

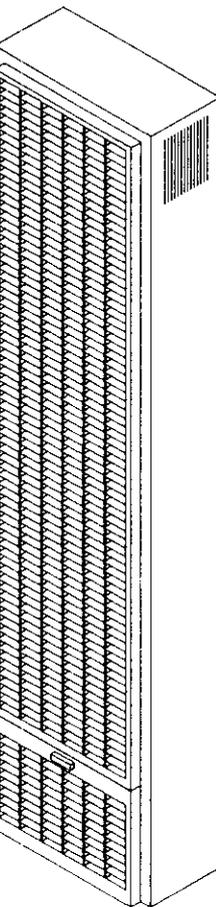
**owners  
manual**  
**MODEL NOS.**  
**2509612**  
**2509622**  
**3509612**  
**3509622**  
**5009612**  
**5009622**

**FOR USE WITH  
NATURAL GAS ONLY**



**MODEL NOS.**  
**2509611**  
**2509621**  
**3509611**  
**3509621**  
**5009611**  
**5009621**

**FOR USE WITH  
LIQUEFIED  
PETROLEUM (L.P.)  
GAS ONLY**  
**Save This Manual For  
Future Reference.**



**GAS-FIRED TOP VENT  
GRAVITY WALL FURNACE**  
**READ THIS OWNERS MANUAL  
CAREFULLY BEFORE YOU INSTALL  
YOUR NEW IMPROVED EFFICIENCY  
WILLIAMS WALL FURNACE**

**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 instruction.
  - 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.

**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:** Do not install any of these furnaces (Natural or L.P. Gas) in mobile homes, trailers, or recreational vehicles.

NOTE: CANADIAN MODEL NUMBERS THIRD DIGIT FROM LEFT TO BE:

- 1 FOR BASIC ALTITUDES
- 2 FOR HIGH ALTITUDES

EXAMPLE:

MODEL: 3509612 BECOMES 3519612  
(0-2000 FT. BASIC ALTITUDE)  
OR BECOMES 3529612  
(2000-4000 FT. HIGH ALTITUDE)

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## 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 heat exchanger 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 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 limitations 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 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, 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, 225 Acacia 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. \_\_\_\_\_

Orig. Purchaser \_\_\_\_\_

Address \_\_\_\_\_

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

Dealer \_\_\_\_\_

Address \_\_\_\_\_

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

Installation date \_\_\_\_\_ Signed by \_\_\_\_\_ (Dealer or authorized representative who certifies that this appliance has been installed in accordance with Manufacturer's instructions and local codes.)

## **A Word From The Manufacturer**

*Dear Customer,*

*To set up our furnace assembly procedures, several hundred quality assurance, safety audit and design performance tests have been conducted according to the standards provided by the American National Standards Institute, the Department of Energy and our certification agency — the American Gas Association Laboratories.*

*This was done to assure you of receiving the best value and most reliable appliance of its type available today.*

*We are confident that your Williams furnace can provide you years of low cost, efficient, heating comfort.*

*Thank you for purchasing a Williams furnace.*

*Sincerely,*

*Employees of Williams Furnace Company*

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## **Introduction**

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

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## **Basic Description**

Vented wall furnaces are shipped ready to install in a 2 x 4 stud wall, with studs 16 inches center to center.

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 appliance 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 2 x 4 stud wall between studs spaced 16 inches center to center, or may be surface mounted to a wall using free standing kit 4901.

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

The furnace contains a single multi-slot 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, but may be obtained from WILLIAMS.)

Convection causes room air to circulate from the floor upward along the front, back, and side of the heat exchanger, and then back to the room.

The furnace heat exchanger is built of heavy gauge steel treated for corrosion resistance. The furnace cabinet is also constructed of heavy gauge steel and has a neutral beige color enamel paint finish. 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.

Models: 2509611, 2509612, 3509611, 3509612, 5009611, 5009612 are equipped with a built-in thermostat control.

Models: 2509621, 2509622, 3509621, 3509622, 5009621, 5009622 are supplied with a wall thermostat.

### **NOTE, ALL MODELS:**

This appliance 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.

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## **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.

## 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. FIELD CONVERSIONS FOR HIGH ALTITUDE ARE NOT PERMITTED IN CANADA.
  4. 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.
  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" 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 col-

umn. 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 AVOID PROPERTY DAMAGE, BODILY INJURY OR DEATH.
8. INSTALL the furnace vent directly to the outdoors, so that harmful gasses will not collect inside the building. Follow the venting instructions for your type 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. See page 7. 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 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.

### 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.

## Unpack Your Furnace

The shipping carton contains the furnace and the items needed to install it:

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

1. Open carton and carefully lift off cabinet face panel.
2. Remove small parts bag and header plate from lower portion of furnace.
3. Remove thermostat (wall thermostat models).

4. Stand Furnace upright.

5. Properly dispose of shipping material.

### 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.

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## 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)  
6 foot folding rule or tape measure  
Screwdriver (medium blade)  
Pliers (wire cutting)  
Hammer  
Hole saw – 2 inches

Screwdriver (Phillips head)  
Stud Locator or small finish nails  
Tin Snips  
8 inch adjustable wrench  
12 inch adjustable wrench  
Key hole saw or sabre saw  
2 - 10 inch or 12 inch pipe wrenches  
Gloves and safety glasses

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## Basic Materials

Pipe and fittings to make connections to furnace.

Pipe Joint Compound resistant to L.P. gases.

\*Electrical wiring supplies as needed.

\*Minimum wire size is #14 gauge copper.

\*Electrical supplies only required if accessory blower is being installed.

A type "BW" gas vent kit for vertical venting such as a WILLIAMS Oval Vent Kit 9901.

Extra lengths of double-wall vent pipe may be needed, depending on height or length of run.

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## Optional Accessories

Free Standing Kit 4901 may be used with all single models. This kit allows the furnace to be mounted on the surface of a wall.

Rear Outlet Register 6901 may be used with all single models when recessed into a standard 2 inch x 4 inch interior stud partition. This kit directs some of the heated air into the room opposite the one in which the furnace is installed.

Blower Accessory 2901 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.

Oval B/W Vent Kit 9901

This U.L. listed B/W vent kit contains 4 feet of oval double-walled vent pipe, plate spacers and base plate or hold-

down plate that starts the venting from the top of furnace. See Page 12 for some additional items you may need.

**ALL MODELS:** Decorator Face Panel Colors

Various Face Panel colors may be used on all models. All are constructed of heavy gauge steel with your choice of colored enamel paint finish.

4915 (Almond)

4916 (Black)

4917 (Red)

4918 (white)

### NOTE

Kits are identified on their carton by the manufacturing number 4901, 6901 and 2901 respectively.

# Installing Your Wall Furnace

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 Procedure on page 17 are vital to the proper and safe operation of the furnace. Be sure they are done.

## Locating Wall Furnace & Thermostat

The furnace is installed between 2 x 4 inch wall studs spaced on 16 inch centers or stud space can be framed in to 16 inches. See page 11 (Fig. 9).

Consider the following points before attempting to install the furnace.

### CAUTION

Do not make cut-outs in 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 other confined space 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.

For large homes or homes with spread-out floor plans, two or more furnaces are recommended.

4. When furnace is properly installed with legs resting on floor plate, it sets the dimension from the face panel to the bare floor. (2½ inches approximately depending on the thickness of floor plate).

A protective barrier (metal or wood), cut to match width and depth of furnace, should be used to cover over any floor coverings such as carpet or sheet vinyl that might be finished off under the furnace.

### NOTE

At no time should the dimension from the bottom of the face panel to the protective barrier be less than 1½ inches.

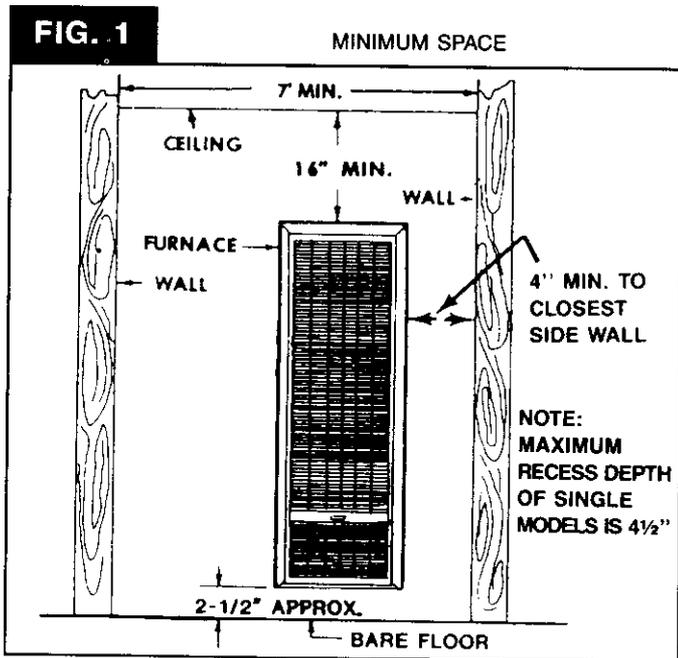
5. The side of the furnace may be as close as 4 inches to a wall. The recessed portion may have 0 inch clearance to combustible material.
6. To provide adequate clearance and service access, the front of the furnace must face the open room. Do not place obstructive furniture closer than four feet to 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. See sections covering piping and electrical wiring for your type of furnace mounting. (Electrical wiring only required for optional blower accessory.)

If your furnace is a wall thermostat model, locate the thermostat about 5 feet above the floor on an inside wall where it will sense the average room temperature.

Avoid the following:

**HOT SPOTS:**  
 Concealed pipes or ducts  
 Fireplaces  
 Registers  
 TV sets  
 Radios  
 Lamps  
 Direct sunlight  
 Kitchen

**COLD SPOTS:**  
 Concealed pipes or ducts  
 Stairwells-drafts  
 Doors-drafts  
 Unheated rooms on other side of wall  
**DEAD SPOTS:**  
 Behind doors  
 Corners and alcoves



2. Check the minimum spacing needs as shown in Fig. 1.
3. The top of the furnace must be at least 16 inches from the ceiling.

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

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

# Combustion & 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 be starving for air.

The combination of a tight energy efficient home with the use of exhaust fans, fireplaces, clothes dryers, and gas appliances results in more and more air being drawn from the house until fresh air may be sucked into the house down the furnace flue or fireplace chimney. 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 and improperly vented or air-starved coal, oil and gas furnaces or other appliances can produce carbon monoxide.

### Be aware of these air starvation signals:

1. Headaches, nausea, dizziness
2. Excessive humidity — heavily frosted windows, moist "clammy" sensation.
3. Fireplace smokes, won't 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 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 ANOTHER GAS APPLIANCE(S), THE TOTAL INPUT RATING OF ALL APPLIANCES MUST BE CONSIDERED WHEN DETERMINING THE FREE AREA REQUIREMENTS FOR COMBUSTION AND VENTILATION AIR OPENINGS.

## WARNING

DANGER OF PROPERTY DAMAGE,  
BODILY INJURY OR DEATH  
EVEN WHEN 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.

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 3 inches in length or 3 inches in height.

### LOUVERS/GRILLES AND SCREENS COVERING FREE AREA OPENINGS

If screen is used to cover opening(s), it must not be smaller than ¼ 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.

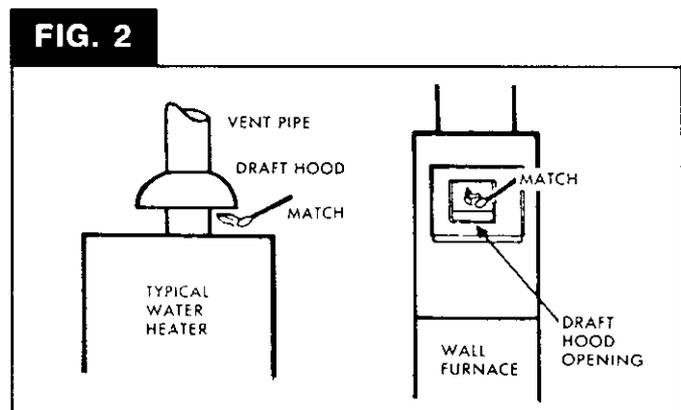
### EXAMPLE 1. FURNACE LOCATED IN UNCONFINED SPACE.\*

\*An unconfined space must have a volume of a minimum 50 cubic feet per 1000 Btuh of total of all appliances in 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.

Fig. 4, page 8 shows the minimum area in square feet, based on 8 foot ceiling heights, required for different Btuh input ratings.

### A. 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.



## Combustion & Ventilation Air (Con't)

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, (or flue damper can be closed).
2. Turn on all exhausting devices, such as:
  - kitchen and bathroom exhaust fans.
  - water heaters (gas and electric).
3. Turn on all vented gas appliances, such as:
  - heating equipment (includes any room heaters)
  - water heaters.
4. Wait ten (10) minutes for drafts to settle down.
5. Check for draffhood spillage at each appliance. (Hold a lighted match 2 inches from draft opening. See Fig. 2, page 7).

### B. No Spillage

Match flame pulls toward draffhood — this indicates sufficient infiltration air. Return exhausting devices and appliances to the condition you found them.

### C. Draffhood Spills

If there is spillage at a draffhood (match goes out or flame wavers away from draffhood):

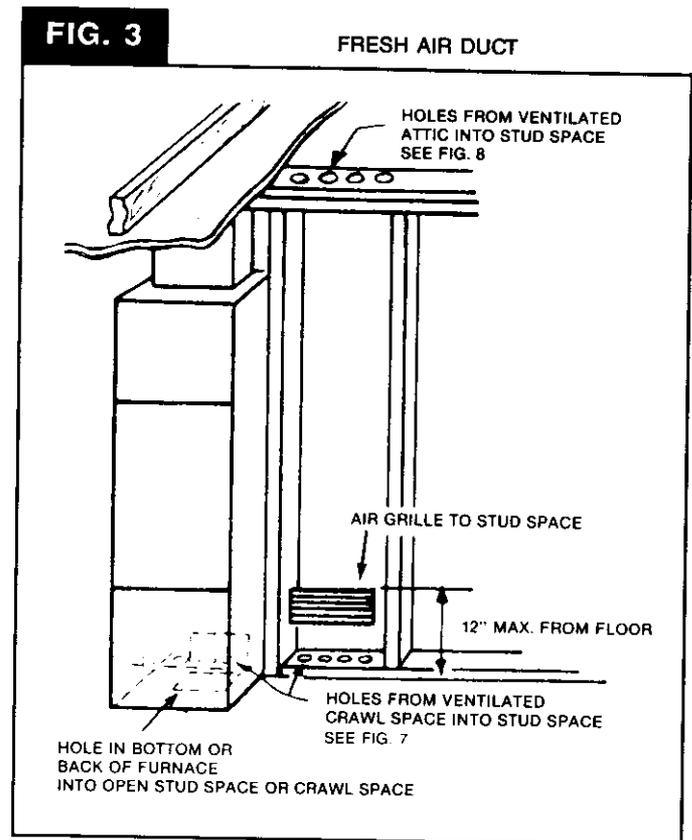
1. Check for plugged flue connectors and chimneys. Check and repair stoppage and test again.
2. If you have a fireplace, open a window or door near the fireplace and then check for spillage.
  - a. If spillage stops, do not use the fireplace without a nearby window or door open until you can supply fresh air by a permanent duct.
3. If you have kitchen and bathroom exhaust fans, turn them off and check for spillage.
  - a. If spillage stops, do not use exhaust fans until you can supply fresh air by a permanent duct. Circuit breakers for fans should be turned off if possible.

### WARNING

DANGER OF ILLNESS, BODILY INJURY OR DEATH  
DRAFFHOOD 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.

4. Spillage means air starvation and a fresh air duct or air intakes must be installed to provide air directly to the furnace or other gas appliance.
- D. If spillage exists or when the furnace is in a building of tight construction where the windows and doors are weatherstripped, air for combustion and ventilation must be obtained from outdoors or space open to the outdoors.

Provide an opening(s) having a total free area of 1 sq. inch per 4000 Btuh of the total of all appliances. The required area is shown in Fig. 7, page 9.



1. Duct must terminate at a point not more than 1 foot above the floor.
2. Duct size must be at least 1 inch of free area for each 4000 Btuh of input of all appliances in area.

**FIG. 4**

MINIMUM AREA IN SQUARE FEET

4000 Btuh Per Square Inch Opening		Max. Btuh Input	*Unconfined Space Min. Area In Sq. Ft. 8' Ceiling Height
Round Duct	Rectangular Duct		
4" DIA.	3" X 3" SQ.	30,000	188
4" DIA.	3" X 3" SQ.	35,000	219
4" DIA.	3" X 4" SQ.	40,000	250
4" DIA.	3" X 4" SQ.	45,000	281
4" DIA.	3" X 5" SQ.	50,000	312
4½" DIA.	3" X 5" SQ.	60,000	375

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

### EXAMPLE 2. 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 & Ventilation Air (Con't)

## A. All Air From Inside Building:

If the confined space adjoins an unconfined space as defined in EXAMPLE 1, provide two permanent openings, one within 12 inches of the top and one within 12 inches of the bottom of the room connecting directly to unconfined space. Each opening must have a free area of at least 100 square inches or 1 square inch per 1000 Btuh combined input of appliances in one room if combined input exceeds 100,000 Btuh.

**WARNING**

**DANGER OF PROPERTY DAMAGE,  
BODILY INJURY OR DEATH**

**THE ADJOINING UNCONFINED SPACE MUST  
HAVE ADEQUATE AIR INFILTRATION AS DEFINED  
IN EXAMPLE 1.**

FOR EXAMPLE: Your furnace is rated at 50,000 Btu per hour. The water heater is rated at 30,000 Btu per hour. The total is 80,000 Btu per hour. You need two grilles, each with 100 square inches of free opening. Metal grilles have about 60% free area, so you need two metal grilles each with 160 square inches of louvered area.

Refer to Fig. 5, which shows grille installation.

Using the previous example, the two connecting rooms plus the closet must equal at least 500 sq. feet to handle the combined input 50,000 plus 30,000.

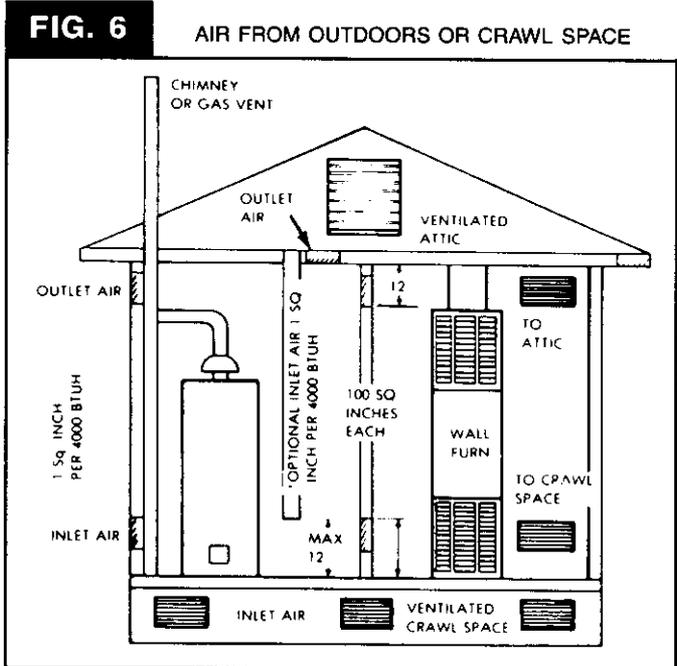
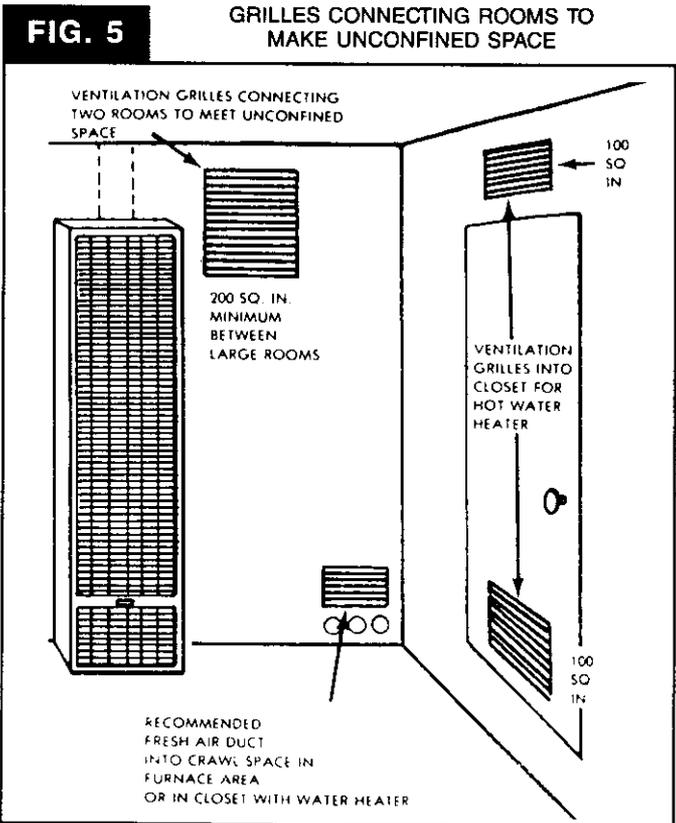
outdoors or spaces open to outdoors such as attic or crawl spaces.

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

If opening connects directly to, or with vertical ducts, the free area of each opening must be at least 1 square inch per 4000 Btuh combined input of appliances in area.

If horizontal ducts are used, the free area of each opening must be at least 1 square inch per 2000 Btuh combined input of appliances in area.

FOR EXAMPLE: Your furnace is rated at 50,000 Btu per hour. The water heater is rated at 30,000 Btu per hour. The total is 80,000 Btu per hour. You need two grilles, each with 20 square inches of free opening, unless connected by horizontal ducts which would require each grille or opening to have a free area of 40 square inches.



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

**FIG. 7** FREE AREA IN SQ. INCHES EACH OPENING (FURNACE ONLY) BASED ON ONE SQ. INCH PER 4000 BTUH

Furnace Btuh/Input	Sq. Inch of Opening	Req'd Number of Holes Sill or Header Plates		
		1½"	2"	3"
30,000	7.5	7	4	2
35,000	8.75	8	5	2
40,000	10.0	9	5	3
45,000	11.25	10	6	3
50,000	12.5	11	6	3
60,000	15.0	13	8	4

# Recessed Mount Installation

## NOTE:

Model Series 25096 and 35096. The maximum recess depth, from rear of furnace forward is 4½”.

## 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 14½ inches from the one found. Drive finishing nails on the inside of this stud. Draw wall cut out to required size as shown in Fig. 8. If wall studs are not on 16 inch centers see “Close Off Stud Space.”

## CUT WALL OPENING (See Caution on page 6)

All models: Cut wall opening 14-3/8 inches wide and 66-1/8 inches high measured from top of floor plate. See Fig. 8. All corners must be square.

## INSTALLATION OF REAR OUTLET REGISTER (If Used)

The optional rear outlet register 6901 can be installed when furnace is recessed. In new construction, install the

rear outlet plasterground at the same time you install the header plate. For existing construction, make necessary cutout and install the plasterground just before you install the furnace. See instructions packed with kit and Fig. 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 door swing, curtains or any other obstruction.

## GAS SUPPLY OPENING

A hole must be drilled for the gas line. See Fig. 8 for alternate gas line openings.

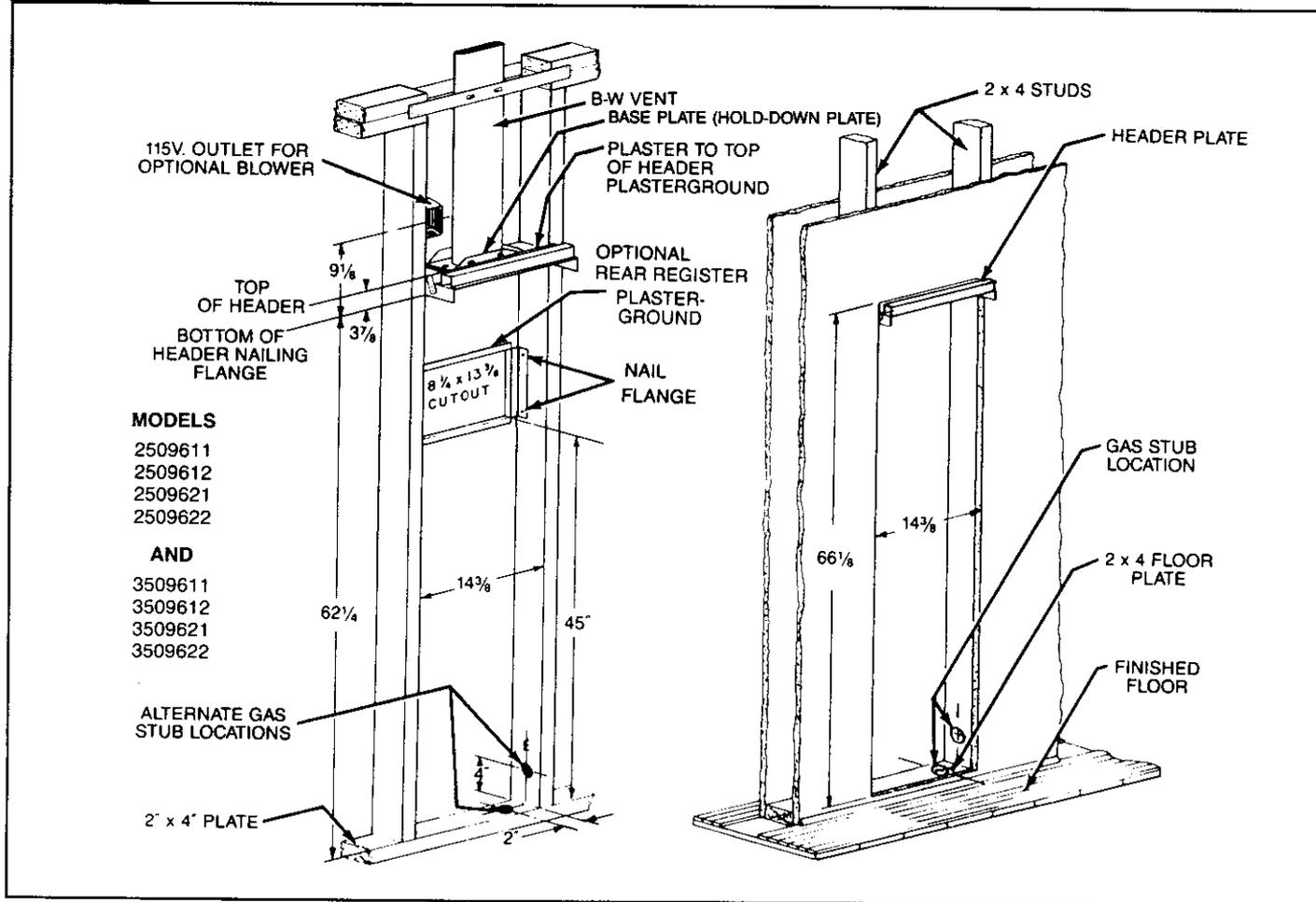
Decide whether the gas line will come through the floor or wall.

Drill a 1½ inch hole in wall or floor (Fig. 8) as needed.

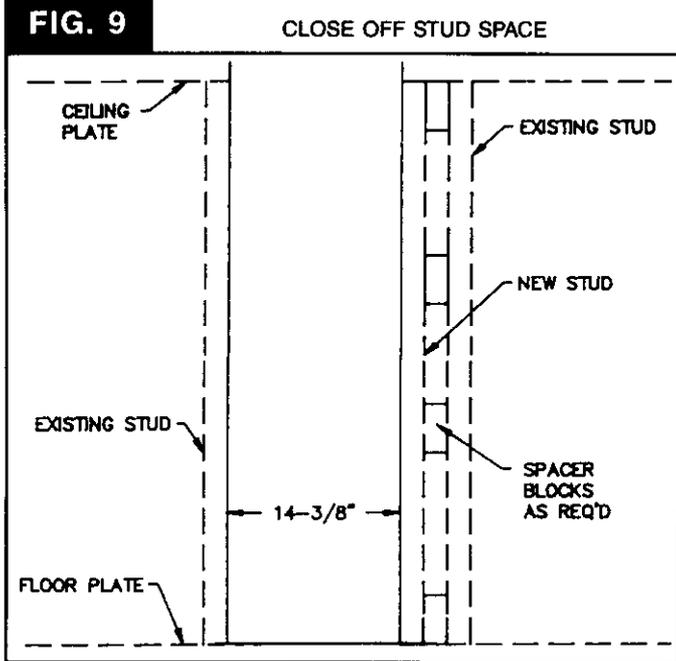
## CLOSE OFF STUD SPACE (If Required)

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. See Fig. 9, page 11.

**FIG. 8** HEADER PLATE AND GAS SUPPLY OPENINGS



## Recessed Mount Installation (Con't)



### CUT PLATE OPENING (RECESSED VENTING)

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 (Fig. 10).

### INSTALL VENT BASE PLATE (HOLD-DOWN PLATE)

Position base plate on top of header plate and fasten with screws. Note: These items are included in Vent Kit 9901.

### HEADER PLATE (VENT SUPPORT)

Measure up 62¼ inches from the top of floor plate. Place a mark on each stud at this distance. See Fig. 8, page 10.

Place the header plate between the studs with the lower edges even with marks on the studs. Make sure header plate is level.

All models: Locate rear edge of nailing tabs at back of 2x4 stud which will center the vent collar in the wall. Nail header plate to studs. See Fig. 8, page 10.

### INSTALL CEILING PLATE SPACER (RECESSED MOUNT)

Refer to Fig. 10.

Two ceiling plate spacers are in the B/W Vent Kit. They must be fastened along each long edge of the ceiling hole to hold the oval vent pipe in the center of the hole.

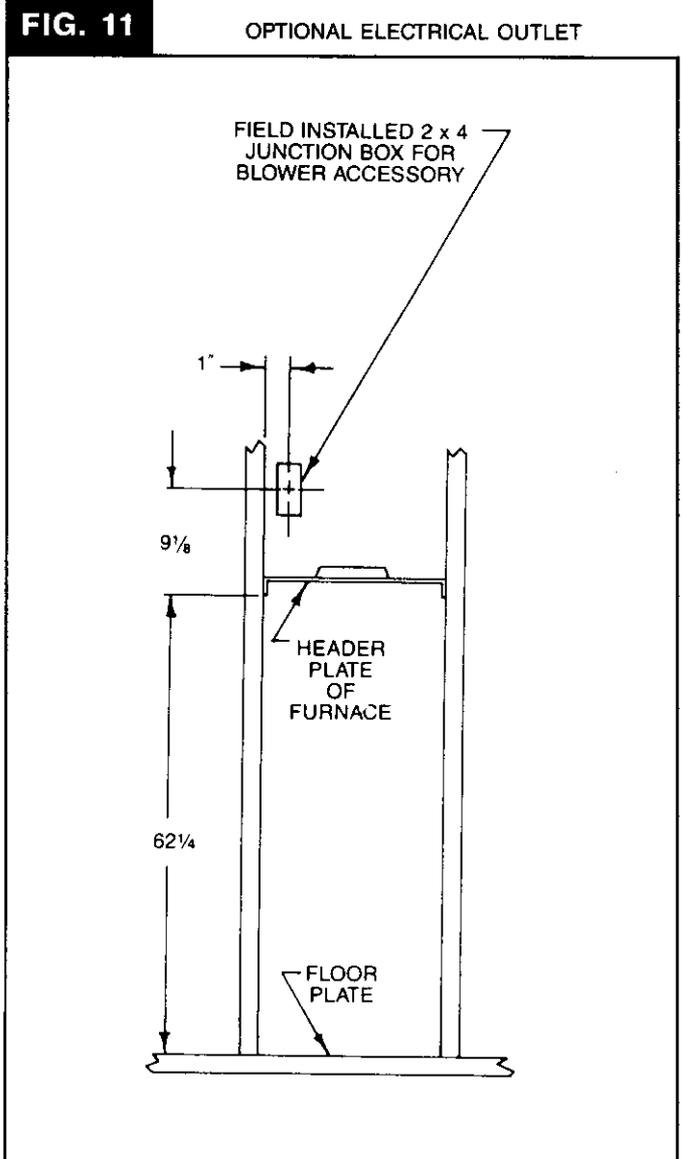
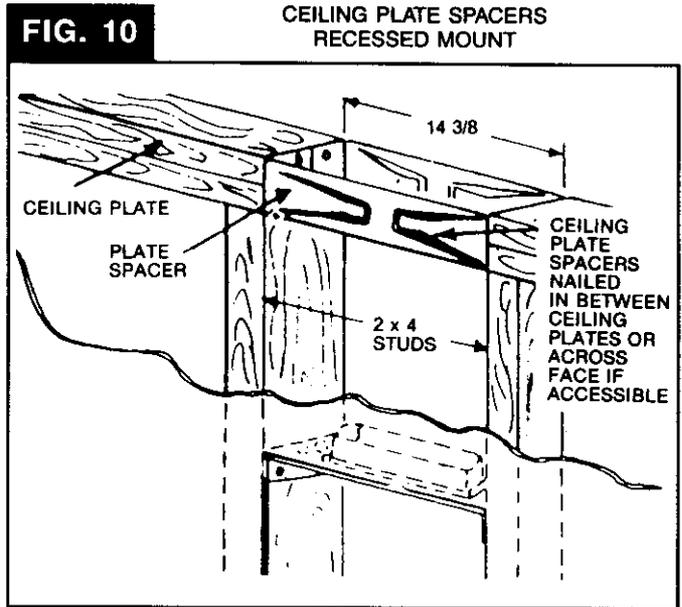
Nail the ceiling plate spacers either across or in between the cut out section of ceiling plate. If nailed between, end must be bent at 90 degrees.

Ceiling plate spacers preserve structural strength and position oval vent pipe in the center of the cut out opening.

No electric power is required unless furnace is equipped with an optional blower. Do not connect 115V service line to the gas control valve or wall thermostat.

### ELECTRICAL OUTLET (Optional)

If you are installing optional blower accessory with the furnace, rough-in a 115V electrical outlet as shown in Fig. 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 gasses will not collect inside the building.

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

### NOTE:

U.L. listed B/W Vent Kit 9901. You must provide other items, not contained in kit, necessary to complete your specific venting situation through the roof. Refer to typical venting system shown in Fig. 12.

### WARNING

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. See Fig. 12. Older style terra-cotta, transite, clay, concrete or masonry type vent pipe cannot be used with this appliance. This older type 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.

### IMPORTANT

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.

### NOTE

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.

First vent pipe offset (if required) must not be any closer than 2'-0" from header plate.

### INSTALL FURNACE VENT (RECESSED MOUNT)

Lower a 4 foot length of oval, double wall vent pipe through the place spacers to the hold-down plate.

Push the vent pipe into the hold-down plate until it is completely seated. (Hold-down cleat will engage the groove in the vent pipe.)

### COMPLETE THE VENTING

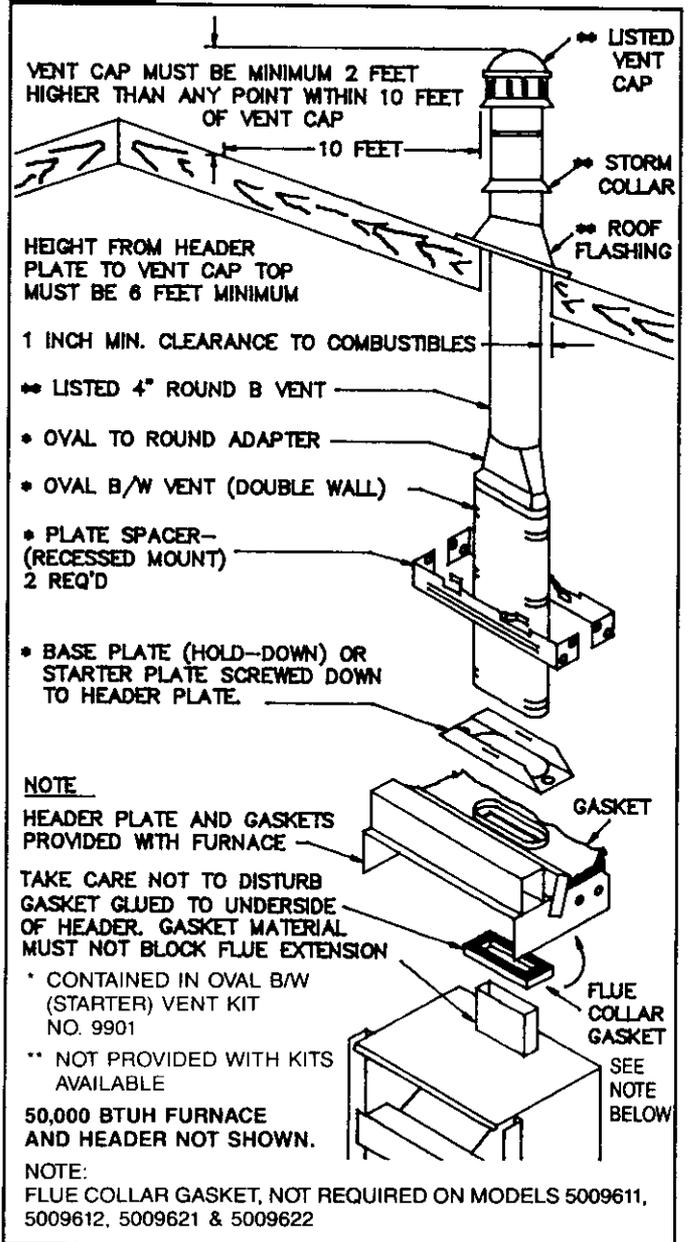
Refer to Fig. 12.

## Vent Installation (Con't)

Type B/W gas vent shall extend from the header plate of the vented wall furnace to a point above the highest ceiling plate within a stud space through which the vent passes, without any offsets or crossovers therein. 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), and offsets or breakovers shall not be greater than 45 degrees from vertical. Refer to (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.

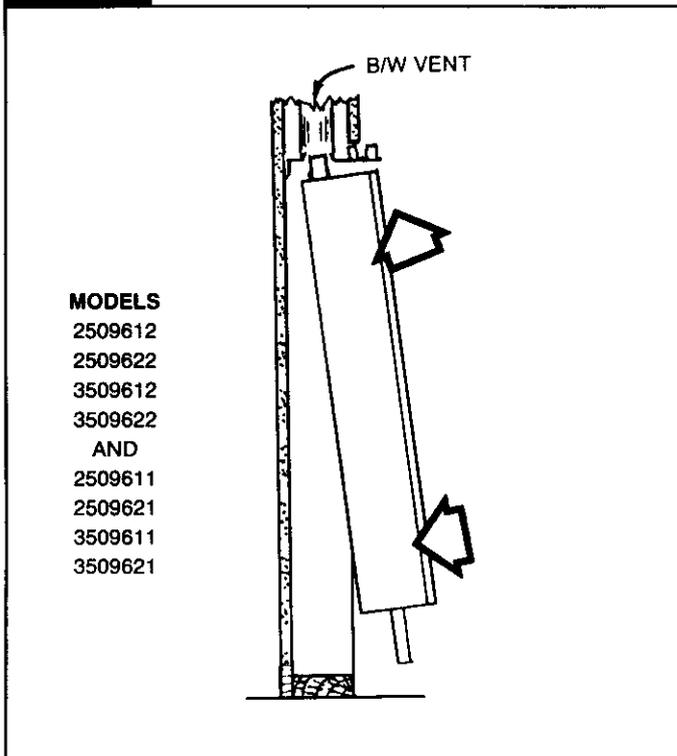
**FIG. 12** TYPICAL VENT INSTALLATION



# Mount The Furnace

**FIG. 13**

POSITION FURNACE



**MODELS**

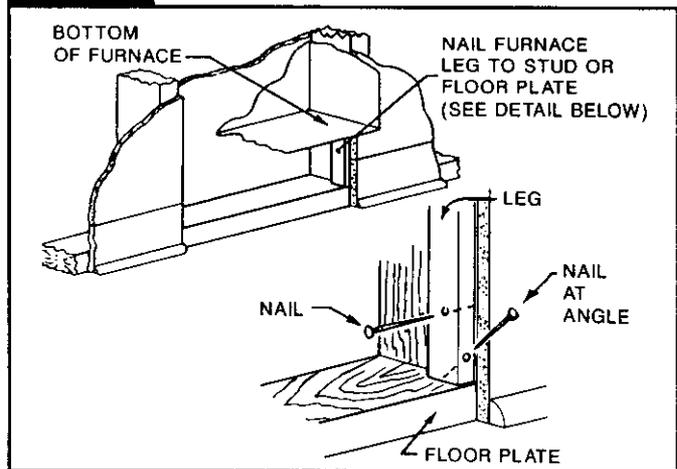
- 2509612
- 2509622
- 3509612
- 3509622
- AND
- 2509611
- 2509621
- 3509611
- 3509621

Clear the recess of all debris, remove any wood plastergrounds. 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. See Fig. 13. Swing bottom of furnace into recess with front edges of legs flush with 2x4 floor plate. Nail through legs into studs or floor plate. See Fig. 14.

**IMPORTANT**  
DO NOT DAMAGE GASKET GLUED TO UNDERSIDE OF HEADER PLATE WHEN PLACING FURNACE IN WALL.

**FIG. 14**

SECURING FURNACE LEGS NEAR FLOOR PLATE



**IMPORTANT**  
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.

**REAR OUTLET KIT INSTALLATION (If Used)**

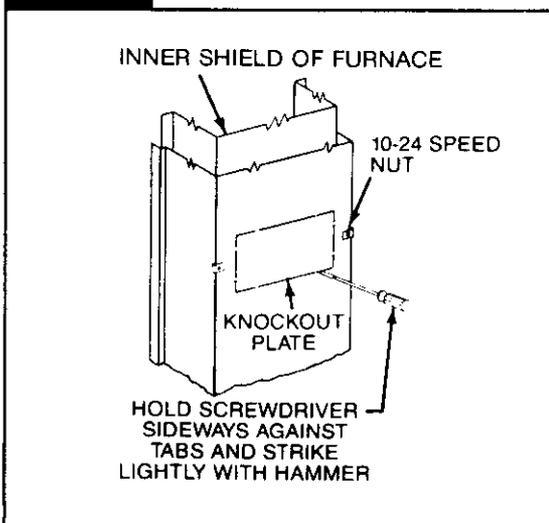
**CAUTION:** Do not install rear outlet kit where grille may be blocked by door swing, curtains or any other obstruction. If Rear Outlet Register 6901 is used, the following procedure must be complete before placing furnace body into wall recess. See Fig. 15. Attach speed nuts to outer shield, and remove knock-out plates as follows:

1. Punch in lower corners with screwdriver blade.
2. Break knock-out 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 as shown in Fig. 16. Have damper in open position when inserting assembly. Secure register assembly to speed nuts with machine screws furnished.

**FIG. 15**

REMOVING KNOCK-OUT PLATES

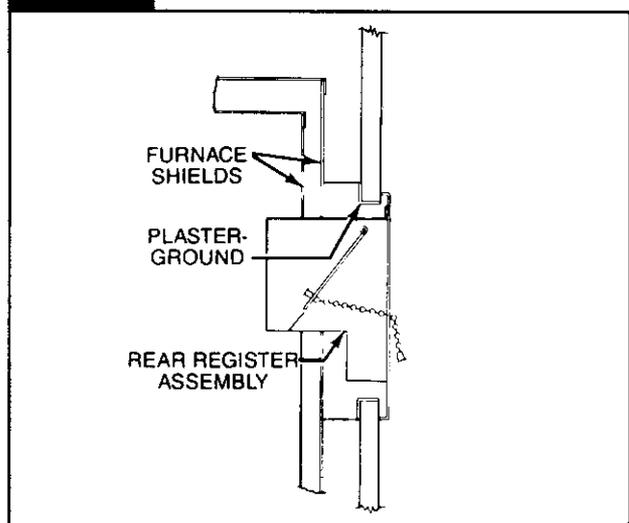


**MODELS**

- 2509612
- 2509622
- 3509612
- 3509622
- AND
- 2509611
- 2509621
- 3509611
- 3509621

**FIG. 16**

MOUNTING REAR OUTLET



# Gas Supply and Piping

Gas control valve, within the furnace, is shipped with a sealed cover 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. FURNACE DESIGNATED FOR USE WITH LIQUEFIED PETROLEUM (L.P.) GAS HAVE ORIFICES SIZED FOR COMMERCIALLY PURE PROPANE GAS. THEY CAN NOT 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. For natural gas, it 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. It must not exceed 13 inches.

Gas pressures and input 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 11 inches water column for L.P. Gas. See page 17 for operation above 2000 feet altitude.

Orifice change may be required to suit gas supplied. Check with your WILLIAMS service department.

## ORIFICE SIZES

Furnace Technical Information, Page 25, shows the correct orifice sizes for the different input ratings when using Natural or L.P. Gas.

## 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 Fig. 18, page 15, 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/CGA B149.) Refer to Fig. 17 for the general layout at the unit. It shows the basic fittings needed.

The following rules apply:

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. Valve distortion or malfunction may result from excess pipe within control. Apply moderate amount of good quality dope to pipe only, leaving 2 end threads bare. If LP gas installation,

use 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. Nipple must be a minimum of 3 inches long. See Fig. 17.
5. Install a manual shut-off valve.
6. Provide a 1/8 NPT test gauge connection immediately before the gas supply connection to the furnace.

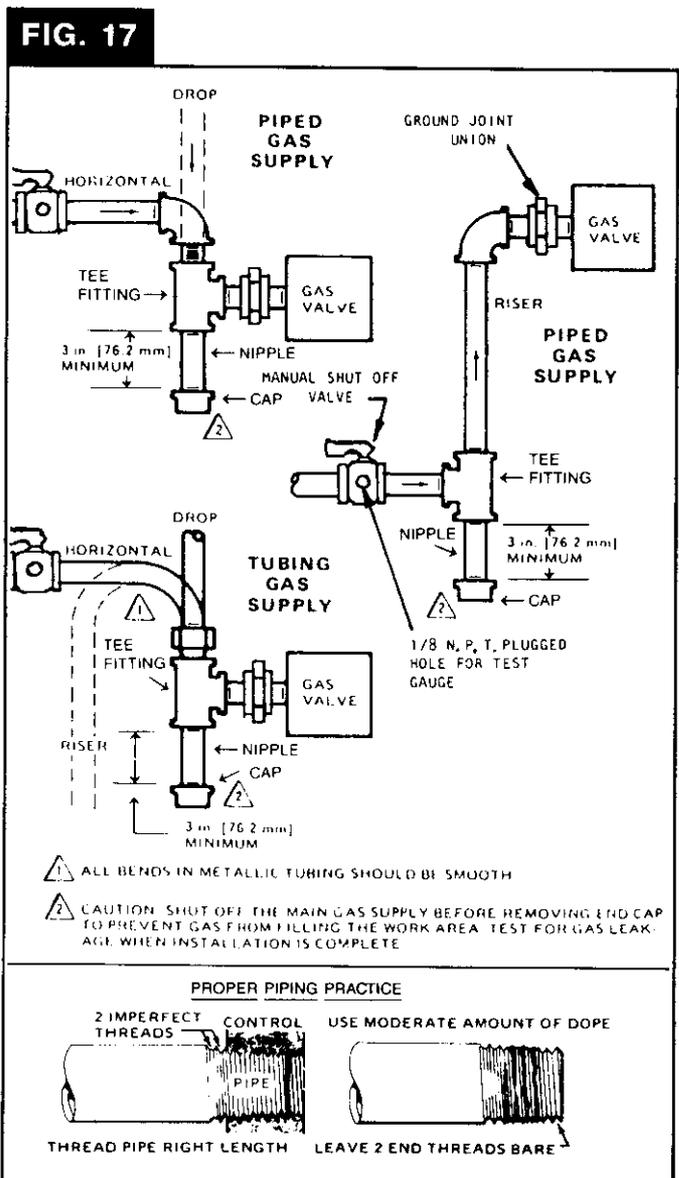
## GAS CONNECTION

If installation is for L.P. gas, installer use 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.



## Gas Supply and Piping (Con't)

### 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 shut off valve must be disconnected during testing. (SEE WARNING BELOW.) Apply soapsuds (or a liquid detergent) to each joint. Bubbles forming indicates 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 HEAT EXCHANGER 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 STARTUP OF UNIT BEFORE THOROUGHLY VENTILATING AREA AND SMELLING NEAR THE FLOOR FOR GAS ODOR.**

**FIG. 18**

GAS PIPE SIZES

LENGTH OF PIPE-FT.	NATURAL GAS PIPE CAPACITY - BTU PER HOUR (INCLUDES FITTINGS) 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
LENGTH OF PIPE-FT.	L.P. GAS PIPE CAPACITY - BTU PER HOUR (INCLUDES FITTINGS)		
	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

## Thermostat Installation

Models 2509611, 2509612, 3509611, 3509612, 5009611 and 5009612 utilize a built-in thermostat control system operated by a heat sensing bulb located in the burner compartment.

#### IMPORTANT

Handle the bulb with care. Do not kink the connecting tubing.

Models 2509621, 2509622, 3509621, 3509622, 5009621 and 5009622 are operated by a millivolt type thermostat. Current to the thermostat is supplied by the pilot generator. Anticipation settings are not required.

1. If an old thermostat is being replaced and is in a satisfactory location and the wiring appears to be in good condition, use existing wiring. If in doubt, use new wire.
2. If a new location is chosen or if this is a new installation, thermostat cable 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 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 (see Fig. 19 page 16).

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 cable or a stiff wire through wall until even with thermostat location.
6. Snag thermostat cable through hole and pull cable through hole in wall so that 6 inches of cable protrudes.
7. Route cable to wall furnace.

#### CAUTION

Do not run wire behind flanges of Header Plate or in any location where it might be damaged. Avoid splicing thermostat wire unless the spliced wires are properly cleaned, soldered and taped.

#### NOTE

Use #18 Ga. wire as supplied for maximum length of 20 feet. If longer length is needed, use #16 Ga. for maximum length of 25 feet.

## Thermostat Installation (Con't)

### MOUNTING THE THERMOSTAT

1. To remove thermostat cover, squeeze both sides and lift. Carefully remove and discard the packing tab protecting the switch contacts.
2. Connect thermostat wires to the terminal screws on the back of thermostat base.
3. Push any excess wire back through hole in 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.

### NOTE

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

Connect thermostat wire, previously run to burner compartment from thermostat, to control valve as shown in Fig. 20.

FIG. 19

ROUTE THERMOSTAT CABLE

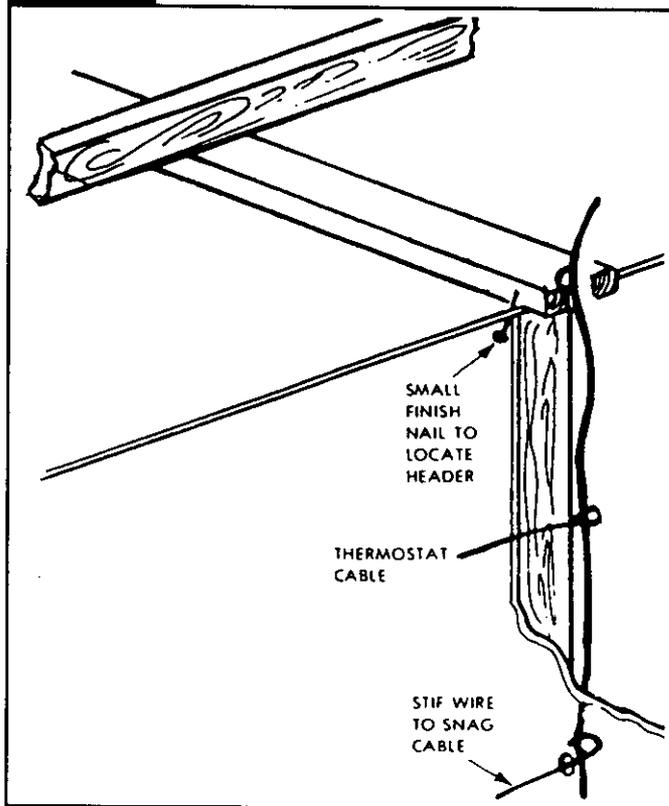
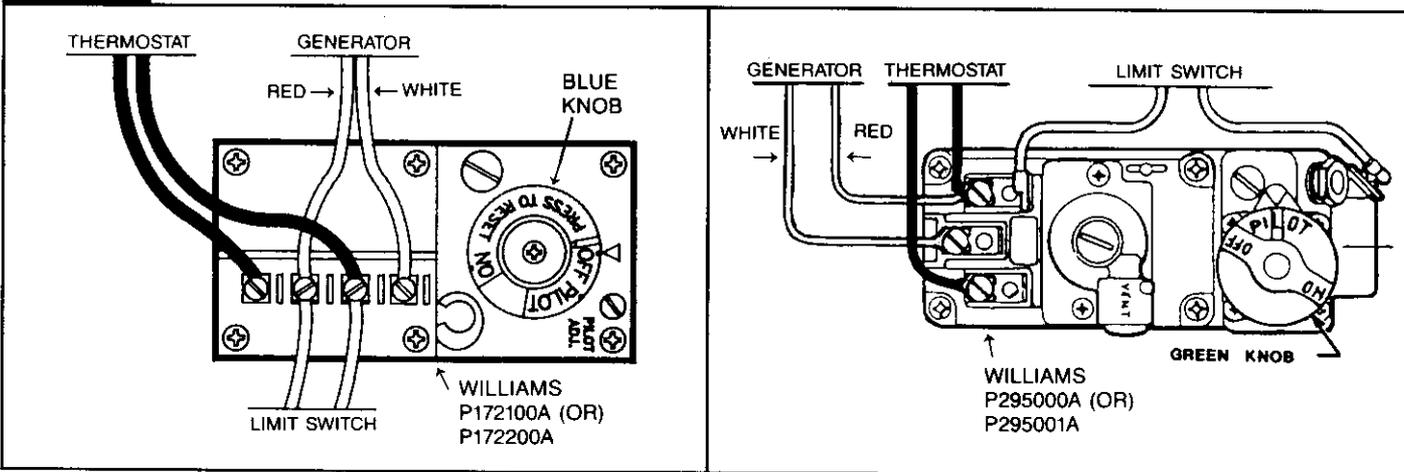
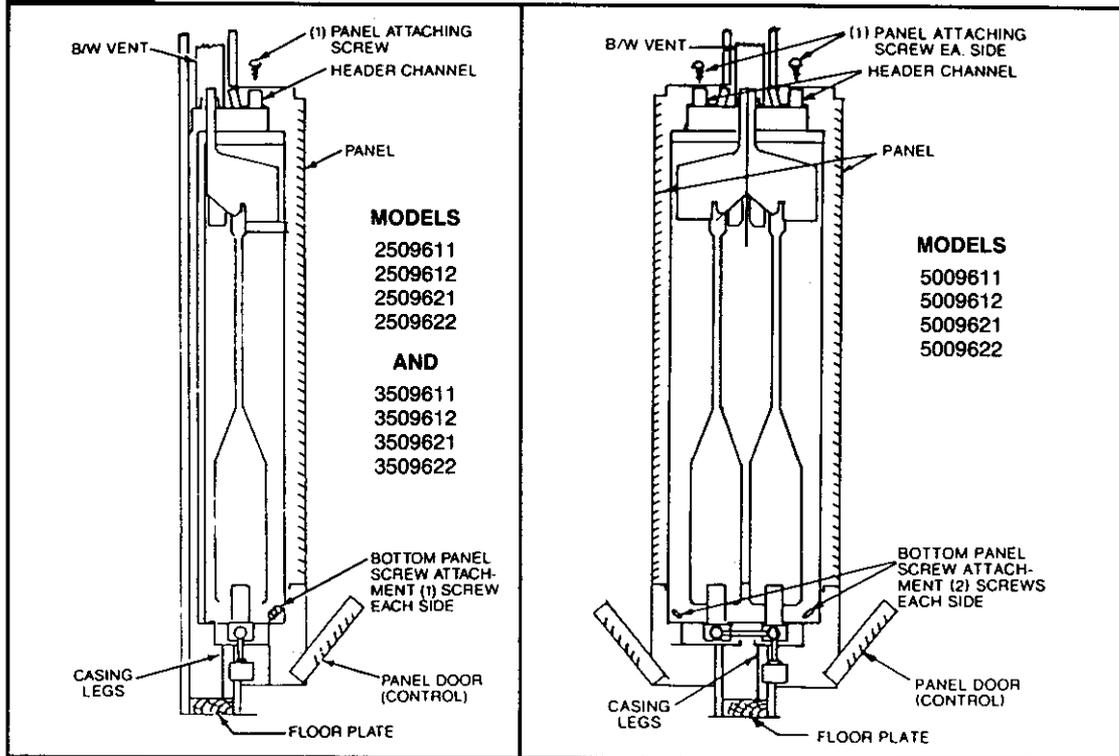


FIG. 20



## Cabinet Installation

FIG. 21



Place panel top over channel on header plate, as shown in Fig. 21. 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 5009611, 5009612, 5009621 and 5009622: Install second face panel in same manner.

### NOTICE

DURING THE FIRST FIRING OF THIS UNIT SOME SMOKE AND ODOR MAY OCCUR. WE RECOMMEND VENTILATING THE AREA DURING THIS "BREAK IN" PERIOD. LET FURNACE REACH FULL OPERATING TEMPERATURE.

## Start-Up Procedure

Start the furnace using the procedures in section OPERATING YOUR FURNACE.

### 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 STARTUP OF UNIT BEFORE THOROUGHLY 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 furnace located at elevations between sea level and 2000 feet, the measured input must not be greater than the input shown on the rating plate of the furnace. For elevations above 2000 feet, the measured input must not

exceed the input of the rating plate reduced by 4 percent for each 1000 feet that the furnace is above sea level.

Gas supply pressure and 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
L.P.	11

Rated input will be obtained on 2500 Btu propane at 11 inch manifold pressure and factory-sized orifices. If LP 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 with your WILLIAMS service department for proper orifice sizing.

## Start-Up Procedure (Con't)

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

#### WARNING

NATURAL GAS HEATING VALUE (BTU PER CUBIC FOOT) CAN VARY SIGNIFICANTLY, THEREFORE, IT IS THE INSTALLERS' RESPONSIBILITY TO SEE THAT BTU INPUT TO THE FURNACE IS ADJUSTED PROPERLY. FAILURE TO DO SO COULD CAUSE HEAT EXCHANGER FAILURE, ASPHYXIATION, FIRE OR EXPLOSION, RESULTING IN DAMAGE, BODILY INJURY OR DEATH. REFER TO THE NATIONAL FUEL GAS CODE (NFPA-54) TO BE SURE THE FURNACE IS BURNING FUEL AT THE PROPER RATE.

Underfiring could cause inadequate heat, excessive condensation or ignition problems. Overfiring could cause sooting flame impingement or overheating of heat exchanger.

Before starting natural gas input check, obtain heating value of gas (BTU per cubic foot) at standard conditions from your local supplier. This factor is used in "Check the Gas Input" section and procedure.

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

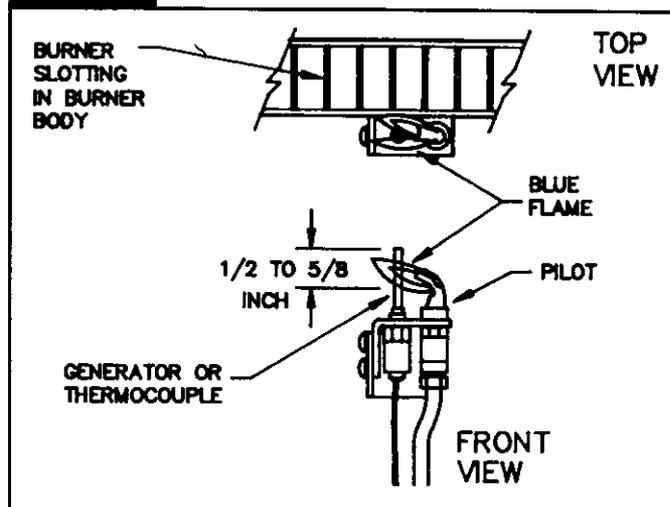
Step 1: Turn off gas supply to all other appliances except the furnace.

Step 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.

Step 3: Assuming natural gas with a heating value of 1000 Btu per cubic foot and 34 seconds per cubic foot as determined by step (2), then:

Input:  $1,000 \times 3,600 \div 34 = 106,000$  Btu Per Hour

FIG. 22



This measured input must not be greater than the input indicated on the rating plate of the furnace.

Step 4: Relight all other appliances turned off in step 1 above. Be sure all pilot burners are operating.

#### CHECK PILOT BURNER

The pilot flame must envelop 1/2 to 5/8 inch of thermocouple or generator. See Fig. 22. Pilot flame is preset at the factory, so ordinarily does not require field adjustment. If adjustment is needed, see page 24.

#### CHECK THERMOSTAT

Check thermostat operation. When set above 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.

## Operating Your Furnace

**MODELS 2509611; 3509611; 5009611  
2509612; 3509612; 5009612**

**NOTE: SEE PAGE 21 FOR MODEL INFORMATION NOTE.**

#### SAFETY, OPERATING AND SHUTDOWN

All models listed above are equipped with a Williams gas control valve part number P322051; P322052 (see page 19) or part number P295100A; P295101A (see page 20).

#### WARNING

DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE LIQUIDS OR VAPORS NEAR THE FURNACE.

#### 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.

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 thermocouple connection at the control valve is tight. If furnace will not stay lit, call your local gas utility or gas supplier.

The furnace operates like this:

1. Cool air around built-in sensing bulb automatically turns on the 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 built-in sensing bulb is sufficiently heated by the warmer room air it automatically turns off the main burner.
4. The fan runs until the heat is removed from furnace, then it will turn off (if equipped).

**NOTE:** On new installation the gas lines will be filled with air and may take several minutes to establish the pilot flame.

#### MANUAL SPARK IGNITER USAGE:

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

1. Review the operating instructions on preceding pages.
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, follow steps 5 through 10 listed in operating instructions.

## FOR YOUR SAFETY, READ BEFORE LIGHTING

### WILLIAMS GAS CONTROL VALVE P322051 & P322052

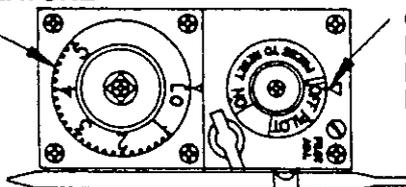
**WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.**

- A. This appliance has a pilot which must be lighted 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.
- WHAT TO DO IF YOU SMELL GAS**
- Do not try to light any appliance.
  - 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.
  - 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 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.

### OPERATING INSTRUCTIONS

1. STOP! Read the safety information above.
2. Turn off all electric power to the appliance (if applicable).
3. Open control access panel.
4. Turn temperature dial clockwise ↻ to "LO".
5. Push in gas control knob slightly and turn clockwise ↻ to "OFF."

#### TEMPERATURE DIAL



**GAS CONTROL KNOB SHOWN IN "OFF" POSITION**

**NOTE: Knob cannot be turned from "PILOT" to "OFF" unless knob is pushed in slightly. Do not 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 next step.
7. Loosen wingnut and open the pilot observation door (if equipped).
8. Find pilot—follow metal tube from gas control. The pilot is mounted on 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.



**THERMO-PILOT COUPLE BURNER**

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.

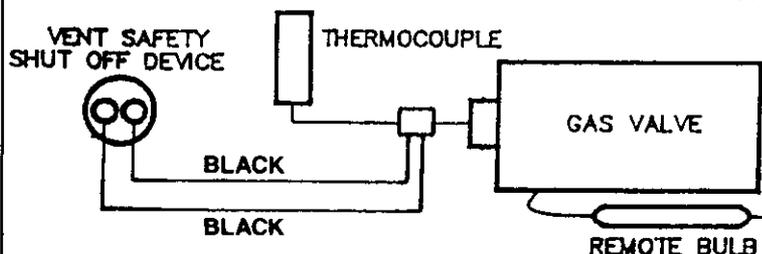
- If knob does not pop up when released, stop and immediately call your service technician or gas supplier.
  - If the pilot will not stay lit after several tries, turn the gas control knob to "OFF" and call your service technician or gas supplier.
11. Close pilot observation door, tighten wingnut (if equipped).
  12. Turn gas control knob counterclockwise ↻ to "ON". Sensing bulb is now activated. Set temperature dial to desired temperature (1 - 5).
  13. Close control access panel.
  14. Turn on all electric power to the appliance (if applicable).

### TO TURN OFF GAS TO APPLIANCE

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

**WARNING: DUE TO HIGH SURFACE TEMPERATURES — KEEP CHILDREN, CLOTHING, FURNITURE OR ANY COMBUSTIBLE MATERIAL AWAY FROM FURNACE.**  
**IMPORTANT: KEEP BURNER AND CONTROL COMPARTMENT CLEAN, SEE PAGE 24.**

#### CONNECTION WIRING DIAGRAM FOR BUILT-IN THERMOSTAT MODELS



#### LEGEND

— FACTORY WIRED LOW VOLTAGE

NOTE:

IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE APPLIANCE HAS TO BE REPLACED, USE ONLY 18 GA., 4/64 INSULATION, 105° C. AWM COPPER WIRE OR ITS EQUIVALENT

## FOR YOUR SAFETY, READ BEFORE LIGHTING

### WILLIAMS GAS CONTROL VALVE P295100A & P295101A

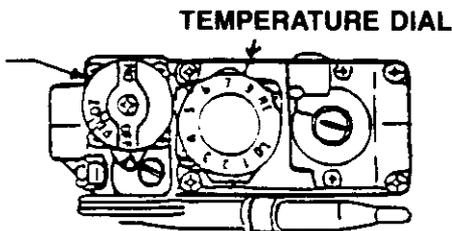
**WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.**

- A. This appliance has a pilot which must be lighted 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.
- WHAT TO DO IF YOU SMELL GAS**
- Do not try to light any appliance.
  - 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.
  - 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 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.

### OPERATING INSTRUCTIONS

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

**GAS CONTROL KNOB SHOWN IN "OFF" POSITION**



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

5. 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 next step.
6. Loosen wingnut and open the pilot observation door (if equipped).
7. Find pilot—follow metal tube from gas control. The pilot is mounted on side of burner.

8. Turn knob on gas control counterclockwise to "PILOT."
9. Push in control knob all the way and hold in. Immediately light the pilot.



**THERMO-PILOT COUPLE BURNER**

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.

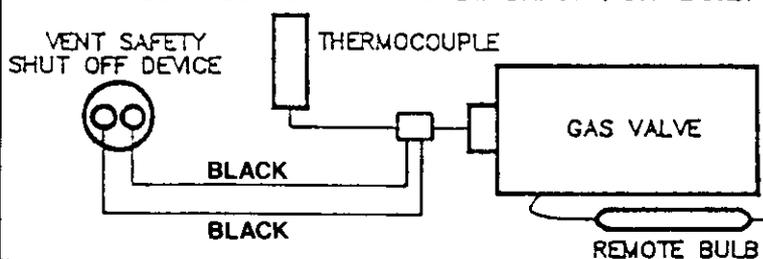
- If knob does not pop up when released, stop and immediately call your service technician or gas supplier.
  - If the pilot will not stay lit after several tries, turn the gas control knob to "OFF" and call your service technician or gas supplier.
10. Close pilot observation door, tighten wingnut (if equipped).
  11. Turn gas control knob counterclockwise to "ON". Burner is now under control of the thermostatic sensing element. Turn temperature dial (numbered 1 thru 8) counterclockwise toward 8 to obtain desired temperature.
  12. Close control access door
  13. Turn on all electric power to the appliance (if applicable)

### TO TURN OFF GAS TO APPLIANCE

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

**WARNING: DUE TO HIGH SURFACE TEMPERATURES — KEEP CHILDREN, CLOTHING, FURNITURE OR ANY COMBUSTIBLE MATERIAL AWAY FROM FURNACE.**  
**IMPORTANT: KEEP BURNER AND CONTROL COMPARTMENT CLEAN, SEE PAGE 24.**

#### CONNECTION WIRING DIAGRAM FOR BUILT-IN THERMOSTAT MODELS



**LEGEND**

— FACTORY WIRED LOW VOLTAGE

**NOTE:**

IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE APPLIANCE HAS TO BE REPLACED, USE ONLY 18 GA., 4/64 IN-SULATION, 105° C. AWM COPPER WIRE OR ITS EQUIVALENT

## Operating Your Furnace (Con't)

**MODELS 2509621; 3509621; 5009621  
2509622; 3509622; 5009622**

### SAFETY, OPERATING AND SHUTDOWN

All models listed above are equipped with a Williams gas control valve part number P172100A; P172200A (see page 22) or part number P295000A; P295001A (see page 23).

#### WARNING

DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE LIQUIDS OR VAPORS NEAR THE FURNACE.

#### 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.

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 gas supplier.

The furnace operates like this:

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 furnace, then it turns off.

#### NOTE

On new installation the gas lines will be filled with air and may take several minutes to establish the pilot flame.

#### MANUAL SPARK IGNITER USAGE:

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

1. Review the operating instructions on preceding pages.
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 operating instructions.

#### MODEL NUMBER INFORMATION

**NOTE: CANADIAN MODEL NUMBERS THIRD  
DIGIT FROM LEFT TO BE:**

- 1 FOR BASIC ALTITUDES
- 2 FOR HIGH ALTITUDES

EXAMPLE:

MODEL: 3509612 BECOMES 3519612  
(0-2000 FT. BASIC ALTITUDE)  
OR BECOMES 3529612  
(2000-4000 FT. HIGH ALTITUDE)

## FOR YOUR SAFETY, READ BEFORE LIGHTING

### WILLIAMS GAS CONTROL VALVE P172100A & P172200A

**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 lighted 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.

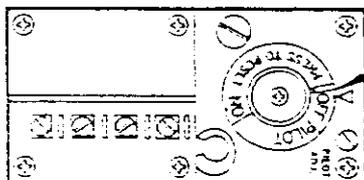
#### WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- 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.
- 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 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.

### 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."

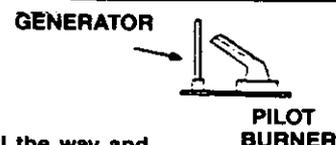


**GAS CONTROL KNOB SHOWN IN "OFF" POSITION**

**NOTE:** Knob cannot be turned from "PILOT" to "OFF" unless knob is pushed in slightly. Do not 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 next step.
7. Loosen wingnut and open the pilot observation door (if equipped).
8. Find pilot—follow metal tube from gas control. The pilot is mounted on 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 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 to "OFF" and call your service technician or gas supplier.

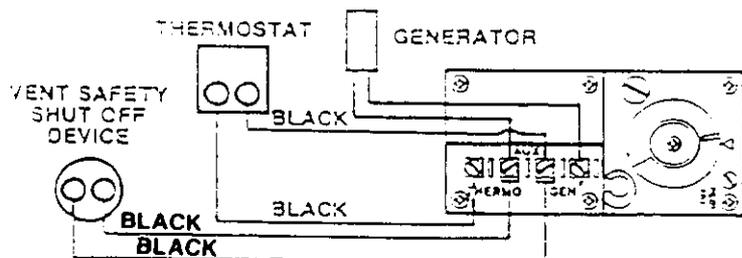
11. Close pilot observation door, tighten wingnut (if equipped).
12. Turn gas control knob counterclockwise to "ON".
13. Close control access panel.
14. Turn on all electric power to the appliance (if applicable).
15. Set thermostat to desired setting.

### TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Open control access panel.
4. From "ON" position, depress and turn gas control knob clockwise to "OFF" position. Do not force.
5. Close control access panel.

**WARNING: DUE TO HIGH SURFACE TEMPERATURES — KEEP CHILDREN, CLOTHING, FURNITURE OR ANY COMBUSTIBLE MATERIAL AWAY FROM FURNACE. IMPORTANT: KEEP BURNER AND CONTROL COMPARTMENT CLEAN, SEE PAGE 24.**

#### CONNECTION WIRING DIAGRAM FOR WALL THERMOSTAT MODELS



#### LEGEND

— FACTORY WIRED LOW VOLTAGE

#### NOTE:

IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE APPLIANCE HAS TO BE REPLACED, USE ONLY 18 GA., 4/64 INSULATION, 105° C. AWM COPPER WIRE OR ITS EQUIVALENT

FOR YOUR SAFETY, READ BEFORE LIGHTING

WILLIAMS GAS CONTROL VALVE P295000A & P295001A

**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 lighted 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.

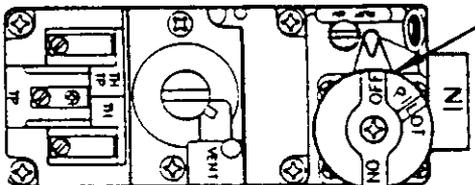
**WHAT TO DO IF YOU SMELL GAS**

- Do not try to light any appliance.
- 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.
- 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 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.

OPERATING INSTRUCTIONS

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



GAS CONTROL KNOB SHOWN IN "OFF" POSITION

NOTE: Knob cannot be turned from "PILOT" to "OFF" unless knob is pushed in slightly. Do not 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 next step.
7. Loosen wingnut and open the pilot observation door (if equipped).
8. Find pilot—follow metal tube from gas control. The pilot is mounted on side of burner.

GENERATOR



PILOT BURNER

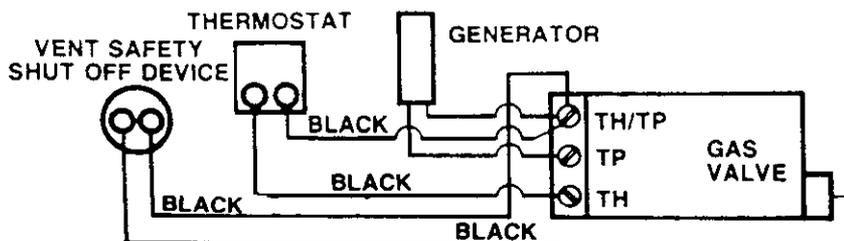
9. Push in gas control knob slightly and turn counterclockwise to "PILOT".
10. Push in control knob all the way and hold in. Immediately light the pilot. Continue to hold the control knob in for about one (1) minute after the pilot is lit. Release knob and it will pop back up. Pilot should remain lit. 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 to "OFF" and call your service technician or gas supplier.
11. Close pilot observation door, tighten wingnut (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 service is to be performed.
3. Open control access panel.
4. Push in gas control knob slightly and turn clockwise to "OFF". Do not force.
5. Close control access panel.

**WARNING: DUE TO HIGH SURFACE TEMPERATURES — KEEP CHILDREN, CLOTHING, FURNITURE OR ANY COMBUSTIBLE MATERIAL AWAY FROM FURNACE.**  
**IMPORTANT: KEEP BURNER AND CONTROL COMPARTMENT CLEAN, SEE PAGE 24.**

CONNECTION WIRING DIAGRAM FOR WALL THERMOSTAT MODELS



LEGEND

— FACTORY WIRED LOW VOLTAGE  
 NOTE:  
 IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE APPLIANCE HAS TO BE REPLACED, USE ONLY 18 GA., 4/64 INSULATION, 105° C. AWM COPPER WIRE OR ITS EQUIVALENT

# How To Care For Your Furnace

## WARNING

DANGER OF BODILY INJURY OR DEATH  
TURN OFF ELECTRIC POWER SUPPLY AT DISCONNECT SWITCH, FUSE BOX OR SERVICE PANEL BEFORE REMOVING ANY DOORS OR ACCESS OR SERVICE PANELS FROM UNIT.

## CABINET FINISH

Clean cabinet with damp rag. Never use abrasive cleaners. Cabinets are finished in heat resistant baked enamel — DO NOT refinish with wall paint.

## 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 obstructive furniture closer than four feet to the front of the cabinet or two feet to the 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 OPTIONAL FAN (If Equipped)

Shut off electricity, then remove screws and face panel. Clean any lint or dirt from fan blades, fan motor, and exposed air passages. Use a brush. See page 33.

## PILOT BURNER

Light pilot using instructions in OPERATING YOUR FURNACE on pages 18 through 23. Leave thermostat at lowest setting.

Pilot flame should surround 1/2 to 5/8 inch of the generator or thermocouple tip. Refer to Fig. 22, page 18. If flame needs adjusting, do so as follows:

## ADJUST PILOT BURNER

See Fig. 22, page 18 and Fig. 23.

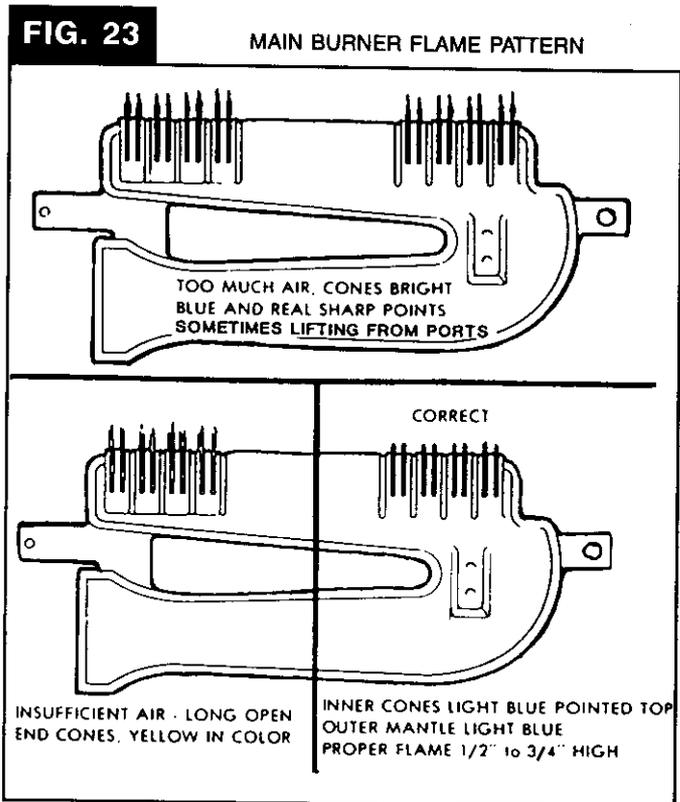
1. Remove screw cover over pilot adjusting screw.
2. Insert small screwdriver. Adjust flame as needed. Turn screw counterclockwise (↺) to increase flame, clockwise (↻) to decrease.
3. Turn thermostat to highest setting. Main burners should light quickly and smoothly. Turn thermostat to lowest setting.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

## BURNER FLAME

Start the furnace and let it operate about 10 minutes then look at the burner flame. Flames should be soft and blue, see Fig. 23. If flames appear abnormal, contact the gas company or a qualified service technician immediately.

## NOTE

No adjustment is provided, or is necessary, for models equipped with welded formed steel burners.



## ADJUST MAIN BURNER FLAME PATTERN

Top vented wall furnaces equipped with cast iron burners have an interrupter screw located under the burner body and extends into the burner neck (venturi). This screw is used to adjust the primary air to fuel mixture for proper burner flame. Allow furnace to operate about 10 minutes before making adjustments.

Burner flames should be a series of blue cones slightly orange at the tips. When flames are sharp and blue with no orange visible, turn air adjusting screw in burner venturi clockwise until very short orange tips are visible. If flames are lazy and yellow, turn air screw counterclockwise to eliminate yellow. See Fig. 23.

## VENT SYSTEM

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

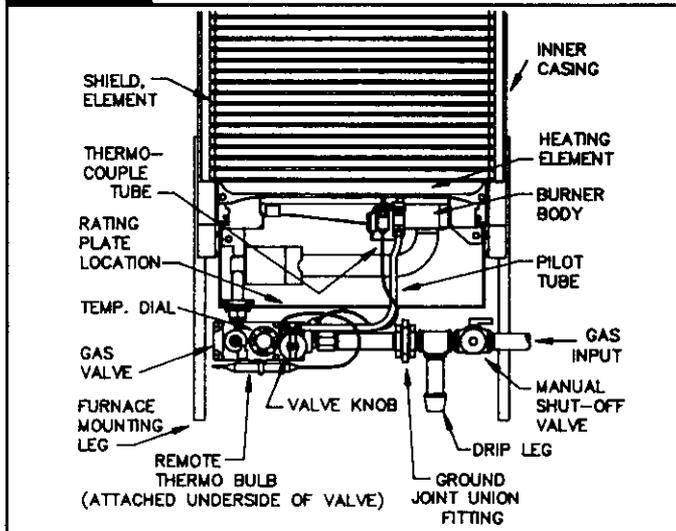
## How To Care For Your Furnace (Con't)

### WARNING

DANGER OF BODILY INJURY OR DEATH  
MAKE SURE GAS SUPPLY IS OFF BEFORE  
REMOVING PANELS OR DOORS, ETC.

FIG. 24

FURNACE CONTROLS



### CLEANING BURNER COMPARTMENT

Because cold air is attracted to the flame during furnace operation, a build up of lint from bedding and dust (etc.)

in the burner area will occur each heating season. 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 struck during cleaning.

### BURNER CLEANING

Check burner. If cleaning is required, contact a qualified service technician to clean and service burner.

### TO REMOVE BURNER(S)

Clean all foreign materials from top of burner. For access to burner of all models:

1. Open burner compartment door.
2. Shut off gas supply to furnace (Manual Shut-Off Valve).
3. Disconnect gas line inside cabinet at ground joint union fitting. See Fig. 24.
4. Remove (2) screws securing burner pan assembly to inner liner.

### NOTE

If furnace is equipped with a welded formed steel burner, remove additional (2) screws securing burner to heating element.

5. Pull burner pan assembly forward approximately 1/2 inch and drop down to expose top of burner.
6. After cleaning, replace burner pan assembly by reversing above procedure.

## Furnace Technical Information

MODEL NUMBER	TYPE GAS	INPUT RATING BTU/HR**	HTG. CAPAC. RATING BTU/HR**	MAIN BURNER ORIFICE		
				DRILL	DEC.	QTY.
2509612 2509622	NAT.	25,000	19,350	#43	.089	1
2509611 2509621	L.P.	25,000	19,350	#54	.055	1
3509612 3509622	NAT.	35,000	25,930	#38	.101	1
3509611 3509621	L.P.	35,000	25,930	#52	.063	1
5009612 5009622	NAT.	50,000	38,000	#43	.089	2
5009611 5009621	L.P.	50,000	38,000	#54	.055	2

\*\*For elevations above 2000 feet reduce ratings 4% for each 1000 feet above sea level.

\*\*\*Btuh = British Thermal Units per hour.

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.

**TROUBLE SHOOTING**  
**WILLIAMS GAS-FIRED TOP VENT GRAVITY WALL FURNACE**

SYMPTOM	POSSIBLE CAUSES	CORRECTIVE ACTION
1. Pilot will not stay lit after carefully following lighting instructions.	A. Thermocouple or generator producing insufficient millivoltage.	Check pilot flame – must impinge on thermocouple or generator. Be sure thermocouple or generator is fully inserted in bracket.
	B. Loose or dirty thermocouple or generator connections at gas valve.	Clean and/or tighten thermocouple or generator connections at valve.
	C. Thermocouple or generator defective.	Check thermocouple with millivolt meter. Should generate approximately 30 millivolts when not connected to load. When connected to load, should generate approximately 14 millivolts; if below 7 millivolts, replace.  Check generator with millivolt meter. Take reading at generator terminals of valve with pilot burning and thermostat contacts closed. Should be 140 millivolts or more.
	D. Grounded thermostat lead wire. (Wall thermostat model.)	Remove thermostat lead wires from valve terminals. If pilot now stays lit, trace thermostat wiring circuit for a ground. May be grounded to furnace or gas supply.
	E. Thermomagnetic pilot safety defective.	Replace gas valve after above is checked out.
	F. Vent Safety Shutoff System.	Check wiring connections from valve to vent safety shutoff device. Be sure all connections are tight. Check for blocked vent or disconnected vent.
2. Pilot burning – no gas to main burner.	A. Manual valve not turned to "On" position after lighting pilot.	Turn gas valve knob to "On" position.
	B. Temperature dial or thermostat not turned to a position calling for heat.	Set temperature dial or thermostat to a position calling for heat.
	C. Plugged burner orifice.	Check – clean or replace.
	D. Temperature dial out of calibration. (Bulb control model.)	See valve instruction sheet.
	E. Mis-wired or broken thermostat wires. Defective thermostat. (Wall thermostat model.)	Check connections at valve terminals. If valve operates check thermostat wires.
	F. Pilot generator may not be generating sufficient millivoltage to open valve.	See 1A above.
	G. Defective valve.	Replace.
3. Furnace operates but turns "Off" before room temperature is attained.	A. Sensing bulb not located properly. (Bulb control model.)	Check location of sensing bulb – see Fig. 24, page 25.
	B. Temperature dial out of calibration. (Bulb control model.)	See valve instruction sheet.

(Continued next page)

**TROUBLE SHOOTING**  
**WILLIAMS GAS-FIRED TOP VENT GRAVITY WALL FURNACE**

SYMPTOM	POSSIBLE CAUSES	CORRECTIVE ACTION
3. Furnace operates but turns "Off" before room temperature is attained. (continued)	C. Thermostat location. (Wall thermostat model.)	Check thermostat location – should not be in the path of warm air discharge from furnace, near a lamp, or above a T.V. or stereo set.
	D. Defective thermostat. (Wall thermostat model.)	Check thermostat calibration or replace.
4. Furnace not producing sufficient heat.	A. Furnace may be too small for space being heated.	Check heat loss calculations.
	B. Furnace not burning at full rate.	Check for low gas pressure at gas valve – should be 4" W.C. for natural gas; 11" W.C. for L.P.G. Check burner orifice.
5. Furnace operates but will not shut "Off" when room temperature is attained.	A. Sensing bulb not located properly. (Bulb control model.)	Check location of sensing bulb – see Fig. 24, page 25.
	B. Temperature dial out of calibration. (Bulb control model.)	See valve instruction sheet.
	C. Bulb or capillary broken. (Bulb control model.)	Replace valve.
	D. Thermostat wiring defective. (Wall thermostat model.)	Thermostat lead wires may be shorted together caused by a nail or staple – check by removing thermostat leads from valve terminals.
	E. Thermostat location. (Wall thermostat model.)	Check thermostat location – if on an outside wall or a hole in wall behind thermostat causing cold air to contact thermostat – relocate.
	F. Defective thermostat. (Wall thermostat model.)	Check thermostat calibration or replace.
	G. Dirt under valve seat or valve stuck open.	Replace valve.
6. Pilot outage problem.	A. Pilot flame may be low or blowing (high) causing safety to drop out.	Adjust pilot flame. Pilot orifice or aerating hole may be plugged (check for spider webs or other organic material).
7. Abnormal operation.	A. Delayed ignition – pilot flame may be too low.	Adjust pilot flame.
	B. Expansion noise ticking.	Check installation – casing may be distorted by being fastened to an uneven opening or jammed under header.
	C. Spillage	Check vent system – may be blocked flue, excessive down draft (wind) or negative pressure in room caused by ventilating fan or a fire in a fireplace. Correct as necessary.
	D. Excessive flame roll-out.	Furnace possibly over rate – check for high gas pressure at gas valve (see 4B above).

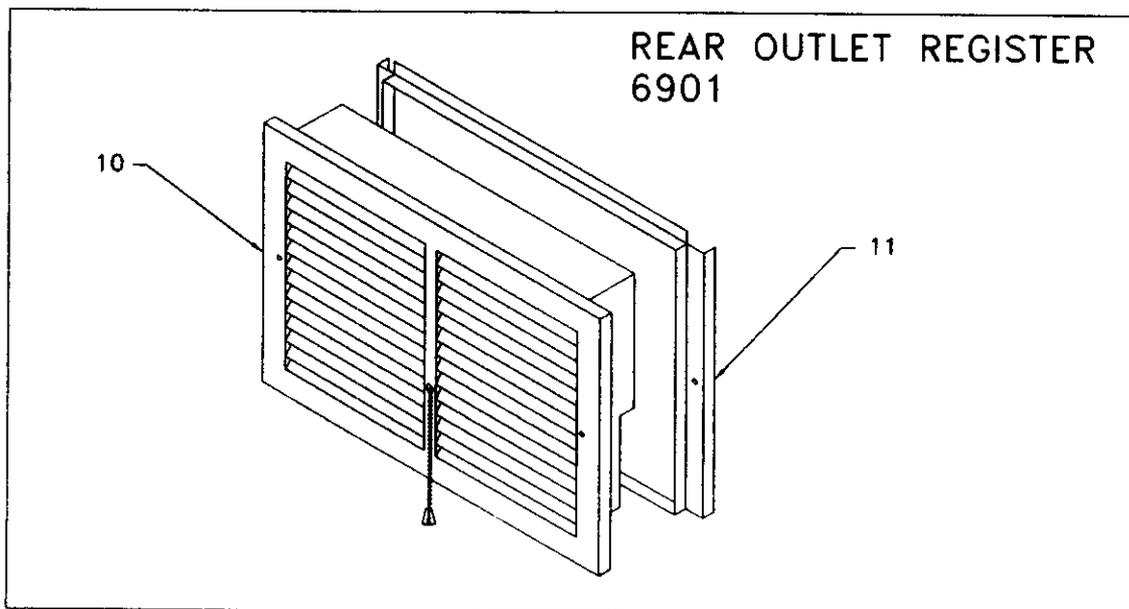
# WILLIAMS GAS-FIRED TOP VENT GRAVITY WALL FURNACE

## REPLACEMENT PARTS LIST FOR MODELS - 2509611; 2509612; 2509621; 2509622 3509611; 3509612; 3509621; 3509622

REF. NO.	PART NO.	DESCRIPTION
1	4915	FACE PANEL
2	9C155	FRONT HEAT SHIELD
3	9D52	COMBUSTION CHAMBER ASSY. - 2509611; 2509612; 2509621; 2509622
3	9D54	COMBUSTION CHAMBER ASSY. - 3509611; 3509612; 3509621; 3509622
4	9B199	DEFLECTOR
5	9C153	INNER SHIELD TOP
6	9C166	DRAFTHOOD ASSEMBLY - 2509611; 2509612; 2509621; 2509622
6	9C165	DRAFTHOOD ASSEMBLY - 3509611; 3509612; 3509621; 3509622
7	P321826	LIMIT SWITCH - 2509611; 2509612; 2509621; 2509622
7	P322055	LIMIT SWITCH - 3509611; 3509612; 3509621; 3509622
8	9C172-1	SHIELD ASSEMBLY
9	5902	HEADER ASSEMBLY (REF. 9B56-1)
10	6901	★ REAR OUTLET
11		★ REAR PLASTERGROUND
☆	9901	OVAL B/W VENT KIT
☆	P320994	DOOR HANDLE
☆	P322085	OWNERS MANUAL

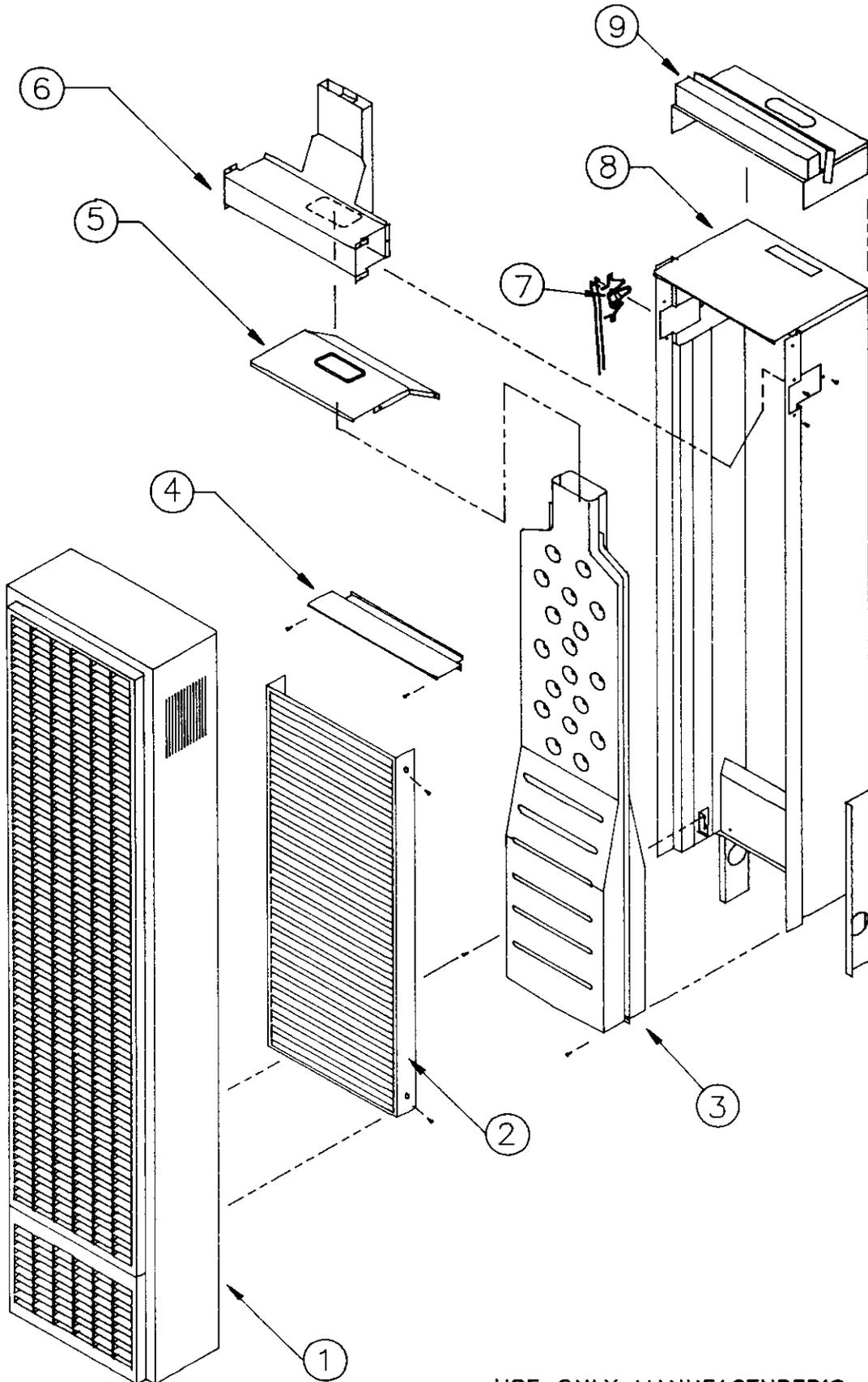
☆ NOT SHOWN ★ NOT AVAILABLE SEPARATELY (KIT FORM ONLY)

NOTE: SCREWS AND BOLTS ARE STANDARD HARDWARE ITEMS, AVAILABLE LOCALLY.  
FOR PARTS ILLUSTRATIONS, SEE BELOW AND PAGE 29



# WILLIAMS GAS-FIRED TOP VENT GRAVITY WALL FURNACE

REPLACEMENT PARTS FOR MODELS  
2509611; 2509612; 2509621; 2509622  
3509611; 3509612; 3509621; 3509622



USE ONLY MANUFACTURER'S  
AUTHORIZED PARTS

38802.DWC  
8-10-63

# WILLIAMS GAS-FIRED TOP VENT GRAVITY WALL FURNACE

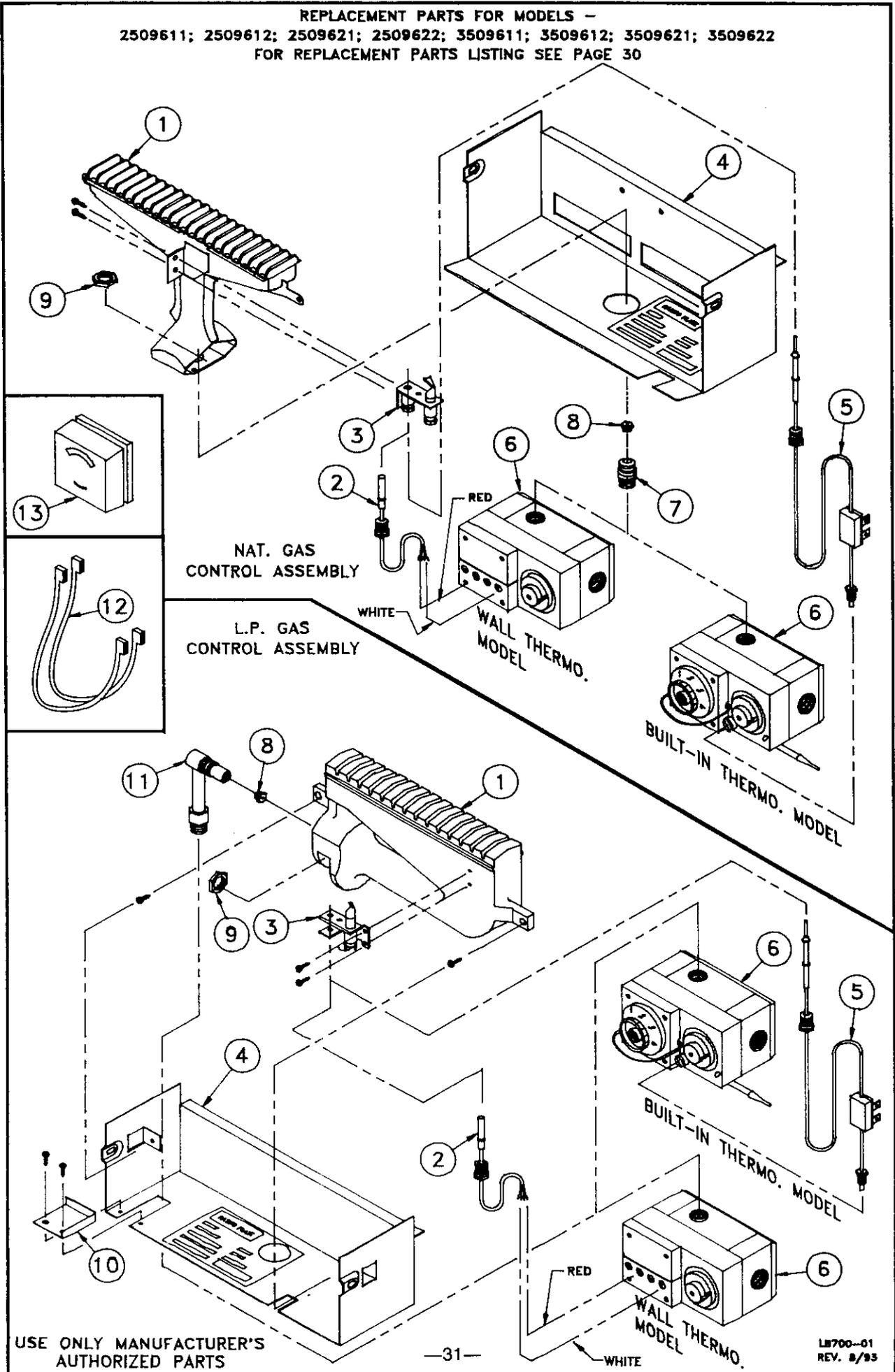
CONTROL ASSEMBLY REPLACEMENT PARTS LIST FOR MODELS - 2509611; 2509612; 2509621; 2509622 3509611; 3509612; 3509621; 3509622										
REF. NO.	PART NO.	DESCRIPTION	2509612	3509612	2509611	3509611	2509622	3509622	2509621	3509621
1	9C105	T-BURNER (FORMED STEEL, NAT. GAS ONLY)	X	X			X	X		
1	P025600	BURNER (CAST IRON)			X	X			X	X
2	P043800	GENERATOR					X	X	X	X
3	P321837	PILOT BURNER	X	X						
3	P179800	PILOT BURNER			X	X				
3	P322274	PILOT BURNER					X	X		
3	P322275	PILOT BURNER							X	X
4	9C104	BURNER PAN ASSEMBLY (T-BURNER)	X	X			X	X		
4	9B59	BURNER PAN ASSEMBLY (CAST IRON)			X	X			X	X
5	P321828	TERMINAL BLOCK THERMOCOUPLE	X	X	X	X				
6	P322051	CONTROL GAS VALVE	X	X						
6	P322052	CONTROL GAS VALVE			X	X				
6	P172100A	CONTROL GAS VALVE					X	X		
6	P172200A	CONTROL GAS VALVE							X	X
7	P328500	ORIFICE ADAPTER	X	X			X	X		
8	P090500	ORIFICE (SPECIFY GAS TYPE & INPUT)	X	X	X	X	X	X	X	X
9	P026200	LOCKNUT	X	X	X	X	X	X	X	X
10	9A106	MANIFOLD RETAINER (CAST IRON BURNER)			X	X			X	X
11	12A01	MANIFOLD ASSEMBLY (CAST IRON BURNER)			X	X			X	X
12	P321836	WIRE ASSEMBLY (2 REQUIRED)	X	X	X	X	X	X	X	X
13	P322016	THERMOSTAT					X	X	X	X

FOR PARTS ILLUSTRATIONS, SEE PAGE 31 "X" DENOTES USAGE

NOTE: SCREWS AND BOLTS ARE STANDARD HARDWARE ITEMS, AVAILABLE LOCALLY.

# WILLIAMS GAS-FIRED TOP VENT GRAVITY WALL FURNACE

REPLACEMENT PARTS FOR MODELS -  
 2509611; 2509612; 2509621; 2509622; 3509611; 3509612; 3509621; 3509622  
 FOR REPLACEMENT PARTS LISTING SEE PAGE 30



USE ONLY MANUFACTURER'S  
 AUTHORIZED PARTS

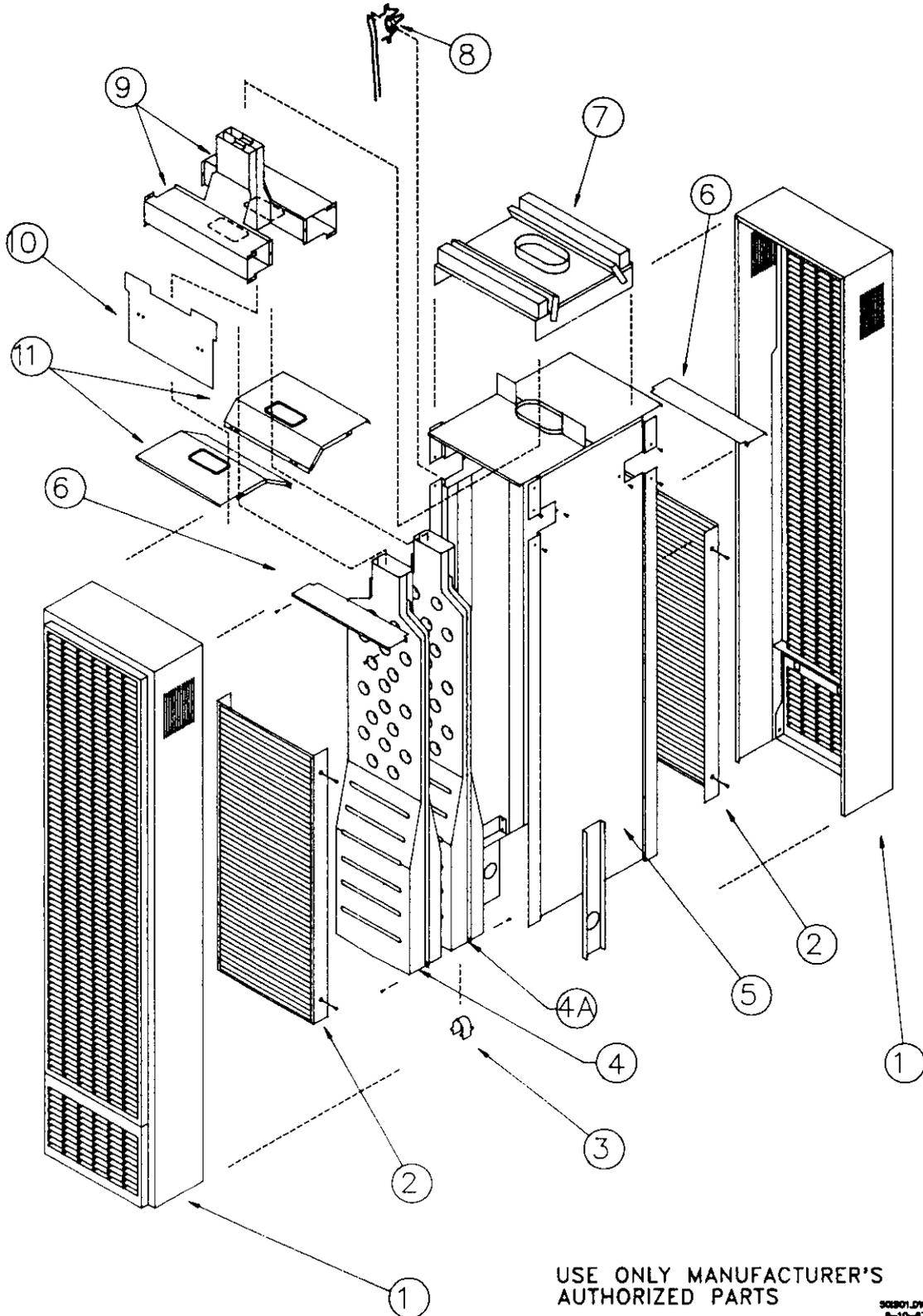
**WILLIAMS GAS -- FIRED TOP VENT GRAVITY WALL FURNACE**

**REPLACEMENT PARTS LIST FOR MODELS --  
5009611; 5009612; 5009621; 5009622**

REF. NO.	PART NO.	DESCRIPTION
1	4915	FACE PANEL (2 REQUIRED)
2	9C155	FRONT HEAT SHIELD (2 REQUIRED)
3	9A277	CARRYOVER SHELL
4	9D65	COMBUSTION CHAMBER ASSEMBLY (FRONT)
4A	9D73	COMBUSTION CHAMBER ASSEMBLY (REAR)
5	9C171	OUTER CASING ASSEMBLY
6	9B199	DEFLECTOR
7	5901	HEADER (REF. -- 9C30)
8	P321826	LIMIT SWITCH
9	9C170	DRAFTHOOD ASSEMBLY (2 REQUIRED)
10	9C157	NON -- VISION SHIELD
11	9C158	INNER SHIELD TOP (2 REQUIRED)
☆	9901	OVAL B/W VENT KIT
☆	P320994	DOOR HANDLE
☆	P322085	OWNERS MANUAL (REV. 11/95)
☆ NOT SHOWN ☆ NOT AVAILABLE SEPARATELY (KIT FORM ONLY) NOTE: SCREWS AND BOLTS ARE STANDARD HARDWARE ITEMS, AVAILABLE LOCALLY. FOR PARTS ILLUSTRATIONS SEE PAGE 33		

WILLIAMS GAS - FIRED TOP VENT GRAVITY WALL FURNACE

REPLACEMENT PARTS FOR MODELS  
5009611; 5009612; 5009621; 5009622



USE ONLY MANUFACTURER'S  
AUTHORIZED PARTS

502801.DWG  
8-10-83

# WILLIAMS GAS-FIRED TOP VENT GRAVITY WALL FURNACE

CONTROL ASSEMBLY REPLACEMENT PARTS LIST FOR MODELS - 5009611; 5009612; 5009621; 5009622						
REF. NO.	PART NO.	DESCRIPTION	5009611	5009612	5009621	5009622
1	9C105	T-BURNER (FORMED STEEL, NAT. GAS ONLY), 2 REQUIRED.		x		x
1	P025600	BURNER (CAST IRON), 2 REQUIRED.	x		x	
2	P043800	GENERATOR			x	x
3	P320758	CARRYOVER PILOT - NAT.		x		
3	P320778	CARRYOVER PILOT - L.P.G.	x			
3	P322396	CARRYOVER PILOT - NAT.				x
3	P322397	CARRYOVER PILOT - L.P.G.			x	
4	9C95	BURNER PAN ASSEMBLY (T-BURNER)		x		x
4	9C34	BURNER PAN ASSEMBLY (CAST IRON)	x		x	
5	P321828	TERMINAL BLOCK THERMOCOUPLE	x	x		
6	P322052	CONTROL GAS VALVE	x			
6	P322051	CONTROL GAS VALVE		x		
6	P172200A	CONTROL GAS VALVE			x	
6	P172100A	CONTROL GAS VALVE				x
7	9A174	SHIELD-BRNR. PAN (FORMED STL. BRNR., NAT. GAS ONLY).		x		x
8	P090500	ORIFICE (2 REQ. SPECIFY GAS TYPE & INPUT)	x	x	x	x
9	P026200	LOCKNUT, 2 REQUIRED.	x	x	x	x
10	9A298	MANUAL SPARK IGNITOR (PIEZO)	x	x	x	x
11	9A108	MANIFOLD ASSEMBLY (CAST IRON BURNER)	x		x	
11	9A200	MANIFOLD ASSEMBLY (FORMED STEEL BURNER)		x		x
12	7A189	PIEZO BRACKET (SPARK IGNITOR)	x	x	x	x
13	9B124	CARRYOVER BRACKET (CAST IRON BURNER)	x		x	
13	9C96	CARRYOVER BRACKET (FORMED STL. BRNR. NAT. GAS ONLY)		x		x
14	P322016	THERMOSTAT			x	x
15	P321836	WIRE ASSEMBLY (2 REQUIRED)	x	x	x	x

FOR PARTS ILLUSTRATIONS, SEE PAGE 35 "X" DENOTES USAGE

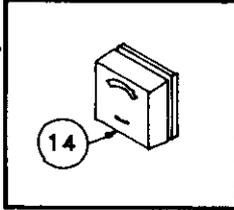
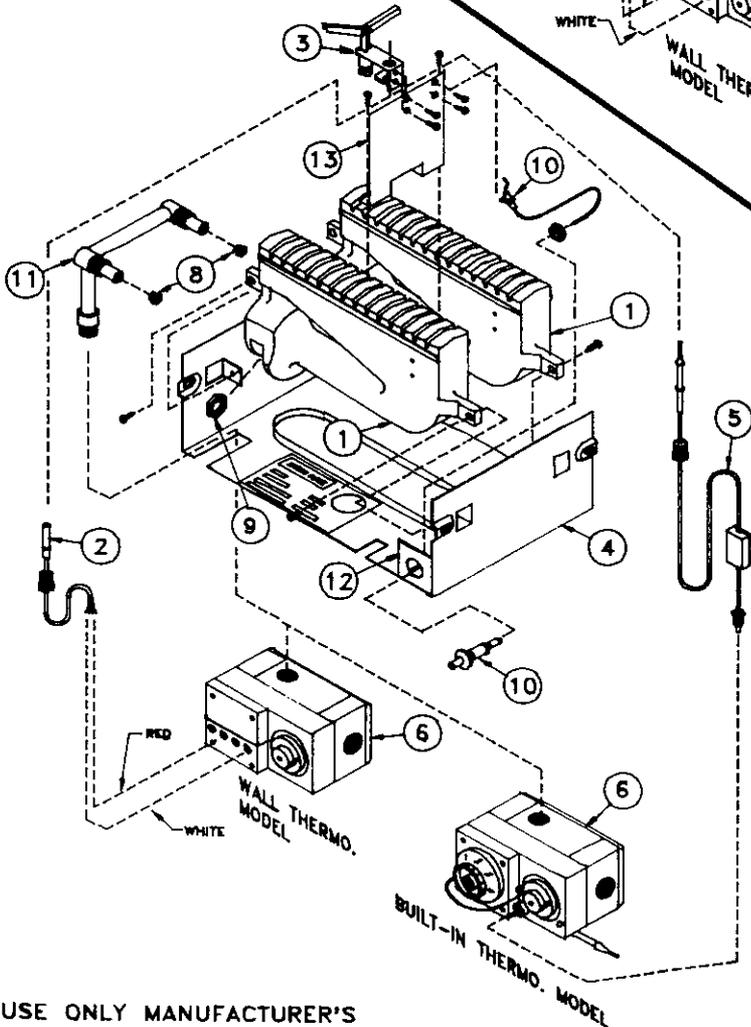
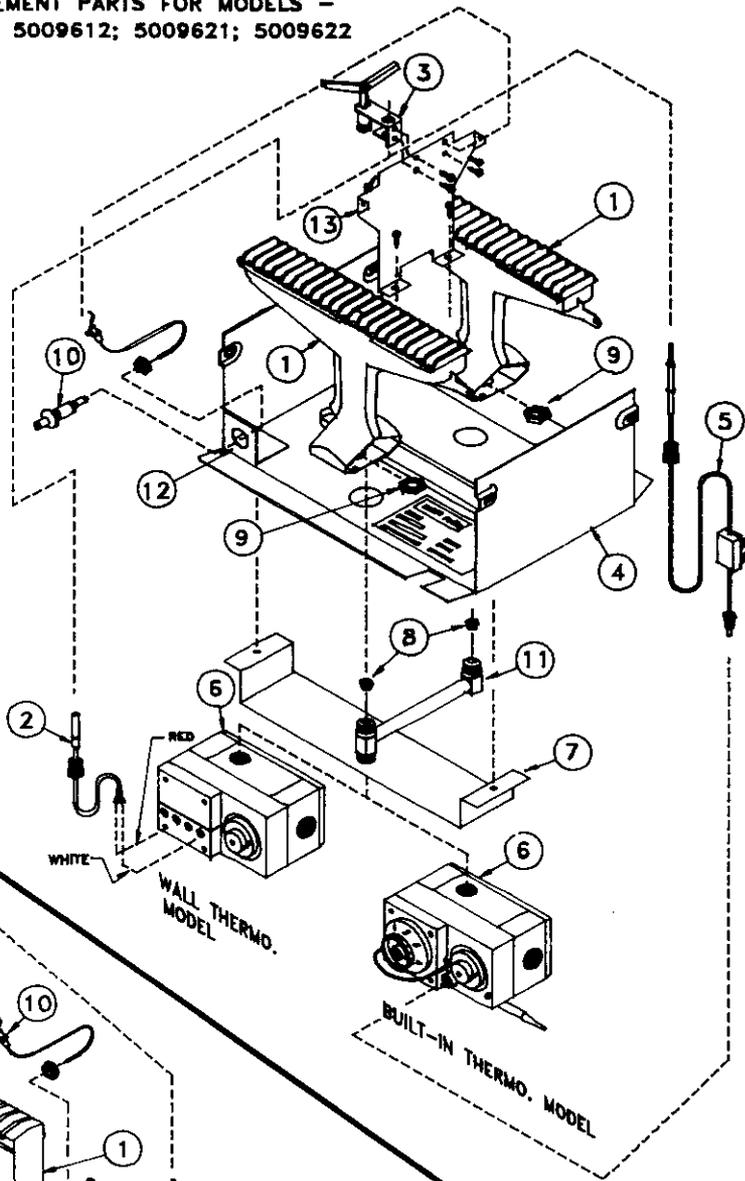
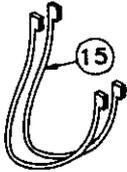
NOTE: SCREWS AND BOLTS ARE STANDARD HARDWARE ITEMS, AVAILABLE LOCALLY.

# WILLIAMS GAS-FIRED TOP VENT GRAVITY WALL FURNACE

REPLACEMENT PARTS FOR MODELS -  
5009611; 5009612; 5009621; 5009622

FOR PARTS LISTING, SEE PAGE 34

NAT. GAS  
CONTROL ASSEMBLY



L.P. GAS  
CONTROL ASSEMBLY

USE ONLY MANUFACTURER'S  
AUTHORIZED PARTS

USE ONLY MANUFACTURER'S  
AUTHORIZED PARTS

LB700-02  
REV. 8/83

# INSTALLATION INSTRUCTIONS

## 2901 BLOWER ACCESSORY KIT

**NOTE:** All electrical work must conform to your local codes and ordinances or in their absence, with current National Electrical Code, ANSI/NFPA 70. If you are not familiar with wiring codes in general, have a competent electrician do this job.

### WARNING

**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 KIT

This 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 furnace heats up the temperature sensing device will be activated and the fan will operate.

Blower accessory will not operate if toggle switch is set in off (center) position.

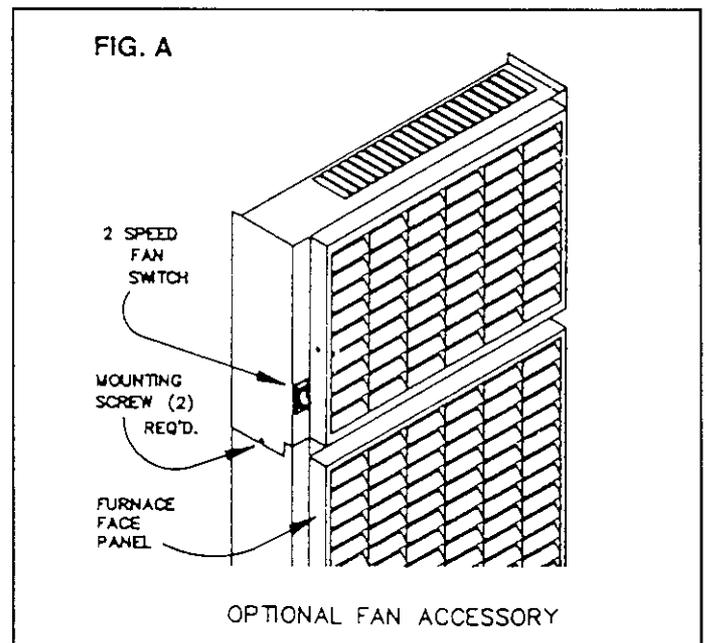
#### Install as follows:

- STEP 1.** Install 115V electrical outlet where shown in your owners manual; see rough-in illustration
- STEP 2.** Remove (2) screws securing blower grille assembly, and remove blower grille (See Fig. A.)
- STEP 3.** Remove (2) screws securing junction box cover (See Fig. C). Then remove cover to gain access to knockout hole located in junction box (See Fig. C)
- STEP 4.** Locate knockout hole and remove knockout using a hammer and screwdriver.
- STEP 5.** Place blower cabinet on furnace top (See Fig. A).
- STEP 6.** Route 115V field wiring into junction box through knockout hole.
- STEP 7.** Make field wiring connection inside junction box (See Fig. B). Follow applicable local and national electrical codes.

- STEP 8.** Drill 1/8 inch diameter hole in each side of the furnace face panel through the holes on the sides of the fan cabinet, and secure the cabinet to the furnace with the two sheet metal screws provided.

**NOTE:** Set blower cabinet against wall surface (required on deeper face panels).

- STEP 9.** Replace junction box cover, securing with screws previously removed.
- STEP 10.** Replace blower grille, securing with screws previously removed.
- STEP 11.** Set switch to desired position. If left in "HI" or "LOW" position during summer months blower accessory could be activated by sunlight striking furnace face panel through unshaded windows. If this is undesirable set switch to "OFF" position.



SEE PAGE 37 FOR ADDITIONAL ILLUSTRATIONS

# INSTALLATION INSTRUCTIONS

REF. NO.	PART NO.	DESCRIPTION
1	P013200	Screw- #8x3/8 Sheet Metal (8) Required
2	9C99	Blower Grille
3	P093200	Screw-#8x3/8 Sheet Metal (2) Required
4	P141000	Screw-#10x1/2 Sheet Metal (1) Required
5	P320911A	Fan Switch- 2 Speed
6	P320912	Wire Bridle
7	P127300	Washer-flat- #10-32 (2) Required
8	P04110	Nut Mach.- #8-32 W/Star Washer (2) Required
9	9C102	Blower Body
10	P321078	Grommet-motor mount (2) Required
11	P012900	Bushing-Strain Relief
12	P322395	Automatic Fan Switch
13	P029200	Screw-Machine - #6-32x15/16 (2) Required
14	P320905	Motor- 2 Speed
15	P320907	Fan Blade
16	9D12-1	Orifice Plate
17	6B161	Junction Box Plate

FIG. B.

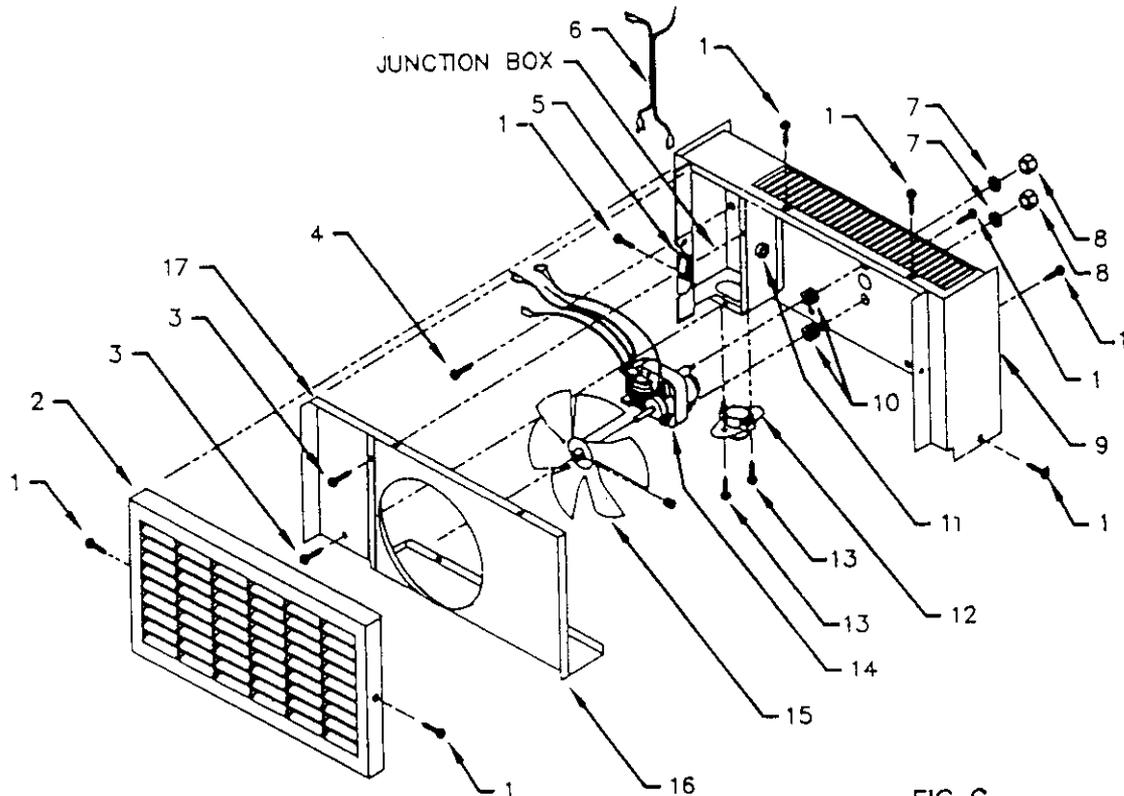
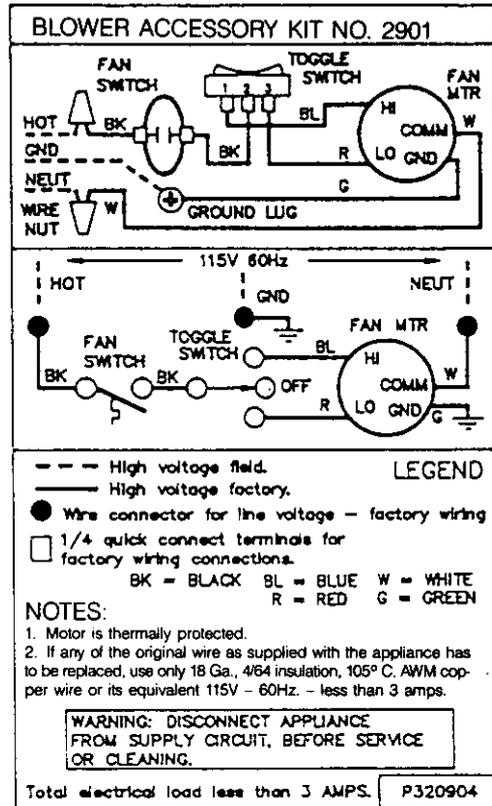


FIG. C

**Service Record**

<b>DATE</b>	<b>MAINTENANCE PERFORMED</b>	<b>COMPONENTS REQUIRED</b>

— Notes —



# owners manual

## SERVICE

### MODEL NOS

- 2509611
- 2509612
- 2509621
- 2509622
- 3509611
- 3509612
- 3509621
- 3509622
- 5009611
- 5009612
- 5009621
- 5009622

**NOTE: CANADIAN MODEL NUMBERS THIRD DIGIT FROM LEFT TO BE:**  
 1. FOR BASIC ALTITUDES  
 2. FOR HIGH ALTITUDES  
**EXAMPLE:**  
 MODEL: 3509612 BECOMES 3519612  
 (0-2000 FT. BASIC ALTITUDE)  
 OR BECOMES 3529612  
 (2000-4000 FT. HIGH ALTITUDE)

## Service Hints

If your furnace fails to work right, you may avoid inconvenience and the cost of a service call by checking the following points before you call for service.

FOR YOUR SAFETY	FOR YOUR SAFETY
Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.	If you smell gas: 1. Open windows. 2. Don't touch electrical. 3. Extinguish any open flame. 4. Immediately call your gas supplier.

POSSIBLE CAUSE	WHAT TO DO
<b>If your furnace is not heating or not giving enough heat —</b> Thermostat is not set correctly. Pilot is out.	Reset thermostat to desired setting. Check pilot. Relight if necessary following instructions for "Operating Your Furnace."
Pilot is on but burner won't come on.	If gas valve is set at other than "On" furnace will not operate. Shut furnace down and follow instructions for relighting in "Operating Your Furnace" section.
Burner is not operating properly.	Check flame. If it is yellow the burner is not getting enough air. Or if flame is blue and noisy and seems to lift off the burner, the burner is getting too much air. See "Checks and Adjustments," page 24.
Air flow restricted.	Check that doors, drapes or furniture are not blocking furnace louvers.
<b>Pilot goes out time after time —</b> Furnace flue blocked.	Locate vent outlet blockage and clean.
Pilot and burner access door not closed properly.	Check the door. See section on "Operating Your Furnace" beginning on page 18.
<b>If burner is noisy —</b> Gas input amount is incorrect. Too much primary air.	Contact Williams Service Department. Contact Williams Service Department.
<b>If blower does not run —</b> Fan switch not set. Blower not connected to electric power.	Select fan speed. Connect to electric power.
<b>If blower motor is noisy —</b> Housing rattling. Blower dirty. Blower wheel bent.	Tighten screws. Clean blower wheel. Straighten or replace.

See troubleshooting section for more detailed information.

## 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 rating plate near gas valve, inside control compartment.



**WILLIAMS FURNACE COMPANY**  
 225 Acacia Street  
 Colton, CA 92324 USA  
 (909) 825-0993

MANUFACTURED  
 IN THE U.S.A.  
 Established 1916

FAX: (909) 824-8009