

### MP516A UNIT VENTILATOR DAMPER OPERATOR

## GENERAL

### DESCRIPTION

The MP516A is a sturdy, compact, rolling diaphragm pneumatic damper operator.

### APPLICATION

Primarily, the MP5 16A controls dampers in sequence with heating and/or cooling valves, or electric heat for single pressure unit ventilator control systems with an electrical fan interlock. This operator is adaptable to many individual unit ventilator systems, and is field adjustable to perform according to standard cycles of operation.

### SPECIFICATIONS

#### OPERATING RANGE:

Model with Hesitation Feature:

Minimum OA range: Factory set for 25 percent (Series 2) or 33 percent (Series 1) minimum stroke at 3 lb/in<sup>2</sup> (21 kPa). Field adjustable 0 to 100 percent.

Hesitation range: 3 to 8 lb/in<sup>2</sup> (21 to 55 kPa).

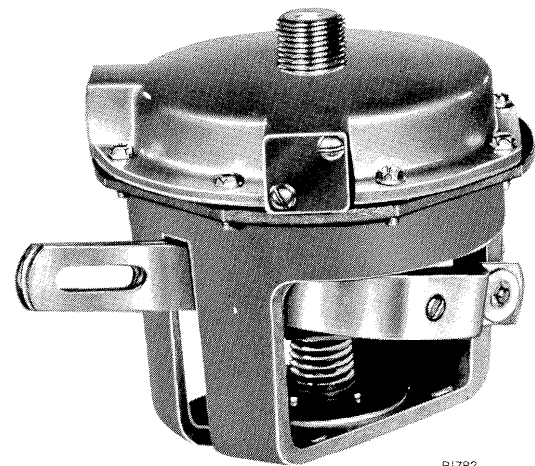
Maximum OA range: 8 to 12 lb/in<sup>2</sup> (55 to 83 kPa).

Model without Hesitation Feature: Full stroke 4 to 8 lb/in<sup>2</sup> (28 to 55 kPa) or 5 to 12 lb/in<sup>2</sup> (34 to 83 kPa).

DAMPER LOAD RATING: 2.7 ft<sup>2</sup> (.25 m<sup>2</sup>).

MAXIMUM SAFE AIR PRESSURE: 25 lb/in<sup>2</sup> (172 kPa).

AMBIENT TEMPERATURE: -20 F (-29 C) minimum, 160 F (71 C) maximum.



R1782

STROKE: 2-1/8 in. (54 mm) maximum, 2-1/2 in. (64 mm) maximum.

### OPERATION

#### MP516A WITH HESITATION

Changes in air pressure on the diaphragm and cup (Fig. 1) position the lever arm through its full travel. An increase in air pressure to 3 lb/in<sup>2</sup> (21 kPa) moves the lever arm against tension of the main spring to a preset percentage of total travel. This factory-set percentage is 25 percent on Series 2 models, 33 percent on Series 1 models (Fig. 2). At 8 lb/in<sup>2</sup> (55 kPa) pressure, the lever arm resumes travel until it reaches 100 percent. At this point, the supply air pressure force is in balance with the hesitation spring force. Motion of the lever arm is returned to zero percent by spring load as air pressure decreases.

## MP516A WITHOUT HESITATION

Changes in air pressure on the diaphragm, and cup and support assembly, (Fig. 3) modulate the lever arm through its travel, Increasing the air pressure overcomes main spring tension, moving the lever arm from its start position. Lever arm travel continues with increasing air pressure until the supply air pressure and main spring forces are in balance.

The air pressure range required for full lever arm travel remains the same regardless of start point pressure. Therefore, the start point pressure is set low enough to permit full lever arm travel with available supply pressure (start point pressure plus full lever arm travel pressure range must be less than or equal to the supply pressure).

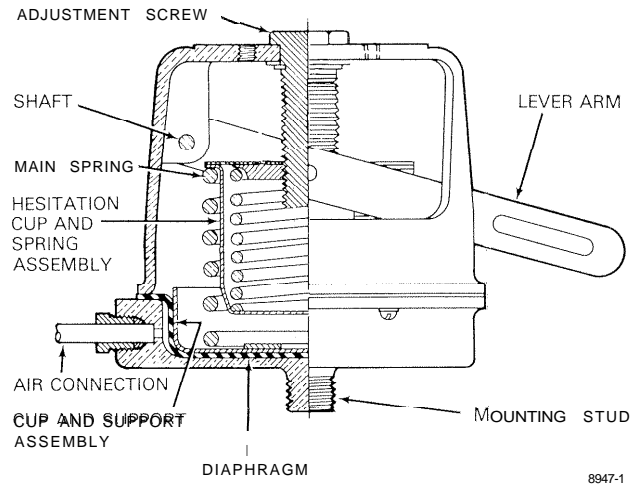


Fig. 1. MP5 16A with Hesitation Feature.

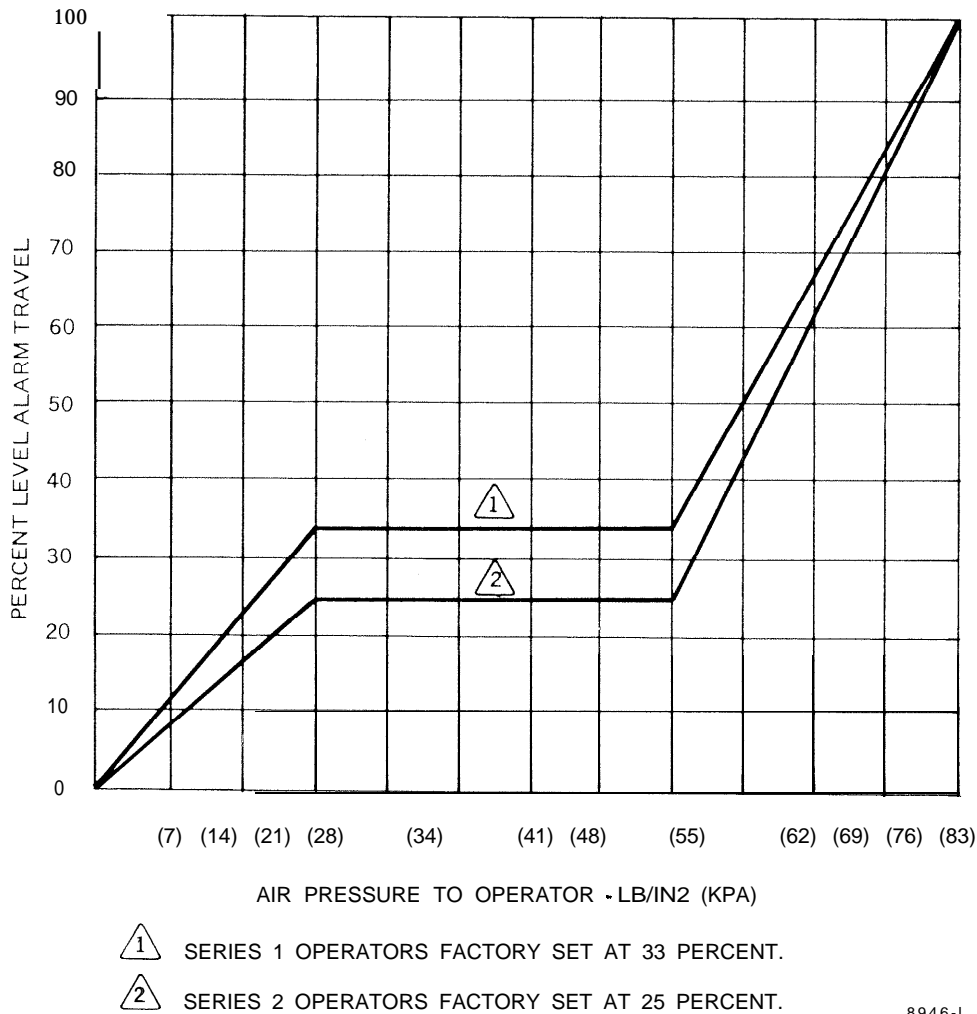


Fig. 2. Illustration of Hesitation Operation.

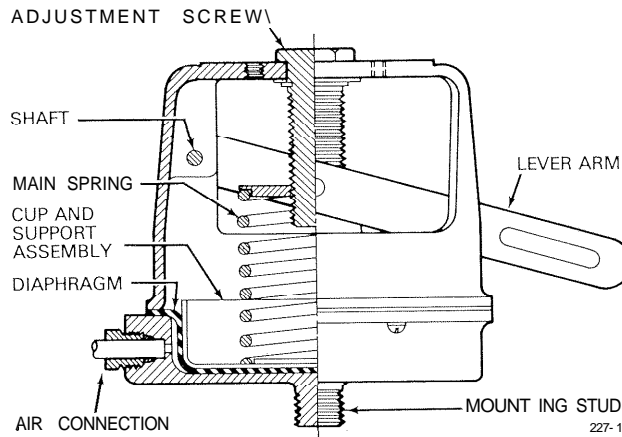


Fig. 3. MP5 16A without Hesitation Feature.

## MAINTENANCE

### EQUIPMENT REQUIRED

1. Gage, 0 to 30 lb/in<sup>2</sup> (0 to 207 kPa), Part No. 305909 or equivalent.
2. Lubriplate No. 630A.
3. Pressure Bulb Assembly, Memphis Service Center No. 852.

### CLEANING AND LUBRICATION

NOTE: Center the main spring, cup, and support assembly (Fig. 1 and 3) with the hole in the lever. Do not allow them to rub against each other.

1. Keep diaphragm, and cup and support assembly free from chips, dirt, and other foreign matter.
2. Apply Lubriplate No. 630A to pivot screws and to threads of mounting stud.

### OPERATIONAL CHECK

1. Install gage in the supply air line.
2. With all linkage removed, slowly adjust the thermostat to raise the BLP to run the lever arm through its entire stroke, then decrease the BLP to return the lever arm to the start position. Motors with the hesitation feature should hesitate from 3 to 8 lb/in<sup>2</sup> (21 to 55 kPa) pressure, then proceed. If the lever arm travel is not smooth and complete, or if reversal loss is greater than 1/2 lb/in<sup>2</sup> (3.5 kPa), check for binding of the lever arm.

### START POINT ADJUSTMENT (MOTORS WITHOUT HESITATION)

NOTE: The start point setting plus the range must not exceed the supply pressure.

1. Increase air pressure and note start point pressure.
2. Decrease pressure.
3. To lower the start point setting, turn the adjustment screw clockwise (CW). To raise the setting, turn the screw counterclockwise (CCW).
4. Recheck start point pressure and make further adjustments if necessary.

### MINIMUM POSITION ADJUSTMENT (MOTORS WITH HESITATION)

1. Increase air pressure to 4 lb/in<sup>2</sup> (28 kPa), chosen to assure device is in hesitation mode. The arrow on the lever and the scale on the operator frame indicate the percent of travel.
2. Turn adjustment CW to increase or CCW to decrease the percent of travel.
3. Recheck to see if the lever arm positions itself properly after the BLP is decreased and/or increased.

# TROUBLESHOOTING

## GENERAL

Before troubleshooting;

- Check air connections for leaks.
- Check lever arm for binding throughout travel range.
- Check operation of the interlocking E-P relay, if applicable (Fig. 4).
- Branch line pressure should reduce to 0 lb/in<sup>2</sup> (0 kPa) when fan is off.
- Check system for improper piping.

## TROUBLESHOOTING PROCEDURES

If the OA/RA dampers do not change position with thermostat setpoint adjustment, perform troubleshooting procedures indicated in Figure 5.

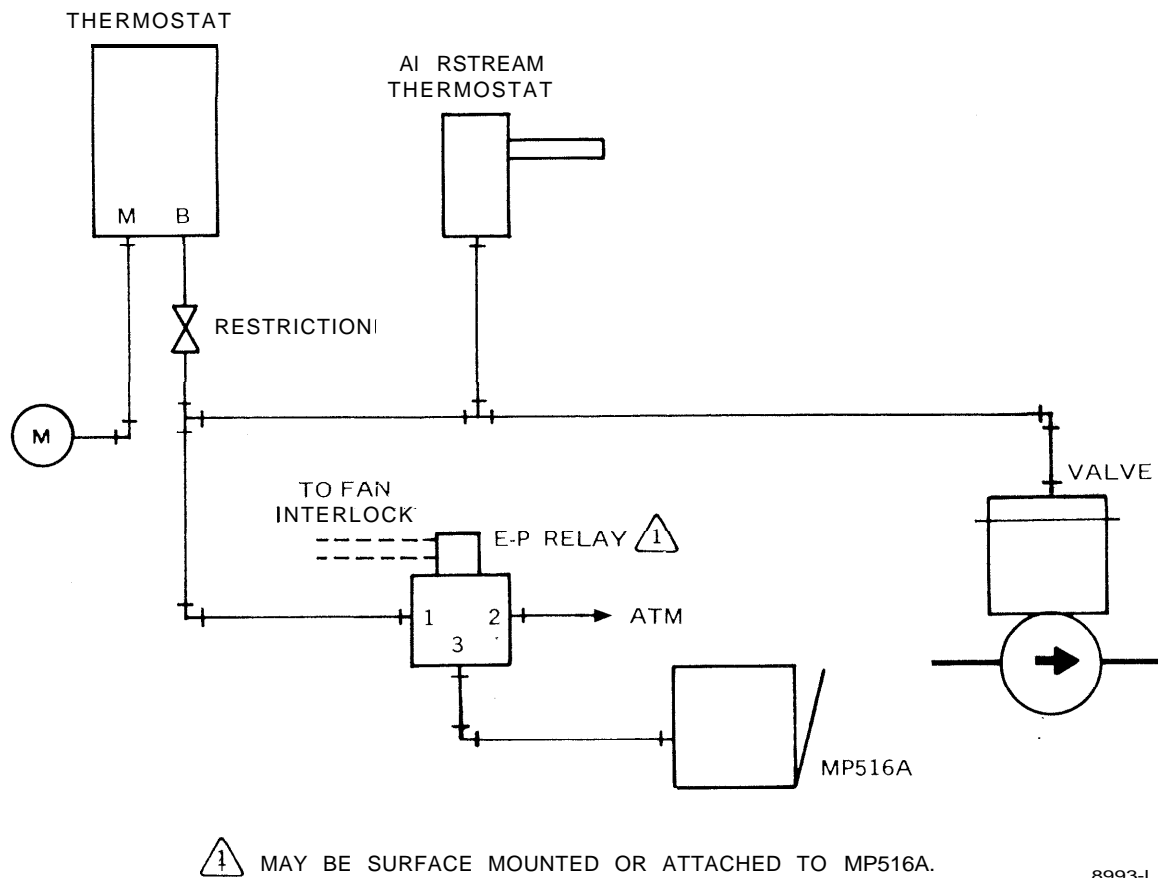
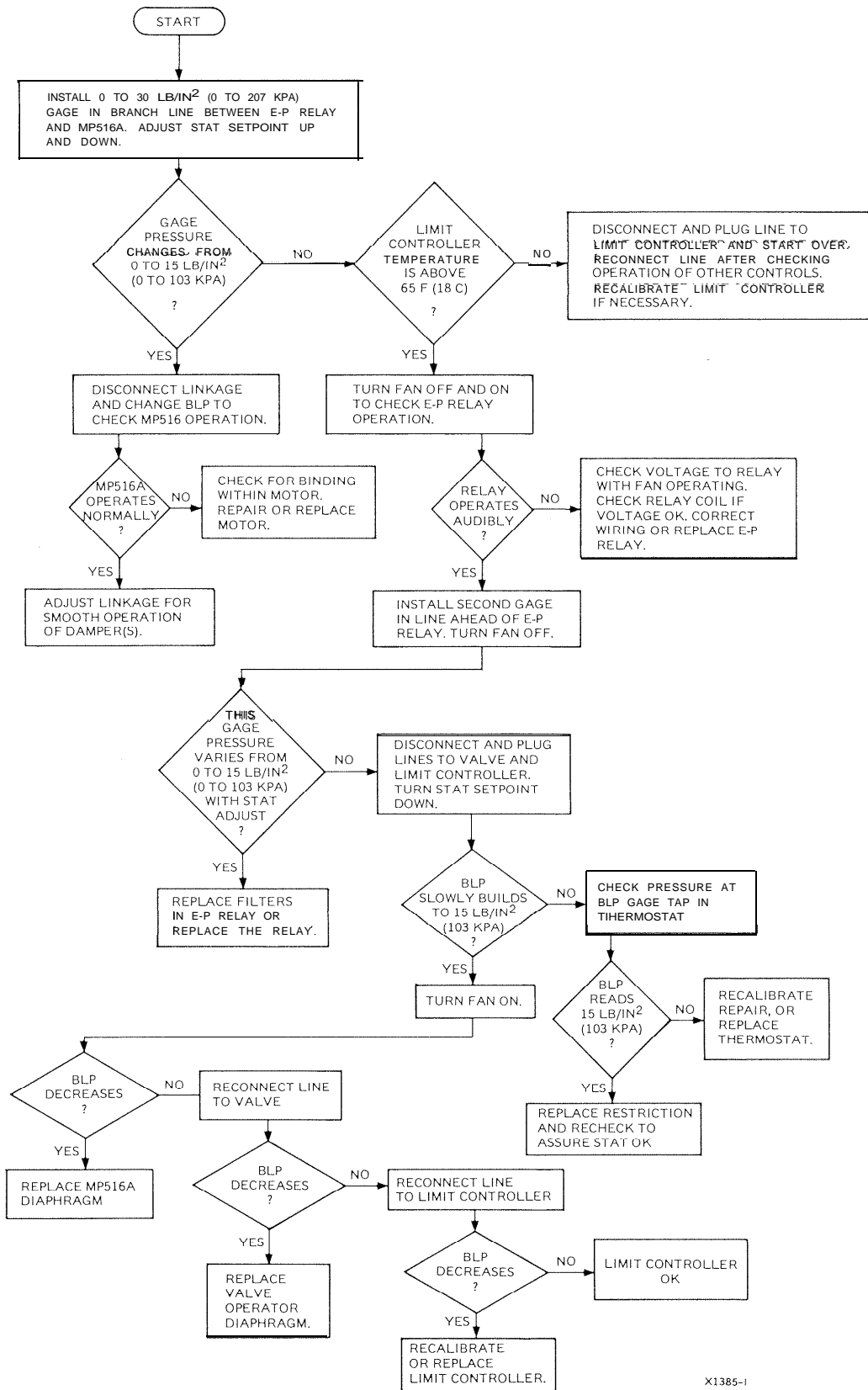


Fig. 4. Typical Cycle 1 or 2 Unit Ventilator Control System Piping Diagram.

# REPAIR

## DIAPHRAGM REPLACEMENT

1. Raise thermostat setting or shut off fan to decrease BLP to zero.
2. Remove damper linkage.
3. Remove branch line connections to operator.
4. Separate operator from mounting bracket or unit ventilator compartment partition.
5. Remove the eight screws securing top cover (see PARTS LIST paragraph and Fig. 6).
6. Remove top cover.
7. Remove diaphragm and replace with new.
8. Reverse procedure for reassembly.
9. Perform operational check.



X1385-1

Fig. 5. Troubleshooting Flow Chart.

# PARTS AND ACCESSORIES

## PARTS LIST

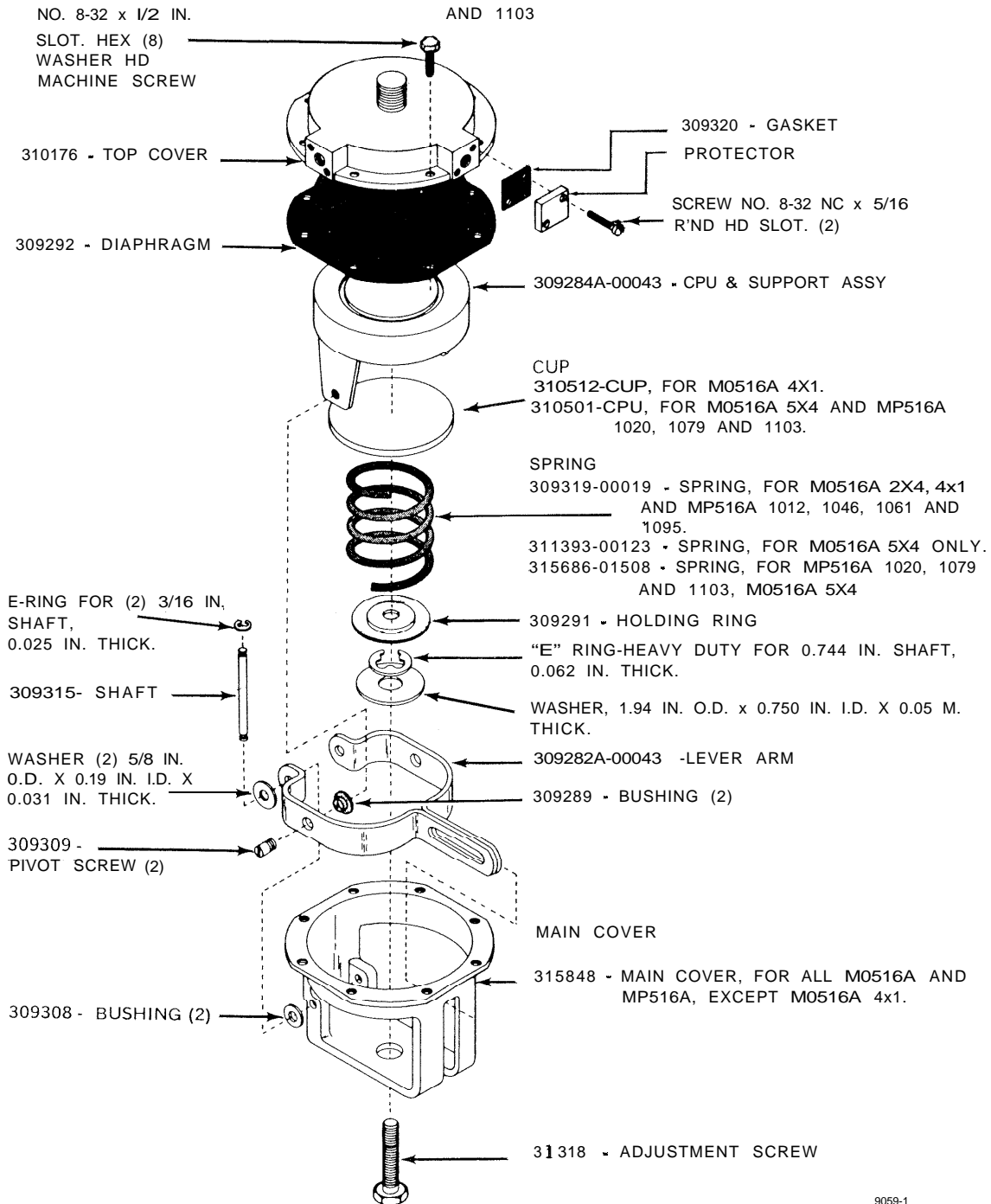
Refer to Figures 6 and 7.

## ACCESSORIES

Refer to Figures 8 through 10 and UNITARY ORDERING GUIDE microfiche in the Master Literature File (MLF TAB: II. F.) for fittings bag assembly selection.

MODELS WITHOUT HESITATION FEATURE:

M0516A 2X4, 4X1 AND 5X4  
MP516A 1012, 1020, 1046, 1061, 1079, 1095  
AND 1103



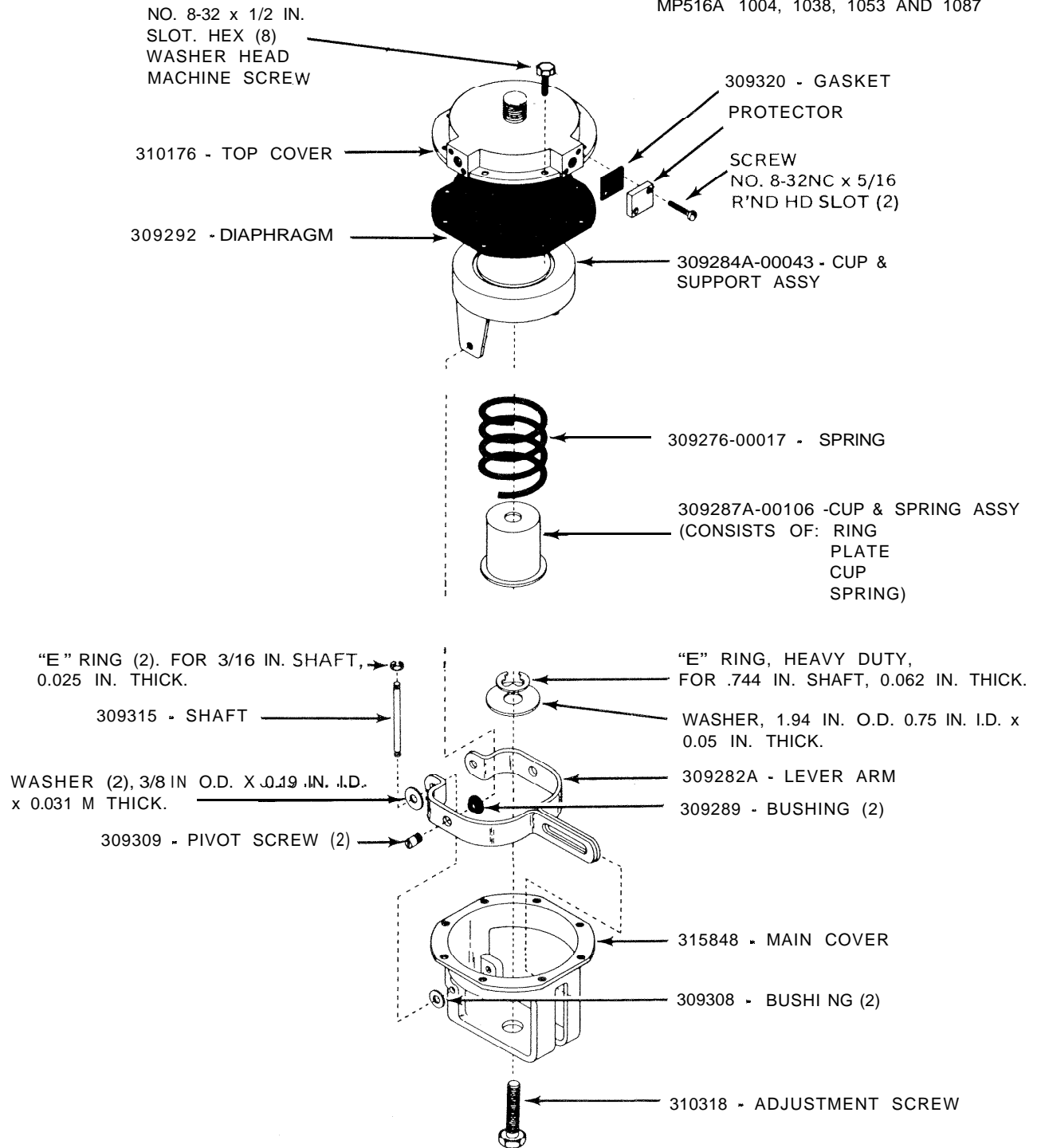
9059-1

Fig. 6. Exploded View-MP516A without Hesitation.

MODELS WITH HESITATION FEATURE

M0516A 1X4

MP516A 1004, 1038, 1053 AND 1087



9062-1

Fig. 7. Exploded View-MP5 16A with Hesitation.

			A	C	D	E	F	G	H	J	K	L	M	N
310072-00062	Rod	23 in. (584 mm)	1											
314181-00062	Rod	19.5 in. (496 mm)			1	1								
314562-00062	Rod	8.0 in. (203 mm)						1						
313220-00062	Rod	10.5 in. (267 mm)							1		1	1		
314190-00062	Rod	4.33 in. (110 mm)								1				1
316739-00062	Rod	5.75 in. (146 mm)											1	
313462-00062	Rod	6.9 in. (175 mm)							1		1			
14001932-002	Rod	18.125 in. (460 mm)					1							
315321	Ball Joint		2		2	2	2	2	2	2	2	2	1	1
26025B	Crank Arm Assy				1			1						
26025E	Crank Arm Assy										1			
314316A	Crank Arm Assy			1										
26026B	Crank Arm Assy		1				1	1		1		1	1	1
316154-00062	Bracket		1	1	1	1	1	1	1	1	1	1		
309178	Protectors		2		2	2	2	2	4	2	4	2	2	2
	Screw	No. 14 x 5/8 in. Slotted Hex Hd					4	2						
	Screw	8-32 x 1/2 in. Slotted Rd Hd											3	3
	Screw	1/4-20 x 5/8 in. Slotted Rd Hd	4	3	3				4	4	4	4		
	Screw	1/4-20 x 1/2 in. Slotted Rd Hd				4								
	Nut	No. 3/4-16 Hex Steel	1	1	1	1	1	1	1	1	1	1		
	Nut	No. 7/16 x 1/4	4						4	4	4	4		
	Nut	No. 3/16 x 1/4		3	3									
	Washer	No. 1/4 Spring Lock	4						4	4	4	4		
	Washer	2 in. O.D., 0.81 in. I.D. Steel	1	1	1	1	1	1	1	1	1	1		

X1386-1

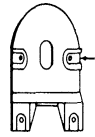
Fig. 8. Fittings Bag Assembly, Part No. 309389A, C-H and J-N.

			A	B	D
316154	BRACKET		1	1	1
	NUT	3/4-16 THD. HEX STEEL	1	1	1
	WASHER	2 IN. O.D., 0.81 IN. I.D. STEEL	1	1	1
	SCREW	10-24 x 1/2 SLOT HEX HEAD SELF-TAPPING	3	3	3
314562	ROD	8 IN. (203 MM)	1	1	
313220	ROD	10.5 IN. (267 MM)			1
3 5321	BALL JOINT		2	2	2
309374A	CRANK ARM ASSY		1		
26025D	CRANK ARM ASSY			1	
26025F	CRANK ARM ASSY				1

15976

Fig. 9. Fittings Bag Assembly, Part No. 314249A, B, and D.





309855 - BRACKET



NUT, NO. 3/4-16 THD, HEX STEEL.



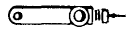
WASHER, NO. 10-24 TOOTHED (4)



LOCKWASHER, 1-1/4 IN. O.D.  
13/16 IN. I.D.



SCREW, NO. 10-24 NC x 5/8 FLAT HD  
SLOT. (4)



309374A - CRANKARM



315321-00062 - BALL JOINT (2)



309384 - LINKAGE ROD, 13 IN. LONG  
(330 MM)

309853 - LINKAGE ROD, 5-1/4 IN.  
(133 MM)

9063-1

Fig. 10. Fittings Bag Assembly, Part No. 309855A.

