

INSTALLATION AND SERVICE INSTRUCTIONS



ECONOMITE MODEL F400B-33 Gas Conversion Burner

The **ECONOMITE F400B-33** conversion burner with intermittent spark ignited pilot is adaptable to most gas utilization equipment, including gravity and forced circulation furnaces and boilers. It is particularly recommended for firing horizontal or downdraft equipment since it needs no draft to maintain a pilot. Power burner design makes it perfectly suited for oil burner replacement, including rooftop and industrial applications.

In the United States, installation must conform with local codes or, in the absence of local codes, with **Installation of Domestic Gas Conversion Burners, ANSI Z21.8b-1993**, and **National Fuel Gas Code, ANSI Z223.1-1992**, or latest edition(s) available from American National Standard Institute. Further reference should be made to the recommendation of your fuel supplier.

NOTE: Any additions, changes, or conversions required in order for the appliance to satisfactorily meet the application needs must be made by a MIDCO distributor (or other qualified agency) using factory specified approved parts.

In Canada, installation must conform with local codes or, in the absence of local codes, with **Installation Codes for Gas Burning Appliances and Equipment, CGA Standard CAN/CGA1-B149.1** or 2. When the conversion burner is used on a Forced air Central Furnace, the two yellow and black warning labels in the literature envelope shall be attached in accordance with **Installation Code, CGA Standard CAN/CGA 1-B149, Clause 5.4.4.4**. Further reference should be made to the recommendation of your fuel supplier.

INSTALLER: Inform and demonstrate to the user the correct operation and maintenance of this appliance. Inform the user of the hazards of storing flammable liquids and vapors in the vicinity of this appliance and remove such hazards. Affix this manual adjacent to the conversion burner.

CODE COMPLIANCE IS THE SOLE RESPONSIBILITY OF THE INSTALLER.

USER: Retain this manual for future reference. If other than routine service or maintenance as described in this manual is required, contact a qualified service agency. **DO NOT ATTEMPT REPAIRS.** An inadvertent service error could result in a dangerous condition.

SAFETY INFORMATION TERMS: The following terms are used to identify hazards, safety precautions or special notations and have standard meanings throughout this manual. When you see the safety alert symbol and one of the safety information terms, as shown below, be aware of the hazard potential.



DANGER: Identifies the most serious hazards which **will** result in severe personal injury or death.

WARNING: Signifies hazards that **could** result in personal injury or death.

CAUTION: Identifies unsafe practices which would result in minor personal injury or product and property damage.

WARNING: If the information in these instructions is not followed exactly, a fire or explosion may result causing property damage, personal injury or death.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately phone your gas supplier from another building. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

Installation and service must be performed by a qualified installer, service agency or the gas supplier.

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SPECIFICATIONS

Standard burners are shipped as NATURAL gas models.
 A kit is available for field conversion to PROPANE gas.
 AIR DELIVERY (Approximate Air Delivery
 at Zero Draft Maximum Firing).....146 SCFM¹
 MAXIMUM FIRING RATE².....700 MBH³
 MINIMUM FIRING RATE².....300 MBH³
 GAS PRESSURE REQUIRED
 NATURAL.....5.0" to 14.0" W.C.
 PROPANE.....11.0" to 14.0" W.C.
 TUBE DIAMETER.....4"
 TUBE LENGTH.....8"
 RECOMMENDED COMBUSTION CHAMBER SIZE
 700 MBH.....15" W x 25" L
 ELECTRICAL SUPPLY.....120/1/60...10 Amp dedicated
 service
 FLAME SAFETY.....Intermittent proven pilot ignition,
 Electronic Safety

1. SCFM=Standard Cubic Feet/Minute.
2. Ratings based on 1000 BTU/Cu. Ft. Natural, 2500 BTU/Cu. Ft. PROPANE at Sea Level. Derate burner for altitudes over 2,000 feet by 4% for each 1,000 feet above sea level.
3. 1 MBH=1,000 BTU/Hr.
 One Gallon of Fuel Oil=140 MBH.

PART 1 INSTALLATION

CAUTION: The **ECONOMITE F400B-33** is not intended for outdoor installation and must be protected from excessive moisture. Provide adequate clearance for service and proper operation.

I VENTILATION

If the former automatic oil burner gave trouble-free operation, it is probable that the gas utilization equipment area has sufficient infiltration of air for combustion and dilution of flue gases. **Nevertheless, the area must be checked:**

Open basement or utility areas of normal construction, without storm windows or tight doors, will generally allow sufficient air infiltration. However, if the gas utilization

equipment is located in a tight or separate room, ventilation to an open area as described above will be required. Install two permanently open grilles, each sized on the basis of one square inch free area per 1,000 BTU of the total input rating of all gas utilization equipment in the combined space. One grille should be located within 12 inches of the ceiling, the other within 12 inches of the floor.

If the gas utilization equipment is located in an area of unusually tight construction, or if an exhaust fan, kitchen ventilation system, clothes dryer and/or fireplace is installed in the building, provisions must be made for an outside air supply near the heating appliance area. Install permanently open grilles sized at not less than one square inch free area per 4,000 BTU of burner input. When ventilating through horizontal ducts, grilles should be sized at not less than one square inch free area per 2,000 BTU of burner input. In any case, the minimum dimension of rectangular air ducts shall not be less than 3 inches.

In Canada, for detailed ventilation requirements, refer to standard CAN/CGA 1-B149.1 or .2 and/or local codes.

II PREPARATION OF THE GAS UTILIZATION EQUIPMENT

Clean the gas utilization equipment, combustion chamber, heat exchanger interior and flue connections. Remove all adhering tars, scale, dirt and soot. Inspect for actual or potential leaks.

Cement all joints, including those in the gas utilization equipment base and around the door frames, to prevent leakage into, or out of the combustion chamber.

The access or firing door should open easily to relieve pressure. If positive latches exist, they should be modified to permit easy opening; a spring loaded door holder is recommended.

On all boilers, make certain the pressure relief safety valve is in good operating condition.

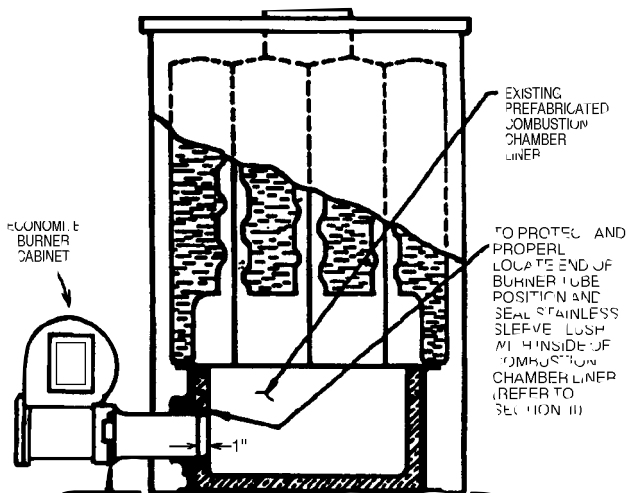


FIGURE 1 Dry Base Boiler with Combustion Chamber Liner (Warm Air Furnace Construction is Similar)

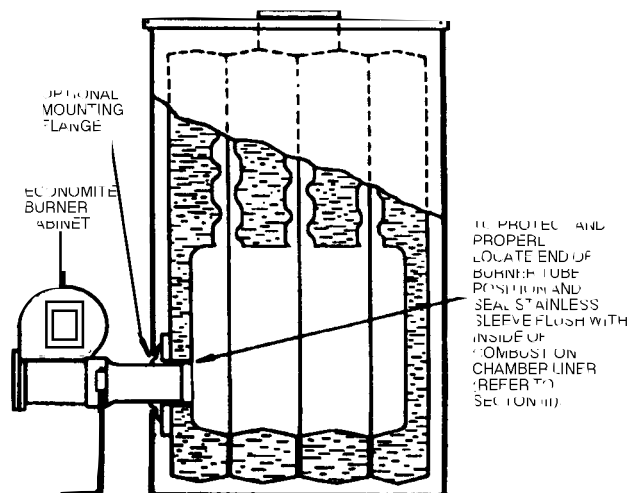


FIGURE 2 Wet Base Boiler with Unlined Combustion Chamber

III COMBUSTION CHAMBER

A combustion chamber liner is normally required to protect non-heat transfer surfaces and to provide a radiant bed for rapid heat transfer to the primary surfaces of the heat exchanger. In most cases the existing combustion chamber liner formerly used for oil burner can be used, if in good condition.

□ In the case of wet base boilers, where the entire firing chamber is comprised of heat exchange surfaces and no chamber liner was provided for oil firing, a liner is usually not required for the ECONOMITE. However, a liner or target wall may be necessary if the firing chamber is unusually short, in order to avoid flame contact on the heat exchanger walls or flueways.

□ If a built up chamber liner is required, use 2,300°F minimum insulating material.

□ The burner tube must be sealed air tight into the combustion chamber opening with refractory material as shown by Figures 1 and 2.

NOTE: In no case should the burner tube be allowed to extend into the chamber proper; it must be set flush to 1" short of the inside surface because high combustion chamber temperatures will cause premature pilot, electrode, burner tube and sleeve deterioration.

□ Special heat resistant alloy extension tubes and instructions are available for those applications where the burner tube is too short to reach the combustion chamber (such as old-fashioned gravity warm air furnace installations.)

⚠ WARNING: BURNER CABINET MUST BE MOUNTED IN ORIENTATION SHOWN IN FIGURES 1 AND 2. ANY OTHER MOUNTINGS MAY CAUSE A DANGEROUS CONDITION, AND WILL VOID BURNER WARRANTY AND AGENCY APPROVALS. NON-STANDARD ARRANGEMENTS MAY BE AVAILABLE FOR SOME MODELS-CONSULT FACTORY FOR DETAILS REQUIRED.

□ Before permanently setting the burner in place, check that the burner ports and pilot are free of foreign materials, and also that the electrodes have not been damaged or displaced. See Figure 7.

IV CHIMNEY, VENT CONNECTOR, AND DRAFT CONTROL

⚠ WARNING: The chimney shall be inspected for unsafe conditions such as deteriorated masonry and excessive soot or other blockage or potential blockage. Installation must conform with local codes or in the absence of local codes with ANSI Z21.8b-1993 and NFPA, ANSI Z223.1-1992.

⚠ WARNING: THE VENT CONNECTOR SHALL NOT BE CONNECTED TO A CHIMNEY ALREADY VENTING SOLID FUEL BURNING EQUIPMENT, AN INCINERATOR OR AN OPEN FIREPLACE.

□ The Vent Connector shall be made of non-combustible, corrosion resistant material capable of withstanding the vent gas temperature produced by the gas utilization equipment and of sufficient thickness to withstand physical damage.

□ The Vent Connector shall be as short as possible. The entire length shall be readily accessible for inspection, cleaning and replacement.

□ The length of horizontal uninsulated Vent Connector between chimney and a single gas utilization equipment shall not exceed 75% of the height of the chimney above the connector, or 100% if the Vent Connector is insulated.

□ The Vent Connector shall be installed so as to avoid turns or other construction features which create excessive resistance to flow of vent gas. It shall be installed without any dips or sags and shall slope upward at least 1/4" per foot.

□ A manually operated damper shall **not** be placed in the Vent Connector or chimney of any gas utilization equipment.

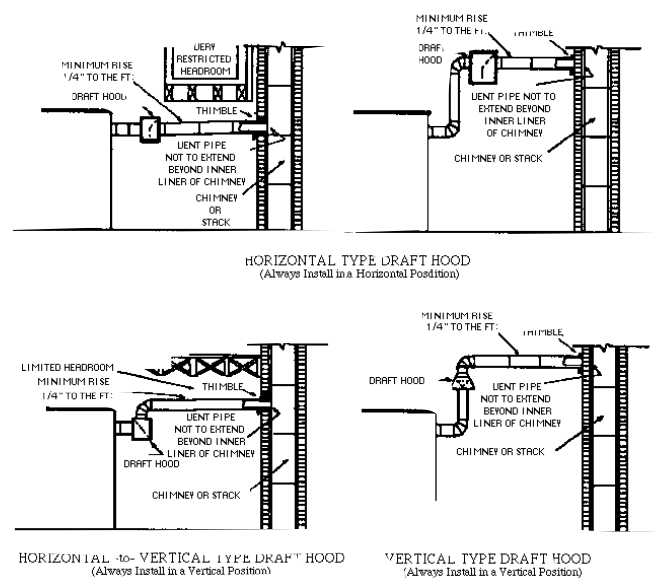
□ The Vent Connector shall be firmly attached to draft hood outlets and flue collars. Joints between sections of connector piping shall be fastened by sheet-metal screws or other approved means. The Vent Connector shall be supported for the design and weight of the material employed to maintain clearance and prevent physical damage and separation of joints.

□ A draft hood or a barometric draft regulator shall be installed in the same room or enclosure as the equipment in such a manner as to prevent any difference in the pressure between the hood or regulator and the combustion air supply (see Figures 3 and 4). In no case shall the relief opening of the draft hood or barometric draft regulator be located at a point lower than the top of the highest flue passage in the equipment.

□ Gas utilization equipment requiring controlled draft may be equipped with a listed double acting barometric draft regulator, **if a approved by local codes.**

□ A device which will automatically shut off gas to the burner in the event of sustained backdraft is required. It must be of the listed manual reset type and installed and adjusted by a qualified service technician in accordance with the manufacturer's instructions.

□ Refer to the gas utilization equipment manufacturer for recommended vent connection requirements.



-3- FIGURE 3 Recommended Locations for Draft Hoods

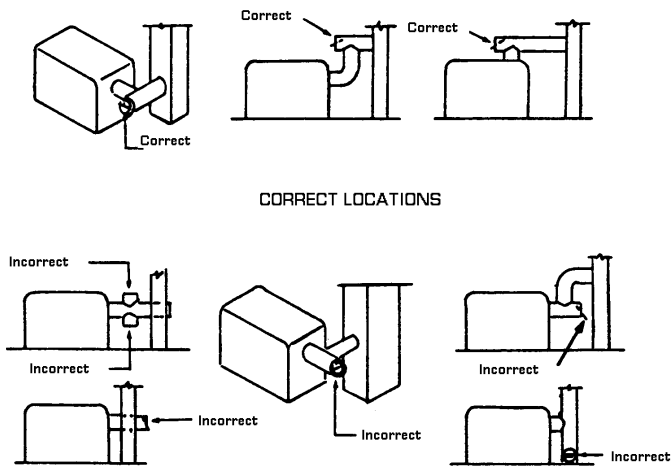


FIGURE 4 Location for Barometric Draft Regulators

Figure 3 and 4: Copyright by the American Gas Association.

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V ELECTRICAL

Installation wiring and grounding to the burner must conform to local codes, or, in their absence in the **United States to National Electric Code, ANSI/NFPA No. 70-1990**, or latest edition; in **Canada, to Canadian Electrical Code Part 1, CSA Standard C22.1**.

□ Use copper wire not less than 14 gage for line voltage wiring. Hook up to a dedicated line with an on-off disconnect switch and a minimum 10 Amp breaker.

□ The frame of the burner should be well grounded. Normally the piping and/or electric conduit will provide sufficient grounding. However, a ground lug is located in control box used for positive grounding where insulated pipe couplings are used or where any doubt exists regarding grounding sufficiency.

□ Confirm that the polarity is correct—hot wire to strip terminal **L1**, neutral **L2**—and that the neutral line is not subject to induced low voltage (check **L2** to earth ground) from other equipment, as that can cause the electronic control to malfunction.

□ Each installation must include suitable limit control(s). Existing oil burner combination operating and limit controls are normally **NOT SUITABLE** for gas burner use.

⚠ CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

VI PIPING

⚠ CAUTION: The available gas pressure should be within the limits shown in **SPECIFICATIONS** section. Excessive pressure will damage Combination Valve, Regulator and manual valves. If the supply pressure exceeds the 14.0" W.C. maximum, a suitable intermediate main regulator must be installed ahead of the Main Manual Shut-Off Valve shown in Figure 5.

□ The burner gas supply piping should branch off from

the main line as close to the gas meter as possible. Do not connect to the bottom of a horizontal section. Use new black pipe and malleable fittings free of cutting and threading burrs or defects.

□ Provide a sediment trap, union and 1/8" pressure tap in piping close to burner as shown in Figure 5.

□ Use pipe joint compound approved for use with Liquid Petroleum Gases.

□ Piping must comply with local codes.

□ To obtain the maximum firing rate of 700 MBH, the NATURAL gas supply piping must be sized to provide a minimum of 5.0" W.C. pressure (11.0" W.C. PROPANE) to the inlet of the combination valve when the burner and all other gas utilization equipment are on.

⚠ CAUTION: Because it is difficult to accurately control pressure during supply pipe leak testing, it is recommended that all low pressure (14.0" W.C. max.) components, both main and pilot, be disconnected during testing. Exposing low pressure regulators and valves, including manual valves, to pressures over 1/2 PSIG (14" W.C.) will cause damage and void all warranties.

⚠ DANGER: Explosion hazard. Do not use oxygen for pressure testing. An explosion could occur during initial start-up.

□ If the burner piping must be rearranged because of space limitation, be sure to carry out the general arrangement shown in Figure 5. Install the combination valve in any position except up-side down.

□ When the burner is installed in jacketed equipment, it is recommended that the Combination Valve be left adjacent to the burner within the vestibule and the Main Manual Shut-Off Valve be installed outside.

NOTE: If there is more than 1.0" W.C. differential in the inlet pressure to the burner compared to when all other gas utilization equipment are off, refer to Section IX.

| PIPE SIZE | TYPE OF GAS | CAPACITY-MBHV | | | | |
|-----------|--------------------|----------------|-----|-----|-----|-----|
| | | LENGTH OF PIPE | | | | |
| | | 10 | 20 | 40 | 60 | 100 |
| 1 | NATURAL PROPANE | 500 | 350 | | | |
| | | 700 | 550 | 350 | 300 | |
| 1-1/4 | NATURAL PROPANE | | 700 | 500 | 400 | 300 |
| | | | | 700 | 600 | 450 |
| 1-1/2 | NATURAL PROPANE | | | 700 | 600 | 450 |
| | | | | | | 700 |
| 2 | NATURAL | | | | | 700 |

Source: Gas Engineers Handbook-1974
Industrial Press Inc. NY, NY

TABLE 1: Supply Pipe Capacities in MBHV

VII MAIN GAS SPUD SELECTION

Burners are approved for use with NATURAL or PROPANE gas and should be used only with the gas specified on the rating plate.

□ The gas input should be set at the heating rate determined by the building heat loss and/or heating plant survey, but not exceeding the rated maximum input of the heating appliance or burner.

□ F400B burners are shipped equipped for natural gas, with the spud removed. Compare the gas input required with the spud capacities shown in the spud table and, if necessary, install the spare spud (see Figure 7).

| NATURAL GAS | | | PROPANE GAS | | |
|--------------------------|-------------------------------|-------------------------------------|-----------------------------|-------------------------------|-------------------------------------|
| SPUD DRILL SIZE | BURNER INPUT MBH ¹ | MANIFOLD PRESSURE W.C. ² | SPUD DRILL SIZE | BURNER INPUT MBH ¹ | MANIFOLD PRESSURE W.C. ² |
| 25/64 (.390) | 300 400 | 2.0" 3.5" | #9 (.196) #3 (.213) | 300 350 | 10.0" |
| 7/16 ³ (.437) | 400 540 | 2.0" 4.0" | #1 (.228) 17/64 (.265) | 400 540 | |
| SPUD RE-MOVED | 540 625 700 | 1.85" 2.5" 3.2" | 9/32 (.281) 19/64 (.296) | 625 700 | |

DATA IS APPROXIMATE AND BASED ON "0" OVERFIRE PRESSURE AT SEA LEVEL OVERFIRE
TABLE 2: Spud Capacity and Preliminary Gas Settings

1. Input range of spud. Adjust the main regulator to vary the manifold gas pressure and burner input within the range shown for a specific spud drill size. With PROPANE, do not exceed 11.0" W.C. under any circumstances.
2. Approximate gas pressure at manifold gas pressure tap.
3. Drill out 25/64 spare spud to 7/16.

VIII INITIAL START-UP/ADJUSTMENT

⚠ WARNING: Ignition is automatic. Make spark observations into combustion chamber only with Main and Pilot Manual Shut-Off Valves closed. Confirm that gas utilization equipment does not contain any accumulated gases. Purge as described in step 3 below.

1. Check the burner piping and valves for gas leaks by applying a weak liquid soap solution to unions and joints with the gas supply on. Leakage will be indicated by the appearance of soap bubbles. Locate and correct all gas leaks before proceeding.

⚠ WARNING: DO NOT USE OPEN FLAME.

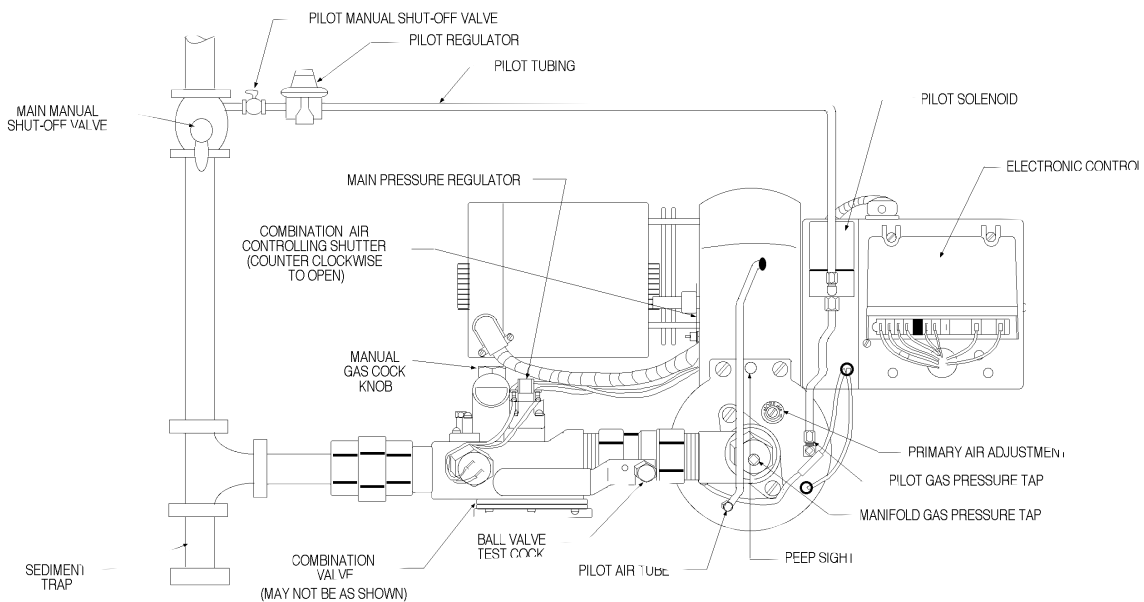
2. Purging the air from the gas supply line at this step will expedite first light-off.

IMPORTANT: Purge outside the building.

Do not purge into the gas utilization equipment.

3. To purge the gas utilization equipment and chimney of any accumulated gases, turn Manual Gas Cock Knob on Combination Valve to **OFF**, close Pilot Manual Shut-Off Valve, turn burner power on, and set operating control to **ON** or thermostat to call for heat. Let the blower run long enough to accomplish four air changes, but not less than five minutes.
4. **IMPORTANT: Make sure that the capacity range of the installed spud and the preliminary combustion air shutter setting are suitable for capacity rating of the gas utilization equipment. Refer to Section VII and Table 2.**
5. **RESET** the Electronic Control by setting the operating control to **OFF** or the thermostat below room temperature for at least 30 seconds. See Section XII.
6. Confirm that Main and Pilot Manual Shut-Off Valves are open. Turn Manual Gas Cock Knob on Combination Valve to **ON**.
7. Turn operating control to **ON** or set thermostat above room temperature. After a 30 second pre-purge, the pilot should ignite. Whenever the burner pilot fails to light during the 15-second ignition trial, or if the flame is lost during the burner run and is not re-established within 15 seconds after the pre-purge, the Electronic Control will shut off the Combination Valve and **LOCK OUT**. To **RESET** the Electronic Control for restart, de-energize the Electronic Control by setting the operating control to **OFF** or thermostat below room temperature for at least 30 seconds. If burner still fails to light, turn it off and repeat from step 5 above. Then if necessary, refer to the **TROUBLE CHART** to isolate the problem.

⚠ WARNING: Repeated unsuccessful attempts to light will result in accumulated gases in gas utilization equipment and chimney. To prevent these gases from reaching an explosive level, periodically purge the gas utilization equipment and chimney as described in step 3 above.



CONSTRUCTION MAY VARY BY BURNER APPLICATION REQUIREMENTS

FIGURE 5 Piping Connections

8. To make a preliminary setting of the burner input, determine the manifold gas pressure required from Table 2 and adjust the Combination Valve Main Gas Pressure Regulator accordingly. See Section XI.
9. To determine the firing rate for NATURAL gas, accurately time test dial for the number of seconds for one revolution and use the following formula. All other gas utilization equipment must be off.

$$\frac{3600 \times \text{test dial size} \times \text{BTU value}}{\text{No. of seconds for one rev. test dial}} = \text{BTU/Hr.}$$

Then divide by 1,000 for MBH value.

$$\text{Example: } \frac{3600 \times 1 \times 1000}{20} = 180,000 \text{ BTU/Hr.} = 180$$

For PROPANE gas, consult your supplier for method of determining firing rate.

10. Adjust combustion air shutter to provide a quiet, soft blue flame with well defined orange and yellow tips for NATURAL gas or with well defined yellow tips for PROPANE gas.
11. The combustion air adjustment which affects the flame length has been set wide open for average conditions. Decrease the combustion air if a longer, softer flame is desired.
12. Check the operation of the burner; start and stop it several times with the thermostat or operating control.
13. With the burner running, check the operation of all limit and associated controls.
14. PERFORM THE FOLLOWING FINAL ADJUSTMENTS for combustion and flue gas temperature. Take the flue gas samples and temperature immediately ahead of the draft control.
 - A. The flue gas temperature should be above 325°F but not exceeding 550°F. Excessive flue gas temperatures will result in low efficiencies. Low flue gas temperature may cause excessive condensation. Reset gas input if necessary to adjust stack temperature.
 - B. Make the final setting of the combustion air shutter by checking the flue gases with an **ORSAT** or similar combustion testing instrument. The carbon monoxide content should conform to local codes, or in their absence, to the level specified in the United States or Canadian Standard referenced on the front cover of this manual; and the carbon dioxide content should be approximately 9.5% for NATURAL and 12.1% for PROPANE, or within the limits prescribed by local codes.
15. Check the draft control to make sure there is no spillage of flue products into the room.
16. **FILL OUT THE INSTALLATION ADJUSTMENT DATA TAG** and affix to the burner or gas utilization equipment.

NOTE: For subsequent normal starting and shut off procedure, refer to **CONSUMER INSTRUCTIONS** or to the instruction plate mounted on the burner.

PART 2 SERVICE

⚠ CONSUMER CAUTION: Do not tamper with the unit or controls. If trouble occurs, contact a qualified Service Technician.

⚠ DANGER: Be sure that the Main and Pilot Manual Shut-Off Valves, Combination Valve and Burner Power Switch are turned OFF before removing any parts for service.

⚠ WARNING: All cover plates, enclosed and guards must be in place at all times except during maintenance and servicing.

IX PILOT

The pilot is of the premix, blast type. The full force of blower air is brought into the mixing tube where the proper amount of gas is added through the pilot orifice. This mixture is discharged through the pilot which contains a perforated flame retention plate. The outer holes diverge to spray the mixture against the side wall of the pilot tip to provide flame retention. The mixture through the center port provides the flame that contacts the flame detection rod and also ignites the main gas.

- Surrounding the base of the pilot flame is a conical shroud which protects the flame against extraneous air currents and inhibits "blow-off" from an overly rich flame.
- The pilot gas orifice is the same size both for NATURAL and PROPANE gas, consequently the gas pressure required for PROPANE is lower than that required for NATURAL gas.

⚠ CAUTION: Do not indiscriminately increase pilot orifice size. Pilot troubles are rarely cured in this manner and new troubles may be created.

- Under normal conditions, with a slight negative pressure in the combustion chamber, pilot operating pressures are 3.5" W.C. NATURAL gas and 2.25" W.C. PROPANE.
- Some conditions which may require a change from the normal setting include: extremely long tubing connections between the regulator and pilot solenoid, high negative or positive combustion chamber pressure, actual air shutter setting and altitude extremes.
- Do not subject the Pilot Solenoid or Pilot Regulator to an inlet pressure over 14.0" W.C. See section VI PIPING for high pressure gas. Note that the standard pilot pressure regulator is not a tight shut-off and, during standby, the outlet pressure will build up to the full inlet pressure.
- The spark rod is located on the center line of the pilot and is positioned so the high tension voltage will arc to the inside of the center port of the retention plate (see Figure 7).
- The flame rod must be positioned as shown in Figure 7 so that the electronic control will detect a proper flame. Note that it is slightly above the centerline of the pilot.
- Both the spark and flame rods are current carrying conductors and, along with their connecting wires, must be kept free of contact with conductive metal parts of the burner. Rod insulators and wire insulators should be clean, dry and free of cracks.
- Rods are made from heat resistant alloys and can be expected to have a long service life. They should be routinely inspected, however, for corrosion or loss of metal.
- The pilot air tube must be kept free of kinks or inside obstructions and its inlet end must be positioned per Figure 7, otherwise air flow could be reduced sufficiently and adversely affect the pilot flame.

| | NOMINAL BTU/Cu. Ft. | |
|--------------------|-----------------------------|-----------------|
| | NATURAL-1000 | PROPANE-2500 |
| PILOT GAS PRESSURE | 2.5"-4.0" W.C. | 2.25"-3.5" W.C. |
| ORIFICE DIAMETER | #55 WIRE DRILL .052 DIA. | |
| APPROX. CAPACITY | 7000 | |

TABLE 3: Pilot Specifications

X MOTOR, BLOWER INTERLOCK & CENTRIFUGAL ACTUATOR

NOTE: BEFORE SERVICING, mark with a scribe line or measure opening of primary air controlling shutter, so that it can be reset to its original position following servicing.

□ Cleaning of the blower wheel is usually the only service required. Need for cleaning is indicated if the character of the flame indicates a deficiency of air. Motor cooling air vents if present should also be cleaned at this time.

□ The blower side plate, motor and wheel are removed as an assembly. Disconnect the motor wires from the motor terminal strip. Disconnect the motor conduit from the motor and remove the side plate screws.

□ The blower wheel is equipped with a spring loaded centrifugal actuator to operate an electrical interlock switch so as to prevent the burner from firing if the blower wheel is not running at its operating speed. When the motor is off, the actuator spring forces the disk against the switch plunger to push it past its operating point. When running, the actuator pulls the disk clear of the plunger.

□ To make a specific test of the interlock circuit:

1. Turn burner power **OFF**.
2. Turn Manual Gas Cock Knob on Combination Valve to **OFF**.
3. Disconnect the motor wire from the motor relay to keep the motor off.
4. Turn burner power **ON** and set the operating control to **ON** or thermostat to call for heat. Check for 24V between the Electronic Control **25V** and **25V GND** terminals.
 - A. No voltage: Interlock circuit OK.
 - B. Voltage present: check that switch bracket is screwed down tight (see Figure 6). If so, without disconnecting switch wires, remove switch bracket and manually depress switch plunger. If voltage is still present, or if the plunger has to be depressed to where dimension "A" of Figure 6 is less than 9/32" when switch clicks over, replace the switch.
5. If the switch tests OK, check dimension "A" of Figure 6 as follows:
 - Switch plunger free.....9/32 to 11/32"
 - Disk free.....7/32 to 1/4"
 - Disk held all the way in.....15/32" min.
6. If plunger dimension is wrong, replace switch. If disc dimension is wrong, check that the actuator operates freely with a minimum movement of 1/4" from the free position. If movement is OK, reposition blower wheel on motor shaft. If not, replace wheel.

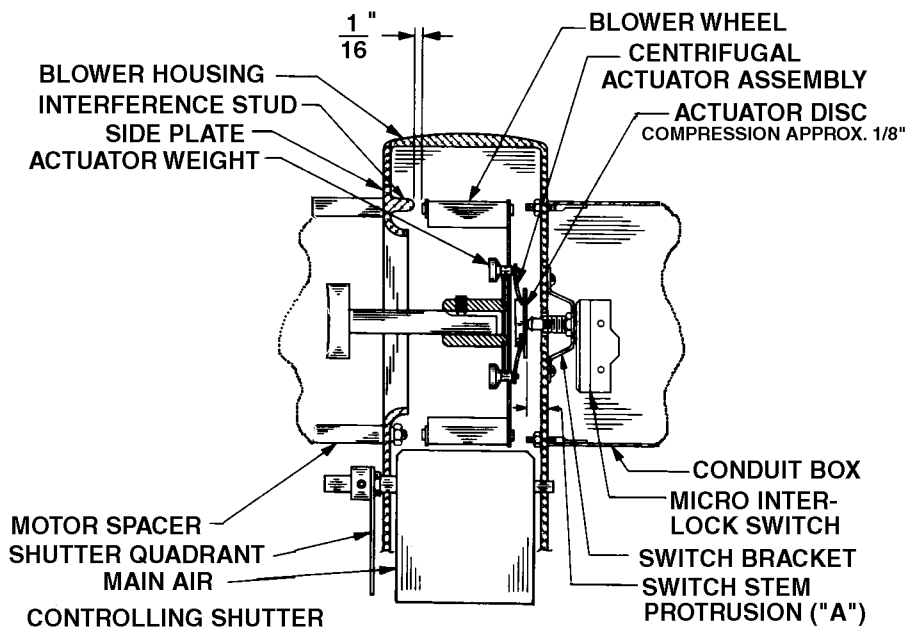


FIGURE 6 Motor, Blower and Interlock Assembly

XI REDUNDANT COMBINATION GAS VALVE

The Combination Valve contains a Manual Gas Shut-Off, Main Gas Pressure Regulator, and Automatic Electric Main Gas Valve.

- The Combination Gas Valve is suitable for a maximum pressure of 14.0" W.C.
- When the gas supply pressure is over 14.0" W.C., special regulators are required. See Section VI Piping.
- Should replacement or service be required, valve manufacturer's instructions must be followed as outlined in their information sheet.
- The Main Gas Pressure Regulator is adjustable for outlet pressure range of 2.0" W.C. to 5.0" W.C.
- Outlet pressure settings must be checked while the gas is flowing.
- To adjust outlet pressure, remove the seal cap for access to the adjusting screw. Turning the screw clockwise will increase outlet pressure, counter clockwise will decrease outlet pressure.

XII S8680J ELECTRONIC CONTROL

- For operation characteristics refer to Honeywell Control literature provided with burner.

XIII SPECIAL EQUIPMENT (OEM VERSIONS)

Special equipment, either factory or contractor installed, may cause variation in the procedures and descriptions given in this manual.

Consult the OEM's manual to identify the differences in the information.

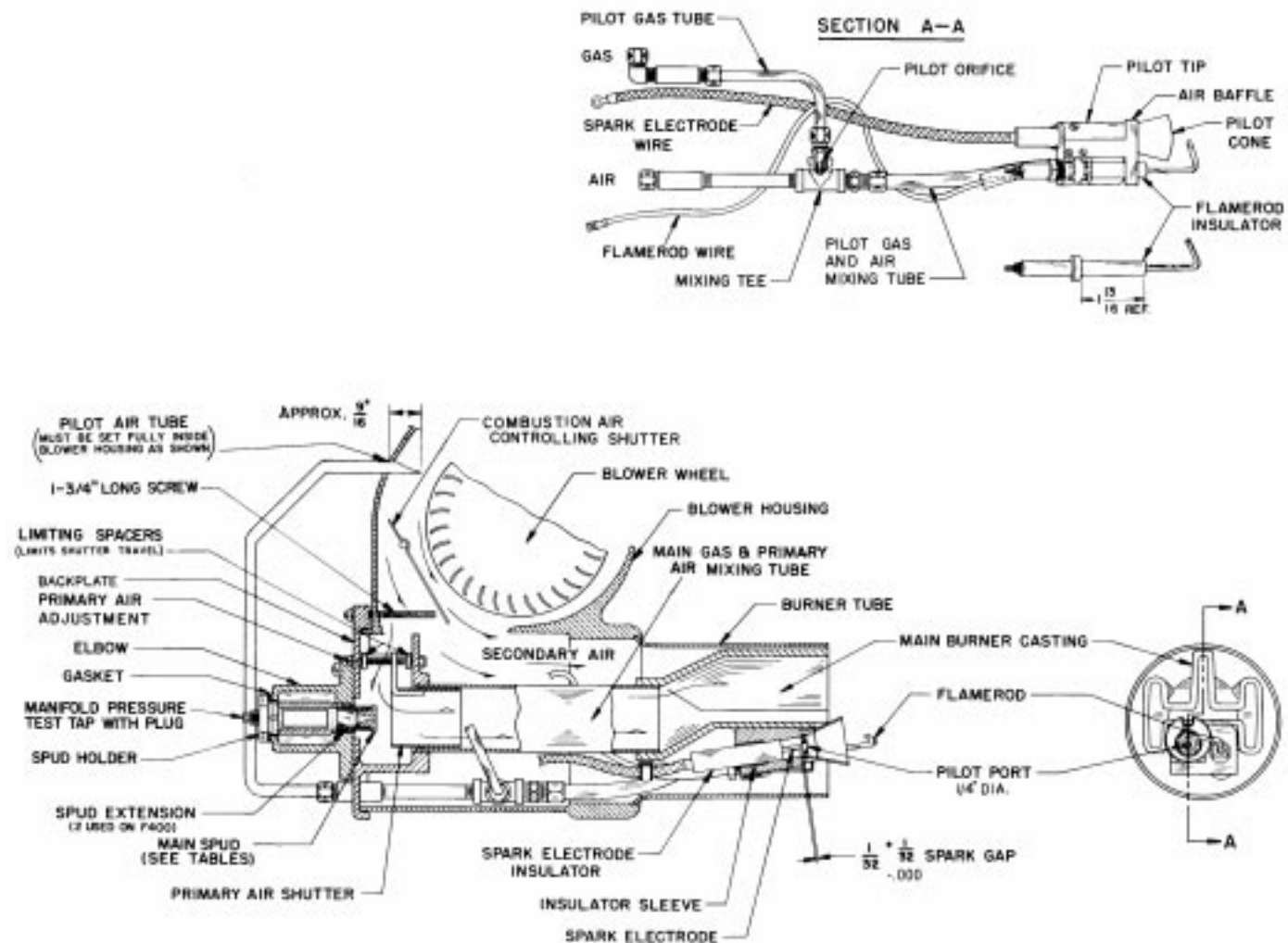


FIGURE 7 General Assembly

CONSUMER INSTRUCTIONS

MAINTENANCE

□ Keep the area around the burner clear and free of combustible material, gasoline or other flammable liquids or vapors. Do not obstruct burner air openings or ventilation grilles for combustion air.

□ The motor features permanently lubricated ball bearings and requires no routing oiling maintenance.

⚠ CAUTION: Check the burner flame periodically. A proper NATURAL gas flame will appear blue at the burner face with orange and yellow tips. A proper PROPANE gas flame will appear blue at the burner face with yellow tips. An improper flame which is too lean will appear short and all blue or purple. Burner cleaning and/or readjustment may be indicated by flames that are too rich or too lean.

⚠ WARNING: If any flame is observed when the burner is on standby, or if the ignition spark or valve operator is heard to come on before the motor reaches operating speed, immediately turn off the manual gas control and burner power. A dangerous condition has developed and must be corrected. CONTACT A QUALIFIED SERVICE TECHNICIAN FOR CLEANING, READJUSTMENT OR REPAIR.

□ Check that the pilot ignition spark does not come on before the motor reaches operating speed. If it does, the motor interlock switch is defective and must be replaced. (See Section X, Motor, Blower Interlock and Centrifugal Actuator).

⚠ WARNING: IF PROPANE GAS IS USED AND THE BURNER IS LOCATED IN A BASEMENT, CRAWL SPACE OR CONFINING SPACE, CONTACT YOUR GAS SUPPLIER ABOUT INSTALLING A "GAS LEAK" WARNING DEVICE. PROPANE GAS IS HEAVIER THAN AIR AND CAN SETTLE IN LOW AREAS OR CONFINED SPACES. THIS WOULD CREATE A DANGER OF EXPLOSION OR FIRE. IF YOU SUSPECT A GAS LEAK, FOLLOW INSTRUCTIONS ON FRONT COVER OF THIS MANUAL.

LIGHTING INSTRUCTIONS

See Figure 7.

1. SET OPERATING CONTROL TO **OFF** OR THERMOSTAT BELOW ROOM TEMPERATURE.
2. TURN MANUAL GAS COCK KNOB ON COMBINATION VALVE TO **ON**.
3. TURN BURNER POWER ON.
4. SET OPERATING CONTROL TO ON OR THERMOSTAT TO CALL FOR HEAT.
5. IF THE PILOT FLAME IS NOT PROVEN WITHIN 15 SECONDS THE ELECTRONIC CONTROL WILL SHUT OFF COMBINATION VALVE AND LOCK OUT. IF THE PROOF OF FLAME IS LOST DURING BURNER RUN AND THE PILOT IS NOT REESTABLISHED WITHIN 15 SECONDS AFTER 30-SECOND PRE-PURGE, THE ELECTRONIC CONTROL WILL SHUT OFF COMBINATION VALVE AND LOCKOUT. TO RESET FOR RESTART, DE-ENERGIZE THE CONTROL BY SETTING THE OPERATING CONTROL TO **OFF** OR THERMOSTAT BELOW ROOM TEMPERATURE FOR AT LEAST 60 SECONDS.
6. REPEAT STEP 4 FOR RESTART.

TO SHUT OFF

1. TURN MANUAL GAS COCK KNOB ON COMBINATION VALVE TO **OFF**.
2. TURN BURNER POWER **OFF**.

SHOULD OVERHEATING OF THE APPLIANCE OCCUR

1. Shut off the manual gas control to the appliance.
2. Do not shut off the control switch to the pump or blower.

TROUBLE CHART

Make sure the thermostat and operating controls are calling for heat. Defective wiring or loose connections can simulate the component defects outlined below. Check associated wiring before replacing a component.

ELECTRICAL AND FLAME CHECKS MUST BE MADE IN THE ORDER LISTED BELOW.

I. MOTOR WILL NOT RUN

- A. Confirm 120V between strip terminals **L1** and **L2** and verify the circuit polarity and electrical ground between strip terminal **L1** and burner Ground.
- B. Check for 120V between strip terminals **L1** and **L2**.
 1. No voltage, open circuit in operating controls.
 2. No voltage, motor relay is defective.
 3. Voltage present, motor is defective.

II. MOTOR RUNS CONTINUOUSLY, BUT NO FLAME

- A. Confirm that both Main Manual Shut-Off and Combination Gas Shut-Off Valves are in the **ON** position.
- B. After 30 second pre-purge, if the pilot flame is not proven within 15 seconds, or if the proof of flame is lost during the burner run and the pilot is not re-established within 15 seconds, the Electronic Control will **lock out**. To reset the control for restart, de-energize the Electronic Control by setting the operating control to **OFF** or thermostat below room temperature for at least 60 seconds.
- C. Clogged pilot orifice.
- D. Pilot regulator misadjusted or defective.
- E. Defective spark electrode or ignition control.
- F. Defective high tension wire.
- G. Wrong pilot orifice.
- H. Defective pilot valve.
- I. Pilot air tube clogged.
- J. Incorrect spark gap.
- K. Pilot regulator vent clogged.

III. MOTOR RUNS, PILOT WILL NOT LIGHT, FLAME SAFEGUARD REMAINS "SET".

- A. Defective centrifugal actuator.
- B. Defective blower interlock switch.
- C. Slow motor.
- D. Defective ignition control.

IV. PILOT LIGHTS, NO MAIN FLAME, RELAY LOCKS OUT

- A. Poor pilot flame adjustment.
- B. Clogged pilot air tube.
- C. Defective flame rod or wire.
- D. Flame rod mislocated.
- E. Spark interference.
- F. Pilot regulator vent clogged.
- G. Defective ignition control.

V. PILOT LIGHTS, NO MAIN FLAME, RELAY REMAINS "SET".

- A. Defective main gas valve.
- B. Closed leak test cock.
- C. Low gas pressure.
- D. Grossly misadjusted main gas and air.
- E. Defective ignition control.

VI. SPASMODIC START

- A. Loose wiring.

*Normal Low Voltage: Burner on standby-24V min.

Burner running (Main Gas Valve energized)-21V min.