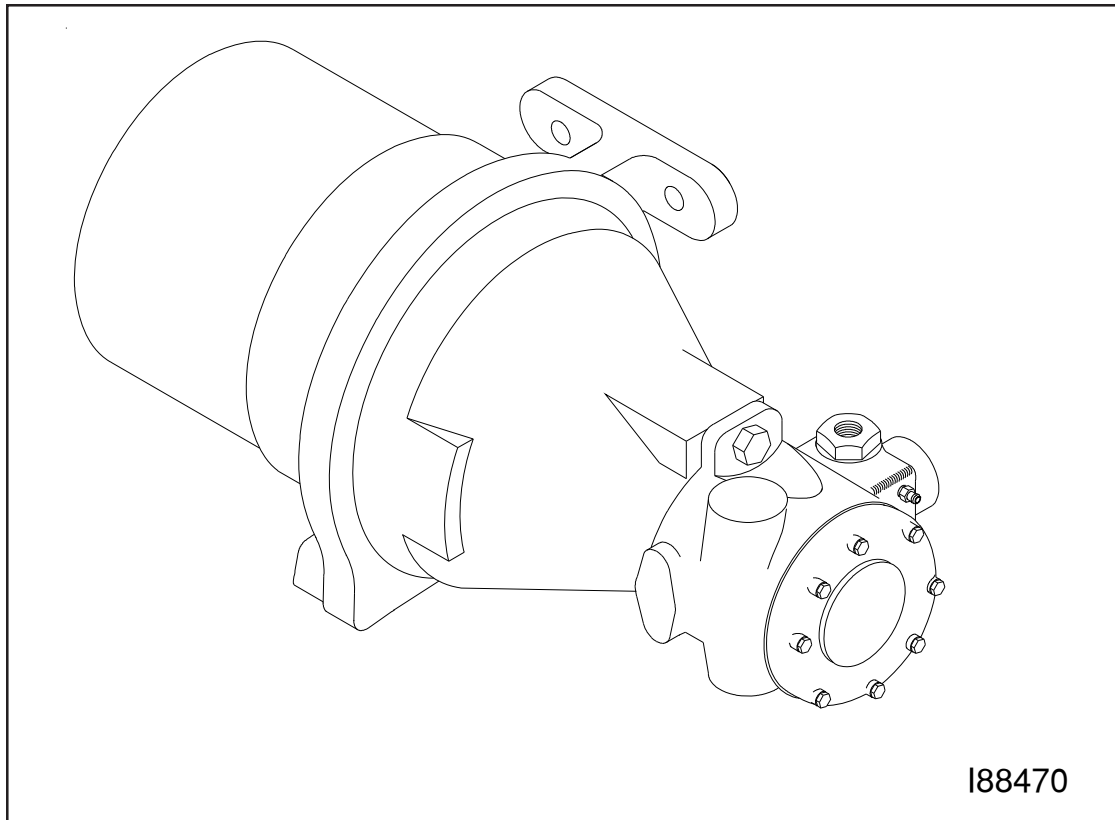




# INSTALLER'S MANUAL

## CLEAN BURN MODEL: J-PUMP

Oil Pump for Clean Burn Furnace/Boiler Models:  
CB-1750, CB-2500, CB-3250, CB-3500, CB-5000  
CB-200-CTB, CB-350-CTB, CB-500-CTB



**PUBLICATION DATE: 9/1/10, Rev. 6**

**CLEAN BURN PART # 43187**



**CAUTION:** This manual provides information for the installation of the J-Pump and replaces information in the Furnace/Boiler Operator's Manual concerning pump installation and burner start-up and adjustment. Note that the installation of the J-pump differs from the installation of a metering pump; following these instructions is critical for the safe and proper installation and operation of your Clean Burn equipment. Keep this manual with your Furnace/Boiler Operator's Manual for future reference.

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## INSTALLING THE J-PUMP

### Guidelines for Oil Pump Installation

Before proceeding with the installation of the J-pump, review the following guidelines for safe and proper tank/pump installation and operation:

- Important information relating to oil tank and pump installation is provided in your **Clean Burn Equipment Operator's Manual** and must be reviewed in conjunction with the following guidelines prior to proceeding with J-pump installation:
  - **Sections 1 and 4** in the equipment Operator's Manual contain important **safety information** relating to safe and proper system installation.
  - Review the **Typical Installation Diagram(s)** provided at the **beginning of Section 4** in the equipment Operator's Manual for important system specifications relating to the placement of the oil tank, oil line sizes and positioning and clearances from combustibles.
- Study the specifications for J-pump installation provided in Figures 1,2,and 3 on the following pages in this manual.
- Mount the J-pump inside the building to protect it from weather/exposure. Install the pump in a location where it can be easily primed and serviced. Its location must be protected from water and combustible fumes. **DO NOT** mount the pump in a basement or on the floor.
- The oil pump can *push* the oil much further than it can suck the oil. It is therefore very important that the pump be positioned as close to the oil tank as possible.
- Position the pump to minimize the height of the suction oil line (i.e. the oil line from the pump to the tank). **DO NOT exceed a maximum vertical suction line lift of 10 feet (or 10" of vacuum)**, or your pump will not operate correctly.
- The oil pump requires a single oil line. **DO NOT** install a return line to the tank unless instructed to do so by your Clean Burn dealer.
- Mount the pump above the highest oil level in the tank, so the pump is suction fed, *not* gravity or pressure fed.  
**ATTENTION:** Oil pressure at the pump inlet may not exceed 3 psi. Refer to NFPA-31.

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### Installing the J-Pump

1. Refer to Figures 1,2, and 3 for J-pump installation specifications; assemble the required tools and materials for the installation.
2. Position and mount the pump as specified in Figures 1,2 and 3.
3. When pump mounting is complete, proceed to the following procedures for the installation of the oil lines and related components (provided in this manual).

## Installing the J-Pump (continued)

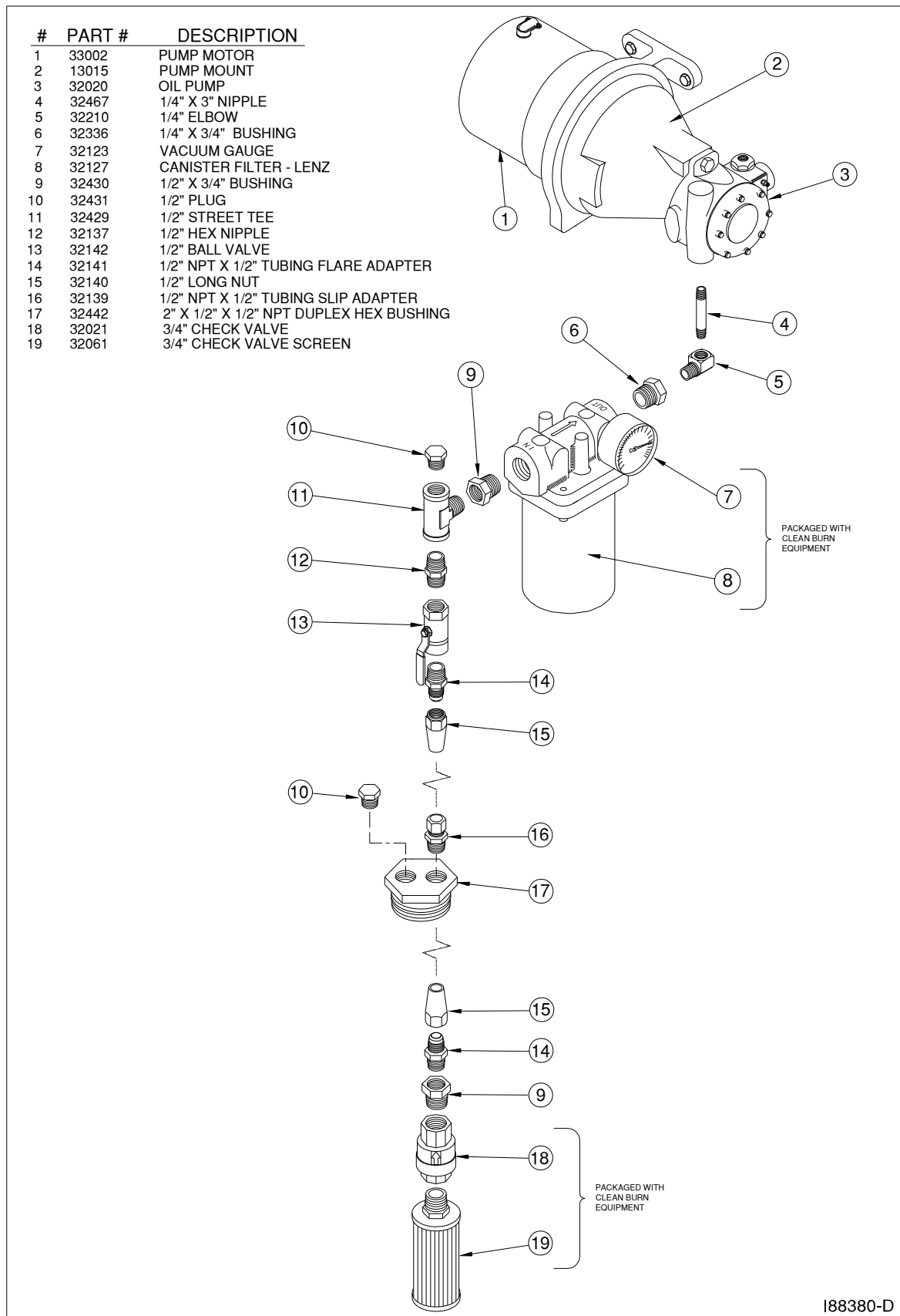
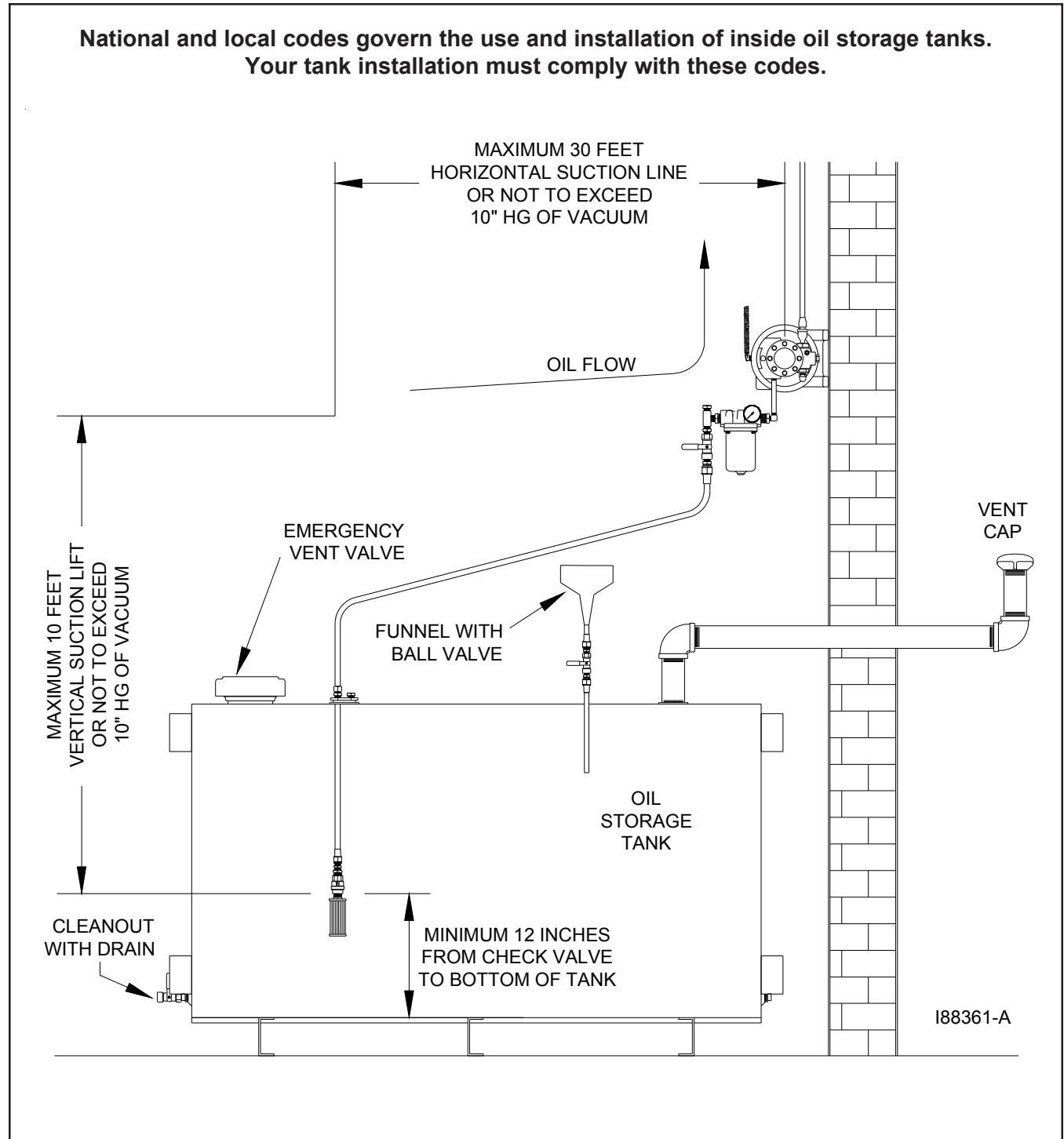


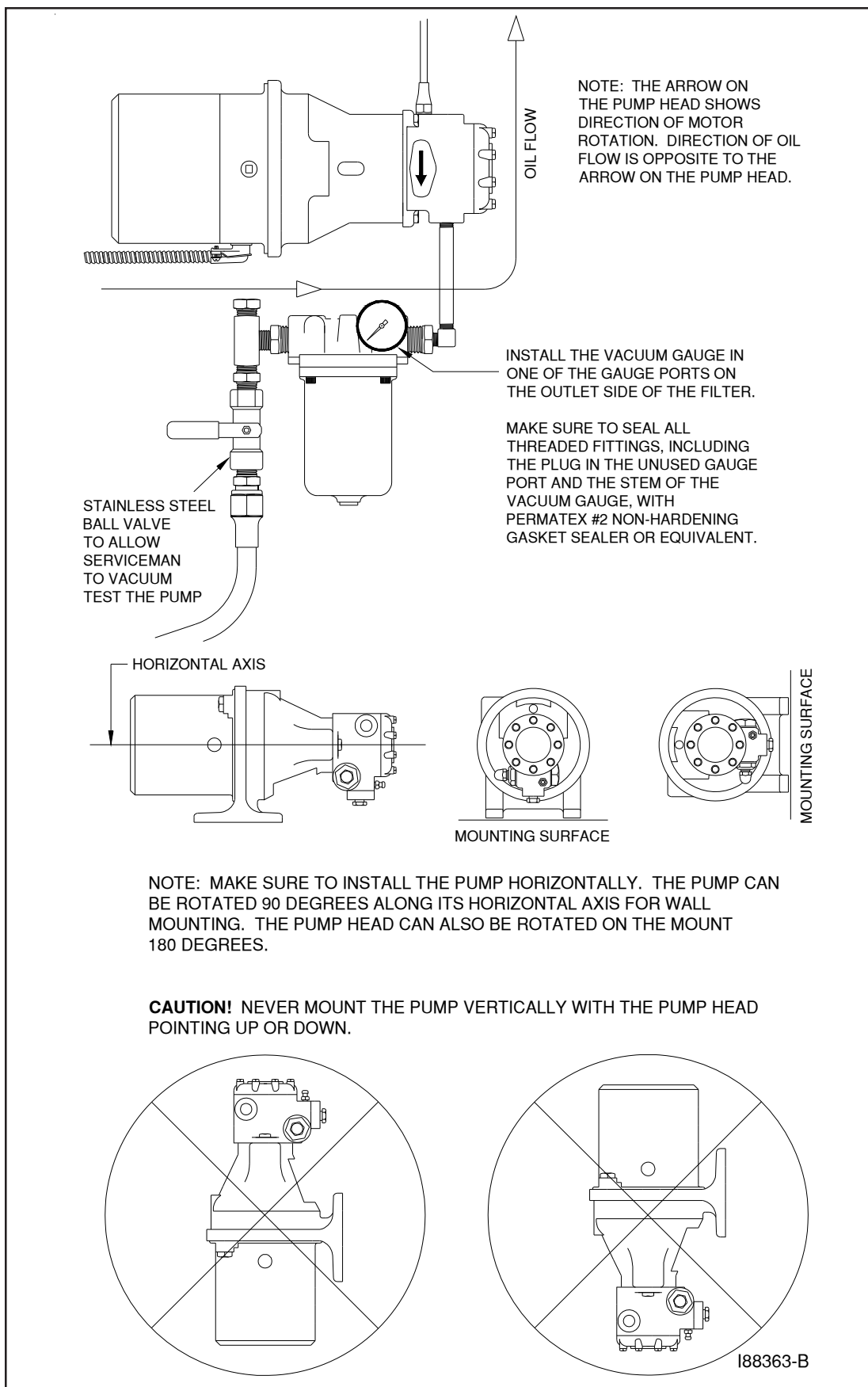
Figure 1 - J-Pump Component Detail

## Installing the J-Pump (continued)



**Figure 2 - Inside Above Ground Tank Installation with J-Pump**

## Installing the J-Pump (continued)



**Figure 3 - Detail of J-Pump Installation for Above Ground Inside/Outside Oil Tank**

## Wiring the J-Pump



**WARNING:** To avoid electrical shock, make sure that power to the furnace/boiler is turned OFF before connecting any wires. A licensed electrician should install all wiring to your furnace or boiler. All wiring must be in accordance with the National Uniform Electrical Code and local codes. Properly size all wires and use electrical conduit for all electrical lines.



**WARNING:** Install an electrical line (pump circuit) from the furnace/boiler to the pump so that the pump is activated by the burner. DO NOT wire the pump directly to a wall outlet so that it runs continuously; this will seriously damage your J-pump and/or furnace/boiler and may result in a fire or explosion hazard.

1. Refer to the appropriate **Wiring Schematics** located in **Appendix B** at the back of the **Clean Burn Equipment Operator's Manual**.
2. Install the pump electrical circuit from the furnace/boiler to the J-pump location. Connect the pump wires (white/black) to the appropriate locations in the furnace/boiler junction box according to the equipment wiring schematic.

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## Installing the Suction Oil Line Components

**ATTENTION:** It is critical that you adhere to the following specifications for suction oil line installation (*oil line from the tank to the pump*). If these specifications are not met, the J-pump will not function correctly and the burner will shut down on reset. The majority of service problems with the oil pump are caused by leaks at fittings in the suction oil line; these problems are eliminated by ensuring a 100% airtight suction oil line which slants up to the pump.

- All suction oil line components must be installed as shown in Figures 1 and 2. **Suction line size is 1/2" diameter.** Proper installation allows the suction oil line to be filled with used oil during initial priming.
- The J-pump must be installed with a **3/4" check valve and screen** at the end of the suction oil line, or the pump will not maintain its prime.
- Use **Permatex #2 non-hardening gasket sealer** on every threaded fitting. DO NOT use teflon tape or teflon pipe dope compounds; the teflon can flake off and cause damage to the pump head.
- **The suction oil line must be 100% airtight for proper system functioning.** Use only high-quality flare fittings for the copper tubing. DO NOT use compression fittings. DO NOT use any steel pipe unions. DO NOT use sweat copper pipe. These types of fittings cause air leaks in the suction oil line and will require re-installation.
- **The suction oil line must slant up to the pump;** any high spots will trap air and will not allow the pump to prime.

## Installing the Suction Oil Line Components (continued)

1. **Assemble the suction oil line fittings (from the J-pump to the canister filter):**
  - a. Refer to Figures 1 and 2 for a detailed look at the oil pump components and fittings.
  - b. Remove the plug from the 1/4" inlet port of the pump.
  - c. Install the 1/4" x 3" brass nipple into the 1/4" inlet port on the pump.
  - d. Install the 1/4" elbow onto the 3" nipple.
  - e. Prepare the canister filter for installation:
    - Install the 3/4" x 1/4" brass hex bushing into the outlet port of the canister filter.  
*Check the direction of the arrow for the proper flow.*
    - Install the 3/4" x 1/2" brass hex bushing into the inlet port of the canister filter.
    - Remove the plug from one of the 1/8" gauge ports in the canister filter and install the vacuum gauge. Seal the threads of the gauge with Permatex #2 non-hardening gasket sealer.
    - Install the 1/2" threaded pipe adapter into one side of the 1/2" ball valve.
    - Install the 1/2" MPT x 1/2" flare adapter into the other side of the ball valve.
    - Install this assembly into one side of the 1/2" brass tee.
    - Install the 1/2" plug on the other side of the 1/2" brass tee.
    - Install the assembled 1/2" tee into the 3/4" x 1/2" brass bushing, which is installed in the inlet port of the canister filter. Make sure that the 1/2" flare adapter is pointing down.
    - Install the canister filter assembly onto the 1/4" brass street elbow as shown in Figure 1.  
The canister filter must be installed with the arrow pointing towards the pump (direction of oil flow).
2. **Install the suction oil line (from the the tank to the canister filter):**
  - a. Refer to Figures 1 and 2 and the **Typical Installation Diagram(s)** located at the beginning of Section 4 of your **Clean Burn Equipment Operator's Manual**.
  - b. Prepare a piece of 1/2" O.D. copper tubing (user-supplied) which will function as the pick-up line from the tank to the canister filter. This copper tubing must have the following specifications:
    - The tube must be one continuous piece of 1/2" O.D. copper tubing with no kinks or fittings.
    - The tube is to slant up from the tank to the pump with no loops or high points to trap air.
  - c. Locate the 2" MPT x 1/2" FPT x 1/2" FPT duplex, slip-thru hex bushing (which will eventually be installed into one of the 2" openings on the tank). Note that the fitting is marked "S" for suction and "R" for return.
  - d. Install the 1/2" MPT x 1/2" slip fitting into the "S" side of the 2" duplex slip-thru hex bushing.
  - e. Install the 1/2" plug into the "R" side of the 2" duplex slip-thru hex bushing.
  - f. Measure the height of the oil tank (from the bottom of the tank, NOT the floor) to the 2" opening that you are going to use for the supply oil line. Deduct 12" from this measurement and transfer this new measurement onto the 1/2" O.D. copper tubing.
  - g. Remove the locking nut and ferrel sleeve connector from the 1/2" slip fitting, and slide them over the copper tubing.
  - h. Slide the 1/2" O.D. copper tubing through the 1/2" slip fitting, which is installed in the 2" bushing.
  - i. Install the screen into one side of the 3/4" check valve (making sure the arrow is pointing away from the screen assembly).
  - j. Install the 3/4" x 1/2" brass bushing into the 3/4" check valve.
  - k. Install the 1/2" MPT x 1/2" flare adapter into the 3/4" x 1/2" brass bushing on the check valve.
  - l. Slide the 1/2" flare nut over the end of the 1/2" copper tubing, and flare the end of the tubing.  
**NOTE:** Use a high-quality flaring tool (such as a Ridgid Flaring Tool) to ensure that all flares are made properly (i.e. so they will be 100% airtight).

## Installing the Suction Oil Line Components (continued)

2. **Install the suction oil line (continued):**
  - m. Install the flared oil line and nut onto the assembled check valve/screen and tighten.
  - n. Pick up the assembled oil line, and carefully guide the end of the tubing with the check valve through the 2" tank opening.
  - o. Apply Permatex #2 non-hardening gasket sealer (or equivalent) to the threads of the 2" duplex slip-thru tank bushing, and tighten this fitting into the tank.
  - p. Pull the 1/2" copper tubing back up through the slip fitting until you see the mark that you put on the tubing earlier. Holding the tubing with one hand, push the ferrel sleeve connector and locking nut down the tubing, then tighten onto the 1/2" slip fitting. The oil line is now installed in the correct position off of the bottom of the tank.
  - q. Carefully bend the oil line up to the canister filter; use a spring bender over the oil line while bending the tubing to prevent kinks in the oil line. Allowing for the flare nut, cut off the excess tubing.
  - r. Install the 1/2" flare nut onto the tubing, and flare the end of the tubing.
  - s. Install the end of the tubing with the flare nut onto the 1/2" flare adapter (on the ball valve assembly at the canister filter).
  - t. Install a vent from the tank to the outside of the building according to code. The tank must be properly vented to allow air to enter the tank as oil is pumped out and to safely vent fumes to the outside. See figure 2.
  - u. Install plugs in all other tank openings as required by code.
  - v. Inspect the installation. For proper suction oil line operation, make sure all components are installed and positioned as specified in this manual.

## Installing the Pressure Oil Line Components

**ATTENTION:** It is critical that you adhere to the following specifications for pressure oil line installation (*oil line from the pump to the furnace/boiler*); if these specifications are not met, the oil pump will not function correctly and the burner will shut down on reset.

The parameters for pressure oil line installation are:

<u>Length of Pressure Line</u>	<u>Line Size</u>
Up to 75 feet	3/8" O.D. copper tubing
Greater than 75 feet, up to 150 feet	1/2" O.D. copper tubing
<ul style="list-style-type: none"> <li>The pressure oil line must slant up to the burner on the furnace/boiler with no loops or high points to trap air.</li> <li>Local codes may require the installation of an in-line <b>"Fire-O-Matic" safety valve</b>. Be sure to check all appropriate codes to ensure compliance.</li> </ul>	

1. Refer to Figure 2 and the **Typical Installation Diagram(s)** located at the beginning of Section 4 of your **Clean Burn Equipment Operator's Manual**.
2. Make sure you have purchased all the necessary fittings to complete the installation correctly.
3. Install the fittings and components as shown in the related illustrations.

## Priming the J-Pump

Preparing your Clean Burn furnace or boiler for operation begins with priming the oil pump. This activity involves a series of separate procedures as follows:

- Preparing the burner for use with the J-Pump
- Preparing the Canister Filter for Pump Priming
- Preparing the Burner for Pump Priming\*
- Activating the Pump\*
- Flushing the Oil Lines\*
- Adjusting the Pump Pressure

***\*Note that these procedures differ slightly depending on the furnace or boiler model. Be sure to follow the appropriate set of instructions for your installation.***

**NOTE:** These procedures must be performed in sequence *without interruption* to properly prime the pump.

**NOTE:** The following tools and materials are required for oil pump priming and should be gathered before starting any priming procedures:

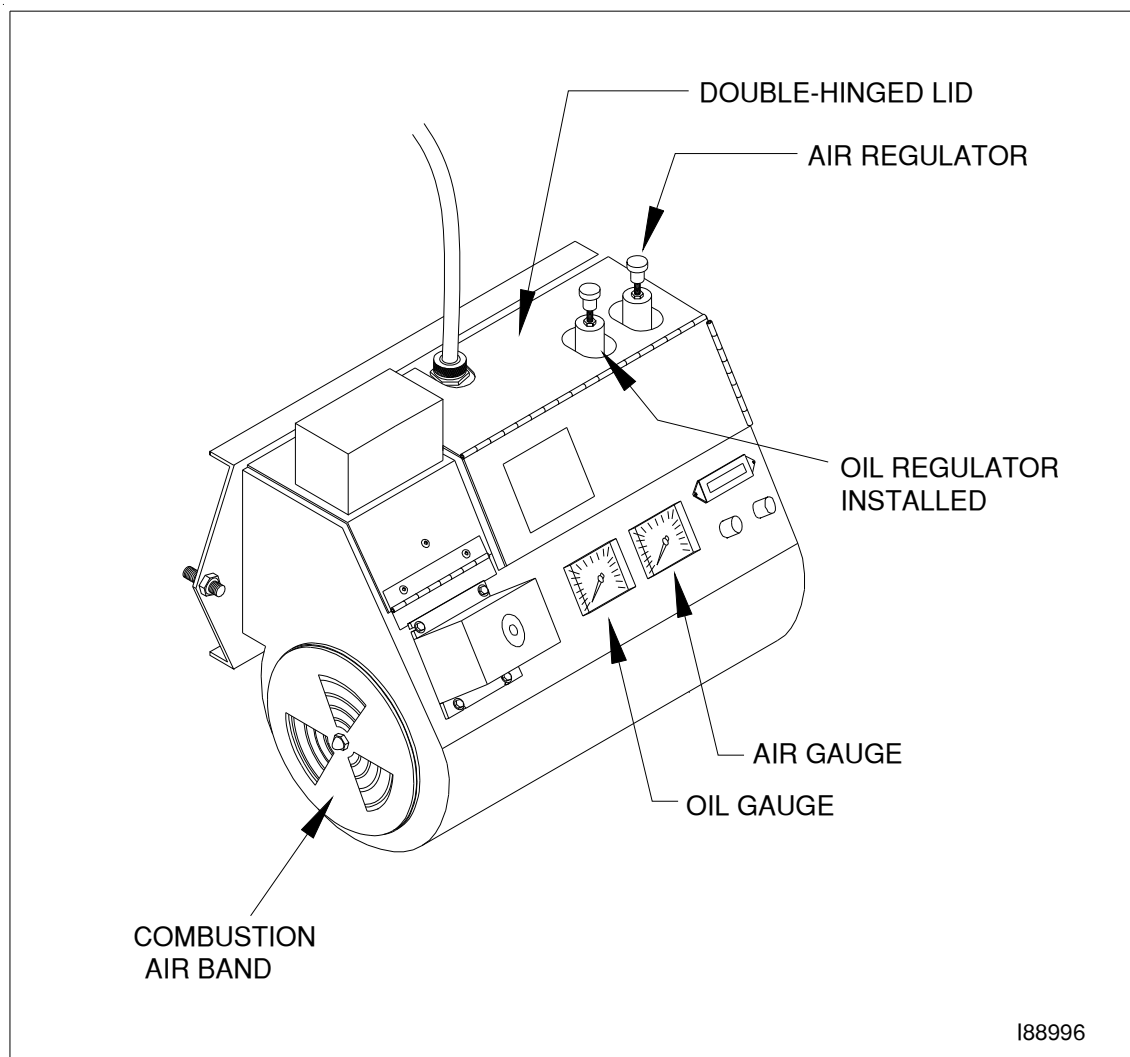
- 3/8" open-end wrench
- Rags
- Two containers (minimum one-gallon)
- Medium straight-blade screwdriver

## Preparing the Burner for Use with the J- Pump (ALL Furnace/Boiler Models)



**WARNING:** To avoid electrical shock hazards, turn off all power to the furnace, and unplug the burner before proceeding.

1. Figure 4 shows an exterior view of the burner components. In this procedure, you will be removing the oil regulator cap from the preheater block assembly and installing an oil regulator to prepare the burner for use with the J pump.
2. Remove the self-tapping screw with a 1/4" nut driver and swing open the double-hinged lid to expose the heater block assembly.
3. Refer to Figure 5. Use a 5/32" Allen wrench to remove the four (4) bolts and washers holding the oil regulator cap in place, then carefully remove the cap.
4. Clean the top of the heater block to remove used oil, etc. DO NOT allow any debris to fall into the oil passageways which have been exposed by the removal of the oil regulator cap.
5. Install the surface mount oil regulator using the four (4) bolts and washers. Tighten the four bolts firmly in a *crisscross pattern* to ensure that there are no leaks.
6. Install the locking bar.
7. Use a 1/8" Allen wrench to tighten the two locking bolts on the locking bar.



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**Figure 4 - Detail of Burner Components**

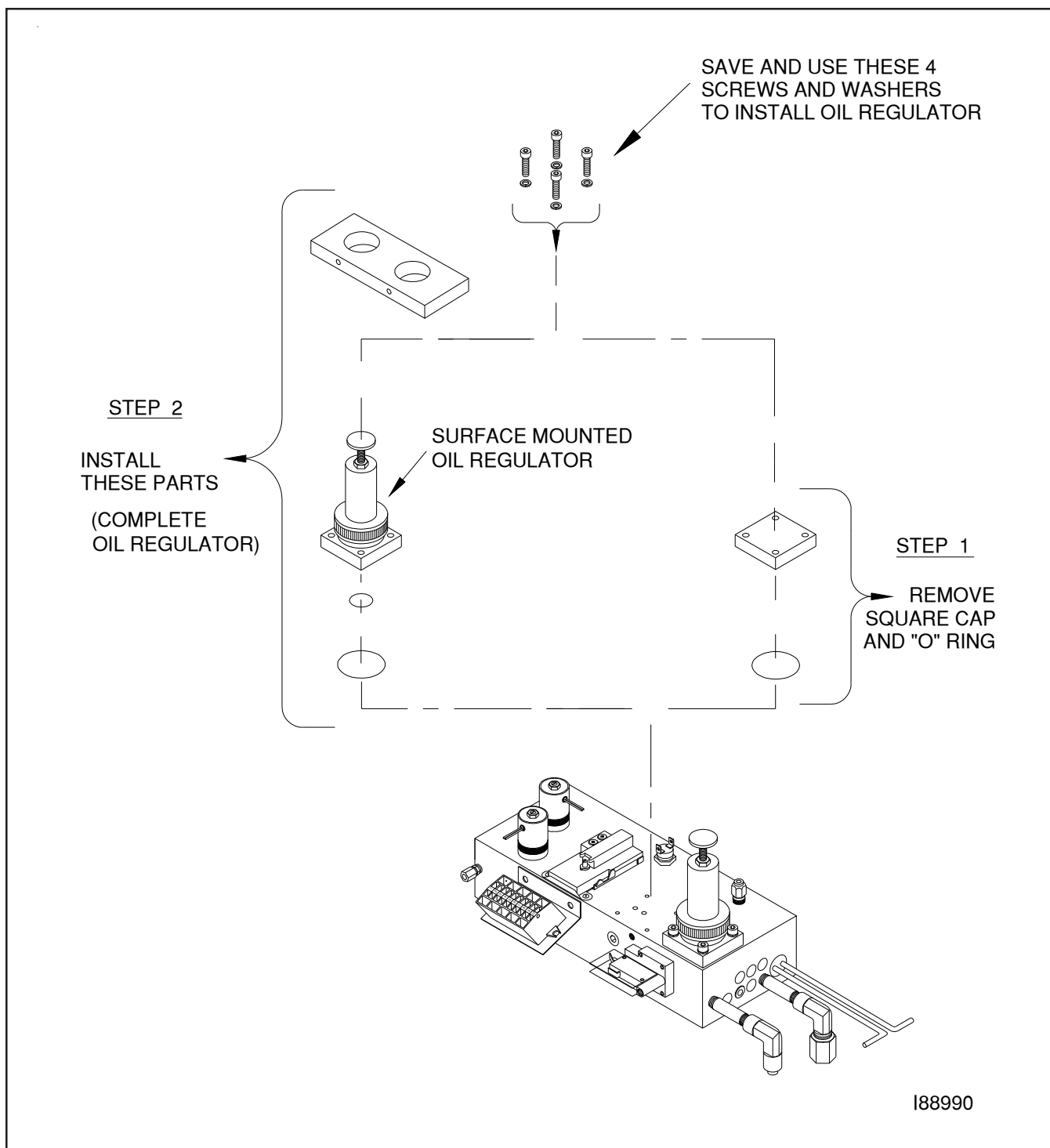
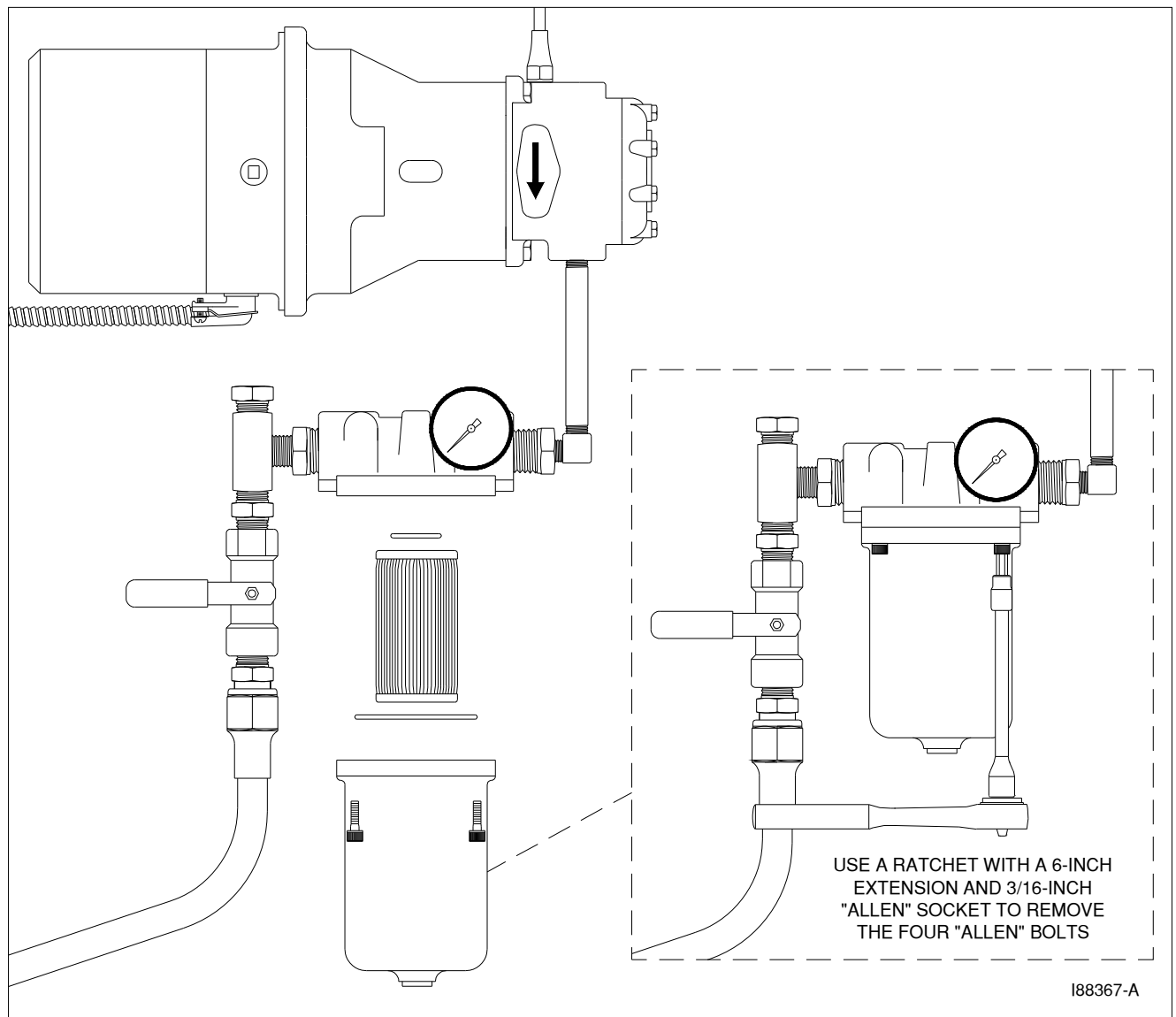


Figure 5 - Detail of Heater Block with Surface-Mounted Oil Regulator

## **Preparing the Canister Filter for Pump Priming** **(ALL Furnace/Boiler Models)**

**ATTENTION:** Fill the canister filter with *used oil* so the pump gears are charged with oil during the priming procedure. DO NOT use new motor oil; it will not ignite at the burner. DO NOT run the pump with dry gears or the pump will not prime and damage to the pump head will occur.

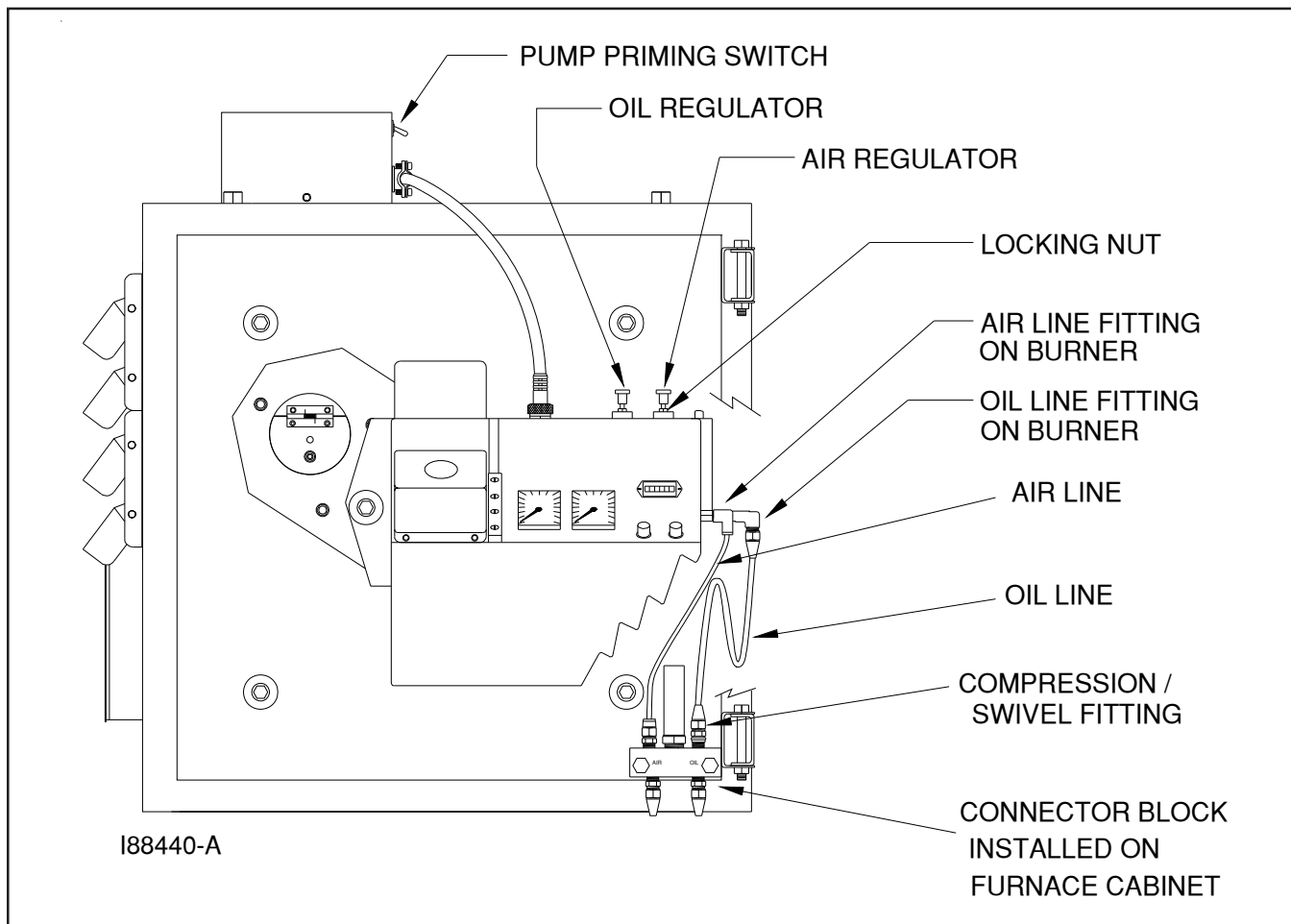
1. Refer to Figure 6.
2. Remove the four (4) bolts holding the canister bowl in place, then remove the bowl.
3. Check the condition of the filter element and O-ring.
4. Make sure the O-ring is in the groove on the top of the filter element. Push the element into position on the filter body.
5. Fill the canister with used oil to prevent the pump from running dry during priming.
6. Check the condition of the canister O-ring, and re-install the canister. Tighten the four canister bolts evenly to ensure that the canister filter is 100% airtight.



**Figure 6 - Oil Canister Detail**

## **Preparing the Burner for Pump Priming** **(Models CB-1750, CB-2500 and CB-3250)**

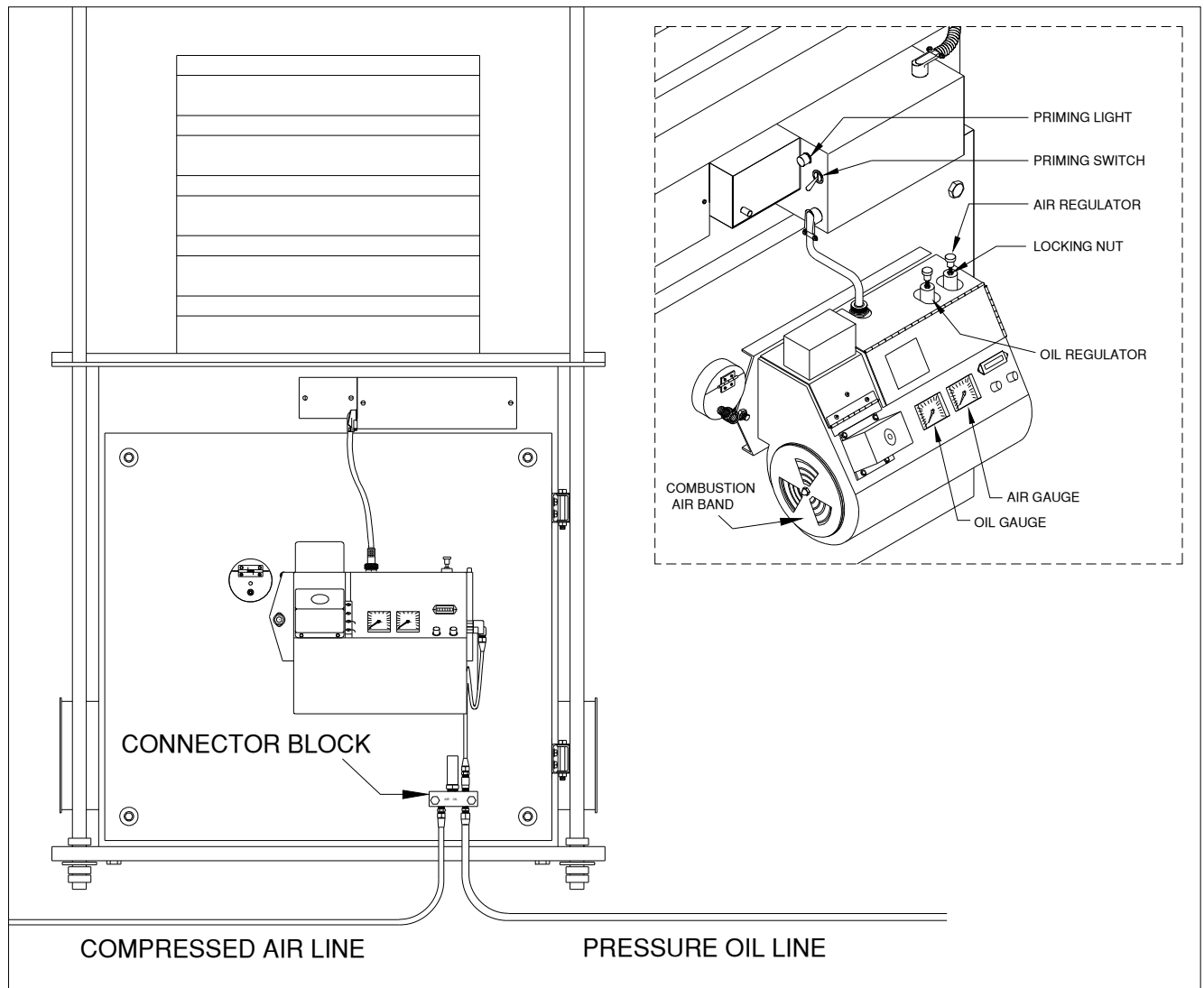
1. Turn the switch on the wall thermostat to OFF.  
**NOTE:** If your thermostat does not have an OFF setting, disconnect one thermostat wire so the burner will not run.
2. Turn the main power to the furnace ON to allow the preheater block to warm up.
3. Refer to Figure 7.
4. Loosen the locking nut on the oil regulator, and turn the knob two to three full turns counterclockwise so the oil regulator is completely shut off.
5. Loosen the locking nut on the air regulator.



**Figure 7 - Detail of Burner Connections on the CB-1750, CB-2500 and CB-3250**

## **Preparing the Burner for Pump Priming** ***(Models CB-3500 and CB-5000)***

1. Turn the switch on the wall thermostat to OFF.  
**NOTE:** If your thermostat does not have an OFF setting, disconnect one thermostat wire so the burner will not run.
2. Turn the main power to the furnace ON to allow the preheater block to warm up.
3. Refer to Figure 8.
4. Loosen the locking nut on the oil regulator, and turn the knob two to three full turns counterclockwise so the oil regulator is completely shut off.
5. Loosen the locking nut on the air regulator.

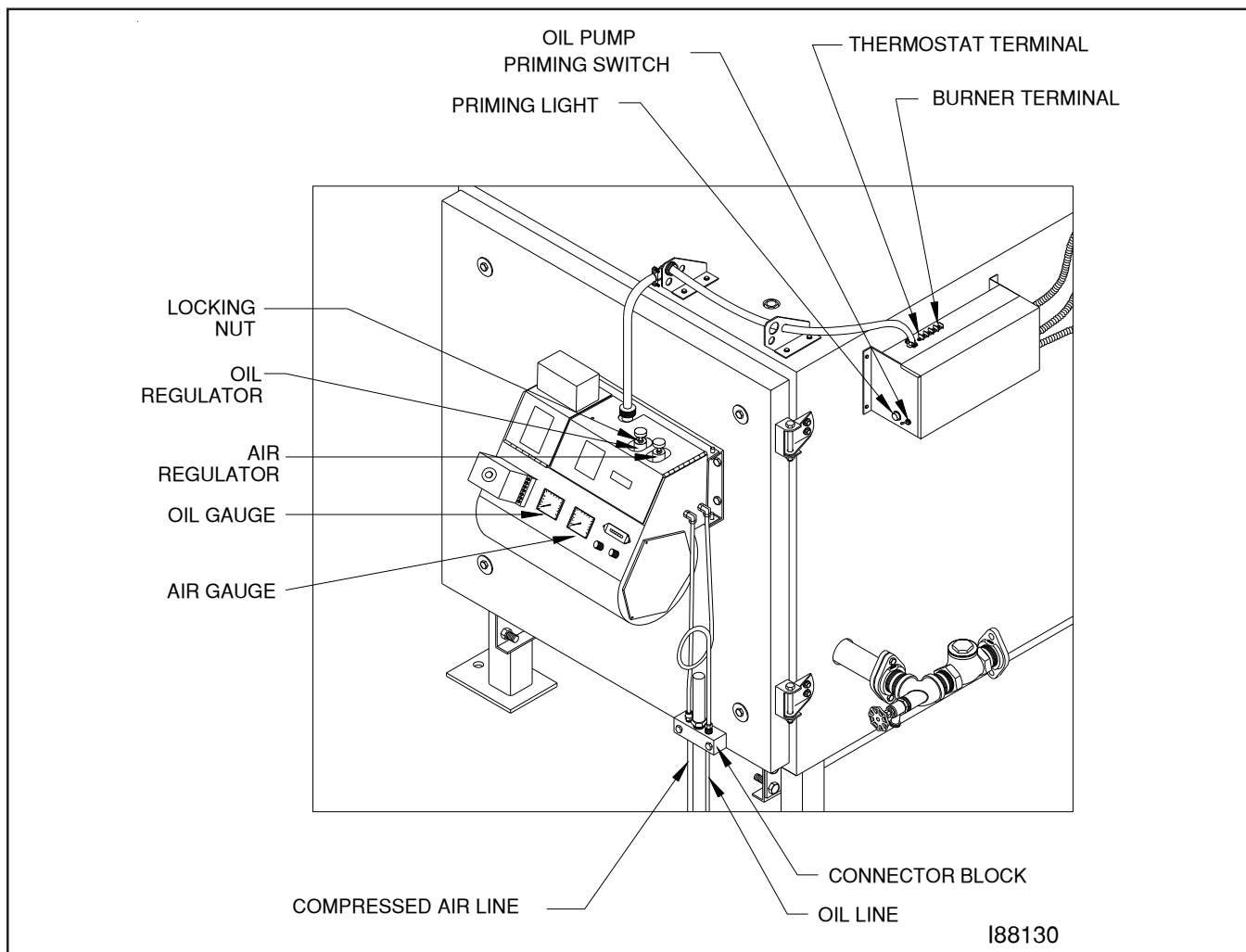


**Figure 8 - Detail of Burner Connections for CB-3500/-5000**

## **Preparing the Burner for Pump Priming** **(Models CB-200-CTB, CB-350-CTB, and CB-500-CTB)**

**ATTENTION:** Before turning the power ON, you must fill the coil tube boiler with water. Refer to Section 10 in the **CTB Operator's Manual** for more information on the hydronics system. **DO NOT** bypass the CTB controls to operate the burner.

1. Disconnect one wire from the terminal block at the "thermostat" connection. (This prevents the burner from running.) A wiring diagram is provided in **Appendix B** in the **CTB Manual**.
2. Turn the main power to the CTB ON.
3. Refer to Figure 9.
4. Loosen the locking nut on the oil regulator, and turn the knob two to three full turns counterclockwise so the oil regulator is completely shut off.
5. Loosen the locking nut on the air regulator.



**Figure 9 - Detail of Burner Connections for CB-200-CTB, CB-350-CTB, and CB-500-CTB**

## Activating the Pump

(Models CB-1750, CB-2500, and CB-3250 Without a Pump Priming Switch)

**IMPORTANT NOTE:** Activating the pump for priming involves running the burner by jumping the "F" terminals of the oil primary control. This procedure (i.e. jumping the "F" terminals) should be used only for this specific purpose--*never for normal operation*. This procedure is accomplished easily by two people: one at the burner and one at the wall thermostat.

**ATTENTION:** When performing this procedure, never jump from an "F" terminal to a "T" terminal, or severe damage to the primary control will occur.

1. Refer to Figure 10, Step 1. Verify that the yellow jumper wire is connected to *one* "F" terminal on the primary control as shown.
2. Turn the switch on the wall thermostat to HEAT, and adjust the thermostat above room temperature.
3. The burner should start running.
4. Immediately turn the knob on the air regulator clockwise until the air gauge registers 10-12 psi. You will adjust the air pressure further during burner startup and operation.
- NOTE:** No air pressure will register on the air gauge until the burner starts running.
5. The amber light should come on, and the pump should start running.
6. ***Within ten seconds***, jump the "F" terminals by connecting the jumper wire to the other "F" terminal as shown in Figure 10, Step 2.

**NOTE:** If the safety reset on the primary control activates and the burner stops running while performing this procedure, follow the instructions in Section 7 in the **Equipment Operator's Manual** to reset the oil primary control and restart the burner.

(Procedure continued on the next page)

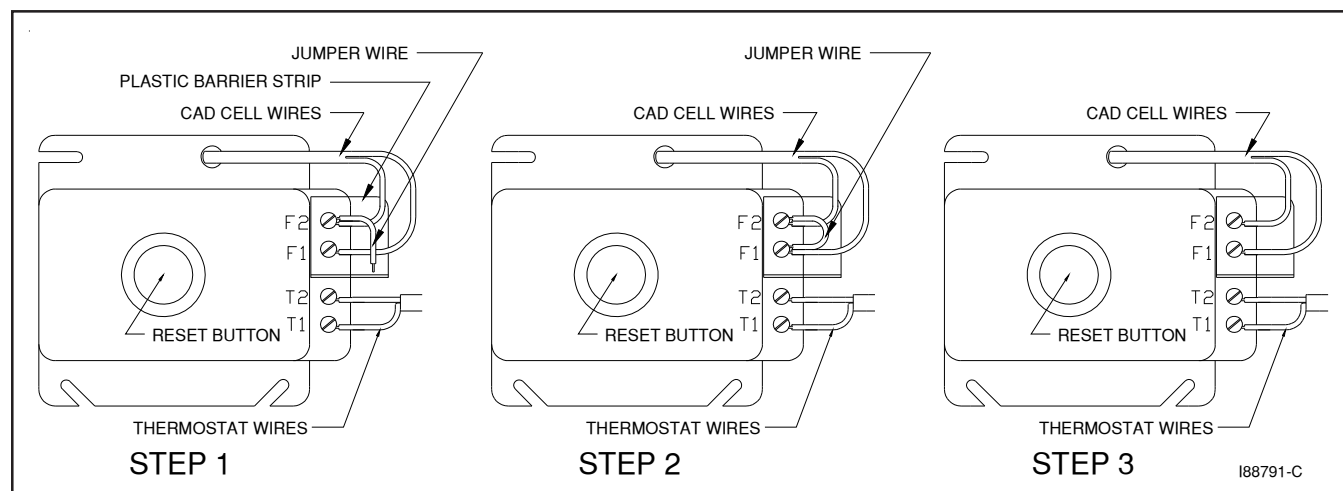


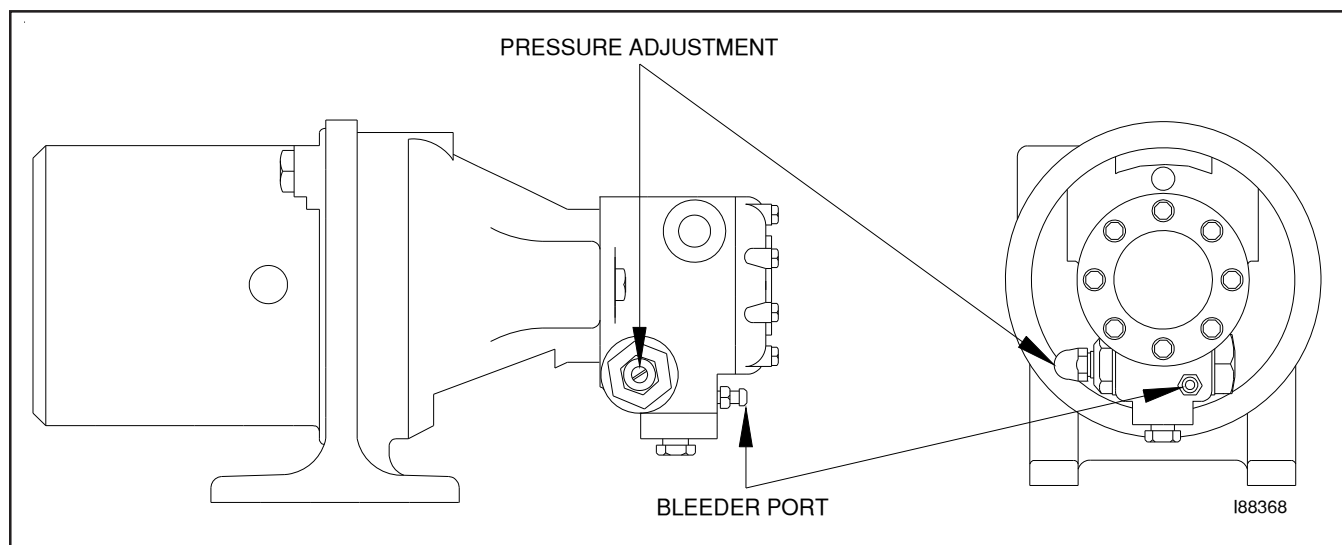
Figure 10 - Jumping the Oil Primary Control

**ATTENTION:** *Never* touch a jumper wire from an "F" terminal to a "T" terminal on the oil primary control. This will severely damage the primary control. Make sure that the plastic barrier strip is in place between the "F" and "T" terminals as shown in Figure 10.

### **Activating the Pump (continued)**

#### **(Models CB-1750, CB-2500, and CB-3250 Without a Pump Priming Switch)**

7. Refer to Figure 11.
8. Go to the oil pump.
9. Use a 3/8" wrench to open the bleeder port on the pump head (two to three full turns) so the bleeder is completely open.
10. Fill a small squeeze bottle with used oil, and squirt a few shots of used oil into the bleeder on the pump. This ensures that the pump gears are charged with oil so the pump can pull an adequate vacuum to prime.
11. Position a one gallon container (minimum) under the bleeder port to catch oil which will flow from the bleeder during pump priming.
12. Within one minute after opening the bleeder port, oil should be sputtering from the port. Make sure the container is positioned to catch the oil flowing from the port.  
**ATTENTION:** If no oil flows within one minute, shut the pump off and call your Clean Burn dealer. DO NOT run the pump "dry"--doing so may damage the gear set.
13. Observe the oil flow at the bleeder port until a steady stream (no fluctuations or sputtering) is achieved. Bleed approximately one quart of oil from the open port to ensure an airtight suction line.  
**NOTE:** If the oil stream continues to fluctuate or sputter, there is a leak(s) in the suction line. Any leak(s) in the suction line must be repaired to ensure that the suction line is 100% airtight.
14. Close the port with a 3/8" wrench and tighten completely.



**Figure 11 - Bleeder Port on Pump Head**

## **Activating the Pump**

### **(ALL Furnace/Boiler Models *With a Pump Priming Switch*)**

**NOTE:** The priming switch has two positions:

- **PRIME (switch is in the UP position):** this is used only for pump priming. When the switch is in the UP position, the pump circuit is activated for priming. The pump will continue to run as long as the switch is in this position. The oil primary control circuit is de-activated so the burner cannot run while the switch is in the UP position.
- **BURNER (switch is in the DOWN position):** this is used for normal burner operation. When the switch is in the DOWN position, the burner controls the operation of the pump. The pump will only run while the burner is running.

1. Refer to Figure 7 (CB-1750/CB-2500/CB-3250), Figure 8 (CB-3500/CB-5000) or Figure 9 (CB-200-CTB/CB-350-CTB/CB-500-CTB) to locate the priming switch.
2. Turn the priming switch to the UP position. The pump should immediately start running.
3. Refer to Figure 11.
4. Go to the oil pump.
5. Use a 3/8" wrench to open the bleeder port on the pump head (two to three full turns) so the bleeder is completely open.
6. Fill a small squeeze bottle with used oil, and squirt a few shots of used oil into the bleeder on the pump. This ensures that the pump gears are charged with oil so the pump can pull an adequate vacuum to prime.
7. Position a one gallon container (minimum) under the bleeder port to catch oil which will flow from the bleeder during pump priming.
8. Within one minute after opening the bleeder port, oil should be sputtering from the port. Make sure the container is positioned to catch the oil flowing from the port.  
**ATTENTION:** If no oil flows within one minute, shut the pump off and call your Clean Burn dealer. DO NOT run the pump "dry"--doing so may damage the gear set.
9. Observe the oil flow at the bleeder port until a steady stream (no fluctuations or sputtering) is achieved. Bleed approximately one quart of oil from the open port to ensure an airtight suction line.  
**NOTE:** If the oil stream continues to fluctuate or sputter, there is a leak(s) in the suction line. Any leak(s) in the suction line must be repaired to ensure that the suction line is 100% airtight.
10. Close the port with a 3/8" wrench and tighten completely.

### **Flushing the Oil Lines**

#### ***(Models CB-1750, CB-2500, and CB-3250 Without a Pump Priming Switch)***

1. Turn the switch on the wall thermostat to OFF; if your thermostat does not have an OFF setting, disconnect one thermostat wire so the burner shuts down.
2. Go back to the burner, and disconnect the oil line at the connector block on the furnace.
3. Position a one-gallon container (minimum) to catch oil which will flow from the disconnected oil line.
4. Disconnect the yellow jumper wire and push the reset button on the oil primary control to re-start the burner. Once the burner starts, re-connect the jumper wire.
5. Observe a steady oil flow until one gallon has been collected; this ensures that all air and debris have been flushed from the oil line.
6. Repeat step 1.
7. Re-connect the oil line to the connector block.
8. Remove the jumper wire from the "F" terminals, and make sure the cad cell wires are now connected to the "F" terminals as illustrated in Figure 10, Step 3. Save the jumper wire for future pump priming.
9. Follow instructions in the following section - "Starting and Adjusting the Burner".

### **Flushing the Oil Lines**

#### ***(ALL Furnace/Boiler Models With a Pump Priming Switch)***

1. Turn the priming switch to the DOWN position to stop the pump.
2. Disconnect the oil line at the connector block on the furnace.
3. Position a one-gallon container (minimum) to catch oil which will flow from the disconnected oil line.
4. Turn the priming switch to the UP position to start the pump running again.
5. Observe a steady oil flow until one gallon has been collected; this ensures that all air and debris have been flushed from the oil line.
6. Turn the priming switch to the DOWN position so the pump stops running.
7. Re-connect the oil line to the connector block.
8. Follow instructions in the following section - "Starting and Adjusting the Burner"

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### **Adjusting the Pump Pressure**

#### ***(ALL Furnace/Boiler Models)***

**NOTE:** It is not necessary to adjust pump pressure for most installations. Adjust the pump pressure *only* if either of the following conditions exist:

- The distance between the pump and the furnace/boiler is less than 50 feet.
- You are burning light viscosity oil such as #2 fuel oil. (In this case, you may also need to install a nozzle with a smaller orifice. Contact your Clean Burn dealer before proceeding.)

1. Refer to Figure 11 to locate the pressure adjustment screw.
2. Turn the set screw counterclockwise with a small, straight-blade screwdriver until the screw is flush with the nipple. DO NOT back the set screw out more than this!
3. Turn the adjustment screw clockwise one full turn to set the pump pressure at approximately 20 psi.

## Starting and Adjusting the Burner

Starting and adjusting the burner involves a series of separate procedures which must be accomplished in sequence without interruption. **Note that for proper operation of the burner with the J-pump, both the air and oil regulators must be properly adjusted.** Be sure to review all the procedures in this section before attempting burner startup and adjustment, paying careful attention to safety information statements.

### **IMPORTANT NOTE: *For Coil Tube Boilers (CB-200-CTB, CB-350-CTB, CB-500-CTB)***

Refer to the **CTB Operator's Manual** for important instructions on preparing the hydronics system for burner startup. The boiler must be filled with water prior to burner startup. **DO NOT** bypass the CTB controls to operate the burner.

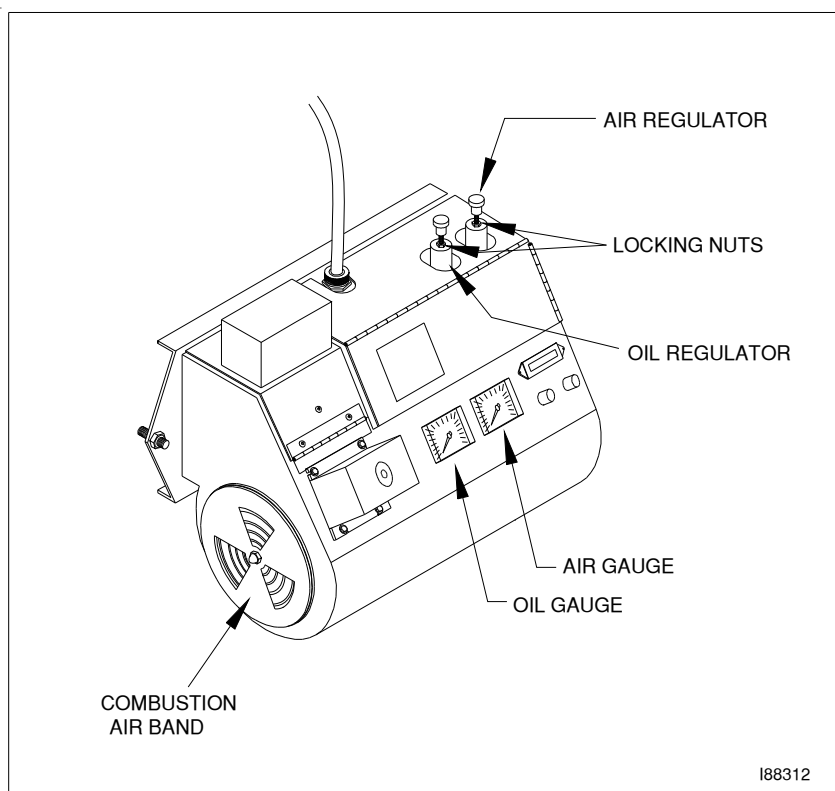
### **IMPORTANT NOTE: *For ALL Furnace/Boiler Models With a Pump Priming Switch***

Prior to starting the burner, make sure the priming switch on the control box is in the RUN BURNER (down position); this allows the burner to control the operation of the pump.

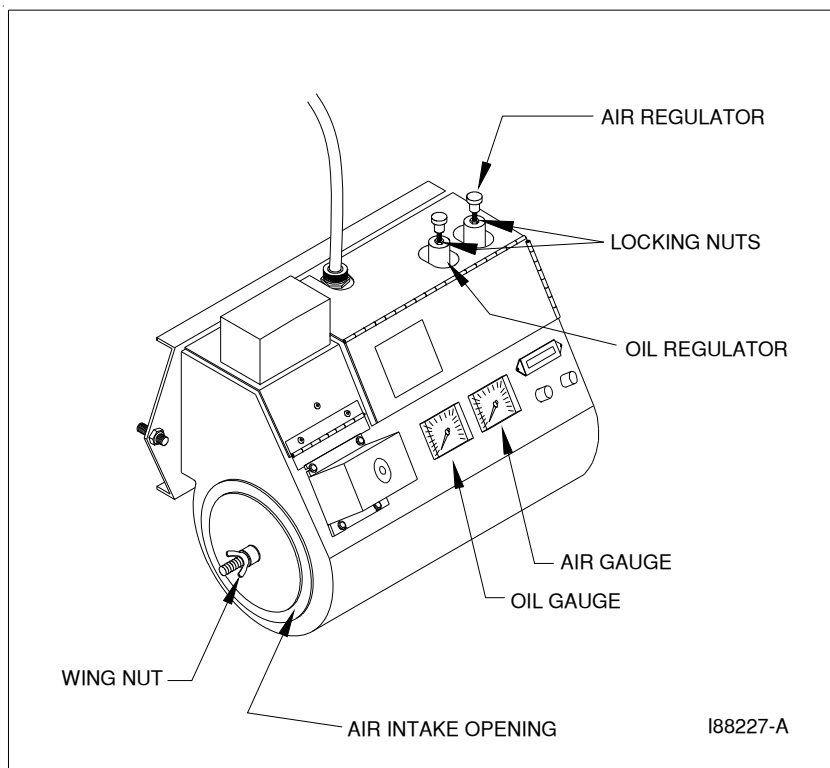
## **Preparing the Burner for Startup**

1. Turn the switch on the wall thermostat OFF, or disconnect one wire from the terminal block at the "thermostat" connection; this prevents the burner from running while these initial adjustments are performed.
2. Turn the main power to the furnace/boiler ON; the green light on the burner should be ON.
3. Wait at least 15 minutes until the preheater block is thoroughly warmed up. (Feel the back of the burner box to make sure the preheater is sufficiently warm. The proving switch on the preheater block will not allow the burner to start until the block is hot.)  
**NOTE:** The preheater block will remain warm as long as power is supplied to the burner. If the main power supply is ever turned OFF, you must wait at least 15 minutes until the preheater block is thoroughly warm before starting the burner.
4. Refer to Figure 12 or 13 to locate the oil and air regulators. Loosen the locking nuts on the oil and air regulators.
5. Turn the adjustment knobs on the oil and air regulators counterclockwise until 1/2" of the threads on the knobs are exposed. **DO NOT** back the knobs all the way out.  
**NOTE:** The air and oil gauges will not show any pressure until the burner starts. Before starting the burner for the first time, it is very important to turn both the air and oil regulators completely OFF as described in this step.

*(Procedure continues on the following pages)*



**Figure 12 - Component Detail of the CB-525-S2 and CB-551-H3 Burners  
(Models CB-1750/2500/3250/3500/CB-200-CTB and CB-350-CTB)**



**Figure 13 - Component Detail of the CB-550-S2 and CB-551-H5 Burners  
(Models CB-5000 and CB-500-CTB)**

## **Preparing the Burner for Startup (continued)**



**WARNING:** The combustion air band/air intake must be properly adjusted to ensure that the burner ignites and burns correctly. **DO NOT** attempt to start the burner with the combustion air band/air intake wide open or completely closed. The burner may not ignite correctly. Failure to heed this warning may result in a fire or explosion hazard.

### **6. Initial Adjustment of the Combustion Air Band:** (Models CB-1750/2500/3250/3500, CB-200-CTB and CB-350-CTB)

- Refer to Figure 12 to locate the combustion air band.
- Rotate the combustion air band to adjust it to the appropriate initial slot opening as listed in the **Initial Adjustment Charts; be sure to locate the appropriate chart/settings for your Clean Burn model.**
- Use a ruler to accurately set the slot opening at the widest section of the slot.

### **Initial Adjustment of the Air Intake:** (Models CB-5000 and CB-500-CTB)

- Refer to Figure 13 to locate the air intake. Note that the CB-550-S2 and CB-551-H5 burners have an adjustable air intake with a locking wing nut.
- Loosen the wing nut and OPEN the air intake by rotating the disk (CCW) to the appropriate slot opening as listed in the **Initial Adjustment Charts; be sure to locate the appropriate chart/settings for your Clean Burn model.**
- Turn the wing nut tight to lock the air intake in place.

**IMPORTANT NOTE:** This initial setting of the combustion air band/air intake will allow you to start the burner. You will fine tune the setting further as described later in these instructions.

## **Initial Adjustment Charts**

**ATTENTION:** The settings shown in the following charts are only *initial* burner adjustments. ***Final burner adjustments must be done by inspecting the flame length according to the illustrations provided in this section.***

### **Initial Adjustments for CB-1750**

**Maximum Input = 175,000 BTUH @ 1.2 GPH with CB525-S2 Burner**

Oil Type	Oil PSI / Flame Length	Air PSI	Air Band	Nozzle
#2 Fuel Oil*	2.5 & <b>check flame length</b>	12 - 16	3/8"	9-5
Used Crankcase Oil	3.0 & <b>check flame length</b>	12 - 16	3/8"	9-5
Used ATF	3.5 & <b>check flame length</b>	12 - 16	3/8"	9-5
Used Hydraulic Oil	3.0 & <b>check flame length</b>	12 - 16	3/8"	9-5

### **Initial Adjustments for CB-2500**

**Maximum Input = 250,000 BTUH @ 1.7 GPH with CB525-S2 Burner**

Oil Type	Oil PSI / Flame Length	Air PSI	Air Band	Nozzle
#2 Fuel Oil*	4.5 & <b>check flame length</b>	12 - 18	1/2"	9-5
Used Crankcase Oil	5.0 & <b>check flame length</b>	12 - 18	1/2"	9-5
Used ATF	5.5 & <b>check flame length</b>	12 - 18	1/2"	9-5
Used Hydraulic Oil	5.0 & <b>check flame length</b>	12 - 18	1/2"	9-5

## Initial Adjustment Charts (continued)

### Initial Adjustments for CB-3250

Maximum Input = 300,000 BTUH @ 2.1 GPH with CB525-S2 Burner

Oil Type	Oil PSI / Flame Length	Air PSI	Air Band	Nozzle
#2 Fuel Oil*	5.5 & <i>check flame length</i>	12 - 18	5/8"	9-5
Used Crankcase Oil	6.0 & <i>check flame length</i>	12 - 18	5/8"	9-5
Used ATF	6.0 & <i>check flame length</i>	12 - 18	5/8"	9-5
Used Hydraulic Oil	6.0 & <i>check flame length</i>	12 - 18	5/8"	9-5

### Initial Adjustments for CB-3500

Maximum Input = 350,000 BTUH @ 2.5 GPH with CB525-S2 Burner

Oil Type	Oil PSI / Flame Length	Air PSI	Air Band	Nozzle
#2 Fuel Oil*	6.5 & <i>check flame length</i>	12 - 18	3/4"	9-5
Used Crankcase Oil	7.0 & <i>check flame length</i>	12 - 18	3/4"	9-5
Used ATF	7.0 & <i>check flame length</i>	12 - 18	3/4"	9-5
Used Hydraulic Oil	7.0 & <i>check flame length</i>	12 - 18	3/4"	9-5

### Initial Adjustments for CB-5000

Maximum Input = 500,000 BTUH @ 3.6 GPH with CB550-S2 Burner

Oil Type	Oil PSI / Flame Length	Air PSI	Air Band	Nozzle
#2 Fuel Oil*	3.5 & <i>check flame length</i>	12 - 18	1/4"	9-11
Used Crankcase Oil	3.8 & <i>check flame length</i>	12 - 18	1/4"	9-11
Used ATF	3.8 & <i>check flame length</i>	12 - 18	1/4"	9-11
Used Hydraulic Oil	3.8 & <i>check flame length</i>	12 - 18	1/4"	9-11

### Initial Adjustments for CB-200-CTB

Maximum Input = 200,000 BTUH @ 1.4 GPH with CB525-S2 Burner

Oil Type	Oil PSI / Flame Length	Air PSI	Air Band	Nozzle
#2 Fuel Oil*	2.0 & <i>check flame length</i>	12 - 14	3/8"	9-5
Used Crankcase Oil	2.5 & <i>check flame length</i>	12 - 14	3/8"	9-5
Used ATF	2.0 & <i>check flame length</i>	12 - 18	3/8"	9-5
Used Hydraulic Oil	2.0 & <i>check flame length</i>	12 - 14	3/8"	9-5

### Initial Adjustments for CB-350-CTB

Maximum Input = 350,000 BTUH @ 2.5 GPH with CB551-H3 Burner

Oil Type	Oil PSI / Flame Length	Air PSI	Air Band	Nozzle
#2 Fuel Oil*	6.0 & <i>check flame length</i>	12 - 16	3/4"	9-5
Used Crankcase Oil	7.0 & <i>check flame length</i>	12 - 16	3/4"	9-5
Used ATF	7.0 & <i>check flame length</i>	12 - 18	3/4"	9-5
Used Hydraulic Oil	7.0 & <i>check flame length</i>	12 - 16	3/4"	9-5

### Initial Adjustments for CB-500-CTB

Maximum Input = 500,000 BTUH @ 3.57 GPH with CB551-H5 Burner

Oil Type	Oil PSI / Flame Length	Air PSI	Air Band	Nozzle
#2 Fuel Oil*	3.5 & <i>check flame length</i>	12 - 18	1/4"	9-28
Used Crankcase Oil	4.0 & <i>check flame length</i>	12 - 18	1/4"	9-28
Used ATF	4.0 & <i>check flame length</i>	12 - 18	1/4"	9-28
Used Hydraulic Oil	4.0 & <i>check flame length</i>	12 - 18	1/4"	9-28

\*If you are burning light viscosity oils such as #2 fuel oil, it may be necessary to install a smaller nozzle. Call your Clean Burn dealer for more information.

## Starting the Burner

1. If you disconnected the thermostat control wire for pump priming, re-connect the wire. Turn the switch on the wall thermostat to HEAT and adjust the thermostat setting above room temperature to start the burner. (For CTB applications, turn the aquastat to call for heat.)
2. **Adjusting the Air Regulator:**  
As soon as the burner starts running, turn the knob on the air regulator clockwise to achieve proper operating air pressure. Refer to the **Initial Adjustment Charts**.
3. Within ten seconds, turn the knob on the oil regulator clockwise until the oil regulator gauge shows 1 psi and the burner ignites. *Do not exceed 1 psi at this time.* Instructions are provided later in this section for adjusting the oil regulator to the proper flame length.  
**NOTE:** If the safety reset on the primary control is activated and the burner stops running, see Section 7 in the **Clean Burn Equipment Operator's Manual** for further instructions on restarting the burner.
4. **Adjusting the Oil Regulator:**  
While adjusting the oil regulator, visually inspect the flame length through the observation port. Refer to Figure 14 for an illustration of the desired flame length. The flame should extend no more than one-half of the way down the combustion chamber.



**WARNING:** The observation port gets hot as the burner fires. To avoid personal injury, always wear heavy work gloves and safety glasses when opening the port and viewing the flame.

**NOTE:** The CB-500 Series burners feature a unique oil regulator system which regulates the oil after it has been heated to 140 °F. At this temperature, the difference in viscosity between various used oils is minimal, and the need for adjusting the oil regulator is significantly reduced. Additionally, these burners allow for fine tuning to accommodate the particular blend of used oils being burned. They are also designed to operate at low ambient temperatures with minimal adjustment.

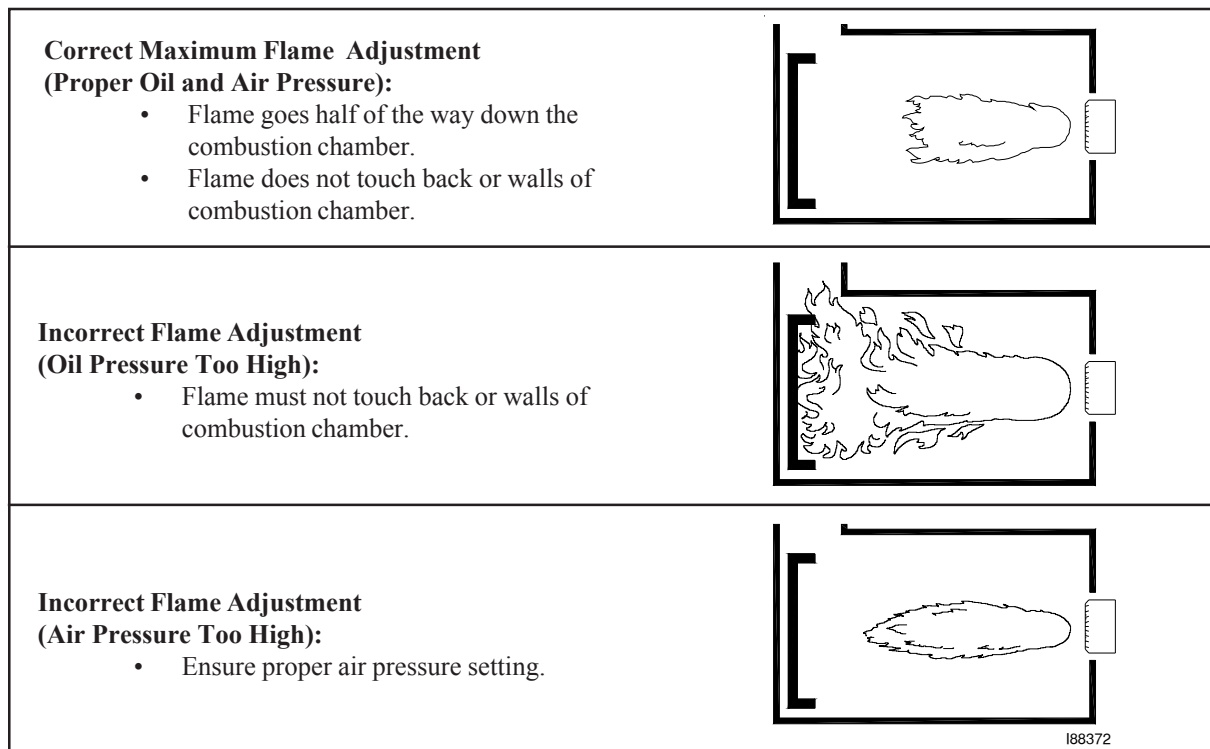


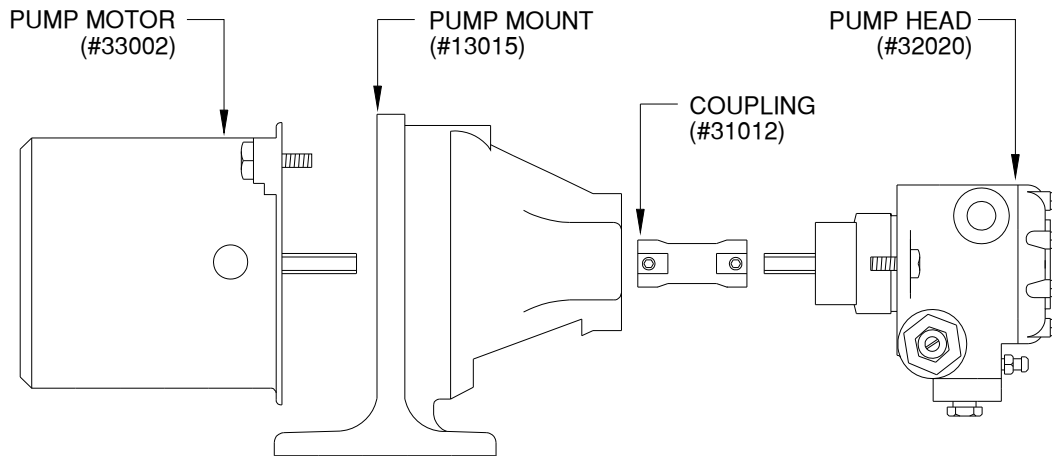
Figure 14- Flame Length Adjustment

## **Starting the Burner (continued)**

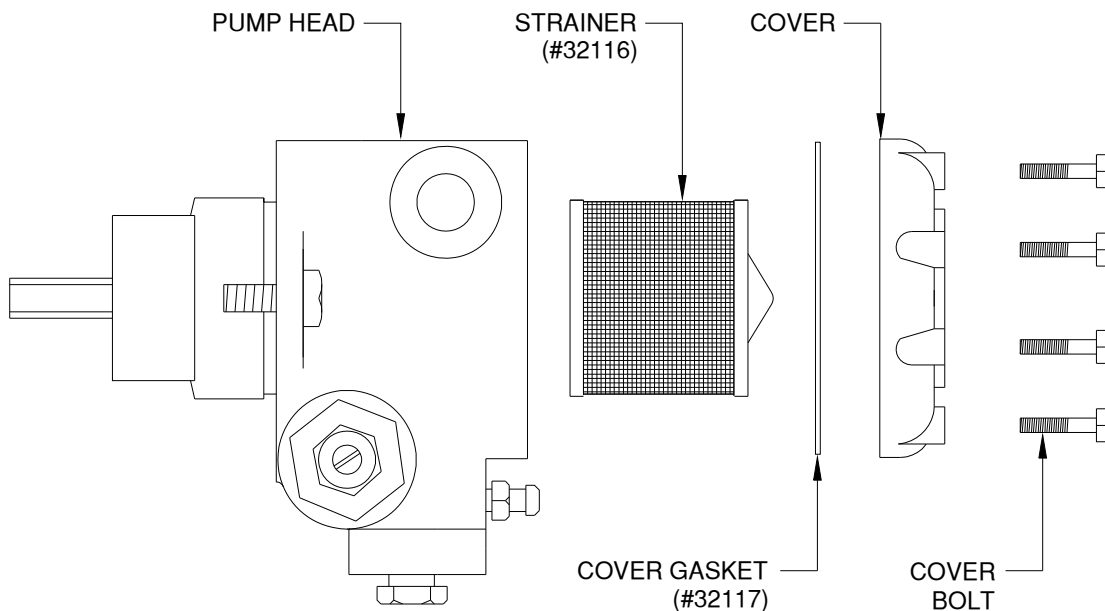
5. Check the flame length after the burner has fired for 15 minutes. If necessary, adjust the oil regulator to fine tune the flame.  
**NOTE (for CTB Applications ONLY):** Fine tune the burner only after boiler set temperature has been reached. Refer to the **CTB Operator's Manual** for additional instructions on checking for proper CTB system operation; this should be accomplished *before* fine tuning the combustion air band.
6. Tighten the locking nuts on the oil regulator and the air regulator after the desired burner performance has been achieved.  
**NOTE:** After initial startup, check the flame length at least weekly and readjust as necessary.
7. **Fine Tuning the Combustion Air Band:**  
**NOTE:** The initial setting of the combustion air band may require additional adjustment.
  - Observe the flame. **The flame should be yellow-white with sharp tips and no "sparkles."**
  - If you see "sparkles" in the flame, the oil you are burning requires LESS combustion air. CLOSE the air band 1/8" to 1/4" and re-check the flame. You should see a yellow-white flame with no "sparkles."
  - If the flame is orange in color, the oil you are burning requires MORE combustion air. OPEN the air band 1/8" to 1/4", and re-check the flame for the proper characteristics.
  - Re-check the flame after five minutes for proper characteristics.
8. **Checking for a Smokeless Burn:**  
Check for a smokeless burn by observing the stack while the burner is running. If you see any smoke, repeat the previous steps for setting the combustion air band and adjusting the air regulator. After adjusting the combustion air band, re-check the flame length.  
**NOTE:** Check for a smokeless burn periodically (as you do the flame length). Immediately readjust the burner if you ever see smoke coming from the stack. Smoke indicates improper air/fuel adjustment.  
**NOTE:** When using instruments to adjust the burner for a smokeless burn, the following readings should be achieved:
  - Draft over fire should be -.02 inch w.c.
  - Adjust for a smoke spot of a trace to 2
  - Adjust for a CO<sub>2</sub> reading of 8 to 10% or an O<sub>2</sub> reading of 7 to 9%
  - Cad cell reading below 500 ohms
9. Refer to the equipment Operator's Manual for additional instructions to verify proper fan/blower operation on furnace models.

## APPENDIX A: J-PUMP TECHNICAL REFERENCE MATERIALS

### Oil Pump Components



CAUTION: WHEN REPLACING THE HEAD, MAKE SURE TO TIGHTEN THE LOCK SCREWS ON THE COUPLING LAST (AFTER THE PUMP HEAD BOLTS HAVE BEEN TIGHTENED) SO THE PUMP AND MOTOR BEARINGS ARE NOT COMPRESSED AND DAMAGED.



CAUTION: WHEN CLEANING THE PUMP HEAD STRAINER, INSTALL A NEW GASKET SO THE PUMP HEAD IS AIRTIGHT. BE SURE TO CLEAN THE TANK IF THE PUMP HEAD STRAINER IS CLOGGED.

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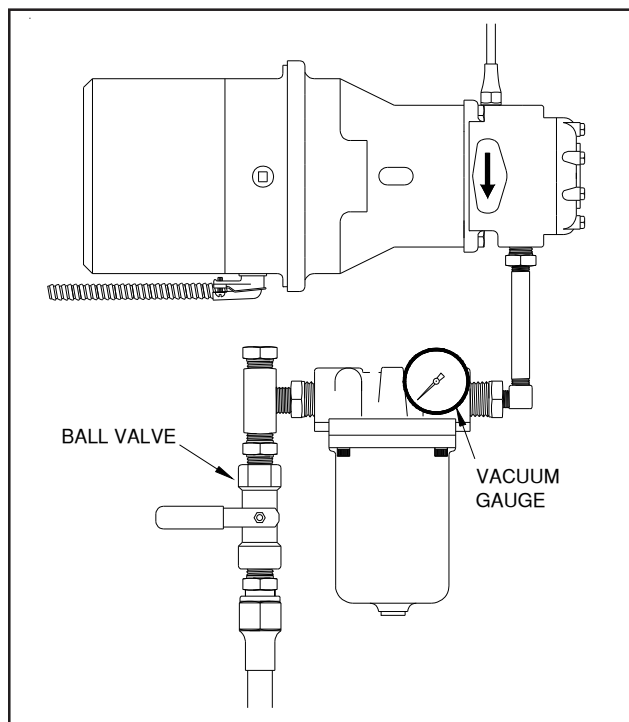
## **Vacuum Testing the Oil Pump**

Vacuum testing the oil pump is a very accurate way to determine the following:

- The condition of the pump -- the ability of the pump to pull a vacuum and suck oil from the tank.
- The condition of the fittings, gaskets and seals from the ball valve to the pump -- these components must all be airtight to avoid suction leaks.

The following procedure provides instructions for vacuum testing the pump and canister filter on systems equipped with a ball valve.

**ATTENTION:** For the pump to pull and hold vacuum, it is critical that all fittings are airtight. If any of these fittings are loose, the pump may not pull a vacuum or may lose the vacuum rapidly. It is also critical that all fittings in the suction line, including fittings on the canister filter, are 100% airtight.



1. Refer to the pump priming procedure in this manual; follow the instructions to prime the pump.  
**NOTE:** The oil pump will not pull a vacuum if the pump is dry. There must be oil in the gears of the pump before the pump can pull a vacuum.
2. With the pump running, open the bleeder two to three full turns, and make sure that oil is flowing from the bleeder. DO NOT close the bleeder yet.
3. Close the ball valve and observe the vacuum gauge.  
**NOTE:** The ball valve must have a stainless steel ball and should be pressure tested by the manufacturer to ensure that it does not leak. If the ball valve leaks, the vacuum test will not be accurate.
4. The vacuum should increase within 15 seconds to 20 to 25 inches of vacuum. When the vacuum gauge reads 20 to 25 inches of vacuum, first close and tighten the bleeder, then turn the pump off.  
**NOTE:** If the pump will not pull at least 20 inches of vacuum, there is a very serious suction leak or the pump is damaged.
5. If there are no suction leaks, the system will hold vacuum.  
**NOTE:** It is acceptable for the vacuum to drop one to five inches within one minute as the seal in the pump seats. The vacuum should then hold steady for 15 minutes.

**IMPORTANT:** If the vacuum drops *more than one to five inches within the first minute*, there is one or more leaks somewhere between the pump and the ball valve. Do the following:

- Wipe your finger along the cylinder at the shaft of the pump. If there is oil here, the pump seal is damaged. Replace the pump.
- Disassemble and clean all the fittings from the pump to the ball valve. Properly seal all fittings with Permatex #2 non-hardening gasket sealer or equivalent. Check the condition of the o-ring on the canister filter and tighten the four canister filter bolts in a crisscross pattern.
- Repeat the procedure to vacuum test the system to ensure that the system is air tight.