Honeywell

Checkout & Test

PNEUMATIC AIRFLOW CONTROL SYSTEMS

TABLE OF CONTENTS

77-5031
Commercial Bldg Group
MLF TAB: II. I.

INTRODUCTION

GENERAL

This literature provides procedures to calibrate, before piping, all airflow control panel devices as well as procedures to adjust and start up the system. A working knowledge of pneumatic control devices and specific test instruments is required to perform system checkout. *A copy of the job drawings and filled out airflow control application work sheets must be available.*

NOTE: Rev. 8-87 of this manual must be used with Pneumatic Airflow Control Systems Modular Engineering Drawings 77-5066 Rev. 8-87 and Airflow Control Systems Application Guide 77-5063 Rev. 8-87.

APPLICABLE LITERATURE

The following literature provides background details on pneumatic airflow control systems:

Description	Provides
1. Pneumatic Airflow Control Systems Modular Engineering Drawings 77-5066	Information on pneumatic airflow control panels including schematics, sequence of operations, and bills of materials.
2. Airflow Control Systems Application Guide 77-5063	Details on control setting calculations, equipment selection, and ordering. Also includes Airflow control application work sheets (needed for checkout and test).
3. Airflow Control System Principles 77-5065	General information on airflow measurement, characteristics of fans and ducts, and background for control applications.

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TEST PANEL

Figure 1 shows the test panel instruments (circled Items 1 through 9) and tools (circled Items 10 through 13) required to calibrate airflow control panel devices. The pressure syringes (Items 10 and 11) are used to pump up a manometer in combination with specific devices for calibration purposes. Open end wrenches (Items 12 and 13), are used for MRP65 Square-Root Extractor (SRE) adjustment. Mount the instruments on a CCT3861 Test Panel Chassis and permanently pipe the two SP970A Pressure Regulator Valves (PRV1 and PRV2, Item 2), the 3 through 15 psi receiver gage (Item 4), and the three-position SP470 Pneumatic Switch (SW, Item 8) as shown in the piping diagram of Figure 1. Use a plastic label maker to create labels for the instruments. Mount the labels on the test panel.

PANEL DEVICE CALIBRATION

BEFORE CALIBRATION

1. Ensure that airflow panel and test instruments are mounted in a vertical plane. Many of the devices must be calibrated in the final position in which they are used (e.g., PP904B PRVs, PP905B Static Pressure Sensors, and MRP65 SREs). Other devices require leveling for use as calibration instruments (e.g., manometers).
2. Obtain applicable Settings work sheet(s) for the airflow panel(s). The work sheets are completed by the branch engineer during application of the job per the Airflow Control Systems Application Guide 77-5063. The Settings work sheets indicate:

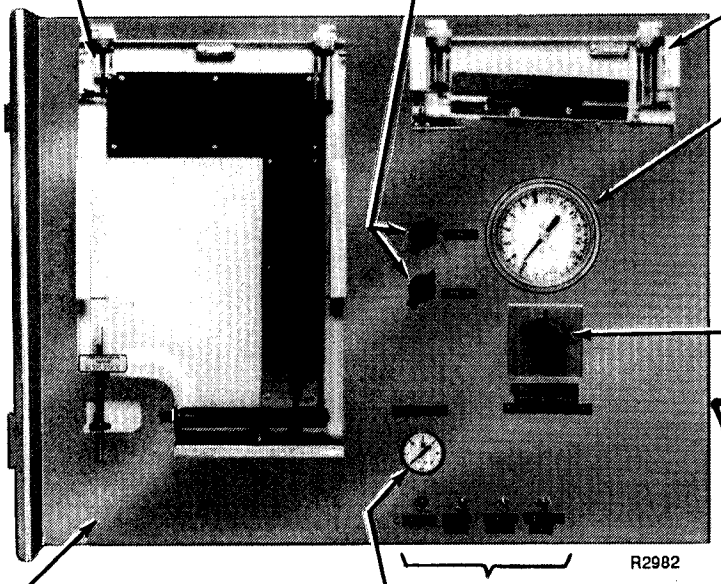
   — Devices furnished with the job. If more than one of the same airflow panel is ordered, the device codes includes a suffix letter (e.g., A, B, C) to distinguish devices for specific panels.
   — Site-specific calibration settings for adjustment of airflow panel devices.

1 COMBINATION INCLINED/VERTICAL SCALE MANOMETER
Model No.: 400-10 (gage only)
Range: 0 through 10 in. wc
Minor Scale Divisions and Range:
Inclined Section: 0.01, 0 to 1 in. wc
Vertical Section: 0.10, 1 to 10 in. wc
Manufacturer:
Dwyer Instruments Inc.
Highway 212 at 12
P.O. Box 373
Michigan City, IN 46360

2 PRESSURE REGULATOR VALVES
(two required)
Model No.: SP970A1005
(remove breakaway stops to get full rotation)
Range: 0 through 16 psi (3.4 to 207 kPa)
Supply: 20 psi
Air Connections: Barb type for 5/32 in. (4 mm) O. D. plastic tubing

3 INCLINED SCALE MANOMETER AIR VELOCITY KIT
Model No.: 115-AV
Range: 0.05 through 0.25 in. wc
Minor Scale Divisions: 0.005
Manufacturer:
Dwyer Instruments Inc.
Highway 212 at 12
P. O. Box 373
Michigan City, IN 46360

4 DIAPHRAGM ACTUATED RECEIVER GAGE
Model No.: 804069AV
Dial Size: 3-1/2 inch
Range: 3 through 15 psi
Minor Scale Divisions: 0.1 psi
Maximum Overpressure: 25 psi
Accuracy: ±0.25 percent of scale range (±0.04 psi)
Connection: Barbed fitting for 1/4 in. (6.350 mm) O. D. tubing



8 PNEUMATIC SWITCH
Model No.: SP470A1018
Range: 0 through 18 psi (0 to 124 kPa)
Maximum Overpressure: 30 psi (207 kPa)
Air Connections: Barb type for 5/32 in. (4 mm) O.D. tubing

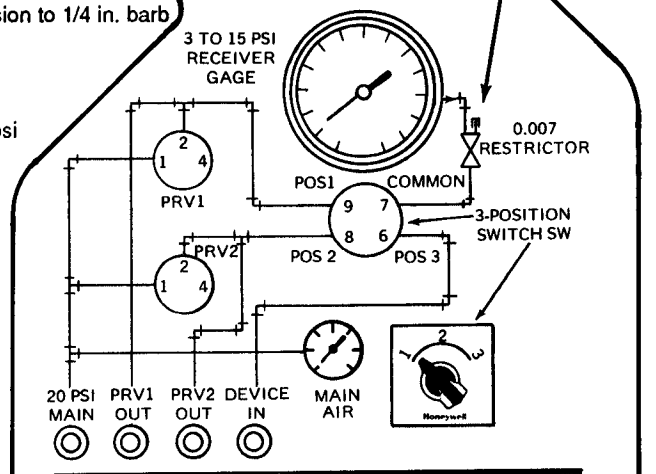
9 RESTRICTORS
Part No.: 14002913-002
Application: Prevent damage to gage

5 TEST PANEL CHASSIS AND MOUNTING BRACKETS
Part No.: CCT3861
Size: 24 in. wide x 19 in. high, 16 gage steel, predrilled
Mounting: Tabs are 12 in. centers for full size ring cabinet door

7 BULKHEAD BARBS
Part No.: CCT1619B
Size: 1/4 in. compression to 1/4 in. barb

6 MAIN AIR GAGE
Model No.: 305965
Range: 0 through 30 psi

PIPING DIAGRAM



SWITCH SW POSITION	PORTS CONNECTED	RECEIVER GAGE READS
1	7 TO 9	PRV1 OUTPUT
2	7 TO 8	PRV2 OUTPUT
3	7 TO 6	TEST DEVICE INPUT

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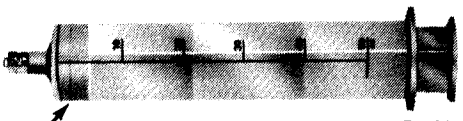
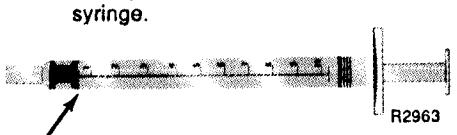


10 50 CC PRESSURE SYRINGE
Model No.: CCT854
Application: Pump for 0 to 10 in. wc. Use flexible tubing supplied with 115-AV Air Velocity Kit to connect to manometers and CCT853A Flexible Tubing to connect to pressure syringe.



11 10 CC PRESSURE SYRINGE
Model No.: CCT863
Application: Pump for fine adjustment of devices

12 1/2-INCH WRENCH
Model No.: CCT636
Description: 1/2 x 9/16 x 10 in. thin (0.19 in.) alloy steel open end wrench
Application: Moore MRP65 Square Root Extractor for calibration

13 7/16-INCH WRENCH
Model No.: CCT648
Description: 7/16 x 1/2 x 10 in. thin (0.19 in.) alloy steel open end wrench
Application: Moore MRP65 Square Root Extractor for calibration

Fig. 1. Airflow Control Test Panel Instruments and Tools.

CALIBRATION AND ADJUSTMENT PROCEDURES

Table 1 lists airflow devices that require calibration or adjustment. Follow procedures in this section and use the test panel to check out these devices.

NOTE: Prior to calibration, pipe 20 psi main air to all devices requiring this air supply. Leave main air connnected throughout the calibration procedures. Cap all branchline outputs, except for the device being tested, to prevent excessive air consumption.

CAUTION

Before adjusting any devices, verify that input air supply is stable. Flip switch SW between positions to verify that the gage readings are repeatable. Allow sufficient time between switch positions for gage readings to stabilize.

Table 1. Airflow Control Panel Devices Requiring Calibration or Adjustment.

Code	Device	Model	Adjustment: Before Piping	Adjustment: At Job Site	Test Setup Required	Application (1)	Optional Literature
BRR	Biasing Repeater Relay	14003238 -004	Yes	Yes	Fig. 5	Differential adjustment return fan ATC	N/A
DIC	Dual Input Controller	RP920A		Yes	Fig. 6	Return fan airflow tracking.	95-7392
PRV	Pressure Regulator Valve	SP970A		Yes Yes	Fig. 7	1. SRE bias 2. RTR bias (CAC) 3. Exhaust fan signal (ATC) 4. Supply fan warm-up flow limit (SPC) 5. Max. flow value (CAC)	95-7237
RTR	Pneumatic Potentiometer	RP922A			None Fig. 8	1. Control attenuation (SPC, CAC, ATC) 2. Flow totalization (CAC, ATC) 3. Differential control (optional percent of supply)	95-7396
SHL/ HLS	Static High Limit/ High Limit Shutdown	PP904B/ CLEAFS-460 (2)			Fig. 10 Fig. 11	1. Static high limit control 2. Fan static high limit shutdown	95-5519/ None
SIC	Single Input Controller	RP920C		Yes	Fig. 12	1. Static pressure PI control 2. Constant airflow PI control 3. Airflow tracking PI control	95-7392
SPM/ FLM	Static Pressure or Flow Indicating Magnehelic Gage	DWY		Yes	None	Indication	77-6086
SPS	Static Pressure Sensor	PP905B	Yes		Fig. 13	SPC	95-7248
SRE	Square-Root Extractor	MRP65			Fig. 14	ATC and CAC	SD65 (3)
VPS	Velocity Pressure Sensor	PP904B			Fig. 15	ATC and CAC	95-5519

(1) Abbreviations: SPC—Static Pressure Control
CAC—Constant Airflow Control
ATC—Airflow Tracking Control

(2) Cleveland Airflow Switch

(3) Moore Products Company Publication

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BRR (14003238-004) BIASING REPEATER RELAY

For Airflow Tracking Control (ATC), turn BRR shaft counterclockwise until O-ring is slightly visible (Fig. 2).

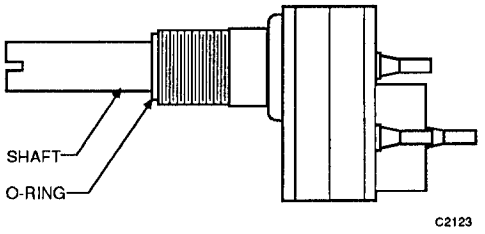

Fig. 2. Adjustments for BRR.

DIC (RP920A) DUAL INPUT CONTROLLER

For return fan ATC, adjust DIC per Figure 3.

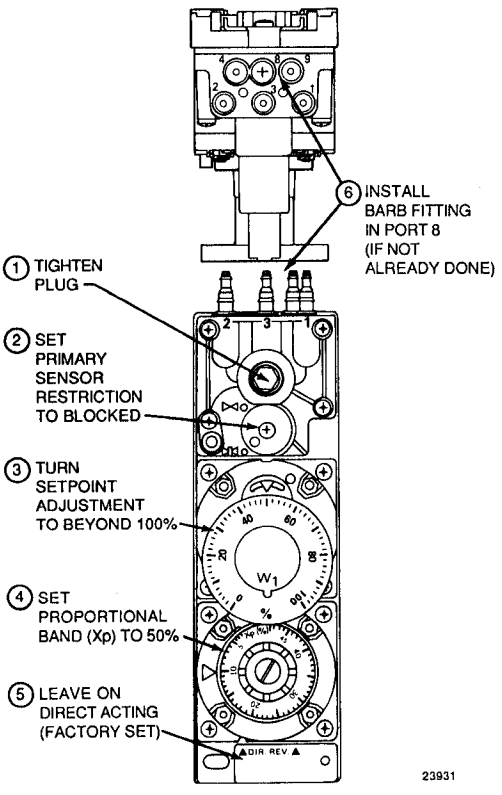

Fig. 3. Adjustments for DIC (RP920A).

PRV (SP970A) PRESSURE REGULATOR VALVE

Calibrate PRV device bias and exhaust fan signal as follows:

1. Pipe PRV per Figure 4.
2. Set SW to Position 3 and block Ports PRV1 OUT and PRV2 OUT.
3. Set PRV as follows:

Application	Gage Reading (psi)
SRE bias	3 ±0.1
RTR bias (CAC)	9 ±0.1
Exhaust fan signal (constant % ATC)	15 ±0.1
Supply fan flow limit	>15
Max. flow value (CAC)	<0.2

4. Remove test panel piping from PRV.

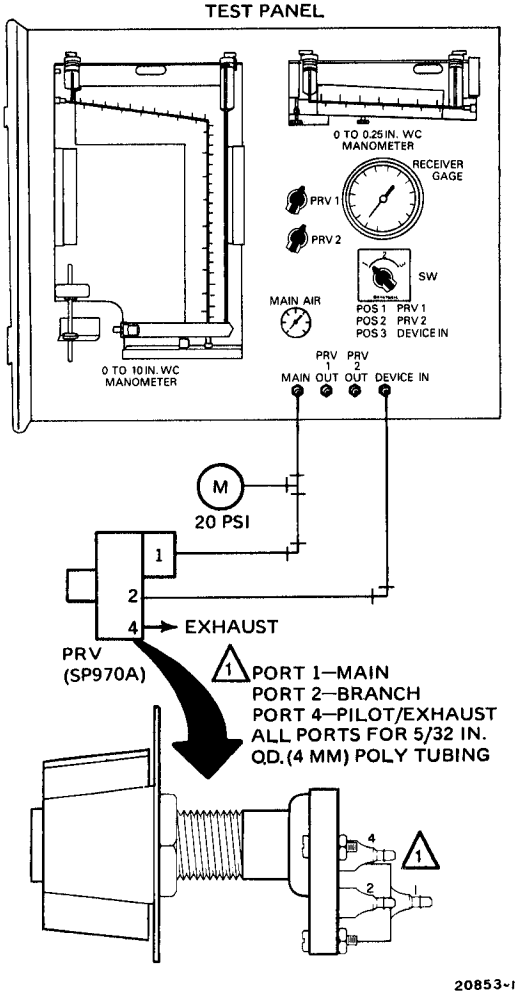

Fig. 4. Test Panel Setup for PRV (SP970A).

RTR (RP922A Pneumatic Potentiometer) RATIO RELAY

Calibrate RTR flow totalization (Constant Airflow Control [CAC], ATC) and percent of supply flow (ATC) as follows:

1. Pipe RTR per Figure 5.
2. Set SW to Positon 1 and adjust PRV1 so gage reads 9 psi (Port 1 of RTR).
3. Set SW to Positon 2 and adjust PRV2 so gage reads 15 psi (Port 3 of RTR).
4. Set SW to Positon 3.
5. Turn dial on RTR so gage reads required psi output (P_0) based on the job required % RTR as indicated on Settings work sheets. See Figure 6. (EXAMPLE: 90% RTR equals 14.4 psi.)
6. Remove test panel piping from RTR.

Calibrate RTR control attenuation (Static Pressure Control [SPC], CAC, ATC) as follows:

1. No test panel piping is required.
2. Turn dial on RTR so it reads 90 ±1%.

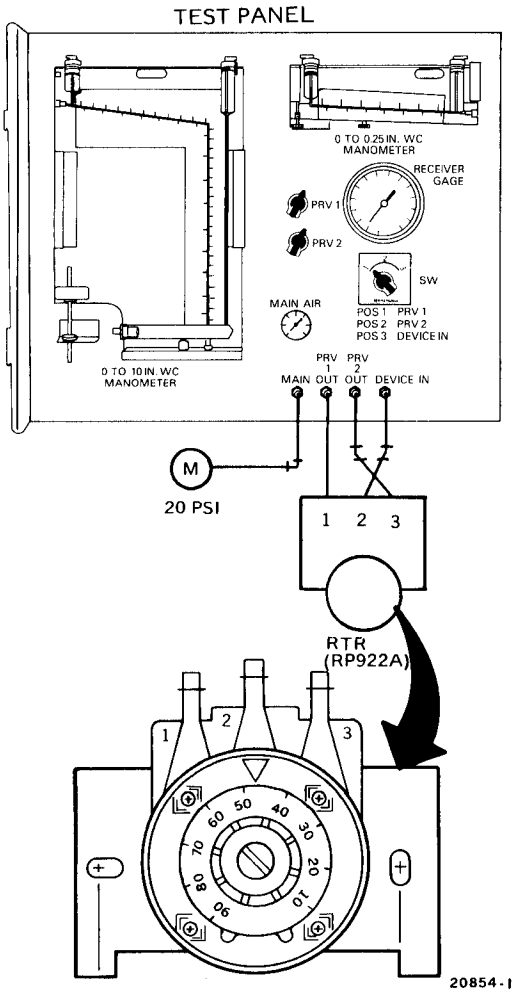

Fig. 5. Test Panel Setup for RTR (RP922A).

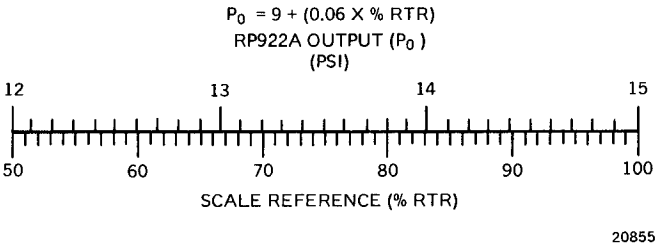

Fig. 6. RP922A Output Pressure (P_0) Based on Job Required % RTR.

STATIC HIGH LIMIT (SHL—PP904B and HLS—CLEAFS-460)

Calibrate Static High Limit (SHL) control as follows:

1. Pipe SHL per Figure 7. (Pull plunger out on pressure syringe before connecting tubing.)
2. Set SW to Positon 3 so gage reads SHL output.
3. Open 0 through 10 in. wc manometer vent. (Verify that manometer is leveled and zeroed.)
4. Use syringe to pump static pressure input to SHL so required setpoint (from Settings work sheet) is within ±0.1 in. wc.
5. Set SHL Throttling Range (TR) to maximum adjustable value (0.5 in. wc).
6. Adjust SHL setpoint so gage reads 9 psi.
   NOTE: When adjusting the setpoint knob, the manometer column moves as well as the gage reading. Always check and reset the manometer (verify it is leveled and zeroed) while adjusting SHL.
7. Remove test panel piping from SHL.

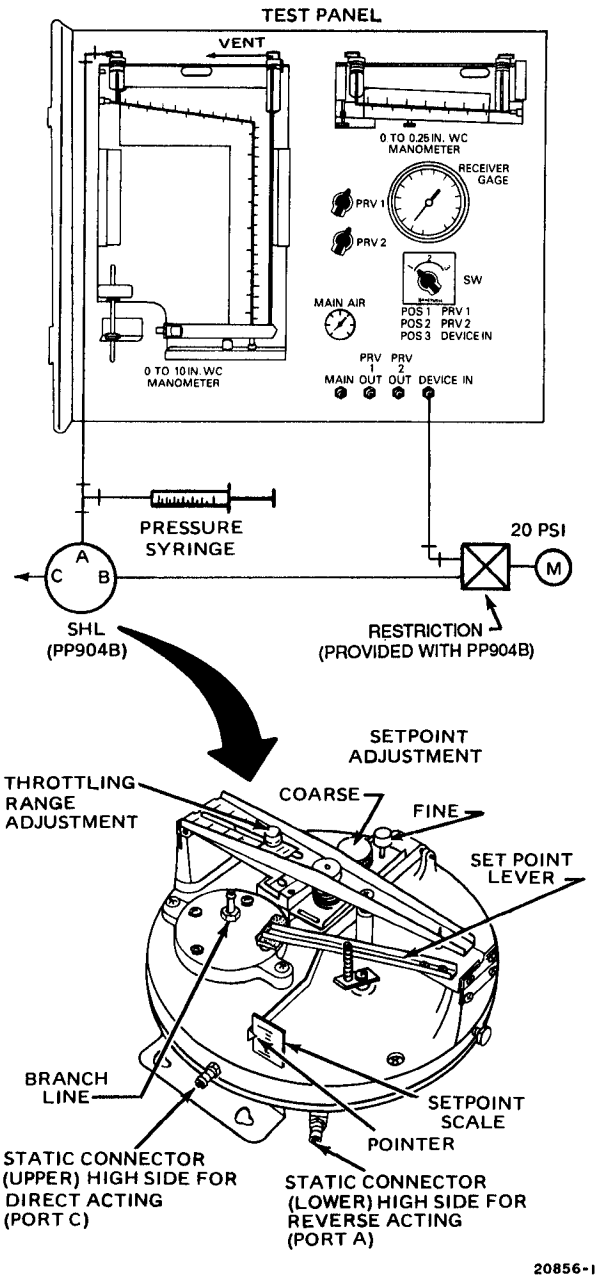

Fig. 7. Test Panel Setup for Controlling SHL (PP904B).

Calibrate static High Limit Shutdown (HLS) as follows:

1. Pipe HLS per Figure 8. (Pull plunger out on pressure syringe before connecting tubing.)
2. Open 0 through 10 in. wc manometer vent. (Verify that manometer is leveled and zeroed.)
3. Pump static pressure input to HLS so required setpoint (from Settings work sheet) is within ±0.1 in. wc.
4. Adjust HLS setpoint screw until a continuity check indicates closed switch contacts.
5. Remove test panel piping from HLS.

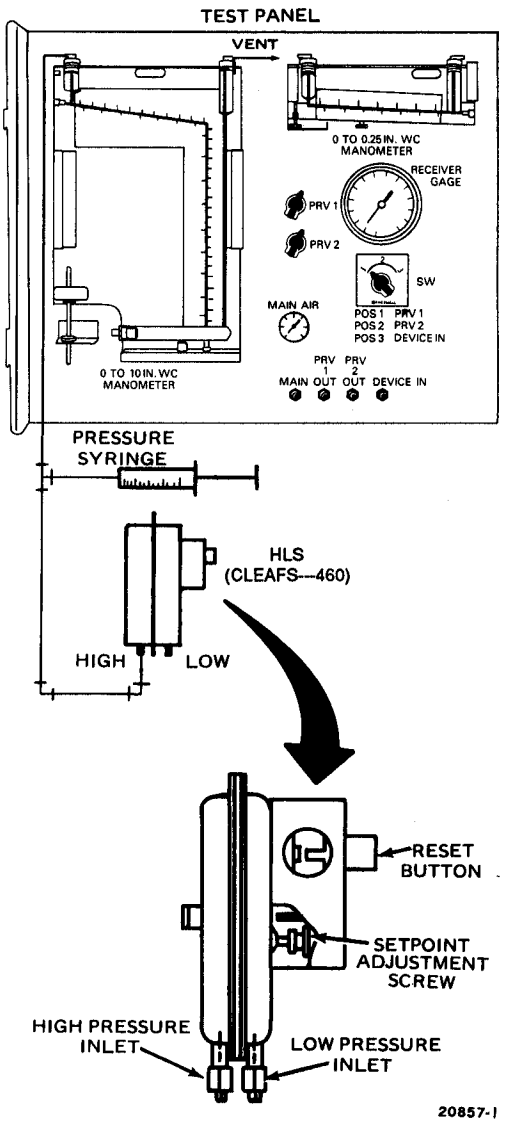

Fig. 8. Test Panel Setup for Static HLS (CLEAFS-460).

SIC (RP920C) SINGLE INPUT CONTROLLER

For SPC, CAC, and ATC with PI (Proportional-Integral) control, adjust SIC per Figure 9.

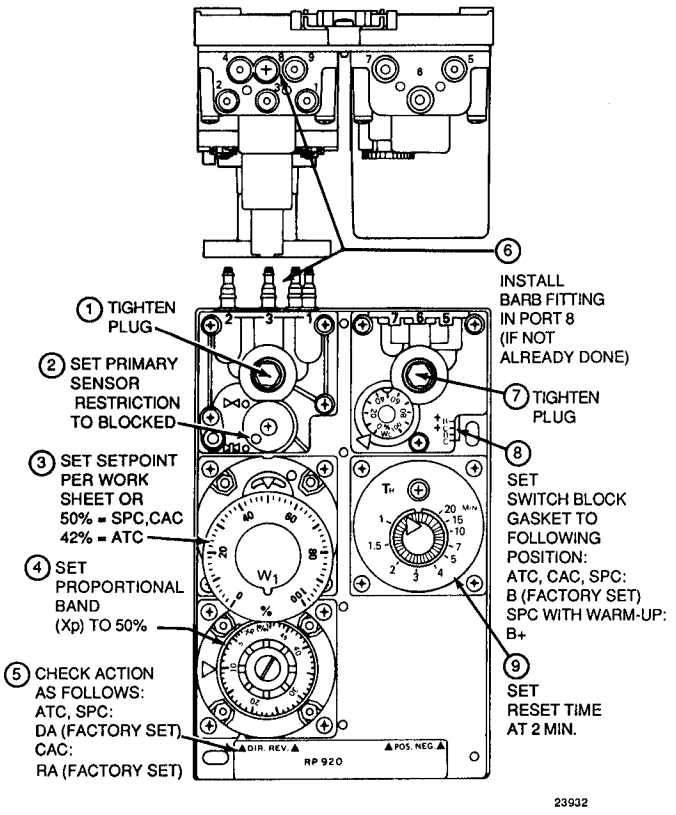

Fig. 9. Adjustments for SIC (RP920C).

SPM AND FLM STATIC AND FLOW MAGNEHELIC GAGES

No calibration is required. Zero adjusting is done during START-UP PROCEDURES. Piping to test panel is not required.

SPS (PP905B) STATIC PRESSURE SENSOR

Calibrate SPS as follows:

1. Pipe SPS per Figure 10. (Pull plunger out on pressure syringe before connecting tubing.)
2. Set SW to Position 3 so gage reads SPS output.
3. Open 0 through 10 in. wc manometer vent. (Verify that manometer is leveled and zeroed.)
4. Use syringe to pump static pressure input to SPS so required setpoint (from Settings work sheet) is within ±0.1 in. wc.
5. Adjust SPS setpoint so gage reads 9 ±0.5 psi.
6. Use syringe to cycle input pressure slightly and return to setpoint (from Settings work sheet). If output is not 9 ±0.5 psi, go to Step 5.
7. Remove test panel piping from SPS.

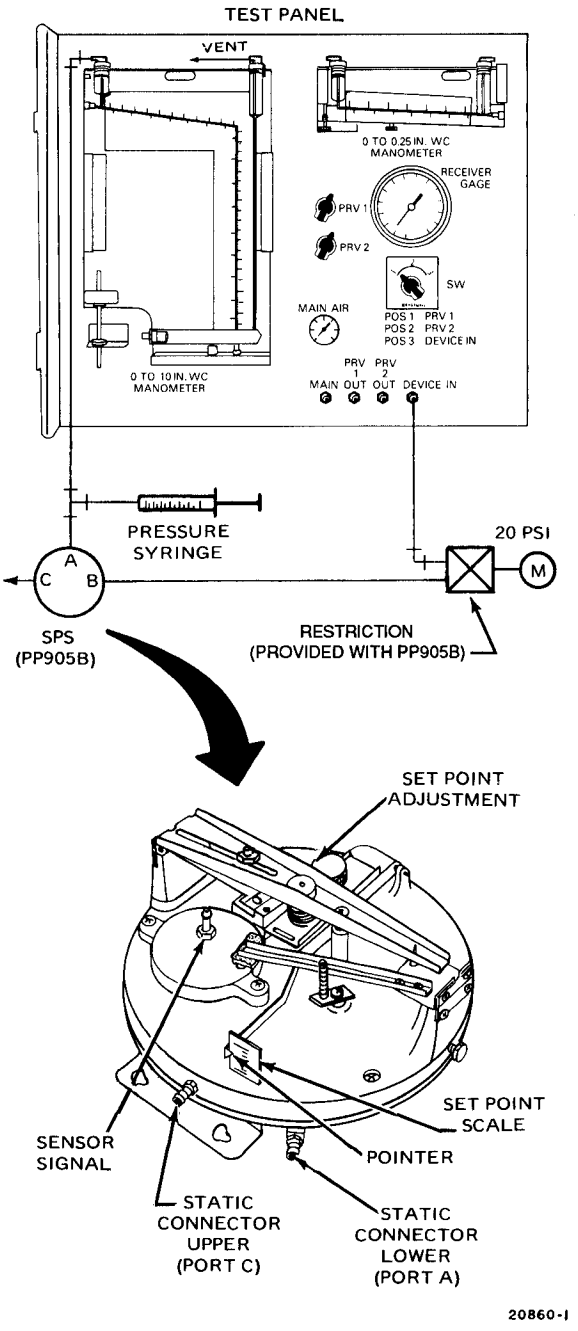

Fig. 10. Test Panel Setup for SPS (PP905B).

SRE (MRP65) SQUARE-ROOT EXTRACTOR

The SRE is factory set, but requires a three-point calibration check as follows:

1. Pipe SRE per Figure 11.
2. Block Port PRV1 OUT.
3. Run the following calibration check:

Step	Set Switch SW to Position	Set PRV2 Output per Gage (psi)	Read SRE Output on Gage (psi)
1	2	3.48	—
2	3	—	5.4 ±0.06
3	2	6	—
4	3	—	9.0 ±0.06
5	2	15	—
6	3	—	15 ±0.06

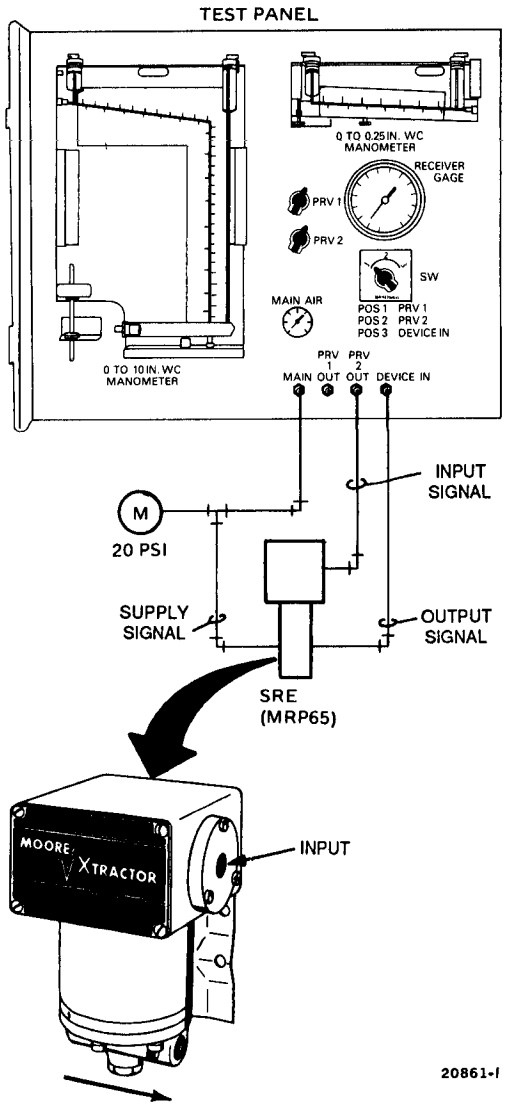

Fig. 11. Test Panel Setup for SRE (MRP65).

CAUTION

When checking SRE, allow 5 to 10 seconds between switch settings for gage reading to stabilize.

4. *If gage output readings are within tolerances, leave the SRE alone.* If gage output readings are not within tolerances, SRE requires calibration. See the APPENDIX: SRE (MRP65) CALIBRATION PROCEDURE.
5. Remove test panel piping from SRE.

VPS (PP904B) VELOCITY PRESSURE SENSOR

For ATC and CAC, both the zero and span VPS calibrations must be accurately set for flow measurement. Calibration requires both the specified job velocity pressure (in. wc) and the corresponding VPS output pressure (psi). The highest pressure determines which manometer to use. (Select a 0 through 0.25 in. wc manometer whenever possible; use a 0 through 10 in. wc manometer only whenever pressures are above 0.25 in. wc.) Calibrate VPS as follows:

1. Pipe VPS per Figure 12. (Pull plunger out on pressure syringe before connecting tubing.)
2. Set SW to Positon 3 so gage reads VPS output.
3. Open manometer vent. (Verify that the manometer is leveled and zeroed.)
4. Adjust VPS setpoint so gage reads 3 psi with no simulated velocity pressure supplied.
5. Use syringe to pump pressure up to specified job velocity pressure and adjust TR to 15 psi.
   NOTE: If TR required cannot be obtained with VPS as shipped, reverse the TR clip (part of the Throttling Range Adjustment—Figure 12) to obtain a wider TR (up to approximately 1.7 in. wc).
6. Repeat Steps 4 and 5, adjusting zero and span in an interactive manner until 3 psi and 15 psi are obtained reflecting the specified job velocity pressure.
7. Remove test panel piping from VPS.

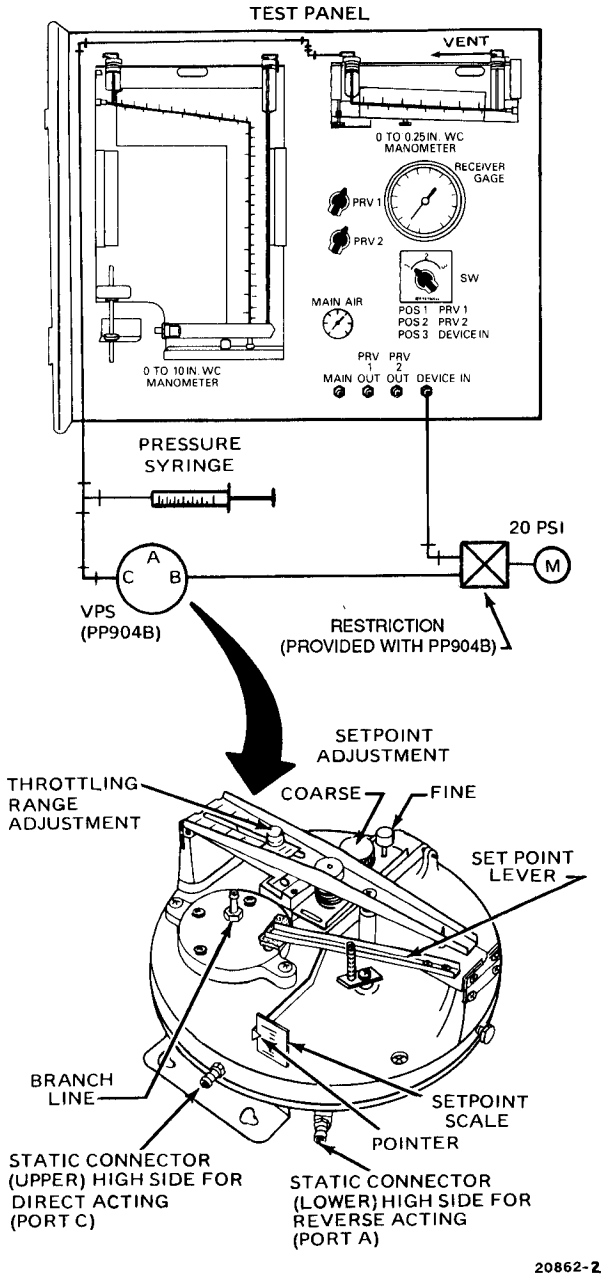

Fig. 12. Test Panel Setup for VPS (PP904B).

SYSTEM START-UP

BEFORE START-UP

1. Mount subpanel and door in a ring cabinet at job site.
2. Mount branch-procured Magnehelic gages on the door.
3. Pipe the panel and door.
4. Complete panel device calibration and adjust setpoints per job drawings.
5. Verify that all related HVAC system components are operable. Components include air terminal units, ductwork, fans and blowers, and the automatic temperature control system.

START-UP PROCEDURE

Table 2 provides an orderly start-up procedure for an airflow control system. Obtain temporary manual control of the fans or dampers, when necessary.

Table 2. Airflow Control System Start-Up Procedure.

Step	Description	Operation
1	Main Air	Verify main air pressure (20 psi minimum) by checking panel gage.
2	Tubing Leakage	Check tubing for leakage. Pressurize each line to 20 psi and verify that there is no pressure decay. To test Flow Measuring Station (FMS) lines: a. Disconnect both lines at FMS and connect them together. b. Disconnect both lines at VPS, plug one line and test the loop via the remaining line. c. Reconnect the lines at the FMS and VPS when testing is complete.
3	Damper Operators/Fan Inlet Vane/Fan Blades	Verify that damper operators and fan inlet vanes acheive a full stroke. The stroke should be a smooth, free operation. NOTE: Fan discharge dampers, fan inlet vanes, and fan blades should be normally closed (n.c.). Return air is normally open (n.o.) Special applications may require n.o. control and need special considerations. If the job requires n.o. control, obtain any special instructions (e.g., calibration or adjustment) before fan start-up. Also, if the job requires variable speed fan control, make certain fan motor goes down to minimum speed with a 3 psi input.
4	Outdoor Air	Check damper operation, including minimum Outdoor Air (OA). OA dampers should never fully close except when fans are off (and possibly during warm-up). **WARNING** 1. Block OA dampers open during test procedures at start-up to prevent possible collapse of the ductwork. 2. At least 50 percent of the air terminal units should be open.
5	Preheat	Ensure preheat is operating during cold weather to prevent coil freeze-up.
6	Magnehelic Gages	Zero all SPM (static) and FLM (flow) Magnehelic gages as follows: a. Set test switches below the gages to ZERO and zero the gages with a small screwdriver. b. Return test switches to NORMAL.
7	Manual Fan Control	Disconnect automatic control from fan. Manually operate each fan and use airflow gages on the panel to verify minimum and maximum flow rates. NOTES: 1. More of the air terminal units may have to be opened to achieve full airflow on the supply side. 2. The fans should be manually run up and down together gradually to equalize cfm on the supply and return sides to avoid excessive building pressurization problems.
8	Automatic Fan Control	Connect fan modulation (branch line pressure) to fan control for automatic operation. Start the fans.
9	Fan Interlock	Verify 20-psi fan interlock signal on panel gage.
10	Supply Fan	The supply fan should go to its static setpoint. If the supply fan hunts, increase integral action timing on SIC (RP920C). If the supply fan does not hunt, decrease integral action timing. (The hunt may be very slow.) Typically, integral action timing can be decreased to its minimum value (less than 1 min.). If integral action timing is at minimum, continue tuning by decreasing the RTR setting and SIC proportional band setting until unstable and then just back off. If static pressure is incorrect, adjust SPS (PP905B) setpoint. For multiple static inputs, manipulate air terminal units to maximize airflow through the duct work being sensed.

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Table 2. Airflow Control System Start-Up Procedure. (Continued)

Step	Description	Operation
11	Return Fan	Fine tune return fan tracking fixed and cfm differentials as follows: a. BRR adjustment determines the fixed differential. Adjust BRR shaft until specified differential from PATC System Parameters work sheet is read on panel cfm gages. b. CFM differential is the sum of supply fan gage values minus the sum of return and exhaust fan gage values. Tune this system by decreasing RTR setting and SIC proportional band setting until unstable and then just back off. Next, decrease integral action timing slightly, if possible.
12	Warm-up	Switch control system to warm-up mode and verify 20-psi warm-up signal on panel gage. The return fan should track at zero differential.
13	High Limit Control	Check static high limit shutdown control. If necessary, temporarily apply an external pressure to simulate high limit static pressure.
14	Single-level, constant airflow	Fine tune the flow reading by adjusting SIC (RP920C) setpoint and using panel cfm gages. **CAUTION** Changing the setpoint from 45 to 55 percent nominally changes the flow setpoint from 0 to 100 percent of the design flow. A very small change will berequired.
15	Dual-level, constant airflow	Verify operation of the Level 2 signal. On activation of Level 2 signal (20 psi), control is at lower cfm level which is fine-tuned through SIC (RP920C) setpoint as in Step 1. On deactivation of Level 2 signal, control switches to higher cfm level (0 psi) which is fine tuned through higher level PRV. While making level adjustments, observe panel cfm gages. **CAUTION** An increase of 1 psi in the PRV output increases the setpoint by 25 percent of the total design flow above the lower cfm level. This pressure change is not 3-psi based, it starts at 0 psi. For example, if the lower cfm level is 50 percent (RP920C setpoint), an output of 2 psi from the PRV adds another 20 percent to the setpoint so it is then 100 percent of the total design flow.

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APPENDIX: SRE (MRP65) CALIBRATION PROCEDURE

GENERAL

There are three MRP65 SRE calibrations: zero, deviation, and span adjustments. The calibrations must be performed in the same order. A stop screw alignment adjustment is also incorporated, but should not be used unless the screw has been turned. For complete calibration, remove SRE from service and pipe it to the test panel per Figure 11. See Figure 13 for location of calibration adjustments. See Table 3 for the full range of input/output values.

NOTES:

1. Use calibration figures in the following procedures only in the case of 3 through 15 psi input and output ranges. If either the input or output range is other than 3 through 15 psi, see Moore Service Instructions (form number SD65) available from:

   Moore Products Company
   Spring House, PA 19477

2. The SRE (MRP65) calibration check related to Figure 11 provides switch SW settings and SRE output tolerances acceptable in the following procedures. The Moore calibration instructions can be used; however, for airflow applications, the following procedures are suggested.

CAUTION

It is important to flip switch SW between positions two or three times and to wait 5 to 10 seconds at each position to assure gage repeatability.

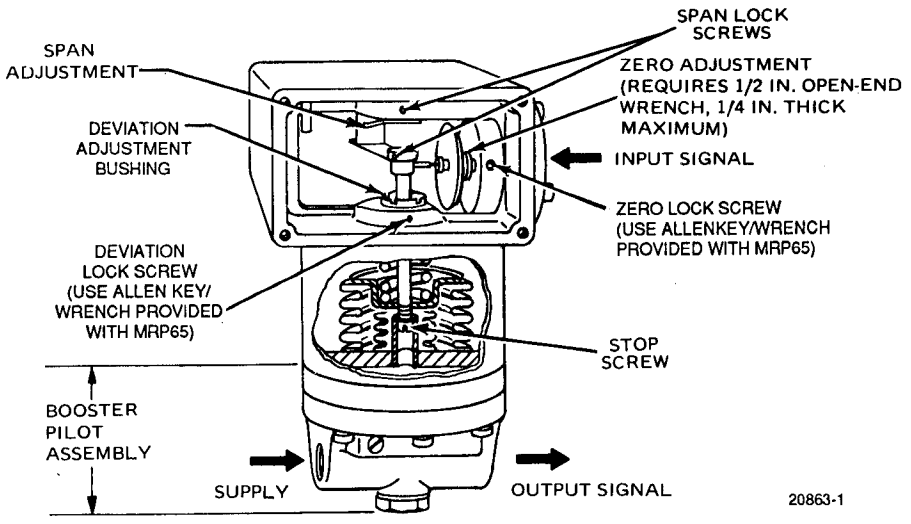

Fig. 13. SRE Calibration Adjustments.

Table 3. Calibration Table for MRP65 Moore Square-Root Extractor.

Square-Root Input		Linear Output	
% Full Scale	psi	% Full Scale	psi
⚠1 4	3.48	20	5.40
9	4.08	30	6.60
16	4.92	40	7.80
25	6.00	50	9.00
36	7.32	60	10.20
49	8.88	70	11.40
64	10.68	80	12.60
81	12.72	90	13.80
100	15.00	100	15.00

⚠1 Values below 4 percent are considered impractical to measure with gages specified. T575

NOTE: This table is based on a 3 through 15 psi input signal and a 3 through 15 psi output signal:

$$P_{out} = 12 \times \sqrt{[(P_{in} - 3) / 12]} + 3$$

ZERO ADJUSTMENT

Use calibration figures in the zero adjustment only in the case of 3 through 15 psi input and output ranges.

1. Adjust SRE input pressure (PRV 2, Switch SW at Position 2) to 3.48 psi. Output pressure (DEVICE IN, Switch SW at Position 3) should read 5.40 psi (see procedure in SRE (MRP65) SQUARE-ROOT EXTRACTOR section).
2. If output pressure is not 5.40 psi, loosen zero lock screw and turn zero adjustment nut "up" to increase output pressure or turn zero adjustment screw "down" to decrease output pressure.
3. Tighten zero lock screw after calibrating zero adjustment.

DEVIATION ADJUSTMENT

Use calibration figures in the following deviation adjustment chart only in case of 3 through 15 psi input and output ranges.

1. Adjust SRE input pressure (PRV 2, Switch SW at Positon 2) to 6 psi. Standard output pressure (DEVICE IN, Switch SW at Positon 3) should read 9 psi. Record actual output pressure in the following deviation adjustment chart. Also, calculate and record the difference (or deviation error) between the actual and standard output pressures.

Deviation Adjustment Chart

Step	Switch SW at Position	SRE Input psi per Gage (PRV 2)	Switch SW at Position	Actual SRE Output psi per Gage (DEVICE IN)	Standard SRE Output psi	Deviation Error psi
A	2	3.48	3	5.40*	5.40 ±0.06	0
B	2	6.00	3		9.00 ±0.06	
C	2	15.00	3		15.00 ±0.06	

*From ZERO ADJUSTMENT section. T576

2. Adjust SRE input pressure to 15 psi. Standard output pressure should read 15 psi. Record actual output pressure in the following deviation adjustment chart. Also, calculate and record the difference (or deviation error) between the actual and standard output pressures.
3. If difference (or deviation error) between actual and standard output pressures is within ±0.06 psi, no deviation adjustment is necessary.
4. If difference between output pressures and standard output pressures is *not* within ±0.06 psi, adjust the deviation to correct the shape of the calibration curve as follows:

   a. Use the following formula to determine Deviation Error (D.E.):

      D.E. = Error at 6 psi input - (Error at 15 psi input/2)

   EXAMPLE:
   D.E. = +1.5 - (+0.5/2)
   = +1.5 - +0.25
   = +1.25

   b. Loosen deviation lock screw located below slotted deviation adjustment bushing (Fig. 13).
   c. If deviation error is positive, turn deviation lock screw out (counterclockwise) slightly; if deviation error is negative, turn deviation lock screw in (clockwise) slightly.
      NOTE: With input pressure at 15 psi and switch SW at Position 3, output pressure should read 15 psi. If an adjustment is necessary, divide the deviation error by 2, and adjust slotted deviation adjustment bushing in the direction indicated until output pressure changes by this amount.

   EXAMPLE:

   D.E. = +1.25
   Adjustment = 1.25/2 = 0.625
   Turn bushing counterclockwise to obtain output pressure of about 14.9 psi.

   d. Tighten deviation lock screw.
   e. Recalibrate zero adjustment and again check deviation adjustment. Continue this procedure until output pressures are within the ±0.06 psi tolerance.

SPAN ADJUSTMENT

Use calibration figures in the following deviation adjustment chart only in case of 3 through 15 psi input and output ranges.

Use calibration figures in the span adjustment only in the case of 3 through 15 psi input and output ranges.

1. Adjust input pressure to 6 psi. Standard output pressure should read 9 psi.
2. Adjust input pressure to 15 psi. Standard output pressure should read 15 psi.
3. If difference between output pressures and standard output pressures is within ±0.06 psi, no span adjustment is necessary.

Deviation Adjustment Chart

Step	Switch SW at Position	SRE Input psi per Gage (PRV 2)	Switch SW at Position	Actual SRE Output psi per Gage (DEVICE IN)	Standard SRE Output psi	Deviation Error psi
A	2	3.48	3	5.40*	5.40 ±0.06	0
B	2	6.00	3	**10.50**	9.00 ±0.06	**+1.5**
C	2	15.00	3	**15.50**	15.00 ±0.06	**+0.5**

*From ZERO ADJUSTMENT section.

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4. If difference between output pressures and standard output pressures is *not* within ±0.06 psi, a span adjustment is necessary as follows:

   a. Loosen span lock screws (Fig. 13).
   b. Increase output span by moving adjustment lever to left; decrease output span by moving adjustment lever to right.
   c. Tighten span lock screws.
   d. Recalibrate zero adjustment and again check span adjustment. Continue this procedure (Steps 1 through 4) until output pressures are within the ±0.06 psi tolerance.

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