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# INSTRUCTIONS FOR THE INSTALLATION, OPERATION AND MAINTENANCE FOR FAIRCHILD MODEL 2800 PLUNGER REGULATOR

## GENERAL INFORMATION

The Fairchild Model 2800 Regulator furnishes a means of rapid change of pressure setting by operation of a push rod.

### Specifications Model 2800

Flow capacity ..... 50 SCFM (85 m<sup>3</sup>/HR)  
(100 psig [7.0 BAR] (700 kPa) supply;  
20 psig [1.5 BAR] (150 kPa) set point)

Exhaust capacity ..... 8 SCFM  
(Downstream pressure 5 psig (13.6 m<sup>3</sup>/HR)  
[3.5 BAR] (35 kPa) above set  
pressure)

Sensitivity ..... ½" (1.25 cm) W.C.

Effect of supply ..... Less than 0.1 psig  
pressure variation [0.007 BAR] (.7 kPa)  
for 100 psig [7.0 BAR]  
(700 kPa) change

Supply pressure ..... 250 psig [17.0 BAR]  
(1700 kPa) max.

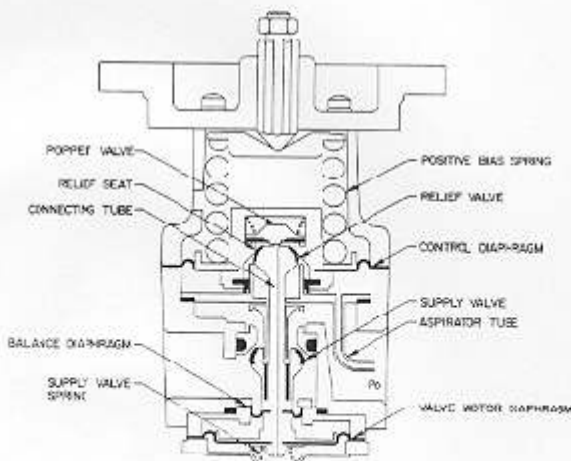
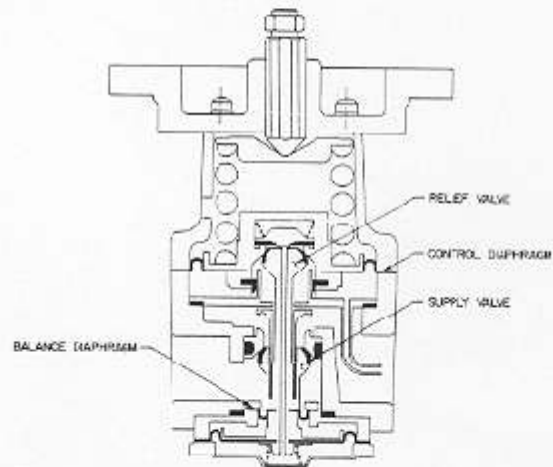
Mounting ..... Pipe or panel

Ambient temperature limits ..... -40°F to +200°F  
(-40°C to +93.3°C)

## PRINCIPLES OF OPERATION

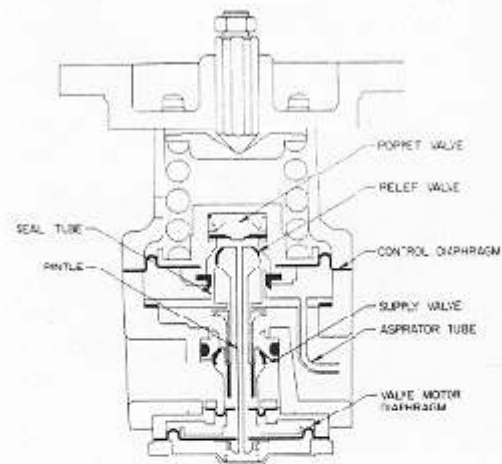
In the Model 2800 Plunger Regulator the main valving mechanism is assisted by a separate valve motor. Under steady state conditions, the valve motor chamber is at or near atmospheric pressure. This motor is actuated by air pressure on the underside of the valve motor diaphragm; however, this action does not occur until the sensitive poppet valve provides corrective action, eliminating the need for constant air bleed to achieve the required sensitivity. With supply pressure turned off and the plunger set to allow the range spring to be expanded, the supply valve is seated because of the upward force of the supply valve spring.

When supply air is introduced to the inlet port, it exerts pressure against the supply valve and the top of the inner valve assembly balance diaphragm. These opposite acting forces tend to keep the supply valve assembly balanced and virtually unaffected by changes in supply pressure.

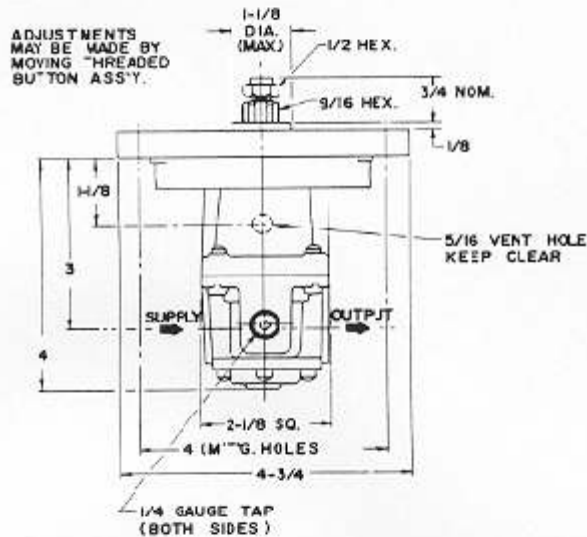


When the plunger of the regulator is depressed to a specific set point, the range spring exerts a force against the top of the control diaphragm. This force is exerted by the range spring to produce an output pressure  $P_o = K$  where  $K$  is the spring constant. This force keeps the relief seat against the relief valve. This output pressure condition is achieved only after pressure reaches the desired set point. Until then, the downward force opens the supply valve, allowing supply air to be routed to the outlet port. Downstream (outlet) pressure is transmitted through the aspirator tube to the control chamber and sensed by the underside of the control diaphragm. The increase in pressure on the bottom of the control diaphragm causes the diaphragm assembly to move upward against the force of the range spring acting on top of the control diaphragm. This force acting through the connecting tube allows the supply valve to throttle, maintaining the output pressure.

When set point is reached, the force acting on the bottom of the control diaphragm is in balance with the force acting on the top of the control diaphragm. At this point the force due to supply pressure acting on the supply valve and the force due to supply pressure acting on top of the balance diaphragm are in balance. The force due to downstream pressure acting on the top of the supply valve and the force due to downstream pressure acting on the bottom of the relief valve are in balance. When downstream pressure increases above set point, the increased pressure is transmitted through the aspirator tube to the bottom of the control diaphragm, causing the diaphragm assembly to move upward and allowing the supply valve to close. The diaphragm assembly continues its upward movement, sliding on the seal tube and allowing the relief valve to open. Because the poppet valve is still closed, pressure is communicated down the valve pintle to the underside of the motor diaphragm, causing the supply valve to seal even tighter. With the continued increase in downstream pressure, the poppet valve opens, venting the excess pressure to atmosphere.



### INSTALLATION

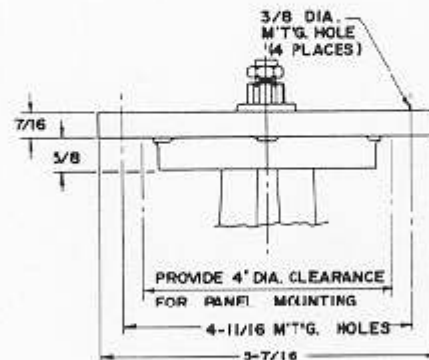


Clean all pipe lines to the regulator to remove dirt and scale before installation is made. Apply minimum amount of pipe compound to male threads of air line only. Start with third thread back and work away from end of line to avoid possibility of getting compound into regulator. Install regulator in air line; body is threaded 1/4" or 3/8" NPT for inlet and outlet connections. Regulator can be mounted in any position without affecting its operation (Figure 2). Inlet and outlet connections are labelled on underside of boss and should be tightened securely. Avoid undersized fittings that will limit flow through the regulator and cause pressure drop downstream. The use of a filter to remove dirt and entrained liquid in the air line ahead of the regulator is recommended for best performance. If an air line lubricator is used, it should be located downstream beyond the regulator in order to avoid interference with regulator performance.

### NOTICE

The presence of certain ester oils in the airlines may hasten deterioration of the elastomers and thus decrease the useful life of this unit.

Range PSIG	Plunger Travel	Thrust at Max. Range
1/2-10	.431 ± 10%	20# ± 10%
1/2-30	.470 ± 10%	62# ± 10%
1-60	.418 ± 10%	124# ± 10%
2-150	.346 ± 10%	311# ± 10%



### ADJUSTMENTS

See Note on Figure.

## SERVICE KIT INSTALLATION

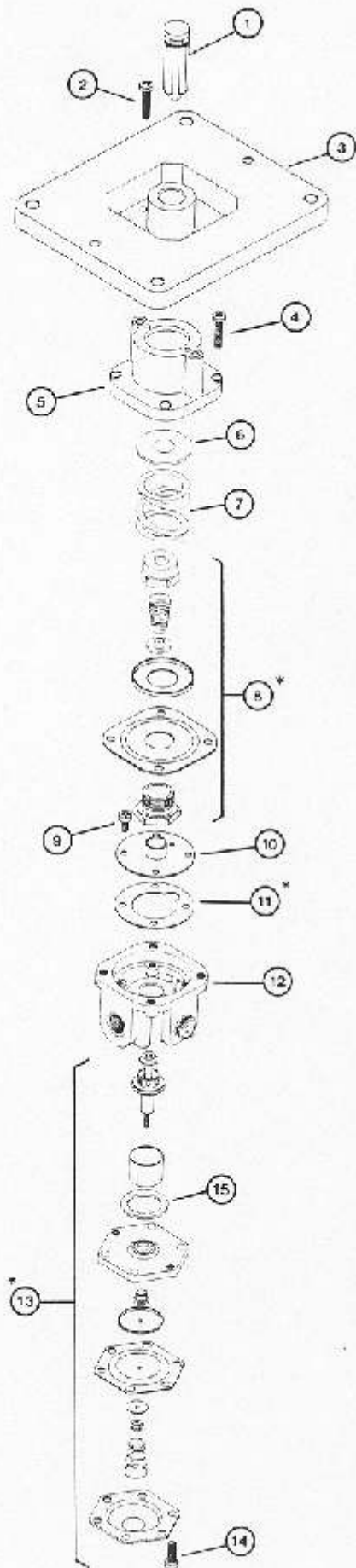
1. Check the parts in the EA-12157 Service Kit against the parts marked with an asterisk in the exploded view and the associated table.
2. Remove two screws (2). Remove base (3) and plunger assembly (1) from regulator.
3. Mark bonnet (5) and body (12) so that the regulator can be reassembled properly.
4. Remove four screws (4) holding bonnet (5) to body (12). Remove bonnet (5), spring seat (6) and spring (7) and set aside.
5. Remove and discard diaphragm assembly (8). Before performing this next step, examine service kit inner valve assembly (13). The assembly is held together by two screws. DO NOT remove these screws when removing old inner valve assembly (13) or installing new one.
6. Turn regulator upside down and remove six screws (14) holding inner valve assembly (13) to body (12).
7. Using a dowel rod, tap out inner valve assembly (13) from body (12) and discard. Remove washer (15) from the well in body assembly (12) and discard.
8. Remove four screws (9) holding seal plate assembly (10) to body (12). Carefully twist and lift the seal plate assembly (10) to remove it. Do not damage the aspirator tube. Remove gasket (11) and discard.
9. Place gasket (11), from service kit, in top well of body (12), with cutout facing OUT port, making sure that four holes in gasket (11) are aligned with four tapped holes in body (12).
10. Carefully place seal plate assembly (10) over inner valve assembly (13) and twist seal plate assembly (10) so that aspirator tube projects into OUT port and four holes in seal plate assembly are aligned with four holes in gasket (11) and body assembly (12).
11. Using four screws (9), fasten seal plate assembly (10) to body (12).
12. Secure inner valve assembly (13) from service kit. Remove washer (15) from the assembly and place into well in the body assembly (12).
13. Place inner valve assembly (13) into body (12) and secure using four screws (14).
14. Secure diaphragm assembly (8) from service kit and place on body assembly (12) so that the four holes in the diaphragm assembly (8) are aligned with four holes in body (12).
15. Place spring (7) into piston well of diaphragm assembly (8). Place spring seat (6) over spring (7) with concave indentation facing up.
16. Align bonnet assembly (5) with body assembly (12), referring to marks placed in step 3. Using four screws (4), secure bonnet assembly (5) to body assembly (12).
17. Place base (3) over the assembly in step 16, and use two screws (2) to secure base (3) to bonnet assembly (5).
18. Insert Plunger assembly (1) into center hole of base (3).
19. Reinstall the regulator in accord with installation instructions in the IOM and follow instructions in the Operation section for placing the regulator back into service.

Index.	Part No.	Description
1	EB-8428-1	Plunger Assembly
2	EB-1032-10	Screw
3	EB-8424	Base
4	EB-1032-12	Screw
5	EB-8520	Bonnet Assembly
6	EB-1122	Spring Seat
7	EB-1123-( )	Spring
*8	EB-1145	Diaphragm Assembly
9	EB-832-6	Screw
10	EB-1148-1	Seal Plate Assembly
*11	EB-1106	Seal Plate Gasket
12	EB-1186-( )	Body Assembly
*13	EB-8086-1	Inner Valve Assembly
14	EB-1032-10	Screw
15	EB-1108	Seal Ring Washer

\*EA-12158 Service Kit Components

### OPTIONS

Spring	
10 psi	EB-1123-10
30 psi	EB-1123-30
60 psi	EB-1123-60
150 psi	EB-1123-150



**LEGAL NOTICE:**

The information set forth in the foregoing Installation, Operation and Maintenance Instructions shall not be modified or amended in any respect without prior written consent of Fairchild Industrial Products Company. In addition, the information set forth herein shall be furnished with each product sold incorporating Fairchild's unit as a component thereof.



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