

Installation Instructions

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

SAFETY CONSIDERATIONS

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may cause death, personal injury, or property damage. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes. Wear safety glasses, protective clothing, and work gloves. Have a fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions included in literature and attached to the unit. Consult local building codes, the current editions of the National Fuel Gas Code (NFGC) NFPA 54/ANSI Z223.1 and the National Electrical Code (NEC) NFPA 70.

In Canada, refer to the current editions of the National Standards of Canada CAN/CSA-B149.1 and .2 Natural Gas and Propane Installation Codes, and Canadian Electrical Code CSA C22.1.

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 **may** 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

FIRE, EXPLOSION, ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury, death and/or property damage.

The ability to properly perform maintenance on this equipment requires certain knowledge, 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 Owner's Manual.

 **WARNING**

FIRE, EXPLOSION, ELECTRICAL SHOCK AND CARBON MONOXIDE POISONING HAZARD

Failure to follow instructions could result in personal injury, death or property damage.

Improper installation, adjustment, alteration, service, maintenance, or use can cause carbon monoxide poisoning, explosion, fire, electrical shock, or other conditions, which could result in personal injury or death. Consult your distributor or branch for information or assistance. The qualified installer or agency must use only factory-authorized kits or accessories when servicing this product.

 **WARNING**

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

Before installing, modifying, or servicing system, main electrical disconnect switch must be in the OFF position and install a lockout tag. There may be more than one electrical supply to the furnace. Check accessories and cooling unit for additional electrical supplies that must be shut off during furnace servicing. Lockout and tag switch with a suitable warning label. Verify proper operation after servicing.

INTRODUCTION



CAUTION

CUT HAZARD

Failure to follow this caution may result in personal injury.

Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing, safety glasses and gloves when handling parts, and servicing furnaces.

This kit is a direct replacement for circuit boards Part No. HK42FZ004, HK42FZ007, HK42FZ008, HK42FZ009, HK42FZ011, HK42FZ013 and HK42FZ016. Changes to the operation of this control include:

1. The blower off delay selections are: 90, 120, 150 and 180 seconds.
2. A COOLING OFF DELAY DEFEAT JUMPER "J2" is provided. It is located in the upper left corner of control board. See Fig. 2. When cut, this permanently reduces the

90 second blower-off delay in the cooling mode, to 5 seconds.

- All 115-volt neutrals are grouped together in one location of board. See Fig. 2.
- Humidifier connection is removed from thermostat terminal block. It is now a 1/4-in. spade terminal, next to the thermostat terminal block. See Fig. 2.

Kit Contains:	Part Number
Control board	HK42FZ034
Wire harness adapter	328151-701
Non-condensing furnace (80% wiring diagram)	328251-101 Rev. A
Condensing furnace (90% wiring diagram)	328218-101 Rev. B
Service label	327596-101 Rev. B

TWINNING

The control board in this kit **CANNOT** be twinned with any of the following circuit boards:

HK42FZ004, HK42FZ007, HK42FZ008, HK42FZ009,
HK42FZ011, HK42FZ16

In twinned installations, another kit will be required for the twin furnace.

ELECTROSTATIC DISCHARGE (ESD)

! CAUTION

FURNACE RELIABILITY HAZARD

Failure to follow this caution may result in unit component damage.

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.

- 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.**
- Ground yourself by touching your hand and tools to clean, unpainted, metal surface of furnace close to control.
- After touching chassis, you may proceed to service the furnace. You will recharge your body with static electricity by moving about or shuffling your feet. Reground yourself.
- If you touch ungrounded objects (recharge your body with static electricity), reground yourself. Use this procedure for installed and uninstalled (ungrounded) furnaces.
- Ground yourself again before handling a new control to protect control from damage. If control is to be installed in furnace, follow items 1 through 5 again before installing control. Put all used **AND** new controls into containers before touching ungrounded objects.
- An ESD service kit (available from commercial sources) may also be used to prevent ESD damage.

INSTALLATION

Step 1 — Removal of Existing Control

! CAUTION

ELECTRICAL OPERATION HAZARD

Failure to follow this caution may result in improper furnace operation or failure of furnace.

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.

- Turn thermostat to OFF or set temperature to the lowest setting.
- Turn off electrical supply to furnace.
- Turn off gas supply to furnace.

! WARNING

ELECTRICAL SHOCK AND FIRE HAZARD

Failure to follow this warning could result in personal injury, death, and/or property damage.

Turn off the gas and electrical supplies to the furnace and install lockout tag before performing any maintenance or service. Follow the operating instructions on the label attached to the furnace.

- For 80% furnaces** remove control access and blower door. **For 90% furnaces** remove outer door assembly and remove the two screws from blower access panel and set aside.
- Disconnect thermostat and humidifier wires (if equipped).
- Disconnect line voltage, blower, EAC, (if equipped) and transformer wires.
- For 80% furnaces** remove retaining screws and remove furnace control board from bracket. **For 90% furnaces** remove two screws from blower deck that hold the control box assembly. Lower control box assembly. Remove retaining screw(s) from board and remove board from control box assembly.
- Remove wiring harness connectors from furnace control board.
- Inspect control and control box for evidence of water staining.
- Correct any sources of water leakage (humidifier, evaporator coil, vent system) into the control area.

Step 2 — Installing the New Control

- Ground yourself! Handle furnace control board by edges.
- Insert tab(s) of board into slots of control box (if required).
- Install furnace control board retaining screw(s). Install wiring harness adapter (part# 328151-701) to three connections of the existing furnace wiring harness. See Fig. 3.
 - The furnace harness 9-pin connector plugs into the mating 9-pin adapter harness connector.
 - The furnace harness 2-pin connector plugs into the mating 2-pin adapter harness connector.
 - The furnace harness 3-pin connector plugs into the mating 3-pin adapter harness connector.
- Connect the other end of the adapter harness (part number 328151-701) to the new furnace control board.

- a. The 11-pin connector connects to PL1 on the furnace control board. See Fig. 2 and 3.
- b. The 2-pin connector which has 2 black wires connects to PL2 on the furnace control board. See Fig. 2 and 3.
- c. The 2 white wires connect to the 115-volt Neutral spade connections, located in front of PL1 on the new furnace control board. See Fig. 2 and 3.
5. Connect the transformer to the new furnace control board. See Fig. 2.
 - a. Blue wire to SEC-2 terminal. SEC-2 terminal is located adjacent to the 3 amp fuse.
 - b. Red wire to SEC-1 terminal. SEC-1 terminal is located adjacent to the 3 amp fuse.
 - c. Black wire to PR-1 terminal. PR-1 terminal is located adjacent to PL2.
 - d. White wire to one of the 115-volt Neutral spade connections located in front of PL1.
6. Connect black wire from furnace auxiliary junction box to L1 on the new furnace control board. L1 is located on the blower enable relay. See Fig. 2.
7. Connect white wire from furnace auxiliary junction box to one of the 115-volt Neutral spade connections located in front of PL1. See Fig. 2.
8. Connect the blower motor leads to the new furnace control board. See Fig. 2.
 - a. Connect the white blower motor lead to the BLW connection within the group of 115-volt Neutral spade connections.
 - b. Connect the blower motor heat tap to the blower relay connection marked HEAT.
 - c. Connect the blower motor cool tap to the blower relay connection marked COOL.
 - d. Connect the remaining blower motor leads to SPARE-1 and SPARE-2.
9. Connect all accessory wires.
10. For 90% furnaces reinstall control box assembly to blower deck, by installing the two screws previously removed from the blower deck.
11. Set blower off delay. **Blower Off Delay Jumper Select** is located on the top-center portion of board. See Fig. 2. It is factory set at 120 seconds.
12. Install new wiring diagram over existing wiring diagram.
 - a. **For 80% furnaces**, apply label # 328251-101, Rev A
 - b. **For 90% furnaces**, apply label # 328218-101, Rev A
13. Do not connect thermostat wires to control board until **Start-up and System Check-out** is complete.

SYSTEM CHECK-OUT

Step 1 — Component Self Test

1. To initiate component test sequence, ensure thermostat is turned OFF or thermostat wires are disconnected. Turn power on and manually close blower door switch. With a short piece of wire, briefly short TEST/TWIN terminal to Com/24v terminal.

Component test sequence is as follows:

- a. Status LED will flash 4 times then turn ON inducer motor.
- b. Inducer motor will run for entire component test.
- c. Hot surface igniter will be turned ON for 15 seconds, then OFF.
- d. Blower motor-HEAT speed will be turned ON for 10 seconds.
- e. Blower motor-COOL speed will be turned on for 10 seconds.
2. Repair, replace or service any component that does not work properly during the self-test. The gas valve is not energized during self-test.

3. Turn power off.

4. Release blower door switch.

NOTE: Current status code will be erased when blower door is removed.

5. Connect thermostat wires.
6. Install blower and access doors.
7. Turn power back on.
8. Turn on gas supply to furnace.

Step 2 — Flame Sensor Operation

Connect a DC microammeter in series with flame sensor. Initiate a call for heat. After burners ignite and stabilize, measure flame current. Nominal flame current is between 4.0 and 6.0 micro amps DC. If flame current is below 4.0 microamps DC, remove and clean flame sensor with fine steel wool, or replace flame sensor.

The furnace control will lock-out when flame current falls to 0.5 micro amps DC.

Step 3 — System Operation

1. Perform any other safety checks as deemed necessary (flame safety, limit switch, vent system etc.).
2. Run unit through one complete call for heat cycle.

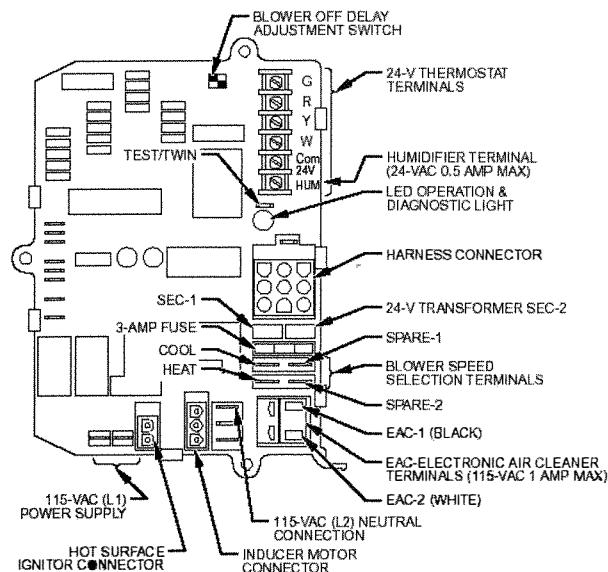


Fig. 1 - Old Style Furnace Control Board

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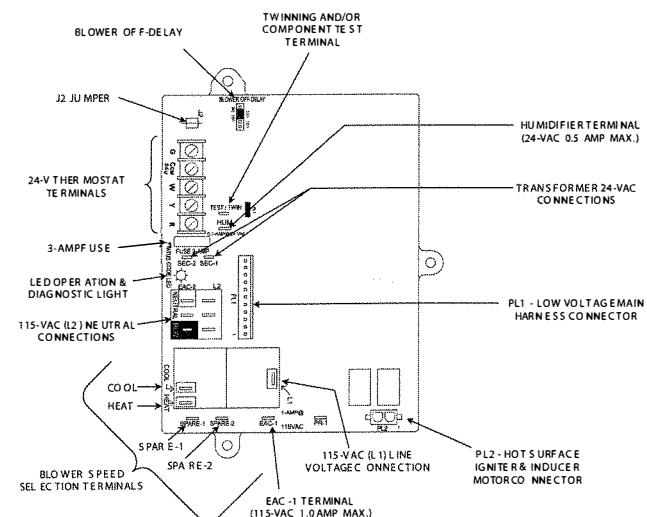


Fig. 2 - New Style Furnace Control Board

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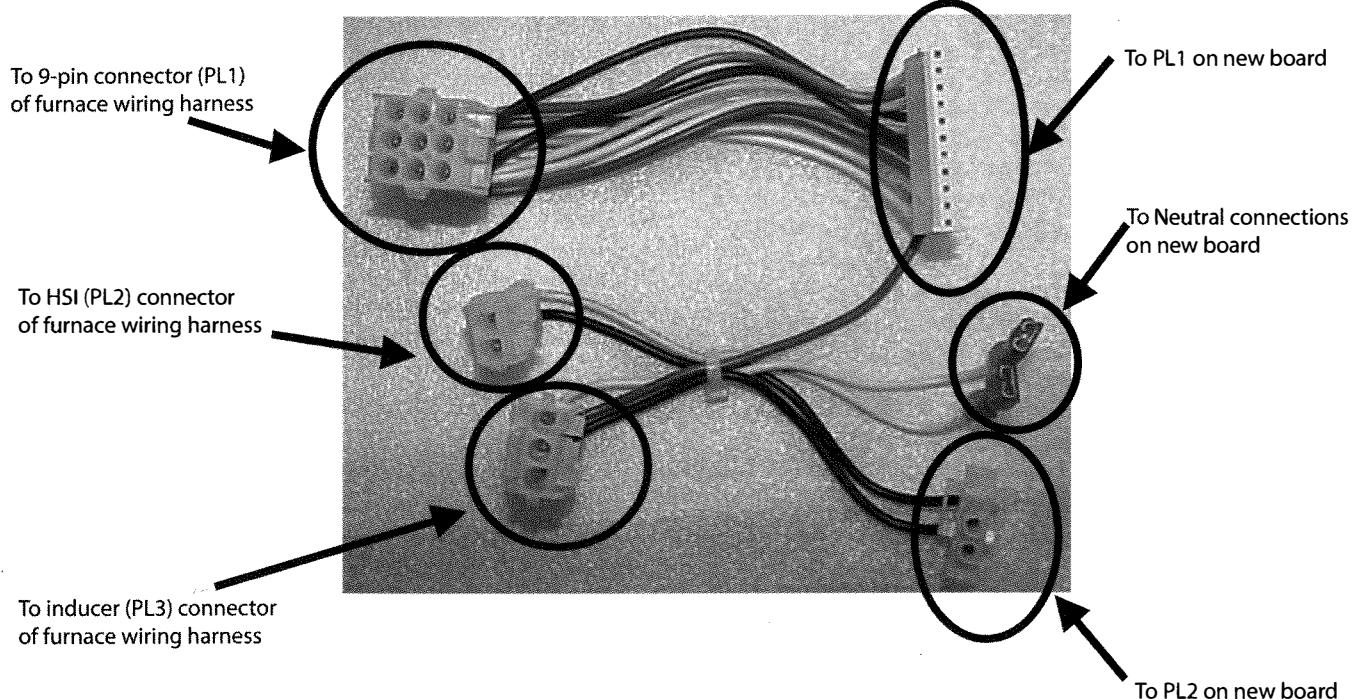


Fig. 3 - Wiring Harness Adapter

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SERVICE

If status code recall is needed, briefly remove then reconnect one main limit wire to display stored status code. On RED LED boards do not remove power or blower door before initiating status code recall. After one status code recall is completed component test will occur.

LED CODE STATUS

CONTINUOUS OFF - Check for 115VAC at L1 & L2, & 24VAC at SEC-1 & SEC-2.

CONTINUOUS ON - Control has 24VAC power.

RAPID FLASHING - Line voltage (115VAC) polarity reversed. If twinned, refer to twinning kit instructions.

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.

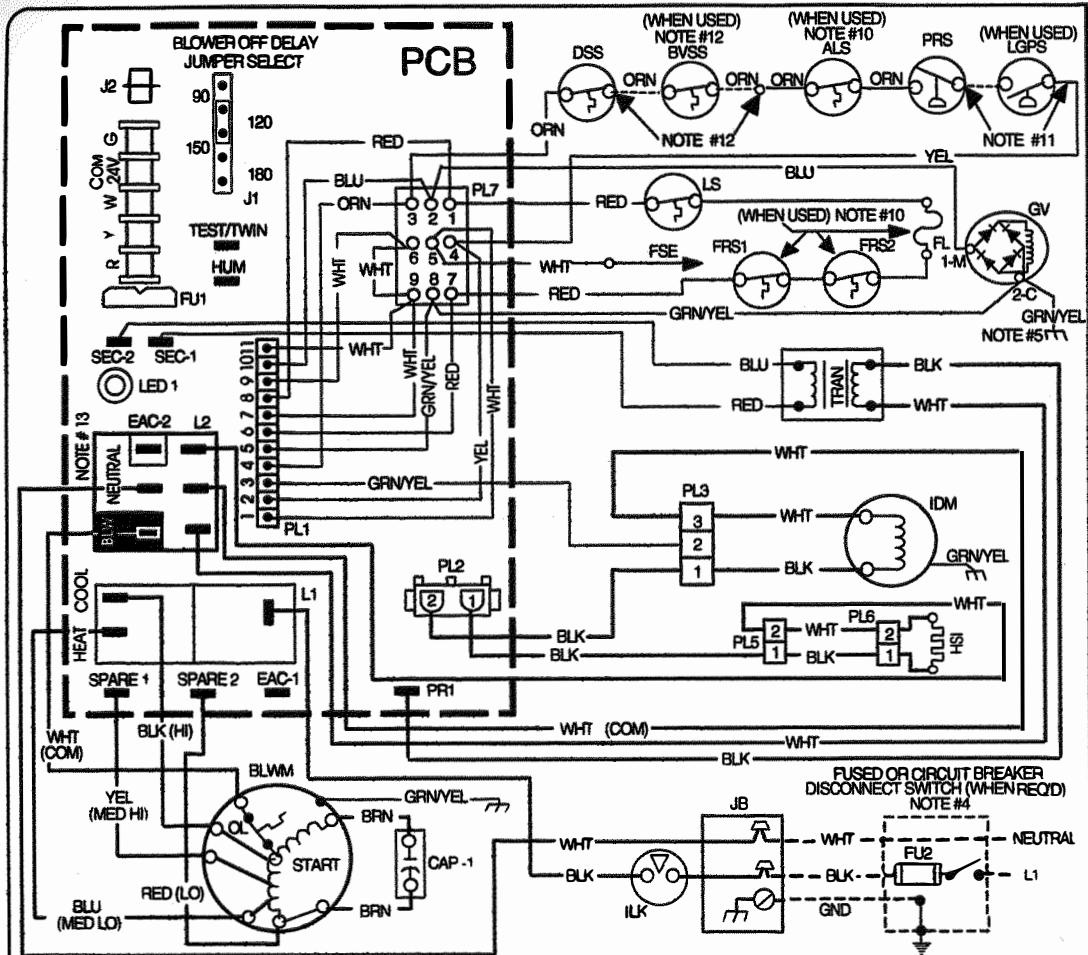
- 11 NO PREVIOUS CODE** - Stored status code is erased automatically after 72 hours. On RED LED boards stored status codes can also be erased when power (115 VAC or 24 VAC) to control is interrupted.
- 12 BLOWER ON AFTER POWER UP (115 VAC or 24 VAC)** - Blower runs for 90 seconds, if unit is powered up during a call for heat (R-W closed) or R-W opens during blower on-delay.
- 13 LIMIT CIRCUIT LOCKOUT** - Lockout occurs if the limit or flame rollout switch is open longer than 3 minutes.
 - Control will auto reset after three hours. 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:
 - Mis-wired gas valve -Defective control (valve relay)
- 22 ABNORMAL FLAME-PROVING SIGNAL** - Flame is proved while gas valve is de-energized. Inducer will run until fault is cleared. Check for:
 - Leaky gas valve -Stuck-open gas valve
- 23 PRESSURE SWITCH DID NOT OPEN** Check for:
 - Obstructed pressure tubing. - Pressure switch stuck closed.
- 24 SECONDARY VOLTAGE FUSE IS OPEN** Check for:
 - Short circuit in secondary voltage (24VAC) wiring.
- 31 PRESSURE SWITCH DID NOT CLOSE OR REOPENED** - If open longer than five minutes, inducer shuts off for 15 minutes before retry. Check for:
 - Excessive wind - Proper vent sizing - Defective inducer motor
 - Low inducer voltage (115VAC) - Defective pressure switch
 - Inadequate combustion air supply - Restricted vent
 - Disconnected or obstructed pressure tubing
 - Low inlet gas pressure (if LGPS used)If it opens during blower on-delay period, blower will come on for the selected blower off-delay.
- 33 LIMIT CIRCUIT FAULT** - Indicates a limit, or flame rollout is open. Blower will run for 4 minutes or until open switch remakes whichever is longer. If open longer than 3 minutes, code changes to lockout #13. If open less than 3 minutes status code #33 continues to flash until blower shuts off. Flame rollout switch requires manual reset. Check for:
 - Restricted vent
 - Proper vent sizing - Loose blower wheel - Excessive wind
 - Dirty filter or restricted duct system.
 - Defective blower motor or capacitor. - Defective switch or connections.
 - Inadequate combustion air supply (Flame Roll-out Switch open).
- 34 IGNITION PROVING FAILURE** - Control will try three more times before lockout #14 occurs. If flame signal lost during blower on-delay period, blower will come on for the selected blower off-delay. Check for:
 - Control ground continuity
 - Flame sensor must not be grounded
 - Oxide buildup on flame sensor (clean with fine steel wool).
 - Proper flame sense microamps (.5 microamps D.C. min., 4.0 - 6.0 nominal).
 - Gas valve defective or gas valve turned off - Manual valve shut-off
 - Defective Hot Surface Ignitor
 - Low inlet gas pressure
 - Inadequate flame carryover or rough ignition
 - Green/Yellow wire **MUST** be connected to furnace sheet metal
- 45 CONTROL CIRCUITRY LOCKOUT** - Auto-reset after one hour lockout due to:
 - Gas valve relay stuck open - Flame sense circuit failure
 - Software check errorReset power to clear lockout. Replace control if status code repeats.

COMPONENT TEST

To initiate the component test sequence, shut OFF the room thermostat or disconnect the "R" thermostat lead. Briefly short the TEST/TWIN terminal to the "Com 24V" terminal. Status LED will flash code and then turn ON the inducer motor. The inducer motor will run for the entire component test. The hot surface ignitor, blower motor FAN speed (AMBER LED boards only) blower motor HEAT speed, and blower motor COOL speed will be turned ON for 10-15 seconds each. Gas Valve and Humidifier will not be turned on.

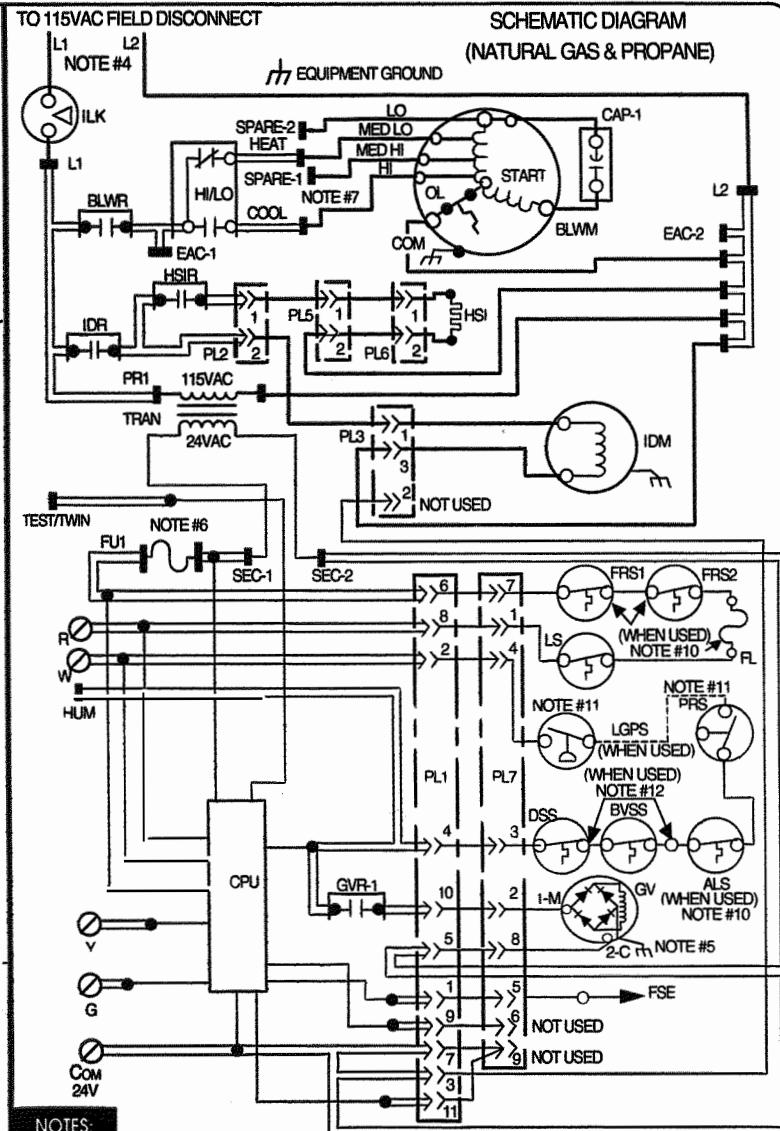
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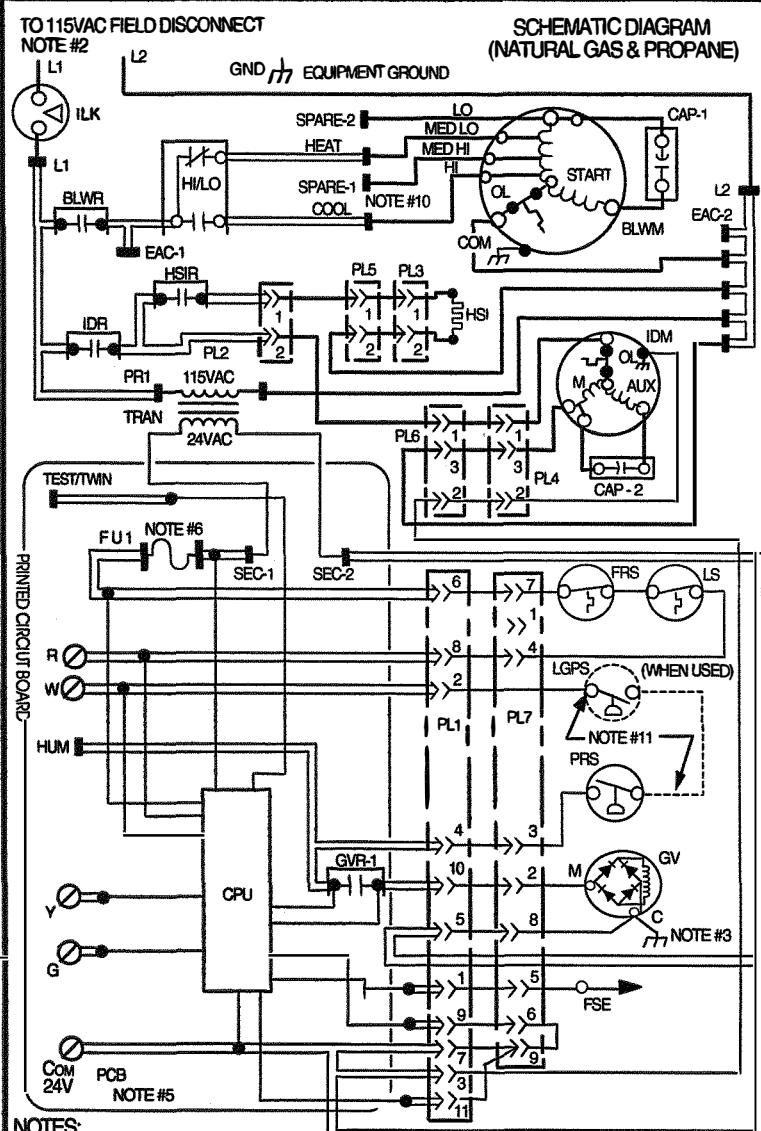
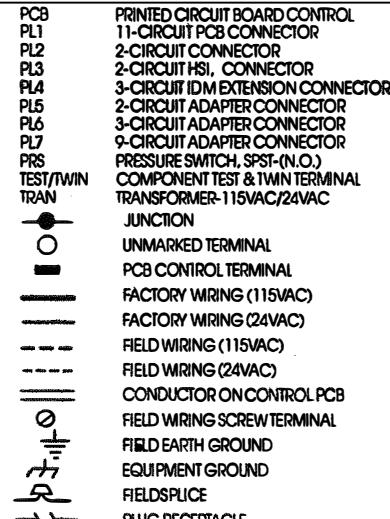
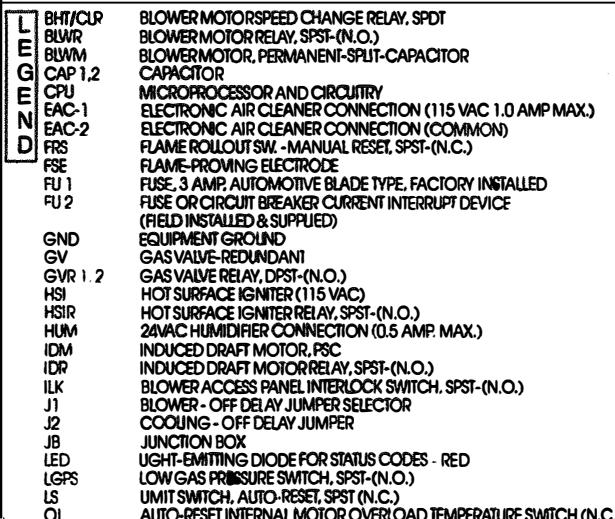
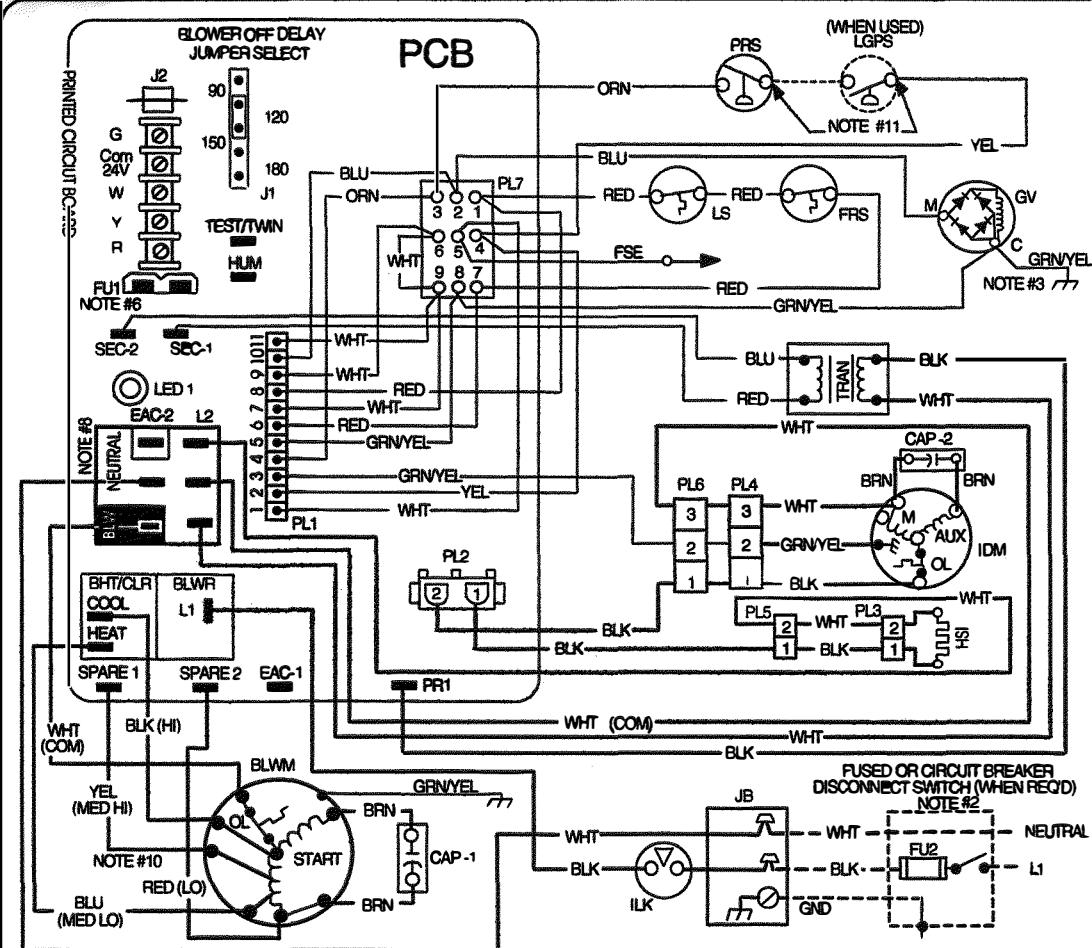

LEGEND

BLWR BLOWER MOTOR RELAY, SPST-(N.O.)
 BLWM BLOWER MOTOR
 CAP CAPACITOR
 CPU MICROPROCESSOR AND CIRCUITRY
 EAC-1 ELECTRONIC AIR CLEANER CONNECTION (115 VAC 1.5 AMP MAX)
 EAC-2 ELECTRONIC AIR CLEANER CONNECTION (COMMON)
 FL FUSE LINK
 FRS FLAME ROLLOUT SW. -MANUAL RESET, SPST-(N.C.)
 FSE FLAME PROVING ELECTRODE
 FU1 3AMP, AUTOMOTIVE BLADE TYPE, FACTORY INSTALLED
 FU2 FUSE OR CIRCUIT BREAKER CURRENT INTERRUPT DEVICE (FIELD INSTALLED & SUPPLIED)
 GND EQUIPMENT GROUND
 GV GAS VALVE-REDUNDANT OPERATORS
 GVR GAS VALVE RELAY, DPST-(N.O.)
 HALO BLOWER MOTOR SPEED CHANGE RELAY, SPDT
 HSI HOT SURFACE IGNITOR (115 VAC)
 HSIR HOT SURFACE IGNITOR RELAY, SPST-(N.O.)
 HUM 24VAC HUMIDIFIER CONNECTION (.5 AMP. MAX.)
 IDM INDUCED DRAFT MOTOR
 IDR INDUCED DRAFT RELAY, SPST-(N.O.)
 ILK BLOWER ACCESS PANEL INTERLOCK SWITCH, SPST-(N.O.)
 JB JUNCTION BOX
 LED LIGHT-EMITTING DIODE FOR STATUS CODES
 LGPS LOW GAS PRESSURE SWITCH, SPST-(N.O.)
 LS LIMIT SWITCH, AUTO RESET, SPST-(N.C.)
 OL AUTO-RESET INTERNAL MOTOR OVERLOAD TEMP. SW.
 PCB PRINTED CIRCUIT BOARD

PL1 11-CIRCUIT PCB CONNECTOR
 PL2 2-CIRCUIT PCB CONNECTOR
 PL3 3-CIRCUIT ADAPTER CONNECTOR
 PL5 2-CIRCUIT ADAPTER CONNECTOR
 PL6 2-CIRCUIT HSI CONNECTOR
 PL7 9-CIRCUIT ADAPTER CONNECTOR
 PRS PRESSURE SWITCH, SPST-(N.O.)
 TEST/TWIN COMPONENT TEST & TWIN TERMINAL
 TRAN TRANSFORMER-115VAC/24VAC
 JUNCTION
 UNMARKED TERMINAL
 PCB TERMINAL
 FACTORY WIRING(115VAC)
 FACTORY WIRING(24VAC)
 FIELD WIRING(115VAC)
 FIELD WIRING(24VAC)
 CONDUCTOR ON PCB
 FIELD WIRING TERMINAL
 FIELD EARTH GROUND
 EQUIPMENT GROUND
 FIELD SPLICE
 PLUG RECEPTACLE


NOTES:

- If any of the original equipment wire is replaced use wire rated for 105 °C
- Inducer (IDM) and blower (BLWM) motors contain internal auto-reset thermal overload switches (OL).
- Blower motor speed selections are for average conditions, see installation instructions for details on optimum speed selection.
- Use only copper wire between the disconnect switch and the furnace junction box (JB).
- This wire must be connected to furnace sheet metal for control to detect flame.
- Replace only with a 3 amp fuse.
- Blower-on delay, gas heating 60 seconds, cooling or heat pump 2 seconds.
- Blower-off delay, gas heating 90, 120, 150 or 180 seconds, cooling or heat pump 90 seconds or 5 seconds when J2 is cut.
- Ignition-lockout will occur after four consecutive unsuccessful trials-for-ignition. Control will auto reset after three hours.
- When used, auxiliary limit switch (ALS) is on some downflow models only. When used, FL is on upflow models only. FRS1 and FRS2 only used downflow and horizontal models.
- Factory connected when LGPS is not used.
- Factory connected when BVSS is not used. BVSS used when Chimney Adapter Accessory Kit is installed.
- Neutral connections are interchangeable within the NEUTRAL connector block.



NOTES.

1. If any of the original equipment wire is replaced use wire rated for 105°C.
2. Use only copper wire between the disconnect switch and the furnace junction box (JB).
3. This wire must be connected to furnace sheet metal for control to prove flame.
4. Symbols are electrical representation only.
5. Solid lines inside PCB are printed circuit board conductors and are not included in legend.
6. Replace only with a 3 amp fuse.
7. Inducer (IDM) and blower (BLWM) motors contain internal auto-reset thermal overload switches (OL).
8. Neutral connections are interchangeable within the NEUTRAL connector block.
9. Blower motor speed selections are for average conditions, see installation instructions for details on optimum speed selection.
10. YELLOW lead not on all motors.
11. Factory connected when LGPS is not used.
12. Ignition-lockout will occur after four consecutive unsuccessful trials-for-ignition. Control will auto-reset after three hours.
13. Blower-on delay: gas heating 60 seconds, cooling or heat pump 2 seconds.
14. Blower-off delay: gas heating selections are 90, 120, 150 or 180 seconds, cooling or heat pump 90 seconds or 5 seconds when L2 is cut.