

# OPERATING, INSTALLATION AND SERVICE MANUAL

## FOR INSTALLATION IN RECREATIONAL VEHICLES AND MOBILE HOUSING

### GAS AND ELECTRIC WATER HEATER

#### FOR YOUR SAFETY

##### WHAT TO DO IF YOU SMELL GAS

1. DO NOT TRY TO LIGHT ANY APPLIANCE.
2. DO NOT TOUCH ANY ELECTRIC SWITCH; DO NOT USE ANY PHONE IN YOUR BUILDING.
3. IMMEDIATELY CALL YOUR GAS SUPPLIER FROM A NEIGHBOR'S PHONE. FOLLOW THE GAS SUPPLIER'S INSTRUCTIONS.
4. IF YOU CANNOT REACH YOUR GAS SUPPLIER, CALL THE FIRE DEPARTMENT.

#### FREEZE WARNING

DRAIN HEATER IF SUBJECT TO FREEZING TEMPERATURES.

**WARNING:** IMPROPER INSTALLATION, ADJUSTMENT, ALTERATION, SERVICE OR MAINTENANCE CAN CAUSE INJURY OR PROPERTY DAMAGE. REFER TO THIS MANUAL. FOR ASSISTANCE OR ADDITIONAL INFORMATION CONSULT A QUALIFIED INSTALLER, SERVICE AGENCY OR THE GAS SUPPLIER.

#### FOR YOUR SAFETY

DO NOT STORE OR USE GASOLINE, OR OTHER COMBUSTIBLE MATERIALS OR LIQUIDS NEAR OR ADJACENT TO THIS HEATER OR ANY OTHER APPLIANCE. THIS APPLIANCE SHALL NOT BE INSTALLED IN ANY LOCATION WHERE FLAMMABLE LIQUIDS OR VAPORS ARE LIKELY TO BE PRESENT.

AN ODORANT IS ADDED TO THE GAS USED BY THIS WATER HEATER.

INSTALLER: AFFIX THESE INSTRUCTIONS TO OR ADJACENT TO WATER HEATER.  
OWNER: RETAIN THESE INSTRUCTIONS AND WARRANTY FOR FUTURE REFERENCE.

ALL TECHNICAL AND WARRANTY QUESTIONS SHOULD BE DIRECTED TO THE COMPANY LISTED ON THE WARRANTY, OR RATING PLATE WHICH CAME WITH YOUR WATER HEATER.



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Dayton, Tennessee 37321

## INSTALLATION REQUIREMENTS

This installation must conform with the requirements of the authority having jurisdiction or, in the absence of such requirements, with the latest National Fuel Gas Code, ANSI Z223-1974, and American National Standard for Recreational Vehicles 501/C-1977.

In Canada, the installation should conform with the following standards:

### A. For Installation in Recreational Vehicles

1. Gas - CSA standard CSA Z240.4.2 Installation Requirements for Propane Appliances and Equipment in Recreational Vehicles.
2. Electrical - CSA standard C22.2 No.148/Z240.6.2 Electrical Requirements For Recreational Vehicles.
3. Plumbing - CSA Standard CSA Z240.3.2 Plumbing Requirements for Recreational Vehicles.

### B. For Installation in Mobile Housing.

1. Gas - CSA Standard CSA Z240.4.1 Installation Requirements For Gas Burning Appliances and Equipment in Mobile Homes.
2. Electrical - CSA Standard CSA C22.1 Canadian Electrical Code Part 1.
3. Plumbing - CSA Standard CSA Z240.3.1 Plumbing Requirements for Mobile Homes.

Au Canada, l'installation doit satisfaire aux normes suivantes:

### A. Pour installation dans les vehicules de loisir

1. Gaz - Norme ACNOR Z240.4.2 Exigences d'installation des appareils et de l'equipement a propane dans les vehicules de loisir.
2. Electricite - Norme ACNOR C22.2 No. 148/Z240.6.2 Exigences electriques des vehicules de loisir.

### 3. Plomberie - Norme ACNOR Z240.3.2 Exigences de plomberie des vehicules de loisir.

### B. Pour Installation Dans Une Maison Roulante

1. Gaz - Norme ACNOR Z240.4.1 Exigences d'installation des appareils et de l'equipement a gaz dans les maisons roulantes.
2. Electricite - Norme ACNOR C22.1 Premiere partie du Code electrique Canadien.
3. Plomberie - Norme ACNOR Z240.3.1 Exigences de plomberie des maisons roulantes.

- (1) The appliance shall be disconnected from the gas supply piping system during any pressure testing of that system.
- (2) The appliance and its gas connection shall be leak tested before placing the appliance in operation.
- (3) All air for combustion must be supplied from outside the structure. Air for combustion must not be supplied from occupied spaces.

## INSTALLATION INSTRUCTIONS

Minimum clearance from combustible construction on sides, top, floor and rear = 0". Provide room for access to rear of heater for servicing.

Degagement minimal de constructions combustibles sur les cotes, le dessus, le plancher et a l'arriere = 0 pouces. Prevoyez suffisamment d'espace pour qu'un technicien puisse avoir acces & l'arriere du chauffe-eau.

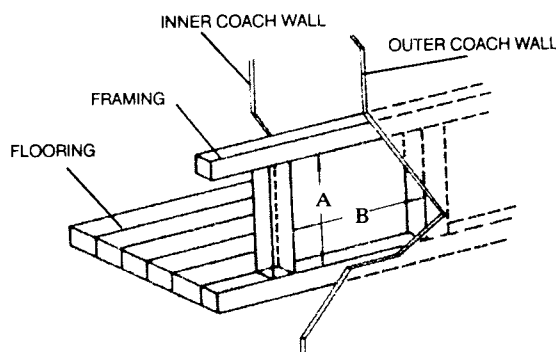


FIGURE 1

(1) Provide an opening flush with floor in outer wall of coach as shown. Wall of coach should be framed as shown in Figure 1. When the water heater is installed directly on carpeting, tile or other combustible material, other than wood flooring, the water heater shall be installed on a metal or wood panel, at least 2 inches greater than the width and length of the water heater. If you prefer, you may cut away the carpet or flooring material, if other than wood, from underneath the water heater and extending 2 inches beyond the width and length of the water heater.

Quand le chauffe-eau est installé directement sur le tapis, la tuile, ou sur autre matière combustible autre que parquet de bois, le chauffe-eau aura installé sur panneau du métal ou de bois au moins que deux pouces plus grand que la largeur et la longueur du chauffe-eau. Si vous préférez, vous pouvez couper le tapis ou matière du parquet, si n'est pas bois, d'au-dessous du chauffe-eau et étendant deux pouces de la largeur et la longueur du chauffe-eau.

(2) Maintain inside dimensions listed below.

Model	A	B
3 Gal	12 3/4"	12 3/4"
6 Gal	12 3/4"	12 3/4"
8 Gal	12 3/4"	12 3/4"
10 Gal	16 1/4"	16 1/4"

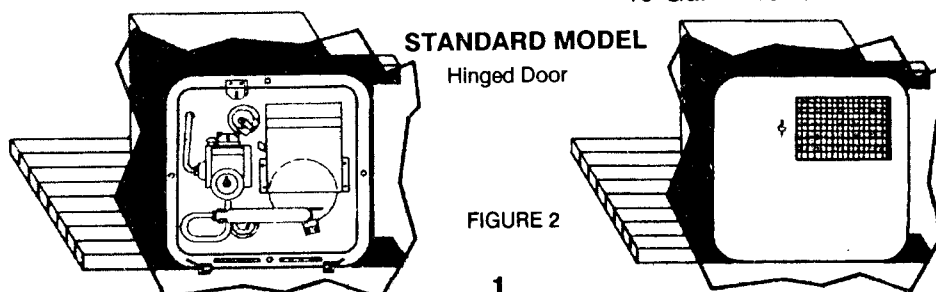


FIGURE 2

(3) Insert heater into framed opening. Place caulking sealant between heater flange and outer wall of the coach to insure a water-tight bond. Secure heater to wall using twelve No. 8 X 3/4" wood screws, screwed through holes in front mounting panel of heater.

(4) To install door, slip one hinge pin into slot on each side of door, then insert other end of hinge pins behind spring brackets on heater frame. Close door so that latch protrudes through slot in door. Turn latch 90 degrees to fasten the door.

## FLUSH MOUNT MODEL

(Separate Door Frame)

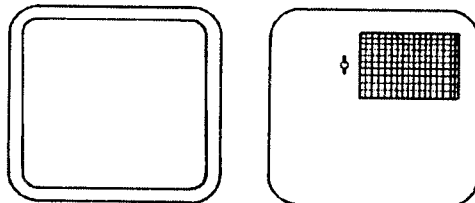


FIGURE 3

(1) Insert heater into the framed opening. Front of housing should be flush with outside wall. Secure to coach with nails at bottom and sides of control housing compartment. Place caulking to inside of housing frame into housing compartment and secure with three #10-24 x 3 1/2 screws.

(2) To install door, locate holes in bottom of door over pins on the lower control housing frame. Close door so that the latch protrudes through the slot in the door. Turn latch 90 degrees to fasten the door.

## REAR CONNECTIONS

(1) Connect water lines to fittings provided, 1/2" NPT female pipe threads.

(2) Connect 3/8" flare fitting gas supply piping to gas connection supplied with heater. Turn on gas and check systems for leaks, using soap and water solution. Be sure there are no gas leaks.

(3) Fill tank with water. Open hot water faucet to expel air from tank. When tank is filled, turn off faucet and check for leaks at connections.

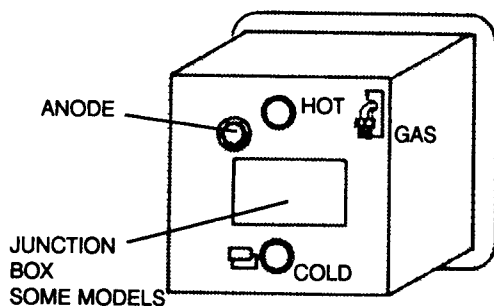


FIGURE 4

## INSTALLATION OF MOTOR AID HEAT EXCHANGER

- (1) Place copper "Y"s in heater as shown in sketch.
- (2) Secure hoses to "Y"s with hose clamps.
- (3) Attach hose from motor-aid heat exchanger to "Y"s.
- (4) Secure hoses to motor-aid and "Y"s with clamps.
- (5) Check all connections for water leaks and proper water circulation through motor-aid heat exchanger, with engine running.

The motor-aid heat exchanger is designed to operate safely and efficiently for an indefinite period of time and should require no maintenance. Be sure to check your heater hoses for cracks after the first year of operation, since a cracked or broken hose could cause a great deal of inconvenience on an outing.

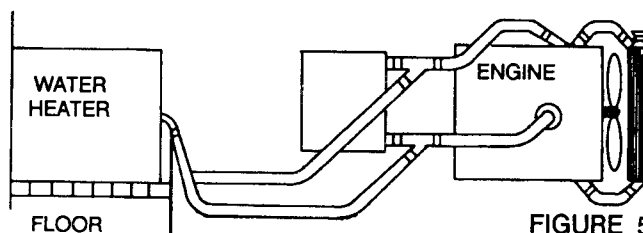


FIGURE 5

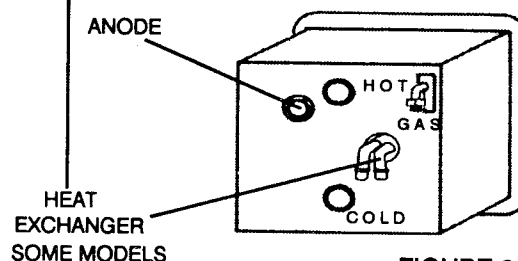


FIGURE 6

## ELECTRICAL CONNECTIONS (120V AC)

Make sure water heater is filled with water before making electrical connections. Check rating plate and wiring diagram before proceeding. Install a fused safety switch or circuit breaker of adequate capacity between heater and electrical power source. Attach the black and white wires from the fused switch or breaker to corresponding colored wires in heater junction box. A green wire from a well grounded source must be attached to the green screw in the junction box, see figure 4.

In Canada, the electrical installation should conform with CSA standard CSA C22.2 No.148/Z240.6.2 Electrical requirements for Recreational Vehicles and CSA C22.1 Canadian Electrical Code Part I when installing the unit in recreational vehicles and mobile homes respectively.

Au Canada, l'installation électrique doit satisfaire à la norme ACNOR 22.2 N 148/Z240.6.2. Exigences électriques des

vehicules de loisir ou a la norme ACNOR C22.1 Premiere partie du Code electrique Canadien selon que l'appareil est installe dans un vehicule deloisir ou une maison roulante.

## WIRING DIAGRAM (120 VAC)

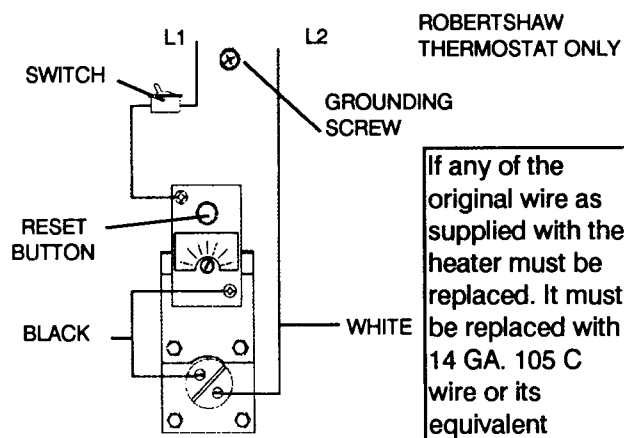


FIGURE 7

## RE-IGNITOR DIAGRAMS

### (RE-IGNITOR MODULE)

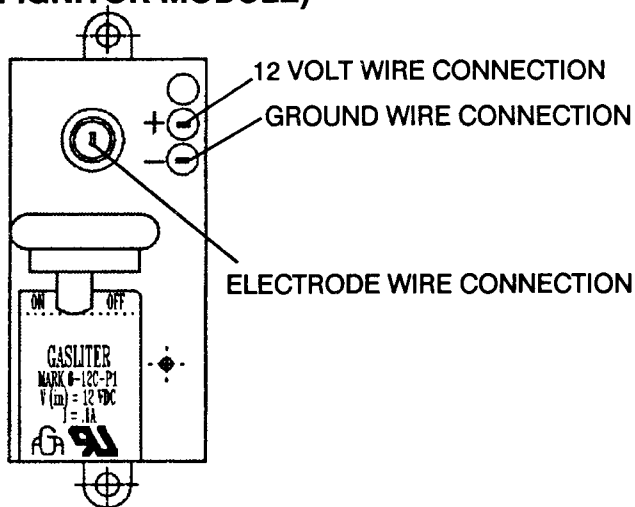


FIGURE 8

### (RE-IGNITOR ASSEMBLY)

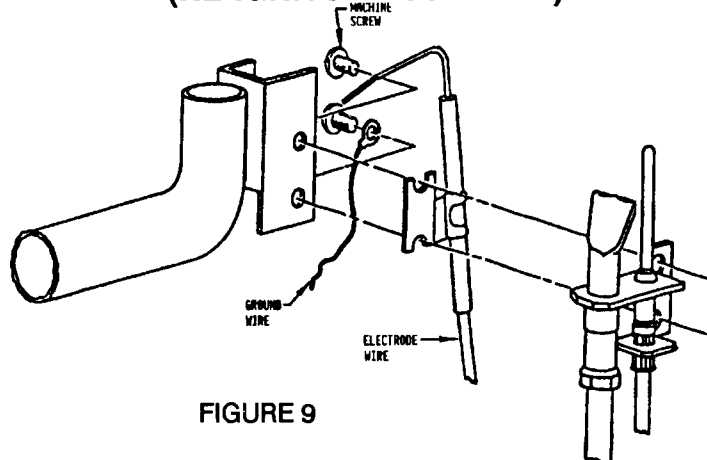


FIGURE 9

## (TOP VIEW RE-IGNITOR AND PILOT)

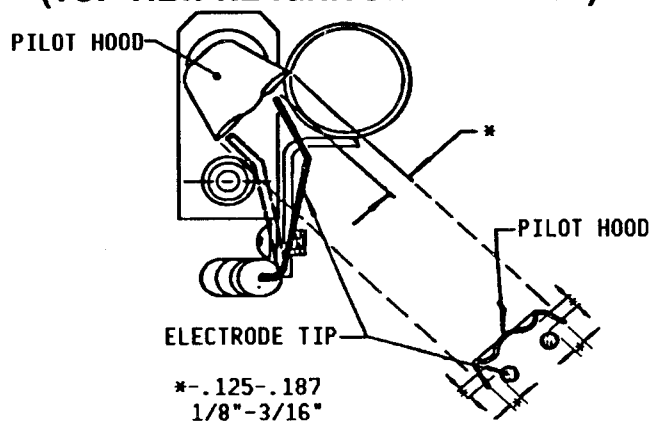


FIGURE 10

## AIR SHUTTER ADJUSTMENT INSTRUCTIONS-LARGE BURNER

1. Turn Air Shutter (B) to obtain proper blue flame

### 2. PARTS:

- A-BURNER TUBE
- B-AIR SHUTTER
- C-GAS COCK
- D-RESET BUTTON
- E-PILOT ADJUSTMENT
- F-TEMPERATURE INDICATOR
- G-SPRING

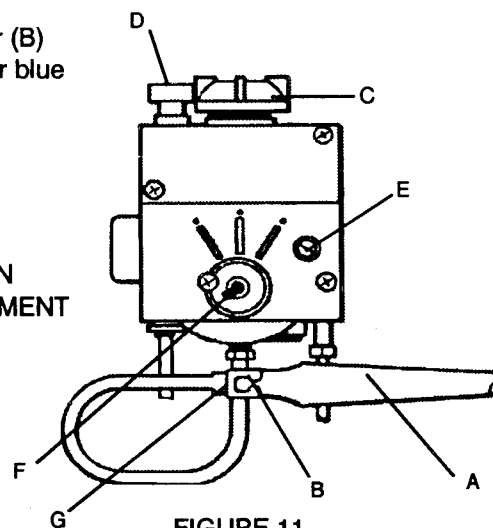


FIGURE 11

## AIR SHUTTER ADJUSTMENT INSTRUCTIONS-SMALL BURNER

1. Loosen nut and bolt (G)
2. Slide air shutter (B) to the right or left to obtain the proper blue flame.
3. Secure nut and bolt.
4. PARTS:

- A-BURNER TUBE
- B-AIR SHUTTER
- C-GAS COCK
- D-RESET BUTTON
- E-PILOT ADJUSTMENT
- F-TEMPERATURE INDICATOR
- G-NUT AND BOLT

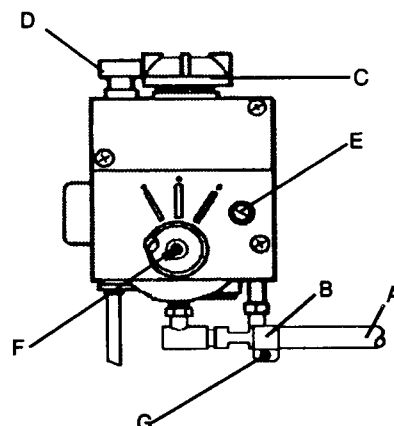


FIGURE 12

## BURNER ADJUSTMENT

All air shutters are preset at the factory to obtain a blue or orange-blue flame. If necessary to adjust your air shutter be sure to keep this color and do not allow burner to burn yellow or sooting will occur.

In cases where sooting has occurred, there is a possibility that this condition may be corrected by making the correct air shutter adjustment. If the burner flame continues to burn yellow after adjusting the air shutter, check, for an obstruction in the burner or the flue box. A stiff brush is recommended for the removal of soot deposits. If the water heater pilot and burner are both burning properly (orange-blue flames) check to make sure the thermostat is shutting off clean. This can be done by turning the temperature dial all the way to the left (counter-clockwise). When this is done, the gas should shut off completely.

### PROPER PILOT AND BURNER FLAME

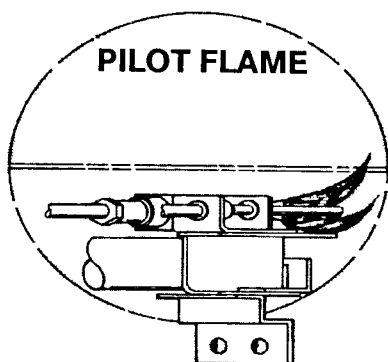


FIGURE 13

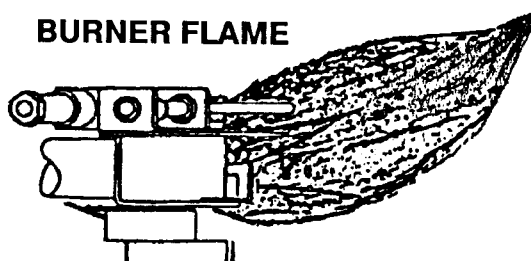


FIGURE 14

Periodically check burner flames visually, compare with sketch above. Periodically check control compartment and screen in door to see that no foreign material has accumulated to prevent flow of combustion and ventilating air.

Since the cost including installation of a thermocouple is relatively small, it is a good practice to replace it in cases where the pilot does not stay lit. If the pilot fails to stay lit after the thermocouple has been replaced, the chances are high that the electro-magnet in the control, or in the built in E.C.O. (energy cut-off device) is defective. In such cases the easiest solution is to replace the control. If desired, the control components, either the magnet or the ECO, may be checked before replacing the control.

## IMPORTANT WARNING

**Make sure water heater is filled with water before power is turned on. Even momentary operation of heater without water in it will burn out the element.**

NOTE: Always open both the cold and hot water faucets when filling vehicle water tank to allow air pockets to be forced out of the water heater. When water flows from the heater faucets, close both faucets.

## WATER TEMPERATURE REGULATION

The thermostat is adjusted to it's lowest temperature position when shipped from the factory. Adjusting the temperature past the 130 degrees F position will increase the risk of scald injury. Vehicles with small children or invalids may require a lower temperature setting.

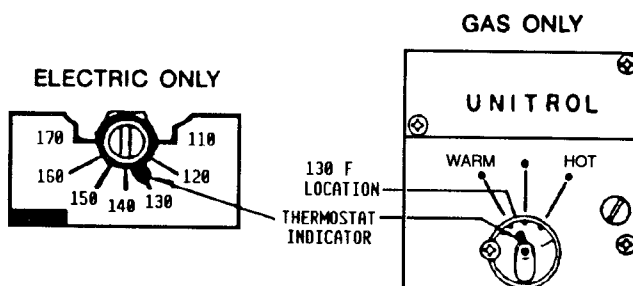


FIGURE 15

## SAFETY INSTRUCTIONS

Should overheating occur, or the gas supply fail to shut off, shut off the manual gas valve to the appliance before shutting off the electrical supply.

Do not use this appliance if any part has been submerged under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control that has been submerged under water.




## DRAINING AND STORAGE INSTRUCTION

If RV is to be stored during winter months, the water heater must be drained to prevent damage from freezing.

- (1) Turn off electrical power and gas to water heater.
- (2) Turn off pressure pump on water system.
- (3) Open both hot and cold water faucets.
- (4) Open drain on water heater.
- (5) Follow RV manufacturer's instructions for draining entire water system.

NOTE: Be certain to refill water heater with water before re-lighting, or turning on electrical power.

## LIGHTING INSTRUCTIONS FOR REIGNITOR CONTROL

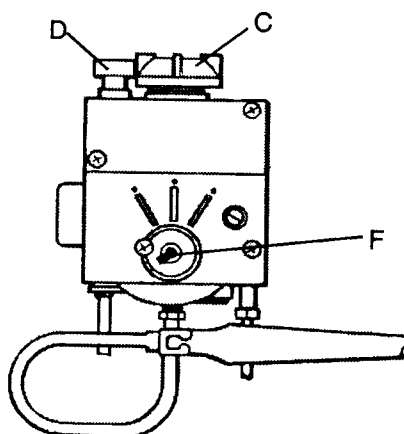
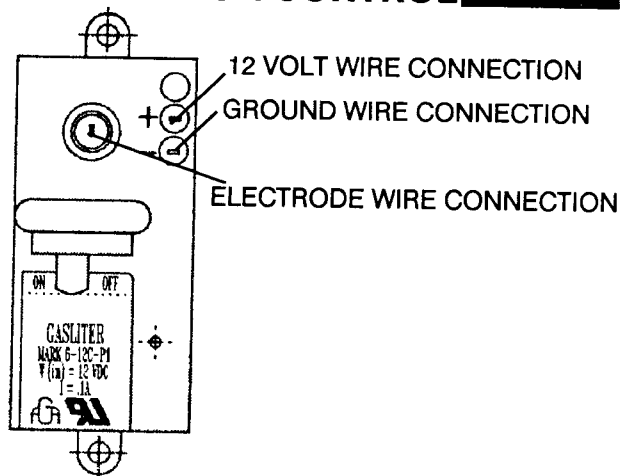
- (1) STOP Read the safety information provided on page 5.
- (2) Place re-ignitor control in the "OFF" position.
- (3) Turn gas cock (C) clockwise  to "OFF" position and temperature indicator to the lowest setting.
- (4) Turn off all electrical power to the appliance.
- (5) Wait five (5) minutes for gas to clear the area. If you smell gas then, STOP! Follow instructions in item "B" of the safety information (Page 5). If you don't smell gas, to next step.
- (6) Turn gas supply on.
- (7) Turn on electrical power to the appliance.
- (8) Turn gas cock (C) counter clockwise  to "pilot" position, press reset button (D), and switch the electric re-ignitor module to "ON" position. Spark will start between electrode tip and pilot hood.
- (9) When pilot lights, the spark will stop. Continue depressing reset button (D) for approximately one minute or until pilot light remains lit. On initial start-up, it may take several minutes before the pilot lights in order to purge the air from the gas lines.
- (10) Turn gas cock (C) counter clockwise  to "ON" position.
- (11) Set temperature dial (F) to desired setting. (Caution: Setting the temperature dial past the 130 degrees F location will increase the risk of scald injury. Small children or invalids may require a lower temperature setting.)

### NOTES:



(1) When the re-ignitor switch is in the "ON" position, the re-ignitor will operate automatically when the pilot flame is extinguished.

(2) When the vehicle is to be stored or the LP gas supply is to be turned off, be sure to turn the re-ignitor control switch to the "OFF" position. This will prevent the battery from being discharged (the re-ignitor will continue sparking.)

(3) The re-ignitor has an alarm which will sound when the pilot is extinguished or if the LP supply is turned off. The alarm will serve as a reminder to turn off the re-ignitor.



## TO TURN OFF WATER HEATER

- (1) Turn temperature dial (F) counter clockwise  to lowest setting.
- (2) Turn off the re-ignitor.
- (3) Turn off electrical power to the appliance.
- (4) Turn gas cock (C) clockwise  to the "OFF" position.
- (5) If vehicle is to be stored or heater is going to be turned off while subject to freezing temperatures, drain water heater (see DRAINING AND STORAGE INSTRUCTIONS Page 4).

## TROUBLE SHOOTING GUIDE

This can be used as a guide that will enable you to solve most of the problems that the customer could have with this water heater.

SOOTING	PILOT WILL NOT COME ON	NO HOT WATER/ PILOT WILL NOT STAY ON	NOT ENOUGH HOT WATER	WATER TOO HOT	POSSIBLE CAUSE
	X				POSSIBLE MALFUNCTION OF THE BOTTLED GAS REGULATOR
	X	X			LINT IN PILOT AIR OPENING
		X			LOOSE OR INOPERATIVE THERMOCOUPLE
	X	X			CLOGGED PILOT ORIFICE
		X			IMPROPER PILOT FLAME
			X		THERMOSTAT SETTING TOO LOW
			X		MAIN BURNER ORIFICE TOO SMALL OR CLOGGED
				X	THERMOSTAT SETTING TOO HIGH
				X	PILOT FLAME ADJUSTMENT TOO HIGH
X					THERMOSTAT NOT SHUTTING OFF COMPLETELY
X					YELLOW PILOT DUE TO IMPROPER SETTING
X					YELLOW FLAME DUE TO IMPROPER AIR SHUTTER ADJUSTMENT
X					LINT OR DIRT IN PILOT OR PILOT ORIFICE
X					LINT OR DIRT IN BURNER TUBE
X					LEAVES OR OTHER OBSTRUCTIONS IN FLUE BOX

## ELECTRICAL MAINTENANCE AND SERVICE ANALYSIS GUIDE

Electric water heaters are designed to operate with a minimum amount of service problems, and with proper operation and care can be expected to outlast other types of water heaters similar in size.

The most common trouble with electric water heaters results from energizing the heater before it is filled with water. Even momentary operation of the heater without water in it will burn out the heating element and render the heater inoperative.

**CAUTION: POWER MUST BE TURNED OFF BEFORE DRAINING THE TANK.**

If the heater is full of water (check this by running water from the hot water faucet) and the water fails to heat, always check the following items before requesting service or parts:

(1) Check incoming power to make sure 120 volt AC electricity is available.

(2) Check the circuit breaker in the coach to make sure it has not tripped.

(3) Remove the water heater electrical access cover and press the red reset button on the heater. (NOTE: Power should be turned off when removing the door cover.)

(4) If, after pressing the reset button and turning the power back on, the heater still fails to operate the power should be turned off and all wires and connections should be checked to make sure they are not loose.

(5) After the first four steps have been followed, the heating element should be checked for continuity with an amprobe or other testing device. If the element is defective, it can be replaced with any other 120 volt AC element of the same or lower wattage as shown on the water heater instruction decal, provided, of course, its mounting holes and gasket will adjust to the element mounting bracket on the water heater. Secondary problems with electric water heaters are rare; however, they can be corrected by minor thermostat adjustments. If the water heater becomes too hot and activates the reset control, reset by pressing the red reset button.

If the foregoing procedures are followed carefully, it should rarely be necessary to seek outside service or parts. If service or parts are required, contact Suburban Manufacturing CO. or any of the factory representatives listed in the manual, or return the defective part(s) to the factory for replacement.

This water heater will operate with a minimum of attention. Should occasion arise that the water be drained, be certain to turn off the gas and power to the water heater, close the valve on the cold water inlet supply and open the hot water faucet to allow air to enter the system.

In cases where the water is too hot and the high limit control is not shutting off the heater, it is possible that the thermostat is loose from the holding bracket and is not being held tightly against the tank. This condition can be detected by applying slight hand pressure to the thermostat, but make sure the power is off. To remedy this problem, remove the bracket and bend it slightly so that it will hold the thermostat against the tank. Make sure that the insulation is covering the thermostat completely.

In Canada, the electrical installation should conform with CSA standard CSA C22.2 No. 148/Z240.6.2 Electrical requirements for Recreational Vehicles and CSA C22.1 Canadian Electrical Code Part 1 when installing the unit in recreational vehicles and mobile homes respectively.

Au Canada, l'installation électrique doit satisfaire à la norme ACNOR 22.2N 148/Z240.6.2. Exigences électriques des véhicules de loisir ou à la norme ACNOR C22.1 Première partie du Code électrique Canadien selon que l'appareil est installé dans un véhicule de loisir ou une maison roulante.

## TEMPERATURE AND PRESSURE RELIEF VALVE

The temperature and pressure relief valve is designed to open if the temperature of the water within the heater reaches 210 degrees F, or if the water pressure in the heater reaches 150 pounds. Recreational vehicle water systems are closed systems and during the water heating cycle, the pressure build-up in the water system will reach 150 pounds. When this pressure is reached, the pressure valve relief will open and water will drip from the valve. This dripping will continue until the pressure is reduced to below 150 pounds and the valve closes. This condition is normal and does not indicate a defective relief valve. Do not plug, cap or reduce the outlet of the pressure and temperature relief valve.

## ANODE PROTECTION

The tank in this water heater is protected by a magnesium or aluminum anode to prolong the life of the tank. Removal of the anode will decrease tank life and will void the warranty on 10 the inner tank.

## ODOR FROM HOT WATER SYSTEM

Odor from the hot water system is not a service problem, and many water supplies contain sufficient amounts of sulphur to produce an odor. The odor is similar to rotten eggs and is often referred to as "sulphur water". Sulphur water is not harmful - only unpleasant to smell. Sulphur water can be caused by a chemical action or by bacteria. The solution to eliminate is heavy chlorination of the water system. Add about six ounces of chlorine (common household liquid bleach) to each 10 gallons in the water tank. Then run the heavily chlorinated water throughout the system, opening each faucet one at a time until you smell the chlorine. Let the RV sit for a few days and the chlorine should take care of the problem. Then you'll need to take care of the chlorine. If you don't have a water filtration system that removes chlorine, you'll have a problem getting rid of the chlorine taste. You might consider adding such a system because it allows you to keep the water chlorinated, and this prevents several problems, including sulphur water. Chlorination also takes care of other types of bacteria and viruses.

## SAFETY

This water heater thermostat is constructed with a built-in safety shut off designed to shut off the gas supply to the main burner and pilot burner in the event the pilot flame is extinguished for any reason. The thermostat is also equipped with a high temperature limit switch (ECO). The Energy Cut Off will shut off all gas supplied to the burner and pilot burner in the event the water temperature exceeds 180 degrees F. The Energy Cut Off switch is a single use switch and is not field replaceable. Should the Energy Cut Off function (open), the thermostat must be replaced before the water heater can be placed in operation again.

Contact your dealer for service. All service work must be done by a qualified service agency.

Le commutateur d'arrêt de tension (Energy Cut Off) est un commutateur à usage unique et ne peut être remplacé sur place. En cas de mise en marche du commutateur d'arrêt de tension, le thermostat doit être remplacé avant de pouvoir faire fonctionner à nouveau le chauffe-eau.