INSTRUCTION MANUAL

FOR

Pressure Regulators

Pump Governors

Pressure Relief Valves

RP-1065-A and RP-1066-A Series

Note to installer: After installing the regulator, give this instruction manual to operating personnel or see that it is filed for future reference.

Robertshaw
INDUSTRIAL PRODUCTS

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INSTRUCTION MANUAL NUMBER

P-2085

Rev. B

Diaphragm actuated, Spring adjusted type Pressure Regulator and Relief Valve for steam service.

FEATURES

- **Valve sizes 1/2" through 2" single-seated. 2-1/2" through 4" double-seated.**
- **All valves stainless steel trimmed.**
- **Choice of setpoint control ranges.**
- **Nylon-reinforced, molded Buna-N diaphragm.**
- **Quick-disconnect valve stem feature.**
- **"Lifetime," spring-loaded, Teflon "Chevron" stem packing.**
- **Polished stainless steel quick-disconnect type valve stem.**
- **Ball bearing adjusting wheel.**
- **Valve designs backed by many years of field service.**
- **All components from a single manufacturer.**

DESCRIPTION

Sensitive, accurate control of reduced pressures is provided by these simple self-operated pressure regulators. They may be used to control steam pressures for heating systems, industrial processes and steam-driven pumps, as well as many other fluid pressure controlling and limiting applications throughout public buildings, institutions, industrial and chemical plants, shipboard installations, etc.

When supplied with reverse-acting valves, these units will open on rising pressure for modulating pressure relief.

These precisely designed pressure regulators are ruggedly constructed, using cast iron alloy of carefully controlled quality for the sturdy frame, molded diaphragms of Buna-N composition, nylon-reinforced for great flexibility and long service life.

Cataloged valves 1/2" through 2" are single-seated, stainless steel trimmed for accurate control on steam applications. The "MA" piston-balanced valves, sizes 3/4" through 1-1/2", permit pressure drops up to the full valve body rating without loss of control accuracy. Sizes 2-1/2 through 4" are fitted with double-seated semi-balanced valves. Double-seated valves are used on services that do not require "dead-end" shutoff. Body material is bronze through 1-1/2" size and cast iron 2" and larger.

OPERATION

The controlled pressure from the downstream side of the valve is applied to the diaphragm through the tapped case opening. Through the area of the diaphragm, the force exerted by the adjusting spring is balanced by the force created from the pressure. Even small changes in the reduced pressure produce immediate changes in valve position to regulate the pressure downstream.

The setpoint is changed by varying the load on the adjusting spring. Rotating the ball-bearing adjustment wheel so as to compress the spring and increase its force against the diaphragm raises the setpoint. Rotation in the opposite direction lowers the setpoint. The scale along one side of the frame provides a reference for restoring the setpoint when adjustment wheel position has been changed from its normal setting.

Regulator No.	Diaphragm Size	Adjustable Pressure Ranges, PSI	Max. Diaphragm Test Pressure, PSIG
RP-1065-A	5	5 - 50 10 - 100 25 - 150	300
RP-1066-A	10	3 - 25 5 - 50 15 - 75	150

ACCURACY OF REGULATION

In general, the greatest accuracy-closest regulation-is obtained with the largest diaphragm and shortest range which will give the required control pressure. For example, a control pressure of 40 psig can be obtained with any of the three ranges in model RP-1065-A and with two of the three ranges in model RP-1066-A. Closest regulation can be expected with the 5 - 50 psi range of model RP-1066-A (size 10 diaphragm). See table for "Accuracy of Regulation."

Unbalanced port areas are not considered in the values tabulated. Small amounts of unbalance are present in single-seated 1/2" "A" valves and in semi-balanced double-seated valves 2" through 4". Under conditions of high pressure drop, the forces opposing valve closure will influence selection of the regulator model (diaphragm size). See "Accuracy of Regulation" tabulation for actual port area unbalance.

ACCURACY OF REGULATION

Pressure Change, PSI, at the diaphragm for full valve stroke†

Regulator No.	Adjustable Range PSIG	Valve Size										
		1/2*	1/2**	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
RP-1065-Al	5-50	2-1/2	3	4	5	6-1/2	7-1/2	9	11	7-1/2	9	11
RP-1065-A2	10-100	5	6-1/2	7-1/2	10	12-1/2	15	17-1/2	22	15	17-1/2	22
RP-1065-A3	25-150	11	13	16	21-1/2	27	32	37	48	32	27	48
RP-1066-A1	3-25	1-1/2	1-1/2	2	2-1/2	3	4	4-1/2	6	4	4-1/2	6
RP-1066-A2	5-50	2-1/2	3-1/2	4	5	6-1/2	7-1/2	9	11	7-1/2	9	11
RP-1066-A3	15-75	5	6-1/2	8	11	13	16	18-1/2	24	16	18-1/2	24
Port Area Unbalance Sq. Inches		.05	.12	.21	0	0	0	0	0	.51	.60	.81
Max. Supply Press., PSIG		225			250				125			
Max. Pressure Drop, PSI		125			250				125	100	100	80

† Control is modulating around setpoint
* 1/4" reduced port.
** 3/8" reduced port.

CAPACITIES, VALVE SIZING

Proper selection of valve size is equally as important as proper selection of model and control range in order to obtain the most accurate and satisfactory control. An oversized valve will result in seat "wiredraw" that increases port leakage and may affect regulation. The smallest valve which will give the required maximum flow in the wide open position should generally be selected regardless of pipeline size.

Liquid – To determine the valve capacity for liquids use the Robertshaw "FLO-RULE" slide rule or consult a factory representative.

Steam – On compressible fluids such as steam or gas, maximum valve capacity is reached at the "critical pressure drop". The "critical pressure drop" is when the pressure ratio is 0.53 or less. The pressure ratio is determined by dividing the downstream pressure, in psia, by the inlet pressure, in psia.

When the pressure drop ratio on an application is greater than 0.53 use the Robertshaw "FLO-RULE" slide rule or consult a factory representative to determine capacity.

At the "critical pressure drop" the Steam Capacity table can be used. For valves, supply pressures and pressure drops other than those tabulated, the Robertshaw "FLO-SLIDE" slide rule or consult a factory representative to determine capacity.

STEAM CAPACITY

At Critical Pressure Drop

Valve Size		1/2"	1/2"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
Port Size		1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
Valve Type		A	A	A	MA	MA	MA	MA	MA	FA	FA	FA
Valve Cv		1.0	1.6	2.1	10.5	12.8	18.6	26.0	47.5	82.5	130.0	226.0
Max. Supply Press, PSIG		225 @ 100° F 150 @ 400° F			250 @ 100° F 250 @ 400° F				175 @ 100° F 125 @ 350° F			
Supply Press. PSIG	Max. Down-stream Press. PSIG	Maximum lbs./hr. Steam based on Supply and Downstream Pressure indicated at left										
15	1	47	83	115	505	660	960	1,340	2,460	4,500	7,000	13,000
20	4	54	97	135	590	775	1,120	1,570	2,870	5,000	8,000	15,500
25	6	62	110	150	675	885	1,290	1,800	3,280	6,000	9,200	18,000
30	10	70	125	170	760	1,000	1,450	2,020	3,700	6,500	10,000	20,000
40	14	86	150	210	935	1,220	1,770	2,480	4,520	8,000	13,000	24,000
50	20	100	180	250	1,100	1,440	2,090	2,930	5,450	9,500	15,000	29,500
60	25	120	210	290	1,270	1,660	2,420	3,380	6,170	11,000	17,500	33,000
70	30	135	235	325	1,440	1,890	2,740	3,830	7,000	12,500	20,000	39,000
80	36	150	265	365	1,620	2,110	3,070	4,280	7,830	14,000	22,000	42,500
90	40	165	290	400	1,790	2,330	3,390	4,740	8,650	16,000	24,000	47,000
100	46	180	320	440	1,960	2,550	3,710	5,190	9,480	18,000	26,000	50,000
125	59	220	390	535	2,380	3,110	4,520	6,320				
150	73	280	450	600	2,800	3,670	5,330	7,450				
175	86				3,340	4,290	6,270	8,590				
200	99				3,660	4,780	6,950	9,710				
225	112				4,100	5,420	7,920	10,800				
250	125				4,510	5,900	8,560	12,000				

INSTALLATION

The regulator may be installed in a horizontal pipeline with the diaphragm either above or below the line. A water seal must be provided when the regulator is used on steam applications to prevent damage to the diaphragm by high steam temperatures.

Reservoir 24669-A2 is recommended to provide the water seal.

An adjustable orifice, such as No. 94204, installed in the feeler line will generally improve control and protect both the valve and diaphragm by damping out pressure pulsations. Both sides of the orifice should be flooded by the water seal at all times.

The feeler line should extend at least 6 ft. to 10ft. downstream from the valve on applications where the regulator is controlling line pressures such as in a steam main. For controlling pressures in a tank or pressure vessel, the regulator should be installed as close to the vessel as possible. The feeler line is connected directly into the vessel or tank.

A hand valve should be installed in the feeler line to protect the diaphragm from downstream pressure buildup on liquid or noncondensable gas service during extended shutdown periods. The regulating valve should be protected by a pipeline strainer. A three-valve by-pass is recommended for ease of servicing.

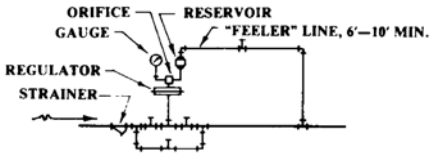


Figure 1

Typical installation of a Pressure Regulator. Showing feeler pipe connection and pressure gauge. Feeler pipe is connected to reduced pressure side of supply line and at point where control is desired.

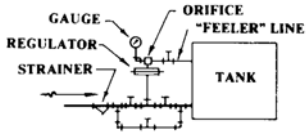


Figure 2

Showing installation of a Pressure Regulator controlling pressure in a closed vessel. Note regulator is installed as close as possible to the tank.

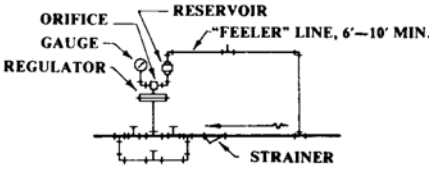


Figure 3

Showing installation of a modulating Pressure Relief Valve. The feeler pipe is connected to the high pressure or upstream side of the supply line and at point where control is desired.

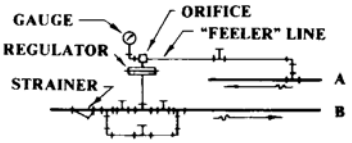
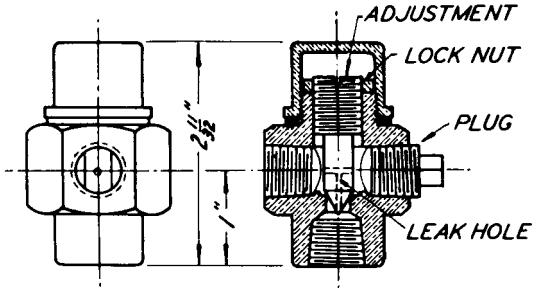


Figure 4

A typical installation of a Pump Governor. Regulating valve is installed in the steam supply line "B" to pump. Feeler pipe is connected in pump outlet line "A" carrying medium being pumped. Adjustable orifice must be used as shown.

ADJUSTABLE ORIFICE NO. 94204

(With or without leak hole)



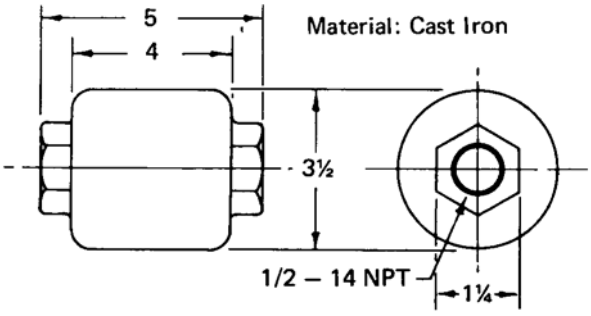
Most types of pressure regulators require a "feeler" pipe for best control. By using this adjustable orifice in the feeler pipe line, rapid pressure fluctuations will be dampened out and more steady control procured.

After the orifice is adjusted for proper flow, the adjustment can be locked by tightening a jam nut as shown in the accompanying drawing. A small passage or leak hole on the 94204-A 1 model is provided in the stem or poppet so that the flow cannot be shut off entirely and thus render the regulator inoperative. The model 94204-A2 does not have a leak hole.

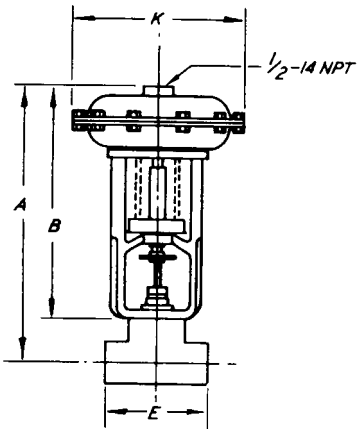
All parts are made of brass. 1/4 " pipe connections. Pipe plug may be removed for installation of pressure gauge.

Supplied only on order and at extra cost.

RESERVOIR NO. 24669-A2



DIMENSIONS, SHIPPING WEIGHTS



Valve Size	1/2*	1/2**	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
Valve Type	A†			MA-Single-Seated Piston Balanced					FA-Double-seated		
Body Material	Bronze								Cast Iron		
Valve Trim	Stainless Steel										
End Connections	Female Threaded Unions							125 lb. Cast Iron Flanges			
E	4-3/4			6-57/64	7-1/8	7-1/2	8-1/2	7	7-3/4	8-5/8	10-1/4

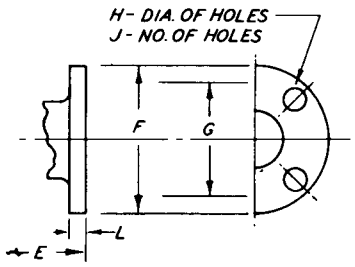
Regulator No. RP-1065-A

A	13-3/16				14-3/4		14-15/16	15-5/8	16		17
B	11-1/4										
K	4-3/4										
Shipping Weight	19	19	20	22	26	30	34	78	86	106	154

Regulator No. RP-1066-A

A	13-3/16				14 3/4		14-15/16	15-5/8	16		17
B	11-1/4										
K	6-5/16										
Shipping Weight	21	21	23	24	28	32	36	80	88	108	156

* 1/4" reduced port.
** 3 /8" reduced port.
† Single Seated
NOTE: On special order, bronze body valve with bronze trim can be furnished in 2", 2-1/2", 3" and 4" sizes, with class 150 flanges.

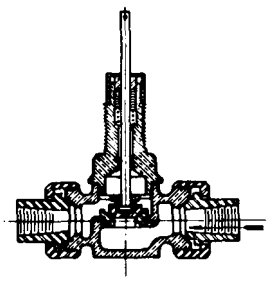


FLANGE DIMENSIONS

Valve Size, Inches	F	G	H	J	L
2	6	4-3/4	3/4	4	1/2
2-1/2	7	5-1/2	3/4	4	3/4
3	7-1/2	6	3/4	4	3/4
4	9	7-1/2	3/4	8	15/16

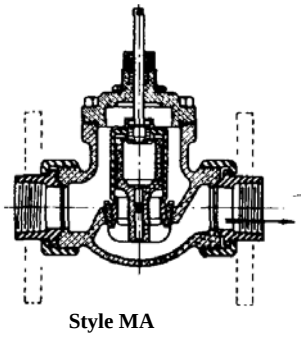
VALVE TYPES

Two Way



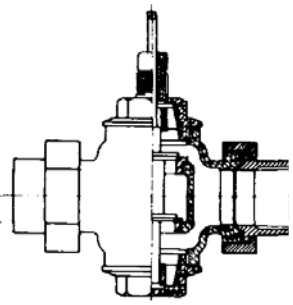
Style A
Union Ends.
Single Seated
Unbalanced
Direct & Rev. Acting
Sizes 1/4″ – 1-1/2″
Bronze
SS Trim

Two Way



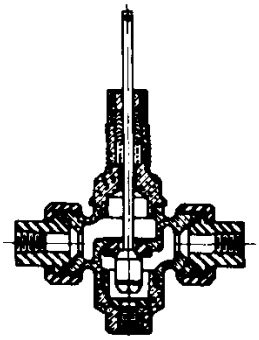
Style MA
Single Seated
Fully Balanced
Direct Acting only
Sizes 3/4″ – 1-1/2″
Union Ends
Bronze or Steel body
Size 2"
Flanged
Bronze, C.I. or Steel body
SS Trim

Two Way



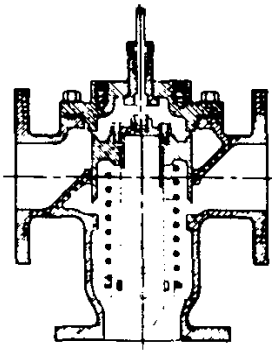
Style FA
Double Seated
Semi-Balanced
Rev. Acting: 3/4" – 1-1/2"
Union ends
Bronze body
Monel or Bronze Trim
Rev. Acting: 2" - 4"
Flanged
CI or Bronze body
Bronze, SS or Monel Trim
Dir. Acting: 2-1/2" - 4"
Flanged
CI or Bronze body
Bronze or SS Trim

Three Way



Style WA
Unbalanced
Union Ends
Sizes 1/2" – 1-1/2"
Bronze Body
SS Trim

Three Way



Style WD
Balanced
Flanged
Sizes 2" – 2-1/2"
Bronze Body
Bronze Trim

ADJUSTMENT

This regulator can be set to control at any pressure within the limits of the pressure range stamped on its nameplate.

After placing the regulator in service, allow several minutes to reach stable operation, then observe pressure. If not correct, change the pressure setting in manner directed below.

To RAISE pressure setting, turn adjustment wheel to RIGHT (see Arrow "A", Figure 5).

To LOWER pressure setting, turn adjustment wheel to LEFT (see Arrow "B", Figure 5).

Make new settings as necessary until desired pressure is obtained.

The regulator has a scale plate to indicate the position of the adjustment. This feature is helpful in resetting the adjustment when frequent changes are necessary. Scale graduations are not in pounds per square inch.

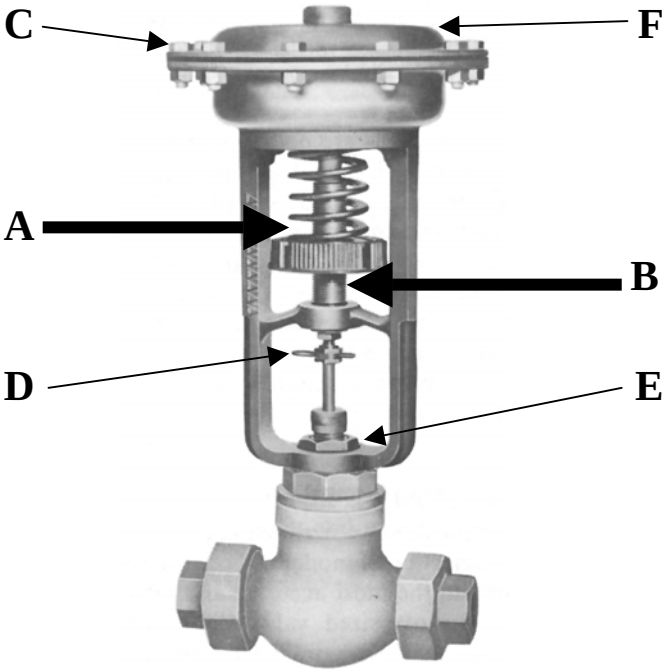


Figure 5

MAINTENANCE

This regulator, if properly installed and used, should require very little attention or maintenance; however, every piece of mechanical equipment deserves some care.

A. UPPER WORKS REMOVAL & INSTALLATION (See Figure 5):

1. Note the position of the handwheel.
2. Turn the handwheel to the left (See arrow "B") to lessen the load on the lock pin (D) and remove the lock pin. Do not disturb the upper works connector.
3. Remove locknut (E) and lift upper works from valve.
4. If reinstalling the original upper works reverse the above procedure.
5. If installing a replacement upper works:
   a. Place the upper works on the valve and secure with locknut (E).
   b. Note the position of the handwheel.
   c. Turn the handwheel to the left (See arrow "B") to align the holes in the upper works connector and the valve stem. Insert the lock pin (D).
   d. Turn the handwheel to the right (See arrow A) until it is in its original position.
   e. Check for proper operation. Refer to the ADJUSTMENT section and adjust as necessary.

B. PACKING

Valve stem packing nut should be kept only **finger-tight**. If valve stem packing must be replaced, follow steps below (See Figures 6 and 7 as applicable).

1. Remove the upper works per Paragraph A.
2. Remove packing nut and spacer or packing gland.
3. Remove bonnet from valve. Removal of the valve bonnet is not necessary but removing the bonnet makes it easier to remove the old packing.
4. Remove old packing parts from the packing box.
5. Clean out packing box with a clean rag or soft paper.
6. Wipe off stem with clean rag. DO NOT attempt to polish. If stem is scratched or nicked around packing area, it should be replaced.
7. If valve is supplied with a bonnet gasket inspect the gasket. Replaced if damaged.
8. Replace bonnet on valve.
9. Carefully place new packing in packing box. Put a small amount of good packing lubricant in the packing (stuffing) box while repacking.
10. Replace packing gland.
11. Replace packing nut and finger tighten.
12. Replace upper works per Paragraph A.

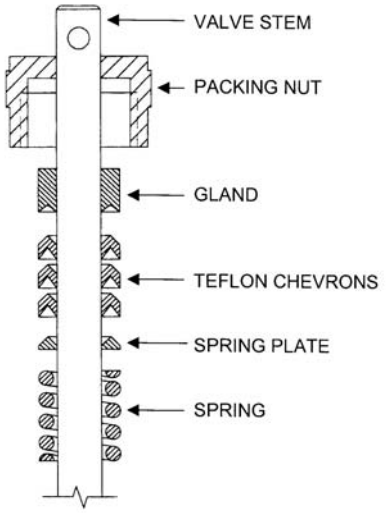


Figure 6
Teflon* chevron packing used for water service.
Packing Kit part number 81900-B3

** Teflon is a trade name of DuPont Company.*

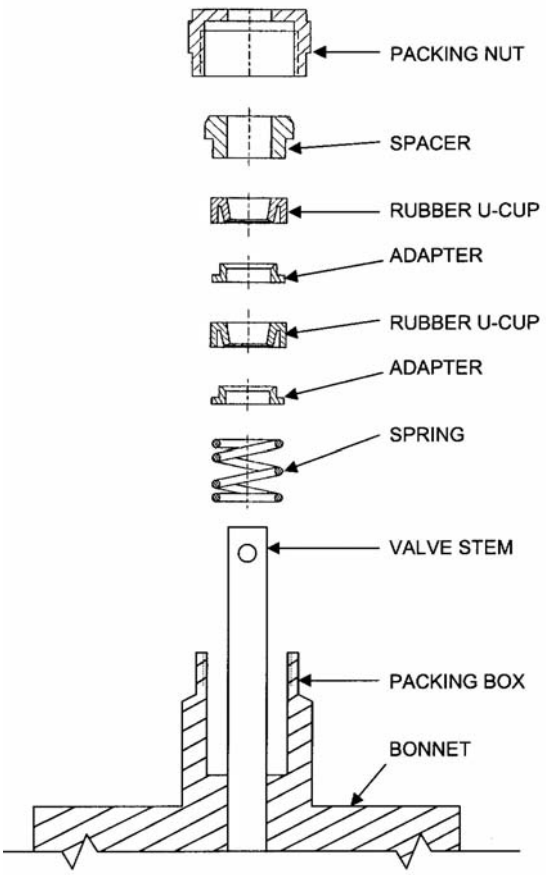


Figure 7
Rubber U-cup packing used for steam service.
Packing Kit part number 81900-E1.

C. DIAPHRAGM

To remove diaphragm, follow steps listed below (See Figure 5).

1. Turn adjusting wheel to left (See arrow B) until adjusting wheel is all the way down.
2. Remove cap screws (C) and lift off upper works bonnet (F) and remove diaphragm.
3. To install element, reverse the above operations.

D. REFACING VALVE SEAT

Under certain conditions the valve seat may be lapped with the valve poppet. However, this should be done only by an experienced person. If the valve poppet or insert is badly scored it should be replaced. Valve repair kits are available.

If possible, the valve should be returned, freight or express charges prepaid, to the factory for any needed repair or parts. If valve is to be lapped, follow the steps below:

1. Remove the upper works from valve per Paragraph A.
2. Remove the packing and the bonnet per Paragraph B.
3. Apply a small amount of (extremely fine) grinding compound, or a graphited paste made by mixing fine flecks of graphite with engine oil, to the valve insert face
4. In lapping, every effort should be made to avoid scoring or grooving the contact faces. Wipe poppet and insert thoroughly with a clean rag after each operation. Use light pressure in lapping even to the extent of holding up part of the weight of the poppet as it is rotated. Frequently lift off poppet to check surface. Heavy pressure causes the grains to become embedded in the material and will produce deep grooves or scores.
5. When seating face of poppet is smooth, groove or lapping surfaces in seating face of insert, if not too deep, does not particularly harm and in some cases seems to assist in getting a quick seat. Wipe away compound from the valve poppet and inserts.

TROUBLE SHOOTING

This regulator has been manufactured to operate within the pressure range stated on the nameplate and the valve has been designed to close against line pressure specified on your order. If the regulator does not function properly immediately after completing the installation and you are unable to correct the trouble, contact the factory and outline your difficulty. When contacting the factory you will need to provide the type of regulator and its serial number, the valve size, and any other pertinent information. Please have this information available when contacting the factory.

If the regulator has been operating satisfactorily for some time and trouble develops, the following information may be of some assistance:

1. Check packing nut (see Figures 6 and 7) to be sure it is only finger-tight and the valve stem is free to move up and down without undue friction. This will require removing the lock pin and possibly the upper works per Paragraph A.
2. The usual cause for poor control over the reduced pressure is collection of scale or other foreign matter on the seats. Such matter may hold the poppet off seat and, in time, cause the seat or poppet to become scored. To inspect seat and poppet, remove valve bonnet.
3. Slightly scored seats or poppets may be refaced per Paragraph D.
4. Valve repair kits and replacement valves are available.

U.S.A. & Canada

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