



By Vehicle Systems, Inc.

Motor Coach Heating Specialists

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: _____

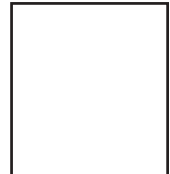
Coach Date of Purchase: _____

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



**Vehicle Systems, Inc.
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SECTION 1: OVERVIEW

Aqua-Hot Overview

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

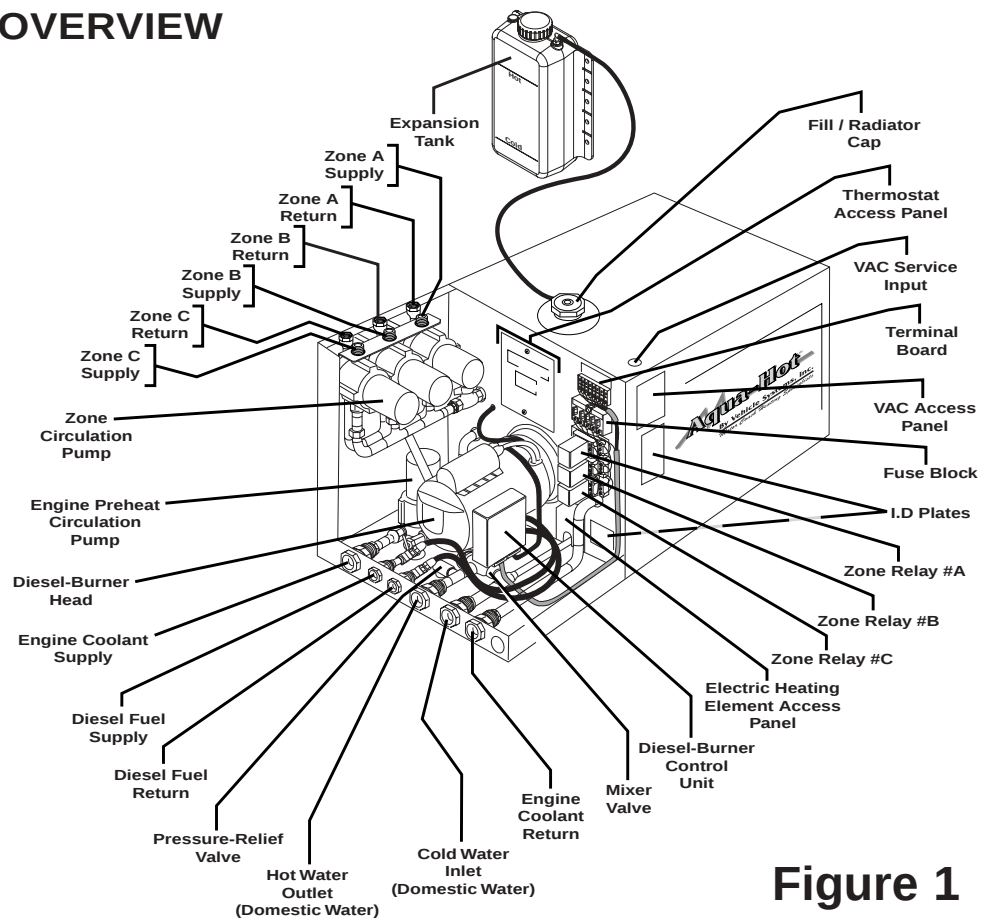


Figure 1

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

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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.

SECTION 2: OPERATING INSTRUCTIONS

Heat Source, continued

NOTE: Both the Diesel-Burner and the 120 VAC Electric Heating Element are thermostatically controlled. Either, or both, heating sources will automatically maintain the temperature of the Aqua-Hot's water and antifreeze solution between approximately 175-200 degrees Fahrenheit. So simply choose how you want to heat your coach/hot water and just leave the Switch(s) (Diesel, Electric, or both) **ON**.

Comfort Control

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.

SECTION 2: OPERATING INSTRUCTIONS

Hot Water

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 Intergal 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).

Engine Preheat

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.

SECTION 2: OPERATING INSTRUCTIONS

Diesel- Burner Component Overview

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

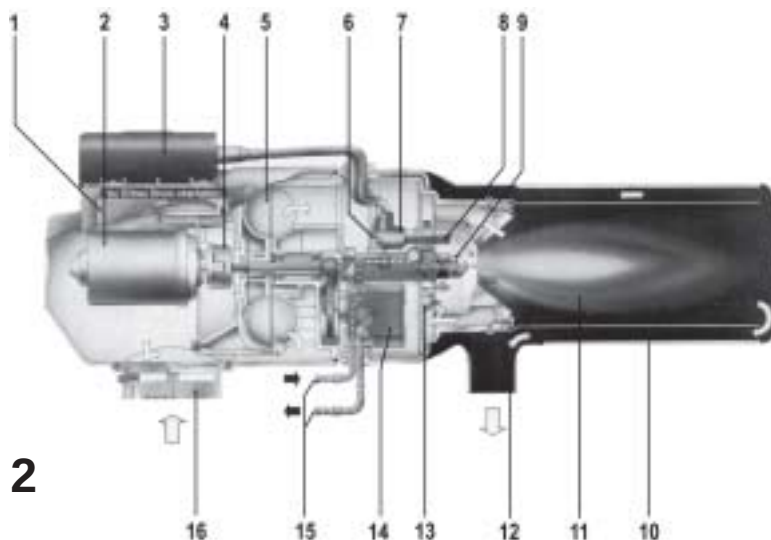
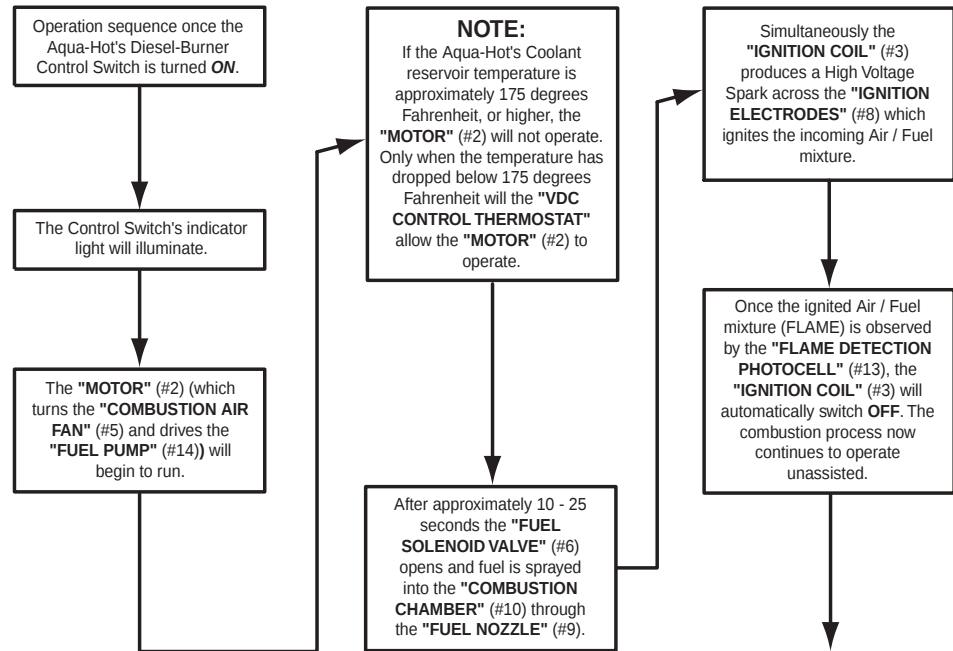


Figure 2

SECTION 2: OPERATING INSTRUCTIONS

Diesel-Burner Operational Flow-Chart

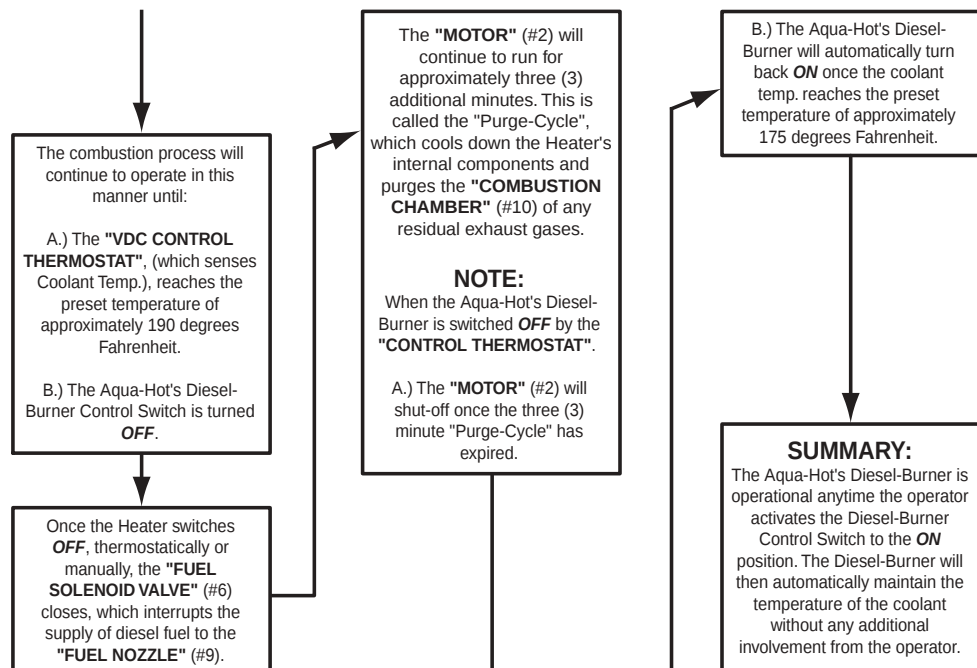
2.5 Diesel-Burner Operational Flow-Chart



SECTION 2: OPERATING INSTRUCTIONS

Diesel-Burner Operational Flow-Chart

2.5 Diesel-Burner Operational Flow-Chart



SECTION 2: OPERATING INSTRUCTIONS

Important Information



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.

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SECTION 4: WINTERIZATION

■ Storage, continued



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: 1. For de-winterization, fill the fresh water storage tank with fresh water. Open/close all interior and exterior water faucets, one at a time, until only clear water is present/visible.

CAUTION: 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**.

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.

Failure Symptom	Probable Cause	Remedy
No Indicator Light on the Diesel-Burner Control Switch or Indicator Light goes Off after 30 sec.	Less than 10 Volts DC to the Aqua-Hot. No Fuel to the Diesel-Burner. Defective Fuel Nozzle. Defective Indicator Light Bulb.	Check House Batteries and Charging System. Check Fuel Filter and Fuel System. Replace Fuel Nozzle. Replace Indicator Light Bulb.
Diesel-Burner Control Switch is On, but the Diesel-Burner's Motor does not function, see Figure 2.	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.	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.
Diesel-Burner does not respond with the 10-25 sec. Purge-cycle	Less than 10 Volts DC to the Aqua-Hot.	Check House Batteries and Charging System.
Diesel-Burner's Combustion Process does not take place.	Loose Harness Plug Connections at the Control Unit. Open "E" or "F" Fuse at the Aqua-Hot. No Fuel to the Diesel-Burner. Defective Fuel Nozzle.	Check Harness Plug Connections to be secure and in place on the underside of the Control Unit. Replace "E" or "F" Fuse. Check Fuel Filter and Fuel System. Replace Fuel Nozzle.
Diesel-Burner's Combustion Process stops after 30 sec.	Loose Harness Plug Connections at the Control Unit. Less than 10 Volts DC to the Aqua-Hot.	Check Harness Plug Connections to be secure and in place on the underside of the Control Unit. Check House Batteries and Charging System.

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

<u>120 VAC Electric Heating Element</u> 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.
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SECTION 5: TROUBLESHOOTING

Aqua-Hot Quick Reference Chart

		CHECK OR REPLACE IF NECESSARY										
COMPONENTS	FAILURE SYMPTOM	Diesel Control Switch	Switch Indicator Light Bulb	Aqua-Hot ("E" & "F") Fuses	VDC Voltage Level to Aqua-Hot	VDC Circuit Breaker	Engine Preheat Control Switch	Aqua-Hot ("A") Fuses	Fuel Supply (No Fuel or air leak)	Diesel-Burner C-Plug Harness Conn.		
Diesel Control Switch "On"	No Function	●	●	●	●	●	●	●	●	●	●	●
Diesel Control Switch Indicator Light	No indicator light or "Off" after 30 sec.	●	●	●	●	●	●	●	●	●	●	●
Engine Preheat Control Switch	No indicator light					●	●					
Diesel-Burner	Motor is not operating		●	●	●							●
Diesel-Burner	No 10-25 second prime cycle			●								
Diesel-Burner	Ignition Coil will not spark		●		●							●
Diesel-Burner	No Combustion							●	●			
Diesel-Burner	Combustion stops after 30 seconds			●	●							●
120 VAC Heating Element	No heat / hot water when plugged into shore power					●						
Engine Preheat	Diesel Engine Remains cold					●	●					

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.**

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OWNER'S SERVICE LOG:

Date	Scheduled Service	Service Center

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(Continued)

OWNER'S SERVICE LOG:

Date	Scheduled Service	Service Center

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

(Continued)

OWNER'S SERVICE LOG:

Date	Scheduled Service	Service Center

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Vehicle Systems

I N C O R P O R A T E D

Motor Coach Heating Specialists · Manufacturers and Distributors

15549 East Highway 52 • Fort Lupton, Colorado 80621 • 1-800-685-4298 • Fax: 303-857-9000

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LTE-LMA-002



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Follow proper safety practices. If in doubt, consult a professional RV technician.