

## RP975A Pneumatic Hesitation Relay

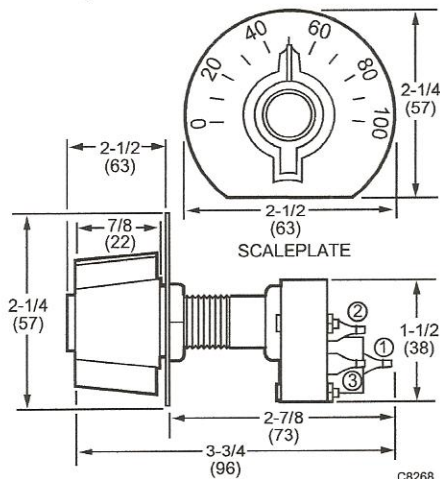
### INSTALLATION INSTRUCTIONS

#### DESCRIPTION

The RP975A is a special three-port pneumatic hesitation relay that provides ASHRAE Cycle II control to a damper operator in large-volume unit ventilation applications.

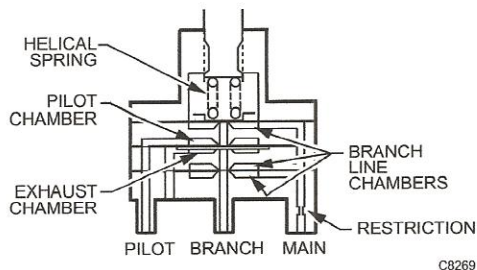
The scaleplate is marked from 0 to 100, and the knob rotates 180 degrees limited by breakaway stops. This represents an output pressure range from 7 to 12 psi (48 to 83 kPa.)

Fig. 1 shows approximate dimensions in inches (millimeters).



**Fig. 1. Dimensions of RP975A with scale plate and knob.**

Fig. 2 shows a cutaway of the RP975A.

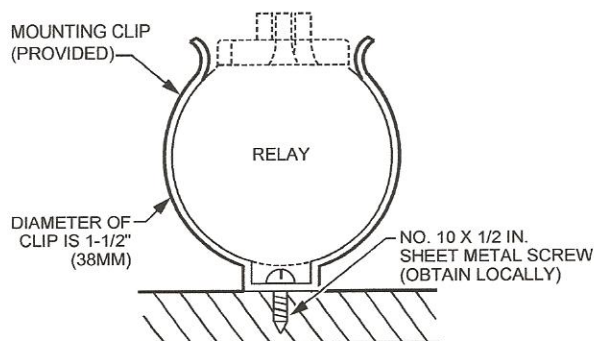


**Fig. 2. RP975A Components.**

#### INSTALLATION

##### Mounting

Suspend on tubing or mount on a surface. See Fig. 3. Use a 1-1/2 in. (38 mm) dia. metal spring clip (supplied) and one No. 10 mounting screw (locally purchased). The RP975A ships with a scaleplate and attached knob.



**Fig. 3. Surface mounting the RP475A with a spring clip.**

##### Piping

Fig. 4. shows adaptation piping. All connections are sharp barb 5/32 in. (4 mm) O.D. polyethylene tubing.



#### CAUTION

To prevent damage to the sharp barb connections, do not attempt to cut or pull tubing. To remove the tubing from the barb connections, cut tubing a few inches from the control device. Use a coupling to reconnect tubing.

NOTE: If the system is other than copper or polyethylene tubing, adapt as shown in Fig. 4.

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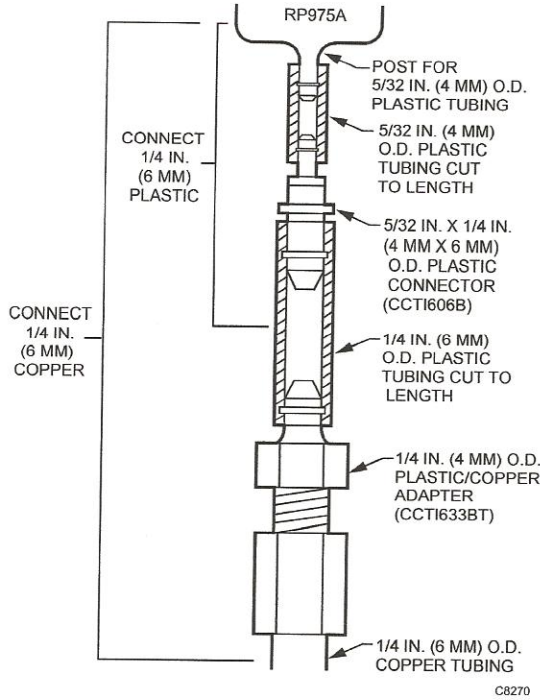


Fig. 4. Adaptation piping.

Table 1. Port Identification

	RP975A
MAIN (Supply Port)	1
BRANCH (Output Port)	2
PILOT (Input Port)	3

**Checkout and Test**

Rotate the knob clockwise to increase start-point pressure output. A steady increase of pilot pressure above minimum position pressure brings about a directly proportional increase in output pressure.

**ENGINEERING DATA**

**Specifications**

**Model:**  
 RP695A Pneumatic Hesitation Relay

**Operating Pressure (Switch and Pilot) Range:**

- Normal Main: 18 psi (90 kPa)
- Maximum Safe Main: 30 psi (207 kPa)
- Branch Output (Port 2): 0 to 18 psi (0 to 124 kPa)
- Pilot Input (Port 3): 0 to 18 psi (0 to 124 kPa)

**Ambient Operating Limits:**

- Temperature: 0 to 140°F (-18 to 60°C)
- Relative Humidity: 5 to 95%

**Output:**

Factory calibrated for 7 to 12 psi (48 to 83 kPa), manually adjustable; may be field recalibrated for any 5 psi (34 kPa) span in the 0 to 18 psi (0 to 124 kPa) range.

**Air Consumption:**

0.022 scfm max. (10 ml/s)

**Construction:**

Molded plastic, neoprene diaphragms, steel spring and shaft

**Operation**

Main air flows through a 0.007 in. (0.18 mm) restriction in Port 1 into the two branch chambers (Fig. 5A.) When pilot pressure force is less than the spring force, the air that enters the lower branch chamber flows out of the exhaust port. When pilot pressure exceeds approximately 1.5 psi (10 kPa), internal Port A between the lower branch chamber and the exhaust chamber closes and Port B in the pilot chamber opens at one end only (Fig. 5B). Branchline pressure then begins to increase up to the spring setting.

At the pressure dictated by the knob setting (7 to 12 psi [48 to 83 kPa]), the branchline pressure in the upper branch chamber overcomes the spring and opens Port C (Fig. 5C). Excess air from the branch line flows out the pilot port because the pilot pressure is less than the branchline pressure. (Note the similarity to the SP970A and B with exhaust air flowing out the pilot line. You cannot use a restricted pilot line.) If pilot pressure increases above the knob setting, pilot air flows into the branch chamber until the branch line pressure equals the pilot pressure. Then the excess bleed air again exhausts through the pilot (Fig. 5D.)

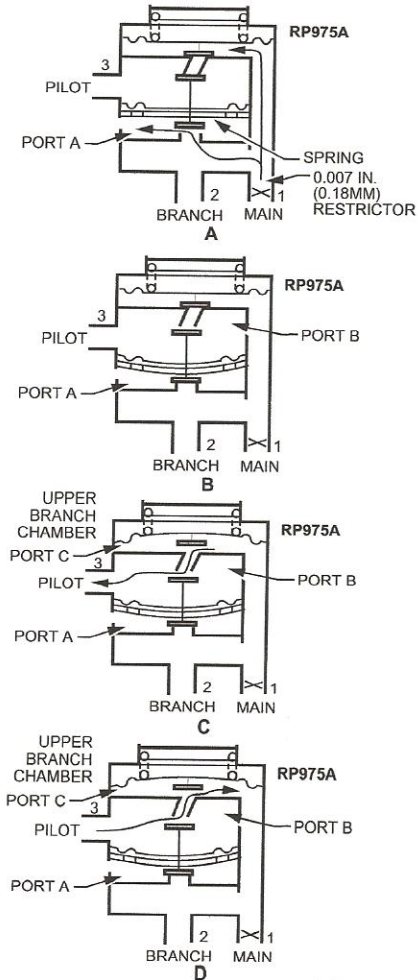


Fig. 5. RP975A Operation.

The scaleplate is marked from 0 to 100 for a knob rotation of 188 degrees. This represents minimum position output pressures from 7 to 12 psi (48 to 83 kPa.). See Fig. 6.

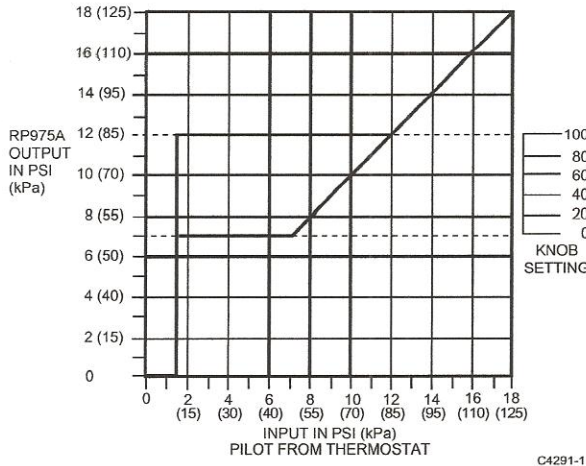


Fig. 6. RP975A output pressure according to knob setting.

**Application(s)**

Fig. 7 shows a typical hookup for the RP975A and a pneumatic damper actuator. When thermostat branchline pressure exceeds 1.5 psi (10 kPa), the damper actuator goes to a preset minimum position determined by knob setting. When thermostat branchline pressure reaches the setting of the RP975A, the thermostat controls the damper actuator. When the thermostat branchline pressure drops below the RP975A setting, the damper drops to the minimum position and stays there until the thermostat branchline pressure drops below 1.5 psi (10 kPa); then the output of the hesitation relay drops to zero.

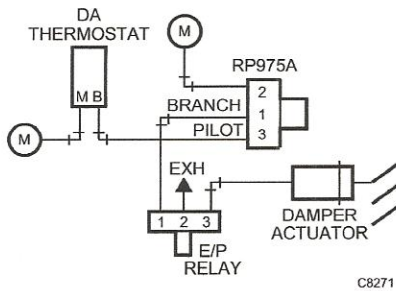


Fig. 7. RP975A application in a restricted branch line circuit.

When a restricted branch line is involved in an existing application (Fig. 8), it is possible to modernize and update the system using an RP975A Hesitation Relay in conjunction with an RP470B relay piped as a repeater to achieve the same control.

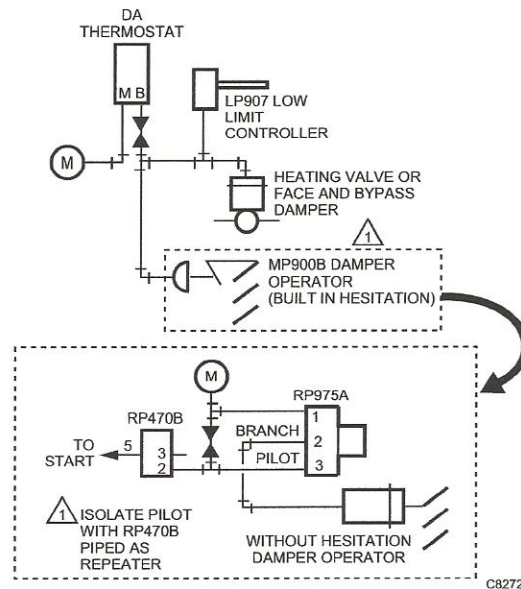


Fig. 8. RP975A application in a restricted branch line circuit.

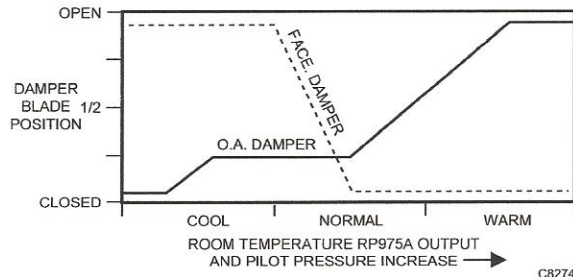


Fig. 9. Damper blade position with respect to the RP975A output pressure and room temperature for typical ASHRAE Cycle II control sequence.

Fig. 9 shows a graph that plots the position of the damper blade, with respect to RP975A output pressure and room temperature, for a typical ASHRAE Cycle II control sequence.

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MODEL NUMBER RP975A

## General

The RP975A is a special three-port pneumatic hesitation relay designed to control an MP909 or MP918 damper actuator in large volume unit ventilator applications.

## Features

- Manually adjustable minimum position.
- Sharp barb air connections (3) for 5/32 in. (4 mm) O.D. plastic tubing.
- Factory mounted scale plate and knob; factory calibrated at 8 psi (55 kPa) at the 20 mark on the scale plate.
- Scale plate markings (0 to 100) equal 7 to 12 psi (50 to 85 kPa) hesitation setting.
- Molded plastic construction with neoprene diaphragms, music wire spring, and steel shaft.
- Metal mounting clip, 1-1/2 in. (38 mm) diameter, supplied with device.

## Specifications

### OUTPUT

Factory calibrated for 7 to 12 psi (50 to 85 kPa), manually adjustable; may be field recalibrated for any 5 psi (35 kPa) span in the 0 to 18 psi (0 to 125 kPa) range.

### NORMAL OPERATING PRESSURES

Main supply (Port 1): 18 psi (125 kPa).  
 Branch output (Port 2): 0 to 18 psi (0 to 125 kPa).  
 Pilot input (Port 3): 0 to 18 psi (0 to 125 kPa).

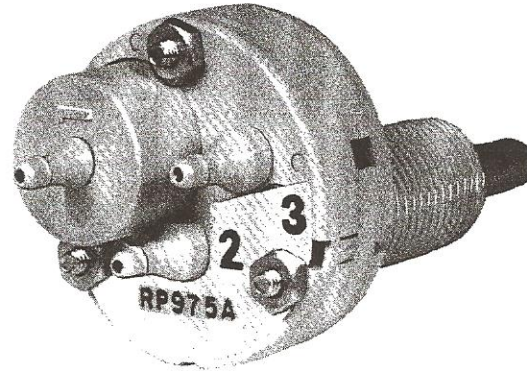
### MAXIMUM SAFE AIR PRESSURE

30 psi (205 kPa)

### AIR CONSUMPTION

0.022 SCFM max. (10 ml/s)

Rev. 5-76



### AMBIENT OPERATING LIMITS

Temperature: 32 to 125F (0 to 52C)  
 Humidity: 5 to 95%

### DIMENSIONS

Refer to Fig. 1

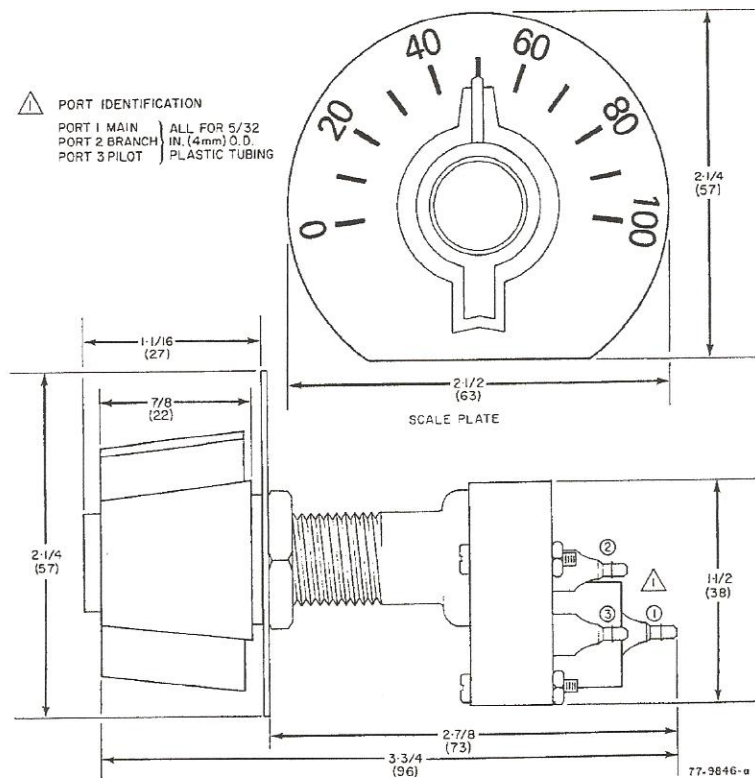


FIG. 1—APPROXIMATE DIMENSIONS OF RP975A WITH SCALE PLATE AND KNOB IN INCHES (MILLIMETERS)

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**AMBIENT OPERATING LIMITS**

Temperature: 32 to 125F (0 to 52C)  
 Humidity: 5 to 95%

**ACCESSORIES**

MP904 or MP909 Damper Operator with  
 7 to 13 psi (50 to 90 kPa) spring range.

**SCALE PLATE AND KNOB**

The scale plate is marked from 0 to 100 for a knob rotation of 188 degrees, limited by break-away stops. This represents minimum position output pressures of from 7 to 12 psi (50 to 85 kPa). If the stops are broken away maximum knob rotation is 300 degrees, representing output pressures of from 5 to 13 psi (35 to 90 kPa). The minimum position output of the RP975A varies in direct proportion to the knob setting.

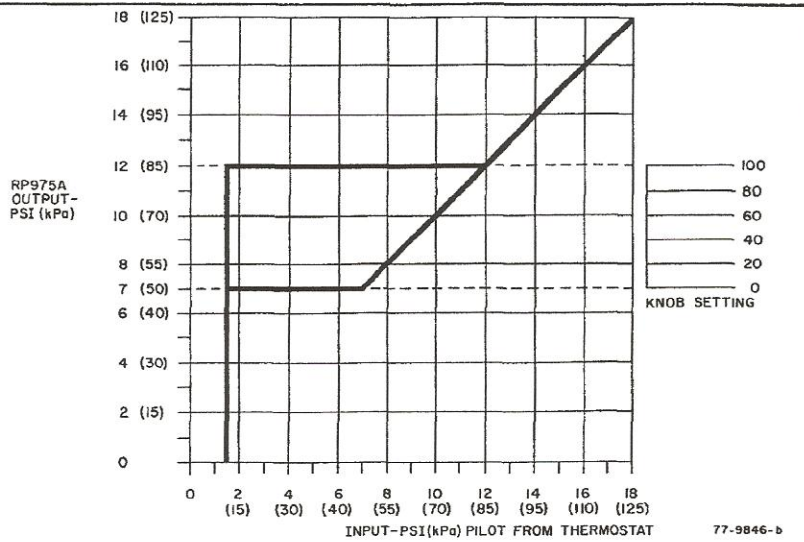


FIG. 2--RP975A HESITATION RELAY OUTPUT PRESSURE VS KNOB SETTING

**Typical Operation**

(Refer to Figs. 3, 4 & 5)

Output pressure from the RP975A to the damper operator will remain at 0 until pilot (input) pressure from the thermostat reaches approximately 1-1/2 psi (10 kPa). The output pressure from the Hesitation Relay will then increase to the preset minimum position as determined by the knob setting and the damper blades will open to the preset minimum ventilation position.

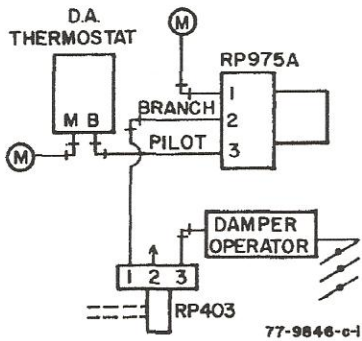


FIG. 3--TYPICAL RP975A APPLICATION

The relay branch output pressure will hesitate at that point, holding the damper blades in position until pilot pressure equals output pressure. If the pilot pressure continues to increase, the output pressure from the RP975A to the damper operator will increase in direct proportion, modulating the damper toward the fully open position.

When a restricted branch line is involved in an existing application (Fig. 5) it is possible to modernize and update the system by using an RP975A Hesitation Relay in conjunction with an RP470B relay piped as a repeater and achieve the same control.

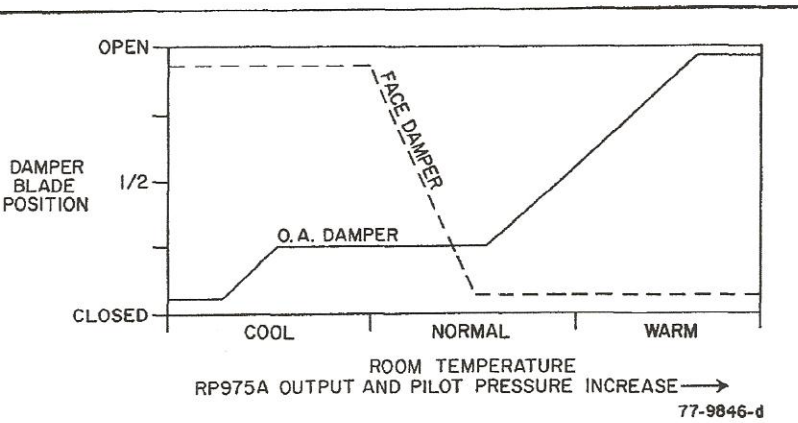
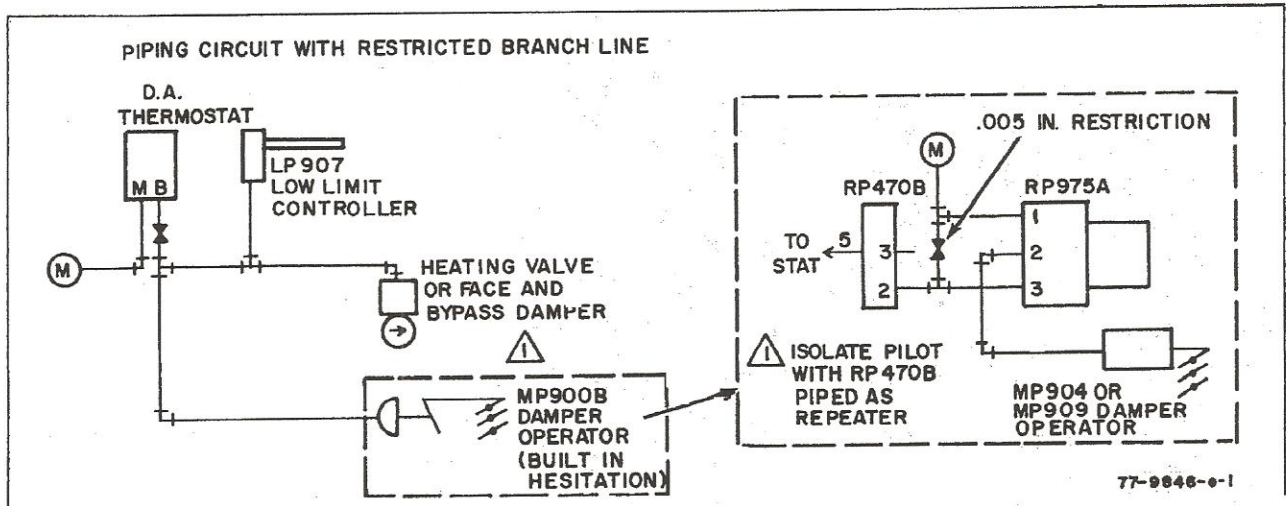


FIG. 4--DAMPER BLADE POSITION WITH RESPECT TO THE RP975A OUTPUT PRESSURE AND ROOM TEMPERATURE FOR TYPICAL ASHRAE CYCLE 2 CONTROL SEQUENCE

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**FIG. 5—RP975A APPLICATION IN A RESTRICTED BRANCH LINE CIRCUIT**

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**AMBIENT OPERATING LIMITS**

Temperature: 32 to 125F (0 to 52C)

Humidity: 5 to 95%

**ACCESSORIES**

MP909 or MP918 Damper Actuator with  
7 to 13 psi (50 to 90 kPa) spring range.

**SCALE PLATE AND KNOB**

The scale plate is marked from 0 to 100 for a knob rotation of 188 degrees, limited by break-away stops. This represents minimum position output pressures of from 7 to 12 psi (50 to 85 kPa). If the stops are broken away maximum knob rotation is 300 degrees, representing output pressures of from 5 to 13 psi (35 to 90 kPa). The minimum position output of the RP975A varies in direct proportion to the knob setting.

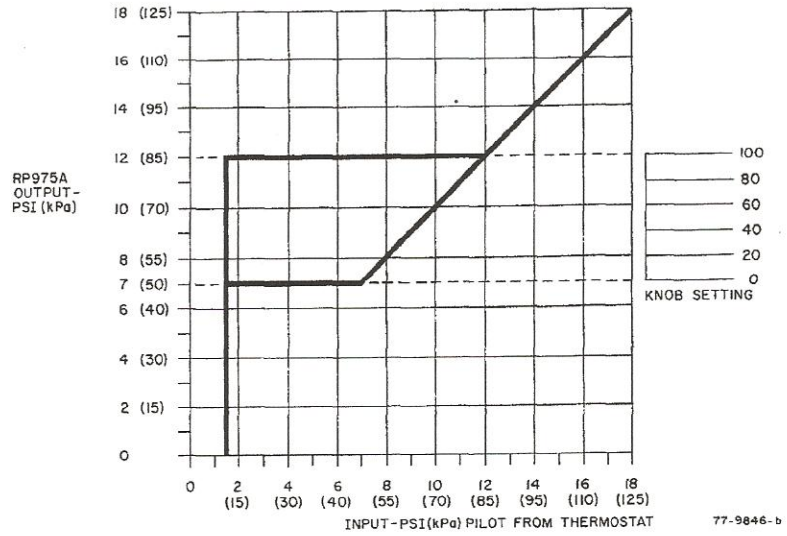


FIG. 2—RP975A HESITATION RELAY OUTPUT PRESSURE VS KNOB SETTING

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