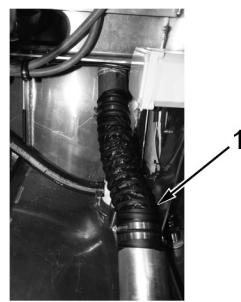


I00003-f09

Figure 44. Vent Outlets.

4. Turn fuel tank vent blower switch to OFF position (WP 0004).
5. Turn house battery switch to position 0 (WP 0004).
6. Open center aft hatch and inspect blower hose (Figure 45, Item 1) for cuts, tears, or damage.

Blower hose is damaged.



I00003-f10

Figure 45. Blower Hose.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
48	Before	Boat Fuel Filters	<p style="text-align: center;"><b>WARNING</b></p> <ul style="list-style-type: none"> <li>• Fuel is flammable and harmful to health. Keep fuel away from heat or ignition sources. DO NOT smoke within 50 feet (15 m) of a fuel source. Do not work on fuel system when engine is hot. Shut down engine before refueling. Ensure fuel nozzle is grounded to filler neck. Do not overfill fuel tank. Keep fire extinguisher nearby. Wear personal protective equipment such as gloves and eye protection and ensure adequate ventilation during refueling.</li> <li>• Refer to local procedures and plans for preventing and responding to fuel spills or leaks. Use a drain pan or suitable container to capture any draining, leaking or spilled fuel. Immediately clean up spilled fuel. Keep cloths / rags away from open flame and / or ignition sources. Comply with local procedures and environmental regulations when disposing of unused fuel, soiled/ cleanup materials (such as filters and rags), and drained, leaked or spilled fuel.</li> <li>• Failure to comply may result in injury to personnel and/or damage to the environment.</li> </ul> <ol style="list-style-type: none"> <li>1. Inspect fuel filters (Figure 46, Item 1) for damage, deterioration, or leaks.</li> <li>2. Inspect fuel filter fittings (Figure 46, Item 2) for leaks.</li> <li>3. Inspect fuel filter bowls (Figure 46, Item 3) on filters for presence of water, contaminants, damage, or leaks. Service as necessary (WP 0058).</li> </ol>	Fuel filters, fittings, or bowls are damaged or show evidence of a Class I leak.  Fuel filter bowl has presence of water or contamination.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

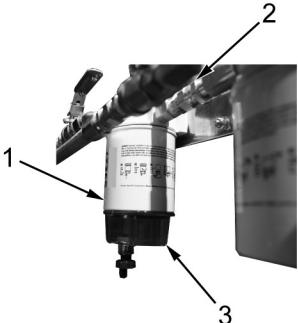
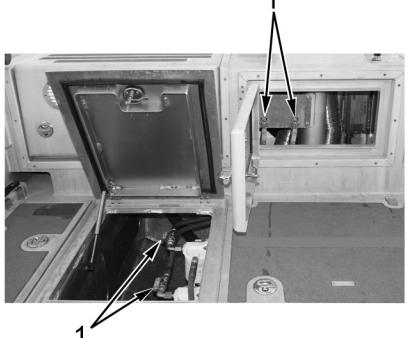
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			 Figure 46 shows a fuel filter assembly mounted on a metal frame. Callout 1 points to the bottom flange of the filter housing. Callout 2 points to the top flange. Callout 3 points to the bottom-most valve or fitting at the base of the filter. The filter itself is cylindrical with a label that includes numbers like 100, 10, 100, and 10.  I00003-f11	

Figure 46. Fuel Filter.

***Table 1. Operator Preventive Maintenance Checks and Services - Continued.***

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
49	Before	Boat Fuel Valves and Hoses	<p style="text-align: center;"><b>WARNING</b></p> <ul style="list-style-type: none"> <li>• Fuel is flammable and harmful to health. Keep fuel away from heat or ignition sources. DO NOT smoke within 50 feet (15 m) of a fuel source. Do not work on fuel system when engine is hot. Shut down engine before refueling. Ensure fuel nozzle is grounded to filler neck. Do not overfill fuel tank. Keep fire extinguisher nearby. Wear personal protective equipment such as gloves and eye protection and ensure adequate ventilation during refueling.</li> <li>• Refer to local procedures and plans for preventing and responding to fuel spills or leaks. Use a drain pan or suitable container to capture any draining, leaking or spilled fuel. Immediately clean up spilled fuel. Keep cloths / rags away from open flame and / or ignition sources. Comply with local procedures and environmental regulations when disposing of unused fuel, soiled/ cleanup materials (such as filters and rags), and drained, leaked or spilled fuel.</li> <li>• Failure to comply may result in injury to personnel and/or damage to the environment.</li> </ul> <ol style="list-style-type: none"> <li>1. Inspect four fuel valves (Figure 47, Item 1) for operation.</li> <li>2. Inspect fuel valves for deterioration, damage, or leaks.</li> </ol>	Fuel valves do not operate, are damaged or show evidence of a Class I leak.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

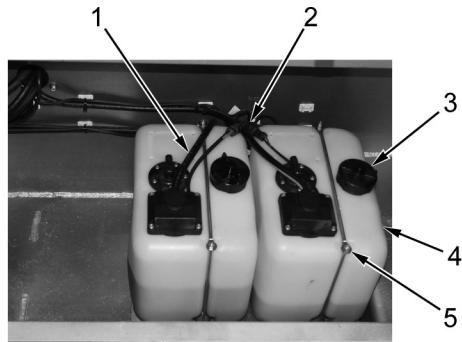
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			 <p>1 1</p>	<p>I00003-f12</p> <p>Figure 47. Fuel Valves.</p> <p>3. Inspect fuel hoses for wear, damage, deterioration, kinks, or leaks.</p> <p>4. Inspect fuel fittings for damage, deterioration, or leaks.</p> <p>Fuel hoses are worn, damaged, or show evidence of a Class I leak.</p> <p>Fuel fittings are worn, damaged, or show evidence of a Class I leak.</p>

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
50	Before	Boat Oil and Sender Assembly	<p style="text-align: center;"><b>WARNING</b></p> <ul style="list-style-type: none"> <li>• Lubricating oil may be flammable. Keep away from heat, open flame and/or other ignition sources. Prolonged contact with lubricating oil may cause a skin rash. Wear protective eyewear, gloves and clothing. Remove saturated clothing immediately and thoroughly wash skin that comes in contact with lubricating oil. If exposed, flush skin and/or eyes with water and seek medical attention.</li> <li>• Use a drain pan or suitable container to capture any draining, leaking or spilled fluid. Refer to local procedures and plans for preventing and responding to fluid spills or leaks. Immediately clean up spilled oil. Keep cloths / rags away from open flame and / or ignition sources. Comply with local procedures and environmental regulations when disposing of lubricating oil, soiled/cleanup materials (such as filters and rags), and drained, leaked or spilled fluids.</li> <li>• Failure to comply may result in injury to personnel and/or damage to the environment.</li> </ul> <ol style="list-style-type: none"> <li>1. Inspect oil level in tanks is not below 1/2 full. Fill as necessary (WP 0057).</li> <li>2. Inspect oil tanks (Figure 48, Item 4) for damage, deterioration, or leaks.</li> <li>3. Inspect oil tank caps (Figure 48, Item 3) are not missing or damaged and are tight.</li> <li>4. Inspect retaining bar (Figure 48, Item 5) for loose, missing, or damaged hardware.</li> <li>5. Inspect oil hoses (Figure 48, Item 1) for wear, damage, deterioration, kinks, or leaks.</li> </ol>	Oil level in tank is below 1/2 full.  Oil tank is damaged or shows evidence of a Class II leak.  Oil tank cap missing, loose, or damaged.  Retaining bar is missing, loose, or damaged.  Oil hoses are worn, damaged, or show evidence of a Class II leak.

***Table 1. Operator Preventive Maintenance Checks and Services - Continued.***

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			<p>6. Inspect electrical connectors (Figure 48, Item 2) and wiring for wear, damage, chaffing, or corrosion.</p>	<p>Connector and wiring is damaged, chaffed, or corroded.</p>



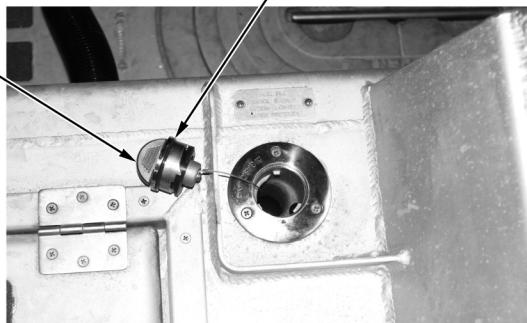
I00003-f13

Figure 48. Oil and Sender Assembly.

***Table 1. Operator Preventive Maintenance Checks and Services - Continued.***

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
51	Before	Boat Fuel Cap	<p style="text-align: center;"><b>WARNING</b></p> <ul style="list-style-type: none"> <li>• Fuel is flammable and harmful to health. Keep fuel away from heat or ignition sources. DO NOT smoke within 50 feet (15 m) of a fuel source. Do not work on fuel system when engine is hot. Shut down engine before refueling. Ensure fuel nozzle is grounded to filler neck. Do not overfill fuel tank. Keep fire extinguisher nearby. Wear personal protective equipment such as gloves and eye protection and ensure adequate ventilation during refueling.</li> <li>• Refer to local procedures and plans for preventing and responding to fuel spills or leaks. Use a drain pan or suitable container to capture any draining, leaking or spilled fuel. Immediately clean up spilled fuel. Keep cloths / rags away from open flame and / or ignition sources. Comply with local procedures and environmental regulations when disposing of unused fuel, soiled/ cleanup materials (such as filters and rags), and drained, leaked or spilled fuel.</li> <li>• Failure to comply may result in injury to personnel and/or damage to the environment.</li> </ul> <ol style="list-style-type: none"> <li>1. Inspect fuel cap (Figure 49, Item 1) is not missing or damaged and is secured.</li> <li>2. Visually inspect o-ring (Figure 49, Item 2) for cracks, damage, or deterioration.</li> </ol>	Cap is damaged or missing. O-ring is missing or damaged.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			 <span style="float: right;">I00003-f61</span>	
52	Before	Boat Engine Guard Frame	<p>Inspect engine guard frame (Figure 50, Item 1) for damage and loose, missing, or damaged hardware.</p>  <span style="float: right;">I00003-f36</span>	Engine guard frame is severely damaged or missing hardware.
53	Before	Boat Buoy Light And Mounting Bracket	<p>1. Inspect buoy mounting bracket (Figure 51, Item 1) for damage and loose, missing, or damaged hardware.</p> <p>2. Remove buoy light (Figure 51, Item 2) from mount and turn with light facing up. Ensure strobe light turns on.</p>	Buoy light does not turn on.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

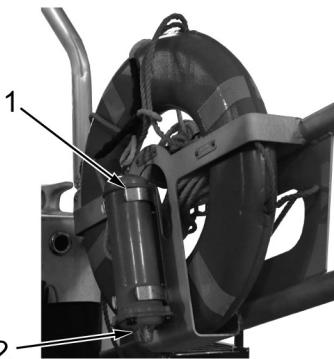
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
				I00003-f50

Figure 51. Boat Buoy Mounting Bracket.

			3. Visually inspect buoy light for damage. Install buoy light on mount with light facing down.	Buoy light is damaged or unserviceable.
54	Before	Boat Scupper Drain Assemblies	1. Inspect scupper rope (Figure 52, Item 2) for cuts, tears, fraying, or deterioration.  2. Inspect scupper clamp (Figure 52, Item 1) is not loose, missing, or damaged.  3. Inspect scupper sleeves (Figure 52, Item 3) for cuts, tears, or damage.	

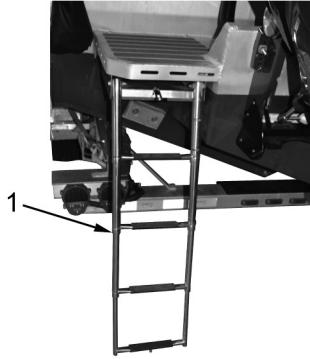


I00003-f14

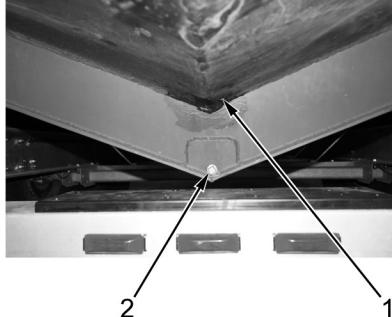
Figure 52. Scupper Drain Assembly.

55	Before	Boat Hull Anodes	<b>NOTE</b> <ul style="list-style-type: none"> <li>• Anodes that are not eroding may not be properly grounded.</li> </ul>	
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**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			<ul style="list-style-type: none"> <li>Starboard hull anode is shown, port hull anode is identical.</li> </ul> <p>Inspect two hull anodes (Figure 53, Item 1) for damage or severe corrosion and loose, missing, or damaged hardware.</p>	Anode has eroded two-thirds past its original size.
				I00003-f37
			Figure 53. Hull Anode.	
56	Before	Boat Rear Ladder Assembly	<ol style="list-style-type: none"> <li>Inspect rear ladder assembly (Figure 54, Item 1) or loose, missing, broken, or deteriorated hardware.</li> <li>Inspect rear ladder assembly (Figure 54, Item 1) for extended and retracted operation.</li> </ol>	
				I00003-f38
			Figure 54. Rear Ladder Assembly.	
57	Before	Boat Stern Plugs	<ol style="list-style-type: none"> <li>Inspect bilge plug (Figure 55, Item 2) and transom plug (Figure 55, Item 1) to ensure they are present.</li> </ol>	Transom or bilge plug is missing or loose.

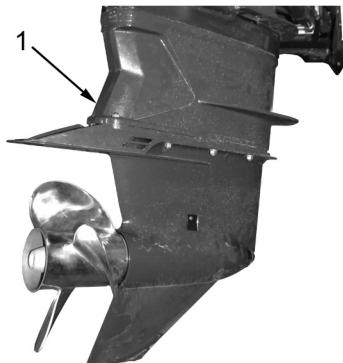
**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
				I00003-f15
			<p>2. If loose, use wrench ensure plugs are securely tightened.</p>	Transom or bilge plug is missing or loose.
58	Before	Engine	<p>1. Visually inspect engines for cracks, dents, leaks, and corrosion.</p> <p>2. Visually inspect for loose, bent, broken or missing hardware.</p>	Engines show significant damage or evidence of a Class II leak. Hardware is loose or damaged.
59	Before	Engine Manual Trim Switch	<p><b>WARNING</b>  When trimming engines keep all body parts clear of contact points between engine and boat. Failure to comply may result in injury to personnel.</p> <p><b>WARNING</b>  When manually trimming engines, ensure personnel are clear of pinch points between engines. Failure to comply may result in injury to personnel.</p> <p><b>NOTE</b>  Manual trim switches are located on the starboard side of the port and starboard engine.</p> <p>Inspect manual trim (Figure 56, Item 1) switch for operation (WP 0004).</p>	Manual trim switch is inoperative.

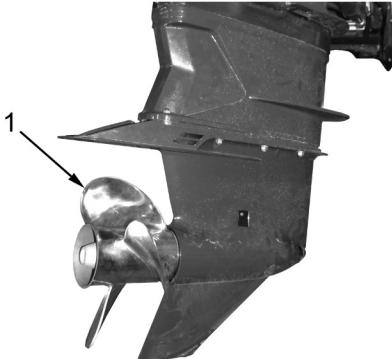
**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
				I00003-f57
60	Before	Engine Exhaust Relief Grommet	Visually inspect exhaust grommet (Figure 57, Item 1) for damage or debris.	Exhaust grommet is clogged or damaged.
				I00003-f39
61	Before	Engine Gearcase Assembly	Visually inspect gearcase assembly (Figure 58, Item 1) for wear, damage or leaks.	Gearcase assembly is worn, damaged or shows evidence of a Class I leak.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			 I00003-f40	
62	Before	Engine Propeller	<p><b>WARNING</b></p> <ul style="list-style-type: none"> <li>Do not service any part of the propeller while the outboard engine is running. Always shift the outboard engine to NEUTRAL position, turn the key switch OFF.</li> <li>Ensure the outboard engine and prop area are clear of people and objects before starting or operating outboard engine. Blades can be sharp and the propeller can continue to turn even after outboard engine is OFF.</li> <li>Failure to follow these warnings may result in injury or death to personnel</li> </ul> <p>1. Visually inspect propeller (Figure 59, Item 1) for wear or damage. 2. Ensure propeller turns freely.</p>	Propeller blades are bent or damaged.  Propeller does not turn freely.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			 I00003-f41	
63	Before	Engine Water Screens	Visually inspect upper (Figure 60, Item 1) and lower screens (Figure 60, Item 2) for damage or debris.	Screens are clogged or damaged.
64	Before	Engine Stern and Swivel Bracket	<p><b>NOTE</b></p> <p>There are two hydraulic connections on each engine.</p> <ol style="list-style-type: none"> <li>1. Visually inspect engine hydraulic connections (Figure 61, Item 1) for wear, damage, deterioration, or leaks.</li> <li>2. Visually inspect stern and swivel bracket (Figure 61, Item 3) for damage or leaks.</li> </ol>	Steering hose connections are worn, damaged or show evidence of a Class I leak.  Stern and swivel bracket is damaged or shows evidence of a Class I leak.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

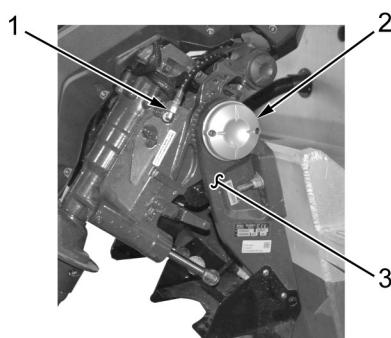
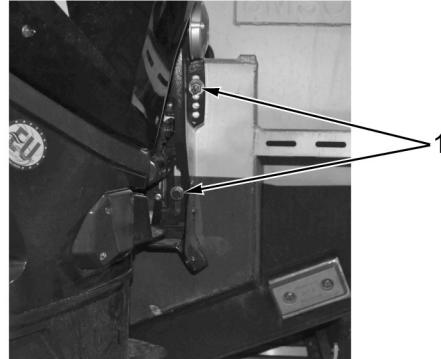
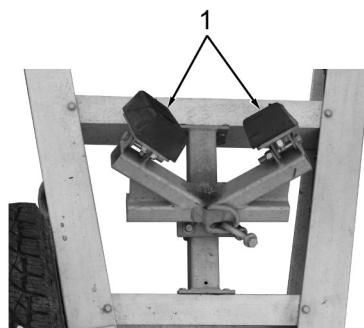
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			<p>3. Visually inspect stern bracket covers (Figure 61, Item 2) for damage and loose, missing, or damaged hardware.</p> 	Stern bracket covers are damaged or missing hardware.

Figure 61. Engine Stern and Swivel Bracket.

65	Before	Engine Mounting Hardware	<p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>Orientation of engine mounting bolts may be reversed.</li> <li>There are four mounting bolts on each engine.</li> </ul> <p>Visually inspect engine mounting hardware (Figure 62, Item 1) for loose or missing components.</p> 	Engine mounting hardware is missing or loose.
66	During	Trailer Brake System	Listen for noise from brake assembly.	Noise is present during braking.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
67	During	Trailer Stop Bumpers	Visually inspect stop bumpers (Figure 63, Item 1) for wear or damage.	Stop bumpers are severely worn or damaged.



I00003-f26

Figure 63. Trailer Stop Bumpers.

68	During	Trailer Electrical Harness Assembly	Visually inspect wiring harness from front to rear of trailer for wear, damage, chaffing or corrosion.	Wires are damaged, chuffed, or corroded.
69	During	Trailer Bunk and Braces	1. Visually inspect polymer bunks (Figure 64, Item 2) for wear or missing components. 2. Visually inspect wood bunks (Figure 64, Item 1) for damage or missing components. 3. Visually inspect bunk braces (Figure 64, Item 3) for damaged or missing components.	Wood bunk(s) is cracked, split, rotting, or missing components. Bunk brace is damaged, missing, or missing components.

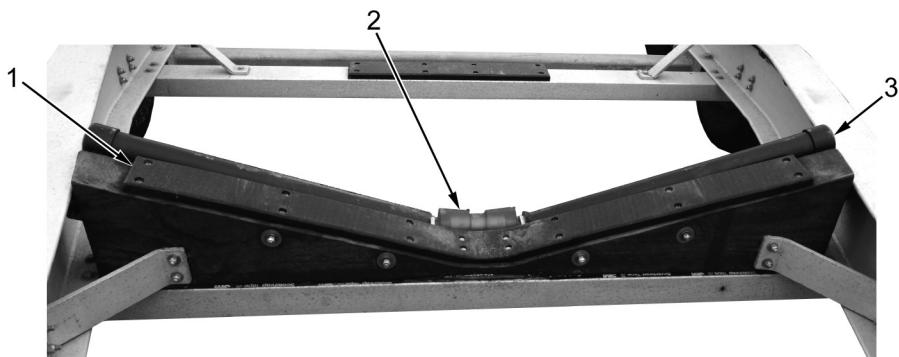


I00003-f66

Figure 64. Trailer Bunk and Braces.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
70	During	Trailer V-Bunk	<ol style="list-style-type: none"> <li>1. Visually inspect polymer pads (Figure 65, Item 1) for wear or missing components.</li> <li>2. Check roller (Figure 65, Item 2) for functionality, damage, and loose or missing hardware.</li> <li>3. Visually inspect Polyvinyl Chloride (PVC) guide (Figure 65, Item 3) for damaged or missing components.</li> </ol>	<p>Polymer pad is significantly worn or missing components.</p> <p>Roller is damaged or missing hardware.</p> <p>PVC guide is damaged or missing components.</p>
71	During	Boat Lighting	<ol style="list-style-type: none"> <li>1. Monitor navigation lights for operation.</li> <li>2. Monitor dive lights for operation.</li> </ol>	<p>Navigation lights do not operate.</p> <p>Dive lights do not operate.</p>
72	During	Boat Bilge	Visually inspect bilge area for excess water, fuel, oil, or hull leaks.	Bilge area shows evidence of a Class I oil or fuel leak, has excess water or hull is leaking.
73	During	Boat Bilge Pump	<ol style="list-style-type: none"> <li>1. Listen for occasional cycling of bilge pumps.</li> <li>2. Visually inspect bow bilge water discharge port (Figure 66, Item 1) for any obstructions. Remove obstructions.</li> </ol>	Excess water is present in bilge and pumps are not cycling.



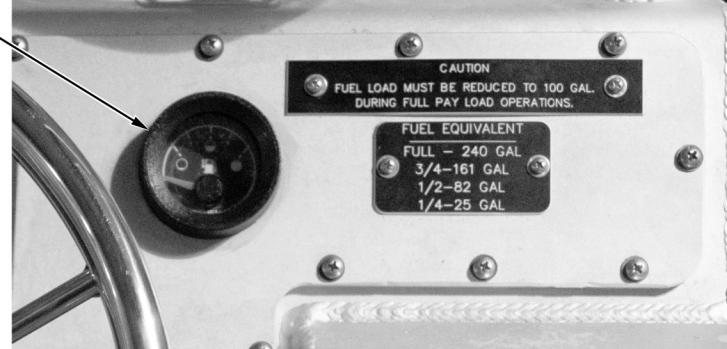
I00003-f64

Figure 65. Trailer V-Bunk.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			 I00003-f18	
			<p>3. Visually inspect stern bilge water discharge port (Figure 67, Item 1) for obstructions and proper drainage. Remove any obstructions.</p>	Bilge water is not draining from stern discharge port or port is obstructed.
74	During	Engine Water Pump Indicator	 I00003-f19	There is unsteady stream of water or no stream at all.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
				I00003-f59
			Figure 68. Engine Water Pump Indicator.	
75	During	Boat Steering	Monitor steering for unusual conditions or response.	Steering is non-responsive or restricted.
76	During	Boat Fuel Level	Monitor fuel gauge (Figure 69, Item 1) level for adequate supply to complete mission.	Fuel level is low.
				I00003-f60
			Figure 69. Fuel Gauge.	
77	During	Boat Engine Monitor	Observe engine monitor (Figure 70, Item 1) for excessive water temperature, low oil, or fault codes (WP 0021).	Fault code(s) are present.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

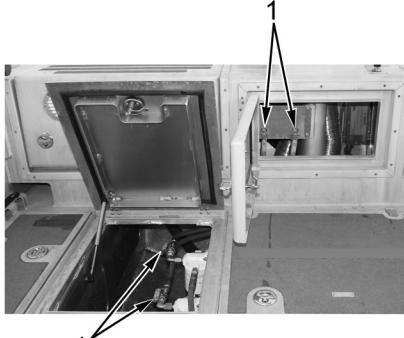
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			 1	I00003-f62
78	During	Boat Transducer	Inspect transducer seal (Figure 71, Item 1) for leaks.	Transducer seal shows evidence of a Class I leak.
			 1	I00003-f63

Figure 70. Engine Monitor.

***Table 1. Operator Preventive Maintenance Checks and Services - Continued.***

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
79	During	Boat Fuel Valves and Hoses	<p style="text-align: center;"><b>WARNING</b></p> <ul style="list-style-type: none"> <li>• Fuel is flammable and harmful to health. Keep fuel away from heat or ignition sources. DO NOT smoke within 50 feet (15 m) of a fuel source. Do not work on fuel system when engine is hot. Shut down engine before refueling. Ensure fuel nozzle is grounded to filler neck. Do not overfill fuel tank. Keep fire extinguisher nearby. Wear gloves and eye protection and ensure adequate ventilation during refueling.</li> <li>• Refer to local procedures and plans for preventing and responding to fuel spills or leaks. Use a drain pan or suitable container to capture any draining, leaking or spilled fuel. Immediately clean up spilled fuel. Keep cloths / rags away from open flame and / or ignition sources. Comply with local procedures and environmental regulations when disposing of unused fuel, soiled/ cleanup materials (such as filters and rags), and drained, leaked or spilled fuel.</li> <li>• Failure to comply may result in injury to personnel and/or damage to the environment.</li> </ul> <p>1. Inspect four fuel valves (Figure 72, Item 1) for leaks.</p>	Fuel valves show evidence of a Class I leak.

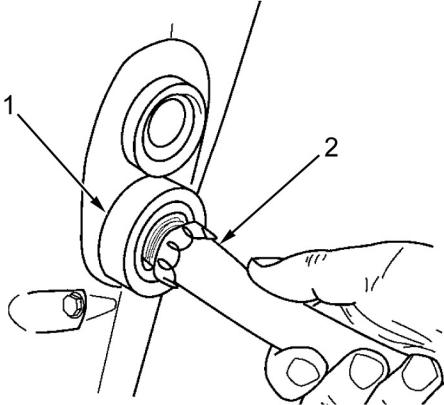
**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
				I00003-f12
			<p>2. Inspect fuel hoses for leaks.</p> <p>3. Inspect fuel fittings for leaks.</p>	<p>Fuel hoses show evidence of a Class I leak.</p> <p>Fuel fittings show evidence of a Class I leak.</p>
80	During	Engine	<p><b>WARNING</b></p> <p>Ensure all personnel in the vicinity and operating the outboard engine wear hearing protection when engine is being operated above 3400 rpm at 85 dB to prevent against potential noise hazards. Failure to comply with this warning may cause damage or loss of hearing.</p> <p>Monitor operation of engine throughout mission, noting any change in response, noise, and performance.</p>	Engine is less responsive, producing excessive noise, or performance is limited.
81	After	Boat and Trailer Wash Down	<p><b>CAUTION</b></p> <p>Do not directly spray the electronic equipment on the console. Failure to comply may result in damage to equipment.</p> <p>1. Using hose and spray nozzle. Spray entire boat and trailer with a fine mist.</p> <p>2. Once the boat and trailer are wet, start from the top down and conduct a final rinse.</p>	

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

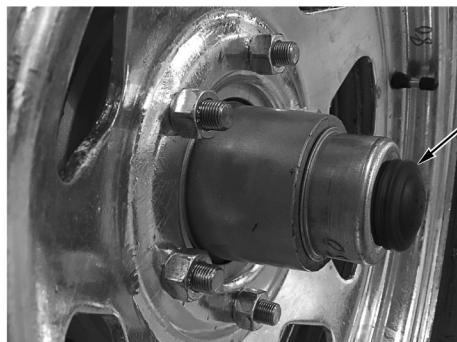
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
82	After	Engine Flushing	<p style="text-align: center;"><b>WARNING</b></p> <ul style="list-style-type: none"> <li>• Do not service any part of the propeller while the outboard engine is running. Always shift the outboard engine to NEUTRAL position, turn the key switch OFF.</li> <li>• Ensure the outboard engine and prop area are clear of people and objects before starting or operating outboard engine. Blades can be sharp and the propeller can continue to turn even after outboard engine is OFF.</li> <li>• Failure to follow these warnings may result in injury or death to personnel</li> </ul> <p style="text-align: center;"><b>WARNING</b></p> <p>When trimming engine up or down, keep all body parts clear of contact points between engine and boat. Failure to comply may result in injury or death to personnel.</p> <p style="text-align: center;"><b>CAUTION</b></p> <p>Engines must be trimmed to the vertical (down) position to flush engine. Make sure the cooling system is drained completely before tilting engine out of the vertical (down) position. Failure to comply may result in damage to equipment.</p> <ol style="list-style-type: none"> <li>1. Turn port and starboard battery switches to ON position (WP 0004).</li> <li>2. Turn ignition key to ON position (WP 0004).</li> <li>3. Using master trim switch tilt engines to vertical (down) position on level ground (WP 0004).</li> </ol> <p style="text-align: center;"><b>NOTE</b></p> <p>Allow engines to flush for at least 10 minutes.</p> <ol style="list-style-type: none"> <li>4. Using garden hose, thread hose (Figure 73, Item 2) into flushing port (Figure 73, Item 1) and turn on water.</li> </ol>	

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			 <p>100003-f73</p>	
			<p>5. After flushing, turn off water and remove hose.</p> <p>6. Leave engines in vertical position and allow water to drain completely.</p> <p>7. Power OFF port battery switch, starboard battery switch, and ignition key (WP 0004).</p>	
83	After	Trailer	Visually inspect trailer for damage.	Trailer is damaged or cannot be repaired.
84	After	Trailer Tire and Wheel Assemblies	<p><b>WARNING</b></p> <p>Operating trailer with under-inflated or defective tire may lead to tire failure and loss of traction or control. Failure to comply may cause injury to personnel.</p> <p>1. Visually inspect each tire and wheel for:</p> <ul style="list-style-type: none"> <li>a. Uneven wear</li> <li>b. Dry rot; check for long cracks between tread. Check for cracks on sidewall.</li> <li>c. Cuts or bulges in tread or sidewall area. Look for foreign material embedded in tread or sidewall area. DO NOT remove stones or other foreign material embedded in sidewall.</li> <li>d. Damaged, loose, or missing lug nuts.</li> <li>e. Valve stem for damage or cracks and presence of cap.</li> </ul>	<p>Tire has uneven wear.</p> <p>Tire is dry rotted.</p> <p>Tire has cuts or bulges in tread or sidewall.</p> <p>Lug nut is missing or loose.</p> <p>Valve stem is damaged.</p>

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			<p>f. Severe corrosion, damage, dents in wheel or foreign objects lodged between wheel and tire.</p> <p>2. Using pressure gauge, inspect each tire pressure is at 80 psi (551 kPa).</p>	<p>Wheel is damaged, dented or severely corroded.</p> <p>Tire is under or overinflated.</p>
85	After	Trailer Hub and Bearing Assemblies	<p><b>CAUTION</b></p> <p>Deflated diaphragm can allow water intrusion into hub assembly. Ensure diaphragm is fully inflated prior to operation, failure to comply may result in damage to equipment.</p> <p>Visually inspect hub assemblies for deflated diaphragm (Figure 74, Item 1) or grease leaking. Diaphragm should be extended approximately <math>\frac{3}{4}</math> in. from hub.</p>	Diaphragm is deflated or grease is leaking.



I00003-f27

Figure 74. Hub Assembly Diaphragm.

86	After	Boat	Visually inspect boat for damage.	Boat is damaged or cannot be repaired.
87	After	Boat Collar	Inspect boat collar for cuts, tears, or deterioration.	Boat collar has signs of damage or foam is exposed.
88	After	Boat Bilge	Visually inspect bilge area for oil, fuel, or excess water.	Bilge area shows evidence of a Class I oil or fuel leak or excess water.
89	After	Boat Bilge Pumps	<p>1. Turn bilge pumps to manual position and inspect for operation (WP 0004). Listen for audible noise coming from forward and aft bilge pumps.</p> <p>2. Visually inspect aft bilge pump for deterioration, damage and loose, missing, or damaged hardware.</p>	<p>Bilge pump does not operate or no audible noise is heard.</p> <p>Bilge pump is damaged or missing components.</p>

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

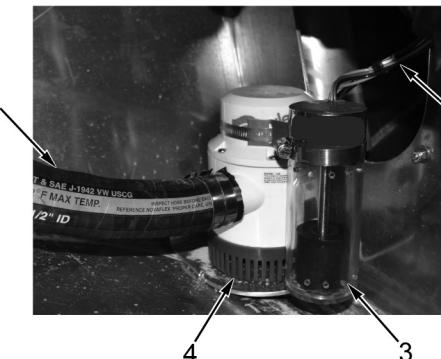
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			<p>3. Visually inspect aft bilge pump strainer (Figure 75, Item 4) for debris. Remove any restrictions.</p> <p>4. Visually inspect aft bilge pump discharge hose (Figure 75, Item 1) for wear, damage, deterioration or kinks.</p> <p>5. Visually inspect aft bilge pump float switch (Figure 75, Item 3) for deterioration, damage, loose, missing, or damaged hardware. Float switch should be free of restrictions.</p> <p>6. Visually inspect aft float switch wiring (Figure 75, Item 2) for wear, damage, or corrosion.</p>	<p>Discharge hose is damaged or flow is restricted.</p> <p>Float switch is damaged, missing components or restricted.</p> <p>Float switch wiring is damaged, chaffed, or corroded.</p>
				I00003-f45

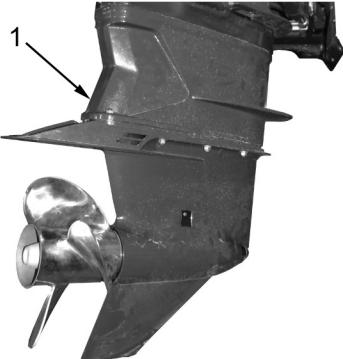
Figure 75. Bilge Pump.

7. Ensure bilge pump switches are in "AUTO" position (WP 0004).

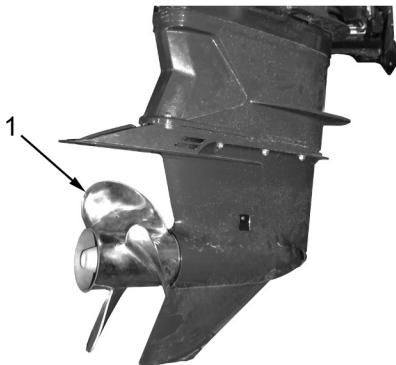
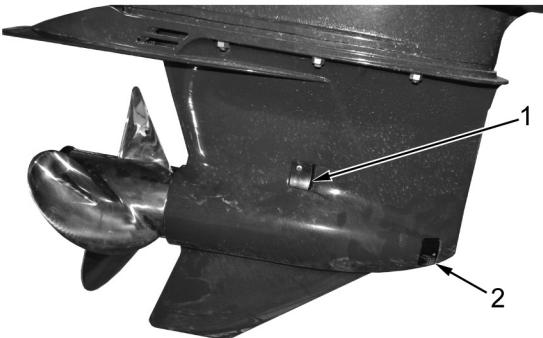
**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
90	After	Boat Oil and Sender Assembly	<p style="text-align: center;"><b>WARNING</b></p> <ul style="list-style-type: none"> <li>• Lubricating oil may be flammable. Keep away from heat, open flame and/or other ignition sources. Prolonged contact with lubricating oil may cause a skin rash. Wear protective eyewear, gloves and clothing. Remove saturated clothing immediately and thoroughly wash skin that comes in contact with lubricating oil. If exposed, flush skin and/or eyes with water and seek medical attention.</li> <li>• Use a drain pan or suitable container to capture any draining, leaking or spilled fluid. Refer to local procedures and plans for preventing and responding to fluid spills or leaks. Immediately clean up spilled oil. Keep cloths / rags away from open flame and / or ignition sources. Comply with local procedures and environmental regulations when disposing of lubricating oil, soiled/cleanup materials (such as filters and rags), and drained, leaked or spilled fluids.</li> <li>• Failure to comply may result in injury to personnel and/or damage to the environment.</li> </ul> <p>Inspect oil level in tanks is not below 1/2 full. Fill as necessary (WP 0057).</p>	Oil level in tank is below 1/2 full.
91	After	Engine	<ol style="list-style-type: none"> <li>1. Visually inspect for cracks, dents, leaks, and corrosion.</li> <li>2. Visually inspect for loose, bent, broken or missing hardware.</li> </ol>	<p>Significant damage or shows evidence of a Class II leak.</p> <p>Hardware is loose or damaged.</p>
92	After	Engine Gearcase Assembly	Visually inspect gearcase assembly (Figure 76, Item 1) for wear, damage or leaks.	Gearcase assembly is worn, damaged, or shows evidence of a Class I leak.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
93	After	Engine Propeller	<p style="text-align: center;"><b>WARNING</b></p> <ul style="list-style-type: none"> <li>• Do not service any part of the propeller while the outboard engine is running. Always shift the outboard engine to NEUTRAL position, turn the key switch OFF.</li> <li>• Ensure the outboard engine and prop area are clear of people and objects before starting or operating outboard engine. Blades can be sharp and the propeller can continue to turn even after outboard engine is OFF.</li> <li>• Failure to follow these warnings may result in injury or death to personnel</li> </ul> <p>1. Visually inspect propeller (Figure 77, Item 1) for wear or damage.</p> <p>2. Ensure propeller turns freely.</p>  <p>I00003-f40</p>	<p>Propeller blades are bent or damaged.</p> <p>Propeller does not turn freely.</p>

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			 <span style="float: right;">I00003-f41</span>	
94	After	Engine Water Screens	Visually inspect upper screen (Figure 78, Item 1) and lower screen (Figure 78, Item 2) for damage or debris.	Screens are clogged or damaged.
			 <span style="float: right;">I00003-f42</span>	
95	After	Engine Mounting Hardware	<p><b>NOTE</b></p> <p>Orientation of engine mounting bolts may be reversed.</p> <p>Visually inspect engine mounting hardware (Figure 79, Item 1) for loose or missing components.</p>	Engine mounting hardware is missing or loose.

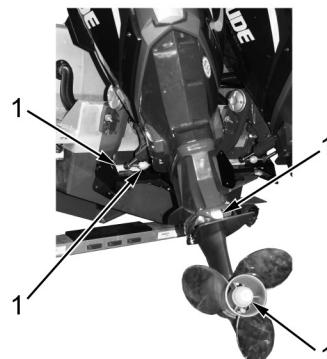
**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
				I00003-f49

Figure 79. Engine Mounting Hardware.

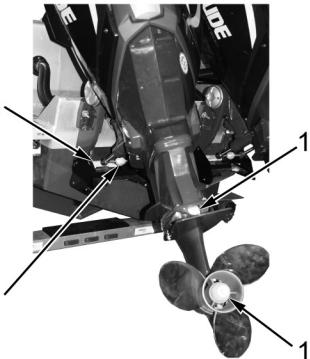
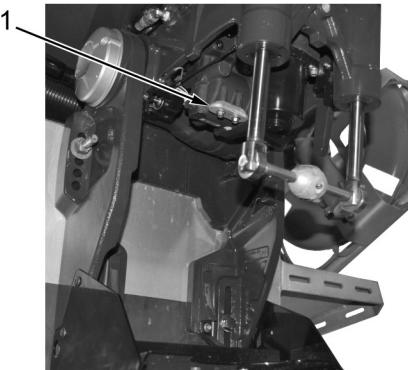
96	Monthly	Port Engine Anodes	<p><b>NOTE</b></p> <p>Anodes that are not eroding may not be properly grounded.</p> <p>1. Visually inspect four port engine anodes (Figure 80, Item 1) for damage or severe corrosion.</p>	Anodes show signs of significant erosion.
97	Monthly	Starboard Engine Anodes	<p><b>NOTE</b></p> <p>Anodes that are not eroding may not be properly grounded.</p> <p>1. Visually inspect four starboard engine anodes (Figure 81, Item 1) for damage or severe corrosion.</p>	Anodes show signs of significant erosion.

Figure 80. Port Engine Anodes.



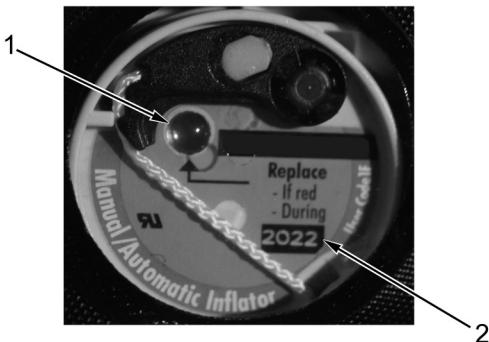
I00003-f16

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			 <p>I00003-f16</p> <p>Figure 81. Starboard Engine Anodes.</p> <p>2. Turn starboard battery switch to ON position (WP 0004).      3. Turn ignition key to ON position (WP 0004).</p> <p><b>WARNING</b>      When trimming engines keep all body parts clear of contact points between engine and boat. Failure to comply may result in injury to personnel.</p> <p>4. Using starboard trim switch, tilt starboard engine fully up (WP 0004).      5. Visually inspect anode (Figure 82, Item 1) for damage or corrosion.</p>	Anode shows signs of significant erosion.
			 <p>I00003-f91</p> <p>Figure 82. Anode.</p>	

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			6. Turn starboard battery switch and ignition key to OFF position (WP 0004).	
98	Quarterly	PFD	<p>1. Ensure status indicator (Figure 83, Item 1) is green.</p> <p>2. Ensure replacement year (Figure 83, Item 2) on PFD is not current year or past.</p>	Status indicator is red. Year displayed is replacement year or past years.



I00003-f20

Figure 83. PFD indicator.

99	Annual	Tow Strap and Shackle	<p>1. Using nippers remove cotter pin (Figure 84, Item 3) from shackle bolt (Figure 84, Item 1). Discard cotter pin.</p> <p>2. Remove nut (Figure 84, Item 2) from shackle bolt (Figure 84, Item 1).</p> <p>3. Remove shackle bolt (Figure 84, Item 1) and shackle (Figure 84, Item 5) from boat.</p> <p>4. Inspect nut (Figure 84, Item 2), shackle (Figure 84, Item 5), and shackle bolt (Figure 84, Item 1) for corrosion or damage. Replace as necessary.</p>	
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**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

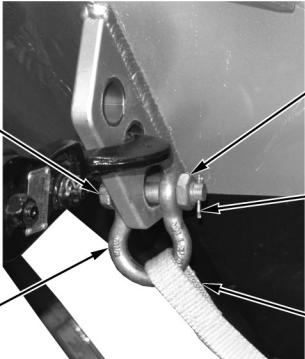
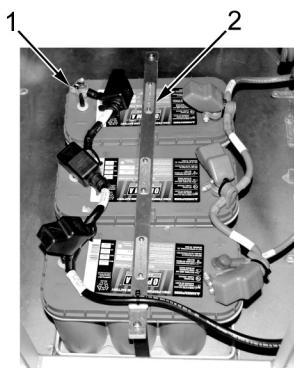
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			 <p>1 2 3 4 5</p> <p>I00003-f90</p>	
			<p>5. Feed shackle (Figure 84, Item 5) through tow strap (Figure 84, Item 4).</p> <p>6. Install shackle (Figure 84, Item 5) and shackle bolt (Figure 84, Item 2) on boat.</p> <p>7. Install nut (Figure 84, Item 2) on shackle bolt (Figure 84, Item 1) and hand tighten.</p> <p>8. Install new cotter pin (Figure 84, Item 3) on bolt (Figure 84, Item 1), secure using nippers.</p>	
100	Annually	Buoy Light	Replace four D cell batteries in buoy light (Figure 85, Item 1) and ensure buoy light operates.	Buoy light does not turn on.
			 <p>1</p> <p>I00003-f83</p>	

Figure 85. Buoy Light.

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
101	Annually	Boat Marine Battery	<p style="text-align: center;"><b>WARNING</b></p> <ul style="list-style-type: none"> <li>• Electrical shock can cause injury or death to personnel when working near, replacing, or servicing any electrical component.</li> <li>• Take great care when working around energized electrical equipment. Contact between unprotected body parts and electrical conductors can cause serious injury or death.</li> <li>• Keep all electrical connections clean, tight, and insulated to prevent shorting or arcing and causing an explosion.</li> <li>• Failure to comply may result in injury or death to personnel.</li> </ul> <p>1. Inspect console and transom batteries for damage or deterioration.</p> <p>2. Inspect console and transom battery retention bars (Figure 86, Item 2) for loose, missing, or damaged hardware.</p>	<p>Battery is damaged.</p> <p>Battery retention bar is loose, missing or damaged.</p>



I00003-f76

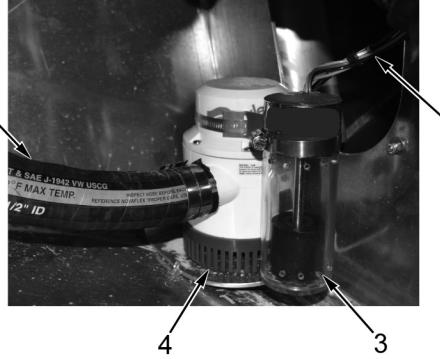
Figure 86. Boat Batteries.

- |   |   |
|---|---|
| <p>3. Inspect console and transom battery terminals (Figure 86, Item 1) are tight and free of corrosion.</p> <p>4. Ensure console and transom batteries maintain operating voltage of 12.6-13.2V (WP 0013).</p> | <p>Battery terminals are loose or corroded.</p> |
|   | <p>Battery does not maintain voltage.</p>       |

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
102	Annually	Boat and Trailer Wash-Down	<p><b>CAUTION</b></p> <p>Do not directly spray the electronic equipment on the console. Failure to comply may result in damage to equipment.</p> <p><b>NOTE</b></p> <p>Note position and orientation of floor panels prior to removal to aide in installation.</p> <ol style="list-style-type: none"> <li>1. Remove 12 floor panels from boat deck.</li> <li>2. Using hose and spray nozzle. Spray entire boat and trailer with a fine mist.</li> <li>3. Once the boat and trailer are wet, start from the top down and conduct a final rinse.</li> <li>4. Allow deck to fully dry and replace 12 floor panels.</li> </ol>	
103	Annually	Forward Bilge Pump	<ol style="list-style-type: none"> <li>1. Remove forward bilge pump cover (WP 0059).</li> <li>2. Visually inspect forward bilge pump for deterioration, damage and loose, missing, or damaged hardware.</li> <li>3. Visually inspect forward bilge pump strainer (Figure 87, Item 4) for debris. Screen should be free of any debris.</li> <li>4. Visually inspect forward bilge pump discharge hose (Figure 87, Item 1) for wear, damage, deterioration or kinks.</li> <li>5. Visually inspect forward bilge pump float switch (Figure 87, Item 3) for deterioration, damage, loose, missing, or damaged hardware. Float switch should be free of restrictions.</li> <li>6. Visually inspect float switch wiring (Figure 87, Item 2) for wear, damage, chaffing, or corrosion.</li> </ol>	<p>Bilge pump is damaged or missing components.</p> <p>Discharge hose is damaged or flow is restricted.</p> <p>Float switch is damaged, missing components, or restricted.</p> <p>Float switch wiring is damaged, chaffed, or corroded.</p>

**Table 1. Operator Preventive Maintenance Checks and Services - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			 <p>1 2 3 4</p> <p>I00003-f45</p>	<p>7. Install forward bilge pump cover (WP 0059).</p> <p>8. Ensure bilge pump switches are in "AUTO" position (WP 0004).</p>

**Table 2. Lubricants.**

COMPONENT	FLUID	APPROXIMATE CAPACITY	INTERVAL
ENGINE	LUBRICATING OIL, ENGINE	2.0 gal. (7.5L)	As required
BRAKE RESERVOIR	BRAKE FLUID, AUTOMOTIVE	1.0 qt.	As required

*Table 3. Replacement Parts.*

ITEM NO.	PART NUMBER/ (CAGEC)	NATIONAL STOCK NUMBER (NSN)	NOMENCLATURE	QTY
1	0100-397-071-10 (1EE70)		COVER,DISPLAY	1
2	0768400 (1UVT5)		COVER,DISPLAY	1
3	1019490 (75535)	4030-01-251-7677	SHACKLE	1
4	1250300 (344K9)	5342-01-322-4701	CAP,FILLER OPENING	1
5	3313004000 (D6046)	6230-12-312-4633	SEARCHLIGHT	1
6	COU200K-2516 (0VSH3)	2540-01-619-0120	COUPLER,DRAWBAR,BALL SOCKET	1
7	COU09557-95 (0VSH3)	2540-01-583-2840	COUPLER,DRAWBAR,RING	1
8	EE2-901 (0NM47)	3940-01-656-6524	SLING,EYE	1
9	HM-195B (62526)		MIC,COMMAND,REMOTE	1
10	T-5813 (55HC0)		HEADSET,WINDMUFF	1
11	T-5901-BLK (55HC0)		HEADSET	1
12	T-5905-17 (55HC0)		HEADSET,CORD	1
13	WS8M-STR-AFT- SPARE (0VSH3)		TIE DOWN,CARGO,VEHICLE	1
14	WS8M-STR-FWD- SPARE (0VSH3)		TIE DOWN,CARGO,VEHICLE	1
15	WSMIC321 (10402)		MICROPHONE,SIREN	1

END OF WORK PACKAGE

**CHAPTER 5**

**OPERATOR MAINTENANCE**

**FOR**

**RIGID INFLATABLE BOAT (RIB)**



---

## OPERATOR MAINTENANCE SERVICE FUELING

---

**INITIAL SETUP:****Personnel Required**

Diver 12D  
Assistant

**Equipment Condition**

24 hour and house breaker tripped, port engine battery switch and ignition key powered ON (WP 0004)

**References**

WP 0004

---

### **WARNING**

- Do not exceed 82 gal. (310.4 L) of fuel in boat fuel tank when trailering with Light Medium Tactical Vehicle (LMTV) as maximum tow capacity is 12,000 lbs (5443.1 kg).
- Do not trailer boat with personnel or equipment on boat.
- Fuel is flammable and harmful to health. Keep fuel away from heat or ignition sources. DO NOT smoke within 50 feet (15 m) of a fuel source. Do not work on fuel system when engine is hot. Shut down engine before refueling. Ensure fuel nozzle is grounded to filler neck. Do not overfill fuel tank. Keep fire extinguisher nearby. Wear personal protective equipment such as gloves and eye protection and ensure adequate ventilation during refueling.
- Refer to local procedures and plans for preventing and responding to fuel spills or leaks. Use a drain pan or suitable container to capture any draining, leaking or spilled fuel. Immediately clean up spilled fuel. Keep cloths / rags away from open flame and / or ignition sources. Comply with local procedures and environmental regulations when disposing of unused fuel, soiled/cleanup materials (such as filters and rags), and drained, leaked or spilled fuel.
- Failure to comply may result in injury to personnel and/or damage to the environment.

### **WARNING**

- Vapor from spilled fuel is heavier than air and will flow to the lowest part of the boat. Ventilate bilges before starting engine.
- Ensure house breaker, 24 hour power breaker, and all electrical devices are OFF except port engine battery.
- If fueling boat from dock, ensure boat is tied off and secured prior to fueling.
- Failure to comply may result in injury or death to personnel.

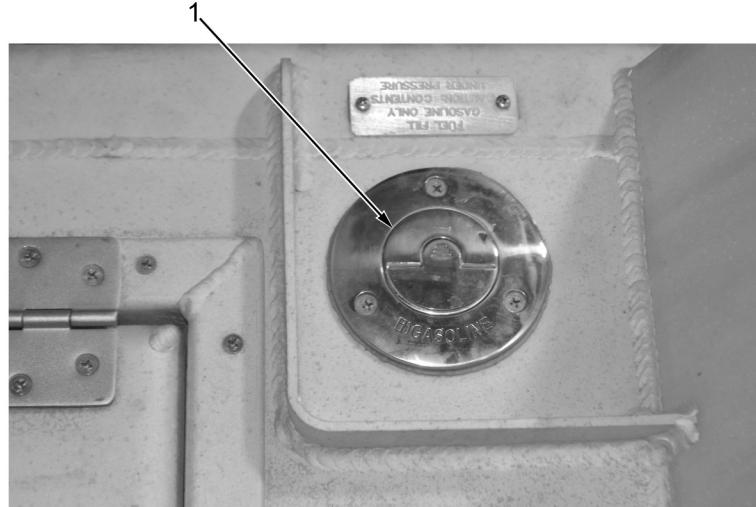
### **CAUTION**

Use only unleaded gasoline. Failure to comply may result in damage to equipment.

**NOTE**

Maximum fuel capacity is 240 gal. (908L).

1. Turn fuel tank cap counterclockwise and remove (Figure 1, Item 1).



M00002-f01

Figure 1. Boat Fuel Cap.

**WARNING**

Maintain nozzle contact with fuel fill plate while fueling to guard against static discharge.  
Failure to comply may result in injury or death to personnel.

2. Insert fuel nozzle and slowly fuel boat.
3. Have assistant monitor fuel gage on console until fuel level reaches desired level (WP 0004).
4. Install fuel tank cap (Figure 1, Item 1) and turn clockwise to tighten.

**END OF WORK PACKAGE**

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**OPERATOR MAINTENANCE  
SERVICE BRAKE RESERVOIR**

---

**INITIAL SETUP:**

<b>Materials/Parts</b>	<b>Personnel Required</b>
Brake Fluid, Automotive (WP 0063, Table 1, Item 3)	Diver 12D
Glove, Patient Examining (WP 0063, Table 1, Item 7)	

---

**Filling Brake Fluid**

**WARNING**

Brake Fluid may be flammable. Keep away from heat, open flame and/or other ignition sources. Prolonged contact with brake fluid may cause a skin rash. Wear personal protective equipment such as eyewear, gloves and clothing. Remove saturated clothing immediately and thoroughly wash skin that comes in contact with brake fluid. If exposed, flush skin and/or eyes with water and seek medical attention.

Use a drain pan or suitable container to capture any draining, leaking or spilled fluid. Refer to local procedures and plans for preventing and responding to fluid spills or leaks. Immediately clean up spilled oil. Keep cloths / rags away from open flame and / or ignition sources. Comply with local procedures and environmental regulations when disposing of brake fluid, soiled/cleanup materials (such as filters and rags), and drained, leaked or spilled fluids.

Failure to comply may result in injury to personnel and/or damage to the environment.

**WARNING**

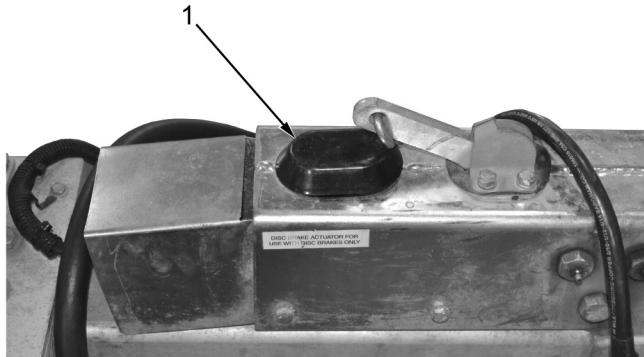
Ensure trailer is properly chocked or attached to a prime mover. Failure to comply may result in damage to equipment and injury or death to personnel.

**NOTE**

Ensure trailer is level prior to adding brake fluid.

**Filling Brake Fluid - Continued**

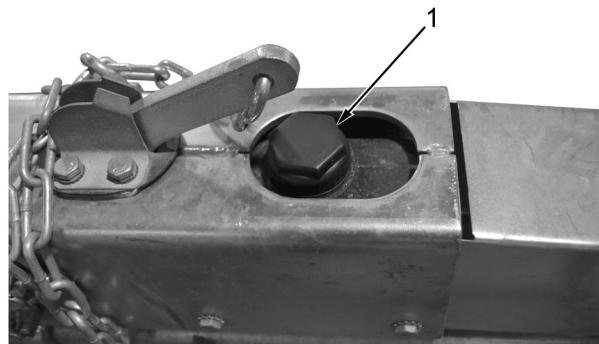
1. Remove brake fluid reservoir access cap (Figure 1, Item 1).



M00003-f01

Figure 1. Brake Reservoir Access Cap.

2. Remove brake fluid reservoir cap (Figure 2, Item 1).



M00003-f02

Figure 2. Brake Fluid Reservoir Cap.

3. Fill reservoir to three-quarters full with brake fluid.
4. Install brake fluid reservoir cap and hand tighten (Figure 2, Item 1).
5. Install brake fluid reservoir access cap (Figure 1, Item 1).

**END OF WORK PACKAGE**

## OPERATOR MAINTENANCE SERVICE OIL RESERVOIRS

---

### **INITIAL SETUP:**

**Materials/Parts**

Lubricating Oil, Engine (WP 0063, Table 1, Item 5)

Glove, Patient Examining (WP 0063, Table 1, Item 7)

**Personnel Required**

Diver 12D

**References**

WP 0002

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### **Filling Oil Reservoirs**

#### **WARNING**

- Lubricating oil may be flammable. Keep away from heat, open flame and/or other ignition sources. Prolonged contact with lubricating oil may cause a skin rash. Wear protective eyewear, gloves and clothing. Remove saturated clothing immediately and thoroughly wash skin that comes in contact with lubricating oil. If exposed, flush skin and/or eyes with water and seek medical attention.
- Use a drain pan or suitable container to capture any draining, leaking or spilled fluid. Refer to local procedures and plans for preventing and responding to fluid spills or leaks. Immediately clean up spilled oil. Keep cloths / rags away from open flame and / or ignition sources. Comply with local procedures and environmental regulations when disposing of lubricating oil, soiled/cleanup materials (such as filters and rags), and drained, leaked or spilled fluids.
- Failure to comply may result in injury to personnel and/or damage to the environment.

**Filling Oil Reservoirs - Continued**

There are two, 3 gal. (11.4 L) oil reservoirs on the boat (WP 0002).

1. Remove oil cap (Figure 1, Item 1).



M00004-f01

Figure 1. Oil Cap.

2. Fill oil reservoir three-quarters full with outboard oil.
3. Install oil cap (Figure 1, Item 1) and hand tighten.

**END OF WORK PACKAGE**

**OPERATOR MAINTENANCE  
FUEL WATER SEPARATOR SERVICE**

---

**INITIAL SETUP:**

**Tools and Special Tools**  
Suitable Drain Pan

**Personnel Required**  
Diver 12D

**Materials/Parts**

Glove, Patient Examining (WP 0063, Table 1,  
Item 3)  
Rag, Wiping (WP 0063, Table 1, Item 7)

---

**WARNING**

- Fuel is flammable and harmful to health. Keep fuel away from heat or ignition sources. DO NOT smoke within 50 feet (15 m) of a fuel source. Do not work on fuel system when engine is hot. Shut down engine before refueling. Ensure fuel nozzle is grounded to filler neck. Do not overfill fuel tank. Keep fire extinguisher nearby. Wear personal protective equipment such as gloves and eye protection and ensure adequate ventilation during refueling.
- Refer to local procedures and plans for preventing and responding to fuel spills or leaks. Use a drain pan or suitable container to capture any draining, leaking or spilled fuel. Immediately clean up spilled fuel. Keep cloths / rags away from open flame and / or ignition sources. Comply with local procedures and environmental regulations when disposing of unused fuel, soiled/cleanup materials (such as filters and rags), and drained, leaked or spilled fuel.
- Failure to comply may result in injury to personnel and/or damage to the environment.

1. Place suitable drain pan below fuel water separator.
2. Turn drain valve (Figure 1, Item 1) counter clockwise to open.



M00005-f01

Figure 1. Drain Valve.

3. Drain until only fuel is seen draining.
4. Turn drain valve (Figure 1, Item 1) clockwise to close.
5. Remove suitable drain pan.

**END OF WORK PACKAGE**

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**OPERATOR MAINTENANCE  
FORWARD BILGE PUMP COVER REMOVAL**

---

**INITIAL SETUP:****Tools and Special Tools**

5/32 T-Handle Wrench (WP 0062, Table 2, Item 18)

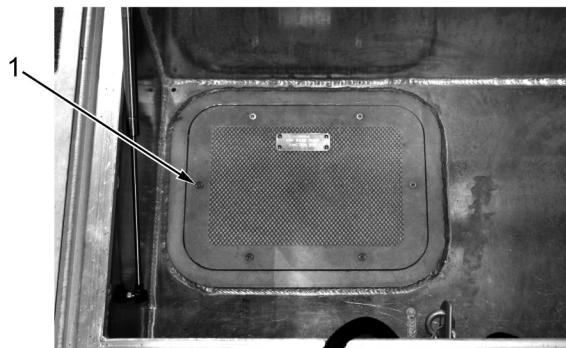
**Personnel Required**

Diver 12D

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**Removal**

Using T-handle wrench, remove six screws (Figure 1, Item 1) and forward bilge pump cover from boat.



M00006-f01

Figure 1. Bilge Pump Cover.

**END OF TASK****Installation**

1. Install forward bilge pump cover on boat.
2. Using T-handle wrench, install six screws (Figure 1, Item 1) on cover.

**END OF TASK****END OF WORK PACKAGE**



**OPERATOR MAINTENANCE  
TRAILER WHEEL ASSEMBLY REMOVAL**

---

**INITIAL SETUP:**

<b>Materials/Parts</b>	<b>Personnel Required</b>
Chock, Wheel -Track (WP 0062, Table 2, Item 28)	Diver 12D
Wrench, Socket (WP 0062, Table 2, Item 31)	Assistant
Jack, Dolly Type, Mechanical (WP 0062, Table 2, Item 14)	
Tire, Wheel, Assembly (WP 0062, Table 2, Item 13)	<b>References</b> WP 0026

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**WARNING**

- Ensure bottle jack is placed on even and level surface.
- Use only radial tires on trailer.
- Failure to comply may result in injury or death to personnel.

**WARNING**

To avoid personal injury, get assistance when lifting components that weigh more than 40 lbs. One assistant is required for items up to 75 lbs, two assistants for items up to 100 lbs, and three assistants for items up to 130 lbs. Ensure lifting is done with the knees and not lower back. Incorrect heavy lifting could result in lower back injury or crushed extremities. Failure to comply may result in injury to personnel.

**CAUTION**

Avoid towing trailer with a flat wheel assembly for long distances. Failure to comply may result in damage to equipment.

**Removal**

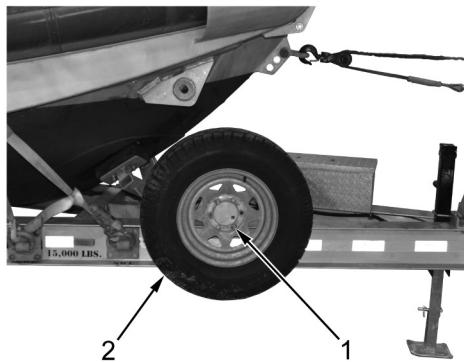
1. Tow trailer to safe, level location.
2. Place wheel chocks (Figure 1, Item 1) around wheel assembly on opposite side of the trailer.



M00007-f01

Figure 1. Wheel Chocks.

3. Remove trailer from prime mover (WP 0026).
4. Using lug wrench, remove two lug nuts (Figure 2, Item 1) from spare wheel assembly (Figure 2, Item 2).
5. Remove spare wheel assembly from trailer.



M00007-f02

Figure 2. Spare Wheel Assembly.

**Removal - Continued****CAUTION**

Turning lug wrench in clockwise direction can damage lug nuts, wheel studs, or wheel assembly. Failure to comply may result in damage to equipment.

6. Using lug wrench, loosen, but do not remove six lug nuts (Figure 3, Item 1) on wheel assembly (Figure 3, Item 2).

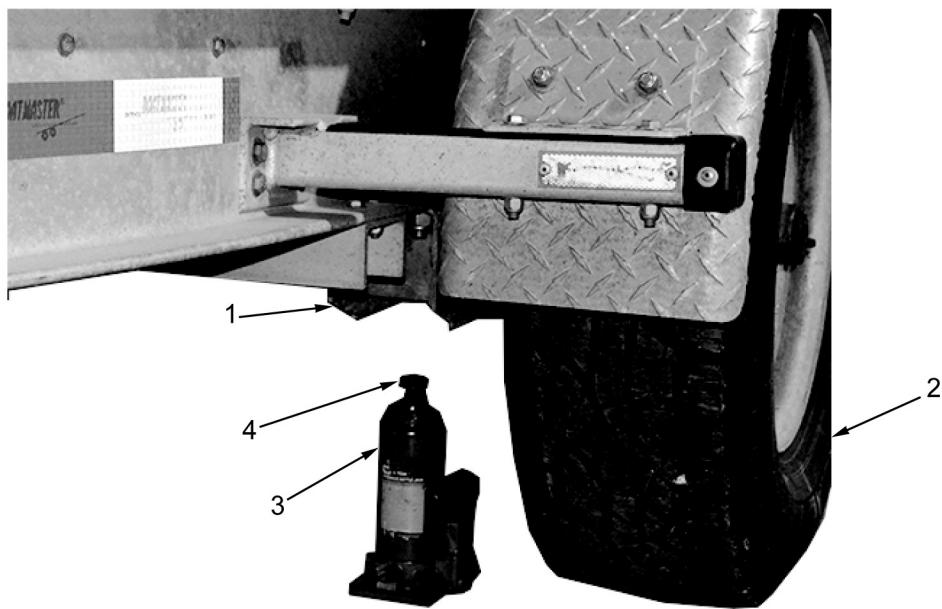


M00007-f07

Figure 3. Wheel Assembly.

**Removal - Continued**

7. Place bottle jack (Figure 4, Item 3) under axle (Figure 4, Item 1) near wheel assembly being removed (Figure 4, Item 2).
8. Unscrew jack screw until jack head (Figure 4, Item 4) is near axle.



M00007-f04

Figure 4. Jack Placement.

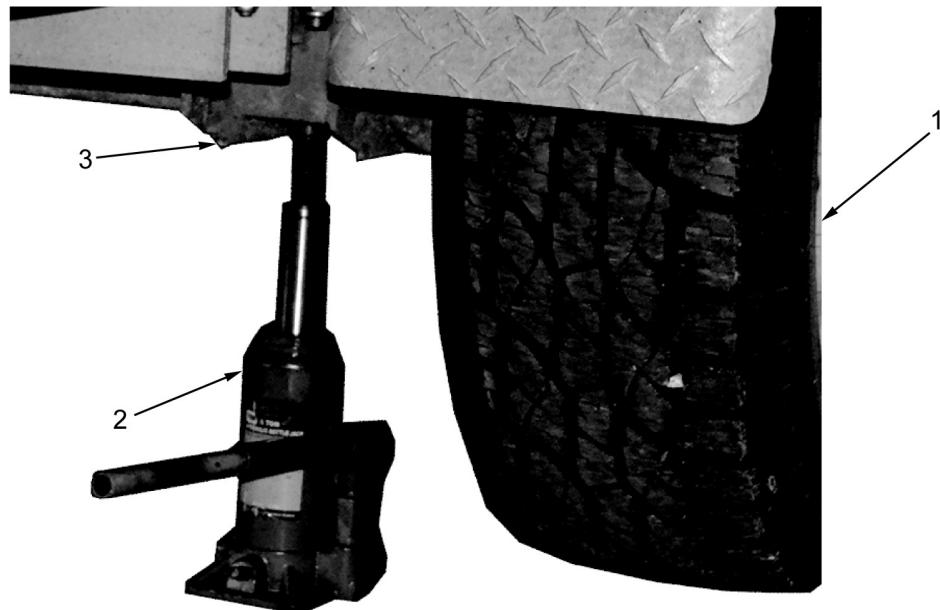
**Removal - Continued****WARNING**

Improper placement or operation of the jack can cause trailer to slip off jack. DO NOT place any body parts between tire and ground when trailer is raised. Failure to comply may result in injury and or death to personnel.

**NOTE**

Leveling support jack may need to be adjusted to maintain contact with the ground after the trailer is raised by the jack.

9. Using bottle jack (Figure 5, Item 2), raise axle (Figure 5, Item 3) until wheel assembly (Figure 5, Item 1) is off the ground.



M00007-f05

Figure 5. Axle and Jack.

**Removal - Continued****NOTE**

Note direction of lug nuts prior to removal to aide in installation.

10. Remove six lug nuts (Figure 6, Item 1) from wheel assembly (Figure 6, Item 2).



M00007-f07

Figure 6. Lug Nut.

11. With aid of assistant, remove wheel assembly (Figure 7, Item 1) from trailer.



M00007-f16

Figure 7. Wheel Assembly.

**END OF TASK**

**Installation**

1. With aid of assistant, install spare wheel assembly (Figure 8, Item 1) on trailer.



M00007-f16

Figure 8. Spare Wheel Assembly.

**Installation - Continued****CAUTION**

Lug nuts must be installed in the same direction as noted during removal. Failure to comply may result in damage to equipment.

2. Install six lug nuts (Figure 9, Item 1) on wheel assembly (Figure 9, Item 2).

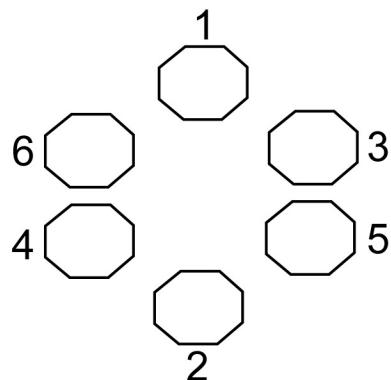


M00007-f10

Figure 9. Lug Nuts.

**Installation - Continued**

3. Tighten six lug nuts with wrench until snug using star torque pattern (Figure 10).



STAR TORQUE PATTERN

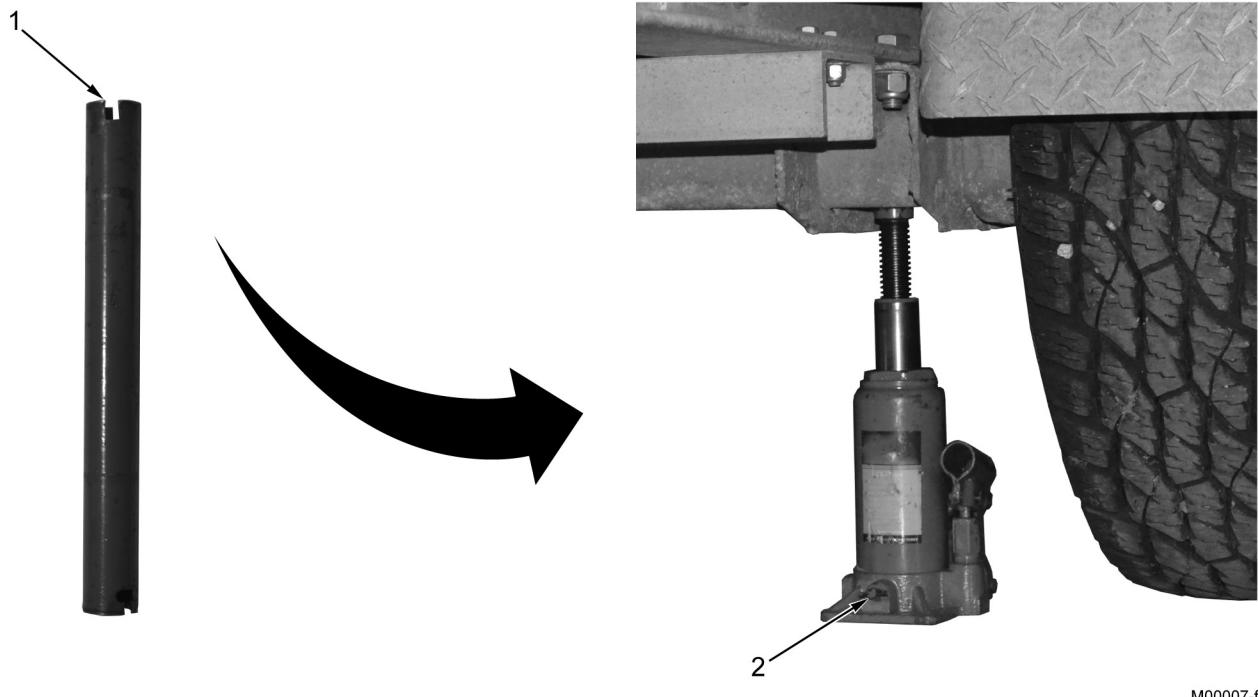
M00007-f12

Figure 10. Star Torque Pattern.

**Installation - Continued****WARNING**

DO NOT place any body parts between tire and ground when lowering the trailer. Failure to comply may result in injury and or death to personnel.

4. Place notched end (Figure 11, Item 1) of jack handle on bottle jack release valve (Figure 11, Item 2).
5. Slowly turn release valve counter clockwise to lower axle and remove bottle jack.



M00007-f11

Figure 11. Bottle Jack.

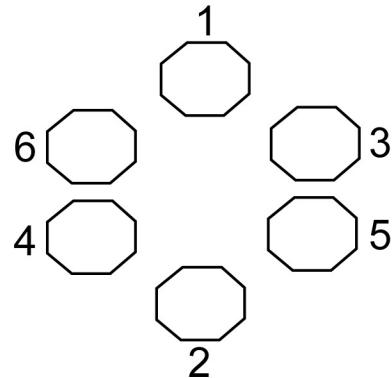
**Installation - Continued****CAUTION**

- Lug nuts on replaced wheel assembly should be checked for tightness after 25 mi. (40 km) and again after 75 mi. (120 km).
- Notify maintenance supervisor that lug nuts on replaced wheel assembly need to be torqued.
- Ensure beveled end of lug nut is centered on stud hole of wheel assembly before fully tightening lug nuts.
- Failure to comply can result in damage to trailer.

**NOTE**

Upon reaching destination notify maintenance supervisor that lug nuts on replaced wheel assembly need to be torqued.

6. With lug wrench, tighten six lug nuts using star torque pattern (Figure 12).



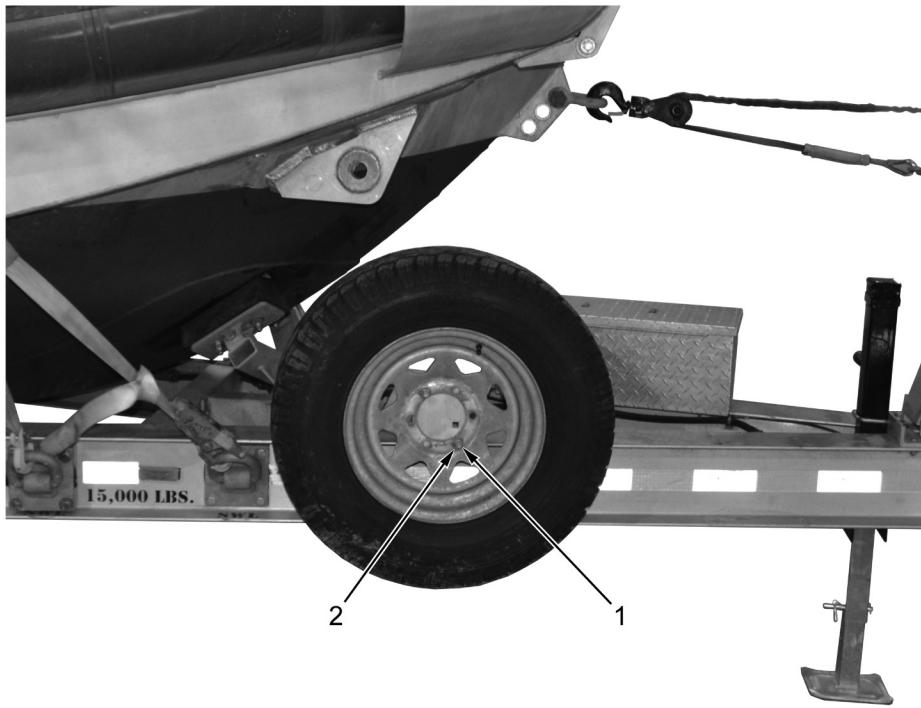
STAR TORQUE PATTERN

M00007-f12

Figure 12. Star Torque Pattern.

**Installation - Continued**

7. With assistant, place flat wheel assembly on trailer spare wheel assembly mount retaining bolts (Figure 13, Item 2).
8. Using lug wrench install two lug nuts (Figure 13, Item 1) on retaining bolts (Figure 13, Item 2).



M00007-f02

Figure 13. Spare Wheel Assembly.

9. Remove wheel chocks from wheel assembly.

**END OF TASK****END OF WORK PACKAGE**

**CHAPTER 6**

**SUPPORTING INFORMATION**

**FOR**

**RIGID INFLATABLE BOAT (RIB)**



## OPERATOR REFERENCES

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### REFERENCES

This work package lists all Field manuals, forms, Technical Manuals (TM), supply catalogs, and miscellaneous publications referenced in this manual.

### NOTE

(Applications for copies of ASTM documents should be addressed to the American Society for Testing Material, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, (online: [www.astm.org](http://www.astm.org)) or copies of these documents are available online at <https://assist.daps.dla.mil/quicksearch/> or <https://www.dodssp.daps.mil/> or from the Document Automation and Production Service, Building 4/D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

### FORMS

DA Form 2028	Recommended Changes to Publications and Blank Forms
DA Form 2404	Equipment Inspection and Maintenance Worksheet
DA Form 2408-9	Equipment Control Record
DA PAM 738-751	Functional Users Manual for The Army Maintenance Management System — Aviation
DA PAM 750-8	The Army Maintenance Management System (TAMMS) User's Manual
SF-368	Product Quality Deficiency Report

### TRAINING CIRCULAR

TC 4-02.1	First Aid
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### MISCELLANEOUS PUBLICATIONS

AR 700-138	Army Logistics Readiness and Sustainability
CTA 8-100	Army Medical Department Expendable/Durable Items
CTA 50-909	Field and Garrison Furnishings and Equipment
CTA 50-970	Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items)
TB MED 507	Heat Stress Control and Heat Causality Management
TM 38-250	Preparing Hazardous Materials For Military Air Shipment

**MISCELLANEOUS PUBLICATIONS - Continued**

TM 750-244-3

Procedures For Destruction Of Equipment To Prevent  
Enemy Use (Mobility Equipment Command)

**END OF WORK PACKAGE**

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**OPERATOR  
COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS**

---

## INTRODUCTION

### Scope

This work package lists COEI and BII for the RIB to help you inventory items for safe and efficient operation of the equipment.

### General

The COEI and BII information is divided into the following lists:

- Components of End Item (COEI). This list is for information purposes only and is not authority to requisition replacements. These items are part of the RIB. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Items of COEI are removed and separately packaged for transportation or shipment only when necessary. Illustrations are furnished to help you find and identify the items.
- Basic Issue Items (BII). These essential items are required to place the RIB in operation, operate it, and to do emergency repairs. Although shipped separately packaged, BII must be with the RIB 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 Table of Organization and Equipment/Modified Table of Organization and Equipment (TOE/MTOE). Illustrations are furnished to help you find and identify the items.

### Explanation of Columns in the COEI List and BII Lists

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, Part Number/Commercial and Government Entity Code (CAGEC). Identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The stowage location of COEI and BII is also included in this column. The last line below the description is the CAGEC (in parentheses) and the part number.

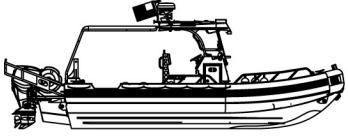
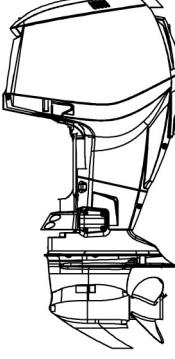
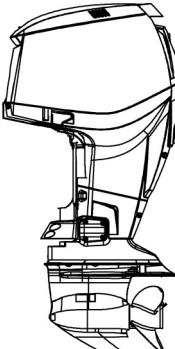
Column (4) Usable On Code. When applicable, gives you a code if the item you need is not the same for different models of equipment. These codes are identified below:

Code	Used on
RIB	8 Meter Army Rigid Inflatable Boat

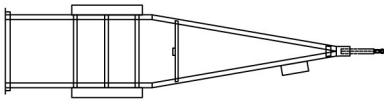
Column (5) U/I. Unit of Issue (U/I) indicates the physical measurement or count of the item as issued per the National Stock Number shown in column (2).

Column (6) Qty Rqr. Indicates the quantity required.

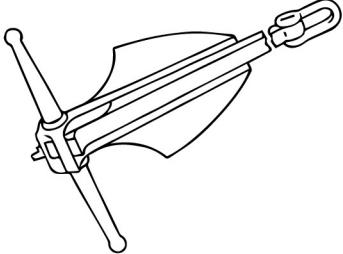
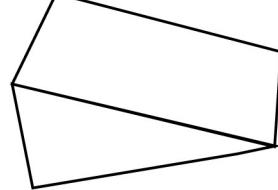
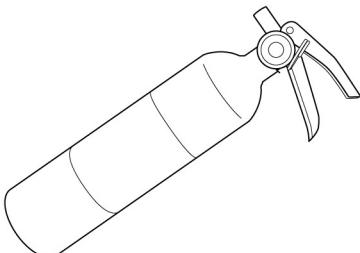
***Table 1. COMPONENTS OF END ITEM LIST.***

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
1	 S00003-f32	BOAT, RIGID INFLATABLE 1102610F-OC-A (0ZFD4)	RIB	EA	1
2	2805-01-666-7770  S00003-f34	OUTBOARD MOTOR, GASOLINE E250Z (1UVT5)	RIB	EA	1
3	2805-01-666-7748  S00003-f35	OUTBOARD MOTOR, GASOLINE E250ZC (1UVT5)	RIB	EA	1

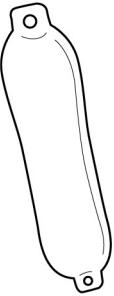
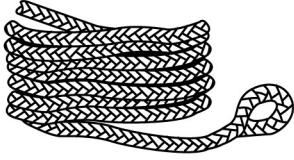
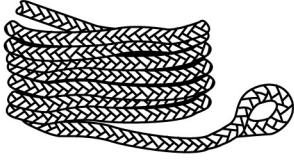
*Table 1. COMPONENTS OF END ITEM LIST - Continued.*

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
4	2330-01-666-7839    S00003-f33	TRAILER, BOAT MOVING WS8M-180 (0VSH3)	RIB	EA	1

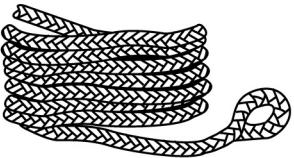
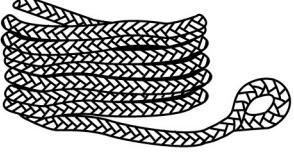
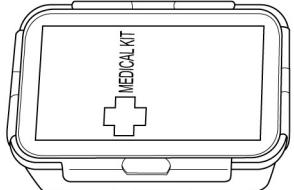
**Table 2. BASIC ISSUE ITEMS (BII) LIST.**

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
1	2040-01-406-6850   S00003-f25	ANCHOR, MARINE, FLUKED FX16 (0JU33)	RIB	EA	1
2	2540-01-494-0078   S00003-f23	CHOCK, WHEEL-TRACK RC815 (032T9)	RIB	EA	2
3	4210-01-586-7150   S00003-f01	EXTINGUISHER, FIRE 25614 (57658)	RIB	EA	3

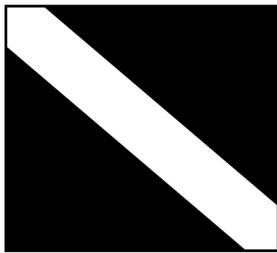
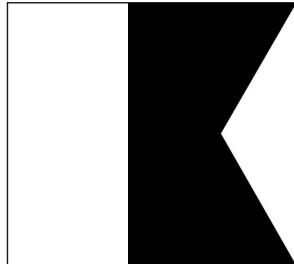
*Table 2. BASIC ISSUE ITEMS (BII) LIST - Continued.*

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
4	2040-01-677-6609   S00003-f30	FENDER, MARINE 22-830-435 (0B530)	RIB	EA	2
5	4020-01-678-4202   S00003-f24	FIBER ROPE ASSEMBLY, SINGLE LEG (Anchor Line) ALB121C1 (0S4H4)	RIB	EA	1
6	4020-01-678-4468   S00003-f31	FIBER ROPE ASSEMBLY, SINGLE LEG (Fender Whip) 302110006BK-1 (41830)	RIB	EA	2

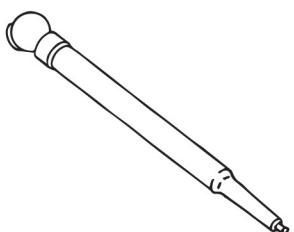
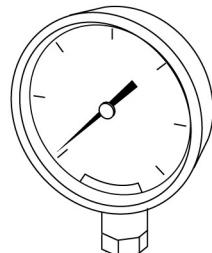
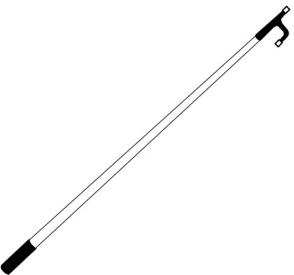
**Table 2. BASIC ISSUE ITEMS (BII) LIST - Continued.**

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
7	4020-01-647-7113    S00003-f04	FIBER ROPE ASSEMBLY, SINGLE LEG (Mooring Line) 302116050BK-1 (41830)	RIB	AY	4
8	4020-01-678-6007    S00003-f05	FIBER ROPE ASSEMBLY, SINGLE LEG (Tow Line) WS8M402097 (0ZFD4)	RIB	EA	1
9	6545-00-922-1200    S00003-f20	FIRST AID KIT, UTILITY 6545-00-922-1200 (89875)	RIB	KT	1

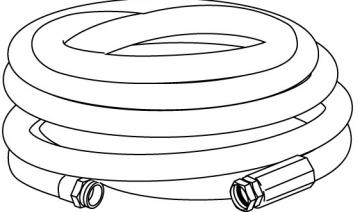
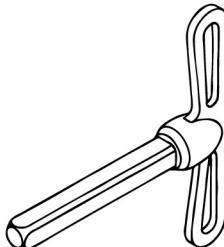
*Table 2. BASIC ISSUE ITEMS (BII) LIST - Continued.*

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
10	4220-00-153-7279   S00003-f08	FLAG, DIVERS 9209 (25609)	RIB	EA	1
11	8345-00-130-2892   S00003-f06	FLAG, NATIONAL 5-1-17 (22571)	RIB	EA	1
12	8345-00-935-0445   S00003-f07	FLAG, SIGNAL 8345-00-935-0445 (83421)	RIB	EA	1

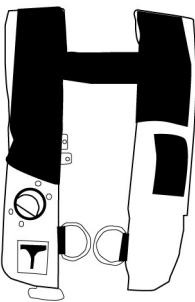
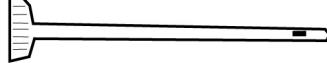
**Table 2. BASIC ISSUE ITEMS (BII) LIST - Continued.**

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
13	4910-01-121-9847    S00003-f29	GAGE, TIRE PRESSURE, SELF-CONTAINED 1314BK (61125)	RIB	EA	1
14	6685-01-657-2940    S00003-f17	GAGE, PRESSURE, DIAL INDICATING BC-PGAUGE (1CAY9)	RIB	EA	1
15	2040-01-579-7489    S00003-f14	HOOK, BOAT 55170 (62840)	RIB	EA	1

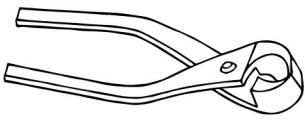
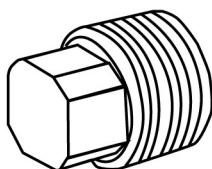
*Table 2. BASIC ISSUE ITEMS (BII) LIST - Continued.*

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
16	4720-01-447-8759   S00003-f11	HOSE, NONMETALLIC (Garden Hose) 829501-1001 (58358)	RIB	LG	1
17	4910-01-548-6073   S00003-f15	JACK, DOLLY TYPE, MECHANICAL (Trailer Jack) HZDJACBTL06TON (0VSH3)	RIB	EA	1
18	5120-01-460-3223   S00003-f19	KEY, SOCKET HEAD SCREW (T-Wrench 5/32) 13109 (31734)	RIB	EA	1

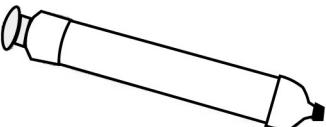
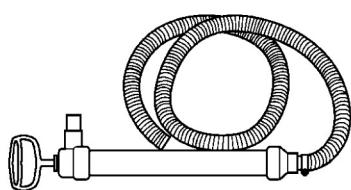
**Table 2. BASIC ISSUE ITEMS (BII) LIST - Continued.**

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
19	4220-01-654-3706  	LIFE PRESERVER, VEST MD3183 (1CJ91)	RIB	EA	6
20	6230-01-677-5342   S00003-f03	LIGHT, MARKER, DISTRESS (Buoy Light) 1820 (7T351)	RIB	EA	1
21	7810-01-678-4236   S00003-f27	NEEDLE, INFLATION 31010 (3FJT7)	RIB	PG	1

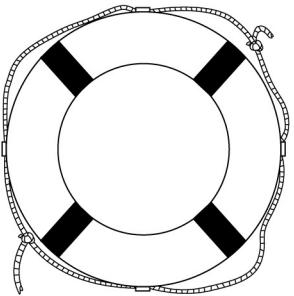
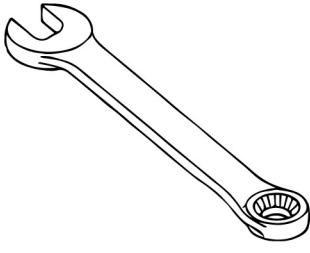
*Table 2. BASIC ISSUE ITEMS (BII) LIST - Continued.*

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
22	5110-01-576-3400    S00003-f22	NIPPERS, END CUTTING 350860 (1UVT5)	RIB	EA	1
23	4730-01-261-5065    S00003-f12	NOZZLE, GARDEN HOSE 7239T11 (39428)	RIB	EA	1
24	4730-01-596-4760    S00003-f18	PLUG, PIPE (Transom Plug) 4452K124 (OKVE6)	RIB	EA	1

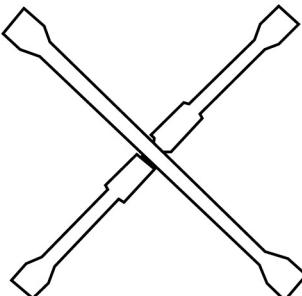
**Table 2. BASIC ISSUE ITEMS (BII) LIST - Continued.**

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
25	4320-01-678-5474    S00003-f10	PUMP, INFLATING, MANUAL (Collar Pump) WS8MKPUMP (0ZFD4)	RIB	EA	1
26	4320-01-677-8594    S00003-f26	PUMP, INFLATING, MANUAL (Hub Hand Pump) 1005 (3FJT7)	RIB	EA	1
27	4320-01-678-0372    S00003-f09	PUMP, RECIPROCATING (Bilge Pump) 915F (0PVF8)	RIB	EA	1

*Table 2. BASIC ISSUE ITEMS (BII) LIST - Continued.*

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
28	4220-01-613-2657   S00003-f02	RING BUOY, LIFESAVING G0-24 (7T351)	RIB	EA	1
29	2530-01-564-1677   S00003-f28	TIRE, WHEEL, ASSEMBLY TIAGT160245E-6GV (0VSH3)	RIB	EA	1
30	5120-01-349-1442   S00003-f21	WRENCH, BOX AND OPEN END, COMBINATION (Wrench 14mm) OEXM14B (55719)	RIB	EA	1

***Table 2. BASIC ISSUE ITEMS (BII) LIST - Continued.***

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
31	5120-01-678-2411    S00003-f16	WRENCH, SOCKET (Lug Wrench) 35633 (75204)	RIB	EA	1

**END OF WORK PACKAGE**

**OPERATOR  
EXPENDABLE AND DURABLE ITEMS LIST**

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## **INTRODUCTION**

### **Scope**

This work package lists expendable and durable items that you will need to operate and maintain the Rigid Inflatable Boat (RIB). 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), CTA 50-909, Field and Garrison Furnishings and Equipment or CTA 8-100, Army Medical Department Expendable/Durable Items.

### **Explanation of Columns in the Expendable/Durable Items List**

Column (1) Item No. This number is assigned to the entry in the list and is referenced in the narrative instructions to identify the item (e.g., Use brake fluid (WP 0018, item 5).

Column (2) Level. This column identifies the lowest level of maintenance that requires the listed item (C = Crew, F = Maintainer).

Column (3) National Stock Number (NSN). This is the NSN assigned to the item which you can use to requisition the item.

Column (4) Item Name, Description, Part Number/(CAGEC). This column provides the other information you need to identify the item. The last line below the description is the part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

Column (5) U/I. Unit of Issue (U/I) code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

*Table 1. Expendable and Durable Items List.*

(1) ITEM NO.	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, PART NUMBER/ (CAGEC)	(5) U/I
1	C	6135 -00-835-7210	BATTERY,NONRECHARGEABLE (D-Cell) 13A (80204)	PG
2	C	9150-01-052-6762	BRAKE FLUID,AUTOMOTIVE (Dot-3) FC9313 (63477)	QT
3	C	6515-01-535-6182	GLOVE,PATIENT EXAMINING PRO31762 (0PMN3)	PG
4	C	6850-01-633-0847	INHIBITOR,CORROSION,PETROLEUM FUEL 766210 (1UVT5)	CO
5	C	9150-01-581-2427	LUBRICATING OIL,ENGINE 0779711 (1UVT5)	GL
6	C	5315-01-518-7397	PIN,COTTER 98338A190 (39428)	EA
7	C	7920-00-205-1711	RAG,WIPING 1711 (1VQE1)	BE
8	C	5975-00-984-6582	STRAP,TIE DOWN,ELECTRICAL COMPONENTS MS3367-1-0 (0U583)	HD
9	C	8030-00-889-3535	TAPE,ANTISEIZING 11072502 (18876)	EA

END OF WORK PACKAGE

<b>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</b> For use of this form, see AR 25-30; the proponent agency is OAASA.		Use Part II (reverse for Repair Parts and Special Tool Lists (RPSTL)).	DATE Date form filled
<b>INSTRUCTIONS FOR SUBMITTING THE DA FORM 2028</b>			
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<p>To identify the proper proponent for any publication or form, visit the APD Web site (<a href="https://armypubs.army.mil">https://armypubs.army.mil</a>) to search for the publication or form by title.</p>			
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<b>PART I - ALL PUBLICATIONS (EXCEPT RPSTL) AND BLANK FORMS</b>			
PUBLICATION/FORM NUMBER, CHANGE NUMBER <i>(If applicable)</i> TM Number		PUBLICATION/ FORM DATE  Date of the TM	TITLE  Title of the TM
<p>For each comment, include as applicable: <i>Comment number, work package number or data module code, page number, paragraph number, figure number, table number, recommended change, and reason for change.</i></p>			
<p>0007-3: Figure 2, Item 9 should show a lock washer. Currently shows a flat washer.</p> <p>0018-2: Cleaning and inspection, Step 6, reference to governor support pin (14) is wrong reference. Reference should be changed to (12).</p>			
TYPED NAME, GRADE/RANK, POSITION TITLE, E-MAIL ADDRESS  Your Name		TELEPHONE NUMBER/DSN/EXTENSION  Your phone number	SIGNATURE

<b>TO:</b> (Forward to proponent of publication or form) (Include ZIP Code) US Army Tank-automotive and Armaments Command (TACOM) ATTN: AMSTA-LCL-IMP/TECH PUBS MS 727 6501 E. 11 Mile Road, Warren, MI 48397-5000	<b>FROM:</b> Activity and location) (Include ZIP Code) Your mailing address	<b>DATE:</b> Date form filled out
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**PART II - REPAIR PARTS AND SPECIAL TOOLS LISTS**

PUBLICATION/FORM NUMBER, CHANGE NUMBER <i>(If applicable)</i> TM number	PUBLICATION/ FORM DATE Date of the TM	TITLE Title of the TM
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For each comment, include as applicable: *Comment number, work package number or data module code, page number, column number, figure number, item number, reference number, national stock number, total number of major items, recommended change, and reason for change.*

**SAMPLE**

<b>PART III - REMARKS</b> (Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)		
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TYPED NAME, GRADE OR TITLE, AND E-MAIL ADDRESS  <b>Your name</b>	TELEPHONE NUMBER/DSN/ EXTENSION  Your phone number	SIGNATURE
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<b>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</b> For use of this form, see AR 25-30; the proponent agency is OAASA.		Use Part II (reverse for Repair Parts and Special Tool Lists (RPSTL)).	DATE
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PUBLICATION/FORM NUMBER, CHANGE NUMBER <i>(If applicable)</i> TM 5-1940-328-10		PUBLICATION/FORM DATE 01 JUNE 2019	TITLE OPERATOR MANUAL FOR RIGID INFLATABLE BOAT NSN 1940-01-646-7565 NSW8MTR-OPEN-001
<p>For each comment, include as applicable: <i>Comment number, work package number or data module code, page number, paragraph number, figure number, table number, recommended change, and reason for change.</i></p>			
TYPED NAME, GRADE/RANK, POSITION TITLE, E-MAIL ADDRESS		TELEPHONE NUMBER/DSN/EXTENSION	SIGNATURE

<b>TO:</b> (Forward to proponent of publication or form) (Include ZIP Code) US Army Tank-automotive and Armaments Command (TACOM) ATTN: AMSTA-LCL-IMP/TECH PUBS MS 727 6501 E. 11 Mile Road, Warren, MI 48397-5000	<b>FROM:</b> Activity and location) (Include ZIP Code)	<b>DATE:</b>
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**PART II - REPAIR PARTS AND SPECIAL TOOLS LISTS**

PUBLICATION/FORM NUMBER, CHANGE NUMBER <i>(If applicable)</i>	PUBLICATION/ FORM DATE	TITLE
TM 5-1940-328-10	01 JUNE 2019	OPERATOR MANUAL FOR RIGID INFLATABLE BOAT NSN 1940-01-646-7565 NSW8MTR-OPEN-001

For each comment, include as applicable: *Comment number, work package number or data module code, page number, column number, figure number, item number, reference number, national stock number, total number of major items, recommended change, and reason for change.*

**PART III - REMARKS** (*Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.*)

TYPED NAME, GRADE OR TITLE, AND E-MAIL ADDRESS	TELEPHONE NUMBER/DSN/ EXTENSION	SIGNATURE
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<b>TO:</b> (Forward to proponent of publication or form) (Include ZIP Code) US Army Tank-automotive and Armaments Command (TACOM) ATTN: AMSTA-LCL-IMP/TECH PUBS MS 727 6501 E. 11 Mile Road, Warren, MI 48397-5000 usarmy.detroit.tacom.mbx.ilsc-tech-pubs@mail.mil		<b>FROM:</b> (Activity and location) (Include ZIP Code)	
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PUBLICATION/FORM NUMBER, CHANGE NUMBER <i>(If applicable)</i> TM 5-1940-328-10		PUBLICATION/FORM DATE 01 JUNE 2019	TITLE OPERATOR MANUAL FOR RIGID INFLATABLE BOAT NSN 1940-01-646-7565 NSW8MTR-OPEN-001
<p>For each comment, include as applicable: <i>Comment number, work package number or data module code, page number, paragraph number, figure number, table number, recommended change, and reason for change.</i></p>			
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**PART II - REPAIR PARTS AND SPECIAL TOOLS LISTS**

PUBLICATION/FORM NUMBER, CHANGE NUMBER <i>(If applicable)</i>	PUBLICATION/ FORM DATE	TITLE
TM 5-1940-328-10	01 JUNE 2019	OPERATOR MANUAL FOR RIGID INFLATABLE BOAT NSN 1940-01-646-7565 NSW8MTR-OPEN-001

For each comment, include as applicable: *Comment number, work package number or data module code, page number, column number, figure number, item number, reference number, national stock number, total number of major items, recommended change, and reason for change.*

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**TM 5-1940-328-10**

**01 June 2019**

By Order of the Secretary of the Army:

**MARK A. MILLEY**  
*General, United States Army*  
*Chief of Staff*

Official:



**KATHLEEN S. MILLER**  
*Administrative Assistant to the  
Secretary of the Army*

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## Remote Control Fault Codes

Code	Remote Control Circuit/ Sensor	Single	Dual	Critical	Evinrude Digital Touch Screen Display	Audible Alarm	Indicator LED's	Fault Information/ Corrective Action
1	Port lever sensor 0 OVER range	X	X	X	Code 1 Lever sensor fault			Signal reading out of range. Throttle command allowed, but limited.
2	Port lever sensor 1 OVER range	X	X	X	Code 2 Lever sensor fault			Signal reading out of range. Throttle command allowed, but limited.
3	Port lever sensor mismatch	X	X	X	Code 3 Lever sensor fault	X		Port sensor 0 and sensor 1 readings do not match. Shift and throttle commands NOT available.
4	Port lever failure	X	X	X	Code 4 Lever sensor fault	X		Port sensor 0 and sensor 1 readings not consistent. Shift and throttle commands NOT available.
5	Starboard lever sensor 0 OVER range		X	X	Code 5 Lever sensor fault			Signal reading out of range. Throttle command allowed, but limited.
6	Starboard lever sensor 1 OVER range		X	X	Code 6 Lever sensor fault			Signal reading out of range. Throttle command allowed, but limited.
7	Starboard lever sensor mismatch		X	X	Code 7 Lever sensor fault	X		Starboard sensor 0 and sensor 1 readings do not match. Shift and throttle commands NOT available.
8	Starboard lever failure		X	X	Code 8 Lever sensor fault	X		Starboard sensor 0 and sensor 1 readings not consistent. Shift and throttle commands NOT available.
9	Pedal sensor 0 OVER range	X		X	Code 9 Pedal sensor fault			Signal reading out of range. Throttle command allowed, but limited.
10	Pedal sensor 1 OVER range	X		X	Code 10 Pedal sensor fault			Signal reading out of range. Throttle command allowed, but limited.
11	Pedal sensor mismatch	X		X	Code 11 Pedal sensor fault	X		Pedal sensor 0 and sensor 1 readings do not match. Shift and throttle commands NOT available.
12	Pedal sensor failure	X		X	Code 12 Pedal sensor fault	X		Pedal sensor 0 and sensor 1 readings not consistent. Shift and throttle commands NOT available.
13	Lever calibration error	X	X					Lever calibration not initialized or corrupted. Calibrate control lever(s).
14	Hardware code error	X	X					
15	Calibration signature error	X	X		Code 15 Lever Calibration Error			Calibration memory not initialized or corrupted. Calibrate control lever(s).
16	Part number not supported	X	X					
17	Throttle calibration error	X	X		Code 17 Throttle calibration fault		FNR indicators flash	Throttle calibration not initialized or corrupted. Turn key to OFF position, then to ON position to reset. Calibrate control lever(s).
18	FT CAN transceiver fault	X	X		Code 18 PRVT Network communications fault		FNR indicators flash	Check remote control network connections
19	EMM0 Private bus heart beat lost	X	X		Code 19 PRVT Network communications fault		FNR indicators flash	Check remote control network connections
20	EMM0 NMEA bus heart beat lost	X	X		Code 20 PBLC Network communications fault		FNR indicators flash	Check NMEA 2000 network connections
21	EMM0 communication lost	X	X	X	Code 21 Network communications fault	X		Shift and throttle commands NOT available. Check remote control and NMEA 2000 Network connections.
22	EMM1 Private bus heart beat lost		X		Code 22 PRVT Network communications fault		FNR indicators flash	Check remote control network connections. On new multi-engine installations, verify engine instances are set correctly.



## Remote Control Fault Codes

Code	Remote Control Circuit/ Sensor	Single	Dual	Critical	Evinrude Digital Touch Screen Display	Audible Alarm	Indicator LED's	Fault Information/ Corrective Action
23	EMM1 NMEA bus heart beat lost		X		Code 23 PBLC Network communications fault		FNR indicators flash	Check NMEA 2000 network connections. On new multi-engine installations, verify engine instances are set correctly.
24	EMM1 communication lost		X	X	Code 24 Network communications fault	X	FNR indicators flash	Shift and throttle commands NOT available. Check remote control and NMEA 2000 network connections. On new multi- engine installations, verify engine instances are set correctly.
25	EMM2 Private bus heart beat lost		X		Code 25 PRVT Network communications fault		FNR indicators flash	Check remote control network connections. On new multi-engine installations, verify engine instances are set correctly.
26	EMM2 NMEA bus heart beat lost		X		Code 26 PBLC Network communications fault		FNR indicators flash	Check NMEA 2000 network connections. On new multi-engine installations, verify engine instances are set correctly.
27	EMM2 communication lost		X	X	Code 27 Network communications fault	X	FNR indicators flash	Shift and throttle commands NOT available. Check remote control and NMEA 2000 Network connections. On new multi- engine installations, verify engine instances are set correctly.
28	EMM3 Private bus heart beat lost		X		Code 28 PRVT Network communications fault		FNR indicators flash	Check remote control network connections. On new multi-engine installations, verify engine instances are set correctly.
29	EMM3 NMEA bus heart beat lost		X		Code 29 PBLC Network communications fault		FNR indicators flash	Check NMEA 2000 network connections. On new multi-engine installations, verify engine instances are set correctly.
30	EMM3 communication lost		X	X	Code 30 Network communications fault	X	FNR indicators flash	Shift and throttle commands NOT available. Check remote control and NMEA 2000 network connections. On new multi- engine installations, verify engine instances are set correctly.
31	Main power disconnected	X	X		Code 31 Main Power Fault		FNR indicators flash	No voltage detected. Check fuse and power connections from remote control to battery.
32	Accessory power disconnected	X	X		Code 32 Accessory Power Fault		FNR indicators flash	Check fuse and power connections from remote control to battery.
33	Main ground disconnected	X	X		Code 33 Ground Fault		FNR indicators flash	Check fuse and power connections from remote control to battery.
34	Accessory ground disconnected	X	X		Code 34 Accessory Ground Fault		FNR indicators flash	Check ground (negative) connections from remote control to battery.
35	System configuration mismatch	X	X		Code 35 System config fault		FNR indicators flash	– The number of EMM instances detected does not match the current configuration. – OR – – There are two different EMMs configured with the same instance number. Use diagnostic software to correct system configuration.
36	Waiting for Neutral	X	X		Code 36 Waiting for Neutral			System has been powered ON with control lever(s) not in the NEUTRAL position. Move control lever(s) to NEUTRAL position.



## Outboard Fault Codes

Code	EMM Circuit/ Sensor	Internal Sensor	S.A.F.E	Shut Down	Evinrude Digital Touch Screen Display	SystemCheck Display	Time To Activate	Sensor: Circuit Voltage / Resistance (0) / Information
1-6	Excessive knock detected		X		Engine	Check Engine	Immediate	Code number indicates affected cylinder. 20 knock events in 100 combustion cycles with maximum correction applied. Make sure sensor is securely fastened to the cylinder head. Check timing adjustments. Test fuel and cooling systems. Check fuel quality.
7-8	Knock Sensor circuit OPEN – Port/ Starboard					Check Engine	5 seconds	Sensor output < 0.15 V and RPM > 3000. Check sensor connection.
15	ROM (EMM program)	X	X	X	Engine	Check Engine	15 seconds	ROM "CHECKSUM" failure. Engine shutdown if ESC checksum error. S.A.F.E. activated if ETC checksum error, engine RPM limited to 1000 RPM.
16	Crankshaft Position Sensor (CPS) Intermittent loss of SYNC				Engine		5 losses, RPM<2000 1 loss, RPM >2000	EMM counts losses of synchronization with crankshaft sensor. Check CPS mounting and resistance. Air gap range: 00.036 to 0.110 in. (1 to 2.8 mm), nominal 0.073 in. (1.85 mm). Resistance: 560 Ω ± 10% @ 77°F (25°C).
17	55 V circuit BELOW range	X	X		Engine	Check Engine	10 seconds	55 V alternator output < 45 V at 500 to 1000 RPM, or < 52 V above 1000 RPM. Engine limited to 1200 RPM. Perform stator/charging tests.
18	55 V circuit ABOVE range	X	X		Engine	Check Engine	1 minute	System Voltage > 57 V. Engine limited to 1200 RPM. Perform stator/charging tests. Check for loose connections in 55 V circuit. Check capacitor.
19	Start-in-gear					Check Engine		Attempted engine start while in gear. Engine will not start.
21	Winterization activated					All LEDs Flashing		Engine is speed limited, and stops after 360 oil pulses. Refer to Maintenance or Operator's Guide.
23	EMM Temperature sensor circuit fault	X					10 seconds	EMM Temperature < -67° F (-55° C), or > 311° F (155° C).
24	EMM Temperature BELOW range	X					10 seconds	EMM Temperature < -22° F (-30° C).
25	EMM Temperature ABOVE range	X	X		Temp	Water Temp/Hot	10 seconds	EMM Temperature > 176°F (80°C). Engine limited to 1200 RPM. See Code 29.
26	12 V circuit BELOW range	X			Battery	Check Engine	5 minutes	Battery voltage <12 V below 2000 RPM or < 12.5 V above 2000 RPM. Perform stator/charging tests.
27	12 V circuit ABOVE range				Battery	Check Engine	5 minutes	Battery voltage > 15.5 V. Check battery connections and wiring.
29	EMM Temperature OVER range	X		X	Temp	Water Temp/ Hot (Flashing)	5 seconds	EMM Temperature > 212° F (100° C). Engine SHUTDOWN. Will NOT restart until EMM temperature returns to normal operating range. Check outboard and EMM cooling systems.
31	Engine Temperature OVER range			X	Temp	Water Temp/ Hot (Flashing)	3 seconds	Engine Temperature > 239° F (115° C). Engine SHUTDOWN. Check cooling system. Check temperature sensor resistance—9000 to 11000 Ω @ 77°F (25°C).
33	Critical NO OIL detected	X		X	Oil	No Oil (Flashing)	5 hours	Outboard has run five hours with code 34, 36 or 117. Engine SHUTDOWN. Will restart and run for 1 minute intervals.
34	Crankcase oil pump circuit OPEN		X		Oil	No Oil	4 seconds	Engine limited to 1200 RPM. Perform oil pump electrical tests.
36	Cylinder oil pump circuit OPEN		X		Oil	No Oil	4 seconds	Engine limited to 1200 RPM. Perform oil pump electrical tests.
37	Water in fuel				Engine	Check Engine	10 seconds	Check fuel supply, 5 V circuit, and ground (NEG). Resistance between probes should be infinite (no continuity).
40	Engine Temperature ABOVE range (port cylinder head) – low speed		X		Temp	Water Temp/ Hot	3 seconds	Engine Temperature > 212° F (100° C) below 3500 RPM
41	Engine Temperature Sensor circuit fault (port cylinder head)				Temp	Check Engine	10 seconds	Engine Temperature < -13° F (-25° C), or > 329° F (165° C). Check 5 V circuit and ground (NEG), and sensor resistance—9000 to 11000 Ω @ 77°F (25°C).
42	Engine Temperature BELOW range (port cylinder head)				Temp		10 seconds	Engine Temperature < -4° F (-20° C). Check engine temperature and sensor resistance.
43	Engine Temperature ABOVE range (port cylinder head)				Temp	Water Temp/ Hot	3 seconds	Engine Temperature > 194° ±3°F (90° ±1.6°C) above 3500 RPM activates warning light and horn. Engine Temperature > 203° ±3°F (95° ±1.6°C) activates S.A.F.E., engine limited to 1200 RPM. Check cooling system.
44	Barometric Pressure (BP) Sensor circuit fault	X					10 seconds	Pressure < 3.8 in. Hg (13 kPa), or > 35.1 in. Hg (119.0 kPa). Make sure EMM BP sensor tube is NOT plugged. Check atmospheric condition for comparison. Clear code and retest.
45	Barometric Pressure (BP) Sensor BELOW range	X					10 seconds	Pressure < 20.7 in. Hg (70 kPa).
46	Barometric Pressure (BP) Sensor ABOVE range	X					10 seconds	Pressure > 31 in. Hg (105 kPa).



## Outboard Fault Codes

Code	EMM Circuit/ Sensor	Internal Sensor	S.A.F.E	Shut Down	Evinrude Digital Touch Screen Display	SystemCheck Display	Time To Activate	Sensor: Circuit Voltage / Resistance (0) / Information
47	Air Temperature (AT) circuit fault				Temp	Check Engine	10 seconds	Air temperature < -67° F (-55° C), or > 212° F (100° C). Check 5 V circuit and ground (NEG), and sensor resistance—9000 to 11000 Ω @ 77°F (25°C).
48	Air Temperature BELOW range				Temp		10 seconds	Air temperature below -22°F (-30°C)
49	Air Temperature ABOVE range				Temp		10 seconds	Air temperature above 158°F (70°C)
51-56	Fuel injector circuit OPEN				Engine	Check Engine	10 seconds	Last digit indicates affected cylinder. Check injector resistance—2 to 3 Ω @ 72°F (22°C). Perform fuel system electrical tests.
57	High RPM with low TPS setting	X		X	Engine	Check Engine (Flashing)	10 seconds	TPS < 5% and RPM > 3000. Engine SHUTDOWN. Will NOT restart until code has been cleared. The problem could be caused by uncontrolled fuel entering the engine. DO NOT attempt to start the outboard until the problem has been found and repaired.
58	Operating temperature not reached (port cylinder head)				Engine		10 minutes	Engine temperature < 104°F (40°C) with engine speed < 1000 RPM. Check thermostat and pressure relief valve.
59	Operating temperature not reached (starboard cylinder head)				Engine		10 minutes	Engine temperature < 104°F (40°C) with engine speed < 1000 RPM. Check thermostat and pressure relief valve.
67	Engine Temperature Sensor circuit fault (starboard cylinder head)				Temp	Check Engine	10 seconds	Engine Temperature < -13° F (-25° C), or > 329° F (165° C). Check 5 V circuit and ground (NEG), and sensor resistance—9000 to 11000 Ω @ 77°F (25°C).
68	Engine Temperature BELOW range (starboard cylinder head)				Temp		10 seconds	Engine Temperature < -4° F (-20° C). Check engine temperature and sensor resistance.
69	Engine Temperature ABOVE range (starboard cylinder head)				Temp	Water Temp/Hot	3 seconds	Engine Temperature > 194° ±3°F (90° ±1.6°C) above 3500 RPM activates warning light and horn. Engine Temperature > 203° ±3°F (95° ±1.6°C) activates S.A.F.E., engine limited to 1200 RPM. Check cooling system.
70	Engine Temperature ABOVE range (starboard cylinder head) – low speed		X		Temp	Water Temp/Hot	3 seconds	Engine Temperature > 212° F (100° C) below 3500 RPM
74	Water Pressure Sensor circuit fault detected						10 seconds	Sensor voltage < 0.15 V or > 4.85 V. EMM water pressure option enabled.
75	Water Pressure BELOW expected range						10 seconds	Sensor voltage < 0.4 V. EMM water pressure option enabled. Confirm engine water pressure. Check sensor circuit.
77	S.A.C. over-current fault	X					10 instances	SAC current > 2 amps and/or < 20 V. Check for shorted 55 V wiring (injector circuits). Check for pinched or chafed wiring.
78	Sensor supply voltage fault	X			Engine	Check Engine	10 seconds	Sensor voltage < 4.75 V. Check sensors and related wiring. Check for pinched or chafed wiring.
79	Starter relay circuit OPEN				Engine	Check Engine	10 seconds	Check starter relay circuit for continuity (key switch OFF) and for 12 V with key switch ON.
81-86	Ignition coil circuit OPEN				Engine	Check Engine	16 instances	Last digit indicates affected cylinder. EMM counts failed ignition events (crankshaft revolutions). Check ignition electrical circuit.
87	Exhaust Pressure circuit fault	X					10 seconds	< -85 in. water or > 85 in. water. Check for plugged or pinched hose or exhaust fitting.
88	Exhaust Pressure BELOW expected range	X					10 seconds	<-40 in. water
89	Exhaust Pressure ABOVE expected range	X					10 seconds	> 80 in. water
91	Fuel pump circuit OPEN				Engine	Check Engine	10 seconds	Check pump resistance: 2 to 3 Ω @ 77°F (25°C). Check connectors and wiring. Perform electrical circuit tests.
94	Fuel pump circuit SHORTED				Engine	Check Engine	2 seconds	Check pump resistance: 2 to 3 Ω @ 77°F (25°C). Check connectors and wiring. Perform electrical circuit tests.
101-106	Ignition coil circuit SHORTED				Engine	Check Engine	16 events (16 RPM)	Last digit indicates affected cylinder. EMM counts failed ignition events. Check wiring. Test with known good ignition coil.
112	Onboard oil level sensor BELOW expected range						8 seconds	Oil level sensor < 0.22 V.
113	Onboard oil level sensor ABOVE expected range						8 seconds	Oil level sensor > 4.75 V.
114	Loss of NMEA 2000 network communication					Check Engine	3 seconds	EMM detects no communication on the NMEA 2000 network. Check NMEA 2000 devices, buss cables, tees and backbone cable.
115	Loss of Remote Control network communication					Check Engine	3 seconds	EMM detects no communication on the Remote Control network. Check remote control connections, buss cables, hubs and backbone cable.



## Outboard Fault Codes

Code	EMM Circuit/ Sensor	Internal Sensor	S.A.F.E	Shut Down	Evinrude Digital Touch Screen Display	SystemCheck Display	Time To Activate	Sensor: Circuit Voltage / Resistance (0) / Information
117	Critical LOW OIL detected	X	X		Oil	No Oil	immediate	EMM counts 20,000 oil pump pulses after LOW OIL switch closes. Engine limited to 1200 RPM. Stop outboard and add oil to tank. Warning resets after three oil pump pulses.
132	Vapor separator upper level switch OPEN circuit		X		Engine	Check Engine	5 seconds	Switch voltage > 4.8 V. Check connectors and wiring. Perform electrical circuit tests.
133	Vapor separator lower level switch OPEN circuit		X		Engine	Check Engine	5 seconds	Switch voltage > 4.8 V. Check connectors and wiring. Perform electrical circuit tests.
134	Exhaust Temperature circuit OPEN fault				Engine	Check Engine	5 seconds	Exhaust temperature ≤ 60°F (20°C). Check connectors and wiring. Check sensor resistance. Perform electrical circuit tests.
136	Exhaust Temperature ABOVE limit		X		Engine	Temperature	1 second	If RPM < 1500, limit is 122°F (50 °C); if RPM < 2500, limit ranges from 122 to 149°F (50 to 65 °C); if RPM < 3750, limit ranges from 149 to 194°F (65 to 90 °C); if RPM > 3750, limit is 194°F (90 °C). Engine limited to 1000 RPM. Check cooling system.
137	Vapor separator low fuel level detected		X		Engine	Check Engine	5 seconds	Vapor separator lower level fuel switch closed. Engine limited to 1200 RPM. Check for fuel level or fuel system restriction.
140	Trim Position sensor output BELOW expected level						10 seconds	Trim sender voltage < 0.22 V. Check connectors and wiring. Perform electrical circuit tests.
141	Trim Position sensor output ABOVE expected level						10 seconds	Trim sender voltage > 4.75 V. Check connectors and wiring for short to ground
153	VRH reference fault	X			Engine	Check Engine	2 seconds	Internal 5 V analog reference is < 4.50 V, or > 5.50 V.
154	Trim UP relay OPEN circuit				Engine		5 seconds	Trim up relay voltage < 4.0 V. Check connectors and wiring. Perform electrical circuit tests.
155	Trim DOWN relay OPEN circuit				Engine		5 seconds	Trim down relay voltage < 4.0 V. Check connectors and wiring. Perform electrical circuit tests.
156	Private CAN error fault						5 seconds	The CANbus transceiver has detected a non-critical fault.
157	Fuel lift pump OPEN circuit				Engine	Check Engine	5 seconds	Fault is detected when key ON, engine OFF. Fuel lift pump voltage < 4.0 V. Check connectors and wiring. Perform electrical circuit tests.
158	Fuel lift pump SHORT circuit				Engine	Check Engine	5 seconds	Fuel lift pump current > 8 amps. Check wiring for shorts to ground.
159	Purge valve OPEN circuit					Check Engine	5 seconds	Fault is detected when output is off. Fuel vent solenoid voltage < 4.0 V. Check connectors and wiring. Perform electrical circuit tests.
160	Purge valve SHORT circuit					Check Engine	5 seconds	Fuel vent solenoid current > 8 amps. Check wiring for shorts to ground.
161	Fused B fault				Engine	Check Engine	5 seconds	Fused B+ voltage < 3.20 V. Check fuses and relays.
<b>Electronic Throttle Controller (ETC)</b>								
162	ETC Shut-down		X		Engine	Check Engine	< 1 second	Communication lost for > 250 ms. Engine limited to 1200 RPM. Use diagnostic software to check software program version and revision in EMM. Reload or replace with proper program. Check connectors and wiring. Perform electrical circuit tests.
163	ETC TPS A BELOW expected range						< 1 second	TPS A < 0.17 V. TPS A is either open or shorted to ground. Check connectors and wiring. Perform electrical circuit tests.
164	ETC TPS A ABOVE expected range						< 1 second	TPS A > 4.92 V. TPS A is shorted to +5 V, or reference ground is OPEN. Check connectors and wiring. Perform electrical circuit tests.
165	ETC TPS B BELOW expected range						< 1 second	TPS B < 0.07 V. TPS B is either open or shorted to ground. Check connectors and wiring. Perform electrical circuit tests.
166	ETC TPS B ABOVE expected range						< 1 second	TPS B > 4.82 V. TPS B is shorted to +5 V, or reference ground is OPEN. Check connectors and wiring. Perform electrical circuit tests.
167	ETC TPS signal OOC		X		Engine	Check Engine	< 1 second	TPS A and TPS B correlated voltage out of range. Engine limited to 1200 RPM. Check connectors and wiring. Perform electrical circuit tests.
168	ETC TPS idle window exceeded		X		Engine	Check Engine	< 1 second	Throttle at spring rest position, key ON, TPS A < 0.25 V or > 1.47 V. Or TPS B < 3.53 V or > 4.75. TPS is out of idle range. Engine limited to 1200 RPM. Check for foreign object in throttle body. Check throttle plate movement manually when key is in the OFF position. Check connectors and wiring. Perform electrical circuit tests.
172	ETC lever Position out of range		X		Engine	Check Engine	immediate	1000 < Lever Position < 65535. Lever position is in an invalid range. Engine limited to 1200 RPM. Check remote control for damaged components. Use diagnostic software to check for remote control fault codes.



## Outboard Fault Codes

Code	EMM Circuit/ Sensor	Internal Sensor	S.A.F.E	Shut Down	Evinrude Digital Touch Screen Display	SystemCheck Display	Time To Activate	Sensor: Circuit Voltage / Resistance (0) / Information
<b>Electronic Throttle Controller (ETC)</b>								
173	ETC motor OPEN circuit		X		Engine	Check Engine	< 1 second	Motor current not detected while attempting to move throttle plate. Motor circuit is OPEN. Engine limited to 1200 RPM. Check connectors and wiring. Perform electrical circuit tests.
174	ETC motor excessive current		X		Engine	Check Engine	< 1 second	Motor is drawing > 4.50 Amps when throttle plate position is not moving. Engine limited to 1200 RPM. Check for foreign object in throttle body. Check motor resistance: $xx \Omega \pm 10\% @ 77^\circ F (25^\circ C)$ . Check connectors and wiring. Perform electrical circuit tests.
175	ETC TPS stability performance		X		Engine	Check Engine	immediate	Faults 163 or 164 and 165 or 166. Both TPS A and TPS B are faulty. Engine limited to 1200 RPM. Check connectors and wiring. Perform electrical circuit tests.
179	ETC running error fault		X		Engine	Check Engine	< 1 second	Throttle plate cannot achieve commanded position. The actual throttle plate position out of limit. Engine limited to 1200 RPM. Check for foreign object in throttle body.
180	ETC running effort fault		X		Engine	Check Engine	< 1 second	The throttle plate requires too much effort to move. Engine limited to 1200 RPM. Check for foreign object in throttle body.
181	ETC drive status fault		X		Engine	Check Engine	immediate	Driver under voltage < 4.15 V, Driver over temperature > 175°C, or motor over current > 9 A. Engine limited to 1200 RPM. Low battery voltage or battery switch OFF with key switch ON. Check connectors and wiring for short circuit. Perform electrical circuit tests.
182	ETC system critical fault		X		Engine	Check Engine	≤ 4 seconds	Sensor reference voltage fluctuating but sensor fault NOT detected. Engine limited to 1200 RPM. Check for code 78 or code 153. Check connectors and wiring. Perform electrical circuit tests.
183	Controller level monitoring error		X		Engine	Check Engine	< 1 second	Safety message interval > 250 ms or co-processor disable key ON test failure. Safety messages not being received from co-processor or co-processor cannot disable driver. Engine limited to 1200 RPM. Use diagnostic software to check software program version and revision in EMM. Reload or replace with proper program. Check connectors and wiring. Perform electrical circuit tests.
191	ETC step response failure		X		Engine	Check Engine	immediate	Throttle position ≥ 10% during step closed or throttle position ≤ 80% during step open. Throttle plate not opening or closing enough. Engine limited to 1200 RPM. Check for foreign object in throttle body.
<b>Electronic Shift Controller (ESC)</b>								
195	ESC SPS BELOW expected range		X		Engine	Check Engine	< 1 second	Shift Position Sensor open or shorted to ground. SPS voltage < 0.25 V. Actuator will remain in current gear until shifting, then will only remain in neutral. Engine limited to 1200 RPM.
196	ESC SPS ABOVE expected range		X		Engine	Check Engine	< 1 second	Shift Position Sensor shorted to +5 V. SPS voltage > 4.75 V. Actuator will remain in current gear until shifting, then will only remain in neutral. Engine limited to 1200 RPM.
197	ESC NEUTRAL switch BELOW expected range		X		Engine	Check Engine	< 1 second	Neutral switch open or shorted to ground. Neutral switch voltage < 0.50 V. Actuator will remain in current gear until shifting, then will only remain in neutral. Engine limited to 1200 RPM.
198	ESC NEITRAL switch ABOVE expected range		X		Engine	Check Engine	< 1 second	Neutral switch shorted to +5 V. Neutral switch voltage > 4.50 V. Actuator will remain in current gear until shifting, then will only remain in neutral. Engine limited to 1200 RPM.
199	SHIFT calibration invalid			X	Engine	Check Engine	Immediate	The forward or reverse calibration exceeds the stored limits. Engine SHUTDOWN. Calibrate shift actuator.
200	ESC driver status flag			X	Engine	Check Engine	Immediate	Shift actuator over current detected, current > 50 Amps. Engine SHUTDOWN. Check connectors and wiring for short circuit. Perform electrical circuit tests.
201	ESC Position Sensors OOC			X	Engine	Check Engine	< 1 second	Shift Position Sensor does not correlate with neutral switch. Check connectors and wiring. Perform electrical circuit tests. Check gearcase for presence of water in shift actuator cavity or damage to the shift actuator.
203	ESC Motor OPEN circuit			X	Engine	Check Engine	< 1 second	Motor current not detected when attempting to move the shift actuator. Engine SHUTDOWN. Check motor resistance: $xx \Omega \pm 10\% @ 77^\circ F (25^\circ C)$ . Check connectors and wiring. Perform electrical circuit
204	ESC Cannot achieve desired gear		X	X	Engine	Check Engine	<2 seconds	A <sup>te</sup> c <sup>s</sup> t <sup>u</sup> s <sup>a</sup> tor cannot achieve commanded gear. Engine limited to 1200 RPM. Engine will SHUTDOWN if NEUTRAL cannot be achieved. Check gearcase for mechanical damage.



## Outboard Fault Codes

Code	EMM Circuit/ Sensor	Internal Sensor	S.A.F.E	Shut Down	Evinrude Digital Touch Screen Display	System Check Display	Time To Activate	Sensor: Circuit Voltage / Resistance (0) / Information
<b>Electronic Shift Controller (ESC)</b>								
205	ESC System Critical Fault			X	Engine	Check Engine	≤ 4 seconds	Actuator movement detected when actuator is in FORWARD, NEUTRAL or REVERSE. Sensor reference voltage fluctuating but sensor fault NOT detected. Engine SHUTDOWN. Check for code 78 or code 153. Check connectors and wiring. Perform electrical circuit tests.
207	ESC Motor excessive current			X	Engine	Check Engine	< 1 second	Motor is drawing excessive current (> 8.0 A) when trying to shift to neutral. Engine SHUTDOWN. Check connectors and wiring. Perform electrical circuit tests. Check gearcase for mechanical damage.
<b>Dynamic Power Steering (DPS)</b>								
211	DPS motor OPEN circuit				Engine	Check Engine	1 second	Motor current < 0.5 Amps with duty cycle > 25%. Check DPS ground lead to block. Check DPS power lead to back of + battery stud. Perform electrical circuit tests.
212	<b>ABA Engine Models (DPS-1):</b> DPS helm pressure sensor BELOW expected range				Engine	Check Engine	1 second	Helm pressure sensor voltage < 0.12 V. Check DPS module and pressure sensor connectors and wiring. Perform electrical circuit tests.
	<b>AFA &amp; Newer Engine Models (DPS-2):</b> Port helm pressure sensor BELOW expected range							Port helm pressure sensor voltage < 0.12 V. Check DPS module and pressure sensor connectors and wiring. Perform electrical circuit tests.
213	<b>ABA Engine Models (DPS-1):</b> DPS helm pressure sensor ABOVE expected range				Engine	Check Engine	1 second	Helm pressure sensor voltage > 4.60 V. Check DPS module and pressure sensor connectors and wiring. Perform electrical circuit tests.
	<b>AFA &amp; Newer Engine Models (DPS-2):</b> Port helm pressure sensor ABOVE expected range							Port helm pressure sensor voltage > 4.60 V. Check DPS module and pressure sensor connectors and wiring. Perform electrical circuit tests. If an i-Dock installation, contact Technical Service for assistance.
214	<b>ABA Engine Models (DPS-1):</b> DPS pump pressure BELOW expected range				Engine	Check Engine	1 second	DPS pump pressure sensor voltage < 0.12 V. Check DPS module and pressure sensor connectors and wiring. Perform electrical circuit tests.
	<b>AFA &amp; Newer Engine Models (DPS-2):</b> Starboard helm pressure BELOW expected range							Starboard helm pressure sensor voltage < 0.12 V. Check DPS module and pressure sensor connectors and wiring. Perform electrical circuit tests.
215	<b>ABA Engine Models (DPS-1):</b> DPS pump pressure ABOVE expected range				Engine	Check Engine	1 second	DPS pump pressure sensor voltage > 4.60 V. Check DPS module and pressure sensor connectors and wiring. Perform electrical circuit tests.
	<b>AFA &amp; Newer Engine Models (DPS-2):</b> Starboard helm pressure ABOVE expected range							Starboard helm pressure sensor voltage > 4.60 V. Check DPS module and pressure sensor connectors and wiring. Perform electrical circuit tests. If an i-Dock installation, contact Technical Service for assistance.
216	DPS Motor over current shutdown				Engine	Check Engine	3 occurrences	Excessive current detected. DPS Motor shutdown due to short circuit condition. Check connectors and wiring. Perform electrical circuit tests.
217	DPS supply voltage BELOW expected range				Engine	Check Engine	10 seconds	DPS supply voltage < 5 V. Check DPS module connectors and wiring. Check for battery voltage at DPS module power lead. Perform electrical circuit tests.
218	DPS module temperature ABOVE expected range				Engine	Check Engine	1 second	DPS module temperature > 176° (80°C). Check cooling flow to /through DPS module and cooling system.
220	DPS steering sensor BELOW expected range (DPS-2 only)				Engine	Check Engine	1 second	Steering position sensor voltage < 0.12 V. DPS steering position sensor OPEN circuit. Check DPS module connectors and wiring. Perform electrical circuit tests. If an i-Dock installation, is the i-Dock button selected in EvDiag6?
221	DPS steering sensor ABOVE expected range (DPS-2 only)				Engine	Check Engine	1 second	Steering position sensor voltage > 4.60 V. DPS steering position circuit too high. Check connectors and wiring. Perform electrical circuit tests.



## THE METRIC SYSTEM AND EQUIVALENTS

<p><b>Linear Measure</b></p> <p>1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches      1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches      1 Kilometer = 1000 Meters = 0.621 Miles</p> <p><b>Weights</b></p> <p>1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces      1 Kilogram = 1000 Grams = 2.2 Pounds      1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons</p> <p><b>Liquid Measure</b></p> <p>1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces      1 Liter = 1000 Milliliters = 33.82 Fluid Ounces</p>	<p><b>Square Measure</b></p> <p>1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches      1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet      1 Sq Kilometer = 1,000,000 Sq Meters = 0.0386 Sq Miles</p> <p><b>Cubic Measure</b></p> <p>1 Cu Centimeter = 1,000 Cu Millimeters = 0.06 Cu Inches      1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet</p> <p><b>Temperature</b></p> <p>9/5 C° +32 = F°  <math>5/9 (F - 32) = C</math>      212° Fahrenheit is equivalent to 100° Celsius      90° Fahrenheit is equivalent to 32.2° Celsius      32° Fahrenheit is equivalent to 0° Celsius</p>
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## APPROXIMATE CONVERSION FACTORS

To Change	To	Multiply By
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Sq Inches	Sq Centimeters	6.451
Sq Feet	Sq Meters	0.093
Sq Yards	Sq Meters	0.836
Sq Miles	Sq Kilometers	2.590
Acres	Sq Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Sq Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

To Change	To	Multiply By
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Sq Centimeters	Sq Inches	0.155
Sq Meters	Sq Feet	10.764
Sq Meters	Sq Yards	1.196
Sq Kilometers	Sq Miles	0.386
Sq Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Sq Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621

**PIN 107240-000**