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Installation, operation, and maintenance instructions

DELUXE UPFLOW GAS-FIRED CONDENSING FURNACE

398A
Sizes 040
thru 120
Series G

Cancels: II 398A-40-1

II 398A-40-2
1/15/89

NOTE: Read these instructions carefully and completely before installing the furnace.

INTRODUCTION

Before installing the furnace, refer to "Procedure for Deluxe Gas-Fired Condensing Furnaces" (packaged with the equipment) for information concerning combustion, venting, piping, and other standard installation practices. Further reference is made to the current edition of the National Fuel Gas Code NFPA 54-1988/ANSI Z223.1-1988.

Installations made in Canada must comply with CAN/CSA-B149.1 and .2 National Installation Codes for natural gas burning appliances and equipment, CSA C22.1 Electrical Code, and must be in accordance with the requirements of the provincial authorities having jurisdiction.

Each Model 398A is shipped from the factory completely assembled with a multispeed direct-drive blower and wired ready for an indoor heating installation. The furnace features a blower control center with easy-to-read, 24-volt terminal strip to ensure proper connections.

The output capacity and any representations of efficiency for this furnace are based on standard Department of Energy test procedures.

The installed operation may vary, depending on installation, weather, and other factors.

The Model 398A Deluxe Gas-Fired Condensing Furnace is designed for installation in alcoves, basements, closets, and utility rooms. This furnace shall not be installed directly on carpeting, or any combustible material other than wood flooring. This furnace is NOT designed for installation in mobile homes, recreation vehicles, or outdoors.

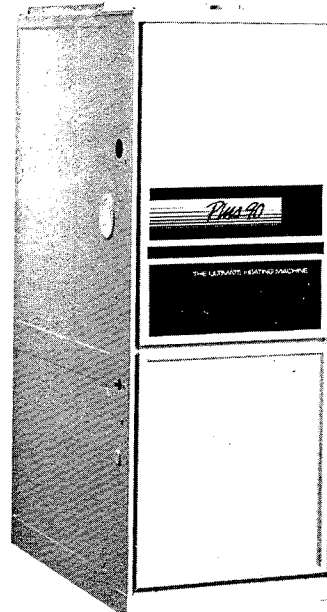
The 398A030040 size is not design certified in Canada.

WARNING: Improper installation, adjustment, alteration, service, maintenance, or use can cause carbon monoxide poisoning, explosion, fire, electrical shock, or other conditions which may cause personal injury or property damage. Consult a qualified installer, service agency, local gas supplier or your distributor or branch for information or assistance. The qualified installer or agency must use only factory authorized and listed kits or accessories when modifying this product. A failure to adhere to this warning can cause electrical shock, fire, personal injury, or death.

CAUTION: Do not use the rear of the furnace for a return-air duct connection. Use the side(s) and/or bottom only. Air delivery above 1800 cfm requires that both sides of the furnace be used, or a combination of one side and the bottom, or the bottom only.

Installation requires the following:

- *I. Inspection
- *II. Canadian Installation
- *III. Furnace Location



A84137

Figure 1—Model 398A

- *IV. Gas Piping
- *V. Combustion-Air and Vent Piping
- *VI. Condensate Piping
- VII. Electrical
- VIII. Sequence of Operation
- IX. Filter
- X. Startup and Adjustment
- XI. Care and Maintenance

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*For these sections (or installation steps), refer to the appropriate sections of "Procedures for Deluxe Gas-Fired Condensing Furnaces" booklet packaged with this unit.

For accessory installation details, refer to the applicable installation literature.

NOTE: Remove all shipping brackets and materials before operating the furnace.

VII. ELECTRICAL CONNECTIONS

A. 115-Volt Wiring

IMPORTANT: Before proceeding with the electrical connections, make certain that voltage, frequency, and phase correspond to that specified on the unit rating plate. Also, check to be sure that the service provided by the utility is sufficient to handle the load imposed by this equipment. Refer to Table I for the equipment electrical specifications.

CAUTION: Do not connect aluminum wire between the disconnect switch and the furnace. Use only copper conductors.

TABLE I—ELECTRICAL DATA

SIZE	Volts—Hertz—Phase	Operating Voltage Range		Max Unit Amps	Min Wire Size	Max Wire Length Feet‡	Max Fuse† or HACR-Type Ckt Bkr Amps
		Max*	Min*				
030040	115—60—1	127	104	9.1	14	39	15
036040	115—60—1	127	104	8.8	14	41	15
036060	115—60—1	127	104	8.5	14	42	15
036080	115—60—1	127	104	8.4	14	42	15
048080	115—60—1	127	104	9.7	14	37	15
048100	115—60—1	127	104	9.8	14	37	15
060100	115—60—1	127	104	13.9	12	41	20
060120	115—60—1	127	104	11.7	14	31	15

*Permissible limits of the voltage range at which the unit will operate satisfactorily.

†Time-delay fuse is recommended.

‡Length shown is as measured one way along wire path between unit and service panel for maximum 2% voltage drop.

TABLE II—DIMENSIONS (In Inches)

Size	A	D	E
030040	17-1/2	15-7/8	15
036040	17-1/2	15-7/8	15
036060	17-1/2	15-7/8	15
036080	17-1/2	15-7/8	15
048080	17-1/2	15-7/8	15
048100	21	19-3/8	18-1/2
060100	21	19-3/8	18-1/2
060120	24-1/2	22-7/8	22

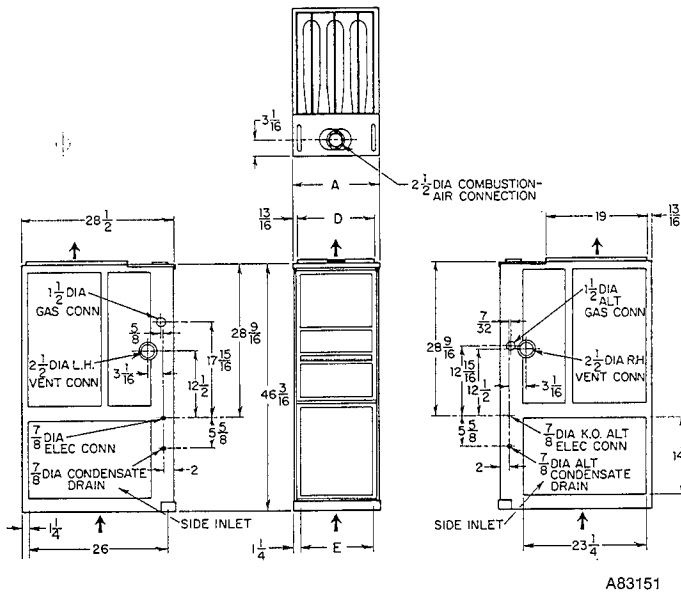


Figure 2—Dimensional Drawing

TABLE III—RATINGS AND PERFORMANCE

SIZE	Input Btuh*	Indoor Capacity Btuh†	ICS** Capacity Btuh†	Temperature Rise Range	Heating		Cooling		Motor HP & Type	Approx Shipping Weight
					Ext Static Pressure	CFM‡	Ext Static Pressure	CFM‡		
030040	41,000	40,000††	40,000††	15—45	0.10	1315	0.40	1265	1/2 PSC	217
036040	44,000	41,000††	41,000††	20—50	0.10	1350	0.50	1275	1/3 PSC	170
036060	66,000	61,000††	61,000††	35—65	0.12	1340	0.50	1230	1/3 PSC	177
036080	88,000	82,000††	81,000††	45—75	0.15	1405	0.50	1315	1/3 PSC	190
048080	88,000	82,000††	81,000††	35—65	0.15	1650	0.50	1535	1/2 PSC	195
048100	110,000	102,000††	102,000††	45—75	0.20	1620	0.50	1580	1/2 PSC	221
060100	110,000	102,000††	102,000††	35—65	0.20	2065	0.50	2135	3/4 PSC	228
060120	132,000	122,000††	122,000††	45—75	0.20	2115	0.50	2110	3/4 PSC	263

*Gas input ratings are certified for elevations to 2000 feet. For elevations above 2000 feet, reduce ratings 4% for each 1000 feet above sea level.

†Determined by U.S. Government tests.

‡Air delivery above 1800 cfm, or systems with a total static pressure drop above 0.5 in. wc, require that both sides, or a combination of one side and bottom or bottom only, of the furnace be used for return air.

**Isolated combustion system; GAMA non-weatherized.

††Tentative ratings.

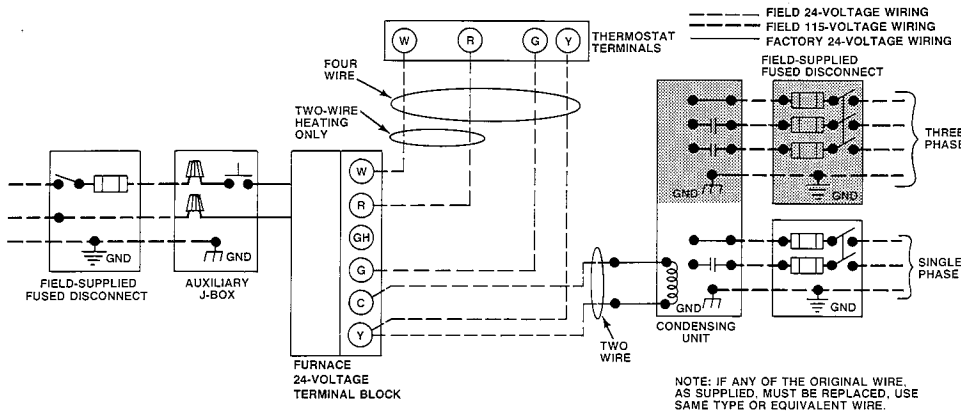


Figure 3—Heating and Cooling Application Wiring Diagram

See Figure 3 for a wiring diagram showing the proper field 115- and 24-volt wiring. Be sure field wiring complies with the National Electrical Code, CSA C22.1 Electrical Code in Canada, and any local codes or ordinances that might apply. Voltage to the system must be within limits shown in Table I. Contact local power company for correction of improper voltage.

NOTE: Operation of unit on improper line voltage constitutes abuse and could affect unit reliability. Do not install unit in system where voltage may fluctuate above or below permissible limits.

Use a separate, fused branch electrical circuit containing a properly sized fuse or HACR-type circuit breaker for this

furnace. See Table I for wire size and fuse specifications. A disconnecting means must be located within sight of, and readily accessible to, the furnace. The blower door switch may be acceptable in some areas as a disconnecting means.

The auxiliary J-box can be moved to the right-hand side of the furnace when a right-side power supply is desired.

1. Remove two screws holding auxiliary J-box.
2. Drill two holes in same position on opposite side and mount auxiliary J-box. (Rotate the J-box 180° so that the switch will be in the notch in the casing flange.)
3. Plug or cap unused electrical entry holes in left side of casing.

WARNING: The cabinet must have an uninterrupted or unbroken ground according to National Electrical Code, ANSI/NFPA 70-1987, CSA C22.1 Electrical Code in Canada, or local codes to minimize personal injury if an electrical fault should occur. This may consist of electrical wire or conduit approved for electrical ground when installed in accordance with existing electrical codes. Do not use gas piping as an electrical ground. A failure to adhere to this warning can result in an electrical shock, fire, or death.

CAUTION: If a manual disconnect switch is to be mounted on the furnace, select a location where a drill or fastener will not contact electrical or gas components.

Check all electrical connections (both factory and field) for tightness. This check should also be done after the unit has reached operating temperatures.

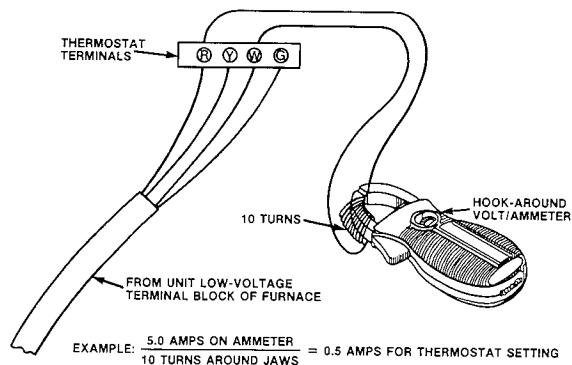
If 115-volt wiring to the unit is encased in a nonmetallic sheath, connect the incoming ground wire to the grounding wire inside the furnace J-box. If properly grounded metallic conduit is used, it will serve as the furnace ground.

B. 24-Volt Wiring

Make field 24-volt connections at the 24-volt terminal strip. See Figure 3.

NOTE: Use AWG No. 18 "color-coded" copper thermostat wire for lengths up to 100 ft. For wire lengths over 100 ft, use AWG No. 16 wire.

IMPORTANT: The thermostat heat anticipation must be set to match the amp draw of the gas valve and other electrical components in the R-W circuit. An accurate amp draw reading can be obtained at thermostat subbase terminals R and W. Figure 4 illustrates an easy method of obtaining the actual amp draw. The amp reading should be taken after the blower has started. The room thermostat should be located



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Figure 4—Amp Draw Check With Ammeter

where it will be in the natural circulation path of room air. Avoid locations where the thermostat would be:

1. Exposed to cold-air infiltration.
2. Exposed to drafts from windows, doors, or other openings leading to the outside.
3. Exposed to air currents from warm- or cold-air registers.
4. Located behind doors, above or below shelves, mantels, or any other location where the natural circulation of air is cut off.
5. Exposed to heat from fireplaces, radios, televisions, lamps, or the rays of the sun.
6. Located on a wall containing pipes or warm-air ducts, or flue or vent pipes.
7. Located on a wall that is inadequately sealed from the attic, crawlspace, or basement.

Any hole in the plaster or panel through which the wires pass from the thermostat should be adequately sealed with suitable material to prevent drafts from affecting the thermostat.

C. Blower Control Center

Each furnace features a blower control center. This device will aid the installer and service technician when installing or servicing the unit. A 24-volt terminal board is marked for easy connection of field wiring. See Figure 5.

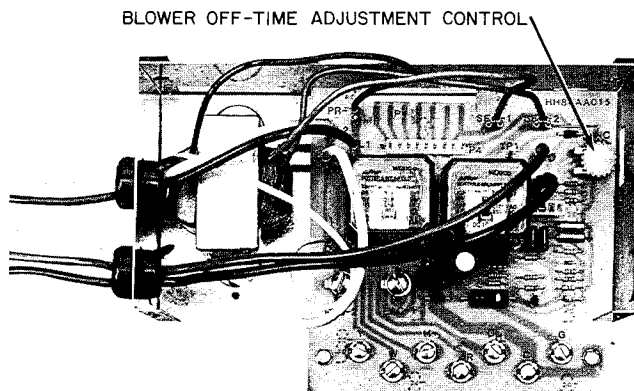
The blower control center features an adjustable blower-off timing device. The "off" timing delay can be varied over a range of 80 to 240 seconds by turning the "off" timing adjustment control in the direction indicated on the label attached to the side of the control box. After a change in adjustment, the time-delay circuit must be energized at least 4 minutes to achieve the new "off" time delay setting. The "off" timing adjustment is set at the factory for a delay of approximately 240 seconds. See Figure 5. The on-time delay is not adjustable (60 seconds).

VIII. SEQUENCE OF OPERATION

Heating Cycle

The control circuit of the furnace shown in the schematic wiring diagram, Figure 6, results in the following sequence of operation for the heating cycle:

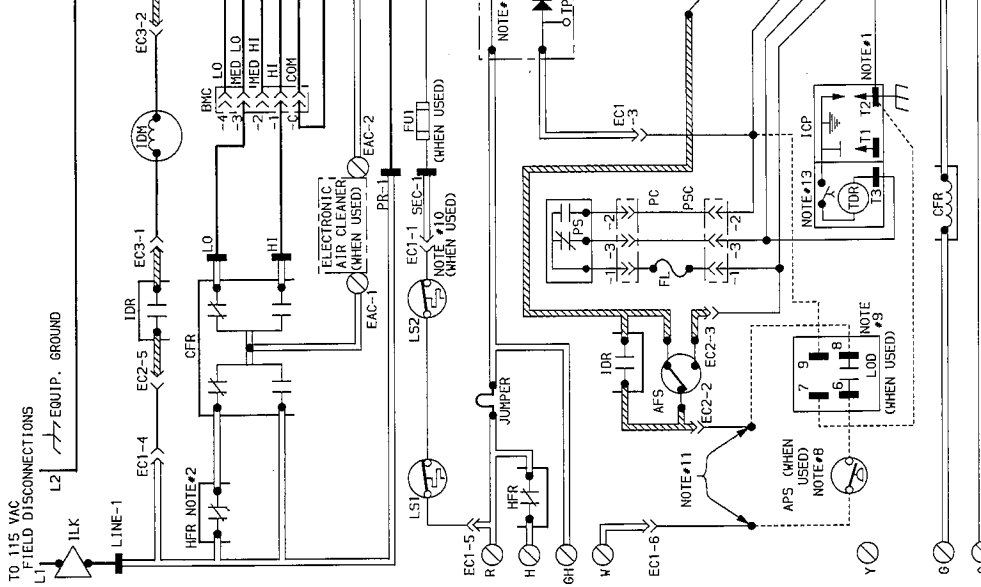
1. When the blower door is in place, 115 VAC is supplied through blower door interlock switch ILK. Transformer TRAN is energized, supplying 24 VAC to heating blower relay HFR, which opens normally-closed blower relay contacts HFR in the low-speed circuit of blower motor MTR.



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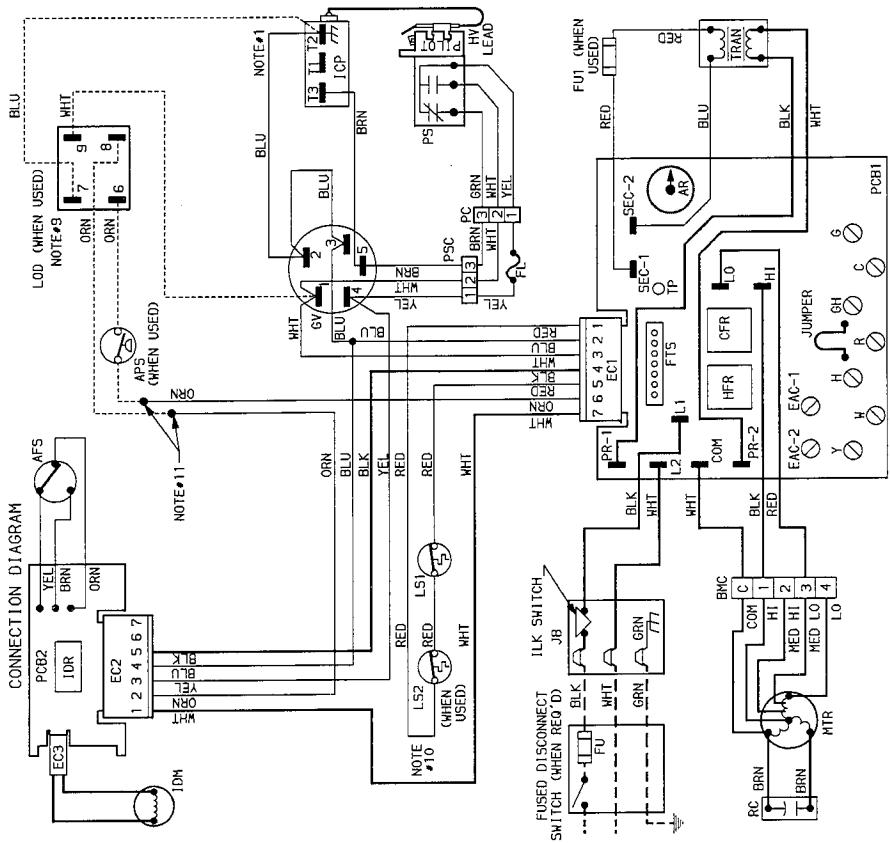
Figure 5—Blower Control Center

SCHEMATIC
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- NOTES:
1. T2 INTERNALLY CONNECTED TO EQUIPMENT GROUND (ICP) MOUNTING SCREWS.
 2. (CFR) CONTACTS ARE NORMALLY CLOSED UNTIL 115 VAC IS APPLIED TO FURNACE.
 3. REPLACEMENT WIRE MUST BE AWG (105° C).
 4. BLOWER MOTOR (MTR) & INDUCER MOTOR (IOM) HAVE A THERMAL OVERLOAD SWITCH.
 5. BLOWER MOTOR (MTR) & INDUCER MOTOR (IOM) HAVE A THERMAL OVERLOAD SWITCH.
 6. USE COPPER WIRE ONLY BETWEEN THE DISCONNECT SWITCH AND THE UNIT.
 7. SYMBOLS ARE AN ELECTRICAL REPRESENTATION ONLY.
 8. PRESSURE SWITCH (AFS) IS USED FOR PROPANE OR 100X SHUTOFF NATURAL GAS.
 9. LOCKOUT DEVICE (LOD) IS USED FOR PROPANE OR 100X SHUTOFF NATURAL GAS.
 10. AUXILIARY LIMIT SWITCH (LS2) USED ON DOWNFLOW MODELS ONLY.
 11. FACTORY CONNECTED WHEN ACCESSORY NOT USED.
 12. ADJUSTABLE BLOWER MOTOR (MTR) OFF DELAY.
 13. 10-SECOND IGNITOR CONTROL PACK (ICP) ON DELAY.

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- LEGEND:
- AFS FLOW SENSING SWITCH, SPDT
 - APS PRESSURE SWITCH (N.O.)
 - BMC COOLING BLOWER MOTOR
 - CFR COOLING BLOWER RELAY, DPDT
 - EC1 EDGE CONNECTOR (FURNACE CONTROL BOARD 7-CKT.)
 - EC2 EDGE CONNECTOR (INDUCER CONTROL BOARD 7-CKT.)
 - EC3 EDGE CONNECTOR (INDUCER CONTROL BOARD 2-CKT.)
 - FUSIBLE LINK (COVER TEMPERATURE)
 - FU1 IN-LINE FUSE 2 AMP
 - GV GAS VALVE (REGULANT)
 - ICP INDUCER MOTOR
 - ILK INDUCER MOTOR INTERLOCK SWITCH, SPST (N.C.)
 - ILK INDUCER MOTOR INTERLOCK SWITCH, SPST (N.O.)
 - IDM INDUCED DRAFT MOTOR
 - JB JUNCTION BOX
 - LOD LOCKOUT DEVICE
 - LS1 LIMIT SWITCH, PRIMARY, SPST (N.C.)
 - LS2 LIMIT SWITCH, AUXILIARY, SPST (N.C.)
 - MTR BLOWER MOTOR
 - PCB1 P.C. BOARD (FURNACE CONTROL)
 - PCB2 P.C. BOARD (INDUCER CONTROL)
 - PCB3 P.C. BOARD (INDUCER CONTROL)
 - PCB4 P.C. BOARD (INDUCER CONTROL)
- PS PILOT SENSOR, SPDT (740A)
PSC PILOT SPILCE CONNECTOR
RC REFRIGERATOR COMPRESSOR
TEST POINT
TRAN TRANSFORMER 115VAC/24VAC
- UNMARKED TERMINAL
TERMINAL FACTORY CONNECTOR
FACTORY WIRING (115V AC)
FACTORY WIRING (24V AC)
FIELD WIRING (115V AC)
FIELD WIRING (24V AC)
CONDUCTOR ON PCB1
CONDUCTOR ON PCB2
FIELD WIRING SCREW TERMINAL
FIELD GROUND
EQUIPMENT GROUND
FIELD SPLICE
PLUG RECEPTACLE

Figure 6—Wiring Diagram

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2. The wall thermostat "calls for heat," closing the R and W circuit. This closed circuit supplies power to the 24-VAC safety circuit containing automatic reset limit switch LS1 and manual reset auxiliary limit switch LS2. Auxiliary limit switch LS2 is used on downflow models only and will break electrical circuit to gas valve if the blower compartment or filters overheat. The switch must be manually reset after cause of overheat condition is corrected.
3. The inducer-motor relay coil IDR is energized. Inducer-motor relay contacts in the 115-VAC circuit close, starting inducer motor IDM. Simultaneously, another set of contacts in inducer-motor relay IDR close in the 24-VAC circuit and lock-in inducer-motor relay coil IDR. The coil is locked-in until the R and W circuit or safety circuit opens.
4. As inducer motor IDM comes up to speed, flow sensing switch AFS actuates energizing the PILOT solenoid coil of gas valve GV and the time-delay relay in spark generator ICP through the fusible link FL.
5. When the PILOT solenoid coil is energized, gas flows to the pilot. The internal pressure switch of gas valve GV senses the pilot gas pressure and closes, completing the HOLD circuit. The normally open time-delay relay within spark generator ICP closes after a 10-second purge delay, energizing the spark generator. The pilot gas is ignited by a spark produced by the spark generator.
6. After a short delay, during which the pilot flame heats up the flame sensing contacts PS, the normally-closed contacts open. The PILOT solenoid coil remains energized through the HOLD circuit. Spark generator ICP shuts off when flame is sensed at the spark electrode. The normally open flame sensing contacts PS close 5 to 20 seconds later, energizing the MGV solenoid coil of the GV. Six to 15 seconds later, the MGV solenoid opens, allowing gas to flow to the main burners where the gas is ignited by the pilot flame.
7. Simultaneously, time-delay circuit AR in the blower control center is energized. Approximately 50 seconds after MGV solenoid coil is energized, heating relay coil HFR is deenergized, closing the 115-VAC contacts of the heating relay HFR, and starting blower motor MTR on heating speed. The H terminal is energized with 24 VAC when blower motor is operating on heat-

ing speed. Electronic air cleaner (EAC) terminals energize with 115 VAC when the blower is operating on either heating or cooling speed.

8. When the thermostat is satisfied, the R and W circuit is broken, deenergizing gas valve GV, inducer motor relay IDR, and the solid-state time-delay circuit on the main printed-circuit board. The gas flow to the pilot and main burners immediately stops. After approximately 80 to 240 seconds (depending on the blower off-time adjustment), heating relay HFR is energized and blower motor MTR stops.

NOTE: After a brief interruption of either electric or gas supply, the furnace will not resume operation until the contacts of pilot-flame sensing switch PS move from the normally open position to the normally closed position.

Cooling Cycle

1. The wall thermostat "calls for cooling."
2. The R, G, and Y circuits are energized. Simultaneously, the R and Y circuit starts the outdoor condensing unit, and the R and G circuit energizes cooling relay coil CFR. The normally-open contacts of cooling relay CFR close, energizing the cooling speed of motor MTR and opening the normally-closed contacts of cooling relay CFR. The electronic air cleaner EAC terminals are energized with 115 VAC when the blower is operating on either heating or cooling speed.

IX. FILTER

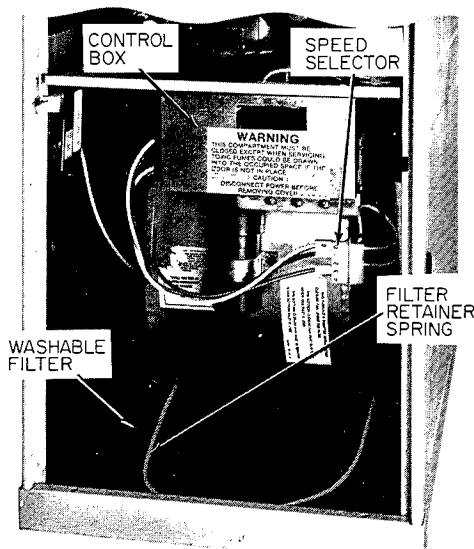
A. Filter Arrangement

The filter is supplied in the blower compartment of the furnace. For bottom inlet application, the filter should be cut to fit where necessary and installed as shown in Figure 7.

NOTE: Remove and discard the bottom closure panel when the bottom inlet is used.

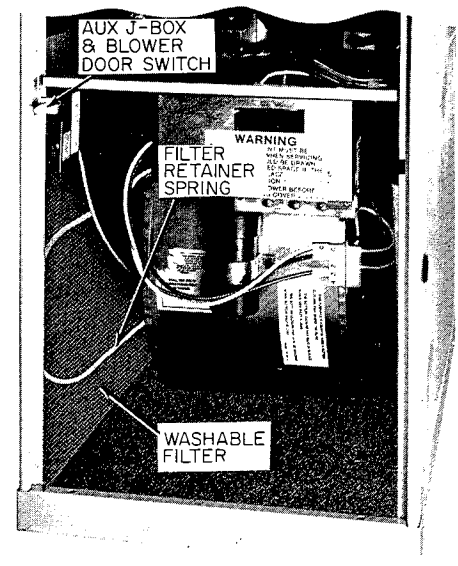
For the side inlet application, see Figure 2 for the opening size. Remove the filter and retainer spring from the bottom opening. Install the retainer spring in the holes provided—one in the blower shelf and the other in the retainer spring bracket. Install the filter as shown in Figure 8. Move the unused retainer bracket to the opposite side, near the front of the furnace, to support the filter.

CAUTION: Be sure the filter retainer spring is behind the flange of the casing side.



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Figure 7—Filter Installed for Bottom Inlet



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Figure 8—Filter Installed for Side Inlet

B. Bottom Closure Panel

When the side inlet is used, the bottom opening must be properly sealed by installing a bottom closure panel shipped under the filter in each furnace. To install the bottom closure panel, perform the following steps:

1. After filter has been installed for side return, remove bottom closure.
2. With furnace either tilted or raised, install panel in opening from bottom of furnace. See Figure 9.
3. Apply appropriate material around bottom closure to obtain airtight seal.

CAUTION: Never operate the unit without a filter or with the filter access door removed.

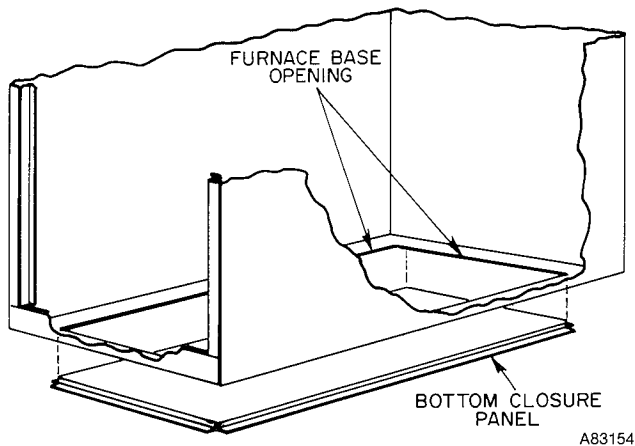


Figure 9—Installing Bottom Closure Panel

X. STARTUP AND ADJUSTMENT

In addition to the following information, refer to "Procedures for Deluxe Gas-Fired Condensing Furnaces."

NOTE: The furnace blower access panel must be in place to complete the 115-volt circuit to the furnace.

CAUTION: This furnace is equipped with a fusible link in the burner enclosure. This link will melt if an overheating condition caused by an inadequate combustion air supply or improper venting practices develops. DO NOT jumper this fuse. Correct the condition and replace the fuse with an identical part.

The gas service pressure must not exceed 0.49 psig (13.6 in. wc) for natural gas.

NOTE: The gas valve regulator has been nominally-set at 3.5 in. wc for natural gas. Refer to "Procedures for Deluxe Gas-Fired Condensing Furnaces" for readjusting and checking input.

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

A. When winterizing the furnace, it is necessary to proceed as follows:

1. Mix a solution of equal amounts of ethylene glycol (Prestone II antifreeze coolant or equivalent) and water.
2. Turn off electrical supply to furnace.

3. Remove control access panel.
4. Disconnect drain tube from bottom of inducer outlet box.
5. Insert funnel in drain tube and pour antifreeze/water solution into furnace until it is visible at point where condensate enters open drain.
6. Reconnect drain tube to outlet box.
7. Replace control access panel.

B. Adjustment of Blower Speed

WARNING: Disconnect the electrical power before changing the speed tap. A failure to adhere to this warning can cause personal injury.

To change motor speed taps, remove the motor tap lead (See Figure 7 and Table IV.) and relocate it on the desired terminal on the plug-in terminal block/speed selector located on the blower housing. Check the temperature rise. It must be within the limits specified on the unit rating plate.

TABLE IV—SPEED SELECTOR

Speed	Tap No.*
Common	C
Hi	1
Med-Hi	2
Med-Low	3
Low	4

*White wire from control box to common; black wire from control box to cooling speed selection; red wire from control box to heating speed selection.

C. Automatic Gas Control Valve

These units are equipped with an automatic gas control valve. Check the proper operation of this valve by moving the room thermostat pointer above and below the room temperature and observe that the main burners light when the pointer is above and go off when the pointer is below the room temperature setting.

XI. CARE AND MAINTENANCE

CAUTION: Because of possible damage to the equipment or personal injury, maintenance should be performed by qualified persons only.

WARNING: Never store any flammables, chloride, or halogen-containing compounds near, or in contact with, the furnace. A failure to adhere to this warning can cause a fire, personal injury, or death.

For continuing high performance, and to minimize 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: 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 Users Manual. A FAILURE TO HEED THIS WARNING COULD RESULT IN SERIOUS PERSONAL INJURY AND POSSIBLE DAMAGE TO THIS EQUIPMENT.

WARNING: Turn off gas and electrical supplies to the unit before performing any maintenance or service on the unit. Follow the operating instructions attached to the furnace. A failure to adhere to this warning can cause personal injury.

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

1. Check and clean or replace air filter each month or as required.
2. Check blower motor and wheel for cleanliness and lubrication each heating and cooling season. Clean and lubricate as necessary. (See Section XI B.)
3. Check electrical connections for tightness and controls for proper operation each heating season. Service as necessary.
4. Check for proper condensate drainage.
5. Check for blockages of combustion-air and vent pipes.

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

A. Air Filter

Remember to disconnect electrical power before removing access panels. To clean or replace the air filter, proceed as follows:

1. Remove blower access panel.
2. Release filter retainer spring from behind flange of furnace casing. See Figures 7 and 8.
3. Slide out filter.
4. Clean filter with cold tap water. Spray in direction opposite to airflow.
5. Rinse and let dry. DO NOT oil or coat filter.
6. Place dry filter in furnace with cross-sectional binding facing blower.

B. Blower Motor and Wheel

For long life, economy, and high efficiency; clean accumulated dirt and grease from blower wheel and motor annually. The following steps should be performed by a qualified serviceperson.

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 electrical supply before removing access panels.

Clean and lubricate as follows:

1. Remove access panels.
2. Remove control box from bottom side of blower shelf and position out of way.
3. Note location of wires for reassembly, then remove electrical leads from numbered side of blower speed selector. See Figure 7 and Table IV.
4. Using backup wrench, disconnect drain pipe at coupling in blower compartment.
5. Loosen hose clamps and remove 7/8-in. diameter drain hose.
6. Loosen hose clamp and disconnect 5/8-in. diameter drain hose at bottom of inducer housing located under blower shelf.
7. Remove screws securing drain trap assembly.
8. Remove screws securing blower assembly to blower shelf and slide blower assembly out of furnace.
9. Squeeze side tabs of blower speed selector and pull from blower housing bracket.
10. Loosen screw in strap holding motor capacitor to blower housing and slide capacitor from strap.

11. Mark blower wheel location on shaft before disassembly, to insure proper reassembly.
12. Loosen setscrew holding blower wheel on motor shaft.
13. 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.
14. Lubricate motor.
 - a. Remove dust caps or plugs from oil ports located at each end of motor. If motor does not have these caps or plugs, bearings are sealed and need no further lubrication.
 - b. Use a good grade of SAE 20 nondetergent motor oil and add one teaspoon (5 cc, 3/16 oz, or 16 to 25 drops) in each oil port. The use of other types or grades of oil will damage the motor. Excessive oiling can cause premature bearing failures.
 - c. Allow time for total quantity of oil to be absorbed by each bearing.
 - d. After oiling motor, wipe excess oil from motor housing.
 - e. Replace dust caps or plugs on oil ports.
15. Remove blower wheel from housing.
 - a. Mark blower wheel orientation and cutoff plate location to insure proper reassembly.
 - b. Remove screws securing cutoff plate and remove cutoff plate from housing.
 - c. Remove blower wheel from housing.
16. 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 drop or bend wheel because balance will be affected.
17. Reassemble blower by reversing steps 15a through c. Be sure wheel is positioned for proper rotation.
18. Reassemble motor and blower by reversing steps 9 through 13. If motor has ground wire, be sure it is reconnected. Be sure motor oiling plugs are pointed up when motor is installed and wheel is centered in blower housing. Spin blower wheel to check clearance.
19. Reinstall blower assembly in furnace.
20. Inspect drain trap and hoses to insure they are not blocked or restricted. Replace drain trap and hoses. Be sure to tighten hose clamps.
21. Using backup wrench, attach drain pipe and tighten compression coupling.
22. Connect electrical leads to blower speed selector. Note that connections are polarized for correct assembly—DO NOT force.
23. Reinstall control box on bottom side of blower shelf.
24. Turn on electrical power and check for proper rotation and speed changes between heating and cooling; operate unit 5 minutes and carefully check for condensate leaks.

C. Cleaning Heat Exchangers

If it becomes necessary to clean the heat exchangers, proceed as follows:

1. Turn off gas and electrical supplies to furnace.
2. Remove control and blower access panels.
3. Loosen hose clamps on combustion-air pipe and move air pipe aside.
4. Using backup wrench, disconnect gas supply at ground joint union. Remove gas pipe from valve.

5. Disconnect pilot leads at 3-circuit connector outside of burner enclosure.
6. Disconnect high-voltage lead at spark generator.
7. Disconnect electrical wires from gas valve.
8. Disconnect pressure tubing from right-hand side of burner enclosure and outlet end of gas valve.
9. Remove burner enclosure front.
10. Remove diffuser from inside top of burner enclosure. Remove screws that secure burner enclosure to cell panel. These screws are located inside the burner enclosure.
11. Using care not to damage cell inlet panel gasket, remove gas control assembly from furnace.
12. Loosen hose clamps at vent pipe connection; disconnect vent pipe and position out of way.
13. Disconnect edge connector from inducer control box.
14. Disconnect edge connector from main control box at blower shelf.
15. Remove screws securing main control box to blower shelf and position control box out of way.
16. Loosen hose clamp and remove drain tube from inducer housing located on bottom side of blower shelf.
17. Remove mounting screws securing inducer assembly to collector box; remove inducer assembly.
18. Remove all old sealant from parts.
19. Loosen hose clamp and remove drain tube from inducer outlet box.
20. Remove screws securing coupling box and remove from furnace. Remove all old sealant from parts.
21. Remove choke plate (when used).
22. Loosen hose clamp and remove 7/8-in. drain tube from trap.
23. Place bucket under 7/8-in. drain tube in blower compartment.
24. Using garden hose, flush each cell of the condensing heat exchanger with water. Use care not to spray water on to interior surfaces of control compartment. Dry all surfaces. Be careful **not** to remove sealant around cell openings in cell panel.
25. Using field-provided small wire brush, steel "snake" cable, reversible electric drill, and vacuum cleaner; clean primary heat exchanger cells. Do **not** use brush to clean condensing heat exchanger.

D. Reassemble Furnace

1. Install choke plate (when used). Be sure choke plate

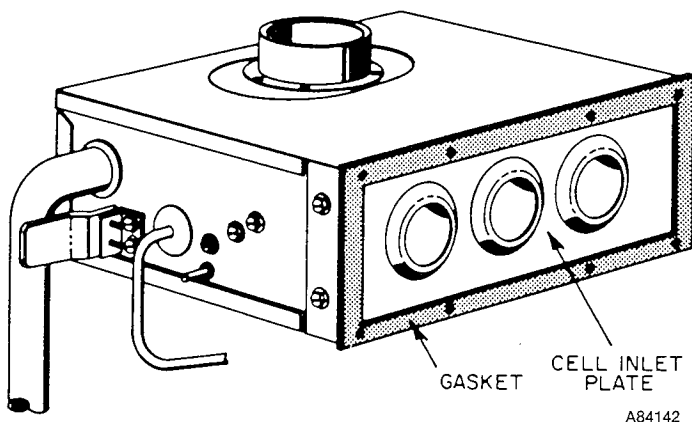


Figure 10—Burner Closure

- bottom conforms to condensing heat exchanger top flange.
2. Apply sealant releasing agent (Pam) to flange of coupling box.
3. Apply a generous bead (3/16 in. dia) of G.E. RTV 122, 162, or Dow-Corning RTV 738 sealant (NO substitute is permissible) to flange of coupling box over releasing agent. Your Distributor should have G.E. RTV 122, 162, or Dow-Corning RTV 738 sealants in stock.
4. Being careful not to smear sealant, position coupling box so that slot is on left-hand side and install coupling box.
5. Be sure small round gasket(s) is in place between blower shelf and inducer housing.
6. Apply sealant releasing agent (Pam) to collector box.
7. Apply 1/8-inch diameter bead of G.E. RTV 122, 162, or Dow-Corning RTV 738 sealant to back of inducer housing. Apply sealant around inlet air opening. (The sealant should be about 1/4 inch from the edge of the inlet air opening.)
8. Using stainless steel screws, install inducer assembly on collector box and support bracket to coupling box.
9. Connect drain tube from collector box to inducer outlet box.
10. Connect 7/8-in. drain tube to trap and collector box. Tighten hose clamps.
11. Connect small drain tube from top of trap to fitting on bottom of inducer housing.
12. Reinstall main control box on blower shelf.
13. Reconnect edge connector at main control box on blower shelf.
14. Reconnect vent pipe. Be sure clamps are tight.
15. Check condition of gasket on cell inlet panel of burner enclosure. Replace gasket if necessary. See Figure 10.
16. Install gas control assembly in furnace.
17. Install diffuser and burner enclosure front.
18. Reconnect pilot leads at 3-circuit connector.
19. Reconnect high-voltage lead to spark generator.
20. Refer to furnace wiring diagram and connect wires to gas valve.
21. Reconnect pressure tubes to gas valve and burner enclosure. Be sure tubes are not kinked.
22. Using backup wrench, install gas pipe in gas valve.
23. Reconnect gas pipe at ground joint union.
24. Reconnect combustion-air pipe. Tighten hose clamps.
25. Turn on gas and electrical supplies.

WARNING: Never use matches, candles, flame, or other sources of ignition to check for gas leakage. Use a soap and water solution. A failure to adhere to this warning can cause a fire, personal injury, or death.

26. Check for gas leaks.
27. Check furnace operation through two complete operating cycles.
28. Check pilot tube and gas valve manifold connection for gas leaks while furnace is in operation.
29. After condensate starts to drain, check for condensate leaks.
30. Replace control and blower access panels.

E. Pilot

Check the pilot and clean if necessary at the beginning of each heating season. The pilot flame should be high enough for proper impingement of the safety element and to light

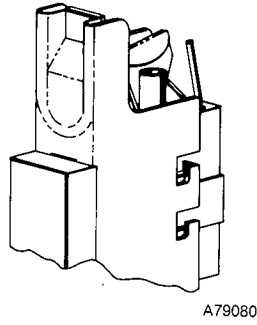
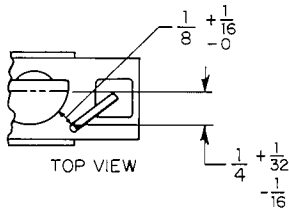


Figure 11—Position of Electrode to Pilot

the burners. Remove any accumulation of soot and carbon from the safety element. Check spark electrode gap. See Figure 11 for proper spark gap.

F. Electrical Controls and Wiring

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

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, strip wire, and reassemble properly and securely. Electrical controls are difficult to check without proper instrumentation; therefore, reconnect electrical power to unit and observe unit through two complete operating cycles.

