

# Atwood Water Heaters

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# Atwood LP Gas Water Heaters

PART #	MODEL#	DESCRIPTION
96110	G6A-7	6 GAL. GAS - PILOT
	G6A-7P	6 GAL. GAS - PILOT RELIGHT- NLA
96117	GC6AA-8	6 GAL. GAS/ELECTRIC - PILOT
	GC6AA-10E	6 GAL. GAS/ELECTRIC - DSI - OEM ONLY
96163	GCH6A-10E	6 GAL. GAS/ELECTRIC - HEAT EXCHANGER - DSI
96121	G6A-8E	6 GAL. GAS - DSI
96136	GH6-8E	6 GAL. GAS - HEAT EXCHANGER - DSI
90073	G9-EXT	6 GAL. GAS - DSI - EXOTHERMAL
90071	GE9-EXT	6 GAL. GAS/ELECTRIC - DSI - EXOTHERMAL
90068	GEH9-EXT	6 GAL. GAS/ELECTRIC - HEAT EXCHANGER - DSI - EXOTHERMAL
94180	G10-2	10 GAL. GAS - PILOT
94186	GC10A-2	10 GAL. GAS/ELECTRIC - PILOT
94191	G10-3E	10 GAL. GAS - DSI
	GH10-3E	10 GAL. GAS - HEAT EXCHANGER - DSI
94022	GC10A-4E	10 GAL. GAS/ELECTRIC - DSI - EXOTHERMAL
94023	GCH10A-4E	10 GAL. GAS/ELECTRIC - HEAT EXCHANGER - DSI - EXOTHERMAL
94105	G16-EXT	10 GAL. GAS - DSI - EXOTHERMAL
94026	GE16-EXT	10 GAL. GAS/ELECTRIC - DSI - EXOTHERMAL
94029	GEH16-EXT	10 GAL. GAS/ELECTRIC - HEAT EXCHANGER - DSI - EXOTHERMAL
<b>MARINE WATER HEATERS - 110 VOLT</b>		
	EHM4-SM	4 GAL. INTERNAL HEAT EXCHANGER - 150 PSI
	EHM6-SM-FHX	6 GAL. INTERNAL HEAT EXCHANGER - SINGLE LOOP - 75 PSI
93891	EHM6-SM-FHX	6 GAL. INTERNAL HEAT EXCHANGER - SINGLE LOOP - 150 PSI
	EHM6-SM-FHX-4W	6 GAL. INTERNAL HEAT EXCHANGER - SINGLE LOOP - 150 PSI - ANDERSON CONNECTOR
	EHM6-SM-FHX-TC	6 GAL. INTERNAL HEAT EXCHANGER - SINGLE LOOP - 150 PSI W/VAC VALVE
94610	EHM6-SM-FHX-SS	6 GAL. INTERNAL HEAT EXCHANGER - SINGLE LOOP - 150 PSI - SS
93882	EHM11-SM-FHX	11 GAL. INTERNAL HEAT EXCHANGER - SINGLE LOOP - 150 PSI
	EHM11-SM-FHX	11 GAL. INTERNAL HEAT EXCHANGER - SINGLE LOOP - 75 PSI
94550	EHM11-SM-FHX-SS	11 GAL. INTERNAL HEAT EXCHANGER - SINGLE LOOP - 150 PSI - SS
	EHM11-SM-FHX-4W	11 GAL. INTERNAL HEAT EXCHANGER - SINGLE LOOP - 150 PSI - ANDERSON CONNECTOR
	EHP-10-SS	10 GAL. INTERNAL HEAT EXCHANGER - FOUR LOOP - 150 PSI - SS
96335	EHP-10	10 GAL. INTERNAL HEAT EXCHANGER - FOUR LOOP - 150 PSI
	EHM11-SM-SS-DUAL-HX	11 GAL. EXTERNAL & INTERNAL HEAT EXCHANGER - SINGLE LOOP - 150 PSI - SS
94210	EH20	20 GAL. INTERNAL HEAT EXCHANGER - TWO LOOP - 150 PSI
94215	E20	20 GAL. NO HEAT EXCHANGER - 150 PSI
<b>INTERNATIONAL MARINE WATER HEATERS - 220 VOLT - CE APPROVED</b>		
	EHM4	
94590	EHM6-FHX	6 GAL. INTERNAL HEAT EXCHANGER - SINGLE LOOP - 150 PSI
	EHM6-FHX	6 GAL. INTERNAL HEAT EXCHANGER - SINGLE LOOP - 75 PSI
94605	EHM6-SS-FHX	6 GAL. INTERNAL HEAT EXCHANGER - SINGLE LOOP - 150 PSI - SS
	EHM6-FHX-4W	6 GAL. INTERNAL HEAT EXCHANGER - SINGLE LOOP - 150 PSI - ANDERSON CONNECTOR
94555	EHM11-FHX	11 GAL. INTERNAL HEAT EXCHANGER - SINGLE LOOP - 150 PSI
	EHM11-FHX	11 GAL. INTERNAL HEAT EXCHANGER - SINGLE LOOP - 75 PSI
	EHM11-FHX	11 GAL. INTERNAL HEAT EXCHANGER - SINGLE LOOP - 150 PSI
	EHM11-SS-FHX	11 GAL. INTERNAL HEAT EXCHANGER - SINGLE LOOP - 150 PSI - SS

# Pilot Models



## QUESTIONS

**The following questions should be answered during this portion of the manual:**

- Are the Robertshaw and White Rodgers thermostat gas control valves inter-changeable?
- What is the minimum gas pressure required for proper water heater operation?
- Where on the water heater gas control can gas pressure be tested?
- Can the pilot flame be adjusted?
- What is minimum millivolt output of the thermocouple required for proper gas control operation?
- How can you test a thermocouple?

# Atwood 6 and 10 Gallon Pilot Water Heaters

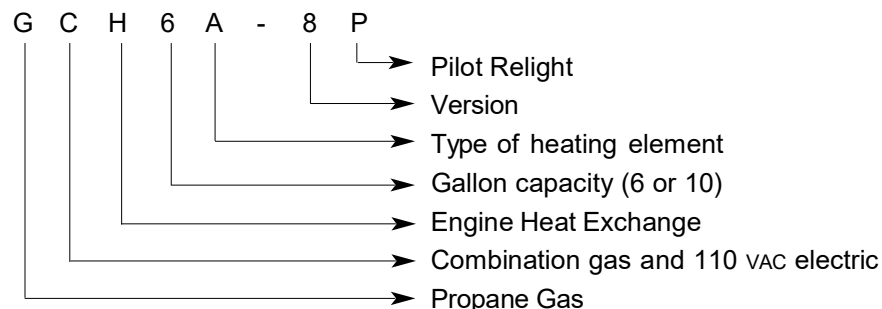
Atwood water heaters are designed and approved for use only in recreation vehicles (travel trailers, 5th wheels, motor homes, etc.). They are offered in two sizes: 6 and 10 gallon capacities.

## **TYPE OF GAS IGNITION -**

This unit is ignited outside of the trailer by a match, piezo ignitor or other ignition device. The water temperature is adjustable at the thermostat control.

## **EXPLANATION OF MODEL NUMBER:**

### **Pilot Models**



**NOTE:** When replacing the element on a combination gas/110 VAC unit, always check the back of the heater for the type of element it has. It will either be a bolt-on or screw-in element. They are not interchangeable.

## **FEATURES**

- All units operate on propane gas.
- A heat exchange option is available for motor homes. The water heater tank must have factory equipped heat exchange tubes welded on it already. They cannot be added later. A new water heater tank with this option is the only way to obtain this feature.
- Skin mounting allows the water heater to be hooked up with plumbing and electrical before the sidewall is erected.
- The tank has a clad aluminum lining that protects against corrosion and does not need to be replaced on a yearly or more frequent basis unlike an anode rod. A more detailed explanation of cladding is found in the back of this manual.
- 95% of all servicing can be done on the outside of the water heater. 110 VAC heating components are the exception since they are located on the back of the water heater inside the trailer.
- A flush flange is available for all models. This makes the access door flush with the trailer sidewall.
- There are multiple protection features in the form of a pressure-temperature relief valve, a limit switch in the gas thermostat and an externally sealed combustion chamber.
- On combination water heaters, the gas mode and the 110 VAC heating mode can be operated at the same time since each mode has its own thermostat.
- Both the six and ten gallon units have the lightest weight in the industry.
- The Atwood Limited Warranty is for a period of two years from the date of purchase to the original owner.
- There are over 1,000 Service Centers throughout the United States.

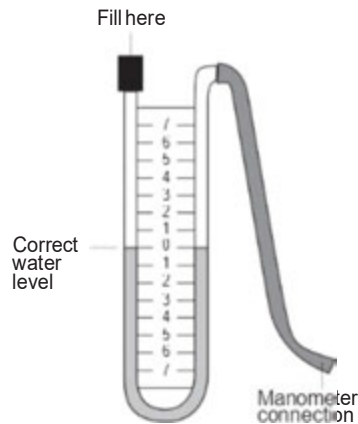
# Recommended Tools and Equipment

**U-Tube Manometer** - This is the most accurate device for measuring gas pressure. If you use a dial-type manometer, it should be calibrated periodically with this type of manometer.

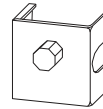
**Thermostat Wrench** - This tool allows for easier and safer removal of the gas thermostat control. An adjustable version for different size controls is available through most RV distributors or you may fabricate one from angle iron. We do not recommend using a pipe wrench because it may damage the control causing it to go out of calibration.

## U-TUBE MANOMETER

with 1/8" pipe nipple



## THERMOSTAT WRENCH



**Multi-meter** - This is the most versatile meter and will test AC voltage and continuity. A continuity test can be used to test for a blown E.C.O. on a gas control.

**Magnet Assembly Thermocouple Tester** - This assembly can be obtained at an electronics or hardware store. This same assembly can also be removed from a Robertshaw control. It will verify if a thermocouple is good. For testing, screw a thermocouple into the tester, heat the thermocouple for 25 seconds and then press the plunger down. If the plunger pops up in less than 25 seconds, the thermocouple is faulty.

## MULTI-METER TO TEST VOLTAGE AND CONTINUITY



## MAGNET ASSEMBLY TO TEST THERMOCOUPLE



# Gas Thermostat Controls and Pilot Assemblies

Only two makes of gas controls have been used on our pilot model water heaters. They are the Robertshaw “Unitrol” and White Rodgers (formerly Jade or ITT).

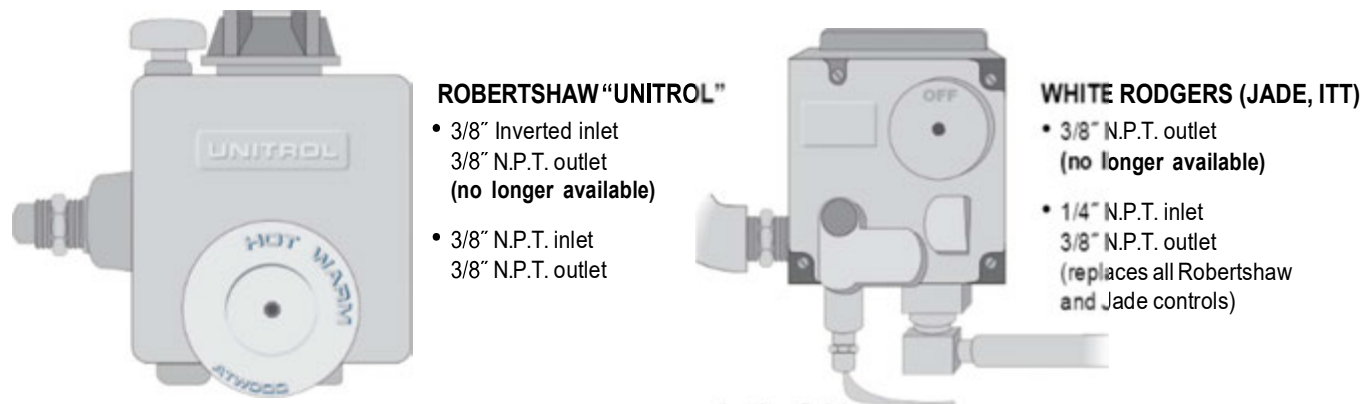
The Robertshaw control came in two different sizes of gas inlets: 3/8” inverted flare and 3/8” N.P.T. The inverted inlet control is no longer available. Therefore, the water heater gas line connection will have to be modified to 3/8” N.P.T. in order to use the current Robertshaw control.

The White Rodger control is the valve we are using on all production today. Formerly it had a 3/8” N.P.T. inlet. Now it is only available with a 1/4” inlet. This improvement eliminates the adapter fitting into the control allowing the use of only a single 45 degree elbow (3/8” flare x 1/4” N.P.T.). If you are replacing a current 1/4” inlet model control with a earlier model 3/8” inlet control you may have in stock, the adapter fitting that mates the control and elbow fitting is still available.

Although the controls appear quite different in size, the White Rodgers and Robertshaw control are interchangeable. Their manifolds will both line up with the burner tube properly.

Both controls have a port to test gas pressure through the valve. This can be accomplished by removing the cover screw and inserting a 1/8” pipe nipple. After attaching your manometer hose to this fitting, the manometer should register 10” W.C. through the valve while it is operating.

**NOTE:** The only valve available today is the Robertshaw control. It will come with the inlet adaptor fittings to replace any existing control if you are buying the genuine Atwood replacement part. (91602) When replacing an older White Rogers valve the orientation of the valve may be slightly different when using the Robertshaw style but they are interchangeable.

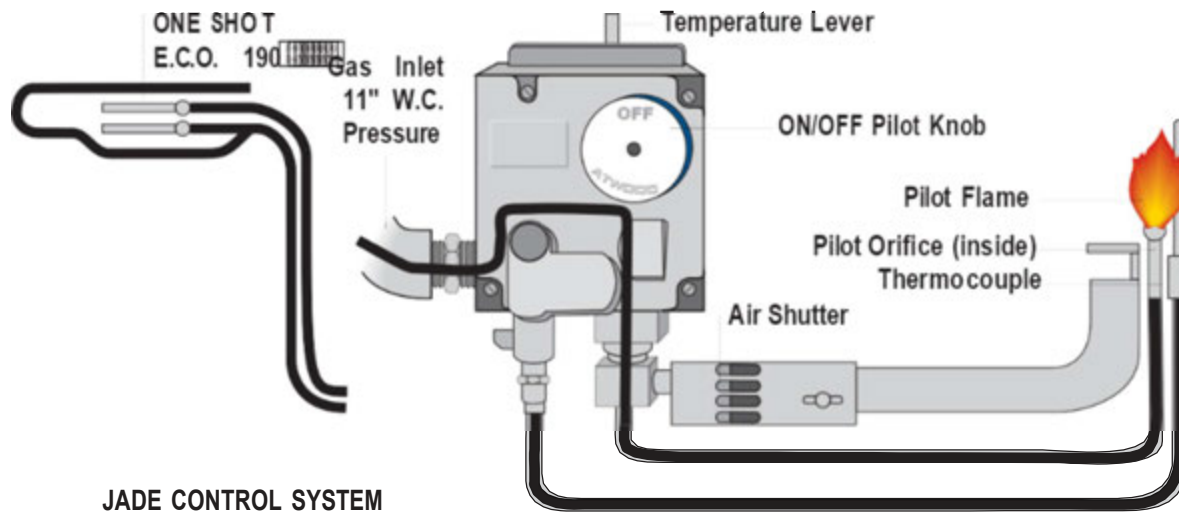


There are two main pilot assemblies that you will encounter in the field.

The first is an earlier model Robertshaw pilot assembly with a 1/4” pilot gas line that mounted on the left side of the main burner.

The current pilot is the Jade assembly with a 1/8” pilot gas line and it mounts on the right side of the main burner.

# Pilot Sequence of Operation



## PILOT OPERATION

- **Gas Pressure** 11" W.C. to control is necessary. Set with two gas appliances running.
- **Gas Control** supplies gas to pilot orifice when control ON/OFF pilot knob is held at pilot position.
- **Pilot Orifice** meters gas to heat thermocouple. Flame should be high enough to engulf the thermocouple.
- **Thermocouple** generates millivoltage to the gas control's magnet assembly.
- **Magnet** when it receives 12 millivolts or more it allows gas to flow freely to pilot without holding pilot knob.
- **E.C.O.** passes millivolts through the gas control and back to thermocouple. Trips permanently open if water temperature exceeds 190°F.

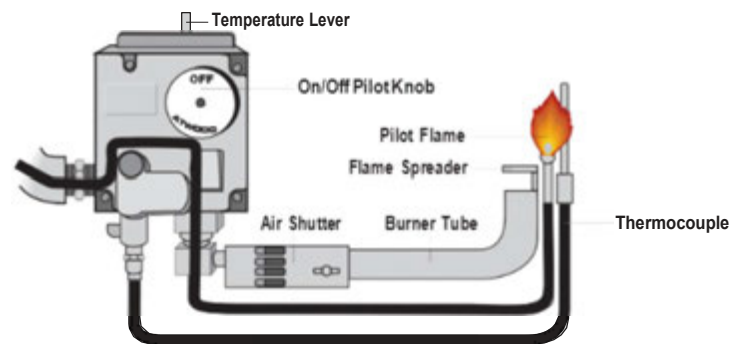
## MAIN BURNER OPERATION

- **Gas Control** supplies gas to main burner when control knob is set to "ON" position and the temperature lever is set to desired temperature after pilot is lit.

# Pilot and Main Burner

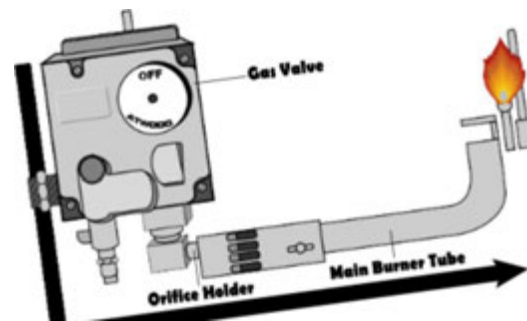
## Pilot Adjustment

Only the gas pressure, gas valve, and the pilot orifice regulate the height of the pilot flame. Early model gas controls have a pilot adjustment screw, but this screw has very little effect on the pilot. The pilot adjustment has been removed from the current Robertshaw control. The flame should be high enough to engulf the thermocouple at all times. A pilot flame any larger could blow the E.C.O. in the gas control. This is typically the result of enlarging the pilot orifice hole with a pin or similar item. For further corrective measures, refer to the trouble-shooting guide.



## Main Burner Adjustment

The gas pressure, air shutter, cleanliness of the burner tube, and orifice regulate the main burner flame. The main burner flame should be mainly blue with a trace of yellow and fairly quiet. If it is not, adjust the gas pressure to 11" W.C., ensure that the main burner air shutter is 1/4 way open and verify that the main burner flame spreader is square to the end of the main burner and centered side to side. For further corrective measures, refer to the trouble-shooting guide.







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# Pilot Water Heater TROUBLE SHOOTING GUIDE

Effective: 2/10/14

Guides are only intended for use on Atwood® products by service technicians who have successfully completed Atwood® training. This guide should be used in conjunction with the appropriate Instruction Manual provided with the product and any applicable Industry standards. This is not intended to be a complete list. Please direct questions concerning service of Atwood Mobile Products LLC. to 866-869-3118 before proceeding.

## CAUSE

## SOLUTION

### PILOT OUTAGE

Gas pressure incorrect-----	Set pressure to a minimum of 11"wc with two or more appliances running
Blocked "U" tube-----	Remove obstruction
Improper main burner alignment-----	Re-align main burner and main burner holder and gas valve
Improper air adjustment-----	Adjust main burner air shutter to approximately ¼ open
Weak thermocouple-----	Replace thermocouple
Poor pilot flame-----	Clean or replace pilot orifice
Weak gas control magnet-----	Replace gas control
Defective E.C.O. in control-----	Replace gas control and check the pilot flame. It should be high enough to engulf the Thermocouple at all times.

### PILOT OUTAGE WHEN BUTTON OR KNOB IS RELEASED

Thermocouple not hot-----	Hold button or knob for 30 seconds before releasing
Thermocouple loose-----	Tighten connection at gas control
Weak thermocouple-----	Replace thermocouple
Weak gas control magnet-----	Replace gas control
Defective E.C.O. in control-----	Replace gas control

### MAIN BURNER WILL NOT IGNITE

Blocked main burner orifice-----	Clean or replace orifice
Flame spreader misaligned-----	Square flame spreader to the end of main burner
Blocked main burner-----	Remove blockage
Improper air adjustment-----	Adjust main burner air shutter to approximately ¼ open
Blocked "U" tube-----	Remove blockage
Gas control out of calibration-----	Replace gas control

### ERRATIC MAIN BURNER FLAME

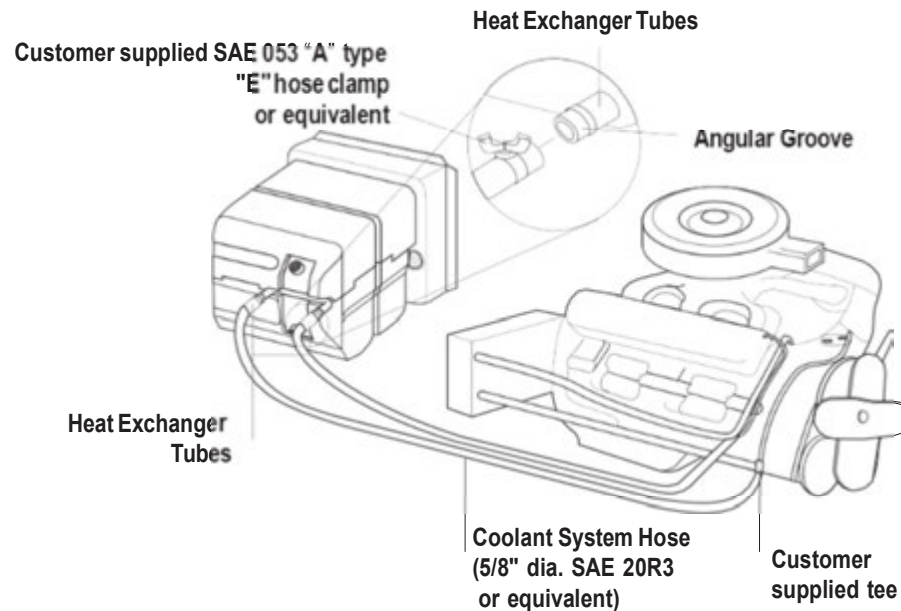
Improper gas pressure-----	Set inlet pressure to a minimum of 11"wc with two or more appliances running
Improper air adjustment-----	Adjust main burner air shutter to approximately ¼ open
Partial blockage of main burner-----	Remove blockage
Partial blockage of main burner orifice-----	Clean and replace orifice
Flame spreader misalignment-----	Re-align spreader or replace main burner
Blockage in "U" tube-----	Remove blockage
Poor gas supply-----	Replace gas supply
Exhaust grille blocked-----	Remove blockage
Improper main burner alignment-----	Re-align main burner, main burner orifice holder and gas valve

### SMOKING AND SOOTING

Gas pressure incorrect-----	Set pressure to a minimum of 11"wc with two or more appliances running
Poor gas supply-----	Replace gas supply
Improper pilot flame-----	Clean or replace pilot orifice
Improper air adjustment-----	Adjust main burner air shutter to approximately ¼ open
Flame spreader misaligned-----	Re-align or replace main burner
Blocked main burner-----	Remove blockage
Improper main burner alignment-----	Re-align main burner orifice holder and gas valve
Blocked "U" tube-----	Remove blockage

### INSUFFICIENT WATER TEMPERATURE

# Engine Heat Exchange System



The engine heat exchange system allows a motor home to heat the water while traveling. This convenient option allows you to arrive at your destination with hot water. Operating a pilot or electronic water heater on gas while in transit is a dangerous practice and will void your Atwood warranty on the heater.

This system consists of a U-shaped aluminum tube that is attached to the outside of the tank with welds. SAE hoses are attached to both ends of this tube and are spliced into the engine coolant system.

When the engine is running, the hot coolant flows past the tank through this tube and by means of heat transfer through the welds, heats the water. The design of this system will not allow the water to reach a boiling point.

## Aftermarket Heating Elements

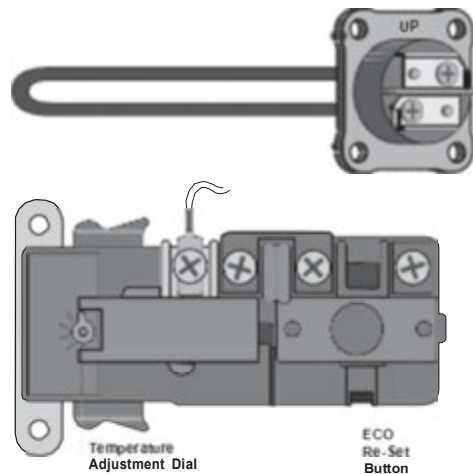


### **WARNING** **EXPLOSION / BURN INJURY**

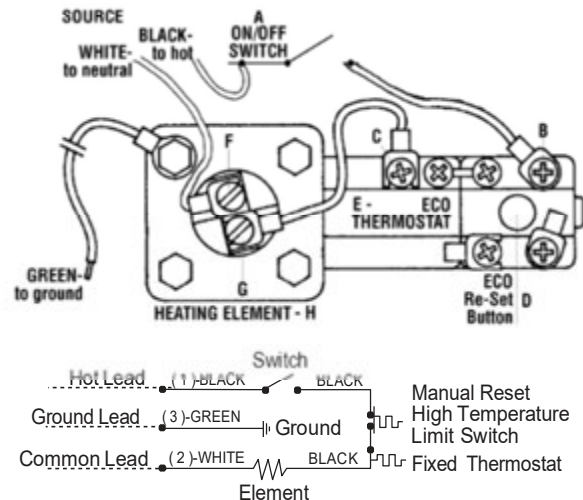
- Aftermarket heating elements can lack critical safety controls.
- Use of these devices can lead to an out of control heating of water tank and a catastrophic wet side explosion.

**YOU DO NOT NEED AN AFTERMARKET HEATING ELEMENT ON AN ATWOOD WATER HEATER. THE USE OF AFTERMARKET HEATING ELEMENT DEVICES MAY ALSO RESULT IN DAMAGE TO COMPONENTS OR WATER HEATER. Atwood's written warranty states**

## BOLT-IN Heating Element, Thermostat & ECO



## 110VAC Trouble-Shooting Wiring Schematic



Early model water heaters with 110 VAC heating capacity used a bolt-on heating element and a one piece thermostat/E.C.O.

This 110 VAC system has an adjustable rectangular thermostat that is surface mounted to the inner tank and retained by a steel clip. The temperature settings are HI, MEDIUM, and LOW. If the thermostat is making unobstructed contact with the aluminum tank and it is set to the HI position, it should heat the water to 130° F. It will take longer to heat a tank of water on electric than gas.

The heating element was changed in 1996 from 1500W to 1400W bringing the amperage draw down to 12.7 amps and allowing more cushion for the 15 amp circuit breaker that is normally placed in line. This change adds a few minutes to the heating time.

There are 110 VAC aftermarket conversion kits being offered by distributors in which the heating element is screwed into the tank where the drain plug is located. We do not offer such a kit. Our kit includes the tank with the 110 VAC components already installed in it.

In the case where the 110VAC portion of the water heater is not heating water, the following diagnostic steps and repairs should be investigated:

**Turn POWER OFF to the appliance before removing junction box cover.**

**Perform the following steps with POWER ON to water heater.**

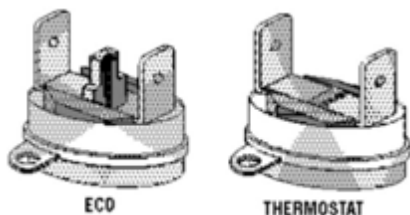
1. Verify switch-A is in ON position.
2. Insure there is 110VAC to the unit (measure voltage across the black and white lead to the appliance with POWER ON). If none, trace wiring back and make appropriate wire repair.

**Perform the following steps with POWER OFF to water heater.**

3. ECO Re-set Button-D should be depressed.
4. Check for continuity between screw-B and screw-C of thermostat. If none, replace thermostat.
5. If water is insufficiently hot, check ECO / Thermostat-E is on high.
6. Verify a good wire connection between thermostat screw-C and heating element screw-G. Correct if necessary.
7. There should be continuity between heating element and thermostat. If not, replace thermostat.

## SCREW-IN

### Heating Element, Thermostat & ECO



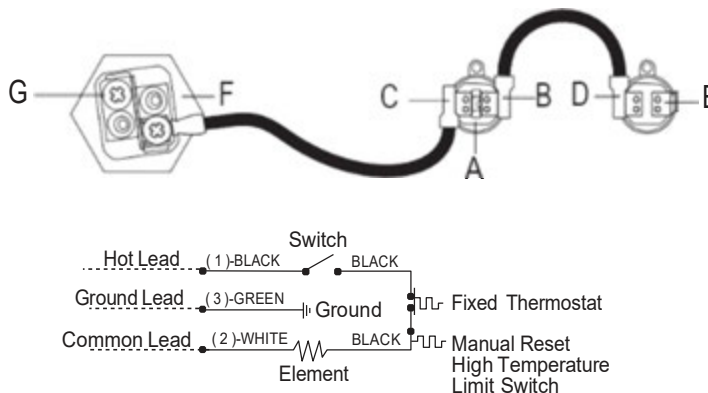
Current production water heaters, with the 110VAC heating option, use a screw-in heating element, a separate pre-set thermostat and a separate ECO.

The screw-in heating element is rated at 1400 watts just like the bolt-on element. It is an incalloy element and can be run for a limited amount of time in a dry tank without shorting out. However dry firing a water heater may also damage your PTR valve and this damage is not covered under warranty.

**CAUTION:** If the heating element is allowed to run with a dry tank, allow the tank to cool down for 2-3 hours before adding water. Adding water before the tank cools sufficiently could collapse the tank.

The thermostat and ECO are pre-set surface-mounted discs. The thermostat is set at 140° F and is the same thermostat used on the gas side of the electronic ignition water heaters. The ECO is a backup thermostat and will trip if the thermostat fails and the water temperature exceeds 170° F.

## 110VAC Trouble-Shooting Wiring Schematic



When the 110VAC portion of the water heater is not heating water, the following diagnostic steps and repairs should be investigated:

**Turn POWER OFF to the appliance before removing junction box cover.**

**Perform the following steps with POWER ON to water heater.**

1. Verify switch is in ON position.
2. Insure there is 110VAC to the unit (measure voltage across the black and white lead to the appliance with POWER ON). If none, trace wiring back and make appropriate wire repair.

**Perform the following steps with POWER OFF to water heater.**

3. Manual reset ECO high limit switch-A should be depressed. Check for continuity between TERMINAL B and TERMINAL C of ECO.
4. Check for continuity between TERMINAL D and TERMINAL E of thermostat. If there is none, replace thermostat.
5. If water is insufficiently hot, insure thermostat is flush with tank.
6. Verify a good wire connection between ECO TERMINAL-C and heating element TERMINAL-F. Correct if necessary.

# Electronic Ignition Models



## QUESTIONS

**The following questions should be answered during this portion of the manual:**

- What is minimum gas pressure for proper water heater operation?
- Where on the gas solenoid valve can gas pressure be tested?
- What is the minimum voltage needed for operation?
- What is the proper wiring hook-up for the water heater circuitry?
- Can the Circuit Board Tester be used on both Fenwal and Channel circuit boards?
- How can the Circuit Board Tester be used to check a "flying lead" circuit board?

# Atwood 6 and 10 Gallon Electronic Ignition Water Heaters

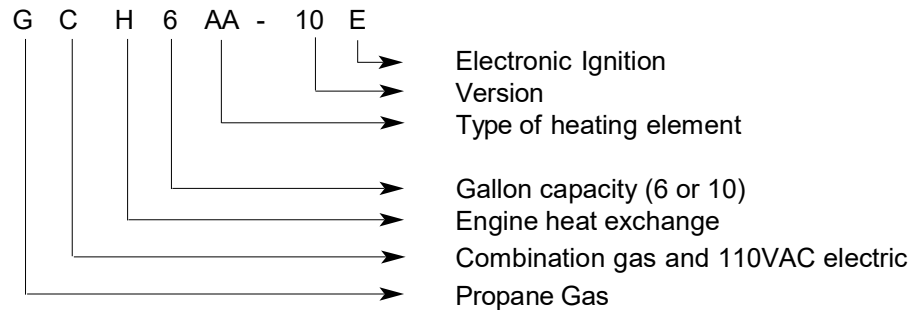
Atwood water heaters are designed and approved for use only in recreation vehicles (travel trailers, 5th wheels, motor homes, etc.). They are offered in two sizes: 6 and 10 gallon capacities.

## TYPE OF GAS IGNITION -

This unit is ignited inside of the trailer by a remote ON/OFF switch. The water temperature is preset at 140° F.

## EXPLANATION OF MODEL NUMBER:

### Electronic Models



**NOTE:** When replacing the element on a combination gas/110 VAC unit, always check the back of the heater for the type of element it has. It will either be a bolt-on or screw-in element. They are not interchangeable.

## FEATURES

- ❑ All units operate on propane gas.
- ❑ A pre-set thermostat set for 140° F. An aftermarket retro-fit adjustable thermostat is available Which is adjustable from 110° to 150° F.
- ❑ A heat exchange option is available. The water heater tank must have factory equipped heat exchange tubes welded on it already. They cannot be added later. A new water heater tank with this feature must be installed to use the heat exchanger. Some models are only available in the aftermarket with the heat exchange option, if you do not need the heat exchange you do not need to cap it off.
- ❑ Skin mounting allows water heater to be hooked up with plumbing & electrical before the sidewall is erected.
- ❑ This heater has a comparable, if not superior, anode type protection for the tank. The tank is manufactured with a clad aluminum lining that protects against corrosion but does not need to be replaced yearly as an anode rod; therefore, adding an anode is unnecessary and can result in voiding the warranty on the water heater. A more detailed explanation of cladding is found in the back of this manual.
- ❑ 95% of all servicing is done on the outside of the water heater. 110 VAC heating components are the exception. Since they are located on the back of the water heater inside the trailer.
- ❑ A flush flange is available for all models. This makes the access door flush with the sidewall.
- ❑ The water heater has protection features that include a pressure-temperature relief valve and a limit switch in the gas thermostat (ECO).
- ❑ Both the six and ten gallon units have the lightest weight in the industry.
- ❑ The Atwood Limited Warranty is for a period of two years to the original owner.
- ❑ There are over 1,000 Service Centers throughout the United States which can be found on our website [www.atwoodmobile.com](http://www.atwoodmobile.com) under the heading "Dealer Locator"

### XT Electronic Models Only

G E H 9/16 - E XT

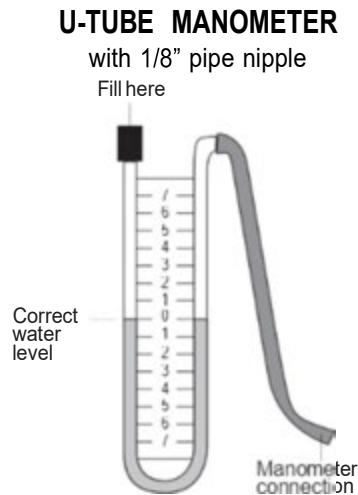
Exothermal Technology

a check valve and a cold water passage, allows you to isolate and drain the tank and pump antifreeze through the plumbing circuit.

## Recommended Tools and Equipment

**U-Tube Manometer** - This is the most accurate device for measuring gas pressure. If you use a dial-type manometer, calibrated it periodically.

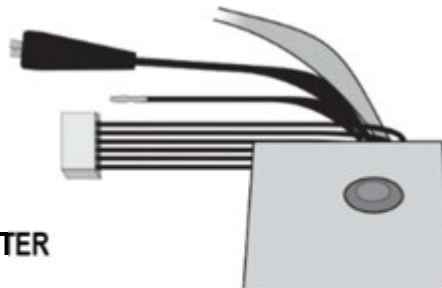
**Multi-meter** - This is the most versatile meter and will test continuity and 12VDC. These tests will allow one to verify voltage problems or faulty components. The entire electronic system can be tested with this meter.



**MULTI-METER TO TEST  
CONTINUITY & VOLTAGE**

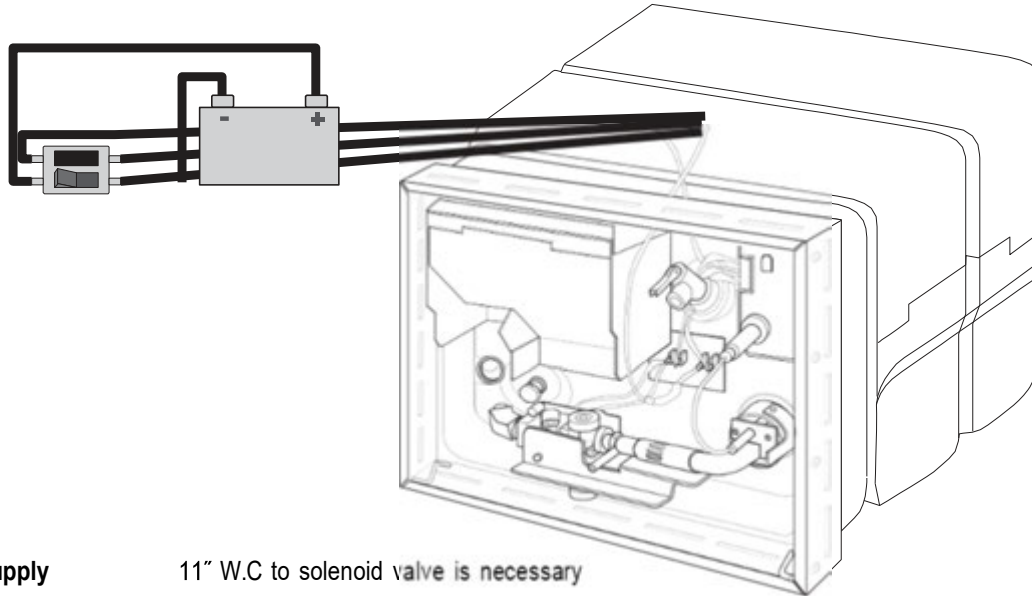


**Circuit Board Tester** - The tester is capable of testing any of the circuit boards (Fenwal and Channel models) that we have used on our water heaters. It is a simple table top device that will diagnose the following items on a circuit board: power circuit, sense circuit, spark generation and the lock-out mode. For use on circuit boards with a flying lead connection, splice a wire into the black wire of the tester harness with a 1/4" male terminal on the free end.



**CIRCUIT BOARD TESTER**

# DSI Sequence of Operation



- **Gas Supply** 11" W.C to solenoid valve is necessary
- **12VDC Battery or filtered side of Converter** Voltage source to water heater
- **ON/OFF Switch** It supplies 12VDC to water heater
- **Thermal Cut-Off** A one shot heat sensing fuse that's normally closed and sends power to the thermostat. When tripped by excessive heat (190°F), (i.e. blocked burner or flue tube) it cuts power to the circuit board and shuts down ignition. This is a sacrificial part, similar to a fuse, and therefore is not covered under manufacturer warranty.
- **Thermostat** A normally closed non-adjustable temperature switch that sends current to the circuit board. It opens when the water temperature reaches approximately 140°F. (155 on XT models)
- **Circuit Board** The next step is the direct spark ignition system. For a period of 6-8 seconds the circuit board will send voltage to both the gas solenoid valve and the electrodes. The board is a 3 try for ignition. If ignition does not occur after three tries, the board goes into a lock-out condition and the non-ignition light illuminated at the ON/OFF switch.



• E.C.O.

• Electrodes



## Electronic Ignition Water Heater TROUBLE SHOOTING GUIDE

Effective: 2/10/14

Guides are only intended for use on Atwood® products by service technicians who have successfully completed Atwood® training. This guide should be used in conjunction with the appropriate Instruction Manual provided with the product and any applicable Industry standards. This is not intended to be a complete list. Please direct questions concerning service of Atwood Mobile Product LLC. to 866-869-3118 before proceeding.

### CAUSE

### SOLUTION

#### WATER HEATER LOCK OUT - SPARK PRESENT BUT NO GAS

Gas pressure incorrect-----	Set inlet pressure at a minimum of 11"wc with two or more appliances running
Low voltage-----	Correct power supply-10.5VDC minimum
Blocked main burner tube-----	Clean burner tube
Blocked main burner orifice-----	Clean or replace orifice
Loose wires on ECO-----	Secure wire connections
Loose wire connection on solenoid valve-----	Secure wire connections
Loose valve wire on wiring harness-----	Repair wire on pin connector or replace wiring circuit board harness
Defective ECO-----	Replace ECO
Defective circuit board-----	Check for "dirty" voltage or replace circuit board
Defective solenoid valve-----	Replace solenoid valve
No gas to solenoid valve-----	Correct gas supply
Dirty connector on circuit board-----	Clean pin connector

#### WATER HEATER LOCK OUT - GAS PRESENT BUT NO SPARK

High tension lead wire loose -----	Secure wire connection on circuit board
Electrodes loosely attached to main burner -----	Secure electrodes to main burner
Improper electrode gapping -----	Re-position spark gap to 1/8" and into path of flame
Dirty electrodes -----	Clean electrodes
Wires loose in electrode porcelain -----	Replace electrodes
Cracked porcelain on electrode-----	Replace electrodes
Defective circuit board-----	Replace circuit board

#### WATER HEATER LOCK OUT - GAS AND SPARK PRESENT

Gas pressure incorrect -----	Set inlet pressure at a minimum 11"wc with two or more gas appliances running
Low voltage -----	Correct power supply - 10.5 VDC minimum
Poor electrical ground -----	Secure electrical ground
Electrodes out of flame pattern -----	Re-adjust electrodes
Electrodes sparking to screw fastening burner to flue tube -----	Adjust electrodes away from screw
Dirty electrodes -----	Clean electrodes
Partial obstruction in main burner -----	Clean main burner
Partially obstructed main burner orifice-----	Clean main burner orifice or replace
Improper air adjustment -----	Adjust main burner air shutter approximately 1/4 open
Flame spreader on main burner misaligned-----	Adjust flame spreader so that it is aligned square to the end burner tube
Manifold not aligned with main burner -----	Re-align solenoid valve with main burner
Partially opening solenoid valve -----	Replace solenoid valve
Defective circuit board-----	Replace circuit board

CAUSE

SOLUTION

**EXCESSIVE OR INSUFFICIENT WATER TEMPERATURES**

By-pass kit valves not set properly -----	Place valves in proper position
Thermostat not seated against tank -----	Reseat thermostat
Defective thermostat-----	Replace thermostat

**ERRATIC BURNER FLAME OR SOOTING**

Low gas pressure -----	Set inlet pressure at a minimum 11" W.C. with two or more gas appliances running
Poor gas supply -----	Replace gas supply
Improper air adjustment -----	Adjust main burner air shutter to approximately 1/4 way open flame should be mainly blue and quiet.
Poor main burner alignment -----	Adjust valve and main burner alignment
Misaligned burner flame spreader -----	Align flame spreader so it is square with end of burner tube
Blocked burner orifice -----	Clean orifice <b>DO NOT enlarge orifice</b>
Obstructed main burner -----	Clean main burner
Obstructed "U" tube -----	Clean "U" tube
Obstructed exhaust grille -----	Remove obstruction

**NO SPARK AND NO GAS**

No voltage -----	Correct power supply - minimum 10.5 VDC
Dirty pin connector on circuit board-----	Clean pin connector
Defective thermal cut-off -----	Replace thermal cut-off
Defective ON/OFF switch-----	Replace switch
Defective circuit board-----	Replace circuit board
Defective thermostat-----	Replace thermostat

## INTERMITTENT IGNITION

### Electronic Ignition Water Heater

# INFORMATIONGUIDE

Effective: 2/10/14

Guides are only intended for use on Atwood products by service technicians who have successfully completed Atwood training. This guide should be used in conjunction with the appropriate Instruction Manual provided with the product and any applicable Industry Standards. This is not intended to be a complete list. Please direct questions concerning service of Atwood products to 866-869-3118 before proceeding.

#### 1. CHECK ALL OF THE WIRE CONNECTIONS.

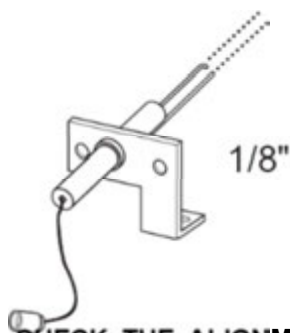
Poor or corroded wire connections cause most of the intermittent problems in water heaters. You should go through and pull all of the wires off any spade connections. Then reconnect them and ensure the connections are tight and corrosion free.

We want to point out two connections often overlooked.

**First, check the (green) ground wire of the circuit board.** This ground is screwed into the side of the flue box. If this is not tight you may not have a secure ground.

**Second, check the four wire pin connector going into the circuit board.** Remove the pin connector from the board. Inspect the pins on the board for corrosion. If corrosion is present remove it then reinstall pin connector onto the board.

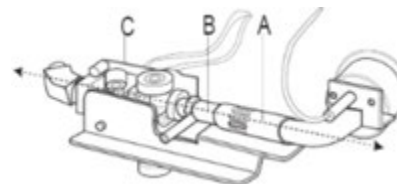
#### 2. CHECK THE INTEGRITY AND POSITION OF THE SPARK PROBE ASSEMBLY.



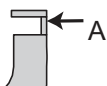
The gap between the sparking probe and the ground probe should be 1/8 inch. The probes should be clean and free of cracks, flaking and corrosion. Position the probes so that they are in the path of the gas flow. Cracks in the ceramic insulator can also be the source of an intermittent problem. To check for cracks insert a fiber washer or any other type of insulation material in the 1/8" gap between the rods.

Remove the gas valve from the circuit and turn the unit on. If you see a spark jumping from the ceramic to the ground rod or bracket, replace the spark probe.

3. **CHECK THE ALIGNMENT OF THE MAIN BURNER TO THE ORIFICE.** Position the main burner tube (A) so that the gas coming out of the orifice (B) is going straight down the middle of the burner tube. If the alignment is off, the gas will bounce down the tube which will alter the gas flow once it reaches the spark. Manually shift the valve (C) with your hands to achieve this alignment.



#### 4. CHECK THE ALIGNMENT OF THE FLAME SPREADER ON THE BURNER TUBE.



At the end of the burner tube there is a dime-shaped deflector disk. This disk spreads the flame out for proper heat distribution.

Align the flame spreader (A) so that it is parallel to the end of the tube.

**5. CHECK THE AIR ADJUSTMENT.**

The burner tube has an adjustable air shutter on it at the end where it goes over the orifice. Position the air shutter so that it is 1/4 of the way open. We are looking for a blue flame with small traces of yellow in the flame. If the flame is fairly quiet then it is adjusted correctly.

**6. CHECK THE CLEANLINESS OF THE ORIFICE.**

The orifice is the hex head brass fitting that is screwed onto the brass manifold of the valve. You will have access to this part once the burner has been removed. Remove the brass orifice and clean with isopropyl alcohol. **NEVER** enlarge the size of the orifice.

**7. CHECK FOR OBSTRUCTIONS IN THE MAIN BURNER TUBE.**

The cleanliness of this tube is very important. Spider webs, soot and other debris can accumulate, causing problems with gas flow down the tube. We recommend cleaning the burner tube with a brush and not compressed air. Compressed air may not fully remove the obstruction. Atwood offers for your convenience a full maintenance kit equipped with tools designed for this type of maintenance.

**8. CHECK THE CLEANLINESS OF THE FLUE TUBE.**

The flue tube is the 2-1/2 inch diameter tube that starts at the bottom right corner of the water heater (where the main burner flame enters) and comes out the top left. This tube can become blocked by debris like insect nests or soot. To clean remove the metal flue box in the top left corner of the water heater. To facilitate cleaning unfold a wire hanger, wrap a rag around the end and use this to swab out the tube. Atwood offers for your convenience a full maintenance kit equipped with tools designed for this type of maintenance

**9. CHECK THE VOLTAGE TO THE VALVE.**

Make sure that the voltage to the gas solenoid valve is between 10.5 and 13.5 volts DC. Voltage drops can occur at almost any component. Turn on another twelve volt appliance when you check the voltage so that you can see how the converter is working with a load. The voltage itself can be intermittent. With linear converters the 12 VDC varies depending on the 115 VAC. If the 115 VAC is high then the 12 VDC will be high, and if the 115 VAC is low then the 12 VDC will be low. If the power to the water heater is connected to the unfiltered side of the converter, move it to the filtered side.

**10. CHECK THE GAS PRESSURE OF THE RV.**

Make sure the gas pressure of the RV is checked with preferably the furnace and the range on to simulate a load. The pressure should be 11 inch water column under load. Besides gas pressure being at the proper level there are other strange things that can happen inside gas lines that cause intermittent problems. We have seen oil build up in a gas line that meant there was good pressure to one appliance but not the correct pressure to another appliance. Moisture could also build up in the gas line that would freeze and partially block the line. Intermittent pressure from the regulator of the bottles is still another area that should be investigated.

**11. INTERMITTENT CIRCUIT BOARD.**

If you have gone through all of the above checks and the intermittent problem is still occurring, only then check the circuit board. Ensure the circuit board is clean and reasonably moisture free before you change it.

There are two major points that should have stood out to you from this list.

## **\*\*POTTED CIRCUIT BOARDS**

Atwood \*\*potted circuit boards can be tested using a multi-meter. This test must be performed with the circuit board removed, and the meter set to the ohms scale. This will check the continuity of all tracks on the harness connection of the board.

**The following steps should be used to test each track.**

A. Cross leads of meter to ensure it is registering continuity.

**B. TO TEST POWER TRACK:**

Place negative lead of the multi-meter to ground (green wire) track of edge connection and positive lead of the multi-meter to top power (brown wire) track of edge connection. If no continuity, board is defective. \*Atwood does not warranty this installation related failure.

**C. TO TEST LAMP TRACK:**

Place negative lead of the multi-meter to ground (green wire) track of edge connection and positive lead of the multi-meter to lamp (blue wire) track of edge connection. If no continuity, this indicates blown lamp track. Circuit board will still fire unit but lamp light will not come on. This is caused by a short in the blue wire between the unit and the switch. Wiring must be corrected before the board is replaced. \*Atwood does not warranty this installation related failure.

**D. TO TEST VALVE TRACK:**

Place negative lead of the multi-meter to ground (green wire) track of edge connection and positive lead of the multi-meter to valve (red wire) track of edge connection. If no continuity, this indicates a blown valve track.

- If the valve wire is shorting under the flue box – Atwood will warranty the board.
- If the E.C.O. terminals are contacting the drawn pan – Atwood will warranty the board only if the inner tank of the water heater was installed flush on the floor of the coach.
- If the inner tank of the water heater does not rest flush against the floor of the coach – \*Atwood does not warranty this installation related failure.

\* Installation related failures on circuit boards are the responsibility of the coach manufacturer.

\*\* Non potted circuit boards can be checked by turning the board over and visually inspecting each track for a burn mark or break in the track itself. A burn mark or broken

## **THERMAL CUT-OFF DEVICE**

Current Atwood direct ignition water heaters are equipped with a thermal cut-off device. This device is located on the incoming power wire and is connected to the thermostat. The thermal cut-off is designed to permanently break circuit and shut down the water heater before excessive heat can cause damage due to obstructions in the main burner tube or flue tube caused by spiders or mud wasps. These obstructions can cause the main burner flame to burn outside the main burner tube. When the flame or the heat from the flame contacts the thermal cut-off, the circuit will open.

If there is **no heat damage** to the thermal cut-off, and if it is determined defective, Atwood will cover the replacement of this device under warranty. We will allow .25 hour at your Atwood approved warranty rate. If there is **heat damage** the device performed its safety feature and no warranty labor will be allowed. Any obstructions should be removed, alignment checked and gas pressure taken before a new thermal cut-off is installed.

Note: When replacing a thermal cut-off, also examine the grill in the access door while the door is in the closed position. The wide aluminum band of the grill should be at the bottom. If it is at the top, this condition may trap exhaust heat and possibly also cause thermal cut-off to trip. To correct, remove the grill from the door and snap back in place with the wide aluminum band at the bottom.

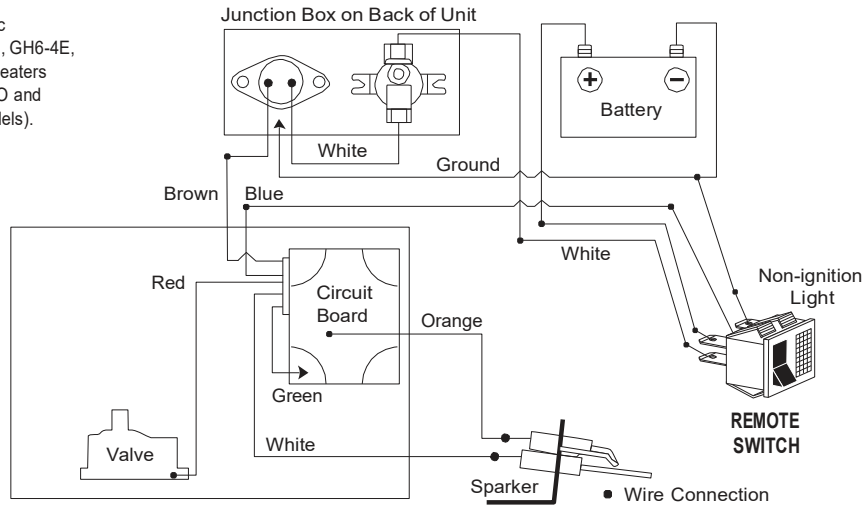
### **THERMOSTAT**

The thermostat on this water heater is pre-set at 140° F. The water heater will cycle off when the water temperature reaches 140° F. and will generally take 20-25 minutes to reach this temperature. It will cycle back on when the water temperature cools down to approximately 115° F. In the latter part of the heating cycle though, it is very common for the pressure-temperature relief valve to weep. Refer to the page covering weeping relief valves to remedy this situation.

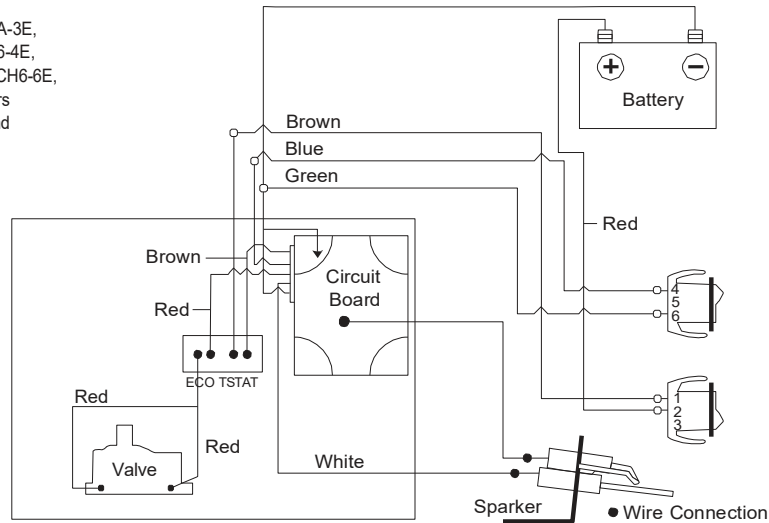
If a customer is dissatisfied with the temperature of the water, first check the water temperature with a cooking thermometer and verifying that the initial cycle is within the time noted above. If not, an adjustable thermostat may be purchased allowing the water temperatures to be adjusted from 110 - 150° F. It fits in place of the original thermostat.

# Water Heater Wiring Schematics

Wiring Schematic  
G6A-2E, G6A-3E, GH6-4E,  
GH6-3E Water Heaters  
(Rear Mount ECO and  
Thermostat Models).



Wiring Schematic G6A-3E,  
G6A-4E, GH6-3E, GH6-4E,  
GCH6-4E, G6A-6E, GCH6-6E,  
GH6-6E Water Heaters  
(Front Mount ECO and  
Thermostat Models).



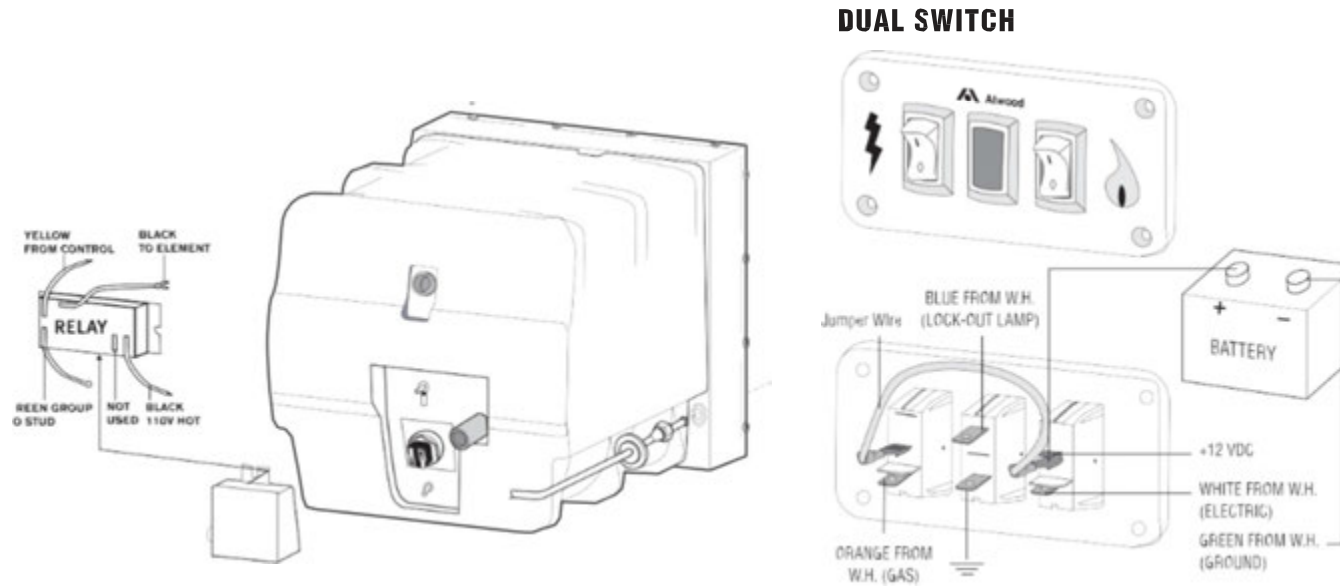
Wiring Schematic G6A-7E, GH6-7E,  
GC6A-7E, GCH6-7E, GC6AA-7E, G6A-  
8E, GH6-8E, GC6AA-8E, GCH6AA-8E,  
GCH6A-9E



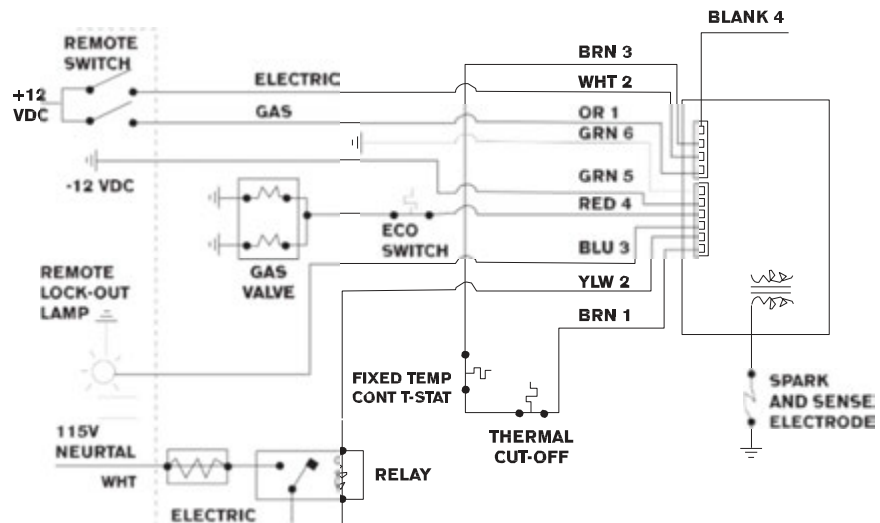
## GC 10A-4E & GC 6A-10E Wiring

In 2003, Atwood created a new gas-electric water heater. These units improve serviceability by moving most of the components for the electric portion of the water heater to the outside except the element and relay, which remain in a junction box in the rear. One module board controls both gas and electric.

When replacing a 3E or 9E to a 4E or 10E some wiring changes are necessary. See the INFORMATION NOTICE that follows.



## WIRING DIAGRAM COMBINATION GAS/ELECTRIC





1120 North Main Street • Elkhart, IN 46514  
PHONE: 574•264•2131 FAX: 574•262•2550  
INTERNET: <http://www.atwoodmobile.com>

## INFORMATION NOTICE

### Atwood Water Heater Conversion

GC10A-3E to GC10A-4E  
GC6A-9E to GC6A-10E

#### ENGLISH,

The gas/electric water heater (Models 4-E & 10-E) replaced all previous combination gas/electric water heaters. Models 3-E & 9-E and before operate on DC for the gas side and AC for the electric side.

These older models operate with two separate switches, one DC and one AC. The gas switch has DC voltage coming into the switch and from the switch to the water heater. There is a separate switch used for the electric portion of the water heater. This switch will have AC power coming into the switch and AC going out of the switch to the electric part of the water heater.

**The 3-E and 9-E's are no longer available**, if an entire water heater must be replaced it will be replaced with the new 4-E or 10-E. **There are no changes in the physical dimensions, but a wiring change will be required.**

With the new water heater you will receive a new 12 volt control switch for both gas and electric.



The separate gas and electric switches will be replaced by this (one) combo switch on current production.



#### **CAUTION** **PRODUCT DAMAGE**

- Extreme care should be taken with all electrical wiring and professional services retained if necessary.

#### WIRING THE REAR OF THE WATER HEATER

The only AC required will be in the rear of the water heater at the relay and the element. See wiring below.

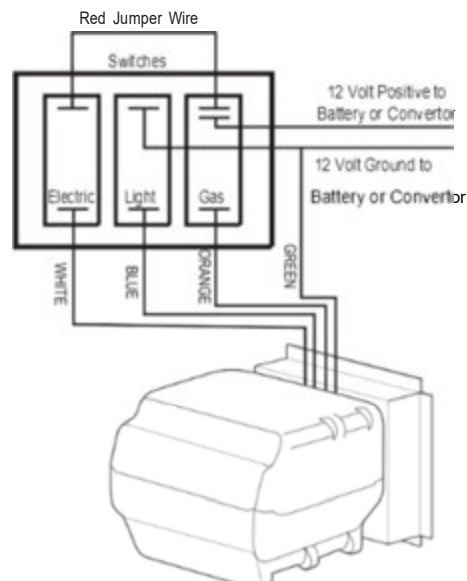
Junction Box 12 VDC/120 VAC

#### • Switch Conversion Instructions

Effective 1/16/07

#### WIRING OF NEW COMBO SWITCH

The new combo switch will be wired, using the picture below.



#### LOCATION OF COMBO SWITCH

Find the most convenient location for the new switch. It should be close to the DC voltage source that will control the switch. This may be where the AC switch was originally located. Remember that you will have to connect DC positive and negative into this switch. There will also be four wires from the water heater that must attach to the switch.

If your original system was controlled through a central monitor panel, and you prefer to use this system, you will have to contact the manufacture of the unit for monitor panel wiring instructions.

Location and phone numbers of qualified Service Centers can be found at our website <http://www.atwoodmobile.com> or call 866-869-3118 to have a Service Center List mailed. Please remove that





# General Information

## QUESTIONS

**The following questions should be answered during this portion of the manual:**

- What causes the pressure-temperature relief valve to weep when unit is in heating cycle?
- How can weeping pressure-temperature relief valves be reduced or eliminated?
- What are the proper draining procedures to help reduce lime deposits and extend tank life?
- Will a tank split for any other reason besides freezing?
- What functions do the retaining rings serve when replacing an inner tank?
- What are the most common ways to winterize a tank?

# PRESSURE-TEMPERATURE RELIEF VALVE

Weeping or dripping of a pressure-temperature relief valve while the water heater is running DOES NOT mean it is defective. This is normal expansion of water as it is heated in the closed water system of a recreation vehicle. The Atwood water heater tank is designed with an internal air gap at the top of the tank to reduce the possibility of weeping and dripping. In time, the expanding water will absorb this air. To replace the air follow these steps:

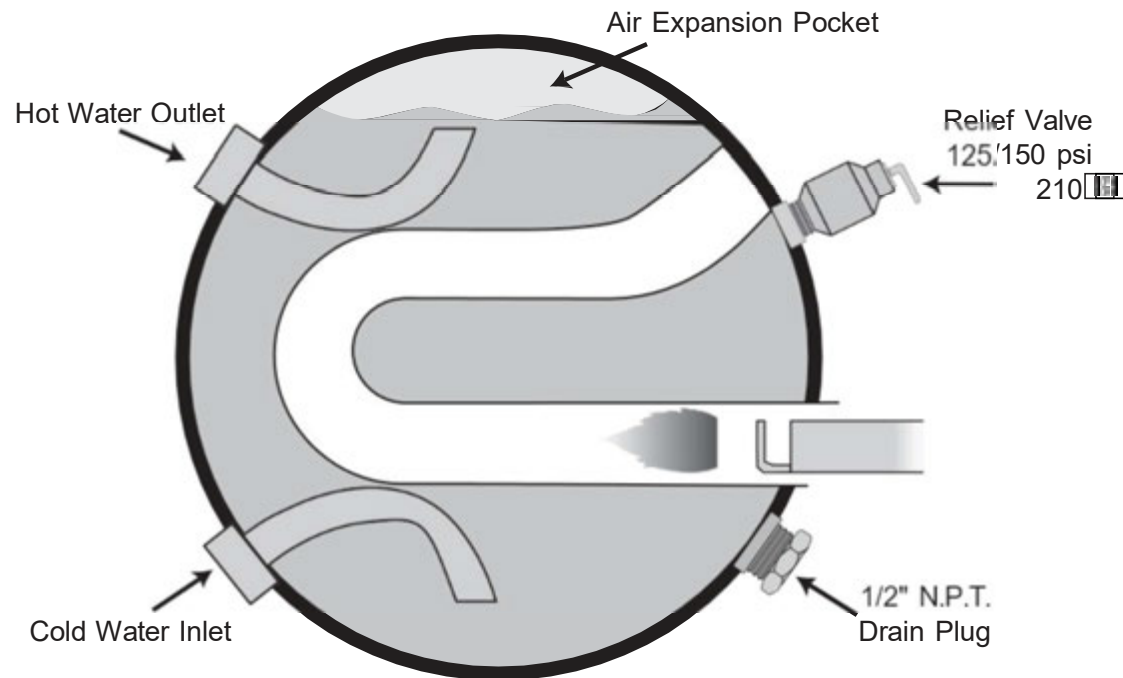
**Step 1:** Turn off water heater

**Step 2:** Turn off incoming water supply

**Step 3:** Open the closest hot water faucet in the coach

**Step 4:** Pull handle of pressure-temperature relief valve straight out and allow water to flow until it stops.

**Step 5:** Allow pressure-temperature relief valve to snap shut, turn on water supply and close faucet.



# WATER HEATER TANK CORROSION

Pinhole leaks from galvanic corrosion may cause the water heater tank to fail.

Microscopic particles of metals (like iron and copper) suspended in water, set up a reaction inside the water heater that is not unlike the principle on which an automotive battery operates. The aluminum tank is the anode and the metals in the water serve as the cathode. Consequently, the aluminum gradually sacrifices itself and aluminum particles are carried away with the water flow.

A white scaly material (aluminum oxide) often is formed around the points where the heaviest action is taking place and heat accelerates the process. Severity of the problem varies considerably in different locales depending on the metal and mineral content of the water. White deposits inside the water heater tank are usually from water impurities that have settled out.

Periodic flushing of the water heater tank under pressure is recommended to slow down this process. For flushing

## **FLUSHING TO REMOVE UNPLEASANT ODOR**

A rotten egg odor (hydrogen sulfide) may be produced when the electro galvanic action of the cladding material releases hydrogen from the water. If sulfur is present in the water supply the two will combine and produce an unpleasant smell.

1. Turn off main water supply. Drain the water heater tank and reinstall drain plug. Remove the pressure-temperature relief valve. Mix solution of 4 parts white vinegar to two parts water. (For a 10 gallon tank, use 6 gallons vinegar to 3 gallons water). With a funnel, carefully pour solution into tank.
2. Cycle water heater with the above solution, letting it run under normal operation 4-5 times.
3. Remove the drain plug and thoroughly drain all water from the tank. Flush the water heater to remove any sediment. You may flush the tank with air pressure or fresh water. Pressure may be applied through either the inlet or outlet valve on the rear of the tank or through the pressure-temperature relief valve coupling located on the front of the unit.

### **TO FLUSH TANK WITH AIR PRESSURE:**

Insert your air pressure through the pressure-temperature relief valve coupling. With the drain valve open, the air pressure will force the remaining water out of the unit.

### **TO FLUSH TANK WITH WATER PRESSURE:**

Fresh water should be pumped into the tank with either the onboard pump or external water pressure. Continue this flushing process for approximately five minutes, allowing the fresh water to agitate the stagnant water on the bottom of the tank and forcing the deposits through the drain opening.

4. Replace drain plug and pressure-temperature relief valve.
5. Refill tank with fresh water that contains no sulfur.

The Atwood water heater is designed for use in a

## **WINTERIZING (FLUSHING) INSTRUCTIONS**

To insure the best performance of your water heater and add to the life of the tank, periodically drain and flush the water heater tank. Before long term storage or freezing weather drain and flush the tank.

1. Turn off main water supply (the pump or water supply hook up source).
2. Drain water heater tank by removing the drain plug. If the water flows sporadically or trickles instead of a steady stream of water, we recommend the following action; first open the pressure temperature relief valve to allow air into the tank and secondly, take a small gauge wire or coat hanger and poke through the drain opening to eliminate any obstructions.
3. After draining the tank, because of the placement of the drain plug, approximately two quarts of water will remain in the tank. This water contains most of the harmful corrosive particles. To remove these harmful corrosive particles flush the tank with either air or water. Whether using air or water pressure, it may be applied through the inlet or outlet on the rear of the tank or the pressure temperature relief valve. (If using the pressure temperature relief valve the support flange must be removed). The pressure will force out the remaining water and the corrosive particles.  
If you use water pressure, pump fresh water into the tank with the assistance of the on-board pump or use external water for 90 seconds to allow the fresh water to agitate the stagnant water on the bottom of the tank and force deposits through the drain opening. Continue repeating adding water and draining until the particles have been cleared from the water remaining in the tank.
4. Replace the drain plug and close the pressure temperature relief valve. The approximately two quarts of water remaining in the tank after draining will not cause damage to the tank should freezing occur.

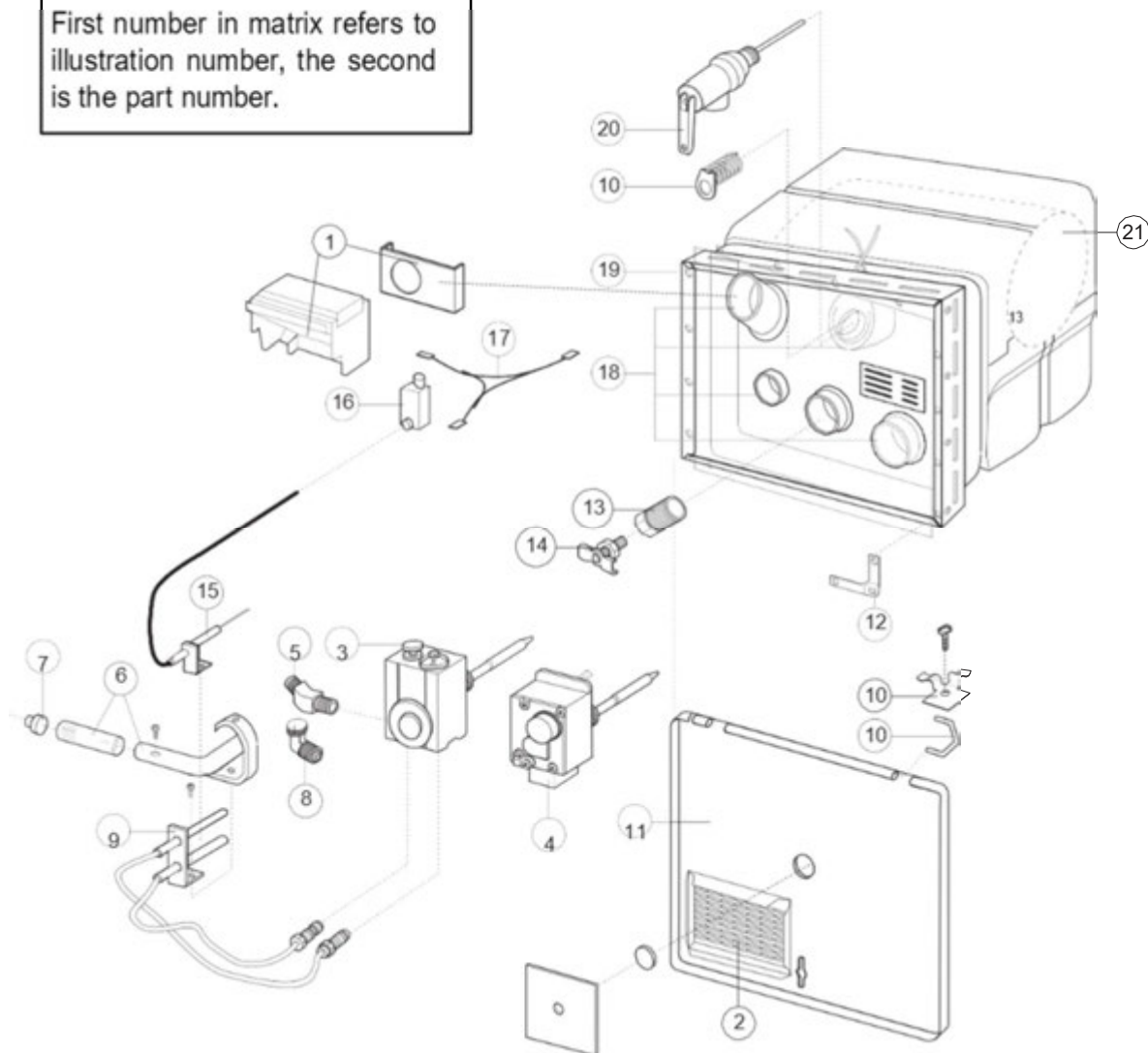
# Water Heater Terminology

Terminology	Definition
<b>Access Door</b>	hinged cover on outside of water heater
<b>By Pass Kit</b>	a combination of hoses and valves that can aid in the winterization of the water heater
<b>CSA</b>	Canadian Standards Association
<b>Calibration</b>	the condition determining whether the thermostat is registering temperatures properly
<b>Cam-Loc Fastener</b>	a door securing device
<b>Circuit Board</b>	an electronic panel that controls the spark, solenoid valve, and senses the main burner flame
<b>Drawn Pan</b>	metal pan attached to the water heater tank and fastened to coach sidewall to isolate combustion to outside of coach
<b>DSI</b>	direct spark ignition a.k.a. electronic ignition
<b>E.C.O. (energy cut off)</b>	high temperature re-set shut off device
<b>Electrolysis</b>	electro chemical corrosive process that can cause pinholes in tanks
<b>Fenwal Tester</b>	a diagnostic circuit board analyzer
<b>Flame Spreader</b>	a round deflective piece found at the combustion end of main burner.
<b>Flue Box</b>	a chamber that separates air intake and exhaust
<b>Flue Tube</b>	combustion and water heating surface area on inside of tank
<b>Flying Lead</b>	flame sensing wire that is sometimes found hard wired to circuit board
<b>Front of Water Heater</b>	access door side of water heater
<b>Gas Solenoid Valve</b>	a 12 volt DC device that turns on or off the flow of gas
<b>Immersion Element</b>	an AC electrical heating coil that is immersed directly into water

Terminology	Definition
<b>Main Burner</b>	a gas and air mixing tube
<b>Main Burner Air Shutter</b>	the slotted sleeve on tube that allows for gas and air adjustment
<b>Main Burner Orifice</b>	a precision drilled fitting that regulates the BTU's of combustion
<b>Mixing Valve</b>	mixes hot and cold water to a fixed temperature 130°F.
<b>N.P.T. (Nat'l Pipe Thread)</b>	a plumbing measurement standard
<b>Pilot Assembly</b>	A gas tube, orifice & thermocouple
<b>Pilot Orifice</b>	a precision drilled thimble shaped component that meters gas flow to pilot.
<b>Pilot Relight Ignition Module</b>	12 volt electronic panel that provides spark ignition and flame sense to maintain pilot flame
<b>Pressure-Temperature Relief Valve</b>	a pressure and temperature safety device used on water heating vessels.
<b>Ring and Gasket</b>	retaining fiber & metal rings that secure combustion pan to tank
<b>Sight Glass</b>	burner flame viewing port on access door
<b>Spark Probe Assembly</b>	a spark electrode & flame sensing
<b>Thermal Cut-Off</b>	heat sensing diode that cuts power to circuit board if a flame backs out of the burner tube or flue tube normally caused by an obstruction in these areas
<b>Thermostat (gas)</b>	a temperature sensitive device for turning on and off the flow of gas (T-stat)
<b>Thermostat (120 volt AC)</b>	a surface mount temperature sensitive device that turns on/off heating element

# Pilot Water Heater 6-10 Gallon

First number in matrix refers to illustration number, the second is the part number.



# Pilot Water Heaters

## Replacement Part Reference January 2014

		GC6A, GC6A-3, GC6A-6, GC6A-7 G6A, G6A-2, G6A-3, G6A-6, G6A-6P, G6A-7, G6A-7P	GH6-3, GH6-6, GH6-7	GC6AA-7, GC6AA-7P	GC6AA-8, GC6AA-8P	G610-3, G610-3E, GH610-3	G10B, G10C	GC10A-2	GC10A-2P	GC10-1, GC10-2, GC10-2P	G10-2, G10-2P	G4SM
N/S	93212	Pilot relight kit-battery operated Retrofits on all pilot model water heaters										
N/S	92973	Inverted Flare Adapter	X	X			X					
N/S	92610	Gas Line Grommet	X	X	X	X	X	X	X	X	X	X
N/S	91285	Jade Orifice fits 91603 Pilot	X	X	X			X	X	X	X	
1	90930	Flue Box & Gasket	X	X	X	X	X	X	X	X	X	X
2	92640	Grille, New Style in Door	X	X	X	X		X	X	X	X	X
3	91602	Robertshaw Thermostat (WL) (3/8" NPT inlet, 3/8" NPT outlet)	X	X	X	X	X	X	X	X	X	X
4	91601	White Rodgers thermostat (1/4" NPT inlet, 3/8" NPT outlet)	X	X	X	X	X	X	X	X	X	X
5	91044	45° Elbow 3/8" x 3/8"-old (6Gal RS only)				X	X					X
	91347	Elbow – 1/4" x 3/8" inlet – new (WR only)	X	X	X							X
6	92615	Main Burner 6 Gallon	X	X	X		X					
	93221	Main Burner 10 Gallon						X	X	X	X	
7	92742	Main Burner Orifice (6 gal. #65 .035")	X	X	X							
	93914	Main Burner Orifice (10 gal. #62 .038")					X	X	X			
8	91441	90° Elbow 3/8" x 3/8"						X	X	X	X	
	92741	Main Burner Orifice Elbow-outlet	X	X	X							X
9	91603	Jade Pilot	X	X	X	X	X	X	X	X	X	X
10	91858	Door Hardware Kit	X	X	X	X		X	X	X	X	X
11	91514	Access Door (6 Gallon) Colonial White	X	X	X	X						X
	93993	Access Door (10 Gal.)						X	X	X	X	
12	91928	Set of 4 Corner Bracket	X	X	X	X	X	X	X	X	X	X
13	91857	Drain Plug 1/2"										
14	92698	Petcock Drain Valve 1/8" (OBS)										
15	93804	Piezo Electrode-hard-wired (OBS)		X	X				X	X	X	
16	93801	Ignition Module – hard-wired (OBS)		X	X						X	
17	93803	Piezo Wiring Harness – hard-wired (OBS)		X	X						X	
18	96010	Ring &Gasket Kit for service tank	X	X	X							X
19	91796	Drawn Pan 6 Gallon Pilot	X	X	X							X

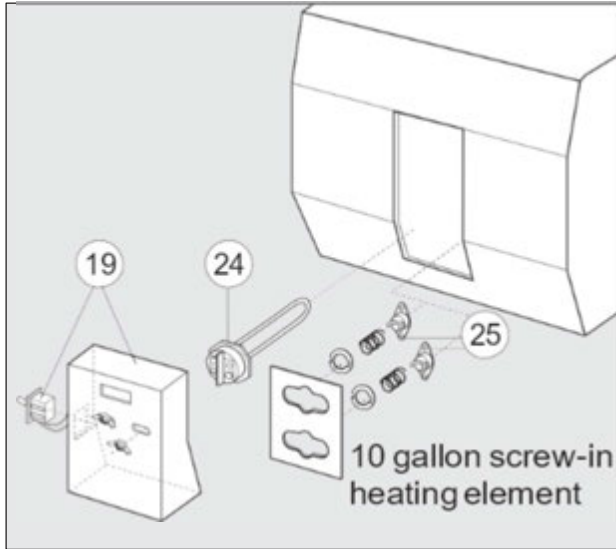
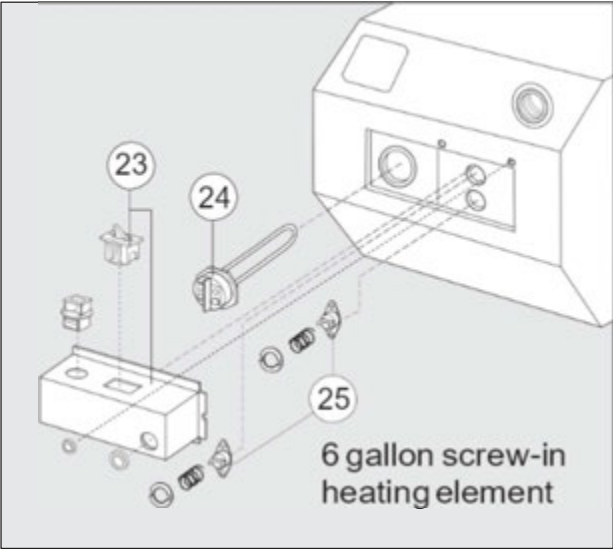
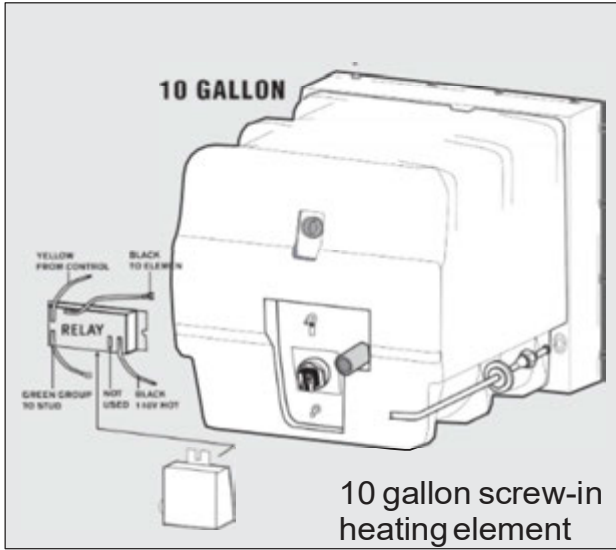
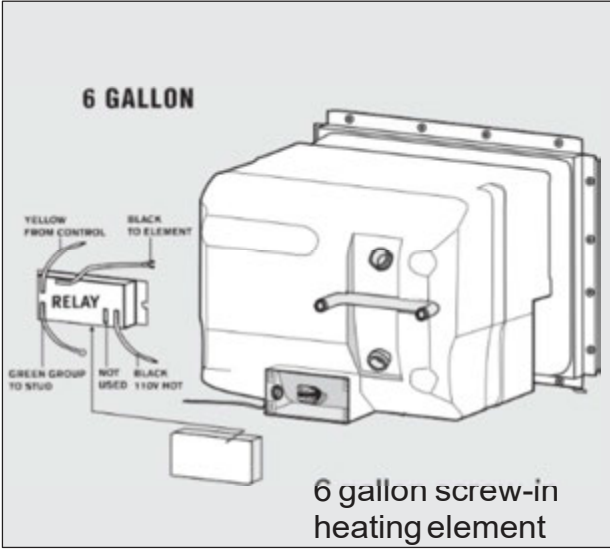
## Replacement Part Reference

### January 2014

<h1 style="text-align: center;">Pilot Water Heaters</h1> <h2 style="text-align: center;">Replacement Part Reference January 2014</h2>			GC6A, GC6A-3, GC6A-6, GC6A-7 G6A, G6A-2, G6A-3, G6A-6, G6A-6P, G6A-7, G6A-7P	GH6-3, GH6-6, GH6-7	GC6AA-7, GC6AA-7P	GC6AA-8, GC6AA-8P	G610-3, G610-3E, GH610-3	G10B, G10C	GC10A-2	GC10A-2P	GC10-1, GC10-2, GC10-2P	G10-2, G10-2P	G4SM
24	92942	110VAC ECO Switch (NLA)								X	X	X	
25	92943	110VAC 140° Thermostat								X	X	X	
26	91092	110VAC On/Off Rocker Switch (6 Gal.)	X		X	X							
	91089	110VAC On/Off Rocker Switch (10 Gal.)								X	X	X	
27	91853	110VAC Thermostat (Rectangle) (NLA)	X									X	
28	91116	110VAC On/Off Switch & Jct Box (6 Gal.)				X							
29	92249	110VAC Element/Gasket (screw-in)	X		X	X			X	X	X		
30	91873	Thermostat/ECO 110VAC	X		X	X			X	X	X		
N/S	91591	Conversion to Pilot 6 gallon 110VAC		X									
N/S	91596	Conversion to Pilot 10 gallon 110VAC									X	X	

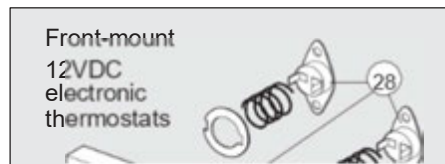
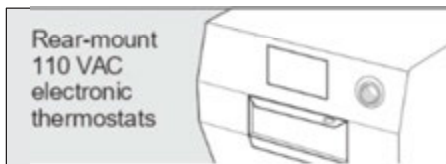
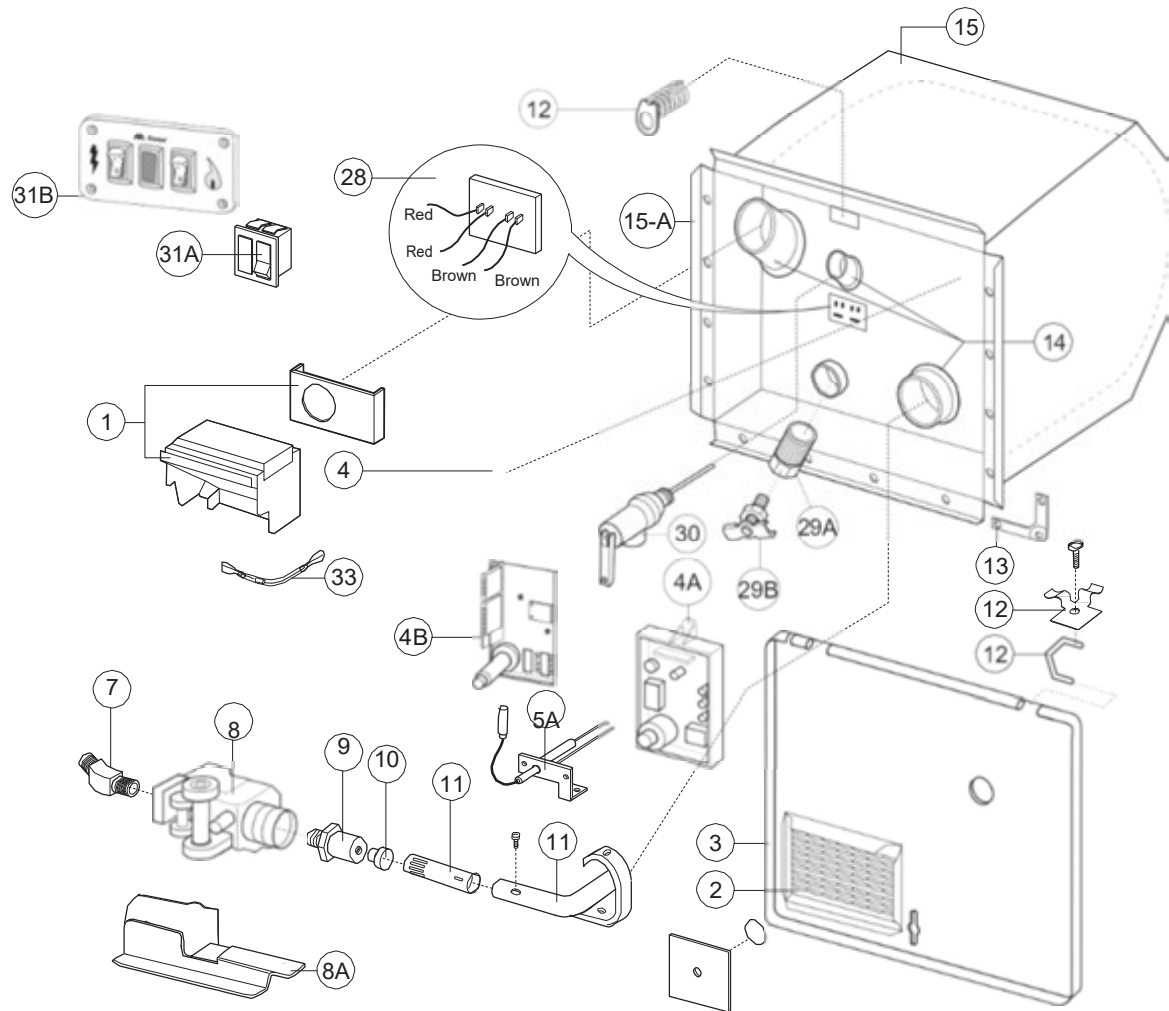


## Electric Side Combination Water Heaters



# Electronic Water Heater

## 6-10 Gallon



GCH6-4E, GCH6-6E, GCH6-7E, GC6A-7E
GH6-6E, GH6-7E, GH6-8E
G6A-6E, G6A-7E, G6A-8E
GCH6A-7E, GCH6A-8E, GCH6A-9E
GC6AA-7E, GC6AA-8E, GC6AA-9E
GCH10A-2E, GCH10A-3E, GC10A-2E, GC10A-3E
G10-1E, GH10-1E
G610-3E, GH610-3E
G10-2E G10-3E
GC10-1E, GC10-2E
GH10-2E, GH10-3E
G6A-2E, GH6-3E
G6A-3E, GH6-3E, GH6-4E, G6A-4E
GCH6A-10E, GC6AA-10E
GC10A-4E, GCH10A-4E

X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X	X	X	X			X
X	X	X	X	X	X	X	X	X	X	X	X			X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X		X	X	X			X
X	X	X	X	X	X	X	X		X	X	X			X
X	X	X	X	X							X	X	X	
					X	X	X	X	X	X				X
X	X	X	X	X	X	X	X	X	X	X	X	X		
													X	X
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X	X	X	X	X									X	
					X	X	X	X	X					X
X	X	X	X	X									X	
				X	X		X	X	X	X				X

## Replacement Part Reference

### January 2014

[illegible]



1120 North Main Street • Elkhart, IN 46514  
PHONE: 574•264•2131 FAX: 574•262•2550  
INTERNET: <http://www.atwoodmobile.com>



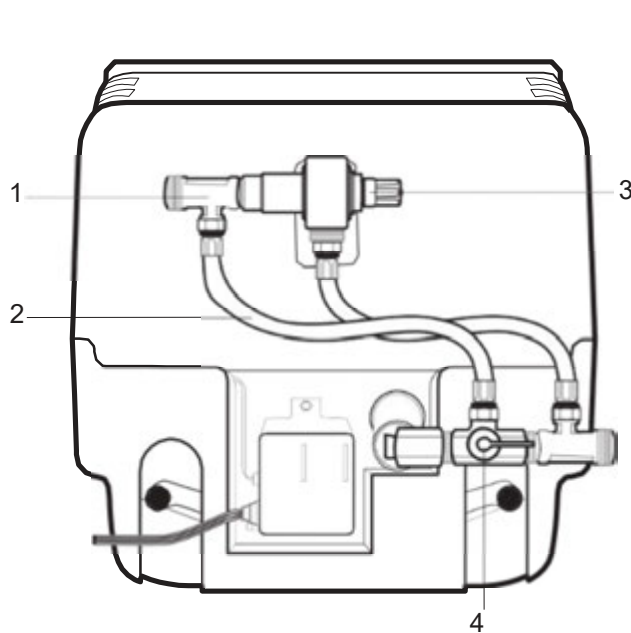
## XT WATER HEATER MPD 92690

REPLACEMENT VALVE KIT  
10 GALLON  
PATENT PENDING

ENGLISH, FRANCAIS (et Canada)

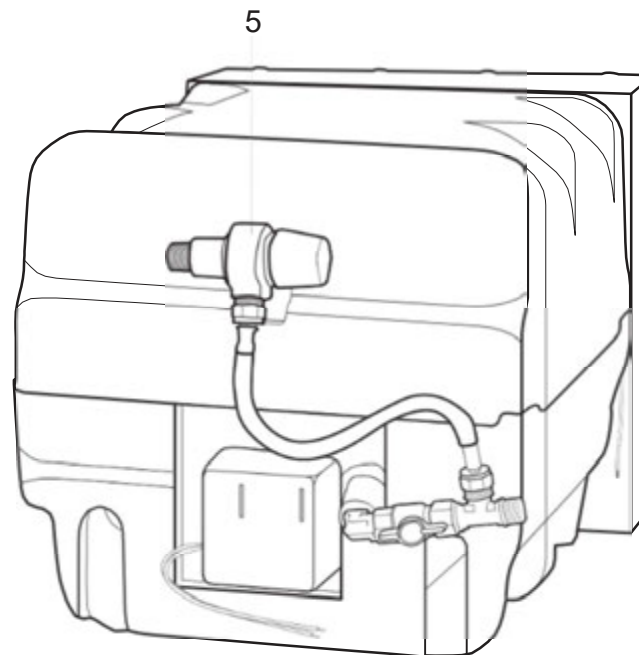
•Installation

Effective 2/14/14



### 10 GALLON TE

2004-2005



### 10 GALLON XT

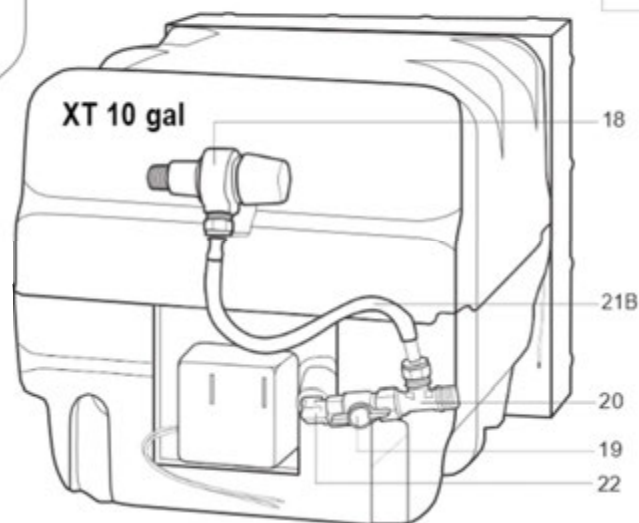
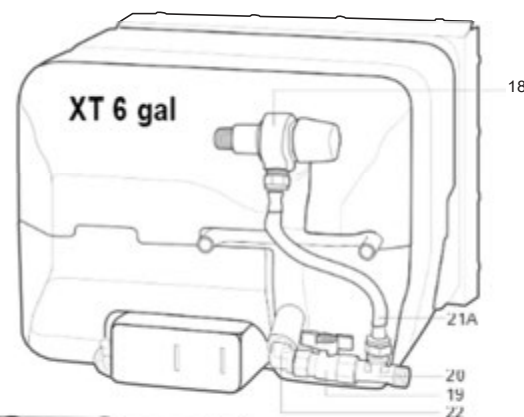
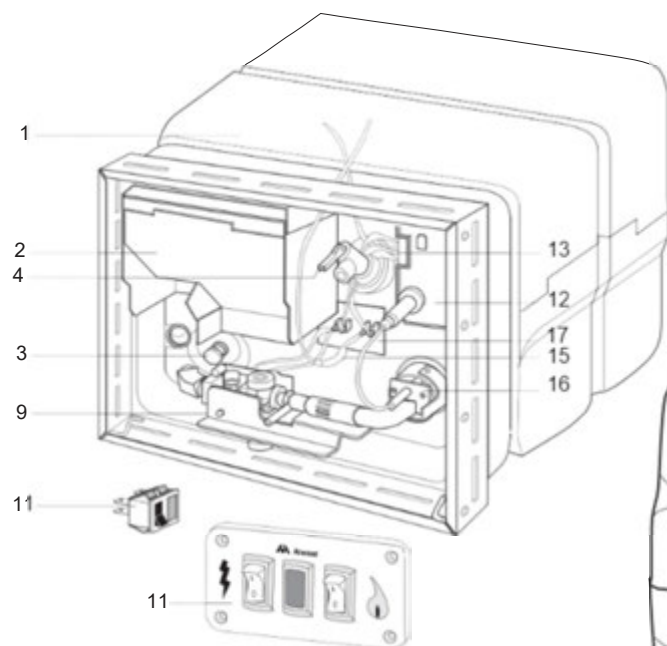
NEWFOR2005-2006

1. Remove water lines (1), flexible hoses (2), mixing valve (3) and inlet plumbing components (4).
2. Install new mixing valve (5) with Teflon tape. Use three wraps and pipe thread sealer to leading threads and install to minimum 35 ft/lbs.
3. Install male/male 90 degree fitting with a minimum of

6. Finish turn on completed elbow/valve/tee assembly to horizontal position.
7. Adjust tee and valve so valve handle operates and tee is pointing branch thread upward.
8. Install flexible hose following instructions on hose tag.

# XT WATER HEATER PART IDENTIFICATION

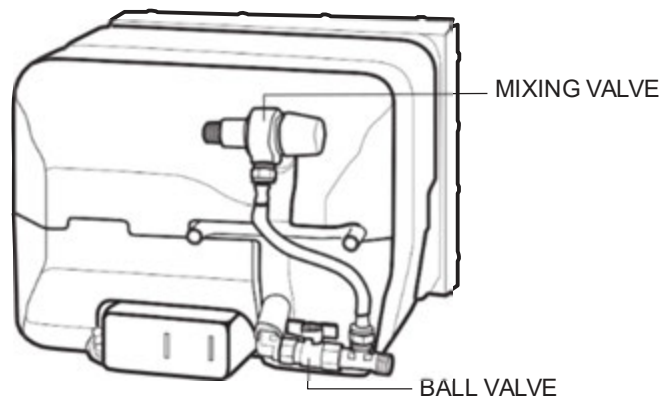
SPARK IGNITION  
HEAT EXCHANGE  
COMBINATION GAS/ELECTRIC



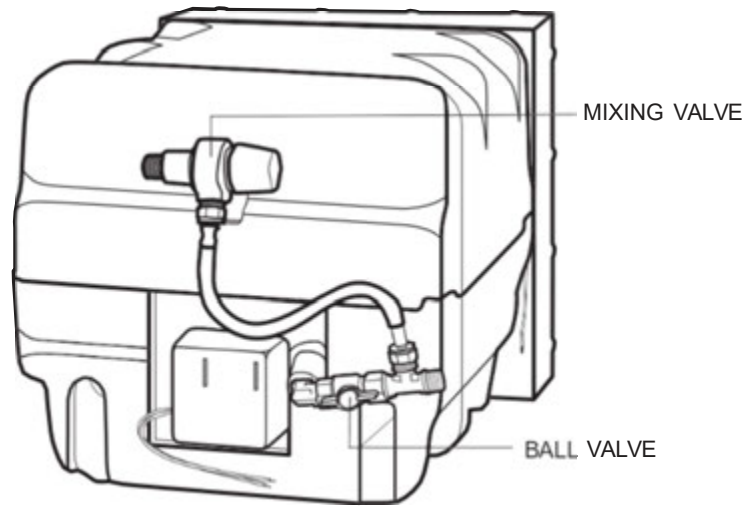
- \* All tanks includes styrofoam jacket
- X Order by model
- ✓ order by color

ITEM REFERENCE	6 GALLON 22 LITRES	10 GALLON 38 LITRES	SPARK IGNITION	ALLUMAGE PAR ÉTINCELLE
1	X	X	* Tank	* Réservoir
2	90960	90960	Flue Box Assembly	Boîtier du conduit
3	91857	91857	Drain Plug	Bouchon de vidange
4A	91604	91604	Pressure-Temperature Relief Valve 1/2" NPT	Soupape de décharge de type
4B	90028	90028	Pressure-Temperature Relief Valve 3/4" NPT	Soupape de décharge de type
9	93870	93870	Solenoid Valve	Électrovanne
11	91959	91959	Black on-Off Switch	Interrupteur Marche/Arrêt noir
	91859	91859	White On-Off Switch	Interrupteur Marche/Arrêt blanc
	91230	91230	Dual Switch	
12	93851	93851	Circuit Board	Circuit imprimé
13	93191	93191	Wiring Harness	Faisceau électrique
15	93866	93866	Thermal Cut Off	Coupure thermique
16	93868	93868	Spark Probe	Détecteur d'étincelle
17	91547	91547	ECO/T-STAT (kit)	Thermostat

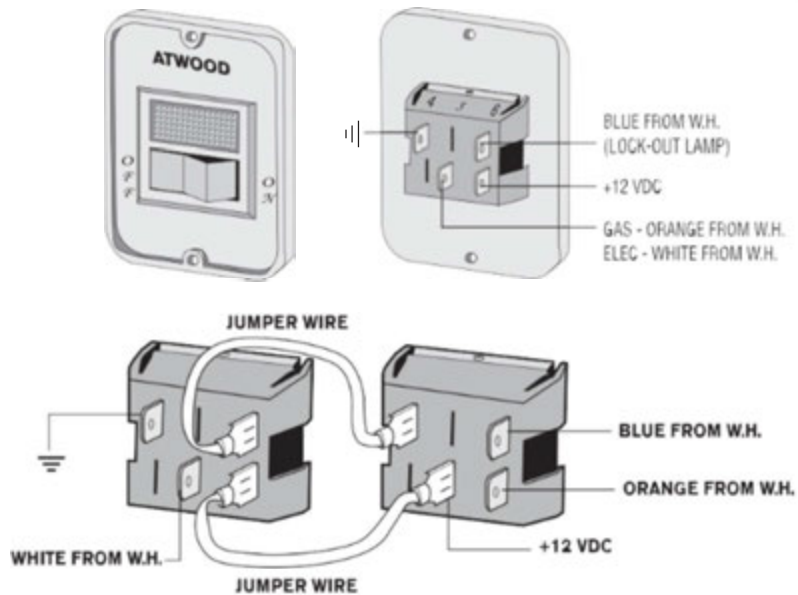
## 9 6 GALLON



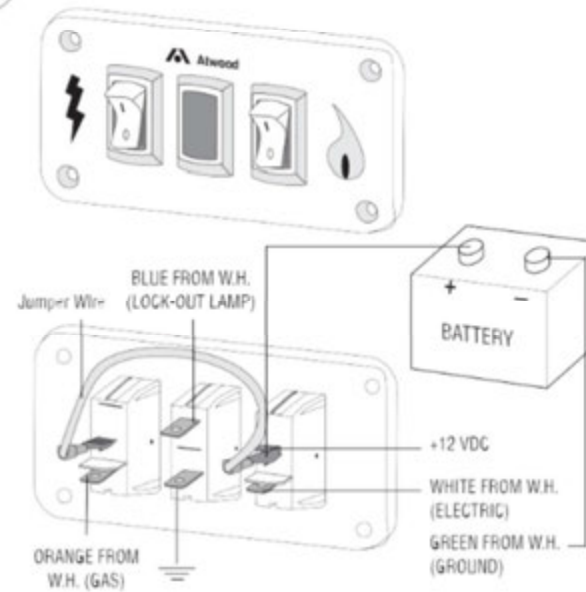
## 10 GALLON



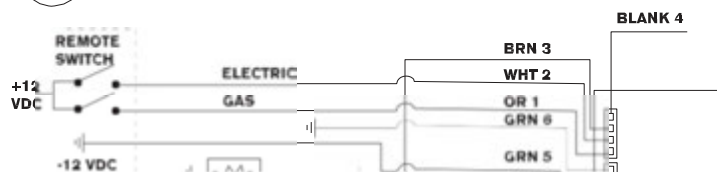
## 10 SINGLE SWITCH



## 11 DUAL SWITCH

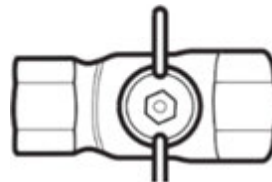


## 12 WIRING DIAGRAM COMBINATION GAS/ELECTRIC



## 13

### WINTERIZED



**SERVICE TANK KIT**  
**PART NUMBERS**  
REPLACEMENT PART REFERENCE  
February 2014

**MODELS**

91411

91412

91591

91592

91593

91596

91641

91642

93950

93952

93953

94205

91059

91053

91060

91028

**GAS**

G6A-2, G6A-3, G6A-6, G6A-7

G10-1, G10-2

**GAS PILOT-RELIGHT**

G6A-6P, G6A-7P

GC6AA-7P, GC6AA-8P

**GAS/PILOT RELIGHT COMBINATION**

GC10-2P

G10-1P, G10-2P

GC10A-2P, GC10A-3P

**GAS & ELECTRONIC IGNITION**

GH10-1E, GH10-2E, GH10-3E

G10-1E, G10-2E, G10-3E, G16-EXT

G6A-4E, G6A-6E, G6A-7E, G6A-8E, G9-EXT

GH6-4E, GH6-6E, GH6-7E, GH6-8E

**GAS/ELECTRIC & ELECTRONIC IGNITION**

GCH6-4E, GCH6-6E, GCH6-7E

GC6A-7E

GCH10A-4E, GEH16-EXT

GCH10A-1E, GCH10A-2E, GCH10A-3E

GC10A-4E, GE16-EXT

GC10A-1E, GC10A-2E, GC10A-3E

GC10-1E, GC10-2E

GCH10-2E

**GAS/ELECTRIC COMBINATION**

GC6A-3, GC6A-6, GC6A-7, GC6AA-7, GC6AA-8

GCH6A-7E, GCH6A-8E, GCH6A-9E

GCH6A-10E, GEH9-EXT

GC6AA-7E, GC6AA-8E, GC6AA-9E

GC6AA-10E, GE9-EXT

GC10-1, GC10-2

GC10A-2, GC10A-3

**HEAT EXCHANGE**

GH6-3, GH6-6, GH6-7

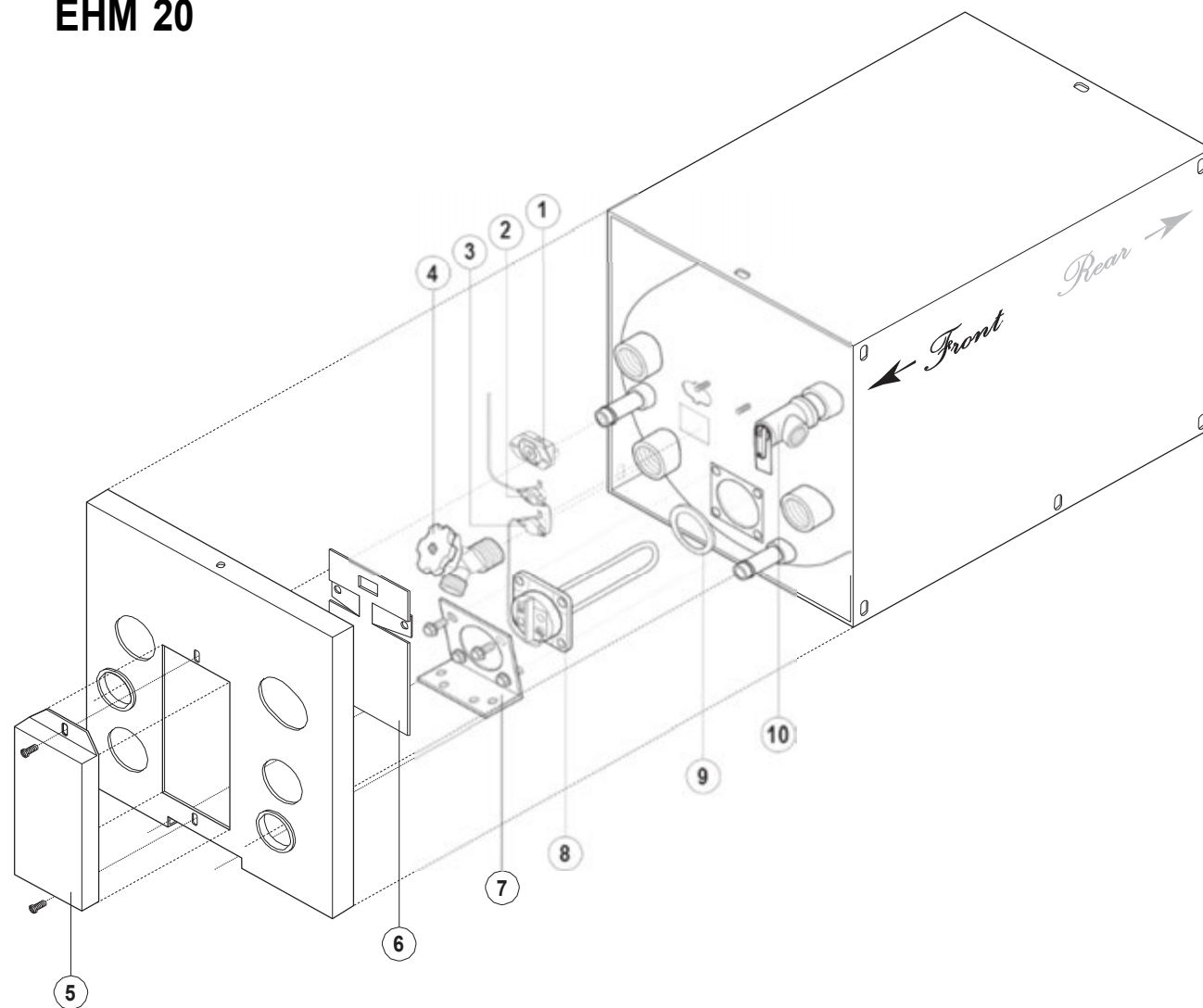




EHM 4-SM  
EHM 6-SM  
EHM 11-SM  
EHM 20

## ELECTRIC WATER HEATER

ALL MARINE WATER HEATER CAPACITIES



ITEM	PART #	DESCRIPTION
1/2/3	90037	Thermostat Kit, with ECO, plate, wires (110V)
	90041	Thermostat Kit, with ECO, plate, wires (220V)
4	93403	Drain Valve 3/4"
5	90045	Access Cover (NEW STYLE)
6	92236	Insulator
7	91498	Front & Rear Mounting Bracket (4 & 6 gal)
	91499	Front & Rear Mounting Bracket (11 & 20 gal)

# ON DEMAND WATER HEATER



## QUESTIONS

The following questions should be answered during this portion of the manual:

- What is minimum gas pressure for proper water heater operation?
- Where on the water heater can gas pressure be tested?
- What is the minimum voltage needed for operation?
- What is the proper wiring hook-up for the water heater circuitry?
- What are the water flow requirements of this water heater?

# Atwood On Demand Water Heater

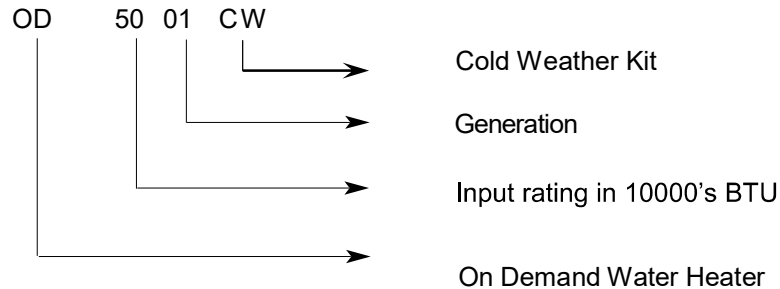
Atwood water heaters are designed and approved for use only in recreation vehicles (travel trailers, 5th wheels, motor homes, etc.). They are offered in two styles one with an additional cold weather kit that uses ceramic resistance heater and heating pad to warm the modulation valve as well as the cold water inlet line inside the water heater.

## TYPE OF GAS IGNITION -

This unit is ignited inside of the trailer by a remote ON/OFF switch. The water heater is designed to produce approximately 65F temperature rise between 1.00 GPM to 1.25 GPM. The consumer can add cold water to achieve the desired hot water temperature. Care must be taken to prevent higher temperatures which may result in scalding.

## EXPLANATION OF MODEL NUMBER:

### Electronic Models



The SERIAL number is 15 digits and can be broken down as follows:

902050306130194 = 90205 (unit's part number)-030613 (build date 03/06/13)-0194 (serial number)

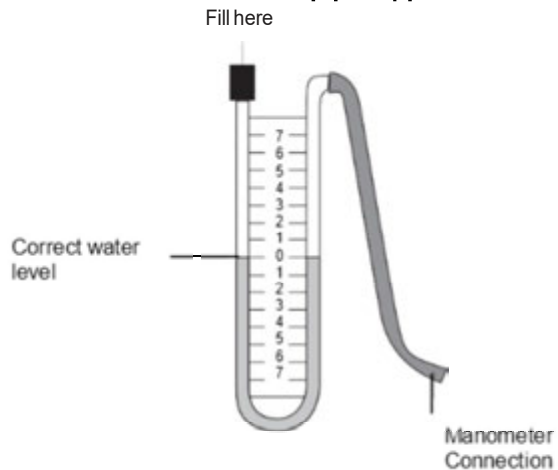
## FEATURES

- ☐ All units operate on propane gas.
- ☐ Easily installs in the rough opening for any current RV water heater on the market today
- ☐ Weight savings of up to 115 pounds of stored water
- ☐ Energy efficient only uses propane when hot water is needed
- ☐ High output flow controlled modulating valve with 50K burner
- ☐ Multiple protection features in the form of a pressure relief valve, a water temperature limit switch, pressure switch, and integrated flow sensor.
- ☐ Skin mounting allows water heater to be hooked up with plumbing & electrical before the sidewall is erected.
- ☐ 95% of all servicing is done on the outside of the water heater.
- ☐ The Atwood Limited Warranty is for a period of two years to the original owner.
- ☐ There are over 1,000 Service Centers throughout the United States which can be found on our website [www.atwoodmobile.com](http://www.atwoodmobile.com) under the heading "Dealer Locator"

## Recommended Tools and Equipment

### U-TUBE MANOMETER

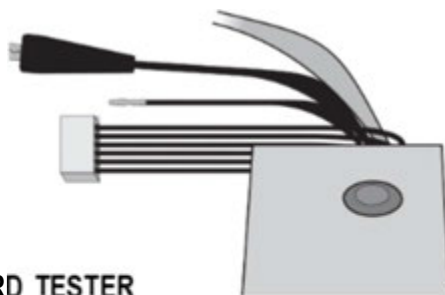
With 1/8" pipe nipple



### MULTI-METER TO TEST CONTINUITY & VOLTAGE



**Circuit Board Tester** - The tester is capable of testing any of the circuit boards (Fenwal and Channel models) that we have used on our water heaters. It is a simple table top device that will diagnose the following items on a circuit board: power circuit, sense circuit, spark generation and the lock-out mode. For use on circuit boards with a flying lead connection, splice a wire into the black wire of the tester harness with a 1/4" male terminal on the free end.



CIRCUIT BOARD TESTER

OEM and Aftermarket-Unit can be installed in Atwood, Suburban, and Girard openings. Unit can also be installed through the wall from exterior, or prior to erecting wall into place at OEM manufacturing facility.

Atwood 6 Gallon Opening 12.7" H x 16.25" W x 17.62" D

Suburban 6 Gallon Opening 12.7" H x 12.7" W x 19.2" D

Atwood 10 Gallon Opening\* 15.75" H x 16.2" W x 20.6" D

Suburban 10 Gallon Opening\* 16.2" H x 16.2" W x 20.5" D

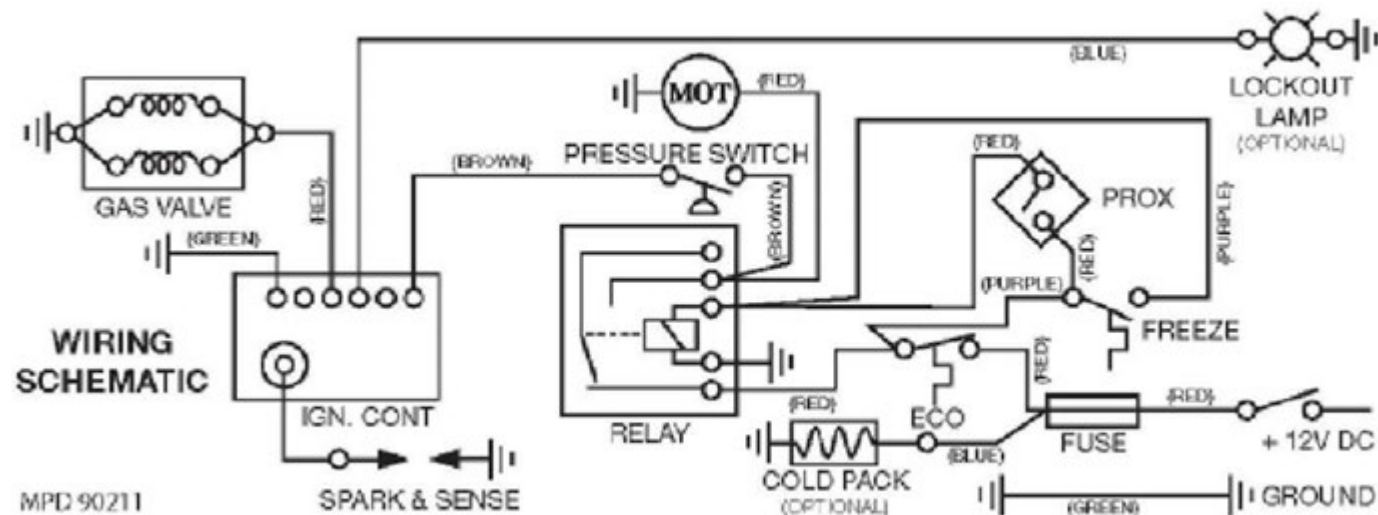
\*Door/Adaptor Kit Required

\*\*these units do not come with a remote wall switch this would be purchased separately.

### General Specifications: (verify before installation)

- Gas Pressure-** Robust gas pressure must be between 11"-13" wc with at least 50% of the gas appliances running/ Gas line diameter should be greater than 3/8" and not to exceed 20-30 feet in length.
- Water Flow-** Water flow needs to be between .8 and 1.5 gallons per minute.
  - NOTE:** Low water flow will not kick on the burner to the optimum burn and high flow can move water through the heat exchange too fast to allow for proper thermal transfer.
- Incoming Water Temperature-** Average ground water temperatures are approximately 55°F in the majority of the United States. Water temperatures far beyond this normal parameter may need to consult with Atwood Mobile Products, LLC Technical Service to determine if this will meet customer expectations.
- Elevation-** At 12,000 feet the 50K BTU would be approximately 60% efficient. Your 50K unit would be equivalent to a 35K BTU heater.

### Wiring Diagram:



# ODWH TROUBLE SHOOTING GUIDE

Effective Date 2/10/14

Guides are only intended for use on Atwood® products by service technicians who have successfully completed Atwood training. This guide should be used in conjunction with the appropriate Instruction Manual provided with the product and any applicable Industry standards. This is not intended to be a complete list. Please direct questions concerning service of Atwood Mobile products LLC to 866-869-3118 before proceeding.

## CAUSE

## SOLUTION

### **Water Heater does not come on when water is flowing min of .5gpm (No Blower Running)**

Loose electrical connection-----	Verify all connections are secure and polarity is correct (red wire to +)
Low flow-----	Verify flow through the heater
Low voltage-----	Correct power supply-10.5VDC minimum
Circuit open-----	Check circuit breaker if tripped correct problem and reset
Voltage is not reaching the ODWH-----	Replace fuse
Voltage is not reaching the board-----	No reed switch continuity adjust/replace
Voltage is not reaching the board -----	Wire harness connector not plugged into board
Dirty voltage-----	If using convertor check for A/C ripple, if present replace convertor
Water mixing valve is on-----	Shut off mixing valve
Defective circuit board-----	Replace circuit board
Open bypass valve-----	An open bypass valve causing water to bypass the heater should be closed

### **Water Heater does not come on when water is flowing min of .5gpm (Blower Running)**

No gas pressure-----	Verify there is gas in the LP tank & tank is on
Ignition electrode is not sparking-----	Verify the electrode is plugged in verify electrode wire is not damaged
Electrode is providing small arc-----	Adjust electrode to proper gap(1/8")
Power blower is not activating switch-----	Verify blower is receiving 12VDC
Pressure switch is not closing-----	Switch tube is clogged clear and replace
Pressure switch out of calibration-----	Replace pressure switch

### **No water flows from tap when turned on**

No water flowing-----	Ensure water supply or pumps are on
Water supply is obstructed-----	Check screens and aerators for obstructions and remove
Inlet outlet lines are reversed-----	If the lines are reversed correct their installation

### **Water Heater comes on but cycles on and off erratically**

Flow is too low to keep water heater operating-----	Check screens and aerators for obstructions and remove
Pump is not functioning properly-----	Repair or replace water pump
Water flow is cycling with the pump-----	A pressure accumulator tank is needed in the water heater.
Air is in the water lines-----	Bleed air from water lines by turning on all the water taps

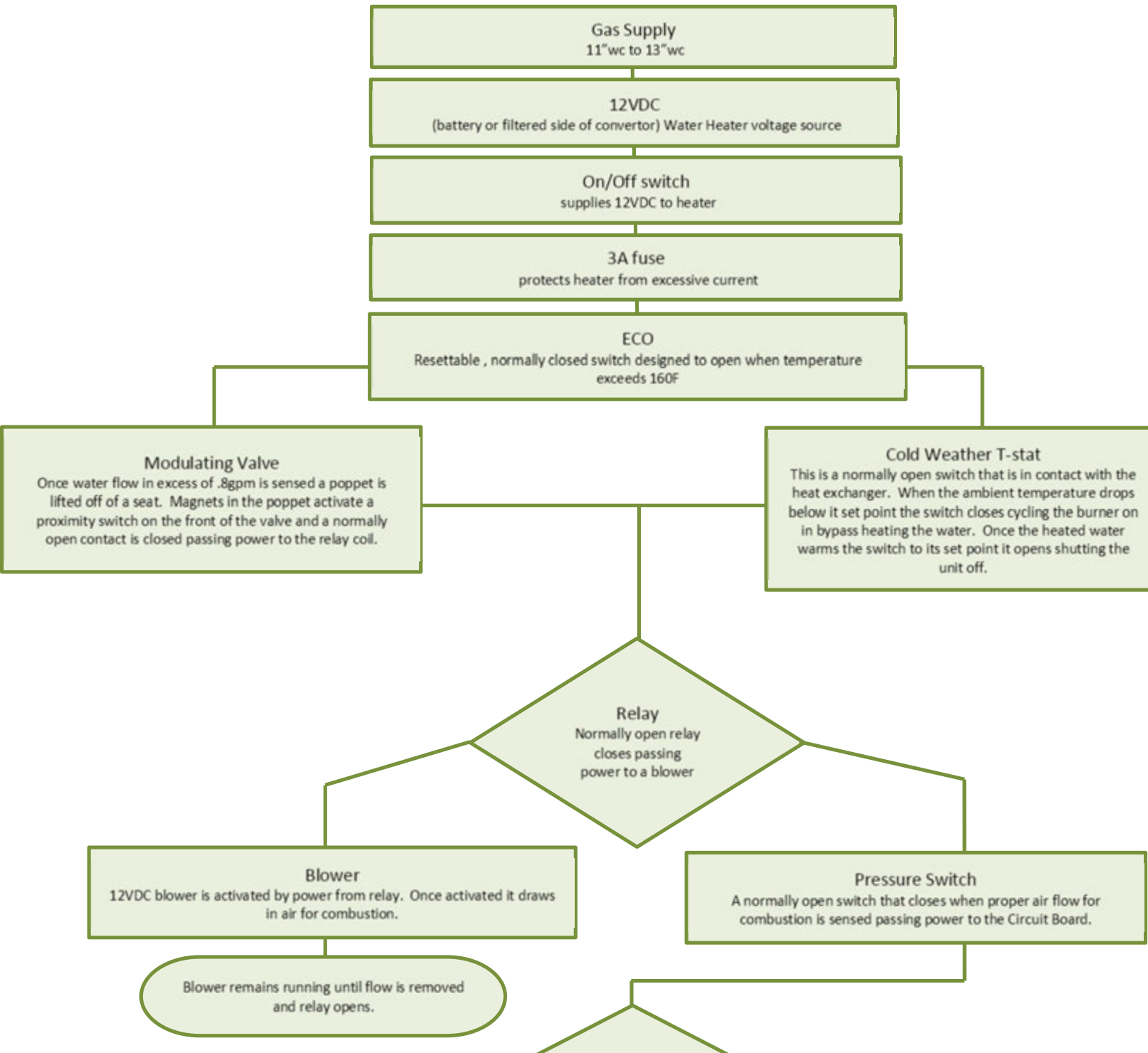
### **Burner ignites but water temperature is too low**

Water flow is too high-----	If water flow is above 1.75gpm reduce flow to this rate or below
Inlet water is too cold (below 45F)-----	Water below this temperature may exceed the capacity of the water heater
Low gas pressure-----	Heater should be supplied 11"wc if not examine/change tank regulator
Heater door louvers/flue obstructed-----	Remove obstruction
Gas piping undersized for application-----	Gas line under 3/8" diameter
Piping longer than 30'-----	Locate ODWH closer to fuel source
Regulator orifice too small for application-----	Replace regulator
Modulating valve set incorrectly-----	Modulating valve set to summer in the winter, see IOM to adjust setting
Modulating valve not reaching high burn-----	Open hot water valve to highest flow then adjust down to optimal temperature

### **Burner ignites but water temperature is too low**

Propane tank regulator is set incorrectly-----	Regulator set above 13"wc adjust regulator to proper setting
Incorrect manifold pressure-----	Verify manifold pressure and adjust regulator

# ODWH Sequence of Operations



### Electrode

Is an ignition source to ignite gas flow. If the electrode does not sense flame in 6-8 seconds it sends a signal to the board to remove power from the gas valve. If this occurs 3 times the board then goes into a lock-out state requiring the on/off switch to be cycled to reset the system.

Once the burner lights the electrode continues to act as a safety device sensing the presence of flame. If the flame is removed the electrode signals the boards to close the gas valve.

### Gas Valve

The board sends voltage to the gas valve (min 10.5VDC) allowing it to open and gas to flow through gas poppet in the modulating valve.

### Burner Assembly/Manifold

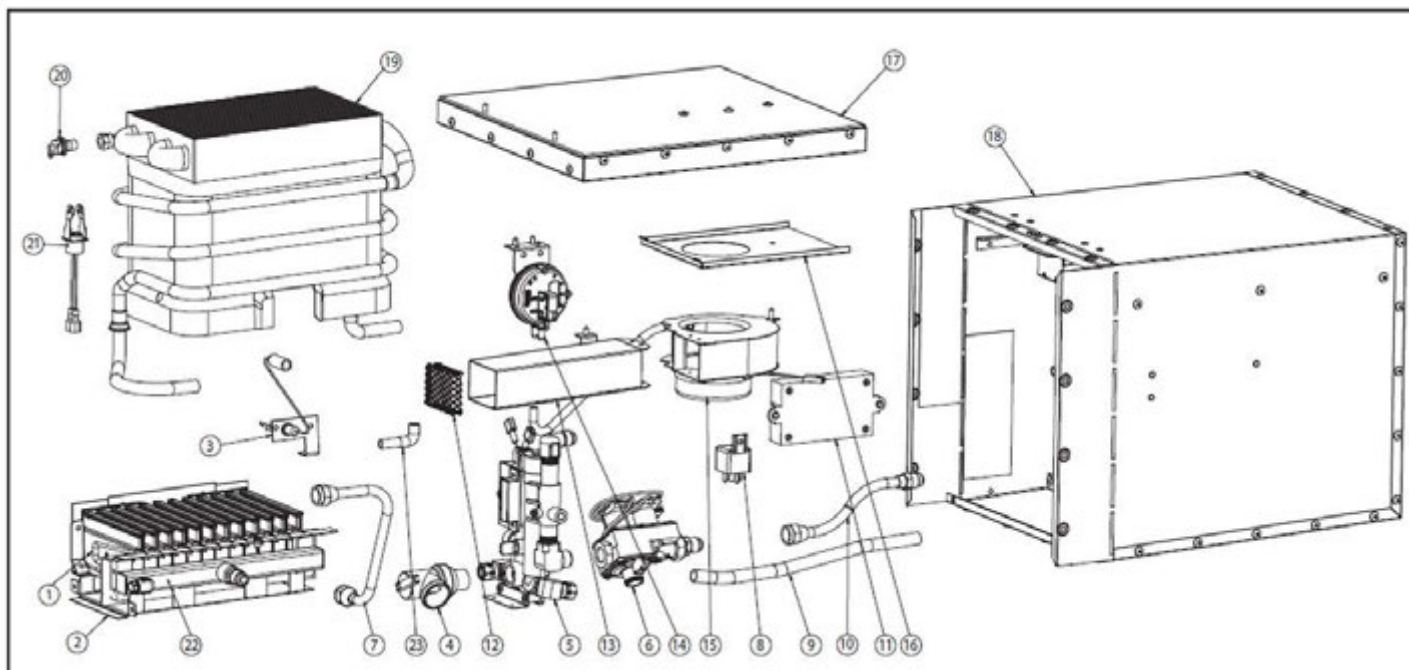
Once gas flows through the modulating valve gas poppet it is carried to the burner assembly where it is ignited as it comes out the burner ribbons. The power blower then draws the heat and exhaust gases upward through the flue.

### Heat Exchange

The heat exchange is attached to the burner assembly. It has water running through copper tubing on its exterior. As the heat is drawn upward by the blower through the interior of the heat exchanger this heat is transferred to the water giving the hot water that we will then use.

Conclusion





ITEM	DESCRIPTION	PART #
1	Burner Assy (50,000 BTU)	90264
2	Burner Mounting Bracket	90265
3	Igniter	90266
4	Pressure Relief Valve (PRV)	90267
5	Modulating Valve Assembly	90268
6	Gas Valve	90269
7	Gas Line – Burner	90270
8	Relay	90271
9	Water Inlet Tube	90272
10	Gas Inlet Tube	90273
11	Ignition Control	90274
12	Flue Outlet Screen	90275
13	Flue Tube	90276
14	Pressure Switch	90277
15	Blower Assembly	90278
16	Fan Base	90279
17	Flue Hood Assembly	90280
18	Case Assembly	90281
19	Heat Exchanger	90282
20	ECO	90283
21	Low Temperature Switch Kit	90346

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Over the years of running a mobile RV repair service, having a dedicated place to access service manuals for all the different appliances and components found on RVs was something that I always had a desire to create.

I hope this resource makes your RV repairs easier, as it has mine, but please be careful and follow proper safety practices when attempting to repair your own RV.

If in doubt, please consult with a professional RV technician!



DARREN KOEPP - OWNER, MY RV WORKS, INC.

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