

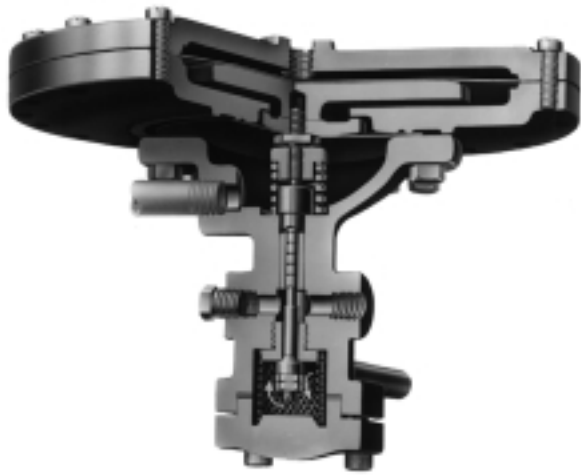


A division of CIRCOR International, Inc.

Technical Data

SD 4011

SPENCE ENGINEERING COMPANY, INC. 150 COLDENHAM ROAD, WALDEN, NY 12586-2035



TYPE A73 PILOT

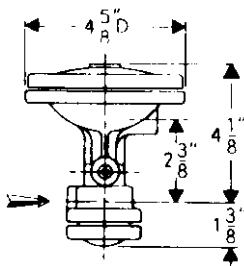
TYPE A SERIES AIR ADJUSTED PILOT

The A Series Pilots, when combined with a Spence Main Valve, will control a steady or varying inlet pressure to a constant delivery pressure. The pilots can control either pressure or temperature.

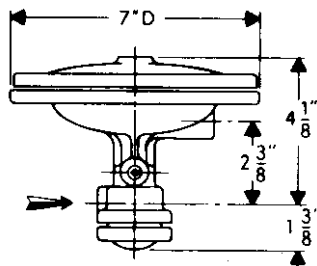
When used as a pressure reducing valve with an A or B Panel, the A Series pilot offers all the advantages of a pilot operated regulator plus the advantage of controlling the regulator from a remote point. When used with a pneumatic controller such as the P60 or T60, the regulator is an indicating pneumatic pressure or temperature controller with P.I. modes.

RATINGS (Maximum Inlet Conditions)

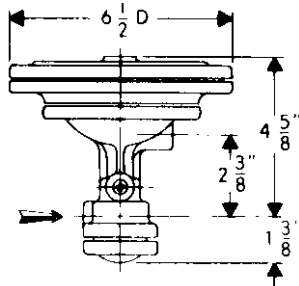
Construction	Pressure	(Temperature)
Cast Iron	250 PSIG	450°F
Cast Bronze	250 PSIG	450°F
Cast Steel	600 PSIG	600°F



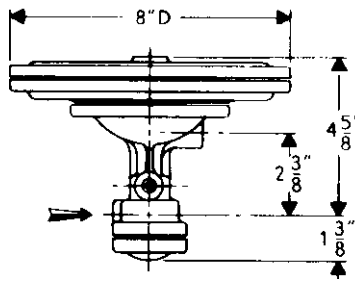
Type A or A83
(wt 6 lb)



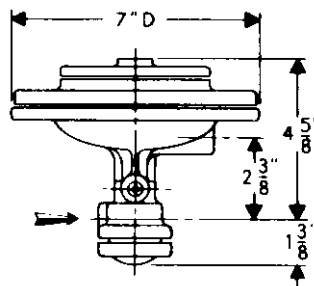
Type A82
(wt 11 lb)



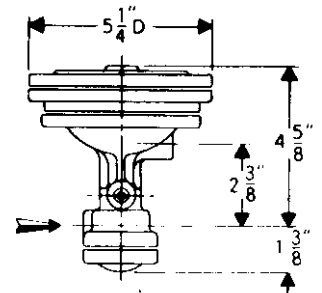
Type A53 or A85
(wt 112 lb)



Type A73 or A70
(wt 15 lb)



Type A35
(wt 14 lb)



Type A43, A46, A84 or A86
(wt 11 lb)

OPERATING PRINCIPLE

The regulator is operated by initial steam or fluid pressure. It is normally closed, being held so by initial pressure on the disc and by an internal main spring. When the pilot is opened, initial pressure flows through the pilot to the 8B tee. Bleedport 4A restricts the flow and pressure builds under the diaphragm and opens the main valve. The 5A restriction elbow steadies the operation of the regulator.

Delivery pressure feeds back through the control pipe to the pilot diaphragm. As this pressure approaches a balance with the air loading signal, the pilot throttles the loading pressure. In turn, the main valve takes a position established by the loading pressure where just enough steam flows to maintain the set delivery pressure. For temperature control, refer to SD for temperature pilot.

SD 4011/9504

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INSTALLATION

PLANNING

Locate the regulator in a horizontal pipe. Prevent water hammer and erratic operation by providing a trap ahead of the regulator. Avoid damaging effects of scale and dirt in pipelines by using a strainer to protect the regulator. Provide a three valve bypass to facilitate inspection of the regulator without interrupting service.

MAIN VALVE

Flush the main piping system thoroughly to clear it of welding beads, scale, sand, etc. Mount main valve with diaphragm chamber down and arrow on body pointing in the direction of flow. Screwed end valve should be mounted in unions.

PILOT

Mount the pilot on either side of the main valve by means of a 1/4" nipple and union provided. Make this connection to the 1/4" pipe tap on the inlet of the main valve. Screw 4A bleedport fitting into 1/8" pipe tap on the outlet of the main valve body. **NOTE: Bleed orifice in this fitting is vital to operation of regulator.** Screw 8B tee into 1/8" pipe tap in pilot. Select tap facing downstream. Screw 5A elbow containing restriction orifice into 1/8" pipe tap on underside of main valve diaphragm chamber. If initial pressure or pressure drop is less than 15 psi, a 5B open elbow without orifice is used. Connect tubing bends as illustrated in Figure 2.

CONTROL PIPE

Use 1/4" pipe for this line which connects the pilot diaphragm chamber to the desired point of pressure control. On instantaneous heaters with steam in the shell, tap the

control pipe into shell. (See Figure 1) Otherwise, enter delivery steam pipe at point of entrance to heater. Pitch the control pipe away from the pilot and avoid water pockets. Locate delivery pressure gage in control pipe to show pressure actually reaching pilot diaphragm. Use a compound gage.

INSULATION

Insulation may be applied to the upper portion (globe and flanges) of the main valve. Do not insulate the diaphragm chamber, condensation chamber (if used) or any part of pilot.

RECOMMENDED INSTALLATION

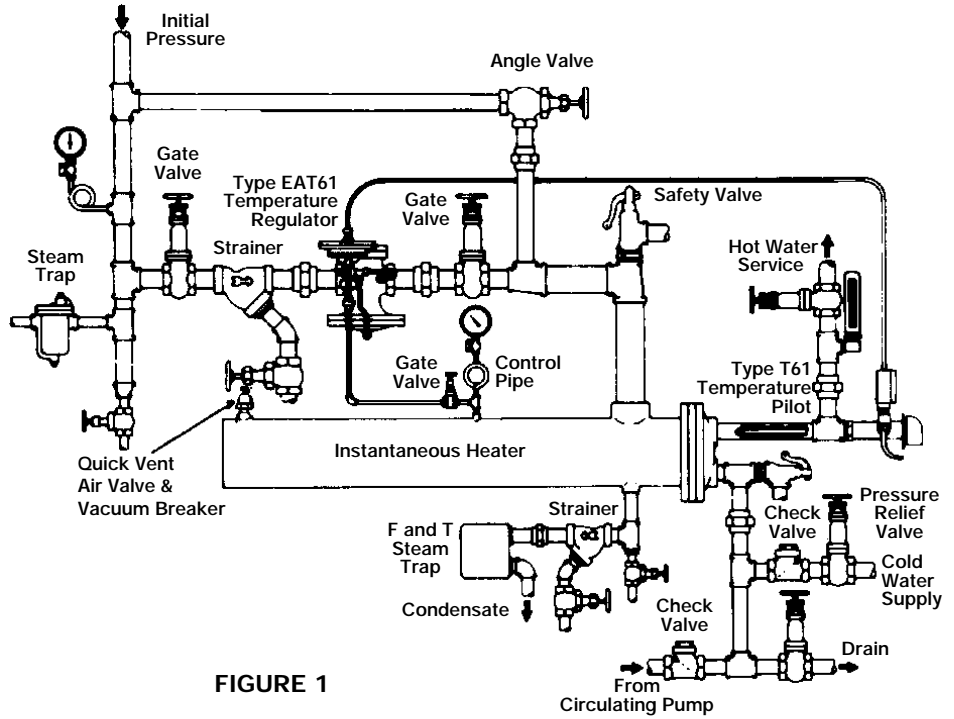


FIGURE 1

START-UP AND SETTING

For pressure reduction, refer to the SD covering the main valve. The instructions for the A Pilot are the same except that they are air loaded instead of spring loaded. For temperature control, refer to the SD covering the temperature pilot.

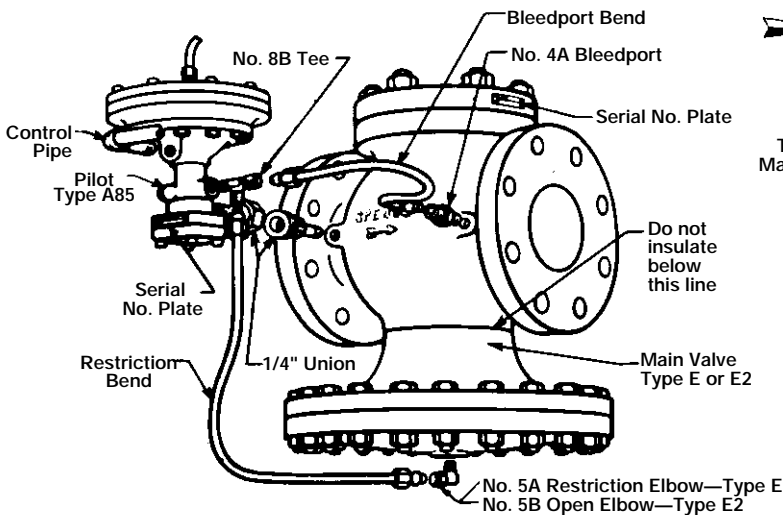


FIGURE 2

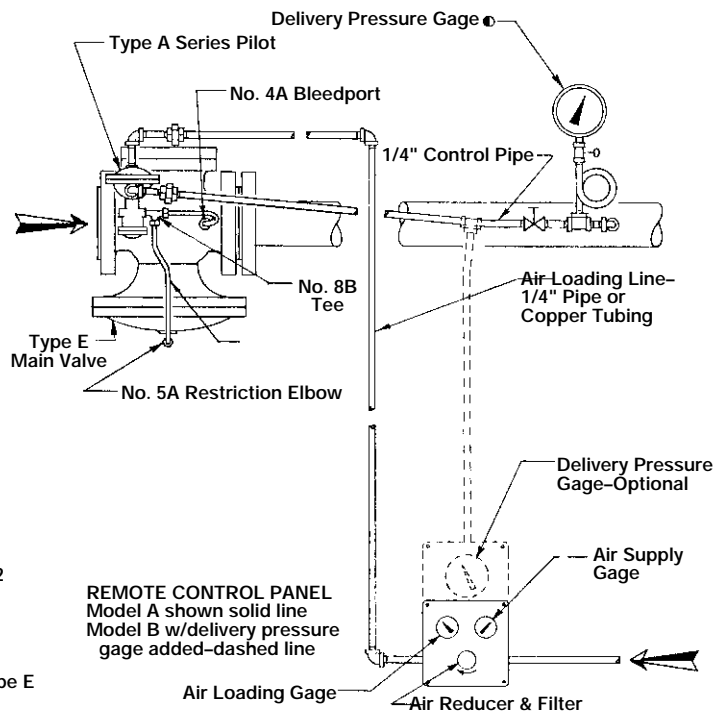


FIGURE 3

MAINTENANCE

DISMANTLING

- 1 - Remove diaphragm nuts and lift off cowl. Lift out diaphragm assembly.
- 2 - Disassemble diaphragm assembly by removing diaphragm screw from pressure plate.
- 3 - Remove blind flange bolts and take off blind flange. Remove screen and gasket.
- 4 - Hold the pusher plate and remove stem nuts. Lift out stem assembly and valve spring. The disc will drop off.
- 5 - If the seat ring requires replacement, remove it from pilot body with a socket wrench.

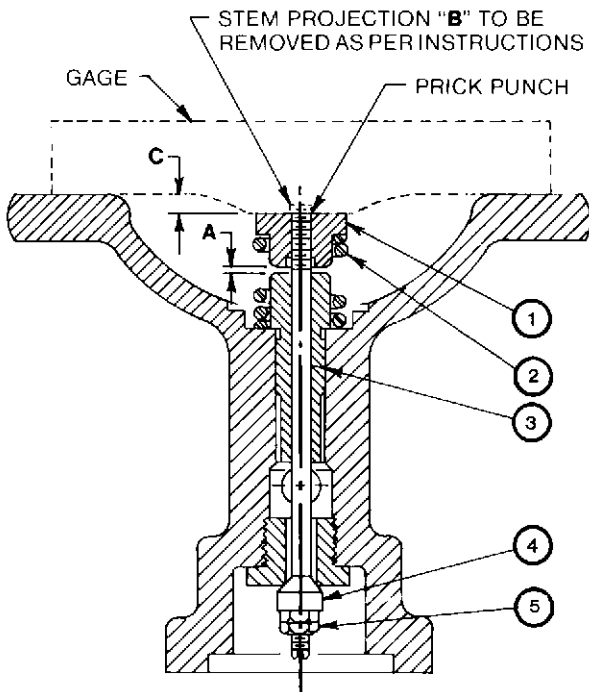


FIGURE 4 - TRAVEL SETTING
All A Series Pilots except A

ASSEMBLY

- 1 - Reassembly the pilot in the reverse of the procedure described above.
- 2 - When replacing diaphragms, apply sealing compound (Copaltite or equal) sparingly to the shoulder of the diaphragm screw. For steel pilots only, apply sealing compound to the diaphragm flange of the pilot body.
- 3 - When replacing gaskets, be sure that any serrated sealing surfaces are cleaned of old gasket material.

INSPECTION

- 1 - Examine the seat and disc sealing surfaces for nicks or other signs of damage by pipeline debris. Slight imperfections may be removed by lapping the surfaces together. Otherwise, the seat and disc must be replaced.
- 2 - Examine the stem for a buildup of pipeline contaminants or erosion. Remove any buildup with a wire brush and polish with very fine crocus cloth. Work carefully to avoid bending the stem.

LAPPING OPERATIONS

Lap sparingly using 500 grit lapping compound and light pressure. Heavy grinding may cause galling, wide sealing surfaces and a grooved disc. all of which tend to produce leakage.

After the sealing surfaces are lapped in, disassemble and clean all parts.

SEAT, DISC AND STEM REPLACEMENT

- 1 - Clean the body threads of old sealing compound using a wire brush. Apply new sealing compound (Copaltite or equal) to the shoulder of seat ring. Let stand until tacky before installing in pilot body.
- 2 - Lap in stem to disc joint with lapping compound.
- 3 - Secure disc (4) to stem (3) with a stem nut (5). Insert this assembly into pilot body (omit valve spring).
- 4 - Apply lapping compound to the disc and lap in the seat to disc joint. The stem is slotted for rotation with a screwdriver.
- 5 - Screw pusher plate (1) on stem (3). Holding disc against its seat, adjust the pusher plate so that dimension C = 11/64" (See Figure 4 or 5).
- 6 - Remove stem nut, being careful not to disturb the pusher plate adjustment, and lift stem out the top of the pilot. Grind off stem Projection B flush with upper surface of the pusher plate.
- 7 - Reinsert stem into pilot body. Install disc and stem nut. Check dimension C and, if correct, lock the adjustment by prick punching the thread at several points. Work carefully to avoid bending the stem.
- 8 - Scrape away burrs raised by prick punching. Upper surface of pusher plate must be smooth and flat.
- 9 - Check that valve travel A = 3/64". This need not be exact. Stem should move smoothly. Binding indicates a bent stem.

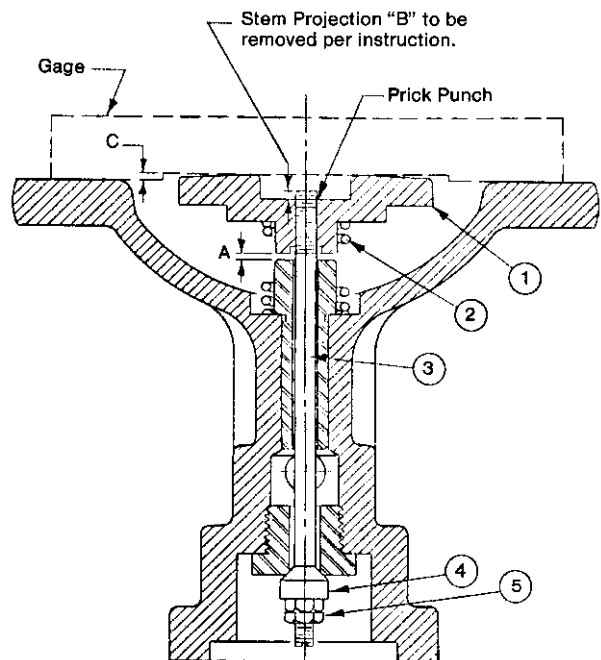
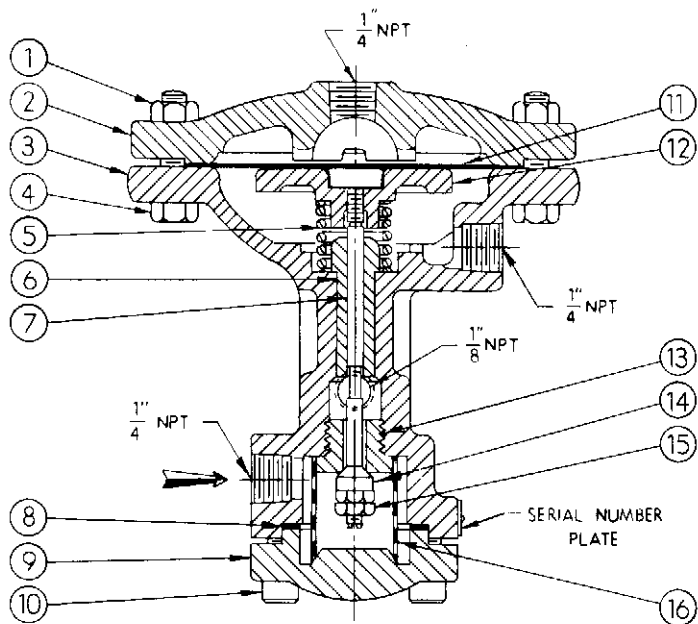


FIGURE 5 - TRAVEL SETTING
A Pilot only

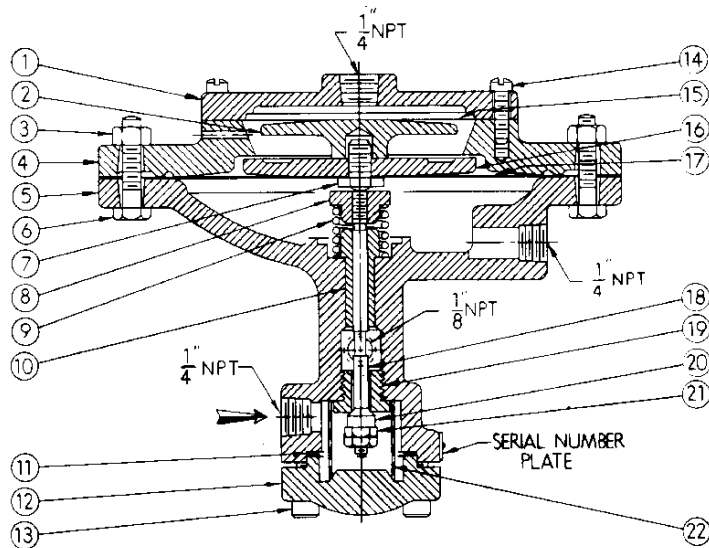


TYPE A PILOT

TYPE A, A82 & A83 PARTS

ITEM NO.	PART NAME	MATERIAL	PART NO.
1	Diaphragm Nut	Steel	05-02871-00
2	Hood, A & A83	Iron	04-02563-00
	Hood, A & A83	Bronze	04-02565-00
	Hood, A & A83	Steel	04-02564-00
	Hood, A82	Iron	04-02600-00
3	Body & Bushing, A & A83	Iron	07-03514-00
	Body & Bushing, A & A83	Bronze	08-04265-00
	Body & Bushing, A & A83	Steel	07-04267-02
	Body & Bushing, A82	Iron	08-04698-00
	Body & Bushing, A82	Bronze	08-04699-00
4	Diaphragm Bolt	Steel	05-04764-00
	Diaphragm Nut	Steel	05-02871-00
5	*Valve Spring	Inconel	05-04985-00
6	Bushing (see item 3)	St. Steel	04-01080-00
7	*Stem	St. Steel	04-05229-00
8	*Gasket, Iron & Bronze Bodies	Non-asbestos	05-02378-00
	*Gasket, Steel Bodies	Flexitalic	05-11718-00
9	Blind Flange	Iron	04-02151-00
	Blind Flange	Bronze	04-02153-00
	Blind Flange	Steel	04-11678-00
10	Blind Flange Bolt, Iron & Bronze Bodies	Steel	05-04803-00
	Blind Flange Bolt, Steel Bodies	Steel	05-11719-00
11	*Diaphragm, A (2 required)	St. Steel	04-01626-00
12	*Pusher Plate, A, Iron & Bronze Bodies	Iron	04-03728-00
	*Pusher Plate, A, Steel Bodies	Steel	04-09520-00
13	*Seat Ring	St. Steel	04-04057-90
14	*Disc	St. Steel	04-01772-90
15	*Stem Nut	Steel	05-02888-00
16	Screen, Water	Monel	04-04701-00
	Screen, Heavy Oil	Monel	04-04702-00
	*Screen, Steam	Monel	04-04700-00
17	Pipe Plug, 1/8 NPT (not shown)	Steel	04-03769-00
	Pipe Plug, 1/8 NPT (not shown)	Brass	04-03770-00
18	*Diaphragm Screw Nut, A82 & A83	Steel	04-02925-00
19	*Diaphragm Screw, A82 & A83	Steel	04-04819-00
20	*Diaphragm, A82 (2 required)	St. Steel	04-03927-00
	*Diaphragm, A83 (2 required)	St. Steel	04-01623-00
21	Floating Plate, A82	Iron	04-03638-00
	Floating Plate, A83	Iron	04-03710-00
22	*Vacuum Spring, A82 & A83	St. Steel	05-05055-00
23	*Pusher Plate, A82 & A83	Steel	04-08177-00

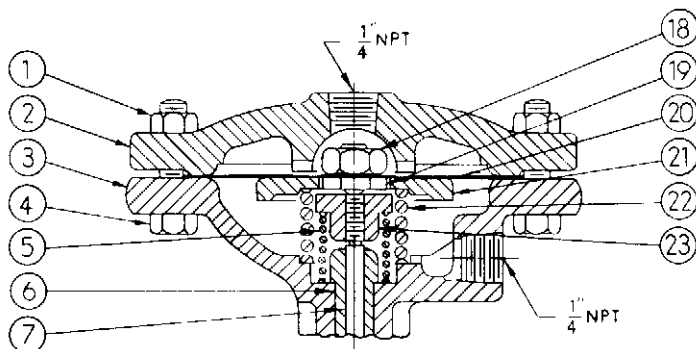
*These parts furnished in Repair Kit



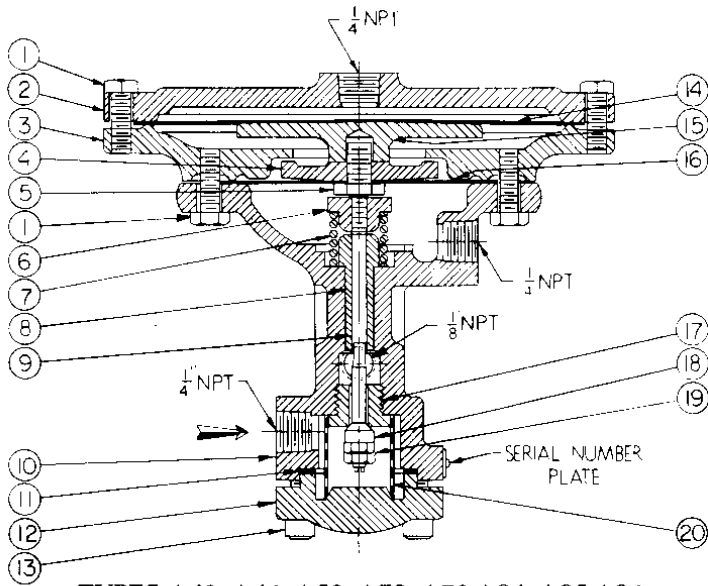
TYPE A35 PILOT

TYPE A35 PARTS

ITEM NO.	PART NAME	MATERIAL	PART NO.
1	Hood	Iron	04-02623-00
2	Loading Pressure Plate	Iron	04-03641-00
3	Diaphragm Nuts	Steel	05-02871-00
4	Cowl	Iron	04-01540-00
5	Body & Bushing	Iron	08-04698-00
	Body & Bushing	Bronze	08-04699-00
6	Control Diaphragm Bolts	Steel	05-04764-00
	Control Diaphragm Nuts	Steel	05-02871-00
7	*Diaphragm Screw	Steel	04-04821-00
8	*Pusher Plate	Steel	04-03718-00
9	*Valve Spring	Inconel	05-04985-00
10	Bushing	St. Steel	04-01080-00
11	*Gasket	Non-asbestos	05-02378-00
12	Blind Flange	Iron	04-02151-00
	Blind Flange	Bronze	04-02153-00
13	Blind Flange Bolts	Steel	05-04803-00
14	Loading Diaphragm Bolts	Steel	05-04832-00
15	*Loading Diaphragms (2 req'd)	St. Steel	04-01626-00
16	*Control Pressure Plate	Iron	04-03684-01
17	*Control Diaphragm (2 req'd)	St. Steel	04-03927-00
18	*Stem	St. Steel	04-05229-00
19	*Seat Ring	St. Steel	04-04057-00
20	*Disc	St. Steel	04-01772-00
21	*Stem Nut	Steel	05-02888-00
22	*Screen-Steam	Monel	04-04700-00
	Screen-Heavy Oil	Monel	04-04702-00
	Screen-Water	Monel	04-04701-00
23	Pipe Plug 1/8 NPT (not shown)	Steel	04-03769-00
	Pipe Plug 1/8 NPT (not shown)	Brass	04-03770-00



TYPES A82 and A83 PILOTS



TYPES A43, A46, A53, A70, A73 A84, A85 A86 and A87 PILOTS

When ordering parts, it is essential that the pilot type, service and serial number be stated.

Select part by item number, but order by part number. Specify complete part number when ordering.

REPAIR KITS

PILOT NAME	IRON & BRONZE PART NUMBER	STEEL PART NO.
A	08-08115-00	08-10372-00
A35	08-08552-00	—
A82	08-09107-00	—
A83	08-09108-00	08-10360-00
A43, A46	08-08175-00	08-10370-00
A53	08-08117-00	08-10369-00
A70	08-09106-00	08-10362-00
A73	08-08178-00	08-10368-00
A84	08-08179-00	08-10367-00
A85	08-08180-00	08-10366-00
A86	08-08181-00	08-10365-00
A87	08-08182-00	08-10364-00

TYPE A43, A46, A53, A70, A73, A84, A85, A86, A87 PARTS

ITEM NO.	PART NAME	MATERIAL	PART NO.
1	Loading & Control Diaphragm Bolt Control Diaphragm Bolts, A70	Steel Steel	05-04809-00 05-04837-00
2	Hood, A43, A84 Hood, A53, A85 Hood, A73, A87, A70 Hood, A46, A86	Iron Iron Iron Iron	04-02622-00 04-02621-00 04-02620-00 04-02624-00
3	Cowl, A43, A84, Iron & Bronze Bodies Cowl, A53, A85, Iron & Bronze Bodies Cowl, A73, A87, Iron & Bronze Bodies Cowl, A70, Iron & Bronze Bodies Cowl, A46, A86, Iron & Bronze Bodies Cowl, A43, A84, Steel Bodies Cowl, A53, A85, Steel Bodies Cowl, A73, A87, Steel Bodies Cowl, A46, A86, Steel Bodies Cowl, A70, Steel Bodies	Iron Iron Iron Iron Iron Duct. Iron Duct. Iron Duct. Iron Duct. Iron Duct. Iron	04-01538-00 04-01536-00 04-01534-00 04-01510-00 04-01541-00 04-01539-00 04-01537-00 04-01535-00 04-04583-00 04-01511-00
4	*Control Pressure Plate *Control Pressure Plate, A70	Steel Steel	04-03679-00 04-08432-00
5	*Diaphragm Screw	Steel	04-04821-00
6	*Pusher Plate	Steel	04-03718-00
7	*Valve Spring *Valve Spring, A70	Inconel Inconel	05-04985-00 05-05197-00
8	Bushing (see item 10)	St. Steel	04-01080-00
9	*Stem	St. Steel	04-05229-00
10	Body & Bushing Body & Bushing Body & Bushing Body & Bushing, A70 Body & Bushing, A70	Iron Bronze Steel Iron Steel	07-03514-00 08-04265-00 07-04267-02 08-04801-00 08-04803-01
11	*Gasket, Iron & Bronze Bodies *Gasket, Steel Bodies	Non-asbestos Flexitalic	05-02378-00 05-11718-00
12	Blind Flange Blind Flange Blind Flange	Iron Bronze Steel	04-02151-00 04-02153-00 04-11678-00
13	Blind Flange Bolt, Iron & Bronze Bodies Blind Flange Bolt, Steel Bodies	Steel Steel	05-04803-00 05-11719-00
14	*Loading Diaphragm, A43, A46, A84, A86 (2 req'd) A53, A85 (2 req'd) A73, A87, A70 (2 req'd)	St. Steel St. Steel St. Steel	04-01629-01 04-01632-00 04-01635-00
15	Loading Pressure Plate, A43, A84 Loading Pressure Plate, A53, A85 Loading Pressure Plate, A70, A73, A87 Loading Pressure Plate, A46, A86	Iron Iron Iron Iron	04-03641-00 04-03640-00 04-03639-00 04-03642-00
16	Control Diaphragms (2 req'd) *Control Diaphragms, A70 (4 req'd)	St. Steel St. Steel	04-01623-00 04-01620-00
17	*Seat Ring	St. Steel	04-04057-90
18	*Disc	St. Steel	04-01772-90
19	*Stem Nut	Steel	05-02888-00
20	*Screen, Steam Screen, Heavy Oil Screen, Water	Monel Monel Monel	04-04700-00 04-04702-00 04-04701-00
21	Pipe Plug, 1/8 NPT (not shown) Pipe Plug, 1/8 NPT (not shown)	Steel Brass	04-03769-00 04-03770-00
22	*Floating Plate, A84, A85, A86, A87	Steel	04-03710-00
23	*Vacuum Spring, A84, A85 *Vacuum Spring, A86 *Vacuum Spring, A87	St. Steel St. Steel St. Steel	05-05055-00 05-04970-00 05-04968-00
24	*Pusher Plate, A84, A85, A86 *Pusher Plate, A87	Steel Steel	04-08177-00 04-07070-00

*These parts furnished in Repair Kit

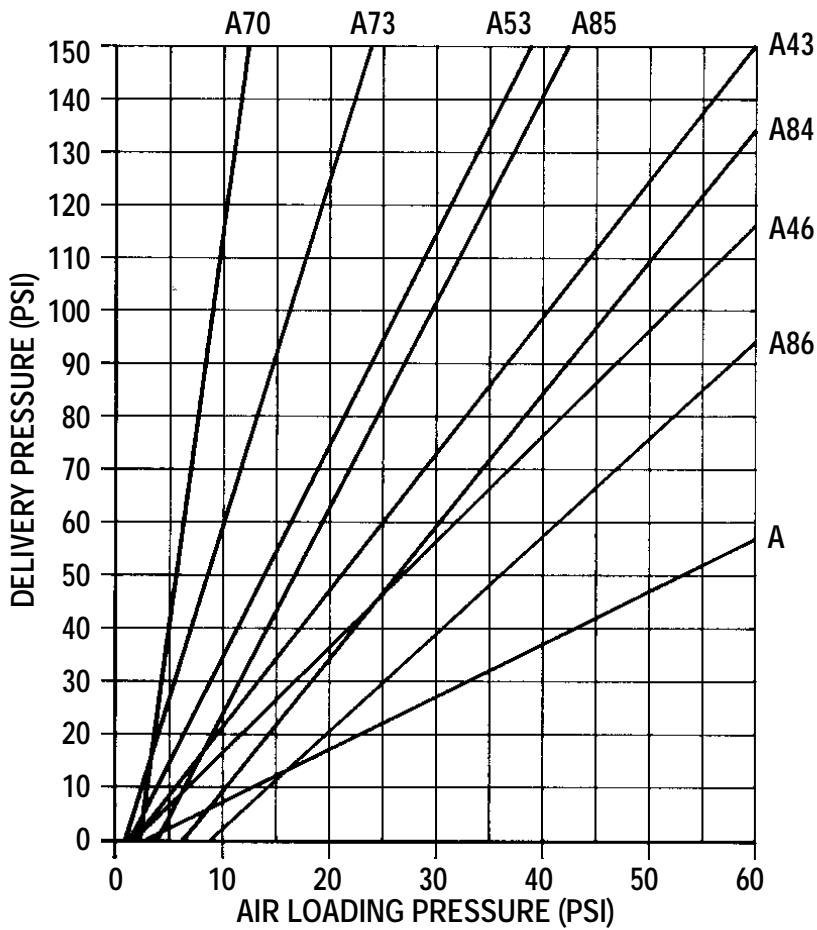


FIGURE 6
Response Curves for Pilots for positive pressure

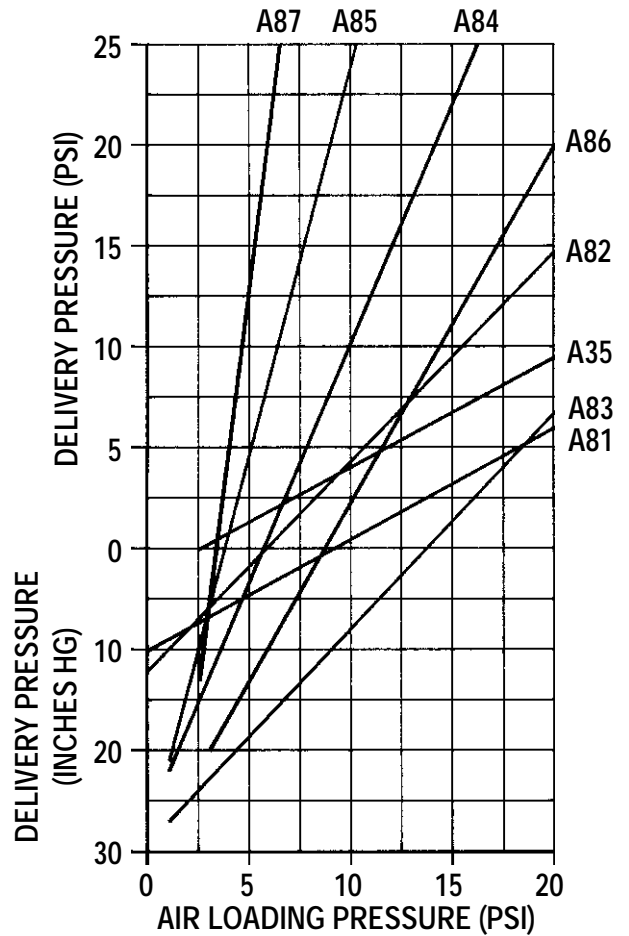


FIGURE 7
Response Curves for Pilots for vacuum & pressure

PANEL BOARD DIMENSIONS

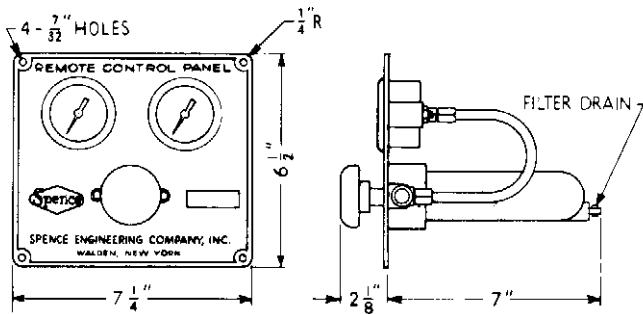


FIGURE 8
Type A Panel (cut out 5 1/4" high by 6" wide)

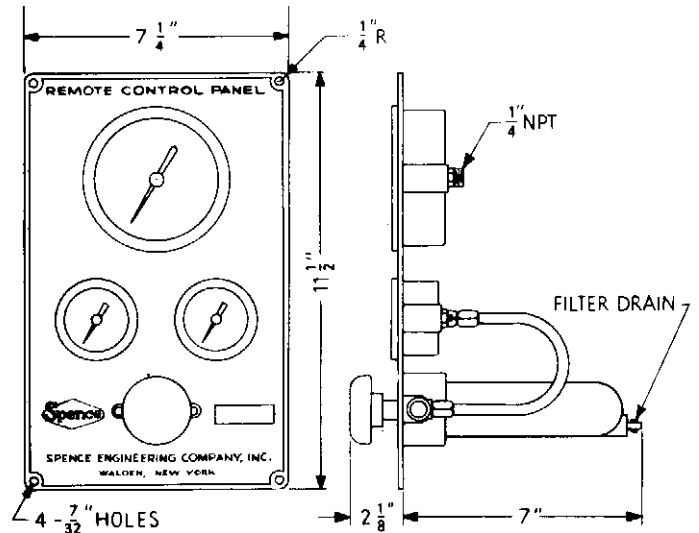


FIGURE 9
Type B Panel (cut out 10 1/4" high by 6" wide)

Air adjustment panels are available in two models as illustrated. Model A includes an air adjusting valve incorporating its own bleed and two gages: one for the supply air, the other to indicate the adjusting air. It is complete and ready to be mounted directly on a control board or box.

Model B is the same as Model A with the exception that it has, in addition, a gage indicating the delivery pressure. The air filter regulator bleeds only on a lowering of the pressure set point.