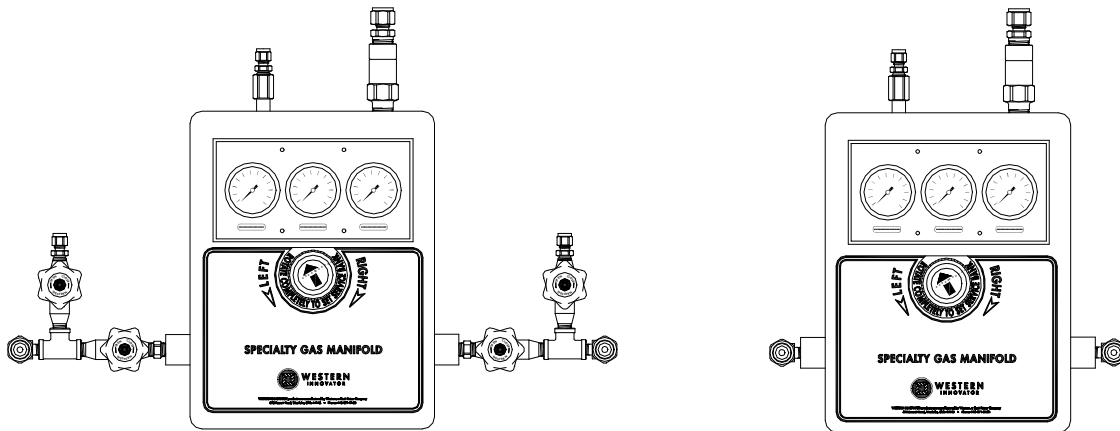




**WESTERN
INNOVATOR**

**Installation and Operating Instructions For
AUTOMATIC CHANGEOVER MANIFOLD
LAB1 AND LAB2 SERIES**



INTRODUCTION

Western manifold systems are cleaned, tested and prepared for the indicated gas service and are built following National Fire Protection Association and Compressed Gas Association guidelines. The manifold consists of a manifold control, one service and one reserve supply, to provide an uninterrupted supply of gas for the specific gas application. The control is designed and built with features providing automatic changeover from the depleted “Service” supply bank to the “Reserve” supply with no loss or drop in delivery pressure. Pressure gauges show system status and alert the need to replace depleted cylinders. Features of the automatic systems include an integral adjustable line regulator, rigid pigtails with check valves and complete mounting hardware. The LAB1 manifold series includes master valves and vent valves.

CAUTION

Failure to follow the following instructions can result in personal injury or property damage:

- Never permit oil, grease, or other combustible materials to come in contact with cylinders, manifold, and connections. Oil and grease may react and ignite when in contact with some gases — particularly oxygen and nitrous oxide.
- Cylinder, header, and master valves should always be opened very s-l-o-w-l-y. Heat of recompression may ignite combustible materials.
- Pigtails should never be kinked or twisted. Mistreatment may cause the pigtail to burst.
- Do not apply heat. Some materials may react and ignite while in contact with some gases — particularly oxygen and nitrous oxide.
- Cylinders should always be secured with racks, chains, or straps. Unrestrained cylinders may fall over and damage or break off the cylinder valve which may propel the cylinder with great force.
- Oxygen manifolds and cylinders should be grounded. Static discharges and lightning strikes may ignite materials in an oxygen atmosphere, creating a fire or explosive force.
- Welding should not be performed near nitrous oxide piping. Excessive heat may cause the gas to dissociate, creating an explosive force.

WARRANTY

All Western manifolds are warranted against defects in materials and workmanship for the period of one year from date of purchase. See back cover for details of limited warranty.

TABLE OF CONTENTS

| | |
|---|----|
| GENERAL INSTRUCTIONS | 3 |
| CONTROL SECTION INSTALLATION | 4 |
| PLUMBING | 6 |
| INSTALLING PIGTAILS AND ATTACHING CYLINDERS | 6 |
| START UP AND CHECKING PROCEDURES | 7 |
| MANIFOLD OPERATION | 8 |
| FUEL GAS MANIFOLDS - FLASHBACK ARRESTORS | 9 |
| GENERAL | 9 |
| OPERATION | 9 |
| FLASH ARRESTOR INSTALLATION | 9 |
| MAINTENANCE | 9 |
| CYLINDER REPLACEMENT & HANDLING | 10 |
| LINE DELIVERY PRESSURE ADJUSTMENT | 10 |
| GENERAL MAINTENANCE | 11 |
| TROUBLE-SHOOTING | 12 |
| MANIFOLD MAINTENANCE & REPAIR PARTS | 13 |
| REPLACEMENT PIGTAILS | 13 |
| PANEL MOUNT GAUGES | 13 |
| VALVE OUTLETS | 13 |
| REGULATORS | 13 |
| FLOOR STAND MAINTENANCE AND REPAIR PARTS | 13 |
| REPLACEMENT NUTS AND BOLTS | 13 |
| STRUCTURAL REPLACEMENT PARTS | 13 |
| WARRANTY | 14 |

WALL MOUNTING OF CONTROL SECTION

1. Determine and mark the vertical center line for installation of the manifold control. (Figure 2)
2. Measure from the floor to a point $6\frac{1}{2}$ " above the height of the cylinders. Using a level, mark a horizontal line at this point extending approximately 10" to the left and 10" to the right of center.

(* — Suggested manifold height. Wall mounting heights may vary from one installation to another depending on available space, cylinder height, etc.)

3. Remove the mounting bracket from the back of the manifold control by removing the nut at the bottom of the bracket. Place the upper edge of the "tee" mounting bracket on the marked horizontal line and centered with the vertical line.

Holding the bracket with the slotted extensions away from the wall, mark the locations for three mounting bolts. (Figure 3)

4. Anchor the mounting bracket to the wall. Selection of mounting fasteners will depend upon wall construction. (Figure 3)
5. Secure the manifold control in place by sliding the round retainers on the back of the cabinet into the slots on the bracket. Replace the nut on the bolt which protrudes from the case and tighten lightly. This bolt only stabilizes the bottom of the unit and is not load-bearing. (Figure 4)

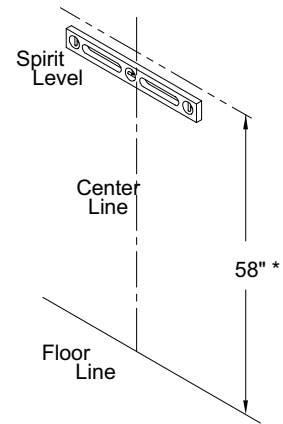


FIGURE 2

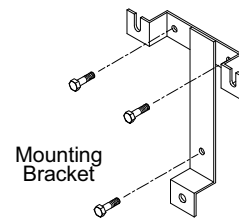


FIGURE 3

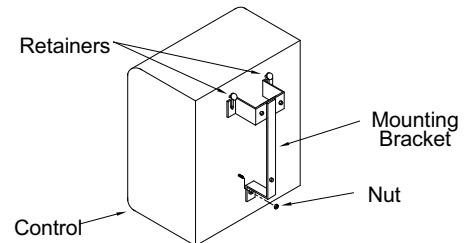


FIGURE 4

FLOOR STAND MOUNTING OF CONTROL SECTION

1. Mark two lines 4.25 inches apart and approximately 6 inches long.
2. Mark the center line of the manifold and two lines 2.125 inches on each side of the center line per figure 5. These marks will indicate where the square base for the manifold cabinet post will be bolted to the floor.

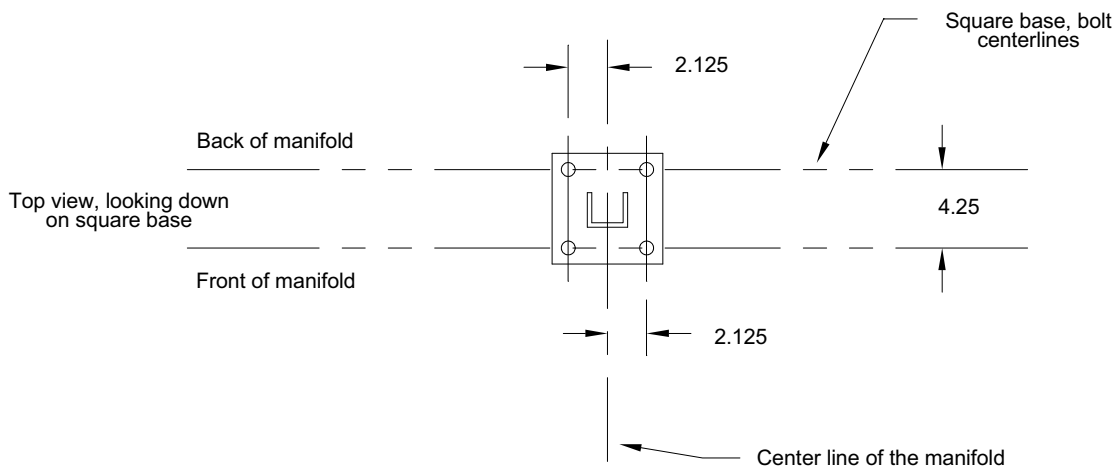


FIGURE 5

3. Orient the square base per figure 6. Mount using fasteners suitable for the type of floor construction.
4. Mount the square tubing to the base using the supplied 1/2" locknuts and bolts. (Figure 7) A spirit level should be used to ensure the square tube is straight.
5. Mount the "tee bracket" to the cabinet post as shown in figure 8 using the 3/8" locknuts and bolts provided. The tee bracket should be located at a height above the cylinder height. This will require two holes for 3/8" bolts to be drilled for mounting the tee bracket.

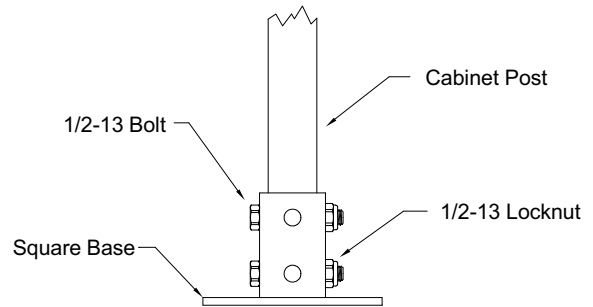


Figure 7

Figure 6

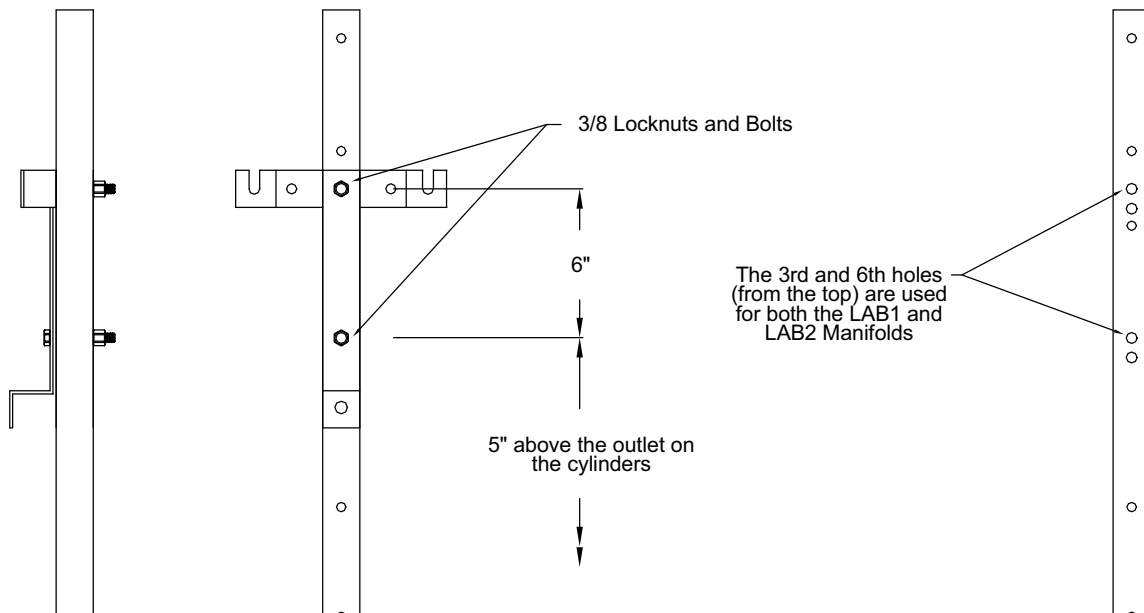


Figure 8

6. Secure the manifold in place by sliding the round retainers on the back of the cabinet into the slots on the bracket. Replace the nut on the bolt which protrudes from the case and tighten lightly. This bolt only stabilizes the bottom of the unit and is not load-bearing. (Figure 9)

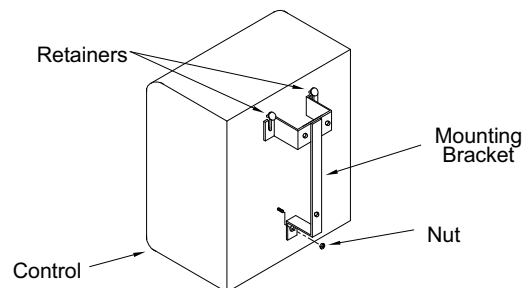


FIGURE 9

PLUMBING

1. A 1/4" O.D. tube compression fitting is supplied with the control and is located at the upper left side of the manifold control. Connect this union to the pipeline system. Sweat joints must be silver soldered. Use BAg-1 specification silver solder (DO NOT USE SOFT SOLDER). Heat the entire joint evenly. Apply enough heat favoring heavy sections, so that solder flows freely around the joint leaving no pin holes. The compression fitting provided permits removal of the manifold control for service. (Figure 10)
2. If the manifold is installed in a closed area, vent piping must be attached to the manifold control relief valve located at the top right of the manifold control. The vent connection is a 1/2" compression tube fitting.

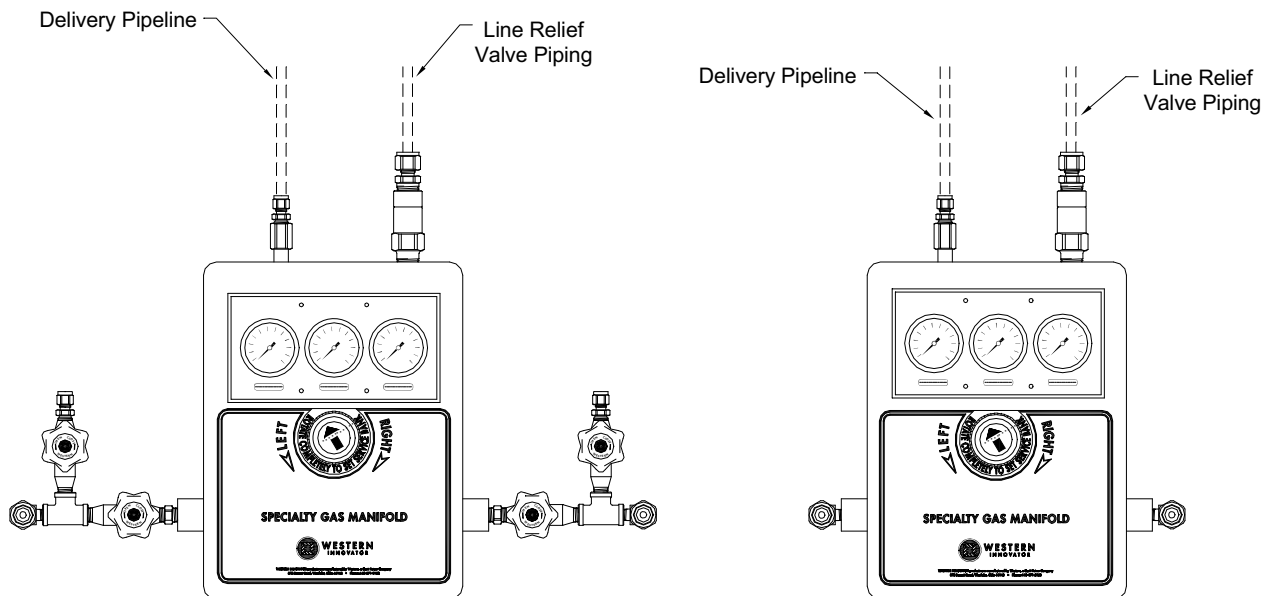


FIGURE 10

INSTALLING PIGTAILS AND ATTACHING CYLINDERS - LAB1

1. Establish flow direction of check valves in pigtails.
2. Connect pigtails to the valve outlet bushings (located on the manifold) with direction of check valve flow from cylinder to manifold end of pigtail.
3. Check the master and vent valves to be certain they are closed.
4. Attach full cylinders to the pigtail connections as explained in "Cylinder Replacement & Handling" on page 10.
5. S-L-O-W-L-Y turn all cylinders open fully (turn counter-clockwise to open). Check all cylinder and pigtail connections for leaks using Western leak detector LT-100 or an oxygen safe solution. (Any bubbles around connections indicate leakage.)

INSTALLING PIGTAILS AND ATTACHING CYLINDERS - LAB2

1. Establish flow direction of check valves in pigtails.
2. Connect pigtails to the valve outlet bushings (located on the manifold) with direction of check valve flow from cylinder to manifold end of pigtail.
3. Attach full cylinders to the pigtail connections as explained in "Cylinder Replacement & Handling" on page 10.
4. S-L-O-W-L-Y turn all cylinders open fully (turn counter-clockwise to open). Check all cylinder and pigtail connections for leaks using Western leak detector LT-100 or an oxygen safe solution. (Any bubbles around connections indicate leakage.)

START UP AND CHECKING PROCEDURES - LAB1

1. Put the right bank in service by turning the control indicator knob fully to the right. S-L-O-W-L-Y open the right master valve (turn counter-clockwise to open). The right bank pressure gauge should show the full pressure of the right cylinder.
2. S-L-O-W-L-Y open the left master valve fully. The left bank pressure gauge will show the full pressure of the left cylinder.
3. Create a slight flow of gas in the delivery pipeline system. Close the right master valve to simulate a depleting right bank. Observe the following:
 - The right bank gauge pressure slowly falls and the control automatically switches over to the left bank.
 - Delivery pressure remains constant.
4. S-L-O-W-L-Y reopen the right master valve. Observe the following:
 - Right bank pressure gauge returns to full pressure.
5. Turn the control indicator knob fully to the left and repeat procedures 3 and 4 to simulate an empty left bank.

START UP AND CHECKING PROCEDURES - LAB2

1. Put the right bank in service by turning the control indicator knob fully to the right. S-L-O-W-L-Y open the right cylinder valve (turn counter-clockwise to open). The right bank pressure gauge should show the full pressure of the right cylinder.
2. S-L-O-W-L-Y open the left cylinder valve fully. The left bank pressure gauge will show the full pressure of the left cylinder.
3. Create a slight flow of gas in the delivery pipeline system. Close the right cylinder valve to simulate a depleting right bank. Observe the following:
 - The right bank gauge pressure slowly falls and the control automatically switches over to the left bank.
 - Delivery pressure remains constant.
4. S-L-O-W-L-Y reopen the right cylinder valve. Observe the following:
 - Right bank pressure gauge returns to full pressure.
5. Turn the control indicator knob fully to the left and repeat procedures 3 and 4 to simulate an empty left bank.

MANIFOLD OPERATION

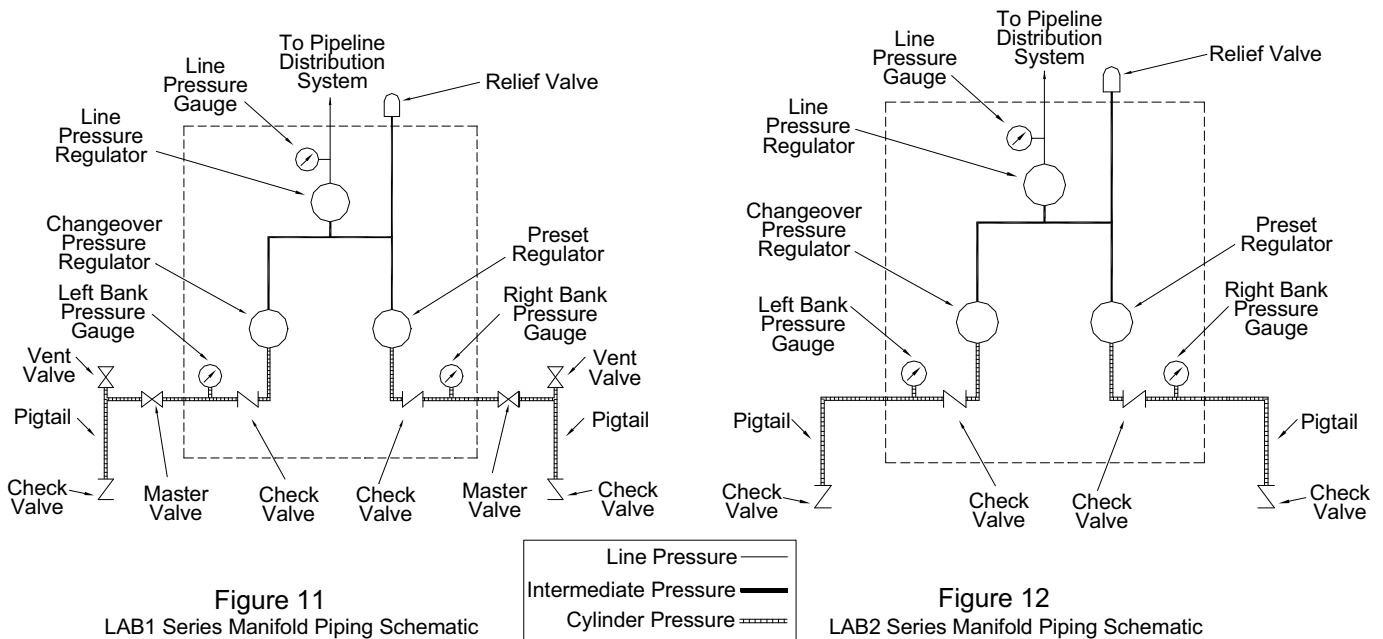
The manifold control includes the following components and features: cylinder pressure gauges, line pressure gauges, intermediate safety relief valve, supply bank control indicator knob, and automatic bank switching. Supply banks consist of pigtailed with check valves, valve outlets, master shut-off valves (LAB1), and vent valves (LAB1).

The cylinder that supplies the piping system is known as the "Service" supply, while the cylinder on stand-by is referred to as the "Reserve" supply. Gas flows through the manifold control to first the primary regulator and then through the line regulator. Delivery pressure is controlled by the line regulator and is adjustable via the access hole in the upper left hand side of the cabinet. (See Line Delivery Adjustment — page 10.)

Changeover from the "Service" to "Reserve" side is accomplished by a pressure differential between the change-over and intermediate primary regulators. As cylinder contents are depleting, pressure passing through the primary regulators will drop. When this pressure drops to the set pressure of the intermediate regulator the "reserve" bank will automatically begin to flow without any interruption in service line delivery pressure.

There is one definite indicator as to which bank should be changed; the arrow on the control indicator knob in conjunction the cylinder bank pressure gauge.

After replacing empty cylinders, open the master valve (on LAB1 series). The knob indicator must be turned to it's opposite position to indicate the new supply bank now in service. The indicator knob must always be in the extreme right or left position, except when moving the indicator knob to it's position after replacement of an empty bank.



To insure proper operation, observe the following guidelines:

1. Carefully follow all instructions.
2. Establish proper flow direction of check valves.
3. Be sure cylinder valves are fully opened.
4. Replace depleted cylinders as soon as practical.

FUEL GAS MANIFOLDS — FLASHBACK ARRESTORS

GENERAL

A dry flash arrestor is provided with all Western acetylene manifolds. A flash arrestor shall also be used on all fuel gas manifolds (not provided with manifold) used in applications with oxygen. Installed in the main gas line or at the head of each branch line, the arrestor protects the main gas supply from the dangers of reverse flow and flashbacks. The safety relief valve is installed on the outlet side of the flash arrestor. Should excessive pressure occur, the gas is then vented out and away to a safe location.

OPERATION

In normal flow, as shown (figure 13), the flexible sleeve is not in contact with the mandrel. If back pressure occurs, the ball check closes and the sleeve is forced tightly against the ridges on the mandrel, creating what is in effect, a "multi-chamber" barrier. This effectively checks backflow and flashback. The excess pressure is vented through the relief valve.

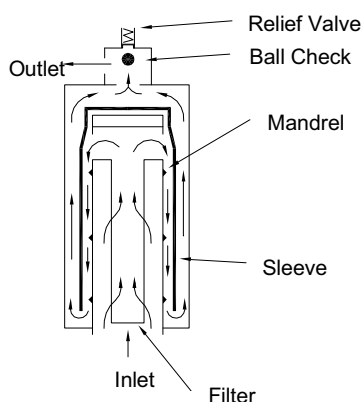


FIGURE 13

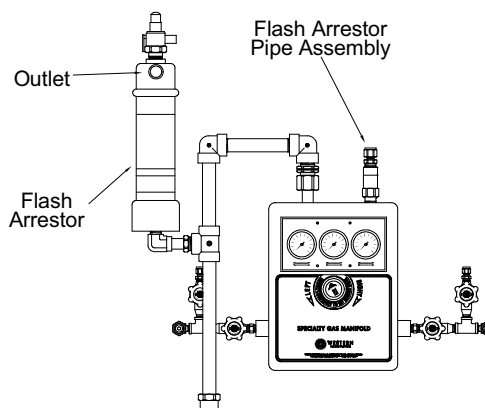


FIGURE 14

FLASH ARRESTOR INSTALLATION

1. Install the flash arrestor to the supplied flash arrestor piping using an approved pipe sealant.
2. Secure the flash arrestor pipe assembly to the manifold outlet (figure 14).
3. The piping from the "outlet" of the flash arrestor to the distribution system and from the relief valve to an outside vent can now be completed. (The National Fire protection Association in its bulletin, NFPA #51 outlines standards for the installation and operation of oxygen/fuel gas systems for welding and cutting.)

MAINTENANCE

1. Periodically, lift the lever on the side of the relief valve slowly and release gas only for an instant. Allow the valve to close on its own spring force. This will assure that the valve is not sticking and will operate properly in case of excess pressure.
2. Check all joints and connections for leakage periodically with leak test solution or any other solution suitable for oxygen service. Also apply a film of the leak solution over the opening of the outlet. Bubbling of the solution will indicate leakage. Do not continue operating until leakage is corrected. If leakage was noted around valve joints or at the outlet, the o-rings in the relief valve should be replaced.

CYLINDER REPLACEMENT & HANDLING - LAB1

1. Shut off the cylinder valve as well as the master valve on the depleted cylinder bank.
2. S-L-O-W-L-Y loosen and remove the pigtail connection from the depleted cylinders.
3. Remove depleted cylinders and replace protective caps.
4. Remove protective cylinder caps from full replacement cylinders. With the valve outlet pointed away from you or anyone else, slowly open each cylinder valve slightly to blow out any dirt or contaminants which may have become lodged into the cylinder valve.
5. Place and secure full cylinders into position using chains, belts, or cylinder stands.
6. Connect pigtails to cylinder valves and tighten with wrench.
7. Open the master valves. S-L-O-W-L-Y turn each cylinder valve until each cylinder is fully on.
8. Close the cylinder valve and open the vent valve. Allow the pressure to deplete, then close the vent valve. Repeat this process a total of three times.
9. The manifold supply bank is now replenished, rotate the knob to place this new bank of cylinders in "Reserve".

CYLINDER REPLACEMENT & HANDLING - LAB2

1. Shut off the cylinder valve on the depleted cylinder bank.
2. S-L-O-W-L-Y loosen and remove the pigtail connection from the depleted cylinders.
3. Remove depleted cylinders and replace protective caps.
4. Remove protective cylinder caps from full replacement cylinders. With the valve outlet pointed away from you or anyone else, slowly open each cylinder valve slightly to blow out any dirt or contaminants which may have become lodged into the cylinder valve.
5. Place and secure full cylinders into position using chains, belts, or cylinder stands.
6. Connect pigtails to cylinder valves and tighten with wrench.
7. Open the master valves. S-L-O-W-L-Y turn each cylinder valve until each cylinder is fully on.
8. The manifold supply bank is now replenished, rotate the knob to place this new bank of cylinders in "Reserve".

LINE DELIVERY PRESSURE ADJUSTMENT

The delivery line pressure (center gauge) has been factory set. If adjustment is required, carefully proceed according to the following instructions.

1. Leave the manifold in full operational status.
2. Create a flow condition in the delivery pipeline system.
3. Locate the line pressure adjustment access hole on the left side of the manifold control.
4. Adjustment: Using an allen wrench, turn clockwise to "increase" pressure, turn counterclockwise to "decrease" pressure.

GENERAL MAINTENANCE

1. Main section

- a) Daily - record line pressure.
- b) Monthly
 - 1) Check regulators and valves for external leakage.
 - 2) Check valves for closure ability.
- c) Annually
 - 1) Check relief valve pressures.
 - 2) Check regulator seats.
- d) Daily - observe nitrous oxide and carbon dioxide systems for cylinder frosting or surface condensation. Should excessive condensation or frosting occur it may be necessary to increase manifold capacity.
- e) Monthly
 - 1) Inspect valves for proper closure.
 - 2) Check cylinder pigtailed for cleanliness, wear, leakage, and thread damage. Replace damaged pigtailed immediately.
 - 3) Inspect pigtail check valves for closure ability.
- f) Every 4 Years
 - 1) Replace all pigtailed

TROUBLE-SHOOTING

(Only qualified repair personnel should make repairs)

| SYMPTOM | PROBABLE CAUSE | REMEDY OR CHECK |
|--|--|---|
| CHANGEOVER PRIMARY REGULATOR | | |
| Venting at relief valve. | Over pressure due to creeping or faulty regulation of primary regulator. | Replace regulator. |
| Gas leakage around primary pressure regulator body and bonnets.. | Loose bonnet(s). | Tighten bonnet(s). |
| | O-ring leak on regulator. | Replace o-ring. |
| Both banks feeding. | Change-over regulator set at too low a delivery pressure. | Adjust regulator per specifications. |
| | Flow rate too high. | Reduce flow demand. |
| INTERMEDIATE PRESSURE REGULATOR | | |
| Venting at relief valve. | Over pressure due to creeping or faulty regulation of primary regulator. | Replace regulator. |
| Gas leakage around primary pressure regulator body and bonnets.. | Loose bonnet(s). | Tighten bonnet(s). |
| | O-ring leak on regulator. | Replace o-ring. |
| Both banks feeding. | Intermediate regulator set at too high a delivery pressure. | Adjust intermediate regulator per specifications. |
| | Flow capacity too high. | Reduce flow demand. |
| LINE PRESSURE REGULATOR | | |
| Gas leakage around regulator body/bonnet. | Loose bonnet. | Tighten bonnet. |
| Pipeline not at desired pressure. | Line regulator not set correctly. | Set delivery pressure per specifications. |
| Required gas flow not available. | Line regulator not set correctly. | Set delivery pressure per specifications. |
| | Flow capacity to high. | Reduce flow demand. |

MANIFOLD MAINTENANCE & REPAIR PARTS

NOTE:

- Western manifold systems are designed and tested for optimal performance and adherence to safety specifications. We recommend the use of Western replacement components to maintain the standards of performance and the safety of the product.

REPLACEMENT PIGTAILS

| | |
|------------------|---|
| WPR-16CVVFA..... | CGA 300 with flash arrestor for Acetylene Service |
| WPR-320CV..... | CGA 320 for Carbon Dioxide (CO ₂) Service |
| WPR-1320CV..... | CGA 326 for Nitrous Oxide (N ₂ O) Service |
| WPR-1340CVV..... | CGA 346 for Breathing Air (Air) Service |
| WPR-83CVV..... | CGA 350 (Hydrogen (H ₂) Service) |
| WPR-15CVVFA..... | CGA 510 with flash arrestor for Acetylene Service |
| WPR-63CVV..... | CGA 540 for Oxygen (O ₂) Service |
| WPR-92CVV..... | CGA 580 for Nitrogen (N ₂) Service |
| WPR-93CVV..... | CGA 590 for 'Zero Air' Service. |

PANEL MOUNT GAUGES — 2" Diameter, 1/4" NPT Back Port

| | | | |
|---------------|----------|--------------|--------------------|
| WMG-3-2..... | 200 psi | WMG-3-7..... | 15 psi (acetylene) |
| WMG-3-4..... | 400 psi | WMG-3-8..... | 2000 psi |
| WMG-3-12..... | 4000 psi | | |

VALVE OUTLETS

| | | | |
|-------------|-----------------------------|-------------|----------------------|
| B-50..... | CGA 540 Valve Outlet | B-1320..... | CGA 326 Valve Outlet |
| B-70..... | CGA 580 Valve Outlet | B-1340..... | CGA 346 Valve Outlet |
| B-20..... | CGA 320 Valve Outlet | B-30..... | CGA 350 Valve Outlet |
| B-40..... | CGA 510 Valve Outlet | B-10..... | CGA 300 Valve Outlet |
| DV-5NP..... | Master Valve and Vent Valve | | |

LAB1 AND LAB2 SERIES REGULATORS

| | |
|-----------------|--|
| WMS-11-119..... | Change-Over Primary Regulator for LAB1 & LAB2- (Air, He, Ar, H ₂ , N ₂ , O ₂) |
| WMS-11-103..... | Change-Over Primary Regulator for LAB1 & LAB2- (CO ₂ & N ₂ O) |
| WMS-11-119..... | Change-Over Primary Regulator for LAB1HP & LAB2HP - (Air, He, Ar, H ₂ , N ₂ , O ₂) |
| WMS-11-115..... | Change-Over Primary Regulator for LAB1 & LAB2 (Acetylene) |
| WMS-11-120..... | Intermediate Primary Regulator for LAB1 & LAB2 - (Air, He, Ar, H ₂ , N ₂ , O ₂) |
| WMS-11-104..... | Intermediate Primary Regulator for LAB1 & LAB2 - (CO ₂ & N ₂ O) |
| WMS-11-105..... | Intermediate Primary Regulator LAB1 & LAB2 (Acetylene) |
| WMS-11-120..... | Intermediate Primary Regulator for LAB1HP & LAB2HP - (Air, He, Ar, H ₂ , N ₂ , O ₂) |
| WMS-11-20..... | Line Regulator for LAB1 & LAB2 - (Air, He, Ar, CO ₂ , N ₂ O, H ₂ , N ₂ , O ₂) |
| WMS-11-19..... | Line Regulator for LAB1 & LAB2 - Acetylene |
| WMS-11-39..... | Line Regulator for LAB1 & LAB2 - (Air, He, Ar, CO ₂ , N ₂ O, H ₂ , N ₂ , O ₂) |

FLOOR STAND MAINTENANCE AND REPAIR PARTS

REPLACEMENT NUTS & BOLTS

| | |
|---------------|-------------------------|
| WMC-6-85..... | 1/2-13 Bolt 2.50" long |
| WMC-6-84..... | 3/8-16 Bolt 2.50" long |
| WMC-6-83..... | 5/16-18 Bolt 2.25" long |
| WMC-6-88..... | 1/2-13 Nylon locknut |
| WMC-6-87..... | 3/8-16 Nylon locknut |
| WMC-6-86..... | 5/16-18 Nylon locknut |

STRUCTURAL REPLACEMENT PARTS

| | |
|---------------|--------------|
| WMC-6-82..... | Square base |
| WMC-6-81..... | Cabinet post |

LIMITED WARRANTY

WARRANTY: The Seller expressly warrants that the products manufactured by it will be free from defects in material, workmanship and title at the date of shipment. This Warranty is exclusive and is IN LIEU OF ALL IMPLIED OR STATUTORY WARRANTIES (INCLUDING WITHOUT LIMITATION, WARRANTIES AS TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, OR ARISING FROM COURSE OF DEALING OF USAGE OR TRADE) or any other express or implied warranties or representations. All claims under this warranty must be made in writing and delivered to the Seller prior to the expiration of 1 year from the date of shipment from the factory, or be barred. Upon receipt of a timely claim, the Seller shall inspect the item or items claimed to be defective, and Seller shall, at its option, modify, repair, or replace free of charge, any item or items which the Seller determines to have been defective at the time of shipment from the factory, excluding normal wear and tear. Inspection may be performed at the Seller's plant and in such event, freight for returning items to the plant shall be paid by Buyer. Seller shall have no responsibility if such item has been improperly stored, installed, operated, maintained, modified and/or repaired by an organization other than the Seller. Adjustments for products not manufactured by Seller shall be made to the extent of any warranty of the manufacturer or supplier thereof. The foregoing shall be the Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for any breach of warranty or for any other claim based on any defect in, or non-performance of, the products whether based on breach of contract or in tort, including negligence or strict liability.



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