

Service and Maintenance Instructions For Sizes 040-140, Series 100

NOTE: Read the entire instruction manual before starting the installation.

These procedures are for size 40,000- through 140,000-Btuh units.

SAFETY CONSIDERATIONS

Installing and servicing 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. In the United States, follow all safety codes including the National Fuel Gas Code NFPA No. 54-1992/ANSI Z223.1-1992. In Canada, refer to the current edition of the National Standard of Canada CAN/CGA-B149.1- and .2-M91 Natural Gas and Propane Gas Installation Codes. Wear safety glasses and work gloves. Have 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 furnace and in instructions or manuals, be alert to the potential for personal injury.

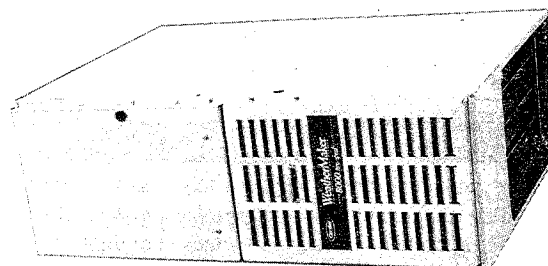
Understand the signal word DANGER, WARNING, or CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which will result in severe personal injury or death. WARNING signifies a hazard that could result in personal injury or death. CAUTION is used to identify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

WARNING

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. A FAILURE TO FOLLOW THIS WARNING COULD RESULT IN POSSIBLE DAMAGE TO THIS EQUIPMENT, SERIOUS PERSONAL INJURY, OR DEATH.

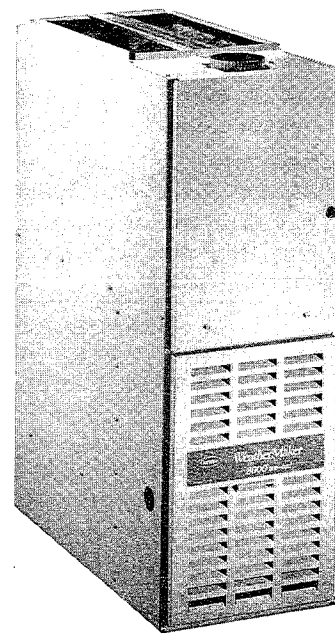
CARE AND MAINTENANCE

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



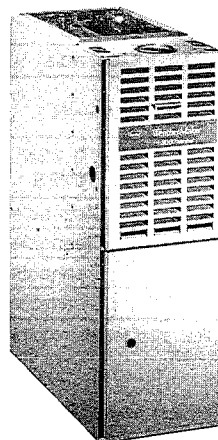
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Fig. 1—Model 58TMA Horizontal



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Fig. 2—Model 58TMA Downflow



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Fig. 3—Model 58TUA Upflow

⚠ 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.

A failure to follow this warning could result in corrosion of the heat exchanger, fire, personal injury, or death.

⚠ WARNING

Turn the gas and electrical supplies to the unit to OFF before performing any maintenance or service on it. Follow the operating instructions on the label attached to the furnace. A 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 air filter each month or more frequently if required. Replace if torn.
2. Check blower motor and wheel for cleanliness each heating and cooling season. Clean and lubricate as necessary.
3. Check electrical connections for tightness and controls for proper operation each heating season. Service as necessary.

⚠ CAUTION

As with any mechanical equipment, personal injury can result from sharp metal edges, etc.; therefore, be careful when removing parts.

AIR FILTER ARRANGEMENT — THE AIR FILTER ARRANGEMENT MAY VARY DEPENDING ON THE APPLICATION. REFER TO TABLE I OR II FOR FILTER SIZE INFORMATION.

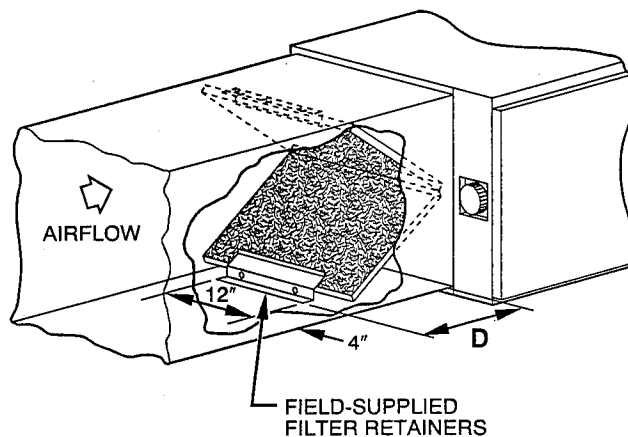
**Table 1—Filter Size Information
(Downflow/Horizontal—In.)**

FURNACE CASING WIDTH	FILTER SIZE	FILTER TYPE
14-3/16	(2) 14 X 20 X 1	Cleanable
17-1/2	(2) 14 X 20 X 1	Cleanable
21	(2) 16 X 20 X 1	Cleanable
24-1/2	(2) 16 X 20 X 1	Cleanable

Table 2—Filter Size Information (Upflow—In.)

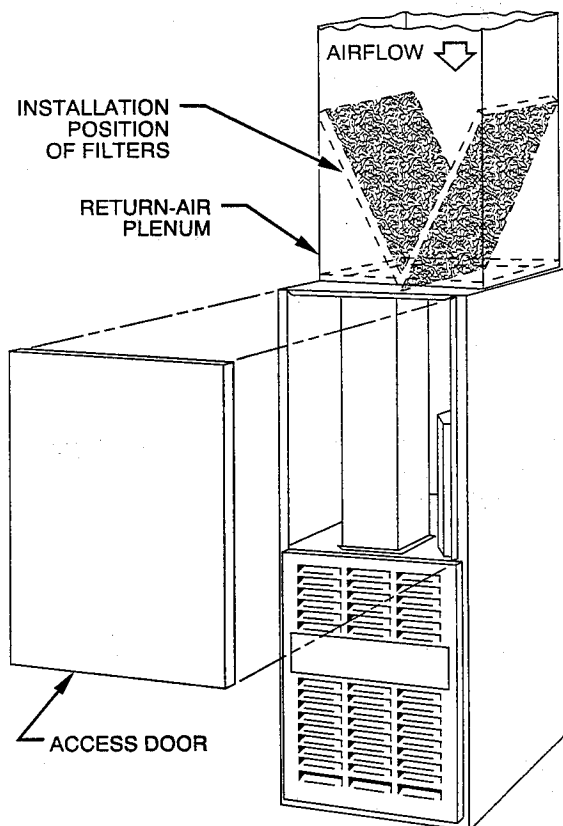
FURNACE CASING WIDTH	FILTER SIZE		FILTER TYPE
	Side Return	Bottom Return	
14-3/16	(1) 16 X 25 X 1*	(1) 14 X 25 X 1	Cleanable
17-1/2	(1) 16 X 25 X 1*	(1) 16 X 25 X 1	Cleanable
21	(1) 16 X 25 X 1	(1) 20 X 25 X 1*	Cleanable
24-1/2	(2) 16 X 25 X 1*	(1) 24 X 25 X 1	Cleanable

* Factory provided with the furnace. Filters may be field modified as required by cutting and folding the frame as indicated on the filter.



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Fig. 4—Horizontal Filter Arrangement



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Fig. 5—Position of Filters

⚠ WARNING

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

1. Horizontal and Downflow.

Each furnace requires 2 filters which are installed in the return-air duct. (See Fig. 4 and 5.) To remove filters for cleaning or replacement, proceed as follows:

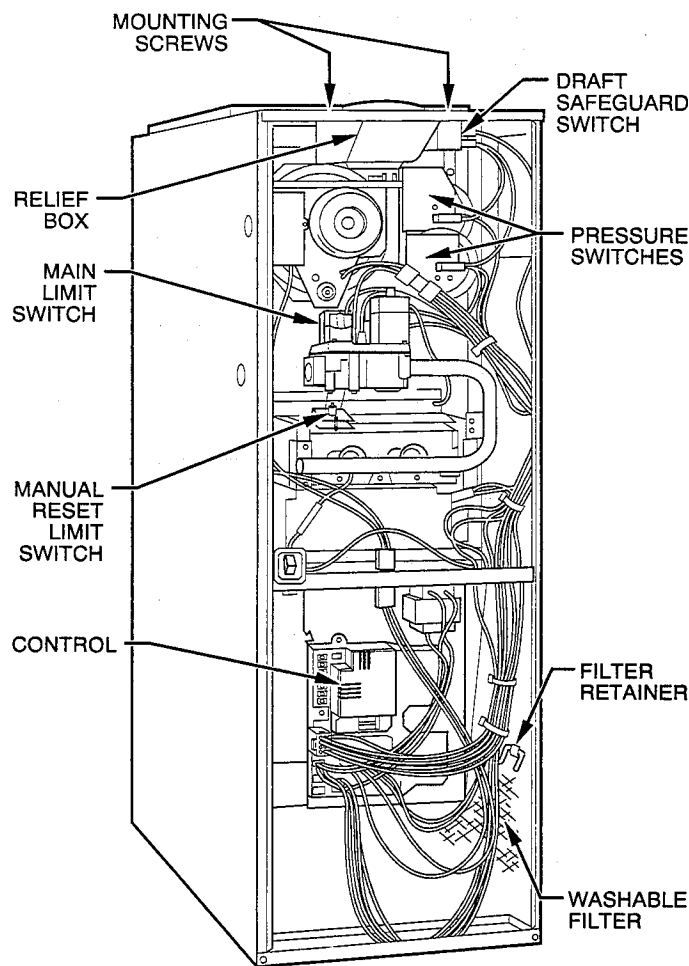
- a. Disconnect electrical power before removing access door.
- b. Remove blower access door.
- c. Reach up behind top plate, tilt filters toward center of return-air plenum, remove filters, and clean as needed. Replace if torn.
- d. Furnaces are equipped with permanent, washable filters.

- e. Clean filters by spraying tap water through filter from opposite direction of airflow.
- f. Rinse and let dry. Oiling or coating of filters is not recommended or required.
- g. Reinstall filters.
- h. Replace access door and restore electrical power to furnace.

2. Upflow.

Each furnace requires 1 or 2 filters which are installed in the blower compartment. (See Fig. 6.) To remove filters for cleaning or replacement, proceed as follows:

- a. Disconnect electrical power before removing access doors.
- b. Release filter retainer from clip at front of furnace casing. (See Fig. 6.) For side return, clips may be used on either or both sides of the furnace.



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Fig. 6—Model 58TUA Upflow

- c. Slide filter out.
- d. Clean filters by spraying tap water through filter from opposite direction of airflow.
- e. Rinse and let dry. Oiling or coating of filter is not recommended or required.
- f. Place filter in furnace.
- g. Replace access doors and restore electrical power to furnace.

BLOWER MOTOR AND WHEEL — For long life, economy, and high efficiency; clean accumulated dirt and grease from the blower wheel and motor annually.

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

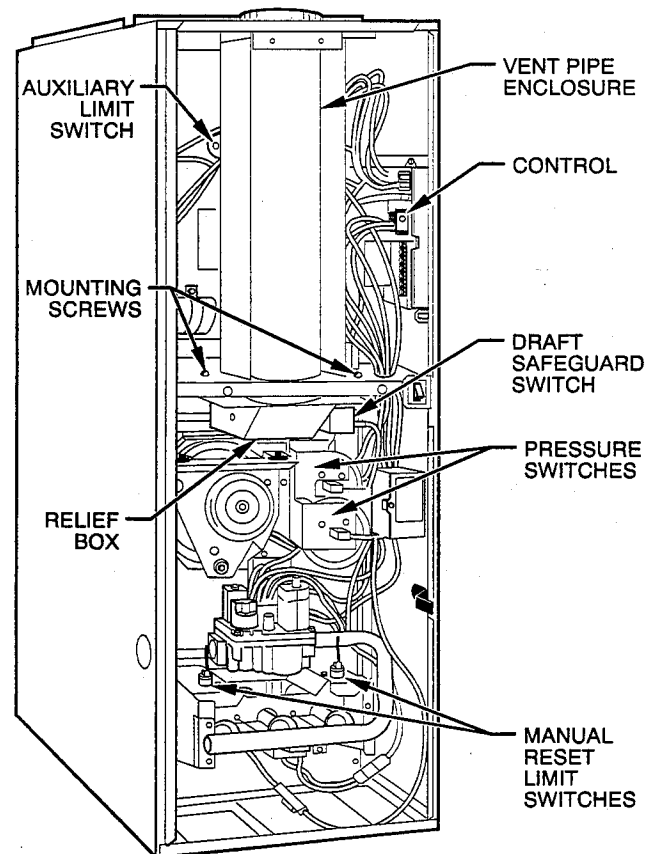
Some motors have prelubricated sealed bearings and require no lubrication. These motors can be identified by the absence of oil ports on each end of the motor. For those motors with oil ports; lubricate as follows:

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

Remember to disconnect the electrical supply before removing access doors.

Clean and lubricate as follows:

1. Remove blower access door.
2. Disconnect vent pipe on downflow/horizontal furnace only.
 - a. Remove vent pipe enclosure.
 - b. Disconnect vent pipe and remove short piece of pipe from furnace.



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Fig. 7—Model 58TMA Downflow

- c. Disconnect wires from auxiliary limit on blower housing (if present).
3. Remove control.
4. Remove electrical leads from numbered side of speed selector. (See Fig. 6 and 7.) Note location of wires for reassembly.
5. Remove screws holding blower assembly to blower deck and slide blower assembly out of furnace.

6. Squeeze side tabs of speed selector and pull selector from blower housing.
7. Loosen a screw in strap holding motor capacitor to blower housing and slide capacitor out from under strap.
8. Mark blower wheel, motor, and motor support in relation to blower housing before disassembly to ensure proper reassembly.
9. Loosen setscrew holding blower wheel on motor shaft.
10. Remove bolts holding motor, and motor mount to blower housing and slide motor and mount out of housing. Disconnect ground wire attached to blower housing before removing motor.
11. Lubricate motor (when oil ports are provided).
 - a. Remove dust caps or plugs from oil ports located at each end of motor.
 - b. Use a good grade of SAE 20 nondetergent motor oil and put 1 teaspoon, 5 cc, 3/16 oz, or 16 to 25 drops in each oil port. Do not over-oil.
 - c. Allow time for total quantity of oil to be absorbed by each bearing.
 - d. After oiling motor, be sure to wipe excess oil from motor housing.
 - e. Replace dust cap or plugs on oil ports.
12. Remove blower wheel from housing.
 - a. Mark cutoff location to ensure proper reassembly.
 - b. Remove screws holding cutoff plate and remove cutoff plate from housing.
 - c. Lift blower wheel from housing through opening.
13. Clean blower wheel and motor using a vacuum with soft brush attachment. Do not remove or disturb balance weights (clips) on blower wheel blades. The blower wheel should not be dropped or bent as balance will be affected.
14. Reinstall blower wheel by reversing items 12 a. through c. Be sure wheel is positioned for proper rotation.
15. Reassemble motor and blower by reversing items 5 through 10. If motor has ground wire, be sure it is connected as before.

⚠ CAUTION

Be sure the motor is properly positioned in the blower housing. The motor oil ports must be at a minimum of 45° above the horizontal centerline of the motor after the blower assembly has been reinstalled in the furnace.

16. Reinstall blower assembly in furnace. Connect electrical leads to speed selector. Please note that connections are polarized for assembly. DO NOT FORCE.
17. Reinstall control. (See step C.13 for reassembly of vent pipe and flue enclosure for downflow/horizontal furnaces.)

CLEANING HEAT EXCHANGER

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

NOTE: Deposits of soot and carbon indicate the existence of a problem which needs to be corrected. Take action to correct the problem.

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

1. Turn gas and power to furnace to OFF.
2. Remove control and blower access doors.

3. Remove vent pipe enclosure on downflow/horizontal furnace only and disconnect vent pipe from relief box.

NOTE: If high temperature plastic, Category III Special Gas Vent, is used, use special care not to crack or damage the pipe and fittings during disconnection. Replace any damaged plastic vent pipe using information in the accessory Category III conversion instruction, or contact your distributor.

4. Remove 2 screws that secure relief box. (See Fig. 6 or 7.)
5. Disconnect wires to the following components. Mark wires to aid in reconnection:
 - a. Draft safeguard switch (Category I vents only).
 - b. Inducer motor.
 - c. Pressure switch(es).
 - d. Limit overtemperature switch(es).
 - e. Gas valve.
 - f. Hot surface ignitor.
 - g. Flame-sensing electrode.
 - h. Wiring connectors leading to control.
6. Remove 8 screws that secure flue collector box to center panel. Be careful not to damage sealant.
7. Remove complete inducer assembly from furnace, exposing flue openings.
8. Using field-provided small wire brush, steel spring cable, reversible electric drill, and vacuum cleaner, clean cells as follows:
 - a. Assemble wire brush and steel spring cable.
 - (1.) Use 48 in. of 1/4-in. diameter high-grade steel spring cable (commonly known as drain clean-out or Roto-Rooter cable).
 - (2.) Use 1/4-in. diameter wire brush (commonly known as 25-caliber rifle cleaning brush).

NOTE: The materials needed in items (1.) and (2.) can usually 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 heat exchanger cell.
 - (1.) Attach variable-speed, reversible drill to end of spring cable (end opposite brush).
 - (2.) Remove cell outlet plates. **IMPORTANT:** Replace screws in center panel before cleaning.
 - (3.) Insert brush end of cable into upper opening of cell and slowly rotate with drill. DO NOT force cable. Gradually insert at least 36 in. of cable into 2 upper passes of cell. (See Fig. 8.)
 - (4.) Work cable in and out of cell 3 or 4 times to obtain sufficient cleaning. DO NOT pull cable with great force. Reverse drill and gradually work cable out.
 - (5.) Remove burner assembly and cell inlet plates.

NOTE: Be very careful when removing the burner assembly to avoid breaking the ignitor. See Fig. 9 for the correct ignitor location.

- (6.) **IMPORTANT:** Replace screws in center panel and cells before cleaning.

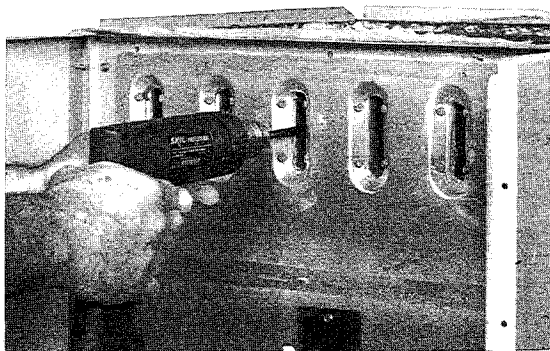


Fig. 8—Cleaning Heat Exchanger Cell

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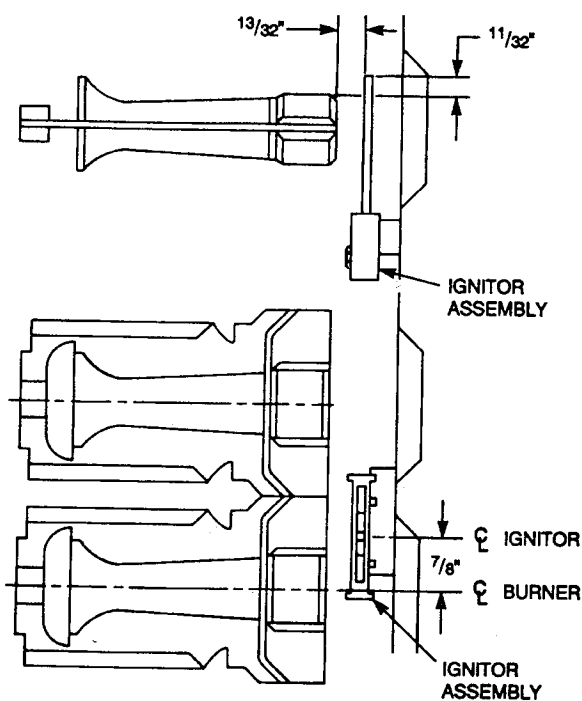


Fig. 9—Position of Ignitor to Burner

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- (7.) Insert brush end of cable in lower opening of cell, and proceed to clean 2 lower passes of cell in same manner as 2 upper passes.
- (8.) Repeat foregoing procedures until each cell in furnace has been cleaned.
- (9.) Using vacuum cleaner, remove residue from each cell.
- (10.) Using vacuum cleaner with soft brush attachment, clean burner assembly.
- (11.) Reinstall cell outlet plates and screws FIRST; then, reinstall cell inlet plates and burner assembly. Care must be exercised to center the burners in the cell openings.
9. After cleaning flue openings, check sealant on flue collector to ensure that it has not been damaged. If new sealant is needed, contact your dealer or distributor.
10. Clean and replace flue collector assembly, making sure all 8 screws are secure.
11. Reinstall relief box.
12. Reconnect wires to the following components:
 - a. Draft safeguard switch (Category I vents only).

- b. Inducer motor.
- c. Pressure switches.
- d. Limit overtemperature switch(es).
- e. Gas valve.
- f. Hot surface ignitor.
- g. Flame sensing electrode.
- h. Wiring connectors leading to control.

13. Reconnect vent pipe to relief box. When applicable replace vent pipe enclosure.

⚠ WARNING

If a Category III, vertical or horizontal, high temperature plastic Special Gas Vent is used, the vent pipe manufacturer's recommended high-temperature adhesive/sealant **MUST** be used at the joint between the relief box flue collar and the heat dissipater, and at all joints loosened during servicing. If the accessory Category III vent instructions are not available, contact your distributor for correct sealant. **DO NOT** drill or use screws, rivets, or any other mechanical fasteners on plastic vent pipe. A failure to follow this warning may result in spillage of flue gas products causing property damage, personal injury, or death.

14. Replace blower door only.
15. Turn power and gas to ON.
16. Set thermostat and check furnace for proper operation.
17. Verify blower airflow and speed changes between heating and cooling.
18. Check for gas leaks.
19. If Category III high-temperature plastic special gas vent pipe is used, inspect entire vent system for any signs of damage or deterioration, such as cracks, unevenness, or discoloration. Inspect and check all sealed joints during furnace operation for an airtight seal and reseal any joints that are not clearly well-sealed. Use only the high-temperature adhesive/sealant recommended by the vent pipe manufacturer. If you are unsure of correct sealant, contact your distributor.
20. Replace control door.

⚠ WARNING

Never use a match or other open flame to check for gas leaks. Use a soap-and-water solution. A failure to follow this warning could result in fire, personal injury, or death.

ELECTRICAL CONTROLS AND WIRING

NOTE: There may be more than 1 electrical supply to unit.

The electrical ground and polarity for 115-v wiring must be maintained properly. Refer to Fig. 10 and 11 for field wiring information and to Fig. 12 for unit wiring information. If the polarity is **NOT** correct, the furnace control will display code 02 on the status LED and prevent heat operation. The control system also requires an earth ground for proper operation of the microprocessor.

With power disconnected to unit, check all electrical connections for tightness. Tighten all screws on electrical connections. If any smoky or burned connections are noticed, disassemble the connection, clean all parts and stripped wire, and reassemble properly and securely. Electrical controls are difficult to check without proper instrumentation; therefore, reconnect electrical power to unit and observe unit through 1 complete operating cycle.

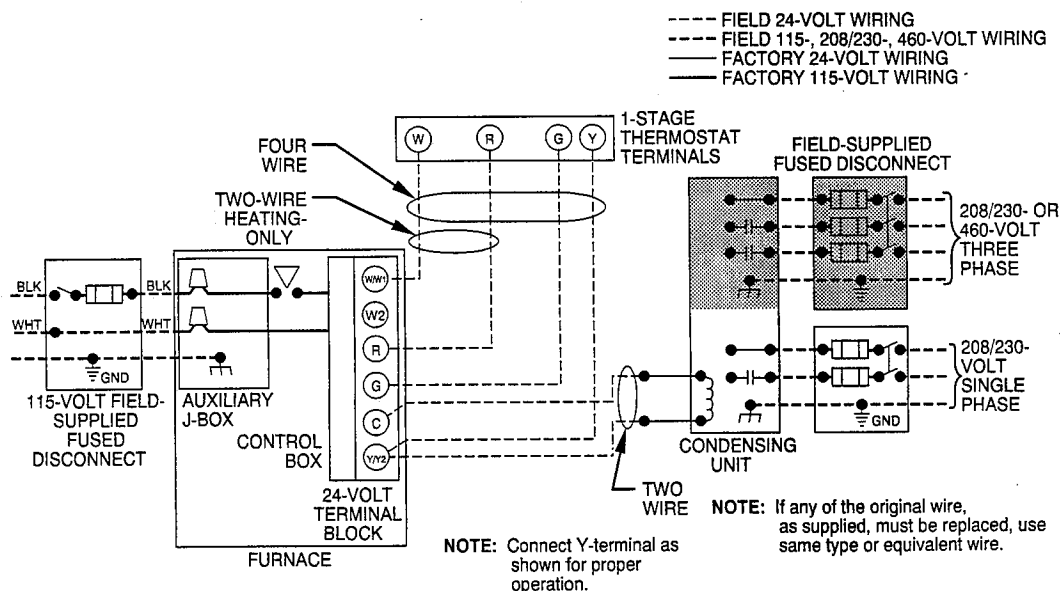


Fig. 10—Heating and Cooling Application Wiring Diagram

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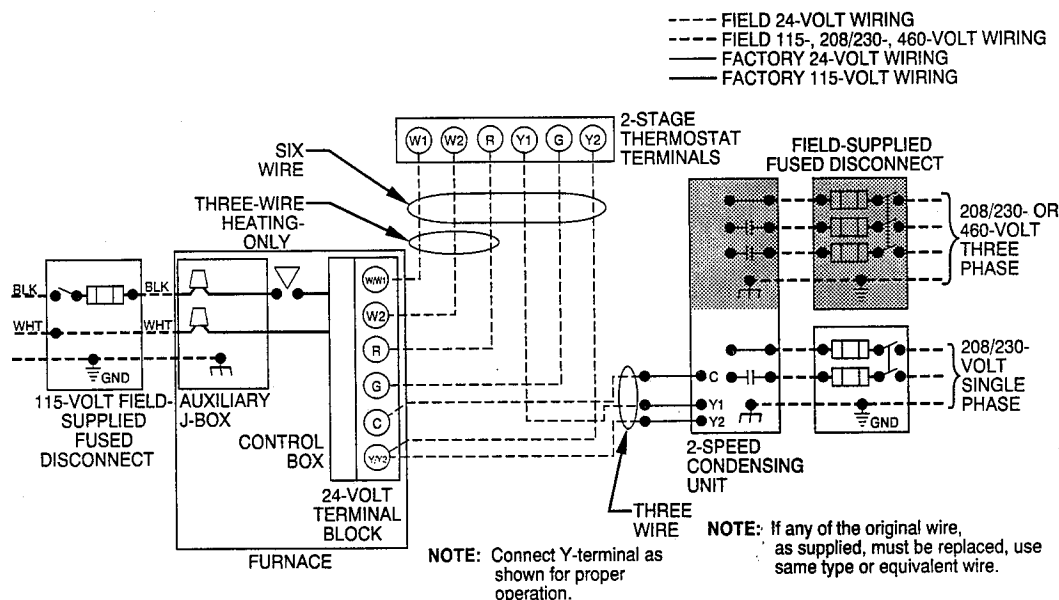


Fig. 11—Heating and Cooling Application Wiring Diagram for 2-Stage Thermostats and/or 2-Speed Condensing Units

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The 24-v circuit contains an automotive-type, 3-amp fuse located on the main control. Any 24-v electrical shorts during installation, service, or maintenance could cause this fuse to blow. If fuse replacement is required, use **ONLY** a 3-amp fuse. The control will display code 24 when the fuse needs replacement.

The control in this furnace is equipped with an LED status light to aid in installation, servicing, and troubleshooting. It can be viewed through the sightglass or window on the blower compartment door. The control indicates status with the LED on continuously, rapid flashing, or a code composed of 2 digits (the first digit is the number of short flashes, the second is the number of long flashes). Refer to the information label on the blower compartment door for code explanations and useful troubleshooting suggestions.

It is important to note that the power to the furnace must not be interrupted and the furnace blower door must not be removed until the LED status code(s) is recorded. When power to the control is interrupted, the status memory is erased.

The control will store up to 5 previous codes but will store no non-current code longer than 48 hr. To retrieve previous codes, if present, no thermostat inputs to the control must be present and all time delays must expire. Remove 1 of the red main limit wires (see Fig. 6 and 7) 1 to 4 sec until the LED light goes out, then reconnect it. (Do not leave red wire disconnected for longer periods of time as the control will assume an overtemperature condition exists and will respond with indoor blower operation.) This places the control in the status recall mode and displays the first code stored in memory. Record the code and repeat the disconnect and reconnect of the red wire, recording each code until code 11 is displayed indicating no additional faults. After the last code is displayed, or after 2 minutes in the code recall mode the control will return to normal standby mode.

Use any recorded fault codes, the information label, and the troubleshooting diagram on the following page to diagnose and correct any problem condition.

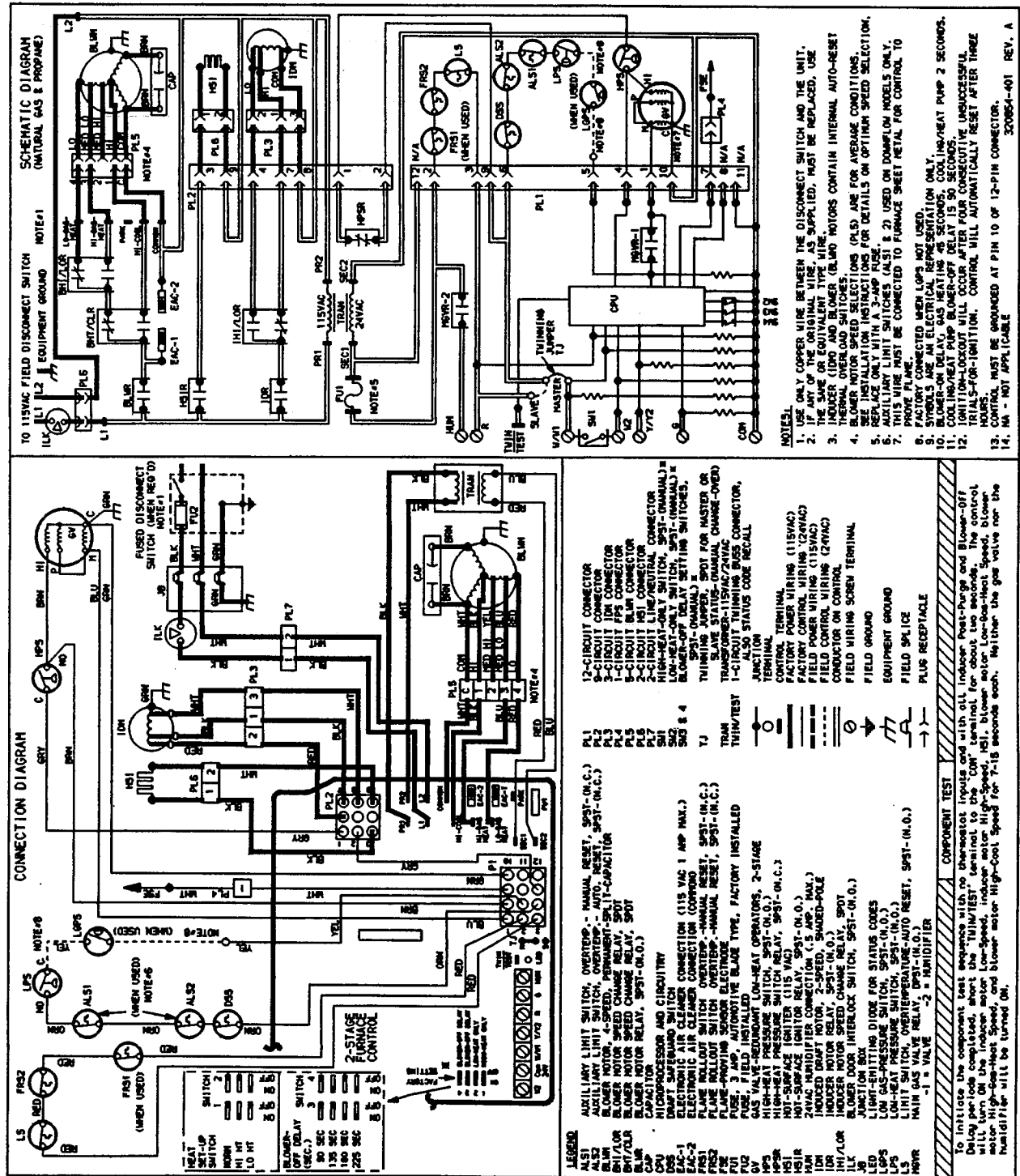


Fig. 12—Unit Wiring Diagram

NOTES:

1. Refer to information label on blower compartment door for procedure for use of LED status codes and problem solving suggestions.
2. LED indicator is viewed through window on blower compartment door.
3. If 115-vac power is energized or interrupted during a call for heat, the indoor blower will run for 90 sec before a gas heating cycle begins - Code 12.
4. After replacing any component, verify correct operating sequence.

TROUBLESHOOTING GUIDE

WARNING

ELECTRICAL SHOCK HAZARD

ONLY QUALIFIED AND TRAINED SERVICE PERSONNEL SHOULD PERFORM THIS PROCEDURE

START

