

bryant

Day & Night

PAYNE

# service and maintenance procedures

## 340MAV 350MAV 355MAV

### GAS-FIRED CONDENSING FURNACES

Cancels: SP05-14

SP05-16  
6-15-94

This Service and Maintenance Instruction covers Series B of above models.

**NOTE:** Read the entire instruction manual before performing any service or maintenance.



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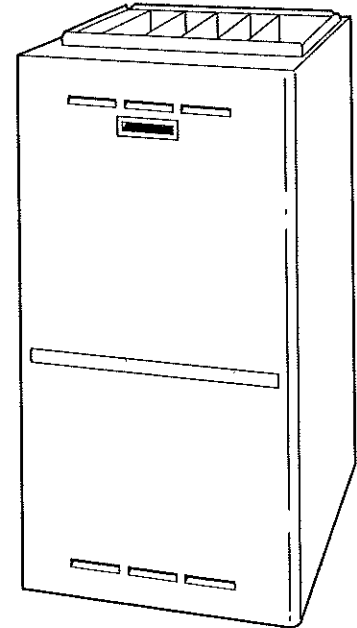
Index	Page
SAFETY CONSIDERATIONS.....	1-2
ELECTROSTATIC DISCHARGE (ESD) PRECAUTIONS PROCEDURE.....	2
GENERAL.....	2
CARE AND MAINTENANCE.....	2-13
Air Filter Cleaning and Replacement.....	2-3
Blower Motor and Wheel Maintenance.....	3-4
Clean Burners.....	4
Clean Heat Exchangers.....	4-5
Primary Heat Exchangers.....	5
Secondary Heat Exchangers.....	5
Flushing Collector Box and Drainage System.....	5-8
Servicing Hot Surface Ignitor.....	8-9
Electrical Controls and Wiring.....	9
Troubleshooting.....	9-12
Checking Heat Tape Operation (If Applicable).....	12
Winterizing.....	12-13
WIRING DIAGRAM.....	14 and 20
Fixed Capacity.....	14
Variable Capacity.....	20
TROUBLESHOOTING.....	15-19
Fixed Capacity.....	15-17
Variable-Capacity Service Label.....	18-19

#### 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, including NFPA 54/ANSI Z223.1-1992, National Fuel Gas Code. In Canada, refer to the current edition of the National Standard of Canada CAN/CGA-B-149. Wear safety glasses and work gloves. Have a fire extinguisher available during start-up and adjustment procedures and service calls.




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Fig. 1—Multipole Furnace in Upflow Orientation

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 words DANGER, WARNING, and 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 which 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 which will result in enhanced installation, reliability, or operation.

 **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:** 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.

## ELECTROSTATIC DISCHARGE (ESD) PRECAUTIONS PROCEDURE

**CAUTION:** Electrostatic discharge can affect electronic components. Take precautions during furnace installation and servicing to protect the furnace electronic control. Precautions will prevent electrostatic discharges from personnel and hand tools which are held during the procedure. These precautions will help to avoid exposing the control to electrostatic discharge by putting the furnace, the control, and the person at the same electrostatic potential.

1. Disconnect all power to the furnace. **DO NOT TOUCH THE CONTROL OR ANY WIRE CONNECTED TO THE CONTROL PRIOR TO DISCHARGING YOUR BODY'S ELECTROSTATIC CHARGE TO GROUND.**
2. Firmly touch a clean, unpainted, metal surface of the furnace chassis which is close to the control. Tools held in a person's hand during grounding will be satisfactorily discharged.
3. After touching the chassis you may proceed to service the control or connecting wires as long as you do nothing that recharges your body with static electricity (for example; **DO NOT** move or shuffle your feet, **DO NOT** touch ungrounded objects, etc.).
4. If you touch ungrounded objects (recharge your body with static electricity), firmly touch furnace again before touching control or wires.
5. Use this procedure for installed and uninstalled (ungrounded) furnaces.
6. Before removing a new control from its container, discharge your body's electrostatic charge to ground to protect the control from damage. If the control is to be installed in a furnace, follow items 1. through 5. before bringing the control or yourself into contact with the furnace. Put all used **AND** new controls into containers before touching ungrounded objects.
7. An ESD service kit (available from commercial sources) may also be used to prevent ESD damage.

### GENERAL

These instructions are written as if the furnace is installed in an upflow application. An upflow furnace application is where the blower is located below the combustion and controls section of the furnace, and conditioned air is discharged upward. Since this furnace can be installed in any of the 4 positions shown in Fig. 2, you must revise your orientation to component location accordingly.

### 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 maintenance contract availability.

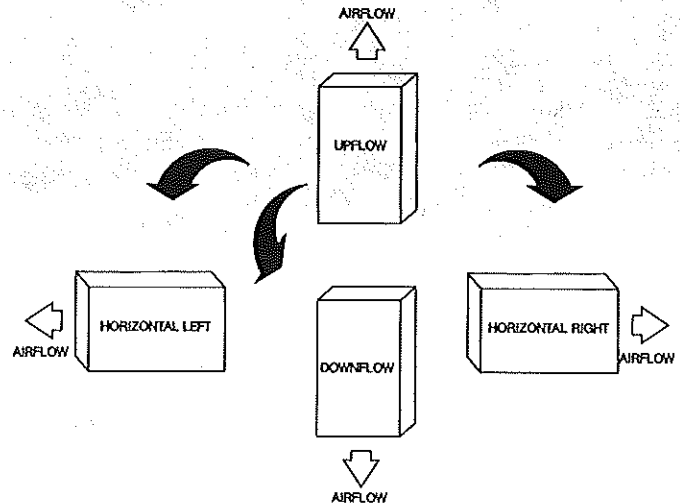


Fig. 2—Multipulse Orientations

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**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 or death.

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

1. Check and clean or replace air filter each month as required.
2. Check blower motor and wheel for cleanliness annually.
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 in combustion-air and vent pipes annually.
6. Check burners for cleanliness annually.

**CAUTION:** Personal injury could result from sharp metal edges, etc. Use care when removing parts.

## I. AIR FILTER CLEANING AND REPLACEMENT

The air filter arrangement may vary depending on the application or orientation.

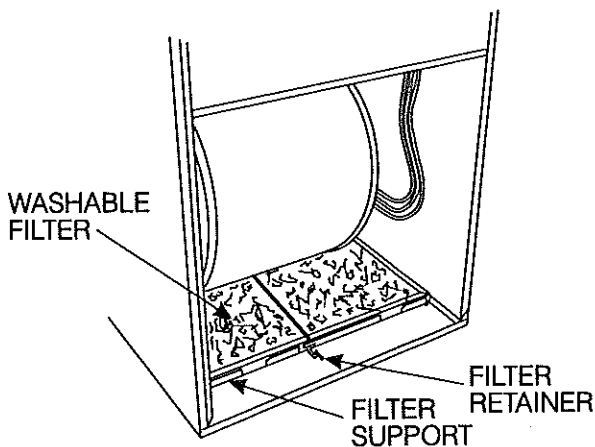
**CAUTION:** Never operate unit without a filter or with the blower access panel removed. Failure to follow this warning could result in a fire or personal injury.

To clean or replace the filters, proceed as follows:

1. Turn off electrical supply to furnace.
2. Remove furnace door and blower access panel.

**CAUTION:** Blower access panel switch opens 24-v power to control center. Terminating 24v to control center will ensure the control is inoperative, however, 115-v power is still supplied to the control center and transformer.

3. Release filter retainer wire. (See Fig. 3 and 4.)
4. Slide filter out of furnace.



**Fig. 3—Bottom Filter Arrangement**

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5. Furnaces are equipped with permanent, washable filter(s). 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.
7. Place filter in furnace.
8. Replace blower access panel and furnace door.
9. Turn on electrical supply to furnace.

**NOTE:** If the filter has cross-mesh binding (when present), the binding must face the blower. If the filter has an air direction arrow, the arrow must point toward the blower.

## II. BLOWER MOTOR AND WHEEL MAINTENANCE

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

The inducer and blower motors are pre-lubricated and require no additional lubrication. These motors can be identified by the absence of oil ports on each end of the motor.

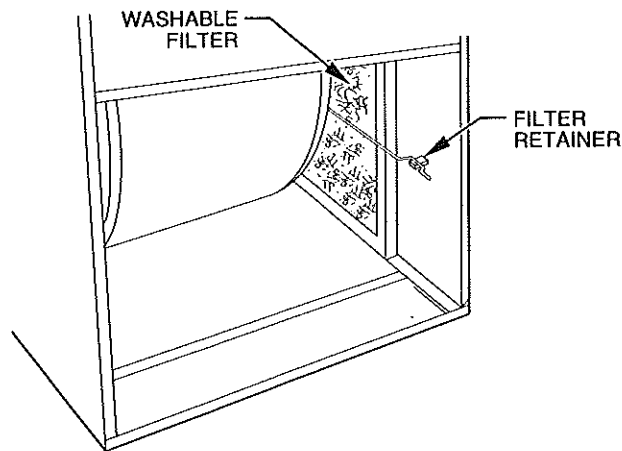
The following items should be performed by a qualified service technician.

Clean blower motor and wheel as follows:

1. Turn off electrical supply to furnace.
2. Remove furnace door and blower access panel.

**CAUTION:** Blower access panel switch opens 24-v power to control center. Terminating 24v to control center will ensure the control is inoperative, however, 115-v power is still supplied to the control center and transformer.

3. Disconnect wires.
  - a. Fixed-capacity furnaces (340MAV or 350MAV)  
All factory wires can be left connected, but field thermostat connections may need to be disconnected depending on their length and routing.
  - b. Variable-capacity furnace (355MAV)
    - (1.) Disconnect motor wiring harness plug on blower housing.
    - (2.) Disconnect auxiliary limit switch leads at switch.
    - (3.) Disconnect field thermostat connections depending on their length and routing.
4. Position control box, transformer, and door switch assembly to right side of furnace casing.



**Fig. 4—Filter Installed for Side Inlet**

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5. If condensate trap is located in left- or right-hand side of furnace casing, proceed to item 6., otherwise remove trap and tubing as described below.
  - a. Disconnect field drain connection from condensate trap.
  - b. Disconnect drain and relief port tubes from condensate trap.
  - c. Remove condensate trap from blower shelf.

6. Remove screws securing blower assembly to blower shelf and slide blower assembly out of furnace.
7. Clean blower wheel and motor by using a vacuum with soft brush attachment. Be careful not to disturb balance weights (clips) on blower wheel vanes. Do not bend wheel or blades as balance will be affected.
8. If greasy residue is present on blower wheel, remove wheel from the blower housing and wash it with an appropriate degreaser. To remove wheel:
  - a. Mark blower wheel location on shaft before disassembly to ensure proper reassembly.
  - b. 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.

- c. Mark blower wheel orientation and cutoff plate location to ensure proper reassembly.
- d. Remove screws securing cutoff plate and remove cutoff plate from housing.
- e. Remove bolts holding motor mounts to blower housing and slide motor and mounts out of housing. On fixed-capacity furnaces (340MAV or 350MAV) only, disconnect capacitor and ground wire attached to blower housing before removing motor.
- f. Remove blower wheel from housing.
- g. Clean wheel per instructions on degreaser cleaner.

9. Reassemble motor and blower wheel by reversing items 8.b. through 8.f. Ensure wheel is positioned for proper rotation.

**NOTE:** Be sure to reattach ground wire on fixed-capacity furnaces (340MAV or 350MAV).

10. Reinstall blower assembly in furnace.
11. Reinstall condensate trap and tubing if previously removed.
  - a. Reinstall condensate trap in hole in blower shelf.
  - b. Connect condensate trap drain tubes. See Fig. 8 or 9 or tubing diagram on main furnace door for proper tube location.

- (1.) Connect 1 tube (blue or blue and white striped) from collector box.
- (2.) Connect 1 tube (violet or unmarked) from inducer housing.
- (3.) Connect 1 tube (relief port, green or pink) from collector box.

c. Connect field drain to condensate trap.

**NOTE:** Ensure tubes are not kinked or pinched, as this will affect operation.

12. Reinstall control box, transformer, and door switch assembly on blower shelf.
13. Reconnect wires.
  - a. Fixed-capacity furnaces (340MAV or 350MAV)

Refer to furnace wiring diagram, and connect thermostat leads if previously disconnected. (See Fig. 18.)

**NOTE:** Refer to Table 1 for motor speed lead relocation if leads were not identified before disconnection.

**TABLE 1—SPEED SELECTOR (340MAV OR 350MAV ONLY)**

COLOR	SPEED	FACTORY ATTACHED TO
Black	High	Cool
Yellow (When Present)	Medium High	Spare
Blue	Medium Low	Heat
Red	Low	Spare
White	Common	Com

**CAUTION:** Heating speed selection **MUST** be adjusted to provide proper temperature rise as specified on the rating plate. Failure to adjust the heating speed may shorten heat exchanger life.

b. Variable-capacity furnaces (355MAV)

- (1.) Refer to furnace wiring diagram, and connect motor and auxiliary limit switch leads. (See Fig. 22.)
- (2.) Connect thermostat leads if previously disconnected.

14. Turn on electrical supply. Manually close blower access panel door switch, and check for proper rotation and speed changes between heating and cooling. Operate unit 10 minutes.

**WARNING:** Blower access panel door switch opens 24-v power to control center. No component operation can occur. The 115-v power is still present at control center and transformer. Caution must be taken when manually closing this switch for service purposes. Failure to follow this warning could result in personal injury or death.

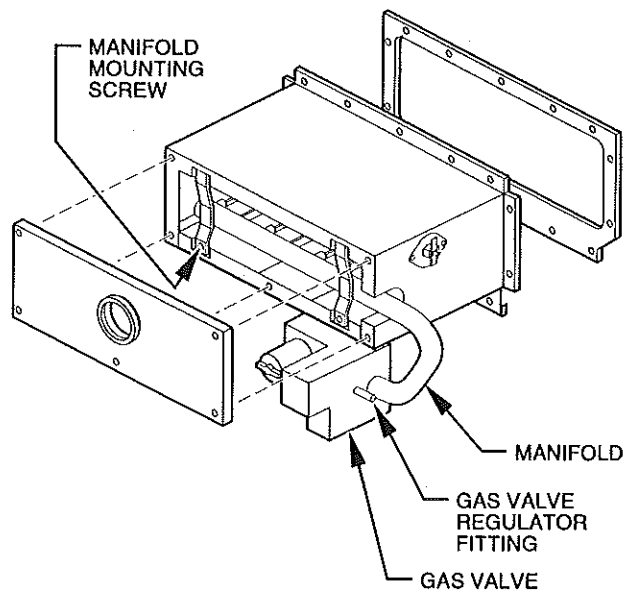
15. If furnace is operating properly, remove device used to manually close blower access panel door switch, replace blower access panel, and replace main furnace door.

### III. CLEAN BURNERS

The following items should be performed by a qualified service technician. If the burners develop an accumulation of light dirt or dust, they may be cleaned by using the following procedure:

1. Turn off gas and electrical supplies to furnace.
2. Remove furnace door.

3. Remove burner box cover.
4. Using backup wrench, disconnect gas supply pipe from gas valve.
5. Remove wires from gas valve. Note location for reassembly.
6. Remove burner box pressure tube from gas valve regulator fitting.
7. Remove screws that secure manifold to burner box. (See Fig. 5.)



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**Fig. 5—Burner Box Assembly**

8. Remove manifold, orifices, and gas valve as 1 assembly.
9. Remove screws attaching burner assembly in burner box.
10. Remove burner assembly from burner box.

**NOTE:** All burners are attached to burner bracket and can be removed as 1 assembly.

11. Clean burners with soft brush and vacuum.
12. Reinstall manifold, orifice, and gas valve assembly in burner box. Ensure manifold seal grommet is installed properly and burners fit over orifices.
13. Reconnect wires to gas valve. Refer to furnace wire schematic for proper wire location.
14. Reinstall burner box pressure tube to gas valve regulator fitting.
15. Reinstall gas supply pipe to gas valve using backup wrench on gas valve to prevent rotation and improper orientation.

**NOTE:** Use propane gas resistant pipe dope to prevent gas leaks. **DO NOT** use Teflon tape.

**WARNING:** Gas valve knob **MUST** be facing forward or tilted upward. Failure to follow this warning could result in property damage, personal injury, or death.

16. Replace burner box cover.
17. Replace furnace door.
18. Turn on gas and electrical connections to furnace.

### IV. CLEAN HEAT EXCHANGERS

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

## A. Primary Heat Exchangers

If the heat exchangers get an accumulation of light dirt or dust on the inside, they may be cleaned by the following procedure:

**NOTE:** If the heat exchangers get a heavy accumulation of soot and carbon, both the primary and secondary heat exchangers should be replaced rather than trying to clean them thoroughly due to their intricate design. A build-up of soot and carbon indicates that a problem exists which needs to be corrected, such as improper adjustment of manifold pressure, insufficient or poor quality combustion air, improper vent termination, incorrect size or damaged manifold orifice(s), improper gas, or a restricted heat exchanger (primary or secondary). Action must be taken to correct the problem.

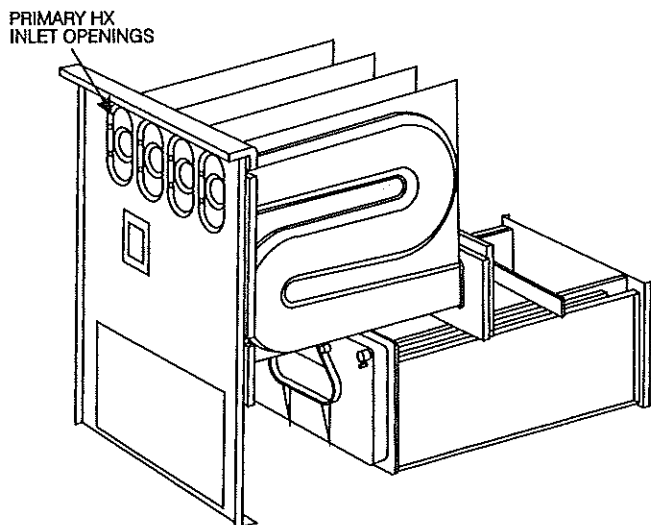
1. Turn off gas and electrical supplies to furnace.
2. Remove furnace door.
3. Disconnect wires or connectors to overtemperature switch, gas valve, ignitor, and flame sensor.
4. Disconnect combustion-air intake pipe from intake housing.
5. Remove the pressure switch tube from intake housing.
6. Remove screws attaching intake housing to burner box, and rotate intake housing away from burner box for removal.
7. Using backup wrench, disconnect gas supply pipe from gas valve.
8. Disconnect pressure tubing from gas valve.
9. Remove 2 screws attaching top filler panel and rotate upwards to gain access to screws attaching burner box to cell panel.
10. Remove screws attaching burner box to cell panel. (See Fig. 5.)

**NOTE:** Burner box cover, manifold, gas valve, and burner assembly should be removed as 1 assembly.

11. Clean heat exchanger openings with a vacuum and a soft brush. (See Fig. 6.)

**NOTE:** After cleaning, inspect the heat exchangers to ensure they are free of all foreign objects that may restrict flow of combustion products.

12. Reverse steps 4 through 10 for reassembly.



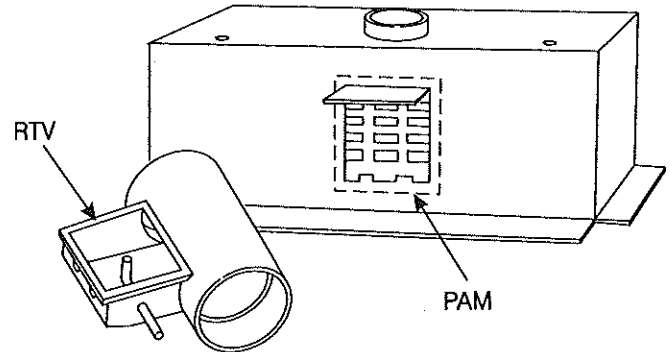
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Fig. 6—Cleaning Inlet Openings of Primary Heat Exchangers

**WARNING:** The ground wire from the gas valve **MUST** be attached to the burner box attachment screw. Failure to attach this ground wire to an adequate casing ground will cause the furnace control to lock out.

**NOTE:** Be sure burner box gasket is installed between burner box and cell panel. If gasket is damaged, replace it.

**NOTE:** Inspect combustion-air intake housing. If foamed gasket was removed, check for any damage. If gasket is damaged in any way, it must be repaired. To repair, remove damaged gasket section, apply sealant releasing agent (PAM cooking spray or equivalent, must not contain corn or canola oil, aromatic or halogenated hydrocarbons) to burner box and apply a small bead of G.E. RTV 162 or Dow-Corning RTV 738 sealant to edge of combustion-air intake housing. (See Fig. 7.)



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Fig. 7—Combustion-Air Intake Housing Gasket Repair

13. Refer to furnace wiring diagram and connect wires to rollout (overtemperature) switch, gas valve, ignitor, and flame sensor.
14. Reconnect pressure switch tubes to gas valve and intake housing. See diagram on blower access panel for proper location of tubes. Be sure tubes are not kinked. (See Fig. 8 or 9.)
15. Turn on gas and electrical supplies to furnace.
16. Check furnace operation through 2 complete heat operating cycles. Look through sight glass in burner enclosure to check burners. Burner flames should be clear blue, almost transparent. (See Fig. 10.)
17. Check for gas leaks.

**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.

18. Replace furnace door.

## B. Secondary Heat Exchangers

**NOTE:** The condensing side (inside) of the secondary heat exchangers **CANNOT** be serviced or inspected. A small number of bottom outlet openings can be inspected by removing the inducer assembly. See Section V — Flushing Collector Box and Drainage System for details on removing inducer assembly.

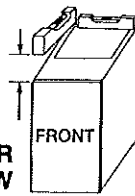
## V. FLUSHING COLLECTOR BOX AND DRAINAGE SYSTEM

1. Turn off gas and electrical supplies to furnace.
2. Remove furnace door.
3. Disconnect inducer motor and pressure switch(es) wires or connectors.

# INSTALLATION

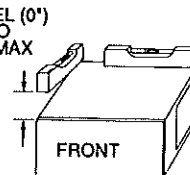
This appliance requires a special venting system. Refer to the installation instructions for parts list and method of installation. Furnace must be installed level, or pitched forward within 1/2 inch of level for proper drainage. Failure will result in equipment or property damage. See Installation Manual for IMPORTANT unit support details on horizontal applications.

LEVEL (0°)  
TO  
1/2" MAX



UPFLOW OR  
DOWNFLOW

LEVEL (0°)  
TO  
1/2" MAX



HORIZONTAL

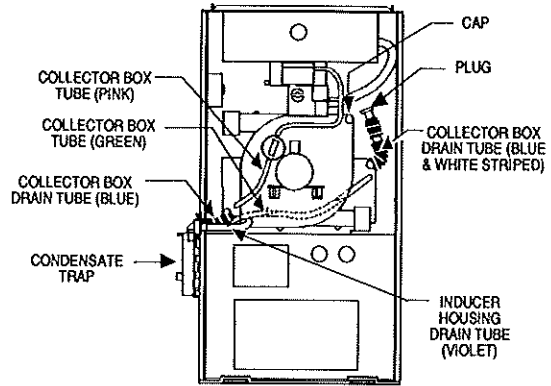
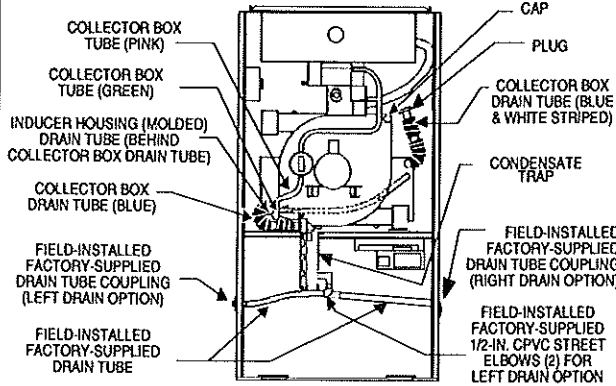
Furnace is shipped from factory in upflow configuration. Pressure tube and drain tube routing MUST match the diagrams below.

Condensate Trap; Factory  
Installed in Blower Shelf

(Blower access panel removed)

Tube location when used in UPFLOW application

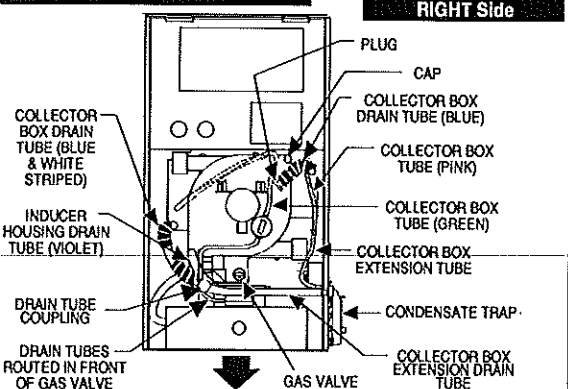
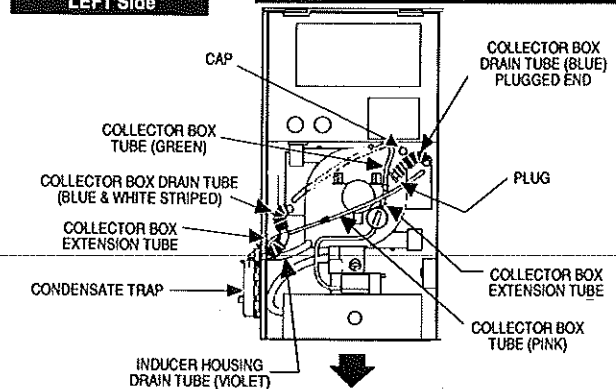
Condensate Trap on LEFT  
Side Optional



Condensate Trap on  
LEFT Side

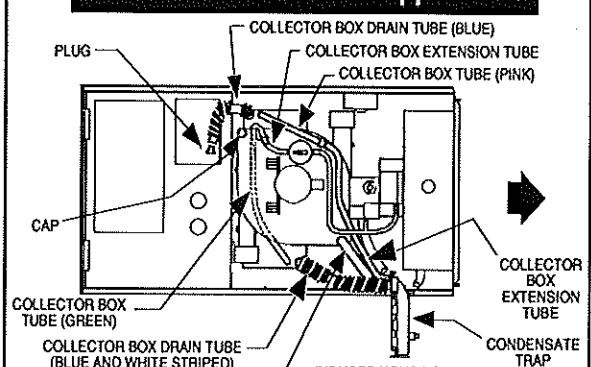
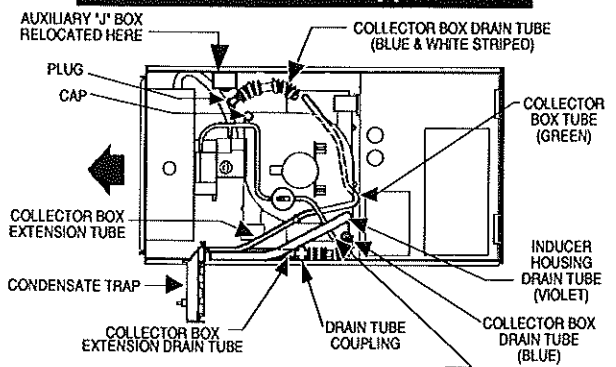
Tube location when used in DOWNFLOW application

Condensate Trap on  
RIGHT Side



Tube location when used on  
HORIZONTAL - LEFT application

Tube location when used on  
HORIZONTAL - RIGHT application



NOTE:

1. All tubing must be connected securely and routed to avoid kinks and traps.
2. Pressure tubing must always slope away from pressure switch to collector box connection as shown.
3. HORIZONTAL-LEFT installations require the collector box pressure tube to be relocated between the inducer housing and the blower shelf to prevent a trap. Refer to the Installation Instructions for further details.

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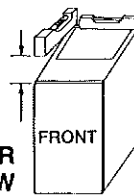
Fig. 8—Furnace Pressure and Drain Tubing Diagram (340MAV and 350MAV)

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# INSTALLATION

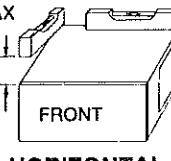
This appliance requires a special venting system. Refer to the installation instructions for parts list and method of installation. Furnace must be installed level, or pitched forward within 1/2 inch of level for proper drainage. Failure will result in equipment or property damage. See Installation Manual for IMPORTANT unit support details on horizontal applications.

LEVEL (0°)  
TO  
1/2" MAX



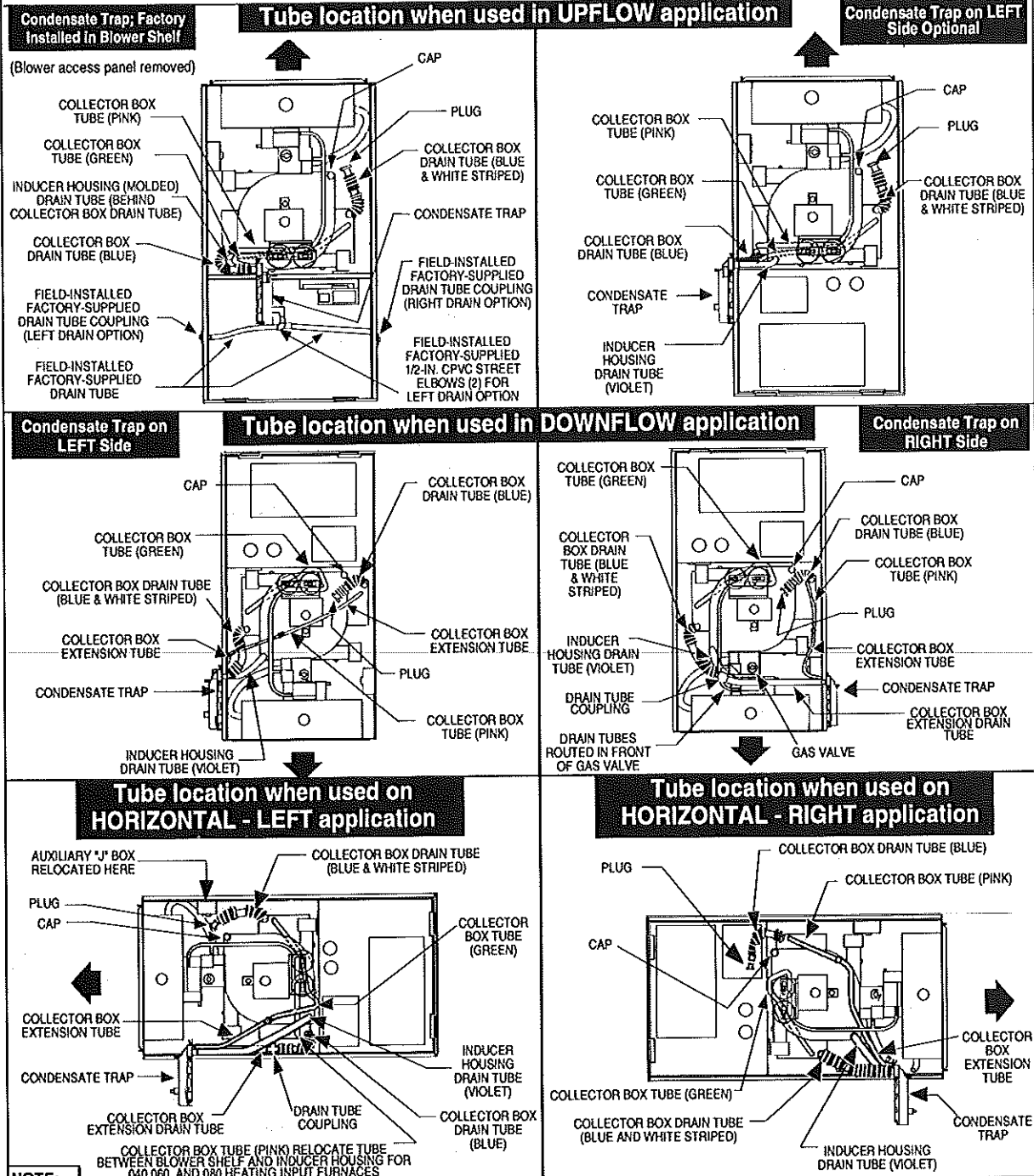
UPFLOW OR  
DOWNFLOW

LEVEL (0°)  
TO  
1/2" MAX



HORIZONTAL

Furnace is shipped from factory in upflow configuration. Pressure tube and drain tube routing MUST match the diagrams below.



1. All tubing must be connected securely and routed to avoid kinks and traps.
2. Pressure tubing must always slope away from pressure switch to collector box connection as shown.
3. HORIZONTAL-LEFT installations require the collector box pressure tube to be relocated between the inducer housing and the blower shelf to prevent a trap. Refer to the Installation Instructions for further details.

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Fig. 9—Furnace Pressure and Drain Tubing Diagram (355MAV)

4. Disconnect pressure switch tubes.
5. Disconnect vent pipe from inducer housing outlet by loosening clamp.
6. Disconnect drain tube from inducer housing. (See Fig. 8 or 9.)
7. Remove inducer housing assembly by removing 4 bolts attaching assembly to cell panel.
8. Flush inside of collector box with water until discharge from condensate trap is clean and runs freely.

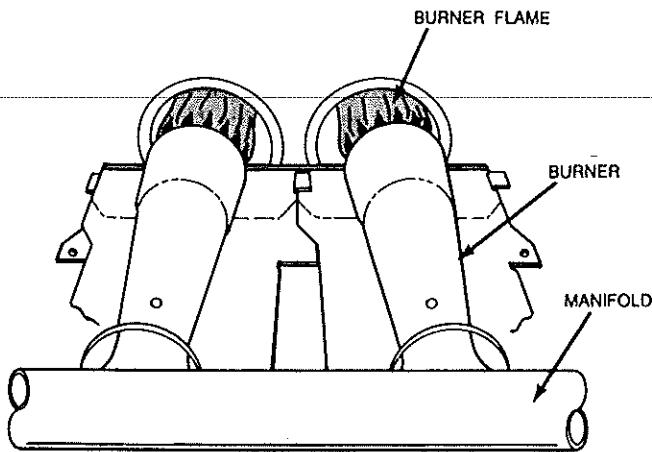
**NOTE:** Ensure the drain tube disconnected from the inducer housing is higher than the collector box opening or water will flow out tube.

9. Inspect inside area of collector box for any pieces of foreign materials and remove if present.

**CAUTION:** DO NOT use wire brush or other sharp object to inspect or dislodge materials in secondary heat exchangers as failure of the secondary heat exchanger will occur. Flush with water only.

10. Reassemble inducer assembly by reversing items 5. through 7.

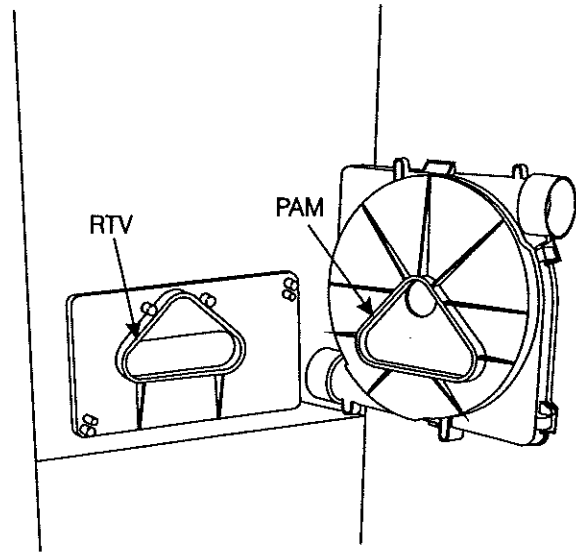
**NOTE:** If seal between the inducer housing and the collector box is damaged in any way, it must be repaired. To repair, apply sealant releasing agent (PAM cooking spray or equivalent, must not contain corn or canola oil, aromatic or halogenated hydrocarbons) to inducer housing. (See Fig. 11.) Apply a small bead of G.E. RTV 162 or Dow-Corning RTV 738 sealant to groove in collector box.



**Fig. 10—Burner Flame**

A89020

11. Refer to furnace wiring diagram and connect wires to inducer motor and pressure switch(es) or connectors.
12. Reconnect pressure tubes to pressure switch(es). See diagram on main furnace door for proper location of tubes. Be sure tubes are not kinked. (See Fig. 8 or 9.)
13. Turn on gas and electrical supplies to furnace.
14. Check furnace operation through 2 complete heat operating cycles. Check area below inducer housing, vent pipe, and condensate trap to ensure no condensate leaks occur. If leaks are found, correct the problem.
15. Check for gas leaks.



**Fig. 11—Gasket on Collector Box**

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**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.

16. Replace furnace door.

## VI. SERVICING HOT SURFACE IGNITOR

The ignitor does NOT require annual inspection. Check ignitor resistance before removal.

1. Turn off gas and electrical supplies to furnace.
2. Remove furnace door.
3. Disconnect ignitor wire connection.
4. Check ignitor resistance.
  - a. Using an ohm meter, check resistance across both ignitor leads in connector.
  - b. Cold reading should be between 45 ohms and 90 ohms.
  - c. If ohm reading is higher than 110 ohms, ignitor is cracked and must be replaced.
5. Remove ignitor.
  - a. While spreading ignitor bracket legs outward, use hand to GENTLY guide ignitor out of burner box.

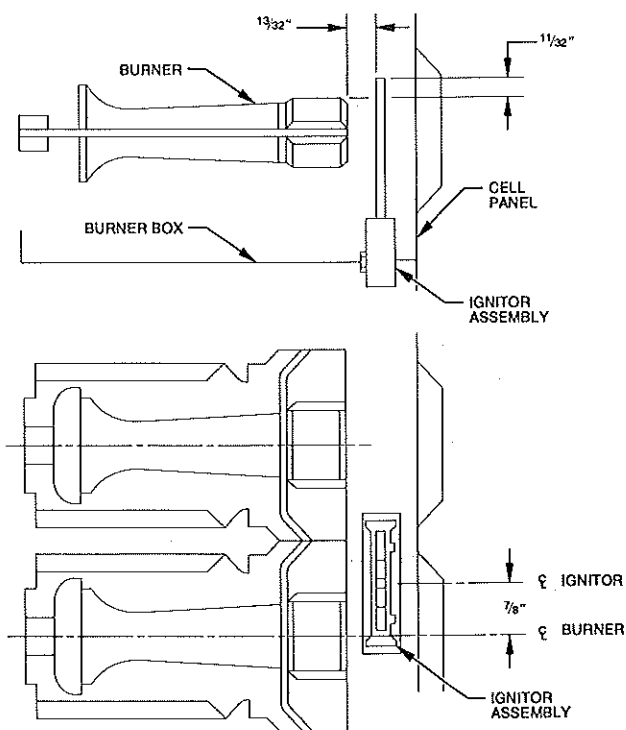
**CAUTION:** The ignitor is fragile. DO NOT allow it to hit the side of the burner box opening while removing or replacing it.

- b. Inspect ignitor for a white area indicating a crack may be present. If found, replace ignitor.

**NOTE:** A small crack cannot be seen on a new ignitor. After a period of operation, a white area will be visible around the crack.

6. After inspecting or replacing ignitor, install it into burner box by gently pushing ignitor into bracket until bracket legs fully secure ignitor. (See Fig 12.)
7. Connect ignitor wire connection.
8. Turn on gas and electrical supplies to furnace.
9. Check furnace operation through 2 heat operating cycles.
10. Replace furnace door.





A93260

**Fig. 12—Hot Surface Ignitor Location and Burner Assembly**

## VII. ELECTRICAL CONTROLS AND WIRING



**CAUTION:** There may be more than 1 electrical supply to the unit. Check accessories and cooling unit for additional electrical supplies.

The electrical ground and polarity for 115-v wiring must be maintained properly. Refer to Fig. 13 for field wiring information and to Fig. 18 or 22 for unit wiring information.

**NOTE:** If the polarity is not correct, the STATUS LED on the control center will flash rapidly and prevent the furnace from operating. The control system also requires an earth ground for proper operation of the control center and flame sensing.

The 24-v circuit contains an automotive-type, 3-amp fuse located on the control center. (See Fig. 14 and 15.) Any direct shorts of the 24-v wiring during installation, service, or maintenance will cause this fuse to blow. If fuse replacement is required, use ONLY a fuse of identical size.

With power to the unit disconnected, check all electrical connections for tightness. Tighten all screws on electrical connections. If any smoky or burned connections are found, disassemble the connection, clean all parts, strip wire, and reassemble properly and securely.

Reconnect electrical supply to unit and observe unit through 1 complete operating cycle. Electrical controls are difficult to check without proper instrumentation; if there are any discrepancies in the operating cycle, contact your dealer and request service.

## VIII. TROUBLESHOOTING

### A. 340MAV and 350MAV Furnaces

For an explanation of fault codes, refer to service label located on back of main furnace door or Fig 19, and the troubleshooting guide Fig 20.

The control center stores 1 fault code (the last fault to occur) for a period of 48 hrs or until the 115- or 24-v power is interrupted.

**NOTE:** Removing blower access panel will open blower access panel door switch and terminate 24-v power to control center, and fault code will be erased. Look into blower access panel sight glass for current LED status.

1. To retrieve fault code, proceed with the following:

**NOTE:** NO thermostat signal may be present at control center, and all blower time delay off periods must be completed.

- a. Leave 115-v power to furnace turned on.
- b. Remove main furnace door.
- c. Look into blower access panel sight glass for current LED status.
- d. Remove blower access panel.

**NOTE:** Leave blower access panel installed to maintain power to control center to view current LED status.

- e. BRIEFLY remove either wire from the main limit switch until LED goes out, then reconnect it.

**NOTE:** If wire to main limit is disconnected longer than 4 sec, main blower starts and retrieval request is ignored.

2. When above items have been completed, the following will occur:

- a. LED flashes a fault code 4 times. Record this fault code for further troubleshooting.
- b. Inducer motor operates for 10 sec, then turns off.
- c. Hot surface ignitor is energized for 15 sec, then de-energized.
- d. Main blower operates at cooling speed for 10 sec, then turns off.
- e. Main blower operates at heating speed for 10 sec, then turns off.

Items a. through e. above will assist in furnace troubleshooting since all components are functionally operated except the gas valve. This procedure is also referred to as "Component Test."

3. Operate furnace through 1 heat cycle to test for proper operation and check LED status.
4. If furnace is operating properly and LED indicates proper operation, replace main furnace door.
5. Component Test can also be initiated by performing the following:
  - a. Remove main furnace door.
  - b. Remove blower access panel.
  - c. Manually close blower access panel door switch.



**WARNING:** Blower access panel door switch opens 24-v power to control center. No component operation can occur. The 115-v power is still present at control center and transformer. Caution must be taken when manually closing this switch for service purposes. Failure to follow this warning could result in personal injury or death.

- d. BRIEFLY short (jumper) TEST, 1/4-in. quick-connect terminal on control center (adjacent to LED diagnostic light) and Com terminal on thermostat connection block. (See Fig 14.)

**NOTE:** If TEST to Com terminals are jumpered longer than 2 sec, LED will flash rapidly, and retrieval request will be ignored.

- e. Component Test will function as described in item 2. above.

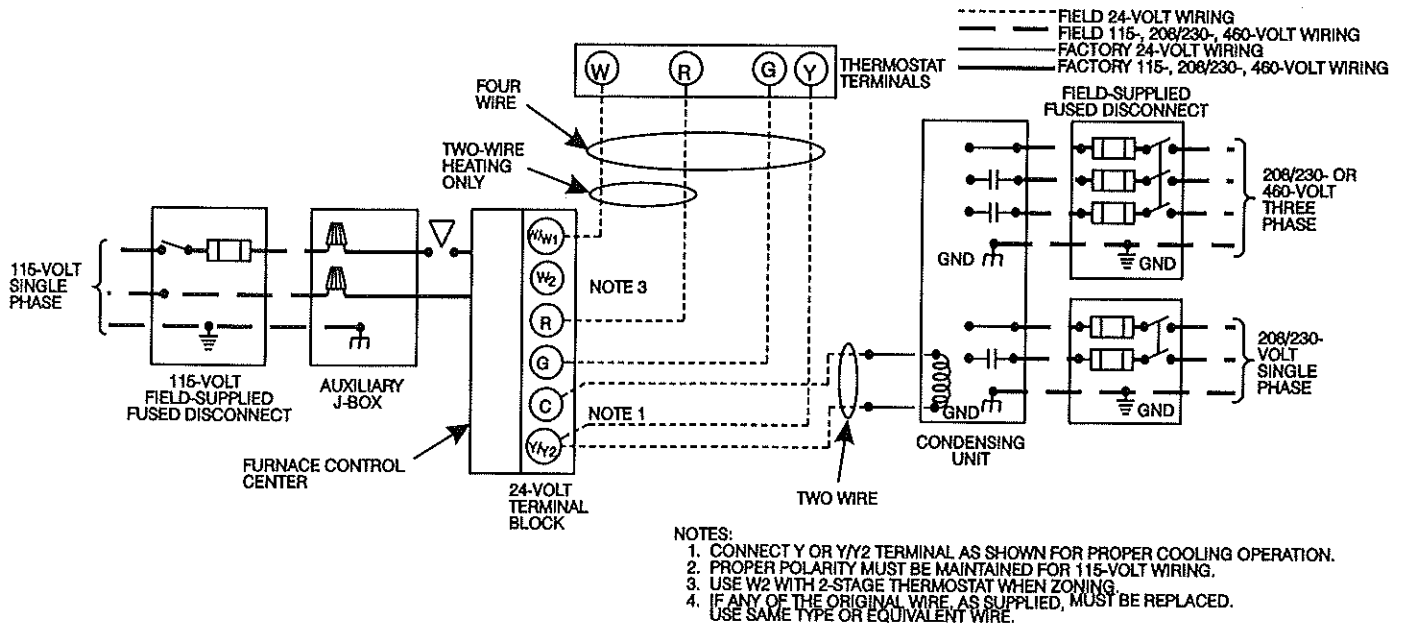


Fig. 13—Field Wiring

A93049

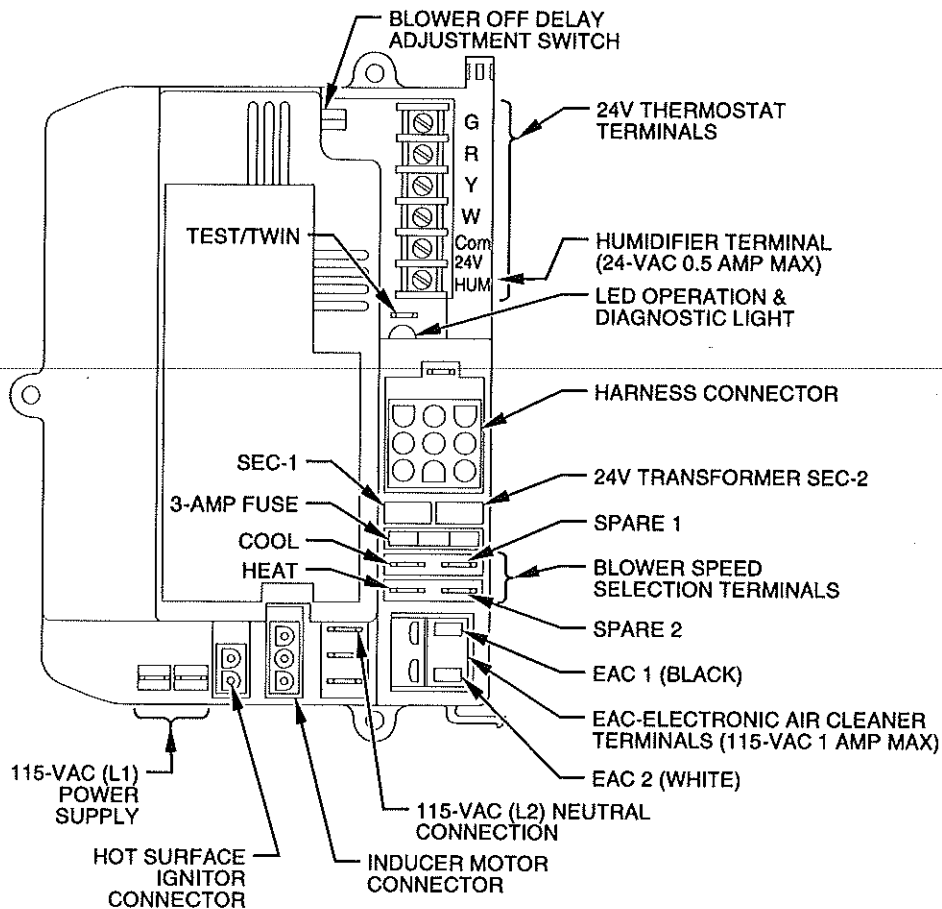


Fig. 14—Fixed Control Center

A93052

- f. Check LED status.
- g. If LED status indicates proper operation, remove device used to manually close blower access panel door switch, replace blower access panel, and replace main furnace door.

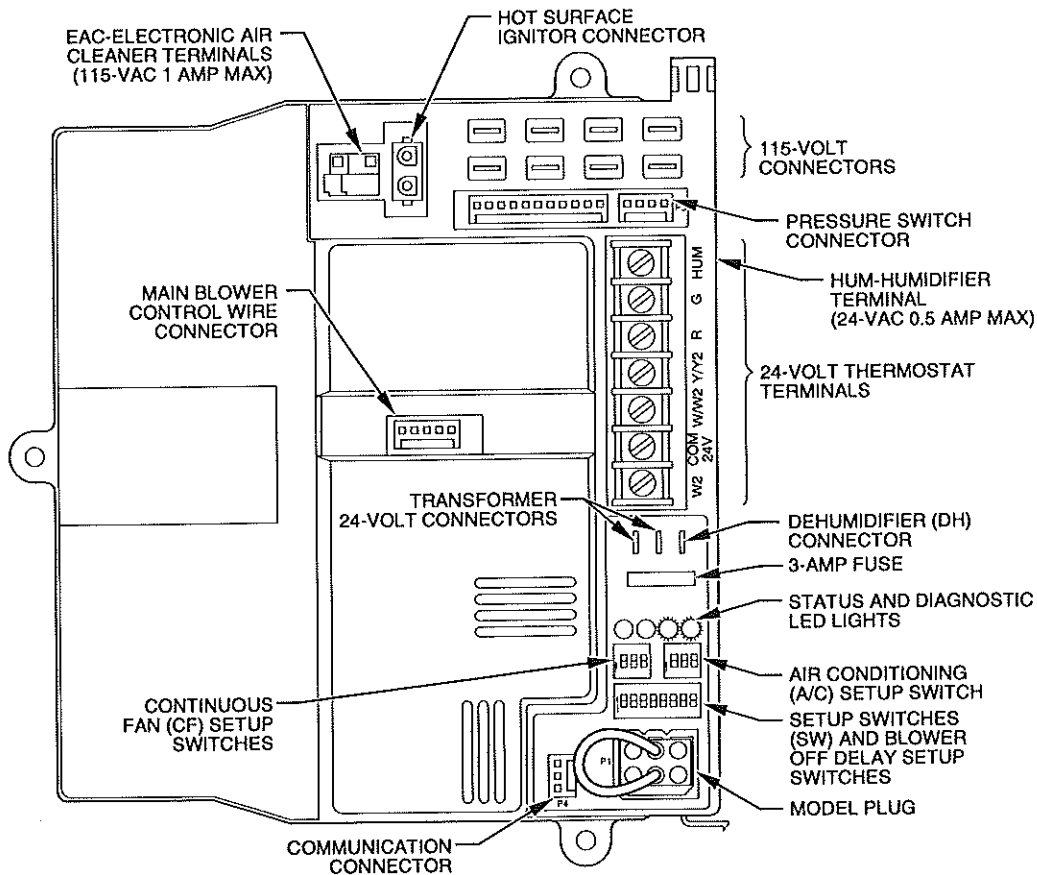
**B. 355MAV Furnace**

For an explanation of fault codes, refer to service label located on back of main furnace door or Fig 21.

The control center stores all fault codes for a period of 5 "good or proper" operating cycles, regardless of 115- or 24-v power interruption.

**NOTE:** Removing blower access panel will open blower access panel door switch and terminate 24-v power to control center. Look into blower access panel sight glass for current LED status.

- 1. To retrieve fault code proceed with the following:



A93062

**Fig. 15—Variable Control Center**

**NOTE:** NO thermostat signal may be present at control center and all blower time delay off periods must be completed.

- a. Leave 115-v power to furnace turned on.
- b. Remove main furnace door.
- c. Look into blower access panel sight glass for current LED status.
- d. Remove blower access panel.
- e. Turn setup switch SW-1 to ON position. (See Fig 15 or 22 for location.)
- f. Manually close blower access panel door switch.

**WARNING:** Blower access panel door switch opens 24-v power to control center. No component operation can occur. The 115-v power is still present at control center, transformer, inducer motor, and main blower motor. Caution must be taken when manually closing this switch for service purposes. Failure to follow this warning could result in personal injury or death.

- g. LEDs display last fault code to occur first, followed by any other fault that has occurred in the last 5 "good or proper" cycles. The remaining faults displayed will be in numerical order starting from the lowest number first. Only 1 of each fault code will be displayed, regardless of how many times the fault has occurred.
- h. Fault code display will continue and repeat as described above or until setup switch (SW-1) is turned off.
- i. Remove device used to manually close blower access panel door switch and replace blower access panel.
- j. Operate furnace through 1 heat cycle to test for proper operation and check LED status.

k. If furnace is operating properly and LEDs indicate proper operation, replace main furnace door.

2. Fault code display can be removed from control's display mode by performing the following. This is also called the "Clean Up Procedure."

- a. Leave 115-v power to furnace turned on.
- b. Remove main furnace door.
- c. Look into blower access panel sight glass for current LED status.
- d. Remove blower access panel.
- e. Turn setup switch SW-1 to ON position. (See Fig 15 or 22 for location.)
- f. Jumper thermostat terminals R, W, and Y on control center.
- g. Manually close blower access panel door switch.

**WARNING:** Blower access panel door switch opens 24-v power to control center. No component operation can occur. The 115-v power is still present at control center, transformer, inducer motor, and main blower motor. Caution must be taken when manually closing this switch for service purposes. Failure to follow this warning could result in personal injury or death.

- h. After fault code 11 flashes for at least 2 times, remove R, W, and Y jumpers.
- i. Turn setup switch SW-1 to OFF position.
- j. Remove device used to manually close blower access panel door switch and replace blower access panel.

- k. Operate furnace through 1 heat cycle to check for proper operation and check LED status.
- l. If furnace is operating properly and LEDs indicate proper operation, replace main furnace door.
3. The control can also assist in troubleshooting by performing a Component Test. The Component Test will functionally operate all furnace components, except the gas valve. Proceed with the following to initiate Component Test:
  - a. Leave 115-v power to furnace turned on.
  - b. Remove main furnace door.
  - c. Remove blower access panel.
  - d. Turn setup switch SW-6 to ON position.
  - e. Manually close blower access panel door switch.

**WARNING:** Blower access panel door switch opens 24-v power to control center. No component operation can occur. The 115-v power is still present at control center, transformer, inducer motor and main blower motor. Caution must be taken when manually closing this switch for service purposes. Failure to follow this warning could result in personal injury or death.

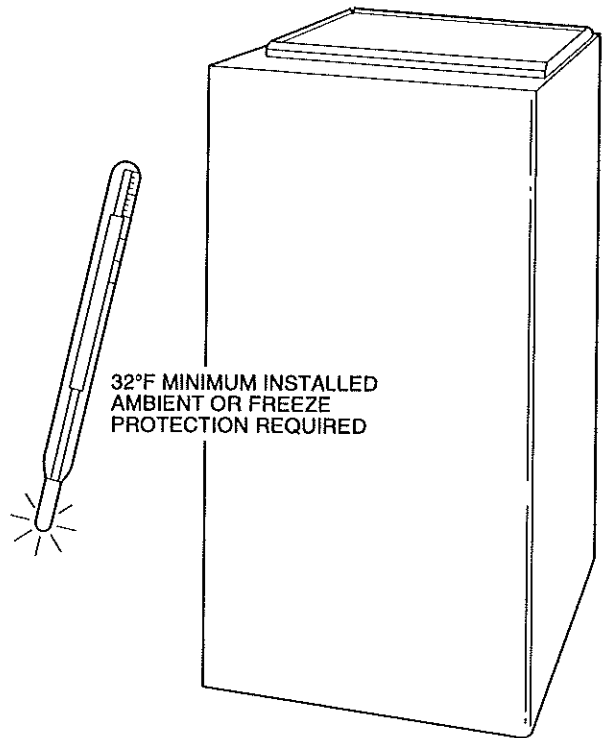
f. When above items have been completed, the following will occur:

- (1.) Green LED lights for 1 sec, followed by both the green and yellow LEDs which light for another 1 sec. During this period, the control is checking itself out.
  - (2.) Inducer motor operates for 20 sec at low speed, operates for 20 sec at high speed, then turns off.
  - (3.) Hot surface ignitor is energized for 15 sec, then de-energized.
  - (4.) Main blower motor operates for 20 sec at low speed, operates at high speed for 20 sec, then turns off.
  - (5.) After component operation test is completed, 1 or more fault codes (11, 22, 41, or 42) will flash. See service label on back of main furnace door or Fig 21 for explanation of codes.
- g. Remove device used to manually close blower access panel door switch and turn setup switch SW-6 to OFF position.
  - h. Replace blower access panel.
  - i. Operate furnace through 1 heat cycle to check for proper operation and check LED status.
  - j. If furnace is operating properly and LEDs indicate proper operation, replace main furnace door.

#### IX. CHECKING HEAT TAPE OPERATION (IF APPLICABLE)

In applications where the ambient temperature around the furnace is 32°F or lower, freeze protection measures are required. If this application is where heat tape has been applied, check to ensure it will operate when low temperatures are present.

**NOTE:** Heat tape, when used, should be wrapped around the condensate drain trap and drain line. There is no need to use heat tape within the furnace casing. Most heat tapes are temperature activated, and it is not practical to verify the actual heating of the tape. Check the following:



A93058

**CAUTION:** If this furnace is installed in an unconditioned space where the ambient temperatures may be 32°F or lower, freeze protection measures must be taken.

1. Check for signs of physical damage to heat tape such as nicks, cuts, abrasions, gnawing by animals, etc.
2. Check for discolored heat tape insulation. If any damage or discolored insulation is evident, replace heat tape.
3. Check that heat tape power supply circuit is on.

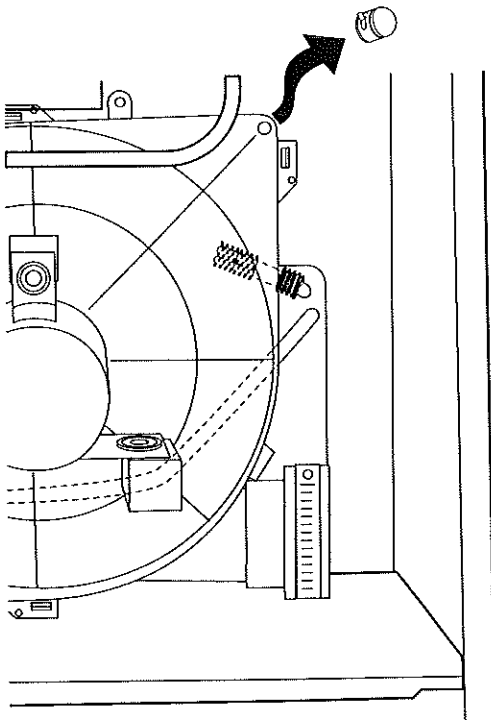
#### X. WINTERIZING

**CAUTION:** 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:

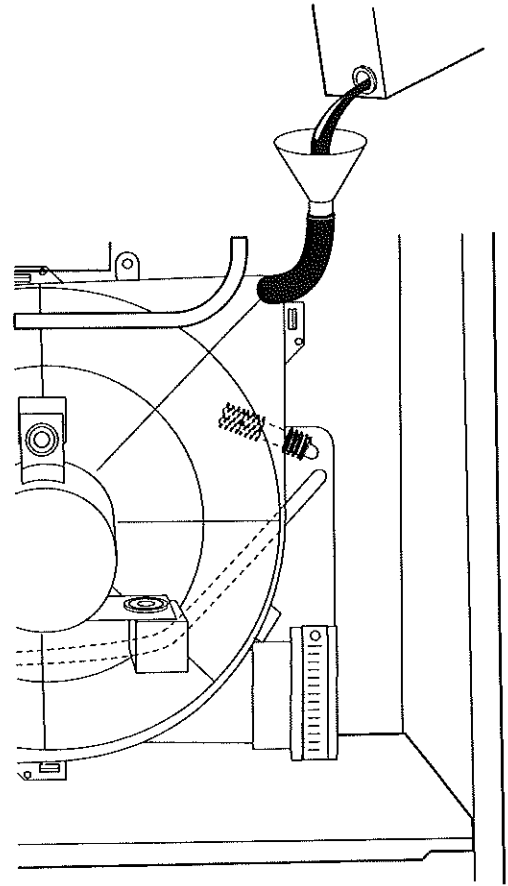
1. Turn off electrical supply to furnace.
2. Remove furnace door.
3. Disconnect drain tube from inducer housing. (See Fig. 16.)
4. Insert funnel in drain tube and pour antifreeze, propylene glycol (RV, swimming pool antifreeze, or equivalent) into furnace until it is visible at point where condensate enters open drain. (See Fig. 17.)
5. Reconnect drain tube to inducer housing.
6. Replace furnace door.

**CAUTION:** Do not use ethylene glycol (Prestone II antifreeze/coolant or equivalent automotive type). Failure of plastic components will occur.



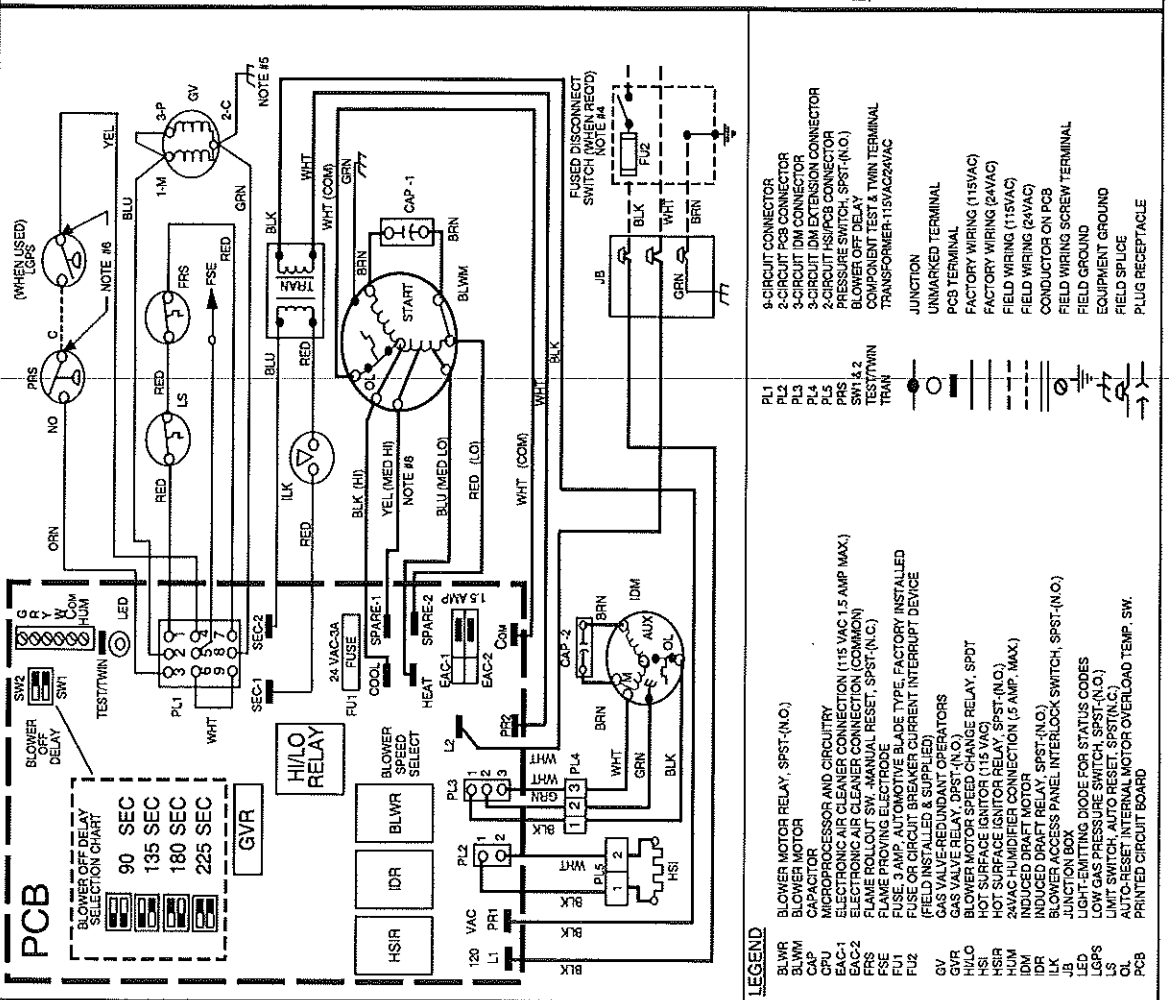
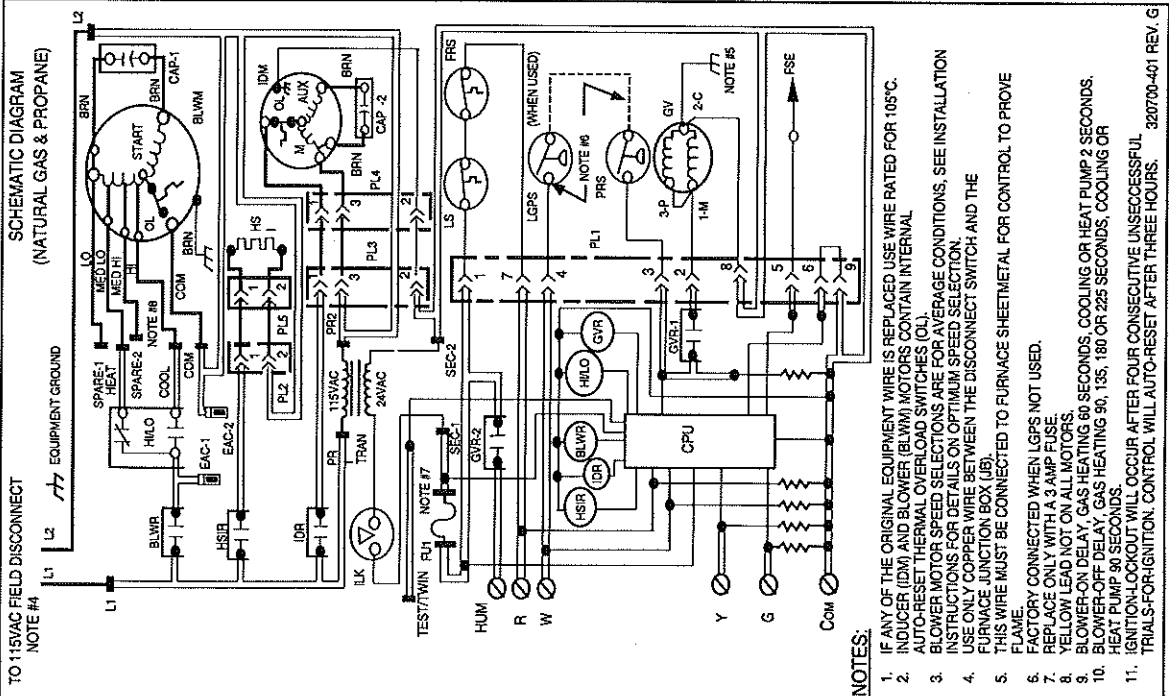
A94208

**Fig. 16—Inducer Housing Drain Tube**



A94209

**Fig. 17—Funnel in Drain and Antifreeze Running Through Trap**



A93050

Fig. 18—Wiring Diagram for 340MAV or 350MAV

SERVICE LABEL

## SERVICE

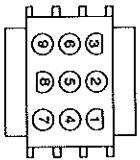
LED CODE	STATUS
<b>CONTINUOUS OFF</b>	- Check for 115VAC at L1 and L2, and 24VAC at SEC-1 and SEC-2.
<b>CONTINUOUS ON</b>	- Control has 24V power.
<b>RAPID FLASHING</b>	- Line voltage (115V) polarity reversed. If twinned, 24V power to one furnace may be out of phase with 24V power to other furnace.

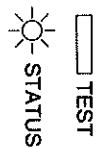
EACH OF THE FOLLOWING STATUS CODES IS A TWO DIGIT NUMBER WITH THE FIRST DIGIT DETERMINED BY THE NUMBER OF SHORT FLASHES AND THE SECOND DIGIT BY THE NUMBER OF LONG FLASHES.

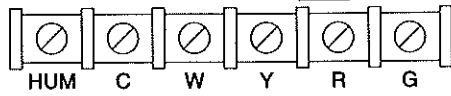
- 11 **NO PREVIOUS CODE** - Stored status codes are erased when power (115V or 24V) to control is interrupted or 48 hours after each fault is cleared.
- 12 **BLOWER ON AFTER POWER UP (115V OR 24V)** - Blower runs for 90 seconds, if unit is powered up during a call for heat (R-W closed).
- 13 **LIMIT OR FLAME ROLLOUT SWITCH LOCKOUT** - Auto reset after three hours. Flame rollout switch requires manual reset. Refer to #33.
- 14 **IGNITION LOCKOUT** - Control will auto-reset after three hours. Refer to #34.
- 21 **GAS HEATING LOCKOUT** - Control will NOT auto reset.  
Check for: - Stuck gas valve relay on control or miswire to gas valve circuit.
- 22 **ABNORMAL FLAME-PROVING SIGNAL** - Flame is proved while gas valve is de-energized. Inducer will run until fault is cleared.  
Check for: - Stuck-open gas valve or leaky gas valve.
- 23 **PRESSURE SWITCH DID NOT OPEN** Check for:  
- Obstructed pressure tubing. - Defective pressure switch (stuck closed).
- 24 **SECONDARY VOLTAGE FUSE IS OPEN**  
Check for: - Short circuit in secondary voltage (24V) wiring.
- 31 **PRESSURE, DRAFT SAFEGUARD, OR AUXILIARY LIMIT (when used) SWITCH DID NOT CLOSE OR REOPENED** - If open longer than five minutes, inducer shuts off for 15 minutes before retry. Check for:  
- Proper vent sizing and condensate pitch. - Inadequate combustion air supply.  
- Vent restriction or high winds. - Low inducer voltage.  
- Defective inducer motor or start capacitor.  
- Defective pressure switch or connections. If it opens after trial for ignition period, blower will come on for 90 second recycle delay.  
- Disconnected or obstructed pressure tubing.
- 33 **LIMIT OR FLAME ROLLOUT SWITCH IS OPEN** - If open longer than three minutes, code changes to #13. Check for:  
- Defective blower motor or start capacitor. - Dirty filter or restricted duct system.  
- Loose blower wheel. - Defective switch or connections.  
- Inadequate combustion air supply (flame rollout switch only).  
- Open flame rollout switch, manual reset.
- 34 **IGNITION PROVING FAILURE** - Control will try three more times before a lockout #14 occurs. If flame signal lost after trial for ignition period, blower will come on for 90 second recycle delay.  
Check for: - Oxide buildup on flame sensor (clean with fine sandpaper).  
- Proper flame sense microamps (.5 microamps D.C. minimum).  
- Gas valve turned off. - Manual shut-off valve.  
- Green wire MUST be connected to furnace sheet metal.  
- Inadequate flame carryover or rough ignition.  
- Low inlet gas pressure.


## COMPONENT TEST

To initiate the component test sequence, shut OFF the room thermostat or disconnect the "R" thermostat lead. Briefly short the TEST terminal to the "C" terminal. Status LED will flash code and then turn on the inducer motor, hot surface igniter, blower motor-heat speed, and blower motor-cool speed for 10-15 seconds each.







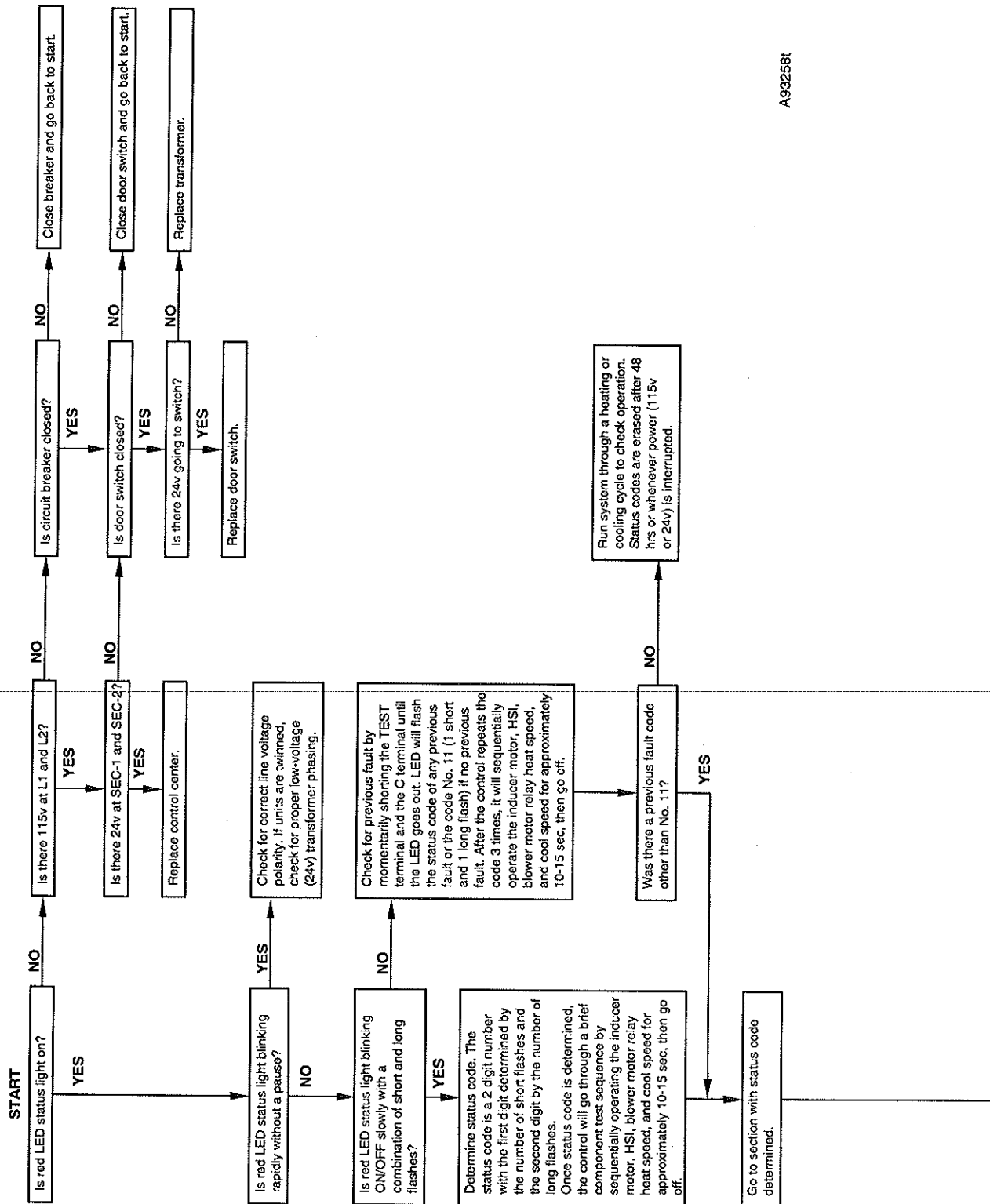


BLOWER OFF  
DELAY SELECT

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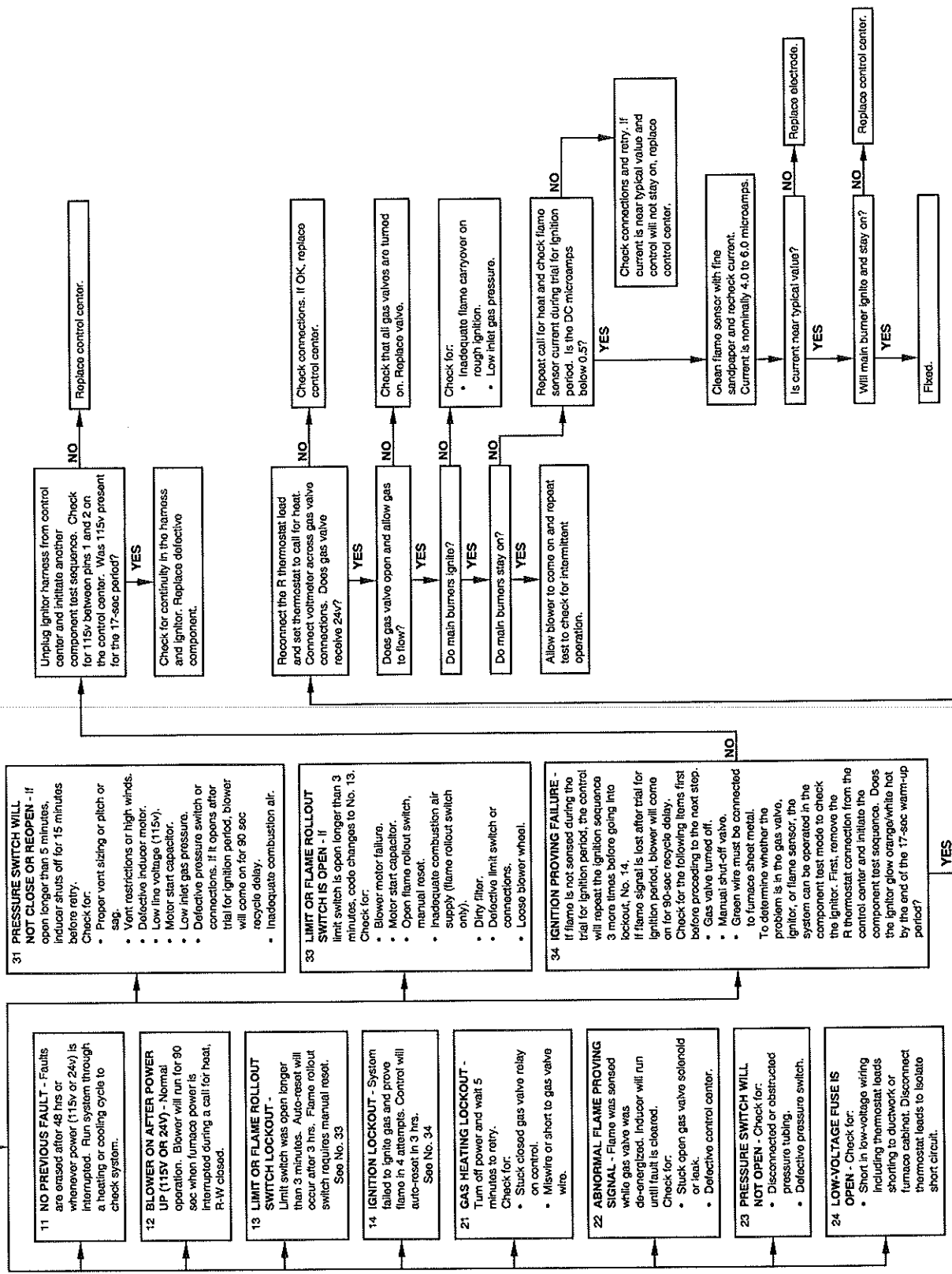
A93297

Fig. 19—Service Label for 340MAV and 350MAV



A93258t





A93258b

A93258

Fig. 20—Troubleshooting Guide for 340MAV and 350MAV

# SERVICE

## LED CODE

RED LED1 ON  
RED LED2 ON

## STATUS

Furnace is operating in emergency heat.  
The microprocessor has malfunctioned. To reset: Put setup switch "SW-1" in the "ON" position and jumper thermostat terminals "R", "W/W1", and "V/Y2" simultaneously with the door switch pushed in and power to the unit "ON". Disconnect jumper and place setup switch in the "OFF" position. If LED2 reappears replace main control board.  
Furnace is operating in high heat.  
Furnace is operating in low heat.  
Line voltage polarity is reversed.

YELLOW LED3 ON  
GREEN LED4 ON  
RED LED2 FLASHING

EACH OF THE FOLLOWING STATUS CODES IS A TWO DIGIT NUMBER WITH THE FIRST DIGIT DETERMINED BY NUMBER OF FLASHES OF THE YELLOW LED AND THE SECOND DIGIT DETERMINED BY NUMBER OF FLASHES OF THE GREEN LED.

- 11 NO FAULT IN RECENT HISTORY DISPLAY** - Indicates no faults have occurred within last five cycles. To read recent fault history put setup switch "SW-1" in the "ON" position. To clear recent fault history, put setup switch "SW-1" in the "ON" position and jumper thermostat terminals "R", "W/W1", and "V/Y2" simultaneously until an "11" is flashed.
- 12 BLOWER CALIBRATION LOCKOUT** - Indicates RPM calculated for low heat was less than 250 RPM or greater than 1300 RPM on two successive attempts. Auto reset after three hours. Reset power and refer to fault #44 section.
- 13 LIMIT SWITCH LOCKOUT** - Indicates the occurrence of 10 successive limit trips during high heat or three successive limit trips during low heat. Auto reset after three hours.  
Check for:
  - Improper or misaligned limit and/or limit shield.
  - Improper high or low heat gas input adjustment.
  - Stuck high heat solenoid in gas valve.
- 14 IGNITION LOCKOUT** - Control will auto-reset after three hours. Refer to #34.
- 21 INVALID MODEL SELECTION** - Indicates model plug is missing or incorrect. See wiring diagram for correct connector jumper location.
- 22 SETUP ERROR** - Indicates setup switch "SW-1" or SW-6" is positioned improperly. The following combinations will cause the fault:
  - Thermostat call with "SW-1" "ON".
  - Thermostat call with "SW-6" "ON".
  - "SW-1" and "SW-6" both "ON" together.
- 23 INVALID BLOWER AIRFLOW SELECTION** - Indicates improper "A/C" or "CF" switch setting. The 042 and 20 unit can deliver 1-1/2 to 3-1/2 tons A/C and 600 to 1400 CFM for continuous fan. The 060 and unit will default to closest allowable airflow.
- 24 SECONDARY VOLTAGE FUSE IS OPEN** - Indicates the fuse is open and there is a short circuit in the low voltage wiring.
- 31 HIGH PRESSURE SWITCH FAULT** - Indicates high pressure switch is closed at call, or in low heat, or fails to close after call, or opens in high heat.  
Check for:
  - Plugged condensate drain.
  - Water in vent piping, possibly sagging pipe.
  - Improper pressure switch wiring or pressure switch tubing connections.
  - Failed or "Out-of-Calibration" pressure switches.
- 32 LOW PRESSURE SWITCH FAULT** - Indicates low pressure switch is closed at call, or fails to close after call, or opens during operation.  
Check for:
  - Plugged condensate drain.
  - Water in vent piping, possibly sagging pipe.
  - Improper pressure switch wiring or pressure switch tubing connections.
  - Failed or "Out-of-Calibration" pressure switches.
- 33 LIMIT SWITCH FAULT** - Indicates the limit, rollout switch or auxiliary limit switch is open or the unit is operating in high heat only mode due to two successive low heat limit trips.  
Check for:
  - Improper or misaligned limit and/or limit shield.
  - Improper low heat gas input adjustment.
  - Stuck high heat solenoid in gas valve.

**34 IGNITION PROVING FAULT** - Control will try three more times before a lockout #14 occurs.

- Check for:
- Gas valve turned "OFF".
  - Oxide buildup on flame sensor (clean with fine sandpaper.)
  - Main shutoff valve turned "OFF".
  - Green wire **MUST** be connected to furnace sheet metal.
  - Proper flame sense microamps (.5 microamps D.C. minimum)
  - Inadequate flame carryover or rough ignition.
  - Low inlet gas pressure.

**41 BLOWER OUTSIDE VALID SPEED RANGE** - Indicates the blower is not operating at the calculated RPM. If this fault occurs in conjunction with fault #44 check wiring to motor otherwise refer to the trouble-shooting guide.

**42 INDUCER OUTSIDE VALID SPEED RANGE** - Indicates the inducer is not operating at the calculated RPM, or has not started within 10 seconds after a call for heat. Check wiring to motor otherwise refer to the trouble-shooting guide.

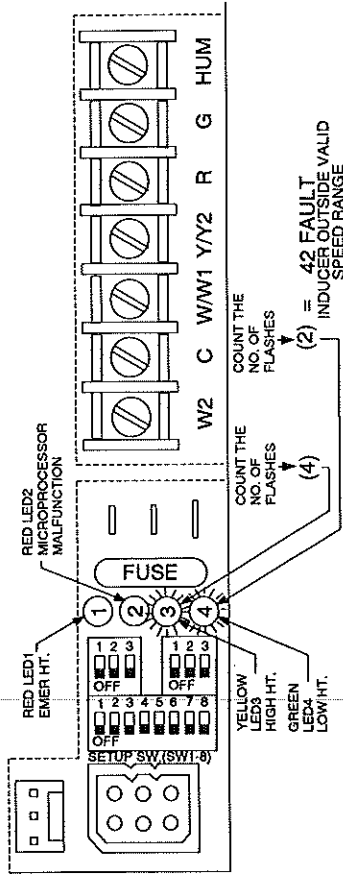
**43 PRESSURE SWITCH CALIBRATION FAULT** - Indicates the low and high pressure switch "make" points during high heat purge are not within the calibration range.

Check for:

- Plugged condensate drain.
- Water in vent piping, possibly sagging pipe.
- Improper pressure switch wiring or pressure switch tubing connections.
- Failed or "Out of Calibration" pressure switches.

**44 BLOWER CALIBRATION FAULT** - Indicates the calculated blower speed is below 250 or above 1300 RPM. Unit will default to low or high heat mode if possible. If this fault occurs in conjunction with fault #41 check wiring to motor otherwise refer to the trouble-shooting guide. If this fault occurs by itself check for undersized ductwork, or excessive static caused by a dirty filter, or closed registers.

**STATUS CODE EXAMPLE**



**COMPONENT TEST**

To initiate the component test sequence, shut "OFF" the room thermostat or disconnect the "R" thermostat lead. Put setup switch "SW-6" in the "ON" position to start the component test sequence. Once initiated the main board will turn "ON" the inducer motor-low speed, inducer motor-high speed, hot surface ignitor, blower motor-low speed, and blower motor-high speed for 15-20 seconds each. When component test is completed one or more of the following codes will flash.

**DESCRIPTION**

- 11** Indicates inducer and blower motor tested OK. Visual check of hot surface ignitor required.
- 22 SETUP ERROR** - Same as code 22 above.
- 41 BLOWER OUTSIDE VALID SPEED RANGE** - Indicates blower motor failed test. Check blower, wiring, and control center.
- 42 INDUCER OUTSIDE VALID SPEED RANGE** - Indicates inducer motor failed test. Check inducer, wiring and control center.

To repeat component test turn setup switch "SW-6" "OFF" and then back "ON". After component test is completed put setup switch "SW-6" in the "OFF" position and reconnect the "R" thermostat lead.

320624-101 REV. F

Fig. 21—Service Label for 355MAV

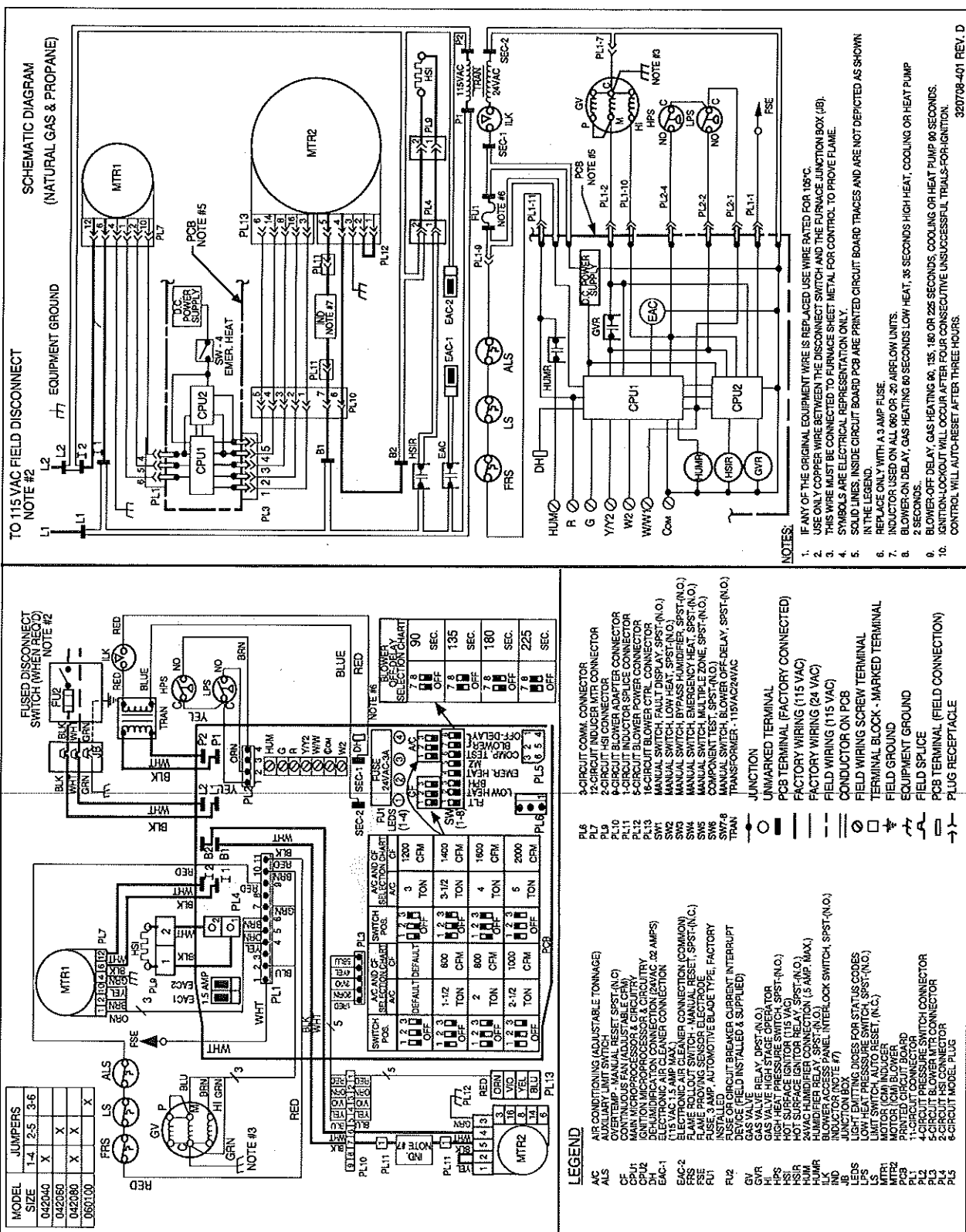


Fig. 22—Wiring Diagram for 355MAV