

Section 5

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POWERING THE ENGINES

Fuel System

The 500 COCKPIT 680 gallons of fuel within four tanks. Fuel systems installed by Carver meet or exceed the requirements of the U.S. Coast Guard, the Boating Industry Association, and the American Boat and Yacht Council during the time your boat was constructed. Each tank must pass a rigid test conducted by the tank manufacturer. In addition to this test, all fuel systems are inspected and pressure tested by Carver.

Your Carver Dealer also makes a full inspection of the fuel system prior to delivering your boat. An entry on the Carver Pre-Delivery Service Record will attest to the dealer's performance of this fuel system inspection.

The fuel system of the 500 COCKPIT can be configured several ways depending upon whether the propulsion system is gasoline or diesel?

Gasoline Fuel Systems

Fuel supply valves are used within gasoline fuel systems to control the flow of fuel from each tank to the engines and generator. Each engine and the generator has its own supply valve.

The port engine's fuel supply valve allows the port engine to draw from either the forward portside tank or the aft portside tank. Likewise, the starboard engine's fuel supply valve allows the starboard engine to draw from the forward starboard tank or the aft starboard tank. The generator valve is alternated between the port and starboard fuel tank, whichever contains a greater amount of fuel. Refer to the **Fuel System Layout (Gasoline)** portion of **Section 9** for fuel tank locations.

Anti-siphon check valves are installed in gasoline fuel systems between the fuel hose and the fuel tank withdrawal tube. Anti-siphon check valves are spring loaded and will "automatically" stop the flow of fuel in the case of a ruptured or disconnected fuel hose.



DANGER

Anti-siphon check valves are important safety components. DO NOT remove anti-siphon valve(s) from the fuel system. Clean and or replace clogged or sticky valves.

POWERING THE ENGINES

Diesel Fuel Systems

Diesel propulsion systems utilize fuel "supply" and fuel "return" lines. The supply lines feed fuel to the engine. Return lines transfer fuel not burned by the engine back to the fuel tank. Each diesel engine in the 500 COCKPIT is plumbed to its nearest fuel tanks (ie. port engine to port fuel tanks, starboard engine to starboard fuel tanks). The generator draws fuel from the port tank.

A fuel transfer pump is included within diesel fuel systems. Since the generator draws fuel from the forward portside tank, this tank may be used at a greater rate. If the two forward tanks become noticeably unequal, use the fuel transfer pump to equalize the volume of fuel between the two forward tanks.

NOTE: The fuel transfer pump transfers fuel between the two forward tanks only.

The fuel transfer pump is located in the forward center section of the engine compartment. The control switch, located on the helm console, utilizes a three position, center "OFF" switch. To transfer fuel: monitor your forward fuel tank gauges to identify the tank that has the highest volume of fuel. Turn "ON" the 12 volt MAIN breaker and the circuit breaker labeled EXTRA that is installed on the 12 volt panel. Turn the fuel transfer switch towards the fuel tank to which you want the fuel to flow. Monitor the fuel gauges and continue to transfer fuel until the tanks are equalized. Fuel shut-off valves are installed in diesel fuel systems between the fuel line and the fuel tank. Both supply and return lines incorporate fuel shut-off valves. Refer the **Fuel System (Diesel)** portion of **Section 9** for locations of the diesel system tanks and equipment.



WARNING

DO NOT operate a diesel engine with its fuel "RETURN" line valve in the closed position. Failure to allow unburned fuel to return to the tank will create excessive pressure within the fuel system that could lead to fuel system failure.

Fuel Tank Vents (Gasoline and Diesel)

Each fuel tank is vented overboard. While the tank is being filled, air is displaced by fuel and escapes through the vent. When fueling, fuel will spurt through the vent when the tank is nearly full. Periodically remove and clean the vent screen. The screens prevent insects and dirt from clogging the vent hose and from contaminating fuel.

Fuel Gauges (Gasoline and Diesel)

Fuel gauges are installed at the helm console for each tank installed on the boat. While underway, the "reading" on the gauges may vary due to the movement of fuel within the tanks. The fuel gauge will provide only a relative indication of the amount of fuel that remains in a tank. They are not calibrated instruments. The port engine ignition must be in the "ON" position for fuel gauges to provide a fuel level reading.

POWERING THE ENGINES

AUXILIARY SYSTEMS

See your the manufacturer's manual for care and maintenance of your engine. This manual can be found in your owner's packet.

Engine Ventilation

Your engine compartment is equipped with a ventilation system consisting of intake ducts, exhaust ducts and bilge blowers.

After fueling, run the bilge blowers for five minutes to evacuate any fuel fumes from the engine compartment. Inspect the engine compartment. Sniff the engine compartment for fuel vapors. After fueling, do not operate onboard equipment until you are sure that the boat is rid of fuel vapors.

While cruising, continuously operate your blowers. This will help disperse excess heat in the engine compartment and also prevents the accumulation of CO which may form under some operating conditions.



Operate bilge blowers for AT LEAST 5 minutes and inspect the bilge for fuel vapors prior to starting the engines. If you discover fuel vapors in the bilge, DO NOT START THE ENGINES. Investigate the source of these vapors and fix the problem before starting the generator. Continue to operate the bilge blowers while the generator is running.

All owners are responsible for keeping their boat's ventilation system in operating condition. Ensure that openings are free of obstructions. Inspect ducts regularly. Make sure that ducts are not blocked or torn, and blowers are operating properly. Replace any worn out components with equivalent type equipment.

Cooling System

Your cooling system removes excess heat from your engine and exhaust system. Closed systems use a freshwater/antifreeze mixture to cool the engine. The coolant runs through a heat exchanger where the excess heat is transferred to raw water taken in through the seacocks. Open cooling systems use raw water to cool the engine directly. If you are not sure, contact your dealer to find out which type of system you have.

Both open and closed cooling systems require sea water to function. Before each cruise, make sure your strainers are free of sea weed and other debris. Open the cooling system seacock before you start your engines. See the **Below the Waterline Thru-Hull Fittings** portion of **Section 9**. If you have a closed system, make sure that you have a sufficient level of coolant in the system.

POWERING THE ENGINES



WARNING

Running your engine with an inadequate supply of antifreeze can cause serious damage.

After starting your engines, check your engine exhaust outlet. If water is not being ejected through the outlet, shut your engine down immediately and ascertain why sea water is not being pumped into the system. Have the problem corrected before restarting your engines.

If your engine temperature gauges register a higher than normal temperature reading, your cooling system may need to be repaired. If the needles start a rapid movement toward a high temperature reading, shut your engines down immediately and have your cooling system checked and repaired.

Exhaust System

The exhaust system consists of an exhaust manifold, a muffler, and the exhaust pipes used to remove engine exhaust from your engine to the atmosphere. If your exhaust system is ruptured or compromised in any way, dangerous carbon monoxide may escape and endanger you or your passengers. Check your exhaust system regularly for leaks. Any change in engine noise should be carefully checked out.

Fire Suppression

A SEA-FIRE automatic Halon 1301 fire suppression system is installed in the engine compartment of your 500 COCKPIT. This system provides an added measure of fire safety in the event of an onboard engine compartment fire.

A Halon tank and monitor is installed on the engine compartment's aft bulkhead. A system monitor is installed near the helm station. The system monitor is wired to an ignition switch. The monitor's light should be "ON" when the ignition switch is turned "ON."

Read the instruction booklet provided by SEA-FIRE for more information on the Halon 1301 system. This booklet is included with the OEM materials for your boat.

Halon systems installed in boats equipped with diesel propulsion engines incorporate an engine shut-off circuit. When the Halon system is activated, the diesel engines are automatically shut down. An override switch is incorporated in the monitor for starting the diesel engines after the system has been activated. Read the SEA-FIRE manual for further instructions.

POWERING THE ENGINES

ENGINE GAUGES

Each helm station is equipped with a complete set of gauges. These instruments allow you to monitor the operation and condition of your boat's engines. Gauges located on the starboard side of the helm station correspond to the starboard engine, port side gauges correspond to the port engine. Familiarize yourself with these gauges before running your engines for the first time.

CAUTION

Engine operator's manuals have been included within your boat's OEM supplied materials package. The engine manual is a detailed and comprehensive manual that will provide you with information on proper operation and maintenance of the engines. DO NOT START OR OPERATE YOUR BOAT'S ENGINES WITHOUT FIRST READING THE ENGINE OPERATOR'S MANUAL.

Instrumental Panel Gauges

Tachometer

The tachometer monitors and indicates the speed of an engine as measured in "revolutions per minute" or RPM. This speed has no relationship with your boat's speed over the water nor does a tachometer necessarily indicate the speed of propeller rotation. The tachometer may not register zero RPM when the respective engine's ignition key is turned off. This is normal.

NOTE: The engine manufacturer has established a maximum RPM rating for your engines. This rating can be found in the engine's operator's guide. Refer to your engine operator's guide for further information concerning maximum RPMs. DO NOT EXCEED THE MAXIMUM RPM RATING.

Temperature Gauge

A temperature gauge monitors the cooling system of an engine. Every engine is designed to operate within a specified temperature range. A sudden increase in an engine's temperature could indicate that the cooling water intake system has become blocked, a water intake hose has failed, or the engine's water pump has malfunctioned.

Your engines are equipped with alarms that will sound when an engine's temperature rises beyond a predetermined level. If this alarm sounds shut down the overheated engine immediately.

Also, while your engines are equipped with high temperature alarms you should still visually monitor each temperature gauge. If an engine's temperature gauge indicates excessive engine temperature, shut down that engine immediately.

POWERING THE ENGINES



WARNING

The engine manufacturer has established a safe operating temperature rating for your engines. This rating can be found within the engine operator's guide. Refer to your engine's operator's guide for further information concerning engine temperature. **DO NOT EXCEED THE ENGINES SAFE OPERATING TEMPERATURE.**

A TIP FROM CARVER: *"A cold engine has a tendency to stall when first put into gear. Let your engines warm up a few minutes before departing your dock or anchorage. "*

Oil Pressure Gauge

Each engine has an oil pressure gauge. This gauge provides an indication of the pressure within the engine's lubrication system. The oil pressure reading will change as engine speed changes. However, a drop (either sudden or gradual) in an engine's oil pressure while you are maintaining a constant speed, may be an indication of an oil pump failure or leak in the lubrication system.

Your boat is equipped with audible alarms that will sound when oil pressure drops below a predetermined level. These alarms will sound upon initially starting an engine or anytime an ignition switch is "ON" and the engine is not running. The alarm sounds under these situations because the engine does not yet have adequate oil pressure. The alarm will cease as soon as oil pressure rises to the proper level.

If this alarm sounds when the boat has been running, or if the alarms fail to become silent within 15 seconds after starting the engines, look at your engine oil pressure gauges. If either gauge indicates abnormally low oil pressure shut down the corresponding engine immediately.

Also, while your engines are equipped with low oil pressure alarms you should still visually monitor each oil pressure gauge. If an oil pressure gauge indicates low pressure, shut down that engine immediately.



WARNING

The engine manufacturer has established a safe oil pressure rating for your engines. This rating can be found within the engine's operator's guide. Refer to your engine operator's guide for further information concerning oil pressure. **DO NOT OPERATE AN ENGINE BELOW ITS MINIMUM OIL PRESSURE RATING.**

POWERING THE ENGINES

Voltmeter

The voltmeters monitor the condition of your boat's batteries. A fully charged battery will indicate approximately 12.5 volts. As power within a battery is used, the indicated voltage for that battery will decrease as indicated on the appropriate voltmeter. The 500 COCKPIT utilizes a voltmeter gauge for each battery. Voltmeters are protected by circuit breakers located on the battery selector switch panel.

A detailed explanation on how to use the voltmeters to monitor battery capacity is included in the **Voltmeter and Ammeter** portion of **Section 2**.

Fuel Gauges

Four fuel gauges, one for each fuel tank, display an approximate indication of the level of fuel that is held within each fuel tanks. This gauge is not calibrated and should not be regarded as a precise or highly accurate method of measuring available fuel quantities.

The fuel gauge will display a reading when the ignition switch for the port engine is turned to the "ON" position.

Gauge Maintenance

The gauge panel should be protected from the sun and weather when not in use. Instrument gauges are not waterproof. Protecting them from the elements will prolong their life.

NOTE: Some gauges can collect condensation within the gauge assembly. This condition is indicated by small beads of moisture behind the gauge's glass bezel. This moisture does not indicate a defective gauge. The Carver Limited Warranty does not include replacing gauges that are cosmetically affected by condensation.

Electronic gauges can be affected by static electricity that may build up on the glass face of the gauge. Periodic washing of the gauge face with warm water and mild liquid detergent will help reduce the static electricity problem and improve gauge accuracy.

POWERING THE ENGINES

CONTROLS

Gear And Throttle Controls

Shift Levers

Shift levers are installed on the port side of the steering wheel. The outside lever controls the port engine and the inside lever controls the starboard engine.

The shift levers allow you to shift from neutral to forward or reverse. These levers are designed to permit independent shifting of each engine. This improves maneuverability in tight quarters.

WARNING

DO NOT shift into, or out of, gear while the engine speed (as indicated on the tachometers) is above IDLE. Costly damage to your boat's drive train could result.

A neutral safety switch is incorporated into the linkage of each gear shift. When properly adjusted, this safety switch will not permit you to start an engine while it is in gear.

A TIP FROM CARVER: *"If you turn the ignition switch key and the engine starter fails to engage it may be because the neutral safety switch for that engine is slightly out of adjustment. If this happens, wiggle the gear shift for that engine fore and aft until the starter engages."*

Throttle Levers

The throttles are installed on the starboard side of the steering wheel. The inside throttle lever controls the port engine and the outside throttle controls the starboard engine.

The throttles allow you to increase or decrease the speed of each engine. These levers are also designed to permit independent control of each engine's speed.

WARNING

ALWAYS return a throttle to its extreme low speed position before shifting the engine into, or out of, gear. Failure to follow this procedure may result in drive train damage.

POWERING THE ENGINES

On a dual engine boat such as the 500 COCKPIT it is recommended that both engines be operated at the same speed while cruising. This reduces engine noise and vibration and improves engine efficiency. Use the engine synchronizer gauge to monitor the speed of each engine. Adjust the throttles so the synchronizer gauge needle is centered. Attempting to synchronize the engines by aligning the throttle levers will seldom work. When the engines are properly synchronized the throttle levers may not necessarily be aligned.

Glendinning Throttle Synchronizer

The 500 COCKPIT is equipped with a throttle synchronizer manufactured by Glendinning Marine Products. This throttle synchronizer allows you to electronically and mechanically interconnect BOTH engine throttles. Interconnecting the throttles allows you to increase and decrease engine speed by using one throttle lever. This also allows you to maintain precisely synchronized RPM levels.

To operate the Glendinning Synchronizer (the following instructions have been extracted from the Glendinning Synchronizer operators manual):

1. Have both engines running and advance speed slightly above idle.
2. Switch Synchronizer "ON" - Pilot light will be "ON."
3. Move "SLAVE ENGINE" (port engine) lever to maximum speed position - since the Synchronizer is now controlling the slave engine, the lever is "limp" or non-effective. Advancing the slave engine lever eliminates the Synchronizer of undue strain in moving the entire control cable system.
4. Both engines are now under the control of a single movement of the lead engine (starboard) control and may be advanced and retarded through the entire cruising range.
5. To disengage - switch OFF Synchronizer - move slave engine lever back towards idle until you feel resistance. It will automatically reengage with the engine control. A safety collar assures positive return to idle when switching OFF and moving lever back.

Use of the Synchronizer at minimum and maximum engine speeds call for engine speed settings to be as follows:

SLAVE engine IDLE set LOWER than LEAD engine.

SLAVE engine MAXIMUM set HIGHER than LEAD engine.

Automatic deactivation of the Synchronizer will result from conditions contrary to the above settings. The pilot light will go OFF, the Synchronizer will be deactivated. To reengage, switch OFF and ON again.

POWERING THE ENGINES

Additional operating instruction can be found in the instruction manual provided by Glendinning Marine Products. This manual is included in the OEM Supplied Materials Portfolio.

Control Cables

Push - Pull type cables are used to connect the shift and throttle controls to the engine. Refer to the information provided by the control manufacturer for more information on adjusting and maintaining your boat's engine controls.

Steering

The 500 COCKPIT uses a hydraulic steering system. Hydraulic steering provides better response than mechanical steering when used on large boats like the 500 COCKPIT.

The boat's helm is connected to the rudders through a hydraulic pump, a network of hydraulic lines, an oil reservoir, a hydraulic cylinder, and a tiller tie rod. By turning the helm, oil is pumped through the hydraulic line which activates the hydraulic cylinder. This cylinder is connected to the tiller tie rod. Extending and retracting the cylinder moves the rudders and enables you to steer the boat. With hydraulic steering the effort needed to turn the helm remains the same regardless of the speed of the boat.

Your hydraulic steering system depends upon a proper and adequate source of hydraulic fluid and sufficient pressure within the hydraulic pump and lines. Refer to the operator's manual for the hydraulic steering system for more information on its operation and maintenance.

POWERING THE ENGINES

PREPARING FOR CRUISING

Fueling

Refer to the engine manual for the fuel type and octane rating recommended for your boat's engines.

Prior To Fueling

- 1) Ensure that the boat is securely moored.
- 2) Close all ports, windows, hatches and doors.
- 3) Stop fans, motors or any other device that could create a spark. Turn off the stove and oven. Shut down the generator.
- 4) **DO NOT SMOKE OR ALLOW ANYONE NEAR THE FUEL DOCK TO SMOKE.**
- 5) Turn the battery selector switch to the "OFF" position.
- 6) Have all guests and passengers leave the boat. Only the fuel handlers should be in the area.

Fueling

- 1) Locate the fuel fill deck plates and remove the deck plate caps. Refer to the **Fill Plate/Pumpout** portion of **Section 9** for fuel fill plate locations
- 2) Be certain that the fuel you are about to pump into your boat is the proper type recommended by the engine manufacturer.
- 3) Have an approximate idea how many gallons of fuel you will be taking on.
- 4) Pump fuel into the fuel tanks. While fueling, keep the fuel hose nozzle in contact with the metal fuel fill deck plate at all times. This is a safe guard against static spark.



CAUTION

Avoid spilling fuel on the gelcoat surface of your boat. Fuel can stain the gelcoat and damage the hull accent stripes.

- 5) Monitor the fuel tank air vents. When the fuel tank is almost full, fuel will spurt out of the vent.

POWERING THE ENGINES

After Fueling

- 1) Replace the fuel fill deck plate caps.
- 2) Wash down or wipe up all spilled fuel.
- 3) Ventilate the cabin by opening ports, windows, doors and hatches.
- 4) Turn the battery selector switch, the 12 volt MAIN breaker and the BILGE BLOWER breaker to the "ON" position.
- 5) Turn "ON" and run the bilge ventilation blower for at least 5 minutes prior to starting an engine or generator.
- 6) Inspect the engine compartment. Sniff the engine compartment for fuel vapors.
- 7) Operate onboard equipment ONLY after you are sure that the boat is free from all fuel vapors.

Pre-start Checklist

- 1) Read and understand the information contained in the Owner's Guide and all OEM supplied literature.
- 2) Open and inspect the engine compartment.
 - Sniff for fuel fumes.
 - Check the bilge water level.
 - Check for oil in the bilge.
 - Check the crank case oil level in each engine.
 - Make an overall inspection of the engine compartment to look for signs of potential problems.
 - Follow all periodic maintenance instructions as detailed in **Section 7**
- 3) Turn the battery selector switch to either the #1 or the #2 position.
- 4) Go to your 12 volt electrical panel and turn the MAIN breaker, the BILGE BLOWER breaker and any other breakers for equipment you may need (horn, trim tabs, etc.) to the "ON" position. Turn the helm console bilge blower switch "ON."
- 5) Check the output level of the bilge ventilator by holding your hand over the bilge vent grill installed on the port side of the boat's hull. You will feel air being blown from the output bilge vent if the bilge blower is operating properly.

POWERING THE ENGINES

DANGER

Operate the bilge blower for **AT LEAST 5 minutes** prior to starting an engine **AND** whenever running the boat at idle speed. Check bilge blower output before starting engines.

During the 5 minutes the bilge blower is running you can complete the following steps:

- 6) If your boat is equipped with a gasoline propulsion system, position the fuel tank selector valves to draw from the desired fuel tank.
- 7) Be sure that all safety gear is onboard and operative. Check out items such as navigational lights, VHF radio, depth sounder, etc. Make sure your boat carries the safety equipment required to meet Federal and local regulations.
- 8) Check to make sure you have an adequate supply of fresh water. Check level of waste holding tank.
- 9) Remove and store shore power cord and dockside water lines.
- 10) Once all tanks are properly filled, return the fuel fill deck plates and secure them.

Starting the Engines

- 1) Read, understand and follow the operator's manual that has been prepared and supplied by the engine manufacturer. The information supplied in the engine manual takes precedence over information presented in the Carver Owner's Guide.
- 2) Put gear shift controls into NEUTRAL.
- 3) Select the engine you will start first. NEVER start both engines at the same time.
- 4) Put the shift level into neutral and slightly advance the throttle. Keep one hand on the throttle and engage the engine starter by turning the ignition key with your other hand. Release the key when the engine starts.

WARNING

The ignition switch is spring activated. Release the key when the engine has started. Failure to release the ignition key after the engine has started may damage the starter.

WARNING

DO NOT operate the starter by engaging the ignition key for more than 10 seconds. If the engine does not start after engaging the starter for 10 seconds, release the key and try again.

POWERING THE ENGINES

The oil pressure warning buzzer will sound for the first few seconds after the engine has started. This is normal. When oil pressure builds the buzzer will stop.

A cold engine may run rough and require some slight advancing of the throttle lever to start the engine and keep it running.

After Your Engines Have Started

- 1) Check your engine gauges. Make sure the oil pressure complies with the engine manufacturer's recommendations. Voltmeter should read about 12.5 volts.
- 2) Check your fuel gauge to make sure you have adequate fuel for your trip.
- 3) Take a look into the engine compartment. Visually inspect the fuel system hoses and exhaust hoses. If you discover a leak or suspect that anything is out of order, shut down the engines and investigate.



DANGER

The engine compartment contains moving, hot machinery. KEEP YOUR HANDS, FEET AND BODY OUT OF THE ENGINE COMPARTMENT WHILE ONE OR BOTH ENGINES ARE RUNNING.

