

INSTALLATION, OPERATION, AND SERVICE MANUAL

POLARIS

HIGH EFFICIENCY GAS WATER HEATER

THESE INSTRUCTIONS ARE INTENDED AS AN AID TO QUALIFIED SERVICE PERSONNEL FOR PROPER INSTALLATION, ADJUSTMENT AND OPERATION OF THIS WATER HEATER. READ THESE INSTRUCTIONS THOROUGHLY BEFORE ATTEMPTING INSTALLATION OR OPERATION. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN IMPROPER INSTALLATION, OPERATION, SERVICE OR MAINTENANCE, POSSIBLY RESULTING IN FIRE, ELECTRICAL SHOCK, SCALD INJURY, CARBON MONOXIDE POISONING, EXPLOSION, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

INSTALLER:

- ATTACH THESE INSTRUCTIONS TO OR ADJACENT TO THE WATER HEATER.
- BEFORE LEAVING THE PREMISES REVIEW THIS OPERATION AND SERVICE MANUAL TO BE SURE THE HEATER HAS BEEN INSTALLED CORRECTLY. START AND OPERATE THE UNIT FOR ONE COMPLETE CYCLE AND MAKE SURE THE WATER TEMPERATURE IS ACCEPTABLE TO THE CONSUMER AT THE FIXTURES.

OWNER:

- RETAIN THESE INSTRUCTIONS AND WARRANTY FOR FUTURE REFERENCE. RETAIN THE ORIGINAL RECEIPT AS PROOF OF PURCHASE.

THIS MANUAL IS NOT TO BE USED WITH GAS STORAGE TYPE WATER HEATERS CERTIFIED FOR INSTALLATION IN MANUFACTURED HOMES (MOBILE HOMES).

WARNING

AN ODORANT IS ADDED BY THE GAS SUPPLIER TO THE GAS USED BY THIS WATER HEATER. THIS ODORANT MAY FADE OVER AN EXTENDED PERIOD OF TIME. DO NOT DEPEND UPON THIS ODORANT AS AN INDICATION OF LEAKING GAS. IF A GAS LEAK IS SUSPECTED, CHECK FOR LEAKS BY USING A CHLORIDE-FREE SOAP AND WATER SOLUTION, OR OTHER APPROVED METHOD. IF A LEAK CANNOT BE FOUND BUT IS STILL SUSPECTED, FOLLOW THE STEPS UNDER "WHAT TO DO IF YOU SMELL GAS" AS OUTLINED ON THIS PAGE. FAILURE TO OBSERVE THIS WARNING COULD RESULT IN PROPERTY DAMAGE, PERSONAL INJURY, OR DEATH.

WARNING

THIS WATER HEATER MUST BE BRACED, ANCHORED, OR STRAPPED TO AVOID FALLING OR MOVING DURING AN EARTHQUAKE. CONTACT LOCAL UTILITIES FOR CODE REQUIREMENTS IN YOUR AREA OR CALL THE 800 NUMBER SHOWN ON FRONT OF THIS MANUAL AND REQUEST INSTRUCTIONS 6600933 FOR EXAMPLES.

 Recognize this symbol as an indication of Important Safety Information.

WARNING: If the information in these instructions is not followed exactly, a fire or explosion may result causing property damage, personal injury or death.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any telephone in your building.
- Immediately call your gas supplier from a neighbor's telephone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

Installation and service must be performed by a qualified installer, service agency or the gas supplier.

TO OBTAIN TECHNICAL, WARRANTY OR SERVICE ASSISTANCE DURING OR AFTER THE INSTALLATION OF THIS WATER HEATER, CALL TOLL FREE:

1-800-456-9805

WHEN CALLING FOR ASSISTANCE, PLEASE HAVE THE FOLLOWING INFORMATION READY:

1. MODEL NUMBER
2. 7 DIGIT PRODUCT NUMBER
3. SERIAL NUMBER
4. DATE OF INSTALLATION

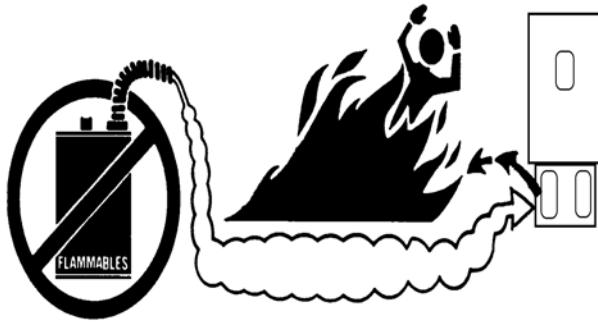


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March 2000

Supersedes 6510166

⚠ DANGER



⚠ Vapors from flammable liquids will explode and catch fire causing death or severe burns.

Do not use or store flammable products such as gasoline, solvents or adhesives in the same room or area near the water heater.

Keep flammable products:

1. far away from the water heater,
2. only in approved containers,
3. tightly closed, and
4. out of children's reach.

This water heater has a main burner and automatic ignition system.

The ignition system:

1. can come on at any time.
2. will ignite flammable vapors.

Vapors:

1. cannot be seen,
2. are heavier than air
3. go a long way on the floor, and
4. can be carried from other rooms to the pilot flame by air currents.

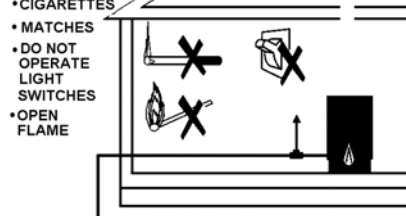
Do not install this heater where flammable products will be stored or used unless the main burner and pilot flames are at least 18 inches above the floor. This will reduce but not eliminate the risk of vapors being ignited by the main burner or pilot flame.

⚠ DANGER

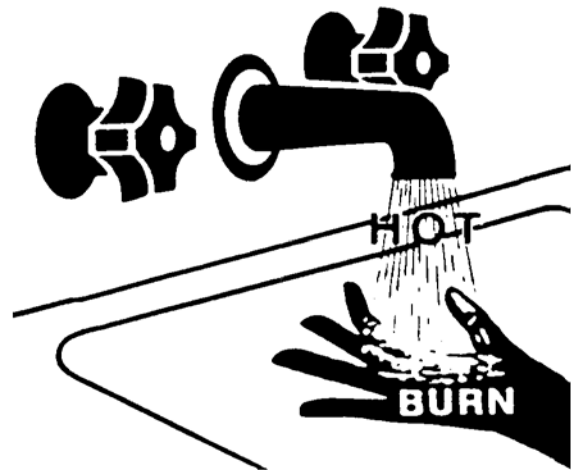
DO NOT USE THIS WATER HEATER WITH ANY GAS OTHER THAN THE ONE LISTED ON THE DATA PLATE. This water heater is equipped for use with one type gas only. **CHECK THE DATA PLATE ON THE WATER HEATER JACKET FOR THE CORRECT GAS. FAILURE TO USE THE CORRECT GAS CAN CAUSE PROBLEMS WHICH CAN RESULT IN DEATH, SERIOUS BODILY INJURY OR PROPERTY DAMAGE.** If you have any questions or doubts consult your gas supplier or gas utility company. Water heaters using bottled propane or liquefied petroleum gas (LPG) are different from natural gas models. A natural gas water heater will not function safely on bottled propane or liquefied petroleum gas (LPG) and a propane gas water heater will not function safely on natural gas. Do not attempt to convert a water heater from natural gas to LPG or from LPG to natural gas.

WHEN REMOVING PURGED GASES FROM A PIPING SYSTEM, DO NOT CREATE A HAZARDOUS CONDITION BY DISCHARGING THE GASES INTO A CONFINED AREA OR IN AN AREA THAT CONTAINS AN IGNITION SOURCE.

- STANDING PILOTS
- ELECTRIC APPLIANCES
- CIGARETTES
- MATCHES
- DO NOT OPERATE LIGHT SWITCHES
- OPEN FLAME



⚠ DANGER



Water temperature over 125°F can cause severe burns instantly or death from scalds.

Children, disabled and elderly are at highest risk of being scalded.

See the instruction manual before setting the water temperature at the water heater.

Feel the water before bathing or showering.

Temperature limiting valves are available for limiting domestic hot water temperatures.

GENERAL SAFETY WARNINGS

BEFORE ATTEMPTING TO INSTALL OR OPERATE THIS WATER HEATER, MAKE SURE YOU READ AND UNDERSTAND THE ENTIRE INSTALLATION, OPERATION AND SERVICE MANUAL. SPECIAL ATTENTION MUST BE GIVEN TO ALL THE SAFETY WARNINGS PROVIDED THROUGHOUT THIS MANUAL. FAILURE TO FOLLOW THESE WARNINGS COULD RESULT IN A FIRE OR EXPLOSION CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR DEATH. IF YOU HAVE DIFFICULTY UNDERSTANDING THE INSTRUCTIONS IN THIS MANUAL OR ARE NOT AN EXPERIENCED INSTALLER, DO NOT PROCEED, BUT GET HELP FROM A QUALIFIED INSTALLATION OR SERVICE TECHNICIAN. FOR ANY QUESTIONS DURING OR AFTER THE INSTALLATION OF THIS WATER HEATER, CALL 1-800-456-9805

DANGER

- TAMPERING WITH THE THERMOSTAT, IGNITION CONTROL, GAS VALVE OR TEMPERATURE AND PRESSURE RELIEF VALVE IS DANGEROUS AND MAY RESULT IN SERIOUS INJURY OR DEATH. TAMPERING VOIDS ALL WARRANTIES. ONLY PROPERLY TRAINED, QUALIFIED SERVICE PERSONNEL SHOULD SERVICE THESE COMPONENTS. DO NOT ATTEMPT TO MODIFY OR CHANGE THIS WATER HEATER IN ANY WAY.
- DO NOT ATTEMPT TO CONVERT THIS WATER HEATER FROM NATURAL GAS TO L.P. OR FROM L.P. TO NATURAL GAS. THIS CAN RESULT IN PROPERTY DAMAGE, FIRE, EXPLOSION, BODILY HARM OR DEATH.
- DO NOT INSTALL THIS WATER HEATER IN A MOBILE HOME
- DO NOT INSTALL THIS WATER HEATER OUTDOORS. THIS WATER HEATER IS CERTIFIED FOR INDOOR INSTALLATION ONLY.
- RESIDENTIAL AREAS WHERE FLAMMABLE LIQUIDS (GASOLINE, SOLVENTS, LIQUID PROPANE, BUTANE, ETC.) OR OTHER SUBSTANCES WHICH EMIT FLAMMABLE VAPORS ARE STORED MAY NOT BE SUITABLE FOR WATER HEATER INSTALLATION. NATURAL AIR MOVEMENTS CAN CARRY FLAMMABLE VAPORS SOME DISTANCE FROM WHERE THEY ARE STORED OR USED. THE ELECTRIC CONTROLS CAN IGNITE FLAMMABLE VAPORS CAUSING PROPERTY DAMAGE, SERIOUS BURNS OR DEATH. NEVER STORE OR USE FLAMMABLE SUBSTANCES IN THE SAME ROOM OR AREA CONTAINING A GAS WATER HEATER. IF SUCH FLAMMABLES MUST BE USED, ALL GAS BURNING APPLIANCES IN THE VICINITY MUST BE SHUT OFF AND THEIR PILOT LIGHTS EXTINGUISHED. OPEN THE DOORS AND WINDOWS FOR VENTILATION WHILE FLAMMABLE SUBSTANCES ARE IN USE.
- FLAMMABLE VAPORS MAY BE DRAWN TO THIS WATER HEATER FROM OTHER AREAS OF THE STRUCTURE BY AIR CURRENTS.
- WATER HEATERS INSTALLED IN GARAGES MUST BE INSTALLED SUCH THAT THE BOTTOM OF THE WATER HEATER IS NO LESS THAN 18 INCHES ABOVE THE FLOOR. THIS IS TO REDUCE BUT NOT ELIMINATE THE RISK OF LIGHTING FLAMMABLE VAPORS WHICH MAY BE PRESENT IN A GARAGE. THIS WATER HEATER MUST BE LOCATED OR PROTECTED TO AVOID PHYSICAL DAMAGE BY VEHICLES OR FLOODING.
- THE WATER HEATER IS CERTIFIED FOR INSTALLATION ON A COMBUSTIBLE FLOOR. HOWEVER WHEN THIS WATER HEATER IS INSTALLED OVER CARPETING, THE CARPETING MUST BE PROTECTED BY A METAL OR WOOD PANEL BENEATH THE WATER HEATER AND EXTENDING BEYOND THE FULL WIDTH AND DEPTH OF THE WATER HEATER BY AT LEAST THREE INCHES IN ANY DIRECTION. IF THE WATER HEATER IS INSTALLED IN A CARPETED ALCOVE OR CLOSET, THE ENTIRE FLOOR MUST BE COVERED BY THE PANEL. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN A FIRE HAZARD.
- FAILURE TO PROPERLY VENT THIS WATER HEATER CAN CAUSE AN EXPLOSION, FIRE, OR CARBON MONOXIDE POISONING WHICH MAY RESULT IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.
- THIS WATER HEATER MUST HAVE AN UNINTERRUPTED GROUND ACCORDING TO THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE, ANSI/NFPA 70, CANADIAN ELECTRIC CODE, PART 1 (CANADIAN INSTALLATIONS), OR THE PREVAILING LOCAL CODES. DO NOT USE GAS OR WATER PIPING AS AN ELECTRICAL GROUND. GROUND THE WATER HEATER BY CONNECTING A GROUNDING WIRE FROM THE ELECTRICAL SERVICE BOX TO THE GREEN GROUND WIRE LOCATED IN THE WATER HEATER'S ELECTRICAL COMPARTMENT.
- DO NOT USE THIS WATER HEATER WITH ANY ELECTRICAL SUPPLY VOLTAGE OTHER THAN THE ONE LISTED ON THE DATA PLATE. THIS WATER HEATER IS EQUIPPED FOR USE WITH ONE VOLTAGE RATING ONLY. FAILURE TO USE THE CORRECT VOLTAGE CAN RESULT IN DEATH, SERIOUS BODILY INJURY OR PROPERTY DAMAGE. IF YOU HAVE ANY QUESTIONS OR DOUBTS CONSULT YOUR ELECTRIC UTILITY COMPANY BEFORE INSTALLING THIS WATER HEATER.
- DO NOT USE AN OPEN FLAME OR ANY KIND OF SPARK TO CHECK GAS PIPING FOR LEAKS.
- DO NOT ATTEMPT TO OPERATE THIS WATER HEATER UNTIL IT IS PROPERLY INSTALLED AND YOU UNDERSTAND ALL OF THE SAFETY WARNINGS AND PRECAUTIONS.
- ADJUSTING THE THERMOSTAT PAST THE 120° F BAR ON THE TEMPERATURE DIAL WILL INCREASE THE RISK OF SCALD INJURY.
- HOUSEHOLDS WITH SMALL CHILDREN, ELDERLY, IMPAIRED OR DISABLED MEMBERS AND ANYONE WITH TEMPERATURE SENSITIVE SKIN MAY REQUIRE A LOW TEMPERATURE SETTING TO REDUCE THE RISK OF SCALD INJURY.
- DO NOT ATTEMPT TO BYPASS OR JUMPER THE ECO. THIS WILL VOID THE WARRANTY AND RELEASE THE MANUFACTURER FROM ANY LIABILITY FOR ANY ACCIDENT RESULTING FROM ELIMINATING THE ECO FROM THE WATER HEATER CIRCUIT.
- CONTAMINANTS IN THE GAS PIPING MAY FOUL THE GAS VALVE CAUSING A MALFUNCTION, FIRE OR EXPLOSION. BE SURE ALL GAS PIPING IS CLEAN AND CLEAR ON THE INSIDE BEFORE ATTACHING THE GAS LINE.
- THE GAS LINE MUST BE OF ADEQUATE SIZE SO AS TO PREVENT UNDUE PRESSURE DROP AND NEVER SMALLER THAN THE PIPE SIZE TO THE GAS VALVE ON THE WATER HEATER. FAILURE TO PROPERLY SIZE THE GAS LINE CAN RESULT IN A FIRE OR EXPLOSION CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

GENERAL SAFETY WARNINGS

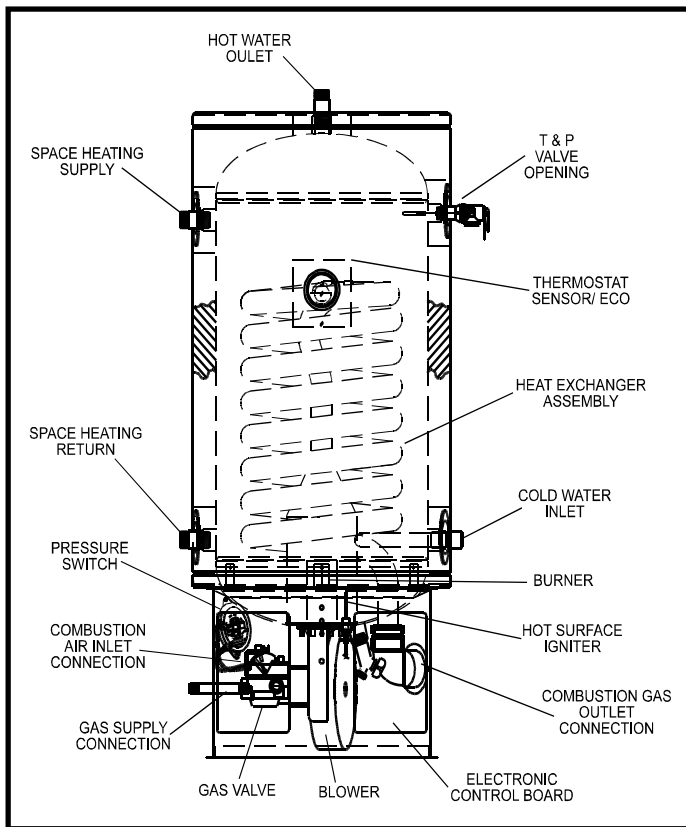


- TURN OFF THE ELECTRIC POWER AT THE FUSE BOX OR SERVICE PANEL BEFORE MAKING ANY ELECTRICAL CONNECTIONS. FAILURE TO DO SO CAN CAUSE AN ELECTRICAL SHOCK RESULTING IN PERSONAL INJURY OR DEATH.
- OBSTRUCTIONS OR HOLES IN THE VENT PIPE CAN CAUSE TOXIC FUMES TO ENTER THE STRUCTURE RESULTING IN CARBON MONOXIDE POISONING OR DEATH. THE AIR INLET AND EXHAUST VENT PIPING MUST BE REPLACED IF IT IS LEAKING.
- DO NOT ATTEMPT TO OPERATE THIS WATER HEATER WITH THE COLD WATER SHUTOFF VALVE CLOSED.
- WATER SUPPLY TO THIS HEATER MUST NOT EXCEED 190° F. WATER TEMPERATURES IN EXCESS OF 190° F WILL CAUSE THE HIGH LIMIT CONTROL (ECO) TO OPEN AND SHUT OFF THE GAS SUPPLY TO THE UNIT.
- HOT WATER CAN PRODUCE FIRST DEGREE BURNS WITHIN:
3 SECONDS AT 140°F (60°C)
20 SECONDS AT 130°F (54°C)
8 MINUTES AT 120°F (49°C)
- THIS WATER HEATER IS EQUIPPED FOR ONE TYPE OF GAS ONLY. DO NOT USE THIS WATER HEATER WITH ANY GAS OTHER THAN THE ONE LISTED ON THE DATA PLATE LOCATED ON THE WATER HEATER JACKET. FAILURE TO USE THE CORRECT GAS CAN RESULT IN PROPERTY DAMAGE, BODILY INJURY OR DEATH.
- HYDROGEN GAS CAN BE PRODUCED IN A HOT WATER SYSTEM THAT HAS NOT BEEN USED FOR A LONG PERIOD OF TIME (GENERALLY TWO WEEKS OR MORE). HYDROGEN GAS IS EXTREMELY FLAMMABLE AND CAN IGNITE WHEN EXPOSED TO A SPARK OR FLAME. TO PREVENT THE POSSIBILITY OF INJURY UNDER THESE CONDITIONS, WE RECOMMEND THE HOT WATER FAUCET BE OPENED FOR SEVERAL MINUTES AT THE KITCHEN SINK BEFORE USING ANY ELECTRICAL APPLIANCE WHICH IS CONNECTED TO THE HOT WATER SYSTEM. IF HYDROGEN IS PRESENT, THERE WILL PROBABLY BE AN UNUSUAL SOUND SUCH AS AIR ESCAPING THROUGH THE FAUCET AS WATER BEGINS TO FLOW. DO NOT SMOKE OR HAVE ANY OPEN FLAME NEAR THE FAUCET AT THE TIME IT IS OPEN.
- REPAIR, REPLACEMENT, SERVICE AND CLEANING OF THE WATER HEATER AND ITS PARTS MUST ONLY BE PERFORMED BY A QUALIFIED SERVICE TECHNICIAN.
- DO NOT ATTEMPT TO OPERATE THIS WATER HEATER WITHOUT A PROPERLY INSTALLED TEMPERATURE AND PRESSURE RELIEF VALVE. FAILURE TO INSTALL AND MAINTAIN A NEW AND PROPERLY LISTED TEMPERATURE AND PRESSURE RELIEF VALVE WILL RELEASE THE MANUFACTURER FROM ANY CLAIMS WHICH MIGHT RESULT FROM EXCESSIVE TEMPERATURE OR WATER PRESSURE.
- NEVER OPERATE AN EMPTY OR PARTIALLY FILLED WATER HEATER. THIS CAN RESULT IN SERIOUS DAMAGE TO THE TANK.

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IMPORTANT: TO INSURE PROPER INSTALLATION AND OPERATION OF THIS PRODUCT, COMPLETELY READ ALL INSTRUCTIONS PRIOR TO ATTEMPTING TO ASSEMBLE, INSTALL, OPERATE, MAINTAIN, OR REPAIR THIS PRODUCT. UPON UNPACKING OF THE WATER HEATER. INSPECT ALL PARTS FOR DAMAGE PRIOR TO INSTALLATION AND START-UP. THIS WATER HEATER MUST BE INSTALLED ONLY BY QUALIFIED INSTALLATION PERSONNEL.



CONSUMER INFORMATION

This water heater is design-certified by CSA International as a Category I direct vented water heater which takes all of its combustion air from outside the structure and exhausts all of its combustion gases to outside the structure.

This water heater should be installed in accordance with the latest edition of the "National Fuel Gas Code", ANSI Z223.1, NFPA 54 and the requirements and codes of the local utilities or other authorities having jurisdiction. Canadian installations must be performed in accordance with CAN/CGA-B149, local installation codes and the authorities having jurisdiction. This is available from the following:

National Fire Protection Agency
1 Batterymarch Park
Quincy, MA 02269

American Gas Association
1515 Wilson Boulevard
Arlington, VA 22209

Canadian Standards Association International
178 Rexdale Boulevard
Etobicoke, ON M9W 1R3

Local Authorities (Check your telephone listings)

CONSUMER RESPONSIBILITIES

This manual has been prepared to acquaint you with the installation, operation, and maintenance of your gas water heater and to provide important safety information in these areas.

We urge you to read all of the instructions thoroughly before attempting the installation or operation of this water heater. This manual should be kept for future reference.

The manufacturer of this water heater will not be liable for any damages caused by failure to comply with the installation and operating instructions outlined in this manual.

If you lack the necessary skills required to properly install this water heater or you have difficulty following the directions, you should not proceed but have a qualified person perform the installation of this water heater. **ONLY QUALIFIED INSTALLATION PERSONNEL SHOULD INSTALL THIS WATER HEATER.**

A data plate identifying your water heater can be found on the water heater jacket. When referring to your water heater always have the information listed on the data plate readily available.

Retain your original receipt as proof of purchase.

WATER HAMMER

Water hammer or pressure surges created by the sudden interruption of the water flow within the water supply system (hot or cold) are detrimental to the water supply system's piping and the water heater. The situation is encountered in facilities utilizing equipment and appliances such as dishwashers and washing machines with quick-closing solenoid valves. The situation can also be affected by the abrupt closing of dishwasher pre-rinse valves, wash-down hoses, quick closing sink and lavatory faucets, and closet and urinal flush valves.

Symptoms that water hammer is present in the water supply system are the premature and reoccurring failures of water piping, water heaters, temperature and pressure relief valves, ballcocks and flush valves and fixtures.

Water hammer can easily be controlled with the installation of properly sized and located water hammer arrestor(s) in the water supply system (hot and cold). Installation of the arrestor(s) should always be located as near the source of the water hammer as possible. Air chambers are not acceptable or substitutable as water hammer arrestors.

Water heater failures due to water hammer are not covered by the unit's warranty.

WATER HEATER MODIFICATION/TAMPERING



TAMPERING WITH THE THERMOSTAT, IGNITION CONTROL, GAS VALVE, OR TEMPERATURE AND PRESSURE RELIEF VALVE IS DANGEROUS AND MAY RESULT IN SERIOUS INJURY OR DEATH. TAMPERING VOIDS ALL WARRANTIES. ONLY PROPERLY TRAINED, QUALIFIED SERVICE PERSONNEL SHOULD SERVICE THESE COMPONENTS. DO NOT ATTEMPT TO MODIFY OR CHANGE THIS WATER HEATER IN ANY WAY.

INSULATION BLANKET

Some governing bodies may require the use of external insulation blankets when water heaters are installed in newly constructed homes and additions. If an insulation blanket is applied to this water heater **CAUTION** must be exercised so as to not restrict its proper function and operation. Please note the following:

- Do not cover the temperature and pressure relief valve, any labels or instruction materials applied to the water heater. These labels must remain visible for reference by the user. Do not remove these labels, as they are a permanent part of the water heater as required by the certification agencies and/or the Federal Government.
- Do not cover any access panels leading to burner or electrical compartments. Do not cover the thermostat controls or doors.
- Do not cover the vent screens located on the heater skirt.

GAS CONVERSION



DO NOT ATTEMPT TO CONVERT THIS WATER HEATER FROM NATURAL GAS TO L.P. OR FROM L.P. TO NATURAL GAS. THIS CAN RESULT IN PROPERTY DAMAGE, FIRE, EXPLOSION, BODILY HARM OR DEATH.

LOCATION REQUIREMENTS AND CONSIDERATIONS

GENERAL INFORMATION

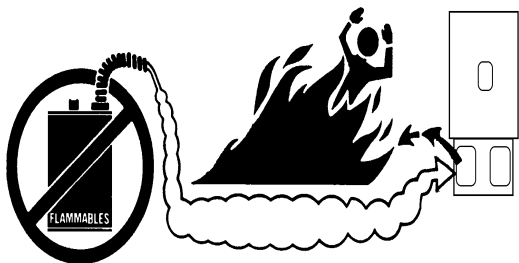
⚠ WARNING

DO NOT INSTALL THIS WATER HEATER IN A MANUFACTURED HOME (MOBILE HOME). This water heater is not approved for installation in a mobile home. **DO NOT INSTALL OUTDOORS.** This water heater is certified for indoor installation only. Failure to follow these instructions could result in **FIRE, PROPERTY DAMAGE, PERSONAL INJURY, OR DEATH.**

⚠ DANGER

AREAS WHERE FLAMMABLE LIQUIDS (GASOLINE, SOLVENTS, LIQUID PROPANE, BUTANE, ETC.) OR OTHER SUBSTANCES WHICH EMIT FLAMMABLE VAPORS ARE STORED MAY NOT BE SUITABLE FOR WATER HEATER INSTALLATION. NATURAL AIR MOVEMENTS CAN CARRY FLAMMABLE VAPORS SOME DISTANCE FROM WHERE THEY ARE STORED OR USED. NEAR GROUND LEVEL VENTS CAN DRAW THESE VAPORS INTO THE WATER HEATER WHERE THE IGNITION SYSTEM OR MAIN BURNER CAN IGNITE THEM CAUSING PROPERTY DAMAGE, SERIOUS BURNS OR DEATH. NEVER STORE OR USE FLAMMABLE SUBSTANCES IN THE SAME ROOM OR AREA CONTAINING A GAS WATER HEATER. IF SUCH FLAMMABLES MUST BE USED, ALL GAS BURNING APPLIANCES IN THE VICINITY MUST BE SHUT OFF AND THEIR PILOT LIGHTS EXTINGUISHED. OPEN THE DOORS AND WINDOWS FOR VENTILATION WHILE FLAMMABLE SUBSTANCES ARE IN USE.

⚠ DANGER



VAPORS FROM FLAMMABLE LIQUIDS WILL EXPLODE AND CATCH FIRE CAUSING DEATH OR SEVERE BURNS.

⚠ WARNING

FLAMMABLE VAPORS MAY BE DRAWN TO THIS WATER HEATER FROM OTHER AREAS OF THE STRUCTURE BY AIR CURRENTS.

IMPORTANT: This water heater should not be installed near a corrosive or potentially corrosive air supply. Water heater corrosion and component failure can be caused by the heating and breaking down of airborne chemicals. These materials are corrosive at low concentration levels with little or no odor to reveal their presence. Examples of potentially corrosive locations and compounds are:

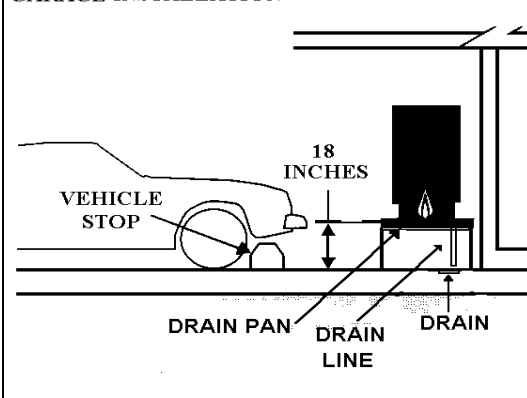
- Beauty shops, dry cleaning establishments, photo processing labs
- Liquid or powdered bleaches, swimming pool chemicals, spray can propellants, cleaning solvents
- Refrigerants
- Calcium and sodium chloride
- Waxes and process chemicals

Products of this sort should not be stored near the water heater or air inlet.

⚠ WARNING

IT IS NOT DESIRABLE TO INSTALL A GAS FIRED WATER HEATER IN A RESIDENTIAL GARAGE. IF INSTALLATION IN A RESIDENTIAL GARAGE IS YOUR ONLY OPTION, THIS WATER HEATER MUST BE INSTALLED SUCH THAT THE BOTTOM OF THE WATER HEATER IS NO LESS THAN **18 INCHES ABOVE THE FLOOR (SEE FIGURE 1 BELOW)**. THIS IS TO REDUCE **BUT NOT ELIMINATE** THE RISK OF IGNITING FLAMMABLE VAPORS WHICH MAY BE PRESENT IN A GARAGE. **THE WATER HEATER MUST BE LOCATED OR PROTECTED TO AVOID PHYSICAL DAMAGE BY VEHICLES OR FLOODING. FAILURE TO FOLLOW THESE WARNINGS CAN CAUSE A FIRE OR EXPLOSION, RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.**

FIGURE 1
GARAGE INSTALLATION



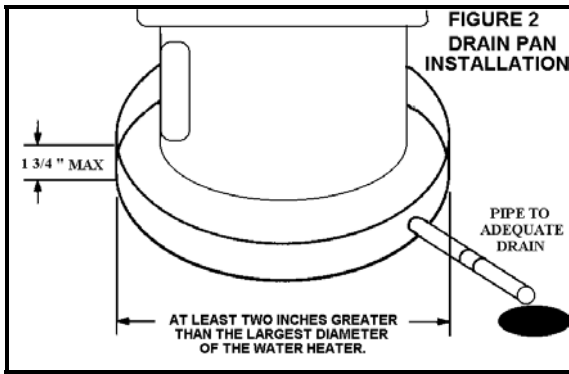
SITE LOCATION

1. Select a location near the center of the water piping system. It must be installed indoors and in a vertical position on a level surface. **DO NOT** install in bathrooms, bedrooms, or any occupied room normally kept closed.
2. Consider the inlet and exhaust vent system piping when selecting the water heater location. The venting system must be able to run from the water heater to the termination with a minimal length and elbows. Input rates are reduced as vent system length increases. **THE VENTING SYSTEM MUST COMPLY WITH THE REQUIREMENTS SET FORTH IN THE VENTING SECTION OF THIS MANUAL.**
3. Locate the water heater near the existing gas piping. If installing a new gas line, locate the water heater to minimize the pipe length and elbows.

IMPORTANT

4. The water heater must be located in an area where leakage of the tank or connections will not result in damage to the area adjacent to the water heater or to lower floors of the structure. It is recommended that a suitable drain pan be installed under the water heater as shown in Figure 2. This pan is to protect the property from damage which may occur from leaks in the tank and pipe connections. The pan must limit the water level to a maximum depth of 1 3/4 inches and be two inches wider than the heater and piped to an adequate drain. Locate the water heater near a suitable inside drain. Outside drains are subject to freezing temperatures which can obstruct the drain line. The piping should be at least 3/4" ID and pitched for proper drainage. **UNDER NO CIRCUMSTANCES IS THE MANUFACTURER TO BE HELD LIABLE FOR ANY WATER DAMAGE IN CONNECTION WITH THIS WATER HEATER.**

LOCATION REQUIREMENTS AND CONSIDERATIONS (CONT.)



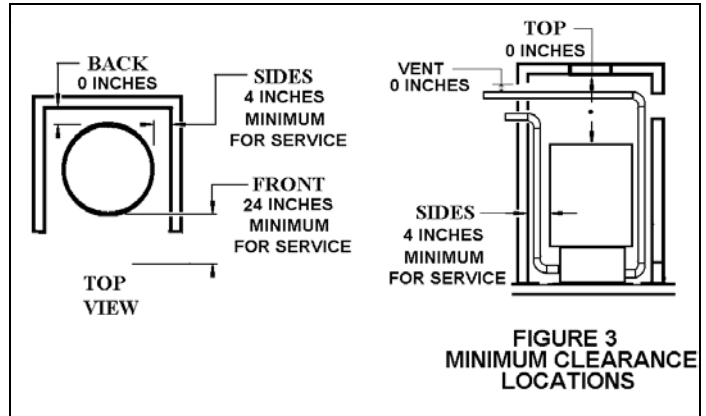
5. The water heater should be located in an area not subject to freezing temperatures. Water heaters located in unconditioned spaces (i.e. attics, basements, garages, etc.) may require the insulation of the water piping and drain piping to protect against freezing. The drain and controls must be easily accessible for operation and service. Maintain proper clearances as specified.

CLEARANCE/ACCESSIBILITY

Minimum clearances from combustible materials are stated on the data plate located on the water heater jacket. The certified minimum clearances between the water heater and combustible materials are:

- Sides, front and back - 0 (zero) inches
- Top - 0 (zero) inches
- Vent - 0 (zero) inches

A minimum of 4 inches of clearance on each side and 24 inches of front clearance should be provided for inspection and service.



REFER TO THE DATA PLATE ON THE WATER HEATER FOR THE CORRECT CLEARANCES FROM COMBUSTIBLE MATERIALS..

⚠️ WARNING

THE WATER HEATER IS CERTIFIED FOR INSTALLATION ON A COMBUSTIBLE FLOOR. HOWEVER, WHEN THIS WATER HEATER IS INSTALLED OVER CARPETING, THE CARPETING MUST BE PROTECTED BY A METAL OR WOOD PANEL BENEATH THE WATER HEATER AND EXTENDING BEYOND THE FULL WIDTH AND DEPTH OF THE WATER HEATER BY AT LEAST THREE INCHES IN ANY DIRECTION. IF THE WATER HEATER IS INSTALLED IN A CARPETED ALCOVE OR CLOSET, THE ENTIRE FLOOR MUST BE COVERED BY THE PANEL. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN A FIRE HAZARD.

CONDENSATE TRAP ASSEMBLY AND DRAIN LINE**CAUTION**

RUN THE CONDENSATE DRAIN IN CONDITIONED AREAS ONLY OR IN SUCH A MANNER AS TO PREVENT FREEZING. FREEZING CONDENSATE CAN BLOCK THE DRAIN LINE RESULTING IN PROPERTY DAMAGE OR WATER HEATER MALFUNCTION.

CONDENSATE TRAP ASSEMBLY

Water vapor in the combustion products will condense inside the water heater and vent piping. A condensate trap assembly is shipped with this water heater and must be installed between the water heater and the exhaust vent piping to collect and remove this condensate as shown in Figure 4. A 5 inch piece of ABS or PVC pipe must be cemented between the exhaust fitting on the water heater and the condensate trap assembly.

Connect the pipe and tee as shown in Figure 4.

CONDENSATE DRAIN LINE

If required by local codes, install a condensate neutralizer cartridge in the drain line. See Figure 5.

The condensate drain line must be routed to a suitable drain. If no floor drain is available or the drain is above the level of the condensate line, install a condensate pump that is resistant to acidic condensate. These pumps are available from local distributors. If the pump is not resistant to acidic water, a condensate neutralizer must be used ahead of the pump.

When installing the drain line, note the following:

- Plastic pipe must be used to connect the condensate trap to a suitable drain or condensate pump. Do not use copper tubing, iron or steel pipe for the condensate drain line.
- Condensate drain lines should be installed in conditioned areas only. Drain lines installed in unconditioned areas subject to freezing conditions should be wrapped with 3 or 5 watt, U.L. listed heat tape or approved insulation. Install per manufacturer's instructions.
- Do not common drain with the temperature and pressure relief valve or the condensate line from an air conditioner evaporator coil.
- Slope the condensate drain line towards the inside floor drain or condensate pump.
- The condensate drain line and connection to drain piping must comply with all local codes.
- Do not run the condensate line into the drain pan.

EXHAUST AND INLET AIR PIPING (CONT.)

VENT PIPE LENGTH

Size the exhaust outlet and combustion air intake pipes as specified in Table 1. This table lists the maximum allowable length in feet of the vent outlet and combustion air inlet pipes as related to the number of required elbows and the termination (see shaded area). The specified maximum lengths are for the separate inlet and vent pipe systems and not the combined length of both systems. Minimum pipe length is 6 feet.

1. Determine termination type and pipe size.
2. Determine number of elbows in exhaust pipe. Do not include the elbows in the termination. Corresponding number in shaded area indicates the maximum length of exhaust pipe.
3. Determine number of elbows in exhaust. Do not include the elbows in the termination. Corresponding number in shaded area indicates the maximum length of exhaust pipe.

NOTE: Table 1 used for ABS and PVC material. Table 2 used for CPVC material.

Example (Using Table 1): The desired installation requires a concentric vent, 2 in. pipe and 3 elbows in the vent outlet piping. 2 elbows are required in the combustion air piping. Referring to the shaded area of the table, the maximum permissible pipe length for the vent outlet piping is 44 feet and the maximum permissible pipe length for the combustion air piping is 48 feet.

When using 2 inch pipe, the inlet and outlet vent length affects the gas input rate. At maximum vent pipe length, the input will be firing at approximately 94,000 BTUH. At minimum vent pipe length, the input will be approximately 100,000 BTUH.

| PIPE SIZE IN. | NUMBER OF 90° ELBOWS | | | | | | | TERMINATION OPTION |
|---------------|----------------------|-----|-----|-----|-----|-----|-----|--------------------|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | |
| 2 | N/A | 52 | 48 | 44 | 40 | 36 | 32 | CONCENTRIC |
| 2 | N/A | 52 | 48 | 44 | 40 | 36 | 32 | STD. HORIZONTAL |
| 2 | N/A | 44 | 40 | 36 | 32 | 28 | 24 | ALT. HORIZONTAL |
| 2 | 52 | 48 | 44 | 40 | 36 | 32 | 28 | VERTICAL |
| 3 | N/A | 120 | 120 | 115 | 111 | 106 | 101 | CONCENTRIC |
| 3 | N/A | 120 | 120 | 115 | 111 | 106 | 101 | STD. HORIZONTAL |
| 3 | N/A | 110 | 110 | 105 | 101 | 95 | 90 | ALT. HORIZONTAL |
| 3 | 130 | 120 | 115 | 110 | 106 | 101 | 95 | VERTICAL |

NOTES:

1. N/A - NOT APPLICABLE
2. THE ABOVE MAXIMUM LENGTHS ARE FOR THE SEPARATE INLET AND OUTLET PIPE SYSTEMS AND NOT THE COMBINED LENGTH OF BOTH SYSTEMS
3. MAXIMUM OF 6 ELBOWS MAY BE USED PER PIPE. DO NOT COUNT THE ELBOWS IN THE TERMINATION OR THE CONDENSATE DRAIN ASSEMBLY. ONLY USE MEDIUM OR LONG SWEEP ELBOWS.
4. TWO 45° ELBOWS ARE CONSIDERED EQUIVALENT TO ONE 90° ELBOW.
5. MINIMUM LENGTH IS 6 FEET PER PIPE.

| PIPE SIZE IN. | NUMBER OF 90° ELBOWS | | | | | TERMINATION OPTION |
|---------------|----------------------|-----|-----|-----|-----|--------------------|
| | 0 | 1 | 2 | 3 | 4 | |
| 2 | N/A | 46 | 36 | 26 | 16 | CONCENTRIC |
| 2 | N/A | 46 | 36 | 26 | 16 | STD. HORIZONTAL |
| 2 | N/A | 26 | 16 | N/A | N/A | ALT. HORIZONTAL |
| 2 | 36 | 26 | 16 | N/A | N/A | VERTICAL |
| 3 | N/A | 115 | 101 | 85 | 70 | CONCENTRIC |
| 3 | N/A | 115 | 101 | 85 | 70 | STD. HORIZONTAL |
| 3 | N/A | 95 | 80 | 65 | 50 | ALT. HORIZONTAL |
| 3 | 110 | 95 | 80 | 65 | 50 | VERTICAL |

NOTES:

1. N/A - NOT APPLICABLE
2. THE ABOVE MAXIMUM LENGTHS ARE FOR THE SEPARATE INLET AND OUTLET PIPE SYSTEMS AND NOT THE COMBINED LENGTH OF BOTH SYSTEMS
3. MAXIMUM OF 4 ELBOWS MAY BE USED PER PIPE EXCEPT WHERE PROHIBITED. DO NOT COUNT THE ELBOWS IN THE TERMINATION OR THE CONDENSATE DRAIN ASSEMBLY.
4. TWO 45° ELBOWS ARE CONSIDERED EQUIVALENT TO ONE 90° ELBOW.
5. MINIMUM LENGTH IS 6 FEET PER PIPE.

VENT TERMINATION LOCATIONS

The air inlet and vent outlet must be installed with the following minimum clearances. Refer to Figures 6 and 9.

- Twelve inches above grade or maximum anticipated snow level.
- Twelve inches from any opening through which flue gases could enter the structure.
- Four feet horizontally and vertically from gas or electric meters, dryer vents, vent hoods, bathroom fan exhaust, attic fans and turbines.
- Two feet from an inside corner formed by two exterior walls.
- Two feet from porches, decks, overhangs and other obstructions.

In addition to maintaining the minimum clearances, the vent should terminate according to the following guidelines:

1. Use only 2 inch pipe on the vent termination. Do not expose any 3" X 2" reducers or bushings to outdoor ambient temperatures.
2. The air inlet and vent outlet must not terminate under a patio, deck or any covered area.
3. Do not terminate the vent near walkways or into alleys or other publicly accessible areas.
4. Do not terminate the vent in an area where children or animals could block pipes.
5. Do not locate the vent terminal too close to shrubs or bushes as the discharge and condensate may stunt or kill them.
6. Caulk all cracks, seams and joints within 6 feet horizontally above and below the vent.

EXHAUST AND INLET AIR PIPING (CONT.)

CONCENTRIC VENT TERMINATION

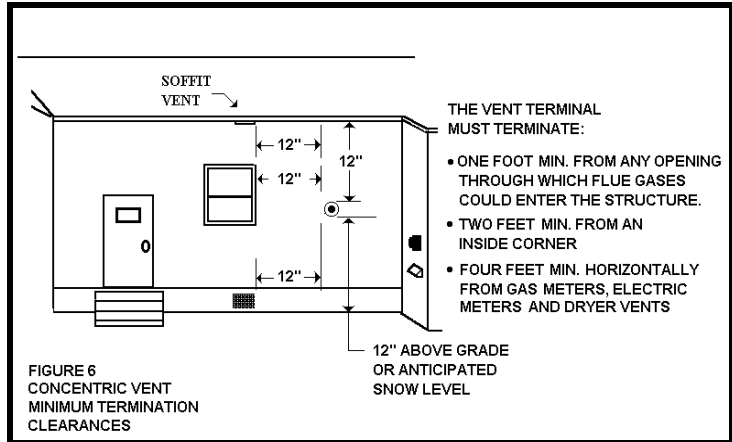
Refer to Figures 6, 7, and 8 and install the vent terminal according to the following instructions:

1. Determine the location for the concentric vent termination (See "Vent Termination Locations"). Cut a 5 inch diameter hole through the wall at the chosen location. Install the Vent Terminal Plate Assembly and secure with 4 screws.

WARNING

ALWAYS DETERMINE THE LOCATION OF ELECTRICAL WIRING, PIPES OR SUPPORTING STRUCTURES IN WALLS BEFORE CUTTING. FAILURE TO FOLLOW THIS WARNING MAY RESULT IN PROPERTY DAMAGE, ELECTRICAL SHOCK, OR WALL COLLAPSE CAUSING PERSONAL INJURY OR DEATH.

2. Cut a 4 foot length of the 2 inch vent outlet pipe. Use only 2" ABS or PVC plastic pipe. Using a soap and water solution as a lubricant, push the 2 inch pipe through the rubber Compression Ring in the tee assembly until it extends approximately 12 inches from the 4 inch pipe.
3. Apply cement to the 4 inch pipe end and the inside of the plastic flange on the plate assembly. Push the 2 inch pipe through the hole in the plate screen and push the 4 inch pipe into the flange. Locate the 2 inch pipe so that it extends 10 inches from the plate. See Figure 7.
4. Secure the assembly with locally approved supports or hangers. Seal the wall penetration with caulking material.
5. Connect the air inlet and vent outlet piping to the concentric vent assembly per Figure 8. Install a drain tee assembly and trap as close to the water heater as possible. This is to drain any water that may be in the combustion air pipe and prevent it from entering the inducer blower. Connect the trap drain line to a suitable drain or to the downstream of the condensate trap of the water heater. **Do not terminate the trap drain line into the condensate drain vent.**



SEE PAGE 30 FOR ALTERNATE AIR INLET DRAIN TEE ASSEMBLY CONFIGURATION.

EXHAUST AND INLET AIR PIPING (CONT.)

HORIZONTAL DIRECT VENT TERMINAL INSTALLATIONS

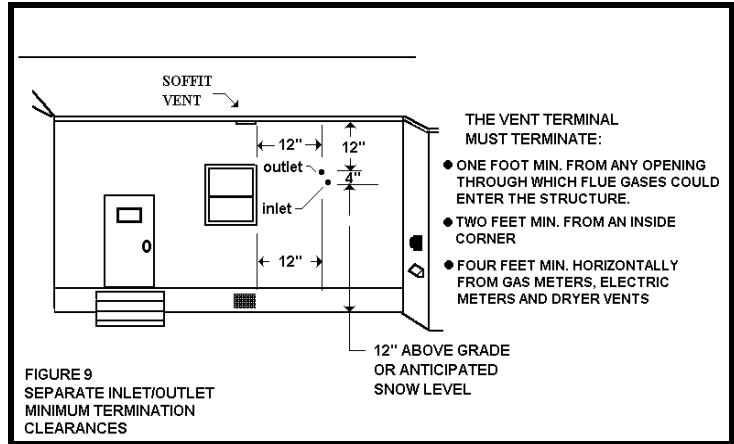
STD. HORIZONTAL TERMINATION

When 3 in. pipe is used between the water heater and the outside wall, reduce it to 2 in. pipe before penetrating the wall. A maximum of 18 inches of 2 in. pipe may be used.

The standard horizontal inlet air termination is a 2 in. pipe which terminates at the exterior wall and utilizes a coupling to prevent the pipe from being pushed back into the structure. The standard horizontal exhaust outlet termination is a 2 in. pipe which terminates 12 inches from the outside wall. See Figure 9 for the proper minimum termination clearances. The air inlet must be located with respect to the exhaust outlet as shown in Figure 10.

Install a 2 in. coupling at the outside wall on both the inlet and exhaust to prevent the terminations from being pushed inward.

Install a drain tee assembly and trap as close to the water heater as possible. This is to drain any water that may be in the combustion air pipe and prevent it from entering the inducer blower. Connect the trap drain line to a suitable drain or to the downstream of the condensate trap of the water heater. **Do not terminate the trap drain line into the condensate drain vent**



ALT. HORIZONTAL TERMINATION

The combustion air and exhaust terminations may be raised up to 24 inches above the wall penetrations if required for anticipated snow levels. See Figure 11. The two elbows shown in Figure 11 are considered part of the termination and should not be included when determining the maximum allowable vent pipe length.

SEE PAGE 30 FOR ALTERNATE AIR INLET DRAIN TEE ASSEMBLY CONFIGURATION.

EXHAUST AND INLET AIR PIPING (CONT.)

VERTICAL TERMINATION

When 3 in. pipe is used between the water heater and the roof, reduce it to 2 in. pipe before penetrating the roof. A maximum of 18 inches of 2 in. pipe may be used.

The vertical inlet air termination requires a return bend or two medium or long sweep radius 90° elbows to keep the inlet downward and prevent entry of rain. These elbows are considered part of the termination and should not be included when calculating the maximum allowable vent pipe length. Refer to Figure 12 for the proper location of the air inlet with respect to the exhaust outlet termination. The vertical exhaust outlet termination is a 2 in. pipe which terminates at least 12 inches above the inlet air termination.

The air inlet and exhaust outlet terminations must be at least 12 inches above the roof line or anticipated snow levels.

GAS INPUT RATE:

The gas input rate of this water heater is affected by several environmental factors such as:

- The heating value of the gas
- The air and gas densities (which vary widely due to barometric pressure and temperature changes).
- Venting installations (pipe diameter and length)

When measuring the input rate these factors should also be incorporated into the calculations. Also measure the gas consumption over a sufficiently long time to obtain an accurate gas consumption rate (eg 3-5 minutes, not one revolution of the meter needle).

Long vents, and vents with many elbows, inherently reduce the gas input rate due to increased resistance to moving combustion air and flue gases. Because the system resistance is increased, the vacuum which causes the gas to flow through the gas orifice is reduced the input drops correspondingly. The short vent typically runs at the rated 100,000 BTU/H; whereas the maximum vent will see the input drop to around 94,000 BTU/H. The approximate relationship is shown in the graph to the right.

WATER SYSTEM PIPING

GENERAL INFORMATION

Water piping, fittings, and valves must be properly installed for the correct and safe operation of this water heater. Please note the following:

DO NOT install this water heater with iron or galvanized piping. The system should be installed only with new piping that is suitable for potable (drinkable) water such as copper, CPVC, or polybutylene. PVC water piping may be used on the cold water inlet supply BUT DO NOT USE PVC PIPING WITHIN 18 INCHES OF THE COLD WATER CONNECTION ON THE WATER HEATER. Do not use PVC piping on the hot water outlet, space heating supply, or space heating return.

DO NOT use any pumps, valves, or fittings that are not compatible with potable water.

DO NOT use valves that may cause excessive restriction to water flow. Use full flow ball or gate valves only.

DO NOT use 50/50 tin-lead solder (or any lead based solder) in potable water lines. Use 95/5 tin-antimony or other equivalent material.

DO NOT tamper with the thermostat, gas valve, ignition control or temperature and pressure relief valve. Tampering with any of the components is DANGEROUS and can result in property damage, severe injury or death. Tampering voids all warranties. Only qualified technicians should service these components.

DO NOT use this water heater as a replacement for an existing boiler installation

DO NOT use with piping that has been treated with chromates, boiler seal, or other chemicals.

DO NOT add any chemicals to the system piping which will contaminate the potable water supply.

DO NOT install check valves in the cold water supply line to the water heater.

CAUTION

NEVER OPERATE AN EMPTY OR PARTIALLY FILLED WATER HEATER. THIS CAN RESULT IN SERIOUS DAMAGE TO THE TANK.

TEMPERATURE & PRESSURE RELIEF VALVE

WARNING

DO NOT ATTEMPT TO OPERATE THIS WATER HEATER WITHOUT A PROPERLY INSTALLED TEMPERATURE AND PRESSURE RELIEF VALVE. FAILURE TO FOLLOW THIS INSTRUCTION CAN RESULT IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

For protection against excessive pressures and temperatures, a temperature and pressure relief valve must be installed in the opening marked "T & P RELIEF VALVE" (see Figure 13). This valve must be design certified by a nationally recognized testing laboratory that maintains periodic inspection of the production of listed equipment or materials as meeting the requirements for Relief Valves and Automatic Shut-off Devices for Hot Water Supply Systems., ANSI Z21.22. The function of the temperature and pressure relief valve is to discharge water in large quantities in the event of excessive temperature or pressure developing in the water heater. The valve must not exceed the working pressure of the water heater as stated on the data plate. **TO PREVENT PROPERTY DAMAGE, PERSONAL INJURY OR DEATH, THE RELIEF VALVE MUST BE ALLOWED TO OPERATE PROPERLY.**

Only a new temperature and pressure relief valve should be used with your water heater. Do not use an old or existing valve as it may be damaged or not be adequate for the working pressure of the new water heater.

THE TEMPERATURE & PRESSURE RELIEF VALVE:

- Must not be in contact with any electrical part.
- Must be connected to an adequate discharge line.
- Must not exceed the working pressure shown on the data plate of the water heater.

THE DISCHARGE LINE:

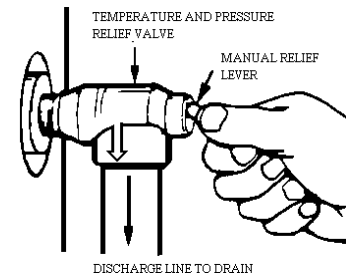
- Must not be smaller than the pipe size of the relief valve.
- Must not be capped, blocked, plugged or contain any valve between the relief valve and the end of the discharge line.
- Must terminate 6 inches above a floor drain or external to the building within 6 inches to the ground.
- Must be capable of withstanding 250°F (121°C) without distortion.
- Must be installed to allow complete drainage of both the temperature and pressure relief valve and discharge line.

WARNING

FAILURE TO INSTALL AND MAINTAIN A NEW PROPERLY LISTED TEMPERATURE AND PRESSURE RELIEF VALVE WILL RELEASE THE MANUFACTURER FROM ANY CLAIMS WHICH MIGHT RESULT FROM EXCESSIVE TEMPERATURE OR WATER PRESSURE.

Manually operate the temperature and pressure relief valve at least once a year to make sure it is working properly.

To prevent water damage, the valve must be properly connected to a discharge line which terminates at an adequate drain. Standing clear of the outlet (discharged water may be hot), slowly lift and release the lever handle on the temperature and pressure relief valve to allow the valve to operate freely and return to its closed position. If the valve fails to completely reset and continues to release water, immediately shut off the manual gas valve and the cold water inlet valve, and call a qualified service technician.



DANGER

DISCHARGING WATER MAY BE HOT AND CAN CAUSE SCALD INJURIES AND PROPERTY DAMAGE. DISCHARGE LINES MUST BE PROPERLY INSTALLED AND PIPED TO AN ADEQUATE DRAIN.

CLOSED SYSTEM/THERMAL EXPANSION

Periodic discharge of the temperature and pressure relief valve may be due to thermal expansion in a closed water supply system. The water utility supply meter may contain a check valve, backflow preventer or water pressure reducing valve. Some jurisdictions may require a backflow preventer in the incoming cold water line when using this water heater for combination space heating/domestic potable water.

This will create a closed water system. During the heating cycle of the water heater, the water expands causing pressure inside the water heater to increase. The temperature and pressure relief valve may discharge hot water under these conditions which results in a loss of energy and a build-up of lime on the relief valve seat.

A diaphragm-type expansion tank suitable for potable water will normally eliminate this weeping condition. Please read and follow the manufacturer's instructions for the installation of such tanks.

Contact the local water supplier or plumbing inspector for information on how to control this situation. Do not plug or restrict the temperature and pressure relief valve.

PIPING INSTALLATION

Piping, fittings, and valves should be installed according to the installation drawing (Figure 13). If the indoor installation area is subject to freezing temperatures, the water piping must be protected by insulation.

Water supply pressure should not exceed 80% of the working pressure of the water heater. The working pressure is stated on the water heater's data plate. If this occurs a pressure limiting valve with a by-pass may need to be installed in the cold water inlet line. This should be placed on the supply to the entire house in order to maintain equal hot and cold water pressures.

IMPORTANT: Heat cannot be applied to the water fittings on the heater as they may contain nonmetallic parts. If solder connections are used, solder the pipe to the adapter before attaching the adapter to the hot and cold water fittings.

IMPORTANT: Always use a good grade of joint compound and be certain that all fittings are drawn up tight.

1. Install the water piping and fittings as shown in the Figure 14. Connect the cold water supply (1" NPT) to the fitting marked "COLD". **DO NOT TURN THE COLD WATER NIPPLE. THE BLACK LINE SHOULD REMAIN ALONG THE TOP SIDE OF THE NIPPLE.** Connect the hot water supply (1" NPT) to the fitting marked "HOT".
2. The installation of unions in both the hot and cold water supply lines is recommended for ease of removing the water heater for service or replacement.
3. In residential and specific commercial applications, the manufacturer of this water heater recommends installing a tempering valve or an anti-scald device in the domestic hot water line as shown in Figure 14. These valves reduce the point of use temperature of the water by mixing cold and hot water and are readily available for use. Contact a licensed plumber or the local plumbing authority.
4. If installing the water heater in a closed water system, install an expansion tank in the cold water line as specified under "Closed System/Thermal Expansion".
5. Install a shutoff valve in the cold water inlet line. It should be located close to the water heater and be easily accessible. Know the location of this valve and how to shut off the water to the heater.

WARNING

DO NOT ATTEMPT TO OPERATE THIS WATER HEATER WITH THE COLD WATER SHUTOFF VALVE CLOSED. THIS CAN RESULT IN SERIOUS DAMAGE TO THE WATER HEATER TANK.

WATER SYSTEM PIPING (CONT.)

6. Install a temperature and pressure relief valve and discharge line in the opening marked "T & P RELIEF VALVE". Install as specified under "Temperature and Pressure Relief Valve, pg. 14".
7. After piping has been properly installed, allow the tank to fill with water and check all connections for leaks. Open the nearest hot water faucet for 3 minutes to purge the water lines of air and sediment to insure complete filling of the tank.

IMPORTANT: Do not fail to install a suitable drain pan under the water heater and pipe the drain line to an adequate drain. See Site Location, page 6, for details.

If this water heater is to be used to supply both space heating and domestic potable (drinking) water (Fig. 14), the instructions listed below must be followed.

- Be sure to follow the manual(s) shipped with the air handler system. Pump and check valve may be integrated into the air handler.
- **This water heater is not to be used as a replacement for an existing boiler installation.**
- If the space heating system requires water temperatures in excess of 120°F, a tempering valve or an anti-scald device should be installed per its manufacturer's instructions in the domestic (potable) hot water supply to limit the **risk of scald injury**.

Also see "General Information, Water System Piping", pg. 14 - 16 for additional instructions on the safe and correct installation and operation of this water heater.

If this water heater is used as a **SOLAR STORAGE HEATER OR AS A BACKUP FOR THE SOLAR SYSTEM**, the water supply temperatures to the water heater tank may be in excess of 120°F. A tempering valve or other temperature limiting valve must be installed in the water supply line to limit the supply temperature to 120°F. An anti-scald device must be installed in the domestic hot water supply line to limit the risk of scald injury.

Solar Water Heating Systems can often supply water with temperatures exceeding 190°F and may result in water heater malfunction. Please read the following warning.

WARNING

WATER SUPPLY TO THIS HEATER MUST NOT EXCEED 190°F. WATER TEMPERATURE IN EXCESS OF 190°F WILL CAUSE THE HIGH LIMIT CONTROL TO OPEN AND SHUT OFF THE GAS SUPPLY TO THE UNIT.

See Figure below for typical water piping installation for Polaris water heater used in conjunction with a solar storage tank.

GAS SUPPLY AND PIPING

GENERAL INFORMATION



THIS WATER HEATER IS EQUIPPED FOR ONE TYPE OF GAS ONLY. DO NOT USE THIS WATER HEATER WITH ANY GAS OTHER THAN THE ONE LISTED ON THE DATA PLATE LOCATED ON THE WATER HEATER JACKET. FAILURE TO USE THE CORRECT GAS CAN RESULT IN PROPERTY DAMAGE, BODILY INJURY, OR DEATH.

GAS PIPING

This water heater must only be connected to gas supplied by a commercial supplier.

Install the gas piping according to all local and state codes or with the "National Fuel Gas Code", ANSI Z223.1 (NFPA 54) - Latest Edition.

Do not use copper or brass piping and fittings. Do not use flexible connectors. Use only rigid pipe.

Table 2 and or Table 3 are provided as a sizing reference for commonly used gas pipe materials. Consult the "National Fuel and Gas Code" for the recommended gas pipe size of other materials.



THE GAS LINE MUST BE OF ADEQUATE SIZE SO AS TO PREVENT UNDUE PRESSURE DROP AND NEVER SMALLER THAN THE PIPE SIZE TO THE GAS VALVE ON THE WATER HEATER. FAILURE TO PROPERLY SIZE THE GAS LINE CAN CAUSE A FIRE OR EXPLOSION RESULTING IN PROPERTY DAMAGE, BODILY INJURY OR DEATH.

**TABLE 2
NATURAL GAS PIPE CAPACITY TABLE (CU. FT./HR)**

Capacity of gas pipe of different diameters and lengths in cu. ft. per hr. with pressure drop of 0.3 in. and specific gravity of 0.60 (natural gas).

| Nominal Iron Pipe Size, Inches | Length of Pipe, Feet | | | | | | | | | | | | | |
|--------------------------------|----------------------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 125 | 150 | 75 | 200 |
| 1/2 | 132 | 92 | 73 | 63 | 56 | 50 | 46 | 43 | 40 | 38 | 34 | 31 | 28 | 26 |
| 3/4 | 278 | 190 | 152 | 130 | 115 | 105 | 96 | 90 | 84 | 79 | 72 | 64 | 59 | 55 |
| 1 | 520 | 350 | 285 | 245 | 215 | 195 | 180 | 170 | 160 | 150 | 130 | 120 | 110 | 100 |
| 1-1/4 | 1050 | 730 | 590 | 500 | 440 | 400 | 370 | 350 | 320 | 305 | 275 | 250 | 225 | 210 |
| 1-1/2 | 1600 | 1100 | 890 | 760 | 670 | 610 | 560 | 530 | 490 | 460 | 410 | 380 | 350 | 320 |

After the length of pipe has been determined, select the pipe size which will provide the minimum cubic feet per hour required for the gas input rating of the water heater. By formula:

$$\text{Cu. Ft. Per Hr. Required} = \frac{\text{Gas Input of Water Heater (BTU/HR)}}{\text{Heating Value of Gas (BTU/FT}^3\text{)}}$$

The gas input of the water heater is marked on the water heater data plate. The heating value of the gas (BTU/FT³) may be determined by consulting the local natural gas utility.

**TABLE 3
LP GAS PIPE CAPACITY TABLE**

Maximum capacity of pipe in thousands of BTU per hour of undiluted liquefied petroleum gases (at 11 inches water column inlet pressure). Based on a Pressure Drop of 0.5 Inch Water Column.

| Nominal iron pipe size, in. | Length of Pipe, Feet | | | | | | | | | | | |
|-----------------------------|----------------------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|
| | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 125 | 150 |
| 1/2 | 275 | 189 | 152 | 129 | 114 | 103 | 96 | 89 | 83 | 78 | 69 | 63 |
| 3/4 | 567 | 393 | 315 | 267 | 237 | 217 | 196 | 185 | 173 | 162 | 146 | 132 |
| 1 | 1071 | 732 | 590 | 504 | 448 | 409 | 378 | 346 | 322 | 307 | 275 | 252 |
| 1-1/4 | 2205 | 1496 | 1212 | 1039 | 913 | 834 | 771 | 724 | 677 | 630 | 567 | 511 |

Example: Input BTU requirement of the water heater, 100,000 BTUH
Total pipe length, 80 feet = 3/4" IPS required.

GAS SUPPLY AND PIPING (CONT.)

When installing gas piping, use a pipe joint compound that is resistant to the action of propane (LPG) gases. Apply the compound to male threads only.

CAUTION

CONTAMINANTS IN THE GAS PIPING MAY FOUL THE GAS VALVE CAUSING A MALFUNCTION, FIRE, OR EXPLOSION. BE SURE ALL GAS PIPING IS CLEAN AND CLEAR ON THE INSIDE BEFORE ATTACHING THE GAS LINE.

When making pipe connections, use a back-up wrench to prevent any twisting of the gas valve. Do not use excessive force when tightening the pipe joint at the gas valve inlet nipple.

Refer to Figure 15 and install as follows:

1. Install a readily accessible full opening manual shutoff valve in the gas supply line as recommended by the local utility. Know the location of this valve and how to turn off the gas to this unit.
2. Install a drip leg as shown. The drip leg must be no less than 3 inches long for the accumulation of dirt, foreign material and water droplets.
3. Install a ground joint union between the appliance gas valve and the manual shutoff valve. This is to allow easy removal of the gas valve.
4. Turn the gas supply on and check for leaks. Use a chloride-free soap and water solution (bubbles forming indicate a leak) or other approved method. **Do not use an open flame. ALL LEAKS MUST BE REPAIRED IMMEDIATELY.**

DANGER

DO NOT USE AN OPEN FLAME OR ANY KIND OF SPARK TO CHECK GAS PIPING FOR LEAKS. IF LEAKING GAS IS PRESENT, AN EXPLOSION OR FIRE MAY RESULT CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

IMPORTANT: This water heater and its gas connections must be leak tested before placing the appliance in operation.

IMPORTANT: Air may be present in the gas lines and could prevent the burner from lighting on initial start-up. The gas lines should be purged of air by a qualified service technician after installation of the gas piping system.

The gas supply pressure must not exceed the maximum supply pressure as stated on the water heater's data plate. The minimum supply pressure is for the purpose of input adjustment.

GAS PRESSURE TESTING

IMPORTANT: Subjecting the gas valve to pressures exceeding 14" W.C. (1/2 psi, 3.7 kPa) may cause damage resulting in an extremely hazardous condition.

- If the code requires the gas lines to be tested at a pressure exceeding 14" W.C., the water heater and its manual shutoff valve must be **disconnected** from the gas supply piping system and the line capped.
- If the gas lines are to be tested at a pressure less than 14" W.C. the water heater must be **isolated** from the gas supply piping system by closing its manual shutoff valve.

A U.L. RECOGNIZED FUEL GAS AND CO DETECTOR(S) ARE RECOMMENDED IN ALL APPLICATIONS AND THEIR INSTALLATION SHOULD BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND /OR LOCAL LAWS, RULES, REGULATIONS, OR CUSTOMS.

ELECTRICAL CONNECTIONS

DANGER

THIS WATER HEATER MUST HAVE AN UNINTERRUPTED GROUND ACCORDING TO THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE, ANSI/NFPA 70 OR THE PREVAILING LOCAL CODES. DO NOT USE GAS OR WATER PIPING AS AN ELECTRICAL GROUND. GROUND THE WATER HEATER BY CONNECTING A GROUNDING WIRE FROM THE ELECTRICAL SERVICE BOX TO THE GREEN GROUND WIRE LOCATED IN THE JUNCTION BOX ON THE WATER HEATER.

DANGER

TURN OFF THE ELECTRIC POWER AT THE FUSE BOX OR SERVICE PANEL BEFORE MAKING ANY ELECTRICAL CONNECTIONS. FAILURE TO DO SO CAN CAUSE AN ELECTRICAL SHOCK RESULTING IN PERSONAL INJURY OR DEATH.

DANGER

DO NOT USE THIS WATER HEATER WITH ANY ELECTRICAL SUPPLY VOLTAGE OTHER THAN THE ONE LISTED ON THE DATA PLATE. THIS WATER HEATER IS EQUIPPED FOR USE WITH ONE VOLTAGE RATING ONLY. FAILURE TO USE THE CORRECT VOLTAGE CAN RESULT IN DEATH, SERIOUS BODILY INJURY OR PROPERTY DAMAGE. IF YOU HAVE ANY QUESTIONS OR DOUBTS CONSULT YOUR ELECTRIC UTILITY COMPANY BEFORE INSTALLING THIS WATER HEATER.

If you lack the necessary skills required to properly install the electrical wiring to this water heater, DO NOT PROCEED, but have a qualified electrician perform the installation.

When making the electrical connections, always make sure:

- The electrical supply has the proper overload fuse or breaker protection. The water heater draws less than 7 amperes.
- The voltage, frequency and phase corresponds to that specified on the water heater rating plate.
- Wire sizes and connections comply with all applicable codes.
- Wiring enclosed in approved conduit (if required by local codes).
- The water heater and electrical supply are properly grounded.

DO NOT USE AN EXTENSION CORD TO SUPPLY POWER TO THIS WATER HEATER.

When installing the electrical wiring to the water heater:

1. **SHUT-OFF THE POWER TO THE ELECTRICAL SERVICE BOX.**
2. Loosen the screws securing the access panel to the electrical compartment. Set the access panel aside.
3. Connect the electrical supply to the water heater in accordance with local utility requirements and codes. Use only a dedicated fused branch electrical circuit containing a properly sized fuse or circuit breaker. Maximum overcurrent protection is 15 amperes. Connect this circuit directly from the electrical service box to an electrical disconnect switch. Locate the switch so that it is readily accessible and located near the water heater. Connect from the electrical disconnect switch to the electrical compartment through the access hole on the water heater.

Black Wire - Hot
White Wire - Neutral
Green Wire - Ground

IMPORTANT: Ground the water heater by connecting a grounding wire from the electrical service ground terminal to the green grounding wire.

The power supply to this water heater must be properly polarized, otherwise the unit will malfunction. A properly polarized power supply will have 120 volts from the hot lead (black) to ground and 0 volts from the neutral lead (white) to ground.

4. Completely fill the tank with water after making all electrical connections. The electrical power may be turned on only after it is certain the tank is completely filled with water.

INSTALLATION CHECK LIST

WATER HEATER LOCATION

- ◇ Centrally located with the water piping system. Located as close to the gas piping and vent pipe system as possible.
- ◇ Located indoors and in a vertical position. Protected from freezing temperatures.
- ◇ Proper clearances from combustible surfaces maintained and not installed directly on a carpeted floor. Sufficient room to service the water heater.
- ◇ Provisions made to protect the area from water damage. Properly sized drain pan installed and piped to an adequate drain.
- ◇ Installation area free of corrosive elements and flammable materials.

GAS SUPPLY AND PIPING

- ◇ Only rigid piping used. No flexible or copper gas connections.
- ◇ Gas supply is the same type as listed on the water heater data plate.
- ◇ Gas line equipped with full opening shut-off valve, union and drip leg.
- ◇ Approved pipe joint compound used.
- ◇ Adequate pipe size and of approved material.
- ◇ Chloride-free soap and water solution or other approved means used to check all connections and fittings for possible gas leaks.

CONDENSATE LINE

- ◇ Proper piping material.
- ◇ Line sloped to adequate drain or approved condensate pump.
- ◇ Protected from freezing (if required).
- ◇ Properly vented.

WATER SYSTEM PIPING

- ◇ Temperature and pressure relief valve properly installed with a discharge line run to an open drain and protected from freezing.
- ◇ All piping properly installed and free of leaks.
- ◇ Heater completely filled with water.
- ◇ Closed system pressure build-up precautions addressed.
- ◇ If required, tempering valve or anti-scald device installed per manufacturer's instructions

ELECTRICAL

- ◇ Unit connected to a dedicated 120 volt, 15 ampere supply.
- ◇ Proper polarity.
- ◇ Water heater properly grounded.
- ◇ Installed per the latest edition of the National Electric Code, ANSI/NFPA 70 or prevailing local codes.

VENT PIPE SYSTEM

- ◇ Vent pipe and fittings of approved material.
- ◇ Acceptable length and number of elbows on air inlet pipe.
- ◇ Acceptable length and number of elbows on exhaust pipe.
- ◇ Installed in accordance with "National Fuel Gas Code", NFPA 54, ANSI Z223.1-Latest Edition or prevailing provisions of local codes.
- ◇ All horizontal piping sloped upward 1/4" per foot.
- ◇ Not obstructed in any way.

VENT TERMINATION

CONCENTRIC

- ◇ 12" min. above grade/snow level
- ◇ Exhaust pipe/air intake pipe sloped downwards toward water heater.

HORIZONTAL

- ◇ Correct relationship - exhaust to intake
- ◇ 12" min. above grade/snow level
- ◇ Exhaust pipe/air intake pipe sloped downwards toward water heater.

ALTERNATE HORIZONTAL

- ◇ Correct relationship - exhaust to intake
- ◇ 12" min. above anticipated snow level
- ◇ Exhaust pipe/air intake pipe sloped downwards toward water heater.

VERTICAL

- ◇ Intake - 12" min. above roof/snow level
- ◇ Correct relationship - exhaust to intake.

START-UP/OPERATION

WARNING

IF YOU DO NOT FOLLOW THESE INSTRUCTIONS EXACTLY, A FIRE OR EXPLOSION MAY RESULT CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR LOSS OF LIFE.

Read these directions thoroughly before attempting to operate this water heater. **Make sure the tank is completely filled with water before applying power to the unit.** Check the data plate on the water heater jacket for the correct gas. Do not use this water heater with any gas other than the one listed on the data plate. If you have any questions or doubts consult your gas supplier or gas utility company.

DO NOT:

- Operate the water heater if it has been subjected to physical damage, flooding, or fire.
- Operate the water heater unless the tank is filled with water.
- Operate the water heater if the cold water supply inlet valve is closed.
- Allow flammable liquids such as gasoline or paint thinner to be stored or used near this water heater.
- Allow combustible materials such as newspapers, rags or mops to accumulate near this water heater.
- Operate this water heater until all operating instructions are understood and followed. Operating instructions are clearly given in this manual and on the water heater label.
- Operate this water heater if you smell gas around the appliance area.

IF YOU SMELL GAS:

1. Open the windows.
2. Get all people out of the building.
3. Do not light matches or any other appliance. Do not smoke.
4. Do not touch any electrical switches (on or off) or use any phones in your residence.
5. Extinguish any open flames immediately.
6. Shut off the gas at the manual shut-off valve. (If using liquid propane gas, shut off the gas at the L.P. tank outside of your residence.)
7. Use an outside phone and immediately call the gas company and the fire department. Give your name and address and ask for instructions.
8. Do not go back into the building. Wait for help to arrive outside of the building.

L.P.G. (BOTTLED PROPANE) MODELS

Liquefied Petroleum Gas is over 50% heavier than air and in the occurrence of a leak in the system the gas will settle at FLOOR LEVEL. Basements, crawl spaces, skirted areas under mobile homes (even when ventilated), closets and areas below ground level will serve as pockets for the accumulation of gas. **Before lighting an L.P. gas water heater, smell all around the appliance at floor level.** If you smell gas, follow the directions as given on this page.

When your L.P. tank runs out of fuel, turn off the gas at all gas appliances including pilot lights. After the tank is refilled and all lines are purged of air, all appliances must be re-lit according to their manufacturer's instructions.

WATER EXPOSURE

Do not try to operate this water heater if the gas valve, blower, main burner, electrical or ignitor controls have been exposed to water in any way. Immediately call a qualified service technician to inspect the water heater and replace any part that has been exposed to water. **DO NOT** attempt to repair these parts. Water heaters subjected to flood conditions or any time the gas valve, blower, main burner, electrical or ignitor controls have been submerged in water require replacement of the entire water heater.

WATER HEATER OPERATION

WARNING

DO NOT ATTEMPT TO OPERATE THIS WATER HEATER UNTIL IT IS PROPERLY INSTALLED AND YOU UNDERSTAND ALL OF THE SAFETY WARNINGS AND PRECAUTIONS.

Refer to Figure 17 and operate the water heater according to its directions. This appliance does not have a pilot light. It is equipped with an electronic ignition device which automatically lights the burner. The ignition control will take 45-50 seconds to light the burner.

This appliance is equipped with 3 lights to show the various stages of burner ignition. They are as follows:

Green Light - Activated when electrical power is supplied to the unit.

Yellow Light - Activated when the thermostat calls for heat. Signals the beginning of the ignition sequence.

Red Light - Activated when the ignition control signals the gas valve to open.

Figure 18 shows the sequence of operation for the ignition cycle.

THERMOSTAT SENSOR

The sensor is a 10K ohm at 77°F (25°C) thermister. Read resistance through the black wires that run to the sensor, remove wires from circuit board before checking. An open or short circuit indicates sensor failure. Check reading against the following table. The resistance should correspond with the temperature in the tank:

| | | |
|-------|--------|-------------|
| 60°F | (16°C) | 15,300 ohms |
| 80°F | (27°C) | 9,300 ohms |
| 100°F | (38°C) | 5,800 ohms |
| 120°F | (49°C) | 3,800 ohms |
| 140°F | (60°C) | 2,500 ohms |

Refer to troubleshooting guide on page 27.

FIGURE 17 POLARIS LIGHTING INSTRUCTION

FOR YOUR SAFETY READ BEFORE OPERATING

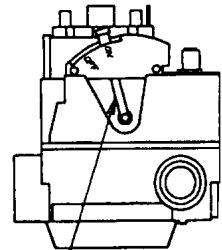
⚠ WARNING

If you do not follow these directions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

- A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. ***Do not try to light the burner by hand.***
- B. **BEFORE OPERATING** smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.
- WHAT TO DO IF YOU SMELL GAS:**
- Do not try to light any appliance.
 - Do not touch any electrical switch; do not use any phone in your building.
 - Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.
- C. Use only your hand to push in or move the gas control selector arm. Never use tools. If the selector arm will not push in or move by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.
- D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance. Water heaters subjected to flood conditions or any time the gas valve, main burner, blower, electrical or igniter controls have been submerged in water require replacement of the entire water heater.

OPERATING INSTRUCTIONS

1. **STOP!** Read the safety warnings above on this label.
2. Turn off electric power to the appliance.
3. Turn temperature dial counter-clockwise ↶ to lowest setting.
4. This appliance is equipped with an ignition device which automatically lights the burner. Do **NOT** try to light the burner by hand.
5. Remove control access panel.
6. Push down on the red selector arm on the gas valve and move to the "OFF" position. **NOTE:** Selector arm cannot be moved to "OFF" unless arm is pushed in slightly. Do not force.
7. Wait five (5) minutes to clear out any gas. If you then smell gas, **STOP!** Follow "B" in the safety warnings above on this label. If you don't smell gas, go to the next step.
8. Move the red selector arm on the gas valve to the "ON" position.
9. Replace control access panel.
10. Set temperature dial to desired setting.
11. Turn on electrical power to the appliance. Green power light will glow. Yellow igniter light will glow as the igniter reaches temperature (35 seconds). The burner will then start and the red burner light will glow.
12. If the appliance will not operate, follow the instructions "To Turn Off Appliance" and call your service technician or gas supplier.



SELECTOR ARM

TO TURN OFF GAS TO APPLIANCE

1. Turn off electric power to appliance if service is to be performed.
2. Turn the temperature dial counter-clockwise ↶ to lowest setting.
3. Remove control access panel.
4. Push down on the red selector arm on the gas valve and move to the "OFF" position. Do not force.
5. Replace control access panel.

OPERATIONAL CONDITIONS

WATER HEATER SOUNDS

During the normal operation of the water heater, sounds or noises may be heard. These noises are common and may result from the following:

1. Normal expansion and contraction of metal parts during periods of heat-up and cool-down.
2. Restrictions in the air inlet pipe, vent outlet pipe or condensate trap. **THIS PROBLEM SHOULD BE ADDRESSED IMMEDIATELY!**
3. Sediment build-up in the tank bottom will create varying amounts of noise and may cause premature tank failure. Drain and flush the tank as directed under "Draining and Flushing", page 24.

SAFETY SHUT-OFF

A high temperature limit switch or ECO (Energy Cut Off) is used to shut off the unit if the water temperature exceeds 190°F (88°C). The ECO may be reset by turning the thermostat dial completely counterclockwise to its lowest setting and clockwise to the desired temperature setting. It may also be reset by turning the power to the water heater OFF and then ON again.

! DANGER

DO NOT ATTEMPT TO BY-PASS OR JUMPER THE ECO AS THIS CAN RESULT IN PROPERTY DAMAGE, BODILY INJURY OR DEATH. THIS WILL VOID THE WARRANTY AND RELEASE THE MANUFACTURER FROM ANY LIABILITY FOR ANY INCIDENT RESULTING FROM ELIMINATING THE ECO FROM THE WATER HEATER CIRCUIT.

LPG models incorporate a blower cover switch to disable the unit in the event that the blower cover is dislodged from the blower housing. If this occurs, **DO NOT** attempt to replace the blower cover or by-pass the blower cover switch. Immediately turn off the electric power to the unit and turn off the gas at the main shut-off valve. Immediately call a qualified service technician.

HYDROGEN GAS BUILD-UP

! DANGER

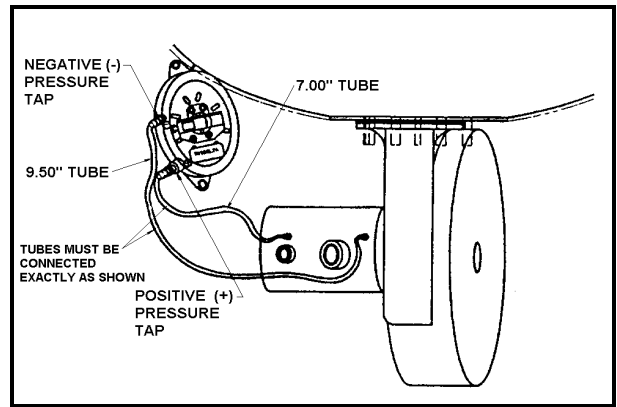
HYDROGEN GAS CAN BE PRODUCED IN A HOT WATER SYSTEM THAT HAS NOT BEEN USED FOR A LONG PERIOD OF TIME (GENERALLY TWO WEEKS OR MORE). HYDROGEN GAS IS EXTREMELY FLAMMABLE AND CAN IGNITE WHEN EXPOSED TO A SPARK OR FLAME. TO PREVENT THE POSSIBILITY OF INJURY UNDER THESE CONDITIONS, WE RECOMMEND THE HOT WATER FAUCET BE OPENED FOR SEVERAL MINUTES AT THE KITCHEN SINK BEFORE USING ANY ELECTRICAL APPLIANCE WHICH IS CONNECTED TO THE HOT WATER SYSTEM. IF HYDROGEN IS PRESENT, THERE WILL PROBABLY BE AN UNUSUAL SOUND SUCH AS AIR ESCAPING THROUGH THE FAUCET AS WATER BEGINS TO FLOW. DO NOT SMOKE OR HAVE ANY OPEN FLAME NEAR THE FAUCET AT THE TIME IT IS OPEN.

PRESSURE SWITCH

This water heater is equipped with a pressure switch. This pressure switch protects the unit by shutting it down in the event:

- A blockage occurs in the combustion air inlet, the flue gas exhaust vent, or both vents.
- The condensate line should freeze and the condensate "backs up" and fills the exhaust vent.
- The blower should fail to operate, or operate improperly.
- The unit begins to operate at an abnormally low input level.

NOTICE: The wiring diagram should be followed during the reconnection of any electrical wires associated with the pressure switch. Tubing must be connected exactly as shown above or the unit will not operate.



MAINTENANCE

! CAUTION

LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION.

DRAINING AND FLUSHING

! WARNING

IT IS VERY IMPORTANT THAT THE WATER HEATER TANK BE DRAINED AND FLUSHED PERIODICALLY, AS NECESSARY, TO ELIMINATE ACCUMULATION OF SEDIMENT BUILDUP IN THE TANK BOTTOM. THIS IS ESPECIALLY IMPORTANT WHERE HARD WATER IS INVOLVED. FAILURE TO FOLLOW THE FOLLOWING STEPS COULD RESULT IN PREMATURE TANK FAILURE CAUSING WATER DAMAGE TO THE STRUCTURE.

The water heater should be drained if being shut down during freezing temperatures. It is recommended that the tank be drained, flushed and cleaned every 6 months to remove sediment which may build-up during operation. To drain the tank perform the following steps:

1. Turn off the electrical supply to the water heater. Turn off the gas to the water heater at the Manual Gas Shutoff Valve.
2. Close the cold water inlet valve. Open a nearby hot water faucet.
3. Connect a hose to the drain valve and terminate it to an adequate drain. Open the water heater drain valve and allow all the water to drain from the tank.

! DANGER

WATER DRAINING FROM THIS HEATER MAY BE HOT AND CAN RESULT IN A SCALD INJURY. DO NOT ALLOW ANYONE TO COME IN CONTACT WITH THE DRAINING WATER AND TERMINATE THE DRAIN HOSE TO AN ADEQUATE DRAIN.

4. Flush the tank with water as needed to remove sediment.
5. Close the drain valve, refill the tank, and restart the heater as directed under "Start-Up/Operation".

3 MONTH INSPECTION

At least every 3 months a visual inspection should be made of the combustion air inlet and exhaust piping and water piping. Check the water heater for the following:

- Obstructions, damage, or deterioration in the venting system. Make sure the ventilation and combustion air supplies are not obstructed.
- Leaking or damaged water, gas, and vent piping.
- Presence of flammable or corrosive materials in the installation area.

MAINTENANCE (cont.)

WARNING

OBSTRUCTIONS OR HOLES IN THE VENT PIPE CAN CAUSE TOXIC FUMES TO ENTER THE STRUCTURE RESULTING IN CARBON MONOXIDE POISONING OR DEATH. THE VENT PIPE MUST BE REPLACED IF IT IS LEAKING.

A U.L. RECOGNIZED FUEL GAS AND CO DETECTOR(S) ARE RECOMMENDED IN ALL APPLICATIONS AND THEIR INSTALLATION SHOULD BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND/OR LOCAL LAWS, RULES, REGULATIONS, OR CUSTOMS.

IMPORTANT: VERIFY PROPER OPERATION AFTER SERVICING THIS WATER HEATER.

TROUBLESHOOTING

WATER HEATER SERVICE MUST ONLY BE PERFORMED BY A QUALIFIED SERVICE TECHNICIAN. Refer to the Troubleshooting Chart on page 27 and 28 for determining the cause of water heater problems.

GAS REGULATOR ADJUSTMENT

WARNING

GAS VALVE ADJUSTMENT MUST ONLY BE PERFORMED BY AN AUTHORIZED SERVICE AGENT

IMPORTANT: Do not adjust the gas valve pressure setting to get certain flow rate or input rate on the water heater. The installed input rate of the water heater will vary depending on inlet and outlet pipe lengths. The correct gas valve setting is required for proper starting characteristics and gas-air mixture.

The gas valve may require adjustment to obtain the proper air/fuel ratio due to varying gas heating values. Should it become necessary to check or adjust the gas valve setting, follow the following procedure:

1. Shut off the water heater by turning the thermostat to its lowest setting. Remove the left access door on the base of the water heater.
2. Using a 3/16" hex key (Allen wrench), remove the plug from the OUT PRESS tap on the gas valve. See Figure 20.
3. Connect the high tap of a differential pressure gauge (Dwyer Magnehelic) to the 1/8" NPT outlet pressure (OUT PRESS) tap on the gas valve. An inclined mano-meter (slope gauge) may be used if it has a shut-off valve in the connecting line.
4. Start the unit. If using an inclined manometer, close the shut-off valve during start-up so that the initial high pressure will not push the indicating fluid out of the gauge.
5. Allow the burner to light and remove the regulator adjustment cap. **DO NOT START OR SHUT-OFF THE UNIT WITH THE REGULATOR ADJUSTMENT CAP OFF AS THIS MAY RUPTURE THE GAS VALVE DIAPHRAGM.**

6. Read the pressure on the gauge. It should be **negative .20** inches of water column. If not, turn the regulator adjustment screw to adjust to this reading. **MAKE CERTAIN YOU ARE READING NEGATIVE PRESSURE AND NOT POSITIVE PRESSURE.**

7. Replace the regulator adjustment cap and tighten. With the cap on, the pressure will become more negative (eg -.30 to -.50" W.C., depending on the vent length).
8. Restart and cycle the unit three times to check for smooth ignition. Readjust the negative pressure setting if necessary.

IMPORTANT: If the unit exhibits rough starting or running at the -.20" W.C. setting, it is acceptable to adjust the pressure setting between -.10"W.C. and -.30"W.C. to achieve smooth ignition.

IMPORTANT: The regulator pressure setting must be measured with the cap off. **Always** replace the cap after the adjustment has been completed. Tighten the cap firmly. The small balance line will not function properly if the cap is left loose.

9. Shut off the water heater and remove the gauge. Replace the outlet pressure tap plug and the access door. Start the water heater.

REMOVAL AND REPLACEMENT OF THE GAS REGULATOR VALVE

REMOVING THE GAS REGULATOR VALVE

WARNING

REMOVAL AND REPLACEMENT OF THE GAS REGULATOR VALVE INVOLVES THE DISCONNECTION OF GAS PIPING AND ELECTRICAL LEADS. IT IS RECOMMENDED THAT THIS PROCEDURE BE PERFORMED BY A QUALIFIED SERVICE TECHNICIAN.

1. Turn off electrical power to appliance. See Figure 22 and turn temperature dial counterclockwise to the lowest setting. Remove the left access panel.
2. Shut off the gas at the manual shutoff valve on the gas supply line. See Figure 21.
3. Push down on the red selector arm on the gas regulator valve and move to the "OFF" position, see Figure 23.
4. Disconnect the electrical leads from the gas regulator valve and move away from the valve.
5. Disconnect and remove the balance line from the "vent" port on the gas regulator valve. The other end of this line connects to the blower inlet.
6. Disconnect the ground joint union in the gas piping. See Figure 21.
7. Disconnect the pipe nipple on the inlet of the gas regulator valve.
8. Unscrew the gas regulator valve counterclockwise and remove.
9. If the Polaris is an L.P. model, check to make sure that the "divider" blade is positioned at either the 10 or 2 o'clock position. There will be a black line marked on the hexagonal part of the orifice holder denoting the position of the divider.

CAUTION

WHEN REMOVING THE GAS REGULATOR VALVE DO NOT USE PIPE WRENCH OR VISE TO GRIP BODY OR ANY TYPE OF BLUNT INSTRUMENT INTO THE INLET OR OUTLET CONNECTIONS. USING THESE TYPE TOOLS MAY RESULT IN DAMAGE TO THE GAS REGULATOR VALVE.

To replace the gas regulator valve repeat the previous procedure in reverse order. Note: If the balance line is kinked or the fittings damaged, this line must be replaced.

- Be sure to use Approved Teflon Tape or Pipe Joint Compound on the gas piping connections and gas regulator valve.
- Turn gas supply on and check for leaks. Use a chloride-free soap and water solution (bubbles forming indicate a leak) or other approved method. Do not use an open flame. **ALL LEAKS MUST BE FIXED IMMEDIATELY.**
- Be sure tank is completely filled with water before lighting and activating the water heater. Refer to Figure 17 and follow lighting procedure.
- Refer to "GAS REGULATOR ADJUSTMENT" section for gas valve regulation.
- If additional information is required, contact the Service Department at the 800 number shown on the front of this manual.

TROUBLESHOOTING GUIDE POLARIS ELECTRONIC CONTROL BOARD

UTEC Status Indicator LED Error Conditions:

Flashing 1 Time - Control is in lock-out because the inducer pressure switch is stuck closed.

Flashing 2 Times - Control is in lock-out because the pressure switch did not close.

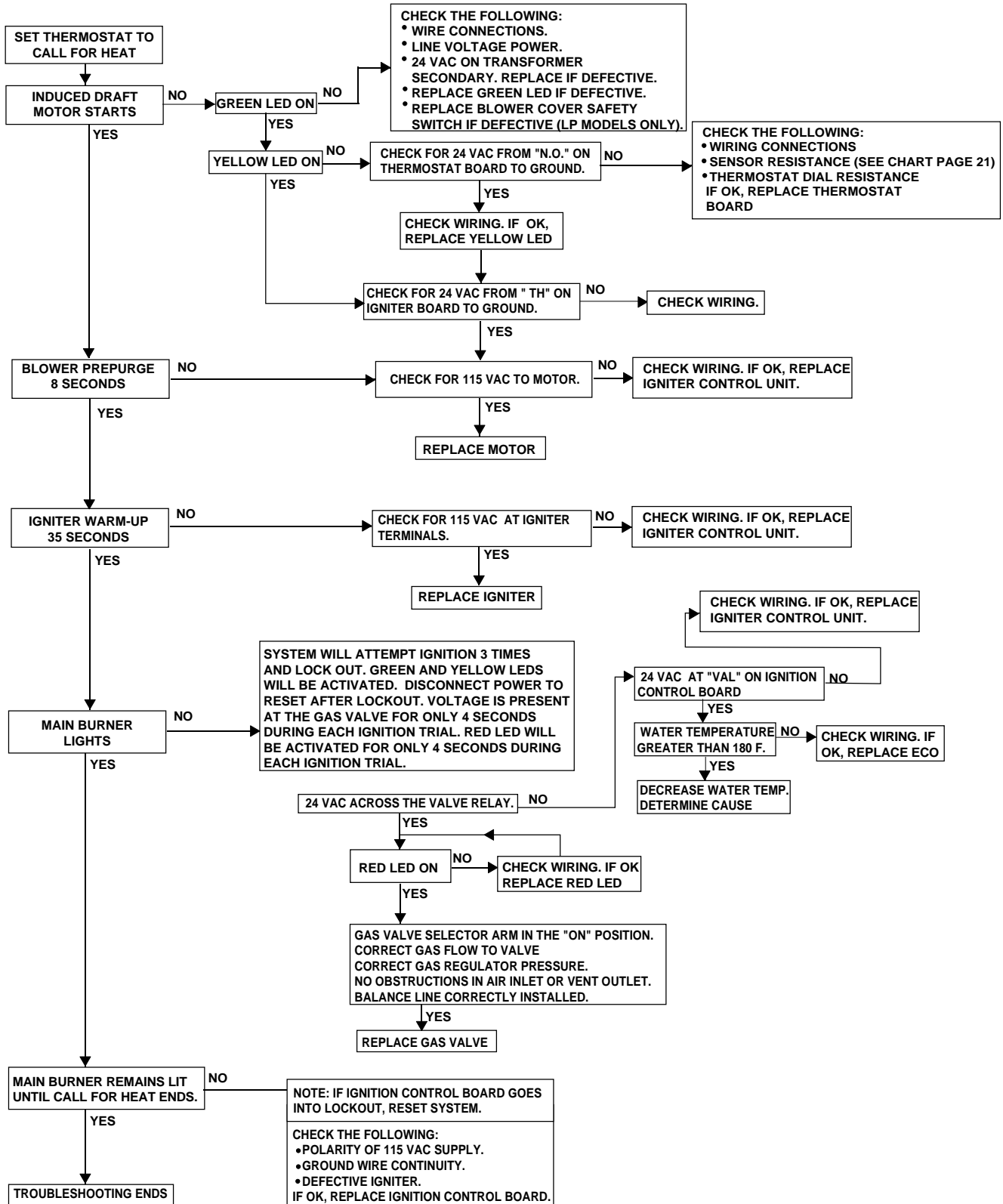
Flashing 3 Times - Control board is in lock-out due to a failed ignition lock-out.

Flashing 4 Times - Control board is in lock-out due to a hardware fault (gas valve sense).

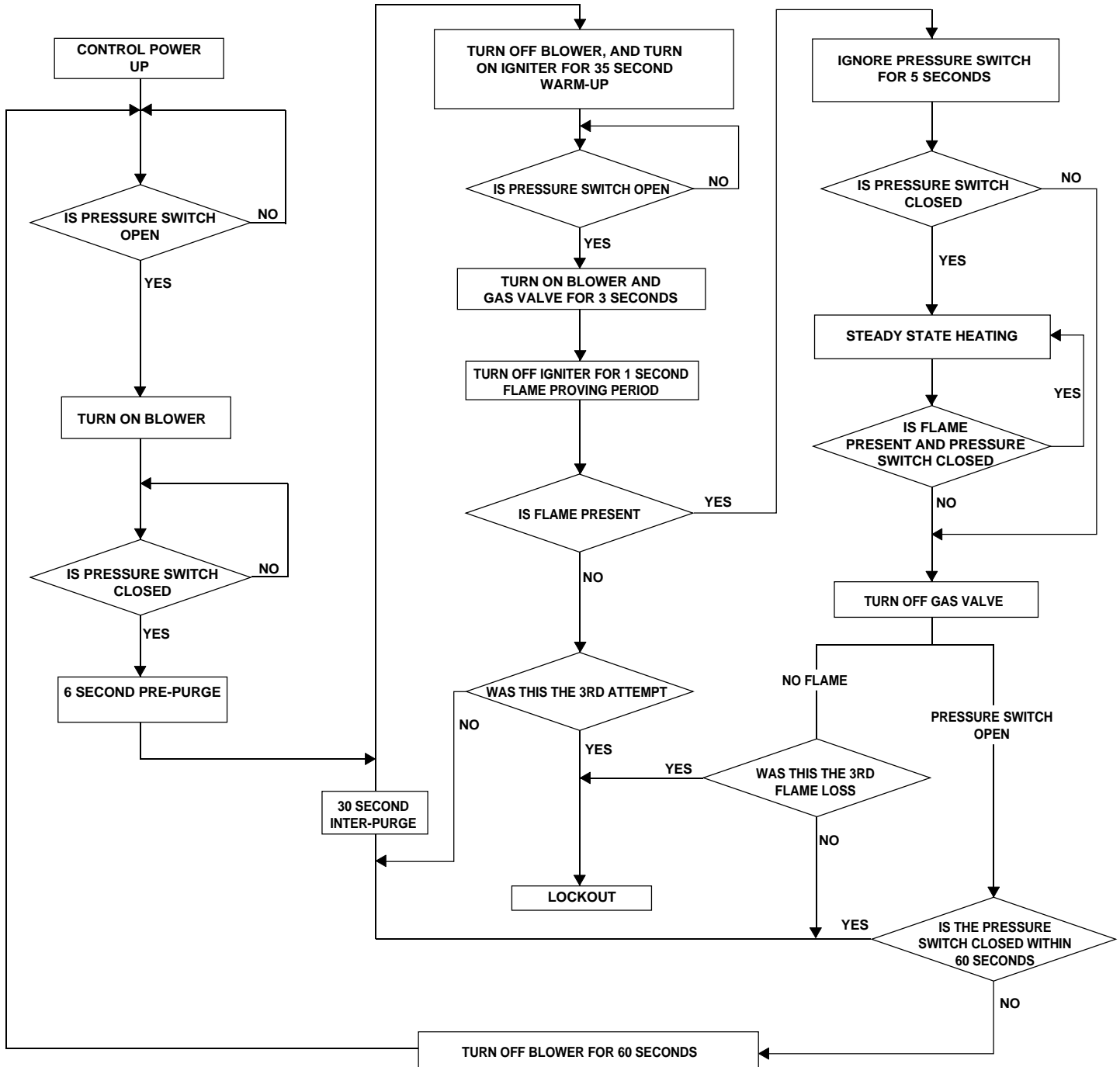
Flashing 5 Times - Control board is in lock-out due to a hardware fault (flame sense).

Flashing 6 Times - Control board is in lock-out due to a false or undesired flame sensed.

An L1 Polarity fault remains a fast flashing code.



1018-525 SOFTWARE OPERATION SEQUENCE



REPAIR PARTS

When ordering repair parts always give the following information:

1. Model, serial and product number
2. Type of gas
3. Item number
4. Parts description

Replacement parts may be ordered through your local distributor.

Reference the parts diagram on the following page.

IMPORTANT: PARTS ARE NOT FIELD REPAIRABLE. DEFECTIVE PARTS MUST BE REPLACED WITH ORIGINAL FACTORY REPLACEMENT PARTS.

ALWAYS INSTALL NEW GASKETS WHEN REMOVING OR REPLACING THE BLOWER, IGNITER OR BURNER ASSEMBLIES.

WARNING

USE CARE WHEN HANDLING THE HOT SURFACE IGNITER. IT IS FRAGILE AND WILL BREAK IF DROPPED. DO NOT TOUCH THE IGNITER PORTION OF THE ASSEMBLY AS THIS WILL CAUSE PREMATURE FAILURE OF THE IGNITER. DO NOT OVERTIGHTEN IGNITER NUTS.

VERIFY PROPER OPERATION AFTER SERVICING.

WARNING

LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION.

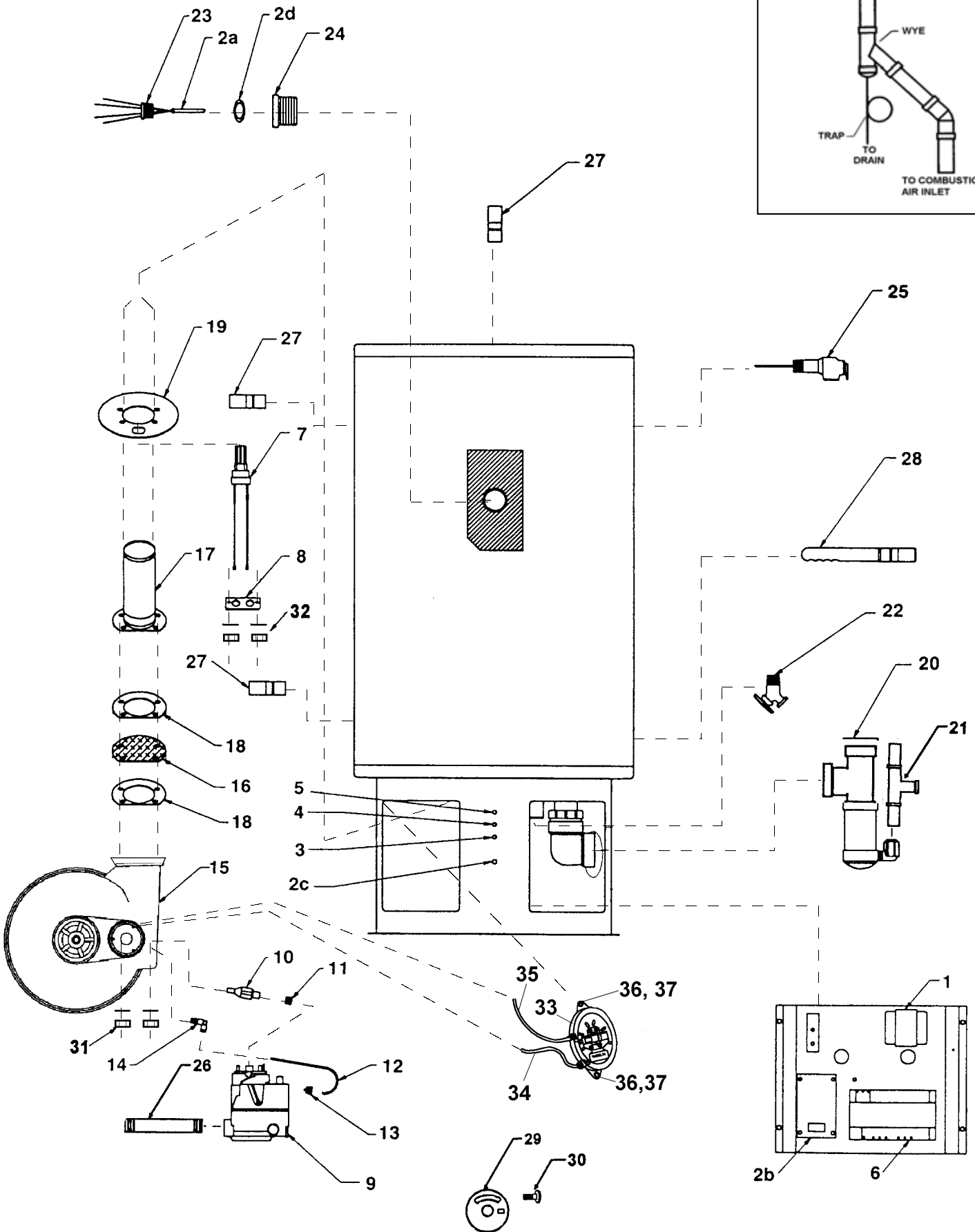
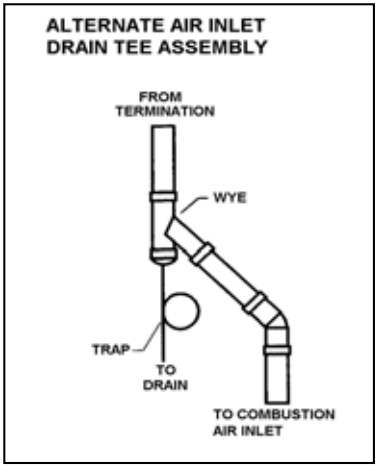
TOOLS REQUIRED FOR SERVICING

| <i>TOOL</i> | <i>FUNCTION</i> |
|--|----------------------------|
| VOLT OHMMETER | MEASURE VOLTAGE/RESISTANCE |
| CLAMP-ON AMMETER | MEASURE CURRENT |
| STOPWATCH | CLOCK GAS CONSUMPTION |
| CALCULATOR | CALCULATE INPUT RATE |
| U-TUBE MANOMETER | READ INLET GAS PRESSURE |
| INCLINED MANOMETER OR DWYER MAGNEHELIC | READ REGULATOR SETTING |
| 3/16" HEX KEY | REMOVE PRESSURE TAP PLUG |
| 3/16" ID PLASTIC TUBING - 2 FT. | CONNECT MANOMETER |
| 1/8" NPT TUBE FITTING | CONNECT 3/16" ID TUBING |
| FLAT BLADE SCREWDRIVER | REMOVE REGULATOR CAP |
| FLAT BLADE SCREWDRIVER | ADJUST REGULATOR SETTING |
| PHILIPS SCREWDRIVER | REMOVE DOORS AND CONTROLS |
| 12" PIPE WRENCH (2 REQUIRED) | REMOVE GAS LINE |
| 7/8" OPEN END WRENCH | REMOVE GAS VALVE |
| 1/2" OPEN END WRENCH | REMOVE BLOWER AND BURNER |
| 1/2" SOCKET AND RATCHET | REMOVE BLOWER AND BURNER |
| 3/8" OPEN END WRENCH | REMOVE IGNITER |
| 5/16" OPEN END WRENCH | REMOVE BALANCE LINE |

REPAIR PARTS LIST

| ITEM NO. | PARTS DESCRIPTION |
|----------|-------------------------------|
| 1 | TRANSFORMER |
| 2A | THERMOSTAT SENSOR/ECO |
| 2B | THERMOSTAT BOARD |
| 2C | THERMOSTAT POTENTIOMETER |
| 2D | O-RING |
| 3 | GREEN LED |
| 4 | YELLOW LED |
| 5 | RED LED |
| 6 | IGNITION CONTROL |
| 7 | HOT SURFACE IGNITER |
| 8 | IGNITER BRACKET |
| 9 | GAS VALVE |
| 10 | ORIFICE HOLDER |
| 11A | ORIFICE - NATURAL GAS |
| 11B | ORIFICE - PROPANE (LPG) GAS |
| 12 | BALANCE LINE |
| 13 | BREAKAWAY FITTING |
| 14 | INSTANT FITTING ELBOW |
| 15 | BLOWER |
| 16 | DISTRIBUTION PLATE |
| 17A | BURNER - NATURAL GAS |
| 17B | BURNER - PROPANE (LPG) GAS |
| 18 | 4 INCH DIA. BLOWER GASKET |
| 19 | 6 INCH DIA. BLOWER GASKET |
| 20 | CONDENSATE TRAP ASSEMBLY |
| 21 | DRAIN VENT ASSEMBLY |
| 22 | DRAIN VALVE |
| 23 | INVERTED FLARE NUT |
| 24 | THERMOSTAT SENSOR BUSHING |
| 25 | T & P VALVE |
| 26 | 1/2" GAS PIPE NIPPLE |
| 27 | 1" NPT X 3" NIPPLE |
| 28 | COLD WATER TUBE ASSEMBLY |
| 29 | THERMOSTAT BEZEL |
| 30 | TAMPER RESISTANT SCREW |
| 31 | BRASS BURNER NUTS/WASHERS |
| 32 | BRASS IGNITER NUTS/WASHERS |
| 33 | PRESSURE SWITCH |
| 34 | VINYL TUBING 7.00" |
| 35 | VINYL TUBING 9.50" |
| 36 | 8-32 X .75" MACHINE SCREW (2) |
| 37 | 8-32 KEPS NUT (2) |

REPAIR PARTS DIAGRAM



POLARIS WIRING DIAGRAM UTEC IGNITION CONTROL BOARD

