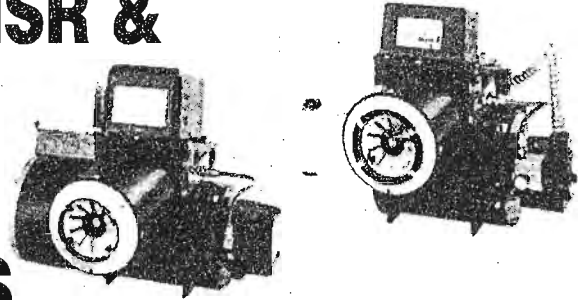




WAYNE COMBUSTION SYSTEMS
801 GLASGOW AVE.
FORT WAYNE, IN 46803

MODEL MSR & MSR-DC OIL BURNERS



Publication Date 3/24/2003

Revision D

Manual 22019-003



WARNING

ELECTRIC SHOCK HAZARD

HIGH VOLTAGES ARE PRESENT IN THIS EQUIPMENT. FOLLOW THESE RULES TO AVOID ELECTRIC SHOCK.

- ▲ Use only a properly grounded circuit. A ground fault interrupter is recommended.
- ▲ Do not spray water directly on burner.
- ▲ Turn off power before servicing.
- ▲ Read the owner's manual before using.



WARNING

OVERHEATING HAZARD

SHOULD OVERHEATING OCCUR:

- ▲ Shut off the manual oil valve to the appliance.
- ▲ Do not shut off the control switch to the pump or blower.

WARNING

NEVER ATTEMPT TO USE GASOLINE AS A FUEL FOR THIS BURNER, AS IT IS MORE COMBUSTIBLE AND COULD RESULT IN A SERIOUS EXPLOSION.

MODEL MSR SPECIFICATIONS

FIRING CAPACITIES MODEL MSR

0.50 TO 2.75 GALLONS PER HOUR
70,000 TO 385,000 BTU/HR INPUT

FUELS

Use No. 1 or No. 2 Heating Oil (ASTM D-396), Kerosene, Diesel & JP8 Jet Fuel.

* NEVER attempt to use gasoline as a fuel for your burner, as it is more combustibile and could result in a serious explosion.

ELECTRICAL

Power Supply115V / 60HZ / 1 PH
Motor3450 RPM, N.E.M.A. 48 Flange, Manual Reset Overload Protection
Ignition.....10,000V / 23MA secondary, Continuous Duty-Shielded, Interrupted Duty Shielded Transformer, or Solid-State Ignition System.

DIMENSIONS (STANDARD)

HEIGHT.....11 $\frac{1}{8}$ "
WIDTH.....13 $\frac{3}{8}$ "
DEPTH.....6 $\frac{7}{8}$ "

FUEL PUMPS

Suntec or Danfoss - Single Stage Standard

MOUNTING

Rigid Flange, Adjustable Flange, or Base Mount

FOR YOUR SAFETY

DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.

INSTALLATION OF BURNER

INSTALLATION OF THE BURNER MUST BE DONE BY A QUALIFIED INSTALLER IN ACCORDANCE WITH REGULATIONS OF THE NATIONAL FIRE PROTECTION STANDARD FOR OIL-BURNING EQUIPMENT, 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. WARRANTY IS VOIDED IF NOT INSTALLED BY SERVICE PERSON.

**THESE INSTRUCTIONS SHOULD BE AFFIXED TO THE BURNER
OR ADJACENT TO THE HEATING APPLIANCE.**



APPROVALS

The burner is U.L. listed, for use with Group I or Group II primary safety controls. State and local approvals are shown on burner rating label. All burners should be installed in accordance with National Fire Protection Association, and in complete accordance with all local codes, and authorities having jurisdiction. Regulations of these authorities take precedent over general instructions provided in this manual.

GENERAL INFORMATION

Heating Plant - Before installing this burner in a conversion installation, try to provide adequate space to service the burner properly. The heating system should be carefully inspected for defects and cleanliness, so proper performance is obtained. An oil burner is only a means of supplying heat to the firebox and from there the heating system must absorb and circulate the heat. The flue passages and heat absorbing surfaces must be clean to assure maximum heat transfer to the furnace or boiler. Soot and fly ash act as insulators, retarding the transfer of heat. All doors, openings, and cracks should be cemented air-tight to eliminate air infiltration into the heating plant, causing heating losses. Inspect smoke pipe and chimney for elimination of leaks and obstructions. Be sure of adequate chimney size and height. Install a mechanical draft adjuster, if needed same size as smoke pipe (see column under draft regulators).

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 temperature assures greater combustion efficiency and lower stack losses. An insulating refractory or a Fiber Fax type chamber can be used with this burner. It is important to select and install, if necessary, the correct size chamber on the conversion job (see chart). On the Flamelock conversion burners the atomized oil burns just off the flamelock. On all oil burners the atomized oil must not touch the sides or bottom of chamber, or smoke will result. To eliminate the smoke, excess air will be required, resulting in high stack temperature and lower combustion efficiency. Install burner so the face of air cone of burner is set 1/8" to 1/4" behind the inside front wall of the chamber (see diagram). Caution on installing Flamelock burners in stainless steel chamber should be taken because of the higher temperature levels produced by high performance flame retention burners. The temperatures may exceed the temperature ratings of the stainless steel chamber, and can result in chamber burn out. Where you are replacing a standard burner with a flame retention burner, take one of the following precautions: (1) Use "Wet Pac" Ceramic Liner to line the inside of chamber, (2) Adjust burner (see Final Adjustments Column).

FUEL UNITS AND OIL LINES

Conversion Burners are provided with single stage 3450 RPM fuel units with the by-pass plug removed for single pipe installations. This is satisfactory where the fuel supply is on the same level or above burner permitting gravity flow of oil. Never exceed over 8 PSI pressure to the suction side of fuel unit. A pressure of over 8 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 fuel unit and oil supply. (If lift exceeds 10 feet, a two-stage fuel unit must be used with a return line). When a two-line system is used the by-pass plug must be installed. This plug is supplied along with the burner attached to fuel unit along with an information pump data sheet in a plastic bag. When oil lines are installed, continuous runs of heavy wall copper tubing are recommended. Be sure that all connections are absolutely airtight. Check all connections and joints. Flared fittings are recommended. **Do not use compression fittings.** See pump data sheet for sizing, lift and length for tubing recommendations. Use an oil filter of adequate size for all installations. Install filters inside the building between the tank shut off valve and the burner. For ease of servicing, locate the shut-off valve and filter near the burner.

TANKS AND PIPING

Local codes and regulations must be adhered to regarding tank and burner installation.

WIRING

All wiring must comply with the National Electric Code and local ordinances, refer to diagram supplied with burner or controls, making sure the burner and controls are wired correctly and that the line switch is properly fused to burner.

AIR SUPPLY FOR COMBUSTION

Do not install in rooms with insufficient air to support combustion. Occasionally it is necessary to install windows or cut holes in a door to these rooms to obtain sufficient air and to prevent less than atmospheric air pressure in the room. If there is a lack of combustion air in the room, the burner flame will be yellow and formation of soot will occur in the heating unit. In buildings of conventional frame, brick or stone construction without utility rooms, basement windows, or stair doors, infiltration is normally adequate to provide air for combustion and for operation of the barometric draft control. For installation in an enclosed utility room without an outside wall, a fresh air opening to the outside with a free cross section area of 20 square inches per each gallon per hour firing is recommended. For each 1,000 feet above sea level, increase the fresh air opening by at least four (4) per cent. The room should be isolated from any area served by exhaust fans. Do not install an exhaust fan in this room.

CHIMNEY

Follow the recommendations of the heating unit manufacturer. It must be properly designed and of adequate size and should be above the surrounding objects, tile-lined, with no obstructions and be in good state of repair. The smoke pipe should set flush with the inside of the tile and cemented in place. All cleanout doors should be sealed.

DRAFT REGULATIONS

The use of a draft regulator is recommended and should preferably be mounted in the smoke pipe. Use a draft gauge to adjust to proper opening. When the burner air supply is properly adjusted, the combustion chamber draft will be approximately $-.01$ to $-.02$ WC and the stack draft will be $-.02$ to $-.04$ WC. The larger the installation, the greater the draft will be required at the stack to obtain the $-.01$, to $-.02$ WC at the combustion chamber.

NOZZLES

Use the proper size, type and spray pattern that heater manufacturers recommend; in some cases of upgrading or conversion installations, the use of an 80(Hollow or Solid Nozzle are the best to start with.

STARTING PROCEDURE

STARTING BURNER

Be sure main switch is in "off" position and be sure thermostat is substantially above room temperature, the oil tank is filled, all valves are open and controls set for operation. Adjust air supply on burner by loosening the locking screw on outer air band, and open partially. Open the inspection door and turn on switch. Prime pump according to the pump manufacturer's recommendations and check pressure. If safety lockout occurs reset after 1 or 2 minutes (caution). Do not run fuel unit dry for more than 5 minutes. When fire is established make a temporary air adjustment for a clean combustion flame, reduce air supply until flame tips appear slightly smoky, then readjust so flame tips are clean looking. Leave inspection door open until chamber is dry. When normal temperatures are reached, close inspection door and adjust draft regulator, see column under "DRAFT REGULATIONS".

FINAL ADJUSTMENTS

At this point a final adjustment should be used by the use of a COMBUSTION TEST KIT. After operating 10 minutes to warm up unit, a smoke tester should be used to take a smoke reading. We are wanting no greater than a #1; (Shell Bacharach Scale). And less than a #1 smoke is desired. Sometimes a new heating unit requires more time than this to burn clean due to the oil film on the new heater unit surfaces. Recheck draft and take a CO₂ reading over the fire and in the stack. If a larger differential between CO₂ readings is noted, air leakage is the most common cause (see column under HEATING PLANT). CO₂ readings must all be taken ahead of draft control. The CO₂ measured in the stack should be at least 9% for oil rates 1.00 G. P. H. or below, and at least 10% for oil rates over 1.00 G.P.H. Unit should be started and stopped several times to assure good operation. Open inspection door, turn off oil valve and check out safety timing of combustion control. Check operation of limit controls and thermostat. Check for oil leaks. Note: All installations should be reinspected after 1 or 2 weeks of normal operation.

FINAL CHECKS

Be sure air band and draft control adjustments are locked, and the controls on heating unit are adjusted in accordance with the Heater and Control Manufacturer's Instruction Sheets. Use efficiency chart (page 4) to finalize set-up.

MAINTENANCE

OILING MOTOR – By proper oiling twice a year, the motor life will be increased; only a few drops of a non-detergent type of oil at both motor holes is needed.

FILTER – The oil filter cartridge should be replaced once a year so the fuel oil will not become contaminated and plug up fuel pump and nozzle of oil burner.

NOZZLE – The nozzle should be changed at least once a year before the start-up of the heating season. Replace with proper nozzle. Handle Nozzles by hex only. Oil from the fingers on the face or filter of nozzle may adversely affect spray characteristics.

COMPONENTS - If for any reason any of the burner parts have to be replaced, always use parts recommended by the manufacturer. Specify part numbers, and description, when ordering. (IN ALL COMMUNICATIONS STATE BURNER MODEL, SERIAL NUMBER AND SPECIFICATION NUMBER).

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.

FAN & BLOWER HOUSING - This must be kept clean, free of dirt and lint. Open transformer to check fan blades for above. Be sure the electric power is off on burner when transformer is opened for the inspection.



EFFICIENCY CHART FOR NO. 2 FUEL OIL NET STACK TEMPERATURE (DEGREES F°)

| | | 300° | 350° | 400° | 450° | 500° | 550° | 600° | 650° | 700° | 750° | 800° | 850° | 900° |
|-----------------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|
| CO ₂ | 15 | 87½ | 86½ | 85¼ | 84¼ | 83¼ | 82 | 81 | 79¾ | 78¾ | 77½ | 76½ | 75½ | 74¼ |
| | | 87½ | 86¼ | 85 | 84 | 83 | 81¾ | 80¾ | 79¾ | 78½ | 77¼ | 76 | 75 | 73¾ |
| | 14 | 87¼ | 86 | 84¾ | 82¾ | 82¾ | 81½ | 80¾ | 79 | 78 | 76¾ | 75½ | 74½ | 73 |
| | | 87 | 85¾ | 84½ | 83½ | 82½ | 81¼ | 80 | 78¾ | 77½ | 76¼ | 75¼ | 74 | 72¾ |
| | 13 | 86¾ | 85½ | 84¼ | 83¼ | 82 | 80¾ | 79½ | 78¾ | 77 | 75¾ | 74½ | 73½ | 71¾ |
| | | 86½ | 85¼ | 84 | 83¼ | 81½ | 80¾ | 79 | 77¾ | 76½ | 75¼ | 73¾ | 72¾ | 71 |
| | 12 | 86¼ | 85 | 83¾ | 82½ | 81¼ | 79¾ | 78¾ | 77¾ | 75¾ | 74½ | 73 | 71½ | 70¼ |
| | | 86 | 84¾ | 83½ | 82 | 80¾ | 79¾ | 78 | 76½ | 75¼ | 73¾ | 72¾ | 70¾ | 69½ |
| | 11 | 85¾ | 84½ | 83 | 81½ | 80¾ | 78¾ | 77¾ | 75¾ | 74½ | 73 | 71½ | 70 | 68½ |
| | | 85½ | 84 | 82½ | 81 | 79½ | 78 | 76½ | 75 | 73¾ | 72 | 70½ | 69 | 67½ |
| | 10 | 85 | 83¾ | 82 | 80½ | 78¾ | 77¾ | 75¾ | 74¼ | 72¾ | 71 | 69½ | 68 | 66¼ |
| | | 84½ | 83 | 81½ | 79¾ | 78 | 76½ | 75 | 73¾ | 71¾ | 70 | 68¾ | 66¾ | 65 |
| | 9 | 84 | 82¾ | 80¾ | 79 | 77¾ | 75¾ | 74 | 72¾ | 70¾ | 68¾ | 67 | 65¼ | 63½ |
| | | 83½ | 81¾ | 80 | 78¾ | 76½ | 74¾ | 73 | 71¾ | 69½ | 67½ | 65½ | 63¾ | 62 |
| | 8 | 83 | 81 | 79¾ | 77½ | 75½ | 73¾ | 71¾ | 70 | 68 | 66 | 64 | 62 | 60 |
| | 82¼ | 80¾ | 78½ | 76½ | 74½ | 72½ | 70½ | 68½ | 66½ | 64¾ | 62¾ | 60 | 58 | |
| 7 | 81½ | 79½ | 77¾ | 75¾ | 73¾ | 71 | 69 | 67 | 64¾ | 62½ | 60¾ | 57¾ | 55½ | |
| | 80¾ | 78½ | 76¾ | 74 | 71¾ | 69½ | 67¾ | 65 | 62¾ | 60¾ | 57¾ | 55½ | 53 | |
| 6 | 79¾ | 77¾ | 75 | 72½ | 70 | 67¾ | 65¾ | 62¾ | 60¾ | 57¾ | 55½ | 52½ | 50 | |
| | 78½ | 76 | 73½ | 71 | 68 | 65½ | 63 | 60¾ | 57½ | 54½ | 51¾ | 49 | 46½ | |
| 5 | 77¾ | 74½ | 71¾ | 69 | 65¾ | 63 | 60 | 57 | 54 | 51 | 48 | 45½ | 42½ | |
| | 75½ | 72½ | 69 | 66¾ | 63 | 60 | 56¾ | 53½ | 50¾ | 47 | 43½ | 40¾ | 36¾ | |
| 4 | 73¾ | 69¾ | 66¾ | 62¾ | 59¾ | 55¾ | 52 | 48½ | 45 | 41¼ | 37½ | 33¾ | 30 | |

ATTACHING AIR TUBE COMBINATIONS FOR CHASSIS PLAN ONLY

When the Oil Burner Chassis and the Air Tube combination are packed separately, the Burner must be assembled as follows:

- 1 – Install the Air Tube Assembly to the Burner Chassis as shown. This can be done by setting the Burner Chassis on its back and placing the assembled Air Tube on the Chassis. (IMPORTANT: Make sure the Oil Drip hole in Air cone (see Fig. 1) is at the six o'clock position.) Secure air tube to chassis with 3 HEX HEAD SCREWS.
- 2 – Install proper nozzle in Drawer Assembly. Loosen the Transformer retainer Screws and swing open to insert the Drawer Assembly (See Fig. 2.) into the air tube to position nozzle. Once installed and adapter fitting is in position in Burner Chassis slot and slide place hole, adjust gun assembly, either back or forward to position nozzle from head. For correct positioning (See Fig. 3). Secure the slide plate by tightening screw at side of housing. Secure the drawer assembly with the locknut provided. Attach flared nut of Oil Line Assembly, (Copper Oil Line) to the end of this adapter fitting as shown.

Install arrow decal as shown so position of Drawer Assembly, is always known. (See Fig. 4)

Recheck for nozzle centering before burner is installed (See Fig. 1). Make sure electrode tips clear retention head.

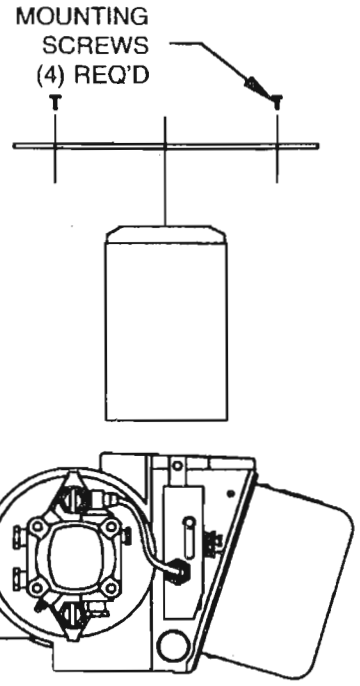
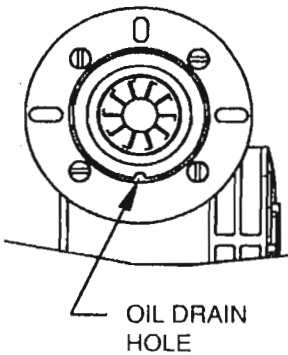


FIG. 1



INSERT "SR" SERIES GUN SETTING GAUGE (AS SHOWN BELOW) TO CHECK NOZZLE POSITION AND ELECTRODE SETTING.

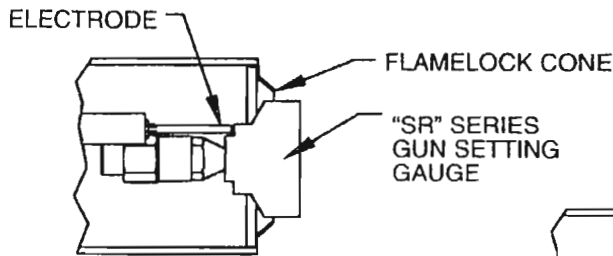


FIG. 3

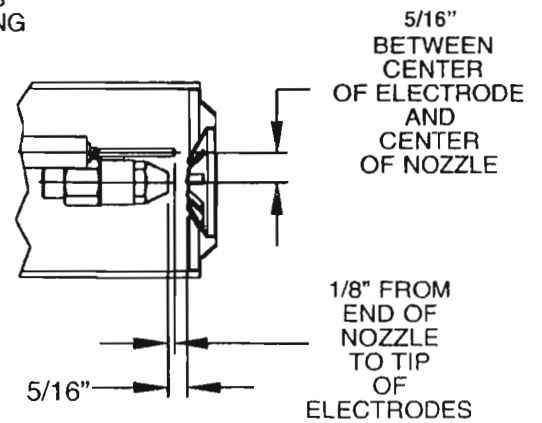


FIG. 2

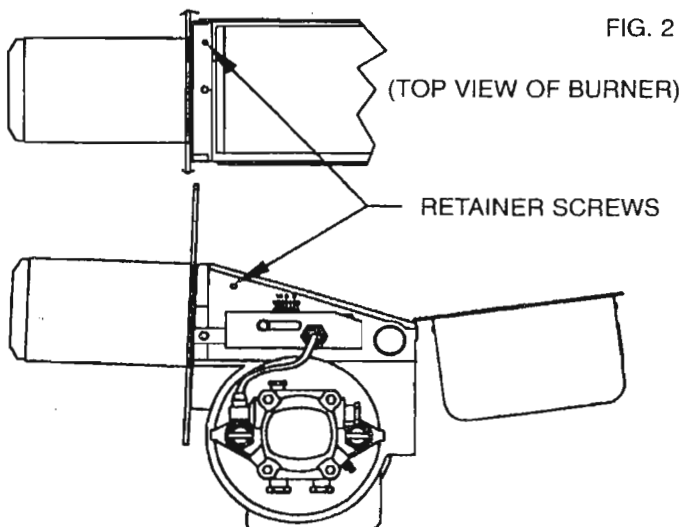
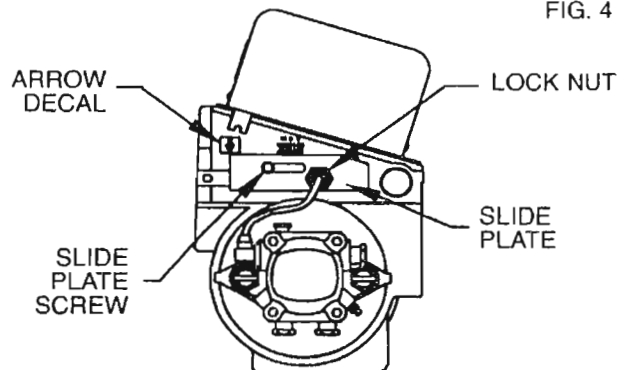
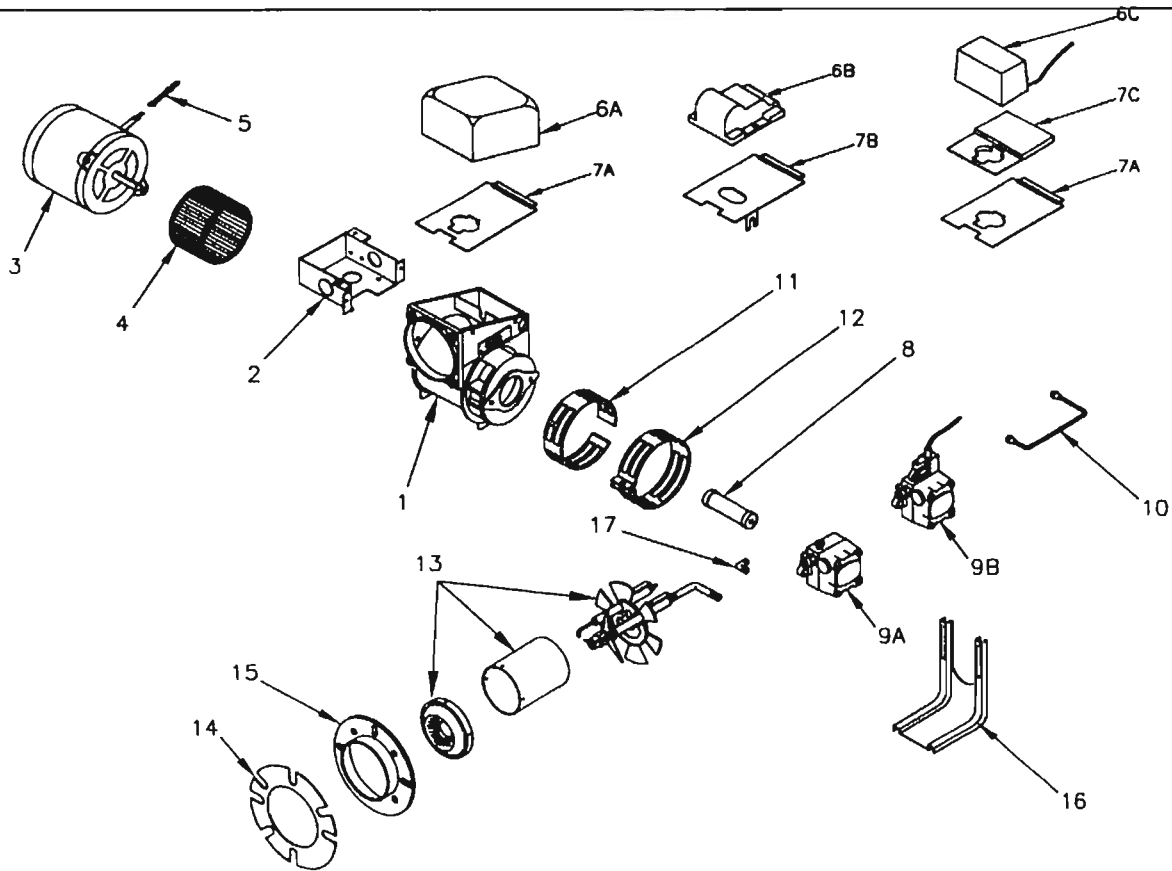


FIG. 4





BURNER COMPONENTS - MODEL MSR



MSR BURNER MODEL, PART DESCRIPTION AND PART NUMBER WHEN ORDERING PARTS

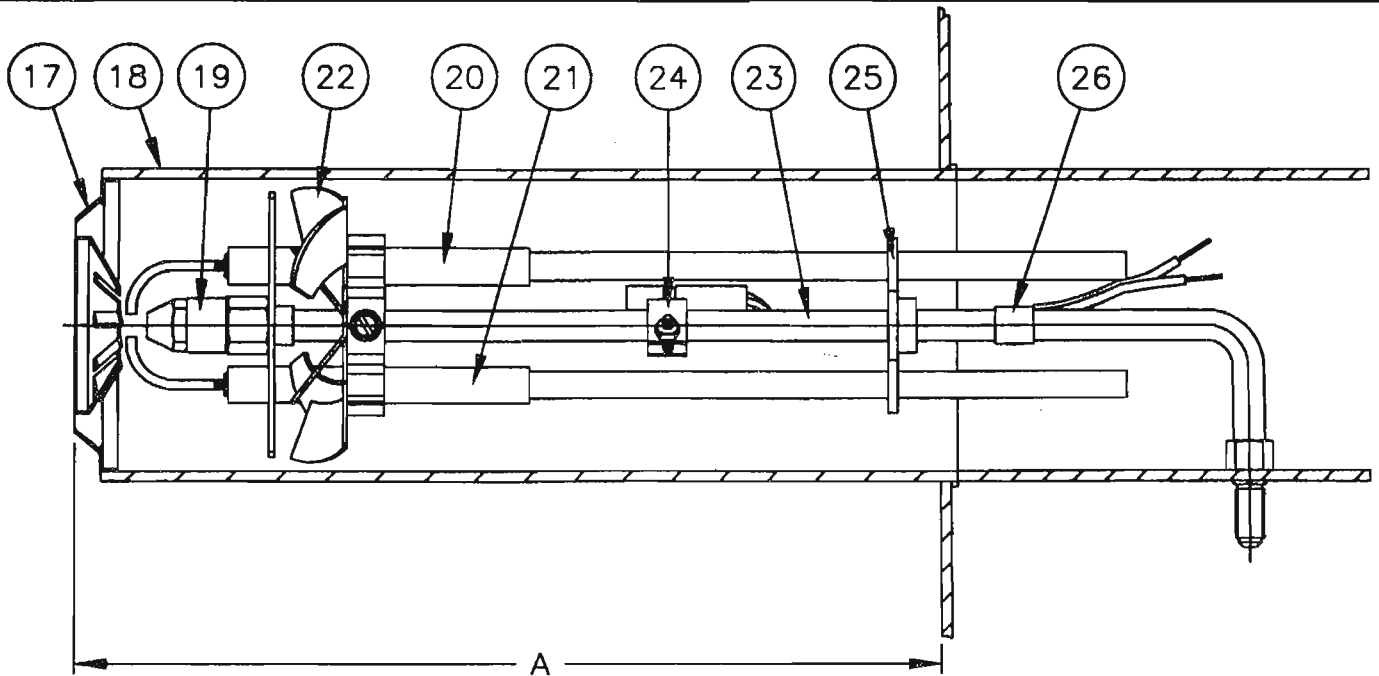
| NO. | DESCRIPTION | PART NO. |
|-----|----------------------------|-----------------|
| 1 | BURNER HOUSING | 31841-036 |
| 2 | JUNCTION BOX ASM | 21319 |
| 3 | MOTOR 1/8 H.P. | 20627 |
| 4 | BLOWER WHEEL 3 1/8 X 4 1/4 | 20673 |
| | BLOWER WHEEL 3 1/2 X 4 1/4 | 21427 |
| 5 | MOTOR CORD COVER | 13029 |
| 6A | TRANSFORMER | 115V 23101-M |
| | | 230V 23103-M |
| 6B | FRANCE IGNITOR | 115V 101050-001 |
| 6C | CARLIN IGNITOR | 230V 31812-002 |
| 7A | COVER | 21723-002 |
| 7B | COVER | 21723-003 |
| 7C | COVER | 100730-001 |
| 8 | COUPLING | 13424 |
| 9A | FUEL UNIT MODEL A | 13495 |
| 9B | FUEL UNIT MODEL B | 13634 |
| 9C | SUNTEC COMBO UNIT | 115V 101128-001 |
| | SUNTEC COMBO UNIT | 230V 101128-002 |
| 10 | 6" OIL LINE ASSEMBLY | 14451 |
| | 8" OIL LINE ASSEMBLY | 14452 |
| 11 | INNER AIR BAND | 20601-002 |
| 12 | OUTER AIR BAND | 20602-002 |

| NO. | DESCRIPTION | PART NO. |
|-----|----------------------|-----------|
| 13 | AIR TUBE & GUN ASSM. | * |
| 14 | GASKET | 12484 |
| 15 | ADJUSTABLE FLANGE | 2689-011 |
| 16 | PEDESTAL MOUNT | 21760-011 |
| 17 | ELBOW | 13494 |

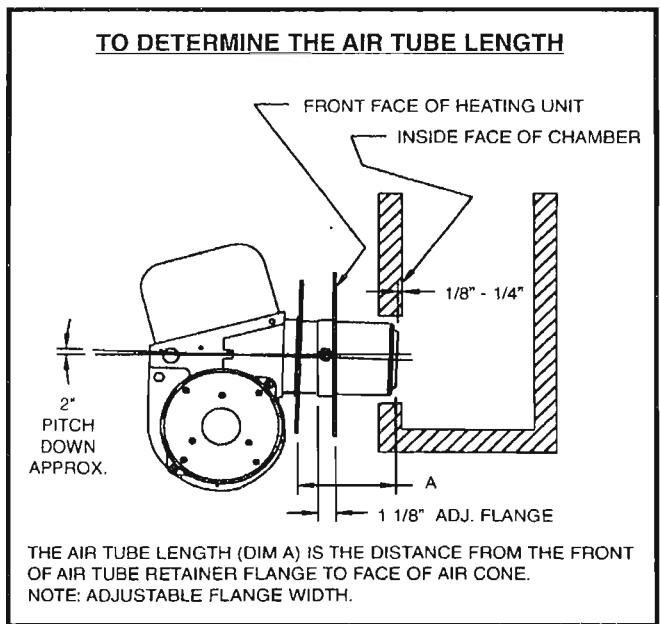
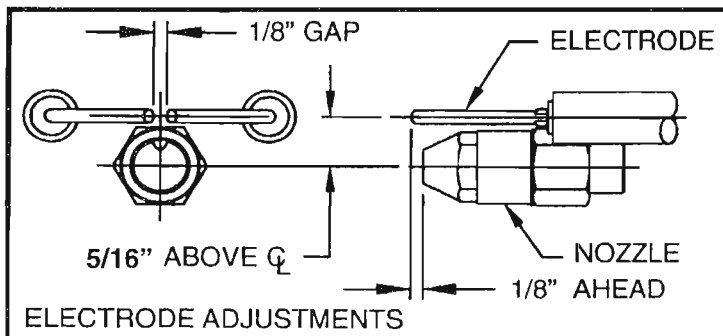
***PART NUMBER SEE PAGE 7**

| Suggested Combustion Chamber Dimensions Conversion or Upgrading Chamber Dimensions (In Inches) | | | | | |
|--|------------------|------------------|------------------|------------------|-------------|
| Firing Rate (G.H.P) | Square | | Round | Height | Floor to |
| | Width | Length | | | |
| 0.85 | 8.5 | 8.5 | 9 | 12 | 5-6 |
| 1.00 | 9 | 9 | 10 $\frac{1}{2}$ | 12 $\frac{1}{2}$ | 5-6 |
| 1.25 | 10 | 10 | 11 $\frac{1}{2}$ | 12 $\frac{1}{2}$ | 5-6 |
| 1.35 | 10 $\frac{1}{2}$ | 10 $\frac{1}{2}$ | 11 $\frac{1}{2}$ | 12 $\frac{1}{2}$ | 5-6 |
| 1.50 | 11 | 11 | 12 $\frac{1}{2}$ | 13 | 5-6 |
| 1.65 | 11 $\frac{1}{2}$ | 11 $\frac{1}{2}$ | 13 | 13 $\frac{1}{2}$ | 5-6 |
| 2.00 | 12 $\frac{1}{2}$ | 12 $\frac{1}{2}$ | 14 $\frac{1}{2}$ | 13 $\frac{1}{2}$ | 6-7 |
| 2.50 | 14 $\frac{1}{2}$ | 14 $\frac{1}{2}$ | 16 | 14 | 7-8 |
| 3.00 | 15 $\frac{1}{2}$ | 15 $\frac{1}{2}$ | 17 $\frac{1}{2}$ | 15 | 7-8 |

AIR TUBE & GUN ASSEMBLY DETAILS MODEL MSR



NOTE: BACKSIDE OF FLAMELOCK TO NOZZLE FACE.



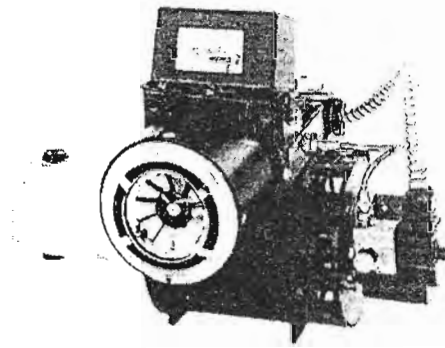
| NO. | DESCRIPTION | PART NO. |
|-----|-------------------------|----------------------|
| 17 | HEAD | 0.85-0.75 #SC 100060 |
| | | 0.75-1.00 #1A 14157 |
| | | 1.00-1.35 #2A 14158 |
| | | 2.00-2.25 #4A 14160 |
| 18 | AIR TUBE | SEE NOTE |
| 19 | NOZZLE ADAPTER | 21913-SER |
| 20 | RIGHT ELECTRODE ASSY. | SEE NOTE |
| 21 | LEFT ELECTRODE ASSY. | SEE NOTE |
| 22 | ELECTRODE SUPPORT ASSY. | SEE NOTE |
| 23 | OIL PIPE ASSY. | SEE NOTE |
| 24 | CAD CELL BRACKET | 13078 |
| 25 | BUSS BAR SUPPORT | 13276-002 |
| 26 | CAD CEL ZIP TIE | 100850-001 |

| STANDARD AIR TUBE DIMENSIONS | | | | |
|------------------------------|-----------|-----------|-----------|-----------|
| AIR TUBE LGT. | | | | |
| DIM.-A- | 0.75-1.00 | 1.00-1.50 | 1.50-2.00 | 2.00-2.75 |
| 4" | 31844-005 | 31845-005 | 31846-005 | 31847-005 |
| 6" | 31844-021 | 31845-021 | 31846-021 | 31847-021 |
| 9" | 31844-045 | 31845-045 | 31846-045 | 31847-045 |
| 12" | 31844-069 | 31845-069 | 31846-069 | 31847-069 |
| 15" | 31844-093 | 31845-093 | 31846-093 | 31847-093 |
| 18" | 31844-117 | 31845-117 | 31846-117 | 31847-117 |

NOTE: WHEN ORDERING STATE BURNER MODEL MSR, SPEC #, PART DESCRIPTION, AIR TUBE COMBINATION, WHAT USABLE AIR TUBE LENGTH, (DIMENSION A), AND FIRING RATE.



MODEL MSR-DC OIL BURNER



MODEL MSR-DC SPECIFICATIONS

FIRING CAPACITIES - MODEL MSR-DC

0.50 To 2.75 GALLONS PER HOUR
70,000 TO 385,000 BTU/HR INPUT

FUELS - MODEL MSR-DC

Use No. 1 or No. 2 Heating Oil (ASTM D-396), Kerosene, Diesel or Jp8 Jet Fuel.

NEVER attempt to use gasoline as a fuel for your burner, as it is more combustible and could result in a serious explosion.

NEVER burn garbage or refuse in the heating unit.

NEVER try to ignite by tossing burning paper or other materials into the heating unit.

NEVER burn waste or crankcase oil in the heating unit.

ELECTRICAL - MODEL MSR-DC

| | |
|--------------|--|
| Power supply | 13.0VDC Minimum (at Battery) |
| Motor | 4500 RPM (Std) or 3950 RPM (low RPM), Ball Bearing, Permanent Magnet |
| Ignition | 20,000V/28MA/50VA Secondary, Intermittent Duty Electronic Ignitor |

DIMENSIONS - MSR-DC (Standard)

| | |
|-------------|------|
| Height..... | 12½" |
| Width | 13" |
| Depth | 6⅞" |

FUEL UNIT

Suntec and DanFoss brands

MOUNTING

Rigid Flange, Adjustable Flange or Base mount.

DC OIL BURNER ELECTRICAL CONSIDERATIONS

- * Not all generators are equally capable. A minimum of 13.0 volts must be provided at the battery.
- * Generators should be operated at the maximum rated RPM during burner operation.
- * Good quality batteries are strongly suggested. Batteries with higher Cold Cranking Amp (CCA) rating and deep draw/marine type batteries are recommended.
- * Use automotive rated battery cabling. All other wiring should be OEM suggested wire type and gauge.
- * Protect all wiring connection points with dielectric grease.
- * Ambient temperature impacts electrical requirements. Higher temperatures will result in higher amp draws.
- * Increased pump operating pressure settings will increase amp draw.
- * Higher gallon rate nozzles and accompanying wider air band openings will increase amp draw.

INSTALLATION OF BURNER

INSTALLATION OF THE BURNER MUST BE DONE BY A QUALIFIED INSTALLER IN ACCORDANCE WITH REGULATIONS OF THE NATIONAL FIRE PROTECTION STANDARD FOR OIL-BURNING EQUIPMENT, 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. WARRANTY IS VOIDED IF NOT INSTALLED BY SERVICE PERSON.

**THESE INSTRUCTIONS SHOULD BE AFFIXED TO THE BURNER
OR ADJACENT TO THE HEATING APPLIANCE.**

TO THE CLEANING EQUIPMENT OWNER

Since 1970, Wayne has supplied the hot water pressure washer cleaning equipment industry with oil burners. You are obtaining a quality burner unsurpassed in engineering design and product development. It will provide you with many years of efficient trouble-free operation, if properly installed and serviced. Please read this manual carefully.



Wayne warrants its burners specifically to those who have purchased it for resale, including your dealer. If, in any case, you have a problem with your burner, or its installation, you should contact your dealer or the cleaning equipment manufacturer for assistance.

FUEL UNITS AND OIL LINES

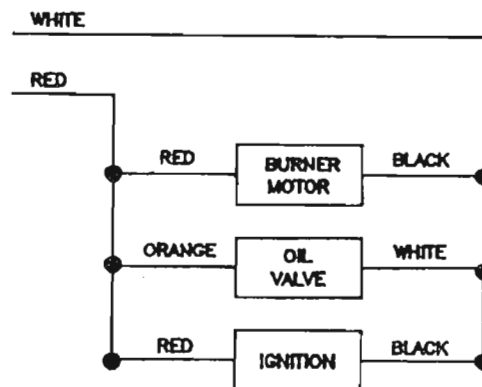
The model MSR-DC oil burner is provided with a single stage 3450 RPM fuel unit with by-pass plug removed for a single pipe installation; the by-pass plug for two pipe (inlet and return) is provided in the plastic bag attached to the fuel unit.

The installation of fuel filters are recommended. Check supply tank for sludge accumulation and leakage. Use only flare fittings on all piping and connections since compression fittings will eventually leak. With the system running, the vacuum should not exceed 12" mercury for single stage units. For ease of servicing, install a shut off valve near burner.

WIRING

The MSR-DC oil burner must be electrically wired and GROUNDED in accordance with local codes or in their absence, with National Electric Code ANS/NFPA No. 70-latest edition.

This oil burner requires a 12-volt DC power source. Use copper wire only not lighter than #12 awg. If a fused disconnect is used, it should be fused for a minimum of 20 amps. Refer to the wiring diagram in this manual or cleaning equipment manufacturers manual making sure the burner and controls are wired correctly.



AIR SUPPLY FOR COMBUSTION

The oil burner fired hot water pressure washer shall not be installed in an area where facilities for normal air circulation or infiltration are so limited as to interfere with ready attainment of all necessary for proper combustion and venting. When the heating appliance is installed in a confined space, two permanent openings shall be provided. One near the top of the enclosure and one near the bottom. Each opening shall have a free area of not less than one square inch per 1000 BTU per hour (140 square inch per gph) of the total input rating of all the appliances in the enclosure. When the building is of unusually tight construction, has an air ventilating system, exhaust fans, process dryer or vented fireplaces, it is recommended that combustion air be supplied through two permanent openings. The openings shall communicate directly, or by means of ducts, with outdoors or such spaces (attic or crawl) that freely communicate with outdoors. Avoid linty environments. For additional venting information, refer to the regulations of the National Fire Protection Standard for oil burning equipment, ANSI/NFPA N0. 31-latest edition, or the cleaning equipment manufacturers recommendations.

NOZZLE AND AIR HANDLING PARTS SELECTION

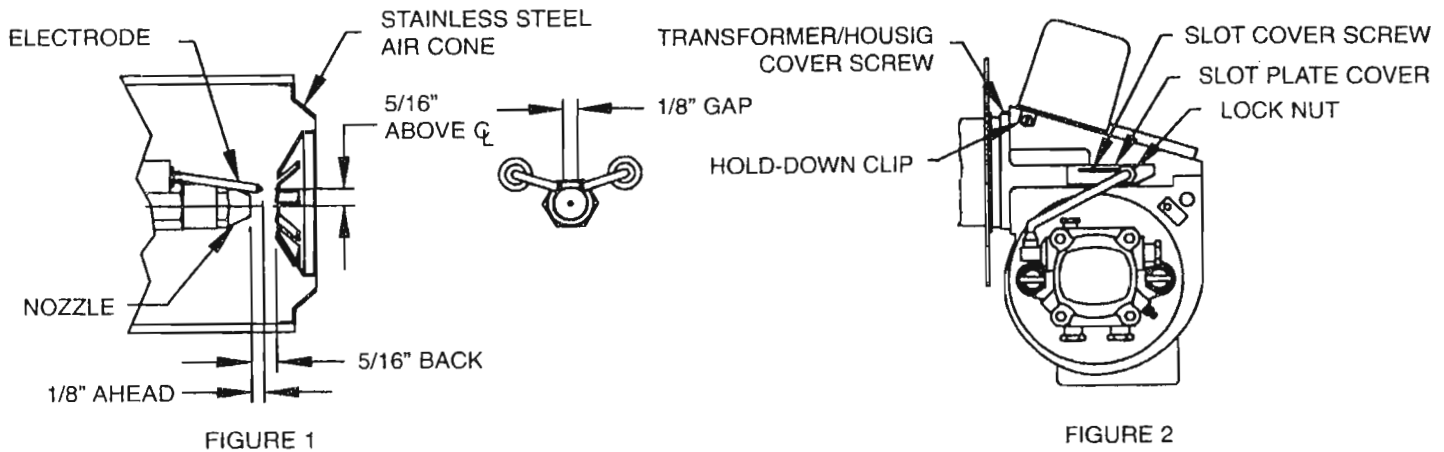
IMPORTANT: Thorough combustion and performance testing was done to establish the correct nozzle type and air handling parts on this MSR-DC oil burner. Under circumstance attempt to replace or alter the oil burner nozzle type or air handling parts (stainless steel flamelock, air cone, electrode support style static disc, blower wheel or slotted air circumstances attempt to fire the MSR-DC oil burner under its 1.00 gph minimum or over its 2.75 gph maximum input rating.



To remove the gun assembly once the burner has been installed on the appliance remove the ignitor/housing cover screw and loosen the screw in the hold-down clip and swing open the transformer. Next, disconnect the copper oil line where it attaches with a 7/16" hex flare nut on the gun assembly oil line adapter fitting and remove the 9/16" hex gun assembly locknut. Now, grasp the rear of the gun assembly where the oil line fitting adapter exits through the housing and pull oil line fitting adapter to the right out of the housing slot and slot plate cover. Gently lift, do not force, the rear of the gun assembly, rotating the oil line fitting adapter up a 45 degrees pulling the entire gun assembly out of the air tube and housing opening.

The recommended can be installed into the nozzle body adapter using the following steps. With the gun assembly removed from the burner, loosen the electrode clamp screw and rotate the electrodes up, out of the way of a nozzle wrench. Now, thread the nozzle into the adapter finger tight then tighten securely with a nozzle wrench. **CAUTION:** Do not over tighten. Next, reposition the electrodes as shown in figure 1. At this time reinstall the gun assembly into the burner using the preceding steps in reverse order. Position the nozzle face forward to a 5/16" setting behind the stainless steel air cone as shown in figure 1. Once in the required position, replace the 9/16" hex lock nut and the 7/16" hex flare nut on the gun assembly and tighten the slot cover screw (see figure 2).

CAUTION: Close the ignitor and observe for spring contact with the brass buss bars, taking care not to pinch the ignition transformer lead wires between the housing and cover plate. Reinstall the ignitor/housing cover screw and tighten the screw in the hold down clip (see figure 2).



STARTING PROCEDURE

PREPARATION STEPS

1. Calibrate and check operation of combustion analysis equipment, CO₂ (carbon dioxide) or O₂ (oxygen) analyzer, smoke pump tester, fuel gas thermometer and oil pressure/vacuum gages. Follow the manufacture recommendation for proper calibration and check out.
2. Install oil pressure gage and vacuum gage in the outlet pressure and inlet ports of the fuel unit.
3. Set oil burner slotted air band shutter 25% open.

STARTING BURNER

1. Turn off the main power switch to the burner and appliance.
2. Be sure main fuel tank is filled and all manual valves are open between the fuel tank and the burner.
3. Turn on the main power switch to the burner and appliance.
4. Prime the fuel pump per its manufacturers recommendations, check fuel unit for 100 psi delivery pressure and check system vacuum (see paragraphs under Fuel Units and Oil Lines).

CAUTION: Do not run fuel unit dry for more than five minutes or damage to the fuel unit could result.



5. Once the fuel unit is primed (no signs of air in oil bleeder port discharge), close the bleed port. Burner will ignite.
6. When flame is established, make a temporary air adjustment to the slotted air band for a visually clean combustion smoke observed from the appliance vent. Allow the appliance to warm up approximately five minutes or until the water temperature reaches that recommended by the cleaning equipment manufacture.
7. Adjust the slotted air band shutter until a #1 to #2 smoke (Shell Bacharach scale) is obtained at the appliance vent.
8. Check CO₂ (carbon dioxide) and/or O₂ (oxygen) percentages and smoke in the flue gas at the appliance vent. In general, CO₂ readings should be in the 10% to 12% range and O₂ readings in the 7.4% to 4.7% range.
9. Once the desired combustion results are attained, securely tighten slotted air band screw and check that controls on the appliance are adjusted per the cleaning equipment manufactures instruction sheets. Remove oil pressure and vacuum gages from the fuel unit and reinstall pipe plug fittings.
10. Check burner lighting with hot chamber, then allow burner and appliance to sufficiently cool. Then check burner lighting with a cold chamber.

SUGGESTION: all new installations should be reinspected after one or two weeks of normal operation.

MAINTENANCE

OILING MOTOR – The MSR_DC oil burner is provided with a ball bearing shaft motor. Ball-bearing motors do not require oiling under normal service conditions.

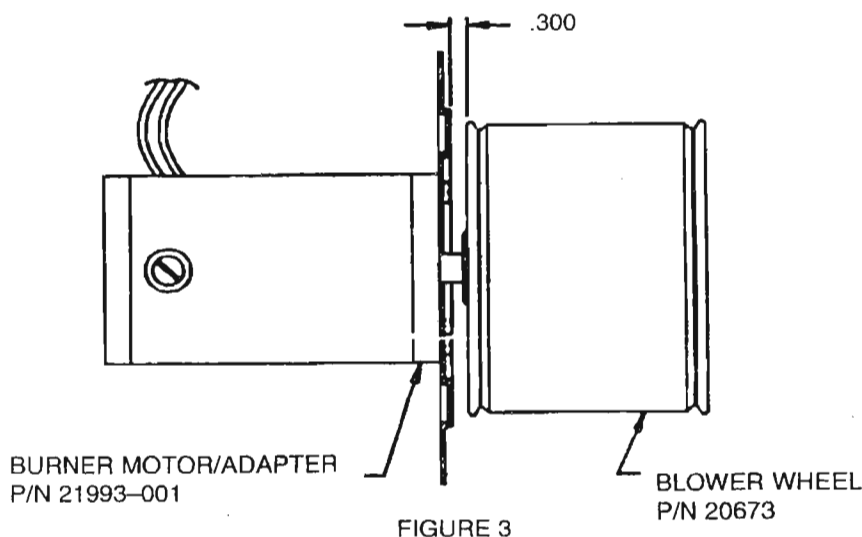
FILTER – The oil filter cartridge should be replaced, or sediment cleaned, periodically so the fuel oil will not become contaminated and plug up the fuel pump and nozzle of oil burner.

NOZZLE – The nozzle should be changed at least once each year or twice a year if the cleaning equipment is used daily through the year and should poor combustion occur. Replace with the proper nozzle.

COMPONENTS – If for any reason any of the burner parts have to be replaced, always use parts recommended by the manufacturer. Specify part numbers and description when ordering. (IN ALL COMMUNICATIONS STATE BURNER MODEL AND SIX DIGIT SPECIFICATION NUMBER).

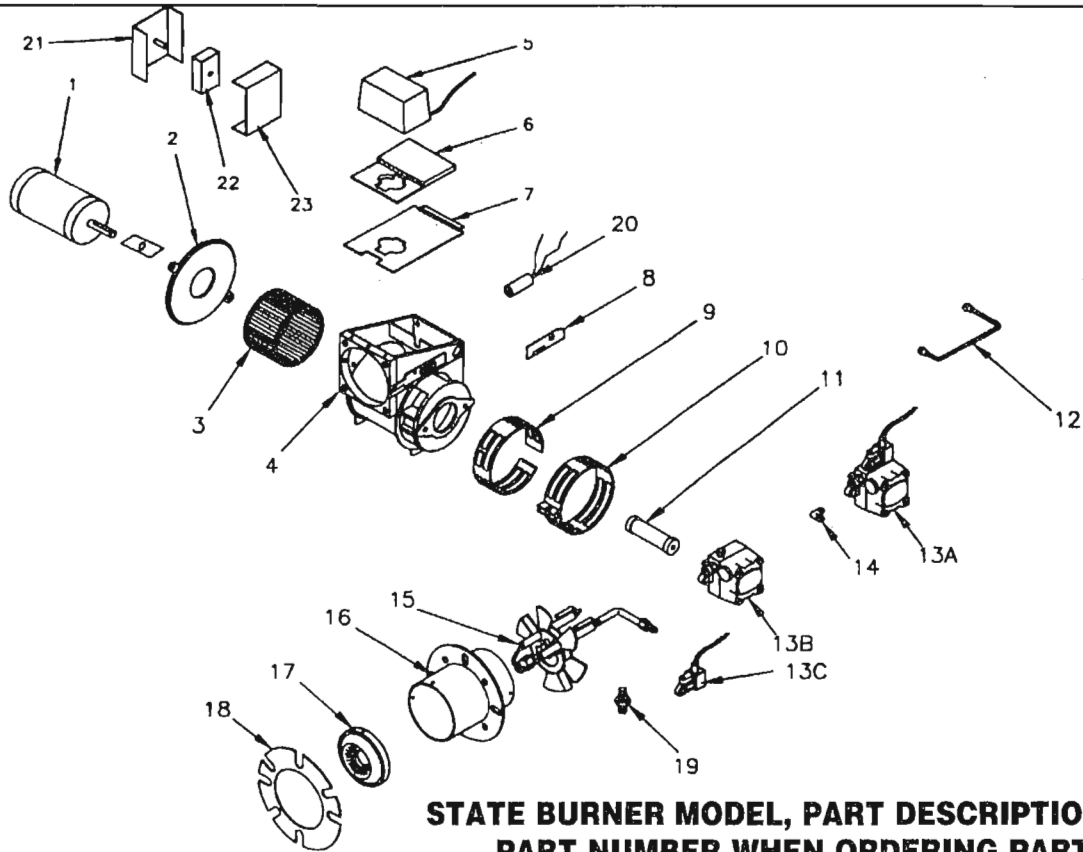
ELECTRODE SETTINGS – This is very important for reliable ignition of the oil; check these once a year in accordance with the instructions provided in this manual. Replace electrodes if worn excessively or if porcelain insulator is oil soaked or cracked (See Figure 1).

FAN & 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. Should the blower wheel be removed for replacement or cleaning, reinstall as shown in figure 3.





BURNER COMPONENTS - MODEL MSR-DC



STATE BURNER MODEL, PART DESCRIPTION AND PART NUMBER WHEN ORDERING PARTS

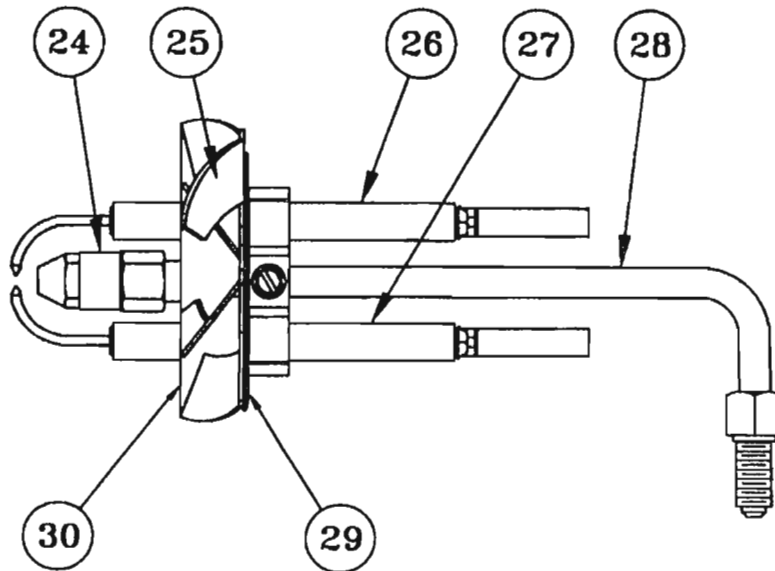
| NO. | DESCRIPTION | PART NO. |
|-----|--|------------------------|
| 1 | MOTOR 1/8 STANDARD MOTOR 1/8 LOW AMP | 21993-005 21993-006 |
| 2 | MOTOR ADAPTOR | 100761-001 |
| 3 | BLOWER WHEEL 3 1/2 X 4 1/4 | 21427 |
| 4 | BURNER HOUSING | SEE NOTE |
| 5 | IGNITOR-12VDC | 31812-003 |
| 6 | MOUNTING BASE | 100730-001 |
| 7 | HOUSING COVER | 21723-002 |
| 8 | SLOT COVER PLATE | 13392 |
| 9 | INNER AIR BAND | 20601-002 |
| 10 | OUTER AIR BAND | 20602-002 |
| 11 | COUPLING | 101119-001 |
| 12 | OIL LINE ASSEMBLY 6" OIL LINE ASSEMBLY 8" | 14451 14452 |
| 13A | FUEL UNIT: SUNTEC COMBO | 101128-005 |
| 13B | FUEL UNIT: SUNTEC | 13495 |
| 13C | FUEL SOLENOID | 100610-005 |
| 14 | ELBOW (USE WITH 13A) | 13494 |
| 15 | GUN ASSEMBLY | SEE NOTE |
| 16 | AIR TUBE/FLANGE ASM | SEE NOTE |

| NO. | DESCRIPTION | PART NO. |
|-----|----------------------------------|----------------|
| 17 | AIR CONE - #3A AIR CONE - #4A | 14159 14160 |
| 18 | GASKET | 12484 |
| 19 | CONNECTOR (USE WITH 13B, 13C) | 14222 |
| 20 | CAD CELL | 14289 |
| 21 | CONTROL BOX | 63355-001 |
| 22 | TIMER, DROP OUT | 100889-002 |
| 23 | COVER, CONTROL BOX | 62899 |

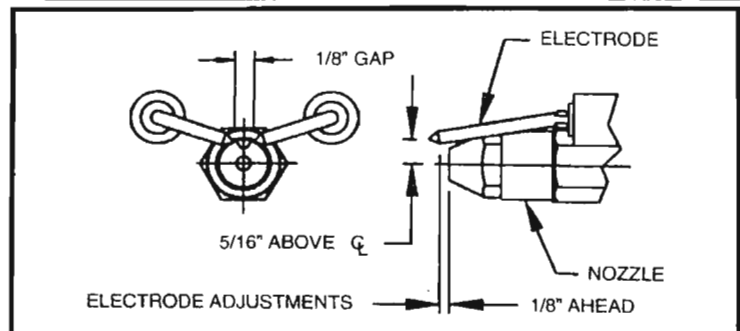
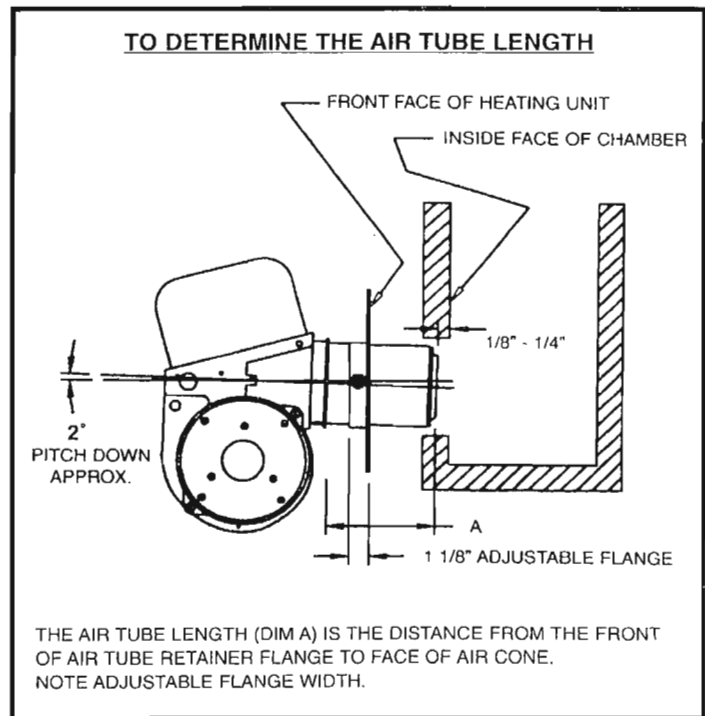
| Suggested Combustion Chamber Dimensions Conversion or Upgrading Chamber Dimensions (In Inches) | | | | | |
|---|--------|--------|-------|--------|-----------------------|
| Firing Rate (G.H.P) | Square | | Round | Height | Floor to Nozzle |
| | Width | Length | | | |
| 0.85 | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 |
| 1.00 | 9 | 9 | 10½ | 12½ | 5-6 |
| 1.25 | 10 | 10 | 11½ | 12½ | 5-6 |
| 1.35 | 10½ | 10½ | 11½ | 12½ | 5-6 |
| 1.50 | 11 | 11 | 12½ | 13 | 5-6 |
| 1.65 | 11½ | 11½ | 13 | 13½ | 5-6 |
| 2.00 | 12½ | 12½ | 14½ | 13½ | 6-7 |
| 2.50 | 14½ | 14½ | 16 | 14 | 7-8 |
| 3.00 | 15½ | 15½ | 17½ | 15 | 7-8 |

NOTE: WHEN ORDERING STATE BURNER MODEL MSR, SPEC#, WHAT USABLE AIR TUBE LENGTH, AND FIRING RATE.

AIR TUBE & GUN ASSEMBLY DETAILS MODEL MSR-DC



| NO. | DESCRIPTION | PART NO. |
|-----|-------------------------|------------|
| 24 | ADAPTOR, NOZZLE SUPPORT | 21913-001 |
| 25 | ELECTRODE SUPPORT ASM | SEE NOTE |
| 26 | ELECTRODE (RH) | SEE NOTE |
| 27 | ELECTRODE (LH) | SEE NOTE |
| 28 | OIL PIPE/FITTING | SEE NOTE |
| 29 | DISC/BAFFLE PLATE | SEE NOTE |
| 30 | CAST STABILIZER | 21408-SER |
| | STAMPED STABILIZER | 100704-001 |



NOTE: WHEN ORDERING STATE BURNER MODEL MSR, SPEC #, PART DESCRIPTION, AIR TUBE COMBINATION, WHAT USABLE AIR TUBE LENGTH, (DIMENSION A), AND FIRING RATE.



WAYNE COMBUSTION SYSTEMS

801 GLASGOW AVE.
FORT WAYNE, IN 48803

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 units, 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.