



MARLOW-HUNTER, LLC

Chapter 8

AC Electric System

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AC Electric Systems

In addition to the 12 Volt DC negative ground system, your boat is equipped with a 120V 60 HZ AC system as standard and a 230V 50 HZ as an option.

The purpose of this chapter is to provide information necessary to understand and operate the AC electrical system aboard your boat. This system comprises your boat's electrical components which are powered by 120V (or 230V) AC power. We will organize this section into the following topics:

1. AC Power System Overview
2. AC Power Supply Equipment and Components
3. AC System Components and Operation

The purpose of this chapter is not to educate on the repair or the expansion of the electrical system. Nor is its purpose to educate on the basics of electricity. Again, the purpose is to provide you with the information to safely operate and maintain the AC electrical system.

⚠ WARNING ⚠

Electricity cannot be detected without the use of specialized test equipment. Never think you know whether a circuit is "live". Always have qualified, competent professionals inspect or make repairs to your electrical systems.

⚠ WARNING ⚠

Do not rely on the information in this manual as a repair guide. As always, only competent electrical service personnel should attempt to repair any electrical equipment or to expand the electrical system. Work performed by non-electrical service personnel may result in electrical shock or damage to the boats systems or components.

8.1 AC Power System Overview

Please refer to 8.18 for the basic power supply equipment and component layouts as reference for this section.

The sources of power for the three-wire grounded AC systems aboard your boat are the following:

1. Shore Power
2. Generator (Option)
3. Inverter (Option)

The overall control of that power is found in the AC Panel. Individual remote panels for the optional generator and inverter are also involved in the specific control of these systems.

Please note Fig. 8.1 for the individual systems/components controlled by the AC Panel and their corresponding resettable breaker amperage.

System	Line	Brk 120V (AMP)	Brk 230V (AMP)
AC Main	1 & 2	30 DBL	15 DBL
Generator (Option)	1	50 DBL	30 DBL
Parallel	2	30 DBL	15 DBL
Outlets	1	20	10
Microwave (Option)	1	15	10
Battery Charger (Option)	1	15	10
Water Heater	1	15	10
Air Conditioner/Fwd (Option)	2	25	15
Air Conditioner/Aft (Option)	2	20	10
Air Conditioner Relay (Option)	2	5	5

Figure 8.1

8.2 AC Power Supply Equipment and Components

8.2.1 Shore Power

Power to energize your boat's AC system can come from a dock side shore power hookup and is the standard method. The connection is located in the starboard side transom garage. Figure 8.2 shows the inlet configuration of three hookups: line 1, 2 and TV. Line 1 inlet is the standard hookup for the boat's AC system. Line 2 is installed when the boat is equipped with the air conditioning option. The TV inlet is installed when the boat is equipped with the TV option.

8.2.1.1 Shore Power Inlet Breaker(s)

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A 30 amp resettable shore power circuit breaker switch panel (Fig. 8.3) is installed to protect the boat's AC circuitry from a shore connection power fault. The panel will have one or two breakers, depending on the existence of the electric stove and/or air conditioning option. The panel is located in the aft cabin's starboard aft bulkhead.

NOTE: It is important that you review the "Electric Shock" pamphlet included within your manuals documents and understand the importance of electrical safety. While electricity provides tremendous convenience, it has the potential to injure and kill. Be sure and follow the warnings posted in this manual and in the manufacturer's OEM manuals included in you manual pack and practice good safety measures. Always have trained, competent technicians service your electrical systems.



Figure 8.2

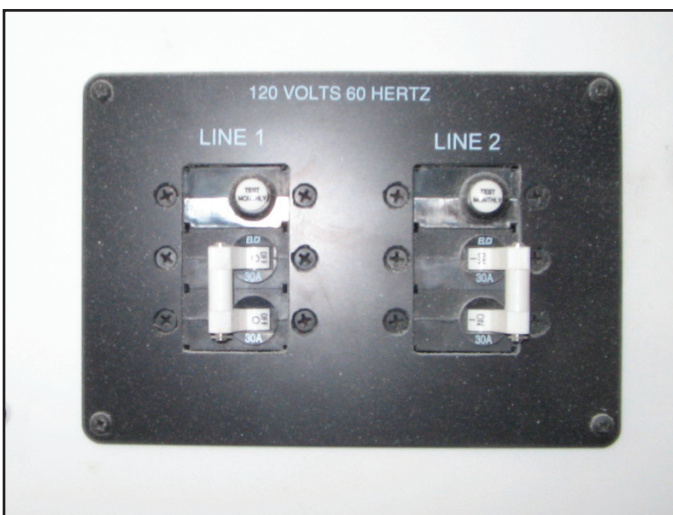


Figure 8.3

⚠ DANGER ⚠

Never work on an energized circuit! Always treat any circuit as if it were live! Always have trained, competent technicians to service your electrical systems!

8.2.1.2 Connect and Turn on Shore Power

1. Turn off all equipment breakers on the AC Panel (Fig. 8.5).
2. Turn off "AC Main" breaker(s) on the AC Panel.
3. Turn off shore power inlet breaker(s) (Fig. 8.3).
4. Plug power cable (Fig. 8.4) into shore power inlet.
5. Turn clockwise to lock.
6. Thread the locking ring onto the boat receptacle to prevent accidental unplugging.
7. Plug power cable (Fig. 8.4) into dock side power outlet.
8. Turn on shore power breaker on the dock.
9. Turn on shore power inlet breaker(s).
10. Turn on main AC breaker(s).
11. Turn on desired equipment breakers.

8.2.1.3 Disconnect Shore Power

Complete the above connection instructions in reverse and with opposite actions (turn off vs. turn on, etc.).

⚠ WARNING ⚠

Using a damaged or improper cord for shore power can cause electrical shock and serious injury. Use a cord specifically designed for shore power connection. Do not use a household extension cord.

⚠ CAUTION ⚠

Water is an excellent conductor of electricity. Keep shore power cord out of water. Do not operate any AC device while you or the cord are in water. To prevent injury or equipment damage, keep all AC

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system components dry.

⚠ WARNING ⚠

DO NOT connect the shore power cord to the dock side electrical source first. You could accidentally drop the cord into the water, which may result in electrical shock and serious personal injury.

made to resist corrosion. In a salt-water environment, however, periodic rinsing of the exposed parts with fresh water, drying and spraying with a moisture repellent can



8.2.1.4 Shore Power Cable

The shore power cable (Fig. 8.4) set is intended for use outdoors. To prolong the life of the set, store indoors when not in use. The metallic parts of your cable set are

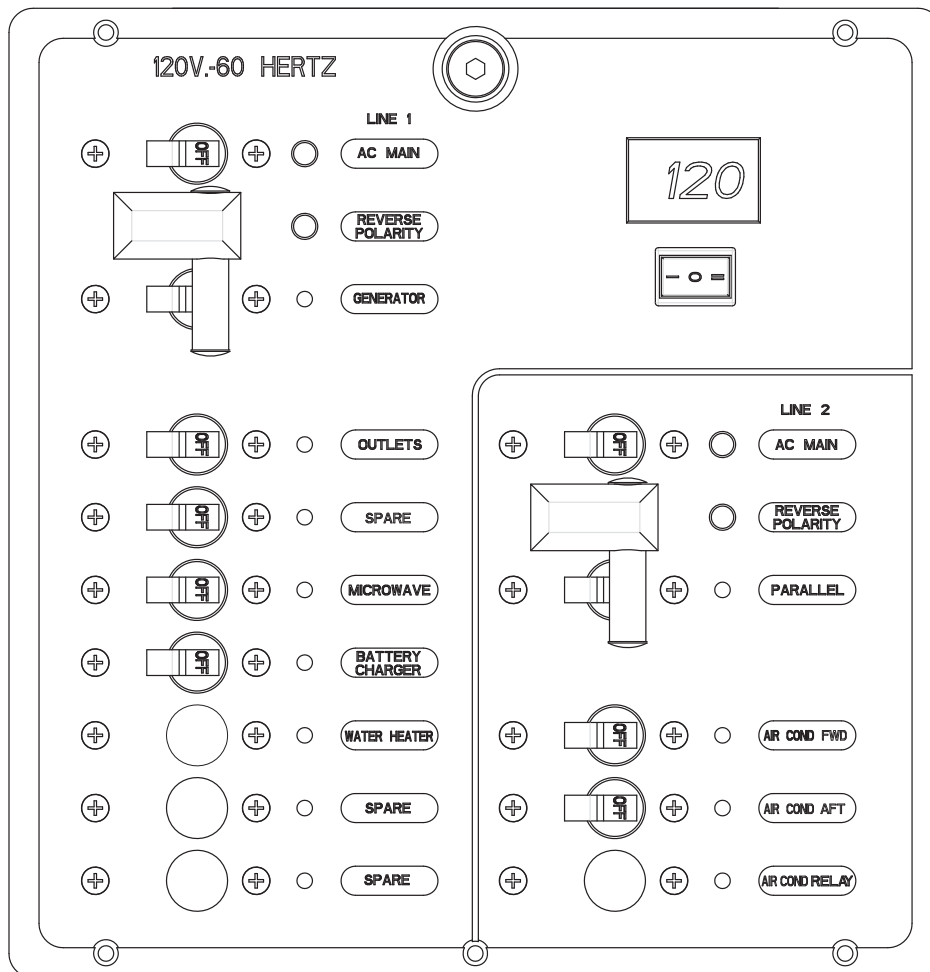


Figure 8.5

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increase the life of the product. Similarly, in case of salt water immersion, rinse plug end and/or connector end thoroughly in fresh water, shake or blow out excess water and allow to dry. Spray with moisture repellent before re-use. Perform maintenance only after the cable is unplugged from its power source. A soiled cable can be cleaned with a grease cutting household detergent. A periodic application of vinyl protector to both ends will help to maintain cables original appearance.

! WARNING !

DO NOT allow the dock side power cord to come in contact with the water. Never operate any power tool or other electrical equipment while you or the devices are in contact with the water, as this may cause electrocution resulting in shock or death.

8.2.3 Main AC Panel

Once AC power is sourced, power is routed to the AC Panel main breakers. The AC Panel is the left panel of the double panels located at the nav station (Fig. 8.6).



Figure 8.6

8.2.3.1 Panel Lights

The power for the panel backlights for both the AC Panel and DC Panel are provided by the DC system. Control of the backlights is through a two-position rocker switch labeled “Panel Lts” located on the DC Panel (see DC Electric Systems chapter of this manual). This switch is located middle right side of the DC Panel.

8.2.3.2 Volt Meter Line Selector Switch

Immediately below the digital volt meter, located at the top-right corner of the panel, is a two-position rocker switch for selecting the line for voltage display. One side of the switch is labeled “1” and other is labeled “2”. Position the switch to the desired line for a power level display. The voltmeter will display the voltage of the lines regardless if the AC panel is energized or not.

8.2.3.3 Breakers, Switches and Fuses

All electrical systems aboard your boat are equipped with over-current protection in the form of breakers or fuses. All systems and components on the AC Panel are protected with toggle breaker switches for convenience in manually interaction with those systems. A green LED is associated with each switch breaker and will illuminate when the breaker is in the “On” position.

8.2.3.4 Main AC Panel Breakers

Each line on the main AC Panel has a 30 amp toggle double-breaker switch labeled “AC Main”. Once these breakers are switched on, the corresponding AC Panel component breaker(s) are energized.

8.2.4 Battery Power (DC System)

The AC system and battery powered DC system will interact at times. These interactions will effect the level of charge in the batteries. If the battery banks aboard your boat loose charge (as power is used to energize the DC system or inverted for the AC system), they can be recharged through either the shore power connection, the engine alternator or the optional generator.

Charging the batteries through shore power or the generator is accomplished through either the battery charger or the inverter. Charging the batteries through the engine alternator is by direct connection. The relevant following sections will clarify the battery charging process.

8.2.5 Generator

An alternative source of power for the AC system is the optional generator (Fig. 8.7). The generator system includes the generator, plumbing (water and fuel), wiring and a remote panel.

The generator will be located in the port aft storage region and accessed through the cockpit’s port gull-wing seat lid. The remote panel is located on the forward hull panel of the nav station (Fig. 8.8)..



Figure 8.7

8.2.5.1 Generator Basic Operation

When powered up, the energy produced from the generator is routed through the AC Panel's 50 amp toggle double-breaker switch labeled "Generator". The toggle switch is managed by a slide-bar stopper. This stopper will only allow source power to be either from shore power or from the generator. Switching on the generator toggle breaker switch will energize the AC panel. Actual control of the generator is through the generator remote panel.



Figure 8.8

8.2.5.1.1 Generator Start

NOTE: Consult the generator manufacturer's OEM manual for specifications when operating the generator's remote panel.

1. Check generator oil level. Ensure level is in accordance with the manufacturer's specifications.

2. Check the external expansion tank water level. Ensure level is in accordance with the manufacturer's specifications.
3. Check the raw water filter is free of debris.
4. Ensure cooling water intake valve is open.
5. Turn off all AC Panel breakers, including the "Generator" breaker.
6. Turn on the desired battery selector switches (see DC Electric System chapter in this manual).
7. Press the "Panel On" button on the generator remote panel (Fig. 8.9). A green LED should illuminate above the button.
8. Press the "Pre-Heat" button on the generator remote panel, if necessary (as per the manufacturer's specifications). An orange LED should illuminate above the button.
9. Press the "Start" button on the generator remote panel. A green LED should illuminate above the button. Refer to the manufacturer's specifications for delay time on re-pressing the start button if the engine does not immediately start.
10. Turn on the "Generator" breaker switch at the AC Panel.
11. Turn on breakers at the AC Panel for the desired AC components.

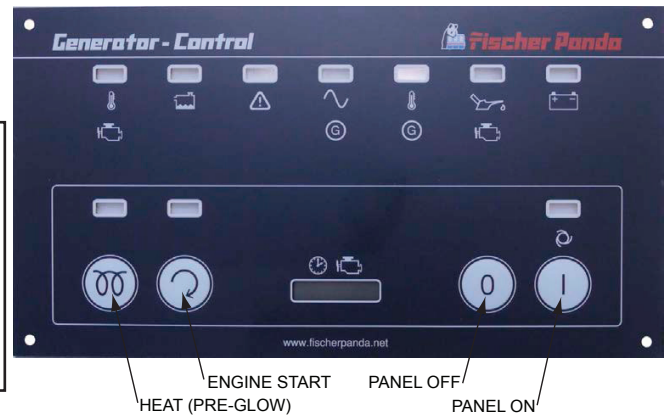


Figure 8.9

8.2.5.1.2 Generator Stop

NOTE: Consult the generator manufacturer's OEM manual for specifications when operating the generator's remote panel.

1. Turn off component breakers at the AC panel.
2. Turn off the “Generator” breaker switch at the AC Panel.
3. If necessary, allow the generator to run to stabilize its temperature (as per the manufacturer’s specifications on temperature and length of stabilization).
4. Press the “Panel Off” button on the generator remote panel (Fig. 8.9). The “Panel On” LED should extinguish.

8.2.5.2 The Parallel Breaker and Optional Air Conditioner Using Generator Power

The generator has sufficient amperage (50 amps) to power both the optional air conditioner and the standard AC system.

To power the optional air conditioner from the generator, perform the following steps:

1. Switch off the “Air Conditioner” breaker switches at the AC Panel.
2. Execute the Generator Start sequence discussed previous.
3. Switch on the AC Panel’s “Parallel” toggle switch breaker. The toggle switch is managed by a slide-bar stopper. This stopper will only allow source power to be paralleled from either 1 shore power line with 50 amps or from the generator.
4. Switch on the “Air Conditioner” breaker switches at the AC Panel.

8.2.5.3 Charging the Batteries Using Generator Power

1. Execute the Generator Start sequence discussed previous.
2. Switch on the “Battery Charger” breaker switch at the AC Panel (see Battery Charger discussion below).

NOTE: Consult the generator manufacturer’s OEM manual for generator operation, care and maintenance.

8.2.6 Battery Charger

If you are docked for an extended period of time, operating the DC system and equipment will drain the power

from the batteries. Unless the batteries are kept charged, they may not have enough power to start the engines when needed. The optional battery charger (Fig. 8.10) will automatically charge the battery banks when the AC system is powered by shore power or the generator.



Figure 8.10

The charger is located in the main salon and can be accessed through the port aft settee lid. A 50 amp pop-out breaker exists on the Battery Switch Panel labeled “Battery Charger” and protects the charging system from a power fault following the AC Panel. A 15 amp toggle switch breaker labeled “Battery Charger” exists for the battery charger on the AC Panel which protects the battery charger from a power fault.

Leaving the battery charger switch breaker on whenever AC power is energized from shore power or generator is a good idea. It will keep the batteries fully charged. After the batteries are recharged, it provides a maintenance or trickle charge as needed.

8.2.6.1 Charging the Batteries

1. Set the toggle switch breakers to supply power to the AC Panel from shore power or generator.
2. Switch on the “Battery Charger” breaker switch at the AC Panel.

8.2.7 Inverter

A final source of power for the AC system is the optional inverter. The inverter converts DC power to AC power. The assembly consists of the inverter, wiring and a remote panel. The inverter is located in the main salon and can be accessed through the port aft settee lid (Fig. 8.11). The remote panel is located on the hull panel of

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the nav station near the optional VHF radio and chart table light (Fig. 8.13).

8.2.7.1 Turning on the Inverter

1. Turn on the desired battery selector switches (see DC Electric System chapter in this manual).
2. Turn on the inverter remote panel at the navigation station.
3. Turn on the “AC Main” switch breaker at the AC Panel.
4. Turn on the appropriate appliance breaker on AC panel.

NOTE: Anticipate an approximate 15 second delay when using the inverter.

NOTE: Consult the inverter manufacturer's OEM manual for inverter operation, care and maintenance.

Please note, it takes 10 DC amps to create 1 AC amp. If the battery voltage drops below 10.5V the inverter will automatically shut down. Also the output of the inverter is not capable of powering the water heater or air conditioning system. Both should be powered by shore power or the generator.



Figure 8.11



Figure 8.12

8.2.7.2 Powering DC Panel and AC Panel Simultaneously When Using the Inverter

When shore power is not connected:

1. Turn on the inverter as outlined above.
2. Switch on the “DC Main” switch breaker at the Battery Switch Panel (see DC Electric System chapter in this

manual).

3. Turn on breakers at the DC Panel for the desired DC components.

8.2.7.3 Built in Inverter Transfer Switch

If shore power or generator is supplying power, the inverter automatically transfers this power to the AC Panel and bypasses the invert mode capabilities.

8.2.7.4 Charging the Batteries from the Inverter

If shore power or generator is supplying power, the inverter can be set to charge the batteries. Simply select Charge mode on the inverter remote panel.

NOTE: When leaving boat unattended, be sure the Invert selection on the remote panel is “OFF”. This way, if shore power is lost for any reason, the inverter will be prevented from converting 12V DC to AC voltage and drain the batteries.

8.2.8 Engine Alternator Operation

Batteries can also be charged by the engine alternator. This is the same basic system as an automobile. A direct wiring connection exists between the alternator and batteries resulting in immediate charging when the engines are running. For additional information regarding the engines, please refer to Engines and Transmissions chapter within this manual.

8.2.9 The Parallel Breaker and Optional Air Conditioner Using Shore Power

Some dock side shore power sources are of sufficient amperage to power both the optional air condition and the standard AC system.

To power the optional air conditioner from a single shore power cable, perform the following steps:

1. Switch off the “Air Conditioner” breaker switches at the AC Panel.
2. Switch on the AC Panel's “Parallel” toggle switch breaker. The toggle switch is managed by a slide-bar stopper. This stopper will only allow source power to be paralleled from either 1 shore power line with 50 amps or from the generator.
3. Switch on the “Air Conditioner” breaker switches at the AC Panel.

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Note: When paralleling shore power, one will need to use a parallel shore power y-adaptor cord.

8.2.10 Reverse Polarity

Each line on the AC Panel includes a LED display for Reverse Polarity. If the Reverse Polarity light is displayed, it indicates a problem exists involving the ground. The problem's origin generally involves the power at dock side or the shore power cord. However, a short in the boat's electrical system may exist between the main AC Panel back to the shore power inlet.

To isolate the cause of the reverse polarity, one must troubleshoot the possible factors for determination. Actions may include testing an alternate shore power source or swapping shore power cords. If the problem appears to be boat side, have your system checked by qualified and competent electrical service personnel.

8.3 AC System Components and Operation

8.3.1 Outlets Breaker (Line 1)

The 120V (230V option) outlets installed throughout your boat are controlled by a 20 amp (10 amp) toggle switch breaker labeled "Outlets" on the AC panel (see Fig. 8.19 for outlet locations). In addition, some outlets have ground fault interruption circuit (GFIC) protection. This system prevents accidental electrical shock. If power is lost to an outlet, reset the breaker at the GFIC outlet.

8.3.2 Microwave Breaker (Line 1)

The microwave is powered by the AC panel and controlled by a 15 amp toggle switch breaker labeled "Microwave". Although it is plugged into a power outlet, the outlet is not part of a GFI circuit.

NOTE: Consult the microwave manufacturers' OEM manual for microwave operation, care and maintenance.

8.3.3 Water Heater Breaker (Line 1)

The water heater installed on your boat provides heated water. It is located in the main salon and can be accessed through the starboard aft dinette seat lid. The water heater is powered by the AC panel and controlled by a 15 amp toggle switch breaker labeled "Water Heater". Although it is plugged into a power outlet, the outlet is not

part of a GFI circuit. Please refer to the Water Systems chapter in this manual for additional details regarding the water heater.

NOTE: Consult the water heater manufacturers' OEM manual for water heater operation, care and maintenance.



Be certain the water heater is full of water and does not contain air. If the water heater is not full of water, damage to the heating elements may result when electrical power is turned on to the unit.

8.3.4 Air Conditioner and Air Conditioner Relay Breakers (Line 2)

8.3.4.1 Air Conditioner Breakers

The optional air conditioning system will provide the desired environmental conditions during hotter months. This option includes a dual compressor layout with one unit located in the main salon and accessed through the starboard aft dinette seat lid. (Fig. 8.13) and one located in the aft cabin and accessed through the drop-in of the port hanging locker (Fig. 8.14).

Each compressor comes with a corresponding air conditioning remote panel. The main salon remote panel is located on the forward facing face of the nav station hull panel (Fig. 8.15). The aft cabin remote panel is located on the port hull panel (Fig. 8.16).

The air conditioning systems are powered by the AC system and is controlled by a 25 amp toggle switch breaker labeled "Air Conditioner".

8.3.4.2 Air Conditioner Relay Breaker

A 5 amp toggle switch breaker exists for the air conditioner's water pump relay panel and protects the pump's circuitry from a power fault. The pump relay panel is used when more than one air conditioning unit draws raw water from the same seawater pump (refer to the Water Systems chapter in this manual for additional details regarding the air conditioner water pump). This breaker must be switched "On" when operating the air conditioners.

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Figure 8.13



Figure 8.14



Figure 8.15



Figure 8.16

8.3.4.3 Double Line Shore Power to Air Conditioner

If a single shore power is less than 50 amps, a second shore power line is required to run the air conditioning. To power the air conditioning, complete the following:

1. Connect 2 shore power lines to the shore power inlets and turn shore power on (see Connect and Turn on Shore Power above).
2. Switch on line 1 AC Main toggle switch breaker on the AC panel.
3. Switch on line 2 AC Main toggle switch breaker on the AC Panel.
4. Switch on the forward Air Conditioner toggle switch breaker at the AC Panel.
5. Switch on the aft Air Conditioner toggle switch breaker at the AC Panel.
6. Switch on the Air Conditioner Relay toggle switch breaker on the AC Panel.

8.3.4.4 Single Line Shore Power to Air Conditioner

If a single shore power is 50 amps, that line is sufficient to power both the optional air conditioner and the standard AC system. To power the air conditioning, complete the following:

1. Connect 1 shore power line to a parallel shore power yoke cord.
2. Connect both ends of the shore power yoke cord to the shore power inlets and turn shore power on (see

Connect and Turn on Shore Power above).

3. Switch on line 1 AC Main toggle switch breaker on the AC panel.
4. Switch on the Parallel toggle switch breaker on the AC panel. (The toggle switch is managed by a slide-bar stopper. This stopper will only allow source power to be paralleled from either 1 shore power line with 50 amps or from the generator.)
5. Switch on the forward Air Conditioner toggle switch breaker at the AC Panel.
6. Switch on the aft Air Conditioner toggle switch breaker at the AC Panel.
7. Switch on the Air Conditioner Relay toggle switch breaker on the AC Panel.

8.3.4.5 Generator Power to Air Conditioner

The generator has sufficient resources to power the AC system, including the air conditioner. To power the air conditioning, complete the following:

1. Execute the Generator Start sequence discussed previous.
2. Switch on the Generator toggle switch breaker on the AC panel. (The toggle switch is managed by a slide-bar stopper. This stopper will only allow source power to be from shore power or the generator).
3. Switch on the Parallel toggle switch breaker on the AC panel. (The toggle switch is managed by a slide-bar stopper. This stopper will only allow source power to be paralleled from either 1 shore power line with 50 amps or from the generator.)
4. Switch on forward Air Conditioner toggle switch breaker at the AC Panel.
5. Switch on the aft Air Conditioner toggle switch breaker at the AC Panel.
6. Switch on the Air Conditioner Relay toggle switch breaker on the AC Panel.

NOTE: When using the air conditioning systems with other appliances power up the air conditioner first.

NOTE: Consult the air conditioner manufacturers' OEM manual for air conditioner operation, care and maintenance.



Always make certain that the pick-up and discharge valves for the Air Conditioning System are opened before using. Failure to do so will cause permanent damage to your compressor. Also, be certain that the strainer is clean. See the Water Systems section for details on cleaning the Strainers.

8.3.4.6 Air Conditioning System Operation

Once power is sourced to the air conditioning, one simply turns on the units at the air conditioner remote panels and sets the temperature (see Fig. 8.19 for details on ducting and venting). Refer to the Water System chapter in this manual and the manufacturer's OEM manual for more detailed information regarding its operation.

Important: Be sure to close the air conditioner seacock when the air conditioner is not in use.

8.3.6 Spare Breaker Positions

The AC Panel has spare toggle switch breaker positions available for the protection and control of future added components.

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Troubleshooting		
Problem	Possible Cause	Solution
No AC power	Shore power breaker(s) tripped or off Shore power cord not connected Loose or disconnected wire	Turn breaker on or reset Check cord, plug in if necessary Tighten connections. See your dealer
No power to AC devices	Breaker(s) at AC Panel tripped or off Shore power cord not connected Loose or disconnected wire	Turn breaker on or reset Check cord. Plug in if necessary Tighten connections. See your dealer
Inadequate power to AC devices	Electrical demand greater than output	Switch off devices and equipment not needed Use shore power AC line if available
Continuous tripping of "AC Main" breaker	Cause of problem not corrected	Determine cause and correct problem before resetting breaker; see your dealer if problem persists
No power at AC outlets	"Outlet" breaker on the AC Panel is OFF Ground fault interrupter tripped	Switch breaker to ON Reset button on outlet and test

AC SYSTEM MAJOR COMPONENT GENERAL LAYOUT WITH INVERTER

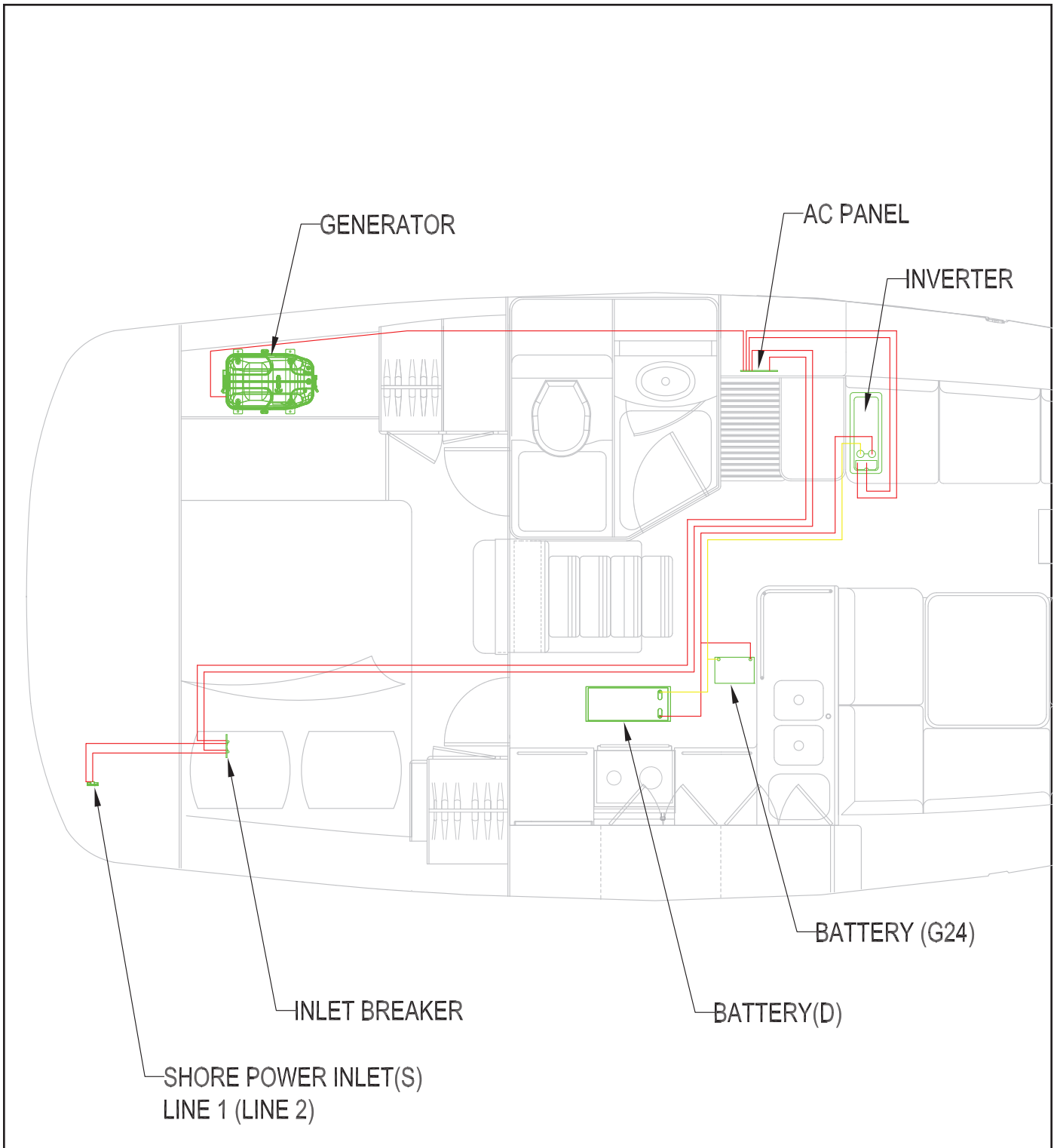


Figure 8.17

AC OUTLET LAYOUT

⚠ DANGER ⚠
Never work on an energized circuit, Always treat any circuit as if it were live!

Electricity cannot be detected without specialized test equipment. Never think you know whether a circuit is "live", always have qualified, competent professionals inspect or make repairs to your electrical systems.

Always run the blowers for at least four minutes before starting any engines.

Internal combustion engines produce carbon monoxide, a dangerous, poisonous gas. Be sure and read the boating safety chapter concerning Carbon Monoxide before starting any engines.

Alterations or extensions to the electrical system can cause electrical shock or fire. Only trained, competent, and certified electricians should perform any electrical maintenance, work, or changes to your boat's electrical system.

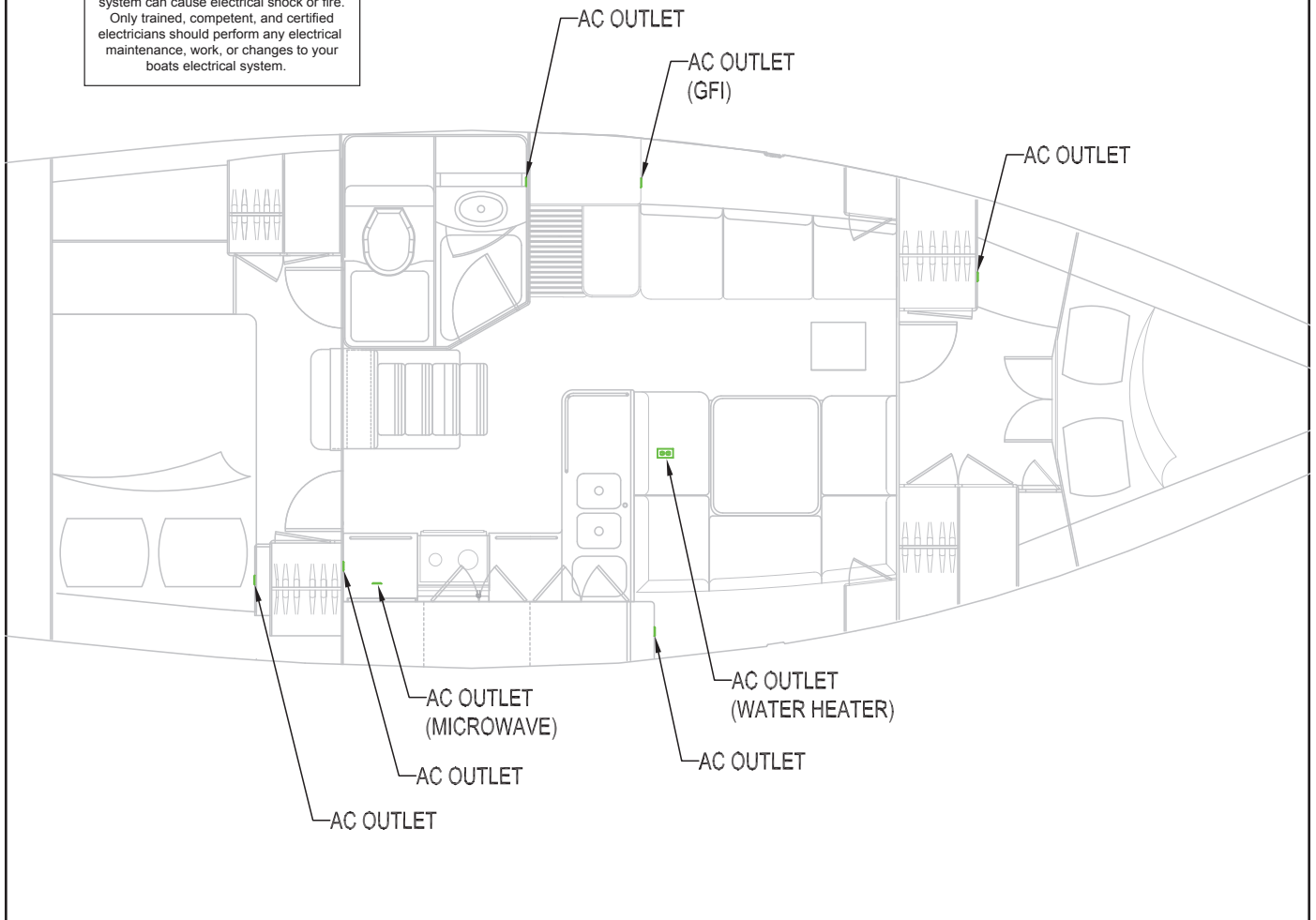


Figure 8.18

AIR CONDITIONER DUCTING LAYOUT

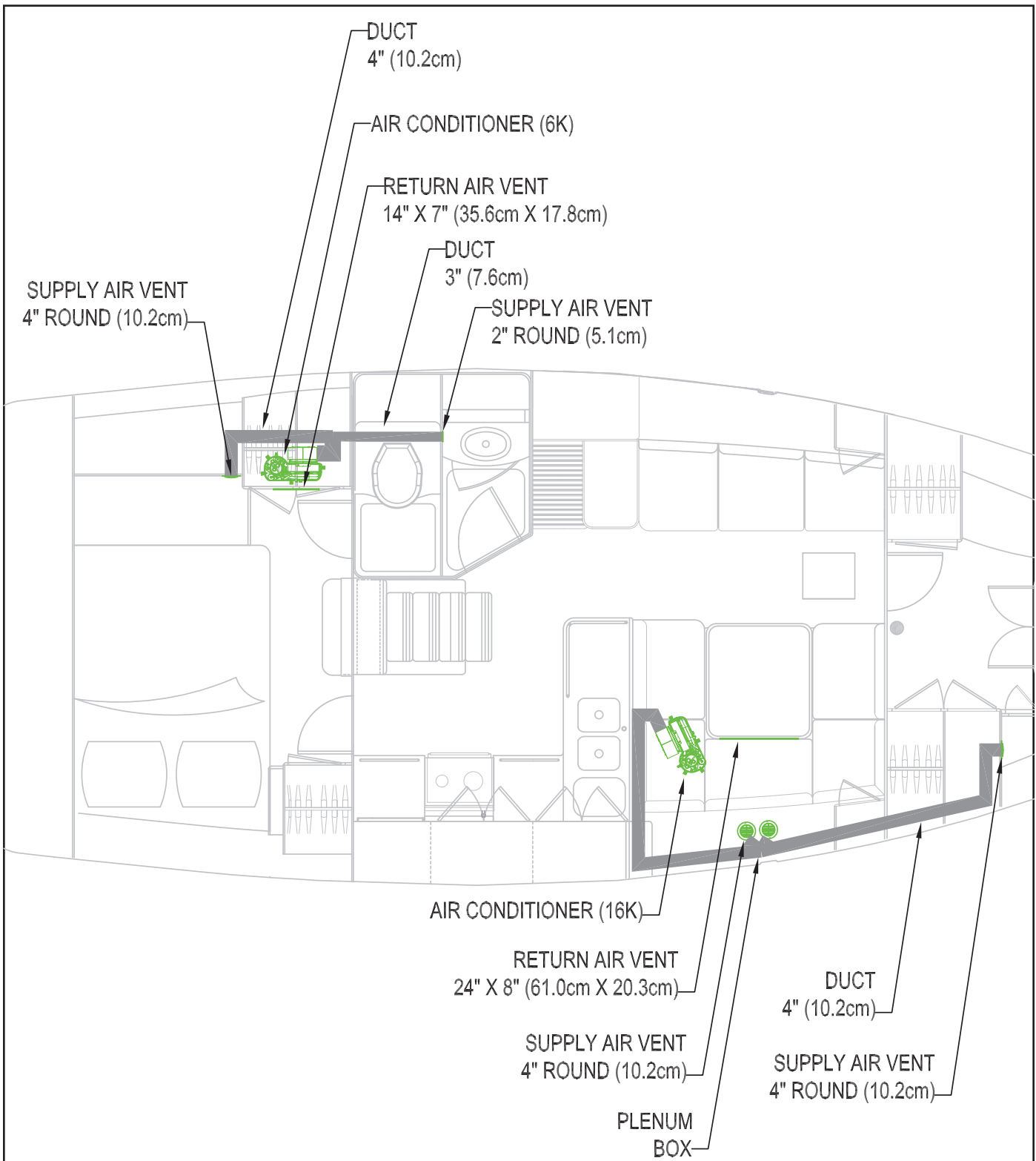


Figure 8.19



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Chapter 9

Water Systems

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Water Systems

The fresh and raw water systems discussions will consist of the following categories:

1. Fresh Water Tanks and Fills
2. Pumps
3. Pick-ups, Valves and Strainers
4. Water Heater

Please refer to Figure 9.18 for the overall fresh water system layout.

9.1 Fresh Water Tanks and Fills

The fresh water system on your boat includes two water tanks with a 40 US gallon (151.4L) capacity per tank. Each tank includes a water fill fitting (Fig. 9.1), located on the port and starboard side decks. Both the port and starboard tank fill fittings are located forward of the jib slider track. Also each tank has a vent fitting (see the Waste chapter in this manual for details on venting) to allow the tank to "breathe". The port tank vent is a thru-hull fitting located aft of the water fill fitting. The starboard tank vent is a deck fitting located on the toe-rail near the water fill fitting (see Boating Safety and Underwater Gear chapters of this manual for the deck hardware and thru-deck location diagrams).

The fresh water tanks are located in the main salon. The port tank can be accessed through the port aft settee bottom panels and/or adjacent floor panes (Fig. 9.2). The starboard tank can be accessed through the aft dinette seat bottom panels to the left of the water heater (under the optional air conditioner) (9.3).



Figure 9.1

9.1.1 To fill the fresh water tanks

1. Ensure the potable water supply is suitable for drinking. Not all potable water is drinking water. Check with the dock master if necessary.

2. Open a water tank fill fitting (Fig. 9.1).
3. Using the hose from the potable water supply, fill the tank until water starts flowing through the vent.
4. Close the fill fitting.
5. Repeat steps 2-4 for the second tank.

! WARNING !

Before connecting to a dock side water source, make certain the water is suitable for drinking. Water that may be of questionable quality could result in serious illness or death.



Figure 9.2



Figure 9.3

CAUTION

Always ensure when filling the fresh water tanks you are filling it through the fresh water fills. Other fill fittings or pump-outs are visually similar. Filling fresh water into the waste pump out could flood your boat, or filling the diesel fuel tank could damage your fuel system.

9.1.2 Fresh Water Sanitation

NOTE: Please be sure and read the OEM manuals supplied with your boat. The next section is quoted from one of those manuals.

“Sanitizing Potable water systems require periodic maintenance to deliver a consistent flow of fresh water. Depending on use and the environment the system is subjected to, sanitizing is recommended prior to storing and before using the water system after a period of storage. Systems with new components, or ones that have been subjected to contamination, should also be disinfected as follows:

NOTE: This sanitizing procedure is in conformance with the approved procedures of the US Public Health Service.

1. Use the following methods to determine the amount of common household bleach needed to sanitize the tank:
 - a. Multiply “gallons of tank capacity” by 0.13; the result is the ounces of bleach needed to sanitize the tank (30 gallons X .13 = 3.9 oz bleach).
 - b. Use the number of liters of tank capacity to determine the number of milliliters of bleach needed to sanitize the tank (120 liters of tank capacity = 120 milliliters of bleach).
2. Mix into solution the proper amount of bleach within a container of water
3. Pour the solution (water/bleach) into the tank and fill the tank with potable water.
4. Open all faucets (hot and cold) allowing the water to run until the distinct odor of chlorine is detected.
5. The standard solution must have four (4) hours of contact time to disinfect completely. Doubling the solution concentration allows for contact time of one (1) hour.

6. When the contact time is completed, drain the tank. Refill with potable water and purge the plumbing of all sanitizing solution.”

9.2 Pumps

Your boat will have both fresh water and raw water pumps which control the flow of water to the related components. These are electrically powered pumps.

9.2.1 Fresh Water Pump

The fresh water pump supplies pressurized water to the system. The pump is located in the galley and accessed through the sink cabinet door (Fig. 9.4).



Figure 9.4

The fresh water pump breaker switch is located on the DC panel (refer to the DC Electric System chapter in this manual for switch breaker details). When the breaker is switched on, the pump will run until the hot and cold water system is pressurized. An automatic pressure switch shuts the pump off until the pressure drops to a preset level (for example, a pressure drop caused by opening a faucet). The pump will then run again until the system is pressurized and turn itself off. The pump has a built-in check valve to prevent backflow through the pumps.

In addition to the standard access to fresh water through

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the head and galley, your boat features an optional cockpit shower/deck-washdown unit located in the lower starboard cockpit near the swim platform (Fig. 9.6).

NOTE: Operate the fresh water pump only when there is water in the tank. Running the pump dry will damage the diaphragm.

NOTE: If the pump runs from time to time even though no water is being used, a water leak most likely exists.. Check all lines for leaks and repair immediately.

NOTE: Whenever servicing the fresh water pump, shut off the water pump breaker at the DC panel.



Figure 9.5

9.2.2 Air Conditioning Seawater Pump

The optional air conditioning units will require a water pump to supply raw water to cool both compressors. The pump (Fig. 9.6) is located in the main salon with access through the main bilge floor panel.

Refer to Figure 9.15 for the full air conditioning water supply layout.

The pump's electrical circuitry incorporates a pump relay panel which includes a toggle switch breaker on the AC panel. When using the air conditioners, ensure the Air Conditioner Relay switch breaker is switched "ON" (refer to the AC Electric System chapter in this manual).

9.2.2.1 To Operate the Air Conditioner

Refer to the AC Electric System chapter in this manual for a discussion on the electrical controls of this system.

NOTE: Consult the pump manufacturer's OEM manual for further details regarding operation, care and maintenance.

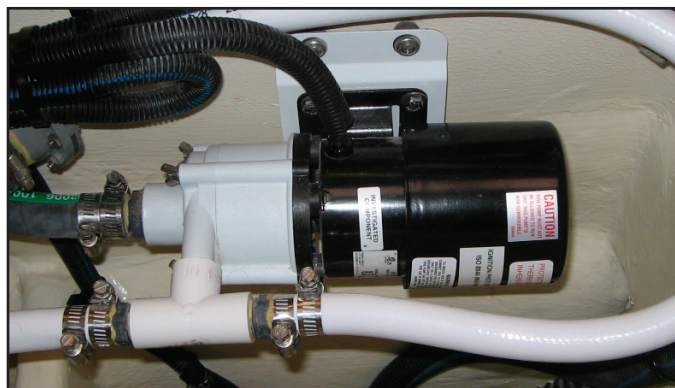


Figure 9.6

9.2.3 Generator Seawater Pump

The optional generator requires a water pump to supply raw water to cool the compressor motor. This pump is not a separately installed component but is part of the generator assembly. Refer to the generator manufacturer's OEM manual for information on pump operations.

9.2.4 Engine Seawater Pump

The engine requires a water pump to supply raw water to cool the motor. This pump is not a separately installed component but is part of the engine assembly. Refer to the engine manufacturer's OEM manual for information on pump operations.

9.3 Pickups, Valves and Strainers

Your boat uses water pickups, valves and strainers to supply water to the boat's various systems.

9.3.1 Pick-ups

Pick-ups, or thru hulls, are placed in various locations in the hull of your boat (refer to the Underwater Gear chapter in this manual for details on thru-hull locations). The pickups will incorporate a "Y" or ball type intake valve (also referred to as a seacock) which controls the flow of raw sea water to the specific component or system associated with the pick-up.

Figure 9.8 shows the intake, ball valve and strainer associated with the optional air conditioning system. To close the ball valve, rotate the handle to the straight up position. To open the valve to seawater, rotate the valve

fully clockwise.



Figure 9.7

⚠ CAUTION ⚠

It is very important to ensure the intake valve is open before using a raw water supplied system. Failure to do so could damage or break down the system or component.

9.3.2 Strainers

Your boat is equipped with strainers (Fig. 9.8 - 9.11) that strain the raw water taken in the pickups, or thru-hulls, for objects that could damage the impeller or pump equipment. They are equipped with a screen or filter that collect these objects. They must be cleaned as part of routine maintenance.

To clean a strainer:

1. Ensure the intake valve is in the off or closed position. Failure to close the intake valve could result in a flooded boat.
2. Remove the “collector” or glass encasement that houses the screen.
3. Remove any objects collected inside and wash the screen.
4. If an ‘o’ ring is present in the seal on the cap, check it for wear or leakage and replace if needed (contact your dealer for replacement).
5. Return the screen and glass encasement.



Figure 9.8



Figure 9.9



Figure 9.10



Figure 9.11

9.3.3 Engine Pickups and Strainers

For your engine to remain at a specific temperature when operating, it will need the assistance of raw water. Heat from the closed cooling system on the engines is transferred to the cooler seawater through heat exchangers inside the engine. The raw water is then discharged through the exhaust.

With a saildrive configuration, the seawater pickup is incorporated within the sail drive leg and screened internally. Please refer the engine manufacturer’s OEM manual for details on the pickup and strainer.

⚠ CAUTION ⚠

Before using any system that requires raw cooling water, ensure that the intake valve is opened and the strainers are not clogged.

⚠ WARNING ⚠

Hot coolant under pressure may boil or explode causing burns or other personal injury when the pressure cap is removed. Allow the engine to cool,

then open the cap slowly to allow any pressure to vent before completely removing the cap.

9.3.4 Fresh Water Pump Strainer

The strainer (Fig. 9.8) for the fresh water pump is mounted directly to the pump as noted in Fig. 9.4.

9.3.5 Air Conditioning Pickup and Strainer

As mentioned previously, the optional air conditioning system requires raw water to cool the compressor. Please refer to Figure 9.15 for the raw water system layout for the air conditioning system.

The pickup (Fig. 9.7) is located in the companionway landing and accessed through the largest floor panel in the landing area (refer to the Underwater Gear chapter of this manual for specific thru-hull locations). The strainer (Fig. 9.10) is mounted just aft of the air conditioner pump.

NOTE: Consult the air conditioner manufacturer's OEM manual for further details regarding operation, care and maintenance.

9.3.6 Generator Pickup and Strainer

As with your engine, the optional generator will require the assistance of raw water to maintain proper operating conditions. The generator pickup is a ball valve seacock as shown in Fig. 9.7. Please refer to Figure 9.16 for the raw water layout of the generator system.

The pickup is located in the companionway landing and accessed through the largest floor panel in the landing area (refer to the Underwater Gear chapter of this manual for specific thru-hull locations). The strainer (Fig. 9.10) is mounted just inline of the generator pickup valve..

NOTE: Consult the generator manufacturer's OEM manual for further details regarding operation, care and maintenance.

CAUTION

Always ensure engine, generator and air conditioner intake valves, or seacocks are open before using these components. Failure to do so could overheat and cause them significant damage.

9.3.8 Toilet Water Supply

The manual toilet uses raw water for flushing. The optional electric toilet uses fresh water from the fresh water system (salt water can damage electric head components). Please refer to Figure 9.17 for the raw water layout for the manual toilet.

For further information on the head system, please refer to the Waste Systems chapter in this manual.

9.4 Water Heater

The fresh water pump supplies water from the water tanks to the water heater (and cold water lines). The water heater is located in the main salon and accessed through the aft dinette seat lid (Fig. 9.12).

The water heater breaker switch is on the AC panel. When the breaker is turned ON, the water heater will heat water until the established temperature level is reached. Before switching the breaker ON, ensure the fresh water pump breaker switch on the DC panel is also ON and the system is pressurized.



Figure 9.12

Follow these procedures when using the water heater:

1. Make sure the water heater is full of water. Open a hot water faucet and allow a steady stream of water to flow out of the faucet to remove all air from the hot water system.
2. With shore power connected to your boat, or the optional generator running, switch on the water

Water Systems

heater circuit breaker.

3. Wait for the water in the tank to heat up, then use as you would at home.

135F (57.2C)	10 seconds
130F (54.4C)	30 seconds
125F (51.6C)	2 minutes
120F (48.8C)	5 minutes

⚠ WARNING ⚠

IMPORTANT!

Water temperatures in excess 110°F (43°C) are dangerous and may cause scalding, severe injury or death

9.4.1 Water Heater Temperature Adjustment (Thermostatic Mixing Valve)

1. Let the water flow for at least 2 minutes to allow supply temperature to stabilize.
2. Calibrate the mixed water outlet temperature by placing a thermometer in the mixed water stream.
3. To adjust the setting of the valve, loosen locking cap with hex wrench (Fig. 9.17). Cap must be lifted 1/4" to adjust temperature.
4. To increase the temperature, turn counterclockwise. To decrease temperature, turn clockwise.
5. Lower handle and tighten screw.
6. Check outlet temperature (compare to the scalding temperature reference table listed below).

NOTE: Consult the water heater manufacturer's OEM manual for further details regarding operation, care and maintenance.

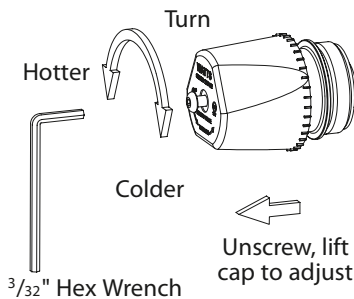


Figure 9.13

Hot Water Scald Time (Reference Only) Temperature/Max duration until injury

155F (68.3C)	1 second
145F (62.9C)	3 seconds

9.4.2 Heat Exchanger

An additional feature of the water heater is its heat exchanger component. This feature allows the water heater to perform its job by transferring heat from the engine's coolant to the fresh water system. Hoses run from the engine to the water heater and back to form a closed loop. This functionality produces a supply of hot water without the use of shore power or the generator.

Refer to Figure 9.17 for the heat exchanger plumbing layout.

⚠ WARNING ⚠

Hydrogen gas may form in water heater if not used. Open valves. Do not smoke or use electrical appliances for several minutes before use.

⚠ CAUTION ⚠

Ensure the water heater is full before energizing. Bleed off any air by opening the hot water valve. Close only when there is a steady flow of water. This will bleed the hot water system of air. Failure to follow these instructions could result in damage to the heating elements in your water heater.

⚠ WARNING ⚠

Allowing your boat to stay connected to dockside water supply while unattended could result in a sunken boat. A major leak or break in the system could flood the bilges. Excess water in the bilges could flood the batteries and result in your boat sinking.

Water Systems

Troubleshooting		
Problem	Cause	Solution
Air in system	Tank empty	Fill water tank
Fresh water pumps cycle on and off	Tank empty Blocked or pinched water lines Loose electrical connections Defective pumps Leak in system	Refill Clear obstruction or straighten line Check connections. Tighten as needed See your dealer for service Repair leak. See your service dealer for repairs
Low water pressure at all sinks and showers	Defective pump	See your dealer for service
Low water pressure at one sink	Pinched water line	Straighten line
No hot water (AC Power)	Water heater breaker OFF	Switch breaker to ON

FRESH WATER SYSTEM LAYOUT

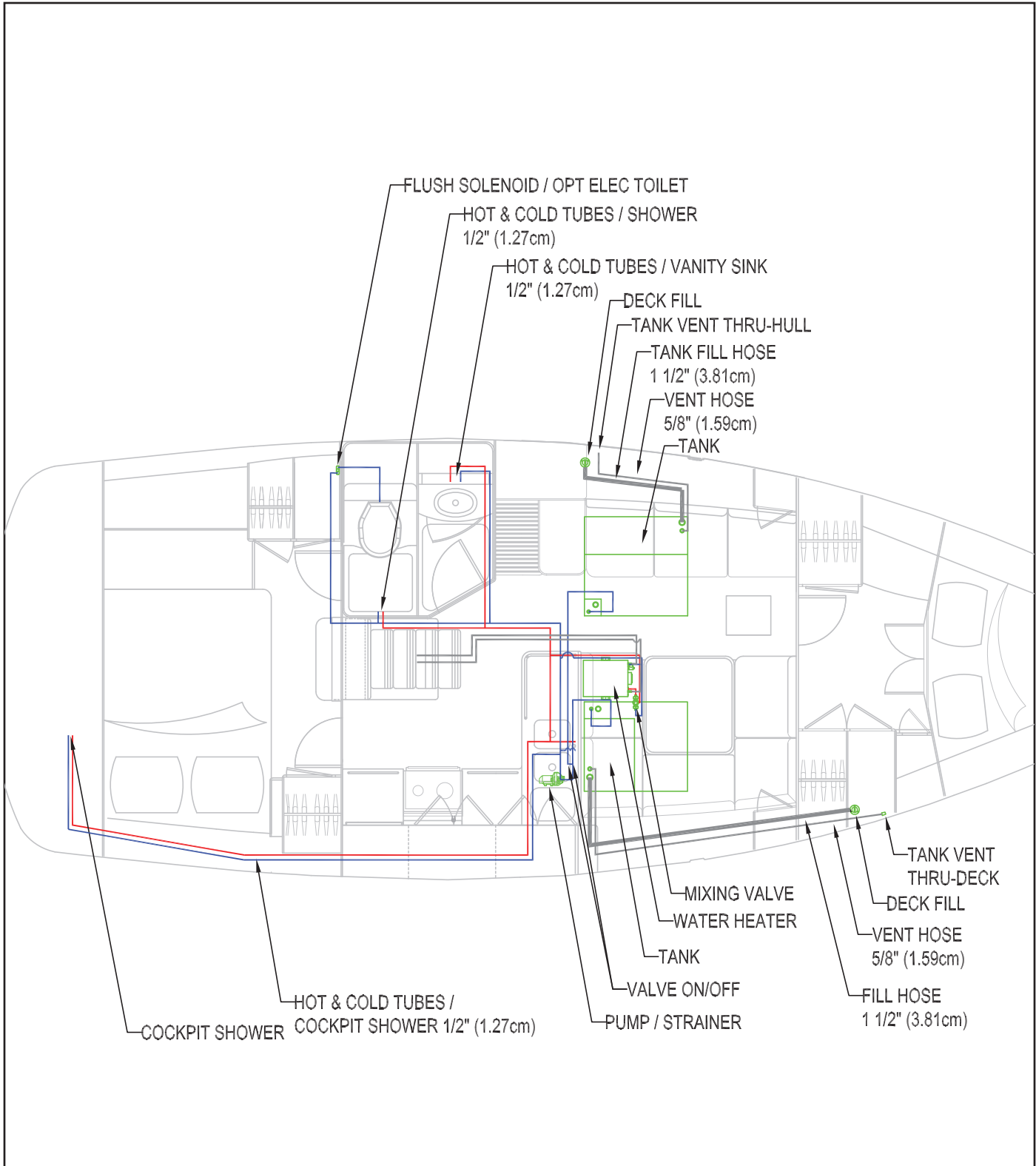


Figure 9.14

OPTIONAL AIR CONDITIONING PLUMBING LAYOUT

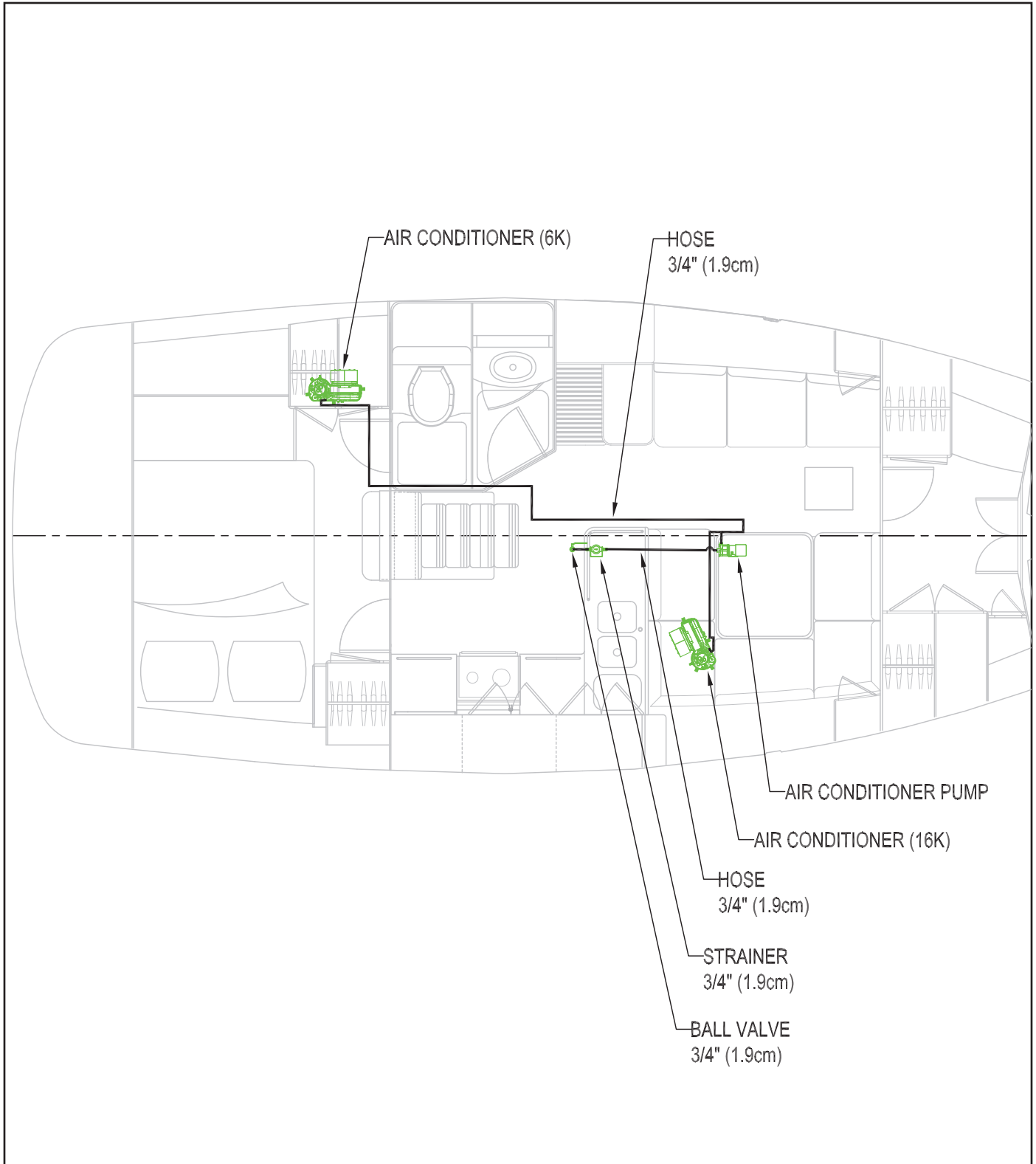


Figure 9.15

OPTIONAL GENERATOR PLUMBING LAYOUT

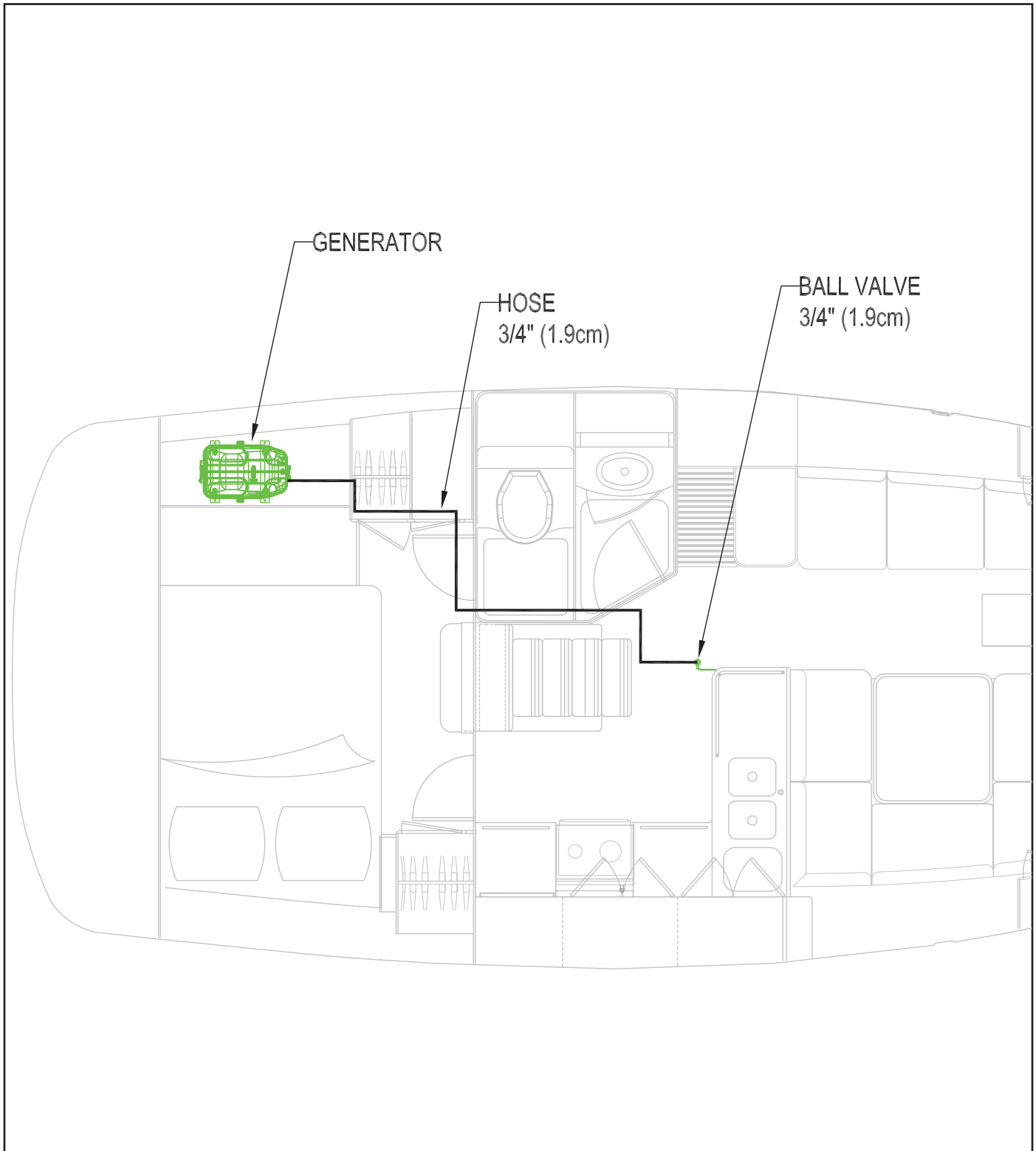


Figure 9.16

MANUAL TOILET RAW WATER & HEAT EXCHANGER LAYOUTS

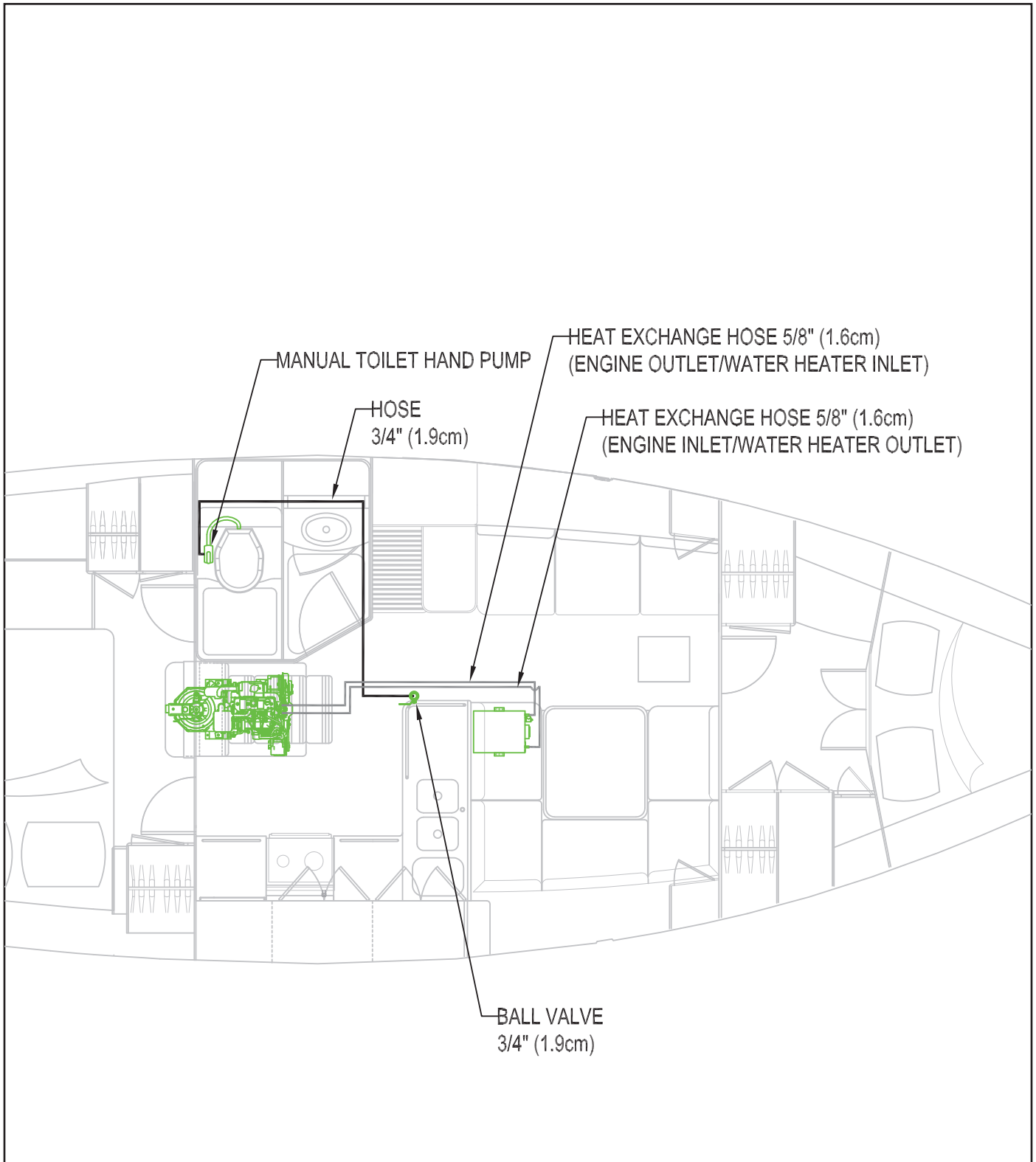


Figure 9.17

