

# INSTALLATION AND MAINTENANCE INSTRUCTIONS

## LG14 INDUSTRIAL/COMMERCIAL

### OIL FIRED FURNACES

*This manual must be left with the homeowner for future reference.*

### **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 or service agency.

### **FOR YOUR SAFETY**

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

### **CAUTION**

Do not store combustible materials near the furnace or warm air ducts. The material may ignite by spontaneous combustion creating a fire hazard.

### **CAUTION**

Never burn garbage or paper in the heating system and never leave rags, paper or any flammable items around the unit.

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Manufactured By  
**Comfort-Aire / Century**  
1900 Wellworth Ave.  
Jackson, MI 49203



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### **IMPORTANT**

The installation of the furnace, wiring, warm air piping, etc., should conform to the requirements of the National Fire Protection Association and National Electrical Code recommendations of the National Environmental Systems Contractors Association, and any state or provincial laws or local ordinances. The local authorities having jurisdiction should be consulted before installation is made. Such applicable regulations or requirements take precedence over the general instructions in this manual. Reference should also be made to the following publications, using whichever publications apply to the installation:

- Standard for the Installation of Oil Burning Equipment, Pamphlet NFPA No. 31; CSA Standard CAN/CSA B139.
- Standard for the Installation of Air Conditioning, Warm Air Heating and Ventilating System, Pamphlet NFPA No. 90A and No. 90B.
- Building Code Standards for the Installation of Heat Producing Appliances, Heating, Ventilating, Air Conditioning, Blower and Exhaust Systems.
- National Electrical Code NFPA No. 70; Canadian Electrical Code Part 1, CSA 22.1

## INSTALLATION OF FURNACE

Read all instructions before starting work so installation will conform to Underwriters' Laboratories or Canadian Standards Association requirements. The furnace must be level when placed on its foundation or in its suspended position. Using a carpenter's level, check the furnace in at least two directions. The weight must be distributed evenly before the duct work is attached.

### General Information

These furnaces may be installed in a vertical or horizontal (right or left hand discharge) position.

These units are supplied with two solid doors on the blower compartment, leaving the bottom open for return air. The return air may also be brought in either side by removing a door and sealing off the bottom with a fabricated sheet metal section.

An external filter compartment can be installed on either side of furnace when used as an upflow furnace. When furnace is used in a horizontal position, a filter compartment can be installed on either side or bottom of unit.

When there is no return air duct or filter compartment used, a return air grille should be used on either side of furnace. There must be at least 36" clearance between grille and wall. Return air ducts must be used when furnace is installed in a confined space so that burner will have enough combustion air supply to function properly.

Installation of a duct type distribution system should follow standard design procedure. The outlet air plenum should be the same size as the opening in furnace. When a return air duct is used it should be the same size as the return air opening.

### Unpacking

Unit is shipped from the factory in one package. The appropriate oil burner along with the appropriate draft control are shipped separately as kits. See Table 1 for a complete listing of the kits.

Available Kits	
FURNACE MODEL	OIL BURNER & DRAFT CONTROL KIT
LG14-225/275B40	A501-1
LG14-350/450B60	A502-1

Table 1

### **⚠ WARNING**

In any installation where damage from oil may occur, a drain pan must be installed. The drain pan must be large enough size to completely prevent any potential oil damage. The drain pan piping must be sized to drain the oil pump capacity and the piping must be routed to drain the oil back to the oil tank.

### LOCATION

Locate the furnace as centrally as possible so that all warm air ducts to the various rooms are nearly the same length. This allows each room to receive an equal and proper amount of heat. This may vary with each particular installation. Position the furnace so the pipe connection to the chimney will be of minimum distance and have a minimum of fittings.

If the equipment is installed in a furnace room, provide 1 square inch per 1000 BTU per hour input of free opening into the room for combustion air supply, or areas as specified by existing heating codes.

The installation must be such that all components are accessible for servicing. A minimum of 36" is recommended on one side of furnace for removing or servicing of blower assembly.

Installation on a combustible floor requires a 6" clearance from the floor.

**When accessibility clearances are greater than fire protection clearances, the accessibility clearances take precedence.** See Table 2 on page 3 for listing of minimum clearances for all models.

## Upflow Installation

Refer to Table 2 for minimum clearances required.

### Burner mounting procedure

The oil burner incorporates a mounting flange on the blast tube that fits directly to the outer casing of the furnace (combustion chamber).

To mount the burner follow these steps:

1. Install the mounting gasket (supplied with the burner) around the burner blast tube and fit it flush to the mounting bracket. The burners use a die cut gasket and plate.
2. Remove the bottom 2 bolts and washers and the top 2 nuts and washers from the unit's burner entrance.
3. Insert the burner blast tube into the 5 3/4" hole which is the entrance to the combustion chamber.
4. Align the slots in the burner mounting plate over the unit's locating pins (threaded) so that the burner is in a straight vertical position. The burner blower will be on the bottom.
5. Install top 2 nuts and washers to secure the burner in place and then continue mounting procedure by installing bottom 2 bolts and washers.
6. Refer to the appropriate burner diagram for electrical hookup.

**Minimum Clearances to Combustibles**  
(All Models)

Furnace Sides/Top	6"
Plenum Sides/Top	6"
Front of unit (Burner Side)	24"
Flue Pipe of Draft Control	18"*
Bottom	0" (Non-Combustible Floor)**

\* The minimum clearance shown to the flue pipe may be reduced by using special protection permitted by local building codes and National Fire Protection Association Standards and CSA 139.

\*\*These units may be installed on a combustible floor only when a minimum of 6" of clearance is provided between the floor and the unit.

**Table 2**

## Horizontal Installation

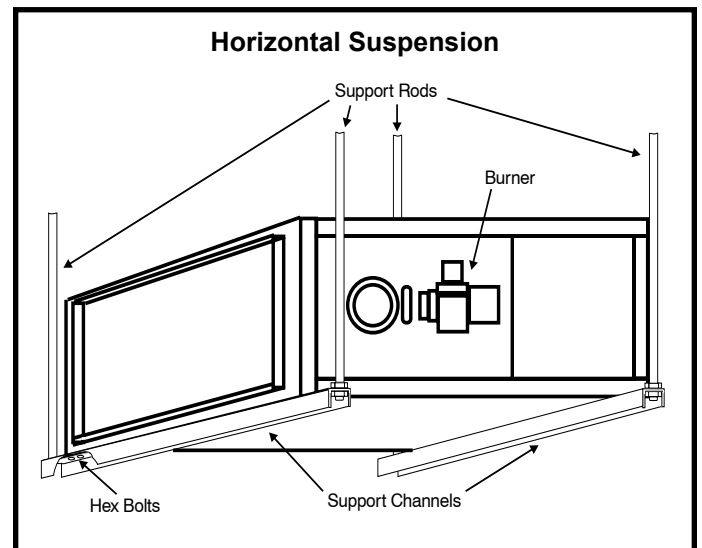
The components as indicated in the following steps must be rotated for horizontal applications.

1. Install burner as shown in Figure 1. Follow the steps shown in **Upflow Installation**.
2. If oilers are provided on the blowers they must be rotated so they can be oiled.
3. If oilers are provided on motor, loosen bolts on resilient mount of motor and rotate so motor can be oiled.
4. Refer to Table 2 for minimum clearances required.

## Horizontal Suspension

Use channel iron supports and 3/4" pipes or 1/2" rods to suspend the furnace. Follow these steps to suspend the furnace (see Figure 1):

1. While furnace is in vertical position, remove bolts that hold corner post to hood and base. Use same bolts to secure channels to furnace.
2. Lay furnace down on channels. **Channels must be installed so that furnace is on top of channels.**
3. Use channels to hoist furnace in position for suspending.
4. Cut 3/4" pipe or 1/2" rods to length, threading end that goes through channel.
5. Use 1 flat washer and 2 nuts on each support rod. Use the 2nd nut for locking.



**Figure 1**

It is very important that the furnace be exactly level since a level unit is necessary for proper fitting of parts. Using a carpenter's level, check the furnace in at least two directions. If the furnace is not level, place fireproof wedges or shims between the low side of the furnace and the floor and check again with the level. The weight of the unit must be distributed evenly on all four corners.

## Air Conditioning

### WARNING

When an air conditioning unit is used in conjunction with the furnace, the evaporator coil must be installed in the discharge (supply) air. Do not install an evaporator coil in the return air; excessive condensation will occur within the furnace.

If the furnace is installed in a confined space and combustion air is taken from the heated space, the supply air and ventilating air must be through two permanent openings of equal area. A confined space is an area with volume less than 50 cubic feet per 1000 BTU per hour of the total input rating of all appliances installed in that space. One opening must be within 12 inches of the ceiling and the other within 12 inches of the floor. Each opening must have a minimum free area of at least 1 square inch per 1000 BTU per hour of the total input rating of all appliances within the space but not less than 100 square inches.

If the furnace is installed in a space within a building of tight construction, air must be supplied from outdoors. In this case, one opening shall be within 12 inches of the ceiling and the other within 12 inches of the floor. If vertical combustion air ducts are run, each opening must have a free area of at least 1 square inch per 4000 BTU per hour. If horizontal combustion air ducts are run, 1 square inch per 2000 BTU per hour of the total input rating of all appliances is required.

A return air duct system is recommended. Where there is no complete return air duct system, a return connection should be run full size to a location outside the confined space and completely sealed so that no air from the confined space can be circulated through the heating duct system.

## VENTING

### WARNING

Combustion air openings in the front of the furnace must be kept free of obstructions. Any obstruction will cause improper burner operation and may result in a fire hazard or injury.

## Outdoor Make Up Air

A minimum mixed return air temperature of 60-65° F must be maintained for outdoor make up air to prevent condensation and corrosion.

### WARNING

The barometric control shall be in the same atmospheric pressure zone as the combustion air inlet to the furnace. Deviation from this practice will cause improper burner operation and may result in a fire hazard or injury.

## Chimney

Before installing the furnace, a thorough inspection of the chimney should be made to determine whether repairs are necessary and that the chimney is of the proper size and constructed in accordance with the requirements of the **National Board of Fire Underwriters or Canadian Standards Association**. The smallest dimension of the chimney should be at least equal to the diameter of the flue pipe of the furnace. Be sure the chimney will produce a steady draft sufficient to remove all the products of combustion from the furnace. A fabricated vent system the same size as the flue outlet of the furnace may also be used. If a manufactured vent is used, it must be listed for use with oil fired equipment.

## Combustion & Ventilation Air

Adequate provisions for combustion air, ventilation of furnace and dilution of the gases must be made. When a furnace is installed in an unconfined space in a building, it can be assumed that infiltration will be sufficient to supply the required air.

## Venting Instructions

### **⚠ WARNING**

This furnace is certified for use with Type "L", Type "A" and "Factory-Built" chimneys. "B" vent must not be used with oil furnaces.

1. Local building codes may have more stringent installation requirements and should be consulted before installation of the unit.
2. The flue pipe should be as short as possible to do the job.
3. The flue pipe should not be smaller than the outlet diameter of the flue outlet of the furnace.
4. Single wall flue pipe should not run outside or through any unconditioned space.
5. The chimney should terminate 2 feet above the highest peak of a peaked roof, and 3 feet higher than a flat roof.
6. The flue pipe must not pass through a floor or ceiling. Clearances to single wall flue pipe should be no less than specified in Table 2 on page 3.
7. The flue pipe may pass through a wall where provisions have been made for a thimble as specified in the Standards of the **National Board of Fire Underwriters**. See Figure 2.
8. The flue pipe should slope upward toward the chimney on a horizontal run at least 1/4 inch to the foot and should be supported by something other than the furnace. See Figure 3 on page 6.
9. Extend the flue pipe into the chimney so that it is flush with the inside of the flue liner. Seal the joint between the pipe and the liner.
10. The furnace shall be connected to a factory-built chimney or vent complying with a recognized standard, or a masonry or concrete chimney lined with a lining material acceptable to the authority having jurisdiction.
11. When 2 or more appliances vent into a common flue, the area of the common flue should not be less than the area of the largest flue or vent connection plus 50 percent of the areas of the additional vents or flue connections. The chimney must be able to sufficiently vent all appliances operating at the same time.
12. **The flue pipe shall not be connected to a chimney flue serving a solid fuel appliance or any mechanical draft system.**
13. All unused chimney openings should be closed.
14. All vent pipe run through unconditioned areas or outside shall be constructed of factory-built chimney sections. See Figure 3 on page 6.
15. Where condensation of flue gases is apparent, the vent shall be constructed to prevent the condensation from entering the flue transition box opening. Provisions shall be made to drain off the condensate. See Figure 3 on page 6.
16. Vent connectors serving this appliance shall not be connected into any portion of mechanical draft systems operating under positive pressure.
17. Keep the area around the vent terminal free of snow, ice and debris.

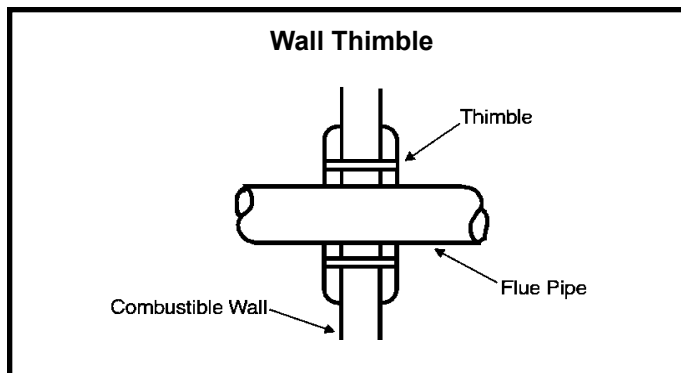


Figure 2

### Smoke Pipe and Draft Control

Connect the furnace vent to the chimney with galvanized smoke pipe and fittings, maintaining full diameter of furnace vent throughout. No reduction in diameter of pipe is allowed. It is best to have the smoke pipe as short and direct as possible. The smoke pipe shall maintain a rise of at least 1/4" per foot. Install draft control at least 12" beyond the furnace.

### Supply & Return Air Plenum

Secure return air plenum to unit using sheet metal screws.

Follow these procedures when installing the supply air plenum:

1. Use sealing strips of fiberglass.
2. Attach the plenum to the furnace or evaporator cabinet with sheet metal screws.
3. Both supply and return air plenums shall be square and at least 18" long. They should be the same dimension as the furnace opening.
4. Install supply and return air ducts as desired.

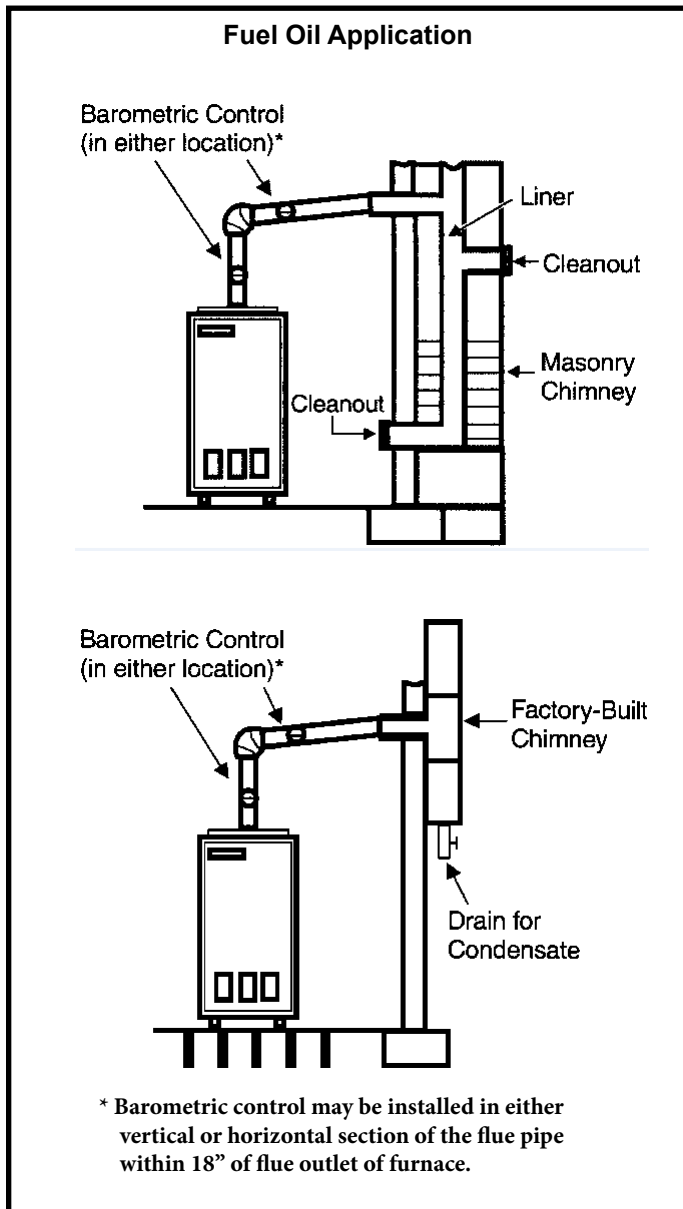


Figure 3

### Oil Supply and Filter Connection

Continuous lengths of heavy wall copper tubing or steel pipe are recommended and should be installed under the floor or near walls to protect from damage. Do not run lines on floor joist or other reverberating surfaces. Always use flare fittings located in accessible places.

Oil filters are required and should be replaced yearly. It is recommended that 2 filters be used, 1 located at the tank and the other near the burner. 10 micron filters are recommended.

### Fan & Limits

The fan and limit switches are located in a position to give the unit the best protection and operation and do not require any change when unit is installed in horizontal position.

If a local requirement calls for a manual reset or any other type of limit or location, this control must be wired in series with the limits that are supplied on unit. If this is not followed, the warranty of heat exchanger and components are voided.

### Electrical Wiring

All wiring must conform to the **National Electrical Code**, the **Canadian Electrical Code** and any local codes. The only electrical connections required on these units are those from the power supply to the junction box on the unit and the 2 burner power supply lines. Refer to the wiring diagram provided on page 9 and those supplied with the burner.

### Thermostat

Locate the thermostat on an inside wall in a room usually occupied during the day at a height of 4 1/2 feet from the floor. Avoid direct sunlight or supply air from a register. Make sure the location is not adjacent to appliances such as ovens or lights.

Wire the thermostat with minimum of #18 AWG thermostat wire.

## BURNER ADJUSTMENT AND OPERATION

### Oil Burner Adjustment

**Refer to the manual supplied with the oil burner for more detailed instructions.**

The furnaces covered in this section are designed to operate at the following combustion settings for the most efficient operation. The following tests should be taken after 15 minutes of operation. A 5/16" diameter hole should be drilled in the flue pipe upstream of the barometric control, where the test samples can be taken.

1. Stack draft: -.08" WC
2. Smoke reading: 0 to trace on a smoke tester
3. CO<sub>2</sub>: 10% - 11%
4. Stack temperatures: 350° - 450° Net

**Do not set air adjustment by observing flame. A smoke tester and CO<sub>2</sub> or O<sub>2</sub> analyzer must be used.**

The nozzle should be replaced with the same type or one that is similar to the type listed on the label located on the front panel adjacent to the oil burner. Refer to Table 3 for the proper nozzle specifications for each unit.

MODEL	OUTPUT	NOZZLE	ANGLE	PATTERN
LG14-225/275B40	225,000	2.0 GPH	70	SOLID
	275,000	2.5 GPH	60	SOLID
LG14-350/450B60	350,000	3.0 GPH	70	SOLID
	450,000	4.0 GPH	60	SOLID

**Table 3**

## Oil Burner Operation

Refer to the manual provided with the oil burner for information on settings of electrodes, nozzles and spinner locations.

Low fire nozzle is installed in burner. High fire nozzle is separately packaged with burner. See the unit nameplate.

Before starting the unit, the necessary fuel and electrical connections should be made in accordance with the instructions provided in this manual.

To prepare unit for starting:

1. Make sure the thermostat is set below room temperature and the circuit breaker and fuel valves are on.
2. Bleed the fuel lines of air using the following procedure. After opening the bleed plug, set the thermostat to call for heat and allow the air and oil to bleed from the pump into a container. The safety switch may have to be reset several times to completely evacuate the system of air. After the fuel lines have been completely bled of air, close the bleed plug, turn the thermostat back and reset the safety switch. The unit should now be ready to start.

### ***Sequence of Operation***

1. Set thermostat to call for heat.
2. The control will power the burner and oil valve, and the burner will start.
3. Air temperature will close fan switch, powering the blower motor. On units using a motor contactor, fan switch will energize the contactor coil and close contactor to power blower motor.

## SERVICE AND MAINTENANCE

Proper maintenance procedures, such as those outlined below, can reduce service problems and increase the life of the furnace.

### **Lubrication**

For motor lubrication, refer to the lubrication instructions attached to the motor. For blower lubrication, refer to the lubrication instructions found on the blower housing.

### **Filters**

There are no set rules for how often filters need changing or cleaning. This will vary due to dirt content of the air under various conditions. Keeping filters clean will prolong the life of the heat exchanger and motors.

### **Heat Exchanger**

The heat exchanger should be checked yearly for dirt and carbon. The main drum can be cleaned through relief tube opening or burner opening. The secondary or tube section can be cleaned with a long handle wire brush. If the gasket is broken when the collector box is removed, replace with 1/8" x 1" insulated stripping.

### **Blower Assembly**

If unit is installed where there is a large amount of dirt in the air, blower wheels should be cleaned yearly or more if necessary. Dirt filled blades will cause reduced air delivery and poor operation of unit. To remove the blower assembly, remove the 4 screws that hold blower assembly in blower tracks. The blower assembly can be removed from either side. When blower assembly is replaced, fasten with same screws that were removed.

### **Burner and Fan**

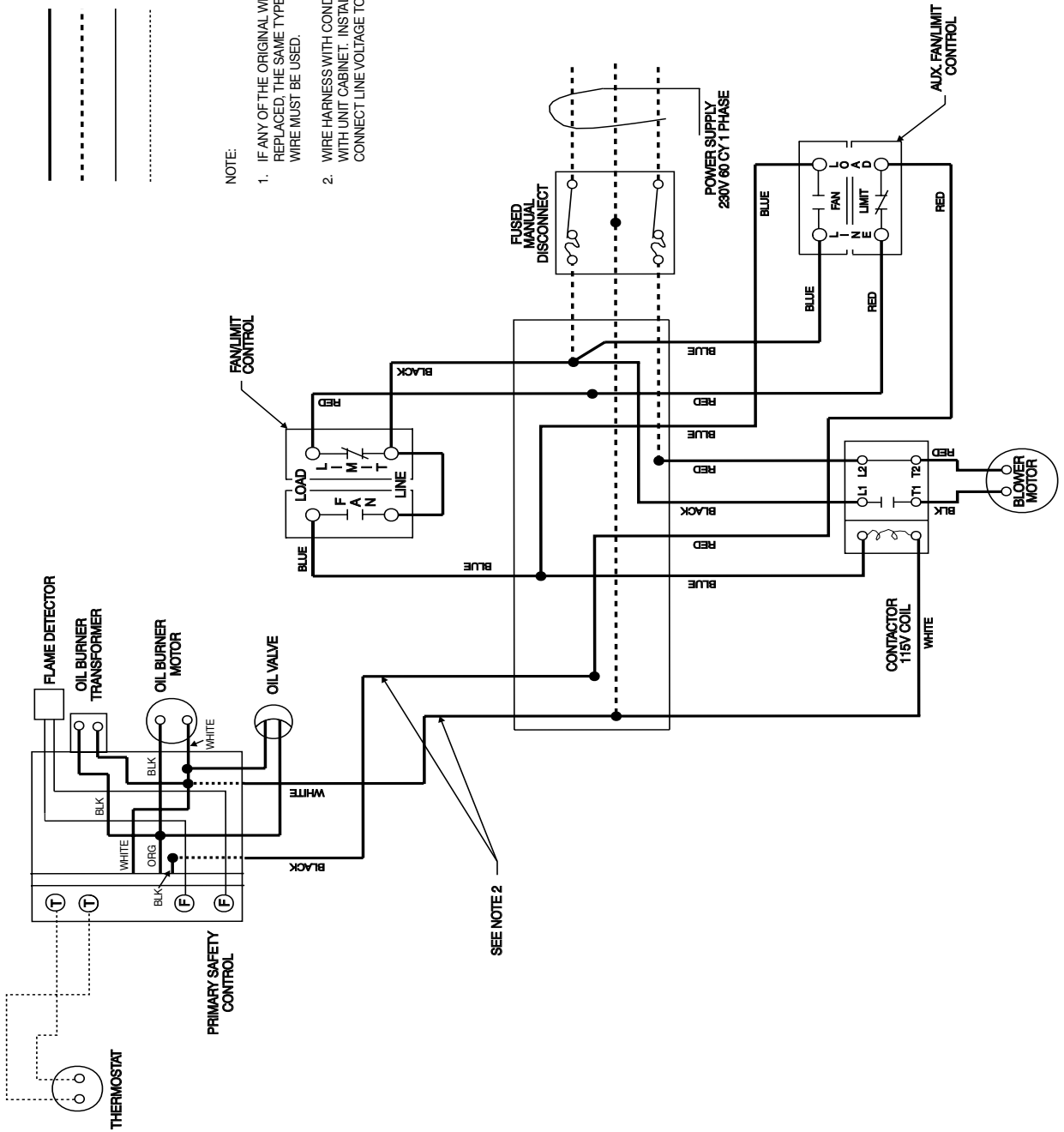
The burner and fan should be cleaned yearly if installed where there is a large amount of dirt in the air.



# Wiring Diagram Oil Burner Furnace

LINE VOLTAGE - FACTORY  
 LINE VOLTAGE - INSTALLER  
 LOW VOLTAGE - FACTORY  
 LOW VOLTAGE - INSTALLER

- NOTE:
1. IF ANY OF THE ORIGINAL WIRE IS REPLACED, THE SAME TYPE AND SIZE WIRE MUST BE USED.
  2. WIRE HARNESS WITH CONDUIT SUPPLIED WITH UNIT CABINET. INSTALLER MUST CONNECT LINE VOLTAGE TO BURNER.



39928D002

Figure 4







## LIMITED EXPRESS WARRANTY LG14 INDUSTRIAL/COMMERCIAL OIL FURNACE

This limited express warranty is applicable to the Patriot® Series of Oil Furnaces manufactured by MARS.

### LIMITED EXPRESS HEAT EXCHANGER WARRANTY

Comfort-Aire/Century warrants the primary heat exchanger and the secondary heat exchanger to be free from defects in material and workmanship to the original owner for 5 years when installed in the purchaser's privately owned, single family residence. The warranty applies only when the furnace is installed per Comfort-Aire/Century installation instructions and in accordance with all local, state and national codes for normal use.

### LIMITED ONE (1) YEAR PARTS WARRANTY

All other components of the Industrial/Commercial Oil Furnace are warranted to be free from defects in material and workmanship for a period of one (1) year from the date of purchase by the original owner provided the furnace is installed per Comfort-Aire/Century installation instructions and in accordance with all local, state and national codes for normal use.

### EXCEPTIONS

The Limited Express Warranty does not cover normal maintenance— Comfort-Aire/Century recommends that regular inspection/maintenance be performed at least once a season and proof of maintenance be kept. Additionally, labor charges, transportation charges for replacement parts, replacement of filters, any other service calls/repairs are not covered by this Limited Warranty. It also does not cover any portion or component of the furnace that is not supplied by Comfort-Aire/Century, regardless of the cause of failure of such portion or component.

### CONDITIONS OF WARRANTY COVERAGE

The warranty begins on the date of purchase by the original consumer. The consumer must retain a receipted bill of sale as proof of warranty period. Without this proof, the express warranty begins on the date of shipment from the factory.

### REMEDY PROVIDED BY THE LIMITED EXPRESS WARRANTY

The sole remedy under the Limited Warranty is replacement of the defective part. If replacement parts are required within the period of this warranty, MARS replacement parts shall be used; any warranty on the

replacement part(s) shall not affect the applicable original unit warranty. Ready access to the unit for service is the owner's responsibility. Labor to diagnose and replace the defective part is not covered by this Limited Express Warranty. If for any reason the replacement part/product is no longer available during the warranty period, MARS shall have the right to allow a credit in the amount of the current suggested retail price of the part/product instead of providing repair or replacement.

### LIMITATION OF LIABILITY

1. There are no other express or implied warranties. MARS makes no warranty of merchantability. We do not warrant that the unit is suitable for any particular purpose or can be used in buildings or rooms of any particular size or condition except as specifically provided in this document. There are no other warranties, express or implied, which extend beyond the description in this document.
2. All warranties implied by law are limited in duration to the five-year term of the parts warranty. Your exclusive remedy is limited to the replacement of defective parts. **We will not be liable for any consequential or incidental damages caused by any defect in this unit.**
3. This warranty gives you specific legal rights and you may also have other rights which vary from state to state. Some states do not allow limitation on how long an implied warranty lasts or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you.
4. No warranties are made for units sold outside the continental United States and Canada. Your distributor or final seller may provide a warranty on units sold outside these areas.
5. MARS will not be liable for damages if our performance regarding warranty resolution is delayed by events beyond our control including accident, alteration, abuse, war, government restrictions, strikes, fire, flood, or other acts of God.

### HOW TO OBTAIN WARRANTY SERVICE OR PARTS

If you have a warranty claim, notify your installer promptly. If the installer does not remedy your claim, write to MARS, 1900 Wellworth Ave., Jackson MI 49203. Enclose a report of inspection by your installer or service person. Include model number, serial number, and date of purchase.

**Owner responsibilities are set forth in the instruction manual—read it carefully.**

**Please visit [www.marsdelivers.com](http://www.marsdelivers.com) to register your new product**



### KEEP THIS INFORMATION AS A RECORD OF YOUR PURCHASE

#### OIL FURNACE

\_\_\_\_\_ Model Number

\_\_\_\_\_ Serial Number

\_\_\_\_\_ Date of Purchase

#### INSTALLATION

\_\_\_\_\_ Installer Name

\_\_\_\_\_ Phone No./Contact Info

\_\_\_\_\_ Date Installation Completed

Component of new HVAC system

Replacement only

**Remember to retain your bill of sale as proof of warranty period.**