

# INSTALLATION INSTRUCTIONS & PARTS LIST OIL FIRED UNIT HEATERS

MODELS: QVOF (50, 84, 100, 140, 180, 250)

**ATTENTION: READ THIS MANUAL AND ALL LABELS ATTACHED TO THE UNIT CAREFULLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE THESE UNITS! CHECK UNIT DATA PLATE FOR ELECTRICAL SPECIFICATIONS AND MAKE CERTAIN THAT THESE AGREE WITH THOSE AT POINT OF INSTALLATION. RECORD THE UNIT MODEL AND SERIAL No.(s) IN THE SPACE PROVIDED. RETAIN FOR FUTURE REFERENCE.**

Model No. \_\_\_\_\_ Serial No. \_\_\_\_\_

## FOR YOUR SAFETY

The use and storage of gasoline or other flammable vapors and liquids in open containers in the vicinity of this appliance is hazardous.

**WARNING: Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.**

**WARNING: Install, operate and maintain unit in accordance with manufacturer's instructions to avoid exposure to fuel substances or substances from incomplete combustion which can cause death or serious illness. The state of California has determined that these substances may cause cancer, birth defects, or other reproductive harm.**

## INSTALLER'S RESPONSIBILITY

**Installer Please Note:** This equipment has been test fired and inspected. It has been shipped free from defects from our factory. However, during shipment and installation, problems such as loose wires, leaks or loose fasteners may occur. **It is the installer's responsibility to inspect and correct any problems that may be found.**

## RECEIVING INSTRUCTIONS


Inspect shipment immediately when received to determine if any damage has occurred to the unit during shipment. After the unit has been uncrated, check for any visible damage to the unit. If any damage is found, the consignee should sign the bill of lading indicating such damage and immediately file claim for damage with the transportation company.



HVAC EQUIPMENT

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 A MESTEK COMPANY

Sterling oil powered Unit Heaters are shipped in a heavy duty reinforced corrugated shipping crate. Upon receiving your unit, a careful inspection of this crate should be made to ascertain if there is any damage either external or concealed.

All Unit Heaters come completely assembled and wired.

## GENERAL INFORMATION

Oil Fired Unit heaters are designed to be suspended. However, they can be installed on approved fire-resistive slabs or supports having no combustible material against the underside of the unit. Other clearances to combustible sources should be not less than 6" from sides and top and 18" from flue pipe in any direction. When suspending the unit from a ceiling, an allowance of 18" from the top of the unit should be made to accommodate a barometric draft regulator.

Unit Heaters should not be subjected to negative pressures (drafts) created by room or building exhaust fans. Sufficient air for combustion is an important consideration.

Special attention must be given to those installations, such as service stations and warehouses, where the units have short stacks since the draft may not be adequate.

When the vertical distance from the fuel supply tanks to the fuel unit on the burner is more than 15 feet, or when a multiple installation is required, the fuel system should include a boost pump. See Figure 2.

## INSTALLATION PROCEDURE

### 1 – HANGING OF UNIT

Welded to the top of the heat exchanger at each corner is a 3/4" pipe coupling which will accommodate a standard 3/4" pipe nipple. There are many ways the suspension of a unit can be accomplished. However, care should be taken to be sure the supporting beams or girders are of ample strength to support the weight of the unit. It is good practice to distribute the weight over several girders rather than depending on one.

### 2 – WIRING

As this is a prewired unit, all controls, with the exception of the thermostat are mounted and wired. 115 volt service to utility box on unit heater is required. Unit should be fused independent of other fixtures, equipment, etc. There is a service switch on the unit. An additional switch should be provided at the room or building entrance.

The thermostat should be mounted away from the blower air stream on an inside wall or partition approximately 5 feet above the floor.

### 3 – FUEL OIL PIPING

#### a) Gravity Systems

Gravity systems where fuel supply is on the same level as unit, require one line from tank to burner. This should be 1/2" or 3/8" O.D. tubing or 3/8" iron pipe according to local codes. There should be a hard seat globe valve at tank. A Main line oil filter should be installed immediately after valve. Another valve, either hard seat globe or heat responsive, should be installed at burner. Local codes must be adhered to.

#### b) Lift Systems

Lift systems where fuel supply tank is below unit, require a two-pipe system. See Figure 1.

Suction and return lines should originate no less than 2" nor more than 4" from bottom of fuel tank. If code permits, 1/2" O.D. soft tubing should be used. A double-tapped bushing should be used in tapping of tank with a slip connector so that both lines are continuous from bottom of tank to inside of building.

A good quality ball check valve should be in the suction line immediately inside of building.

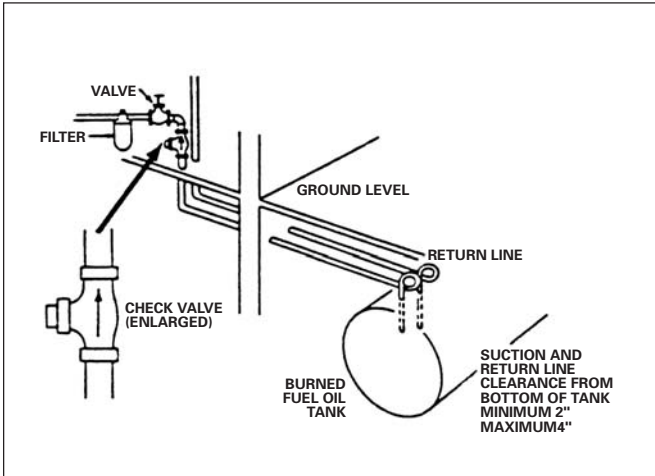
Care should be exercised in installing lines in tank so that they do not curl up inside of tank.

Lines should continue to burner either as copper tubing or black pipe, depending on local codes, and should be run straight and direct, eliminating need for bends or elbows as much as possible. Lines should be securely fastened to eliminate vibration and/or sagging.

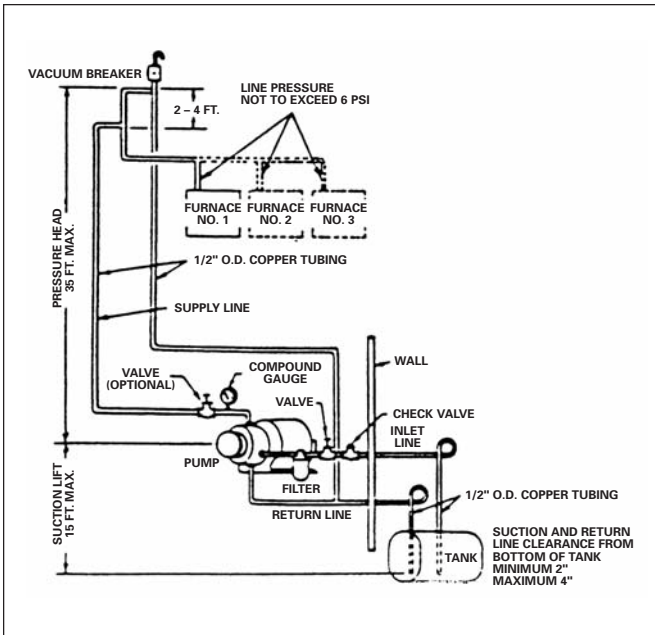
Be sure bypass plug is installed in proper place, tightly secured. See instruction sheet attached to pump for more detail. On all connections, use oil resistant joint compound. Either hard seat globe valve or heat responsive valve (Fromatic or equal), depending on code, should be installed in suction line as close to pump as practicable.

A boost pump should be used on multiple unit heater installations, or where an installation has more than a 15 foot lift (measured from the suction line in fuel tank to the fuel unit on the burner). See Figure 2

**Figure 1 - Fuel Oil Piping.**

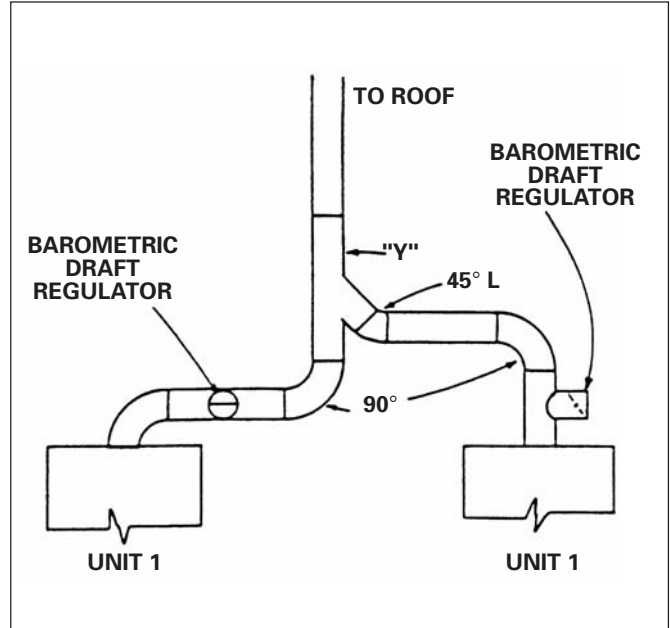


**Figure 2 - Piping Overhead System**



**NOTE: When two units are connected to a common chimney, they should be connected as shown in Figure 3.**

**Figure 3**



**4 – FLUE CONNECTIONS**

Connect flue pipe to chimney. If chimney is masonry type, be sure base is clean of debris and that opening through tile is at least as large as flue pipe (see specification sheet).

Chimney, either masonry or pre-fab, should be in accordance with local requirements. The flue gas exit of a chimney shall be at least 3 feet above the highest point where the chimney passes through the roof of a building, and at least 2 feet higher than any portion of a building within 10 feet of the chimney. Chimney should not be connected to an open fireplace, but could serve two heating units.

Barometric draft regulator should be installed in flue pipe, Regulator should be installed in run of flue pipe, either horizontal or vertical. It is poor practice to install in a tee that is substituted for an elbow as this has a tendency to puff odors out of regulator on starts.

Special attention must be given to those installations such as service stations and warehouses where units are suspended at ceiling level. Because of the height restrictions on the chimney, draft is not adequate. Available for these installations is a draft inducer and prover at additional cost.

## **5 – FAN AND LIMIT CONTROL SETTING**

A good rule to follow is to use lowest limit setting that will assure enough heat and use lowest fan settings that will not circulate cool air before fan stops.

The recommended setting is: Limit 200 degrees, fan on 130 degrees; fan off 90 degrees.

## **6 – STARTING AND TESTING OF UNIT**

Before starting burner, it is advisable to remove nozzle assembly and check nozzle size (see nozzle specifications label on unit) and setting of electrodes. Put 5 to 10 drops of good quality SAE 20 motor oil (Havoline) in the oil cups at each end of the motor. Repeat oiling of motor at the start and mid-point of each heating season.

The burner is equipped with a cadmium sulfide flame detector that is located in the base plate of ignition transformer and is accessible by moving the transformer to a position normally required for the removal of the ignition assembly. If new installation, make sure fuel tank has been filled. Insert a fuse in fuse block. Set thermostat a minimum of 2 degrees above room temperature.

It is important that the installation be checked for safety shutdown in the event a malfunction of equipment occurs. There are several ways this can be accomplished. We recommend one of the following:

- a. Before opening oil valve and priming fuel unit, turn on switch. Burner should, but because of no fuel, combustion will not be established. Burner should operate the prescribed time, depending on the primary control, and then go off on "safety". If burner does not start, check reset of primary, thermal cutout on burner motor, or fuse.
- b. After priming fuel unit (see following paragraph) and establishing combustion, disconnect motor lead from orange wire of primary and turn switch on. Primary control should be energized and remain so the prescribed time, depending on primary, and then go on "safety". After completion of test reconnect motor lead to orange wire.

## **7 – TO PRIME FUEL UNIT**

Place a can under valve of fuel unit and open bleed valve one-quarter turn. Make certain all fuel oil valves to burner are open. Push reset on primary control. Turn on switch to burner. Operate burner until a good stream of fuel, free from bubbles and foam, flows from bleed valve. Close bleed valve and combustion should occur. If primary goes "safety" before fuel unit is completely purged, wait approximately four minutes, RESET PRIMARY CONTROL AND CONTINUE PRIMING UNTIL COMBUSTION IS ESTABLISHED.

## **8 – FINAL ADJUSTING AND TESTING**

Punch or drill a hole in flue pipe as close to unit as possible large enough to accommodate the probes of the instruments (1/4").

Using the draft gauge, adjust barometric draft regulator to establish a maximum of minus .04 inches of draft in flue pipe. It is desirable to operate with minimum draft required to remove products of combustion; however, unit should not operate with draft in flue pipe below minus .02 inches. Failure to obtain these readings indicate a need for a draft inducer.

Using the Smoke Tester, adjust "fine" air shutter of burner (see burner specifications sheet) to effect a 0+ reading on smoke scale. If this is not possible, open bulk air band to No. 1 setting on scale on burner housing and reset "fined" adjustment. Continue the procedure until recommended reading is obtained remembering final adjustment should be made with fine tuning air shutter.

Using the CO<sub>2</sub> Tester, analyze the flue gas. CO<sub>2</sub> should be a minimum of 8 percent. Determine the gross stack temperature using the Stack Thermometer. Net stack temperature (flue gas temperature minus room temperature) should be less than 600 degrees F.

If the recommended CO<sub>2</sub> or smoke readings cannot be obtained, check the fuel nozzle pressure, and flue draft. Recheck fuel nozzle for proper type (refer to nozzle specification label on unit).

Installation is now complete. Fill out warranty card and mail to register your warranty.

# RECOMMENDED OIL SUPPLY SYSTEMS

## BOOSTER PUMP

### SETTING PRESSURE AND BLEEDING FIGURES 4 AND 5

1. Stop all burner pumps.
2. Start boost pump manually
3. Set boost pump pressure so that gauge in first burner manifold reads not more than 10 P.S.I.
4. Bleed air from first burner pump by loosening unused inlet plug; bleed other units downstream the same way.
5. Bleed manifold by loosening pipe cap (Figure 4).
6. For automatic operation, place switch on OFF.

### Boost Pump Maximum Inlet Line (Ft.) For Figures 4 & 5

| Height | 0-7' | 10' | 13' | 15' |
|--------|------|-----|-----|-----|
| 30 GPH | 100' | 80' | 63' | 52' |
| 50 GPH | 60'  | 53' | 41' | 34' |

Operation is extremely simple. Pressure developed by oil burner fuel unit closes low-voltage switch connected to it. This causes switch relay to energize boost pump motor, which starts and stop automatically with burner. For initial start-up, switch relay may be held "in" manually. Or a manual ON/OFF switch can be connected across low-voltage wires leading from switch relay to pressure switch. With manual switch in "ON" position, boost pump runs continuously.

**NOTE: Check all burners for normal start and fuel units for stable atomizing pressure. Then open boost pump switch for automatic operation upon burner demand.**

Systems in Figures 4 and 5 will be in constant operation when low-voltage switches are not used.

**NOTE: Installations in figures 4 and 5 can be either Intermittent or Constant operation.**

**CAUTION: When 2' riser cannot be maintained, use pressurized system in Figure 4.**

Manifold and feeder lines must be run in a horizontal plane and elevated above fuel unit intakes. At furnace locations, extend feeder lines downward to fuel unit intakes.

Install in accordance with National Board of Fire Underwriters and local ordinances where applicable.

Figure 4 - Pressurized System

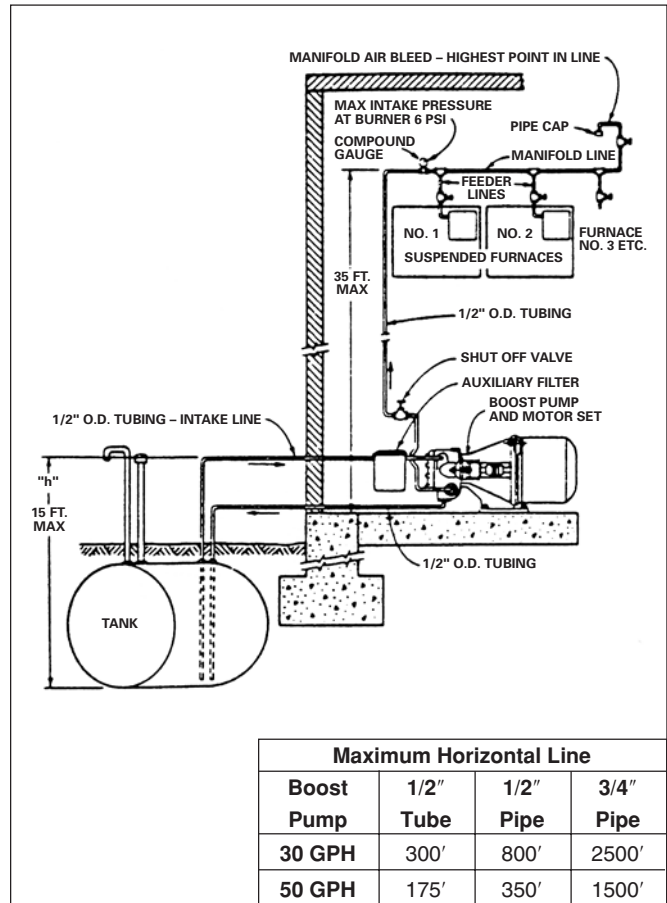
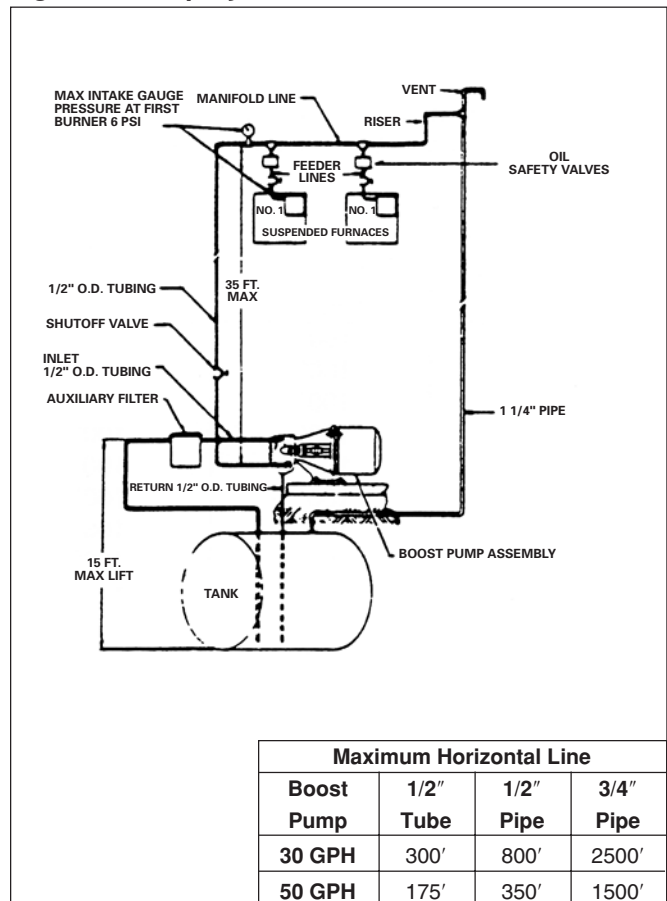


Figure 5 - Loop System



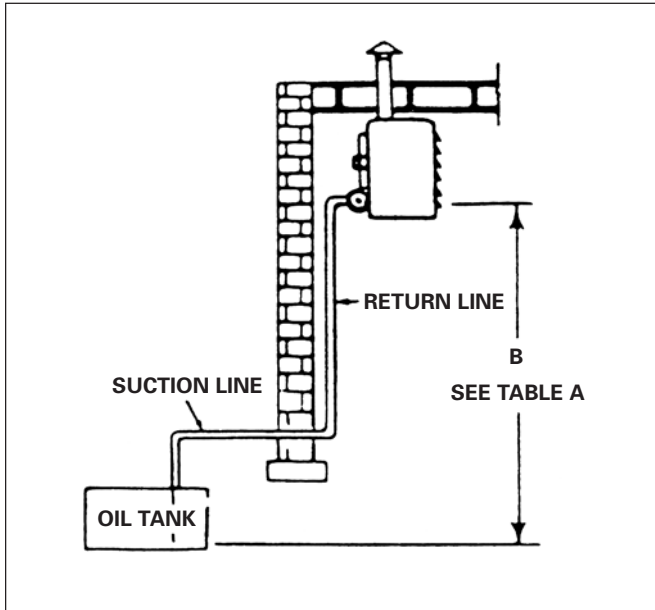
# RECOMMENDED OIL SUPPLY SYSTEMS

## 2 PIPE SYSTEM

Separated suction oil line must be used for second unit. Return oil lines can be twinned together.

Correct line size for two pipe installation 1/2" O.D. tubing.

Figure 6



Maximum allowable length of either intake or return line in feet, including horizontal and vertical run.

Maximum line lengths shown above are calculated for No. 2 oil at 60° and 3450 RPM pump speed.

Table A  
"Lift" Installation Values

| Distance "B"<br>Lift | Single Stage | Two Stage |
|----------------------|--------------|-----------|
| 0'                   | 100'         | 100'      |
| 1'                   | 100'         | 100'      |
| 2'                   | 100'         | 100'      |
| 3'                   | 100'         | 100'      |
| 4'                   | 100'         | 100'      |
| 5'                   | 100'         | 100'      |
| 6'                   | 100'         | 100'      |
| 7'                   | 99'          | 100'      |
| 8'                   | 83'          | 100'      |
| 9'                   | 68'          | 100'      |
| 10'                  | 52'          | 100'      |
| 11'                  | 42'          | 100'      |
| 12'                  | 25'          | 100'      |
| 13'                  | —            | 100'      |
| 14'                  | —            | 100'      |
| 15'                  | —            | 100'      |

# WIRING

Figure 7

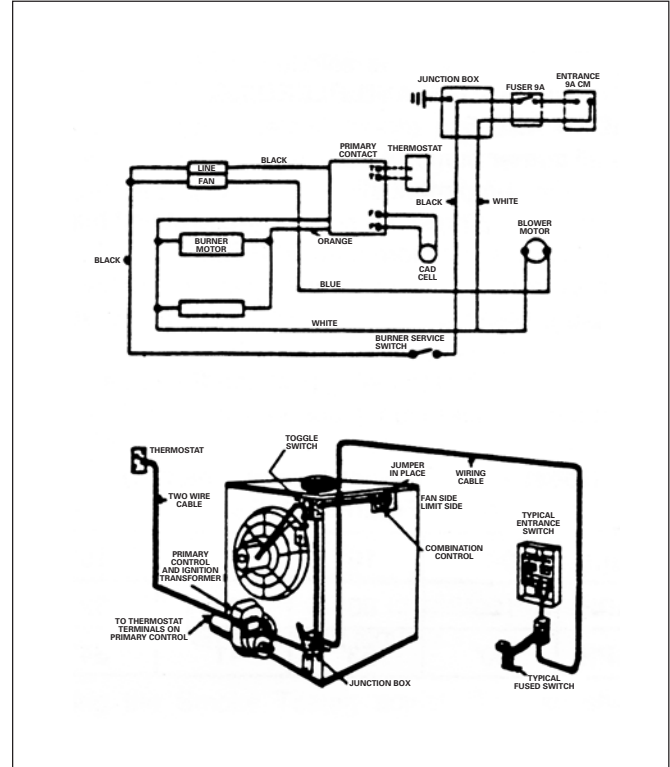
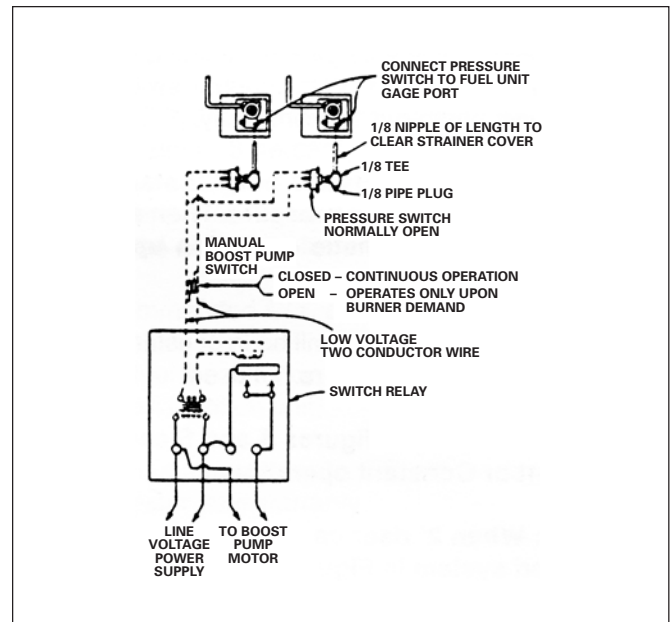


Figure 8 - Intermittent Operation



**NOTES:**



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