

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

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

STABILITY

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

In addition:

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

WARNING

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

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

Passengers should remain seated while boat is moving.

MAINTAINING CONTROL

GENERAL CONSIDERATIONS

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

- Instruct passengers on location and use of safety equipment and procedures.

WARNING

CONTROL HAZARD

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

WARNING

SPEED HAZARD

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

WARNING

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

VISIBILITY

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

WARNING

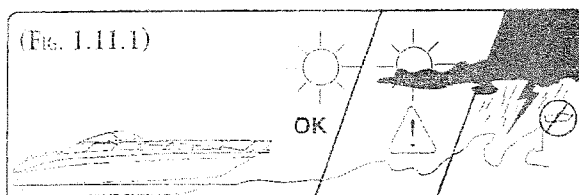
VISIBILITY HAZARD

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

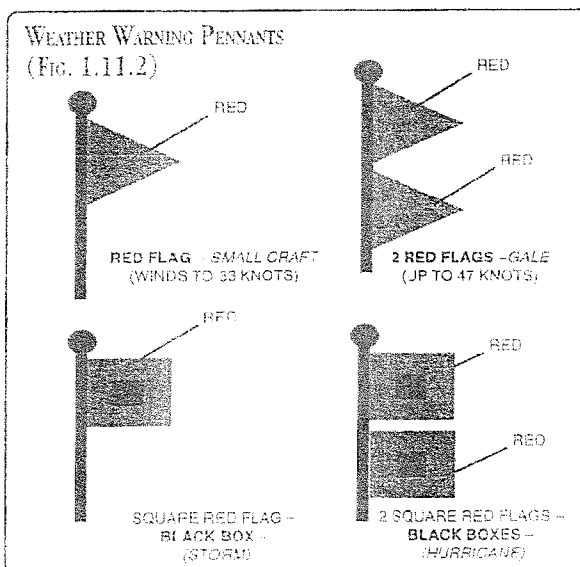
- Be sure that other boats or objects are not in the way before making quick turns.

WEATHER

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



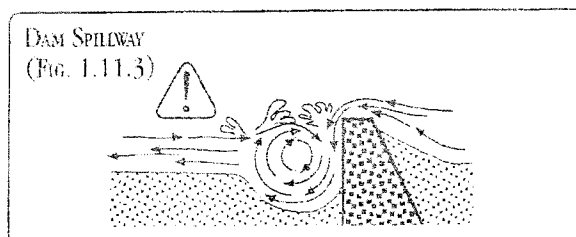
- Learn storm signals and take appropriate action (see Fig. 1.11.2).
- Check the weather and sea conditions before leaving and while underway.
- A sudden change in wind direction or speed or an increase in wave height indicates deteriorating weather.
- Wear a personal flotation device.
- If a storm approaches,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



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

DAM SPILLWAYS

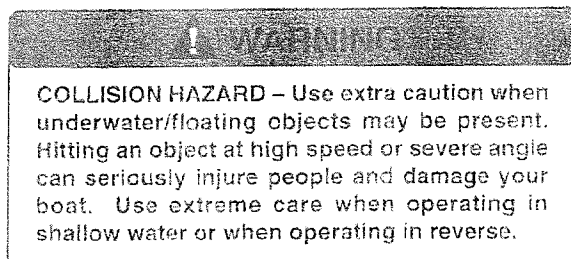
Avoid the waters above and below dam spillways. Dangerous currents and turbulence exist in both areas causing rapidly changing and hazardous conditions.



OPERATING IN SHALLOW WATER

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

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



CAUTION

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

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

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

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

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

FLOAT PLAN

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

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

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

PAINT, CLEANING AGENTS & OTHER SUBSTANCES

The use of products containing chlorine,

WARNING

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

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

WATER SPORTS

SWIMMING

- Do not swim from a moving boat.
- Many areas prohibit swimming from boats except in designated areas.
- Make sure boat's engine is turned off before allowing people to swim anywhere near your boat. Shut the engine OFF and remove the key from the ignition switch so that nobody will accidentally start the engine while swimmers are nearby.
- Turn off engine when taking swimmers or

WARNING

PERSONAL INJURY HAZARD

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

skiers aboard or when putting them overboard. Never permit use of the transom swim platform while engine is running.

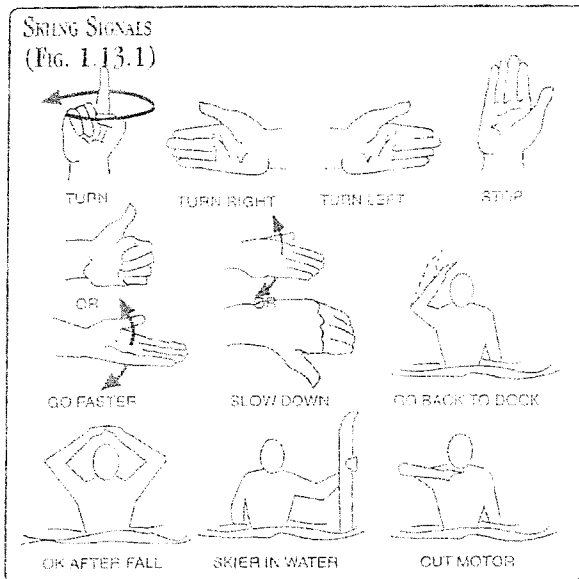
- Slow down and exercise extreme caution when cruising in an area where there might be swimmers or skiers in the water.

SKIING

WARNING

Skiers must wear an approved PFD.

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



Turn – Arm raised, circle with index finger extended.

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

Back to Dock – Pat top of head.

Cut Motor – Draw finger across throat.

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

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

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

Stop – Raise arm with palm vertical and facing forward.

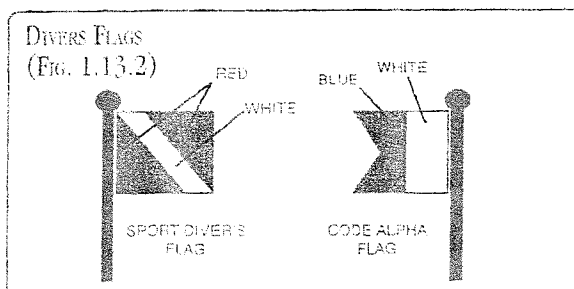
Turn Right – Extend arm out from body to the right.

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

OK After a Fall – Clasp hands together overhead.

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

DIVING



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

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

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

IN GENERAL

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

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

SAFETY HOTLINES

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

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

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

OPERATION GUIDELINES

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

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

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

BOARDING

- Board only one person at a time.

! WARNING !

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

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

STARTING, SHIFTING AND STOPPING

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

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

STARTING ENGINE CHECKLIST:

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

SHIFTING

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



CAUTION

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

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

STOPPING ENGINE CHECKLIST:

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



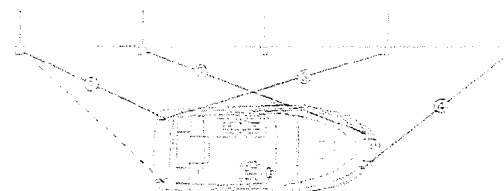
CAUTION

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

HANDLING DOCK LINES

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

BASIC DOCKING LINES
(Fig. 1.14.1)



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

The basic lines used for docking are:

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

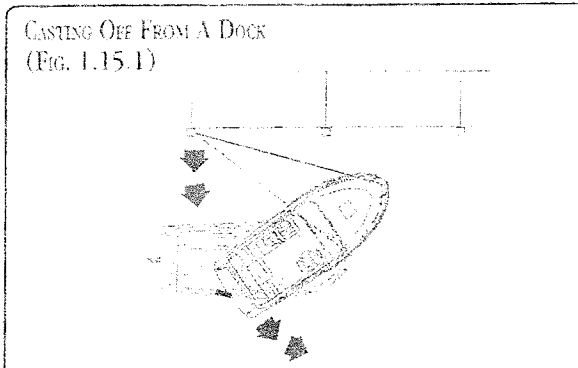
Spring lines are especially valuable when tide movement is significant. They also help in controlling the boat when leaving a dock.

CASTING OFF

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

- Start engine before casting off.
- Put adequate space between boat and dock before trying to move away.
- Successful maneuvering secrets:
 - Since a boat turns at its stern, the stern must have enough clearance to move back toward the dock as the bow moves away from the dock.
 - Use wind and current to move a boat whenever possible, aided by spring lines as needed.
- Power slowly ahead about 1 meter (3 feet) with the after bow spring line fastened. (Fig. 1.14.2). At the same time, turn the wheel toward the dock. The combination of rudder/propeller action and the spring line will swing the stern away from the dock.

CASTING OFF FROM A DOCK
(FIG. 1.15.1)



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

LEAVING MOORING

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

APPROACHING THE DOCK

Procedures vary depending on whether you tie up at a:

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

Some procedures apply in all situations:

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

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

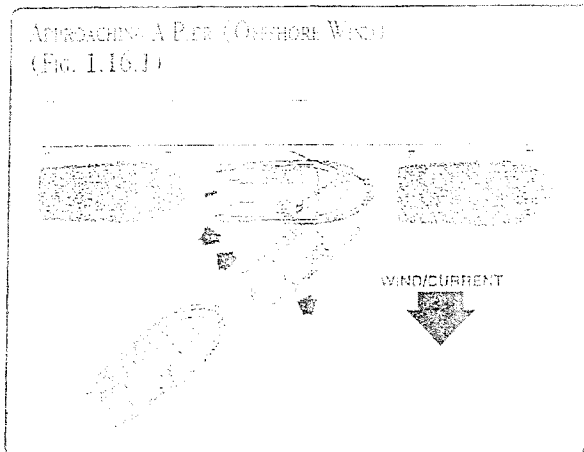
- High Wind/Current – Approach against the wind or current.
- Mild Wind/Current – Approach against the stronger of wind or current.

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

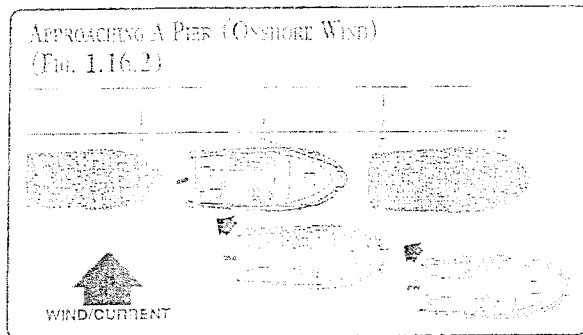
APPROACHING A PIER/WHARF

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

APPROACHING A PIER (ONSHORE WIND)
(Fig. 1.16.1)



APPROACHING A PIER (ONSHORE WIND)
(Fig. 1.16.2)



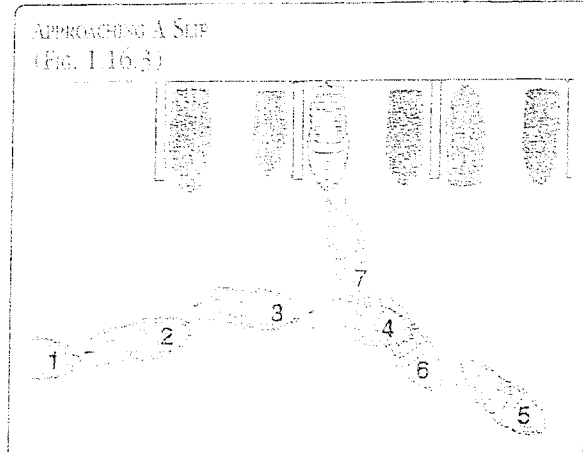
to reverse and turn the wheel toward the dock. Remember that some boats do not steer well in reverse, and tight turns are difficult.

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

APPROACHING A SLIP

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

APPROACHING A SLIP
(Fig. 1.16.3)

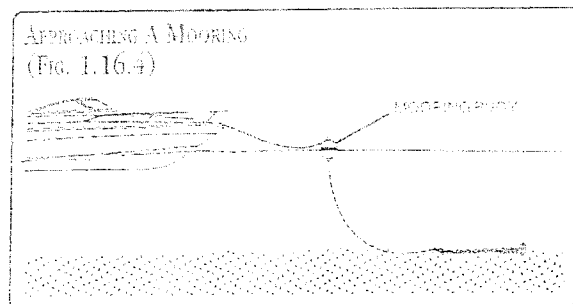


- Shift to forward as you enter, turn wheel to other side and give throttle a short burst of power to align the boat with the slip.
- Shift to reverse. Back slowly.
- When almost completely in, shift to forward to stop.
- Keep engine running at idle and in neutral until all lines are secured.

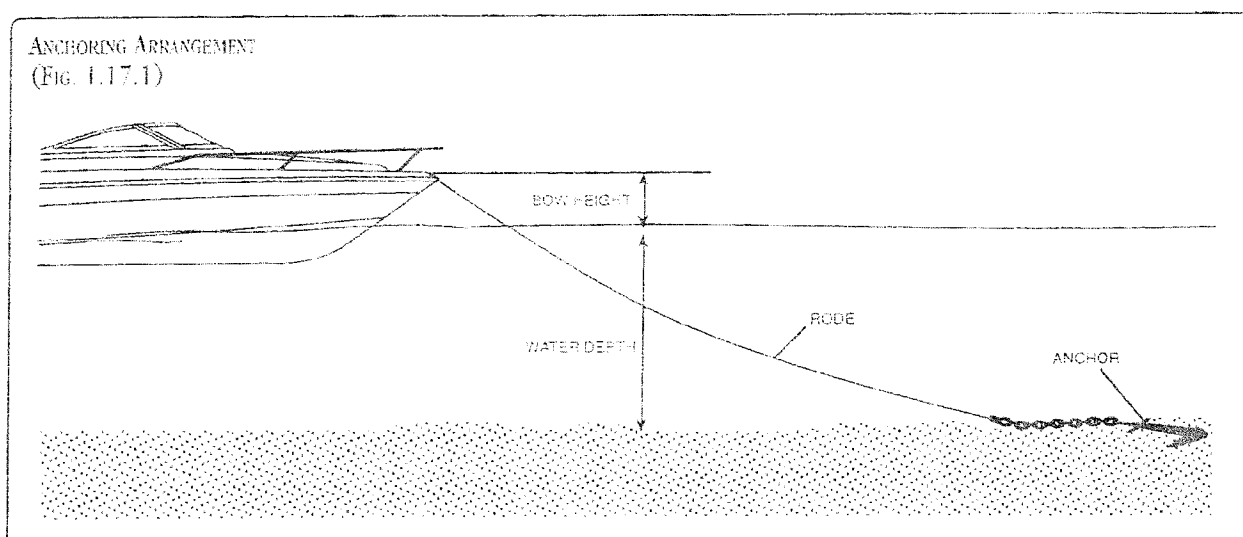
APPROACHING A MOORING

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

APPROACHING A MOORING
(Fig. 1.16.4)



ANCHORING ARRANGEMENT
(Fig. 1.17.1)



ANCHORING

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

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

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

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

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

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

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

$$\text{Rode Length} = (\text{Bow Height} + \text{Water Depth}) \times \text{Scope}$$

Example:

$$\text{Rode Length} = (3 \text{ feet} + 10 \text{ feet}) \times 7^*$$

$$\text{Rode Length} = 13 \text{ feet} \times 7^*$$

$$\text{Rode Length} = 91 \text{ feet}$$

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

LOWERING THE ANCHOR

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

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

WARNING

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

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

SETTING THE ANCHOR

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

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

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

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

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

WEIGHING ANCHOR

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

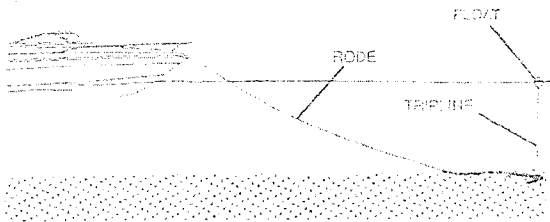
Be careful that trailing lines do not foul in the propeller.

CLEARING A FOULED ANCHOR

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

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

ANCHOR TRIPLINE ARRANGEMENT
(Fig. 1.18.1)



MANEUVERING AND CONTROL

⚠ WARNING

COLLISION HAZARD

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

⚠ WARNING

PERSONAL INJURY HAZARD

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

⚠ WARNING

MANEUVERING HAZARD

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

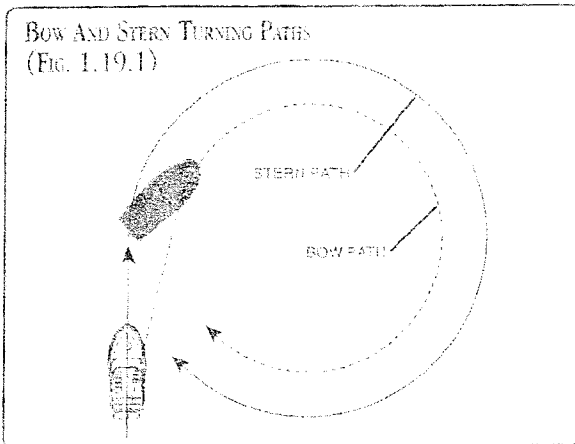
⚠ WARNING

SPEED HAZARD

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

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

BOW AND STERN TURNING PATHS
(FIG. 1.19.1)



STEERING

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

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

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

! WARNING

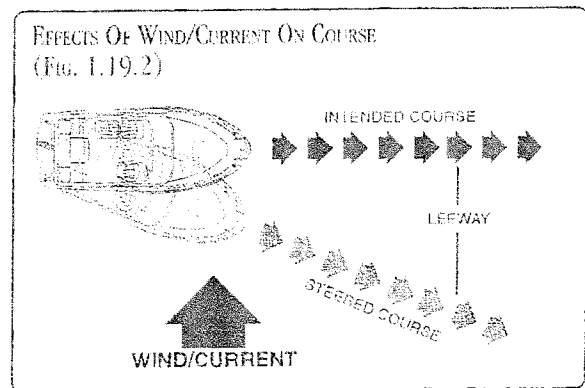
CONTROL HAZARD

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

WIND AND CURRENT

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

EFFECTS OF WIND/CURRENT ON COURSE
(FIG. 1.19.2)



TRIMMING

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

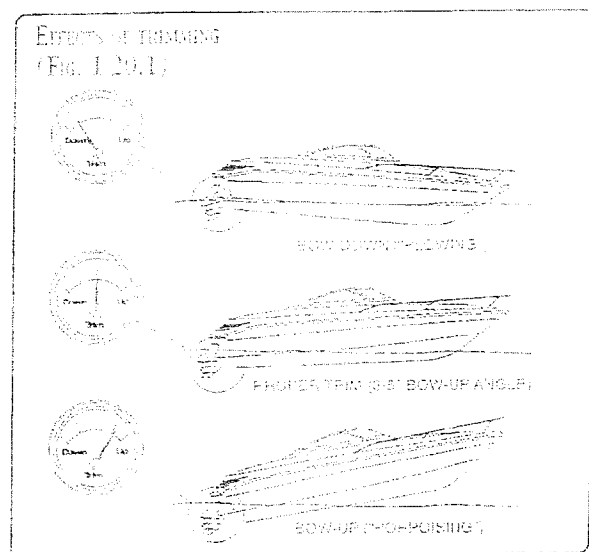
Power trim enables you to adjust the bow attitude up or down by changing the propeller angle in relation to the hull.

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

! WARNING

MANEUVERING/CONTROL HAZARD

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



adjustment at lower speeds when power trim may be ineffective.

A properly trimmed boat:

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

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

To achieve proper trim:

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

CAUTION

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

If propeller speed increases suddenly, reduce engine RPM and trim the drive unit down/under/in until propeller ventilation stops.

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

NAVIGATION

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

The two basic types of navigational rules are:

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

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

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

- **Underway** – Any boat which is not anchored, made fast to shore or dock, nor aground
- **Power-Driven Vessel** – any boat propelled by an engine. (includes sailboats propelled by an engine regardless of whether or not the sails are in use).
- **Sailing Vessel** – any boat propelled by sail only. (no engine in operation).

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

- Any vessel unable to maneuver
- Any vessel with restricted maneuverability
- Any vessel engaged in commercial fishing
- Any sailing vessel

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

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

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

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

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

NAVIGATIONAL BUOYS AND MARKERS

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

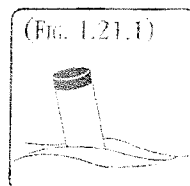
Consult local boating authorities for the type of hazard/warning buoys and markers used in the jurisdiction where you will be boating.

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

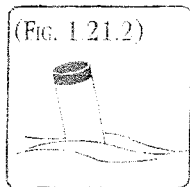
- **Uniform State Waterway Marking System (USWMS)** – used on inland waters and maintained by the individual states.

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

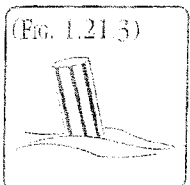
The USWMS marks areas of obstruction and channels which are not well defined with the cardinal system. The cardinal system requires that the boater:



pass north or east of BLACK-TOPPED white buoys.



pass south or west of RED-TOPPED white buoys.

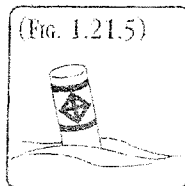


pass outside (away from shore) of RED and WHITE vertically STRIPED buoys.

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



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



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



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



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

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

FWMS BUOYS (Fig. 1.21.8)	
GAT	UNLIGHTED
LIGHTED	SPAR
NUN	SAFE WATER
DAY MARKER (STARBOARD)	DAY MARKER (PORT)

TYPICAL NAVIGATION MARKERS
(Fig. 1.22.1)



① DANGER - THE NATURE OF THE DANGER MAY BE INDICATED INSIDE THE DIAMOND SHAPE SUCH AS ROCKS, REEFS, DAMS, BRIDS OR CONSTRUCTION

② DIVERS DOWN FLAG - AS REQUIRED BY FEDERAL LAW TO BE DISPLAYED BY DIVERS. BOATS EXERCISE CAUTION.

③ INFORMATION - GIVES DIRECTIONS, DISTANCES AND OTHER NON-REGULATORY MESSAGES.

④ GREEN NUN BUOY - NAVIGATE TO STARBOARD FACING UPSTREAM.

⑤ MID CHANNEL - PLACED OUTSIDE THE BUOY ON EITHER SIDE

⑥ RED CAN BUOY - NAVIGATE TO PORT FACING UPSTREAM.

⑦ MOORING BUOY - WHITE WITH REFLECTORIZED BLUE BAND. MAY HAVE A WHITE LIGHT OR REFLECTOR.

⑧ CAUTION - CONTROLLED AREA AS INDICATED. A. CIRCLE SUCH AS SPEED LIMIT, NO FISHING, NO ANCHORING, SKIING ONLY, SLOWING AHEAD, NO PROP BLADE, NO SKIING.

⑨ BOATS KEEP OUT - THE NATURE OF THE DANGER MAY BE PLACED OUTSIDE THE CROSSED DIAMOND SUCH AS WATERFALLS, SWAMP AREA OR RAPIDS.

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

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

The phrase “red right returning” is a good way to remember the correct course between the red and the black or green buoys when returning to harbor. It refers to the red buoys marking the right side of the channel when returning to port (or heading upstream). When leaving port (or heading downstream), the opposite is true. Red buoys are on the left and black or green buoys are on the right. If the seaward direction is difficult to determine, compare the navigational aids you see with a nautical chart.

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

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

NAUTICAL CHARTS

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

RIGHT-OF-WAY

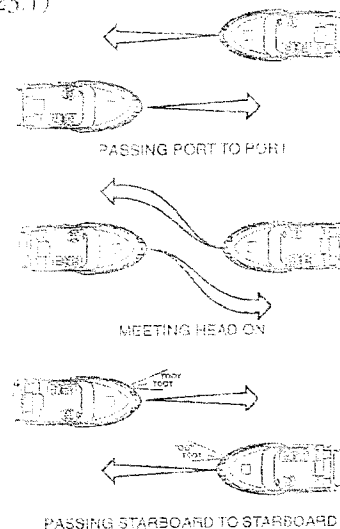
CAUTION

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

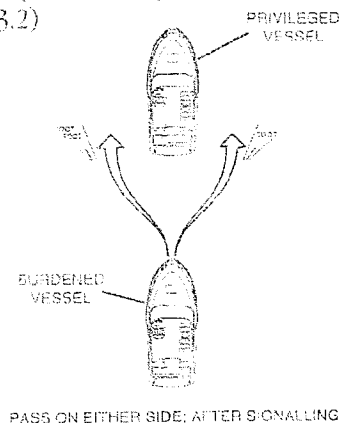
There are three ways of encountering another vessel on the water – meeting, crossing or overtaking.

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

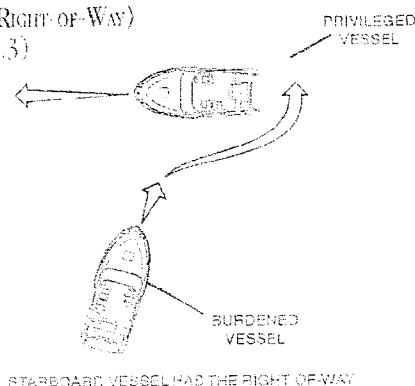
MEETING (RIGHT-OF-WAY)
(FIG. 1.23.1)



OVERTAKING (RIGHT-OF-WAY)
(FIG. 1.23.2)



CROSSING (RIGHT-OF-WAY)
(FIG. 1.23.3)



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

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

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

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

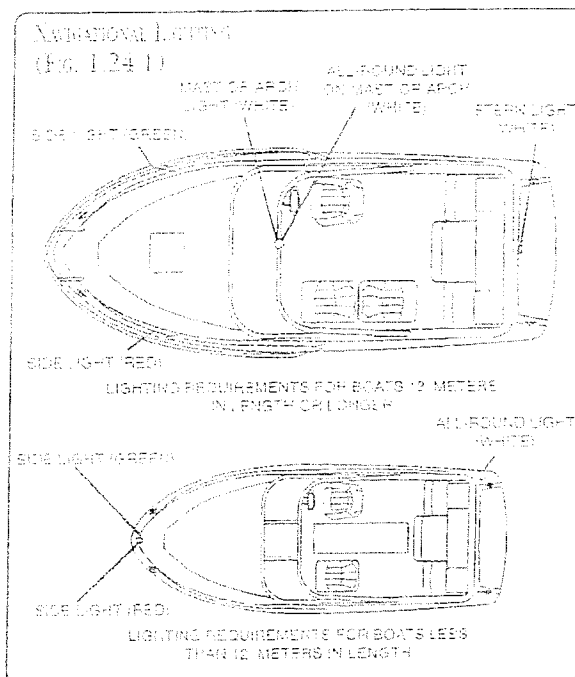
NAVIGATIONAL LIGHTS

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

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

BOAT NAVIGATIONAL LIGHTS

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



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

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

WARNING

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

NAVIGATING IN FOG

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

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

- Have passengers help to lookout.

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

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

EMERGENCY SITUATIONS

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

NOTICE

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

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

DISTRESS SIGNALS

MARINE RADIOS

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

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

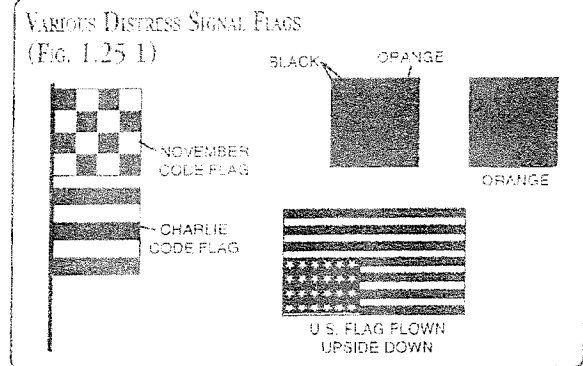
- VHF-FM Channel 16
- SSB 2182 kHz

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

EMERGENCY BROADCASTS

Emergency situations are categorized as:

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



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

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

VISUAL DISTRESS SIGNALS

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

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

Other universally recognized visual distress signals include:

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

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

AUDIBLE DISTRESS SIGNALS

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

Other universally recognized visual distress signals include:

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



FIRE

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

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

Prevention is the safest method of fighting fires. Remember:

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



WARNING

EXPLOSION/FIRE/ASPHYXIATION

- Open flame cooking appliances consume oxygen. This can cause asphyxiation or death.
- Maintain open ventilation.
- Liquid fuel may ignite.
- Use fuel appropriate for type of stove.
- Turn off stove burner before filling.
- Do not use stove for comfort heating.
- Use "sniff test" to check for fumes in bilge and engine compartment.
- Store flammable material in containers which are safety-approved by the Coast Guard.
- Keep flammable material containers in a locker, sealed from the boat's interior and vented overboard.
- Ensure ventilation systems are unobstructed.
- Remove canvas before starting engine.
- Extinguish smoking material carefully.
- Use special care with flames or high temperature near urethane foam.
- Check cleaning products for flammability.
- Ventilate when cleaning or painting.
- Disconnect electrical system from its power source before performing maintenance. (See



WARNING

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

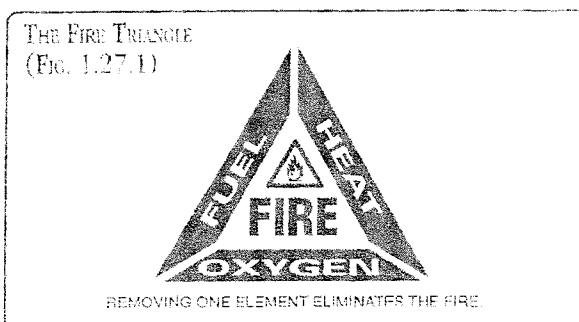
Section 7 – Electrical System(s)

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

FIRE SUPPRESSION EQUIPMENT

GENERAL

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



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

FIXED SYSTEM

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

PORTABLE EXTINGUISHERS

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

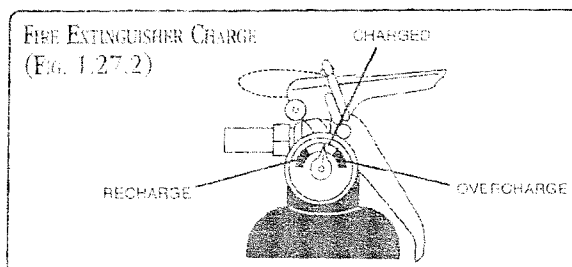
- "A" – Combustible solids (wood, plastic)

- "B" – Flammable liquids (oil, gasoline)
- "C" – Electrical fires

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

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

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



IN THE EVENT OF A FIRE

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

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