INSTRUCTIONS FOR THE INSTALLATION, OPERATION
AND MAINTENANCE OF

FAIRCHILD MODEL 14 POSITIVE AND NEGATIVE BIAS RELAY

GENERAL INFORMATION

The Fairchild Model 14 bias relay provides for reproduction of a signal pressure plus or minus the spring bias setting.

Specifications

Model 14

Flow capacity ..... 40 SCFM (68 m³/HR) max (100 psig [7.0 BAR] (700 kPa) supply; 20 psig [1.5 BAR] (150 kPa) set point)

Exhaust capacity ..... 5½ SCFM (9.4 m³/HR) (Downstream pressure 5 psig [3.5 BAR] (35 kPa) above set pressure)

Sensitivity ..... ½" (1.25 cm) W.C.

Effect of supply pressure variation ..... Less than 0.1 psig [.007 BAR] (.7 kPa) for 100 psig [7.0 BAR] (700 kPa) change

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

Signal pressure ..... 150 psig [10.0 BAR] (1000 kPa) max.

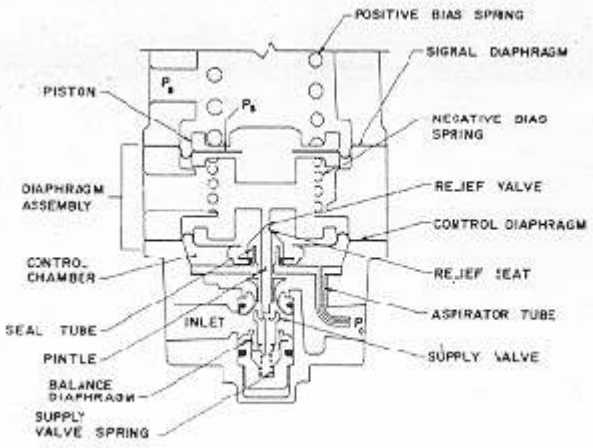
Output pressure ..... 150 psig [10.0 BAR] (1000 kPa) max

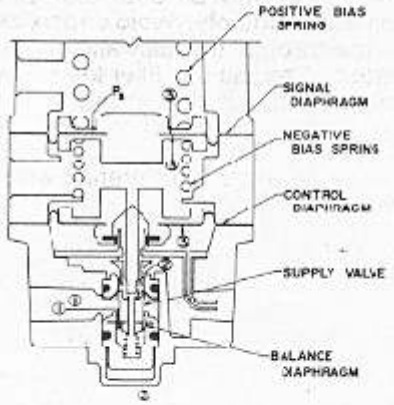
Mounting ..... Pipe or panel

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

PRINCIPLES OF OPERATION

When the knob of the Model 14 is adjusted to a specific setpoint, the range spring exerts a force against the top of the signal diaphragm. Signal pressure Ps also acts against the top of the signal diaphragm. The negative bias spring force acts against the bottom of the signal diaphragm. The combined force is the result of the sum of Ps acting on the signal diaphragm area and the range spring force, minus the negative bias spring force assisted by the supply valve spring force. The resulting output pressure Po = Ps + K1 – K2 or Ps + K where Ps is signal pressure, and K is the combined spring constant. This force keeps the relief seat against the relief valve. This condition is achieved only when output pressure reaches the desired setpoint. 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 where it is sensed on the underside of the control diaphragm. The increase in pressure on the control diaphragm causes the diaphragm assembly to move upward, sliding on the seal tube against the force of the signal pressure acting on the signal diaphragm

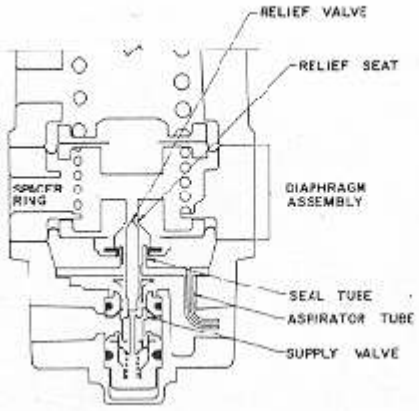




and the range spring force acting on the piston, assisted by the negative bias spring force. This force, acting through the pintle, allows the supply valve to throttle, maintaining the output pressure.

When setpoint is reached, the force acting on the bottom of the control diaphragm is in balance with the force acting on the top and bottom of the signal diaphragm.

If downstream pressure increases above setpoint, the increase is transmitted through the aspirator tube to the control diaphragm. The increased pressure acting on the control diaphragm area moves the diaphragm assembly upward, allowing the supply valve to be seated. As the diaphragm assembly continues to move upward, sliding on the seal tube, the relief seat moves away from the relief valve, allowing downstream air to exhaust through the port in the ring spacer. If downstream pressure decreases below set point, the pressure decrease is transmitted through the aspirator tube to the control diaphragm. The decrease in pressure on



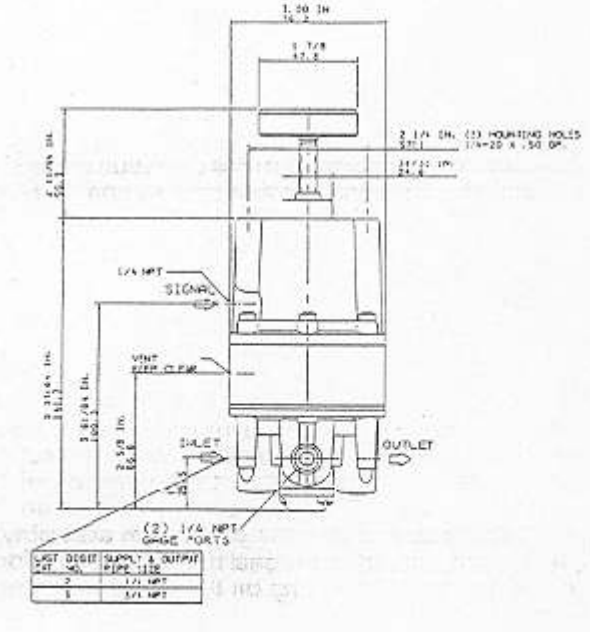
the control diaphragm causes the diaphragm assembly to move downward, lowering the relief seat against the relief valve. As the downward movement of the diaphragm assembly continues the supply valve opens, increasing downstream pressure until set point value is reached. For negative bias, the compression on the positive bias spring is relieved by backing out the knob. In this case, the negative bias spring inside the diaphragm assembly exerts an upward (or negative) force, lifting the relief seat away from the pintle, allowing downstream pressure to exhaust through the ring spacer port. In order to achieve output, the signal pressure must be greater than the resulting negative bias. The output pressure remains firm until the signal pressure reaches some value greater than the negative bias.

INSTALLATION

Clean all pipe lines 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 relay. Install relay in air line; body is fitted with a ¼" or ⅜" NPT for the inlet and outlet connections. Relay can be mounted in any position without affecting its operation. Inlet, outlet and signal connections are labelled (look for arrows denoting direction of flow on underside of unit) and should be tightened securely. Avoid undersized fittings that will limit flow through the relay and cause pressure drop downstream. The use of a filter to remove dirt and entrained liquid in the air line ahead of the relay is recommended for best performance. If an air line lubricator is used, it should be located downstream beyond the relay in order to avoid interference with the relay performance.

NOTICE

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



SERVICE KIT INSTALLATION

NOTE: Service Kit installation instructions are typical for the standard Model 14 unit. Partial exploded views are included for the Tamperproof Option components.

Also included are Option Tables which identify components which are changed from those of the Standard Model 14 unit. Blank spaces in the table mean that the Standard part is used. The designation NA in the table means that the standard part is not applicable.

FOR MODEL 14

1. Check parts in the EA-12128-(1) service kit against the parts marked with an asterisk in the exploded view and the associated table.
2. Mark Bonnet Assembly (3) and Body (10) so that the relay can be reassembled correctly.
3. Turn Knob Assembly (1) counterclockwise to release compression on Range Spring (5).

FOR MODEL 14 TAMPERPROOF

1. Check parts in the EA-12128-(1) service kit against the parts marked with an asterisk in the exploded view and the associated table.
2. Mark Body (8) and Bonnet Assembly (15) so that they can be reassembled properly.
3. Remove Nut (1A). Turn Range Screw (2B) counterclockwise to release pressure on the Range Spring (5).

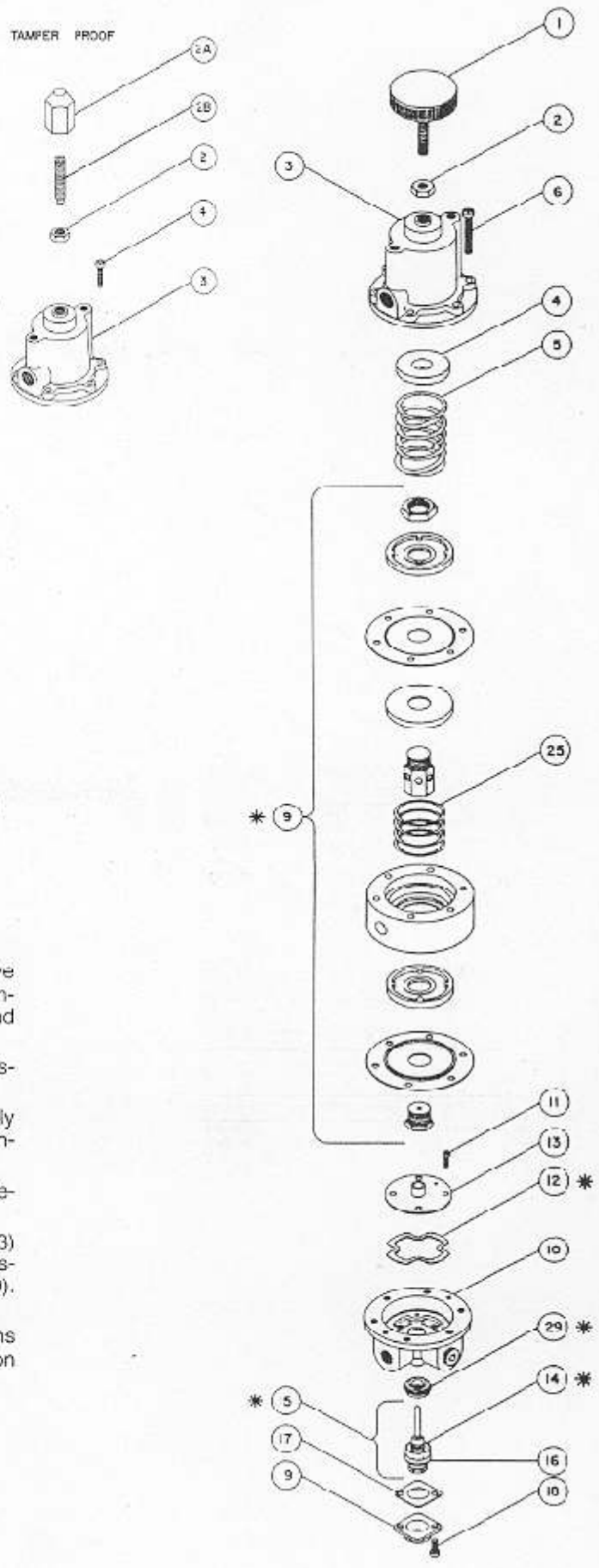
FOR ALL MODEL 14 RELAYS

4. Remove six Screws (6) holding the Bonnet Assembly (3) and Diaphragm Assembly (9) to Body (10).
5. Remove Bonnet Assembly (3), Spring Seat (4) and Spring (5) and set aside.
6. Remove Diaphragm Assembly (9) and discard.
7. Remove two Screws (18) holding Retainer Plate (17) and Retainer Cap (19) to Body (10). Set aside Plate (17) and Cap (19).
8. Press out Inner Valve Assembly (15) and Screen (14) from the top of Body (10).
9. Remove four Screws (11) holding Seal Plate Assembly (13) to Body (10). Remove Seal Plate Assembly (13) and set aside. Remove gasket (12) and discard.
10. Using a soft hammer or dowel rod, press out Seat Assembly (29) from Body (10) and discard.
11. Secure Seat Assembly (29) from service kit and place into bottom bore of Body (10) brass end first until it is sealed in the bottom of the center bore.
12. Turn Body (10) right side up and place Gasket (12) into center well so that indents in the gasket are opposite the four tapped holes.
13. Place Seal Plate Assembly (13) into Body (10) so that aspirator extends into the OUT port of the Body (10) and four holes in Seal Plate Assembly (13) are aligned with four holes in Body (10). Secure Seal Plate Assembly (13) to Body (10) using four Screws (11).

Index	Part No.	Description
1	EB-4124-1	Knob Assembly
1A	EB-7057-2	Cap Nut
2	EB-1120	Lock Nut
2A	EB-1120	Nut
2B	EB-8159-16	Adjusting Screw
3	EB-1895	Bonnet Assembly
4	EB-6058	Spring Seat
5	See Table	Spring
6	EB-1032-32	Screw
*9	See Table	Diaphragm Assembly
10	EB-6050	Body
*11	EB-1032-5	Screw
*12	EB-6053	Gasket
13	EB-1948-1	Seal Plate Assembly
*14	EB-6017	Screen
*15	See Table	Inner Valve Assembly
16	EB-7156	O Ring
17	EB-6027	Retainer Plate
18	EB-1032-6	Screw
19	EB-7136	Retainer Cap
25	EB-8891	Spring
*29	EB-6070	Seat Assembly

*EA-12128 Service Kit components

Range psig	[BAR]	(kPa)	Spring
–15 to 2	[–1.0 to .15]	(15)	EB-6060-20
–15 to 10	[–1.0 to .7]	(70)	EB-6060-30
–15 to 30	[–1.0 to 2.0]	(200)	EB-6060-60
–15 to 100	[–1.0 to 7.0]	(700)	EB-6060-150



14. Place screen (14) from service kit into groove of Inner Valve Assembly (15) from service kit. Place Inner Valve Assembly (15) into bottom bore of Body (10), pintle end first and press in until it seats.
15. Secure Retainer Plate (17) and Cap (19) to Body (10) using two Screws (18).
16. Turn Body (10) right side up. Place Diaphragm Assembly (9) on Body (10), aligning six holes in Diaphragm Assembly (9) with six holes in Body (10).
17. Center Spring (5) on Diaphragm Assembly (9). Place Retainer (4) on top of Spring (5).
18. Using marks made in step 2, align Bonnet Assembly (3) with Body (10). Use six Screws (6) to fasten Bonnet Assembly (3) and Diaphragm Assembly (9) to Body (10). Reinstall Cap (1A) to tamperproof unit.
19. Reinstall the relay in accord with installation instructions in the IOM and follow instructions in the operation section for placing the relay back in service.

ADJUSTMENTS

There are no field adjustments required.

OPERATION

Relieve pressure on range spring before putting relay into service for the first time. To operate, turn the adjusting screw slowly in a clockwise direction until required positive bias setting is obtained. Turned in this direction, the screw compresses the range spring causing increased output pressure. For decreased output pressure or negative bias setting, turn the screw counterclockwise.

MAINTENANCE

The relay is easily disassembled for the occasional cleaning or removal of foreign matter. Before this is done, however, shut off valve upstream of the relay to prevent escape of air when relay is disassembled. There is no need to remove the relay from the pipe line; remove the two No. 10-32 screws on the bottom of the unit and pull out the inner valve assembly. Wash inner valve assembly with solvent exercising care to avoid damaging diaphragms and valve facings. Replace assembly carefully.

The vent hole in the body of the relay should be kept clear. A slight flow of air through this hole is necessary for the proper operation of the relay.

The adjusting screw should be lubricated with Molycote type "G" grease.

TROUBLE SHOOTING

PROBLEM	CHECK
Leakage	Body screw tightness Diaphragm
High Bleed	Relief pintle and relief seat for damage or contamination
Difficult to Adjust	Adjusting screw and ball Seal ring lubrication

REPAIR PARTS LIST

Service Kits are available for maintenance of the Model 14 relay.

EA-12128-1	Standard
EA-12128-2	Non-Releiving (N)
EA-12541	Silicone Parts
EA-12542	Viton Parts

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.

ISO 9001:2000 Certified

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