

**Sport
Boats
Owner's
Manual**



V-110

Welcome

As the new owner of the world's most prestigious Sport Boat, we at SEA RAY would like to welcome you into our world-wide and ever expanding fraternity 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 through our product quality, performance and dependability.

SEA RAY's commitment - Excellence by Design - has enabled us to create a superior craft providing you with comfort, performance, safety and dependability. All our boats comply with the 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).

This Owner's Manual - to be kept onboard your SEARAY - 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 the Owner's Packet and this manual and really get to know your boat!

Because our Product Development and Engineering division is continually upgrading our products, some descriptions in this manual may differ somewhat from the actual equipment on your boat. If this occurs, please refer directly to the updated information in the accompanying Owner's 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, routine periodic maintenance and attention to safety inspections. If you have questions not fully covered by this manual or the manufacturer's instructions, please consult your authorized dealer for assistance.

Thank you for selecting a SEA RAY!

Bon Voyage



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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.

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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.

General Information

SECTION 1
GENERAL
INFORMATION

For Your Information

OWNER'S PACKET

Throughout this manual we will be referring to your Owner's Packet. This file contains the Sea Ray® Owner's Manual, a plastic navigation chart and instructions on the warranties, use, adjustment and maintenance of installed equipment and accessories. It also contains the Engine Operator's Manual which covers the warranty, service, specification of oil and grease, proper gauge readings, 20-hour check and other precautions concerning your engines. Use your Owner's Packet to retain instructions and data on additional equipment or accessories installed after delivery.

We have included two booklets in your Owner's Packet called You and Your Boat and You and Your Trailer published by the National Marine Manufacturers Association (NMMA). These booklets provide additional basic boat and trailer operation instructions and information.

If your copies are missing or you would like additional copies, they are available from Dept. TM, National Ma-

rine Manufacturers Association, 401 North Michigan Ave., Chicago, IL 60611.

PARTS, EQUIPMENT & PERFORMANCE

The personal equipment and supplies accumulated on a boat can amount to a great deal more weight than the owner realizes with a possible loss of speed. Such weight should be kept 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. Altitude may also dramatically affect the performance of your boat. Because of these variables, Sea Ray® cannot guarantee performance standards such as speed. Consult your Sea Ray® dealer when considering the addition of a major weight.

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

SEAWORTHY READING MATERIAL

It is beyond the scope of this manual to cover every aspect of boating and seamanship. There are many books available that provide information that you as a boat owner should become familiar with. One book that is considered to be the most well rounded in providing information about boating is *Piloting, Seamanship and Small Boat Handling*, By Charles F. Chapman. 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 this owner's manual to become a well informed boatsman.

Dealer's 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.
- An explanation of safety considerations regarding the use of containment systems and components.
- A complete Owner's 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 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.

Consumer Responsibilities

It is the owner's responsibility to:

- Read and understand the express limited warranty.
- Read all literature and instructions and use all equipment in accordance therewith.

- Examine the boat and assure all systems are working properly at the time of accepting delivery.
- Provide proper maintenance and periodic servicing of the boat in accordance with the Service Guide and Owner's Manual.
- Return the boat after 20 hours of operation to the selling dealer for its 20-hour inspection.

When contacting your dealer regarding warranties or service, please have all pertinent information such as serial numbers, model numbers, etc. on hand.

Sea Ray Boats, Inc. has a permanent record of your boat, which is retained under its "Hull Identification Number." Data is kept regarding equipment and accessories, as well as dealer/shipping information.

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

!
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.

Safety

Your safety, as well as the safety of your passengers and craft, are your responsibility. Familiarize yourself with the following safety precautions before using your boat.

1. All passengers should remain properly seated while the boat is in motion.
2. Keep your boat and equipment in top condition by frequently inspecting the hull, engine and all gear.
3. Use maximum caution when taking on fuel. Know your fuel tank capacity and fuel consumption at various RPM's.

4. Be certain there is enough fuel aboard for your anticipated cruising needs and an adequate reserve if you change your plans for weather or other reasons.
5. Make sure that regulation lifesaving and fire fighting equipment are on board and in proper working condition. They should be conspicuous, easily accessible and your passengers should be instructed in their use.
6. Watch the weather. Check local weather reports before departure. Be especially on the lookout for strong winds and electrical storms.
7. Have up-to-date charts of your area on board.
8. File a float plan with a friend or relative about where you intend to cruise. Be sure to give that person a good description of your boat. Keep them advised of any changes in your cruise plans. These precautions will enable your friend or relative to tell the Coast Guard where to search for you and what type of boat to look for if you fail to return. Be sure to advise the same person when you complete your trip to prevent any false alarms about your safety.
9. Instruct your passengers in the fundamentals of handling and operating your boat in the event you are unable to do so and for their safety.
10. Do not overload or improperly load your boat.
11. Do not permit passengers to ride on parts of your boat not designed for such use. Instruct passengers to sit in designated seating areas while underway.
12. Water ski in areas clear of other boats and always have an observer in your boat to maintain a proper look out.
13. Never drive the boat directly behind a water skier. At 25 m.p.h. the boat will overtake a fallen skier who was 200 feet in front in 5 seconds.
14. Turn off your engine when taking swimmers or skiers aboard or when putting them overboard. Never permit use of the transom swim platform while your engine is running.
15. DANGER: Fore and aft sun pads should not be used when vessel is under way.
16. Proper foot gear should be worn at all times to avoid slipping and falling.
17. Always wear non-slip foot gear while washing and waxing boat.
18. Know and obey the Rules of the Road and always maintain complete control of your boat.
19. Always operate with care, courtesy and common sense.

20. Understand the meanings of navigation buoys, and never moor to one. (It is a Federal offense.)
21. Know the various distress signals. A recognized distress signal used on small boats is to slowly and repeatedly raise and lower the arms outstretched to each side.
22. Storm signals are for your information and safety. Learn them and be guided accordingly.
23. A special flag (red flag with a white diagonal stripe or white and blue international "Alpha") flown from a boat or buoy means diving operations are underway nearby. Approach with caution and stay clear by at least 30 yards.
24. Make sure your boat's motor is turned off before allowing people to swim anywhere near your boat. Shut the motor OFF and remove the key from the ignition switch so that nobody will accidentally start the motor while swimmers are nearby. Also, slow down and exercise extreme caution any time you are cruising in an area where there might be swimmers or water skiers in the water. Always keep a down skier in sight and on the operator's side of the boat when approaching the skier. Never back up to anyone in the water.
25. Keep an alert lookout. The operator is required by law to "maintain a proper lookout" by sight (and hearing). The driver must insist that they have an unob-

structed view particularly to the front. No passengers, or load should block the driver's view when operating the boat above idle speed. Be sure that other boats or objects are not in your path before making quick turns.

26. Watch your wake. It might capsize a small craft. You are responsible for damage caused by your wake. Pass through anchorages at a minimum speed.
27. Consider what action you would take under various emergency conditions such as a person overboard, fog, fire, a damaged hull or other bad leaks, motor breakdown, severe storm or collision.
28. If your boat ever capsizes, remember that it will continue to float (if not overloaded, powerboats less than 20' in length will float when swamped), it is usually best to remain with it. You are more easily located by a search plane or boat.
29. Do not drive over ski jumps. You may injure yourself and others or damage the boat.
30. Do not attempt to run the boat in the ocean surf. It is illegal in some areas and can cause serious injuries or damage to the boat.
31. Do not test fire extinguishers by squirting small amounts of the agent. The extinguisher might not work

when needed. Always follow approved instructions when checking fire extinguishers.

32. Have onboard an adequate anchor and sufficient line to secure and hold your boat in all types of weather and sea conditions (at least six times the depth of the water).
33. Know your fuel tank capacity and cruising range. If it is necessary to carry additional fuel, do so only in proper containers. Take special precautions to prevent the accumulation of fuel vapors in confined spaces: DO NOT store fuel or flammable liquids in closed storage areas. Ventilation has not been provided for explosive vapors.

! DANGER

When engine is running, boarding ladder and swim platform should not be in use and if equipped transom door must be closed and secured.

! 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.

! DANGER

In all gasoline powered boats, engine and generator exhaust systems produce colorless and odorless carbon monoxide gas (CO). Direct prolonged exposure can result in CO poisoning which may be harmful or fatal. To prevent excessive exposure and reduce the possibility of accumulation of CO in the cabin and cockpit of the boat, the operator should insure adequate ventilation in each the cabin and cockpit areas, through utilization of cabin hatches, cabin doors, cabin windows, cockpit windshield windows and side windshield vents to increase air movement through cabin and cockpit areas. The following conditions tend to increase accumulation of CO in and about the boat and require the operator's particular attention:

1. Operation at slow speeds or dead in the water.
2. Operation with a high bow angle attitude.
3. The utilization of canvas top, side curtain & back curtains.
4. Contributing climatic conditions, such as a head wind.
5. Operation of engines and/or generator in confined spaces or at dockside.
6. Any blockage of hull exhaust outlets.

Indications of excessive exposure to CO concentration may include nausea, dizziness & drowsiness.

HOW HIGH LEVELS OF CARBON MONOXIDE (CO) MAY ACCUMULATE IN YOUR BOAT

! WARNING

When you are tied to a dock and/or immediately alongside of other vessels, pay particular attention to the generator or main engine exhaust emissions from the nearby vessels.

! WARNING

When operating center console or cuddy cabin at cruising speeds, slow speeds, or dead in the water with canvas tops, side curtains and/or back curtains in place, pay particular attention to the engine exhaust to ensure that emissions do not accumulate in boat interior. Maintain proper ventilation by adjusting canvas enclosures.

! WARNING

Remove Aft Curtain or Camper Top Canvas Before Starting Engine and Operating Vessel.

! WARNING

Do not operate your boat with persons in the forward area if operator visibility is obstructed.

! WARNING

When operating center console or cuddy cabin with high bow angle pay particular attention to the engine exhaust emissions as to ensure that emissions do not accumulate in boat interior. Maintain proper ventilation by adjusting canvas or bow angle.

CORRECT VENTILATION

When operating center console or cuddy cabin with full canvas installed leave an opening in the forward curtain or deck hatch and back curtain to allow through flowing air movement.

! WARNING

Use caution with skier in tow as rope may backlash into cockpit when released.

! WARNING

URETHANE FOAM IS FLAMMABLE!

Urethane foams have been used in the construction of your Sea Ray®. Do not expose urethane foams to open flames or any other direct or indirect high temperature ignition sources such as burning operations, welding, burning cigarettes, space heaters, or naked lights.

Once ignited, urethane foams will burn rapidly, releasing great heat and consuming oxygen at a high rate. In an enclosed space the resulting deficiency of oxygen will present a danger of suffocation to the occupants. Hazardous gases released by the burning foam can be incapacitating or fatal to human beings if inhaled in sufficient quantities.

LIGHTNING PRECAUTIONS

The basic purpose of lightning protection awareness is to ensure the safety of the boat owner and passengers during a lightning storm. Everyone on board should take the following precautions.

1. Ideally, docking your vessel and disembarking for safe haven is recommended, but if you cannot return to shore, seek shelter inside the boat and remain there until the storm has passed.

2. Stay out of the water! If caught swimming in the water during a storm get back into the boat and remain there until the storm has passed.
3. Lightning will seek a ground when it strikes. Avoid contact with metal parts of the boat.

FIRE EXTINGUISHER DISCHARGE PORT

Inboard/Outboard Sport Boats not equipped with the halon fire extinguisher option are equipped with a fire extinguisher discharge port. In the event of a fire, the access plate on the engine compartment can be removed to allow the operator to discharge a fire extinguisher into the engine compartment without having to open the engine box. Do not open the engine compartment immediately! This feeds oxygen to the fire and flashback could occur.

! WARNING

- In case of fire **DO NOT** open engine box or compartment.
- Shut down engines, generator and blowers
- Continuously discharge entire contents of halon or CO2 portable fire extinguisher through port immediately.

LOADING

The capacity plate attached to a boat states the maximum persons in pounds and the maximum weight capacity for persons, motor and gear in pounds that the boat will handle safely under normal conditions. These load capacity ratings are computed from a complex formula determined by the U.S. Coast Guard. Overloading is a violation of Coast Guard Regulations. The number of seats in a boat is NOT an indication of the number of persons it can carry safely. **DO NOT CARRY MORE PASSENGERS THAN INDICATED ON THE CAPACITY PLATE. DO NOT OVERLOAD THE BOAT.**

The performance of a boat is affected by the amount and distribution of the load it is carrying.

When loading a boat, step or climb into the cockpit. Never jump into a boat.

Have someone on the dock pass the gear aboard. Secure all gear firmly so that it will not shift or interfere with the operation of the boat. Place heavy gear in the boat so that the load is balanced and will not affect the trim of the boat.

Have the passengers board one at a time and seat them so as to maintain an even trim of the boat from port to starboard and forward to aft.

Do not exceed the load capacity rating as stated on the U.S. Coast Guard Capacity information plate.

Do not allow passengers to ride on the bow of a closed bow boat.

Do not allow passengers to ride in the bow of an open bow boat if not properly seated.

Do not allow passengers to ride in non-designated seating areas.

Do not allow several passengers to ride in the bow of a small boat, causing the bow to "plow."

Do not allow passengers to ride on the stern cushion or gunwales of the boat. Falling from moving boats is a major cause of boating accidents.

Do not sit on seat backs, or motor box when engine is running.

Do not stand on the sides of the boat at any time.

The engine should never be running when the operator is not in a proper driving position. Proper driving position means, seated with body facing forward and hands at the controls.

Remember that the presence of the capacity plate does not relieve the boatsman from the responsibility

SECTION 1
GENERAL
INFORMATION

ity of using common sense or sound judgment. Rough water and adverse weather conditions will reduce the stability of the boat. Advance knowledge of weather forecasts and water conditions are recommended.

OVERLOADING, IMPROPER LOADING AND DISTRIBUTION OF WEIGHT ARE SIGNIFICANT CAUSES OF ACCIDENTS. CAPACITY PLATES INDICATE MAXIMUM LOADS UNDER NORMAL CONDITIONS. GIVE YOURSELF AN EXTRA MARGIN OF SAFETY IN ROUGH WATER.

Passenger Safety

As a skipper, it is up to you to look out for the safety of your passengers. As noted, the Coast Guard requires you to have one approved flotation device for each passenger aboard. Make sure that all children and non-swimmers actually wear jackets while boating. Request that your guests wear soft-soled, non-skid deck shoes. Hard-soled shoes are slippery and can result in a fall. Always see that your passengers are properly seated while underway. ***Never allow passengers to sit on the fore deck, gunwale, or on top of seat backs while the boat is in motion.*** Instruct at least one passenger on the proper operation of your Sea Ray® just in case something should happen to you.

Swimming & Water Skiing – Diving

These pastimes are three of the greatest joys connected with boating, but they also represent a potential danger if performed carelessly around a boat.

When skiing, always have two people in the boat – one to concentrate on operating the boat and watching the water ahead; the other to keep an eye on the skier. Some states require the observer to be at least 12 years old (it's the law). Insist that all skiers wear a U.S.C.G.A. properly fitting ski vest. Always keep your boat a safe distance from bathing beaches and areas in which skin divers may be operating. A spinning propeller is extremely dangerous. Always turn off the engine when taking swimmers or skiers aboard, or when putting them overboard.

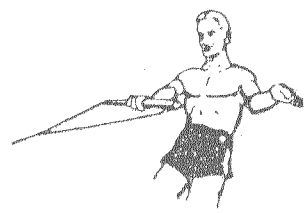
WATER SKIING

The following guides will do much to reduce the hazards while water skiing:

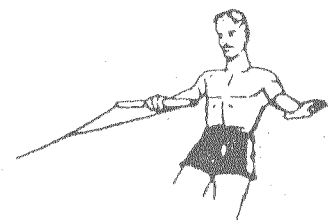
1. Water ski only in safe areas, away from other boats and swimmers, out of channels, and in areas free of underwater obstructions.
2. Do not allow anyone who cannot swim to water ski.

3. Be sure that the skier is wearing a proper U.S.C.G. approved flotation device. A properly designed ski vest is intended to keep a stunned or unconscious person afloat.
4. Always carry a second person on board to observe the skier so that you may give your full attention to the operation of the boat and the conditions of the waters ahead.
5. Approach a skier in the water from the starboard side, and be certain to stop your motor before coming in close proximity to the skier.
6. Give immediate attention to a fallen skier.

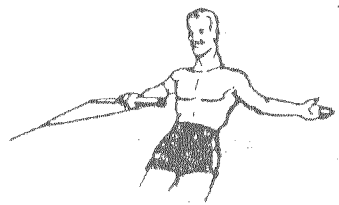
The hand signals shown below are recommended by the A.W.S.A. (American Water Skiing Association). Skier, observer and boat operator should all know and understand these simple signals from the skier.



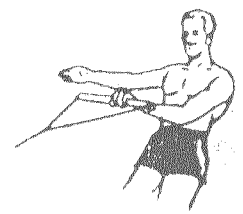
Faster – Palm of one hand pointing upward.



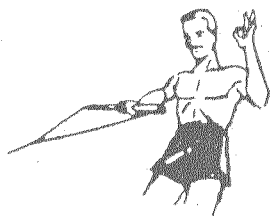
Slower – Palm pointing down.



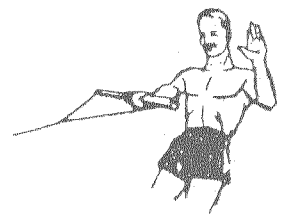
Left Turn – Arm outstretched point to the left.



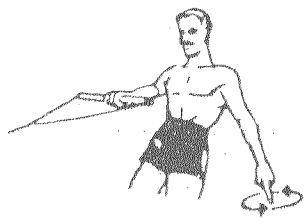
Right Turn – Arm outstretched point to the right.



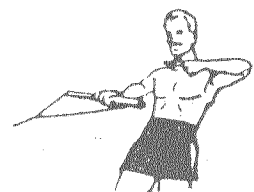
Speed OK – Arm upraised with thumb and finger joined to form circle.



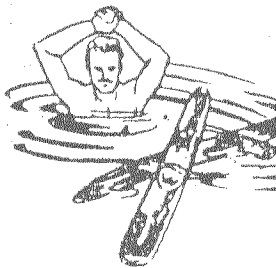
Stop – Hand up, palm forward, policeman style.



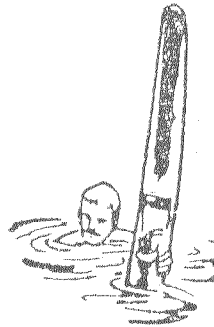
Return to Drop-off Area – Arm at 45 degree from body pointing down to water and swinging.



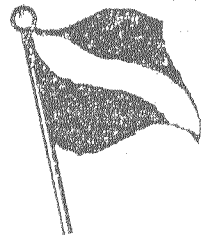
Cut Motor – Finger drawn across throat.



Skier OK After the Fall – Hands clenched together overhead.



Pick Me Up or Fallen Skier, Watch Out – One ski extended vertically out of water.



Danger



Distress

DIVING: RESPECT THESE FLAGS

Danger (Red)

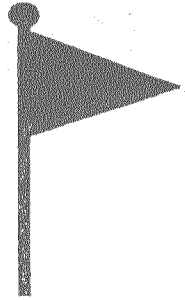
The SPORT DIVERS FLAG indicates a diver in the water. You should keep a minimum of 30 yards between your boat and this flag. "A life is worth more than a few feet of water."

Distress (Orange)

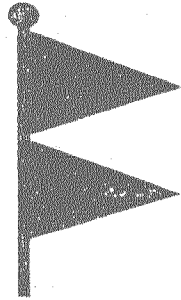
The DISTRESS FLAG indicates a boat or passenger in serious trouble. When seeing it, you should respond and render any assistance possible. Remember – it could be your boat displaying this flag.

STORMS/ROUGH WEATHER

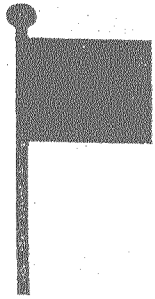
A wise boatman keeps a sharp eye out for impending storms or high winds. When a storm is detected approaching, head for the nearest shelter and wait it out. If you are unfortunate enough to be caught in open water during a storm, have everybody put on life jackets and sit low in the boat. Keep the bow headed into the waves with enough power to maintain slow headway.



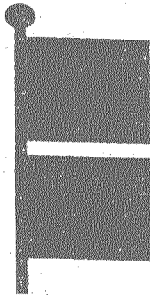
RED FLAG – Small craft
(winds to 33 knots)



2 RED FLAGS – Gale (up
to 47 knots)



**SQUARE RED FLAG -
- BLACK BOX** - (Storm)



**2 SQUARE RED FLAGS
BLACK BOX**– (Hurricane)

BOATING SAFETY COURSES

Your local Coast Guard Auxiliary or Power Squadron generally puts on a Safe Boating Class several times a year.

They are very comprehensive and generally of minimal cost to you. Call your local US Coast Guard Auxiliary or Power Squadron Flotilla for the time and place of the next class.

Regulations – Safety Procedures And Safety Equipment

SAFETY PROCEDURE AND EQUIPMENT

The safety equipment you own and the procedures you follow depend solely on you, the boat owner. Many safety features have been incorporated in your Sea Ray® but more can be added as needed to meet your particular requirements.

THINK OF YOURSELF AND OTHERS

For your personal safety and that of your passengers and other boaters, please note the following recommendations:

Boats should not be operated by inexperienced persons until complete instructions in the use of all instruments and controls, handling characteristics at all speeds and water conditions, and driver check-out is completed under the supervision of a qualified person.

Passengers should be made aware of the possibility of being thrown to the deck, or even from the boat, if they are not carefully seated while the boat is being run.

Be especially careful in the proximity of other boats, pilings, underwater obstructions, sea walls, or other obstacles.

More frequent checks and preventive maintenance are required for high performance boats. Mechanical failure at high speeds may cause very serious consequences to persons and property.

Remember that the person in control of the boat is responsible for his own acts of negligence, carelessness, irresponsible operation or damage caused by his wake.

The following guidelines should always be followed:

- Do not "show off" in tight areas or around docks.
- Every experienced boatman knows that danger can attend high speed boating if trouble signs and prudent operation are ignored.
- Every experienced skipper knows that choppy water demands slower speeds. And he knows that vigilant maintenance is essential to safety in operation.

- Maximum throttle should be used for very brief periods only – damage to structure and engine may result with prolonged operation.
- Be certain atmospheric conditions assure clear visibility and straight runs at least one mile ahead.
- Be sure that there is no possibility of other boats coming into your course from the sides.
- The operator is responsible for the safety of his passengers. Do not let passengers stand up.
- Avoid sharp turns at high speed; keep one hand on the throttle at all times ready to reduce speed.

SPEED ACCORDING TO SEA CONDITIONS

Modify speed in keeping with weather and sea conditions.

Modify speed depending upon debris.

Always throttle back whenever boat leaves the water to prevent over revving of the engine and undue stress on the outdrive unit when boat re-enters the water. You will damage your engine if the propeller leaves the water without an instant reduction of R.P.M.

SOME THINGS TO CHECK

Achieving good performance requires regular and above average attention to hull, engine, mechanical and electrical equipment.

The bottom must be clean and smooth and checked regularly. Passengers load and trim should be adjusted for best performance.

The propeller must match the boat and engine and be in perfect balance and condition.

Engines must be expertly tuned for maximum power output. Consult the Engine Operator's Manual and servicing dealer for details.

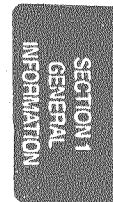
SAFETY REVIEW

As a boat owner, you have the responsibility for the safety of all occupants of your boat. To protect yourself, your passengers, and other boaters, follow these suggestions for safety:

1. Be careful with gasoline and gasoline fumes. Gas in the bilge is very dangerous. Use care when refueling. If gasoline is spilled inside your boat, clean it up

immediately. Make certain there are no fumes in your boat before starting the engine.

2. Check all gas lines and connections periodically. Open the engine compartment and "sniff" for fumes before starting your engine.
3. Periodically check your fire extinguisher, life preservers and other safety equipment to make certain they are in good condition. Make certain that there is a U.S. Coast Guard approved life preserver for each person aboard plus one approved throwable device for man overboard protection. Children and non-swimmers should wear life preservers at all times.
4. Keep an alert lookout for swimmer, divers, skiers and other boats. Be extra cautious at night or in inclement weather.
5. Watch the weather. Be especially watchful for strong winds or electrical storms. Small craft storm signals are for your information and safety. Learn them and be guided accordingly.
6. Instruct at least one of your passengers in the basic fundamentals of the handling of your boat in case you are disabled or fall overboard.
7. Turn off your engine when taking swimmer or skiers aboard or when putting them overboard. Never per-



- mit use of the transom swim platform while your engine is running.
8. Do not overload or improperly load your boat. Don't permit passengers to ride on parts of your boat not designed for such use.
 9. Know your fuel tank capacity and your engine's hourly fuel consumption. Compute your fuel consumption. Compute your fuel usage and use this as a backup check against the reading of your fuel gauge.
 10. Watch your wake. It might capsize a smaller boat or do considerable damage to boats or property along the shore.
 11. Obey the rules of the road. Neglect of this is the greatest single cause of collisions.
 12. Watch your footing when on board or boarding. Require that good boat shoes be worn by your passengers to avoid the possibility of slipping.
 13. Know the meaning of the buoys. Never moor to one. It is a federal offense.
 14. If uncertain as to the depth of the water ahead, proceed with caution. In rough water – slow down – keep the bow headed into the waves with enough power to maintain headway.

15. Check and tighten shift and throttle and steering cable connections at least twice a year. A loose connection can result in sudden loss of steering and control.
16. Water ski in areas that are clear of other boats and always have an observer in your boat to maintain a proper look out.

Grounding & Towing

If you unfortunately find yourself aground and unable to pull off with your own power, or in need of a tow, or if you wish to help another craft from either predicament, remember that there is no way of knowing the amount of pull or strain which will be required. The stress may easily exceed the strength of the cleats and their fastenings. Cleats are designed and located for mooring use only.



WARNING

DO NOT use grab handles for grounding or towing!

The boat structure itself can be damaged by an excessive pulling strain. It is much safer, in these cases, to form a bridle by passing a line completely around the hull. Do this for both the pulling boat and the one being aided.

Towing Lines:

Some synthetic fiber ropes should not be used for pulling or towing (except a light dinghy): The characteristic ability of some types of rope to stretch, which makes it desirable for anchor and docking lines, renders it extremely dangerous if the line breaks loose while under stress.

The preferred line for towing is double-braided nylon. It has sufficient elasticity to cushion shock loads, but not so much as to create a snap-back hazard. Braid-on-braid line is stronger than three-strand twisted nylon of the same size and will not kink. Its disadvantage is that it does not float and must be watched to avoid entanglement in the towing vessel's propeller. Any type of line breaking under stress is dangerous and over-stressing should be avoided. **ALWAYS STAND CLEAR OF ANY TAUT LINES.**

Handling The Towing Boat:

The tow-line should be made fast as far forward as practicable, as in tug and towboat practice. If there is no suitable place forward, make a bridle from the forward bits, running around the superstructure to a point in the forward part of the cockpit. Use sufficient padding at contact points to prevent chafing of the hull and deck.

Cautions In Towing:

Secure the tow line so that it can be cast loose if necessary or, failing that, have a knife or hatchet ready to cut it.

This line is a potential danger to anyone near if it should break and come whipping forward. Never stand near or in line with a highly strained tow line, and keep a wary eye out at all times.

In any towing situation, never have people fend off the other vessel with hands or feet; even the smallest boats coming together under these conditions can cause broken bones or severed fingers. With large vessels the risk is the loss of a whole limb, or worse.

When Not To Tow:

If you are not equipped for the job, stand by the disabled vessel. You may be able to put a line across and assist by keeping the other craft's bow at a proper angle to the sea until help comes.

Call the Coast Guard or other salvage agency and turn the job over to them when they arrive. Don't try to be a hero, as you are more than likely neither trained nor experienced in this type of work. No boat is worth a life!

Government Regulations

The Coast Guard is an ever-present help to the boating public. Its boating regulations prescribe minimum standards of safety. You must equip your boat to comply with these regulations. The following is a list of the minimum

safety equipment required for boats less than 26 feet in length. These requirements may vary from state to state. Consult your Sea Ray® dealer for variations to these requirements in your area.

1. At least one B-1 type hand-held portable fire extinguisher (Outboard Only).
2. At least one B-1 type hand-held portable fire extinguisher on all other sport boats without a fixed halon system. (No extinguisher is required by law for boats under 26' with fixed halon systems, but good prudence would dictate keeping one portable B-1 fire extinguisher available for emergency use.)
3. At least one Coast Guard approved Type 1, 2, or 3 personal flotation device (life jacket) for each person aboard. (If over 20 miles offshore, they must be Type 1.)
4. At least one Type 4 device designed to be grasped instead of worn (ring buoy or buoyant cushion).
5. A minimum of three pyrotechnic devices are required. They must be USCG approved, in serviceable condition and readily accessible. They must be marked with a date showing the service life, which must not be expired.
6. You must carry three signals for day use and three signals for night use. Some pyrotechnic signals meet

both day and night use requirements. Pyrotechnic devices should be stored in a cool, dry location. A water tight container painted red or orange and prominently marked "DISTRESS SIGNALS" is recommended.

7. USCG approved pyrotechnic visual distress signals and associated devices include: Pyrotechnic red flares (hand-held or aerial), Pyrotechnic orange smoke (hand-held or floating), Launchers for aerial red meteors or parachute flares.
8. One hand, mouth or power-operated whistle or horn, audible for at least half a mile.

The following safety-related items should be considered as part of your standard equipment:

9. Mooring lines
10. Fenders, lines.
11. Manual bilge pump
12. Waterproof flashlight(s) with extra batteries
13. Charts of your intended cruising area
14. First aid kit

15. Anchor and adequate line

16. Boat hook

17. Oar or paddle

TOOL CHEST

1. Assorted screwdrivers (Phillips and flat blade)
2. Pliers (regular, vise-grip, and water pump)
3. Wrenches (box, open-end, allen, adjustable)
4. Socket set (metric or U.S. standard as appropriate)
5. Electrical tape

MISCELLANEOUS ITEMS

1. Engine and accessories manuals
2. Spare set of spark plugs and other ignition parts
3. An assortment of spare fuses

OTHER TIPS

1. When commissioning a new boat, do not plan an extensive trip or party until you have had a shakedown cruise to make sure all equipment on your boat is functioning properly and you are familiar with its operation.
2. Use fenders to protect your boat's hull whenever mooring next to floats, piers or other boats.
3. Carry plenty of line that is properly sized to your boat. We suggest at least two 15' lengths of 3/8 " nylon line.

DISCHARGE OF OIL

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, if such discharge causes a film or sheen upon, or discoloration of, the surface of the water, or causes a sludge or emulsion beneath the surface of the water. Violators are subject to a penalty of \$5,000.



DISPOSAL OF PLASTICS AND OTHER GARBAGE IN WATERS OF THE UNITED STATES

Federal regulations prohibit the discharge of **plastic garbage anywhere** in the marine environment. Plastic includes but is not limited to: plastic bags, styrofoam, cups and lids, six-pack holders, bottles, caps, buckets, shoes, milk jugs, egg cartons, stirrers, straws, synthetic fishing nets, ropes, lines, and "bio- or photo-degradable" plastics.

NOTICE

It is illegal for any vessel to dump plastic trash anywhere in the ocean or navigable waters of the United States.

These regulations also restrict the disposal of other types of garbage within specified distances from shore.

Learn and conform to "Annex V" of the International Convention for the Prevention of Pollution From Ships, 1973 commonly known as Annex V of MARPOL (Marine Pollution) 73/78.

Enforcement

The U.S. Coast Guard is responsible for enforcement of Annex V.

A person found to have violated these regulations may be liable for a civil penalty not to exceed \$25,000 for each violation. In addition, criminal penalties not to exceed \$50,000 and/or imprisonment up to 5 years may be imposed.

Lack of compliance with the requirement may be cause for owner/operator citation and fine (outlined above), by the U.S. Coast Guard during routine boardings.

The Coast Guard may deny vessels entry to marinas and terminals not in compliance.

RULES OF THE ROAD

Your boat is subject to Coast Guard enforced marine traffic laws known as "Rules of the Road." There are two sets of rules- the United States Inland Navigational Rules and the International Navigational Rules. The United States Inland Rules are applicable to all vessels inside the demarcation lines separating inland and international waters. The "Rules of the Road" can be obtained from your local Coast Guard unit or from the United States Coast Guard Headquarters (1300 E. Street NW, Wash-

ington, D.C. 20226) in the publication "Navigational Rules, International-Inland."

"Aids to Navigation" (Coast Guard pamphlet no. 123) explains the significance of various lights and buoys. This and other pamphlets, including the "Boating Safety Training Manual," and "Federal Requirements for Recreational Boats" are also available from the United States Coast Guard Headquarters.

Because of proposed alterations in buoys and markers, we advise you to periodically contact the Coast Guard to stay apprised of impending changes:

If you have ship-to-shore radio telephone aboard, heed storm warnings and answer any distress calls. The spoken word "MAYDAY" is the international signal of distress. **NEVER** use this word unless there is danger close at hand -an emergency- and you are in need of immediate assistance.

Maneuvering

When all of your predeparture checks have been completed, you will be ready to leave the dock.

Basic Maneuvering

Your boat features a planing hull whose handling characteristics you should be aware of. Steering the boat at either idling or cruising speeds will generally require minimal effort.

Your boat may wander slightly from port to starboard when operating at idle speed in forward gear. This is a natural characteristic of boat hulls and shouldn't be cause for concern. Simply correct for this wander with small steering adjustments until you get up to cruising speed. Avoid the tendency to over correct for a wandering condition.

Practicing maneuvers at slow speeds will help you to become familiar with all the special handling characteristics associated with your boat.

! WARNING

Always keep hands, feet, hair and clothing away from the outdrive. Do not attempt any maintenance or adjustments to the motor or outdrive unit while the motor is running. Failure to shut off the motor for maintenance or adjustments may cause injury or death.

Remember that all boats steer by the stern (the feeling is much like steering your automobile in reverse). This means that the stern of your boat will swing in the direction opposite to your turn. For example, when you turn

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INFORMATION

the helm wheel to the left, the stern of the boat will swing to the right as the boat goes into a left turn. This is especially important to keep in mind when approaching a swimmer or downed skier in the water.

Always use extreme caution when approaching someone in the water. Approach them at idle speed only, allowing your stern to swing away from them as you get close.

Place the shifter in NEUTRAL and shut off the boat's motor when you are still several feet from the person in the water. Check that everyone is safely seated before restarting the motor. If you are unfamiliar with picking up swimmers in the water, practice this maneuver with a retrievable floating object before attempting it under actual conditions.

Stopping The Boat

Boats have no brakes. Stopping is accomplished by backing down on the throttle. Once the boat has slowed and the motor is idling, place the shifter in REVERSE. Gradually increasing reverse power with the throttle will allow you to stop the boat in a very short distance. Note that a boat will not respond to steering in reverse nearly as well as it does when going forward, so do not expect to accomplish tight turning maneuvers when backing up.

Practice

Once you are away from the dock, devote some time to learning how to maneuver.

- Practice docking by using an imaginary dock.
- Practice stopping and reversing.
- When operating in close quarters or docking, all maneuvering should be done at idle speed. Proceed with caution in congested areas.
- Gradually increase your speed. Get used to the boat before attempting any full throttle operation.



Jumping waves exerts tremendous force against the boat which can over stress and damage the hull, deck and/or internal construction.

DOCKING

Preparation

Proper docking requires preparation. Start by making sure you have adequate mooring gear, and that it is stowed

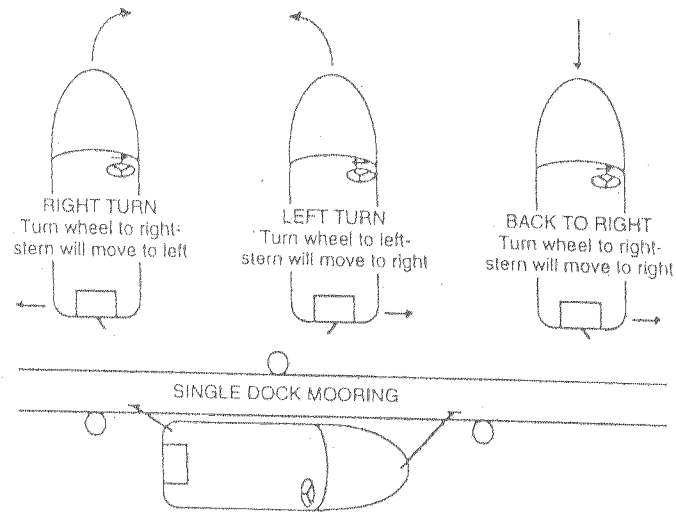
correctly and ready for use. Your dealer is the best source for information concerning the amount and type of equipment you should carry.

Approaching the Dock

When approaching a mooring area, lower your speed within a reasonable distance to allow your wake to subside before it reaches other boats or docks. As you get close to your moorage, check for any wind or current action that may affect your maneuver then make a conservative approach with these factors in mind. Try to use the elements to your advantage. Allow them to carry the boat into the dock. If there are high winds or strong currents, it is best to approach the moorage against the wind or current, called the lee side. With a mild current and little or no wind, it is best to approach with the wind or current, called the windward side. While approaching, check to see that all lines are attached on the side of the boat facing the moorage. Also insure that fenders are lowered on that side. Be sure to check that the fenders are hung at the proper height.

As you approach your moorage, it is desirable to have one person at the bow and one at the stern of the boat, each with a mooring line. Approach at idle RPM at an angle approximately 45 degrees to the dock. When the starboard side of the bow is within a few feet of the dock, the stern can be brought alongside the moorage by turning the steering wheel hard to port, and while at idle RPM, shift the boat into REVERSE and turn the wheel toward

the dock. This will stop the boat and bring the stern even closer to the dock. Turning the wheel away from the dock when shifted into REVERSE will slow the approach of the stern toward the dock. These steps are reversed for docking to port.



Leaving the Dock

Take into account wind, tide, current and other forces that affect your maneuvering as you leave the dock. Most maneuvering to and from a dock is best accomplished at idle speeds.

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Do not forget to release the mooring lines and stow the fenders.

Departing Under Windy Conditions

When leaving a moorage on your starboard side and your bow cannot be pushed away from the dock first, start forward with the helm wheel turned to starboard for two or three feet. Then shift to REVERSE. Repeat if necessary to get the stern far enough away from the dock so you can back clear of any other boats that may be moored ahead of you. (Use opposite steering directions when departing a dock located to port.)

Section 2 • Bilge & Underwater Gear

Bilge

DRAIN PLUG

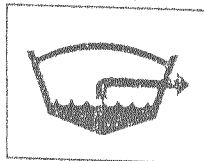
Your Sea Ray® is fitted with a brass garboard drain plug. This is a threaded plug which is installed through the outside of the transom. We recommend that you remove the drain plug when trailering or storing your boat.

REPLACE THE DRAIN PLUG BEFORE LAUNCHING OR YOUR BOAT MAY SINK.

Inboard Engine Ski Rays Only: Your Sea Ray® is also fitted with a midship T-handle drain plug. This is a threaded plug which is installed through the bottom of the hull below the forward end of the engine. We recommend that you remove the drain plug when trailering or storing your boat on land.

ELECTRIC BILGE PUMP

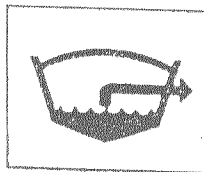
Your Sea Ray® is equipped with an electric bilge pump, located in the bilge sump, just forward of the transom. The pump is wired to the battery through a fuse or breaker and operated by a bilge pump switch on the dash



switch panel. The battery should always be inspected to ensure proper charge for pumping. Failure of the battery could result in sinking of the boat. When the switch is in the ON position, the pump will run continuously until turned OFF.

When the bilge pump switch is OFF the bilge sump area should be checked periodically for rising water. When the water level becomes apparently high, turn the bilge pump switch ON until the water is pumped out, then switch OFF. **CAUTION: DO NOT RUN THE PUMP DRY FOR A PROLONGED PERIOD OF TIME.**

AUTOMATIC BILGE PUMP



Your Sea Ray® may have an automatic bilge pump with float switch located in the bilge sump, just forward of the transom.* The pump is wired to the battery through a fuse in the bilge.

The battery should always be inspected to ensure proper pumping. Failure of the battery could result in sinking of the boat.

*Note: On Sport Boats with inboard engines, such as the Sea Ray® Ski Ray®, the bilge pump is located under the cockpit floor adjacent to the battery. For access, remove the battery and battery box.

This pump is equipped with a bilge pump switch on the dash. 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 after the water recedes. The pump should NOT be left in the MANUAL mode unless the bilge is being pumped out for servicing.

FORWARD SUMP PUMP

Cabin model boats may be equipped with a forward sump pump and float switch, located under the cabin entrance step. Water collected in the sump area is pumped overboard when the water level raises the float switch, activating the pump.

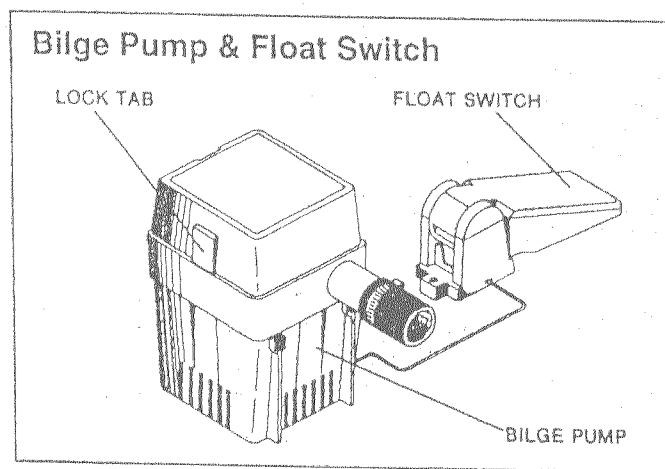
Bilge Pump Maintenance:

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

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 intakes and keep them free of dirt or material which may impede the flow of water through the pump. To clean the pump strainer, depress the lock tabs on both sides of the pump and lift the pump cover.



Trouble Shooting:

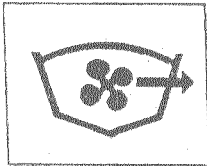
If water does not come out of discharge hose:

1. Check the fuse on the dash switch panel (or breaker on the bilge breaker box).

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.

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

BILGE BLOWER (N/A With Outboard Engines)



Sea Ray® Sport Boats are equipped with an electric bilge blower to remove fumes from the engine compartment and provide ventilation through the deck vents before starting the engine and when operating below cruising speeds. The bilge blower is located inside the port side of the transom.

! WARNING

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

Operation:

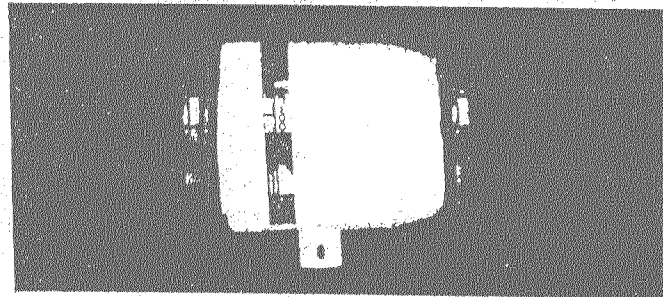
The bilge blower is operated by an on/off switch located on the dash switch panel. Operate the blower a minimum of (4) four minutes and check the engine compartment for fumes before starting the engine. The blower system is protected by a fuse behind the dash switch panel, (or breaker on the dash switch panel depending on your Sport Boat model).

! DANGER

Gasoline Vapors Can Explode
Before Starting Engine:

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

Run Blowers Below Cruising Speed



Bilge Blower

Maintenance:

The bilge blower should be checked periodically to ensure that the hoses are securely fastened. 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 (or breaker) at the dash.
2. Check to see if the blower hose is fastened to the blower.

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

Engine

The engine is the heart of your Sea Ray®. 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 carburetor (on gasoline engines), or the air inlet (on die-

sel engines). Water entering the carburetor or air inlet when the engine is not operating may go directly into the cylinders, resulting in rust and possibly internal engine damage.

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 packet.

ENGINE REMOVAL (Inboard/Outboard Engines)

(For Inboard Engine removal instructions refer to "Section 7, Ski Ray Information".)

Should the removal of an engine become necessary, see your Sea Ray® dealer. The following is only a generalized procedure to follow.

1. Remove the drive unit.
2. Remove all electrical wires, fuel lines and exhaust fittings from the engine.

! WARNING

Make sure to plug the fuel line to avoid fuel leakage, contamination, fire and explosion hazard.

3. Detach both throttle and shift cables. **Do not bend or twist the cables, as damage may result.**
4. Remove transom-mount bolts for the engine.
5. Remove engine mount bolts and lift the engine out.
6. Remove water intake hose.

To reinstall, reverse the above procedure. Check the water hose and wiring connections. Also, check for fuel leaks.

VIBRATION & CAUSES

Some vibration is to be expected in your boat because of the action of the engine 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 ski rope, remember that a long line may easily become entangled with the propeller when backing down.

Bent Prop (and/or Shaft) (Inboard Engines Only)

A badly damaged or distorted prop or shaft is an obvious cause of vibration. Even when the propeller appears to be perfect, make sure it has not been pulled off-center by the prop key.

Engine and Shaft Out of Alignment (Inboard Engines Only)

Although the shaft is properly aligned when it leaves the factory, after transit and after the boat has been in the water a few days, the alignment should be rechecked. The shaft coupling is the connecting point between the shaft and the engine and the alignment should be set at .003" to .005". Refer to "SHAFT" in this section of the Owner's Manual.

Coupling Out of True (Inboard Engines Only)

Although an extremely unlikely condition, check the couplings if other efforts to correct the vibration fail. Check the engine half of the coupling (with dial indicator on the face of the coupling) to see that it runs true with the shaft

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UNDERWATER GEAR

coupling. Also check the coupling keys. They must fit correctly to prevent forcing the couplings off center.

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, reverse gear or reduction gear housing, contacts a stringer, brace, or part of the hull, vibration will result. The flexible shaft log allows a limited side motion of the shaft, but an excessive "whip" can cause the shaft to strike the sides of the shaft hole or the shaft log with resultant vibration.

Other Causes (Inboard Engines Only)

Other causes of vibration include the following: engine out of tune, a bent rudder, a worn strut bearing, a component of the exhaust system vibrating against the hull or improper contact between shaft taper and the propeller hub bore.

Underwater Gear

NOTE: For information covering inboard engine underwater gear such as: Access to Bilge Hardware, Propeller Shaft & Alignment, Shaft Log & Stuffing Box, Rudder & Rudder Stuffing Box and Seacocks & Strainers, refer to "Section 7, Ski Ray® Information".

OUTDRIVE IMPACT PROTECTION (N/A With Inboard Engine)

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.

If engine should strike a submerged object, STOP 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.



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.

PROPELLERS

Your Sea Ray® has been equipped with propellers 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.**

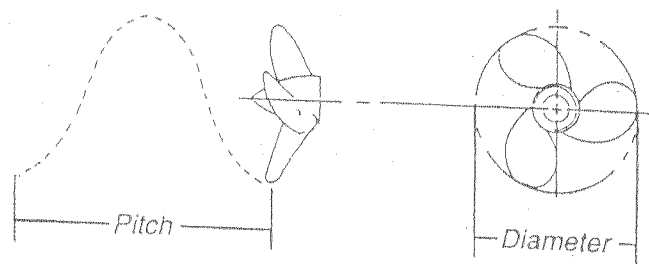
Propellers should be free of nicks, excessive pitting and any distortions that alter the propellers from their original design. Badly damaged props should be replaced, but those that are chipped, bent or merely knocked out of shape can be reconditioned by your marine dealer.

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

Propeller installation on inboard/outboard and outboard engines is covered in the Engine Operator's Manual.

Basic Propeller Characteristics

Propellers have two basic characteristics: diameter and 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.



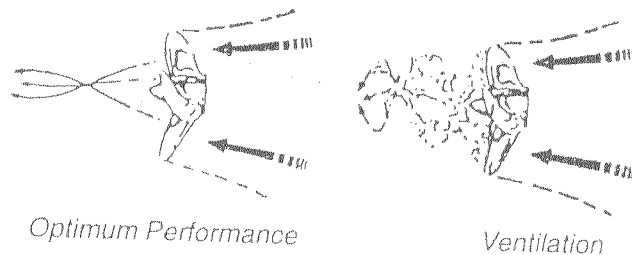
For example, a propeller with a 12-inch pitch, when rotated 360° would, theoretically, advance 12 inches through the water. Actually, no propeller applied to any boat is 100% efficient. No 12-inch pitch blade will, in a single rotation, advance a boat 12 inches. This variance is referred to as slippage.

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. This problem is normally caused by air or 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 units are equipped with an adjustable trim tab 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.

Replace Damaged Propellers

Propellers should be free of nicks, excessive pitting and any distortions that alter propellers from their original design. A badly damaged propeller should be replaced, but those that are chipped, bent or merely knocked out of shape can be reconditioned by your marine dealer.

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

Operating your boat with a damaged propeller will reduce its top speed, may introduce undesirable handling characteristics and will definitely increase fuel consumption. A damaged propeller may also create unpleasant vibrations leading to an increased sound level. These excessive vibrations will hasten wear to rotating and reciprocating engine components and may cause costly damage.



Section 3 • Instruments & Controls

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.

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 special 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 effect 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.

 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.

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

Hydraulic Steering (Outboard Engines)

Most Sea Ray® power boats fitted with outboard engines 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 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 (Inboard Engines & Some Outboard Engines)

The steering wheel is connected to the rudder arm on inboard engines and 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 salt-water) 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.

CAUTION

Boat steering is not self-centering. Steering is affected by engine and propeller torque, 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.

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

SECTION 3
INSTRUMENTS &
CONTROLS

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.

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

POWER TRIM & TILT OPERATION (N/A With Inboard Engines)

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(es) 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 for 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 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.

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.

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 over-heating 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

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 a engine alarm and how to use it properly.

IGNITION SHUT DOWN SWITCH (Available On Some Sport Boat 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.

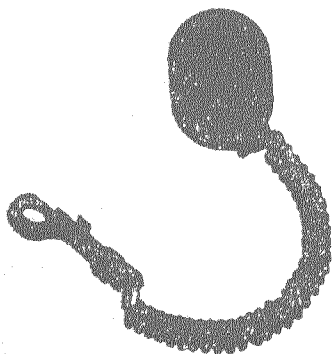
The ignition shut down switch incorporates a shut-off switch, switch clip, lanyard and lanyard clip, which is clipped to the helmsman. If a situation arises where the engine must be shut down, a pull on the cord to release the clip from the shut-off will shut down the engine.



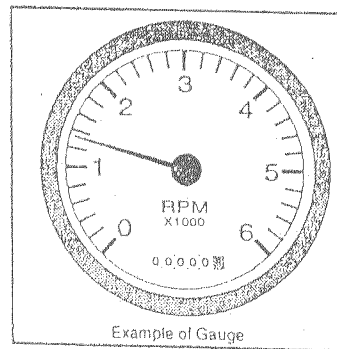
CAUTION

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.

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 Shut Down Switch



Example of Gauge

TACHOMETER w/ HOURMETER

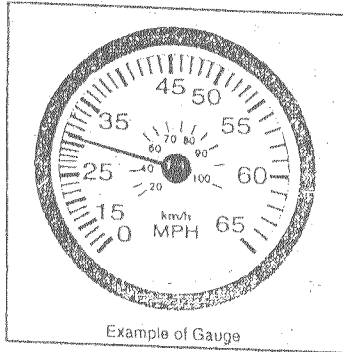
The tachometer indicates the revolutions per minute (RPM) of the engine. (It does not indicate the speed of the boat.) Your Engine Operator's Manual states the maximum full throttle RPM at

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.

The hour meter measures cumulative hours of operating time on the engine. 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

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

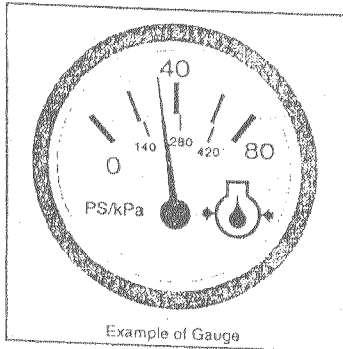


Example of Gauge

sure the water pressure hole is not clogged.

Speedometer Maintenance:

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



Example of Gauge

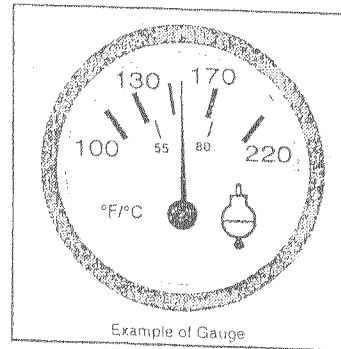
OIL PRESSURE GAUGE (N/A With Outboard Engines)

The oil pressure gauge is designed to monitor the pressure maintained in the engines internal lubricating system. Maximum 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.

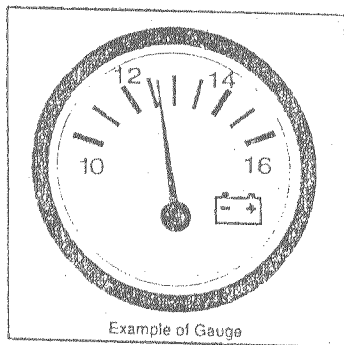


Example of Gauge

WATER TEMPERATURE GAUGE

The water temperature gauge indicates temperature of the 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.

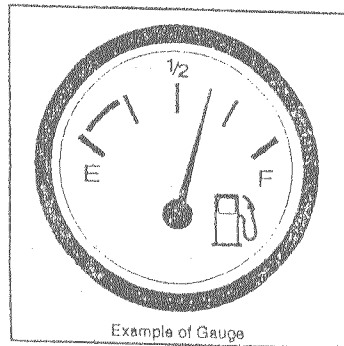


Example of Gauge

VOLTMETER

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 mal-

function or heavy battery drain.

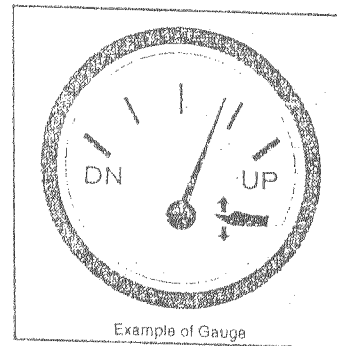


Example of Gauge

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



Example of Gauge

TRIM GAUGE (Inboard/Outboard Only)

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.

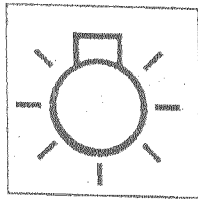
Should ventilation occur, reduce your engine RPM and trim the outdrive DOWN until it stops.

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

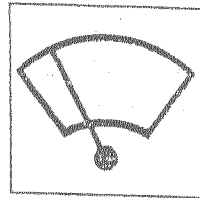
SWITCH PANEL SYMBOLS

(Only Applies To Models With Illustrated Switches)

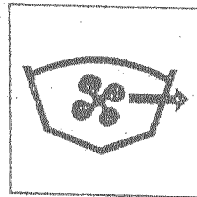
Your Sea Ray® Sport Boat may be equipped with illustrated accessory ON/OFF switches. Below is a listing of each symbol and its switch function. Your boat may also be equipped with a ACCESSORY switch which has no markings.



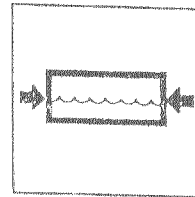
Lights



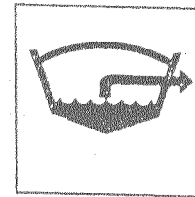
Windshield Wiper



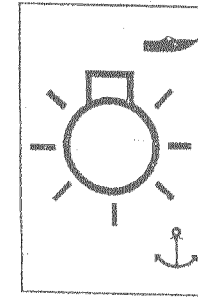
Bilge Blower



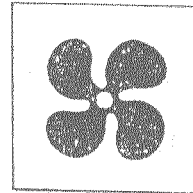
Fresh Water System



Bilge Pump



Navigation Lights



Heater
(Ski Ray Only)

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.

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.

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.

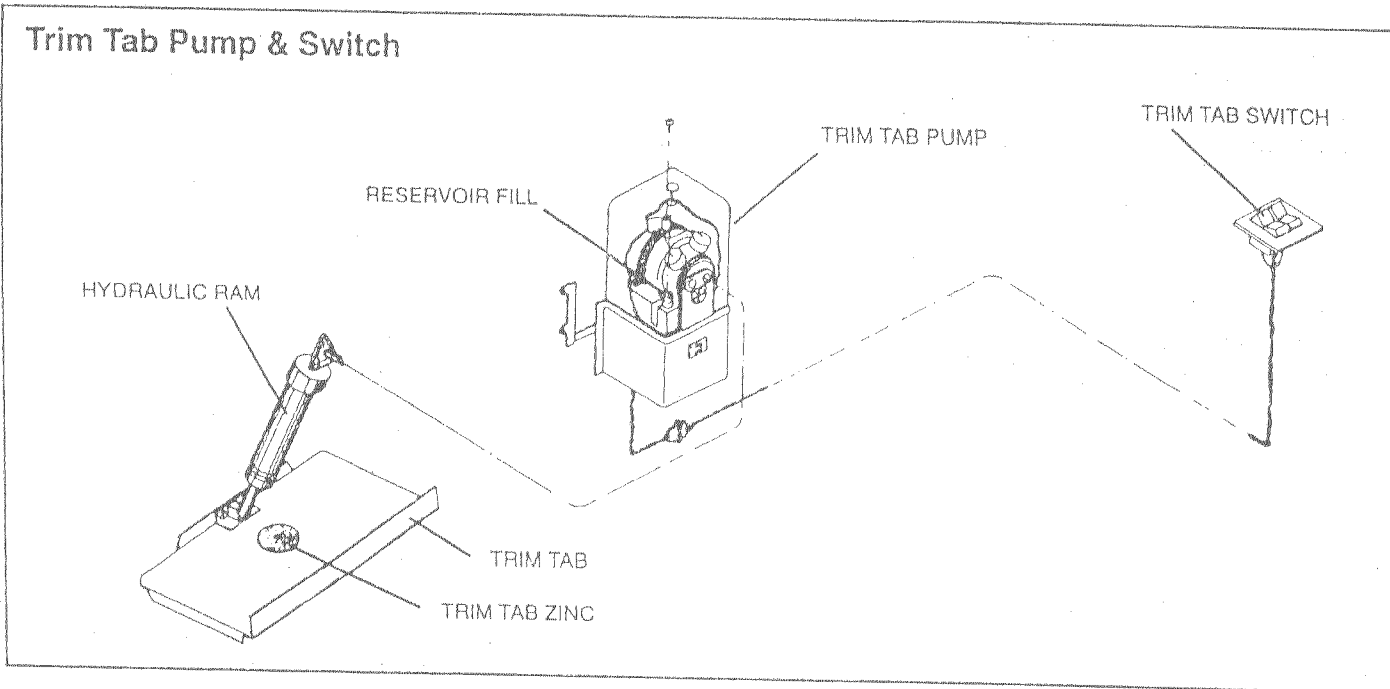
In heavy following seas or when running in an inlet best maneuverability is obtained with a bow high attitude. To be sure the tabs are full up in the zero position, push the bottom halves of the rockers for several seconds.

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.

RUNNING ATTITUDE	LIST	PUSH
BOW UP	----	TOP OF BOTH ROCKERS
BOW UP	PORT	TOP OF STARBOARD ROCKER
BOW UP	STARBOARD	TOP OF PORT ROCKER
BOW DOWN	PORT	BOTTOM OF STARBOARD ROCKER
BOW DOWN	STARBOARD	BOTTOM OF PORT ROCKER



SECTION 3
INSTRUMENTS &
CONTROLS

Section 4 • Fueling & Starting

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.

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

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

! 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.

! DANGER
Gasoline Vapors Can Explode
Before Starting Engine:

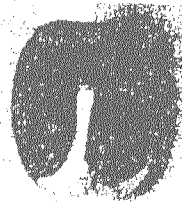
- Check engine compartment for gasoline vapors.
- Operate blower for 4 minutes.

Run Blowers Below Cruising Speed

SECTION 4
FUELING &
STARTING

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 multi-purpose 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.



Hull Mounted Fuel Vent With Screen

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

Inboard/Outboard & Inboard Engines 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. 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.

Outboard Engines 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.

NOTICE

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

Recommended Fuel: (Gasoline)

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

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.

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.

NOTICE

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

NOTICE

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

REFER TO THE ENGINE OPERATORS 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.

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 Engines 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.

CAUTION

The use of other than recommended gasoline and Quicksilver 2 Cycle Outboard Oil or an acceptable oil ABYC/BIA TC-W may cause piston scoring, bearing failure or both. DO NOT, under any circumstances, use multi-grade or other highly detergent automobile oils or oils which contain metallic additives.

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

Engine Starting, Shifting & Stopping

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.

⚠ WARNING

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

⚠ WARNING

Before starting engine, operate bilge blower for at least four minutes to remove any explosive fumes from engine compartment.

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:

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.

⚠ 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
Close engine box before starting engine to avoid hair, loose clothing or jewelry becoming entangled in belts and pulleys.

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

(Inboard Engine Only)

Check seacock for open position. Make sure strainer is clean and tight. **NOTE:** Seacock and strainer are optional equipment on Ski Rays® with inboard engines. (See Section 7, Information Specific To Ski Rays, Seacocks & Strainers)

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 & Inboard Engines 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 & Inboard 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.

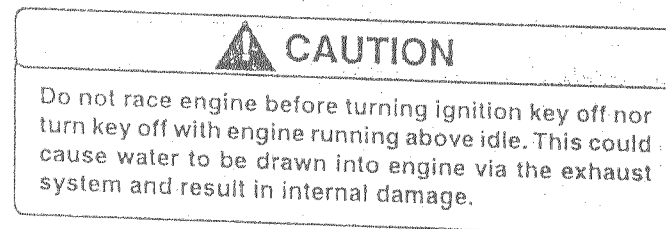
4. Be sure charging system is functioning correctly.
5. Observe power package for fuel, oil, water and exhaust leaks. The engine and electrical equipment should be shut off if fuel leaks are found.

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:



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.

Section 5 • Electrical System

D. C. Systems

The 12 volt direct current (D.C.) 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 D.C. electrical systems. Additional equipment 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 equipment to be taken from the voltmeter terminals.

Enlist the aid of your dealer for a careful analysis of D.C. 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 battery installed in your boat has been selected for its ability to furnish starting power based on engine starting requirements as well as its ability to power the D.C. 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.

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

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.

To remove the battery cables:

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

Battery maintenance:

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.

Only replenish with distilled water. Do not use metal funnels.

Coat battery terminal clamps with silicone grease. Keep battery clean and dry.

Only use a battery charger designed to charge automotive/marine batteries when batteries are disconnected from the boat's electrical circuit.

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.

DANGER

- 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.

IGNITION PROTECTION

To avoid the possibility of creating sparks in a gasoline environment all electrical components in the bilge 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 bilge.

BILGE FUSES

The bilge fuse(s) are located in the bilge adjacent to the battery. A fuse is provided for the bilge pump, stereo memory and on some models the optional 12 volt refrigerator.

In the event that a fuse blows, determine and correct the fault, then replace the fuse. It is recommended to carry spare fuses.

BATTERY SWITCH

(Optional On Some Models)

The battery switch is located in the bilge. When the switch is in the OFF position all 12 volt current to the engine and accessories is turned off except power to the bilge pump(s) and mercathode. The battery switch must be ON to start the engine. Turn battery switch OFF when leaving boat for extended time to save batteries.



Always stop engine before switching to "OFF" position.

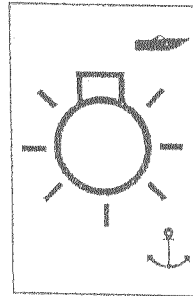
ELECTRICAL SYSTEM BREAKERS and/or FUSES

In the event it becomes necessary to replace an electrical breaker or fuse, REPLACE ONLY WITH BREAKERS OR FUSES OF THE SAME AMPERAGE. The amperage is marked on the side of the breaker or fuse.

If a breaker or fuse is replaced with a breaker or fuse of lower amperage it will be insufficient to carry the electrical load of the equipment it is connected to and cause nuisance tripping.

If a 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.

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 white anchor light must be displayed.

To operate the RUNNING lights:
Push the navigation light switch toward the boat.

To operate the ANCHOR lights:
Push the navigation light switch toward the anchor.

In boats without illustrated switches; push switch UP for running lights and DOWN for anchor light.

WIRE COLOR CODE

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

- **Battery Wiring**

- 2 AWG Red: battery cable (positive)
- 2 AWG Black: battery cable (negative)

- **Halon System**

- 16 AWG Green/White: indicator
- 16 AWG Black: indicator ground

- **Bilge Pump**

- 14 AWG Brown: manual
- 14 AWG Brown/Red: float switch auto
- 14 AWG Brown/Red: dash switch auto
- 16 AWG Black: ground
- 16 AWG Red/Violet: power

- **Bilge Blower**

- 16 AWG Yellow: blower
- 16 AWG Black: ground
- 16 AWG Red/Violet: power

- **Water System**

- 16 AWG Brown/White: power
- 16 AWG Black: ground

- **Trim Planes (Tabs)**

- 10 AWG Red: power
- 16 AWG Red: port valve

- 16 AWG Green: starboard valve
- 16 AWG Blue: pump pressure
- 16 AWG Yellow: pump retract

- **Horn**

- 16 AWG Orange/Black: power
- 16 AWG Black: ground

- **Wiper**

- 16 AWG Orange: power
- 16 AWG Black: ground

- **Lights**

- 16 AWG Gray: running lights & mast light
- 16 AWG Gray or Gray/Blue: anchor light
- 16 AWG Blue: power
- 16 AWG Black: ground

- **Stereo**

- 16 AWG Clear/Copper: right speaker positive
- 16 AWG Clear/Silver: right speaker negative
- 16 AWG Clear/Copper: left speaker positive
- 16 AWG Clear/Silver: left speaker negative
- 16 AWG Red: power
- 16 AWG Black: ground
- 16 AWG Yellow: memory/clock
- 16 AWG Orange: antenna

- **Grounding Circuit**

- 8 AWG Green: fuel tank fill

Electrolysis & Zinc Anodes

Electrolysis corrosion of underwater metals on power boats can result in serious deterioration. The boat owner must be aware of the possibilities of galvanic action, (the deterioration of underwater metals due to dissimilar characteristics when placed in salt water), and/or electrolysis. 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.

Inboard/Outboard and outboard engines are fitted with zinc anodes on their lower units, refer to the engine operator's manual for their locations. If your Sport Boat is equipped with trim planes (tabs), zinc plates are installed on the trim planes (tabs). Zinc protects 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.

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. 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.

NOTICE

Do not paint between the zinc and the metal it contacts, and do not paint over the zinc.

Section 6 • Accessories

SECTION 6
ACCESSORIES

Canvas

CARE & MAINTENANCE

Brush the canvas with a soft-bristled brush and hose down at regular intervals to remove dust and dirt particles. It may be washed in a mild solution of Lux or Ivory soap and Borateem in lukewarm water (no more than 100°F). Rinse thoroughly to remove soap. Do not use detergents.

For more stubborn cases, soak the canvas in a solution of 1/2 cup (4 oz.) Clorox, 1/2 cup (4 oz.) Ivory and one gallon warm water for about 20 minutes. Rinse with cold water to remove all soap. NOTE: This method may remove part of the water repellence, so apply a water repellent treatment as necessary.

The canvas may be washed in an automatic washer on the "cold" cycle using 2 cups (16 oz.) Clorox and 1 cup (8 oz.) Ivory Flakes. DO NOT DRY IN A DRYER - ALLOW CANVAS TO LINE DRY ONLY. The fabric is 100% acrylic and it will shrink. Canvas may be dry cleaned, but a water repellent treatment will then be necessary.

Storage:

Do not fold or crease any of the clear vinyl panels, as cracking will result. Do not fold or store any canvas while wet. All canvas should be rolled or folded when dry and stored in a clean dry place.

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

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 behind 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.

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 windshield frame.

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.

6.2

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 top and extends back to the transom. To install, zip to convertible top and snap along sides then snap along transom.

!
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.

!
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 is used to cut down on the amount of sunlight entering the cabin through the hatch.

MOORING COVER

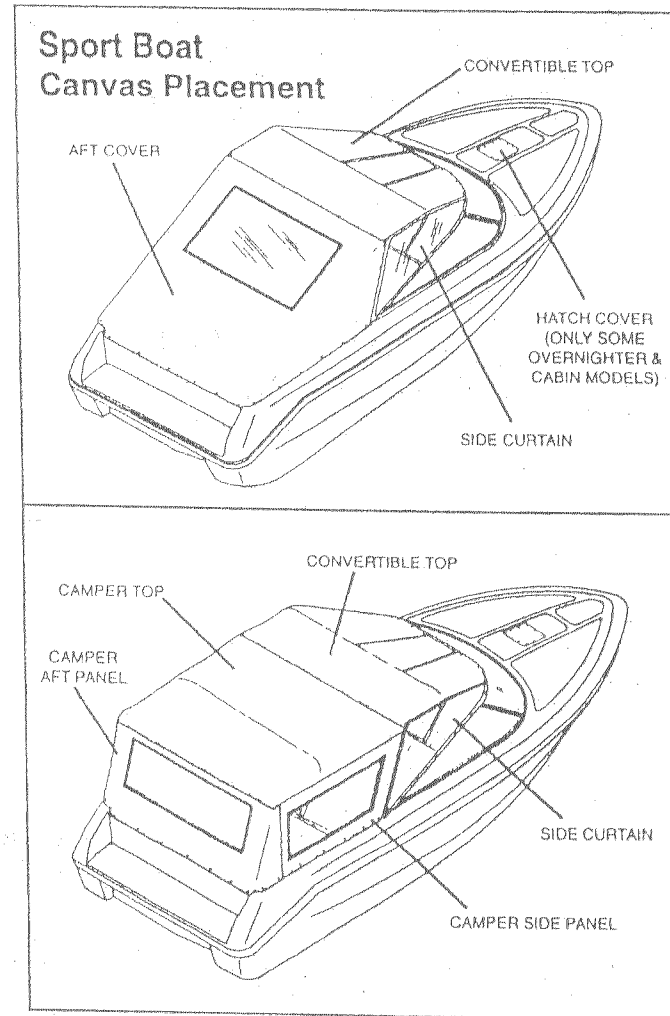
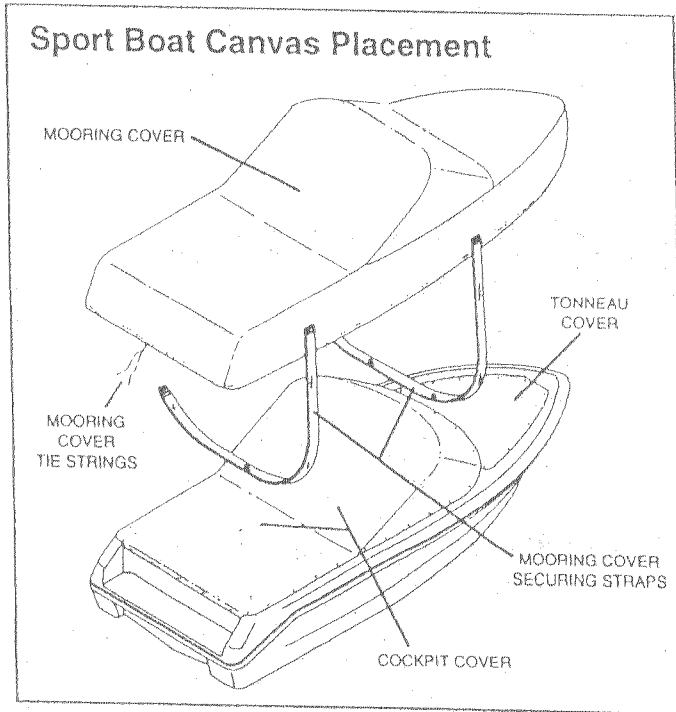
The mooring cover is used as a long term storage cover. To install cover, spread over entire boat, secure straps under boat and tie at transom.

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



Halon System (N/A With Outboard Engines)

The system uses halon fire extinguishant and is installed in the bilge. In the event of a fire, the heat sensitive automatic head will release the halon 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 halon 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.

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.

Allow the halon 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 PACKET FOR INSTRUCTIONS AND WARRANTY INFORMATION.

Head System (Portable) (Optional On Some Models)

Some SEA RAY Sport Boats can be equipped with a portable self-contained head unit. The head unit is located under the center cabin cushion in Cuddy Cabin models and inside the enclosed head area forward of the helm on some Bow Rider models.

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

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 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.

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.

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.

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.

NOTE: Never sit on top of seat.

Stereo

The stereo is protected by the stereo fuse or breaker at the dash. When your boat is equipped with the upgraded stereo 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.

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.

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.

UNDER DECK SKI STORAGE

(190 Ski Ray Only)

The enclosed bow storage compartment is accessible by unlocking and lifting the latch on the center dash area. Upon lifting the latch the aft facing seat back will raise automatically exposing access to the bow storage compartment. To close, simply push down on the seat back until it latches into place.

Stove (Optional On Some Models)

The alcohol stove has one burner and an integral tank, which is pressurized by using the built-in pump. Fill tank 3/4 full with denatured ethyl alcohol. USE MARINE STOVE ALCOHOL FUEL ONLY.

DANGER

Open flame cooking appliances consume oxygen. This can cause asphyxiation or death. Maintain open ventilation. Do not use this appliance for comfort heating.

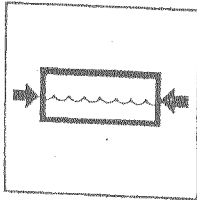


DANGER

Liquid fuel may ignite, causing severe burns. Before filling, turn OFF stove burner. Follow manufacturer's instructions.

REFER TO OWNER'S 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.

6.8

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 9, Laying-Up Instructions, Winterization Checklist For Boats Stored On Land."

WATER PUMP FILTER

The pump has a filter to prevent particles from entering the pump head. The filter should be checked and cleaned periodically.

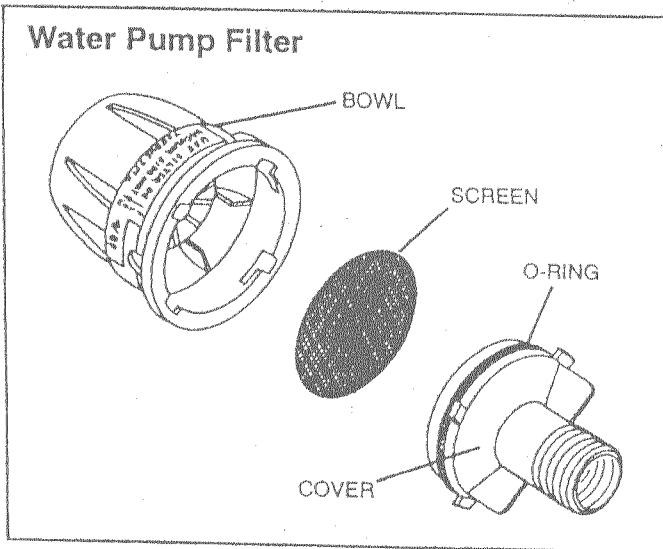
Before servicing the system, turn the water system OFF and release pressure on the system by opening a faucet.

To clean filter:

1. Turn cover counter clockwise 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



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.

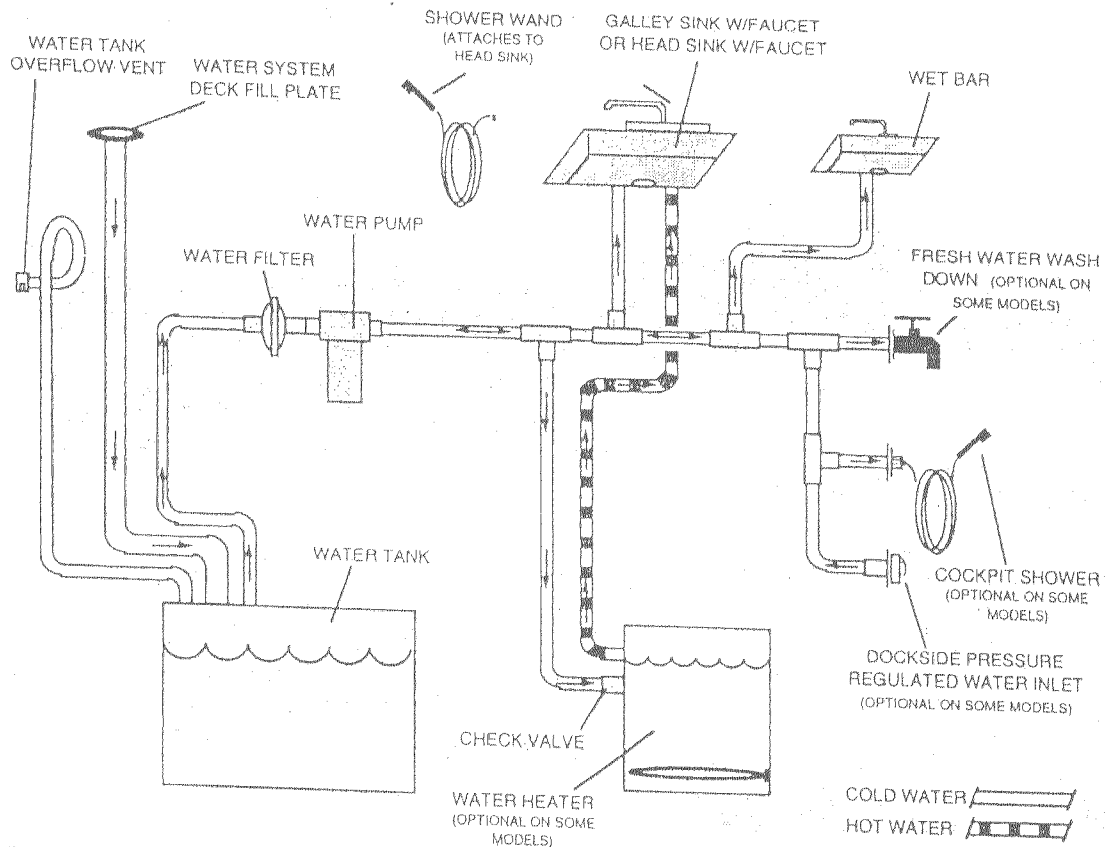
SECTION 6
ACCESSORIES

SANITIZING 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.

Pressure Water System Layout*



*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.

Section 7 • Information Specific To Ski Rays®

Note: Section 7 provides information which pertains ONLY to Sea Ray®'s Ski Ray® model boats.

Safety

Refer to "Section 1, General Information" for Sea Ray® Sport Boat and Ski Ray® safety related information.

Engine

Be sure to read information about engines in "Section 2, Bilge & Underwater Gear" and refer to the engine operators manual in the owner's packet.

MARINE GEARS (Inboard Engines)

Reduction Gears

A reduction gear reduces the rotating speed of the propeller shaft in relation to the engine RPM. This permits

the use of a larger propeller while allowing the engine to attain its rated RPM, thereby increasing efficiency.

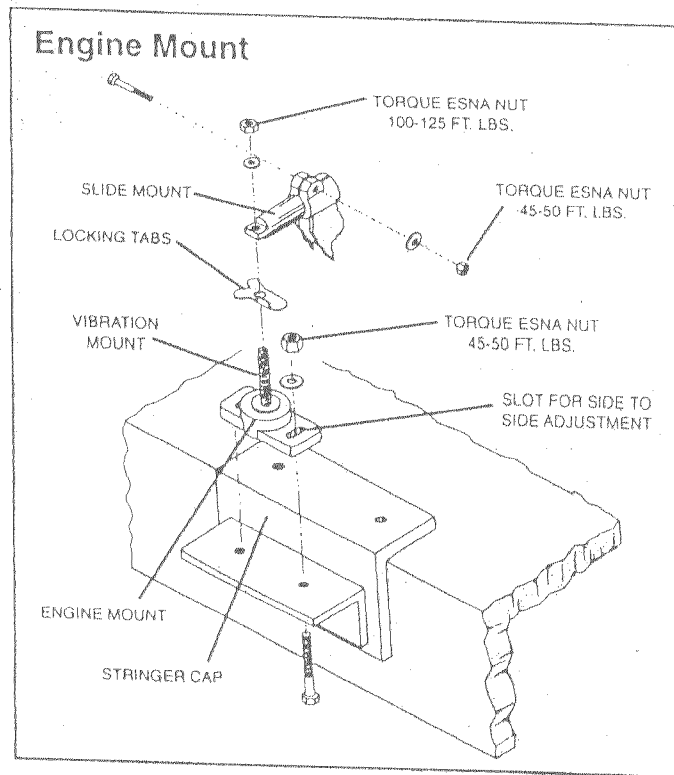
Reverse Gears

The reverse gear incorporates the clutch and controls the rotation of the propeller. The position of the clutch control or shifting lever indicates the motion which the clutch and reverse gear are transmitting. The center position of the lever indicates neutral. Engine RPM should never exceed 1000 when engaging or disengaging the clutch. Higher RPM will result in unnecessary wear and shortened life of the unit, and perhaps breakage.

Marine reverse gears are hydraulically operated, thereby making it imperative to periodically maintain and check oil level. If the correct oil level is not maintained, slippage occurs, causing damage to the clutch plates. Too much oil will cause foaming and erratic clutch operation. For additional information see the Engine Operator's Manual.

ENGINE MOUNTS (Inboard Engines)

The adjustable type engine mounts permit adjustment sideways as well as vertically. Vertical adjustment nuts lock up or down on the threaded vertical stud, with a slot provided to allow side to side adjustment on the engine.



7.2

Important: The large adjustment lock-nuts on these mounts must be tightened properly to retain alignment. It is also advisable to spray a protective coating on the studs and nuts.

ENGINE REMOVAL (Inboard Engines)

Should the removal of an engine become necessary, see your Sea Ray® dealer. The following is only a generalized procedure to follow.

1. Close the engine seacock (if applicable).
2. Remove all electrical wires, fuel line and raw water intake hose from the engine.

WARNING

Make sure to plug the fuel line to avoid fuel leakage, contamination, fire and explosion hazard.

3. Unbolt the engine coupling from the shaft coupling and then slide the shaft and coupling back from the engine.
4. Detach both throttle and shift connections. Do not bend or twist the cables, as damage may result.
5. Remove the mounting bolts for the engine and lift the engine out, leaving the mounts bolted to the stringer caps.

To reinstall, reverse the above procedure. Check the coupling and shaft alignments, as well as water hoses and wiring connections. Also check for fuel and exhaust leaks and make sure seacock is open before starting engine.

Underwater Gear

ACCESS TO BILGE HARDWARE (Inboard Ski Rays® Only)

To gain access to the bilge hardware such as the shaft log, strut bolts, rudder, rudder stuffing box and steering cable, remove the engine box then lift out the aft center floor board.

PROPELLERS

Be sure to read propeller information in "Section 2, Bilge & Underwater Gear".

Propeller Installation For Inboard Engines:

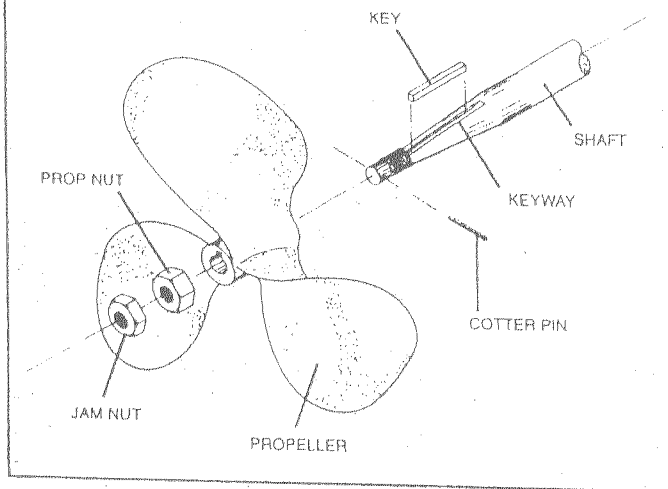
1. Grease the shaft with a multi-lube marine grease.
2. Install the propeller on the shaft taper without the key. Mark its position with a non-graphite bearing marker.

3. Remove the propeller and insert the key in the keyway.
4. Reinstall the propeller so its position is at the mark. (Caution should be taken to prevent the propeller from riding the key up the keyway end radius and forcing the propeller off center.)
5. Next, tighten the prop nut securely, using a 2" x 4" block between the propeller blade, strut and rudder.
6. Then tighten the jam nut while holding the prop nut in place.
7. Install a cotter pin through the hole in the shaft and bend the ends of the pin over.

NOTICE

If the jam nut and prop nut are installed properly, the propeller should not loosen. If you tighten both nuts holding only the propeller blade, the nuts could possibly thread back on the shaft to the cotter pin. It is important that the above procedure be followed.

Propeller Installation For Inboard Engines

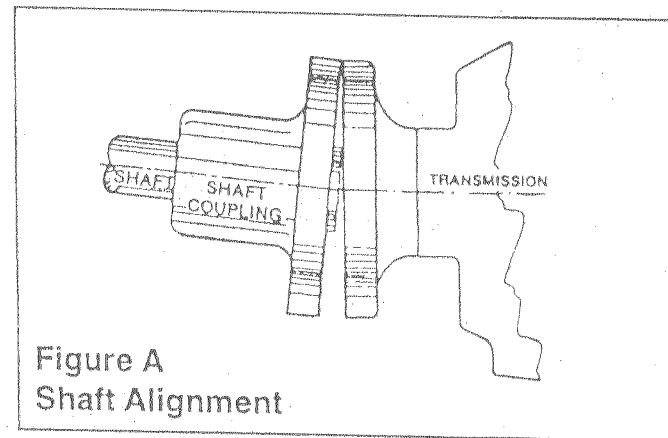


PROPELLER SHAFT (Inboard Engine Only)

The shaft coupling is the connecting point between the shaft and the engine. The alignment should be set at .003" to .005" (0.08 - 0.13mm). Misalignment is much exaggerated in Figure A, but a slight misalignment will cause loss of power, excessive wear, noise and vibration. It should not be tolerated. When checking for parallel coupling faces (the proof of proper alignment), use a

feeler gauge not more than .003 to .005 of an inch thick (0.08 - 0.13mm).

With coupling faces brought together by hand - not bolted - the feeler gauge should be tightly gripped at all points around the edges of the couplings. Next, hold the engine coupling flange stationary and rotate the shaft coupling flange 90 degrees in either direction. The feeler gauge should still be tightly gripped at all points around the edges of the couplings:



SHAFT LOG & STUFFING BOX (Inboard Engine Only)

The shaft log is a fiberglass tube which provides an opening through the bottom of the boat for the propeller shaft. The stuffing box is connected to it by a short length of special flexible hose which serves to absorb normal shaft vibration. The stuffing box prevents water leaking around the shaft and into the boat.

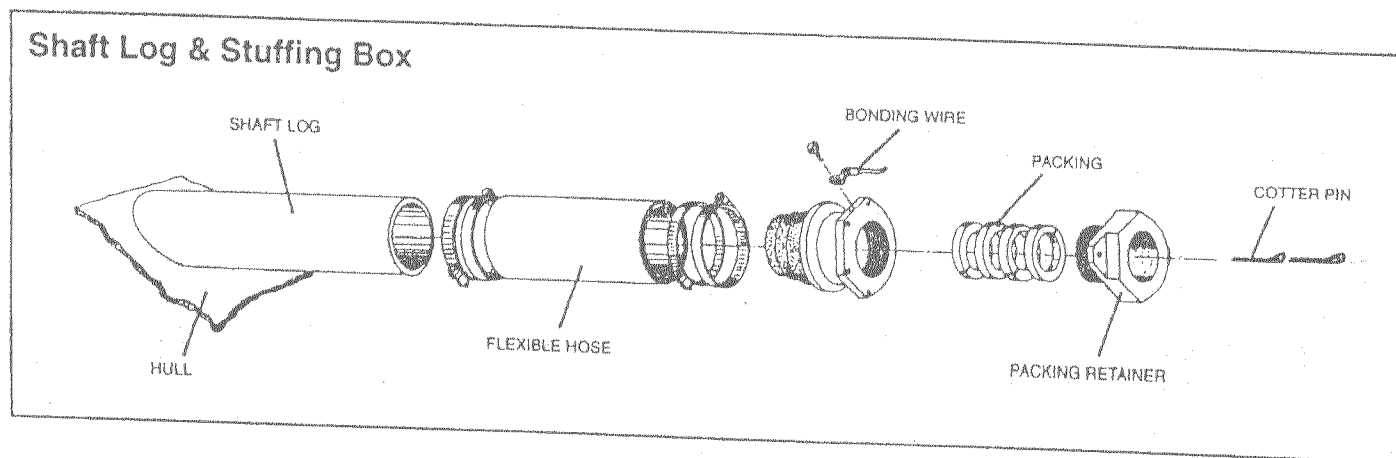
A slow leak, about one drop every 20 seconds, is desirable to lubricate the shaft. However, if the propeller shaft stuffing box is found to be leaking excessively (due to wear caused by the rotating shaft), it can usually be stopped by hand tightening. Do not over tighten as it will score the shaft. Tighten the stuffing box by removing the

cotter pins and rotating the packing retainer clockwise until the leak becomes a slow drip. Reinstall the cotter pins.

If, after the boat has been in use for some time, the stuffing box leaks persistently, remove the packing retainer and add a ring or two of packing to that which is already in place. If this is ineffective, completely remove the old packing and replace it with new packing rings. The ends of each ring should touch and the joints should be staggered. Shaft alignment and straightness must be correct or leaking will persist.

The packing material used is high temperature packing, and Chestron 329 Stern Lon-1/4" is recommended.

SECTION 7
SKI PANS



STRUT (Inboard Engine Only)

The strut is the bronze casting fastened to the bottom of the hull to support and form a bearing for the propeller shaft. A replaceable rubber bearing is inserted to minimize wear and protect the shaft where it passes through the strut hub. During lay up periods, squirt castor oil into this bearing to keep it from freezing to the shaft. **Never use machine oil or grease on rubber bearing.** Periodically check all strut fastenings to assure that they are secure.

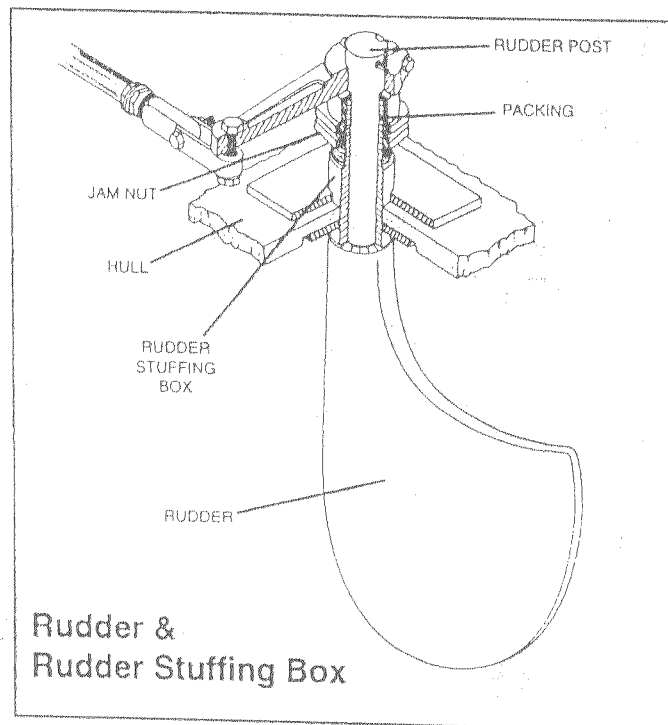
To replace the rubber strut bearing, see your Sea Ray® dealer.

RUDDER & RUDDER STUFFING BOX (Inboard Engine Only)

The rudder is the vertical flat surface aft of the propeller that pivots about a vertical axis and changes the direction of the boat through the water. The rudder stuffing box prevents water from leaking into the boat where the rudder post enters the hull.

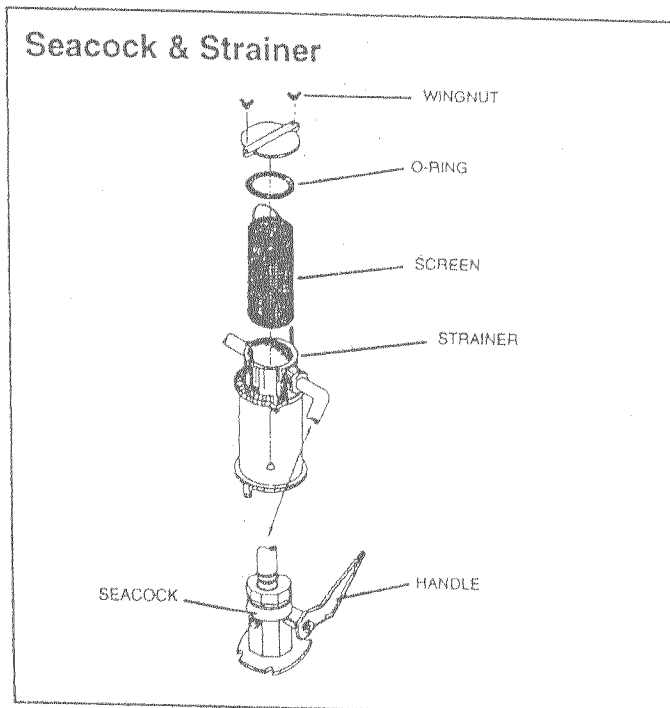
The rudder stuffing box has the same basic characteristic as the shaft stuffing box and the maintenance is the same but repacking is seldom required. If repacking is necessary, use 1/4" flax packing. The rudder requires little

maintenance. The rudder post, however, should be greased with a waterproof marine grease at least once a season.



SEACOCKS & STRAINERS (Option w/Inboard Engine Only)

Seacocks and strainers are located in the bilge area. To open the seacock, turn the handle in line with water flow (vertical). To close, turn the handle against water flow (horizontal). The seacock body should be inspected and lubricated annually.

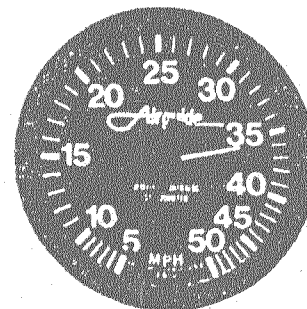


Sea water strainers should be inspected frequently and cleaned out when plugged. To clean the strainer, close the seacock and unscrew the wingnuts on top of the strainer housing. Remove and wash the stainless steel screen. After replacing the screen, replace and tighten the wingnuts, open the seacock and check for leaks.

CAUTION

Close all seacocks when leaving boat for any length of time. Sinking may result.

Ski Ray® Speedometer



**AIRGUIDE™
SPEEDOMETERS***
(Available On Some
Ski Ray's® Only)

The dual Airguide™ speedometers indicate the speed of your boat in miles per hour. If one is struck and put out of commission on a run, the other one will continue to operate. It operates by transferring the water pressure at the pitot

tube mounted on the transom to the gauge. The knurled adjustment knob on the front of the instrument is used to precisely adjust the speed indication with the boat underway. To insure an accurate reading, make sure that the pitot tube is in the down position and its opening is not clogged.

Speedometer Maintenance:

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

*Your boat may be equipped with Airguide™ or electric speedometers. REFER TO OWNER'S PACKET FOR INSTRUCTIONS AND WARRANTY INFORMATION.

Ski Ray® Canvas

Not all canvas options are available for every Ski Ray. Only read sections pertaining to canvas on your boat.

BIMINI TOP & BOOT

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

Installing:

1. Attach the center stanchions with the pins provided.
2. Secure front and back support straps.
3. The two middle bow straps hook to the center console rail above the windshield to put tension on the middle bows.

The bimini top can be pivoted on the center stanchion to store in either a forward or aft position.

To fold supports, the clips must first be removed from either the forward or aft brackets, depending on which position you would like it to be stored.

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.

ENCLOSURE

The enclosure consists of four transparent vinyl window curtains.

Installing:

1. The port and starboard curtains zip along the side edges of the bimini top, then snap to the top edges of the deck plate.
2. The forward curtain zips to the bimini top, the port and starboard side curtain and the forward spray hood. The forward curtain then snaps to the deck plate on the port and starboard sides of the spray hood.
3. The aft curtain zips along the bimini top and port and starboard side curtains, then snaps along the bottom.

When not in use, all curtains can be rolled up to the bimini top and snapped into place, or taken down and stored under bow hatches. Do not fold the curtains since permanent damage can occur to the vinyl material. All vinyl material should be rolled.

SUN TOP AND BOOT

(190 Ski Ray® Sportster Only)

The sun top installs over 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 snap front section to windshield frame.
3. Secure straps behind 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 support.

Seating Accommodations

ADJUSTABLE DRIVER BUCKET SEAT

(Ski Ray® Sportster™ Only)

The adjustable seat can slide forward and aft. To change seat position, loosen the knob on the port side of the seat base, slide seat to desired position then tighten the knob.

Maintenance For Bucket Sliding Seat Bases:

1. Lubricate slider track annually with a good quality marine lubricating grease.
2. Replacement parts can be ordered through a authorized Sea Ray® dealer.

REMOVABLE TRI-SECTIONAL REAR SEATING (Ski Ray® Sportster™ Only)

The tri-sectional rear seats can be completely removed or remove just the center section using the area as a walk-thru to the boarding platform. To remove, loosen the barrel bolts on the inside of the seats and lift out the seat bases.

Ski Pylon & Transom Ski Tow Ring (Ski Ray® Sportster™ Only)

SKI PYLON

The ski pylon installs forward of the engine box into the cockpit floor.

7.10

To remove the ski pylon loosen the pylon clamp nuts below the floor through the engine compartment.

TRANSOM SKI TOW RING

! WARNING

Avoid personal injury. This water ski transom tow ring was designed for water skiing only. Any other uses such as parasailing, kit flying, towing other boats, etc. may overstress the transom tow ring possibly causing personal injury and/or equipment damage.

Do not tow more than two water skiers with this transom tow ring.

! WARNING

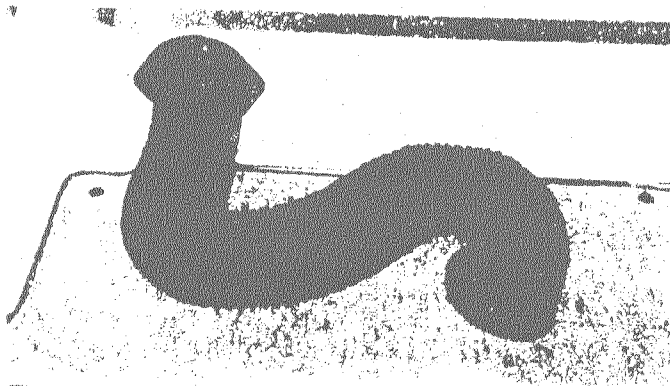
Use caution with skier in tow as rope may backlash into cockpit when released.

Heater (Optional On Some Ski Ray® Models)

The heater blows hot air to the helm kick panel area and onto the cockpit floor. The heater works off a heat exchange system with hot water from the engine. The heater

box is located in the closed bow storage area. The heater is protected by the "ACCESSORY" switch breaker on the switch panel.

The heater vent in the base of the spotter seat is connected to a stretchable flexible hose. The vent can be pulled out of the seat base to direct heat where it is desired.



Removable Heater Hose

To operate:

1. The engine must be operating and warm.
2. Turn ON the "FAN" switch on the switch panel.

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

Water System (Optional On Some Ski Ray Models)

Be sure to read information about the water system in "Section 6, Accessories".

RAW WATER TRANSOM SHOWER

The water system is activated by the "WATER SYSTEM" switch on the dash. The switch must be ON to operate the transom shower. The transom shower wand is located under the aft starboard seat back cushion.

To get hot water the system draws water through the engine block. The engine must be operating to make the water hot. To get cold water the system draws water through a thru-hull water pick-up fitting in the bilge.

The hot and cold water hoses go through a Y-valve fitting under the spotter seat cushion. Adjust valves to get desired water temperature.

To operate:

1. If boat is equipped with optional engine seacock and/or cold water pick-up seacock, make sure it is open.
2. Turn ON the WATER SYSTEM switch.

3. Turn on shower wand.

Shut wand off as flow becomes steady and free of air.
Shutting off the wand will cause the pump to shut off.

Section 8 • Information Specific To The Laguna®

NOTE: Section 8 provides information which pertains ONLY to Sea Ray's® Laguna® model boats.

Safety

Refer to "Section 1, General Information" for Sea Ray® Sport Boat and Laguna® safety related information.

Water System

Refer to "Section 6, Accessories" for information and operation of the water system.

FRESH WATER SYSTEM

The fresh water system consists of a water tank, water pump, filter, spigot and breaker.

Laguna® 21 Center Console (Optional)

The water tank is located in the bilge area and is accessible through the aft center cockpit hatch. The water pump and filter are located on the port side in the bilge area.

The sink and spigot are located forward of the engine in the bait preparation center. The water fill plate is located on the transom, aft of the bait preparation center. The water pump is protected by a 12 volt breaker on the helm breaker panel.

Laguna® 21 Walkaround (Optional)

The water tank, water pump and water filter is located under the forward center cockpit hatch. The spigot is located on the starboard side of the cockpit. Fill the water tank by removing the cap on the water tank and filling with potable water. The water pump is protected by a 12 volt breaker on the control station breaker panel.

Laguna® 24 Center Console

The water tank is located in the bow, just forward of the forward center storage area. The water pump and filter are located on the port side under the forward center cockpit hatch. The spigot is located on the port side of the cockpit in the recessed area below the cockpit bolster. The water fill plate is located on the forward port side of

the deck. The water pump is protected by a 12 volt breaker on the helm breaker panel.

SEA WATER WASHDOWN

The sea water washdown system consists of a seacock, check valve, water pump, pressure switch, water spigot and system ON/OFF switch. The pump is turned on by the "WASH DOWN PUMP" breaker on the control station breaker panel.

The pump draws water through a thru-hull seacock located in the bilge area, mounted through the bottom of the boat. The seacock must be open to allow water into the system.



CAUTION

Close all seacocks when leaving boat for any length of time. Sinking may result.

Before reaching the spigot, water is directed through a pressure switch which is located next to the water pump. As water is used the pressure switch turns the pump on and off to maintain constant pressure to the spigot.

To operate the system, open the seacock and turn ON the "WASH DOWN PUMP" breaker on the control station breaker panel, then turn on the water spigot.

8.2

LIVE BAIT WELL SYSTEM

(Optional On Some Laguna® Models)

Laguna® 16 Side Console

The bait well is located in the bow of the boat.

To Operate:

1. Fill the bait well with water using a bucket.
2. Turn the bait well switch ON. The switch operates a pump that keeps the water in the well circulating.

To Empty:

1. Pull the plug allowing water to drain through the side of the hull.

NOTE: Do not operate the baitwell pump when baitwell is empty. Running the pump dry for an extended period of time may damage the pump.

Laguna® 18 Center Console

The bait well is located under the helm seat cushion.

To Operate:

1. Fill the bait well with water using a bucket.
2. Turn the bait well switch ON. The switch operates a pump that keeps the water in the well circulating.

To Empty:

1. Pull the plug allowing the water to drain out.

NOTE: Do not operate the baitwell pump when baitwell is empty. Running the pump dry for an extended period of time may damage the pump.

Laguna® 21 Center Console

The bait well is located under the helm seat cushion. The bait well is fitted with a stand pipe that allows water to drain overboard if too much water is added, keeping it at a certain level.

To Operate:

1. Open the live bait well seacock located in the bilge.
2. Turn the "BAITWELL PUMP" switch to the "FILL" position. The "BAITWELL PUMP" switch is located on the control station switch panel.

3. Turn the "BAITWELL PUMP" switch ON. The switch operates a pump that keeps the water in the well circulating.

To Empty:

1. Pull out the stand pipe allowing the water to drain out through the base of the seat.

NOTE: Do not operate the baitwell pump when baitwell is empty. Running the pump dry for an extended period of time may damage the pump.

Laguna® 21 Walkaround

The bait well is located in the aft port corner of the cockpit. The bait well is fitted with a stand pipe that allows water to drain overboard, through a seacock in the bilge, if too much water is added, keeping it at a certain level.

To Operate:

1. Fill the bait well with water using a bucket.
2. Turn the "BAITWELL PUMP" switch to the "FILL" position. The "BAITWELL PUMP" switch is located on the control station switch panel.

3. Turn the "BAITWELL PUMP" switch ON. The switch operates a pump that keeps the water in the well circulating.

To Empty:

1. Open the bait well seacock in the bilge.
2. Pull out the stand pipe allowing the water to drain out through the seacock in the bilge.

NOTE: When the baitwell is not in use, make sure the baitwell seacock is closed.

NOTE: Do not operate the baitwell pump when baitwell is empty. Running the pump dry for an extended period of time may damage the pump.

Electrical System

ELECTRONICS CIRCUIT WITH GROUND PLATE (Optional On Some Laguna® Models)

The 50 amp electronics circuit utilizes a circuit breaker in the bilge breaker box to feed the fuse block. The fuse block is to be used for electronic equipment only. There is a static ground buss located at the helm for mounting of electronic equipment static grounds only, not for current

carrying grounds. It is grounded via a ground plate mounted on the bottom of the hull. Do not use bottom paint on the ground plate as it will destroy the effective area of grounding.

Canvas

Not all canvas options are available for every Laguna®. Only read sections pertaining to canvas on your boat.

BIMINI TOP & BOOT

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

Installing:

1. Attach the center stanchions with the pins provided.
2. Secure front and back support straps.
3. The two middle bow straps hook to the center console rail above the windshield to put tension on the middle bows.

The bimini top can be pivoted on the center stanchion to store in either a forward or aft position.

To fold supports, the clips must first be removed from ei-

ther the forward or aft brackets, depending on which position you would like it to be stored.

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.

CONSOLE COVER

The console cover is designed to protect the center console when not in use. To install the cover simply slip over the console and snap in place.

ENCLOSURE

The enclosure consists of four transparent vinyl window curtains.

Installing:

1. The port and starboard curtains zip along the side edges of the bimini top, then snap to the top edges of the deck plate.
2. The forward curtain zips to the bimini top, the port and starboard side curtain and the forward spray hood. The forward curtain then snaps to the deck plate on the port and starboard sides of the spray hood.

3. The aft curtain zips along the bimini top and port and starboard side curtains, then snaps along the bottom.

When not in use, all curtains can be rolled up to the bimini top and snapped into place, or taken down and stored under bow hatches. Do not fold the curtains since permanent damage can occur to the vinyl material. All vinyl material should be rolled.

HELM SEAT COVERS

The helm seat covers are protective canvas bags that fit over each helm seat and tie at the bottom.

Head System

PUMP-OUT HEAD

(Optional On Some Laguna® Models)

The optional head with dockside pump-out is the same head described in "Section 6, Accessories" except the holding tank has a dockside pump-out 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.

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

Section 9 • Storage & Launching

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.

To lift the boat for service or storage, attach the lifting hooks to the bow and stern eyes. When attaching the aft hooks, use a spreader bar to avoid stress cracks in the fiberglass and gel coat.

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.

CAUTION

Do not use cleats for lifting.

NOTE: Except Ski Rays® that are fitted with lifting cleats.

TRAILERING

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.

We have included a booklet in your owner's packet called *You and Your Trailer* published by the National Marine Manufacturers Association (NMMA). The booklet provides basic trailer operation instructions and information. Also, 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.

If your copy of *You and Your Trailer* is missing or you would like another copy, additional copies are available

from Dept. TM, National Marine Manufacturers Association, 401 North Michigan Ave., Chicago, IL 60611.

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. Sport Boats are 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 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 of 50% water/antifreeze mixture in bilge pump sump.

2. Water System

- Drain system completely by opening a fixture and allow pump to operate until tank is dry.
- Open the lowest outlet in water system to drain lines.
- To remove any remaining water remove outlet hose on pump and activate pump. To blow out lines, attach air nozzle where outlet hose was removed. Make sure all fixtures are open before starting.
- Your system is now winterized. Don't forget to reattach the outlet hose and close all fixtures.

3. 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.

4. Batteries

- Remove from boat.
- Remove grease and dirt from top surface.
- Grease terminal bolts.

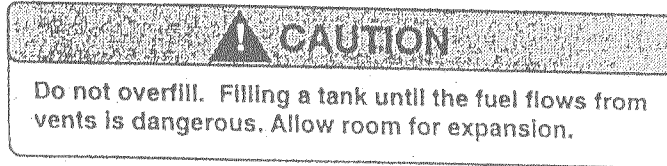
- Store on wooden pallet or thick plastic in a cool dry place. Do not store on concrete.
- Keep under a trickle charge.
- When replacing battery in service, remove excess grease from terminals, recharge as necessary and reinstall in boat.

5. Head System

- Empty top tank and holding tank.
- Make sure all water is cleared.

6. Fuel System

- 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 is treated.



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.

BATTERIES

Before installing the batteries, 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.

SECTION 9
STORAGE &
LAUNCHING

3. Check all wiring for loose connections.
4. Check all switches and equipment for proper operation. Anchor lines and gear should be inspected and replaced if necessary.
5. Make sure hull drain plug is in place.
6. Clean bilge thoroughly if it was not done at lay-up.
7. Check all engine fluid levels.
8. Check fuel lines for leaks.

Section 10 • Care & Refinishing

Fiberglass/Gelcoat

Molded fiberglass coated with a gel coat exterior finish make up the structure of the hull, deck and some interior parts of your Sea Ray®. 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.

!
Gelcoat surfaces are slippery when wet. Use extreme care when walking on wet gelcoat.

If the gelcoated surface gloss cannot be restored by waxing, power buff with a rubbing compound such as 3M Super Duty #05955, followed with 3M Finesse-It 2 #05928, then wax.

! WARNING

Care should be utilized in waxing commonly walked upon areas of the boat to insure that they are not dangerously slippery.

An alternate method is to use Meguiars #44 Heavy Duty Color Restorer followed with Meguiars #50 Boat Cleaner/Polish, then wax.

Recommended waxes are; 3M Imperial Hand Glaze #05990 or Meguiars #26 Hiteck Yellow Wax.

If gelcoat is not maintained and becomes heavily oxidized, light sanding may be required before buffing.

STAINS & SCRATCHES

Gelcoat and painted surfaces are very resistant to deep stains. Common surface stains can be removed with diluted household detergents, providing 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 gel coat 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. 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 annually. If it needs repainting, flush the old paint and wash with hot water and laundry detergent. Rinse well and let surface dry completely. Feather any deep scratches with sandpaper and repaint, following the directions on the bottom paint label. Replacement coating can be ordered from your Sea Ray® dealer.

Fiberglass hulls should never be hauled, painted and re-launched the same day since this does not allow sufficient time for the moisture which has been absorbed into the old paint film to completely dry out. Generally, 24 to 36 hours of drying time is required.

Bilge/Engine Compartment

1. Pump the bilge 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 screen.
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 operators manual for engine maintenance details. Wipe off engines 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 termi-

nals. 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 edged, 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.

Plexiglass

Never use a dry cloth or duster, or glass cleaning solutions on plexiglass.

To clean plexiglass, 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 chambray.

Grease and oil may be removed from plexiglass with kerosene, hexane, white (not aviation or ethyl) gasoline or aliphatic naphtha (no aromatic content).

Do not use solvents such as acetone, silicone spray, benzene, carbon tetrachloride, fire extinguisher fluid, dry cleaning fluid or lacquer thinner on plexiglass, since they attack the surface.

Remove fine scratches with fine automotive acrylic rubbing and polishing compounds.

Teak

Teak does not require refinishing but should be cleaned occasionally with a teak cleaner, obtainable at marine supply stores. Do not use steel wool in cleaning teak, it leaves rust specks. Bronze wool is available and should be used. Several penetrating protective coatings are available for treating teak and their use is considered advantageous. Because some cleaners can damage gelcoats and aluminum, always read the directions before using any cleaner.

Upholsteries

Exterior fabrics should be cleaned with a sponge or very soft scrub brush and a mild soap and warm water solution. Rinse after scrubbing with plenty of cold, clean water and allow the fabric to air dry in a well ventilated place, preferably 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 G&T® MARINE FABRICS

Always clean immediately. Test an unseen area of fabric before cleaning stain. See following chart for cleaning recommendations.

Type of Stain	Steps			Cleaning Recommendations
	1	2	3	
Water Stain	B	C	E	A. White cloth - Westley's® Clear Magic. B. White cloth - Westley's® Clear Magic - air hose. C. Lendow® Glass Cleaner. D. Lift Off® Spot Remover. E. Clothes shaver to remove lint. F. Follow instructions of staining agent manufacturer. * Suntan lotions, wet leaves, permanent markers and some other products contain dyes that permanently stain.
Motor Oil	A			
Spray Paint	A	D	F	
Mildew	A	E		
Yellow Mustard	A	D		
Wet Leaves*	A			
Oil Base Paint	A	D	F	
Suntan Lotion*	A	F		
Chewing Gum	D			
Tar	D	A		
Lipstick	A			
Ketchup	A			
Grease	A	D		
Ball Point Ink	A			
Household Soil	A			
Permanent Marker*	A	F		
Coffee, Tea	A			
Chocolate	A			
Adhesive	D			
Teak Oil	D			
Latex Paint	A	D	F	
Crayon	A	D		

SECTION 10
CARE &
REFINISHING

BOARDING PLATFORM NON-SKID PADDING (Only On Some Ski Ray Models)

To clean swim platform padding, 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 non-abrasive soap or detergent. A soft sponge or brush, kept clean for this purpose, is excellent. Blot dry with a clean cloth.

The non-skid padding was applied with 3M® Scotch-Grip™ 2141 Rubber & Gasket Adhesive; if the padding begins to peel or is in need of replacement it can be reapplied with the same or a rubber adhesive with similar characteristics.

Section 11 • Service Information

SECTION 11
SERVICE
INFORMATION

Useful Service Information

OWNER _____
HOME PORT _____
BOAT NAME _____
REGISTRATION # _____ STATE _____
HULL SERIAL # _____
WARRANTY REGISTRATION DATE _____
ENGINE MAKE & MODEL _____
ENGINE SERIAL # _____
OUTDRIVE SERIAL# _____
PROPELLER SIZE _____ DIA _____
PROPELLER PITCH _____ " PART# _____
FUEL CAPACITY _____
WATER CAPACITY _____
KEY #, IGNITION _____ DOOR _____

RADIO CALL LETTERS _____
SELLING DEALER _____
CITY & STATE _____
LENGTH _____
BEAM _____
DRAFT _____
VERTICAL CLEARANCE _____
ESTIMATED WEIGHT _____
BATTERY VOLTAGE _____
TRAILER MAKE _____ MODEL _____
SERIAL# _____ GVW _____
INSURANCE CO. _____
POLICY# _____
PHONE# _____
HULL COLOR _____ DECK COLOR _____
INTERIOR COLOR _____

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 YOUR ENGINE OPERATOR'S MANUAL FOR DETAILS

	BEFORE EVERY USE	AFTER FIRST 20 HRS.	EVERY 50 HOURS	EVERY 100 HOURS	ANNUALLY
CHECK ENGINE OIL LEVEL	X				
CHANGE ENGINE OIL					
CHECK GENERATOR OIL LEVEL	X			X	X
REPLACE OIL FILTER					
REPLACE ENGINE MOUNTED FUEL FILTER				X	X
CHECK TRANSMISSION FLUID LEVEL				X	
CHANGE TRANSMISSION FLUID	X				
CLEAN CRANKCASE VENTILATING SYSTEM					X
CLEAN TRANSMISSION OIL STRAINER SCREEN		X		X	
CHECK COOLING SYSTEM HOSES & CONNECTIONS FOR LEAKS (WITH ENGINES RUNNING)					X
TIGHTEN ENGINE MOUNT FASTENERS	X				
CHECK FOR LOOSE, DAMAGED OR MISSING PARTS	X	X			X
CHECK WATER PICK-UP & WATER IMPELLERS					X
CHECK ACCESSORY DRIVE BELTS	X				
CHANGE ANTIFREEZE					X
CLEAN AIR CLEANERS					X
CHECK ZINCS IN HEAT EXCHANGER		X		X	
FLUSH ENGINE WITH FRESH WATER AFTER					
		EVERY 25 HOURS			
		EVERY USE IN SALT WATER			

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.

REFER TO THIS MANUAL FOR DETAILS.

SECTION 11
SERVICE
INFORMATION

	BEFORE EVERY USE	AFTER FIRST 20 HRS.	EVERY 50 HOURS	EVERY 100 HOURS	ANNUALLY
CHECK SEA WATER STRAINERS & SEACOCKS*	X	X	X		
LUBRICATE SEACOCKS*					
CHECK ENGINE ALARMS*	X				X
CHECK EXHAUST SYSTEM FOR LEAKS*	X	X		X	
CHECK FUEL SYSTEM LINES & CONNECTIONS	X	X	X		
CHANGE WATER SEPARATING FUEL FILTER		X			
LUBRICATE THROTTLE & SHIFT LINKAGE PIVOT POINTS		X			X
CHECK BATTERY ELECTROLYTE LEVEL	X	X	X	X	X
CHECK ALL ELECTRICAL CONNECTIONS (INCLUDING DOCKSIDE POWER INLET*)		X			X
INSPECT PROPELLER FOR POSSIBLE DAMAGE			X		
CHECK WATER SYSTEM PUMP FILTER*		X	X		X
INSPECT FRESH WATER PUMP & WATER SYSTEM*		X		X	
CHANGE HEAD SYSTEM VENT FILTER*					X
CHECK FLUID IN TRIM TAB PUMP*		X			X
CHECK OIL IN STEERING SYSTEM					X
	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.

Quick Reference Departure Checklist

Dealer _____

Boat Length & Model _____

Owner _____

BEFORE DEPARTING

- | | |
|--------------------------|-------------------------------|
| 1. Weather Conditions | - Safe To Go Out |
| 2. Required Documents | - All On Board |
| 3. Navigation Equipment | - All On Board |
| 4. Coast Guard Equipment | - Required Equipment On Board |
| 5. Transom Drain Plug | - Installed |
| 6. Bilge Pumps | - Working & Clean |
| 7. Blower | - Working |
| 8. Navigation Lights | - Working |
| 9. Horn | - Working |

- | | |
|-------------------------------|--------------------------------|
| 10. Trim Planes (Tabs)* | - Working |
| 11. Fresh Water Tank* | - Full |
| 12. Head System Holding Tank* | - Empty |
| 13. Fuel Tank | - Filled With Recommended Fuel |
| 14. Fuel System | - Check For Leaks, Fumes |
| 15. Fuel Filter | - Check For Tightness & Clean |
| 16. Power Steering Fluid* | - Full |
| 17. Steering System | - Working Smoothly & Properly |
| 18. Crankcase Oil | - Check Level |

TRAILERING (If Applicable)

- | | |
|----------------------|--------------------------------------------|
| 19. Trailer Hitch | - Check Connection And Fit |
| 20. Engine Clearance | - In Trailering Position |
| 21. Safety Chains | - Attached |
| 22. Electrical | - Check Lights, Brake Lights, Turn Signals |
| 23. Mirrors | - Adjusted For Trailering |
| 24. Boat Position | - Secure On Trailer |

25. Tie-Downs - Tight

26. Winch - Locked

* Optional Equipment On Some Models.

! WARNING
Do Not Run The Engine In An Enclosed Area, Such As A Closed Boat House, As There Is The Possibility Of Inhaling And Build Up Of Carbon Monoxide.

STARTING ENGINE

- 1. Water Intake (With Inboard Engine) - Below Water Surface
- Open Seacock (If Applicable)
- 2. Primer Bulb (Outboards Only) - Squeeze Until Firm
- 3. Engine Compartment - Ventilated
- 4. Battery Switch(es) - Check For ON Position
- 5. Fuel Valve - Open (If Applicable)
- 6. Blower (N/A with Outboard) - Run At Least 4 Minutes & When Operating Below Cruising Speeds
- 7. Bilge Area - Check For Leaks, Fumes

- 8. Throttle Only Function - Actuate And Advance Throttle Slightly
- 9. Throttle Control - With Shift In Neutral Position Advance Throttle Slightly As Required While Operating Starter
- 10. Alarm* (Test) (See Section 3, Instruments & Controls, Engine Alarm System) - Turn Ignition Key to RUN Position, Alarm Should Sound After A Few Seconds
- 11. Ignition Key - Turn Clockwise To START
- 12. Engine Start - Return Key To RUN Position

NOTE: 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 Battery To Recover Between Starting Attempts.

* Optional Equipment On Some Models.

AFTER STARTING ENGINE

- 1. Check Tell-Tail (Outboards Only) - Water Being Discharged
- 2. Oil Pressure Gauge - Check For Normal Reading*
- 3. Water Temperature Gauge - Check For Normal Reading* (N/A with Outboards)

SECTION 11
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- | | |
|---------------------|----------------------------------|
| 4. Voltmeter | - Check For Normal Reading* |
| 5. Fuel Gauge | - Check For Adequate Level |
| 6. Fuel Lines | - Check For Leaks, Fumes |
| 7. Engine Operation | - Check Idle and Shift |
| 8. Water Test Boat | - Note RPM And General Operation |

*Refer To Engine Owner's Manual For Proper Readings.

STOPPING ENGINE

- | | |
|-------------------------------------|-----------------------------|
| 1. Throttle Control | - Bring To Neutral Position |
| 2. Mooring Lines | - Tied Securely To Dock |
| 3. Idle Engine For 5 Minutes | - To Cool Engine |
| 4. Ignition Key | - Turn To OFF Position |
| 5. Fuel Valve (If Equipped) | - Turn To OFF Position |
| 6. Battery Switch(es) (If Equipped) | - Turn To OFF Position |

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.

bulkhead – vertical partition in a boat.

chine – meeting juncture of topside and bottom of boat.

chock – deck fitting, used as guides for mooring or anchor lines.

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

cockpit – an open space aft of a decked area from which a boat is steered.

deck – upper structure which covers the hull.

draft – depth of water required to float boat.

fathom – six feet.

freeboard – height of topside from water line to deck.

gunwale (pronounced gun'l) – meeting junction 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, a watertight vessel 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 hours.

lee – the side that is sheltered from the wind.

port – term designating left side of the boat.

scupper – holes permitting water to drain overboard from deck or cockpit.

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

starboard – term designating right side of the boat.

stern – the aft end of a boat.

stern drive – outboard unit of a inboard/outboard (I/O) engine installation.

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

topside – the top portion of the outer surface of the hull on each side above the water line.

transom – vertical part of stern.

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

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



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