

Mainship

TRAWLERS

AN EMPLOYEE OWNERSHIP COMPANY

Operator's Manual

30 Pilot TM



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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.

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.

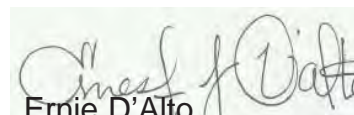
This Operator's Manual will acquaint you with the proper operation and maintenance of your new Mainship boat, as well as boating safety, which is our primary concern, whether in ports or at sea.

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 G.M.

A handwritten signature in dark ink, appearing to read "Ernie D'Alto", is written over a light green rectangular background.

Ernie D'Alto
General Manager

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

Mainship Corporation, is one of America's oldest privately held boating companies. In February 1996 Mainship became an employee ownership company. We continue to be dedicated to giving you a quality boat 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 boating.

A Proud Heritage

With every Mainship, three generations of experience combine with modern engineering and production techniques provide you one of the most affordable, full featured fishing boats in the industry today.

From the tower to the transom door, every piece of equipment and its placement has been engineered to provide the most seasoned angler with the best advantage on the water. Mainship has included everything but the tackle to make ours the most complete sport fish on the market today. Bait prep and rigging stations, washdown, rod holders, rocket launcher's, and a complete package of Coast Guard approved safety equipment will get you out to the blue-water action without a lot of extra cost

How to Use this Manual

Many people read their Operator's Manual from beginning to end when they first receive their new boat. If you do this, it will help you to learn about the features and controls on your new boat. In this manual, you'll find that pictures, illustrations 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 Boating Safety section 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 hazards are. Then we'll 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.

Any questions regarding your Mainship ® or this manual contact Customer Service at:

Mainship Corporation
255 Diesel Rd.
St. Augustine, FL. USA 32084
Phone: (904) 827-2055
Fax: (904) 827-2152
[http: // www.Mainship.com](http://www.Mainship.com)
email: info@Mainship.com

Operator's Manual at a Glance

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3. Warranty

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Mainship[®]

TRAWLERS

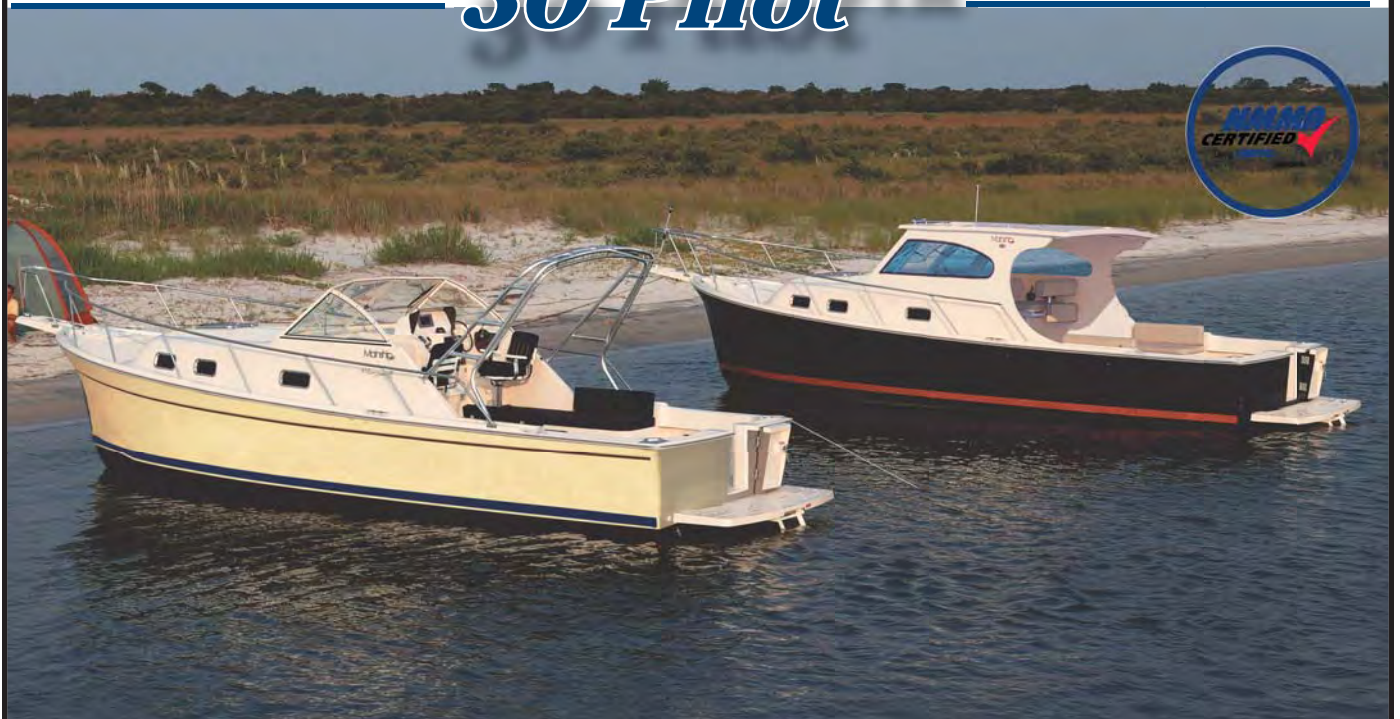
AN EMPLOYEE OWNERSHIP COMPANY

Chapter 2

Documents

Forms

30 Pilot[™]



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 Manufacturers 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



PRE-DELIVERY SERVICE RECORD

255 DIESEL ROAD • ST. AUGUSTINE, FLORIDA 32086 USA
800-578-0852 • FAX 904-827-2156

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 _____	Model: _____ H.P. _____
Gear S/N P _____ S _____	Gear Ratio _____ Brand _____
Generator S/N _____	Generator Size _____ Brand _____

Dealer Complete Each Item, Check and Initial with Customer Present

<p style="text-align: center;"><u>Before Launch Procedure</u></p> <ol style="list-style-type: none"> 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. Muffler Plugs in _____ 11. Engine oil levels P _____ S _____ 12. Engine coolant levels P _____ S _____ 13. Generator oil (if applicable) _____ 14. Generator coolant (if applicable) _____ 15. Transmission oil levels P _____ S _____ 16. Transmission/Shaft couplings bolted (Loose) _____ 17. Visual checks: _____ A. Engine Hoses _____ B. Engine Belts _____ 18. Sea Cocks open _____ 19. Garboard drains in _____ 20. Splash Guards (shaft) _____ 21. Battery, Check Cables _____ <p style="text-align: center;"><u>In Water Checks</u></p> <ol style="list-style-type: none"> 1. Check for leaks _____ Engine intake hoses _____ Engine coolant _____ Engine exhaust _____ Stuffing boxes _____ Strut bolts _____ Rudder posts _____ Accessory through hulls and/or transducers _____ (See owners manual for locations) 2. Check and tighten all engine mounts _____ 3. Shaft/Coupling alignment _____ (Within .004) 	<p style="text-align: center;"><u>Systems Checks</u></p> <ol style="list-style-type: none"> 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 Power 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 _____ 14. Boat properly re-commissioned _____ 15. A/C operation _____ <p style="text-align: center;"><u>After Starting Engine</u></p> <ol style="list-style-type: none"> 1. Throttle, Shift operation _____ 2. Water flow from exhaust _____ 3. Oil pressure _____ P _____ S _____ 4. Engine visual checks _____ P _____ S _____ (Oil, water leaks) 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 9. All options function properly _____ <p style="text-align: center;"><u>Final Check</u></p> <ol style="list-style-type: none"> 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 FORM FILLED OUT _____ 6. OWNER HAS RECEIVED, READ AND _____ UNDERSTANDS WARRANTY AND _____ OWNERSHIP RESPONSIBILITIES 7. BOAT PROPERLY CLEANED, _____ INTERIOR AND EXTERIOR 8. QUICK OVERVIEW OF OWNERS MANUAL _____
--	--

DEALER SIGNATURE _____	DATE _____ 20__
OWNER SIGNATURE _____	DATE _____ 20__

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

Mainship 30 Pilot™ • Documents, and Forms

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. _____

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

[illegible]

Notes:

This image shows a full page of blank, lined paper. It features approximately 28 evenly spaced horizontal blue or grey lines across its entire width. The lines are uniform in thickness and spacing, providing a template for handwriting practice or general note-taking. There are no margins, text, or other markings present on the page.

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Mainship

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AN EMPLOYEE OWNERSHIP COMPANY

Chapter 3

Warranty

30 Pilot™



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LIMITED WARRANTY

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LIMITED WARRANTY

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**PRE-DELIVERY SERVICE RECORD**

255 DIESEL ROAD • ST. AUGUSTINE, FLORIDA 32086 USA

800-578-0852 • FAX 904-827-2156

**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 _____ | Model: _____ H.P. _____          |
| Gear S/N P _____ S _____   | Gear Ratio _____ Brand _____     |
| Generator S/N _____        | Generator Size _____ Brand _____ |

**Dealer Complete Each Item, Check and Initial with Customer Present**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. Muffler Plugs in \_\_\_\_\_
11. Engine oil levels P \_\_\_\_\_ S \_\_\_\_\_
12. Engine coolant levels P \_\_\_\_\_ S \_\_\_\_\_
13. Generator oil (if applicable) \_\_\_\_\_
14. Generator coolant (if applicable) \_\_\_\_\_
15. Transmission oil levels P \_\_\_\_\_ S \_\_\_\_\_
16. Transmission/Shaft coupling bolted (Loose) \_\_\_\_\_
17. Visual checks: \_\_\_\_\_
  - A. Engine Hoses \_\_\_\_\_
  - B. Engine Belts \_\_\_\_\_
18. Cock open \_\_\_\_\_
19. Garboard drains in \_\_\_\_\_
20. Splash Guards (shaft) \_\_\_\_\_
21. Battery \_\_\_\_\_

In Water Checks

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

Systems Check

1. Fuel tanks fill properly - No fuel leaks \_\_\_\_\_ or fittings \_\_\_\_\_
2. Water tanks fill properly \_\_\_\_\_
  - A. Fresh water system pressurized \_\_\_\_\_
  - holds pressure \_\_\_\_\_
  - B. Seals at fittings \_\_\_\_\_
3. Prop Shaft Power System \_\_\_\_\_
- 110 Generator Power System \_\_\_\_\_
- 110 Ships Systems \_\_\_\_\_
- 12 volt/dc Ships Systems \_\_\_\_\_
- Water Heater System \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_
11. All ext. doors and locks operate properly \_\_\_\_\_
12. All hatches, drawers, slides and hatches \_\_\_\_\_  
operate properly \_\_\_\_\_
- Entire boat hosed down, checked for \_\_\_\_\_  
inside leaks \_\_\_\_\_
14. Boat properly re-commissioned \_\_\_\_\_
15. A/C operation \_\_\_\_\_

After Starting Engine

1. Throttle, Shift operation \_\_\_\_\_
2. Water flow from exhaust \_\_\_\_\_
3. Oil pressure \_\_\_\_\_ P \_\_\_\_\_ S \_\_\_\_\_
4. Engine visual checks \_\_\_\_\_ P \_\_\_\_\_ S \_\_\_\_\_  
(Oil, water leaks)
5. Proper idle speed (Check mtg. \_\_\_\_\_  
recommendations)
6. Proper gauge readings \_\_\_\_\_
7. Gear shift works properly forward, \_\_\_\_\_  
reverse, neutral
8. Engine manufacturers specifications, \_\_\_\_\_  
max RPM
9. All options function properly \_\_\_\_\_

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 FORM FILLED OUT \_\_\_\_\_
6. OWNER HAS RECEIVED, READ AND \_\_\_\_\_  
UNDERSTANDS WARRANTY AND \_\_\_\_\_  
OWNERSHIP RESPONSIBILITIES
7. BOAT PROPERLY CLEANED, \_\_\_\_\_  
INTERIOR AND EXTERIOR
8. QUICK OVERVIEW OF OWNERS MANUAL \_\_\_\_\_

|                                                       |                   |
|-------------------------------------------------------|-------------------|
| DEALER SIGNATURE _____                                | DATE _____ 20____ |
| OWNER SIGNATURE _____                                 | DATE _____ 20____ |
| 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

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**

**LUHRS CORPORATION**  
 255 Diesel Road  
 St. Augustine, Florida 32086  
 904/829-0500  
 904/829-2605 - FAX

Year \_\_\_\_\_ Model \_\_\_\_\_ Hull # LHR \_\_\_\_\_  
 Power \_\_\_\_\_ Generator \_\_\_\_\_ Ignition Key # \_\_\_\_\_  
 LH# \_\_\_\_\_ Size \_\_\_\_\_  
 RH# \_\_\_\_\_ Serial # \_\_\_\_\_ Door Key # \_\_\_\_\_

Date Delivered to Dealer \_\_\_\_\_ Date Delivered to Customer \_\_\_\_\_

**OWNER**

Street \_\_\_\_\_  
 City & State \_\_\_\_\_ Zip Code \_\_\_\_\_  
 Phone: Home \_\_\_\_\_ Work \_\_\_\_\_ Fax \_\_\_\_\_  
 Boat Name \_\_\_\_\_ Location of Boat (Ship Code Only) \_\_\_\_\_

**DEALER**

Street \_\_\_\_\_  
 City & State \_\_\_\_\_ Zip Code \_\_\_\_\_  
 Phone \_\_\_\_\_ Fax # \_\_\_\_\_

**FINAL CHECKOUT**

- ☐ OWNER FAMILIARIZED WITH LUHRS WARRANTY & OWNERSHIP RESPONSIBILITIES.  
☐ OWNER FAMILIARIZED WITH DEALERSHIP WARRANTY AND SERVICE POLICIES.  
☐ OWNER RECEIVED LUHRS 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:**

- |                                               |                                                           |                                                  |
|-----------------------------------------------|-----------------------------------------------------------|--------------------------------------------------|
| <input type="checkbox"/> FUEL SYSTEM          | <input type="checkbox"/> DC ELECTRICAL SYSTEM             | <input type="checkbox"/> MAINTENANCE & UPKEEP    |
| <input type="checkbox"/> WATER SYSTEM         | <input type="checkbox"/> POWER PLANT & MECHANICAL SYSTEMS | <input type="checkbox"/> HANDLING & OPERATION    |
| <input type="checkbox"/> AC ELECTRICAL SYSTEM | <input type="checkbox"/> SAFETY SYSTEMS                   | <input type="checkbox"/> OWNER SPECIFIED OPTIONS |

**DEALER'S SIGNATURE** \_\_\_\_\_ **DATE** \_\_\_\_\_

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

**OWNER'S SIGNATURE** \_\_\_\_\_ **DATE** \_\_\_\_\_

The Luhrs Corporation Limited Warranty gives you specific rights. You may also have other rights which vary from state to state.

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

WHITE - LUHRS

YELLOW - DEALER

PINK - OWNER

Notes:

This image shows a full page of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page, typical of notebook paper. There are no margins, text, or other markings on the page.

# Mainship

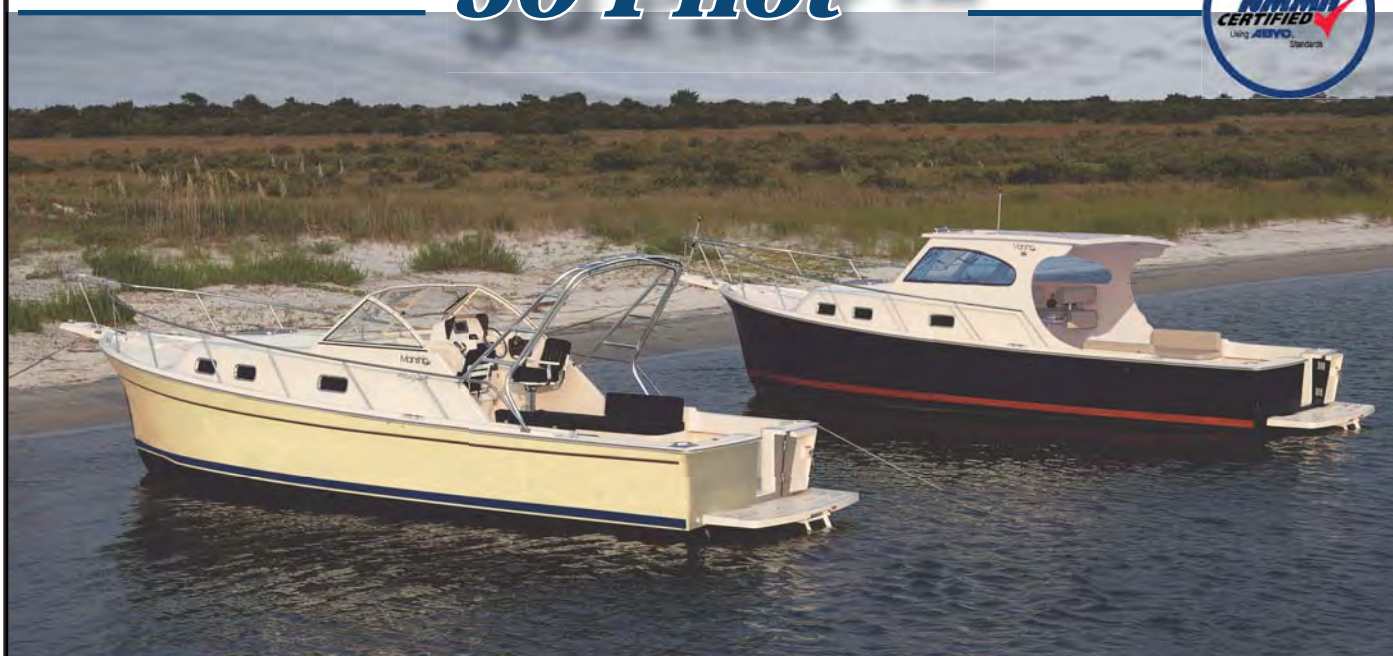
## TRAWLERS

AN EMPLOYEE OWNERSHIP COMPANY

*Chapter 4*

# *Boating Safety*

*30 Pilot <sup>TM</sup>*



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:



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



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



**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. On the following page, At the end of this chapter we show you 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:

- (2) 5/8” x 25’ Nylon Dock Lines
- (2) 5/8” x 36’ Nylon Deck Lines
- (1) Alert 12 Gauge Marine Signal Kit
- (2) Mariner 10 BC Fire Extinguishers
- (2) Stainless Anchor Shackles
- (1) 5/8” x 200’ Nylon Anchor Line
- (1) 5/16” x 5’ Galvanized Chain
- (6) Adult Form Life Vests (PID)
- (1) White Form Cushion
- (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
- VHF radio
- 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.

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## 4.2 Carbon Monoxide Hazard

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(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 MONOXIDE (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 lower 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 effects 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

# Know the Dangers!



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.

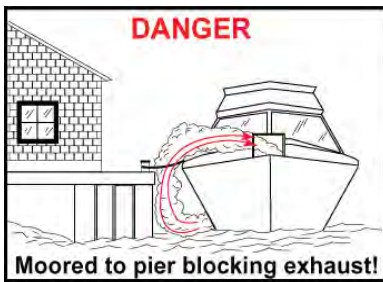
Slow speeds or idling in the water can cause carbon monoxide gas to accumulate in the cabin, cockpit, bridge, and aft deck, even in an open area. A tailwind (force of wind entering from aft section of the motorboat) can also increase accumulation.

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.

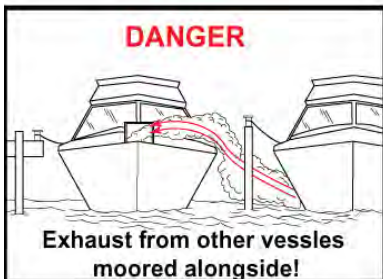
Teak surfing, dragging and water-skiing within 20 feet of a moving watercraft can be fatal.

D



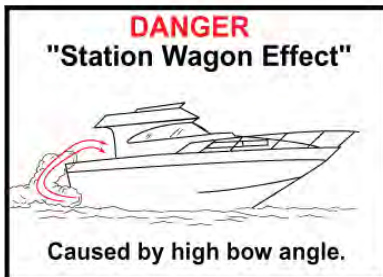
**Figure 4.3.** Blocked hull exhaust outlets near a pier, dock, seawall, bulkhead or any other structure can cause excessive accumulation of Carbon Monoxide gas with the cabin areas of your boat. Be certain hull exhaust outlets are not blocked in any way.

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



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

R

and receive a special purchase price, please contact our Customer Service Hotline at 1-800-248-2980.

#### 4.2.10 Carbon Monoxide Review

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.

| <b>! DANGER !</b> |                                   |                                                                                   |
|-------------------|-----------------------------------|-----------------------------------------------------------------------------------|
| 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 audible, 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 over 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.



**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 or Unconsciousness | 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



**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

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### 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.

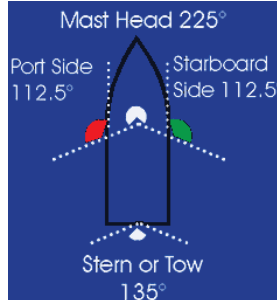
### 4.5.3 Running and Navigation Lights

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.

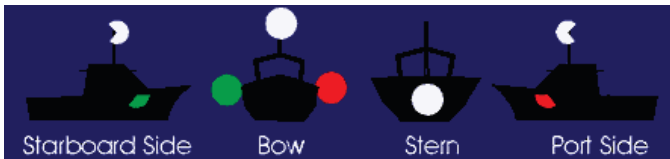
Operating at night can present some special challenges. Not only is your depth perception lessened, bright lights on the shore can cast misleading reflections on the water and if you wear glasses, or worse yet, bifocals, you simply don't see as well at night as you do during the day. It is not only important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

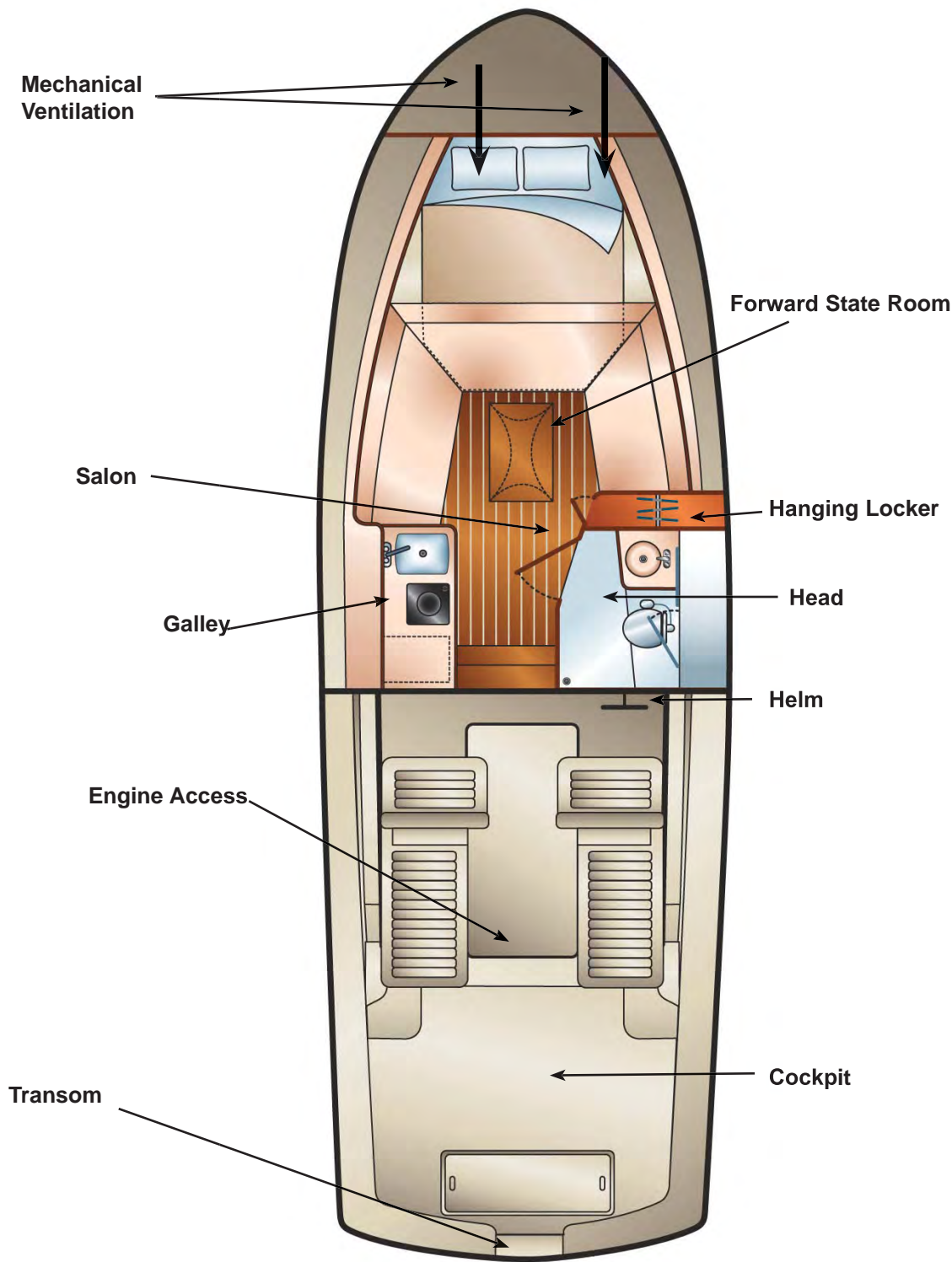
When boating at night, remember the following: "When two lights you see ahead, turn your helm and show your red."

#### 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:

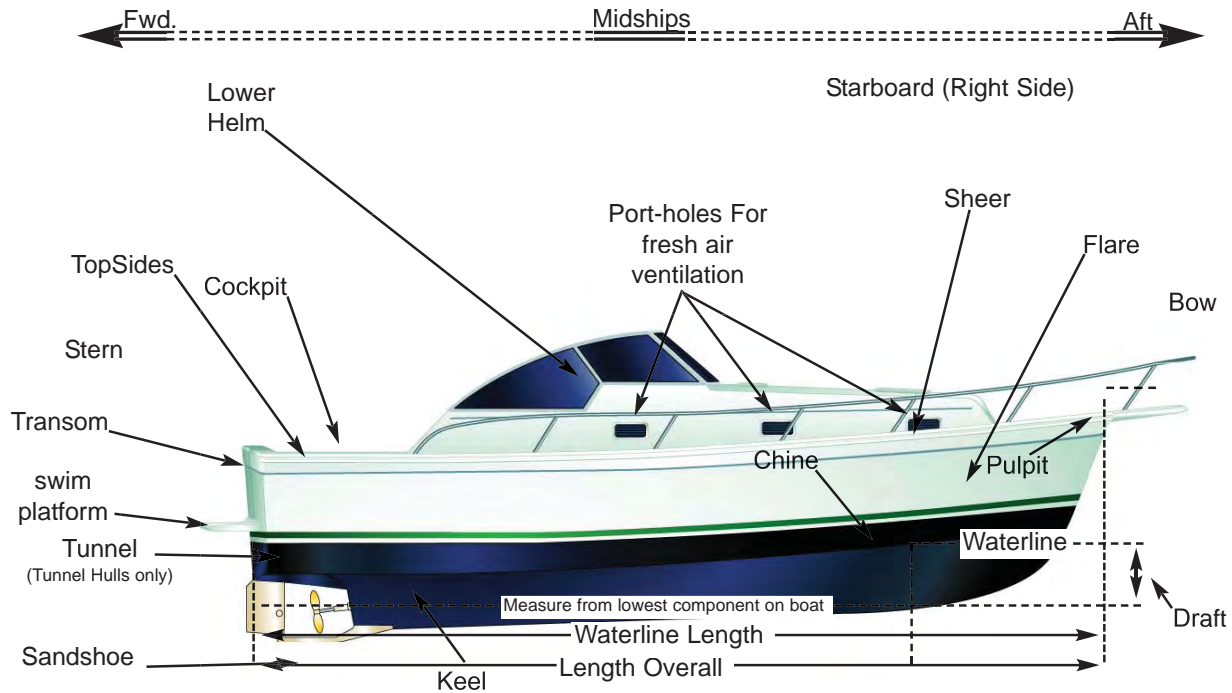
One Prolonged Blast.....Warning Signal  
 One Short Blast.....Pass on my port side  
 Two Short Blasts.....Pass on my starboard side  
 Three Short Blasts.....Engines in Reverse  
 Five or More Blasts.....Danger Signal

Interior Arrangement  
Showing Ventilation

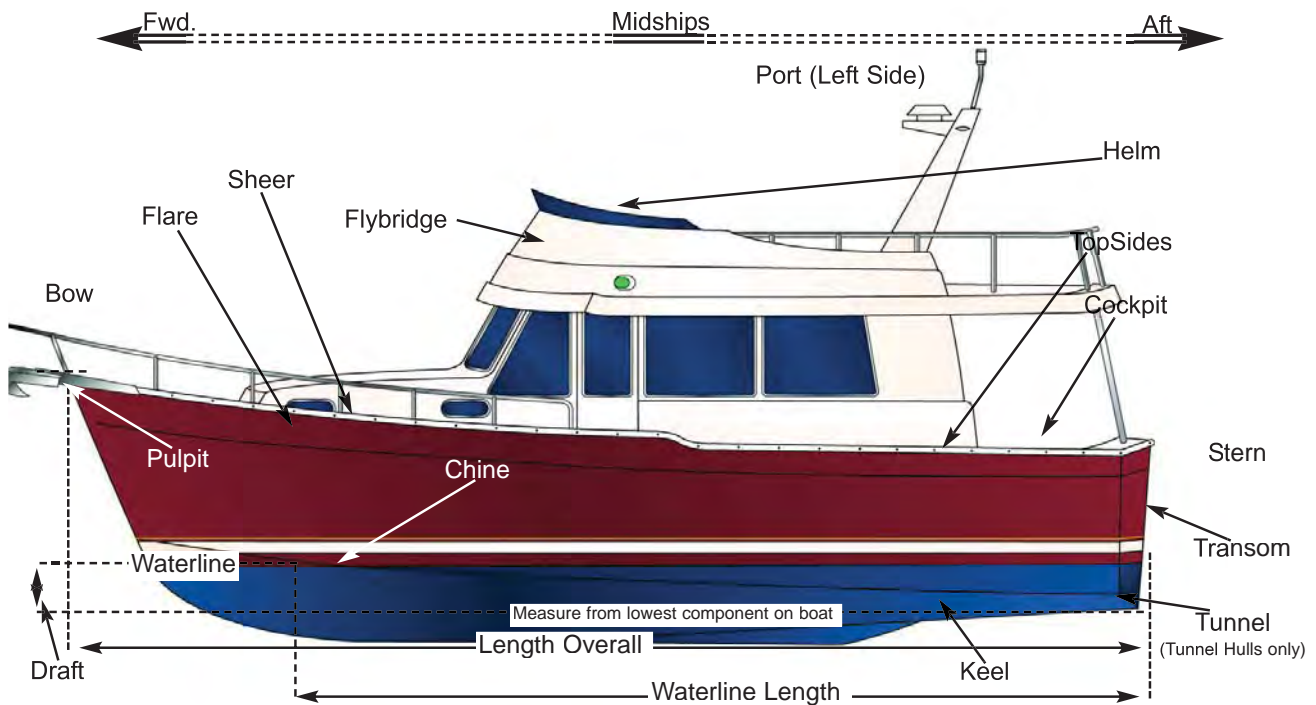


## General Boat Arrangements

### Pilot Models



### Trawler Models





# Mainship

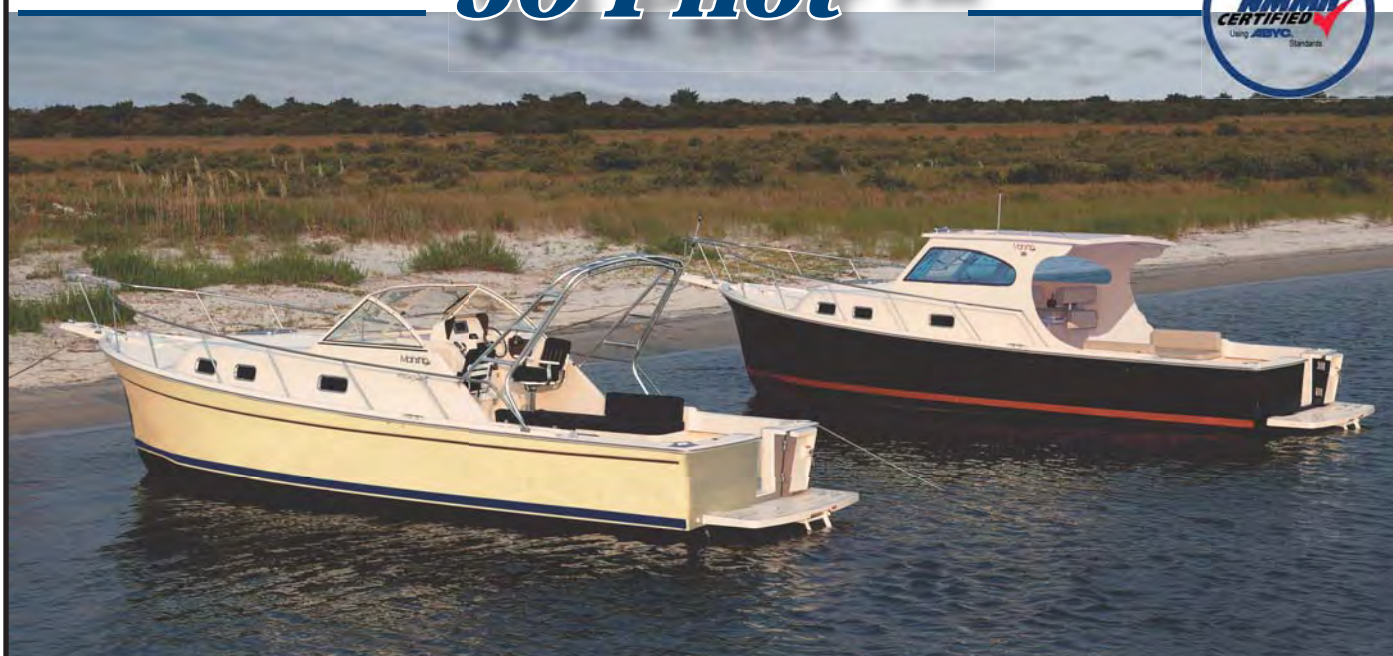
## TRAWLERS

AN EMPLOYEE OWNERSHIP COMPANY

*Chapter 5*

# *Fuel System*

*30 Pilot <sup>TM</sup>*



## **FUEL SAFETY CHECKLIST FOR BOARDING**

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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 owner's 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.

## The Mainship 30 Pilot Fuel System

The purpose of the fuel system is to maintain the necessary supply of fuel to the engines and generator upon demand and as needed. The fuel system on your boat is comprised of the following components or systems, which will be described separately.

Fuel Tank  
Fuel Lines and Hoses  
Fuel Valves  
Fuel Filtration

*Note: There are many safety hazards and warnings associated with your fuel system. You must keep this system maintained and safe in order to enjoy your boat, and keep yourself, your passengers, and your neighbors safe. Please read, and understand all associated materials.*

### 5.1 Fuel Tank

Your boat is equipped with 1 fuel tank, having a capacity of 250 gallons. It is located forward of the engines in the engine compartment.

The fuel tank is 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 fuel tank 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.

#### 5.1.1 Fuel Tank Grounding System

The fuel tank 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 is to allow you to constantly monitor the fuel level in the fuel tanks. Your boat has a fuel gauge on the helm for each tank. If your boat has two tanks, then the port gauge is for monitoring the port tank, likewise, the starboard is for monitoring the starboard tank.

Fig 5.1 gives you a look at the multi-gauge focusing on the fuel gauge side.

Fig. 5.1



**! 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 Lines and Hoses

If any fuel fill or vent hose are in need of replacement, insure 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, fittings, 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!

*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 Customer Service Department immediately! If hoses need to be replaced make sure only USCG Type A1 are used.*

### 5.2.1 Fuel Tank Fills & Vents

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



The fuel tank fill fitting is located on each side of the gunwale amidships. The fuel tank also has a hull vent fitting. These fittings are located on the port and starboard hull sides. The vent fittings are connected to the fuel tank with the fuel vent hose. These vents allow air to pass through them when fueling and when the engine or generator is pulling fuel from the tanks.

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 condi-

tions 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 !

**Always ensure you are opening the correct fill on your deck, there are water, and waste pump out fittings on the deck as well that can be easily mistaken as fuel fills.**

**Filling your water or waste system with fuel can cause fire or explosion.**

### 5.2.2 Fuel Supply Lines and Hoses

### ! WARNING !

**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.**

If any fuel fill or vent hose 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.

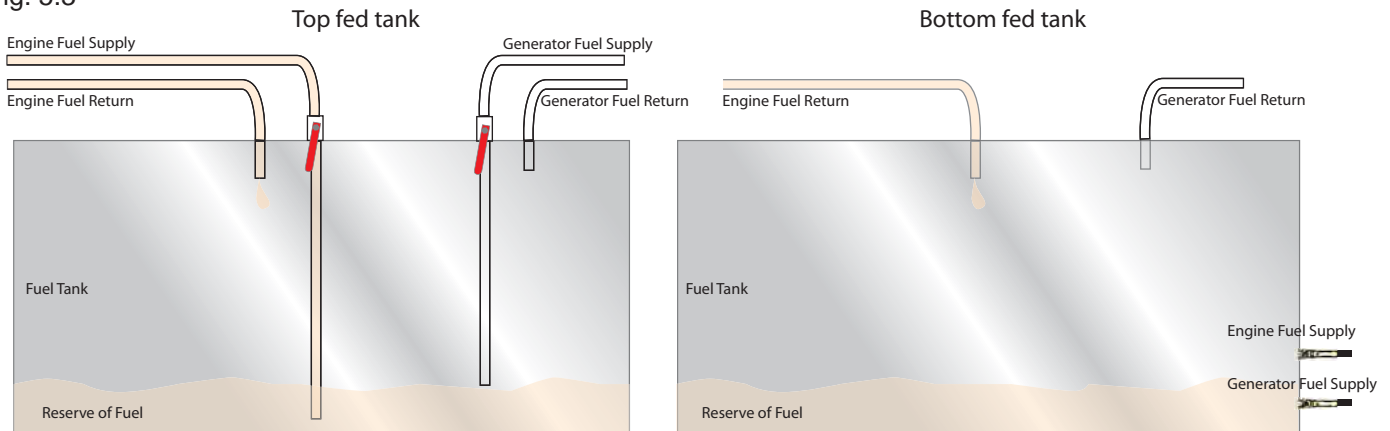
The fuel supply lines or hoses, fitting, and connections should be inspected often for leaks and signs of wear, dry rot, chafing, or swelling. A good way to inspect the fuel hoses is to run your hand along the length of the hose including the fittings. Leaks will be revealed as wet spots on your hand. 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

When the fuel falls below the level as demonstrated in Fig. 5.3, the fuel supply to the generator will be depleted. This will ensure emergency fuel supply to the engines.

Fig. 5.3



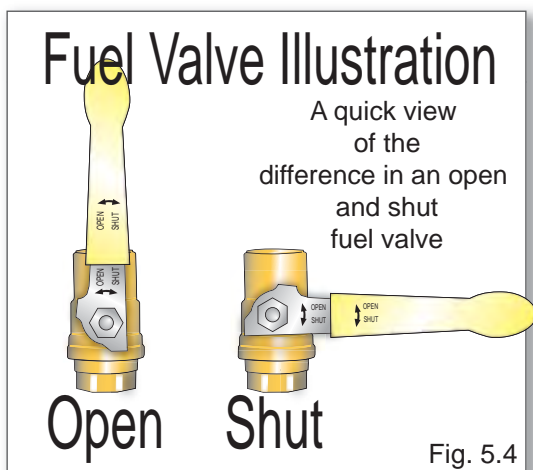
*Note: If your tank is the bottom valve type then the valve placement is key in the Generator supply notation.*

### 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 5.4.



### 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

Each 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 these filters.

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.

On the following page, you will find 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 Gas Engines (Option)

Not all boats have a Gas Engine Option, but if yours does, and you have opted for the gas engines, then the fuel filtration system on the gas engine option is comprised of an inline or primary filter and a secondary filter on the engine as part of the engine package.

# 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

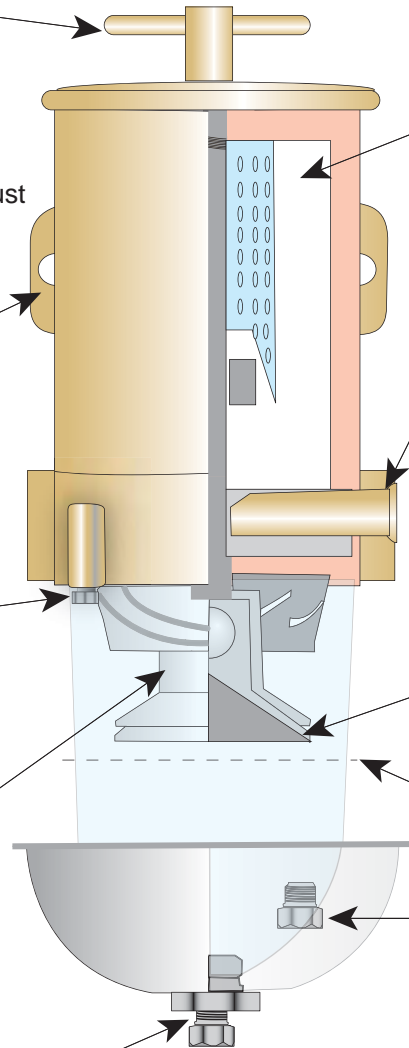
If the element is changed or the  
assembly drained for any reason,  
repriming the assembly (filling  
with fuel) may be necessary. Fill to just  
above the top of the element  
before replacing the lid.

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.

### 5.4.3 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.
4. Note: Do not leave drain open for very long as it will empty filter of all fuel.
5. When fuel is detected coming out of drain, close drain quickly.
6. Close vent plug and tighten snugly.
7. Open shut off valve.
8. Follow priming instructions.

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

**Fig. 5.5**

**See Mfr. documentation to drain your fuel filter, or to change the filter element.**



### 5.4.4 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.

### 5.4.5 Here are some general guidelines for fueling your boat:



**WARNING**

**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.



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



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 LPS (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 to remove 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).

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 5.5.7

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

#### Exposure Limits

| 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) |                                                                               |                                                 |

### 5.5.7 Protective Clothing

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.

### 5.5.8 Stability and Reactivity

Stable at ambient temperatures.

Hazardous polymerization reactions will not occur.

### 5.5.9 Material to Avoid

Avoid contact with strong oxidizing agents.

### 5.5.10 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.*

### 5.5.11 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.

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.

### 5.5.12 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.

### 5.5.13 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.*



**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.                    | 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.                                                      |

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# Mainship<sup>®</sup>


## TRAWLERS

AN EMPLOYEE OWNERSHIP COMPANY

# *30 Pilot II*

## *Chapter 6*

# Underwater Gear

A photograph of two Mainship 30 Pilot II boats on the water. The boat in the foreground is white with a blue stripe and a blue interior. The boat in the background is white with a dark blue stripe and a dark blue interior. They are both on the water, with a sandy beach and some vegetation in the background.

*There are components aboard your boat that are operating behind the scenes and under the water. Here we will introduce you to those components, their functions, and supply you with any maintenance that these components may require.*

### Underwater Gear

Your underwater Gear consists of the following components:

Propulsion components  
Steering Components  
Seawater Intake  
Monitoring Equipment

### 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 propellers supplied with your Mainship boat have been selected as the best propeller for average use. Propellers use “pitch” or the angle of the blades to determine the amount of power exerted from your engines.

Consider keeping an extra set of propellers on your boat. If the propellers become damaged, you can replace them with the spares and continue your outing. Check with your Mainship dealer if you want to purchase an extra set.

*Note: You, as the 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 Shafts

The propeller shafts are made of stainless steel Aquamet, which has excellent corrosion 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 shafts 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 position.

#### 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. Here is a view of a dripless shaft seal (Fig 6.1) showing direction of cooling water.

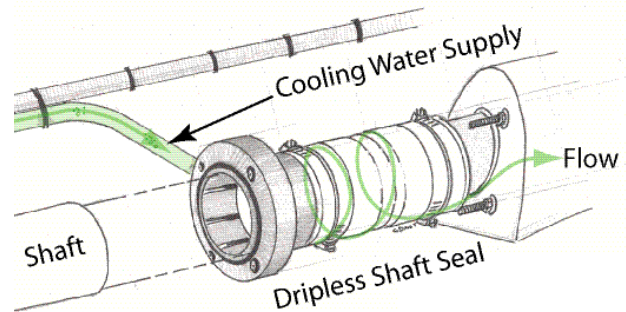


Fig. 6.1

#### 6.1.4 Shaft Logs and Stuffing Boxes

The shaft log is a fiberglass 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 which is water cooled and lubricated from water taped off the engine cooling system. 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

Each propeller shaft is supported by manganese bronze struts fastened to the bottom of the hull. The struts have replaceable bearings to minimize wear and to protect the shaft at the points where it passes through the strut hubs. The strut bearings should be inspected annually and replaced as necessary. Location of the struts can be found in the Underwater Gear Components at the end of this section.



### 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 Components

### 6.2.1 Steering System

The steering system on your boat contains a steering wheel, hydraulic pump, rudder assembly, a rudder position indicator, and an auto pilot.

The steering system has a modern hydraulic steering system. SEASTAR 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.

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

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.



Fig. 6.2

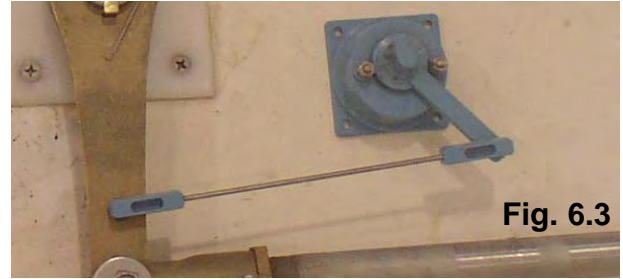


Fig. 6.3

### 6.2.2 Rudders

Your 30 Pilot II has manganese rudders. 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 "dripless" stuffing boxes. However because the friction involved in the shaft seal is not evident in the rudder shafts no coolant is needed to keep the bearings cool. In Fig 6.4 you will find a breakdown of the components that make up the rudder assembly.

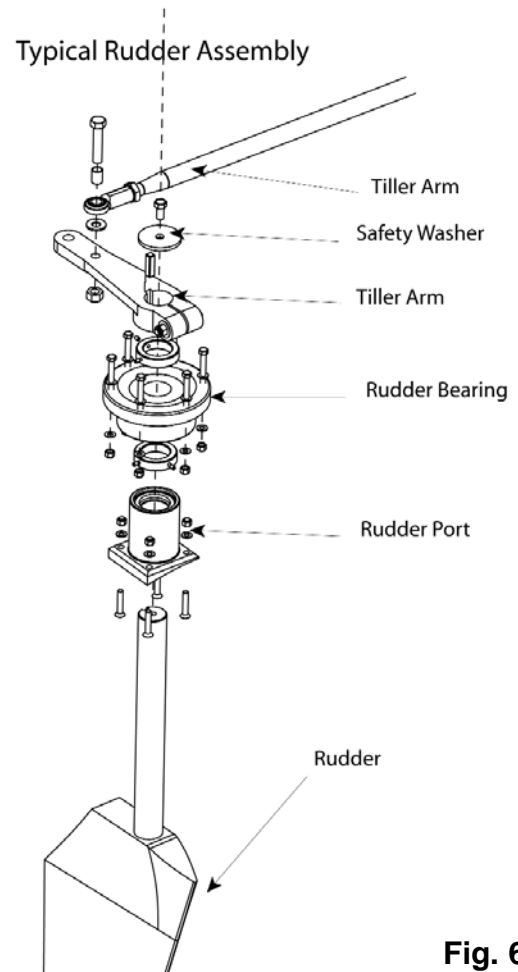


Fig. 6.4

## Chapter 6 -Underwater Gear

At the end of this chapter you will find a detailed drawing of your entire steering assembly. The steering wheel and related equipment are detailed in the Hydraulics subject, of the Engines and Transmissions Section.

### 6.2.3 Trim Tabs

While Trim Tabs are not directly related to the steering assembly part of the underwater gear, they are related to the control of the boat.

Trim tabs are mounted on the bottom of the transom. Trim refers to the running angle of the boat while underway. For efficient operation, trim your boat to run at an angle between 3-6 degrees to the water.

A set of switches on the helm command console controls the trim tabs. (Fig 6.5) The switches operate electrically powered hydraulic cylinders which raise and lower the tabs individually. The trim tabs are activated by turning on the ignition.

When you first throttle up, your boat's trim angle increases and the bow tends to rise. Before advancing throttles to achieve plane, be sure the trim tabs are retracted ("bow up" position). If the tabs are lowered, you could lose control of your boat.

As you continue to accelerate, the planing attitude tends to level out. Use the trim tabs to trim your boat for ease of handling and maximum fuel efficiency. If the trim tabs are angled down, they cut into the water as it passes under the hull to force the stern up and the bow down. Trim tabs also compensate for uneven loads in the boat by allowing the operator to trim up one side of the boat or the other.

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.



Fig. 6.5



Fig. 6.6

## 6.3 Seawater Intake

### 6.3.1 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 in Fig 6.6 is an example of one type of intake. This intake may be the "gravity fed" type. The seawater being forced through the intake to the system or component. The other type is fed by the velocity of seawater being forced through the intake by the boat speed. These types are always position with the opening side of the intake in the forward position. Gravity fed intakes are the opposite.

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.



Fig. 6.7



### 6.4 Monitoring Equipment

---

The optional electronics package you have or 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.

Basically, all boats will be equipped with a device called a "Transducer". This device 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".

**Troubleshooting**

| <b>Problem</b>      | <b>Possible Cause</b>                     | <b>Resolution</b>                                                                                                                |
|---------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| 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                                                                                                                |

# Mainship<sup>®</sup>

## TRAWLERS

AN EMPLOYEE OWNERSHIP COMPANY

# *30 Pilot II*

## *Chapter 7*

# DC Electric System



**DANGER**

### **—Extreme Hazard—**

- Never use an open flame in a battery storage area.
- Prevent sparks near battery
- Battery will explode if a spark or flame ignites the free hydrogen given off during charging.

### DC Electric System

The DC System consists of the following systems or components:

- Batteries
- Battery Switches
- Bilge Pumps
- Oil Changer
- Shower Sump
- Windlass
- Generator Starter
- Main Engine Starters
- Lighting
- Head Components
- Refrigerator / Freezer
- Fresh Water Pump
- Macerator
- Seawater Pump
- Livewell Pump
- CO Monitors
- Ventilation
- Entertainment Centers
- Halon Controls
- Trim Tabs
- Horn
- Electronics

Throughout this section the components will be separated into categories of Power Supply and related components such as, switches, breakers, fuses, panels, chargers, grounding and bonding, the components that are powered by the DC electrical system, and finally operations and suggestions for control or usage of the systems or components. At the end of the section you will find a "Legends" section that will detail the switch, breaker, and control panels aboard your boat.

### 7.1 Power Supply Components

#### 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

During charging batteries produce gases 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.

#### 7.1.1 Batteries

The DC System derives its power from a battery in the Lazarette area. A circuit breaker near the battery switch (located fwd of the batteries on the bulkhead) connects the battery to the electrical system. The battery supplies power to the DC control on the Main Distribution Panel (MDP) in the main cabin. From this panel, power is distributed to such equipment as cabin lights, instruments, and accessories.

The negative terminal of all banks are attached to the grounding buss on the engine. This system, known as a negative ground system, is the approved system for marine DC electrical systems. The battery wiring system has two color coded wires. The yellow wire is the ground (negative), and the red wire is the (positive).

To avoid explosions, do not use jumper cables and a booster battery to start the engine. If batteries are dead then remove and recharge them ashore.

Batteries produce hydrogen and oxygen gasses when they are being charged. These explosive gasses escape through the vent/fill caps and may form an explosive atmosphere around the battery if ventilation is poor. This gas may remain around the battery for several hours after charging. Sparks or flame can ignite the gas and cause an explosion.

#### 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. The following precautions must be taken;

\*The wiring to the batteries must have proper over-current protection in the form of fuse or breakers.

\*Use only battery chargers that have been listed by a testing agency, such as Underwriters Laboratories, Inc.

\*Follow the wiring diagrams exactly.

## Chapter 7 - DC Electric System

To remove the battery:

1. Turn off all power drawing breakers and isolate battery.
2. Remove positive (+) cable first, then the negative (-)

When you install a battery, battery connections must be made properly.

1. Attach the positive cable to the positive (+) terminal.
2. Attach the negative cable to the negative (-) terminal on the battery.

*Batteries should always be removed and installed by trained, qualified persons to avoid all damages.*

### 7.1.2 Battery Switch

Each battery has a two position selector switch (fig. 7.1) located fwd of the engines, mounted on the bulk head in the “Battery Switch Panel”.

The selector switches are marked as to which battery they control. Turning the selector switch to the off position turns power off to the respective circuits, likewise the on position turns power on.

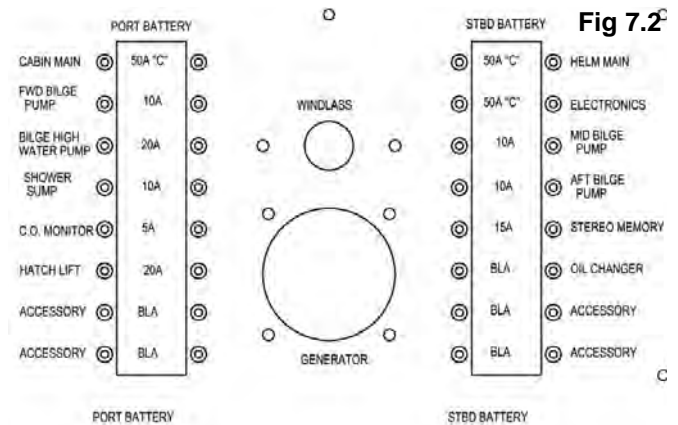


Fig 7.1

### 7.1.3 Battery Switch Panel

The battery switch panel houses the breakers for some of the main components in your DC system. The breaker controls are marked at the switch panel, and control systems or components on your boat that require a connection that remains energized even though the Main Panel may be de-energized.

The breakers and switches are described in greater



detail in the “Breakers and Switches” section of this section.

Fig. 7.2 gives you a quick look at the systems and the breaker sizes that control them. The battery switch panel is shown in greater detail at the end of this chapter in the “Legends” section.

### 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. 7.4) is located on the fwd bulk-head in the engine room. The charger is protected by a fuse on the ground side at the charger (fig. 7.3).



Fig 7.3



Fig 7.4



## Chapter 7 - DC Electric System

### 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. 7.5.

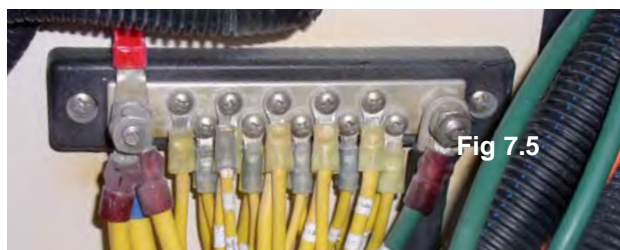
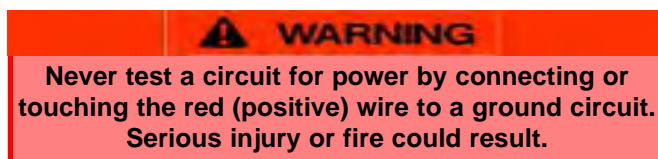


Fig 7.5

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 bonding system is attached to the grounding system at one location aboard your boat, usually the main grounding block, near the battery switch.

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. 7.6) attached to the underwater area of the transom.



Fig 7.6

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 control panel (Main Distribution Panel, MDP).

### **WARNING**

**The blower must be run for four (4) minutes before starting the engine or generator.**

### **WARNING**

**Fuel fumes in the engine or lazarette compartment can explode. Before working on any electrical wiring, ventilate the area and disconnect the batteries to prevent sparking.**

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 control panel (MDP) 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 Main Distribution Panel (DC Side )

The batteries also power the MDP or Main Distribution Panel. Indicators on the panel give you the power left in the batteries, as shown in fig. 7.7.

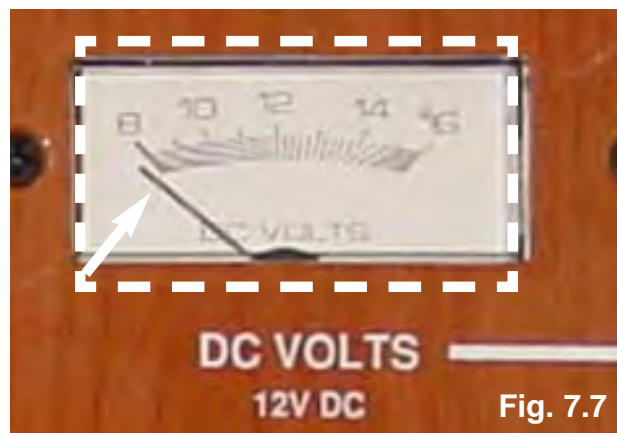
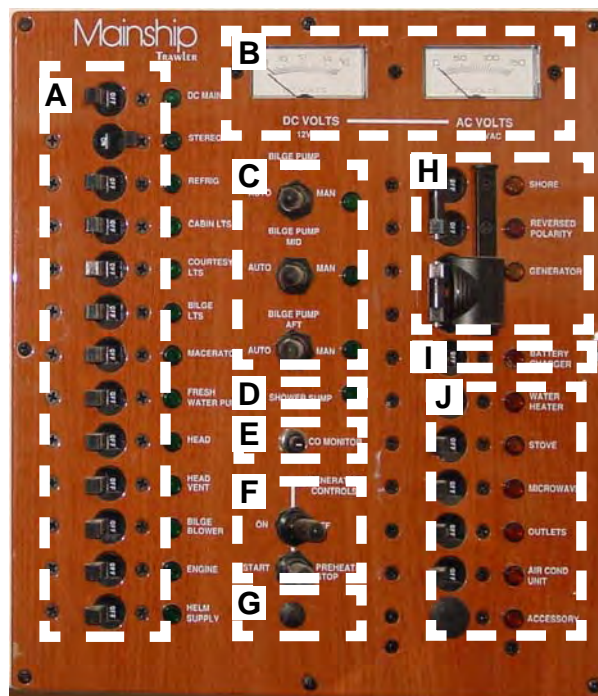


Fig. 7.7

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



As you can see in Fig. 7.8, the MDP is divided into sections:

Section A - This section is devoted to DC power, the breakers in this position supply power to your DC systems or components.

Section B - This is your gauges, this will allow you to read the amount of power left in your "house battery" as well as on the AC side, allowing you to assess the amount of voltage from the generator or shore power.

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.

Section G - Here is your bilge blower switch.

Section H - This is the slider switch for shore power or generator power. (This is discussed in the AC Electric Section)

Section I - This is the breaker for the battery charger.

Section J - This is the AC Electric breakers, these are discussed in the AC Electric Section.

The DC side of the MDP is shown in greater detail in the "legends" subject of this section.

### 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 separated because of the method in which power is supplied to the two systems. The interior lights are powered from the MDP and marked Cabin Lights. The exterior light-

ing is powered from the lower helm station. Each light on these circuits have a switch on the side, as shown in Fig. 7.9.



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
- Spreader Lights (option)
- 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 spreader Lights are an option. If your boat has spreader lights installed these are the lights that are located on the aft side of the tower. The function is to give lighting to the cockpit area of the boat. They are a safety feature.

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

*Note; Consult your wiring ladder to ensure the voltage of any and all lighting circuits.*

### 7.2.5 CO Monitors

In each area aboard your Mainship 30 Pilot II 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 30 Pilot II, consult your Owners Packet and find the documentation for the CO Monitors. Fig. 7.10 gives you a look at the 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 30 Pilot II 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":

The oil changer is located in the engine compartment on the fwd bulkhead. Fig. 7.11

*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 30 Pilot II 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.

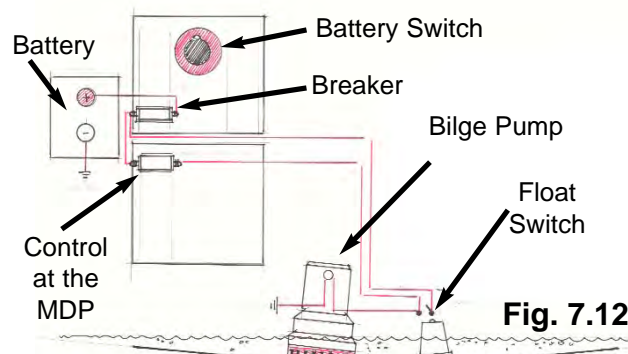
The horns are DC powered and the controls are located at the helm.

### 7.2.10 Bilge Pump Systems

The Mainship 30 Pilot II 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. 7.12 shows you the typical wiring.

For more information about your bilge pump system see Sanitary





## Chapter 7 - DC Electric 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 28 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.

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

#### **CAUTION**

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

#### **WARNING**

**Always run exhaust fans for at least four minutes before attempting to start engines.**

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. 7.13



### 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 shower sump can be found on the Battery Switch Panel.

### 7.2.14 Horn

The Mainship 30 Pilot II meets all CE standards in safety equipment by supplying you with the best available. The 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 both upper and lower helm.

### 7.2.15 Windlass

Your Mainship 30 Pilot II 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 stations. There is also a circuit breaker at the battery switch. The windlass can be operated from the helm station or from the bow. See manufacture's owner's manual about the proper and safe operating procedures. See Fig. 7.14



### 7.2.16 Windshield Wipers

The 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.*

### 7.2.17 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 stations and the breakers for those components are on the helm stations. 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 engine compartment ON.
2. Switch on relevant breakers at battery switch
3. Switch the DC main circuit breaker at electrical panel (MDP) to ON.
4. Switch on relevant breakers at the MDP.

*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.

### 3.3 To operate the macerator pump:

#### CAUTION

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

*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.

#### WARNING

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

### 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.



**Always run exhaust fans for at least four minutes before attempting to start engines.**

### 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.*

For more information about your windlass refer to the Underway Section of this manual.

### 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 the 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.*

### 7.3.9 Maintenance

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

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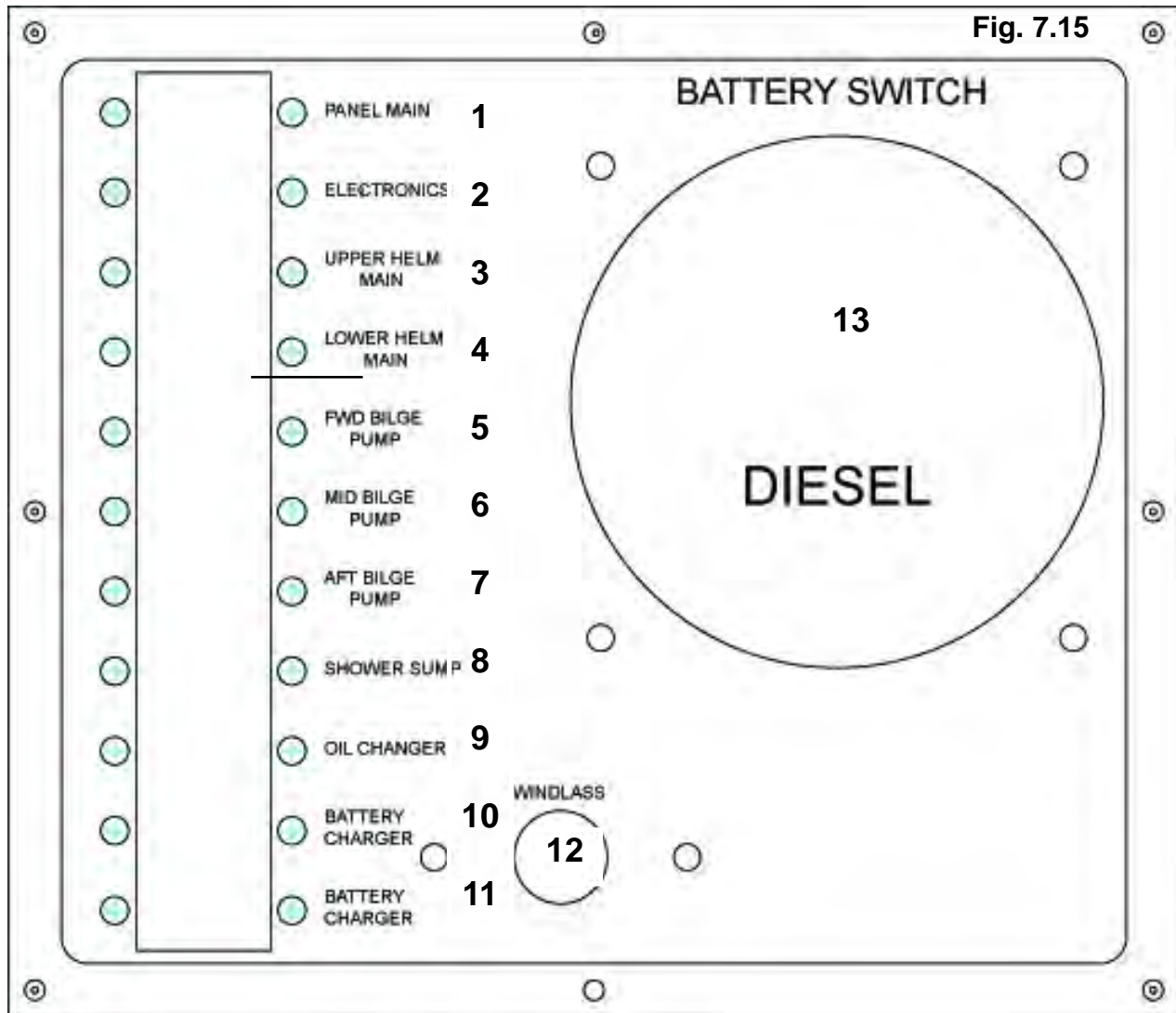
## 7.4 Legends

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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

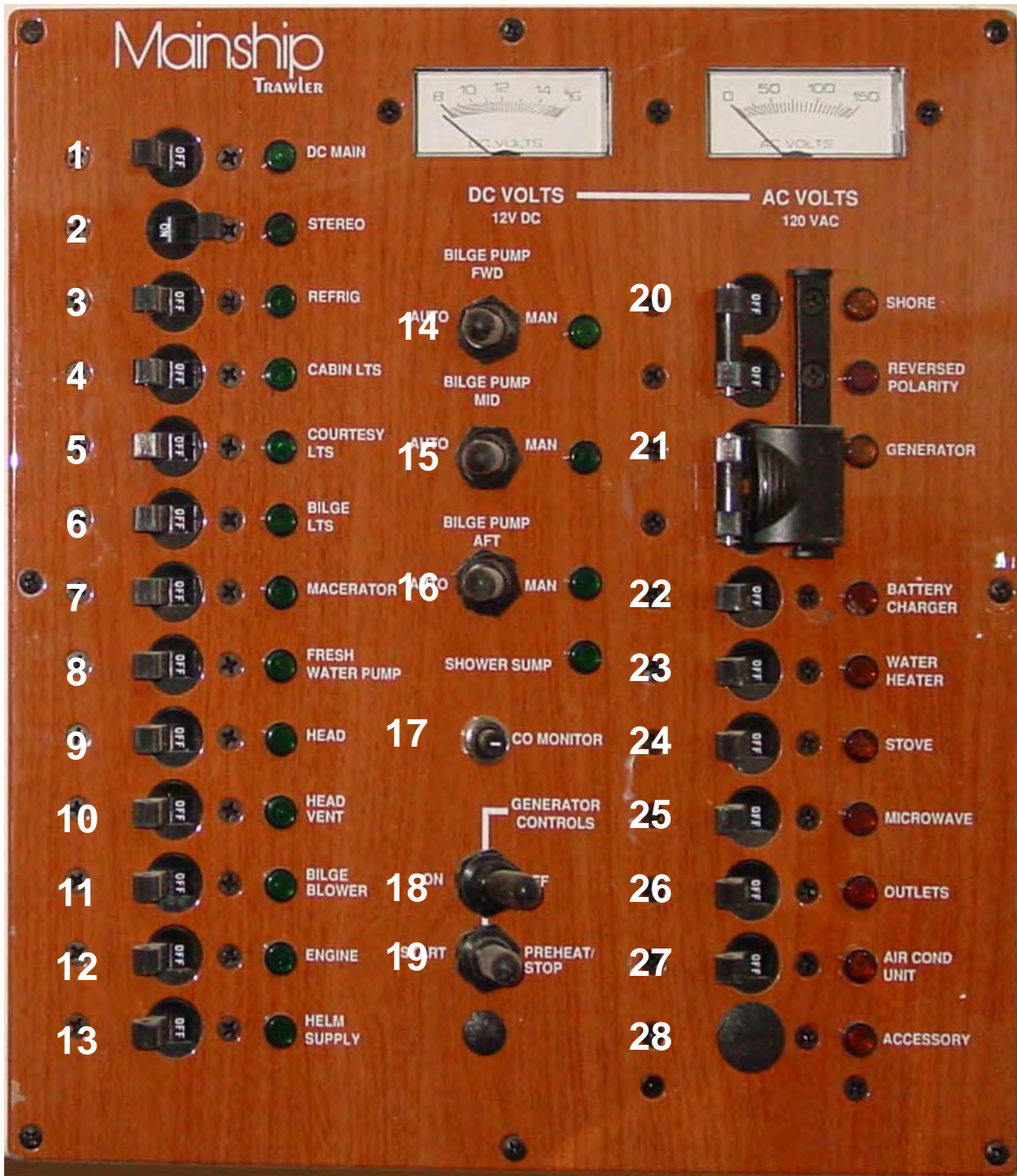


1. This breaker controls power to the MDP.
2. This power controls power to the electronics
3. This breaker controls power to the upper helm
4. This breaker controls power to the lower helm.
5. This breaker controls the power to the fwd bilge pump
6. Protection for the Mid bilge pump
7. Protection and power to the aft bilge pump
8. Oil Changer
10. Battery Charger
11. Battery Charger
12. Windlass Breaker
13. Main 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 AC and DC Voltage

Fig. 7.16



Details of legend on the following page.

### Details of photo from page 7.12, Fig. 7.16

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. Stereo Breaker

3. Refrigerator - Turns on power for the DC refrigerator.

4. Lighting - Powers up all cabin lighting

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

5. Courtesy Lights

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

7. Macerator - Supplies the power to run the macerator pump. Read the section in the DC Electric and the Sanitation Section for the correct usage!

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

10. Head Vent

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

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

13. Helm Supply - This breaker sends power to the helm station components, breakers, and switches.

14., 15, 16 - These three switches allow you to manually operate your bilge pumps. Fwd, Mid and Aft, see the Operations and Maintenance subject in this Section or consult the Waste and Sanitation Section in this manual.

17. CO Monitor - CO Monitor reset switch. See the Operation and Maintenance subject in this section for detailed info as well as the Boating Safety Section in this manual to educate yourself against the deadly Carbon Monoxide Gas.

18, 19. Generator Controls - allows you to preheat, start and stop your generator directly from the MDP.

20. Shore - This is the main shore power breaker, this will supply AC voltage to the AC components from the shore power.

*Note: This switch is a sliding lock type, you cannot energize the Generator Power while in the Shore Power position likewise in the Generator Power position you cannot energize the shore power.*

21. Generator - This is the Generator Main to supply AC voltage to all the AC component breakers from the generator.

22. Battery Charger - This breaker supplies power to the battery charger to ensure charged batteries.

23. Water Heater - Power to the water heater is supplied through this breaker.

*Note: Never energize this breaker without ensuring that the water heater is full of water, to do so could burn the elements out of the water heater.*

24. Stove - This is the breaker to turn power on to your stove in the galley.

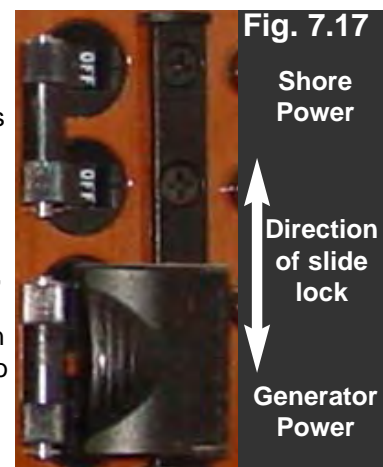
25. Microwave - Powers your microwave.

26. Outlets - this breaker powers all the outlets on your boat with AC Power.

27. Air Cond Unit - This supplies AC power to your Air Condition system. The AC Cooling water pump is powered from the system and should always be monitored for operation before use of the Air Conditioning system. See the Fresh ? Raw Water Systems section for detailed usage.

28. Accessory - This is an AC voltage accessory space for optional or added components.

Fig 7.17 gives you a look at the slide lock switch on the MDP. With the slide lock it is not possible to energize the generator power and the shore power together. From the photo in Fig. 7.16, this is breaker # 24 and 25. In the position shown this would be to energize generator power.





### Helm and Helm Breaker / Switch Panel



1. 12DC Accessory Plug
2. Circuit Breaker
3. Engine Start / Switch
4. Engine Stop
5. Horn
6. Circuit Breaker
7. Navigation Lights
8. Circuit Breakers
9. Cockpit Lights
10. Circuit Braeker
11. Wipers
12. Circuit Breakers
13. Accessory Switch
14. Circuit Breakers

15. Accessory Switch
16. Circuit Breakers
17. Accessory Switch
18. Circuit Breaker
19. Accessory Switch
20. Circuit Breaker

## Chapter 7 - DC Electric System

### Troubleshooting

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

# Mainship<sup>®</sup>

## TRAWLERS

AN EMPLOYEE OWNERSHIP COMPANY

### *30 Pilot II*

#### *Chapter 8*

# AC Electrical System



**DANGER**

### **—Extreme Hazard—**

- Never work on an energized system • Read all electrical safety warnings
- Electricity will kill you, if handled in the wrong way, always use qualified personnel to perform electrical work.



### AC Electric System

The AC System consists of the following systems or components:

- Shore Power Connection
- Shore Power Breaker
- Isolation Transformer
- Generator (Optional)
- MDP
- Breakers
- Components

*Important: The AC system is connected to the living quarters of your boat through an AC junction panel located on the Port side behind the cabinets in the Salon area. See the AC Mechanical Arrangement for further location details.*

#### WARNING

**Electricity cannot be detected without the use of specialized test equipment. Never think you know whether a circuit is “live”, always have qualified, competent professionals inspect or make repairs to your electrical systems.**

Throughout this section the components will be separated into categories of Power Supply and related components such as, switches, breakers, fuses, panels, chargers, grounding and bonding, the components that are powered by the AC electrical system, and finally operations and suggestions for control or usage of the systems or components. At the end of the section you will find a “Legends” section that will detail the switch, breaker, and control panels aboard your boat.

The sources for power supply in your AC electric system, are the shore power, and your generator if you purchased the generator option. We will explain both systems as if your boat came to you with a generator installed. If you opted not to have the generator then simply omit the sections that deal with that part of the boat, they will not apply to your boat.

#### *Note:*

*It is important that you review the “Electric Shock” pamphlet included with your manual and understand the importance of electrical safety. While electricity is one of our greatest friends it can well be your worst enemy. Be sure and follow the warnings posted in this manual and your component or systems manuals in your owner’s packet and practice good safety. Always have trained competent technicians to service your electrical systems, it could mean your life.*

### 8.1 Power Supply Components



#### 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!**

As we mentioned the two sources for AC power are the shore power and the generator. There is a slider lock switch on the MDP that allows you to switch between the two power sources without energizing both at once.

#### 8.1.1 Shore Power Supply

The Mainship 30 Pilot II has one shore power inlet. A 30 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.



#### 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 system components dry.**



#### 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.**



#### 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.



Fig. 8.1

Later on in this section we will detail the steps to connecting your shore power. Lets take a look at more of the shore power components.

### 8.1.2 Shore Power Cord

Mainship has supplied you with a durable 50' shore power cord. The cord will have a male connection on one end and a female connection on the other end. Do not use chemicals to clean or service your shore power cord, unless specified by the manufacture. Follow manufactures recommendations on servicing or cleaning your shore power cord. See **Fig 8.2 page 8.4** for more info about your shore power cord.

### 8.1.3 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.

### 8.1.4 Main Distribution Panel

In the DC section (**Fig. 7.8**) we discussed the MDP and gave you a description of the MDP and allowed you to see the different sections in the panel. Later on in the “Legends” subject of this section we will detail the MDP, AC side breakers and their functions.

### 8.1.5 Generator (option)

If you opted to have the generator installed then you have made a good choice, we supply you with the best all around generator setup for your needs aboard this boat. However the generator is a fuel powered engine, so whether you have a gas or a diesel boat there are

some safety concerns about any type of fuel engine. Lets look at some of those then we will discuss more about the function and operation of the generator system.



**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 engines.**



**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.**



**DANGER**

**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.**



**WARNING**

**The blower must be run for four (4) minutes before starting the engine or generator.**

The generator is comprised of a fuel supply, return and an exhaust system. The fuel supply is comprised of a supply valve, supply hose, and a fuel filter, along with the return hose.

The exhaust system is made up of an exhaust hose a muffler and the exhaust outlet. See your Mechanical Arrangement Illustrations for locations of these components, they can be found at the end of each pertinent section, or at the end of this section the entire AC system will be laid out in an illustration showing locations for each of the components.

The fuel supply components will be described in greater detail in the Fuel Section and the exhaust will be described in the Waste and Sanitary Section of this manual.

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## Chapter 8 - AC Electrical System

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### 8.1.6 Main Distribution Panel

Again we bring you to the MDP, in the DC section (Fig. 7.8) we discussed the MDP and gave you a description of the MDP allowing you to see the different sections in the panel. Later on in the “Legends” subject of this section we will detail the MDP, AC side breakers and their functions.

### 8.1.7 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. 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”.

### 8.1.8 Grounds, Bonding, and Zinc

In several locations aboard your boat you will find grounding blocks such as the one pictured in **fig. 8.2**. The AC System is tied into the DC grounding system at the main grounding bus shown in Fig. 8.2.



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”.

The main grounding block is the location where the AC System and the DC System share the ground.

### 8.1.9 Outlets and GFI Components

The outlets aboard your boat are for AC electrical connections to supply power to your AC accessories. They are just like your outlets in your home and supply 110 volt AC power.

There are two required GFI outlets aboard your boat, one is in the head and one in the galley, though there are several other outlets they are either breaker protect-

ed on the MDP or wired in the circuit of an existing GFI. In the case of the 30 Pilot II, the only circuit wired outlet is in the forward section of the boat and it is wired off the GFI outlet in the galley. The other outlets such as the ones that supply power to your entertainment, refrigerator, microwave and other 110 volt components that require an outlet for power are wired off the MDP and breaker protected at that point. These are usually placed behind cabinets or the components that they supply power to, and aren't visible.

Though the outlets are a system or a component such as in the next subject we have placed the descriptions in the Power Supply subject due to the purpose of their installation.

---

## 8.2 Systems and Components

---

As with the DC System there are several AC powered systems or components aboard your boat; here we will break those down for you with a function and description of each one. Later in the Operations and Maintenance subject we will describe the use or operation of these systems or components.

### 8.2.1 Battery Charger

The battery charger (fig. 7.4) is located on the fwd bulk-head in the engine room. The charger is protected by a fuse on the ground side at the charger (fig. 7.3). See the DC Electric section for the Fig. 7.3, and 4.

### 8.2.2 Water Heater

**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.

The water heater use and function is described in the Water Systems Section, here we will detail the electrical side of the heater.

The Water Heater is powered by the AC side of the MDP on the breaker titled “Water Heater”. It is much the same as an electric water heater in your home except in this case the heater uses 120 volt but, it uses elements to heat the water to a specified temperature. Consult the manufactures documentation for any internal information about the water heater.

### 8.2.3 Stove

Mainship has supplied your boat with a high quality single burner electric stove. Your stove is powered from the AC side of the MDP at the breaker marked "stove" and operates the same as your home stove. The stove is also 120 volt powered.

### 8.2.4 Microwave

The microwave is powered with 120 volt power through the breaker marked "Microwave", there is a 120 volt receptacle behind the microwave that it is plugged into. This outlet is not part of the GFI circuit it is protected by the breaker on the MDP.

### 8.2.5 The Entertainment Center

The entertainment center is powered from the MDP through the breaker labeled "Outlets". This breaker also controls power to the GFI 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 side of the panel.



**Fig.8.3** gives you a look at the quality flat screen television that is provided in your boat.

### 8.2.6 Air Conditioning

The Air Conditioning system is AC powered and powered from the AC side of the MDP.

The cooling water pump is controlled by the compressor, and is energized when the Air Conditioning Compressor comes on.

You can consult the Arrangement Illustration at the end of this section for location information, or see the Mechanical Arrangement in the Boating Safety Section, the Water Systems will show you the Pick-up and Strainer for this system.

### **CAUTION**

**Always make certain the the Pick-up Valve for the Air Conditioning System is opened before using, failure to do so will cause permanent damage to your compressor. Also be certain the the strainer is clean, Water Systems section for some detail for cleaning the strainers.**

It is very important for you to read and understand the operation and the maintenance for the systems or components in your AC Electric System, this will save failure of components or systems as well as make your boat a safer more enjoyable investment.

## 8.3 Operations and Maintenance

### 8.3.1 To Operate the AC Electrical System

If you opted for the generator system then you will, as we have mentioned have the capabilities for two separate AC Electric systems. We will discuss the procedures for energizing both.

### 8.3.2 Shore Power

First the Shore Power System is a convenient way to obtain power should you be docked. Be sure to read the warnings posted earlier in this section on shore power safety.

1. Turn off all 120 volt breakers on the AC side of the MDP.
2. Shut down the generator if it is in operation.
3. Connect the female end of the shore power cord to your boats shore power inlet receptacle. Be certain the the lock ring is tightly secure. If there is a cord already supplied at the dock be sure to unhook the cord from the dockside outlet.
4. Connect the shore power cable to the power supply. When connecting the shore power cable to the dockside outlet, be sure make certain that the cable has sufficient slack to prevent stretching during tidal changes.
5. Slide the Shore Power / Generator Power Slide Lock Switch over to the Generator side of the switch. With the slide over on the Gen side you should be able now turn on the shore power switch.



## Chapter 8 - AC Electrical System

If there is no power to the electrical distribution panel (MDP), check the following,

\* Breaker switch at dockside power.

\* Main breaker switch on shore power side of distribution panel (MDP)

### 8.3.3 To Disconnect the Shore Power

1. Turn off all 120 volt breakers on the MDP.
2. Turn off the dockside breaker.
3. Disconnect the shore power cord from the dockside outlet.
4. Disconnect the shore power cord from the boats shore power connection.
5. Store your cord in a safe dry location.

### 8.3.4 To start the generator (option)

1. Shut down all AC devices and equipment.
2. Disconnect shore power if connected. Set AC MAIN circuit breaker to OFF.
3. Start generator. (See generator start-up instructions following.)
4. Move slide bar up to lock out shore power. Set GENERATOR circuit breaker ON. (See Fig. 8.5)
5. Switch on only the circuits you will be using.



#### DANGER

**Carbon Monoxide can be harmful or fatal if inhaled. Inspect generator exhaust system for leaks at each generator startup.**



#### WARNING

**The blower must be run for four (4) minutes before starting the engine or generator.**

### 8.3.5 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

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 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 GENERATOR START-STOP switch 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.*

### 8.3.6 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.

### 8.3.7 The Air Conditioning System

1. Ensure you have 120 volt power to the MDP.
2. Check to make sure that the seawater intake that feeds the Air Conditioning cooling is open and that the strainer is clean and debris free.
3. Energize the Air Conditioning system at the MDP panel
4. Check to make sure that the discharge is flowing at the Air Conditioning cooling water discharge.

---

## 8.4 Legends

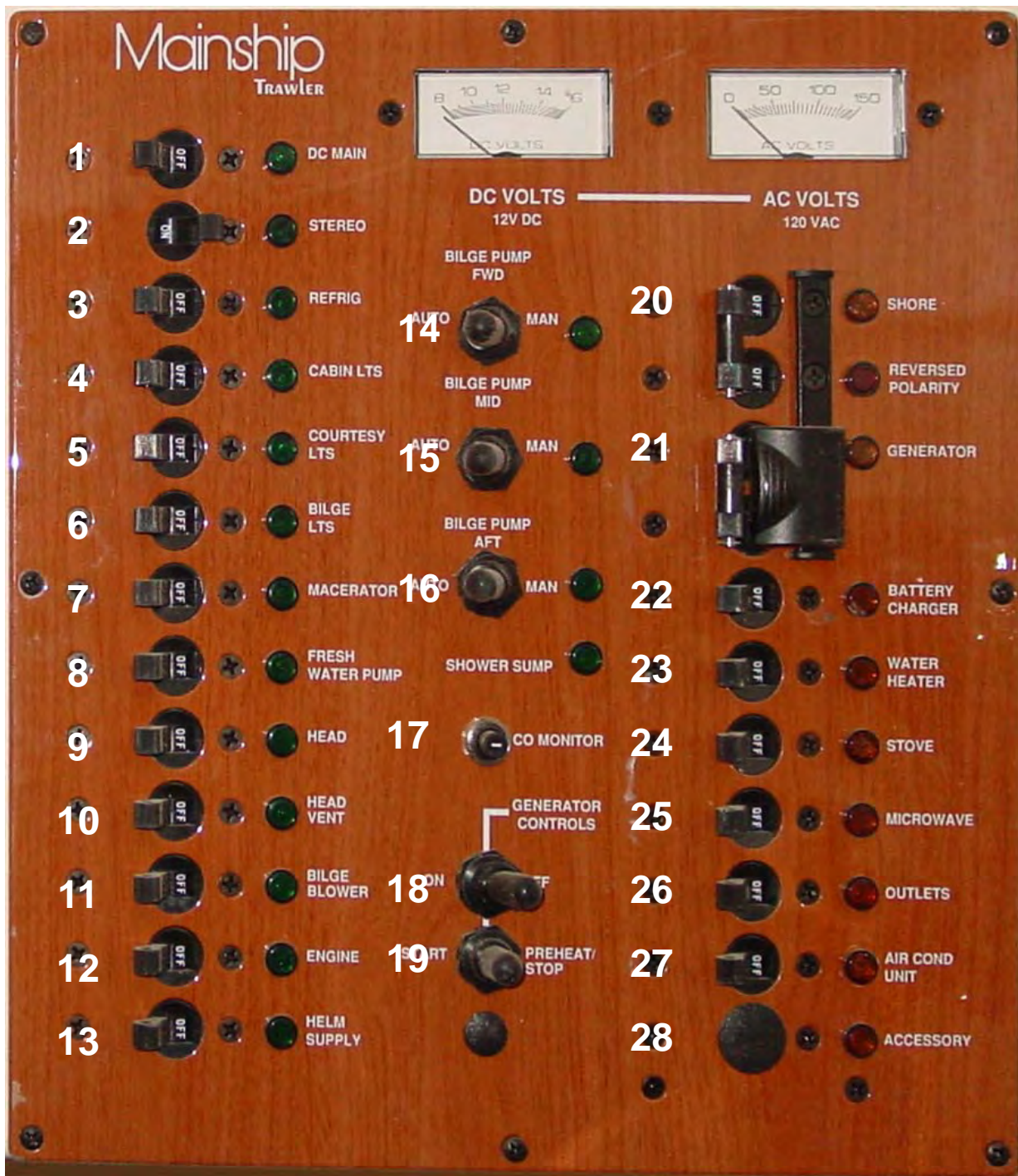
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On the next few pages we offer you photo's, drawings, and other materials so that you may better understand the locations and get a visual on your AC electric components.

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

Main Distribution Panel for AC and DC Voltage

Fig. 8.4



Details of legend on the following page.

## Chapter 8 - AC Electrical System

### Details of photo from page 8.8, Fig. 8.4

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. Stereo Breaker

3. Refrigerator - Turns on power for the DC refrigerator.

4. Lighting - Powers up all cabin lighting

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

5. Courtesy Lights

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

7. Macerator - Supplies the power to run the macerator pump. Read the section in the DC Electric and the Sanitation Section for the correct usage!

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

10. Head Vent

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

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

13. Helm Supply - This breaker sends power to the helm station components, breakers, and switches.

14., 15, 16 - These three switches allow you to manually operate your bilge pumps. Fwd, Mid and Aft, see the Operations and Maintenance subject in this Section or consult the Waste and Sanitation Section in this manual.

17. CO Monitor - CO Monitor reset switch. See the Operation and Maintenance subject in this section for detailed info as well as the Boating Safety Section in this manual to educate yourself against the deadly Carbon Monoxide Gas.

18, 19. Generator Controls - allows you to preheat, start and stop your generator directly from the MDP.

20. Shore - This is the main shore power breaker, this will supply AC voltage to the AC components from the shore power.

*Note: This switch is a sliding lock type, you cannot energize the Generator Power while in the Shore Power position likewise in the Generator Power position you cannot energize the shore power.*

21. Generator - This is the Generator Main to supply AC voltage to all the AC component breakers from the generator.

22. Battery Charger - This breaker supplies power to the battery charger to ensure charged batteries.

23. Water Heater - Power to the water heater is supplied through this breaker.

*Note: Never energize this breaker without ensuring that the water heater is full of water, to do so could burn the elements out of the water heater.*

24. Stove - This is the breaker to turn power on to your stove in the galley.

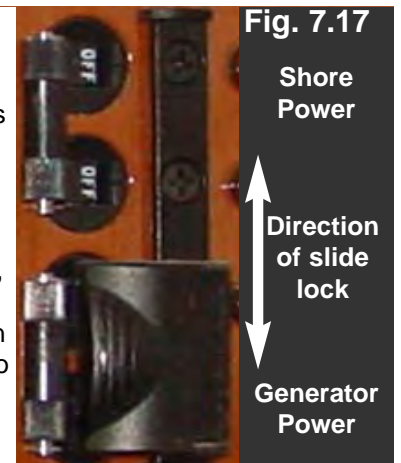
25. Microwave - Powers your microwave.

26. Outlets - this breaker powers all the outlets on your boat with AC Power.

27. Air Cond Unit - This supplies AC power to your Air Condition system. The AC Cooling water pump is powered from the system and should always be monitored for operation before use of the Air Conditioning system. See the Fresh ? Raw Water Systems section for detailed usage.

28. Accessory - This is an AC voltage accessory space for optional or added components.

Fig 7.17 gives you a look at the slide lock switch on the MDP. With the slide lock it is not possible to energize the generator power and the shore power together. From the photo in Fig. 7.16, this is breaker # 24 and 25. In the position shown this would be to energize generator power.



## Chapter 8 - AC Electrical System

### TROUBLESHOOTING

| Problem                                            | Possible Cause                                                                                                                                                                     | Solution                                                                                                                                         |
|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| No AC power                                        | Main breaker(s) in engine compartment tripped or off<br><br>Breaker(s) at AC control center tripped or off<br><br>Shore power cord not connected<br><br>Loose or disconnected wire | Turn breaker on or reset.<br><br>Turn breaker on or reset.<br><br>Check cord; plug in if necessary.<br><br>Tighten connections. See your dealer. |
| No power to AC devices                             | Breaker(s) at AC Control<br><br>Center tripped or off<br>Shore power cord not connected<br><br>Loose or disconnected wire                                                          | Turn breaker on or reset.<br><br>Check cord; plug in if necessary.<br><br>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.<br><br>Switch PARALLEL breaker off to reduce demand.<br><br>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.<br><br>See your dealer if problem persists.                                        |
| Generator will not start                           | Battery discharged or dead<br><br>Tried to start unit using remote starter at generator                                                                                            | Recharge or replace battery.<br><br>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<br><br>Ground fault interrupter tripped                                                                                                    | Switch breaker to ON.<br><br>Reset button on outlet and test                                                                                     |



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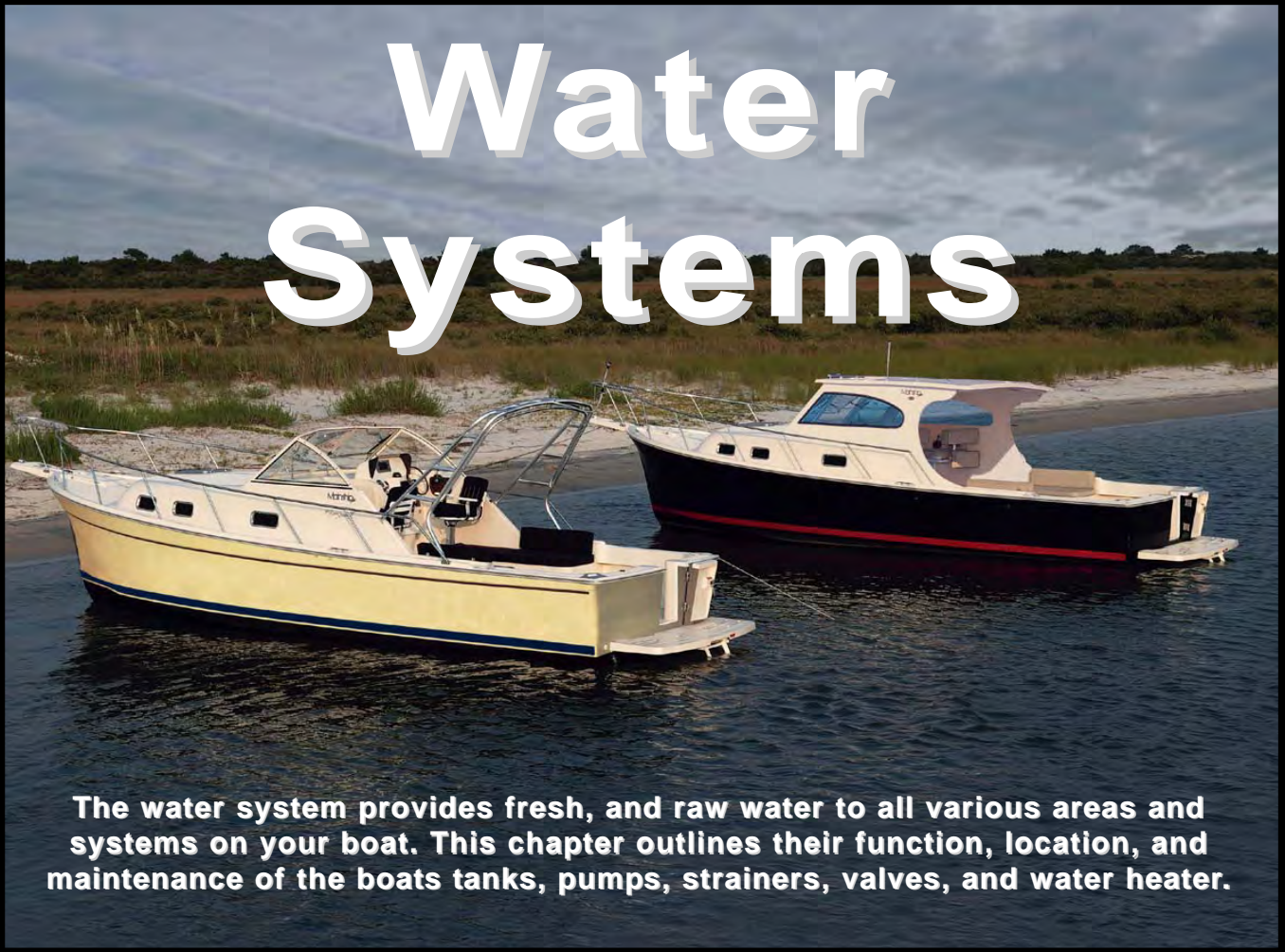
## TRAWLERS

AN EMPLOYEE OWNERSHIP COMPANY

# *30 Pilot II*

## *Chapter 9*

# Water Systems

A photograph of two Mainship 30 Pilot II boats on the water. The boat in the foreground is white with a blue stripe and a blue interior. The boat in the background is white with a dark blue stripe and a dark blue interior. They are both on calm water with a grassy shoreline in the background.

The water system provides fresh, and raw water to all various areas and systems on your boat. This chapter outlines their function, location, and maintenance of the boats tanks, pumps, strainers, valves, and water heater.



---

### Water System Components

---

The fresh and raw water systems consist of the following components:

Dockside Water Supply  
Fresh Water Tanks and Fills  
Fresh Water Pump  
Raw Water Pump / Washdown  
Live Well Pump  
AC Cooling Pump  
Raw Water Pickup and Strainer  
Head Pick-up  
AC Pick-up and Strainer  
Generator Cooling Pick-up and Strainer  
Engine Seacocks and Strainers  
Fixtures and Valves  
Water Heater

---

### 9.1 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 pumps. The dockside system is connected after the water pump which then will act as the check valve.

The dockside water inlet is on the port side next to the fresh and raw water faucet's. 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 pumps.

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 which is normally around 35 psi.

This dockside water does not fill the water tanks.

*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.*

---

#### 9.1.1 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.

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### 9.2 Water Tanks

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The fresh water system on the Mainship 30 Pilot II has a fresh water tank which holds 38 gallons, this tank has a fill located on the side. The vent is located on each side of the hull. A water line connects the tank to the fresh water pump. The pump is located in the Lazarette area.

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

#### 9.2.1 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.

### 9.3 Pumps

---

#### 9.3.1 Fresh Water Pumps / Washdown

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

The fresh water washdown connection is located aft of the cabin under the port gunwale. The washdown connection faucet is labeled "Fresh Water Washdown".

*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.*

#### 9.3.2 Raw Water Pump / Washdown

The raw water washdown faucet is situated next to the fresh water faucet under the port gunwale.

A pump in the lazarette area, next to the fresh water pump supplies raw seawater to this faucet.

##### 9.3.2.1 To use the raw water washdown:

1. Insure the breaker on the DC side of the control 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.

#### 9.3.3 Live Well Pump (option on fishing boats)

Your boat may be supplied with a live well system, which is made up of a live well tank, and a pump.

The sea water is held in the live well tank by an overflow tube that is mounted in the bottom of the tank. This keeps the sea water at a set level. When it is needed to drain the tank, the overflow tube can be removed by pulling upward, and out of the rubber grommet that it is mounted in. This will drain the tank.

#### 9.3.4 AC Cooling Pump

Your Mainship 30 Pilot II may be equipped with the optional air conditioner reverse cycle unit. This type of unit can heat or cool your boat.

The Air Conditioning system is made up of a pickup valve (or thru hull) (see underwater gear for its location), a sea strainer, an AC cooling pump, and the major compressors and air handlers.

To find the AC cooling pumps' location refer to the arrangement illustration at the end of this chapter or the Mechanical Arrangement at the end of the Boating Safety chapter.

The AC cooling pump relieves sea water from the pick-up and strainer and pumps it through the AC compressor to cool the compressor..

See the AC Electric Section for an explanation of the electrical controls of this system.

##### 9.3.4.1 To operate the air condition:

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 port side of the lazarette area, aft of the AC pump, in the bilge.
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 is located next to the MDP.

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

*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*

### 9.4 Pickups and Strainers

There are various pickups and strainers installed aboard your boat, here we will discuss the ones associated with the water systems.

#### 9.4.1 Strainers

Your boat is equipped with strainers that strain the raw water taken in the thru hulls or pickups 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. Next remove the "collector" or glass encasement that houses the screen. Remove any objects collected inside, and wash screen.

##### 1. Unscrew Wing Nuts



Fig 9.1

##### 2. Release coverlocks and open cover.



Fig 9.2

Pull out stainless filter



Fig 9.3

4. Clean filter and cylinder Replace in reverse of these procedures.



Fig 9.4

#### 9.4.2 Raw Water / Livewell Pickup and Strainer

The raw water and livewell systems share a pickup and strainer. These are both located in the bilge aft of the generator in the lazarette area.

#### 9.4.3 Head Pickup

The head pickup is installed if you have the electric head system installed aboard your boat. This is situated in the bilge under the access hatch on the deck forward of the entrance steps.

Since the head pickup is part of the waste system it is described in greater detail in the "Sanitary and Waste" Section of this manual.

## Chapter 9 - Water Systems

### 9.4.4 AC Pick-up and Strainer (Air Conditioning Option)

At the end of this section you will find an illustration of the AC cooling water arrangement. It is important to always insure that the intake valve (see mechanical arrangement in the Boating Safety Chapter as well) is always open before using the AC System.

If you purchased your boat with the air conditioning option you will find the documentation for the operation of this system in the Owner's packet of manufactures Owner's / Operators manuals.

### 9.4.5 Generator Cooling Pick-up and Strainer

The generator is an engine and just like the main engines it requires cooling water. Water is supplied to the generator through the intake and strainer 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.

### 9.4.6 Engine Seacocks and Strainers

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

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

#### WARNING

Hot coolant under pressure may boil or explode and cause burns or other personal injury when the pressure cap is removed. Allow the engine to cool, then open the cap slowly to allow any pressure to vent before completely removing the cap.

#### CAUTION

Before using any system that requires raw cooling water, insure that the intake valve is opened, and the strainers are not clogged. Section 9.4.1 illustrates the procedure for cleaning your strainers.

### 9.4.7 Water Heater

The fresh water pump supplies water to the water heater from the water tanks. A breaker on the AC side of the MDP 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 side of the MDP. If you are using the generator, move the slide bar up and switch on the PARALLEL circuit breaker.
3. Wait for the water in the tank to heat up, then use as you would at home.

#### WARNING

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

## 9.5 Fresh Water Manifold (if equipped)

Not all models are equipped with a fresh water manifold, but If your boat is equipped then this section will supply you with the information to operate and maintain this component.

The fresh water manifold is basically a diverter for the separate water systems aboard your boat. It has both a cold water and a hot water side to it, and is made up of a supply line that supplies the water to the manifold. The manifold is then separated into lines that feed the various systems.

Usually centrally located it allows the owner some control over which branches of the water system are being supplied.

On the next page you will find a photo guide to the Fresh Water Manifold with some instructions on it's use.

### General Fresh water Manifold Photo



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

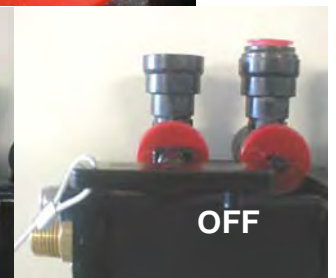
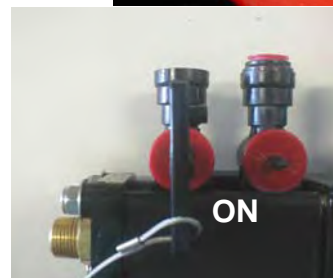
Cold Water inlet, notice cold side inlet has blue lines on outlet. Also valve is tagged with blue washer.

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 area's 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 insure that the valve stem is perpendicular to the water outlet line. Arrows (highlighted) on (see flow direction) show direction of flow.

Valve Key



Arrows show flow direction





## Chapter 9 - Water Systems

### Troubleshooting

| Problem                                     | Cause                                                                                                                  | Solution                                                                                                                                                                                                       |
|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Air in system                               | Tank empty                                                                                                             | Fill both water tanks.                                                                                                                                                                                         |
| Fresh water pumps cycle on and off          | Tank empty.<br>Blocked or pinched water lines.<br>Loose electrical connections.<br>Defective pumps.<br>Leak in system. | Refill.<br>Clear obstruction or straighten line.<br>Check connections; tighten as needed.<br>See your dealer for service.<br>See your dealer for service.<br>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.                                                                                                                                                                                          |
|                                             |                                                                                                                        |                                                                                                                                                                                                                |

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## TRAWLERS

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# *30 Pilot II*

## *Chapter 10*

# Waste and Sanitation

A photograph of two boats on a body of water. In the foreground, a yellow boat with a blue stripe is visible. Behind it, a dark blue boat with a red stripe is visible. The background shows a grassy shoreline under a cloudy sky.

This sections outlines the use care and maintenance of your boats sanitary systems as well as bilge pumps and waste systems.

## Chapter 10 - Waste and Sanitation

**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.**

### Sanitation Systems

Your Mainship 30 Pilot II has a sanitation and bilge system that is the cutting edge of sanitation. The components are designed to fit the most demanding environment. Some of the following components are listed in the Sanitation and Bilge Section:

- Head Systems
- Drains
- Pumps
- Holding Tank
- Washdowns
- Macerators
- Shower Sump

In this section we will break the systems down into a format to help you better understand how your systems work and what it takes to maintain them. These systems are further divided into four types of discharge; Gray Water, Black Water, Raw water and Gaseous discharges. The gray water system is comprised of waste that is not considered raw sewage; which is categorized as black water. Raw water is the cooling water that is taken in through pickups, etc. and discharged back. Gaseous discharges are your exhaust, or fuel vents. Parts of the sanitation systems are Drains / Discharges, Pumps, Holding Tanks / Sumps, the lines or hoses that feed or drain these systems and the components that make up the collective point for waste, and the access point for sanitation.

### 10.1 Drains / Discharges

Most drains are in the form of through hulls or overboard discharges. These fittings connect to a component or line that is routed from a collection point or point of waste origin. Any waste outlet that is gravity fed would be called a drain, likewise any that was fed by a pump would be called a discharge.

However waste is not limited to liquids, so an example might be the exhaust system on your engine or generator. This system disposes of the Carbon Monoxide gas through the exhaust system.

In this section we will cover all the types of drains and discharges aboard your boat, give you the details of how they work and the information so you can maintain these components.

#### 10.1.1 Through Hulls

There has to be a outlet or way to discharge the liquid waste. These are called through hulls, they are openings in the hull or sides of your boat with brass fittings. These are fitted to drain hoses and sized to be compatible with the system that they drain. At the end of this section you will find illustrations showing you the locations of your thru hulls and their specific function. The hoses that feed the through hulls on your boat are looped over the fitting, in order to prevent any water or waste to leak or drain back into your boat. Fig. 10.1 gives you a look at some through hulls.

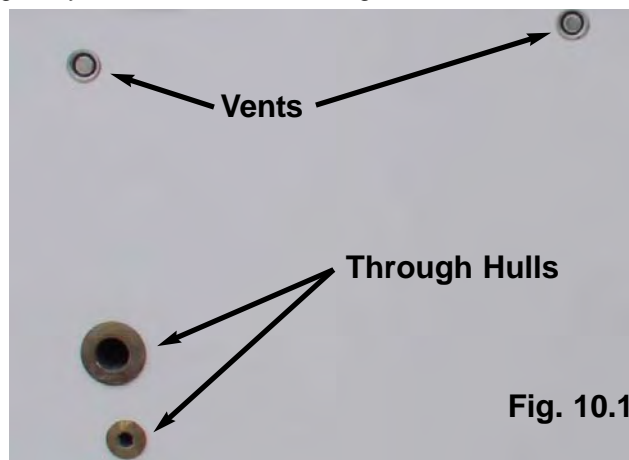


Fig. 10.1

Vents, also shown in Fig. 10.1 are another type of through hull and yet another type of waste disposal. These are limited to allowing over flow or air to escape the fuel, holding and water tanks aboard your boat. This is one way that gaseous waste products as well as in some instances liquids are disposed of. However you should always avoid using the fuel tank vent as a way to tell if your tanks are getting full when fueling. Fuel spills are a dangerous hazard. (See the Fuel Section of this manual).

Any waste outlet that is gravity fed would be called a drain, likewise any that was fed by a pump would be called a discharge.

#### 10.1.2 Overboard Discharge



Some discharges have valves associated with them, the black water, or raw sewage system from the head is one such system. Located near the macerator pump (discussed later in this section), is the Overboard Discharge Valve. This is a ball type valve in which the chopped solid waste from the holding tank is disposed of after passing through the macerator.

Basically all pumps are somewhat associated with the Waste / Sanitation system, but in this section we will focus on the pumps that are directly associated with the process of pumping waste overboard. The supply function of these pumps are discussed in other sections.

**Note: The Overboard Discharge Valve should remain closed at all times except when in use.**

### 10.2 Pumps

#### 10.2.1 Bilge Pumps

Probably the most important pump system on your boat is the bilge pump system. Your boat is supplied with three bilge pumps and one high velocity emergency bilge pump, all are part of the gray water system. This emergency bilge pump has the pumping capacity to clear over 2000 gallons a minute from your bilges, while your standard bilge pumps, the forward (fwd) the middle (mid) and the aft have a capacity of over 1000 gallons each.

We are concerned about your safety, you should review all information contained in this manual, as well as the manufactures manuals concerning all systems on your boat, but the bilge pump system will be one that is crucial to learn. These pumps have the function of clearing water from the bilges of your boat. You must ensure that they are kept clean and functionable in order for these pumps to complete that task.

#### 10.2.2 Emergency Bilge Pump

The emergency, or High Water Bilge pump is generally 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. Fig. 10.2 gives you a look at the emergency bilge pump aboard your boat.



Fig. 10.2

Should the water level rise above a high water mark, and the emergency bilge pump come 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 (Fig. 10.3), 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." Mainship has 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 chocked full of safety, and navigational information.



Fig. 10.3

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.

#### 10.2.3 The Fwd, Mid, and Aft Bilge Pumps

Basically these systems are identical except in the discharge hose routing and location. The function is the same. These pumps are located in the lowest parts of the bilge, the function of these pumps are to clear the water before it reaches the high water level.

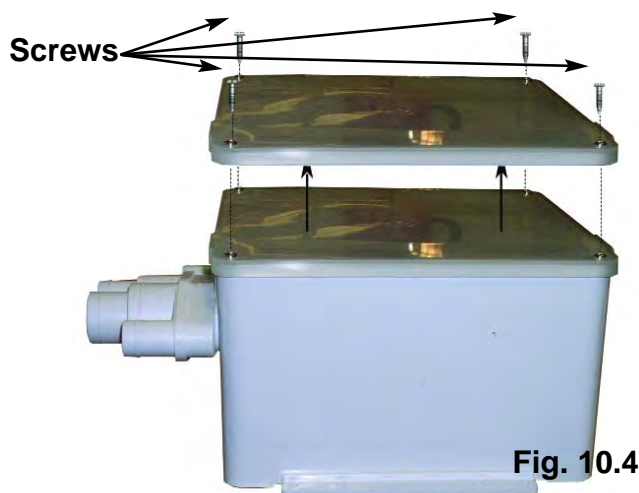
Careful maintenance should be made to these systems, to ensure they are always operational. Check the DC Electric Section or the Operation and maintenance subject of this section, to find the details about operation of these pumps, and details of how to manually run them.

#### 10.2.4 Shower Sump

## Chapter 10 - Waste and Sanitation

Another pump that incorporates the float switch / pump system is your shower sump pump. Due to the level of the shower drain, we have installed a pump system to rid the boat of water from your shower. The small holding tank also acts as a collection point for hair, and other waste materials that might get washed down the shower drain.

As in the bilge pumps, when the water reaches a certain level in the sump box the float energizes the pump and clears the water. Refer to the Operation and maintenance subject of this section for details on the servicing or maintenance of the shower sump. Fig. 10.4 shows you the sump pump and illustrates the disassembly for maintenance.



Later in this section we will discuss in greater detail the process in performing routine maintenance on your shower sump.

### 10.2.5 Macerator Pump

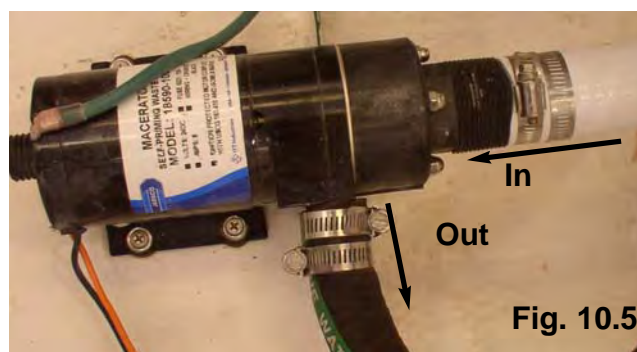
The macerator pump disposes of black water discharge, or raw sewage. This will be any material from the holding tank.

Your toilet pumps the material to your holding tank, then when you are in legal waters to dispose of the materials, you can remove the materials from your holding tank with the macerator pump. Refer to the Operations and Maintenance subject in this section to learn how to operate the macerator safely.

The macerator pump acts as a garbage disposal in your home. The pump contains “chopping wheels” that chop and grind the solid waste into pieces small enough to pass through the discharge hoses and the overboard discharge valve.

**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.**

Refer to the mechanical arrangement Illustration in the Boating safety section or the Sanitation arrangement at the end of this section for location information for the macerator pump. Fig. 10.5 is the image of the pump.



## 10.3 Other Waste Related Equipment

### 10.3.1 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 of exhaust being 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 very dangerous. Be sure to follow all guidelines concerning Carbon Monoxide.

### 10.3.2 Holding Tank

The holding tank on your boat is installed to hold black water waste until you can safely dispose or pump it overboard. Refer to the Arrangement Illustrations in the Boating Safety section or at the end of this section for location information about the holding tank. Refer to the Operations and Maintenance subject in this section to learn how to perform maintenance on your holding tank, or to learn how to pump it out.



**Remember: You must make sure it is legal to empty your holding tank in the waters you occupy. Some areas have restrictions on pumping out black water waste!**

### 10.4 Head Systems

All vessels with fixed toilets that are operated on the waterways of the United States and some foreign countries are required to be equipped with an operable Marine Sanitation Device (MSD). The Marine Sanitation System aboard your boat is a waste tank system, defined by the United States Coast Guard as a Type III System. Type III systems permit operation of the toilet without direct discharge of untreated waste after every flush. Type III systems can be discharged at a Marina, Dockside Pump-out stations or, if in coastal waters, at least three miles offshore.

**Note: Overboard discharge capabilities must remain inoperative while within the 3 mile limit. This is accomplished by closing the macerator discharge thru hull valve. Refer to the Mechanical arrangement Illustration in the Boating Safety Section, or the Sanitation Arrangement Illustration at the end of this section.**

Your boat is equipped with one of the following Marine Sanitation Systems, depending on the option you chose at the time of purchase:

- \* Vacu-flush Toilet
- \* Electric Toilet

#### 10.4.1 Vacu-flush System

Vacu-flush systems use a small amount of water (a little more than a pint) per flush in addition to a simple vacuum. The toilet is attached to a pressurized fresh water system. Fresh Water is the key to an odor free bathroom compartment. Vacu-flush toilets are equipped with an integral vacuum breaker which prevents the possible contamination of the potable water supply.

Vacuum energy supplied by a vacuum pump, is stored in a vacuum tank and is monitored to maintain a certain level. The vacuum pump is controlled by an electrical breaker switch, located on the main distribution panel. Refer to the electrical sections for more information about the electric panels and location of the switch. As the toilet is flushed vacuum energy is depleted and the vacuum pump will automatically activate and restore the

vacuum to the required level. The vacuum pump will operate approximately 30 to 90 seconds until the system reaches the required operating vacuum level. Toilet waste, both solid and liquid, are removed by the vacuum energy and water combination to the waste tank. The waste is stored in the waste tank until pump-out at a proper facility. On page 10.6, Fig. 10.6 you will find a schematic showing the pump route and equipment for the Vacu-flush Toilet system.

#### 10.4.2 Electric Head System

These heads are typically designed to use raw water. There is a discharge, between the toilet and the waste tank is a device called a macerator that is not totally unlike a blender or a garbage disposal--it purees solid waste & paper. Macerating heads require more flush water than any other type of toilet--a minimum of 1 gallon to 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 dual function pump which eliminates having to mess with hand pumps and dry bowl valves. With the simple push of a single switch, the self-priming flush pump rinses the bowl.

The toilet is controlled by a switch at the MDP. Refer to the electrical sections of this manual for more information about the MDP. Refer to the location illustrations in this section or the Boating Safety section for location information of your sanitation system.

On the following page you will find a general outline illustration for the Vacuum Head System (Fig. 10.6), and the Electric Head systems (Fig. 10.6). These illustrations will give you an idea about the components in the system and the routing of the waste lines.

#### 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 systems seals and hoses.**

Vacu-Flush System

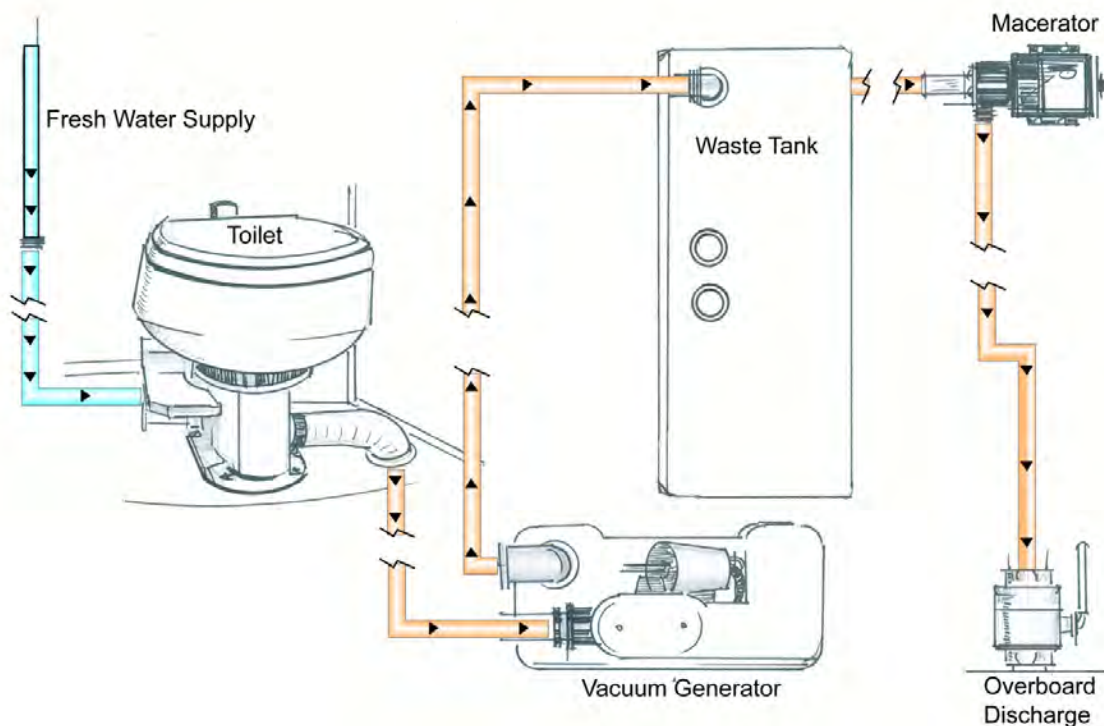


Fig. 10.6

Electric Head System

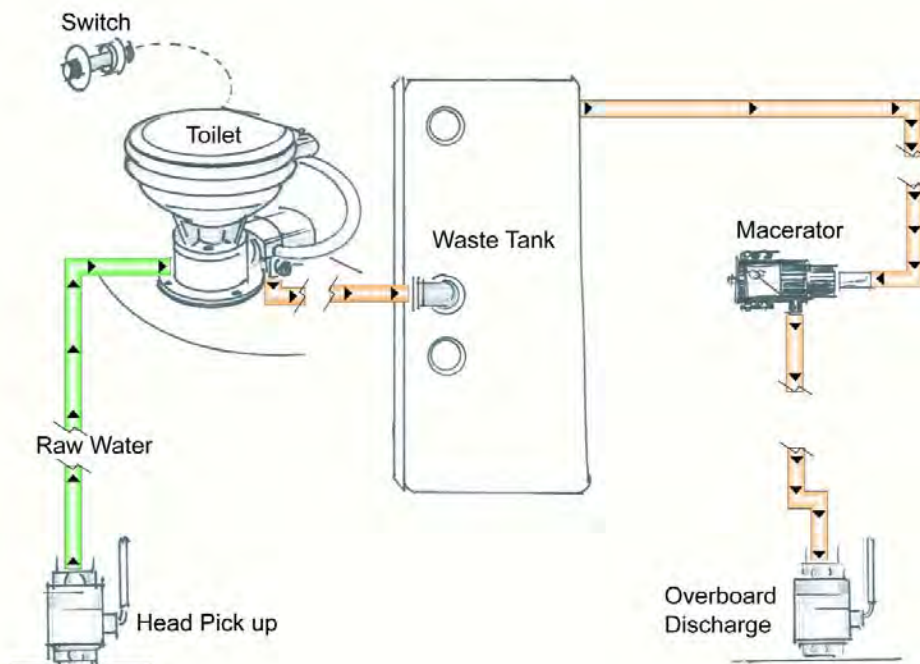


Fig. 10.7

### 10.5 Operations and Maintenance

This section details the systems operation and maintenance on the components or systems if applicable.

#### 10.5.1 Bilge Pumps

As we previously discussed in this section and in the DC Electric Systems Section, your boat has a total of four (4) bilge pumps. The Emergency or High Water Pump, and the fwd., mid., and aft. bilge pumps (3). We detailed the operations of these pumps in the DC Electric Section (Section 7) and can be found in subject 3.2.

Here are the steps mentioned in that subject:

##### 10.5.1.1 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.

##### 10.5.1.2 Maintenance on bilge pumps

No maintenance is required other than ensuring that the float switches are operational and that there is no debris clogging the pump intakes.

#### 10.5.2 Macerator Pump

##### CAUTION

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

##### 10.5.2.1 Operation

1. Open the overboard discharge valve (see the mechanical arrangement illustrations for locations)
2. Switch the "MACERATOR" breaker on at the DC Panel.
3. Allow the macerator to run until the holding tank is

empty, but no longer (see caution 5.2).

4. When you hear the pump speed up, indicating the the holding tank is empty, immediately switch the pump off.

5. Close the overboard discharge valve.

##### WARNING

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

##### WARNING

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

##### 10.5.3.1 Maintenance

No maintenance is required on your macerator pump.

*Helpful Hint: Should the macerator pump become clogged, you can manually rotate the internal grinder wheels by removing the small plastic cap on the back of the macerator pump. This encloses the screw which is attached to the grinding wheels and by inserting a flat screwdriver you can rotate the wheels and possibly remove any debris clogging the pump.*

#### 10.5.4 Shower Sump

The shower sump operation is automatic, there is an indicator light on the main distribution panel. When the indicator light is illuminated, the pump is operating.

##### 10.5.4.1 Maintenance

Fig 10.4 gives you an idea of how to remove the plastic cover on the shower sump. While no maintenance is required on the pump itself, you do need to ensure that the holding tank is clean and free of debris for the operation to be functional.

#### 10.5.5 Holding Tank

The holding tank must be cleaned or pumped out when it becomes nearly full. There are two methods for removing waste from the holding tank, either by pumping overboard in coastal waters, or by dockside pump-out at a waste facility.

### 10.5.5.1 Overboard Pump-out Operation

See the macerator operation guide Section 5.2.1 for instructions to pump-out the holding tank.

**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.**

### 10.5.5.2 Dockside Waste Removal

To remove waste from the holding tank at a dockside waste facility, insert the hose from the pump-out facility into the waste access on the coaming (Fig. 10.8) of your boat and follow instruction at the facility. Instructions from one facility to another may vary.



**Fig. 10.8**

### 10.5.5.3 Maintenance

Maintenance on the holding tank is best described as ensuring no methane gas is leaked and to keep odors down to a minimum. 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.

## 10.5.6 Toilets

### 10.5.6.1 Vacu-Flush Toilet Operation

1. Ensure the fresh water pump is energized and the system contains fresh water.

The operation of the vacu-flush head is performed by depressing the foot control lever at the base of the toilet. Consult your Owner's Packet for further instructions

concerning operation of the vacu-flush heads.

### 10.5.6.2 Vacu-Flush Toilet Maintenance

Performing maintenance on the toilet is much the same as in your home. In this case however, do not use any abrasive, or harsh chemicals.

### 10.5.6.3 Electric Toilet Operation

1. Ensure that the raw water system is operational.

Instructions for operating the electric head are mounted at the toilet, follow these carefully.

### 10.5.6.4 Electric Toilet Maintenance

Much the same as the vacu-flush, clean with mild cleaners, and consult your Owner's Packet for further instructions.

## Chapter 10 - Waste and Sanitation

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| Problem                 | Cause                                                                                                             | Solution                                                                                                                                                                                                                                |
|-------------------------|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Head not flushing       | HEAD breaker OFF<br><br>Head seacock closed<br><br>Battery charge low                                             | Switch breaker to ON. If breaker is tripped, determine cause and correct.<br><br>Open seacock.<br><br>Charge batteries                                                                                                                  |
| Head not emptying       | Blocked line to holding tank                                                                                      | Remove material from line                                                                                                                                                                                                               |
| Shower sump overflowing | Breaker OFF<br><br>Discharge line blocked<br><br>Pinched line<br><br>Defective float switch<br><br>Defective pump | Switch breaker to ON. If breaker is tripped, determine cause and correct.<br><br>Clear material from line<br><br>Straighten line.<br><br>Replace switch. See your dealer for service.<br><br>Replace pump; see your dealer for service. |



# Mainship<sup>®</sup>

## TRAWLERS

AN EMPLOYEE OWNERSHIP COMPANY

# *30 Pilot II*

## *Chapter 11*

# Engines and Transmissions

A photograph of two Mainship 30 Pilot II boats on the water. The boat in the foreground is white with a blue stripe and is angled towards the left. The boat in the background is dark blue with a red stripe and is angled towards the right. The background shows a grassy shoreline under a cloudy sky.

**This chapter is important for enjoyable and safe operation of your boat. It summarizes information about your boats engines, transmissions, and related equipment.**

**Troubleshooting guides are located at the end of the section.**

## Chapter 11 - Engines and Transmissions

The following is a list of components associated with your engines and transmissions:

- Engines
- Engine Controls
- Throttle Controls
- Engine Monitoring
- Engine Cooling
- Emergency Equipment
- Transmission
- Shifters and Controls

### 11.1 Engines

In accessing your engines you must locate the engine hatch handle in the engine hatch at the aft end and lift upward, as soon as the hatch starts to rise, gas shocks will take over and relieve the weight of the hatch. Fig 11.1 gives you a look at the hatch in the upward or open position.



Fig. 11.1

Once the hatch is open you can step down into the engine room onto the decking.

#### **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.

You will find your Mainship is equipped with a state of the art diesel engine. The engine drives a propeller through a transmission and a propeller shaft. The engine is started with controls at the helm using batteries as a power source.

Mounted on the engine is an alternator that keep the batteries charged.

*Important: Engines require air to operate. The air intakes are located at the port and starboard sides of*

*the cockpit. For this reason do not operate the engine or generator with this area obstructed.*



Fig 11.2 illustrates the way the air is passed to the engine room for the engines. There are air passages on both sides of the cockpit under the coamings.

*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 depend 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 engines. Do not exceed this rating. Check the manual for other information about maximum RPMs.

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.

Engines that are selected by Mainship are designed to meet or exceed industry standards set by marine engine manufacturers.

#### 11.1.1 Engine Controls

Situated at each helm station are your engine controls, these controls are your starter switches, your shut down switches and your audible alarms. At the end of this



## Chapter 11 - Engines and Transmissions

section you will find more information on the uses of these controls but now we will give you the information you need to locate and understand the uses of each control.

On the helm station you will find “start / stop” switches (fig. 11.3) for the engines.



**Fig. 11.3 Helm Engine Switches**

In this configuration (fig. 11.3) the operations are self explanatory one position is to start and the other is to stop the engines. If you have the configuration of a rocker switch being in the stop position (left open in the shown configuration), then that is the engine kill switch. The start switch will be a three position rocker switch in which the lower position will be the master “off” position which will shut power to all gauges, however this will not kill the engines. To stop the engines from running you must step backwards through the start-up procedures (located in the end of this section). In other words you must return the port switch (start / stop) to the center position, then kill the engines with the stop switch to the stbd side. Then you can return the main switch (start / stop) on the port side to the full off position. Anytime the start / stop switch is in the center position, you will hear an audible alarm. This is a normal operation. However if this alarm sounds while the engine is running, then there is a temperature, or an oil problem in the engine. See your engine manuals in the owners packet for more information, so that you can have a problem free voyage.

### 11.1.2 Throttle Controls

You are connected to your engine, via an electronic Throttle / Shift lever at the helm.

The control has three positions, Forward (Fwd), Neutral, and Reverse. There is also a control button on the lever in which you must press to take control of your boat. See your manufactures documentation for info.

Also see the helm layout in the DC Chapter of this manual for location of the lever.

### **CAUTION**

**Do not shift from Fwd, into Reverse while the engine is running. To do so may damage the transmission.**

### 11.1.3 Engine Monitoring

Your engines are monitored with gauges located at each helm station. Normally gauges are labeled according to the function that they serve.

The TACHOMETER tells you how fast the engine is turning in RPMs (revolutions per minute). Multiply the reading by 100 for actual engine speed. The “tachs” may not read zero when the engine is off. Refer to the engine manual for the maximum RPM rating established by the engine manufacture.

The OIL pressure gauge indicates the pressure of the engine oil. The engine manual specifies a safe oil pressure rating for the engines.

The TEMP gauge indicates the temperature of the engine coolant. The engine manual specifies a safe operating temperature for your boat’s engine.

The FUEL gauge indicates the amount of fuel in the fuel tank.

The engine Hourmeter records engine operating time in hours.

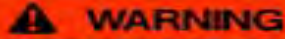
The VOLT meter indicates battery status. Readings below 11 volts indicate a low battery charge or a heavy load on the battery. (A heavy load means that many systems and components are operating off the battery). If you do not plan to use your boat for a time, keep the batteries charged. If you are connected to shore power, leave the battery charger on. Otherwise, turn on the engine periodically. Readings between 12 and 14 volts indicate that the condition of the battery is good. Readings above 14 volts are normal when you have increased engine speed. If this high reading continues for more than 15 minutes, have your dealer check the regulator.

For information on the correct levels for engine running, please consult your engine owner’s manuals from the engine manufacture 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



**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.**

There are two separate systems that cool your engines. 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 manufacture, 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 fig. 6.1, Underwater Gear chapter 6). The illustration demonstrates the flow of the raw water. The water is then discharged out the shaft log.

### 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 manufacture to insure you will know what the alarm means should one sound on your boat.

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 and

maintenance.

With respect to transmission control, the lever has three relative positions: FORWARD(Fwd), NEUTRAL (center), and REVERSE (back). The neutral position has a detente positioning pin. You can feel the pin drop into the detente when a lever is in exact neutral. A safety switch allows you to start the engine only when the lever is in the neutral position.

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## 11.2 Transmissions

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### 11.2.1 Shifters

You are connected to your transmission electronically via the shift controls at the helm stations. With respect to transmission control, the shifter has three relative positions: FORWARD(Fwd), NEUTRAL (center), and REVERSE (back). The neutral position has a detente positioning pin. You can feel the pin drop into the detente when a lever is in exact neutral. A safety switch allows you to start the engine only when the lever is in the neutral position.

In the Underway Chapter, (chapter 12) you will find instructions on starting your engines. Also detailed in the manufactures 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 detente until the starter kicks in. Have your Mainship 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 Operations and Maintenance

#### 11.3.1 Hydrolock

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 or 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.*

**Engine manufacturers do not warranty items damaged by hydrolock!**

If vessel is in rough seas and rocking back and forth it is possible that the outlet could become immersed and the exhaust line flooded



Fig. 11.5

Then as the vessel pitches down at the bow some of this water drains into the muffler



The high water level plus the surging action caused by the rocking motion can result in water entering the exhaust header.

#### 11.3.2 Engine 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 needed action. Inspect your boat's exhaust system frequently, or have a qualified service person service the system to insure that there are no leaks.



## Chapter 11 - Engines and Transmissions

| Troubleshooting             |                                  |                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Problem                     | Possible Cause                   | Solution                                                                                                                                                                                                                                                                                                                                   |
| Engine not starting         | No fuel reaching engine          | <p>Fuel tank vent blocked. Clean hose and fitting to remove material. Make sure hose is not pinched.</p> <p>Fuel line obstructed. Check fuel lines. Make sure line is not pinched.</p> <p>Clogged engine fuel filter. Refer to engine manual for instructions on cleaning filter.</p> <p>Fuel supply valve closed at tank. Open valve.</p> |
|                             | Improper starting procedures     | Review starting procedures in engine manual.                                                                                                                                                                                                                                                                                               |
|                             | Contaminated fuel                | Inspect for water or other contaminant's 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 detente 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.                                                                                                                                                                                                                                                           |
|                             | Hydrolock                        | Replace switch.                                                                                                                                                                                                                                                                                                                            |
|                             | Jammed "starter drive"           | See instructions in this Section under "Hydro-Lock." See your dealer immediately.                                                                                                                                                                                                                                                          |
|                             |                                  | Loosen starter motor; then free stuck gear                                                                                                                                                                                                                                                                                                 |
|                             |                                  |                                                                                                                                                                                                                                                                                                                                            |

## Chapter 11 - Engines and Transmissions

| Problem                                                 | Possible Cause                        | Solution                                                                                                |
|---------------------------------------------------------|---------------------------------------|---------------------------------------------------------------------------------------------------------|
| 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 engine temperature                   | Cooling water intake system blocked   | Clean seacock strainer.                                                                                 |
|                                                         | Water intake hose leaking or ruptured | Remove material blocking line.<br>Replace hose.                                                         |
|                                                         | 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.                                                       |

## Chapter 11 - Engines and Transmissions

| Problem                    | Possible Cause                                                                                                                                                                   | Solution                                                                                                                                                                                                    |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Excessive vibration        | Loose engine mounting bolts<br>Engine not timed properly or misfiring<br>Engine-to-shaft couplings out-of-round or off center<br>Engine misaligned<br>Worn strut or transmission | Inspect and tighten as required.<br>See your dealer for service.<br>See your dealer for service.<br>See your dealer for service.<br>Replace bearings if needed. See your dealer for service.                |
| Poor performance           | Boat overloaded<br>Weight poorly distributed<br>Excess bilge water<br>Damaged or incorrect propeller<br>Fouled or damaged hull bottom<br>Engine misaligned                       | Reduce load.<br>Distribute weight evenly. Trimming may help.<br>Pump out water; check for leaks.<br>Inspect propeller. Replace if necessary.<br>Inspect, clean, or repair.<br>See your dealer.              |
| Low cranking speed         | Loose or dirty electrical connections or damaged wiring<br>Low battery charge<br>Defective battery<br>Engine oil too heavy for prevailing temperatures                           | Check all related electrical connections and wires.<br>Charge battery.<br>Replace battery.<br>Drain oil and refill with correct grade and 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.<br>See solutions under "Engine Overheating" problem.                                                                             |
| Excessive fuel consumption | Restriction in air filter                                                                                                                                                        | Remove filter and clean or replace.                                                                                                                                                                         |

## Chapter 11 - Engines and Transmissions

| Problem                  | Possible Cause                              | Solution                                                                                                           |
|--------------------------|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| No 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.                                                                            |

# Mainship<sup>®</sup>

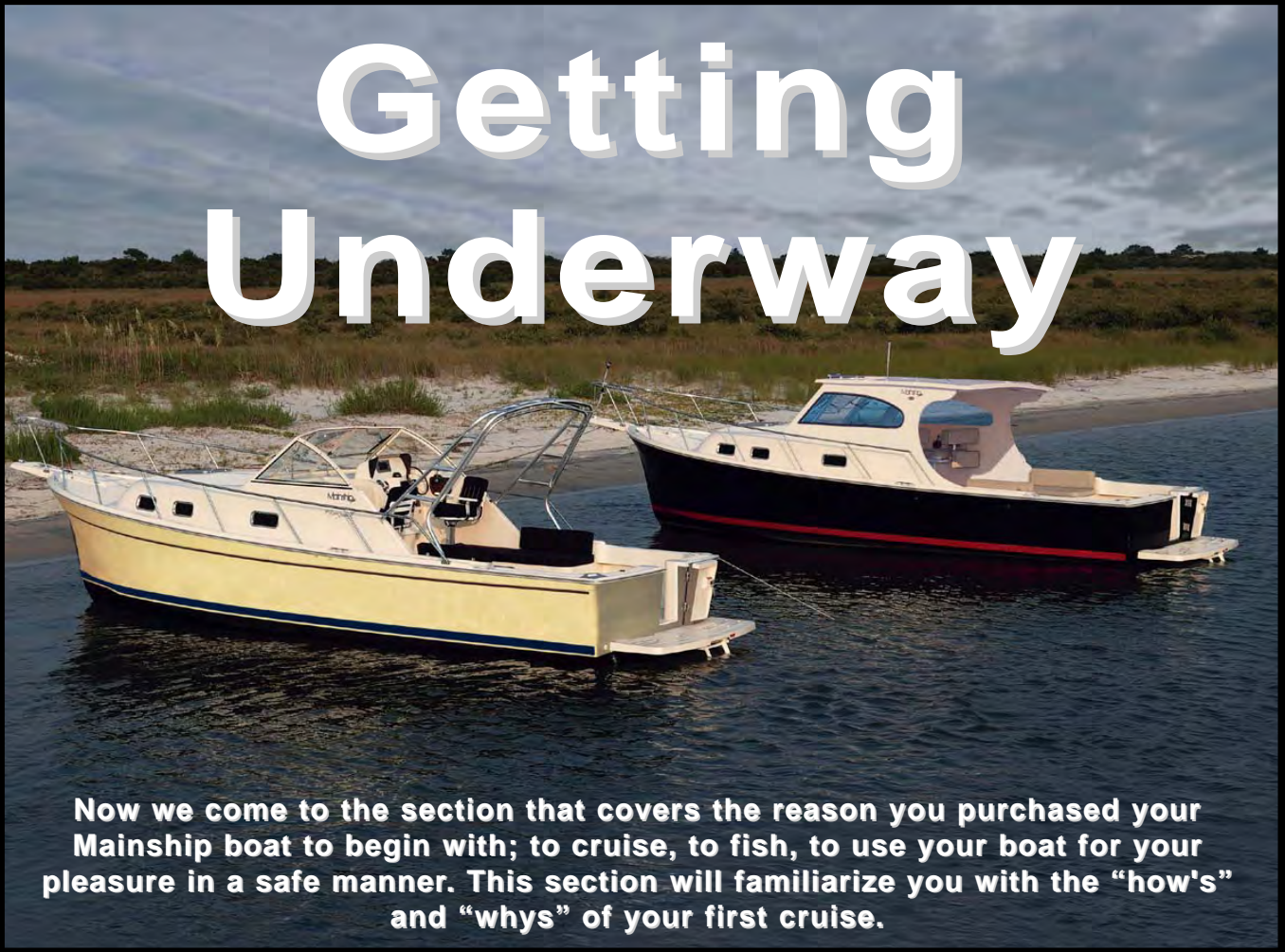
## TRAWLERS

AN EMPLOYEE OWNERSHIP COMPANY

# *30 Pilot II*

## *Chapter 12*

# Getting Underway

A photograph of two Mainship 30 Pilot II boats on the water. The boat on the left is white with a blue stripe, and the boat on the right is white with a dark blue stripe. They are both equipped with outboard motors and are positioned near a sandy beach with some vegetation in the background.

Now we come to the section that covers the reason you purchased your Mainship boat to begin with; to cruise, to fish, to use your boat for your pleasure in a safe manner. This section will familiarize you with the “how’s” and “whys” of your first cruise.



### Underway

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 manuals 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 a 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 functionality of these important systems.

#### 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

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 \_\_\_\_\_ (fire dept, or 911); (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 tech. 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.

After insuring that there are no hazards, damages, or alarms you may board your boat.

#### 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 or 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

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## Chapter 12 - Getting Underway

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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 engines 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.

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## 12.2 Starting the engines

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First turn power at the battery switches to the on position, energizing the Battery Switch Panel (detailed in the DC Electric chapter). Make sure that 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 (MDP), turn the battery switch to the “on” position. Switch engine breaker and helm breaker to ON.

Check that bilge pumps are working by switching breaker for each pump to MANUAL (OFF) position.

Check out the following bridge equipment and accessories:

Navigation lights

Horn

Throttle and shifters for smooth operation

Steering system ease of operation

Check engine oil level. Refer to the engine manual for instructions. Add oil if needed.

Check the seawater intakes that feed propulsion equipment

Check the coolant level

### 12.2.1 Running the engines

Now it's time to start the engines, this is accomplished by the following procedures:

First move the throttle to the idle position, and insure that the shift levers are in neutral. A neutral safety switch prevents the engines from starting when the transmission is engaged, or in gear.

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 engines have 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 engines.

Next hold down the control button on the shift control, to “take command” of the engine at this control. When the light stops blinking you now have command of the engine.

After checking the DC gauges, then start each engine with the start switch.

Once the engine starts and the oil pressure builds the alarm will cease. If not shut down the engines and check your oil levels, if normal seek the help of a professional mechanic.

As the engines warm the temp gauge will start to rise, watch the gauge and make sure that the engines do not run hot.

Once the engines come up to operating temp. (check manufactures recommendations for correct temp.) move the shift lever to Fwd. and Reverse to make sure that the transmission will engage.

Now shut down the engines and recheck your oil and transmission fluid levels.

## Chapter 12 - Getting Underway

*Important: Always be careful when starting the engines. Use common sense and good judgment. Shut down the engines 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.*

### WARNING

In order to prevent premature fuel pump failure, do not continuously crank engine starters for more than 10 seconds.

### WARNING

DO NOT remove cooling system filler 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 engines immediately if any exhaust leaks are detected.

*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 engines reach operating temperature, accelerate engines to 2000 RPMs. Check that voltmeters read 13 to 14.5 volts. Move throttle back to idle position.

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 engines 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 (RPMs).

### 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 gauge drops below 1/4 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

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## Chapter 12 - Getting Underway

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Turning radius at different speeds  
Response to steering at low 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 RPMs stated in the operating manual for the engines. Efficiency will decrease if you do not care for and maintain them properly. If the engines are 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°F to 130°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, engines, and other components. If underwater gear is damaged, avoid operation of the boat, and have it repaired as soon as possible.

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## 12.4 Emergency Operations

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### 12.4.1 Low Battery Voltage (For twin engine configuration)

Should you find yourself in a position where one battery has too low voltage to start the engine, it is still possible to start with parallel starting.

Parallel starting actually links power from the opposite battery to supply the engine with the low voltage.

To start an engine using parallel starting, with one engine running, simply hold down the parallel start button for the engine that has the low voltage (port switch for port engine stbd. switch for stbd engine), while holding the parallel start button press the start button for that engine.

If you find that you have too low voltage in both batteries then it will be necessary for you to shut down the engines completely and start your generator, or connect to shore power to recharge your batteries, be sure and turn on the battery charger.

#### WARNING

During charging batteries produce gases 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 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.

### 12.4.2 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 engines activates this light. Check this light every time you start the engines. It shows that the system is charged and ready to operate.

## Chapter 12 - Getting Underway

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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 15

**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.



### 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.

minutes.

\*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.

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### 12.5 Returning to Port

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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.



# Mainship

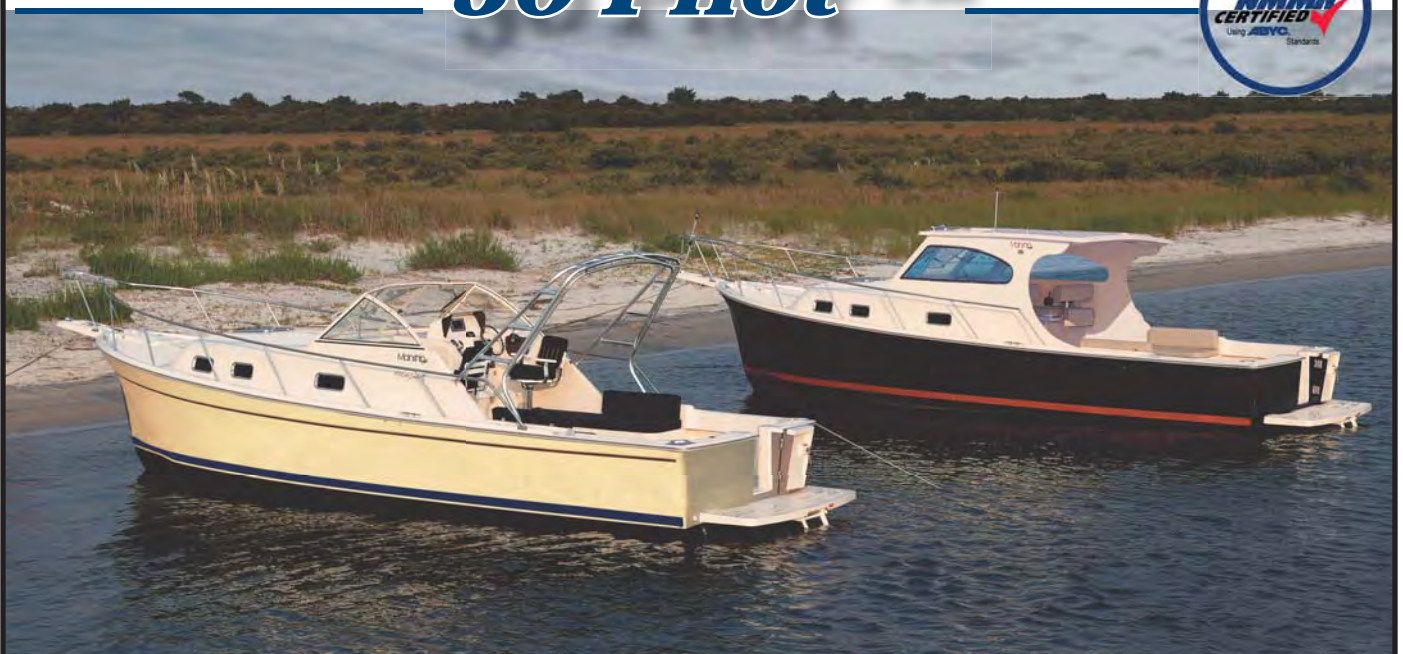
## TRAWLERS

AN EMPLOYEE OWNERSHIP COMPANY

*Chapter 13*

# *Maintenance*

*30 Pilot <sup>TM</sup>*



## 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**

"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

### 13.1.2 Recommended Maintenance Materials

We recommend that you carry the following on board your yacht:

- Plastic marine tape
- Instant glue
- Silicone rubber
- Electrical tape
- Two-part epoxy adhesive
- Engine oil
- Spray lubricant

### 13.1.3 Recommended Spare Parts

We recommend that you carry the following spare parts on board your yacht:

- 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.

## 13.1 Maintenance Materials

Following is a list of tools we recommend that you carry on board your yacht. 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

## 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 nec-

essary.

#### \*\* 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

Rinse the SS rails and SS hardware after cruising. Polish them periodically to prevent salt water corrosion.

\*\* Follow these procedures to clean stainless steel:

\* 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.

### 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.*



**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.)**

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### 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.*

### 13.2.11 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.

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## 13.3 Interior

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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.*

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## 13.4 Mechanical Systems and Components

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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.



**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 flare fittings and flare 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 one 12V deep cycle, heavy duty battery for each engine 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.**

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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.

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### 13.5 Periodic Maintenance

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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.

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### 13.6 Storage and Lifting

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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.*

### 13.6.3 Draining Your Boat

Your boat has bilge pumps for draining water from the bilges. Some compartment 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.

### 13.6.2 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.

### 13.6.3 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.

### 13.6.4 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.

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### 13.7 Fitting out after Storage

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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.



# Mainship<sup>®</sup>


## TRAWLERS

AN EMPLOYEE OWNERSHIP COMPANY

# *30 Pilot II*

## *Chapter 14*

# Glossary

A photograph of two Mainship 30 Pilot II boats on the water. The boat on the left is white with a blue stripe, and the boat on the right is white with a dark blue stripe. They are both equipped with outboard motors and are positioned near a sandy beach with some vegetation in the background.

As you read this manual, you will encounter many descriptive terms unique to seamanship and boating. This section defines these terms as they are used in this manual.

## Chapter 14 - Glossary

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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.

## Chapter 14 - Glossary

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**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 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.

## Chapter 14 - Glossary

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**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.

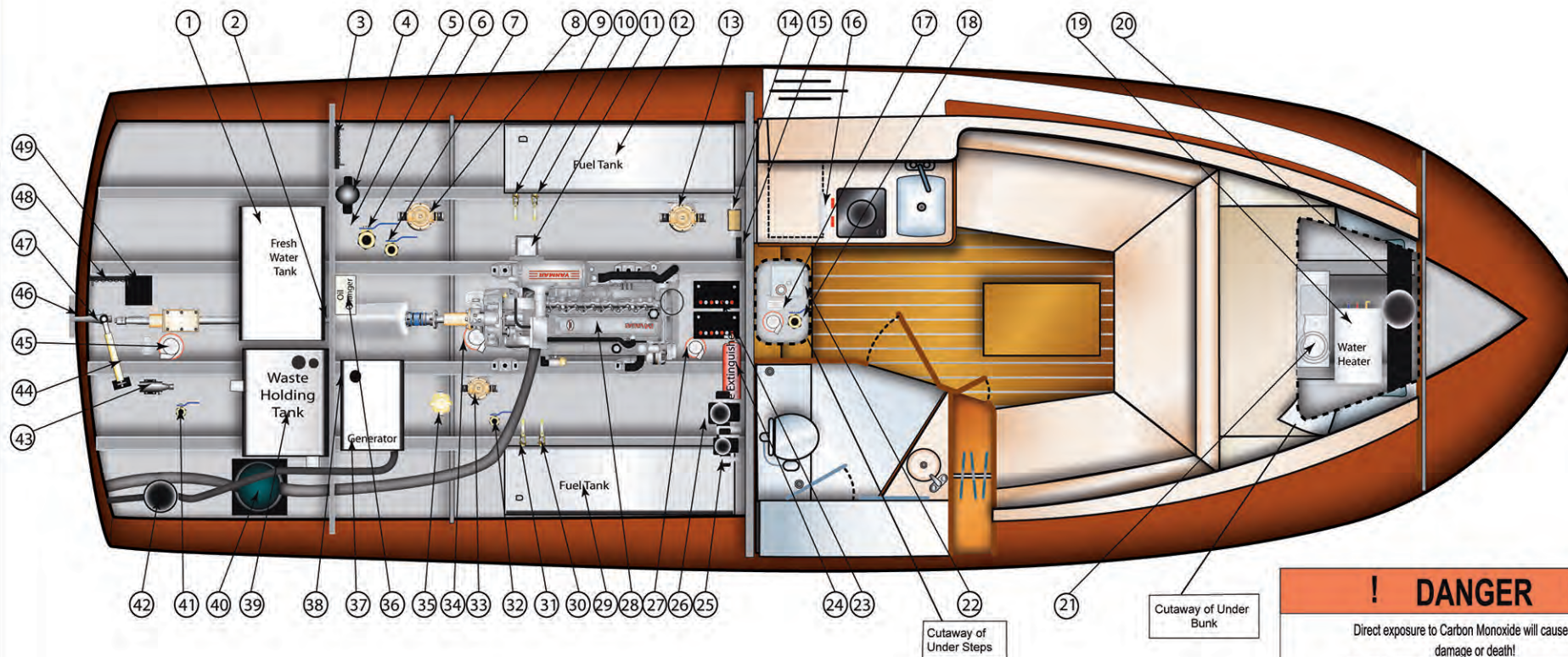
**Weather deck** - A deck with no overhead protection.

**Windlass** - A device used to raise and lower an anchor.



# Mainship 30 Pilot II

## Mechanical Arrangement



| Item # | Description              |
|--------|--------------------------|
| 1      | Fresh Water Tank         |
| 2      | Generator Battery Switch |
| 3      | Bonding Block            |
| 4      | Fresh Water Pump         |
| 5      | Engine Room Light        |
| 6      | Main Engine Seacock      |
| 7      | AC Intake Valve          |
| 8      | Engine Intake Strainer   |
| 9      | Crossover Fuel Valve     |
| 10     | Engine Supply Valve      |
| 11     | Fuel Filter              |
| 12     | Port Fuel Tank           |
| 13     | AC Strainer              |
| 14     | AC Pump                  |
| 15     | Battery Charger          |
| 16     | Battery Switch           |

| Item # | Description                     |
|--------|---------------------------------|
| 17     | Fwd Bilge Pump                  |
| 18     | Head Pick-up                    |
| 19     | Water Heater                    |
| 20     | Bow Thruster                    |
| 21     | AC Compressor                   |
| 22     | Shower Sump                     |
| 23     | Batteries                       |
| 24     | Halon System                    |
| 25     | Head Blower                     |
| 26     | Engine Room Blower              |
| 27     | Mid Ship Bilge Pump             |
| 28     | Engine                          |
| 29     | Stbd Fuel Tank                  |
| 30     | Stbd Cross Over Fuel Valve      |
| 31     | Generator Fuel Supply Valve     |
| 32     | Generator Cooling Water Pick-up |

| Item # | Description                |
|--------|----------------------------|
| 33     | Generator Cooling Strainer |
| 34     | Aft Bilge Pump             |
| 35     | Generator Fuel Filter      |
| 36     | Oil Changer                |
| 37     | Generator                  |
| 38     | Engine Room Light          |
| 39     | Waste Holding Tank         |
| 40     | Muffler                    |
| 41     | Macerator Discharge        |
| 42     | Generator Muffler          |
| 43     | Macerator Pump             |
| 44     | Steering Assembly          |
| 45     | Emergency Bilge Pump       |
| 46     | Zinc Block                 |
| 47     | Rudder Assembly            |
| 48     | Bonding Block              |
| 49     | Trim Tab Pump              |

### ! 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!

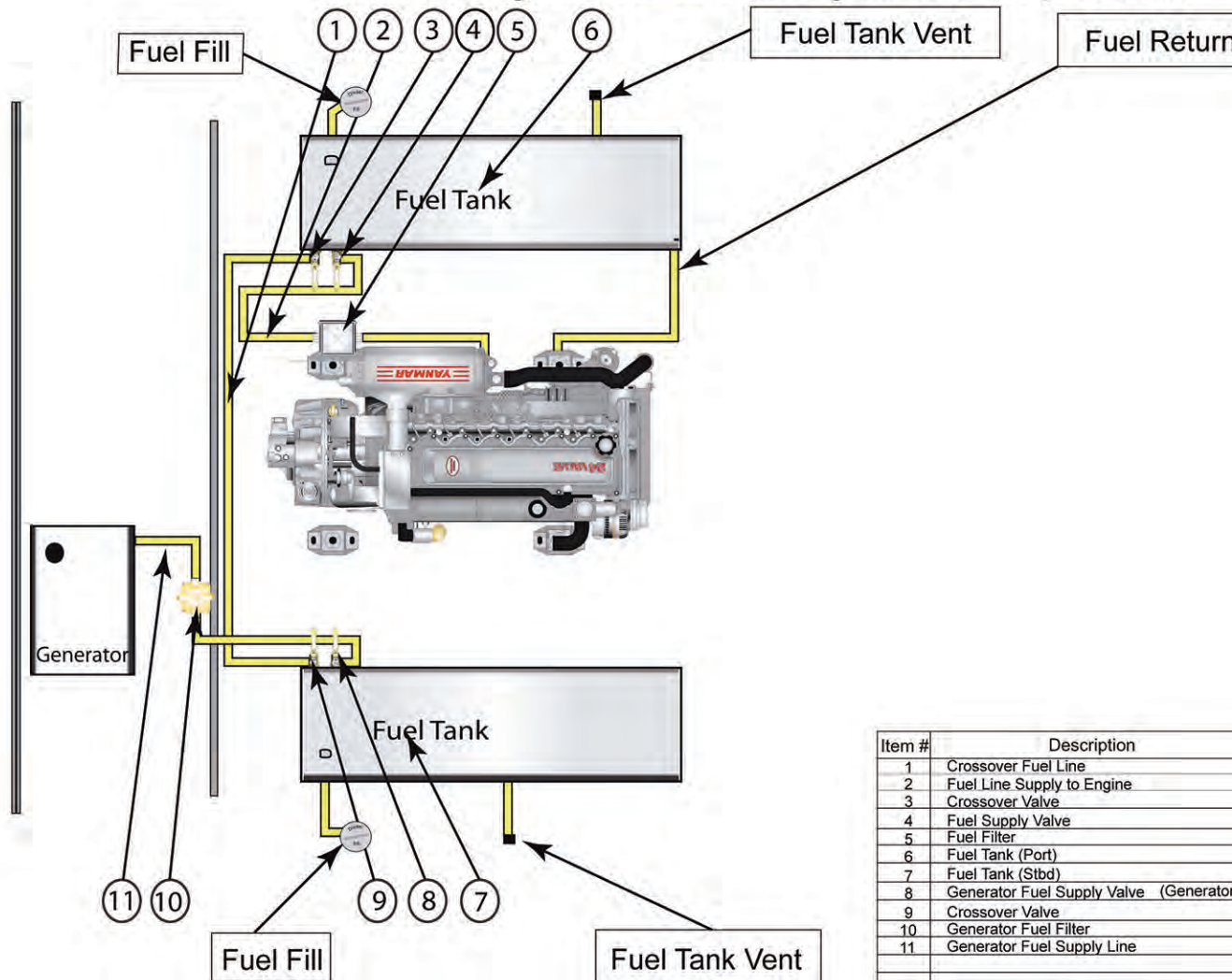
Keep cabin and cockpit well ventilated!

See Owner's / Operator's Manuals for more details!



# Mainship 30 Pilot II

## Fuel System and Fuel System Components



| Item # | Description                                  |
|--------|----------------------------------------------|
| 1      | Crossover Fuel Line                          |
| 2      | Fuel Line Supply to Engine                   |
| 3      | Crossover Valve                              |
| 4      | Fuel Supply Valve                            |
| 5      | Fuel Filter                                  |
| 6      | Fuel Tank (Port)                             |
| 7      | Fuel Tank (Stbd)                             |
| 8      | Generator Fuel Supply Valve (Generator Opt.) |
| 9      | Crossover Valve                              |
| 10     | Generator Fuel Filter                        |
| 11     | Generator Fuel Supply Line                   |
|        |                                              |
|        |                                              |
|        |                                              |
|        |                                              |
|        |                                              |
|        |                                              |

### Warning!

Leaking fuel is a fire and explosion hazard; personal injury or death could result!

Inspect your system for leaks at least once a year!

Never use a match to inspect for fuel leaks!

Never try to clean up a fuel spill with a vacuum or wet vac! Always use a pre-approved soaking cloth or agent.

Always run blowers for at least four minutes before starting any engines.

Never operate your boat if a fuel leak is present.

While fueling a spark caused by static electricity could result in fire or explosion, which could cause personal injury or death!

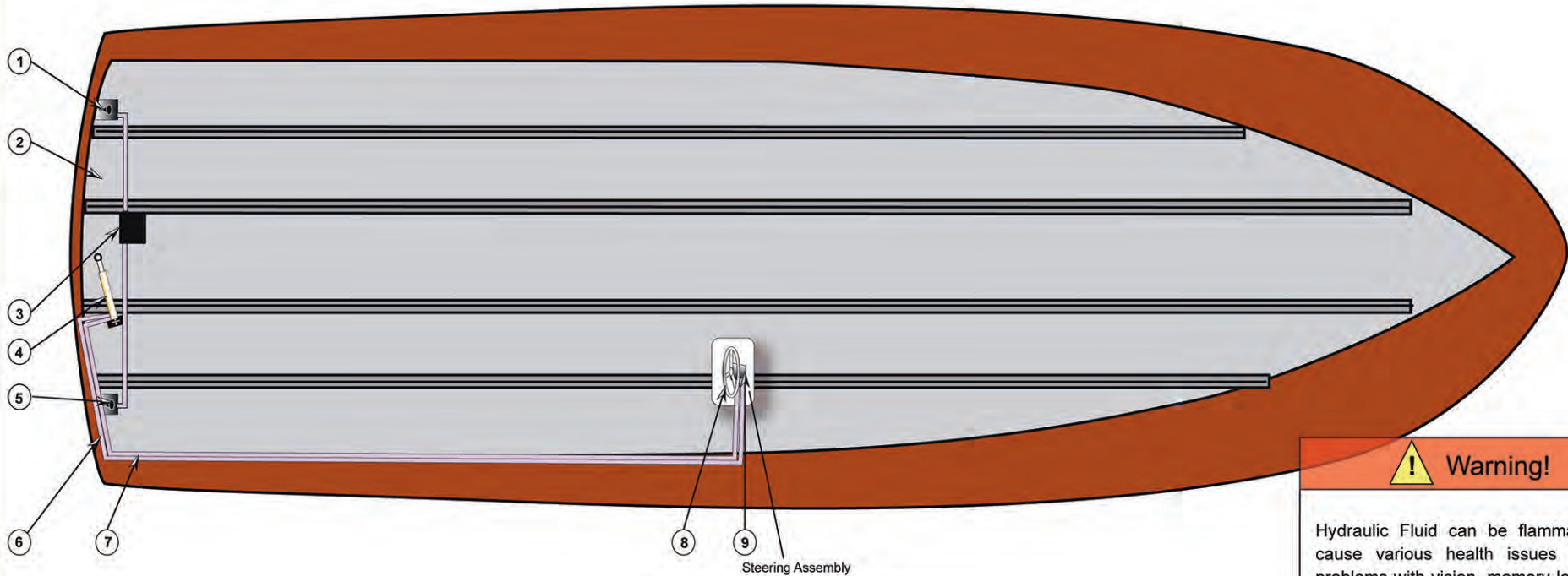
Burning fuel creates Carbon Monoxide; a deadly gas. See the Boating Safety Chapter for information about how to reduce Carbon Monoxide aboard your boat

### Caution

Using the wrong type of fuel will result in severe damage to the engines.

# Mainship 30 Pilot II

## Hydraulic System



| Item # | Description                 |
|--------|-----------------------------|
| 1      | Port Trim Tab               |
| 2      | Port Trim Tab Supply Line   |
| 3      | Trim Tab Pump               |
| 4      | Steering Ram                |
| 5      | Stbd. Trim Tab              |
| 6      | Supply Line Steering (Port) |
| 7      | Supply Line Steering (Stbd) |
| 8      | Steering Wheel              |
| 9      | Helm Pump                   |
|        |                             |
|        |                             |
|        |                             |
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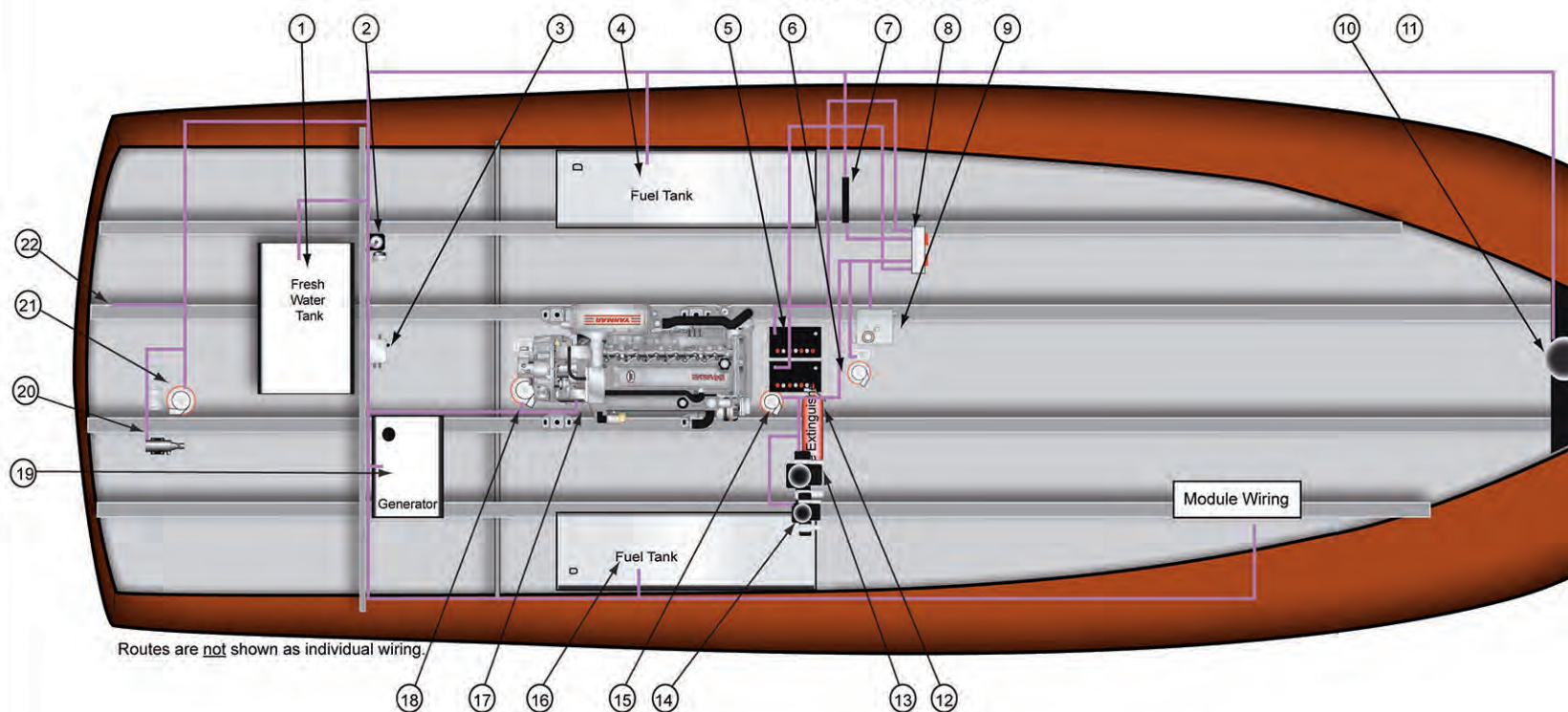
### Warning!

Hydraulic Fluid can be flammable and cause various health issues including problems with vision, memory loss, tremors, dizziness, difficulty speaking, and disorientation – were related to exposures on the job to fumes from hydraulic fluid. The fluid contained an organophosphate. Organophosphates are used to improve lubricating quality, but they have been used also as insecticides and can damage the nervous system.



# Mainship 30 Pilot II

## DC Electric



Routes are not shown as individual wiring.

|    |                  |    |                           |
|----|------------------|----|---------------------------|
| 1  | Fresh Water Tank | 12 | Fire Extinguishing System |
| 2  | Fresh Water Pump | 13 | Engineroom Blower         |
| 3  | Oil Changer      | 14 | Head Blower               |
| 4  | Fuel Tank Gauge  | 15 | Mid Bile Pump             |
| 5  | Batteries        | 16 | Fuel Tank Gauge           |
| 6  | Fwd Bilge Pump   | 17 | Engine                    |
| 7  | MDP              | 18 | Emergency Bilge Pump      |
| 8  | Battery Switch   | 19 | Generator                 |
| 9  | Shower Sump      | 20 | Macerator                 |
| 10 | Bow Thruster     | 21 | Aft Bilge Pump            |
| 11 | Windlass         | 22 | Trim Tab Pump             |

**Notice!**  
Wiring routes are subject to change! This depends upon the availability of certain components or systems. Never attempt to repair or change electrical components or systems aboard your boat, Unless you are completely qualified to do electrical repairs or changes.

### Warning!

Fuel Fumes in the engine compartment can explode. Before working on any electrical wiring, ventilate the engine compartment and disconnect the batteries to prevent sparking.

Never use an open flame in a battery storage area.

Batteries can explode if a spark or flame ignites the free hydrogen given off during charging.

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

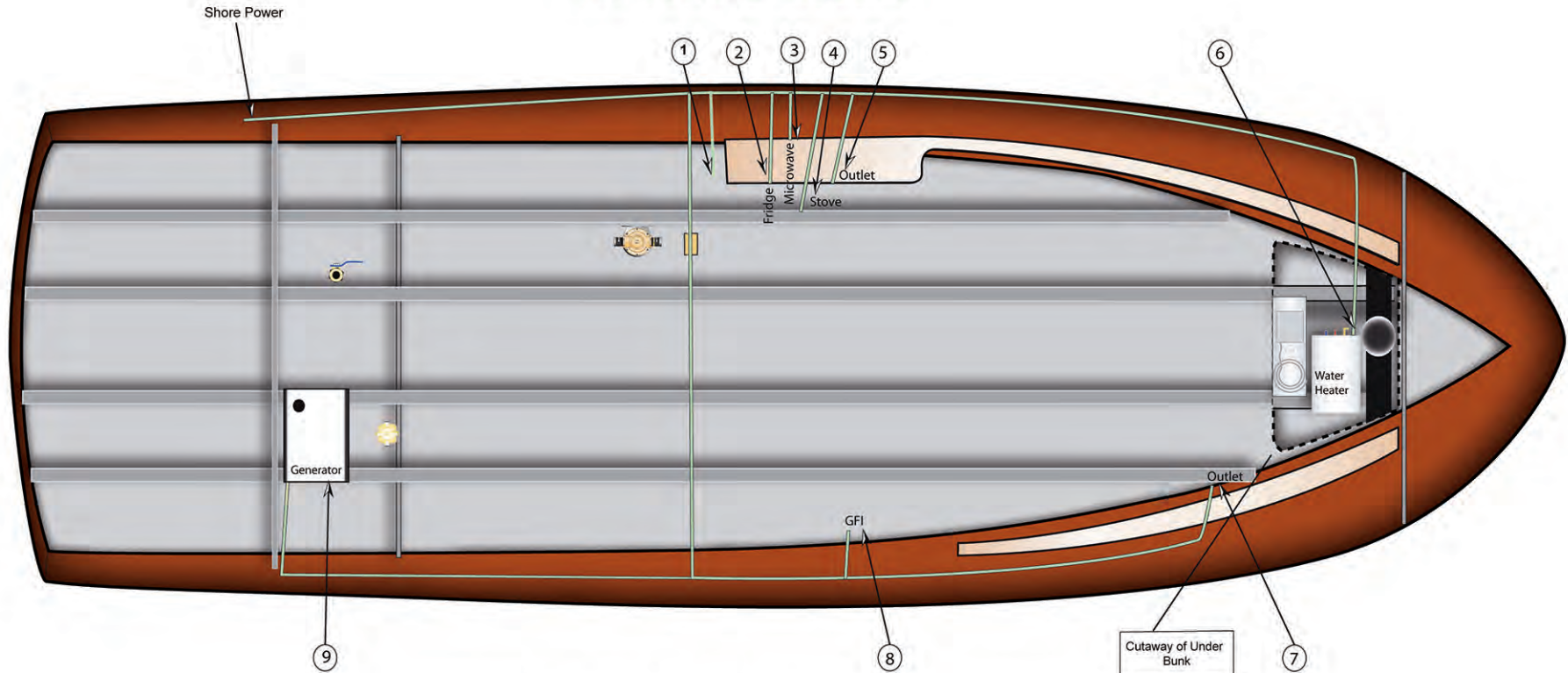
### Caution!

Never reset a breaker which has been tripped without first correcting the problem. Electrical system devices can be damaged and be faulty which can cause fire. Always correct the problem causing the tripped breaker before re-energizing.

Alterations or extensions to the electrical system can cause electrical shock or fire.

## Mainship 30 Pilot II

## 110 Volt AC Electric

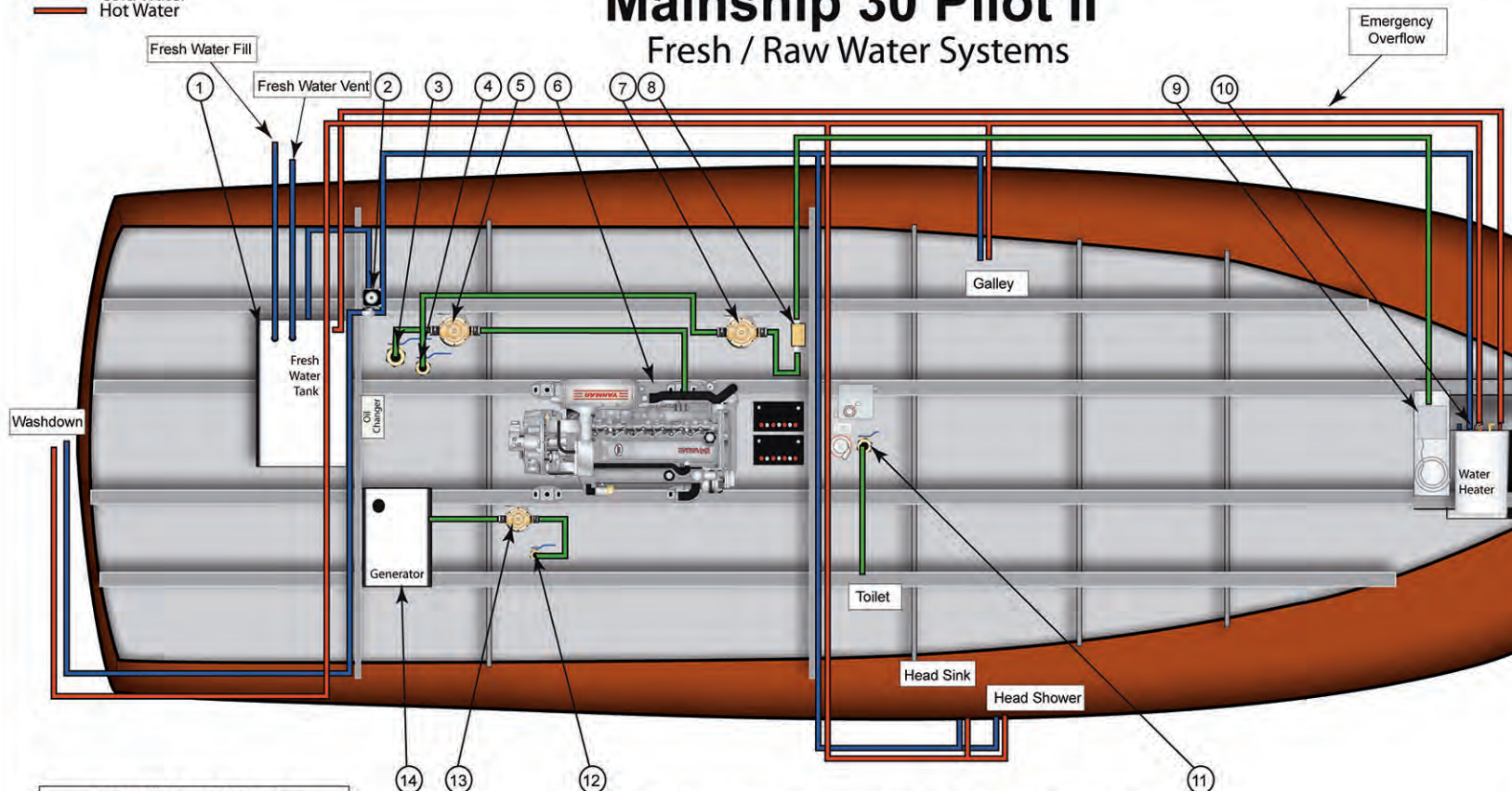


| Item # | Description  |
|--------|--------------|
| 1      | MDP          |
| 2      | Refrigerator |
| 3      | Microwave    |
| 4      | Stove        |
| 5      | Outlet       |
| 6      | Water Heater |
| 7      | Outlet       |
| 8      | GFI          |
| 9      | Generator    |
|        |              |
|        |              |
|        |              |
|        |              |
|        |              |



— Raw Water  
— Cold Water  
— Hot Water

# Mainship 30 Pilot II Fresh / Raw Water Systems



## Capacities, and Volumes

| Legend | Component          | US      | Metric   |
|--------|--------------------|---------|----------|
| 1.     | Fresh Water Tank - | 38 gal. | 143.84 L |
| 2.     | Fresh Water Pump - | 3.7 GPM | 14 LPM   |
| 10.    | Water Heater -     | 11 gal. | 41.63 L  |

|    |                        |    |                    |
|----|------------------------|----|--------------------|
| 1  | Fresh Water Tank       | 12 | Gen Cooling Pickup |
| 2  | Fresh Water Pump       | 13 | Gen Strainer       |
| 3  | Main Seacock           | 14 | Generator          |
| 4  | A/C Pickup             | 15 |                    |
| 5  | Main Engine Strainer   | 16 |                    |
| 6  | Engine                 |    |                    |
| 7  | A/C Strainer           |    |                    |
| 8  | A/C Pump               |    |                    |
| 9  | A/C Compressor         |    |                    |
| 10 | Water Heater           |    |                    |
| 11 | Toilet Raw Water (opt) |    |                    |

## 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 as serious illness or death may occur.

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.



- Grey Water Discharge
- CO Discharge (engine exhaust)
- Waste Tank Vent
- Raw Water
- Black Water Discharge

# Mainship 30 Pilot II

## Waste / Drain Systems

