

Service and Maintenance Instructions For Sizes 060-100, Series 140

NOTE: Read the entire instruction before starting the installation.

SAFETY CONSIDERATIONS

Installation and service of heating equipment can be hazardous due to gas and electrical components. Only trained and qualified personnel should install, repair, or service heating equipment.

Untrained personnel can perform basic maintenance functions such as cleaning and replacing air filters. All other operations must be performed by trained service personnel. When working on heating equipment, observe precautions in the literature, tags, and labels attached to or shipped with the unit and other safety precautions that may apply.

Follow all safety codes, including NFPA 54/ANSI Z223.1-1988, National Fuel Gas Code. Wear safety glasses and work gloves. Have a fire extinguisher available during start-up and adjustment procedures and service calls.

Recognize safety information. This is the safety-alert symbol . When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury.

Understand the signal word—DANGER, WARNING, or CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which will result in severe personal injury or death. WARNING signifies hazards that could result in personal injury or death. CAUTION is used to identify unsafe practices, which would result in minor personal injury or product and property damage.

WARNING

Never store anything on, near, or in contact with, the furnace, such as:

1. Spray or aerosol cans, rags, brooms, dust mops, vacuum cleaners, or other cleaning tools.
2. Soap powders, bleaches, waxes or other cleaning compounds, plastic or plastic containers, gasoline, kerosene, cigarette lighter fluid, dry cleaning fluids, or other volatile fluids.
3. Paint thinners and other painting compounds, paper bags or other paper products.

Failure to follow this warning can cause corrosion of the heat exchanger, fire, personal injury, or death.

CARE AND MAINTENANCE

For continuing high performance and to minimize possible equipment failure, it is essential that maintenance be performed annually on this equipment. Consult your local dealer for maintenance and the availability of a maintenance contract.

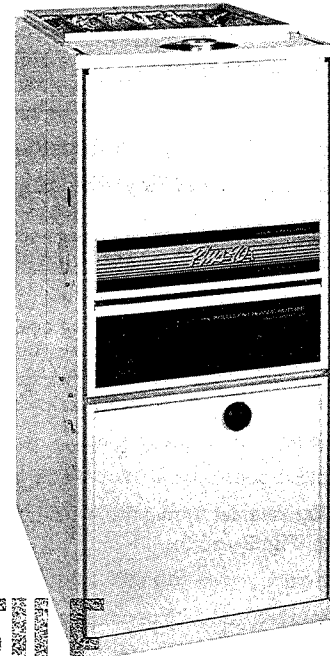


Fig. 1—Model 58SXB Upflow Furnace

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WARNING

The ability to properly perform maintenance on this equipment requires certain expertise, mechanical skills, tools, and equipment. If you do not possess these, do not attempt to perform any maintenance on this equipment other than those procedures recommended in the User's Manual. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN POSSIBLE DAMAGE TO THIS EQUIPMENT, SERIOUS PERSONAL INJURY, OR DEATH.

WARNING

Turn OFF the gas and electrical supplies to the unit before performing any maintenance or service. Follow the operating instructions on the label attached to the furnace. Failure to follow this warning could result in personal injury.

The minimum maintenance that should be performed on this equipment is as follows:

1. Check and clean or replace air filter each month or as required.

2. Check blower motor and wheel for cleanliness and lubrication each heating and cooling season. Clean and lubricate as necessary. (See Step 2.)
3. Check electrical connections for tightness, and controls for proper operation each heating season. Service as necessary.
4. Check for proper condensate drainage; clean as necessary.
5. Check for blockages of combustion-air and vent pipes.

⚠ CAUTION

As with any mechanical equipment, personal injury could result from sharp metal edges, etc. Be careful when removing parts.

Step 1—Air Filter Cleaning and Replacement

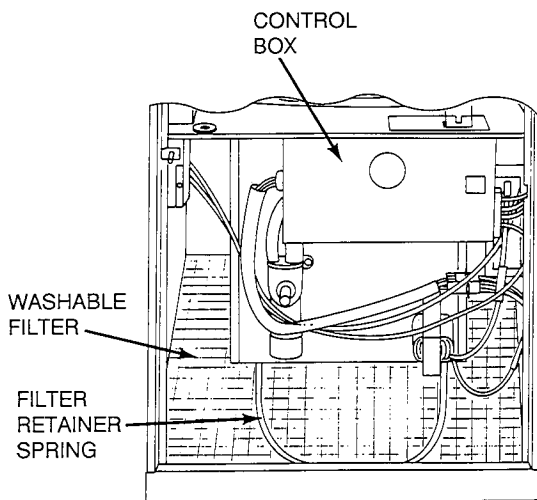
The air filter arrangement may vary depending on the application.

⚠ CAUTION

Never operate unit without a filter or with filter access door removed. Failure to follow this warning could result in a fire or personal injury.

To clean or replace the air filter, proceed as follows:

1. Turn OFF electrical supply to unit.
2. Remove access doors.
3. Release filter retainer spring from behind flange of furnace casing. (See Fig. 2 and 3.)
4. Slide filter out.
5. Furnaces are equipped with permanent, washable filters. Clean filter by spraying cold tap water through filter in opposite direction of airflow.
6. Rinse filter and let dry. Oiling or coating of filter is not recommended or required.
7. Place filter in furnace with cross-mesh binding either up or facing blower.
8. Replace access doors.
9. Turn ON electrical supply to furnace.

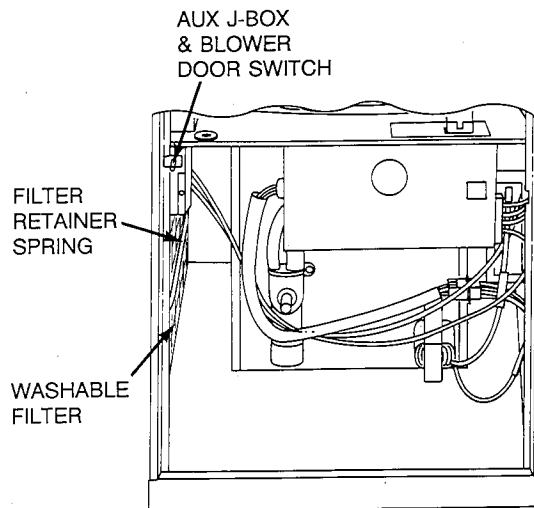


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Fig. 2—Filter Installed for Bottom Inlet

Step 2—Blower Motor and Wheel Maintenance

For long life, economy, and high efficiency, clean accumulated dirt and grease from blower wheel and motor annually.



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Fig. 3—Filter Installed for Side Inlet

The following items should be performed by a qualified service technician:

Some motors have prelubricated, sealed bearings and require no lubrication. These motors can be identified by the absence of oil ports on each end of the motor. For motors with oil ports, lubricate as follows:

Lubricate motor every 5 years if motor is used for intermittent operation (thermostat FAN switch in AUTO position), or every 2 years if motor is in continuous operation (thermostat FAN switch in ON position).

Clean and lubricate as follows:

1. Turn OFF electrical supply to unit.
2. Remove access doors.
3. Remove drain trap and control box:
 - a. Remove control box from bottom side of blower shelf and position to one side.
 - b. Disconnect 9-circuit connector PL-4 from blower housing.
 - c. Using backup wrench, disconnect drain pipe at coupling in blower compartment.
 - d. Loosen hose clamp and remove 7/8-in. diameter drain hose from drain trap.
 - e. Loosen hose clamp and disconnect 5/8-in. diameter drain hose at bottom of inducer housing located under blower shelf.
 - f. Remove screws securing drain trap assembly.
4. Remove screws securing blower assembly to blower shelf and slide blower assembly out of furnace.
5. Squeeze side tabs of connector PL-4 and pull from blower housing bracket.
6. Mark blower wheel location on shaft before disassembly to insure proper reassembly.
7. Loosen setscrew holding blower wheel on motor shaft.

NOTE: Mark blower mounting arms and blower housing so each arm is positioned at the same hole location during reassembly. This will insure that oilers point up.

8. Remove bolts holding motor mount to blower housing and slide motor and mounts out of housing.
9. Lubricate motor (when oil ports are provided).

- a. Remove dust caps or plugs from oil ports located at each end of motor. If motor does not have these caps or plugs, bearings are sealed and need no further lubrication.
 - b. Use a good grade of SAE 20 nondetergent motor oil and add one teaspoon (5 cc, 3/16 oz, or 16 to 25 drops) in each oil port. The use of other types or grades of oil will damage the motor. Excessive oiling can cause premature bearing failures.
 - c. Allow time for total quantity of oil to be absorbed by each bearing.
 - d. After oiling motor, wipe excess oil from motor housing.
 - e. Replace dust caps or plugs on oil ports.
10. Remove blower wheel from housing:
 - a. Mark blower wheel orientation and cutoff plate location to insure proper reassembly.
 - b. Remove screws securing cutoff plate and remove cutoff plate from housing.
 - c. Remove blower wheel from housing.
 11. Clean blower wheel and motor using a vacuum with soft brush attachment. Be careful not to disturb balance weights (clips) on blower wheel vanes. Do not drop or bend wheel as balance will be affected.
 12. Reassemble blower by reversing items 10.a. through 10.c. Ensure wheel is positioned for proper rotation.
 13. Reassemble motor and blower by reversing items 5 through 8. If motor has ground wire, be sure it is reconnected.

⚠ CAUTION

Ensure the motor is properly positioned in the blower housing. The motor oil ports must be at a minimum of 30° above the horizontal centerline of the motor after the blower assembly has been reinstalled in the furnace.

14. Reinstall blower assembly in furnace.
15. Reinstall drain trap and control box:
 - a. Inspect drain trap and hoses to ensure they are not blocked or restricted. Reinstall drain trap and hoses. Be sure to tighten hose clamps.
 - b. Using backup wrench, attach drain pipe and tighten compression coupling.
 - c. Reconnect 9-circuit connector. Note that connector is polarized for correct assembly; **do not force connector**.
 - d. Reinstall control box on bottom side of blower shelf.
16. Turn ON electrical supply and check for proper rotation and speed changes between low- and high-heat and cooling; operate unit 10 minutes and carefully check for condensate leaks.

Step 3—Cleaning Heat Exchangers

The following items should be performed by a qualified service technician:

If it becomes necessary to clean the heat exchanger because of carbon deposits, soot, etc., proceed as follows:

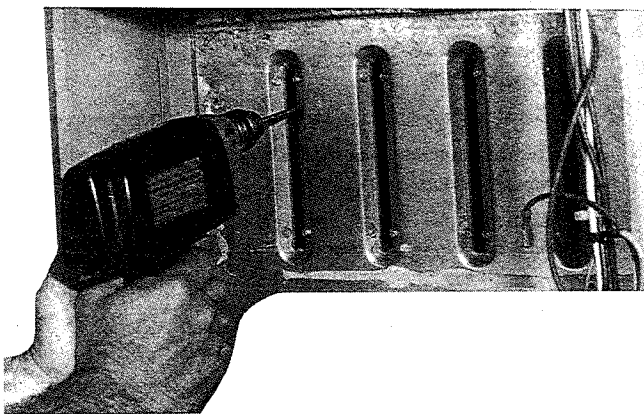
NOTE: Deposits of soot and carbon indicate a problem exists that needs to be corrected. Action must be taken to correct the problem.

1. Turn OFF gas and electrical supplies to furnace.
2. Remove control and blower access doors.
3. Loosen hose clamps on combustion-air pipe and move air pipe aside.

4. Using backup wrench, disconnect gas supply at ground joint union. Remove gas pipe from valve.
5. Disconnect pilot leads at 3-circuit connector outside of burner enclosure.
6. Disconnect high-voltage lead at spark generator.
7. Disconnect gas valve leads at 6-circuit connector on top of valve.
8. Disconnect pressure tubing from right side of burner enclosure and outlet end of gas valve.
9. Remove burner enclosure front.
10. Remove diffuser from inside top of burner enclosure. Remove screws that secure burner enclosure to cell panel. These screws are located inside the burner enclosure.
11. Using care not to damage cell inlet panel gasket, remove gas control assembly from furnace.
12. Loosen hose clamps at vent pipe connection; disconnect vent pipe and position to one side.
13. Loosen hose clamp and remove drain tube from inducer outlet box.
14. Disconnect both 6-circuit connectors from electronically commutated motor (ECM) inducer controller mounted on left side of furnace.
15. Remove screws securing ECM inducer controller to mounting plate attached to left side of furnace.
16. Disconnect 15-circuit connector from main control box at blower shelf.
17. Disconnect 6-circuit connector from both pressure switches.
18. Remove screws securing main control box to blower shelf and position control box to one side.
19. Loosen hose clamp and remove drain tube from inducer housing located on bottom side of blower shelf. (See Fig. 7.)
20. Remove mounting screws securing inducer assembly to collector box; remove inducer assembly and remove all old sealant from parts.
21. Remove screws securing coupling box and remove from furnace. Remove all old sealant from parts.
22. Remove choke plate (when used) from primary heat exchanger outlet.
23. Loosen hose clamp and remove 7/8-in. drain tube from trap. (See Fig. 7.)
24. Place bucket under 7/8-in. drain tube.
25. Using garden hose, flush each cell of the condensing heat exchanger with water. Use care not to spray water onto interior surfaces of control compartment. Dry all surfaces. Be careful **not** to remove sealant around cell openings in cell panel.
26. Using field-provided small wire brush, steel spring cable, reversible electric drill, and vacuum cleaner, clean primary heat exchanger cells. **Do not use wire brush or other sharp object to clean condensing heat exchanger.** Failure of the condensing heat exchanger will occur—flush with water only.
 - a. Assemble wire brush and steel spring cable.
 - (1.) Use 4 ft of 1/4-in. diameter high-grade steel spring cable (commonly known as drain cleaning or Roto-Rooter cable).
 - (2.) Use 1/4-in. diameter wire brush (commonly known as 25-caliber rifle cleaning brush).

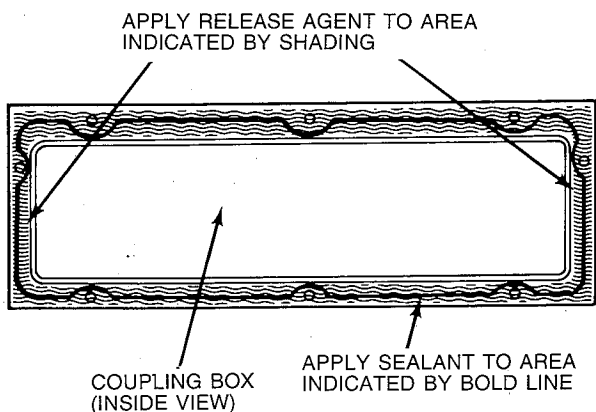
NOTE: The materials required above can be purchased at local hardware stores.

- (3.) Insert twisted wire end of brush into end of spring cable, and crimp tight with crimping tool or strike with ball-peen hammer. *Tightness is very important.*
- (4.) Remove metal screw fitting from wire brush to allow insertion into cable.
- b. Clean each primary heat exchanger cell:
 - (1.) Attach variable-speed, reversible drill to end of spring cable (end opposite brush).
 - (2.) Insert brush end of cable into upper opening of cell and slowly rotate with drill. **Do not** force cable. Gradually insert at least 3 ft of cable into two upper passes of cell. (See Fig. 4.)
 - (3.) Work cable in and out of cell three or four times to obtain sufficient cleaning. **Do not** pull cable with great force. Reverse drill and gradually work cable out.
 - (4.) Insert brush end of cable in lower opening of cell, and proceed to clean two lower passes of cell in same manner as two upper passes.
 - (5.) Repeat procedures (above) until each furnace cell has been cleaned.
 - (6.) Using vacuum cleaner, remove residue from each cell.
 - (7.) Using vacuum cleaner with soft brush attachment, clean burner assembly.



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Fig. 4—Cleaning Primary Heat Exchanger Cell



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Fig. 5—Inside View of Coupling Box

Step 4—Reassemble Furnace (After Cleaning Heat Exchangers)

1. Install choke plate (when used). Be sure choke plate bottom conforms to top flange of condensing heat exchanger.

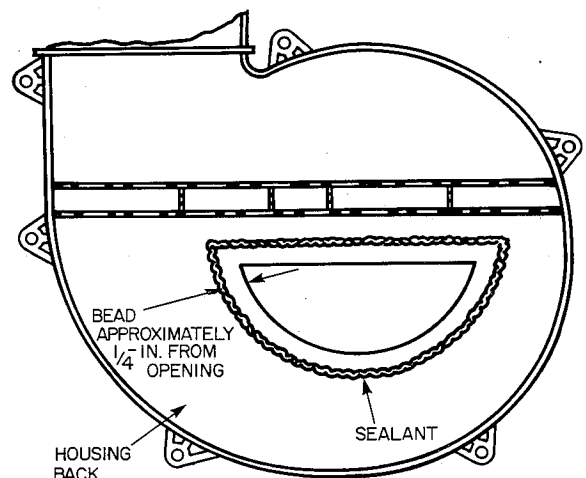
2. Reinstall coupling box:

- a. Apply sealant releasing agent (Pam) to coupling box flange and cell panel where coupling box flange matches. (See Fig. 5.)
- b. Apply a generous bead (3/16-in. dia) of G.E. RTV 122, 162, or Dow-Corning RTV 738 sealant (**NO substitute is permissible**) to flange of coupling box. Your distributor should have G.E. RTV 122, 162, or Dow-Corning RTV 738 sealants in stock.
- c. Being careful not to smear sealant, position coupling box so that slot in insulation is on left side and install coupling box.

3. Be sure small round gasket(s) is in place between blower shelf and inducer housing.

4. Reinstall inducer assembly:

- a. Apply sealant releasing agent (Pam) to collector box. (See Fig. 6.)
- b. Apply 1/8-in. diameter bead of G.E. RTV 122, 162, or Dow-Corning RTV 738 sealant to back of inducer housing. Apply sealant around inlet air opening. The sealant should be about 1/4 in. from the edge of the inlet air opening. (See Fig. 6.)



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Fig. 6—Backside of Inducer Assembly Housing

- c. Using stainless steel screws, install inducer assembly on collector box and support bracket to coupling box.
- d. Reconnect ECM inducer controller leads at both 6-circuit connectors.
- e. Reconnect pressure tubes to pressure switches. (See Fig. 7.)
- f. Connect small drain tube from top of trap to fitting on bottom of inducer housing. (See Fig. 7.)
- g. Connect drain tube from collector box to inducer outlet box.
5. Connect 7/8-in. drain tube to trap and collector box; tighten hose clamps. (See Fig. 7.)
6. Reinstall vent pipe; be sure clamps are tight.
7. Reinstall main control box on bottom of blower shelf.
8. Reconnect 15-circuit connector from wire harness to main control box.

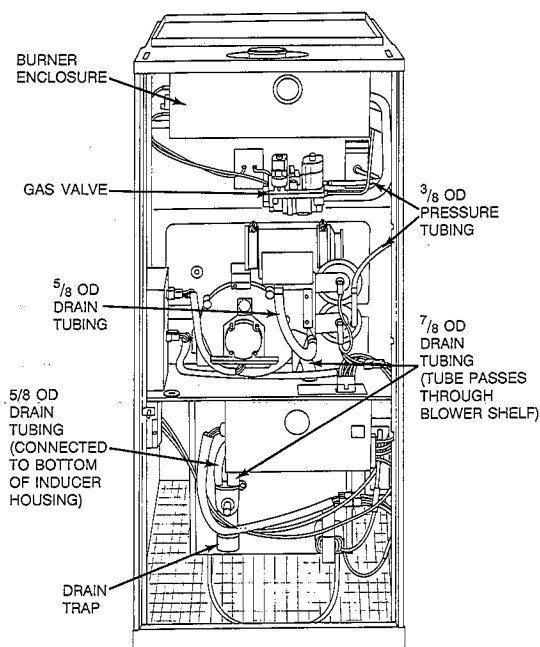


Fig. 7—Pressure and Drain Tubing Diagram

9. Check condition of gasket on cell inlet panel of burner enclosure. Replace gasket if necessary. (See Fig. 8.)

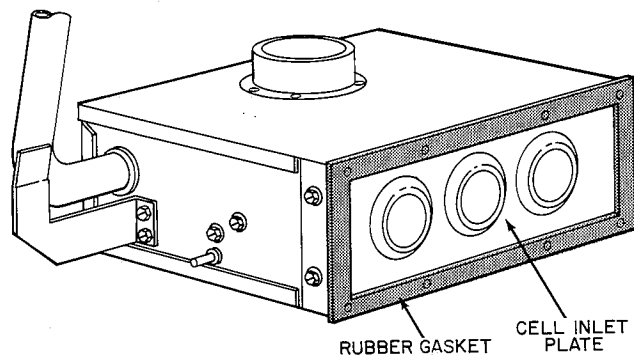


Fig. 8—Burner Enclosure

10. Install gas control assembly in furnace.
11. Install diffuser and burner enclosure front.
12. Reconnect pilot leads at 3-circuit connector.
13. Reconnect high-voltage lead to spark generator.
14. Reconnect gas valve leads at 6-circuit connector.
15. Reconnect pressure tubes to gas valve and burner enclosure. Be sure tubes are not kinked.
16. Using a backup wrench, install gas pipe in gas valve.
17. Reconnect gas pipe at ground joint union.
18. Reconnect combustion-air pipe. Tighten hose clamps.
19. Replace blower door only.
20. Turn ON gas and electrical supplies.

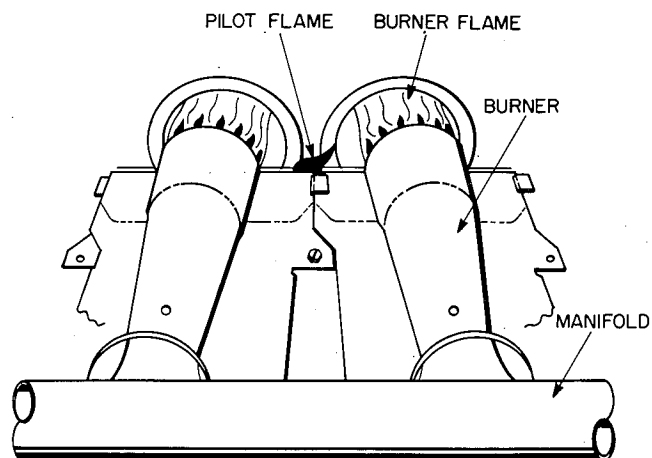


Fig. 9—Burner Flame

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21. Check furnace operation through two complete operating cycles. Look through sight-glass in burner enclosure to check burners. Burner flames should be clear blue, almost transparent. (See Fig. 9.)

⚠ WARNING

Never use matches, candles, flame, or other sources of ignition to check for gas leakage. Use a soap-and-water solution. Failure to follow this warning could result in a fire, personal injury, or death.

22. Check for gas leaks.
23. After condensate starts to drain, check for condensate leaks.
24. Replace control door.

Step 5—Clean Condensate Drainage System

1. Disconnect 5/8-in. drain tube from bottom of inducer housing. (See Fig. 7.)
2. Disconnect 7/8-in. drain tube from collector box. (See Fig. 7.)
3. Disconnect condensate drain line from drain trap at compression fitting.
4. Remove 1/4-in. screw(s) securing strap on drain trap to blower housing.
5. Remove drain trap/hose assembly from furnace and flush with water until clean.
6. Flush external condensate drain line with water until clean.
7. Reassemble condensate drainage system by reversing items 1. through 5.

Step 6—Pilot Assembly

Check the pilot assembly and clean if necessary at the beginning of each heating season. The pilot flame should be high enough for proper impingement of the safety element and to light the burners. Remove any accumulation of soot and carbon from the safety element. Check spark electrode gap. See Fig. 10 for proper spark gap and Fig. 11 for correct pilot location.

Step 7—Electrical Controls and Wiring

NOTE: There may be more than one electrical supply to the unit. With power disconnected to the unit, check all electrical connections for tightness. Tighten all screws on electrical connections. If any smokey or burned connections are found, disassemble the connection, clean all parts, strip wire, and reassemble properly and securely.

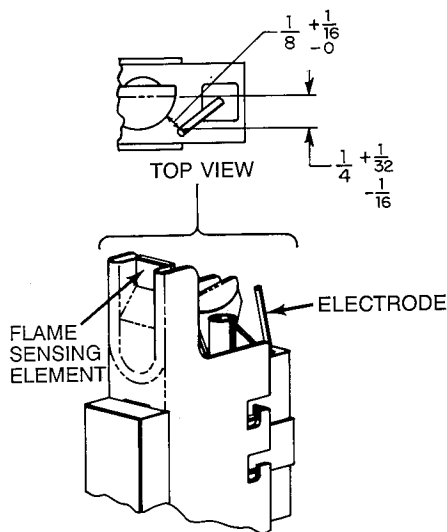


Fig. 10—Position of Electrode to Pilot

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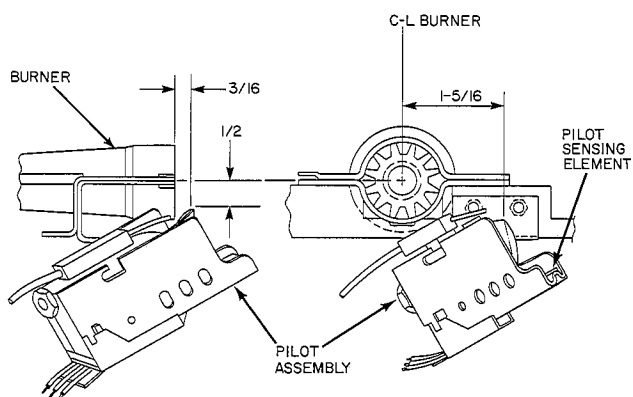


Fig. 11—Pilot/Burner Positions

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Reconnect electrical power to the unit and observe unit through one complete operating cycle. Electrical controls are difficult to check without proper instrumentation.

ELECTRICAL NOISE AND INTERFERENCE — This equipment generates and uses radio frequency energy and, if not installed and used properly (in strict accordance with the manufacturer's instructions), may cause interference with radio and television reception. The unit has been tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of Federal Communications Commission (FCC) Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in an installation. If this equipment does cause interference to radio or television reception (which may be determined by turning the equipment off and on), the user is encouraged to try correcting the interference by one or more of the following measures:

- (1.) Re-orient receiving antenna.
- (2.) Relocate receiver with respect to equipment.
- (3.) Move receiver away from equipment.
- (4.) Plug receiver into different outlet so that equipment and receiver are on different branch circuits.

- (5.) Slide Ferrite core electrical noise suppressor over thermostat wire.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The following booklet prepared by the FCC may be helpful: "How to Identify and Resolve Radio-TV Interference Problems." This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4.

SERVICE DIAGNOSTICS — This furnace has a light emitting diode (LED) display to aid the installer, homeowner, or service technician in installing or servicing the unit. (See Fig. 12.) The display can be seen through the view port provided in the blower door. To decipher the meaning of the display, refer to Fig. 13 or the fault code label inside the control access door.

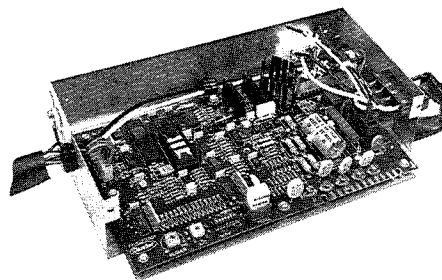


Fig. 12—Microprocessor Control Center

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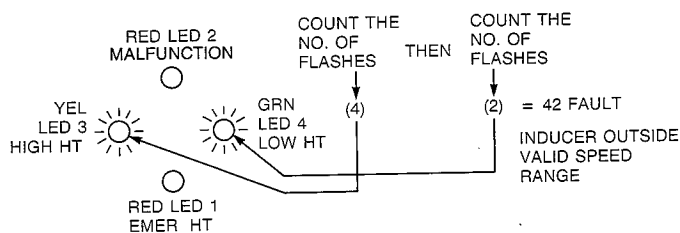


Fig. 13—Fault Code LED's

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View the display through the port provided in the blower door. If YEL LED 3 is lit continuously, the furnace is operating in the high-heat mode. If GRN LED 4 is lit continuously, the furnace is operating in the low-heat mode. If the lower RED LED 1 is lit continuously, the furnace is operating in the emergency-heat mode. If the upper RED LED 2 is lit continuously, the microprocessor has malfunctioned.

DO NOT REMOVE THE BLOWER DOOR IF LED's ARE FLASHING; the fault code will be lost.

Alternate flashing of the YEL and GRN LED's indicates a fault has occurred during operation. Count the number of times the YEL LED flashes and then count the number of times the GRN LED flashes. Once the fault code has been determined, refer to Table 1 or the fault code label inside the control access door to decipher the meaning of the display.

When power is turned ON at the main disconnect, a microprocessor self-test sequence will be completed in approximately 20 seconds. During this period the GRN LED will light for 12 seconds, followed by lighting of the YEL and GRN LED's for 1 second. After this period, the unit will operate if a thermostat signal is initiated.

Table 1—Fault Code Descriptions

CODE	DESCRIPTION
11	No faults in history display
12	Blower calibration lockout
13	High limit lockout
14	Pilot proving lockout
21	Invalid model selection
22	Set-up error
23	Cooling capacity error
24	Illegal thermostat input
31	High-pressure switch fault
32	Low-pressure switch fault
33	High limit fault
34	Pilot proving fault
41	Blower outside valid speed range
42	Inducer outside valid speed range
43	RPM ratio out of range
44	Blower calibration fault

Using this fault code, the owner may save the expense of a service call by following the procedures provided in the User's Manual. A service technician can follow the steps furnished in the appropriate section of the trouble shooting guide when correcting the problem.

NOTE: If the fault history is not cleared during servicing, the microprocessor will clear it internally after five heating cycles have been successfully completed without the fault occurring. This is done to prevent the storage of fault codes in the service history which are useless to the technician.

Step 8—Winterizing

⚠ CAUTION

The unit must not be installed, operated, and then turned off and left off in an unoccupied structure during cold weather when the temperature drops to 32° F and below. Freezing condensate left in the furnace will damage the equipment.

If the furnace will be off for an extended period of time in a structure where the temperature will drop to 32° F or below, winterize as follows:

1. Mix a solution of equal amounts of ethylene glycol (Prestone II antifreeze/coolant or equivalent) and water.
2. Turn OFF electrical supply to furnace.
3. Remove control access door.
4. Disconnect drain tube from bottom of inducer outlet box.
5. Insert funnel in drain tube and pour antifreeze/water solution into furnace until it is visible at point where condensate enters open drain.
6. Reconnect drain tube to outlet box.
7. Replace control access door.

