

# SERVICE INSTRUCTIONS

## OILGEAR TYPE "R" MODULAR RESISTANCE OPERATOR FOR "VSM" CYLINDER RELIEF VALVES

### PURPOSE OF INSTRUCTIONS

These instructions are written to simplify your work when installing, operating and maintaining Oilgear Type "VSM" cylinder prefill valves and operators. Your acquaintance with the construction, principle of operation and characteristics of these valves will help you attain satisfactory performance, reduce shut-down time and increase the unit's life. Some valves and operators have been modified from those described in this bulletin and other changes may be made without notice.



Figure 1. Typical Prefill with Type "R" Modular Operator (90001-R).

### REFERENCE MATERIAL

Piping Information ..... Bulletin ... 90011  
Prefill and Control Specifications ..... Bulletin .. 86000

Size 100 (4") thru 200 (8") Cylinder  
Prefill and Exhaust Valves ..... Bulletin .. 986304

Size 250 (10") and Larger Cylinder  
Prefill and Exhaust Valves ..... Bulletin 986308  
Resistance Valve ..... Section 5, Page B3.51  
Needle Check Valve ..... Section 5, Page A3.1  
Check Valve ..... Section 5, Page A5.5

### I. PREPARATION AND INSTRUCTION

See reference instruction on applicable size cylinder prefill and exhaust valve. See referenced "Piping Information" bulletin and individual circuit diagram before connecting prefill to system.

### II. CONSTRUCTION

Refer to Figure 2. The principle parts of this operator are a dashpot nose (310) on the control piston, a floating dashpot mechanism (302) in the rear head (300), an adapter block (315) and the resistance operator module block (360) containing the adjustable resistance valve (361), the adjustable needle check valve (362), and an optional check valve (363). Optional limit switch assembly (340) or visual tell tale assembly (325) may also be mounted on the adapter block (315).

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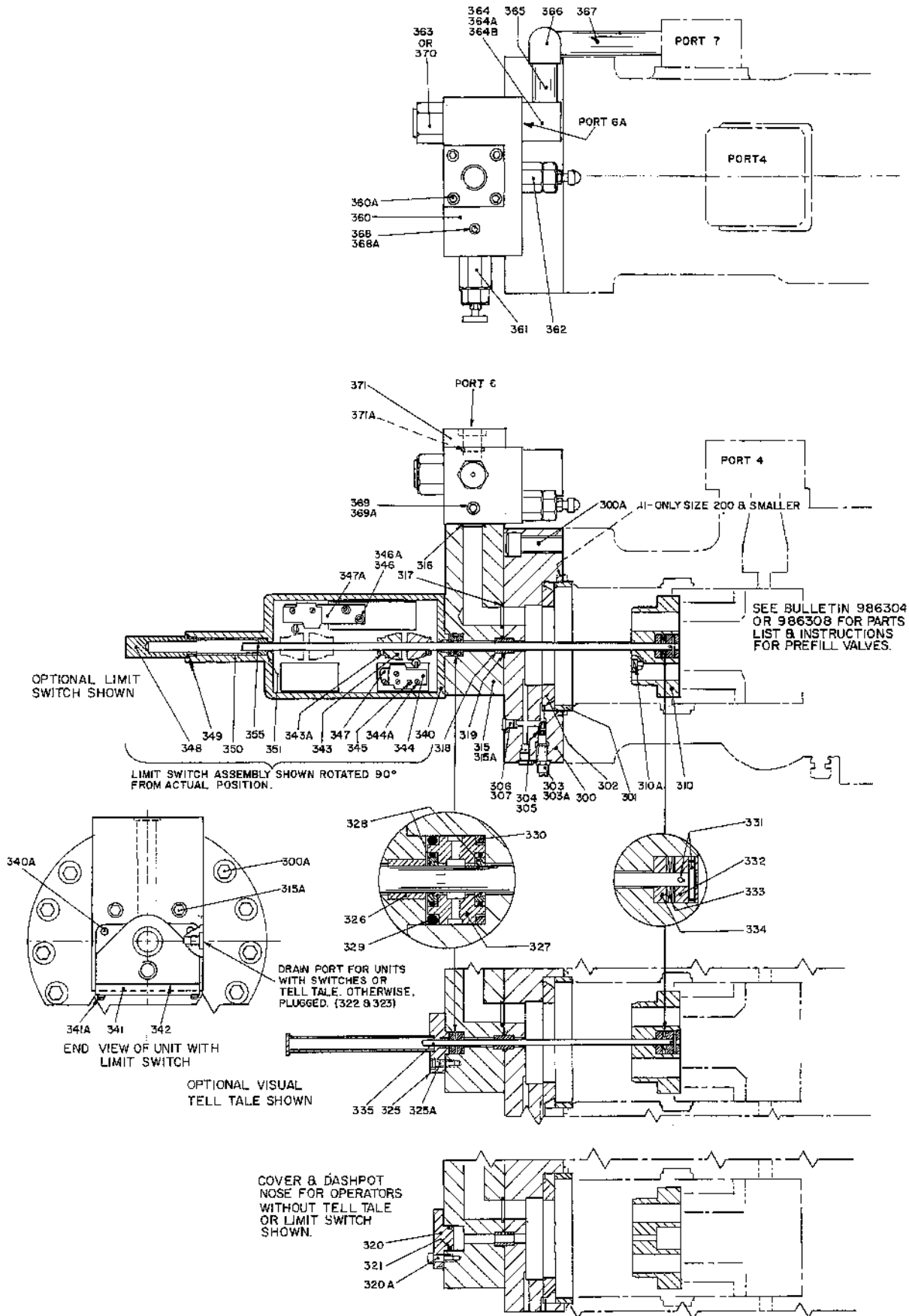


Figure 2. Parts Drawing. Modular Resistance Type Operator. DS-986331. (516666)

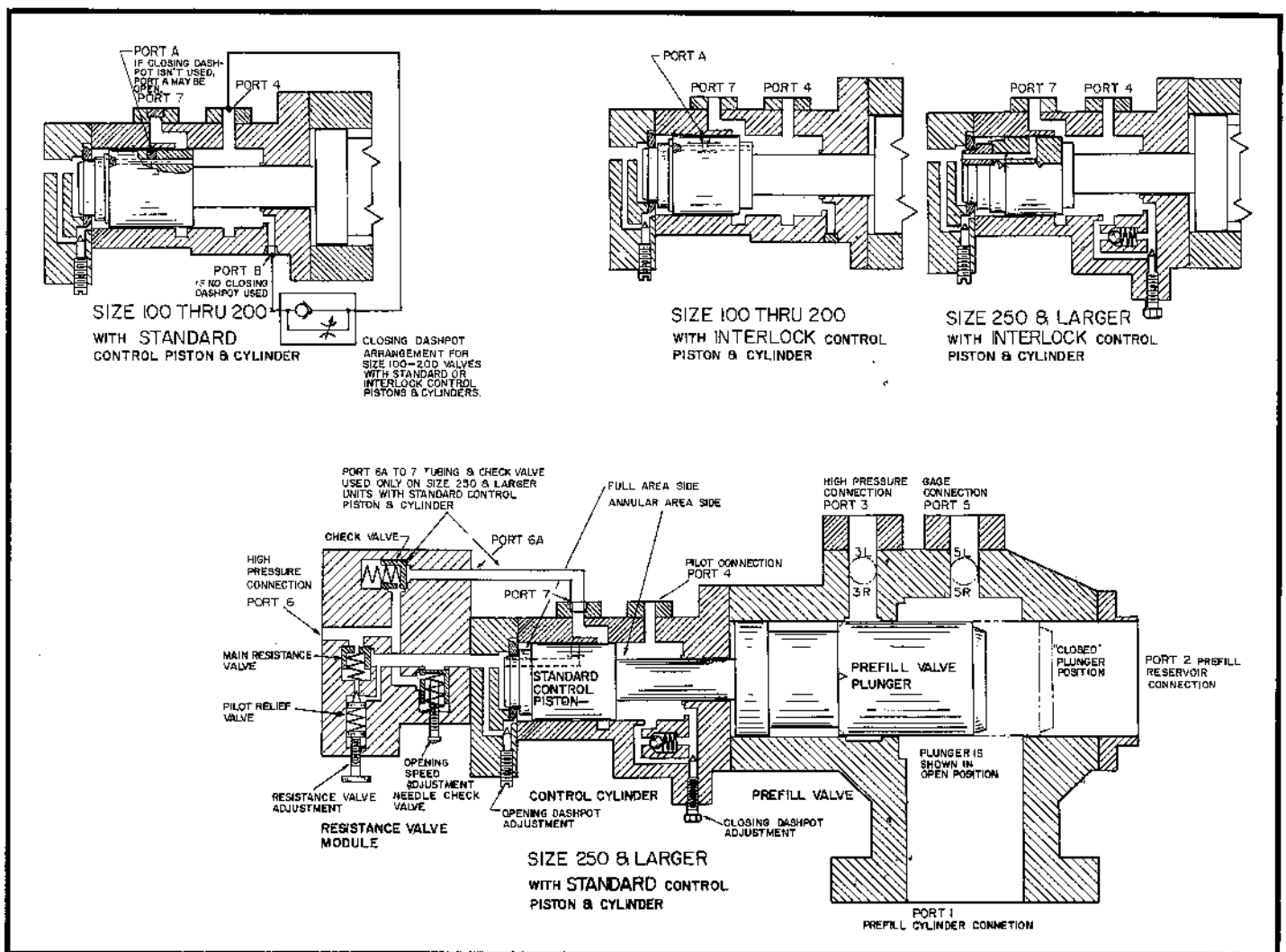


Figure 3. Schematic Cut-a-way Diagram, Prefill Valve with Resistance Operator (5V-12039-L).

### III. PRINCIPLE OF OPERATION

See Figure 3. Flow in Port 6 is blocked by the check valve and by the check valve portion of the needle check valve. This same flow in Port 6 is resisted by a pilot operated resistance valve. Pressure is ported thru orifice in the main resistance valve to the pilot relief valve. When pressure exceeds the pilot valve setting, pressure on top of the main resistance valve spool is relieved, a pressure imbalance then exists (across the resistance valve spool) and pressure (from Port 6) raises the main resistance valve spool to allow flow to the large area side of the control piston which closes the prefill valve plunger at a constant speed.

Applying pressure thru Port 4 (and annular area side of control piston) and connecting Port 6 to drain opens the prefill valve plunger. Flow from the large area side of the control piston forces open the needle check valve. However, the check valve can open only as far as the adjusting screw allows it. Thus, the opening speed is now metered by the setting of the needle check valve. When passage in the control piston is connected to Port 7 (and piped to Port 6A), flow out Port 7 and thru check valve is unrestricted so control piston (and prefill plunger) moves at maximum speed. When control piston blocks Port 7, speed again is restricted. The integral opening dashpot cushions control piston as it reaches "full open" position.

For operation with interlock piston or adjustable closing dashpot, see referenced bulletins on Cylinder Prefill and Exhaust Valves.

### IV. SPECIFICATIONS

See referenced bulletin on Prefill and Control Specifications

### V. MALFUNCTIONS AND CAUSES

#### A. PREFILL DOES NOT CLOSE PROPERLY

1. Insufficient operator pressure
2. Faulty or leaking pilot operated resistance valve, and/or needle check valve, and/or check valve (see referenced material).
3. Plugged dashpot check or choke valves.
4. See referenced bulletin on applicable Cylinder Prefill and Exhaust Valve.

#### B. PREFILL DOES NOT OPEN PROPERLY

1. Insufficient pilot pressure.
2. Faulty or binding check valve (see referenced material).
3. Needle check valve binding or not properly adjusted (see referenced material).
4. Leaking resistance valve (see referenced material).
5. Dirt in adjustable choke (including dashpot) passages.
6. See referenced bulletin on Cylinder Prefill and Exhaust Valves.

## VI. TESTING AND ADJUSTING

The resistance valve can be adjusted by loosening jam nut and turning knob clockwise to increase the setting and counterclockwise to decrease.

To adjust opening speed of cylinder prefill plunger, loosen jam nut and turn acorn nut of needle check valve clockwise to decrease speed and counterclockwise to increase.

To measure prefill valve plunger stroke or observe movement, use the tell tale rod if unit is so equipped. If limit switch is used, remove enclosure cover (341) to observe rod movement. If not equipped, the optional visual tell tale assembly can be ordered from The Oilgear Company.

## VII. DISASSEMBLY

### A. GENERAL

Refer to Figure 2. It will be advantageous to tag similar parts (particularly screws, plugs and o'rings) during disassembly to be certain they don't become confused with similar parts and to ensure they will be returned to original location.

**WARNING: NEVER attempt to remove or install any component or assembly while system is running. Always shut-off power and release pressure from system before servicing or testing.**

### B. PREPARATION

While disassembling or assembling unit, we recommend choosing an area where no traces of dust, sand or other abrasive particles, which can damage the operator and system, are in the air. We also recommend not working near welding, sand blasting, grinding benches and the likes. Place all parts on a CLEAN surface. To clean parts which have been disassembled it is important to use CLEAN solvents. All tools and gages should be CLEAN prior to working with this unit and new CLEAN threadless rags used to handle and dry parts.

#### CAUTION:

**Before disassembling, isolate prefill valve from reservoir and press cylinder, or drain hydraulic fluid.**

**Avoid allowing cylinder prefill plunger (18) movement beyond normal closed position or piston rings will expand in Port 3 relief and lock plunger in body. Refer to Figure 2. Depending upon what part or parts are to be inspected, it may not be necessary to completely take apart all assemblies or disconnect piping.**

### F. CONNECTION

Install Port 6 flange (371) with O'ring (371A) in place. Reinstall piping connection between Port 7 and Port 6. Be sure to install o'ring (364B) before securing flange (364) with screws (364A) to module block. Be sure to install o'ring before securing Port 7 flange to control cylinder. After entire prefill is assembled and mounted, reconnect electrical and hydraulic connections to Ports 4 and 5.

### C. DISCONNECTING & DISMOUNTING

Disconnect all electrical and hydraulic connections to or from ports (remove flange (371) and o'ring (371A)). Remove screws (364A), disconnect Port 6A flange (364) from resistance operator module (360) and remove o'ring (364B). Disconnect Port 7 flange and remove piping assembly (365, 366 and 367).

## D. RESISTANCE VALVE MODULE

Remove screws (360A) and lift resistance valve module (360) from the adapter block (315). The resistance valve assembly (361), the needle check assembly (362) and the check valve assembly (363) can be turned out from the module block. See referenced material.

### E. TELL TALES (if used)

IF VISUAL TELL TALE is used, remove screws (325A) and pull guard (325) and bushing (326) from adapter (315).

IF LIMIT SWITCH is used, remove screws (341A), and lift cover (341) and gasket (342) from enclosure (340). Mark location of cam (343) on tell tale rod (355) and loosen set screw (343A). Remove screws (340A) and slide limit switch enclosure body (340) with bushing (326) [along tell tale rod (355)] from adapter (315).

### F. ADAPTER BLOCK

Lift o'ring (316) from its bore. Remove Screws (315A) and slide adapter block (315) out [along tell tale rod (335 or 355)] from rear head (300). If necessary, seal retainer assembly parts (327, 328, 329 and 330) can be removed as well as bearing sleeve (318) and o'ring (319).

### G. REAR HEAD

Remove screws (300A) and the rear head (300) can be slid out and along tell tale rod (335 or 355). The dashpot sleeve (302) and rear head locating ring (301) can be removed. If necessary, loosen jam nut (303A) and turn choke screw (303) out from rear head.

### H. TELL TALE ROD

Working inside the control cylinder, remove screws (310A). Tugging on the rod (335 or 355) should bring out dashpot nose (310) and rod retaining assembly. If necessary, pins (331) can be pressed out and outer rod retainer (332), washer springs (333) and inner rod retainer (334) can be removed.

## VIII. INSPECTION

Clean all parts thoroughly, inspect and replace any part showing signs of undue wear. Be sure o'rings are free from nicks, cuts, hardening, cracking or deterioration. Wash all parts thoroughly prior to assembly.

**WARNING - Always wear safety goggles when using solvents or compressed air. Failure to wear goggles, could result in serious personal injury.**

## IX. ASSEMBLY

### A. TALE ROD

Slide inner retainer (334) on to the rod (335 or 355), follow with washer springs (333) and, using roll pins (331), lock outer retainer (332) onto the rod. Slip the assembly into the counterbore of dashpot nose (310). Using screws (310A), secure the nose/rod assembly to the control piston inside the control cylinder.

### B. REAR HEAD

Place o'ring (304) and back-up ring (305) on choke screw (303). Insert assembly into rear head (300) and lock in place with jam nut (303A). Insert dashpot sleeve (302) and rear head locating

## X. PARTS LIST

Parts used in this assembly are per Oilgear specifications. Use Oilgear parts to ensure compatibility with assembly requirements. When ordering replacement parts, be sure to include prefill type designation, serial number, bulletin number and item number. To assure seal and packing compatibility, specify type of hydraulic fluid used.

ITEM NO.	DESCRIPTION	ITEM NO.	DESCRIPTION	ITEM NO.	DESCRIPTION
300	Head, Rear	324A	Screw, Sock Hd. Cap	347	Plate, Sub
300A	Screw, Sock. Hd. Cap	325	Guard, Visual Tell Tale	347A	Plate, Adapter
301	Ring, Rear Head Locating	325A	Screw, Sock. Hd. Cap	348	Cap, Limit Switch End
302	Sleeve, Dashpot	326	Bushing, Rod	349	Seal, O'ring
303	Screw, Flow Choke	327	Retainer, Rod Seal	350	Bushing, Back-up
303A	Nut, Jam	328	Seal, Inner Rod	351	Bushing, Limit Switch Rod
304	Seal, O'ring	329	Seal, O'ring	355	Rod, Limit Switch Tell Tale
305	Ring, Back-up	330	Seal, Joint Ring	360	Module, Resistance Operator
306	Plug, Hex	331	Pin, Roll	360A	Screw, Hydro-Stack
307	Seal, O'ring	332	Retainer, Outer Rod	361	Assembly, Resistance Valve
310	Nose, Dashpot	333	Washer, Spring	362	Assembly, Needle Check Valve
310A	Screw, Nylock S.H.C.	334	Retainer, Inner Rod		
		335	Rod, Visual Tell Tale	363	Assembly, Check Valve
315	Block, Module Adapter	340	Body, Limit Switch Enclosure	364	Flange, Port 6A
315A	Screw, Sock. Hd. Cap	340A	Screw, Sock. Hd. Cap	364A	Screw, Sock. Hd. Cap
316	Seal, O'ring	341	Cover, Enclosure	364B	Seal, O'ring
317	Seal, O'ring	341A	Screw, Rd. Hd.	365	Pipe, Nipple
318	Bearing, Rod Sleeve	342	Gasket, Enclosure	366	Elbow, Pipe
319	Seal, O'ring	343	Cam, Limit Switch	367	Pipe
320	Cap, End	343A	Screw, Set	368	Plug, Hollow Hex.
320A	Screw, Sock. Hd. Cap	344	Switch, Micro	368A	Seal, O'ring
321	Seal, O'ring	344A	Screw, Rd. Hd.	369	Plug, Hollow Hex.
322	Plug, Hollow	345	Screw, Rd. Hd.	369A	Seal, O'ring
323	Seal, O'ring	346	Screw, Rd. Hd.	370	Plug, Hollow
324	Flange, Port 6	346A	Washer	370A	Seal, O'ring
				371	Flange, Port 6

### O'RING SIZES

Cross Section x O.D. Duro ±5

ITEM NO.	PREFILL VALVE SIZE	
	200	250 thru 400
304	1/16 x 3/8 90	1/16 x 3/8 90
307	ARP 904	ARP 904
316	1/8 x 1-3/8 90	1/8 x 1-3/8 90
317	1/8 x 1-1/4 90	1/8 x 1-3/8 90
319	3/32 x 7/8 90	3/32 x 7/8 90
321	1/8 x 1-1/8 90	1/8 x 1-1/8 90
323		ARP 904
329	1/8 x 1-1/8 90	1/8 x 1-1/8 90
349	ARP 910	ARP 910
364B	1/8 x 1-3/8 90	1/8 x 1-3/8 90
368A	ARP 908	ARP 908
369A	ARP 910	ARP 910
370A	ARP 920	ARP 920
371A	1/8 x 1-3/8 90	1/8 x 1-3/8 90

ring (301) in counter bore of rear head. Be sure o'ring (11) is in place, slip rear head (300) along rod and fasten to control cylinder with screws (300A).

### C. ADAPTER BLOCK and SEAL ASSEMBLY

With sleeve bearing (318) and o'rings (319 and 317) in place, use screw (315A) to secure adapter head to rear head (300). Inner rod seal shaft seal (328) is composed of a square (cross section) rubber ring that fits around the outside of a plastic ring. **It is recommended that both parts of seal be installed simultaneously.** Note the orientation of the rod seal retainer (327). The narrow O.D. groove of the retainer must face towards the control cylinder when assembled into the adapter block - the "sharp" edges of the inner rod seal (328) must point towards the control cylinder when assembled. To force the seals into the retainer (327), place assembled inner rod seal on a flat surface and **evenly** press the retainer down on each of the inner rod seals (328). Press the square (cross section) joint ring seal (330) into the narrow groove of the retainer and the o'ring (329) into the remaining groove. Slide the seal assembly over the tell tale rod and into the counterbore of adapter block (315).

#### NOTE:

**Use a guide bushing behind seal to keep inner rod seal (328) from popping out of retainer (327).**

### D. TELL TALES (if used)

Be sure bushing (326) is installed in visual tell tale assembly (325) or in limit switch enclosure body (340).

IF VISUAL TELL TALE is used, slide assembly (325) over the rod (335) and fasten with screws (325A).

IF LIMIT SWITCH is used, slide the enclosure body (340) over rod (355) being certain that cams (343) also slide along rod and fasten with screws (340A). Move cams (343) to locations, marked on disassembly, and tighten set screws (343A) to lock in place. Put gasket (342) in place and fasten cover (341) with screws (341A). Be sure to connect "Limit Switch Drain Port", in module adapter block (315), to drain.

### E. RESISTANCE VALVE MODULE

If removed, turn check valve assembly (363), needle check valve assembly (362) and resistance valve assembly (361) cartridge, with o'rings in place, back into the module body (360). Be sure o'ring (316) is in counterbore of adapter block, place module block (360) on adapter and secure with screws (360A).

### F. CONNECTION

Install Port 6 flange (371) with o'ring (371A) in place. Reinstall piping connection between Port 7 and Port 6. Be sure to install o'ring (364B) before securing flange (364) with screws (364A) to module block. Be sure to install o'ring before securing Port 7 flange to control cylinder. After entire prefill is assembled and mounted, reconnect electrical and hydraulic connections to Ports 4 and 5.



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