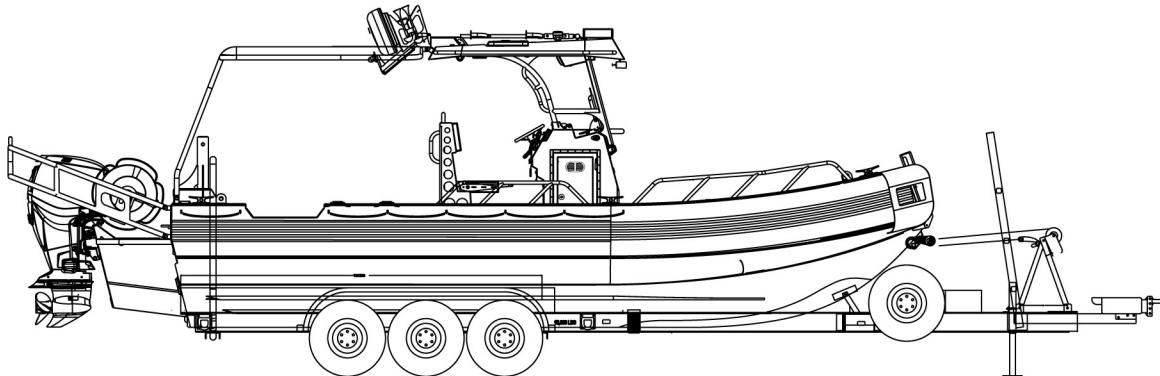


TM 5-1940-328-10

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



DISTRIBUTION STATEMENT C - Distribution authorized to U.S. Government Agencies and their contractors only for Administrative-Operational Use as determined on 16 July 2014 . Other requests for this document shall be referred to US Army Tank-automotive and Armaments Command, ATTN: Product Manager, Sets, Kits, Outfits & Tools (PM-SKOT), MS 901, Selfridge ANGB, SFAE-CSSFP-SK, MS 640, 6501 E. 11 Mile Road, Warren, MI 48397-5000 .

DESTRUCTION NOTICE – Destroy by any method that will prevent disclosure of contents or reconstruction of the document.

COPYRIGHT RELEASE - The contractor has obtained and provided to the Government copyright releases in writing from all pertinent copyright holders, which are listed at the end of General Information, such that the Government may copy and distribute this technical manual to Government agencies and their contractors.

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

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this publication. If you find any errors, or if you would like to recommend any improvements to the procedures in this publication, please let us know. The preferred method is to submit your DA Form 2028 (Recommended Changes to Publications and Blank Forms) through the Internet on the TACOM Unique Logistics Support Applications (TULSA) Web site. The Internet address is <https://tulsa.tacom.army.mil>. Access to all applications requires CAC authentication, and you must complete the Access Request form the first time you use it. The DA Form 2028 is located under the TULSA Applications on the left-hand navigation bar. Fill out the form and click on SUBMIT. Using this form on the TULSA Web site will enable us to respond more quickly to your comments and to better manage the DA Form 2028 program. You may also mail, e-mail, or fax your comments or DA Form 2028 directly to the U.S. Army Tank-automotive and Armaments Command. The postal mail address is U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-LCL-IMP/TECH PUBS, MS 727, 6501 E. 11 Mile Road, Warren, MI 48397-5000. The e-mail address is usarmy.detroit.tacom.mbx.ilsc-tech-pubs@mail.mil. The fax number is DSN 786-1856 or Commercial (586) 282-1856. A reply will be furnished to you.

DISTRIBUTION STATEMENT C - Distribution authorized to U.S. Government Agencies and their contractors only for Administrative-Operational Use as determined on 16 July 2014. Other requests for this document shall be referred to US Army Tank-automotive and Armaments Command, ATTN: Product Manager, Sets, Kits, Outfits & Tools (PM-SKOT), MS 901, Selfridge ANGB, SFAE-CSSFP-SK, MS 640, 6501 E. 11 Mile Road, Warren, MI 48397-5000.

DESTRUCTION NOTICE – Destroy by any method that will prevent disclosure of contents or reconstruction of the document.

COPYRIGHT RELEASE - The contractor has obtained and provided to the Government copyright releases in writing from all pertinent copyright holders, which are listed at the end of General Information, such that the Government may copy and distribute this technical manual to Government agencies and their contractors.

TABLE OF CONTENTS

	<u>Page No.</u> <u>WP Sequence No.</u>
HOW TO USE THIS MANUAL.....	v
Chapter 1 - GENERAL INFORMATION	
GENERAL INFORMATION.....	WP 0001
EQUIPMENT DESCRIPTION AND DATA.....	WP 0002
THEORY OF OPERATION.....	WP 0003
Chapter 2 - OPERATOR INSTRUCTIONS FOR RIGID INFLATABLE BOAT (RIB)	
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>
Chapter 4 - PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) FOR RIGID INFLATABLE BOAT (RIB)	
PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) INTRODUCTION.....	WP 0053
PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS).....	WP 0054
Chapter 5 - OPERATOR MAINTENANCE FOR RIGID INFLATABLE BOAT (RIB)	
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
Chapter 6 - SUPPORTING INFORMATION FOR RIGID INFLATABLE BOAT (RIB)	
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.

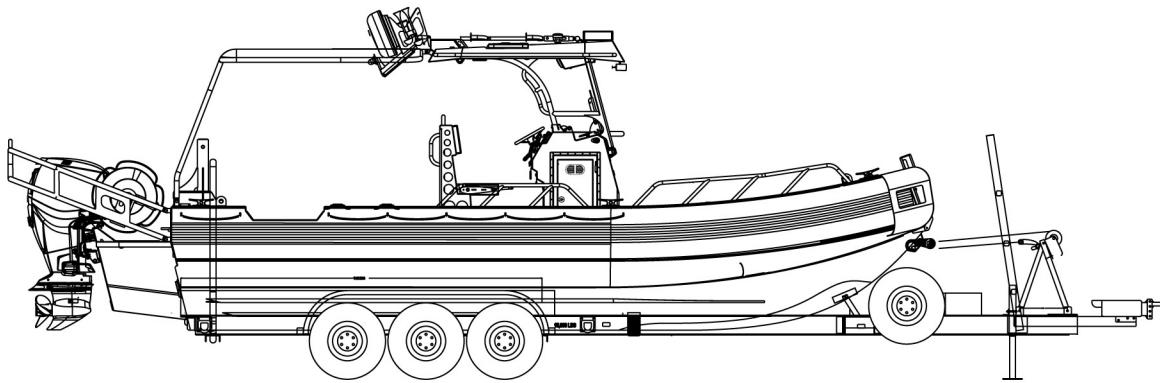


Figure 1. Rigid Inflatable Boat.

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 ²	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 ²	Square Foot
in ²	Square Inch
m ²	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.

COPYRIGHT RELEASE

Permission has been given to the Government in writing from all pertinent copyright holders, which are listed at the end of General Information, such that the Government may copy and distribute this technical manual, TM 5-1940-328-10, to Government agencies and their contractors.

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**

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.

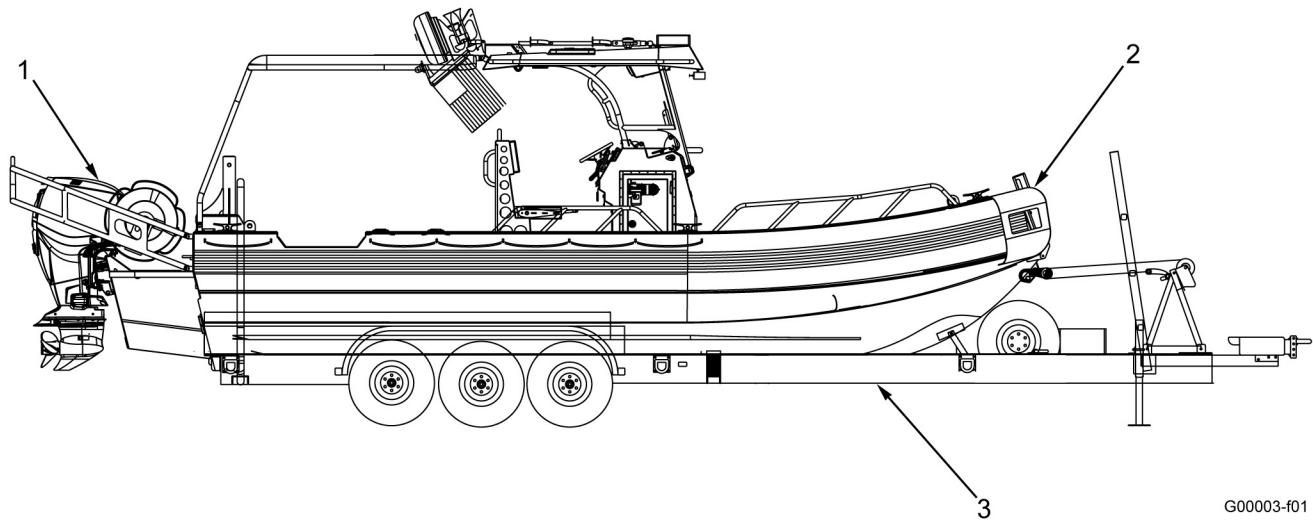
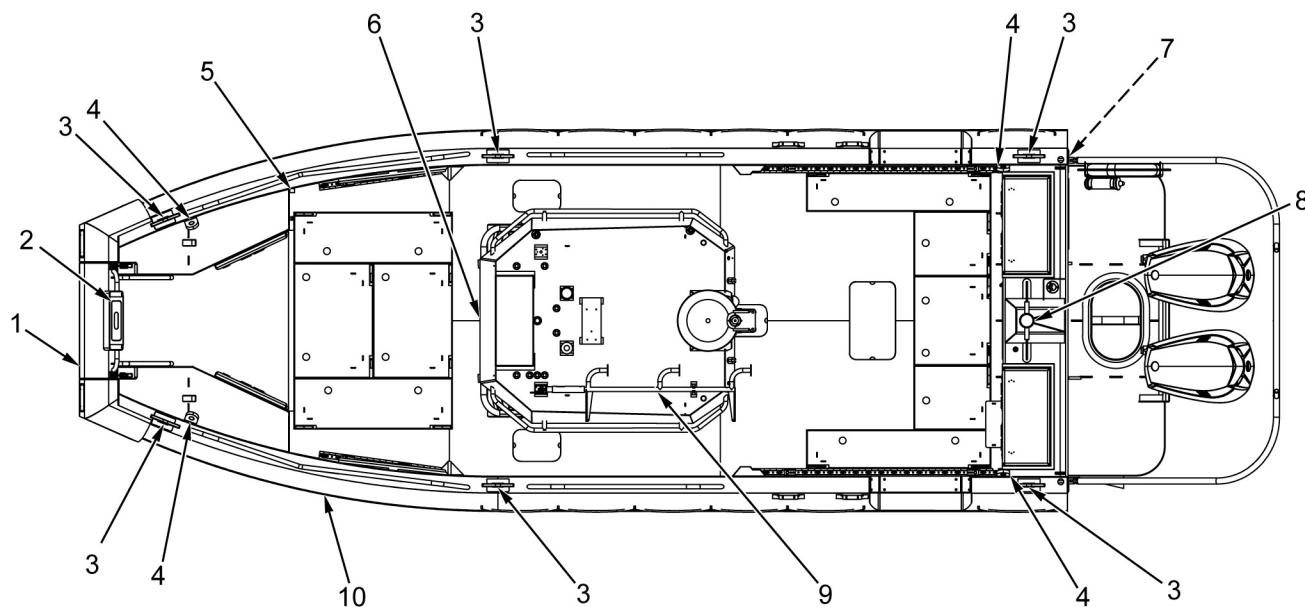
LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

Figure 1. RIB Components.

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

Item	Component	Description
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

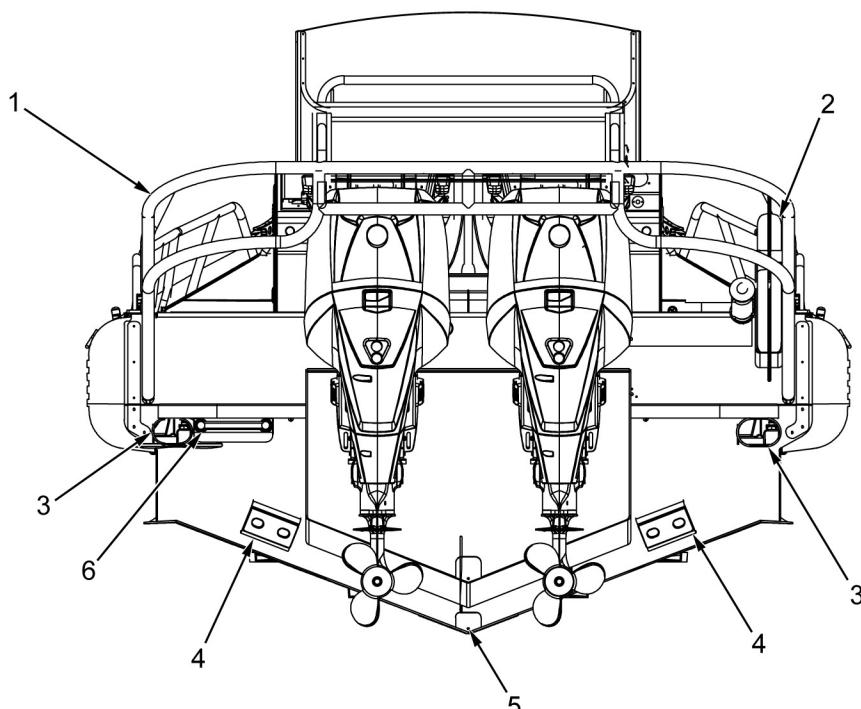
Figure 2. Hull Components.

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

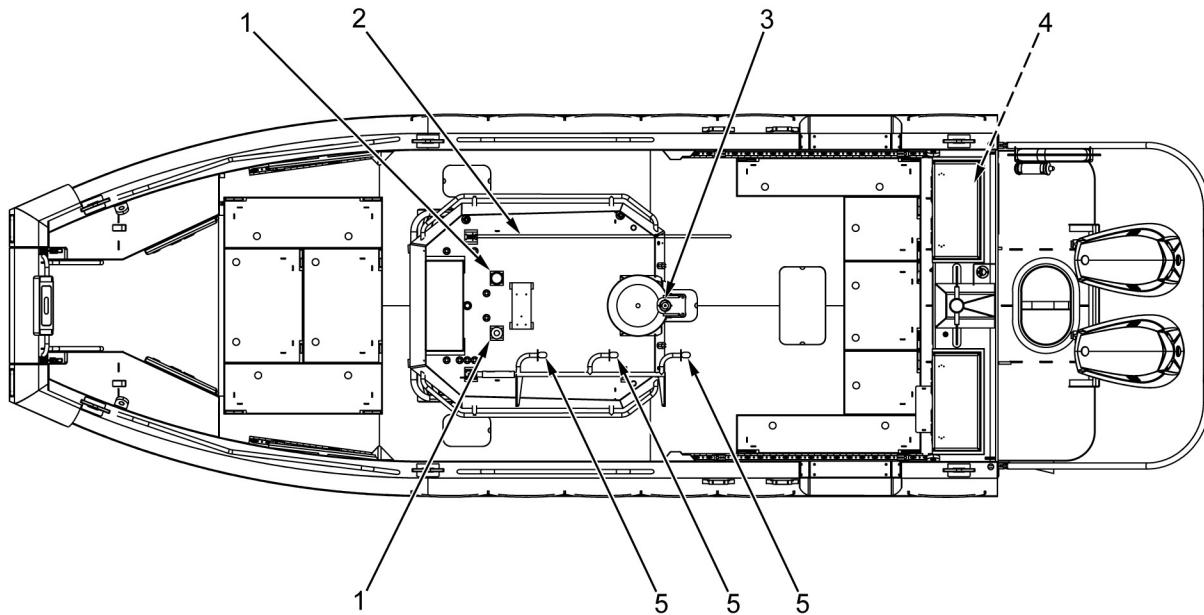
Figure 3. Rear Hull Components.

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

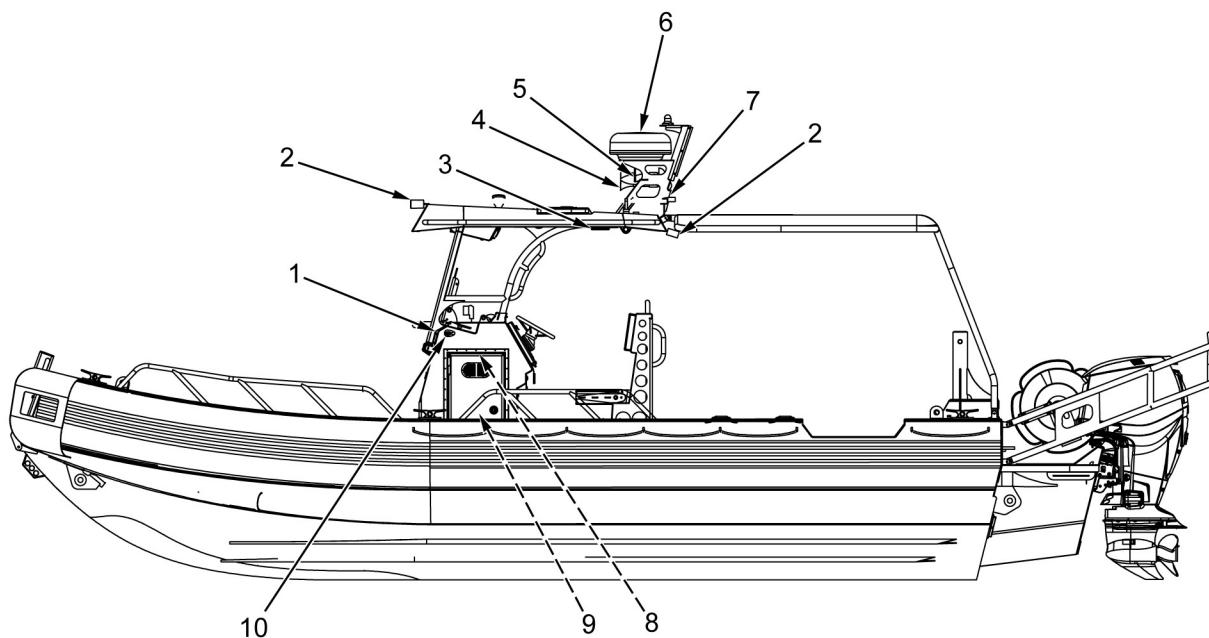
Figure 4. Hull Electrical Components.

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

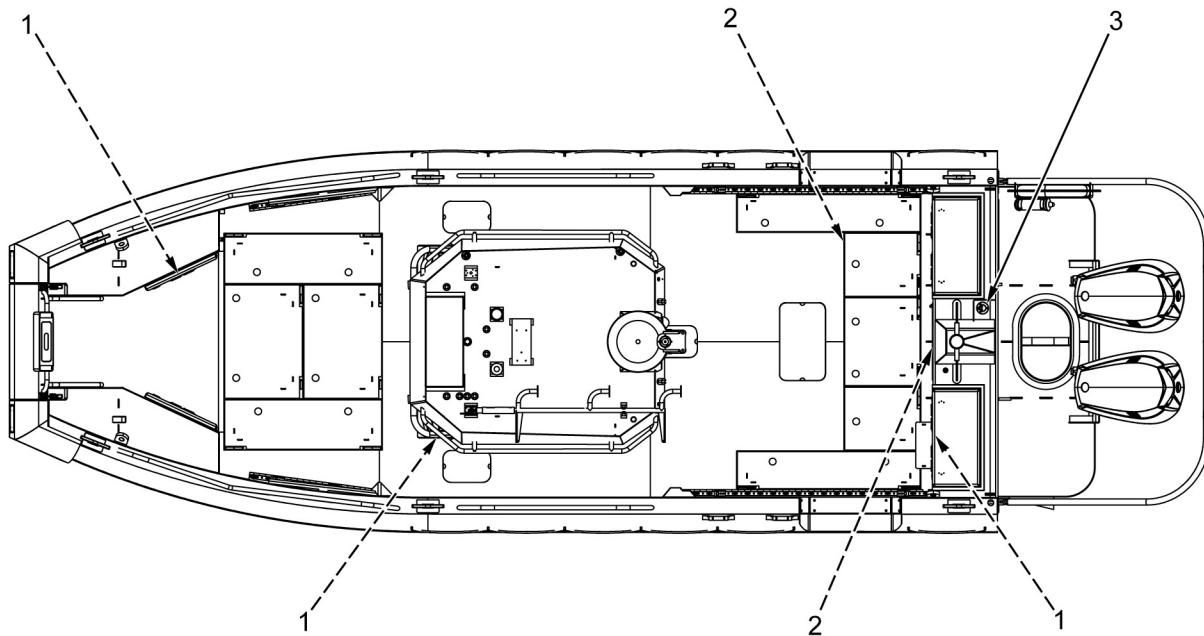
Figure 5. Electrical Components.

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

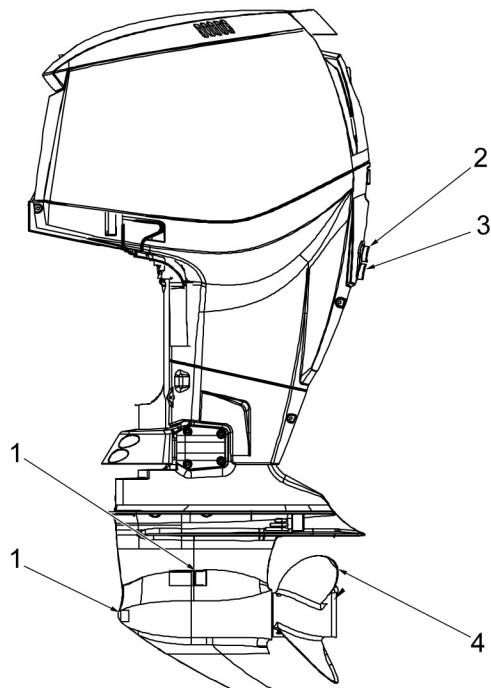
G00003-f06

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.***

Hull and Inflatable Tube:	
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
Electrical System:	
Battery, Type	12 Voltage (V) Marine Battery
Battery, Number	5
Circuit Breakers:	
1x50A	Bilge Pumps
3x80A	House, Port, Starboard Batteries
1x40A	Spare
Controls:	
Throttle	Electronic
Propulsion	Forward, Neutral, and Reverse
Steering	Hydraulic
Capacities:	
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.***

Engine:	
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
Trailer:	
Model	WS8M-180
Axles	3 Axles
Gross Vehicle Weight Rating	18,000 lbs (8,165 kg)
Tire Size	245/75R16
Material	Aluminum
Weights:	
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

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

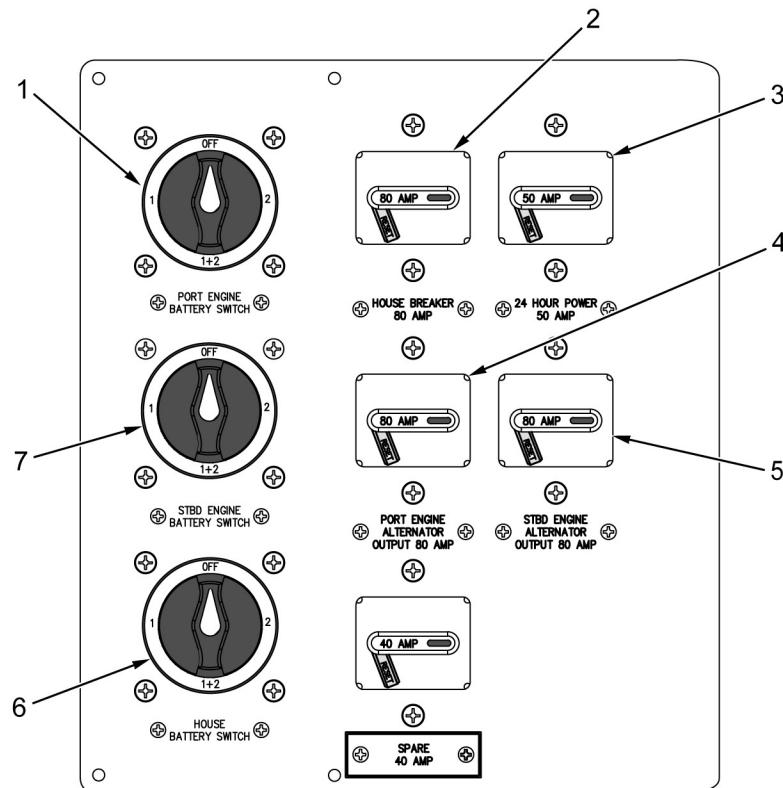
OPERATOR INSTRUCTIONS

FOR

RIGID INFLATABLE BOAT (RIB)

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

CONTROLS AND INDICATORS



000001-f01

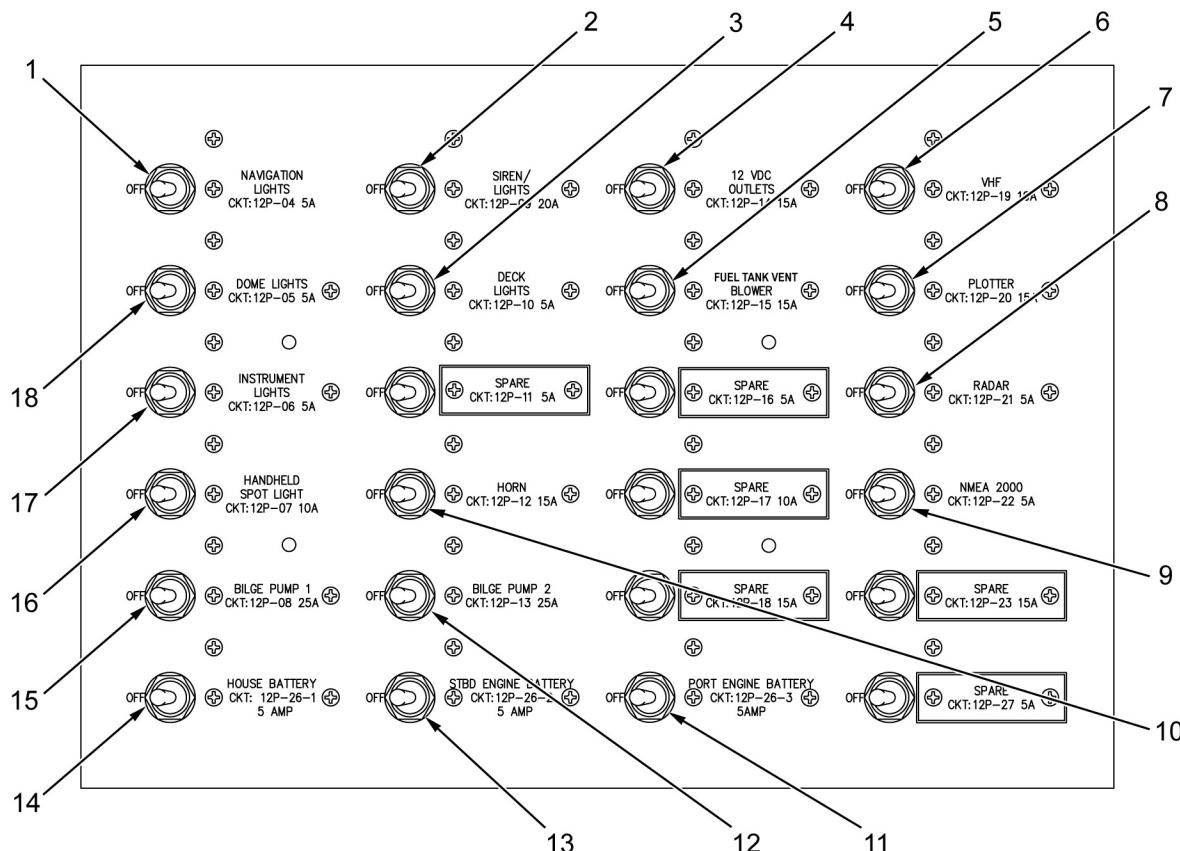
Figure 1. Battery and Breaker Controls.

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

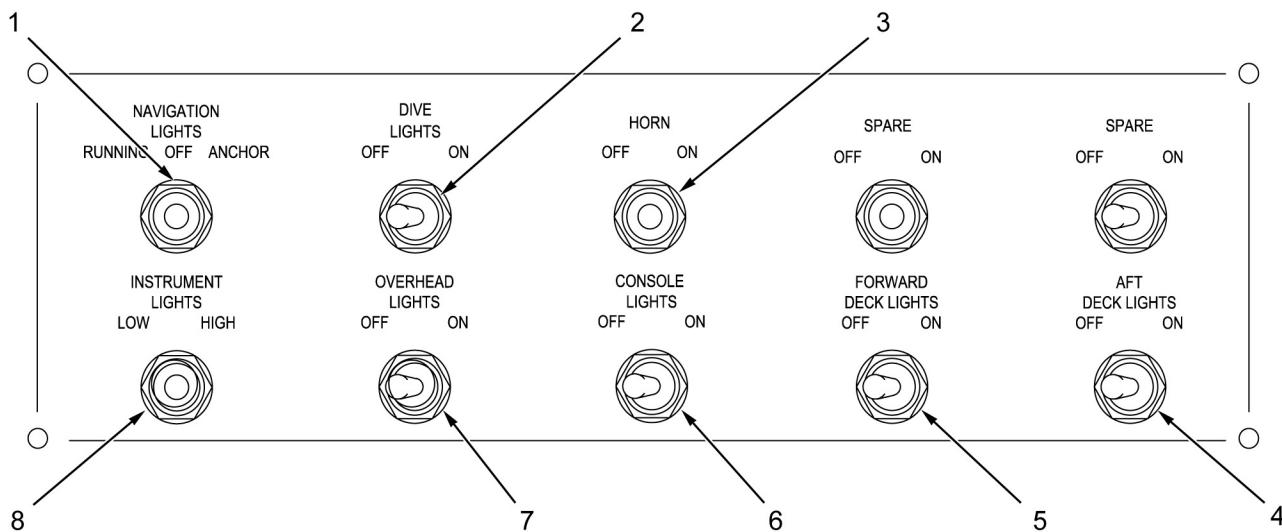
Figure 2. Control Panel Control Switches.

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.

Key	Control/Indicator	Function
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.

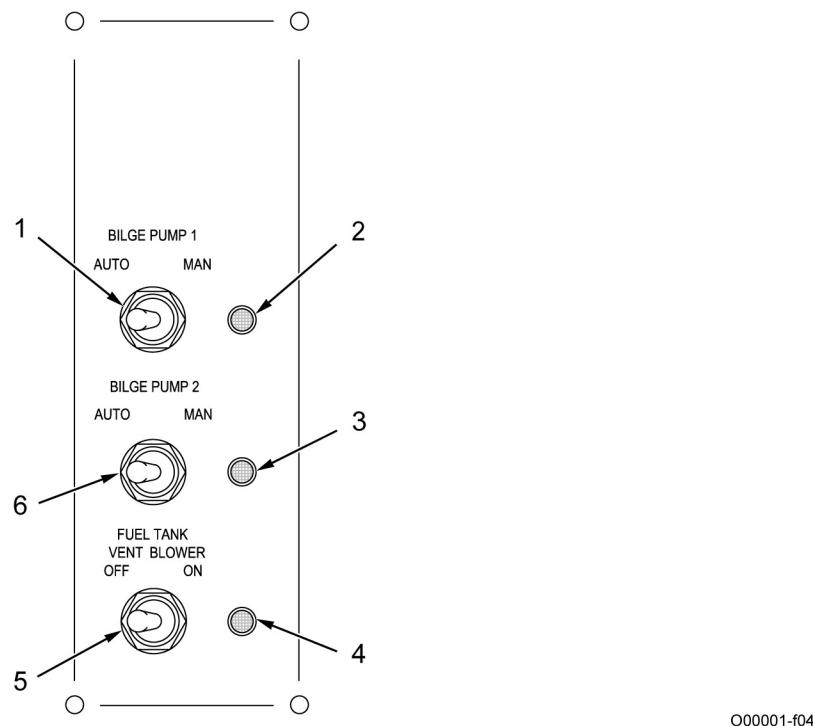


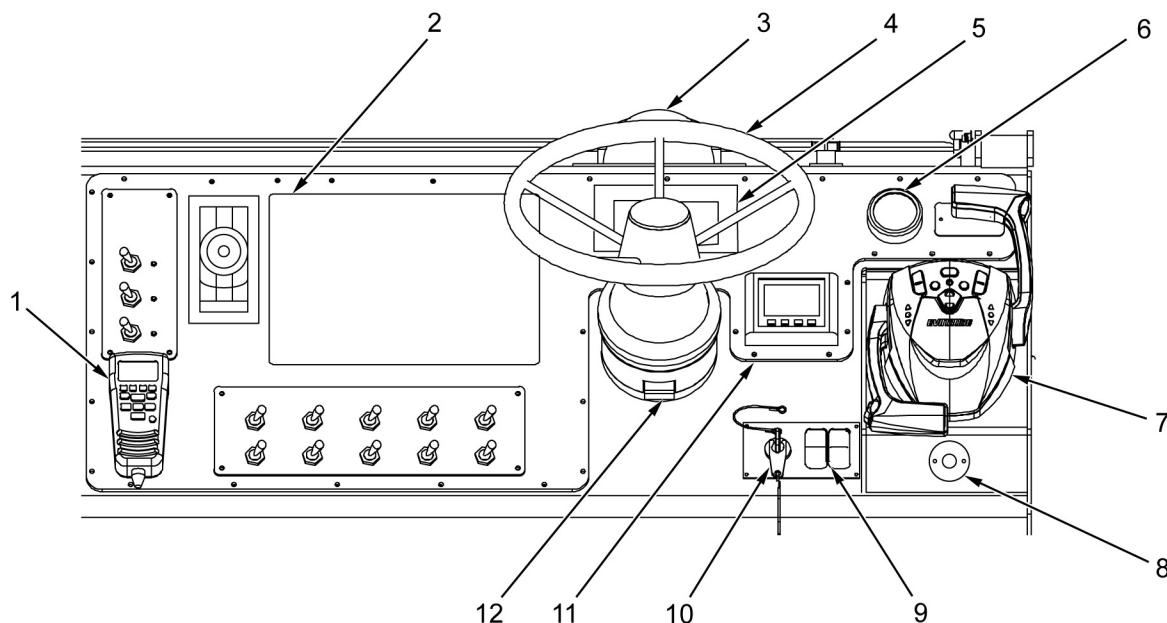
Figure 4. Operating Switch Panel 2.

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

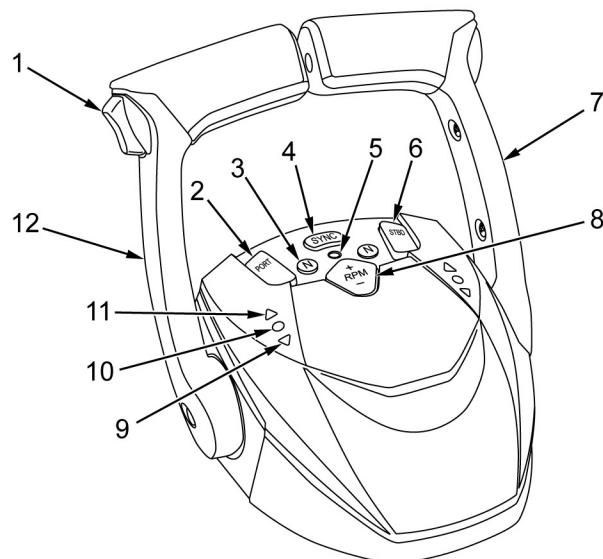
Figure 5. Cabin Console Controls.

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.



O00001-f06

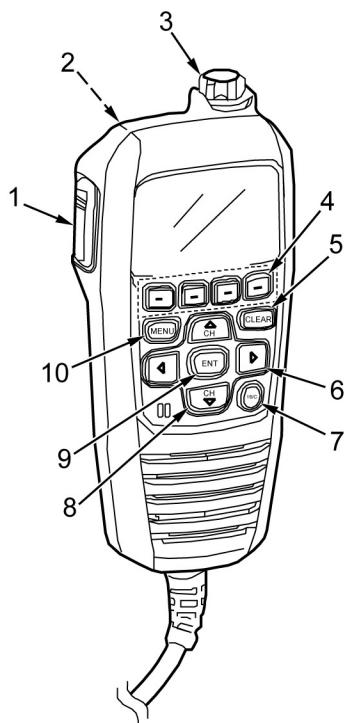
Figure 6. Throttle Controls.

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

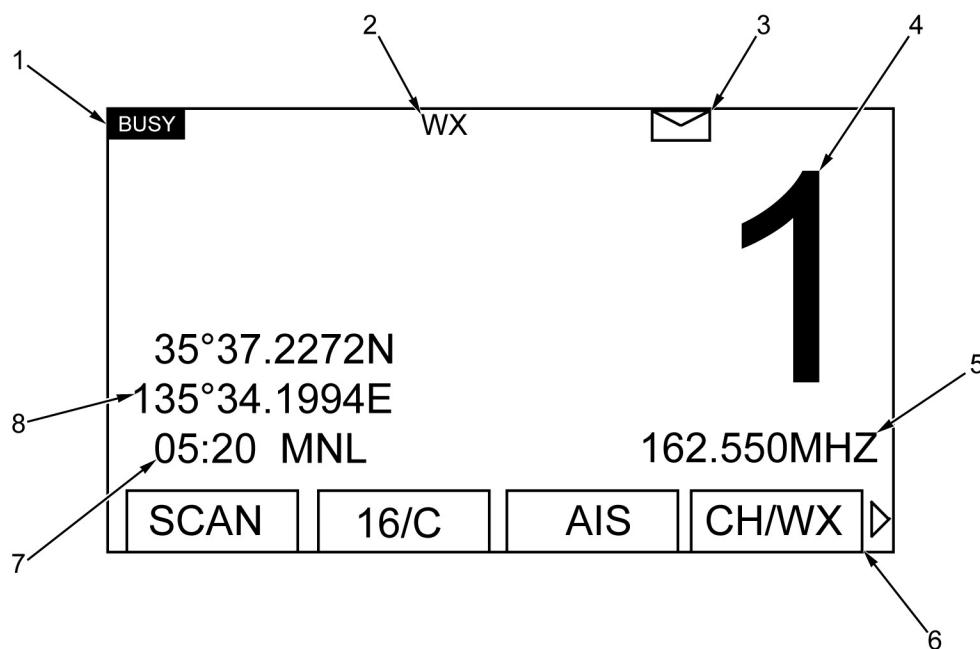
Figure 7. Command Microphone.

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"> • When the power is OFF, hold down for 1 second to turn ON power. • Hold down for 1 second to turn OFF power. • Rotate to select the operating channels, menu items, or menu settings. • Push to set the input data or selected item. • Rotate to adjust the squelch level. • Rotate to adjust the volume level.

Table 7. Command Microphone Controls - Continued.

Key	Control/Indicator	Function
4	SOFTKEYS	<ul style="list-style-type: none"> • Scan: Push to start or stop a normal or priority scan. • Channel/Weather Channel: Push to select and toggle the regular channel and weather channel. • High/Low: Push to set the power to high or low. • 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. • Backlight: Push to enter the Liquid Crystal Display (LCD) and key backlight brightness adjustment mode.
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"> • Push to switch to the previous or next key function that is assigned to the soft keys. • 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.
7	CHANNEL 16/ CALL CHANNEL KEY	<ul style="list-style-type: none"> • Push to select channel 16. • Hold down for 1 second to select the call channel.
8	UP AND DOWN/ CHANNEL SELECT KEYS "Λ / ∨"	<ul style="list-style-type: none"> • Push to select the operating channels, menu items, or menu settings. • While scanning, push to check favorite channels, change the scanning direction, or manually resume a scan.
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

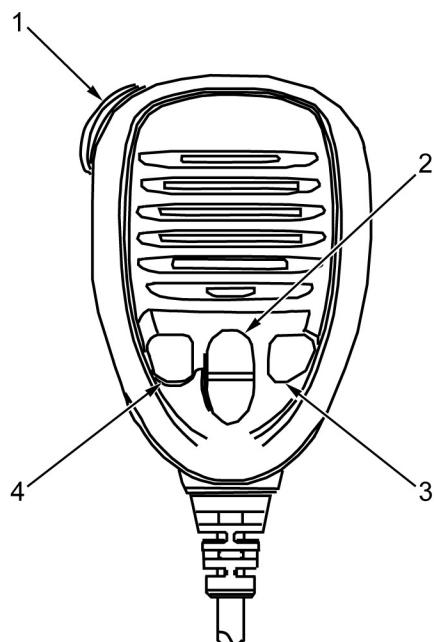
Figure 8. Command Microphone Display Overview.

Table 8. Command Microphone Display.

Key	Control/Indicator	Function
1	BUSY/TRANSMIT ICON	<ul style="list-style-type: none"> The “BUSY” icon appears when receiving a signal or when the squelch is open. The “TX” icon appears while transmitting.
2	CHANNEL GROUP ICON	<ul style="list-style-type: none"> The selected channel group icon, “USA”, “INT”, or “CAN” appears. The “WX” icon appears when the weather channel is selected.
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">• Shows the current time when valid GPS position data is received.• "NO TIME" appears when no GPS position data is received.
8	POSITION INDICATOR	<ul style="list-style-type: none">• Shows the current position when valid GPS position data is received.• "NO POSITION" appears when no GPS position data is received.



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"> • Push to toggle the power high or low. • While holding down key, turn ON the power to turn the microphone lock function ON or OFF.
4	CHANNEL 16/CALL CHANNEL KEY	<ul style="list-style-type: none"> • Push to select channel 16. • Hold down for 1 second to select the call channel.

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

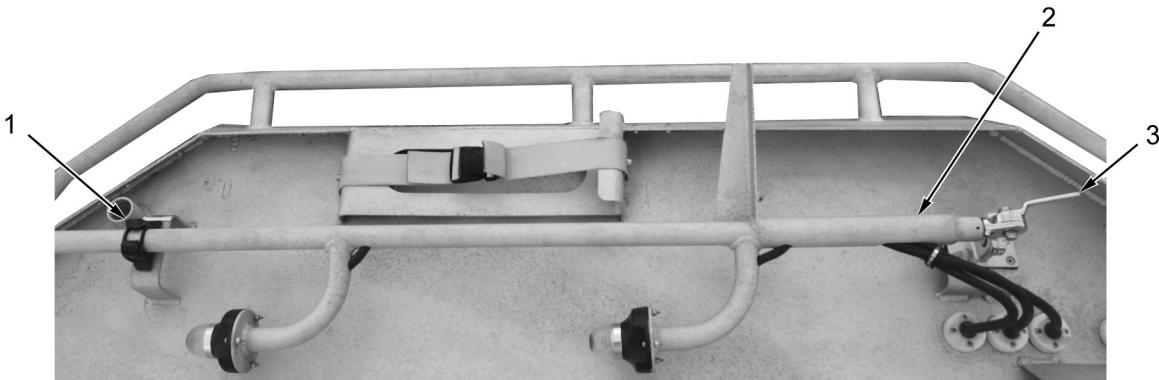
Pre-Start Procedures

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

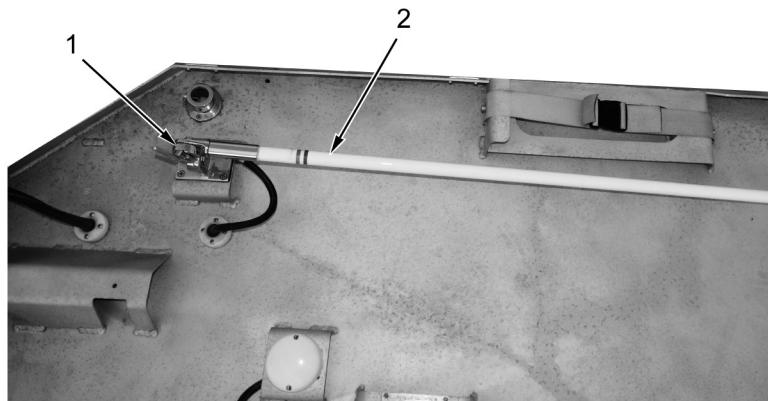
1. Secure and stow all equipment.
2. Remove retaining strap (Figure 1, Item 1) and raise dive mast (Figure 1, Item 2) to vertical position.
3. Rotate lock lever (Figure 1, Item 3) approximately 90° and lock mast (Figure 1, Item 2) into position.



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.



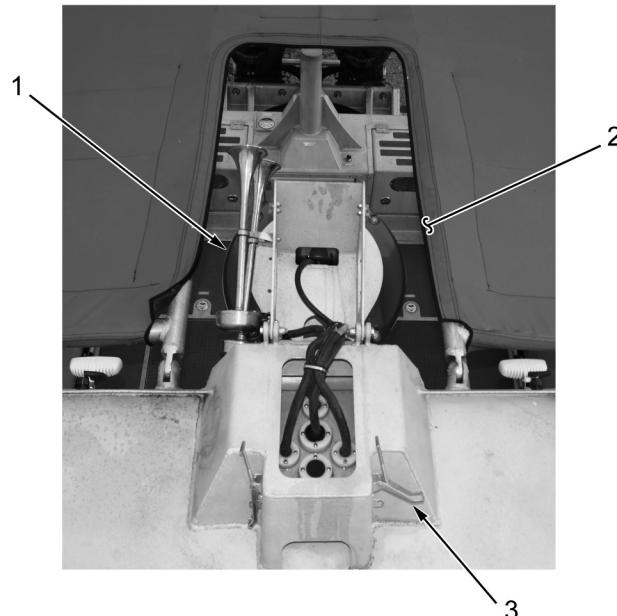
000002-f02

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

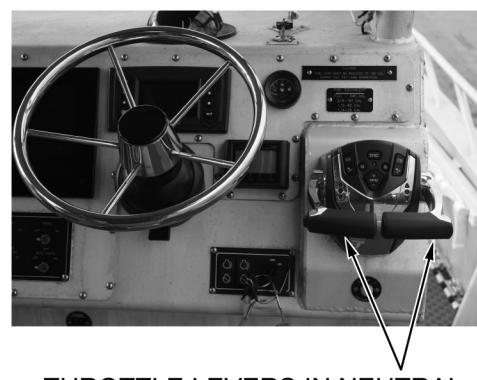
9. Engage two turnbuckle fasteners (Figure 3, Item 3) and secure radome mast (Figure 3, Item 1).



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.

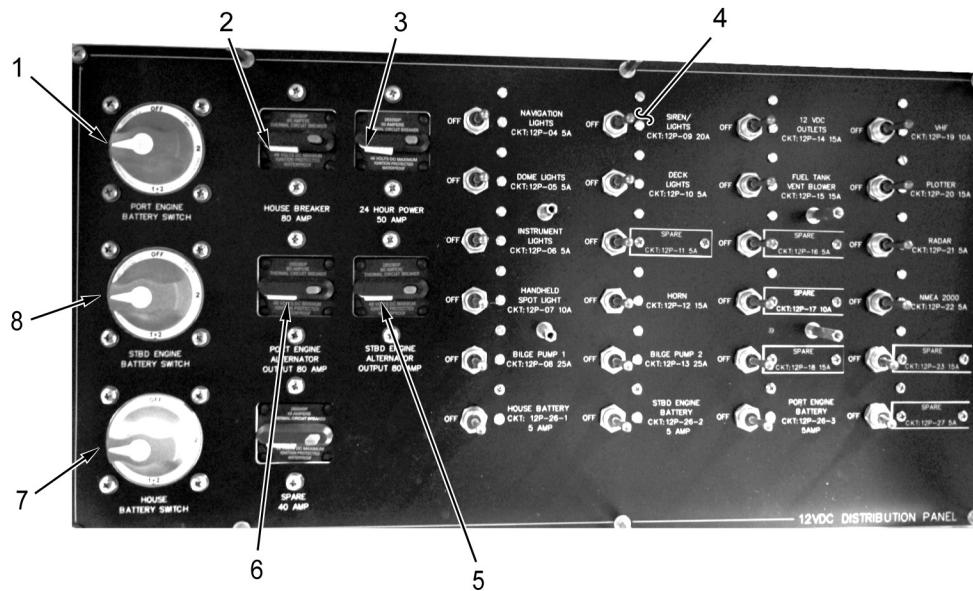
Pre-Start Procedures - Continued

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).



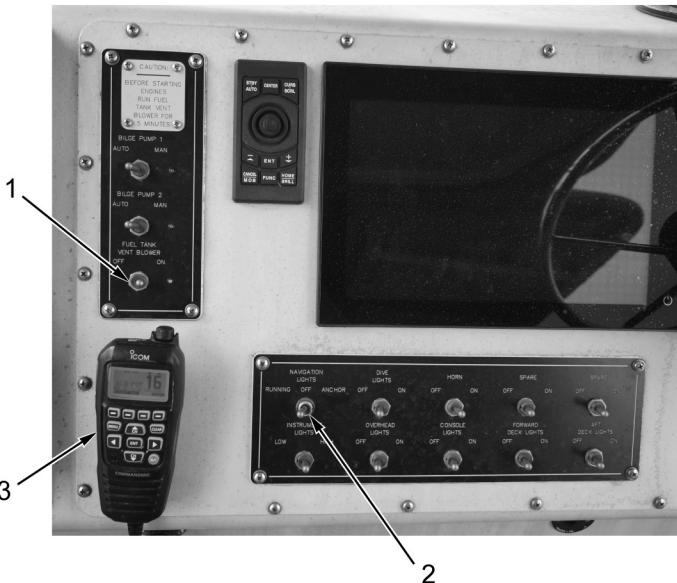
000002-f06

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.



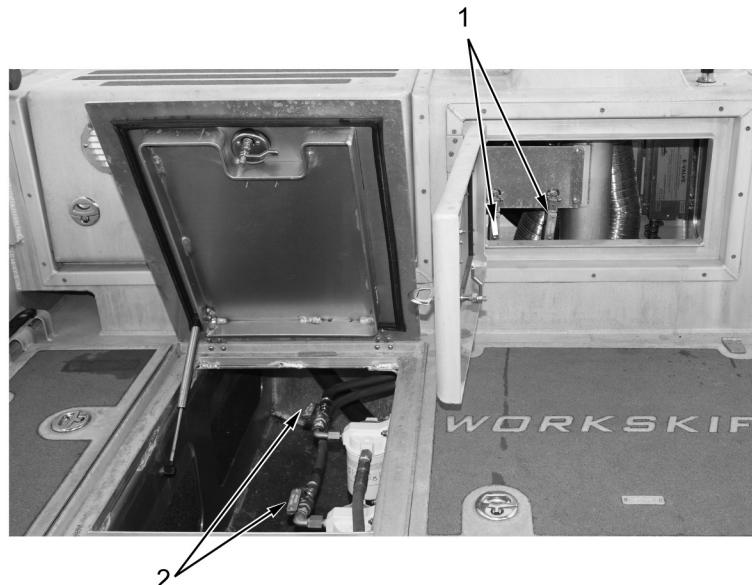
000002-f09

Figure 7. Scupper Drain.

Pre-Start Procedures - Continued**NOTE**

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

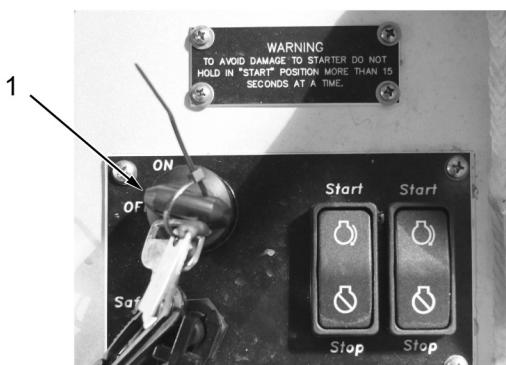
19. Verify starboard compartment fuel valves (Figure 8, Item 2) and aft compartment fuel valves (Figure 8, Item 1) are in OPEN position.



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:

Tools and Special Tools	References
Wrench, Box and Open End, Combination (WP 0062, Table 2, Item 30)	WP 0007
	WP 0008
	WP 0010
Personnel Required	Equipment Condition
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.

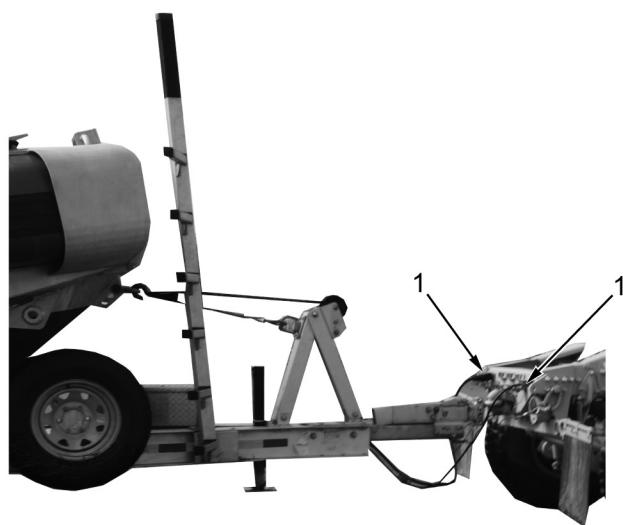
2. Inspect bilge plug (Figure 2, Item 2) and transom plug (Figure 2, Item 1) to ensure they are in place. If loose, use wrench to tighten.



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

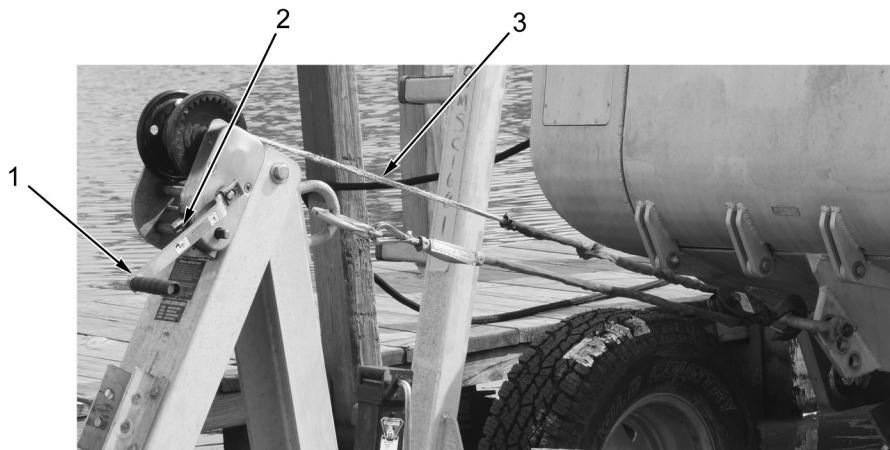
Figure 5. Engine Gear Case Submerged.

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).



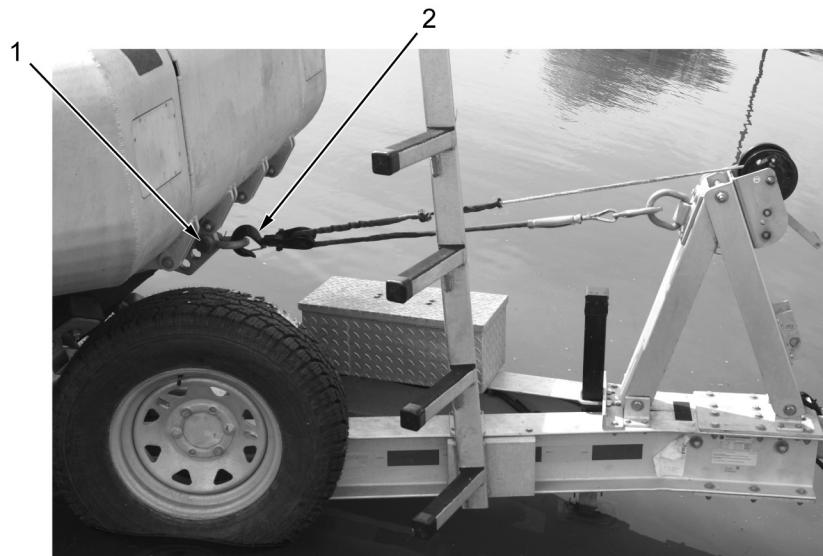
O00003-f09

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:

Personnel Required	References (cont.)
Diver 12D	WP 0040
Assistant	WP 0046
References	Equipment Condition
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.

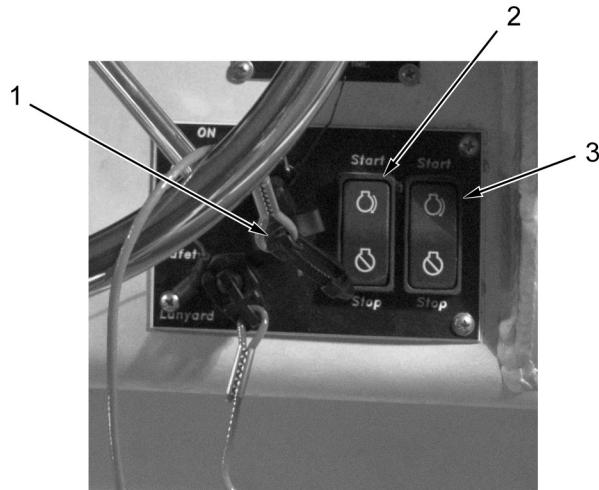
WARNING

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:

Personnel Required	References (cont.)
Diver 12D	WP 0010
Assistant (2)	WP 0025
References	Equipment Condition
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).

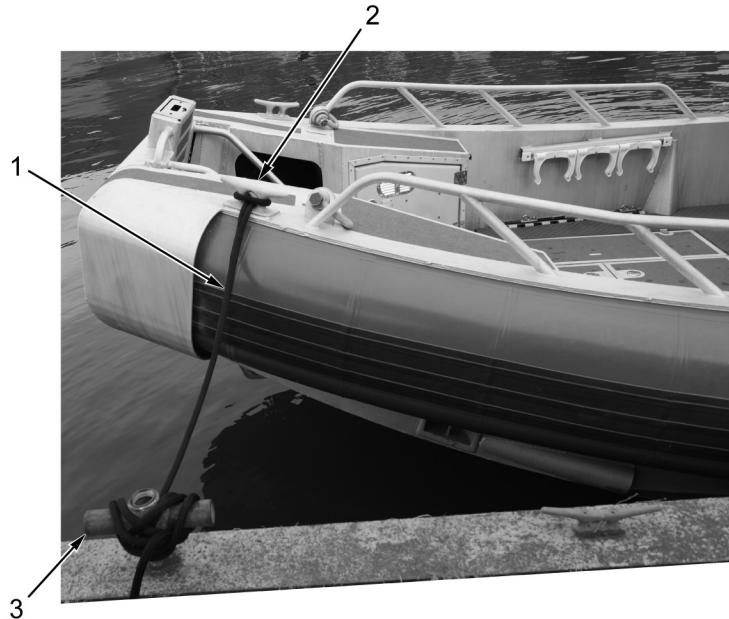


Figure 2. Throttle in Neutral.

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).



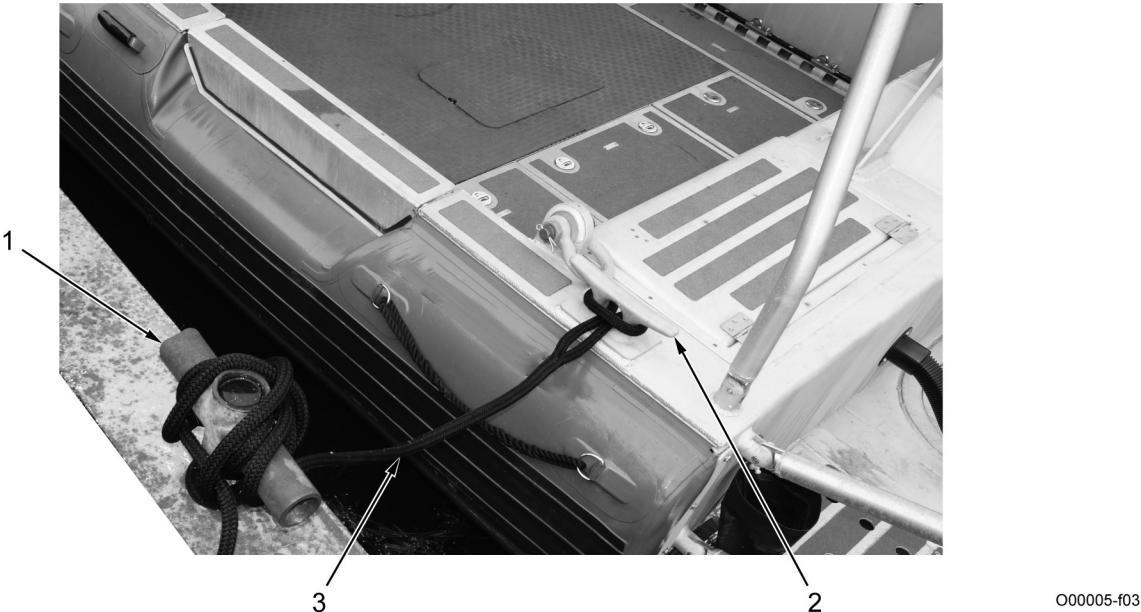
O00005-f02

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.

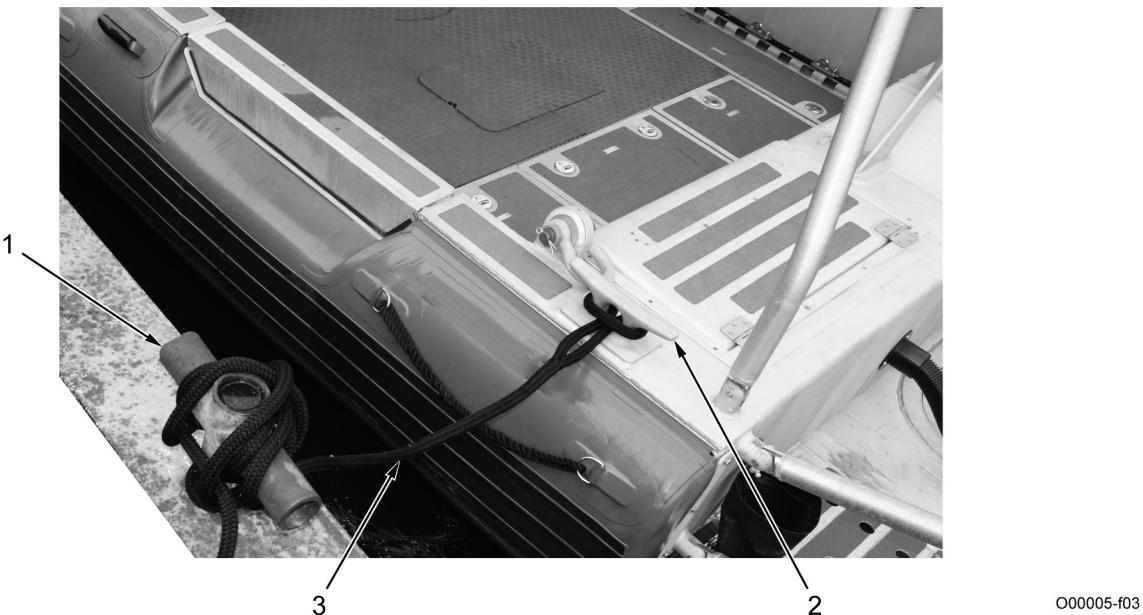
7. Perform engine shutdown procedure (WP 0025).

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).



000005-f03

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).

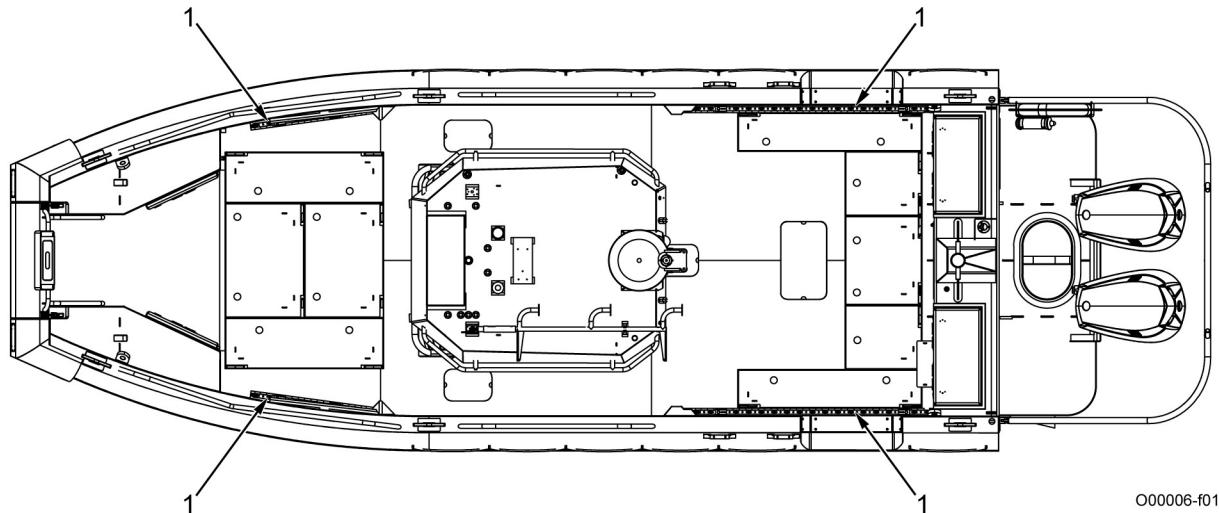


Figure 1. Tie Down Locations.

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

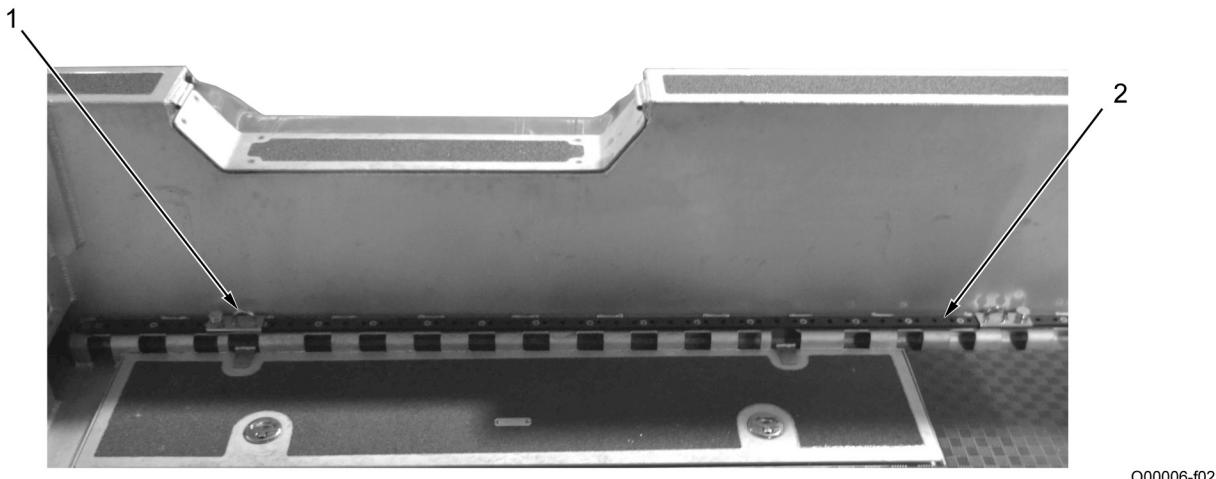


Figure 2. Cargo Tie Downs.

END OF WORK PACKAGE

**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.



000009-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

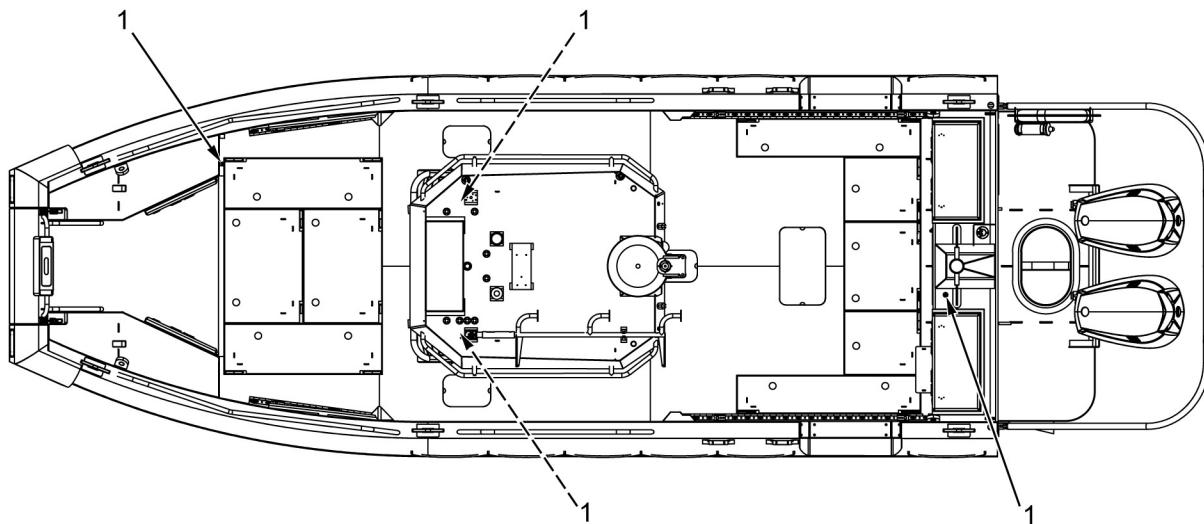
Halogen bulbs emit heat during use, avoid contact with bulb. Allow bulb to cool before
handling. Failure to comply may result in injury to personnel.

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).



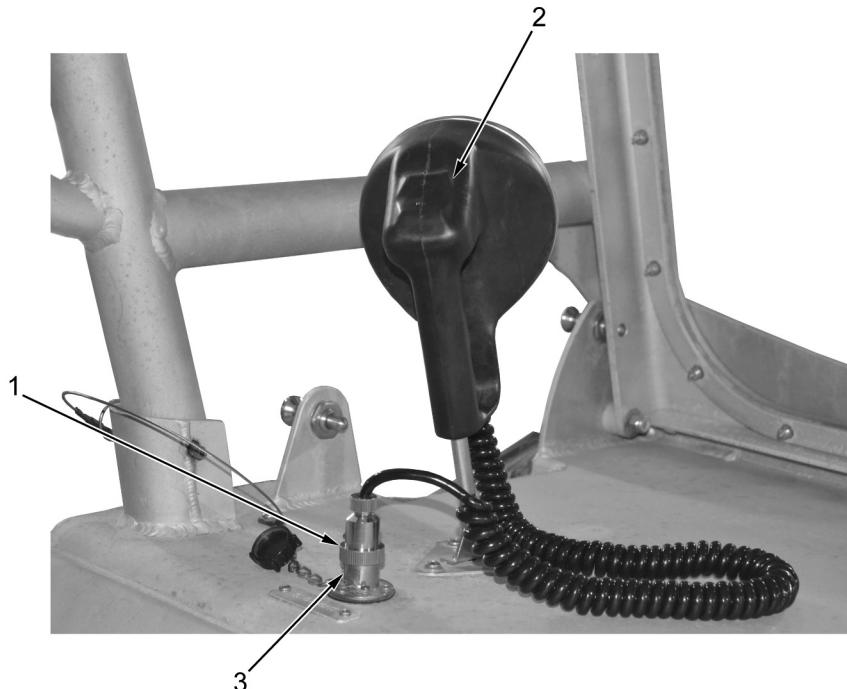
O00014-f01

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.

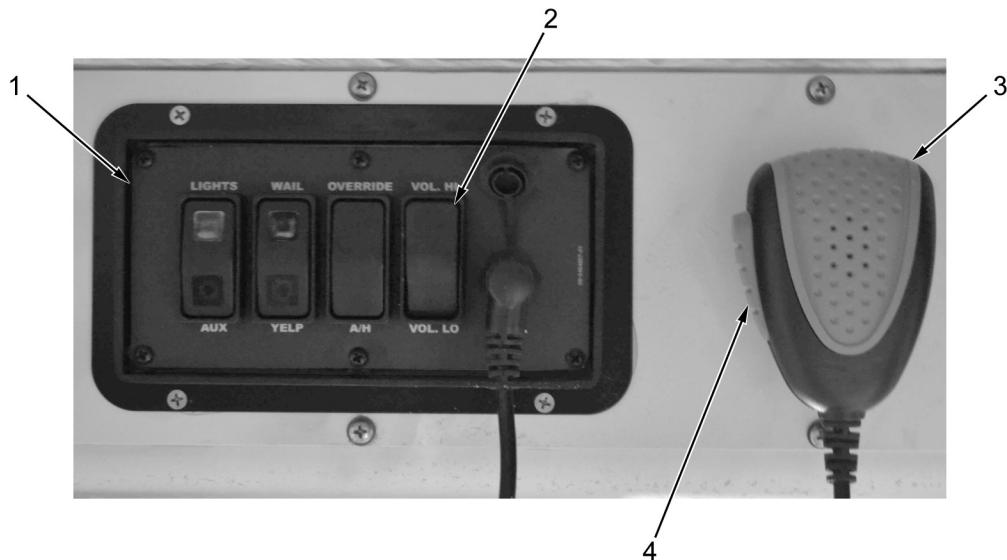
The loud speaker and siren is a three tone siren system featuring WAIL, YELP, and AIRHORN (A/H) functions.

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.



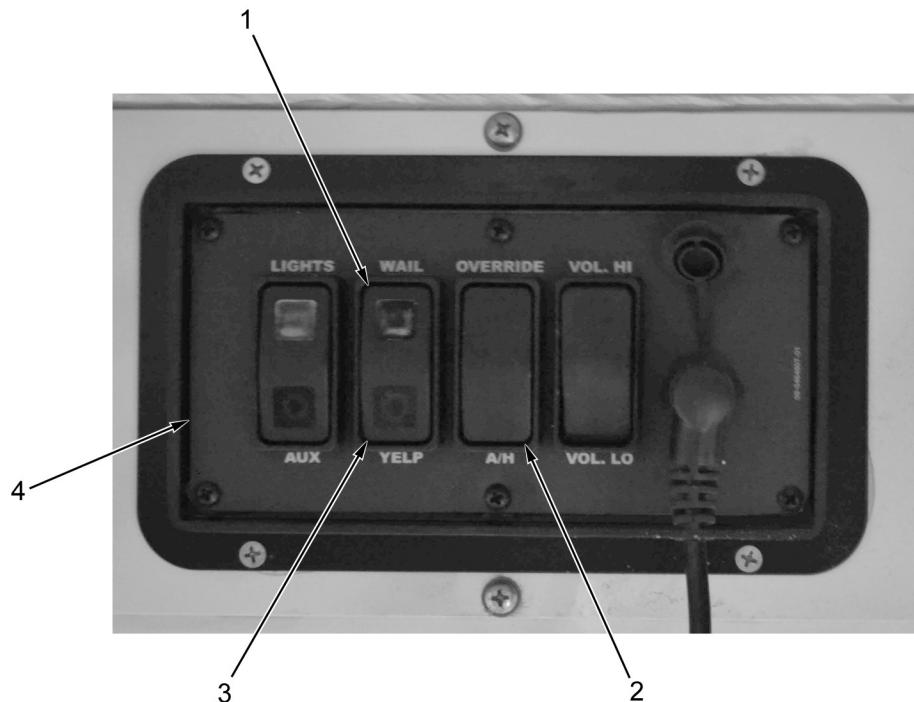
O00015-f01

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

**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.



O00017-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-Funntional 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

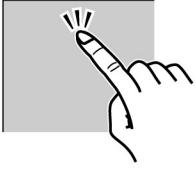
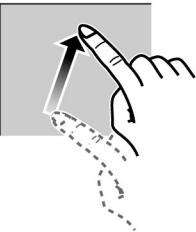
Figure 1. Display Power Button.

NOTE

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

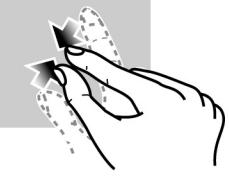
2. Read the navigation warning and select “OK”.

Multi-Function Display Touchscreen Operation

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

000018-f02

Figure 2. Operation with One Finger.

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

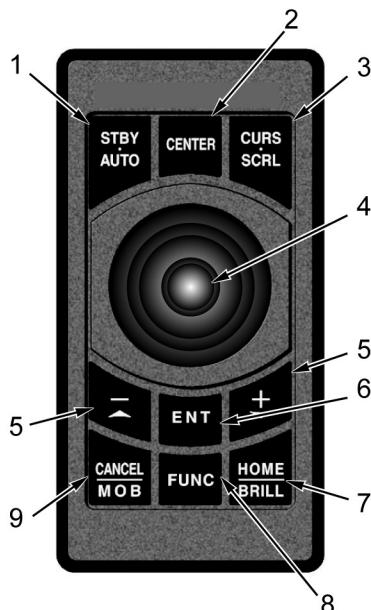
000018-f03

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	STBY•AUTO	Function not available.
2	CENTER	Returns own ship to the center of the screen (Plotter/Radar display). Cancels the echo history (Sonar display).
3	CURS•SCRL	Switches the joystick gesture between the cursor mode and scroll mode.
4	JOYSTICK	<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> Cursor mode operation: Moves the cursor. Scroll mode operation: Pans the display (Plotter/Radar display). Shifts the range and scrolls back the picture (Sonar display).
5	+,-	Selects an item from slide-out/main/pop-up menu. Zooms in (+) and out (-).
6	ENT	Activate a selected item. Swipe function: Opens the slide-out menu, [Layers] menu, data area, quick page.
7	HOME/BRILL	<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	FUNC	Does the function set at [Function Gesture].
9	CANCEL/MO 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

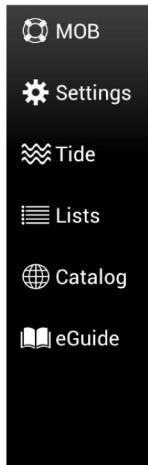


000018-f06

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

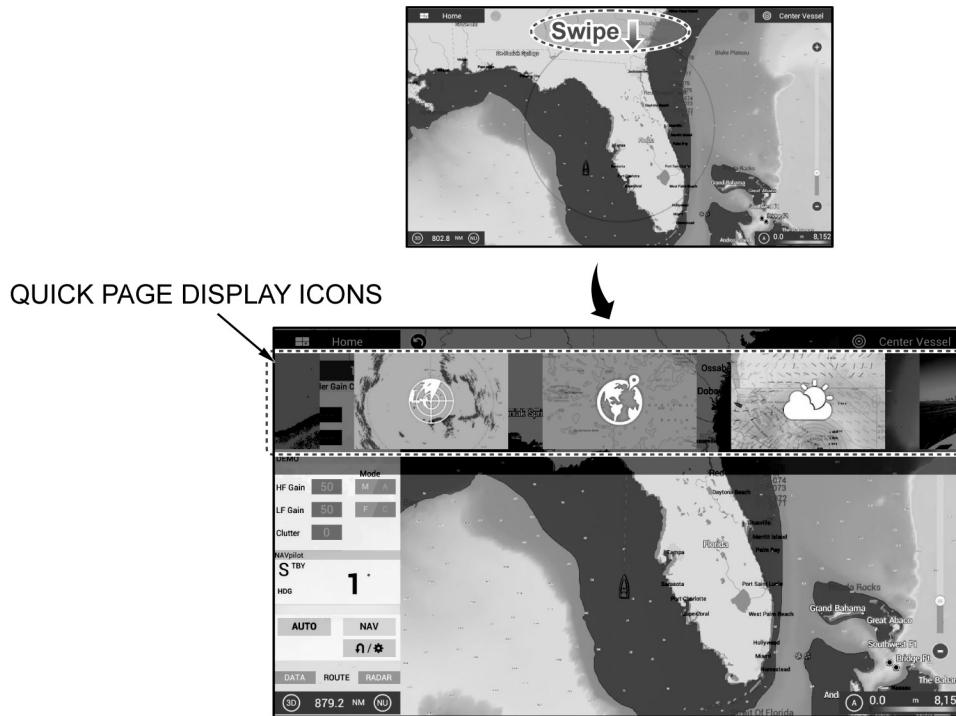


O00018-f08

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

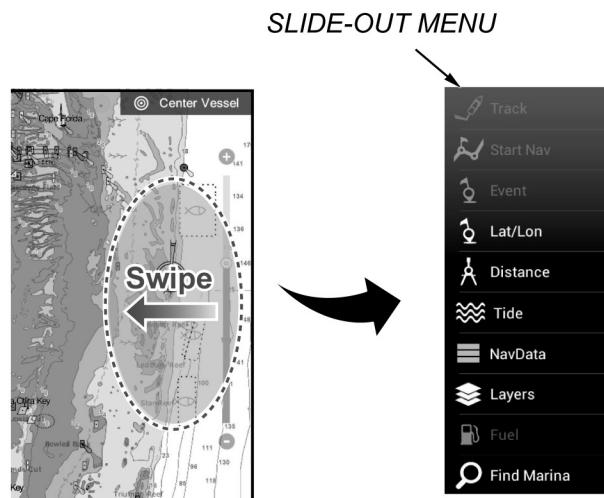
Figure 11. Quick Page Function.

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



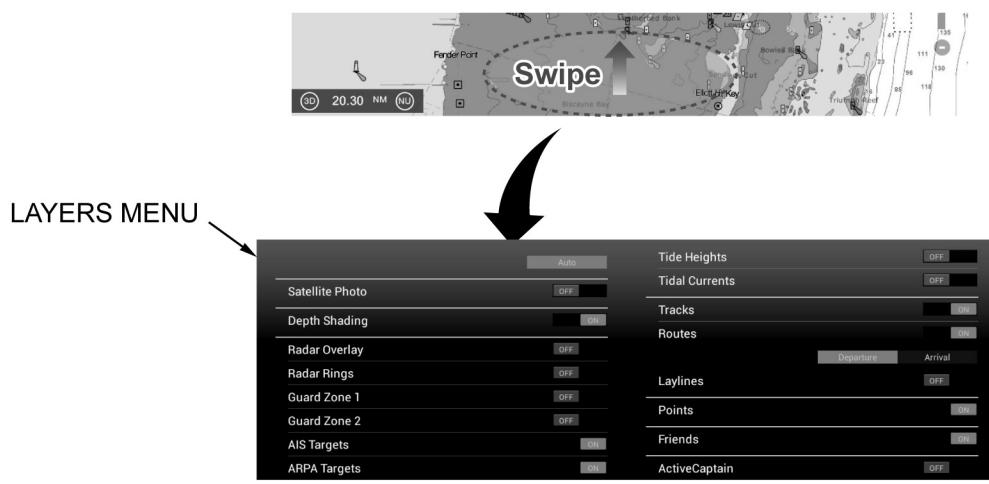
O00018-F10

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).

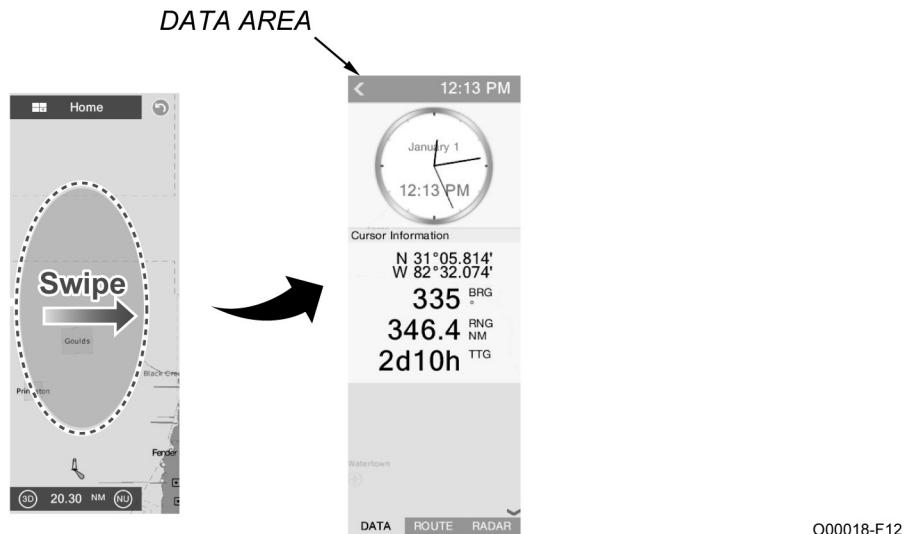


Figure 14. Data Area.

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

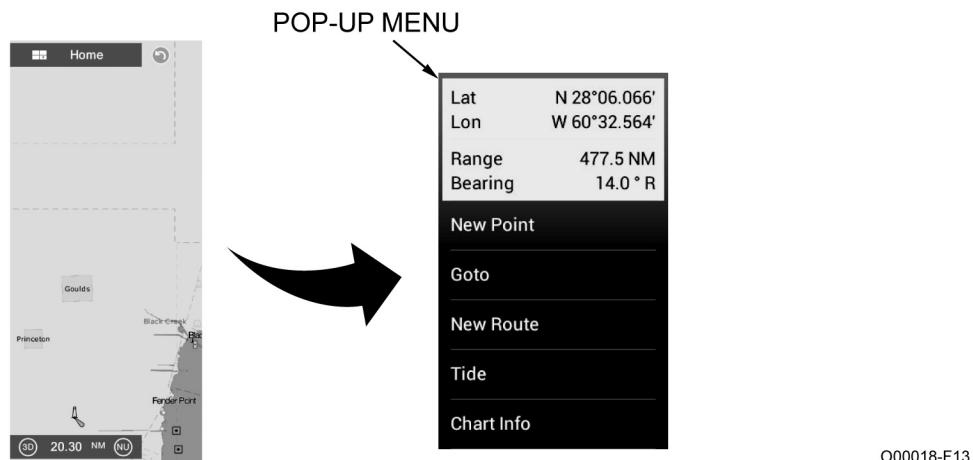


Figure 15. Pop-up Menu

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).

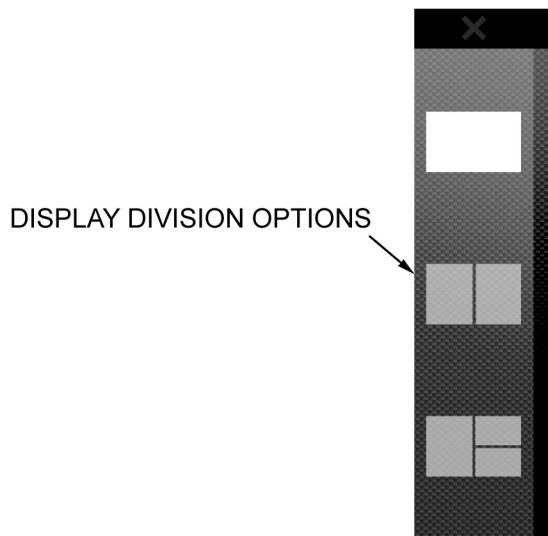


Figure 17. Display Division Options.

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

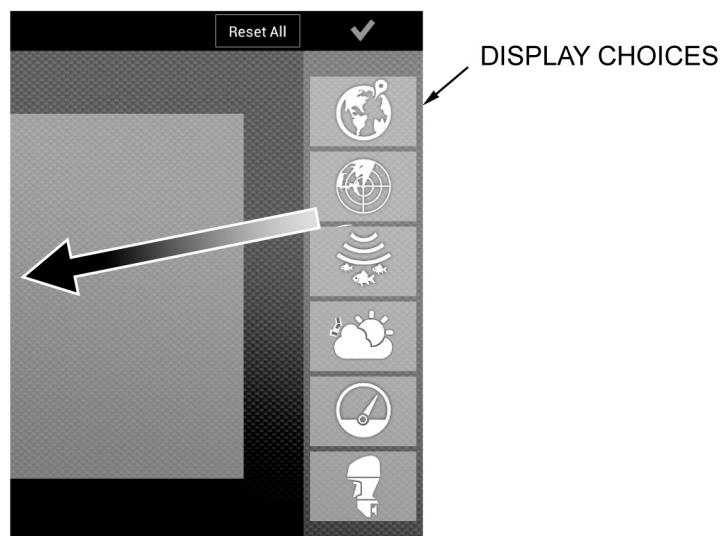


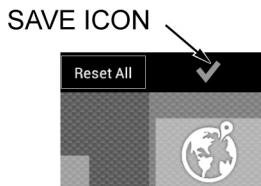
Figure 18. Split Screen Display Icons.

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.

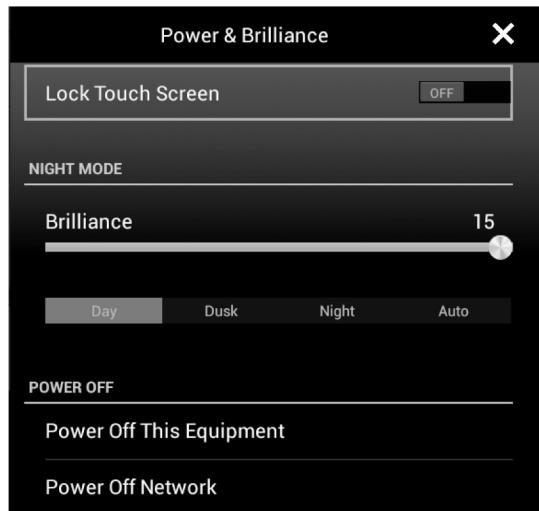


O00018-f01

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.



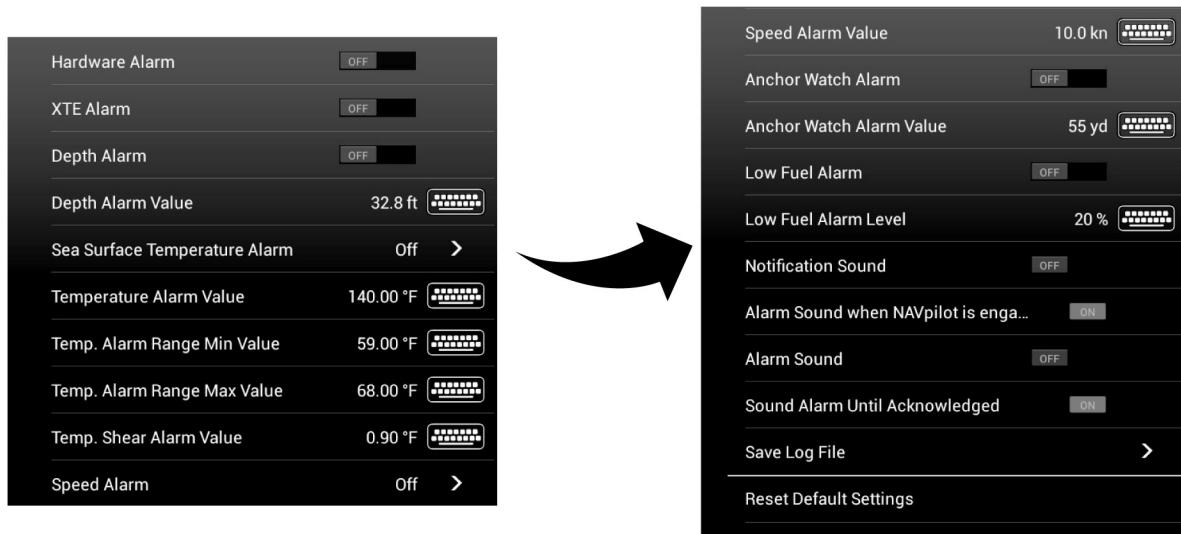
O00018-F17

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

Multi-Function Display Alarm Operation - Continued

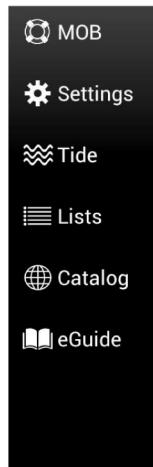
1. Tap the "Home" icon (Figure 23, Item 1) at the top left corner of any operation screen to display the home screen.



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.



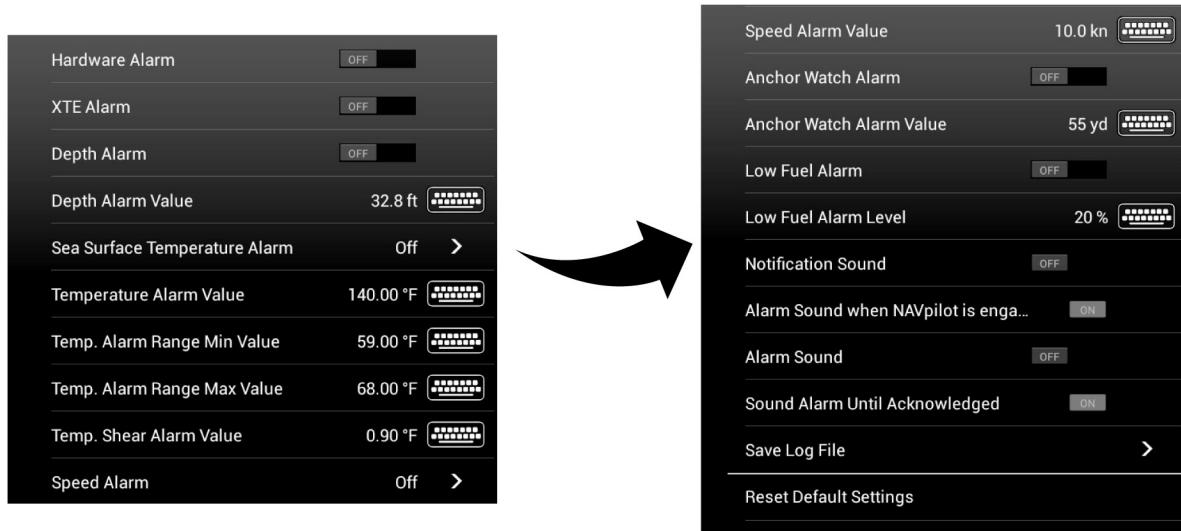
O00018-f07

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.



O00018-F16

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.



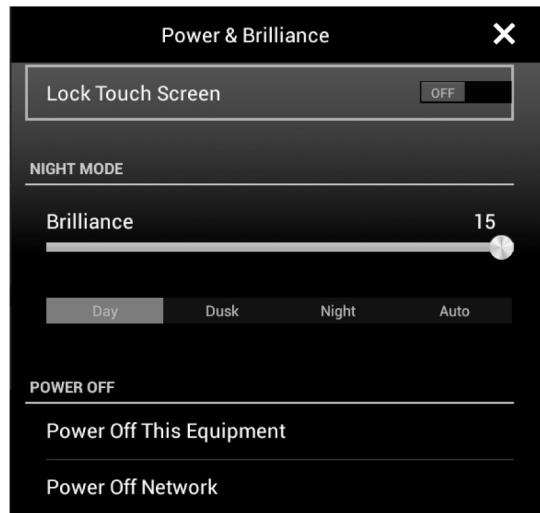
O00018-f01

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.

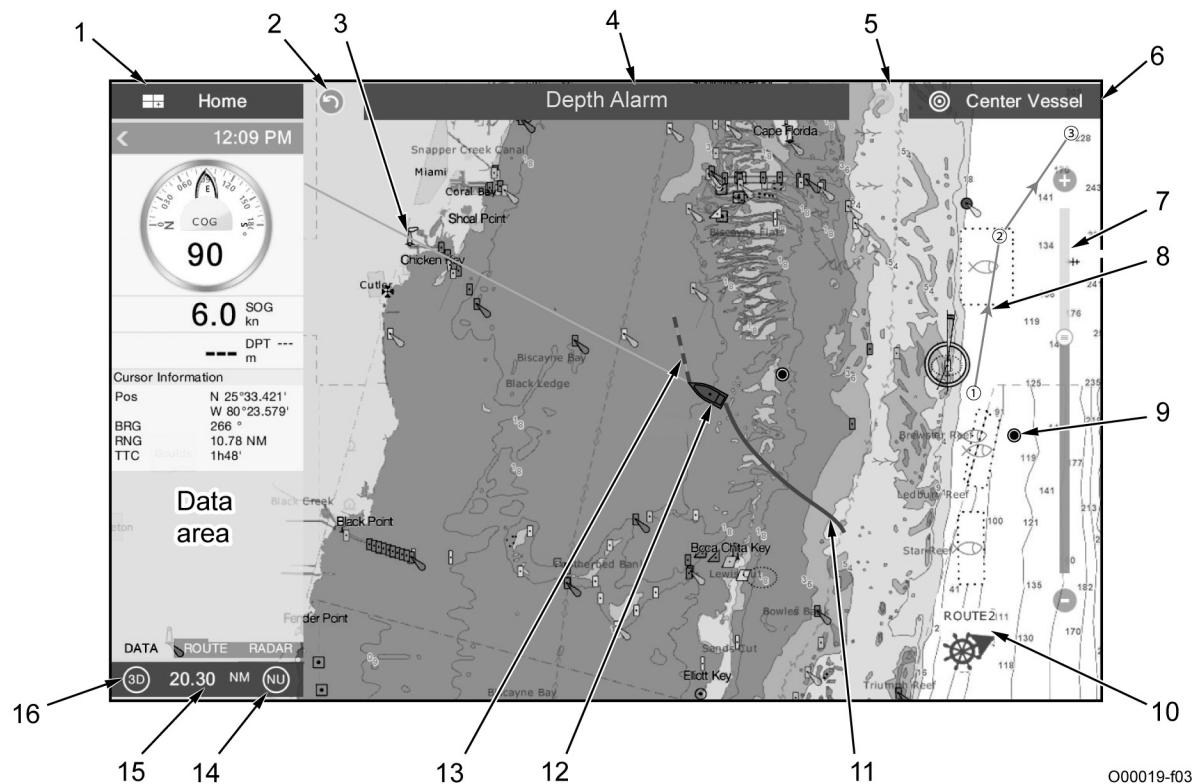


Figure 1. Plotter Display.

Table 1. Plotter Display.

Item No	Key Name	Function
1	Home Icon:	Displays time/date, sensor icons and statuses, display icons, and functions.
2	Undo Icon:	Reverses last change done.
3	Heading Line:	Indicates the boats heading in all orientation modes.
4	Status Bar:	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	Redo Icon:	Restore the undo action.
6	Return Own Ship to Screen Center:	Return the display with boat oriented in the center of screen.
7	Slide Bar:	Adjusts the display range. Top of slider bar is zoomed in and bottom of slider bar is zoomed out.
8	Inactive Route (expanded):	A route that is not currently selected.
9	Point:	A location marked on the plotter.
10	Inactive Route (Sleeping):	A route that is not currently selected.
11	Track:	Displays the boats movement over time.
12	Boat Icon:	The boat icon is displayed in red and marks the current position of the boat and moves with the boats movement.
13	COG (Course Over Ground)	The COG line is a dotted line that runs from the boat icon and points in the direction the boat is moving.
14	Orientation Mode Switch:	Change the orientation of the plotter to show a “head-up” or “north-up” orientation.
15	Chart Range:	Displays the range displayed in nautical miles.
16	2D/3D Switch:	Change the display of the plotter chart to display 2D or 3D.

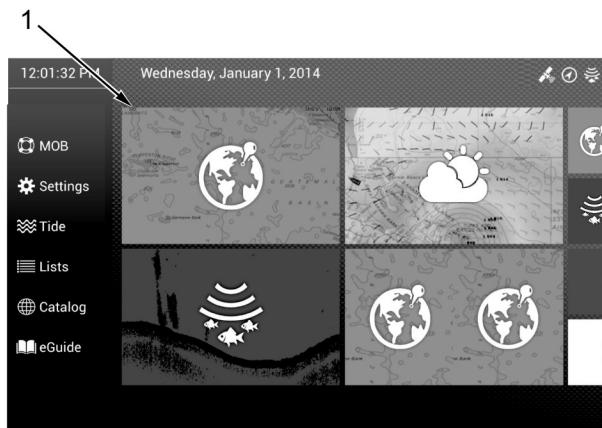
1. If display is not on the “Home screen”, tap the “Home” icon (Figure 2, Item 1) at the top left corner of any operation screen to display the home screen then select the desired display icon.



000019-f02

Figure 2. Home Icon.

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

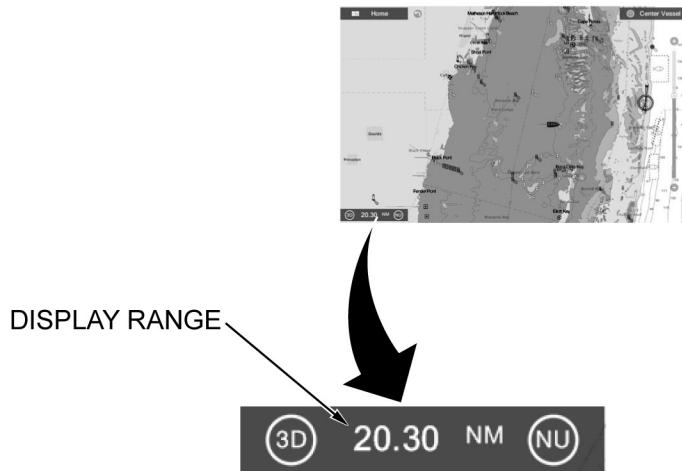


O00019-f01

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.

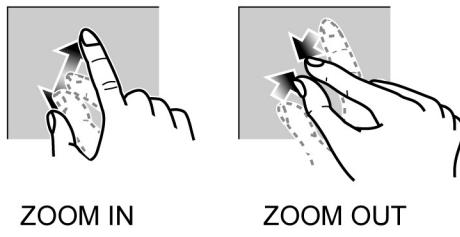


O00019-f04

Figure 4. Plotter Display Range.

Adjusting Display Range of Plotter - Continued

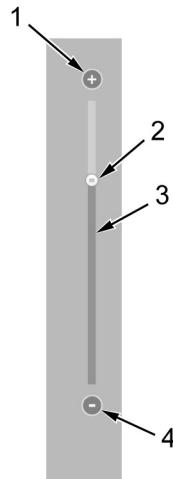
1. To zoom in and out on the plotter display using fingers, use two fingers in a pinching manner (Figure 5).



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).

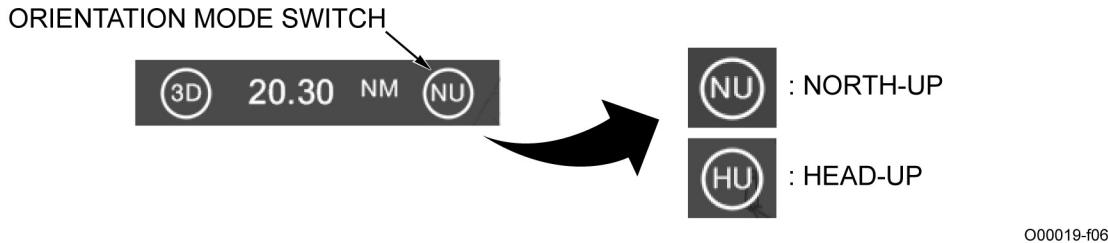


Figure 7. Plotter Orientation Settings.

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).

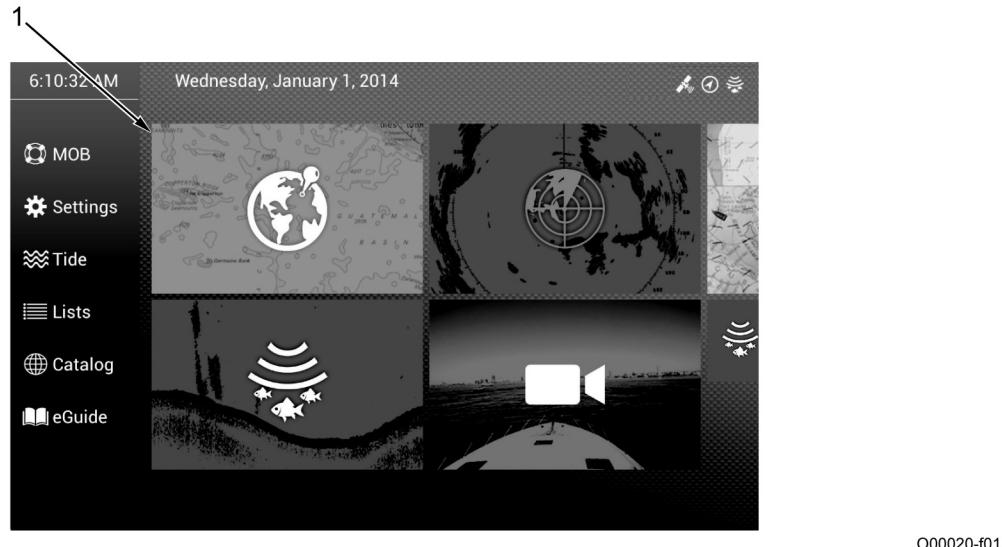


Figure 2. Home Screen.

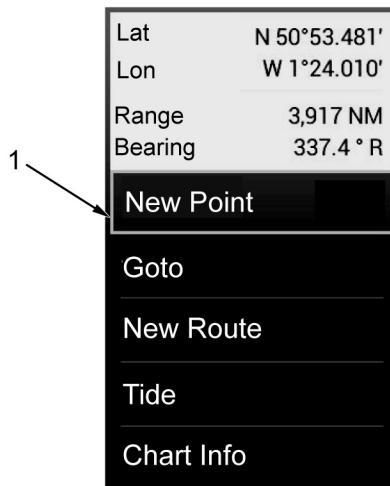
Entering A Point At Selected Position

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.

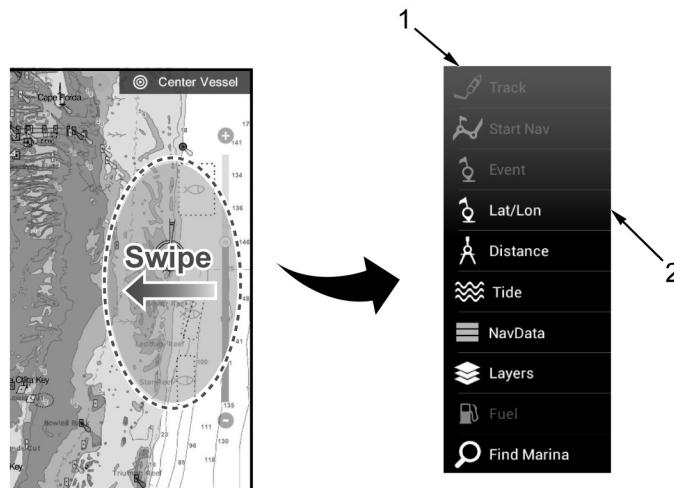
Entering A Point Using Coordinates

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).

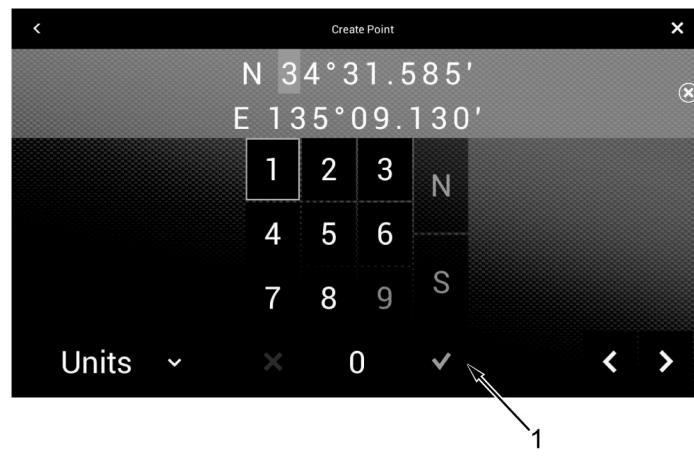


Figure 5. Numeric Keyboard.

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.

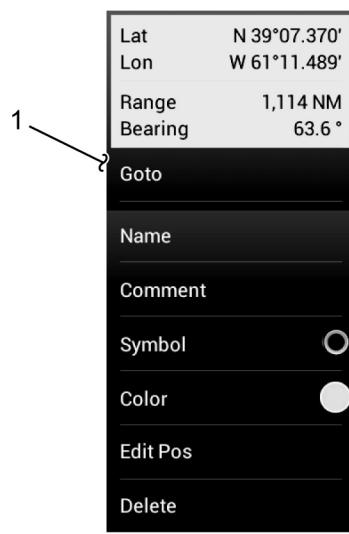


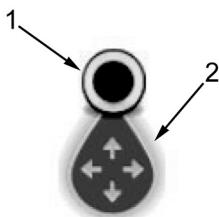
Figure 6. Point Information Menu.

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.



O00020-f07

Figure 7. Point Movement Cursor.

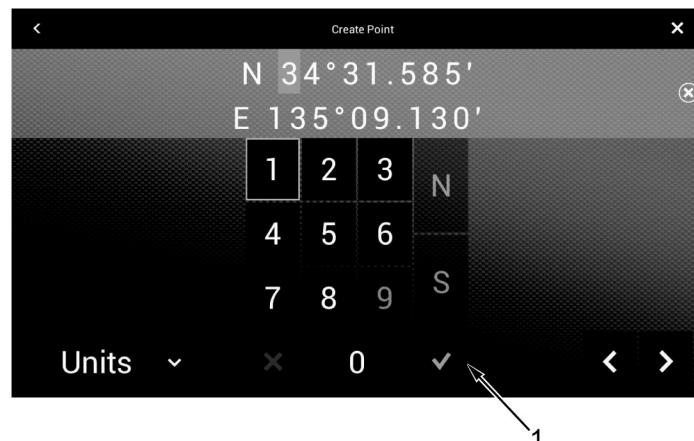
2. Drag and drop the selected point to the desired location.
3. Tap “End Move” at the top right hand corner of the screen to save the new location.

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).

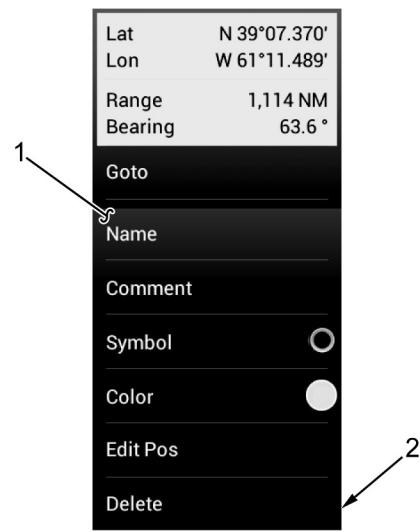


O00020-f05

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).

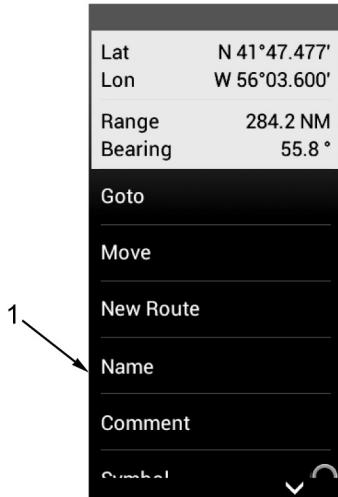


O00020-f08

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.

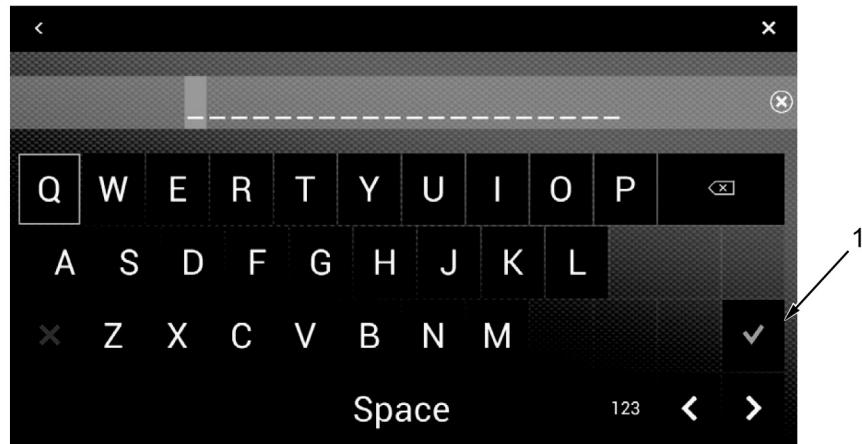
NOTE

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.



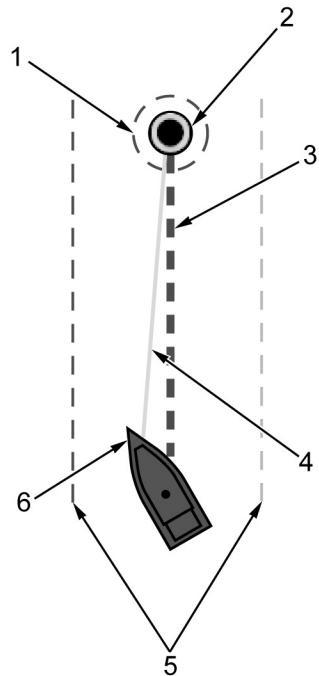
000020-f11

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

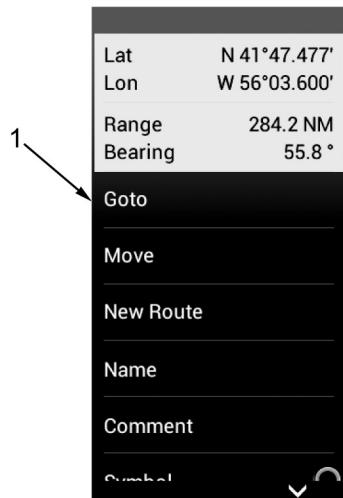
Figure 12. Navigation Screen.

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.

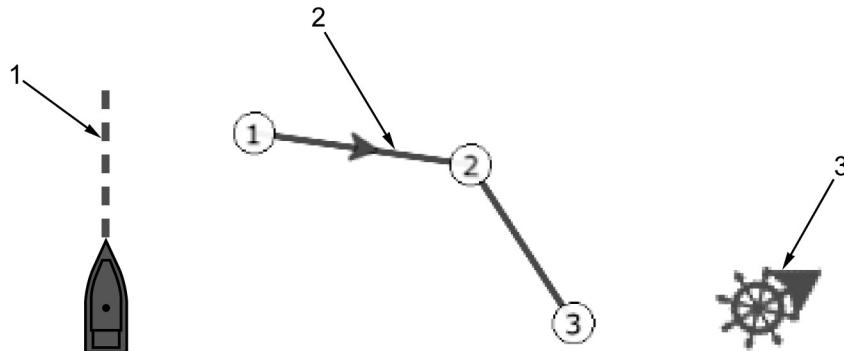


O00020-f13

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.

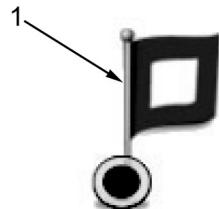
Creating A New Route - Continued

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.



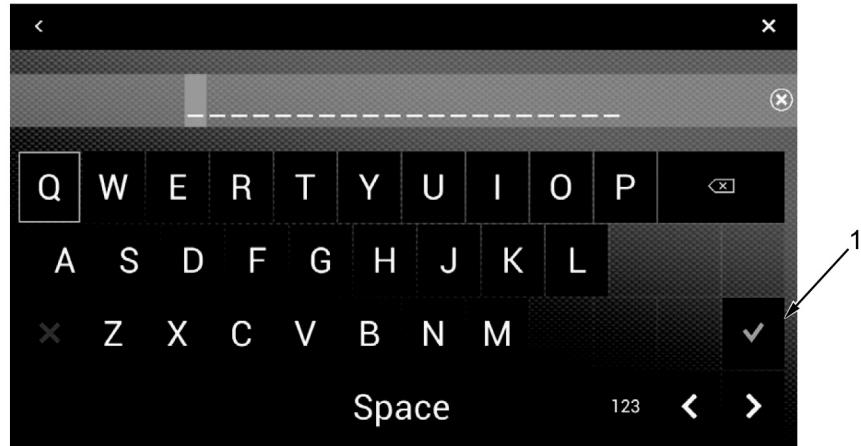
O00020-f15

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).

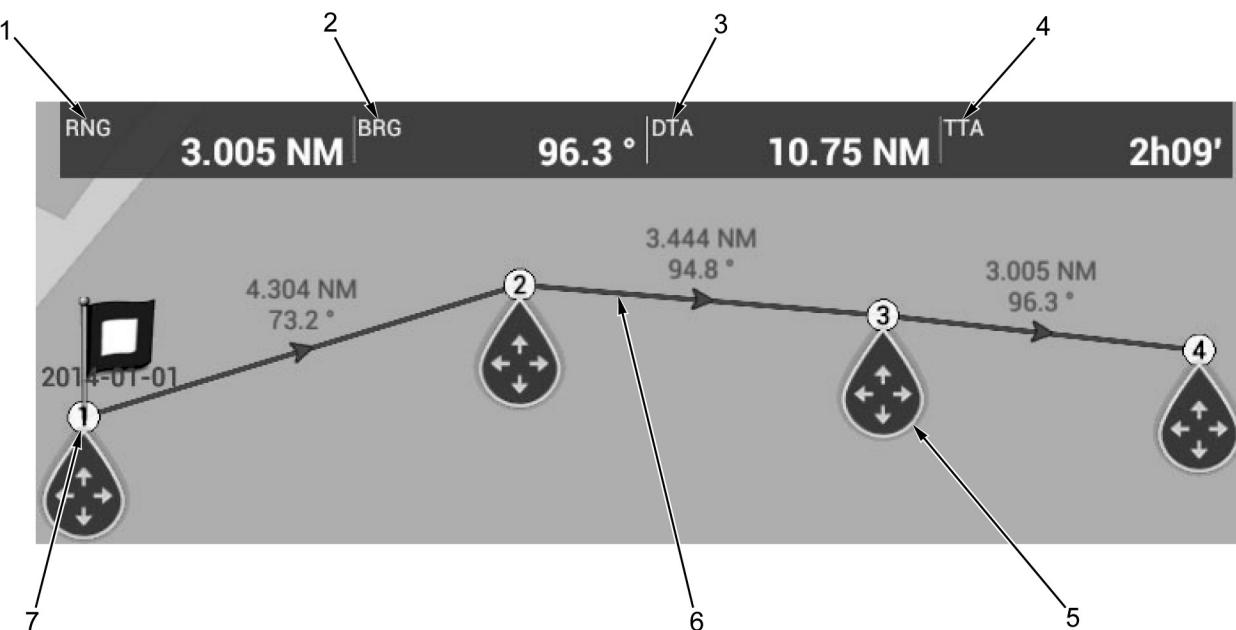


000020-f16

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.

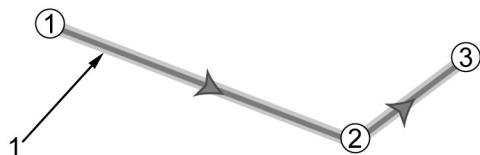
Key	Graphic Icon	Function
1	Range “RNG”	Range between last two points.
2	Bearing “BRG”	Bearing between last two points.
3	Distance to Arrival “DTA”	Distance between current boat position and destination.
4	Time to arrival “TTA”	Estimated time to destination.
5	Move Icon	Drag and drop to the change location 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

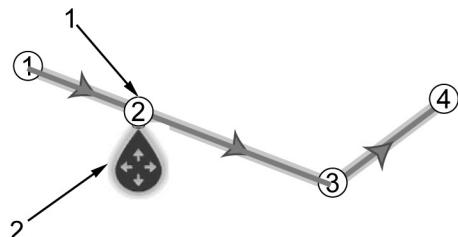
- From the plotter display using a created route, tap a position on the route line (Figure 18, Item 1) to insert desired point and open the “route information” menu.



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.

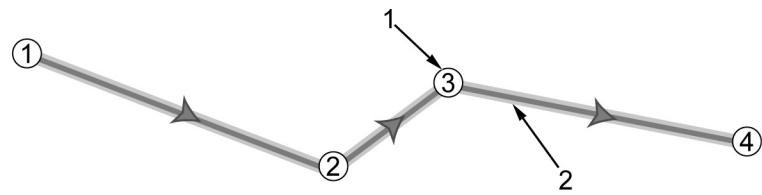
NOTE

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

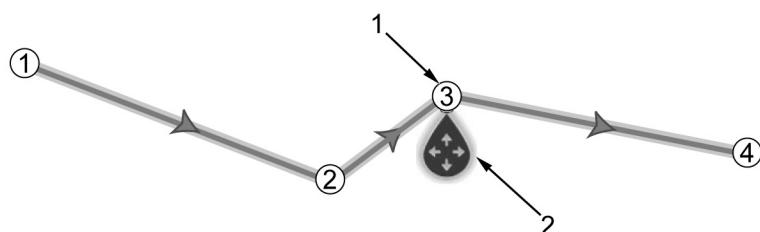
- From the plotter display using a created route, tap a point (Figure 20, Item 1) in the route (Figure 20, Item 2) to open the “route information” menu.

Moving A Point In A Route - Continued

000020-f20

Figure 20. Route Line.

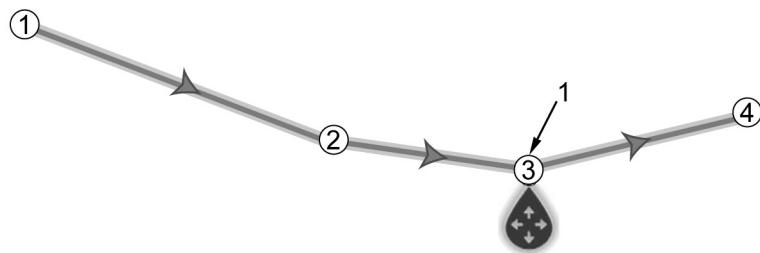
2. Tap "Move", a cursor (Figure 21, Item 2) will be displayed below the selected point (Figure 21, Item 1).



000020-f21

Figure 21. Point Selection.

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



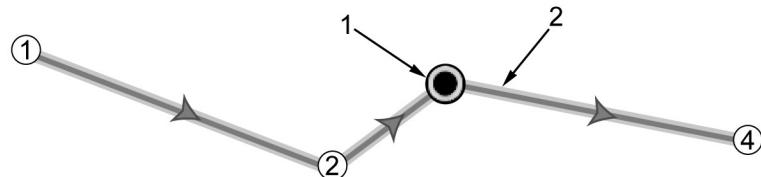
000020-f22

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

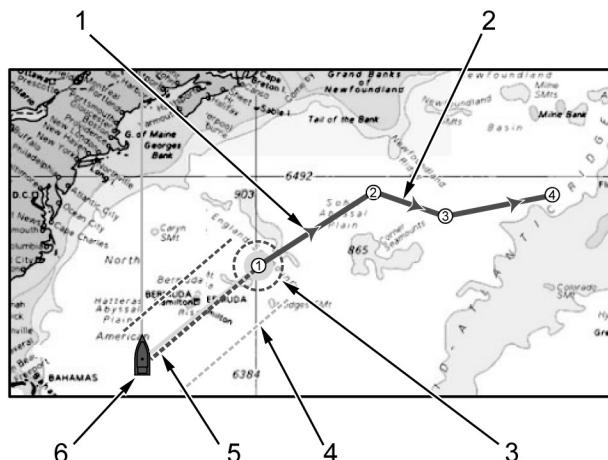
Figure 24. Route Line.

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

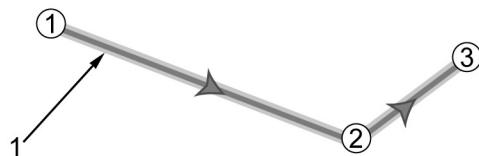
Figure 25. Point Navigation Display.

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

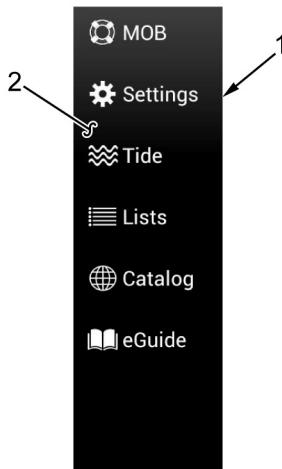
Tapping “Start Nav” option will plot a direct course to point 1.

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

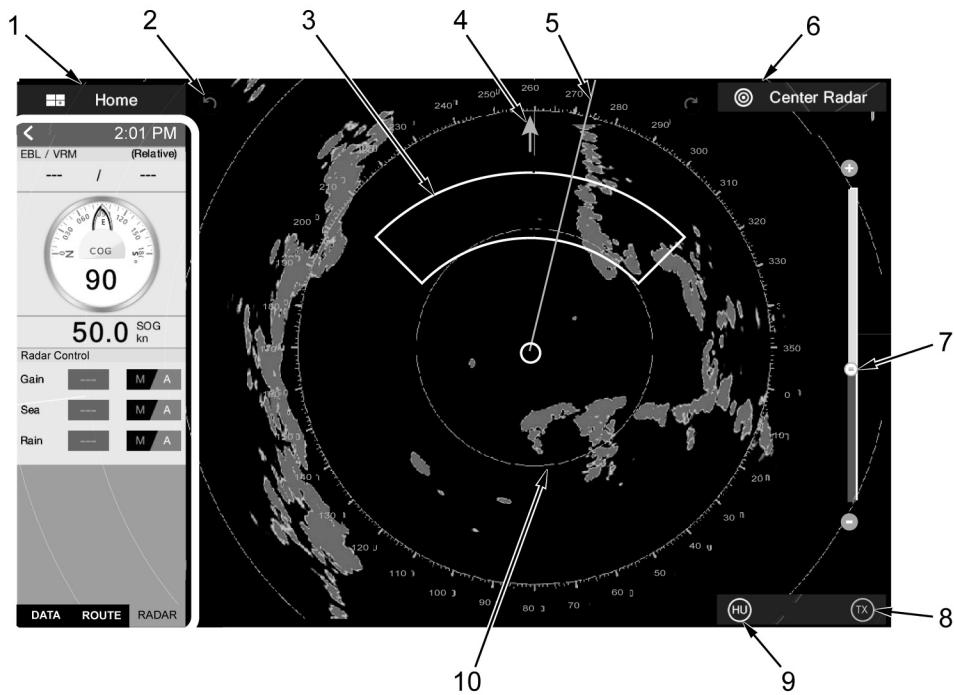
Equipment Condition

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

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	Home Icon:	Displays time/date, sensor icons and statuses, display icons, and functions.
2	Undo Icon:	Reverses last change done.
3	Guard Zone:	Notifies when radar targets are in the area indicated.
4	North Mark:	Marks the position of north on the radar.
5	Heading Line:	Indicates the boats heading in all orientation modes.
6	Center Radar:	Return the display with boat oriented in the center of screen.
7	Slide Bar:	Adjusts the display range. Top of slider bar is zoomed in and bottom of slider bar is zoomed out.
8	TX/Standby Switch	Put radar in transmit or stand-by mode.

Table 1. Radar Display - Continued.

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

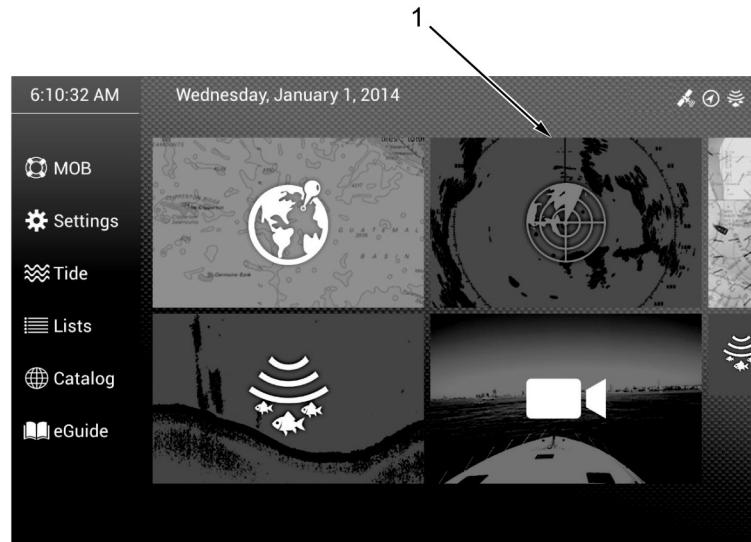
1. If display is not on the “Home screen”, tap the “Home” icon (Figure 2, Item 1) at the top left corner of any operation screen to display the home screen then select the desired display icon.



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.

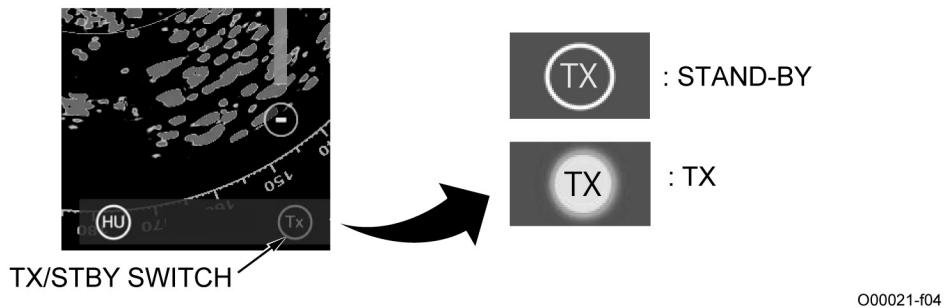


Figure 4. TX/STBY Switch.

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).

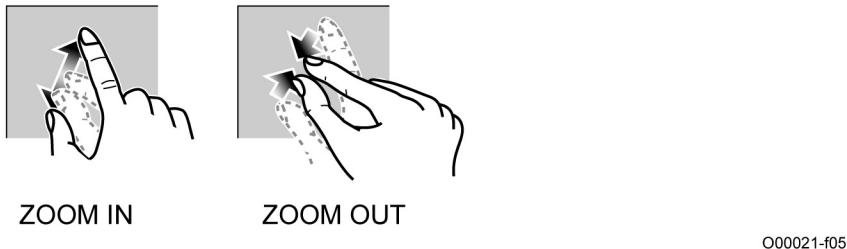
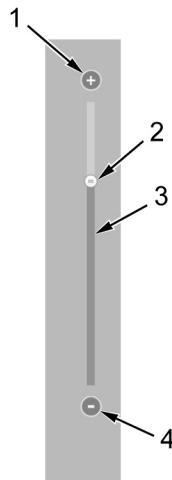


Figure 5. Zooming Gestures.

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



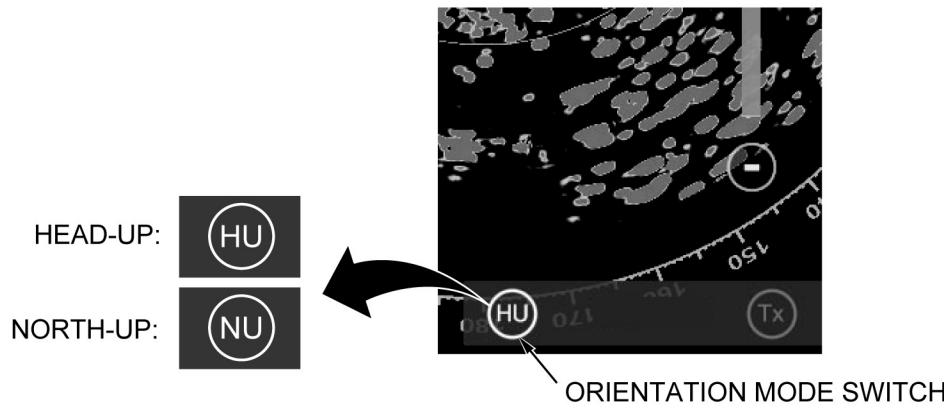
000021-f06

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.

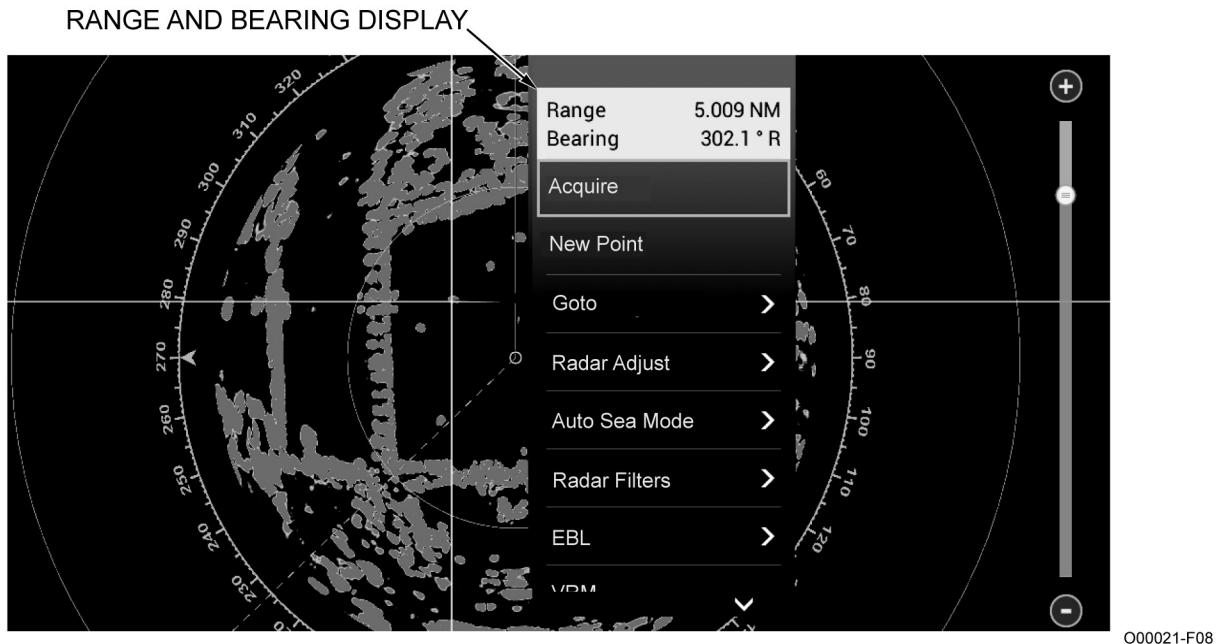


Figure 8. Range and Bearing Display.

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.

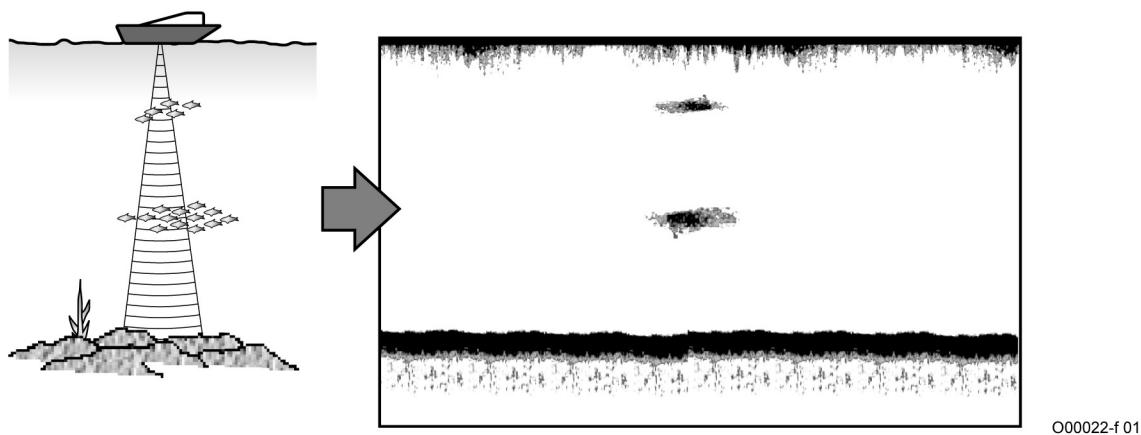
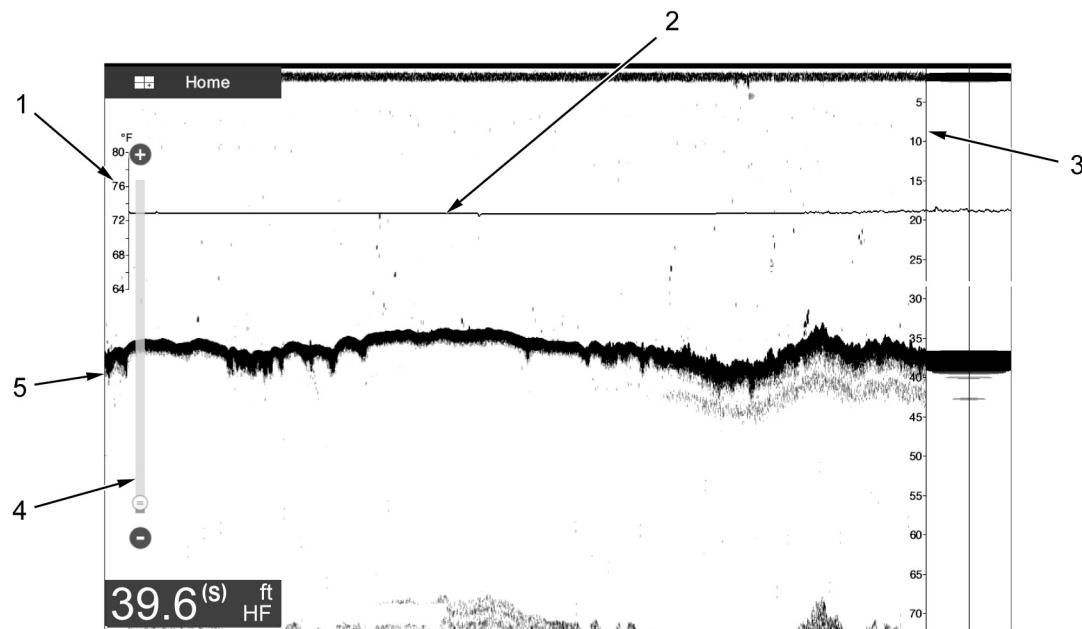


Figure 1. Sonar Operation.



O00022-f04

Figure 2. Sonar Display.

Table 1. Sonar Display.

Item No.	Key Name	Function
1	Temp Scale:	Displays a range of degrees to determine the sea surface temperature using the Temp Graph.
2	Temp Graph:	Is a line running from left to right on the screen displaying the sea surface temperature.
3	Depth Scale:	Displays a range of depth in feet to determine the depth to an object or the sea bottom.
4	Slide Bar:	Adjusts the display range. Top of slider bar is zoomed in and bottom of slider bar is zoomed out.
5	Bottom Echo:	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).

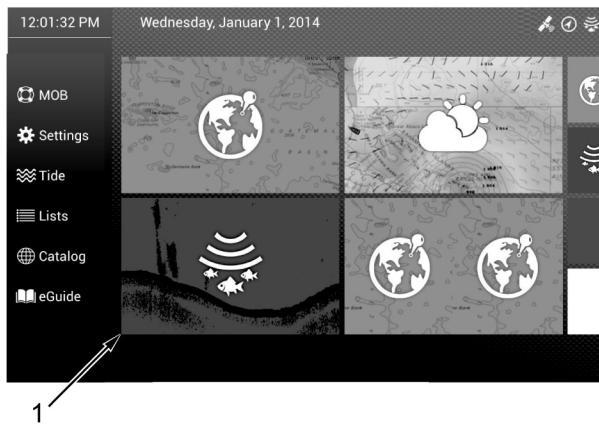


Figure 4. Sonar Display Icon.

Sonar Transmit/Standy Mode

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

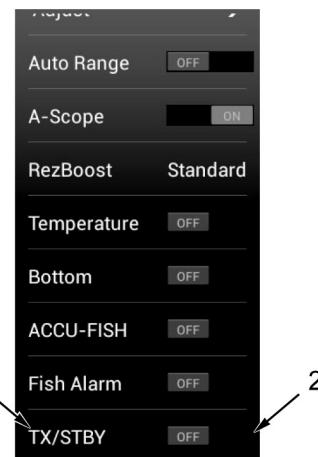
Sonar Transmit/Standy Mode - Continued

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

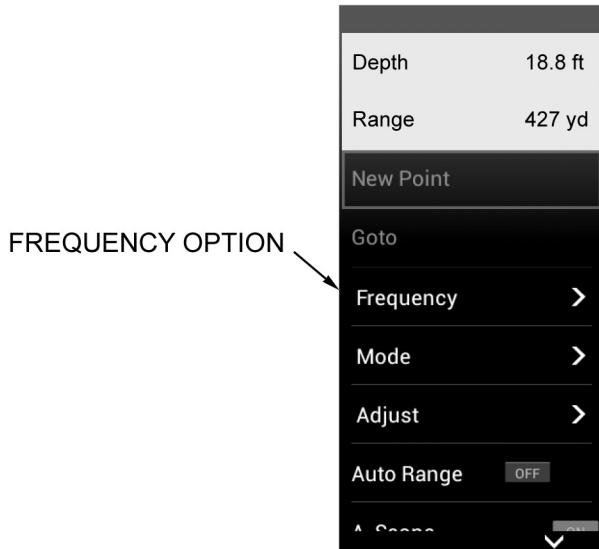
Figure 5. Transmit/Standy Mode.

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).



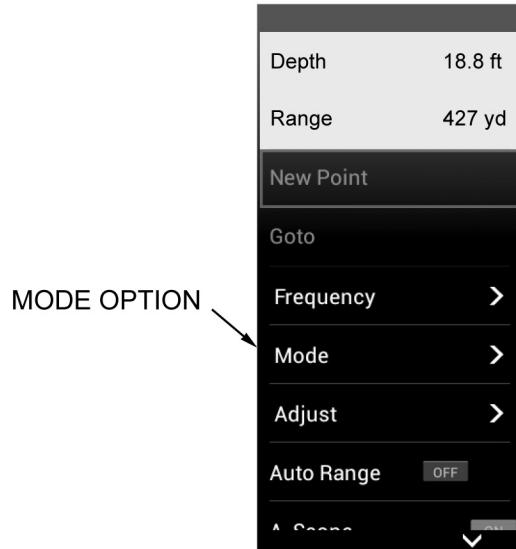
O00022-F08

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.

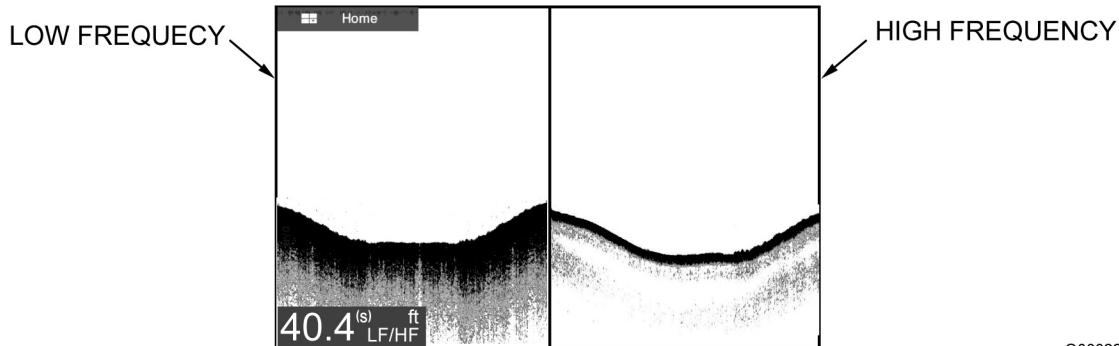


Figure 10. Dual Frequency Display.

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

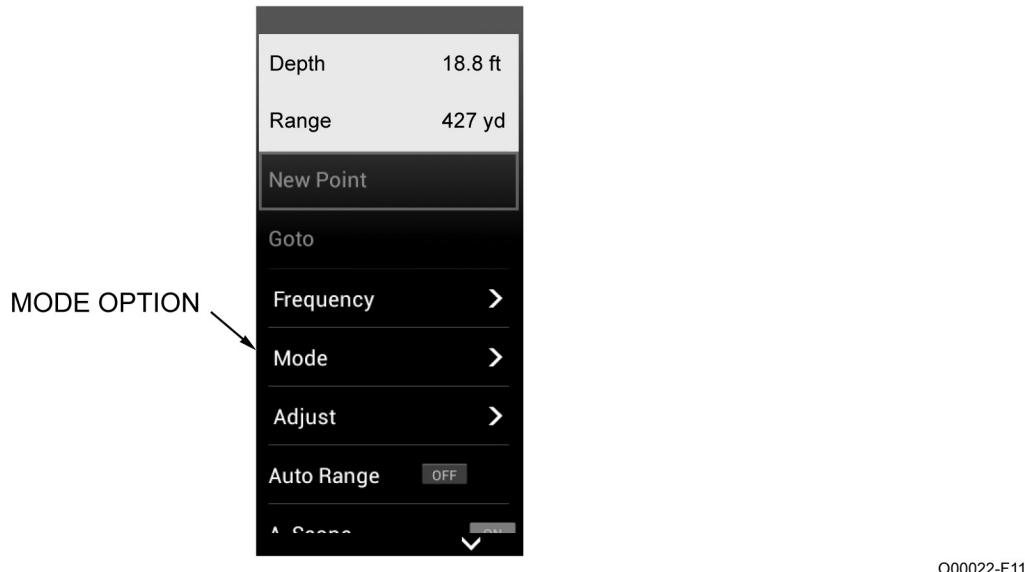
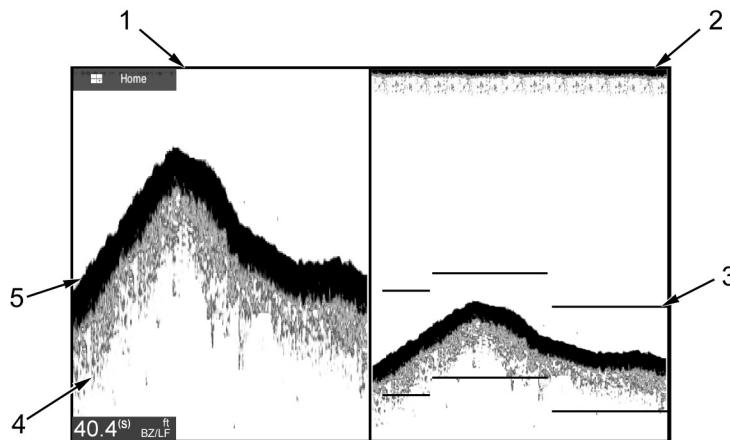


Figure 11. Sonar Mode Option.

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

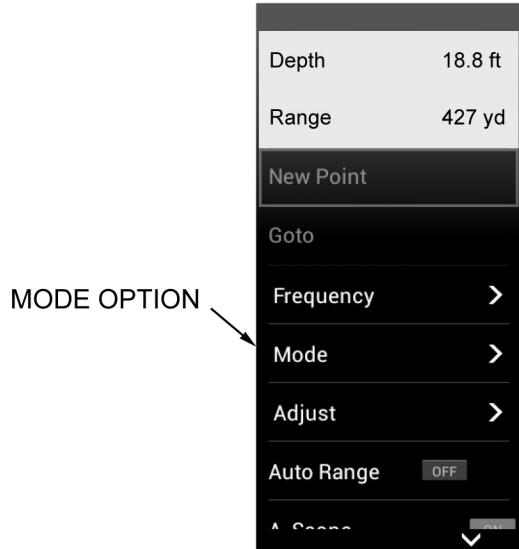
Figure 12. Bottom Zoom Display.

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.

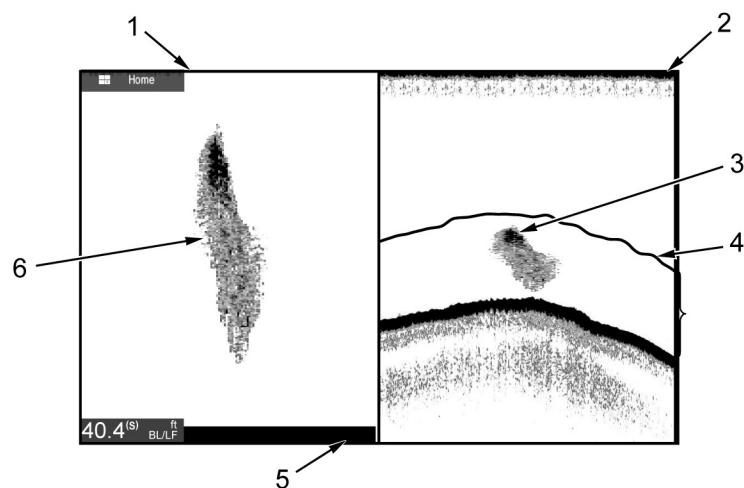


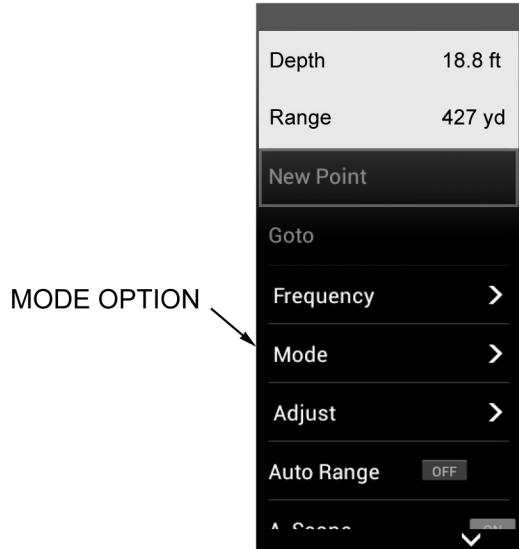
Figure 14. Bottom Lock Display.

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).

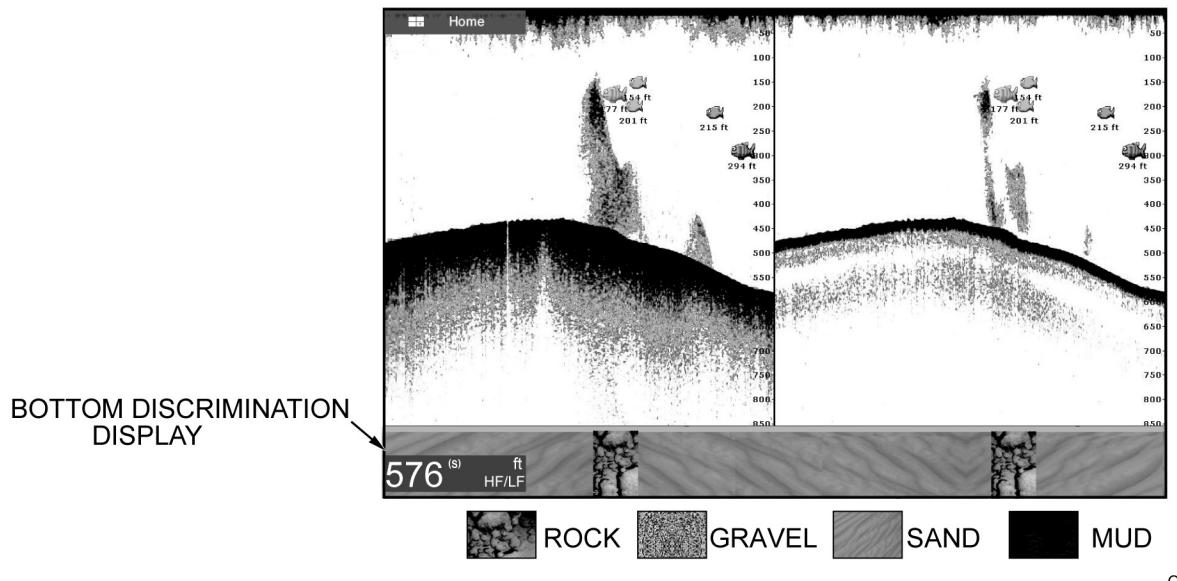


Figure 16. Bottom Discrimination Display.

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

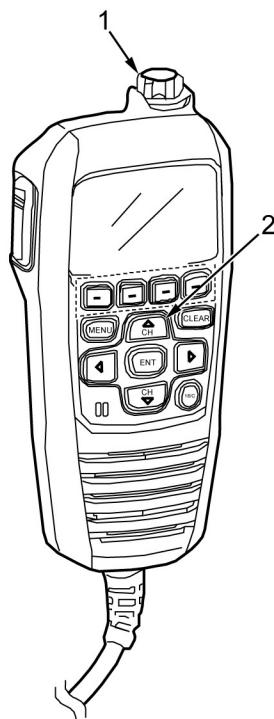
House battery switch powered ON, VHF antenna raised (WP 0005)

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

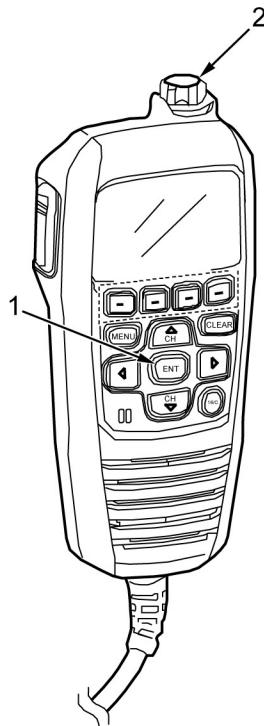
Figure 1. Command Microphone Remote.

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.



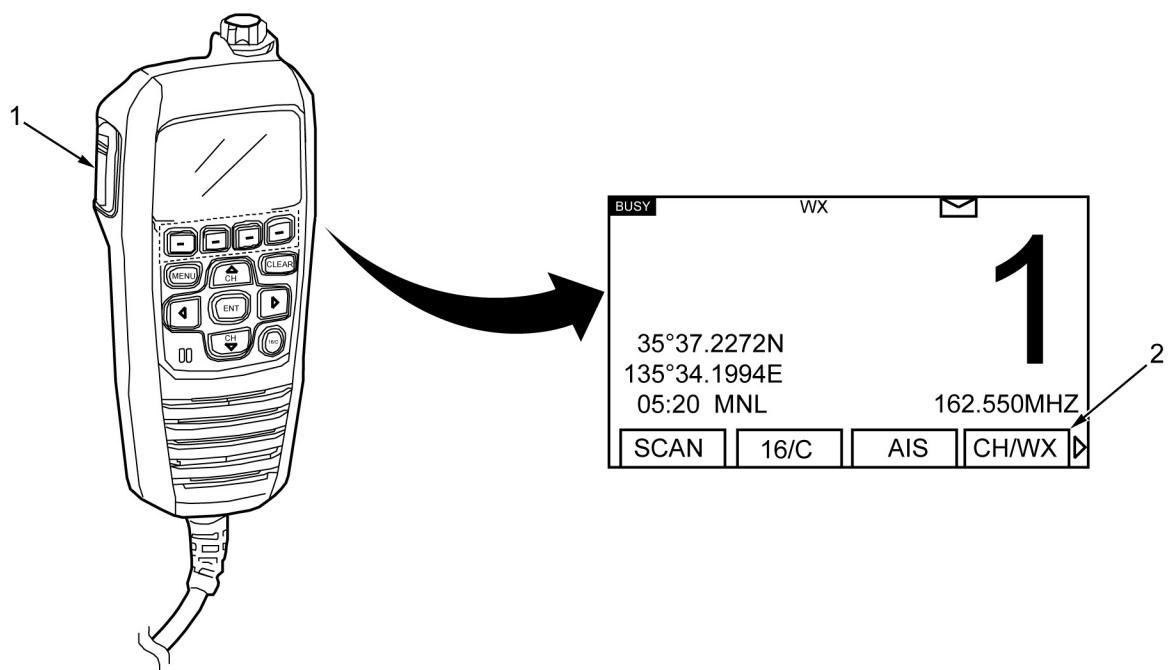
000024-f04

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.

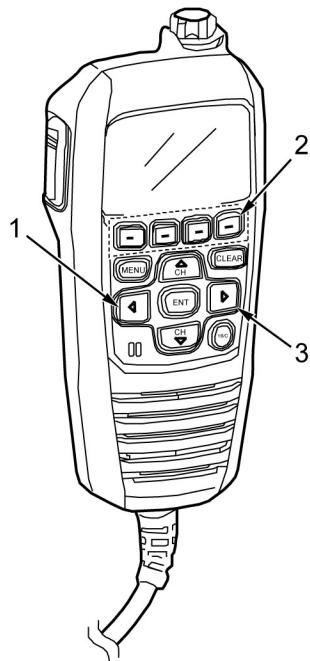
3. Speak slowly and clearly into the microphone.
4. When the transmission is finished, release the “Push-To-Talk” button.
5. When a message is received, the “BUSY” indicator will appear on the screen while the message is being received.

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.

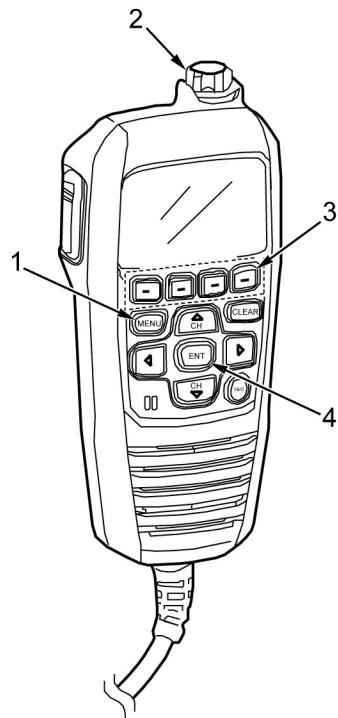


000024-f06

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

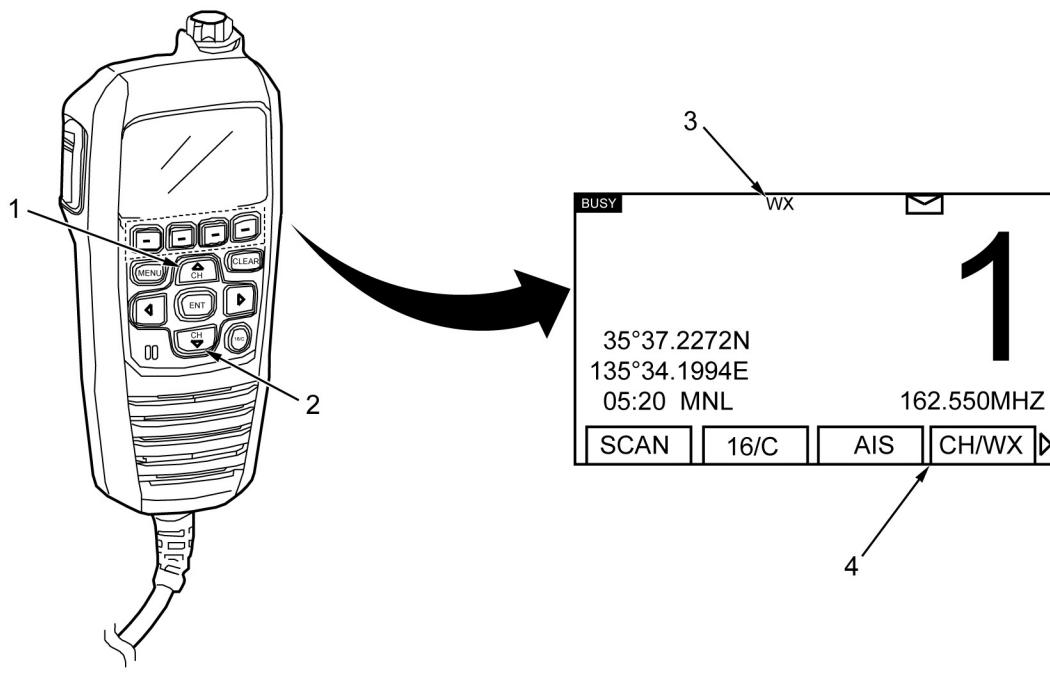
Figure 5. Softkey Programming Selection.

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

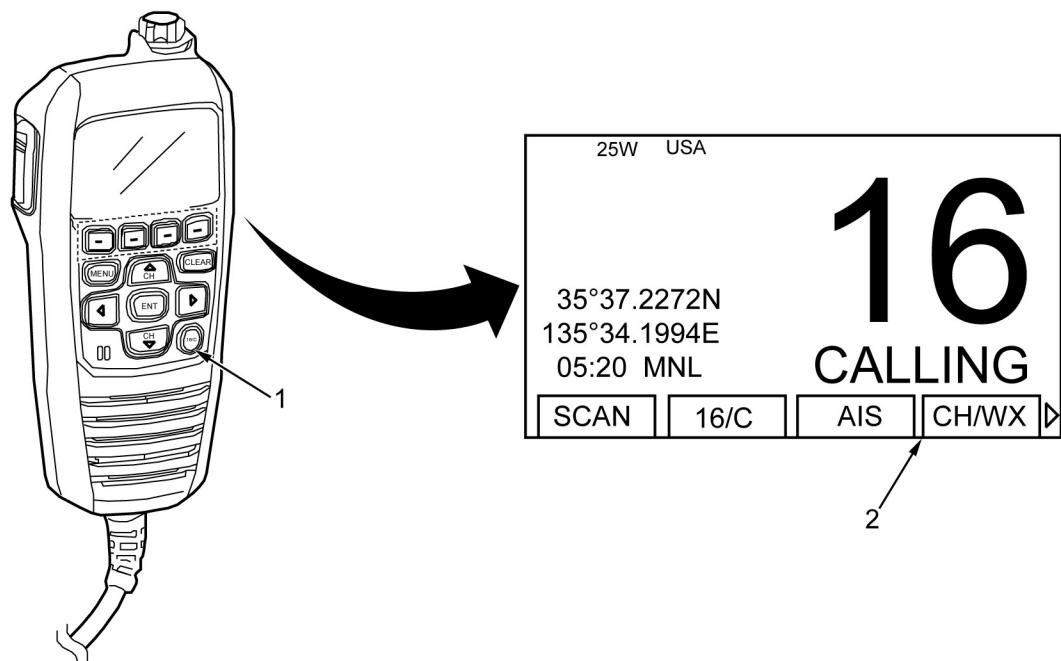
Figure 6. Weather Channel Selection Screen.

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.

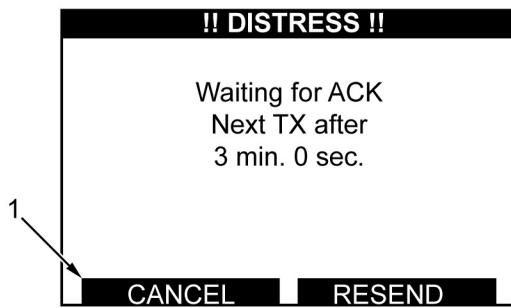


000024-f10

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).



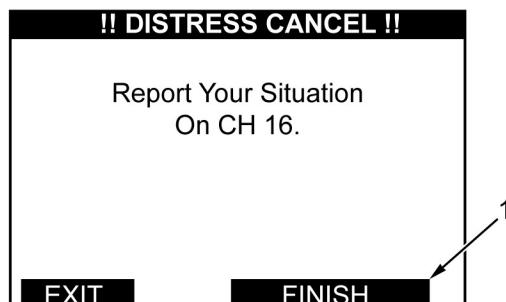
000024-f12

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

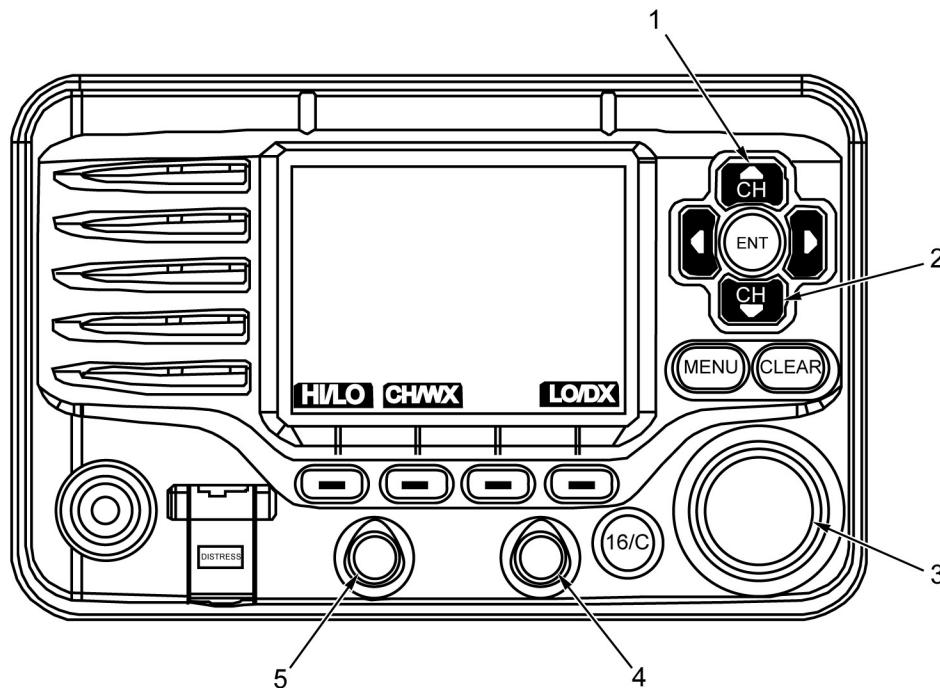
Diver 12D

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.



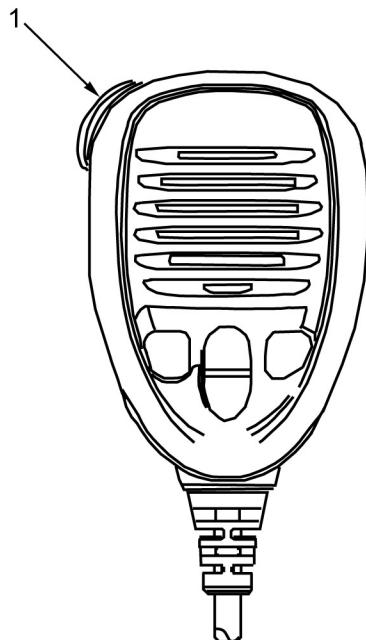
O00025-f02

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

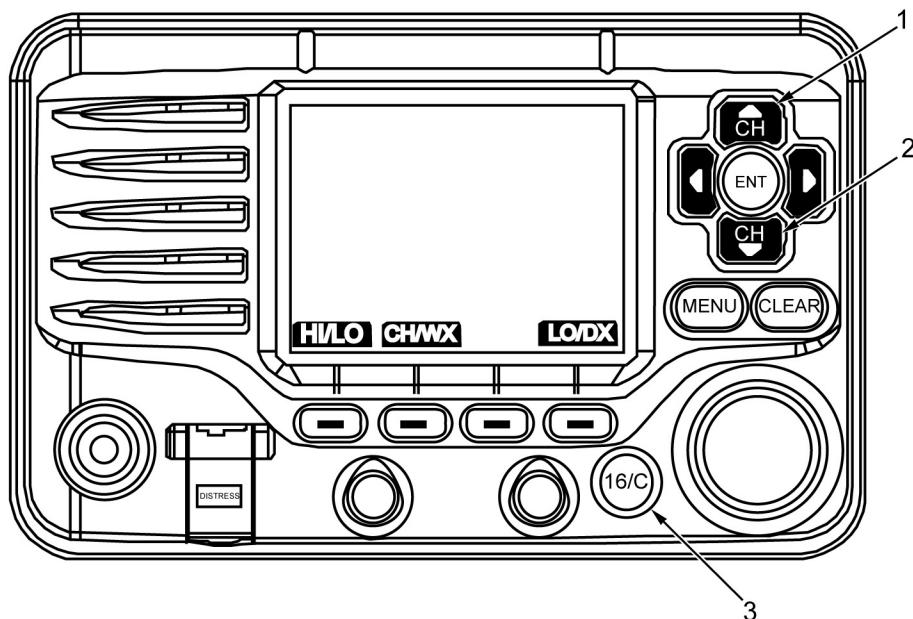
Figure 2. Mircophone PTT Button.

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.

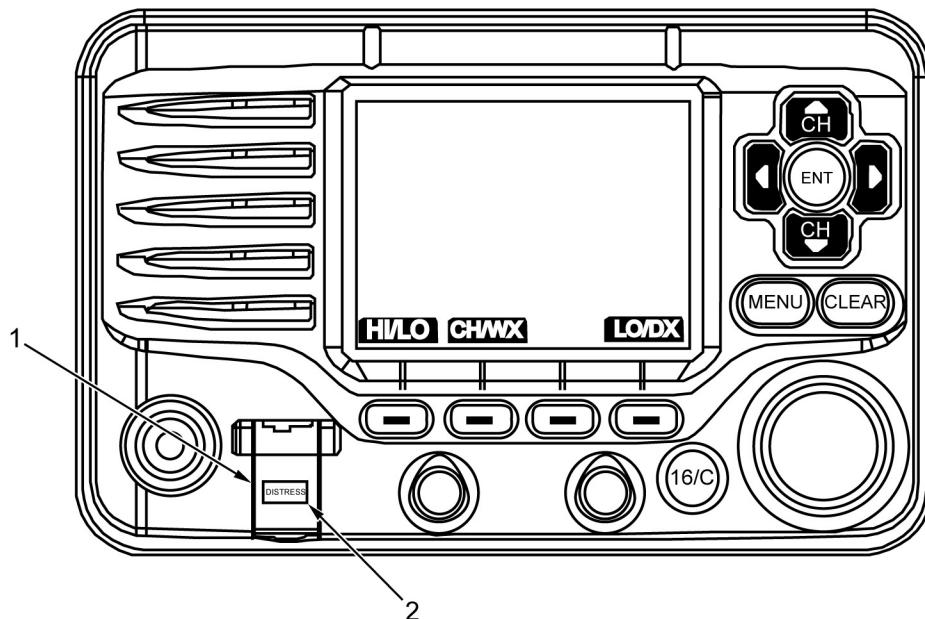
Transmitting A Distress Call

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.

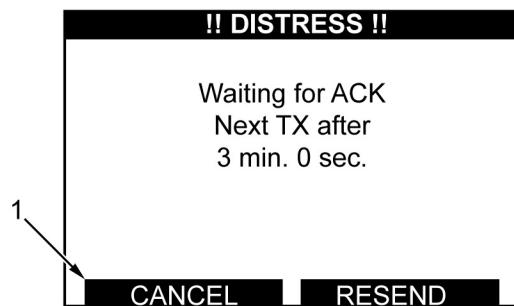


000025-f05

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).



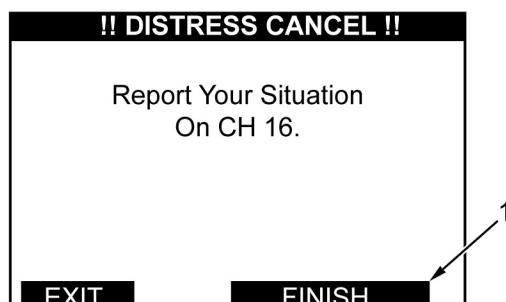
000025-f07

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

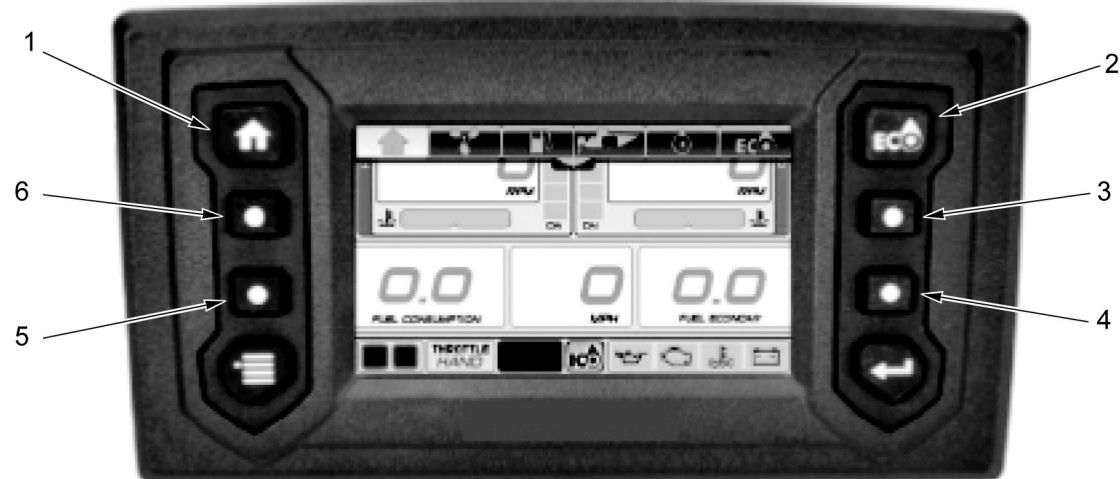
References

WP 0007
WP 0010

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	HOME	The home screen shows data for port and starboard engines. Data includes rpm, coolant temperature, trim position, speed, fuel consumption, and fuel economy.
2	ECO	The ECO screen displays boat fuel economy data. Data includes engine trim position, fuel consumption, fuel economy, range, average, speed, and rpm.
3	TRIP	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	VESSEL	The vessel screen shows vessel data. Data includes; battery voltage, fuel consumption, speed, and fuel economy.
5	FLUID TANKS	<ul style="list-style-type: none"> • Oil level data shown is from the reservoir on the engine. • Oil level readings are not available when the engine is in the tilt range. • The fluid tanks screen shows oil level of the reservoir for each engine.
6	OUTBOARD	<ul style="list-style-type: none"> • Oil level data shown is from the reservoir on the engine. • Oil level readings are not available when the engine is in the tilt range. • 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,

Engine Monitor Overview - Continued

Table 1. Engine Monitor Display - Continued.

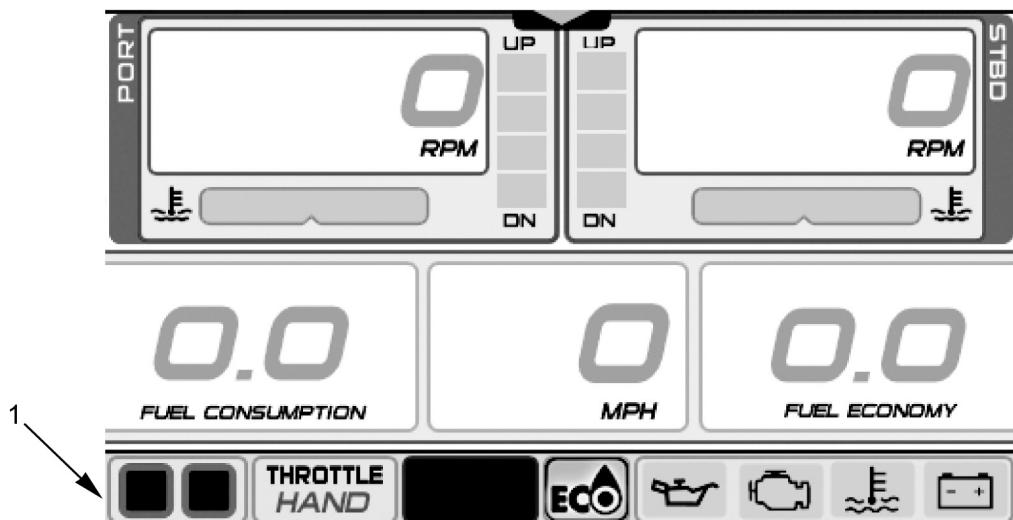
		coolant temperature, water pressure, battery voltage, oil level, fuel consumption, and throttle position.
--	--	---

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.

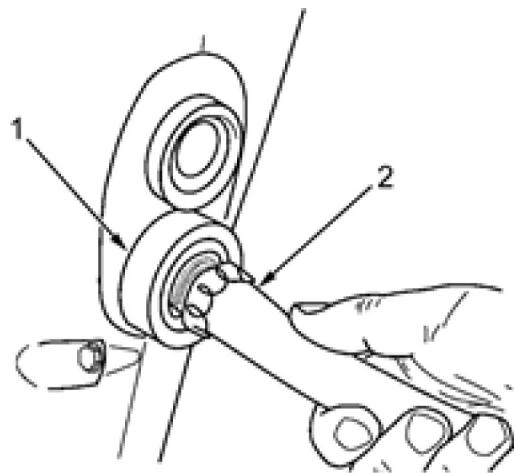
Winterization Preparation - Continued**WARNING**

- 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.

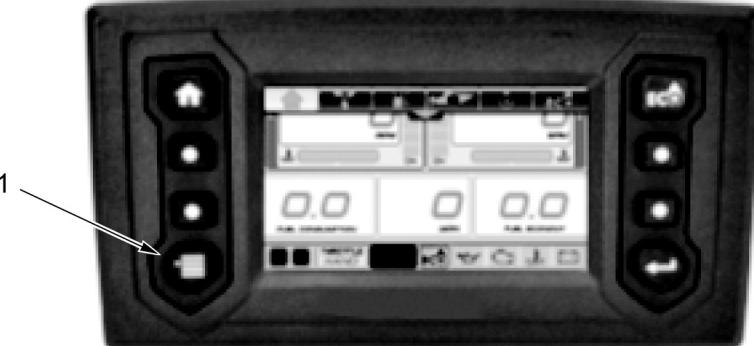


000026-f03

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.