Owner’s Manual

Model Numbers

AHE-100-02S -12 VDC
AHE-200-02S - 24 VDC
OWNER’S INFORMATION

Owner’s Name: ___________________________________________________________

Address: _______________________________________________________________

City: __________________________ State: ____________ Zip Code: _____________

Telephone: _____________________________________________________________

Coach Model: __________________________________________________________

Coach Date of Purchase: _________________________________________________

Aqua-Hot Model No: _____________________________________________________

Aqua-Hot Serial No: _____________________________________________________

Please Mail To: Vehicle Systems Warranty Department

15549 East Highway 52

Ft. Lupton, CO 80621

Aqua-Hot™ Motor Coach Heating System Owner’s Manual 05/02
The Aqua-Hot Motor Coach Heating System is an on-board Hydronic Heating System (heating with hot water) that provides a continuous, on-demand supply of domestic hot water, as well as interior zone heating where and when it is needed. Both heating features are accomplished by a unique Diesel-Fired Burner and an AC powered Electric Heating Element (120 VAC). These two heating sources maintain the temperature of the Aqua-Hot's solution of water and antifreeze. In addition, the Aqua-Hot has been designed to preheat the vehicle's engine prior to starting. This feature provides easy engine start-up whenever cool weather conditions are present. Be sure to review Figure 1 for complete component overview.
SECTION 1: OVERVIEW

Aqua-Hot Overview, continued

Figure 1

Aqua-Hot™ Motor Coach Heating System Owner’s Manual 05/02

 SECTION 2: OPERATING INSTRUCTIONS

Heat Source

Please read the complete Owner’s Manual prior to operating your Aqua-Hot Heating System. Also, be sure to fill out and mail in your Owner’s Information Card located at the front of this manual.

2.1 Activating The Aqua-Hot Heating System

Diesel-Burner

Turn the Diesel-Burner Control Switch ON. This procedure will activate the Diesel-Burner and the indicator light located on or near the Switch. Please contact your specific motorhome manufacturer for the exact Diesel-Burner Control Switch location. Allow 10-20 minutes for the System to reach operating temperature. Please note that the Diesel-Burner is the main heat source for heating both the interior and the domestic hot water. So, be sure to leave this switch ON during normal heating requirements.

Electric Heating Element

The VAC Electric Heating Element is wired directly into your motorhomes 120 VAC electrical system and is operational whenever VAC power is available. Allow 1-2 hours for the System to reach operating temperature. Please note that the Electric Heating Element will adequately provide all your heating needs only for low heating demand situations, such as when moderate ambient temperatures exist and/or when there is a low demand for domestic hot water.
2.2 Zone Thermostat(s) Operation

**Interior Room Thermostats**

Simply adjust each Room Thermostat to the desired temperature. Then whenever a Room Thermostat “calls-for-heat” the Aqua-Hot’s Circulation Pump(s) and Interior Zone Fans will be activated. These devices together will supply warmth and comfort to each interior heating zone. Please contact your specific motorhome manufacturer for the exact Room Thermostat location(s).

**Bay Thermostat**

Simply adjust the Bay Thermostat to approximately 40 degrees Fahrenheit. This will prevent freezing of the domestic water storage system. Please contact your specific motorhome manufacturer for the exact Bay Thermostat location.

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2.3 Using the Domestic Hot Water System

When the Aqua-Hot is at operating temperature, the domestic water is automatically heated as it is being used. Because the Aqua-Hot does not store any hot water simply open any hot water faucet and a continuous supply of domestic hot water will be present within a few seconds. This hot water feature is continuous and is accomplished by the Aqua-Hot’s Mixer Valve and Integral Domestic Hot Water Heating System. Please note that the Diesel-Burner Control Switch must be ON to get an unlimited supply of hot water (i.e. during showers).

2.4 Using the Engine Preheat System

When the Aqua-Hot is at operating temperature, and the Diesel-Burner and/or the 120 VAC Electric Heating Element Switch(s) is ON, follow these simple instructions:

A. Turn the Aqua-Hot’s **Engine Preheat** Switch **ON**. This procedure will activate the Engine Preheat Circulation Pump. Circulating the engine’s coolant through the Engine Preheat System will adequately warm the engine for easy start-ups on cool mornings. Please contact your specific motorhome manufacturer for the exact Engine Preheat Switch location.

**NOTE:** Allow approximately 1 to 2 hours of engine preheating run time. Time will be shortest when the Diesel-Burner Control Switch is ON.
SECTION 2: OPERATING INSTRUCTIONS

Engine Preheat, continued

B. Turn OFF the Aqua-Hot’s Engine Preheat Switch whenever engine preheating is not desired.

NOTE: The Aqua-Hot’s Engine Preheating System acts as a supplemental heating source, in addition to the Diesel-Burner and the 120 VAC Electric Heating Element. While traveling, the engine’s heated coolant will automatically pass through the Engine Preheat / Motoraid System, transferring heat into the Aqua-Hot’s Heat Tank. This design feature reduces the total operating hours of the Diesel-Burner and the 120 VAC Electric Heating Element.

Diesel-Burner Component Overview

1. Control Unit
2. Motor
3. Ignition Coil
4. Clutch
5. Combustion Air Fan
6. Fuel Solenoid Valve
7. Electrode Holder
8. Ignition Electrodes
9. Fuel Nozzle
10. Combustion Chamber
11. Heat Exchanger
12. Exhaust Port
13. Flame Detection Photocell
14. Fuel Pump
15. Fuel Ports (Supply / Return)
16. Combustion Air Port (Intake) with Adjustable Shutter

Figure 2
SECTION 2: OPERATING INSTRUCTIONS

2.5 Diesel-Burner Operational Flow-Chart

Operation sequence once the Aqua-Hot's Diesel-Burner Control Switch is turned ON.

The Control Switch's indicator light will illuminate.

The "MOToR" (#2) (which turns the "COMBUSTION AIR FAN" (#5) and drives the "FUEL PUMP" (#14)) will begin to run.

After approximately 10 - 25 seconds the "FUEL SOLENOID VALVE" (#6) opens and fuel is sprayed into the "COMBUSTION CHAMBER" (#10) through the "FUEL NOZZLE" (#9).

NOTE:
If the Aqua-Hot's Coolant reservoir temperature is approximately 175 degrees Fahrenheit, or higher, the "MOToR" (#2) will not operate. Only when the temperature has dropped below 175 degrees Fahrenheit will the "VDC CONTROL THERMOSTAT" allow the "MOToR" (#2) to operate.

Simultaneously the "IGNITION COIL" (#3) produces a High Voltage Spark across the "IGNITION ELECTRODES" (#8) which ignites the incoming Air / Fuel mixture.

Once the ignited Air / Fuel mixture (FLAME) is observed by the "FLAME DETECTION PHOTOCELL" (#13), the "IGNITION COIL" (#3) will automatically switch OFF. The combustion process now continues to operate unassisted.

NOTE:
If the Aqua-Hot's Coolant reservoir temperature is approximately 175 degrees Fahrenheit, or higher, the "MOToR" (#2) will not operate. Only when the temperature has dropped below 175 degrees Fahrenheit will the "VDC CONTROL THERMOSTAT" allow the "MOToR" (#2) to operate.

After approximately 10 - 25 seconds the "FUEL SOLENOID VALVE" (#6) opens and fuel is sprayed into the "COMBUSTION CHAMBER" (#10) through the "FUEL NOZZLE" (#9).

SUMMARY:
The Aqua-Hot's Diesel-Burner is operational anytime the operator activates the Diesel-Burner Control Switch to the ON position. The Diesel-Burner will then automatically maintain the temperature of the coolant without any additional involvement from the operator.

SECTION 2: OPERATING INSTRUCTIONS

2.5 Diesel-Burner Operational Flow-Chart

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SECTION 2: OPERATING INSTRUCTIONS

2.6 Precautions

CAUTIONS:
- The Aqua-Hot’s Exhaust is HOT!
- **DO NOT** park in areas where dry conditions exist underneath the vehicle, as a fire may result (i.e. dry grassy fields).
- **DO NOT** operate the Aqua-Hot’s Diesel-Fired Burner inside an enclosed building.
- Operating the Aqua-Hot Diesel-Burner or the 120 VAC Electric Heating Element without the water and antifreeze solution will cause **serious damage** to the Heater.
- The Heater should be switched OFF when refueling.

SECTION 3: MAINTENANCE

Upkeep

3.1 Maintenance Schedule

Monthly

Check the Aqua-Hot’s solution of water and antifreeze to ensure that it is at the proper level. Do this by visually checking the coolant level in the Aqua-Hot’s Expansion Tank, see Figure 1. This should be checked only when the Aqua-Hot is at operating temperature, “HOT.”

Annually

**CAUTION:** Before cleaning or servicing, disconnect all power supplies.

It is ideal to have your Aqua-Hot tuned-up yearly. A tune-up should consist of a Fuel Nozzle and Fuel Filter replacement and a thorough cleaning of the Combustion Chamber, if necessary. This simple tune-up will keep your Aqua-Hot running smoothly throughout the year. This annual tune-up will also allow service personnel to inspect for wear and tear of other components.

**CAUTION:** Operating the Aqua-Hot’s Diesel-Burner or the 120 VAC Electric Heating Element without the water and antifreeze solution will cause **serious damage** to the Heater.
SECTION 4: WINTERIZATION

### Storage

#### 4.1 Domestic Hot Water System

The Aqua-Hot's domestic hot water system must be completely drained of domestic water any time the heater is stored where freezing temperatures may be experienced.

**CAUTION:** Not winterizing your Aqua-Hot, when freezing temperatures are present, will result in serious damage to the Aqua-Hot's domestic hot water system.

**NOTE:** The Aqua-Hot can still be used for interior zone heating even if the domestic hot water system has been drained and winterized.

Follow the instructions listed below when winterizing the Aqua-Hot’s domestic water system:

**A.** Completely drain the fresh water storage tank.

**NOTE:** If your coach is equipped with appliances that use fresh water (i.e. ice makers, water purifiers, etc.) follow the manufacturer's recommendation for winterization.

**B.** Disconnect the domestic water demand pump's suction line from the fresh water storage tank.

**C.** Attach an adequate piece of hose onto the suction side of the domestic water demand pump.

**D.** Place the opposite end of the hose into an adequate supply of FDA approved RV-Antifreeze; approximately 2 gallons will be required.

E. Open/close all interior and exterior water faucets, one at a time, until only pure RV-Antifreeze is present. Perform this procedure for both hot and cold faucets.

F. Remove the hose and reconnect the domestic water demand pump's suction line to the fresh water storage tank.

G. Disconnect all electrical power supplies to the Aqua-Hot during storage.

**NOTE:** If you’re disinfecting your potable water system, after de-winterizing, be sure to follow RVIA’s “Instruction for Disinfection of Potable Water Systems on Recreation Vehicles.” These instructions can be found in the ANSI A119.2 Handbook for Recreational Vehicle Standards. To receive a copy of this RVIA Standard, write to: Recreation Vehicle Industry Association, 1896 Preston White Drive, P.O. Box 2999, Reston, VA 20195-0999, or visit the RVIA website at [www.rvia.com](http://www.rvia.com).
SECTION 5: TROUBLESHOOTING

Prior to troubleshooting your Aqua-Hot, be sure to reference Figure 1 for a complete overview of the heating system, and Figure 2 for a complete component overview of the Diesel-Burner. Also, please review Section 2.5 of this manual for details on the Diesel-Burner's operation. Use the following chart when troubleshooting your **Diesel-Burner** only.

<table>
<thead>
<tr>
<th>Failure Symptom</th>
<th>Probable Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel-Burner Control Switch is On, but the Diesel-Burner's Motor does not function, see Figure 2.</td>
<td>Loose Harness Plug Connections at the Control Unit. Open “E” or “F” Fuse at the Aqua-Hot. Less than 10 Volts DC to the Aqua-Hot. Defective Diesel-Burner Control Switch or Loose Conn.</td>
<td>Check Harness Plug Connections to be secure and in place on the underside of the Control Unit. Replace “E” or “F” Fuse. Check House Batteries and Charging System. Replace Switch or Repair Loose Connection.</td>
</tr>
<tr>
<td>Diesel-Burner's Combustion Process stops after 30 sec.</td>
<td>Loose Harness Plug Connections at the Control Unit. Less than 10 Volts DC to the Aqua-Hot.</td>
<td>Check Harness Plug Connections to be secure and in place on the underside of the Control Unit. Check House Batteries and Charging System.</td>
</tr>
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</table>

Use the following chart when troubleshooting your **120 VAC Electric Heating Element** only.

| 120 VAC Electric Heating Element does not produce heat, or hot water, when motorhome is plugged into shore power. | VAC Breaker is Off or Switch is Defective. | Turn VAC Breaker On or replace Switch. |

## SECTION 5: TROUBLESHOOTING

### Quick Reference Chart

<table>
<thead>
<tr>
<th>COMPONENTS</th>
<th>FAILURE SYMPTOM</th>
<th>CHECK OR REPLACE IF NECESSARY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel Control Switch “On”</td>
<td>No Function</td>
<td>Switch, Indicator Light Bulb, Fuel Filter, Electric Heating Element</td>
</tr>
<tr>
<td>Diesel Control Switch Indicator Light</td>
<td>No indicator light or &quot;Off&quot; after 30 sec.</td>
<td>VAC Breaker, Battery Voltage, Electric Circuit Breaker, Engine Preheat Control Switch</td>
</tr>
<tr>
<td>Engine Preheat Control Switch</td>
<td>No indicator light</td>
<td>VAC Breaker, Battery Voltage, Electric Circuit Breaker, Engine Preheat Control Switch</td>
</tr>
<tr>
<td>Diesel-Burner</td>
<td>Motor is not operating</td>
<td>Engine Preheat C-Plug Service Cord</td>
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<tr>
<td>Diesel-Burner</td>
<td>No 10-25 second prime cycle</td>
<td></td>
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<tr>
<td>Diesel-Burner</td>
<td>Ignition Coil will not spark</td>
<td></td>
</tr>
<tr>
<td>Diesel-Burner</td>
<td>No Combustion</td>
<td></td>
</tr>
<tr>
<td>Diesel-Burner</td>
<td>Combustion stops after 30 seconds</td>
<td></td>
</tr>
<tr>
<td>120 VAC Heating Element</td>
<td>No heat / hot water when plugged into shore power</td>
<td></td>
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<tr>
<td>Engine Preheat</td>
<td>Diesel Engine Remains cold</td>
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WARRANTY POLICY

- FOR AQUA-HOT MODELS -

Vehicle Systems Inc. warrants the AQUA-HOT Heater, to the original owner, to be free from defects in material and workmanship under design usage and service conditions for a period of two (2) years on parts and labor beginning on the date of purchase of the vehicle. Replacement parts are covered for the remainder of the heating systems warranty or for six months (180 days) which ever is greater.

This warranty does not apply to damage or failure of the AQUA-HOT Heater or the vehicle into which it was installed due to improper installation, assembly, maintenance, abuse, neglect, accident, or the use of parts not supplied by Vehicle Systems Inc. Vehicle Systems is not responsible for incidental or consequential damages.

The intent of this warranty is to protect the end user of the heating system from such defects, which would occur in the manufacture of the product. The warranty is not intended to protect the end user from problems, which are outside the ability of Vehicle Systems’ control.

To obtain warranty repair authorization or for additional information please contact our Technical Support Department at 1-800-685-4298 (8 AM to 5 PM) Mountain Standard Time.

Aqua-Hot™ Motor Coach Heating System Owner’s Manual 05/02

OWNER’S SERVICE LOG:

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