Section 3

SHORE POWER/GENERATOR POWER

AC ELECTRICAL SYSTEM

Introduction

You can supply power to your boat's 50 amp AC (alternating current) electrical system through dockside power cords to a dockside power source or by operating the onboard generator. If your boat is **not** equipped with air conditioning, all power is routed through the single dockside MAIN breaker. If your boat is equipped with air conditioning, the air conditioning units are powered separately through the dual dockside MAIN breaker.

The AC electrical system in your boat can be configured in one of the following ways:

Single 50 Amp Dock side ("Single Dock side")

A single 50 amp service is the standard configuration for the 500 COCKPIT. This system is powered by a single 50 amp shore power cord or the boat's onboard generator.

Single dockside systems are wired at the Carver factory in either 110 volt AC or 220 volt AC. 110 volt systems are used throughout North American and Pacific Rim countries. 220 volt is primarily used in European countries whose standard electrical system is based on 220 volt power.

Dual 50 Amp Dock side ("Dual Dock side")

If your 500 COCKPIT is equipped with air conditioning, dual dockside wiring has been installed to handle the extra current flow .

The dual 50 amp system utilizes two 50 amp services, each service powered by its own 50 amp shore power cord or by the boat's onboard generator.

Dual dockside is available in either 110 volt or 220 volt configurations. Please refer to the following section that pertains to your boat's wiring configuration.

Wiring System

The single or dual dockside electrical system of your 500 COCKPIT uses three wire, color-coded circuitry. The black wire in a circuit carries the current from the power source to the outlet. Each black wire is connected to and protected by a circuit breaker that is installed in the circuit breaker panel. The white wire carries the current from the outlet back to the power source. Ground wires will be either green or bare copper wires. During normal operation, current does not flow through the ground wires.

Buss bars are used within the electrical system to help route and organize the wires. The system's white or neutral wires are connected together at buss bars. The ground wires are also connected together at another independent buss bar.

SHORE POWER/GENERATOR POWER

⚠ DANGER

The black and white wires are hot, current carrying wires. Do not touch them while the system is connected to a power source.

Reverse Polarity

Reverse polarity only occurs with 110 volt electrical systems. If your boat is equipped with a 220 volt system, disregard this section.

The MAIN circuit within your boat's electrical system is designed with a circuit that senses the voltage difference between the neutral and ground terminal blocks. If the dockside electrical power source is incorrectly wired and the polarity is reversed, the red reverse polarity light in the dockside electrical box will come on. If reverse polarity occurs while your boat is connected to shore power, the reverse polarity light on your boat's AC electrical panel will come on.

⚠ WARNING

If reverse polarity occurs, turn off the 50 amp main breaker(s) on your AC electrical panel and disconnect your power cord(s) from the shore power supply. Notify marina management of the problem. Use a different dockside electrical box.

AC Electrical Panel

Power within your boat's AC electrical system is routed and controlled via the AC circuit breaker panel. Your circuit breaker panel has a 50 amp MAIN breaker which protects the overall AC electrical system. Another MAIN breaker protects the circuits used if your boat is equipped with dual dockside. Both MAIN breakers are located on the same AC salon panel.

Circuit breakers enable you to manually interrupt a circuit by switching the breaker on or off. They also protect the electrical system by automatically disconnecting the circuit from the power source in the case of a short or overload.

⚠ WARNING

NEVER reset a breaker that has been automatically tripped without first correcting the problem. Failure to do this may create a dangerous situation.

Voltmeter and Ammeter Usage

Your boat's electrical system is equipped with a voltmeter and an ammeter. These instruments are located on the AC circuit breaker panel. The voltmeter provides you with an indication of the electrical voltage that is entering your boat's system.

SHORE POWER/GENERATOR POWER

With your boat's shore power cord attached to a dockside power source the onboard voltmeter should read between 110 and 120 volts in a 110 volt system and between 210 and 240 volts in a 220 volt system. If the voltage indicates a reading of 105 volts (205 volts in a 220 volt system) or less, DO NOT USE THE SYSTEM. If you experience a low voltage reading as described, contact the marina's management to locate the source of the problem.

If the voltmeter is reading zero voltage it is an indication that no current is getting to the AC circuit breaker panel. Check your shore power cord to make sure it is properly attached to both the boat and the dockside electrical box. Also, make sure you have turned on the dockside electrical breaker.

After checking these items, if you are still not getting power to the boat, contact marina management to ensure that the dockside power is operable.

If indications are that the problem is with the boat's electrical system, have the system inspected by a qualified electrician.

The ammeter provides you with an indication of the LOAD that is being put on the boat's 50 amp electrical system.

With all other breakers on the AC circuit breaker panel turned off and only the MAIN breaker switched on, and a reading of between 110 and 120 volts (210 and 240 volts for a 220 volt system), the ammeter should be indicating 0 amps.

As you begin to power AC equipment (water heater, battery charger or any other portable equipment powered through the wall-mounted AC receptacles), the ammeter will begin to give readings in excess of 0 amps. More information on amperage and electrical loads can be found in the **Electrical Loads** portion of **Section 3**.

Selecting a Power Source

Power to your AC electrical system can be supplied by an onboard generator or by using a dockside power supply. The lights above the main breakers on your AC electrical panel indicate if your boat is hooked up to a dockside power source or if your generator is running. To change power sources for one or both AC electrical services, turn off the main breaker for that service and flip the SOURCE SELECTOR switch. Turn the main breaker back on to restore power to the service.

SHORE POWER/GENERATOR POWER

50 Amp Main Breakers

The MAIN breakers for the SHORE 1 single dockside service is located in the upper left corner of the AC electrical panel. If your boat is equipped with air conditioning, two additional SHORE 2 MAIN breakers are located in the lower left corner of the panel.

The 50 amp MAIN breakers are designed to be very sensitive to power surges. The surge that results when connecting your boat's dockside power cord to shore power may be enough to trip the MAIN breakers. To avoid this situation, turn the MAIN breakers to the "OFF" position BEFORE connecting your boat to shore power or starting the generator. Also, if the shore power connection is made, disconnected and secured, the MAIN breaker will most likely trip.

This breaker must be on in order for any breakers in the service to work.

NOTE: Remove all perishables from your refrigerator if you leave your boat for more than forty-eight hours. The power supply to your refrigerator may be interrupted and your food may spoil.

Using Dock side Shore Power

⚠ DANGER

Supplying power to an empty water heater may result in damage to the units heating element and could result in a fire.

1) Turn off the WATER HEATER circuit breaker on your AC panel. Do not turn the breaker back on until your boat's fresh water system and water heater have been filled, pressurized and primed.

2) Make sure the 50 amp MAIN breaker(s) located within the boat's AC circuit breaker panel is turned off.

3) On the AC breaker panel, slide the SHORE 1 AC selector bar to the dockside power source. If your boat is equipped with Air conditioning, Slide the SHORE 2 AC selector bar to the dockside power source as well.

4) Locate your 50' dockside electrical cord(s). Be certain that all cords are in good repair. Inspect cords for cuts, nicks or abrasions in the exterior plastic cover.

⚠ DANGER

DO NOT use a damaged cord or a cord that is not specifically designed for this purpose. A household extension cord should not be used as a shore power cord for your boat. Using a damaged or improper cord could lead to electrical shock and serious personal injury.

SHORE POWER/GENERATOR POWER

5) Connect the female end of the cord to your boat's shore power receptacles located on the transom. Be sure to secure the nonmetallic threaded locking ring that locks the cordset to the inlet. This prevents accidental disconnection or arcing due to a gap between plug and inlet.

6) Choose a neat and safe way to route the dockside cord(s) to the dockside electrical box.

7) Turn off the breaker that is installed in the dockside electrical box. Plug the male end of the dockside cord into the dockside electrical box. The shore power plugs have a nonmetallic threaded locking ring that locks the cordset to the dockside inlet. This prevents accidental disconnection or arcing due to a gap between plug and inlet. After the cordset is connected, turn on the dockside electrical box breaker.

8) If the red reverse polarity light comes on, disconnect the shore power cord and contact marina management. If polarity is okay, turn on your boat's 50 amp MAIN.

9) Monitor the voltmeter and ammeter while your boat is connected to any electrical power source.

⚠ WARNING

If the red reverse polarity light comes on, DO NOT try to turn on the MAIN breaker. INSTEAD, disconnect the shore power cord immediately. Notify the marina management of the reverse polarity problem and use a different dockside electrical box.

⚠ DANGER

ONLY people who are trained and experienced in working with electricity should service your boat's AC system. Inexperienced or untrained people may be harmed by incorrectly servicing a high voltage electrical system.

⚠ DANGER

Disconnect the power source before attempting to service any electrical system.

SHORE POWER/GENERATOR POWER

AC ELECTRICAL SERVICE

Shore 1 (Main Power)

Main breaker

The SHORE 1 service is controlled by a 50 AMP MAIN CIRCUIT BREAKER. This MAIN breaker supplies power to the individual circuit breakers for that service. Each individual breaker will not function unless the MAIN breaker is "ON". The following individual circuit breakers have been installed in your boat.

Receptacles Fwd:

This breaker regulates the power to the receptacles in the forward stateroom.

Salon Receptacles:

This breaker regulates the power to the receptacles in the salon.

Galley Receptacles:

This breaker regulates the power to the receptacles in the galley.

Aft Receptacles:

This breaker regulates the power to the receptacles in the aft stateroom and the aft deck.

Microwave:

A microwave oven has been installed on your boat as original factory installed equipment. This appliances operates on AC power. To power your microwave, switch the AC circuit breaker to the "ON" position. Refer to the manual supplied by the microwave's OEM supplier for information regarding operation and maintenance.

Coffee Maker:

A coffee maker has been installed on your boat as original factory installed equipment. This appliances operates on AC power. To power your coffee maker, switch the AC circuit breaker to the "ON" position. Refer to the manual supplied by the coffee maker's OEM supplier for information regarding operation and maintenance.

Range:

Your 500 COCKPIT is offered with a "three burner" electric range as standard equipment. To use the range turn the AC circuit breaker labeled RANGE to the "ON" position. Use the controls mounted on the range to control burners and heat adjustments. Information on the proper use and maintenance of the range is provided by the OEM supplier. Look for this information in the OEM information packet.

NOTE: **Propane stoves were offered as an option at the time your boat was built. If your boat was equipped from the Carver factory with a propane stove, an additional LP breaker must be turned to the on position. For further safety and maintenance information using the propane stove, refer to the OEM information packet.**

SHORE POWER/GENERATOR POWER

Water Heater:

Hot water can be supplied to your fresh water system through your boat's engine heat exchangers or the hot water heater. When your boat's engines are not running, supply hot water to the fresh water system using the hot water heater. Turning this breaker labeled WATER HEATER to the "ON" position supplies power to the water heater.

⚠ DANGER

DO NOT supply power to an empty water heater. Fill, pressurize and prime the boat's water system prior to turning on the water heater. Heating an empty water heater will damage to the unit's heating element and could lead to a fire. Refer to the Fresh Water System portion of Section 4 for instructions on filling, pressurizing, and priming the fresh water system. Refer to Section 4 for information on how to operate the onboard water heater. Information on the proper use and maintenance of your boat's water heater has also been provided by the OEM supplier. This information is in the OEM information packet.

Dishwasher

On boats equipped with an optional dishwasher, this breaker regulates power to the unit. Turn this breaker to the "ON" position before attempting to use the dishwasher. Refer to the manual provided by the manufacturer for more information on use and maintenance of that appliance.

Trash Compactor

On boats equipped with an optional trash compactor, this breaker regulates power to the unit. Turn this breaker to the "ON" position before attempting to use the trash compactor. Refer to the manual provided by the manufacturer for more information on use and maintenance of that appliance.

Icemaker Aft Deck:

The 5 amp breaker labeled ICEMAKER controls power to the icemaker in the boat's salon. Refer to the manual provided by the manufacturer for more information on use and maintenance of that appliance.

Central Vacuum:

On boats equipped with an optional Central Vacuum, this breaker regulates power to the unit. Turn this breaker to the "ON" position before attempting to use the Central Vacuum.

Washer/Dryer:

On boats equipped with an optional washer/dryer, this breaker regulates power to the unit. Turn this breaker to the "ON" position before attempting to use the washer/dryer. Refer to the manual provided by the manufacturer for more information on use and maintenance of that appliance.

SHORE POWER/GENERATOR POWER

Battery Charger:

All 500 COCKPITS are equipped with a 80 amp battery charger. To use the boat's battery charger turn the AC circuit breaker labeled BATTERY CHARGER to the "ON" position. More information on using the battery charger can be found in the **Battery Charger** portion of **Section 2**. Refer to the manual provided by the manufacturer of the battery charger for more information regarding its use and operation.

Spare:

The remaining two 10 Amp, and 5 Amp breakers labelled "Spare" are available for dealer or owner installed equipment.

Shore 2 (Air Conditioning System)

The following Shore 2 breakers supply power to your boats air conditioning system.

A/C Water Pump:
The air conditioning system requires the use of a water pump. This pump transfers sea water for use within the air conditioning condenser system. The breaker labeled A/C WATER PUMP turns this water transfer pump "ON" or "OFF." Turn this breaker to the "ON" position before using the air conditioning system.

⚠ CAUTION

DO NOT use the forward, salon, aft or bridge air conditioning units without first turning the A/C WATER PUMP breaker to the "ON" position. Failure to do this may damage the air conditioning system.

Aft A/C Unit:
This circuit breaker controls the condenser and fan for the aft air conditioning unit which cools the master stateroom, master head compartment and salon. Turn this breaker "ON" to activate the aft air conditioner.

Salon A/C Unit:
This circuit breaker controls the condenser and fan for the salon air conditioning unit. Turn this breaker "ON" to activate the salon air conditioner.

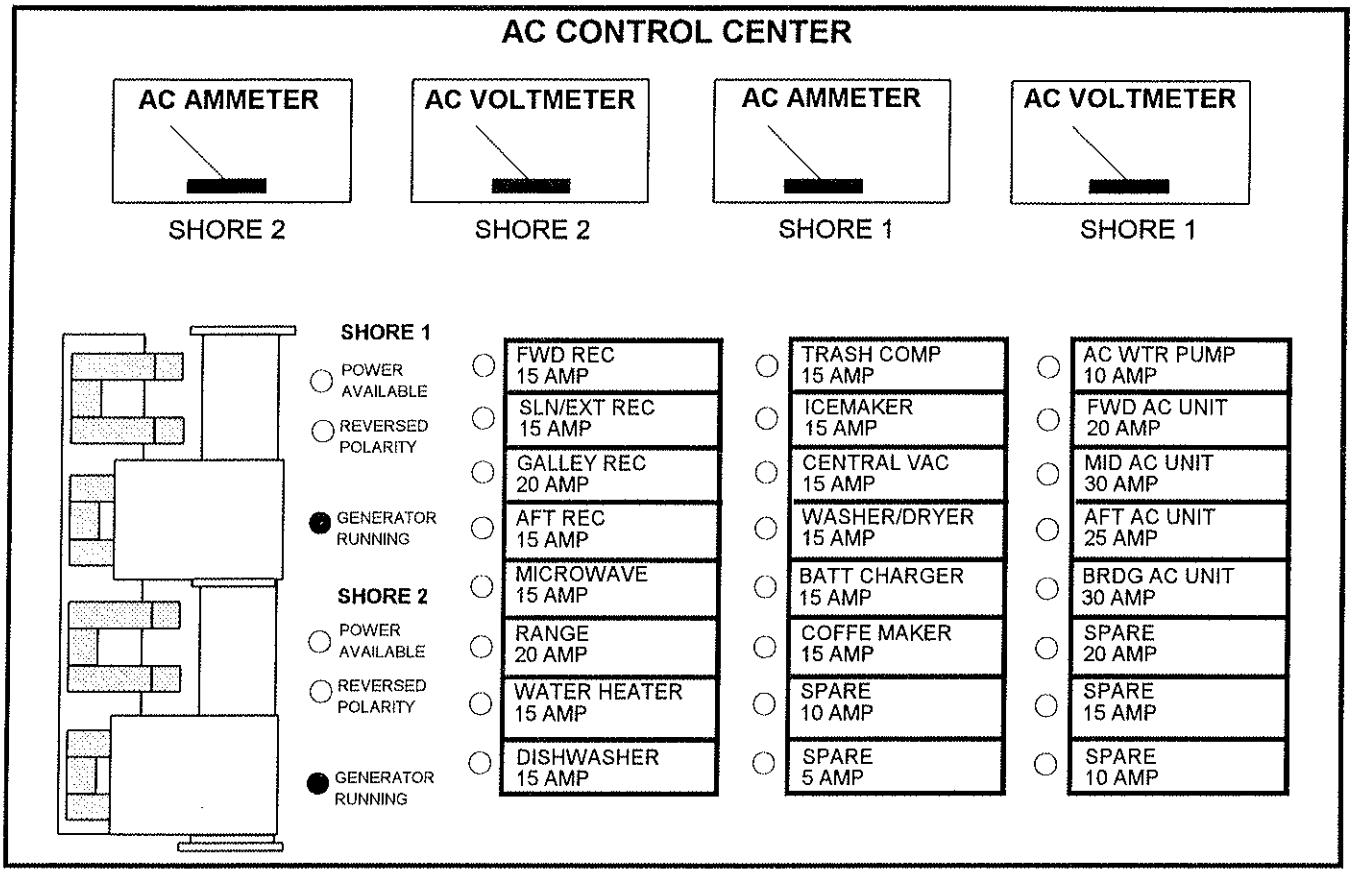
Fwd A/C Unit:
This circuit breaker controls the forward air conditioning unit. This unit cools the forward stateroom and forward head compartment. Turn this breaker "ON" to use the forward air conditioner.

Bridge A/C Unit:
This circuit breaker controls the bridge air conditioning unit. This unit cools the bridge area. Turn this breaker "ON" to use the bridge air conditioner.

Spare:
The remaining three 20 Amp, 15 amp, and 10 amp breakers labeled "Spare" are available for dealer or owner installed equipment.

SHORE POWER/GENERATOR POWER

AC Main Breaker Panel



SHORE POWER/GENERATOR POWER

Using the Generator

The 500 COCKPIT is factory equipped with an AC generator. An onboard generator will enable you to power AC electrical accessories while away from dockside power. The generator is installed in the port, forward area of the engine compartment. Fuel is drawn from the same fuel tanks used to supply the boat's propulsion engines.

Starting The Generator

1) Read, understand and follow the operator's manual that has been prepared and supplied by the generator manufacturer.

⚠ DANGER

Operate bilge blowers for AT LEAST 5 minutes and inspect the bilge for fuel vapors prior to starting the generator. If you discover fuel vapors in the bilge. DO NOT START THE GENERATOR. 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.

2) The generator starter is powered by a dedicated and separate 12 volt deep cycle battery. This battery is installed in the forward, starboard area of the engine compartment. Power to the generator from this battery is controlled by a ON/OFF switch. Turn this switch to the "ON" position prior to starting the generator.

NOTE: The boat's battery charger monitors and charges the generator battery along with the other ship's batteries.

⚠ WARNING

NEVER turn the generator battery ON/OFF switch to the "OFF" position while the generator is running. Doing this will damage the generator or alternator wiring.

3) The generator engine uses sea water as a coolant. The sea water intake valve must be opened prior to starting the generator. This valve is located in the forward, port area of the engine compartment.

4) Position the boat's fuel system valve(s) to feed fuel to the generator from the desired tank. Refer to the **Fuel System** portion of **Section 5** for more information.

5) Turn the 50 amp MAIN breaker(s) for SHORE 1 and SHORE 2 to the "OFF" position. Slide the "generator lockout plate" down to uncover the generator MAIN breaker(s).

6) The generator START/STOP switch is located near the center bottom of the boat's AC electrical panel. The generator START/STOP switch is a spring-loaded, mo mentary switch. Push the switch to the "START" position until the generator starts. Release the switch when the generator has started.

⚠ WARNING

The START/STOP switch is spring activated. Release the switch when the generator has started. Failure to release the switch after the generator has started may damage the starter. ALSO, do not activate the generator starter for periods longer than 10 seconds. If the generator fails to start after the first attempt, wait 1 minute before trying again.

7) When the generator is running smoothly, switch the generator MAIN breaker(s) to the "ON" position. This connects the generator to the boat's AC electrical system. AC receptacles and accessories can now be used in the same manner as when the boat is connected to dockside power.

8) To turn the generator "OFF", turn the START/STOP switch to the "STOP" position. If the generator will not be used for an extended period (a few days or more) turn the generator battery switch to the "OFF" position.

9) To use dockside power, turn the generator MAIN breaker(s) to the "OFF position. Slide the generator lockout plate to expose the SHORE 1 and SHORE 2 MAIN breaker(s). Connect and use the dockside power system as detailed in Section 5.

⚠ DANGER

Generator exhaust contains carbon monoxide, a dangerous and poisonous gas. DO NOT INHALE GENERATOR EXHAUST. Refer to Carbon Monoxide portion of Section 1 for more information on engine exhaust and carbon monoxide.

A TIP FROM CARVER: *"Dedicating a 12 volt battery to the generator provides an important safety feature. A dedicated battery enables you to start the generator regardless of the condition of the two 12 volt ship's batteries. If the ship's batteries become discharged to the point where they are not able to start an engine, start the generator and turn on the battery charger. This will recharge the ships batteries and will enable you to start the propulsion engines when the batteries have been recharged to an adequate level."*

SHORE POWER/GENERATOR POWER

Ground Fault Circuit Interrupters Receptacles

Certain receptacles are Ground Fault Circuit Interrupters (GFCI). GFCI outlets provide protection against abnormal current flow from a conductor to ground. Ground fault protection is based on the idea that a normal electrical circuit has all the current flowing in the wires designated for that circuit.

Ground fault protection is provided by measuring the current in each conductor and seeing that whatever flows "down" one conductor in a circuit, flows "back" through the corresponding conductor of the same circuit. If there is an imbalance in the current, it is considered a "fault" in that circuit. Your boat's electrical system is protected from ground fault through the installation of GFCI receptacles.

When a ground fault current is detected in the AC system, the GFCI outlets will trip and interrupt the flow of current. The advantage of ground fault protection aboard your boat is that the incorrect flow of current will cause the electrical power to be interrupted BEFORE appreciable damage to equipment or wiring. Ground fault interrupters also provide you and your guests with protection from inadvertent electrical shock.

Testing GFCI Receptacles

GFCI receptacles are identified by a button that is located between the receptacles two outlets. Pushing the button will interrupt the current in that receptacle and all other receptacles on that circuit. If the power IS NOT interrupted do not use the receptacles on that circuit and contact a qualified electrician to make the proper repairs. Press the reset button to restore power of the receptacles in that circuit. Test the GFCI receptacles on a weekly basis to ensure proper operation.

Electrical Loads

When using your boat's AC receptacles be aware that household appliances exert a "load" on an electrical system when they are used. Your boat's system is only capable of carrying a certain electrical load. This load is measured in AMPs. Each MAIN circuit in your boat has an electrical capacity of 50 amps. If the load on this system exceeds the level of amperage it was designed for, a breaker will trip. This is a signal that you have overloaded the circuit. Following is a list of typical household equipment and the approximate loads that could develop during their use.

AC EQUIPMENT ELECTRICAL LOADS

Fans	Up to 0.7 amps
Electric Blanket	Up to 2 amps
Television	Up to 2.7 amps
Coffee Maker	Up to 6.3 amps
Battery Charger	Up to 7.3 amps
Toaster	Up to 10.5 amps
Fry pan	Up to 12.3 amps
Space heater	Up to 13.7 amps
Refrigerator	Up to 15 amps

SHORE POWER/GENERATOR POWER

An appliance that uses an electric motor, such as a vacuum cleaner or electric drill, will have a "motor load plate" mounted on the unit. This motor load plate will provide information on the load that will be created while using the device.

As the chart indicates, appliances that utilize a motor or a heating element create rather high loads. Be particularly careful when using curling irons, toasters, coffee makers, hair dryers, mix masters or any other comparable types of equipment.

⚠ WARNING

DO NOT overload the electrical circuits. Use the above chart to judge the load that is being put on an individual receptacle. Exceeding these loads will trip the circuit breaker. Reduce the amperage on a receptacle before resetting a tripped breaker.

Bonding System

Your Carver is equipped with a comprehensive metallic bonding system that effectively interconnects all underwater equipment and thru hull fittings. This is done to ensure that fittings are at equal electrical potential. Bonding minimizes the effects of corrosion due to stray electrical currents.

Included within this bonding system are sacrificial zinc anodes that have been installed on each of the boat's propeller shafts and onto the underwater portion of the boat's transom. These anodes will corrode and deteriorate sooner than the boat's underwater fittings and will provide a visual reference to the level of stray current to which your boat is being exposed.

Your boat's 12 volt system, AC system, and the batteries negative leads are all connected to the bonding system. These systems are interconnected through buss bars located in the engine and aft bilge compartments and connected to the transom mounted zinc plate. This system ensures that the "cases" of all metallic equipment onboard your boat are at the same electrical potential.

⚠ WARNING

DO NOT tamper with or modify the boat's bonding system. Doing so could threaten the integrity of the system.

⚠ WARNING

Monitor the condition of your boat's zinc anodes. Replace zinc anodes when you have determined that they have been reduced from their original size by 50%. DO NOT allow the zinc anodes to completely deteriorate. Refer to Section 5.5 for additional precautions concerning the sacrificial anodes.

NOTE: Damage resulting from stray current or galvanic corrosion is NOT covered under the Carver limited warranty.

SHORE POWER/GENERATOR POWER

AC Electrical Schematic

Not available at time of printing

AC ELECTRICAL SCHEMATIC

SHORE POWER/GENERATOR POWER

Trouble Shooting AC Electrical System

PROBLEM	POSSIBLE CAUSE	SOLUTION
No AC power as indicated by voltmeter.	Shore power cord not connected.	Inspect shore power cord.
	Power not turned on at dock box.	Turn dock box breaker ON.
	50 Amp MAIN breaker tripped or in OFF position.	Reset MAIN breaker or turn to ON position.
	Loose or disconnected electrical wire.	Contact Carver Dealer.
No power at cabin AC outlets.	30 Amp MAIN breaker tripped or turned to the OFF position.	Reset or turn ON the 50 Amp MAIN breaker.
	Breakers labeled REC or REC GALLEY turned to the OFF position.	Turn breakers ON.
	Ground fault interrupter tripped.	Locate and reset ground fault interrupter.
	Shore power cord disconnected.	Reattach shore power cord.
50 AMP MAIN breaker continues to trip.	Faulty MAIN breaker.	Contact Carver dealer to have breaker replaced.