Bryant Air Conditioning

installation instructions 394D

GAS-FIRED FORCED-AIR FURNACE

Series B
Sizes 050 thru 175

Cancels: 39394DP85

39394DP91
11/1/75

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GENERAL

Before installing the furnace, refer to "Procedure for Gas Furnace Installation" (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 American National Standard Z223.1 "National Fuel Gas Code".

Model 394D Gas Furnace is shipped from the factory completely assembled and wired ready for indoor heating installation. It is manufactured with direct-drive blowers only and incorporates a low-voltage terminal strip for convenience of field wiring.

CAUTION: Do not install furnace in a corrosive or contaminated atmosphere. Make sure that all local ordinances for combustion and circulating air supply are observed.

The design of the 394D Upflow Gas-Fired Furnaces is A.G.A. certified for installation on combustible flooring in alcoves, basements, closets, or utility rooms.

CLEARANCE REQUIREMENTS (in inches)

Sides	1
Back	0
Top of Plenum	1
Vent Connector (single wall)	6
Type B (double wall)	1
Front	6

Provide service clearance of 30 in. at front of unit.

Installation comprises the following:

*I. Inspection
*II. Location, Ventilation, and Air for Combustion
*III. Gas Piping
*IV. Venting
V. Electrical
VI. Sequence of Operation
VII. Filter
VIII. Startup and Adjustment
IX. Care and Maintenance

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

For accessory installation details, refer to applicable installation literature.

V. ELECTRICAL CONNECTIONS

A. Line-Voltage 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 additional load imposed by this equipment. Refer to the unit rating plate for equipment electrical requirements.

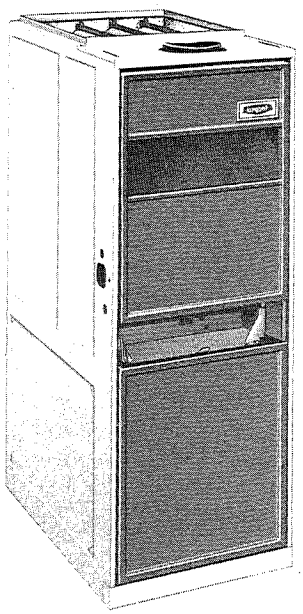

Figure 1—Model 394

See Figure 5 for wiring diagram showing the proper field high- and low-voltage wiring. Make all electrical connections in accordance with the National Electrical Code and any local codes or ordinances that might apply.

Use a separate branch electrical circuit for this furnace. A disconnecting means must be located within sight of, and readily accessible to, the furnace.

WARNING: The unit cabinet must have an uninterrupted or unbroken electrical ground to minimize personal injury if an electrical fault should occur. This may consist of electrical wire or approved conduit when installed in accordance with existing electrical codes.

B. Low-Voltage Wiring

Make Field low-voltage connections at the low-voltage terminal strip. See Figure 5.

Set the thermostat heat anticipator at 0.5. If additional controls are connected in the thermostat circuit, the amp draw must be added to this setting. Failure to make the setting will result in improper operation of the thermostat.

The room thermostat should be located where it will be in the natural circulating path of room air. Avoid locations where the thermostat would be exposed to cold air infiltration, drafts from windows, doors, or other openings leading to the outside, or exposure to air currents from warm or cold air registers; or to exposure where the natural circulation of the air is cut off—such as behind doors, above or below mantels, shelves, etc.

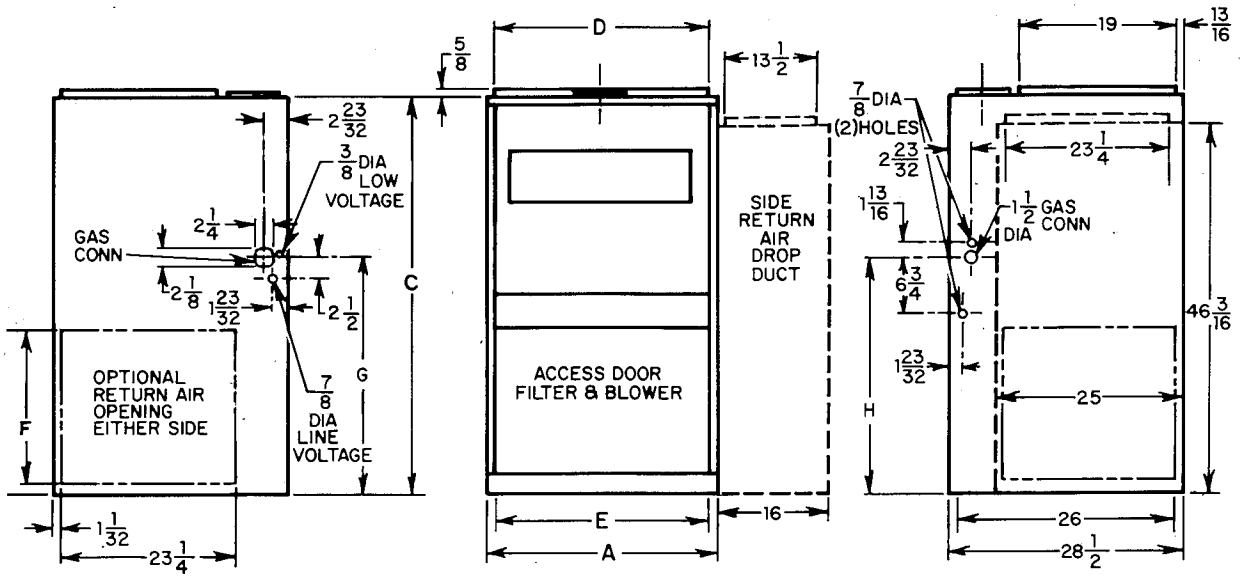

Figure 2—DIMENSIONAL DRAWING

TABLE I—DIMENSIONS IN INCHES

MODEL & SIZE	A	C	D	E	F	G	H	Vent Dia
394D-000050	12	46-3/16	10-3/8	9-1/2	14-1/2	27-1/8	32-9/16	4
394D-024050	12	46-3/16	10-3/8	9-1/2	14-1/2	27-1/8	32-9/16	4
394D-000080	14-3/16	46-3/16	12-9/16	11-11/16	14-1/2	27-1/8	32-9/16	4
394D-024080	14-3/16	46-3/16	12-9/16	11-11/16	14-1/2	27-1/8	32-9/16	4
394D-036080	14-3/16	46-3/16	12-9/16	11-11/16	14-1/2	27-1/8	32-9/16	4
394D-000100	17-1/2	46-3/16	15-7/8	15	14-1/2	27-1/8	32-9/16	5
394D-036100	17-1/2	46-3/16	15-7/8	15	14-1/2	27-1/8	32-9/16	5
394D-048100	21	46-3/16	19-5/16	18-1/2	14-1/2	27-1/8	32-9/16	5
394D-000125	21	46-3/16	19-5/16	18-1/2	14-1/2	27-1/8	32-9/16	5
394D-036125	21	46-3/16	19-5/16	18-1/2	14-1/2	27-1/8	32-9/16	5
394D-048125	21	46-3/16	19-5/16	18-1/2	14-1/2	27-1/8	32-9/16	5
394D-060125	21	56-3/16	19-5/16	18-1/2	14-1/2	27-1/8	32-9/16	5
394D-000150	24-1/2	46-3/16	22-7/8	21	14-1/2	27-1/8	32-9/16	6
394D-048150	24-1/2	46-3/16	22-7/8	21	14-1/2	27-1/8	32-9/16	6
394D-060150	24-1/2	49	22-7/8	21	18	29-15/16	35-3/8	6
394D-060175	31-1/2	49	29-7/8	29	18	29-15/16	35-3/8	7

TABLE II—RATINGS AND PERFORMANCE*

MODEL	NATURAL and LP		Temp Rise Range	Heating		Cooling	
	Input Btuh	Output Btuh		Ext Static Pressure	CFM	Ext Static Pressure	CFM
394D-000050	50,000	40,000	70-100	0.12	408	—	—
394D-024050			45-100		482	0.5	780
394D-000080			70-100		654	—	—
394D-024080	80,000	64,000	70-100	0.12	772	0.5	790
394D-036080			45-100		772		1190
394D-000100			70-100		818	—	—
394D-036100	100,000	80,000	45-100	0.15	965	0.5	1200
394D-048100			45-75		1157		1540
394D-000125			70-100		1020	—	—
394D-036125			70-100		1069		1210
394D-048125	125,000	100,000	45-100	0.2	1206	0.5	1560
394D-060125			45-75		1447		2000
394D-000150			70-100		1225	—	—
394D-048150			45-100		1454		1500
394D-060150	150,000	120,000	45-75	0.2	1736	0.5	2080
394D-060175	175,000	140,000	45-100	0.5	1688	0.5	2010

*The above ratings are certified for altitudes to 2000 ft. For elevations above 2000 ft reduce ratings 4% for each 1000 ft above sea level.

The thermostat should not be exposed to heat from nearby fireplaces, radios, televisions, lamps, or rays from the sun. Nor should the thermostat be mounted on a wall containing pipes or warm air ducts, or a flue or vent that could affect its operation and prevent it from properly controlling the room temperature. 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.

VI. SEQUENCE OF OPERATION

A. Heating

The pilot (6A) must be lit, closing its contacts, before the gas valve (5A) will open. If, for some reason, the gas valve does not open when thermostat calls for heat, heat assist coil (7S) causes fan control (7S) to close its contact, energizing blower motor (3B or 3D).

When the thermostat calls for heat, the control circuit is closed between terminals (4/R and W). Power from transformer (1A) energizes automatic gas valve coil (5A) and heat assist coil (7S) simultaneously. After a short time delay, automatic gas valve (5A) opens, permitting gas to flow to the burners where it is ignited by the gas pilot. After another delay, the fan control energizes its contacts (7S), energizing blower motor (3B or 3D) on heating speed.

When the thermostat is satisfied, the circuit between terminals (4/R and W) is broken, deenergizing automatic gas valve coil (5A) and heat assist coil (7S). After a few seconds, automatic gas valve (5A) closes, stopping the flow of gas to the burners. After a longer delay, fan control (7S) opens its contacts to stop blower motor (3B and 3D).

If the furnace overheats for any reason, limit control in 7S will switch, breaking the circuit to automatic gas valve coil (5A). After a short delay, the gas valve closes, shutting off the flow of gas to the burners. The furnace will continue to cycle until the fault is corrected.

B. Cooling

When the thermostat calls for cooling, power from transformer (1A) energizes cooling relay coil (2C), closing its contacts, and energizing blower motor (3D) on its cooling speed. It continues to operate until the thermostat is satisfied.

When the thermostat is satisfied, the circuit to terminal (G) is broken, deenergizing cooling relay coil (2C) which, in turn, opens its contacts, stopping blower motor (3D).

LINE-TO-LINE WIRING DIAGRAMS

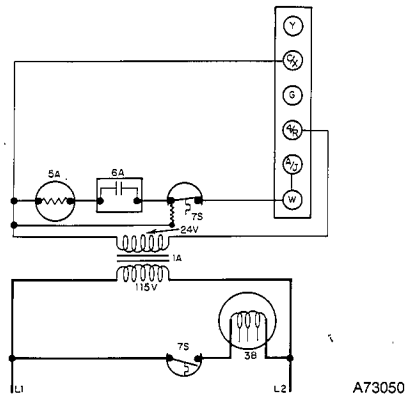

Figure 3—Units Without Cooling Fan Relay

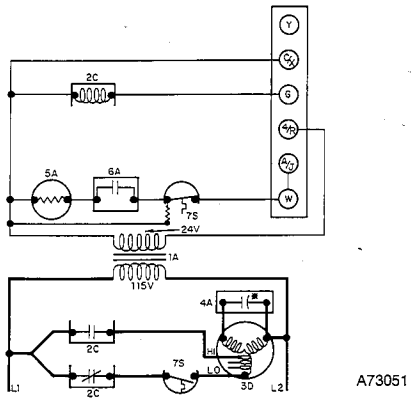

Figure 4—Units With Cooling Fan Relay

LEGEND

1A-Transformer
2C-Cooling Fan Relay
3B-Fan Motor SP
3D-Fan Motor PSC
4A-Capacitor (None on 1/6- & 1/3-HP Motors)
5A-Gas Valve
6A-Pilot (None on LP)
7S-Combination Fan Limit Switch and Heat Assist When Used

NOTE: If any of the original wire, as supplied, must be replaced, use same type or equivalent wire.

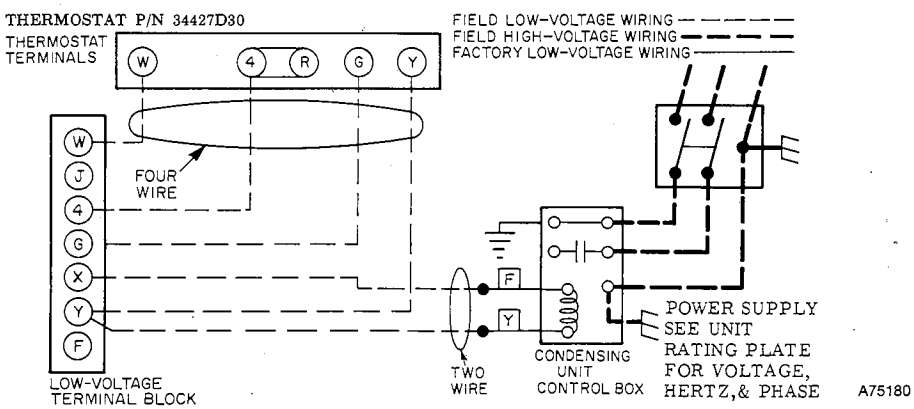

Figure 5—Heating and Cooling Application Wiring Diagram

C. Fan/Limit Control

At the moment the thermostat "calls for heat," the time-delay mechanism of the control is energized. If, because of pilot outage, the control bimetal element does not sense a temperature change, the control will turn on the blower strictly by means of the time-delay feature. If for any reason the time delay is not energized as the thermostat calls for heat, the control bimetal element will bring on the blower when it senses a temperature rise of 50 degrees Fahrenheit (standard differential) above the turn-off setting. During the blow-down period and after the thermostat is satisfied, the control will turn the blower off at the indicated setting sensed by the control bimetal element.

VII. FILTER

A. Filter Arrangement

The filter is factory-installed in the bottom of the furnace. This is for bottom inlet application. See Figure 6.

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

For side inlet application, see Figure 2 for the opening size. Remove the filter and the retainer spring from the bottom opening. Install the retainer spring in the holes provided—one in the blower deck and the other in the retainer spring bracket. See Figure 7.

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

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 panel from furnace.
2. Rotate panel 180° so that it appears inverted. See Figure 8.

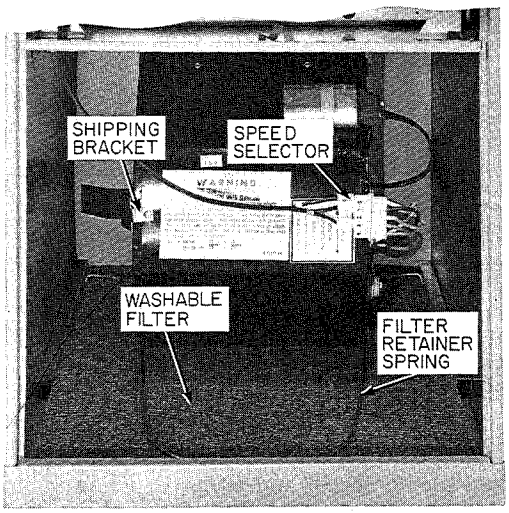

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Figure 6—Filter Installed For Bottom Inlet

CAUTION: Never operate unit without a filter or with filter access door removed. Damage to blower motor may result.

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

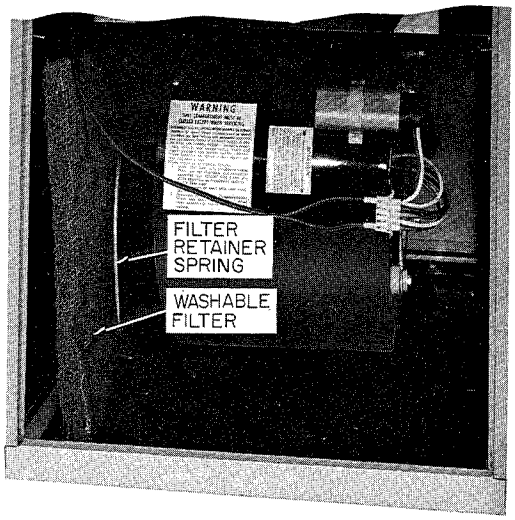

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Figure 7—Filter Installed for Side Inlet

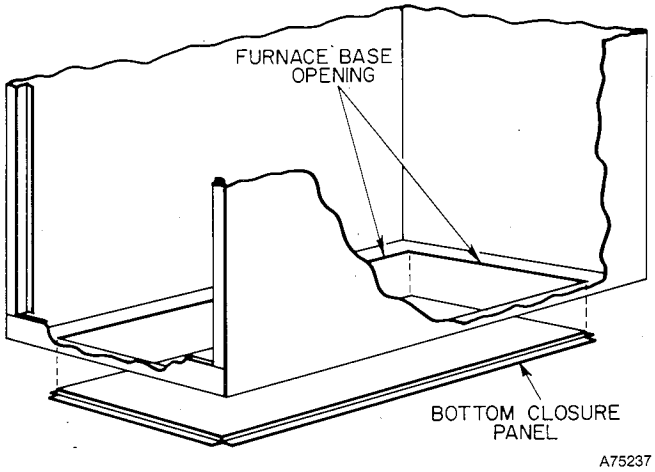

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Figure 8—Installing Bottom Closure Panel

3. With furnace either tilted or raised, install panel in opening from bottom of furnace.

VIII. STARTUP AND ADJUSTMENT

In addition to the following information, refer to "Procedures for Gas Furnace Installation" packaged with the unit.

A. Adjustment of Blower Speed

To change motor speed taps, remove the motor tap lead (see Figure 6) and relocate it on the desired terminal on the plug-in terminal block/speed selector located on the blower.

CAUTION: When adjusting the blower speed, make certain that the temperature rise across the heat exchanger does not exceed that specified on the rating plate.

TABLE II—SPEED SELECTOR

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

B. Bryant Automatic Gas Control Valve

These units are equipped with an A-643 Bryant automatic gas control valve, there are three positions for the manual valve knob (OFF-PILOT-ON). There is a position stop at the PILOT position. To move the manual valve knob from the PILOT position to either ON or OFF position, the manual valve knob must be depressed.

If not already checked when lighting the main burner, check the proper operation of this valve by moving the room thermostat pointer above and below room temperature and observing that the main burners light on call for heat and go off when the pointer is moved below the room temperature setting. All Bryant automatic gas control valves have a delay when opening or closing.

IX. CARE AND MAINTENANCE

WARNING: Never store anything on, 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.

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

The ability to properly perform maintenance on this equipment requires certain mechanical skills and tools. If you do not possess these, contact your Dealer for maintenance.

WARNING: Turn off gas and electrical supplied to unit before performing any maintenance or service on unit.

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.
3. Check electrical connections for tightness and controls for proper operation each heating season. Service as necessary.

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 air filter, proceed as follows:

1. Remove blower access door.
2. Release filter retainer spring from behind flange of furnace casing.
3. Slide filter out.
4. Clean filter with tap water.
5. Rinse and let dry. No oiling or coating of filter is required.
6. Place filter in furnace with cross-sectional binding up or 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.

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 electrical leads from left side of Molex speed selector. See Figure 6. Note location of wires for reassembly.
3. Remove screws holding blower assembly against blower deck and slide blower assembly out of furnace.
4. Squeeze side tabs of Molex speed selector and pull it from blower housing.
5. Loosen a screw in strap holding motor capacitor to blower housing and slide capacitor from under strap.
6. Mark blower wheel, motor, and motor support in relation to blower housing before disassembly, to insure proper reassembly.
7. Loosen setscrew holding blower wheel onto motor shaft.
8. Remove bolts holding motor mount to blower housing and slide motor and mount out of housing. Some motors have a ground wire attached to blower housing: disconnect it also.
9. Lubricate motor.
   a. Remove dust caps or plugs from oil ports located at each end of motor.
   b. Use a good grade of SAE 20 nondetergent motor oil and put one teaspoon, 5 cc, 3/16 oz., or 16 to 25 drops in each oil port.
   c. Allow time for total quantity of oil to be absorbed by each bearing.
   d. After oiling motor, be sure to wipe excess oil from motor housing.
   e. Replace dust caps or plugs on oil ports.
10. Remove blower wheel from housing.
    a. Mark blower wheel orientation and cutoff location to insure proper reassembly.
    b. Remove screws holding cutoff plate and remove cutoff plate from housing.
    c. Lift blower wheel from housing through opening.
11. Clean blower wheel and motor by using vacuum with soft brush attachment. Care must be exercised not to disturb balance weights (clips) on blower wheel vanes. Also do not drop or bend wheel, as balance will be affected.
12. Reassemble blower by reversing procedures 10a thru c. Be sure wheel is positioned for proper rotation.
13. Reassemble motor and blower by reversing procedures 4 thru 8. If motor has ground wire, be sure it is connected as before.

14. Reinstall blower assembly in furnace.
15. Connect electrical leads to Molex speed selector. Please note that connections are polarized for assembly—**do not force.**
16. Turn on electrical power and check for proper rotation and speed changes between heating and cooling.

C. Cleaning Heat Exchanger

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

1. Turn off gas and electrical supply.
2. Remove access panels.
3. Remove vent connector and draft diverter. Screws are located inside draft diverter opening.

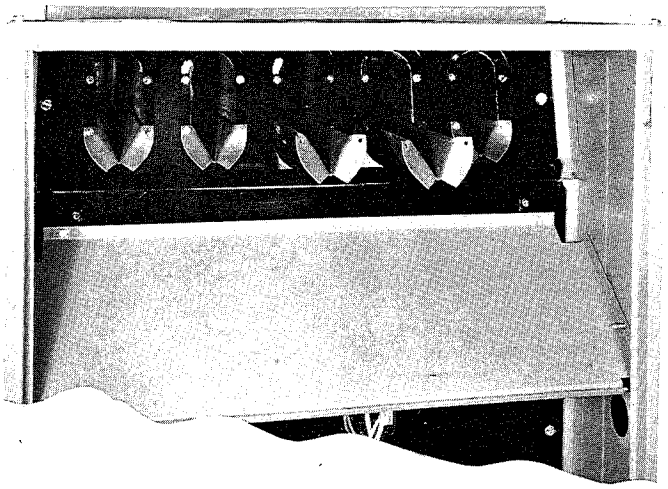

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Figure 9—Removing Baffles

4. Remove flue baffles from flue outlets of heat exchanger. See Figure 9.
5. Remove secondary air baffle and burners. To remove pilot burner, disconnect pilot supply tube at gas valve.
6. Clean flue ways with brush and or vacuum.
7. Replace flue baffles. Be sure all screws are in place and tight.
8. Replace draft diverter and vent connector. Be sure screws are replaced and tight.
9. Replace secondary air baffle and burners.
10. Turn on gas and electricity. Check for gas leaks.

WARNING: Never use a match or other open flame to check for gas leaks. Use a soap-and-water solution.

D. Pilot

Pilot should be checked and cleaned if necessary at the beginning of each heating season. Pilot flame should be high enough for proper impingement of the safety element and to light the burners. Remove accumulation of soot and carbon from thermocouple safety element, if used.

It is recommended the pilot be turned off during the summer season.

E. 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 and stripped wire, and reassemble properly and securely. Electrical controls are difficult to check without proper instrumentation. Therefore, reconnect electrical power to unit and observe unit through one complete operating cycle. If there are any discrepancies in the operating cycle, contact your Dealer and request service.