



# OWNER'S MANUAL INSTALLATION INSTRUCTIONS

VISITEZ NOTRE SITE WEB POUR LA VERSION FRANÇAISE DE CE MANUEL  
VISITE NUESTRA PÁGINA WEB PARA LA VERSIÓN EN ESPAÑOL DE ESTE MANUAL  
<https://www.williamscomfortprod.com/products/furnaces/>

## DIRECT VENT GRAVITY WALL FURNACE

MODEL NUMBERS (natural gas)  
1403822 / 2203822 / 3003822

MODEL NUMBERS (propane gas)  
1403821 / 2203821 / 3003821

DISCONTINUED MODEL NUMBERS:  
1413822 / 143822 / 1453822 / 2203822 / 223822 2253822  
/ 3003822 / 301822 / 3053822 / 1413821  
1433821 / 1453821 / 2203821 / 2233821 / 2253821  
3003821 / 3013821 / 3053821

SAVE THIS MANUAL FOR FUTURE REFERENCE.

READ THIS OWNER'S MANUAL CAREFULLY BEFORE YOU  
INSTALL YOUR NEW WILLIAMS WALL FURNACE.



**⚠ WARNING:** This Direct-Vent furnace is approved for aftermarket manufactured home installations (once the manufactured home is sold, installed and stationary) unless prohibited by local codes. Not for manufactured home manufacturer (factory) installation. Do not install any of these furnaces (natural or propane gas) in trailers or recreational vehicles.

**⚠ WARNING:** This product can expose you to chemicals including epichlorohydrin which is known to the State of California to cause cancer and birth defects and/or other reproductive harm. For information go to [www.p65warnings.ca.gov](http://www.p65warnings.ca.gov)

**⚠ WARNING:** Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to this manual. For assistance or for additional information consult a qualified installer or, service agency.

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

- 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:

- Open all windows.
- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone or cell phone in your building.
- Extinguish any open flame.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach the gas supplier, call the fire department.
- Installation and service must be performed by a qualified installer, service agency or the gas supplier.

# WARRANTY

The manufacturer, Williams Furnace Co., warrants this wall furnace or heater to the original purchaser under the following conditions:

**ANY WARRANTY CONSIDERATIONS ARE CONTINGENT ON INSTALLATION BY A QUALIFIED INSTALLER (CONTRACTOR). SELF-INSTALLATION IS PROHIBITED AND WILL INVALIDATE YOUR WARRANTY.**

## LIMITED ONE-YEAR WARRANTY

1. Any part thereof which proves to be defective in material or workmanship within one year from date of original purchase for use will be replaced at the Manufacturer's option, FOB to its factory.
2. No liability is assumed by the Manufacturer for removal or installation labor costs, nor for freight or delivery charges.

## LIMITED EXTENDED WARRANTY

1. In addition to the above limited one year warranty on the complete unit, any combustion chamber which burns out or rusts under normal installation, use and service conditions during a period of nine years following expiration of the one-year warranty period will be exchanged for a like or functionally similar part.
2. No liability is assumed by the Manufacturer for removal or installation labor costs, nor for freight or delivery charges.

## LIMITATIONS

1. THIS LIMITED WARRANTY IS THE ONLY WARRANTY MADE BY THE MANUFACTURER, IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE ARE LIMITED TO THE SAME ONE YEAR TERM AS THE EXPRESS WARRANTY. UNDER NO CIRCUMSTANCES SHALL THE MANUFACTURER BE LIABLE FOR INCIDENTAL, CONSEQUENTIAL, SPECIAL OR CONTINGENT DAMAGES OR EXPENSES ARISING DIRECTLY OR INDIRECTLY FROM

ANY DEFECT IN THE PRODUCT OR ANY COMPONENT OR FROM THE USE THEREOF. THE REMEDIES SET FORTH HEREIN ARE THE EXCLUSIVE REMEDIES AVAILABLE TO THE USER AND ARE IN LIEU OF ALL OTHER REMEDIES.

Some states do not allow limitation on how long an implied warranty lasts, and some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you.

2. This warranty does not include any charge for labor or installation.
3. This warranty does not extend to painted surfaces or to damage or defects resulting from accident, alteration, misuses or abuse or improper installation.
4. This warranty does not cover claims which do not involve defective workmanship or materials.

## DUTIES OF THE CONSUMER

1. The heating equipment must be installed by a qualified installer and operated in accordance with the installation and homeowner's instructions furnished with the equipment.
2. Any travel, diagnostic costs, service labor, and labor to repair the defective unit will be the responsibility of the owner.
3. A bill of sale, canceled check, payment record or permit should be kept to verify purchase date to establish the warranty period.
4. Have the installer enter the requested information in the space below.

## GENERAL

1. The manufacturer neither assumes nor authorizes any person to assume for it any other obligation or liability in connection with said equipment.
2. Service under this warranty should be obtained by contacting your dealer. Provide the dealer with the model number, serial number, and purchase date verification.
3. If, within a reasonable time after contacting your dealer, satisfactory service has not been received, contact: Customer Service Department, 250 West Laurel Street, Colton, CA 92324 for assistance.
4. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

# INSTALLATION RECORD

Model No. \_\_\_\_\_ Serial No. \_\_\_\_\_

Original Purchaser \_\_\_\_\_

\_\_\_\_\_ Address \_\_\_\_\_

City and State \_\_\_\_\_ Zip \_\_\_\_\_

Dealer \_\_\_\_\_

Address \_\_\_\_\_

City and State \_\_\_\_\_ Zip \_\_\_\_\_

Installation Date \_\_\_\_\_ Name \_\_\_\_\_ Signature \_\_\_\_\_

(Dealer or authorized representative who certifies that this appliance is installed in accordance with Manufacturer's instructions and local codes.)

# CONTENTS

YOUR WILLIAMS WARRANTY	2
INSTALLATION RECORD	2
TABLE OF CONTENTS	3
SAFETY RULES	4
INTRODUCTION	5
BASIC MATERIALS NEEDED	6
BASIC TOOLS NEEDED	6
OPTIONAL ACCESSORIES	6
INSTALLING YOUR WALL FURNACE	7
LOCATING YOUR WALL FURNACE	7
THERMOSTAT INSTALLATION	9
THERMOSTAT MOUNTING	10
CABINET INSTALLATION	10
GAS SUPPLY AND PIPING	11
ORIFICE SIZES	11
GAS PIPING	12
INSTALLATIONS IN THE STATE OF MASSACHUSETTS	13
OPERATING YOUR FURNACE	14
LIGHTING THE PILOT	14
OPERATING INSTRUCTIONS	15
TO TURN OFF GAS TO APPLIANCE	15
START-UP PROCEDURE	16
HOW TO CARE FOR YOUR FURNACE	17
BLOWER ACCESSORIES 2302 & 2303	18
FURNACE ASSEMBLY REPLACEMENT PARTS 140 MODELS	20
CONTROL ASSEMBLY REPLACEMENT PARTS 140 MODELS	21
BLOWER ACCESSORY REPLACEMENT 2303 KIT FOR MODELS 1403821 / 1403822	22
FURNACE ASSEMBLY REPLACEMENT PARTS 220 / 300 MODELS	24
CONTROL ASSEMBLY REPLACEMENT PARTS 220 / 300 MODELS	25
BLOWER ACCESSORY REPLACEMENT 2303 KIT FOR MODELS 2203821 / 2203822	26
TROUBLESHOOTING YOUR FURNACE	28
HINTS AND INFORMATION	30
SERVICE RECORD	31

# SAFETY RULES

**⚠ WARNING:** READ THESE RULES AND THE INSTRUCTIONS CAREFULLY. FAILURE TO FOLLOW THESE RULES AND INSTRUCTIONS COULD CAUSE A MALFUNCTION OF THE FURNACE. THIS COULD RESULT IN DEATH, SERIOUS BODILY INJURY AND/OR PROPERTY DAMAGE.

Installation must conform to local codes. In the absence of local codes, installation must conform with the National Fuel Gas Code, ANSI Z223.1. The appliance, when installed, must be electrically connected and grounded in accordance with local codes or, in the absence of local codes, with the current National Electrical Code ANSI/NFPA NO. 70.

## IN CANADA:

1. Installation must conform to local codes or, in the absence of local codes, the current CAN/CGA B149 installation code.
2. The appliance, when installed, must be electrically connected and grounded in accordance with local codes or, in the absence of local codes, with the current CSA C22.1 Canadian Electrical code.
3. Reference is made in this manual regarding gas type as propane gas. Be advised that propane gas is not available in Canada, refer to propane gas.

1. Use only manufacturer's replacement parts. Use of any other parts could cause injury or death.
2. DO NOT install this furnace where it could be isolated by closing doors to the heated space.
3. DO NOT install this furnace in a travel trailer or recreational vehicle.
4. MAINTAIN all clearances specified in section "Locating Wall Furnace and Thermostat".
5. BE SURE this furnace is for type of gas to be used. Check the rating plate by the gas valve in the lower cabinet. Do not change it to use other gases without the proper manufacturer's Gas Conversion Kit.
6. For natural gas, the minimum inlet gas supply pressure for the purpose of input adjustment is 5" water column. The maximum inlet gas supply pressure is 7" water column.  
  
For propane gas, the minimum inlet gas supply pressure for the purpose of input adjustment is 11" water column. The maximum inlet gas supply pressure is 13" water column.
7. Any safety screen, guard or parts removed for servicing this appliance must be replaced prior to operating the appliance to avoid property damage, bodily injury or death.
8. Install the furnace vent directly to the outdoors so that harmful combustible flue gases will not collect inside the building. Follow the venting instructions for your type of installation exactly. Use only the type and size of vent pipe and fittings specified.
9. BE SURE to provide for adequate combustion and ventilation air. The flow of this air to the furnace must not

be blocked.

10. NEVER vent flue gases into another room, a fireplace or any space inside a building. This could cause property damage, bodily injury or death.
11. Never test for gas leaks with an open flame. Use a soap solution to check all gas connections. This will avoid the possibility of fire or explosion.
12. ALLOW the furnace to cool before servicing. Always shut off electricity and gas to furnace when working on it. This will prevent any electrical shocks or burns.
13. DUE TO HIGH TEMPERATURES, locate the furnace out of traffic and away from furniture and draperies.
14. ALERT children and adults to the hazards of high surface temperatures and warn them to keep away to avoid burns or clothing ignition.
15. CAREFULLY supervise young children when they are in the same room with the furnace.
16. DO NOT place clothing or other flammable material on or near furnace.
17. INSTALLATION and REPAIR must be done by a qualified service person. The appliance should be inspected before use and at least annually by a professional service person. More frequent cleaning may be required due to excessive lint from carpeting, bedding material, etc. It is imperative that control compartments, burners and circulating air passages be kept clean. Failure to keep burner-control compartment and other parts of furnace clean can cause dangerous conditions to develop which can cause injury and even death.
18. BEFORE INSTALLING: To avoid electrical shock, turn off electrical circuits that pass through the wall where you are going to install the furnace.
19. BE AWARE of good safety practices by wearing personal protective equipment such as gloves and safety glasses to avoid being injured by sharp metal edges in or around furnace and while cutting or drilling holes in wood and/or sheet metal.
20. CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.  
  
Always shut-off electricity to furnace when working on it. This will prevent any electrical shocks or burns.
21. DO NOT store or use gasoline or other flammable liquids or vapors near the furnace.

**⚠ WARNING:** Do not use this furnace if any part has been under water. Immediately call a certified service technician to inspect the furnace and to replace any part of the control system and any gas control which has been under water.

# INTRODUCTION

Please read our instructions before you install and use your furnace. This will help you obtain the full value from this furnace. It will also help you avoid any needless service costs if the problem is found within this instruction manual.

Always consult your local heating or plumbing inspector, building department or electric utility company regarding regulations, codes or ordinances which apply to the installation of a Direct-Vent Wall Furnace.

## BASIC DESCRIPTION

Your direct-vent wall furnace is shipped ready to install against an exterior wall up to 9 inches thick. For walls greater than 9 inches, and up to 24 inches thick, use an optional Vent Extension Kit.

The furnace may burn either Natural or propane gas, depending on the model you have purchased.

No electric power is required unless furnace is equipped with an

optional blower accessory.

Always consult your local heating or plumbing inspector, building department or gas utility company regarding regulations, codes or ordinances which apply to the installation of a direct-vent furnace.

The sealed combustion system draws combustion air directly from outdoors into the combustion chamber and combustion gases are discharged directly outdoors through tubes on the rear of the furnace.

The furnace cabinet is also constructed of heavy-gauge steel and has a powder paint finish.

The furnace controls are located behind an access door on the lower front of the furnace. All models are equipped with American Gas Association and Canadian Gas Association (AGA/CGA) listed gas valves and pilots.



## WARNING: CARBON MONOXIDE POISONING HAZARD

**Failure to follow the steps outlined below for each appliance connected to the venting system being placed into operation could result in carbon monoxide poisoning or death.**

*The following steps shall be followed for each appliance connected to the venting system being placed into operation, while all other appliances connected to the venting system are not in operation:*

- 1) Seal any unused openings in the venting system.
- 2) Inspect the venting system for proper size and horizontal pitch, as required in the National Fuel Gas Code, ANSI Z223.1/NFPA 54 or the Natural Gas and propane Installation Code, CSA B149.1 and these instructions. Determine that there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.
- 3) As far as practical, close all building doors and windows and all doors between the space in which the appliance(s) connected to the venting system are located and other spaces of the building.
- 4) Close fireplace dampers.
- 5) Turn on clothes dryers and any appliance not connected to the venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they are operating at maximum speed. Do not operate a summer exhaust fan.
- 6) Follow the lighting instructions. Place the appliance being inspected into operation. Adjust the thermostat so appliance is operating continuously.
- 7) Test for spillage from draft hood equipped appliances at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle.
- 8) If improper venting is observed during any of the above tests, the venting system must be corrected in accordance with the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and/or natural gas and propane installation code, CSA B149.1.
- 9) After it has been determined that each appliance connected to the venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-fired burning appliance to their previous conditions of use.

# INTRODUCTION

## Materials Needed

- Pipe joint compound resistant to L.P. gases.
- Caulking compound-silicone rubber with a temperature rating of 500°F.
- DO NOT use caulking advertised as paintable or for bathtub use as most contain fillers and will not withstand high temperatures.
- Pipe and fittings to make connections to the furnace.
- Electrical wiring supplied as needed for optional blower.
- Minimum wire size is #14 gauge copper.

## Tools Needed

- Hand drill or properly grounded electric drill
- 6 ft. folding rule or tape measure
- Screwdrivers (Phillips Head)
- Pliers (wire cutting)
- Stud locator or small finishing nails.
- Tin snips
- 8 and 12 inch adjustable wrenches
- Keyhole or sabre saw
- (2) 10 inch or 12 inch pipe wrenches
- Gloves and safety glasses

## Helpful Installation Information

The following booklets will help you in making the installation:

ANSI/NFPA 70, or current edition "National Electrical Code".

In Canada: CSA C22.1 Canadian Electrical Code.

American National Standard Z223.1 or current edition of the "National Fuel Gas Code."

Obtain from the American National Standard Institute, Inc., 1430 Broadway, New York, NY 10018. In Canada, CAN/CGA B149.

## Optional Accessories

Vent Extensions: For walls greater than 9 inches thick and up to 24 inches thick, use one of the following Vent Extension Kits:

KIT NUMBER	WALL THICKNESS	MODELS
9301	9 inches to 15 inches	22038 / 30038 Series
9302	15 inches to 24 inches	22038 Series
9303	15 inches to 24 inches	14038 / 30038 Series
9304	9 inches to 15 inches	14038 Series

**BLOWER ACCESSORIES 2302 / 2303** – To increase circulation of warmed air within the heated space, you may use Blower Accessory Kit 2302, for model series 22038 or Kit 2303 for model series 14038. Both are equipped with a two speed fan and an automatic fan switch.

**THIN WALL COLLAR KIT 9307** – For walls less than 4-1/2 inches thick, a Thin Wall Collar Kit may be used to increase wall thickness.

**VENT-CAP GUARD 9308** – This mounts to the outside of the exterior wall over the vent cap, to protect pedestrian traffic from heat.

**VENT SHIELD DEFLECTOR 4318** – Insulated, galvanized sheet for all direct-vent models.

**THERMOSTAT P322016**

**GAS CONVERSION KITS** – Used to convert your furnace from natural gas to propane gas and from propane gas to natural gas. See page 12



# INSTALLING YOUR FURNACE

## Locating Your Wall Furnace

Consider the following points before attempting to install the furnace.

### ALL MODELS

1. This is a direct-vent wall furnace. It must be installed on an outside wall for proper venting of flue gases. Figure 1
2. Wall furnace must be surface mounted on an outside wall up to 24-inches thick when using an optional Vent Extension Kit.
3. Check the clearances needed from the furnace and vent. Figure 1 and 2 You must place the furnace where you will have no less than the clearances shown.
4. The outside vent must be at least 18-inches away from any window or other building opening.
5. The furnace will not work if anything stops free entry of fresh air into the vent, or free flow of flue gases from it. Be sure the center of the vent cap is at least 12-inches above ground level or shrubs. Figure 1 Make sure shrubs are kept trimmed. It must also be at least 18-inches from any wall or other blockage and 30-inches below any overhang.
6. Place the furnace near the center of the space to be heated for good air circulation. Do not put it behind a door or draperies. Do not put it in a closet, alcove, hallway or other confined space where the furnace could be isolated by closing doors to the heated space.
7. Be sure that gas piping and electrical wiring (optional blower only) can be brought to the furnace.
8. Select a location that will provide adequate accessibility clearance for servicing and proper operation.

### INTERIOR CLEARANCES (FIGURE 2)

#### 14038 SERIES:

1. There must be at least 1-3/16 inches of space between the floor (top of floor covering) and the bottom of cabinet.
2. The top of the furnace must be at least 24-inches from the ceiling or other projecting overhang.
3. The side of the furnace must not be closer than 2-inches to an adjacent wall.

#### 22038 / 30038 SERIES:

1. There must be at least 5-1/2 inches of space between the floor (top of floor covering) and the bottom of cabinet.
2. The top of the furnace must be at least 30-inches from the ceiling or other projecting overhang.
3. The side of the furnace must not be closer than 2-inches to an adjacent wall.

Choose a location for the thermostat (optional) about 5-feet above floor on an inside wall. The thermostat wire supplied with your furnace is 20-feet long, which should be enough to run up through the attic so the thermostat can be a maximum of 16 feet from furnace measured in a straight line, or approximately 12-feet from the furnace if the wire is run under the floor. The thermostat should be sensing an average room temperature; avoid the following:

Concealed pipes/ducts  
Fireplaces  
Registers  
TV sets  
Radios  
Lamps  
Direct sunlight  
Kitchen

### COLD SPOTS

Concealed pipes/ducts  
Stairwells (drafts)  
Doors (drafts)  
Unheated rooms on other side of the wall

### DEAD SPOTS

Behind doors  
Corners / alcoves

After selecting a location that meets the requirements, inspect the wall, floor and outside areas. Make sure there are no pipes, wiring, or anything else that would interfere with furnace, vent or thermostat installation. If required, move or pick a new location.

FIGURE 1

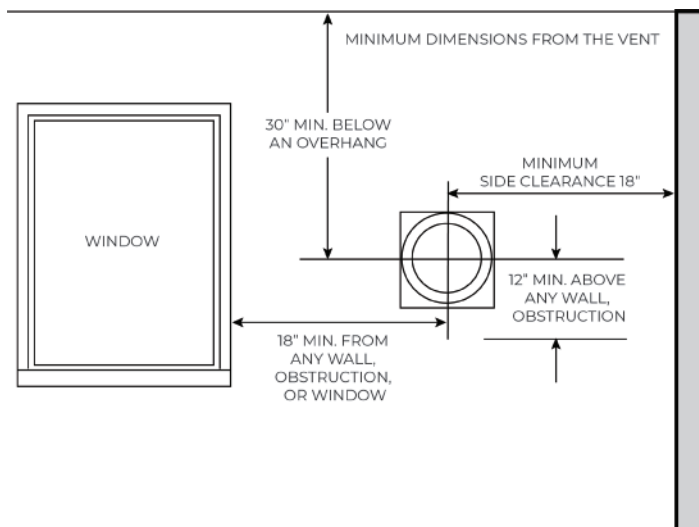
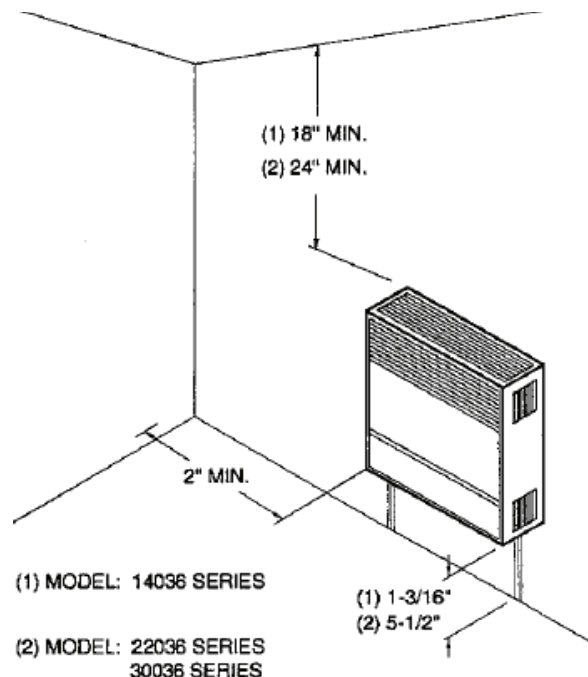


FIGURE 2



### HOT SPOTS

# INSTALLING YOUR FURNACE

To avoid electrical shock, turn off all electrical circuits that pass through the wall where you are going to install the furnace.

This furnace must be installed using only the vent tube, air inlet tube and vent cap assembly supplied by the manufacturer.

Before the furnace is installed, an opening must be cut through the wall for the vent cap.

## FIND THE STUDS

Find the studs where the furnace is to be placed. Use a stud locator or small finishing nails. Drive a nail on the inside of the first stud. Drive a second nail on the outside of this stud.

The inside edge of the next stud should be about 14-1/2 inches from the one found. Drive a finishing nail on the inside edge of this stud, then another nail on the outside edge.

Using a level, draw vertical lines that will represent the two stud center lines.

## CUT VENT OPENING

After locating the studs, use the cardboard template Figure 4. Line up the center of the stud lines on the template with the center lines you have drawn on the wall. Use the template to draw the 9-1/4 inch diameter circle on the wall. Then mark the location of the gas supply line.

Using a window, door or wall corner for reference, measure to find where the vent will be on the outside wall. Check to be sure of the proper clearances Figures 1 and 2. If necessary, relocate the furnace for proper clearances.

Drill a 1/4 inch hole in the wall at the vent opening center mark all the way through to the outside. Cut the 9-1/4 inch diameter hole through the inside wall. Using the 1/4 inch hole as center, cut a matching hole in the outside wall. It may be better to work from the outside when breaking through brick, stone or tile.

Make sure the wall openings are aligned so vent tubes and vent will fit properly.

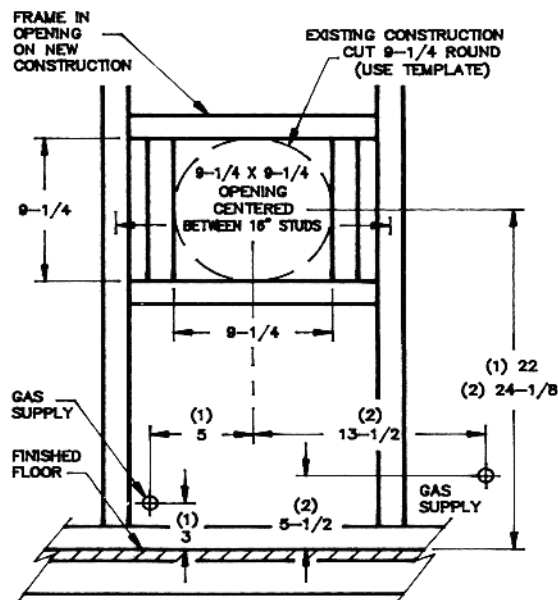
In new construction, frame in 9-1/4 inch x 9-1/4 inch opening centered between the studs spaced 16 inches on centre and the center point located as noted in Figure 3.

## GAS AND ELECTRICAL SUPPLY OPENINGS

Holes must be drilled for the gas line (and electrical supply if you use an optional blower kit). Drill a 1-1/2 inch hole in the wall for the gas line where indicated on the cardboard template. Figure 4. You will have to determine whether the gas line will enter the home through the outside wall or the floor plate. These instructions can only guide you to where the gas line will enter the furnace.

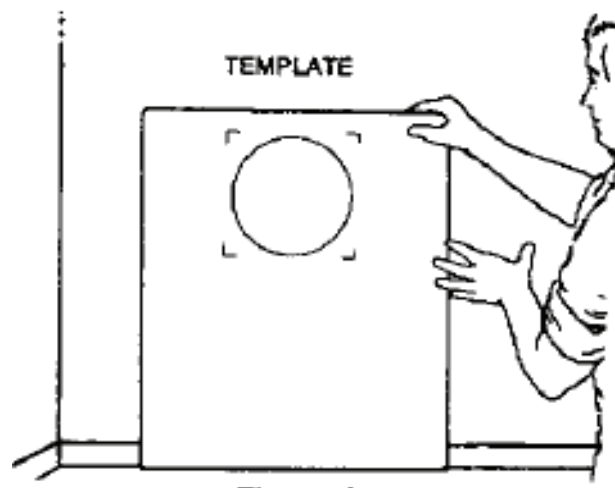
FIGURE 3

NOTE: 9-1/4 x 9-1/4 OPENING MAY BE ROUND OR SQUARE CUT.



1. 14036 Series  
2. 22036 / 30036 Series

FIGURE 4



The gas line can be run at this time or after the furnace is mounted. See Gas Supply and Piping section.

No electrical power is required unless furnace is equipped with an optional blower kit.

Do not connect a 115V service line to the gas valve or wall thermostat.

## INSTALL SPACER PLATE (Figure 5)

Install the mounting spacer plate with spacers entering and centered within the 9-1/4 inch vent opening in the wall. Level the top of the spacer plate (embossed top) and fasten it to the interior wall using the six (6) #8 roundheaded (long) screws provided.



**IMPORTANT:** The vent tubes are factory equipped for walls 5 to 9 inches thick only. For wall thicknesses up to 24 inches, follow the instructions packed with the appropriate factory Vent Extension Kits.

### FURNACE MOUNTING (Figure 5)

Set the furnace body against the wall, legs on the floor, with the vent tubes extending through the spacer plate.

Fasten the furnace to the wall through holes at the top and bottom of the support legs using the four (4) #3 round headed (long) screws provided.

Push the air inlet shield on from the exterior side of the wall. Rotate the air inlet shield until the notches on the end of the tube are straddling the standoff tabs on the mounting spacer plate. Trim the air inlet shield flush with the exterior of the wall. Never crimp the vent tubes or force them to fit.

**NOTE:** Do not trim flue extension or air inlet collar.

### INSTALL VENT CAP

Outside, place a single strip of mastic (provided) around the back flange of the vent cap. Figure 6 Install the vent cap by inserting it into the air inlet tube and over the vent tube.

Important: The top of the vent cap is embossed "TOP". Install it in the correct position to prevent water from entering the wall. Level the vent cap and attach it to the outside wall with four (4) #8 roundheaded (long) screws. Figure 6

If the wall surface is not flat (shiplapped siding, etc.) or less than 5 inches thick, use a Thin Wall Collar Kit (9307) or, build up a flat surface with wood strips. Do not tilt or bend the cap to fit uneven surfaces. The vent cap flange must be tight against the wall to prevent rain or wind penetration. Use standard caulking compound if required (not provided).

For brick, masonry or plaster walls, it may be necessary to use lag screws or expanding anchor bolts, which are not furnished with the furnace.

When the vent cap is to be installed on vinyl siding, or a projection within 6 inches of any side that could block the air inlet, the entire vent should be supported away from the wall at least the distance of the projection. A 2" x 4" frame, with outside dimensions that match the overall dimensions of the mounting plate, is recommended. The 2" x 4" frame protects vinyl siding from possible damage. Seat and paint all joints. The wall depth plus the additional 2" x 4" frame depth should not exceed a total depth of 13 inches.

## Thermostat Installation (Sold Separately)

### WALL MOUNTING

1. Use Williams thermostat P322016 or any millivolt thermostat.
2. If an existing thermostat is being replaced and is in a satisfactory location and the wiring is in good condition, use existing wiring. If in doubt, use new wiring.
3. If a new location is chosen or if this is a new installation, the thermostat wire must first be run to the location selected. All wiring must agree with local codes and ordinances. These instructions cover bringing the wire down from the attic, but it can be run from a basement or crawl space using similar methods.
4. Before drilling a hole in the wall at the selected location,

FIGURE 5

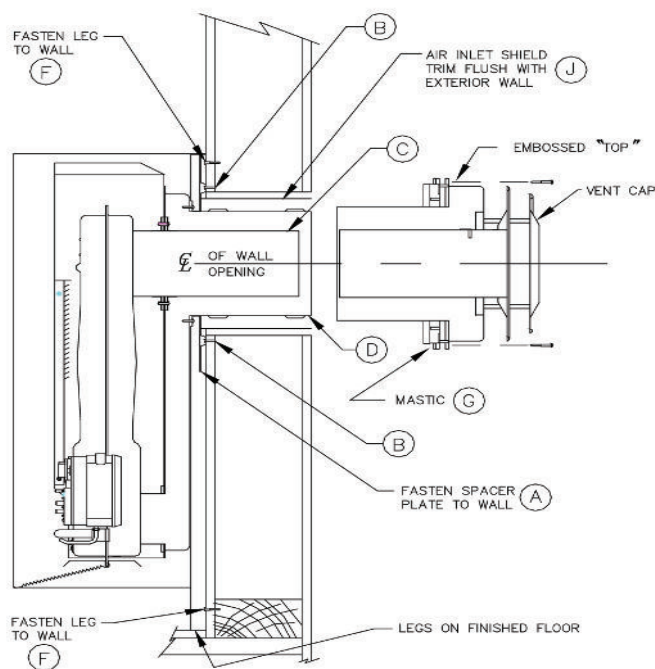
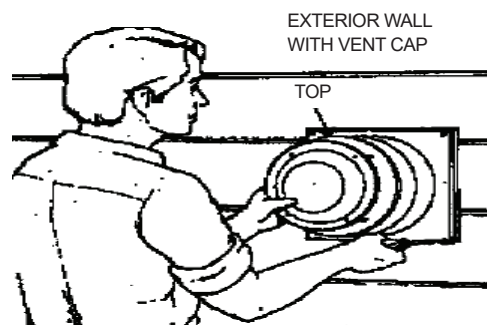


FIGURE 6



drive a small finishing nail through the ceiling in the corner of the wall and ceiling above the thermostat location. Pull the nail out and push a small stiff wire through the hole so it can be found in the attic. Drill a 1/2-inch hole through the ceiling wall plate.

5. Probe for obstructions in the partition. Then, drill a 1/2-inch hole through the wall at the selected location for the thermostat.
6. From the attic, feed the thermostat wire or a stiff wire through the wall until even with thermostat location.
7. Snag the thermostat wire through the wall so that 6 inches of wire protrudes.
8. Route wire to the furnace leaving enough excess wire to make the connections at the gas valve.

### CABINET MOUNTING

1. Locate the knockout on the right side of the furnace to mount the thermostat. Remove the knockout by tapping it lightly with a

# INSTALLING YOUR FURNACE

screwdriver.

2. Cut the thermostat wire to the required length below.

Model Number	Length
14038 Series	31 inches
22038 Series	45 inches
30038 Series	47 inches

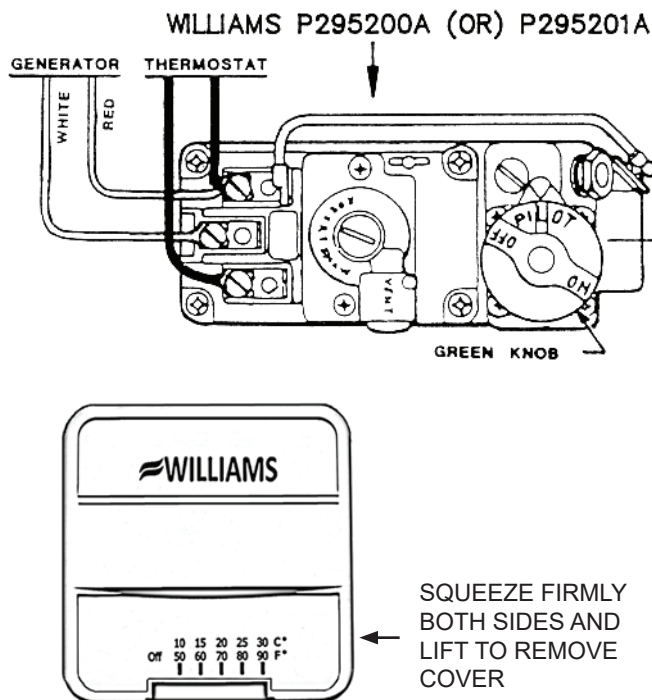
3. Connect the thermostat wires to terminal screws on the front of the thermostat base. See instructions packaged with thermostat.
4. Feed the thermostat wires through the knockout and to the gas valve.

**IMPORTANT:** Keep the thermostat wire away from the combustion chamber.

5. Mount the thermostat to the side of cabinet with the screws provided. Replace the thermostat cover.
6. Connect the thermostat wire to the gas valve. Figure 9

**IMPORTANT:** BEFORE REMOVING THE FACE PANEL DISCONNECT THERMOSTAT WIRES AT THE GAS VALVE.

FIGURE 9



## Thermostat Mounting

1. To remove the thermostat cover, grasp cover and squeeze both sides firmly, then lift to remove cover. Carefully remove and discard the packing tab protecting the switch contacts.
2. Connect thermostat wires to the terminal screws on the front of thermostat base.
3. Push any excess wire back through hole in the wall and plug the hole with insulation to prevent drafts from affecting thermostat operation.
4. Being sure to level thermostat for the best appearance. Fasten the thermostat base to the wall through the mounting holes with the screws provided.
5. Replace the thermostat cover.

**NOTE:** Refer to the installation instructions packed in the thermostat carton if you have any doubt about the above procedures.

## Cabinet Installation

### 14038 SERIES:

Set the cabinet over the furnace body, dropping the rear top flange between the support legs and wall. Open the cabinet door and attach the cabinet to the inner casing with two (2) sheet metal screws. Figure 10

### 22038 / 30038 SERIES:

Set the cabinet over the furnace body, dropping the rear top flange into the slot in top of the spacer plate and into the slots between the support legs and wall. When correctly positioned side-to-side, a dimple on the rear top flange will slide against the inside of each support leg. Attach two (2) tension springs through the bottom flange of the combustion chamber and the bottom of the cabinet. Fasten the trim strip to the bottom of the support legs using two (2) sheet metal (short) screws. Figure 11

FIGURE 10

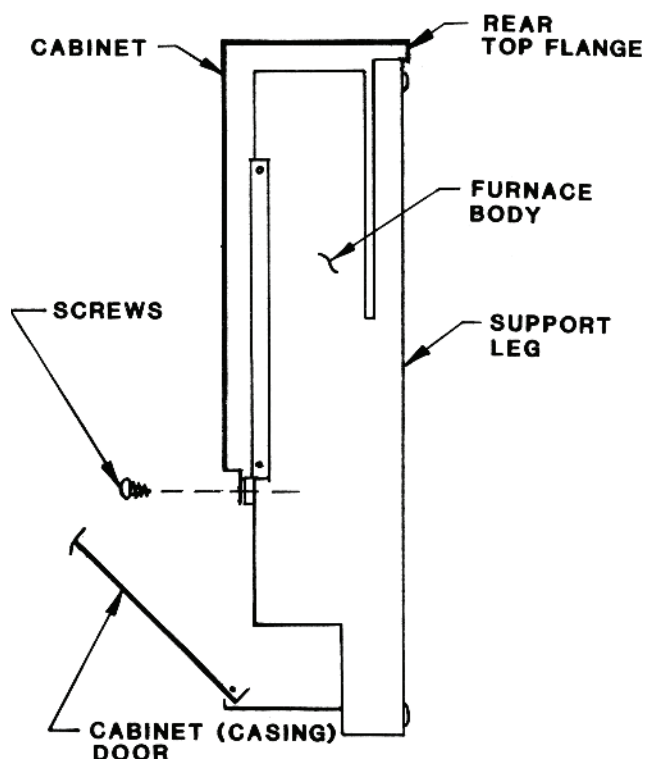
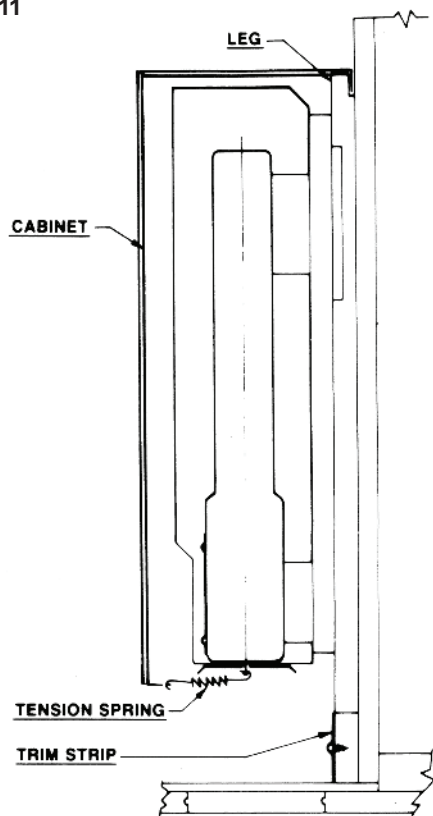


FIGURE 11



## Gas Supply and Piping

The gas control valve is shipped with a sealed cover over the gas inlet tapping. Do not remove seal until you are ready to connect piping.

**⚠ WARNING:** Danger of property damage, bodily injury or death. Make sure the furnace is equipped to operate on the type of gas available. Models designated as natural gas are to be used with natural gas only. Furnaces designated for use with propane gas have orifices sized for commercially pure propane gas. They cannot be used with butane or a mixture of butane and propane.

### GAS SUPPLY

Minimum gas supply pressure for natural gas to the furnace control valve is 5 inches water column and must not be more than 7 inches water column.

Minimum gas supply pressure for propane gas to the furnace control valve must be at least 11 inches water column and must not exceed 13 inches water column.

Gas pressures and pressures to the burners must not exceed the rated input and pressure shown on the rating plate. For natural gas, the manifold pressure should be 4 inches water column. The manifold pressure should be 10 inches water column for propane gas. An orifice change may be required to suit the gas supplied.

## Orifice Sizes

The efficiency rating of these appliances is a product thermal efficiency rating determined under continuous operating conditions and determined independently of any installed system. For elevations above 2,000 feet reduce ratings 4% for each 1,000 feet above sea level.

The correct orifice sizes for the different input ratings when using natural or propane gas are:

CAPACITY AND ORIFICE SIZING						
MODEL NUMBER	GAS TYPE	INPUT RATING BUT/hr.	HEATING CAPACITY RATING BUT/hr.	MAIN BURNER ORIFICE		
				DRILL	DEC	QTY
14038	NATURAL	14,000	9,800	#50	.0700	1
14038	PROPANE	14,000	9,800	#56	.0460	1
22038	NATURAL	22,000	16,210	#44	.0860	1
22038	PROPANE	22,000	16,210	N/A	.0560	1
30038	NATURAL	30,000	21,000	#39	.0990	1
30038	PROPANE	30,000	21,000	N/A	.0640	1

## Gas Piping

# INSTALLING YOUR FURNACE

CONVERSION KITS	
DESCRIPTION	MODELS
NATURAL GAS TO PROPANE GAS FOR 14038 SERIES	8939
NATURAL GAS TO PROPANE GAS FOR 22038 SERIES	8940
NATURAL GAS TO PROPANE GAS FOR 30038 SERIES	8941
PROPANE GAS TO NATURAL GAS FOR 14038 SERIES	8942
PROPANE GAS TO NATURAL GAS FOR 22038 SERIES	8943
PROPANE GAS TO NATURAL GAS FOR 30038 SERIES	8944

FIGURE 12

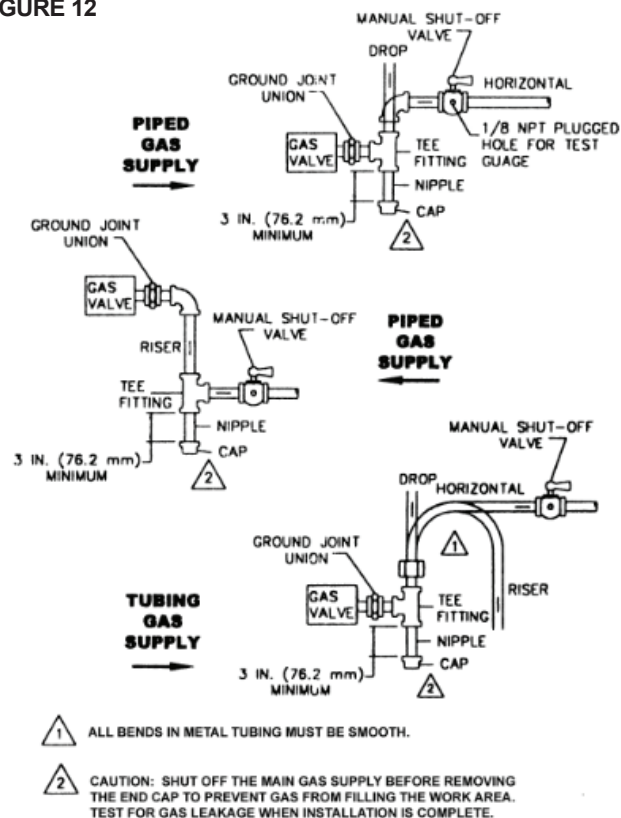
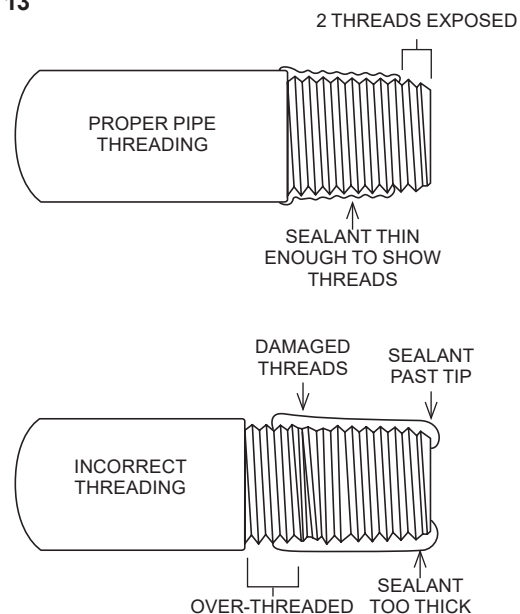


FIGURE 13



The gas supply line must be of an adequate size to handle the BTU/hr. requirements and length of the run for the unit being installed.

Determine the minimum pipe size from Figure 14, basing the length of the run from the gas meter or source to the unit.

All piping must comply with local codes and ordinances or with the National Fuel Gas Code (ANSI Z223.1 NFPA No. 54), whichever applies. (In Canada: CAN/C.G.A.B149). Refer to Figure 12 for the general layout of the unit. It shows the basic fittings needed.

1. Use new, properly reamed pipe free from chips such as steel or black iron pipe and fittings that are approved by local codes. Metal chips and debris can damage the gas valve.
2. Do not thread the pipe too far. Distortion or malfunction may result from excess pipe within the control valve. Apply a moderate amount of good quality dope to the pipe threads only. Leave the two end threads bare. Figure 13 On propane gas installations, use a compound resistant to action of liquefied petroleum gases.
3. Use ground joint unions.
4. Install a drip leg (sediment trap) to trap dirt and moisture before it can enter the gas valve. The nipple must be a minimum of 3-inches long.
5. Install a manual shutoff valve.
6. Provide a 1/8" NPT test gauge connection immediately before the gas supply connection to the furnace.

## GAS CONNECTION

If installation is for propane gas, use a two-stage regulator and make all connections from the storage tank to furnace.

Use two pipe wrenches when making the connection to the valve to prevent turning and/or damage to the gas valve.

The connection between the shutoff valve and the burner control assembly can be made with an A.G.A./C.G.A. design certified flexible connector if allowed by local codes.

Tighten all joints securely.

## CHECKING THE GAS PIPING

Test all piping for leaks. When checking gas piping to the furnace with gas pressure at less than 1/2 PSI, shut off manual gas valve to the furnace. If the gas piping is to be checked with the pressure at or above 1/2 PSI, the furnace and manual shutoff valve must be disconnected during testing. Apply a soap solution (or a liquid detergent) to each joint. Bubbles forming indicate a leak. Correct even the slightest leak at once.



**WARNING:** Danger of property damage, bodily injury or death. Never use a match or open flame to test for leaks. Never exceed specified pressures for testing. Higher pressures may damage the gas valve and cause over firing which may result in combustion chamber failure. Liquefied petroleum gas (L.P.G.) is heavier than air and it will settle in any low area, including open depressions and it will remain there unless area is ventilated. Never attempt start-up of the unit before thoroughly ventilating the area and smelling near the floor for gas odor.

When an existing category I heater is removed or replaced, the original venting system may no longer be sized to properly vent the attached appliances

FIGURE 14

GAS PIPE SIZES			
NATURAL GAS PIPE CAPACITY - BTU/hr. (includes fittings) PIPE SIZE			
LENGTH OF PIPE - FT.	1/2"	3/4"	1"
20	92,000	190,000	350,000
40	63,000	130,000	245,000
60	50,000	105,000	195,000
PROPANE GAS PIPE CAPACITY - BTU/hr. (includes fittings) PIPE SIZE			
LENGTH OF PIPE - FT.	1/2"	3/4"	1"
20	189,000	393,000	732,000
40	129,000	267,000	504,000
60	103,000	217,000	409,000

# INSTALLATIONS IN THE STATE OF MASSACHUSETTS

All installations in the State of Massachusetts must use the following requirements when installing, maintaining or operating direct-vent propane or natural gas-fired space heaters.

For direct-vent appliances, mechanical-vent heating appliances or domestic hot water equipment, where the bottom of the vent terminal and the air intake is installed below four feet above grade the following requirements must be satisfied:

1. If there is not one already present, on each floor level where there are bedroom(s), a carbon monoxide detector and alarm shall be placed in the living area outside the bedroom(s). The carbon monoxide detector shall comply with NFPA 720 (2005 Edition).
2. A carbon monoxide detector shall be located in the room that houses the appliance or equipment and shall:
  - a. Be powered by the same electrical circuit as the appliance or equipment such that only one service switch services both the appliance and the carbon monoxide detector.
  - b. Have battery back-up power;
  - c. Meet ANSI/UL 2034 Standards and comply with NFPA 720 (2005 Edition); and
  - d. Have been approved and listed by a Nationally Recognized Testing Laboratory as recognized under 527 CMR.

## A CARBON MONOXIDE DETECTOR SHALL:

- a. Be located in the room that houses the appliance

- or equipment;
- b. Be either hard-wired or battery powered or both; and
- c. Shall comply with NFPA 720 (2005 Edition).
3. A product-approved vent terminal must be used, and if applicable, a product-approved air intake must be used. Installation shall be in strict compliance with the manufacturer's instructions. A copy of the installation instructions shall remain with the appliance or equipment at the completion of the installation.
4. A metal or plastic identification plate shall be mounted at the exterior of the building, four feet directly above the location of vent terminal. The plate shall be of sufficient size to be easily read from a distance of eight feet away, and read "Gas Vent Directly Below".



# OPERATING YOUR FURNACE

## The furnace operates in the following sequence:

1. The thermostat turns on the main burner.
2. Heat builds up in the furnace and starts the fan (if equipped). The heated air comes out the panel louvers.
3. When the thermostat setting is reached, it shuts off the main burner.
4. The fan runs until the heat is removed from the furnace, then it turns off.

Your furnace is equipped with a built-in pressure regulator. propane gas models also have a regulator at the supply tank. If you have a question regarding the amount of fuel consumed, call your local gas utility or gas supplier.

**⚠ WARNING:** DO NOT TAMPER WITH THE REGULATOR OR BURNER ORIFICES, AS PROBLEMS RESULTING FROM THERE MAY CAUSE PRODUCT FAILURE NOT COVERED BY WARRANTY.

Input and output ratings shown on the rating plate, located in burner compartment, must not be exceeded.

**IMPORTANT:** KEEP BURNER AND CONTROL COMPARTMENT CLEAN.

**⚠ WARNING:** Do not store or use gasoline or other flammable liquids or vapors near the furnace.

**⚠ WARNING:** Danger of bodily injury or death. Do not operate the furnace with a broken or missing pilot observation door.

## Lighting the Pilot

### FOR YOUR SAFETY, READ BEFORE LIGHTING

This furnace is equipped with a manually operated piezo spark ignition device to ignite the pilot gas. Follow the steps below and use the manual spark igniter to light the pilot in place of a match. Press spark igniter button repeatedly and vigorously. If the spark igniter fails to provide spark to light the pilot, loosen the wing nut holding the pilot cover. This opens to the combustion chamber. The pilot may be ignited with a match.

1. Follow the instructions below and use a match to light the pilot as instructed.
2. After lighting the pilot, carefully replace the pilot observation door and tighten wing nut down.

On new installations, the gas lines will be filled with air and it may take several tries to establish the pilot flame. Check the manual shutoff valve in the gas line. It must be in the open position (handle

parallel to the gas line) before you can light your furnace. Your furnace is equipped with a 100% safety pilot, which will shut off the gas valve in case the pilot is not burning or functioning properly. Make sure the pilot is adjusted properly and that the generator connection at the control valve is tight. If furnace will not stay lit, call your local gas utility company.

**⚠ WARNING:** If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

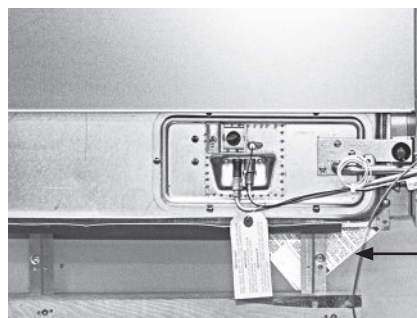
- A. This appliance has a pilot which must be lit by hand. When lighting the pilot, follow these instructions exactly.
- B. **BEFORE LIGHTING** smell around the appliance area for gas. Be sure to smell next to the floor because some gases are heavier than air and will settle on the floor.
- C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, do not 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 and to replace any part of the control system and any gas control which has been under water.

### WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electric switch. Do not use any telephone or cell phone in your building.
- Immediately call your gas supplier from a neighbour's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier call the fire department.

**IMPORTANT:** KEEP BURNER AND CONTROL COMPARTMENT CLEAN.

Read owner's manual before using/install. Be sure **CHAINED LIGHTING INSTRUCTION TAG** hangs at the lowest position in the furnace under/below the heat shield.

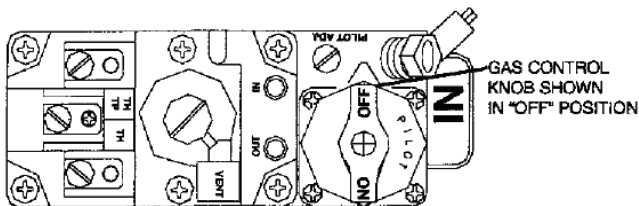


LIGHTING INSTRUCTIONS TAG



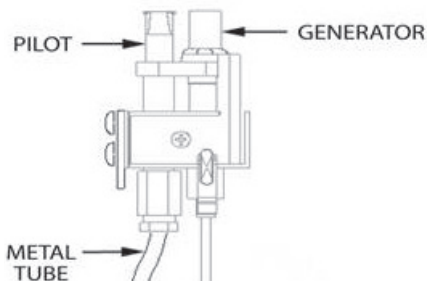
# Operating Instructions

1. **STOP!** Read the safety information above.
2. Set the thermostat to lowest setting.
3. If applicable, turn off all electric power to the appliance.
4. Open the control access panel.
5. Push in the gas control knob slightly and turn it clockwise to "OFF".



**NOTE:** The knob cannot be turned from "PILOT" to "OFF" unless the knob is pushed in slightly. Do not use force.

6. Wait five (5) minutes to clear out any gas, then smell for gas, including near the floor. If you then smell gas, **STOP!** Follow "B" in the safety information on previous page. If you do not smell gas, go to the next step.
7. Loosen wing nut and open the pilot observation door.
8. To find the pilot, follow the metal tube from gas control valve. The pilot is mounted on the side of the burner.
9. Turn the knob on gas control valve counter clockwise to "PILOT".



10. Push in the control knob all the way and hold it in. Immediately light the pilot. Continue to hold the control knob in for about one (1) minute after the pilot is lit. Release the knob and it will pop back up. The pilot should remain lit. If it goes out, repeat Steps 5 through 10. If the knob does not pop up when released, stop and immediately call your service technician or gas supplier.

If the pilot will not stay lit after several tries, turn the gas control knob to "OFF" and call your service technician or gas supplier.

11. Close the pilot observation door, tighten the wing nut (if equipped).
12. Turn the gas control knob counter clockwise to "ON".
13. Close the control access panel.
14. Turn on all electric power to the appliance (if applicable).
15. Set thermostat to the desired setting.

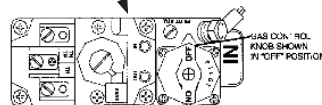
## FOR YOUR SAFETY READ BEFORE LIGHTING

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

- This appliance has a pilot which must be lighted by hand. When lighting the pilot, follow these instructions exactly.
  - BEFORE LIGHTING** 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 or strike a match.
  - Do not touch any electric 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.
  - Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.
  - Do not use this appliance if any part has been 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 which has been under water.

## OPERATING INSTRUCTIONS

1. **STOP!** Read the safety information above.
2. Turn off all electric power to the appliance (if applicable).
3. Set the thermostat to lowest setting.
4. Open control access panel.
5. Push in gas control knob slightly and turn clockwise to OFF.

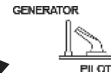


**NOTE:** Knob cannot be turned from PILOT to OFF unless knob is pushed in slightly. Do not force.

6. Wait (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you then smell gas, **STOP!** Follow "B" in the safety information above. If you don't smell gas, go to the next step.
7. Loosen wing nut and open the pilot observation door (if equipped).
8. Find pilot—follow metal tube from gas control.

The pilot is mounted on the side of burner.

9. Push in gas control knob slightly and turn counterclockwise to PILOT.
10. Push in control knob all the way and hold in. Immediately light the pilot. Continue to hold the control knob in for about (1) minute after the pilot is lit. Release knob and it will pop back up. Pilot should remain lit. If it goes out, repeat steps 5 thru 10.
11. If knob does not pop up when released, stop and immediately call your service technician or gas supplier.
12. If pilot will not stay lit after several tries, turn the gas control knob to OFF and call your service technician or gas supplier.
13. Close pilot observation door, tighten wingnut (if equipped).
14. Turn gas control knob counterclockwise to ON.
15. Close control access panel.
16. Turn on all electric power to the appliance (if applicable).
17. Set thermostat to desired setting.

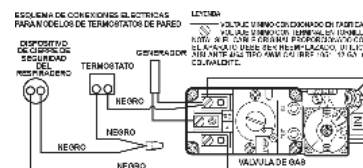


## TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed (if applicable).
3. Open the control access panel.
4. Push in gas control knob slightly and turn clockwise to OFF. Do not force.
5. Close the control access panel.

**LIGHTING PILOT:** (If furnace is equipped with a manual spark igniter follow next steps).

1. Review all operating instructions above.
2. When lighting pilot, depress red button located on the lower right side of the burner compartment (view pilot through glass observation door, repeat several times if necessary).
3. If pilot fails to light or spark is not present while actuating, follow steps 5 thru 10 above.



Read owner's manual before using/installing. Be sure **CHAINED LIGHTING** hangs at the lowest position in the furnace under/below the heat shield.

INSTRUCTION TAG

## To Turn OFF Gas To Appliance

1. Set the thermostat to its lowest setting.
2. If servicing is to be performed, turn off all electric power to the appliance.
3. Open the control access panel.
4. Push in the gas control knob slightly and turn it clockwise to the "OFF" position. Do not use force.
5. Close the control access panel.

**WARNING:** Due to high surface temperatures, keep children, clothing, furniture or any combustible material away from the furnace. Make sure the "FOR YOUR SAFETY" hang tag (see below) hangs below the heat shield.

**WARNING:** Danger of ignition flash and eye injury or blindness. Protect your eyes. Never attempt to light the pilot with the gas control valve knob in the "ON" position. Flashback could occur.

# OPERATING YOUR FURNACE

## Start-Up Procedure

Start the furnace using the procedures in the section "Operating Your Furnace".

**⚠ WARNING:** Danger of bodily injury or death. Liquid petroleum gas (L.P.G.) is heavier than air and it will settle in any low area, including open depressions, and it will remain there unless the area is ventilated. Never attempt to start-up the unit before thoroughly ventilating the area.

Check the furnace operation as outlined in the following instructions. If any sparking, odor or unusual noises are encountered, shut off electrical power immediately. Recheck for wiring errors or obstructions in or near the optional blower motor.

**NOTICE:** During the initial firing of this unit, some smoke and odor may occur. We recommend ventilating the area during this initial "break-in period".

### CHECK GAS INPUT AND PRESSURES

For furnaces located at altitudes between sea level and 2,000 feet, the measured input must not be greater than the input shown on the rating plate of the furnace. For elevations above 2,000 feet, the measured input must not exceed the input on the rating plate reduced by 4% for each 1,000 feet that the furnace is above sea level.

The gas supply pressure and the manifold pressure with the burners operating must also be as specified on the rating plate.

TYPE OF GAS	MANIFOLD PRESSURE, IN. W.C.
NATURAL	4.0
PROPANE	10.0

The rated input will be obtained on 2,500 BTU of propane at 10 inches manifold pressure with factory-sized orifices. If propane gas having a different value is supplied, orifices must be changed by a qualified installer before the furnace is operated.

### CHECK THE MANIFOLD GAS PRESSURE

A tapped opening is provided in the gas valve to facilitate measuring the manifold gas pressure. A "U tube" manometer having a scale range from 0 to 12-inches water column should be used for this measurement. The manifold pressure must be measured with the burner and pilot operating. Any major changes in the flow must be made by changing the size of the burner orifice. Check with your local gas company for the proper orifice size.

### CHECK THE GAS INPUT (NATURAL GAS ONLY)

Under firing could cause inadequate heat, excessive condensation or ignition problems. Over firing could cause shooting flame impingement or overheating of the combustion chamber. Before starting the natural gas input check, obtain the heating value of the gas (BTU per cubic foot) at standard conditions from your local supplier. This factor is used in the "Check the Gas Input"

section and procedure.

To measure the input using the gas meter, proceed as follows:

1. Turn off the gas supply to all other appliances except the furnace.
2. With the furnace operating, time the smallest dial on the meter for one complete revolution. If this is a 2 cubic foot dial, divide the seconds by 2; if it is a 1 cubic foot dial, use the time in seconds as is. (3,600 = Sec. Per Hr.) This gives the seconds per cubic foot of gas being delivered to the furnace.
3. Assuming natural gas with a heating value of 1,000 BTU per cubic foot and 34 seconds per cubic foot as determined by step 2 above, then:  
$$\text{Input: } 1,000 \times 3,600 \div 34 = 106,000 \text{ BTU/hr.}$$

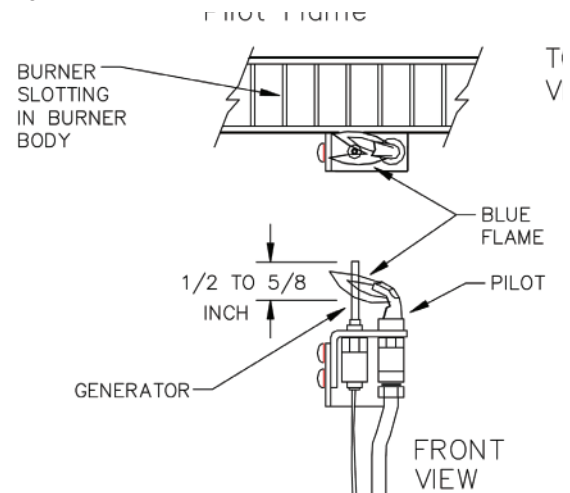
This measured input must not be greater than the input indicated on the rating plate of the furnace.
4. Relight all other appliances turned off in step 1 above. Be sure all pilot burners are operating.

**⚠ WARNING:** Natural gas heating valve (BTU per cubic foot) can vary significantly; therefore, it is the installer's responsibility to see that Btu input to the furnace is adjusted properly. Failure to do so could cause combustion chamber failure, asphyxiation, fire or explosion, resulting in damage, bodily injury or death. Refer to the Natural Fuel Gas Code (NFPA-54) to be sure the furnace is burning fuel at the proper rate.

### CHECK PILOT BURNER

The pilot flame should surround the generator tip 3/8-inch to 1/2-inch. Pilot gas may need adjustment depending on the inlet pressure. Increase or decrease the pilot flame to obtain proper setting.

FIGURE 15

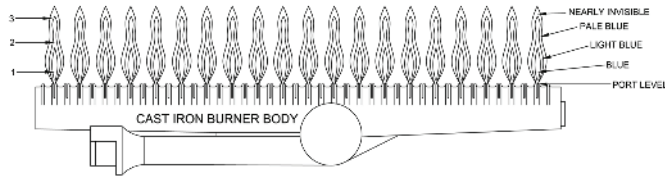


### BURNER FLAME CHARACTERISTICS

Start the furnace and let it operate at least 10 minutes. Open the access door to view the burner flame. Limit your movements near the furnace a few more minutes before making your final observation. The flame may look yellow due to dust particles in the room air. The flame should change to a nice blue color with firm inner and secondary cones. An occasional flash of orange might be seen as dust particles burn in the flame. This is normal. No burner adjustment

# CARING FOR YOUR FURNACE

FIGURE 16



is provided, or is necessary. Figure 16

## NORMAL APPEARANCE

### NATURAL GAS:

1. Inner cone- blue color - 1/2 to 3/4-inch above ports.
2. Secondary inner cone - light blue - 1 to 2-inches above ports.
3. Total flame - from blue to nearly invisible - approximately 6-inches above ports.

### PROPANE GAS:

1. Inner cone - blue color - 1/2 to 3/4-inch above ports.
2. Secondary inner cone - light blue - 1 to 2-inches above ports.
3. Total flame - from blue to nearly invisible - approximately 6-inches above ports.

## How to Care for Your Furnace

### ABNORMAL APPEARANCE

#### LAZY FLAME:

Long soft yellow cones moving around in the combustion chamber lifting from ports (insufficient air).

#### EXTREMELY FAST FLAME:

Will not hold to ports - entire cone sections blow off from noisy ports (too much pressure).



**WARNING:** If flame appears abnormal, contact the gas company or a qualified service technician immediately.

### ANNUAL UPKEEP NEEDED

It is recommended that a qualified service technician perform these checks at the beginning of each heating season:

#### BURNER CLEANING

Keep clean at all times. Clean all foreign materials from the top of burner. For access to the burner:

1. Shut off the gas supply to furnace.
2. Remove the cabinet.
3. Disconnect the gas line inside cabinet at the ground joint union fitting.
4. Remove the six (6) #10-24 screws securing the control door assembly to the combustion chamber.

5. Carefully remove the control door and burner assembly from the combustion chamber. Be careful not to damage the control door gasket.
6. Clean all foreign materials from the top of the burner.
7. After cleaning, replace the control door and the burner assembly by reversing the above procedure. The control door gasket should be replaced if its condition is in doubt.

### CLEANING BURNER COMPARTMENT

Because cold air is attracted to the flame during furnace operation, a build up of lint from carpeting, bedding, dust, etc. in the burner area will occur. It is necessary to clean this area regularly. Use a vacuum cleaner with a narrow attachment to reach small areas. Be careful in and around the pilot. A change in its adjustment could be made if moved during cleaning. A properly adjusted burner with nearly all gasses will produce a flame which has a clear blue cone having a bluish-red or bluish-violet outer mantle.

### CLEANING BLOWER (IF EQUIPPED)

Turn off electric power supply at the disconnect switch, fuse box or service panel before servicing. For maximum motor life of the optional blower, inspect the motor yearly and clean any lint or dust from fan blades, fan motor and ventilating holes. Oil yearly with two drops of SAE 20 high temperature oil.

### VENT SYSTEM

Check the vent cap and tubes to be sure there are no blocked inlet air or flue openings. The flow of combustion and ventilation air must not be obstructed. Clean or replace before using the furnace. On new installations, the gas lines will be filled with air and may take several minutes to establish a pilot flame.

### FURNACE AREA

For better circulation and more effective heating, do not place obstructive furniture closer than four feet to the front of the cabinet or two feet to either side of the cabinet.

The furnace area must be kept clear and free from combustible material, gasoline and other flammable vapor and liquids.

### CABINET FINISH

Clean the cabinet with a damp cloth. Never use abrasive cleaners. Cabinets are finished in heat-resistant powder paint. DO NOT refinish.

### PILOT BURNER

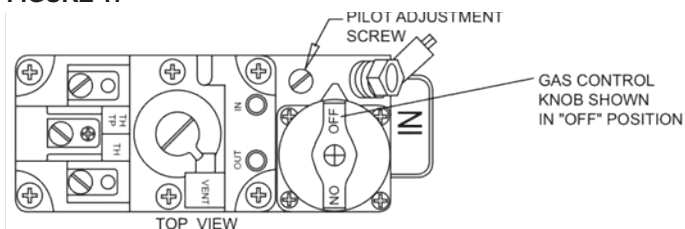
Light the pilot using instructions in "Lighting the Pilot". Leave the thermostat at its lowest setting. The pilot flame should surround the generator tip 1/4" to 5/8". If flame needs adjusting, do so as follows:

1. Insert a small screwdriver into the pilot adjusting screw. Adjust flame as needed. Turn the screw counterclockwise to increase the flame, clockwise to decrease the flame.
2. Turn the thermostat to the highest setting. The main burner should light quickly and smoothly. Turn the thermostat to its lowest setting. The main burner should go out. The pilot should remain lit.

# CARING FOR YOUR FURNACE

**⚠ WARNING:** Danger of bodily injury or death. If equipped with accessory blower, turn off the electric power supply at the disconnect switch, fuse box or service panel before removing any access doors or service panels from unit.

FIGURE 17



## BLOWER ACCESSORY 2302 & 2303

This accessory can be operated using the factory equipped three-prong (grounding) plug and cord or may be field wired. See field wiring installation instructions below. When using the plug and cord, for your protection against shock hazard, it must be plugged directly into a properly grounded three prong receptacle. **DO NOT REMOVE THE PRONG.** All electrical work must conform to your local codes and ordinances, or in their absence, with National Electrical Code ANSI/NFPA 70. In Canada, Canadian Electrical Code C22.1. It must also be electrically grounded. If you are not familiar with wiring codes in general, have a competent electrician do the job.

**WARNING:** Danger of property damage bodily injury or death. Unplug the service cord from the electrical outlet before removing or working on this blower kit.

### MOUNTING - MODEL 2302

1. Remove the knock-out plates "A" and "B" from right side of the furnace. Figure 1 page 19
2. Remove the junction box cover and place the blower and junction box in position as shown on Figure 1 page 19.
3. Attach the blower and the junction box to the inner

casing using the pre-punched holes with screws "C" and "D" provided with this kit. See Figure 1 on page 19 for proper mounting hole to use with your furnace model (see rating plate for furnace model number). Reattach the junction box cover.

4. After the blower and junction box are installed, rotate bushing "H" if needed to prevent the motor wire from binding against the blower casing.
5. Plug in the factory supplied three-prong (grounding) plug and cord or see field wiring instructions below.

### MODEL 2303

1. Set the blower on top of the furnace with the rear flange of the blower cabinet behind the furnace cabinet. This will place the back of the blower cabinet against the wall surface. See Figure 2 page 19
2. Plug in the service cord.



# KIT No. 2302

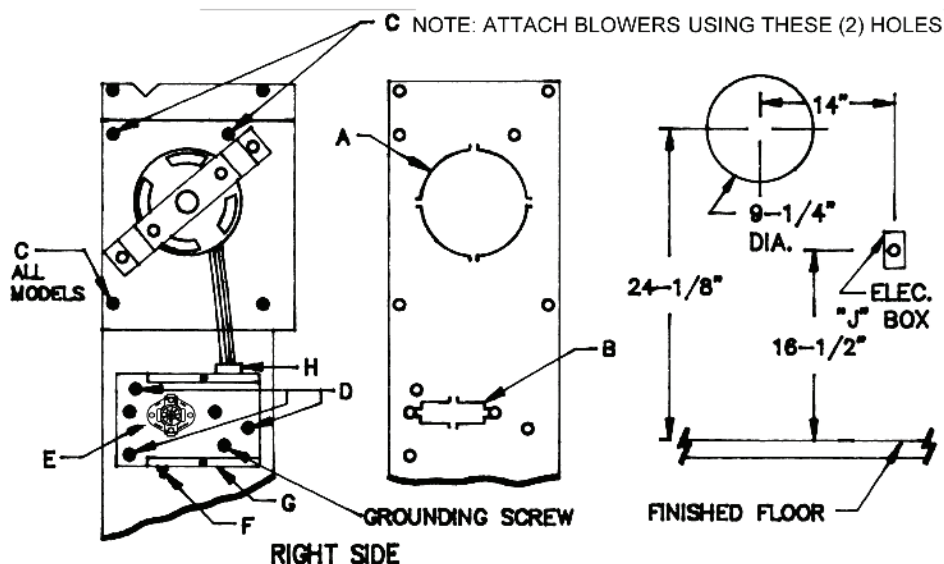


Figure 1

# KIT NO. 2303

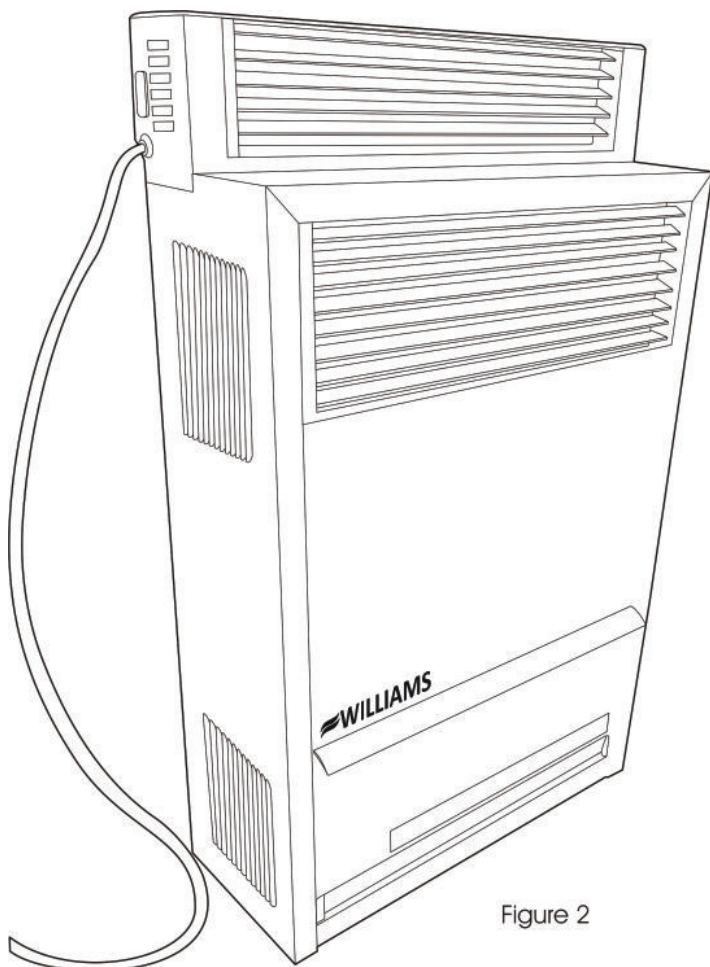
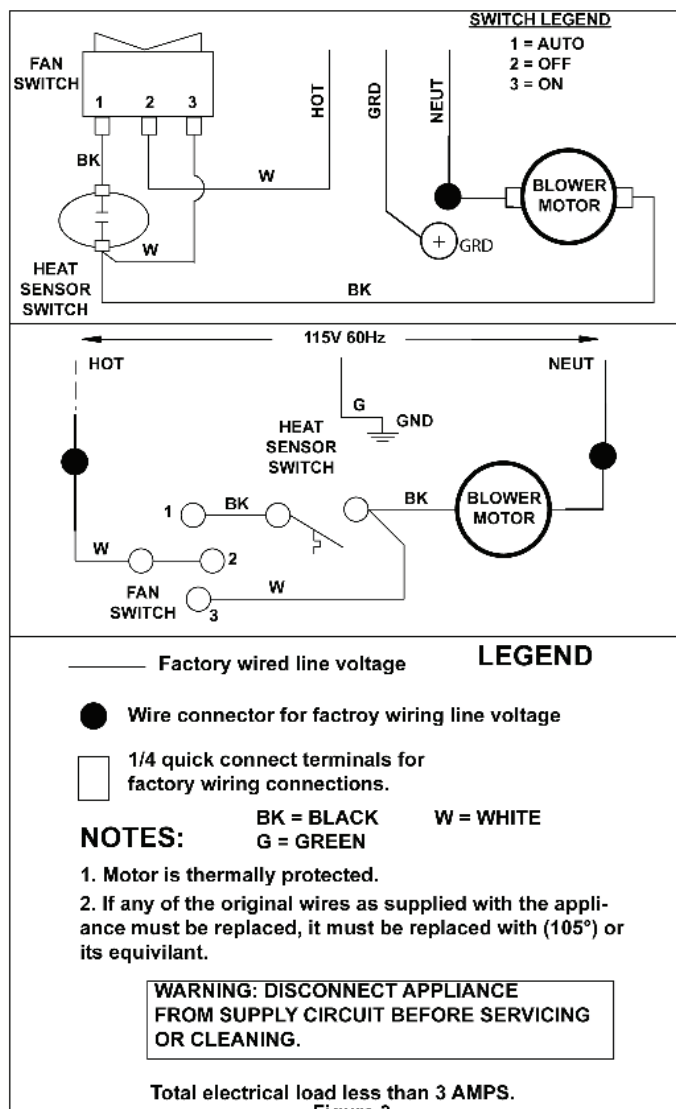


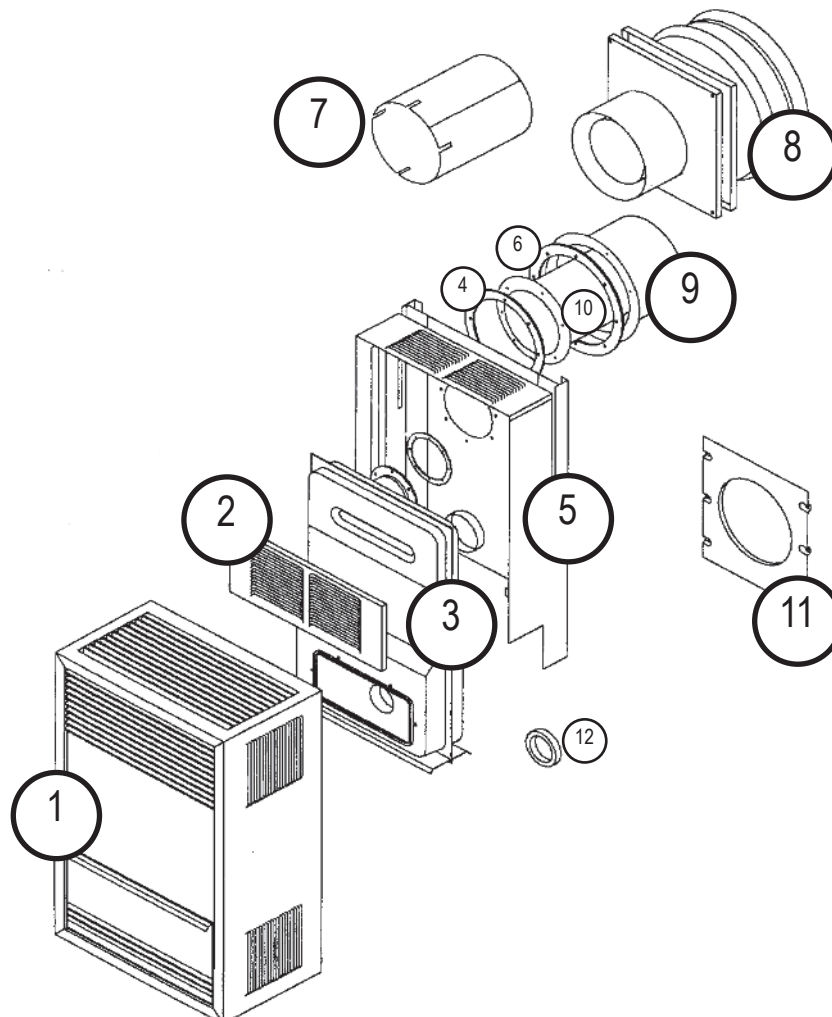
Figure 2



# FURNACE ASSEMBLY REPLACEMENT PARTS

## 140 MODELS

REF. NO.	REPLACEMENT PART DESCRIPTION	MODEL NUMBERS	
		NATURAL 1403822	PROPANE 1403821
<b>1</b>	Face Panel	4309	4309
<b>2</b>	Combustion Chamber Shield	8A72	8A72
<b>3</b>	Combustion Chamber	6303	6303
<b>4</b>	Flue Tube Gasket (2 Req.)	P147001/2	P147001/2
<b>5</b>	Inner Casing	8B62	8B62
<b>6</b>	Air Inlet Gasket	P147000	P147000
<b>7</b>	Air Inlet Shield (Standard Maximum 9" Thick Wall)	6C54-1	6C54-1
<b>8</b>	Vent Cap	9306	9306
<b>9</b>	Air Inlet Collar (Standard Maximum 9" Thick Wall)	6C60	6C60
<b>10</b>	Flue Extension (Standard Maximum 9' Thick Wall)	6A193	6A193
<b>11</b>	Mounting Spacer Plate	8B64	8B64
<b>12</b>	Air Inlet Gasket	P121800	P121800

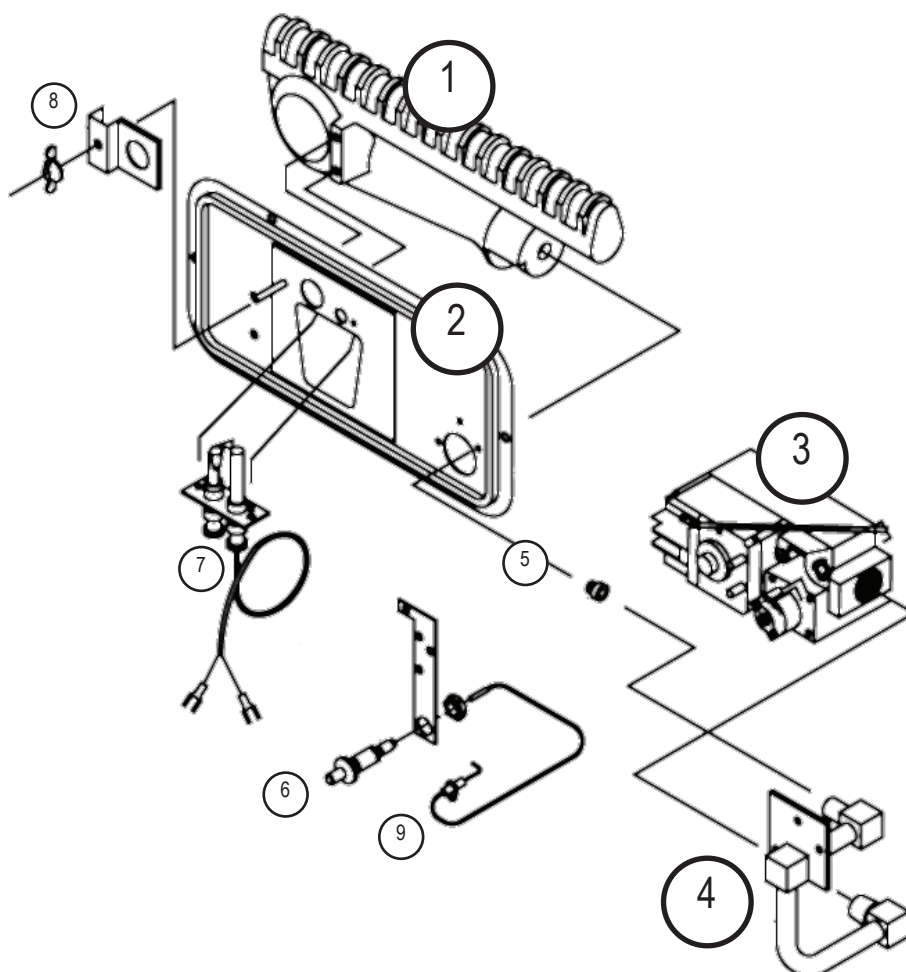




# CONTROL ASSEMBLY REPLACEMENT PARTS

## 140 MODELS

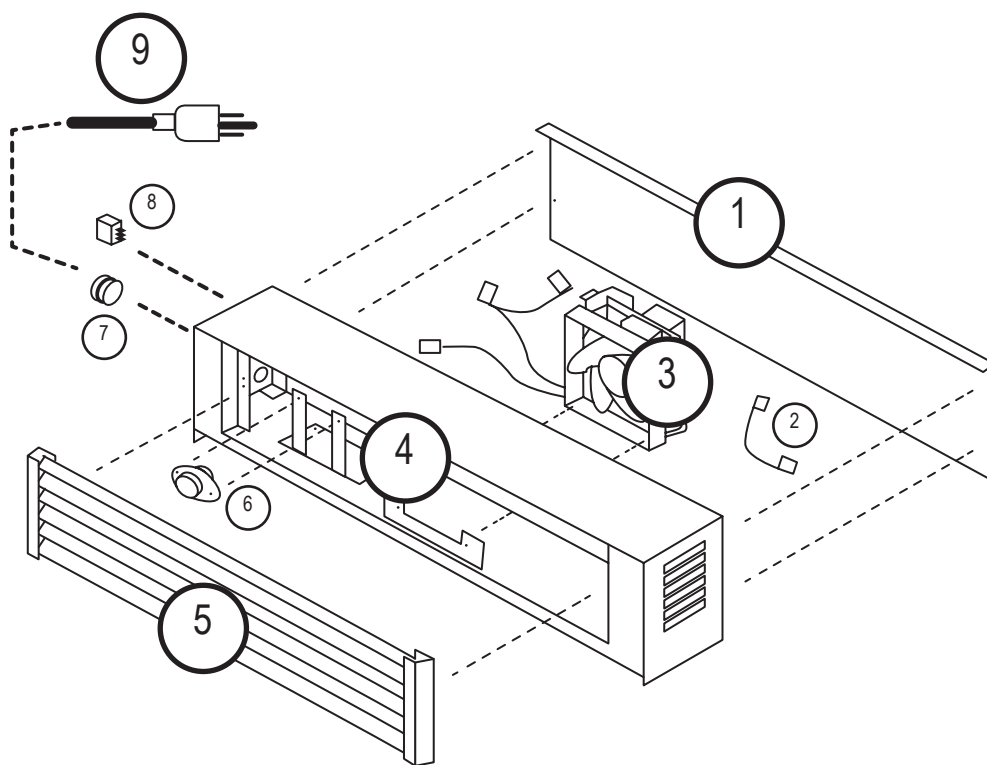
MODEL NUMBERS			
NATURAL		PROPANE	
1403822		1403821	
REF. NO.	REPLACEMENT PART DESCRIPTION	1403822	1403821
1	Burner	P168400	P168400
2	Control Door with P500677 Gasket	8A103	8A103
3	Gas Valve	P295200A	P295201A
4	Manifold with P147200 Gasket	P323659	P323659
5	Burner Orifice (Sea Level)	P090550	P090556
6	Manual Spark Igniter	P285500	P285500
7	Pilot (P142700 gasket not included)	P323700	P322399
8	Observation Door with P100100 Gasket	12B40	12B40
9	Electrode	P322400	P322400



# BLOWER ACCESSORY REPLACEMENT 2303 KIT FOR MODELS 1403822 / 14H3822

		KIT NUMBER
REF. NO.	REPLACEMENT PART DESCRIPTION	2303
1	Back Plate	8A128
2	Wire	P101000
3	Fan Blower Assembly	8B94
4	Blower Casing Assembly	8B93
5	Louver Assembly	8B90
6	Heat Sensor Switch	P323095
7	Strain Relief	P500158
8	Fan Switch	P323080
9	Plug and Cord	P323335

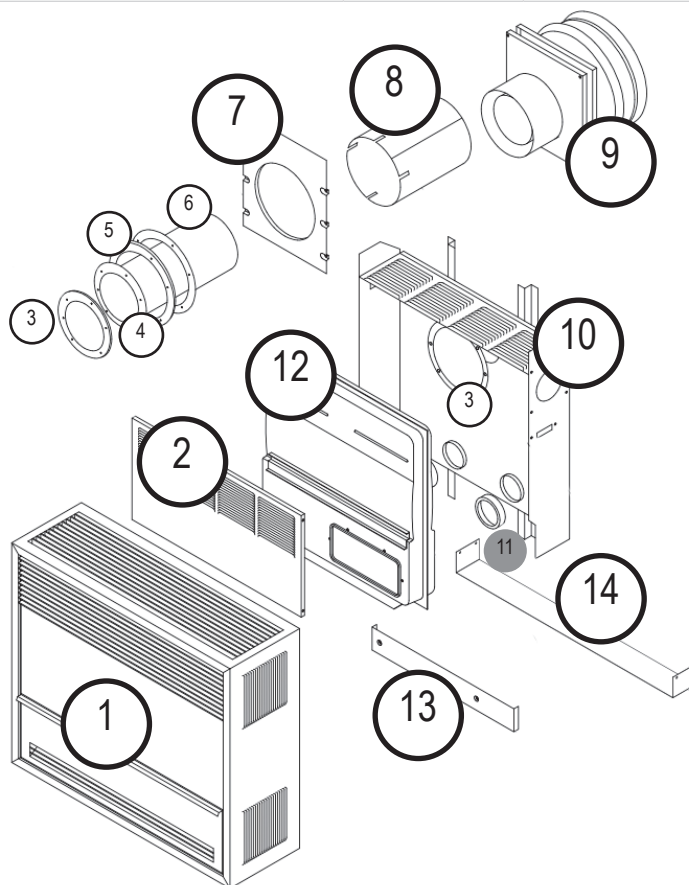
# EXPLODED VIEW & REPLACEMENT PARTS CHART



# FURNACE ASSEMBLY REPLACEMENT PARTS

## 220 / 300 MODELS

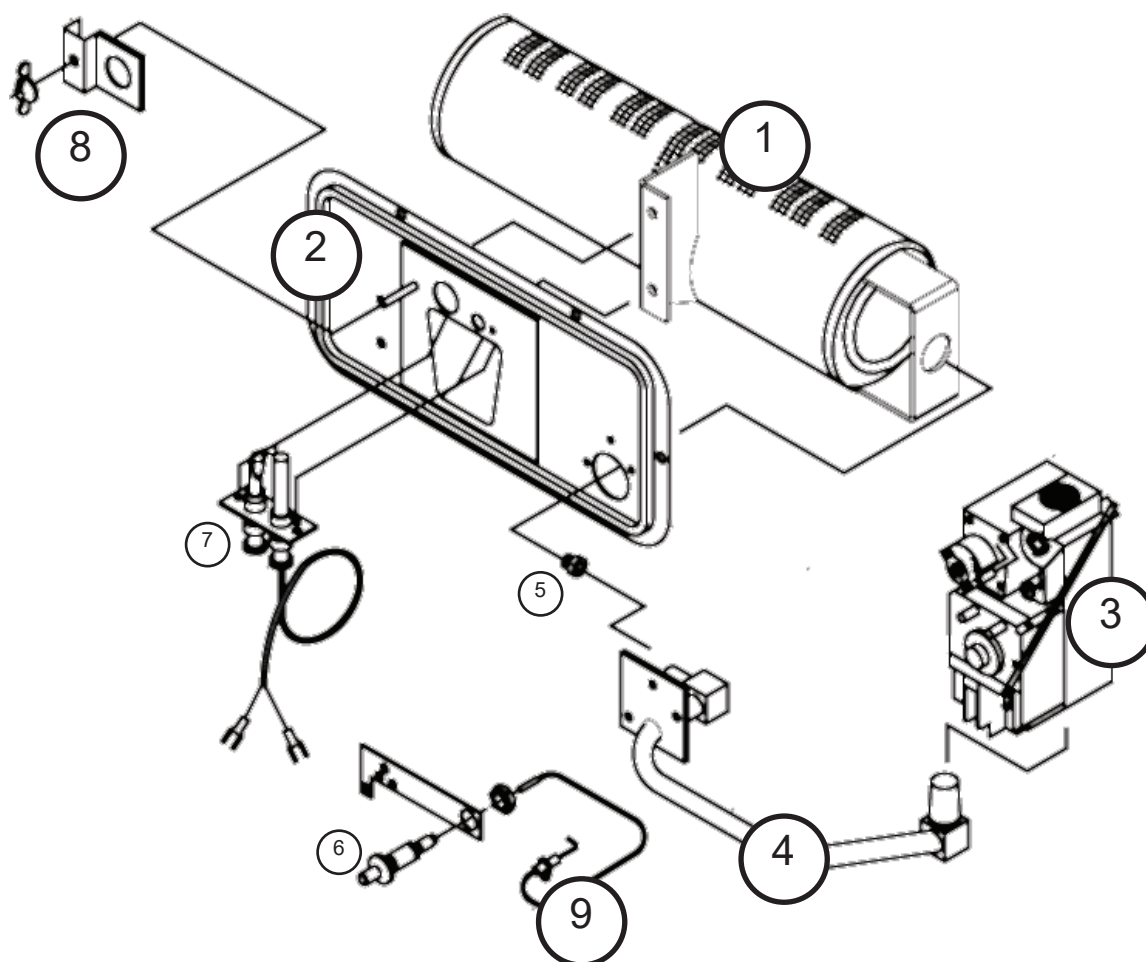
REF. NO.	REPLACEMENT PART DESCRIPTION	MODEL NUMBERS			
		NATURAL 2203822	PROPANE 2203821	NATURAL 3003822	PROPANE 3003821
1	Face Panel	4313	4313	4313	4313
2	Combustion Chamber Shield	6B149	6B149	6B149	6B149
3	Flue Tube Gasket (2 Req.)	P147001	P147001	P147001	P147001
4	Flue Extension (Standard Maximum 9" Thick Wall)	8A51	8A51	6A190	6A190
5	Air Inlet Gasket	P147000	P147000	P147000	P147000
6	Air Inlet Collar (Standard Maximum 9" Thick Wall)	6C60	6C60	6C51	6C51
7	Mounting Spacer Plate	6C66	6C66	6C66	6C66
8	Air Inlet Shield (Standard Maximum 9" Thick Wall)	6C54-1	6C54-1	6C54-1	6C54-1
9	Vent Cap	9306	9306	9306	9306
10	Inner Casing	6D20	6D20	6D20	6D20
11	Air Inlet Gasket (2 Req.)	P121800	P121800	P121800	P121800
12	Combustion Chamber	6304	6304	6304	6304
13	Leg Cover Plate	6B25	6B25	6B25	6B25
14	Bottom Heat Shield	—	—	6A240	6A240



# CONTROL ASSEMBLY REPLACEMENT PARTS

## 220 / 300 MODLES

MODEL NUMBERS					
NATURAL			PROPANE		
2203822		3003822	2203821		3003821
REF. NO.	REPLACEMENT PARTS DESCRIPTION	2203822	2203821	3003822	3003821
1	Burner	P168404	P168404	P168404	P168404
2	Control Door with P500677 Gasket	8A135	8A135	8A135	8A135
3	Gas Valve	P295200A	P295201A	P295200A	P295201A
4	Manifold with P147200 Gasket	P323655	P323655	P323655	P323655
5	Burner Orifice (Sea Level)	P090544	P332628	P090539	P332621
6	Manual Spark Igniter	P285500	P285500	P285500	P285500
7	Pilot (P142700 gasket not included)	P322398	P322399	P322398	P322399
8	Observation Door with P100100 Gasket	12B40	12B40	12B40	12B40
9	Electrode	P322400	P322400	P322400	P322400

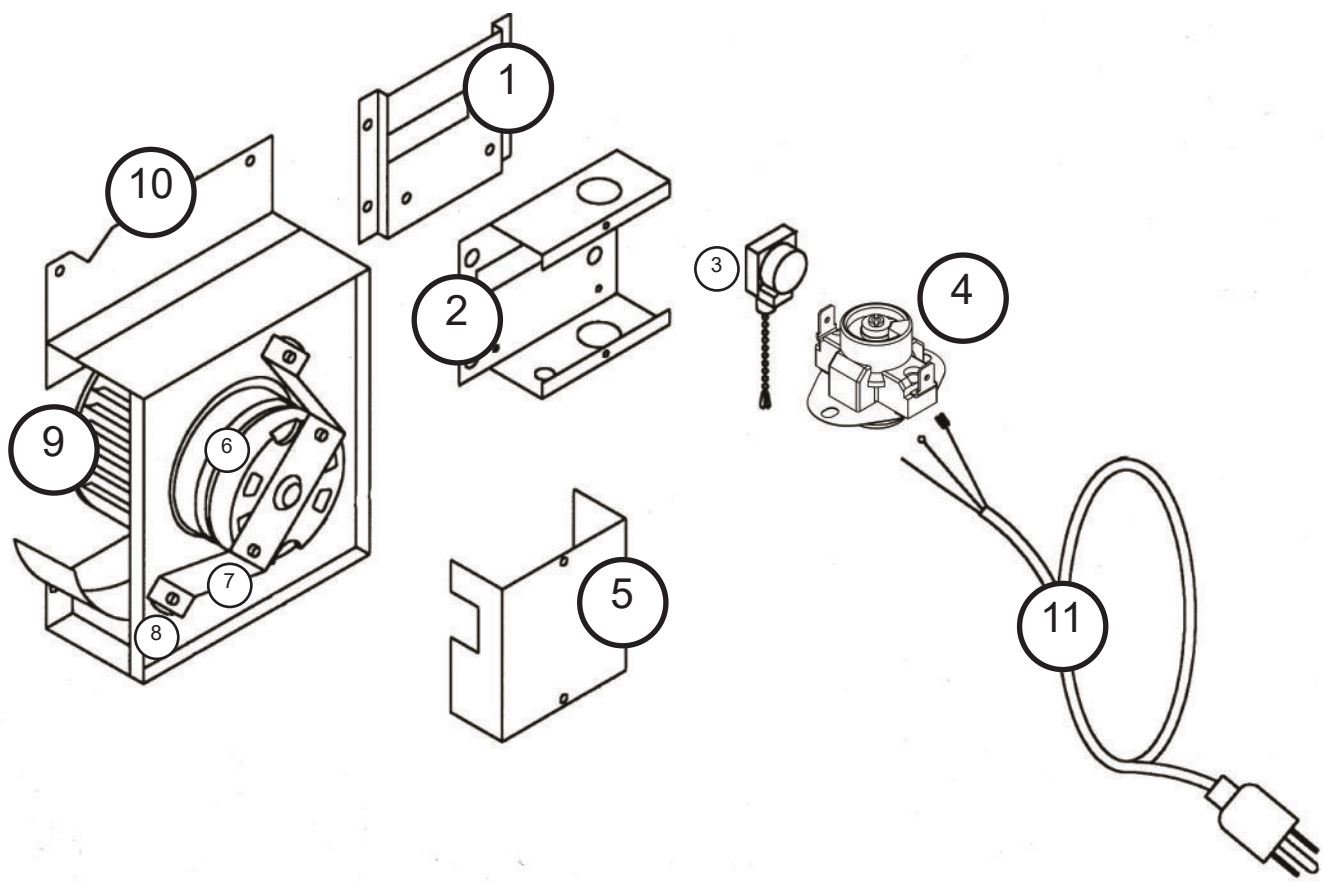


# BLOWER ACCESSORY REPLACEMENT 2302 KIT FOR MODELS 2203822 / 22H3822 / 3003822

		KIT NUMBER
REF. NO.	REPLACEMENT PART DESCRIPTION	2302
1	Switch Box Bracket	6A24
2	Switch Box	6B33
3	Fan Switch (Pull Chain)	P321017
4	Automatic Fan Switch	P332490
5	Switch Box Cover	6A23
6	Motor	P130600
7	Motor Support	6A93
8	Vibration Isolator (2 Req.)	P128400
9	Blower Wheel	P130700
10	Blower Frame	6B64
11	Plug and Cord	P323335



# EXPLODED VIEW & REPLACEMENT PARTS CHART



# TROUBLESHOOTING YOUR FURNACE


For qualified service technicians.

ISSUE	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
1. Pilot will not stay lit after carefully following lighting instructions.	A. Generator producing insufficient millivolts.	Check the pilot flame. It must impinge on the generator. Be sure the generator is fully inserted in the bracket. Make sure the pilot lighting door is tightly closed.
	B. Generator defective.	Check generator with millivolt meter. Take reading at generator terminals of valve with pilot burning and thermostat contacts closed. The reading should be 140 millivolts or more. Clean and/or tighten connections at valve.
	C. Loose or dirty generator connections at gas valve.	Remove thermostat lead wires from valve terminals. If the pilot now stays lit, trace the thermostat wiring circuit for a ground. May be grounded to the furnace, gas supply, nails or staples.
	D. Grounded thermostat lead wire.	
	E. Defective gas valve.	Replace the gas valve after the above is verified.
2. Pilot burning - no gas to the main burner.	A. Valve not turned to "ON" position after lighting the pilot.	Turn the gas valve knob to the "ON" position.
	B. Thermostat not turned to a position calling for heat.	Set the thermostat to a position calling for heat.
	C. Plugged burner orifice.	Check - clean or replace.
	D. Improperly wired or broken thermostat wires. Defective thermostat.	Check the connections at the valve terminals. Jumper across the thermostat terminals on the valve. If the valve operates, check the thermostat wires.
	E. Pilot generator may not be generating sufficient millivolts to open valve.	See 1A and 1C above.
	F. Defective valve.	Replace the gas valve after above is verified.
3. Burner comes "ON" but goes "OFF" after operating for no apparent reason.	A. Tubes not properly installed.	Check the vent tube and the air inlet tube. Follow the installation instructions. Be sure the joints are tight and both tubes are in place. Use only the tubes furnished. Do not extend the tubes beyond original length.
	B. Furnace may be overrated.	Check for high pressure at the valve. See rating plate for specified min./max. supply pressure. Check the burner orifice.
4. Furnace operates, but turns "OFF" before room temperature is attained.	A. Thermostat location.	Check the thermostat location. It should not be in the path of warm air discharge from the furnace, near a lamp or above a T.V. or stereo set.
	B. Defective thermostat.	Check the thermostat calibration or replace.
5. Furnace not producing sufficient heat.	A. Furnace may be too small for space being heated.	Check heat calculations.
	B. Furnace not burning at full rate.	Check for low gas pressure. Check the burner orifice.
6. Furnace operates, but will not shut "OFF" when room temperature is attained.	A. Thermostat wiring defective.	Thermostat lead wires may be shorted together, by a nail or staple. Check by removing thermostat leads from the valve terminals.
	B. Thermostat location.	Check the thermostat location. If on an outside wall or there is a hole in the wall behind the thermostat causing cold air to contact the thermostat. Relocate the thermostat.

ISSUE	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
	<ul style="list-style-type: none"> <li>C. Defective thermostat.</li> <li>D. Dirt under the valve seat or valve stuck open.</li> </ul>	<p>Check the thermostat calibration or replace.</p> <p>Replace the valve.</p>
7. Pilot outage problem.	<ul style="list-style-type: none"> <li>A. Pilot flame may be low or blowing (High), causing the safety to drop out.</li> <li>B. Broken or no gaskets on control or pilot observation doors.</li> </ul>	<p>Adjust pilot flame. Check vent tube and air inlet tube. Be sure pilot lighting door is closed. Pilot orifice or aerating hole may be plugged (check for spiders, webs or other material).</p> <p>Clean and replace.</p> <p>Adjust pilot flame.</p>
8. Abnormal operation.	<ul style="list-style-type: none"> <li>A. Delayed ignition - pilot flame may be too low.</li> <li>B. Expansion noise ticking.</li> </ul>	<p>Casing may be distorted by being fastened to an uneven wall. Vent tube and air inlet tube may be in a bind with a vent cap assembly. Be sure the hole through the wall is correct and parts fit without binding.</p>
9. Noisy Blower.	<ul style="list-style-type: none"> <li>A. Housing rattling.</li> <li>B. Blower dirty.</li> <li>C. Blower wheel bent.</li> </ul>	<p>Tighten blower screws.</p> <p>Clean blower wheel.</p> <p>Straighten or replace.</p>
10. Blower does not run.	<ul style="list-style-type: none"> <li>A. Fan switch not set.</li> <li>B. Check bearings.</li> </ul>	<p>Select fan speed.</p> <p>Add oil as outlined in blower instructions.</p>

# HINTS AND INFORMATION

If your furnace fails to work correctly, you may avoid the inconvenience and cost of a service call by checking the troubleshooting section on **page 28** before you call for service.

 **WARNING:** If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

**DO NOT** store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

- Do not try to light any appliance.
- Do not touch any electrical switch.
- Do not use any phone or cell phone in your building.
- Extinguish any open flame.
- Immediately call your gas supplier from a neighbor's phone. 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.

## HOW TO ORDER REPAIR PARTS

When ordering repair parts, always give the following Information:

1. MODEL NUMBER
2. MFG. DATE CODE
3. PART NUMBER
4. PART DESCRIPTION

All parts listed herein may be ordered from your equipment supplier. The Model Number of your Williams wall furnace will be found on the nameplate near gas valve, inside control compartment.

## WHAT TO DO IF YOU SMELL GAS

- Open all of the windows.

# SERVICE RECORD

DATE	MAINTENANCE PERFORMED	COMPONENTS REQUIRED



DESIGNED  
& ASSEMBLED  
IN THE USA  
SINCE 1916

[www.williamscomfortprod.com](http://www.williamscomfortprod.com) | 888-444-1212 | 250 West Laurel Street, Colton CA 92324 USA

Subject to change without notice | © 2021



P322101-B-12/21