

maintained as required by the Rules of the Road.

Moving Bow UP (Drive Unit UP) Characteristics:

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

Moving Bow DOWN (Drive Unit DOWN) Characteristics:

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

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

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



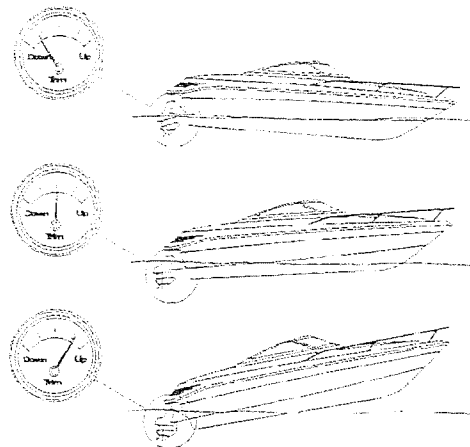
CAUTION

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

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

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

EFFECTS OF POWER TRIM
(Fig. 3.4.2)



POWER TILT OPERATION

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

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

OUTBOARD

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

INBOARD/OUTBOARD

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

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

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

ENGINE ALARM SYSTEM



CAUTION

Never ignore an alarm.

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

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

CAUTION

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

IGNITION SHUTDOWN SWITCH

(AVAILABLE ON SOME MODELS)

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

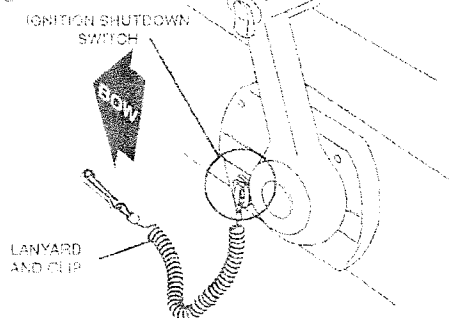
Unintentional activation of the switch could cause potentially hazardous situations. Some of the situations could include: loss of balance and falling forward of unstable passengers, loss of power and directional control in heavy seas, strong currents or high winds, or loss of control when docking. The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

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

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

Ignition Shutdown Switch

(Fig. 3.5.1)



CAUTION

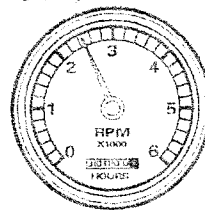
This shut down switch is to be used as a safety stop switch only. It should NOT be used as the normal engine shut-off.

Instrument Gauges

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

TACHOMETER W/HOURMETER

TYPICAL TACHOMETER GAUGE
(Fig. 3.5.2)



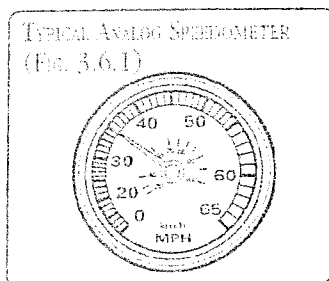
The tachometer indicates the revolutions per minute (RPM) of the engine. (It does not indicate the speed of the boat.) Your Engine Operator's Manual states the maximum full

throttle RPM at which your engine should operate. This should not be exceeded. The tachometer should also be used to determine the most comfortable and economical cruising RPM.

Hour Meter

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

Speedometer



The speedometer indicates the speed of your boat in miles per hour. It operates by transferring the water pressure against the small hole in the leading edge of the outdrive unit to the gauge. To

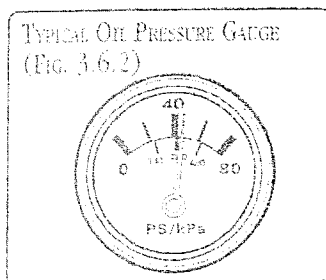
ensure an accurate reading, make sure the water pressure hole is not clogged.

SPEEDOMETER MAINTENANCE:

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

Oil Pressure Gauge

(N/A WITH OUTBOARD ENGINES)



The oil pressure gauge is designed to monitor the oil pressure maintained in the engine's internal lubricating system. Maximum engine oil pressure is controlled by a preset valve in the

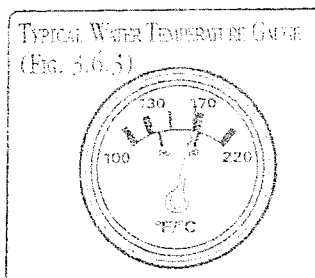
oil pump. Note the reading which this gauge records when the engine is new, as it is the "norm" which can be used as reference during the life of the engine.

IF A COMPLETE LOSS OF OIL PRESSURE

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

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

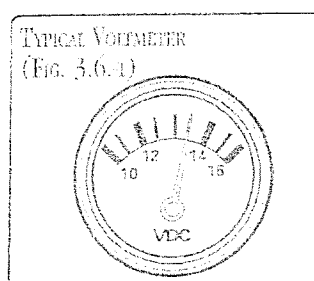
Water Temperature Gauge



The engine water temperature gauge indicates the temperature of cooling water circulating inside the engine. Your engine is equipped with a thermostat so a predetermined

engine temperature should be reached soon after starting the engine and maintained thereafter while the engine is running. Refer to your Engine Operator's Manual for proper gauge readings. IF THE TEMPERATURE APPROACHES ABOVE NORMAL ON YOUR GAUGE, SHUT DOWN THE ENGINE AT ONCE.

Voltmeter

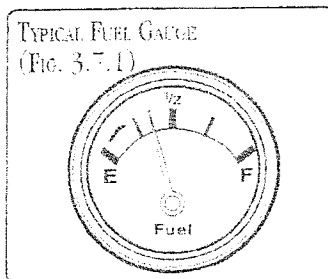


The voltmeter indicates battery voltage. Normal engine operating voltage will range between 12.0 to 15.5 volts when the alternator is charging. Significantly higher

or lower readings indicate a battery problem, alternator malfunction or heavy battery drain.

Fuel Gauge

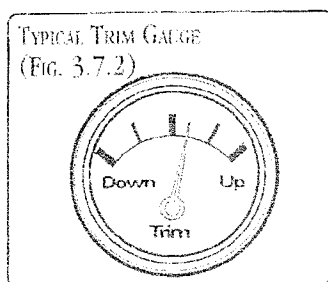
The fuel gauge indicates the amount of fuel in the fuel tank. The most accurate reading of the fuel gauge is at idle speeds when your boat is in an approximately level position. At slow plane when your boat is in a bow up position, the gauge will read inaccurately because the fuel in the tank travels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



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

TRIM GAUGE

(INBOARD/OUTBOARD ONLY)



The trim gauge indicates the angle of the stern drive cavitation plate in relation to the bottom of your boat. When the stern drive is trimmed DOWN, the bow of your boat is being

forced down. It is recommended that the trim be in a full DOWN position when accelerating from idle to plane. This will result in faster planing and less bow rise. Once on plane, the drive unit can be trimmed UP. This will raise the bow of the boat and increase speed.

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

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

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

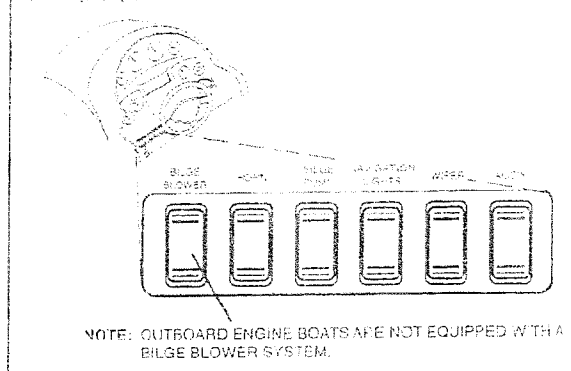
EQUIPMENT SWITCHES

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

HELM SWITCH PANEL

The rocker-type switch panel consists of a series of sealed momentary, two or three position illuminated switches. The switches connect to a fuse block

TYPICAL HELM SWITCH PANEL
(FIG. 3.7.3)

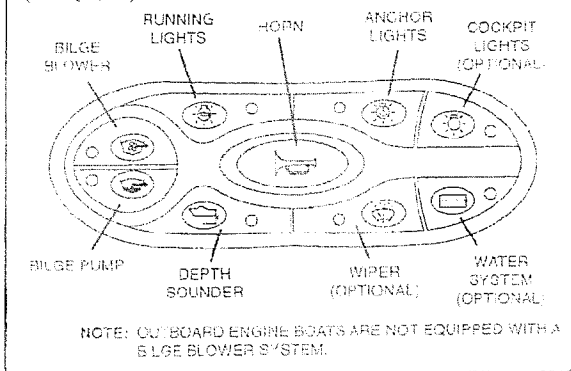


located under the dash (see Section 5 – *Electrical System*).

ELECTRONIC SWITCH PAD

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

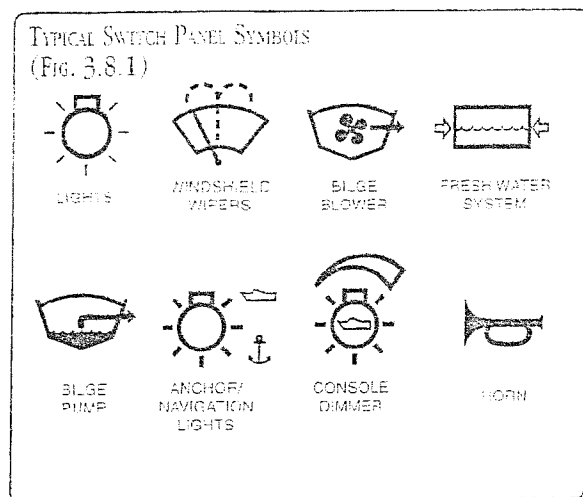
ELECTRONIC SWITCH PAD
(FIG. 3.7.4)



SWITCH PANEL SYMBOLS (ONLY APPLIES TO MODELS WITH ILLUSTRATED SWITCHES)

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

TYPICAL SWITCH PANEL SYMBOLS
(Fig. 3.8.1)



CONSOLE DIMMER



(N/A ON SOME MODELS)

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

NAVIGATION LIGHTS



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

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

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

TO OPERATE THE RUNNING LIGHTS:



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

TO OPERATE THE ANCHOR LIGHTS:



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

MARINE COMPASS



(ONLY AVAILABLE ON SOME MODELS)

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

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

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

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

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

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

TRIM TABS

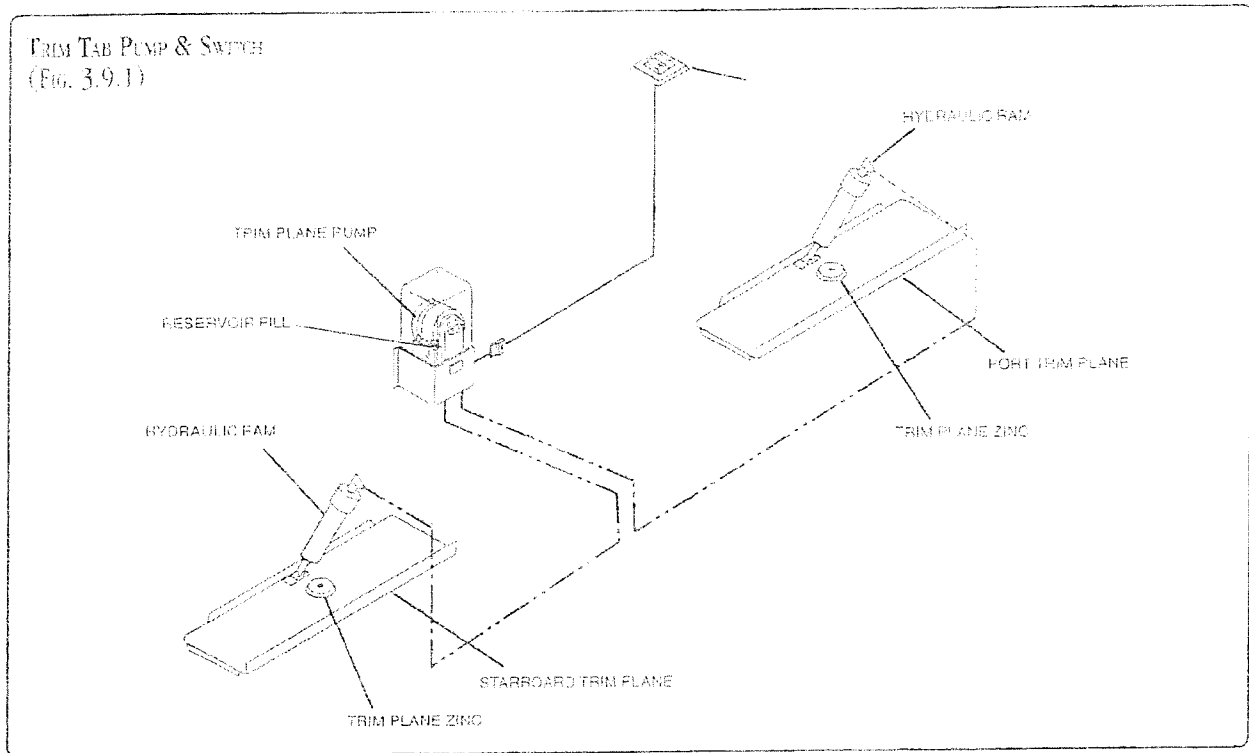


(OPTION ON SOME MODELS)

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

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

TRIM TAB PUMP & SWITCH
(FIG. 3.9.1)



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

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

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

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

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

CARBON MONOXIDE MONITOR

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

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

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

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

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

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.

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

DANGER

Gasoline Vapors Can Explode.

Before Starting Engine:

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

Run blowers below cruising speed.

WARNING

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

WARNING

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

WARNING

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

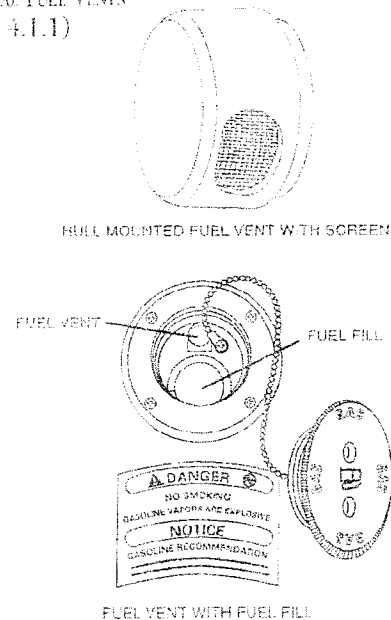
CAUTION

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

FUEL TANK

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

TYPICAL FUEL VENTS
(Fig. 4.1.1)

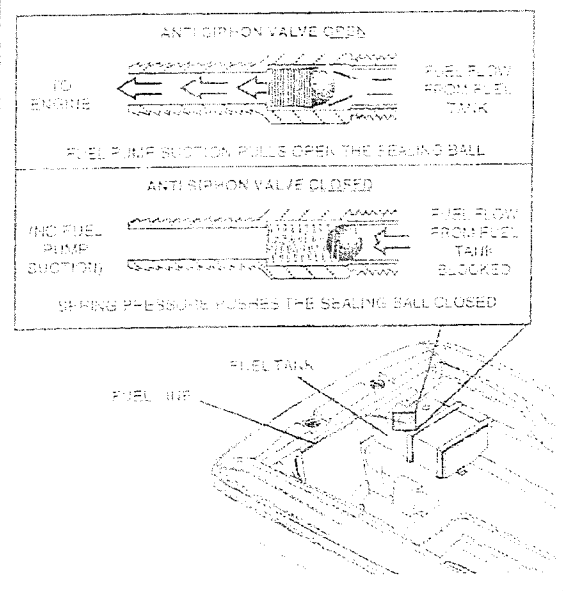


The engine is only able to utilize 95% of the total fuel in the fuel tank, this is known as usable fuel. Allow 15% reserve usable fuel for running in heavy seas.

INBOARD/OUTBOARD ENGINE ONLY

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

ANTI-SIPHON VALVE (Fig. 4.2.1)



OUTBOARD ENGINE ONLY

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

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

FUEL RECOMMENDATIONS

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



CAUTION

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

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

NOTICE

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

NOTICE

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

RECOMMENDED FUEL (GASOLINE)

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

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

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

NOTICE

GASOLINE RECOMMENDATIONS

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

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


AVOID USING FUELS WITH ALCOHOL ADDITIVES

FUEL FILTERS


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

NOTICE

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

RECOMMENDED FUEL: (DIESEL) 

#2 Diesel fuel.

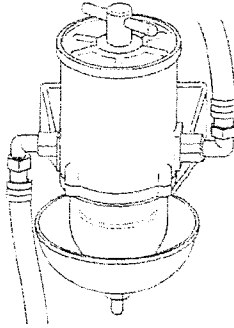
FUEL FILTERS: (DIESEL) 

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

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

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

RACOR® WATER SEPARATING FUEL FILTER
(FIG. 4.3.1)



REFER TO THE ENGINE OPERATORS MANUAL FOR MORE DETAILED INFORMATION.

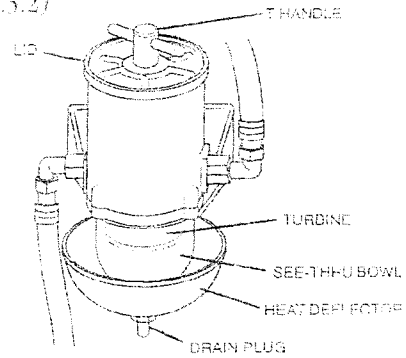
RACOR® FUEL FILTER MAINTENANCE

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

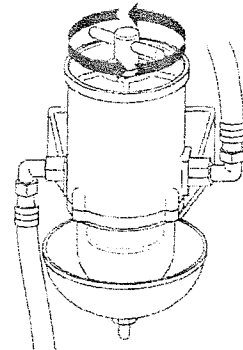
Inspect or drain the collection bowl of water daily. To drain water:

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

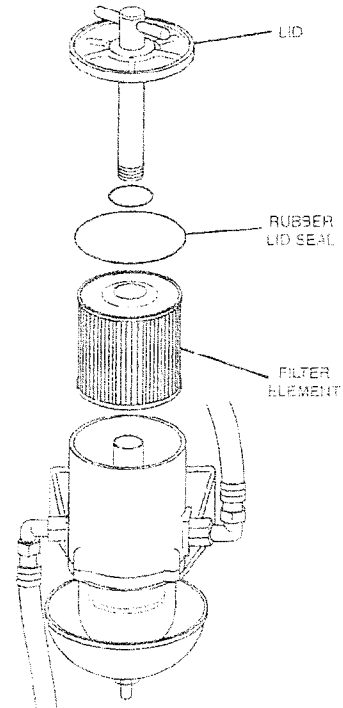
RACOR® WATER SEPARATING FUEL FILTER DRAIN PLUG
(FIG. 4.3.2)



RACOR® WATER SEPARATING FUEL FILTER
ELEMENT REPLACEMENT
(FIG. 4.3.3)



RACOR® WATER SEPARATING FUEL FILTER
ELEMENT REPLACEMENT
(FIG. 4.3.4)



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

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

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

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

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

FUELING PRECAUTIONS

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

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

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

⚠ WARNING

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

⚠ WARNING

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

GENERAL:

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

BEFORE FUELING:

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

WHILE FUELING:

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

AFTER FUELING:

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

OIL INJECTION SYSTEM

(OUTBOARD ENGINE ONLY)

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

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

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

LOCATION:

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

FOR OPERATING INSTRUCTIONS REFER TO ENGINE OPERATOR'S MANUAL.

OIL RECOMMENDATIONS FOR OUTBOARD ENGINES

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

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

ENGINE STARTING, SHIFTING & STOPPING

! WARNING

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

! CAUTION

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

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

IMPORTANT: Observe the following:

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

STARTING THE ENGINE

! DANGER

GASOLINE VAPORS CAN EXPLODE.

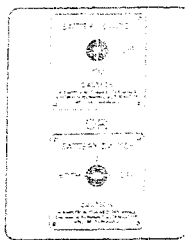
Before Starting Engine:

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

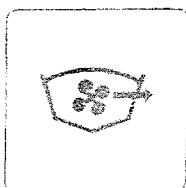
Perform the following as appropriate:

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

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

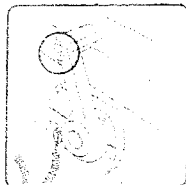


3. Run bilge blowers at least four minutes. Check the bilge for fuel fumes or liquid. Always check bilge by visual inspection and smell. Do not start the engine until the source of fumes is determined and corrected and the bilge area is safely ventilated.

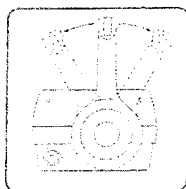


4. (Inboard/Outboard & Outboard Engines Only)

Place drive unit in full DOWN/IN position.



5. Place control handle in NEUTRAL.



6. Position throttle setting as follows:

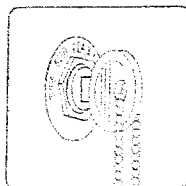
COLD ENGINE - Press THROTTLE ONLY button and move control/throttle lever to full throttle, then return to about 1/4 throttle. In extreme cold it may be necessary to pump lever more than once.

WARM ENGINE - Press THROTTLE ONLY button and move control/throttle lever to 1/4 throttle position.

FLOODED ENGINE - Press THROTTLE ONLY button and move control/throttle lever to full throttle. Be prepared to decrease engine speed to 1000-1500 RPM as soon as engine starts.

7. (Inboard/Outboard Only)

Turn ignition key clockwise to START. Release key when engine starts and allow switch to return to RUN position. Move control/throttle lever back to decrease engine RPM to 1000-1500 RPM if necessary.



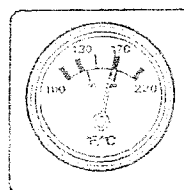
(Outboard Engines Only)

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

AFTER STARTING ENGINE:

1. (Inboard/Outboard Engines Only)

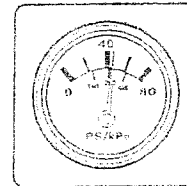
Check oil pressure gauge immediately after engine starts. If oil pressure is not within specified range, (see engine operator's manual ENGINE SPECIFICATIONS), stop engine immediately and determine cause.



2. If engine is cold, run engine for 1 or 2 minutes at fast idle (1000-1500 RPM).

3. After engine has warmed up, check water temperature gauge to ensure that engine temperature is not abnormally high. If it is, stop engine immediately and determine cause. **NOTE:**

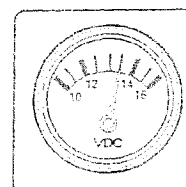
Refer to engine Owner's Manual for correct reading.



(Outboard Engines Only)

Check that water is running from the "Tell-Tail" on the back of the engine. If intermittent or no flow is observed, STOP ENGINE IMMEDIATELY. Check "Tell-Tail" stream often during motor operation.

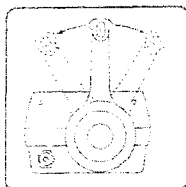
4. Be sure charging system is functioning correctly.



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

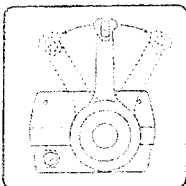
SHIFTING

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

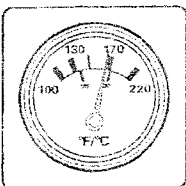


STOPPING THE ENGINE

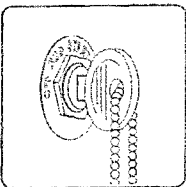
1. Move control/shift lever to NEUTRAL and allow engine to drop to IDLE speed.



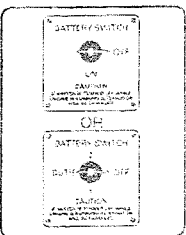
2. Secure mooring lines.
3. If engine has been run at high speed for a long period of time, allow engine to cool by running at IDLE speed for 3 to 5 minutes.



4. Turn ignition key to OFF.



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



SECTION 5 • ELECTRICAL SYSTEM

DC SYSTEM

The 12 volt direct current (DC) electrical system derives its power from the battery(ies), which is kept charged by an engine-driven alternator. The battery voltage is indicated by the voltmeter on the dash panel. The negative terminal is attached to the grounding studs of the engine. This "negative ground system" is the approved system for marine DC electrical systems. Additional 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 DC power needs on your boat. It may be necessary to add batteries or auxiliary charging methods to supply adequate power for the additional accessories you require.

BATTERY

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

CAUTION

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

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

TO REMOVE THE BATTERY CABLES:

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

BATTERY MAINTENANCE

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

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

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

In general:

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

DANGER

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

CAUTION

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

PROPOSITION 65 WARNING

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

KEEPING THE BATTERY CHARGED

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

BOATS NOT EQUIPPED WITH DOCKSIDE POWER

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

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

BOATS EQUIPPED WITH DOCKSIDE POWER & AC TO DC CONVERTER/BATTERY CHARGER

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

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

CONNECTING JUMPER CABLES

DANGER

EXPLOSION HAZARD

DO NOT USE JUMPER CABLES IN THE ENGINE COMPARTMENT

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

IGNITION PROTECTION

DANGER

GASOLINE VAPORS CAN EXPLODE

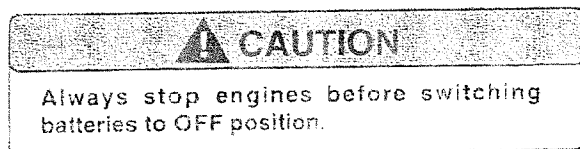
Use **ONLY** Marine Rated parts to replace such items as starters, distributors, alternators, generators, etc. **Do not** use Automotive Parts because they are not ignition protected and could cause a fire or explosion.

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

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

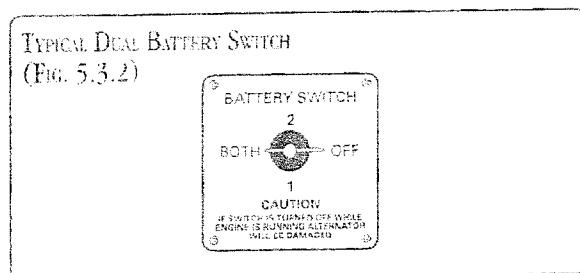
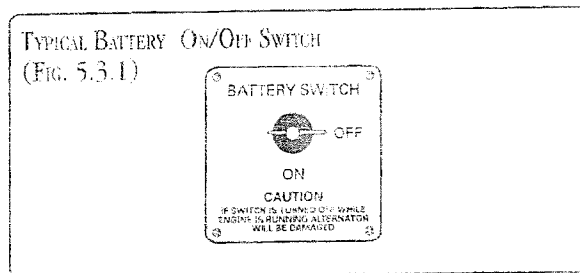
BATTERY SWITCHES

(OPTIONAL ON SOME MODELS)



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

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



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

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

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

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

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

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

ELECTRICAL SYSTEM

BREAKERS AND/OR FUSES

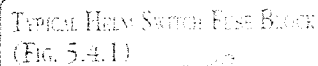
In the event it becomes necessary to replace an electrical fuse or breaker, **REPLACE ONLY WITH A BREAKER OR FUSE OF THE SAME AMPERAGE.** If a breaker or fuse is replaced with a breaker or fuse of lower amperage, it will be insufficient to carry the electrical load of the equipment it is connected to 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.

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

It is recommended that you carry spare fuses.

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



Your Sea Ray® Sport Boat may have an illuminated waterproof electronic switch pad with ISO symbols to control lights, bilge pump and other accessories. The switch pad is connected to the electronic interface module (EIM) located under the dash (see Fig. 5.1.2). The EIM uses automotive type fuses to protect these accessories. It also has a fuse condition test button and indicator light for each component.

OTHER FUSES AND BREAKERS

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



(Fig. 5.4.5)

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

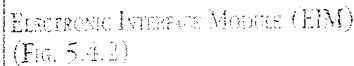
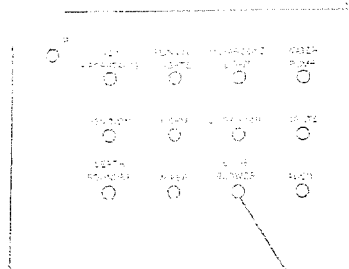


Diagram illustrating the rear panel of the control unit, showing various connection points and components:

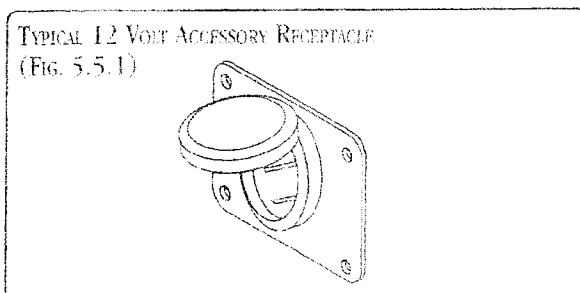
- FUSES
- INDICATOR LIGHTS
- FUSE CONDITION (PUSH TO TEST)
- 12 VOLT DC CONNECTION
- CABLE CONNECTION TO ELECTRONIC SWITCH PAD
- (SHOWN WITHOUT COVER)



NOTE: THIS IS A PRELIMINARY REPORT. IT IS NOT TO BE USED FOR OFFICIAL PURPOSES.

12 VOLT ACCESSORY RECEPTACLE

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



LIGHTING

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

NAVIGATION LIGHTS

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

TO OPERATE THE RUNNING LIGHTS

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

TO OPERATE THE ANCHOR LIGHTS

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

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

WIRE COLOR CODE

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

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

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

AC SYSTEM (OPTION ON SOME MODELS)

120 VAC/60 Hz ELECTRICAL SYSTEM

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

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

CAUTION

Never operate shore power at less than 105 volts.

NOTICE

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

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

SHORE POWER HOOK-UP

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

CAUTION

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

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

CAUTION

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

4. Turn individual breakers ON.

MAINTENANCE FOR SHORE POWER CABLE SET & SHORE POWER INLETS

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

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

WARNING

Disconnect the power cable from power source before performing maintenance.

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

CONVERTER (If Equipped)

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

DANGER

CHARGING BATTERIES PRODUCES EXPLOSIVE HYDROGEN GAS

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

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

WARNING

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

NOTICE

Check the battery water level before operating the converter.

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

Charging characteristics contain 3 elements:

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

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

WARNING

Never block air circulation through the converter.
Never store any gear on top of the unit.

CAUTION

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

Refer to "Battery Maintenance" in this section.