Mainship®
TRAWLERS
AN EMPLOYEE OWNERSHIP COMPANY

Operator's Manual

40 Trawler
Single & Twin

V1.011508 • P/N 1034082

Thank You!
From the General Manager

Dear Mainship Owner,

Congratulations and welcome to the Mainship family! As a Mainship owner, you will enjoy the quality and the attention to detail for which Mainship Boats are renowned. Mainship and your dealer are committed to your service and total satisfaction.

This Operator's Manual will acquaint you with the proper operation and maintenance of your new Mainship boat, as well as boating safety, which is our primary concern, whether in ports or at sea.

Please mail in all manufactures' registration and warranty cards to ensure that your Mainship and Original Equipment Manufacture (O.E.M.) warranties are valid. The individual warranty cards are contained in the owner's packet along with all of the O.E.M. manuals. please remember that all the information contained in the O.E.M. manuals supercedes the information contained in this manual.

Finally, if you are new to boating, be certain to learn the proper rules of seamanship to ensure the safety of your passengers. Refer to Chapman's Piloting, Seamanship, and Small Boat Handling Manual for important and useful information concerning this aspect of boating. Attend a safe boating course offered by the United States Coast Guard Axillary, United States Power Squadron, or any enterprise experienced in conducting safe boating courses.

Thank you for choosing Mainship. I am confident your new boat will provide you and your family with years of enjoyable boating.

Thanks from Mainship

Welcome to the Mainship Family

At the time of delivery, your dealer should have requested your signature on the WARRANTY REGISTRATION FORM and PRE-DELIVERY SERVICE RECORD. This space in your Owner's Manual is provided for your copies of these documents. These forms, when returned to MAINSHIP by the dealer, will:

** ACTIVATE YOUR WARRANTY COVERAGE
(Until we receive your warranty registration your Mainship warranty is not in effect),

** Involve you in our CUSTOMER SATISFACTION PROGRAM, leading to an exchange of our Mainship gift for your opinions on your new Mainship, and

** Place you on our distribution list for the Mainship Newsletter publication.

Everyone here at the Mainship Corporation wishes you safe, fun, and relaxing boating in your new Mainship.

As the owner of a Mainship 40 Trawler, you have chosen one of the finest boats money can buy.

Mainship Corporation, is one of America's oldest privately held yachting companies. In February 1996 Mainship became an employee ownership company. We continue to be dedicated to giving you a quality yacht that will bring you years of enjoyment whether you're spending a day at the marina or cruising down a waterway. Performance, dependability, safety, and comfort is more than just a catchy phrase at Mainship. It is the basis for every step of design and construction to assure you of many pleasure-filled years of yachting.

A Rich Heritage

Mainship Corporation was formed in 1977 and soon outgrew the existing facilities. A new plant was built in Marlboro, NJ and was home to Mainship until 1992 when it was moved to St. Augustine, FL. Over 1200 of the traditionally styled cruisers were built before Mainship began building a European inspired line of cruisers in 1988. The new boat line did well for several years, but Mainship's real destiny was to return to the trawlers that made them famous. In 1994, the first new Trawler, a 35" sedan was introduced and the market accepted the new breed with enthusiasm.

Today, Mainship Corporation is the leading manufacturer of production trawlers building 6 different models with many more on the drawing boards. Production is split between the St. Augustine facility it shares with the Luhrs Corpoation.

How to Use this Manual

Many people read their owner's manual from beginning to end when they first receive their new yacht. If you do this, it will help you learn about the features and controls for your new yacht. In this manual, you'll find that pictures and words work together to explain things quickly.

Table of Contents

A good place to look for what you need is in the Table of Contents in the beginning of this manual. It is a list of the chapters and the page number where you'll find them.

Safety Warnings and Symbols

In chapter 4 (Boating Safety) you will find a number of cautions, warnings, and danger symbols to tell you about things that could hurt you.

In this chapter we tell you where the hazard are. Then, we tell you what to do to help avoid or reduce them. Please read this chapter carefully, to prevent yourself or someone else from possible injury.

If you have any questions regarding your Mainship or this manual contact Customer Service at:

Mainship Corporation
255 Diesel Road
St. Augustine, FL, 32086 USA
Phone: (904) 827-2025
Fax: (904) 827-2158
http: // www.Mainship.com
email: info@Mainship.com

Operator’s Manual at a Glance

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Mainship®
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Chapter 1

Introduction

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1.1 The Manual Packet

This operator's manual, along with your owner's packet, has been compiled to help you to operate your boat with safety and pleasure. The Owner's / Operator's Manual:

- Describes basic safety information;
- Describes some of the features of your boat;
- Describes the equipment on your boat;
- Contains fundamentals of the use of that equipment;
- Contains fundamentals of the use of your boat.

However, please note that the information in this manual only summarizes more detailed information in the equipment manuals. The summaries are intended to be a convenient reference for daily use. OEM manuals take precedence over the information in the manufactures documents.

This information does not give you a course in boating safety, or how to navigate, anchor, or dock your boat. Operating a boat, sail or power, requires more skills, knowledge and awareness than is necessary to operate a car or truck.

1.2 Your Responsibilities

Please keep this manual in a dry and secure but readily accessible place and leave it on the boat at all times! Make sure to hand over this manual to the new owner if you decide to sell the boat.

If this is your first boat of this type or you are changing to a new boat you are not familiar with, please insure that you obtain handling and operating experience before assuming command. For your safety, and the safety of your passengers you must:

- Take a course in Boating Safety;
- Get instruction, or aide in the safe and proper handling of your boat;
- Familiarize yourself and your passengers of the locations, and use of all safety, and essential operating equipment;

Understand and follow the rules of the road;

- Learn how to navigate a boat in the proper sea, and weather conditions;
- Register your boat, contact state boating authorities, or the marine dealer for the registration requirements.

Boating Safety courses provide owners and operators with the opportunity to gain knowledge and experience in a variety of skills:

- Navigation
- Seamanship and boat handling
- Rules of the Road
- Knowledge of federal, state, and local regulations
- Weather prediction
- Safety at sea
- Survival in bad weather
- Respect for others on the water
- First aid
- Radio communication
- Distress signals
- Rendering assistance to others
- Use of lifesaving equipment
- Pollution control
- Knowledge of the boat and its systems
- Seaworthiness
- Leaving or approaching a dock mooring
- Anchoring and weighing anchor
- Beaching the boat and shallow water operations
- Towing and being towed
- Handling mooring lines and tying up
- Procedures for emergencies including fire, flooding, collision, and medical emergencies, etc.

Even when your boat is categorized for them, the sea and wind conditions corresponding to the design categories A, B, or C (see the design category example at the end of this section.) can range from strong gale to severe conditions where only a competent, fit and trained crew handling a well maintained boat can safely operate.

We would like to hear your comments or suggestions concerning our manuals. Did you find the information helpful? Was the information delivered in a clear precise manner? Was the information thorough enough to help you with your new boat? Please call us at (904) 827-2055 to speak to our Manual Department, if you have questions, or comments, concerning the manual. Please note, this department does not have design or warranty information you will need to contact those departments for such information.

Fig. 1.1 Design Categories

Sea and wind conditions for which a boat is assessed by the International Standard to be suitable, provided the craft is correctly handled in the sense of good seamanship and operated at a speed appropriate to the prevailing sea state.

Design Category A (“ocean”)

Category of boats considered suitable to operate in seas with significant wave heights above 4 m and wind speeds in excess of Beaufort Force 8, but excluding abnormal conditions, e.g. hurricanes.

Design Category B (“coastal”)

Category of boats considered suitable to operate in seas with significant wave heights up to 4 m and winds of Beaufort Force 8 or less

Design Category C (“inshore”)

Category of boats considered suitable to operate in seas with significant wave heights up to 2 m and a typical steady wind force of Beaufort Force 6 or less.

Design Category D (“sheltered waters”)

Category of boats considered suitable to operate in waters with significant wave heights up to and including 0,30 m with occasional waves of 0,5 m height, for example from passing vessels, and a typical steady wind force of Beaufort 4 or less.

REF: EN ISO 12217

1.3 Dealer's Responsibilities

In addition to a pre-delivery check and service of your boat, your dealer should give to you:

A description and demonstration of the safety systems, features, instruments, and controls of your boat;

An orientation in the general operation and mechanical systems of your boat;

An explanation of the Mainship CSI Program and Hot Alert process for same.

A copy of the Product Delivery Service Record form” completed by you and the dealer during your inspection of the boat;

A review of all warranty information and how to obtain warranty service;

The complete Owner’s Packet.

If you do not receive these materials, forms, or information, or you have any questions contact your dealer, or call 1-800-578-0852

1.4 Sources of Information

In North America, contact one of the following for Boating courses:

- U.S. Coast Guard Auxiliary
- U.S. Power Squadron
- Canadian Power and Sail Squadrons
- Red Cross
- State Boating Offices
- Yacht Clubs

Contact your dealer or the Boat/U.S. Foundation at 1-800-336-2628

Outside of North America, contact your boat dealer, or your government boating agency for assistance.

Mainship supplies you with; and recommends that you read the following:

Piloting, Seamanship and Small Yacht Handling (Chapman)
Motor Yacht and Sailing
P.O. Box 2319, FDR Station
New York , NY 10002

Mainship recommends that you purchase and read the following:

Yachtsman Handbook
by Tom Bottomly
Motor Yacht and Sailing
P.O. Box 2319, FDR Station
New York, NY 10002

The Complete Book of Maintenance and Repair
by Dave Kendall
Doubleday and Co.
Garden City, NY 11530

Pleasure Yachting and Seamanship
U.S. Coast Guard Auxiliary
306 Wilson Road Oaklands
Newark, DE 19711

1.5 Equipment Manufacturer Manuals

Mainship purchased various equipment and components from other manufacturers and installed them on your boat while it was being built. Examples include the engines, pumps, and the generator. Most OEMs (Original Equipment Manufacturers) have provided operation and maintenance manuals for your boat's equipment. Keep OEM manuals with your Mainship Operator's Manual in a safe and accessible place. Be sure to pass them along to the new owner if you sell your boat.

NOTE: The OEM manuals take precedence over the Mainship Operator's Manual. If information in the Mainship Operator's Manual differs from that in the OEM manuals, follow the information in the OEM manuals.

1.6 Warranties

Nearly all OEM equipment has its own limited warranties. Warranty registration cards are in your Operator's packet.

Locate and read the individual warranties; put them together for easy, future reference.
For international owner's; your warranty can be found in your CE compliant Owner's Manual.

For U.S. and non-EU compliant countries, your warranty info can be found in the Warranty section, chapter 3 of the Operator's Manual.

1.7 Hull Identification Number (HIN)

The "Hull Identification Number" located on the starboard aft side, is the most important identifying factor, and must be included in all correspondence and orders. Failure to include it creates delays. Also of vital importance are the engine serial numbers and part numbers when writing about or ordering parts for your engine. Refer to the engine manufacturers manuals for locations of engine serial numbers, and record them for future reference.

1.8 Manufacturers Certifications

As a boat manufacturer Mainship builds their products to guidelines established under the Federal Boat Safety Act of 1971. The act is promulgated by the U.S. Coast Guard who has authority to enforce these laws on boat manufacturers that sell products in the United States. Mainship ensures that all of it's products comply with these laws.

The NMMA, National Marine Manufacturers Association, provides Mainship with a third party certification. The NMMA is an organization that represents the marine industry and assists manufacturers, boat dealers, marinas, repair yards and component suppliers in areas of legislation, environmental concerns, marine business growth, and state and federal government agency interaction. The third party certification that Mainship participates in, uses well known Standards and Recommended Practices of the ABYC, American Boat and Safety Council.

We at Mainship participate extensively in the ABYC, which is all non-profit, and develops and publishes voluntary standards and recommended practices for boat and equipment design, construction, service and repair. We utilize all applicable ABYC standards in the construction of Mainship boats.

Finally Mainship sells their products worldwide, and as such must conform to the various rules and regulations required by other countries. Most notably are the ISO standards in Europe which require the application of the CE (Common European) mark. This mark, much like the NMMA certification here in the U.S., gives you the boat owner specific information concerning your boat.

1.9 Service, Parts, and Repair for your Boat

When your boat needs serviced, parts, or repair, take it to an authorized Mainship dealer. To find a dealer in your area call 800-578-0852, or internationally you can call 011-44-7733-368-990.

To find repair and parts facilities for the equipment installed on your boat, refer to the manual for that component.

If a problem is not handled to your satisfaction:

Discuss any warranty related problems directly with the service manager of the dealership or your sales person. Give the dealer an opportunity to help the service department resolve the matter for you.

If a problem arises that has not been resolved to your satisfaction by your dealer, contact Mainship at 800-248-2980, and the appropriate customer service department information will be provided to you.

Notes:

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Chapter 2

Documents

Forms

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Your Mainship dealer completes the Pre-Delivery Inspection Report (See Warranty Section) before you take delivery of your boat. It is the dealer's responsibility to both you and to Mainship to give your boat a final inspection. The purpose of this inspection is to assure proper adjustment and operation of the entire vessel. **"Your dealer should provide you with the Pre-Delivery Inspection Report at the time of delivery."**

"Mainship will not pay warranty costs for items that should have been covered in the pre-delivery service inspection and recorded on the Pre-Delivery Inspection Report."

Owners must coordinate with the dealer to insure Mainship warranty registration is completed and returned to Mainship.

2.1. Records

Inserted at the end of this section are several records you will find helpful.

Use the BOAT RECORD (Fig. 2.2) to record all important
information about your boat and its equipment. After your dealer has recorded all the information, remove the record from your Owner's Manual and store in a safe place. Do not keep this form aboard your boat.

The FLOAT PLAN (Fig. 2.4) provides a record of your destination, departure and return times, boat description, passenger list, and other information about the trip you have planned. At the bottom of the form is space for listing emergency phone numbers in case your return is delayed past the expected time. It also has space for indicating information about the person filling the report. Leave the completed form ashore with a responsible person. We recommend you make several copies of this form each boating season to make sure you have a good supply.

The MAINTENANCE LOG (Fig 2.5) helps to keep maintenance records in one place. Using this log will allow you to track maintenance work that has been completed and to determine when maintenance is required. Your
dealer will also find this information helpful. If you decide to sell your boat, the maintenance record will make your boat seeable because it tells prospective buyers that you have taken good care of your boat.

2.2 Accident Reports

No one likes to think about having a boating accident, but boating accidents do happen. You must file an accident report after a boating accident just as you must file an accident report after an automobile accident. A copy of the U.S. Coast Guard Accident Report is included at the end of this section. You can get more copies of the report by calling the U.S. Coast Guard Boating Safety Hotline at 1-800-368-5674.

You must file this report with the U.S. Coast Guard within 48 hours after an accident resulting in one of the following:

- A person disappears from a vessel under circumstances that indicate death or injury

- Personal injury requiring medical treatment beyond first aid

- Damage to the vessel or property damage

- Complete loss of the vessel

State statutes determine whether you must file an accident report in this case. An accident report must be filed if the damage exceeds a threshold dollar value as established by the states, the threshold is $100-$200. Call the Boating Safety Hotline (800-368-5647) to verify the threshold for a particular state.

For all other accidents, you must file the report within 10 days.

Note: State and local agencies may also have accident reporting requirements. Check with local enforcement agencies or with your local Mainship dealer regarding local requirements.

2.3 Specifications and Drawings

All Mainship boats are built in compliance with applicable United States Coast Guard regulations and recommendations at the time of construction. Mainship boats comply with the standards developed by the National Marine Manufactures Association for its Boat Certification Program.

The locator drawings will help you find the location of devices and equipment.

Note: Efforts have been made to make the drawings in this manual consistent with production. However, in the effort to improve this vessel, modifications have been made in the design that may date some of the drawings in this manual.

On the next few pages you will find sample forms for some of the issues dealing with your new boat. Familiarize yourself with these forms, use them, they can be very handy.

Fig. 2.1

Mainship
MOTOR YACHTS

PRE-DELIVERY SERVICE RECORD

POST OFFICE DRAWER 1750 • 255 DIESEL ROAD • ST. AUGUSTINE, FLORIDA 32085 USA
904-829-0500 • FAX 904-829-0683

IMPORTANT: This completed report is required for processing of claims for warranty adjustment. Please forward immediately.

Dealer Name _____ Owner Name _____
Address _____ Address _____
City _____ City _____
State _____ State _____

Hull No. _____ Size _____ Type _____
Engine S/N P_____ S_____ Make _____
Gear S/N P_____ S_____ Gear Ratio _____
Generator S/N _____ Generator Size _____

Dealer Complete Each Item, Check And Initial

Before Launch Procedure

1. Prop Size _____
   Shaft Size _____
2. Prop Rotation _____
3. Prop installed properly with cotter pin in shaft _____
4. Shaft turns freely _____
5. Strut bearing set screws _____
6. Shaft aligned in shaft log _____
7. Shaft alignment in relation to strut _____
8. Engine intakes clear and installed properly _____
9. Engine Plugs in _____
10. Engine oil levels P_____ S_____
11. Engine coolant levels P_____ S_____
12. Generator oil (if applicable) _____
13. Generator coolant (if applicable) _____
14. Transmission oil levels P_____ S_____
15. Transmission/Shaft couplings bolted (Loose) _____
16. Visual checks: _____
    A. Engine Hoses _____
    B. Engine Belts _____
17. Sea Cocks open _____
18. Garboard drains in _____
19. Splash Guards (shaft) _____
20. Battery, Check Cables _____

In Water Checks

1. Check for leaks
   Engine intake hoses _____
   Engine coolant _____
   Engine exhaust _____
   Stuffing boxes _____
   Strut bolts _____
   Rudder posts _____
   Accessory through hulls _____
   (See owners manual for locations)
2. Check and tighten all engine mounts.
3. Shaft/Coupling alignment
   (Within .004)

Systems Checks

1. Fuel tanks fill properly - No fuel leaks on lines or fittings
2. Water tanks fill properly
   A. Fresh water system pressurized holds pressure _____
   B. No leaks at fittings _____
3. 110 Shore Power System _____
4. 110 Generator System _____
5. 110 Ships Systems _____
6. 12 volt/dc Ships Systems _____
7. Water Heater System _____
8. Stove _____
9. Head System Operational _____
10. Nav./Running Lights _____
11. All int/ext. doors and locks operate properly _____
12. All int/ext. drawers, slides and hatches operate properly _____
13. Entire boat hosed down, checked for topside leaks _____

After Starting Engine

1. Throttle, clutch operation _____
2. Water flow from exhaust _____
3. Oil pressure P_____S_____
4. Engine visual checks (Oil, water leaks) P_____S_____
5. Proper idle speed (Check mfg. recommendations) _____
6. Proper gauge readings _____
7. Gear shift works properly forward, reverse, neutral _____
8. Engine manufacturers specifications, max RPM _____

Final Check

1. Safety Stickers & CG Sticker _____
2. All accessory equipment on board _____
3. All loose gear on board _____
4. All appropriate manuals on board _____
5. **Warranty card filled out** _____
6. **Owner familiarized with operation and warranty policy** _____
7. Boat properly cleaned, interior and exterior _____

DEALER SIGNATURE _____ DATE _____ 19 _____

OWNER SIGNATURE _____ DATE _____ 19 _____

DEALER COMMENTS (Refer to check list by item #)

_____

_____

_____

FAILURE TO PROPERLY EXECUTE THIS DOCUMENT AND THE APPROPRIATE WARRANTY REGISTRATION FORM MAY RESULT IN DENIAL OF WARRANTY CLAIMS.

Remove 2nd and 3rd copies and return original
Distribution: Original - Mainship, 2nd Copy - Owner, 3rd Copy - Dealer
1/94/1K

The Boat Record is provided to record information about the boat and its components. This record should be filled out by the selling dealer at the time of delivery.

Owner's Name _____ Phone_____

Address_____

Dealer _____ Phone_____

Address_____

Boat Name_____ Hull Number _____

(Hull Identification Number is located on the outside of the transom, on the starboard side, upper corner.)

Delivery Date _____ Registration No._____

Length _____ft Beam_____ft Draft_____ft

Approximate Displacement_____lbs Approximate Height Above Waterline_____ft

DOCKSIDE INFORMATION

Engine Oil Type _____ Oil Filter_____

Generator Oil Type_____ Oil Filter_____

Transmission Oil Type _____ Water Capacity_____

ENGINE AND TRANSMISSION

Engine Manufacturer _____ Model_____

Engine Serial No. Port _____ Stbd_____

Transmission Manufacturer _____ Model_____

Transmission Serial No. Port _____ Stbd_____

GENERATOR

Manufacturer _____

Model No. _____ Serial No._____

PROPELLER AND SHAFTS

Propeller Manufacturer _____ Model_____

No. Blades _____ Bore_____

Diameter _____ft Pitched_____ft Cupped_____ft

Shaft Length _____ Diameter_____

Battery Manufacturer _____ Mode_____

Rating: Engine _____ Generator_____

Fig. 2.3

Electronic Equipment Information

NOTE: The following is provided for your use in recording electronic equipment which you may add to your boat. All equipment should be recorded so that the information is available in case of repair or for any insurance claim.

ITEM: _____

Manufacturer _____

Model No. _____ Serial No. _____

ITEM: _____

Manufacturer _____

Model No. _____ Serial No. _____

ITEM: _____

Manufacturer _____

Model No. _____ Serial No. _____

ITEM: _____

Manufacturer _____

Model No. _____ Serial No. _____

ITEM: _____

Manufacturer _____

Model No. _____ Serial No. _____

ITEM: _____

Manufacturer _____

Model No. _____ Serial No. _____

ITEM: _____

Manufacturer _____

Model No. _____ Serial No. _____

ITEM: _____

Manufacturer _____

Model No. _____ Serial No. _____

ITEM: _____

Manufacturer _____

Model No. _____ Serial No. _____

Fig. 2.4

Float Plan

Name of Operator_____Age_____

Address_____

Phone_____

Boat Make _____ Model_____

Length_____ Hull Color_____Deck Color_____

Registration No._____Home Port_____

Radio frequencies_____

Equipment on Board, PFDs, Flares, Anchor _____

_____

Fuel Capacity _____ Water Capacity_____

Distinguishing Features_____

_____

Departed from_____

Date_____Time_____

Destination_____

Stops_____

Estimated time of Arrival: Date_____Time_____

Name, age, address and phone number of other persons on board:

_____

_____

_____

_____

_____

_____

Fig. 2.5 **Maintenance Log**

Date	Maintenance Performed	Hourmeter

Notes:

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Chapter 3

Warranty

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MAINSHIP CORPORATION LIMITED WARRANTY

According to the U.S. Public Law No. 93-637, effective July 4, 1975: The following limited warranties apply to all 2008 Model Year boats produced my MAINSHIP CORPORATION.

LIMITED ONE YEAR WARRANTY

Mainship Corporation ("Mainship") warrants to the first-use purchaser and any subsequent registered owner during the warranty period, that any part manufactured by Mainship in its 2008 Model Mainship Yacht purchased from an authorized Mainship Dealer will be free of defects caused by faulty workmanship or materials for a period of twelve (12) months from the date of delivery to the first-use purchaser, provided the part is properly used and maintained and subject to the following exclusions, limitations, and conditions. As the sole and exclusive remedy, Mainship's obligation under this warranty is limited to repair or replace any such defective part.

LIMITED FIVE YEAR BOTTOM BLISTER WARRANTY

Mainship warrants to the first-use purchaser and any subsequent registered owner during the warranty period that the boat will be free from gelcoat blistering on underwater, exterior gelcoat surfaces of the hull, for a period of five (5) years from the date of delivery to the first-use purchaser, provided the hull has been properly used and maintained and subject to the following exclusions, limitations, and conditions. During this period, Mainship will supply or reimburse an authorized Mainship Dealer the parts and labor required to repair a blistered underwater surface of the hull. It is recommended that the blister repair be done during a seasonal haul out for service or storage. Mainship's obligation for the cost reimbursement pursuant to this warranty is based on the prorated schedule described hereafter during the five-year period. During the first two (2) years of the first-use purchaser's ownership, Mainship will pay for 100% of the repair cost. During the third year of the first-use purchaser's ownership, Mainship will pay for 75% of the repair cost. During the fourth year of the first-use purchaser's ownership, Mainship will pay for 50% of the repair cost. During the fifth year of the first-use purchaser's ownership, Mainship will pay for 25% of the repair cost.

The following will void this bottom blister limited warranty:
(1) If the hull gelcoat has been sanded, sandblasted, and subjected to abrasion, impact or damage and/or such conditions being repaired.
(2) If Mainship's required bottom preparation procedures described in the Mainship Owner's Manual are not followed.
(3) If the hull gelcoat has been altered in any way by repairs or coatings other than the proper application of antifouling bottom paint.

LIMITED HULL AND DECK STRUCTURE FIBERGLASS WARRANTY

Mainship Five Year Limited Warranty Coverage (Transferable to Subsequent Registered Owner): Mainship warrants to the first-use purchaser and any subsequent registered owner during the warranty period the hull and deck of each boat shall be free from structural defects in fiberglass materials and workmanship for a period of five (5) years from the date of delivery to the first-use purchaser and subsequent registered owner under normal use and service. This limited warranty applies only to the structural integrity of the deck and hull and the supporting pan/grid or stringer system. Hulls, pan/grid, or stringers modified in any way, or powered by engines other than the type and size installed or specified by Mainship, are not covered by this limited warranty. As the sole and exclusive remedy, Mainship's obligations under this limited warranty are limited to the repair or replacement of any such structurally defective part.

CONDITIONS ON THE APPLICABILITY OF LIMITED WARRANTY COVERAGE

The limited warranties contained herein apply only to covered defects first arising and reported in writing to Mainship or its authorized dealer within the applicable warranty coverage. If the Mainship Yacht is used for commercial, rental, charter or any other non-consumer, individual or recreational services, then the above warranty periods are limited to sixty (60) days from the date of purchase. These limited warranties shall not be effective unless the Mainship warranty registration form and pre-delivery service record are duly completed and signed by the first-use purchaser within ten (10) days of the date of delivery of a Mainship Yacht. The warranty registration form and the pre-delivery service record must be returned to Mainship, and they must be appropriately completed and signed by both the authorized Mainship Dealer and owner. Warranty coverage shall not be initiated until the completed form is received at Mainship. The Mainship Dealer is responsible for submitting the warranty registration form and pre-delivery service record to Mainship.

The Mainship Dealer is to be used by the Mainship Yacht owner for reporting, claiming, and receiving any warranty service from Mainship. All repairs covered by these limited warranties must be pre-approved by Mainship. Normally, all repair requests and approvals are to be communicated through an authorized Mainship Dealer. To obtain warranty service for your Mainship Yacht, including any allegedly defective part, you, as owner, must make a specific and detailed claim in writing to an authorized Mainship Dealer within the applicable warranty period. Warranty repairs may be performed at the authorized Mainship Dealers servicing location or at an otherwise Mainship approved servicing facility at Mainship's discretion. The owner is responsible for all expenses associated with transporting the Mainship Yacht and/or the defective part to and from the Mainship selected service location. Mainship may also, at its option, choose to conduct any repairs or replacements at the Mainship plant. If repairs or replacements are determined to be performed at the Mainship plant, then the transportation costs to and from the Mainship plant are the obligations of the owner.

The Mainship Yacht owner shall report to Mainship any Mainship Dealer failures in the performance of warranty repairs.

The sole and exclusive remedy under this warranty, including any applicable implied warranty, is the repair or replacement as determined by Mainship at its option of defects in materials and workmanship covered by the limited warranties. The labor cost reimbursement will be based on the Labor Allowance Schedule established by Mainship from time to time. Repairs are not to be performed by a non-Mainship Dealer and the repair cost MUST be authorized by Mainship in advance and be based on a reasonable number of hours as determined by Mainship. Transportation, hauling, launching, bottom paint, storage, dockage, cradling rental, rigging and de-rigging, or other similar costs are not part of Mainship's obligation under the limited warranties and shall not be paid for by Mainship.

LIMITED WARRANTY EXCLUSIONS

Mainship does not provide any warranty coverage nor shall it have any liability or responsibility for any defects, costs, expenses or damages related to the following:

- Any yacht purchased from any party who is not an authorized Mainship Dealer.
- Damage or deterioration of the gelcoat surface finishes, including cracking, fading or oxidation of gelcoat.
- The cost to remove, dissemble, or reinstall any part not installed by Mainship which is needed to be removed before any warranty work approved by Mainship may be conducted.
- Engines, transmissions, or generator(s).
- Any component covered by its own specific warranty (such as, appliances or furniture not manufactured by Mainship).
- Any glass breakage.
- Speeds, fuel consumption, range or handling, or performance characteristics.
- Exterior fabrics, carpet, upholstery, canvas, and enclosures.
- Any parts or components not installed by Mainship.
- Any damage caused by collision, grounding, act of nature, accident, or abuse.
- Any loss of use, loss of time, maintenance cost, travel expenses, towing, transportation, survey expenses or other items not specifically covered within this document.
- Any Mainship that has been used for charter, rental or commercial, racing or military purpose (See 60-day limitation specified herein).
- Any Mainship that has been misused, used for commercial purpose, operated without required maintenance or operated contrary to instructions in the Mainship owner's manual, modified or altered from factory specifications or subject to improper maintenance.
- Damage, deterioration, and failure to maintain interior fabrics and finishes.
- Any Mainship product identified by Mainship to an authorized dealer as too damaged to be warranted.
- Paint, gelcoat, upholstery damage, plastic finishes, engines, engine parts, bilge pumps, stoves, blowers, pressure water pumps, propellers, shafts, rudders, controls, instruments.
- Problems caused by improper operation and maintenance, storage, cradling, blocking, normal wear and tear, misuse, neglect, accident, corrosion, electrolysis, or improper operation.

LIMITATION / EXCLUSION OF ANY APPLICABLE IMPLIED WARRANTIES

THESE LIMITED WARRANTIES FROM MAINSHIP ARE YOUR SOLE AND EXCLUSIVE REMEDIES AND ARE EXPRESSLY IN LIEU OF ANY AND ALL OTHER REMEDIES, INCLUDING TORT/NEGLIGENCE THEORIES AND WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. WHETHER ARISING BY LAW, CUSTOM, CONDUCT, OR USAGE OF TRADE. SOME STATES AND COUNTRIES DO NOT ALLOW LIMITATIONS ON AN IMPLIED WARRANTY, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU. IN THE EVENT THAT IMPLIED WARRANTIES ARE FOUND TO EXIST UNDER THE LAW OF A PARTICULAR STATE OR COUNTRY, NOTWITHSTANDING THE EXCLUSION CONTAINED HEREIN, THE DURATION OF ANY SUCH IMPLIED WARRANTY SHALL BE LIMITED TO ONE YEAR FROM THE DATE OF PURCHASE BY THE FIRST-USE PURCHASER. ALL IMPLIED WARRANTIES, IF ANY, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE EXCLUDED AND DISCLAIMED IN THEIR ENTIRETY AFTER ONE YEAR FROM THE DATE OF PURCHASE BY THE FIRST-USE PURCHASER. TO THE EXTENT PERMITTED BY APPLICABLE LAW OR STATUTE, NO OTHER WARRANTIES FROM MAINSHIP EXTENT BEYOND THE DESCRIPTION OF THE WARRANTIES CONTAINED HEREIN. PLEASE NOTE THAT SOME STATES AND COUNTRIES DO NOT ALLOW LIMITATIONS ON THE APPLICABLE TIME PERIOD FOR IMPLIED WARRANTIES, SO THE ONE-YEAR TIME LIMITATION WHICH IS CONTAINED HERE MAY NOT APPLY TO YOU. YOUR SPECIFIC LEGAL RIGHTS WILL VARY FROM STATE TO STATE AND COUNTRY TO COUNTRY.

THE PURCHASER ACKNOWLEDGES THAT NO OTHER REPRESENTATIONS WERE MADE TO HIM OR HER WITH RESPECT TO THE QUALITY OR FUNCTION OF THE BOAT. ANY ORAL STATEMENT OR PRINTED MATERIAL ADVERTISING THE BOAT WHICH SPEAKS TO ANY PERFORMANCE CHARACTERISTICS OF THE BOAT OR ANY OF ITS COMPONENTS SHALL BE CONSIDERED AND CONSTRUED AS AN ESTIMATED DESCRIPTION ONLY AND SHOULD NOT BE RELIED UPON AS AN EXPRESS WARRANTY OR AS THE BASIS OF THE BARGAIN FOR THE BOAT OR ANY OF ITS COMPONENTS.

ANY CONSEQUENTIAL, INDIRECT, OR INCIDENTAL DAMAGES WHICH MAY BE INCURRED ARE EXCLUDED AND PURCHASER(S) REMEDY IS LIMITED TO REPAIRS OR REPLACEMENT OF ANY DEFECTIVE PART(S). SOME STATES AND COUNTRIES DO NOT ALLOW THE EXCLUSION OF LIMITATION OF INCIDENTAL OR CONSEQUENTIAL OR INDIRECT DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE AND COUNTRY TO COUNTRY.

TRANSFER OF LIMITED ONE-YEAR AND FIVE-YEAR BOTTOM BLISTER WARRANTIES

The unexpired portions of the one-year limited warranty and the limited five-year bottom blister warranty and the limited five-year hull and deck structure fiberglass warranty may be transferred to a subsequent registered owner upon purchase of the Mainship Yacht from an authorized Mainship Dealer. An inspection report from an accredited marine surveyor and written request to transfer these warranties must be made within thirty (30) days from date of resale. A non-refundable recording fee of $250.00 must accompany any transfer request. Mainship reserves the right to reject any warranty transfer request for a Mainship Yacht that has been damaged or neglected. Mainship will confirm all warranty transfers in writing to the Mainship dealer and the second owner.
The transfer of the ownership of the boat will not extend the expiration dates of the limited warranties.

OWNER'S PROBLEM WITH WARRANTY SERVICE

In the event the first-use purchaser or registered subsequent owner has any problems or questions regarding the Mainship warranty or the Mainship warranty service being provided by an authorized Mainship Dealer, please forward that question or problem directly to the authorized Mainship Dealer in writing explaining your problem and asking for their assistance in resolving the problem. Generally speaking, the owner of the authorized dealership, which is an independent contractor of Mainship, is in the very best position to assist you because of their familiarity with the warranty work that was performed on your behalf. In addition, Mainship expects its dealers to be concerned with your continued satisfaction and, as a result, should be given an opportunity to provide that assistance.

If, after contacting the dealer in writing and you, as the first-use purchaser or registered subsequent owner, are unhappy with the dealer's response or if you feel that you require any further assistance, please write to the address below. In communicating to Mainship, please provide Mainship with a copy of the warranty claim which is the subject of your need for assistance, and any correspondence which you exchanged with the dealer. Please be certain that the forwarded information includes your hull identification number and name as well as the hours of usage on your engines. If at all possible, provide a chronological description of the problems which you confronted as well as the repair attempts. Include the dealer name and dealer personnel consulted. It is much appreciated if you would concisely describe your problem or question and any comments that you might have regarding the dealer's efforts to conduct the repair. Upon receipt of your correspondence, Mainship will begin its analysis and investigation into the circumstances. Mainship may contact you directly and the dealer if any further information is necessary. Mainship will also contact the dealership so as to assist both the dealer and you in resolving the question or concern.

WARRANTY REGISTRATION

These limited warranties shall not be effective unless the MAINSHIP Warranty Registration Form and Pre-Delivery Service Record; which are furnished with each new boat, are filled out completely and returned to MAINSHIP within ten (10) days of delivery.
The return to MAINSHIP of the fully signed Warranty Registration Form is critical. Warranty coverage cannot be initiated until the completed form is received at MAINSHIP.
All repairs and/or replacements will be made by an authorized MAINSHIP Dealer, or at the option of MAINSHIP, at the MAINSHIP plant. If the repairs are of such a nature that the warranty work must be performed at the MAINSHIP plant, transportation costs to and from the MAINSHIP plant shall be paid by the owner. The labor cost reimbursement will be based on the Labor Allowance Schedule established by MAINSHIP and, where not applicable, on a reasonable number of hours as determined by MAINSHIP. Any repairs and replacements must be approved in advance by an authorized MAINSHIP Service Representative.

GOVERNING LAW AND JURISDICTION

U.S. law governs this limited warranty. Each party hereby irrevocably submits to the exclusive jurisdiction of the U.S. courts in respect of any claim or matter arising out of or in connection with this limited warranty.

TORT LIABILITY

Nothing in this limited warranty shall limit or exclude the liability of either party for:
(a) Death or personal injury resulting from negligence; or
(b) Fraud or fraudulent misrepresentation; or
(c) Breach of any terms implied by any statute or law applicable to the limited warranty.

SEVERANCE

If any provision of this limited warranty shall be found by any court or administrative body of competent jurisdiction to be invalid or unenforceable, such invalidity or unenforceability shall not affect the other provisions of this limited warranty which shall remain in full force and effect.
The parties agree, in the circumstances referred to in this clause XII to attempt to substitute for any invalid or unenforceable provision a valid and enforceable provision which achieves to the greatest extent possible the same effect as would have been achieved by the invalid or unenforceable provision.

Warranty & Service

JUNE 2006

Dear Mainship Customer,

Thank you for providing written notice of transfer of ownership. We are pleased you have selected a Mainship and we will make every effort to assure you that Mainship ownership will be a satisfying experience for you.

Based on the information you will provide below, we will notify you of the expiration dates of any remaining warranties in effect at the time of transfer. You will also be entered into our databases used by Mainship and our vendors to document current owners, as well as added to our mailing list for updates and information on your Mainship boat.

Should you require assistance at any time during ownership, you should contact your Mainship selling dealer or to call us directly at (800) 248-2980 if they are not able to assist.

Please confirm the information at the bottom of this page and mail a copy to us. We will make any corrections as required. Thank you for being part of the Mainship family.

Customer Relations

_____

Hull #:_____Model: _____ Date of Purchase: _____E-mail:_____

Phone: (H) _____ (W) _____ Fax: _____

Purchased From: Name: _____

Address: _____

City/State/Zip: _____

( ) Private Owner ( ) Dealer ( ) Broker

255 Diesel Road • St. Augustine, FL 32084
www.Luhrs.com
(800) 248-2980

WARRANTY PROGRAM

1. WARRANTY REGISTRATION

   A Warranty Registration Form is sent with each boat. **To activate a warranty, this form must be completed at the time of closing and returned to Mainship within ten (10) days. FAILURE TO COMPLY WILL VOID WARRANTY.**

2. PRE-DELIVERY SERVICE RECORD

   The P.D.S.R. is another term for "make-ready." Your Mainship Dealer will perform certain services and inspections in connection with delivering your boat.

3. The P.D.S.R. will accompany your new boat. When the boat is commissioned and launched, the P.D.S.R. should be completed. The complete list should be reviewed with you at the time of delivery; you should sign to acknowledge and receive a copy. **One copy will be retained for the dealer's records, and the original must be returned to Mainship within ten (10) days of delivery. FAILURE TO COMPLY WILL VOID WARRANTY.**

4. Any warranty claims or communications with your dealer must include the entire hull number.

5. Mainships' Warranty Department must be contacted for authorization on any warranty work that will exceed $300.00. You will receive an authorization number which should appear on the Warranty Claim Form. Use of authorization number will facilitate payment.

6. All claims for warranty work must be filed on a standardized Mainship Warranty Claim Form within thirty (30) days of completion of work or claim may ne denied.

7. DEALER CENTRAL PROCESS
   Warranty claims will be reviewed once submitted by dealership personnel, for appropriate coverage.

8. Notations, requests for more information, approval process, etc. will be available for "real time" monitoring by dealership.

9. CUSTOMER SATISFACTION SURVEYS
   During the first year of ownership, the first purchaser will receive two Customer Satisfaction Surveys—the first (CSS#1) will be received shortly after taking delivery and focuses on the dealer's ability to sell and commission the boat and the owner's initial satisfaction with the boat. The second survey (CSS#2), sent nine to ten months into ownership, allows the purchaser to evaluate most of the boat's functional systems and characteristics. Both surveys are dependent upon receipt of the first purchaser's Warranty Registration Form.

Mainship
MOTOR YACHTS

PRE-DELIVERY SERVICE RECORD

POST OFFICE DRAWER 1750 • 255 DIESEL ROAD • ST. AUGUSTINE, FLORIDA 32085 USA
904-829-0500 • FAX 904-829-0683

IMPORTANT: This completed report is required for processing of claims for warranty adjustment. Please forward immediately.

Dealer Name _____ Owner Name _____
Address _____ Address _____
City _____ City _____
State _____ State _____

Hull No. _____ Size _____ Type _____
Engine S/N P_____ S_____ Make _____
Gear S/N P_____ S_____ Gear Ratio _____
Generator S/N _____ Generator Size _____

Dealer Complete Each Item, Check And Initial

Before Launch Procedure

1. Prop Size _____
   Shaft Size _____
2. Prop Rotation _____
3. Prop installed properly with cotter pin in shaft _____
4. Shaft turns freely _____
5. Strut bearing set screws _____
6. Shaft aligned in shaft log _____
7. Shaft alignment in relation to strut _____
8. Engine intakes clear and installed properly _____
9. Engine Plugs in _____
10. Engine oil levels P_____ S_____
11. Engine coolant levels P_____ S_____
12. Generator oil (if applicable) _____
13. Generator coolant (if applicable) _____
14. Transmission oil levels P_____ S_____
15. Transmission/Shaft couplings bolted (Loos
16. Visual checks: _____
    A. Engine Hoses _____
    B. Engine Belts _____
17. Sea Cocks open _____
18. Garboard drains in _____
19. Splash Guards (shaft) _____
20. Battery, Check Cables _____

In Water Che

1. Ch for leaks
   Engi ses _____
   Engine coolant _____
   Engine exhaust _____
   Stuffing boxes _____
   Strut bolts _____
   Rudder posts _____
   Accessory through hulls _____
   (See owners manual for locations)
2. Check and tighten all engine mounts.
3. Shaft/Coupling alignment
   (Within .004)

Systems Checks

1. Fuel tanks fill properly - No fuel leaks lines or fitti
2. Water tanks fill properly
   A. Fresh water system pressurized holds pressure _____
   B. No leaks at fittin _____
3. 110 Shore Power Sy _____
4. 110 Gen System _____
5. 110 _____
6. olt/dc Ships stems _____
7. ater Heater Sy m _____
8. ve _____
9. Syst perational _____
10. Na g Lights _____
    All int doors and locks operate properly _____
    All int/e rawers, slides and hatches operate p rly _____
13. ire boat osed down, checked for t de leaks _____

After Starting Engine

1. Throttle, clutch operation _____
2. Water flow from exhaust _____
3. Oil pressure P_____ S_____
4. Engine visual checks (Oil, water leaks) P_____ S_____
5. Proper idle speed (Check mfg. recommendations) _____
6. Proper gauge readings _____
7. Gear shift works properly forward, reverse, neutral _____
8. Engine manufacturers specifications, max RPM _____

Final Check

1. Safety Stickers & CG Sticker _____
2. All accessory equipment on board _____
3. All loose gear on board _____
4. All appropriate manuals on board _____
5. **Warranty card filled out** _____
6. **Owner familiarized with operation and warranty policy** _____
7. Boat properly cleaned, interior and exterior _____

DEALER SIGNATURE _____ DATE _____ 19 _____

OWNER SIGNATURE _____ DATE _____ 19 _____

DEALER COMMENTS (Refer to check list by item #)

_____

_____

_____

FAILURE TO PROPERLY EXECUTE THIS DOCUMENT AND THE APPROPRIATE WARRANTY REGISTRATION FORM MAY RESULT IN DENIAL OF WARRANTY CLAIMS.

Remove 2nd and 3rd copies and return original
Distribution: Original - Mainship, 2nd Copy - Owner, 3rd Copy - Dealer
1/94/1K

THE COMPLETION OF THE Mainship PRE-DELIVERY CHECKLIST BY (DEALER) IS PART OF Mainship OWNER'S PACKAGE. THIS CHECKLIST DISCLOSES (DEALER'S) ACTUAL KNOWLEDGE OF GENERAL CONDITION AND OPERATION OF THE LISTED ITEMS AS OF THE DATE SIGNED BY (DEALER) AND IS NOT A WARRANTY OR AFFIRMATION OF FACT OR WRITTEN PROMISE OF ANY KIND BY Mainship, ITS AGENT, OR ANY OTHER AGENT MADE IN CONNECTION WITH THE SALE OF THE VESSEL, ITS ENGINE(S) AND EQUIPMENT, NOR DOES IT AFFIRM OR PROMISE THAT SUCH MATERIAL OR WORKMANSHIP IS DEFECT FREE NOR IS IT A WARRANTY OR GUARANTEE THAT CERTAIN CONDITIONS DO NOT EXIST. THIS CHECKLIST IS NOT AN EXPANSION OF OR AMENDMENT TO ANY WARRANTIES PROVIDED OR A SUBSTITUTE FOR ANY WARRANTIES PROVIDED BY Mainship SET FORTH IN THE DEALER'S PURCHASE CONTACT OR THE Mainship WRITING APPLY TO THE CHECKLIST.

WARRANTY REGISTRATION

Mainship TRAWLERS

MAINSHIP CORPORATION
255 Diesel Road
St. Augustine, Florida 32086
904-829-0500 • 904-578-0852
FAX 904-827-2156

Year _____ Model _____ Hull # MPT _____
Power _____ Generator _____ Ignition Key # _____
LH# _____ Size _____
RH# _____ Serial # _____ Door Key # _____

Date Delivered to Dealer _____ Date Delivered to Customer _____

OWNER _____ Email: _____

Street _____

City & State _____ Zip Code _____

Phone: Home _____ Work _____ Fax # _____

Boat Name _____ Location (Zip Code Only) _____

DEALER _____ Dealer Representation _____

Street _____ Store Location: _____

City & State _____ Zip Code _____

Phone _____ Fax # _____

FINAL CHECK OUT

- ☐ OWNER FAMILIARIZED WITH MAINSHIP WARRANTY & OWNERSHIP RESPONSIBILITIES.
- ☐ OWNER FAMILIARIZED WITH DEALERSHIP WARRANTY AND SERVICE POLICIES.
- ☐ OWNER RECEIVED MAINSHIP OWNER'S MANUAL AND APPROPRIATE ENGINE AND ACCESSORY MANUALS.
- ☐ OWNER RECEIVED COPY OF PRE-DELIVERY SERVICE RECORD.

BOAT INSPECTION - OWNER FAMILIARIZED WITH THE OPERATION OF:

☐ FUEL SYSTEM	☐ DC ELECTRICAL SYSTEM	☐ MAINTENANCE & UPKEEP
☐ WATER SYSTEM	☐ POWER PLANT & MECHANICAL SYSTEMS	☐ HANDLING & OPERATION
☐ AC ELECTRICAL SYSTEM	☐ SAFETY SYSTEMS	☐ OWNER SPECIFIED OPTIONS

DEALER'S SIGNATURE _____ **DATE** _____

I understand that it is my responsibility to read and familiarize myself with the contents of the Mainship Owner's Manual, the various engine and component manuals, and the Mainship Corporation Limited Warranty.

OWNER'S SIGNATURE _____ **DATE** _____

The Mainship Corporation Limited Warranty gives you specific rights. You may also have other rights which vary from state to state. MAINSHIP DOES NOT HONOR ANY IMPLIED WARRANTIES EXPRESSED BY DEALER.

Please complete this form and return it to MAINSHIP CORPORATION within 10 days of delivery. Failure to comply may void warranty.

WHITE - MAINSHIP *YELLOW* - DEALER *PINK* - OWNER

Notes:

Mainship®
TRAWLERS
AN EMPLOYEE OWNERSHIP COMPANY

Chapter 4
Boating Safety

40 Trawler
Single & Twin

V1.011508 • P/N 1034082

As you read your owner's manual, please note hazard warnings which alert you to safety and precautions and unsafe conditions or operating procedures. We have included these warnings because we are concerned about your safety and the safety of your passengers. Hazard statements generally have five parts:

1. The hazard symbol.
2. A signal word which indicates the severity of the hazard.
3. A concise description of the hazard.
4. The results of ignoring the hazard.
5. Steps for avoiding the hazard:

The three signal words which indicate the severity of a hazard are danger, warning, and caution. The meanings they convey are as follows:

⚠ DANGER ⚠

Calls attention to immediate hazards that will result in severe injury or death.

⚠ WARNING ⚠

Identifies hazards or unsafe practices that could result in personal injury or death.

⚠ CAUTION ⚠

Indicates hazards or unsafe practices that could result in minor personal injuries, property damage, or component damage.

Also included in this manual are owner advisory statements identified as "Important" or "Note". Unlike the hazard communication statements, they alert you to conditions affecting equipment operation, maintenance, and servicing practices.

Important: This is a general advisory statement or procedure intended to prevent damage to the equipment or associated component.

Note: This is a general advisory statement relating to equipment operating and maintenance procedures. Its intent is to call attention to information more important than normal text.

4.1 Safety

Boating safety and the safety of your passengers are your responsibility. You should fully understand and become familiar with the operating and safety procedures and precautions in this manual and the other manuals in the owner's packet before you launch your new boat.

4.1.1 Safe Operation

Following is general information about safe operation.

Keep your boat and equipment in safe operating condition. Inspect the hull, engines, safety equipment, and all boating gear regularly.

Important: Federal law requires you, the owner, to provide and maintain safety equipment on your new boat. Consult your Coast Guard, state, and local regulations to ensure your boat has all required safety equipment on board. Additional equipment may be recommended for your safety and that of your passengers. Make yourself aware of its availability and use.

BE VERY CAREFUL when fueling your boat. Be sure you know the capacity of your boat's fuel tank and the amount of fuel you use when operating at frequently used engine speeds (RPMs). Ask your dealer about the capacity of your boat's fuel tank.

Always know where you are on the boat, know the nautical terms for the different areas of your boat. At the end of this chapter are shown a general layout of these terms and illustrate the areas that may be of importance to you.

Make sure you have enough fuel on board for anticipated cruising requirements. In general, use 1/3 of your supply to reach your destination and 1/3 to return. Keep 1/3 in reserve for changes in your plans due to weather or other circumstances.

Note: Your generator supply line is located higher on the auxiliary fuel tank than the engine's supply lines. This is for your safety in that your generator cannot deplete your fuel supply should it ever be left running.

Be sure lifesaving and fire extinguishing equipment is on board. This equipment must meet regulatory agency standards, and it should be noticeable, accessible, and in a safe operating condition. Your passengers should know where this equipment is and how to use it.

• Keep an eye on the weather. Be aware of possible changing conditions by checking a local weather report before your departure. Monitor strong winds and electrical storms closely.

• Always keep accurate, updated charts of the area on board your boat.

• Before you leave the port or harbor, file a float plan with a family member, relative, friend, or other responsible person ashore.

• Always operate your boat with care, courtesy, and common sense.

• Instruct at least one other passenger aboard in the operating procedures in handling your boat. This person can take over if you unexpectedly become unable to do so.

• Do not allow passengers to ride on parts of your boat other than designated seating areas.

• Ask all passengers to remain seated while the boat is in motion.

• Do not use the swim platform or boarding ladder while engines are running.

• Understand and obey the "Rules of the Road." Always maintain complete control of your boat.

• Do not overload or improperly load your boat.

4.1.2 Safe Boating Courses

Your local U.S. Coast Guard Auxiliary and the U.S. Power Squadrons offer comprehensive safe boating classes several times a year. You may contact the Boat/U.S. Foundation at 1-800-335-BOAT (2628), or in Virginia 1-800-245-BOAT (2628). For a course schedule in your area, you may also contact your local U.S. Coast Guard Auxiliary or Power Squadron Flotilla for the time and place of their next scheduled classes.

4.1.3 Voluntary Inspections

State boating officials in many states or the U.S. Coast Guard Auxiliary offer courtesy inspections to check out your craft. They check your boat for compliance with safety standards and required safety equipment. You may voluntarily consent to one of these inspections and are allowed time to make correction without prosecution. Check with the appropriate state agency or the Coast Guard Auxiliary for details.

4.1.4 Rules of the Road

Navigating a boat is much the same as driving an automobile. Operating either one responsibly means complying with a set of rules intended to prevent accidents. Just as you assume other car drivers know what they are doing, other boaters assume you know what you are doing.

As a responsible yachtsman, you will comply with the "Rules of the Road", the marine traffic laws enforced by the U.S. Coast Guard. There are two sets of rules: The United States Inland Navigational Rules and the International Rules. The United States Inland Rules apply to all vessels inside the demarcation line separating inland and international waters. The Coast Guard publishes the "Rules of the Road" in its publication "Navigational Rules, International-Inland." You can get a copy from your local U.S. Coast Guard Unit or the United States Coast Guard Headquarters, 1300 E Street NW, Washington, D.C. 20226.

4.1.5 Safety Equipment

Important: Federal law requires you, the owner, to provide and maintain safety equipment on your boat. Consult your Coast Guard, state, and local regulations, to ensure your boat has all required safety equipment on board. Additional equipment may be recommended for your safety and that of your passengers. Make yourself aware of its availability and use.

We have provided the following safety equipment in your Loose Gear Kit:

- (4) 5/8" x 35' Nylon Dock Lines
- (1) Flare Kit (U.S.A. Boats Only)
- (2) Fire Extinguishers (U.S.A. Boats Only)
- (1) Electric Horn
- (1) 5/8" x 150' Nylon Anchor Line
- (1) 5/16" x 50' Galvanized Chain
- (6) Life Vests (PFD) (U.S.A. Boats Only)
- (1) Type IV Throwable PFD
- (1) Safety Gear Bag
- (1) United States Coast Guard Pamphlet
- (1) Anchor

4.1.6. Additional Equipment

You should consider having additional equipment on board to help make your boating experience safer and

more enjoyable. Some examples include the following:

- Anchor and line*
- Boat hook*
- Bucket & Sponge
- Commonly used spare parts
- Distress signal kit*
- Docking lines*
- Engine and accessory manuals*
- Extra keys
- Extra V-belts
- Fenders*
- First aid kit
- Flashlight & extra batteries
- Manually operated bilge pump
- Navigational charts
- Owner's Manual
- Replacement bulbs*
- Spare fuel and oil filters*
- Tool kit

*Provided in Loose Gear Kit

4.1.7 Personal Flotation Devices (PFDs)

There must be one United States Coast Guard approved wearable personal flotation device of Type I, II, or III for each person on board your boat. The PFDs must be in serviceable condition and readily accessible. A minimum of three PFDs (two wearable and one throwable) is required regardless of the number of persons on board.

(A) PFD Type I, Wearable:

This offshore life jacket has the greatest buoyancy. It is effective for all waters where rescue may be delayed. Its design allows for turning most unconscious persons in the water from face down position to a vertical or face-up position.

(B) PFD Type II, Wearable:

This near-shore buoyant vest provides less buoyancy than a Type I PFD. It is intended for calm inland waters or waters where there is a chance of quick rescue. It turns its wearer to a face-up position as does the Type I PFD, but the turning action is not as pronounced as the Type I, and it will not turn as many persons under the same conditions as a Type I.

(C) PFD Type III, Wearable:

Classified as a flotation aid, this PFD allows wearers to place themselves in a vertical or face-up position in the water. Type III PFD has the same minimum buoyancy as a Type II PFD. It has little or no turning ability. People participating in water sports often prefer this PFD because it is intended for use in waters where quick rescue is possible and it is generally the most comfortable for continuous wear.

(D) PFD Type IV, Throwable:

You must also have aboard at least one throwable PFD Type IV device. The Type IV device can be thrown to a person in the water and held by the user until rescued. The design does not allow it to be worn. The most common Type IV PFD are buoyant cushions or ring buoys. This PFD must be immediately available for use and in serviceable condition.

4.2 Carbon Monoxide Hazard

(See enclosed brochure concerning Carbon Monoxide poisoning and preventing)

As all responsible yachtsmen know, there are unseen dangers when boating. One danger is serious enough that we feel the need to specifically bring it to your attention. It is odorless, colorless, and tasteless, but can be harmful or fatal if inhaled. Its name is CARBON MONIXIDE (CO)

4.2.1 Carbon Monoxide Safety

This section is intended to provide educational information about carbon monoxide relative to boats and boating. Carbon Monoxide accumulation is affected by boat geometry, hatch, window, and door openings, ventilation openings, proximity to other structures and boats, wind direction, boat speed, boat maintenance, and a multitude of other variables. This section discusses many of these and enables the boat owner to better understand all conceivable variables. Therefore, the boat owner is cautioned not to exclusively rely on it to prevent the accumulation of Carbon Monoxide.

4.2.2 What is Carbon Monoxide?

Carbon Monoxide is a highly poisonous gas formed by the combination of carbon and oxygen. Commonly referred to as CO, its chemical formula is C for carbon and O for oxygen. CO is a colorless, odorless, and tasteless gas

that, by itself, cannot be detected by human senses. CO diffuses in the air much more rapidly than other gasses that are detectable by the human senses. The weight of CO is about the same as air so it does not rise or fall like other gasses but will distribute itself throughout the boat. CO is produced any time a material containing carbon is burned. In boating, these materials include, but are not limited to, gasoline, diesel fuel, or propane. All carbon based fuels produce varying amounts of CO, depending on their carbon content. Gasoline is high in carbon and, therefore, produces high levels of CO. However, the exhaust of all engines and generators as well as any open flame device, produce CO and the same precautions should be taken regardless of the type of fuel.

4.2.3 How Carbon Monoxide Can Enter Your Boat

Any device that burns fuel creates Carbon Monoxide. For example, a propane cook-top or a space heater are both potential sources for CO. But the most serious danger comes from the gasoline engines and generators aboard your own and neighboring boats. There are four basic ways that CO from a running engine or generator can enter your boat.

The “station wagon effect” results from the aerodynamics of deck cabins and flying bridges. With the boat underway, the air flow over the top forms a low pressure area behind the cabin or transom which can suck exhaust gasses into the cockpit and the cabin inefficient trim angles also can cause the station wagon effect.

4.2.4 Symptoms of Carbon Monoxide Poisoning

Most important is to know the causes, study the symptoms, and be trained in the emergency care. This is the best way to avoid, understand, and respond to any Carbon Monoxide emergency:

One or more of the following symptoms can signal the adverse effects of Carbon Monoxide accumulation. The order of this list is generally the sequence of symptoms. However, the number of symptoms and the order of their appearance may change for different people.

- **Watering and Itching eyes**
- **Tightness in the chest**
- **Flushed Appearance**
- **Ringing in the ears**
- **Throbbing Temples**
- **Inattentiveness**
- **Convulsions**
- **Drowsiness**
- **Headache**
- **Dizziness**
- **Vomiting**
- **Collapse**
- **Nausea**
- **Fatigue**

4.2.5 Effects of Carbon Monoxide

When inhaled, Carbon Monoxide is absorbed by the lungs and reacts with the blood hemoglobin to form carbon hemoglobin, which reduces the oxygen carrying capacity of the blood. The result is a lack of oxygen for the tissues, causing subsequent tissue death and, if prolonged, death of the individual. Carbon Monoxide in high concentrations can be fatal in a matter of minutes. Even lower concentrations must not be ignored because the affects of exposure to CO are cumulative and can be just as lethal. Certain health related problems and age increases the effects of CO. People who smoke or are exposed to high concentrations of cigarette smoke, consume alcohol, or have lung or heart disorders are particularly susceptible to an increase in the effects from CO. However, the health of all of the boat’s occupants should be considered. Physical exertion accelerates the rate at which the blood absorbs CO. The early effects of CO poisoning are easy to overlook because they are similar to the effects of other boating related stress such as eye strain, fatigue, sun exposure, seasickness, or alcohol consumption. But, as the concentration of CO in the air increases, it has increasingly adverse effects on your health.

4.2.6 When Overcome by Carbon Monoxide

When someone falls victim to Carbon Monoxide poisoning, fast and responsive action is crucial. Know the symptoms. The earlier the effects of CO are detected, the better the chances for recovery. The following list shows the sequences of events that must be done in an effort to revive a CO victim:

- Evacuate, Ventilate, Investigate, complete the Carbon Monoxide poisoning action sequence
- Move the victim to fresh air.

- Administer oxygen if available

- If the victim is not breathing, perform artificial resuscitation per approved CPR procedures until medical help
- arrives and takes over.

• Prompt action can mean the difference between life and death.

• Ventilate the area.

• Investigate the source of CO and take corrective action.

• As always, you can contact the Red Cross to obtain information for training in CPR or emergency response care.

4.2.7 How to Minimize the Accumulation of Carbon Monoxide

Practice good inspection and maintenance habits. Be certain hull exhaust outlets are not blocked or restricted in any way.

Be alert for exhaust gasses from other boats. Always provide adequate ventilation when weather enclosures are in place and engines or generator is running.

Do not run with a high bow angle. Use trim tabs or redistribute the load to maintain a low bow angle. Orient your boat to maximize the dispersion of CO.

We cannot identify or describe every possible variable or combination of variables, you must continually observe passengers for symptoms or Carbon Monoxide intoxication and be aware of the many possibilities of Carbon Monoxide accumulation. For instance, poorly maintained hoses and hose connections on the generator or engine exhaust system(s) can permit Carbon Monoxide to escape into the interior of your boat. Therefore, the exhaust system must be periodically examined and maintained in order to ensure its integrity. Moreover, all accommodation spaces constantly require proper ventilation.

4.2.8 Preventative Maintenance

Frequent inspections and proper maintenance of the engine, and exhaust system, as well as, other various areas of your boat are critical in preventing the accumulation of Carbon Monoxide. It is the owner's responsibility to make sure the entire boat is inspected and maintained against CO.

The exhaust systems of your engines and generator are under constant attack from salt water, gasses, vibration, and normal wear. Inspect every exhaust system component often. Start with a visual inspection. Check each joint for discoloration, carbon buildup, stains, water leaks, or other signs of damage. Inspect all metal parts for corrosion, discoloration, or flaking. Check that all hose clamps are in good condition and properly tightened. Carefully inspect all exhaust and cooling hoses for signs of wear, dry rot, cracking, discoloration, chafing, or swelling. If any of these conditions exist, have the entire system inspected and corrected by a qualified technician before starting the engines or generator.

Next, start each engine and generator one at a time. Follow the full run of the exhaust system, listening and looking for leaks. While doing this, make sure there is adequate ventilation and that your CO detector is on.

Other items to inspect are as follows: If your boat has access panels, check that the access panels around the engine and exhaust are in place and fit snugly to minimize the opportunity for CO to enter the cabin. There should be no large openings where CO could enter the cabin. Ensure that all ventilation systems are in good working order and are not blocked or punctured. Check all sink drains to assure that they have a good water trap to prevent CO from coming in from the outside.

Finally, because poorly running engines produce excessive CO, make sure engines and generators are tuned up. They should run smoothly and not produce black smoke. The spark plugs (gas engines) and ignition systems should be maintained regularly, and the fuel system and air filters should be in good order.

4.2.9 Carbon Monoxide Detectors

If you carefully avoid potential CO accumulation and maintain your systems properly, you have made great strides towards protecting yourself and others from the dangers of Carbon Monoxide. We have assisted you in your endeavor by providing CO detectors in each living area aboard your boat. We use only those CO detectors that are UL approved for marine use. RV and residential models won't withstand the elements of the boating environment. Most CO detectors require specific maintenance procedures to remain accurate and functional. Follow the manufacturer's instructions for the use and maintenance of the CO detectors.

If you would like to purchase additional CO detectors and receive a special purchase price, please contact our Customer Service Hotline at 1-800-248-2980.

4.2.10 Carbon Monoxide Review

Know the Dangers!

DANGER!
CARBON MONOXIDE

Swimming near or under the back deck or swim platform. Carbon monoxide from exhaust pipes of inboard engines, outboard engines and generators build up inside and outside the boat in areas near exhaust vents. STAY AWAY from these exhaust vent areas and DO NOT swim in these areas when the motor or generator is operating. On calm days, wait at least 15 minutes after the motor or generator has been shut off before entering these areas. NEVER enter an enclosed area under a swim platform where exhaust is vented, not even for a second. **It only takes one or two breaths of the air in this "death chamber" for it to be fatal.**

Blockage of exhaust outlets can cause carbon monoxide to accumulate in the cabin and cockpit area - even when hatches, windows, portholes, and doors are closed.

Exhaust from another vessel that is docked, beached, or anchored alongside your boat can emit poisonous carbon monoxide gas into the cabin and cockpit of your boat. Even with properly vented exhaust, your boat should be a minimum of 20 feet from the nearest boat that is running a generator or engine.

Slow speeds or idling in the water can cause carbon monoxide gas to accumulate in the cabin, cockpit, bridge, and aft deck, even in an open area. A tailwind (force of wind entering from aft section of the motorboat) can also increase accumulation.

The "station wagon effect," or backdrafting can cause carbon monoxide to accumulate inside the cabin, cockpit, and bridge when operating the boat at a high bow angle, with improper or heavy loading or if there is an opening which draws in exhaust.

This effect can also cause carbon monoxide to accumulate inside the cabin, cockpit, aft deck, and bridge when protective coverings are used and the boat is underway.

Teak surfing, dragging and water-skiing within 20 feet of a moving watercraft can be fatal.

D

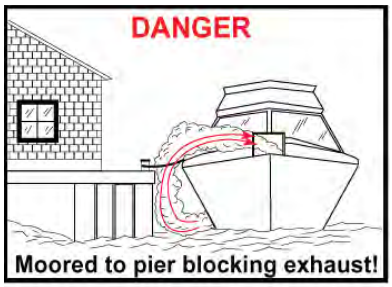

Figure 4.3. Blocked hull exhaust outlets near a pier, dock, seawall, bulkhead or any other structure can cause excessive accumulation of Carbon Monoxide gas with the cabin areas of your boat. Be certain hull exhaust outlets are not blocked in any way.

A

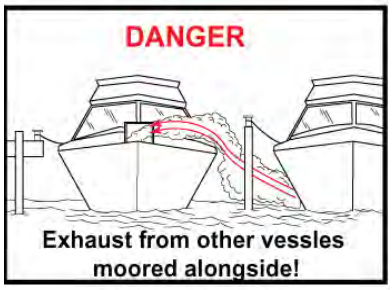

Figure 4.4. Engine and generator exhaust from other vessels alongside your boat, while docked or anchored, can cause excessive accumulation of Carbon Monoxide gas within the cabin and cockpit areas of your boat. Be alert for exhaust from other vessels.

N

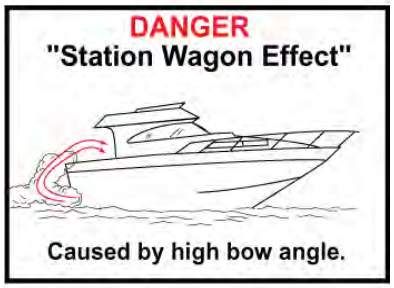

Figure 4.5. Engine or generator exhaust from your boat while underway and operating with a high bow angle can cause excessive accumulation of Carbon Monoxide gas within the cabin and cockpit areas of your boat. Always provide adequate ventilation and redistribute the load to lower the boat angle.

G

Figure 4.6. When protective weather coverings are in place, engine or generator exhaust from your boat, while docked and/or running, can cause excessive accumulation of Carbon Monoxide gas within the cabin and cockpit areas of your boat. Always provide adequate ventilation when the weather coverings are in place and either the engine or generator are running.

E

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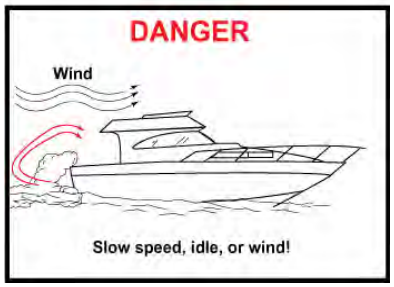


Figure 4.7. While underway or drifting slow speed can cause co buildup, add a tailwind and this can intensify the effect.

Everyone is at risk for Carbon Monoxide poisoning! Particularly sensitive are children, pregnant women, the elderly, and people with lung disease, heart disease, or anemia!

WHY? Because Carbon Monoxide is an odorless, colorless gas that prevents the blood from carrying oxygen to the vital organs. CO (Carbon Monoxide) is 200 times more likely to replace oxygen in the blood.

Check the symptoms of Carbon Monoxide poisoning in this chapter (4.2.4) again right now, so you will be able to recognize these symptoms should they ever arise.

⚠ DANGER ⚠

Mild Exposure	100 – 400 PPM (parts per million)	causes headaches and fatigue resembling the flu.
Medium exposure	400 – 800 PPM	causes severe headaches, drowsiness, nausea, and rapid heart rate.
Extreme exposure	over 800 PPM	results in unconsciousness, convulsions, heart or respiratory failure, and death.

Many reported cases of Carbon Monoxide poisoning determined that while victims are aware they are not well, they become so disoriented, they are unable to save themselves by either exiting the building or calling for assistance. Also, children and pets may be affected first.

Carbon Monoxide gas is produced when any type of fuel is incompletely burned. Gasoline engines and fuel burning appliances (furnace, fireplace, oven, stove, water heater, etc.) also, space heaters, gas, and charcoal grills produce CO.

Extended operation of unvented fuel burning appliances (range, oven, fireplace, etc.) can build up high CO levels.

⚠ CAUTION ⚠

This alarm will only indicate the presence of Carbon Monoxide gas at the sensor. Carbon Monoxide gas may be present in other areas.

⚠ WARNING ⚠

To reduce the risk of Carbon Monoxide poisoning, test the alarm's operation after the boat has been in storage, before each trip, and once a week during use.

- DO NOT attempt to test the alarm by any other means than by using the Test/Reset button.
-
- DO NOT attempt to produce CO to test the alarm. The Test/Reset button tests all functions of the alarm and is the only safe way to be sure the alarm is working properly.

Once again, here and now, check in the DC Electric (7.3.8) chapter on the operation of your CO detector. Learn how to use it, how it works, what the alarm signals are, and what your response should be.

⚠ DANGER ⚠

Actuation of your CO alarm indicates the presence of Carbon Monoxide (CO) which will KILL YOU! If the alarm sounds:

1. Press the Reset/Silence button.

2. Call Emergency Services: Write the number here _____.

3. Immediately move to fresh air, outdoors, or to an open window or door. Do a head count to check that all persons are accounted for. Do not re-enter the premises nor move away from an open door or window until the emergency responders have arrived, the premises have been aired out, and your alarm remains in its normal operation.

4. After following steps 1, 2, and 3, if your alarm reactivates in a 24 hour period, repeat steps 1 – 3 and call a qualified appliance technician:
Write the number here _____

Where to Install Alarms:

- For minimum protection, CO alarms should be installed near all sleeping areas.

- For maximum protection, CO alarms should be installed in all sleeping areas.

• Where not to Install Alarms:

• Not behind furniture, drapes, closets, or areas that will block air flow to the alarm.

• Not within 12 inches of window openings, exterior doors, heating or return air vents, or any other drafty areas.

• The alarm should not be located within 5 (1.5 m) feet of any cooking appliance.

• For information on taking care of your CO alarm, see the Maintenance chapter of this manual.

Limitations of the CO alarm:

Carbon Monoxide alarms will not work without power. Some examples causing no alarm power are: A blown or missing fuse, broken wire, faulty connection, circuit breaker tripped, or a discharged battery.

This alarm will only detect the presence of CO gas at the sensor. Carbon Monoxide gas may be present in other areas.

Carbon Monoxide alarms may not be heard. The alarm loudness is designed to meet or exceed the regulatory standards. However, the alarm may not be heard if alarms are located in remote locations or behind closed doors. The alarm may not be heard by persons who are hard of hearing, have consumed alcoholic beverages, taken prescription or non-prescription medication, or illegal drugs.

This alarm is designed to detect Carbon Monoxide from any source of combustion. It is not designed to detect smoke, fire, or any other gasses. The alarm may not sound at low Carbon Monoxide levels. This product is intended for use in ordinary indoor locations of living spaces. It is not designed to measure compliance with Occupational Safety Health Administration (OSHA) commercial or industrial standards. Individuals with medical problems may consider using warning devices which provide audible and visual signals for levels under 30 PPM.

How else to protect your family from Carbon Monoxide:

Ensure alarms are installed properly. Carefully read and follow ALL the instructions in this manual. Test your unit every week. Alarms that do not work, do not alert you to the presence of Carbon Monoxide.

Make regular visual inspections of all fuel burning equipment including gas water heaters, kitchen gas stoves, space heaters, gas dryers, or other pilots. Check the color of the flame! The color should be blue.

Make regular visual inspections of the engine and generator exhaust systems. Cracked exhaust systems can allow Carbon Monoxide to enter the living area.

Professionally maintain your engine and generator. Although gas engines and generators produce Carbon Monoxide, a poorly tuned engine and generator will produce greater amounts of Carbon Monoxide.

Installed CO detector specs:

Safe T Alert	60-541 and 60-542
Power Supply	12 VDC
Opening Voltage	7 – 16 VDC
Average Standby Current draw	60 ma @ 12 VDC
Operational temperature	-40F to 150F -40C to +66C
Relative humidity	15%(+/- 5%) to 95% (+/- 4%)
Gas detected	Carbon Monoxide
CO Alarm level	Over 100 PPM
Low CO alarm	70 to 100 PPM
No alarm	30 PPM for 30 days
Warm up time	10 minutes
Alarm silence time	under 6 minutes
Case dimensions	60-541 5”x3”x1.5”60-542 6.5”x3.5”x1
Audible alarm	85db @ 10 feet

CO operation specs, here is a list of the audile, or visual alarms you may see or hear, and exactly what the function indicates.

Normal Operation	Audible signal none	Visual Signal Green
Low CO alarm	4 beeps 5 sec. Off	flashing red
CO alarm	4 beeps 5 sec. Off	steady red
Malfunction	beep every 30 sec.	Red/green
Applicable UL standard		UL 2034 RV rev Oct. 1, 1998 UL 1524 Marine

4.3 Other Dangers

4.3.1 Weather

Storms rarely appear without advanced notice. Check

the weather forecast before you begin a day of boating. Be aware, however, that weather conditions can change rapidly. If you have a marine radio, listen to the weather reports issued by the U.S. Coast Guard and others. If you have a portable radio, keep it tuned to a station broadcasting frequent weather reports. Many boating clubs fly weather signals. Learn to recognize these signals and listen to your local forecasts before leaving port.

Your surroundings can also be a good indicator of changing weather conditions. Watch for changes in wind direction or cloud formations. There is no substitute for a good understanding of weather conditions and what to do when the weather takes a turn for the worse.

The present and forecasted weather conditions are a primary consideration and the possibility of storms should always be a concern. If storms are a possibility, keep a watch on the horizon, especially to the west, for approaching storms. Monitor the weather forecast on a marine channel or local weather station. The best possible solution is to return to port if time allows.

Other steps to follow to weather a storm include:

• Ensure all passengers have on their PFD's.

• Secure all loose gear.

• Reduce your speed. Keep enough power to head into the waves at an angle. Avoid taking waves over the bow. If wind and waves come from astern, adjust your power to keep waves from going over the the stern.

• Position passengers so that the weight will best keep the boat stable. It is advisable for passengers to keep weight low and as close as possible to the centerline of the boat.

• Drop a sea anchor over the stern to maintain the bow into the seas. If you do not have a sea anchor aboard, use a canvas bucket, tackle box, or other object that will work like an anchor.

• Radar reflectors, if installed on your boat, should be 18 inches diagonally. They should be placed 12 feet above the waterline. Otherwise, a boat with radar may have trouble “seeing” your boat.

⚠ WARNING ⚠

Never attach tow line to deck cleat or anchor windlass. Cleat or windlass may pull free from deck and cause serious personal injury or property damage.

4.3.2 Fog

You can judge the likelihood of fog formation by periodically measuring the air temperature and the dew point temperature. If the difference between these two temperatures is small, fog is likely to develop.

Foggy conditions include mist, snowstorm, or heavy rain.

Avoid operation in such weather, especially if your boat is not equipped with radar or other

4.3.3 Remember these guidelines:

• Unless your boat is well equipped with charts, head for shore at the first sign of fog and wait until conditions improve. If you have charts on board, take bearings as fog sets in, mark your position, and continue to log your course and speed.

• Make sure all persons on board have put on their personal flotation devices (PFDs). If your boat has sounding equipment, take soundings regularly and match them with known depths on your charts.

• Station a person forward in the boat as a lookout.

• Reduce your speed. From time to time, stop engines and listen for other fog signals.

• Sound the horn or bell at approximately 2 minute intervals.

• If there is any doubt about continuing your excursion, anchor. Listen for other fog signals while continuing to sound your fog horn.

4.3.4 Drugs and Alcohol

Drugs and alcohol affect a person’s ability to make sound judgments and react quickly. As a responsible boater, you will refrain from using drugs or alcohol (singly or combined) while operating your boat. Operation of motorized vessels while under the influence carries a significant penalty. Drugs and alcohol decrease your reaction time, impair your judgment, and inhibit your ability to safely

operate your boat.

4.3.5 Collision

If a serious collision occurs, first check the persons on board for injuries. Then inspect the boat to determine the extent of the damage.

Prepare to help the other craft unless your boat or its passengers are in danger.

Prepare to help the other craft if your bow penetrated the other boat or its passengers are in danger.

If the bow of the other boat penetrated your boat's hull, prepare to plug the fracture once the boats are separate.

4.3.6 Running Aground

If your boat runs aground, check everyone for injury and inspect damage to the boat or propellers. If lightly grounded, shift weight of passengers or gear to heel the boat while reversing engines. If towing becomes necessary, do not attach towline to deck cleats. These are not designed to take full load of the boat. We recommend using a commercial towing service.

4.3.7 Swamped or Capsized Boat

If your boat becomes swamped or capsized, put on a PFD immediately and set off a distress signal. Chances are good a capsized boat will stay afloat. For this reason, stay with the boat. Do not leave the boat or try to swim to shore except under extreme conditions. A capsized boat is easier to see than a swimmer, and shore may be further away than it appears.

4.3.8 Falling Overboard

One of the most frightening emergencies that can occur aboard a boat is a crew member or yourself falling overboard. Although "man overboard" or "MOB" drills have been a part of boating safety for decades, they have been largely overlooked by many responsible boat owners.

Just as important as acquiring the knowledge to rescue a person is the ability to help yourself if you are the person overboard. Be sure and refer to your "Chapman Piloting", "Seamanship and Boat Handling" manual supplied with your new boat. It is packed with useful and essential safety and emergency procedures to ensure you have a safe and happy boating experience.

We have the utmost interest in your safety. Therefore, we have provided a means of re-boarding the boat should you or a crew member fall overboard. On the transom, we have added steps to aid you in re-boarding. If your boat is equipped with a swim platform, there is a ladder attached to the platform which extends into the water.

4.3.9 Hypothermia

If a person falls overboard, hypothermia may be an immediate concern. Hypothermia means a person's body loses heat to the water faster than the body can replace it. If not rescued, the person will become exhausted and likely drown. In general, the colder the water, the shorter the time for survival. PFDs will increase survival time because they provide insulation.

Water Temperature	Exhaustion orUnconsciousness	Expected Time of Survival
32.5	Under 15 min	Under 15 to 45 min
32.5 – 40	15 – 30 min	30 – 90 min
40 – 50	30 – 60 min	1 – 3 hrs
50 – 60	1 – 2 hrs	2 – 4 hrs
60 – 70	2 – 3 hrs	2 – 4 hrs
70 – 80	3 – 12 hrs	3 hrs – indefinite
Over 80	Indefinite	Indefinite

4.4 Fire

⚠ DANGER ⚠

A fire aboard your boat is serious. Explosion is possible. Respond immediately. Develop a fire response plan.

4.4.1 Fire

Every boater should develop a fire response plan to determine what kind of fire (fuel, electrical, etc.) might break out, where it might break out, and the best way to

react. Having a plan and, is possible, assigning responsibilities to others results in quicker decisions and quicker reactions.

Important: Everyone on board should know where a fire extinguisher is and how to operate it.

Any fire requires stopping the engines immediately.

If the fire is in the engine compartment, shut off the bilge blower immediately. Do not open the hatch to the engine compartment. The fire will flare up as the fresh air supply increases suddenly.

Keep the fire downwind if possible. If the fire is aft, head into the wind.

Have all persons on board put on their personal flotation devices (PFDs).

If you can get at the fire, aim the fire extinguisher at the base of the flames and use a sweeping action to put out the fire.

If the fire gets out of control, make a distress signal and call for help on the radio.

Deciding whether to stay with the boat or abandon ship will be difficult. If the decision is to abandon ship, all persons on board should jump overboard and swim a safe distance away from the burning boat.

4.5 Distress Signals

4.5.1 Mayday

If you have a VHF radio, heed storm warnings and answer any distress calls from other boats. The word "MAYDAY" spoken three times is the international signal of distress. Monitor marine radio channel 16, which is reserved for emergency and safety messages. You can also use this channel to contact the Coast Guard or other boaters if you have trouble.

Never send a "MAYDAY" message unless there is a serious emergency and you are in need of immediately assistance.

4.5.2 Visual Distress Signals

The U.S. Coast Guard requires that all boats operating on U.S. Coastal Waters have visual distress signal equipment on board. In general, coastal waters include all waters except rivers, streams, and inland lakes. The Great Lakes are considered coastal waters, as is a river mouth more than two miles wide. Boats owned in the United States and operating on the high seas must also carry visual distress signal equipment.

Visual distress equipment must be in serviceable condition and stowed in a readily accessible location. Equipment having a date showing useful service life must be within the specified usage date shown. Both pyrotechnic and non-pyrotechnic equipment must be U.S. Coast Guard approved.

Pyrotechnic U.S. Coast Guard approved visual distress signals and associated equipment include: Red flares, handheld or aerial Orange smoke, hand held or floating Launchers for aerial red meteor or parachute flares. Non-pyrotechnic equipment includes an orange distress flag, dye markers, and an electric distress light.

No single signaling device is ideal under all conditions for all purposes. Consider carrying various types of equipment. Careful selection and proper stowage of visual distress equipment is very important. If young children are frequently aboard, you should select devices with packages which children, but not adults, will find difficult to open.

Other helpful publications available from the U. S. Coast Guard include "Aids to Navigation" (U.S. Coast Guard pamphlet #123), which explains the significance of various lights and buoys, the "Boating Safety Training Manual", and "Federal Requirements for Recreational Boats". Check with your local Coast Guard Station, your new dealer, or a local marina about navigational aids unique to your area.

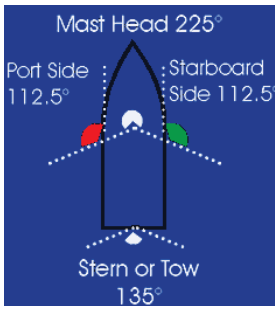
4.5.3 Running and Navigation Lights

Your boat must have running and navigation lights for safe operation after dark. Observe all navigation rules for meeting and passing. Do not run at high speeds during night operation. Always use common sense and good judgment.

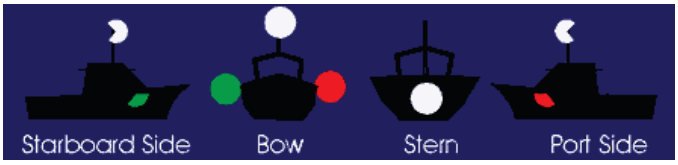
Operating at night can present some special challenges. Not only is your depth perception lessened, bright lights on the shore can cast misleading reflections on the water and if you wear glasses, or worse yet, bifocals, you simply don't see as well at night as you do during the day. It is not only important that you be able to identify other vessels operating in your proximity, it is equally important

that other vessels see you. Most recreational vessels are less than 30 feet in length and, according to "The Rules of the Road", shall be equipped with navigation lights. These lights not only have a certain arc through which they can be seen but must be seen from a minimum distance. The following lighting requirements are for recreational vessels less than 12 meters in length (approximately 39.4")

Light	Arc	Color	Visible Range
Masthead Light	225	Wht	2
Starboard	112.5	Grn	1
Port Sidelight	112.5	Red	1
Sternlight	135	Wht	2



The arc of the lights and color allows you to determine the direction a vessel is moving. How good are your lights? You should test them to see how visible you might be at night. Whether on a trailer or at the marina, switch on your lights and see how well they can be seen. Walk away from the boat or row away, if you are at anchor or at a mooring, and see how visible the lights are as you move further away. How easy are they to see against the background of lights on shore?



Does your stern light shine dead astern over the required 135 degree arc or does it shine to one side or up or down. Can it be seen from the required 2 miles and why is that important? As an example, let's say that your stern light, for some reason, can only be seen for ½ mile. You are underway at 8 knots and a large ship is approaching at 15 knots. The ship is only 4 minutes away from collision with you. By the time the ship "might" see you, identify the light and decide on the reaction that should be taken, it is too late. A ship traveling at 15 knots may take miles to stop. Look at the stern light again, as you move from the stern toward the bow. Does the stern light "disappear" as the sidelight "appears"? The stern light should disappear and sidelight appear at 22.5 degrees abaft the beam. If you don't see the green starboard sidelight or the red port sidelight when the stern light disappears, there is a problem with the arc of one or all of these lights. This means that if another boat were approaching you at the angle where no lights are seen, there is increase risk of collision.

If both the sternlight and sidelights are seen brightly at the same time, you still have a problem. A vessel approaching won't know whether they are overtaking or crossing and whether they should give-way or stand-on.

You should also check to make sure that your masthead light disappears at the same time each sidelight disappears and they both disappear when the stern light appears.

Check your sidelights from dead ahead. You should see both red and green. However, by moving toward one side by 1-3 degrees, you should then see only one light. If you still see two lights, an approaching vessel won't be able to tell which direction you are going.

It is very important to be seen from a distance but also for an approaching vessel to be able to determine your direction of travel.

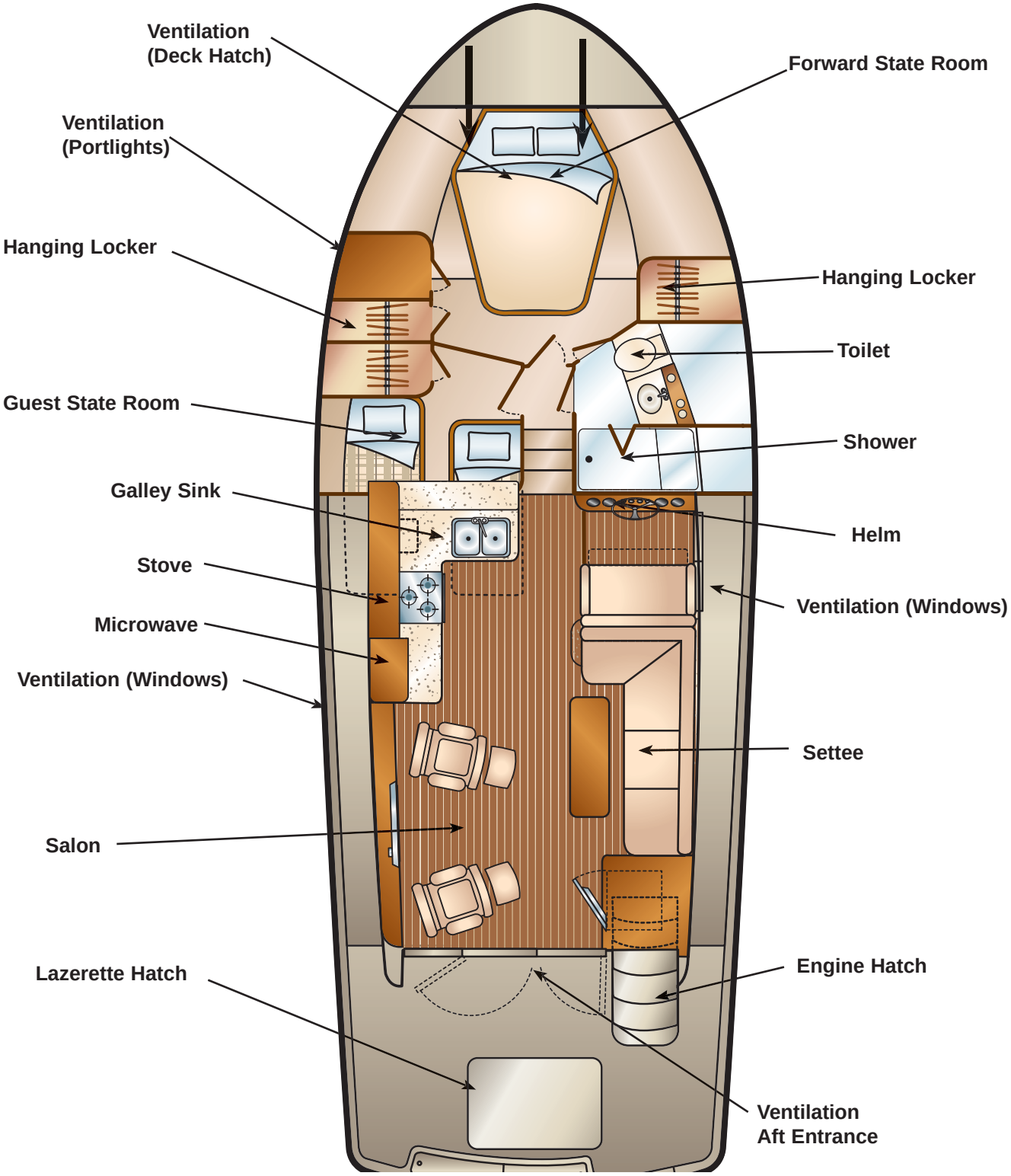
When boating at night, remember the following: " When two lights you see ahead, turn your helm and show your red."

4.5.4 Sound Signaling Device

Your boat is provided with a horn which conforms with U.S. Coast Guard requirements for boats of this size. All class A boats are recommended to carry a hand, mouth, or whistle, as well as a power operated horn. The device should be used to promote safe passing, as well as a warning to other vessels in fog, or confined areas, or as a signal to operators of locks or drawbridges. Following are standard whistle signals:

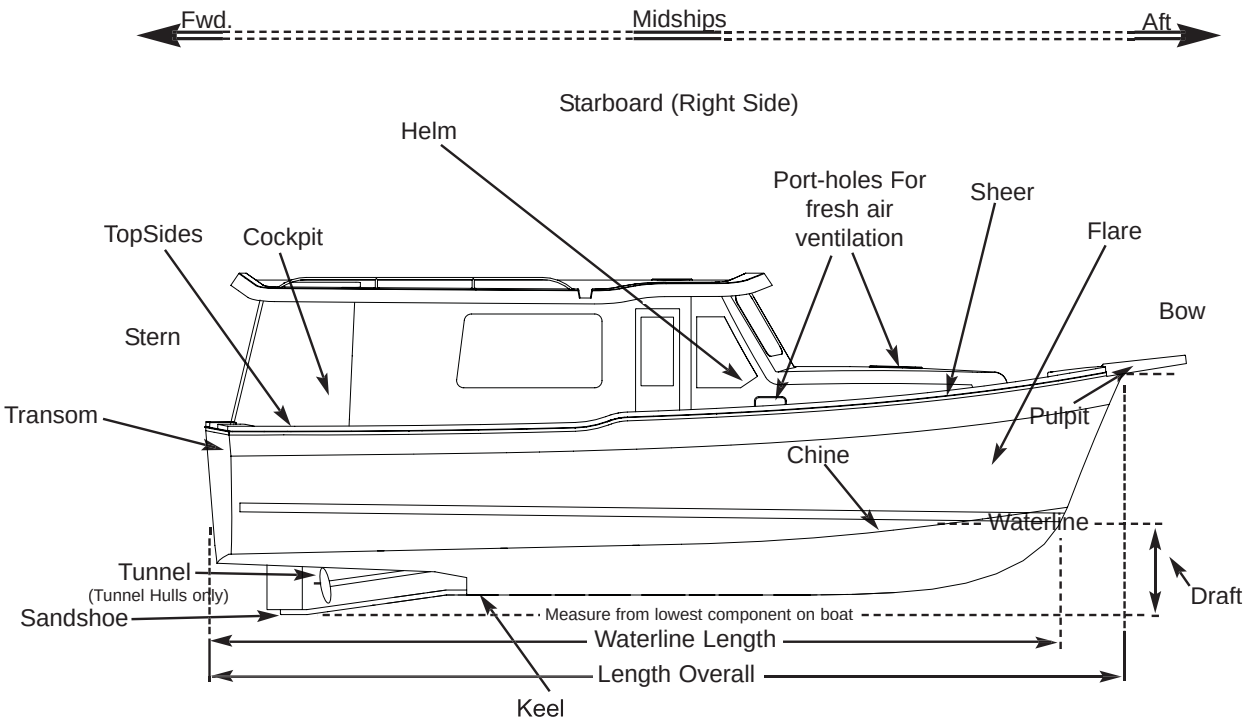
One Prolonged Blast.....Warning Signal
One Short Blast.....Pass on my port side
Two Short Blasts.....Pass on my starboard side
Three Short Blasts.....Engines in Reverse
Five or More Blasts.....Danger Signal

Interior Arrangement
Showing Ventilation

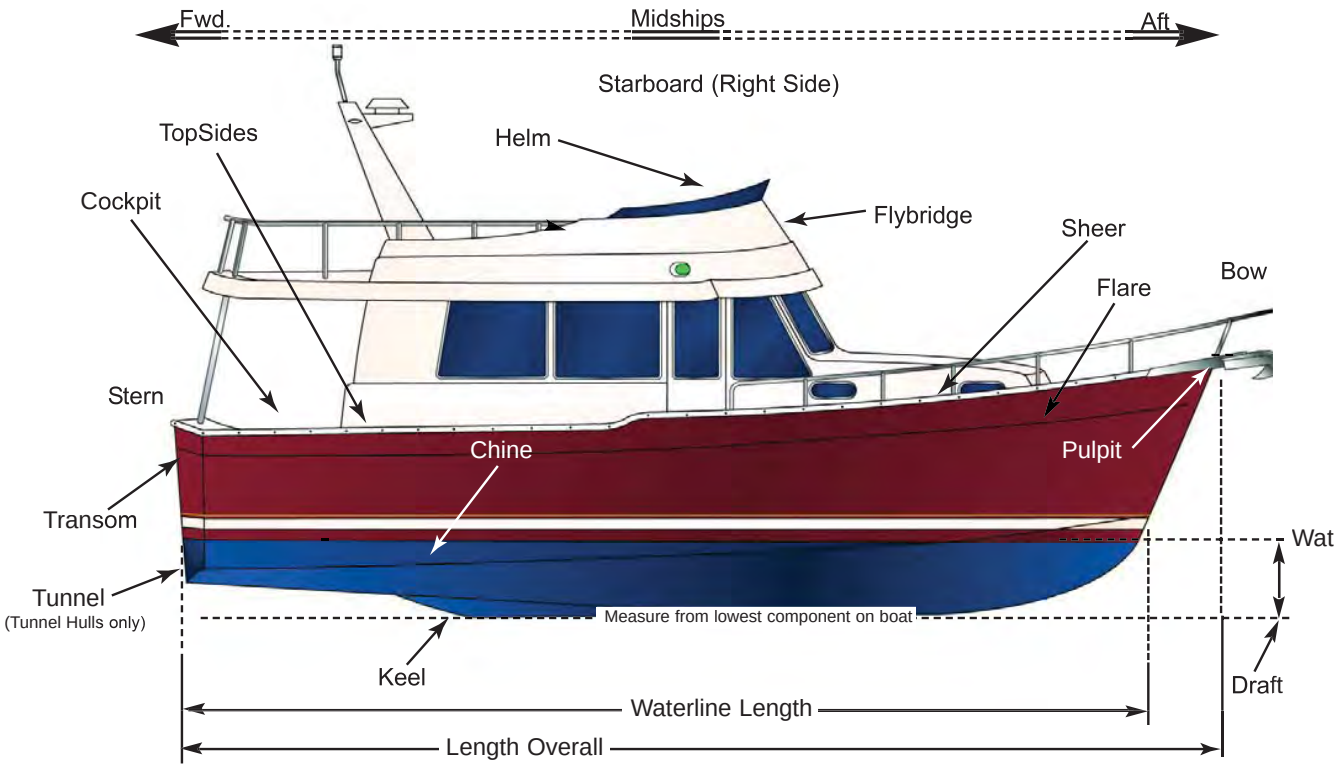


General Boat Arrangements

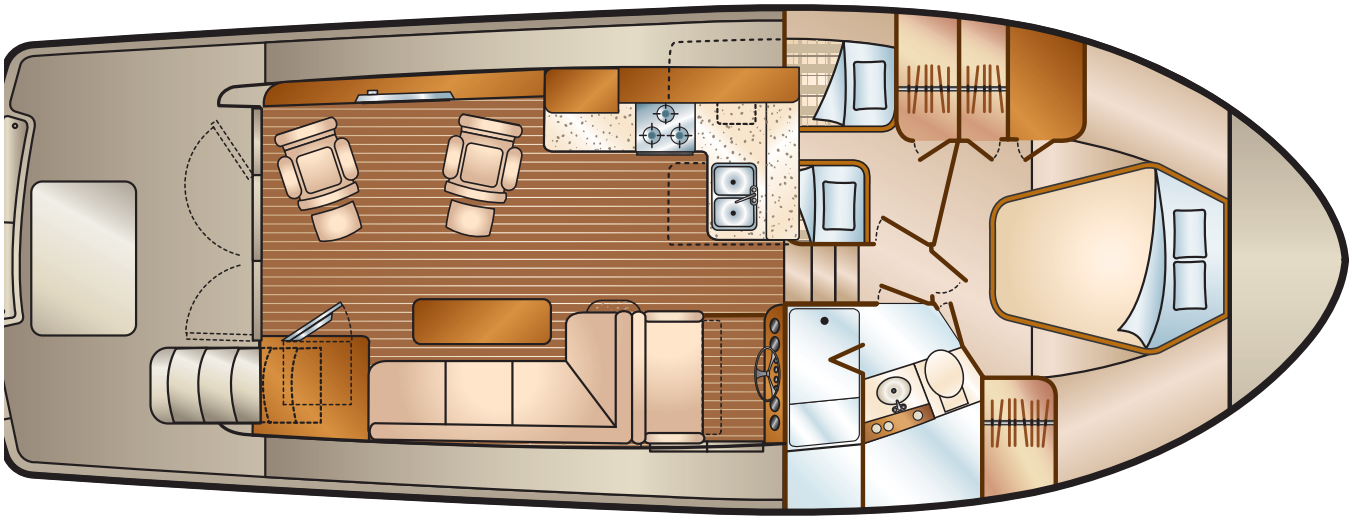
Trawler Hardtop



Trawler



40 Trawler
Specifications



Length Overall	41' 4"	12.60M
Length Overall (Less pulpit and platform)	36' 9"	11.20M
Beam	14' 2"	4.32M
Clearance Height (with Mast upright)	17' 4"	5.30M
Clearance Height (with Mast lowered)	12' 6"	3.81M
Sleeping Capacity	6	
Fuel Capacity	300 Gallons	1,136 Liters
Water Capacity	118 Gallons	492 Liters
Holding Tank Capacity	40 Gallons	178 Liters

Notes:

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Chapter 5
Fuel Systems

40 Trawler
Single & Twin

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FUEL SAFETY CHECKLIST FOR BOARDING

This fuel safety checklist is designed to be used as a quick reference to minimize the risks associated with fuel hazards. You should refer to this checklist every time you board your boat. Read your owners manual so that you have a full understanding of the fuel system on your boat.

Before approaching your boat, extinguish all smoking materials and make certain there are no other sources of possible ignition near your boat.

Approach your boat alone to make the initial inspection. Have your guests and crew standby a safe distance away.

From the dock, visually inspect your boat for any fuel leaks from the deck fills or hull vents and take notice if there is any odor of fuel.

Once aboard, open the cabin door and sniff at the doorway then inside the cabin for fuel odor.

Open the engine compartment hatch and sniff for fuel odor.

Inspect the engine compartment and all bilge compartments for fuel leaks and sniff for fuel odor.

If there are any signs of fuel leakage, either visually or by odor, open doors, hatches, and windows. Evacuate the boat and inform the dock master. Have an authorized service technician inspect your boat.

If no signs of fuel are present, board your guests and crew.

Run exhaust blowers for five minutes before starting the engines or generator.

Always be aware of the hazards associated with fuel and practice good common sense.

“HAPPY AND SAFE BOATING” from the Mainship Team

Fuel Systems

The fuel systems aboard your Mainship yacht consists of the following components or sub-systems.

- Fuel Tanks
- Fuel Fills
- Fuel Vents
- Fuel
- Lines, Crossover Lines, and Valves
- Fuel Water Seperators (Fuel Filters)

5.1 Fuel Tank

Your boat is equipped with 2 fuel tanks, having a total capacity of 300 gallons. The fuel tanks are located port and stbd outboard of the engine in the engine compartment.

The fuel tanks are equipped with a fuel level sending unit; which provides an electrical signal to the fuel gauge located at the helm, to indicate the fuel level.

The tank is filled through two fuel fills (5.2.1), on each side of the boat.

The fuel tanks should be inspected for signs of leaks, corrosion, and/or pitting at least once a year. Corrosion normally appears as a white, chalky, or flaky substance on the surface of the tank. Sometimes, it also appears as pitting or small pockets of missing aluminum. Another indication of corrosion is bubbles on the paint that coats the tank. If any of these conditions are present, have an authorized service technician inspect the tank immediately. If a leak is found, turn off battery switches and disconnect shore power (See Connecting & Disconnecting Shore Power, AC Electrical System), which explains the proper way to disconnect and disable any possible source of ignition). Contact your dealer or Customer Service immediately.

The engine room blower is installed to assist you in removing heat and fuel vapors from your engine room area. Check the DC Electrical system, and the Engines and Transmissions chapters for more information about the blower.

Figure 5.1

5.1.1 Fuel Tank Grounding System

The fuel tanks and fuel fills on your boat are electrically grounded (or bonded) to the ground buss bar of the bonding system (see the DC Electrical chapter). This grounding system is designed to prevent the discharge of static electricity when fueling your boat. An authorized service technician should inspect this system at least once each year.

5.1.2 Fuel Gauge

The purpose of the fuel gauge (Fig. 5.1) is to allow you to constantly monitor the fuel level in the fuel tanks. Your boat has a fuel gauge on the helm.

⚠ DANGER ⚠

Never enter the engine room without proper ventilation first. A spark caused by power tools or lighting equipment could result in fire or explosion which could cause personal injury or death.

⚠ WARNING ⚠

Fuel leaking from any part of the fuel system can lead to fire and explosion that can cause serious bodily injury or death. Inspect system before fueling.

⚠ CAUTION ⚠

Using the wrong type of fuel will result in severe damage to the engines. Refer to your owner's manual for fuel recommendations.

⚠ DANGER ⚠

Leaking fuel is a fire and explosion hazard. Personal injury or death could occur.

5.2 Fuel Tank Components

5.2.1 Fuel Tank Fills & Vents

The fuel tanks are filled through its respective fuel fill fitting and the cap is marked DIESEL.

The fuel tanks fill fittings are located on each side of the gunwale amidships. The fuel tanks also have a hull vent fittings. These fittings are located on the port and starboard hull sides.

The fuel fill and fuel vent hoses, fittings, and connections should be inspected for leaks and signs of dry rot or swelling at least once a year. If any of these conditions are present, have an authorized service technician inspect the fuel system immediately. If a leak is found, turn off battery switches, disconnect shore power, and disable any possible source of ignition. Contact your dealer or Customer Service immediately.

⚠ DANGER ⚠

The use of any hose other than the USCG Type A1 or A2 could result in fuel leakage. Leaking fuel is a fire and explosion hazard. Personal injury or death could result.

5.2.2 Fuel Supply Lines and Hoses

If any fuel fill or vent hose's are in need of replacement, ensure that only USCG Type A1 or A2 are used. Each engine has a fuel supply hose that runs from the pickup tube in the fuel tank to the fuel water separator (commonly referred to as the fuel filter), then from the filter to the engine. Also, each engine has a fuel return hose that runs from the engine back to the fuel tank. If your boat has a generator, the generator will have somewhat the same setup, with the supply and return hose. The fuel supply lines or hoses, fitting, and connections should be inspected often for leaks and signs of wear, dry rot, chafing, or swelling. A good way to inspect the fuel hoses is to run your hand along the length of the hose including the fittings. Leaks will be revealed as wet spots on your hand. If any evidence of hose deterioration is present, have a qualified technician replace all the hoses with USCG Type A1 hoses immediately!

Note: If a leak is found, turn off battery switches, disconnect shore power, and disable any source of ignition. Do not start your engines, the generator, or any devices that could create a spark. Contact your dealer or our Customer Service Department immediately! If hoses need to be replaced, make sure only USCG Type A1 are used.

5.2.3 Generator Fuel Supply Notice

In figure 5.2 we demonstrate the layout of your boat's fuel pick up lines on the port side fuel tank. See the Mechanical Arrangement Drawing in the Boating Safety chapter of this manual for more location information. The pickup inside the tank for the generator is higher than the engine pickup.

Figure 5.2

5.3 Fuel Valves

Your boat has fuel shutoff valves located at the tank in the supply line route. These valves are used to start or stop the flow of fuel through the supply lines.

Note: Even if the fuel supply valves are closed, there may be fuel in the supply lines to the filters and engines (or generator). Disconnecting these fittings without properly bleeding the system of fuel could result in emptying the fuel filters and causing a fuel spill. Only a qualified technician should ever make repairs to your fuel system.

The fuel supply valves are the “ball type” valves. Turning the handle so it is perpendicular to the valve body shuts off the supply or return. Turning the handle so it is in line with the valve body opens the valve, as shown in Figure 5.3.

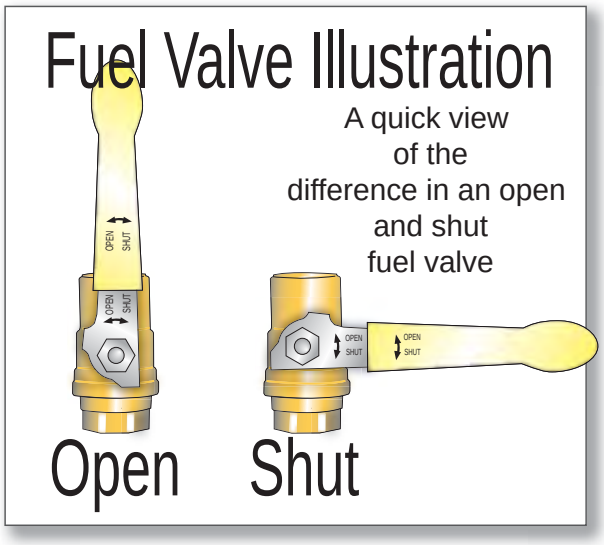


Figure 5.3

Example of Fuel Supply Lines and Valves

Note: This configuration may not reflect the configuration of what your fuel valves are. This can be found in the Fuel System Arrangement at the end of this chapter.

5.4 Filters (Fuel Water Separators)

The fuel supplied to the engines or the generator (if so equipped) may contact impurities found in the fuel tanks or in the fuel from your supplier. If these impurities are not removed prior to starting the engine or generator, performance may be seriously affected. Removal of the fuel impurities is accomplished by external fuel filters.

5.4.1 Main Engine Filters

The engine has a separate filter located away from the engine. Check the Fuel Arrangement illustration at the end of this chapter for the exact location of this filter.

An authorized service technician should replace all filters annually prior to spring launch. They may need more frequent replacement if you notice poor engine/generator performance due to contaminated fuel.

Figure 5.4 shows an illustration for the Racor Fuel Water separator (commonly referred to as the fuel filter). This will break down the components of the filter and their uses within the filter.

5.4.2 Generator Fuel Filter

Check your fuel system arrangement at the end of this chapter for the location of the Generator Filter (tagged). This is a fuel – water separator type filter.

To service the filter:

1. Make sure the engine is off.

2. Close shut-off valve between fuel tank and filter if applicable.

3. Open vent plug on mounting head with a ½" wrench.

Note: Do not leave drain open for very long as it will empty filter of all fuel.

4. When fuel is detected coming out of drain, close drain quickly.

5. Close vent plug and tighten snugly.

6. Open shut off valve.

7. Follow priming instructions.

Consult your owner's packet for more information concerning this filter or for replacement parts.

5.4.3 Fuel Additives

Refer to your Engine Manual for recommendations. Refer to the "Winterization and Storage" section of your owner's manual for information concerning the use of fuel stabilizers. Always follow the manufacturer's recommendations when using fuel additives or stabilizers.

Here are some general guidelines for fueling your boat:

⚠ CAUTION ⚠

Using the wrong type of fuel will result in severe damage to the engines. Refer to your owner's manual for fuel recommendations.

⚠ WARNING ⚠

Fuel leaking from any part of the fuel system can lead to fire and explosion that can cause serious bodily injury or death. Inspect system before fueling.

Before fueling, check the fuel system for leaks. Check components for weakening, swelling, or corrosion. Immediately replace any leaking or defective components before operating an engine. Keep the tank as full as practical to reduce condensation and the accumulation of moisture in the fuel system. In warm and hot weather, allow for expansion of the fuel. A fuel tank may overflow when the fuel expands after being pumped from cool underground storage tanks or after fueling when air temperatures are cool (night and early morning).

Follow these procedures to fuel your boat:

- Safely and securely moor your boat to the dock.
- Turn off engine and generator.
- Turn main battery switches off to prevent sparks from electrical equipment (lights, blowers, pump, etc.)
- Disconnect shore power if connected.
- Put out all cigarettes, cigars, pipes, or other items that may produce a spark or flame.
- Completely close all ports, hatch covers, and doors.
- Ask guests to leave the boat during fueling.
- Remove cap from the fill pipe. Both port and starboard fills are connected to the fuel tank.
- Insert the fuel hose nozzle into the fill pipe. During fueling, maintain contact between the nozzle and the fill pipe.
- After pumping several gallons of fuel, inspect engine compartment for any signs of fuel leakage.
- Fill the tank completely, allowing space at the top of the tank for thermal expansion.
- Fill slowly near the top to avoid overflow.
- Remove nozzle after tank is full and replace fill cap.
- Make sure cap is tight.
- If any fuel was spilled, clean it up immediately.
- After fueling is complete, open all hatches, doors, and compartments.
- Visually check all fuel fittings, lines, and tanks for fuel leakage.
- Check all lines up to engines and generator. Smell for fumes.
- Correct any problem before you start the engines.
- Turn main battery switches on.
- Run bilge blower at least four minutes to ventilate engine compartment.
- Restart engines and restore boat to operating condition.
- Do not smoke until your boat is clear of the fuel dock.

⚠ DANGER ⚠

Fuel vapors can explode. Do not smoke at the dock. Extinguish all flames, stove, and other ignition sources before you approach a fuel dock.

⚠ DANGER ⚠

Explosive fuel vapors can become trapped in the lower portions of the boat. Close all hatch covers, windows, doors, and compartments while fueling your boat.

5.5 LPG (Liquefied Petroleum Gas) System

LPG (Liquefied Petroleum Gas) is a generic term to describe liquefied gasses consisting predominately of Propane (C3) and Butane (C4) hydrocarbons.

5.5.1 Hazards

Extremely flammable! These gasses readily form explosive air-vapor mixtures at ambient temperature.
Vapor is heavier than air and may travel toward sources of ignition (e.g. along drainage systems, into bilges, etc.).

Liquid from the tanks will generate large volumes of flammable vapor (approximately 250:1).

Figure 5.4

Racor Fuel Filters

Damaged , Worn , or dirty seals will allow air ingestion. Inspect and Replace all seals as needed. Clean the seating surfaces of dirt or debris every time the element is replaced.

Hand Tighten the T-handle only! Do not use tools

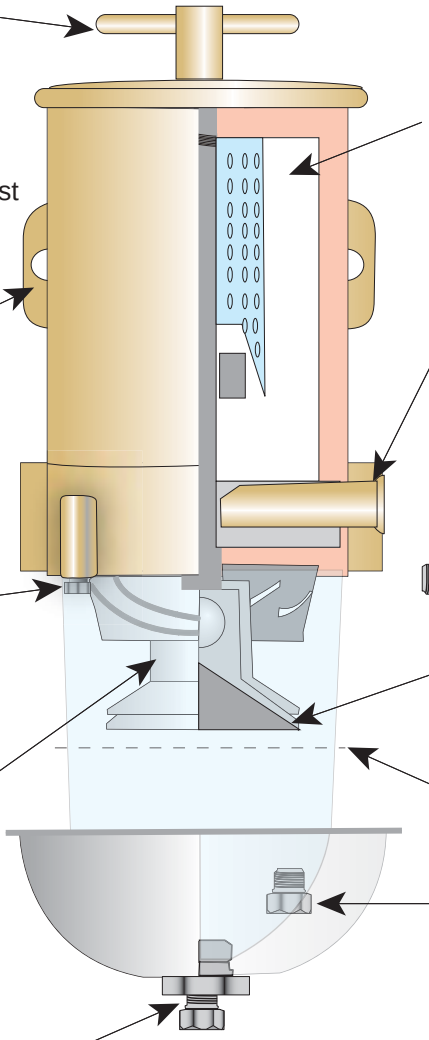
If the element is changed or the assembly drained for any reason, repriming the assembly (filling with fuel) may be necessary. Fill to just above the top of the element before replacing the lid.

If the carriage bolt has been loosened, do not overtighten it as this may distort the cylinder roundness.

The four self - tapping capscrews must not be overtightened to avoid stripping out the body threads after disassembly start threads by hand prior to using tools Specification 55 - 65 in lbs.

The hollow aluminum check ball floats up against the seat when the fuel is stopped thus preventing fuel bleed back. If your unit looses prime, inspect upstream hose connections first otherwise disassemble the unit and inspect the seal and ball.

Air bubbles or fuel leakage appearing from the drain may indicate that the drain is not closed completely. Specifications: 30 - 35 in. lbs.



The element should be replaced every 10,000 miles, every 500 hours, every other oil change, annually, or if the first indication of power loss, whichever occurs first.

SAE O- ring ports should have smooth angled seat for sealing. Do not scratch this surface. Check O-ring for damage.

The housing plug O-ring must not be damaged or swollen. Tighten snugly. Specifications: 15 - 20 in. lbs.

Air bubbles appearing from the turbine are an indications of an upstream leak between the Racor inlet and the fuel tank pick up tube.

Drain water if present before it gets to this level.

A water sensor plug is installed if the water sensor option is not selected. Tighten snugly. Specifications 15-20 in. lbs.

Cold burns (frostbite) will result from skin/eye contact with liquid from the tanks.

Liquid release or vapor pressure jets present a risk of serious damage to the eyes.

Abuse involving willful inhalation of very high concentrations of vapor, even for short periods, can produce unconsciousness or might prove fatal. Inhalation may cause irritation to the nose and throat, headache, nausea, vomiting, dizziness, and drowsiness.

Unconsciousness or asphyxiation may result in poorly ventilated or confined spaces.

5.5.2 First-Aid Measures

Eyes: Immediately flush eyes with plenty of cool water for at least 15 minutes. Hold eyelids apart while flushing to rinse entire surface of eye and lids with water. Get immediately medical attention.

Skin: In case of cold burns, immediately place affected area in warm water (41 degrees) and keep immersed until circulation returns. Get immediate medical advice.

Other requirements: Severe inhalation or overexposure to this material may sensitize the heart to catecholamine-induced arrhythmia. Do not administer *catecholamine to overexposed individuals. Contact the Poisons Information Service and/or seek further medical advice.

*(Catecholamine are chemical compounds derived from the amino and tyrosine that act as hormones or neurotransmitters.) “Wikipedia Encyclopedia”

5.5.3 Fire-Fighting Measures

Activate emergency systems and/or sound the alarm. Call the Fire Department. Evacuate all persons from the area.

Ensure an escape route is always available from any fire. If it is safe to do so, close the container valve(s). Allow any gas-fueled fire to burn out. If unable to cut off supply of gas, allow it to burn.

Keep LPG cylinders or tanks cool, as pressurized containers will explode if subjected to high temperatures.

Small LPG fires can be attacked with dry powder fire extinguishers, provided the fuel supply can be turned off after the fire is extinguished.

5.5.4 Accidental Release Measures

As these substances have a very low flash point, any spillage or leak is a severe fire and/or explosion hazard.

If a leak has not ignited, stop gas flow at container, eliminate all sources of ignition, and evacuate all persons. Stay upwind of release. Inform emergency services.

Liquid leaks generate large volumes of flammable vapor, heavier than air, which may travel to remove sources of ignition (e.g. along drainage systems).

Where appropriate, use water spray to disperse the gas or vapor.

Vapor may collect in any confined space.

If spillage has occurred in a confined space, ensure adequate ventilation and check that a safe, breathable atmosphere is present before entry.

Do not enter a vapor cloud. Only trained specialized individuals should attempt to enter a vapor cloud.

Wear protective clothing. See 5.5.6

In the event of a major leak, contact the appropriate authorities.

Small quantities of spilled liquid may be allowed to evaporate. Vapor should be dispersed by effective ventilation.

5.5.5 Handling and Storage

Store and use only in equipment/containers for use with your particular appliance. Tanks should only be stored in a locker installed and designed for LPG storage, outside the living areas of the boat.

Installation or added appliances should only be performed by qualified personnel.

Follow manufacturer’s instructions for changing tanks.

Ensure good ventilation.

Avoid inhalation of vapor.

When handling cylinders, wear protective footwear and suitable gloves.

When handling cylinders (above head height) protective headgear may be necessary.

When changing tanks, wear suitable gloves and safety goggles or face shields.

Avoid contact with the eyes.

5.5.6 Exposure Controls / Personal Protection

• Skin Protection – Wear suitable protective overalls with long sleeves to cover exposed skin.

• Eye Protection – Use chemical goggles or face shield when changing tanks.

• Hand Protection – Use impervious gloves when changing tanks.

• Use suitable protective gloves when handling cylinders.

• Foot Protection – Wear safety boots or shoes when handling cylinders.

• Head Protection – When handling cylinders above head heights, protective headgear may be necessary.

5.5.7 Stability and Reactivity

Stable at ambient temperatures.

Hazardous polymerization reactions will not occur.

5.5.8 Material to Avoid

Avoid contact with strong oxidizing agents.

5.5.9 Hazardous Decomposition Products

Normally Carbon Dioxide.
Incomplete combustion will generate Carbon Monoxide. See the Boating Safety Chapter for more information on Carbon Monoxide.

Note: Can form explosive mixture with air.

5.5.10 Toxicological Information

Eyes: Will present a risk of serious damage to the eyes if contact with liquid or vapor pressure jet occurs.

Skin: Will cause cold burns (frostbite) if skin contact with liquid occurs.

Figure 5.5 Exposure Limits

	Long Term Exposure Limit (PPM) (8 hr TWA)	Short Term Exposure Limit (PPM) (10 min period)
Butane	600	750
LPG	1000	1250
Propane	None Established. Considered to be an asphyxiate at high concentration in air	
(source: India LPG)		

Inhalation: Low vapor concentrations may cause nausea, dizziness, headaches, and drowsiness. High vapor concentrations may produce symptoms of oxygen deficiency which, coupled with central nervous system depression, may lead to rapid loss of consciousness.

ABUSE: Under normal conditions of use, the product is not hazardous. Abuse involving deliberate inhalation of very high concentrations of vapor, even for short periods, can produce unconsciousness and/or result in a sudden fatality.

5.5.11 Environmental Information

Spills are unlikely to penetrate the soil.

Unlikely to cause long term adverse effects to the environment. Will photo-degrade under atmospheric conditions.

Unlikely to cause long term effects in the aquatic environment.

5.5.12 Disposal Considerations

Product discharge may only be carried out by qualified persons.

• Do not dispose of any LPG container.

• Return all cylinders to the supplier.

Note: This section on LPG is to be considered as a Danger alert. However, we have added in the following additional precautions and warnings.

⚠ DANGER ⚠

Open flame cooking appliances consume oxygen. This can cause asphyxiation or death.

Maintain open ventilation.

Liquid fuel may ignite, causing severe burns.

Use fuel appropriate for the type of stove installed.

Turn off stove before changing tank.

Do not use for comfort heating.

Use special care for flames near urethane foam.

Once ignited, it burns rapidly, producing extreme heat and releasing hazardous gasses and consuming large amounts of oxygen.

Specifically follow all warnings and instructions in your Owner's Manual, your Operator's Manual, and the equipment Manufacturer's Manuals provided to you.

Troubleshooting		
Problem	**Cause**	**Solution**
Fuel overflows at the fill plate (tank not full)	Fill or vent line blocked	Check lines. Clear obstruction from line or straighten line if kinked.
Water or moisture in fuel tank	Cap on deck fuel fill plate not tight	Check cap. Tighten.
	Condensation forming on walls of partially filled tank	Follow remedies for “Condensation” above. If remedies fail to correct problem, fuel tank and lines may need to be drained and flushed. See your dealer for service.
	Poor quality fuel from marina tanks	Diesel engines. Check fuel/water separators. Drain if necessary. Check with your dealer.
Engine cranks but will not start (fuel system)	Lack of fuel	Clean fuel filter, check fuel level. Check whether anti-siphon valve, if so equipped, is stuck shut. Improper starting procedure. Review starting procedures in engine manual.
	Clogged fuel filter	Check and replace fuel filter. Check fuel pump, fuel pump filter, fuel filter, and fuel tank line for cracked flanges or restricted fittings.

Notes:

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Chapter 6

Underwater Gear

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Underwater Gear

Your underwater gear consists of the following:

- Propulsion Components
- Steering Components
- Trim Tabs
- Seawater Intake
- Monitoring Equipment
- Anchor and Windlass

6.1 Propulsion Components

Propulsion components are any component that would be involved in the movement of your boat. This section will detail the components that are submerged or underwater most of the time.

6.1.1 Propellers

The propeller supplied with your Mainship boat has been selected as the best propeller for average use.

Consider keeping an extra propeller on your boat. If the propeller becomes damaged, you can replace it with a spare and continue your outing. Check with your Mainship dealer if you want to purchase an extra propeller.

Note: You, as owner, can change propeller sizes to suit different conditions. However, Mainship Corporation assumes no liability for performance and damage caused by the change in propeller size.

6.1.2 Propeller Shaft

The propeller shaft is made of stainless steel Aquamet, which has excellent corrsion resistance and very high strength. The coupling at one end of the shaft is bolted to the transmission. The other end of the shaft is tapered, threaded and keyed for installation of the propeller. The propeller shaft pass through the hull encased in the shaft log. Then, on the underside of the hull, is attached a strut, which holds the propeller shaft in postion.

6.1.3 Dripless Shaft Log

You may have purchased your boat with the optional dripless shaft log seals. The dripless shaft seal receives water from the raw water side of each engine for cooling. The shaft log seal is 100 percent watertight. The dripless shaft seal is a one-piece bearing containing a proprietary lip seal that encompasses the propeller shaft. The seal has no moving parts and remains motionless. The centrifugal force of the shaft turning inside the stationary housing flushes a constant supply of water lubrication through fluted grooves and out through the shaft log. Fig. 6.1 is a view of a dripless shaft seal showing associated parts and assemblies.

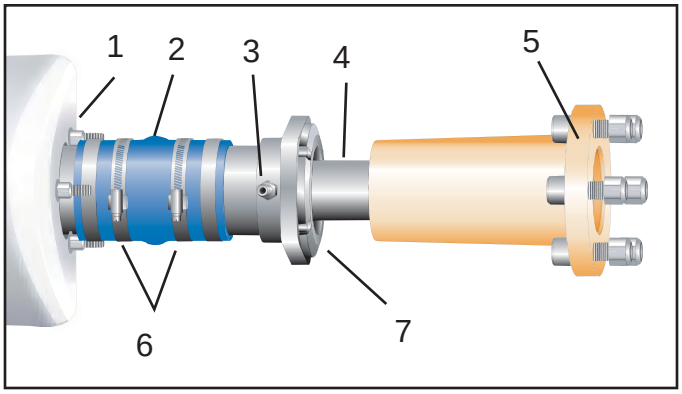


Figure 6.2

Parts List for Fig. 6.2

1. Shaft Log
2. Flexible Coupling
3. Water Injection Fitting
4. Shaft
5. Shaft Coupling
6. Hose Clamps
7. Seal Carrier

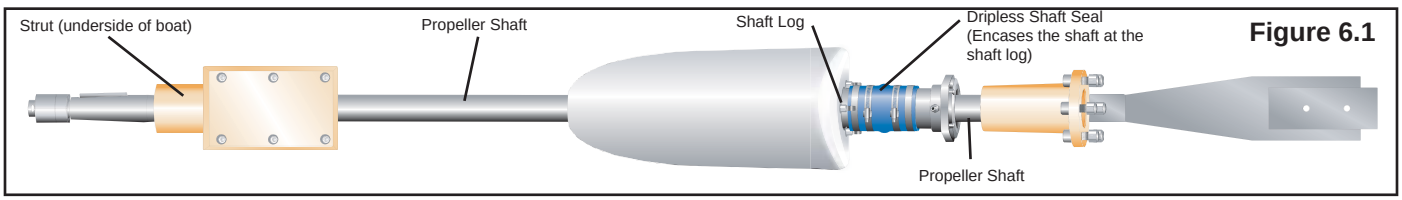


Figure 6.1

The shaft seal assembly should be inspected at least annually.

1. Inspect the blue hose for damage. Inspect the hose clamps for corrosion and proper tensioning. With Strong Seals; tighten with a screwdriver or a nut driver is sufficient.

2. Remove the water lubrication hose from the shaft seal. Make sure the fitting on the seal is clear and inspect for corrosion. If the boat is in water, there should be a strong inflow of water seeping into the boat. Use the inspection cap attached to the fitting to stop this inflow.

3. Inspect engine fitting to make sure that it is clear and check for corrosion.

4. If the boat is equipped with a spare seal assembly, make sure that it is separated from the Strong Seal and secured firmly on the shaft.

5. With vessel in the water, idle the engine. Check the water flow from the lubrication hose at the shaft seal. The flow rate should be about one gallon per minute at idle.

6. Make sure that all hoses and clamps are reassembled securely.

6.1.4 Shaft Log and Stuffing Box (Other than the Dripless Shaft Seal)

The shaft log is a brass tube inserted in an opening in the bottom of the boat aft, for the propeller shaft. A short length of flexible hose connects the shaft stuffing box to the shaft log.

The stuffing box keeps water from leaking around the shaft into the boat. The stuffing box has a packing gland filled with synthetic lip seal. Unlike shaft logs with flax packing there should not be any drip. If there is leakage, the lip seal may need replacement, the log may be out of alignment, or the shaft may be bent or scored. Have your dealer check any persistent leakage.

6.1.5 Struts

The propeller shaft is supported by a manganese bronze strut fastened to the bottom of the hull. The strut has replaceable bearings to minimize wear and to protect the shaft at the points where it passes through the strut hub. The strut bearings should be inspected annually and replaced as necessary.

6.1.6 Alignment

Aligning the engine with the propeller shaft is critical for smooth operation of your boat. Shaft alignment may change slightly after your boat is in use. Your dealer should check alignment as part of commissioning, particularly if there is vibration, a drumming sound, or loss of RPMs.

If alignment is necessary see your authorized Mainship service technician.

6.2 Steering System

6.2.1 Steering System

The steering system on your boat consist of a steering wheel, hydraulic pump (Fig. 6.3), rudder assembly, a rudder position indicator, and an auto pilot (option) (Fig. 6.4).

The steering system has a modern hydraulic steering system. The hydraulic steering uses the ship's helm to provide the steering motion for the steering system via a manually-driven hydraulic pump. A manual hydraulic steering system consisting of a helm and a hydraulic ram. Turning the steering wheel to port or starboard makes the system move the steering ram accordingly. For more information about the steering system consult your documentation in your owner's packet.

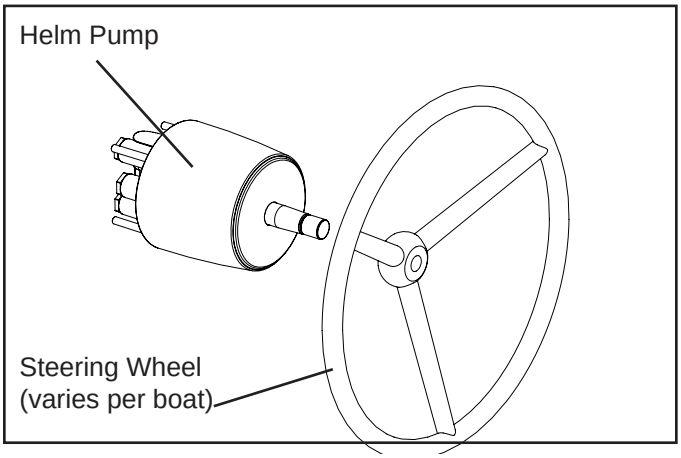


Figure 6.3

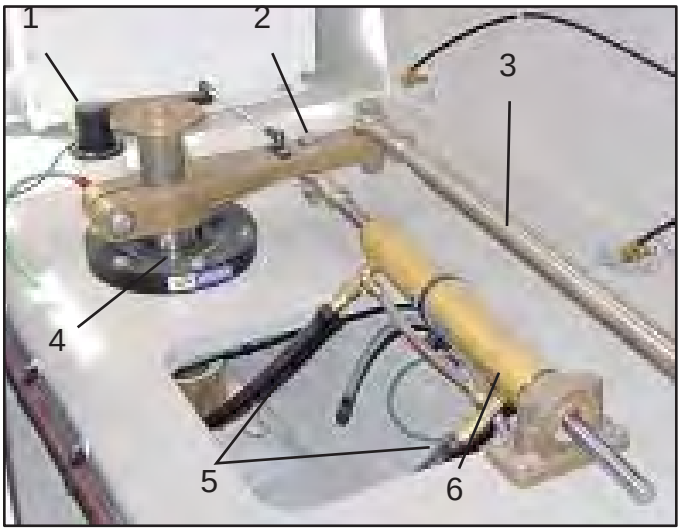


Figure 6.4

Note: If the steering system needs repair, your Mainship dealer has the correct tools. Do not try to service the system yourself.

Parts List for Fig. 6.4

1. Auto Pilot
2. Tiller Arm
3. Tie Bar
4. Rudder Shaft and Seal
5. Hydraulic Hoses
6. Steering Ram

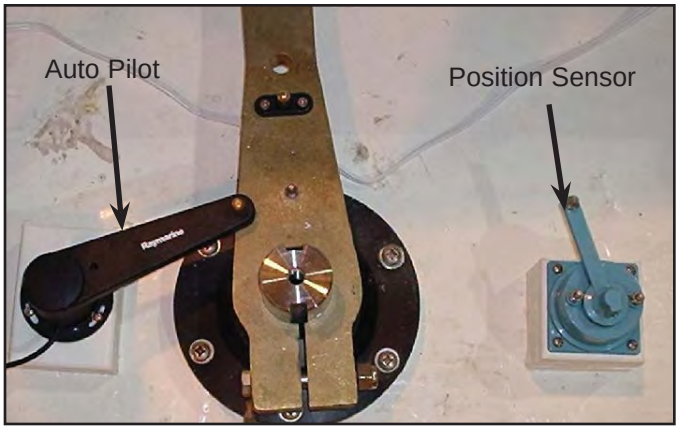


Figure 6.5

Parts List for Fig. 6.5

1. Auto Pilot (See OEM manual)
2. Rudder Position Indicator (Optional)

The rudder position indicator consists of two parts: the sender which is attached to the tiller arm in the transom area, and the gauge indicator which is at the helm station.

The gauge indicator will move to either the port or the starboard side of the gauge in relation to the movement of the rudder arm.

Figure 6.6

6.2.2 Rudders

Your Mainship 34 Trawler Hardtop has a manganese rudder. The rudder shaft stuffing box provides an opening for the rudder shaft through the bottom of the boat. The stuffing box keeps water from leaking around the shaft into the boat. These also use a “dripless” stuffing box. However because the friction involved in the shaft seal is not evident in the rudder shaft no coolant is needed to keep the bearings cool. On the following page you will find a breakdown of the components that make up the rudder assembly.

(Optional) Autopilot

The autopilot works much the same way as the position sensor in that it has a sensor at the tiller arm which controls the autopilot keeping the boat on the course programmed to the controls.

For more information about the autopilot consult your documentation in your owner’s packet.

Illustrated example of the steering system

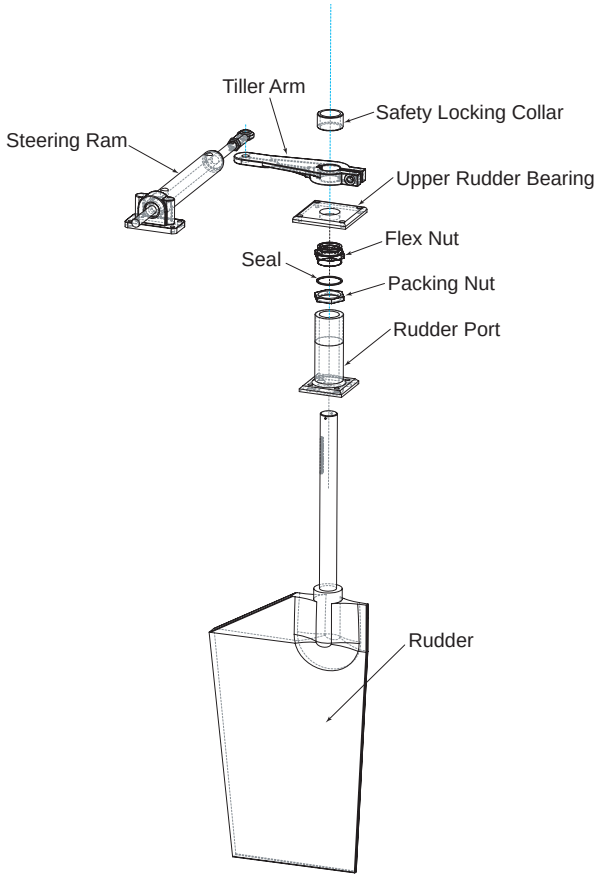


Figure 6.7

6.3 Trim Tabs

The trim tabs are two flat plates, hinged below the water line on the transom at the rear and are raised or lowered hydraulically by using the rocker switches located at the helm.

The trim tabs are used to adjust the sideways listing of the boat due to uneven loading, a strong crosswind, or propeller torque. The twisting effect of propeller torque is especially pronounced when running the engine at a high horsepower output. To correct the listing, adjust the trim tabs to level the boat. When the boat is level right to left, the steering effort will be the same for port and starboard turns.

Lower the trim tabs on the listing side by pushing the top half of the rocker switch in short bursts, until the correct trim is reached.

Using both switches to lower both tabs in balanced (evenly port and starboard fashion) will lower the bow, when on a plane, if the rear of the boat is loaded. As before use only short bursts to move the trim tabs.

When running at a cruising speed the trim tabs should be fully raised (upward position) unless the aft section of your boat is loaded.

In a following sea, or an inlet the best maneuverability can be achieved with a high bow attitude.

You should also raise the trim tabs when your boat is below planing speed or at rest. When you back your boat out of a slip, the drag from a tab still lowered will pull your boat to that side and you will not be able to back straight out of the slip. Raising the tabs also protects the rams from marine growth because they are retracted into the cylinder. The trim tabs are deactivated by turning off the ignition.

A properly trimmed boat:

• Operates at a correct running attitude of between 3 and 6 degree angle to the water. (Slightly raised bow)

• Reduces drag and increases fuel economy

• Preserves good forward visibility and increases safety

⚠ WARNING ⚠

Use short bursts to move your trim tabs. Holding the switches to long could cause sudden steering problems.

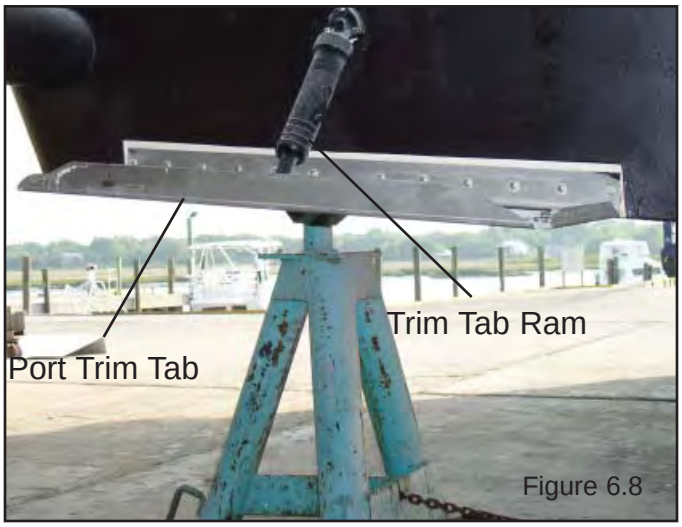
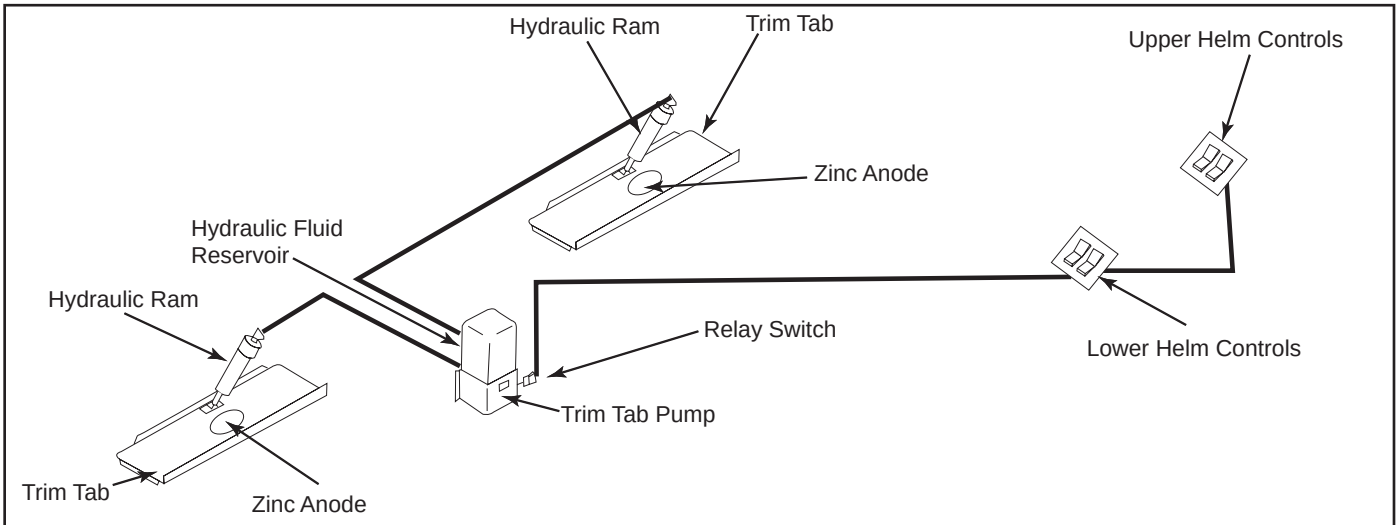


Figure 6.8



Typical Trim Tab System Figure 6.8

Bow down ("Plowing")

Proper Trim (3° to 5° Bow-up angle)

Bow Up ("Porpoising")

Running Attitude	List	Controls
Bow Up	———	Bottom of both Switches
Bow Up	Port	Bottom of Stbd. Switch
Bow Up	Starboard	Bottom of Port Switch
Bow Down	Port	Top of Stbd. Switch
Bow Down	Starboard	Top of Port Switch

6.4 Seawater Intake

6.4.1 Pick Ups and Intakes

On the bottom of your boat you will find pick ups and intakes for the supply of raw water to your boats various systems.

Shown is an example of one type of intake. The intake may be gravity fed as pictured or forced by movement of the boat, which in this instance the intake would be positioned reverse of the one pictured so that water would be forced through the intake with pressure from the movement of the boat.

Care should be taken that these intakes and pick ups are cleaned of barnacles and other growth as specified in the maintenance section of this manual to maintain a clear open passageway.

Figure 6.9

The optional electronics package you have ordered on your boat will largely determine the underwater gear that is related to the monitoring equipment. Be sure and refer to your documentation in your owner's packet to find out the details about this equipment.

6.5 Monitoring Equipment

The (optional) "Transducer" is used to tell the speed of your boat. The information is passed to the speedometer at the helm station, from which you are able to monitor.

See your owner's packet for more information concerning the "Transducer".

6.6 Anchor and Windlass

Your boat is equiped with a plow type anchor, which is attached at the bow pulpit to a windlass system.

The windlass facilitates the anchoring of your boat by automatically raising and lowering the anchor. To operate the windlass, the windlass power switch at the helm station must be switched on.

Note: It is important that the windlass clutch is tight for proper operation and safety. Periodically check the clutch and tighten if necessary.

To tighten the clutch:

• With the anchor in the stowed position, tighten the windlass clutch by inserting the emergency handle in the clutch nut. (See Fig. 6.10) and turn clockwise.

To Operate Manually:

• Make sure that the safety hook is removed from the anchor chain.
• Insert the emergency handle into the clutch nut.
• Turn handle clockwise to retrieve anchor.

To operate from the bow:

• Switch the power on at the controls
• Remove the safety hook
• Lift the protective cap from the foot switch and depress the up or down switch for the desired result.

To operate from the helm:

• Make sure that the safety hook is removed from the anchor chain
• Turn the windlass switch on
• Push the bottom of the windlass contol switch (located on the helm) to raise the anchor. Push the top of the switch to lower the anchor.

Maintenance:

⚠ DANGER ⚠

Make sure that the power is off before performing any maintenance or work on the windlass.

• Periodically check the motor and control box electrical connections, remove any residue and cover connections with a small coating of grease.

It is recommended that you, once a year, disassemble the windlass and remove residue buildup. To perform this maintenance follow all safety procedures and complete the following:

• Using the emergency handle, unscrew the nut by turning the handle counterclockwise.
• Remove the drum, upper cone, chain wheel, and lower cone.
• Wash down with water to remove any residue.
• Coat surfaces with a light film of lubricant.
• Reassemble the unit and tighten the clutch by turning the handle clockwise.

Note: Refer to your Owner's / Operator's Manual in your owner's packet for detailed information about your windlass.

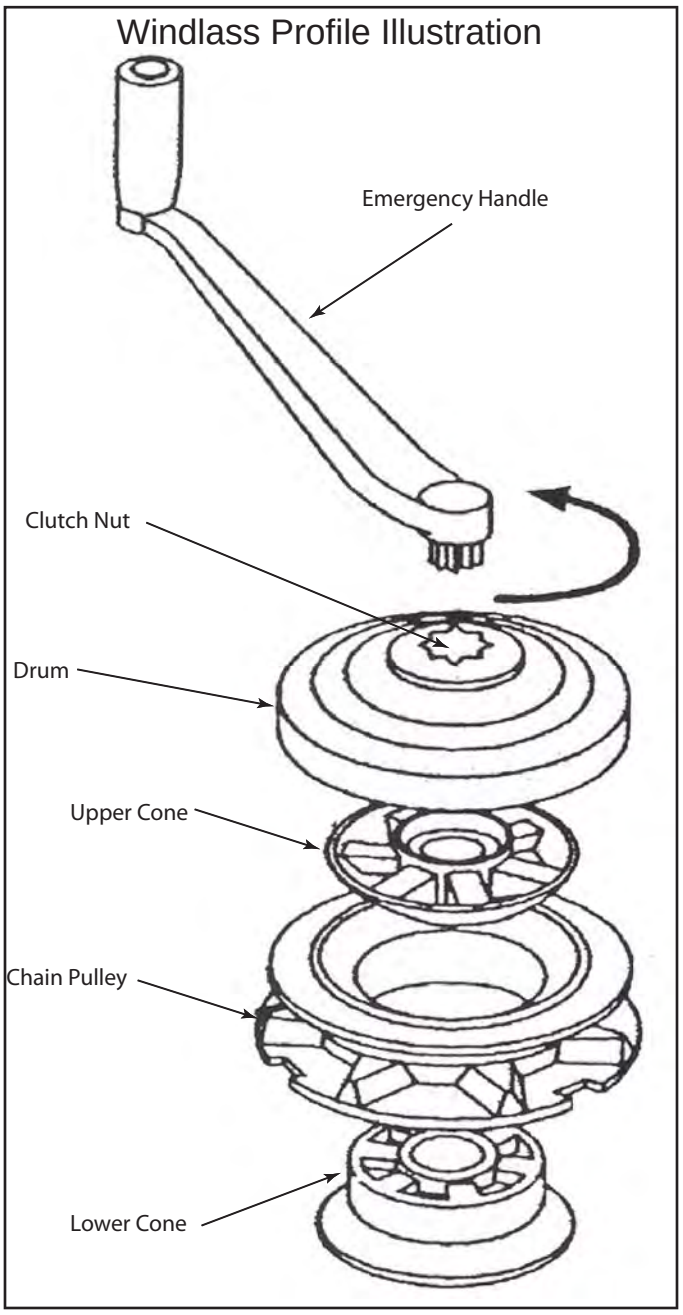

Windlass Profile Illustration
Emergency Handle
Clutch Nut
Drum
Upper Cone
Chain Pulley
Lower Cone

Figure 6.10

Troubleshooting

Problem	Possible Cause	Resolution
Excessive vibration	Material obstructing propeller	Remove material from propeller, shaft, or rudder by reversing engines. If necessary, stop engines and cut or pull material away.
	Bent prop or shaft	Replace propeller. If vibration continues, see your Mainship dealer for service.
	Excessive play in shaft log	Check shaft log for wear. Avoid sudden torque changes. See your dealer for repairs.
	Bent rudder	Replace. See your dealer for service.
Poor performance	Material wrapped around propeller	Run engines in reverse. If necessary stop engines and cut or pull material away.
	Damaged propeller; wrong propeller in use	Replace propeller

Notes:

Mainship®
TRAWLERS
AN EMPLOYEE OWNERSHIP COMPANY

Chapter 7
DC Electric Systems

40 Trawler
Single & Twin

V1.011508 • P/N 1034082

DC Electric System

Your boat has a 12 V DC negative ground and a 120V Hz (Hertz) AC electrical system. Your electrical system was thoroughly inspected at the factory before your boat was delivered to your dealer. The DC Electric System consistsof the following systems or components:

- Battery Switches
- DC Distribution Panel
- Helm Controls
- Batteries
- Battery Charger
- Pumps
- Lighting
- CO Monitors
- Waste Systems
- Engine Controls
- Bilge Blowers
- Appliances
- Windlass
- Trim Tabs
- Gauges

7.1 DC Power System & Components

To operate the 12V DC System

1. Switch the main battery switch in the engine com-partmrnt to ON.

2. Switch the DC MAIN circuit breaker at the DC Distribution Panel to ON.

Note: Always switch circuit breakers off when you leave your boat unattended.

7.1.1 Battery Switches

Each battery bank is wired to a battery selector switch (Fig. 7.1) located on the engine room aft bulkhead. The battery switch controls the delivery of DC power from the batteries to the engine and all components using DC power.

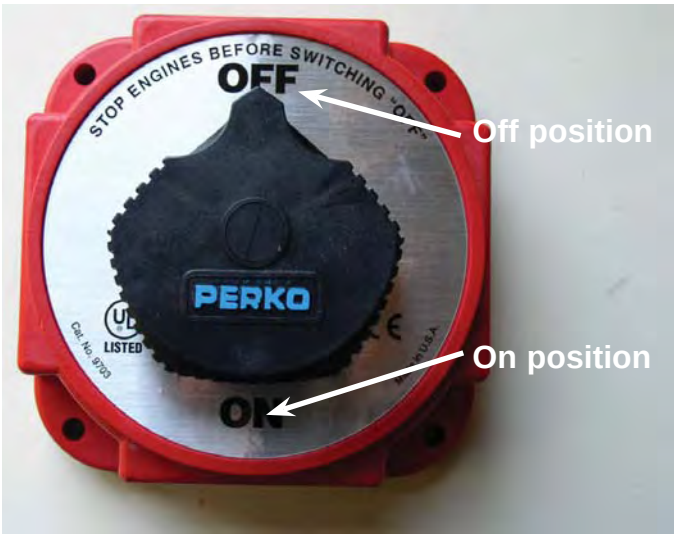


Figure 7.1 Battery Switch

7.1.2 Battery Switch Panel

The battery switch panel supplies power to all the major systems of your boat, as well as controlling power to the "constant hot" systems. These are systems that need or have power supplied to them whether the battery switch is on or off.

Note: For safety and convenience the following items are not shut off by the battery switches:

- Bilge Pumps
- Sump Pump
- CO Monitor
- Stereo Memory
- Engine

These items need constant power to perform their task. This allows the bilge pumps to operate any time excess fluid accumulates in the bilge. The remaining DC system is turned off with battery switches.

Figure 7.2 Battery Switch Panel

7.1.3 Batteries

The batteries installed in your boat have been selected for their ability to furnish starting power based on engine starting requirements, as well as their ability to power the DC components attached the electrical system. See Table 1 for the recommended batteries for your boat.

⚠ WARNING ⚠

Batteries contain Sulfuric Acid and can cause severe personal injury if mishandled. Avoid contact with eyes, skin, or clothing. In case of contact, flush with water at least 15 minutes. If swallowed, drink large quantities of water or Milk of Magnesia, beaten egg or vegetable oil, and get medical attention immediately.

⚠ WARNING ⚠

Charging batteries produce gasses which can explode if ignited. Explosion can shatter a battery. Battery acid can cause severe personal injury such as blindness. Keep flame, spark, and smoking materials away from batteries while charging. Charge in a well ventilated area.

⚠ WARNING ⚠

Batteries contain a large amount of potential electrical energy! Extreme care must be used when working with batteries. An improper connection to a battery can release enough energy to cause severe personal injury or fire.

Table 1 Recommended Batteries (or equivalent)

MFG/PN	Group Size	Volts	Qty
Stowaway ST8DDC400	8D	12	3*
ST27DP730	27	12	1

* 4 With Optional Inverter, 5 with Optional Bow Thruster

7.1.4 Battery Charging System

An alternator on the engine charges the battery while the engine is running. Check your engine information packet for more information about these systems.

The battery charger (fig. 7.3) is located on the engine room fwd bulkhead. The charger is protected by a fuse on the positive and ground side at the charger.

Figure 7.3 Battery Charger

7.1.5 Breakers, Switches, and Fuses

All electrical systems aboard your boat are provided with overcurrent protection in the form of breakers or fuses. Examples of breakers are the system or component controls at the Main Distribution Panel or MDP, or in the battery selector switch panel. Systems that would normally require you to energize them for use are provided with switches.

The breaker and switch panels are detailed further in the end of this section under “Legends”.

7.1.6 Grounds, Bonding, and Zinc

In several locations aboard your boat you will find grounding blocks such as the one pictured in fig. 7.4.

⚠ WARNING ⚠

Never test a circuit for power by connecting or touching the red (positive) wire to a ground circuit.
Serious injury or fire could result.

Figure 7.4 Grounding Block

While there are bonding blocks as well aboard your boat, the grounding blocks can be determined by the groups

of yellow (negative) wires attached. All electrical circuits require a ground, so all grounds are joined in sections at “grounding blocks”.

You will notice on the right hand side of the grounding block pictured a green wire attached, this is part of the “Bonding System”.
The purpose of the bonding system is to protect your boat’s underwater components from electrolysis or galvanic corrosion. Examples of underwater components would be the propellers, propeller shafts, rudders, or engine / generator and seawater intake valves.

Electrolysis and galvanic corrosion occurs primarily in salt water but can occur to a lesser degree in fresh water. Salt water allows electric current to flow from anodic to cathodic material. Any two metals from two components and their relative position in the galvanic rating table will determine which metal loses material (anode) and which metal remains largely undisturbed (cathode). The distance apart in the galvanic table of the two metals determines the rate of wear.

To help prevent corrosion, sacrificial zinc anodes are wired to the underwater components of your boat, such as the propeller shafts and rudders, then connected to a large sacrificial zinc anode plate (fig. 7.5) attached to the underwater area of the transom.

Figure 7.5 Zinc Plate

The sacrificial zinc anodes are considerably easier and cheaper to replace and their deterioration will not affect the performance of your boat as would the deterioration of any underwater components.

The bonding system is a network of wires (color coded green) that are connected to all metallic underwater components within the interior of the hull, which makes them one unit for electrical current purposes. This network of wires is then attached to the sacrificial zinc anode located on the transom, which allows corrosion of the anode but prevents corrosion of the underwater components.

General maintenance of the bonding system consists of yearly replacement of the sacrificial anodes. This should be completed during the spring launch procedure for example. The anode may require more frequent replacement, depending on your docking location and the length of your boating season. If possible, check the anode for excessive corrosion midway through your boating season. If excessive corrosion is noted, have your dealer or a competent technician replace the sacrificial zinc anode. Periodically check the wiring connections to make sure they are tight and free of corrosion. Tighten and clean connections as necessary.

Important: DO NOT PAINT any part of the sacrificial zinc anode as it will retard the flow of electric current through them and render them ineffective.

7.1.7 Generator

Although technically the generator is part of the AC System, because it supplies AC power. The starting of the generator requires DC power, the generator starting receives power from the batteries in the lazarette area.

The generator supplies 120 volt 60 hz AC power for operating devices and equipment controlled through the AC Distrbution Panel.

When the generator indicating light is on and the generator breakers are ON, AC power is supplied to both the generator and AC control panel devices and equipment. The ON light at the AC Distribution Panel is illuminated.

The slide bar prevents power from being supplied from shore power when using the generator.

Refer to the “Operation and Procedures” part of the AC Electric section for information on starting the generator.

7.1.8 DC Distribution Panel

The DC Distribution Panel, located in the starboard aft side of the salon controls DC current throughout the boat. Figure 7.8 lists the breakers and circuits they protect.

Besides the battery selector switches you must engage the DC Main at the MDP to provide DC power to the respective components or systems.

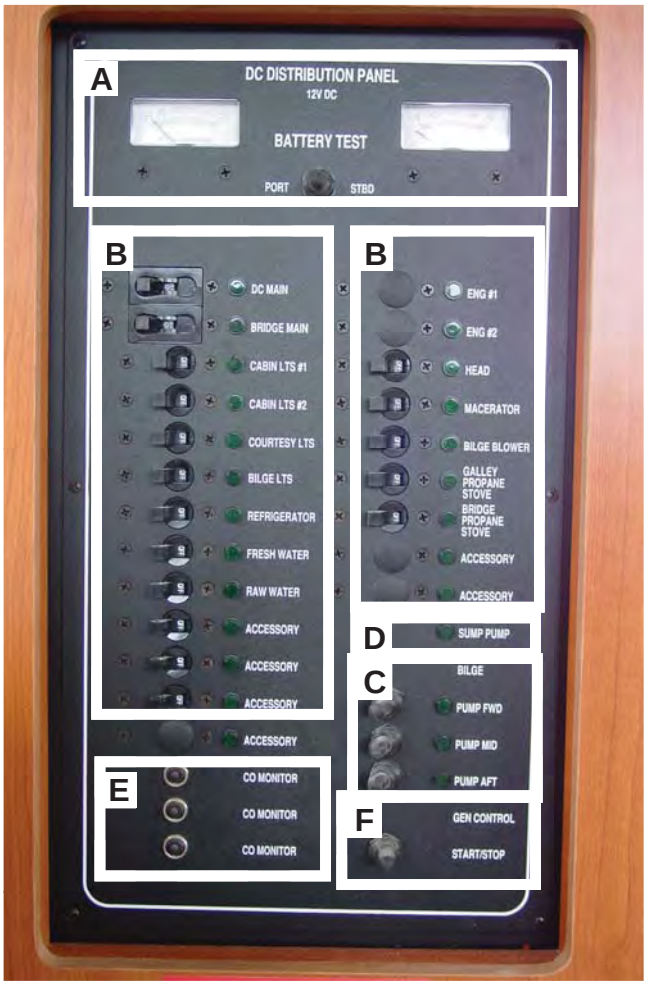


Figure 7.8 DC Distribution Panel

As you can see in Fig. 7.8, the DC Distribution Panel is divided into sections:
Section A - This section is devoted to monitoring the DC power.
Section B - These are your breakers that control various components aboard your boat.
Section C - This is the bilge pump section, the fwd, mid, and aft bilge pumps have manual modes that allow you to turn them on, here you will find the switches to go from automatic to manual mode.
Section D - This is your Shower Sump indicator light, the shower sump (discussed in the Waste Section) , when activated will illuminate this green light to allow you to acknowledge the operation.
Section E - This is the reset for your CO Monitor
Section F - This is the generator controls. If your boat is equipped with a generator, there will be a “preheat, start/stop”, and “on and off” switch here.

7.2 Systems and Components

There are many systems and components on the DC side of your boat from emergency and safety to entertainment, these systems make up the largest part of your electrical system.

Here we will discuss the electrical parts of those systems and try and give you a better understanding of the uses and features of your DC electrical systems and components. Since the largest part of your controls are at the MDP, we will start there and run down the systems and components as they are listed on the MDP, from there we will look at the battery switch panel, and finally the helm controls.

7.2.1 DC Main

In order to energize the DC system aboard your boat, besides the battery switch you must turn the breaker marked “DC Main” to the on position. This supplies power to the remaining breakers and systems on the MDP. However you do not have to energize the DC Main to have power to the DC switches and breakers at the helm.

7.2.2 Raw and Fresh Water Breakers

The breakers at the MDP marked “Raw Water”, and “Fresh Water Pump” control power to these two systems. The fresh water pump will not operate since this is a pressurized system and the pressure on the system has to fall below a specified point in order to activate the pump. On the raw water side the pump is active and running when you energize the breaker.

7.2.3 Refrigerator

The breaker marked “Refrig” supplies power to the DC powered refrigerator aboard your boat.

7.2.4 Lighting Systems

There are basically four different lighting systems aboard your boat. These are the Interior and Exterior lighting, the safety and navigational lighting, and if supplied the courtesy lighting.

The interior and exterior lighting systems are are powered from the MDP and are labeled.

The engine room and Lazarette (generator) area lighting are also powered from the MDP.

The next area, safety and navigational lighting closely follows Coast Guard regulations regarding safety and navigational lights. They are as follows:

- Side Marker Lights
- All Around Light
- Stern Light
- Spotlight (option)

The first three in the list are involved in Navigational Lighting. These lights are powered from the MDP. The side marker lights are the red and green light on each side of the boat, the all around light is the mast light (sometimes called).

The all around light serves two functions, it lights up in front if you are underway and the front and back light up if you are anchored.

The stern light is only on if you are underway. It is located on the transom of the boat, and also powered from the MDP.

The spotlight (option) is usually mounted at the fwd part of the hardtop, it is powered from the helm station and the controls are located on the helm.

7.2.5 CO Monitors

In each area aboard your Mainship 34 Trawler Hardtop you will find a CO Monitor (Carbon Monoxide Monitor). At Mainship we care about your safety and have installed these CO Monitors to show our concern.

For more information about the CO Monitors mounted on your Mainship 40 Trawler, consult your Owners Packet and find the documentation for the CO Monitors. Fig. 7.9 gives you a look at the CO monitor.

Figure 7.9 CO Monitor

7.2.6 Entertainment Centers

The entertainment centers in the berthing areas of your boat are 12 volt DC powered. The power is supplied through the MDP, the television is AC powered, the stereo is DC powered.

More information about the controls of your entertainment centers and equipment can be found in your Owner's Packet..

7.2.7 Oil Changer

Your Mainship 40 Trawler may be equipped with the optional oil changer. The oil changer receives its power from the DC Electrical System. The breaker is located on the Battery Switch Panel, the breaker is marked "OIL CHANGER":
Note: Discharge of oil prohibited. The Federal Water Pollution Control Act prohibits the discharge of oil or oily waste into or upon navigable waters and contiguous zone of the United States, if such discharge causes a film or sheen upon, or discoloration of, the surface of the water, or causes a sludge or emulsion beneath the surface of the water. Violators are subject to a penalty of $5,000.

7.2.8 Trim Tabs
The Trim Tabs are also DC powered, the Trim Tabs are described in greater detail in the Underwater Gear section of this manual.

7.2.9 Horn

The Mainship 34 Trawler Hardtop meets all CE standards in safety equipment by supplying you with the best available. The "trumpet" style horns mounted above the bridge are just another example of our commitment to

your safety.

The horns are DC powered and the controls are located at the helm.

7.2.10 Bilge Pump Systems

The Mainship 40 Trawler is equipped with 3 bilge pumps and one emergency bilge pump. For locations of the bilge pump systems consult your Mechanical Arrangement Drawing or the Sanitary Systems Drawing.

The Bilge Pump System consists of a pump and a float switch. When the water level rises far enough to activate the float switch this activates the pump which lowers the water level down to a point that the float switch stops the power. Fig. 7.10 shows you the typical wiring.

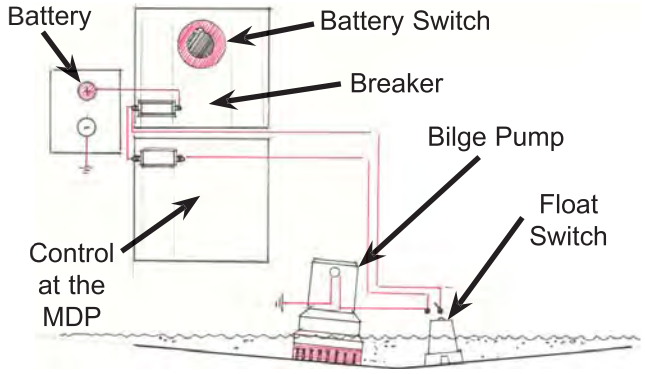


Figure 7.10 Bilge Pump System

7.2.11 Ventilation

Ventilation is a very important issue with your boat, with the potential for carbon monoxide buildup (see Boating Safety Section) along with the simple comfort of fresh air or air conditioning, ventilation is a standard that is a necessity.

On your Mainship 40 Trawler there are essentially three types of ventilation, the air conditioning system (AC System), the exhaust or blowers, and the Bomar hatches, which supply you with fresh air when opened. Since the air conditioning system is AC powered (see AC Electric Section) and the hatches require no power we will detail the blowers (or exhaust fans), and their function here.

For blower location consult your Mechanical Arrangement Illustration in the Boating Safety Section, or the Ventilation Illustration in the same section.

⚠ CAUTION ⚠

Fuel fumes in the engine compartment can explode. Before working on electrical wiring ventilate engine room and disconnect battery cables to prevent sparks.

There is an exhaust blower installed in the head, controlled by a switch in the head.

The engine room blower is an exhaust fan which will remove any exhaust fumes from the engine room, as well as removing heated air.

The blower in the lazarette area, or generator space is a supply fan. It supplies fresh air to the generator (option). This blower fan is specific to the generator and will only be installed if the generator option is ordered.

7.2.12 Fire Extinguishing Systems

Another component that is specific to the generator is the fire extinguisher in the lazarette area. If your boat does not have the generator option then this system is not installed.

In the engine room there is another fire extinguishing bottle installed. This system is DC powered, with the relay, or “module” and the alarm at the helm station. When a fire is detected on your boat, the alarm will sound and set off the Halon bottles. This relay will shut down the engines, the blowers, and the generator. To reset the system, activate the reset switch on the monitor at the helm. See fig. 7.11

Figure 7.11 Fire Alarm Monitor

7.2.13 Shower Sump

The shower sump is part of the Sanitary Systems and more information about the Shower Sump can be found in that section, however the breaker control for the show-

er sump can be found on the Battery Switch Panel.

7.2.14 Windlass

Your Mainship 40 Trawler may be equipped with an optional windlass. It receives its power from the DC electrical system. The windlass offers you the ability to raise and lower your anchor from the helm station.

There is also a circuit breaker at the battery switch panel. The windlass can be operated from the helm station or from the bow. See manufacturer's owner's manual about the proper and safe operating procedures. See Fig. 7.12

Figure 7.12 Windlass Controls

7.2.15 Windshield Wipers

There are three separate wiper motors on your boat. All are supplied with power on one circuit, switched at the helm.

Wiper Blades should be replaced as needed, carefully inspect blades on each outing and replace as needed to prevent scratching of your windshield.

7.2.16 Gauges and Electronics Package

The "Electronics Package" is an option, and there are a few different configurations available, so be sure and refer to your Owner's Manual Packet for any documentation about these components.

The power for the electronics and gauges come from the helm station and the breakers for those components are on the helm station. For more information concerning gauges, refer to the Engines and Transmissions Section of this manual.

7.3 Operations and Maintenance

7.3.1 To operate the 12 Volt DC System:

1.Switch the main battery switch in the cockpit ON.

2. Switch on relevant breakers at battery switch.

3. Switch the DC main circuit breaker at electrical panel to ON.

4. Switch on relevant breakers at the DC Panel.

Note: Always switch circuit breakers off when you leave your boat unattended.

7.3.2 To manually operate your bilge pumps:

Note: The power to the MDP does not need to be energized in order to manually operate your bilge pumps.

1. Locate the bilge pump switches at the MDP and switch them to the manual position.

2. Another procedure to be used in extreme circumstances involves locating the float switch, and manually rotating the float handle on the side of the float switch to simulate the float switch being underwater. This will energize the pump and the pump will operate.

7.3.3 To operate the macerator pump:

Important: U.S. Coast Guard regulations require that boats have a sanitation system on board to control pollution. Waste is to be stored in a holding tank or other device so it can be properly disposed of at a shore facility. Discharging this waste overboard in U.S. lakes, rivers, bays and sounds and within 3 miles of shore in international waters is prohibited. Check with the Coast Guard regarding regulations in your area.

1. Power up the DC panel as described in this section.

2. Open the seacock valve located under the steps to salon.

3. Switch the MACERATOR breaker switch at the DC main electrical control panel to ON.

4. Allow the macerator to run until the holding tank is empty, but no longer. Running the macerator when

the tank is empty will damage the pump. When full the macerator will have a low pitch grind. When empty this changes to a high pitch grind.

5. When you hear the pump speed up (indicates tank is empty), immediately switch the MACERATOR breaker to OFF.

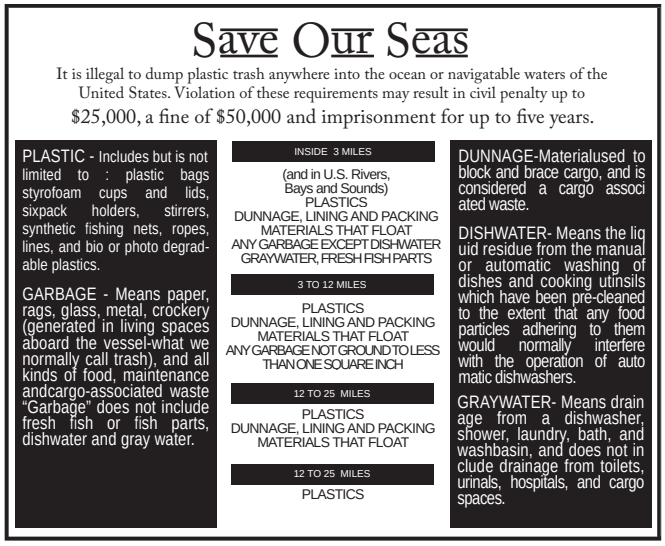
6. Close the seacock.

⚠ CAUTION ⚠

Do not place facial tissue, paper towels or sanitary napkins in head. Such materials can damage waste disposal systems and the environment.

⚠ WARNING ⚠

Important: If the seacock is not closed, the holding tank will fill with sea water and could possibly flood the boat.



Save Our Seas

It is illegal to dump plastic trash anywhere into the ocean or navigatable waters of the United States. Violation of these requirements may result in civil penalty up to $25,000, a fine of $50,000 and imprisonment for up to five years.

PLASTIC - Includes but is not limited to : plastic bags styrofoam cups and lids, sixpack holders, stirrers, synthetic fishing nets, ropes, lines, and bio or photo degradable plastics.

GARBAGE - Means paper, rags, glass, metal, crockery (generated in living spaces aboard the vessel-what we normally call trash), and all kinds of food, maintenance andcargo-associated waste "Garbage" does not include fresh fish or fish parts, dishwater and gray water.

INSIDE 3 MILES

(and in U.S. Rivers, Bays and Sounds)
PLASTICS
DUNNAGE, LINING AND PACKING MATERIALS THAT FLOAT
ANY GARBAGE EXCEPT DISHWATER GRAYWATER, FRESH FISH PARTS

3 TO 12 MILES

PLASTICS
DUNNAGE, LINING AND PACKING MATERIALS THAT FLOAT
ANY GARBAGE NOT GROUND TO LESS THAN ONE SQUARE INCH

12 TO 25 MILES

PLASTICS
DUNNAGE, LINING AND PACKING MATERIALS THAT FLOAT

12 TO 25 MILES

PLASTICS

DUNNAGE-Materialused to block and brace cargo, and is considered a cargo associated waste.

DISHWATER- Means the liquid residue from the manual or automatic washing of dishes and cooking utinsils which have been pre-cleaned to the extent that any food particles adhering to them would normally interfere with the operation of automatic dishwashers.

GRAYWATER- Means drainage from a dishwasher, shower, laundry, bath, and washbasin, and does not include drainage from toilets, urinals, hospitals, and cargo spaces.

7.3.4 To operate the bilge blower or "ventilation" system:

1. Power up the DC system as discussed in this section.

7.3.5 Diesel Engines / Diesel Generator:

2. At the MDP switch the blower on.

7.3.6 Gas Engines / Gas Generator:

2. With Gas engines you have a blower in both the engine compartment and the generator or Lazarette compartment. There is a blower switch located at any location you can start an engine from.

3. Switch the blower motor on.

7.3.7 To operate the windlass:

1. Power up the windlass from the battery switch.

2. Electrical controls for the windlass are at the helm stations in the form of double rocker type switches.

3. There are foot controls at the bow pulpit that operate the windlass as well. The red switch lowers the anchor and the gray switch raises the anchor.

Important: Attached to the anchor chain is a safety cable. This cable must be manually released in order to operate the windlass to lower your anchor. This is a safety feature so the the anchor is not accidentally lowered while underway, or any situation that it would be undesirable to lower the anchor. Be sure and place the safety cable back on the anchor chain when not in use.

7.3.8 CO Monitors

For your protection Mainship has installed CO Monitors aboard your boat. The operation of the CO monitor requires a (10) ten minute warm up period, during which the sensor element is cleaned and the unit is stabilized. During this warm up period, the green indicator light will flash on and off. The green indicator light will remain on until the next warm up period or the detection of Carbon Monoxide gas. If the green indicator light does not illuminate, make sure a qualified electrician checks all wiring connections, and clean and tighten if necessary. Check the breaker at t he battery switch. If the indicator light still fails to illuminate, contact your Mainship dealer for replacement.

7.3.8.1 Low CO Warning

When CO gas is detected there are audible and visual signals that follow. A "Low CO Warning" will be a flashing yellow indicator accompanied by a beep sound every (5) five minutes. The yellow indicator will flash until the presence of CO has been lowered to an acceptable level. If the level is not lowered then an alarm will sound in approximately (15) fifteen minutes. Contact a qualified

technician to locate and repair the source of the Carbon Monoxide Gas and do not enter your boat until the CO gas is at an acceptable level.

7.3.8.2 CO Alarm

A Red flashing indicator light and a pulsed alarm sound indicates a high level of Carbon Monoxide (See Boating Safety Section 4 of this manual), and immediate action is required.

Contact a qualified technician to locate and repair the source of CO, and do not enter your boat until repairs have been made, and the gas has been brought to an acceptable level. After pressing the reset switch the alarm will sound a beep every (30) thirty seconds until the CO is lowered to the low CO level. If not brought down to this level the CO alarm will sound in approx. (6) minutes.

7.3.8.3 CO Monitor Malfunction

If the indicator light flashes alternating red / green accompanied by a beep sound every (15) fifteen seconds, and pressing the test/reset switch will not discontinue the visual and audio signal, then see your Mainship dealer for a CO monitor malfunction.

CO Monitor Maintenance

Test the monitor after removing your boat from storage, prior to departing on a cruise and on a weekly basis.

Carefully observe the color of each light during the test to be certain they are functioning properly.

Vacuum the dust from the cover with the brush attachment of your vacuum cleaner.

Frequently clean with a damp cloth and dry with a dry soft cloth.

Do not spray waxes or cleaning agents on the monitor.

7.4 Legends

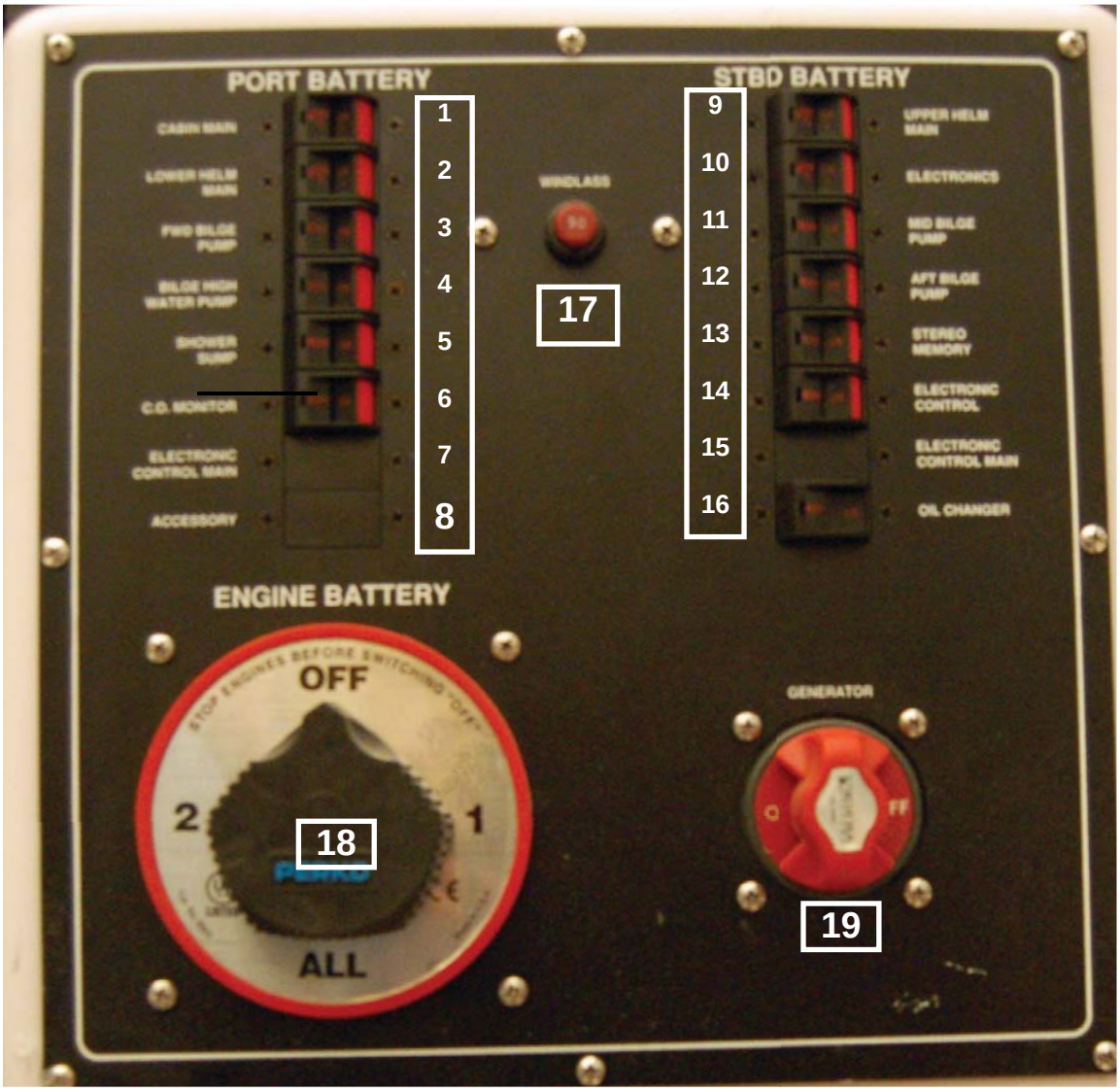
7.3.9 Maintenance

The maintenance of your DC system is ensuring that all connections are clean, tight and covered with a corrosion inhibitor compound.

This section will cover the layout of your DC switches and breakers panels. If you refer to your DC System illustration at the end of this section you will find a general layout of the wiring, and components involved in the DC electrical system. However over the next few pages you will have detailed layouts of the panels and switches from the battery to the helm.

Battery Switch Panel

Fig. 7.13



1. Breaker controls power to the DC Panel.
2. Breaker controls power to the Helm.
3. Breaker controls power to the Fwd Bilge Pump.
4. Breaker controls power to the Emergency or "High Water" Bilge Pump.
5. Shower Sump protection.
6. Breaker controls the power to the CO Monitor.
7. Controls power to the Electronics package (optional).
8. Accessory or extra breaker slots.
9. Not Used.
10. Controls power to the Electronics package (optional).
11. Mid Bilge Pump
12. Aft Bilge pump
13. Stereo memory.
14. Electronic engine control (optional).
15. Electronic Control Main
16. Breaker for Oil Changer (optional).
17. Breaker for Anchor Windlass.
18. Main Battery switch.
19. Generator Battery switch.

Note: The breakers installed are the "push to reset" type. They are not on and off switches. These systems are meant to be powered at all times and the only time these breakers will be "off" is if there is a fault in the component or circuit.

Main Distribution Panel for DC Voltage

Fig. 7.14

Details of legend on the following page.

Details of photo from page 7.12, Fig. 7.14

1. DC Main - Supplies power to the DC components on The MDP. This is the main breaker for all the other breakers on the panel.

2. Power Supply to bridge.

3. Interior Lighting *Note: Remember there is a switch on the lights housing as well.*

4. Cockpit Lighting

5. Courtesy Lights

6. Bilge lights - Lights up the engine room and the lazarette area (Generator location if generator installed)

7. Breaker for the Refrigerator

8. Fresh Water Pump - The fresh water pump will run until the system is pressurized. Then will cycle as needed to keep the pressure stable.

9. Raw Water - This is the breaker for your raw water pump.

10-13. Accessory

14. Port Engine - Supplies power to the Port Engine for starting.

15. Stbd Engine - Supplies power to the Stbd Engine for starting

16. Head Facilities - See the Sanitation Section to correctly operate the Electric Head.

17. Macerator Breaker - *Be sure and consult your sections concerning the macerator pump in the DC Electric and the Waste and Sanitation chapters.*

18. Bilge Blower - The breaker for your bilge blower

19. Optional Propane Stove - This breaker controls the fuel solenoid valve that supplies fuel to your optional propane stove.

20. Optional Propane Stove - This breaker controls the fuel solenoid valve that supplies fuel to your bridge propane stove.

21-22. Accessory

23. Shower Sump Indicator light, illuminates when the automatic Shower Sump is energized.

24. Auto / Manual Selector Switch for the Forward Bilge Pump.

25. Auto / Manual Selector Switch for the Mid Bilge Pump.

26. Auto / Manual Selector Switch for the Aft Bilge Pump

27. Generator Switch Note: See the Generator section in the DC Electric Chapter.

28. CO Monitor Reset Switches, *Note: Read the CO Monitor Section in the Boating Safety Chapter*

29. This gauge indicates the amount of amps available to the DC MDP.

30. Battery selector switch, this switch allows you to select the specific battery to check the amount of charge available, this can be read on your DC Volt meter, #31

31. This is the DC Volt meter, registers the amount of voltage in selected battery. See # 30

Figure 7.15 Slide Lock Switch

With the slide lock it is not possible to energize the generator power and the shore power together.

Lower Helm Station (Twin)

1. 12V Plug	12. Fuel Gauge
2. High Water Alarm - Sounds when emergency bilge comes on line due to amount of water in bilges.	13. Horn
3. Stern and Bow Thruster Controls	14. Navigation Lights
4. Windlass Control Switch	15. Fuel Gauge Swtch
5. Port Engine Start/Stop Switch	16. Windshield Washer
6. Port Engine Display	17. Port Wiper
7. Starboard Engine Display	18. Center Wiper
8. Indicator Lights for bilge pumps and generator	19. Stbd Wiper
9. Starboard Engine Start/Stop Switch	20. Windlass Power
10. Electronic Engine Control	21. Windlass Control
11. Emergency engine shutdown over-ride - Indicator light with audible alarm when Halon system is activated.	22. Parallel Start

Troubleshooting

Problem	Cause	Solution
12/24 volt equipment not working	Battery selector switch turned off	Check battery selector switches and e`nsure they are on
Battery not charging with engine running	Check alternator, belt, etc.	Change alternator, tighten belt
Battery not holding a charge	Faulty Battery Faulty battery charger	Replace Battery Have your dealer check battery charger
12 volt DC device not working	circuit breaker for device is off Weak or dead battery Faulty electrical connection	Switch breakers to on Change battery selector switch position, recharge battery Check 12 volt DC connections, tighten or repair as needed.
Cabin lights not working (off or dim)	Cabin breaker for device is off Weak or dead battery Light bulb burned out	Switch breaker to on Change battery selector switch position, recharge battery Replace bulb
Blower (s) inoperative	Blown fuse Weak or dead battery	Replace fuse Recharge or replace battery

Notes:

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Chapter 8
AC Electric Systems

40 Trawler
Single & Twin

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AC Electric System

Besides a 12 VDC negative ground system, your boat has a 120 V 60 Hz (220/230 V 50 Hz) AC system. This section gives you the basic knowledge you will need to understand this system.
The AC System consists of the following systems or components:

- AC Distribution Panel
- Shore Power Supply
- Generator Power Supply (Option)
- Battery Charger
- Refrigerator
- Microwave
- Coffee Maker
- Water Heater
- Galley Stove
- Stereo, TV, DVD
- Air Conditioning Units

8.1 Power Supply Components

The AC system is a three-wire grounded system powered by either the shore power or genertor (if so equipped). A circuit breaker for the shore power connection is on the transom just above the shore power coed plug.

There is a ground fault interruption circuit (GFIC) that protects all outlets. This system prevents accidental electrical shock. If power is lost to an outlet, reset the breaker at the GFIC outlet.

Important: If you cannot reset GFIC outlet, do not use any other outlets to prevent damage to the electrical system or electrical devices. Have your dealer or qualified electrician check the circuit.

Circuit breaker on the main electrical panel controls and protects the AC circuits. The legend for the AC Distribution Panel is on page 8 and 9 of this chapter. The circuit breaker must be ON to power each AC device. A brief discussion of the purpose of several of the breakers at this panel follows. The remaining breakers, switches and indicators are discussed with the systems or equipment they control.

⚠ CAUTION ⚠

Never reset a breaker which has tripped automatically without locting and correcting the problem. Electrical system and devices may be damaged. Faulty connections can cause a fire. Correct the cause before resetting the breaker.

When the GENERATOR indicating light is ON and its breaker is ON, AC power is supplied to the equipment and devices below it. The slide bar prevents power from being supplied by shore power when the generator is providing power.

The ACCESSORY slots are for any additional AC equipment you may add to your boat.

Note: Before you add additional items to the boat's electrical system, ask your dealer to analyze your boat's AC and DC systems.

8.1.1 Shore Power Supply

Your boat has two shore power inlets, one on the transom and one in the anchor locker. A 50 amp 120 volt line supplies power to the AC control center in the salon. Next to the shore power inlet plug is a circuit breaker for the power connection.

Besides the generator, still another source of AC power is your Inverter. The Inverter takes DC power from your batteries, and transforms it to AC power.

⚠ DANGER ⚠

Never work on an energized circuit! Always treat any circuit as if it were live! Always have trained competent technicians to service your electrical systems!

Water is an excellent conductor of electricity. Keep shore power cord out of water. Do not operate any AC device while you or the cord are in the water. To prevent injury or equipment damage, keep all AC system components dry.

⚠ CAUTION ⚠

Be certain the water heater is full of water and does not contain air. If the water heater is not full of water damage to the heating elements may result when electrical power is turned on to the unit.

Fig. 8.1 gives you a look at the shore power connection showing the breaker location.

Connecting Shore Power

Follow these procedures to connect shore power to your boat:

1. Turn all 120V circuit breakers at main control panel to OFF. Shut down generator if it is operating.

2. Connect the female end of the 50 amp (yellow) shore power cable to the boat's inlet receptacle. Make sure the lock is tight.

⚠ WARNING ⚠

DO NOT connect the shore power cord to the dockside electrical source first. You could accidentally drop the cord into the water which may result in electrical shock and serious personal injury.

Using a damaged or improper cord for shore power can cause electrical shock and serious injury. Use a cord specifically designed for shore power connection. Do not use a household extension cord.

3. Make sure the dockside shore power outlet is OFF. Plug the male end to the dock outlet, make sure the cable has enough slack to prevent stretching caused by tidal changes.

4. Turn the dockside power breaker ON.

Disconnecting Shore Power

To disconnect shore power:

1. Switch off all circuits.

2. Swtch off the dock circuit breaker.

3. Disconnect the shore power cables from the dock outlets.

4. Disconnect the shore power cables from the boat's inlet receptacles. Store the cables in a safe place where they will not become wet or damaged.

8.1.2 Isolation Transformer

Beyond the shore power connection and the shore power breaker, your AC power will be routed through the Isolation Transformer. See the Mechanical Arrangement Illustration for the location of the ISO transformer.

The ISO transformer is a standard “dry” type 3.6 KVA transformer that basically isolates your boat from the shore power. It is a valuable safety feature aboard your boat.

8.1.3 Generator Power Supply (option)

The optional generator on your boat provides 120V 60 Hz AC power for operating devices and equipment controlled through the AC Distribution Panel. The generator is controlled from the AC Distribution Panel.

The cooling system for the generator engine is a closed system. Engine coolant is circulated through a heat exchanger. Heat is tranferred from the engine coolant to sea water circulating through the chambers in the heat exchanger. The sea water is then ejected through the generator exhaust through the port side of the boat.

Connecting Generator Poawer

Before connecting generator power to the AC system:

1. Shut down all AC devices and equipment.

2. Disconnect shore power if connected.

3. Start generator. (See generator stsrt-up instructions following.)

4. Move slide bar to lock out shore power. Set GENERATOR circuit breaker ON.

5. Switch on only the circuits you will be using.

8.1.4 Generator Start-up

1. To gain access to the generator enter through the hatch in the cockpit area. Check generator for signs of fuel or oil leaks. If your boat has diesel engines, check the fuel filter.

⚠ DANGER ⚠

Fuel leaking from any part of the fuel system can lead to fire and explosion that can cause serious bodily injury or death. Inspect system before starting engine.

Never enter the engine room without proper ventilation first. A spark caused by power tools or lighting equipment could result in fire or explosion which could cause personal injury or death.

As with any fuel burning engine Carbon Monoxide is a concern. Read the Boating Safety section of this manual, study the pamphlets supplied and educate yourself about carbon monoxide poisoning. It could mean the difference in your life and the life of your loved ones.

2.Check area for fuel fumes. If you detect fuel fumes:

a. Evacuate the boat immediately.

b. Notify the dock, fire department, or Coast Guard of the condition.

c. Open all hatches, doors, and ports for natural ventilation.

d. When you can no longer smell fumes, locate the source. Using a hand held pump, carefully remove any fuel from bilge. Dispose of this fuel in a safe, approved location.

3.If you do not smell fuel fumes, make sure fuel shutoff valve on fuel line to generator is open.

4. Check generator oil level. Refer to the generator manual for instructions. Add oil if necessary.

5. Check generator coolant level. See generator manual for instructions.

6. Open generator seacock. Valve is open when handle is in line with the hose. Seacock is located forward of the generator sea strainer

7. At generator control panel, turn all 120 Volt circuit breaker OFF. Make sure slide bar is moved up to lock out shore power breaker.

8. For Gen Sets other than “Northern Lights” During cold weather starts place the controllers start/stop switch in the Stop/Preheat position for 15-20 sec. before attempting to start the generator.

9. Press and hold in either the remote GENERATOR START-STOP switch located in the salon or the START-STOP switch on the generator itself to START. Release switch as soon as the generator engine begins running.

Important: Do not crank generator continuously for more than 10 seconds. If engine fails to start within 10 seconds, release switch. Allow starter motor to cool for at least 10 seconds. Then try starting the engine again. If generator fails to start after three attempts, contact your Mainship dealer. Prolonged starting attempts may damage starter motor as well as the generator.

10. Check for water coming from the exhaust outlet pipe. Water flowing from the pipe indicates the water is circulating through the generator cooling system. You should see water flowing shortly after generator starts.

11. Inspect the exhaust system for leaks. If you detect leaks or smell fumes, shut down the generator immediately. Do not restart the generator until you have corrected the problem.

12. Allow the generator to warm up before connecting a heavy electrical load. Keep the load within the nameplate rating.

Note: Infrequent use of the generator may result in hard starting. For detailed start-up information, refer to the generator operating manual.

8.1.5 Generator Shutdown

1. Shut off all 120 Volt circuit breakers.

2. Allow generator to run for one to two minutes at no load to allow the engine to cool down.

3. Press GENERATOR START-STOP switch to STOP.

4. Close fuel valve and seacock.

8.1.6 Battery Charger

The boat's batteries are normally charged whenever the engine is running. If you are docked for an extended period of time, operating DC devices and equipment will drain the power from the batteries. Unless the batteries are kept charged, they may not have enough power to start the engine or generator (if so equipped) when you need them.

The battery charger will automatically charge the engine battery and the generator battery when the power supply is through the AC system. The BATTERY CHARGER breaker ia on the AC Distribution Panel.

Leaving the battery charger on whenever AC power is available is a good idea. It will keep the batteries fully charged. After the batteries are recharged, it provides a maintentance or trickle charge as needed.

The battery charger is on aft engine room bulkhead. Refer to the manufacturer's owner's manual for operating procedures.

Figure 8.2 Battery Charger

8.2 Cabin Amenities

Your boat comes equipped with a 3 burner electric stove & oven. It receives its power from the AC electrical system only. The breaker is located on the AC Distribution Panel.

The optional propane stove & oven has 3 burners. The propane tank is located in the LP Gas Locker on the Flybridge. Refer to the manufacture's owner's manual reference safety precautions and maintenance procedures.

The optional summer galley electric grill receives its power from the AC electric system only. The breaker is located on the AC Distribution Panel.

The optional summer galley propane grill's propane tank is located in the LP Gas Locker on the Flybridge.

⚠ WARNING ⚠

Be sure to have proper ventilation if using a propane stove. Improper ventilation could result in injury or death.

The optional summer galley ice maker plugs into an outlet in the galley itself and receives its power from the AC electric system only. The breaker for the ice maker OUTLET #1 or OUTLET #2 is located on the AC Distribution Panel.

8.2.1 Microwave

The microwave receives its power from the AC electric system only. The breaker is located on the AC Distribution Panel. Refer to the manufacturer's owner's manual for detailed information regarding your microwave.

8.2.2 Refrigerator

Your refrigerator operates on AC power only. It receives its power from OUTLET #1 or OUTLET #2 breaker located on the AC Distribution Panel. Refer to the manufacturer's owner's manual for operating information.

8.2.3 Water Heater

The fresh water pump supplies water to the water heater from the water tank. The water heater capacity is 6 gallons. The water heater receives its power from the AC Distribution Panel. It does not run on DC power. Refer to the manufacturer's manual for operating information.

⚠ CAUTION ⚠

Be certain the water heater is full of water and does not contain air. If the water heater is not full of water damage to the heating elements may result when electrical power is turned on to the unit.

8.2.4 The Air Conditioning & Heating System

Your boat may be equipped with the optional air contioner reverse cycle unit. This type of unit can heat or cool your boat. The air conditioning pump draws in sea water through a seacock in the bilge when the air conditioner is running.

The air condition unit is controlled through the breaker switch at hte AC Distribution Panel. When using the air conditioner, its breaker swtch must in the ON position.

To operate the air conditioner:

1. Open the air conditioner seacock. The valve is open when its handle is in line with the hose. The seacock is located to the starboard side of the engine room, near the forward bulkhead.

2. Check the strainer. Clean if necessary to assure a steady flow of water to the unit.

3. Set the thermostat to the temperature desired. The thermostat for the salon is located at the helm and the thermostat for the forward cabin and v-berth area is located on the starboard side of the v-berth bunk.

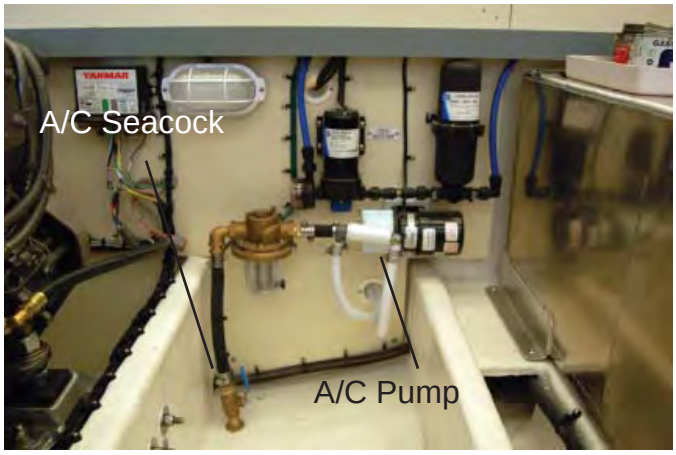


Figure 8.3 A/C Pump and Seacock

Important: Be sure to close air conditioner seacock when the air conditioner is not in use. Refer to the manufacturer's owner's manual furnished with the air conditioner for more information regarding its operation.

The air conditioners are located beneath the bed in the v-berth and under the helm station.

8.2.5 The Entertainment Center

The entertainment center is powered from the AC Distribution Panel through the breaker labeled "OUTLETS". This breaker also controls power to the GFIC circuits.

Here you will find that the components in the entertainment system that are AC powered will be the only components powered from here. The stereo is DC powered and powered from the breaker titled "Accessory" on the DC Distribution Panel.

Figure 8.4

Fig.8.3 gives you an example of a quality flat screen television that is provided in your boat.

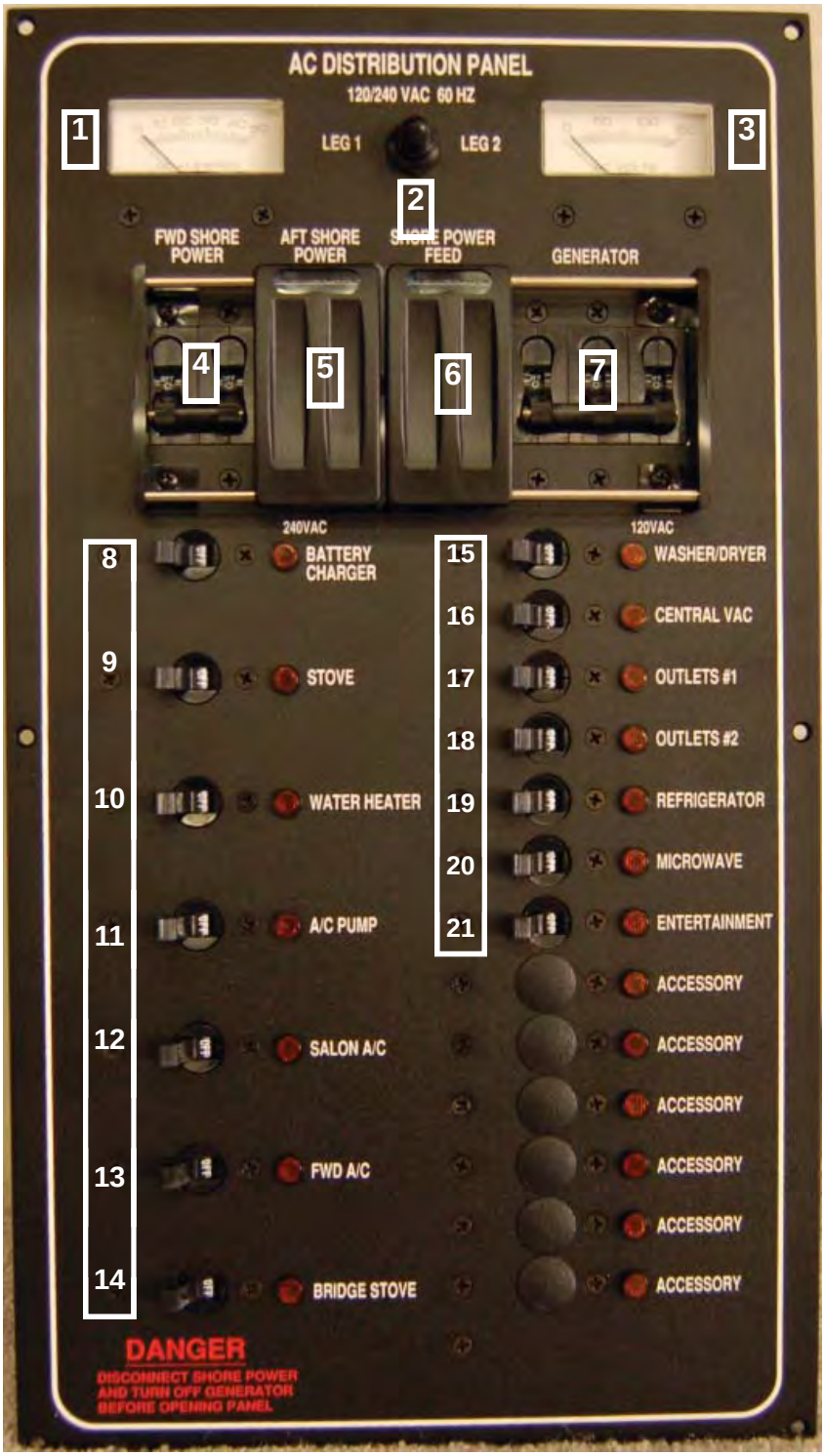
8.3 Legends

The next few pages are photos, drawings, and other materials so that you may better understand the locations and get a visual on your AC electric components.

Remember to practice electrical safety, always have competent, trained technicians to service your boat, and enjoy your investment.

Main Distribution Panel for AC Voltage

Figure 8.5



Details of legend on the following page.

Details of photo from page 8.8, Fig. 8.5

1. AC Amp Indicator - allows you to monitor the amps from the selected power source

2. Shore Power Selector Switch - allows you to select forward or aft shore power supplies.

3. AC Volt Meter - allows you to monitor the volts being fed from selected power source.

4. Fwd Shore Power Breaker

5. Aft Shore Power Breaker

6. Shore Power Feed Breaker

7. Generator Breaker

8. Battery Charger

9. Stove Breaker

10. Water Heater Breaker *Note: see the section about your water heater before energizing!*

11. A/C Pump Breaker *Note: be sure and read the section on AC controls and operation before attempting to run your Air Conditioning*

12. Salon A/C Breaker

13. Fwd A/C Breaker

14. Bridge Stove Breaker

15. Washer/Dryer Breaker

16. Central Vac Breaker

17. AC Outlets #1 Breaker

18. AC Outlets #2 Breaker

19. Refrigerator Breaker

20. Microwave Breaker

21. Entertainment Breaker

Figure 8.6

Fig. 8.6 shows slide lock switch on the AC Distribution Panel. With the slide lock it is not possible to energize the generator power and the shore power together. From the photo in Fig. 8.4, this is breaker # 4 and 7. In the position shown this would be to energize generator power.

TROUBLESHOOTING

Problem	Possible Cause	Solution
No AC power	Main breaker(s) in engine compartment tripped or off	Turn breaker on or reset.
	Breaker(s) at AC control center tripped or off	Turn breaker on or reset.
	Shore power cord not connected	Check cord; plug in if necessary.
	Loose or disconnected wire	Tighten connections. See your dealer.
No power to AC devices	Breaker(s) at AC Control	Turn breaker on or reset.
	Center tripped or off Shore power cord not connected	Check cord; plug in if necessary.
	Loose or disconnected wire	Tighten connections. See your dealer.
Inadequate power to AC devices (generator running)	Electrical demand greater than generator output	Switch off devices and equipment not needed. Switch PARALLEL breaker off to reduce demand. Use shore power AC line if available.
Continuous tripping of main breaker	Cause of problem not corrected	Determine cause and correct problem before resetting breaker. See your dealer if problem persists.
Generator will not start	Battery discharged or dead	Recharge or replace battery.
	Tried to start unit using remote starter at generator	If generator starts using remote starter, have dealer check switches at main panel and generator.
No power at AC outlets	Outlet breaker in AC control center OFF	Switch breaker to ON.
	Ground fault interrupter tripped	Reset button on outlet and test

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Chapter 9

Water Systems

40 Trawler
Single & Twin

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Water System Components

Your boat is comprised of two systems Fresh Water and Raw Water. The components that are used in each system are broken down in this chapter. Their applications and some use information can be found. The components are as follows:

Fresh Water:

- Dockside Water Supply
- Fresh Water Tanks
- Fresh Water Fills and Vents
- Fresh Water Pump
- Accumulator
- Water Manifold
- Wash Downs
- Water Heater

Raw Water:

- Intakes, Pickups or Seacocks
- Strainers
- Raw Water Pump
- Air Conditioning Cooling Water (Option)
- Wash Down (Option)

9.1 Fresh Water System

9.1.1 Dockside Water Supply

When you are docked, you can connect a pressurized dock water supply to your boat. A dockside water supply will pressurize the boat's water system without using the water pump.

The dockside water inlet is on the transom above the swim plateform. Connecting a portable (drinking) water hose from a local water source to this inlet provides water under pressure to the fresh water system without using the pump.

Dockside water often comes from a municipal water supply or similar sources which supplies water at a higher pressure than the boat's onboard system pressure. The pressure regulator on the water inlet reduces the pressure of the dockside supply to match the boat system's lower pressure.

This dockside water does not fill the water tanks.

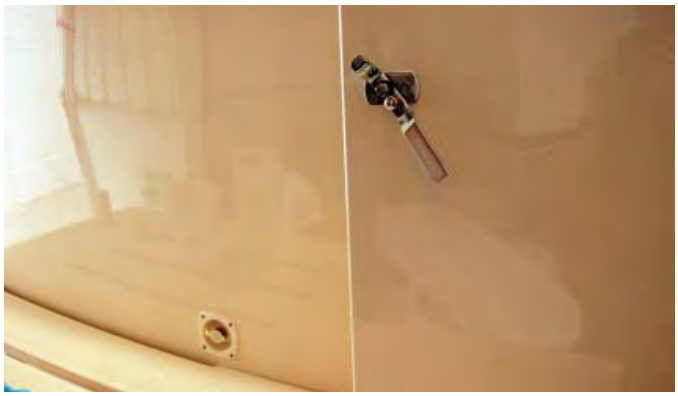


Figure 9.1

Important: Always disconnect the dockside water supply when you leave your boat unattended. A major leak or break in the system could flood your boat. Excess water in the bilge may sink your boat or flood the batteries and engine. Your warranty does not cover this damage.

Note: Before you connect your boat's water system to the dockside water supply, make sure the dockside water supply is suitable for drinking. Check with the dockmaster to be sure.

To connect the dockside water inlet to your boat's water system:

1. Connect a garden hose to the dockside water supply.

2. Connect the other end of the hose to the dock side water spigot.

3. Open the cold water faucet closest to the dock side water inlet on the boat.

4. Open the dockside water supply spigot. As soon as a steady stream of water comes out of the faucet on the boat, close the spigot.

5. Check the boat's water system for leaks. This inspection is particularly important when you use the dockside water hookup the first time.

The fresh water system is now ready for use.

9.1.2 Water Tanks

The fresh water system on your boat has two water tanks totaling 118 gallons, and fresh water fills located on the port and stbd side transom. The vents are located on each side of the hull. A water line connects the tank to the fresh water pump. The pump is located on the blower board in the engine room.

Note: Whenever servicing the fresh water pump, shut off the DC breaker for the water system.

To fill the fresh water tank:

1.Make sure the dockside water supply is suitable for drinking. Not all dockside water is drinking water. Check with the dockmaster if necessary.
2.Open the water tank fill fitting.

3.Using the hose from the dockside water supply, fill the tank until water starts flowing through the vent.

4.Close the fill fitting.

9.1.3 Fresh Water Pump

The fresh water pump supplies water to the system under pressure when the dockside water supply is not connected. The *FRESH WATER PUMP* breaker switch is on the DC Distribution Panel. When the breaker is switched to ON, the pump will run until the hot and cold water systems are pressurized. An automatic pressure switch shuts the pump off until the pressure drops to a preset level (for example, a pressure drop caused by opening a faucet). The pump will then run again until the system is pressurized and turn itself off. The pump has a built-in check valve to prevent backflow through the pump.

Figure 9.2

Important: Operate the fresh water pumps only when there is water in the tank. Running the pumps dry will damage the diaphragm.

If the pumps run from time to time even though no water is being used, a leak in a water line is a likely cause. Check all lines for leaks, and repair immediately.

9.1.4 Fresh Water Manifold

Your boat is equipped with a Seatech Fresh Water Manifold, the manifold reduces the need for connectiors or fittings in any of the lines that feed components. The water lines run from the manifold directly to the component for which it feeds. Fig. 9.7 contains detailed information about your manifold.

9.1.5 Fresh Water Washdown/Shower

Your boat is equipped with (1) fresh water washdown located on the flybridge stairs.

Figure 9.3

9.1.6 Water Heater

⚠ WARNING ⚠

Hydrogen gas may form in water heater if the heater is not used.
Open valves, do not smoke or use electrical appliance for several minutes before use, or energizing the water heater.

The fresh water pump supplies water to the water heater from the water tanks. A breaker on the AC Distribution Panel controls power to the heater.

Follow these procedures when using the water heater:

1.Make sure the water heater is full of water. Open a hot water faucet and allow a steady stream of water to flow out of the faucet to remove all air from the hot water circuit.

2. With the generator running or shore power connected to your boat, switch on the WATER HEATER circuit breaker at the AC Distribution Panel. If you are using the generator, move the slide bar to left and switch on the GENERATOR circuit breaker.

3. Wait for the water in the tank to heat up, then use as you would at home.

9.2 Raw Water System

9.2.1 Intakes, Pickups or Seacocks

No matter how you name them they mean the same, these are valves or through hulls in the underside of your boat that allow raw seawater to be supplied to various systems. Your boat uses these intakes to provide raw water to systems such as the Air Conditioning Cooling systems, the raw water washdown and others. You must ensure that the valve is in the open position before using any system that uses raw water.

9.2.1.1 Engine Intake

It is a very important function for your engine to remain a specific temperature when operating. This is done with the aid of raw water from the main engine intake.

Heat from the closed cooling system on the engine is transferred to the cooler seawater through heat exchangers inside the engine. The raw water is then discharged through the exhaust.

9.2.1.2 Generator Cooling Intake

The generator is an engine and just like the main engine it requires cooling water. Water is supplied to the generator through the intake located just aft of the generator. Raw water is taken in via the raw water intake and then passes through the strainer and is discharged through the exhaust of the generator. Consult the DC Electric Chapter (chapter 7) of this manual for more information about your generator option.

9.2.2 Strainers

Next in line of raw water usage is the strainers. The strainers arein a sense what their name entails. They strain the rwa water taken in the trough hulls or valves for objects that could damage the impeller or pump equipment. Strainers are equipped with a screen or a filter inside that collect objects taken in. They must be cleaned as part of routine maintenance.

To clean a strainer first make sure the supply valve is in the off or closed position. Failure to close the intake or seacock could result in a flooded boat.

1. Remove strainer cover with a spanner wrench.

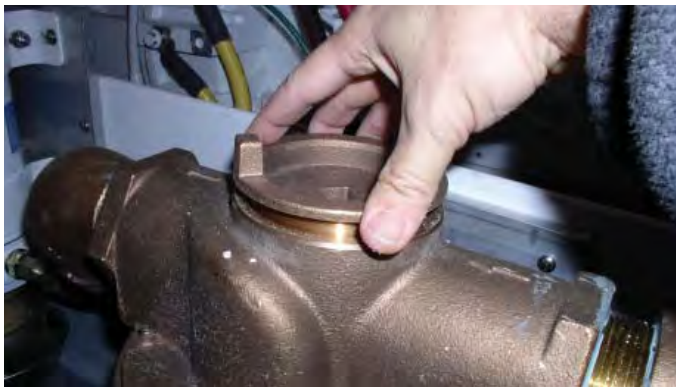


Figure 9.4

2. Remove strainer basket and clean.

Figure 9.5

3. Remove any objects collected inside, and wash screen.

9.2.3 Air Conditioning Cooling Water

The air conditioning compressors use raw seawater as cooling water. The intake for this system is on the starborad side of the engine forward in the engine compartment. This system consists of an intake, a strainer and a pump. Refer to page 9.10 for a more detailed layout. The used water is then discharged through the air conditioning through hull.

9.2.4 Raw Water Washdown

Located in the anchor locker forward in your boat is the raw water washdown. This system consists of a pie eye in the anchor locker with a retractable hose inside equipped with a valve. This system makes an ease of washing the anchor components when retracted.

The raw water pump provides water under pressure for forward washdown. Figure 9.6 is a view of the raw water pump, intake and strainer. The pump cycles on and off as needed to maintain water pressure within a preset range.

When the pressure drops to a low set point, the pump turns on and runs until the pressure reaches the high set point. If the outlet valve is completely open, the pump runs continuously. If it is partially open, the pump cycles on and off.

The raw water pump is located on forward port side engine room bulkhead.

To use the raw water washdown:

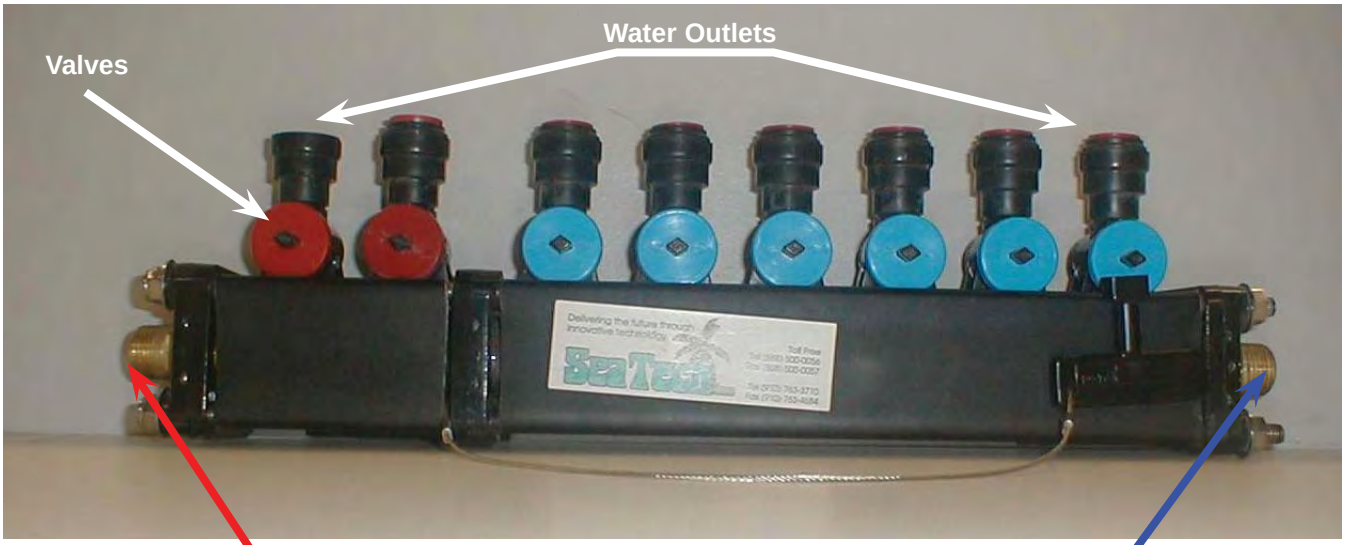
1. Ensure the breaker on the DC Distribution Panel is on.

2. Wait for the system to build up pressure, which will be noted by the pump shutting off.

3. Turn on the valve and use.

Figure 9.6

General Fresh Water Manifold Photo

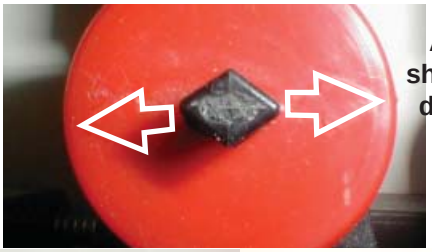


Hot Water inlet, notice hot side inlet has red lines on outlet. Also valve is tagged with red washer.

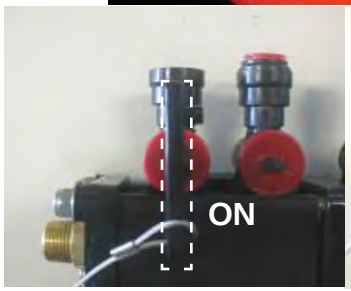
Cold Water inlet, notice cold side inlet has blue lines on outlet. Also valve is tagged with blue washer.

Valves that control flow: Each outlet is equipped with a valve that controls the flow of fresh water to a specific system. This allows you to turn off flow to specific areas of your boat for service or storage. The manifold is equipped with a key that works the valve. (see valve key picture) this tool is attached to the manifold via a small cable. To turn off the flow of water place the insert over the “diamond” shaped valve stem and ensure that the valve stem is perpendicular to the water outlet line.

Valve Key



Arrows show flow direction



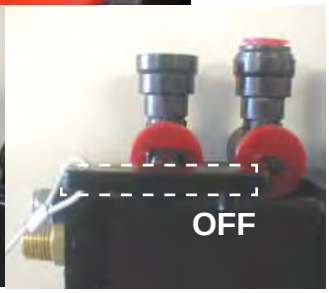


Figure 9.7

Troubleshooting		
Problem	**Cause**	**Solution**
Air in system	Tank empty	Fill both water tanks.
Fresh water pumps cycle on and off	Tank empty. Blocked or pinched water lines. Loose electrical connections. Defective pumps. Leak in system.	Refill. Clear obstruction or straighten line. Check connections; tighten as needed. See your dealer for service. See your dealer for service. Repair leak, see your service dealer for repairs.
Low water pressure at all sinks and showers	Defective pumps.	See your dealer for service.
Low water pressure at one sink	Pinched waterline.	Straighten line.
No hot water (AC Power)	Water heater breaker off.	Switch breaker to ON.

Notes:

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Chapter 10
Waste and Sanitation

40 Trawler
Single & Twin

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This section outlines the use, care, and maintenance of your boat's waste and sanitary systems, as well as, bilge pumps.

Important: U.S. Coast Guard regulations require that boats have a sanitation system on board to control pollution. Waste is to be stored in a holding tank or other device so it can be properly disposed of at a shore facility. Discharging this waste overboard in U.S. lakes, rivers, bays, and sounds, and within three miles of shore in international waters is prohibited. Check with the Coast Guard regarding regulations in your area.

Sanitation Systems

Your boat is comprised of three sanitation systems Black Water, Gray Water and Bilge Water. The components that are used in each system are broken down in this chapter. The components are as follows:

Black Water:
- Electric Tiolet
- Holding Tank
- Macerator Pump

Gray Water:
- Shower Sump Pump

Bilge Water:
- Bilge Pumps
- High Water Alarm

10.1 Black Water

10.1.1 Electric Toilet

Electric macerating heads are only a little more complex than a manual head. They are typically designed to use raw water. An impeller pump replaces the piston type found in manual heads, and there is also a discharge. Between the two is a device called a macerator that is not totally unlike a blender or a garbage disposal that purees solid waste and paper. Macerating heads require more flush water than any other type of toilet, a minimum of 1 gallon ot rinse urine completely out of the machinery, a minimum of 3 gallons to clear solids and paper. Insufficient flushing shortens the life of the motor and macerator.

The 12 volt electric marine toilet comes with a compact white vitreous china bowl and is equipped with a duel function pump which eliminates having to mess with hand pumps and dry bowl valves. With the simple push of a single button, the self-priming flush pump rinses the bowl.

This unique head has a powerful wastewater evacuation pump with a built-in macerator and still has a remarkably quit flush cycle. The pump is mounted remotely from the toilet and supplies toilet bowl rinse water on demand whenever triggered by the multi-function flush control. It must not be connected to potable water because it does not have a siphon breaker to protect against contamination. The unit features a mult-function flush control panel with a single push-button flush control and a bowl fill/drain selector switch. You can raise the water level prior to use or drain the bowl in rough seas. Includes 6'L smooth white hose to connect to back of the bowl with remote solenoid valve. The rinse water is controlled by an electric solenoid valve and siphon breaker that may be connected to any pressurized water system that delivers 3 1/2 gpm.

Figure 10.1

Below is a general outline illustration for the Electric Head system (Fig. 10.2). This illustration will give you idea about the components in the system and the routing of the waste lines.

10.1.1.1 Toilet Cleaning/Maintenance

Clean with mild cleaner and consult your owner's packet for further instructions.

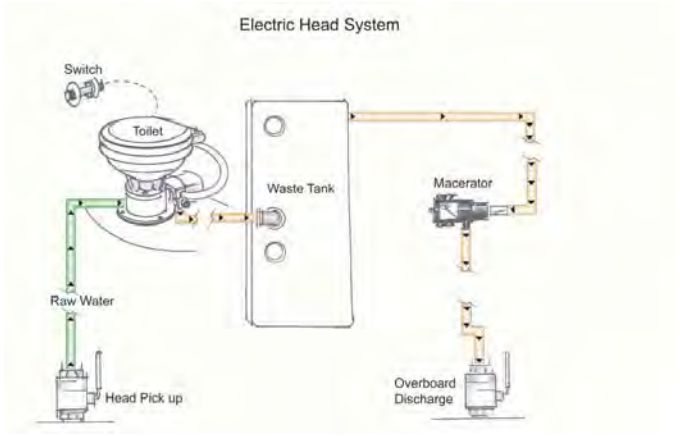

Figure 10.2

⚠ CAUTION ⚠

Do not use chlorine-based or caustic cleaning agents, or chemicals such as a drain opening product in your head systems. Use of these products may cause serious damage to the system's seals and hoses.

10.1.2 Holding Tank

Waste from the toilet is pumped to the holding tank located in the forward bilge. The holding tank has a capicity of 40 gallons. You can empty the holding tank using a dockside pumpout located in the stbd deck adjacent to the helm door, or when permitted, through a macerator through hull fitting in the hull bottom.

Check the tank regularly to see how full it is. When the tank is full, do not use the head. If the tank is overfilled, waste can plug the vent or, worse yet, the tank can rupture, allowing its contents to empty into the bilge. Checking the level regularly is time well spent.

To remove waste from the holding tank ata dockside waste facility, insert the hose from the pump-out facility into the waste access (Fig. 10.3) of your boat and follow the instructions at the facility. Instructions from one facility to another may vary.

When pumping out the holding tank, place the waste cap in a secure place. If you drop it into the water or it falls overboard, you will probably not be able to retrieve it. Consider keeping an extra cap on board in case of an accident.

Figure 10.3

10.1.2.1 Holding Tank Cleaning/Maintenance

Any deodorizer may be used as long as it contains no alcohols or strong chemicals. Steer clear of drain opening type chemicals or strong bleaching type agents. Maintenance on the holding tank is best described as ensuring no methane gas is leaked and to keep odors down to a minimum.

⚠ WARNING ⚠

Waste in the holding tank can form methane gas. Use suitable precautions when any maintenance is done to the sanitary system.

10.1.3 Macerator

⚠ CAUTION ⚠

Running the macerator when the holding tank is empty will cause damage to the pump.

If regulations permit, the macerator can be used to pump waste from the holding tank overboard. the macerator circuit breaker switch on the DC Distribution Panel controls power to the macerator. The macerator pulls the waste from the holding tank, grinds the waste into small particles, and pumps the waste overboard through the seacock.

To operate the macerator:

1. Open the seacock valve located in the forward bilge aft of the holding tank.

2. Switch the MACERATOR breaker on the DC Distribution Panel to ON.

3. Allow the macerator to run until the holding tank is empty, but no longer. Running the macerator when the tank is empty will damage the pump.

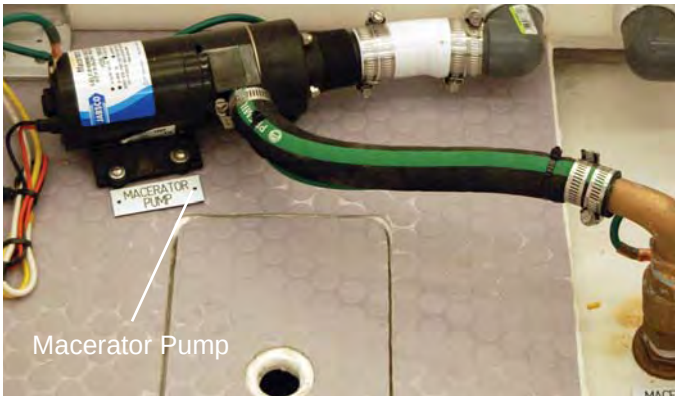

Figure 10.4

4. When you hear the pump speed up (indicates tank is empty), immediately switch the macerator breaker to OFF.

5. Close the seacock.

⚠ WARNING ⚠

Failure to close the overboard discharge valve when not in use could cause the holding tank to fill and possibly flood the boat.

10.2 Gray Water

10.2.1 Shower Sump Pump

The system directs waste water from the accessories such as the galley and head sinks, air conditioning condensate and shower to the shower sump that is fitted with a float switch and pump that pumps the water overboard through a through hull side fitting.

The small holding tank also acts as a collection point for hair and other waste materials that might get washed down the shower drain.

The shower sump operation is automatic. An indicator light on the helm stations illuminates when the pump is operating. Figure 10.3 shows you the sump pump and illustrates the disassembly for cleaning. You need to ensure that the sump is clean and free of debris for the operation to be functional.

The HEAD breaker switch on the DC Distribution Panel controls the operation of the sump pump.

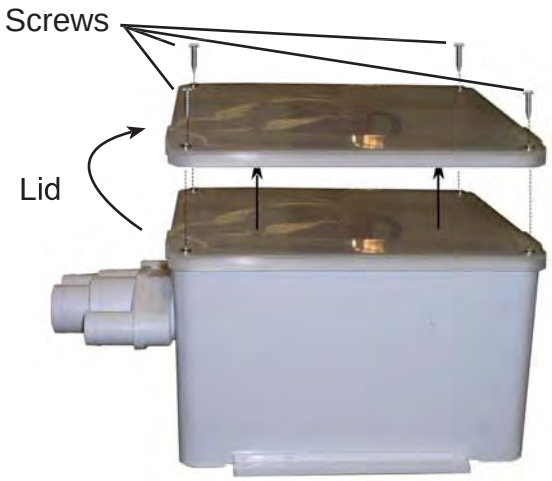

Figure 10.5

10.3 Bilge Water

10.3.1 Bilge Pumps

Your boat has three bilge pumps and one emergency bilge pump: one forward, one midships and one aft. The pumps, which operate automatically, have separate circuit breakers at the DC Distribution Panel.
When the water in the bilge rises to a preset level, a float switch adjacent to the bilge pump turns the pump on automatically. The pump runs until the water level reaches a preset low level. When a pump is running its indicator light at the helm stations comes on. The bilge pumps can also be operated manually.

Note: Power is always available to the bilge pumps. When a pump's breaker is switched to OFF (or AUTO mode), the pumps operate automatically. When it is switched to ON (or MANUAL mode), the pump runs until the breaker is switched to AUTO.

10.3.2 Emergency Bilge Pump

The emergency, or High Water Bilge pump, is located in the aft section of your boat. It is mounted about 4" off the bottom of the bilge. This is why it is referred to as a High Water Pump. We discussed in the DC Electric section about the float switch and the operation of the pump, so, you already understand that the water level has to be above a high water level to operate this pump. Figure 10.3 gives you a look at the emergency bilge pump aboard your boat.

Should the water level rise above the high water mark, and the emergency bilge pump comes online, you will hear a high water alarm from the helm along with a solid red light. It would also be important to mention here that when you hear the high water alarm, it means that high water exists in the bilges and it is time to take action. Refer to the "Chapman's Piloting, Seamanship and Boat Handling." We have supplied you with a copy of this book aboard your new boat, but if you do not have one, it is a wise idea to purchase this boating manual. It is full of useful safety and navigational information.

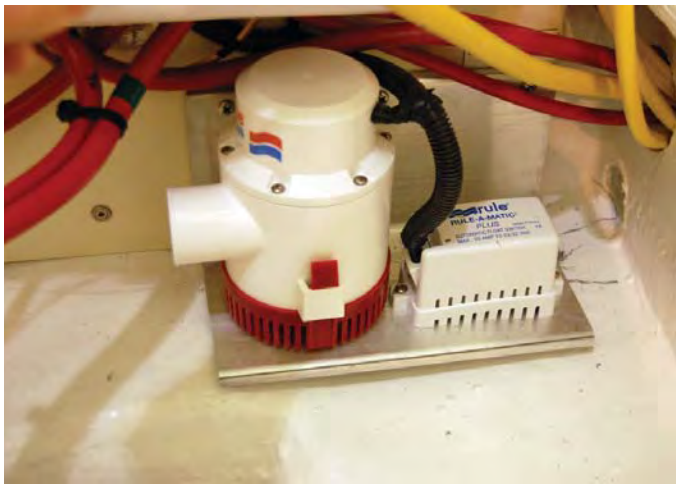

Figure 10.6 (shown emergency bilge pump)

Check your Mechanical Arrangement illustration in the Boating Safety Section for the location, and the Waste / Sanitation illustration at the end of this section, for the discharge hose routing for this or any pump.

Careful maintenance should be made to these systems to ensure they are always operational. Check the DC Electric Section, or the Operation and Maintenance subject of this section, to find the details about operation of these pumps and the details of how to manually run them.

10.4 Other Waste Related Equipment

10.4.1 Engine / Generator Exhaust

The subject here will be discussed in the Engine & Transmission Section. The motivation for placing this subject in the Sanitation System Section is due to the fact that exhaust is discharged from your boat. We will have an entire subject concerning engine and generator exhaust in the Engines and Transmissions Section. Here we will simply mention that the exhaust is a gas, Carbon Monoxide (see Boating Safety Section) and is very dangerous. Be sure to follow all guidelines concerning Carbon Monoxide.

Troubleshooting		
Problem	**Cause**	**Solution**
Head Not Flushing	Head breaker Off Head Seacock Closed Battery Charge Low	Switch Breaker to on. If Breaker is tripped determine cause and correct. Open Seacock Charge Batteries
Head Not Emptying	Blocked line to tank	Remove material from line
Shower Sump Overflowing	Head Breaker OFF Discharge line blocked Pinched Line Defective Float Switch Defective Pump	Switch Breaker to on. If Breaker is tripped determine cause and correct. Clear material from line Straighten line Replace Switch (See your dealer for service) Replace Pump (See your dealer for service)
Shower Sump Overflowing	Breaker OFFDischarge line blocked-Pinched lineDefective float switch-Defective pump	Switch breaker to ON.If breaker is tripped, determine cause and correct. Clear material from lineStraighten lineReplace switch. See your dealer for serviceReplace pump. See your dealer for service

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Chapter 11
Engines and Transmissions

40 Trawler
Single & Twin

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Engine and Transmission

The following is a list of components associated with your engines and transmissions.

- Engine (s)
- Engine Mounts
- Controls
- Engine Monitoring
- Engine Cooling
- Emergency Equipment
- Engine Exhaust
- Transmission (s)
- Shifters and Controls

11.1 Engine

Your boat is equipped with a marine diesel engine. The engine drives a propeller through a transmission and propeller shaft. The engine is started with controls at the helm using a batteries as a power source. Mounted on the engine is the alternator that keeps the batteries charged. Access to the engine is through the engine hatch in the salon.

Important: The engine require air to operate. For this reason, do not operate the engine or generator with this area obstructed.

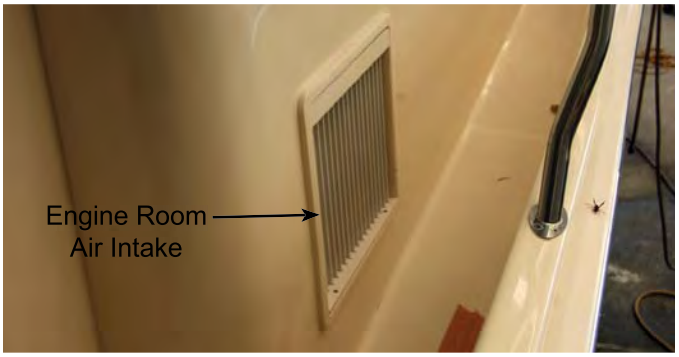


Figure 11.1

⚠ CAUTION ⚠

Take proper care when washing down, or cleaning your engines, that water does not enter the air intakes. Water in the air intakes may go directly to the cylinders, resulting in rust and possibly internal engine damage.

Figure 11.2 gives you a look at a typical single engine-drive and components aboard a boat.

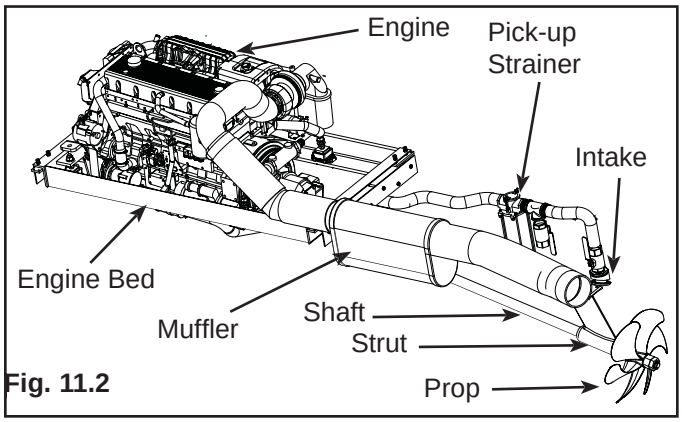


Fig. 11.2

Important: The engine manual supplied by the manufacturer includes complete and detailed information about operating and maintaining your boat's engines. Be sure to read it. Do not start or operate the boat's engines until you have done so. The life and performance you receive from your engines depends greatly on the way you care for it.

The engine manual states the maximum RPM rating established by the engine manufacturer for your boat's engine. Do not exceed this rating. Check the manual for other information about maximum RPM's.

The engine manual also specifies a safe oil pressure rating for the engines. Do not operate an engine if its pressure is below the minimum rating. The oil pressure will change as the engine's speed changes. However, if the pressure gauge indicates a gradual or sudden drop in pressure while you are maintaining a constant speed, the lubrication system may be leaking or the oil pump may have failed. Shut the engine down immediately. Do not operate the engine until the problem is corrected. Refer to the engine manual for complete information.

The engine selected is designed to meet or exceed industry standards set by marine engine manufacturers.

Important: Engines are not warrantied by Mainship Corporation, these warranties are written by the engine manufacturers.

⚠ CAUTION ⚠

The decking in the engine room can become very slippery due to heat, water, or oil. Be very careful when stepping down into the engine room.

⚠ DANGER ⚠

When occupying the engine room, or any area that mechanical equipment may be located, always be aware of moving parts or components. Death or dismemberment may be the result of being caught in moving machinery.

11.1.1 Engine Mounts

The engine mounts supplied with your boat are manufactured by the engine manufacturer. These mounts are designed specifically for the engine in which they are attached.

Most engine mounts are designed for adjustment sideways as well as vertical. Vertical adjustment nuts lock up or down on the threaded vertical stud, with a slot provided to allow side to side adjustment on the engine.

Many factors warrant the size and type of engine mounts that are used. These mounts also contain isolators which isolate the engine from the boat or stringers to dampen vibration, noise. and other undesirable effects from engines. For more information about the engine mounts see the engine manufacturers manuals.

11.1.2 Engine Controls

Teleflex Controls (Yanmar Engine Option)

Situated at the helm station are your engine controls. These controls are your start switches, your shut down switches, and your audible alarms. Lets look at the information you need to locate and understand the uses of each control.

Fig. 11.3

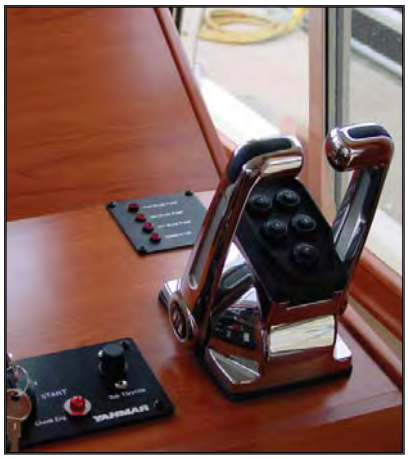


Fig. 11.3 You will find an engine control at the helm station. The control contains the function of synchronization, throttle, shift, and monitoring of the engine controls. Moving the lever forward engages the forward gear and increases the throttle, as moving backwards does reverse.

In this configuration (Figure 11.4), the operations are self-explanatory. Follow the manufacturers manuals for more detailed information concerning the keypad functions.

Note : Before you can use the keypad on the control station, you must first take control of that station. Please refer to the manufacturers manuals for more information.

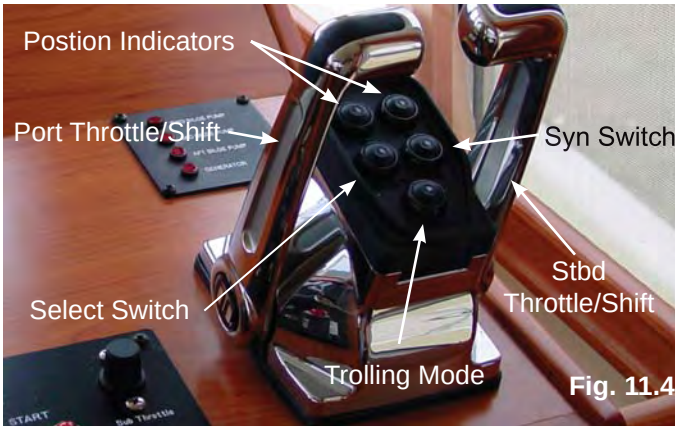


Fig. 11.4

Also at the helm station you will find the engine “start”, “stop” switch as shown in Fig. 11.5.

To energize the Engine Control you must first ensure that the battery switch is in the ON position. (See the DC Electric section for information on your battery switches), then energize the helm breaker on the DC control panel in the engine room, along with the Port and Stbd Cntrl Power breakers. You can see an image and location of these breakers in the legend of the DC breaker panel in the DC Electric section of this book.

Fig. 11.5

If your boat has the Cummins ® engine option you will find engine controls like the ones in Fig 11.4 at your helm stations. These controls are very much like the controls on your throttle / shift keypad, and the functions work the same.

As with all the control components on your boat refer to the manufacturers manuals supplied with your boat.

11.1.3 Engine Monitoring

⚠ CAUTION ⚠

Always monitor your boats oil pressure, and water temp. while underway, even if your engines are equipped with an alarm system to monitor these.

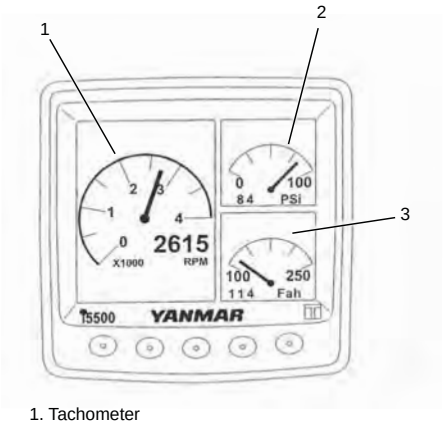
Shut down the engines immediately if the gauges are not in normal ranges or an alarm sounds.

Do not restart your engines until the problem is corrected.

Yanmar Engine Option:

The Teleflex Marine Electronic CANBus is a comprehensive boat information center. Teleflex Marine Electronic CANBus allows the boat operator to recieve a wealth of critical operational information, displayed clearly and instantly at the helm on the LCD display. The Teleflex Marine contiuously monitors and reports information ranging from basic operating data to detailed vessel enviroment information. It continuously displays multiple engine operating parameters as well as vessel sensor inputs. In addition, the it displays preventitive maintenance reminders as well as system diagnostics.

Figure 11.6



1. Tachometer
2. Engine Oil Pressure Meter
3. Multi-function Meter (Coolant Temperature, Lube Oil Temperature, Boost Pressure, Voltage, Load Factor, Throttle Valve, Fuel Consumption Rate and Gear Shift Position)

For additional details on the Teleflex display and the associated Teleflex CANBus system components implemented on the Yanmar option, reference the OEM documentation.

For information on the correct levels for engine running, please consult your engine owner's manuals from the engine manufacturer in your owner's packet.

Important: The Hourmeter will run if you leave the ignition switch on when the engine is not running. This unnecessarily increases the number of engine hours.

Note: Instruments have a tolerance for accuracy. In addition, each engine may operate at differing values at the same RPM. As long as the instruments are reading within the proper operating range, the engine is operating properly.

11.1.4 Engine Cooling

There are two separate systems that cool your engine. The raw water cooling system is described in detail in your "Water Systems" (section 9) of this manual. The internal engine cooling system is supplied by the engine manufacturer. This system features a closed antifreeze coolant bottled in a reservoir attached to the engine. Coolant is circulated through the engine in separate channels than the raw water cooling.

Note: Be sure the engine seacocks are open before you start the engine. Failure to open them will cause damage to the water pump impeller.

The raw water system on your engine also feeds the shaft coupling to cool your shaft bearings. In this system, raw water is passed from the engine via a hose to the shaft log (see Figure 6.1, Underwater Gear chapter 6). The illustration demonstrates the flow of the raw water. The water is then discharged out the shaft log.

⚠ DANGER ⚠

Hot coolant under pressure may boil over and cause burns or other personal injury when pressure cap is removed. Allow engine to cool. Open pressure cap slowly to allow pressure to vent before removing cap.

11.1.5 Emergency Equipment

Your engines are set up to operate under the toughest conditions. However, should the oil pressure become too low, or the engine overheat, alarms will sound at the helm. There are several conditions that will sound an alarm and save you from damaging your engines. Be sure and study your documentation supplied by the engine manufacturer to ensure you will know what the alarm means should one sound on your boat.

11.2 Transmissions

The transmission has a reduction gear which drives the propeller at a slower rotation speed than that of the engine. The transmission also has a hydraulic sump and pump separate from the engine. Transmission oil level can be checked using the filler cap and dipstick assembly. Refer to the transmission manual for more detailed information about transmission operation.

You are connected to your transmission electronically via the shift controls at the helm stations. With respect to the transmission control, the shifter has three relative positions; FORWARD (Fwd), NEUTRAL (center), and REVERSE (back).

Features of your transmission:

- Reverse reduction marine transmission with hydrauli cally actuated multi-disc clutches .
- Suitable for high performance applications in luxury motoryachts, sport fishers, express cruisers etc .
- Robust design also withstands continuous duty in workboat applications .
- Fully works tested, reliable and simple to install .
- Compatible with all types of engines and propulsion systems, including waterjets and surface- pierc ing propellers, as applicable .
- Design, manufacture and quality control standards comply with ISO 9001

Transmission models do vary.
This is a basic model.

11.3 Operations and Maintenance

In the Underway Chapter, (Chapter 12) you will find instructions on starting your engines. Also detailed in the manufacturer's documentation supplied with your boat, you will find instructions on maintenance items that you may perform yourself. Should you have any questions regarding maintenance or operations not provided, be sure and consult your boat dealer.

Once in a while, an engine may not start, even if the lever is in neutral. The reason may be that the neutral safety switch is slightly out of adjustment. While you are turning the ignition key, move the lever up and down slightly over the détente until the starter kicks in. Have your dealer check the switch as soon as possible.

Important: Shift the transmission only when the engine speed is at or below 1000 rpm. Shifting at higher engine speeds could severely damage the boat, the transmission, and the engine. Allow the transmission to remain in neutral for a few seconds before reversing the rotation of the propeller.

11.3.1 Hydrolock

⚠ CAUTION ⚠

Water entering engine cylinders can cause hydrolock and damage the engine. Operate boat properly to keep water from entering engine. Damage caused by hydrolock is not covered under warranty.

Hydrolock is caused by water entering the engine cylinders through the exhaust. The following conditions can cause hydrolock.

Engine shutdown: A sudden engine shutdown while the boat is moving may force water into the exhaust system.

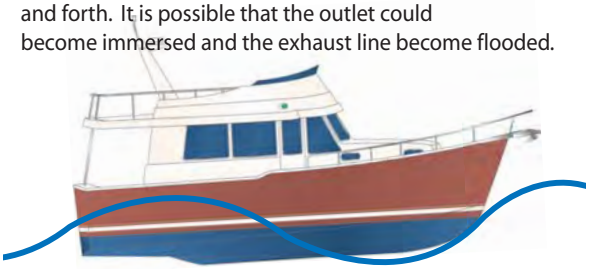
Anchored or adrift: Rough seas may cause rocking severe enough to cause water to splash out of the mufflers into the engine while the engines are shut down, anchored from the stern, pulling a sea anchor, or adrift.

Improper hoisting: Operators are sometimes tempted to reduce hoisting time for propeller changes by hoisting only the boat stern. Such hoisting can cause residual water in the exhaust system to enter the engine cylinders.

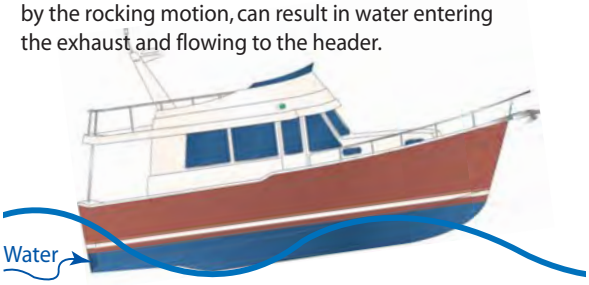
⚠ WARNING ⚠

Engine manufacturers do not warranty items damaged by hydrolock!

If your boat is in rough seas and rocking back and forth. It is possible that the outlet could become immersed and the exhaust line become flooded.



The high water level plus the surging action caused by the rocking motion, can result in water entering the exhaust and flowing to the header.



Then as the boat pitches down in the bow, some of the water drains into the muffler. Then on into the exhaust riser, and finally into the cylinders.

Then when there is an attempt at re-starting, there is damage to the engines, or there is serious corrosion to the critical parts of the engine.

11.3.2 Engine / Generator Exhaust

Your engine exhaust contains Carbon Monoxide! Be sure and read the Boating Safety Chapter and know the dangers and how to avoid them. Carbon Monoxide will kill you, and in most situations, by the time you know something is wrong it could be too late. Know what to look for and what to do in case of necessary action. Inspect your boat's exhaust system frequently, or have a qualified service technician service the system to ensure that there are no leaks.

Always ensure the exhaust clamps are tightened,, throughout the system.

Keep the necessary tools to perform this action on hand.

⚠ DANGER ⚠

Run blower motor in the engine area, for at least four minutes before starting the engines, it is a good rule to allow the fans to operate during the entire time the engines are running.

⚠ DANGER ⚠

Avoid the exhaust outlets, lines, hoses or equipment when the engines have been run for a period of time. These areas may be very hot! You can be seriously burned by the exhaust system after the engines have ran for a period of time. Allow the exhaust system to cool, before handling, or making adjustments to avoid injury.

Troubleshooting

Problem	Possible Cause	Solution
Engine not starting	No fuel reaching engine	Fuel tank vent blocked. Clean hose and fitting to remove material. Make sure hose is not pinched
		Fuel line obstructed. Check fuel lines. Make sure line is not pinched
		Clogged engine fuel filter. Refer to engine manual for instructions on cleaning filter
		Fuel supply valve closed at tank. Open valve
	Improper starting procedures	Review starting procedures in engine manual
	Contaminated fuel	Inspect for water or other contaminants in fuel. If contaminated, drain tank and flush with fresh fuel
Engine starter not cranking	Discharged battery	Recharge or replace battery
	Neutral safety switch misaligned	Move throttle lever up and down slightly over the détente while moving ignition switch. (Have dealer check switch as soon as possible)
	Corroded battery terminals	Clean battery terminals
	Loose battery terminals	Tighten connections
	Bad starter switch	Test switch continuity. Replace switch if required. See your dealer for service
		Replace switch
	Hydrolock	See instructions in this Section under “Hydro-Lock”. See your dealer immediately
	Jammed “starter drive.”	Loosen starter motor, then free stuck gear
Engine speed erratic	Pinched or clogged fuel lines	Replace line or remove obstruction
		See your dealer for service
	Contaminated fuel	Drain fuel tank and lines. Flush with clean fuel and replace fuel filters. See your dealer for service
Engine running rough	Defective fuel pump	Have your dealer check pump
	Idle speed too low	Check idle speed and adjust as needed
	Faulty ignition system components	See your dealer for service
	Clogged fuel filter	Clean or replace filter
	Pinched fuel lines	Straighten lines

	Clogged fuel lines	Remove obstruction
	Blocked fuel vent	Clean vent
Engine overheating	Cooling water seacock closed	Open seacock
	Seacock pickup blocked	Remove obstruction
	Collapsed water pump suction hose	Replace hose
Sudden increase in	Cooling water intake system blocked	Clean seacock strainer
Engine temperature	Water intake hose leaking or ruptured	Remove material blocking line
	Water pump failure	See your dealer for service
Drop in oil pressure (engine running at constant speed)	Lubrication system leaking	Repair if possible. See your dealer for service
	Defective oil pump	See your dealer for service
	Pinched oil lines to remote filters	Reroute if possible. See your dealer for service
Excessive vibration	Loose engine mounting bolts	Inspect and tighten as required
	Engine not timed properly or misfiring	See your dealer for service
	Engine-to-shaft couplings out-of-round or off-center	See your dealer for service
	Engine misaligned	See your dealer for service
	Worn strut or transmission	Replace bearings if needed. See your dealer for service
Poor performance	Boat overloaded	Reduce load
	Weight poorly distributed	Distribute weight evenly. Trimming may help
	Excess bilge water	Pump out water. Check for leaks
	Damaged or incorrect propeller	Inspect propeller. Replace if necessary
	Fouled or damaged hull bottom	Inspect, clean, or repair
	Engine misaligned	See your dealer
Low cranking speed	Loose or dirty electrical connections	Check all related electrical connections and wires
	Low battery charge	Charge battery
	Defective battery	Replace battery
	Engine oil too heavy for prevailing temperatures	Drain oil and refill with correct grade viscosity oil. See engine manual for correct grade and viscosity
Poor acceleration	Throttle not full open	Inspect cables and linkage for binding, obstructions, and loose fasteners
	Engine overheating	See solutions under “Engine Overheating” problem
Excessive fuel consumption	Restriction in air filter	Remove filter and clean or replace

Low oil pressure	Insufficient oil in crankcase	Check and add correct grade and viscosity oil. Visually check engine for leaks
	Excess oil in crankcase	Check and remove required amount of oil. Check for cause of excessive oil (improper filling, bad fuel pump, etc.).
	Diluted or improper grade and viscosity oil	Change oil and oil filter. Be sure to use the correct grade and viscosity oil
	Oil leak in pressure line	Inspect all oil lines and tighten all connections as necessary
No oil pressure	Defective gauge, gauge tube, or oil line	Replace gauge or gauge sender
	No oil in engine	Refill crankcase. See engine manual for proper grade and viscosity
High oil pressure	Too heavy grade of oil	Drain oil and replace. See engine manual for proper grade
	Dirt or obstruction in oil line	Drain and clear oil system. Check for bent or flattened oil lines and replace as necessary
Sludge in oil	Infrequent oil changes	Drain oil and refill with oil of proper grade and viscosity
	Dirty oil filter	Replace filter
	Water in oil	Drain oil and refill. See your dealer if problem persists
Transmission shifts hard	Corroded or pinched linkage	Lubricate or replace linkage as needed

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Mainship

TRAWLERS

AN EMPLOYEE OWNERSHIP COMPANY

Chapter 12

Getting Underway

40 Trawler

Single & Twin

V1.011508 • P/N 1034082

The first cruise is a time for you to grt acquainted with your boat. As its new skipper, you can learn how your boat operates and handles. Before you go on the first cruise, you should be able to answer “yes” to the following questions:

• Has your dealer completed the pre-delivery service inspection? Have you and your dealer signed the Pre-Delivery Inspection Report?

• Have you filled out and mailed all warranty registration cards?

• Have you read and do you understand this owner’s manual and the OEM manuals?

• Does your boat’s safety equipment comply with federal and local regulations?

• Has your boat been registered with the proper authorities? Does your hull display the proper identification?

• Has your dealer reviewed with you the operation of the boat and its systems? Has your dealer answered all your questions?

If you have taken care of these preliminary steps, you are ready to take your first cruise. Before you start, give some thought to the cruise itself. Choose a calm day if you can.

12.1 Boarding Your Boat

Make it a routine to visually inspect the exterior of your boat every time you approach it to board. Look for signs of damage that could be caused by the dock or other boats.

12.1.1 Preparing to Board

As you board your boat, you should listen for any alarms which could be sounding. The high water alarm at the helm will warn you of the high water bilge pump in operation. The CO detectors could indicate the presence of the deadly Carbon Monoxide gas. The dangers of Carbon Monoxide are detailed at length in the Boating Safety Chapter of this manual, and in the insert that is placed in the Boating Safety Chapter.

Note: There are other issues that could cause these alarms to sound such as the loss of power in the batteries that feed the CO detectors and the systems. This is so you are warned that you are nearing the loss of function of these important systems.

⚠ CAUTION ⚠

This alarm will only indicate the presence of Carbon Monoxide at the sensor. Carbon Monoxide gas may be present in other areas.

⚠ WARNING ⚠

Actuation of your CO alarm indicates the presence of Carbon Monoxide (CO) which will KILL YOU! If the alarm sounds:

1.Press the Reset/Silence button.

2.Call Emergency Services.

3.Immediately move to fresh air, outdoors, or to an open window or door. Do a head count to check that all persons are accounted for. Do not reenter the premises nor move away from an open door or window until the emergency responders have arrived, the premises have been aired out, and your alarm remains in its normal operation.

4.After following steps 1, 2, and 3, if your alarm reactivates in a 24 hour period, repeat steps 1 – 3 and call a qualified appliance technician. Write the number here: _____ _____to investigate for sources of CO from fuel burning equipment and appliances, and inspect for proper operation of this equipment. If problems are identified during this inspection, have the equipment serviced immediately. Note any combustion equipment not checked by the service technician and contact the manufacturer directly for more information about CO safety and this equipment.

There are also alarms on your engine that could be sounding if the engine is running. Be sure and check your manufacturer’s documentation for information concerning these alarms.

12.1.2 Upon Boarding

If possible, board from the cockpit area and lift the Lazarette and the engine room hatch to inspect for leaks, both fuel and water. If you detect fuel fumes, follow the procedures listed here and in the Fuel Chapter of this manual.

12.1.3 Strong Fuel Fumes

Fuel fumes are heavier than air and can collect in the bilge area. These fumes are extremely hazardous. If you detect strong fumes, proceed as follows:

⚠ WARNING ⚠

Leaking fuel is a fire and explosion hazard. Personal injury or death could occur.

⚠ DANGER ⚠

Explosive fuel vapors can become trapped in the lower portions of the boat. Close all hatch covers, windows, doors, and compartments while fueling your boat.

1.Evacuate all occupied enclosures immediately.

2.Shut down engine and generator.

3.Turn off all electrical circuits.

4.Inform the dockmaster. Have a qualified technician check the boat immediately to determine the source of the odor.

5.Open the boat for natural ventilation.

6.When you can no longer smell fumes, locate the source. Dispose of fuel in a safe, approved manner.

12.2 Starting the Engine

First, turn power at the battery switches to the On position, energizing the battery and switch panel (detailed in the DC Electric Chapter). Make sure that the bilge blower hoses are properly attached and that blower openings are not blocked.

It is important to follow the procedures to prevent electric shock.

At main electrical control panel, switch engine breaker and helm breaker to ON.

Check that bilge pumps are working by switching breaker for each pump to MANUAL (OFF) position. Switch ON breaker for fresh water pump to make sure it is working.

Check out the following bridge equipment and accessories:

- Seawater intakes that feed propulsion equipment
- Navigation Lights
- Horn
- Throttle and shifters for smooth operation
- Steering system ease of operation

⚠ WARNING ⚠

Using a damaged or improper cord for shore power can cause electrical shock and serious injury. Use a cord specifically designed for shore power connection. Do not use a household extension cord.

⚠ CAUTION ⚠

Water is an excellent conductor of electricity. Keep shore power cord out of water. Do not operate any AC device while you, or the cord, are in the water. To prevent injury or equipment damage, keep all AC electric system components dry.

⚠ WARNING ⚠

DO NOT disconnect the shore power cord to the boat first. You could accidentally drop the cord into the water, which may result in electrical shock and serious personal injury.

Check engine oil level. Refer to the engine manual for instructions. Add oil if needed.

Check the coolant level.

12.2.1 Running the Engine

Now it is time to start the engine. This is accomplished by the following procedures:

1.First, move the throttle to the idle position and ensure that the shift levers are in neutral. A neutral safety switch prevents the engine from starting when the transmission is engaged, or in gear.

2.Next, turn the switch to the “ON” position. You will then hear an audible alarm. This is the oil alarm and will cease when the engine has started and the oil pressure rises. You can also check the voltage gauges to see if you actually have enough power in the batteries to start the engine.

3.After checking the DC gauges, then start the engine with the start switch.

4.Once the engine starts and the oil pressure builds, the alarm will cease. If the alarm does not cease, shut down the engine and check your oil levels. If normal, seek the help of a professional mechanic.

⚠ WARNING ⚠

In order to prevent premature fuel pump failure, do not continuously crank engine starter for more than 10 seconds.

5.As the engine warms, the temp gauge will start to rise. Watch the gauge and make sure that the engine does not run hot.

6.Once the engine comes up to operating temp (check manufacturer's recommendations for correct temperature), move the shift lever to Fwd and Reverse to make sure that the transmission will engage.

7.Now, shut down the engine and recheck your oil and transmission fluid levels.

⚠ WARNING ⚠

DO NOT remove cooling system filter cap when engine is hot. Allow to cool and then remove pressure cap slowly, allowing pressure to vent. Hot coolant under pressure may discharge violently.

⚠ WARNING ⚠

Exhaust gasses contain Carbon Monoxide. This is a poisonous gas and can cause death. Shut down engine immediately, if any exhaust leaks are detected.

Important: Always be careful when starting the engine. Use common sense and good judgment. Shut down the engine immediately if you observe any unsafe operating conditions.

Important: If engine fails to start within 10 seconds, release switch. Allow starter motor to cool for at least 60 seconds, then try starting the engine again.

Note: Should there be a problem with the battery voltage level, see the section in this chapter for emergency operation.

12.3 Getting Underway

⚠ WARNING ⚠

Before ever pulling away from the dock, make sure that the shore power cord and the fresh water hoses are disconnected.

Check that the fresh water tanks are full.

Verify that you have up to date fire extinguisher and flares.

Make sure you have the required safety equipment for your passengers.

After the engine reaches operating temperature, accelerate the engine to 2000 RPM's. Check that voltmeters read 13 to 14.5 volts.

Check wind, tide, and current to determine the best way to maneuver your boat away from the dock. Cast off mooring lines.

Shift your boat's engine into forward or reverse, depending on whether you want to move the bow or the stern away from the dock first. Your engine should be running at a slow speed as you move away from the dock.

Once your boat is in open water, you can safely accelerate to cruising speed. Advance throttle to setting which provides your desired engine speed (RPM's).

12.3.1 Boat Handling

The best method to learn how to handle your boat and get the best performance is to practice and experiment. After several hours of operation, experiment with throttle settings to find the setting that will be the most comfortable and economical range for your particular loading conditions.

We suggest that you make a speed/rpm chart to determine the most economical operation. Operate your boat at various speeds and check the fuel consumption. Determine the amount of operating time remaining when the fuel drops below ¼ full. Make a log of this type of information and have it available when operating your boat.

In addition, you should determine the following:

- Minimum speed for effective steering.
- Turning radius at different speeds
- Response to steering at slow speeds
- Acceleration and deceleration rates

12.3.2 Boat Speed

Boat speed depends on many factors and cannot be guaranteed. These factors will vary with differing conditions. Some of the factors include the following:

- Engine efficiency
- Weather conditions
- Extra load
- Marine growth
- Damaged underwater gear

Engines operate most efficiently at the RPM's stated in the operating manual for the engine. Efficiency will decrease if you do not care for and maintain them properly. If the engine is neglected, power will drop and speed will decrease. In addition, expensive repairs may become necessary. Be sure to follow all instructions in this manual as well as those in the engine operating manual.

Weather conditions can also affect engine performance. An increase in engine room temperature from 90 degrees F to 130 degrees F could result in a 4% decrease in horsepower. Barometric pressure and humidity also influence horsepower. The cumulative effect of weather alone could decrease engine efficiency as much as 10% on hot days.

The extra load resulting from adding personal equipment, gear, and passengers to the boat may result in a decrease in speed. The extra load could also be water in the bilge. A gallon of water weighs 8 pounds. For example, twenty gallons of water in the bilge adds 160 pounds of weight to the boat. This additional weight reduces the boat's speed and, when combined with other extra loads, may significantly reduce performance.

Marine growth on the bottom of the boat will increase resistance and decrease speed. Increased resistance increases fuel consumption. Keeping the bottom of the boat clean will improve fuel efficiency.

Damaged underwater gear (propeller, shaft, struts) can decrease speed and performance. Such damage is also likely to cause excessive vibration which can damage the boat, engine, and other components. If underwater gear is damaged, avoid operation of the boat and have it repaired as soon as possible.

12.4 Emergency Operations

12.4.1 Fire

Your boat has a halon (or equivalent) fire extinguisher system which operates automatically to extinguish a fire in the engine compartment. The system has an indicator light on the helm. Moving the switch to ON before starting the engine activates the light. Check this light every time you start the engine. It shows that the system is charged and ready to operate.

A loud sound (similar to that of small arms fire) followed by a "rushing" air sound indicates activation of the extinguisher. If the green indicator light goes out or if you hear the extinguisher discharging, proceed as follows:

* Activating the automatic fire system will automatically shut down the engine and the generator.

* Evacuate all occupied enclosures immediately. If practical, evacuate the boat.

* Do not run the blowers.

* Do not open the engine compartment. Allow the halon fire extinguisher to soak the compartment for at least fifteen minutes.

⚠ DANGER ⚠

Flash fire erupting from the engine compartment can burn you. Opening the engine compartment will feed oxygen to the fire and cause the fire to flash back. Keep engine compartment closed for at least 15 minutes after fire extinguisher discharges.

* Wait for hot metals and fuels to cool before inspecting for damage or cause of fire.

* Open engine compartment slowly. Have approved portable fire extinguisher at hand and ready for use.

Do not breathe fumes or vapors caused by fire. HALON FUMES ARE TOXIC!

12.5 Returning to Port

After completing the day's cruise and mooring your boat, shut down the engine.

* Reduce engine speed to idle. Place transmission control in neutral. Allow engine to idle for a few minutes.

* Move switch to OFF to shut down the engine.

Before going ashore, check the following items:

Shore power on and plugged in
Battery charger operating
Shaft and rudder log for leaks

A thorough washdown of your hull, decks, and rigging with soap and fresh water will help keep your boat looking like new for years.

Note: See the AC Electric section in this manual for information on connecting the shore power, and the Water Systems chapter for information on connecting the dockside water supply.

Mainship

TRAWLERS

AN EMPLOYEE OWNERSHIP COMPANY

Chapter 13

Maintenance

40 Trawler

Single & Twin

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Maintenance

You have made the investment to purchase your boat. Now is the time to take care of it. Here we will supply you with the knowledge to do just that.

We will separate this chapter into sections that deal with each part of your boat. The exterior, the interior, and the mechanical components. At the end of the chapter, we will offer you some maintenance tips and also give you a schedule of maintenance to be performed. Remember that any manufacturer's recommended maintenance schedules supercedes ours and their specific schedules or tasks should be performed.

⚠ WARNING ⚠

A wide variety of components used on this vessel contain or emit chemicals known to the state of California to cause cancer and birth defects and other reproductive harm.
EXAMPLES INCLUDE:
Engine and generator exhaust.
Engine and generator fuel, and other liquids such as coolants and oil, especially used motor oil.
Cooking fuels.
Cleaners, paints and substances used for vessel repair.
Waste materials that result from wear of vessel components.
Lead from battery terminals and from other sources such as ballast or fishing sinkers.
TO AVOID HARM:
Keep away from engine, generator and cooking fuel exhaust fumes.
Wash areas thoroughly with soap and water after handling the substances above.
California Health & Safety Code 25249.5-.13

13.1 Maintenance Materials

Following is a list of tools we recommend that you carry on board your boat. Note that this list is the minimum required:

- Flashlight
- Vise grips (small and medium)
- Needle nose pliers
- Screw and nut driver set with ratchet handle
- Multi-bladed knife
- Set of screwdrivers (Phillips and flat blade, including "shorty" in both
- Offset screwdriver
- Set of combination wrenches (box at one end, open end at the other)
- Extra batteries for flashlight
- Set of tubing wrenches
- Wire crimping and stripping tool
- Hacksaw

13.1.1 Recommended Maintenance Materials

We recommend that you carry the following on board your boat:

- Plastic marine tape
- Instant glue
- Silicone rubber
- Electrical tape
- Two-part epoxy adhesive
- Engine oil
- Spray lubricant

13.1.2 Recommended Spare Parts

We recommend that you carry the following spare parts on board your boat:

- Engine oil (1 case) (Refer to engine manual).
- Antifreeze (5 gallons) (Refer to engine manual).
- Transmission fluid (4 quarts) (Refer to transmission manual)
- Oil filters (2)
- Coolant pump impeller and cover plate gaskets (2)
- Spare engine hoses and clamps (2)
- Electric fuses
- Fuel filters (4)
- Water hose or pipe for freshwater unions
- Pipe or hose unions
- Engine accessory belts (2 complete sets)
- Propeller and shaft (for extended cruises)

To keep the exterior of your boat in good condition, you should follow a periodic preventive maintenance program and practice good storage habits. In this section, are important suggestions that will help keep your boat in the best possible condition.

13.2 Exterior

13.2.1 Care and Maintenance During Summer Months

Before storing your boat, remove loose items such as cushions, towels, and similar items. Water trapped under these items can cause gelcoat discoloration and mildew.

After each use, rinse the entire boat with fresh water. If the boat has been used in brackish or salt water, use a mild soap during the washdown.

Covering your boat between uses will protect the finish from direct sunlight. Do not cover it with anything that will not allow moisture to evaporate, for example, sheet plastic.

13.2.2 Finish Protection

Waxing two or four times a year is recommended. If you are in a climate where you use your boat year round, wax your boat every three months. If you have a summer boating season, wax at the beginning of the season and before winter storage.

Waxing helps protect your boat from everyday elements. Use a wax recommended for fiberglass (gelcoat) finishes. Many automatic, over-the-counter waxes can be used. Check the product label for recommended surfaces and applications.

13.2.3 Color Fading and Yellowing

Darker colors are more prone to fading because they absorb more of the sun's ultraviolet rays. Whites and off-whites will yellow, usually on the deck radii. If the finish on your boat has started to fade or yellow, and waxing will not restore the finish, compounding with a fine grit compound and a low speed buffer may be necessary. An automotive, fine grit rubbing compound will work well in most cases.

* Follow the manufacturer's application instructions. Do not apply compound or wax in direct sunlight.

* Never place the buffer in such a manner that the pad touches the ground. The pad will pick up dirt which will cause deep scratches in the finish.

* After compounding, clean the surface with soap and water. Apply a good coat of wax.

13.2.3 Minor Scratches

If you have light surface scratches and rubbing compound does not remove them, wet sanding may be necessary.

** To wet sand:

* Clean the area with soap and water. During sanding, try to keep the area free of dust and dirt.

* Use a 500 or 600 grit wet and dry sandpaper. Use a sanding block. Sandpaper and sanding blocks can be purchased from automotive supply stores.

* When sanding, keep the surface wet. On dry surfaces, press a wet sponge above the sanding area. Always keep the sanding block flat on the surface. Never use the edge or corner. Doing so will make scratches that rubbing compound will not remove.

* After completing wet sanding, compound the sanded area with a fine grit rubbing compound. Use a low speed (1200 – 2800 rpm) buffer. Several applications of rubbing compound will have to be applied before all the scratches are removed.
* Apply a good coat of wax.

13.2.4 Stains

You can remove stains using a cleaner specifically made for gelcoat surfaces. Any cleaner recommended for cultured marble or fiberglass tubs and sinks will work. Most of these cleaners can be purchased at a grocery store.

If a cleaner does not remove the stain, use a fine grit rubbing compound. By hand, apply a small amount of the compound to the stain area. Using a cotton cloth and medium pressure, rub the compound into the stained area. After the stain is removed, wash the area with soap and water and apply a good coat of wax.

13.2.5 Stainless Steel Care

All of us are familiar with the common alloy "Stainless Steel" that is used for in the construction of so many marine hardware components. However, most people are surprised to learn that this nickel, chromium, iron alloy will indeed corrode and develop rust stains when exposed to the every day marine environment without due care and protection.

Corrosion is a natural process that any "Stainless" material will present. The good news is that it is easily prevented and cleaned. With the proper care and attention your boat's bright work can be kept in mint condition.

To give you the best possible start in caring for your stainless we have included just the right product with

your boat's standard equipment, a ***"Stainless Care Kit"***. Please follow the personal safety directions on the supplied products.

Some simple steps to maintain the perfert shine:

* Rinse all stainless rails and hardware after cruising.

* Wipe dry with a clean, soft cloth to avoid water marks.

* Wash with hot water and soap or detergent such as Bon Ami or other cleaner available commercially.

* Rinse with clear water after cleaning. Wipe dry with a clean, soft cloth to avoid water marks.

* If discolorations or deposits persist, use a non-scratching household cleanser or other polishing powder with a little water and a soft cloth.

Important: Do not use abrasive cleaning products, pads, steel wool, or steel brushes. These products will damage the finish.

* For stubborn deposits, use a plastic scouring pad or soft bristle brush with cleanser and water. Rub lightly in the direction of the polishing lines of the finish. Do not use too much pressure because the cleaner may mar the surface.

* Do not allow deposits to remain on the finish for long periods of time. Do not allow salt solutions, disinfectant, bleaches, or cleaning compounds to remain on the finish. Chemicals in many of these compounds may damage the rails or hardware. Rinse with soft water after every exposure and wipe dry with a clean, soft cloth.

* Polish them periodically to prevent surface staining.

Enclosed with your ***"Stainless Care Kit"*** you will find a detailed guide on the application of the different products. Please take the time to read this first. Due to the natural behavior of "Stainless" materials on your boat we are unable to accept warranty claims which relate to surface staining or discoloring.

If your boat is not equiped with the "Stainless Care Kit" or you need to replenish please contact the Customer Service Department at 1-800-248-2980 or email: customerservice@luhrs.com.

13.2.6 Deck Hatches

Wax the rubber gaskets on all deck hatches with a carnauba wax to ensure gasket material does not stick to Plexiglass.

13.2.7 Acrylic and Plexiglass

Important: Do not use glass cleaning sprays, scouring compounds, or solvents (such as acetone, gasoline, or thinners) to clean acrylic or Plexiglass.

Following are guidelines for cleaning acrylic and Plexiglass parts:

* Wash acrylic hatches, windows, and any other acrylic compounds with mild soap and plenty of lukewarm water.

* Use a clean, soft cloth.

* Apply only a light pressure when cleaning.

* Rinse with clear water, and blot dry with a damp cloth or chamois.

13.2.8 Windows

The window frames on your boat are made of high quality aluminum with an enamel paint surface. The frames need no maintenance other than cleaning with soap and water. Do not use abrasive or strong chemicals. These may damage the finish and allow corrosion to start. Frames should be protected with marine wax.

The glass in the frames is tempered safety glass and requires only normal cleaning.

The side windows and deck hatches are made of acrylic plastic. Refer to instructions for cleaning acrylic and Plexiglass.

13.2.9 Caulking

All deck fitting, bow rails, windows, hatches, etc, have been caulked with the highest quality material to ensure a waterproof joint with the boat. However, normal use will flex the joint and eventually break down the seal.

Note: We recommend that all deck fittings, hatches, windows, rail, etc. be caulked periodically to prevent damaging leaks from developing.

⚠ WARNING ⚠

Cleaning agents and paint ingredients may be flammable and/or explosive, or dangerous to inhale. Be sure to use adequate ventilation, and appropriate safety clothing. (gloves, safety glasses, respiration, etc.)

13.2.10 Bottom Paint Preparation Warning

Do not use any sanding, sandblasting or other abrasive reparation of the bottom, as this will void your hull blistering warranty. See the warranty information in Chapter 3 of this manual.

Important: Do not paint the zinc anodes (connected to the boat's bonding system) on the outside of the transom.

3.2.11 Bottom Painting

Choose a bottom paint system that suits the environment in your area. Follow the procedure recommended by the manufacturer of the paint, while making sure not to void the Mainship Hull Blistering Warranty. The procedure for preparing and painting the bottom varies between paint manufacturers, but should always include dewaxing, etching and sometimes priming of the surface.

13.2.12 Epoxy Barrier Coat

Sanding of the gel coat bottom surface will be permitted should a customer wish to have epoxy barrier coat applied to the hull, (example Interlux Interprotect 1000, 2000, West System or VCTar). This will not void the Five-Year Blister Warranty. Mainship refers to epoxy barrier coatings as mentioned above, not epoxy primer paints. If an epoxy barrier coat is applied to a Mainship vessel, it must be registered with the Warranty Department prior to application of the product. If the dealer applies bottom paint only, sanding ***will not*** be allowed and the no sanding system must be used.

13.3 Interior

You can usually clean the surfaces of these components with a mild cleaner such as Fantastic. Avoid using harsh or abrasive cleaners. Use approved marine sanitary treatment chemicals to control the odor in the toilet and holding tank.

13.3.2 Walls

The wood used in your boat is treated at the factory with a multi-coat finish process. To maintain the finish, use a good grade of furniture polish.

13.3.4 Bilges

The bilges are finished with a high quality gelcoat which is easy to keep clean. Several brands of bilge cleaners will dissolve dirt and grime, but will not harm the environment when pumped overboard. If you keep the bilge clean, it is much easier to identify leaks or other problems if they should develop.

Important: The Federal Water Pollution Control Act prohibits the discharge of oil or oily waste into or upon navigable waters in the United States. Violators are subject to a penalty.

13.3.5 Shower Sump

The showers drain into contained Sump which keep hair, soap, scum, and bacteria from building up in the bilge and developing an odor. The Sump consists of a plastic box, a pump, and an automatic float switch. A detailed instruction on cleaning the shower sump can be found in the Sanitary Systems Chapter 10. This describes the function more thoroughly.

Important: Periodically open the sump box and clean out the buildup of hair and scum to prevent eventual clogging of the pump.

13.4 Mechanical Systems and Components

Refer to the manuals supplied by the boat component manufacturers for their recommended periodic maintenance. The manuals may indicate maintenance requirement, in addition to, the minimum maintenance tasks listed in the following charts.

Note: In case of conflicts between the maintenance information in this manual and the manuals supplied by the equipment manufacturer, the equipment manuals take precedence.

13.4.1 Engine Oil

See engine operating manual for recommended oils and correct procedures for checking and replenishing oil.

⚠ WARNING ⚠

Hot coolant under pressure may boil over and cause burns or other serious injury when cap is removed. Allow engine to cool. Open pressure cap slowly to allow pressure to vent before removing cap.

13.4.2 Engine Coolant

See engine operating manual for recommended coolants and correct procedures for checking and adding coolant.

13.4.3 Engine Exhaust

Visually inspect the engine and generator exhaust systems (hoses, joints, manifolds, etc.) for leaks. Make sure all clamps are tight. Check hoses and exhaust boxes for damage. Replace any damaged exhaust system component.

Note: Any discoloration around a joint or gasket usually indicates a leak.

13.4.4 Generator Oil

See generator operating manual for recommended oils and correct procedures for checking and replenishing oil.

13.4.5 Generator Coolant

Refer to the generator manual for detailed recommendations about checking and adding coolant.

13.4.6 Transmission Oil

Refer to the transmission manual for detailed recommendations about checking and adding oil.

13.4.7 Fuel Filter

Refer to the engine manual for correct information about checking and replacing the fuel filter on gasoline engines.

For diesel engines, check all fuel filters daily to remove all sediment and water from the filter. Inspect the canister for possible corrosion or deterioration. Replace canister if you observe any corrosion or other deterioration.

Replace the filter element at least once each season, more often if there is contamination of the fuel system. Always replace the bowl gasket each time the filter is reassembled. Check carefully for any signs of leakage.

13.4.8 Fuel Line Connections

Check all fuel line connections for leaks at least once a year. Tighten as necessary.

Important: Be careful when tightening fittings. Over-tightening can crack the flair fittings and flair nuts. Use only tube wrenches when tightening connections.

13.4.9 Batteries

⚠ WARNING ⚠

Avoid spilling battery electrolyte into the engine compartment or bilge. Also, avoid getting saltwater on or in the battery. Either condition can create a gas that is explosive and poisonous if inhaled. If you spill electrolyte, ventilate the area. Neutralize the acid in the electrolyte with baking soda. Clean up neutralized electrolyte with a disposable rag or paper towel.

Your boat has provision for three 12V deep cycle, heavy duty batteries for the engine a fourth for the inverter and a marine cranking battery for the generator. Although these batteries are relatively maintenance free, some simple routine maintenance can increase the effectiveness and life.

* Keep the batteries fully charged. Batteries kept fully charged last longer than batteries kept at a partial charge.

* Check the level of the electrolyte regularly. Correct level is just above the plates. Add distilled water only if necessary. Over-filling can cause poor performance and early failure.

* Check the battery every 30 days. Keep the top of the battery clean. When necessary, clean the top of the battery with a baking soda solution and rinse with fresh water.

Important: To prevent battery failure, do not allow the soda solution to enter the battery cells.

* Inspect the cables and clamps regularly.

* Remove the battery cables and clean the battery terminals and posts regularly. Use a wire brush or bronze

wool. After re-connecting the terminals, apply a coating of grease or petroleum jelly (Vaseline) to protect them against corrosion.

Important: Before cleaning the batteries, disconnect and remove them from the boat.

* Replace corroded or damaged parts immediately.

* Use the standard battery test with a hydrometer to check the condition of the battery.

* Remove the batteries from the boat during periods of extended storage. Store the batteries in a cool (above freezing), dry area. Do not set the batteries directly on a concrete floor.

All batteries lose some charge during storage, but the loss of charge is inversely proportional to the temperature. The lower the temperature, the less charge is lost. Avoid storing the batteries in a humid area. Humidity will lead to corrosion of the terminals.

13.4.10 Shore Power Cable Care

⚠ WARNING ⚠

Electrical shock can cause injury or death. Before working on electrical system, disconnect all power sources. Inform others to prevent accidental re-connection of electrical service. All voltages above 12 volts are dangerous. Maintaining power cable while connected to shore power can cause electrical shock. Disconnect cord before maintenance.

Clean the cable with a grease cutting household detergent. Apply a vinyl protector periodically.

The metallic parts of the cable are corrosion resistant. You can, however, increase the life of the cable in a salt water environment by wiping the exposed parts with fresh water. Then, dry them and spray them with a moisture repellent.

If the cable is dropped into salt water, rinse the plug and connector end thoroughly in fresh water. Then shake or blow off excess water and allow cable to dry. Spray plug and connector with a moisture repellent before you use the cable again.

13.4.11 Electrical System Connections

At least once each year, disconnect electrical connectors in the bilge, engine, and upper control areas. Check the terminals for corrosive buildup. Have your boat dealer repair connectors and terminals if they are corroded.

13.4.12 Trim Tabs

Electro-hydraulic trim tabs are installed on your boat. Annual inspection of hydraulic lines and fluid levels is recommended. The trim tab pump is located in the Lazarette, mounted just below the hatch cover. See manufacturer's specifications for proper fluid and fluid levels.

13.5 Periodic Maintenance

Proper and timely maintenance is the best insurance you can buy for trouble free and pleasurable boating. Included in this section are maintenance charts which identify maintenance tasks and their frequency. Use the charts as a checklist.

Following are specific maintenance tasks that you should complete after the first 20 hours of operation:

* Check rudder packing glands for leaks (no leaks at all).

* Check propeller shaft packing glands for leaks (approximately 1 drop per minute).

* Check all through hull fittings for leaks.

* Check all doors and cabinets for proper fit and operation.

* Realign propeller shaft

* Tighten all engine mounts.

* Complete engine maintenance as recommended by engine manufacturer.
* Tighten all hose clamps and lubricate them.

* Check and tighten all pressurized water system fittings.

* Check and service batteries, tighten battery connections, and lubricate as needed.

At the end of this chapter, you will find a maintenance schedule. It is important that you keep the manufacturer's documentation for the components and follow the

maintenance schedules and procedures listed in that literature. This information takes precedence over what is supplied by the boat manufacturer.

13.6 Storage and Lifting

In most cases, the reason for storage is winter layup. The information in this section is a general guide. Your boat dealer or a competent boatyard should prepare your boat for winter storage. If you are removing your boat from the water for another reason, use the information in this section as a guideline. Following the procedures in this section helps to extend the life of your boat and its equipment and simplifies re-commencing in the spring.

Indoor storage is beneficial if you are storing your boat in a climate that produces ice and snow. However, the storage building should be adequately ventilated, not tightly closed. Ventilation, both around and throughout the boat, is very important.

If you use outdoor storage facilities, cover your boat with a canvas cover with provisions for ventilation to keep the boat from "sweating." Building a frame over the boat to support the canvas will allow the passage of air around the boat. The frame should be a few inches wider than the boat so the canvas will clear the rails.

Before preparing your boat for winter storage, check the condition of the boat and its systems and equipment. Note any repairs needed. The need for other repairs may become apparent during winterization. Make arrangements to have the repairs completed.

13.6.1 Lifting Your Boat

Following are guidelines which will help prevent damage to your boat as it is being lifted.

* Never hoist the boat with a greater than normal accumulation of water in the bilge. Fuel and water tanks should be empty.

* Place slings where indicated by the sling tags on the gunwale. Proper location of the aft sling is critical. Lifting aft of the station indicated may damage the propeller shaft. Lifting forward of the station indicated, with the sling under the exhaust outlets, may cause cracking which is not covered by the warranty. Blocks or pads at the chine corners will help keep pressure to a minimum at this point.

* Disconnect the propeller shafts at the transmissions to prevent damage to the transmission.

* Use flat, wide slings made of belting and spreader bars long enough to keep pressure off the gunwale. Do not use cable slings. Pressure by the slings on the gunwale can cause severe gelcoat crazing or more serious hull damage.

* The spreader bar at each sling should be as long as the distance across the widest point the sling surrounds.

* Weight should be primarily distributed along the keel. If a marine railway or platform is used, locate and adjust the blocking to distribute the weight over several areas at the intersection of stringers and bulkheads. The bunks and/or blocks should match deadrise angle and provide adequate support and stability.

* When lifting the boat, keep the bow higher than the stern so the exhaust lines can drain. This will keep water from running forward through the manifold and into the engine itself where the water can become trapped.

Note: Keep the bow higher than the stern every time the boat is lifted. Do not lift the stern to change a propeller. Doing so can cause water to enter the engine. Engine failure is possible if water enters the engine cylinders. This water can cause hydrolock and bend the piston rods. Even a small amount of water can cause rust or other damage.

(See Fig. 13.1 for lifting, shipping and cradling dimensions)

13.6.2 Draining Your Boat

Your boat has bilge pumps for draining water from the bilges. Some compartments in the bilge may not drain completely because of the position of the boat. Pump these compartments out then use a sponge to remove all remaining water.

Procedures for draining and winterizing the fresh water system are in this section under the "Preparing for Storage" heading.

13.6.3 Preparing for Storage

* Clean, scrub, and sponge the hull and deck as soon as the boat is pulled from the water and is still in the sling. Cleaning marine growth from the hull is easier when it is still wet.

* Clean the inside of all hull openings, through hull fittings, and screens. Inspect the hull and underwater gear for signs of wear, deterioration, or damage. Note any damage to the propulsion equipment, helm area, cabin, etc. Make repairs, if at all possible, before covering your boat.

* Fill the fuel tanks with treated fuel to prevent condensation. If you use a stabilizer or conditioner, be sure to follow the instructions on the container.

Important: Do not overfill fuel tanks so fuel flows from the vent. Allow room in the tanks for fuel to expand.

** Prepare the Engines for Storage:

* In areas where temperatures fall below freezing, the bilge area under the engines must be pumped out and sponged completely dry. Check for areas that do not drain to the pumps. Drain mufflers.

Note: Refer to the engine owner's manual for winterization and storage procedures.

** Prepare the Batteries for Storage:

* Be sure main battery breakers are off.

* Remove batteries from boat and store in area where temperatures remain above freezing.

* Place batteries on a wooden pallet or bench.

* Keep batteries charged. Check electrolyte levels regularly. Add electrolyte if needed.

** Prepare Holding Tank

* Empty and rinse holding tank until tank is clean.

* Close head intake seacock and remove hose.

* Pour the nontoxic antifreeze into the head and keep flushing the head until the antifreeze reaches the holding tank.

* If your boat has a macerator discharge and the boat is removed from the water, run the macerator pump long enough for antifreeze to run through the pump and the lines.

* Remove drain plug from seacock while valve is closed. Allow line to drain. Replace drain plug.

** Prepare the Fresh Water System:

* Remove the fresh water supply by opening the hot and cold faucets in the galley for 10 minute intervals. Repeat until the fresh water tank is empty.

* Open all faucets: galley, shower, cockpit shower, etc.

* Drain the water heater. Disconnect lines from the engine heat exchanger (if equipped). Drain exchanger and lines.

* Remove hot and cold water lines and hook them together.

* Remove inlet hose from tank and insert it into a container of nontoxic antifreeze. Turn pump on. Starting at faucet furthest from pump, open all faucets until antifreeze flows out.

* Turn off pump and reconnect hose to water heater and pump.

* Remove seacock drain plugs to prevent damage from freezing. Close all seacocks.

** Prepare Interior of Boat for Storage:

* To keep mildew from forming, remove all items that will hold moisture (PFD's, towels, blankets, clothing, canvas, etc.).

* Make sure all garbage is removed.

* Scrub the inside of the boat. Clean cabinets, drawers, and cupboards. Allow cabin area to dry and air for at least one day if possible.

* Stand or prop up mattresses and cushions remaining on board to allow good air circulation around them. Hang life preserver and other equipment to prevent mildew.

* Remove any detachable and valuable equipment and electronics.

** Prepare Exterior of Boat for Storage:

* Sand the hull bottom and apply at least one coat of anti-fouling paint.

Note: This coat of paint must be applied during winterization or before the beginning of a new boating season. Check with your dealer for information about the paint you should use.

* Apply a coat of wax to the entire boat. Put rust inhibitor on all metal parts.

* Cover the boat with a tarpaulin or mooring cover. If the boat is stored outside, you may need to place supports under the cover to shore up pockets where rain or snow can collect.

13.6.4 Supporting Your Boat During Storage

A cradle is the ideal support for your boat whenever it is not in the water. Properly designed and located, the cradle will support the boat under the main frames. Support at these points is essential for preventing damage to the hull.

If a cradle is not available, the boat may be supported on two or three timbers across a boat well or on another firm footing substantial enough to keep the boat level. The timbers and the foundation must be substantial enough to prevent any change in shape while supporting the boat during storage. The weight carried by the supports should be evenly divided, the keel should carry a share of it.

Store the boat with the bow up so any accumulation of moisture will run off. (See Fig. 13.1 for lifting, shipping and cradling dimensions)

13.7 Fitting out after Storage

If the hull was not painted during winterizing, sand and pain the hull bottom before removing the boat from its cradle.

Before launching your boat, do not load unneeded equipment, furniture, and personal items until the launch and final checkout are complete.

13.7.1 Pre-Launch Checkout

** Before placing your boat in the water, check and perform the following:

* Check all anchor lines and gear and replace, if necessary.

* Check all through hull fittings to make sure they are clean. Make sure all drain plugs are installed. Check all strut and through hull hardware for damage and tightness. Repair or adjust as needed.

* Check propellers and propeller shafts for proper installation and tightness. Clean propeller and shafts. Check shaft play in strut bearing. Replace bearing if play is excessive.

* Check shaft alignment. Refer to the engine owner's manual or check with your boat dealer for details.

* Clean battery terminal posts and cable terminals with a wire brush or bronze wool. Install batteries and attach cables. After cable posts are tightened down, coat posts with oil or Vaseline to keep out air and acid. Check all wiring connections and contacts for corrosion and tightness.

* Check all seacocks for easy operation. Check the condition of all hoses.

* Check operation of bilge pumps in manual and automatic modes. Check operation of shower sump pumps.

* Check all bilge blowers for proper operation.

* Check operation of all DC circuits.

* Launch your boat.

13.7.2 Post Launch Checkout

** After launching your boat, check the following:

* Check all sources of possible leaks from bow to stern. Make this check with boat fully in the water, but still in the slings!

* Check engines and generator following procedures described in equipment manuals.

* Check the entire exhaust system for the engines and the generator carefully. Make sure all exhaust systems are gastight. If exhaust opening was plugged or covered during storage, remove blockage.

Maintenance Schedule

Spring Commissioning

- **Engine(s)**
- Change Oil and Oil Filters
- Change Fuel Filter
- Check Coolant Level
- Inspect Pressure Cap
- Check Transmission/V-drive Fluid
- Replace Engine Zincs
- Inspect Stuffing Box
- Inspect Belts, Wires, Hoses, etc.
- Check Gauges for Proper Operation
- Check Throttle and Gear Shift
- Inspect Raw Water Impeller
- Check Engine Room Ventilation System

- **Fuel System**
- Change Primary Fuel Filters
- Check for Fuel Leaks/Fuel in Bilge
- Add Biocide to Tank(s) (If req'd)

- **Genset**
- Change Oil and Oil Filter
- Change Fuel Filter
- Check Coolant Level
- Inspect Pressure Cap
- Replace Engine Zincs
- Inspect Belts, Wires, Hoses, etc.
- Check Gauges for Proper Operation
- Inspect Raw Water Impeller

- **Batteries/Charging System**
- Check Charger/Inverter Operation
- Check Battery Fluid Level (If req'd)
- Check Alternator Output
- Check Battery Terminals for Corrosion, Tightness

- **Pressure Water System**
- Flush System
- Fill Tank(s)
- Check Pump for Proper Operation
- Check Faucets and Piping for Leaks
- Check Water Heater

- **Helm**
- Check for Proper Operation
- Check Hydraulic Fluid Level
- Check Trim Tab Operation

- **Refrigeration/Icemaker**
- Flush/Check for Proper Operation
- **Air Conditioning**
- Flush/Check for Proper Operation

- **Electronics**
- Check VHF for Proper Operation
- Check GPS
- Check Auto Pilot (Dock side only)
- Check Radar
- Check Wind Instruments
- Check Running, Deck, Spreader Lights

- **Bilge Pumps**
- Check Manual and Electric

- **Propane System**
- Pressure Test Propane System
- Inspect Hoses

- **Head(s)**
- Test for Proper Operation
- Lube

Monthly Preventative Maintenance

- **Engine(s)/Genset**
- Check Oil Level
- Check Coolant Level
- Check/Clean Raw Water Strainer
- Inspect Hoses and Belts
- Inspect Throttle, Stop and Gear Shift
- Inspect Transmission Coupling Bolts
- Check Stuffing Box
- Check Primary Fuel Filter
- Check Engine Room Ventilation System
- Check for Fuel Leaks/Fuel in Bilge

- **Electrical System**
- Check Battery Fluid Level (If req'd)
- Check Battery Terminals for Corrosion, Tightness
- Check Battery Charger
- Check Bilge Pump Operation
- Check Running, Deck, Spreader Lights

- **Rigging**
- Check Winches and Anchor Windlass

- **Helm**
- Check Steering Fluid Level/Pressure
- Check Trim Tab Operation

- Lube Head(s)
- Presure Test Propane System
- Inspect Propane Hoses
- Check Propane Solenoid
- Check Mooring Lines
- Check Sea-Fire Indicator Light
- Shake Fire Extinguishers

Winterization

- **Engine(s)/Genset**
- Change Oil and Filter
- Check Coolant Freeze Protection
- Flush with Freeze Ban
- Fog Engine
- Inspect Stuffing Box
- Change Engine Zincs

- Battery/Charger
- Check Specific Gravity (If req'd)
- Check Battery Fluid Level (If req'd)
- Check Charger Operation

- Pressure Water System
- Drain Tank(s)
- Flush System with Freeze Ban

- Head(s)
- Flush Tiolets and sinks with Freeze Ban

- Refrigeration/Icemaker
- Flush with Freeze Ban
- Disconnect Water Line and Drain

- Air Conditioning
- Flush with Freeze Ban

- Fuel System
- Add Stabilizer to Fuel Tank(s)

- Miscellanrous
- Check manual/Electric Bilge Pumps
- Close Propane tank
- Close Seacocks
- Drain all Sea Strainers/Seacocks
- Close Propane Valve

Periodic Scheduled Maintenance

Refer to Para. 13.5 and Manufacturer's Manual Recommendations.

Lifting, Shipping and Cradling Dimensions

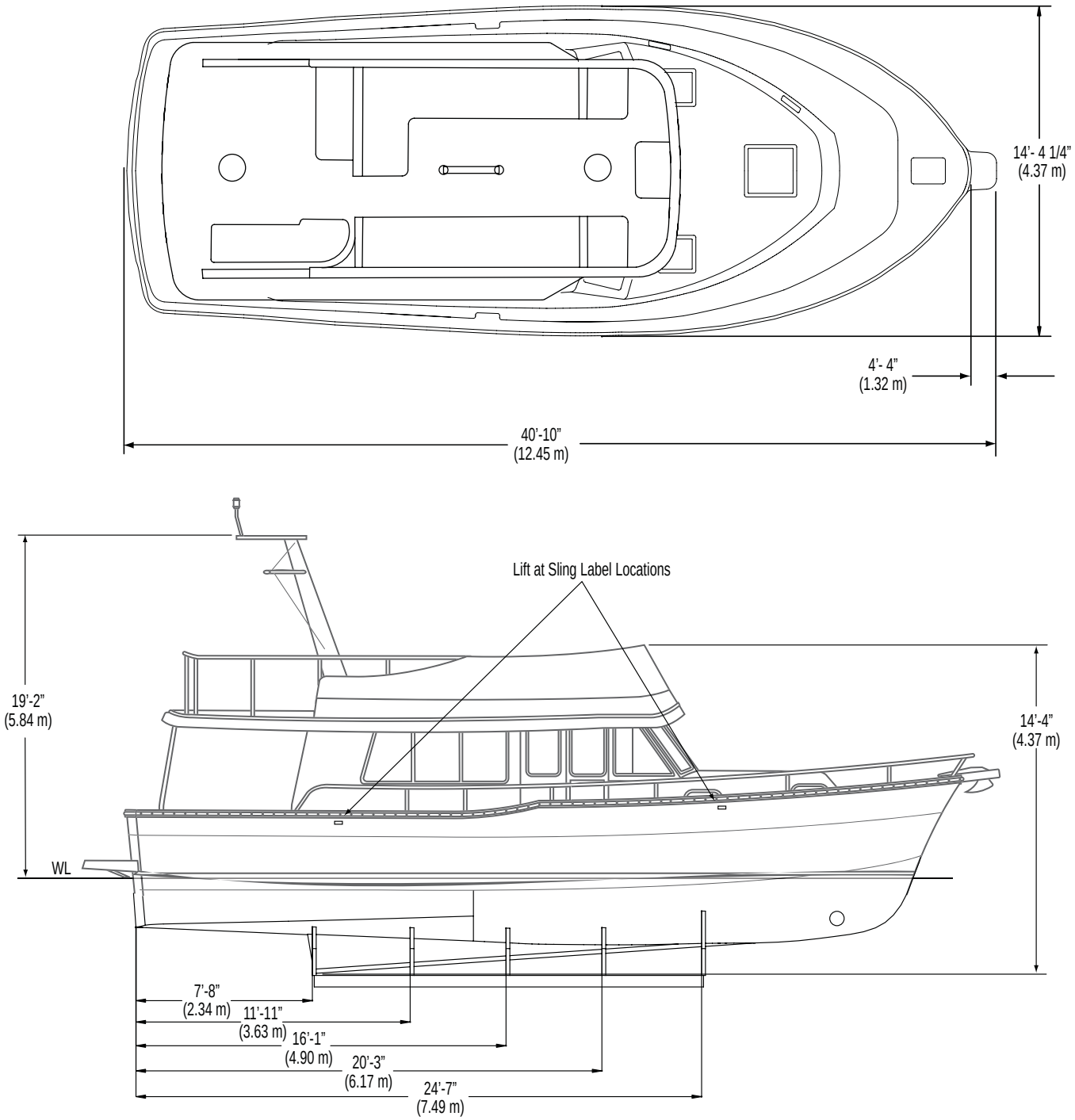

Figure 13.1

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Mainship®
TRAWLERS
AN EMPLOYEE OWNERSHIP COMPANY

Chapter 14

Glossary

40 Trawler
Single & Twin

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Abaft - Toward the rear of the boat.

Abeam - At right angles to the boat's keel.

Aboard - On the boat.

Abreast - Side by side.

Adrift - Loose, not on a mooring or towline.

Aft - Towards or at the stern.

Aground - Stuck fast on the bottom.

Ahead - In a forward motion.

Amidship - (1) An object or area midway between the bow and the stern of the boat; (2) An object or area midway between the port and the starboard side of the boat.

Ampere - The standard unit used to measure the strength of an electrical current.

Astern - Direction of travel when boat moves backwards.

Athwartship - Movement from port to the bottom of the lowest part of the boat (for example, the propeller tip or rudder); (2) The depth of water necessary to float a boat.

Even keel - To be floating evenly without listing to either side.

Exhaust system - The means by which the hot engine or the generator exhaust gases are moved from the engine and released into the atmosphere.

Fathom - Six (6) feet.

Fender - A rubber or plastic device positioned to absorb impact between vessels or a vessel and a dock.

Flare - (1) Outward curve of the hull as it comes up the side from the water line; (2) A pyrotechnic device used for emergency signalling.

Flotsam - Refuse that floats when discharged overboard.

Flying bridge - The uppermost steering station from which the vessel is controlled.

Fore-and-aft - A line, or anything else, that runs parallel to the longitudinal center of the boat.

Forward - Toward the bow.

Freeboard - The minimum vertical distance from the center of the water to the center of the gunwale.

Galley - The kitchen area of a boat.

Gasket - A strip of sealing material used to make joints fluid tight.

Gelcoat - The thin outer layer of pigmented plastic used on exposed fiberglass components.

Gland - The movable part of a stuffing box, which compresses the packing when tightened (also referred to as packing gland")

Ground - The electrical potential of the (electrical ground) earth's surface, which is zero.

Gunwale - (1) The line where the upper deck and the hull meet; (2) The upper edge of a boat's side.

Hatches - Covers on hatchways.

Hatchways - Access ways through decks.

Hardtop - A permanent cover over the cabin or cockpit.

Hawser - A heavy rope used for mooring or towing.

Head - A toilet or lavatory.

Heading - The direction that a vessel is pointing with reference to true, magnetic, or compass north.

Headway - The forward motion of a vessel through the water.

Heel - To tip or tilt to one side by means of an external force.

Helmsman - The individual steering the boat.

Hull - The main body of a boat.

Inboard - (1) From either the port or starboard side of a boat towards the fore and aft centering of a boat; (2) The dock side of a moored boat.

Jetsam - Refuse that sinks when discharged overboard.

Keel - The centerline of a boat running fore and aft at the lowest point of the hull.

Knot - (1) A maritime unit of speed equal to 1.15 miles per hour; (2) A term for hitches and bends in a line of rope.

Lazarette - Storage compartments below the deck at the stern of the boat.

List - When the vessel inclines to port or starboard by its own means.

Longitudinal - Running lengthwise.

Mooring - An arrangement for securing a boat to a mooring buoy or pier.

Navigational - A set of red, green, and white lights lights which indicate the position of a vessel and must be shown by all vessels between dusk and dawn.

Overhead - A ceiling or roof of a vessel.

Overboard - Over the side of a boat.

Outboard - (1) From the fore and aft centerline of a boat toward both the port and starboard sides (2) The seaward side of a moored boat.

Passageway - A corridor or hallway aboard ship.

Personal Flotation Device (PFD) - A life preserver.

Pier -A loading platform that extends at an angle from the shore.

Piling -Support or protection for wharves, piers, etc.

Pitch - (1) The vertical motion of a boat in a seaway, about the athwartship axis; (2) The axial advance in inches of a propeller during one complete revolution.

Planing hull - At slow speeds, a planing hull will displace water in the same manner as a displacement hull. As speed increases, the hull provides a lifting effect up onto the surface of the water.

Port - (1) Looking forward, the left side of a boat from bow to stern; (2) A harbor.

Port beam - The left center of a boat.

Port bow -Facing the bow, the front left side.

Port quarter Looking forward -, a vessel's left rear section.

Quarter - The sides of a boat aft of amidships.

Quartering sea - Sea (waves) coming from a boat's quarter.

Rode - The anchor line or chain.

Running lights - See Navigational lights.

Rudder - A vertical plate used to steer the boat.

Salon - The main social cabin on a boat, usually the largest area.

Screw - A propeller.

Scupper - A drain from the edge of a deck or cockpit that discharges overboard.

Seacock - A positive action shutoff valve connected directly to the hull seawater intake and discharge piping.

Shaft - The long, round rod that connects the engine/transmission to the propeller.

Shaft log - A fitting at the hull bottom where the shaft connecting an engine to its propeller penetrates the hull. A shaft log permits the shaft to rotate while simultaneously preventing water from entering the hull.

Sheer - The top of the hull's curvature at the deck line from the bow to stern.

Sheer strake -The upper edge of the hull, immediately below the deck.

Sole - Term used to refer to the deck of a boat or the floor of the cabin.

Spring line - A pivot line used in docking or to prevent the boat from moving forward or astern while made fast to a dock.

Starboard - Looking forward, the entire right side of a boat from bow to stern.

Starboard - When facing the bow, the front beam right side.

Starboard - When looking forward, the right quarter right rear section of the boat.

Stem - The leading edge of a boat's hull.

Stern - The back of a boat.

stringer - Longitudinal and transverse continuous members used to provide a vessel with strength.

Strut - A propeller shaft support that is below the hull. The main strut is a large strut that is mounted immediately forward of the propeller. An intermediate strut is smaller than the main strut and is mounted between the main strut and the shaft log.

Sump - A pit or well into which water is drained.

Superstructure - A flying bridge or other structures that extend above the deck.

Topside - To go to the uppermost deck.

Transom - The planking or structure forming the stern of a square-ended boat.

Transverse -Direction running across the boat.

Underway - A vessel that is not moored, docked, at anchor, or aground.

V-bottom - A hull with the bottom section that is shaped in the form of a "V"

V-drive - A drive system that has the output of the engine facing forward and coupled to a transmission. The prop shaft is then coupled to the transmission.

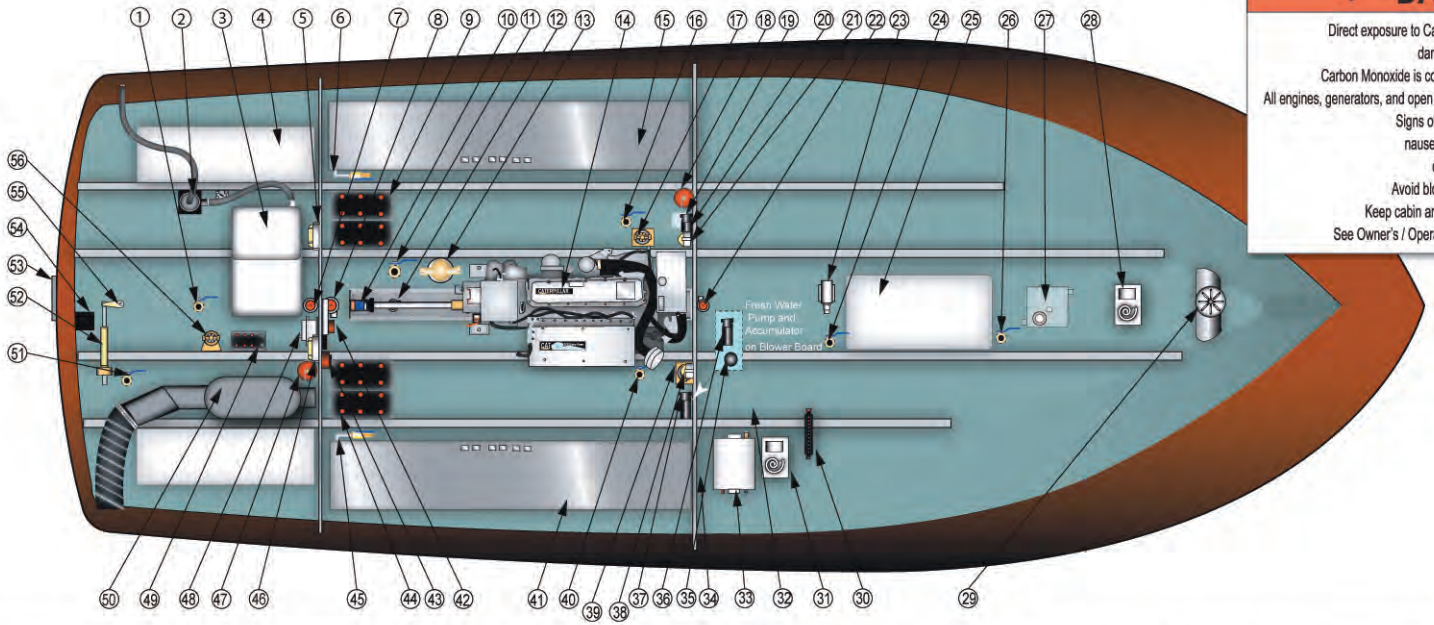
Water line - The line of the water on the hull when the boat is afloat and at rest.

Weather deck -A deck with no overhead protection.

Windlass - A device used to raise and lower an anchor.

Mainship 40 Trawler Single

Mechanical Arrangement



! DANGER !

Direct exposure to Carbon Monoxide will cause brain damage or death!
Carbon Monoxide is colorless, odorless, and dangerous!
All engines, generators, and open flame appliances produce Carbon Monoxide!
Signs of exposure include nausea, dizziness and drowsiness!
Avoid blockage of exhausts!
Keep cabin and cockpit well ventilated!
See Owner's / Operator's Manuals for more details!

1. Generator Cooling	10. Dripless Shaft Log	19. Fuel Filter	28. A/C Compressor	37. Air Conditioning Pump	46. Engine Room Light	55. Rudder Assembly
2. Generator Muffler	11. Engine Seacock	20. Raw Water Pump	29. Bow Thruster	38. Engine Room Light	47. Gen Set Halon	56. Generator Cooling Strainer
3. Generator	12. Mid Bilge Pump	21. Engine Room Light	30. Fresh Water Manifold	39. A/C Intake Strainer	48. Oil Changer	
4. Water Tank	13. Engine Sea Strainer	22. Fwd Bilge Pump	31. A/C Compressor	40. A/C Intake	49. Generator Battery	
5. Engine Room Light	14. Engine	23. Maverator Pump	32. Vacuum Generator (Option)	41. Stbd Fuel Tank	50. Engine Muffler	
6. Engine Fuel Supply	15. Port Fuel Tank	24. Overboard Discharge	33. Water Heater	42. Battery Switch Panel	51. Muffler Drain Overboard	
7. Aft Bilge Pump	16. Raw Water Pickup	25. Waste Tank	34. Holding Tank Vent Filter	43. Inverter Selector (Option)	52. Steering Ram	
8. Emergency Bilge Pump	17. Raw Water Strainer	26. Head Pickup	35. Fresh Water Accumulator	44. Inverter Batteries (Option)	53. Zinc Plate	
9. Batteries	18. Halon	27. Shower Sump	36. Fresh Water Pump	45. Fuel Supply Valve	54. Trim Tab Pump	

Mainship 40 Trawler Twin

Mechanical Arrangement

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Direct exposure to Carbon Monoxide will cause brain damage or death!
Carbon Monoxide is colorless, odorless, and dangerous!
All engines, generators, and open flame appliances produce Carbon Monoxide!
Signs of exposure include nausea, dizziness and drowsiness!
Avoid blockage of exhausts!
Keep cabin and cockpit well ventilated!
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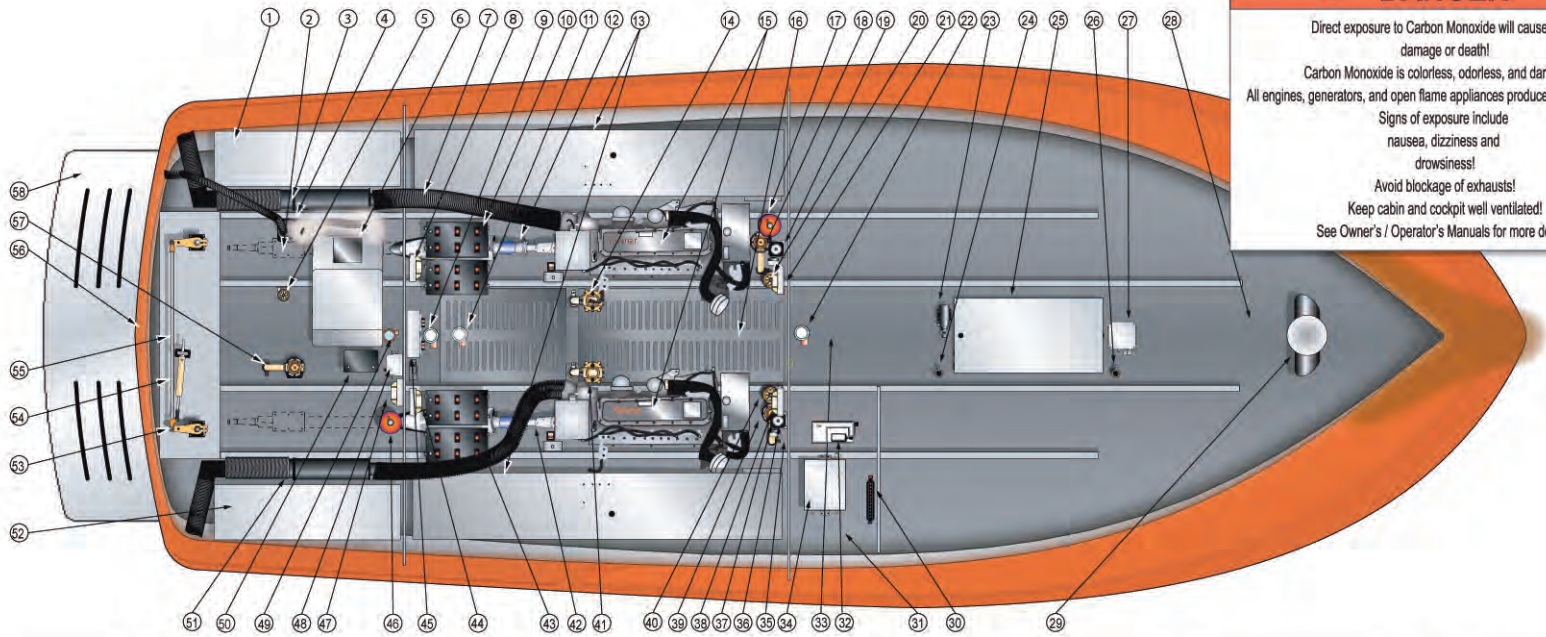
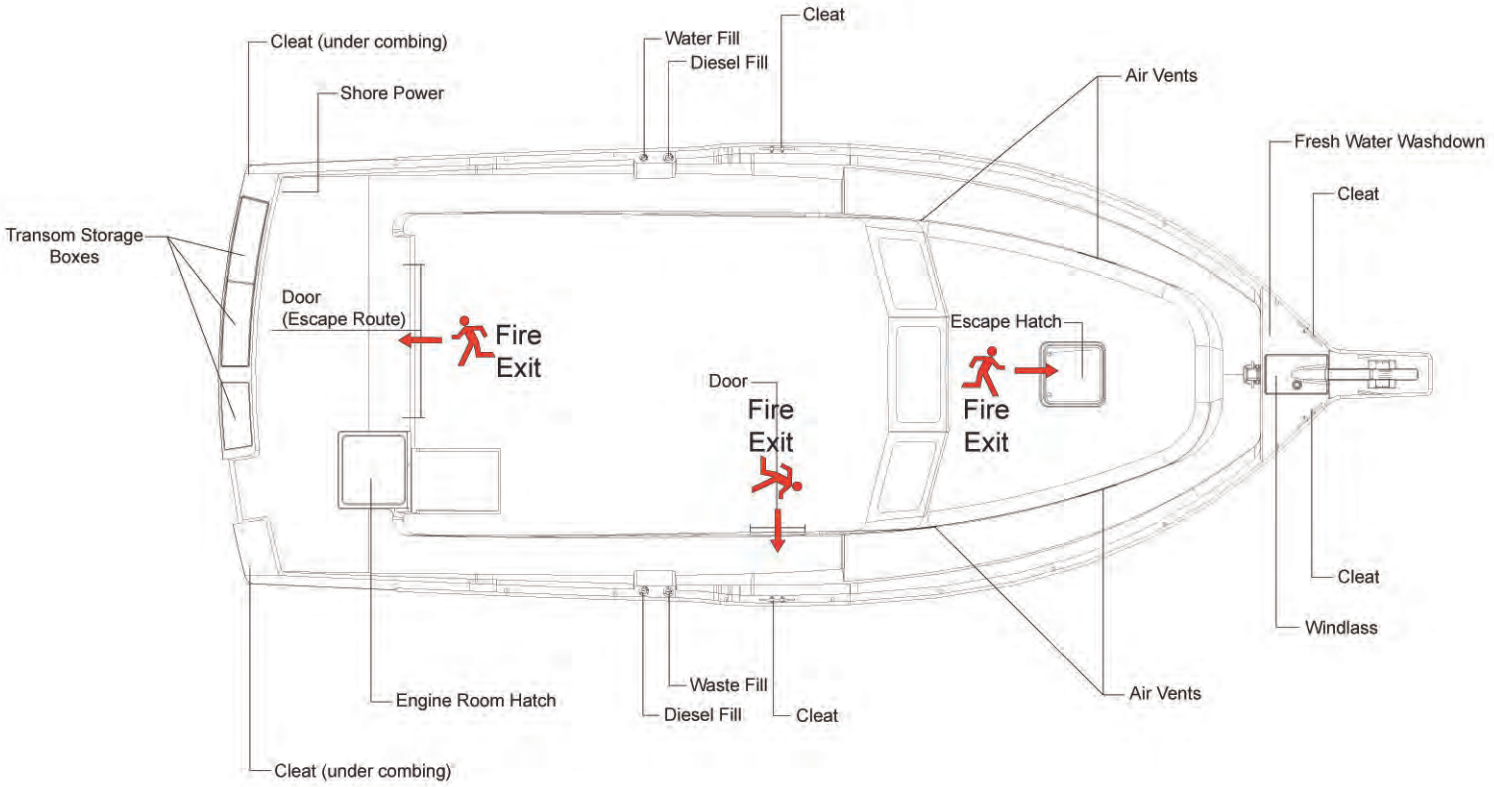


1. Port Water Tank	10. Engine Batteries	19. Raw Water Pump	28. A/C Compressor	37. Air Conditioning Pump	46. Halon	55. Tiller Arm
2. Strut	11. Mid Bilge Pump	20. Port Fuel Filter	29. Bow Thruster	38. Engine Room Light	47. Engine Room Light	56. Zinc Plate
3. Engine Muffler	12. Port Shaft Log	21. Engine Room Light	30. Fresh Water Manifold	39. A/C Intake/Strainer	48. Oil Changer	57. Generator Pickup/Stariner
4. Generator Muffler	13. Fuel Tanks	22. Fwd Bilge Pump	31. A/C Compressor	40. Stbd Fuel Filter	49. Aft Bilge Pump	58. Swim Platform
5. Generator Fuel Filter	14. Port Engine Pickup	23. Maverator Pump	32. Vacuum Generator (Option)	41. Stbd Engine Pickup	50. Generator Battery	
6. Generator	15. Engines	24. Overboard Discharge	33. Keel	42. Stbd Shaft Log	51. Engine Muffler	
7. Port Fuel Supply Valve	16. Engine Room Grate*	25. Waste Tank	34. Water Heater	43. Inverter Batteries (Option)	52. Stbd water Tank	
8. Engine Room Light	17. Halon	26. Head Pickup	35. Fresh Water Accumulator	44. Engine Room Light	53. Rudder Assembly	
9. Emergency Bilge Pump	18. Raw Water Strainer	27. Shower Sump	36. Fresh Water Pump	45. Battery Switch	54. Steering Ram	

* The engine room grate has been illustrated as being semi-transparent so that the viewer may see underlying systems or parts.

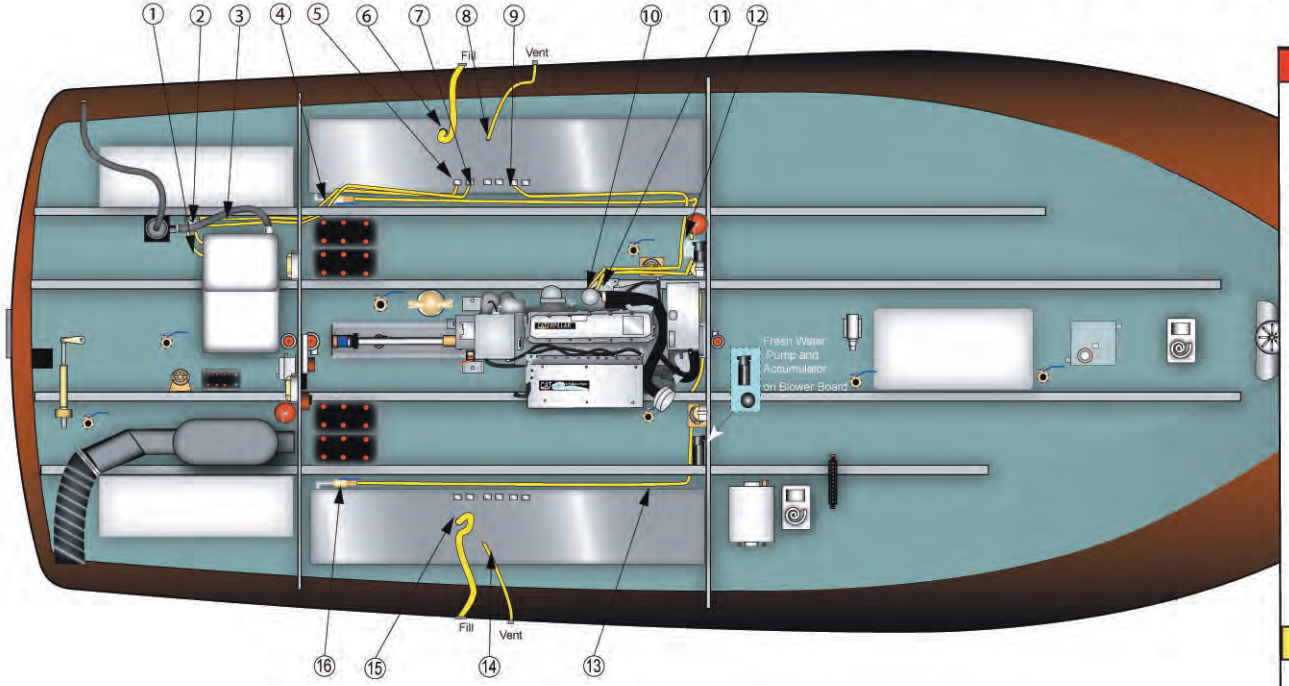
Mainship 40 Trawler Single & Twin

Deck Arrangement



NOTE: Fire escapes shown in this illustration, are intended to be shown as an escape from an inside, enclosed area.

Mainship 40 Trawler Single



1. Generator Supply	9. Engine Return
2. Generator Return	10. Engine Supply from Filter
3. Generator Fuel Filter	11. Engine Return to Tank
4. Fuel Filter Valve	12. Fuel Filter
5. Generator Supply	13. Stbd Main Supply Line
6. Fuel Fill	14. Vent
7. Generator Return	15. Fuel Fill
8. Vent	16. Stbd Supply Valve

⚠ DANGER ⚠

California Proposition 65

Diesel Engine Exhaust and some of it's components are known by the state of California to cause cancer, birth defects, and other reproductive harm.

Leaking fuel is a fire and explosion hazard. Avoid serious injury or death from fire or explosion.

NO SMOKING

Keep both sight gauge valves closed except when checking fuel level.

Do not mistake the water fill, waste pumpout, or even a rod holder for the Fuel Fill, ensure you are placing fuel in the correct deck fitting.

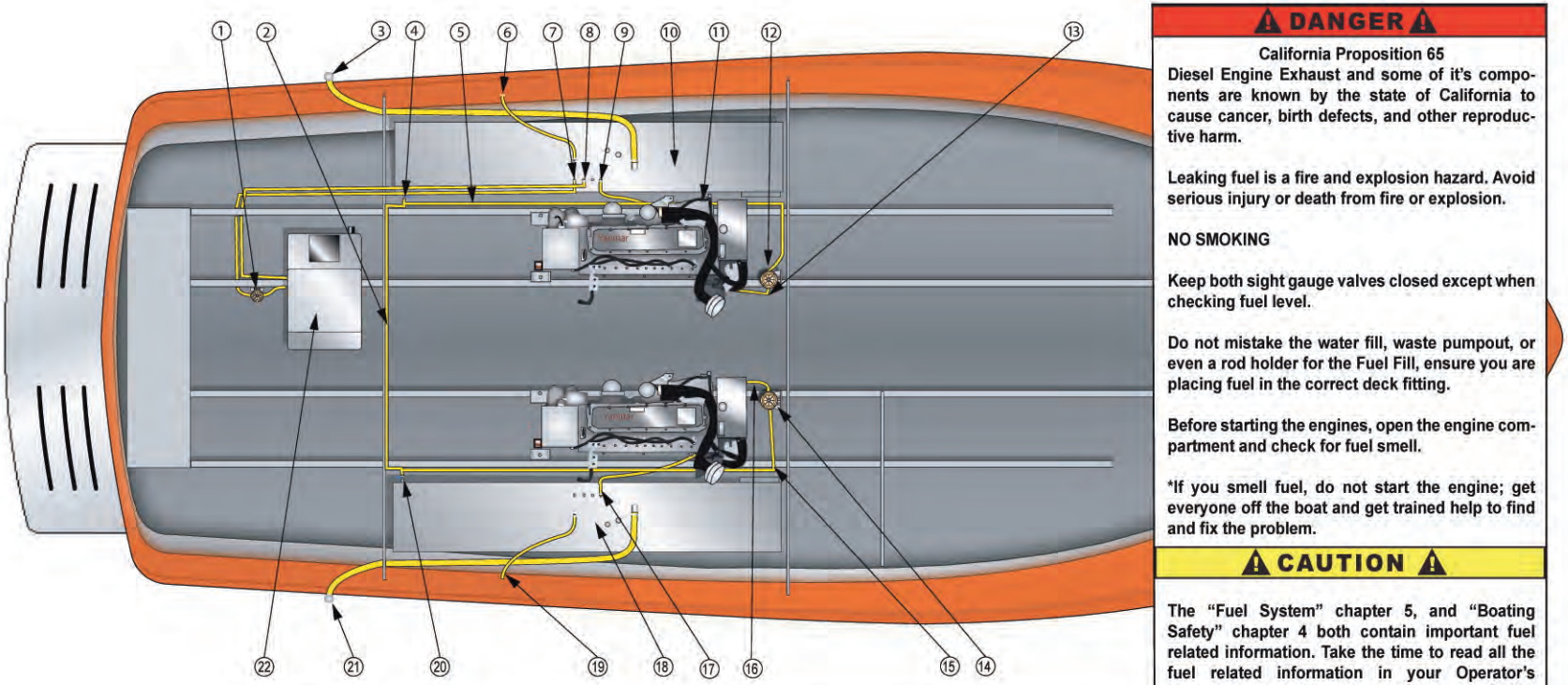
Before starting the engines, open the engine compartment and check for fuel smell.

***If you smell fuel, do not start the engine; get everyone off the boat and get trained help to find and fix the problem.**

⚠ CAUTION ⚠

The "Fuel System" chapter 5, and "Boating Safety" chapter 4 both contain important fuel related information. Take the time to read all the fuel related information in your Operator's Manual, Owner's Manual, as well as the O.E.M. manuals.

Mainship 40 Trawler Twin



1. Generator Fuel Filter	7. Generator Fuel Supply	13. Fuel Supply to Port Engine	19. Stbd Fuel Vent
2. Crossover Line	8. Generator Fuel Return	14. Stbd Fuel Filter	20. Stbd Fuel Supply Valve
3. Port Fuel Fill	9. Port Engine Fuel Return	15. Stbd Fuel Supply	21. Stbd Fuel Fill
4. Port Fuel Supply Valve	10. Port Fuel Tank	16. Fuel Supply from Filter	22. Generator
5. Port Fuel Supply Line	11. Port Engine	17. Stbd Engine Return	
6. Port Fuel Vent	12. Port Fuel Filter	18. Stbd Fuel Tank	

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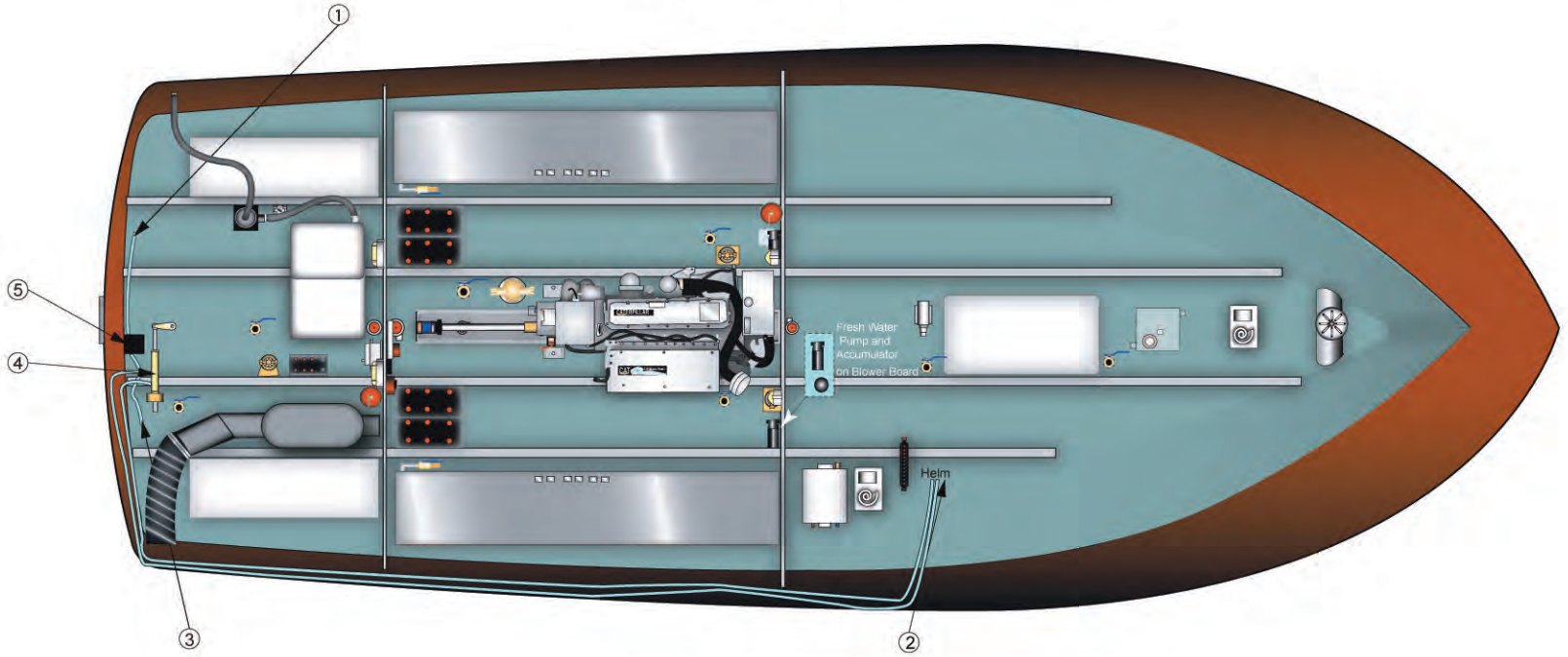
Mainship 40 Trawler Single

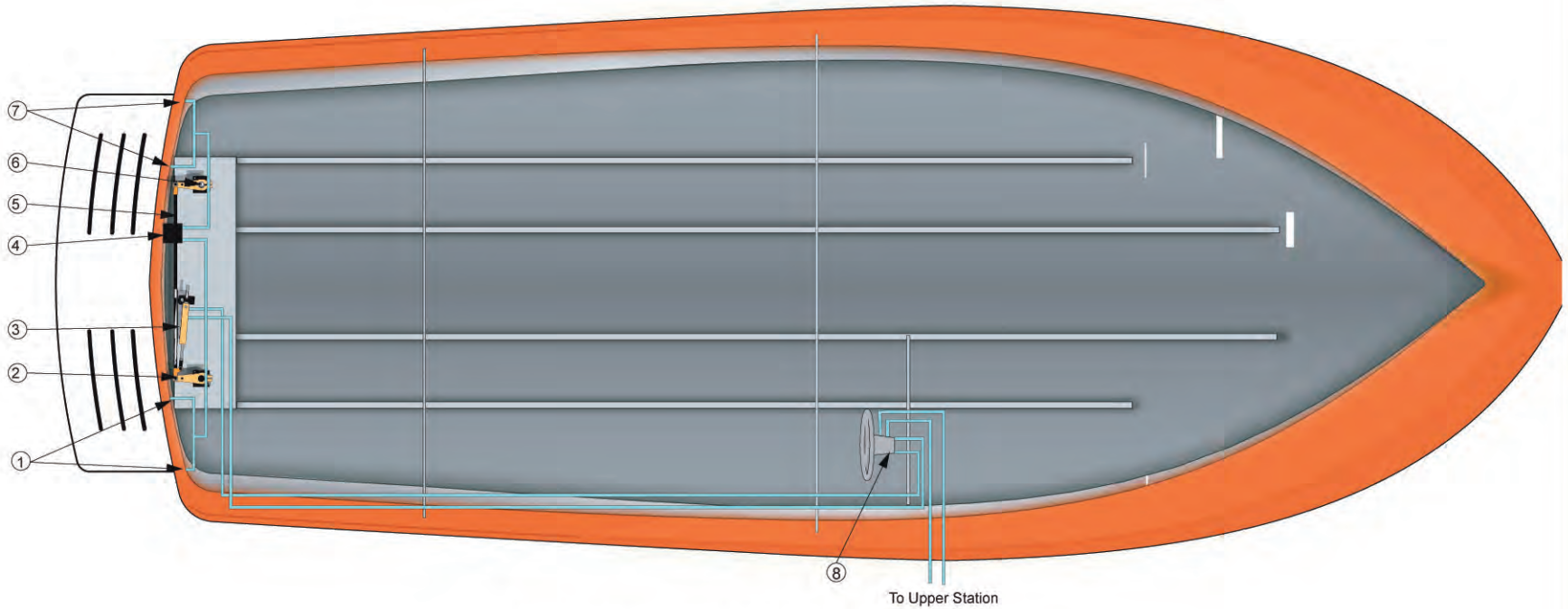
Hydraulic System



1. Trim Tab
2. Steering
3. Trim Tab
4. Steering Ram
5. Trim Tab Pump

Mainship 40 Trawler Twin

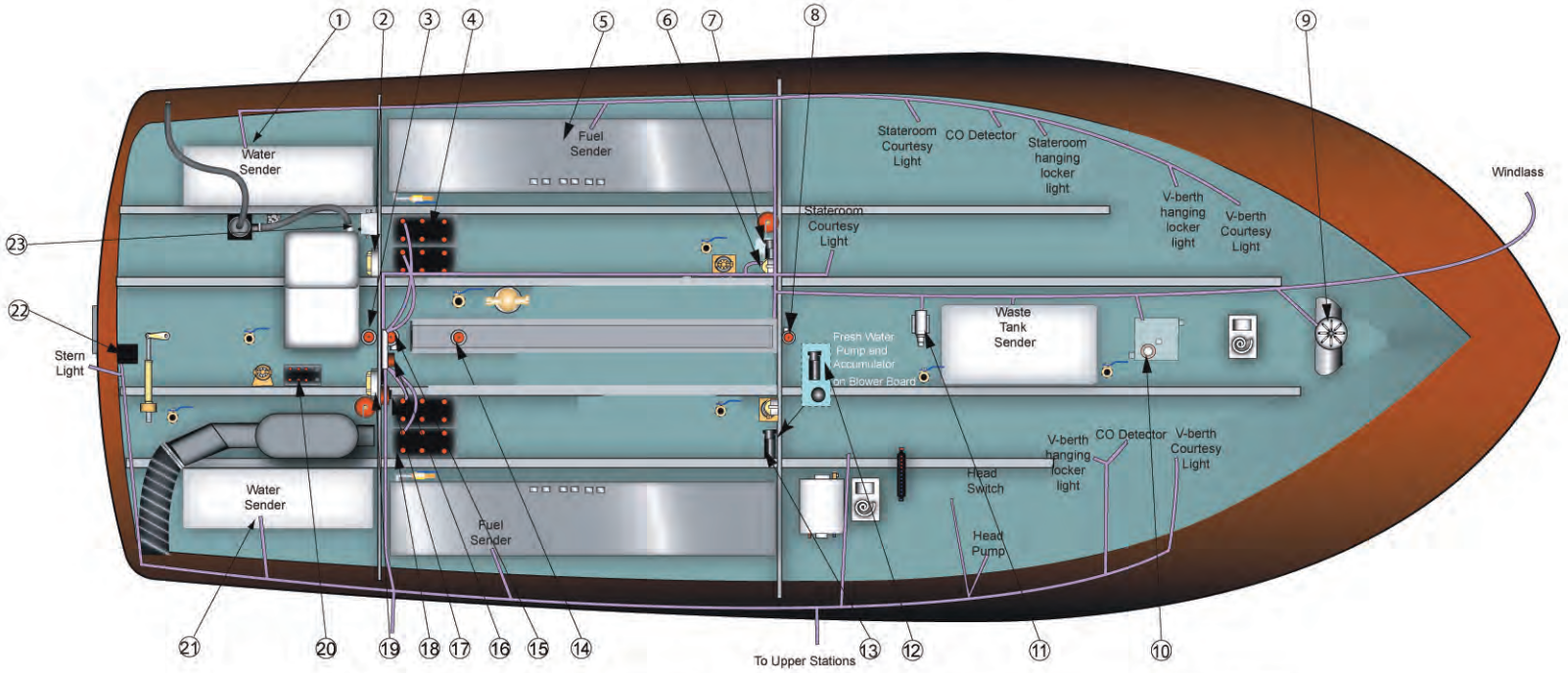
Hydraulic System



1. Stbd Trim Tab Lines	5. Tie Rod
2. Stbd Tiller Arm	6. Port Tiller Arm
3. Steering Ram	7. Port Trim Tab Lines
4. Trim Tab Pump	8. Steering Hyraulic Pump

Mainship 40 Trawler Single

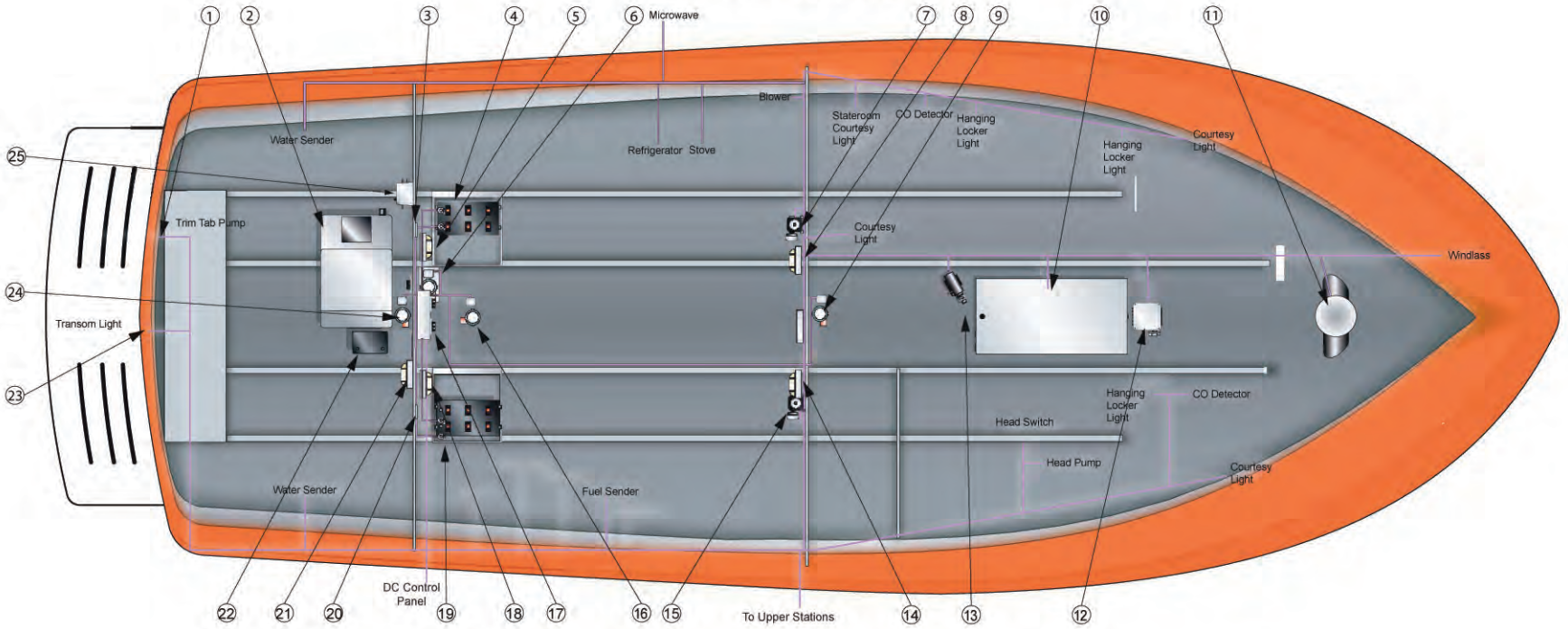
DC Electric System



1. Fresh Water Sender	7. Raw Water Pump	13. Air Conditioner Pump	19. Engine Room Light
2. Generator Set Light	8. Fwd Bilge Pump	14. Mid Bilge Pump	20. Gen Set Battery
3. Aft Bilge Pump	9. Bow Thruster	15. Emergency Bilge Pump	21. Fresh Water Sender
4. Main Batteries	10. Shower Sump	16. Battery Switch Panel	22. Trim Tab Pump
5. Fuel Tank Sender (Port)	11. Macerator	17. Battery Inverter Switch	23. Oil Changer
6. Engine Room Light	12. Fresh Water Pump	18. Inverter Battery	

Mainship 40 Trawler Twin

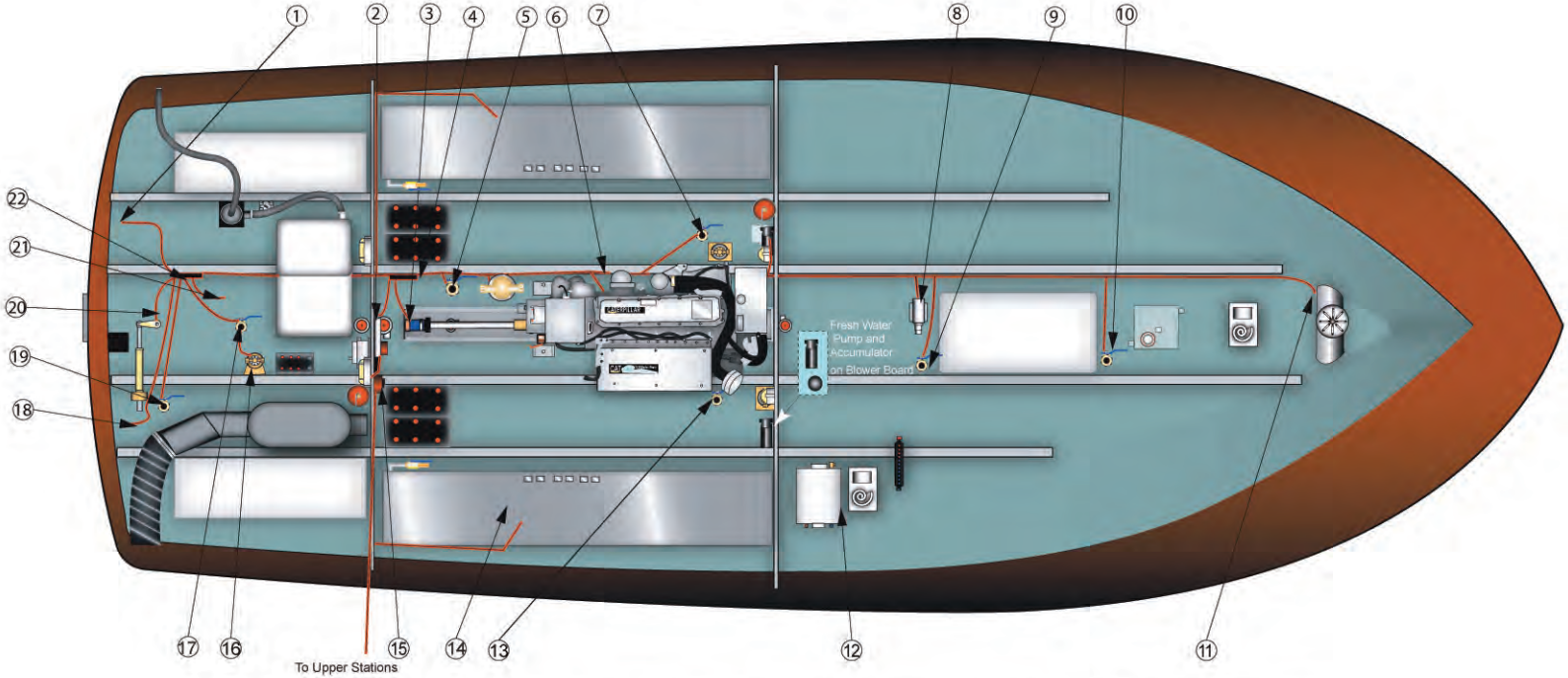
DC Electric System



1. Trim Tab Pump	7. Raw Water Pump	13. Macerator	19. Batteries	25. Oil Changer
2. Generator	8. Engine Room Light	14. Engine Room Light	20. Grounding Block	
3. Grounding Block	9. Fwd Bilge Pump	15. Fresh Water Pump	21. Gen Set Light	
4. Main Batteries	10. Waste Tank Sender	16. Mid Bilge Pump	22. Gen Set Battery	
5. Engine Room Light	11. Bow Thruster	17. Battery Switch Panel	23. Trim Tab Pump	
6. Emergency Bilge Pump	12. Shower Sump	18. Engine Room Light	24. Aft Bilge Pump	

Mainship 40 Trawler Single

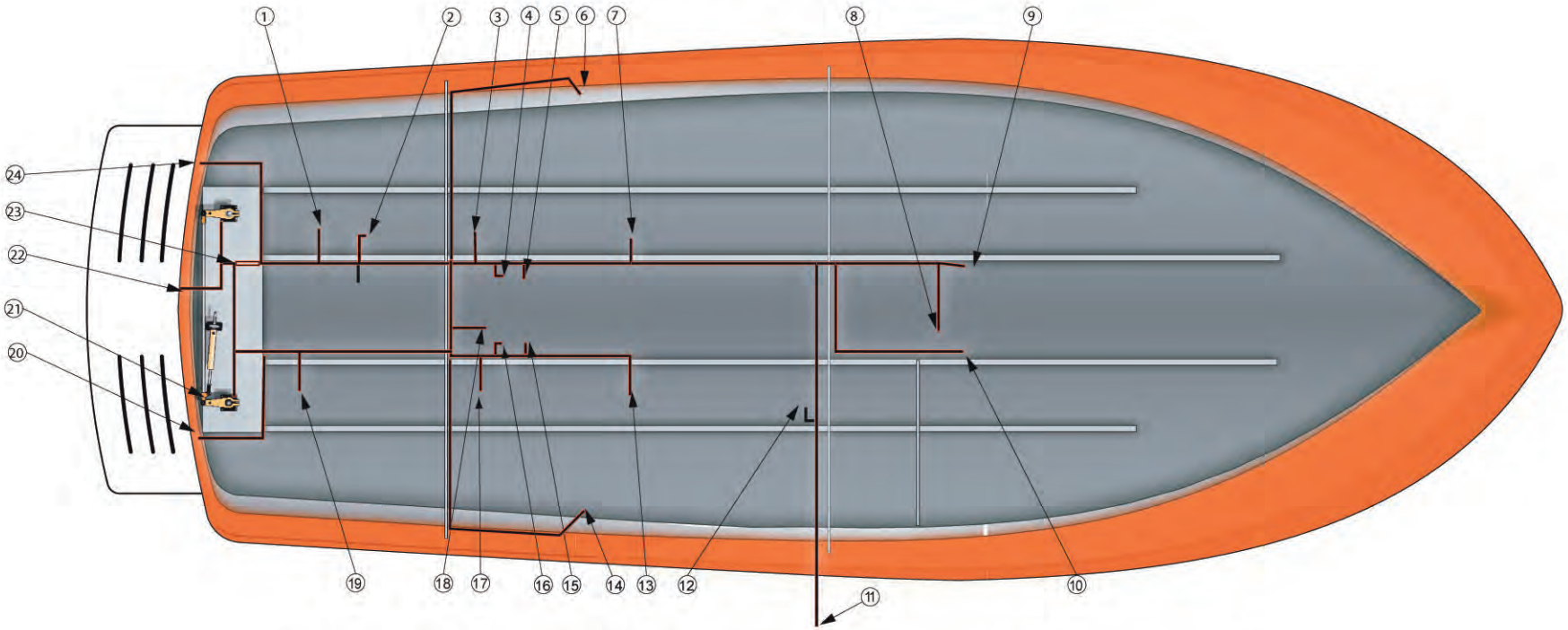
Bonding System



1. Trim Tab	7. Raw Water Intake	13. Air Conditioning Pickup	19. Muffler Cooling Pickup
2. Battery Switch	8. Macerator	14. Fuel Tanks	20. Rudder Assembly
3. Shaft Log	9. Overboard Discharge	15. Inverter Selector	21. Drain Plug
4. Grounding Block	10. Head Pickup	16. Generator Strainer	22. Grounding Block
5. Main Engine Sea Cock	11. Bow Thruster	17. Generator Pickup	
6. Engine Ground	12. Water Heater	18. Trim Tab	

Mainship 40 Trawler Twin

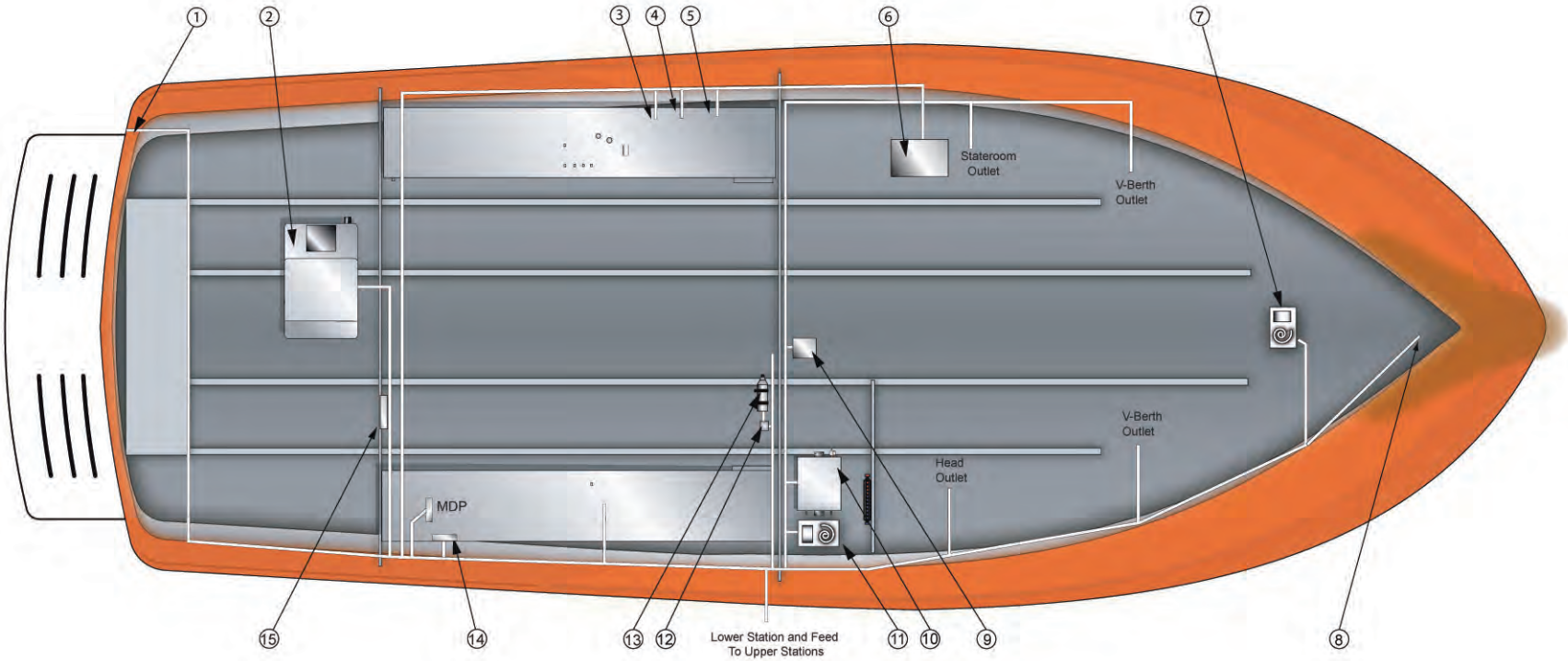
Bonding System



1. Strut	7. Engine Port	13. Engine Stbd	19. Strut
2. Gen Set	8. Overboard Discharge	14. Fuel Tank	20. Trim Tab Stbd
3. Shaft Log Port	9. Macerator	15. Engine Strainer Stbd	21. Rudder Assembly
4. Engine Pickup Port	10. Head Pickup	16. Engine Pickup Stbd	22. Zinc Plate
5. Engine Strainer Port	11. To Upper Station	17. Shaft Log Stbd	23. Ground Block
6. Fuel Tank Port	12. AC Pickup	18. Garboard Drain	24. Trim Tab Port

Mainship 40 Trawler Single & Twin

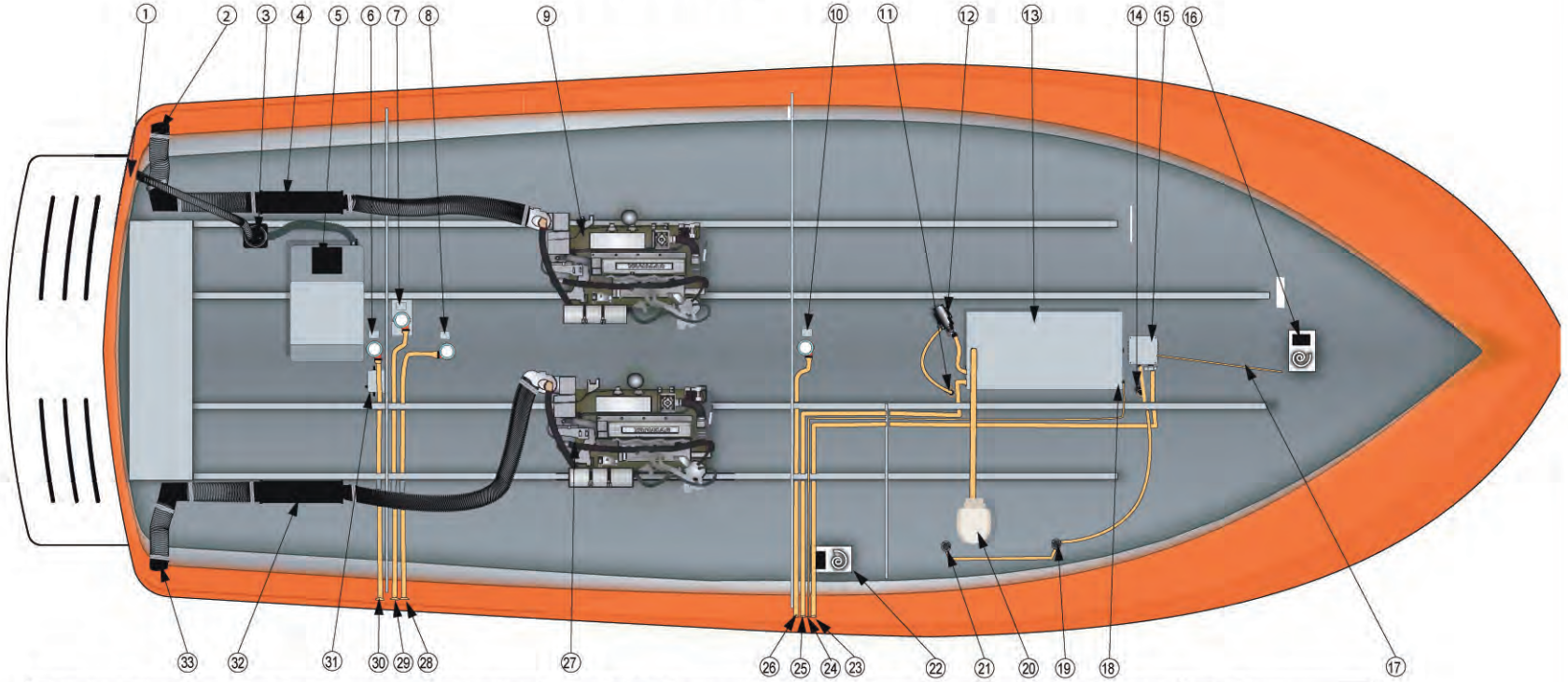
AC Electric System



1. Aft Shore Power	5. Stove	9. Vacuum	13. A/C Pump
2. Generator	6. Fwd Shore Power	10. Water Heater	14. Inverter
3. Microwave	7. Air Conditioner	11. Air Condintioner	15. Battery Charger
4. Refrigerator	8. Fwd Shore Power	12. A/C Pump Relay	

Mainship 40 Trawler Twin

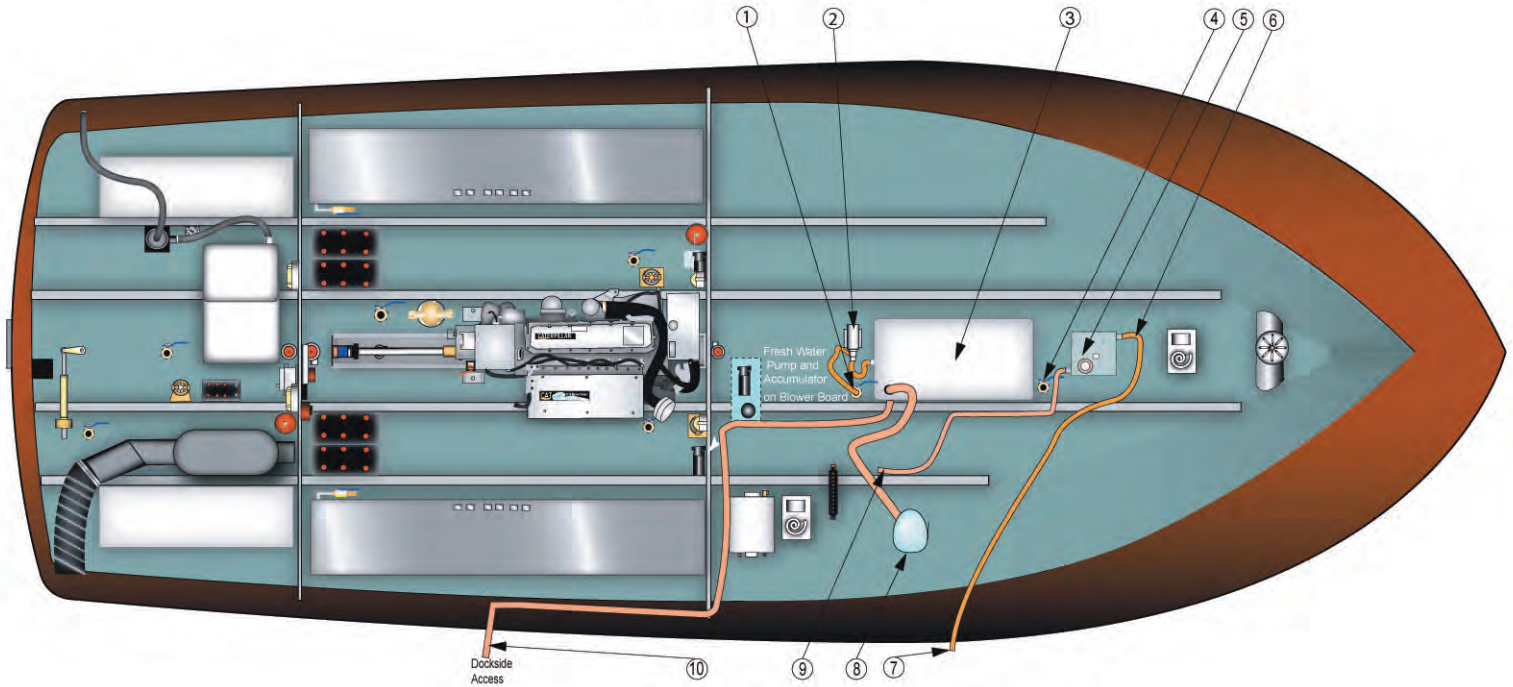
Waste System



1. Generator Exhaust Output	6. Aft Bilge Pump	11. Overboard Discharge	16. A/C Compressor	21. Head Pan Drain	26. Fwd Bilge Overboard	31. Oil Changer
2. Port Engine Exhaust	7. Emergency Bilge Pump	12. Macerator	17. A/C Drain	22. A/C Compressor	27. Stbd Engine	32. Stbd Engine Muffler
3. Generator Muffler	8. Mid Bilge Pump	13. Waste Tank	18. Waste Tank Vent	23. Shower Sump Overboard	28. Mid Bilge Overboard	33. Stbd Engine Exhaust
4. Port Engine Muffler	9. Port Engine	14. Head Pick-Up	19. Shower Drain	24. Waste Tank Vent	29. Emergency Bilge Pump	
5. Generator	10. Fwd Bilge Pump	15. Shower Sump Pump	20. Toilet	25. Waste Tank Pumpout	30. Aft Bilge Overboard	

Mainship 40 Trawler Single

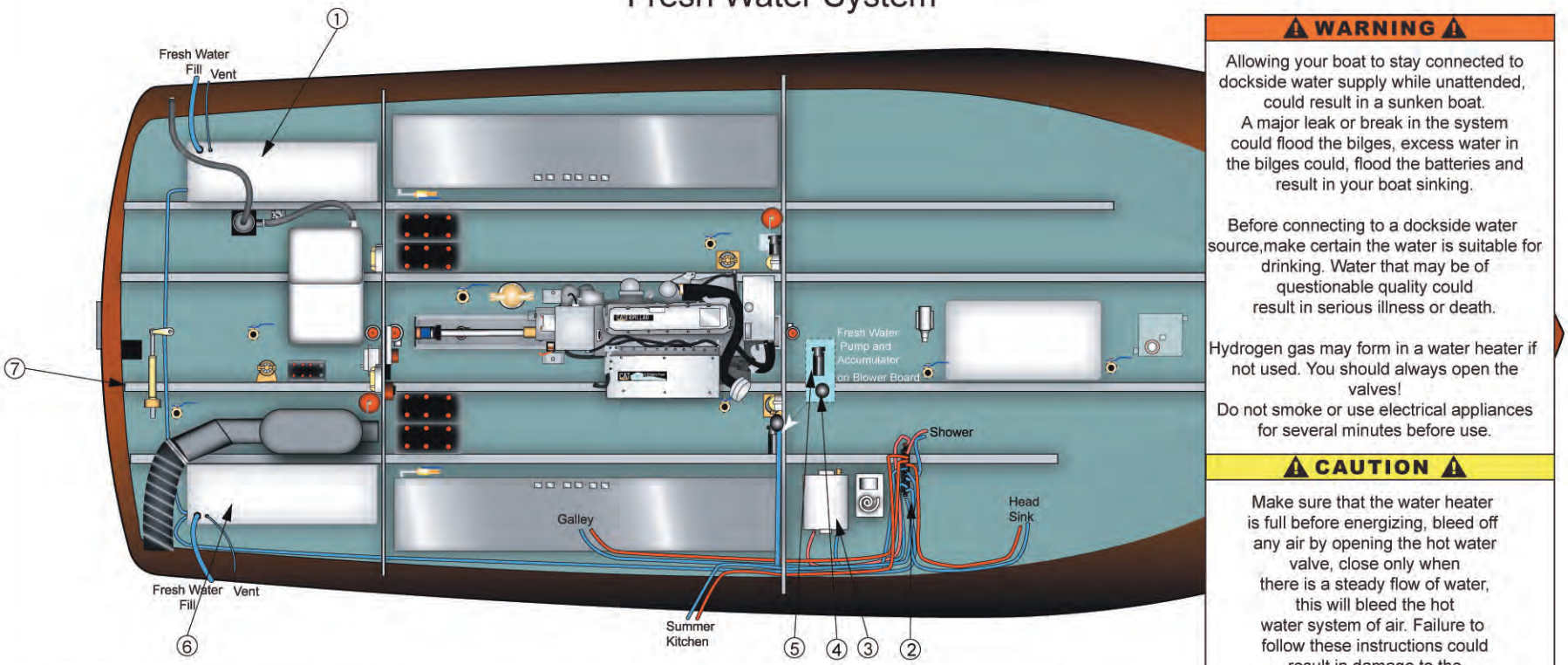
Waste System



1. Overboard Drain	6. Shower Sump Drain
2. Macerator Pump	7. Shower Sump Overboard
3. Waste Tank	8. Toilet
4. Head Pickup	9. Shower Drain
5. Shower Sump	10. Dock Pump Out Access

Mainship 40 Trawler Single

Fresh Water System



⚠ WARNING ⚠

Allowing your boat to stay connected to dockside water supply while unattended, could result in a sunken boat.
A major leak or break in the system could flood the bilges, excess water in the bilges could, flood the batteries and result in your boat sinking.

Before connecting to a dockside water source,make certain the water is suitable for drinking. Water that may be of questionable quality could result in serious illness or death.

Hydrogen gas may form in a water heater if not used. You should always open the valves!
Do not smoke or use electrical appliances for several minutes before use.

⚠ CAUTION ⚠

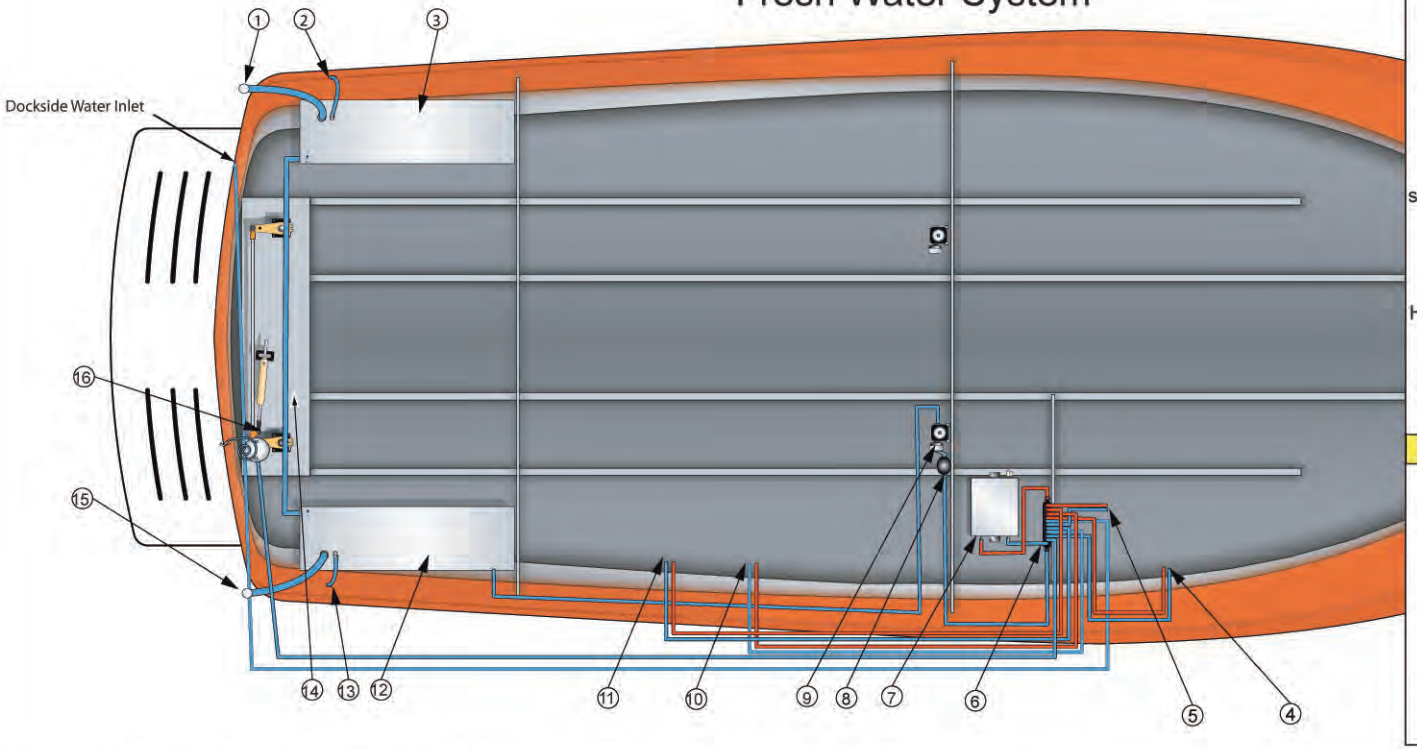
Make sure that the water heater is full before energizing, bleed off any air by opening the hot water valve, close only when there is a steady flow of water, this will bleed the hot water system of air. Failure to follow these instructions could result in damage to the heating elements in your water heater.

NOTE: ALL WATER LINES ARE 15 mm TUBING, TANK VENT HOSES ARE 3/4" (19mm) SHIELDVAC AND TANK FILL HOSE IS 1 1/2" (38mm) SHIELDVAC.

1. Port Fresh Water Tank (59 Gal)	5. Fresh Water Pump
2. Fresh Water Manifold	6. Stbd Fresh Water Tank (59 Gal)
3. Water Heater	7. Fresh Water Washdown (Located on Flybridge Stairs)
4. Accumulator	

Mainship 40 Trawler Twin

Fresh Water System



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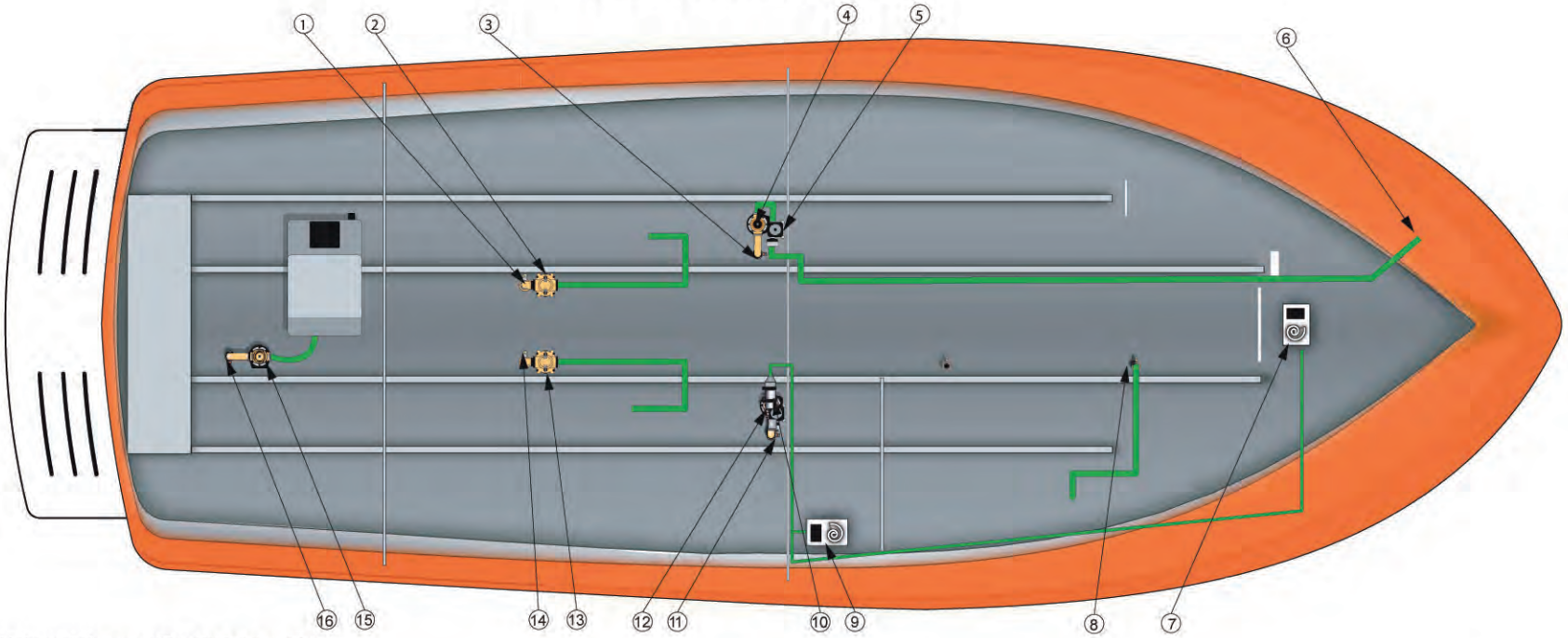
NOTE: ALL WATER LINES ARE 15mm TUBING, TANK VENT HOSES ARE 3/4" (19mm) SHIELDVAC AND TANK FILL HOSE IS 1 1/2" (38mm) SHIELDVAC.

1.Port Fresh Water Fill	5. Shower	9. Fresh water Pump	13. Stbd Fresh Water Vent
2. Port Fresh Water Vent	6. Fresh Water Manifold	10. Fresh Water to Summer Kitchen	14. Fresh Water Crossover
3. Port Fresh Water Tank (59 Gal)	7. Water Heater	11. Fresh Water to Galley	15. Stbd Fresh Water Fill
4. Head Sink	8. Accumulator	12. Stbd Fresh Water Tank (59 Gal)	16. Fresh Water Washdown (Located on Flybridge Stairs)

Mainship 40 Trawler Twin

Raw Water System

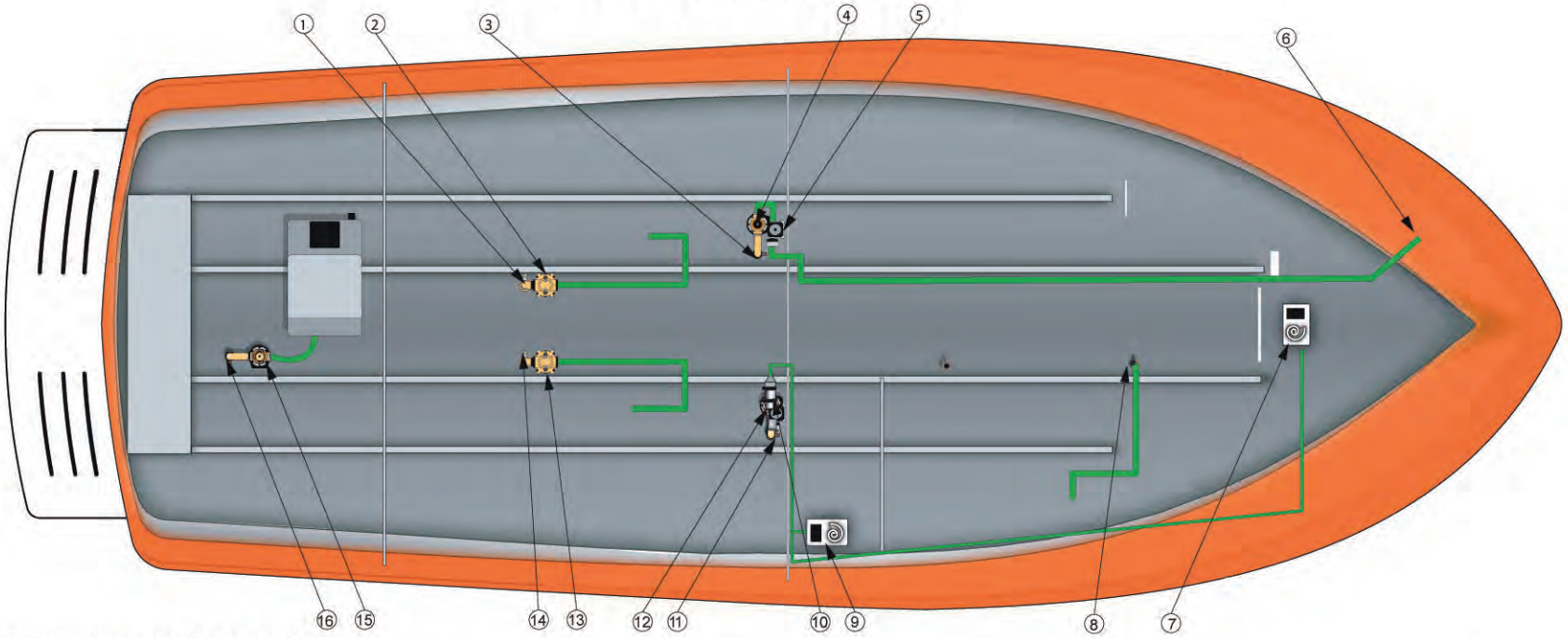


*Note: You should always drain your muffler prior to transporting.

1. Port Engine Intake 2" (5.1cm) Ball Valve with Thru Hull	5. Raw Water Pump	9. A/C Compressor 10K BTU	13. Stbd Engine Strainer 2" (5.1cm)
2. Port Engine Strainer 2" (5.1cm)	6. Raw Water Washdown	10. A/C Pump	14. Stbd Engine Intake 2" (5.1cm) Ball Valve with Thru Hull
3. Raw Water Intake 3/4" (1.9cm) Ball Valve with Thru Hull	7. A/C Compressor (Fwd) 10K BTU	11. A/C Intake 3/4" (1.9cm) Ball Valve with Thru Hull	15. Generator Strainer 1" (2.54cm)
4. Raw Water Strainer 3/4" (1.9cm)	8. Head Pick-Up	12. A/C Strainer 3/4" (1.9cm)	16. Generator Intake 1" (2.54cm) Ball Valve with Thru Hull

Mainship 40 Trawler Twin

Raw Water System



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1. Port Engine Intake 2" (5.1cm) Ball Valve with Thru Hull	5. Raw Water Pump	9. A/C Compressor 10K BTU	13. Stbd Engine Strainer 2" (5.1cm)
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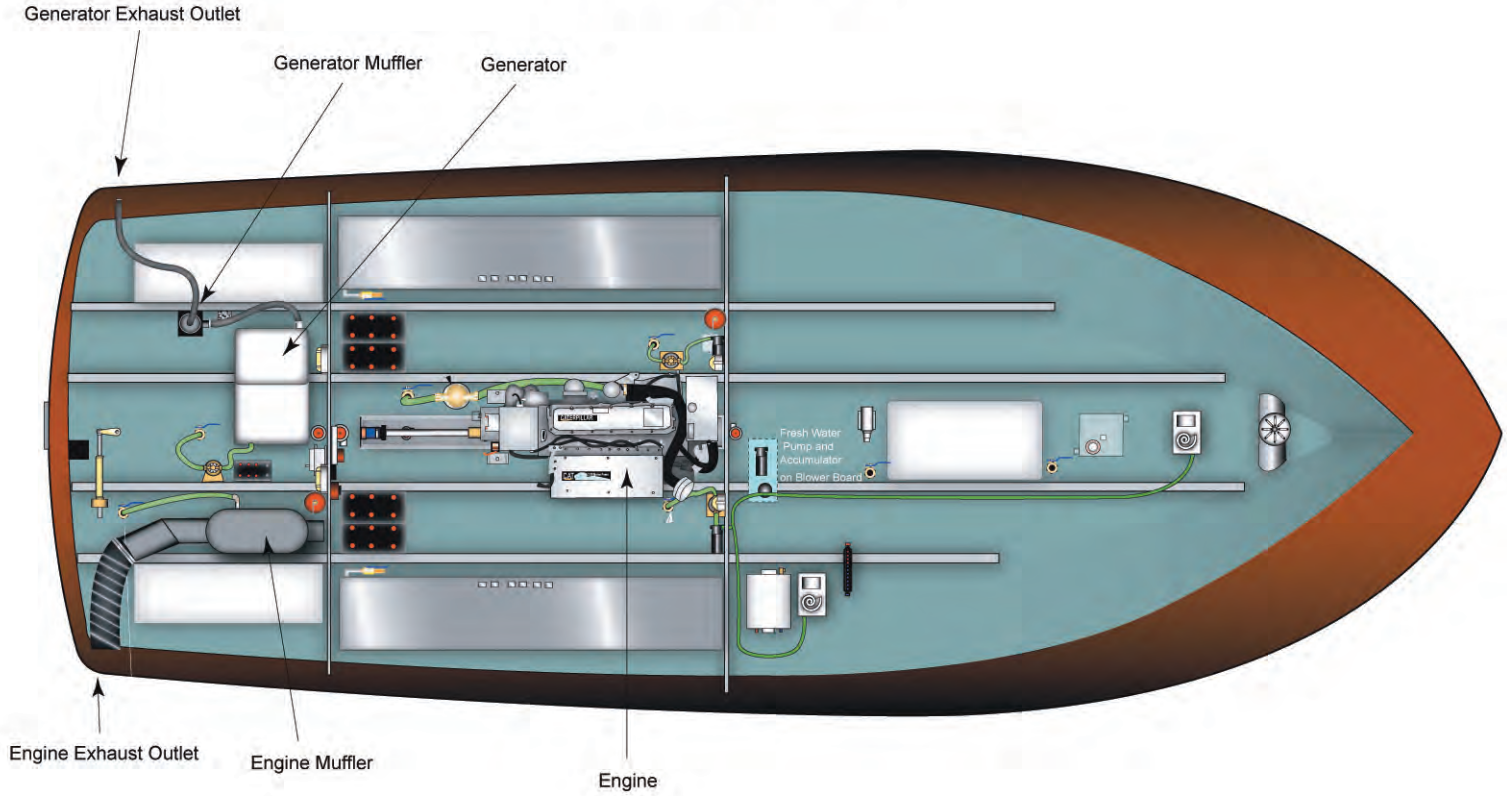
3. Raw Water Intake 3/4" (1.9cm) Ball Valve with Thru Hull	7. A/C Compressor (Fwd) 10K BTU	11. A/C Intake 3/4" (1.9cm) Ball Valve with Thru Hull	15. Generator Strainer 1" (2.54cm)
4. Raw Water Strainer 3/4" (1.9cm)	8. Head Pick-Up	12. A/C Strainer 3/4" (1.9cm)	16. Generator Intake 1" (2.54cm) Ball Valve with Thru Hull

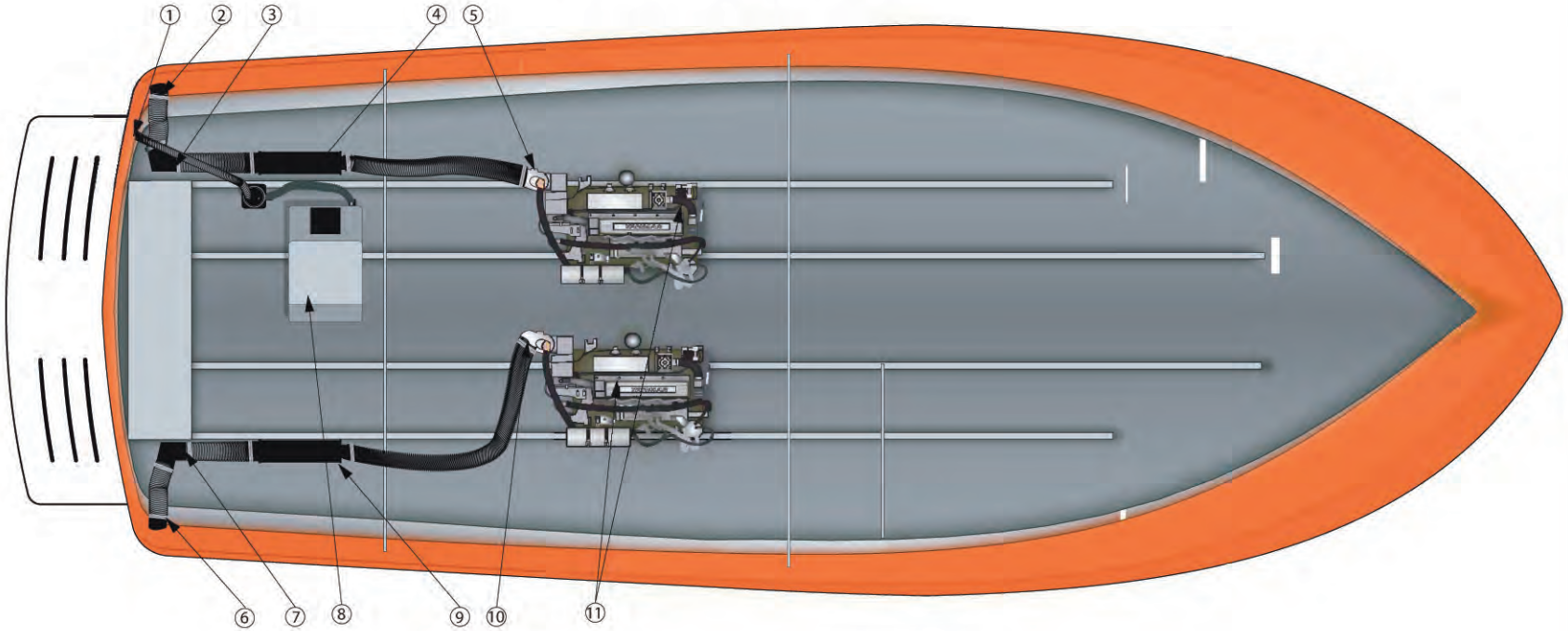
Mainship 40 Trawler Single

Exhaust System



Mainship 40 Trawler Twin

Exhaust System



1. Generator Exhaust Overboard	7. Exhaust Hose
2. Port Engine Exhaust Overboard	8. Generator
3. Exhaust Hose	9. Stbd Engine Muffler
4. Port Engine Muffler	10. Stbd Engine Riser
5. Port Engine Riser	11. Engines
6. Stbd Engine Exhaust Overboard	