Electrical - AC

Electric Heating Element:

The electric heating element uses AC power as an alternate power source for heating the Aqua-Hot's boiler tank.

Troubleshoot the electric heating element if the following condition has occurred:

- There is a lack of hot domestic water and interior heat when the electric element is selected as the heating source.

Troubleshooting:

NOTE: For continuous domestic hot water to be present, the diesel-burner must be selected also as a heating source.

1. Verify that the motor home is either plugged into shore power or that the generator is running to provide AC power.

2. Verify that both the "Electric Heating Element Status" and the "Heating Status" indicator lights on the electronic controller are illuminated.

   If the "Electric Heating Element Status" indicator light on the electronic controller is not illuminated, complete the following:

   A. Verify that the electric element switch on the interior switch panel is on.

   B. Install a jumper wire on the JP2 plug, between pins 52 and 53 ("ELECT-O" and "ELECT-I") on the electronic controller to bypass the electric element switch.

   If the "Electric Heating Element Status" indicator light illuminates on the electronic controller with the jumper wire installed, check the Electric Element Switch, on the interior switch panel for functionality.

   If the "Electric Heating Element Status" indicator light does not illuminate on the electronic controller with the jumper wire installed, follow the instructions in this manual to replace the electronic controller.

   If the "Heating Status" indicator light on the electronic controller is not illuminated, complete the following:

   A. Check the temperature of the Aqua-Hot's boiler tank.

   If the boiler tank temperature is below 158°F, troubleshoot the control thermostat.

   If the boiler tank is above 158°F, the Aqua-Hot is at operating temperature and requires no heat.

3. Verify the Electronic Controller is sending 12 Volt DC to the A.C. Relay.

   A. Using a volt meter check pins 11 & 12 ("AC REL -" and "AC REL +") for 12-Volt D.C on the JP3 plug.

   If 12 Volts of DC power is not present while the "Electric Heating Element Status" and "Heating Status" indicator lights on the electronic controller are illuminated, follow the instructions in this manual to replace the electronic controller.

4. If 12 Volts of DC power are present at the relay, complete the following:

   A. Locate the AC wires connected to the AC relay (pins 2 and 4), and remove the AC wires from the relay.

   B. Using an ohmmeter, check the relay AC pins (2 and 4) for continuity.

   If no continuity exists, follow the instructions in this section to replace the AC relay.

5. Verify that the electric heating element is receiving adequate AC power by completing the following:

   A. Remove the AC access cover.

   B. Plug the Coach into shore power/turn generator on.

C. Using an AC voltmeter, verify that 110 volts of AC power are present at the terminal block reference figure 20. If there is not 110 VAC present at the terminal block for the electric element, there is a problem inside the motor home.

D. Using a digital clamp-meter, verify the electric element's amp draw is between 11.2 to 13 amps.

E. Check the electric element's wires for continuity by completing the following:

a. Disconnect the motor home from shore power/ shut off generator.

b. Disconnect the wires from the electric heating element.

c. Disconnect the wires from the AC terminal block.

d. Check the black and white wires at the terminal block for continuity.

4. Check the electric heating element for functionality by completing the following:

A. Disconnect all power supplies.

B. Remove the AC access cover.

C. Remove all wires from the electric heating element.

D. Using an ohmmeter, check the electric heating element for the proper ohms. The Ohms reading should be between 8.5 - 9.5 ohms.

If the ohms reading is not between 8.5 - 9.5 ohms follow the instructions in this section to replace the electric heating element.

Replacement Procedure:

⚠ DANGER! ⚠

FAILURE TO DISCONNECT ALL POWER SUPPLIES AND/OR TO ALLOW THE HEATER TO COOL BEFORE SERVICING COULD CAUSE SERIOUS DAMAGE OR PERSONAL INJURY.

1. Ensure that the Aqua-Hot has been completely shut down and that all power sources have been disconnected. Also, because this replacement procedure will involve the boiler tank and the potential for hot coolant, be sure the heater has adequately cooled.

2. Drain the antifreeze and water heating solution from the Aqua-Hot's boiler tank using the drain valve.

3. Remove the AC access cover.

4. Remove the two wires secured to the defective electric heating element by releasing the screw terminals.

5. Using a 1-1/2 inch socket, remove the defective electric heating element from the Aqua-Hot's boiler tank.

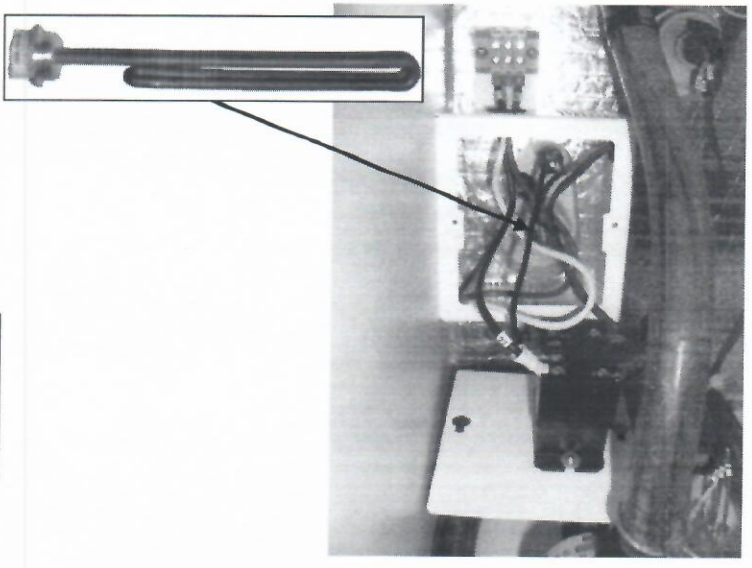
6. Install the replacement 1650-watt electric heating element into the boiler tank ensuring that the "up" lettering on the element is installed in the up position.

7. Connect the wires removed from the defective electric heating element to the replacement electric heating element and tighten the screw terminals.

8. Reinstall the AC access cover.

9. Refill the Aqua-Hot's boiler tank with the antifreeze and water heating solution.

Figure 19



AC Relay:

The AC relay is an electrical device where the DC circuit from the electronic controller determines whether the AC power is permitted to flow to the electric heating element. This allows the electronic controller to switch the electric heating element on and off in conjunction with the interior switch panel and control thermostat even though the electric heating element is on a separate circuit.

Troubleshoot the AC relay if the following condition has occurred:

- The electric heating element fails to operate.

Troubleshooting:

1. Disconnect the AC power source to the motorhome (unplugging from shore power or shutting off the generator).

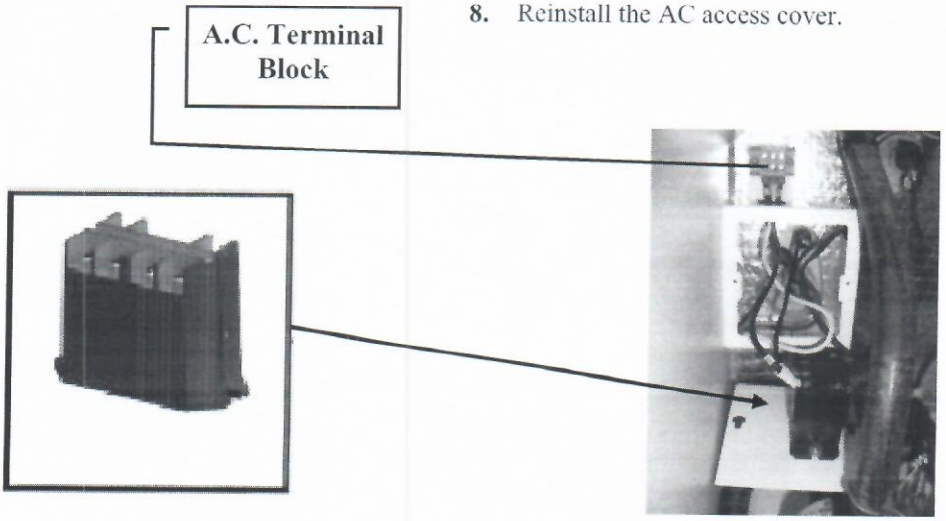
2. Turn the electric element switch on the interior switch panel on and check the electronic controller to ensure that the "Electric Heating Element Status" and the "Heating Status" indicator lights are illuminated.

3. Using a voltmeter, check pins 11 and 12 ("AC Relay +" and "AC Relay-") on the JP3 plug for 12 Volts-DC.

   If 12 Volts of DC power are not present while the "Electric Heating Element Status" and "Heating Status" indicator lights on the electronic controller are illuminated, follow the instructions in this manual to replace the electronic controller.

   If 12 Volts of DC power are present, complete the following:

Figure 20



   A. Locate the AC wires connected to the AC relay (pins 6 and 8), and remove the AC wires from the relay.

   B. Using an ohmmeter, check the relay AC pins (6 and 8) for continuity.

      If no continuity exists, follow the instructions in this section to replace the AC relay.

Replacement Procedure:

⚠ DANGER! ⚠

FAILURE TO DISCONNECT ALL POWER SUPPLIES AND/OR TO ALLOW THE HEATER TO COOL BEFORE SERVICING COULD CAUSE SERIUOS DAMAGE OR PERSONAL INJURY.

1. Ensure that the Aqua-Hot has been completely shut down and that all power sources have been disconnected.

2. Also, ensure that the motor home is not connected to shore power and that a generator is not connected during this replacement procedure.

3. Remove the AC access cover.

4. Release the wires from the defective AC relay by removing the corresponding screw terminals.

5. Remove the defective relay by drilling the rivets that hold the defective relay in place.

6. Rivet the replacement AC relay to the AC access cover.

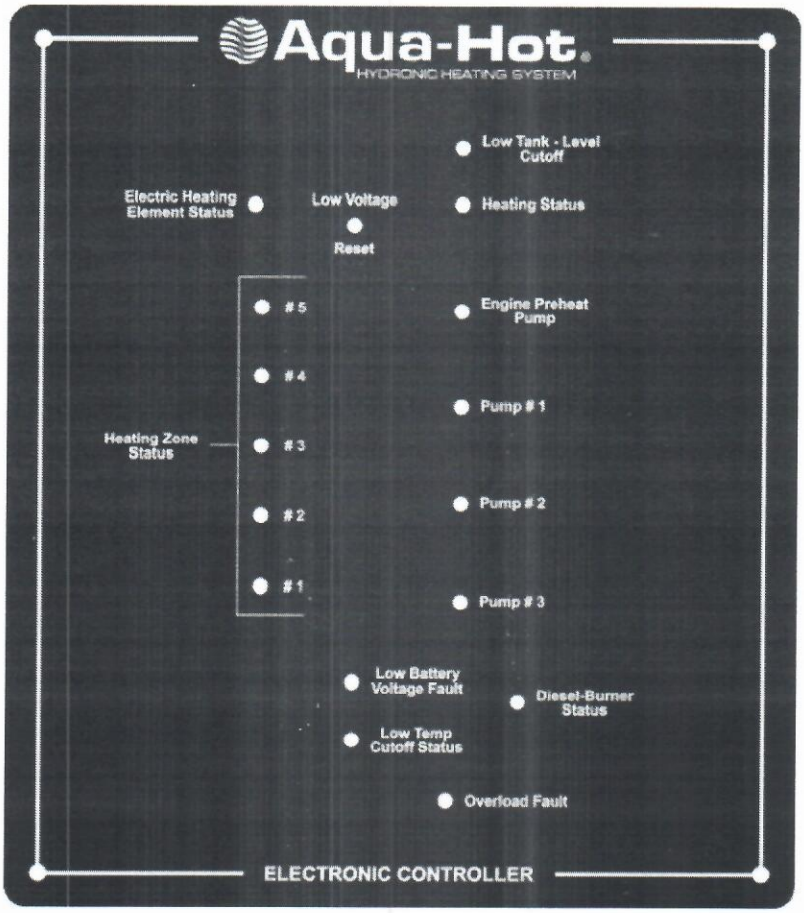
7. Using the wiring diagram in Appendix A, connect the wires previously removed to the replacement AC relay.

8. Reinstall the AC access cover.

Electronic Controller Overview

The electronic controller is an electronic circuit board that controls the electrical functions of the Aqua-Hot heating system. All wiring for the switch panel is connected to the electronic controller, as well as the wiring circuitry from the Aqua-Hot unit. Indicator lights on the front panel will illuminate red if there is a short circuit, overload, or fault condition within the system. It also will indicate when circuits are functioning properly with a green indicator light.

Figure 21



Electronic Controller General Facts

Nominal input voltage range ..... 10.6V to 15V
Idle current ..... Approx. 15mA
Low voltage cutoff threshold 10.0V
Low voltage lockout delay ..... Approx. 5 minutes

Input Load Currents

Zone thermostats (each) ..... Approx. 4mA
Diesel-Burner switch ..... Approx. 12mA
Electric Element switch ..... Approx. 4mA
Engine Preheat switch ..... Approx. 4mA
Low-level cutoff switch ..... Approx. 10mA
Control Thermostat ..... Approx. 8mA
Low-temperature cutoff switch ..... Approx. 5mA

Output Current Capacity

Zone fans (each) ..... 2.0A max.
Circulation pumps (each) ..... 2.0A max.
Engine preheat pump ..... 2.0A max.
AC relay ..... 500mA max.
B4+ burner (Webasto) power ..... 6.0A max.
B1+ burner master control ..... 2.0A max.
C1/C7 burner thermostat control ..... 1.0A max.