City of Portland, Maine - Building or Use Permit Application

389 Congress Street, 04101 Tel: (207) 874-8703, Fax: (207) 874-8716

Permit No:	Issue Date:	CBL:
10-1284		177 I020001

Location of Construction:	Owner Name:	Owner Address:	Phone:
396 Brighton Ave	Packard-robitaille Cindy	396 Brighton Ave	
Business Name:	**Contractor Name:**	**Contractor Address:**	**Phone**
	Mike McDonald Heating Service	160 Fellows St South Portland	2073187079
Lessee/Buyer's Name	**Phone:**	**Permit Type:**	**Zone:**
		HVAC	R-3

Past Use:	Proposed Use:	Permit Fee:	Cost of Work:	CEO District:
Single Family	Single Family /Install natural gas Carlin burner in the basement, install Embasey fire place on the first floor, installing direct vent instant hot water heater.	$110.00	$8,374.90	3

FIRE DEPT: N/A ☐ Approved ☐ Denied

Signature:

INSPECTION: Use Group: R3 Type:

Signature:

Proposed Project Description:
Install natural gas Carlin burner in the basement, install Embasey fire place on the first floor, installing direct vent instant hot water heater.

PEDESTRIAN ACTIVITIES DISTRICT (P.A.D.)

Action: ☐ Approved ☐ Approved w/Conditions ☐ Denied

Signature: Date:

Permit Taken By:	Date Applied For:
gg	10/12/2010

1. This permit application does not preclude the Applicant(s) from meeting applicable State and Federal Rules.
2. Building permits do not include plumbing, septic or electrical work.
3. Building permits are void if work is not started within six (6) months of the date of issuance. False information may invalidate a building permit and stop all work.

PERMIT ISSUED

OCT 25 2010

City of Portland

Zoning Approval

Special Zone or Reviews	Zoning Appeal	Historic Preservation
☐ Shoreland	☐ Variance	☑ Not in District or Landmark
☐ Wetland	☐ Miscellaneous	☐ Does Not Require Review
☐ Flood Zone	☐ Conditional Use	☐ Requires Review
☐ Subdivision	☐ Interpretation	☐ Approved
☐ Site Plan	☐ Approved	☐ Approved w/Conditions
Maj ☐ Minor ☐ MM ☐	☐ Denied	☐ Denied
Date: ok with conditions 10/18/10	Date:	Date:

CERTIFICATION

I hereby certify that I am the owner of record of the named property, or that the proposed work is authorized by the owner of record and that I have been authorized by the owner to make this application as his authorized agent and I agree to conform to all applicable laws of this jurisdiction. In addition, if a permit for work described in the application is issued, I certify that the code official's authorized representative shall have the authority to enter all areas covered by such permit at any reasonable hour to enforce the provision of the code(s) applicable to such permit.

SIGNATURE OF APPLICANT | ADDRESS | DATE | PHONE

RESPONSIBLE PERSON IN CHARGE OF WORK, TITLE | DATE | PHONE

FILL IN AND SIGN WITH INK

PERMIT ISSUED

OCT 25 2010

City of Portland

APPLICATION FOR PERMIT
HEATING OR POWER EQUIPMENT

To the INSPECTOR OF BUILDINGS, PORTLAND, ME.

The undersigned hereby applies for a permit to install the following heating, cooking or power equipment in accordance with the Laws of Maine, the Building Code of the City of Portland, and the following specifications:

Location / CBL: MM I 020 Use of Building: Home S/F Date: 9-30-10

Name and address of owner of appliance: Vern Malloch 396 Brighton Ave. Portland

Installer's name and address: Mike McDonald Heating Service LLC 160 Fellows St. So. Portland, Me. 04106 Telephone: 318-7079

Location of appliance:
- ☑ Basement
- ☑ 1st Floor
- ☐ Attic
- ☐ Roof

Type of Fuel:
- ☑ Gas
- ☐ Oil
- ☐ Solid

Appliance Name: Carlin / Embassy / Moritz

U.L. Approved ☑ Yes ☐ No

Will appliance be installed in accordance with the manufacture's installation instructions? ☑ Yes ☐ No

IF NO Explain:

The Type of License of Installer:
- ☐ Master Plumber #
- ☐ Solid Fuel #
- ☐ Oil #
- ☑ Gas # PNT5249
- ☐ Other

Type of Chimney:
- ☐ Masonry Lined
- ☐ Factory built stainless steel liners for fireplace (Embassy) and new carlin (Gun only).
- ☐ Metal

Factory Built U.L. Listing #

- ☑ Direct Vent

Type PVC (Moritz) UL#

Type of Fuel Tank
- ☐ Oil
- ☑ Gas Natural

Size of Tank

Number of Tanks

Distance from Tank to Center of Flame _____ feet.

Cost of Work: $ 8374.90

Permit Fee: $ 110.00

Approved

Fire:

Ele.:

Bldg.:

Approved with Conditions

☐ See attached letter or requirement

Inspector's Signature

Date Approved

Signature of Installer: Michael McDonald

White - Inspection Yellow - File Pink - Applicant's Gold - Assessor's Copy

City of Portland, Maine - Building or Use Permit

389 Congress Street, 04101 Tel: (207) 874-8703, Fax: (207) 874-8716

Permit No:	Date Applied For:	CBL:
10-1284	10/12/2010	177 J020001

Location of Construction:	Owner Name:	Owner Address:	Phone:
396 Brighton Ave	Packard-robitaille Cindy	396 Brighton Ave	
Business Name:	**Contractor Name:**	**Contractor Address:**	**Phone**
	Mike McDonald Heating Service	160 Fellows St South Portland	(207) 318-7079
Lessee/Buyer's Name	**Phone:**	**Permit Type:**	
		HVAC	

Proposed Use:	Proposed Project Description:
Single Family / install natural gas Carlin burner in the basement, install Embasey fire place on the first floor, installing direct vent instant hot water heater.	Install natural gas Carlin burner in the basement, install Embasey fire place on the first floor, installing direc: vent instant hot water heater.

Dept: Zoning **Status:** Approved with Conditions **Reviewer:** Marge Schmuckal **Approval Date:** 10/18/2010

Note: **Ok to Issue:** ☑

1) This is NOT an approval for an additional dwelling unit. You SHALL NOT add any additional kitchen equipment including, but not limited to items such as stoves, microwaves, refrigerators, or kitchen sinks, etc. Without special approvals.
2) This property shall remain a single family dwelling. Any change of use shall require a separate permit application for review and approval.

Dept: Building **Status:** Approved with Conditions **Reviewer:** Jonathan Rioux **Approval Date:** 10/25/2010

Note: **Ok to Issue:** ☑

1) Application approval based upon information provided by applicant. Any deviation from approved plans requires separate review and approval prior to work.
2) Maintain proper setback(s) from property lines/buildings and proper clearances from vertical openings when direct venting.
3) The installation must comply with the State of Maine Gas Regulations, and the IRC, 2003.

PERMIT ISSUED

OCT 25 2010

City of Portland

- Natural Gas Corbin Burner in basement
- Embassy Fire Place 1st floor in existing chimney
- Note direct vent instant hot water heater

CITY OF PORTLAND, MAINE

Department of Building Inspections

Original Receipt

Oct 12 2010

Received from Michael McDonald

Location of Work 396 Brighton Ave

Cost of Construction $_____ Building Fee:_____

Permit Fee $_____ Site Fee: _____

Certificate of Occupancy Fee: _____

Total: 110.00

Building (IL) ✓ Plumbing (I5) ___ Electrical (I2) ___ Site Plan (U2) ___

Other HVAC

CBL: 137 I 020

Check #: MC **Total Collected $** 110.00

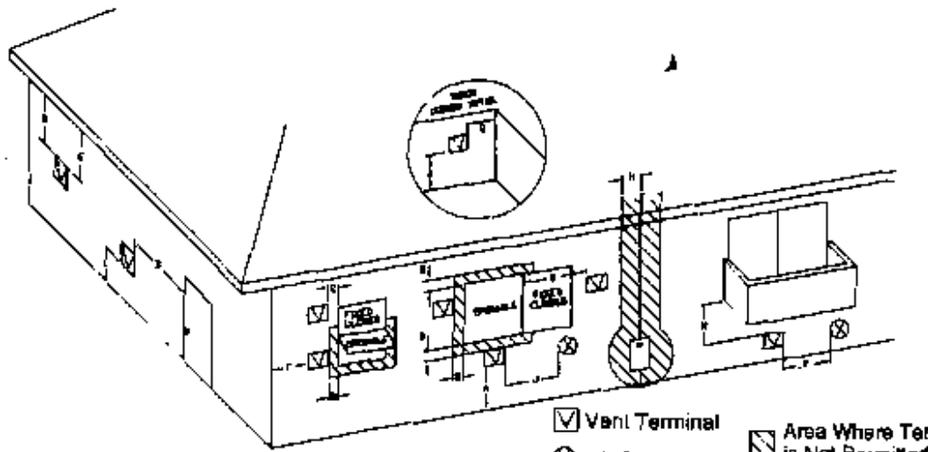
No work is to be started until permit issued.
Please keep original receipt for your records.

Taken by: Kayla

WHITE - Applicant's Copy
YELLOW - Office Copy
PINK - Permit Copy

Clearance Requirements from Vent Terminations to Building Openings

* All clearance requirements are in accordance with ANSI Z21.10.3 and the National Fuel Gas Code, ANSI Z223.1 and in Canada, in accordance with NSCNGPIC.



	Clearance	
A=	Above grade, veranda, porch, deck, or balcony	12" (12")
B=	Window or door that may be opened	12" (36")
C=	Permanently closed window	*
D=	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet from the center of the terminal	*
E=	Unventilated soffit	*
F=	Outside corner	*
G=	Inside corner	*
H=	Each side of center line extended above meter/regulator assembly	3' within a height 15' above meter/regulator assembly
I=	Service regulator vent outlet	3'
J=	Nonmechanical air supply inlet or combustion air inlet to any other appliance	12" (36")
K=	Mechanical air supply inlet	3' above if within 10' (6')
L=	Above paved sidewalk or paved driveway located on public property	(7' **)
M=	Under veranda, porch, deck, or balcony	* (12"- Canada Only***)

()= Indicates clearances required in Canada
*Maintain clearances in accordance with local installation codes and the requirements of the gas supplier
**A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings.

7. Installation

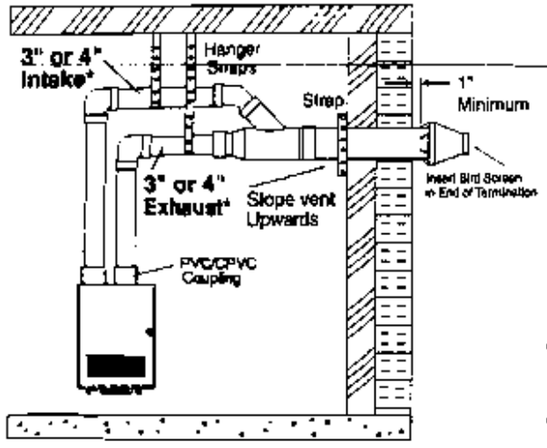
Securing to the wall

Be sure to do

- The weight of the device will be applied to the wall. If the strength of the wall is not sufficient, reinforcement must be done to prevent the transfer of vibration.
- Do not drop or apply unnecessary force to the device when installing. Internal parts may be damaged and may become highly dangerous.
- Install the unit on a vertical wall and ensure that it is level.

Item	Check	Illustration
Locating Screw Holes	**⚠ CAUTION** • When installing with bare hands, take caution to not inflict injury. • Be careful not to hit electrical wiring, gas, or water piping while drilling holes. 1. Drill a single screw hole, making sure to hit a stud 2. Insert and tighten the screw and hang the unit by the upper wall mounting bracket. 3. Determine the positions for the remaining four screws (two for the top bracket and two for the bottom), and remove the unit.	Location of Screw Hole Mounting Bracket (upper) Locating Screw Holes
Mounting	4. Drill holes for the remaining four screws. 5. Hang the unit again by the first screw, and then insert and tighten the remaining four screws. 6. Take waterproofing measures so that water does not enter the building from screws mounting the device.	Tapping Screw
Structure	• Make sure the unit is installed securely so that it will not fall or move due to vibrations or earthquakes.	
Elevations 0 ft.	• If this water heater is being installed at an elevation of 2,000 ft. or higher, disconnect the connector labeled "High Elevation Disconnect" as illustrated on the right. This connector is located inside the unit	

Horizontal Vent Termination- 3" Concentric PVC/CPVC Termination



*4" pipe requires the use of a reducing coupling just prior to the termination.

No. of Elbows	3" PVC or CPVC Max. Straight Vent Length**	4" PVC or CPVC Max. Straight Vent Length**
3	10'	30'
2	13'	36'
1	16'	42'

** Not including the concentric termination

- The concentric termination may be shortened, but not lengthened from its original factory supplied length.
- 3" or 4" PVC or CPVC pipe may be used with the concentric termination. Maintain the same vent pipe diameter from the water heater flue to the termination.
- Do not exceed the maximum vent lengths as specified in this section.
- When using 4" pipe, it will be necessary to use 4" x 3" reducing couplings and a short section of 3" pipe to connect to the termination. Use no more than a 6" section pipe to make the connection between the reducing couplings and the termination.
- When using 3" pipe, it will be necessary to use 4" x 3" reducing couplings to connect the vent pipe to the water heater flue.
- There must be a minimum of 1" clearance between the outside wall and the air intake section of the termination as illustrated on the left.
- Install a securing strap to prevent movement of the termination.
- Terminate at least 12" above grade or above snow line.
- Terminate at least 7' above a public walkway, 6' from the combustion air intake of any appliance, and 3' from any other building opening, gas utility meter, service regulator etc.
- Terminate at least 3' above any forced air inlet within 10', 1' below, 1' horizontally from or 1' above any door, window, or gravity air inlet into any building per National Fuel Gas Code ANSI Z223.1/NFPA 54.
- Slope the horizontal vent 1/4" upwards for every 12".
- Use a condensation drain if necessary.
- In the Commonwealth of Massachusetts a carbon monoxide detector is required for all side wall horizontally vented gas fuel equipment. Please refer to Technical Bulletin TB 010606 for full installation instructions.

9. Gas Piping

The appliance and its individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of ½ psig (3.5 kPa).
The Appliance must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than ½ psig (3.5 kPa).

The appliance and its gas connections must be leak tested before placing the appliance in operation.

The inlet gas pressure must be within the range specified. This is for the purposes of input adjustment.

In order to choose the proper size for the gas line, consult local codes or the National Fuel Gas Code ANSI Z223.1.

Gas Pressure
Size the gas line according to total btuh demand of the building and length from the meter or regulator so that the following supply pressures are available even at maximum demand:

Natural Gas Supply Pressure
Min. 4" WC
Max. 10.5" WC

LP Gas Supply Pressure
Min. 8" WC
Max. 14" WC

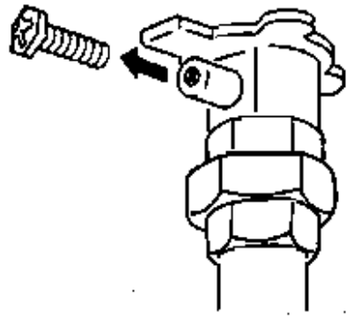
Gas Meter
Select a gas meter capable of supplying the entire btuh demand of all gas appliances in the building.

Gas Connection
- Do not use piping with a diameter smaller than the inlet diameter of the water heater.
- Gas flex lines are not recommended unless they are rated for 199,900 btuh.
- Install a gas shutoff valve on the supply line.
- Use only approved gas piping materials.

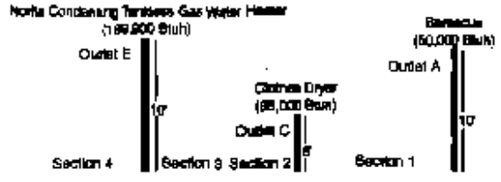
Measuring Gas Pressure

In order to check the gas supply pressure to the unit, a tap is provided on the gas inlet. Remove the hex head philips screw from the tap, and connect a manometer using a silicon tube.

In order to check the gas manifold pressure, a pair of taps are provided on the gas valve inside the unit. The pressure can be checked either by removing the hex head philips screw and connecting a manometer with a silicon tube, or by removing the 1/8" NPT screw with an allen wrench and connecting the appropriate pressure gauge.



Sample Gas Line



Instructions

1. Size each outlet branch starting from the furthest using the Btuh required and the length from the meter.
2. Size each section of the main line using the length to the furthest outlet and the Btuh required by everything after that section.

Carlin part number MNEZGasU Rev. 06/03/02

WARNING: If the information in this manual is not followed exactly, a fire or explosion may result, causing property damage, personal injury or death.

- **Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.**
- **WHAT TO DO IF YOU SMELL GAS**
  - **Do not try to light any appliance.**
  - **Do not touch any electrical switch; do not use any phone in your building.**
  - **Immediately call your gas supplier from an outside phone. Follow the gas supplier's instructions.**
  - **If you cannot reach your gas supplier, call the fire department.**
- **Installation and service must be performed by a qualified installer, service agency or the gas supplier.**

MODEL EZ-Gas
Gas burner

User's information

Contents

WARNING Provide unobstructed combustion air openings sized and located per appliance manual and applicable codes.

Retain this *User's information* manual for your use. Read this manual completely. Ask your service technician if you have any questions regarding the use of the burner or appliance.

Retain the *Burner manual* only for use by your qualified service technician.

Should you observe unusual or abnormal operation of the burner or appliance, contact your qualified service technician immediately. Do not attempt to service or repair this product yourself.

Carlin Combustion Technology, Inc.
70 Maple Street
Ph 413-525-7700
East Longmeadow, MA 01028
Fx 413-525-8308
carlincombustion.com

FOR YOUR SAFETY READ BEFORE OPERATING

WARNING If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This burner does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.

B. Before OPERATING, smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor. See below.

C. Use only your hand to turn the gas control knob. Never use tools. If the knob will not turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

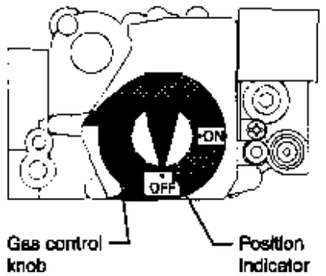
D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control, which has been under water.

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electric switch; do not use any phone in your building.
- Immediately call your gas supplier from an outside phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

OPERATING INSTRUCTIONS

1. **STOP!** Read the safety information above.
2. Set the appliance limit(s) to lowest setting.
3. Turn off all electrical power to the burner/appliance.
4. Remove jacket access panel if burner is located inside jacket.
5. This burner is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
6. Turn **Gas control knob** clockwise ↷ to **OFF**.
7. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, **STOP!** Follow the safety information above. If you don't smell gas, go to the next step.
8. Turn **Gas control knob** counterclockwise ↶ to **ON**.
9. Turn on all electric power to the burner and appliance.
10. Set appliance limit(s) to desired setting.
11. If the burner/appliance will not operate, follow the instructions "**TO TURN OFF GAS TO THE BURNER**" below and call your service technician or gas supplier.
12. Replace jacket front panel.



TO TURN OFF GAS TO THE BURNER

1. Set appliance limit(s) to lowest setting.
2. Turn off all electric power to the burner and appliance if service is to be performed.
3. Remove jacket access panel if burner is installed inside the jacket.
4. Turn **Gas control knob** clockwise ↷ to **OFF**. Do not force.
5. Replace jacket access panel (if applicable).

PLEASE read carefully

WARNING **Annual service/start-up:** Have the burner/appliance started up and serviced at least once annually by a qualified service technician. Professional care is necessary to properly service your equipment and verify it is operating reliably. Failure to properly maintain the equipment could result in severe personal injury, death or substantial property damage.

WARNING **You must keep the area around the burner/appliance free from the following.** Failure to comply could result in severe personal injury, death or substantial property damage due to potential fire, explosion or equipment damage from corrosive flue products.

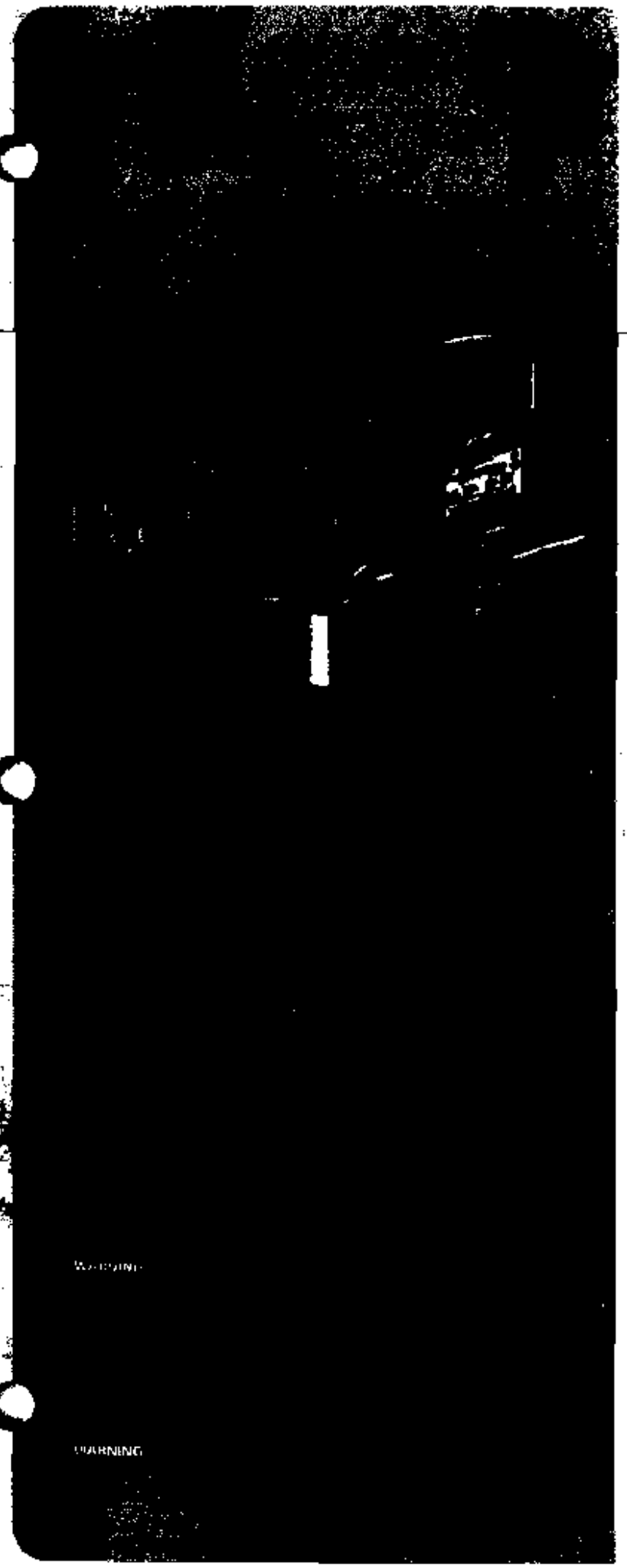
- Do not store or use gasoline or other flammable vapors or liquids near or in the same room as the burner.
- Do not use or store laundry products, paint, varnish, thinner or other such chemicals near or in the same room as the burner/appliance. These chemicals cause creation of acids in the burner, heat exchanger and vent system that can cause severe damage.
- Do not store combustible materials near or in the same room as the burner/appliance.

User care and maintenance

- ❑ Please **read through the information** provided for you in this manual. Ask your qualified service technician to explain normal operation of your equipment.
- ❑ **Daily** inspect the space around the burner/appliance to verify the area is clean and free of the materials listed above.
- ❑ **Occasionally** look into the appliance burner observation port to inspect the flame to verify the burner is operating normally. The flame should be generally blue, with well-defined yellow and orange tips for natural gas, or with well-defined yellow tips for propane gas.
- ❑ **Periodically** watch the operation of your burner/appliance through an operating cycle to verify normal operation. If you notice unusual conditions or equipment behavior, contact your qualified service technician. Follow the instructions on page 2 to shut down the burner/appliance while waiting for the technician.

Burner model	Serial number	Measured firing rate, Btu/h	Gas orifice drill size	Inlet gas pressure, IWC
CO_2%	O_2%	Fuel (natural or propane)	Were all controls tested?	
Comments about installation/start-up:				
Installer's name:	Company name:	Company address:	Phone:	

Date	Technician	Company/address	Describe work performed



MODEL EZ-Gas™ Gas burner

Instruction manual

Contents

Carlin Combustion Technology, Inc.
70 Maple Street, East Longmeadow, MA 01028
Ph 413-525-7780 Fx 413-525-6306
Tech support 800-989-2275 carlincombustion.com

PLEASE 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 and the appliance manual. Where appliance instructions differ from this manual, follow the appliance instructions. Read the label attached to the burner air tube to verify the burner is correct for the appliance being used. See page 7 for procedures.

Damage or shortage claims

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

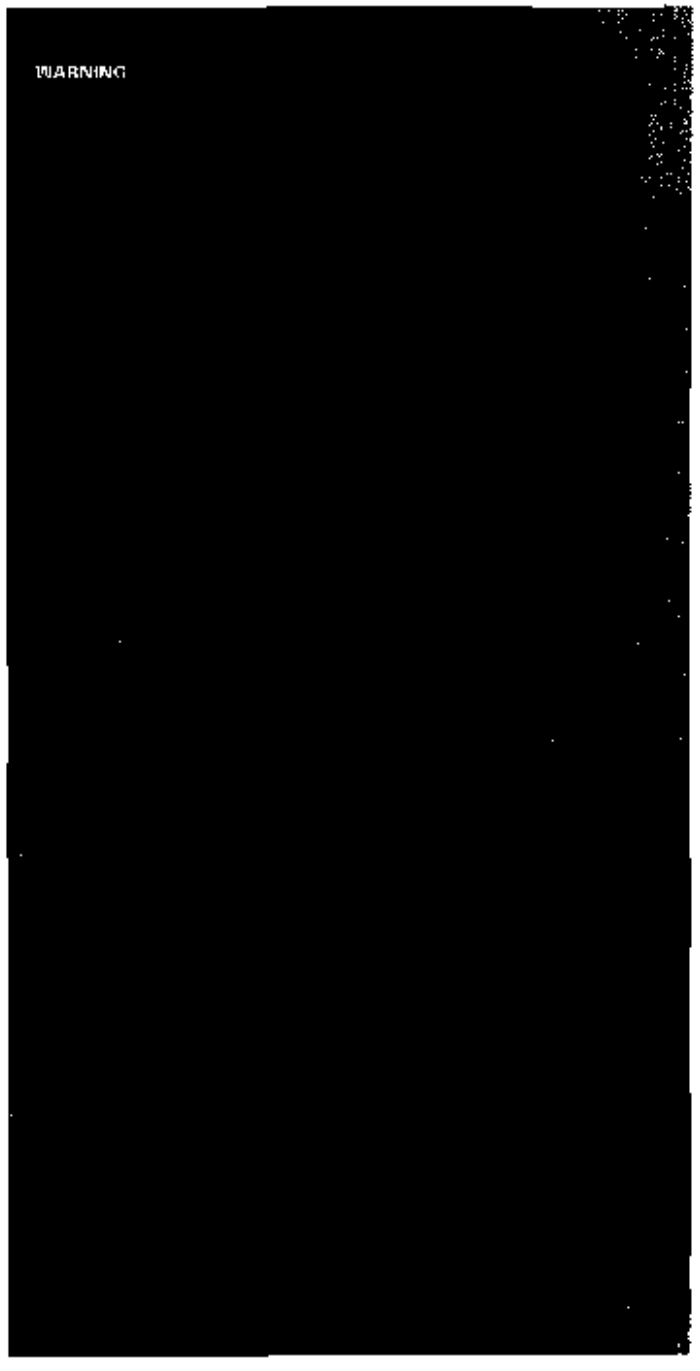
When calling or writing about the burner . . .

Please provide us with the UL serial number and burner model number to assist us in locating information. Enter this information on the Installation Certificate in this manual. The certificate information can be helpful when troubleshooting or obtaining replacement parts.

Fill out burner adjustment label

Fill out the burner adjustment label, located on the front of the hinged cover plate (or on French language plate) after completing installation and burner setup.

WARNING — Should overheating occur: (1) shut off the manual gas control to the appliance, (2) do not shut off the control switch to the pump or blower.



Codes and standards

NOTICE — The installer/servicer is solely responsible for compliance with all applicable codes and standards.

Burner listing

Carlin EZ-Gas burners are C-UL listed, for use in the US or Canada, per ANSI Z21.17/CSA2.7-latest edition, for use with natural gas or propane gas. Specify Canadian application when ordering the burner to obtain proper labeling and manuals.

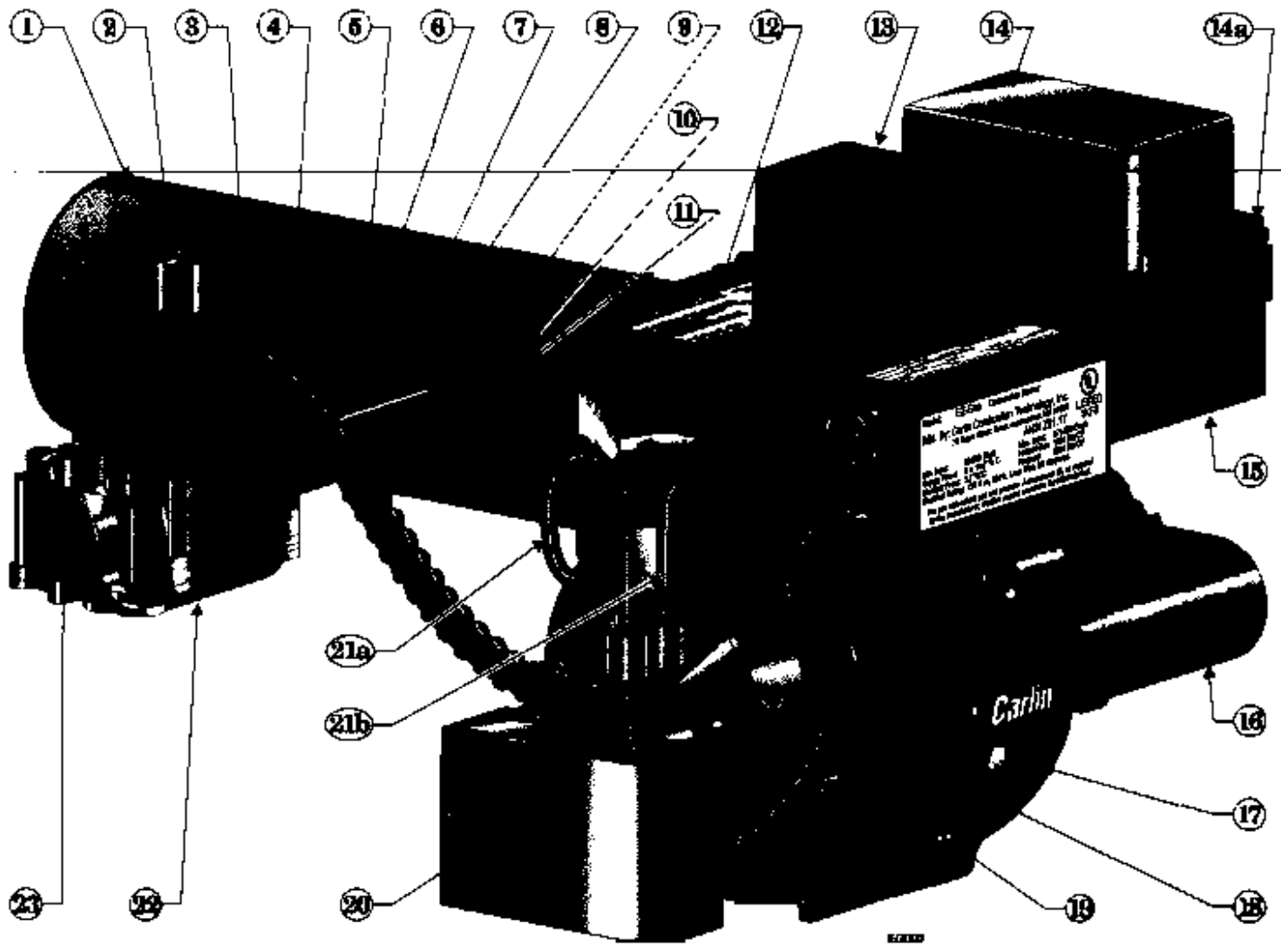
Codes

The installation must conform with local codes or, in the absence of local codes, with the Standard for the Installation of Domestic Gas Conversion Burners, ANSI Z21.8, and the National Fuel Gas Code, ANSI Z223.1, or the CAN/CGA-B149, Installation Codes. The electrical installation must also conform with local codes or, in the absence of local codes, with the National Electrical Code, ANSI/NFPA 70, or the Canadian Electrical Code, CSA C22.1/CSA C22.2.

Model EZ-Gas gas burner — Instruction manual

Where appliance instructions differ from this manual, follow the appliance instructions.

EZ-Gas burner at-a-glance



1 Air tube (flange omitted for clarity), with powder coat paint finish

2 Diffuser plate (hole or slot pattern)

3 Gas manifold (concentric cylinders swaged and welded at ends) — Gas manifold delivers gas to gas openings on inner wall of manifold near the diffuser plate.

4 Ignitor electrode insulator

5 Flame rod insulator

6 Ignitor electrode

7 Flame rod electrode

8 Gas orifice nipple — see pages 7 and 8 for orifice sizing requirements

9 Gas inlet connection (gas entrance to gas manifold)

10 Gas manifold outer wall

11 Gas manifold inner wall

12 Hinged cover plate (for access to blower wheel & electrodes)

13 Ignitor — Carlin Model 41800 solid state electronic ignitor — 9,000 volts, continuous duty rated)

14 Primary control (Carlin Model 60200FR microprocessor-based interrupted ignition flame supervisory control, for use with flame rod flame rectification)

14a Flame current test jack

15 Burner junction box

16 Motor (Carlin PSC motor, with permanently-lubricated bearings and automatic thermal overload protection)

17 Blower housing (cast aluminum), with powder coat paint finish

18 Blower wheel

19 Air band with indicator — Only a single adjustment required for setting combustion air; see page 7 for starting setting based on appliance model and input)

20 Airflow proving switch — Prevents burner from firing if air is not moving

21a Airflow proving switch sensing line (aluminum) — blower inlet

21b Airflow proving switch sensing line (aluminum) — blower outlet

22 Combination gas valve (with integral gas pressure regulation — set for 3½" w.c. outlet pressure)

23 Gas supply entrance — ¾" NPT; 5" w.c. min; 14" w.c. max

1. Prepare site • prepare burner • mount burner

Inspect installation site

Inspect, repair and/or 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. If intended for use with an oil burner as well, the vent system must comply with relevant codes for both gas and oil firing. Appliances equipped with a gas conversion burner are treated as fan-assisted appliances.

The vent system must not be pressurized unless the vent piping and vent system are designed accordingly. The vent must provide draft at all times (negative pressure in vent).

Do not install or use an existing manual damper in the vent connector or vent.

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.

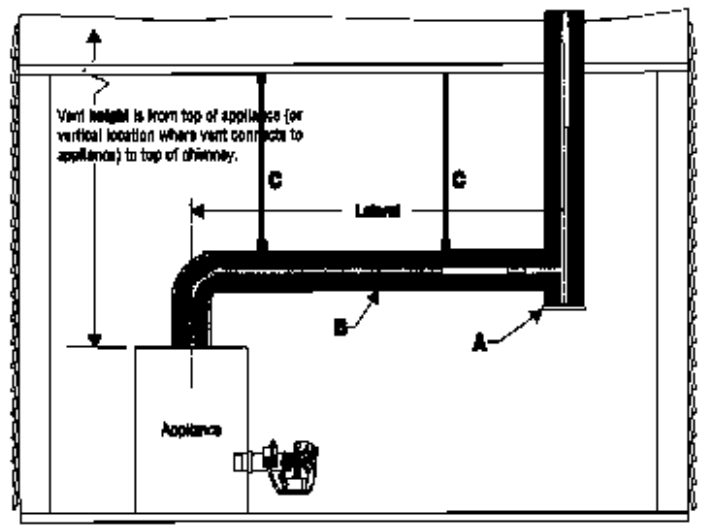
Vent/chimney sizing

- Follow all local codes when sizing the vent and chimney
- Refer to the appliance manufacturer's manual, when available, for venting recommendations.

Prepare vent/chimney

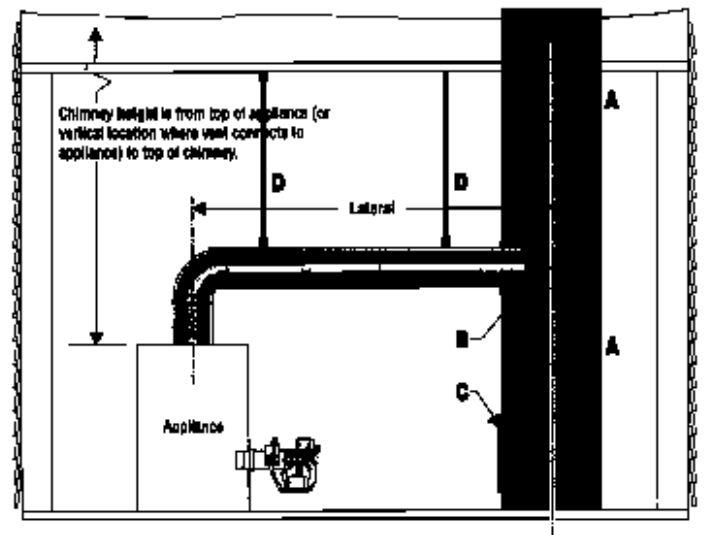
- Secure all metal vent joints with screws, following the vent manufacturer's instructions. Seal all joints in the vent system and chimney. Repair masonry chimney lining and repair all mortar joints as needed.
- Where draft fluctuations are likely, install a double-acting barometric draft regulator in the vent piping. (The damper must be located in the same space as the appliance.) Install a manual reset spill switch in the top of the draft regulator outlet. Wire the switch into the appliance limit circuit to shut off the appliance/burner if sustained downdraft should occur. Refer to the appliance manufacturer's instruction manual for recommendations regarding the need for a barometric draft regulator.
- Provide support for the vent piping. Do not rest the weight of any of the vent piping on the appliance flue outlet.

Figure 1 *Vent and vent connector installation*



Metal vent application

A Connect to vertical with tee, if possible, to provide inspection/cleanout opening in vent.
B Seal all joints and access openings tightly to prevent draft loss.
C Support vent pipe so no weight of vent connector rests on appliance.

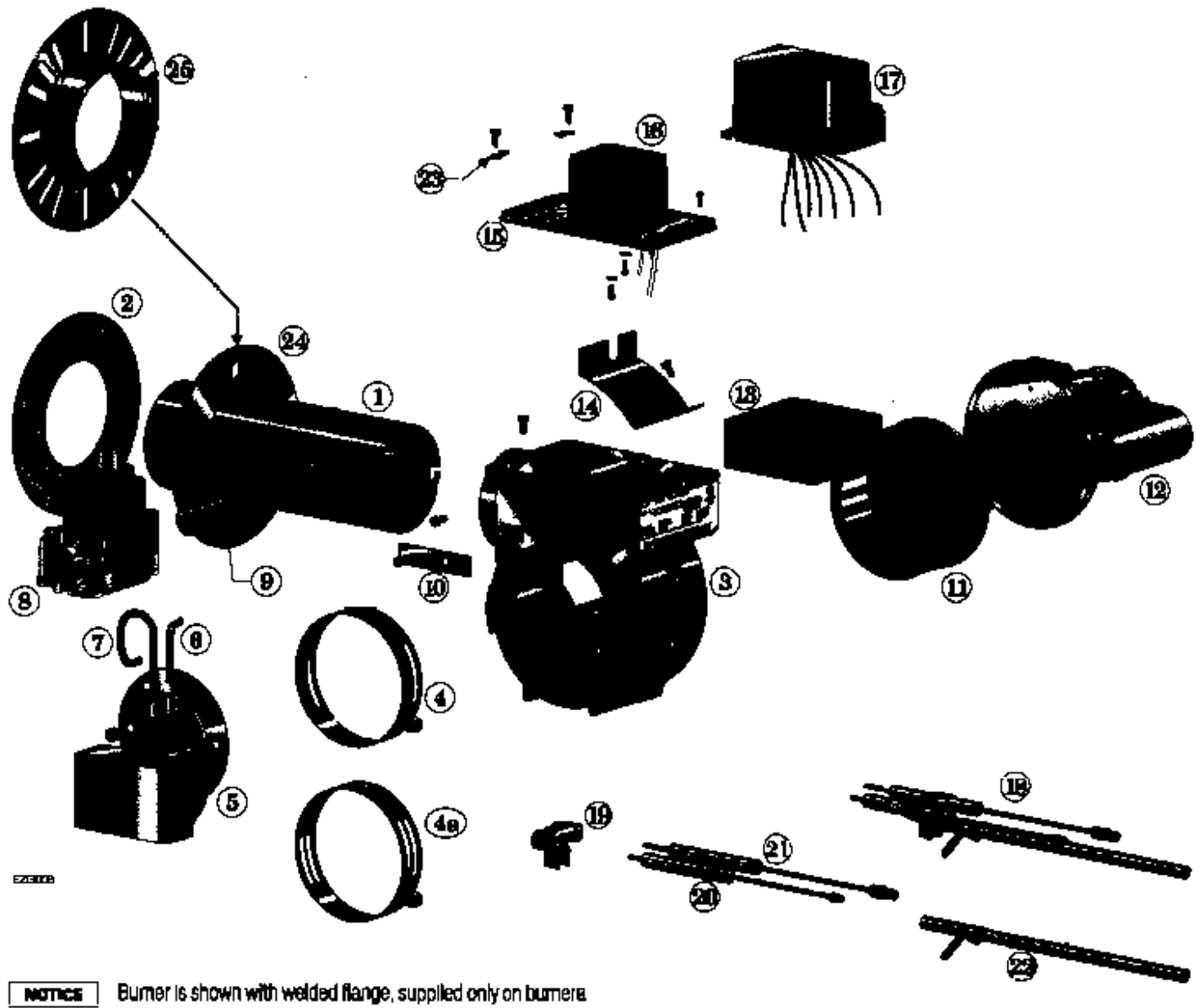


Masonry chimney application

A Tile-lined interior masonry chimney only; with all tile and joints in good condition.
B Vent pipe should be almost flush, but not extending into, inside surface of liner.
C Seal all access openings tightly to prevent draft loss.
D Support vent pipe so no weight of vent connector rests on appliance.

EZ3001-02

9. Replacement parts *(continued)*



NOTICE Burner is shown with welded flange, supplied only on burners ordered for specific appliance applications. Other burners are supplied with the universal flange (item 24).

22	Ignitor electrode/flame rod support rod:	for 10-inch air tube	98571A
		for 12-inch air tube	98571B
		for 14-inch air tube	98571C
		for 16-inch air tube	98571D
		for 18-inch air tube	98571E
24	Welded flange (when supplied)		Included with air tube

9. Replacement parts

1	Air tube with gas manifold & diffuser:	10-inch air tube with "A" diffuser	99392A
		10-inch air tube with "B" diffuser	99392B
		12-inch air tube with "A" diffuser	99392D
		12-inch air tube with "B" diffuser	99392E
		14-inch air tube with "A" diffuser	99392G
		14-inch air tube with "B" diffuser	99392H
		16-inch air tube with "A" diffuser	99392I
		16-inch air tube with "B" diffuser	99392P
		18-inch air tube with "A" diffuser	99392M
		18-inch air tube with "B" diffuser	99392K
3	Blower housing		99660
5	Airflow switch and mounting plate assembly		99622
7	Blower outlet sensing line		99565
9	Gas orifice nipple, ¾" NPT both ends x 4"	Starter hole orifice	9938440XX
		Drilled to size	Contact factory
11	Blower wheel		77933
13	Junction box, 4" x 4", with grommet and lock washer		contact factory
15	Hinged cover plate for Carlin ignitor		99498
17	Primary control, Carlin 60200FR microprocessor flame rod control		6020002FR
19	Electrode holding base with hardware		23135S
21	Ignitor electrode:	for 10-inch air tube	99433A
		for 12-inch air tube	99433B
		for 14-inch air tube	99433C
		for 16-inch air tube	99433D
		for 18-inch air tube	99433E

1. Prepare site • prepare burner • mount burner *(continued)*

Inspect installation site

Verify combustion/ventilation air openings

WARNING Installing the burner/appliance in a space that does not provide enough air for combustion and ventilation can result in severe personal injury, death or substantial property damage. Follow all applicable codes and guidelines below to ensure space has sufficient air openings.

Large spaces

For appliances located in basements, ventilated crawl spaces or other large areas, no additional air openings should be necessary. Exception: If the building construction is unusually tight (see National Fuel Gas Code for definition), you will need to provide air openings into the building if appliance air comes from inside. Provide one opening within 12 inches of the ceiling, and one opening within 12 inches of the floor. Size each opening to provide free area (after deduction for louvers) of 1 square inch per 1,000 Btuh input of all fuel-burning appliances in the building.

Confined spaces — air from inside building

If air openings connect to areas inside the building, provide two openings, one within 12 inches of the ceiling, the other within 12 inches of the floor. Each opening must have a free area (after deduction for louvers) of 1 square inch per 1,000 Btuh of all appliances in the space. If the building construction is unusually tight (see National Fuel Gas Code for definition), you will need to provide air openings into the building. Provide two openings sized and located as for the openings into the boiler space.

Confined spaces — air from outside

If air openings connect directly to outside, provide two openings, one within 12 inches of the ceiling, the other within 12 inches of the floor. Each opening must have a free area (after louver deduction) of:

- If directly through side wall: 1 square inch for each 4,000 Btuh of all appliances in the space.
- If through vertical ducts: 1 square inch for each 4,000 Btuh of all appliances in the space.
- If through horizontal ducts: 1 square inch for each 2,000 Btuh of all appliances in the space.

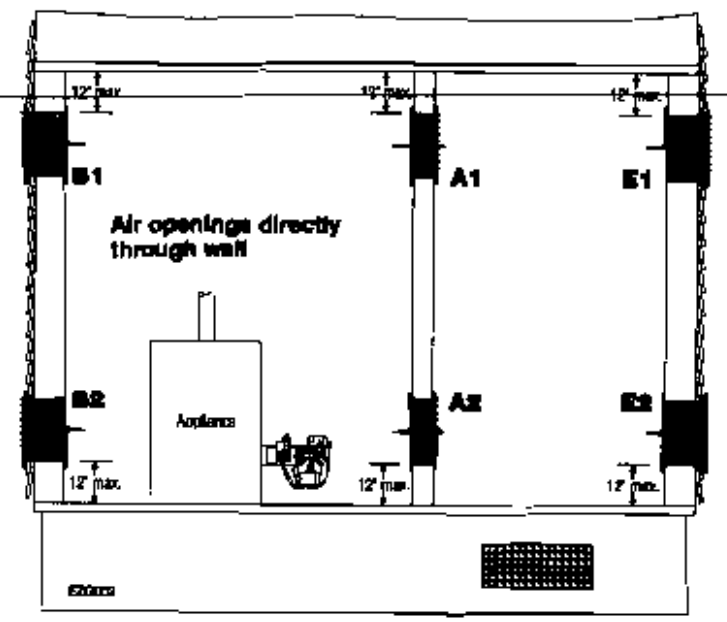
Optional air inlet boot

For spaces not fitted with large enough air openings, you may be able to apply the optional inlet air boot, with air ducted directly to the air boot from outside. You must use a vent outlet/air inlet termination approved by the appliance manufacturer. Refer to the appliance instructions and inlet air boot instructions for correct application.

You will also have to apply this option if the appliance space may contain corrosive contaminants, such as laundry products, paints, varnishes or other chemicals.

WARNING Even when using the optional inlet air boot, make sure the space provides enough ventilation to prevent overheating of the appliance, burner and controls. If there is risk of overheating, you must install ventilation air openings sized large enough to provide air for cooling the equipment. Failure to provide ventilation can result in severe personal injury, death or substantial property damage.

Figure 2 Locating & sizing air openings



Minimum grille free area per 1,000 Btuh input of all appliances in space

A1 & 2	Two openings through interior wall	**1 sq. in.**
B1 & 2	Two openings through outside wall	**0.25 sq. in.**
C1 & 2	Two vertical ducts (to attic and crawl space)	**0.25 sq. in.**
D1 & 2	Two horizontal ducts from outside	**0.50 sq. in.**
E1 & 2	If building construction is unusually tight, provide two air openings as shown if appliance air comes from inside.	**1 sq. in.**

Example A space contains two fuel-burning appliances. The combined input is 120,000 Btuh. Air comes in through horizontal ducts from outside. This is case D. So multiply 0.50 sq. in. times 120 to get 60 sq. in. free area per opening. If louvers reduce free area to 70%, then divide minimum free area by 0.7 for actual grille area, or 60 ÷ 0.7 = 85.7 sq. in.

1. Prepare site • prepare burner • mount burner *(continued)*

Inspect installation site

Verify combustion/ventilation air openings *(continued)*

WARNING When sizing air openings for combustion and ventilation, include air required for exhaust fans and other appliances, such as clothes driers, that require air for operation.

Check appliance manual and applicable codes for required sizing of combustion and ventilation air openings.

- 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, such as laundry products, paint, thinner, varnish, etc.
- Confirm with user that the area will be kept free of these materials at all times.

Prepare the appliance

WARNING **Burner input:** Install a gas burner sized for the normal input rating of the appliance. Do not install a burner with a higher firing rate than the appliance rating. Do not install a burner with a firing rate more than 10% lower than the appliance rating. The appliance and vent system could be damaged due to condensation.

Clean the appliance: Clean the appliance thoroughly and seal all joints. Test all electrical components and verify the relief valve works (boilers only).

Verify combustion chamber dimensions comply with the minimum dimensions shown in Figure 3, page 7. Install or replace combustion chamber liner if required by the appliance manufacturer. The burner must not extend into the combustion chamber. The end of the burner air tube must be within ¼" of the inside face of the combustion chamber. If the space around the burner air tube is more than ¼", wrap the burner air tube with minimum 2300-°F-rated ceramic fiber blanket to seal off the gap.

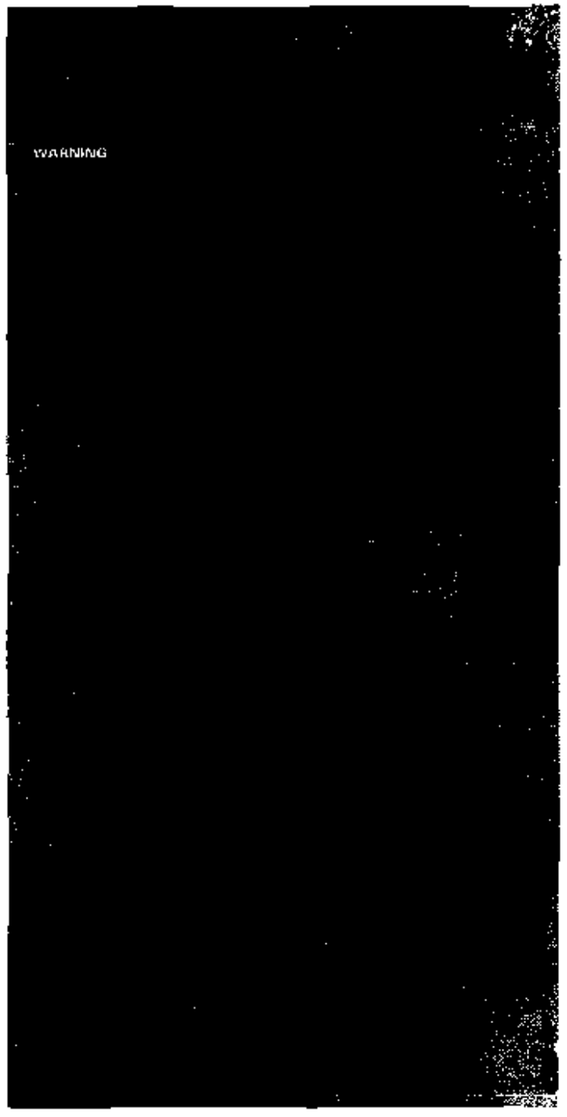
Repair or replace damaged appliance components. Inspect the appliance thoroughly. Follow appliance manufacturer's guidelines for repair or replacement of any component found defective.

When cleaning the appliance or working with **ceramic fiber refractories or fiberglass insulation**, see **WARNING** on this page.

Failure to comply with the above could result in severe personal injury, death or substantial property damage.

Verify clearances

- Verify that the burner/appliance will maintain all clearances to combustible walls or floor and all clearances required for service/maintenance as required in the appliance manual and applicable codes.



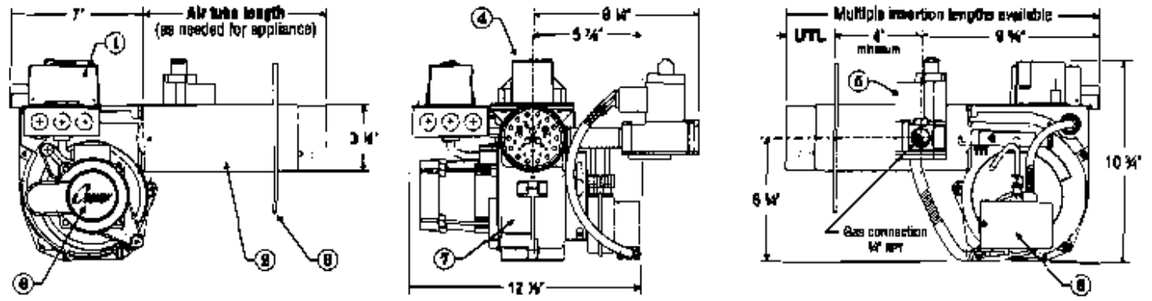
Prepare appliance for burner mounting

WARNING The universal flange supplied with EZ-Gas burners is intended only for firing chambers with negative overfire pressure. For pressurized firing, you must obtain a burner with a welded flange, designed for use with the appliance. Failure to comply could result in severe personal injury, death or substantial property damage.

See page 19 for required dimensions and bolt locations.

8. Dimensions and mounting information

Figure 9 *Dimensional data*



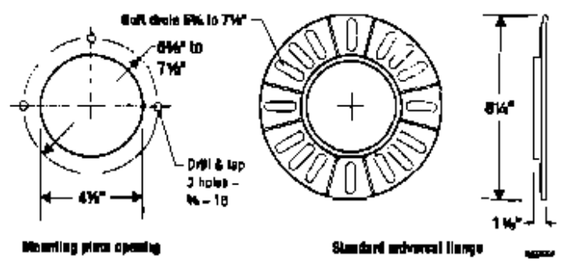
① Carlin 50200RA microprocessor control
② Air tube
③ Flange (selected to meet appliance requirements)
④ Carlin 41600 oxide ultra ignitor
⑤ Combination gas valve
⑥ Carlin PSC motor
⑦ Cast aluminum blower housing
⑧ Air flow proving switch

Mounting burner to appliance

WARNING The universal flange is intended only for firing chambers with negative overfire pressure. For pressurized firing, you must obtain a burner with a welded flange, designed for use with the appliance. Failure to comply could result in severe personal injury, death or substantial property damage.

Prepare the burner opening on the front of the appliance as shown in Figure 10 if not already supplied. See page 7 to determine the location of the flange on the burner air tube. Tighten the flange locking screws firmly.

Figure 10 *Universal flange mounting*



Mounting plate opening — Standard universal flange

7. Troubleshooting *(continued)*

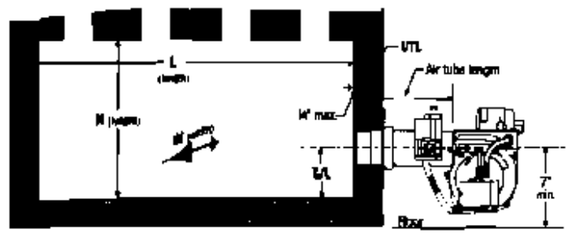
Problem	Possible cause	Corrective action
WARNING		These procedures must only be performed by a qualified service technician. Use care when performing tests on electrically or mechanically live parts. Disconnect power to burner/appliance and close main manual gas valve when removing components for service. Failure to comply could result in severe personal injury, death or substantial property damage.
Burner lights, but locks out after TFI	Insufficient flame signal	Flame signal at test jack on 60200FR must be at least 0.8 microamps. Check following if signal is lower. Flame rod may be touching ground, insulator may be broken, or contamination may cause path to ground. Inspect and clean if necessary. See Figures 4 and 5, page 8 for more information. Check flame rod position in burner per page 8, Figures 4 and 5. Adjust if necessary. Flame rod must be correctly positioned for best flame signal.
	Ignition — no spark or poor spark	Check wire connections to ignitor electrode. Check position of ignitor electrode per page 8, Figures 4 and 5. Adjust if needed. Check primary voltage to ignitor. If ignitor receives 120 VAC and doesn't generate spark, replace ignitor.
	Airflow	Check air band setting against Table 1, page 7.
	Wrong orifice size	Verify orifice size per Table 1, page 7. See pages 7 and 8 for procedure.
	Manifold pressure	Check combination gas valve outlet pressure — should be between 3.2 and 3.8 inches w.c.
	Inadequate gas supply	Check line pressure at combination gas valve supply pressure tapping. Gas pressure must be at least 5 inches w.c. If other appliances are on same line or regulator and burner pressure drops when they are on, line is undersized. Contact your gas supplier. If gas pressure is always low, check supply regulator setting and adjust if necessary. Gas pressure must not exceed 14 inches w.c.
	Improper draft	Over-fire draft should normally be no more than 0.02 inches w.c. Refer to appliance manufacturer's instructions for proper draft reading. Adjust barometric draft regulator if necessary.
	Flame rod grounded	Check flame rod and insulator. If flame rod is grounded in any way, the control will lockout after the trial for ignition.
	120 VAC polarity	Check polarity of power supply. If hot and neutral wires are reversed, flame rod circuit cannot sense flame correctly. Control will lockout after the trial for ignition.

1. Prepare site • prepare burner • mount burner *(continued)*

Inspect burner and components

WARNING Do not install or operate the burner if any component is damaged or if burner does not comply with the specifications or any other guidelines in this manual.

Figure 3 *Combustion chamber dimensions (see Table 1)*



Air tube insertion length (UTL)

- Usable air tube length (UTL) is the distance from mounting flange to end of air tube. Verify that the end of the air tube will be flush with, or no more than ¼ inch short of, the inside of the appliance combustion chamber front wall when the burner is mounted. See Figure 3 and Table 1 below for further information.

Diffuser plate

- Verify correct diffuser plate (item 2, page 3). Compare diffuser plate listed on air tube label with diffuser plate listed in Table 1.

Gas orifice drill size

- The gas orifice is drilled through a plate in the end of the orifice nipple (see item 8, page 3). Read the factory-drilled orifice size on the label attached to the burner air tube (see item 1, page 3) near the blower housing end. If the gas orifice size is not correct for your application, or if the label is illegible for any reason, check the orifice size directly and redrill orifice or replace if necessary, as follows (next page).

Table 1 *Burner specifications for EZ-Gas burners (see Figure 3)*

											Nominal air tube length:	UTL min.	UTL max.
75,000	3/16	5/64	5 %	1	B	3	7	6	8	7	10"	1 ¾"	3 ½"
125,000	¼	13/64	30 %	1	B	3½	9	7	9	8½	12"	1 ¾"	5 ½"
175,000	5/16	¼	30 %	2	A	4	12	8	10	10	14"	1 ¾"	7 ½"
225,000	11/32	9/32	45 %	2	A	4½	15	9	11	13			
275,000	7/16	11/32	75 %	2	A	4½	17	9	11	15			

Note 2 — Use this as the starting setting only. Adjust air band setting, if necessary, after performing combustion testing (see page 13).

Note 4 — Horizontal cylindrical chambers — diameter must be no less than column "W" above.
Horizontal stainless steel cylindrical chambers — diameter at least 1 to 4 inches larger than column "W" above.

1. Prepare site • prepare burner • mount burner *(continued)*

Inspect/redrill gas orifice when required

- Turn off power to the burner/appliance before proceeding.
- Close main manual gas valve in gas line to burner. Then disconnect the ground joint union to allow rotating burner combination gas valve.

WARNING You must disconnect power to burner and close main manual gas valve before proceeding. Failure to do so could result in severe personal injury, death or substantial property damage.

- Remove wire junction box cover on gas valve by removing the single screw attaching the box to the valve body. Then pull the two insulated spade connectors off of the gas valve terminals.
- Remove the combination gas valve (item 22, page 3) and the orifice nipple (item 8, page 3). Remove the orifice nipple from the gas valve.
- Read the correct orifice drill size from Table 1, page 7. Then check actual orifice size using that size twist drill bit.
- ***If gas orifice is smaller than required,*** redrill the orifice to the correct size, if necessary.
- ***If gas orifice is larger than required,*** obtain a replacement orifice nipple from Carlin. If necessary, drill the orifice hole in the replacement orifice nipple to the correct size.

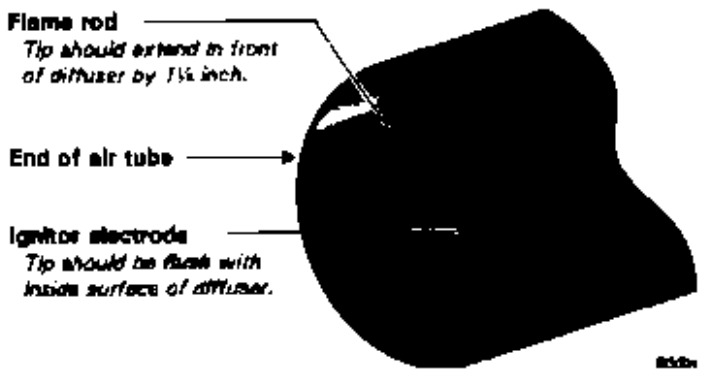
WARNING Drill the orifice carefully, avoiding drill wobble. Wobble will cause the orifice to be over-sized. The orifice nipple should be secured in a vise, if possible, to ensure it is steady during the drilling process.

- Write the orifice size on the orifice nipple label (or on the French label attached to the burner for Canadian installations).
- Replace the gas valve and piping, using only pipe dope listed for use with liquefied petroleum gases. Make sure the arrow on the orifice nipple label points in the direction of gas flow.

Flame rod and ignitor electrode

- Inspect the burner from air tube end. Flame rod should extend through the diffuser plate as shown in Figure 4. Ignitor electrode should be flush with inner face of diffuser plate as shown.

Figure 4 *Flame rod and ignitor electrode placement*



- The flame rod and ignitor electrode must not touch the diffuser or any grounded metal surface at any point. The flame rod and electrode should be as close as possible to the centers of the diffuser holes. If either the flame rod or electrode is closer than 1/16" to the diffuser, remove assembly (see page 16 for removal instructions and verify dimensions per Figure 5). Loosen the electrode bracket clamp screw. Rotate the assembly slightly on the support rod. Then re-tighten the clamp screw. Replace assembly and check spacing again. Continue adjusting as necessary until neither rod nor electrode is closer than 1/16" to the diffuser.

Install gas valve on burner

1. Read WARNING's on page 9 before installing gas valve.
2. Apply a small amount of pipe dope (suitable for propane gas) to gas valve outlet connection, gas line nipple and burner gas connection. Assemble pipe nipple to gas valve. Install gas line nipple in burner gas connection.

WARNING To avoid damage to gas valve, do not hold valve with a pipe wrench or over-tighten. Use only a crescent wrench or other means. Failure to comply could result in severe personal injury, death or substantial property damage.

3. Feed wires into air pressure switch housing and secure conduit fitting with lock nut.
4. Connect white wire from valve to white wire from burner with wire nut. Attach black wire quick-connect terminal to switch terminal connector (violet wire from burner is attached to other switch terminal).

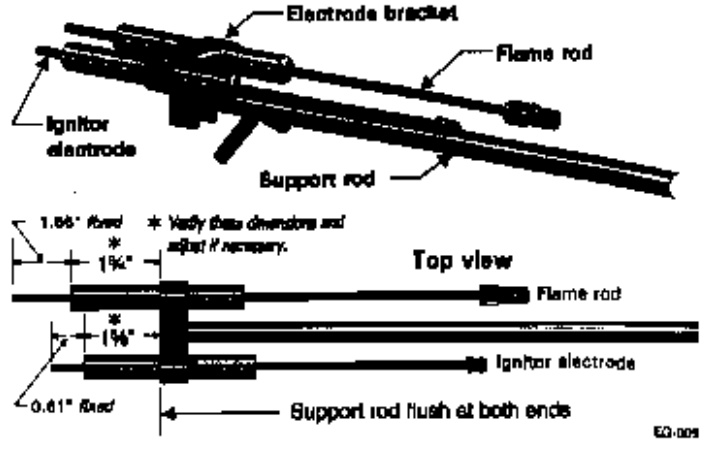
Inspect components and wiring

- Visually inspect all burner components and wiring.
- Verify that wiring is intact and leads are securely connected.
- Verify that all burner components are in good condition.

Mount burner in appliance

- Verify appliance burner front plate dimensions per page 19.
- Slide gasket supplied with burner over end of air tube.
- Insert burner into appliance opening and bolt in place.

Figure 5 *Flame rod/ignitor electrode assembly*



7. Troubleshooting

Problem	Possible cause	Corrective action
WARNING		These procedures must only be performed by a qualified service technician. Use care when performing tests on electrically or mechanically live parts. Disconnect power to burner/appliance and close main manual gas valve when removing components for service. Failure to comply could result in severe personal injury, death or substantial property damage.
Burner motor will not start	120 VAC power circuits	Check voltage and polarity at entrance to appliance and burner. Check fuse or breaker protecting circuit. Check appliance limit circuit — are controls calling for heat? Check electrical connections.
	Primary control is in Lockout	Red LED will be on. Press the reset button for 1 second. If red LED comes back on in a couple of seconds, there could be voltage present to the gas valve or the motor relay contacts could be stuck in the closed position. The Safety Monitoring Circuit causes lockout if this occurs. If there is no voltage present at the gas valve (using a voltmeter), replace the control. If there is voltage at the gas valve, check all wiring for accuracy. Replace the control if the 60200FR gas valve wire shows 120 VAC when disconnected from the burner wiring.
	Primary control is in Latch-up	Red and amber LED's will both be on. See page 12 for procedure to handle this condition. When resetting control from Latch-up, be sure to investigate what caused the repeated failures. Correct the condition.
	Incorrect wiring	Check wiring against appliance and burner wiring diagrams.Verify all connections are secure.
	Defective motor	Remove motor leads from junction box and apply power directly. If motor fails to operate, then replace.
	Defective primary control	If control receives power to both the black and red/white wires, but doesn't start the motor, the control may be defective. Replace control.
Repeated flame failures — burner won't light	Airflow too high	Check air band setting against Table 1, page 7. Reposition to correct setting if necessary.
	Gas orifice wrong	Check gas orifice size. See pages 7 and 8 for procedure.
	Wrong manifold pressure	Check combination gas valve outlet pressure — should be between 3.2 and 3.8 inches w.c.
	No gas supply to combination gas valve	Check main manual gas valve — might be closed. Attach manometer to combination gas valve supply pressure tapping and check pressure. If no pressure, trace gas line to find why no gas is available.
	Gas valve not opening	Check gas supply pressure to combination gas valve. Pressure in excess of 14 inches w.c. will cause valve to lockup. Check voltage to gas valve. Is gas valve receiving 120 VAC? If gas valve is receiving 120 VAC and not opening, and gas supply pressure is below 14 inches w.c., replace gas valve.
	Airflow switch	Check electrical connections and sensing connections to airflow switch. If blower operates, check across switch to see if it closes. If switch doesn't close with blower operating, measure the differential pressure between the two sensing lines with a manometer. Differential should be 2.5" w.c. minimum. If switch is correctly connected, but won't close, replace airflow switch.
	Primary control defective	Check voltage to gas valve during TFI. If no voltage to valve, replace control.

8. Maintenance and service procedures *(continued)*

Maintenance/service procedures

Cleaning blower wheel

1. The blower wheel accumulates dust and debris from normal operation. You will need to clean the wheel blades periodically to prevent reduction in airflow. To clean blades, remove the two bolts securing the motor to blower housing.
2. Slide the motor out and rotate to remove and access blower wheel.
3. Use a brush and vacuum to clean each blade and the blower housing interior.
4. Replace motor/wheel in blower housing and secure with the two bolts.
5. Push wire stack back into junction box.

Replacing blower motor or wheel

1. If either the blower wheel or motor must be replaced, remove the two bolts securing the motor to housing.
2. Disconnect the motor wires in the burner junction box.
3. Loosen the Allen screw securing the blower to the motor shaft and remove the wheel.
4. 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.
5. 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.

WARNING 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.

Model EZ-Gas gas burner — Instruction manual

Where appliance instructions differ from this manual, follow the appliance instructions.

2. Install gas piping from meter to combination gas valve

Piping from meter to burner

WARNING Connect from the gas supply to the burner combination gas valve inlet using new, clean black iron pipe and malleable iron fittings only. Do not use copper, brass, cast iron or galvanized pipe or fittings.

Provide support for gas piping. Do not rest weight of piping on burner gas valve.

Apply pipe dope sparingly at all joints. Use only pipe dope listed for use with propane gas. Do not use pipe sealing tape.

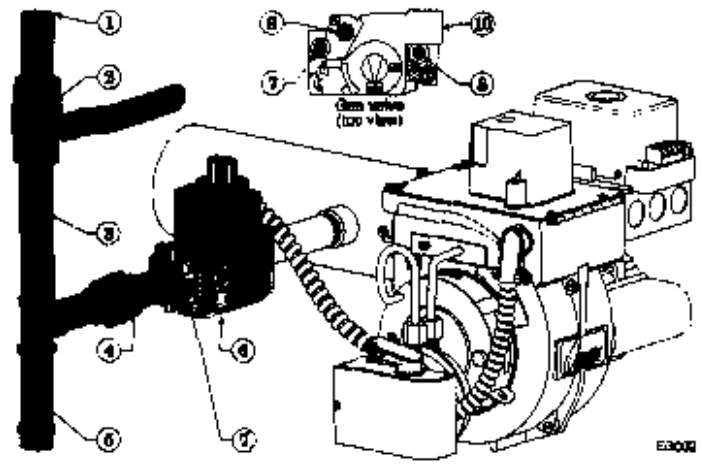
Do not hold gas valve with pipe wrench. Use crescent wrench or other smooth-jawed device. Do not over-tighten.

Failure to comply with above could result in severe personal injury, death or substantial property damage.

1. If possible, install a new gas line directly from the gas meter. If you are using an existing gas line, verify it is clean and in good condition, and verify it is large enough to handle the load of all connected appliances.
2. When branching from a common gas line, do not tap off from the bottom of horizontal sections — only from the side or top.
3. Install a main manual shutoff valve, sediment trap and ground joint union near the burner combination gas valve connection as shown in Figure 6.
4. If the burner is installed inside the appliance jacket, install the main manual gas valve and sediment trap external to the jacket.
5. Size piping (or verify size) using Table 2. You will find additional information on gas line sizing in the National Fuel Gas Code, ANSI Z223.1.

WARNING In the state of Massachusetts, when lever-type gas shutoffs are used, they must be T-handle type only.

Figure 6 *Connecting gas supply piping to burner*



1 Pipe to meter or branch
2 Main manual gas shutoff valve
3 Use clean, burr-free black iron pipe and malleable iron fittings
4 Ground joint union
5 Sediment leg
6 Burner combination gas valve
7 Upstream pressure tap, 1/8"
8 Outlet pressure tap, 1/8"
9 Gas regulator access screw
10 Gas valve wire junction box

Gas supply pressure — *natural or propane*

- Maximum supply pressure: **14 inches** w.c.
- Minimum supply pressure: **5 inches** w.c.

WARNING Do not expose the combination gas valve to gas pressure in excess of 14 inches water column. Higher pressure could damage the valve seat, resulting in potentially hazardous condition. When pressure testing piping at higher pressures, disconnect burner from gas line before testing.

If the gas supply pressure can exceed 14 inches water column at any time, you must install a lockup type gas pressure regulator in the gas supply piping, ahead of the main manual gas valve installed at the burner.

Test and purge gas line

Read WARNING above.

Pressure test and purge the line. Pressure testing should be done by the gas supplier or utility, following all applicable codes.

Table 2 *Capacities of black iron pipe, cubic feet gas/hour*

Natural gas, 1000 Btu/cu ft, 0.60 specific gravity					
½	92	63	50	43	38
¾	190	130	105	90	79
1	350	245	195	170	150
1¼	730	500	400	350	305
Natural gas, 1000 Btu/cu ft, 0.65 specific gravity					
½	120	82	66	57	50
¾	250	170	138	118	103
1	465	320	260	220	195
1¼	950	660	530	480	400
Propane gas, 2500 Btu/cu ft, 1.53 specific gravity					
½	57	39	31	27	24
¾	118	81	65	56	49
1	217	152	121	105	93
Propane gas, 2500 Btu/cu ft, 2.0 specific gravity					
½	74	51	41	35	31
¾	155	105	86	73	64
1	288	198	161	136	121

3. Wire burner

Code compliance

The burner/appliance installation must comply with codes listed on page 2 and any other locally applicable codes.

General wiring requirements

WARNING ***Read and follow the guidelines below.*** Failure to comply could result in severe personal injury, death or substantial property damage.

Electrical shock hazard — Disconnect electrical supply to the burner before attempting to service.

Electrically ground burner — The burner must be grounded in accordance with local codes or, in the absence of local codes, with the National Electrical Code, ANSI/NFPA 70 (in Canada, per Canadian Electrical Code, CSA C22.1/CSA C22.2).

Label all wires before removing for servicing. Wiring errors could result in unsafe appliance/burner operation.

NOTICE Read appliance manufacturer's instructions completely before wiring burner.

The 60200FR control requires a constant 120 vac power source from the appliance as well as power from the appliance limit circuit. See Figure 7. Check polarity carefully. If hot and neutral wires are reversed at appliance power source, the control will lockout on flame failure.

If replacing any of the wire supplied with the burner, use minimum #18 AWG 125°C or better.

Verify power supply

1. The burner requires a 120vac/60~/single-phase power supply, with at least a 5-amp fuse. The current draw will be (when equipped with Carlin motor and Carlin 41600 electronic ignitor):

During ignition	2.6 AMPS	3.0 AMPS	2.8 AMPS
Steady operation	2.0 AMPS	2.5 AMPS	2.3 AMPS

2. The 120 vac power connections to the black and red/white wires of the 60200FR must be the same polarity ***from the same power source.*** DO NOT attempt to supply separate power sources. Check the power from the heat exchanger with a voltmeter. Verify that the supply to the black and red/white wires are from the 120 vac HOT side and that the power is no less than 102 vac nor more than 132 vac.

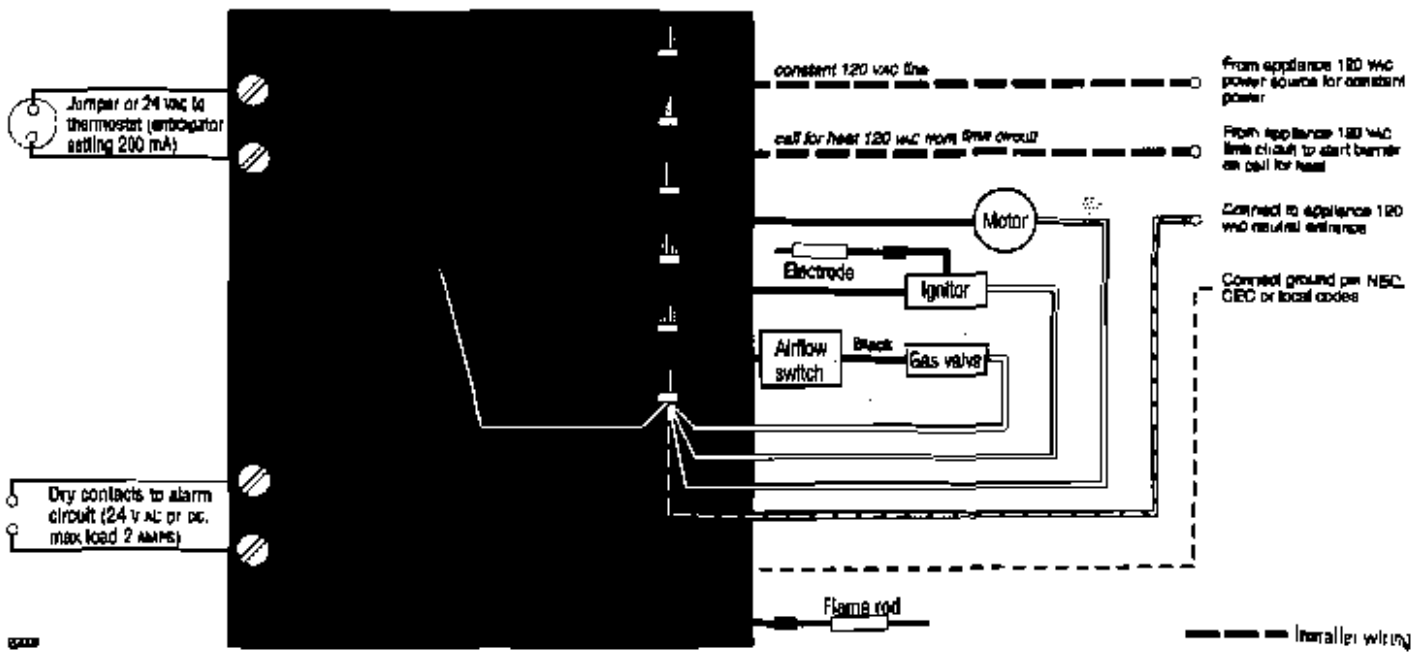
Checking burner flame signal

The 60200FR uses flame rectification to detect the flame. Because the grounded metal surface area near the flame rod is much larger than the surface of the flame rod, current flows through the flame more easily in one direction than the other. This causes an AC voltage applied to the flame rod to result in a DC current. (Note that, if the flame rod should touch a grounded metal part, the current would be AC, not DC, and the control would sense flame failure.)

The 60200FR control has a 3 mm flame signal test jack (item 14a, page 3) that can be used with a flame signal meter, such as the Honeywell W136. Or you can use a standard 3 mm stereo plug fitted with two leads. Connect these leads in series with your ammeter leads to read DC microamps.

The minimum flame signal needed to satisfy the 60200FR sensing circuit is 0.8 microamps. The control will register flame failure at any lower signal.

Figure 7 *Wiring diagram — EZ-Gas burner with 60200FR primary control — typical wiring to appliance*



6. Maintenance and service procedures

WARNING This burner should 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.

WARNING Turn off power to appliance and close main manual gas valve when servicing burner. See warnings on page 2 and elsewhere in this manual regarding correct procedures. Failure to comply could result in severe personal injury, death or substantial property damage.

Annual start-up & service

Annual start-up and service procedures

- ❑ 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.
- ❑ Turn off power to appliance and close main manual gas valve.
- ❑ Remove burner from appliance and inspect diffuser plate, ignitor electrode and flame rod (see Figure 4, page 8).
- ❑ Remove ignitor electrode/flame rod assembly to clean and adjust if necessary.
- ❑ To remove assembly:
  1. Remove the connector wires from the flame rod and ignitor electrode.
  2. Remove the lock nut securing the housing end of the assembly support rod.
  3. Remove the access cover (item 14, page 21) by loosening the screw securing it in place.
  4. Pull the electrode/flame rod assembly straight back and out.
  5. Clean the assembly if necessary. Replace any part that is damaged
  6. Check the dimensions of the assembly against those shown in Figure 5, page 8. Adjust if necessary.

NOTICE If the inside surface of the air tube and/or diffuser plate need to be cleaned, clean them with a vacuum cleaner with brush attachment before replacing the electrode/flame rod assembly.

  7. Replace the electrode/flame rod assembly:
     - Insert the electrode/flame rod assembly into the air tube, with support legs down (electrode/flame rod up).
     - Rest the support rod on the scroll extension and against the right side of the support rod mounting stud. Keep the support rod pressed against the mounting stud.
     - Slide the assembly forward. Keep the support rod mounting hole pointed upward
     - When you feel the flame rod go through its diffuser plate hole, lift the support rod and slide its mounting hole onto the mounting stud.
     - Replace the locking nut on the mounting stud and tighten.
     - Replace the access cover (item 14, page 21) and tighten its retainer screw.

WARNING After replacing the electrode/flame rod assembly, follow the inspection procedure on page 8 to verify the electrode and flame rod are correctly positioned. Failure to properly install them can result in equipment failure.

- ❑ Close the housing cover plate and secure in place.
- ❑ Check the burner flange gasket. It must be in good condition. Replace gasket on burner flange and mount burner in appliance, securing to mounting studs.
- ❑ Perform the complete checkout procedures of pages 11 through 14, including system inspection and checks.

4. Check system • start-up burner/appliance

Inspect/check system

Before starting the burner and appliance, verify the system has been installed as directed by this manual and the appliance instructions.

Check gas piping for leaks

WARNING Disconnect the burner from the gas supply line if gas line test pressure will exceed 14 inches w.c. Exposing the burner combination gas valve to pressure higher than 14 inches w.c. can damage the valve seat, resulting in potentially unsafe operation.

You can usually test the gas piping by allowing the line to fill with gas to main regulator outlet pressure.

1. Shut off gas flow to all appliances connected to the meter.
2. If test pressure will be less than 14 inches w.c., turn the burner combination gas valve knob to OFF. If test pressure will be higher than 14 inches, remove the burner from the gas line by shutting off the main manual gas valve installed near the burner (per Figure 6, page 9) and disconnecting the ground joint union. See warning above.
3. Watch the gas meter dial. For a one half cubic foot per revolution dial, there should be no movement of the dial for at least 5 minutes. For larger volumes per revolution, increase this time proportionately.
4. If you detect a gas leak, locate the leak with a soap suds mixture and repair it. Then test the system for leaks again.

WARNING Do not test for leaks with an open flame. And do not use oxygen as a test gas. Either of these could cause an explosion, resulting in severe personal injury, death or substantial property damage.

Bleed gas line

Purge all air from the gas line. Purge to outside of the building, NEVER into the appliance or burner.

Leak test near-burner gas piping

If piping near burner has not already been pressure tested, open main manual gas valve on supply to burner and smell around area for any signs of gas. Apply a soap suds mixture to all gas piping joints near burner and check for any leaks. If any leaks appear, repair before proceeding and retest.

Set burner air band

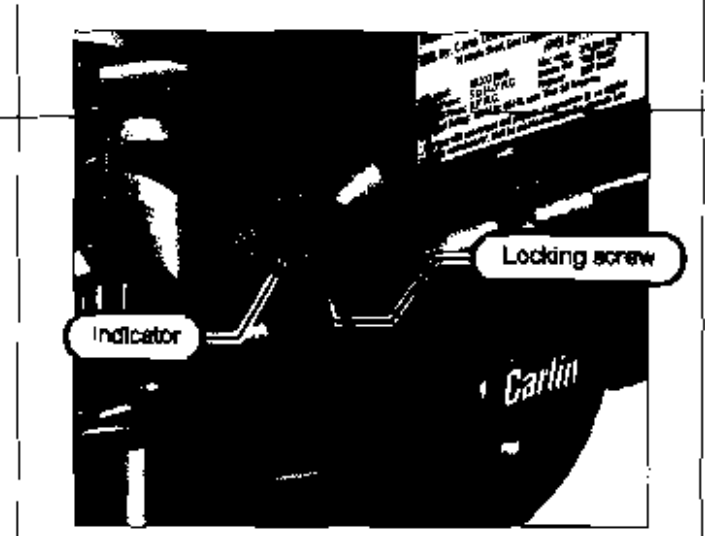
See Figure 8. Loosen air band locking screw. Then rotate band until indicator points to setting given in Table 1, page 7. Tighten air band locking screw.

The Table 1 setting will probably be satisfactory without change. If the combustion test indicates a need for more or less air, however, you will have to adjust the band accordingly.

Check burner and primary control

Inspect burner thoroughly. Verify hinged cover is in place and in good condition, cover is closed and clamps are tightened. Verify all wiring is in place and all components are secure and in position.

Figure 8 Air band adjustment



WARNING Do not start the burner if you smell gas or if there may be gas present in the appliance combustion chamber, heat exchanger or the vent system. An explosion could occur, causing severe personal injury, death or substantial property damage.

WARNING During initial start-up, you must be constantly alert for emergency conditions such as fuel leaks, electrical malfunctions, etc. Familiarize yourself with the location of manual shutoff valves and switches so you can quickly use them if needed.

WARNING If the burner fails to ignite, NEVER attempt to manually bypass the normal sequence of the control, which provides purging of the combustion chamber.

Verify flame failure lockout of 60200FR control

1. Install a hose barb fitting in the combination gas valve outlet pressure tap and connect with a hose to a U-tube manometer.
2. Close the main manual gas valve and turn the combination gas valve knob to ON.
3. Turn on power to appliance and set appliance limit(s) to call for heat.
4. Burner motor will start. The 60200FR will run for its prepurge timing, then start the ignitor. Approximately one second later, the combination gas valve will open. (The manometer should show almost no pressure, because the main manual gas valve is closed.)
5. After the Trial for Ignition Period, (TFI) the 60200FR will lockout and turn on the red LED. The ignitor will shut off and the gas valve will close. Turn off power and set controls to stop call for heat.
6. If lockout does not occur, replace the 60200FR control.

5. Perform checkout procedures • fill out certificate

Verify burner/appliance operation

Check burner/appliance/controls operation

- ❑ Test operating and limit controls on appliance as specified in appliance instruction manual.
- ❑ Check operation of the 60200FR primary control by forcing Latch-up (three consecutive lockouts during the same call for heat) by closing the main manual gas cock and cycling the burner. Press the reset button to reset when the control locks out on flame failure. Do this two times and the control should enter Latch-up. See page 12 to reset control.
- ❑ Check operation of airflow switch.
  - ❑ Cycle the burner off with the appliance controls. Then turn off power to the appliance. Remove the two sensing lines from the airflow switch by loosening the plastic sealing nuts and pulling the aluminum sensing tubes out of the sockets.
  - ❑ With the sensing lines removed, turn on power to the appliance and set the controls to call for heat. Watch the manometer on the combination gas valve outlet pressure tap. After the control performs its pre-purge, it will try to turn on the gas valve. The gas valve should not open with the airflow sensor lines removed. Set the controls to stop the call for heat and turn off power to the appliance. If the airflow switch operates correctly (gas valve doesn't open), continue with normal operation. If switch fails to operate correctly, replace the switch and retest.

WARNING NEVER attempt to adjust the air pressure switch setting. This could allow unsafe operation of the burner, resulting in potential of severe personal injury, death or substantial property damage.

Verify burner operation

- ❑ Start and stop the burner several times, allowing the primary control to sequence through normal operation. Verify correct operation of burner and control throughout.

Verify burner/appliance operation *(cont.)*

Verify vent system operation

- ❑ Verify vent is operating correctly and flue products are properly exhausted from building.
- ❑ Check operation of barometric damper and spill switch.
- ❑ 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.

Prepare burner for normal operation

- ❑ Cycle burner off with appliance controls. Then turn off power to the appliance.
- ❑ Close the main manual gas valve.
- ❑ Remove the U-tube manometer line from the combination gas valve outlet pressure tap hose barb. Remove hose barb and replace 1/8" NPT pipe plug in tapping.
- ❑ Verify all components and wires are in place and burner is ready for operation.

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 the user's information manual (and the appliance manual) with the user.
- ❑ Verify the user is aware of all procedures specified in the manual.
- ❑ Verify user will not store or use combustible liquids or materials or contaminants in the vicinity of the burner/appliance.

Fill out the certificate

- ❑ Fill out the Installation/Service certificate on the back page of this manual.

4. Check system • start-up burner/appliance *(continued)*

WARNING Should overheating or an emergency occur, immediately:

- Shut off main manual gas valve.
- Shut off control switch to burner.

Under some circumstances power should remain on for water pumps or circulating blowers. Determine proper response before attempting start-up.

If burner fails ignition on several attempts, close gas valve and use burner blower to purge appliance before restart.

Model 60200FR diagnostic LED's

Ⓐ – Amber **OFF** Ⓡ – Red **OFF** Ⓖ – Green **OFF**
Ⓐ – Amber **ON** Ⓡ – Red **ON** ● – Green **ON**
Ⓐ – Amber **FLASHING** ■ – Red ***FLASHING***
Ⓐ – Amber **BLINKING** (blinks off momentarily every 3 to 4 seconds)

NOTICE Please see 60200FR control label for trial for ignition (TFI) and purge timings.

Start-up & operation

WARNING Do not start the burner if the combustion chamber contains residual gas. Allow gas to disperse.

NOTICE Per UL requirements, the control will not turn on if the flame rod senses flame during the self-test. If the flame rod senses flame, the green LED turns on. The control will remain in self-test mode until the flame rod no longer senses flame. The amber LED will remain on, but blink off momentarily Ⓐ every 3 to 4 seconds.

Ⓐ Ⓡ Power ON Open all manual gas line valves. Close the line switch. (If Rnd LED turns on constant ●, control is in lockout. See below to reset.)

● Ⓡ Self-test 1 The control performs a "boot-up" test to verify internal operation each time power is applied to the red/white wire. About 4 seconds after power application, the amber LED turns on. The test continues for about 8 more seconds. If the test fails, the control turns the amber LED off and repeats this test sequence until successful.

Ⓐ Ⓡ Stand-by (No call for heat) If Self-test 1 is successful, amber LED turns off and control waits for heat call.

● Ⓡ Call for heat Set operating control and all limit controls to call for heat. The 60200FR thermostat circuit must be closed (jumpered) and power coming to black wire from limits.

Self-test 2 The amber LED turns on. For the first 3 to 4 seconds, the control performs a self-test. If the flame rod senses flame, the green LED turns on. The control repeats the self-test until flame is no longer detected (green LED would turn off). During this time, the amber LED will remain on, but blink off momentarily Ⓐ every 3 to 4 seconds. If the control detects motor contacts closed or power to the gas valve, lockout occurs.

Ⓐ Ⓡ Burner on After the self-test, the amber LED turns off. The ***motor*** starts.

Ⓐ Ⓡ Pre-purge The ***ignitor*** warms after the pre-purge period. Two seconds later, the ***gas valve*** opens. The 2-second delay (ignition establishment period) helps ensure a stable spark is in place when the gas valve opens (to compensate for sluggish response of some AC ignition transformers).

Ⓐ Ⓡ TFI After gas valve opens, the flame rod must sense flame within the TFI time limit (trial for ignition). The green LED turns on ● at the end of the TFI if the flame rod senses flame.

Ⓐ Ⓡ ● Run The burner continues firing during call for heat if the flame rod senses flame. Amber and red LED's are off and green LED is on during normal running.

Ⓐ ● Ⓘ Lockout If the flame rod does not sense flame within the TFI time limit after gas valve activation, **lockout** occurs. The control turns the red LED on constant, and closes the ***alarm*** contact. Green LED is off.

To Reset Push in and hold reset button for 1 second, then release.

Ⓐ ● Ⓘ Latch-up If the control locks out **3 times** during a single call for heat, **latch-up** occurs. The control turns on both the amber and red LED's constant. You must use the special procedure below to reset the control after latch-up.

WARNING **Reset from latch-up — *Only a qualified service technician should attempt to reset the control after latch-up. The problem that caused the repeated burner problems must be corrected before returning the burner to normal operation.***

Ⓡ ■ Ⓢ Push in and hold the reset button for about 10 seconds. The red and amber LED's will flash alternately.

Ⓐ Ⓡ Ⓢ After the LED's begin flashing, continue to hold the reset button for about another 20 seconds. The LED's will turn off. Release the reset button and the control will restart. (Releasing the button before the LED's turn off will cause the control to remain in latch-up.)

NOTICE The 60200FR control will not reset from lockout or latch-up if power is interrupted.

Ⓐ ■ Flame failure If the flame rod loses flame signal during operation (after the TFI), the red LED flashes. The ***gas valve*** closes within 2 seconds. The ***motor*** remains on for the post-purge period, then shuts off. **Recycle:** Control waits for 65 seconds (with red LED flashing), then begins again at **Self-test 2.** Red LED goes off Ⓡ

(NOTE: Controls with non-recycle feature will lock out on flame failure.)

Ⓐ Ⓡ Post-purge Set operating control(s) and limit(s) to stop call for heat. The ***gas valve*** will turn off within 2 seconds. The ***motor*** remains on for the post-purge period, then turns off.

Ⓐ Ⓡ Stand-by Control remains in stand-by mode until limit circuit sends power to the black wire and thermostat circuit closes (or jumpered) — (call for heat)

4. Check system • start-up burner/appliance *(continued)*

Installer/servicer

Please check off and fill in certificate

WARNING Should overheating or an emergency occur, immediately:

- Shut off main manual gas valve.
- Shut off control switch to burner.

Under some circumstances power should remain on for water pumps or circulating blowers. Determine proper response before attempting start-up. If appliance fails ignition on several attempts, close gas valve and use burner blower to purge appliance before restart.

Preparation before checkout

- ❑ Burner/appliance installed per appliance instruction manual?
- ❑ Burner components verified against Table 1, page 7?
- ❑ Burner/appliance installed per all applicable codes?
- ❑ Installation site has adequate ventilation openings and vent system?
- ❑ Gas supply line in good condition and sized correctly?
- ❑ All gas line joints sealed with pipe dope listed for use with liquefied petroleum gases?
- ❑ Gas supply pressure to combination gas valve checked?
- ❑ Regulator installed if pressure can exceed 14 inches w.c.?
- ❑ Air purged from gas line?
- ❑ Gas piping checked for leaks?
- ❑ Wiring installed per burner and appliance instruction manuals?
- ❑ Burner inspected and primary control flame failure lockout checked?
- ❑ Start-up sequence performed (page 12)?

Make final burner adjustments

Check for leaks in gas piping

- ❑ Smell around burner to make sure there is no gas leak in near-burner piping. Verify integrity of gas line joints between combination gas valve and burner gas inlet tapping using soap suds mixture.

Check/adjust gas valve outlet pressure

- ❑ With burner running, check manometer reading for combination gas valve outlet pressure. Adjust valve regulator if necessary so the reading is 3.5 inches w.c. for either natural gas or propane gas.

Make final burner adjustments *(continued)*

Inspect flame

- ❑ Look at flame through appliance observation port. The flame should be a soft blue with well-defined orange and yellow tips for natural gas, or well-defined yellow tips for propane gas. (If you make air or gas pressure changes later, inspect the flame again.)

Check the firing rate

- ❑ Natural gas only — Turn off all other gas appliances connected to the gas meter. Use a stopwatch to time the number of seconds for a flow of one cubic foot of gas (two revolutions for a one half cubic foot per revolution dial, for example). You will also need to know the gas heat content in Btu per cubic foot. Determine the actual input from: INPUT = (3600 x Btu per cubic foot) ÷ (number of seconds for one cubic foot), for firing rate in Btu/h. For example, for 1050 Btu per cubic foot natural gas, with meter timed at 30.2 seconds for one cubic foot of gas: INPUT example = (3600 x 1050) ÷ (30.2) = 125,200 Btu/h. Firing rate should be within ± 5% of rated input for the appliance. Adjust the combination gas valve pressure regulator if necessary to obtain the correct firing rate. Valve outlet pressure must not be lower than 3.2 inches w.c. nor higher than 3.8 inches w.c.
- ❑ For propane gas, contact your propane supply for procedure to verify firing rate.

Check combustion using instruments

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.

Natural Gas	8.5%	10.4%	8.2%	3.0%

- ❑ Insert test probe into vent above appliance to sample flue products. The results should show CO_2 or O_2 as follows:
- ❑ If the combustion results are outside the range above, and the firing rate of the burner is within 5% of rated input, open or close the air band until the CO_2 (or O_2) are acceptable

WARNING After CO_2 (O_2) tests are completed satisfactorily, measure flue products for carbon monoxide (CO) concentration. The CO must not exceed 50 ppm adjust to "air free", or other if specified by local codes.

- ❑ Check pressure overfire in appliance. Refer to appliance manual for recommended reading and barometric damper instructions for proper setting of damper.

VENTING AND INSTALLATION

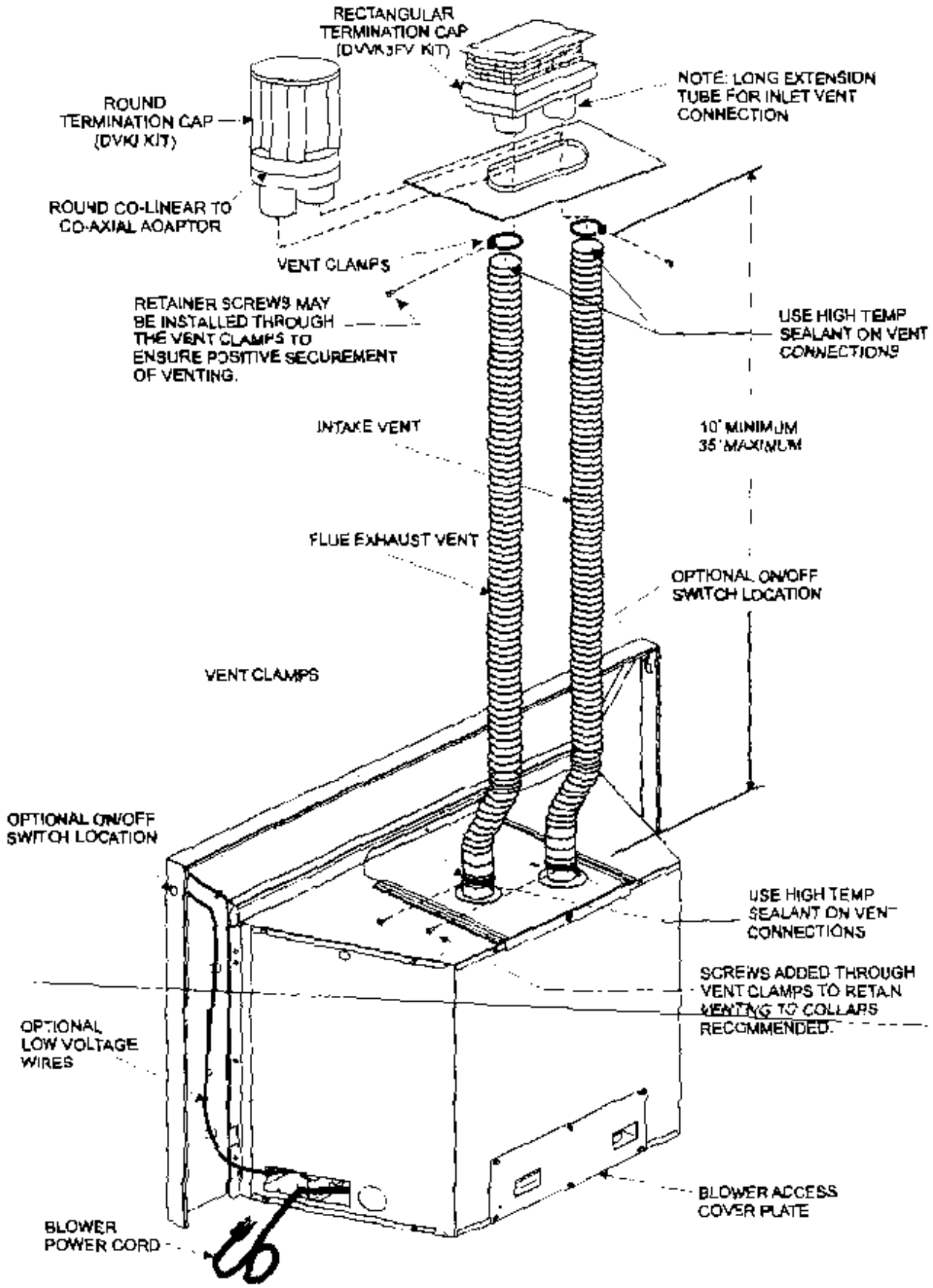


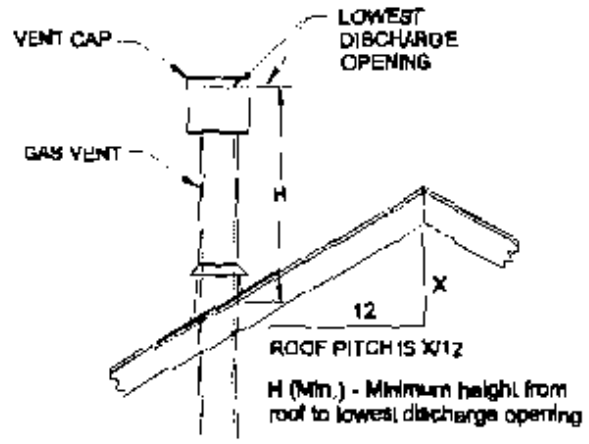
Figure 8

Fire Place

VERTICAL TERMINATION

Determining Minimum Vent Height Above the Roof.

WARNING: Major U.S. building codes specify minimum chimney and/or vent height above the rooftop. These minimum heights are necessary for the *interest* of safety. These specifications are summarized in Figure 9.



ROOF PITCH	H (Min.)
Flat to 6/12	12" (305 mm)
6/12 to 7/12	15" (381 mm)
Over 7/12 to 8/12	18" (457 mm)
Over 8/12 to 16/12	24" (610 mm)
Over 16/12 to 21/12	36" (914 mm)

Figure 9

Note that for steep roof pitches, the vent height must be increased. In high wind conditions, nearby trees, adjoining roof lines, steep pitched roofs, and other *similar* factors can result in poor draft, or down-drafting. In these cases, increasing the vent height may solve this problem.

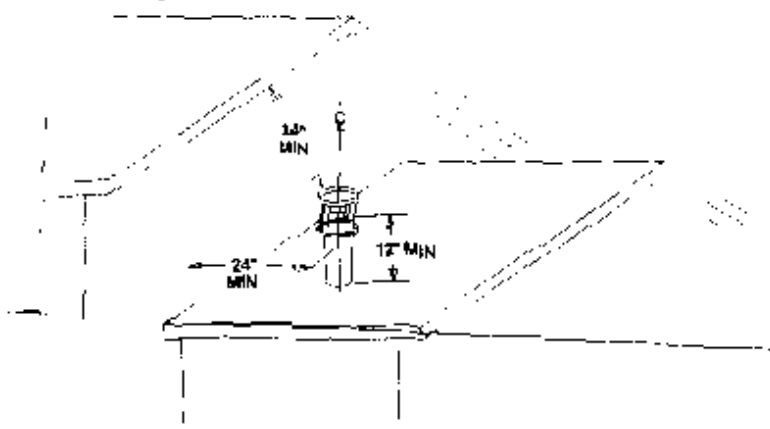


Figure 10

When terminating the vent cap near an exterior wall or overhang, maintain minimum clearances as shown in **Figure 10.**

Vertical Through the Roof Applications

The Gas Fireplace Insert has been approved for:

a) Vertical installations up to 35 feet in height (top of insert to cap).
b) Two sets of 45 degree elbow offsets (bends in flexvent) within the vertical installation. From 0 to a maximum of 8 ft. of vent pipe can be used between elbows.
c) Wall straps must be used to support offset pipe every 4'.

This application will require that you first determine the roof pitch and use the appropriate venting components.

General Maintenance

Conduct an inspection of the venting system semi-annually. Recommended areas to inspect are as follows:

1. Check areas of the venting system which are exposed to the elements for corrosion. These will appear as rust spots or streaks and, in extreme cases, holes. These components should immediately be replaced.
2. Remove the cap and shine a flashlight down the vent. Remove any bird nests or other foreign material.
3. Check for evidence of excessive condensate, such as water droplets forming in the flex venting and subsequently dripping out at joints or seams. Condensate can cause corrosion of caps, pipe and fittings. It may be caused by having excessive lateral runs, or having exterior portions of the system exposed to cold weather.
4. Inspect joints to verify that no pipe sections or fittings have been disturbed and, consequently, loosened. Also, check mechanical supports, such as wall straps or plumbers' tape for rigidity.