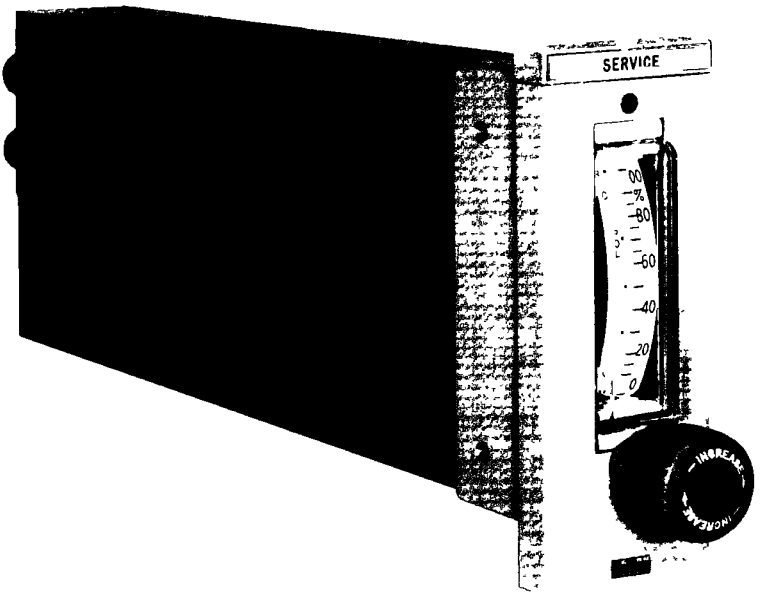
Product Instruction P91-1



Mini-Line® 500 Manual Stations Type AL

Bailey Babcock & Wilcox

INDEX

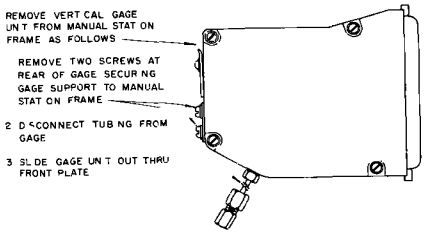


FIGURE 1 Removing Vertical Gage Unit from Manual Station

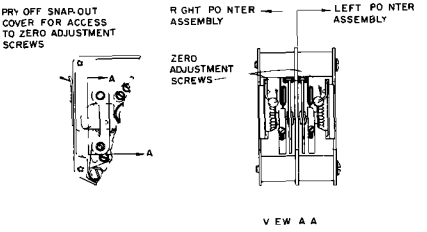


FIGURE 2 - Removing Snapout Cover from Vertical Gage Unit

INSTALLATION

Pre-Service Adjustment Check

IMPORTANT: Before placing H, A Station in service, check adjustment of vertical gage units as outlined below For convenience, perform this check at a test bench before the H A Station is installed in the panel

1 Position H/A Station at angle at which it will be mounted in service Apply pressure corresponding to 10% scale to H, A Station input connection If pointer reads correctly, proceed to step 4

2 If pointer does not read correctly, remove vertical gage unit from H, A Station as outlined in Figure 1

3 Remove snapout cover (Figure 2) and turn zero adjustment screw until pointer reads correctly Reinstall cover

4 Apply pressure to gage unit corresponding to 90% and 50% scale If pointer readings are correct, proceed to step 5 If readings are incorrect, refer to "Vertical Gage Unit Adjustment", page 7

Mounting Manual Station on Panel

Manual Stations are designed for plug in mounting in a panel mounted enclosure (Figure 3) Install enclosure as follows·

5 Make panel cutout in accordance with Figure 3

6 Loosen mounting screw on front plate which secures Manual Station to enclosure, and remove Station

7 Slide enclosure thru cutout from front of panel

8 Place mounting clips (in bag tied to enclosure) in position on enclosure Tighten clip screws securely against panel

9 Slide Manual Station into enclosure and secure with mounting screw in front plate

Installing Connecting Tubing

10. Connect external tubing to manifold connections on rear of enclosure (Figure 3) Connection ports are 1, 4 18 NPT female Use 1 /4 inch O D copper, aluminum, or plastic tubing

Cleaning Scale Cover

11 Remove protective tape from scale cover Clean cover with toothpaste or 'Plastar", plastic cover cleaner and polish (obtainable from Bailey Meter Company in 10 ounce jar - specify Part Number 199274 1)

CAUTION Do not use a solvent which will scratch cover finish or react with plastic cover

Placing in Service

The Manual Station may now be placed in service as outlined below

12 Turn on supply pressure to Manual Station (check external tubing connections for leakage)

13. Adjust hand control knob on front plate for desired output (see Figures 4 thru 7 for typical applications)

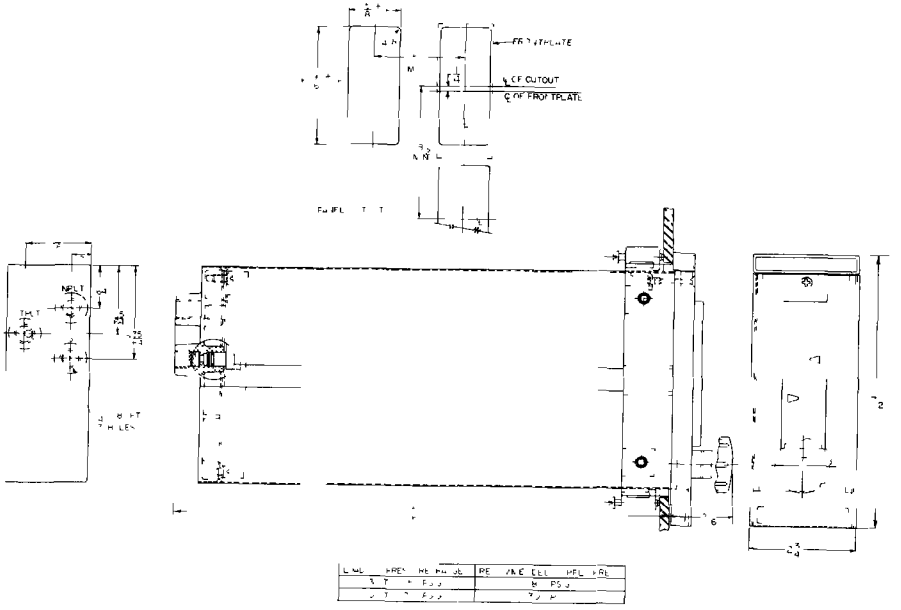


FIGURE 3 Manual Station Mounting Dimensions

OPERATING FUNCTIONS

Set Point Manual Station

Refer to Figure 4 Output pressure from the Set Point Manual Station is normally applied to a Controller to establish the control set point The output pressure is produced by a hand relay (see Figure 11) which is manually adjusted by the knob on the Station front plate A double pointer vertical gage unit indicates Manual Station output (SET POINT) pressure and input (METER) pressure to the Controller

Basic Manual Station

Refer to Figure 5 Output pressure from the Basic Manual Station is normally applied to a power unit (control drive, valve, etc) for remote control The output pressure is produced by a hand relay (see Figure 11) which is manually adjusted by a knob on the Station front

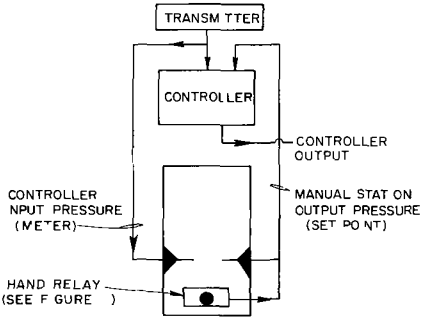


FIGURE 4 - Typical Application of Set Point Manual Station

plate A single pointer vertical gage unit indicates Manual Station output (CONTROL) pressure A *double pointer vertical gage unit* indicates Manual Station output (CONTROL) pressure and the POSITION of the power unit

Bias Manual Station

Refer to Figure 6 Output pressure from the Bias Manual Station is normally applied to a power unit (control drive, valve, etc) for remote control. The output pressure is produced by a bias relay (see Figure 12) which is manually adjusted by a knob on the Station front plate A double pointer vertical gage unit indicates input (LOADING) pressure from a Controller and Manual Station output (BIAS) pressure

Tie-Back Manual Station

Refer to Figure 7 Output pressure from the Tie Back Manual Station is normally applied to a Hand/Auto Station to control the output pressure of a Controller The Manual Station output pressure is produced by a hand relay (see Figure 11) which is manually adjusted by the knob on the Station front plate A double pointer vertical gage unit indicates Manual Station output (TIE BACK) pressure and Controller (RELAY) output pressure

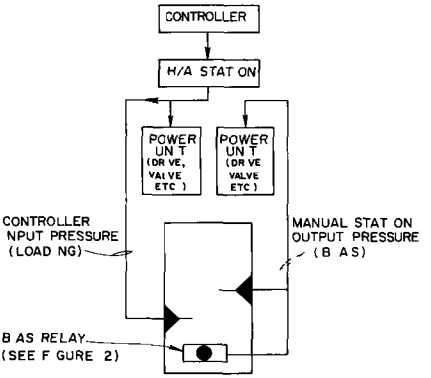


FIGURE 6 - Typical Application of Bias Manual Station

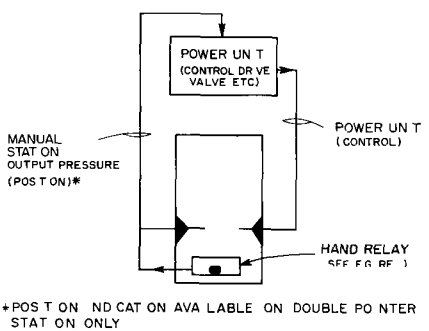


FIGURE 5 Typical Application of Basic Manual Station

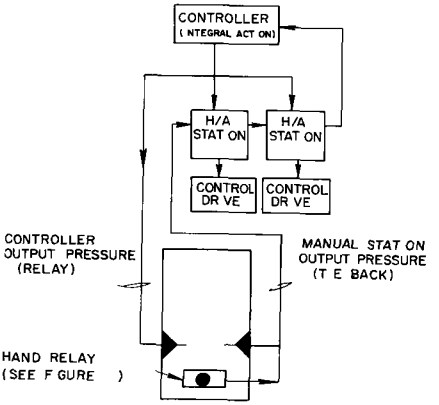


FIGURE 7 Typical Application of Tie-Back Manual S tion

ROUTINE MAINTENANCE

1 Maintain a clean air supply, free of oil or moisture

2 Check filter in supply inlet port at manifold shortly after installation If filter (Items 2B and 2C, Figure 13) must be replaced, remove wire mesh disc, felt pad, and second wire mesh disc Install new filter, making certain wire mesh disc is inserted in inlet port before inserting felt pad

3 Periodically depress orifice clean out plunger (Figure 8) on rear of hand or bias relay to insure that the orifice remains open and clean CAUTION This operation should only be performed when relay is being bench tested since depressing the plunger while relay is in service may disrupt the process

4 Whenever necessary, clean plastic scale cover as follows

a Remove (and replace) scale cover as shown in Figure 9

b Clean cover with a soft cloth which will not scratch the plastic surface Use tooth paste or "Plastar', plastic cover cleaner and polish (obtainable from Bailey Meter Company, in 10-ounce jar--specify Part No 199274 1) Do not use a solvent which will scratch cover finish or react with plastic cover.

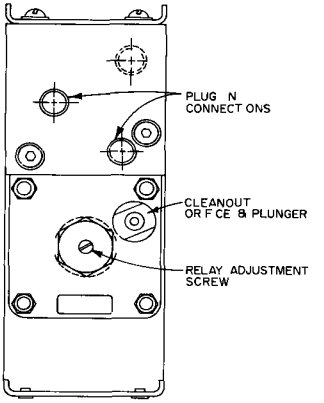


FIGURE 8 Rear View of Manual Station

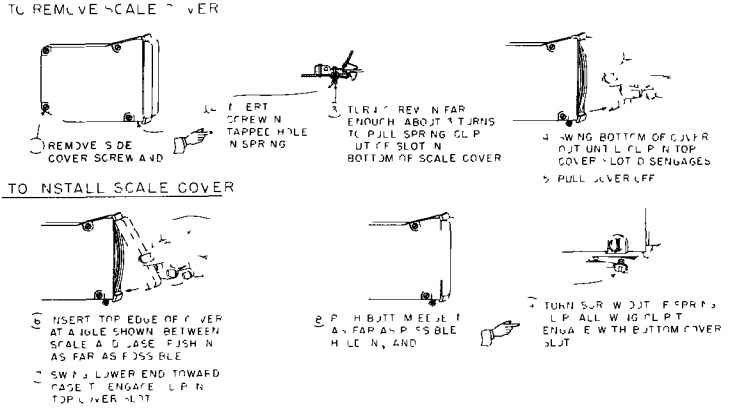


FIGURE 9 Removing and Replacing Vertical Gage Scale Cover

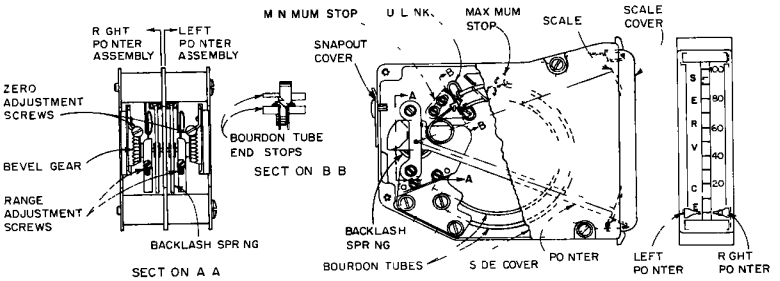


FIGURE 10 Vertical Gage Unit Adjustments

CORRECTIVE MAINTENANCE

Vertical Gage Unit Adjustment

If operational faults occur which are traced to the vertical gage units, make the following adjustment checks·

1 Remove gage unit from Manual Station as shown in Figure 1 Pry off snapout cover and remove side cover for access to gage unit adjustments (see Figure 2)

2 Apply pressure to Bourdon tube and check block assembly for leakage with a soapsuds solution If a leak is found, replace en tire gage unit The damaged unit may be returned to the factory for repair

3 Check all links to see that they are properly connected and that they move freely with Bourdon tube movement

4 Make certain that indicating pointer does not rub against side or face of scale If nec essary, bend pointer slightly until it clears scale

5 Check pointer adjustment as outlined below

a Apply pressure tc gage equivalent to first major scale division above 0% scale If pointer does not read correctly, turn zero ad justment screw (Figure 10) until desired read ing is obtained

b Apply pressure to gage equivalent to first major scale division below 100% scale If pointer does not read correctly, turn range adjustment screw (Figure 10) until desired reading is obtained

c Repeat steps 5a and 5b until pointer reads correctly at both scale divisions

d Apply pressure to gage equivalent to midscale division If pointer does not read correctly, but does read correctly in steps 5a and 5b above, alter the shape of U-link at free end of Bourdon tube as follows 1) If midscale point er reading is low spread link slightly, or 2) If midscale pointer reading is high, close link slightly.

6 Repeat steps 5a thru 5d until pointer reads correctly over full scale

7 Apply 2 psig to Bourdon tube (pointer will read slightly below minimum scale mark) Loosen minimum stop screws (Figure 10) and position minimum stop next to Bourdon tube end stop; tighten screws

8 Apply pressure to Bourdon tube cor responding to maximum scale value plus 0 25 psig (pointer will read slightly above maximum scale mark). Loosen maximum stop screws and position maximum stop next to Bourdon tube end stop, tighten screws

9 To return gage unit to service, reverse the order of the operations outlined in step 1 above

Hand Relay Disassembly

To disassemble the Hand Relay (Part No 5321995 □) for cleaning or replacement of parts, proceed as follows

1. Refer to Figure 13. Disconnect tubing

and remove two screws (21) holding manifold support (19) to support bracket assembly (7)

2 Remove two socket head screws (23) holding manifold to Relay and slide manifold and support bracket rearward

3 Remove two socket head screws (12) holding Relay to support bracket (7) and remove Relay

4 Refer to Figure 15 Unscrew valve cap (7) and remove valve stem (11), inlet valve seat (13), and valve seat spring (15)

CAUTION Do not disturb setting of relay adjustment screw (Figure 8) at center of valve cap This setting is factory set and should not be disturbed unless control bellows has been removed or replaced (see "Hand Relay Adjustment)

5 Unscrew orifice clean out assembly (4) and orifice (14)

6 Relieve spring compression by rotating center adjustment gear (27) counterclockwise until it turns easily

7 Remove four nuts (at corners of valve housing face) and screws securing spring housing (23) to valve housing (9) and separate housings

8 Pull control bellows assembly (16) from valve housing (9) (Control bellows assembly is held by exhaust valve diaphragm which snaps into place around valve seat)

9 If desired, unscrew loading spring assembly (19) from adjustment shaft (left hand thread)

10 To reassemble, reverse above procedure, observing the following precautions

a When replacing control bellows assembly (16), make certain exhaust valve diaphragm (29) is properly snapped into place around exhaust valve seat

b When replacing orifice clean out assembly (4), make certain that clean cut wire is not bent and passes cleanly thru the orifice

c Make certain that all O rings are undamaged and properly installed Apply lubricant to O rings when reassembling relay

Hand Relay Adjustment

1 Connect output pressure line of Relay, thru a petcock, to a volume chamber equipped with a suitable pressure gage (0 30 psig) for indicating chamber pressure Volume chamber may be any pressure tight container with volume of about 300 cubic inches

2 Open petcock and adjust Manual Station control knob to obtain 3 psig pressure in volume chamber

3 Close petcock and adjust control knob to obtain 27 psig (for 3 27 range) or 15 psig (for 3 15 range) output pressure from Relay (read output pressure on Manual Station gage)

4 Open petcock and note time rate of pressure increase in volume chamber

5 Close petcock and adjust control knob to obtain 3 psig output pressure from Relay

6 Open petcock and note time rate of pressure decrease in volume chamber

7 If inlet valve seat is properly adjusted, the time rate of pressure increase as noted in step 4 will be equal to the time rate of pressure decrease as noted in step 6 If these rates are not equal (or if the control bellows or nozzle bellows has been replaced) it will be necessary to make the following adjustment

a If time rate of pressure increase is greater than the rate of pressure decrease, turn adjustment screw (Figure 8) counterclockwise

b If time rate of pressure decrease is greater than the rate of pressure increase, turn adjustment screw clockwise

NOTE: By turning the relay adjustment screw (Figure 8) on the rear of the Manual Station, the inlet valve seat position can be changed with respect to the neutral position of the exhaust valve seat, in effect, controlling the relative openings of the inlet valve and exhaust valve for a given position of the control bellows

Bias Relay Disassembly

To disassemble the Bias Relay (Part No 5321885 2) for cleaning or replacement of parts, proceed as follows

1 Refer to Figure 13 Remove Relay from Manual Station as outlined in steps 1, 2, and 3 under "Hand Relay Disassembly"

2 Refer to Figure 14 Unscrew valve cap (7) and remove valve stem (12), inlet valve seat (16), and valve seat spring (17)

CAUTION· Do not disturb setting of relay adjust ment screw (Figure 8) at center of valve cap This setting is factory set and should not be disturbed unless control bellows or nozzle bellows has been damaged or replaced or the ball and nozzle assembly has been disassembled

3 Unscrew orifice clean-out assembly (5) and orifice (3)

4 Remove four screws (at corners of valve housing face) securing valve housing (13) to bellows housing (30), and separate housings

5 Pull control bellows assembly (6) from valve housing (13) (Control bellows assembly is held by exhaust valve diaphragm which snaps into place around valve seat)

6 Remove four screws securing spring housing (25) and vane nozzle housing (40) to bellows housing (30)

7 Separate housings and remove nozzle bellows

CAUTION Do not disturb ball and nozzle assembly unless absolutely necessary If, however, the assembly is disturbed because of necessary disassembly procedures, perform the steps outlined under "Bias Relay Ball and Nozzle Adjustment below before proceeding to step 9

8 Remove loading bellows and spring assembly by turning center adjustment gear clockwise until bellows and spring assembly are free of adjustment shaft.

9 To reassemble, reverse above procedure, observing the precautions outlined under "Hand Relay Disassembly", step 10 Also apply O ring lubricant to U cup packing (Item 32, Figure 14) when reassembling relay

Bias Relay Ball and Nozzle Adjustment

1 When making an adjustment on the ball and nozzle assembly, correct setting of the ball with respect to the nozzle is best made by holding the ball against the nozzle with a blunt ended instrument, and alternately tightening each screw about 1/2 turn Tighten screws securely

a. To check setting, reassemble Relay, omitting spring housing and loading bellows and spring assembly Insert a piece of sealing gasket material between the nozzle housing and the bellows housing over the output pressure passage (passage opening into volume surrounding ball and nozzle) so output pressure will not escape to atmosphere

b. Apply normal supply pressure to supply pressure port and connect a suitable pressure gage (0-30 psig) to output pressure post. With no external force applied to ball, the distance between ball and nozzle is at maximum and the output pressure should be approximately zero Manually, press ball against nozzle opening using a blunt-ended instrument to prevent side thrust The output pressure should increase to within 3 psi of supply pressure An output pressure less than this indicates that the ball is not centered with respect to the nozzle and adjustment must be repeated

Bias Relay Adjustment

NOTE If the following checks and adjustments cannot be made with Manual Station connected in the system, the output pressure line must be closed off or output connection plugged

1. Adjust Manual Station control knob for zero bias (BIAS pressure equals LOADING pressure)

2 Apply pressure exactly equal to the supply pressure to Manual Station input connection This is most easily accomplished by connecting into supply pressure line.

3 Manual Station BIAS pressure should be 3 psi (±1/4 psi) less than input pressure (supply pressure) If not, turn relay adjustment screw (Figure 8) to obtain correct BIAS pressure

NOTE By turning the relay adjustment screw (Figure 8) on the rear of the Manual Station, the inlet valve seat position can be changed with respect to the neutral position of the exhaust valve seat, in effect, controlling the relative openings of the inlet valve and exhaust valve for a given position of the control bellows

4 If correct reading cannot be obtained in step 3 above, and if the ball and nozzle assembly was disturbed, check the ball and nozzle assembly adjustment as outlined on page 9 then repeat steps 1, 2, and 3 above.

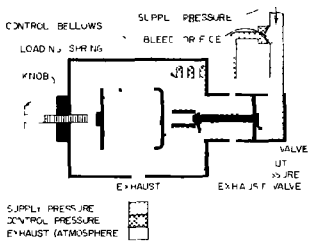


FIGURE 11 Schematic of Hand Relay

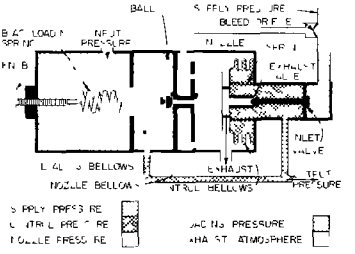


FIGURE 12 Schematic of Bias Relay

SCHEMATIC OPERATION

Hand Relay

Output pressure from the Set Point, Basic, and Tie Back Manual Stations is produced by a hand relay (Figure 11) Compression of the loading spring is opposed by pressure in the control bellows so that spring compression and output pressure are always proportional when the unit is balanced

Turning the control knob in the "increase direction causes compression of the loading spring The resulting compression closes the exhaust valve and opens the inlet valve, admitting supply air to the control bellows chamber The control bellows pressure increases until the bellows has expanded sufficiently to restore the inlet exhaust valve mechanism to its original position (inlet valve closed, exhaust valve floating) Output pressure is then proportional to the increased loading spring compression, and the system is again at balance

Turning the control knob in the "decrease" direction reverses the operation described above

Bias Relay

Output pressure from the Bias Manual Station is produced by the bias relay (Figure 12) Bias relay output pressure is controlled by the input pressure and the bias loading spring Variations in input pressure applied to the inside of the loading bellows are exactly reproduced in the output pressure, while a constant difference (bias) between input pressure and output pressure is maintained by the bias spring The compression or tension of the bias spring can be adjusted by the control knob to exert a maximum force on the loading bellows equivalent to ±12 psi bias for a 3 15 range or ±24 psi bias for a 3-27 range

When the bias relay is in equilibrium, output pressure balances both the input pressure and the force exerted by the compression or tension of the bias spring This output pressure, plus control bellows spring loading, also balances the nozzle pressure. The control bellows spring exerts a force (compression) on the bellows equivalent to a pressure of 3 psi so that at balance, the nozzle pressure is 3 psi greater than the output pressure This differential insures the proper direction of flow thru the nozzle

An increase in input pressure or in bias spring compression expands the loading bellows, moving the ball closer to the nozzle The air flow from the nozzle is retarded, increasing the pressure in the nozzle bellows As the nozzle bellows expands, the control bellows is compressed, closing the exhaust valve and opening the inlet valve Supply air flows thru the inlet valve, increasing the output pressure and starting a restoring action at the loading bellows and at the control bellows As the output pressure increases, the loading bellows is compressed, moving the ball away from the nozzle, and the control bellows expands, moving the inlet-exhaust valve assembly toward its original position When the control pressure has increased to a value equivalent to the new input pressure plus bias spring loading, the loading bellows and the control bellows will have been restored to their "at balance" position and the relay is again in equilibrium

A decrease in input pressure or in bias spring compression reverses the operation of the relay

REPLACEMENT PARTS

Spare Parts Kits

The Spare Parts Kits shown in Figures 13 thru 16 should be carried in stock. Specify the Spare Parts Kit part number to order a complete kit.

Ordering Individual Parts

Figures 13 thru 16 are Parts Drawings of the Manual Stations Normally these drawings apply to the unit furnished However, there may be individual differences in specific units because of·

a design changes made since the printing of this Instruction Section, or

b. special design of the Manual Stations to make them suitable for a special application

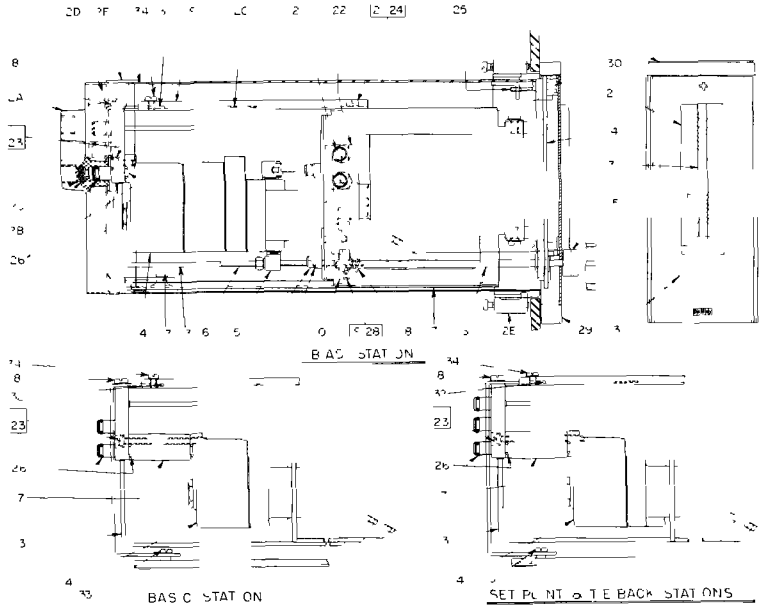
Therefore, when ordering parts, assure the receipt of correct replacements by specifying the Manual Station Module Part Number.

EXPLANATION OF NOMENCLATURE

MANUAL STATION MODULE PART NO.	MANUAL STATION NOMENCLATURE*	RANGE (PSIG)	SCALE LEGEND	
			LEFT INDICATOR	RIGHT INDICATOR
5323260-1	AL02A10	3-27	METER	SET POINT
5323260 2	AL02A50	3-27	DIRECT READING**	SET POINT
5323260-3	AL01A10	3 15	METER	SET POINT
5323260 4	AL01A50	3-15	DIRECT READING**	SET POINT
5323260 5	AL02D10	3 27	RELAY	RESET
5323260-6	AL01D10	3 15	RELAY	RESET
5323270-1	AL02B10	3 27	CONTROL	-
5323270-2	AL02B20	3-27	CONTROL	POSITION
5323270-3	AL01B10	3-15	CONTROL	
5323270 4	AL01B20	3-15	CONTROL	POSITION
5323280 1	AL02C10	3-27	LOADING	BIAS
5323280-2	AL01C10	3 15	LOADING	BIAS

*NOMENCLATURE appears only on the Manual Station Specification Sheet included in Instruction Books furnished on system or contract jobs. A "5" in the third position of the Nomenclature indicates that the Manual Station module is complete with enclosure, Part No. 5322670-1. An "X' in any Nomenclature position indicates that the instrument is special.

**SCALE LEGEND engraved in terms of variable, such as FLOW, LEVEL, PRESSURE.



ITEM	PART NO	NAME
1	1Wb1441 1	DESIGNATION PLATE
2	532267 0	ENCLOSURE INCLUDES
2A	5371481 1	COVER MAINPOLE
2B	53204 4 1	FELT PAD 2 REQD
2C	53204 3	WIRE MESH DISC 4 REQD
2D	IC 3?A	PAN HD SEMS EXT 4 REQD
2E	5214b14 1	MOUNTING CLIP 2 REQD
2F	1ab235 1	NAMEPLATE
3	53299 1 1	CONTROL PLATE
4	5323?50 1	FRONT PLATE
5	1 1b53 4	ROLL PIN
6	5323?51 1	DRIVE SHAFT
	532263	SUPPORT BRKT ASSEMBLY
8	1b6173 1	RETAINING RING

ITEM	PART NO	NAME
9	6b b 7	HEX SOCKET CONE PT SS
10	31? 9 1	GEAR
11	?11 1 00	SHAFT PROFILE WASH 4 REQD
12	32? ? ?0	RET HD SCREW 2 REQD
13	SEE TABLE P PING ASSEMBLY	
14	SEE TABLE RELAY ASSEMBLY*	
15	19,118 6	ELBOW CONNECTION SEE TABLE
16	5317?? 1	LOWER TUB ASSY SEE TABLE
17	53??2?8	SPACER MANIFOLD SEE TABLE
18	17 32x3 8	PAN HD SEMS INT 5 REQD
19	5322b43 1	SLIDE BRACKET
20	1ab235?	NAMEPLATE
21	10 3?x1 4	PAN HD SEMS INT 4 REQD
22	53 1?0	GAGE SUPPORT

ITEM	PART NO	NAME
23	SEE TABLE S REW 2 REQD	
24	? 0 SAE WASHER ? REQD	
25	5??3?80 1	SPECIAL MOUNTING SCREW
26	5311428 3	CORNER BASE SEE TABLE
27	SEE TABLE VERTICAL AGE**	
28	3 40x1 8	HEX SOCKET CUP PT SS
29	5124403 1	FRONT PLATE ASSEMBLY
30	6 32x1 ?	PAN HD SEMS EXT 4 REQD
31	5319?51 21	SCALE ASSEMBLY SEE TABLE
32	5?249?0 1	CORNER SUPPORT
33	32x1 4	PAN HD SEMS EXT 2 REQD
34	6 3?x3 16	SEMS EXT 2 REQD

*FOR DETAILS OF HAND RELAY ASSY 532 9?? 1 SEE PTS DWG P91 ?
**FOR DETAILS OF VERTICAL GAGE ASSEMBLY SEE PARTS DRAWING P12 5

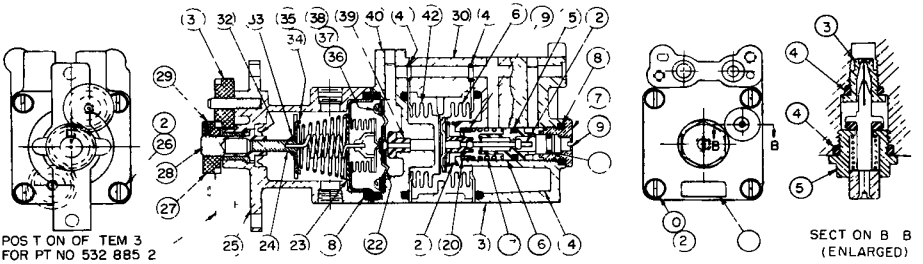
TABLE

PART NO	PSIG	ITEM 13	ITEM 14	ITEM 15	ITEM 16	ITEM 17	ITEM 23	ITEM 26	ITEM ?	ITEM 31
5323?0? 1	3 ?5	5323b49 1	5321?85 2	? REQD	1 REQD	OMIT	10 32x3 8	5 REQD	5314943 26	MIT
5323?0 2	3 15	3226b49 1	5321?85 2	2 REQD	1 REQD	OMIT	0 32x3 8	5 REQD	5318134 23	M T
5323?70 1	3 2	5323?54 1	5319?95 1	OMIT	OMIT	1 REQD	10 32x2 1 4	6 REQD	5315438 10	CMT
5323??0 ?	3 2	5?2325? 2	5?9?95 2	OM T	OMIT	1 REQD	10 32x? 1 4	? REQD	53.4945 2	M T
5323??0 4	3 1	5323?54 1	5319?95 1	OM T	OMIT	1 REQD	1 32x2 1 4	6 REQD	5?13135 9	CMIT
5323??0 4	3 15	5323?55 2	5321?95 1	OM T	OM T	1 REQD	10 ?2 1 4	6 REQD	5314134 24	MIT
5323?70	3 27	5 ?3?55 1	5?91?95 1	CM T	OMIT	1 REQD	17 32x2 1 4	7 REQD	53 4945 23	CMIT
5323?6 ?	3 2	5323?56 1	5321?95 1	OMIT	OM T	1 REQD	10 ?2x2 1 4	7 REQD	5314945 25	1 REQD
5323?6 4	3 5	5323?5 1	5321?95 1	OM T	OM T	1 REQD	13 32x? 1 4	? REQD	5318134 20	CMIT
5323?? 4	? 15	5323.55 1	5321?45 1	OMIT	OM T	1 REQD	10 3?x2 1 4	? REQD	5318134 19	1 REQD
5323?6 5	3 2	53?3?55 1	53?1?95 1	OM T	CM T	1 REQD	10 32x2 1 4	? REQD	53 4945 21	CMIT
5323?70 6	3 5	5323?56 1	532 ?45 1	CM T	OMIT	1 REQD	10 32x2 1 4	? REQD	5318134 18	CM T

*MANUAL STATION MODULE PART NUMBER ?

SPARE PARTS KIT PART NUMBER ?b?.34	
QTY	ITEM NO
	2b
?	?B
4	?C

FIGURE 13 Parts Drawing P91 1, Manual Station Assembly



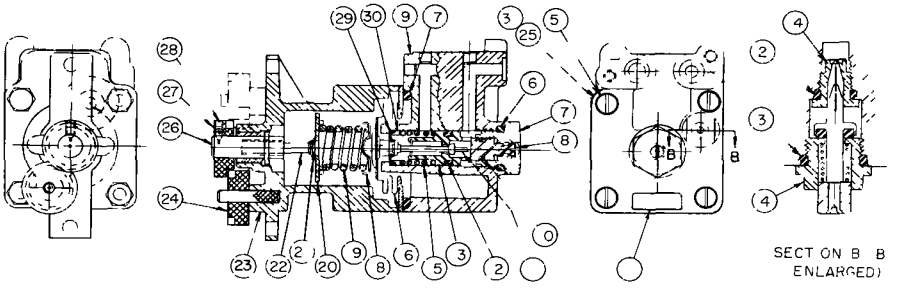
ITEM	PART NO	NAME
1	CODE LABEL	SPECIFY NO ON LABEL WHEN ORDERING PARTS
2	NO 10	PL PATT MED LK WASH 8 REQD
3	5316464 1	ORIFICE ASSY
4	5311428 11	O RING
5	5316478 1	ORIFICE CLEANOUT
6	5316974 1	BELLOWS ASSY
7	5316809 1	VALVE CAP
8	5311428 7	O RING
9	5316808 1	VALVE ADJ SCREW
10	10 32x1 3/4	FIL HD SCREW 4 REQD
11	5311428 20	O RING
12	5316811 1	VALVE STEM
13	5321893 1	VALVE HOUSING
14	5317009 1	VOLUME FILLER
15	5311428 23	O RING
16	5316977 1	VALVE SEAT ASSY
17	5316844 1	VALVE SEAT SPRING
18	5311428 24	O RING 4 REQD
19	5316813 1	DIAPHRAGM CLAMP
20	5316812 1	EXHAUST VALVE DIAPHRAGM
21	5320156 1	BELLOWS SPRING

ITEM	PART NO	NAME
22	5317003 1	BALL & VANE ASSY
23	5316975 1	STOP PLATE
24	5316994 1	BELLOWS ASSY
25	5323245 1	SPRING HOUSING
26	10 32x1 3/8	FIL HD SCREW 4 REQD
27	5316793 2	ADJUSTMENT GEAR
28	5316815 1	ADJUSTMENT SHAFT
29	661617 1	CONE PT SET SCREW
30	5323248 1	BELLOWS HOUSING ASSY
31	5316998 1	ADJUSTMENT GEAR
32	5317004 1	U CUP PACKING
33	198173 3	RETAINING RING
34	5316816 1	GUIDE & SPRING SUPPORT
35	5316904 1	COMPRESSION SPRING
36	5316901 1	CLAMP PLATE
37	6 32x3/16	RD HD SCREW 2 REQD
38	NO 1106	SHK LK WASH 2 REQD
39	5316894 1	NOZZLE
40	5323247 1	VANE & NOZZLE HSG ASSY
41	5311428 2	O RING 5 REQD
42	5316838 1	BELLOWS ASSY

NOTE FOR PT NO 5321885 2, ROTATE ITEM (31) 180° TO POSITION SHOWN BY DASHED LINES

SPARE PARTS KIT NO 256128 1
INCLUDES ITEMS 4, 6, 8, 11, 15, 17, 18, 20, 22, 24, 32, 33, 35, 41, 42

FIGURE 14 - Parts Drawing P91-8, Bias Relay Assembly Part No 5321885 2

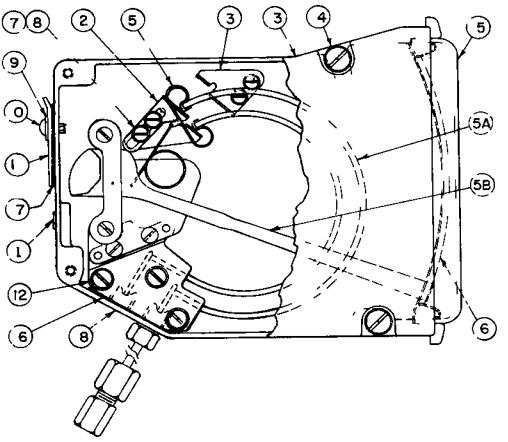


ITEM	PART NO	NAME
1	CODE LABEL	SPECIFY NO ON LABEL WHEN ORDERING PARTS
2	5311428 2	O RING GASKET
3	5311428 11	O RING GASKET
4	53164"8 1	ORIFICE CLEANOUT
5	10 32x2 1 4	FIL HD SCREW 4 REQD
6	5311428 "	O RING GASKET
7	5316809 1	VALVE CAP
8	5316808 1	VALVE ADJ SCREW
9	5321892 1	VALVE HOUSING
10	5311428 20	O RING GASKET
11	5316811 1	VALVE STEM
12	5311428 23	O RING GASKET
13	53169"7 1	VALVE SEAT ASSY
14	5316464 1	ORIFICE ASSEMBLY
15	5316844 1	VALVE SEAT SPRING

ITEM	PART NO	NAME
16	5316802 1	CONTROL BELLOWS ASSY
17	5311428 24	O RING GASKET
18	5316817 1	SPRING SUPPORT
19	5316819 1	LOADING SPRING
20	5316816 1	GUIDE & SPRING SUPPORT
21	198173 3	RETAINING RING
22	5316814 1	ADJUSTMENT SCREW
23	5323245 2	SPRING HOUSING
24	5316998 1	ADJUSTMENT GEAR
25	NO 10	PL PATT MED LK WASH 4 REQD
26	5316815 1	ADJUSTMENT SHAFT
27	5316793 2	ADJUSTMENT GEAR
28	661617 1	CONE PT SET SCR
29	5316812 1	EXHAUST VALVE DIAPHRAGM
30	5316813 1	DIAPHRAGM CLAMP
31	10 32	MED HEX NUT 4 REQD

SPARE PARTS KIT NO 256127 1
INCLUDES ITEMS 2 4 6 10, 12 15 17, 19, 21 29

FIGURE 15 Parts Drawing P91 7, Hand Relay Assembly Part No 5321995 1



ITEM	PART NO	NAME
1	CODE LABEL	SPECIFY NO WHEN ORDERING PARTS
2	SEE TABLE	MINIMUM STOP
3	SEE TABLE	MAXIMUM STOP
5	SEE NOTE	MECHANISM ASSY, INCLUDES ITEMS 5A & 5B
5A	SEE NOTE	BOURDON TUBE & BLOCK ASSY
5B	SEE NOTE	POINTER, SEE TABLE
6	SEE NOTE	SCALE ASSY
7	#3 48x3, 16	PAN HD STL SCR 4 REQD
8	NO 1203	SHK LK WASH 4 REQD
9	5316456 1	WASHER 2 REQD
10	5314337 1	FASTENER, 2 REQD
11	5314336 1	COVER PLATE ASSY
12	6 32x7/8	PAN HD EXT SEMS 3 REQD
13	SEE NOTE	COVER
14	6 32x1/4	PAN HD EXT SEMS 4 REQD
15	5314294 1	SCALE WINDOW
16	SEE TABLE	GASKET
17	5322355 1	GASKET
18	SEE NOTE	CASE ASSY

SPARE PARTS KIT NO 256028 1	
QUANTITY	ITEM NO
2	15

POINTER	GAGE UNIT RANGE	ITEM 2	ITEM 3	ITEM 16
DOUBLE	3 27	5315411 1	5315411 2	5322195 2
SINGLE	3 27	5315411 1	5315411 2	5322195 1
SINGLE	3 15	5315701 1	5315411 1	5322195 1
DOUBLE	3 15	5215701 1	5315411 1	5322195 2

NOTE SPECIFY TYPE, MODEL, SERIAL NUMBER, AND RANGE OF INSTRUMENT
ALSO FOR POINTER (ITEM 5B) SPECIFY WHETHER LEFT RIGHT OR BOTH LEFT AND RIGHT ARE DESIRED
ALSO FOR SCALE (ITEM 6) SPECIFY LEGEND AND RANGE FIGURES

FIGURE 15 Parts Drawing P12-5, Vertical Gage Unit Assembly

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M ch gan Ka amazoo
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M ssou Kansas C ty
M ssour St Lou s
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New Jersey East Orange
New York Buffa o
New York Syrac se
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O o C eve and
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Texas Da as
Texas Hous on
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O tar o Toron o
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August 1971