80% TWO-STAGE

GAS FIRED FURNACE

User's Information Manual



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

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- WHAT TO DO IF YOU SMELL GAS:
 - Do not try to light any appliance.
 - Do not touch any electrical switch; do not use any phone in your building.
 - Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
 - If you cannot reach your gas supplier, call the fire department.
- Installation and service must be performed by a qualified installer, service agency or the gas supplier.

You have purchased a high efficiency, gas-fired, warm-air residential furnace. It is designed to heat your home efficiently and safely. It is also designed to interface with your cooling equipment and to assist in circulating conditioned air.

Your furnace functions are regulated by an integrated control module which responds to your home thermostat. This module controls all aspects of operation, including safety and is designed to assure efficiency, reliability, and comfort.

This furnace has been designed with flexibility in mind. It can be installed in an upright or horizontal position and uses indoor air for combustion.

Your furnace is built to provide many years of safe and dependable service, providing it is properly installed and maintained. Take time to familiarize yourself with the information concerning furnace installation, features, operation, and maintenance contained within this manual.

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RECOGNIZE THIS SYMBOL AS A SAFETY PRECAUTION.

ATTENTION INSTALLING PERSONNEL

As a professional installer you have an obligation to know the product better than the customer. This includes all safety precautions and related items.

Prior to actual installation, thoroughly familiarize yourself with this Instruction Manual. Pay special attention to all safety warnings. Often during installation or repair it is possible to place yourself in a position which is more hazardous than when the unit is in operation. Remember, it is your responsibility to install the product safely and to know it well enough to be able to instruct a customer in its safe use.

Safety is a matter of common sense...a matter of thinking before acting. Most dealers have a list of specific good safety practices...follow them.

The precautions listed in this Installation Manual are intended as supplemental to existing practices. However, if there is a direct conflict between existing practices and the content of this manual, the precautions listed here take precedence.

Remember to leave this manual with the homeowner.

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

To avoid death, personal injury or property damage, do not use this furnace if any part of the furnace has been under water. Immediately call a qualified service technician to inspect the furnace and to replace any part of the control system and any gas control having been under water.

Your warranty certificate is also supplied with the unit. Read the warranty carefully and note what is covered. Keep the warranty certificate in a safe place, so you can find it, if necessary.

Before using this manual, check the serial plate for proper model identification.

- **Installer** Affix this manual, the Installation Guide, and Specifications Sheet adjacent to the appliance.
- **Owner** Keep all product literature in a safe place for future reference.

THE INSTALLATION AND SERVICING OF THIS EQUIPMENT MUST BE PERFORMED BY QUALIFIED, EXPERIENCED TECHNICIANS ONLY.

General Information

This furnace is built to provide many years of safe and dependable service, providing it is properly installed and maintained. However, abuse and/or improper use can shorten the life of the furnace and create hazards for you, the homeowner.



This product contains or produces a chemical or chemicals which may cause serious illness or death and which are known to the State of California to cause cancer, birth defects or other reproductive harm.

To avoid possible equipment damage, personal injury, fire or death, the following instructions must be observed regarding unit location, air requirements and operating procedures.

Unit Location

- The furnace area and the vicinity of any other gas appliances must be kept clear and free of combustible materials, gasoline, and other flammable vapors and liquids. Also, do not store or use flammable items such as paint, varnish, or lacquer in the area.
- Do not store or use chlorine or fluorine products (bleaches, cements, strippers, aerosols) near the unit. They can corrode the heat exchanger.
- 3. Do not use the furnace closet as storage for brooms, mops, brushes and oily rags or cloths. The area must be kept clear, clean and free of lint. Furnace must be kept free and clear of exposed or loose insulation materials in the area of installation. Examine the furnace area when the furnace or additional insulation is added since some insulation materials may be combustible.
- 4. Make sure the furnace is always connected to an approved vent, in good condition, to carry combustion products outdoors.
- 5. Familiarize yourself with the controls that shut off the gas and electrical power to the furnace. If the furnace is to be shut down at the end of the heating season, turn off both the gas and electrical power. For safety, always turn the gas and electrical power off before performing service or maintenance on the furnace.
- 6. Establish a regular maintenance schedule to insure efficient and safe operation of the furnace. The furnace should be checked at the beginning of each heating and cooling season by a qualified service technician.

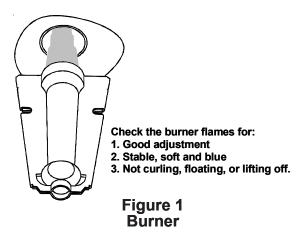
To avoid personal injury or fire, minimum clearances to combustible surfaces must be followed.

7. Make certain the required clearances for the furnace are always maintained. These clearances are listed on the Furnace Clearance Label, attached to the furnace unit. If any question develops, contact the installer of the furnace, or another qualified servicer.

Unit Installation

Examine the furnace installation to determine the follow-ing:

- 1. All flue product carrying passages external to the furnace (i.e. chimney, vent connector) are clear and free of obstructions.
- 2. The vent connector is in place, slopes upward and is physically sound without holes or excessive corrosion.
- 3. The return air duct connection is physically sound, sealed to the furnace casing, and terminates outside the space containing the furnace.
- 4. The physical support of the furnace is sound without sagging, cracks, or gaps around the base so as to provide a seal between the support and the base.
- 5. There are no obvious signs of deterioration of the furnace.
- Check the burner flames for adjustment. Flames should be stable, soft and blue, (dust may cause orange tips but must not be yellow). The flames should extend directly outward from the burner without curling, floating, or lifting off (Figure 1).



Air Requirements

To avoid death, personal injury or property damage, enough fresh air for proper combustion and ventilation of flue gases must be provided to this furnace. Most homes require outside air to be supplied into the furnace area.

WARNING

Improved construction and additional insulation in homes have reduced the heat loss and made these homes much tighter around doors and windows so that air infiltration is minimal. This creates a problem to supply ventilation and/or combustion 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, water heaters, non-direct vent furnaces, etc.) increases this problem and appliances could be starving for air.

If fuel-burning appliances are starved for air, the flue gases which these appliances produce as they operate may not vent outdoors properly, but remain in the home instead. These flue gases may include carbon monoxide.



Death or personal injury from asphyxiation can result from exposure to carbon monoxide.

Carbon monoxide or "CO" is a colorless and odorless gas produced when fuel is not burned completely or when the flame does not receive sufficient oxygen.

Be aware of these air starvation signals which indicate conditions that may result in carbon monoxide or that carbon monoxide may be present:

- 1. Headaches-Nausea-Dizziness, Flu-Like Symptoms.
- 2. Excessive humidity-heavily frosted windows or a moist "clammy" feeling in the home.
- 3. Smoke from a fireplace will not draw up the chimney.
- 4. Flue gases that will not draw up the appliance vent pipe.

Combustion Air

The air for combustion and ventilation can typically be obtained from the surrounding unconfined space or louvered closet door. Observe the following precautions concerning air availability:

- When a furnace is installed in a closet and the closet door is louvered, DO NOT OBSTRUCT LOUVERS. Louvers must be open and clear to provide combustion air to the furnace.
- When a furnace is installed in a confined space within a home and the air for combustion and ventilation enters the space through ducts from the outside, be sure to routinely check the entering and outlet (grilled) openings to verify that they are always clear and clean.
- Do not partition off a small area around the furnace utilizing a non louvered door. This could obstruct the combustion air from reaching the furnace.
- The combustion and ventilation air must never come from a corrosive atmosphere.

Indoor Humidity

Relative humidity is the amount of water vapor in the air relative to the amount the air can hold at the same temperature. Example: At 40% relative humidity, the air could hold 2 1/2 times as much moisture ($2.5 \times 40 = 100\%$) before becoming saturated.

The colder the air; the less moisture it can hold. As air is warmed, its ability to hold moisture is increased.

Example: A winter day, outdoor temperature 10° F, and relative humidity of 70%. If that air enters a home and is warmed to 72° F the relative humidity will drop to 6% (very dry) if no more moisture is added.

Relative humidity is important to your health and home as proper humidification helps reduce respiratory difficulties and helps improve the indoor air quality.

A good relative humidity is one just high enough to barely start condensation along the lower edges or lower corners of the windows. More than that can be damaging.

Frequent fogging or excessive condensation on inside windows indicates the indoor humidity level is too high for outdoor weather conditions. Damage to the building may result if the condition persists. Condensation on inside of storm windows indicates loose inside windows. Adding weather-stripping to tighten inside windows usually corrects this problem.

The following table shows the recommended maximum indoor humidity in relationship to the outdoor temperatures.

Outdoor	Humidity		
Temperature	Single -Paned	Double-Paned	
	Glass	Glass	
+30°F	30%	50%	
+20°F	20%	40%	
+10°F	15%	35%	
0°F	10%	30%	
-10°F	5%	25%	
-20°F	5%	20%	
-30°F	3%	18%	

Table 1

For Propane (LP) Installations Only

For furnaces operating on propane, please review the following warnings before use.



To avoid death, personal injury or property damage due to explosion or fire, install a gas detecting warning device. Since the odorant in propane gas can be reduced by iron oxide (rust), a gas detecting warning device is the only reliable method to detect propane gas leaks.



If the gas furnace is installed in a basement, an excavated area or a confined space, it is strongly recommended to contact a propane supplier to install a gas detecting warning device in case of a gas leak.

- Since propane gas is heavier than air, any leaking gas can settle in any low areas or confined spaces.
- Propane gas odorant may fade, making the gas undetectable except with a warning device.



An undetected gas leak will create a danger of explosion or fire. If the presence of gas is suspected, follow the instructions on the front cover of this manual. Failure to do so could result in SERIOUS PERSONAL INJURY OR DEATH.

Furnace Operation

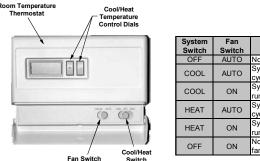
In the heating mode, gas is burned and the products of combustion are drawn through a heat exchanger by an induced draft blower. The flue gases are then exhausted from your home through a flue pipe system. The furnace circulator blower passes indoor air over the heat exchanger and then through the conditioned space.

Thermostat Functions

This furnace requires a two-stage thermostat. A two stage thermostat controls which firing rate is used depending on the temperature difference between the set point and the room temperature. If the difference is small, the thermostat will energize the furnace on the low stage. If the temperature difference is high, the thermostat will energize the furnace on high stage. A two stage thermostat and furnace properly used will maintain a much tighter control of temperature than a conventional single stage thermostat and furnace.

For optimal operation of this furnace, set the thermostat to the temperature desired. Do not over adjust the thermostat to turn the heat on. This will cause the high stage heat to come on when the low stage heat could have satisfied the demand. Setting the temperature to the desired temperature will minimize temperature fluctuations.

In addition, there are thermostats that automatically switch from Heating to Cooling and with night setbacks. The night set-back, or multiple set-back type, will adjust the temperature at night or during the day when no one is at home, saving energy and lowering fuel bills.



System Switch	Fan Switch	Action
OFF	AUTO	None
COOL	AUTO	System only cools, fan cycles off and on.
COOL	ON	System only cools, fan runs all the time.
HEAT	AUTO	System only heats, fan cycles off and on.
HEAT	ON	System only heats, fan runs all the time.
OFF	ON	No heating or cooling, fan runs all the time.

Typical Thermostat

General Information

WARNING

Electrical components are contained in both compartments. To avoid electrical shock, injury or death, do not remove any internal compartment covers. Contact a qualified servicer at once if an abnormal condition is noticed.

NOTICE:

Do not use this furnace if any part has been under water. Immediately call a qualified servicer to inspect the furnace and to replace any part of the control system and any gas control which has been under water.

Keep both doors in place except for inspection and maintenance. An interlock switch prevents furnace operation if the blower door is not in place.

Dehumidistat

The dehumidistat (not included in furnace) controls excessive humidity in the home. To operate, set the dehumidistat to the desired relative humidity level. If the cooling system is wired to the furnace controls and is running, the furnace blower will lower its speed to improve dehumidification, if needed.

Refer to Specification Sheet for available dehumidistats (not included in furnace).

Self Diagnostic Electronic Control Module

Certain furnace models are equipped with a self-diagnostic electronic control module. If a furnace component is not operating properly, the control module will repeatedly flash a red light on and off in a factory-programmed sequence, depending on the problem encountered.

If a furnace equipped with a self-diagnostic module is not operating properly, look through the observation window in the blower access door and make note of the number of flashes in the sequence. Contact a qualified servicer for further information. Do not attempt to troubleshoot the problem yourself.

Gas Valve

The gas valve regulates gas flow to the burners in response to input from the integrated control module.

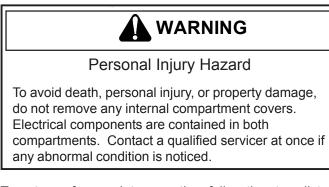
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The furnace has an electronic ignition device which lights the burners automatically. Never try to light the burners by hand.

Blowers

This furnace has an induced draft blower which draws flue products through the heat exchanger and exhaust them outdoors. It also has a circulator or main blower that passes indoor air over the heat exchanger and into the conditioned space. Both blowers are permanently lubricated, no further oiling is required.

Starting Your Furnace



To put your furnace into operation, follow the steps listed below.

- 1. Close the manual gas valve external to the furnace.
- 2. Turn off the electrical power supply to the furnace.
- 3. Set room thermostat to lowest possible setting.
- 4. Remove the louvered door on the front of the furnace by loosening the two screws securing the door to the blower deck.
- 5. This furnace is equipped with an ignition device to automatically light the burners. Do not try to light burners by hand.
- 6. Turn the gas control knob or lever clockwise to the OFF position. The knob or lever should turn easily. Do not use excessive force.
- 7. Wait five minutes to clear out any gas. Then smell for gas, including near the floor. This is important. Some types of gas are heavier than air and the smell will be closer to the floor.
- If gas can be smelled following the five minute waiting period in Step 7, follow the instructions on the front page of this manual. If gas can not be smelled:

Turn the gas control knob or lever counterclockwise to the ON position. The knob or lever should turn easily. Do not use excessive force.

- 9. Replace the door on the front of the furnace.
- 10. Open the manual gas valve external to the furnace.
- 11. Turn on the electrical power supply to the furnace.
- 12. Set the room thermostat to the desired temperature.

NOTE: There is an approximate 20 second delay between thermostat energizing and burner firing.

Shutting Down Your Furnace

To shut down your furnace, follow the steps listed below.

- 1. Set the thermostat to lowest setting.
- 2. Turn off the electrical power supply to the furnace.
- 3. Remove the louvered door on the front of the furnace by loosening the two screws securing the door to the blower deck.
- 4. Turn the gas control knob or lever clockwise to the OFF position. The knob or lever should turn easily by hand. Do not use excessive force.
- 5. Close manual gas shut-off valve external to the furnace.
- 6. Replace the door on the furnace.

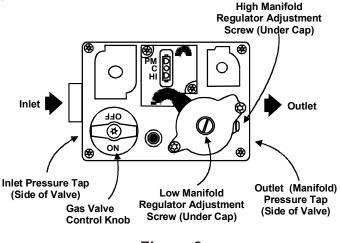


Figure 2 White-Rodgers 36E96

Safety Circuits

A number of safety circuits are employed to ensure safe and proper furnace operation. These circuits serve to control any potential safety hazards and, as inputs in the monitoring and diagnosis of abnormal function. These circuits are continuously monitored by the integrated control module.

Self Diagnostic Electronic Control Module

Certain furnace models are equipped with a self-diagnostic electronic control module. If a furnace component is not operating properly, the control module will repeatedly flash a red light on and off in a factory-programmed sequence, depending on the problem encountered.

If a furnace equipped with a self-diagnostic module is not operating properly, look through the observation window in the blower access door and make note of the number of flashes in the sequence. Contact a qualified servicer for further information. Do not attempt to troubleshoot the problem yourself.

Auxiliary Limit

The auxiliary limit control is located on the blower deck and monitors heat exchanger compartment temperatures. It is a normally-closed (electrically), manual-reset, temperature-activated sensor. This limit guards against overheating as a result of insufficient conditioned air passing over the heat exchanger. Disconnect electrical power prior to removing the non-louvered door to reach the secondary limit control. The control is in addition to the main limit control and shuts the furnace off in case of a blower failure. This control is a manual reset control, which can be reset only once. If the unit goes off on limit a second time, contact a qualified servicer so the problem causing the control to open can be corrected.

Roll-out Limit Switches

The roll-out limit switches are normally-closed (electrically), manual-reset, temperature-activated sensors. The switches are mounted on the burner/manifold assembly and monitors the burner flame. If there is an improper draw of burner flames into the heat exchanger, the rollout limit switches will detect it and shutdown the gas flowing to the burners,



To avoid death, personal injury, or property damage, due to fire or explosion, do not reset the roll-out protection device. If it opens, the cause must be investigated by a qualified servicer before any attempt is made to engage the roll-out protection device and turn the furnace back on.

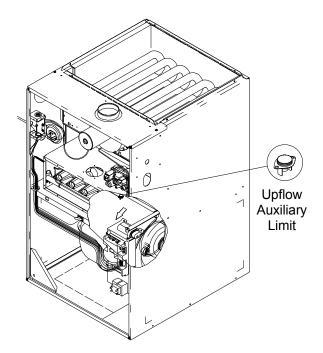


Figure 3 Upflow Auxiliary Limit Location

Safety Circuits

Roll-out Protection Device

The roll-out limit is a normally-closed (electrically), manual-reset, temperature-activated sensor. The rollout limit switch is located on one end of the burner assembly (Figure 4). If there is an improper draw of burner flames into the heat exchanger, the roll-out limit will detect it and shutdown gas flowing to the burners. For added protection, a burner enclosure box is installed over the burner assembly, preventing the flames from damaging other components. The roll-out limit is mounted on the burner/manifold assembly and monitors the burner flame.



PERSONAL INJURY HAZARD

To avoid death, personal injury, or property damage, due to fire or explosion, do not reset the roll-out protection device. If it opens, the cause must be investigated by a qualified servicer before any attempt is made to engage the roll-out protection device and turn the furnace back on.

Resetting From Lockout

Furnace lockout is characterized by a non-functioning furnace (circulator blower may be running continuously). On furnaces with a self-diagnostic electronic control module, the control diagnostic light will repeat a single flash followed by a pause.

Furnace lockout results when a furnace is unable to achieve ignition after three attempts, or when it has lost flame five times during a single call for heat. When this occurs, it is possible to reset the control by turning the thermostat setting below room temperature for one to twenty seconds then returning the setting to the desired temperature. The control will automatically reset after one hour. The control may also be reset after a lockout by turning off the electrical disconnect switch to the furnace for one to twenty seconds.

IMPORTANT: If the condition which originally caused the lockout still exists, the control will return to lockout. If your furnace frequently locks out, a problem exists which must be corrected. Contact a qualified servicer.

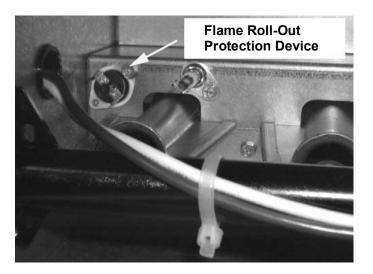


Figure 4 Roll-out Protection Devices

Routine Maintenance

If you perform maintenance on the furnace yourself, remember that certain mechanical and electrical knowledge, skills and tools are required to perform maintenance on the furnace. Personal injury or death may result if you are not properly trained. You should call your installing dealer or place of purchase if you are uncertain about your ability to perform maintenance.

To avoid death or personal injury due to electrical shock, disconnect the electrical power before performing any maintenance.

Annual Inspection

The furnace should be inspected by a qualified installer, or service agency at least once per year. This check should be performed at the beginning of the heating season. This will ensure that all furnace components are in proper working order and that the heating system functions appropriately. Particular attention should be paid to the following items. Repair as necessary.

- Flue pipe system. Check for any corrosion of the flue pipe. If significant corrosion exists, have flue pipe replaced.
- Wiring. Check electrical connections for tightness and/or corrosion. Check wires for damage.
- Filters. Check that filters are clean and in the proper placement in the furnace or duct system.

Filters



To avoid death, personal injury or property damage, never operate furnace without a filter installed. Dust and lint will build up on internal parts resulting in loss of efficiency, equipment damage and possible fire.

Even though a return air filter is not supplied with this furnace, the return air must be filtered. The installer must supply filters at the time of installation. Become familiar with filter location and procedures for removing, cleaning and replacing them. If needing help, contact the installer of the furnace or another qualified servicer. If filter replacement becomes necessary, it must be replaced with a filter of the same type and size that complies with UL900 or CAN/ULC-S111 standards.

See the Specification Sheet for filter sizes.

PERSONAL INJURY HAZARD

To avoid death or personal injury due to electrical shock, disconnect the electrical power before removing filters or performing any maintenance.

Filters must be inspected, cleaned or changed every two months or as required. It is the owner's responsibility to keep air filters clean. **NOTE:** Dirty filters are the most common cause of inadequate heating or cooling performance.

Upflow Filters (Not Included With Furnace)

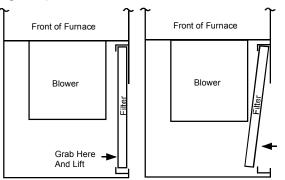
To remove the external upflow filter from the external filter rack, disconnect electrical power to the furnace and follow the directions provided with the external filter rack kit.

NOTE: If using Media Air Cleaner MAC1 or Electronic Air Cleaner EAC6, follow the directions that came with the air cleaner for proper filter removal, cleaning, and replacement procedures.

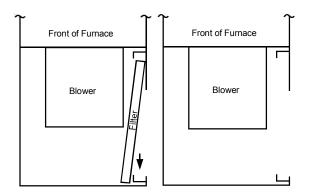
Remove the blower compartment. Using a vacuum cleaner, clean out the blower area, external filter rack area, and the adjacent area of the return air duct.

To remove the filter located in the furnace retaining rails:

- 1. Disconnect electrical power to the furnace and remove the two front panels (louvered panel first).
- 2. Grasping the lower portion of the filter, disengage the filter from the lower railing by lifting it up and toward the blower. Drop the filter down and pull outward (Figure 5).



a. Lift filter above bottom b. Tilt filter to clear rail. rail



c. Lower filter below top d. Pull filter out. rail.

Figure 5 Filter Removal

Use a vacuum cleaner to clean out the blower area and the adjacent area of the return air duct.

Some installations will have throwaway filters. If dirty, these filters must be thrown away and replaced with two new similar size throwaway filters. Other installations will have permanent filters. If dirty but not torn, these filters must be cleaned as follows:

Wash, rinse, and dry a permanent filter. Both sides of a metal filter should be sprayed with a dust adhesive as recommended on the adhesive container. Spray adhesives for use with permanent metal filters can be found at some hardware stores. If badly torn or not cleanable, these filters must be replaced with permanent filters of the same type and size.

To reinstall filter follow instructions included with external filter rack kit. BE SURE AIRFLOW DIRECTION ARROW POINTS TOWARDS THE BLOWER.

When the filter is located in the bottom of the furnace on a bottom return system the filter is held in place by a wire filter retainer (Figure 6). To change and clean the filter, push back and up on the wire filter retainer to release it from under the front lip of the basepan. Slide the filter out and follow cleaning or replacement instructions above. Replace filter opposite of removal.

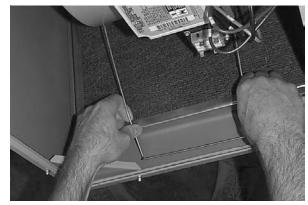


Figure 6 Wire Filter Retainer

Horizontal Filters (Not Included With Furnace)

For furnaces installed horizontally, filters must be installed external to the furnace casing. A central return with filters installed in the duct behind the return grille may be used. This would simplify filter replacement by merely requiring the removal of the grille. Clean or replace filters every two months or as required. Dirty filters are the most common cause of inadequate heating or cooling performance.

NOTE: If using Media Air Cleaner MAC1 or Electronic Air Cleaner EAC6, follow the directions that came with the air cleaner for proper filter removal, cleaning, and replacement procedures.

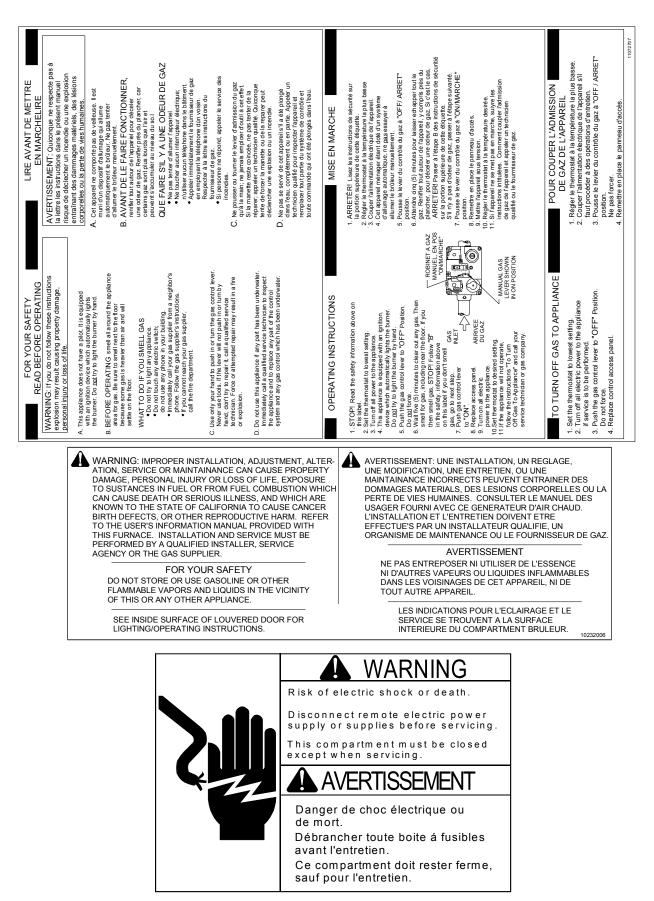
Induced Draft Motor Lubrication

The induced draft motor bearings are permanently lubricated. No further lubrication is required.

Air Circulating Blower Motor Lubrication

The air circulation blower motor bearings are permanently lubricated. No further lubrication is required.

NOTE: If safety labels are missing or illegible, contact the installing dealer for ordering information.



For More Information

To obtain the proper labels, the Model, Manufacturing Number and Serial Number of the unit must be supplied. These numbers are recorded on the nameplate of the furnace. For convenience, record this information here:

MODEL NUMBER:	
MANUFACTURING NUMBER: P	_F
SERIAL NUMBER:	