



8699 and 8699A Balancing Orifices assure equal flow to all burners on a manifold by causing a pressure drop that is large relative to any other drop between the manifold inlet and the burners. (Another type of orifice, the Series 8697 Metering Orifice, should be used wherever metering, fuel/air ratio adjustment without an analyzer, or accuracy better than  $\pm 5\%$  is required.)

8699A Orifices replace some sizes of 8699's. Dimensional differences in the unions prohibit interchanging orifice plates between 8699 and 8699A. 8699A Orifice Unions are tagged "8699A".

**Construction.**  $\frac{1}{2}$ " to  $2\frac{1}{2}$ " pipe sizes include a specially machined malleable iron union, a rubber gasket, a jig-drilled cold rolled steel orifice plate and an identification tag. 3" and 4" sizes include a cast iron flange union, 2 cloth inserted rubber gaskets, nuts, bolts, a bored cold rolled steel orifice plate with tab and an identification tag. Stainless steel plates or special drillings are available on all sizes at extra cost. When special drillings are required on 10 or less orifices, accuracy cannot be guaranteed. Maximum recommended pressure is 50 psi; temperature 300 F.

**Installation.** Install one limiting orifice valve between regulator and manifold, as shown in Fig. 2, for adjusting fuel/air ratio. When burning natural gas, the use of these Balancing Orifices usually permits gas down-comer pipes one size smaller than the connection on the North American burner. Provide a straight run of 5 pipe diameters upstream and 2D downstream of the Balancing Orifice, or install identical piping in all downcomers. Do not screw pipes in so far that they touch orifice plate.

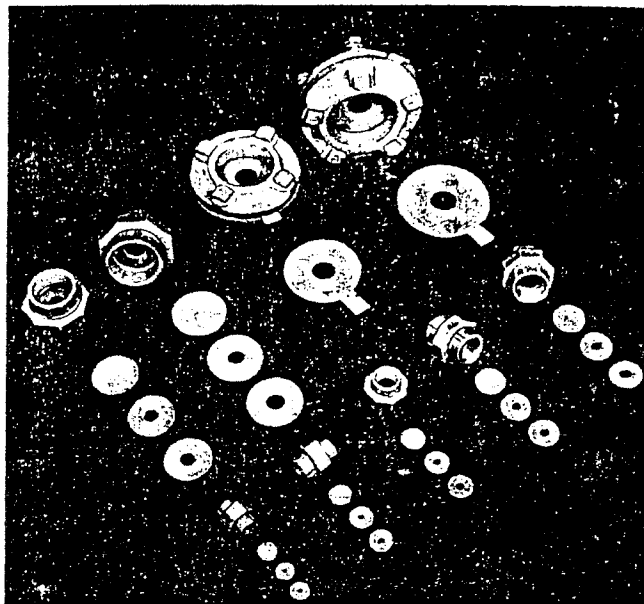


Figure 1. Balancing Orifice and Holders. Specially machined and gasketed unions hold orifice plates that have been carefully jig-drilled for a flow accuracy of 5%.

**Selection.** Select orifices for largest practical pressure drop. A pressure drop of about  $\frac{1}{2}$  of the maximum regulator outlet pressure or impulse should be taken across the balancing orifices, the other half being taken across the single limiting orifice valve for adjusting the fuel/air ratio of the whole bank of burners. The larger orifice for each pipe size has a capacity at 8 psi drop about equivalent to a velocity of 40 fps in the pipe; the smaller orifice about 30 fps.

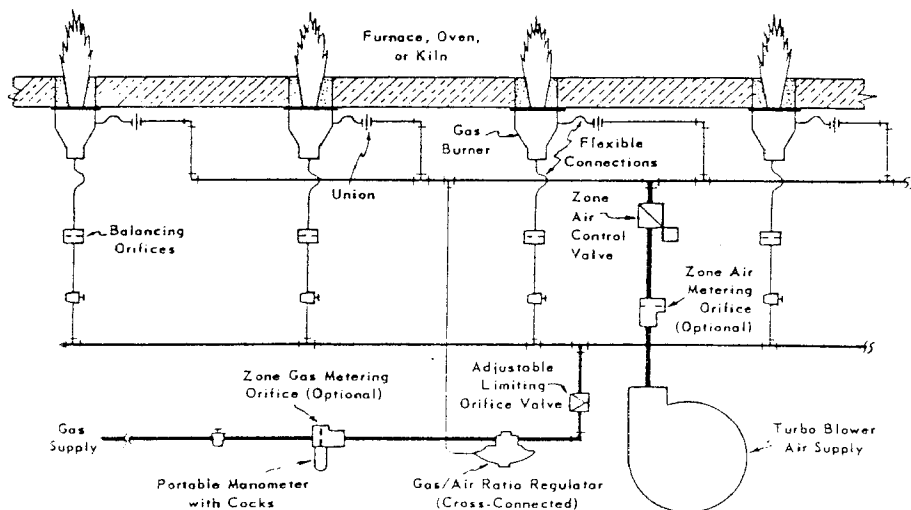
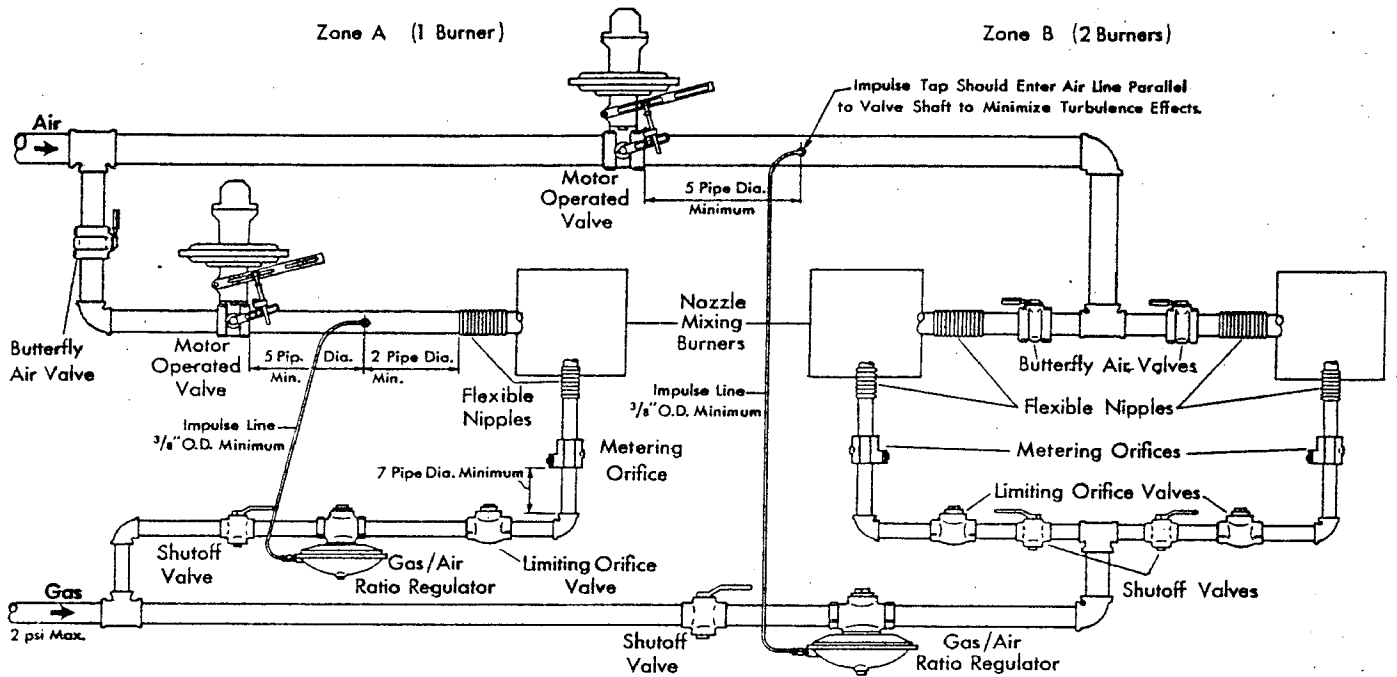


Figure 2. Schematic Piping for Balancing Orifices. Equal orifices in each branch pipe divide the flow from the manifold equally despite uneven branch lengths or irregular welding or pipefitting practice, if sized for sufficiently high pressure drop.

## INSTRUCTIONS for 223G and 4425 GAS BURNERS



### INSTALLATION

To minimize leaks around the tile and to prevent cracking of the tile by thermal expansion in the wall, follow the installation instructions on North American's Supplement AM-10.

### LIGHTUP AND ADJUSTMENT

1. Make sure all fuel shutoff valves are closed. Close Limiting Orifice Gas Valves on initial lighting. Open furnace doors and flue dampers.
2. Start blower and check direction of blower rotation.
3. Open burner air valves wide, and open zone control air valves wide for purging the furnace.
4. Check temperature controller, control motor, and control valve. Linkage must not bind. The air control valve and motor combination should be adjusted for low fire to full open.
5. When the furnace is purged of all combustible gases and vapors, turn the zone control air valve back to 1/4 or less open (low fire position), leaving the individual burner air valves wide open. Light pilots in accord with Pilot Instructions (Bulletin 40.15).
6. Use a screwdriver to open the limiting orifice valve a few turns counter-clockwise. Open the gas shutoff valve. If the burner does not light, close the gas shutoff valve and open the limiting orifice a few more turns, purge the furnace, and then open the gas shutoff valve.

Repeat this procedure until the flame lights, adjust as needed while slowly turning the main air valve to high fire. Replace the cover on the Limiting Orifice Gas Valve.

7. To adjust burner for low fire, return the zone control air valve to low fire position without changing the Limiting Orifice Gas Valve setting; then adjust the gas/air ratio regulator for desired flame. If a #7218 Regulator is used, remove the gas diaphragm cover plug and use a screwdriver to turn the spring adjusting plug clockwise for more gas or counter-clockwise for less gas.
  8. If other burners are supplied by the same gas/air ratio Regulator light each by turning the air to low fire rate and then opening the Limiting Orifice Gas Valves and air valves as in step 6 above. Approximate settings for the Limiting Orifice Valves can be made by counting the number of turns the adjusting screw on the first valve (step 6) was opened.
  9. Turn all burners to high fire (with temp. controller, if used), and if necessary readjust the Limiting Orifice Gas Valves.
  10. Turn all burners back to low fire, and if necessary readjust the regulator spring as in step 7. Replace cover plug.
- If flame safety is used, refer to Bulletin 88.32 and Supplement 88.32-1.