



MODEL  
**EZ SERIES**  
**Oil Burners**  
**Instruction Manual**

**Contents**

Read this first..... 2  
 Application information ..... 3  
 Prepare site • Assemble burner • Mount burner ..... 4  
 Prepare burner ..... 6  
 Wire burner • Start burner ..... 9  
 Adjustment and verification ..... 9  
 Annual start-up and service..... 10  
 Maintenance procedures ..... 11  
 Repair parts ..... 12  
 User care and maintenance .....Rear cover

**WARNING** Installer/servicer — Except where specifically stated otherwise, this manual must be used only by a qualified service technician. Failure to comply with this or other requirements in this manual could result in severe personal injury, death or substantial property damage.

**WARNING** User — The burner Instruction Manual is intended only for your service technician. The burner and heat exchanger must be inspected and started at least annually by your service technician.

**NOTICE** The National Oilheat Research Alliance (NORA) recommends single pipe oil systems and high-quality filtration for all fuel types. This should include at least a 10 micron Spin-on filter. Double filtration provides even greater assurance clean fuel will get to the pump. Contaminants in the tank that enter the fuel supply to the burner can cause pump sticking/seizing. These contaminants may increase in the early stages of transitioning to modern fuels (Ultra Low Sulfur and Bio Blends). High quality filtration adds protection against pump sticking



**Ratings**

Input: EZ LF.....0.35 to 1.45 GPH  
 EZ1 .....0.50 to 1.65 GPH

Fuels: US: No.1 or No. 2 heating oil, including bio blends up to B20 (U.S ONLY) (ASTMD396)  
 Canada: No. 1 stove oil or No. 2 heating oil (ASTM D396)

Fuel unit: Suntec A2VA-3006

Electrical: Power ..... 120V/60 HZ/1-PHASE  
 Motor ..... Carlin PSC, 1/6 HP, 3450 RPM  
 Current .....Approx. 2.5 AMPS

Ignition: Carlin Model 45000 electronic..... 19,000 VOLTS

Control: U.L. Group I or II primary safety control

Agencies: UL Listed (US and Canada)



126 Bailey Road • North Haven, CT 06473  
 Phone 203-680-9401 • Fax 203-764-1714

**TECH SUPPORT 800-989-2275 • carlincombustion.com**

© Copyright 2021 — Carlin Combustion Technology

## Read this first . . .

### Special attention flags

Please pay particular attention to the following when you see them throughout this manual.

**DANGER** Notifies you of hazards that WILL cause severe personal injury, death or substantial property damage.

**WARNING** Notifies you of hazards that CAN cause severe personal injury, death or substantial property damage.

**CAUTION** Notifies you of hazards that WILL or CAN cause minor personal injury or property damage.

**NOTICE** Notifies you of special instructions on installation, operation or maintenance that are important, but are not normally related to injury or property damage hazards.

### General information

#### Burner applications

Follow all instructions in this manual, the primary control data sheet and the appliance manual. Verify the burner is correct for the appliance being used and for all applicable codes/standards.

#### Damage or shortage claims

The consignee of the shipment must file damage or shortage claims immediately against the transportation company.

#### When calling or writing about the burner . . .

Please provide us with the UL serial number and burner model number to assist us in locating information. This information can be helpful when troubleshooting or obtaining replacement parts.

### Burner option . . .

#### Optional Burner Cover with air intake adapter

- Carlin's optional EZ burner cover is available on all EZ 1 models.
- Combustion air can be taken from the room or can be piped to the burner cover when the optional air intake adapter is installed.
- See separate instructions provided with the cover for installation and special instructions required with the cover.

#### **WARNING** Should overheating occur:

1. Shut off the oil supply to the burner.
2. DO NOT shut off the control switch to the circulator or blower.

**WARNING** Follow the guidelines below to avoid potential severe personal injury, death or substantial property damage.

### Installer/service technician . . .

- Read all instructions before proceeding. Perform all procedures, and in the order given to avoid potential of severe personal injury, death or substantial property damage.
- Before leaving the site after startup or service, review the User's information page with the user. Make the user aware of all potential hazards and perform the training outlined below.

### Train the user . . .

- To properly operate the burner/appliance per this manual and the appliance instructions see User's information.
- To keep this manual at or near the burner/appliance for ready access by the user and service technician.
- To contact the service technician or oil dealer if he encounters problems with the burner/appliance.
- To keep the appliance space free of flammable liquids or vapors and other combustible materials.
- Do not use laundry products, paints, varnishes or other chemicals in the room occupied by the burner/appliance.
- To contact the service technician at least annually for startup and burner/appliance service.

### When servicing the burner . . .

- Disconnect the electrical supply to the burner before attempting to service to avoid electrical shock or possible injury from moving parts.
- Burner and appliance components can be extremely hot. Allow all parts to cool before attempting to handle or service to avoid potential of severe burns.

## Application Information

### Codes and standards

#### Certification

EZ Series oil burners are U.L. listed for the U.S. and Canada, certified to comply with ANSI/UL 296, for use with #1 or #2 heating oil including bio blends not exceeding B20 (U.S. only). Burner labels list compliance, when required, with special local, state or provincial approvals.

**NOTICE** Install this burner in accordance with all local codes and authorities having jurisdiction. Regulations of these authorities take precedence over the general instructions provided in this manual.

#### United States installations

Burner/appliance installations in the United States must comply with the latest editions of NFPA 31 (Standard for the Installation of Oil-Burning Equipment), ANSI/NFPA 70 (National Electrical Code), and all applicable local codes.

#### Canadian installations

Burner/appliance installations in Canada must comply with the latest editions of CSA B139 (Installation Code for Oil Burning Equipment), CSA standard C22, Part 1 (Canadian Electrical Code), and all applicable local codes.

### OEM burners

#### General information — OEM burners

- Burners welded flange set at the proper insertion depth and pitch for the appliance.
- Burners may be installed on the appliance or shipped in a separate carton.
- Burner nozzles are installed in the burner, bagged or tied onto the burner chassis, or located in the appliance packaging.
- Fuel unit pressure is factory-set. Check burner supplement for the correct pressure setting.
- The air band scale is calibrated for the fuel unit pressure. Set the air band to match the nozzle size installed. See burner supplement for further information.

#### Installing OEM burners

- Burner flanges are welded to the air tube to ensure the correct pitch. Do not attempt to adjust the pitch using the air tube locking screws.

#### Oil nozzle selection — OEM burners

- Use only the nozzle specified in burner supplement.

## Prepare Site • Assemble Burner • Mount Burner

### Inspect/repair/replace vent system

**WARNING**

Do not install this burner unless you have verified the entire vent system and the appliance are in good condition and comply with all applicable codes. And ... The vent and chimney must be sized and constructed in accordance with all applicable codes. Do not install or use an existing manual damper in the breeching (vent connector) or chimney. Do not connect the appliance vent connector to a chimney or vent serving a fireplace, incinerator or solid-fuel-burning apparatus. In a cold climate, do not vent into a masonry chimney that has one or more sides exposed to the outside. Install a listed stainless steel liner to vent the flue products. A defective vent system could result in severe personal injury, death or substantial property damage.

#### Prepare vent/chimney

- Secure all metal vent joints with screws, following the vent manufacturer's instructions. Seal all joints in the vent system and chimney. Repair masonry chimney lining and repair all mortar joints as needed.
- Install a barometric draft regulator in the vent piping if specified in the appliance manual. (The damper must be located in the same space as the appliance.)
- Provide support for the vent piping. Do not rest the weight of any of the vent piping on the appliance flue outlet.

### Combustion/ventilation air openings

**WARNING**

Even if combustion air is piped to an (optional) burner air intake adapter, the boiler room must still have the minimum air openings listed in Table 2 and described in the following paragraphs. This is to provide needed ventilation to keep the burner and appliance cool and to avoid the boiler room developing negative pressure.

The combustion air openings **MUST** be sized based on the total input of **all appliances in the room**.

Check appliance manual and applicable codes for required sizing/design/placement of combustion/ventilation air openings. You can use the following general guidelines, taken from NFPA 31, provided they meet all local requirements.

#### Louvers/screens

- Air opening sizes are always given in free area. This means after deduction for louver obstruction. If you can't find the louver reduction for the grilles used, assume free area is 20% of total for wood louvers, or 60% of total for metal louvers.
- Screens can be no finer than ¼-inch mesh, and must be accessible for cleaning.

#### Residential installations

Unconfined spaces (at least 7,000 cubic feet per GPH)

- An unconfined space means a room with at least 7,000 cubic feet volume for each GPH input (or 50 cubic feet per MBH) of **all appliances in the room**. Example: For each 1 GPH oil input,

the room must have 7,000 cubic feet (875 square feet with an 8-foot ceiling height.)

- Open basements and crawl spaces are usually large enough, and will generally allow enough air infiltration so special provisions will seldom be required.
- If the building is tightly constructed, you will have to provide outside air openings into the building. The total free area of the openings must be at least 1 square inch per 5,000 Btuh (28 square inches per GPH) of all appliances in the space.
- See Table 2 for summary.

#### Air openings to confined spaces (less than 7,000 cubic feet per GPH)

- Air taken from inside building only —
- Provide two openings — one near floor, the other near ceiling. Provide free area of 140 square inches per GPH input. If building is tightly constructed, provide air opening(s) into building providing 30 square inches per GPH as well.
- Air taken from outside —
  - Direct through outside wall or vertical ducts: Provide two openings — one near floor, the other near ceiling. Provide free area of 35 square inches per GPH input.
  - Through horizontal ducts: Provide two openings — one near floor, the other near ceiling. Provide free area of 70 square inches per GPH input.
- Ventilation air from inside/combustion air from outside
  - Size openings to interior to provide 140 square inches free area per GPH input. Size outside air duct to provide 28 square inches free area per GPH.
- See Table 1 for summary.

**Table 1** Minimum combustion/ventilation air openings

Source of air	Minimum free area of opening(s)	Total grill area, typical (sq. in.) for firing rates of:					
		1 GPH		2 GPH		3 GPH	
		Wood	Metal	Wood	Metal	Wood	Metal
Residential installations, unconfined spaces (7,000 cu. ft. volume per GPH)							
From inside building, typical construction	No special openings required if natural infiltration is sufficient.						
From inside building, tight construction	1 or more grilles 30 Sq. in./ GPH	150	50	300	100	450	150
Residential installations, confined spaces							
From inside building through interior walls	2 openings, each 140 Sq. in./ GPH	700	234	1400	467	2100	700
From outside building direct through outside wall	2 openings, each 35 Sq. In./ GPH	175	59	350	117	525	175
From outside building through vertical ducts	2 openings, each 35 Sq. In./ GPH	175	59	350	117	525	175
From outside building through horizontal ducts	2 openings, each 70 Sq. In./ GPH	350	117	700	234	1050	350
Ventilation through interior walls, with an opening to outside	2 Int. openings, each 140 Sq. In./ GPH	700	234	1400	467	2100	700
	1 Exterior opening 28 Sq. In./ GPH	140	47	280	94	420	140
Commercial installations							
From outside building direct through adjacent outside wall	One opening through outside wall, providing free area of at least 28 Square inches per GPH input						
Other conditions	Size openings per local codes/jurisdictions						

## Prepare Site • Assemble Burner • Mount Burner (continued)

**WARNING**

The burner may operate successfully under momentary downdraft conditions, but sustained downdraft is unsafe. This can occur with an inadequate or incorrectly installed chimney/vent. It can also occur in rooms/buildings equipped with exhaust fans or unsealed return air ducts.

Always check operation of the burner under all conditions to verify vent system operates correctly.

**Combustion/ventilation air openings:**

Always provide combustion/ventilation air to the appliance room sufficient to prevent any negative pressure in the space — if necessary, install new or additional air openings. See instructions in this manual for combustion air openings.

**Piped combustion air applications:**

Burners with piped combustion air require a Carlin CAP System or a Field CAS-1 combustion air system.

Failure to correct downdraft or negative room pressure operation could result in severe personal injury, death or substantial property damage.

**WARNING**

Even if using an (optional) air intake system, make sure the space provides enough ventilation to prevent overheating of the appliance, burner and controls. The equipment room must have combustion air/ventilation openings sized large enough to provide air for cooling the equipment and for combustion when needed. Failure to comply can result in severe personal injury, death or substantial property damage.

### Combustion/ventilation air checklist

- Verify that openings are unobstructed.
- Verify that appliance space and air source spaces are free of:
  - Gasoline or other flammable liquids or vapors.
  - Combustible materials.
  - Air contaminants and chemicals, such as laundry products, paint, thinner, varnish, etc.
- Confirm with the building owner that the area will be kept free of these materials at all times and that air openings will be kept unobstructed.

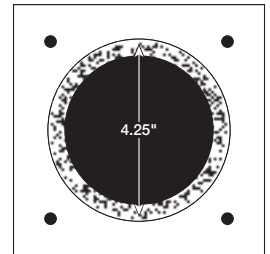
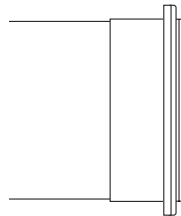
### Verify clearances

Verify that the burner/appliance will maintain all clearances from combustible construction and clearances for service/maintenance as required in the appliance manual and applicable codes.

Verify that the vent system components maintain all necessary clearances to combustible construction, including the correct design of thimbles and insulation where penetrating combustible walls.

**NOTICE**

To avoid damages, check that the boiler door opening insulation is large enough to accommodate the Carlin EZ blast tube installation. If not, boiler door opening insulation must be trimmed to 4.25" diameter.



## Prepare Burner

### Removing/installing head assembly

**WARNING** Use care when handling burner components after the burner has been firing. Components can be hot and could cause severe personal injury.

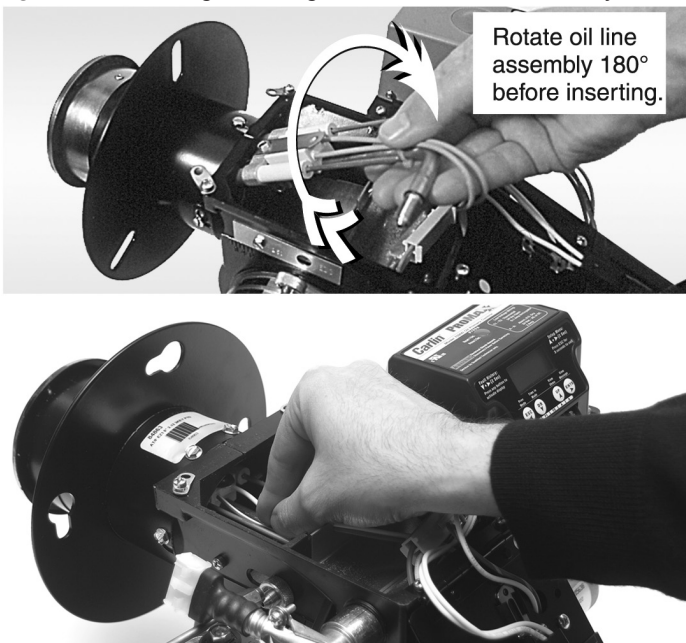
You will need to remove the combustion head assembly for inspection of the assembly, replacement of the oil nozzle or adjustment of electrodes.

Note: Loosen and remove access cover for easier access.

#### To remove the assembly:

1. Loosen, and then rotate the two screw clamps securing the ignitor in place. Swing the ignitor plate open.
2. Unscrew the oil line fitting and thumb nut at the burner housing.
3. Pull the threaded end of the oil tube into the blower housing (Figure 1).
4. Rotate the assembly 180° so the electrodes are upside down. This places the electrode insulators out of the way for easy removal.
5. Remove the combustion head assembly, as shown in Figure 1, by pulling the assembly up and out of the housing.
6. Handle the assembly with care to avoid bending/moving the electrodes, or damaging the electrode ceramic insulators.
7. Inspect the gasket on the bottom of the ignitor plate. The gasket prevents air from escaping from the housing. Replace the gasket if not in good condition.
8. Inspect the ignitor contact clips. Clean or replace if necessary to ensure reliable contact with the electrodes.

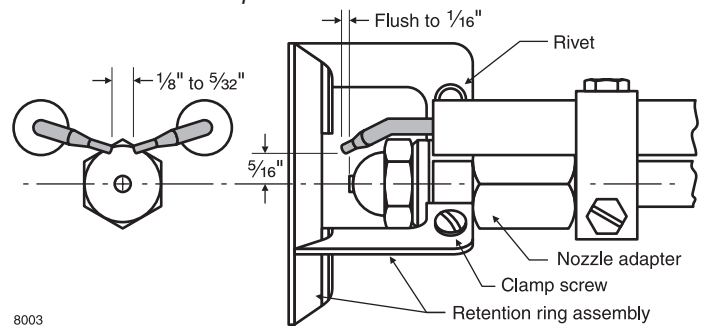
**Figure 1** Inserting/removing combustion head assembly



### Install nozzle/check electrodes

1. Loosen the clamp screw on the retention ring assembly (see Figure 2). Slide the retention ring assembly off of the nozzle adapter.
2. Install the nozzle specified in burner supplement.
3. Hold the nozzle adapter securely when removing or replacing the nozzle (Figure 3). Take care not to damage the electrode insulators or to bend the electrodes in the process.

**Figure 2** Electrode placement, retention ring assembly and nozzle adapter



**WARNING** Inspect the nozzle adapter before replacing the nozzle. If the threads have been damaged or shows score marks, replace the nozzle line/adapter assembly.

4. Replace the retention ring assembly by slipping one of the riveted arms through the gap between the electrode tips. Align this arm straight up, with the ring clamp firmly against the nozzle adapter shoulder. Then tighten the clamping screw.
5. Check the electrode settings. Position the electrodes as shown in Figure 2. These settings are critical in ensuring a reliable ignition. Once the electrodes are set, check all clamps to be sure they are securely tightened.

**Figure 3** Carefully support the nozzle adapter when removing or installing nozzle



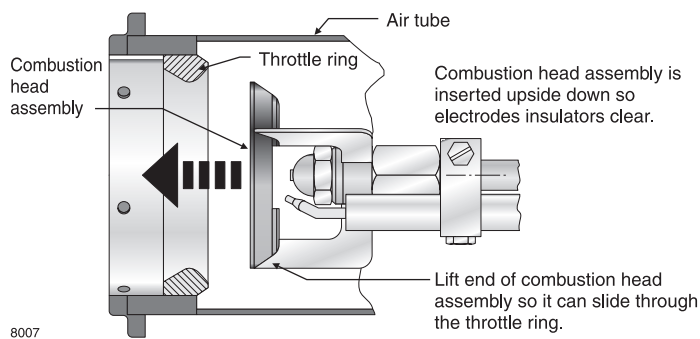
## Prepare Burner (continued)

To replace the combustion head assembly, reverse the previous sequence.

- Remember to put the assembly in upside down, so the electrode insulators are out of the way.
- See Figure 8. You will have to lift the end of the assembly to guide it through the reduced diameter throttle cone at the end of the air tube. DO NOT FORCE.

**CAUTION** Use care when tightening the oil line fitting to oil tube extension. Tighten securely, but do not cross-thread or over-tighten.

**Figure 4** Inserting combustion head assembly



## Adjust air band (initial setting)

1. The burner pump pressure is factory set. Loosen the lock screw and move the air band until the pointers line up with the setting indicated in the burner supplement (Figure 5).  
NOTE: For high altitude installations above 2,000 feet, increase the air supply setting 4% for each 1,000 feet above 2,000 feet above sea level.
2. The burner is now adjusted to the approximate air band setting. When you check combustion with instruments during start-up or servicing, you may have to adjust the air band slightly to achieve the desired combustion readings. See “Adjust burner using test instruments,” page 9.

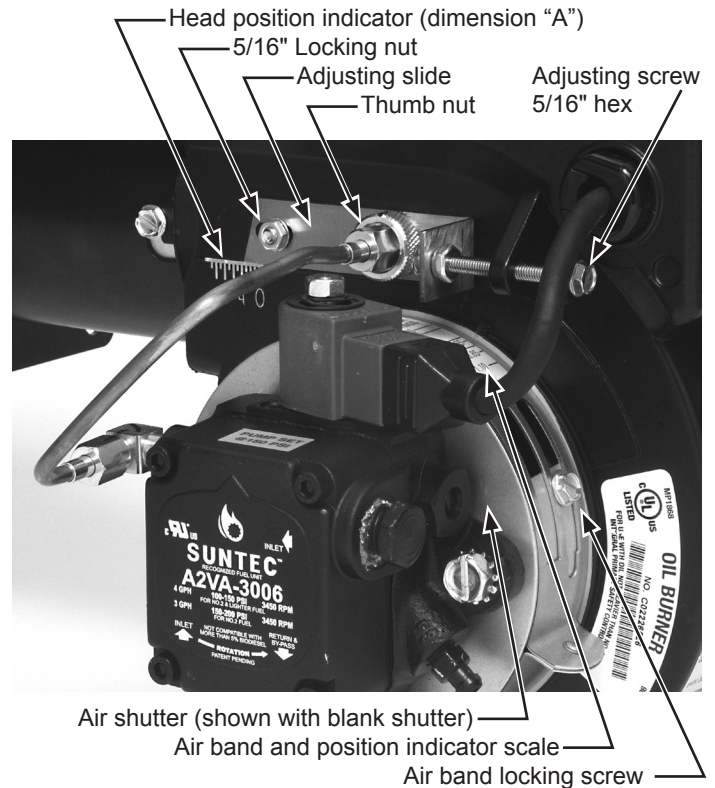
## Adjust head position

1. If necessary to make head bar adjustment loosen the slide locking nut and oil line thumb nut. Rotate the adjusting screw to align the leading edge to the required head bar position indicated on the burner supplement (Figure 5).
2. Lock in place by first tightening the oil line thumbnut, then tightening the locking nut.

## Final adjustments

The burner is now adjusted to the approximate air settings for the firing rate chosen. When you check combustion with instruments during start-up or servicing, you may have to make slight adjustments to the air-band to achieve desired combustion results. The head bar can be adjusted to additionally optimize combustion (Figure 5).

**Figure 5** Head bar/air band adjustment



## Prepare Burner (continued)

### Inspect/install fuel supply

**CAUTION** Inspect the oil supply system. Ensure that the fuel lines are correctly sized and installed and that the fuel flow is unobstructed, the oil tank is clean and only #1 or #2 heating oil are supplied. Failure to supply a reliable oil flow could result in loss of heat and potential severe equipment damage.

#### General guidelines:

- When installing oil lines, use continuous runs of heavy-wall copper tubing if possible.
- Check fuel unit (oil pump) data sheet for recommended line sizing, lift limitations and maximum length.
- Check all connections and joints to ensure they are air-tight.
- Use flare fittings. Do NOT use compression fittings.
- Never use pipe sealing tape. Fragments can break off and plug fuel line components.
- Install a shut-off valve at the tank and one near the burner. (Use fusible handle design valves when possible or when required by codes.)
- Install a large capacity fuel filter (rated for 50 microns or less) near the burner.

#### Fuel unit bypass plug

**WARNING** The fuel unit is shipped ready for a one-line oil system (bypass plug is shipped loose). Install the bypass plug only if connecting to a two-line oil system. Operating with the plug in place on a one-line system will damage the fuel unit and could lead to oil leakage and fire hazard.

**WARNING** If the fuel line or fuel supply is above burner, never exceed 3 PSIG pressure at the fuel unit inlet. Install a suitable OSV to reduce the pressure. Operating the fuel unit with higher inlet pressure could result in fuel unit seal damage, oil leakage and potential fire hazard.

### Fuel system requirements

The standard burner fuel unit is a single-stage, 3450-RPM oil pump. Apply this fuel unit only on one-line systems where the fuel supply is on the same level with, or higher than, the burner. For other conditions, you must provide a two-line fuel system. You may also have to change the fuel unit to a two-stage type.

### Perform checkout procedures

#### Verify before starting burner

- WARNING** Should overheating or an emergency occur, immediately:
- Shut off oil supply line valve.
  - Under some circumstances power should remain on for water pumps or blowers. Determine proper response before attempting start-up.
  - If burner fails ignition on several attempts, use burner blower to purge appliance chamber before restart.

#### Checklist

- Burner/appliance installed per appliance instruction manual?
- Burner nozzle and head positioning bar verified against burner supplement?
- Burner/appliance installed per all applicable codes?
- Installation site has adequate combustion/ventilation air openings and vent system?
- Fuel supply line in good condition and sized/designed correctly?
- Oil tank has oil and oil line valves are open.
- Wiring installed per burner/appliance instructions?
- Burner, appliance and all components inspected and in good condition?



## Wire Burner • Start Burner – See *included Primary Control Data Sheet*

**WARNING** Turn off power to appliance when servicing burner. Failure to comply could result in severe personal injury, death or substantial property damage.

### Adjustment and Verification

#### Perform combustion test

**WARNING** **COMBUSTION MUST BE VERIFIED WITH THE (OPTIONAL) BURNER COVER IN PLACE —**

Remove the burner cover if installed. Set up and adjust the burner using the following procedure. Replace the burner cover, allow the burner/appliance to run at least 15 minutes, then check combustion again. Readjust the burner is necessary. **The CO<sub>2</sub> will increase when the cover is put on**, particularly if combustion air is piped to the burner.

**WARNING** **If air is ducted to an (optional) air adapter, combustion must be set based on the air inlet temperature.** Air temperature variations will change how much air enters the burner, so the combustion must be set to anticipate the variations. Follow the guidelines below.

#### Adjust burner using test instruments

- Operate burner for 15 minutes before making final adjustments using test equipment.
- Check for leaks in fuel piping.

**WARNING** Inspect fuel piping system for leaks. Repair any leaks to avoid fire hazard from oil leakage or combustion problems due to air infiltration into oil.

- Inspect flame
  - Look at flame through appliance combustion chamber observation port. The flame should be well-defined and should not impinge on any appliance surface. (If you make air or gas pressure changes later, inspect the flame again.)

**WARNING** Do not attempt to confirm combustion simply by inspecting the flame visually. You must use combustion test instruments. Failure to properly verify/adjust combustion could allow unsafe operation of the burner, resulting in severe personal injury, death or substantial property damage.

- Insert test probe into vent or appliance flue damper sample opening to sample flue products.

**WARNING** Heating units designed for natural draft operation are normally set for a slightly negative pressure, usually -0.01 to -0.02 inches w.c. draft at the combustion chamber test port. Appliances designed for forced draft (positive pressure in the chamber) must be air-tight to prevent exfiltration of harmful combustion products. Failure to properly set draft for the appliance could result in severe personal injury or death.

- Use combustion test equipment to verify that the burner is properly set up for your installation.** Appliances with positive pressure in the chamber may require a wider air opening. See appliance instructions for details. Verify/adjust settings by testing with instruments.

- With the EZ burner equipped with the correct head setting, oil nozzle and initial air band setting, the flue products will usually contain between 11½% and 12½% CO<sub>2</sub> (5.9% and 3.8% O<sub>2</sub>) and zero (Bacharach) smoke. (Based on air inlet temperature of 70°F — see Table 5 for the proper values at other air temperatures for burners with ducted combustion air.)
- Depending on length of air piping (when used) and on air temperature, CO<sub>2</sub> may change one per cent or more with the cover in place.
- Check smoke. It should be zero on the Bacharach scale.
- Set the appliance flue damper or barometric draft regulator so the draft or pressure in the vent complies with the appliance manufacturer's instructions.

#### Re-install (optional) burner cover and check combustion again

- Allow the burner to operate with the cover on for at least 15 minutes. (Insert a temperature probe to measure incoming combustion air temperature if combustion air is ducted to the burner.)
  - Retest CO<sub>2</sub> (or O<sub>2</sub>) and smoke again. The values will change when the cover is installed. Depending on length of air piping and on air temperature, CO<sub>2</sub> may change one per cent or more with the cover in place.
  - Make sure the CO<sub>2</sub> (or O<sub>2</sub>) values are in the range given in Table 5 for the inlet air temperature measured. IF NOT, remove the cover and adjust the air band more open to decrease CO<sub>2</sub> (increase O<sub>2</sub>) or close the air band slightly to increase CO<sub>2</sub> (decrease O<sub>2</sub>).
  - Tighten air band clamping screw.

**WARNING** All installations should be checked after one to two weeks of operation to ensure the appliance/burner units are operating correctly.

**Table 2** Burners using inside air for combustion – Use “65°F or higher” row in table below.

**Burners with ducted combustion air – MEASURE incoming combustion air temperature and set the CO<sub>2</sub> (or O<sub>2</sub>) using the following chart:**

Incoming combustion air temperature during setup	CO <sub>2</sub> min	CO <sub>2</sub> max	O <sub>2</sub> max	O <sub>2</sub> min
<b>-20°F to 0°F</b>	10.2%	11.0%	7.0%	5.8%
<b>5°F to 30°F</b>	11.0%	11.5%	5.8%	5.5%
<b>35°F to 60°F</b>	11.5%	12.2%	5.5%	4.2%
<b>65°F or higher</b>	12.0%	12.5%	4.6%	3.9%

## Adjustment and Verification

(continued)

### Verify burner/appliance operation

#### Check burner/appliance/controls operation

- Test operating and limit controls on appliance as specified in appliance instructions.
- Check operation of the primary control by forcing lockout to occur. For primary controls that enter latch-up after multiple lockouts, force latch-up to occur as well. Reset primary control per control data sheet instructions after each test.
- Start and stop the burner several times, allowing the primary control to sequence through normal operation. Verify correct operation of burner and primary control throughout.

#### Verify vent system operation

- Verify vent is operating correctly and flue products are properly exhausted from building. If the building contains any exhaust fans or conditions that could affect vent performance, check burner/appliance/vent operation with exhaust fans (or other conditions) operating.

#### Combustion/ventilation air

- Verify combustion/ventilation air openings are not/will not be obstructed.
- Verify air opening louvers are full open.
- If louvers are motor-operated, verify motor and end switch are interlocked with appliance/burner wiring to prevent operation of the burner if the air louvers are not fully opened.

#### Prepare burner for normal operation

- Cycle burner off with appliance controls.
- Turn off power to the appliance.
- Seal the appliance flue damper test opening.
- Verify all components and wires are in place and burner is ready for operation.
- Restore power to the appliance.

#### Train the user

- Train the user to operate the burner and appliance under normal conditions.
- Explain procedure to shut down burner/appliance when required.
- Review rear cover of this manual (and the appliance manual) with the user.
- Verify the user is aware of all procedures specified in the manuals.
- Verify user will not store or use combustible liquids or materials or contaminants in the vicinity of the burner/appliance.

## Annual Startup and Service

### Perform the following

**WARNING** This burner must be started and serviced at least annually by a qualified service technician. Failure to properly maintain and service the burner could result in severe personal injury, death or substantial property damage.

- Discuss burner/appliance operation with user to determine any problems that may have occurred during the previous season and to verify user is aware of proper operation and care of the burner/appliance.
- Review proper operation of the appliance/burner unit with the user.
- Turn off power to appliance.
- Remove combustion head assembly to clean and adjust if necessary. (See procedure on page 10.)
- If the inside surface of the air tube and/or retention ring need to be cleaned, clean them with a vacuum cleaner with brush attachment while the combustion head assembly is out of the burner.
- Replace the oil nozzle with the correct size.
- Inspect and adjust the ignition electrodes and insulators per instructions on pages 10 and 11 of this manual. Replace if proper spacing cannot be achieved or if components are damaged.
- Close the housing cover plate and secure in place.
- Inspect the fuel line oil filter. Replace if necessary.

**NOTICE** The National Oilheat Research Alliance (NORA) recommends single pipe oil systems and high-quality filtration for all fuel types. This should include at least a 10 micron Spin-on filter. Double filtration provides even greater assurance clean fuel will get to the pump. Contaminants in the tank that enter the fuel supply to the burner can cause pump sticking/seizing. These contaminants may increase in the early stages of transitioning to modern fuels (Ultra Low Sulfur and Bio Blends). High quality filtration adds protection against pump sticking.

- Perform the complete checkout procedures of pages 10 to 13, including system inspection and checks.
- Inform the user of any problems found.

## Maintenance Procedures

### Maintenance/service procedures

**WARNING** Turn off power to appliance when servicing burner. Failure to comply could result in severe personal injury, death or substantial property damage.

#### Cleaning blower wheel

- The blower wheel accumulates dust and debris from normal operation. You will need to clean the wheel blades periodically to prevent reduction in airflow.
  - Inspect the blower wheel by removing the blower wheel access cover.
  - To remove the cover, open the ignitor plate and loosen the blower wheel access cover screw about three turns.
  - Inspect the blower wheel to see if it needs to be cleaned. Dirt and lint on the wheel reduce air flow, and must be removed if the burner is to operate correctly.
- To clean blades, remove the two bolts securing the motor to blower housing.
  - Slide the motor out and rotate to remove and access blower wheel.
  - Use a brush and vacuum to clean each blade and the blower housing interior.
  - Replace motor/wheel in blower housing and secure with the two bolts.
  - Push wire slack back into junction box.

#### Replacing blower motor or wheel

- If either the blower wheel or motor must be replaced, remove the two bolts securing the motor to housing.
- Disconnect the motor wires in the burner junction box.
- Loosen the Allen screw securing the blower to the motor shaft and remove the wheel.
- When assembling the replacement assembly, slide the wheel onto the motor shaft and use feeler gauges to set a space of 3/64 inch between the blower wheel and the motor face.
- Replace the motor/wheel assembly in the housing, wire the motor leads and secure the motor with the two bolts.

#### Motor maintenance

- The Carlin PSC motor is constructed with permanently-lubricated bearings, and requires no oiling. Should you replace the original motor with another type of motor, occasional oiling may be required, depending on motor design and manufacturer's recommendations.
- Any time you replace a component or disassemble any part of the burner for service/maintenance, perform a complete operational test after reassembly to verify the burner operates correctly. Failure to verify operation could result in severe personal injury, death or substantial property damage.

#### Checking ignitor

**WARNING** Never test an ignitor by placing a screwdriver (or other metallic object) across the high voltage clips. Check ignitors only by observing spark at ignition electrodes, with fuel supply OFF. Using any other method could cause ignitor damage and severe personal injury.

- Checking 45000 ignitors only:
  - Disconnect electrical power to burner.
  - Remove hold down clips or screws. Lift ignitor mounting plate to the full-open position. Set high voltage clips to a 1/2" to 3/4" gap.
  - Carefully energize ignitor and check for spark arcing at the high voltage terminals. If spark jumps the gap, ignitor is good.

#### Ceramic fiber materials

**WARNING** The appliance may contain ceramic fiber and/or fiberglass materials. Ceramic fiber materials, such as chamber liners, may contain carcinogenic particles (chrysothalites) after exposure to heat. Airborne particles from fiberglass or ceramic fiber components have been listed as potentially carcinogenic by the State of California. Take the following precautions when removing, replacing and handling these items.

Avoid breathing dust and avoid contact with skin or eyes. Wear long-sleeved, loose-fitting clothing, gloves and eye protection. Use a NIOSH N95 certified respirator. This respirator meets requirements for protection from chrysothalites. Actual job requirements or NIOSH regulations may require other or additional protection. For information, refer to the NIOSH website, <http://www.cdc.gov/niosh/homepage.html>.

Ceramic fiber removal: To prevent airborne dust, thoroughly wet ceramic fiber with water before handling. Place ceramic fiber materials in a plastic bag and seal to dispose.

Avoid blowing, tearing, sawing or spraying fiberglass or ceramic fiber materials. If such operations are necessary, wear extra protection to prevent breathing dust.

Wash work clothes separately from other laundry. Rinse clothes washer thoroughly afterwards to prevent contamination of other clothing.

NIOSH First aid procedures:

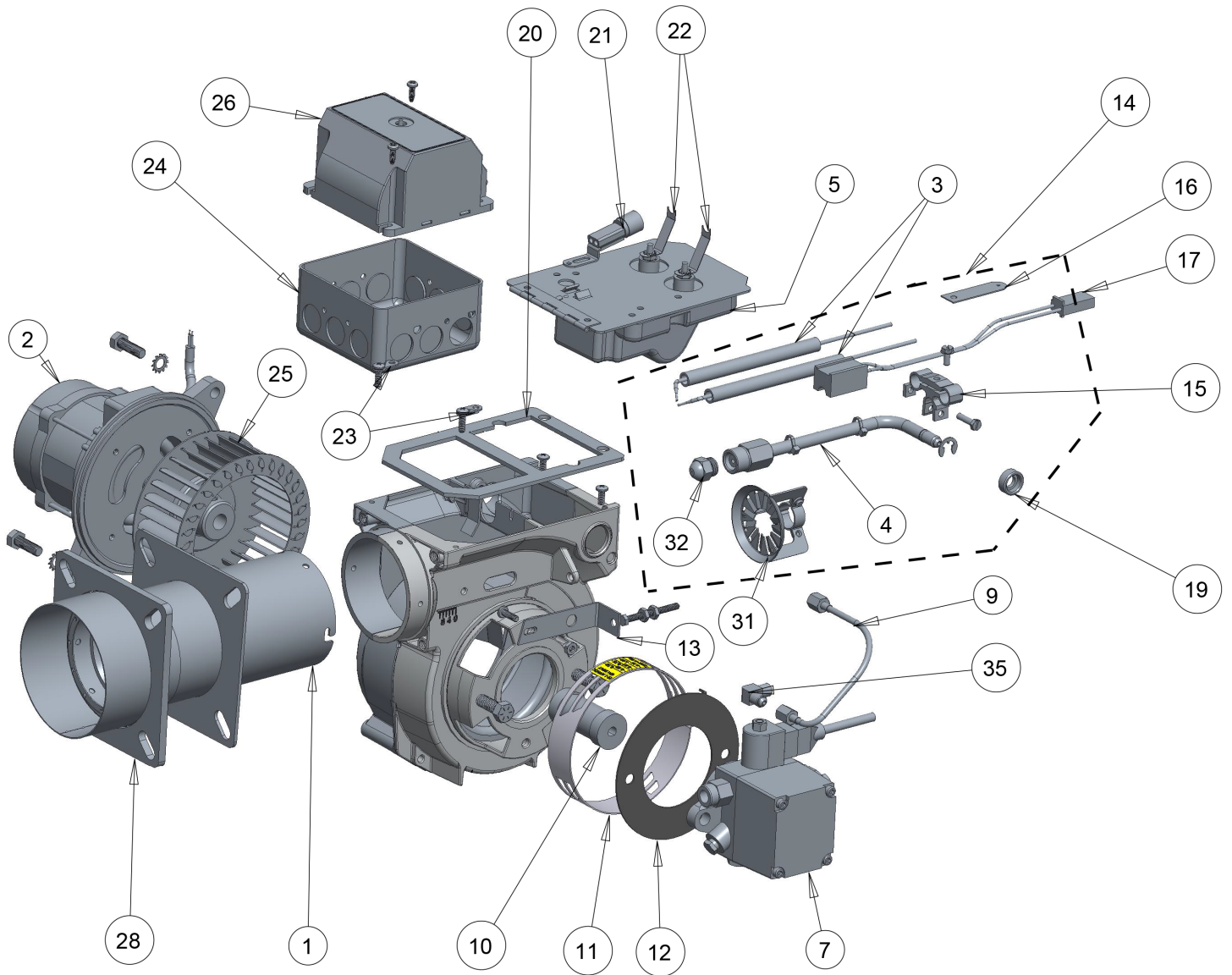
Eye exposure — irrigate immediately

Breathing — fresh air.

## Repair Parts

Item	Description	Part No.
<b>1</b>	Air tube with welded flange for specific appliance	Consult Factory
<b>2</b>	Motor, 1/6 hp, 3450 rpm, Carlin PSC	98022
<b>3</b>	Electrode wire, set of 2, 7" nominal, approx. 8-1/2" oal	82776
<b>4</b>	Nozzle line/adaptor assembly, 7" nominal, approx. 8-3/4" oal	56861
<b>5</b>	Ignitor, Carlin electronic	45000
<b>7</b>	Fuel unit, std. single stage, Suntec A2VA-3006B	98750
<b>9</b>	Oil line, 3/16 od, std. fuel unit to nozzle line	34470
<b>10</b>	Coupling, for std. fuel units, approx. 2-3/8" oal	75564
<b>11</b>	Air band with PSIG scale, 1 slot	98055
	Air band with PSIG scale, 2 slot	98087
	Air band with 100% scale, 2 slot	98101
<b>12</b>	Air shutter, blank (EZ 1) (EZ LF)	97780
<b>13</b>	Head positioning slide bar kit	51593S
<b>14</b>	Combustion head assembly 7"	77966
<b>15</b>	Electrode bracket	23135
<b>16</b>	Bracket, nozzle line heater	64493
<b>17</b>	Nozzle line heater w/electrical disconnect (optional)	66787
<b>18</b>	E-ring for nozzle line (not shown)	50624
<b>19</b>	Thumb nut, nozzle line	62885
<b>20</b>	Gasket, ignitor	51586
<b>21</b>	Cad cell	4002400A
<b>22</b>	Ignitor terminal kit, (2 terminals & nuts)	24463
<b>23</b>	Ignitor hold-down tab, two required	44842
<b>24</b>	Junction box, 4"x4", w/grommet and lockwasher	44586
<b>25</b>	Blower wheel, 5-1/16d x 2w	77933
<b>26</b>	Primary control (consult factory for other controls)	70200
<b>28</b>	Gasket, mounting flange	Consult Factory
<b>31</b>	Retention Ring	77438S
<b>32</b>	Nozzle (consult Setup Guide)	-
<b>34</b>	Plug-in wire harness (not shown)	Consult Factory
<b>35</b>	Elbow, 3/16 flare x 1/8 NPT	29926
<b>40</b>	Access cover w/deflector (EZ 1)	99282A

**Repair Parts** (continued)



# Carlin®

Combustion Technology



**WARNING** The burner must be cleaned, tested and adjusted annually by a qualified oil burner service technician.

**WARNING** **Should overheating occur:**

1. Shut off the oil supply to the burner.
2. **DO NOT** shut off the control switch to the circulator or blower.
3. Contact your oil dealer or service technician and the fire department (if needed).

## EZ Series Oil Burner User Care and Maintenance

**WARNING** Refer only to the information on this page, intended for your use. The remainder of this manual is intended only for your service technician. Failure to comply could result in severe personal injury, death or substantial property damage.

For other than routine maintenance, contact a qualified service company. Perform the following as needed.

- Keep the area around the burner clear and free from combustible vapors and liquids.
- Do not obstruct the flow of combustion and ventilating air.
- Most motors currently used on residential type burners use permanently-lubricated bearings, and do not require field lubrication. Read the label on the motor to determine oiling needs, if any. Do not over-lubricate. This can cause as much trouble as not lubricating at all.

**WARNING** Never attempt to use gasoline as a fuel for this burner, as it is more combustible and could result in a serious explosion. Never attempt to burn refuse or use any fuel other than #1 or #2 heating oil (ASTM D396).