

Service and Maintenance Instructions For Sizes 045-155, Series 121

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

Index	Page
SAFETY CONSIDERATIONS	1
CARE AND MAINTENANCE.....	2
Air Filter Arrangement	2-3
Blower Motor and Wheel	3-4
Cleaning Heat Exchanger	4-5
Electrical Controls and Wiring	5-6
Wiring Diagram	7
Troubleshooting Guide	8

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, on tags, and on 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.

NOTE is used to highlight suggestions that **will** result in enhanced installation, reliability, or operation.

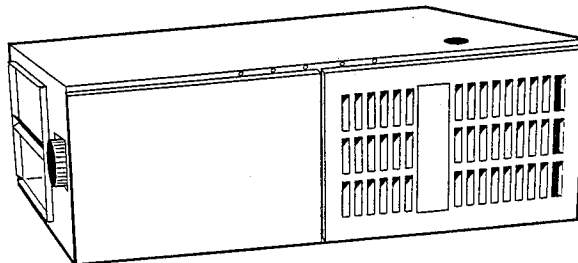


Fig. 1—Model 58RAV Horizontal

A92059

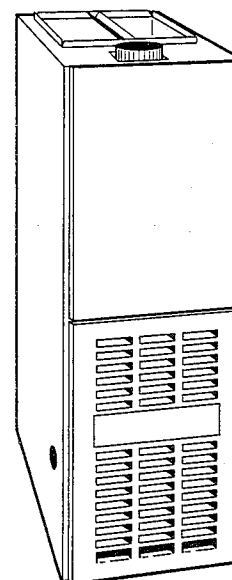


Fig. 2—Model 58RAV
Downflow

A92058

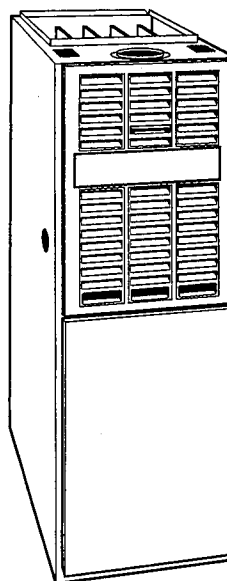


Fig. 3—Model 58PAV Upflow

A92057

⚠ 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.

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.

⚠ 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 could result in corrosion of the heat exchanger, fire, personal injury, or death.

⚠ WARNING

Turn off the gas and electrical supplies to the unit 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 1 or 2 for filter size information.

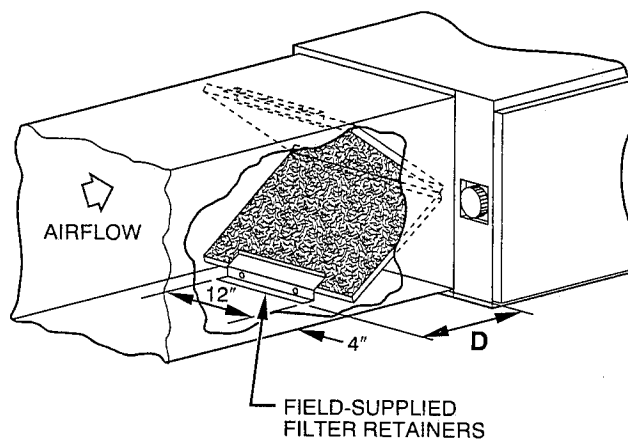
Table 1—Filter Size Information For Downflow/Horizontal Furnace (In.)

FURNACE CASING WIDTH	FILTER QUANTITY AND SIZE	FILTER TYPE
14-3/16	(2) 16 X 20 X 1	Cleanable
17-1/2	(2) 16 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 For Upflow Furnace (In.)

FURNACE CASING WIDTH	FILTER QUANTITY AND 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.



A82173

Fig. 4—Horizontal Filter Arrangement

⚠ 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. Clean filter with tap water. Spray water through cross-mesh binding side, in opposite direction of airflow.
- e. Rinse and let dry. Oiling or coating of filters is not recommended.
- f. Reinstall filters with cross-mesh binding facing blower.
- g. Replace access door and restore electrical power to furnace.

2. Upflow

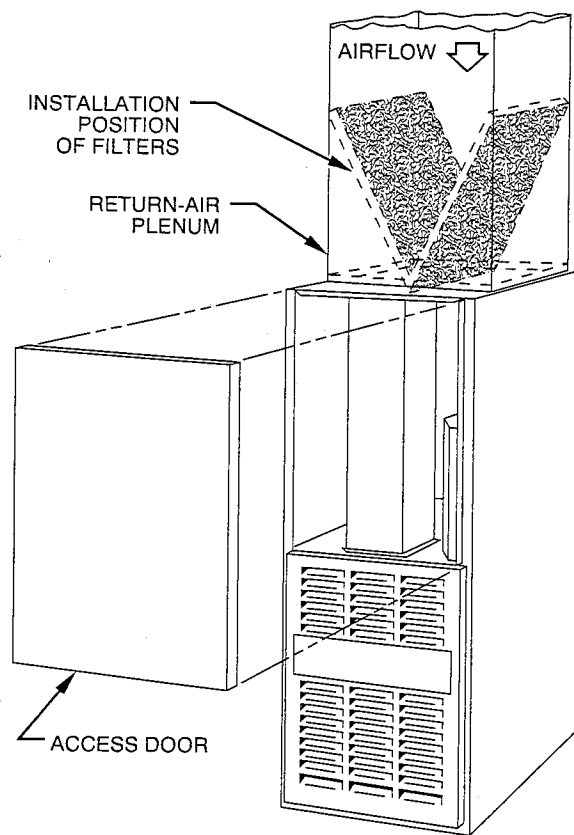


Fig. 5—Position of Filters

A88486

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:

- Disconnect electrical power before removing access doors.
- Remove access doors.
- 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. Slide filter out.
- Rinse and let dry. Oiling or coating of filter is not recommended.
- Reinstall filters with cross-mesh binding facing blower.
- 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 pre-lubricated, 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 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.

- Remove vent pipe enclosure.
 - Disconnect vent pipe and remove short piece of pipe from furnace.
 - Disconnect wires from auxiliary limit on blower housing.
3. Remove control box.
 4. Remove electrical leads from numbered side of speed selector. (See Fig. 6 and 7.) Note location of wires for reassembly.

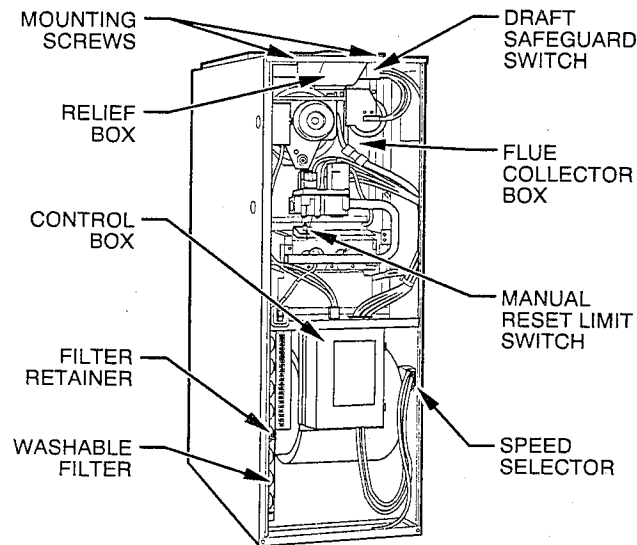


Fig. 6—Model 58PAV Upflow

A92063

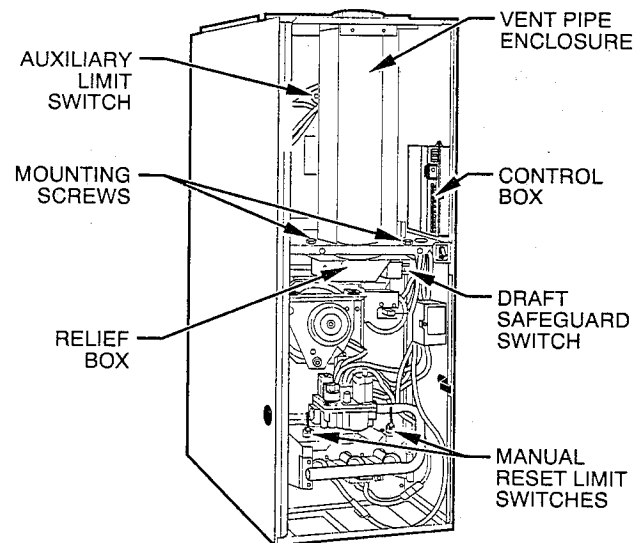


Fig. 7—Model 58RAV Downflow

A92064

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 it out of blower housing.
7. Loosen 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 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 non-detergent 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. Wipe excess oil from motor housing after oiling motor.
 - e. Replace dust caps 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 steps 12 a. through c. Be sure wheel is positioned for proper rotation.
15. Reassemble motor and blower by reversing steps 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. Connections are polarized for assembly. **DO NOT FORCE.**
17. Reinstall control box. Reinstall vent pipe and enclosure on downflow/horizontal furnace.
18. Turn on electrical power and check for proper rotation and speed changes between heating and cooling.

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.

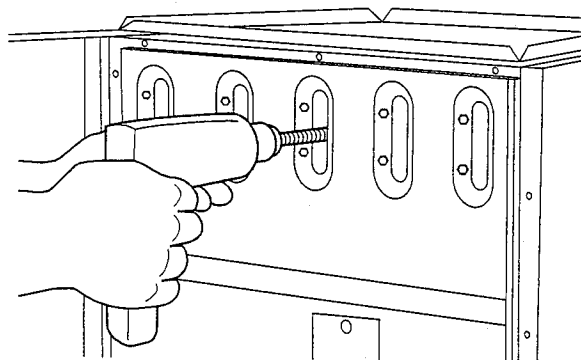
If it becomes necessary to clean the heat exchanger because of carbon deposits, soot, etc., proceed as follows:

1. Turn off gas and power to furnace.
2. Remove control and blower access doors.
3. Remove vent pipe enclosure disconnect vent pipe from relief box. (Downflow/horizontal furnaces only).
4. Remove 2 screws that secure relief box. (See Fig. 6 or 7.)
5. Disconnect wires to the following components:
 - a. Draft safeguard switch.
 - b. Inducer motor.
 - c. Pressure switch.
 - d. Limit overtemperature switch(es).

- e. Gas valve.
- f. Hot surface ignitor.
- g. Flame sensing electrode.
- h. Two wiring connectors leading to control box.
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. Clean cells as follows using field provided small wire brush, steel spring cable, reversible electric drill, and vacuum cleaner.
 - 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).
 - (1.) Use 1/4-in. diameter wire brush (commonly known as 25-caliber rifle cleaning brush).

NOTE: The items needed in steps (1.) and (2.) can usually be purchased at local hardware stores.

- (2.) Insert twisted wire end of brush into steel end of spring cable, and crimp tight with crimping tool or strike with ball-peen hammer. **TIGHTNESS IS VERY IMPORTANT.**
- (3.) 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).
 - (1.) 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.)



A91252

Fig. 8—Cleaning Heat Exchanger Cell

- (1.) Work cable in and out of cell 3 or 4 times for sufficient cleaning. **DO NOT PULL CABLE WITH GREAT FORCE.** Reverse drill and gradually work cable out.
- (1.) 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.

- (2.) Replace screws in center panel and cells before cleaning.
- (3.) 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.

- (4.) Repeat items 1 — 6 until each cell in furnace has been cleaned.
 - (5.) Remove residue from each cell using vacuum cleaner.
 - (6.) Clean burner assembly using vacuum cleaner with soft brush attachment .
 - (7.) 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.
 - b. Inducer motor.
 - c. Pressure switch.
 - d. Limit overtemperature switch(es).
 - e. Gas valve.
 - f. Hot surface ignitor.
 - g. Flame sensing electrode.
 - h. Two wiring connectors leading to control box.
 13. Reconnect vent pipe to relief box. Replace vent pipe enclosure (downflow/horizontal furnace only).
 14. Replace blower access door only.
 15. Turn on power and gas supply.
 16. Set thermostat and check furnace for proper operation.
 17. Check for gas leaks.
 18. Replace control access 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 for field wiring information and to Fig. 11 for unit wiring information. If the polarity is NOT

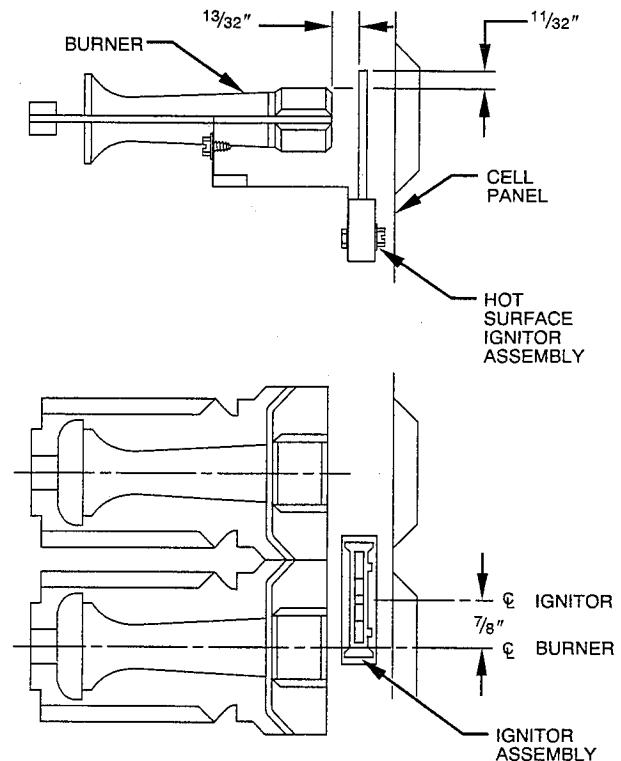


Fig. 9—Position of Ignitor to Burner

A93347

correct, the microprocessor control will shut OFF the gas flow shortly after completion of the ignition trial period. 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. Reconnect electrical power to unit and observe unit through 1 complete operating cycle.

The 24-v circuit contains an automotive-type, 3-amp fuse located on the main control board. Any direct shorts during installation, service, or maintenance could cause this fuse to blow. If fuse replacement is required, use ONLY a 3-amp fuse of identical size.

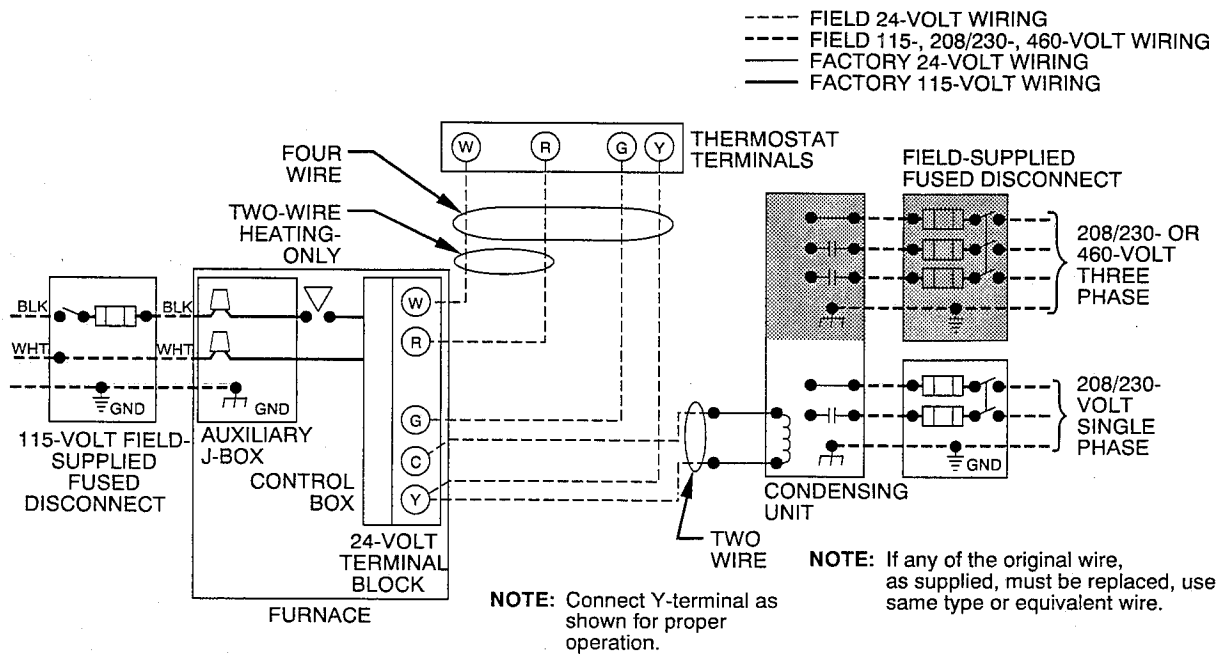


Fig. 10—Heating and Cooling Application Wiring Diagram

A78461

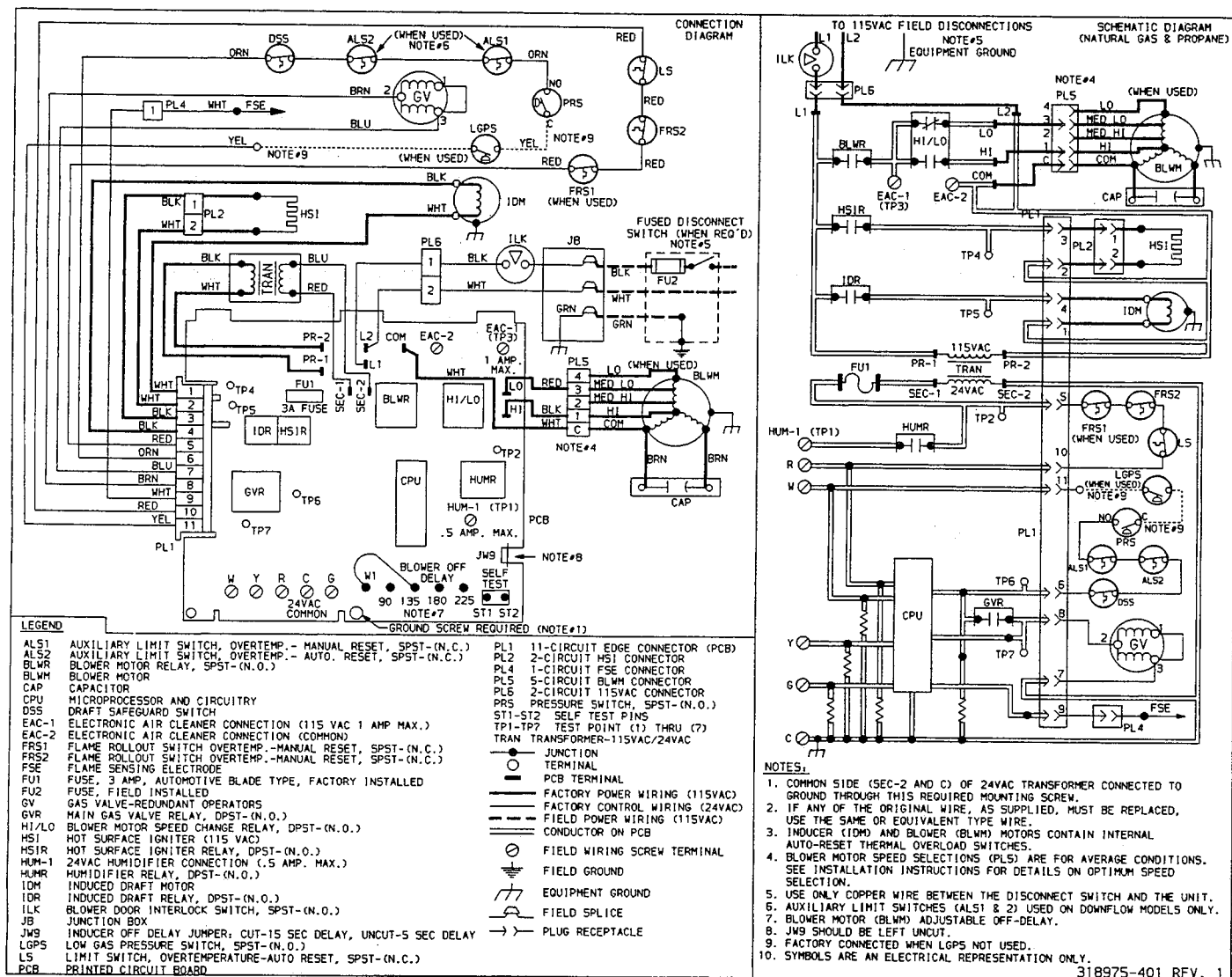


Fig. 11—Unit Wiring Diagram

A92048

TROUBLESHOOTING GUIDE

