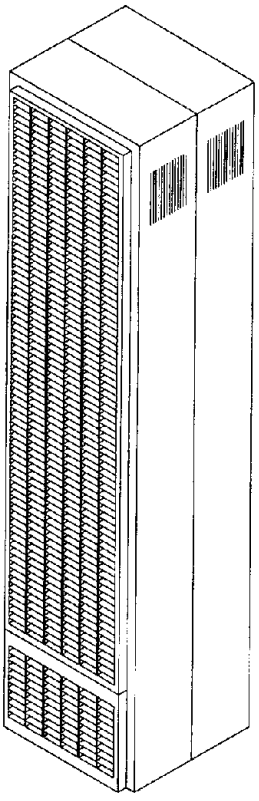
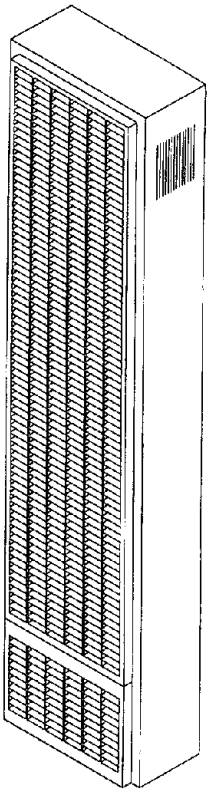
Williams
THE COMFORT PRODUCTS PEOPLE

MODELS:
NATURAL GAS ONLY
2509622; 2539622; 2559622
3509622; 3539622; 3559622
5009622; 5039622; 5059622

MODELS:
PROPANE GAS ONLY
2509621; 2539621; 2559621
3509621; 3539621; 3559621
5009621; 5039621; 5059621



50,000 Btu/hr. Model



25,000 and 35,000 Btu/hr. Model

INSTALLATION & OPERATING INSTRUCTIONS MANUAL
Top-Vent Wall Furnace

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

WARNING: Installation and repair must be done by a qualified service person. The furnace should be inspected before use and at least annually by a professional service person.

WARNING: Do not install this furnace (Natural or L.P. Gas) in mobile homes, trailers or recreational vehicles.

Version disponible
en Espanol
llame al
(909) 825-0993, ext. 237

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.
- 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 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 your gas supplier, call the fire department.
- Installation and service must be performed by a qualified installer, service agency or the gas supplier.

Introduction

The following steps are all needed for proper installation and safe operation of your furnace. If you have any doubts as to any requirements, check with local authorities. Obtain professional help where needed. All of checks and adjustments in the Start-Up Procedures are vital to the proper and safe operation of the furnace.

Basic Description

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 vented wall furnace.

No electric power is required unless furnace is equipped with an optional blower accessory.

The efficiency rating of this furnace is a product thermal efficiency rating determined under continuous operating conditions and was determined independent of any installed system.

Single wall models described in this manual, are installed in a 2x4 stud wall between studs spaced 16 inches center-to-center. They may be surface mounted to a wall using the optional free standing kit model no. 4901.

Warmed air is discharged into the room in which the furnace is located.

The furnace contains a single multi-shot gas burner.

Combustion air is drawn in from the room where the furnace is located and is vented out of the top of the furnace vertically through vent piping in the stud space to a roof vent top. (Vent equipment is not supplied with furnace).

Convection causes room air to circulate from the floor upward along the front, back, and sides of the combustion chamber, and then back to the room.

The furnace combustion chamber is built of heavy-gauge steel treated for corrosion resistance. The furnace cabinet is also constructed of heavy-gauge steel and has been finished with a heat-resistant powder paint. The front of the cabinet is fully louvered.

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

Note: This furnace is equipped with a vent safety shutoff system, designed to protect against improper venting of combustion products. Operation of this wall furnace when not connected to a properly installed and maintained venting system or tampering with the vent safety shutoff system can result in carbon monoxide (CO) poisoning and possible death.

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 "National Fuel Gas Code".

Obtain from - American National Standards Institute, Inc., 1430 Broadway, New York, N.Y. 10018. In Canada CAN/CGA B149.

Unpacking Your Furnace

The furnace is shipped assembled. The cabinet must be removed for the furnace installation.

1. Open carton and carefully lift off face panel.
2. Remove small parts bag and header plate from lower portion of furnace.
3. Stand furnace upright.

Note: Check the burner rating plate, located in burner compartment, to make sure your furnace is equipped to operate on the type of gas available (either natural or L.P. gas). DO NOT convert unit from natural gas to L.P. gas or from L.P. gas to natural gas without the proper manufacturer's gas conversion kit.

Basic Tools Needed

Hand drill or properly grounded electric drill
Expansion bit 1/2 inch to 1-5/8 inch or 1/2 inch and 1-1/2 inch blade bits
1/8 inch drill bit (metal)
Six-foot folding ruler or tape measure
Screwdriver (medium blade)
Hammer
Pliers (wire cutting)
Screwdriver (phillips head)
Stud locator or small finishing nails
8- and 12-inch adjustable wrenches
Two -10-inch or 12- inch pipe wrenches
Tin Snips
Gloves and safety glasses

Basic Materials

Pipe and fittings to make connections to furnace
Pipe joint compound resistant to L.P. gasses.
Vertical venting materials.
Minimum wire size is #14 gauge copper.
Electrical supplies are required if blower accessory is being installed.

Optional Accessories

1. Blower Accessories 2901, 2907: May be used on all models and mounts on top of the furnace. This blower increases circulation of warm air through
the heated space. A 115V outlet adjacent to the furnace is required.

2. Trim Strip Kit 4701: Metal strips, painted with durable soft-white powder paint, provide a trimmed look to your installation.

3. Free Standing Accessory 4901: May be used with all single sided models. This kit allows the furnace to be on the surface of a wall.

4. Rear Outlet Registers 6901, 6919, 6920: May be used with single-sided models when recessed into a standard 2x4 inch interior stud partition. This kit directs some of the heated air into the room opposite the one in which the furnace is installed.

5. Oval B/W Vent Kit 9901: This U.L. listed B/W vent kit contains four feet of oval double-wall vent pipe, plate spacers and base plate or hold down plate that starts the venting from the top of the furnace. See Vent Installation page for some additional items you will need.

6. Vent Adapter Kit 9902: Optional vent adapter, typically used when the furnace is vented into a chimney.

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 L.P.G. BE ADVISED THAT L.P.G. IS NOT AVAILABLE IN CANADA, REFER TO PROPANE/L.P. GAS.

1. Use only manufacturer's replacement parts. Use of any other parts could cause injury or death.

2. DO NOT install this furnace in an alcove, confined space or near a fireplace.

3. DO NOT install these furnaces in a travel trailer, recreational vehicle or mobile home.

4. MAINTAIN all clearances specified in section "Locating Wall Furnace and Thermostat" and "Vent Installation".

5. BE SURE 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. Unsafe operation could result and could cause bodily injury and death.

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 L.P. 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 an appliance must be replaced prior to operating the appliance to

8. INSTALL the furnace vent directly to the outdoors, so that harmful combustion 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 soap suds to check all gas connections. This will avoid the possibility of fire or explosion.

12. ALLOW 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 temperature and warn 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.

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.

21. Do not store or use gasoline or other flammable liquids or vapors near the furnace.

WARNING

DO NOT USE THIS HEATER IF ANY PART HAS BEEN UNDER WATER. IMMEDIATELY CALL A QUALIFIED SERVICE TECHNICIAN TO INSPECT THE HEATER AND TO REPLACE ANY PART OF THE CONTROL SYSTEM AND ANY GAS CONTROL WHICH HAS BEEN UNDER WATER.

Locating the Furnace

The furnace is installed between 2x4 inch wall studs spaced on 16-inch centers or a stud space that can be framed in to 16 inches.

Consider the following points before attempting to install the furnace:

Caution

Do not make cut outs in the wall or ceiling before checking in the attic for ceiling joist locations and proposed venting.

1. 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 install it in a closet, alcove, hallway or where the furnace could be isolated by closing doors to the heated space. Do not locate the furnace where a door could swing over the front panel, or where circulation could be retarded by furniture or cabinets.

2. Check the minimum spacing needs as shown in Figure 1.

3. The top of the furnace must be at least 16 inches from the ceiling.

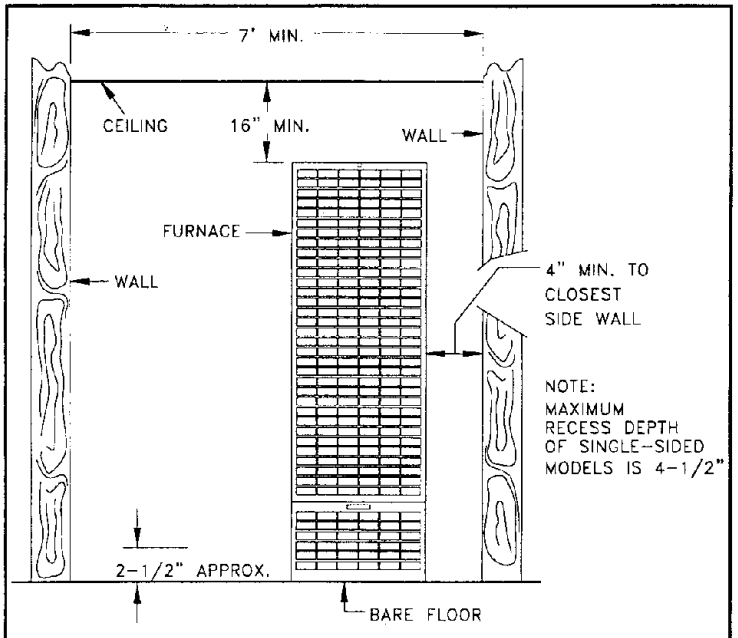


Figure 1

4. When furnace is properly installed with legs resting on floor plate, it sets the dimension from the face panel to the bare floor. (2-1/2 inches approximately depending on the thickness of floor plate).

   A protective barrier (metal or wood), cut to match the width and depth of the furnace, should be used to cover over any floor coverings such as carpet or sheet vinyl that might be finished off under the furnace. At no time should the dimension from the bottom of the face panel to the protective barrier be less than 1-1/2 inches.

5. The side of the furnace may be as close as 4 inches to the wall. The recessed portion may have 0 inch clearance to combustible material.

6. To provide adequate clearance and service access, the front of the furnace must face the open room. Do not place anything closer than four feet to front of cabinet.

7. After picking a location, inspect the wall, floor, attic and roof areas. Make sure there are no pipes, wiring, bracing, etc., that would interfere with furnace or vent installation. If required move them or pick a new location.

8. Be sure that gas piping and electrical wiring can be brought to the location. Electrical wiring required for optional blower accessory.

9. If installing the thermostat on the wall, locate the thermostat approximately five feet above the floor on an inside wall where it will sense the average room temperature.

   Avoid the following:

HOT SPOTS:	COLD SPOTS:
Concealed pipes or ducts	Concealed pipes or ducts
Fireplaces	Stairwells-drafts
Registers	Doors-drafts
TV sets	Unheated rooms on
Radios	other side of wall
Lamps	DEAD SPOTS:
Direct sunlight	Behind doors
Kitchen	Corners and alcoves

   After picking a location that meets the requirements, make sure there are no pipes, wiring, or anything else that will interfere with thermostat installation. If required, move or pick a new location.

Combustion and Ventilation Air

Warning

Danger of illness bodily injury or death. The furnace and any other fuel burning appliance must be provided with enough fresh air for proper combustion and ventilation of flue gases. Most homes will require that outside air be supplied into the furnace area.

The high cost of energy for home heating has brought about new materials and methods used to construct or remodel most current homes. The improved construction and additional insulation has reduced the heat loss and made these homes much tighter around windows and doors so that infiltrated air is minimal. This creates a problem to supply combustion and ventilation air for gas-fired or other fuel burning appliances. Any use of appliances that pull air out of the house (clothes dryers, exhaust fans, fireplaces, etc.) increases this problem and appliances could starve for air.

The combination of a tight energy efficient home with the use of exhaust fans, fireplaces, clothes dryers, and gas appliances result in more and more air being drawn from the house.

Carbon monoxide can be the result. Carbon monoxide or "CO" is a colorless, odorless gas produced when fuel is not burned completely or when the flame does not receive sufficient oxygen. Automobiles, charcoal, wood fires, improperly vented or air-starved coal, oil and gas furnaces or other appliances can produce carbon monoxide.

Do not install furnace in the same room or near a wood or solid fuel burning fireplace.

Be aware of these air starvation signals:

1. Headaches, nausea, dizziness.
2. Excessive humidity - heavily frosted windows, moist "clammy" sensation.
3. Fireplace smoke, will not draw.
4. Furnace flue backs up.

Air Requirements

The requirements for providing air for combustion and ventilation are listed in the National Fuel Gas Code NFPA 54/ANSI Z223.1 (in Canada CAN/CGA B149). Most homes will require that outside air

WARNING: DANGER OF PROPERTY DAMAGE, BODILY INJURY OR LOSS OF LIFE. DO NOT INSTALL FURNACE IN ANY AREA WHERE OXYGEN IS IN USE.

Combustion and Ventilation Air

be supplied to the furnace area by means of ventilation grilles or ducts connecting directly to the outside or spaces open to the outdoors such as attic or crawl space. The only exception is when the furnace area meets the requirements and definitions for an unconfined space with adequate air filtration.

All air openings and connecting ducts must comply with the following:

If the furnace is installed in an area with other gas appliances, the total input rating of all appliances must be considered when determining the free area requirements for combustion and ventilation air openings.

Ducts must have the same cross-sectional area as the free area of the openings to which they connect. The minimum dimension of rectangular air ducts must not be less than three inches in length or height.

Warning

Danger of property damage, bodily injury or death. Even when a house meets requirements for unconfined space with adequate air infiltration, it is recommended that a fresh air intake be installed to lessen the possible dangers from any future changes on the home.

Louvers/Grilles and Screens Covering Free Area Openings

If screen is used to cover opening(s), it must not be smaller than 1/4 inch mesh. Use the free area of a louver or grille to determine the size opening required to provide the free area specified. If the free area is not known, assume a 20% free area for wood and a 60% free area for metal louvers or grilles.

Infiltration Air

If your furnace is in an open area (unconfined space), the air that leaks through the cracks around doors and windows may be enough for combustion and ventilation air. The doors should not fit tightly. The cracks around windows should not be caulked or weather stripped.

Spillage means air starvation. A fresh air duct or air intake opening must be installed to provide air directly to the furnace or other gas appliance.

If spillage exists or when the furnace is in a building of tight construction where the windows and doors are weather stripped, air for combustion and ventilation must be obtained from outdoors or space open to the outdoors.

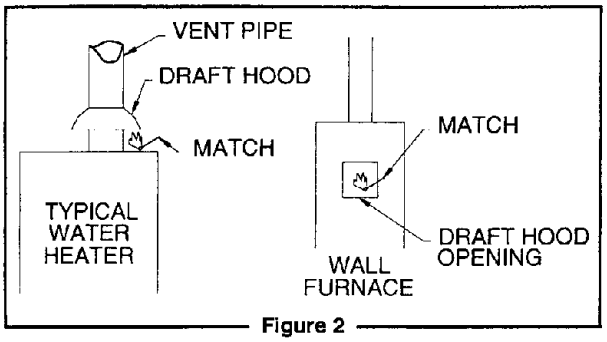


Figure 2

To determine if infiltration air is adequate, perform the following checks:

1. Close all doors and windows. If you have a fireplace, start a fire and wait until flames are burning vigorously.

2. Turn on all exhausting devices, i.e., kitchen and bathroom exhaust fans; water heaters (gas and electric).

3. Turn on all vented gas appliances, i.e., heating equipment (includes any room heaters), water heaters.

4. Wait ten (10) minutes for drafts to settle.

5. Check for draft hood spillage at each appliance. Hold a lit match two inches from draft opening. (Figure 2).

No Spillage - Match flame pulls toward draft hood - this indicates sufficient infiltration air. Return exhausting devices and appliances to the condition you found them.

Draft hood Spills - If there is spillage at a draft hood (match goes out or flame wavers away from draft hood) check for plugged flue connectors and chimneys. Repair stoppage and test again.

If you have a fireplace, open a window or door near the fireplace and then check for spillage. If spillage stops, do not use the fireplace without a nearby window or door open until you can supply fresh air by a permanent duct.

If you have kitchen and bathroom exhaust fans, turn them off and check for spillage. If spillage stops, do not use exhaust fans (circuit breakers for fans should be turned off) until you can supply fresh air by a permanent duct.

Provide opening(s) having a total free area of 1 square inch per 4,000 Btuh of the total of all appliances. The required area is shown in Figure 3. This fresh air opening or duct must terminate at a point not more than one foot above the floor. It must have at least one inch of free area for each 4,000 Btuh of input of all appliances in area.

Free Area in Square Inches Each Opening (Furnace Only)
Based on One Square Inch Per 4,000 Btuh.

Furnace Btuh/Input	Square Inch of Opening	Required Number of Holes Sill or Header Plates		
		1-1/2"	2"	3"
30,000	7.50	7	4	2
35,000	8.75	8	5	2
40,000	10.00	9	5	3
45,000	11.25	10	6	3
50,000	12.50	11	6	3
60,000	15.00	13	8	4

Figure 3

Furnace Located in Unconfined Space

An unconfined space must have a volume of a minimum 50 cubic feet per 1,000 Btuh total of all appliances in the area. Adjoining rooms may be included only if there are no doors between the rooms, or if special provisions are made such as ventilation grilles installed between connecting rooms. Figure 4 outlines the minimum area in square feet, based on 8 foot ceiling heights for various Btuh input ratings.

Minimum Area in Square Feet

4,000 Btuh Per Square Inch Opening		Max. Btuh Input	*Unconfined Space Min. Area in Sq. Ft. 8' Ceiling Height
Round Duct Dia.	Rectangular/Square Duct Size		
4"	3" x 3"	30,000	188
4"	3" x 3"	35,000	219
4"	3" x 4"	40,000	250
4"	3" x 4"	45,000	281
4"	3" x 5"	50,000	312
4-1/2"	3" x 5"	60,000	375

*Can be two or more rooms joined by ventilation grilles.

Figure 4

Furnace Located in Confined Space

If furnace is installed in a confined space, it must be provided with free air for proper combustion and ventilation of flue gases by one of the following methods:

Combustion and Ventilation Air

Warning

Danger of property damage, bodily injury or death. The adjoining unconfined space must have adequate air infiltration.

1. Air from Inside Building
   If the confined space adjoins an unconfined space, provide two permanent openings. One within 12 inches of the top and another at the bottom of the room directly connected to the unconfined space. Each opening must have a free area of at least 100 square inches or 1 square inch per 1,000 Btuh of all appliances combined.

2. Air From Outdoors:
   If confined space does not adjoin an unconfined space, then air must be provided from outdoors or spaces open to outdoors such as attic or crawl spaces.

Openings for inlet or outlet air should not be made into attic area if attic is equipped with a thermostat controlled power vent.

Provide two permanent openings, one within 12 inches of top and bottom of the room connecting directly, or by using ducts, with the outdoors or areas open to outdoors.

If the opening connects directly, or with vertical ducts, the free area of each opening must be at least 1 square inch per 4,000 Btuh combined input of all appliances in the area.

If horizontal ducts are used, the free area of each opening must be at least 1 square inch per 2,000 Btuh combined input of all appliances in the area.

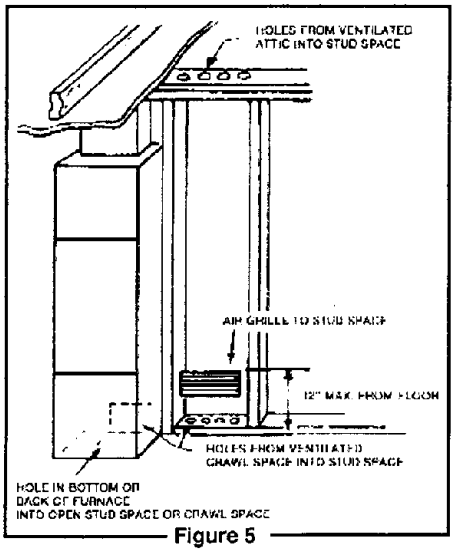


Figure 5

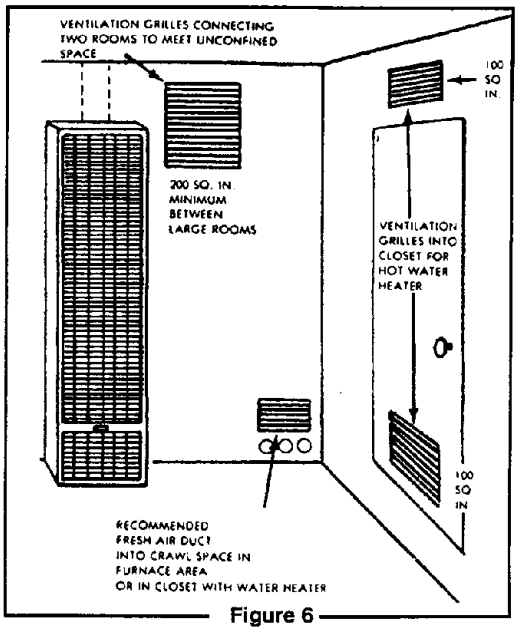


Figure 6

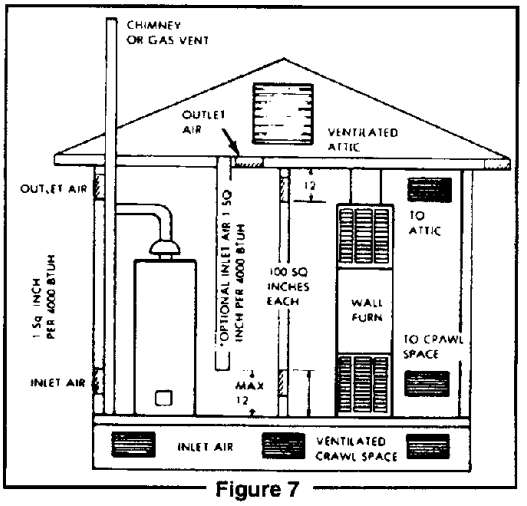


Figure 7

Warning

Danger of illness bodily injury or death. Draft hood spillage, with unobstructed vents, indicates that additional air must be brought into the structure from the outside. Keep a window open (minimum 2 inches) near the appliance until a permanent air duct is installed.

Recessed Mount Installation

Model series 25096 and 35096. The maximum recess depth, from rear of furnace forward is 4-1/2", on models 25096 or 35096 series.

Find the Studs and Ceiling Joists

Use a stud locator or small finishing nails. Repeatedly drive and remove a nail into the wall in the area of the stud until it is located. Then find the inside edge of the stud. Leave the nail at this location.

The other stud should be about 14-1/2 inches from the one found. Drive finishing nails on the inside of this stud. Draw wall cut out to required size as shown in Figure 8. If wall studs are not on 16 inch centers, see "Close Off Stud Space".

Cut Wall Opening

Cut wall opening 14-3/8 inches wide and 66-1/8 inches high measured from the top of the floor plate (Figure 8). All corners must be square.

Installation of Rear Outlet Register

The optional rear outlet register, model no. 6901, may be installed when the furnace is recessed into the wall. In new construction, install the rear outlet plaster ground at the same time you install the header plate. For existing construction, make necessary cut out and install the plaster ground before you install the furnace. See instructions packed with accessory and Figure 8.

Do not allow wall finish material to project into the furnace recess.

Do not install rear outlet register where grille may be blocked by a door, curtains or any other obstruction.

Gas Supply Opening

A hole must be drilled for the gas line. Decide whether the gas line will come through the floor or wall. Drill a 1-1/2 inch hole in wall or floor as needed (Figure 8).

Recessed Mount Installation

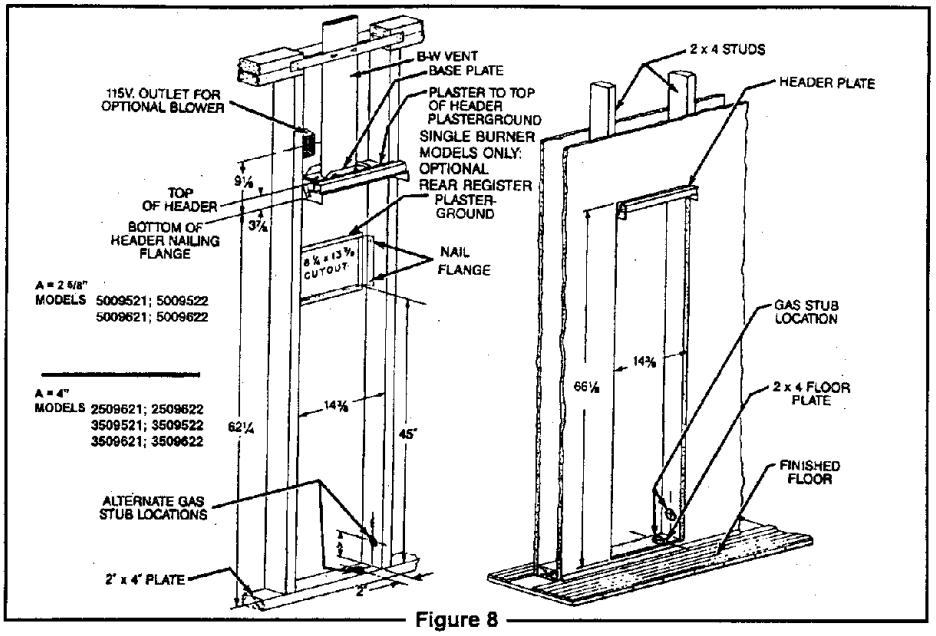


Figure 8

Close Off Stud Space

If studs are not on 16 inch centers, cut the hole for the furnace next to an existing stud and frame in the other side using a 2x4 and spacer blocks as required. Figure 9.

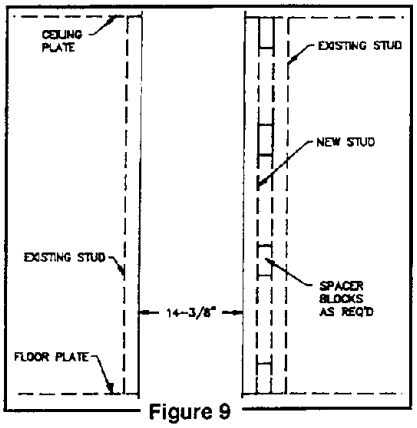


Figure 9

Ceiling Plate Opening

Cut away the ceiling plate between the studs where the furnace is to be installed. Work from the top in the attic. If there is no access to the top, remove the wall covering between the two wall studs, all the way to the ceiling. Work through this opening. Cut out the entire plate so the plate edges will be even with the inner face of the 2x4 studs. (Figure 10).

Install Vent Base Plate (Hold-Down Plate)

Position base plate on top of header plate and fasten with screws.
Note: Hold down plate is not included.

Header Plate (Vent Support)

Measure upward 62-1/4 inches from the top of the floor plate. Place a mark on each stud at this distance. (Figure 8). Place the header plate between the studs with the lower edges even with marks on the studs. Make sure header plate is level.

Locate rear edge of nailing tabs at back of the header. Nail header plate to the 2x4 studs which will center the vent collar in the wall. (Figure 8).

Install Ceiling Plate Spacer

Nail the ceiling plate spacers either across or in between the cut out section of ceiling plate. If nailed between, end must be bent at 90 degrees. They must be fastened along each long edge of the ceiling hole to hold the oval vent pipe in the center of the hole. Ceiling plate spacers preserve structural strength and position oval vent pipe in the center of the cut out opening. Ceiling plate spacers are not included. (Figure 10).

Electrical Outlet (Optional)

If you are installing optional blower accessory, rough-in a 115V electrical outlet as shown in Figure 11.

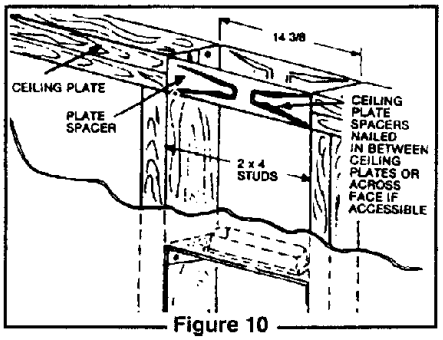


Figure 10

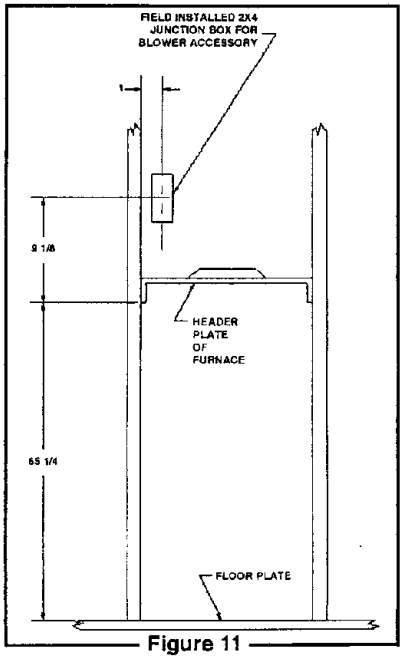


Figure 11

Surface Mount Installation

The use of optional Free Standing Kit No. 4901 allows furnace to be mounted on the surface of a wall. See detailed instructions packed with kit.

Vent Installation

The vent installation must comply with all local codes and ordinances. If in doubt, consult your local codes or inspector.

The furnace vent must be directed to the outdoors so that harmful combustion gases will not collect inside the building.

This furnace must not be connected to a chimney flue serving a separate solid-fuel burning appliance.

This product is design certified by A.G.A./C.G.A. to be installed with a U.L. listed type "B" approved vent and type "B/W" approved vent. (Figure 12). Older style terra-cotta, transite, clay, concrete or masonry type vent pipe can not be used with this appliance. This type of vent pipe will not heat fast enough to establish a draft, which will result in improper venting of combustion products. Consequently, this could cause the vent safety control system to shut down the furnace.

The area above header within the stud space MUST be kept clear of any attic insulation to allow the free circulation of air around oval vent piping. In some areas the building code requires the use of an attic shield.

The B/W vent must extend through the ceiling and roof terminating at least 12 feet above the finished floor on which the furnace rests.

The first vent pipe offset (if required) may not to be any closer than 2'-0" from header plate.

Install Furnace Vent

Attach a 4 foot length of oval, double-wall vent pipe through the plate spacers, if recessed, to the hold-down plate. Push the vent pipe into the hold-down plate until it is completely seated. The hold-down cleat will engage the groove in the vent pipe.

Complete the Venting

Type B/W gas vent shall extend from the header plate of the furnace to a point above the highest ceiling plate within a stud space through which the vent passes, without any offsets or crossovers. After a type B/W gas vent passes through the highest ceiling plate within a stud space above the furnace which it serves, the vent system may be completed with a type B gas vent, of the same manufacturer (do not mix brands of pipe). Offsets or breakovers cannot be greater than 45 degrees from vertical. Refer to The Uniform Mechanical Code.

Install oval to round adapter. Complete the piping extending it through the roof. Use a 4 inch round double wall (Type B) vent pipe, roof flashing, storm collar, and vent top as shown. The vent cap must be at least 2 feet higher than any point that is within 10 feet horizontally of the vent cap. There must be at least 1 inch clearance between the vent pipe and any combustible material.

Typical Vent Installation

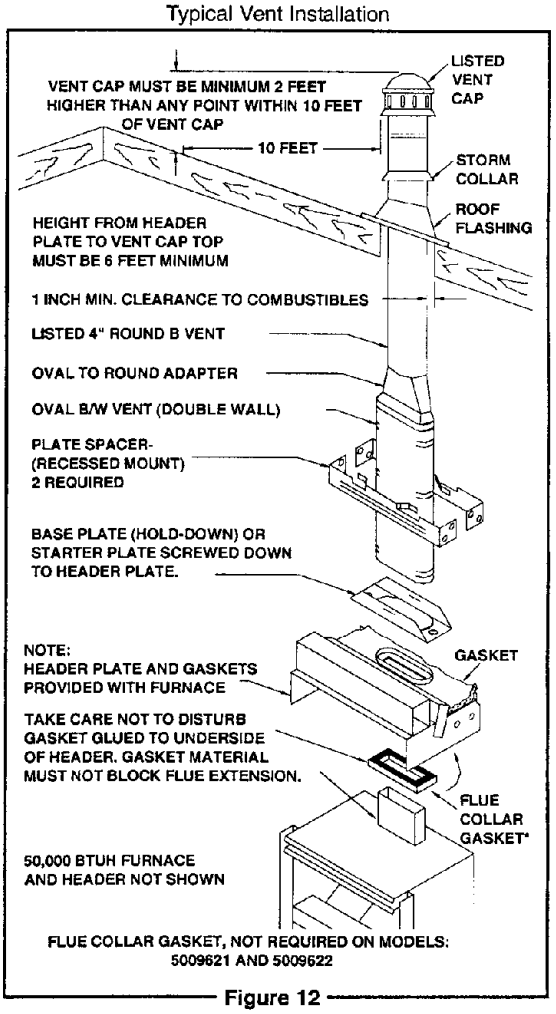


Figure 12

Mount the Furnace

Clear the wall recess of all debris, remove any wood plaster grounds. Stand furnace in front of recess, holding the furnace body at an angle. Insert flue collar into opening in the header plate and raise furnace carefully. (Figure 13). Swing bottom of furnace into wall recess with front edges of legs flush with 2x4 floor plate. Nail through legs into studs or floor plate. (Figure 14).

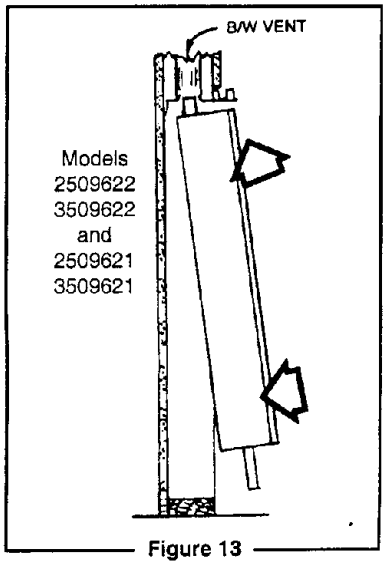


Figure 13

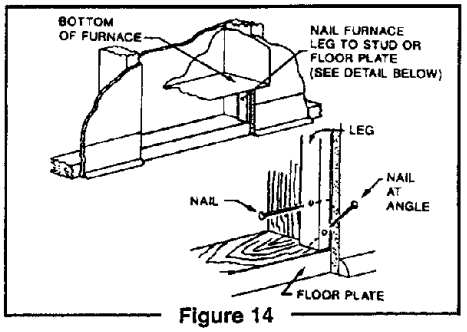


Figure 14

Do not damage gasket glued to underside of header plate when placing furnace in wall.

Avoid nailing the legs so tightly that it disturbs the inner furnace casings. Do not try to force the furnace into a smaller-than-specified recess.

Mounting the Furnace

Rear Outlet Kit Installation (Optional)

Caution: Do not install rear outlet kit where grille may be blocked by a door, curtains or any other obstruction.

If Rear Outlet Register 6901 is used, the following procedure must be complete before placing furnace body into wall recess. (Figure 15). Attach speed nuts to outer shield, and remove knockout plates as follows:

1. Punch in lower corners with screwdriver blade.
2. Break knockout side and bottom connecting tabs. Hold screwdriver blade sideways against tab and strike head of screwdriver lightly with a hammer.
3. Swing plate outward; bend it back and forth to break the top tabs.

After furnace is in position, install rear outlet register as shown in Figure 16. Have damper in open position when inserting assembly. Secure rear outlet register to speed nuts with machine screws furnished.

Removing Knockout Plates

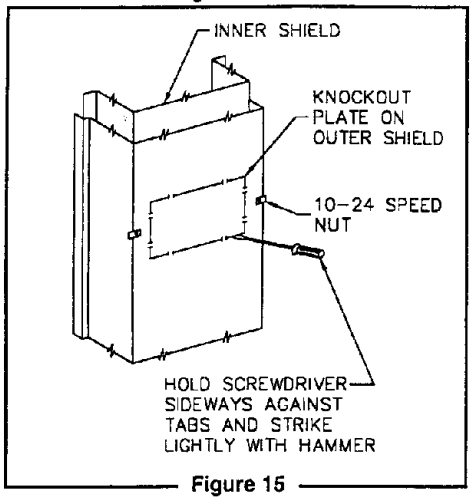


Figure 15

Mounting Rear Outlet Register

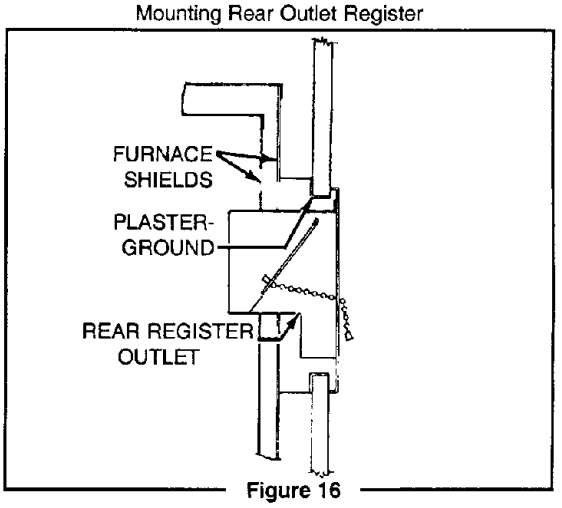


Figure 16

Gas Supply and Piping

The gas control valve, is shipped with a sealed cover over the gas inlet tapping. Do not remove seal until 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 liquefied petroleum (L.P.) 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.

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

Gas pressures and pressures to the burners must not exceed the rated input and pressure shown on the rating plate. On natural gas, the manifold pressure should be 4 inches water column. The manifold pressure should be 10.5 inches water column for L.P. gas. An orifice change may be required to suit gas supplied.

Orifice Sizes

The efficiency rating of these appliances is a product thermal efficiency rating determined under continuous operating conditions and was determined independently of any installed system. For elevations above 4,500 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 L.P. gas are:

Model Number	Gas Type	Input Rating Btu/Hr	Heating Capacity Rating Btu/Hr	Main Burner Orifice		
				Drill	Dec.	Qty.
2509622	Nat.	25,000	19,350	#43	0.089	1
2509621	L.P.	25,000	19,350	#54	0.055	1
3509622	Nat.	35,000	25,930	#38	0.101	1
3509621	L.P.	35,000	25,930	#52	0.063	1
5009622	Nat.	50,000	38,000	#44	0.086	2
5009621	L.P.	50,000	38,000	#54	0.055	2

Btuh = British Thermal Units per hour.

Gas Piping

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 17, 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 18 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 or other approved by local codes.
2. Do not thread 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 only. Leave the two end threads bare. (Figure 19). If L.P. gas installation, use a compound resistant to action of liquefied petroleum gases.

Gas Supply and Piping

3. Use ground joint unions.

4. Install a drip leg (sediment trap) to trap dirt and moisture before it can enter the gas valve. 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.

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 overfiring which may result in combustion chamber failure. Liquid petroleum (L.P.) gas 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 unit before thoroughly ventilating area and smelling near the floor for gas odor.

Pipe Capacity - Btu/Hr with Fittings			
Natural Gas			
Length of Pipe-Ft.	Pipe Size		
	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
L.P. Gas			
Length of Pipe-Ft.	Pipe Size		
	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

Figure 17

Gas Connection

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

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

Connection between shutoff valve and 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.

Left Side Gas Inlet Shown. Models Vary.

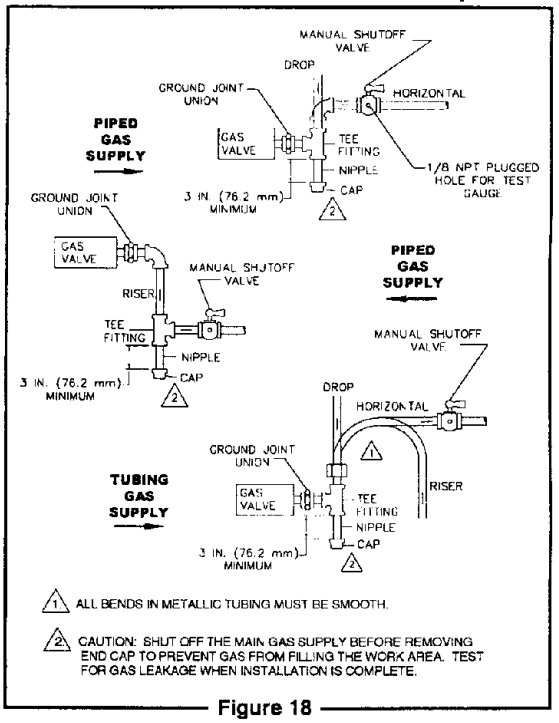


Figure 18

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 for the furnace. If 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 soapsuds (or a liquid detergent) to each joint. Bubbles forming indicates a leak. Correct even the slightest leak at once.

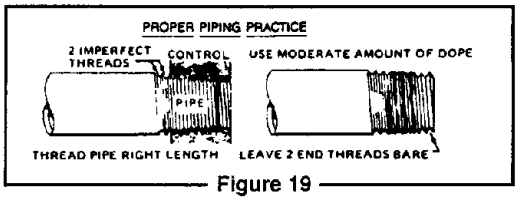


Figure 19

Cabinet Installation

Place panel top over channel on header plate, as shown in Figure 20. Press panel tight against wall, and secure it to header with screw provided in final assembly package. Open control door at bottom of panel and fasten panel at each side through slots in flanges with screws provided.

Attach handle to panel door with screws provided.

Models 5009621 and 5009622: Install second face panel in same manner.

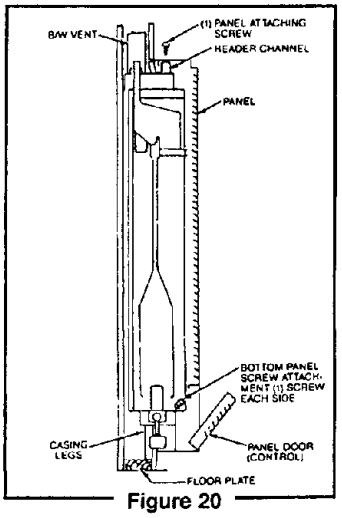


Figure 20

Thermostat Installation

Williams' heaters are operated by a millivolt type thermostat. Current to the thermostat is supplied by the pilot generator. Do not connect to electricity. Anticipator settings are not required.

1. Use of existing wire is acceptable if it is in a satisfactory location and the wire is in good condition. When in doubt, use new wiring.
2. If a new location is chosen or if this is a new installation, 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.
3. Before drilling a hole in wall at selected location, 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.
4. Probe for obstructions in the partition. Then, drill a 1/2-inch hole through wall at selected location for thermostat.
5. From the attic, feed the thermostat wire through wall until even with thermostat location.
6. Snag thermostat wire through hole and pull wire through hole in wall so that 6-inches of the wire protrudes.
7. Route wire to heater.

CAUTION

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

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

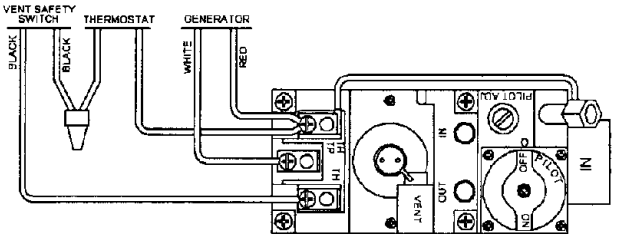
Wall-Mounted Thermostat Installation

1. To remove thermostat cover, squeeze both sides and lift.
2. Connect thermostat wires to the thermal screws on the back of thermostat base.
3. Push any excess wire back through hole in the wall and plug hole with insulation to prevent drafts from affecting thermostat operation.
4. Be sure to level thermostat for best appearance. Fasten thermostat base to wall through mounting holes with screws provided.
5. Replace the thermostat cover.
6. Do not run wire in any location where it might be damaged. Avoid splicing thermostat wires unless the spliced wires are properly cleaned, soldered and taped.
7. Use #18 gauge wire as supplied for maximum length of 20 feet. If longer length is needed, use #16 gauge wire for maximum length of 25 feet.
8. Connect thermostat wires to the control valve as shown in Figure 21.

Cabinet-Mounted Thermostat Installation

1. Before removing face panel disconnect thermostat wires at the gas valve.
2. Locate the knockout on the right side of heater to mount the thermostat. Remove knockout by taping lightly with a screwdriver. It will also be necessary to cut the inside panel insulation about a 1/2-inch for clearance to the knockout.
3. Cut the thermostat wire to 56 inches.
4. Connect thermostat wires to thermal screws on the back of the thermostat base.
5. Feed the thermostat wires through the knockout and route through the metal clip to the gas valve.
6. Mount the thermostat to the side of the cabinet with screws provided.
7. Replace thermostat cover.
8. Connect thermostat wires to the control valve as shown in Figure 21.

IMPORTANT: KEEP THERMOSTAT WIRE AWAY FROM COMBUSTION CHAMBER.



Either thermostat wire may be connected to the control valve.

P323011 (OR)
P322660

Figure 21

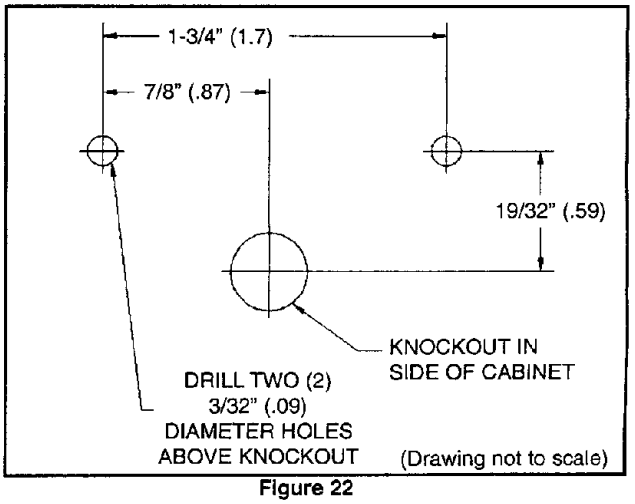


Figure 22

Start-Up Procedure

Warning

Danger of property damage, bodily injury or death. Liquefied petroleum (L.P.) gas 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 unit before throughly ventilating area.

Check the furnace operation as outlined in the following instructions. If any sparking, odors or unusual noises are encountered, shut off electric power immediately. Recheck for wiring errors, or obstructions in or near fan motor (if equipped).

Check Gas Input and Pressures

For furnaces located at elevations between sea level and 4,500 feet, the measured input must not be greater than the input shown on the rating plate of the furnace. For elevations above 4,500 feet, the measured input must not exceed the input of the rating plate reduced by 4 percent for each 1,000 feet that the furnace is above sea level.

Gas supply pressure and manifold pressure with the burner operating must also be as specified on the rating plate.

Type of Gas	Manifold Pressure, in W.C.
Natural	4"
L.P.	10.5"

Rated input will be obtained on the heating value of 2,510 Btu/hr for propane at 10.5-inches manifold pressure and factory-sized orifices. If L.P. gas having a different heating value is supplied, orifices must be changed by a qualified service technician 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 of water 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 Thermostat

Check thermostat operation. When set above room temperature or temperature shown on the thermostat, the main burner should light. Make certain the thermostat turns off the furnace when room temperature reaches the selected setting and starts the furnace when room temperature falls a few degrees.

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 natural gas input check, obtain heating value of gas (BTU per cubic foot) at standard conditions from your local supplier.

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

1. Turn off 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, 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 then, input: 1,000 x 3,600 ÷ 34 = 106,000 Btu Per hour. 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 and verify all pilot burners are operating.

Check Pilot Burner

The pilot flame must surround 1/2- to 5/8-inches of the generator. Pilot flame is preset at the factory, so ordinarily does not require field adjustment. (Figure 23). On new installations, the gas lines will be filled with air and may take several minutes to establish a pilot flame.

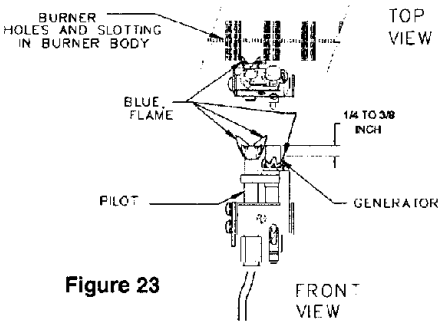


Figure 23

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 observations. 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 is provided, or is necessary. (Figure 24).

Normal Appearance

Natural Gas:

1. Inner cone - blue color - 3/8 to 5/8 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.

L.P. 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.

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.

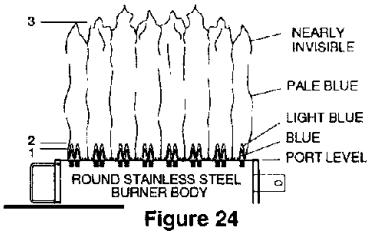


Figure 24

Warning

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

Lighting the Pilot
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.

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 gas is 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, don't try to repair it, call a qualified service technician. Force or attempts to 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.

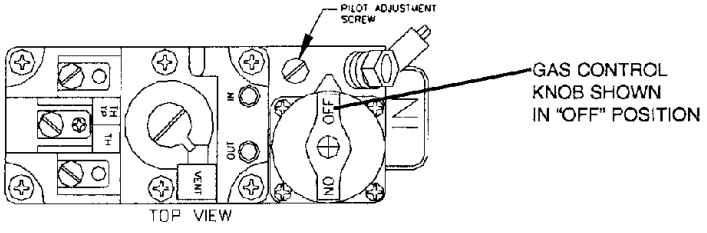
WHAT TO DO IF YOU SMELL GAS

*Do not try to light any appliance.
*Do not touch any electric switch; do not use any telephone 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.

IMPORTANT: KEEP BURNER AND CONTROL COMPARTMENT CLEAN.

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 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 use force.

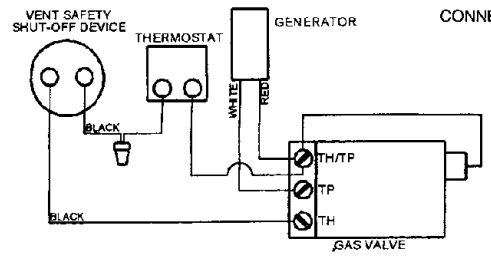
6. Wait five (5) minutes to clear out any gas, then smell for gas, including near the floor. If you then smell gas, STOP! Follow "B" in the safety information above. If you don't smell gas, go to the next step.
7. Loosen wing nut and open the pilot observation door (if equipped).
8. To find the pilot, follow metal tube from gas control. The pilot is mounted on the side of the burner.
9. Turn knob on gas control 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 one (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 through 10.
    *If 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 "OFF" and call your service technician or gas supplier.
11. Close pilot observation door, tighten wing nut (if equipped).
12. Turn gas control knob counterclockwise ↶ to "ON".
13. Close control access panel.
14. Turn on all electric power to the appliance (if applicable).
15. 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 servicing is to be performed.
3. Open control access panel.
4. Push in gas control knob slightly and turn clockwise ↷ to "OFF" position. Do not use force.
5. Close control access panel.

WARNING: DUE TO HIGH SURFACE TEMPERATURES, KEEP CHILDREN, CLOTHING, FURNITURE OR ANY COMBUSTIBLE MATERIAL AWAY FROM HEATER.



CONNECTION WIRING DIAGRAM FOR THERMOSTATS

LEGEND
—— FACTORY WIRED LOW VOLTAGE
⊘ SCREW TERMINAL LOW VOLTAGE

NOTES: IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, USE ONLY 18GA. 4/64 INSULATION, 105° C. AWM COPPER WIRE OR EQUIVALENT. FOR FIELD WIRED CONNECTIONS USE NO. 18 AWG WIRES RATED FOR AT LEAST 105° C (221° F).

WILLIAMS GAS CONTROL VALVE P323011 OR P322660

Operating Your Furnace

The furnace operates in the following sequence:

1. 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 front 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 100% safety pilot which will shut off the gas supply in case the pilot is not burning or functioning properly. Make sure the pilot is adjusted properly and that the pilot generatoR connection at the control valve is tight. If furnace will not stay lit, call your local gas utility or a qualified service person.

Warning

Danger of property damage, bodily injury or death. If the furnace overheats or fails to shut off, close manual gas valve for the furnace before turning off electric power for the fan.

If furnace is equipped with a manual spark ignitor, follow these steps:

1. Review the pilot lighting instructions.
2. When instructed to "light the pilot", depress red button located on the burner pan for pilot ignition. If necessary, depress red button several times for pilot ignition.
3. If pilot fails to ignite or a spark is not present while actuating red button, repeat steps 5 through 10 listed in "Lighting the Pilot".

How to Care for Your Furnace

Cabinet Finish

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

Furnace Area

Keep the area near the furnace clear and free from combustible materials, gasoline and other flammable liquids and vapors.

Combustion and Ventilation Air

The combustion and ventilation air supply must not be blocked. Do not put anything in or on the furnace cabinet. For better circulation and more effective heating, do not place obstructions, furniture or other items closer than four feet to the front of the cabinet or two feet from each side of the cabinet.

Annual Upkeep Needed

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

Cleaning Blower (If Equipped)

Shut off electricity. Clean any lint or dirt from fan blades, fan motor and exposed air passages. Annually put two drops of SAE 20 oil in each of the two cups or oil tubes.

Pilot Burner

Light pilot using instructions in "Lighting the Pilot". Leave thermostat at lowest setting. Pilot flame should surround 1/2 to 5/8 inches of the generator tip. If flame needs adjusting, do so as follows:

1. Remove screw cover over pilot adjusting screw.
2. Insert small screwdriver. Adjust flame as needed. Turn screw counterclockwise ↺ to increase flame, clockwise ↻ to decrease.
3. Turn thermostat to highest setting. Main burner should light quickly and smoothly. Turn thermostat to lowest setting. Main burner should go out. Pilot should remain lit.
4. Replace screw cover with gasket over pilot adjusting screw. (Figure 25).

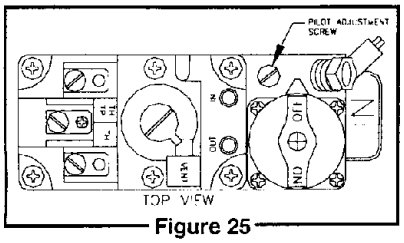


Figure 25

Vent System

Make sure that no parts of the venting system are blocked or rusted. Clean or replace before using furnace.

Burner Cleaning

If cleaning is required, contact a qualified service technician to clean and service burner. To remove burner(s):

1. Open burner compartment door.
2. Shut off gas supply to furnace.
3. Disconnect gas line inside cabinet at ground joint union fitting. (Figure 26).
4. Remove (2) screws securing burner pan assembly to inner liner.
5. Pull burner pan assembly forward approximately 1/2-inch and drop down to expose the top of the burner.
6. Clean all foreign materials from the top of the burner.
7. After cleaning, replace burner pan assembly by reversing above procedure.

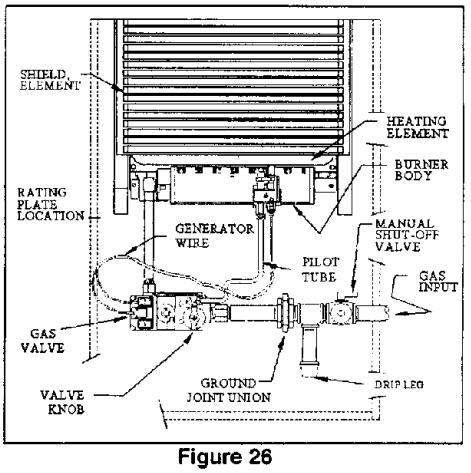


Figure 26

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 clear blue cone having a bluish-red or bluish-violet outer mantle.

Danger

A build up of any dust, lint or foreign material in the primary air opening of the burner can interfere with the proper air gas mixture and can result in a yellow flame which can produce carbon monoxide and soot. This condition if allowed to develop, can lead to bodily injury including death. It is imperative that the burner be kept clean.

Blower Accessory 2901 and 2907

This blower accessory is installed on furnace top and increases circulation of warm air through heated space. A 115V outlet adjacent to the furnace is required. For automatic setting, you must select "HI" or "LOW" position. When the furnace heats up, the automatic fan switch will be activated and the fan will operate. The blower accessory will not operate if fan switch is set in "OFF" (center) position. Be sure this accessory is of the type and design required for use with your furnace.

1. Turn off electric power supply at disconnect switch, fuse box or service panel before installation or service of the blower accessory.
2. Label all wires prior to disconnection when servicing. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.
3. Install 115V electrical outlet as shown in Figure A.
4. Remove two (2) screws securing blower grille and remove blower grille as shown in Figure B.
5. Remove two (2) screws securing junction box cover. Remove cover to gain access to knockout located in junction box.
6. Locate knockout and remove using a hammer and screwdriver.
7. Place blower body on furnace top as shown in Figure B.
8. Route 115V wiring into junction box through knockout.
9. Make wiring connection inside junction box as shown in Figure C. Follow applicable local and national electrical codes. All electrical work must conform to your local codes and ordinances or in their absence, with National Electrical Code, NFPA 70/ANSI. If you are not familiar with wiring codes in general, have a competent electrician do this job.
10. Drill 1/8 inch diameter hole in each side of the furnace face panel through the holes on the sides of the fan cabinet. Secure the blower to the furnace with the two screws provided.
11. Replace junction box cover, securing with screws previously removed.
12. Replace blower grille, securing with screws previously removed.
13. Set switch to desired position. If left in "HI" or "LOW" position during summer months, blower could be activated by heat. If this is undesirable, set switch to "OFF" position.

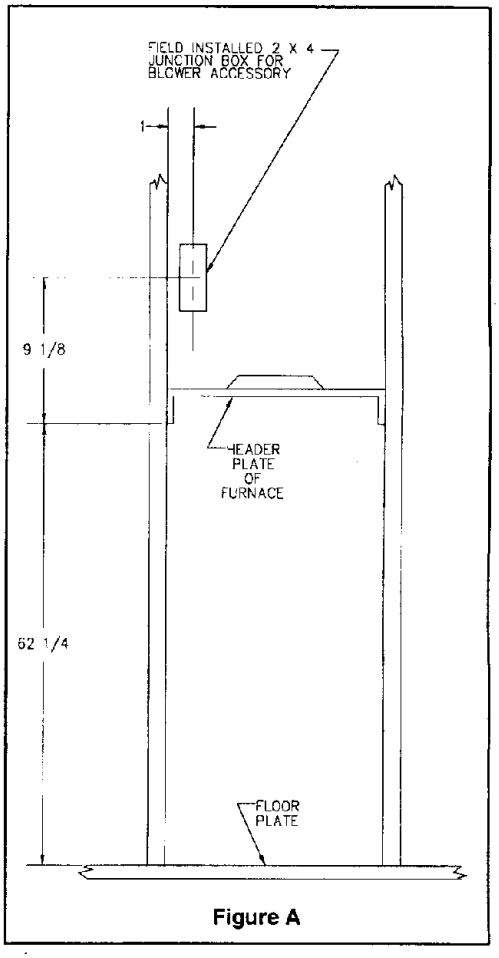


Figure A

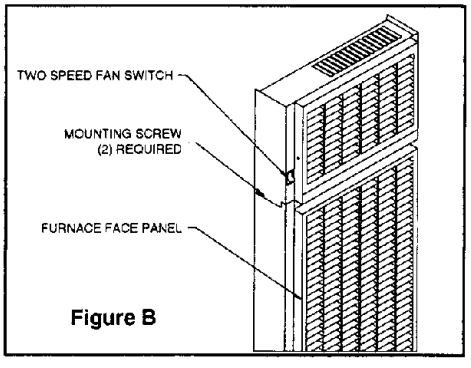


Figure B

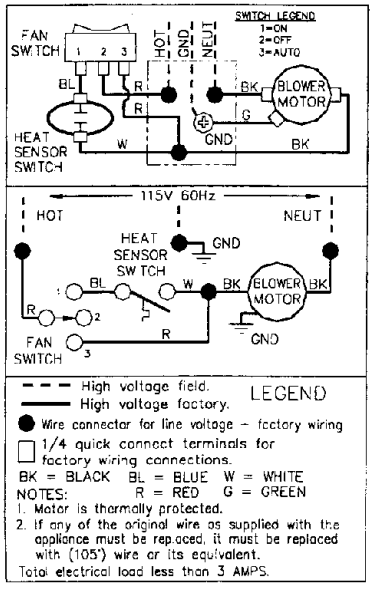


Figure C
Model 2907

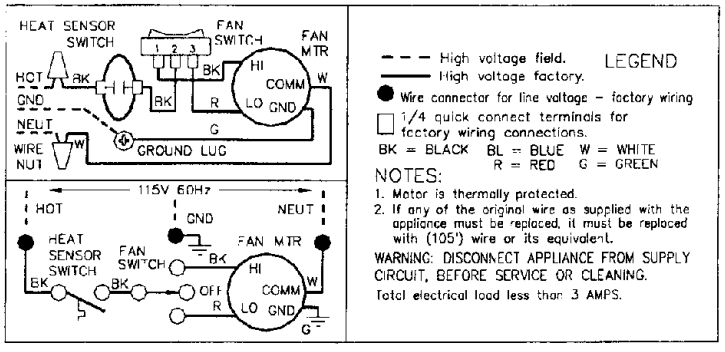


Figure C
Model 2901

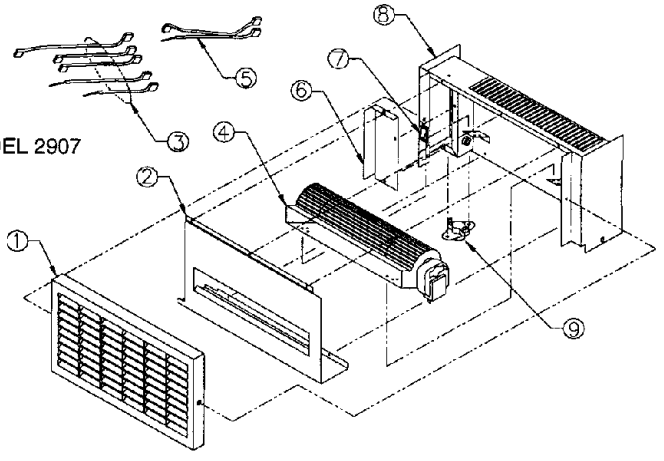
CAUTION: Danger of property damage, bodily injury or death. Turn off electric power supply at disconnect switch, fuse box or service panel before removing or working on fan cabinet.

Blower Accessory 2901 and 2907

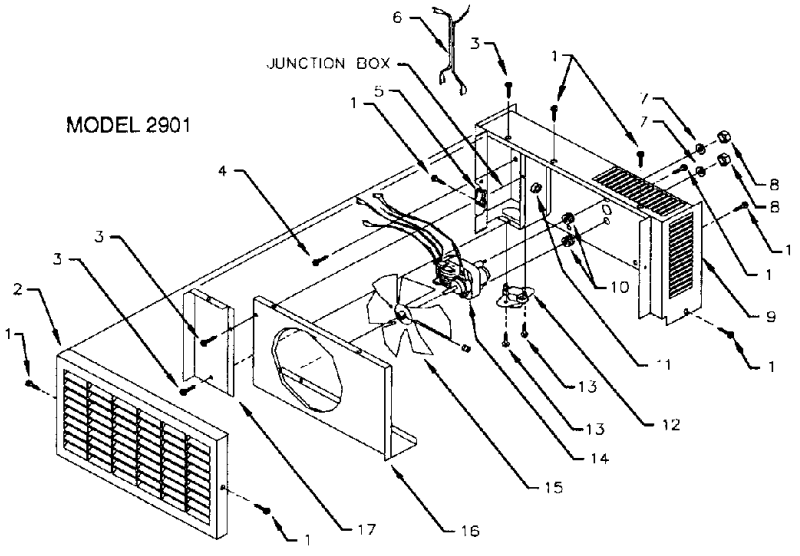
Model 2901		
Ref. No.	Part No.	Description
1	P013200	Screw - #8A x 3/8 (8)
2	9C99	Blower Grille
3	P093200	Screw - #8B x 3/8 (3)
4	P141000	Screw - #10 x ½
5	P320911A	Toggle Switch
6	P320912	Wire Bridle
7	P127300	Flat Washer-#10-32 (2)
8	P041100	Machine Nut - #8-32 w/Washer (2)
9	9C102	Blower Body
10	P321078	Motor Mount Grommet (2)
11	P012900	Strain Relief Bushing
12	P323095	Fan Switch
13	P029200	Screw - #6-32 x 5/16
14	P320905	Motor
15	P320907	Fan Blade
16	9D12-1	Orifice Plate
17	9B161	Junction Box Cover

Model 2907		
Ref. No.	Part No.	Description
1	9C99	Blower Grille
2	9B246	Orifice Plate
3	9B248	Wire Assemblies
4	P321842	Blower and Motor
5	P320912	Heat Senor Wire Assembly
6	9A483	Junction Box Cover
7	P323080	Fan Switch
8	9B249	Blower Body
9	P323095	Heat Sensor Switch

MODEL 2907



MODEL 2901



Motorized Rear Outlet Register 6919 and 6920

WARNING

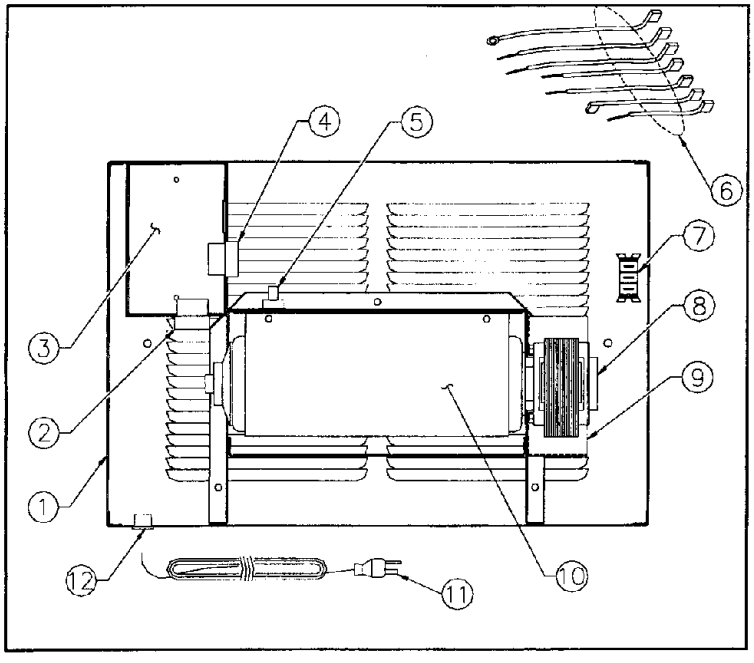
Danger of property damage, bodily injury or death. Turn off all electrical power supply at disconnect switch, fuse box or service panel before removing or working on fan. For your protection against shock hazard, this appliance is equipped with a three-prong (grounding) plug and should be plugged directly into a properly grounded three-prong receptacle. **Do not cut or 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. If you are not familiar with the wiring codes in general, have a competent electrician do this job.

This kit directs some of the heated air into the room opposite the one in which the furnace is installed. Read these instructions carefully and familiarize yourself with the installation before you begin. Use gloves to protect your hands from sharp metal edges.

Blower Settings: You must select "ON" for continuous blower operation or "AUTO" for automatic setting. If the blower is set on "AUTO" when the furnace heats up, the heat sensor switch is activated and the blower will operate until the furnace cools down, then the blower will turn off. The blower will not operate if fan switch is set in the "OFF" (center) position.

Location Warning: This register must be centered between studs and aligned with the furnace for proper engagement. (Figure D). Make sure the furnace is centered on the same studs before you cut any wall openings for the register.

1. Measure and mark wall for opening as shown in Figure A. Check the wall for any electrical wiring present before cutting the opening. Reroute existing electrical if necessary.
2. If recessed mounted installation, place plaster ground in opening and attach to 2x4 studs.
3. An embossed knockout plate is located on the rear of the outer shield and another is located directly behind it on the inner shield. (Figure B). Remove the knockout plates on the furnace by punching in the lower corners with a screwdriver blade. Then, holding screwdriver blade sideways against the side and the bottom connecting tabs, strike the head of the screwdriver lightly with a hammer to break tabs. Swing plates outward and bend it back and forth to break top tabs. Both knockouts must be opened (metal removed) in order to attach the register assembly properly. If the inner shield knockout is not embossed deep enough to be removed easily, mark an outline using the existing opening as a guide. Use tin snips to cut the area away. A pilot hole may be needed to begin the first cut. Take care not to damage the combustion chamber directly behind the inner shield when making a pilot hole.
4. Attach speed nuts to outer shield. (Figure B). After the furnace is in position, insert register into the opening as shown in Figure A. Install machine screws through register housing and into the speed nut clips on the furnace outer shield. Do not over tighten the screws.
5. After the register has been plugged in, set the fan switch to the desired blower operation.



Replacement Parts List 6919 and 6920			
Ref. No.	Part No.		Description
	6919	6920	
1	9B269	9B285	Register Assembly
2	P500185	P500185	Strain Relief Bushing
3	9A427	9A427	J-Box Cover
4	P603108	P603108	Strain Relief Bushing
5	P323079	P323079	Heat Sensor Switch
6	9B270	9B270	Internal Wiring
7	P323080	P323080	Fan Switch
8	P323076	P323076	Motor and Blower
9	9A432	9A462	Motor Cover
10	9B266	9B284	Motor Housing Back Plate
11	P323081	P323081	Cord and Plug
12	P323084	P323084	Bushing

Use only manufacturer's authorized parts.
Note: Screws, bolts and washers are standard hardware items and may be purchased locally.

CAUTION: Do not install this kit where outlet grille may be blocked or covered by a door, curtains or any other obstructions.

Motorized Rear Outlet Register 6919 and 6920

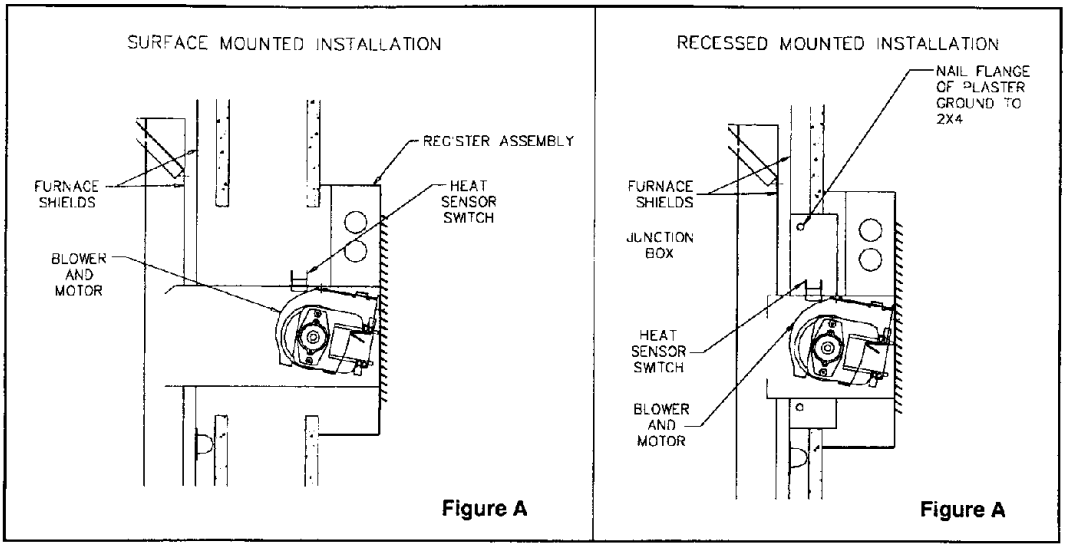


Figure A

Figure A

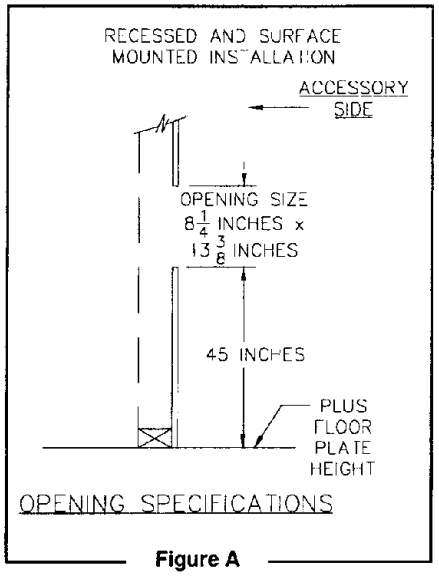


Figure A

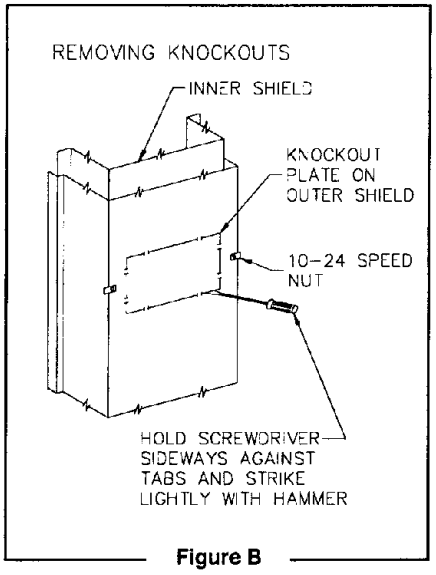
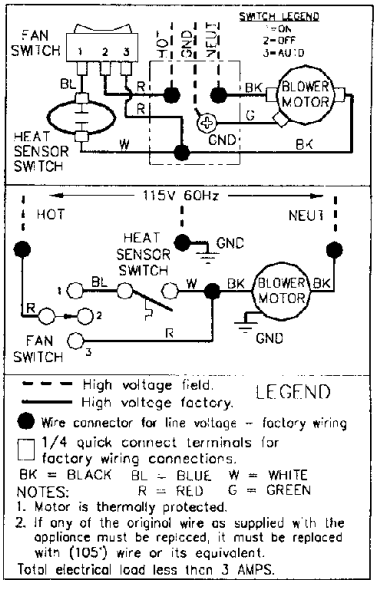


Figure B



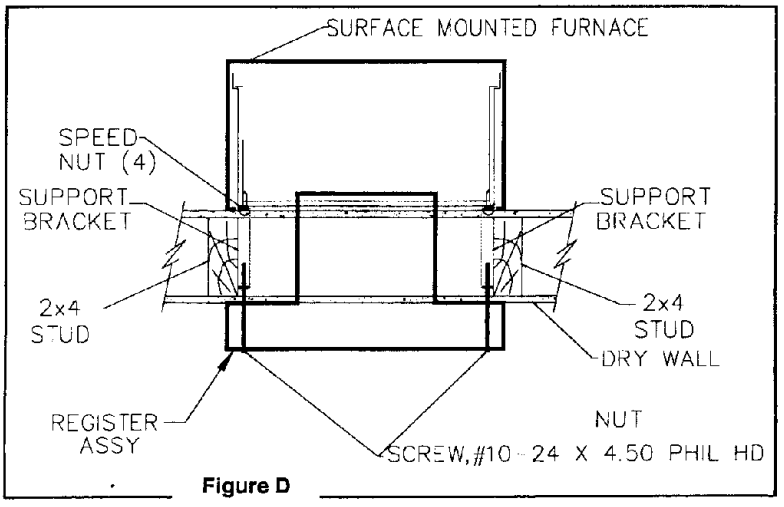


Figure D

Troubleshooting

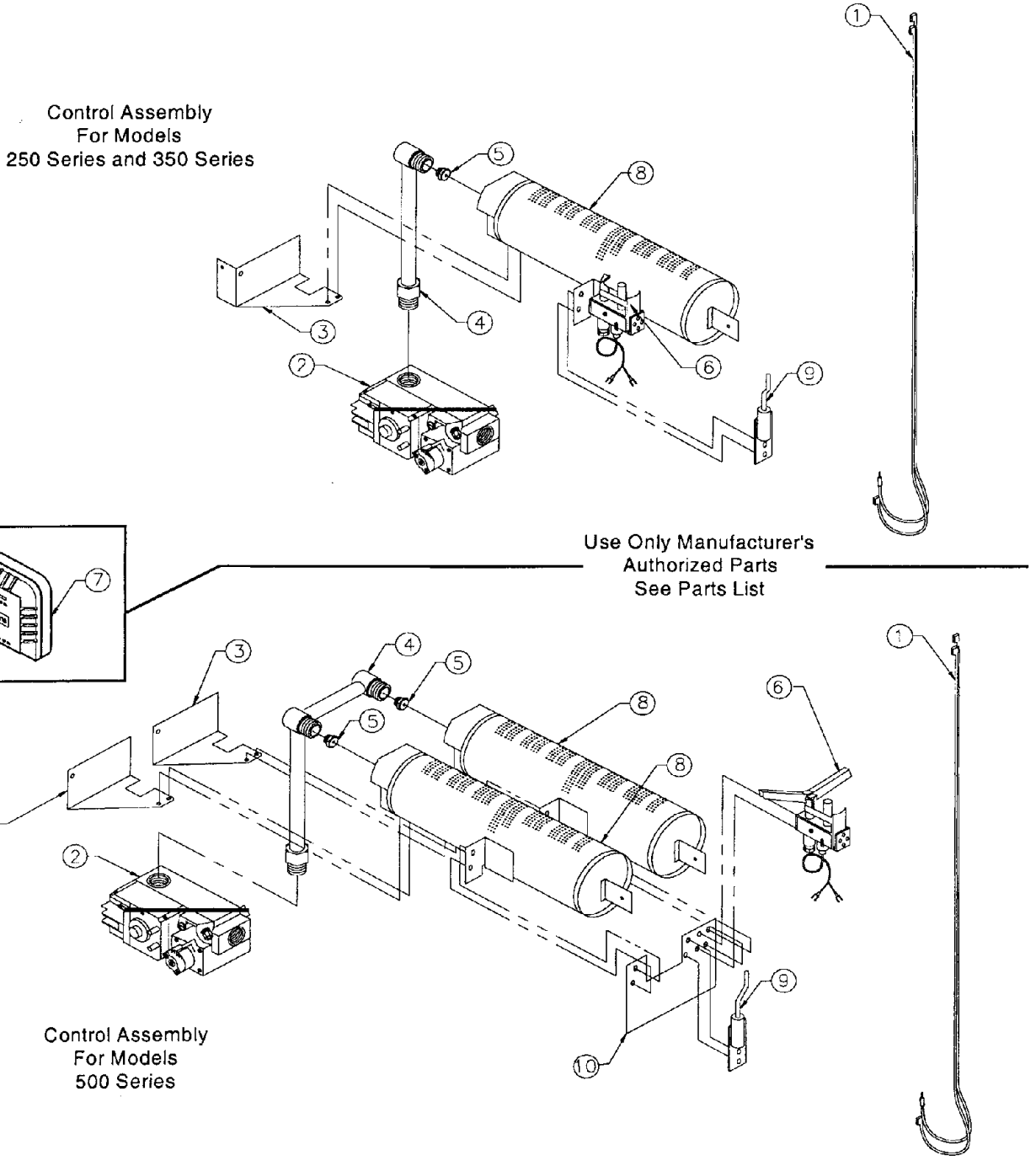
	Symptom	Possible Causes	Corrective Action
1.	Pilot will not stay lit after carefully following lighting instructions.	A. Generator producing insufficient millivoltage.	Check pilot flame. It must impinge on the generator. Be sure generator is fully inserted in bracket.
		B. Loose or dirty generator connections at gas valve.	Clean and/or tighten generator connections at valve.
		C. Generator defective.	Check generator with millivolt meter. Take reading at generator terminals of the valve with the valve placed in "Pilot" position. Disconnect the thermostat wires. The millivolt reading should be 450 millivolts or more.
		D. Grounded thermostat wire.	Remove thermostat wires from valve terminals. If pilot now stays lit, trace thermostat wiring circuit for a ground. May be grounded to furnace, gas supply, nails or staples.
		E. Defective gas valve.	Replace gas valve after above is verified.
2.	Pilot burning - no gas to the main burner.	A. Valve not turned to the "ON" position after lighting pilot.	Turn gas valve knob to the "ON" position.
		B. Thermostat not turned to a position calling for heat.	Set 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 connections at valve terminals. If valve operates, check thermostat wires.
		E. Pilot generator may not be generating sufficient millivoltage to open valve.	See 1A and 1C above.
		F. Defective valve.	Replace gas valve after above is verified.
		G. Vent safety switch tripped.	Check and reset.
3.	Furnace operates but turns off before room temperature is attained.	A. Thermostat location.	Check thermostat location. It should not be in the path of warm air discharge from furnace, near a lamp, or above a T.V. or stereo set.
		B. Defective thermostat.	Check thermostat calibration or replace.
4.	Furnace not producing sufficient heat.	A. Furnace may be too small for space being heated.	Check heat sizing calculations.
		B. Furnace not burning at full rate.	Check for low gas pressure at gas valve. It should be 4 inches W.C. for natural gas; 10.5 inches W.C. for L.P.G. Check for blocked burner orifice.
5.	Furnace operates but will not shut off when room temperature is attained.	A. Thermostat wiring defective.	Thermostat lead wires may be shorted together, caused by a nail or staple. Check by removing thermostat leads from valve terminals.
		B. Thermostat location.	Check thermostat location. If on an outside wall, or there is a hole in the wall behind the thermostat cold air may be coming in contact with the thermostat. Relocate.
		C. Defective thermostat.	Check thermostat calibration, verify thermostat temperature reading or replace.
		D. Valve stuck open.	Replace valve.
6.	Pilot outage.	A. Pilot flame may be low or blowing (high).	Adjust pilot flame. Pilot orifice may be plugged (check for spider webs or other material).
		B. Drafts or drafty areas.	Check for doorway and high movement areas.
7.	Noisy Blower.	A. Housing rattling.	Tighten blower screws.
		B. Blower dirty.	Clean blower wheel.
		C. Blower wheel bent.	Straighten or replace.
8.	Blower does not run.	A. Fan switch not set.	Select fan speed.
		B. Check bearings.	Add oil as outlined in "Blower Accessory Instructions".

Troubleshooting

Symptom	Possible Causes	Corrective Action
9. Main burner will not stay on.	A. Blockage in vent pipe.	Check vent pipe for blockage, such as bird nests, twigs, leaves, etc.
		Check that the vent cap is properly installed, and not placed to far down on the vent pipe. Cap must be the same manufacturer as the vent.
	B. Vent too short.	The vent should terminate a minimum of 12 feet above floor plate. The top of the vent must be at least 2 feet above any obstacle within a 10 foot radius, including the roof.
	C. Restriction in vent system caused by offsets.	All type "B" vents shall extend in a vertical direction with offsets not exceeding 45 degrees. Any angle greater than 45 degrees from vertical is considered horizontal. Any offsets used should be as far above the draft hood as possible to allow venting to begin before any restriction is encountered. The use of too many offsets may also prevent proper venting.
	D. Incorrect vent pipe.	Use listed B/W type vent pipe. DO NOT use transite or any other type of ceramic pipe for venting. DO NOT use single wall pipe. When venting into a masonry chimney, the chimney must be properly lined and sized for this gas furnace. The use of type "B" or flexible chimney liner is recommended.
	E. Loose connections on the vent safety wiring harness.	Check the connection on both the switch and the gas valve. Tighten if necessary.
10. Abnormal operation.	A. Delayed ignition - pilot flame may be too low.	Adjust pilot flame. Refer to "How to Care for Your Furnace" section in this manual.
	B. Expansion noise, ticking.	Check installation. Casing may be distorted by being fastened to an uneven opening or jammed under header. A restricted vent may create expansion noise. Refer to "Vent Installation" section in this manual.
	C. Combustible gas spillage.	Check vent system for a blocked flue, excessive down draft (wind) or negative pressure in room caused by ventilating fan or a fire in a fireplace.
	D. Excessive flame roll-out.	Furnace is possibly overrated, check for high gas pressure at gas valve, (see 4B).
	E. Burner is over-fired.	Check the manifold gas pressure. Check the rate, this appliance is manufactured for elevations up to 4,500 feet. It must be derated for operation above 4,500 feet.
	F. Yellow burner flame.	Check burner for obstructions. Install new burner and pilot orifices.
	G. Yellow pilot flame.	Remove pilot orifice, check and clean.

Replacement Parts List

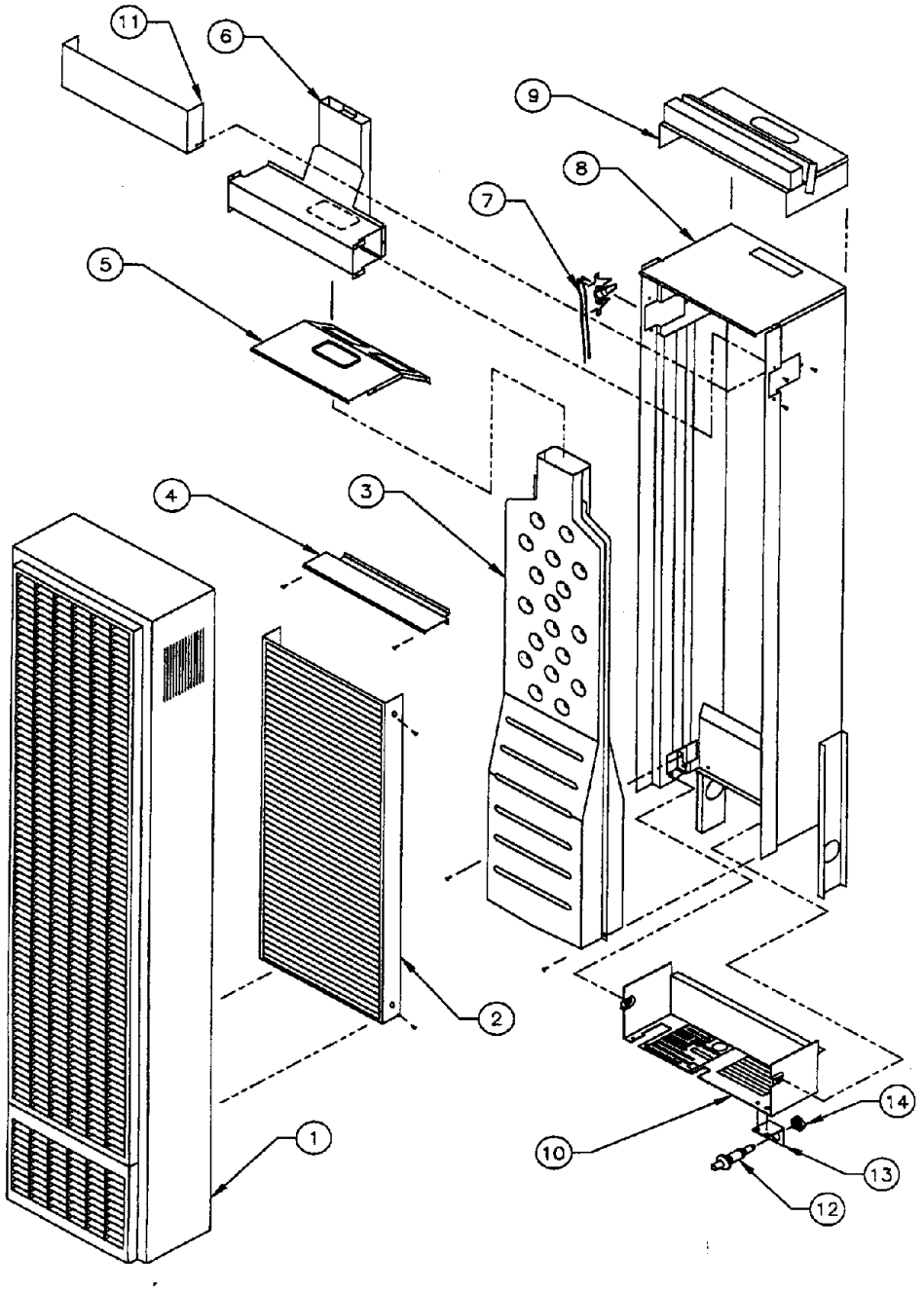
Ref. Number	Description	2509621 2539621 2559621	2509622 2539622 2559622	3509621 3539621 3559621	3509622 3539622 3559622	5009621 5039621 5059621	5009622 5039622 5059622
1	Wire Assembly (2 Required)	P321836	P321836	P321836	P321836	P321836	P321836
2	Valve	P323012	P323011	P323012	P323011	P323012	P323011
3	Front Burner Bracket	9B234	9B234	9B234	9B234	9B243	9B243
4	Manifold	9B238	9B238	9B238	9B238	9B241	9B241
5	Burner Orifice (500 Series - 2 Required)	P090554	P090543	P090552	P090538	P090554	P090544
6	Pilot/Generator Assembly	P501618	P501617	P501618	P501617	P322397	P322396
7	Thermostat	P322016	P322016	P322016	P322016	P322016	P322016
8	Burner (500 Series - 2 Required)	12B56	12B56	12B56	12B56	12B56	12B56
9	Electrode	P322276	P322276	P322276	P322276	P322155	P322155
10	Pilot Mounting Plate	-	-	-	-	9A409	9A409



Note: Screws, bolts and washers are standard hardware items and may be purchased locally.

Replacement Parts List

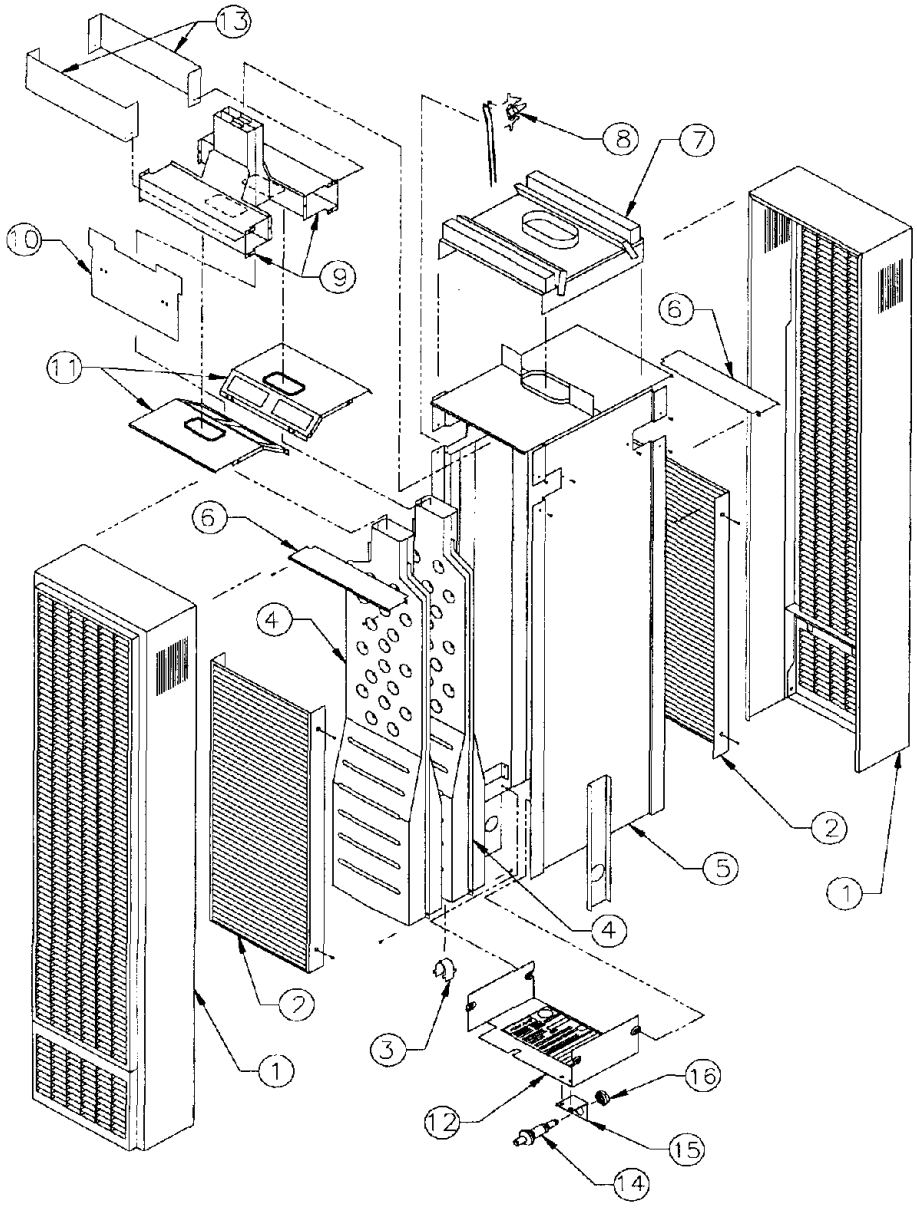
Ref. Number	Description	2509621 2539621 2559621	2509622 2539622 2559622	3509621 3539621 3559621	3509622 3539622 3559622
1	Face Panel	4915	4915	4915	4915
2	Front Heat Shield	9C155	9C155	9C155	9C155
3	Combustion Chamber	9D52	9D52	9D54	9D54
4	Deflector	9B199	9B199	9B199	9B199
5	Inner Shield Top	9C153	9C153	9C153	9C153
6	Draft Hood	9C166	9C166	9C165	9C165
7	Vent Safety Switch	P321826	P321826	P322055	P322055
8	Shield Assembly	9C209	9C209	9C209	9C209
9	Header	5902	5902	5902	5902
10	Burner Pan	9B237	9B237	9B237	9B237
11	Blower Heat Deflector	9A440	9A440	9A440	9A440
12	Manual Spark Igniter	P285500	P285500	P285500	P285500
13	Igniter Bracket	7A189	7A189	7A189	7A189
14	Pal Nut	P285501	P285501	P285501	P285501



Note: Screws, bolts and washers are standard hardware items and may be purchased locally.

Replacement Parts List

Ref. Number	Description	5009621 5039621 5059621	5009622 5039622 5059622
1	Face Panel (2 Required)	4915	4915
2	Front Heat Shield (2 Required)	9C155	9C155
3	Carryover Shell	9A321-1	9A321-1
4	Combustion Chamber	6914	6914
5	Shield Assembly	9C211	9C211
6	Deflector (2 Required)	9B199	9B199
7	Header	5901	5901
8	Vent Safety Switch	P321826	P321826
9	Draft hood (2 Required)	9C170	9C170
10	Non-Vision Shield	9C157	9C157
11	Inner Shield Top (2 Required)	9C158	9C158
12	Burner Pan	9B244	9B244
13	Blower Heat Deflector	9A440	9A440
14	Manual Spark Igniter	P285500	P285500
15	Igniter Bracket	7A189	7A189
16	Pal Nut	P285501	P285501



Note: Screws, bolts and washers are standard hardware items and may be purchased locally.

Your Warranty

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

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 repaired or replaced at the Manufacturer's option, FOB 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 or service conditions during a period of nine years following expiration of the one-year warranty period will be exchanged for a like of functionally similar part, FOB Manufacturer's factory.
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 THIS 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 nor to damage or defects resulting from accident, alteration, misuse 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 homeowners 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, cancelled 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 St., 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 Information

Model No._____ Serial No._____

Original Purchaser_____

Address_____

City and State_____ Zip_____

Dealer_____

Address_____

City and State_____ Zip_____

Installation Date_____ Installer_____

Installer: Please leave these instructions with the consumer. Consumer: Please retain these instructions for future reference.

How to Order Repair Parts

All parts listed may be ordered from your equipment supplier. The model and serial number will be found on the rating plate near the gas valve. When ordering parts, always provide:

1. Model number
2. Serial number
3. Part number and description

