Sport Boat Owner's Manual

Welcome

Congratulations on becoming the new owner of the world's most prestigious Sport Boat. We at Sea Ray® Boats, Inc. welcome you into our worldwide and ever-expanding family of boating enthusiasts.

Every journey lets you enjoy the excitement of a new adventure. Your new Sport Boat is more than a boat; it is a way of living. Our organization is dedicated to providing pleasure and fulfillment to your boating experience.

Sea Ray's commitment – Excellence by Design – has enabled us to create a superior craft providing you with comfort, performance, safety and dependability. All of our boats comply with safety standards set by the United States Coast Guard and are designed, engineered and manufactured in accordance with applicable recommendations and guidelines of the National Marine Manufacturers Association (NMMA) and the American Boat and Yacht Council (ABYC).

The Owner's Manual Packet, to be kept on board your Sea Ray, introduces you to all the features which make our boats so incomparable. For years of trouble-free boating, take the time now to carefully review the information in your Owner's Manual Packet and really get to know your boat. **Have everyone who will operate your Sport Boat read this manual.**

The Owner's Manual Packet contains the following:

- **Sea Ray Warranty Statement**

  Read the Sea Ray Warranty Statement so you will be familiar with the terms.

- **Specification Sheet**

  The Specification Sheet lists standard equipment for your boat as well as available optional equipment and useful specifications needed for safe boating.

- **Parts Manual**

  The Parts Manual helps you locate items and understand the layout of your Sea Ray. It also makes it easier when ordering replacement parts.

- **Sea Ray Sport Boat Owner's Manual**

  The Sea Ray Sport Boat Owner's Manual gives you valuable operating and safety information about your responsibilities as a Sport Boat owner/operator.

- **Original Equipment Manufacturer (OEM) Information**

  This section of your Owner's Manual Packet contains information from the manufacturer of equipment installed on your boat. Examples include the engine, steering and VHF radio. Throughout the Owner's Manual Packet you will be referred to information provided by manufacturers of specific systems.

Because our Product Development and Engineering Division is continually upgrading our products, some descriptions in this manual may differ somewhat from equipment on your boat. If this occurs, please refer directly to the updated information in the accompanying Owner's Manual Packet. If such information is not included, consult your authorized dealer for assistance.

Because your purchase represents a substantial investment, we know you will want to take the necessary measures to protect its value. We suggest you plan a program for proper operation, periodic maintenance and safety inspections. If you have questions which are not fully covered by the Owner's Manual Packet or the manufacturer's instructions, please consult your authorized dealer for assistance.

Thank you for selecting a Sea Ray®!

Bon Voyage

Sea Ray

Owner's Manual Packet Contents

	Sea Ray Owner's Manual	Sea Ray Owner's Manual Supplem't Section 12	Sea Ray Specification Sheet	Sea Ray Parts Manual	Engine Operator's Manual	OEM Manual	Sea Ray Owner's Manual Packet
Accident Reporting	X						X
Alarms	X				X	X	
AM/FM Cassette Stereo	X					X	
Anchoring	X						X
Auto-Pilot System						X	
Battery System	X	X		X			
Bilge Layout		X*		X			
• Bilge Blower	X					X	
• Bilge Pump	X					X	
Canvas	X			X			
Capacity Plate	X			X			
Carbon Monoxide	X						
Certifications	X	X					
Cleaning	X					X	
Cockpit		X					
Communication Equipment	X					X	
Compass	X					X	
Console		X		X			
Construction Standards	X	X					
Controls	X	X					
Depth Finder						X	
Dimensions		X	X				
Drains	X	X		X			
Education	X						
Electrical System	X	X		X			
Electrolysis	X	X					
Emergency Engine Shutdown	X					X	
Emergency Procedures	X						
Engine	X				X		
Environmental Considerations	X						
Equipment:							
• Recommended	X						
• Required	X						X
• Standard		X	X				
Fire	X						
Fire Suppression Equipment	X					X	X
Flame Arrestor	X				X		X
Flooding, Swamping	X						
Fuel System	X				X	X	
Gauges	X	X					
Gear Shift	X				X		
Global Positioning System (GPS)						X	
Graphics			X	X			
Head System	X	X	X	X			
Homologations (International)	X	X					
Hotlines (Safety)	X	X					X
Identification Numbers	X	X					
Ignition	X	X			X		
Ignition Protection	X	X					
Impaired Operation	X	X					
Instrument Use & Calibration	X	X					

Owner's Manual Packet Contents (Cont'd)

	Sea Ray Owner's Manual	Sea Ray Owner's Manual Supplem't Section 12	Sea Ray Specification Sheet	Sea Ray Parts Manual	Engine Operator's Manual	OEM Manual	Sea Ray Owner's Manual Packet
Layout		X	X			X	
Lifesaving Equipment	X						
Lifting	X	X					
Lightning Protection	X			X			
Lights	X			X			
Load Capacity	X	X					
Maintenance	X				X	X	
Maneuvering	X					X	
Monitors	X					X	
Nautical Terms	X						
Navigation	X						X
Operation	X						
Optional Systems		X					
Personal Flotation Devices	X					X	X
Power Capacity	X		X				
Powertrain	X				X		
Propeller	X				X	X	
Propulsion					X		
Required Equipment	X						
Registration							X
Safety	X						X
Seating		X					
Seaworthiness Inspection	X						
Service Schedule					X	X	
Spare Parts				X			
Specifications		X	X				
Stability	X	X					
Start-In-Gear Protection	X				X		
Steering	X			X			
Sump		X		X			
Symbols	X						
Switches		X					
Tank Capacities		X	X				
Throttle	X			X	X		
Through-Hull Fittings	X	X					
Trim Tabs	X	X		X			
Troubleshooting	X				X	X	
Upholstery	X			X			
Ventilation	X	X					
Warning Labels	X			X			
Warranty		X					X
Water System	X	X		X			
Weight		X	X				
Winterizing	X					X	
Wiring Schematics		X				X	

To replace any material from the Owner's Manual Packet, contact your Sea Ray® dealer.

Information in this publication is based upon the latest product specifications available at printing. Sea Ray Boats, Inc. reserves the right to make changes at any time, without notice, in the colors, equipment, specifications, materials and prices of all models, or to discontinue models. Should changes in production models be made, Sea Ray® is not obligated to make similar changes or modifications to models sold prior to the date of such changes.

* If available at the time of publication of the manual.

Key To Symbols On Prints

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SECTION 9 • SERVICE INFORMATION

Sport Boat Owner's Manual
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Sea Ray®

Sport Boats

Hazard Warning Symbols

The hazard warning symbols shown below are used throughout this manual to call attention to potentially dangerous situations which could lead to either personal injury or product damage. We urge you to read these warnings carefully and follow all safety recommendations.

⚠ DANGER

The symbol shown above alerts you to immediate hazards which WILL cause severe personal injury or death if the warning is ignored.

⚠ WARNING

The symbol shown above alerts you to hazards or unsafe practices which COULD result in severe personal injury or death if the warning is ignored.

⚠ CAUTION

The symbol shown above alerts you to immediate hazards which COULD result in minor personal injury, or cause product or property damage if the warning is ignored.

NOTICE

The symbol shown above calls attention to installation, operation or maintenance information which is important to proper operation, but is not hazard-related.

Section 1 • General Information

Introduction

This manual has been compiled to help you operate your Sea Ray® boat safely and pleasurably. It contains details of the craft, typical equipment supplied or fitted, systems and information pertaining to operation and maintenance. Please read this manual carefully, and familiarize yourself with the operation of all systems before using your craft.

If you are not familiar with the Sea Ray® boat you have purchased, for your own comfort and safety, please ensure that you obtain handling and operating experience before taking command. Your dealer or yacht club can direct you to sources of instruction.

Store this manual in a secure area, and transfer it to the new owner when you sell the vessel.

Warranty & Construction Standards

Sea Ray® provides a Warranty Statement describing terms and conditions under which defects in your boat will be repaired. Familiarize yourself with the warranty and follow instructions regarding proper operation and maintenance. Failure to follow instructions can void the warranty.

Sea Ray® also outlines Construction Standards detailing industry standards followed in building your boat (see the *Welcome* page at the beginning of the manual). Consult your marine dealer for any additional information.

Registration

In addition to the registration requirements for your boat in the state where it is used most frequently. Many states require ***additional registration*** when an out-of-state boat is used within their boundaries. Contact state boating authorities or any marine dealer for registration requirements.

Education

Although this manual is extremely informative, it does not contain everything you need to know regarding the safe operation of your Sea Ray® boat. We strongly urge you to get instruction in proper handling and navigation before taking command.

Some agencies you may consider which offer boating courses are:

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

Consult your marine dealer for an agency near you or check your telephone directory. Information is also available by calling 1-800-336-BOAT for the Boat U.S. Foundation **International owners/ operators should consult their marine dealer.**

Many books provide information that is valuable to you as a boat owner/operator. A book that is considered to be the most well-rounded is ***Chapman – Piloting, Seamanship and Small Boat Handling,*** **by Elbert S. Maloney,** published by Hearst Marine Books. In addition, there are many free pamphlets available from your local Coast Guard Auxiliary. It is highly recommended that you read additional publications other than just this owner's manual to become a well-informed boat owner/operator.

Dealer Responsibilities

Although your boat has undergone a series of rigid inspections throughout the manufacturing process, the final factory check is not the last one before you take delivery. Your dealer must perform additional pre-delivery checks and service your Sea Ray® in preparation for delivery. Dealer responsibilities include providing:

- An adequate orientation in the general operation of your Sea Ray® boat.
- An "In Service Form" to be completed and signed by both the dealer and the consumer after inspection of boat by consumer.
- An explanation of safety considerations regarding the use of containment systems and components.
- A complete Owner's Manual Packet containing literature and information regarding your Sea Ray® boat and its separate warranted products, warranty and registration cards, and operation, installation and maintenance instructions.
- A review of all warranties, pointing out the importance of mailing warranty and registration

forms to various manufacturers within the required time limits, and assistance in accomplishing same.

- Instructions on obtaining local and out-of-area service during and out of warranty periods.

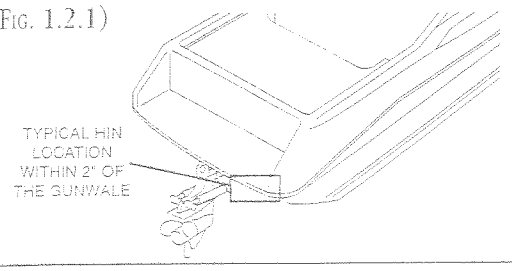
Owner/Operator Responsibilities

The owner/operator is responsible for examining the boat before accepting delivery to ensure all systems are working properly. In addition, the owner/operator is responsible for understanding and compliance with the following procedures and operational requirements:

- State registration
- Warranty registration
- Warranty terms and conditions
- Rules of the road
- Break-in procedure
- Return boat to dealer for inspection after 50 hours of operation in salt water, 100 hours fresh water, or at the end of the first year, whichever comes first
- Proper maintenance of boat and its systems
- Safety equipment
- Safety training of passengers and crew
- Insurance
- Knowledge of boat systems
- Seaworthiness/operational inspection
- Safe operating practices
- Avoiding use of drugs/alcohol
- Environmental regulations
- Accident reports
- Assistance to other boaters

The "Hull Identification Number," located on the transom, is on permanent file with Sea Ray® Boats, Inc. Data is kept regarding equipment and accessories, as well as dealer/shipping information. It is the most important identifying factor and must be included in all correspondence and orders. **Failure to include this number will only create delays.** Also of vital importance are the engine serial numbers and parts numbers. When writing about or ordering parts for your engine always include these numbers.

Hull Identification Number (HIN) (Fig. 1.2.1)



Insurance

You must establish insurance coverage before operating your boat for the first time. As the boat owner, you are legally responsible for damage or injury caused by your boat. Insurance also protects against loss by fire, theft or other causes and provides liability protection against accidents.

Parts & Equipment

Personal equipment and supplies accumulated on a boat can amount to a great deal more weight than the owner realizes, and may result in a loss of speed. Keep such weight to a reasonable minimum. When accessories or extra items are added, consider their weight and select their location to maintain the desired trim of the boat, fore, aft and athwartship. A drop in RPM will be noted as weight is added, and it may be advisable to change propeller size to compensate. Because of these variables, Sea Ray® cannot guarantee performance standards such as speed. Consult your Sea Ray® dealer when considering the addition of any item of major weight.

⚠ WARNING

Use only Marine Rated parts to replace such items as starters, distributors, alternators, generators, carburetors, fuel pumps, etc. Do not use Automotive Parts because they are not ignition protected and could cause a fire or explosion.

Servicing Your Sea Ray

It is important that the owner/operator follow the recommended maintenance outlined by the Service Guide (see pg. 9.2). Please keep in mind that this guide is based on average operating conditions and recommended maintenance should be increased if above average use or severe operating conditions exist.

Replacement parts or additional equipment may be purchased through your Sea Ray® dealer.

To find a SEA RAY® dealer in your area, call:

Sea Ray® Customer Service:
Phone: 1-800-SRBOATS
FAX: 1-314-213-7878

To find repair and parts facilities for equipment installed on your boat, refer to the original equipment manuals which can be found in your owners packet.

MANUFACTURER'S CERTIFICATIONS

A **CE mark** means that your Sea Ray® Boat has been certified with applicable International Organization for Standardization directives.

NMMA certification means that your Sea Ray® Boat has been judged by the National Marine Manufacturers Association to be in compliance with applicable federal regulations and American Boat and Yacht Council standards.

The following information is furnished in compliance with ISO directives and RSG guidelines in effect as of the date of publication of this manual. Sea Ray® will provide additional information if standards are amended.

The following information, required for export of the vessel, must be filled out by the dealer:

Boat Model: _____

Design Category: ☐ Ocean ☐ Offshore ☐ Inshore ☐ Sheltered Waters

Hull Identification Number: _____

Maximum Recommended Load: _____

Recommended Number of Passengers: _____

Maximum Rated Engine Power: _____

Engine Installed

Manufacturer: _____

Model and Number: _____

Weight of Craft

With Engine and Permanently Attached Items: _____

Without Engine: _____

(FOR EXPORT ONLY)

CERTIFICATION DESIGN CATEGORIES

The definitions of the Design Category are as follows:

- **Ocean:** Designed for extended voyages where conditions may exceed wind force 8 (Beaufort scale) (47 mph and above) and significant wave heights of 4 meters (13.12 feet) and above, and vessels largely self-sufficient.
- **Offshore:** Designed for offshore voyages where conditions up to, and including, wind force 8 (39-46 mph) and significant wave heights up to, and including, 4 meters (13.12 feet) may be experienced.
- **Inshore:** Designed for voyages in coastal waters, large bays, estuaries, lakes and rivers where conditions up to, and including, wind force 6 (25-31 mph) and significant wave heights up to, and including, 2 meters (6.56 feet) may be experienced.
- **Sheltered Waters:** Designed for voyages on small lakes, rivers, and canals where conditions up to, and including, wind force 4 (13-18 mph) and significant wave heights up to, and including, 0.5 meters (1.64 feet) may be experienced.

The "significant wave height" is considered to be the primary factor for determining design category and other parameters (e.g. meterorological) are descriptions of when these wave heights may be expected to occur. (Refer to page 1.10 for weather information.)

Manufacturer's Specifications

Sea Ray® provides specific information about your boat in compliance with ISO 10240, American Boat and Yacht Council (ABYC) Technical Report T-24 and other applicable standards and directives. The following is included in the Owner's Manual Packet supplied with the boat.

US–Domestic Boats

- Warranty Terms & Conditions
- Hull Identification Number
- Engine/Transmission Serial Numbers
- Type of Boat/Series Name
- Dimensions – Feet (Meters):
  - Length
  - Beam
  - Vertical Clearance
  - Draft
- General Arrangements:
  - Deck Plan
  - Interior Plan
  - Profile
- Propulsion:
  - Engine Type
  - Propeller
- Electrical:
  - Rated Amperage
  - Voltages – Frequency – Phases
  - Battery Capacity
  - Switches, Fuses, Circuit Breakers (location, type)
  - Wiring Diagrams
- Tank Capacities – Gallons (Liters):
  - Fuel
  - Fresh Water
  - Holding Tanks
- System Diagrams:
  - Water
  - Fuel
  - Exhaust
  - Ventilation
  - Bilge Pumping
  - Steering
  - Engine Cooling
- Stability/Flotation Capability
- Strong Points for Docking & Lifting
- Warning Labels, Part Numbers & Ordering Procedure
- Standard Equipment
- Optional Equipment
- Reference Manuals for Other Equipment
- Contacting Manufacturers of Other Systems
- Contacting Factory Service Department
- Construction Features
- Construction Standards

International–Non Domestic Boats

- Type of Boat/Series Name
- Hull Identification Number
- Maximum Recommended Load
- Propulsion:
  - Maximum Rated Engine Power
  - Manufacturer
  - Model and Number
- Stability/Flotation Capability
- Weight
  - With Engine
  - Without Engine

Nautical Terms

Abeam – object 90 degrees to center line on either side of boat.

Abaft – a point on a boat that is aft of another.

Aft – toward the rear or stern of the boat.

Beam – the width of a boat.

Bow – the fore part of a boat..

Bow Eye – Bolt with looped head mounted on extreme forward part of bow.

Bulkhead – vertical partition in a boat.

Chine – meeting juncture of side and bottom of boat.

Chock – deck fitting, used as guides for mooring or anchor lines. Also, a wedge to stop wheels from rolling.

Cleat – deck fitting with arms or horns on which lines may be made fast.

Cockpit – an open space from which a boat is operated.

Deck – upper structure which covers the hull between gunwales.

Draft – depth of water required to float boat and its propulsion system.

Fathom – six feet.

Fenders – rope or plastic pieces hung over the side to protect the hull from chafing.

Freeboard – height of exposed hull from water line to deck.

Ground tackle – general term referring to anchors, anchor lines, etc.

Gunwale (pronounced gun'l) – meeting juncture of hull and deck.

Hatch – an opening in deck to provide access below.

Head – toilet or toilet area in a boat.

Headroom – vertical distance between the deck and cabin or canopy top.

Helm – steering console.

Hull – the basic part of a boat that provides buoyancy to float the weight of the craft and its load.

Keel – the major longitudinal member of a hull; the lowest external portion of a boat.

Knot – unit of speed in nautical miles per hour.

Lee – the side that is sheltered from the wind.

PFD – Personal Flotation Device; life preserver.

Port – term designating left side of the boat.

Rudder – Movable fixture at the stern used for steering.

Scupper – hole permitting water to drain overboard from deck or cockpit.

Sheer – curve or sweep of the deck as viewed from the side.

Snub – to check or tighten a line suddenly.

Starboard – term designating right side of the boat

Stern – the aft end of a boat.

Stern drive – outboard unit of an inboard/outboard (I/O) engine installation.

Stringer – longitudinal members fastened inside the hull for additional structural strength.

Transom – transverse part of stern.

Wake – disturbed water that a boat leaves behind as a result of forward motion.

Windward – toward the direction from which the wind is blowing.

Safety

⚠ WARNING

A qualified operator must be in control of the boat at all times. Do not operate the boat while under the influence of alcohol or drugs. Never operate your boat at speeds which exceed the operator's ability to react if an emergency develops. At night, turn on the appropriate navigation lights and cruise at a reduced speed that will allow you plenty of time to avoid dangerous situations.

NOTICE

The law requires the owner/operator to assist any person or boat in distress as long as he does not endanger his boat.

The tremendous feeling of freedom inherent in boating can be overshadowed by disaster if you ignore safety precautions. This manual presents basic guidelines, but it does not address every possible risk you may encounter. You are strongly urged to:

- Take a boating safety course.
- Get hands-on training from your boat dealer.
- Regularly review safety requirements.

Minimum Required Equipment

Consult your national boating law enforcement agency.

EQUIPMENT	*CLASS A* *(Less than 4.8 meters [16 feet])*	*CLASS 1* *(4.8 to less than 7.9 meters [16 to less than 26 feet])*	*CLASS 2* *(7.9 to less than 12.2 meters [26 to less than 40 feet])*	*CLASS 3* *(12.2 to less than 19.8 meters [40 to less than 65 feet])*
Bell, Whistle	Some means of making efficient sound signal, for example, whistle or air horn **and** a bell audible for .5 nautical mile.			
Fire Extinguisher -Portable (if no fixed fire extinguishing system is installed in machinery spaces)	At least one (ABYC recommends two for boats 4.8 to less than 7.9 meters [16 to 26 feet]) B-I type Coast Guard approved portable marine fire extinguisher. (Not required on outboard motor boats less than than 7.9 meters [26 feet] in length without permanently installed fuel tanks and not carrying passengers for hire, provided construction of boat will not permit entrapment of explosive or flammable gases or vapors.)		At least two (ABYC recommends at least three) B-I type approved portable marine fire extinguishers, or at least one B-II type Coast Guard approved portable marine fire extinguishers.	At least three (ABYC recommends at least four) B-I type approved portable marine fire extinguishers, or at least one B-I type plus one B-II type Coast Guard approved portable marine fire extinguisher.
Fire Extinguisher -Portable (if fixed fire extinguishing system is installed in machinery spaces)	None	None	At least one B-I type approved portable marine fire extinguisher.	At least two B-I type approved portable marine fire extinguishers, or at least one B-II type Coast Guard approved portable marine fire extinguisher.
Lights	Required between sunset and sunrise or in reduced visibility.			
Muffling	Efficient muffling device or system to prevent excessive or unusual engine noise.			
Personal Flotation Devices (PFDs)	One Coast Guard approved Type I, II or III device for each person aboard, plus one throwable Type IV device. Type V device is acceptable if worn for approved use. Always wear a PFD when boating.			
Ventilation	Boats with closed compartments or permanently installed fuel tanks must be equipped with an efficient natural or mechanical bilge ventilator or meet applicable Coast Guard construction standards for fuel and electrical systems.			

- Maintain your boat and its systems.
- Have your boat inspected at least annually by a qualified mechanic or dealer.

Refer to the table of minimum required safety equipment on page 1.6.

Explanation Of Safety Precautions

This manual provides safety precautions which must be observed when operating or servicing your boat.

The following precautions appear throughout the manual. Learn to recognize the degree of precaution and understand the associated instructions. The precautions listed are not all-inclusive. Always use common sense in the operation of your boat.

Warning Labels

Mounted at key locations throughout the boat, warning labels advise the owner/operator of imperative safety precautions to follow when operating and/or servicing equipment. **Do not remove or obstruct any warning label.** Replace any label which becomes illegible. See the Parts Manual for replacement part numbers and ordering procedure.

Four basic types of labels include:

⚠ DANGER

DANGER – Immediate hazards which WILL result in severe personal injury or death if the warning is ignored.

⚠ WARNING

WARNING – Hazards or unsafe practices which COULD result in severe personal injury or death if the warning is ignored.

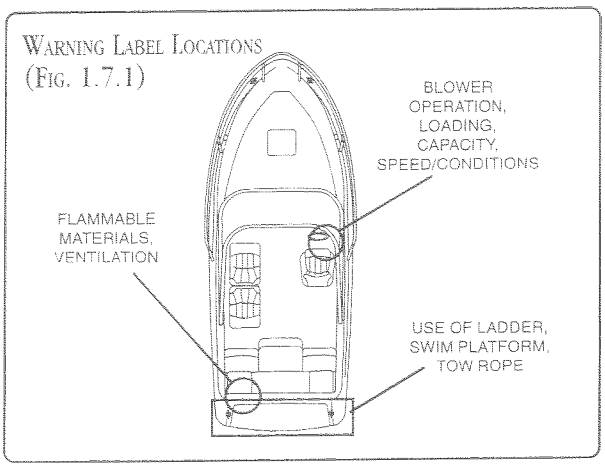
⚠ CAUTION

CAUTION – Hazards or unsafe practices which could result in minor injury or product or property damage if the warning is ignored.

NOTICE

Information which is important to proper operation or maintenance, but is not hazard-re-

Warning Label Locations (Fig. 1.7.1)



Lifesaving Equipment

⚠ WARNING

Always wear a personal Flotation Device (PFD) when boating.

Even strong swimmers can tire quickly in the water and drown due to exhaustion, hypothermia, or both. The buoyancy provided by a personal flotation device (PFD) will allow the person who has fallen overboard to remain afloat with far less effort and heat loss, extending survival time necessary to find and retrieve them.

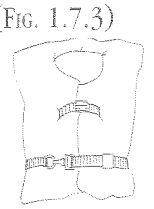
Boat operators are required to carry one wearable personal flotation device (Type I, II, III or V) for every person on board. Boats must also have at least one throwable device (Type IV).

PFD Classifications:

(Fig. 1.7.2)

Off-Shore Life Jacket (Type I) – most buoyant, it is designed to turn an unconscious person face up; used in all types of waters where rescue may be slow, particularly in cold or rough conditions.

(Fig. 1.7.3)



Near-Shore Life Vest (Type II) – "keyhole" vest with flotation-filled head and neck support is also designed to turn a person face up, but the turning action is not as pronounced; used in calm, inland waters or where quick rescue is likely.

(Fig. 1.8.1)

Flotation Aid (Type III) – vest is designed so conscious wearers can turn face up; often designed for comfort while engaged in sports such as skiing.

(Fig. 1.8.2)

Throwable Devices (Type IV) – horseshoe buoys, ring buoys and buoyant cushions are designed to be grasped, not worn.

(Fig. 1.8.3)

Special-Use Devices (Type V) – sailboat harnesses, white-water vests, float coats, and hybrid vests which have minimum inherent buoyancy and an inflatable chamber.

Before purchasing PFDs, ensure that there is an attached tag indicating they are approved by the U.S. Coast Guard or by your national boating law enforcement agency.

Children and non-swimmers must wear PFDs at all times when aboard. All passengers and crew should wear them. A loose PFD is often useless in an emergency.

⚠ WARNING

The law requires that PFDs must be readily accessible, if not worn, that is, removed from storage bags and unbuckled.

Throwable devices must also be readily available and right at hand.

The operator is responsible for instructing everyone aboard on the location and use of PFDs.

Size PFDs for the wearer. Children require special attention in the use of PFDs.

Test PFD buoyancy at least once a year.

Additional Recommended Equipment

In addition to the required equipment, the following list includes items which would be wise to include onboard your boat.

- Visual distress signals for day and night use (required in some areas; consult local regulations)
- Marine radiotelephone
- Charts of your intended cruising area
- Spare keys
- Emergency position-indicating radio beacon
- Portable radio with weather band
- Waterproof flashlight(s)
- Extra batteries
- Mooring lines
- Fenders
- Lead line
- Ground tackle (at least 2 anchors, rode, shackles)
- Boat hook
- Manual bilge pump
- Spare parts kit (spark plugs, fuses, etc.)
- Instruction manuals for engine and accessories
- First aid kit
- Tool kit:
  - Assorted screwdrivers (Phillips and flat blade)
  - Pliers (regular, vise-grip, and tongue & groove)
  - Wrenches (box, open-end, allen, adjustable)
  - Socket set (metric or U.S. standard as appropriate)
  - Electrical tape

Impaired Operation

Special attention must be given to the effects of alcohol and drugs while boating. No other single factor is involved in so many marine accidents and deaths. The detrimental effects of alcohol and drugs are increased by the wind, waves and sun, quickly impairing your ability to react. Boating laws are far more strict today than in the past, and enforcement is tougher on those who use alcohol and drugs when boating.

⚠ WARNING

CONTROL HAZARD – Federal laws prohibit operating a boat while under the influence of alcohol or drugs. These laws are vigorously enforced

Failure to Use Handhold

Handholds are for your safety. Hold onto handholds to maintain safety and balance. Failure to use handholds could result in losing balance, hitting parts of the boat, falling overboard or even ejection from the boat.

⚠ WARNING

PERSONAL INJURY HAZARD

Use handholds wherever they are provide.

Load Capacity

The certification plate, located on the hull near the helm or transom indicates maximum weight and number of persons your boat can handle under normal sea conditions. **Do not exceed the load capacities stated.**

The U.S. Coast Guard requires boats less than 6.4 meters (20 feet) to have a certification plate stating the maximum number of persons and the maximum weight the vessel will handle safely under normal conditions.

International (ISO) requirements state that any craft up to 24 meters (78.7 feet) must display a certification plate.

The information present on the certification plate does not relieve the operator from responsibility. Use common sense and sound judgement when placing equipment and/or passengers in your boat.

- The number of seats does not necessarily indicate how many people a boat can safely carry.
- When operating on-plane (above idle speed), allow no more passengers than there are real seats, and insist that passengers sit down in those seats.

⚠ WARNING

PERSONAL INJURY HAZARD

When underway, keep passengers clear of areas not designed for riding. Especially hazardous areas include seat backs, bow, gunwale, transom platform and fore and aft decks.

- Do not permit passengers to ride on parts of your boat not designed for such use.
- Overloading violates regulations. Do not carry more weight or passengers than indicated on the certification plate.

⚠ DANGER

EXTREME HAZARD – Do not use sun pads (if equipped) while craft is underway.

- Overloading, improper loading and distribution of weight are significant causes of accidents. Allow yourself an extra margin of safety in rough water.

Certification Plates (Examples)
Fig. 1.9.1

Power Capacity

Do not exceed the maximum engine power rating stated on the builder's plate attached to your boat (outboard only), or the largest available engine option for your boat offered by Sea Ray® (see Fig. 1.9.1).

Propellers

Your Sea Ray® has been equipped with a propeller which our tests have shown to be the best suited for general use under normal conditions and load. In some situations you may wish to change propellers to give your boat slightly different performance characteristics. In general, changing to a lower pitch propeller will increase acceleration and load-pulling ability, but with a slight decrease in top speed. Conversely, moving to a higher pitch propeller will attain higher top speed with a light load, but will sacrifice acceleration and power. Your particular requirements should be discussed with your Sea Ray® dealer. **Under no circumstances use a propeller which allows the engine to operate at higher than recommended RPM.**

To maintain rated power, propellers should be free of nicks, excessive pitting and any distortions that alter them from their original design. Badly damaged propellers should be replaced, but those that are chipped, bent or merely out of shape can be reconditioned by your marine dealer.

When boat usage is extensive, it is advisable to carry an extra propeller aboard.

Stability

Your boat was manufactured to specific stability and flotation standards. Any deviation from the recommended load capacities will put your boat in jeopardy of swamping and/or sinking.

In addition:

- Stability may be substantially reduced if equipment is added to the superstructure.
- Stability is substantially reduced by loose fluids or weight within the hull. Keep bilge area as dry as possible, and close openings in rough weather.

⚠ WARNING

STABILITY HAZARD – Load boat properly. The manufacturer's load rating is the maximum allowed under normal conditions. Adjust downward if weather, water or other conditions are adverse.

Allow passengers to ride only in areas that do not pose a hazard to themselves or the boat.

Passengers should remain seated while boat is moving.

Maintaining Control

General Considerations

- You are responsible for passengers' actions. If they place themselves or the boat in danger, immediately correct them.
- Know how your boat handles under different conditions. Recognize your limitations and the boat's limitations. Modify speed in keeping with weather, sea and traffic conditions.
- Instruct passengers on the fundamentals of operating your boat in case you are unable to do so.
- Instruct passengers on location and use of safety equipment and procedures.

⚠ WARNING

CONTROL HAZARD

- **A qualified operator must be in control of the boat at all times.**
- **Always operate boat within maneuvering speed limitations.**
- **Exercise constant attention to the boat's direction when underway.**
- **Always keep a firm grip on the steering control.**

⚠ WARNING

SPEED HAZARD

- **Operate boat at speeds within ability to maintain control and react if an emergency occurs.**
- **Reduce speed at night, in congested waterways and when weather and sea conditions warrant.**
- **Watch your wake. It might capsize a small craft. You are responsible for damage caused by your wake.**

⚠ WARNING

COLLISION HAZARD – Turn on navigation lights at night and in other reduced visibility situations, and cruise at reduced speed to allow time to avoid dangerous situations.

Visibility

- The law requires the operator to "maintain a proper lookout by sight (and hearing)."
- Operator must insist on unobstructed vision, particularly to the front. Move passengers or load if they block the view when the boat is above idle speed.
- Post a lookout to watch for obstacles when visibility from the helm is limited due to operating conditions.

⚠ WARNING

VISIBILITY HAZARD

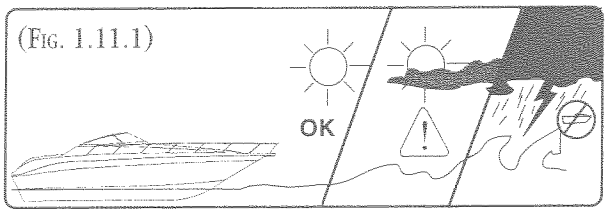
- **Keep visibility clear. Move passengers if they obstruct operator's view.**
- **Designate a lookout to watch for obstacles and other vessels when the field of vision from the helm is limited due to operating conditions**

- Be sure that other boats or objects are not in the way before making quick turns.

Weather

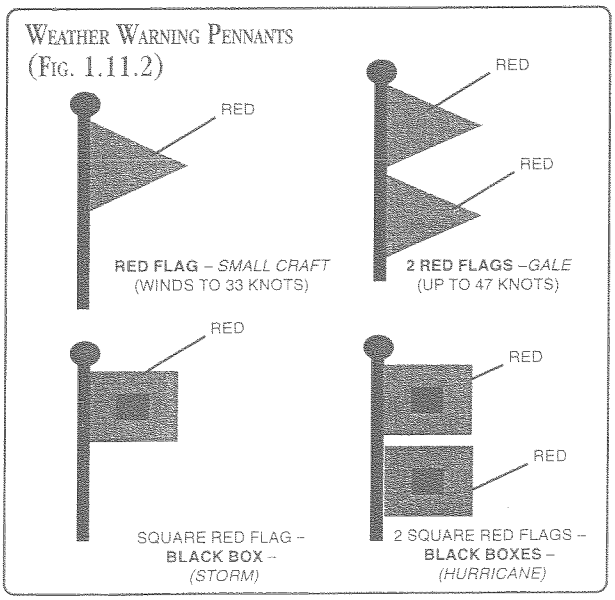
Getting caught in severe weather is hazardous. Bad weather and/or rough sea conditions can cause an uncomfortable and more importantly an unsafe situation. Consult local weather information for the latest weather conditions or any impending deterioration of the weather before setting out and while underway. Following are a few basic weather-related rules:

(Fig. 1.11.1)



- Learn storm signals and take appropriate action (see Fig. 1.11.2).
- Check the weather and sea conditions before leaving and while underway.
- A sudden change in wind direction or speed or an increase in wave height indicates deteriorating weather.
- Wear a personal flotation device.
- If a storm approaches, immediately seek a safe harbor.
- If a storm hits, have everyone sit low in the boat. Secure (close) all windows, hatches and doors to minimize the risk of flooding. Head the bow into the wind with enough power to maintain slow headway.

Weather Warning Pennants
(Fig. 1.11.2)

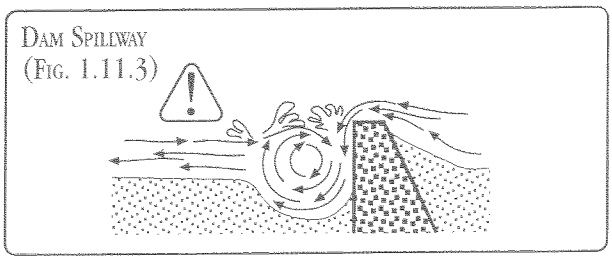


- Secure equipment safely when underway in rough weather.
- If you encounter fog, determine your position, set a safe course, slow down and alert other boats of your presence with a sound signal.
- If a lightning storm approaches, the safest action is to dock and disembark. If you cannot return to shore, seek shelter **inside** the boat and remain there until the storm passes.
- Lightning will seek a ground when it strikes. The best protection is a properly grounded lightning rod placed high enough to provide a protective umbrella over the hull. Stay clear of the lightning rod, all attached wiring and all metal parts of the boat.
- **Stay out of the water during a lightning storm.** If caught swimming during a storm, get back into the boat and remain there until the storm passes.

Dam Spillways

Avoid the waters above and below dam spillways. Dangerous currents and turbulence exist in both areas causing rapidly changing and hazardous conditions.

Dam Spillway
(Fig. 1.11.3)



Operating In Shallow Water

Operating in shallow water presents obvious hazards. In addition to insufficient draft, sand bars, stumps or other unmarked obstructions in deep water can cause serious damage to the boat.

Other hazards in shallow water include mud, sand, weeds and debris, which can foul your engine's

! WARNING

COLLISION HAZARD – Use extra caution when underwater/floating objects may be present. Hitting an object at high speed or severe angle can seriously injure people and damage your boat. Use extreme care when operating in shallow water or when operating in reverse.

⚠ CAUTION

If engine should strike a submerged object, STOP THE ENGINE as soon as possible and examine drive unit for damage.

Operating a damaged drive unit could cause additional damage to other parts of engine, or could affect controllability of the boat. If continued running is necessary, do so at GREATLY REDUCED SPEED.

propeller and cooling water intakes. Excessive vibration may indicate a fouled or damaged propeller.

Your stern drive equipped boat features outdrive impact protection in the event the outdrive unit strikes an underwater object (see Section 2 – *Outdrive Impact Protection)*

Become familiar with the area in which you are operating. Consult tide tables, charts and ask local boaters. If you know or suspect shallow water, post a lookout and proceed with caution.

Float Plan

File a float plan with a friend or relative about where you intend to cruise. Give a good description of the boat. Advise of any changes in cruise plans.

These precautions will enable your friend or relative to tell the Coast Guard or your national boat agency where to search for you and what type of boat to look for if you fail to return.

Advise the same person when you complete your trip to prevent false alarms about your safety.

Paint, Cleaning Agents & Other Substances

The use of products containing chlorine,

⚠ WARNING

EXPLOSION/FIRE HAZARD – Ventilate when painting or cleaning. Ingredients may be flammable/explosive.

phosphates, perfumes and non-degradable ingredients should be avoided. Consult your marine dealer regarding environmental regulations before painting the hull. Fumes can last for hours, and chemical ingredients can harm people, property and the environment. Common household cleaning agents may cause hazardous reactions. Read and understand directions before proceeding.

Water Sports

Swimming

- Do not swim from a moving boat.
- Many areas prohibit swimming from boats except in designated areas.
- Make sure boat's engine is turned off before allowing people to swim anywhere near your boat. Shut the engine OFF and remove the key from the ignition switch so that nobody will accidentally start the engine while swimmers are nearby.
- Turn off engine when taking swimmers or skiers aboard or when putting them overboard. Never permit use of the transom swim platform while engine is running.
- Slow down and exercise extreme caution when cruising in an area where there might be swimmers or skiers in the water.

⚠ WARNING

PERSONAL INJURY HAZARD

- **Keep clear of areas designated for swimming, skiing or diving. Recognize markers used for such areas.**
- **When engine is running, close and lock transom door and do not use boarding ladder and swim platform.**

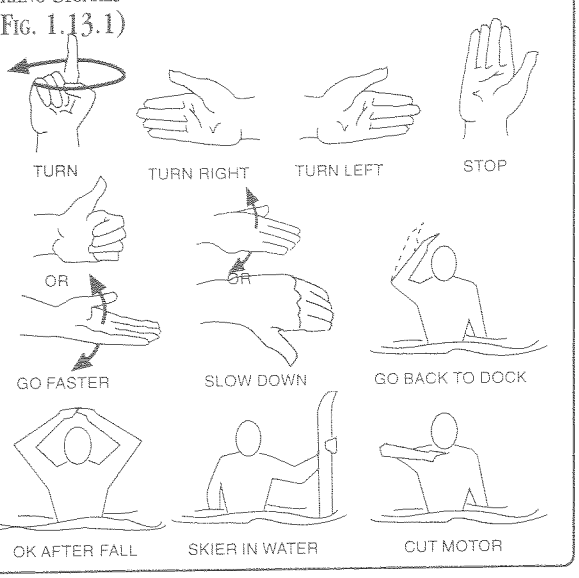
Skiing

⚠ WARNING

Skiers must wear an approved PFD.

- Anyone who water skis must know how to swim.
- Never drive the boat directly behind a water skier. At 22 knots (25 m.p.h.), it takes only 5 seconds to overtake a fallen skier who was 60 meters (200 feet) in front.
- Keep a downed skier in sight and on the operator's side of the boat when approaching the skier. Never back up to anyone in the water.
- Learn the signals to communicate with a skier. Although a skier cannot operate the boat from their position, they should be able to control it through hand signals (Fig. 1.12.1).

Skiing Signals
(Fig. 1.13.1)



Turn – Arm raised, circle with index finger extended.

Skier in Water – Extend one ski vertically out of water.

Back to Dock – Pat top of head.

Cut Motor – Draw finger across throat.

Slow Down – Thumb pointed down or palm down, move hand up and down.

Faster – Thumb pointed up or palm up, move hand up and down.

OK – Raise arm and form a circle with thumb and index finger.

Stop – Raise arm with palm vertical and facing forward.

Turn Right – Extend arm out from body to the right.

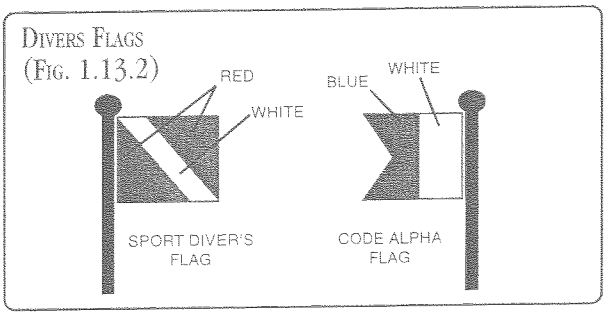
Turn Left – Extend arm out from body to the left.

OK After a Fall – Clasp hands together overhead.

- Be aware of sudden release of tow rope. It can backlash into cockpit and cause injury to onboard passengers.

Diving

Divers Flags
(Fig. 1.13.2)



- Recognize and respect diving flags. Keep at least 30 meters (100 feet) away.

  Sport Divers Flag – Red flag with diagonal white stripe marks a diver in the water.

  Code Alpha Flag – Blue and white pennant designates boat being used in dive operations.

In General

When engaged in water sports, be safe and courteous to others sharing the water:

- Be considerate to fishermen.
- Do not water ski in congested areas.
- Avoid navigation markers.
- Stay well clear of other boats and skiers.

Safety Hotlines

The U.S Coast Guard offers many pamphlets on safety and other information not covered in this book. Contact your local Coast Guard unit or call the toll-free safety hotlines below for information.

- U.S. Coast Guard 1-800-368-5647
- Canadian Coast Guard 1-800-267-6687

In other countries, ask your marine dealer for information on how to contact the national boating law enforcement agency.

Operation Guidelines

While this section presents the most basic operating principles, it is not intended to address all conditions that may be encountered during operation of the boat.

Sea Ray recommends that you take a course of certified instruction before operating a boat.

Become familiar with the location of the boat's equipment, drains, safety features and specifications before operating and maneuvering.

Boarding

- Board only one person at a time.

⚠ WARNING

SLIPPING HAZARD – Wet decks are slippery. Wear proper footwear and use extreme caution on wet surfaces.

- Load gear after you are aboard. Carrying gear while boarding can make you lose balance.
- Distribute equipment weight evenly.
- Instruct passengers where to sit during on-plane operation to reduce possibility of falling overboard during high speed maneuvers.
- If gear is not immediately needed, stow it in secure area.
- Safety gear must be immediately accessible at all times.
- Children and non-swimmers must wear PFDs at all times when aboard. All passengers and crew should wear them, since a loose PFD is often useless in an emergency. The law requires that PFDs, if not worn, must be readily accessible, that is, removed from storage bags and unbuckled. Throwable devices must be readily available, that is, right at hand. The operator is responsible for instructing everyone aboard on their location and use.

Starting, Shifting and Stopping

Before starting the engine, remove accessory canvas and attach the emergency engine stop switch lanyard to the emergency stop switch and to the operator (see Sectuiion 3 – *Instruments & Controls*). See the engine operator's manual for detailed starting instructions.

Do not ignore any alarm! Correct problem before casting off.

Starting Engine Checklist:

- Fuel – supply adequate, including reserve
- Oil – level adequate
- Battery(ies) – power adequate
- Drain plugs – installed
- Gear – neutral
- Bilge blower – run at least 4 minutes before starting
- "Sniff test" – no leaks or fumes
- Emergency stop switch – attached to operator and stop switch
- Gauges (after ignition and warmup) – readings normal (see engine operator's manual)

Shifting

- Shift to neutral and allow boat to lose almost all headway before shifting into forward or reverse.

⚠ CAUTION

Pause in neutral while shifting, wait for boat to lose headway, and then shift quickly. Easing into gear can damage transmission.

- Reversing gear acts as a braking mechanism. Use caution. Sudden slowing of forward motion may cause following sea to swamp the boat.
- Become thoroughly familiar with the boat's response to movement of the controls. (See Sectuiion 3 – *Instruments & Controls*.)

Stopping Engine Checklist:

- Gear – neutral
- Mooring lines – secure
- Engine – idle 5 minutes to cool
- Ignition – off

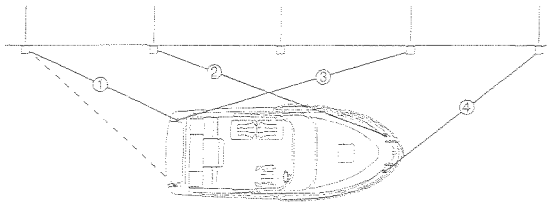
⚠ CAUTION

- **Turn off engine at idle speed. Racing the engine before switching off can draw water into the engine through the exhaust, causing internal damage.**
- **If boat is equipped with an emergency stop switch, wear the lanyard at all times when operating the boat but use it to stop only in an emergency. Do not use it to shut off the engine during normal operation.**

Handling Dock Lines

Dock lines secure a boat in its berth and help maneuver the boat close to the pier. Dock lines for recreational boats are usually made of nylon because it stretches, is durable and is easy on the hands. The number and size of dock lines increase as the size of the boat increases.

Basic Docking Lines
(Fig. 1.14.1)



1 STERN LINE
2 FORWARD QUARTER SPRING
3 AFTER BOW SPRING
4 BOW LINE

The basic lines used for docking are:

- Bow Line – Fastened to the boat's forward cleat and run forward at about a 45 degree angle to a dock cleat or pile to prevent the boat from moving astern.
- Stern Line – Fastened to the boat's after cleat and run astern at about a 45 degree angle to a dock cleat or pile to prevent the boat from moving forward.
- Spring Lines – As many as four, but generally two:

  – After Bow Spring – Fastened to the after bow and run aft to a dock cleat or pile;

  – Forward Quarter Spring – Fastened to the stern and run forward to a dock cleat or pile.

Spring lines are especially valuable when tide movement is significant. They also help in controlling the boat when leaving a dock.

Casting Off

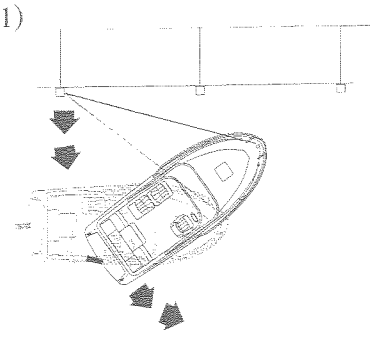
Casting off procedures vary depending on wind, current and traffic. Some general guidelines are:

- Start engine before casting off.
- Put adequate space between boat and dock before trying to move away.
- Successful maneuvering secrets:

  – Since a boat turns at its stern, the stern must have enough clearance to move back toward the dock as the bow moves away from the dock.

  – Use wind and current to move a boat whenever possible, aided by spring lines as needed.
- Power slowly ahead about 1 meter (3 feet) with the after bow spring line fastened. (Fig. 1.14.2). At the same time, turn the wheel toward the dock. The combination of rudder/propeller action and the spring line will swing the stern away from the dock.

Casting Off From A Dock
(Fig. 1.15.1)



- Bring aboard the spring line and fenders.
- Check for loose or trailing lines which can foul the propeller.
- Back the boat with rudder/propeller centered until well clear of the dock.
- Swing the bow away. The stern will move toward the dock, but if you have allowed enough room, it will not hit the dock.
- Proceed slowly, sounding a long horn blast to alert other boats that you are departing.

Leaving Mooring

- Because the boat is heading into the wind and the stern is already clear, this is fairly simple.
- Untie from mooring buoy and back slowly away several boat lengths.
- When you can see the mooring buoy, it is safe to move forward, giving the buoy wide clearance.

Approaching The Dock

Procedures vary depending on whether you tie up at a:

- Pier (parallel to shore) or wharf (not parallel)
- Slip (between piles, at right angle to pier or wharf)
- Mooring (anchoring buoy away from shore)

Some procedures apply in all situations:

Move slowly and plan maneuvers ahead of time. Use wind and current whenever possible to move or slow the boat and remember that boats do not have brakes. To slow forward motion, back off on the throttle. After the boat slows and the engine idles, shift to reverse and gradually increase throttle until the boat stops.

If there is more than one way to approach a berth, use the most conservative maneuver:

– High Wind/Current – Approach against the wind or current.

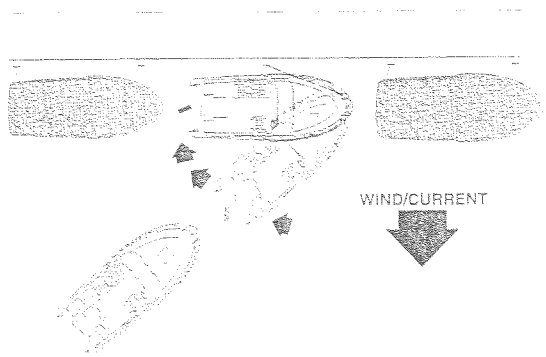
– Mild Wind/Current – Approach against the stronger of wind or current.

Use fenders to protect the boat. **Never use arms or legs to try to stop a boat's movement.**

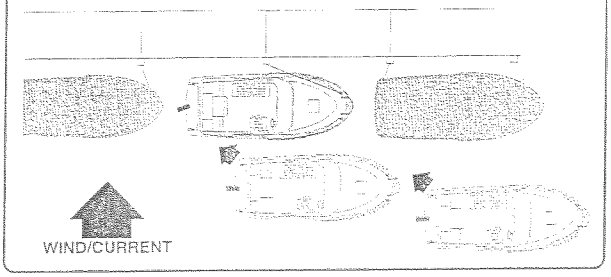
Approaching A Pier/Wharf

- Approach at a 45 degree angle.
- When the boat is a few feet from the dock, bring the stern closer by turning the wheel away from the dock, keeping the engine at idle. Then shift

Approaching A Pier (Offshore Wind)
(Fig. 1.16.1)



Approaching A Pier (Onshore Wind)
(Fig. 1.16.2)



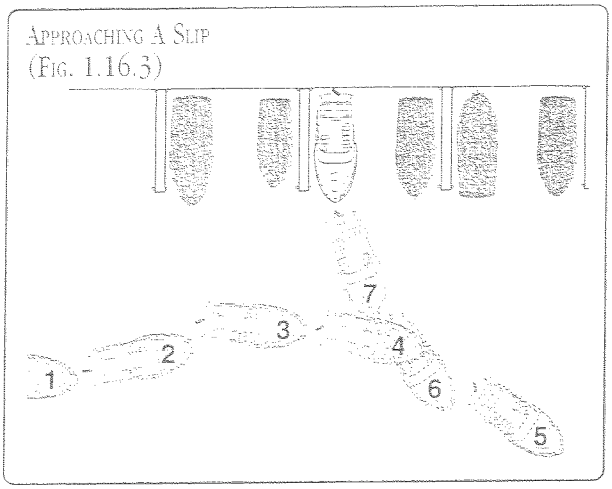
to reverse and turn the wheel toward the dock. Remember that some boats do not steer well in reverse, and tight turns are difficult.

- Have adequate docking gear ready for use. Put fenders out and attach lines on side of boat that will be next to the dock.
- If possible, station experienced crew at the bow and stern, each with dock lines.
- When the boat is fairly close, throw the first line under-handed to a person on the dock, aiming it over his head and upwind. The bow line is usually the first line.
- If no one is on the dock, get as close as you can and loop any line over a piling or cleat.
- Wait for boat to lose headway before securing lines. Secure the after bow spring line first.
- Keep engine running at idle and in neutral until all lines are secured.

Approaching A Slip

- Put out fenders.
- Turn the stern toward the slip, much like preparing to back a car into a garage.
- Shift to reverse and maneuver slowly into slip.

Approaching A Slip
(Fig. 1.16.3)

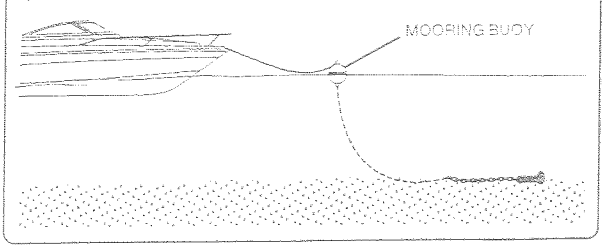


- Shift to forward as you enter, turn wheel to other side and give throttle a short burst of power to align the boat with the slip.
- Shift to reverse. Back slowly.
- When almost completely in, shift to forward to stop.
- Keep engine running at idle and in neutral until all lines are secured.

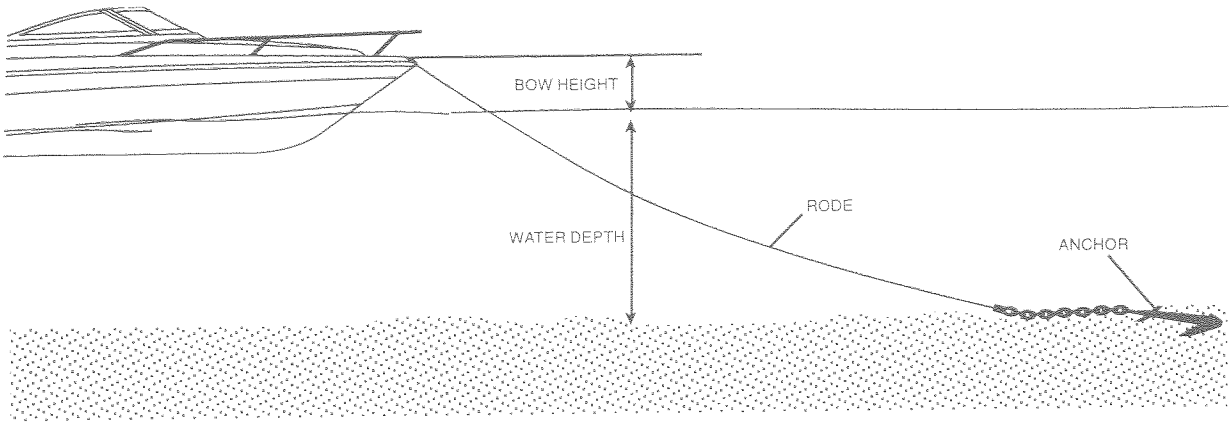
Approaching A Mooring

- Moor only in designated areas. Never moor to a navigational buoy.
- As you approach, note how other boats lie at mooring buoys. Since they are heading into the wind/current, approach your mooring at the same heading. If there are no other boats, estimate the wind/current direction as best you can.
- Shift to neutral when you think you have enough headway to reach your buoy.
- Station a crew member at the bow with a boat hook to pick up the mooring line. As the boat gets closer, you will lose sight of the buoy from the helm so the crew member forward must signal direction and distance.
- Keep engine running until the crew member signals that the mooring line is secured.

Approaching A Mooring
(Fig. 1.16.4)



ANCHORING ARRANGEMENT
(FIG. 1.17.1)



ANCHORING

Wind and sea conditions affect an anchored boat. The boat is not moving through the water, and without headway there is no control. Stay alert! Be sure the that anchor will hold under all circumstances if you are leaving the boat.

Understand the principles of rode and scope and their effect on anchor performance.

The rode is the line connecting the anchor to the boat. Nylon line is ideal because it is light, strong, stretches, can be stowed wet and is easy to handle. Add a short chain between the anchor and the nylon line to prevent abrasion of the line.

The scope is technically defined as the ratio of the rode length to the vertical distance from the bow to the sea floor. Scope depends on the type of anchor, bottom, tide, wind and sea conditions.

- Minimum is 5:1 for calm conditions; norm is 7:1; severe conditions may require 10:1.

$$\text{Scope} = \frac{\text{Rode Length}}{\text{Bow Height} + \text{Water Depth}}$$

Since you want to know how much rode to use when anchoring, the formula is:

Rode Length = (Bow Height + Water Depth) x Scope

Example:

Rode Length = (3 feet + 10 feet) x 7*

Rode Length = 13 feet x 7*

Rode Length = 91 feet

* Scope factor may range from 5 to 10 or more. Less than 5, the anchor breaks out too easily.

LOWERING THE ANCHOR

Be sure there is adequate rode for the depth of water and secure rode to both the anchor and the boat.

- Stop completely before lowering the anchor.
- Keep feet clear of coiled line as it pays out.
- Turn on the anchor light at night and in reduced visibility.

⚠ WARNING

SINKING HAZARD – Anchor from the bow if using one anchor. A small current can make a stern-anchored boat unsteady; a heavy current can drag a stern-anchored craft under water.

COLLISION HAZARD – Anchor only in areas where your boat will not disrupt other boats. Do not anchor in a channel or tie up to any navigational aid. It is dangerous and illegal.

SETTING THE ANCHOR

There is no best way to set an anchor. Experiment to see how your anchor performs.

One method is to turn the rode around a bitt and slowly pay out as the boat backs from the anchor site. When the proper scope has been reached, snub the rode quickly, causing the anchor to dig into the bottom.

- Reverse engine slowly to drive the anchor in and prevent it from dragging.
- Secure the rode to the bitt or cleat.

Occasionally check your position against the shoreline or other permanent landmark. If the

anchor is dragging allowing you to drift, reset the anchor and pay out more line.

Weighing Anchor

To weigh (or retrieve) the anchor, start the boat and run slowly up to the anchor, taking in the rode as you go. The anchor will usually break out when the rode becomes vertical. Coil lines to let them dry before stowing.

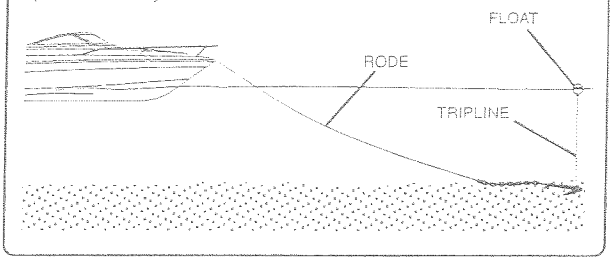
Be careful that trailing lines do not foul in the propeller.

Clearing a Fouled Anchor

A fouled anchor can test your patience and ingenuity. One of the best methods of breaking free is to set a tripline before you lower anchor.

- Attach a line to the crown or head of the anchor and the other end to a float.
- The line should be just long enough to reach the surface of the water, allowing for tides.
- A 9.5 mm (3/8-inch) polypropylene line is a good choice because it is light, strong and floats.
- If the anchor snags, pull vertically on the tripline to lift the anchor by the crown.

Anchor Tripline Arrangement
(Fig. 1.18.1)



Maneuvering And Control

⚠ WARNING

COLLISION HAZARD

- Turn on navigation lights at night and in other reduced visibility situations, and cruise at a reduced speed to allow time to avoid dangerous situations.
- Use extra caution when underwater/floating objects may be present. Hitting an object at high speed or severe angle can seriously injure people and damage your boat. Use extreme care when operating in shallow water or when operating in reverse.

⚠ WARNING

PERSONAL INJURY HAZARD

- When underway, keep passengers clear of areas not designed for riding. Especially hazardous areas include seat backs, bow, gunwale, transom or forward platform and aft sundeck.
- Passengers in bow rider seats must exercise constant caution. When water is rough, move from bow rider area to aft passenger seats.
- Remain alert. Use of drugs, alcohol or other substances which impair judgment poses a serious threat to yourself and others. The boat operator is responsible for the behavior of passengers.
- Ensure emergency stop switch lanyard is always attached to operator while boat is in operation.

⚠ WARNING

MANEUVERING HAZARD

- Always operate within maneuvering speed limitations.
- Exercise constant attention to the direction of the boat when underway.
- Always keep a firm grip on the steering control, especially when steering torque is strong.

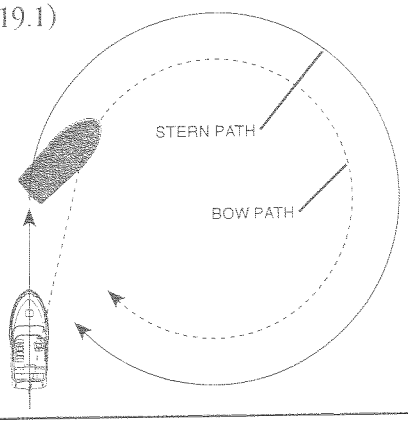
⚠ WARNING

SPEED HAZARD

- Operate boat at speeds within the operator's ability to maintain control and react if an emergency occurs.
- Adapt boat speed to sea conditions.
- Reduce speed in congested waterways.
- Operating in unsafe manner may result in injury or death to occupants.
- Avoid showboating! Turning suddenly, jumping waves, or steering close to other boats, docks or obstacles can cause personal injury and boat damage.

Become familiar with the boats operating characteristics at slower speeds before maneuvering at full throttle. Wind and current will have a more pronounced effect on the boat at slower speeds and maneuvering is far more difficult. It is recommended that maneuvering skills be practiced in open water away from traffic

Bow And Stern Turning Paths
(Fig. 1.19.1)



Steering

Steering response depends upon throttle, motion and position of the drive unit. It is important to understand that since both thrust and steering are at the stern of the boat, the bow will follow a smaller turning circle because thrust is pushing the stern away from the direction of the turn.

Steering a boat differs from steering an automobile in several ways:

- Turn the steering wheel in the direction that you want the bow to turn, but remember that the boat will be turning at the stern.
- Steering control will be reduced when in reverse.
- A boat needs to be making headway for proper control. Avoid overcorrecting and veering from side to side at slow speeds by keeping the steering wheel centered.
- The operator must always keep a firm grip on the steering wheel. There may be noticeable pull or torque on the steering wheel under certain engine trim positions and/or bow-up attitude such as when getting up on plane. This effect may be reduced or eliminated by changing the engine trim so that the propeller shaft is more parallel to the water's surface.

⚠ WARNING

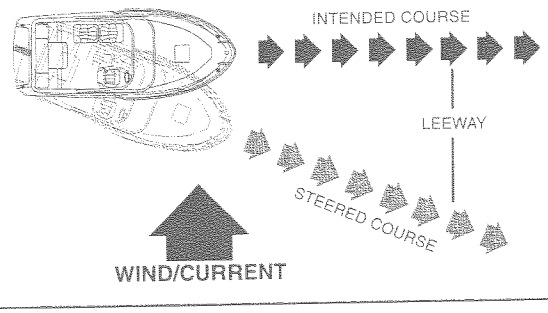
CONTROL HAZARD

- **Boat steering usually is not self-centering. Steering is affected by engine and propeller torque, trim plane, wave and current action, and the speed of the hull through the water. Constant attention and control of the boat's direction is required for safe operation.**
- **Some steering systems are especially sensitive to engine torque and operator seating. Practice under varying conditions to prevent accidents.**

Wind and Current

Wind and/or current will cause the boat to deviate from the intended course of travel. Leeway is the amount of difference between the intended course and the course that must be steered in order to end up at the same position. Because the boat is being pushed sideways by the wind or current, it is actually tracking through the water at an angle. A boat moving slowly with a strong wind or current will need to steer into the wind/current at a greater angle to its intended course to compensate for leeway than will a faster moving boat.

Effects Of Wind/Current On Course
(Fig. 1.19.2)



Trimming

Your boat is designed to plane at a particular speed and weight distribution. As speed decreases or weight increases, the stern will settle lower in the water and the hull will push a hill of water, increasing drag and requiring more power to move through the water.

Power trim enables you to adjust the bow attitude up or down by changing the propeller angle in relation to the hull.

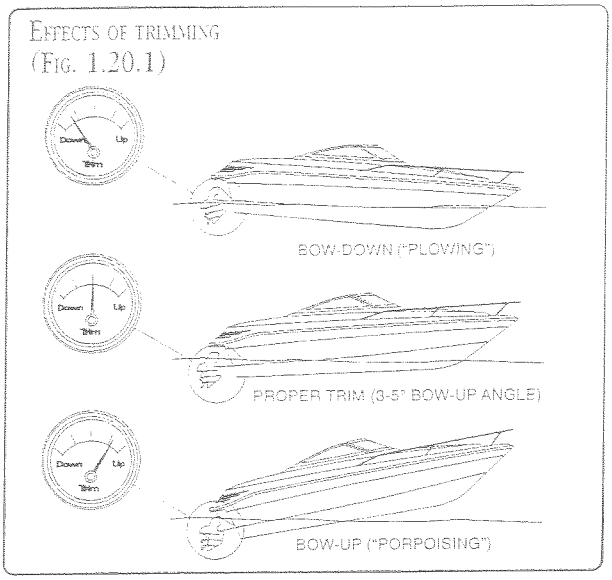
Hydraulic trim tabs are adjusted independently of each other and of the power trim, enabling adjustment bow attitude up and down as well as to correct for side to side list. Trim tabs provide attitude

⚠ WARNING

MANEUVERING/CONTROL HAZARD

- **Ensure continuous visibility of other boats, swimmers, and obstacles during bow-up transition to planing.**
- **Adjust engine to an intermediate trim as soon as boat is on plane to avoid possible ejection due to boat spinout. Do not attempt to turn boat when engine is trimmed extremely down/under/in.**

EFFECTS OF TRIMMING
(FIG. 1.20.1)



adjustment at lower speeds when power trim may be ineffective.

A properly trimmed boat:

- Operates at a correct running attitude of a 3 to 5 degree angle to the water (bow slightly up).
- Reduces drag and increases fuel efficiency.
- Preserves good forward vision.
- Increases safety.

Use short bursts of rocker switches to adjust power trim and trim tabs. Pushing switches too far at once may cause sudden steering problems. Adjusting one trim tab more than the other will adjust list caused by improper equipment storage, too many people on one side or a strong cross wind.

To achieve proper trim:

- Trim the engine fully down/under/in and set the throttle at moderate to maximum when starting out.
- Once on plane, trim the engine slightly up/out to avoid a bow-down condition ("plowing") which can cause unpredictable and inefficient steering. Attempting to turn or encountering a moderate wave in a bow-down condition may result in an abrupt turn or spinout.
- Avoid trimming the engine too far up/out which will cause a bow-up condition leading to bouncing ("porpoising") or propeller ventilation. If propeller speed increases suddenly, reduce engine RPM and trim the drive unit down/under/in until propeller ventilation stops.

⚠ CAUTION

If stern drive is equipped with power tilt for trailering, use it only for that purpose. Tilting drive unit into the trailering zone while underway may damage the drive unit or engine.

Outboard engines may have a trim tab to compensate for steering torque. Torque is caused by the propeller shaft not being parallel to the water surface and will cause the boat to pull to one side.

NAVIGATION

The following is only a general overview of boating "Rules of the Road". This manual does not contain all of the rules of navigation. Therefore, you are strongly urged to acquire instruction in navigation before taking command of your boat.

The two basic types of navigational rules are:

- **Inland Rules** – these rules govern vessels on the inland waters of the United States.
- **International Rules** – these rules apply to vessels on the high seas.

Basic principles apply, however some differences do exist. Learn and understand the rules which govern the type of boating in which you will be engaged. Make sure to consult your marine dealer for any additional "local rules and regulations" which may apply. Keep in mind that every situation which may occur cannot possibly be covered. Therefore, common sense must prevail.

It is important to understand the following **"Basic Rules"** of boating:

- **Underway** – Any boat which is not anchored, made fast to shore or dock, nor aground
- **Power–Driven Vessel** – any boat propelled by an engine. (Includes sailboats propelled by an engine regardless of whether or not the sails are in use).

  Power-Driven vessels must give right-of-way to the following:

  - Any vessel unable to maneuver
  - Any vessel with restricted maneuverability
  - Any vessel engaged in commercial fishing
  - Any sailing vessel
- **Sailing Vessel** – any boat propelled by sail only. (no engine in operation).

  Sailing vessels must give right-of-way to the following:

  - Any vessel unable to maneuver
  - Any vessel with restricted maneuverability

- Any vessel engaged in commercial fishing

- **Vessel Engaged in Fishing** – any commercial fishing boat with gear that restricts maneuverability (not included are trolling lines or other gear which does not impede maneuverability).

  Vessel engaged in commercial fishing must give right-of-way to the following:

  - Any vessel unable to maneuver
  - Any vessel with restricted maneuverability

Navigational Buoys And Markers

Waterways are marked with hazard/warning and directional buoys and markers. They are located to help keep you on course and away from hazardous situations. It is important to familiarize yourself with the different buoys and markers used in navigation.

Consult local boating authorities for the type of hazard/warning buoys and markers used in the jurisdiction where you will be boating.

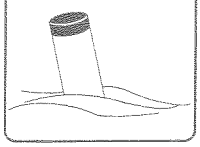
Two primary marking systems are used in the U.S.:

- **Uniform State Waterway Marking System (USWMS)** – used on inland waters and maintained by the individual states.

  The USWMS marks well defined channels with a lateral system of red and black buoys. That is, the sides of the channel are lined with buoys and a boater should pass between them.

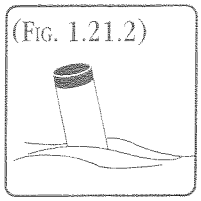
  The USWMS marks areas of obstruction and channels which are not well defined with the cardinal system. The cardinal system requires that the boater:

(Fig. 1.21.1)



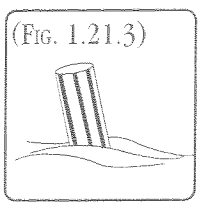
pass north or east of BLACK-TOPPED white buoys.

(Fig. 1.21.2)



pass south or west of RED-TOPPED white buoys.

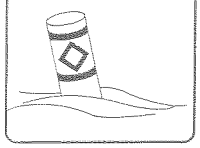
(Fig. 1.21.3)



pass outside (away from shore) of RED and WHITE vertically STRIPED buoys.

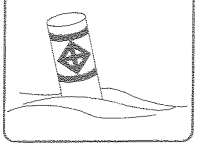
Be aware that the following USWMS regulatory markers **MUST be obeyed.** The regulatory markers are white with geometric shapes painted in international orange.

(Fig. 1.21.4)



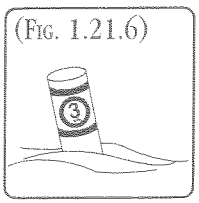
DANGER – DO NOT approach this marker. To do so could result in damage to the vessel or injury.

(Fig. 1.21.5)



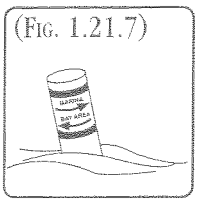
STAY OUT! – boats are prohibited to operate beyond these markers.

(Fig. 1.21.6)



CONTROL SPEED – the speed limit enforced in this area is display on the marker.

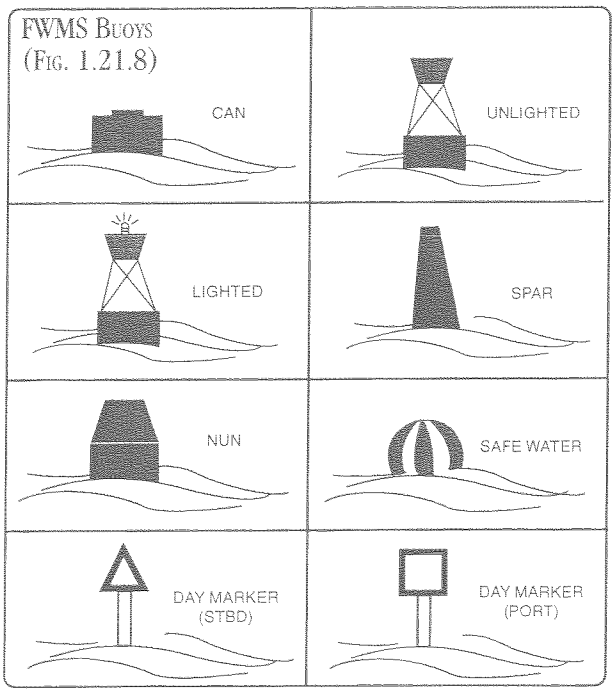
(Fig. 1.21.7)



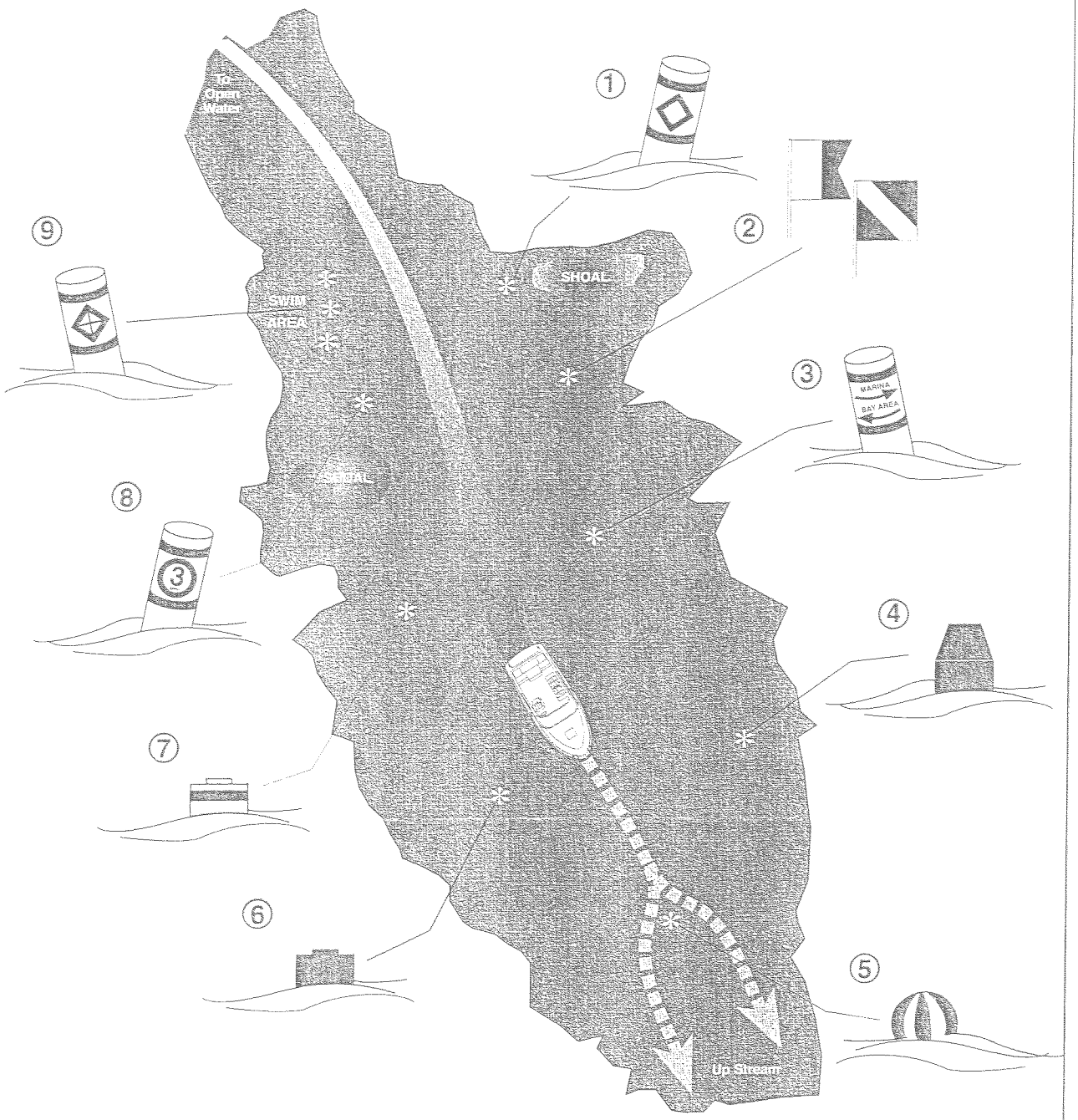
DIRECTIONAL – these markers point out the direction to various sites on the waters.

- **Fresh Water Management System (FWMS)** Additionally, the FWMS is further modified into the Western River Buoyage, and the

FWMS Buoys
(Fig. 1.21.8)



Typical Navigation Markers
(Fig. 1.22.1)



1. **DANGER!** – THE NATURE OF THE DANGER MAY BE INDICATED INSIDE THE DIAMOND SHAPE SUCH AS ROCKS, REEFS, DAMS, SNAGS OR CONSTRUCTION
2. **DIVERS DOWN FLAGS** – REQUIRED BY FEDERAL LAW TO BE DISPLAYED BY DIVERS. BOATS EXERCISE CAUTION.
3. **INFORMATION** – GIVES DIRECTIONS, DISTANCES AND OTHER NON-REGULATORY MESSAGES.
4. **GREEN NUN BUOY** – NAVIGATE TO STARBOARD FACING UPSTREAM.
5. **MID CHANNEL** – PASS CLOSE TO THIS BUOY ON EITHER SIDE.
6. **RED CAN BUOY** – NAVIGATE TO PORT FACING UPSTREAM.
7. **MOORING BUOY** – WHITE WITH REFLECTORIZED BLUE BAND. MAY HAVE A WHITE LIGHT OR REFLECTOR.
8. **CAUTION** – CONTROLLED AREA AS INDICATED IN CIRCLE SUCH AS SPEED LIMIT, NO FISHING, NO ANCHORING, SKIING ONLY, SLOW-NO WAKE, NO PROP BOATS, NO SKIING.
9. **BOATS KEEP OUT!** – THE NATURE OF THE DANGER MAY BE PLACED OUTSIDE THE CROSSED DIAMOND SUCH AS WATERFALLS, SWIM AREAS OR RAPIDS.

Intercoastal Waterway Buoyage. Consult local authorities for the marking system used in your area.

The FWMS lateral marking system employs a variety of markers (Fig. 1.21.7) However, the position, color and numbering of the markers remains consistent. That is, the right side (starboard) of a channel is always marked with RED, EVEN numbered buoys and the left (port) side marked with GREEN, ODD numbered buoys.

The phrase **"red right returning"** is a good way to remember the correct course between the red and the black or green buoys when returning to harbor. It refers to the **red** buoys marking the **right** side of the channel when **returning** to port (or heading upstream). When leaving port (or heading downstream), the opposite is true. Red buoys are on the left and black or green buoys are on the right.

If the seaward direction is difficult to determine, compare the navigational aids you see with a nautical chart.

In addition, sound producing and lighted buoys are used in conditions of low visibility, fog and darkness.

Storms, collisions or unusual tides may cause a buoy to be missing, adrift or off the charted position. Pass buoys at a distance because even on the correct location, they may be very close to the danger they mark. Report misplaced buoys to the proper authorities.

Nautical Charts

Nautical charts produced by the National Ocean Service, U.S. Army Corps of Engineers and others provide critical information regarding water hazards, safe channels, depth, course and headings to guide you while boating. It is extremely important to learn charting and navigation skills before taking command of a vessel. Consult your marine dealer for charts of your area.

Right-of-Way

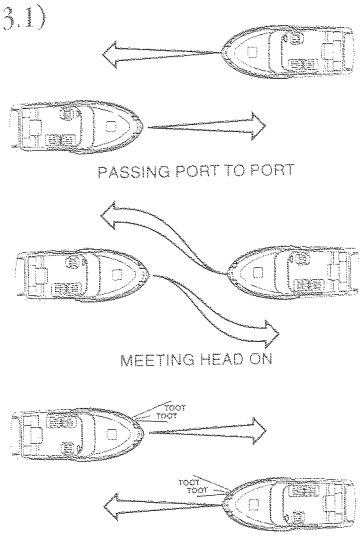
⚠ CAUTION

- **Follow navigation rules to avoid collisions.**
- **Less maneuverable boats generally have the right of way. Steer clear of the stand-on (right-of-way) boat and pass to its stern.**
- **If a collision appears unavoidable, both vessels must act. Prudence takes precedence over right-of-way rules if a crash is imminent.**

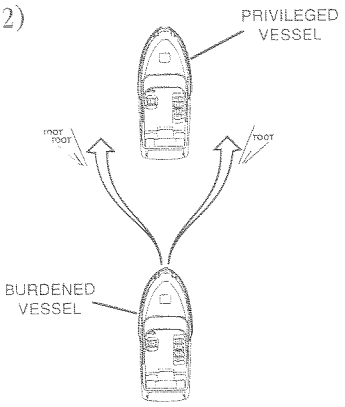
There are three ways of encountering another vessel on the water – meeting, crossing or overtaking.

Generally, the vessel with less maneuverability has the right-of-way. Stay clear of the vessel and pass

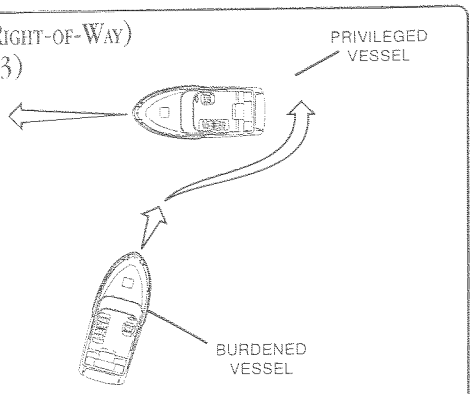
Meeting (Right-of-Way)
(Fig. 1.23.1)



Overtaking (Right-of-Way)
(Fig. 1.23.2)



Crossing (Right-of-Way)
(Fig. 1.23.3)



to his stern. Small pleasure boats must always stay clear of and yield to large commercial boats in narrow channels.

The vessel which has the right-of-way is the "privileged boat". This boat can hold speed and course. The "burdened boat" is the vessel which must make any adjustment to course and/or speed necessary to keep clear of the privileged boat.

When meeting another vessel head-on, neither boat has the clear right-of-way, both vessels should decrease speed and pass port to port (Fig. 1.23.1). However, if both vessels are on the left side of a channel, each should initiate two short blasts of the horn and pass starboard to starboard. If you find yourself overtaking a slower vessel which is in your path of travel, you are the burdened vessel. Make any adjustment necessary to avoid collision and pass either to port or starboard. Signal your intent to do so by sounding your horn twice if passing on the port and once if passing on the starboard (Fig. 1.23.2). When encountering a situation whereby you and another vessel will be crossing paths of travel, the starboard vessel has the right-of-way (Fig. 1.23.3).

Having the right-of-way does not excuse you from accountability in the event of a collision. The general prudential rule of boating states that in the event that a collision appears unavoidable, both vessels have the responsibility to act in such a manner as to avoid collision.

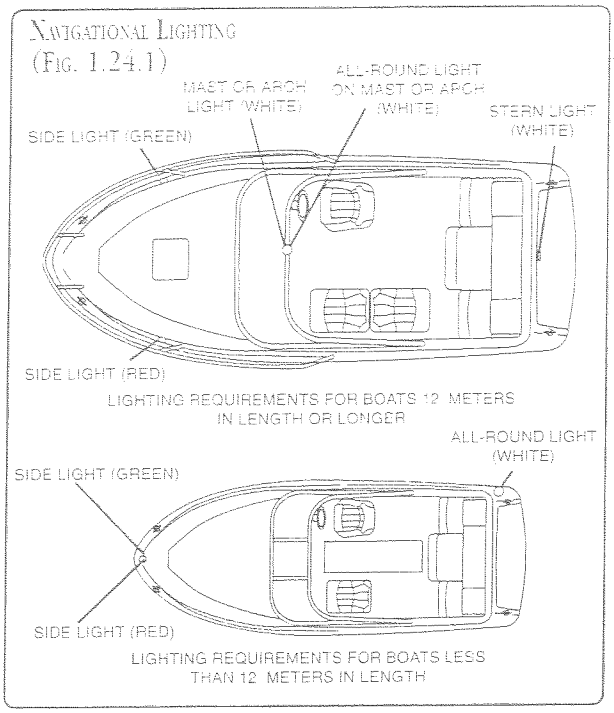
Navigational Lights

When operating between sunset and sunrise and during periods of reduced visibility navigational lights must be operational. It is common for manufacturers to provide proper lighting, however, it is the responsibility of the owner/operator to learn and comply with local boating requirements

It is important that the owner/operator learn to recognize navigational light groupings from any position encountered.

Boat Navigational Lights

- **Masthead Light** – white light on mast visible forward, port and starboard
- **All-Round Light** – white light on mast visible from any direction
- **Side Lights** – red light on the port, forward hull; green light on the starboard, forward hull
- **Stern Light** – white light visible from behind.
- **Anchor Light** – white light visible from any direction.



Navigational Lighting (Fig. 1.24.1)

LIGHTING REQUIREMENTS FOR BOATS 12 METERS IN LENGTH OR LONGER

LIGHTING REQUIREMENTS FOR BOATS LESS THAN 12 METERS IN LENGTH

Sailboats, commercial fishing vessels, public safety boats, dive boats and dredges have different lighting requirements. Also international and inland lighting rules differ slightly, learn to recognize the lighting requirements in your area. Avoid lights you do not recognize.

Nighttime operation requires extra caution. All Rules of the Road apply, but regardless of who has right-of-way, it is wise to slow down and stay clear of other boats. If possible, have a passenger help keep watch. Help your night vision by avoiding bright lights.

⚠ WARNING

Do not operate the boat between sunset and sunrise with the navigation light switch in the ANCHOR LIGHT position. RUNNING LIGHTS are required at night to indicate direction of travel and right-of-way.

Navigating In Fog

Avoid operating in foggy weather, but if visibility is reduced by fog, mist or heavy rain, a boat underway must reduce speed, maintain a vigilant lookout and sound a warning signal of one prolonged blast (approximately five (5) seconds) of the horn or whistle every two (2) minutes.

- Pay close attention to maintain bearing and speed.
- Wear PFDs.

- Have passengers help to lookout.

A boat at anchor in an area of reduced visibility must ring a bell rapidly for five (5) seconds at one (1) minute intervals.

If you hear a fog signal forward or abeam, immediately slow or stop, then proceed with caution until any danger of collision has passed.

Emergency Situations

Plan ahead. The time to think about emergencies is before they happen. As the owner/operator, you must take control and direct what will happen next. Know what to do **before** you encounter any of the following situations.

NOTICE

The law requires the owner/operator to assist any person or boat in distress as long as he does not endanger his boat.

The 1971 Boating Safety Act grants protection to a "Good Samaritan" boater offering assistance in good faith and absolves that boater from any civil liability arising from the assistance given.

Distress Signals

Marine Radios

A radio is the most important means of receiving information and summoning aid that a boat operator has. Learn proper radio procedure to be prepared for emergency situations.

VHF-FM is the most common short-range radio and single sideband (SSB) radios are used for longer range. Designated emergency radio channels are:

- VHF-FM Channel 16
- SSB 2182 kHz

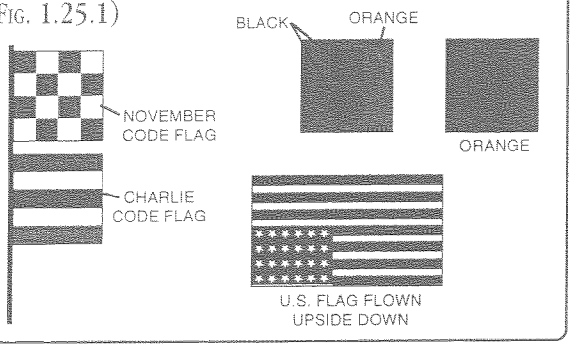
NOAA Weather Radio (NWR) is operated by the National Weather Service and provides continuous weather information for all U.S. waters on both VHF-FM and SSB radio frequencies.

Emergency Broadcasts

Emergency situations are categorized as:

- **Emergency** – life or vessel is in imminent peril.
  - Call sign – **"Mayday, Mayday, Mayday"**

Various Distress Signal Flags (Fig. 1.25.1)



- **Urgency** – emergency situation less severe than an emergency.
  - Call sign – **"Pan-Pan, Pan-Pan, Pan-Pan"** (pronounced Pahn-Pahn)
- **Safety** – weather warnings and navigational safety.
  - Call sign – **"Security, Security, Security"** (pronounced Say-Cure-It-Tay)

Cease all radio transmissions if you hear a distress call. If you can assist, respond on the emergency frequency. If you cannot assist, continue to monitor the emergency frequency until it is obvious that help is being provided.

Visual Distress Signals

U.S.Coast Guard regulations require boats in coastal waters and the Great Lakes to carry visual distress signals for day and/or night use.

- Boats less than 4.9 meters (16 feet), open sailboats less than 7.9 meters (26 feet), boats participating in organized events and manually propelled boats must carry night visual distress signals only.
- At least three (3) USCG approved pyrotechnic devices marked with date showing service life must be carried if visual distress signals are required. They must be readily accessible, in serviceable condition and not expired.
- Carry at least three (3) day and three (3) night signals, or six (6) signals meeting both day and night requirements.
- Store pyrotechnic signals in a well-marked waterproof container in a cool, dry location.

Other universally recognized visual distress signals include:

- Flames in a bucket.
- Code flags November and Charlie.
- Square flag and ball.

- Black square and ball on an orange background flag.
- Orange flag (certified).
- Electric distress light (certified) – for night use only.
- Dye marker (any color).
- Person waving arms.
- U.S. flag flown upside down.

Audible Distress Signals

U.S.Coast Guard regulations require one mouth, hand or power-operated horn or whistle which is audible for at least one half mile.

Other universally recognized visual distress signals include:

- Radio communication.
- Radio-telegraph alarm.
- Position indicating radio beacon.
- Morse Code SOS sounded by any means (3 short, three long, three short).
- A fog horn sounded continuously.

Fire

Fire, a serious boating hazard, can be brought under control if you are prepared and act quickly. Boats are relatively small and will generally burn quickly, so remaining on board and battling a fire for an extended amount of time is not recommended. If the fire cannot be extinguished within the first few minutes, the boat will have to be abandoned.

A small fire can be extinguished quickly if extinguishers are accessible, are the correct type and are used correctly. Extinguishers required by the Coast Guard or other boating law enforcement agency are only the minimum needed. Install fire extinguishers where they might be needed and are easily accessible. Test equipment and emergency plans regularly.

Prevention is the safest method of fighting fires. Remember:

- Use extreme caution while fueling.
- Refrain from smoking while fueling.
- Ensure fuel does not leak.
- Use only marine safety-approved cooking and heating systems.
- Open flames demand constant attention.
- Run exhaust blowers at least 4 minutes before starting engine.

⚠ WARNING

EXPLOSION/FIRE/ASPHYXIATION

- **Open flame cooking appliances consume oxygen. This can cause asphyxiation or death.**
- **Maintain open ventilation.**
- **Liquid fuel may ignite.**
- **Use fuel appropriate for type of stove.**
- **Turn off stove burner before filling.**
- **Do not use stove for comfort heating.**

- Use "sniff test" to check for fumes in bilge and engine compartment.
- Store flammable material in containers which are safety-approved by the Coast Guard .
- Keep flammable material containers in a locker, sealed from the boats interior and vented overboard.
- Ensure ventilation systems are unobstructed.
- Remove canvas before starting engine.
- Extinguish smoking material carefully.
- Use special care with flames or high temperature near urethane foam.
- Check cleaning products for flammability.
- Ventilate when cleaning or painting.
- Disconnect electrical system from its power source before performing maintenance. (See Section 7 – *Electrical System.*)

⚠ WARNING

FIRE/ASPHYXIATION HAZARD – Use special care with flames or high temperature near urethane foam used in construction of your boat. Burning, welding, lights, cigarettes, space heaters, etc. can ignite urethane foam. Once ignited, it burns rapidly, producing extreme heat, releasing hazardous gases and consuming much oxygen.

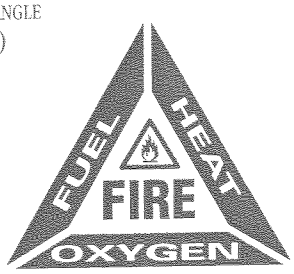
- Replace breaker or fuse with same amperage device.
- Electrical appliances must be within the rated amperage of boat circuits.
- Observe the boat carefully while the electrical system is energized.
- Only a qualified marine electrical technician may service the boat's electrical system.

Fire Suppression Equipment

General

Fire requires a combination of fuel, heat and oxygen in order to burn. Fire suppression equipment removes one or more of these three elements to eliminate the fire.

The Fire Triangle
(Fig. 1.27.1)



REMOVING ONE ELEMENT ELIMINATES THE FIRE.

- Fire suppression equipment can be either fixed or portable. Fixed systems are located in machinery compartments. They should be supplemented by portable extinguishers mounted at key sites and easily accessible, for example, near the engine compartment, galley and helm.
- Coast Guard and other boating law enforcement agency regulations govern the number and type of devices on board. Be sure you are knowledgeable of the regulations within your area. (See *Safety – Minimum Required Equipment*, Pg. 1.6)

Fixed System

- Fire extinguishant is installed permanently in one or more machinery spaces. In the event of a fire, a sensor releases fire-killing extinguishant in the compartment.
- The fixed system is wired to the ignition and turns on when the engine is started.
- An indicator light on the dash is activated when the fire suppression system is available. The light goes out when the system discharges.
- See Section 6 – *Automatic Fire Extinguishing System.*

Portable Extinguishers

Extinguishers are rated in the following classifications according to type of fire:

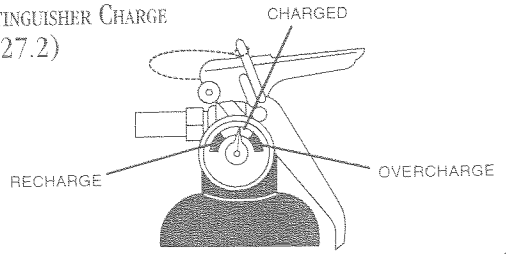
- "A" – Combustible solids (wood, plastic)
- "B" – Flammable liquids (oil, gasoline)
- "C" – Electrical fires

Sizes are identified by Roman numerals – from "I" (smallest) to "V" (largest). Small size provides only a few seconds of firefighting capability.

Check that fire extinguishers are fully charged and become familiar with their use.

It is important to follow the manufacturer's instructions for periodic testing of the portable extinguishers on your boat. **Do not** test by squirting small amounts of the agent; this may cause the extinguisher to fail or become ineffective if needed.

Fire Extinguisher Charge
(Fig. 1.27.2)

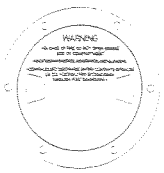


In The Event Of A Fire

- Extinguish smoking materials, shut off blowers, stoves and engines.
- Throw burning materials overboard if possible.
- If the fire is accessible, empty the contents of fire extinguishers at the base of the flames.
- Move anyone not involved in fighting the fire away from the flames.
- Signal for help.
- Grab distress signals and survival gear, put on PFDs and prepare to abandon ship.
- If equipped with a fixed fire extinguishing system, heat sensors will automatically set the system off, flooding the compartment with extinguishant. Wait fifteen (15) minutes before inspecting the fire area to allow the area to soak and cool. Have portable fire extinguishers ready and avoid breathing fumes caused by the fire or extinguishant.
- If the fire is in the engine compartment and no fixed extinguishing system is installed:
  - Do not open the engine hatch. This would feed oxygen to the fire.
  - Discharge portable fire extinguishers through the access plate provided on the engine compartment cover.

If an explosion is imminent, grab distress signals and survival gear, put on PFDs and immediately abandon the boat.

Fire Extinguisher Discharge Port
(Fig. 1.28.1)



- Get clear of danger, account for all who were on board and render assistance.
- Keep everyone together and use distress signals.

⚠ WARNING

BURN HAZARD – Swim against the current or wind if you abandon ship. Leaking fuel will float with the current and may ignite.

Flooding, Swamping

Operator disregard for hazardous weather and water conditions is one of the most common causes of flooding or swamping, along with improper loading, handling and anchoring. Be aware of the possible consequences of your actions. Insist everyone wear a personal flotation device (PFD) when boating.

Remember:

- The bilge ventilation vents are the first areas where downflooding type water ingress occurs.
- Match speed and operation of the boat to sea conditions.
- Strictly adhere to the amount of weight and number of persons for safe operation under normal conditions.
- Adjust weight/number of persons to compensate for water conditions.
- Ensure proper bilge pump operation.
- Anchor from bow if using only one anchor.
- Adjust trim and close openings in rough weather.
- Reverse engine(s) only when forward speed is sufficiently slow to prevent following sea from swamping boat.
- The speed of operation should never exceed the ability to maneuver the craft safely.

In The Event Of Swamping Or Capsizing

- Shut off engines, generators and blowers.
- Account for all who were on board.
- Do not attempt to swim to shore. It is farther away than it looks.
- **Stay with the boat.** It will float even with major damage. Hang onto or climb up on the hull and signal for help.

A swamped or overturned boat is much easier for rescuers to locate than a person in the water. Leave the safety of the boat only as a last resort and only after carefully assessing the situation.

Collisions and Leaking

Keep a sharp lookout for other boats, especially on the way back to port and at night. Be aware that fatigue caused by glare, motion, noise and vibration will reduce reaction time. Know and obey the rules of the road and be courteous. If a collision occurs:

- Account for everyone on board and check for injuries.
- Immediately switch on bilge pumps and operate manual bilge pumps if needed to reduce water intake.
- Check for structural damage and assess the extent of leaks.
- Slow down or stop to reduce water intake, unless maintaining speed would keep the hole above water.

Stay with the boat and signal for help if damage is serious. Otherwise, patch the hole from the outside with whatever means are available.

Water Rescue

A person who has fallen overboard must be rescued before hypothermia or drowning occurs. The amount of time they stay afloat may be determined by rough water conditions, bulky boating clothing, swimming ability, intoxication, any injuries sustained and exhaustion.

Successful recovery of a person in the water depends on boat handling skills (being familiar with your boat's speed and turning ability) and practicing rescue procedures.

Rescue is a combination of returning to the victim, making contact and getting them back on board.

Returning To The Victim

- Immediately sound an alarm and keep the victim in sight.
- Slow the boat and keep pointing toward the person overboard. At night, direct the best available light source at the person.

- Throw a life preserver, even if the person is wearing a PFD. It will serve as another marker

Making Contact

- Stop or slow the boat and circle toward the victim.
- Try to approach from downwind or into the waves.
- Keep the victim on the helm side so the boat operator has the victim constantly in sight.
- When almost alongside, stop the engine in gear to prevent propeller "windmilling".

Getting Back Aboard

- Assist the person in boarding the boat. The person should normally be brought in over the stern.
- If the person is injured, a capable rescuer may put on a PFD with a safety line attached and enter the water to assist the victim.

Drowning

- Try to reach to the drowning victim or throw a life preserver. Swim to rescue a drowning victim only as a last resort.
- Handle with care. Spinal injuries may have occurred.
- Try to resuscitate. At least two people on board should be CPR certified.
- Keep the victim warm and signal for help as soon as possible.

Grounding

Running aground may be avoided by paying attention to marker buoys or indicated by waves as they form into breakers when passing over a sand bar.

If you do run aground, the course of action depends on how hard the boat hits bottom and whether the boat remains stranded. If it is a simple touch, you may need only to inspect the hull and propulsion. If you are aground, assess the situation before reacting. In some cases, throwing the boat into reverse can cause more damage.

In The Event Of Running Aground

- Inspect for damage to the hull, propulsion and steering systems.
- Check for leaks. If water is coming in, stopping the intake of water takes priority over getting free.
- Determine water depth all around the boat and type of bottom (sand, mud, rocks, etc.). This will help you decide which way to move the boat.
- Determine if tide, wind or current will drive the boat harder aground or will help free it.

Towing

A recreational boat towing another is usually a last resort because of possible damage to one or both boats. The Coast Guard or a private salvage company is better equipped. A recreational boat may assist by standing by, and possibly keeping the disabled boat's bow at a proper angle until help arrives. Only when conditions are ideal – that is, seas are calm, disabled boat is small, and one or both skippers know correct technique – should a recreational boat tow another.

! WARNING

PERSONAL INJURY HAZARD – Towing or being towed stresses the boat's hardware and lines. Failure of any part can seriously injure people or damage the boat.

Towing Vessel

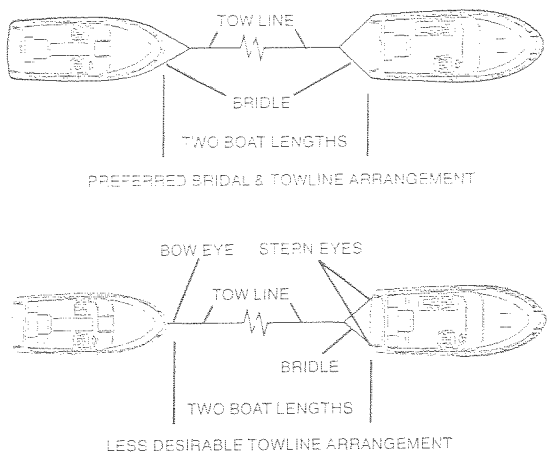
- Be sure your boat will not run aground too.
- Because you are maneuverable and the grounded boat is not, you should pass the towline to the grounded boat.
- Use double-braided or braid-on-braid line. Never use three-strand twisted nylon; it has too much elasticity and can snap back dangerously.
- Fasten the towline as far forward as possible on the upwind or up-current side of the towing boat. Fastening it to the stern will restrict maneuverability of the towing boat.
- If possible, use a bridle.
- Move slowly to prevent sudden strain on slack line.
- Be ready to cast loose or cut the line if the towing situation becomes hazardous.

Vessel Being Towed

Use extreme caution:

- If it is necessary to be towed after being freed, keep someone at the wheel to steer.

Towing Arrangement
(Fig. 1.30.1)



Both Vessels

Use extreme caution:

- Creating a bridle with a line around the hull or superstructure will distribute the load over a wide area; pad pressure points. This technique can be used on both the towing and towed boat.
- Leave at least two (2) boat lengths between vessels to allow for adequate movement.
- Keep lines clear of propellers on both boats.
- Keep hands and feet clear of the other boat.
- Never hold a towline after it is pulled taut.

Propulsion, Control or Steering Failure

- Shut off engine.
- Put out an anchor to prevent drifting.
- Determine if you can fix the problem yourself. See engine operator's manual if engine is flooded.
- Signal for help.

Exhaust Emissions

You can be overcome by fumes from your own engine or from neighboring boats. Ensure continuous movement of fresh air.

⚠ DANGER

EXTREME HAZARD – Ensure adequate ventilation. Engines, cooking and heating appliances produce carbon monoxide gas (CO). Prolonged exposure can cause serious injury or death. To reduce CO accumulation, increase air movement by opening windows or adjusting canvas. The following conditions require special attention:

- **Operating at slow speed or dead in the water.**
- **Operating with the bow high.**
- **Operating engine in confined spaces.**
- **Using canvas curtains.**
- **Blocking engine exhaust.**
- **Winds blowing exhaust toward boat occupants.**

Carbon Monoxide

Carbon monoxide is an odorless, colorless, extremely toxic gas that is the product of any type of combustion produced by engines, heaters, stoves or generators. Symptoms of carbon monoxide poisoning are dizziness, ears ringing, headaches, nausea and unconsciousness. A poisoning victim's skin often turns cherry red. CO is a major threat because its presence is not likely to be noticed until its effects are felt.

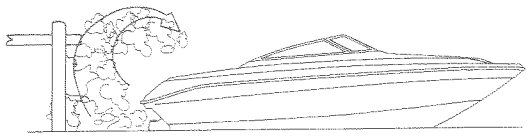
CO concentrations can occur when there are exhaust system leaks, inadequate ventilation or poor air circulation from the motion of the boat (also known as backdrafting).

To minimize the danger of CO accumulation:

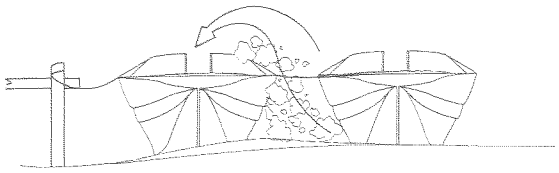
- Operate without the canvas installed.
- Operate with the center windshield open (or, for closed bow boats, the forward hatch open) if the convertible top is installed.
- Operate all combustion devices in well ventilated areas.
- Use fans or forced air if necessary.
- Avoid idling for long periods of time.
- Inspect the exhaust system regularly.

If CO poisoning is suspected, have the victim breathe fresh air deeply. If breathing stops, resuscitate. A victim often revives, then relapses because organs are damaged by lack of oxygen. Seek immediate medical attention.

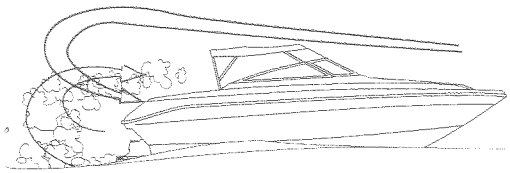
Examples Of How High Levels Of Carbon Monoxide May Accumulate
(Fig. 1.31.1)



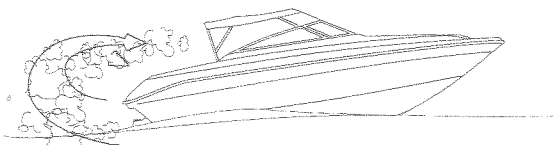
Blocking hull exhausts. Operating at slow speed or dead in the water. (Illus. A)



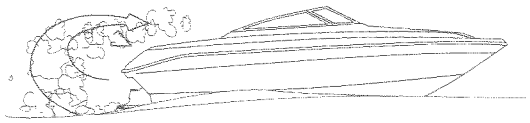
Operating engine in confined spaces. (Illus. D)



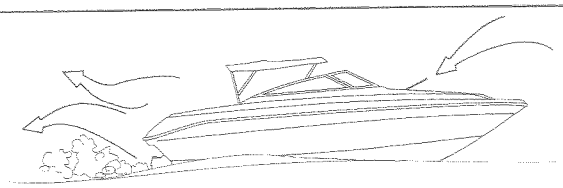
Using canvas curtains. (Illus. B)



Operating with the bow high. (Illus. E)



Winds blowing exhaust toward boat occupants. (Illus. C)



Good ventilation. (Illus. F)

Medical Emergency

In an emergency, you may be far from professional medical assistance. Be prepared. Take a first aid course, and carry a first aid kit. Be aware of any special conditions that may affect anyone on board.

Accident Report

Contact the state boating agency where the accident occurs. In the absence of a state enforcement agency, contact the nearest Coast Guard office. Other countries may have differing requirements for reporting an accident. Consult the nation which you are visiting for accident requirements.

The master or person in charge of a vessel is obligated by law to provide assistance that can be safely provided to any individual at sea. The master or person in charge is subject to a fine and/or imprisonment for failure to do so.

NOTICE

The U.S. Coast Guard and state agencies require a report to be filed by the operator of a boat involved in an accident involving loss of life, disappearance, injury requiring treatment beyond first aid, loss of boat or property damage exceeding $500.

Trailering

When selecting a trailer for your boat, ensure that the structure conforms to the shape of your hull, provides support near the keel, and good fore and aft support.

⚠ WARNING

The trailer selected must conform to the boats weight and hull shape.

The towing vehicle must have the capability of pulling the load. Towing a load which exceeds the vehicles towing capacity may cause loss of control.

The certification label on the trailer shows the Gross Vehicle Weight Rating (GVWR). Make sure that the total weight of your boat, engine, gear, and trailer does not exceed the GVWR.

Consult your state authority (Dept. of Motor Vehicles) for requirements regarding registration, lights, brakes, GVWR, etc. Compliance with other states through which you may be traveling would be prudent as these requirements vary widely from state to state.

The following will help to ensure a safe and pleasurable trip when trailering your boat.

- Check brakes on towing vehicle for fluid levels and proper operation before you depart.
- Inspect trailer springs and undercarriage for loose or missing parts.
- Ensure that the tires are inflated properly. Under-inflated tires heat up rapidly causing damage or failure.
- Check wheel bearings and lug nuts.
- Tail lights and turn signals should be in proper working order.
- It is important that the tongue weight is between 5% and 10% of the total weight of your boat and trailer. Too much or too little tongue weight will cause the towing vehicle to sway.

To determine tongue weight:

- Weigh your trailered boat on a commercial scale.
- Park boat and trailer on a level, paved surface.
- Place a sturdy box on a bathroom scale.
- Position the scale under the tongue jack, ensuring that the trailer tongue is exactly parallel to the ground.
- Read tongue weight on the scale.
- Adjust weight if necessary by rearranging equipment, changing the position of the boat on the trailer, or rearranging the axle on the trailer frame.
- Stow convertible top, if equipped.
- A spare tire for the trailer as well as the towing vehicle and the appropriate tools should be carried.
- Ensure that any covers or hatches are secured before towing.

Hitches

There are two basic types of hitches, weight-carrying and weight-distributing. Consult local regulations for the type(s) of hitch which is allowable in your area.

Weight-Carrying – This is an inexpensive, somewhat simple bumper hitch. The entire tongue weight is supported at the hitch (bumper). This type of hitch is adequate for light trailers however, its use is not allowed in some areas.

Weight-distributing – A necessity for tongue weights which exceed 350 pounds, this hitch is designed to distribute the load to all wheels of both the towing vehicle and the trailer. Heavier loads can be hauled with less wear on the towing vehicle. Some types of weight distributing hitches are equipped with anti-sway bars which improve control of towing vehicle and trailer.

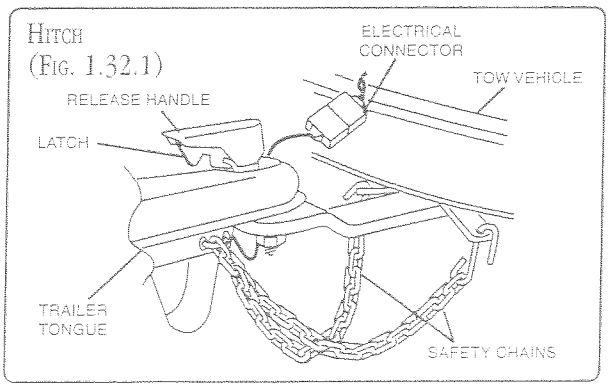
- The hitch coupler MUST match the size of the hitch ball. Check the trailer coupler for the correct diameter of ball to be used.
- Always use a hitch with the same or greater class number as the trailer.

Safety Chains

Properly installed safety chains prevent the trailer from becoming completely detached while you are traveling. Crossing the chains under the tongue will prevent the trailer from dropping to the road in the unlikely event that it becomes separated from the hitch.

- Safety chains should have a breaking strength of at least the gross weight of the trailer.
- Secure the safety chains to the trailer tongue with bolts.
- Hook the chains in the form of an "X" to the towing vehicle (Fig. 1.32.1).

Hitch
(Fig. 1.32.1)



Maneuvering With A Trailer

Exercise caution when towing by allowing extra following distances to avoid having to make sudden stops. Be aware of decreased acceleration capability and allow more room for overtaking slower traffic. Be prepared for trailer sway caused by the air turbulence of larger overtaking vehicles.

Remember that the trailer will turn inside the track of the towing vehicle, so corners, curbs and other obstructions must be given wider clearance. The boat will probably obstruct the rear view of the driver and additional mirrors may be required on the towing vehicle.

Some basic considerations when towing are:

- Become familiar with accelerating, slowing and stopping smoothly.
- Signal your intentions well ahead of time when turning or passing and allow for the extra length of the vehicle and trailer.
- Periodically stop and examine tires and wheel bearings for overheating. Check connections and test tiedowns, covers and fastenings for tightness.

Familiarize yourself with backing up by practicing with an empty trailer in an empty parking lot. Get a feel for backing up straight by making small steering corrections and remember that the trailer will turn in the opposite direction of the towing vehicle.

- Back the trailer slowly. Avoid oversteering and do not rush.
- Turn the steering wheel in the opposite direction that you want the trailer to turn. If you want the trailer to back to the left, turn the towing vehicle's wheels to the right and vice versa.
- As the trailer begins to turn, move the steering wheel back toward center. The trailer will continue to turn at an increasing rate and the steering wheel must now be turned in the opposite direction to slow the turning rate.
- If the trailer does not turn sharply enough, or "jackknifes" (turns too sharply), stop. Pull ahead and try again.

If possible, have someone outside of the towing vehicle to give guidance. Remember that proficiency in backing up a trailer comes with practice.

Launching and Loading

Prior to launching

Prepare the boat for launch in the parking lot, away from the ramp. Try to observe other launchings and take note of any effects of current and wind or problems on the ramp. Allow adequate time for the trailer wheel bearings to cool and check for the following:

- Boat cover removed.
- Garboard drain plug(s) installed.
- Fuel and water tanks filled.
- Equipment loaded and distributed for proper trim.
- All tiedowns removed.
- Bow and stern docking lines fastened and fenders rigged.
- Outboard or stern drive tilted up.
- Electrical connections to tow vehicle disconnected.

Launching

Check that wheel chocks are available and recheck to be sure that the drain plugs are installed. Do not release the winch line until the boat is in the water. When approaching the ramp, back the trailer to the left whenever possible to provide better launching visibility. Position someone outside of the tow vehicle to provide guidance and back straight down the ramp (See Fig. 1.34.1.-1.34.4).

- Proceed backing down the ramp, keeping tow vehicle/trailer as straight as possible and stop with the trailer wheels at the water's edge.

⚠ CAUTION

Allow sufficient time for trailer wheel bearings to cool before submerging.

- Set tow vehicle parking brake and place wheel chocks behind tow vehicle wheels.
- Release trailer tilt latch (if equipped) and have

⚠ CAUTION

Never leave the tow vehicle unattended on the ramp with only the parking brake set.

  a helper hold bow line from the ramp.
- Tighten the trailer winch brake and release the anti-reverse lock, but do not unhook the winch cable from the bow eye.
- Let the boat slide off the trailer into the water, then unhook the winch cable from the bow eye.

Hook the winch cable to the trailer or rewind onto winch. Use gloves when handling cable.

⚠ WARNING

PERSONAL INJURY HAZARD

Severe injury is possible if the winch system malfunctions or the cable breaks. Do not allow anyone to stand near the winch or cable.

- Use bow and stern lines to pull boat to pier and tie off lines.
- Return trailer tilt to horizontal position and lock in place. Remove wheel chocks and drive tow vehicle and trailer up the ramp to a parking area.
- Lower outboard or stern drive, start engine and allow to warm up.
- Cast off lines and slowly depart from the launch area.

Loading

Begin preparing to load the boat onto the trailer before approaching the ramp by stopping engine, disconnecting and securing fuel lines (outboards only) and tilting outboard or stern drive unit to the up position. Loading the boat onto the trailer is almost the reverse procedure as launching the boat:

- Back the trailer down the ramp following the same procedures and safety precautions as for launching.
- Release tilt latch (if equipped) and maneuver the boat onto the trailer using the bow and stern lines.
- Hook the winch cable to the boat's bow eye. Use gloves when handling cable.

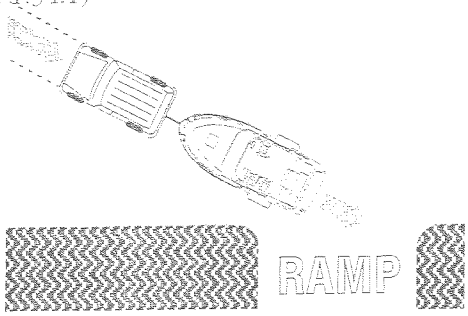
⚠ WARNING

PERSONAL INJURY HAZARD

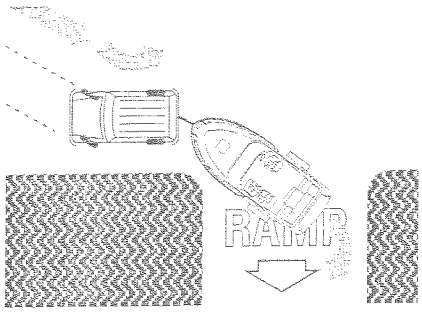
Severe injury is possible if the winch system malfunctions or the cable breaks. Do not allow anyone to stand near the winch or cable.

- Set winch anti-reverse lock and crank boat onto trailer.
- While trailer is tilted and boat/trailer is still inclined on the ramp, open the garboard drain plugs.
- Lock trailer tilt in horizontal position and secure boat with tiedowns
- Remove wheel chocks and drive tow vehicle and trailer up the ramp to a parking area.

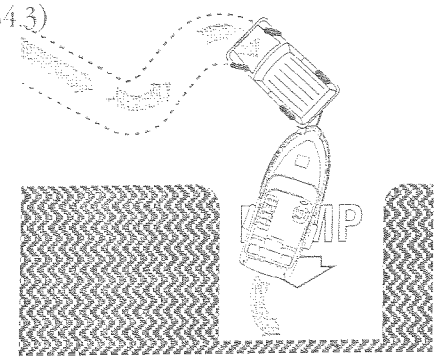
(Fig. 1.34.1)



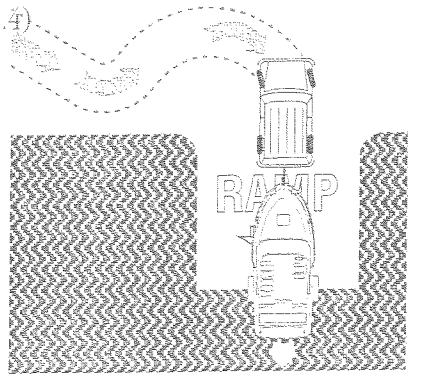
(Fig. 1.34.2)



(Fig. 1.34.3)



(Fig. 1.34.4)



After Loading

Inspect the hull and particularly the propeller for nicks or other damage. If the boat has been in salt water, wash down the hull and trailer as soon as possible and wipe down the hardware and canvas with a soft clean cloth and protectorant.

Reconnect electrical connections from trailer to tow vehicle, stow equipment, replace boat cover and complete securing the tiedowns.

Environmental Considerations

Fuel & Oil Spillage

Regulations prohibit discharging fuel or oily waste in navigable waters. Discharge is defined as any action which causes a film, sheen or discoloration on the water surface, or causes a sludge or emulsion beneath the water surface. A common violation is bilge discharge. Use rags or sponges to soak up fuel or oily waste, then dispose of it properly ashore. If there is much fuel or oil in the bilge, contact a knowledgeable marine service to remove it. Never pump contaminated bilge overboard. Help protect your waters.

Fill tank(s) less than rated capacity. Allow for fuel expansion.

Waste Disposal

NOTICE

- **There is a possibility of being fined for having an operable direct overboard discharge of waste in some waters. Removing seacock handle, in closed position, or other means must be used to avoid fine.**
- **It is illegal for any vessel to dump plastic trash anywhere in the ocean or navigable waters of the United States.**

- Many areas prohibit overboard sewer discharge. Close and disable flow-through waste systems to prevent discharge in such areas.
- Bag all refuse until it can be disposed of ashore. Regulations prohibit disposal of plastic anywhere in the marine environment and restrict other garbage disposal within specified distances from shore.

The Coast Guard is requiring any ocean-going boats 40 feet or larger to have a written "waste management" plan on board. While the requirement is aimed at commercial and passenger ships, there is no exception for recreational boats. "Ocean-going" means any boat going beyond the three-mile coastal U.S. boundary. The written plan can be as simple as:

> All vessel refuse is placed in trash bags which are stored on board until they can be disposed of in dumpsters on shore. This policy is reviewed by all crew and passengers. The person in charge of carrying out the plan is:
>
> Name:_____

⚠ CAUTION

FOR BOATS WITH VACUFLUSH® HEADS ONLY

Do not place facial tissues, paper towels or sanitary napkins in head. Such material can damage the waste disposal system and the environment.

Excessive Noise

Many areas regulate noise limits. Even if there are no laws, courtesy demands that boats operate quietly.

Wake/Wash

! WARNING

SPEED HAZARD – Watch your wake. It might capsize a small craft. You are responsible for damage caused by your wake.

Power boat wakes can endanger people and vessels. Each power boat operator is responsible for injury or damage caused by the boat's wake. Be especially careful in confined areas such as channels or marinas. Observe "no wake" warnings.

⚠ CAUTION

Reduce speed in congested waterways.

Be alert for No Wake markers.

BILGE

DRAIN PLUG

Your Sea Ray® is fitted with a brass garboard drain plug. This is a threaded plug which is installed through the outside of the transom. We recommend that you remove the drain plug when dry docking your boat. **MAKE SURE TO REPLACE THE DRAIN PLUG BEFORE LAUNCHING.**

GARBOARD DRAIN PLUG LOCATION
(FIG. 2.1.1)

BILGE PUMP

A bilge pump and float switch is located in the bilge sump.

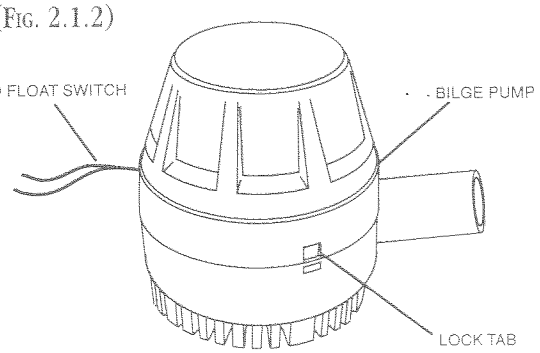
The bilge pump is equipped with a switch on the dash with a "MANUAL" and "AUTO" position. When the switch is in the "MANUAL" position, the pump will run continuously. When in the "AUTO" position, the pump is activated when there is enough water in the bilge to raise the float switch to its highest position; and deactivated when the water recedes. **The pump should NOT be left in the "MANUAL" mode unless the bilge is being pumped out for servicing.**

The pump is protected by a fuse located under the dash and in the bilge (see Section 5 – *Electrical*).

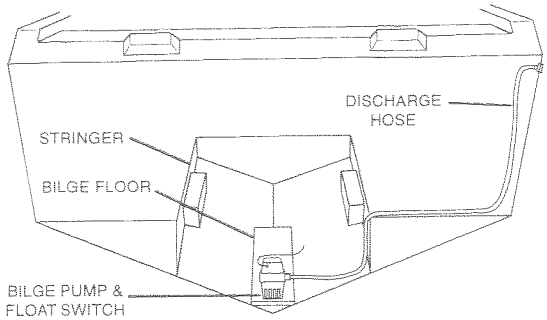
Some bilge pumps may be fitted with an in-line check valve. Bilge pumps that must be equipped with very long discharge hoses are equipped with the check valve. The check valve prevents the residual water in the hose from coming back into the bilge which would cause the pump to cycle on and off trying to pump out the same water.

Because of the weight of water, 8.3 pounds per gallon (1 kilogram per liter), it is important to keep the bilge as free of water as possible.

BILGE PUMP
(FIG. 2.1.2)



TYPICAL BILGE PUMP INSTALLATION
(FIG. 2.1.3)



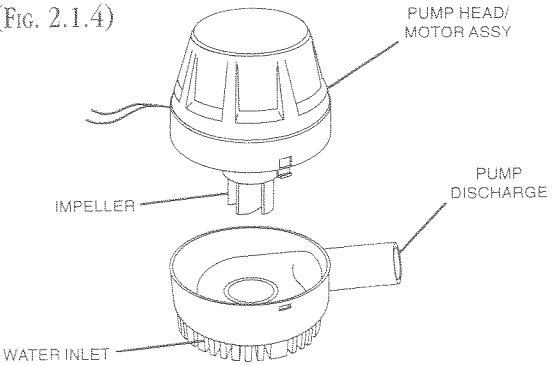
MAINTENANCE

Frequently inspect the area under the float switch to ensure it is free from debris and gummy bilge oil. To clean, soak in heavy duty bilge cleaner for 10 minutes, agitating several times. Check for unrestricted operation of the float. Repeat the cleaning procedure if necessary.

Inspect the bilge pump intake and keep it free of dirt or material which may impede the flow of water through the pump. To clean the pump, remove the pump head and inspect the impeller and water inlet in the base of the pump.

Inspect the check valve located in the discharge line.

BILGE PUMP ASSEMBLY
(FIG. 2.1.4)



Trouble Shooting

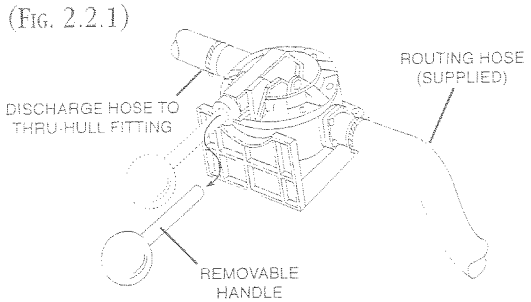
If water does not come out of discharge hose:

1. Inspect the fuse in the bilge. Replace if the fuse is blown. Be sure to replace with the correct size fuse.
2. Remove the motor module to see if the impeller rotates with the power on.
3. Remove any debris that may have accumulated in the nozzle section or strainer base.
4. Check hose and connection on hull side for debris and proper connections.

If an optional manual bilge pump is installed on your boat, it is equipped with a hose which can be routed to any area which is in need of attention.

To operate, make sure that the open end of the hose is completely submerged in the water to be removed, insert the removable handle into the pump and begin pumping. (See the specific information section for location of optional manual bilge pump (if supplied) in your vessel.

Manual Bilge Pump (Optional)
(Fig. 2.2.1)



NOTICE

The Federal Water Pollution Control Act prohibits the discharge of oil or oily waste into or upon the navigable waters and contiguous zones of the United States. Violaters are subject to a fine of $5,000.

Bilge Blower

Your Sea Ray® is equipped with an in-line bilge blower to provide bilge ventilation. The blower is wired through a fuse located under the dash with a switch on the dash panel.

With gasoline engine: Run the blower for four minutes before starting the engines or when operating below cruising speed .

⚠ DANGER

GASOLINE VAPORS CAN EXPLODE

Before Starting Engine:

- Check engine compartment for gasoline vapors.
- Operate blower for 4 minutes. Run blower when moving below cruising speed.

With diesel engine: Run the blower when operating below cruising speed to dissipate bilge heat build-up.

Maintenance

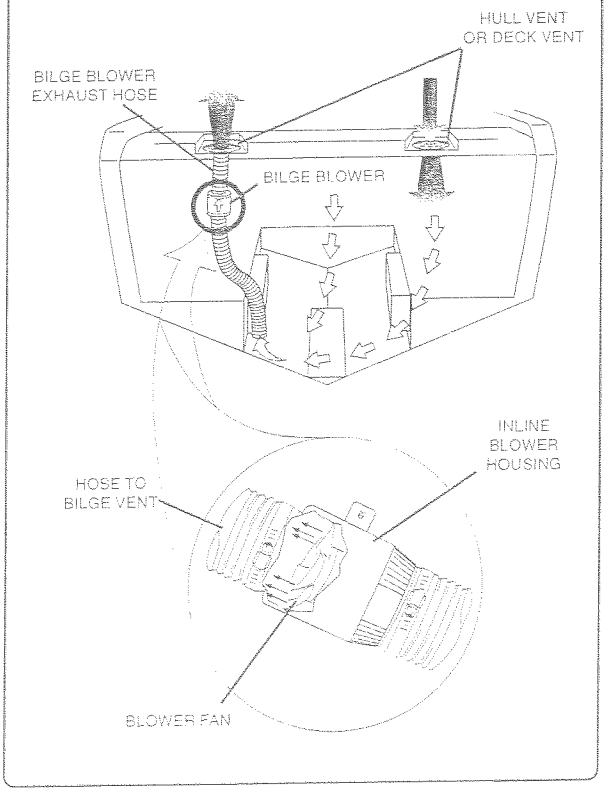
The bilge blower should be checked periodically to ensure that the hose is securely fastened to blower. Check for corrosion of wires and make sure 12 volt wires are secured in place.

Trouble Shooting

If your bilge blower fails to operate:

1. Check the fuse on the electronic interface module or the fuse block under the dash to ensure that the fuse has not blown.
2. Check to see if the blower hose is fastened to the blower.

Typical Bilge Blower Installation
(Fig. 2.2.2)



Engines

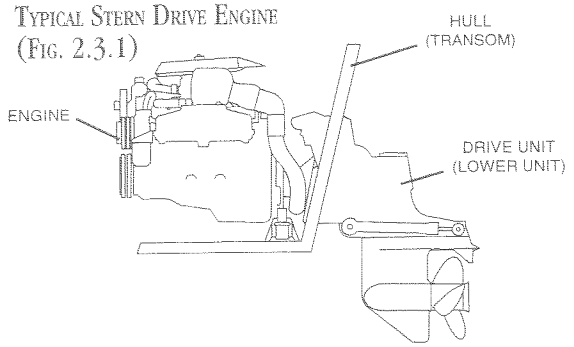
The engine is the heart of your Sea Ray® boat. Proper attention to and maintenance of your engine will assure you of many hours of pleasurable, safe boating and will prevent unnecessary engine problems. A general maintenance program consists of proper lubrication, cleaning of fuel filters, fuel lines and air filters. When washing down, or at any other time, take care that water does not enter the air inlet on fuel injection systems. Water entering the air inlet when the engine is not operating may go directly into the cylinders, resulting in rust and possibly internal engine damage.

⚠ CAUTION

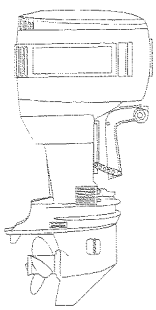
Avoid the contact of flammable materials with hot engine parts.

You must fully comply with the manual provided by the engine manufacturer. Follow the recommended maintenance and warranty schedule in your Engine Operator's Manual included in the Owner's Manual Packet.

Typical Stern Drive Engine (Fig. 2.3.1)



Typical Outboard Engine (Fig. 2.3.2)



Engine Exhaust System

The exhaust system used on Sea Ray® boats with stern drive engines is designed so that the water from the raw water cooling system is pumped through the engine and then overboard through the exhaust outlet through the propeller hub.

Prior to every boat use, examine the exhaust system fittings to ensure tightness. Leaks in the exhaust system may permit carbon monoxide exposure.

⚠ WARNING

Hose clamps must be tight at all times to avoid exhaust leaks and possible carbon monoxide exposure.

Vibration & Causes

Some vibration is to be expected in your boat because of the action of the engines and the propeller. But excessive vibration indicates conditions which must be promptly corrected to avoid damage. The following are some conditions which may cause vibrations.

Foreign Object Interfering With Propeller Action

Weeds, ropes, fishing lines or nets can become wrapped around the propeller and/or shaft, causing vibration and loss of speed. Always stop and then reverse the propeller after going through a weedy area to unwrap and clear away any weeds which may have accumulated. Although reversing will sometimes help to unwrap lines and nets, they are difficult to remove without hauling.

Always check for loose or trailing dock lines before getting underway. When towing a dinghy or surfboard, remember that a long line may easily become entangled with the propeller when backing down.

Bent Prop (And/Or Shaft)

A badly damaged or distorted prop is an obvious cause of vibration.

Engine Part Hitting Boat Structure

Engines are flexibly mounted to reduce transmission of vibration to the hull structure. If some part of the engine, such as the oil pan, contacts a stringer, brace, or part of the hull, vibration will result.

Other Causes

Other causes of vibration could be related to the engine being out of tune.

Underwater Gear

Outdrive Impact Protection

Impact damage can occur in either a forward or reverse direction. It can occur while trailering or in the water. When trailering, make certain outdrive unit is in its highest position. If an underwater object is struck while boat is moving forward, the hydraulic system cushions the kick-up of the drive unit as it clears the object, thereby preventing or greatly reducing damage to the drive unit.

⚠ CAUTION

Impact protection systems cannot be designed to ensure total protection from impact damage under ALL operating conditions. If an object is struck at a severe angle or high rate of speed, damage naturally can occur. Use extreme caution when operating in shallow water areas where known underwater obstacles are present. Use extreme care to prevent striking an underwater object with drive unit while operating boat in reverse, as no impact protection is afforded to the drive unit in this position.

If engine should strike a submerged object, STOP THE ENGINE as soon as possible and examine drive unit for damage. If damage is present or suspected the boat should be taken to an authorized dealer for thorough inspection and necessary repair. Operating a damaged drive unit could cause additional damage to other parts of engine, or could affect controllability of the boat. If continued running is necessary, do so at greatly reduced speeds.

Propeller

The propeller should be free of nicks, excessive pitting and any distortions that alter the propeller from its original design. A badly damaged prop should be replaced, but one that is chipped, bent or merely knocked out of shape can be reconditioned by your marine dealer.

When doing extensive cruising, it is advisable to carry extra propellers aboard.

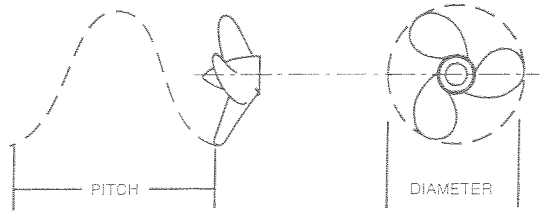
Basic Propeller Characteristics

Propellers have two basic characteristics:

- Diameter
- Pitch.

Diameter is that distance measured across the propeller hub line from the outer edge of the 360° that is made by the propeller's blade during a single rotation. Pitch is that distance in inches that a propeller will travel if rotated one revolution without any slippage (see Fig. 2.4.1).

Propeller Pitch and Diameter
(Fig. 2.4.1)

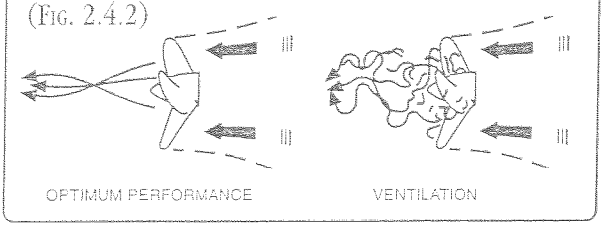


For example, a propeller with a 12-inch pitch, when rotated 360° would, theoretically, advance 12 inches through the water. Actually, no propeller applied to any boat is 100% efficient. No 12-inch pitch blade will, in a single rotation, advance a boat 12 inches. This variance is referred to as slippage.

Ventilation, Its Causes and Corrections

While often called "cavitation," ventilation is really a different effect. At times when a boat enters or leaves a sharp turn, the propeller seems to slip and lose thrust and the engine may over-speed (see Fig. 2.4.2). This problem is normally caused by air or

Propeller Ventilation
(Fig. 2.4.2)



aerated water entering the propeller. (A damaged propeller can also cause ventilation.) Ventilation can usually be corrected by one or more of the following:

1. Replace the damaged or incorrect propeller with the recommended one.

2. Set the outdrive at a lesser trim angle (trim the unit downward).

Cavitation, Its Causes and Corrections

Cavitation is a phenomenon that occurs in all propeller-driven craft under certain conditions. The surface of propeller blades are not perfectly flat, and as water is drawn through the blades to be discharged aft into the propeller's slip stream, the water flowing over the curved surface of the blade encounters areas of greater and less pressure.

In those areas of reduced pressure, air bubbles are formed. When they move out of the low pressure area these bubbles collapse. If they collapse while in contact with an object, such as part of the propeller blade or trim plane, the bubbles create such highly localized forces that they erode the surface of the object. In the case of the propeller, such damage is sometimes called a "burn." It may be caused by an irregularity in the propeller's leading edge, and it should be corrected by reconditioning the propeller or by replacement.

Cavitation is a normal occurrence in modern sport boats, and prop inspection should be part of routine maintenance.

Propeller Torque and Its Correction

Some of the more powerful motors create a considerable torque effect; that is, a twisting motion causing the boat to ride with one sheer lower than the other. This twisting reaction is caused by the direction of propeller rotation lifting one side of the boat. This causes an uneven drag, so that a boat's bow may tend to fall off in one direction or the other from the intended course given by the wheel.

Stern drive and inboard units are equipped with adjustable trim tabs which may be adjusted to balance "steering torque" so that the steering wheel will turn with equal ease in each direction. Follow the trim plane adjustment instructions in the Engine Owner's Manual.

Torque action may occur when maximum or close to maximum rated horsepower is applied. Any slight torque may be offset by shifting passenger or gear weight laterally to the high side of the boat.

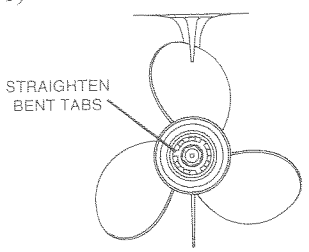
Propeller Removal And Installation

⚠ WARNING

PERSONAL INJURY HAZARD – Always shift to NEUTRAL position, remove ignition key and spark plug wire to prevent propeller rotation from accidental engine startup while performing propeller maintenance.

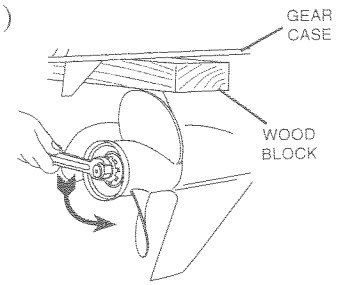
1. Shift throttle control/gear shift to NEUTRAL.
2. Straighten the bent tabs on the propeller nut retainer (see Fig. 2.5.1).

(Fig. 2.5.1)



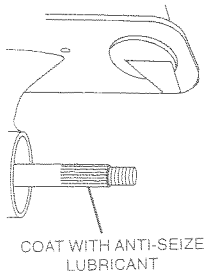
3. Place a block of wood between the gear case and propeller to stop propeller from rotating and remove propeller nut (see Fig. 2.5.2).

(Fig. 2.5.2)



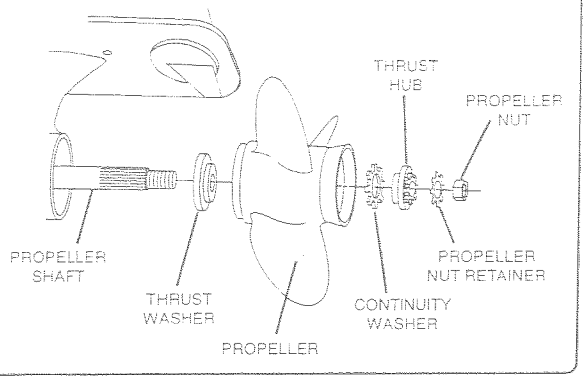
4. Pull the propeller straight off the shaft. If the propeller is seized to the shaft and cannot be removed, have the propeller removed by an authorized dealer.
5. Coat the propeller shaft with an anti-seize lubricant (see Fig. 2.5.3).

(Fig. 2.5.3)



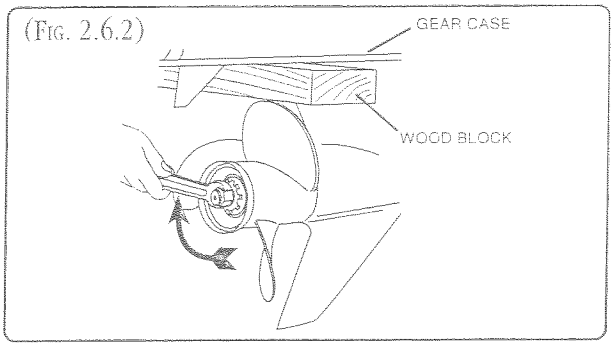
6. Install the thrust washer, propeller, continuity washer, thrust hub, propeller nut retainer and propeller nut onto the shaft (see Fig. 2.6.1).

(Fig. 2.6.1)



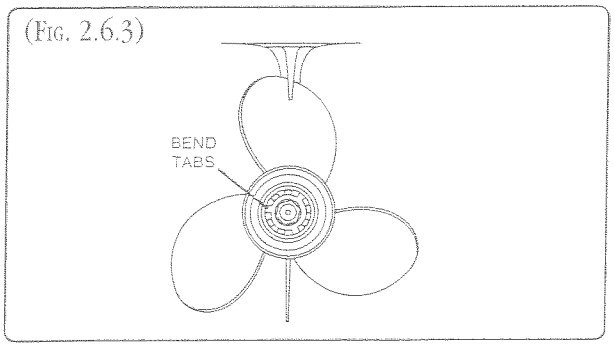
7. Place a block of wood between the gear case and propeller and torque propeller nut to recommended manufacturer's specifications (see Fig. 2.6.2). **To find correct torque, refer to your Engine Owner's Manual in the Owner's Manual Packet.**

(Fig. 2.6.2)



8. Secure the propeller nut by bending three (3) of the tabs of the propeller nut retainer into the thrust hub grooves (see Fig. 2.6.3).

(Fig. 2.6.3)



STEERING SYSTEM

Steering system integrity and control is imperative when engaging in recreational water activities. Constant attention must be paid to the continued proper performance of the steering system. Strict adherence to the following guidelines must be followed to ensure safe recreational boating.

⚠ CAUTION

Boat steering is not self-centering. Steering is affected by engine and propeller torque, trim plane setting, wave and current action, and the speed of the hull through the water. Constant attention and control of the direction of the boat is required for safe operation.

POWER STEERING
(INBOARD/OUTBOARD ENGINES)

The power steering used with stern drives is a mechanical system with enclosed cable. The steering wheel is connected to the stern drive power steering unit by cable. THE CABLE CONNECTIONS AT THE HELM AND AT THE RUDDER TIE BAR SHOULD BE INSPECTED AT LEAST TWICE A YEAR. **A loose connection can result in a sudden loss of steering and control.**

Push-pull cable steering should be checked for proper lubrication of the cable, proper alignment, with no binding or looseness, and no interference in the system. Cable and attachment to the outdrive should be checked for wear, rust or corrosion on a regular basis and be properly lubricated. Check the anchor post at the aft end of the cable to be sure it is secured and free from rust and corrosion.

A routine maintenance schedule for the power steering system should be set up to include a normal service for every 50 hours of operation or 60 days (whichever comes first); under severe service – every 25 hours of operation or 30 days (whichever comes first). **NOTE: Operation in salt water is considered severe service.**

SERVICE SHOULD INCLUDE:

- Lubricate the control valve through the grease fitting with multipurpose lubricant until grease appears around the rubber boot.
- Coat power assist steering output shaft and exposed steering cable end with appropriate lubricant.
- Lubricate cable end guide pivot point with SAE 30W engine oil.
- Check power assist steering fluid level and add type "A" automatic transmission fluid as required to bring level up to "FULL" mark on the dipstick, which is attached to fill cap.
- Inspect all hydraulic lines and hoses as part of routine maintenance for leaks. Be certain that lines and hoses are free from friction and extreme heat and adjoining parts. Tighten fittings and clamps as needed.
- Check all bolts for tightness on a regular basis.
- Check pump pulley drive belt often for wear and proper tension. Overtight belts may cause bearing failure. Loss of the belt compounds affect steering severely.

REFER TO THE ENGINE OPERATOR'S MANUAL FOR PROPER FLUID LEVELS AND LUBRICANTS.

Sea Ray® recommends that all repairs and/or replacements to steering systems be made by qualified dealers authorized by manufacturer of the steering system of your boat.

REFER TO OWNER'S PACKET FOR INSTRUCTIONS AND WARRANTY INFORMATION.

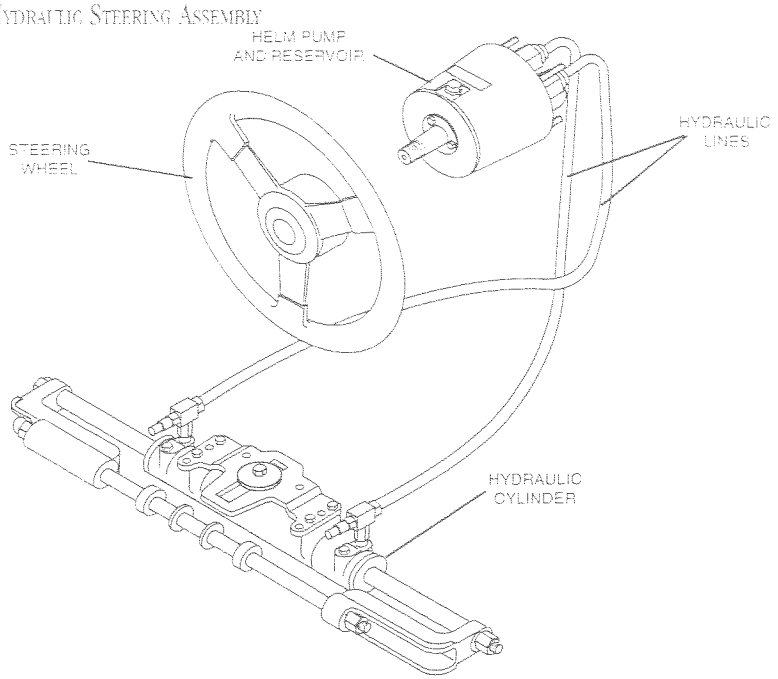
HYDRAULIC STEERING
(INBOARD/OUTBOARD AND OUTBOARD ENGINES)

Most Sea Ray® Boats fitted with outboard engines and some inboard/outboard engine boats use a hydraulic steering system. Periodically remove the plug in the helm unit and check the oil level visually. The oil level should be within 1/2" of the filler hole.

The system must be filled with hydraulic oil meeting Mil Spec H-5606 A. Refer to steering system owner's information in the Owner's Packet for specific hydraulic oils that can be used.

Periodically check the mechanical connections and linkages at the cylinder. Replace worn parts, tighten loose parts and lubricate as needed. The steering system is protected against over-pressure situations by a pressure relief valve. Sometimes when returning the wheel from a hard-over position, a slight resistance may be felt and a clicking noise may be heard. This is a completely

Typical Sport Boat Hydraulic Steering Assembly
(Fig. 3.2.1)



normal situation caused by the releasing of the lockspool in the system.

REFER TO OWNER'S PACKET FOR INSTRUCTIONS AND WARRANTY INFORMATION.

Mechanical Steering System

(Some Outboard Engines)

The steering wheel is connected to the steering tie bar on outboard engines by a cable. THE CABLE CONNECTIONS AT THE HELM AND AT THE RUDDER ARM OR TIE BAR SHOULD BE INSPECTED AT LEAST TWICE A YEAR. **A loose connection can result in sudden loss of steering and control.**

Push-pull cable steering should be checked for proper lubrication of the cable, proper alignment, with no binding or looseness, and no interference in the system. Cable and attachment to the rudder arm or tie bar should be checked for wear, rust or corrosion on a regular basis and be properly lubricated. Check the anchor post at the aft end of the cable to be sure it is secured and free from rust and corrosion.

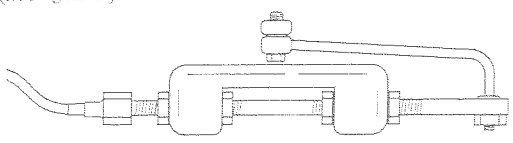
A routine maintenance schedule for the mechanical steering system should be set up to include a Normal Service for every 50 hours of operation or 60 days (whichever comes first); and a Severe Service (after operation in saltwater) every 25 hours of operation or 30 days (whichever comes first).

Service should include:

- Inspection of components and fasteners for wear and replacement of parts if worn.
- Lubrication of steering cable, by (FULLY EXTENDING) transom end of cable out of housing and applying Quicksilver 2-4C Multi-Lube on the exposed end.
- Pivot point lubrication with SAE 30W engine oil.
- Inspection and lubrication of the steering head should be made annually by an authorized dealer or whenever unusual sounds or changes in operation develop.

Sea Ray® recommends that all repairs and/or replacements to steering systems be made by qualified dealers authorized by manufacturer of the steering system of your boat.

Typical Mechanical Steering Link
(Fig. 3.2.2)



REFER TO OWNER'S PACKET FOR INSTRUCTIONS AND WARRANTY INFORMATION.

Gear Shift & Throttle Control

The shift/throttle control unit for the engine activates both the shifting mechanism and the throttle. The control must be in the neutral position to start your engine. Moving the lever forward engages the forward gear and then the throttle advance. To reverse power, bring the control lever back to neutral position, then move it further back to engage the reverse gear and increase reverse thrust.

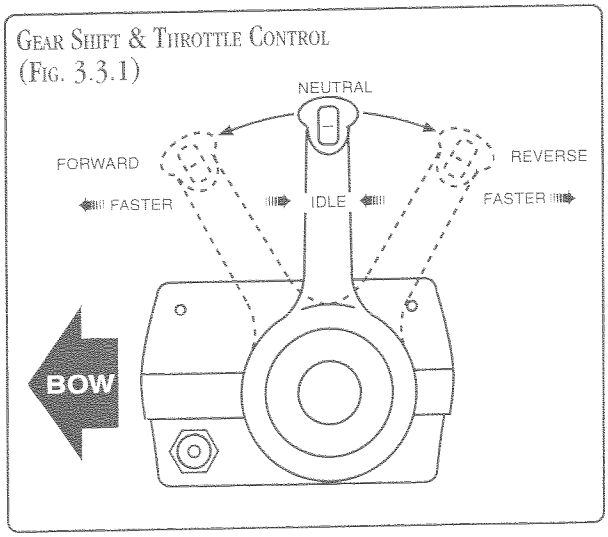
Throttle controls are equipped with a "throttle only" mechanism which allows the shift mechanism to be disengaged from the throttle. This allows the throttle to be advanced without shifting the transmission when starting. The "throttle only" mechanism may differ from one style gear shift/throttle unit to another, refer to your Gear Shift & Throttle Manual for proper operation of this feature.

The throttle control regulates the RPM of the engine. Regulating the RPM of the engine will control the speed of the boat.

Reversing the shift mechanism will act as a braking action, as sudden slowing of the boat from forward motion will create a following wake which may rise above the transom and flood the boat if the boat is moving at too great a speed. All propellers are designed to provide maximum forward thrust, so the reverse thrust of the propeller will not be as efficient.

Controls may vary slightly depending on the particular Sea Ray® model and engine combination.

Gear Shift & Throttle Control
(Fig. 3.3.1)



⚠ WARNING

- **Shift selector to NEUTRAL before starting engine.**
- **Shift only when engine is at idle.**
- **Reversing at high speeds can cause flooding/ swamping due to water being pushed over the transom (stern).**

⚠ CAUTION

- **Shift quickly; easing into gear can damage the transmission.**

Maintenance

Periodically check and seasonally lubricate the linkages with medium weight oil.

Occasionally it will be necessary to adjust the tension on the cables to ensure a positive and direct response of the control lever action.

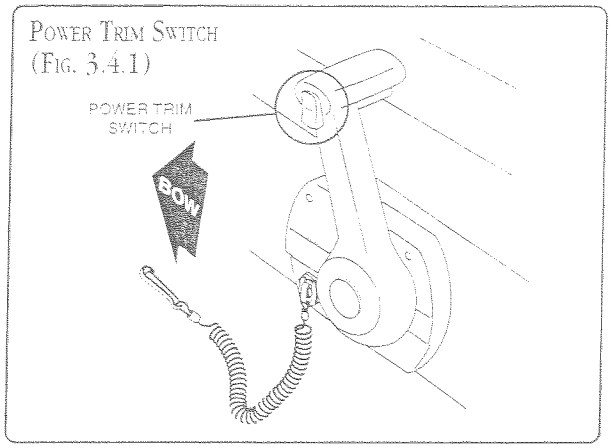
REFER TO OWNER'S PACKET FOR INSTRUCTIONS AND WARRANTY INFORMATION.

Power Trim & Tilt Operation

The Power Trim & Tilt System allows the operator to raise and lower the drive unit for trailering, launching, beaching, shallow water operation, and while underway to provide the ideal boat angle (in relation to water surface) for a given load and water condition. In most cases, best all-around performance is obtained with the drive unit adjusted so that the boat will run at a 3° - 5° angle to the water (front of hull just slightly out of the water). The Power Trim and Tilt switch is located on the shift/throttle control lever.

NOTE: Boats can be operated in a manner and at certain speeds causing trim angles such that visibility is partly or completely obscured. Motor trim angles, hull trim plane angles (if equipped), and boat load distribution as well as hull speed are factors affecting a boat's trim angle. This standard cannot assure visibility such that a boat can be operated without some loss of visibility from the helm during high trim angles. High trim angle will result from operation at speeds during the transition from displacement mode to planing mode, rapid accelerations, incorrect loading, improper motor trim angles and improper hull trim plane angles. During these conditions it is expected that a lookout will be

Power Trim Switch
(Fig. 3.4.1)



maintained as required by the Rules of the Road.

Moving Bow UP (Drive Unit UP) Characteristics:

- Reduces wetted surface of hull, generally increasing top speed.
- Increases clearance over submerged objects.
- May cause boat to accelerate and get up on plane slower.
- In excess, can cause bouncing, porpoising, and/or propeller ventilation.
- Causes overheating if trimmed up beyond water pickup.

Moving Bow DOWN (Drive Unit DOWN) Characteristics:

- Will help boat to accelerate and get up on plane faster.
- Could improve boat ride in rough water (at partial throttle).
- Will reduce boat speed in most cases.
- Stops "porpoising"

To Trim Bow of Boat UP (Drive Unit UP):

- Press UP on TRIM switch until the drive unit moves to properly trim the boat or until trim limit switch stops upward travel.

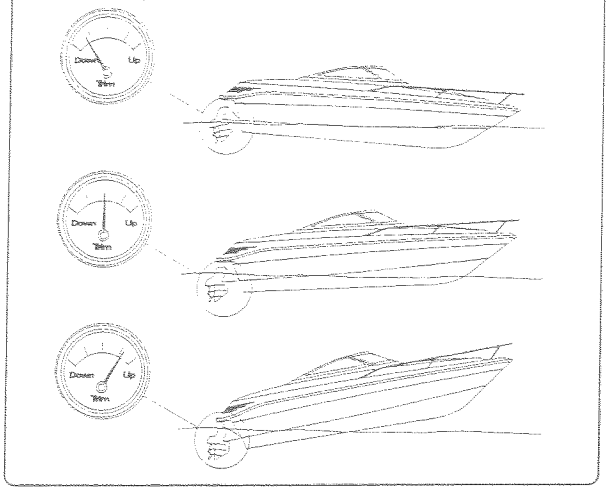
⚠ CAUTION

NEVER trim the drive unit UP using the TRAILER switch while boat is underway. Severe damage to drive unit may result if the unit is raised beyond the gimbal ring support flanges at engine speeds above 1,200 RPM.

To Trim Bow of Boat DOWN (Drive Unit DOWN) or To Lower Drive Unit from Raised Position:

- Press DOWN on TRIM switch until the drive unit moves to properly trim boat or until the drive unit reaches the end of down travel.

Effects of Power Trim
(Fig. 3.4.2)



Power Tilt Operation

The Power Tilt allows the operator to raise and lower the drive unit for trailering, beaching and launching. On boats with outboard engines, the Power Tilt will tilt the engine completely out of the water. The Power Tilt switch is located on the shift/throttle control lever.

To Raise Drive Unit for Trailering, Beaching Launching or Shallow Water Operation:

Outboard

- Press and hold TRIM switch until drive unit reaches desired height or end of upward travel.

Inboard/Outboard

- Press and hold TRAILER switch until drive unit reaches desired height or end of upward travel.

NOTE: Power Trim pump motor operates both Power Trim and Tilt. The pump motor is protected from overheating by an internal circuit breaker. If trim/trailer switch is held depressed after drive unit reaches end of upward travel, the internal circuit breaker will open and the pump will stop. If this should happen, release switch and allow motor to cool for approximately one minute. Once motor is cool, the circuit breaker will reset automatically and trim operation may be resumed.

REFER TO OWNER'S PACKET FOR INSTRUCTIONS AND WARRANTY INFORMATION.

Engine Alarm System

⚠ CAUTION

Never ignore an alarm.

Some engines installed in Sea Ray® Sport Boats utilize an audible engine alarm. The alarm indicates a problem with one or more of the following: engine water temperature, oil pressure and/or stern drive oil level.

Read the Engine Operator's Manual supplied by the engine manufacturer to learn if your Sport Boat is equipped with an engine alarm and how to use it properly.

⚠ CAUTION

IF THE ENGINE INDICATOR(S) AND ALARM COME ON WHILE RUNNING, QUICKLY CHECK AND NOTE THE OIL PRESSURE AND WATER TEMPERATURE GAUGE READINGS. TURN OFF ENGINE IMMEDIATELY. Check for leaks and see if the cooling water pickup is blocked or clogged. If necessary, clear the water pickup of any foreign matter. DO NOT RESTART THE ENGINE UNTIL CAUSE FOR ALARM SOUNDING HAS BEEN FOUND AND CORRECTED.

Ignition Shutdown Switch

(Available On Some Models)

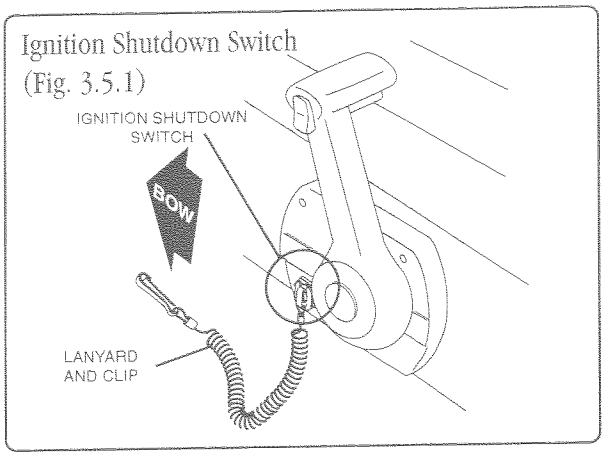
Your Sea Ray® may utilize an ignition shut down switch to stop the engine when the operator of the boat leaves his control station in an unsafe situation, either accidentally by falling into the boat, or by falling or being ejected overboard. This would most likely occur as a result of poor operating practices, such as sitting on the back of the seat at planing speeds, standing at planing speeds, operating at high speeds in shallow or obstacle-infested waters, drinking while driving or daring high-speed maneuvers.

Unintentional activation of the switch could cause potentially hazardous situations. Some of the situations could include: loss of balance and falling forward of unstable passengers, loss of power and directional control in heavy seas, strong currents or high winds, or loss of control when docking. The ultimate decision of whether to use an ignition shut down switch or not, rests with you, the owner/driver.

The ignition shut down switch incorporates a shut-off switch, switch clip, lanyard and lanyard clip, which is clipped to the helmsman. If a situation arises where the engine must be shut down, a pull on the cord to release the clip form the shut-off will shut down the engine.

To reset ignition shut down switch after deactivation, simply reinstall the switch clip above the shut-off switch and flip the switch to the "UP" position.

Ignition Shutdown Switch
(Fig. 3.5.1)



⚠ CAUTION

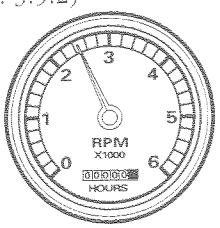
This shut down switch is to be used as a safety stop switch only. It should NOT be used as the normal engine shut-off.

Instrument Gauges

Your Sport Boat is equipped with analog gauges as standard equipment. The following information is a brief description of the gauge packages. Refer to the Owner's Manual Packet and/or consult the dealer for complete instructions regarding your sport boat gauge package.

Tachometer w/Hourmeter

Typical Tachometer Gauge
(Fig. 3.5.2)



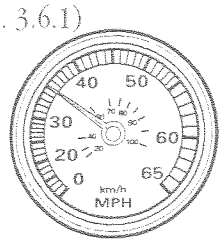
The tachometer indicates the revolutions per minute (RPM) of the engine. (It does not indicate the speed of the boat.) Your Engine Operator's Manual states the maximum full throttle RPM at which your engine should operate. This should not be exceeded. The tachometer should also be used to determine the most comfortable and economical cruising RPM.

Hour Meter

The hour meter measures cumulative hours of operating time. It should be used to keep a careful log of engine maintenance as well as performance data and fuel consumption. Do not leave ignition key on with the engine off, as this will increase the engine hours on the hour meter.

Speedometer

Typical Analog Speedometer (Fig. 3.6.1)



The speedometer indicates the speed of your boat in miles per hour. It operates by transferring the water pressure against the small hole in the leading edge of the outdrive unit to the gauge. To ensure an accurate reading, make sure the water pressure hole is not clogged.

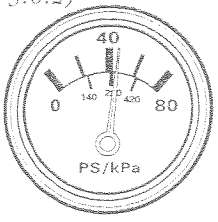
Speedometer Maintenance:

1. A clogged waterpickup will render the speedometer inoperative. Clean with a piece of wire or blow out with compressed air. Before blowing out with compressed air, disconnect speedometertubing from tube and speedometer fitting.
2. Drain the system of water completely before storage. Remove tubing from speedometer fitting and blow through tubing to remove water.

Oil Pressure Gauge

(N/A With Outboard Engines)

Typical Oil Pressure Gauge (Fig. 3.6.2)



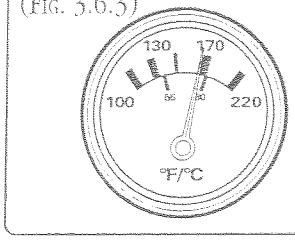
The oil pressure gauge is designed to monitor the oil pressure maintained in the engines internal lubricating system. Maximum engine oil pressure is controlled by a preset valve in the oil pump. Note the reading which this gauge records when the engine is new, as it is the "norm" which can be used as reference during the life of the engine.

IF A COMPLETE LOSS OF OIL PRESSURE OCCURS, TURN ENGINE OFF AT ONCE. Continued running after loss of pressure will cause engine damage. First, manually check the oil level. If low oil level is not the cause, consult your Sea Ray® dealer. DO NOT RESTART THE ENGINE UNTIL THE PROBLEM HAS BEEN CORRECTED.

Slight fluctuations in gauge readings are not uncommon during operation and may be due to the characteristics of the lubricating oil. Greater fluctuations should be investigated.

Water Temperature Gauge

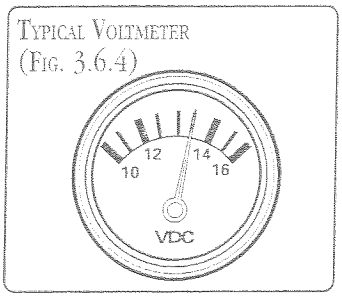
Typical Water Temperature Gauge (Fig. 3.6.3)



The engine water temperature gauge indicates the temperature of cooling water circulating inside the engine. Your engine is equipped with a thermostat so a predetermined engine temperature should be reached soon after starting the engine and maintained thereafter while the engine is running. Refer to your Engine Operator's Manual for proper gauge readings. IF THE TEMPERATURE APPROACHES ABOVE NORMAL ON YOUR GAUGE, SHUT DOWN THE ENGINE AT ONCE.

Voltmeter

Typical Voltmeter (Fig. 3.6.4)

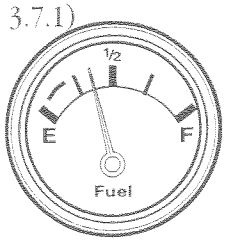


The voltmeter indicates battery voltage. Normal engine operating voltage will range between 12.0 to 15.5 volts when the alternator is charging. Significantly higher or lower readings indicate a battery problem, alternator malfunction or heavy battery drain.

Fuel Gauge

The fuel gauge indicates the amount of fuel in the fuel tank. The most accurate reading of the fuel gauge is at idle speeds when your boat is in an approximately level position. At slow plane when your boat is in a bow up position, the gauge will read inaccurately because the fuel in the tank travels to the rear of the tank and away from the fuel sending

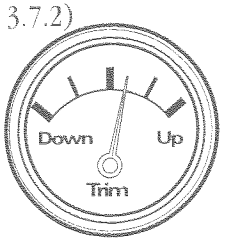
Typical Fuel Gauge
(Fig. 3.7.1)



unit. Because gauge readings are approximate, they should be compared to the hours of use versus known fuel consumption (GPH).

Trim Gauge (Inboard/Outboard Only)

Typical Trim Gauge
(Fig. 3.7.2)



The trim gauge indicates the angle of the stern drive cavitation plate in relation to the bottom of your boat. When the stern drive is trimmed DOWN, the bow of your boat is being forced down. It is recommended that the trim be in a full DOWN position when accelerating from idle to plane. This will result in faster planing and less bow rise. Once on plane, the drive unit can be trimmed UP. This will raise the bow of the boat and increase speed.

You will need to experiment a bit to determine the trim position you prefer under various conditions. If you trim the outdrive out too far while on plane, you may encounter propeller ventilation. This is evidenced by a sudden increase in RPM and should be avoided.

Should ventilation occur, reduce your engine RPM and trim the outdrive DOWN until it stops.

REFER TO YOUR ENGINE OPERATOR'S MANUAL FOR PROPER GAUGE READING.

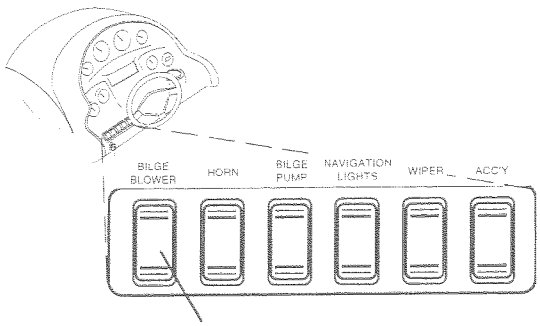
Equipment Switches

To energize the various equipment and accessories such as the bilge pump, navigation lights, horn, etc., your Sea Ray® Sport Boat may be equipped with either a rocker-type switch panel or an electronic switch pad located at the helm.

Helm Switch Panel

The rocker-type switch panel consists of a series of sealed momentary, two or three position illuminated switches. The switches connect to a fuse block located under the dash (see Section 5 – *Electrical System*).

Typical Helm Switch Panel
(Fig. 3.7.3)

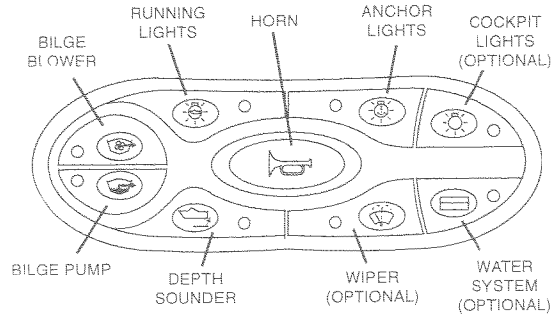


NOTE: OUTBOARD ENGINE BOATS ARE NOT EQUIPPED WITH A BILGE BLOWER SYSTEM.

Electronic Switch Pad

Your Sea Ray® Sport Boat may be equipped with an illuminated waterproof electronic switch pad. The Individual switch functions are indicated by ISO symbols and connect to the electronic interface module (EMI) located under the dash (see Section 5 – *Electrical System*).

Electronic Switch Pad
(Fig. 3.7.4)

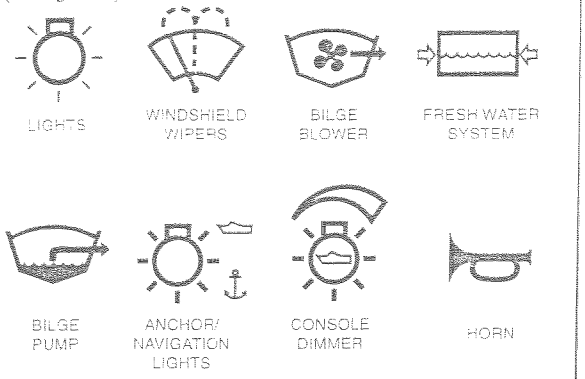


NOTE: OUTBOARD ENGINE BOATS ARE NOT EQUIPPED WITH A BILGE BLOWER SYSTEM.

Switch Panel Symbols (Only Applies To Models With Illustrated Switches)

Your Sea Ray® Sport Boat may be equipped with illustrated accessory ON/OFF switches (see Fig. 3.8.1). Below is a listing of typical symbols and their switch function. For a complete table of symbols found on your boat, refer to the opening section of your Owner's Manual. Your boat may also be equipped with an ACCESSORY switch which has no markings.

Typical Switch Panel Symbols
(Fig. 3.8.1)



Console Dimmer

(N/A On Some Models)

There is a "CONSOLE DIMMER" control located on the dash switch panel which controls the intensity of the dash lights. The dash lights are turned on when the navigation running lights are turned on.

Navigation Lights

Navigation lights must be displayed while underway from sunset to sunrise or in conditions of reduced visibility. It is wise to run at reduced speed whenever navigation lights are needed. The term "underway" denotes not at anchor or dock. Trolling or drifting with power off is considered underway and normal running lights must be displayed. At anchor, in open water, a 360 degree white anchor light must be displayed.

Although the navigation lights supplied with your Sea Ray® are of top quality, failure may occur for a variety of reasons:

1. There may be a blown fuse or tripped breaker. (Replace the fuse or reset the breaker.)
2. The bulb may be burned out. (Carry spare bulbs for replacement.)
3. The bulb base may be corroded. (Clean the base periodically and coat it with nonconductive grease.)
4. A wire may have come loose or may be damaged. (Repair as required.)

To Operate The Running Lights:

Push the switch on control station switch panel with the running lights symbol.

To Operate The Anchor Lights:

Push the switch on control station switch panel with the anchor lights symbol.

Marine Compass

(Only Available On Some Models)

A marine compass is deflected and its usefulness impaired when other instruments or objects containing iron, magnets, or electric current carrying wires are in its vicinity. A newly installed compass must be adjusted to compensate for these influences if they must remain in proximity to it.

The compensating or adjusting should be done by a qualified compass adjuster. A compass can seldom be corrected to zero deviation on all headings, so you will be provided with a deviation card or chart showing the correction to be applied when laying out a compass course or making your navigational calculations. **Keep this card at the helm at all times.**

After your compass is adjusted, do not permit items such as iron or steel to be placed near it, even temporarily, as they will affect its accuracy. The compass must be readjusted if any items which affect it are removed, relocated or added in its vicinity.

When not in use, the compass should be protected from excessive and prolonged sunlight. If your compass becomes sluggish or erratic, it should be serviced by an authorized repair station.

To keep the plexiglass dome free from scratches, remove salt deposits and dust with a damp cloth. An occasional treatment with paste wax will help preserve the dome surface.

REFER TO OWNER'S PACKET FOR INSTRUCTIONS AND WARRANTY INFORMATION.

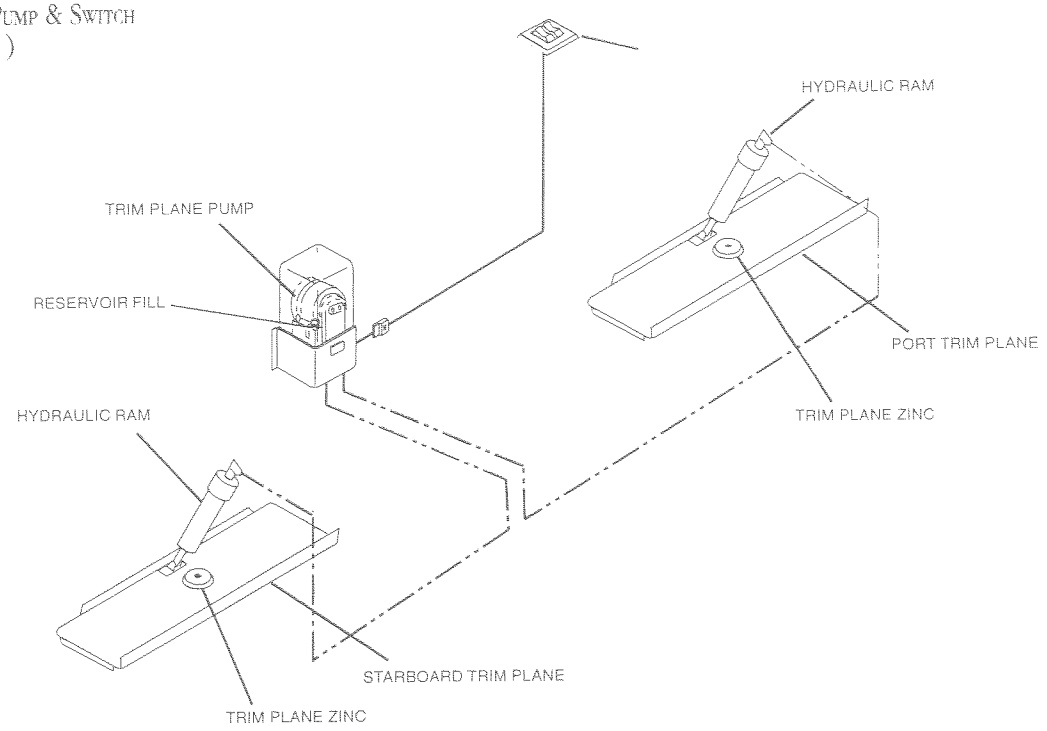
Trim Tabs

(Option On Some Models)

The trim tabs are operated with a rocker type momentary switch on the dash. They are protected by a circuit breaker on the helm switch panel which must be ON to use the trim tabs.

To trim the bow of your boat down, push the top halves of both rockers down in half second bursts. If you hold the rockers down, you will over trim the boat and the bow will dig in. To correct over trimming, push bottom halves of both rockers to obtain desired planing angle.

Trim Tab Pump & Switch
(Fig. 3.9.1)



The two trim tabs on the transom of your boat can also be used to trim the list of your boat that may be caused by improper storage of gear, too many people on one side or a strong cross wind. Operation of the rocker switch should be momentary short bursts to achieve proper attitude of the hull.

When running wide open, most boats do not require any trim unless heavily loaded.

In heavy following seas or when running in an inlet, best maneuverability is obtained with a bow high attitude. To be sure the tabs are full up in the zero position, push the bottom halves of the rockers for several seconds.

The trim tab pump is located in the bilge, mounted on the transom. To service the unit, remove the tinted plastic cover to gain access to reservoir fill plug and motor parts. Hydraulic trim tabs use Type A Dexron II automatic transmission fluid, which should be filled up to the "FULL" mark on the pump base. Add fluid with the trim tabs in the up position only.

REFER TO OWNER'S PACKET FOR INSTRUCTIONS AND WARRANTY INFORMATION.

Carbon Monoxide Monitor

Your Sea Ray® Boat may be equipped with a carbon monoxide (CO) monitor.

The CO monitor is an electronic instrument that detects CO. When a potential hazard exists, the monitor will alert the occupants by a flashing DANGER light and alarm.

The monitor is mounted in the cabin and operates through a fuse located on the fuse block under the dash, or an in-line fuse near the battery switch.

It is extremely important that you become totally familiar with your CO monitor and its functions.

SEE THE OWNER'S HANDBOOK IN YOUR OWNER'S MANUAL PACKET FOR DETAILED INFORMATION AND OPERATING INSTRUCTIONS.

FUEL SYSTEMS

Fuel lines, filters and all fuel system components should be checked at the start of each season and periodically thereafter, particularly after any work has been done aboard the boat which might have affected any part of the system. Be certain that all are in proper condition and that the entire system is fuel tight.

Only a qualified marine mechanic should be allowed to work on the fuel system. Damage can be done to fuel system components by indiscriminate tightening of connections, including flexible fuel line sections.

Make sure that fuel lines are in good condition and that they do not come in contact with any moving parts.

⚠ DANGER

Gasoline Vapors Can Explode.

Before Starting Engine:

- **Check engine compartment for gasoline vapors.**
- **Operate blower for 4 minutes.**

Run blowers below cruising speed.

⚠ WARNING

DO NOT store fuel or flammable liquids in closed storage areas. Ventilation has not been provided for explosive vapors.

⚠ WARNING

Use of the bilge blower should never take the place of checking the bilge visually and "smelling" for fumes.

⚠ WARNING

Leaking fuel is a fire and explosion hazard. Inspect system regularly. Examine fuel tanks for leaks or corrosion at least annually.

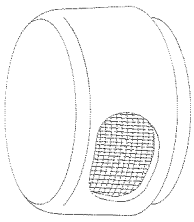
⚠ CAUTION

Never start an engine until you are certain that gasoline fumes are not present in engine compartment or elsewhere in the boat.

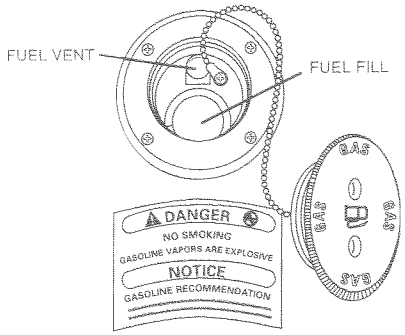
FUEL TANK

Your Sea Ray® is fitted with one fuel tank located either under the cockpit floor or against the transom behind the aft cockpit panel. The fuel fill cap is located on the deck. The fuel tank is fitted with a vent located on the hull or inside the fuel fill fitting. This type of vent serves a multipurpose of pressure/vacuum release, safety overflow and flame arrester with hull type mount. Keep the screen in hull mounted vent fitting clean. Replace screen immediately if damaged or displaced.

TYPICAL FUEL VENTS (FIG. 4.1.1)



HULL MOUNTED FUEL VENT WITH SCREEN



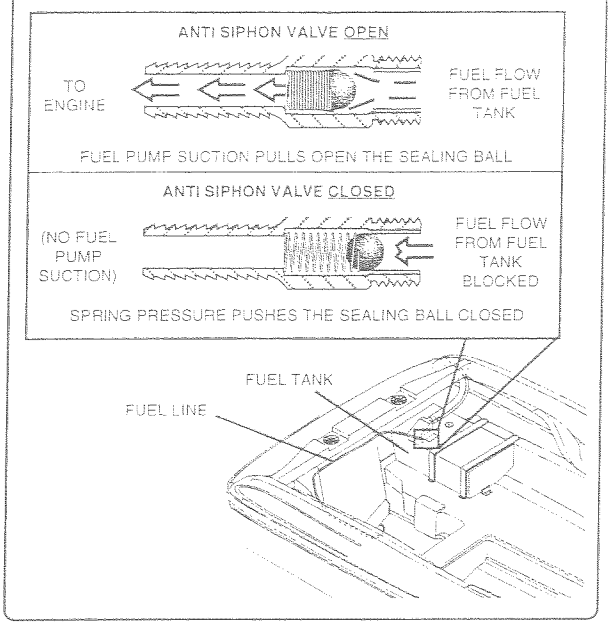
FUEL VENT WITH FUEL FILL

The engine is only able to utilize 95% of the total fuel in the fuel tank, this is known as usable fuel. Allow 15% reserve usable fuel for running in heavy seas.

INBOARD/OUTBOARD ENGINE ONLY

The fuel pick-up at the fuel tank has an anti-siphon valve to prevent fuel from siphoning out in the event of line failure (see Fig. 4.2.1). In an emergency situation, remove the anti-siphon valve if the engine is not getting fuel. NOTE: Replace with new anti-siphon valve or fuel shut off valve as soon as possible as anti-siphon protection is required by federal law.

Anti Siphon Valve
(Fig. 4.2.1)



Outboard Engine Only

A fuel shut-off valve is located on the fuel pick-up tube on the fuel tank.

A fuel primer bulb is located on the fuel line going to the engine. It must be squeezed until firm before starting engine.

Fuel Recommendations

The quality of the fuel is very important for satisfactory engine performance and long engine life. Fuel should be clean and free of contamination. Your fuel tanks should be kept full of fuel whenever possible. This will reduce the amount of water condensation and reduce the possibility of contamination.

⚠ CAUTION

Use of improper gasolines can damage your engine seriously. Engine damage resulting from use of improper gasoline is considered misuse of engine and voids warranty.

Follow engine manufacturer's recommendations for types of fuel and oil.

NOTICE

Always use fresh gasoline. Gasoline forms gum and varnish deposits, and may cause trouble if held in a tank for too long.

NOTICE

In rough seas, allow approximately 15% reserve when planning fuel consumption.

Recommended Fuel: (Gasoline)

Some of these adverse effects are due to the tendency of gasolines containing alcohol to absorb moisture from the air, resulting in a phase of water and alcohol separating from the gasoline in the fuel tank.

The adverse effects of alcohol are more severe with methyl alcohol (methanol) and are worse with increasing alcohol content.

- Use a propeller that allows the engine to operate at or near the top of its maximum throttle RPM.
- Use Quicksilver Valve Lubricant or Quicksilver Valvetane Plus to help prevent recession.

NOTICE

GASOLINE RECOMMENDATIONS

The use of any good grade unleaded regular or premium gasolines with a minimum posted octane rating [(A.K.I.) Anti-Knock Index] of 87, are satisfactory for use in gasoline marine engines. In areas where unleaded regular or premium gasolines are not available, a good grade leaded regular with a minimum posted octane rating (A.K.I.) of 89 may be used. However, gasolines containing alcohol, either methyl alcohol (methanol) or ethyl alcohol (ethanol) may cause increased:

1. **Corrosion of metal parts.**
2. **Deterioration of rubber and plastic parts.**
3. **Fuel permeation through flexible fuel lines.**
4. **Wear and damage of internal engine parts.**
5. **Starting and operating difficulties.**

AVOID USING FUELS WITH ALCOHOL ADDITIVES

Fuel Filters

The fuel filters installed on the engine should be replaced in accordance with the Engine Owner's Manual. The filters help keep the fuel free of water and contamination and keep particles from entering the engine's carburetor or fuel injectors.

NOTICE

Use of any methanol, gasohol or alcohol based fuel additive will damage the fuel filter.

Recommended Fuel: (Diesel)

#2 Diesel fuel.

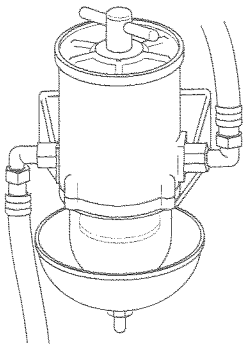
Fuel Filters: (Diesel)

Primary and secondary fuel filters are installed on the engine of your Sea Ray® to help keep the fuel as clean as possible. Primary fuel filter is the Racor water separating fuel filter. The secondary fuel filter should be replaced in accordance with the Engine Owner's Manual.

Use of any methanol, gasohol or alcohol based fuel additive will damage the fuel filter.

NOTE: In rough seas, allow approximately 15% reserve when planning fuel consumption.

Racor® Water Separating Fuel Filter (Fig. 4.3.1)



REFER TO THE ENGINE OPERATORS MANUAL FOR MORE DETAILED INFORMATION.

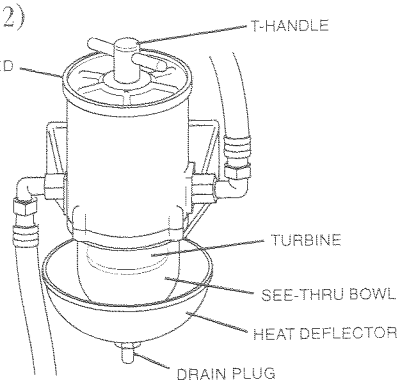
Racor® Fuel Filter Maintenance

A major cause of poor starting or power loss is the result of a clogged filter element or a fuel system air leak. Check that the filter lid and drain plug are properly tightened.

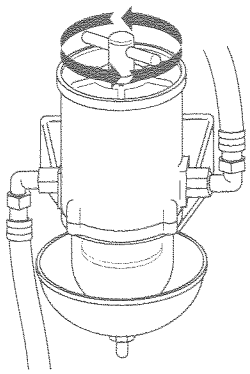
Inspect or drain the collection bowl of water daily. To drain water:

1. Shut down the engine.
2. Loosen the T-handle on the top lid to break the vacuum within the filter (see Fig. 4.3.3).
3. With a suitable collection container in place, remove the drain plug and drain water and contaminants (see Fig. 4.3.2).

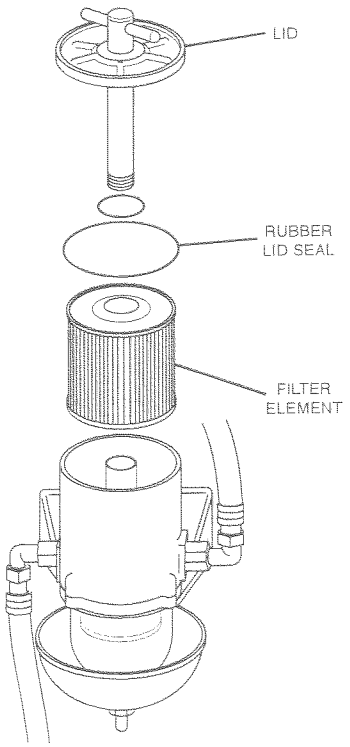
Racor® Water Separating Fuel Filter Drain Plug (Fig. 4.3.2)



Racor® Water Separating Fuel Filter Element Replacement (Fig. 4.3.3)



Racor® Water Separating Fuel Filter Element Replacement (Fig. 4.3.4)



4. Replace the drain plug and, if necessary, prime the filter by removing the lid and filling the filter with clean fuel.
5. Replace the lid and tighten the lid T-handle by hand only. Do not overtighten.

Replace the filter element at regular intervals or if power loss is noticed. To replace the element:

1. Shut down the engine.
2. Remove the lid. Remove the element by holding the molded handle and slowly pulling upward with a twisting motion (see Fig. 4.3.3).
3. Replace the lid rubber seal with the one supplied with the new element. Apply a coating of clean fuel or motor oil to this seal prior to reassembly. Insert the new element with a slow downward twisting motion.
4. Fill the filter with clean fuel, then replace the lid. Tighten the lid T-handle by hand only. Do not overtighten.
5. Start the engine and check for leaks. Correct any leaks with the engine shut down.

It is recommended that spare filter elements be carried as one tankful of excessively contaminated fuel can plug a filter.

REFER TO THE ENGINE OPERATOR'S MANUAL FOR MORE DETAILED INFORMATION.

Fueling Precautions

Certain precautions must be carefully and completely observed every time a boat is fueled.

NOTE: Certain parts of this manual refer to bilge blowers and engine boxes which can be disregarded on Sea Ray's® with outboard engines.

Refer to your owners manual supplement for the location of the fuel tank and fuel fill for your model of boat.

⚠ WARNING

- **Store flammable material in safety-approved containers. Keep containers in a locker designed by the boat manufacturer for that purpose. Never store flammable material in a non-vented space.**
- **Observe "No Smoking" while fueling.**
- **Run bilge blower at least four (4) minutes before starting engine. Check bilge and engine compartment for fumes.**
- **Keep ventilation system free of obstructions. Never modify the vent system.**

⚠ WARNING

- **Fill to less than rated capacity of tank. Allow for fuel expansion.**
- **If fuel enters the bilge, do not start the engine. Determine the cause and severity. Contact a knowledgeable marine service to remove fuel. Do not pump bilge overboard. Contact the local boating law enforcement agency for additional advice. (See Section 1 – *Environmental Considerations – Fuel and***

General:

- Fuel during daylight.
- Check fill plate label to ensure fuel is placed only in fuel tank.
- Avoid spills.
- Know your fuel capacity and consumption. Record the amount of fuel used since your last fillup, and compute the engine's hourly fuel usage. As a backup check to your fuel gauge, deduct the average hourly fuel usage from fuel tank capacity.
- Observe the "rule of thirds": one-third fuel for trip out, one-third for return, one-third for reserve.
- Allow an additional 15 percent fuel reserve when operating in rough seas.

Before Fueling:

- Make sure your boat is tied securely to the fueling pier.
- Turn off engine, bilge blower, fans and other devices that can produce a spark.
- Close all doors, hatches and engine box to prevent fumes from entering the boat.
- Disembark all people not needed for the fueling operation.
- Prohibit all smoking on board and nearby.
- Have a fire extinguisher close at hand.

While Fueling:

- Do not leave boat unattended.
- Keep nozzle or can spout in contact with the fill opening to guard against static sparks.
- Do not spill fuel.
- Do not over fill. Filling a tank until fuel flows from the vents is dangerous. Allow room for expansion.

After Fueling:

- Close fill openings.
- Wipe up any spilled fuel. Dispose of wipe up rags on shore.
- Check for fuel fumes in the bilge; ventilate until odor can no longer be detected. Check for any drips or liquid fuel.

Oil Injection System

(Outboard Engine Only)

Marine outboard two cycle engines require an oil and gasoline mixture to be used in the fuel system. Oil is precisely mixed with gasoline by an automatic oil injection system.

REFER TO ENGINE OPERATOR'S MANUAL FOR CORRECT OIL REQUIREMENTS DURING BREAK-IN OF ENGINE.

The oil injection system has a built-in test alarm which sounds momentarily as a test whenever you switch the key from OFF to ON position. The alarm sounds intermittently to let you know when the oil level is low. The alarm sounds steadily to indicate engine overheating. DO NOT IGNORE ALARM. Permanent damage to engine can result if the cause is not immediately identified and corrected.

Location:

- The 115hp outboard engine Oil Injection Tank is mounted on the side of the engine.
- With other outboard engines, the Oil Injection Tank is located in the bilge.

FOR OPERATING INSTRUCTIONS REFER TO ENGINE OPERATOR'S MANUAL.

Oil Recommendations For Outboard Engines

Only use recommended oil such as Quicksilver 2 Cycle Outboard Oil or an acceptable oil with ABYC/BIA rating TC-W shown on oil container in 2 cycle outboard marine engines.

REFER TO THE ENGINE OPERATOR'S MANUAL IN THE OWNER'S PACKET.

Engine Starting, Shifting & Stopping

⚠ WARNING

DO NOT run the engine in an enclosed area, such as a closed boat house, as there is the possibility of build-up and inhaling of carbon monoxide.

⚠ CAUTION

Ensure that engine compartment openings are clear and free of debris (i.e. bird nests, bees nests, etc.)

The engine operation and maintenance manual furnished with your boat describes pre-start and starting procedures. The following are basic reminders and not intended to cover every detail of starting. We urge you to thoroughly read and understand your engine manual.

IMPORTANT: Observe the following:

- Do not start engine without water being supplied to seawater pickup pump (to prevent pump or engine damage).
- Do not operate starter motor continuously for more than 10 seconds.
- When engine starts, quickly reduce throttle setting to avoid exceeding 1500 RPM.
- Never shift drive unit unless engine is at Idle RPM.
- Check the engine fluid levels. See your Engine Operator's Manual for proper readings.
- Check engine for coolant drain plug installations. (N/A with outboard engine)

Starting the Engine

⚠ DANGER

GASOLINE VAPORS CAN EXPLODE.

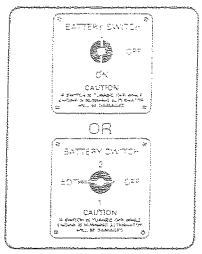
Before Starting Engine:

- **Check engine compartment for gasoline vapors.**
- **Operate blower for 4 minutes.**

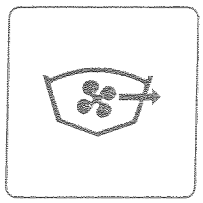
Perform the following as appropriate:

1. Perform any other necessary checks, as indicated by your dealer, or specified in your engine operator's manual.

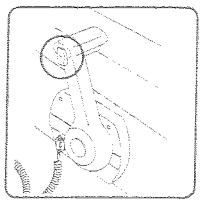
2. (If applicable) Turn battery switch and fuel shut-off valve to ON position.



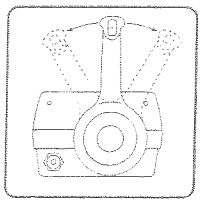
3. Run bilge blowers at least four minutes. Check the bilge for fuel fumes or liquid. Always check bilge by visual inspection and smell. Do not start the engine until the source of fumes is determined and corrected and the bilge area is safely ventilated.



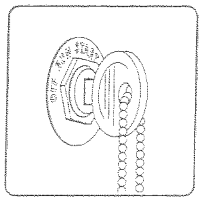
4. **(Inboard/Outboard & Outboard Engines Only)**
   Place drive unit in full DOWN/IN position.



5. Place control handle in NEUTRAL.



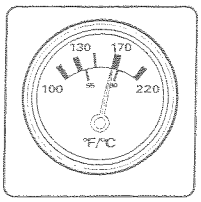
6. Position throttle setting as follows:
   COLD ENGINE - Press THROTTLE ONLY button and move control/throttle lever to full throttle, then return to about 1/4 throttle. In extreme cold it may be necessary to pump lever more than once.
   WARM ENGINE - Press THROTTLE ONLY button and move control/throttle lever to 1/4 throttle position.
   FLOODED ENGINE - Press THROTTLE ONLY button and move control/throttle lever to full throttle. Be prepared to decrease engine speed to 1000-1500 RPM as soon as engine starts.
7. **(Inboard/Outboard Only)**
   Turn ignition key clockwise to START. Release key when engine starts and allow switch to return to RUN position. Move control/throttle lever back to decrease engine RPM to 1000-1500 RPM if necessary.



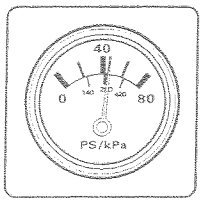
(Outboard Engines Only)
Squeeze fuel primer bulb until it is firm. Turn ignition key clockwise to START and push in on key switch to actuate CHOKE. Release key when engine starts and allow switch to return to RUN position. **NOTE: If engine is warm, do not push in on key switch, the engine should start without using the CHOKE.** Move control/throttle lever back to decrease engine RPM to 1000-1500 RPM if necessary.

After Starting Engine:

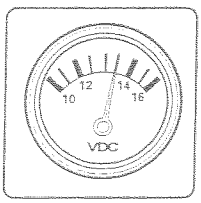
1. **(Inboard/Outboard Engines Only)**
   Check oil pressure gauge immediately after engine starts. If oil pressure is not within specified range, (see engine operator's manual ENGINE SPECIFICATIONS), stop engine immediately and determine cause.



2. If engine is cold, run engine for 1 or 2 minutes at fast idle (1000-1500 RPM).
3. After engine has warmed up, check water temperature gauge to ensure that engine temperature is not abnormally high. If it is, stop engine immediately and determine cause. **NOTE:** Refer to engine Owner's Manual for correct reading.



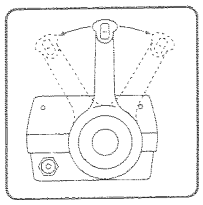
   (Outboard Engines Only)
   Check that water is running from the "Tell-Tail" on the back of the engine. If intermittent or no flow is observed, STOP ENGINE IMMEDIATELY. Check "Tell-Tail" stream often during motor operation.
4. Be sure charging system is functioning correctly.



5. Observe power package for fuel, oil, water and exhaust leaks. The engine and electrical equipment should be shut off if fuel leaks are found.

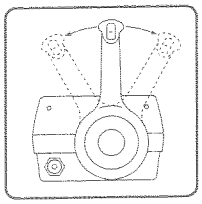
Shifting

1. To shift drive unit, return control/throttle lever to NEUTRAL, (THROTTLE ONLY button will pop out to engage shifting when lever is advanced).
2. Move control/shift lever with a firm, quick motion forward to shift to FORWARD gear, or backward to shift to REVERSE. After shifting drive unit, advance throttle to desired setting.

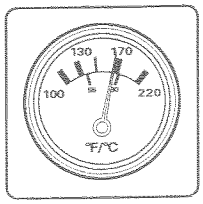


Stopping the Engine

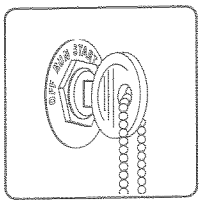
1. Move control/shift lever to NEUTRAL and allow engine to drop to IDLE speed.



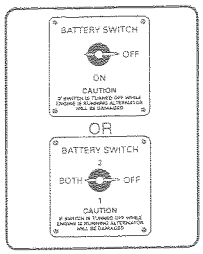
2. Secure mooring lines.
3. If engine has been run at high speed for a long period of time, allow engine to cool by running at IDLE speed for 3 to 5 minutes.



4. Turn ignition key to OFF.



5. (If applicable) Turn battery switch and fuel shut-off valve to OFF position.



DC SYSTEM

The 12 volt direct current (DC) electrical system derives its power from the battery(ies), which is kept charged by an engine-driven alternator. The battery voltage is indicated by the voltmeter on the dash panel. The negAtive terminal is attached to the grounding studs of the engine. This "negative ground system" is the approved system for marine DC electrical systems. Additional equipmenmt must be adaptable to the negative ground system, and when installing, it will be necessary to stipulate that each item's current supply be taken from the 12 volt distribution buss bar If additional circuit protection is required, it should be added in that area. Do not allow any power feeds for accessory requipment to be taken from the voltmeter terminals.

Enlist the aid of your dealer for a careful analysis of DC power needs on your boat. It may be necessary to add batteries or auxiliary charging methods to supply adequate power for the additional accessories you require.

BATTERY

The batter7 installed in your boat has been selected for their ability to furnish starting power based on engine starting requirements, as well as its ability to power the DC system. When replacing a battery, refer to your engine operation and maintenance manual to find the recommended battery for the engine installed in your boat. A deep cycle or combination deep cycle/starting battery is recommended.

⚠ CAUTION

Always disconnect battery cables before doing any work on the engine's electrical system or alternator wiring to prevent arcing or damage to the alternator.

Sea Ray® recommended batteries are available through your local Sea Ray® dealer.

TO REMOVE THE BATTERY CABLES:

1. Turn OFF all items drawing power from the battery.
2. Turn the battery switch to the OFF position (battery switch is optional equipment on some models).
3. Remove the negative cable first, then the positive cable. To replace the cables, reverse the procedure.

BATTERY MAINTENANCE

Probably the most life-shortening experience for a battery is to be drained to zero charge before recharging. When a battery discharges, the active material on both positive and negative plates converts to lead sulfate, causing the plates to become more alike in electrical charge. The electricity-conducting battery acid becomes weaker and the voltage drops. As the battery remains discharged, this process continues until the reversing process of recharging the battery becomes impossible. It is recommended that a battery not be discharged more than 50 percent. If the battery does become run down, recharge it as soon as possible.

Overcharging a battery can be just as detrimental to its life as running it down too far. Battery acid can percolate and overflow or escape as explosive hydrogen gas. The resulting heat buildup in the battery will cause the plates to soften and shed the charging grid's active material. Batteries will maintain their charge much better in cold temperatures.

Simply starting the engine to recharge the battery may not be effective. The alternator only creates charging power at higher engine speeds, so simply idling or trolling may not generate enough power to recharge the battery.

In general:

- Check the fluid level in the cells approximately every 4 weeks, and more often in summer and hot zones.
- The fluid level must be between the lower and the upper markings.
- Replenish only with distilled water. Do not use metal funnels.
- Coat battery terminal clamps with dielectric silicone grease. Keep batteries clean and dry.
- Only use a battery charger designed to charge automotive/marine batteries. Use charger only when batteries are disconnected from the boat's electrical circuit.

⚠ DANGER

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

⚠ CAUTION

While the engine is running, the battery terminal clamps must not be loosened or detached nor should the battery switch(es) be turned off, otherwise the alternator and other electronic units will be damaged.

PROPOSITION 65 WARNING

Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Wash hands after handling.

Keeping the Battery Charged

The battery in your boat is kept charged basically the same way as the battery in your automobile; by the alternator. However, there is one major difference, most boats are used much less often than an automobile. If the engine is not run often the battery will not hold its charge. To keep batteries charged read the following information:

Boats Not Equipped With Dockside Power

If your boat will not be used for a prolonged period of time, remove the battery (or batteries) from the boat and connect to an automotive type battery charger. Follow the instructions that come with the charger for proper use. DO NOT OVERCHARGE. (For proper battery storage, see Section 7 – *Storage & Launching Procedures, Winterization Checklist for Boats Stored On Land, Batteries*).

If the boat is to be reused in the near future, be sure to turn off all loads. Turn the battery switch (if equipped) to the OFF position.

Boats Equipped with Dockside Power & AC to DC Converter/Battery Charger

If your boat is equipped with dockside power and a converter, it should be kept ON at all times. The converter is designed to keep the battery(ies) charged and convert AC shore power to DC power, allowing the operation of DC accessories without draining the battery.

Note: Refer to the Converter information on Pg. 5.7.

Connecting Jumper Cables

⚠ DANGER

EXPLOSION HAZARD

DO NOT USE JUMPER CABLES IN THE ENGINE COMPARTMENT

Jumper cables are not ignition protected. Sea Ray® does not recommend using jumper cables in the engine compartment. The engine compartment may accumulate dangerous explosive gasoline fumes/vapors and hydrogen gas from batteries being charged. DO NOT introduce a possible spark producing element into the engine compartment.

Ignition Protection

⚠ DANGER

GASOLINE VAPORS CAN EXPLODE

Use ONLY Marine Rated parts to replace such items as starters, distributors, alternators, generators, etc. Do not use Automotive Parts because they are not ignition protected and could cause a fire or explosion.

To avoid the possibility of creating sparks in a gasoline environment, all electrical components in the engine compartment are ignition protected.

Protective terminal covers, such as rubber boots on electrical connections, must be in place when engine is operating or when working in the engine compartment.

Battery Switches
(Optional On Some Models)

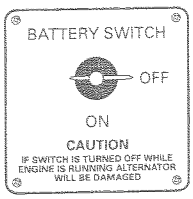
⚠ CAUTION

Always stop engines before switching batteries to OFF position.

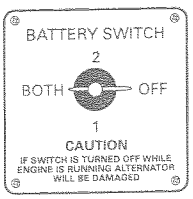
The battery switch controls the delivery of DC power from the battery(ies) to the engine and DC loads, as well as allowing the alternator to charge the battery(ies). There are two (2) types of optional switches:

- **ON/OFF Switch** with two (2) positions: ON and OFF.
- **Battery Selector Switch** with four (4) positions: OFF, 1, BOTH and 2.

Typical Battery On/Off Switch
(Fig. 5.3.1)



Typical Dual Battery Switch
(Fig. 5.3.2)



A single engine boat with one (1) battery will have the ON/OFF Switch. When equipped with two (2) batteries, it will have the Battery Selector Switch.

The following information is for boats with two (2) batteries and the optional Battery Selector Switch:

- In the OFF position you have no power to the engine and DC loads.
- In the "1" position you have power from number 1 battery only.
- In the "2" position you have power from number 2 battery only.
- In the "BOTH" position you have power from BOTH batteries at the same time. This parallels the batteries to assist in starting the engine on your Sport Boat.

NOTE: The bilge pumps and stereo memory CANNOT be turned OFF with the battery switch. The entire remaining DC system CAN be turned OFF with the battery switch.

When you are not running the engine and you wish to use any DC system such as the Stereo, optional Water System, or any 12V DC outlets, it is recommended that you use **one battery** for DC system operation and save the other battery to assist engine starting.

To determine which battery to use for DC system operation when the engine is not running, turn the Battery Selector Switch to the 1 position and look at the voltmeter on the instrument panel at the helm (Note the voltage). Do the same with the switch in the 2 position. By doing this you have determined how much DC voltage is stored in each battery. After determining battery voltage, select which battery you wish to use for your DC systems and move the Battery Selector Switch to that position. It is recommended that you do not choose the battery with the higher stored voltage to run the DC systems. Save that battery for engine startup. Remenber to switch to BOTH batteries before starting the engine. This will assist the weaker battery during engine start. Also, in the BOTH position, both batteries will be charged during engine operation.

Electrical System
Breakers and/or Fuses

In the event it becomes necessary tio replace an electrical fuse or breaker, REPLACE ONLY WITH A BREAKER OR FUSE OF THE SAME AMPERAGE. f breaker or fuse is replaced with a breaker or fuse of lower amperage, it will be insufficient to carry the electrical load of the equilpment it is connected to and cause nuisance tripping.

If breaker or fuse is replaced with a breaker or fuse of higher amperage, it will not provide adequate protection against an electrical malfunction and will create a possible fire hazard.

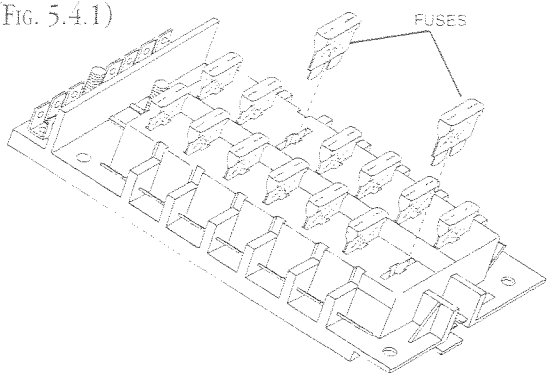
Sea Ray® Boats use two circuit protection systems. Your boat is equipped with one of the two. The two systems offered are the "Helm Switch Panel Fuse Block" or "Electyronic Interface Module". Below are descriptions of each system.

It is recommended that you carry spare fuses.

Helm Switch Panel Fuse Block

The helm switch panel is protected by a fuse block located under the dash. This fuse block uses automotive type fuses.

Typical Helm Switch Fuse Block (Fig. 5.4.1)



Electronic Interface Module (EIM)

Your Sea Ray® Sport Boat may have an illuminated waterproof electronic switch pad with ISO symbols to control lights, bilge pump and other accessories.

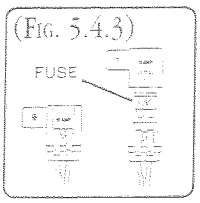
The switch pad is connected to the electronic interface module (EIM) located under the dash (see Fig. 5.4.2). The EIM uses automotive type fuses to protect these accessories. It also has a fuse condition test button and indicator light for each component.

To access the EIM fuses, remove the cover. REPLACE ONLY WITH A FUSE OF THE SAME AMPERAGE. The amperage is marked on the side of the fuse.

Other fuses and breakers

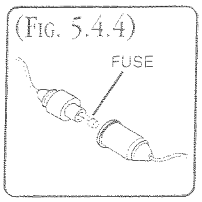
Other fuses and breakers include:

(Fig. 5.4.3)



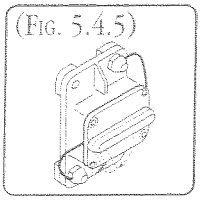
Bilge fuses, typically located in the engine compartment adjacent to the battery. This type of fuse protects the bilge pump, stereo memory and, on some models, the optional 12V refrigerator.

(Fig. 5.4.4)



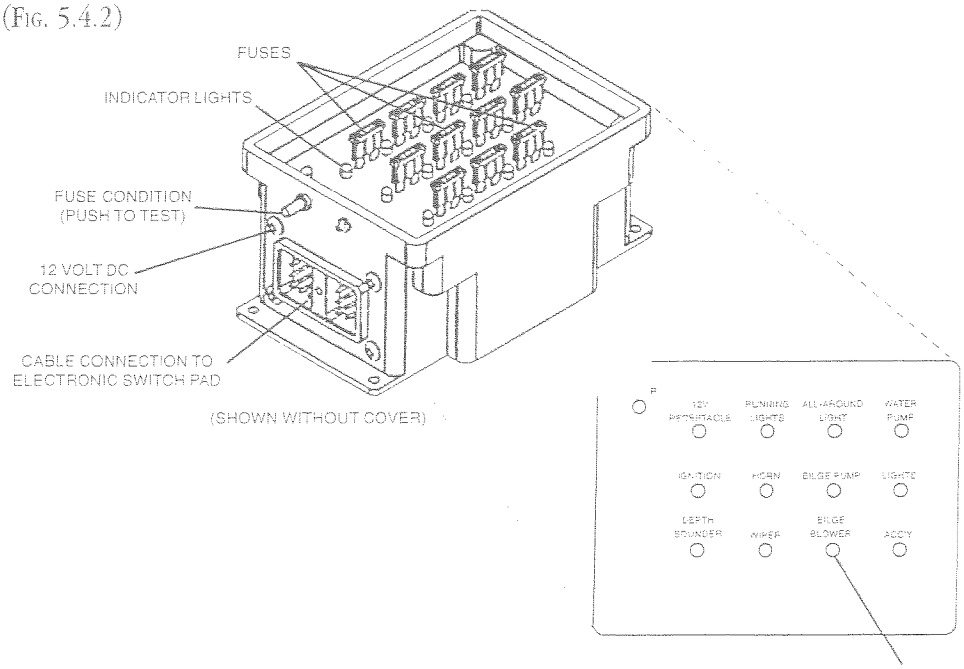
This fuse protects the Mercathode® electrolysis protection system. It uses a standard glass type fuse.

(Fig. 5.4.5)



This surface mount breaker is found in the engine compartment when the boat is equipped with the optional fish/ski package. It protects the trolling motor and can be reset if tripped.

Electronic Interface Module (EIM) (Fig. 5.4.2)

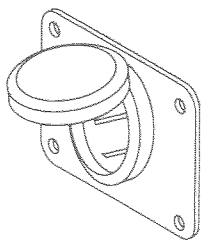


NOTE: BOATS WITH OUTBOARD ENGINES ARE NOT EQUIPPED WITH A BILGE BLOWER SYSTEM.

12 Volt Accessory Receptacle

Your Sea Ray® Sport Boat has a 12 volt accessory receptacle at the control station. It is a DC ("cigarette lighter") style receptacle to be used with any 12 volt accessories using this type of plug.

Typical 12 Volt Accessory Receptacle (Fig. 5.5.1)



Lighting

Your boat is equipped with different lighting fixtures throughout. **Never replace a defective light with any bulb other than the type and wattage of the original bulb.**

Navigation Lights

Navigation lights must be displayed while underway from sunset to sunrise. The term "underway" denotes not at anchor or dock. Trolling or drifting with power off is considered underway and normal running lights must be displayed. At anchor in open water, a 360 degree wgite light must be displayed.

To Operate the RUNNING Lights

Push the Navigation Lights switch toward the boat (Boats equipped with the electronic switch pad have a dedicated button for running lights).

To Operate the ANCHOR Lights

Push the Navigation Lights switch toward the anchor (Boats equipped with the electronic switch pad have a dedicated button for anchor lights).

On boats without illustrated switches, push the Navigation Lights switch UP for Running Lights and DOWN for Anchor Lights.

Wire Color Code

Some boats may not have all the wires shown due to differences in options and accessories available for your particular model.

- **Battery Wiring**
  Red Battery Cable (Positive)
  Black Battery Cable (Negative)
- **Automatic Fire Extinguisher System**
  Green/White: indicator
  Black: indicator ground
- **Bilge Pump**
  Brown: manual
  Brown/Red: float switch and dash switch auto
  Red/Violet: power
  Black: ground
- **Bilge Blower**
  Yellow 16 AWG: blower
  Red/Violet: power
  Black: ground
- **Water System**
  Brown/White: power
  Black: ground
- **Trim Tabs**
  Red: power
  Red: port valve
  Green: starboard valve
  Blue: pump pressure
  Yellow: pump retract
- **Horn**
  Orange/Black: power
  Black: ground
- **Wiper**
  Orange: power
  Black: ground
- **Lights**
  Gray: running lights and mast light
  Gray or Gray/White: anchor light
  Blue: power
  Black: ground

- **Stereo**
  Clear/Copper: speaker positive
  Clear/Silver: speaker negative
  Red: power
  Orange: antenna
  Yellow: memory/clock
  Black: ground
- **Grounding Circuit**
  Green: fuel tank fill

AC System (Option On Some Models)

120 VAC/60 Hz Electrical System

The 120 volt AC electrical system operates on the dockside 30 amp, 60 cycle shore power cordset.

On boats equipped with the standard 30 amp shore power system, it may be difficult to operate all 120 volt appliances simultaneously. Use good common sense while operating several options at once, as the amperage draw of the accessories selected may be greater than the AC electrical system can provide through its configuration. It may be necessary to turn off some accessories while operating others.

⚠ CAUTION

Never operate shore power at less than 105 volts.

NOTICE

The actual usage of equipment will depend on the amperage output of the power source available.

The 120 volt wiring installed on Sea Ray® boats consists of three color-coded wires. The black wire is the "hot" feed, white is the common, or neutral, and the green wire is the ground. All branch breakers and switches for AC equipment are installed on the "hot" wire. The green conductor of the shore power is connected through a galvanic isolator and then connected to the main AC grounding buss. The main breaker may trip if there is a surge in line voltage, an electrical storm or an onboard system overload. The main breaker interrupts both the neutral and hot feeds in the AC circuit to prevent equipment damage due to internal overloads and external surges.

Shore Power Hook-Up

1. Make sure the MAIN breaker and all AC branch breakers are OFF.
2. Ensure dockside breaker is OFF, then plug the shore power cord into the shore power inlet. Turn clockwise to lock. Thread the locking ring on the inlet to secure cable and prevent accidental unplugging

⚠ CAUTION

Shore power cord should be secured or routed to avoid laying or falling into water and to avoid stress on shore power plug and inlet.

3. Plug the dockside cord into the shore power outlet box on the dock. Turn the circuit breaker on the dock to the ON position.

⚠ CAUTION

It is imperative that the shore power outlet is dry before plugging into the dock power inlet.

4. Turn individual breakers ON.

Maintenance for Shore Power Cable Set & Shore Power Inlets

The metallic parts of your cable set and power inlet are made to resist corrosion. In salt water environment, life of the product can be increased by periodically wiping the exposed parts with fresh water, drying and spraying with a moisture repellent.

A soiled cable can be cleaned with grease-cutting household detergent. A periodic application of vinyl protector will help both ends and cable maintain their original appearance.

⚠ WARNING

Disconnect the power cable from power source before performing maintenance.

In case of salt water spray or immersion, rinse plug end and/or connector end thoroughly in fresh water, shake or blow out excess water and allow to dry. Spray with a moisture repellent before reuse.

CONVERTER (IF EQUIPPED)

The battery charging unit installed on your Sport Boat is fully automatic and is designed specifically for the marine environment. The high frequency characteristic has allowed these chargers to achieve a huge size and weight reduction over their previously used equipment. Commonly called high frequency or smart chargers, these units bring a new sophistication to the battery charger field. These units feature a built-in amperage indicator and a dual color power on LED. When the charger is on the LED will be RED, indicating charger is in fast charge mode. After the absorption cycle is complete (approx. 3 hours) the LED will change to GREEN, indicating the charger is in float mode.

⚠ DANGER

CHARGING BATTERIES PRODUCES EXPLOSIVE HYDROGEN GAS

- **Never use an open flame in the battery storage area.**
- **Avoid striking sparks near the battery.**

A battery will explode if a flame or spark ignites the free hydrogen given off during charging.

! WARNING

Do not get the converter wet when hosing down or cleaning the bilge area.

NOTICE

Check the battery water level before operating the converter.

Leave the converter running at all times to maintain the 12 volt system voltage.

Charging characteristics contain 3 elements:

- **Bulk Charge** - this is initiated at power up and provides the chargers full-rated current to the battery bank until a predetermined voltage level of 14.2 to 14.4V is achieved and/or a certain time has passed.
- **Absorption Charge** - this stage immediately follows the bulk charge mode. It maintains the battery voltage at the bulk charge voltage level, but gradually decreases the current as the battery accepts the charge until it reaches a predetermined current level.
- **Float Charge** - this stage is designed to hold the battery at a safe, low voltage (typically 13.3V) providing up to the chargers full rated amperage to accommodate DC load requirements. The charge will remain in this mode until the AC power is cycled off and then on again.
- **Equalization** - this is a manually triggered stage which prevents the batteries from aging prematurely by applying a small, steady current until the battery reaches 16V. This dissolves the hardened crystals on the battery's plates and prolongs the battery life. Equalization mode is activated by a manual switch located on the lower left converter cover.

REFER TO OWNER'S MANUAL PACKET FOR INSTRUCTIONS AND WARRANTY INFORMATION.

! WARNING

Never block air circulation through the converter.

Never store any gear on top of the unit.

⚠ CAUTION

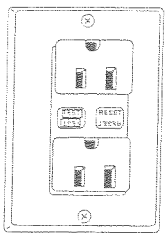
When operating the converter for prolonged periods of time, check the battery water level at least weekly.

Refer to "Battery Maintenance" in this section.

Ground Fault Interrupter Outlets

The ground fault interrupter outlet(s) (GFI) is located in the galley and/or head. Each outlet is equipped with a test and reset switch in the center face plate. All exposed 120 volt outlets are protected by this outlet.

GFI Outlet
(Fig. 5.8.1)



⚠ CAUTION

Persons with heart problems or other conditions which make them susceptible to electric shock may still be injured by ground faults on circuits protected by the GFI receptacle. No safety devices yet designed will protect against all hazards or carelessly handled or misused electrical equipment or wiring.

The GFI receptacle is designed to protect people from the line-to-ground shock hazards which could occur from defective power tools or appliances operating from this device, or from down-line outlets protected by it. It does not prevent line-to-ground electric shock, but does limit the time of exposure to a period considered safe for normally healthy persons. It does not protect persons against line-to-line, or line-to-neutral faults. The GFI receptacle does not protect against short circuits or overloads. This is the function of the circuit breaker.

In the event of power failure which has not affected the fuse or breaker serving these particular outlets, unplug all cord-connected appliances from the GFI protected outlets, and restore power by pressing in the RESET button on the GFI receptacle. To test, press the TEST button. The RESET button will pop out indicating that power is off at all the GFI protected outlets. Push the RESET back in and reconnect the appliances one at a time. A defective appliance which trips the GFI should be repaired at once.

If the RESET button will not stay in after all appliances have been disconnected from the circuit, call a qualified electrician.

If the RESET button does not pop out when the TEST button is pressed, PROTECTION IS LOST. Do not use any outlets on the circuit. Call a qualified electrician. TEST REMINDER: FOR MAXIMUM PROTECTION AGAINST ELECTRICAL SHOCK HAZARD, TEST YOUR GROUND FAULT CIRCUIT INTERRUPTER AT LEAST ONCE A MONTH.

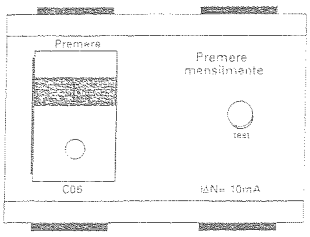
Test Procedure:

1. Push TEST button. The RESET button will pop out. Power is now off at all outlets protected by the GFCI, indicating that the device is functioning properly.
2. If RESET does not pop out when testing, do not use any outlets on this circuit. Protection is lost. Call a qualified electrician.
3. To restore power, push RESET button. Enter date on record card.

International Receptacle

All readily accessible 220V outlets are protected by a Residual Current Circuit Breaker (RCCB) (see Fig. 5.8.2). This circuit breaker is mounted in an accessible location such as under a cabinet and includes a test switch to verify proper operation. Its function is similar, but not identical to the 120V GFI.

RCCB Outlet
(Fig. 5.8.2)



REFER TO OWNER'S MANUAL PACKET FOR INSTRUCTIONS AND WARRANTY INFORMATION.

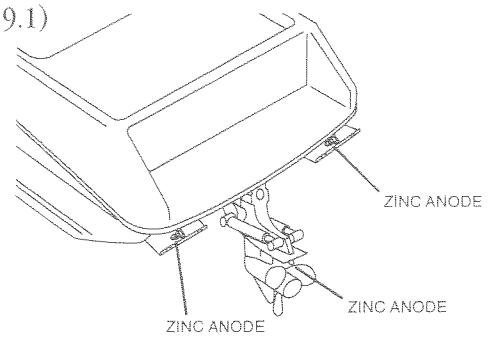
Galvanic Corrosion & Zinc Anodes

Galvanic corrosion of metals on power boats can result in serious deterioration. The boat owner must be aware of the possibilities of galvanic corrosion which is the deterioration of metals due to dissimilar characteristics when placed in water. It is the owner's responsibility to check for and replace damaged parts due to galvanic deterioration. Refer to your Sea Ray® dealer to investigate the source of stray corrosive currents.

Zinc Anodes

Stern drive and outboard engines are fitted with zinc anodes on their lower units (refer to your Engine Owner's Manual for their locations). If your Sport

Zinc Plates (Fig. 5.9.1)



Boat is equipped with trim tabs, zinc anodes are installed on each of the trim tabs (see Fig. 5.9.1).

Zinc anodes protect underwater hardware. Zinc, being much less "noble" than copper-based alloys and aluminum used in Sea Ray® underwater fittings, will deteriorate first and protect the more noble parts.

⚠ CAUTION

Replace zinc sacrificial anodes if they are corroded 50% or more.

Zinc anodes generally require replacement about once a year. (In salt water areas, replace every six months.) The need to replace anodes more frequently may indicate a stray current problem within the boat or at the slip or mooring (This describes the corrosive effects of a DC voltage source through a loose wire or connection lying in bilge water). If zinc anodes do not need replacing after one year, they may not be providing proper protection. Loose anodes or low-grade zinc may be the problem.

DO NOT PAINT BETWEEN THE ZINC AND THE METAL IT CONTACTS, AND DO NOT PAINT OVER THE ZINC.

When an AC shore power system is connected to the boat, the underwater metal fittings will, in effect, be connected through the water to grounded metals ashore. The zincs will be consumed at a faster rate unless the marina maintains a protective system to prevent this. In this case, hanging a zinc in the water bonded to the metal outlet box on the dock will reduce zinc loss on the boat. Do not connect this zinc to the boat's ground system.

It is extremely important that all electrically operated DC equipment and accessories be wired so that the ground polarity of each device is the same as that of the battery. Sea Ray® boats have a negative ground system, which is the recommended practice throughout the marine industry. All metal items (fuel tanks, underwater gear, etc.) in the boat are connected to the zinc anode by the green bonding wire.

Electrolysis can also be caused by "stray currents" due to a fault in an electrical item, even though correctly grounded. A galvanic current isolator (zinc saver) is standard on all Sea Ray® boats. It is installed between the shore power ground and the boat's AC grounding connection to the DC bonding system. This connection maintains the safety ground from dockside power while stopping the flow of DC corrosive currents.

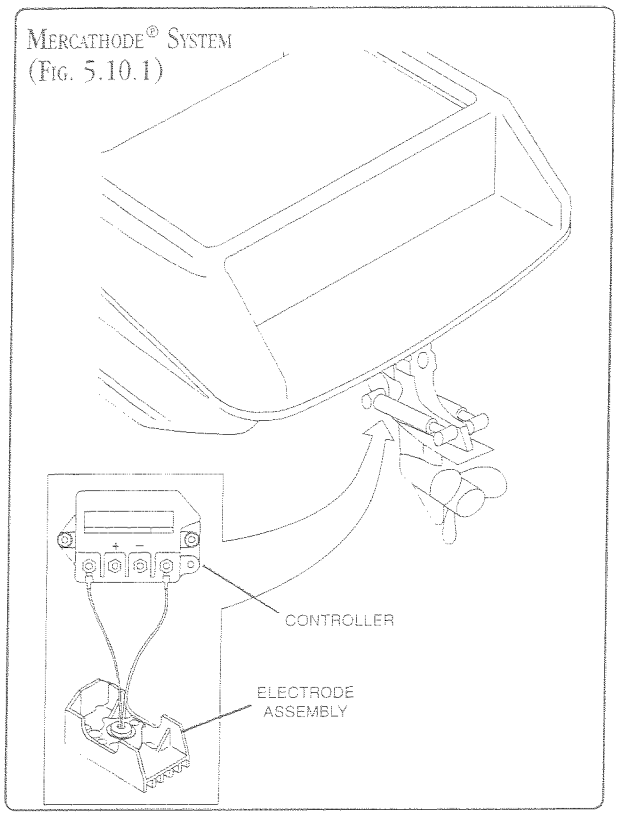
⚠ CAUTION

Never disconnect AC green wire (safety ground) from the engine terminal.

Marine Electronic Cathodic Anti-Corrision System (Mercathode®)

The automatically controlled Cathodic Anti-Corrosion System for marine installation protects underwater metals from the effects of corrosion and electrolysis on stern drives. The system components are designed for trouble-free marine swervice. Damaged or open connectors are generally the cause of operation difficulties. **DO NOT PAINT THE MERCATHODE® SYSTEM.**

Mercathode® System
(Fig. 5.10.1)



The anode and reference electrode are attached to the electrode assembly under each stern drive unit. The solid state controller is mounted within a plastic housing in the bilge on the transom. The male connector is for the reference electrode and female connector for the anode. The other two leads are for connecting to the 12 volt system.

Maintenance

The Mercathode® system should be tested to ensure adequate output. This test should be made where the boat is moored, using Quicksilver® Reference Electrode and Test Meter. Contact your authorized Sea Ray® dealer to arrange for this test.

REFER TO THE ENGINE OWNER'S MANUAL FOR INSTRUCTIONS AND WARRANTY INFORMATION.

Section 6 • Accessories

NOTE: Not all accessories described here are standard equipment or even available as options. Options and features subject to change without notice. It is advisable to refer to the Owner's Manual Packet and read information provided by individual equipment manufacturers for operation and maintenance of equipment.

Canvas

⚠ DANGER

Exhaust fumes from engines contain deadly Carbon Monoxide gas (CO). Boats with canvas or poor ventilation are most likely to collect fumes. CO sickness symptoms include headache, nausea and dizziness. DO NOT mistake for sea sickness. Ventilate boat. See boat owner's manual for more

Sea Ray® is committed to boating safety. Please refer to Exhaust Emissions and Emergency Procedures (See Section 1 - *General Information*). It is important to read and understand the effects of carbon monoxide and how to ventilate your boat to prevent the build-up of this invisible gas.

Attached to the inside of the Bimini or Convertible Top is a **DANGER** tag for Carbon Monoxide gas (CO) build-up and a **WARNING** tag for excessive speeds while canvas is installed. The Aft Curtain also has a **WARNING** tag stating "The Aft Curtain is not designed to be used while engine is running or boat is underway." If your canvas does not have these tags, or they are lost or are unable to be read, contact your dealer for replacement labels.

The canvas manufacturer has provided the canvas piece name and position on each canvas piece, with a sewn on white label. Do not remove these tags. They will help you with identification and position for easier installation procedures.

It is recommended that you decide which canvas pieces you want to remove or install before you leave the boat slip. Removing or installing canvas on the water could be difficult as not all water conditions allow for your stability while attempting removal or installation.

Components of your canvas set consists of metal frame tubes, sliding adjustable support poles, frame mounts, zippers, zipper valance, velcro and snaps. If any of these components need replacing, contact your dealer.

Storage

- Do not fold or store any of the canvas set pieces while wet. All canvas should be rolled or folded when dry and stored in a clean, dry place.
- For clear vinyl pieces, the recommended methods for storage are rolling or laying down flat. The clear vinyl should never be folded or creased as cracking will result. To protect the clear vinyl from rubbing against itself while rolled or stored flat, place a piece of very soft, non-abrasive cloth between the pieces. If the surface of the clear vinyl becomes scratched see your dealer.
- When storing the Aft Curtain, fold the canvas over the clear vinyl window (DO NOT FOLD CLEAR VINYL), then roll or store flat.

Care and Maintenance

The fabric should be cleaned regularly before substances such as dirt, pollen, etc. are allowed to accumulate on and become embedded in the fabric. The fabric can be cleaned without being removed from the framework. Simply brush off any loose dirt, pollen, etc.; hose down and clean with a mild solution of a natural soap in lukewarm water (no more the 100° F., 38° C.). Rinse thoroughly to remove soap. DO NOT USE DETERGENTS. Allow to completely air dry.

If you have stubborn cleaning cases, call your dealer for proper procedures. Do not try your own cleaning procedures as they may void any warranties.

After each use, especially in salt water areas, rinse the canvas completely with fresh cold water. Then let the canvas set dry completely before stowing.

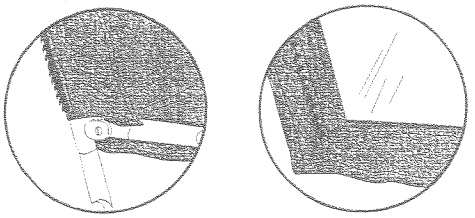
All metal components of the canvas set should be rinsed with fresh cold water and exposed components wiped dry to maintain appearance and working order.

REFER TO OWNER'S MANUAL PACKET FOR INSTRUCTIONS AND WARRANTY INFORMATION.

Installation Tips

Zippers are located on each canvas piece. When attaching any canvas piece, make sure canvas is centered on the frame bows and only partially zip the zippers. This helps to hold the piece in place and relieves tension, helping the other sides zip or snap easier. After all the sides of the piece are secure, finish zipping all the zippers. This will ensure a tight fit.

Zippers
(Fig. 6.2.1)



- Make sure that zippers are fully engaged before zipping them completely. DO NOT force them shut.
- The large zippers have locking sliders. Be sure to lift the tabs to release the lock.
- When installing canvas tops start the forward and aft zippers, zipping them only about 12" to 18" before closing them all the way. Be sure the top is centered on the frame.

  The frames have center marks engraved in the tubing. Line up the canvas with the mark and pull taut to each side.

  Be sure the top canvas is centered after it has been folded or removed for any reason.
- Lubricate zippers and fasteners with pure silicone spray, or a product made especially for this use. **DO NOT USE PETROLEUM BASED PRODUCTS**, as it will stain the canvas.

⚠ CAUTION

Roll the aft cover up for storage to avoid damage to vinyl windows.

- Hang all your curtains to the top.
- Join the down zipper, closing only approximately 3" to 4", you may have to open the top zipper on the corners, and the side to allow enough slack to join the down zippers.
- When installing the aft curtains, engage the top and down zippers as above, leaving them open except for 3" to 4". Pull the curtain back and fasten around the hull. Close all zippers.

Convertible Top and Boot

The convertible top installs overhead above the cockpit seating area.

Installing:

1. Position top so that main support tube will lean aft and secure support tubes with pins.
2. Unroll and attach front section to windshield frame.
3. Secure straps or tubes behind the center support tubes.

The top should be rolled up when not in use. The boot zips over the top after it is rolled up on the aft support.

NOTICE

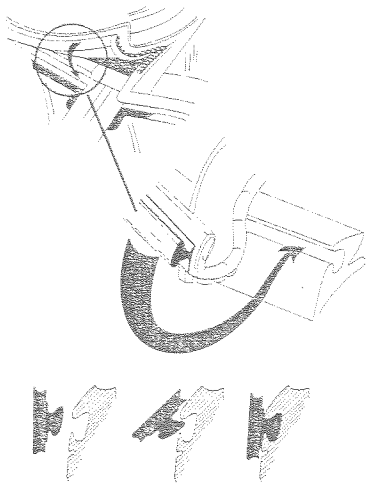
Keep vinyl side curtains from touching stainless steel bows on the convertible or bimini top. Prolonged contact in the hot sun may damage clear vinyl material.

Sea Ray's® Patented Interlocking Canvas Top Extrusion

(Snapless Windshield Canvas)

The canvas for the convertible top and side curtains is fitted with a rubber strip along the bottom. The strip is designed to be pressed into the groove on the outside of the windshield frame. If installation is difficult, use the lubricant provided in the owners packet.

Interlocking Canvas Top Extrusion
(Fig. 6.2.2)



Installing:

Place the bottom half of the rubber strip into the groove then press the top half into the groove.

Removing:

Carefully peel the rubber strip out of the groove.

Side Curtains

The transparent vinyl side curtains snap to the side of the windshield frame and zip to the underside of the convertible top. There is a port and starboard side curtain, which should be rolled up for storage when not in use. Do not fold the side curtain since permanent damage can occur to the vinyl material.

NOTE: Remove vinyl side curtains when boat is not in use. Prolonged time in the hot sun may cause damage to clear vinyl material. Keep vinyl side curtains from touching stainless steel bows on convertible top.

Bimini Top & Boot

The bimini top installs over the cockpit area on a suspension bow assembly.

Installing:

1. Attach the center and aft stanchions with the pins provided. Attach the forward strap.
2. The bimini top can be pivoted on the center stanchion to store in the aft position by removing the forward strap and leaning aft.
3. The top should be rolled up when not in use. The boot zips over the top after it is collapsed together.

Aft Cover

The aft cover zips to the back of the convertible or bimini top and extends back to the transom. To install, zip to convertible or bimini top and snap along sides, then snap along transom.

⚠ WARNING

To avoid entrapment of carbon monoxide gas, remove aft cover or camper top canvas before starting engine and operating vessel.

Camper Aft Cover & Boot

The camper top installs over the cockpit aft of the convertible top. The canvas boot is used as a protective cover over the camper aft cover when rolled up on the support tube.

Installing:

1. Insert support tubes into brackets aft of the port and starboard windshield wings.
2. Zip forward section of cover to aft end of convertible top.
3. Unfold canvas moving aft and secure with straps to transom.

⚠ WARNING

To avoid entrapment of carbon monoxide gas, remove aft cover or camper top canvas before starting engine and operating vessel.

Cockpit Cover

The cockpit cover is used as a short term storage cover. To install cover, take down convertible top, snap canvas along windshield frame, snap along sides then along transom.

Hatch Covers (Some Cabin Models)

The canvas hatch covers slip in place over the deck hatch and are used to cut down on the amount of sunlight entering the cabin through the hatch.

Mooring Cover

The mooring cover is used as a long term storage cover. To install cover, spread over entire boat, secure straps under boat and tie at transom.

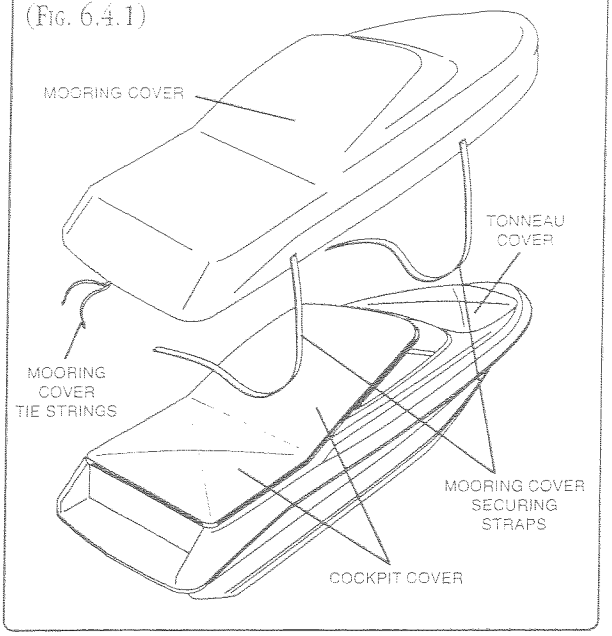
Tonneau Cover

The tonneau cover snaps around the open bow of the Bow Riders. The cover may be used while underway or as a storage cover.

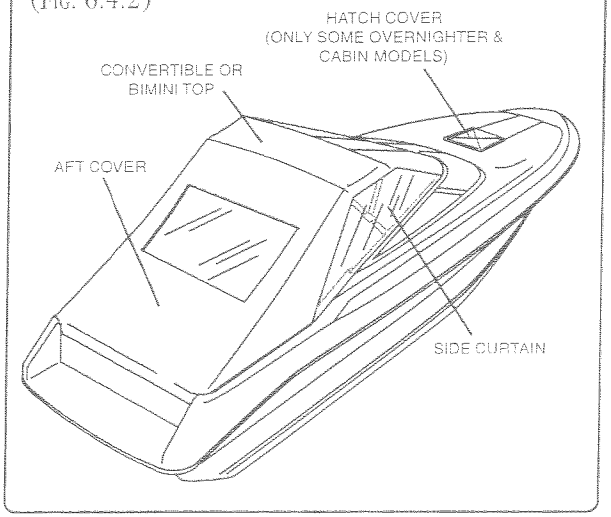
Trailering With Canvas

You may trailer your boat with either cockpit cover or tonneau cover installed, however, the mooring cover must be installed over boat with tie down straps secure. The convertible or bimini top, side curtains

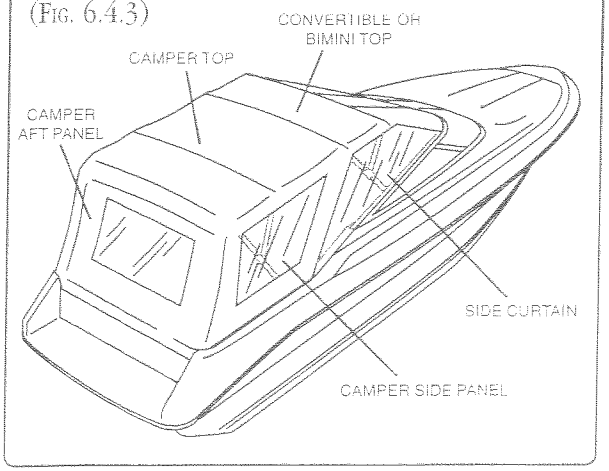
Sport Boat Canvas Placement
(Fig. 6.4.1)



Sport Boat Canvas Placement
(Fig. 6.4.2)



Sport Boat Canvas Placement
(Fig. 6.4.3)



and camper aft cover must be removed when trailering. Damage will occur to canvas and bows or boat if attached to boat while trailering.

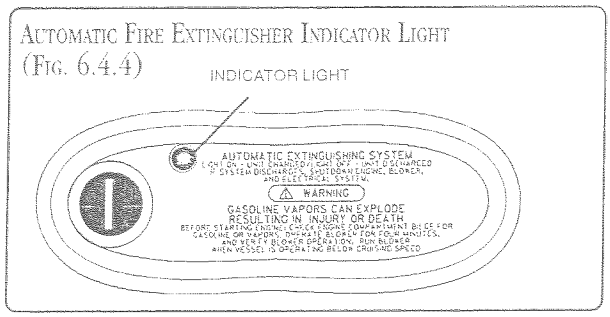
Automatic Fire Extinguishing System

(Optional On Some Models, N/A With Outboard Engines)

The automatic fire extinguishing system is installed in the bilge. In the event of a fire, the heat sensitive automatic head will release the extinguishant as a vapor, totally flooding the area in firekilling concentrations. The system indicator light is wired to the ignition and is turned ON when the ignition is turned ON.

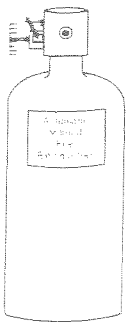
The indicator light is located on the dash panel. Under normal circumstances, when the ignition is ON the indicator light is lit. If the unit discharges, the light will go out.

Automatic Fire Extinguisher Indicator Light
(Fig. 6.4.4)



WHEN ACTUATION OCCURS, IMMEDIATELY SHUT DOWN ENGINE, POWERED VENTILATION, ELECTRICAL SYSTEMS AND EXTINGUISH ALL SMOKING MATERIALS. DO NOT OPEN THE ENGINE COMPARTMENT!! THIS FEEDS OXYGEN TO THE FIRE AND FLASHBACK COULD OCCUR.

Typical Automatic Fire Extinguisher
(Fig. 6.4.5)



Allow the extinguishant to "soak" the compartment for at least fifteen (15) minutes and for hot metals or fuels to cool before cautiously inspecting for cause of damage. Have portable extinguishers at hand and ready. Do not breath fumes or vapors caused by the fire.

REFER TO OWNER'S MANUAL PACKET FOR INSTRUCTIONS AND WARRANTY INFORMATION.

Depth Finder with Transducer

(Optional On Some Models)

Your Sea Ray® Sport Boat is available with a depth finder and transducer. The digital readout is mounted in the dash and features shallow and deep water alarms. It is turned on and off by a switch on the helm switch panel.

REFER TO THE DEPTH FINDER OWNER'S MANUAL IN THE OWNER'S PACKET FOR OPERATING INSTRUCTIONS.

Head Systems

(Only Available On Some Models)

Your Sea Ray® Sport Boat is available with a variety of head system options. Below is a description of each option. You should be aware of which option(s) your boat is equipped with and read the sections pertaining to it. The Owner's Manual Packet in your boat contains information pertaining to your head system that should be carefully read.

⚠ CAUTION

Do not flush facial tissue, paper towels or sanitary napkins in head. Such material can damage waste disposal system and the environment.

NOTICE

There is a possibility of being fined for having an operable direct overboard discharge in some waters. Close waste discharge seacock and remove handle or take other measures to avoid a fine.

Requirements for Operators

The Environmental Protection Agency (EPA) standards state that in freshwater lakes, freshwater reservoirs or other freshwater impoundments whose inlets or outlets are such as to prevent the ingress or egress by vessel traffic subject to this regulation, or in rivers not capable of navigation by interstate vessel traffic subject to this regulation, marine sanitation devices certified by the U.S. Coast Guard installed on all vessels shall be designed and operated to prevent the overboard discharge of sewage, treated or untreated, or of any waste derived from sewage. The EPA standards further state that this shall not be construed to prohibit the carriage of Coast Guard-certified flow-through treatment devices which have been secured so as to prevent such discharges. They also state that waters where a Coast Guard certified marine sanitation device permitting discharge is allowed include coastal waters and estuaries, the Great Lakes and interconnecting waterways, freshwater lakes and impoundments accessible through locks, and other flowing waters that are navigable interstate by vessels subject to this regulation (40 CFR 140.3).

Portable Self-Contained Head

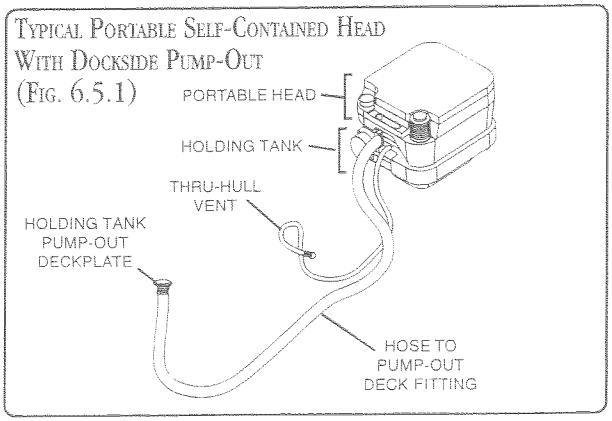
The portable self-contained unit has two individual holding tanks. The top tank is fitted with a hand pump and holds the fresh water and chemicals. The bottom tank holds waste material.

REFER TO OWNER'S MANUAL PACKET FOR INSTRUCTIONS AND WARRANTY INFORMATION.

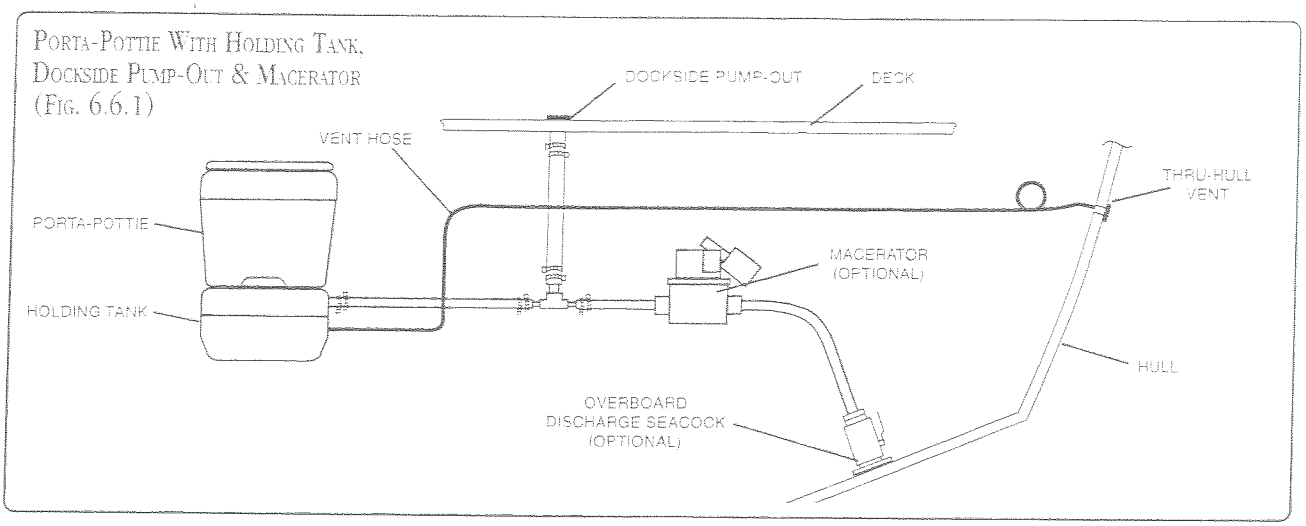
Portable Self-Contained Head with Dockside Pump-Out

The optional portable head with dockside pump-out is the same head as described above, except that the bottom holding tank has a dockside pump-out

Typical Portable Self-Contained Head with Dockside Pump-Out (Fig. 6.5.1)



Porta-Pottie With Holding Tank, Dockside Pump-Out & Macerator (Fig. 6.6.1)



hose attached. The hose leads to a waste plate on the deck. The holding tank can be emptied by a dockside sewage pump-out station (see *Dockside Pump-Out Option* in this section) or pumped directly overboard using the macerator option (see *Macerator* in this section).

REFER TO OWNER'S MANUAL PACKET FOR INSTRUCTIONS AND WARRANTY INFORMATION.

VacuFlush® System

The VacuFlush® head utilizes a HEAD SYSTEM breaker on the helm switch panel. The foot pedal at the base of the toilet opens a mechanical seal and vacuum forces waste through the opening in the bowl to an accumulator tank, through the vacuum pump and then to the holding tank or treatment tank. To Operate:

1. Turn ON the WATER SYSTEM breaker.
2. Turn ON the HEAD SYSTEM breaker.

REFER TO OWNER'S MANUAL PACKET FOR INSTRUCTIONS AND WARRANTY INFORMATION.

Holding Tank Operation

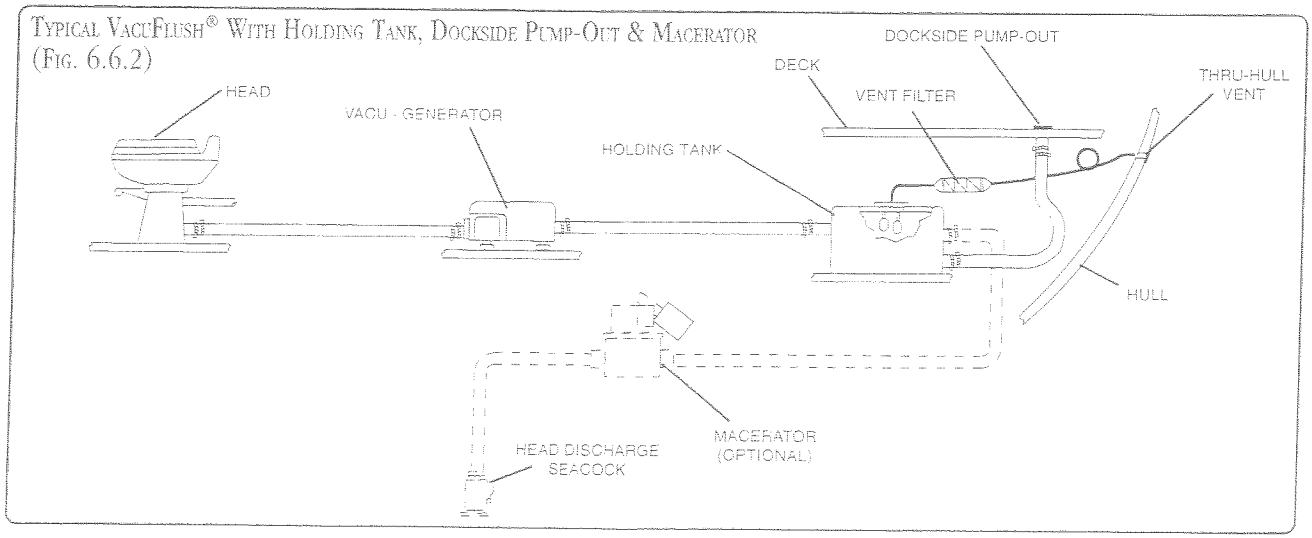
Waste from the head is directed into the holding tank located in the bilge. The holding tank fluid level indicator is located in the head and indicates 1/2 FULL, FULL and DO NOT FLUSH, or on some models may read FULL, 1/2, or EMPTY. WHEN the FULL light is on, the DO NOT FLUSH light will also be on. When these lights are ON, the holding tank must be emptied before the head can be reused.

Dockside Pump-out

To empty holding tank, the services of a dockside pump out station will be needed. Follow instructions at the station and make sure pump out station hose is inserted into the deck plate marked WASTE. The holding tank can also be emptied through utilization of the macerator (if supplied) (see *Macerator* in this section).

REFER TO OWNER'S MANUAL PACKET FOR INSTRUCTIONS AND WARRANTY INFORMATION.

Typical VacuFlush® With Holding Tank, Dockside Pump-Out & Macerator (Fig. 6.6.2)



Macerator

(Optional with Dockside Pump-Out)

The macerator gives the boat operator the means of discharging the holding tank contents directly overboard through a seacock in the bottom of the hull. The seacock minimizes flooding potential and provides a means of opening and closing to maintain hoses. This option is available in conjunction with the dockside pump out.

NOTICE

There is a possibility of being fined for having an operable direct overboard discharge of waste in some waters. Removing the seacock handle, in the closed position, or other means must be used to avoid fine.

It is illegal for any vessel to dump plastic trash anywhere in the ocean or navigable waters of the United States.

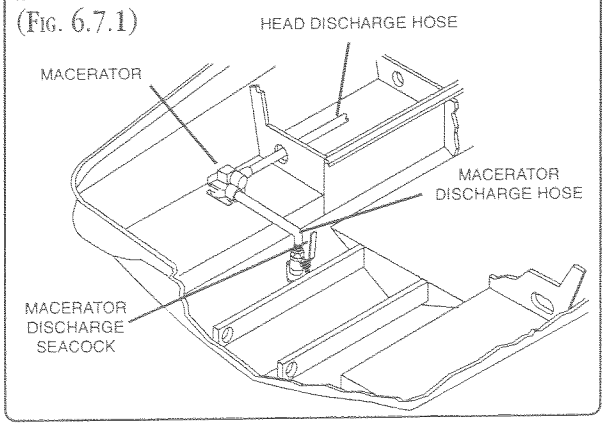
To Operate The Macerator:

1. Turn the DISCHARGE PUMP breaker ON and open the waste discharge seacock located on the bilge floor.
2. Operate discharge switch located in the head.
3. When tank is empty, release the switch and close waste discharge seacock.

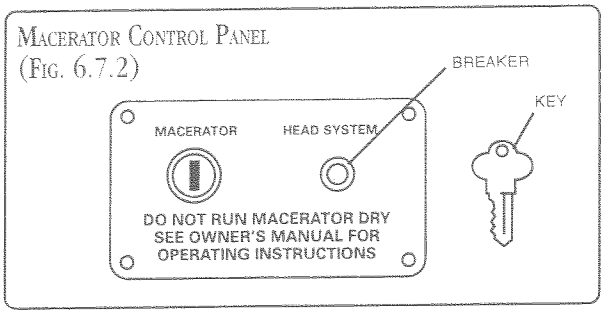
NOTE: There is a possibility of being fined for having an operable direct overboard discharge in U.S. waters. **Close waste discharge seacock and remove handle or take other measures to avoid fine.**

DISCHARGE OF SEWAGE DIRECTLY OVERBOARD IS FOR USE ONLY WHERE APPROVED.

Typical Macerator System
(Fig. 6.7.1)



Macerator Control Panel
(Fig. 6.7.2)



Maintenance

Prior to each use and at regularly scheduled intervals (see Section 9 – *Service Guide*), cycle the macerator seacock handle open and shut to ensure proper operation of the seacock.

Vent Filter (With VacuFlush® System)

The vent filter is designed to control odors associated with the head system operations. The filter must be changed at the beginning of each boating season to be effective. The vent filter is installed in-line on the holding/treatment tank ventilation hose.

Note: Do not overfill the holding/treatment tank as this will flood the vent filter and render it useless. Filter replacement will then be required. Replace the filter with Sealand® Part #315-310-000.

Horn

The horn is operated by a momentary switch on the dash and is protected by a fuse or breaker at the helm. There is no maintenance required to the horn itself, although it is advisable to avoid spraying water directly into the horn.

REFER TO OWNER'S MANUAL PACKET FOR INSTRUCTIONS AND WARRANTY INFORMATION.

Refrigerator/Freezer/ Ice Chest (Optional On Some Models)

12 Volt DC System

The 12 volt system utilizes a REFRIGERATOR switch and breaker located on the dash. To operate the unit on 12 volt power, preferably with engine operating, turn the switch on the refrigerator to ON.

AC Voltage System

The refrigerator operates on the AC voltage shore power system (if applicable). To operate the unit on AC power, connect the shore power system, turn the dash switch ON then turn the REFRIGERATOR breaker ON.

⚠ CAUTION

Do not cover refrigerator vents.

Some models may feature a built-in or removable ice chest.

REFER TO OWNER'S MANUAL PACKET FOR INSTRUCTIONS AND WARRANTY INFORMATION.

Seating Accommodations

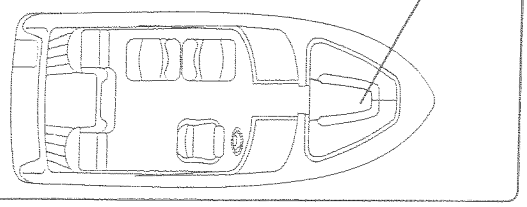
⚠ DANGER

Do not allow anyone to ride on parts of the boat that were not designed for such use. Sitting up on seat backs, bow riding, gunwale riding, transom platform riding, or lounging on aft sundeck while under way is especially hazardous and will cause personal injury or death.

Bow Rider Filler Cushion
(Optional On Some Bow Rider Models)

The bow rider filler cushion is used in the open bow area to form a cushioned platform. To install, simply fit cushion into space between the port and starboard bow seats.

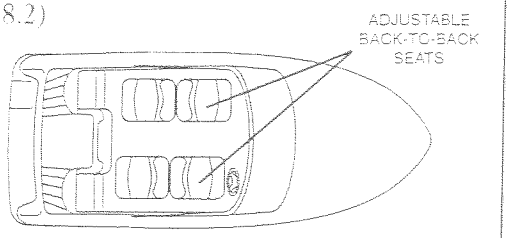
Typical Bow Rider Filler Cushion (Fig. 6.8.1)



Adjustable Back-To-Back Seats
(Seating Option on Some Models)

The starboard adjustable back-to-back seats will slide forward and aft by loosening the outboard knobs. The starboard seat can also be adjusted to lay flat by loosening the adjustable knobs on the outboard side and pushing the seats away from each other.

Typical Adjustable Back-To-Back Seats (Fig. 6.8.2)



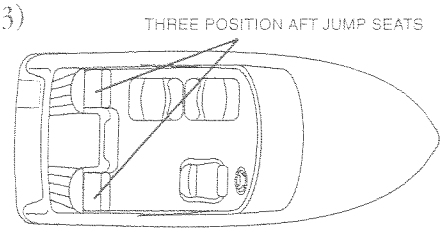
The port back-to-back seat can be adjusted to lay flat by lifting up on the front of each seat and pulling them away from each other.

NOTE: Never sit on soft backs or top of seats.

Three Position Aft Jump Seats
(Seating Option on Some Models)

The three position aft jump seats, located on each side of the motor box, can be adjusted from a sitting position to a platform across the back of the cockpit. To change the cushion height simply grasp the front of the cushion and slide out, then reposition the cushion to the upper or lower position. To store cushions slide vertically behind the bottom seat supports.

Typical Three Position Aft Jump Seats (Fig. 6.8.3)

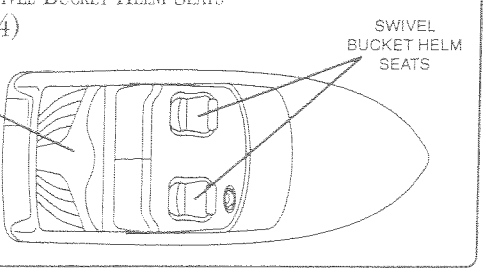


Swivel Bucket Helm Seat w/Slider
(Seating Option on Some Models)

The adjustable bucket helm seat can swivel left and right and slide forward and aft. The port passenger seat can swivel left and right (see Fig. 6.8.4).

NOTE: Never sit on top of seat.

Typical Swivel Bucket Helm Seats (Fig. 6.8.4)



Stereo

The stereo is protected by the stereo fuse or breaker at the dash. The power for the stereo memory and clock is maintained even if the battery switch is off.

REFER TO THE STEREO OWNER'S MANUAL IN THE OWNER'S PACKET FOR OPERATING INSTRUCTIONS.

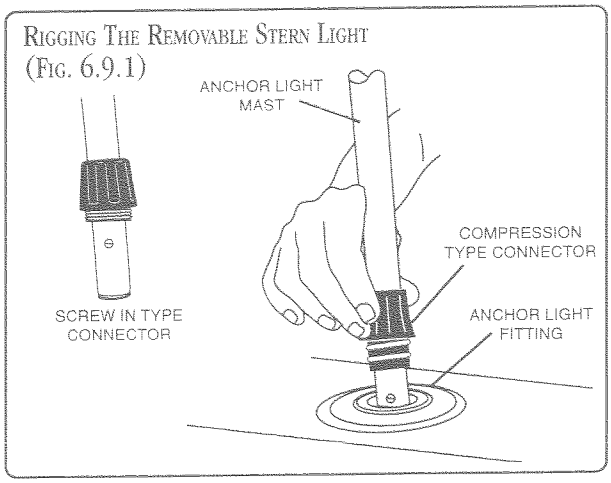
Removable Stern Light

A white all-around light must be displayed between sunset and sunrise, during periods of reduced visibility and when at anchor (see Section 1 – *Navigation Lights*). If your boat does not have a permanently installed stern light, then it is equipped with a removable stern light.

It is stowed either under the engine hatch or in one of the outboard side storage compartments. It is installed in a receptacle on the aft gunwale or transom either with a screw-in type connection or a push-in-and-twist compression-type fitting.

REFER TO OWNER'S MANUAL PACKET FOR INSTRUCTIONS AND WARRANTY INFORMATION.

Rigging The Removable Stern Light
(Fig. 6.9.1)

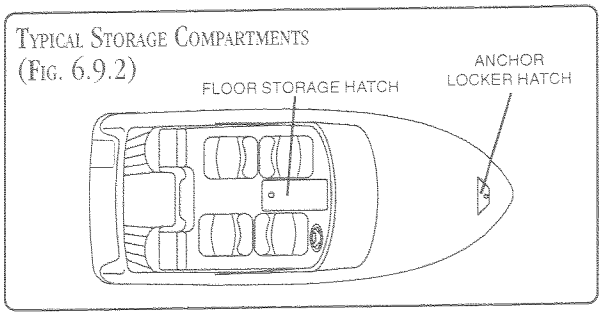


Storage Compartments

Anchor Locker & Rack

On the bow of some sport boats is a hinged anchor locker with rack for storage of rope and anchor. To open, turn handle and pull up on hatch. The compartment should be cleaned and dried thoroughly each time the boat is used to avoid odor and mildew build up.

Typical Storage Compartments
(Fig. 6.9.2)



Floor Storage Hatch

The cockpit hatch is large enough to hold skis or other fairly large items. The compartment should be cleaned and dried thoroughly each time the boat is used to avoid odor and mildew build up.

Stove (Optional On Some Models)

The optional butane stove operates on a standard disposable butane cylinder (if applicable).

⚠ DANGER

Open flame cooking appliances consume oxygen. This can cause asphyxiation or death. Maintain open ventilation. Do not use this appliance for comfort heating.

REFER TO THE STOVE OPERATOR'S MANUAL FOUND IN YOUR OWNER'S MANUAL PACKET FOR DETAILED OPERATING INSTRUCTIONS AND WARRANTY.

Transom Trailer Trim Switch

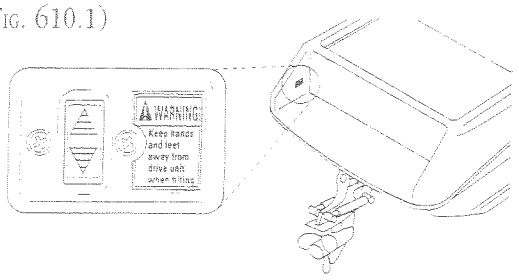
(Optional On Some Models)

A transom-mounted power trim switch is available for the convenience of raising the stern drive lower unit to the TRAILER position while at the aft of the boat.

⚠ CAUTION

If stern drive is equipped with power tilt for trailering, use it only for that purpose. Tilting drive unit into the trailering zone while underway may damage the drive unit or engine.

Transom Trailer Trim Switch
(Fig. 610.1)



REFER TO OWNER'S MANUAL PACKET FOR INSTRUCTIONS AND WARRANTY INFORMATION.

Water System

(Optional On Some Models)

The fresh water system is activated by the WATER SYSTEM or ACCESSORY switch on the dash. The switch must be ON to operate the faucet or transom shower.

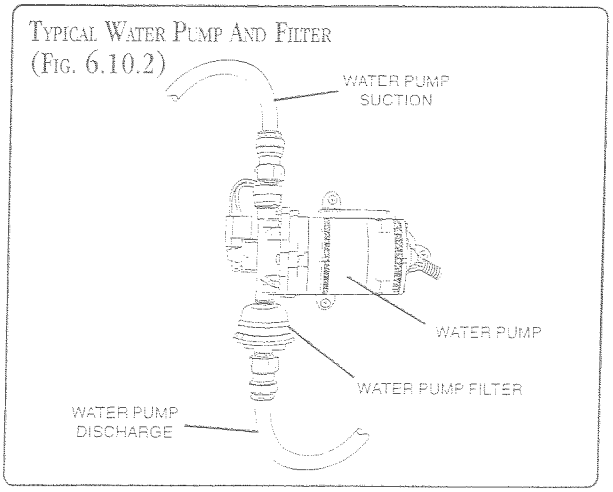
To begin initial operation:

1. Fill the water tank from a source known to provide safe, pure drinking water.
2. Turn ON the WATER SYSTEM or ACCESSORY switch.
3. Open faucet or turn on shower wand.

Shut faucet and/or wand off as flow becomes steady and free of air. Shutting off the faucet and/or wand will cause the pump to shut off.

To winterize the water system refer to Section 7 – *Winterization Checklist For Boats Stored On Land.*

Typical Water Pump And Filter
(Fig. 6.10.2)



Water Pump Filter

The pump has a filter to prevent particles from entering the pump head. The filter should be checked and cleaned periodically.

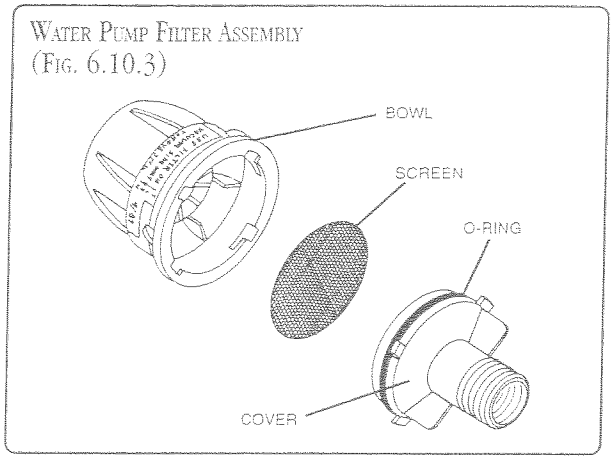
Before servicing the system, turn the water system OFF and release pressure on the system by opening a faucet.

To clean filter:

1. Turn cover counterclockwise and pull out.
2. Carefully remove the screen and rinse with clean water.

Replace, making sure the O-ring is in place when replacing the cover.

Water Pump Filter Assembly
(Fig. 6.10.3)



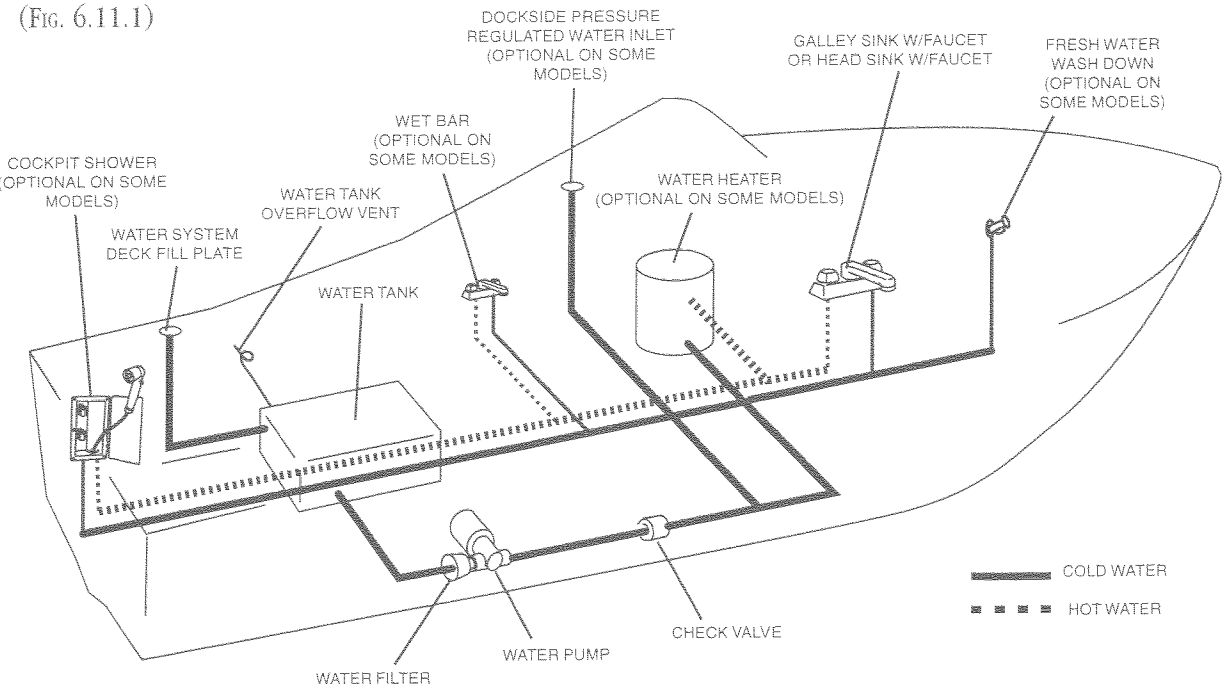
Sanitizing the Water System

Although your dealer initially sanitizes the water system, if the system has not been used for a long period of time or you suspect it may be contaminated, use a water treatment additive to sanitize the potable water system. Water treatment additives are available at marine/RV supply stores.

If water treatment additives are not available, adhere to the following procedure for complete sanitation of your potable water system.

1. With tank empty, mix a solution of Clorox or Purex household bleach (5% Hypochlorite solution) using 2 oz. per gallon of tank capacity. Fill tank with water.
2. Turn on faucet(s) until air has been released and the entire system is filled.
3. Allow to stand for three hours.
4. Drain and flush with potable fresh water.
5. To remove excessive chlorine taste or odor which might remain, prepare a solution of one quart vinegar to three gallons water and allow this solution to agitate in the tank for several days by vehicle motion.
6. Drain tank and again flush with potable water.

Typical Pressure Water System Layout*
(Fig. 6.11.1)



*NOTE: THIS DIAGRAM IS NOT MEANT TO BE AN EXACT REPRESENTATION OF THE WATER SYSTEM IN YOUR BOAT, BUT INSTEAD DEPICTS A TYPICAL WATER SYSTEM ARRANGEMENT WITH OPTIONAL ACCESSORIES. THE ACCESSORIES SHOWN MAY NOT BE AVAILABLE AS STANDARD EQUIPMENT OR EVEN AVAILABLE AS OPTIONS. THIS DIAGRAM IS NOT DRAWN TO SCALE.

Gray Water System

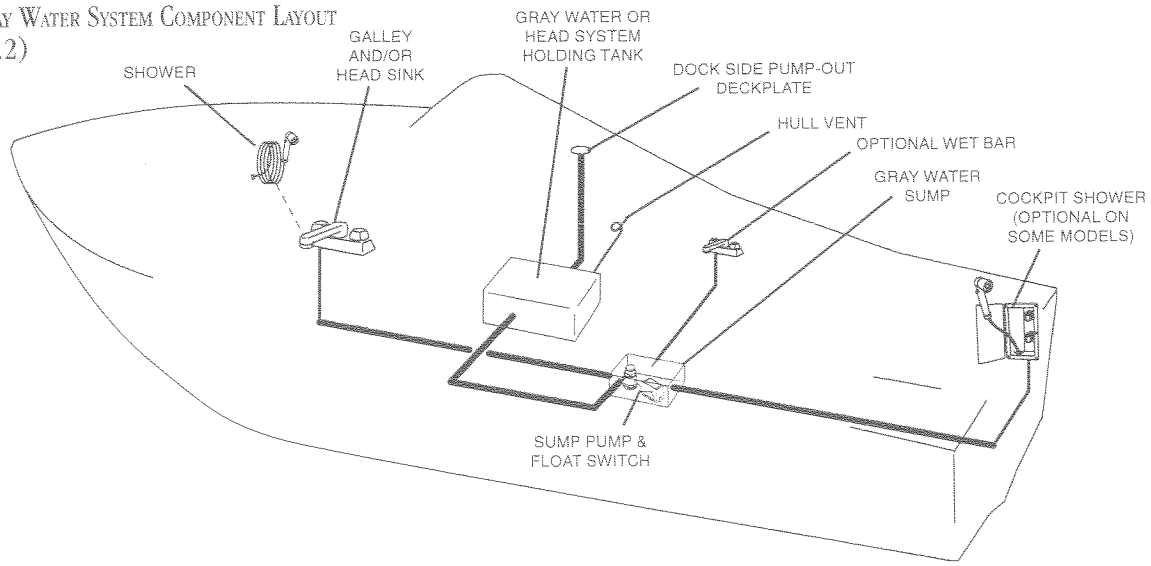
(Optional On Some Models)

The gray water system (see Fig. 6.12.1) is designed for boats that are used in areas that restrict overboard water discharge.

The system directs waste water from accessories such as the galley and head sinks and shower to a sump that is fitted with a float switch and pump that pumps the water to the gray water tank. The tank must be emptied when it becomes full.

To empty the gray water system holding tank with the dockside pump out the services of a dockside pump out station will be needed.

Typical Gray Water System Component Layout
(Fig. 6.11.2)



*NOTE: THIS DIAGRAM IS NOT MEANT TO BE AN EXACT REPRESENTATION OF THE GRAY WATER SYSTEM IN YOUR BOAT, BUT INSTEAD DEPICTS A TYPICAL GRAY WATER SYSTEM ARRANGEMENT WITH OPTIONAL ACCESSORIES. THE ACCESSORIES SHOWN MAY NOT BE AVAILABLE AS STANDARD EQUIPMENT OR EVEN AVAILABLE AS OPTIONS. THIS DIAGRAM IS NOT DRAWN TO SCALE.

Follow instructions at the station and make sure pump out station hose is inserted into the deck plate marked GRAY WATER/WASTE.

Cockpit Step/Seating

Some Sport Boats are fitted with cockpit seating which utilize fold down legs with locking pins. Be sure locking pins are securely fastened to provide a solid platform.

LAYING-UP INSTRUCTIONS

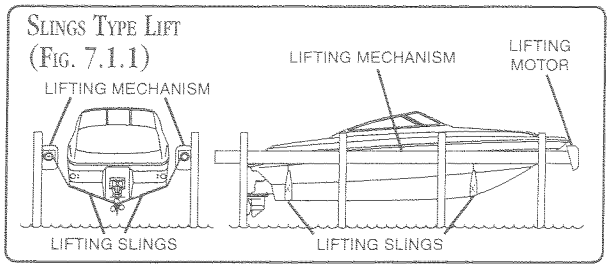
LIFTING THE BOAT

When lifting the boat always keep the bow higher than the stern to drain the exhaust lines and to prevent water from running forward through the manifold and into the engine where it can become trapped. It may seem expedient to lift only the stern when changing a propeller, but this can result in water entering the engine cylinders, causing hydrostatic lock and resulting in possible internal engine damage and quite possibly engine failure. Even a small amount of water in the engine can cause rust and is to be avoided.

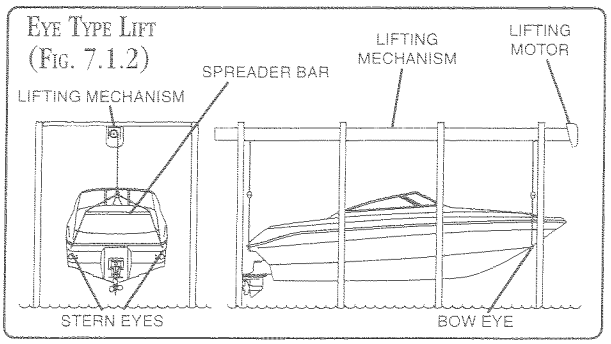
With fiberglass boats, severe gelcoat crazing or more serious hull damage can occur during launching and hauling if pressure is created on the gunwales by slings. Flat, wide belting-type slings and spreaders long enough to keep pressure from the gunwales are necessary. Cable-type slings should be avoided. Do not place the slings where they may lift on the underwater fittings.

To lift the boat with lifting hooks attached to the bow and stern eyes, use a spreader bar at the aft hooks to avoid stress cracks in the fiberglass and gel coat.

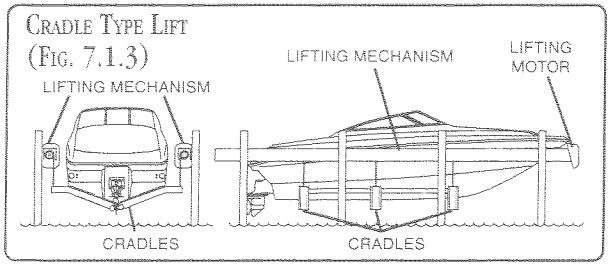
SLINGS TYPE LIFT
(FIG. 7.1.1)



EYE TYPE LIFT
(FIG. 7.1.2)



CRADLE TYPE LIFT
(FIG. 7.1.3)



⚠ CAUTION

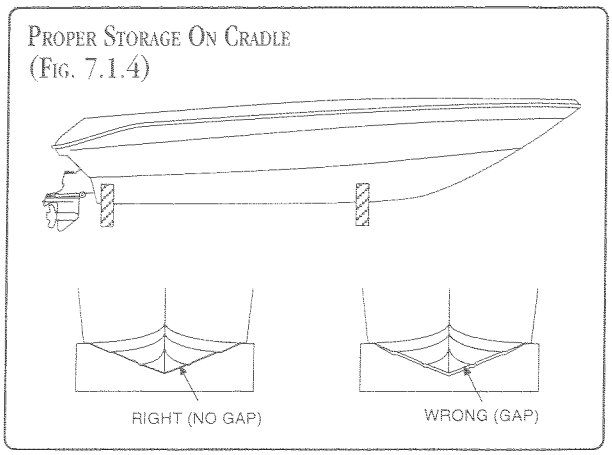
Do not use cleats for lifting.

Never hoist the boat with an appreciable amount of water in the bilge. Fuel and water tanks should preferably be empty, especially if of large capacity.

SUPPORTING THE BOAT DURING STORAGE

A cradle is the ideal support for the boat whenever it is not in the water. Properly designed and constructed, it will provide support at the proper points, which is essential to avoid stress on the hull. Do not rest boat on underwater fittings.

PROPER STORAGE ON CRADLE
(FIG. 7.1.4)



TRAILER

The manufacturer of your trailer has provided you with a vehicle designed for many years of convenient, trouble-free service. Now, it is up to you to give it proper care and maintenance to be sure it will continue to perform safely and satisfactorily.

Bow and Stern Eyes

The bow eye should be used to haul the boat onto a trailer. The stern eyes should be used as tie down points for trailering the boat. Lifting with the bow and stern eyes may cause stress on the fiberglass and gel coat.

Because all trailers are not exactly alike, be sure to read and comply with any warnings and information supplied by the trailer manufacturer about your specific model.

Draining the Boat

In climates where freezing occurs, it is important that the bilge be completely drained and dried out when the boat is laid up for the winter. Your Sport Boat is equipped with a drain plug for this purpose. Some compartments in the bilge may not drain completely because of the position of the boat. They should be pumped out and sponged until totally free of water.

The boat's fresh water system (if equipped) must be drained. Open faucets in the boat. Open a connection at the lowest point in the fresh water lines to completely drain them. Break the connections on each side of the water pump. Drain the head.

The engine cooling system must be free of water if there is danger of freezing. Drain plugs are provided on the engine for this purpose; these should be reassembled securely immediately after draining is accomplished.

CONSULT YOUR ENGINE OPERATOR'S MANUAL FOR DETAILED INFORMATION ON PREPARING THE ENGINE FOR STORAGE.

Winterization Checklist for Boats Stored on Land

1. Boat Storage

- Store boat in a bow high attitude.
- Remove hull drain plug.
- Pour one (1) pint (half-liter) of 50% water/ antifreeze mixture in each bilge pump sump.

2. Engine

- Flush engine with fresh water.
- Remove engine drain plugs.
- **Refer to your Engine Operator's Manual for detailed information on preparing the engines for storage and winterization.**

3. Battery(ies)

- Remove from the boat. Remove negative (-) cable first, then positive (+) cable.
- Remove grease and dirt from top surface.
- Grease terminal bolts.
- Store on wooden pallet or thick plastic in a cool dry place. Do not store on concrete.
- Keep under a trickle charge.
- When replacing battery in service, remove excess grease from terminals, recharge as necessary and reinstall in boat.

4. Head System (If Equipped)

Portable Self-Contained Head

- Empty top tank and holding tank.
- Make sure all water is cleared.

Head Systems with Dockside Pump-Out

- Flush entire system thoroughly with fresh water.
- Pump out holding tank.
- Shut WATER SYSTEM breaker OFF on the helm switch panel and remove from each side of water pump.
- Remove water line from inlet fitting located on back bottom half of water valve on head.
- Flush one gallon (four liters) antifreeze mixed with one gallon (four liters) of water through toilet and let vacuum pump run for one or two minutes.
- Pump out holding tank.

5. Water System (If Equipped)

- Turn ON fresh water pump.
- Open all faucets, let system drain completely, leave faucets open.
- Turn OFF fresh water pump.
- Remove hoses from water pump.
- Blow out all lines to clean.

6. Fuel Systems

Gasoline:

- Fill fuel tank with gasoline and a gasoline stabilizer and conditioner such as "Stabil," to treat the gasoline.
- Run engines for ten minutes to ensure that all gas in the carburetor and fuel lines are treated.

Diesel:

- Diesel fuel must be treated with a biocide, "Biobor," which prevents bacteria and fungi from contaminating diesel fuel that contains some water.
- Diesel fuel should also get a petroleum distillate additive, such as "Stabil" or "Racor RX1000." This will help assimilate water in the fuel and prevent freezing problems.
- Fill fuel tanks with the treated fuel.
- Run engines for ten minutes to ensure that all diesel fuel in injectors and fuel lines are treated.

⚠ CAUTION

Do not overfill. Filling a tank until the fuel flows from vents is dangerous. Allow room for expansion.

REFER TO INDIVIDUAL OWNER'S MANUALS FOR SPECIFIC PROCEDURES.

Fitting Out After Storage

Fuel System

Check the entire fuel system for loose connections, worn hoses, leaks, etc. and repair. This is a primary safety precaution.

Battery(ies)

Before installing the battery(ies), clean the terminal posts with a wire brush or steel wool and then attach the cables. After the cable clamps are tightened, smear the post and clamps with vaseline or grease to exclude air and acid. Do not apply grease before attaching and tightening the terminal clamps. Examine all wiring.

Miscellaneous

1. Check all thru-hull fittings for unobstructed water passage. Be alert for any deteriorated hoses and/or fittings below the water line which might fail in service and admit water.
2. Test the navigation lights.
3. Check all wiring for loose connections.
4. Check all switches and equipment for proper operation.
5. Check bilge blowers for proper operation. Turn ON blowers and place hand over hull blower vent to make sure air is coming from vent.
6. Anchor lines and gear should be inspected and replaced if necessary.
7. Make sure the hull drain plug is in place.
8. Clean bilge thoroughly if it was not done at lay-up.
9. Check all engine fluid levels.
10. Check fuel lines for damage and/or leaks. Make sure that they do not come into contact with moving parts.

Security Considerations

Be conscious of the security of your boat. Always remove the keys from the ignition, lock hatches, lock the cabin door, remove and stow any removable electronic gear (fishfinders, LORAN, etc.) and personal gear (fishing poles, etc.) normally left aboard your boat.

Section 8 • Care & Refinishing

Maintenance and Reconditioning

Your new boat has been designed to provide you with years of enjoyment and satisfaction. In order to maintain the factory new appearance of your boat, we recommend the use of 3M™ Marine's one step Maintenance and Reconditioning Products designed specifically for pleasure boats. Following proper fiberglass maintenance guidelines will help maintain your boat's performance, value, and enjoyment.

Fiberglass & Gelcoat

The fiberglass hull, deck and some interior parts consist of the molded shell and exterior gelcoat. The gelcoat is the outer surface, often colored, that presents the shiny smooth appearance which is associated with fiberglass products. In some areas, this gelcoat surface is painted or taped for styling purpose.

Wash the fiberglass regularly with clean, fresh water. Wax gelcoated surfaces to maintain the luster. In northern climates, a semiannual waxing may suffice for the season. In southern climates, a quarterly application of wax will be required for adequate protection.

⚠ WARNING

Gelcoat surfaces are slippery when wet. Use extreme care when walking on wet gelcoat.

Always wear non-slip foot gear while washing and waxing boat.

⚠ WARNING

Care should be utilized in waxing commonly walked upon areas of the boat to ensure that they are not dangerously slippery.

REFER TO 3M ONE STEP MAINTENANCE AND RECONDITIONING PRODUCTS PAMPHLET IN YOUR OWNER'S MANUAL PACKET FOR INSTRUCTIONS AND WARRANTY INFORMATION

Stains & Scratches

Gelcoat and painted surfaces are very resistant to deep stains. Common surface stains can be removed with diluted household detergents, provided these detergents do not contain ammonia or chlorine. Porcelain-cleaning powders are too abrasive and often contain chlorine and ammonia, either of which would permanently discolor the gelcoat and paint. Alcohol or kerosene can be used for difficult stains but should be washed away promptly with a mild detergent and water. **Never use** acetone or any ketone solvents.

Minor scratches and deeper stains which do not penetrate the gelcoat may be removed by light sanding and buffing.

Special Care for Boats that are Moored

If permanently moored in salt water or fresh water, your boat will collect marine growth on its bottom. This will detract from the boat's beauty and greatly affect its performance. There are two methods of preventing this:

- Periodically haul the boat out of the water and scrub the bottom with a bristle brush and a solution of soap and water.
- Paint the hull below the waterline with a good grade of antifouling paint. **DO NOT paint the engine drive surfaces.**

NOTE: There are EPA regulations regarding bottom paint application. Consult your Sea Ray® dealer for proper application methods.

Care For Bottom Paint

From time to time a slight algae or slime forms on all vessels. If necessary the bottom painted portion of the hull can be wiped off with a coarse turkish towel or a piece of old rug while the boat is in the water. **DO NOT** use a stiff or abrasive material to clean the bottom paint.

The bottom paint should be inspected monthly. If it needs repainting consult your Sea Ray® dealer.

Bilge/Engine Compartment

1. Pump the bilges dry and remove all loose dirt. Be sure that all limber holes are open. If there is oil in the bilge and the source is not known, look for leaks in engine oil lines or engine gaskets. Oil stains can be removed by using a bilge cleaner available from your dealer or a

marina. **DO NOT** use flammable solvents.

2. Check all wiring to be sure it is properly supported, that its insulation is intact, and that there are no loose or corroded terminals. If there are corroded terminals, they should be replaced or thoroughly cleaned. Tighten all terminals securely and spray them with light marine preservative oil.
3. Inspect the entire fuel system (including fill lines and vents) for any evidence of leakage. Any stains around joints could indicate a leak. Try a wrench on all fittings to be sure they are not loose, but do not over tighten them. Clean fuel filters and vent screens.
4. Inspect the entire bottom for evidence of seepage, damage or deterioration, paying particular attention to hull fittings, hoses and clamps. Straighten kinked hoses and replace any that do not feel pliable. Tighten loose hose clamps and replace those that are corroded. Tighten any loose nuts, bolts or screws.
5. Refer to your engine operator's manual for engine maintenance details. Wipe off engine to remove accumulated dust and grease. If a solvent is used, make sure it is nonflammable. Go over the entire engine and tighten nuts, bolts, and screws. Inspect the wiring on the engine and clean and tighten the terminals. Inspect the belts and tighten them if needed. Clean and lubricate the battery terminals; fill the battery cells with distilled water as needed.

Topside Areas

1. Check grab rails for loose screws, breaks, sharp edges, etc., that might be hazardous in rough weather. Inventory and inspect life jackets for tears and deterioration. Check your first aid kit to make sure it is complete. Check the signaling equipment. Inspect anchor, mooring and towing lines and repair or replace as required. **DO NOT** stow wet lines or they may mildew and rot.
2. Stainless steel and alloy fittings should be cleaned with soap and water or household glass cleaner. Remove rust spots as soon as possible with a brass, silver or chrome cleaner. Irreversible pitting will develop under rust that remains for any period of time. Never use an abrasive like sandpaper or steel wool on stainless. These may actually cause rust. To help protect the stainless, we recommend the use of a good car wax.
3. When instruments are exposed to a saltwater environment, salt crystals may form on the bezel and the plastic covers. These salt crystals should be removed with a soft, damp cloth; never use abrasives or rough, dirty cloths to wipe plastic parts. Mild household detergents or plastic cleaners can be used to keep the instruments bright and clean.

REFER TO THE OWNER'S MANUAL PACKET FOR INSTRUCTIONS AND WARRANTY INFORMATION.

Acrylic Plastic Sheeting (Plastic Glass)

Never use a dry cloth or duster or glass cleaning solutions on acrylic.

To clean acrylic, first flood it with water to wash off as much dirt as possible. Next, use your bare hand, with plenty of water, to feel and dislodge any caked dirt or mud. A soft, grit-free cloth may then be used with a nonabrasive soap or detergent. A soft sponge, kept clean for this purpose, is excellent. Blot dry with a clean damp chamois.

Grease and oil may be removed from acrylic with kerosene, hexane, white (not aviation or ethyl) gasoline or aliphatic naphtha (no aromatic content).

Do not use solvents such as acetone, silicone spray, benzine, carbon tetrachloride, fire extinguisher fluid, dry cleaning fluid or lacquer thinner on acrylic, since they attack the surface.

Remove fine scratches with fine automotive acrylic rubbing and polishing compounds.

Upholsteries

Exterior fabrics should be cleaned with a sponge or very soft scrub brush and a mild soap and warm water solution. After scrubbing, rinse with plenty of cold, clean water and allow the fabric to air dry in a well ventilated place, preferrably away from direct sunlight.

Mildew can occur if your boat does not have adequate ventilation. Heat alone will not prevent mildew; you must also provide for fresh air circulation.

Cleaning Recommendations for Marine Fabric

Cleaning and mainrtenance information is provided by the material manufacturer.

NOTICE

Always clean immediately. Test an unseen area of fabric before cleaning stain.

REFER TO THE OWNER'S MANUAL PACKET FOR INSTRUCTIONS AND WARRANTY INFORMATION.

Section 9 • Service Information

Useful Service Information

OWNER _____

HOME PORT _____

BOAT NAME _____

REGISTRATION # _____ STATE _____

HULL SERIAL # _____

WARRANTY REGISTRATION DATE _____

ENGINE MAKE & MODEL _____

SERIAL # _____

OUTDRIVE RATIO _____

SERIAL # _____

PROPELLER SIZE _____

PART # _____

FUEL CAPACITY _____

WATER CAPACITY _____

KEY #, IGNITION _____ DOOR _____

SELLING DEALER _____

CITY & STATE _____

LENGTH _____

BEAM _____

DRAFT _____

VERTICAL CLEARANCE _____

ESTIMATED WEIGHT _____

MAXIMUM LOAD: WEIGHT _____ # PEOPLE _____

GENERATOR SERIAL # _____

MODEL # _____ KILOWATTS _____

Service Guide

NOTE: The Service Guide is based on average operating conditions. Under severe operating conditions, intervals should be shortened. Operation in salt water is considered severe operating conditions.

REFER TO THIS MANUAL AND YOUR ENGINE OPERATOR'S MANUAL FOR DETAILS.

	BEFORE EVERY USE	AFTER FIRST 20 HRS.	EVERY 100 HOURS	ANNUALLY
CHECK ENGINE OIL LEVEL	●			
CHANGE ENGINE OIL			●	●
REPLACE OIL FILTER			●	●
REPLACE ENGINE MOUNTED FUEL FILTER			●	
CHECK OUTDRIVE FLUID LEVEL	●			
CHANGE OUTDRIVE FLUID				●
CLEAN CRANKCASE VENTILATING SYSTEM		●	●	
CLEAN TRANSMISSION OIL STRAINER SCREEN**				●
CHECK COOLING SYSTEM CONNECTIONS FOR LEAKS (WITH ENGINE RUNNING)	●			
TIGHTEN ENGINE MOUNT FASTENERS		●		●
CHECK FOR LOOSE, DAMAGED OR MISSING PARTS	●			
CHECK PICK-UP & WATER IMPELLERS**				●
CHECK ACCESSORY DRIVE BELTS	●			
CLEAN FLAME ARRESTOR		●	●	
CHECK ZINCS	EVERY 25 HOURS			

Equipment Listed To Service May Not Be Standard Equipment or Even Available as Options On Your Particular Sea Ray® Sport Boat. Service Equipment Which Your Boat Is Equipped With.

Service Guide (Cont'd)

REFER TO THIS MANUAL AND YOUR ENGINE OPERATOR'S MANUAL FOR DETAILS.

	BEFORE EVERY USE	AFTER FIRST 20 HRS.	EVERY 50 HOURS	EVERY 100 HOURS	ANNUALLY
CHECK MACERATOR SEACOCK***	●	●	●		
LUBRICATE MACERATOR SEACOCK***					●
CHECK ENGINE ALARMS	●				
CHECK EXHAUST SYSTEM FOR LEAKS	●	●		●	
CHECK FUEL SYSTEM LINES & CONNECTIONS	●	●	●		
CHANGE WATER SEPARATING FUEL FILTER		●			●
LUBRICATE THROTTLE & SHIFT LINKAGE PIVOT POINTS		●		●	●
CHECK BATTERY ELECTROLYTE LEVEL	●	●	●		
CHECK ALL ELECTRICAL CONNECTIONS *(Including Dockside Power Inlet)**		●			●
INSPECT PROPELLER FOR POSSIBLE DAMAGE			●		
CHECK WATER SYSTEM PUMP FILTER*		●	●		●
INSPECT FRESH WATER PUMP & WATER SYSTEM*		●		●	
CHECK HOLDING TANK LEVEL*	●				
CHECK FLUID IN TRIM PLANE PUMP*		●			●
TEST 120 VOLT GFI OUTLET*					●
CHECK OIL IN STEERING SYSTEM	EVERY 3 MONTHS				

* Equipment listed to service may not be standard equipment or even available as options on your particular Sea Ray® Sport Boat. Service equipment which your boat is equipped with.

** Sea Ray® recommends that this maintenance be performed by an authorized service center.

*** Service required for macerator equipped boats only.

Quick Reference Departure Checklist

As the owner/operator of a Sea Ray® Sport Boat, you are responsible for the safe operation your boat and the safety of your passengers. Always be sure that required documents, navigational equipment and Coast Guard required safety equipment is aboard and in proper working order.

Boarding the Boat*

General

1. Weather Conditions ..... Is it going to be safe to go out
2. Transom Drain Plug ..... Installed
3. PFDs and all other Coast Guard required safety equipment ..... Available for all children and adults
4. Ignition keys ..... Available
5. Tool Box ..... Stocked with a variety of appropriate tools

Trailer

1. Wheel Lug Nuts ..... Tight (None missing)
2. Trailer Lights ..... Working properly
3. Winch and Tie Downs ..... Tight and secure

Boat Systems

1. Bilge Pump ..... Working. Discharge any appreciable amounts of water overboard
2. Blower ..... Working. "Sniff" the bilge/engine compartment for fuel odor
3. Navigation Lights ..... Working. Have spare bulbs and fuses aboard
4. Radio/Electronics ..... Working
5. Horn ..... Working
6. Power Trim/Trim Tabs ..... Full range of motion. No excessive play or binding *(If Applicable)*
7. Fresh Water Tank ..... Filled and sanitized *(If Applicable)*
8. Head System Holding Tank ..... Empty *(If Applicable)*

1. Seacock ..... Open (handle parallel to hose) *(If Applicable)*

Engine

1. Battery(ies) ..... Fully charged (Check water cell levels)
2. Fuel Tank ..... Filled with recommended fuel
3. Fuel System ..... Check for leaks
4. Fuel Filter ..... Check that filter is clean and tight
5. Diesel Racor Fuel Filter ..... Check that filter is clean, tight and free of water
6. Engine Coolant Drain Plugs ..... Secured
7. Steering Fluid ..... Full
8. Throttle/Gearshift Control Test ..... Full range of motion

*Note: Many of these items should be checked before leaving the house.

Quick Reference Departure Checklist (Cont'd)

Preparing to Depart and After Launching

General

1. Bilge/Engine Compartment ..... "Sniff" the bilge/engine compartment for fuel odor. Run the bilge blower for at least four (4) minutes.
2. Shore Power Cable ..... Disconnected from dockside power inlet *(If Applicable)*
3. Lines, Fenders and Anchor ..... Ready for use
4. Passengers/Crew ..... Instructed in duties for getting underway and fitted for a correct size PFD

Engine

1. Battery Switch ..... In the ON position
2. Fuel Valve ..... Open *(If Applicable)*
3. Engine Alarm ..... Test. Should sound after a few seconds
4. Gear Shift/Throttle Control ..... In NEUTRAL/IDLE position

Starting the Engine*

1. Gearshift/Throttle Control ..... Shift in NEUTRAL (Refer to your Engine Owner's Manual for startup procedures for your specific engine)
2. Ignition Key ..... Turn clockwise to START. Hold in START position until engine starts, then release to ON position

IMPORTANT: Do not continue to operate starter for more than 10 seconds without pausing to allow starter motor to cool off for 2 minutes. This also will allow the battery to recover between starting attempts.*

⚠ WARNING

Do not run the engine in an enclosed area, such as a closed boat house, as there is the possibility of buildup and inhaling of carbon monoxide.

*If engine fails to start, refer to Pg. 9.7 and/or the Engine Owner's Manual for further troubleshooting procedures

Quick Reference Departure Checklist (Cont'd)

While Underway

General

1. Passengers/Crew ..... Safely seated with PFD's on or immediately accessible
2. Lines and Fenders ..... Stowed

Boat Systems

1. Power Trim/Trim Tabs ..... Bring boat to "On Plane"
2. Navigation Lights ..... On at night or in reduced visibility

Engine

1. Tachometer ..... Engine operating in safe RPM range
2. Engine Gauges ..... Continually monitor
3. Engine Operation ..... Check idle and shift. Listen for abnormal noises and visually check the engine compartment while underway

Returning to Port

General

1. Passengers/Crew ..... Instructed in duties for line handling
2. Lines and Fenders ..... Ready for use

Boat Systems

1. Navigation Lights ..... Turned OFF when secured
2. Anchor Light ..... ON if necessary
3. Bilge/Engine Compartment ..... "Sniff" the bilge/engine compartment for fuel odor. Run the bilge blower if necessary. Check for water in bilge. Run bilge pump if necessary

Engine

1. Gearshift/Throttle Control ..... Bring to NEUTRAL position
1. Tachometer ..... Idle the engine for five (5) minutes to cool down
2. Ignition Key ..... Turn to OFF position when engine is cooled down
3. Engine Operation ..... Check idle and shift. Listen for abnormal noises

Securing the Boat

General

1. Shore Power Cable ..... Connected to dockside power inlet
   (If Applicable)
2. Lines and Fenders ..... Fenders in place, lines tied securely to dock

Boat Systems

1. Seacock ..... Closed (handle perpendicular to hose)
   (If Applicable)
2. Helm Switch Panel ..... All switches in the OFF position
3. Gearshift/Throttle Control ..... In the NEUTRAL position

Engine

1. Ignition Switch ..... In the OFF position and keys removed
2. Battery Switch ..... In the OFF position
1. Fuel Valve ..... Closed (handle perpendicular to hose)
   (If Applicable)

If the Engine Does Not Start

No Starter Motor Response

1. Check battery condition for sufficient charge
2. Check battery cable connections tight and free from corrosion
3. Check battery switch in the ON (or BOTH) position
4. Check gearshift/throttle control lever in the NEUTRAL position
5. Check starter motor and solenoid connections
6. Check ignition switch connections

Starter Motor Responds, but No Ignition

1. Check electrical connections on engine wiring harness and ignition wiring
2. Check that fuel tanks are not empty
3. Check fuel filter and filter/water separator (if applicable) clean
4. Check ignition shutdown switch safety lanyard properly connected

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