Carlin®
Combustion Technology

CAP System Kit

Combustion Air Proving Kit with Burner Cut-Off

Designed to meet NFPA31* requirements for combustion air

Installation Instructions and Operating Manual

CAP Model	Description	Firing Rate (GPH)
51300S	Complete CAP System Kit (for Carlin burners without covers)	0.50 - 2.00
51300AS	Low Rate CAP Kit (for Carlin burners with covers)	0.50 - 1.00
51300BS	Medium Rate CAP Kit (for Carlin burners with covers)	1.05 - 1.45
51300CS	High Rate CAP Kit (for Carlin burners with covers)	1.50 - 2.00
Note: All CAP System models require Carlin 70200 Primary Control manufactured after Sept. 2018		

Patent No.: 11,428,407 & 11,879,640

WARNING **Electrical shock hazard.** To prevent electrical shock, death, or equipment damage, disconnect power supply before installing or servicing CAP System. Only qualified personnel may install or service the CAP System in accordance with local codes and ordinances. Read instructions completely before proceeding.

*See Section 5.4.3.3 as covered by April 2019 TIA 16-2

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CAP SYSTEM KIT COMPONENTS

(see page 3 for part descriptions)

COMPONENTS CONTAINED IN POLYBAG

CAP SYSTEM KIT COMPONENTS

Reference Number	Description	Part Number	Quantity	MODEL			
				51300S	51300AS	51300BS	51300CS
1	Burner Cover	50404ABLK	1	●			
Following items come assembled with Burner Cover (above)							
1a	Burner Cover Reset Button	51288	1	●			
1b	5/16-18 x 5/8" Phillips Head Screw	50008	1	●			
	1/4" Retaining Nylon Washer	50800	1	●			
2	Burner Cover Backplate	50433B	1	●			
3	CAP System Air Flow Switch (0.18" WC)	50806A	1	●	●		
4	CAP System Air Flow Switch (0.30" WC)	50806B	1	●		●	
5	CAP System Air Flow Switch (0.85" WC)	50806C	1	●			●
6	Clamp	51642	1	●	●	●	●
7	3" 90° PVC Elbow	51314	1	●	●	●	●
8	3" Air Intake Screen	51322	1	●	●	●	●
9	5/16" Plated Star Washer	31179	2	●			
	5/16-18 x 5/8" Hex Head Bolt	50604	2	●			
10	CAP System Air Inlet	51300	1	●	●	●	●
Following items come assembled with CAP System Air Inlet (above)							
10a	24 inch Air Flow Switch Wiring Harness	51308A	1	●	●	●	●
10b	10-14 x 1/2" Phillips Head Screw	50605	2	●	●	●	●
10c	8-16 x 3/4" Phillips Head Screw	51327	1	●	●	●	●
11	Connecting Flange	51305	1	●	●	●	●
12	CAP System Kit Instructions and Operating Manual	MNCAP	1	●	●	●	●
13	9/32"ID x 7/8" OD Grommet	51669	1	●			
14	5/16" Plated Star Washer	31179	2	●	●	●	●
	5/16-18 x 5/8" Hex Head Bolt	50604	2	●	●	●	●
15	.88" Split Grommet	51425A	2	●	●	●	●
16	Hole Plugs	99715	4	●	●	●	●
17	1.62" Split 5Grommet	50844A	1	●	●	●	●
18	Burner Cover Oil Line Insert	50703	1	●	●	●	●
19	Burner Cover Backplate Filler	50433B1	1	●	●	●	●
Following item comes assembled with Burner Cover Backplate Filler (above)							
19a	1/8" Black Nylon Rivets	50851	2	●	●	●	●
20	Label – Burner Setup Chart	51316	1	●	●	●	●

Components inside red box are contained in the polybag.

● *Components 14-20 indicate parts included with 50433KITS (Cover Seal Kit).*

CAP System Operation

The CAP System is designed to shut down the burner in the event the outside combustion air supply becomes blocked. At each burner startup, the system will check the air intake during pre-purge (Valve Delay On*). If the air is blocked, the control will abort ignition and shutdown the burner. If the air intake is not blocked during this startup test, but becomes blocked during normal burner operation, the burner will shut down if the air remains blocked for 20 seconds. Following any shutdown, the burner will be permitted to recycle 3 times following a 1 minute delay. The system will lock out the burner if the blockage continues throughout 3 recycles during any single call for heat.

**If the Burner has no valve, the air intake cannot be checked during pre-purge. In this case, the burner will shut down following the 20 second blockage described above. For all burners with valves, Valve Delay settings of less than 15 Seconds will be automatically changed to 15 Seconds to allow for the prepurge test.*

Getting Started

1 Ensure you have the right CAP System Kit for your application by confirming the firing rate (in GPH) with the table on page 1.

IMPORTANT: If you change the firing rate, pressure switches are available separately to convert the CAP System after installation. (See instructions for Installing Pressure Switch on page 8).

Pressure Switch Conversion	
Firing Rate GPH	Pressure Switch
0.50-1.00	50806A
1.05-1.45	50806B
1.50-1.90	50806C

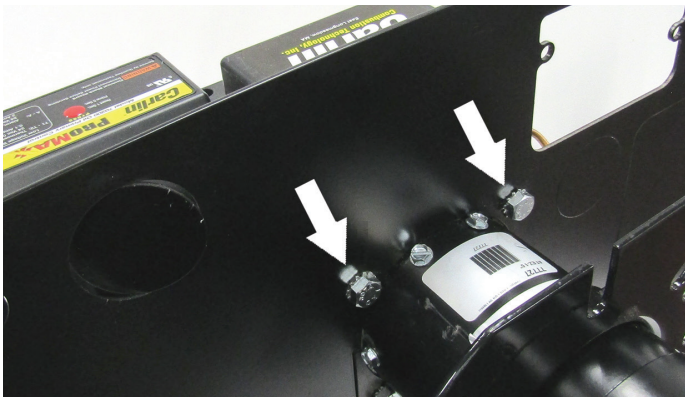
2 Ensure that the burner is equipped with a Carlin Pro-X 70200 primary control with low voltage blocked vent (BV) terminals as shown.

NOTE: 70200 controls manufactured prior to Sept. 2018 are not compatible with the CAP System.

3 **INSTALLING BACKPLATE** (for uncovered burners)

If installing on a covered burner, skip to Step 4.

- Mount backplate 2 in the desired orientation and secure to the burner using the mounting bolts and star washers 9 provided (as shown). The backplate is reversible to accommodate left-hand or right-hand mounting of the air inlet. (See step 8 for available inlet mounting configurations.)



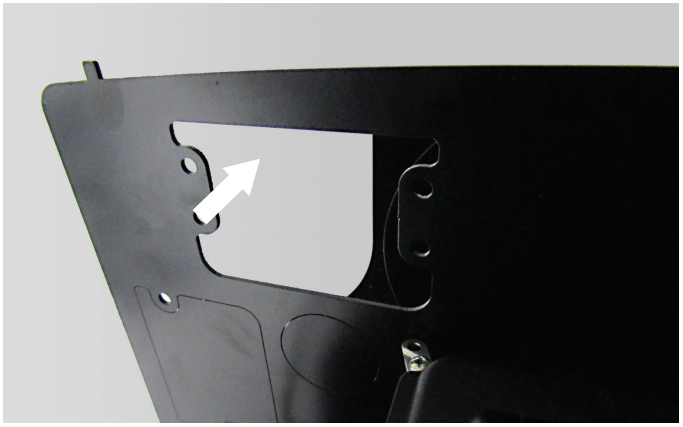
- Reroute any BX cable, wiring harness, etc. through one of the circular knockouts in the backplate 2.

4 **ROUTE THE OIL LINE**

- Route the oil line through one of the circular knockouts in the burner cover backplate 2.

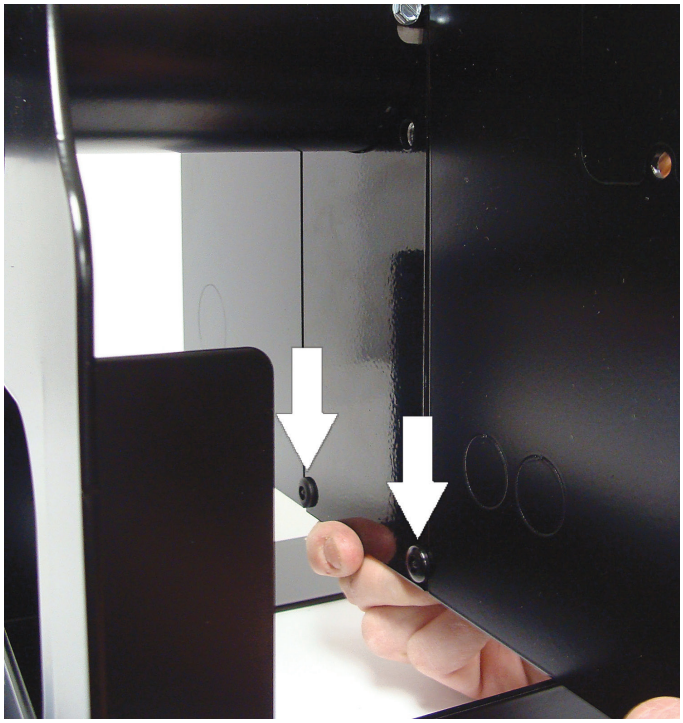
5 **REMOVE AIR INLET KNOCKOUT**

- Remove the 2" x 4" air inlet knockout that corresponds to the desired air inlet position (vertical or horizontal) as shown in step 8.

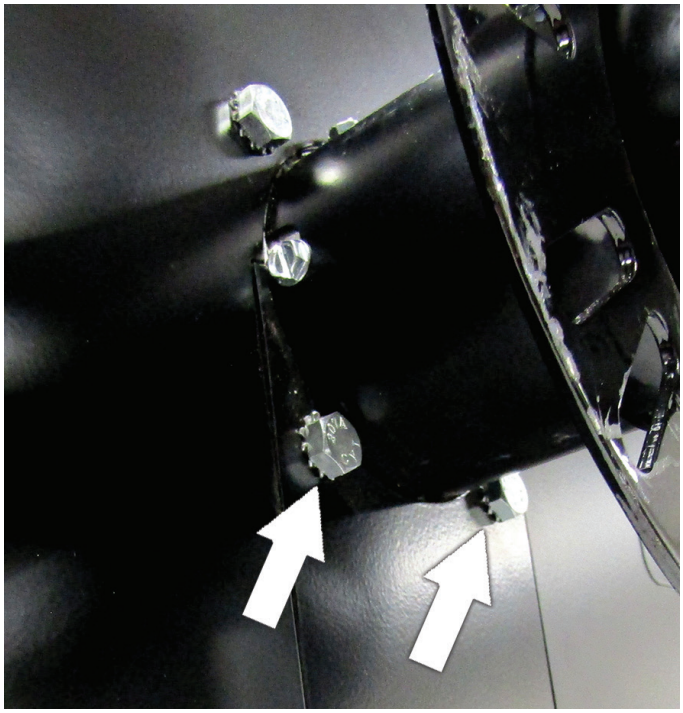


6 SEAL THE BACKPLATE

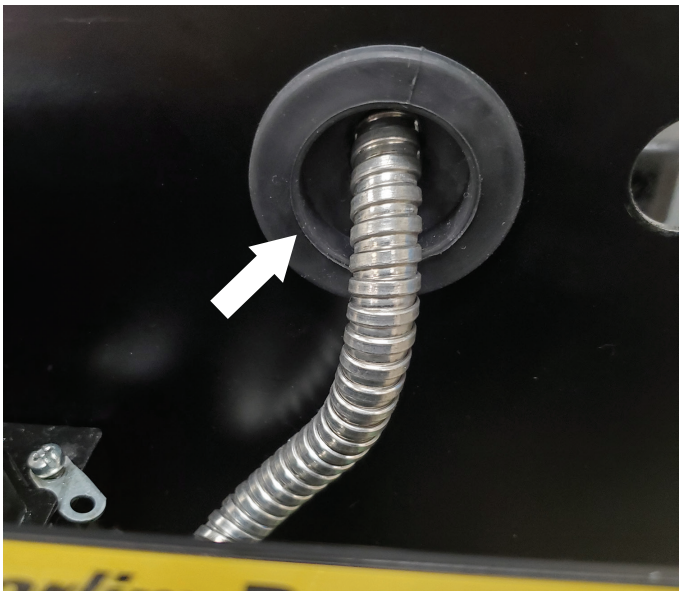
- Use the plastic rivets 19a at the bottom corners of the filler plate to properly align the filler plate with the burner backplate 2.



- Secure the filler plate 19 below the burner air tube using the two 5/16" bolts and star washers 14 provided.

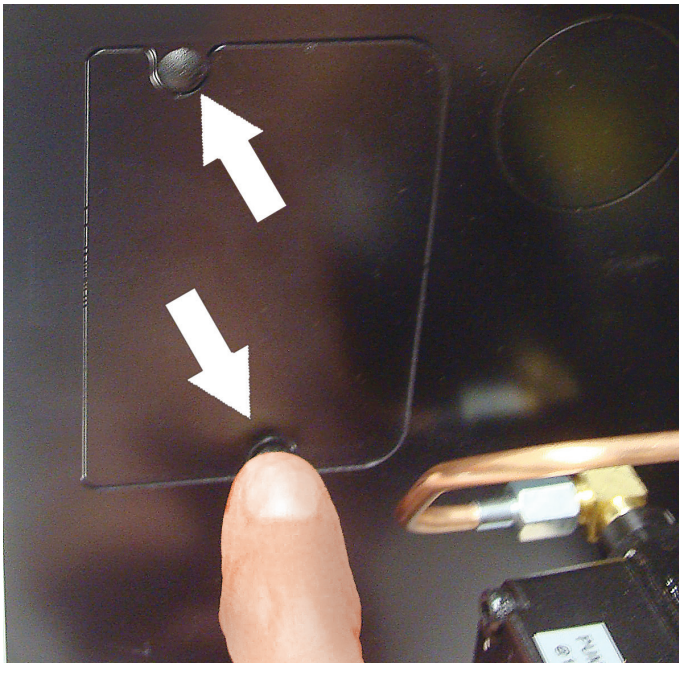


- Install the 1.62"split grommet 17 around any BX cable, wiring harness, etc. leaving the burner backplate 2.



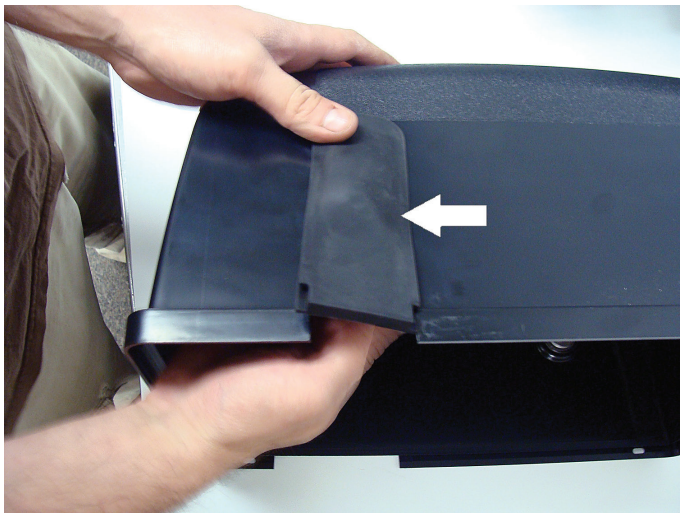
- Install one of the .88" split grommets 15 around the oil line.

- Fill the 1/4" and 7/8" holes in the backplate with plugs provided 16.



7 SEAL THE COVER

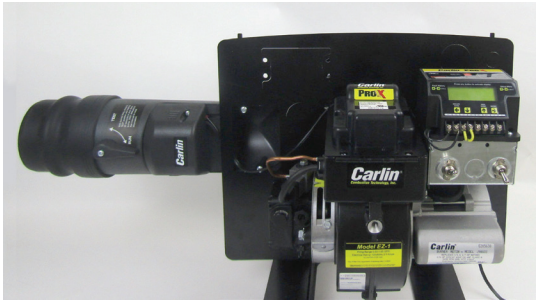
- Install the rubber filler 18 into the 4" opening in the bottom of the cover 1 as shown.



8 INSTALL THE AIR INLET

- Using the screws provided 10b, mount the CAP System air inlet 10 onto the 2" x 4" air inlet knockout removed in Step 5. Mounting examples below.

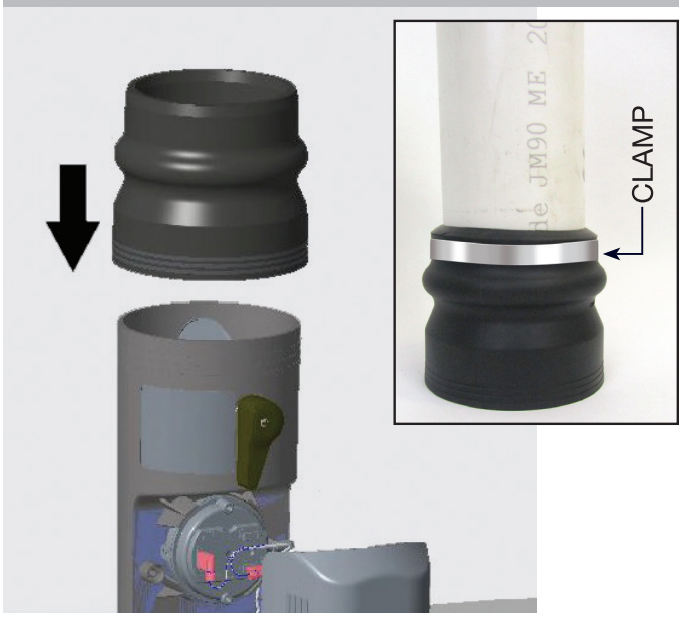
VERTICAL CONFIGURATIONS



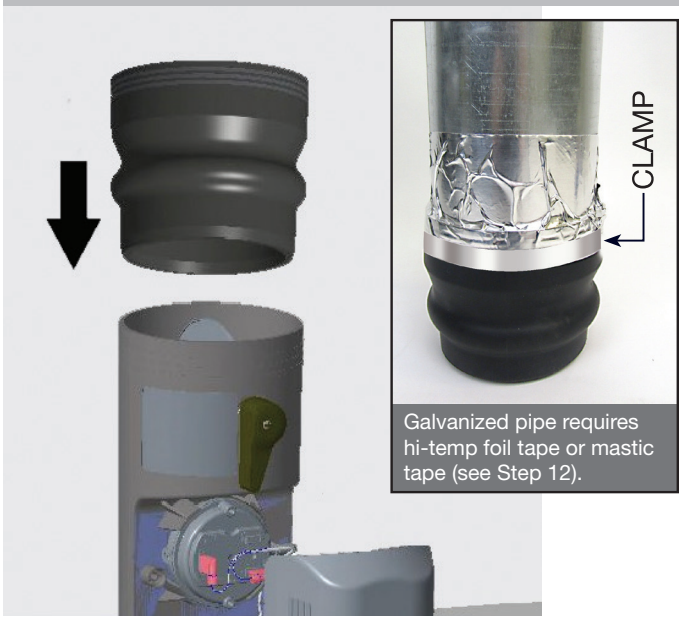
HORIZONTAL CONFIGURATION (left side only)

9 Slide the connecting flange 11 onto the air inlet 10 until fit is tight. Reverse flange when using galvanized piping. Secure with clamp 6.

PVC

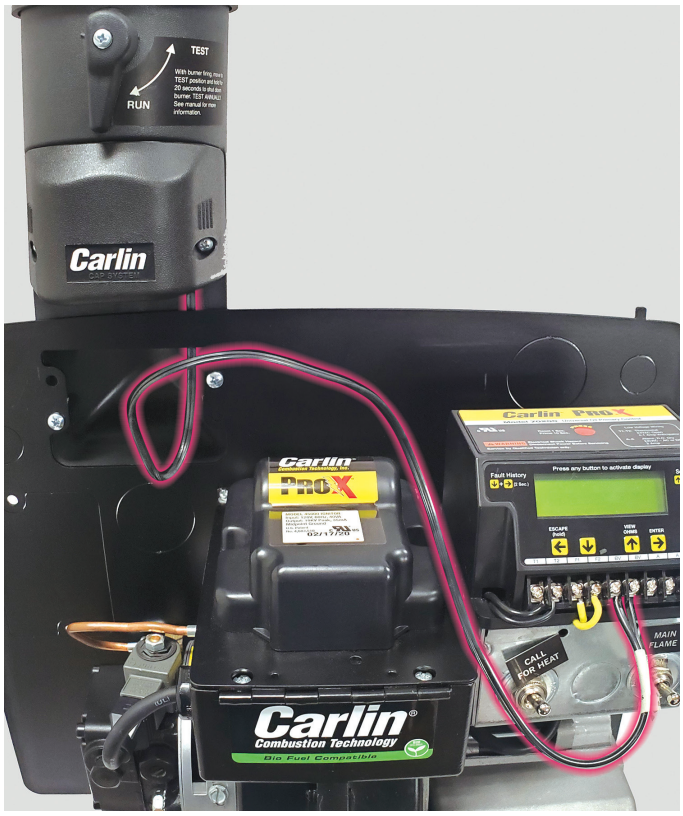


GALVANIZED



Galvanized pipe requires hi-temp foil tape or mastic tape (see Step 12).

10 Route the Air Flow Switch Wire Harness 10a from the combustion air inlet 10 to the low voltage blocked vent (BV) contacts on the Pro-X 70200 primary control.



11 SETTING BLOCKED VENT + AIR INTAKE FEATURE

The Pro-X 70200 Primary Control (manufactured Sept. 2018 or later) is equipped with a Blocked Vent Air Intake feature that works in conjuction with the CAP System. To activate this setting:

- Press ↑ and → simultaneously for 2 seconds. This brings you to the settings menu.
- Scroll through the settings using → until you reach **Vent Input**.
- Scroll down to **Intake** using the ↓.
- Press → **/ ENTER** button. The display will briefly indicate **Vent Input** has been "Entered" and has replaced any previous setting.

NOTE: If the Pro-X 70200 is also connected to a blocked exhaust switch, call Carlin Technical Support for assistance.

12 PIPING

3" PVC (recommended) or 4" galvanized vent pipe must be installed to provide outside air to the CAP System. (Maximum run of 80 total feet with each elbow equaling 10 feet. Example: 40 feet straight pipe and 4 elbows = 80 feet total run.)

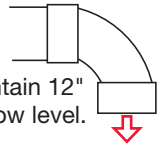
Secure piping to connecting flange 11 using clamp 6. (See step 9.)

NOTE: Galvanized pipe should not be used with firing rate less than 0.65 GPH.

Important PVC Specs

For proper operation of the CAP System, air inlet piping should only use schedule 40 or 80 PVC.

12 PIPING (continued)



Combustion air outdoor termination: Use PVC elbow 7 facing downward and air intake screen provided 8. Maintain 12" clearance above highest anticipated snow level.

Galvanized

IMPORTANT: For proper operation of the CAP System galvanized pipe must be sealed air tight (including all joints and seams) with hi-temp foil tape or mastic stress tape.

When using galvanized, the CAP system connecting flange 11 needs to be reversed (groove stripes/wider opening on top). Galvanized should be fitted inside wider opening until it hits stop/lip (may require lubricant). Thinner end should be inserted into air inlet opening 10. There will be a smaller gap between edge of connector and galvanized pipe. Tight seal is made inside connector.

Termination hood (not provided) is needed for use with galvanized pipe. Maintain 12" clearance above highest anticipated snow level.

WARNING: Be sure to adhere to manufacturer's recommendations and all local codes with regards to proximity of combustion air piping to appliance vent/exhaust stack.

Avoid locations where snow may drift and block combustion air. Ice or snow may cause boiler to shut down if combustion air becomes obstructed. Combustion air termination must be min. 12" from or below doors, windows or gravity inlet. USE SWEEP ELBOWS FOR ALL COMBUSTION AIR PIPING. DO NOT USE short radius elbows for combustion air piping – boiler performance could be affected.

13 Mount the cover 1 by aligning the two holes on the top flange of the cover with the mounting tabs on the backplate. Tighten the mounting screw 1b, located in the center of the cover, securely to prevent basement air from entering the cover.

14 CHECK BURNER SETUP

CAP System utilizes outside air for combustion. Incoming air temperature will fluctuate by season which can significantly impact combustion. Use the table below to set the combustion settings based on outside temperatures at the time of setup.

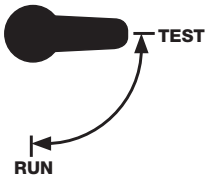
Incoming combustion air temperature during setup	CO_2 min	CO_2 max	O_2 max	O_2 min
–20°F to 0°F	10.2%	11.0%	7.0%	5.8%
5°F to 30°F	11.0%	11.5%	5.8%	5.5%
35°F to 60°F	11.5%	12.2%	5.5%	4.2%
65°F or higher	12.0%	12.5%	4.6%	3.9%

- Apply the burner setup label 20 to the top of the burner cover 1.

Testing CAP System Operation

1 With the CAP System installed and the cover securely mounted, initiate a call for heat and allow the burner to fire.

2 With the burner firing, move the Test Lever to the TEST position . The burner will shut down following a 20 second delay.



NOTE: The 70200 will allow the burner to recycle three times to prevent nuisance shutdowns caused by temporary blockages or high wind conditions. If the blockage persists the burner will shut down and lock out after the third recycle attempt.

NOTE: If the burner does not have a prepurge cycle, the burner will fire upon recycle, but will shut down following 20 seconds of operation. (See the 70200 instructions for more details).

Annual Test

Using the instruction above, the CAP System operation should be tested annually.

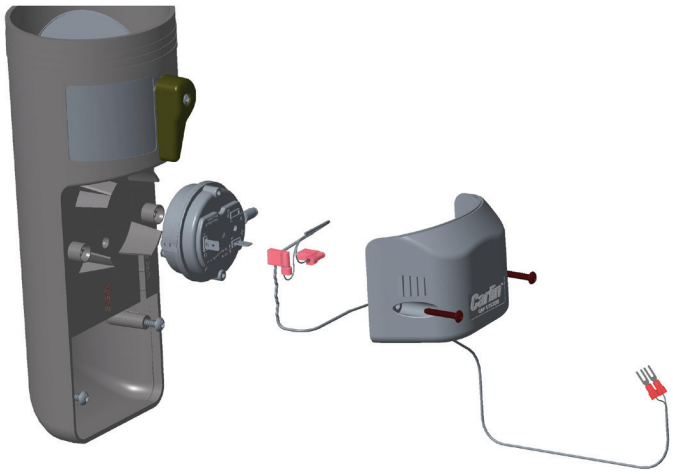
Troubleshooting

Burner Will Not Shut Down During Test
If the burner did not shut down with the test damper closed for a sustained 20 seconds, check the following:

- Make sure that the burner cover 1 is properly sealed. If a significant amount of air is leaking into the cover 1 or backplate 2, the burner will not shut down during the test. Check for proper installation of all components in the Burner Seal Kit (see Step 6).
- Make sure that the burner cover screw 1b is tight. This also prevents basement air from entering the cover.
- Check that the correct air pressure switch 3 4 5 is installed based on the firing rate of the burner (See table on page 2 and instructions for changing the switch on this page)
- Make sure Vent Input on 70200 control is set to “Intake” (see step 11).

Changing the Air Pressure Switch

The air pressure switch 3 4 5 must correspond with the firing rate of the burner – see table on page 2. Carlin’s Complete CAP System Kit (51300S) contains all three pressure switches. Switches are also available separately. If you need to change the switch to accommodate your application, follow the instructions below:



1 Remove the switch cover which is secured by two mounting screws 10c (shown above).

2 Unplug the two female fast-ons from the switch.

3 Pull the switch outward to remove it from the assembly. Replace it with the switch that corresponds to the burner’s firing rate. Reattach the wires and secure the switch cover

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