



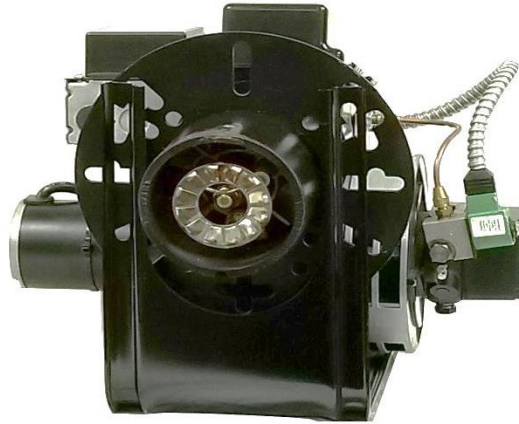
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# MODEL EHASR-DC & EH-DC OIL BURNERS

Manual 101441-001 | Revision A | Publication Date: 12/4/2020



UL File Number: MP98

## SPECIFICATIONS

### Firing Capacities:

#### Model EHASR-DC

0.75 – 3.00 gal/hr  
 105,000 – 420,000 Btu/hr Input

#### Model EH-DC

3.00 – 6.00 gal/hr  
 420,000 – 840,000 Btu/hr Input

### Fuel Pumps

Single Stage Standard

### Electrical

Power Supply .....13.5Vdc, Operating Load w/igniter on: 30 A, w/igniter off: 25A

Motor .....13.5Vdc, 3850 rpm, 25 Amps

Ignition .....20,000V secondary, Continuous Duty or Interrupted Duty

Note- The electrical specifications shown are maximum current draw; blower wheel and other components will affect current draw.

**Fuels:** Use No.1 or No.2 heating oil (ASTM D-396), Kerosene, Diesel (ASTM D975-18), JP8

### Dimensions (Standard):

Height .....12 1/2"  
 Width .....15 1/2"  
 Depth .....11 1/2"  
 Center Line of Tube to Floor ..... 8 1/16"

### Mounting:

Rigid Flange, Adjustable Flange, or Pedestal Mount



**READ THIS MANUAL BEFORE USING THIS PRODUCT. FAILURE TO FOLLOW THE INSTRUCTIONS AND SAFETY PRECAUTIONS IN THIS MANUAL CAN RESULT IN SERIOUS INJURY OR DEATH. KEEP THIS MANUAL FOR FUTURE REFERENCE. INSTALLER: LEAVE THIS MANUAL WITH THE END USER.**



**INSTALLATION OF THE BURNER MUST BE DONE BY A QUALIFIED INSTALLER IN ACCORDANCE WITH REGULATIONS OF THE NATIONAL FIRE PROTECTION AGENCY, NFPA NO. 31, AND IN COMPLETE ACCORDANCE WITH ALL LOCAL CODES AND AUTHORITIES HAVING JURISDICTION.**

**A QUALIFIED INSTALLER IS THE PERSON WHO IS RESPONSIBLE FOR THE INSTALLATION AND ADJUSTMENT OF THE EQUIPMENT AND WHO IS LICENSED TO INSTALL OIL-BURNING EQUIPMENT IN ACCORDANCE WITH ALL CODES AND ORDINANCES.**

## INSTALLATION LOG

<b>BURNER MODEL:</b>	<b>SPECIFICATION NUMBER:</b>	<b>FUEL:</b>	<b>Nozzle Size and Pattern:</b>
<b>Pump Fuel Pressure (psi):</b>	<b>CO<sub>2</sub> (%):</b>	<b>Smoke Spot:</b>	<b>CO (PPM):</b>
<b>INSTALLER'S NAME:</b>	<b>CONTRACTOR NAME:</b>	<b>CONTRACTOR ADDRESS:</b>	<b>CONTRACTOR PHONE NUMBER:</b>
<b>CONTRACTOR LICENSE #:</b>	<b>DATE OF INSTALLATION:</b>		
<b>COMMENTS ABOUT INSTALLATION/START UP:</b>			

## BURNER/EQUIPMENT SERVICE LOG

SERVICE DATE	TECHNICIAN	COMPANY / ADDRESS	CONTRACTOR LICENSE #	WORK PERFORMED
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**THESE INSTRUCTIONS SHOULD BE AFFIXED TO THE BURNER OR ADJACENT TO THE HEATING EQUIPMENT.**

**Overview of Safety Warning System and Your Responsibilities**

The safety of you and others depends upon you thoroughly reading and understanding this manual. If you have questions or do not understand the information presented in this manual, **please call Wayne Combustion Systems or see [www.waynecombustion.com](http://www.waynecombustion.com).**



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. The meaning of this safety alert symbol is as follows: **Attention! Become alert! Your safety may be at risk. The message that appears next to the warning describes the hazard, which can be either written or pictorially presented. NEVER remove or tamper with the warning labels, safety devices or guards fitted on the unit.**

Wayne Combustion Systems is **NOT** responsible for any bodily injury and/or property damage that may result from operation outside of the stated operating conditions for which this unit was intended.

**Hazard Definitions:**



Indicates a hazardous situation, which, if not avoided, will result in **death or serious bodily injury.**












Indicates a hazardous situation, which, if not avoided, could result in **death or serious bodily injury.**



Indicates a hazardous situation, which, if not avoided may result in **minor or moderate bodily injury.**



Indicates a situation that may result in equipment-related damage.

Hazard Level	Pictogram	Type	Hazard Explanation
		Fire or Explosion	<p>Failure to follow safety warnings exactly could result in serious injury, death or property damage.</p> <p>Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other piece of equipment.</p> <p>Never attempt to use gasoline as a fuel for this burner, as it is more combustible and could result in a serious explosion.</p>
		Electric Shock or Burn	<p><b>High voltages are present in this equipment. Follow these rules to avoid electric shock:</b></p> <ul style="list-style-type: none"> <li>• Use only a properly grounded circuit. A ground fault interrupter is recommended.</li> <li>• Do not spray water directly on burner.</li> <li>• Turn off power before servicing.</li> <li>• Read the owner's manual before using.</li> </ul>
		Overheating	<p><b>Should overheating occur:</b></p> <ul style="list-style-type: none"> <li>• Shut off the manual oil valve on the heating equipment.</li> <li>• Do not shut off the control switch to the pump or blower.</li> </ul>
		Carbon Monoxide Poisoning	<p><b>Carbon monoxide is a colorless, odorless gas that can kill. Follow these rules to control carbon monoxide:</b></p> <ul style="list-style-type: none"> <li>• Do not use this burner if in an unvented, enclosed area. Carbon monoxide may accumulate.</li> <li>• Check flue gases for carbon monoxide. This check requires specialized equipment.</li> <li>• Allow only qualified burner service persons to adjust the burner. Special instruments and training are required.</li> <li>• Read the burner manual before using.</li> </ul> <p><b>CARBON MONOXIDE POISONING:</b> Early signs of carbon monoxide poisoning are similar to the flu with headaches, dizziness, weakness, nausea, vomiting, sleepiness, and confusion. If you suspect carbon monoxide poisoning, get outside to fresh air immediately, and then call 911. Some people are more affected by carbon monoxide than others. These include pregnant women, people with heart or lung disease or anemia, those under the influence of alcohol, and those at high altitudes.</p>
		Proposition 65 material	<p>This product can expose you to chemicals, including lead, nickel, carbon monoxide and sulfur dioxide, which are known to the State of California to cause cancer or birth defects or other reproductive harm. For more information, go to <a href="http://www.p65Warnings.ca.gov">www.p65Warnings.ca.gov</a>.</p>
		Special Requirements	<p>When contacting Wayne Combustion Systems for service information, please have the burner specification and model number when calling or writing. Specification number will be located on a 1" X 2" rectangular sticker on the back of the burner and model number is on the big square sticker that has the manufacturer's logo and contact information. This sticker will be above the specification label.</p>

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Read this manual carefully and in its entirety prior to performing any maintenance or service on the burner.

## GENERAL INFORMATION

### OPERATING VOLTAGE

The EHASR-DC and EH-DC burners covered in this manual typically receive operating voltage from the equipment's dc charging system. These systems are often referred to as "12Vdc systems"; however, the actual voltage may vary between 12.5Vdc and 14Vdc depending on the system and the operating load. Components of the burner may have markings indicating "12Vdc"; however, these components have been designed to operate at the voltage variations provided by the equipment's charging system.

### WARRANTY

Wayne Combustion Systems warrants its burner's specifically to organizations that have purchased it for resale, including your dealer. If you have a problem with your burner, or its installation, you should contact your dealer for assistance. For a full description of the warranty see page 37.

### MAINTENANCE

Wayne Combustion Systems recommends yearly inspection/service of your oil heating system by a qualified service agency or individual.

A qualified service agency or individual must be:

- Licensed or certified to install and provide technical service to oil heating systems.
- Experienced with all applicable codes, standards and ordinances.
- Responsible for the correct installation and commission of the equipment.
- Skilled in using combustion test instruments to adjust and troubleshoot oil burners.

### APPROVALS

This burner is design certified by UL to comply with ANSI/UL Standard 296 and is for use with No. 1 fuel oil or No. 2 fuel oil. All burners must be installed in accordance to the original equipment manufacturers instructions. If installation instructions are not found in the OEM manual, use this manual as a guide and contact the equipment manufacturer for installation help with our burner.

### MANUAL ORGANIZATION

This manual is organized so that the licensed contractor can troubleshoot the burner by working through the **GENERAL TROUBLESHOOTING GUIDE** on page 7. The **GENERAL TROUBLESHOOTING GUIDE** is organized by the performance issue or "problem" requiring attention. Each problem will list potential root causes that may result in the problem listed in order from most likely to least likely, and the solution to correct each root-cause that may be affecting burner performance. The solution listed for each root-cause will reference supplemental information regarding normal burner/component operation and service instructions depending on the problem and root-cause. If this is a new installation see **GENERAL INSTALLATION INFORMATION** on page 22.

### MODEL VARIATIONS

The EHASR-DC burner utilizes unique air cones and oil gun assemblies to optimize burner performance in its rated firing rate range. The air cone is a single piece construction and is fixed to the air tube. The oil gun depth is set in reference to the fixed air cone. The EH-DC burner utilizes a flamelock that is attached to the nozzle adaptor on the oil gun; this allows the burner to have a variable gun depth setting based on the firing rate needed. An EH-DC uses an oil pump that is rated up to 7 gallons per hour to provide the necessary fuel capacity.

### BURNER COMPONENTS

The EHASR-DC and EH-DC model burners are constructed with a 12Vdc solid state igniter. Certain DC burners specifications are built with a timer and flame detecting cad cell that will de-energize the 12Vdc igniter after the presence of flame has been proven. The purpose of the timer is to reduce the overall electrical current consumption of the burner when the power supplied from a generator is limited. The EHASR-DC and EH-DC burners are factory equipped with "Permanent Magnet" motors that utilize a simple brush design making the motor maintenance free. Equipment manufacturers may specify one type of component over another. Please contact Wayne Combustion Systems for assistance with replacement component selection.

# TROUBLESHOOTING



Before troubleshooting, familiarize yourself with the startup procedures and sequence of operation. Check the burner, ignitor, oil primary control (if equipped), and cad cell (if equipped) for proper operation and condition.

## Preliminary Steps

Check the following common causes of issues:

- Wiring connections, fuses, power supply to the burner blower motor, controls, and ignition device.
- Flow switch is closed.
- Thermostat (controller) is calling for heat.
- Contacts between ignition device and electrodes.
- Electrode gap is properly set at nozzle.
- Oil piping to burner and tank is in good condition
- Oil pump pressure.
- Oil nozzle is correctly sized for application.
- Check cad cell location and photo eye cleanliness.

## GENERAL TROUBLESHOOTING GUIDE



The 12Vdc oil primary control is reset by removing power from the white command wire for 2 seconds. Repeated re-start attempts of a non-lighting burner could lead to the buildup of unburned fuel in the combustion chamber. This may cause smoking and possible detonation that will damage the equipment if the burner does light.

Wayne Combustion Systems produces EHASR-DC and EH-DC burners in different variations for multiple OEM manufacturers. When troubleshooting a burner on a piece of equipment, consult your equipment manual for specific troubleshooting information. If the equipment manual is not available, use this general troubleshooting guide.


PROBLEM	POSSIBLE CAUSE	SOLUTION
<b>BURNER WILL NOT LIGHT</b>	Little or no fuel	Fill tank with fuel.
	Improper fuel or water in fuel	Drain fuel tank and fill with proper fuel.
	Limit switch open	Close flow switch or thermostat switch, and check flow switch for proper cycling operation.
	Improper electrode spacing, gap too small or too large	Clean and position electrode tips according to Figure 15 on page 27 or Figure 16 on page 28.
	Plugged fuel filter	Replace as needed.
	Misadjusted burner air bands	Re-adjust air bands for clean burn.

PROBLEM	POSSIBLE CAUSE	SOLUTION
<b>BURNER WILL NOT LIGHT</b> (continued)	Little or no fuel pressure from fuel pump	Increase fuel pressure to manufacturer's specifications. See Figure 25 on page 36 for pump features. Check that the plastic coupler (see Figure 1 on page 13, item 13) is not slipping on pump shaft, replace as needed and/or replace pump.
	Air bubble in pump	Bleed pump (see page 31 for instructions) and check all fuel lines for air leaks, replace lines as needed. See Figure 25 on page 36 for pump features.
	Flex-coupling slipping on fuel pump shaft or burner motor shaft	Replace as needed. See Figure 1 on page 13, Item 13.
	Fuel not reaching combustion chamber	Check fuel system for proper flow going through the burner.
	Clogged burner nozzle	Replace. See page 23 for instructions.
	Low voltage at burner wire leads	Check for proper 13.5Vdc going to the burner
	Fuel solenoid malfunction	Replace as needed. See Figure 1 on page 13 for replacement part.
	Bad connection between drop-out timer and ignition device	All wire contacts should be clean and tight. No breaks in wire insulation, replace as needed. See page 23 for wire size recommendations.
	Drop-out timer sees light in combustion chamber	Disconnect cad cell and test ignition device for proper arc between contacts.
	Faulty drop-out timer	Bypass drop-out timer in the circuit and test for proper arc between contacts. If arc is present replace drop-out timer. See Figure 1 on page 13 for replacement part number.
	Faulty burner ignition device	Test ignition device for proper arc between contacts. Replace as needed. See Figure 1 on page 13 for replacement part.
	Disconnected or short in electrical wiring	All wire contacts should be clean and tight. No breaks in wire insulation, replace as needed. See page 23 for wire size recommendations.
	Oil primary control sees light during safety check and remains in standby mode (Applicable only if burner comes with oil primary control).	Remove power from white command wire for 2 seconds on Wayne 12Vdc oil primary control. Identify control model number and observe burner sequence of operations. If burner remains on standby see <b>Burner does not light, Wayne control remains on standby</b> , on page 10.
	Oil gun depth spaced too far ahead causing electrodes to short to ground through air cone.	Identify burner model and position oil gun depth according to Figure 17 on page 28 and Figure 18 on page 29. See page 28 for instructions.
Heavy sooting on burner electrodes, and air cone causing a weak arc between the electrodes.	Clean as required. Check ceramic for any chips and cracks that could affect arc between the electrodes, replace as required. See Table 2 on page 15 for replacement parts.	
<b>BURNER WILL LIGHT, BUT NOT STAY LIT DURING CALL FOR HEAT</b>	Oil primary control goes into nuisance lockout (Applicable only if burner comes with oil primary control).	Remove power from white command wire for 2 seconds on Wayne 12Vdc oil primary control, observe burner sequence of operations. If burner locks out again see <b>Burner Will Light, But Will Not Stay Lit During "Call For Heat"</b> , on page 11.
<b>BURNER SMOKES</b>	Improper fuel or water in fuel	Drain tank and replace contaminated fuel.
	Improper air adjustment	See page 30 for air band adjustment on burner assembly



<b>PROBLEM</b>	<b>POSSIBLE CAUSE</b>	<b>SOLUTION</b>
<b>BURNER SMOKES</b> (continued)	Low fuel pressure	Increase fuel pressure to manufacturer's specifications. See Figure 25 on page 36 for pump features.
	Air bubble in fuel lines	Check fuel lines for leaks or air bubbles. Tighten or replace as needed.
	Plugged or dirty burner nozzle	Replace burner nozzle. See page 23 for instructions.
	Improper nozzle size installed, nozzle size too big	Contact equipment manufacturer for proper nozzle size, and replace. See page 23 for instructions.
	Heavy accumulation of soot on heat exchanger and burner assembly	Remove burner assembly from heat exchanger. Clean thoroughly.
	Faulty oil nozzle spray pattern	Replace. See page 23 for instructions.
	Misaligned or damaged electrode	Realign electrodes according to Figure 15 or Figure 16 on page 28, and the oil gun depth according to Figure 17 or Figure 18 on pages 29.
	Obstruction in smoke stack	Check for blockage or other foreign objects.
	Scratch along surface of nozzle adapter sealing surface, causing oil to leak and loss of pressure to oil nozzle	See Table 2 on page 15 for replacement part number and replace.
<b>BURNER RUNS CONTINUOUSLY WITHOUT SATISFYING CALL FOR HEAT</b>	Improper fuel or water in fuel	Drain fuel tank and fill with proper fuel.
	Reduced fuel pressure	Check fuel pump pressure. Check that fuel filter is not clogged, replace as necessary. Increase fuel pressure to manufacturer's specifications. See Figure 25 on page 36 for pump features. Replace pump if needed.
	Soot build-up on heat exchanger.	Clean heat exchanger with soot remover.
	Improper burner nozzle installed, nozzle size too small.	Contact equipment manufacturer for proper nozzle size, and replace. See page 23 for instructions.
<b>BURNER RUNS BUT EQUIPMENT IS OVERHEATING</b>	Fuel pump pressure too high	Readjust fuel pressure to equipment manufacturer's specs. See Figure 25 on page 36 for pump features.
	Oil primary control keeps energizing burner past "call for heat". (Applicable only if burner comes with oil primary control).	Identify control model. Replace Control, and wire accordingly to Figure 3 on page 16.
	Faulty fuel pump shut-off valve	Replace fuel pump shut-off valve.
	Defective flow switch or Thermostat	Replace.
	Incorrect fuel nozzle size, nozzle size too big	Contact equipment manufacturer for proper nozzle size, and replace. See page 23 for instructions.
<b>BURNER MOTOR WILL NOT RUN</b>	Faulty oil primary control. (Applicable only if burner comes with oil primary control).	Observe burner sequence of operations. Check voltage going to the burner motor if it does not run during the 15 second trial for ignition, replace control.
	Fuel pump seized	Replace fuel pump. See Figure 1 on page 13 for replacement parts
	Burner fan loose or misaligned	Identify fan part number by measuring the outside diameter of the fan. Then reference Table 1 on page 14 and position the fan spacing according to Figure 26 on page 36 and tighten set screw.
	Defective control switch	Replace switch.
	Loose wire	Check and replace or tighten wiring.

PROBLEM	POSSIBLE CAUSE	SOLUTION
<b>BURNER MOTOR WILL NOT RUN (CONT.)</b>	Defective burner motor	Replace motor.
	Faulty oil primary control. (Applicable only if burner comes with ignition control).	Observe burner sequence of operations. Replace control if necessary
<b>BURNER STAYS ON WHEN NO CALL FOR HEAT</b>	Flow switch defective	Check for proper operation, replace if necessary.
	Fuel solenoid defective	Replace fuel solenoid.



**Troubleshooting tables on pages 10-12 are specific to burners that come equipped with an oil primary control. These sections only apply if the general troubleshooting guide instructs the licensed contractor to consult these sections while servicing the burner.**

**NOTE: This section refers to Wayne 101382 series controls.**

**BURNER DOES NOT LIGHT, 12Vdc WAYNE OIL PRIMARY CONTROL REMAINS ON STANDBY**

Procedure	Corrective Actions
1. Make sure flow switch is closed	-----
2. Check for 13.5Vdc voltage at primary control.	<ul style="list-style-type: none"> <li>• Check battery voltage while equipment is running. There should be 14 volts or higher at the battery and investigate equipment wiring for any crack or tears in the wire insulation.</li> </ul>
3. Check LED light on 101382 control	<ul style="list-style-type: none"> <li>• 101382 red LED flashes for 2 seconds followed by one short 0.5 second flash</li> <li>• Sees external light during safety check or connections are shorted.</li> </ul>
4. Shield cad cell from external light	<ul style="list-style-type: none"> <li>• Identify control model number. Energize white thermostat wire to verify that burner goes through proper sequence of operations.</li> <li>• If burner does not light, replace primary control.</li> </ul>

## BURNER WILL LIGHT, BUT 12Vdc WAYNE OIL PRIMARY CONTROL GOES INTO LOCKOUT

Procedure	Status	Corrective Actions
1. Check for DC voltage at the oil primary control (13.5 volts)	If voltage is good	Go to step 2
2. Check 101382 red LED light on bottom of control	101382 red LED light flashes for 2 seconds, followed by five 0.5 second flash	<ul style="list-style-type: none"> <li>Control is sensing bad flame signal, go to step 4.</li> </ul>
	101382 red LED light is off and the green LED light is illuminated	<ul style="list-style-type: none"> <li>Thermostat or flow switch on piece of equipment could be bad, go to step 3.</li> </ul>
3. Disconnect the white command wire from thermostat and attach it to the red power in wire and energize burner	Burner starts, and stays running.	<ul style="list-style-type: none"> <li>Check thermostat or flow switch circuit.</li> </ul>
	Burner starts, but does not stay running.	<ul style="list-style-type: none"> <li>De-energize burner and disconnect ground connection on battery</li> <li>Check all internal wiring connections according to Figure 3 on page 16.</li> <li>Reconnect ground connector on battery and energize burner</li> <li>If burner does not stay running, replace control</li> </ul>
4. Check that nozzle size is per equipment manufacturer's recommendation	Burner nozzle incorrect.	<ul style="list-style-type: none"> <li>Change nozzle and fuel pressure to factory settings and retest, if burner doesn't stay lit go to step 5</li> </ul>
	Burner nozzle correct	<ul style="list-style-type: none"> <li>Go to step 5</li> </ul>
5. Check that burner air band setting is set up per manufacturer recommendation	Burner air band setting too low.	<ul style="list-style-type: none"> <li>Could cause black puff of smoke on ignition if the fuel-air mixture is too rich.</li> <li>Use a combustion test kit to measure the CO<sub>2</sub> % and smoke spot in the exhaust.</li> <li>Adjust air band opening until CO<sub>2</sub> % measures between 10-12 %, and smoke spot is a 1 or less.</li> <li>If problem persists go to step 6</li> </ul>
	Burner air band setting too high	<ul style="list-style-type: none"> <li>Could cause delayed ignition on burner start-up if the fuel-air mixture is too lean.</li> <li>Use a combustion test kit to measure the CO<sub>2</sub> % and smoke spot in the exhaust.</li> <li>Adjust air band opening until CO<sub>2</sub> % measures between 10-12 %, and smoke spot is a 1 or less.</li> <li>If problem persists go to step 6</li> </ul>
	Burner air band set at manufacturers recommendations	<ul style="list-style-type: none"> <li>Go to step 6</li> </ul>

**BURNER WILL LIGHT, BUT 12Vdc WAYNE OIL PRIMARY CONTROL GOES INTO LOCKOUT**

**(CONT)**

<b>Procedure</b>	<b>Status</b>	<b>Corrective Actions</b>
6. Check cad cell sighting for view of flame. - De-energize burner. - Unplug cad cell and clean face with soft cloth. Check cad cell positioning for view of flame. Place cad cell back in socket. - Re-energize burner.	Burner locks out.	<ul style="list-style-type: none"> <li>• Go to step 7</li> </ul>
	Burner keeps running, until "call for heat" is satisfied.	<ul style="list-style-type: none"> <li>• System is okay.</li> </ul>
7. Check Control & Cad cell. - Remove cad cell wires from connectors on the oil primary control and leave lead wires unconnected. - Energize burner - Place jumper across cad cell terminals after burner motor turns on.	Burner doesn't run.	<ul style="list-style-type: none"> <li>• Replace primary control.</li> </ul>
	Burner runs.	<ul style="list-style-type: none"> <li>• Control is okay, replace cad cell.</li> </ul>

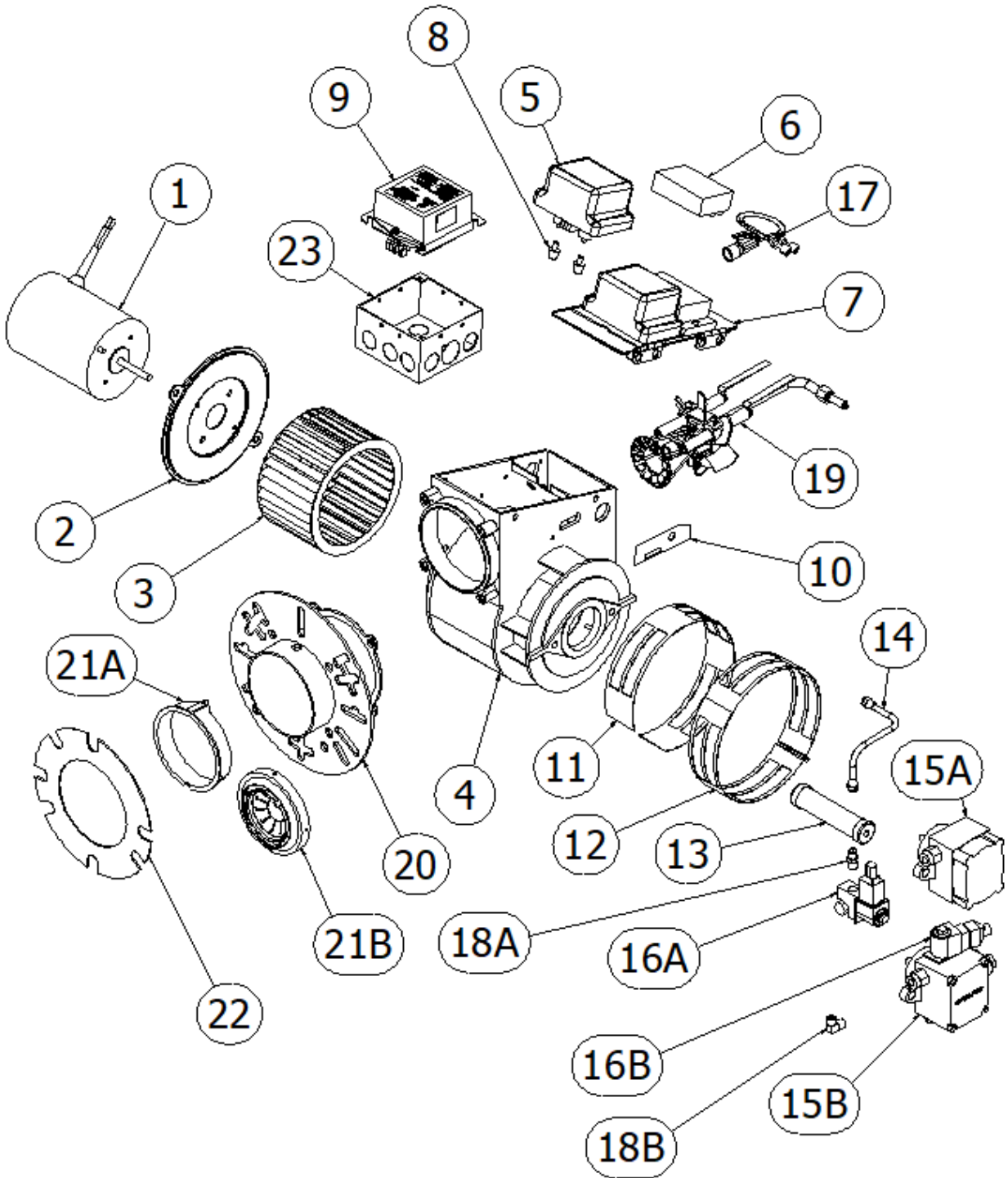


Figure 1- Burner Components – Models EH-DC and EHASR-DC

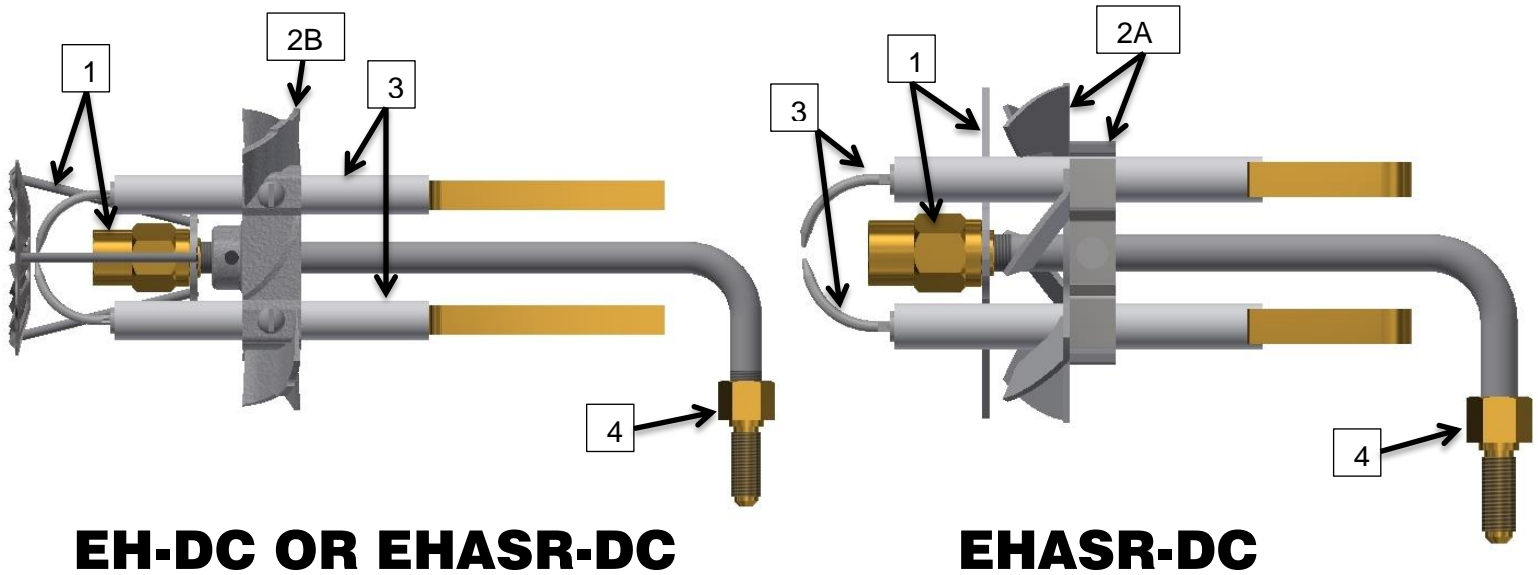
**Table 1- EH-DC and EHASR-DC Replacement Parts**

No.	Description	EH	EHASR
1	13.5Vdc Motor	(See NOTE Below)	
2	Motor Mounting Flange	100891-001	100891-001
3	Blower Wheel Fan	(See NOTE Below)	
4	Burner Housing - Painted	(See NOTE Below)	
5	13.5Vdc Igniter-Solid State	101308-001 101436-001	101308-001 101436-001
6	Igniter Drop-Out Timer Relay	100889-002	100889-002
7 <sub>4)</sub>	Kit-13.5Vdc Igniter plate assembly	101385-SERE	101385-SERE
8	Igniter Contact Springs	100732-001	100732-001
	Igniter Contact Posts	31953-001	31953-001
9	13.5Vdc Wayne Oil Primary Control	(See NOTE Below)	
10	Slot Cover Plate	13392	13392
11	Air Band – Inner 8 Sot	2669-002	2669-002
12	Air Band - Outer 8 Slot	2668-002	2668-002
13	Coupling – MOD E	101320-001	101320-001
14	Oil Line Assembly	14452	14452
15A <sub>3)</sub>	Pump - A2VA-7116	●	13495
	Pump - A2YA-7916	14375	●
15B <sub>2)</sub>	Pump – A2VA-3006/12Vdc SOL.	●	101128-011

No.	Description	EH	EHASR
16A <sub>3)</sub>	12Vdc Solenoid Valve	100610-005	100610-005
16B <sub>2)</sub>	12Vdc Solenoid Valve Coil	100885-003	100885-003
17	Cad Cell 5" Wire	15002	15002
	Cad Cell - Up to 9" Tube	14289-KIT	14289-KIT
	Cad Cell - 12" + Tubes for gun mount	13666-KIT	13666-KIT
18A <sub>3)</sub>	Brass Connector	14222	14222
18B <sub>3)</sub>	Brass Connector 90° Elbow	13494	13494
19	Gun Assembly	(See NOTE Below)	
20	Air Tube/Flange Weldment	(See NOTE Below)	
21A <sub>1)</sub>	Cast Iron - 3 9/16" No Vane	13003	●
	Cast Iron - 3 3/4" No Vane	101366-001	●
21B <sub>1)</sub>	Stainless - SR #3A	●	14159
	Stainless - SR #4A	●	14160
22	Gasket	12484	12484
23	Junction Box	(See NOTE Below)	
Not Shown	Pedestal	2794-011	2794-011

**NOTE: STATE SPECIFICATION NUMBER, BURNER MODEL, PART DESCRIPTION WHEN ORDERING PARTS, THIS DICTATES WHAT PART IS NEEDED FOR YOUR BURNER SPECIFICATION NUMBER**

- 1) Cast Iron Cones - Measure machined ID. Stainless Steel Air Cones - Number/Letter combination stamped into face of outer ring.
  - 2) Item 15B are oil pumps that come with oil solenoid valves already attached, but replacement parts (item 16B) are available for replacing the fuel solenoid coil.
  - 3) Item 15A are oil pumps that do not come with solenoid valves, solenoid valves are optional for these model. If oil pump comes with a solenoid valve (item 16A), item number 18A must be used. If oil pump does not come with a solenoid valve, brass connector elbow 18B must be used.
  - 4) 13.5Vdc Igniter kit assembly includes items 5, 6, 8 and 17 fully assembled on a new burner mounting plate.
- = Item not available for purchase on that specific burner model

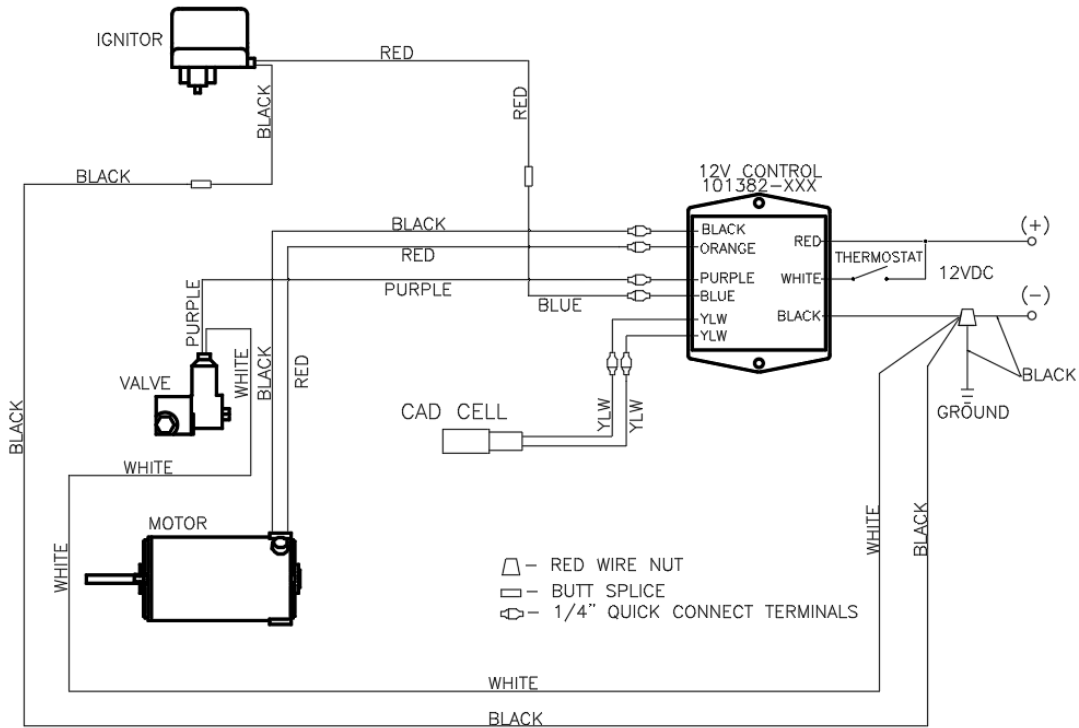


**Figure 2– Oil Gun Assembly Detail View**  
(Parts not necessarily as shown)

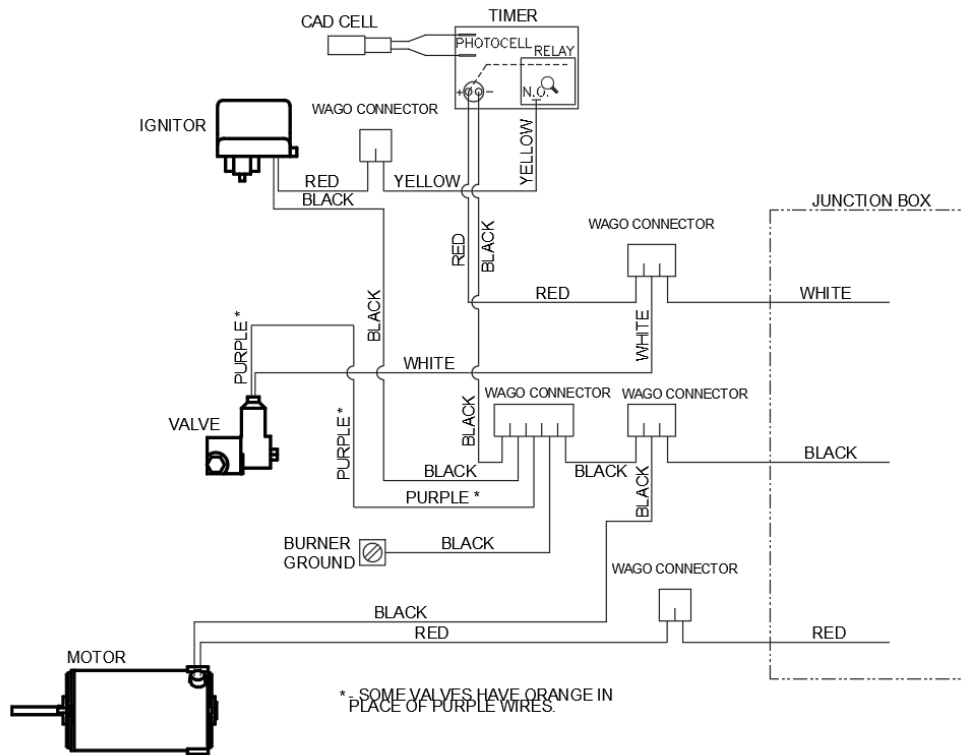
**Table 2- Oil Gun Replacement Parts**

No.	Part Description	EH-DC	EHASR-DC
1	Nozzle Adaptor/Flame lock/Tripod Assembly	100427-SER	12988-002
2A	Stamped Stabilizer Support Kit	21923-001	21923-001
2B	Cast Stabilizer Support Kit	21408-SER	21408-SER
3	Stem/Insulator Kit	13286	13286
4	Oil Pipe Fitting	14295-002	14295-002

# WIRING DIAGRAMS

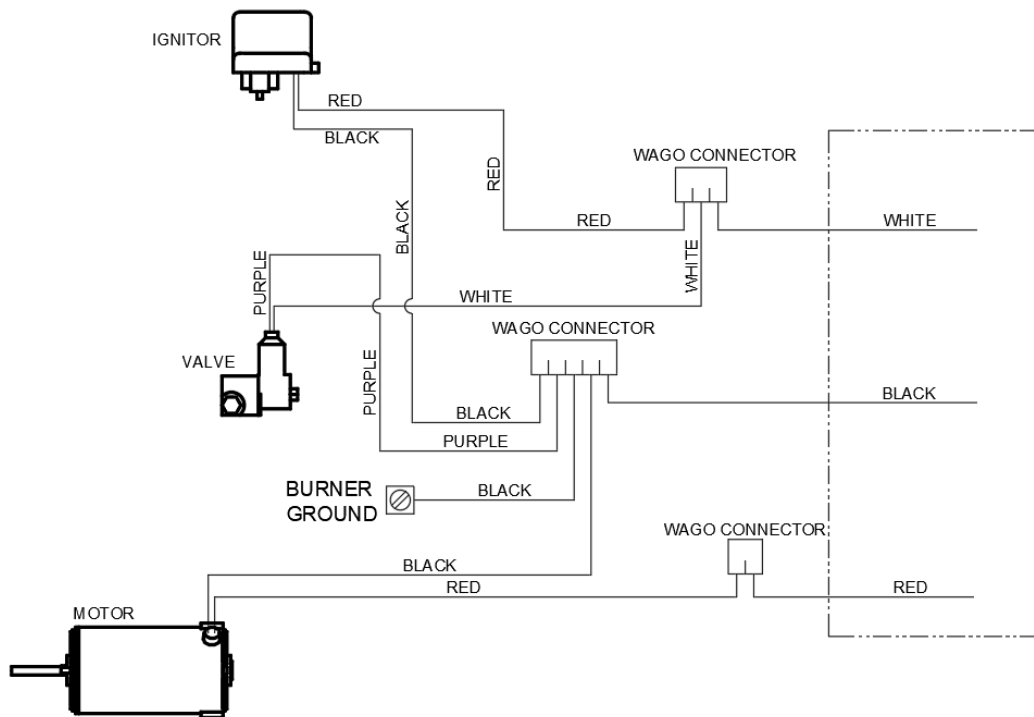


**Figure 3- Wiring Diagram for EH-DC and EHASR-DC burner with Wayne 12Vdc Oil Primary Control**



**Figure 4- Wiring Diagram for 12Vdc EH-DC & EHASR-DC burner with Igniter Drop-Out Timer (Interrupted Ignition)**





**Figure 5- Wiring Diagram for 12Vdc EH-DC & EHASR-DC burner without Igniter Drop-Out Timer (Igniter-Continuous Duty)**

## WAYNE 12Vdc OIL PRIMARY CONTROL



**Figure 6- Wayne 101382 series 12Vdc Oil Primary Control**

### OIL PRIMARY CONTROL FEATURES

The 12Vdc Wayne 101382 series oil primary control is an option used on 12Vdc oil burners. The 12Vdc oil primary control is used with a cad cell flame sensor to control the oil burner's sequence of operation. The 101382 series control is equipped with one of three different timings and features. The 101382-001 is the standard control, the 101382-002 is designed for quick starts when used on a pressure washer, and the 101382-003 is equipped with a post-purge feature see sequence of operation for details on each one. All oil primary controls are potted and sealed to protect against harsh operating environments. The oil primary control has built in over-current protection to protect the oil burner from component failure. The oil primary control comes equipped with diagnostic LED lights to indicate system status and assist in troubleshooting. See fault chart for a list of fault codes while troubleshooting oil primary control.

## OIL PRIMARY CONTROL FAULT CHART

**Table 3- Oil Primary Control Fault Chart**

RED LED FAULT CODE	FAULT DESCRIPTION	CORRECTIVE ACTION
Long flash followed by 1 short flash	Cad cell is exposed to light	See page10
Long flash followed by 2 short flash	Igniter output internal short	Replace control
Long flash followed by 3 short flash	Fuel Solenoid output internal short	Replace control
Long flash followed by 4 short flash	Motor output internal short	Replace control
Long flash followed by 5 short flash	No ignition detected, lockout	See page 11
Long flash followed by 6 short flash	Solenoid valve shorted to ground	See page 7
Long flash followed by 7 short flash	Igniter shorted to ground	See page 7
Long flash followed by 8 short flash	Motor shorted to ground	See page 7

Note- Long flash is 2 second long and short flashes are ½ second long. Fault codes will flash on/off continuously until voltage is removed from the white command wire.

## SEQUENCE OF OPERATION: BURNERS WITH WAYNE 12Vdc OIL PRIMARY CONTROL 101382-001

### BURNER OPERATION

On every call for heat the oil primary control performs an internal safety check; verifying the cad cell is not registering a false flame signal. Completing a successful check, the burner's blower motor is energized; after 3 seconds the ignition device is energized, and in another 3 seconds the fuel solenoid is energized which begins the 15 second trial for ignition. Once flame is established the oil primary control will monitor the presence of flame by using the cad cell's resistance signal. The igniter is de-energized 15 seconds after a flame signal has been proven. Burner operation will continue until power is removed from the white command wire on the oil primary control. When power is removed from the white command wire the burner solenoid is de-energized and the motor will perform a 30 second post-purge before shutdown. If the presence of a flame is not detected during the trial for ignition, the oil primary control will go into a "lock-out" condition. If this occurs, proceed to the section titled SAFETY LOCK-OUT TIME.

### SAFETY LOCK-OUT TIME

Ignition failure occurs during the first "trial for ignition" period

The cad cell monitors the combustion chamber for a presence of flame during the burner's trial for ignition period. If the presence of a flame is not detected the oil primary control will go into a lockout condition. When the oil primary control goes into lockout it will de-energize the burner, and the control's red LED light located on the bottom of the control will flash for 2 seconds followed by five short 0.5 second flashes. The red LED will repeat this sequence until the control is reset. Remove power from the white command wire for 2 seconds to reset the control. If normal ignition does not occur see **GENERAL TROUBLESHOOTING GUIDE** on page 7.



Repeated re-start attempts of a non-lighting burner could lead to the buildup of un-burned fuel in the combustion chamber. This may cause smoking and possible detonation that will damage the equipment if the burner does light.

Intermittent flame failure occurs during a "call for heat"

If the oil primary control stops sensing the presence of a flame after the signal has been proven and the trial for ignition timer has expired, the oil primary control will re-energize the ignition device. The oil primary control then enters another "trial for ignition" period. If flame signal is proven during the trial for ignition, and lost after the trial for ignition timer expires the control will go into another "trial for ignition" period. If no flame is proven during the trial for ignition period the control will go into a lockout condition. If normal ignition does not occur see **GENERAL TROUBLESHOOTING GUIDE** on page 7.

# SEQUENCE OF OPERATION: BURNERS WITH WAYNE 12Vdc OIL PRIMARY CONTROL 101382-002

## BURNER OPERATION

On every call for heat the oil primary control performs an internal safety check; verifying the cad cell is not registering a false flame signal. Completing a successful check, the burner's blower motor is energized; after 1 second the ignition device and fuel solenoid are energized which begins the 15 second trial for ignition. Once flame is established the oil primary control will monitor the presence of flame by using the cad cell's resistance signal. The igniter is de-energized 15 seconds after a flame signal has been proven. Burner operation will continue until voltage is removed from the white command wire on the oil primary control. When voltage is removed from the white command wire the burner solenoid is de-energized. If the presence of flame is not detected during the trial for ignition, the oil primary control will go into a "lock-out" condition. If this occurs, proceed to the section titled SAFETY LOCK-OUT TIME.

## SAFETY LOCK-OUT TIME

Ignition failure occurs during the first "trial for ignition" period

The cad cell monitors the combustion chamber for a presence of flame during the burner's trial for ignition period. If the presence of a flame is not detected the oil primary control will go into a lockout condition. When the oil primary control goes into lockout it will de-energize the burner, and the control's red LED light on the bottom of the control will flash for 2 seconds followed by five short 0.5 second flashes. The red LED will repeat this sequence until the control is reset. Remove power from the white command wire for 2 seconds to reset the control. If normal ignition does not occur see **GENERAL TROUBLESHOOTING GUIDE** on page 7.



Repeated re-start attempts of a non-lighting burner could lead to the buildup of un-burned fuel in the combustion chamber. This may cause smoking and possible detonation that will damage the equipment if the burner does light.

Intermittent flame failure occurs during a "call for heat"

If the oil primary control stops sensing the presence of a flame after the signal has been proven and the trial for ignition timer has expired, the oil primary control will re-energize the ignition device. The oil primary control then enters another "trial for ignition" period. If flame signal is proven during the trial for ignition, and lost after the trial for ignition timer expires the control will go into another "trial for ignition" period. If no flame is proven during the trial for ignition period the control will go into a lockout condition. If normal ignition does not occur see **GENERAL TROUBLESHOOTING GUIDE** on page 7.

# SEQUENCE OF OPERATION: BURNERS WITH WAYNE 12Vdc OIL PRIMARY CONTROL 101382-003

## BURNER OPERATION

On every call for heat the oil primary control performs an internal safety check; verifying the cad cell is not registering a false flame signal. Completing a successful check, the burner's blower motor is energized, after 10 seconds the ignition device is energized and in another 3 seconds the fuel solenoid is energized which begins the 15 second trial for ignition. Once flame is established the oil primary control will monitor the presence of flame by using the cad cell's resistance signal. The igniter is de-energized 15 seconds after a flame signal has been proven. Burner operation will continue until voltage is removed from the white command wire on the oil primary control. When voltage is removed from the white command wire the burner solenoid is de-energized and the motor will run a 2 minute post-purge cycle before de-energizing. If voltage is re-applied to the white command wire during the motor 2 minute post-purge the control will restart the sequence of operations as described before. If the presence of flame is not detected during the trial for ignition, the oil primary control will go into a "lock-out" condition. If this occurs, proceed to the section titled SAFETY LOCK-OUT TIME.

## SAFETY LOCK-OUT TIME

Ignition failure occurs during the first "trial for ignition" period

The cad cell monitors the combustion chamber for a presence of flame during the burner's trial for ignition period. If the presence of a flame is not detected the oil primary control will go into a lockout condition. When the oil primary control goes into lockout it will de-energize the burner, and the control's red LED light on the bottom of the control will flash for 2 seconds followed by five short 0.5 second flashes. The red LED will repeat this sequence until the control is reset. Remove power from the white command wire for 2 seconds to reset the control. If normal ignition does not occur see **GENERAL TROUBLESHOOTING GUIDE** on page 7.



Repeated re-start attempts of a non-lighting burner could lead to the buildup of un-burned fuel in the combustion chamber. This may cause smoking and possible detonation that will damage the equipment if the burner does light.

Intermittent flame failure occurs during a "call for heat"

If the oil primary control stops sensing the presence of a flame after the signal has been proven and the trial for ignition timer has expired, the oil primary control will re-energize the ignition device. The oil primary control then enters another "trial for ignition" period. If flame signal is proven during the trial for ignition, and lost after the trial for ignition timer expires the control will go into another "trial for ignition" period. If no flame is proven during the trial for ignition period the control will go into a lockout condition. If normal ignition does not occur see **GENERAL TROUBLESHOOTING GUIDE** on page 7.

# SEQUENCE OF OPERATION: BURNER WITH DROP-OUT TIMER

## BURNER OPERATION

When the burner is built with a drop-out timer according to Figure 4 and voltage is applied across the red and black wire leads the burner blower motor will be energized. When voltage is applied to the white wire lead the ignition device and fuel solenoid will be energized. If the presence of a flame is proven, the drop-out timer is triggered to start a 3 second count-down to de-energize the ignition device. If the drop-out timer does not receive a good flame signal it will not de-energize the ignition device. If it loses the flame signal while the ignition device is de-energized it will re-energize the igniter. If any problems arise during ignition or continued operation of the burner see the **GENERAL TROUBLESHOOTING GUIDE** on page 7.

# SEQUENCE OF OPERATION: BURNER WITHOUT CONTROL OR DROP-OUT TIMER

## BURNER OPERATION

If the burner is controlled by a flow switch on the incoming power line to the burner, the operation of the burner is a simple ON/OFF mechanism, where all the burner components will be energized to fire the burner. If any problems arise during ignition or continued operation of the burner see the **GENERAL TROUBLESHOOTING GUIDE** on page 7.

## OPERATIONAL CHECK OF BURNER



Make sure combustion chamber is free of oil or oil vapor before starting system.

### START SYSTEM

- Open hand valve in oil supply line.
- Make sure system is electrically energized, check fuses, and activate burner switch if provided.
- Energize the white command wire on the oil primary control (if equipped).
- Burner should light and operate until call for heat is satisfied.

### CHECK SAFETY FEATURES

#### Simulate flame failure

- Follow starting procedures to turn on burner.
- Close hand valve on supply line, stopping fuel delivery to the burner.
- The oil primary control should lockout after control's trial for ignition timer expires. The burner blower motor and ignition device should stop, and the solenoid valve should close.

#### Simulate ignition failure

- Close hand valve on supply line, stopping fuel delivery to the burner.
- Follow starting procedures to turn on burner.
- Oil primary control should lockout after control's trial for ignition timer expires. The burner blower motor and igniter should stop, and the solenoid valve should close.

#### Simulate power failure

- With burner running, turn off power supply to the system.
- Burner should stop.
- Restore power, burner should start.

If system does not operate as described, proceed to **GENERAL TROUBLESHOOTING GUIDE** on page 7.

## GENERAL INSTALLATION INFORMATION

When installing the burner, be sure to provide adequate space for easy service and maintenance. Prior to installation of the oil burner, the heating system should be carefully inspected for defects and cleanliness. The flue passages and heat absorbing surfaces must be clean to ensure maximum heat transfer. Soot acts as an insulator, which decreases the transfer of heat. The combustion chamber, flue gas passages, and openings must be tightly sealed to eliminate air infiltration. Excess air cools the flame and thus lowers efficiency. Inspect the flue for leaks and obstructions.

### COMBUSTION CHAMBER

The purpose of a combustion chamber is to maintain a high flame temperature by reflecting the heat back into the flame. A high flame temperature assures higher combustion efficiency and lower stack losses. It is important to select and install the correct nozzle size for a given combustion chamber size (see Table 5 on page 35). On all oil burners the atomized oil must not touch the sides or bottom of the combustion chamber or incomplete combustion will occur leading to smoke and soot build-up. To reduce smoke while the burner is running, the burner must have an adequate supply of combustion air by having a large enough opening on the air band assembly. If too much air is utilized it can lead to high gas exhaust temperatures, and lower combustion efficiency. Install the burner according to the equipment manufacturer's guidelines.

### FUEL PUMPS

Model EHASR-DC and EH-DC oil burners are provided with single stage 3450 RPM fuel pumps with the by-pass plug removed for a single pipe installation. This is satisfactory where the fuel supply is on the same level, or above burner, permitting gravity flow of oil.

#### **NOTICE**

Never exceed 3 PSI pressure to the suction side of the fuel pump. A pressure over 3 PSI may cause damage to the shaft seal and allow it to leak oil.

When it is necessary to lift the oil to the burner, a return line should be run between the fuel pump and oil tank. (If lift exceeds 10 feet, a two stage fuel pump must be used with a return line). When a two line installation is made, the by-pass plug must be installed. This is supplied with the burner attached to fuel pump, along with a pump data sheet in a plastic bag.

#### **NOTICE**

Do not install by-pass plug if running single pipe operation, this will over-pressurize the pump causing an oil leak at the pump shaft seal.

### FUEL LINES

Replace fuel lines with parts approved by the equipment manufacturer. Be sure that all connections are air-tight. Check all connections and joints. Flared fittings are recommended. Do not use compression fittings. Avoid using fittings in inaccessible locations. Install an UL certified oil filter of adequate size for all installations.

### FUEL TANKS



Check existing tanks for water and sludge accumulation; clean if necessary. Also clean or replace existing piping.

## ELECTRICAL WIRING OF BURNER


Refer to the equipment manufacturer's manual for wiring of the burner into the piece of equipment. If burner is correctly wired according to the equipment manufacturer's manual and the burner is not working refer to wiring diagrams Figure 3, Figure 4 and Figure 5 on pages 16 & 17 for internal wiring of the burner.

For line voltage wiring to the burner use copper conductor wire not lighter than #12 AWG. If a fused disconnect is used, it should be sized for a minimum of 30 amps.

If the oil burner comes equipped with an oil primary control, the burner will have a white command wire that will be wired in series to a manual switch or limit switch. If this circuit is closed and complete it will energize the ignition device and fuel solenoid. The burner is controlled by the piece of equipment. When the piece of equipment calls for heat, verify that the equipment is controlling the burners on/off operation. When connecting the burner to the DC power supply, utilize the knockout provided on the burner's junction box for field wiring connections.

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



If any of the original burner wiring must be replaced, it must be replaced with #14 AWG 105°C wire or equivalent

## NOZZLE AND AIR CONE SELECTION

The EHASR-DC and EH-DC oil burners typically fire well with a solid or semi-solid nozzle with a spray angle of 80, 70, or 60 degrees. Generally the use of an 80 degree solid nozzle is a good starting point. Always use the proper nozzle size, spray cone type and spray angle the equipment manufacturer recommends. Should this information not be available, your own good judgment will prevail. Under no circumstances attempt to fire the EHASR-DC oil burners under their 0.75 gal/hr minimum input rating or over their 3.00 gal/hr maximum input rating. Under no circumstances attempt to fire the EH-DC oil burner under its 3.00 gal/hr minimum input rating or over its 6.00 gal/hr maximum input ratings. Consult Table 5 on page 35 for air cone recommendations for a given firing rate.

## NOZZLE INSTALLATION

In order to install or change the nozzle, the oil gun assembly needs to be removed from the burner. The EHASR-DC and EH-DC burners has an arrow decal that lines up with the leading edge of the oil gun slot cover plate. This will help with re-installing the oil gun in the proper position once the nozzle has been installed. See Figure 7 for part identification.

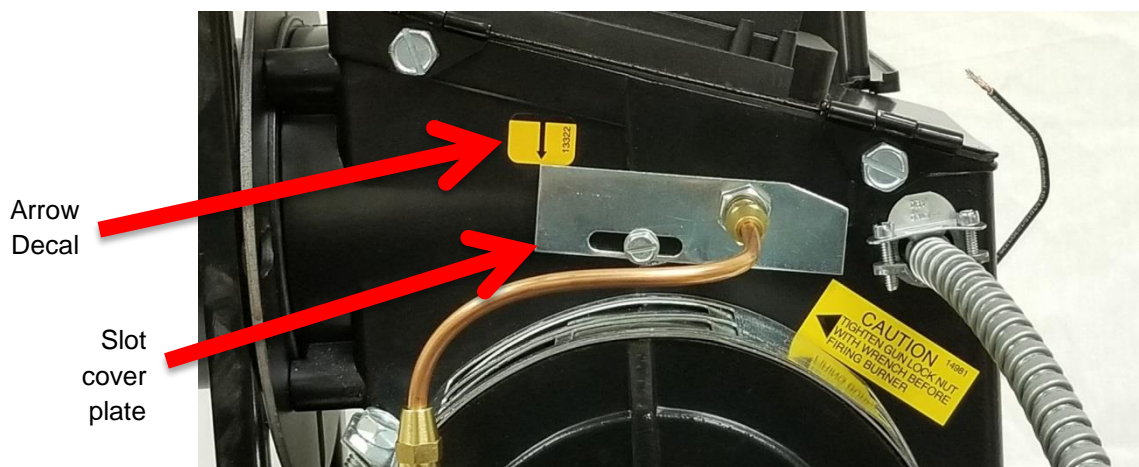
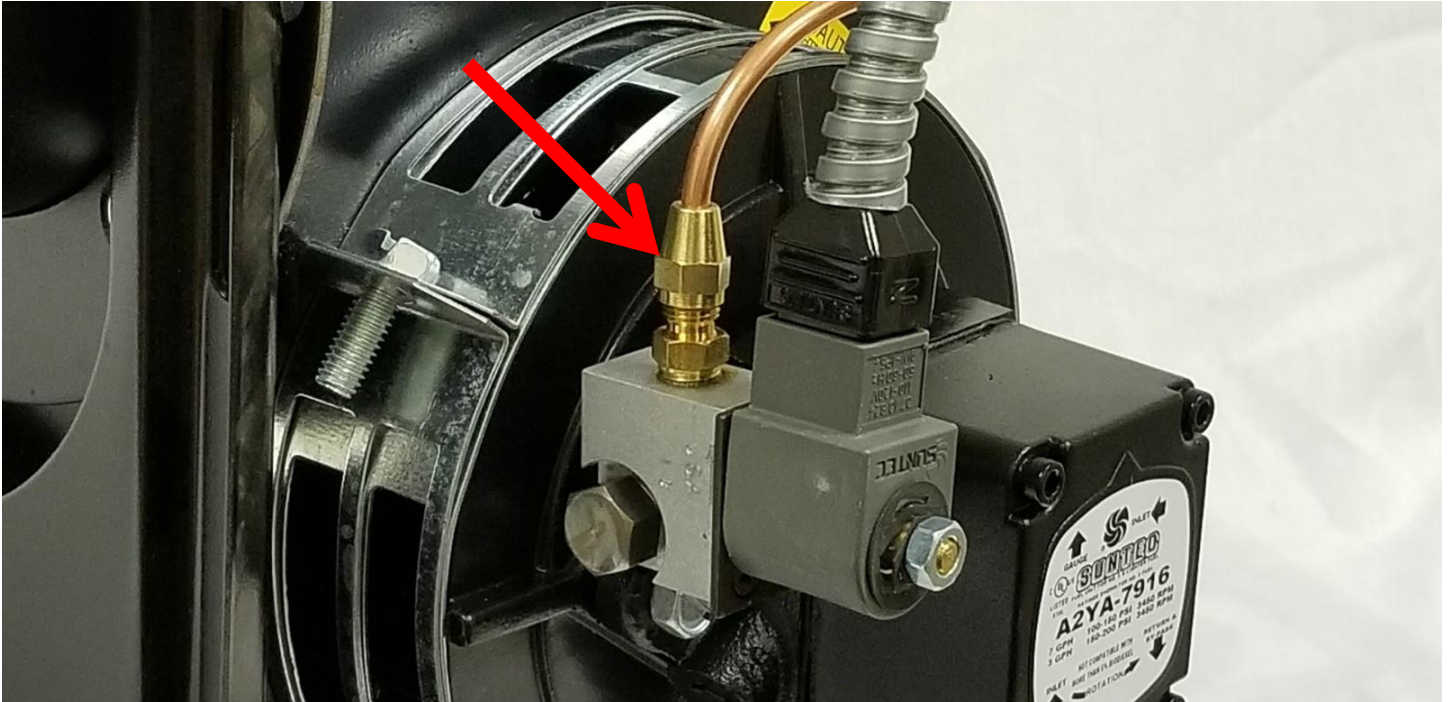


Figure 7– Side View of Oil Gun Slot Plate Cover

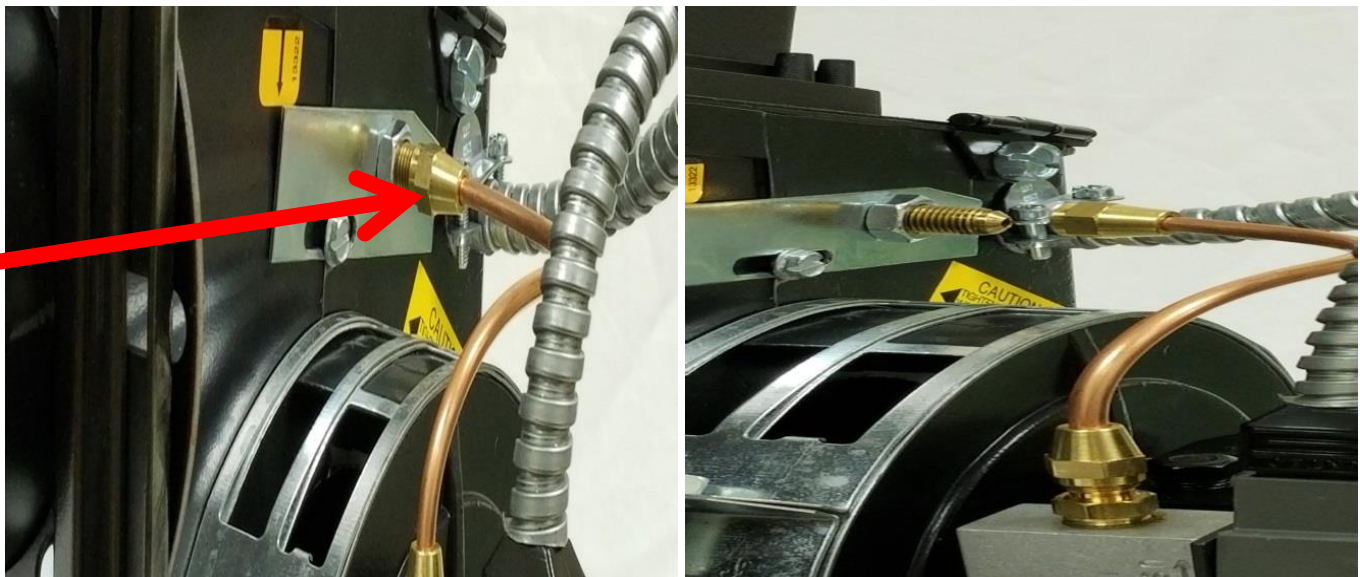
1. Locate the slot plate cover, loosen the brass oil assembly nut with a 7/16 inch wrench at the connection with the brass fitting on the solenoid valve, but do not remove all the way. (Figure 8 on page 24).

Note-For pumps with combination solenoid valves disconnect the oil line from the brass elbow fitting installed in the nozzle port of the pump.



**Figure 8- Oil Line Assembly Fitting**

2. Loosen and disconnect the brass nut of the copper oil line assembly from the oil gun assembly fitting and rotate the oil line out of the way (Figure 9).



**Figure 9- Oil Line Removal**

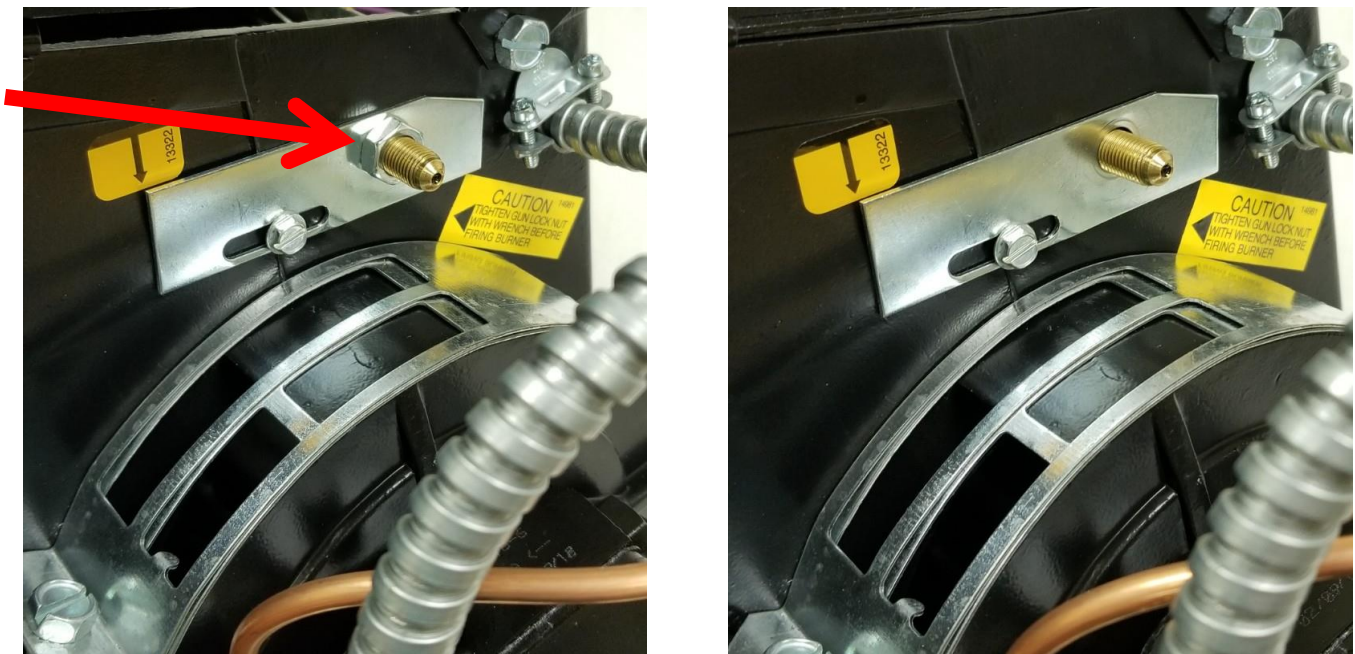


3. Next loosen the ignition device mounting plate clip screw by using a flat head screwdriver, move the hold down clip off of the mounting plate, this will allow the igniter device assembly to swing open to the left. Leave the plate in the closed position (Figure 10).



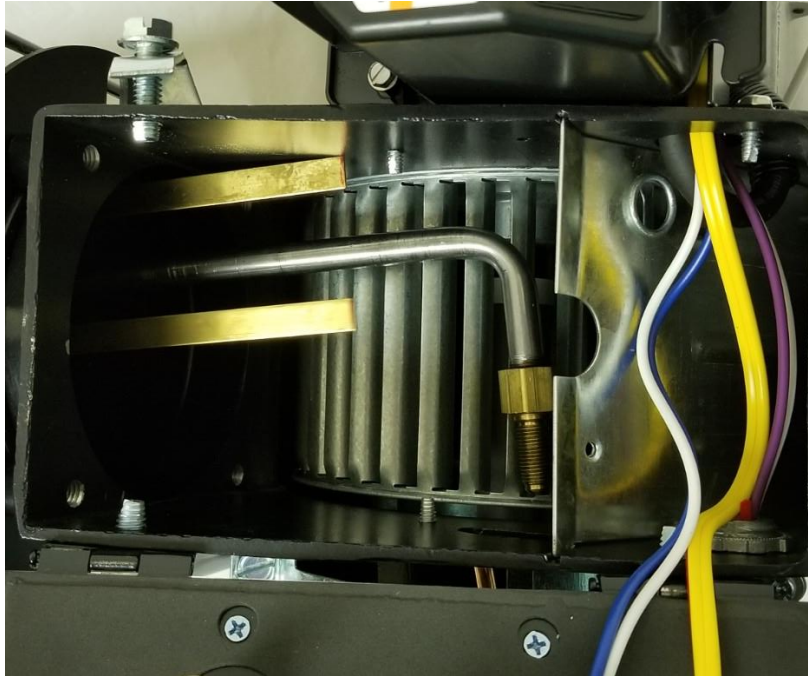
**Figure 10- Ignitor mounting plate screw removal**

4. Using a 9/16 inch wrench loosen and remove the oil gun assembly locknut (Figure 11).



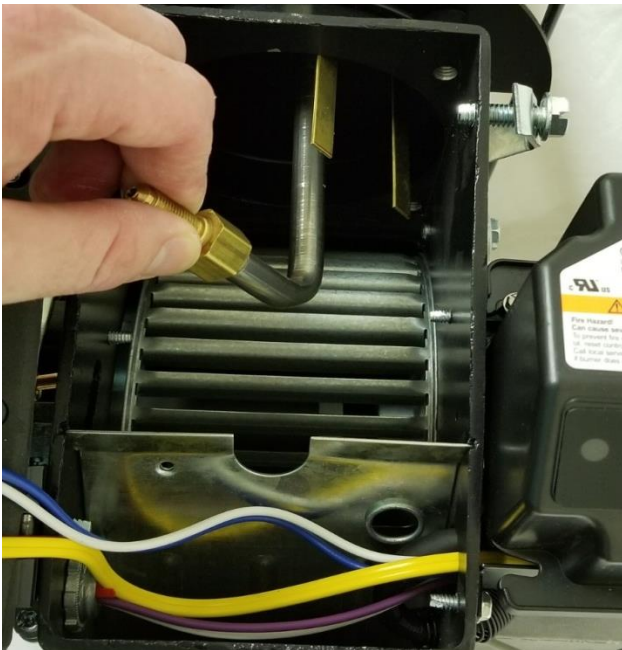
**Figure 11- Oil Gun Lock Nut Removal**

5. Now grasp the rear of the oil gun assembly where the oil line fitting adapter exits through the housing and pull the oil gun to the right out of the housing slot and the slot plate cover (Figure 12).




**Figure 12- Oil Gun Removal**

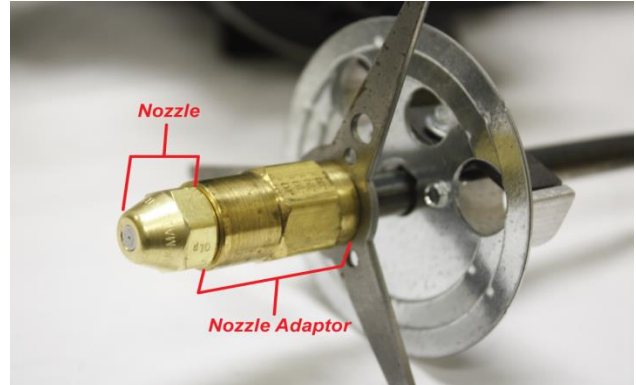
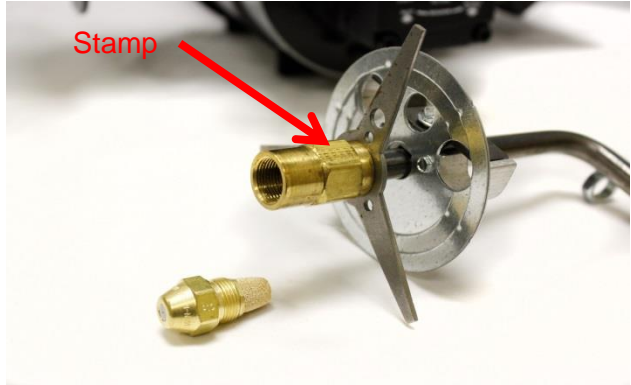
6. While rotating the oil line fitting adapter up at a 45 degree angle, gently lift, but do not force, the entire gun assembly out of the housing opening (Figure 13).



**Figure 13- Oil Gun Removal (Continued)**

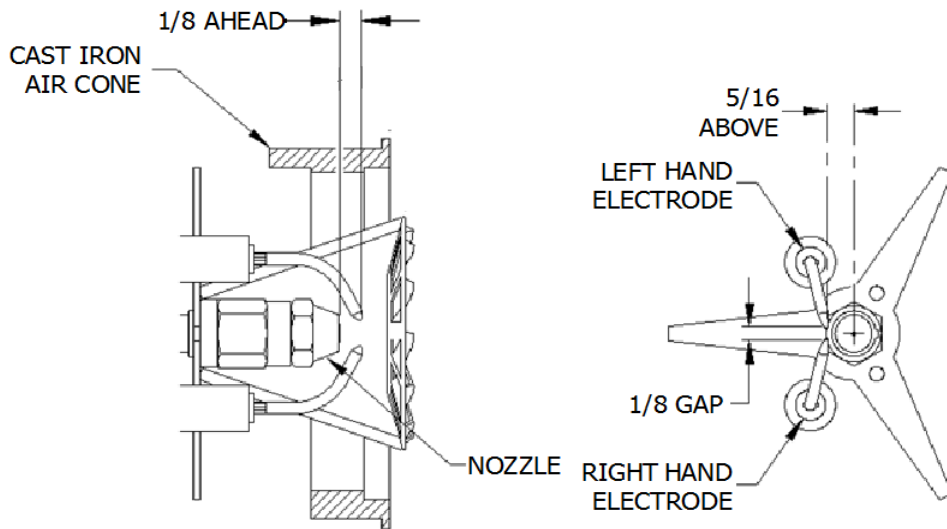
7. Thread the nozzle into the nozzle adaptor finger tight, then tighten the nozzle securely with a 5/8" wrench, while using a 3/4" backing wrench to hold the nozzle adaptor. Do not over tighten. There is a brass stamp that reads "TOP" on the nozzle adaptor that should be orientated up (Figure 14).

	<p>DO NOT touch the new nozzle's filter or touch the face of the nozzle. Oil from your fingers on either surface can adversely affect nozzle performance</p>
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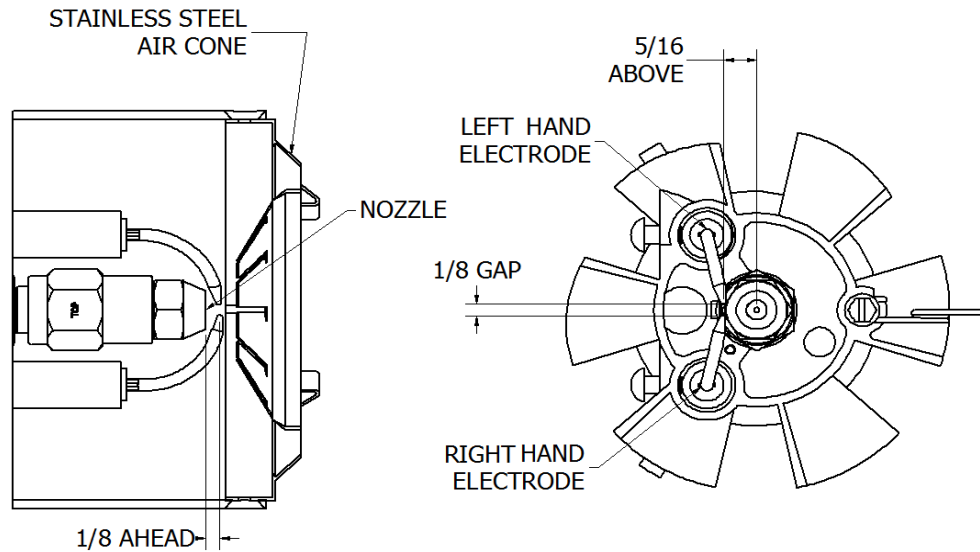


**Figure 14- Oil Gun Nozzle Installation (Flamelock and electrodes removed for clarity).**

8. Identify which burner model you have, then measure and verify that the electrode spacing is per Figure 15 or Figure 16 on pages 27-28, if not correct to factory settings.



**Figure 15–EH-DC Electrode Positions, Factory settings**



**Figure 16–EHASR-DC Electrode Positions, Factory settings**

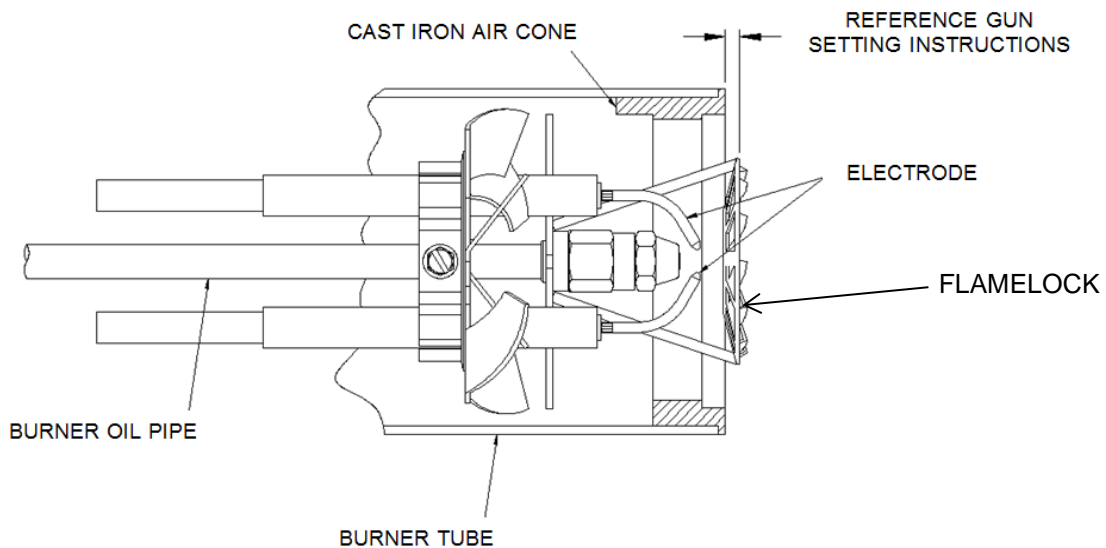
9. At this time position the gun assembly back into the housing in reverse sequence that gun assembly was removed in, while taking care not to disrupt the electrode spacing.

Note: Re-measure electrodes gap after installing gun assembly in burner to verify that the position has not shifted

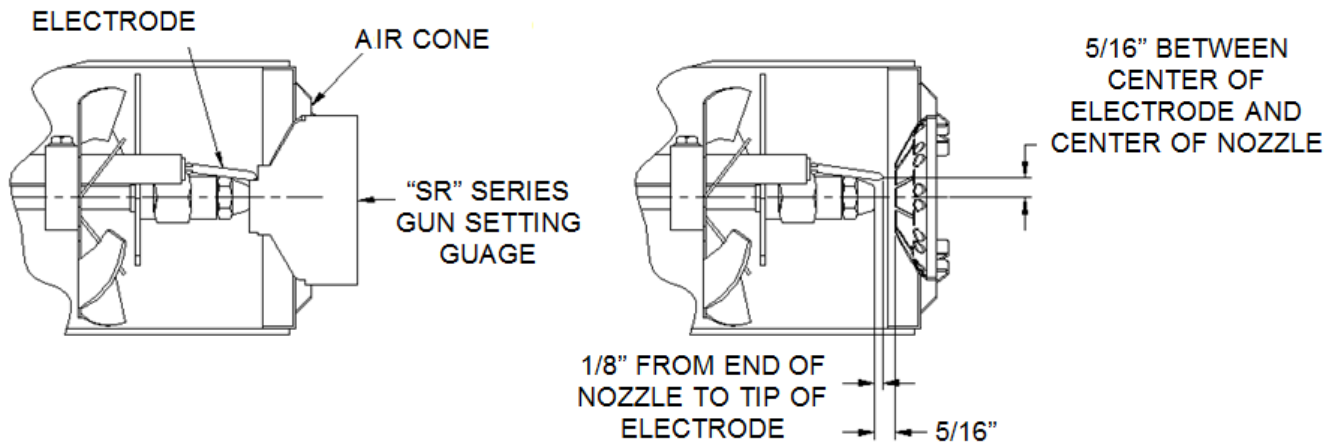
## SETTING GUN DEPTH

For the oil burner to function properly the distance between the nozzle and the air cone needs to be maintained as shown in Figure 17 & Figure 18 on pages 28-29.

**Suggested startup setting:** EH-DC Flamelock 1/8" ahead of cast iron cone face for 3.00 to 4.50 gal/hr or 1/4" ahead for 4.50 to 6.00 gal/hr

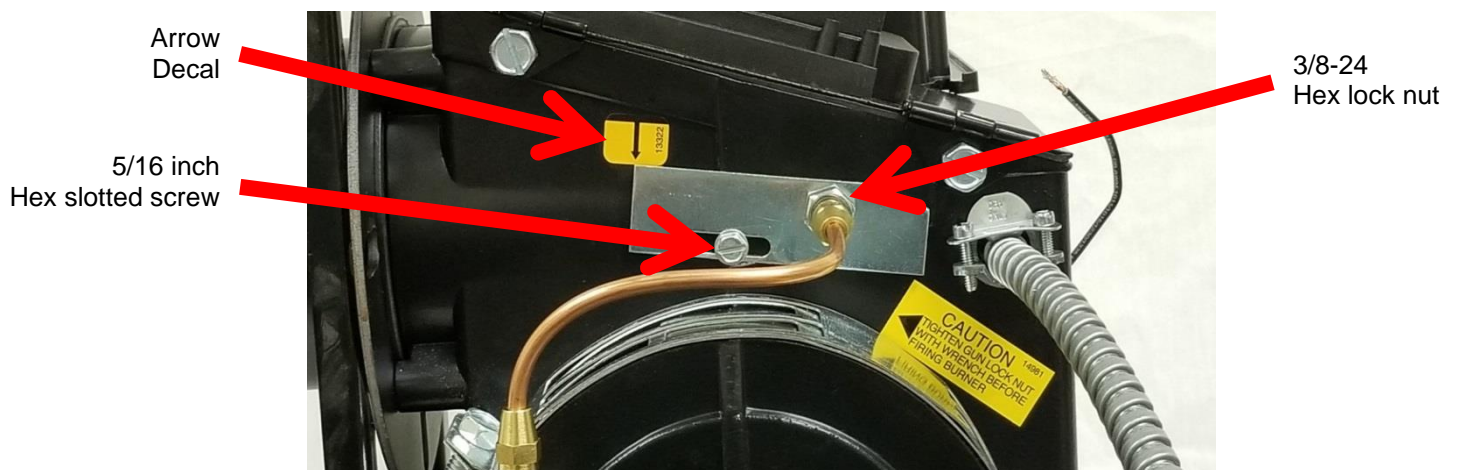


**Figure 17- EH-DC Gun Depth Settings**



**Figure 18– EHASR-DC Gun Depth Settings**

1. Identify which E burner model you have and set the gun depth accordingly.
2. To position the gun assembly forward or backwards, loosen the gun assembly 3/8-24 hex lock nut with a 9/16 inch wrench and the 5/16 inch hex slotted slot cover screw as shown in Figure 19.



**Figure 19– EH-DC/EHASR-DC Oil Gun Depth Adjustment**

3. Once in the required position per Figure 17 and Figure 18, retighten the hex lock nut and slot cover screw, move and align arrow decal with slot plate cover.

**NOTICE**

Close the ignition transformer and assure there is a positive spring contact with the brass buss bars. Take care not to pinch the ignition transformer lead wires between the housing and cover plate. Reinstall the igniter plate hold down clip and tighten the 5/16-18 hex slotted screw securely.

## STARTING PROCEDURE

### STARTING BURNER

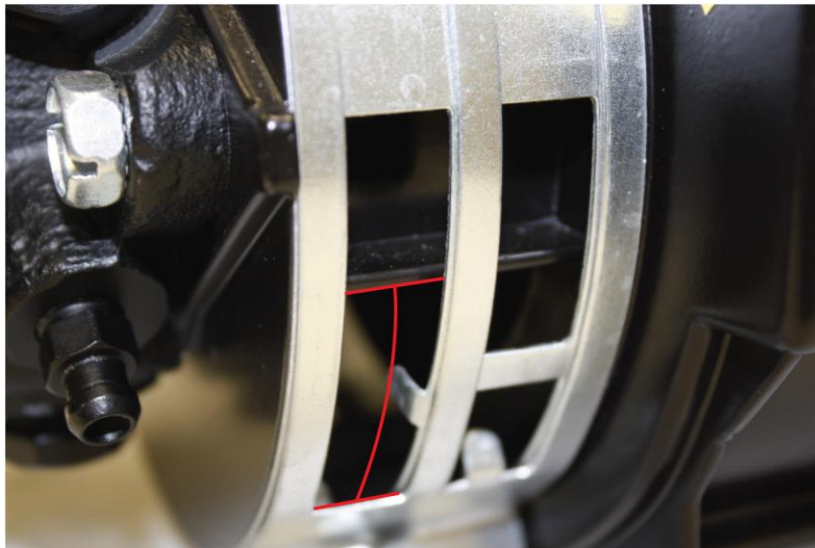
Be sure that the starter switch on the equipment is in the “OFF” position, set the thermostat to a temperature substantially above room temperature, and ensure the oil tank is filled, all valves are open, and controls set for operation. Adjust air supply on burner by loosening screw on interlocking air bands, and open the air band until black smoke is eliminated on start-up (see Figure 20).



Air Band  
Adjustment  
Screw

**Figure 20– Air Band Adjustment Screw Location**

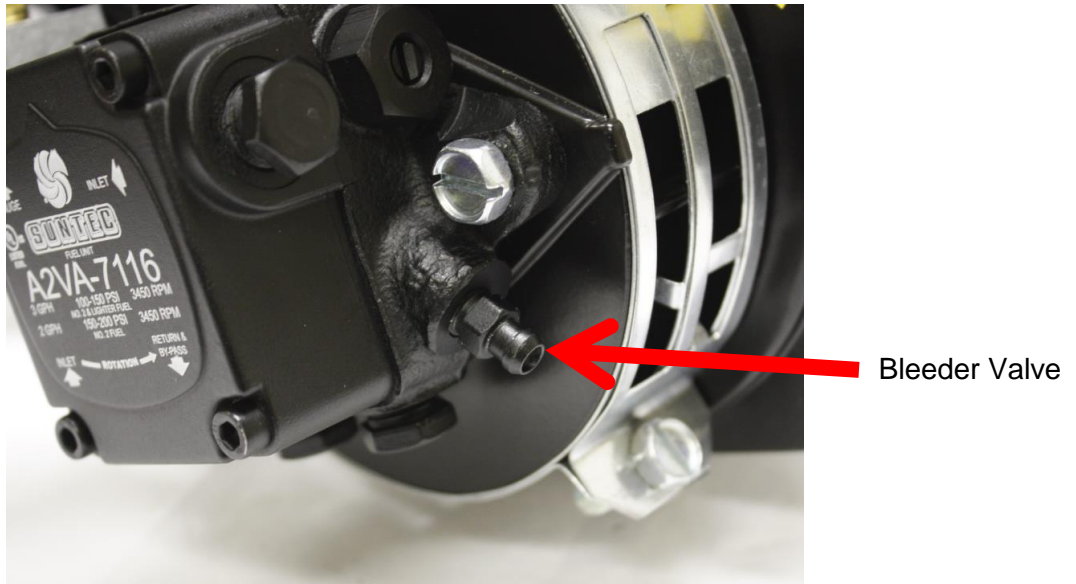
Once black smoke is eliminated measure the air band open according to Figure 21 with a ruler and mark it down in the notes of this manual for the next service.



**Figure 21– Air Band Opening**

Open the ignition device mounting plate and turn on the burner switch if one is present.

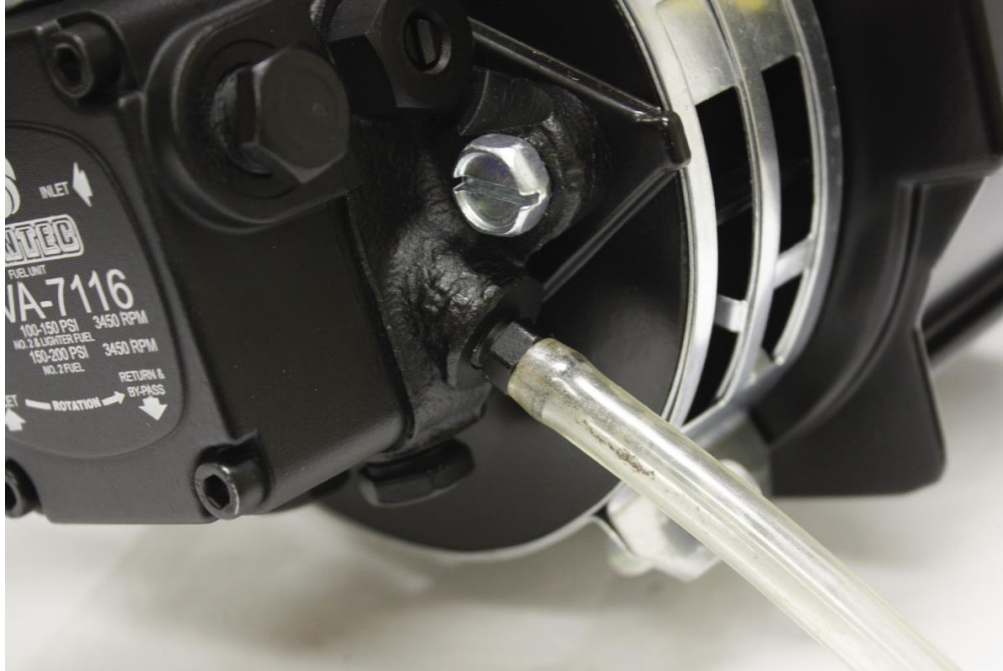
Next, bleed the pump by following steps 1-3 before starting the burner. See Figure 22 for the location of the bleeder valve on the pump.



**Figure 22– Fuel Pump Bleeder Valve Location**

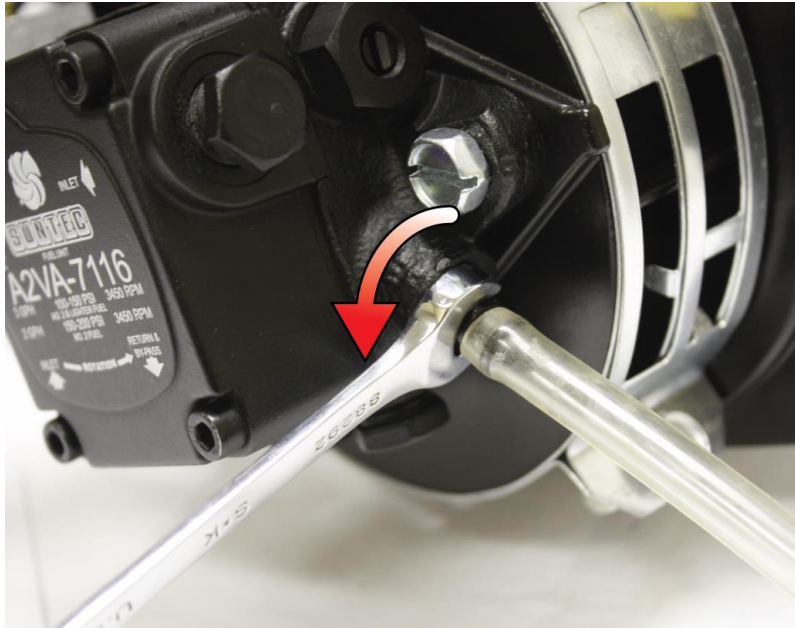
Note: If the pump is set up in two pipe operation with the by-pass plug installed, bleeding the pump is not necessary.

1. Slide a 1/8" Vinyl hose on the bleeder valve as shown in Figure 23 and route the hose into a small container.



**Figure 23– Bleeder hose location**

2. With the burner running, use a 3/8 inch wrench to open the bleeder valve about one-half turn (Figure 24). Allow oil to drain into the container until a steady, clear bubble free oil stream is noticed. Close the bleeder plug.



**Figure 24– Bleeder valve adjustment**

Note: If safety lockout occurs during burner operation, reset after one or two minutes.

3. Close the ignition device mounting plate, and tighten the hold down clip screw.

## **NOTICE**

Do not run fuel unit dry for more than two minutes or damage to the pump may result.

## **FINAL ADJUSTMENTS**

Final adjustments should be made by the use of a combustion test kit. Run the piece of equipment for ten minutes to allow for warm up, a smoke tester should be used to take a smoke reading. The smoke test should read no greater than #1 (Shell Bacharach scale), and less than a #1 smoke is desired. A new heating unit might require more time than this to burn clean due to the oil film on the new heat exchanger surfaces. Take a CO<sub>2</sub> and CO reading from the equipment exhaust. Combustion readings must be taken ahead of draft control, if used. For best performance of the burner CO<sub>2</sub> measured in the exhaust should be between 10-12% for most applications, and CO should be minimized with a goal of 250 ppm or less. In no case should CO be above 400 ppm. The burner should be started and stopped several times to assure good operation. Open ignition device mounting plate, unplug solenoid valve lead, and check the oil primary control (if equipped) for normal operation see. Check operation of flow switch and thermostat. Check for oil leaks.

## **SETTING COMBUSTION EFFICIENCY**

1. Fire burner, adjust interlocking air bands until smoke from the exhaust changes from black to clear and see through.
2. Record CO<sub>2</sub> and smoke levels. If CO<sub>2</sub> is low, close the air band by a 1/8 of an inch using a ruler or scale, and repeat CO<sub>2</sub> and smoke test. Continue this adjustment until desired CO<sub>2</sub> and smoke levels are obtained. Record stack temperature.
3. Check lighting with cold and hot chamber.
4. Lock all adjustment screws.

## **FINAL CHECKS**

Be sure all screws are locked and the controls on heating unit are adjusted in accordance with the heater and control manufacturer's instruction sheets.

Note: O<sub>2</sub> % should be over 3 %, and for CO emissions the lower the better, but typical applications for pressure washers should be under 250 ppm.



## MAINTENANCE



Before beginning any maintenance work on the burner, be sure that all oil valves from the tank are closed and electrical power to the burner is disconnected.

**The following routine maintenance operations should be performed on the burner once a year:**

- **Filter/strainer:** The oil filter cartridge should be replaced once a year so the fuel oil will not become contaminated and plug up the fuel pump and fuel nozzle in the oil burner.
- **Nozzle:** The nozzle should be changed at least once a year before the start of the heating season. Replace with proper nozzle.
- **Electrode Settings:** This is very important for reliable ignition of the oil; check these once a year in accordance with the instructions provided in this manual. Replace electrodes if worn excessively or if electrode insulator is oil soaked or cracked.
- **Fan and Blower Housing:** This must be kept clean, free of dirt and lint; open transformer to check fan blades from above. Be sure the electric power is off on burner when the transformer is opened up for this inspection.

**Components:** If replacement of a burner component becomes necessary, always use parts recommended by the manufacturer. Specify part numbers and description when ordering. (In all communications, state burner model, serial numbers, and equipment manufacturers and equipment model designation).

# REFERENCE INFORMATION

## Table 4- Efficiency Chart for No. 2 Fuel Oil

Net Stack Temperature (°F)

	300°	350°	400°	450°	500°	550°	600°	650°	700°	750°	800°	850°	900°
<b>15</b>	87.5	86.5	85.3	84.3	83.3	82.0	81.0	79.8	78.8	77.5	76.3	75.5	74.3
<b>14.5</b>	87.5	86.3	85.0	84.0	83.0	81.8	80.8	79.3	78.5	77.3	76.0	75.0	73.8
<b>14</b>	87.5	86.0	84.8	82.8	82.8	81.5	80.3	79.0	78.0	76.8	75.5	74.5	73.0
<b>13.5</b>	87.0	85.8	84.5	82.5	83.5	81.3	80.0	78.8	77.5	76.3	75.3	74.0	72.3
<b>13</b>	86.8	85.5	84.3	83.3	82.0	80.8	79.5	78.3	77.0	75.8	74.5	73.5	71.8
<b>12.5</b>	86.5	85.3	84.0	83.3	81.5	80.3	79.0	77.8	76.5	75.3	73.8	72.8	71.0
<b>12</b>	86.3	85.0	83.8	82.5	81.5	79.8	78.5	77.3	75.8	74.5	73.0	71.5	70.3
<b>11.5</b>	86.0	84.8	83.5	82.0	80.8	79.3	78.0	76.3	75.3	73.8	72.3	70.8	69.5
<b>11</b>	85.8	84.5	83.0	81.5	80.3	78.8	77.3	75.8	74.5	73.0	71.5	70.0	68.5
<b>10.5</b>	85.5	84.0	82.5	81.0	79.5	78.0	76.5	75.0	73.8	72.0	70.5	69.0	67.5
<b>10</b>	85.0	83.5	82.0	80.5	78.8	77.3	75.8	74.3	72.8	71.0	69.5	68.0	66.3
<b>9.5</b>	84.5	83.0	81.5	79.8	78.0	76.5	75.0	73.3	71.8	70.0	68.3	66.8	65.0
<b>9</b>	84.0	82.3	80.8	79.0	77.3	75.8	74.0	72.3	70.8	68.8	67.0	65.3	63.5
<b>8.5</b>	83.5	81.8	80.0	78.3	76.5	74.8	73.0	71.3	69.3	67.5	65.5	63.8	62.0
<b>8</b>	83.0	81.0	79.3	77.5	75.5	73.8	71.8	70.0	68.0	66.0	64.0	62.0	60.0
<b>7.5</b>	82.3	80.3	78.5	76.5	74.5	72.5	70.5	68.5	66.5	64.3	62.3	60.0	58.0
<b>7</b>	81.5	79.5	77.3	75.3	73.3	71.0	69.0	67.0	64.8	62.5	60.3	57.8	55.5
<b>6.5</b>	80.8	78.5	76.3	74.0	71.8	69.5	67.3	65.0	62.8	60.3	57.8	55.5	53.0
<b>6</b>	79.8	77.2	75.0	72.5	70.0	67.8	65.3	62.8	60.3	57.5	55.5	52.5	50.0
<b>5.5</b>	78.5	76.0	73.5	71.0	68.0	65.5	63.0	60.3	57.5	54.5	51.8	49.0	46.5
<b>5</b>	77.3	74.5	71.8	69.0	65.8	63.0	60.0	57.0	54.0	51.0	48.0	45.5	42.5
<b>4.5</b>	75.5	72.5	69.0	66.3	63.0	60.0	56.8	53.5	50.3	47.0	43.5	40.3	36.8
<b>4</b>	73.3	69.8	66.3	62.8	59.3	55.8	52.0	48.5	45.0	41.3	37.5	33.8	30.0

CO2 % Measured from Flue Exhaust

**Table 5– Max Suggested Firing rate for a Given Combustion Chamber Size**

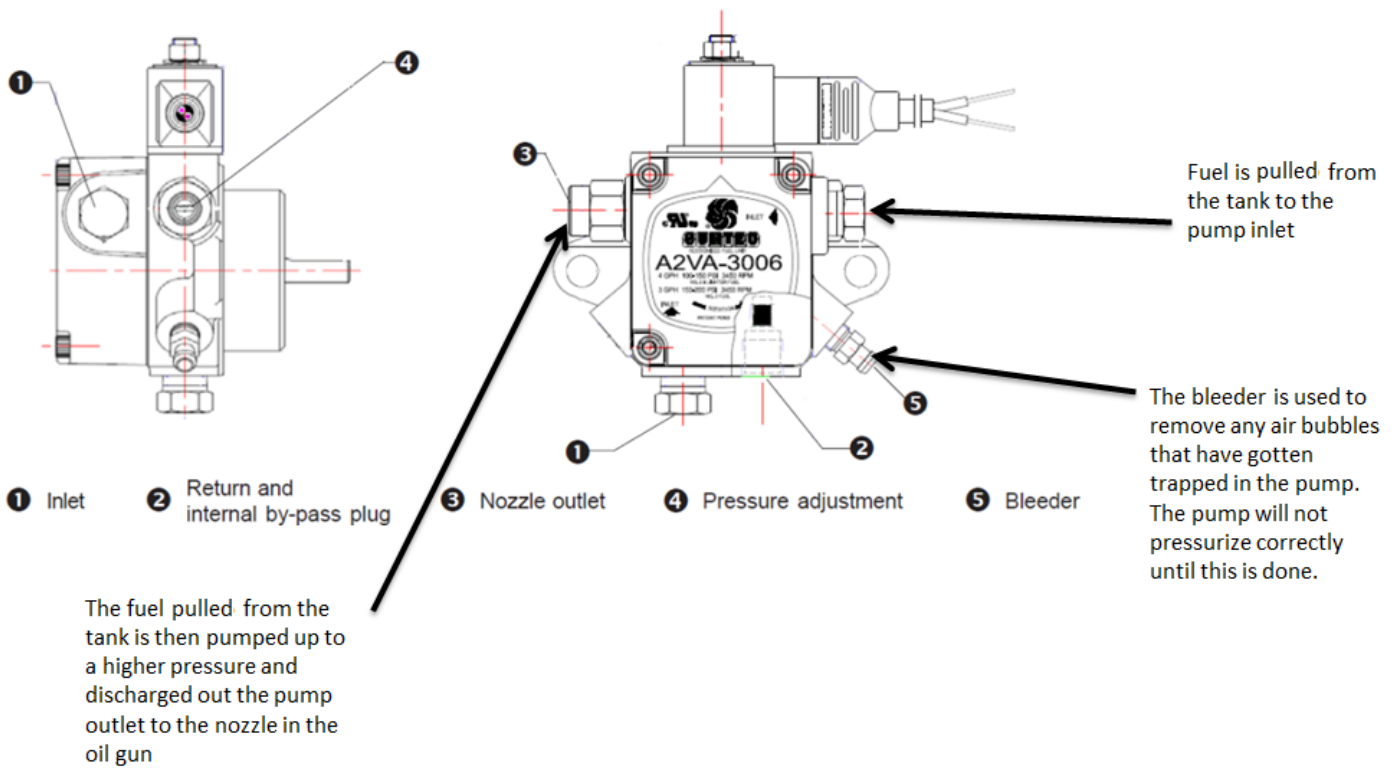
	Air Cone Size <sup>1</sup>	Firing Rate (gal/hr)	Square Chamber	Diameter Round Chamber	Rectangular Chamber	Rect. Chamber Height	Nozzle Distance to Floor
<b>EHA &amp; EHASR Only</b>	1A	0.75	*	10"	8" x 9"	9"	4"
		1.00	*	11"	10" x 10"	10"	4 1/2"
		1.25	*	12"	11" x 11"	11"	5"
	2A	1.35	*	12"	11" x 11"	11"	5"
		1.50	*	13"	11" x 12"	12"	5"
	3A	1.65	*	14"	12" x 13"	13"	5"
		1.75	*	14"	12" x 13"	13"	5"
	4A	2.00	*	15"	13" x 14"	13 1/2"	5 1/2"
		2.50	*	17"	14" x 16"	14"	5 1/2"
		3.00	15 1/2" x 15 1/2"	17 1/2"	13" x 18 1/2"	14"	7"
<b>EH Only</b>	Cast iron air cone P/N:13003	3.00	15 1/2" x 15 1/2"	17 1/2"	13" x 18 1/2"	14"	7"
		3.50	17 3/4" x 17 3/4"	20"	15" x 23"	15"	7 1/2"
		4.00	19" x 19"	23 1/2"	16" x 22 1/2"	16"	8"
		4.50	20" x 20"	*	17" x 23 1/2"	17"	8 1/2"
	Cast iron air cone P/N:101366-001	5.00	23 1/4" x 23 1/4"	*	18" x 25"	18"	9"
		6.00	24 x 1/2" x 24 1/2"	*	23" x 28 1/2"	20"	10"

\*- Chamber size not recommended with given firing rate

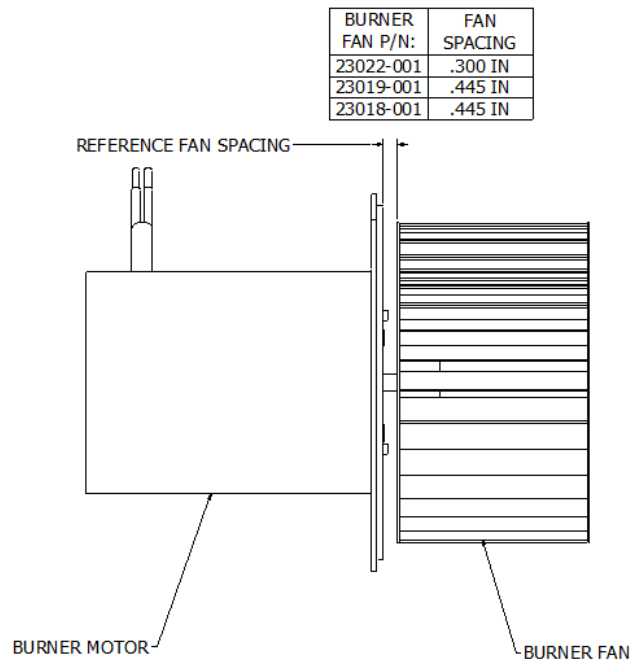
1. Listed air cone size is a general recommendation for the given firing rates, this can vary depending on the different sized baffles and air handling parts that are used within the burner.

## REFERENCE FIGURES

### OIL PUMP FEATURE IDENTIFICATION



**Figure 25- Pump Feature Identification**



**Figure 26- Blower Wheel Spacing**

## WARRANTY



# LIMITED WARRANTIES FOR OIL AND GAS BURNERS, MADE BY WAYNE AND USED IN RESIDENTIAL INSTALLATIONS

**WAYNE COMBUSTION SYSTEMS ("WAYNE")** warrants to those who purchase its **Oil Burner Models** for resale or for incorporation into a product of resale, that its burner is free from defects in material and workmanship under normal use and service for thirty-six (36) months from the date of manufacture. **ALL GAS BURNERS** manufactured by "WAYNE" will be similarly warranted for eighteen (18) months from date of manufacture except where original manufacture offers a greater warranty. (Reference #6 below) **THESE LIMITED WARRANTIES DO NOT APPLY UNLESS THE BURNER COVERED BY IT IS PROPERLY INSTALLED BY A QUALIFIED, COMPETENT TECHNICIAN, WHO IS LICENSED WHERE STATE AND/OR LOCAL CODES PREVAIL, AND WHO IS EXPERIENCED IN MAKING SUCH INSTALLATIONS,** in accordance with NFPA #31 of the national fire protection association and in accordance with all local, state and national codes.

Any **IN-WARRANTY** burner component which is defective in material or workmanship will be either repaired or replaced as follows:

1. Fuel pumps, motors, transformers, gas valves, and controls should be returned to an authorized service station or distributor of WAYNE for determination of applicability of this LIMITED WARRANTY as to either repair or replacement, where said service station or distributor is reasonably available in the customer's locality. The manufacturers of burner components regularly publish and distribute listings showing the locations of their network of service stations. Where such local service is NOT available for the burner components described above or other burner parts are involved, these items should be returned, freight prepaid, to WAYNE Service Department, 801 Glasgow Ave, Fort Wayne, Indiana 46803.
2. Burners and/or component(s) determined to be covered under this LIMITED WARRANTY by WAYNE shall be repaired or replaced at WAYNE's sole option.
3. WAYNE is not responsible for any labor cost for the removal and replacement of said burner or burner components and equipment associated therewith.

4. A burner so repaired will then carry the LIMITED WARRANTY equal to the unexpired portion of the original burner LIMITED WARRANTY.
5. If inspection by WAYNE does **NOT** disclose any defect covered by this LIMITED WARRANTY, the burner or burner component(s) will be either repaired or replaced at the expense of the customer and WAYNE'S regular charges will apply.
6. If the original manufacturer of a burner component offers a warranty greater than either of our LIMITED WARRANTIES described above, then this portion will be added to our LIMITED WARRANTY.

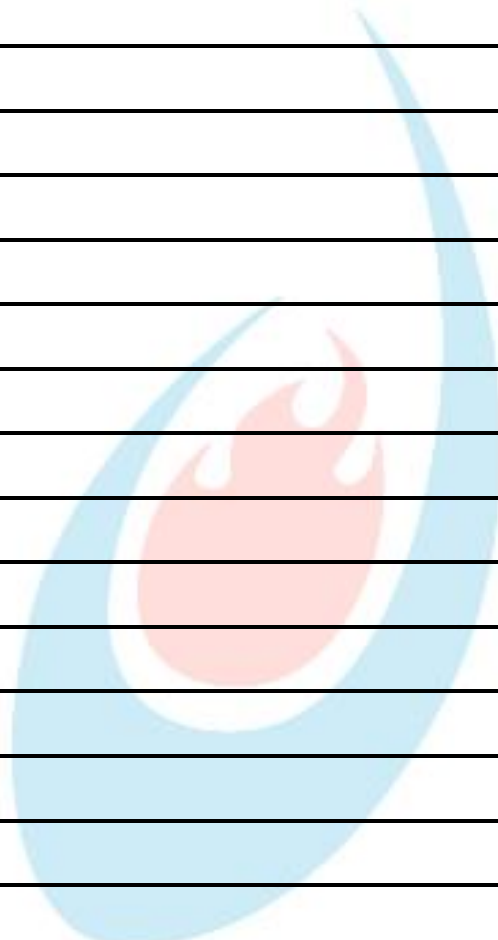
This LIMITED WARRANTY does **NOT** cover products which have been damaged as the result of accident, abuse, misuse, neglect, improper installations, improper maintenance or failure to operate in accordance with WAYNE's written instructions.

These LIMITED WARRANTIES do not extend to anyone except the first purchaser at retail and only when the burner is in the original installation site.

**IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE SHALL BE LIMITED TO THE DURATION OF THE LIMITED EXPRESS WARRANTIES CONTAINED HEREIN. WAYNE EXPRESSLY DISCLAIMS AND EXCLUDES ANY LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES OF ANY NATURE FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY.**

Some states do not allow limitation on how long an implied warranty lasts, so the above limitation may not apply to you. Also, some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. WAYNE neither assumes or authorizes any person to assume for WAYNE any other liability or obligation in connection with the sale of these products. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

# NOTES



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