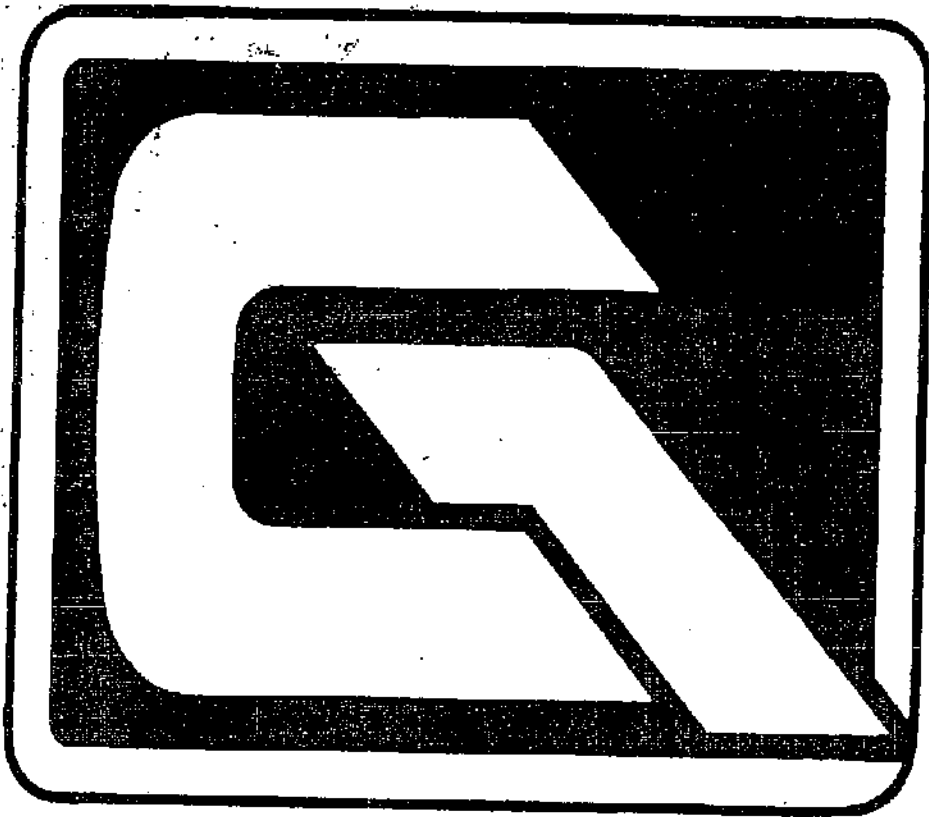


GLASTRON®



STERN DRIVE BOAT Owner's Manual

Table of Contents

General Information	
Introduction.....	1
Warranty	3
Safety On Board.....	4
Safety Afloat.....	7
Engine Shut-Off Safety Switch	9
Owner's Records.....	10
Electrical Systems	
General	13
12 Volt DC System.....	14
120 Volt AC System	16
GFCI	18
Corrosion	19
Wiring Color Code.....	20
Typical Wiring Diagram	21
Water Systems	
Fresh Water	23
Marine Sanitation Device.....	24
Getting Under Way	
Loading	25
Fueling Procedures	26
Instruments & Controls	27
Starting The Engine(s)	30
Accelerating & Trimming.....	31
Mooring Lines	33
Water Skiing	35
Preventive Maintenance	
Engine(s)	36
Fuel System & Ventilation.....	38
Cooling System	39
Sea Strainers & Valves.....	40
Stern Drive	41
Steering System	42
Bilge.....	43
Winter Lay-up & Storage	
Dry Storage	44
Engines.....	44
Fresh Water System	45
Sanitary Water System	46
General Housekeeping.....	46
Batteries	47
Appearance Care	
Fiberglass & Gelcoat.....	48
Teak	49
Deck Hardware & Fittings	49
Windshield & Ports.....	50
Carpeting	51
Seat Covering & Vinyl Trim.....	53
Curtains & Tops.....	53
Troubleshooting	
Engine Problems.....	54
Transmission Problems	59
Lack Of Performance	59
Vibration Problems	59
Nautical Terms	60

General Information/Introduction

Welcome Aboard

Your new Glastron boat has been designed and manufactured to provide you with the ultimate in boating pleasure. Glastron boats are manufactured with the finest of materials and workmanship found in the boating industry. During the manufacturing process Glastron has performed several different tests and inspections to insure seaworthiness and beauty.

Standards and Construction

The Standards and Construction of all Glastron boats meet or exceed U.S. Coast Guard requirements and the National Marine Manufacturer's Association (NMMA) recommendations concerning:

- Navigational Lights
- Factory Installed Fuel Systems
- Engine and Fuel Tank Compartment Ventilation
- Basic and Level Flotation (depending on length of boat)
- Steering System

Construction of the hull begins with multiple layers of fiberglass, bonded with polyester resin, providing a seaworthy hull. The interior of your Glastron also includes micas, marine grade vinyls and carpets. Reasonable care and maintenance will insure that the boat will retain an attractive appearance as the years go by.

Owner's Manuals

Your owner's manual should be used as a guide to familiarize yourself with all the systems and components in your Glastron. The procedures in this manual will help you with the operation and maintenance of your boat. The information may be general in nature in some cases and detailed in others. The suppliers of some of the more complex components such as engines, pumps, generators, refrigerator, air conditioner, radio and electronics, supply their own instruction manuals which are included in the Owner's Manual zipper bag.

The suppliers of these products maintain

their own manufacturer's warranty and service facilities. One of the first orders of business should be to fill out each warranty card and mail it back to the manufacturer to register ownership.

Additional Information

Your Glastron dealer is always ready to help you keep your boat in top condition. There are areas that you, the owner, may not be able to service with today's complex technology. Your dealer has access to factory trained specialists when they are needed for such equipment as air conditioning, engines, and stern drives. Basic servicing can be handled by you, such as checking and changing the engine oil, checking the condition of the hoses, bilge pumps, and electrical connections to name a few. It is important to know when to go to your Glastron dealer for factory trained expert assistance.

We suggest you develop a regular plan of routine maintenance on the engine(s) and hull, to keep your boat operation reliable and efficient. A schedule of cleaning and waxing of the exterior will help keep the appearance like new. Glastron recommends that the boat skipper and one other person who normally accompanies the skipper, enroll in a boating safety course. Educational programs are sponsored by organizations such as the U.S. Auxiliary and the American Red Cross. See your Glastron dealer about special courses available in your area.

For detailed information, contact:

Boat U.S. Foundation for Boating Safety Hotline

Most states also offer safe boating courses. Call 800/336-BOAT to find out what's offered in your state.

Skipper's Course

G.P.O. Superintendent of Documents
Washington, D.C. 20012

United States Power Squadrons

P.O. Box 30423
Raleigh, NC 27617

General Information/Introduction

American Red Cross
Local address

NMMA
401 N. Michigan Avenue
Chicago, IL 60611

There are many good boating publications that have information about your area and what other boaters are doing, such as clubs and other activities.

Sources of Waterways Information: the National Marine Manufacturer's Association has 5 booklets which list sources for safety, cruising and local waterway information. Each covers a different region of the U.S. (North Central, South Central, Northeastern, Southeastern, and Western) For single copies, write to:

Ask for the booklet for your region.

Your Glastron Owner's Manual contains a wealth of information about your specific boat. Don't overlook it as an important source of safety information. In addition to your Glastron Owner's Manual, you can obtain a general purpose manual for your boat or trailer by writing to NMMA and asking for the booklet "You and Your Boat" or "You and Your Trailer" -single copies are free.

General Information/Warranty

General

The Glastron Limited Warranty, in its entirety, appears on the inside back cover of this manual. We made every effort to simplify our warranty so it would be easily understood. However, if you have any questions regarding the warranty, please do not hesitate to contact your dealer.

Owner Responsibility

The new Glastron owner must indicate an understanding of terms and conditions of the Glastron Limited Warranty by signing the warranty registration card where indicated.

The warranty registration card should be properly completed by the dealer, signed by the new owner, and returned to Glastron, Inc. within fifteen (15) days after the original purchase in order to validate the warranty.

Service

Should a problem develop with your new Glastron as a result of workmanship or materials, we want it corrected and back in

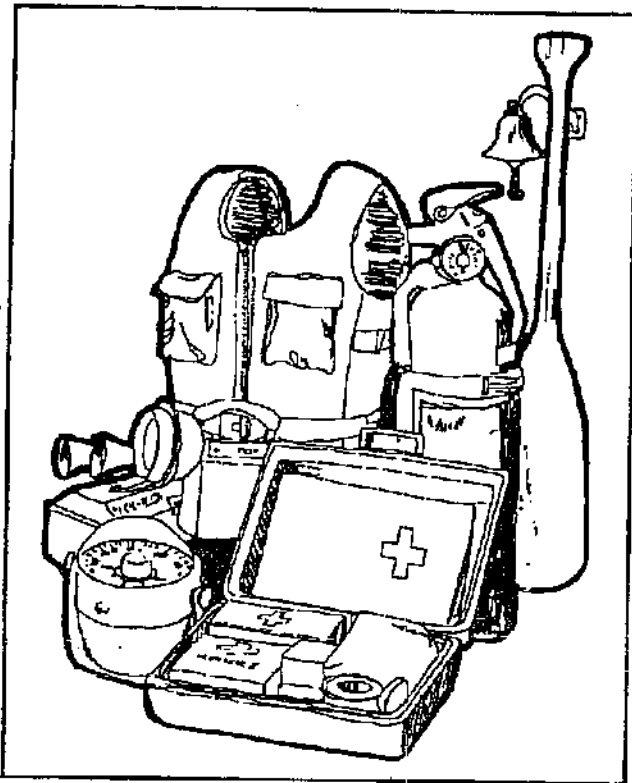
service just as quickly as possible. Contact the factory authorized Glastron dealer, preferably from whom you purchased your boat. (All warranty repairs must be processed by an authorized Glastron dealer). Should the dealer fail to remedy the cause of your problem, contact Glastron, Inc. within thirty (30) days. It is your responsibility to deliver your boat to the dealer or to Glastron, Inc., if necessary.

ALL BOAT MANUFACTURERS ARE REQUIRED BY THE FEDERAL BOAT SAFETY ACT OF 1971, TO NOTIFY FIRST TIME OWNERS IN THE EVENT ANY DEFECT IS DISCOVERED "WHICH CREATES A SUBSTANTIAL RISK OF PERSONAL INJURY TO THE PUBLIC". IN ORDER THAT WE CAN COMPLY WITH THE LAW, IF IT BECOMES NECESSARY, IT IS ESSENTIAL THAT YOUR WARRANTY REGISTRATION CARD WITH THE OWNER'S NAME, ADDRESS AND THE BOAT SERIAL NUMBER BE COMPLETED AND MAILED TO:

GLASTRON BOATS

700 West River Road
Little Falls, MN 56345 .30
(612) 632-8395

General Information/Safety On Board



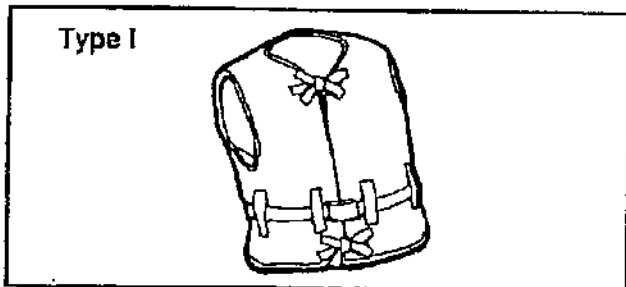
Safety Equipment

You are required by law to provide and maintain the following equipment on your boat:

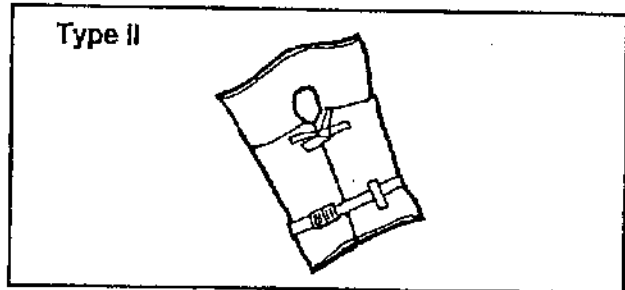
Personal Flotation Devices (PFDs)

All Glastron boats must be equipped with United States Coast Guard approved personal flotation devices of Type I, II or III of a suitable size for each person aboard.

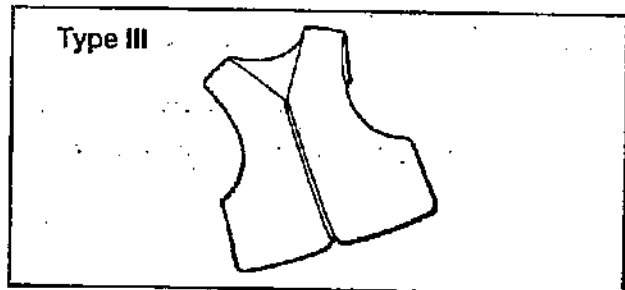
Wearable PFD Type I has the greatest required buoyancy and is designed to turn most unconscious persons in the water from a face down position to a vertical or slightly backward position. Type I is most effective for all waters, especially offshore when rescue may be delayed.



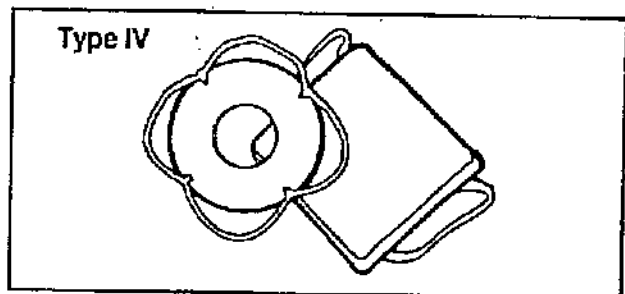
Wearable PFD Type II is designed to turn its wearer same as Type I, however the turning action is not as pronounced as Type I. The Type II will not turn as many persons under the same conditions as Type I.



Wearable PFD Type III is designed so the wearers can place themselves in a vertical or slightly backward position. Type III has the same buoyancy as Type II PFD, but it has little or no turning ability.



Your boat must have one **throwable PFD Type IV** device which can be thrown to a person in the water and grasped and held by the user until rescued. It is not designed to be worn. The most common Type IV devices are a buoyant cushion and a ring buoy.



Wearable PFDs shall be readily accessible and throwable devices shall be immediately available for use, and in "Serviceable Condition".

General Information/Safety On Board

Fire Extinguishers

All class 2 boats (over 26' in length) must be equipped with at least two U.S. Coast Guard approved hand portable type B-I extinguishers or at least one B-II type approved portable fire extinguisher.

Boats under 26' in length are required to be equipped with at least one USCG approved hand portable type B-II extinguisher.

The extinguishers should be mounted in a readily accessible location away from the engine compartment. All persons on board should know the locations and operation of all fire extinguishers.

When an approved fixed fire extinguishing system is installed, one less B-I type is required.

If your fire extinguisher has a gauge as an indicating device, cold or hot weather may have an effect on the gauge reading. Consult the instructions supplied with the fire extinguisher to determine the accuracy of the gauge.

Horn and Bell

All class 2 boats (over 26' in length) must be equipped with a hand or power operated mechanical device capable of producing blasts of two-second duration audible at a distance of at least one mile, and a bell which, when struck, produces a clear bell-like tone. This device is commonly called a "fog bell" and is also required.

Boats under 26' in length are required to be equipped with an "efficient" sound producing device, which can be mouth, hand or power-operated, capable of producing a blast of two-second duration audible at a distance of at least one-half mile.

Visual Distress Signals

The regulation to carry visual distress signals became effective January 1, 1981. This regulation requires all recreational boats when used on coastal waters - which includes the Great Lakes, the territorial

seas and those waters directly connected to the Great Lakes and the territorial seas, up to a point where the waters are less than two miles wide, and the boats owned in the United States when operating on the high seas - to be equipped with visual distress signals.

Pyrotechnic and non-pyrotechnic devices must be Coast Guard approved, in serviceable condition and stowed to be readily accessible. If dated with a date showing the serviceable life, this date must not have passed.

Pyrotechnic USCG approved visual distress signals and associated devices include:

- Pyrotechnic red flares, hand held or aerial
- Pyrotechnic orange smoke, hand held or floating
- Launchers for aerial red meteors or parachute flares

Non-pyrotechnic devices:

- Orange distress flag
- Electric distress light

No single signaling device is ideal under all conditions and for all purposes. Consideration should therefore be given to carrying several types.

If young children are frequently aboard, careful selection and proper stowage of visual distress signals becomes especially important. If you elect to carry pyrotechnic devices, you should select those in tough packaging and not easy to ignite should the device fall into the hands of children.

Registration

Federal and state laws require that every boat equipped with propulsion machinery of any type be registered in the state in which it is principally used. Registration numbers and validation stickers must be displayed on the boat according to regulations, and the registration certificate must be carried on board when the boat is in use.

General Information/Safety On Board

Other Recommended Equipment

- Owner's Manual, Engine Manual
- Anchor and line
- Manually operated bilge pump
- Bucket & sponge
- Compass, navigational charts
- Boat hook
- Flashlight
- Docking & towing lines
- First aid kit
- Commonly used spare parts
- Tool kit
- Fenders
- Extra keys









General Information/Safety Afloat

Weather Awareness

A good understanding of basic seamanship makes for a safe skipper. Basic seamanship covers everything from boat handling to weather. To the knowledgeable skipper, storms rarely appear without considerable advance notice. With today's vast network of meteorological observation and reporting stations around the world and the availability of weather reports by radio, you have accurate weather information faster than ever before. But when the weather bureau has a failure in their predictions, in the interests of safe boating there is no substitute for a strong understanding of what action to take when the weather takes a turn for the worst.

Many cruiser clubs fly weather signals. You should learn to recognize these signals, and listen to your own local forecasting before leaving port.

Chart of Storm Signals

	Daytime Flags	Nighttime Lights
Small Craft Warning Winds up to 38 mph		
Gale Winds to 54 mph		
Whole Gale Winds to 72 mph		
Hurricane Winds of 72 mph & over		

Storm Tips

- Watch horizon for approach of storm
- Turn on radio for weather information
- Return to safe port if time allows
- Stow loose gear below and lash any gear on deck

- Close ports and hatches and secure them
- As seas build, slow down. Have crew and passengers on deck put on life jackets
- Maneuver to stay well off lee shore in case of engine failure
- Use just enough power to maintain steerageway
- Most boats ride best heading into seas. Experiment
- Choose heading that is most easy riding

Fog Tips

- When fog sets in, take bearings and mark position on chart
- Keep log of courses and speeds
- Sound horn or fog bell intermittently to warn others
- Slow down
- Station lookout forward
- Stop engines from time to time and listen for other fog signals
- Take sounding, if you have equipment on board, and match up with sounding on chart
- If you have any doubt, anchor and listen for other fog signals while still sounding yours
- Radar reflector - they should be (18" diagonal) 12' above water
- Have crew put on life jackets

Running Aground

If you run aground, check your passengers for injury and any damage to the boat or propeller(s). Try to shift the weight of passengers and/or gear to heel boat while reversing engine. A boat hook can be used to help push off or ask a passing boat to pass a tow line for help in pulling off. If these efforts fail, get help from the Coast Guard.

Collision

If you should have a serious collision, check your passengers for injury and check the extent of damage. Stand by to help the other craft unless your vessel or passengers are in danger. If the bow of the other vessel has penetrated your boat's hull, stand by to plug the fracture upon separation of

General Information/Safety Afloat

the vessel. Shore up the hole with a spare life jacket or bunk cushions on the inside of your boat. Place duct tape or canvas patch on the outside of the hull with wood strips nailed over the hole. While plugging the hole, trim weight to get the hole out of water during repairs. If your boat is in sinking condition, get all hands in life jackets. If you have a radio, notify the Coast Guard or other authorities immediately. VHF channel 16 or 22 CB radio.

Fire on Board

You should be familiar with the operation of the fire extinguishers on board. If you should have a fire on board, stop the engines and work fast. If the fire occurs in the engine compartment, shut off the fuel supply immediately. Have all hands put on life jackets. If fire gets out of control, make a distress signal, call for help on the radio and jump overboard.

General Information/Engine Safety Switch

Engine Shut-Off Safety Switch

High performance boats are equipped with engine shut-off safety switches. These safety switches are designed to turn off the engines in the event the driver is thrown from the controls.

The purpose of the engine shut-off safety switch is to stop the engine when the operator leaves his control station accidentally by falling in the boat or by falling or being ejected overboard. (Attach lanyard to clothing or around body such that any movement from seat pulls the cap off of the switch). This can happen as a result of poor operating practices such as sitting on the back of the seat at planing speeds, standing (in boats not equipped with wrap-around bolster seats) at planing speeds, operating at high speeds in shallow or obstacle laden waters, drinking and driving, or engaging in daring, high speed boat maneuvers. Since there is a tendency of an unmanned boat, powered by a motor, to circle (known as the circling phenomenon), the installation and use of an emergency stop switch may help to prevent injury to an operator who has

fallen or been ejected overboard by preventing the boat from circling and hitting the person in the water.

The shut-off safety switch has one main disadvantage; inadvertent activation of the switch. This could cause any or all of the following potentially hazardous situations:

- Loss of balance and the falling forward of boat passengers - a particular concern on bow rider type boats.
- Loss of power and directional control in heavy seas, strong currents or high winds.
- Loss of control when docking.

WARNING

As Glastron cannot possibly know of and advise the boating public of conceivable boat-motor types and/or poor operating practices, the final decision of whether to install and use an engine shut-off switch rests with you, the owner/driver.

General Information/Owner's Records

Data Sheet

Glastron Model Name _____ Hull Serial Number _____
Name of Boat _____ State _____ Length _____ Beam _____
Hull Color(s) _____ Weight _____
Draft (Drive Down) _____ (Drive Up) _____ Freeboard (Forward) _____ (Aft) _____
Engine(s)
Make _____ Model Name _____ H.P. _____ Model No. _____
Oil: SAE _____ Quarts per Engine _____ Oil Filter No. _____
Port Serial No. _____ Transom Plate Serial No. _____
Starboard Serial No. _____ Transom Plate Serial No. _____
Transmission(s) (330HP and Larger Only) Gear Ratio _____
Port Serial No. _____ Starboard Serial No. _____
Drive Unit(s) Gear Ratio _____
Port Serial No. _____ Starboard Serial No. _____
Fuel Tank Capacity _____ Number of Tanks _____ Fuel Filter No. _____
Water Tank Capacity _____ Number of Tanks _____
Generator
Make _____ Model Name _____ Model No. _____
Serial No. _____ K.W. _____
Radio
Make _____ Type _____ Model No. _____ Serial No. _____
Battery
Make _____ Type _____
Propeller(s)
Manufacturer _____ Diameter/Pitch _____ / _____ No. of Blades _____
Style _____ Material _____ Mfg. Part No. _____
Key Numbers Cabin _____ Glove Box _____ Ignition Switch(s) _____
Other Equipment _____

Selling Dealer
Name _____
Address _____
Phone No. _____
Salesman _____
Servicing Dealer
Name _____
Address _____
Phone No. _____
Service Manager _____

General Information/Owner's Records

Fuel Log

Date	Hours Run	Fuel (gals)	Range (mi)	RPM	MPH	GPH

Date	Hours Run	Fuel (gals)	Range (mi)	RPM	MPH	GPH

General Information/Owner's Records

Float Plan

Glastron recommends filling out a float plan each time you use your boat. Leave this information with a responsible person ashore (i.e. friend, relative, or dockmaster).

If not returned by _____ call the Coast Guard or (Local Authority) Rescue Center telephone numbers (Coast Guard) _____ (Local Authority) _____ (Rescue Center) _____

1. Name of person reporting _____
Telephone No. _____
2. Description of Boat: Name of Boat _____ Type _____
Color: Hull _____ Deck _____ Cabin _____ Trim _____
Registration No. _____ Length _____ Make _____
Other _____
3. Persons Aboard: Total _____
Name _____ Age _____ Phone No. _____
Address _____
Name _____ Age _____ Phone No. _____
Address _____
Name _____ Age _____ Phone No. _____
Address _____
4. Engine: Type _____ H.P. _____ Fuel _____ Gals. _____
5. Survival Equipment (Check as appropriate) _____ Life Jackets _____ Cushions _____ Flares _____
_____ Smoke Signals _____ Flash Light _____ Distress Light _____ Anchor _____ Paddles _____ Food _____
_____ Water _____ Raft/Dinghy _____
6. Radio Yes/No: Frequencies _____
7. Trip Expectations: Leave at _____ (time) From _____
Going to _____ or _____
Expect to Return by _____ (time) and in no event later than _____ (time)
8. Any other information _____

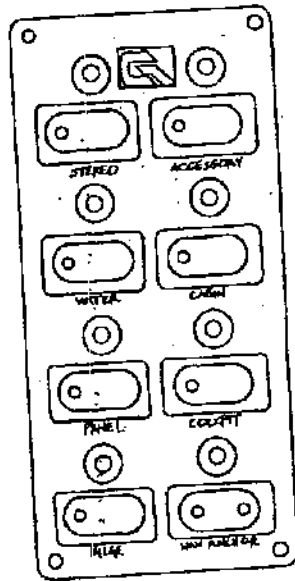
Electrical Systems/General

There may be two electrical systems used on your boat: the 12 Volt direct current (DC) system and an optional 120 Volt alternating current (AC) system. The battery powered 12 Volt DC system is used for starting the engines and for providing power for operating 12-volt electrical equipment. The 12 Volt DC system does not have sufficient power to operate some of the appliances on board such as the electric stove

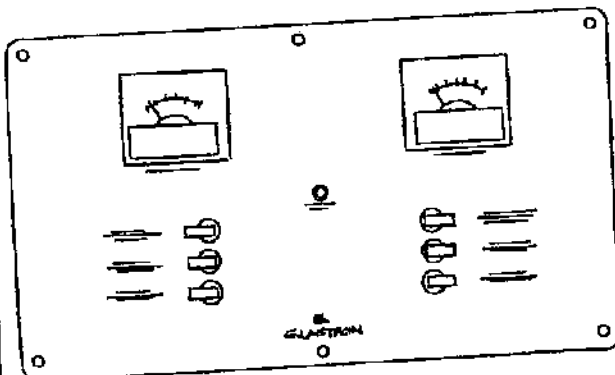
and air conditioner. These appliances require standard 120 Volt AC current which originates from either dockside shorepower, on-board generator, or inverter.

Your boat may be equipped with one of the three electrical panel configurations shown on this page. The power requirements of the electrical equipment on board determine which of the three is used.

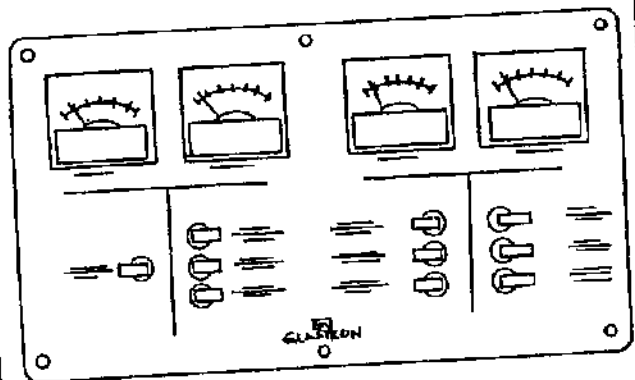
Basic 12 Volt DC System



12 Volt DC System for Cabin Boats



Integral 12 Volt DC and 120 Volt AC Shorepower System



Electrical Systems/12 Volt DC System

Description

The 12 Volt DC electrical system is a 12 Volt, 2 wire, negative ground type. The hot wire is positive, feeding the lights and appliances for instance, and the negative return is by an insulated wire to the negative terminal of the battery.

Power from the batteries to the system is controlled by a high quality master battery disconnect switch on some models. Note that the automatic float switch (supplied with some models) for the bilge pump is not wired through this switch and will operate even with the battery switch in the off position.

On twin engine installation the starboard battery is used to power the starboard engine and the boat electrical system. The port battery powers only the port engine. Since it is isolated from the boat system, due to the battery selector switches, it is available as a back-up battery to start the starboard engine should an electrical device on the boat system be left on, causing the battery to be drained.

Batteries

Batteries are supplied by the dealer or boat owner, and it is important to choose the correct size and type designed for the particular engine(s). Refer to the engine manufacturer's installation and/or owner's manual.

Master Battery Switch (May Be Optional)

The master battery switch provides important protection for the boat, electrical system and batteries. Because the switch serves more than one battery, it doubles as a selector switch. A switch can connect one or another or all batteries to a subsystem. The switch is a make-before-break type, connecting the second battery before disconnecting the first. This assures that at least one battery is always on the system.

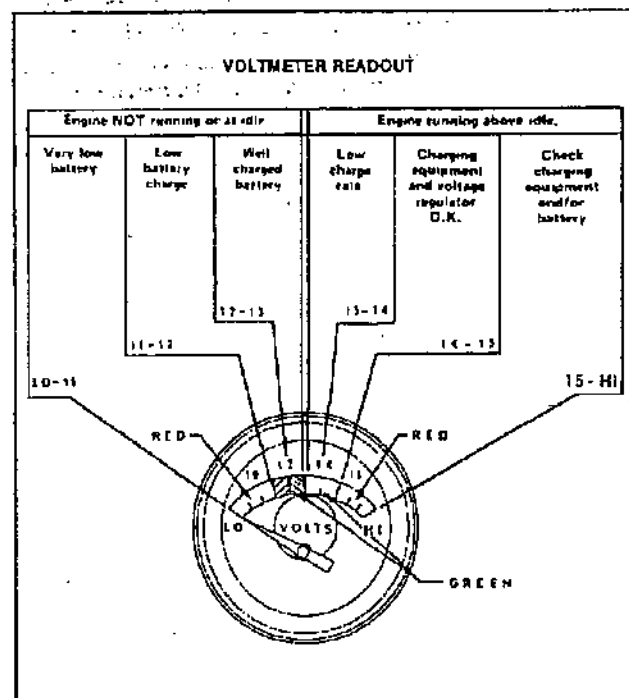
The port selector switch sends power to the port starter from the port battery when the

switch is in the "Battery # 1" position. The starboard selector switch sends power to the starboard battery when the switch is on the "Battery # 1" position. To access the starboard battery for starting the port engine, it is necessary to place the selector switch on "Battery # 2". To access the port battery for starting the starboard engine, it is necessary to place the selector switch on "Battery # 2".

Alternators

The engine alternator will recharge the batteries when the engines are running. A voltage regulator controls the rate of charge by sensing voltage variations and will increase or decrease output accordingly.

The voltmeter indicates the condition of the battery and voltage regulator and the charging state of the alternator. The charging circuit of the electrical system is, as with all other systems, intended to operate within a certain range which is indicated on the face of the voltmeter. The diagram below reflects the various readings possible with the engine not running, idling and running above idle. Some cruiser models will only have one voltmeter and a switch for checking twin engine battery conditions.



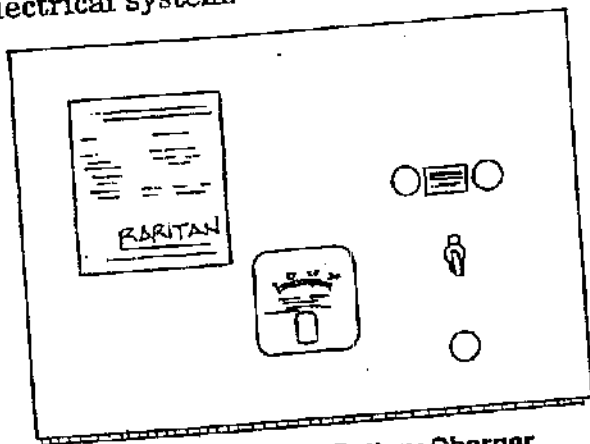
Electrical Systems/12 Volt DC System

Overload Protection

The engine is equipped with a circuit breaker to protect the engine wiring harness and instrumentation power leads. If an electrical overload occurs, a circuit breaker will open and interrupt current flow when the current draw exceeds the rated amperage. Refer to your engine manual for location and resetting procedure.

Converter/Battery Charger (May Be Optional)

The battery charger in your boat is automatic and permanently connected. It is an AC/DC converter and charger that operates from standard AC power sources from 105 to 125 volts. Whenever the energy level of the monitored batteries drops below full charge, the charger comes on automatically to restore full charge. When full charge is restored, the unit shuts off. There is no trickle charge to boil off electrolyte. Check water level of battery(s) every 3 to 4 weeks. Additionally, this unit will provide up to 20 amps of converted power to the DC electrical system.



Typical Converter/Battery Charger

Engine Alarm System

Some engines are equipped with an audible warning alarm. An alarm (located under the dash) will sound if any one of the following occurs in either engine: 1) cooling system water temperature too high, 2) engine oil pressure too low, or 3) low gear lubricant level. If the alarm sounds, quickly observe gauges for an abnormal reading, then stop engine immediately. If all gauges read normal, then refer to your engine manual to aid in finding and correcting the problem.

If the cause for the alarm cannot be found, consult with your dealer. To prevent possible damage to an engine, do not restart engine until the cause for the warning has been found and corrected. In an emergency situation, continue at low speed.

NOTE

The same alarm(s) will sound if one or both ignition keys are turned to "Run" position and engine(s) is not started within 7 to 14 seconds. This feature allows you to test the warning system, which should be done at least once every 5 hours of operation.

Electrical Systems/120 Volt AC System

Optional 120 Volt AC power can be supplied in one of three ways: by shoreline cable, by on-board generator (optional), or by inverter (optional).

Shorepower

Your boat may be equipped with a receptacle located outside. The receptacle has a water resistant cover that protects the male electrical prongs.

The matching cable plug is female. This connection is designed to prevent all but the correct cable from being used. The opposite end of the cable has a three prong plug for the dockside outlet. The special outside receptacle is wired directly to the boat's distribution panel where circuit breakers are provided for each of the on-board circuits.

Procedure for connecting shorepower cable:

1. Turn the master AC switch(es) and all individual switches on the main electrical panel to the "off" position before connecting shore cable(s). This precaution will prevent ruinous arcing at the plug.
2. Connect the cable to the boat's inlet receptacle first and then to the shore outlet receptacle. If the shore receptacle has a switch, turn it to the "on" position. Circuit breakers or switches located on docks exposed to moisture and/or salt could corrode moving parts and make them hazardous. You should exercise extreme caution when making your electrical connections.
3. Make sure the cable has more slack than the mooring lines to avoid strain. Don't allow so much slack that it can be damaged by chafing between the boat and pier or lay in the water.
4. Turn on master AC switch(es).
5. Observe polarity indicator. If reverse polarity light is on, discontinue use of shorepower until problem is corrected. Contact your dealer or a qualified marine electrician.

6. Observe the voltmeter (if equipped) on the distribution panel. If you are in a marina where voltage is low, be more cautious about using too many appliances. Also, low voltage can damage some items such as the refrigerator or air conditioner. Check operating voltage specifications on the unit or in the operator's manual. Note that it may be necessary to monitor the voltage level due to variations caused by increased draws from other electrical users on the same circuit.

7. Turn on individual breaker switch or switches as wanted.

8. The AC ammeter allows the owner to monitor the loads placed on the AC system. The optional inverter can supply between twenty-five and thirty amps of power. The shorepower side of the system is rated to thirty amps. Generator system outputs vary (see generator instructions for specifics). A draw in excess of these values will cause a protective breaker to trip.

On-board Generator (Optional)

You have been supplied with an owner's manual on the generator set you have on board. We suggest the reading of this manual to familiarize yourself with the operation of this piece of equipment.

Generator Starting Procedure

The following procedure should be followed before and during the generator start up:

1. Check fuel supply and engine oil level.
2. Check sea strainer for debris.
3. Check engine cooling system. Running your generator without proper cooling water can damage the rubber impeller in the water pump. If fresh water cooled, check coolant level.
4. Check switches on electrical panel. Turn all switches to the off position before engine starting.
5. Start bilge blower and allow it to run for

Electrical Systems/120 Volt AC System

4 minutes before starting generator engine.

6. If your generator has a diesel engine, turn the preheat switch to the "on" position and allow one minute for preheat.

7. Now you can start your generator engine. After the engine starts, check for water coming out the exhaust outlet. If there is no water, shut down your engine to avoid damage to your engine.

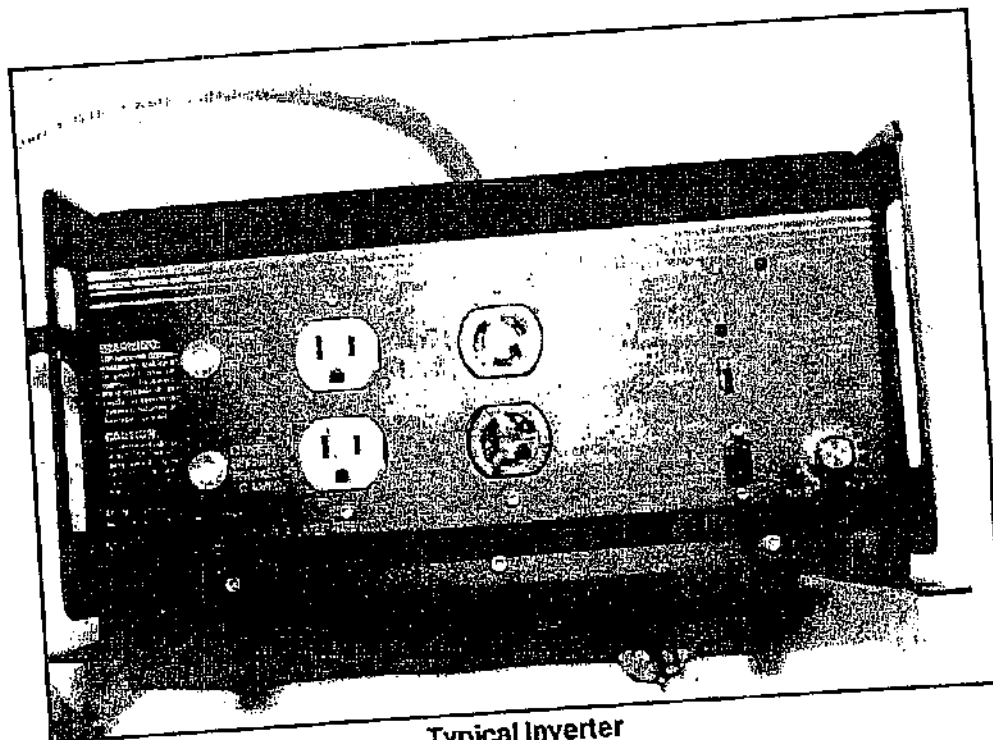
Inverter

The inverter takes 12 Volt DC power and converts it to 120 Volt AC power. This device is used in conjunction with a shore-power system. The two power sources run through an automatic switching device that supplies shorepower whenever it is plugged in or inverter power when the shorepower

is not available. Two deep-cycle batteries are capable of supplying substantial amounts of AC power since most AC electrical devices either have low draw (i.e. the refrigerator which operates on about one amp) or are used for short periods of time (i.e. the microwave that uses eight to ten amps but is only used for a few minutes at a time). A panel which monitors the inverter system functions is located in the cabin. An isolator system is supplied with the inverter system to allow the inverter batteries to be recharged by the propulsion engine alternator.

Isolator

Several isolator systems are available. The general concept of an isolator is to allow a single engine alternator to charge more than one battery without allowing a back-feed between the batteries.



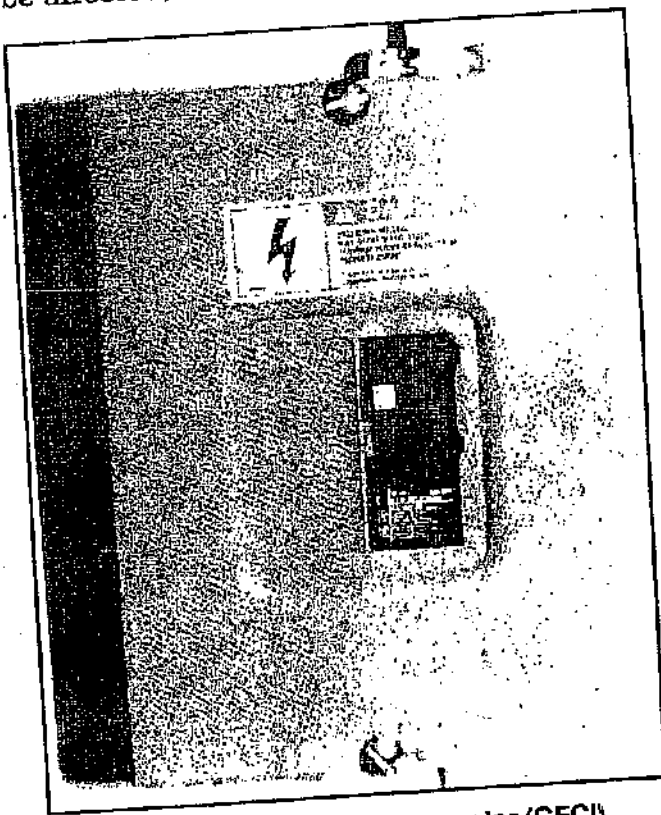
Typical Inverter

Electrical Systems/GFCI

Ground Fault Circuit Interrupter (GFCI)

A GFCI outlet protects you against hazardous electrical shock if your body becomes a path through which electricity travels to reach ground. This could take place when you touch an electrical appliance or cord that is "live" through a faulty mechanism, damp or worn insulation, etc. You don't have to be on the ground itself to be shocked; you could be touching plumbing or other material that leads to ground.

When protected by the GFCI, you may still feel a shock but the GFCI should cut it off quickly enough so a person in normal health should not have a serious electrical injury (infants and very small children may still be affected).



Ground Fault Circuit Interrupter (GFCI)

WARNING

The GFCI will not protect against: Line-to-line shocks (type received from metal inserted in both straight slots of an outlet), current overloads or line-to-line short circuits.

Test Procedure

Like any other safety device, your GFCI outlets should be checked every month to make sure they are operating properly to protect you. This check should be logged with other maintenance duties once a month.

1. Push test button. This should result in power being off at all outlets. Verify by plugging test lamp into every such outlet.

CAUTION

If reset button does not pop out or if test lamp or indicator light remains lit after reset button pops out, do not use any outlets on the circuit. Have a qualified electrician check the circuit out.

2. When the GFCI tests O.K., restore power by returning the lever to the "on" position.

Electrical Systems/Corrosion

Description

Corrosion of metal parts, especially those submerged in seawater, has been a common problem for boat owners. Corrosion is caused by stray electric currents from shore stations supplying AC current, improperly grounded AC lines and circuits, and poorly insulated DC powered equipment from boats moored nearby.

Corrosion is accelerated when electric current is present. For example, in the accompanying list, aluminum is less noble than copper. This means the aluminum will corrode faster than the copper if the two are submerged in seawater.

Galvanic Series of Metals

The metals in this chart range from the Least Noble (Anode Active) to the Most Noble (Cathode Passive). Combinations of any of them will show you what to expect relative to Active and Passive Corrosion.

Least Noble (Anode-Active)

1. Zinc
2. Galvanized steel
3. Aluminum
4. Cadmium
5. Mild steel
6. Wrought iron
7. Cast iron
8. Ni-Resist
9. Lead
10. Tin
11. Manganese bronze
12. Naval brass (60% copper-39% zinc)
13. Nickel (active)
14. Yellow brass (65% copper-35% zinc)
15. Admiralty brass
16. Aluminum bronze
17. Red brass (85% copper-15% zinc)
18. Copper
19. Silicon bronze
20. Nickel (passive)
21. Hastelloy C

Most Noble (Cathode-Passive)

This information is important to know when adding or replacing hull fittings; use metals that are close to each other in the galvanic series.

Sacrificial Zinc Anode System

This system, used to combat corrosion on underwater metal parts, is the attachment of zinc castings to the parts in need of protection. Zinc, which is an active metal in the galvanic series, is attacked by corrosion while a nobler metal such as a bronze fitting is protected. Note that it is necessary to periodically replace the sacrificial anodes.

Electrical Systems/Wiring Color Code

The most recent color coding of boat wiring is one proposed by the American Boat and Yacht Council. It is published in the organization's *Safety Standards for Small Craft* manual. Glastron and boat equipment manufacturers voluntarily comply with these standards so the owner of a new boat can easily install equipment or troubleshoot the electrical system. Here is the color code system:

RED wire is used for the positive (+) side of the battery DC systems on wires that go to fuses or circuit breakers, to distribution panels, high-draw equipment (engine starters), ignition switches, and to ammeters.

YELLOW WITH RED STRIPE wire is used on one circuit only; from starter switch to the starter solenoid.

DARK GRAY wire is used for navigation lights. It is also the color used for the sensor wire from the tachometer sender to the gauge.

BROWN wire is used for the leads to the bilge pumps or switches.

PURPLE wire is used from the ignition switch to electrical instruments and the engine electrical system.

DARK BLUE wire is used for instrument and cabin lights. These run from switches to the lights.

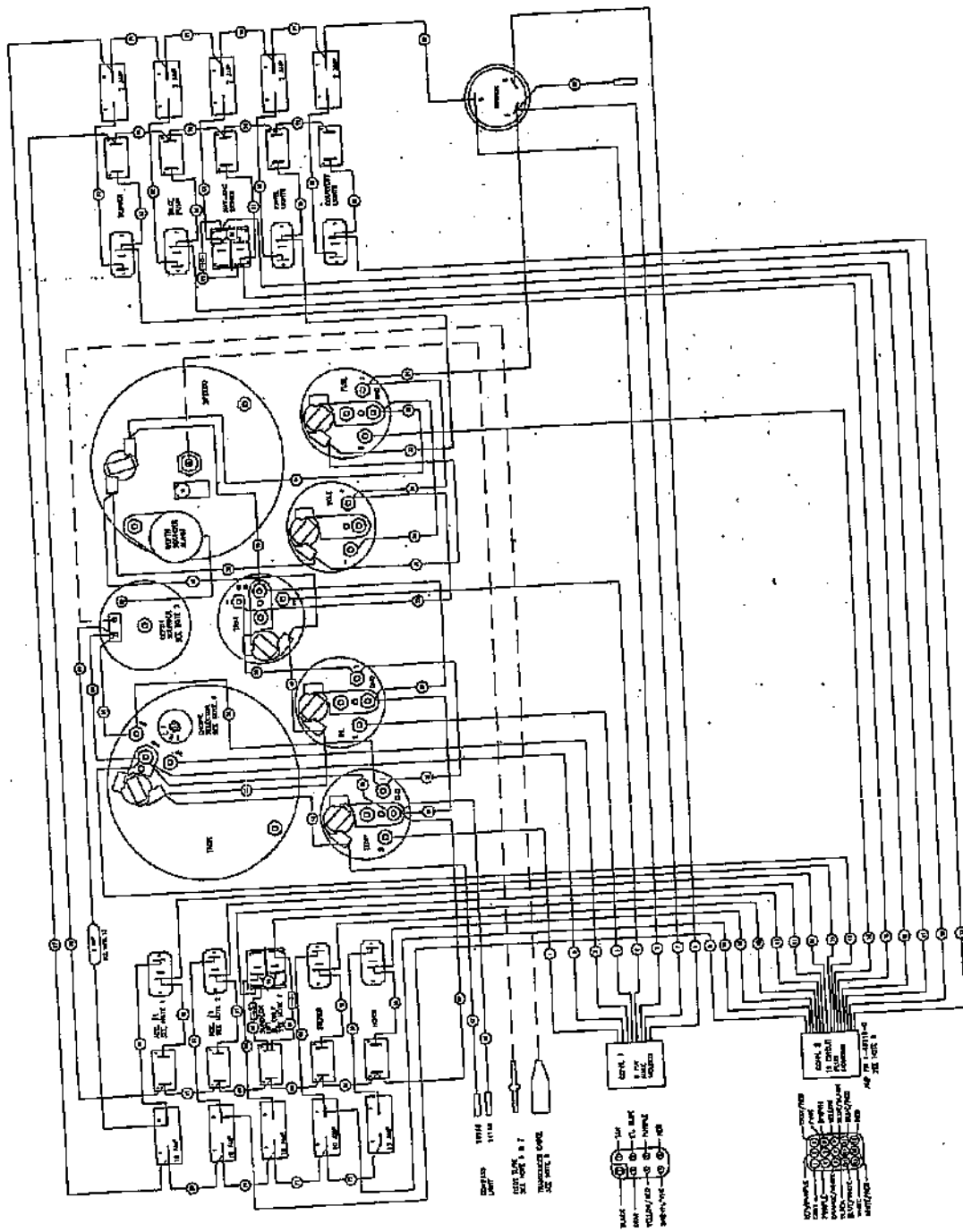
Function	Gauge	Color
Negative Lead	10	Black
Positive Lead	10	Red
Stern Light	14	Gray
Bow Light	14	Gray/Red
Panel Lights	14	Blue
Courtesy Lights	14	Blue/White
Cabin Lights	14	Blue/Black
Bilge Pump	14	Brown
Accessory	14	Orange
Horn	14	Orange/White
Stereo (Power)	14	Purple/Red
Stereo (Memory)	14	Red
Ground	14	Black
Blower	14	Yellow
Fwd. Mast Light	14	Gray/White
Aft Mast Light	14	Gray/Black
Refrigerator	10	Red/White
Demand Pump	14	Brown/White
Electric Head	10	White/Black
Shower Sump Pump	14	Brown/Black
Windshield Wiper Sender	14	Orange/Black
Starter	14	Yellow/Red

NOTE

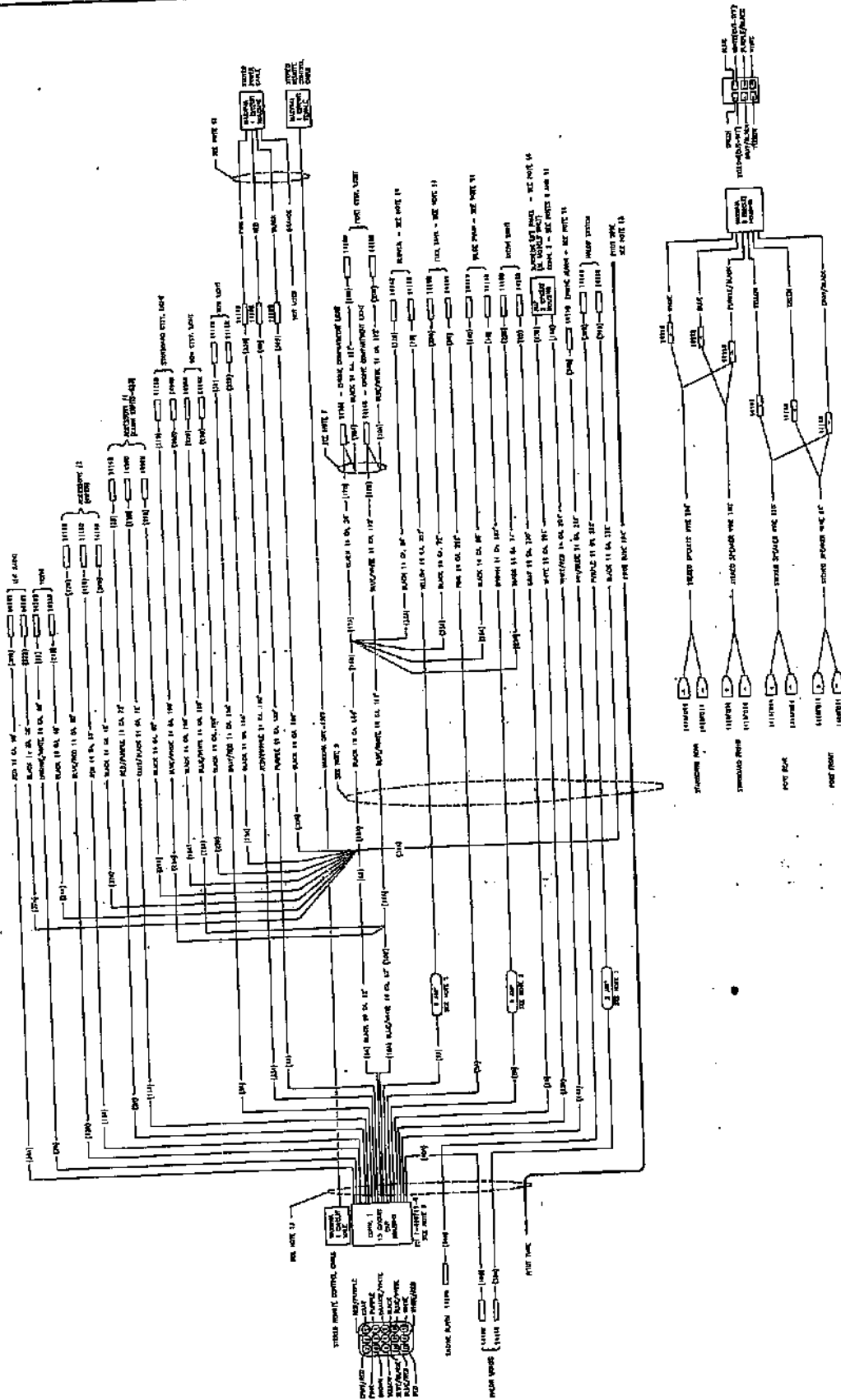
A colored stripe may be added to electrical leads to differentiate between devices using the same base color wire. For example, the bow light lead may have a red stripe added to the base gray color to distinguish it from the stern light.

AC circuits are color-coded with white, black and green wires. The white is called a "neutral" wire, the black is "hot" and the green wire is "ground". All leads are 10 or 12 gauge.

Electrical Systems/Typical Wiring Diagram



Electrical Systems/Typical Wiring Diagram



Water Systems/Fresh Water

Description

The fresh water system in some boats is pressurized. When a faucet is opened, pressure in the line is reduced as the water pressure drops. A pump is activated by a pressure sensing switch in the pump. The pump will continue to run after all faucets are closed and the pressure set point of the sensor is reached.

Hot water is provided by either a heat exchanger connected with the engine or an electric rod in the hot water heater.

Filling the Water Tank

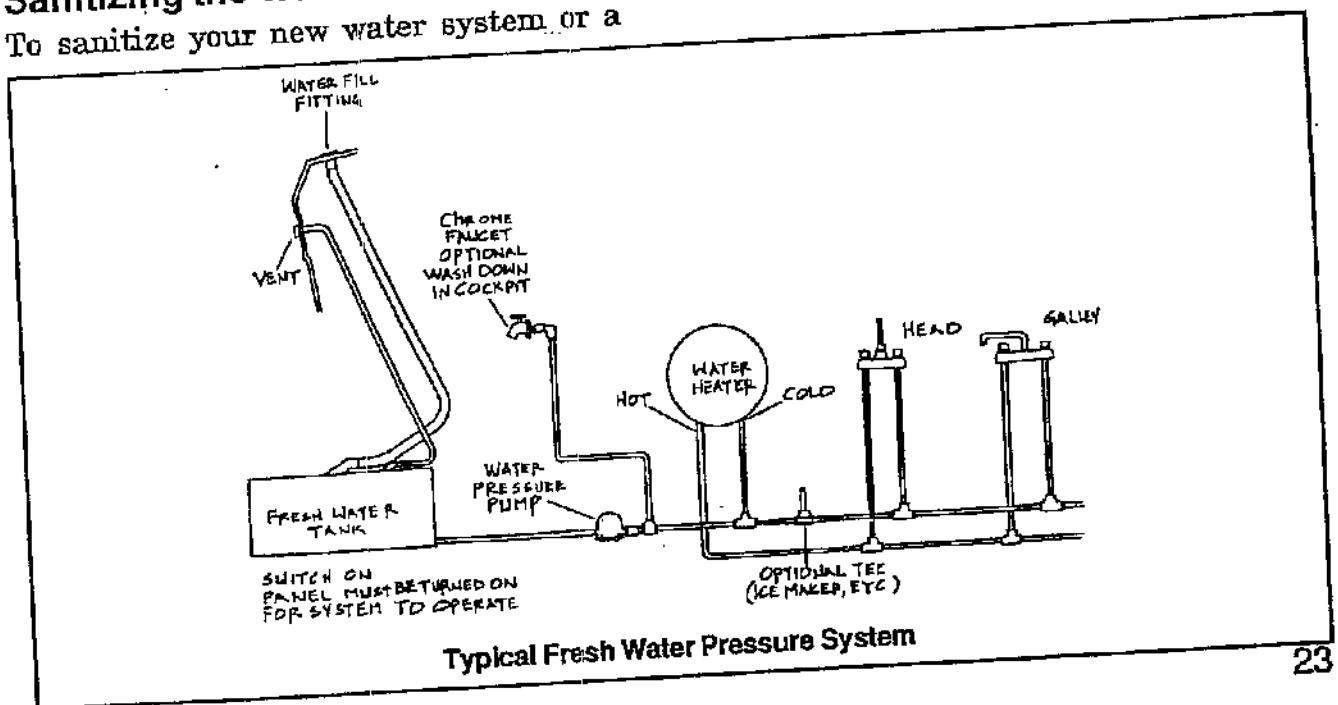
To fill your water tank, you should use a plastic hose (approved for potable water). Do not use a rubber hose; it can give the water a disagreeable flavor. The hose should be kept for filling use only. After using the hose it should be emptied. Start at one end and raise the hose to shoulder level and walk to the opposite end of the hose, allowing the remaining water to flow out. You should store your water tank filling hose in a dry, clean place. It is also a good practice to screw the two ends of the hose together to keep the inside clean.

Sanitizing the Water

To sanitize your new water system or a

system that has not been used for a long period of time, the following steps should be taken:

1. A chlorine solution should be mixed by using one gallon of fresh water and a quarter-cup of household bleach.
2. With the water tank empty, pour the mixture into the tank. Use one gallon of the chlorine mixture for each 15 gallons of tank capacity.
3. After the mixture has been added, fill the tank to capacity with fresh water.
4. Open all faucets until all air has been released. Start with the faucet furthest from the water pump.
5. Let the treated water stand for 3 or 4 hours.
6. Drain water tank and lines and flush with fresh water.
7. If chlorine taste is excessive, prepare a solution of one quart of vinegar to 5 gallons of water. Let this solution set in the system for several days.
8. Drain water tank and flush with fresh water.



Typical Fresh Water Pressure System

Water Systems/Marine Sanitation Device

Marine Toilet

Your boat may have been equipped with a marine sanitation device. If maintained, it should offer you years of trouble-free service. With your new boat, you received manufacturer's literature for the head supplied with your boat. We suggest you review this material and order a few spare parts to have in case an emergency should arise.

The marine toilet is similar to your home toilet but the marine toilet has a few differences: Flushing is done with either sea water or fresh self-contained water through a manual pump; or, if equipped, an electric pump. The electric pumping is a tandem system; flush water is pumped in and waste is pumped out. Some electric toilets have grinders or macerators on the outlet pump to reduce the size of solid matter and paper.

To make your electrical system operational, you must open the intake sea cock or valve. When the boat is unattended, the sea cock or valve should be in the closed position.

Operation and Maintenance

1. Guests and crew aboard your boat should be instructed in the proper use of your system. Emphasis should be placed on what not to put into the system.

2. When leaving the boat, always shut off all below-waterline sea cocks to prevent sinking should a hose or pipe leak occur.

3. Less odor will be generated if fresh water from the drinking supply is left in the toilet bowl instead of sea water. Merely pour in a pint or so into bowl to form a water seal.

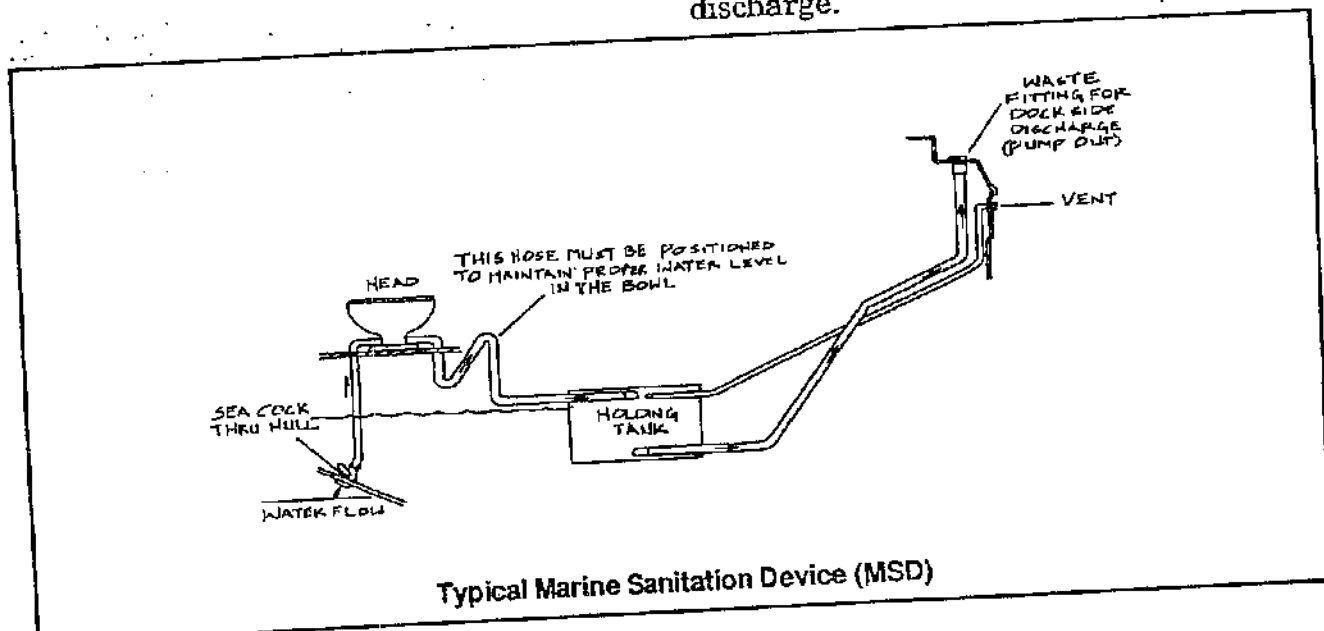
4. A flammable gas is generated by the sewage in the holding tank and it must be vented overboard. Be sure this vent is kept open and clear of obstructions.

5. Repair kits and instructions for their use should be carried on board to avoid delays in toilet repair.

Holding Tank

Various chemicals are available to control odors and help break down solids. Consult your marine dealer as to what to use. After you empty your holding tank, fill tank with fresh water and pump it out again to rinse. Another method is to empty your tank, and add fresh water and a mild toilet bowl cleaner or cold water detergent. Let stand in tank for 15-20 minutes, then pump out. Rinse tank thoroughly with fresh water.

EPA/USCG regulations do not allow direct overboard discharge on any boat. Therefore, no provision is made for overboard discharge.



Typical Marine Sanitation Device (MSD)

Getting Under Way/Loading

CAUTION

Overloading and improper distribution of weight are significant causes of accidents. Capacity plates indicate maximum loads under normal conditions. Give yourself an extra margin of safety in rough waters.

When loading your boat, remember to distribute the load evenly, keep the load low and do not overload. Overloading is a very significant cause of accidents in pleasure boating.

The capacity plate attached to your boat states the maximum person capacity in pounds and the maximum weight capacity for persons and gear in pounds that the boat will handle safely under normal conditions. These load capacity ratings are computed from a rather complex formula determined by the U.S. Coast Guard. Capacity plates are also certified by National Marine Manufacturer's Association (NMMA).

When loading your boat, always step onto the boat, never jump. Have someone on the

dock pass the gear aboard. Secure all gear firmly so that it will not shift or interfere with the operation of the boat.

Passengers should board your boat one at a time, have them be seated to maintain an even trim.

Do not allow passengers to ride on the bow.

Do not allow passengers to ride sitting on the stern, tops of seats, sundeck, standing up, or gunwales. Falling from moving boats is a major cause of fatal boating accidents. Do not allow passengers to sit such that they interfere with the driver's visibility.

Remember that the presence of the capacity plate does not relieve the skipper from the responsibility of using common sense or sound judgement. Rough water and adverse weather conditions will reduce the maximum capacity rating of the boat.

Overloading is a violation of Coast Guard regulations!

The diagram shows a side view of a boat with a capacity plate mounted on the cabin area. The capacity plate is a rectangular sign with the following text: "GLASTRON, INC. NEW BRAUNFELS, TX MODEL 206 FUTURA SE", "MAXIMUM CAPACITIES", "9 PERSONS OR 1500 POUNDS", "1500 POUNDS - PERSONS & GEAR", and "THIS BOAT COMPLIES WITH U.S. COAST GUARD SAFETY STANDARDS IN EFFECT ON THE DATE OF CERTIFICATION". Two warning signs are also shown. The first sign, located near the propellers, reads "DANGER AVOID PERSONAL INJURY STOP ENGINES IF PERSONS ARE NEAR PROPELLERS". The second sign, located near the stern, reads "DANGER AVOID PERSONAL INJURY KEEP AWAY WHEN ENGINES ARE RUNNING".

The capacity plate shown here is for reference only and is not necessarily the one for your boat. Capacity plates are only installed on boats under 26 feet in length.

Getting Under Way/Fueling Procedures

WARNING

FIRE AND EXPLOSION HAZARD

Fuel leakage from any part of the fuel system can lead to a fire and explosion hazard which can cause serious bodily injury or death. Careful periodic inspection of the entire fuel system is mandatory, particularly after storage. All fuel components including fuel tanks, (whether plastic or metal), fuel lines, fittings, fuel filters, fuel pumps, and carburetors should be inspected for leakage, softening, hardening, swelling or corrosion. Any sign of leakage or deterioration necessitates replacement before further engine operation.

Because of the possible adverse effect of alcohol in gasoline, it is recommended that only alcohol free gasoline be used when possible.

If only alcohol containing fuel is available, or if the presence of alcohol is unknown, then increased inspection frequencies for leaks and abnormalities is required.

Fueling Procedures

Gasoline fumes are heavier than air and will sink to the lowest part of your boat, such as the bilge. These areas must be periodically flushed away. Every year the Coast Guard reports increasing numbers of fires and explosions due to carelessness while fueling. Therefore, precautions must be taken while fueling to prevent fumes from collecting on board, and to be sure that any fumes dispersed while fueling are not ignited. Follow the safe fueling procedure below:

Prior to Fueling

1. Close all doors, hatches and compartments.
2. Make sure all electrical equipment is

turned off. Don't turn on any switches while fueling.

3. Don't smoke or allow anyone aboard to smoke while fueling.
4. Fuel in good light. Gas spills are unnoticeable in the dark.
5. Shut off all engines, motors, fans, and blowers.
6. Make sure you are securely moored.
7. Do not stretch fuel hoses across the deck of another boat.
8. Make sure a fire extinguisher is available.
9. Remove fuel fill cap and insert the hose nozzle into tank opening. Hold nozzle handle securely. Nozzle must touch metal fill to avoid static produced sparks.
10. Allow a little space at the top of the tank. Do not fill completely to the opening.

After Fueling

11. Replace fill cap and wash and wipe off any spillage around fuel fill area. Discard any rags that you used to wipe up spillage in a safe place.
12. Open all doors and hatches and compartments to air out any possible fumes. Make a sniff test, especially down near the bilges and cabin sole.
13. Check all fuel lines and connections for leakage. If leakage is present, repair and clean up.
14. Run the blower for at least 4 minutes before starting your boat, continue to run blower.
15. After all fumes are gone, you may start your engine(s).

Getting Under Way/Instruments & Controls

General

Your Glastron boat has been equipped with a full set of instruments that give you indications of what is taking place within your engine. Upon delivery of your boat, make note of the readings that your gauges indicate. This will be a good reference point for the life of the engine. Fluctuations in gauge readings on occasion are not unusual. Greater changes in readings should be investigated.

Oil Pressure Gauge

Many serious problems within your engine can be reflected on your oil pressure gauge. If a loss of oil pressure is indicated, shut the engine down at once or serious damage to the engine can result. Check the oil level. If oil level is correct, consult your dealer or a qualified mechanic to determine the cause of the low pressure indication.

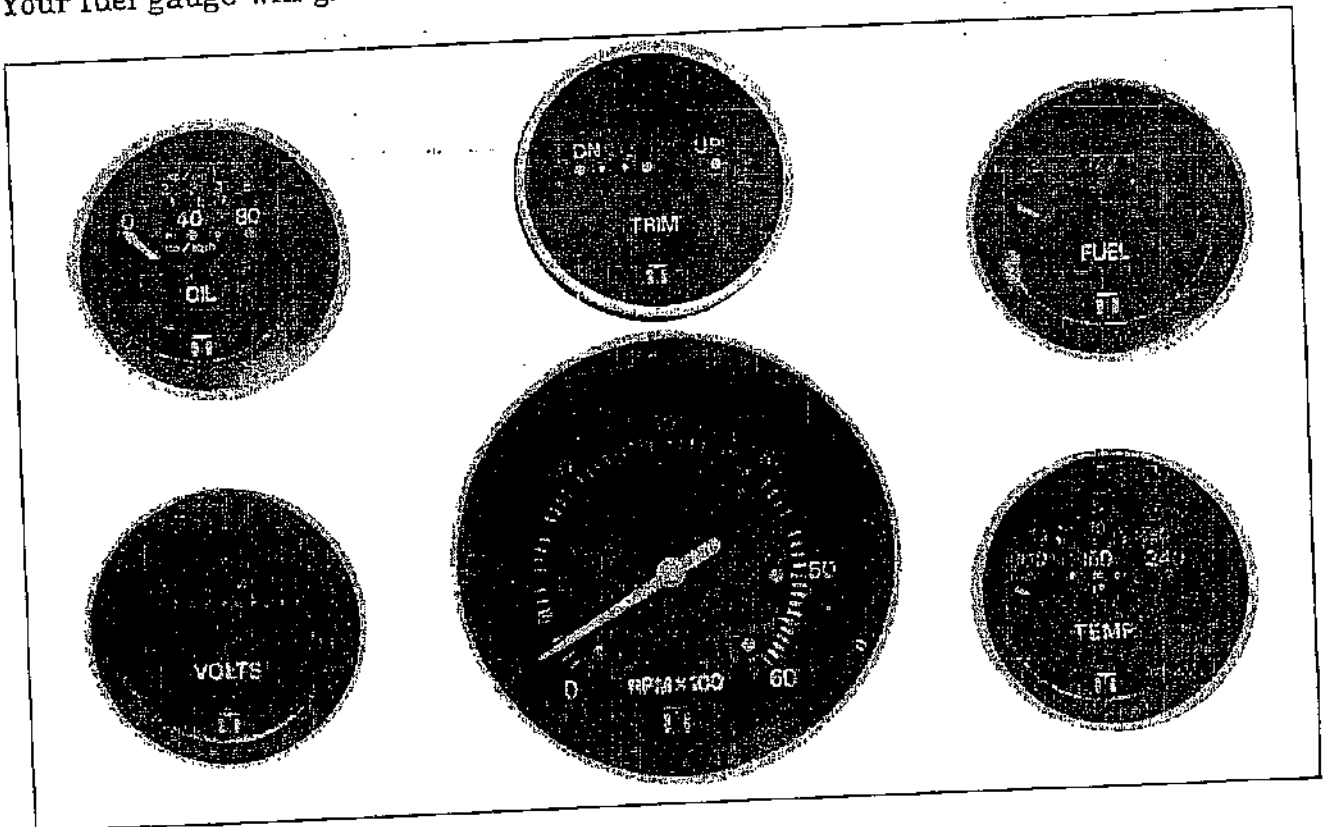
Fuel Gauge

Your fuel gauge will give an indication of

the amount of fuel contained within the fuel tank. There can be a slight error in the reading of the gauges. Keep in mind that a fuel gauge will usually read higher than actual when boat is underway due to bow of boat being higher than at rest. It is a good practice to use the "one-third rule" in fuel management. Use one-third of the fuel to go, one-third to get back and keep one-third in reserve.

Voltmeter

Voltmeter readings should be 12 to 15 volts when the engine is running 1000 RPMs or higher. This indicates that the battery is being charged. When the engine is not running and the ignition key or switch is "on" and the meter reading is still showing a high reading, this indicates your battery is fully charged. If meter readings indicate a constant low reading, you should give your charging system a complete check. This should include battery system as well. An oscillating reading indicates a loose voltage regulator connection or loose belts. Voltage drops after engine shut down indi-



Getting Under Way/Instruments & Controls

icates a bad battery or heavy load.

Temperature Gauge

The temperature gauge indicates the temperature of the engine water cooling system. After starting the engine, always check the gauge. If hot, shut the engine down immediately and consult your engine owner's manual.

The engine's cooling system will reach and maintain a specific temperature soon after starting. If the gauge indicates an abnormally high reading, shut the engine down and check out the cooling system. Check for water leaks, closed sea cocks or valves.

This gauge should be checked frequently while running. The water temperature heat senders that send readings to the gauge should be checked periodically to make sure that they are in good working condition.

Tachometer

A tachometer indicates the revolutions per minute (RPM) your engine is running. In increments of 100, there is no correlation of RPMs to speed of the boat, due to many different factors such as wind, current and load.

Trim Gauge

A trim indicator shows the angle of the stern drive in relation to the bottom of the boat, and it is an aid for achieving maximum performance. In addition, it corrects both the fore and aft and side-to-side ride attitude caused by off-balanced load, prop torque, wind, etc.

Engine Remote Controls

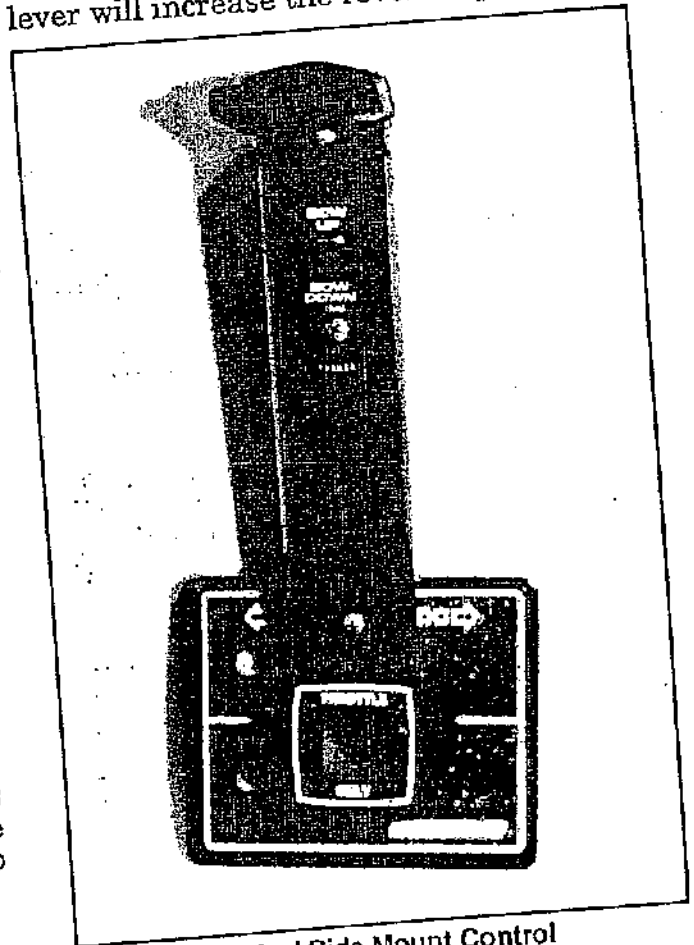
Detailed explanation of the particular type of control installed in each boat and its operational function is contained in the manufacturer's operations and maintenance manual.

The throttle control not only regulates the speed of the engine, it also acts as the gear

shift lever to control the forward and aft rotation of the propeller.

Movement of the lever forward of the neutral position will engage the shifting mechanism causing the boat to move forward. Increasing the forward movement of the lever will increase engine rpm, and cause the boat to move forward with increasing speed.

Movement of the control lever aft of the neutral position will reverse the shift mechanism causing the boat to move backward. Increasing the aft movement of the lever will increase the reverse speed.



Typical Side Mount Control

WARNING

Acceleration in reverse at too high of speed can create a following wake that could rise above the transom and flood the boat.

Reversing the shift mechanism will act as

Getting Under Way/Instruments & Controls

a "braking action" when maneuvering the boat at low speeds.

CAUTION

Care should be taken when shifting between forward and reverse. To avoid transmission or drive damage, always pause in neutral for a few seconds before reversing propeller rotation.

The dual console mount style of control provides independent lever control of both clutch and throttle operation of each engine. The design allows a precise sequence for safe, one hand control of both engines.

CAUTION

Care should be taken when coming off plane to avoid entry of backwash into boat. Correct procedure calls for gradually decelerating unless conditions dictate otherwise.

CAUTION

At least yearly inspections of all engine control components (e.g. control box, cables, cable connectors, engine levers, etc.) should be made. These inspections should become more frequent as the boat ages.

Getting Under Way/Starting The Engine(s)

Pre-Start Checks

1. Your boat should be secured to the dock, trailer or mooring slip before starting the engine(s) and kept secure until the engine(s) is warmed up and running properly.
2. Check fuel supply.
3. Open sea cock for the engine cooling water. (If equipped).
4. Open fuel valve located in engine compartment. (If equipped).
5. Check engine oil level and power steering fluid level. On larger stern drive engines, check transmission fluid level. (If equipped).
6. Make sniff test; this is a very effective way to detect fumes.
7. Turn on bilge blower and allow it to operate for four minutes before starting. Let it continue to operate until boat is under way at planing speed.
8. Check control lever. Make sure it is in neutral.
9. Move throttle to approximately 1/4 throttle.

Starting

1. If your boat is equipped with master battery switch, set switch to Batt 1, 2, or All position.
2. Turn ignition key clockwise to start engine. After engine starts, allow key switch to return to "Run" position.
3. If engine is cold, advance remote control

lever to full throttle position, then return the lever to approximately 1/4 throttle position while cranking the engine. This will actuate carburetor accelerator pump and feed fuel to the engine. In extremely cold weather it may be necessary to pump the control lever more than once.

CAUTION

Do not operate starter continuously for more than 30 seconds without pausing. Allow starter to cool between attempts to start your engine. Allow at least 2 minutes between starting attempts.

4. After engine starts, check oil pressure gauge immediately. See instrumentation section of this manual. If oil pressure is not within specified range, STOP ENGINE IMMEDIATELY and determine cause.
5. If engine is cold, run engine for a short period of time (1 or 2 minutes) at fast idle (1000 - 1500 RPMs).
6. After engine has warmed up, check water temperature gauge to insure engine temperature remains within specified range. If temperature gauge reads abnormally high, STOP engine and determine cause.
7. Inspect for fuel, oil, water and exhaust leaks.

CAUTION

Except in an emergency, do not shift transmission at engine speeds above 1000 RPMs. When shifting from "forward" to "reverse" or vice versa, momentarily pause in "neutral" position to allow propeller to stop turning - preventing gear train damage.

Getting Under Way/Accelerating & Trimming

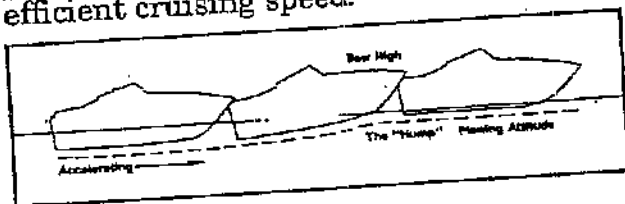
CAUTION

Full throttle acceleration is not recommended until after engine "Break In" is completed - usually 20 hours. See engine manufacturer's literature for details.

After you have spent a good deal of time practicing maneuvers and have a feel for how the boat handles, you will be ready to run in open waters.

As you throttle up and accelerate, your boat will increase its angle of trim, causing it to ride bow-high. From a maximum angle, the boat will level out to its planing attitude with continued acceleration. This maximum angle is known as the "hump". Because visibility, handling and performance are reduced, it is advisable to get "over the hump" as soon as possible. When you first begin to move, a few seconds at full throttle should get the boat over the hump and into its planing attitude.

Once over the hump, allow the boat to accelerate until you achieve a comfortable plane and then throttle back to a more fuel efficient cruising speed.

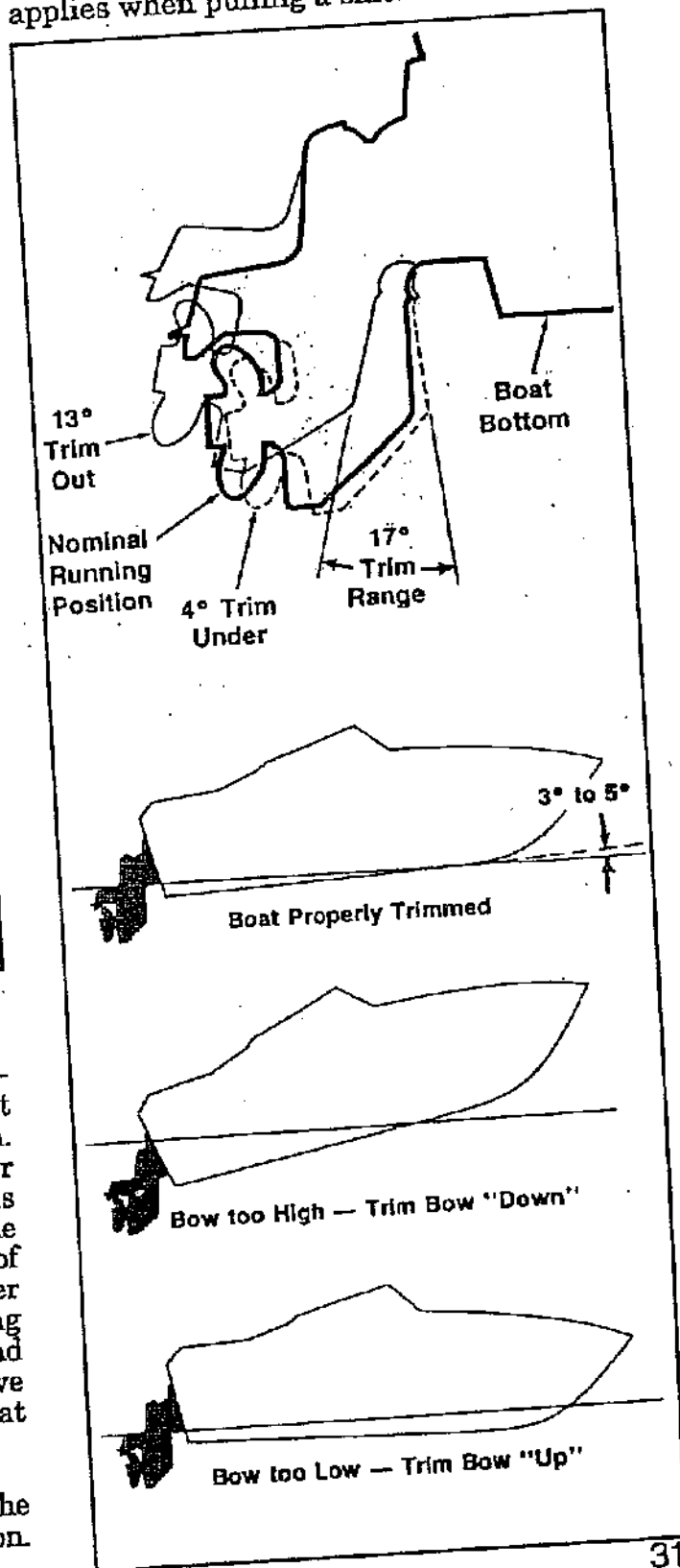


Trimming

Trimming the drive unit(s) while underway allows you to adjust the ideal boat angle for a given load and water condition. Refer to your drive unit owner's manual for instructions regarding the trim controls installed on your boat. In general, the drive unit has an adjustable trim range of approximately 17 degrees (13 degrees over and 4 degrees under nominal running position). In most cases, the best all-around performance is obtained with the drive unit(s) adjusted so that the boat will run at an angle of 3 to 5 degrees to the water.

Boats should not be seen on-plane with the drive unit(s) in the full under position.

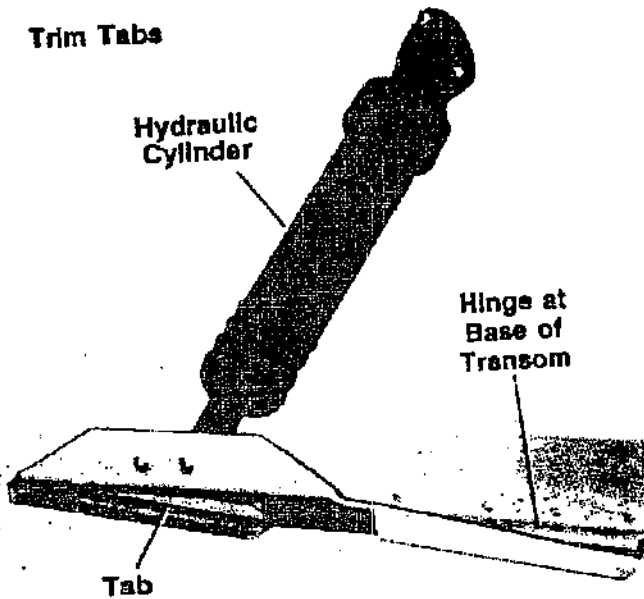
This situation causes prop torque feedback to create a listing attitude and increases the likelihood of bow steering. This even applies when pulling a skier.



Getting Under Way/Accelerating & Trimming

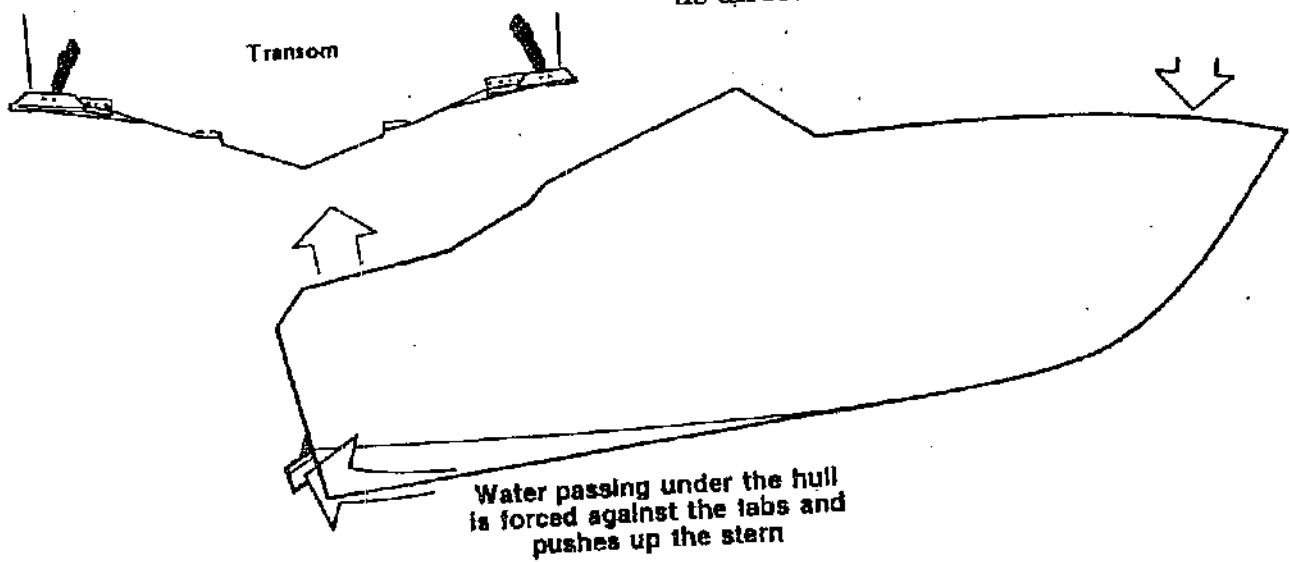
Trim tabs (if equipped) provide a service similar to the power trim on the engine(s). The tabs are adjusted by hydraulic cylinders controlled remotely by the operator. In an uneven weight situation, the operator can compensate by trimming up one side of the boat.

Trim Tabs



CAUTION

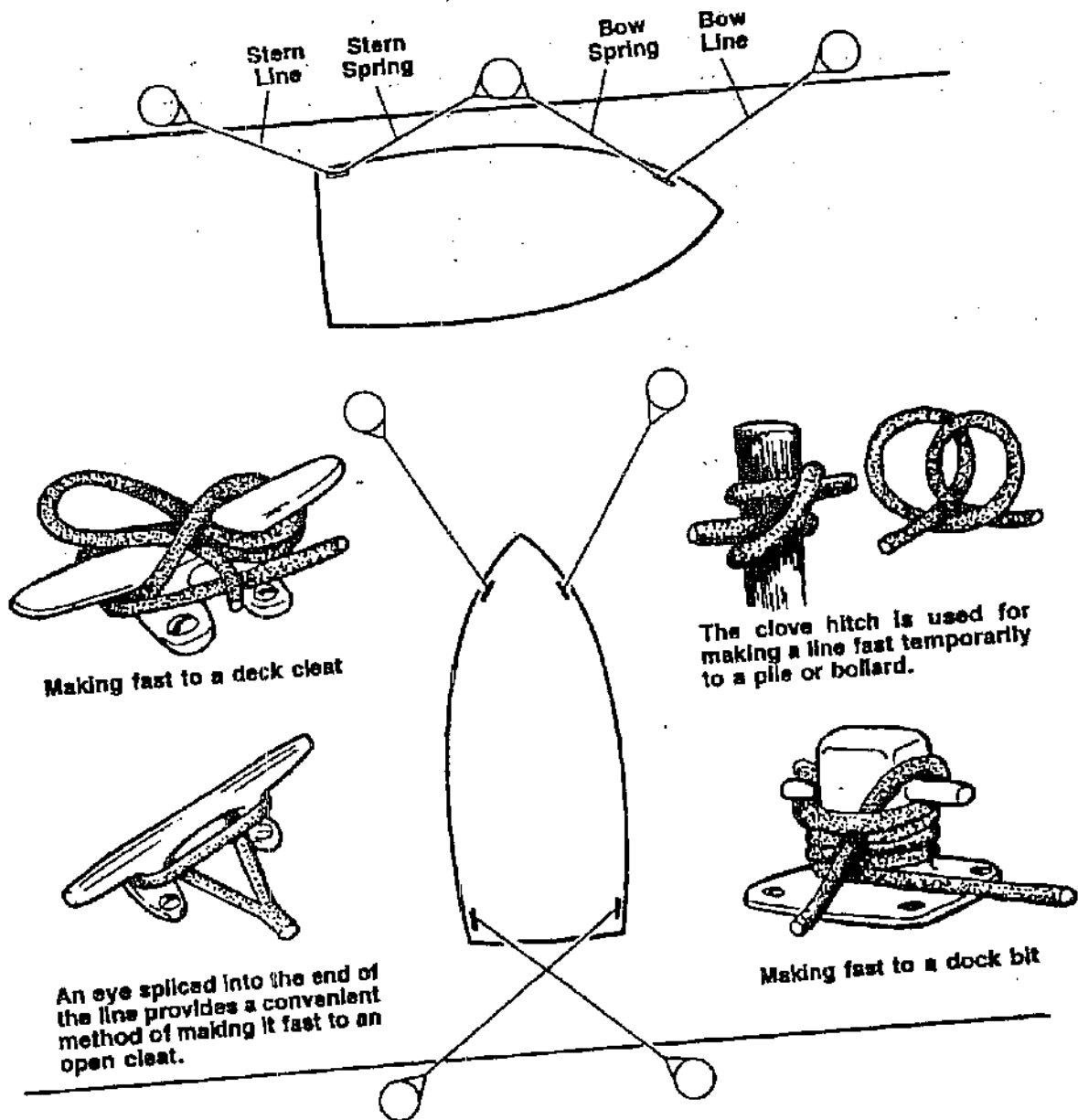
Don't lower tabs all the way at high speeds as directional instability can result.



Getting Under Way/Mooring Lines

There are four types of deck lines that concern skippers of small boats. These are the bow line, stern line, and two spring lines. The first two secure the craft's bow and stern, while the spring lines keep the boat from moving forward or backward when alongside a dock. These lines have to be long enough to handle any docking situation the boat might encounter. Their length, even for a 16-foot runabout, should be at least 15 feet. Each line should have an eye splice that will fit comfortably over the bow or stern cleats. In many docking situations, particularly those of short dura-

tion, bow and stern lines will suffice when secured with bowline or clove hitch. For longer periods and in situations where the water is running swiftly, spring lines are needed. The stern spring line leads from the stern cleat of the boat forward to the piling or cleat on the dock. The bow spring line is led from the bow cleat aft to the dock. When mooring a boat in a slip, bow and stern lines on both port and starboard sides will keep the craft in position. In tidal conditions, it is essential to leave slack in the lines for the rise and fall of the water.



Getting Under Way/Mooring Lines

Rope Materials

Although you still see rope made from the old materials of hemp and manila, it is increasingly hard to buy. The new kinds of rope are so superior that the boat owner has little reason to pay any attention to most of the old materials, although he may have difficulty in making the right choice among the new forms.

Nylon rope is strong (more than twice as strong as the best yacht manila for the same size) and has useful qualities of elasticity or controlled stretch. The rope can be given various degrees of softness or hardness, and some variations in surface textures, to fit its intended uses. With its shock-absorbing elasticity, it is particularly well-suited for dock lines and anchor lines. There is one other characteristic of nylon rope; not only does it stretch, it can shrink - 10% or more - under some circumstances. But unlike manila, it doesn't shrink with each wetting.

High-tenacity polyester fiber (Dacron, Terylene, Duron, Fortrel, A.C.E., Kodel are trademarks) is made into rope that is virtually as strong as nylon but has one important difference: the rope can be made to have very little stretch. In manufacturing, polyester rope can be given varied finishes: woolly, smooth, or textured to make it easy to grip, as required.

Aramid fiber (Kevlar), the newest material used for marine rope, combines strength and strong dimensional stability (near zero stretch). It is comparatively expensive.

Polypropylene rope is least expensive among the synthetics. It is about as strong as manila, but tends to deteriorate rapidly from exposure to the ultra-violet component of sunlight. Its main advantage is that it floats, so it is suited to water-ski tow ropes and dinghy painters. Any other use aboard a boat is an economy measure and may be unwise. For appropriate special purposes, it should be large size (compared to nylon) and renewed frequently.

Getting Under Way/Water Skiing

Some models are more suited for water skiing than others. The larger models, for example, produce unusually large wakes. This may be excellent for trick skiers, but a serious problem for the novice. Large wakes are also undesirable in slalom skiing and double-wake cut jumping. If your boat is not equipped with a ski-tow eye, consult your dealer. Your dealer can also assist you in the full line of ski accessories.

With your boat appropriately equipped, you can start driving for water skiers. If you have never driven skiers before, it's a good idea to spend some hours as an observer, working with and learning from an experienced driver. However, even an experienced driver should be familiar with the boat and the way it handles before pulling a skier. The driver should also know the skier's past experience and drive according to his or her ability.

The popular sport of water skiing has brought a special set of safety precautions to observe in boating. The following guides will do much to reduce the hazards while water skiing:

1. Water ski only in safe areas, away from other boats and swimmers, out of channels, and in water free of underwater obstructions.
2. Allow no one who cannot swim to water ski.

3. Be sure that the skier is wearing a proper lifesaving device. A properly designed ski vest is intended to keep a stunned or unconscious person afloat.

4. Always carry a second person on board to observe the skier so that full attention may be given to your operation of the boat and the waters ahead.

5. Approach a skier in the water from the lee side (downwind), and be certain to stop your motor before coming in close proximity to the skier. We generally recommend to approach on the driver's side so you never lose sight of the skier in the water.











WARNING

A rotating propeller can fatally injure someone in the water. Always watch for swimmers or skiers, and steer well clear. When picking up a skier or swimmer, stop the boat before propeller is near the person, then shut off the engine until the person is safely aboard.

6. Give immediate attention to a fallen skier. Be careful not to swamp the boat while taking a skier on board.

Below is a set of hand signals recommended by the AWSA (American Water Skiing Association). Skier, observer and boat operator should all know and understand these 10 simple signals from the skier.

Skiing Signals

 <p>Faster — Palm of one hand pointing upward.</p>	 <p>Slower — Palm pointing down.</p>	 <p>Speed OK — Arm extended with thumb and finger joined to form circle.</p>	 <p>Right Turn — Arm extended pointing to the right.</p>	 <p>Left Turn — Arm extended pointing to the left.</p>
 <p>Return to Drop-off Arm — Arm at 45 degrees from body pointing down to water and swinging.</p>	 <p>Cut Motor — Fingers drawn across throat.</p>	 <p>Stop — Hand up, palm forward, policeman style.</p>	 <p>Skier OK After the Fall — Hands clasped together over head.</p>	 <p>Pick Me Up - Fallen Skier, Work Out — One ski extended vertically out of water.</p>

Preventive Maintenance/Engine(s)

General

You have been supplied with an engine manual that pertains to your particular type of engine(s) installed aboard your boat. For detailed information, please consult the manufacturer's literature.

Glastron recommends that you have your boat serviced at an authorized dealer. However, you can perform the following preventive maintenance tasks if you are so inclined.

Checking Oil

During break-in, oil level should be checked every 2 hours of running time. After break-in period, oil level should be checked before starting engine(s) each day. To check oil level:

1. Boat should be in the water and engine must be stopped.
2. If engine has been run, wait approximately 5 minutes for oil to drain back into engine oil pan.
3. Remove crankcase oil dipstick, wipe clean and re-install. Be sure to push dipstick all the way down into the dipstick tube.
4. Remove dipstick, note level indicated. Oil level must be maintained between "Full" and "Add" marks on dipstick.
5. If oil level is at or below "Add" mark, remove oil filler cap from valve rocker arm cover and add oil, as necessary, to bring level up to "Full" mark. Do not overfill. Space between "Full" and "Add" marks represents one quart.
6. Re-install dipstick, being sure to push it all the way down into dipstick tube.

DISCHARGE OF OIL PROHIBITED!
THE FEDERAL WATER POLLUTION CONTROL ACT PROHIBITS THE DISCHARGE OF OIL OR OILY WASTE INTO OR UPON THE NAVIGABLE WATERS AND CONTIGUOUS ZONE OF THE

UNITED STATES IF SUCH DISCHARGE CAUSES A FILM OR SHEEN UPON, OR DISCOLORATION OF, THE SURFACE OF THE WATER, OR CAUSES A SLUDGE OR EMULSION BENEATH THE SURFACE OF THE WATER. VIOLATORS ARE SUBJECT TO PENALTY OF \$5,000!

Changing Oil and Filter

1. Run engine until water temperature gauge indicates normal operating temperature.
2. Stop engine. Place a container under crankcase oil drain plug in oil pan and remove drain plug. After oil has drained completely, re-install drain plug securely.
3. Remove oil filter by turning in a counter clockwise direction. Be sure that old sealing ring is removed with filter. Discard filter.
4. Coat sealing ring on new oil filter with engine oil and install filter. Hand tighten filter in accordance with manufacturer's instructions. Tighten securely, but do not overtighten.
5. Remove oil filter cap from valve rocker arm cover and fill crankcase with correct grade and viscosity oil. (Consult your engine owner's manual for detailed information). **Always use dipstick to determine exact quantity of oil required.**

Fuel Filters

Fuel filters should be replaced at least once each year. Consult your engine owner's manual for detailed information on changing your fuel filters.

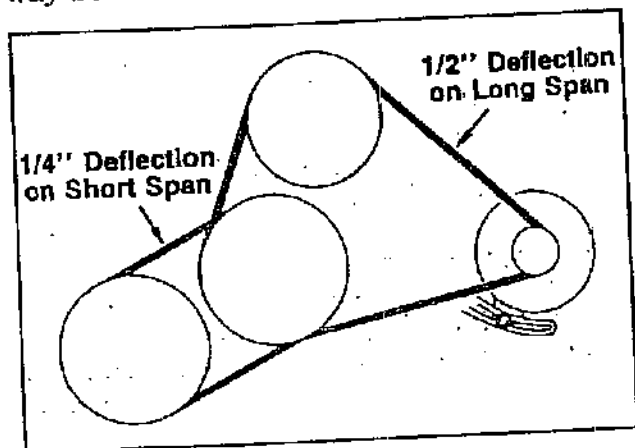
WARNING

Be careful when changing fuel filters; gasoline fumes are extremely flammable and highly explosive under certain conditions. Be sure that the ignition key is "Off". Do not smoke or allow open flames in the area while changing fuel filters.

Preventive Maintenance/Engine(s)

Belt Tension

Since the belt tension affects the engine cooling and electrical system, it is important to check it frequently. When correct, the belt or belts should deflect 1/4" or 1/2" (depending on length) when pressed midway between the farthest spaced pulleys.



To adjust or replace the belts, loosen all mounting bolts on the alternator, or seawater pump or power steering pump, depending on which belt you wish to change. Remove the old belt, and check pulleys for rust pitting or bends - replace pulleys if required. Install the new belt and adjust belt tension by pulling on the alternator or seawater pump, away from the engine block until correct belt tension is achieved, then tighten all mounting bolts.

Tune-Up (Gas Engine)

A tune-up is a series of mechanical adjustments to get the peak performance from your engine(s). A tune-up should be performed every 250-300 hours or sooner if the engine becomes hard to start, runs roughly, does not seem to have power or once each year for low hour users.

Due to the large number of optional engines Glastron offers, it would be impossible to provide specific tune-up instructions for each one. The detailed tune-up information is contained in your Engine Owner's Manual. However, we will give

you some broad basic information on engine tune-ups that you can do yourself.

Begin each tune-up by running until warm. Shut off, remove spark plugs and take a cylinder compression test. Compare readings with engine manufacturer's specifications.

Spark plug wires, especially the noise suppressor type, deteriorate with age. Check each wire carefully for cracks in the insulation. If any wire is questionable, replace all of them. Every two years, replace them regardless of condition.

Your marine dealer may carry pre-cut wire kits for your engine. Simply replace old wires with proper length wires from kit. When changing spark plug wires, to avoid mistakes, remove one wire at a time.

Remove spark plugs and keep them in order or mark each one with the cylinder number. Examine each spark plug. Electrode appearance is a good indication of performance in each cylinder and permits early recognition of trouble.

Remove distributor cap attaching screws and remove distributor cap. Wipe cap with clean, dry cloth. If residue is present, use solvent to remove. Inspect cap for cracks, carbonized paths (inside and outside) that could permit hi-tension spark leakage, burned or eroded hi-tension terminals or a worn or broken rotor button. Replace cap if any of these conditions exist.

Clean rotor with a cloth (containing solvent) to remove any residue. Inspect rotor for cracks, broken contact spring, eroded or loose metal segment or carbonized paths that could allow hi-tension spark leakage. If condition is doubtful, replace rotor.

On all of the new engines, basic ignition timing has been set at the factory and should not require readjustment. Timing can be checked, if desired, however, using a conventional timing light.

Preventive Maintenance/Fuel System & Ventilation

General

Whether your boat is equipped with a diesel or gasoline engine, you should consult your engine manual regarding important maintenance information. The following information pertains only to the fuel system beyond the engine, including the engine compartment ventilating system.

The fuel system in your Glastron is designed to provide the aspect of safety in the prevention of fire and explosion, and to provide a continuous flow of clean fuel to your engine. The system is designed and built to conform to, or exceed all standards set by the U.S. Coast Guard and National Marine Manufacturers Association (NMMA).

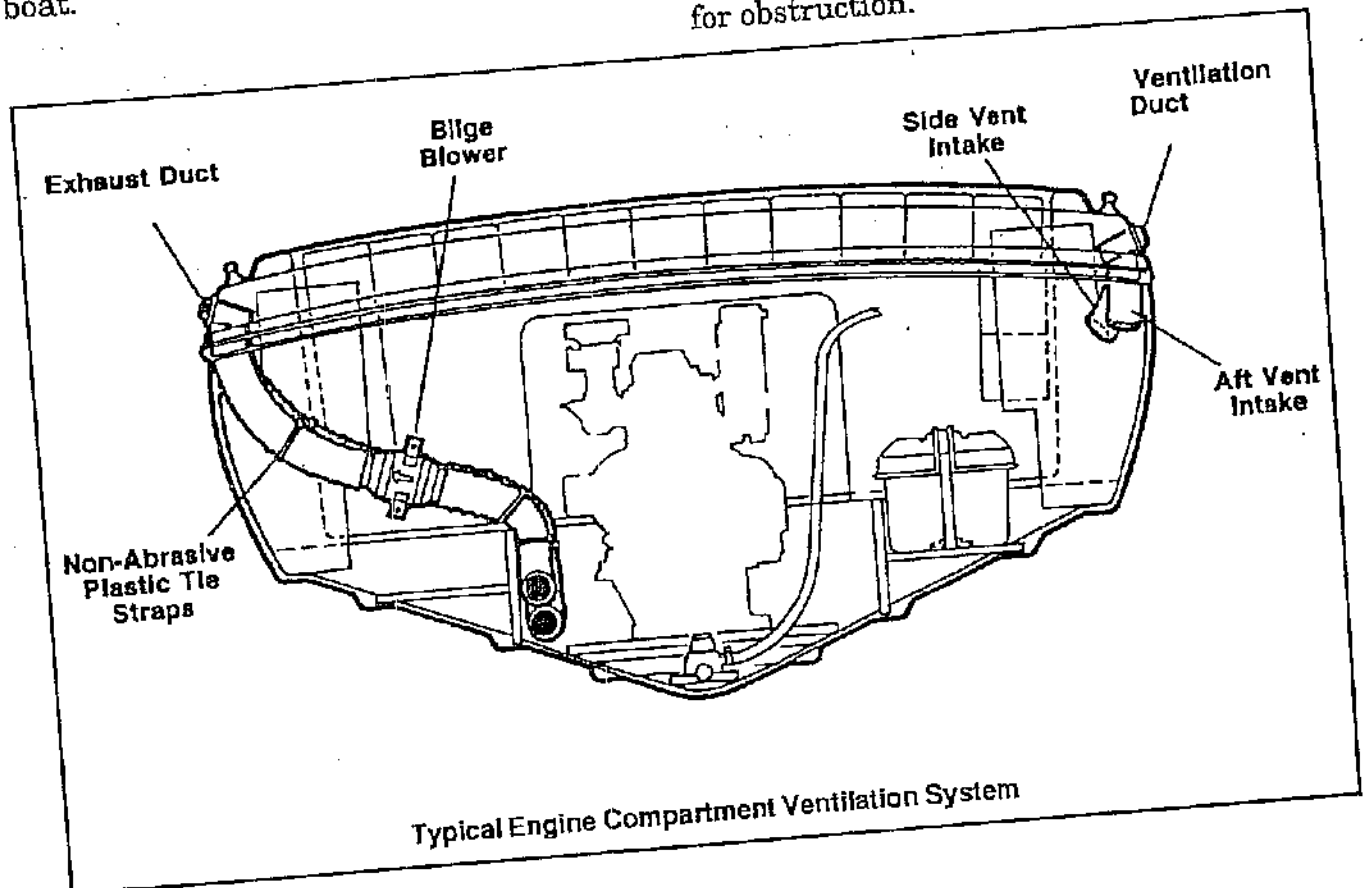
It is most important that you check and maintain your fuel system at frequent intervals. The entire system must be kept liquid and vapor tight within the hull interior. A half tea cup of gasoline can create enough explosive vapor to totally destroy a large boat.

Inspection plates or hatches are located over the fittings on top of the tank. A manual fuel shut-off valve or automatic anti-siphon valve is located in the line at the pick-up fitting on the aft section of the tank.

Inspection

The following checks should be performed on a monthly basis:

1. Check entire fuel system for leaks (starting at fuel tank).
2. Check fuel lines and hoses for cracks or other signs of deterioration. If replacement is necessary, see your dealer.
3. Check fuel line fittings, carburetor mounting fasteners and fuel pump mounting fasteners for tightness.
4. Check condition of ventilation ducts and clamps. If replacement is necessary, see your dealer for parts.
5. Check fuel tank vent on outside of hull for obstruction.



Typical Engine Compartment Ventilation System

Preventive Maintenance/Cooling System

General

The engine cooling is provided either by raw water system and/or freshwater system. Raw water is that in which the boat is floating. Freshwater is that which is contained in a closed circuit and recirculates.

Description

In a raw-water system, seawater enters through the stern drive or a through-hull fitting guarded by a sea cock. A strainer prevents debris from entering. A pump forces the water to the engine. After pass-

ing through the internal passages of the engine, the water is routed to the exhaust manifold and then discharged overboard through the exhaust pipes. Actual engine temperature is controlled by the engine thermostat.

The freshwater system is similar to the raw-water system except that the raw-water does not enter the internal passages of the engine. Instead, raw-water passes through a heat exchanger to cool the freshwater contained in the closed circuit of the engine.

Preventive Maintenance/Sea Strainers & Valves

General

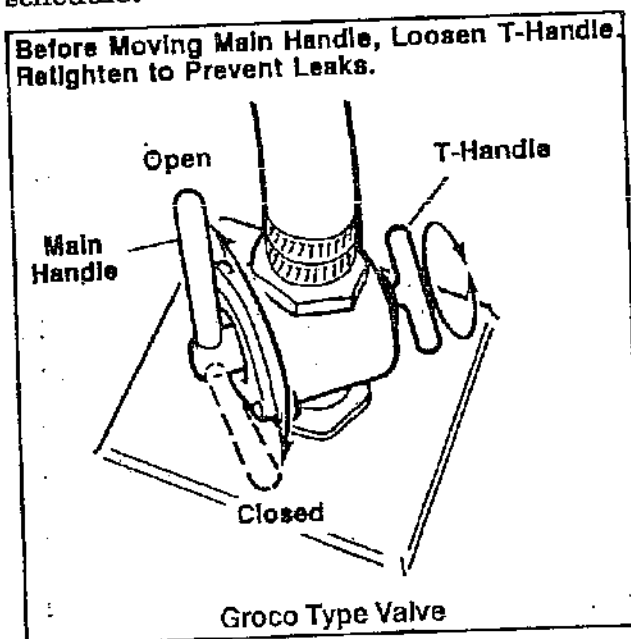
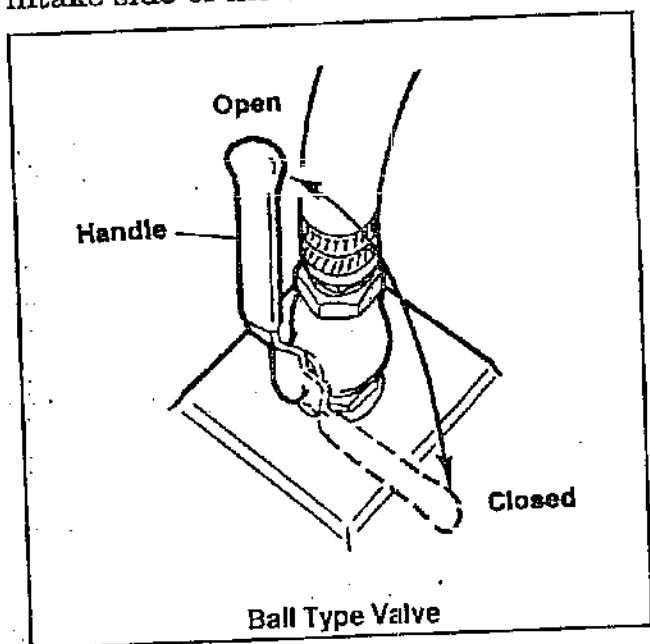
Some models are equipped with sea cocks and valves to provide a convenient means of shutting off openings below the water line in emergencies or when removing various units for repair. It is a good practice to close them when the boat is left unattended for extended periods of time.

Cleaning and Inspection

The sea strainer has been installed on the intake side of the water cooling system to

prevent the system from getting clogged and to provide an easy way to clean occasional debris. Periodic inspection and removal of foreign matter is essential for safe operation. This requirement will vary depending on amount of use and local operating conditions.

Quick cleaning of strainer is accomplished by removal of basket through access plate in top casting. Make sure to check castings, fasteners, cover gasket, plug, tie rods, etc., for damage or deterioration on a regular schedule.



Preventive Maintenance/Stern Drive

Checking Oil Level

The stern drive unit should be checked at manufacturer's specified interval. If low, add the lubricant specified in your stern drive maintenance manual.

NOTE

On some models, a Stern Drive Unit Oil Reservoir is available to allow checking the drive unit oil level from inside the boat, and with the boat in the water. Contact your dealer should you desire to purchase this reservoir.

1. Position stern drive unit so that anti-ventilation plate is level.

WARNING

Do not remove "Oil Vent" plug if drive unit is hot from operation. Hot oil is expanded

and can discharge from hole if plug is removed.

2. Remove "Oil Vent" plug from drive shaft housing.

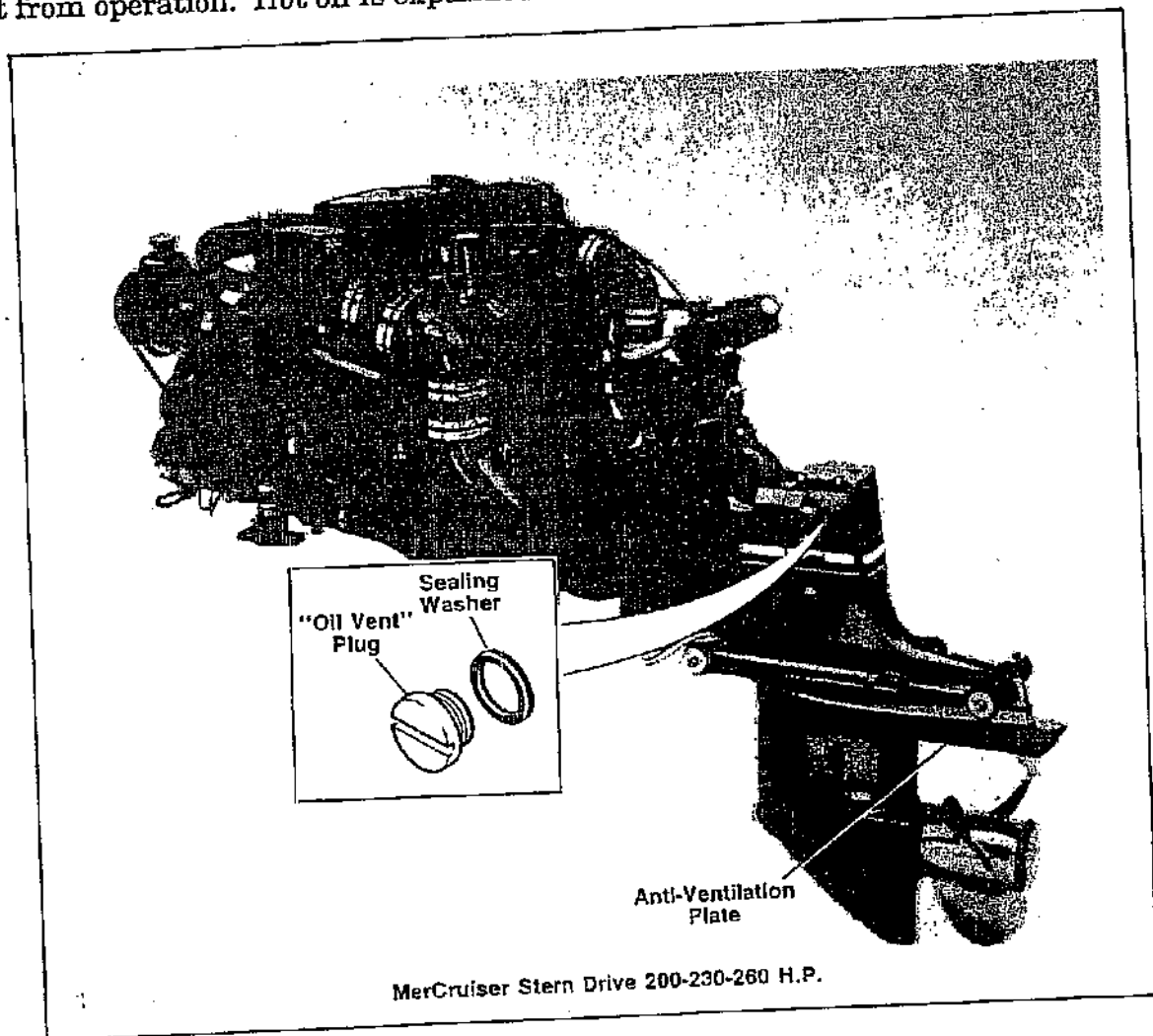
3. Check oil level. Oil should be even with bottom edge of "Oil Vent" hole.

4. If oil level is low, fill drive unit through "Oil Vent" hole with specified oil (see your drive unit maintenance manual) to bring oil up to the proper level.

CAUTION

If more than 2 oz. (52 grams) of lubricant is required to fill drive unit, an oil leak is indicated and unit should be checked and corrected as soon as possible.

5. Re-install "Oil Vent" plug with sealing washer under head and tighten securely.



MerCruiser Stern Drive 200-230-260 H.P.

Preventive Maintenance/Steering System

The standard steering used in all single engine models is a mechanical system utilizing a push-pull enclosed cable.

All steering systems require periodic maintenance to be trouble-free and safe. Regular checks of the complete system, whichever system your boat may have, is essential.

Push-pull cable steering should be checked for proper lubrication of the cable, proper alignment, with no binding or looseness, and no interference in the system. Cable and attachments to the stern drive should be checked for wear, rust or corrosion, and be properly lubricated. A complete review should be made at least yearly and more often as the system ages.

NOTE

Manufacturer's manual containing illustrations and instructions on the type of steering installed is supplied with each boat. Be sure that you receive this manual from your dealer.

Glastron recommends that all repairs and/or replacements to steering systems be made only by qualified dealers certified by the manufacturer of the steering system on your boat.

CAUTION

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

NOTE

Some twin engine boats may be equipped with a steering tie bar between the stern drive units (outside stainless steel tie bar). Proper lubrication of the ball joints on the tie bar ends with multi-purpose lubricant every 20 hours is recommended. Tie bar equipped stern drive units must be raised or lowered simultaneously to prevent damage to bar and end joints.

Preventive Maintenance/Bilge

Inspection

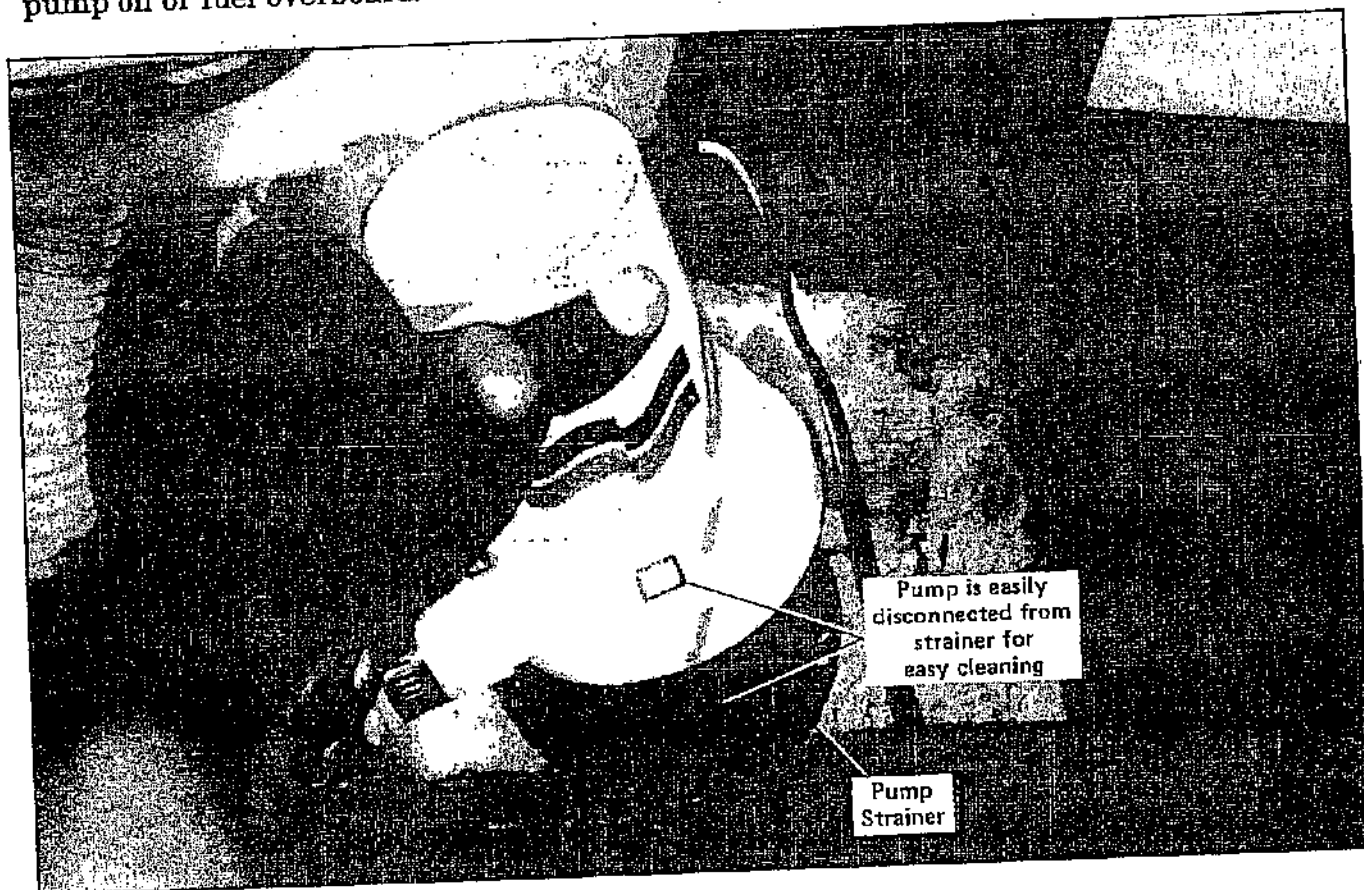
The deep parts of the hull beneath the cabin sole, cockpit floor and engine(s) are the bilges. A mechanical or hand bilge pump may be used to pump water from the deepest bilge. The water from the shallower bilges flows through limber holes in the bulk heads and stringers to the deep part of the bilge. The bilge should be checked before getting under way to make sure it is free of water. It is normal to have a slight bit of water in the bilge. Should your bilge become filled with oil or fuel, check for engine leaks and correct immediately. If your boat is in the water, do not pump oil or fuel overboard.

Cleaning

Pump bilges dry and remove all loose dirt. Be sure all limber holes are open and the bilge pump strainers are clean. Oil stains are best removed by use of a bilge cleaner available from your dealer or a marina. **Do not use flammable solvents to clean your bilge!**

CAUTION

Electrically operated bilge pumps are subject to malfunction and are no substitute for frequent inspection of the bilge, especially during periods of long rain, high seas or storm conditions.



Winter Lay-Up & Storage/Dry Storage

Hull Preparation

If your boat is going to be placed in dry storage, as soon as the boat is hauled, scrub the hull and deck thoroughly to remove marine growth, scum and loose paint. The hull is easiest to clean when first hauled because the adhering material is still wet. If barnacles and other growth are on the hull, it will be necessary to scrape them off. Be careful not to scratch or otherwise

damage the gelcoat.

Inspect the underwater gear for any signs of excessive wear and examine propellers for damage.

Deck Preparation

Wash the deck, superstructure, and/or cockpit; clean all chrome and coat with a rust inhibitor before storing.

Engines

Lubrication System

1. Drain each crankcase only after engine has reached normal operating temperature to ensure complete drainage of used oil.

NOTE

If drain oil contains sludge, the engine should be flushed with a flushing oil. Refer to the engine owner's manual for recommended flushing oil and procedure.

2. Replace oil filter on engine.

3. Fill each crankcase with required quantity of recommended engine oil. Refer to engine owner's manual.

4. Shut off fuel line, start engine and pour or spray a fogging oil through carburetor air inlet. Continue until engine stops due to lack of gasoline.

5. Clean and lubricate all linkages.

6. Spray entire exterior of engine with a rust and corrosion inhibitor.

7. Remove stern drive unit(s), check all seals, grease u-joints and change gear oil. Either store unit inside or reinstall with new gaskets and seals.

8. Remove propeller - clean, repair and lubricate prop shaft.

Cooling System

If the possibility of freezing exists, the cooling system must be drained to prevent freeze damage to the engine and cooling system. The cooling system should also be drained if the boat is to be stored for an extended period of time to prevent corrosion damage.

If the boat is to be in dry storage, it is important that the boat be positioned so that the engine is as level as possible.

When draining the cooling system, make sure when plugs and petcocks are removed, that drain holes are free of foreign material such as sand, silt or rust.

If the cooling system is to be drained with boat in the water, the water intake valve must be closed until engine is restarted. This will prevent water from flowing back into cooling system.

For additional assurance against freezing and rust, it is recommended that the cooling system be filled with anti-freeze and pure fresh water. Anti-freeze should be mixed to the anti-freeze manufacturer's recommended proportions for the lowest temperature to which engine will be exposed.

For detailed information that pertains to your engine, consult your engine owner's manual.

Winter Lay-Up & Storage/Fresh Water System

General

If your boat is going to be idle or stored for a period of time, particularly when freezing temperatures are expected, the water system should be winterized. There are two methods: one requires draining the system completely and leaving it dry. The other system uses a special non-toxic potable water anti-freeze solution available from your marine dealer or recreational vehicle equipment supplier.

Draining the System

1. Open all faucets and allow pump to empty water tank and intake lines. Run the pump dry for one or two minutes before turning it off.
2. Open all drains, including the one on the water heater (if equipped).
3. Disconnect discharge and intake hoses from the pump. Start the pump and allow it to run until all water is expelled from unit.
4. Reconnect the hoses, close the drains, and leave faucets open.

Anti-Freeze

WARNING

Do not use automotive type radiator anti-freeze under any circumstances. It is poisonous. Most fresh water anti-freeze protects the system to -50 degrees F and adds color to the water to indicate its presence. Although this type of anti-freeze

is non-toxic, do not drink the solution. The system must be thoroughly drained and flushed to remove all traces of color of the anti-freeze when the boat is recommissioned.

1. Fill tank with fresh water and add the correct amount of anti-freeze recommended by the manufacturer.

2. Open all faucets, one at a time, starting with the furthest from the water pump. Be sure that you open hot water faucets as well to fill water heater with anti-freeze.

3. When colored water flows from each faucet, close it and leave it closed.

4. Remove water pump fuse to prevent cycling during lay-up.

Recommissioning

If anti-freeze has not been used, simply install pump fuse, fill the system with fresh water and open each faucet (starting with furthest from pump) until all air is removed from the system. If anti-freeze was used, proceed as follows:

1. Drain the system following steps 1-4 of lay-up procedures.

2. Fill with fresh water and let it set in tank for 10-15 minutes.

3. Drain and flush tank, until water is no longer colored.

4. Add fresh water when system is clear. Install new filter element.

Winter Lay-Up & Storage/Batteries

Removal

Glastron recommends batteries be removed from boat during long storage periods. In removing batteries, extreme caution should be exercised to avoid contact with battery acid. If spillage occurs, wash area down with a solution of baking soda and water. After removing batteries, clean outside of case with a baking soda/water solution.

Cleaning

Inspect batteries to make sure the battery cases are in good condition and not damaged. Terminals should be cleaned with the baking soda solution making sure no solution is allowed to enter the cells. Clean the battery cable clamp with the same solution and brighten the post and clamp with a piece of fine grit emery cloth. Then

cover the cable end with a light coat of petroleum jelly.

Maintenance

Check battery cells for fluid level. If low, add distilled water. Before storing, check the specific gravity of each cell. Battery should be fully charged before storage.

Storage

Batteries should be stored in a cool, dry place. Never store on concrete or dirt floors, as the charge will be absorbed into the ground. It is best to place batteries on wooden racks or shelves.

A monthly recharge of the batteries is recommended.

Appearance Care/Fiberglass & Gelcoat

Description

All Glastron boats are constructed of fiberglass. The hull, inner liner, and deck are built separately and later assembled together. These parts are built in layers of fiberglass strands, mat, woven roving and fab mat, which are bonded together with polyester resins. The outermost layer of the hull and deck is a pigmented resin, called gelcoat. Gelcoat is highly resistant to scratches from scrapes which occur during normal boat use.

Maintenance

Routine cleaning with ordinary soap and water is sufficient to remove most salt, dirt and grime. Stubborn stains will require the use of a special fiberglass cleaner and stain remover. The use of ammoniated or abrasive type cleaners will dull and discolor the surface of gelcoat, and are not recommended for use in routine maintenance.

Frequent waxing of the gelcoat surfaces will discourage soiling and help to preserve its surface lustre. Auto wax, which is commonly used by boat owners, is formulated for acrylic or alkyd auto finishes and is therefore less effective on gelcoat. Use a fiberglass wax which will fill in the pores of the gelcoat. Also, fiberglass wax contains chemicals to screen out harmful ultraviolet rays that cause color fade.

WARNING

Do not wax the upper deck surfaces where sure footing is required. Waxed gelcoat is very slippery, wet or dry, and would be hazardous to walk on.

Repairing Gelcoat Damage

The gelcoat on your boat is approximately 1/64" thick. Minor scratches in the gelcoat itself can be wetsanded out. But keep in mind that the scratch is really not being removed; it's the removal of the gelcoat surrounding the scratch that makes the scratch seem to disappear. Be sure to keep the gelcoat protected with a coat of wax to avoid frequent sanding. Deep scratches

that penetrate the gelcoat layer along with nicks, scars and small breaks should be repaired as soon as possible to avoid further damage. Obtain gelcoat of the same pigment to match the boat's color. A thickening agent and catalyst must be added to the gelcoat before application. These items can be purchased from your dealer.

Damage beyond the gelcoat layer which requires repair of the underlying fiberglass should be performed by a qualified lay up person. Consult your dealer.

Minor scratches in the gelcoat can be removed by wetsanding with a series of silicon carbide wet/dry sandpaper.

Start first with 320 grit, sanding it lightly until scratches start to disappear. Use 400 grit until the scratches are gone and then finish sanding with 600 grit. Finally, buff the sanded area with rubbing compound. Use a clean, dry cloth and rub hard until the compound begins to dry and then lighten up to polish the surface.

Gelcoat blistering is an industry phenomenon which can occur from water permeation through the gelcoat surface. Although it affects only a small percentage of boats, it is a potential problem to all boat owners.

Although gelcoat and fiberglass laminate are very durable, a certain amount of porosity does exist and can eventually lead to osmotic blistering.

With the application of several available water protection epoxy barriers, available from your dealer, the likelihood of blistering can be greatly reduced.

Anti-Fouling Bottom Paint

The bottom of your boat has the same gelcoat finish as the topsides. If foul waters produce unsightly marine growth, you may want to see your dealer regarding an anti-fouling bottom paint.

Before selecting a bottom paint, consult your dealer or boaters in your area to determine what works best for them. There are

Appearance Care/Fiberglass & Gelcoat

so many crucial variables involved - water temperature, water pollution, salinity, sunlight, current, suspended dirt and organic matter, and chemical discharges into

the water - that it is impossible to select a bottom paint on the basis of advertising alone. Anti-fouling bottom paint may adversely affect performance.

Teak

Description

The teak trim on your boat was selected because of its beauty, durability (wet or dry) and screw-holding property. When properly maintained, teak affords a natural wood grain beauty that far surpasses any other wood used on boats. The exposure that the wood is subjected to, opens the pores to the entry of ultraviolet sun rays, and salt water or fresh water causing the wood to expand, contract and then oxidize. Oxidation produces minute splitting of the grain which accelerates the aging process. Aging turns the color of the teak to a light grey. Cleaning and oiling the teak are tasks that will maintain its original appearance.

Cleaning

Use an organic cleaner that can penetrate the pores of the teak and cleanse them of dirt and stains. Avoid some of the harsh teak cleaning liquids. Some are so caustic that they remove the soft part of the teak from the hard wood to produce a rippled surface.

Oiling

An oil sealer should be applied with a soft cloth. Excess oil should be wiped off. After the oil base has been absorbed into the wood, a second coat should be applied. During the summer, it may be necessary to reapply oil which has been lost by the drying effect of the sun. Avoid applying too many coats as this can produce a noticeable varnished look.

Deck Hardware & Fittings

Cleaning

The screws, hinges, latches, rails, cleats, chocks and other hardware on your Glas-tron are aluminum, stainless steel or plated. Washing with soap and water after use and cleaning with a standard metal polish will easily clean these surfaces.

Inspection

Periodic inspection of your boat for tightness and fit of screws, bolts, clamps, and fittings is recommended. Keep sufficient tools available to adjust your boat's hardware whenever it becomes necessary.

Appearance Care/Windshield & Ports

Description

The windshield of your boat is either tempered safety glass or plastic. Safety glass will shatter into very small pieces upon impact. This type of glass is also affected by temperature changes. This type of glass can be found at your local glass company, should you need to replace a broken windshield. Portlights, transparent hatch covers and windows in your canvas set are synthetic material.

Cleaning

Tempered safety glass may be cleaned with soap and water or any good commercial glass cleaner. Plexiglass, clear vinyl or other synthetic materials should be washed with a mild soap and plenty of water. Remove grease and oil with kerosene or hexane: do not use solvents such as acetone, benzine, carbon tetrachloride or lacquer thinner, since they will attack the surface. Plexiglass may be waxed after cleaning.

Appearance Care/Carpeting

Spots and Stains

Spills and stains should be treated immediately. The longer a spot remains, the more difficult it will be to remove. Blot up spills with clean, white absorbent materials (towels, napkins, tissues, etc.). Remove solid built-up materials with a rounded tablespoon, spatula or edge of a dull knife.

Pre-test spot removal agents in an inconspicuous area. Apply several drops of solution on the carpet and rub gently with a clean, white towel. If color transfers to the cloth or a color change occurs, a professional cleaner should be consulted.

Do not overwet. Use small amounts of the cleaning agents and blot frequently. Always blot, do not rub or brush. Work from the outer edge of the spot towards the center to prevent rings. Beginning with step 1, treat the stained area with each spotting solution until the stain is removed. The final step is always to gently rinse the area with water, then absorb all the remaining moisture with absorbent towels.

Be patient. Some stains respond slowly. All spots and stains cannot be removed from every fabric due to differences in fibers, dyes, constructions, finishes, composition of the stain, length of time the stain

has remained on the article, etc. Some stains require professional treatment.

Cleaning Solutions

Ammonia Solution - Mix one tablespoon of clear household ammonia with one-half cup of water.

Detergent Solution - Mix one tablespoon of a colorless, mild detergent or dishwashing liquid in a cup of lukewarm water.

Dry Cleaning Solvent - Volatile dry spotter or commercial spotter such as Carbona, Energine, or K2R. Use in small amounts; can be harmful to sizings, backings or stuffing materials. **DO NOT** use gasoline, lighter fluid or carbon tetrachloride.

Enzyme Detergent - Mix a solution of enzyme detergent following the directions on the label. **DO NOT** soak or overwet. Allow the solution to remain on the stain for the recommended length of time before removing.

POG - Paint, oil and grease remover, available in hardware stores.

Vinegar Solution - Mix one-third cup of white household vinegar with two-thirds cup of water.

Stain	Description	Cleaning Instructions
Blood	Red when fresh, dries to dark brown with irregular edge.	<ol style="list-style-type: none"> 1. Apply cool detergent solution, blot. 2. Apply cool ammonia solution, blot. 3. Apply enzyme detergent, blot. 4. Rinse thoroughly with water, blot until dry. 5. If stain remains, apply rust remover or oxalic acid solution. 6. Bleaching with 3-5% hydrogen peroxide may be necessary.
Butter & Margarine	Greasy, yellowish-red • Contains vegetable dye, corn oil, milk, salt, preservatives, vegetable fats.	<ol style="list-style-type: none"> 1. Apply dry cleaning solvent, blot. 2. Apply detergent solution, blot until dry. 3. Apply vinegar solution, blot. 4. Rinse with water, blot until dry.
Catsup & Tomato Sauce	Reddish-brown, absorbed and built-up • Contains tomatoes, salt, sugar, spices, tannin, vinegar.	<ol style="list-style-type: none"> 1. Apply cool detergent solution, blot. 2. Apply ammonia solution, blot. 3. Apply enzyme detergent, blot. 4. If stain remains, bleach with 3-5% hydrogen peroxide or sodium perborate. 5. Rinse thoroughly with water, blot until dry.
Jam & Jelly	Reddish or bluish, absorbed and built-up • Contains pulp of fruit, sugar, tannin preservatives.	<ol style="list-style-type: none"> 1. Apply detergent solution, blot. 2. Apply vinegar solution, blot. 3. Rinse with water, blot. 4. Apply enzyme detergent, blot. 5. Rinse with water, blot until dry.

Appearance Care/Carpeting

Lipstick

Various colors, soft and greasy • Contains pigment or dye in fat, waxes and oils.

1. Scrape off excess with spatula or dull knife.
2. Apply POG, blot, making sure not to reapply stain onto fabric.
3. Apply drycleaning solvent, blot.
4. Apply detergent, blot.
5. Apply ammonia solution, blot.
6. Apply vinegar solution, blot.
7. Rinse with water, blot until dry. *Try to avoid wetcleaning on wool. Use POG and drycleaning solvents as long as possible.

Mildew

Greyish or brownish fungus with black spots. May permanently damage fibers.

1. Apply enzyme detergent, blot.
2. Apply ammonia solution, blot.
3. Rinse thoroughly with water, blot.
4. Apply solution of oxidizing bleach (chlorine or perborate) *Do not use chlorine bleach on wool or silk.
5. Rinse thoroughly with water, blot until dry.

Mud

Greyish, brownish, reddish absorbed and built-up • Contains soil with greases and oils, clay, iron.

1. Brush or scrape off as much as possible.
2. Apply detergent solution, blot.
3. Apply ammonia solution, blot.
4. Rinse thoroughly with water, blot until dry.
5. If stain remains, apply POG and drycleaning solvent alternately, blot until dry.

Mustard

Yellowish, absorbed or built-up • Contains mustard seed, vinegar, salt, tumeric, oils, spices.

1. Apply detergent solution, blot.
2. Apply vinegar solution, blot.
3. Apply enzyme detergent, blot.
4. If stain remains, rust remover (oxalic acid solution) or bleaching may be necessary. *Do not use ammonia or alkalies.

Nail Polish

Various colors, stiff, shiny and built-up • Contains dye or pigment in a liquid cellulose acetate base, solvent, plasticizer.

1. Apply drycleaning solvent.
2. Apply POG, blot.
3. Apply amyl acetate if available, or nail polish remover—PRETEST FIRST.
4. If stain remains, apply detergent solution, blot until dry.
5. Apply ammonia solution, blot.
6. Apply vinegar solution, blot.
7. Rinse with water, blot until dry.

Urine

Yellowish or brownish, darkened with age, absorbed • Contains urea, uric acid, ammonia, organic acids, cholesterol, albumins, proteoses.

1. Blot up as much as possible if still wet.
2. Apply detergent solution, blot.
3. Apply ammonia solution, blot.
4. Apply vinegar solution, blot.
5. Rinse thoroughly with water, blot until dry.
6. If stain remains, apply rust remover or oxalic acid solution.
7. Bleaching with 3-5% hydrogen peroxide or sodium perborate might be necessary. *Urine stains may cause permanent dye removal from fibers.

Vomit

Various colors, absorbed and built-up • Contains food mucus, albumins, acids.

1. Blot up as much as possible.
2. Apply enzyme detergent, blot.
3. Apply ammonia solution, blot.
4. Apply vinegar solution, blot.
5. Rinse thoroughly with water, blot until dry.

Wine

Reddish or purplish, absorbed • Contains alcohol, sugar, tannin, coloring matter.

1. Apply detergent solution, blot.
2. Apply vinegar solution, blot.
3. Apply ammonia solution, blot.
4. If necessary, bleach with 3-5% hydrogen peroxide or sodium perborate.
5. Rinse thoroughly with water, blot until dry.

Appearance Care/Seat Covering & Vinyl Trim

Description

Your Glastron seat coverings and trim are expanded vinyl. The vinyl used is water-proof, mildew resistant and is virtually unaffected by extreme temperatures.

Cleaning

Most dirt and spills will wipe clean with a damp rag or sponge but scrubbing with soap and water or with vinyl cleaner is sometimes necessary. The surface is slightly porous and certain bad spills may leave a stain which sets. Do not use solvents or abrasive detergents in cleaning.

Care

When possible, exterior cushions should be removed and placed inside the boat when not being used.

When cushions are left in the boat for winter storage, open zippers and insert small blunt object to elevate material away from foam for venting purposes. If seats can be folded down, the folded down position is best for storage.

Certain deluxe interiors feature seamed vinyl seat covers, and the seams will allow the foam cushions to absorb water. Therefore these seats should be covered when not in use or when washing down.

Curtains & Tops

Description

Glastron curtains and tops are manufactured from high quality materials. This material is weather, rot, mildew and water resistant.

Cleaning

When cleaning your boat, you should hose down all the fabrics and scrub with soap and a soft bristled brush. Rinse thoroughly.

For extreme cases of soil or mildew, a mild solution of ammonia and water may be applied, scrubbed and followed by a com-

plete rinsing.

Should a leak occur along the seams of your top, you may easily remedy by rubbing a stick of paraffin along the affected area or by applying a coating of Scotch Guard.

Snaps and zippers are rust resistant, but should be regularly lubricated. Vaseline, silicone spray, or paraffin are some of the lubricants that are effective. Zippers should never be forced.

Never fold or roll damp or wet fabric up without proper ventilation. Let air-dry before storing. This will decrease the possibility of mildew.

Troubleshooting/Engine Problems

This chart is designed to aid you in finding and correcting minor engine problems. If the problem is too complex, we suggest you contact your local authorized marine dealer.

Troubleshooting is a logical sequence of elimination. First, decide what the problem is, then start the process of elimination starting with the simpler causes and working toward the more complex.

CAUTION
Before attempting any checks or repairs around engine or electrical components, disconnect battery cables to avoid possible personal injury or damage to equipment.

Problem	Probable Cause	Remedy
Engine will not start (Fuel system)	<p>Improper starting procedure</p> <p>Empty fuel tank or fuel shut-off valve closed</p> <p>Choke not operating properly</p> <p>Clogged fuel filters</p> <p>Faulty fuel pump</p> <p>Engine flooded</p> <p>Contaminated fuel</p>	<p>Review starting procedure.</p> <p>Check fuel tank for fuel level, or open valve.</p> <p>Check choke linkage for freedom of movement and remove only obstructions.</p> <p>Check and replace filters.</p> <p>Refer to engine manual for fuel pump testing procedures.</p> <p>Do not attempt to start engine for at least 5 minutes, then fully advance throttle, (make sure remote control is in neutral position) and crank engine.</p> <p>Inspect fuel for water or other contaminants. If contaminated, drain tank and flush with fresh fuel.</p>
Engine will not start (Ignition system)	<p>Ignition switch defective</p> <p>Battery switch in off position</p> <p>Spark plugs fouled or broken</p> <p>Distributor broken, wet, cracked or dirty</p> <p>Bad rotor, cracked, broken spring contact, eroded or loose metal segment, or carbonized paths</p> <p>Improper timing</p>	<p>Inspect switch for loose connections, test switch continuity. Replace switch if necessary.</p> <p>Turn selector switch to battery position.</p> <p>Clean, regap or replace.</p> <p>If wet or dirty, wipe with cloth (containing solvent if possible). Inspect cap for cracks, carbonized paths (inside and out) replace cap if necessary.</p> <p>Inspect and wipe with a cloth (containing solvent if available) remove all residue. Inspect rotor replace if bad.</p> <p>Check timing and adjust if necessary, to your engine owner's manual.</p>

Problem	Probable Cause	Remedy
Low cranking speed	<p>Loose or dirty electrical connections or damaged wiring</p> <p>Bad battery</p> <p>Engine oil too heavy for prevailing temperatures</p>	<p>Check all associated electrical connections and wires.</p> <p>Test battery as explained in electrical section under batteries in engine manual.</p> <p>Drain oil and refill with correct grade and viscosity oil. (Consult your engine owner's manual.)</p>
Starter will not crank engine	<p>Discharged battery</p> <p>Corroded battery terminals</p> <p>Loose connection in starting circuit</p> <p>Defective starting switch</p> <p>Starter motor brushes dirty</p> <p>Jammed "starter drive"</p>	<p>Charge battery, change battery selector switch to "Both" or "All."</p> <p>Clean terminals.</p> <p>Check and tighten all connections.</p> <p>Replace switch.</p> <p>Clean or replace brushes.</p> <p>Loosen starter motor and free gear.</p>
Starter motor turns but does not crank engine	<p>Partially discharged battery</p> <p>Defective wiring</p> <p>Broken "starter drive"</p>	<p>Change battery selector switch to second battery or "Both or All" position.</p> <p>If above fails, charge or replace batteries.</p> <p>Inspect all wiring.</p> <p>Remove starter motor and repair drive.</p>
Lack of power	<p>Throttle not fully open</p> <p>Ignition or carburetion</p> <p>Flame arrestor dirty or air intake obstructed</p> <p>Engine overheating</p>	<p>Inspect cable and linkages for binding, obstructions or loose fasteners.</p> <p>Service ignition system and carburetor.</p> <p>Clean flame arrestor and check air intake.</p> <p>Check engine temperature. Consult engine owner's manual for proper engine operating temperature.</p>
Misfiring	<p>Fouled spark plugs</p> <p>Wet spark plug wires</p> <p>Carbon tracked distributor</p>	<p>Remove, clean or replace.</p> <p>Wipe dry, inspect and replace damaged wires.</p> <p>Clean or replace.</p>

Troubleshooting/Engine Problems

Problem	Probable Cause	Remedy
Misfiring (con'd)	<p>Loose ignition wires</p> <p>Cold engine with improperly set choke</p> <p>Defective fuel pump</p> <p>Partially clogged fuel filter</p> <p>Incorrect carburetor mixture</p> <p>Contaminated fuel</p>	<p>Inspect all wire connections.</p> <p>Check engine owner's manual for proper choke setting.</p> <p>Repair or replace.</p> <p>Clean or replace fuel filter.</p> <p>See engine owner's manual for proper carburetor adjustment.</p> <p>Drain fuel tank, flush clean and replace fuel filters.</p>
Excessive fuel consumption	<p>Restriction in air cleaner</p> <p>Faulty fuel pump</p> <p>Incorrect timing</p>	<p>Remove air cleaner and replace filters.</p> <p>Repair or replace.</p> <p>Check engine owner's manual for correct timing.</p>
Smoky exhaust (Blue)	<p>Lube level too high</p> <p>Oil too thin</p> <p>Oil overheated</p> <p>Fuel mixture too rich</p> <p>Choke stuck</p> <p>Poor carburetor setting</p> <p>Carburetor fuel level too high</p> <p>Clogged flame arrestor</p> <p>Misfiring</p> <p>Plugs</p>	<p>Drain off excessive oil.</p> <p>Drain and replace oil. Consult your engine owner's manual.</p> <p>Check cooling system.</p> <p>Adjust carburetor.</p> <p>Lubricate and adjust.</p> <p>Re-adjust carburetor. Consult engine owner's manual.</p> <p>Adjust float in carburetor.</p> <p>Clean or replace.</p> <p>See engine owners manual.</p> <p>Clean, regap or replace.</p>
(Black or gray)		
(White smoke)		
Low oil pressure	<p>Insufficient oil in crankcase</p> <p>Excessive oil in crankcase</p> <p>Diluted or improper grade oil</p> <p>Oil leak in pressure line</p>	<p>Check and add correct grade and viscosity oil. Visually check engine for leaks.</p> <p>Check and remove required amount of oil. Check for cause of excessive oil (improper filling, bad fuel pump, etc.)</p> <p>Change oil and oil filter, being sure to use the correct grade and viscosity.</p> <p>Inspect all oil lines and tighten all connections as necessary.</p>

Problem	Probable Cause	Remedy
No oil pressure	Defective gauge, gauge tube or oil liner No oil in engine	Replace gauge, or tube and tighten or replace liner as necessary. Fill with proper grade oil. (Consult your engine owner's manual.)
High oil pressure	Too heavy grade of oil Dirt or obstruction in oil lines	Drain oil and replace with proper grade. (Consult your engine owner's manual.) Drain and clear oil system. Check for bent or flattened oil lines and replace where necessary.
Knocking or pinging	Wrong fuel Incorrect timing Pre-ignition Overheated engine Cooling system trouble	Drain tank and replace with proper fuel. Re-time engine according to your engine owner's manual. Clean or replace spark plugs and check engine timing. Check engine cooling system. Check water intake valve and connections for leaks.
Erratic running	Choke not operating Faulty fuel pump Idle speed too low Faulty ignition system components Clogged fuel filters Contaminated fuel Kinked or clogged fuel lines or fuel tank vent line Flame arrestor plugged with foreign material or air intake hose obstructed	Check choke linkages for binding or an obstruction. Refer to engine owner's manual for fuel pump testing procedures. Check idle speed and adjust. Service ignition system. (Consult your engine owner's manual.) Replace filters. Inspect fuel for water or other contaminants. If contaminated, drain tank and flush with fresh fuel. Replace line if kinked, blow out line with compressed air to remove obstruction. Clean flame arrestor and check hose.

Troubleshooting/Engine Problems

Problem	Probable Cause	Remedy
Engine overheating	Heat exchanger (closed system only)	Clogged. Clean out obstruction and flush with clean fresh water.
	Cooling system airbound	Bleed air from cooling system. See engine owner's manual for details.
	Kinked, collapsed or broken hose	Straighten or replace hose.
	Coolant level low (closed system only)	Check cause of low coolant level and repair. Refill system with proper coolant solution.
	Water inlet valve closed	Open valve completely.
	Water pickup obstructed	Remove obstruction.
	Drive belt loose, broken or in poor condition	Replace and/or adjust belt.
	Seawater pickup pump drive belt loose, broken or in poor condition	Replace and/or adjust belt.
	Defective seawater pickup pump	Repair or replace.
Sludge in oil	Infrequent oil changes	Drain and refill with proper grade oil.
	Dirty oil filter	Replace filter.
	Water in oil	Drain and refill. If trouble persists, check for cracked block, defective head gasket or cracked head.

Troubleshooting/Transmission Problems

Problem	Probable Cause	Remedy
Hard shifting	Linkages Low fluid level	Lubricate and inspect shift cable and linkages. Check fluid level and fill with proper grade fluid. Check reason for low fluid level.

Lack Of Performance

Probable Cause	Remedy
Damaged or improper propeller Excessive bilge water Boat overloaded or load improperly distributed Boat bottom fouled or damaged	Inspect propeller and replace if necessary. Pump out bilge and check for cause of water entry. Reduce load or redistribute load more evenly. Inspect, clean or repair as necessary.

Vibration Problems

Probable Cause	Remedy
Loose engine mounting bolts Propeller shaft bent Propeller bent or pitch out of true	Inspect and tighten bolt if necessary. Replace bent shaft. Inspect propeller and replace if necessary.

Nautical Terms

Aboard; on or in the boat.

aft, after; aft is the part of the boat toward the stern.

amidships; toward the center from side to side or front to rear.

anchor; a powerful hooked piece of iron for gripping the bottom.

anchor light; a 32 point white light shown by a ship at anchor.

anti-fouling paint; paint applied to a boat's bottom to keep weeds and barnacles from clinging to the bottom.

ashore; on shore.

astern; behind the boat, go astern to move backwards.

bail; to scoop water from the bottom of a boat with a bucket or container.

barnacles; small, hard-shelled marine animals which are found attached to pilings, docks and bottoms of boats.

beam; the width of a boat at its widest point.

bearing; the direction of an object from the boat, either relative to the boat's direction or to compass degrees.

below; under the deck.

berth; a bunk or bed on board a boat.

bilge; the bottom of a boat below the flooring.

blower; a fan device used to ventilate fumes from below decks.

boarding; entering upon or climbing into a boat.

bow; the forward part of the boat's hull.

bow line; a mooring line.

bridge; the navigating deck of a boat.

bridge, flying; an open deck above the bridge, usually with a duplicate set of engine controls and navigating facilities.

broach; to turn sideways to the seas when running before them.

bulkhead; any vertical partition (wall) on a boat.

Can buoy; a black or black-striped buoy of round shape.

capstan; a mechanically, or hand driven machine with vertical axis used on deck to haul in the anchor.

cast off; to let go.

chafe; to wear by steady rubbing.

chafing gear; protective coating as to absorb the rubbing.

chain; the anchor chain usually stores forward in the cabin and runs up on deck through a hawse pipe.

check; to hold back or stop a line gradually.

chocks; oval-shaped castings fore and aft through which the anchor line and dock lines may pass.

cleat; a piece of wood or metal with projecting arms or horns, used for securing lines.

coaming; vertical wood or fiberglass railing around the cockpit or hatches to keep water from getting in.

companion ladder; the stairs leading down into the cabin.

compass; device used to determine directions on shipboard.

Davit; a curved spar or pair of spars with sheaves in their ends and which can be rotated out over the side to hoist a boat or dinghy easily from the water onto the deck.

deck; an open surface on which the crew and passengers walk.

dinghy; small boat used as a tender by a yacht.

displacement; the volume of water displaced by the hull. The displacement weight is the weight of this volume of water.

drogue; a sea anchor.

Ebb; the falling tide.

ensign; the national flag of a vessel.

fathom; a measure of depth; six feet.

fender; a cushion, usually cylindrical in shape, used to protect the sides of a boat from rubbing against docks or other vessels.

fend off; to push off with a boat hook or by hand to avoid sharp contact with a dock or other vessel.

flood; the rising tide.

flukes; the palms or broad portions of an anchor which hold into the ground.

fore; the term applied to portions of a boat near the bow.

fore and aft; in the lengthwise line of a boat.

freeboard; the shortest distance from the water line to the lowest part of the deck.

Galley; the cooking area of a boat.

gear; a broad term applying to rigging or to the personal effects of people on board.

Nautical Terms

gimbal; a device in which the compass or galley stove is set to keep it level when the boat heels.

ground swell; the general heaving of the sea in the absence of waves.

ground tackle; a group term for all gear used in anchoring a boat.

gunwale; the rail or upper edge of a boat's side.

hatch; an opening from the deck to the interior of the boat.

head; a boat's toilet.

heave to; a boat is said to be hove to in a storm when she is without forward progress, but carrying a sea anchor and just enough power to hold her position in the seas.

hull; that part of a boat from the deck down.

Inboard; toward the center of a boat.

inboard-outboard; also known as outline and I/O, a motor installation with inboard engine directly geared to an outboard drive.

Kedge; an auxiliary anchor of lesser holding power than the main anchor. Often carried out by a small boat and used for warping a vessel ahead. Also a grounded seaward by using an anchor carried out to deep water.

knots; a measure of speed indicating nautical miles per hour (a nautical mile is equal to 6080 feet).

Latitude; a measure of distance north or south of the equator.

lee; the side opposite to that from which the wind is coming.

leeward; the direction toward which the wind is blowing.

life line; lines along the rail of a boat supported by stanchions.

list; the lean of a boat to one side or another due to weight on board.

locker; a storage compartment on ship-board.

log; an instrument for determining a boat's speed.

logbook; a record of all matters pertaining to a boat's position or operation.

longitude; distance east or west of the prime meridian at Greenwich, England.

loran; a navigational device which affords lines of positions derived from signals emitted from pairs of transmitting stations.

Midships; same as amidships, indicating the center of the boat.

mooring; a mooring consists of an anchor embedded in the bottom. A chain from it to a buoy to the boat, usually with a pick-up can or buoy to facilitate getting the pennant on board.

Navigation; the art of conducting a boat safely from a known position to a known destination.

nun buoy; a red or red striped buoy of conical shape.

Over all; the measurement from the extreme forward end to the extreme after end of the deck.

Pad eye; a fitting consisting of a plate with a metal eye, permanently secured to a part of the boat.

part; to break.

pennant; a three-sided flag.

personal flotation devices (PFDs); usually cloth jackets made with pads of buoyant material to sustain a person in water.

pitch; the measure of angle of a propeller blade.

port; the left side, looking forward. Also an opening, porthole.

propeller; a group of two or more helical blades which drive a boat through the water.

Quadrant; a fitting to the rudder shaped like a sector of a circle. The steering cable is affixed to this and controls the rudder through it.

Rub rail; a strip of molding extending outward from the boat's sides to protect the hull.

rudder; the device by which the boat is steered.

Scuppers; opening in the toe rail to allow water to drain off.

sea anchors; a drogue or drag.

sea cock; a valve opening or shutting a

Nautical Terms

pipe connection through the hull.
sextant; a device used in celestial navigation to determine the altitudes at sun, moon and stars.
shank; the main body of an anchor.
shoal; shallow.
slip; a boat's berth between two piers.
slack; to ease off.
snub; to check quickly around a cleat.
soundings; to take sounding is to test the depth of the water with a lead line or Fathometer.
spring line; a line from the bow aft or quarter forward to prevent fore and aft motion at a dock and to help hold the boat off the dock.
squatting; the tendency of the stern to sink low in the water at high speed.
starboard; the right side of the boat looking forward.
steady as you go; a command to maintain course and speed.
steerageway; sufficient speed to keep the boat responding to her rudder.
stern; the after end of the boat.
stove in; when the shell of a boat is smashed in by impact, the craft is said to be stove in.
stow; to pack away neatly.
strut; the supporting piece which holds the propeller shaft in place between the propeller and the hull.

stuffing box; the hull fitting through which the propeller shaft passes, allowing the shaft to turn freely without leaking water.
swab; a nautical term for mop.
swamp; to sink by taking water over the rail.

Tachometer; a measuring device which indicates the number of revolutions per minute.
tend; the direction of the anchor chain or rode toward the anchor.
top off; to fill up a tank.
topsides; the sides of a boat between the waterline and rail.
transom; a flat stern at right angles to the keel, often bearing the yacht's name and home port.
trim; a boat's balance when properly loaded.

Underway; a boat is underway when she is not secured to shore or the bottom.

Wake; the path of a boat left astern in the water.
way; controlled motion through the water, when the boat is moving.
windlass; a kind of winch used to raise the anchor.

Suggested Reading List

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