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installation instructions

COUNTERFLOW GAS-FIRED FORCED-AIR FURNACE

396G

Series A
and B
Sizes 050
thru 150

INTRODUCTION

Before installing the furnace, refer to "Procedure for Gas-Fired 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 American National Standard Z223.1 National Fuel Gas Code.

Each furnace is shipped from the factory completely assembled with multispeed direct-drive blower and wired ready for counterflow indoor heating installation only. All sizes feature a printed-circuit board control center with easy-to-read, low-voltage terminal strip to ensure proper connections.

The efficiency rating of the furnace is a product thermal efficiency rating determined under continuous operating conditions independent of any installed system.

CAUTION: Do not install furnace in a corrosive or contaminated atmosphere. Make sure all combustion and circulating air requirements listed in "Procedure for Gas-Fired Furnaces" are adhered to, in addition to all local codes and ordinances.

The design of the counterflow gas-fired furnace is A.G.A. certified for installation on combustible flooring (with optional floor base), in alcoves, basements, closets, or utility rooms. This furnace line is **not** A.G.A. certified for installation in a mobile home, recreation vehicle, or outdoors.

TABLE I—CLEARANCES (In Inches)

Sizes	050	075 thru 150
Sides—Single-Wall Vent	1	1
Type-B Double-Wall Vent	0	1
Back	0	0
Top of Plenum	1	1
Vent Connector—Single-Wall	6	6
Type-B Double-Wall	1	1
Front—Combustion Air	6	6
Service	30	30

Installation comprises the following:

- I. Inspection
- II. Location, Ventilation, and Air for Combustion
- III. Gas Piping
- IV. Venting

All of the above steps are covered in general by the like-numbered sections of the "Procedure for Gas-Fired Furnaces" booklet packaged with the furnace; therefore, these Installation Instructions will contain only supplementary information applicable to installing the furnace.

In addition, the following sections deal specifically with installation of the 396G:

- V. Supply-Air Plenum Installation
- VI. Electrical
- VII. Sequence of Operation
- VIII. Filter
- IX. Startup and Adjustment
- X. Care and Maintenance

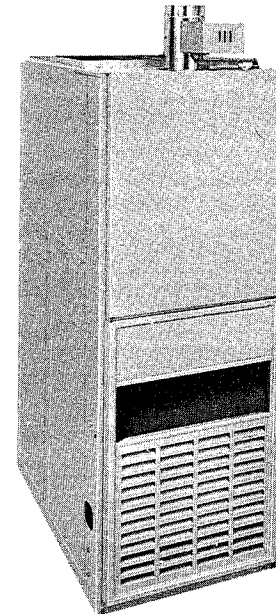
For accessory installation details, refer to applicable installation literature.

Cancels: 40396DP5-A
and 40396DP6-A

40396DP7-A
1/15/80



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Figure 1—Model 396G036075 With Optional Vent Damper Installed

V. SUPPLY-AIR PLENUM INSTALLATION

A. Installation on a concrete slab

1. See Figure 2 for dimensions and location of supply-air opening in furnace bottom.
2. Construct hole in floor per dimensions in Figure 3 and Table IV.
3. Place plenum and furnace as shown in Figure 4.

B. Installation on a combustible floor

1. Read Installation Instructions packaged with combustible floor base.
2. Cut and frame hole in floor per dimensions in Table I of Installation Instructions packaged with combustible floor base. If this requires cutting of a floor joist, tie ends of cut joist into adjacent joists so that proper floor support will be maintained.
3. Assemble and install combustible floor base per instructions packaged with base.
4. When completed, combustible floor base, plenum, and furnace (or coil casing when used) should be installed as shown in Figure 6.

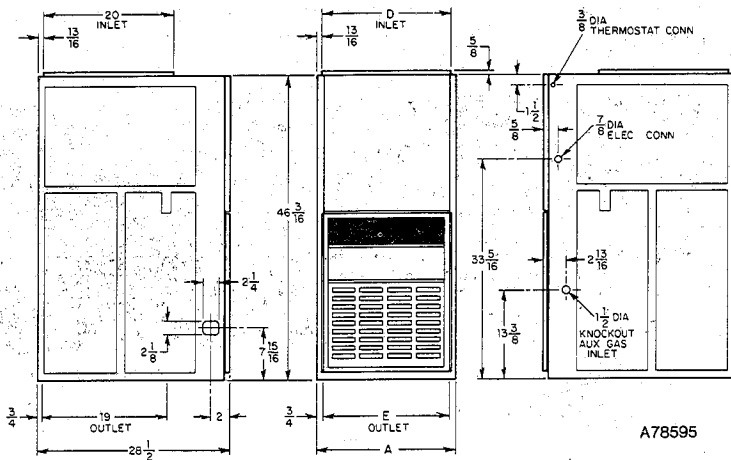


Figure 2—Dimensional Drawing

TABLE II—DIMENSIONS (In Inches)

Size	A	D	E	Vent
024050	14-3/16	12-9/16	12-11/16	4
000075	17-1/2	15-7/8	16	4
036075	17-1/2	15-7/8	16	4
000100	17-1/2	15-7/8	16	5
048100	17-1/2	15-7/8	16	5
000125	21	19-3/8	19-1/2	5
048125	21	19-3/8	19-1/2	5
060150	24-1/2	22-13/16	23	6

TABLE III—RATINGS AND PERFORMANCE*

Size	Input Btuh	Bonnet Capacity Btuh	Temp Rise Range	Heating		Cooling		Motor HP & Type	Approx Ship. Weight
				Ext Static Pressure	Ft ³ /Min	Ext Static Pressure	Ft ³ /Min		
024050	50,000	40,000	45-75	0.50	620	0.5	800	1/3-SP	127
000075	75,000	60,000	70-100	0.12	700	—	—	1/10-SP	146
036075			45-75	0.50	925	0.5	1255	1/3-SP	155
000100	100,000	80,000	70-100	0.20	870	—	—	1/5-SP	161
048100			60-90	0.50	990	0.5	1630	1/2-PSC	168
000125	125,000	100,000	70-100	0.20	1090	—	—	1/5-SP	185
048125			60-90	0.50	1235	0.5	1620	1/2-PSC	186
060150	150,000	120,000	55-85	0.50	1850	0.5	2075	1/2-PSC	225

*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.

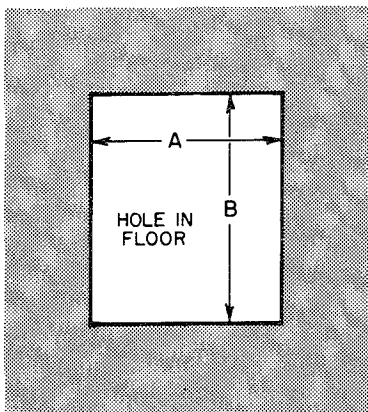


Figure 3—Floor Opening for Concrete Slab

TABLE IV — OPENING DIMENSIONS

Furnace Size	A	B	
		Heat-Only	Heat/Cool*
024050	13-1/8	19-5/8	20-15/16
000075, 036075, 000100, & 048100	16-7/16	19-5/8	20-15/16
000125 & 048125	19-7/8	19-5/8	20-15/16
060150	23-7/16	19-5/8	20-15/16

*These dimensions apply when a Model 518A Evaporator Coil casing is to be installed.

VI. 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.

CAUTION: Do not connect aluminum wire between disconnect switch and furnace.

See Figure 8 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.

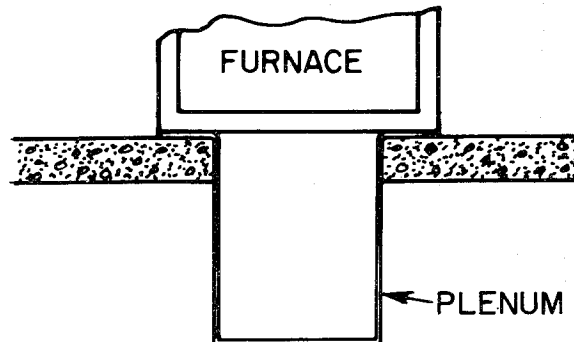


Figure 4—Furnace on a Concrete Slab

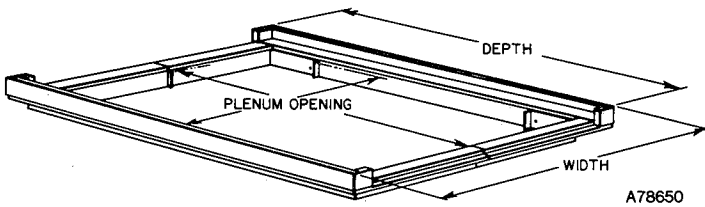


Figure 5—Combustible Floor Base

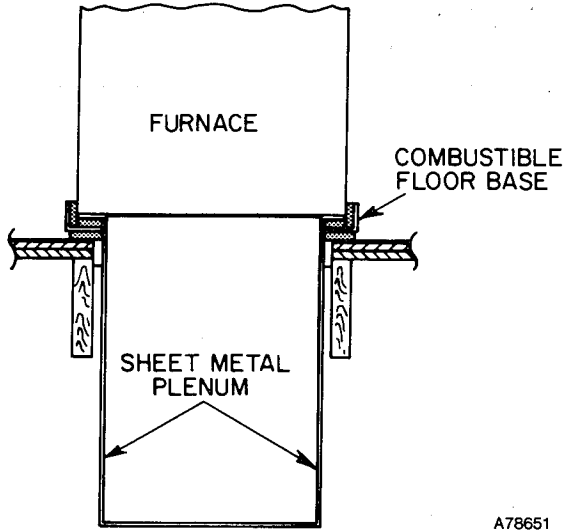


Figure 6—Furnace, Plenum, and Base Installed on a Combustible Floor

Use a separate fused branch electrical circuit for this furnace. A disconnecting means must be located within sight of, and readily accessible to, the furnace. In some areas, the unit door switch may qualify as the disconnecting means.

WARNING: The furnace must be electrically grounded in accordance with local codes, the National Electric Code, and ANSI C1-1978. Do not use gas piping as an electrical ground.

If line-voltage 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 metallic conduit is used, it will serve as the ground.

B. Low-Voltage Wiring

Make field low-voltage connections at the low-voltage terminal strip. See Figure 8.

NOTE: Use AWG No. 18 “color-coded” copper thermostat wire for lengths up to 100 ft. Above 100 ft, use AWG No. 16 wire.

Set the thermostat heat anticipator at 0.5 for a furnace with a BDP Model 646A Gas Valve; 0.6 for a furnace with an Essex Model 242 Gas Valve; 0.2 when a Model 997A Vent Damper is installed — no matter which of these gas valves is used. If additional controls are connected in the thermostat circuit, their amp draw must be added to this setting. A failure to make this setting will result in improper operation of the system.

For accurate reading, check the amp draw at the thermostat with an ammeter. A failure to make this setting will result in improper operation of the system.

The room thermostat should be located where it will be in the natural circulation 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.

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.

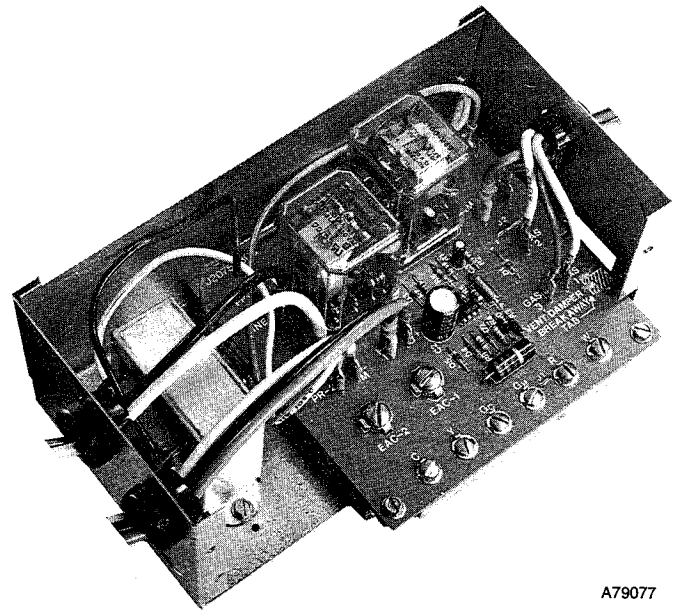


Figure 7—Printed-Circuit Control Center

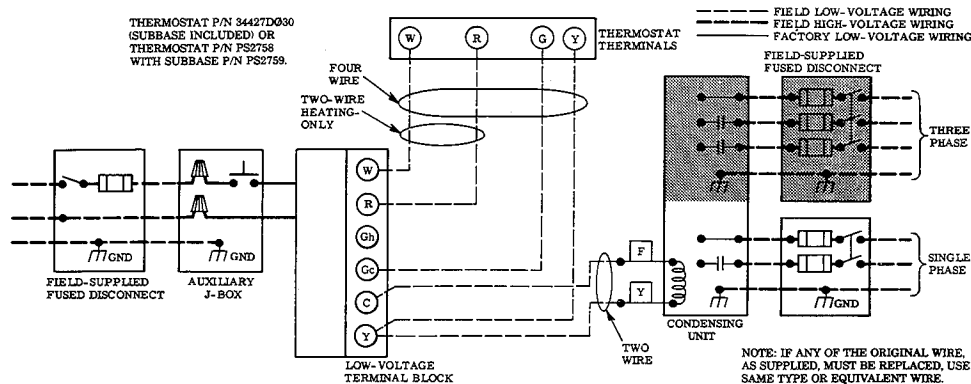


Figure 8—Heating and Cooling Application Wiring Diagram

C. Blower Control Center

Each furnace features a printed-circuit control center. This will aid the installer and serviceman when installing and servicing the unit. See Figure 7. A low-voltage terminal board is marked for easy connection of field wiring.

VII. SEQUENCE OF OPERATION

NOTE: The wiring diagram shown in Figure 9 covers heating-only and Figures 10 and 11 cover heating/cooling.

A. Heating

Gas and electrical supplies must be turned on at the furnace.

NOTE: When power is applied to heat relay coil 2A in the control circuit, the normally closed contacts in the blower circuit will open.

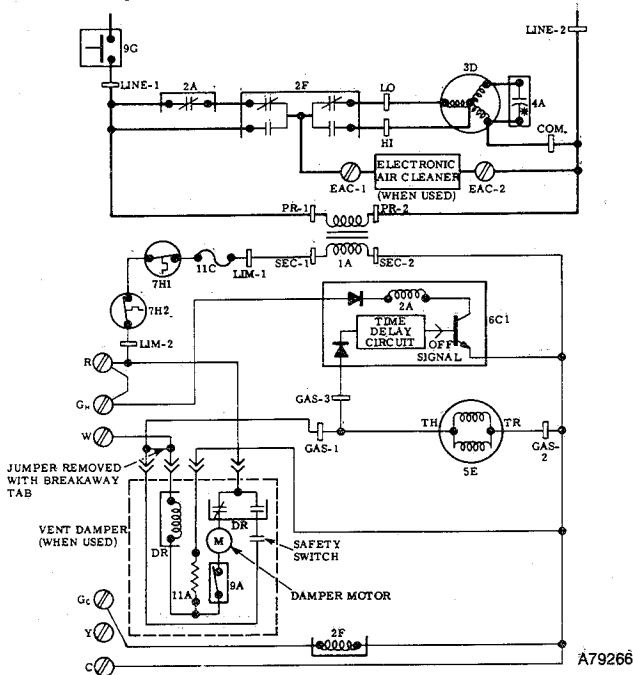


Figure 9—Line-to-Line Wiring Diagram for Sizes 050 thru 150 (match-lit pilot) Natural Gas & LPG

1: BDP 646 and Robertshaw 7000 BKER Gas Valves (IID Models)

When the thermostat "calls for heat," the control circuit is closed between terminals R and W. Power from transformer 1A through fusible link 11C and limit switches 7H1/7H2 energizes the pilot valve portion of automatic gas valve 5F and pilot igniter 6F. The pilot valve opens, permitting gas flow to the pilot burner where it is ignited.

The pilot valve portion of automatic gas valve 5F is a solenoid consisting of a "pick" and a "hold" coil. Both the "pick" and the "hold" coils must be energized to open the valve, but only the "hold" coil must be energized to keep it open.

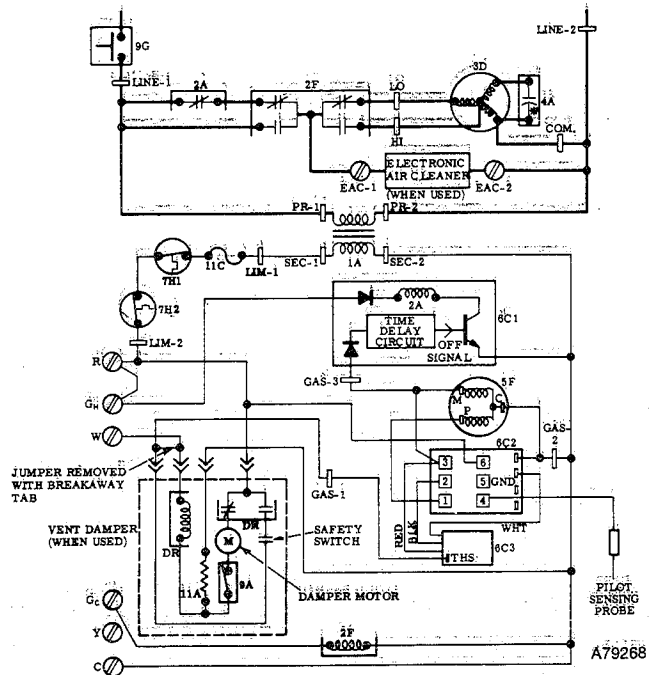


Figure 11—Line-to-Line Wiring Diagram for Sizes 050 thru 150 IID LPG

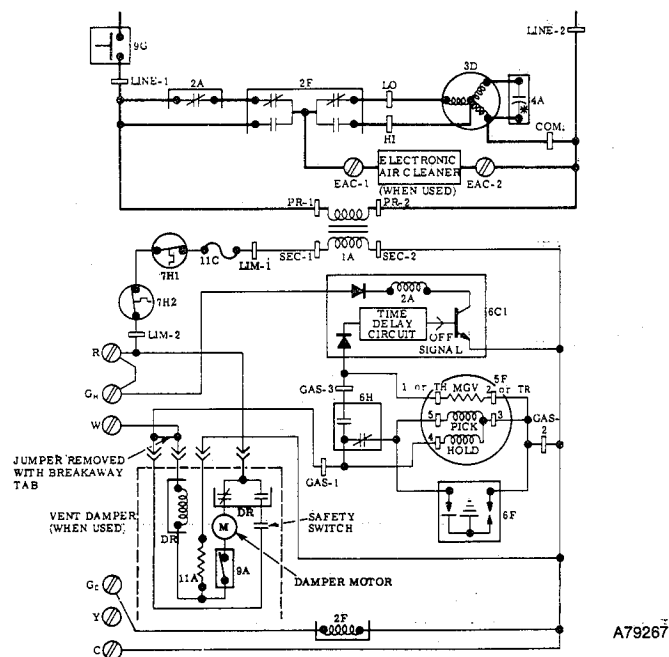


Figure 10—Line-to-Line Wiring Diagram for Sizes 050 thru 150 IID Natural Gas

LEGEND

- 1A—Transformer 115/24
- 2A—Relay-Heat (SPST-N.C.)
- 2F—Relay-Cool (DPDT)
- 3D—Blower Motor
- 4A—Run Capacitor
- 5E—Gas Valve
- 5F—Gas Valve (Two-Circuit)
- 6C1—Printed-Circuit Board
- 6C2—Pilot Igniter and Flame Sensing
- 6C3—Lockout Timer Module
- 6F—Pilot Igniter
- 6H—Safety Pilot (Flame Sensing)
- 7H1—Limit Switch (SPST-N.C.)
- 7H2—Auxiliary Limit Switch (SPST-N.C.)
- Manual Reset
- 9A—Summer/Winter Switch
- 9G—Blower Door Switch (SPST-N.O.)
- 11A—Resistor
- 11C—Fusible Link

When the pilot flame is established, pilot 6H switches its contacts in approximately 40 to 60 seconds, energizing the main valve portion of gas valve 5F and deenergizing pilot igniter 6F and the "pick" coil portion of the pilot solenoid in gas valve 5F.

The main valve portion of gas valve 5F is heat motor operated; therefore, after approximately 10 seconds, (Robertshaw Valve opens instantly), this portion of the valve opens, permitting gas flow to the main burners where the gas is ignited by pilot 6H.

2. BDP 647 and Essex 242 Gas Valves (Match-Lit Models)

The furnace pilot must be lit to energize the thermal magnet circuit of gas valve 5E, thus permitting gas flow to the remaining portion of the valve.

TABLE V — PILOT GAS CONSUMPTION

Pilot	Gas	Btuh	In. wc
BDP 733B	Nat	875	5.0
Penn	Nat	1250	3.5
Penn	Prop.	690	10.5

When the thermostat "calls for heat," the control circuit is closed between terminals R and W. Power from transformer 1A through fusible link 11C and limit switches 7H1/7H2 energizes gas valve 5E, causing the valve to open and permitting gas flow to the main burners, where it is ignited by the pilot. Some furnaces are equipped with a step opening gas valve. When the burners first ignite, the flame will be low and soft. In approximately 15 seconds the valve will fully open and the burner flame will be normal size.

3. Essex 242 Gas Valve (IID Models) LPG

When the thermostat "calls for heat," the control circuit is closed between terminals R and W. Power from transformer 1A through fusible link 11C, limit switches 7H1 & 7H2, and through lockout timer module 6C3, energizes pilot igniter 6C2 and the pilot valve part of gas valve 5F, causing the valve to open and to ignite the pilot. When the pilot flame is established, the pilot sensing probe energizes the main gas valve, permitting gas flow to the main burners. The pilot electrode continues sparking for approximately 5 to 10 seconds after the pilot flame has been established.

If the pilot flame is not proven within approximately 30 seconds, lockout module 6C3 opens, deenergizing gas valve 5F and stopping the gas flow to the pilot. The lockout module remains open until it is manually reset by interrupting the low-voltage or high-voltage circuit for approximately 30 seconds.

3. Blower Circuit

With power through the solid-state time-delay circuit on printed-circuit board 6C1 and heat relay 2A, blower motor 3D is energized on heating speed approximately 75 seconds after gas valve 5E has been energized (or the pilot flame has been proven in the case of BDP 646 Gas Valve 5F).

4. Limit Control

If the furnace overheats for any reason, limit control 7H1 switches, breaking the circuit to automatic gas valve 5E or 5F. The gas valve closes immediately, stopping gas flow to the main burners and the pilot. In addition, blower motor 3D continues to operate because heat relay 2A is deenergized to cool down the furnace.

Manual reset auxiliary limit switch 7H2 is located on the top right-hand corner of the furnace. In the event of blower motor failure, this switch breaks the electrical circuit to the gas valve, stopping gas flow to the main burners. The switch must be manually reset after the blower motor has been replaced.

Fusible link 11C is provided in the transformer 1A secondary circuit as protection from overheating conditions in the vestibule area of the furnace. Should this condition exist, the fuse opens and deenergizes gas valve 5E or 5F and heat relay 2A, stopping the gas flow to the burners and starting blower motor 3D.

When the thermostat is satisfied, the circuit between R and W is broken, deenergizing automatic gas valve 5E or 5F, pilot 6H (when used), and the solid-state time-delay circuit on printed-circuit board 6C1. The gas flow stops immediately to the pilot and main burners with the BDP 646 or Robertshaw 7000 BKER Gas Valves, and to the main burners only with the BDP 647 and Essex 242 Gas Valves. After approximately 105 seconds, heat relay 2A is energized and blower motor 3D stops.

Some furnaces are equipped with a step opening gas valve. When the burners first ignite, the flame will be low and soft. In approximately 15 seconds, the valve will fully open and the burner flame will be normal size.

B. Vent Damper (when used)

When the thermostat "calls for heat," the control circuit is closed between terminals R and W. Power from transformer 1A energizes the damper motor relay coil, causing the normally closed relay contacts to open, deenergizing the damper motor and causing the spring-loaded damper to open. When the automatic vent damper is open, the circuit is completed to automatic gas valve 5E or 5F. The sequence from this point on is the same as that for heating.

When the thermostat is satisfied, the circuit between R and W is broken, deenergizing the damper motor relay, and causing the relay contacts to close. The damper motor starts and closes the damper.

C. Cooling (cooling models only)

When the thermostat "calls for cooling," power from transformer 1A energizes the condensing unit contactor, cooling relay coil 2F, 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 Gc is broken, deenergizing cooling relay coil 2F which, in turn, opens its contacts, stopping blower motor 3D.

VIII. FILTER ARRANGEMENT

The two factory-supplied filters are shipped in the blower compartment. After the return-air duct has been connected to the furnace, install the filters in a V-formation inside the return air plenum. See Figure 12.

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

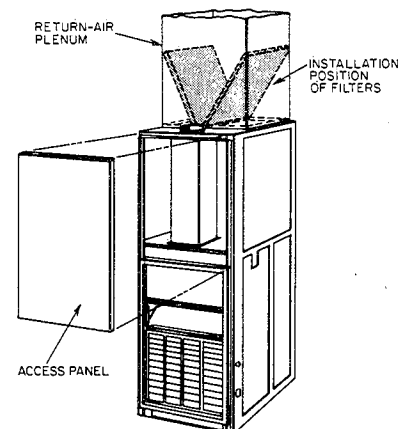


Figure 12—Position of Filters

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IX. STARTUP AND ADJUSTMENT

In addition to the following information, refer to "Procedures for Gas-Fired Furnaces" packaged with the unit.

NOTE: There is a switch located in the blower compartment that breaks the electrical power supply when the blower access door is removed. Be sure blower access door is properly installed.

CAUTION: This furnace is equipped with a fusible link in the vestibule area that 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.

A. Adjustment of Blower Speed

WARNING: Disconnect the electrical power before changing the speed tap.

To change motor speed taps, remove the motor tap lead (see Table VI) 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 VI—SPEED SELECTOR

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

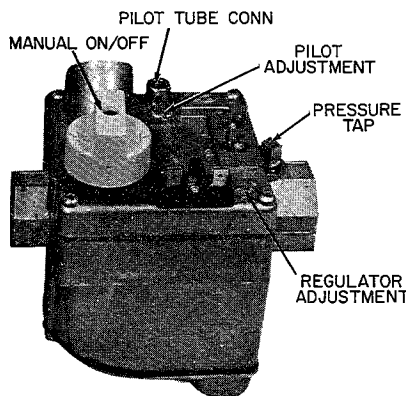


Figure 13—Redundant Automatic Gas Control Valve—BDP Model 646

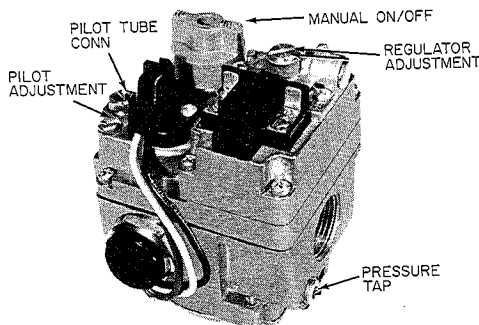


Figure 14—Redundant Automatic Gas Control Value —Robertshaw Model 7000 BKER

B. Automatic Gas Control Valve

These units are equipped with an automatic gas control valve. 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 room temperature setting.

NOTE: For ease of adjusting the pilot flame, disconnect one power lead at main gas valve. For Model 646 Gas Valve, disconnect terminal No. 1 and for match-lit models, disconnect either lead. This will prevent main burner ignition and allow time to adjust the pilot. Reconnect the power lead after adjustment.

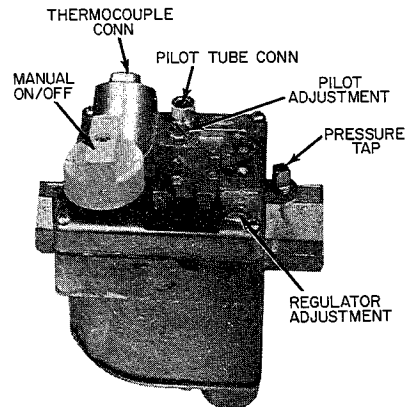
X. CARE AND MAINTENANCE

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

WARNING: Never store anything on, or in contact with, the furnace, such as:

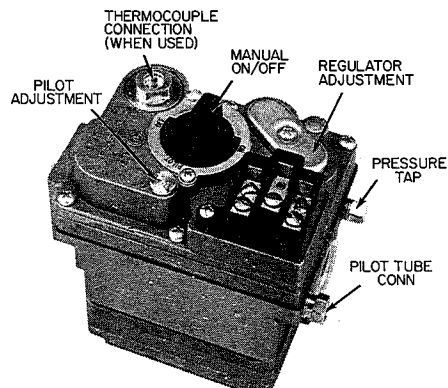
1. Spray or aerosol cans, rags, brooms, dust mops, vacuum cleaners, or other cleaning tools.
2. Soap powders, bleaches, waxes or other cleaning compounds, plastic or plastic containers, gasoline, kerosene, cigarette lighter fluid, dry cleaning fluids, or other volatile fluids.
3. Paint thinners and other painting compounds, paper bags or other paper products.

For continuing high performance, and to minimize possible equipment failure, it is essential that periodic maintenance



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Figure 15 — Redundant Automatic Gas Control Valve — BDP Model 647



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Figure 16 — Redundant Automatic Gas Control Valve — Essex Model 242

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 supplies to unit before performing any maintenance or service on unit. Follow relighting instructions on plate attached to furnace.

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

Each furnace accommodates two filters which are installed above the furnace in the return-air plenum.

To clean or replace the filters, proceed as follows:

1. Disconnect electrical power before removing access panel.
2. Remove upper access panel.
3. Reach up behind top plate, tilt filters toward center of return-air plenum, remove filters, and replace or clean as needed.
4. Some furnaces are equipped with permanent, washable filters.
 - a. Clean with tap water.
 - b. Rinse and let dry.
 - c. No oiling or coating of filters is required.
 - d. Reinstall filters with cross-hatch binding facing blower.

B. Blower Motor and Wheel

Clean and lubricate as follows:

1. Remove upper access panel.
2. Loosen screw in vent pipe enclosure front and remove vent enclosure front by sliding forward (toward front of unit).
3. Disconnect vent pipe at first joint above unit and swing

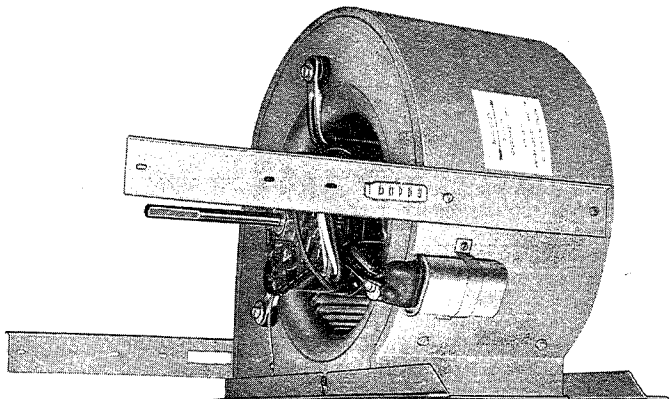


Figure 17—Dual Blower With Left-Hand Housing and Wheel Removed.

vent pipe assembly to the side, supported by suitable means (block of wood, etc.).

4. Slide vent pipe upward through the rectangular opening in top plate and remove vent pipe from furnace.
5. Remove four screws in vent pipe enclosure back and remove enclosure back by tilting top toward blower, and sliding bottom toward front of furnace.
6. Disconnect electrical leads from right side of Molex speed selector. Note location of wires for reassembly.
7. Remove screws holding blower assembly against blower deck and slide blower assembly out of furnace.
8. Squeeze side tabs of Molex speed selector and pull it from blower housing.
9. Units with motor capacitor, loosen screw in strap holding capacitor to blower housing and slide capacitor from under strap.
10. Mark blower wheel, motor, and motor support in relation to blower housing before disassembly, to insure proper reassembly.
11. Loosen setscrew holding blower wheel onto motor shaft.
12. 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.
13. Lubricate motor.
 - a. Remove dust caps or plugs from oil ports located at each end of motor.
 - b. Use good grade of SAE 20 nondetergent motor oil and put one teaspoon, 5cc, 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.
14. 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.
15. 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.
16. Reassemble blower by reversing procedures 14a thru 14c. Be sure wheel is positioned for proper rotation.
17. Reassemble motor and blower by reversing procedures 8 thru 12. If motor has ground wire, be sure it is connected as before.
18. Reinstall blower assembly in furnace.
19. Reinstall vent enclosure back.
20. Reinstall vent pipe through opening in top plate, secure to draft hood and connect remainder of vent pipe assembly.
21. Reinstall vent enclosure front, and secure with screw.
22. Reinstall access panel.

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 to furnace.
2. Remove front access doors.
3. Remove vent pipe enclosure front and flue pipe.

4. Remove draft diverter. Screws are located inside draft diverter opening.
5. Remove flue baffles from flue outlets of heat exchanger.
6. Remove secondary air shield and burners. To remove pilot burner, disconnect pilot supply tube (and thermocouple on 100% shut-off models) at gas valve.
7. Clean flue ways with brush and or vacuum. Check heat exchanger for leaks and cracks. Replace if necessary.
8. Replace flue baffles. Be sure all screws are in place and tight.
9. Replace draft diverter and vent connector. Be sure screws are replaced and tight.
10. Replace burners and secondary air shield.
11. 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.

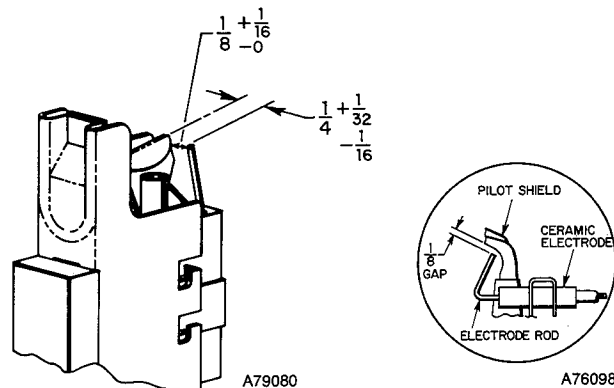
D. Pilot

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 the burners. Remove the accumulation of soot and carbon from the thermocouple safety element or sensing probe.

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.



BDP Model 733B

Penn Model J996

Figure 18 — Position of Electrode to Pilot

TABLE VII — TROUBLE ANALYSIS CHART

WARNING: Turn off gas and power supply to unit before servicing (unless specific test requires gas and electric supplies).

SYMPTOM	CAUSE	REMEDY
Pilot will not light.	No spark at electrode	Readjust, if necessary, so that gap between electrode tip and pilot burner is as shown in Figure 18. Clean dirt or moisture accumulation from electrode ceramic with cloth. Cracked ceramic—replace pilot electrode assy. Check for loose or broken wiring at and between spark generator and electrode. Replace wire or tighten connection as necessary. Check fuse or circuit breaker for 115-volt supply to furnace. Check blower access panel for proper installation. Check 24-volt input to spark generator. If you read 24 volts and above steps have been completed, replace spark generator assy.
	Spark shorting out to main burner	Readjust electrode as specified. Clean pilot orifice.
	No gas at pilot burner	Check voltage to terminals 3 and 5 or TR and TH of gas valve. Check for proper opening of pilot valve, broken wires, or loose connections. If no deficiency is found, replace valve assy. Connect to power supply. Check fuse, wiring, or circuit breaker.
Burners will not ignite.	No 115-volt power to furnace	Replace transformer.
	No 24-volt power to control circuit	Check all wiring and all wirenut connections.
	Miswired or loose connections	Check voltage to terminals 1 and 2 or TR and TH of gas valve. Check for proper opening of main gas valve, broken wires, or loose connections. If no deficiency is found, replace gas valve assy.
	No gas at main burners	Clean pilot orifice.
Blower operates continuously.	Dirty pilot—yellow flame	Move thermostat fan switch to AUTO position.
	Thermostat fan switch in ON position	Correct combustion air and venting practice—replace fuse link with identical part.
	Fusible link blown	Clean dirty air filter—reinstall.
	Dirty filter causing limit operation	Replace printed-circuit board.
Inadequate heating	Defective heat relay	Replace with proper size furnace.
	Furnace undersized for application	Check gas pressure at manifold. Clock gas meter for input. If too low, increase manifold pressure or install correct orifices. Clean dirty air filter—reinstall.
	Gas input to furnace too low	Increase blower speed. Open registers—ductwork restricted.
	Limit switch cycles main burners	Blower motor failure—replace motor.
	Manual reset limit switch contacts open	Check thermostat circuit amps and set anticipator accordingly.
Aldehyde odors, (CO), sooting flame—floating flame	Thermostat anticipator set too low	Adjust air shutter on burners to provide soft, blue, flame. Check all screws around flue outlets and burner compartment. Tighten. See "Section II, Location & Air for Combustion & Ventilation" (Std Procedures for Gas-Fired Furnaces). Replace cracked heat exchanger. Reduce input and check orifices—furnace overfired. Check vent for restriction.
	Incomplete combustion—poor flame characteristics	