



**HAMMEL DAHL
CONOFLOW**

A Unit of

International Telephone and Telegraph Corporation

Post Road, Warwick, Rhode Island 02888

**SERVICE AND
INSTALLATION**

FILED: MECH SYSTEMS
COND. DEMIN.
MODULATING BALL VALVE
MOD™ SERIES 600
AIR OPERATED
PISTON OR DIAPHRAGM
SIZES 3" THROUGH 12"

M-56

STORAGE/HANDLING

When steel or iron valves are to be stored for an extended period of time, coat the internals and gasket surfaces with a rust inhibitor. Exposed external parts should be sprayed with a protective film of oil.

A packing list, containing a complete description of the valve and accessories (such as valve positioner, etc.), accompanies each valve when shipped. This list should be checked when the shipment is received.

When hoisting the valve, make sure that equipment is of sufficient strength and is positioned so that accessories or tubing will not be damaged.

INSTALLATION

The valve performs best when installed in a straight run of pipe away from bends or sections of abnormal velocity or non-laminar flow. Care should be taken to assure concentricity between reducers, the optimum inlet included angle is 30°. The included angle on the downstream side should be the minimum which is practical.

When installing or removing the valve from the pipeline, the valve plug should be in the closed position.

Line flanges should be in-line and square to lessen bolt stress and free joints. Care must be taken in tightening line flange studs for uniform stud loading. (See line torque values in this Bulletin)

The valve may be mounted in any rotational attitude on the pipeline axis. Clearance should be provided in at least one plane equal to the line flange O.D. for removal of the valve from the pipeline.

INSTRUMENTS

An air supply pressure regulator with filter should be installed in the air line ahead of any instrument mounted on the valves. Mounted positioners are piped and adjusted at the factory.

Excessive delay in response may occur when air control instruments are placed more than 100 ft. from the valve. (Refer to Hammel-Dahl Valve Positioner Service Manual HD 1339)

FINAL CHECK

After the valve has been installed, make a final check as follows:

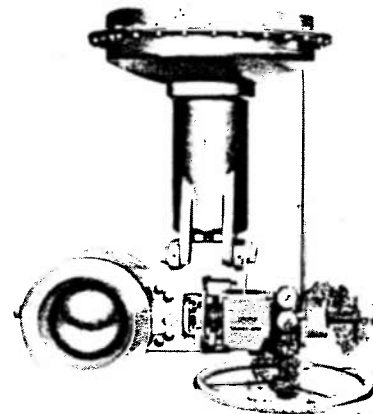
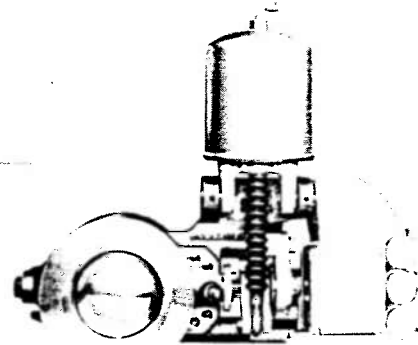
1. Valve travel — vary the control air signal to the actuator to ascertain that the plug travels through a 90° arc from closed to fully open position.
2. Air lines to the actuator — check for leaks.
3. Control instruments / valve action — check to be sure that the combined actions (direct or reverse) of controller, positioner, actuator and valve will give the desired direction of plug movement and when required, the desired position in the event of air failure.

I. GENERAL

- a. Maintenance of actuator and instrumentation may be performed without removing the valve from the line.
- b. The manual override may be added or removed without removing the valve from the line.
- c. Maintenance on the valve may be made on location after removal from the pipeline. If major repairs are required. However, the valve should be taken to a suitable repair shop.

II. REMOVAL OF ACTUATOR FROM BODY ASSEMBLY

1. Piston Actuator (A61)
 - a. Remove the lever pin snap ring (34) and lever pin (32).
 - b. Disconnect air lines from positioner to actuator.
 - c. Loosen gimbal pin set screws (125). Remove actuator gimbal pins (124).
 - d. Remove actuator.



2. Diaphragm Actuator (A45)
 - a. Remove the lever snap ring (34) and lever pin (32)
 - b. Disconnect air line from positioner to actuator.
 - c. Remove actuator mounting cap screws (124)
 - d. Remove actuator.

III. DISASSEMBLY OF 300# ANSI RATED VALVE BODY

- a. Remove the valve from the line.
 1. Remove all line flange studs (9).
 2. Slip the valve from the line.
- b. Disassembly of seal ring stack
 1. Remove seal ring retainer screws (35).
 2. Remove the seal ring retainer (3), the seal ring (5), the seal ring back up ring (7), and the shims (11) by lifting away from the body inlet.
- c. Removal of drive shaft
 1. Unscrew retainer cap screws (31).
 2. Unscrew the lever cap screw (33).
 3. If actuator is still on the valve remove the lever pin (32) by removing lever pin snap ring (34).
 4. Remove the spline sleeve (29), the outboard bearing (Press fit — remove only if necessary.) (30), the bearing retainer (28), and the travel indicator plate (19).
 5. Unscrew the packing follower stud nuts (24).
 6. Remove the split ring drive shaft retainer (10), the gland (13), the packing (12), etc., the packing follower (14) and the packing follower flange as a unit by withdrawing the drive shaft (8) with attached lever (26) from the packing box. The drive shaft retainer (10) is in two halves (split ring) which easily disengages from the drive shaft (8). With the drive shaft retainer removed, other packing box parts can be slipped off the drive shaft easily.

Size	Piston Area	Stem Area
16 in. ²	15.9 in. ²	.44 in. ²
28 in. ²	28.2 in. ²	.44 in. ²
56 in. ²	56.6 in. ²	.78 in. ²

VII. DISASSEMBLY OF A61 / ACTUATOR

NOTE: SEE SECT. II

- a. Remove all pneumatic tubing or accessories before proceeding further. This is done to protect them from damage.
- b. Remove the actuator from the valve body assembly as instructed in the basic instruction bulletin for the valve in use.
- c. Remove the piston cylinder (174).
 1. Tap the base plate (265) with a lead hammer to push it up into the piston cylinder such that the build-in shoulder on the base plate will clear the snap ring (180).
 2. Pry the snap ring out with a screw driver. It is best to apply the screw driver as a lever at one end of the snap ring and work it out of the groove along the periphery a little at a time until it falls free.
 3. An air gun can be applied to the lower air connection to remove the piston cylinder. Care must be exercised to prevent an air pressure build up in the piston chamber in excess of a few psig. If an air gun is not available the cylinder may be removed manually.
- d. Remove the rod end (127) from the piston stem (267).
 2. Remove the dust boot (179).
 3. Withdraw the piston stem (267) from the guide (102).
- e. Complete disassembly.
 1. Remove O-rings (122), (176), and (266).
 2. Remove piston stem nut (266), and piston stem (267) from piston (175) only if absolutely required. Pipe dope is used to assure leak tight joints.
 3. Remove guide (102) from base plate (265) only if absolutely necessary due to wear or leakage. This part is press fitted and sealed.
 4. Remove base plate bearings (265A) from the base plate only if absolutely necessary. These parts are press fitted.
- f. Examine all parts visually for evidence of damage. Check the coating on the inside of the cylinder for damage. This coating is Flexcote 707. It is good for continuous service at temperatures from -50°F to +240°F. Damaged coatings can be stripped and reapplied in accordance with instructions from Polynearing, Inc., P. O. Box 3355, Tulsa, Oklahoma 74150, or a spare cylinder may be used as a replacement.

A/61 ASSEMBLY

- a. Install the bearings (265A) and the guide (102) in the base plate (265). Be sure the parts are clean and apply pipe dope to the O.D. of the guide before installing it. Wipe off excess pipe dope after installation.
- b. Replace if required and install O-rings (122) (176) and (266). Lubricate all O-rings with Houghton "O" lube or equivalent.
- c. Place travel stop (130) over piston stem (267) and insert the piston stem down thru the guide (102) as part of the stem and piston assembly. Lubricate the stem freely.
- d. Slip the dust boot (179) over the end of the piston stem (267) and engage the bead to the groove in the lower end of the guide (102).
- e. Install the rod end (127) in the stem (267) with the rod end lock nut (167) assembled to the rod end.
- f. Lubricate the inner walls of the piston cylinder (174) liberally with Houghton "O" lube or equivalent. Carefully press the piston cylinder (174) down over the piston O-ring (176), base plate (265) and base plate O-ring (200) until the step in the cylinder inside diameter hits the upper surface of the base plate (265).
- g. Insert the snap ring (180) into the piston cylinder groove.
- h. The actuator is now ready for mounting on the valve. It is suggested that the actuator be mounted on the valve before reinstalling the pneumatic tubing lines or appropriate accessories to minimize damage.

SUGGESTED MAINTENANCE SCHEDULE

- a. The "O"-rings and dust boot should be replaced every two to five years depending on the environment.

VIII. PRINCIPALS OF OPERATION / A45 DIAPHRAGM ACTUATOR

1. General
 - a. In the "Normal" position (no air pressure on diaphragm) the spring force holds the actuator stem in a retracted position. The A45 actuator is a rigidly mounted device used in combination with a lever to convert linear motion to rotary motion. Reversibility is achieved by mounting the actuator to the left or right side of the valve drive shaft axis. The actuator stem has no guiding and is allowed to rock through an angle of approximately 2° as it follows the rise and fall of the lever's rotary motion.
 - b. All accessories should be removed before disassembling the actuator.
 - c. A45 diaphragm actuators are available with 3-15, 9-21, 10-22, and 6-30 psig spring ranges. The 10-22 psig spring range is achieved by placing a spring preload spacer (111) between the spring (129) and the diaphragm plate at assembly.
 - d. The maximum case rating for the A45 diaphragm actuator is as follows:
 - 100 IN.² - 55 psig
 - 200 IN.² - 45 psig

IX. DISASSEMBLY OF A45 ACTUATOR

NOTE: SEE SECT. II

- a. To remove diaphragm and actuator stem.
 1. Remove all diaphragm case cap screws (109) and nuts (110) except for the four extended cap screws (109A).
 2. Back off the four extended cap screws (109A) alternately in small increments. These screws are used to preload the spring (129).
 3. Remove the diaphragm case assembly (101).
 4. Remove the diaphragm (115), diaphragm plate (108), actuator stem (120), actuator stem nut (117), and diaphragm washer (118) from the spring barrel (131) as a subassembly.
 5. Disassemble the diaphragm and stem subassembly by removing the actuator stem nut (117) from the actuator stem (120).
- b. Remove the spring (129). For those actuators with elevated spring preloads, the spring preload spacer (111) is removed with the spring.

DISASSEMBLY OF DIAPHRAGM CASE FROM YOKE

- a. Remove lower diaphragm case bolts (68).
- b. Lower diaphragm case (21) is now free of yoke.

A45 / ASSEMBLY

- a. Place the lower diaphragm case (121) on the spring barrel (131) so the tapped holes line up. Mount with bolts (68) lower diaphragm case (21) to yoke (31).
- b. Thread the lower diaphragm case screws (168) and the lower travel stop screws (130) alternately into the tapped holes in the spring barrel (131) and tighten firmly to hold the lower diaphragm case (121) in position.
- c. Lower the spring (129) into the spring barrel (131) using care to see that it's properly seated.
- d. The next step is employed only when the higher preload spring ranges are required. Place the spring preload spacer (111) on top of the spring (129).
- e. Drop the stem and diaphragm assembly, stem first, down through the spring (129) until the diaphragm plate (108) rests on the spring (129).
- f. Align the holes at the outer edge of the diaphragm (115) with the corresponding holes in the lower diaphragm case (121).
- g. Place the diaphragm case assembly (101) over the diaphragm (115) with the air connection in line with the actuator mounting holes at the base of the spring barrel (131).

7. Remove the guide bushing (18) from the packing box.
- d. Removal of the plug.
 1. Back off the trunnion screw (21) about $\frac{1}{4}$ " and tap it lightly on the end to dislodge the trunnion (4) from the body (1).
 2. Continue removal of the trunnion screw (21).
 3. Push the trunnion (4) into the body bowl and remove.
 4. Remove the plug (6) through the body inlet.

IV. DISASSEMBLY OF THE 150# ANSI RATED VALVE BODY

NOTE: Procedure for disassembly of 150# body is exactly the same as that listed above for the 300# body with the exception of the removal of drive shaft, follow drive shaft procedure below.

- a. Removal of drive shaft.
 1. Unscrew the lever cap screw (33).
 2. Unscrew cap screws (31).
 3. Remove travel indicator plate (19).
 4. If actuator is still on the valve remove the lever pin (32) by removing lever pin snap ring (34).

V. ASSEMBLY OF 300# ANSI RATED VALVE

- a. Installing the plug.
 1. Install the plug (6) thru the body inlet. The plug (6) should be oriented such that the spherical surface faces the inlet, the surface indent facing up and the splined journal bore on the packing box side of the body (1).
 2. Install the trunnion (4) from inside the body (1) by passing it, tapered end first, thru the plug trunnion bore and aligning it with the tapered bore in the body. A light coating of "Never-Seez #160" is recommended on the major diameter of the trunnion (4) whenever practical.
 3. Place the trunnion gasket (22) over the trunnion screw (21) and assemble to the trunnion from outside the body. Lock tight.
- b. Installing the drive shaft.
 1. Drop the guide bushing (18) to the bottom of the packing box.
 2. Assemble the drive shaft (8), the drive shaft retainer (10), the gland (13), the packing (12), etc. and the packing follower (14) into the packing box as a unit. Be careful to assure that the drive shaft spline is engaged in the plug splined hole.
 3. Slip the packing flange (15) over the end of the drive shaft (8) and engage the packing follower studs (23). Screw the packing follower stud nuts (24) finger tight, on the packing follower studs (23).
- c. Installing the seal ring, etc.
 1. Set the plug in the closed position with the body inlet facing up.
 2. The body gasket surface should be clean and free of nicks, scratches, dirt, etc.
 3. Install several shims (Part No. 11) in the body. Be sure that all shim surfaces are clean and free of dirt, scratches, etc.
 4. Install the seal ring back up ring (7) with chamfer facing plug (6).
 5. Install the seal ring (5). Be careful to position it properly on the plug spherical surface so that contact is made along the entire inner edge of the seal ring. Press downward on the outer edge of the seal ring to assure that deflection is minimal. (Not more than .010").
 6. Install the seal ring retainer (3) being careful to maintain the alignment of the plug (6) and seal ring (5).
 7. Install seal ring retainer screws (35) through the seal ring retainer into the tapped holes provided in the body inlet face. Tighten retainer screws uniformly using good flange assembly practice.
 8. Rotate the plug (6) to determine seal ring (5) loading. A torque wrench should be used to check loading. On the bench, torque requirements should not exceed 1 Ft. Lb./inch of nominal valve size. For soft seats torque should not exceed $\frac{1}{2}$ Ft. Lb./inch of nominal valve size.
- d. Installing the lever (26)
 1. Rotate the plug (6) to closed position such that the plug face indent is $\frac{1}{8}$ " away from the inner edge of the seal ring (5).

2. For push down to CLOSE action install the lever (26) on the drive shaft (8) with the linkage clevis towards the valve inlet and approximately 45° below the pipe line axis.
3. Place the spline sleeve (29) on the end of the drive shaft (8). Press fit the outboard bearing (30) into the bearing retainer (28). If disassembly was necessary. Drop the outboard bearing retainer assembly onto the spline sleeve (29) and slide the travel indicator plate (19) between the body bosses and the outboard bearing retainer (28). Lock in position using cap screws (31) and lockwashers (39).
4. Position the plug travel pointer (36) to indicate closed position on the travel indicator plate (19) and lock it to the lever (26) with the self tapping screw (37).
5. Install the lever lock screw (33) in the lever (26).
6. FOR PUSH DOWN TO OPEN ACTION, with plug (6) still in the closed position, the lever (26) is mounted such that the linkage clevis is on the opposite side of the drive shaft away from the valve inlet and approximately 45° above the valve axis. The travel indicator plate would be installed on the valve inlet side. All other assembly operations are as described in paragraphs 3 thru 5 above.

NOTE: PUSH DOWN TO OPEN ACTION is used with diaphragm actuator spring to close action only. All piston actuator applications are push down to close action.

VI. ASSEMBLY OF 150# ANSI RATED VALVE

NOTE: Procedure for assembly of 150# rated valve is the same as that outlined in Section V for the 300# ANSI valve.

The 150# ANSI rated valve, however, is not equipped with an outboard bearing (30) or bearing retainer (28). (See Section V paragraph d.3)

The travel indicator plate (19) is mounted directly to the valve body bosses and secured with cap screws (31) and lockwashers (39).

Continue to follow procedure outlined in Section V.

PRINCIPLES OF OPERATION / A61 PISTON ACTUATOR

- a. Pneumatic pressure is applied to both sides of the actuator piston from the outputs of a Hammel-Dahl P52 double acting positioner to provide precise position in throttling applications. The pneumatic pressure drop across the piston will vary according to the demands of the control system to produce plug movement. When the plug reaches the required position as dictated by the instrument signal, the pressure drop across the piston drops to a value which achieves a "Null" condition for the entire control loop.

In on-off applications pressure is applied to one side of the piston or the other side as dictated by system requirements by appropriate means, usually a 4-way solenoid valve or two 3-way solenoid valves.
- b. Fail safe can be provided pneumatically in the "UP" position, "DOWN" position, or "LAST" position as required. See schematic diagrams Fig. #3, Fig. #4 and Fig. #5 which show the auxiliary components required and piping arrangements.
- c. When a manual override device is mounted on a valve as an auxiliary manual operator and the primary pneumatic actuator is a A61 piston type A $\frac{1}{4}$ " Manual two-way by-pass valve must be installed between the positioner output lines to equalize the pressure on both sides of the actuator piston. This two-way by-pass valve would be closed during automatic valve operation. The equalization of pressure across the piston eliminates the need for the manual override to overcome the force resulting from pressure trapped in a piston actuator chamber.
- d. The maximum pressure rating of the A61 piston actuator is 150 psig.
- e. The A61 Actuator is a yokeless type design and is mounted to the valve by means of gimbal pins (124) which allow the actuator to rock back and forth as it follows the arc of the rotary valve action.
- f. Maximum actuator thrust may be stated as follows:
 1. (In the "UP" direction) thrust = supply pressure \times piston area - stem area.
 2. (In the "DOWN" direction) thrust = supply pressure \times piston area.

- h. Insert the four extended cap screws (109A) at 90° positions along the bolt circle of the diaphragm case assembly (101) and engage the cap screw nuts (110) on the extended cap screws. Preload the spring (129) by taking up on the extended cap screws (109A) alternately using good bolting practice. When the diaphragm case assembly (101) and lower diaphragm case (121) have been brought together, assemble all remaining cap screws (109) and cap screw nuts (110) in position. Tighten all nuts (110) as assure diaphragm seal.
- i. Pressurize the upper diaphragm case with air and check outer edge of diaphragm for leaks with leaktec or other suitable means.
- j. Check stroke. (2¼" ± ⅛" for 100 In.² size and 3½" ± ⅛" for 200 In.² size.)

A45 / DIAPHRAGM ASSEMBLY

- a. Diaphragm and actuator stem assembly enter spring barrel as a unit.
 1. Replace diaphragm, if necessary.
 2. Slide the diaphragm plate (8) (flat side up) over the actuator stem (20) to rest on the shoulder of the stem.
 3. Dust the diaphragm thoroughly with talcum to prevent abrasion; place the diaphragm over the actuator stem to rest on the diaphragm plate so that the mold of the diaphragm will cause it to drape over the edge of the plate.
 4. Place diaphragm washer (18) (rounded corners down) over the actuator stem, then secure the assembly with the actuator stem nut (17).

X. INSTALLING THE A61 PISTON ACTUATOR ON THE VALVE

- a. Put the plug (6) in the closed position.
- b. Position the actuator between the actuator mounting bosses provided on the body and engage the gimbal pins (124) to the body and actuator. Lock the gimbal pins (124) in position with the gimbal pin set screws (125).
- c. Stroke the actuator to the "down" position. ("UP" position in diaphragm actuator push down to close action).
- d. Adjust the rod end (127) to mate with the lever clevis (26) and engage with the lever pin (32). Engage snap rings (34).
- e. Stroke the actuator fully (2¼" on 3" and 4" valves, 3½" on 6", 8", 10" and 12" valves).

XI. INSTALLING THE A45 DIAPHRAGM ACTUATOR ON THE VALVE

Follow procedure outlined in Sect. IX, (Installing the A61 Piston Actuator on the valve).

After engaging gimbal pins secure actuator bosses to body using actuator mounting cup screws (124) set screw (125) and mounting cap screw washers (126).

XII. INSTALLING THE BELL MOUTH RING (3) (150# — 300# VALVES)

- a. When the bell mouth ring (3) is required, the seal ring retainer (3), seal ring (5), and seal ring back up ring are not used.
- b. Additional shim stock (11) is required with the bell mouth ring to prevent the plug (6) from binding to the bell mouth ring. When the valve is installed in the line the plug should move freely. The minimum number of shims (Part No. 11) required to achieve free plug travel must be used.

INSTALLATION OF THE DECLUTCHABLE MANUAL OVERRIDE

SM-8-1 & SM-18-1 300# (See Note for assembly on 150# Models Sect. VI)

It is not necessary to remove the valve from the line or disturb the valve and actuator relationship in order to install the manual override. The manual override is designed to overcome the spring force of the diaphragm actuator therefore the lever pin (32) need not be removed when switching from pneumatic to manual operation when a diaphragm actuator is used. It is recommended that a ¼" two-way by-pass valve be installed between the air connections on the piston actuator when the manual override is installed. This valve provides the means of equalizing the pressure on both sides of the piston.

NOTE: For 150# ANSI rated valves specify valve rating when ordering parts for manual override.

INSTALLATION

1. Remove the outboard bearing cap screws (31).
2. Remove the spline sleeve (29) from the outboard bearing retainer (28) and engage it on the end of worm gear shaft (146A) of the manual override.
3. Install the manual override mounting studs (109) in the tapped holes in the body previously used for the outboard bearing cap screws (31).
4. Place the travel indicator plate (19) in position on the studs (109).
5. Move the worm gear shaft (146A) of the manual override to the declutch position and drop the manual override interface down on the mounting studs (109). (Handwheel down).
6. Install the lockwashers (110A) and stud nuts (110) on the mounting studs (109).
7. Position the worm gear shaft (146A) to engage the spline sleeve (29) by turning the handwheel (135).
8. Engage and disengage the declutching mechanism several times to assure concentric alinement of the drive shaft (8) and the worm gear shaft (146A).
9. Tighten the mounting stud nuts (110).
10. Check to be sure the declutching mechanism is disengaged when air supply is applied to the actuator.

VALVE SIZE	RATING	STUD SIZE *B7	TORQUE FT. LBS.
3"	150#	⅝"-11	120
	300#	¾"-10	200
4"	150#	⅝"-11	120
	300#	¾"-10	200
6"	150#	¾"-10	200
	300#	¾"-10	200
8"	150#	¾"-10	200
	300#	⅞"-9	320
10"	150#	⅞"-9	320
	300#	1"-8	490
12"	150#	⅞"-9	320
	300#	1½"-8	720

NOTE: Torque Values are nominal only. Torque Ft. Lbs. would vary with type of material, surface, lubricants, etc.

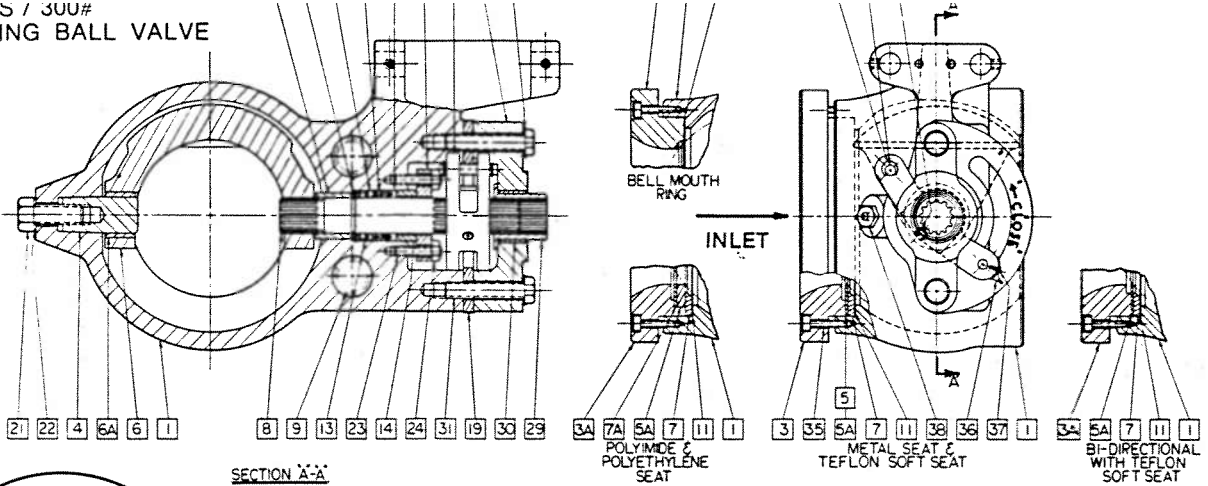
BALL VALVE WEIGHTS (LBS)

VALVE SIZE	RATING	BODY ASSEMBLY W/DIAPH. ACT. W/PISTON ACT.						FOR MANUAL OVERRIDE ADD ...
		WT.	SHPG. WT.	WT.	SHPG. WT.	WT.	SHPG. WT.	
3"	150#	35	45	105	135	60	75	10
	300#							
4"	150#	46	58	116	148	71	88	10
	300#							
6"	150#	90	105	230	275	115*	135	20
	300#							
8"	150#	130	150	270	320	155*	180	20
	300#							
10"	150#	215	240	355	410	260**	305	20
	300#							
12"	150#	320	350	460	520	365**	415	20
	300#							

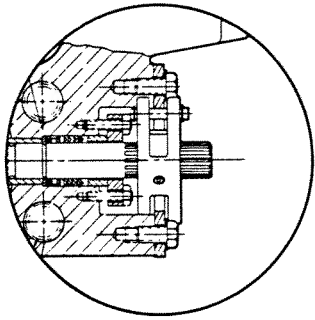
*28 in.² Piston Actuator — For 56 in.² size add 20 lbs.

**56 in.² Piston Actuator — For 28 in.² size subtract 20 lbs.

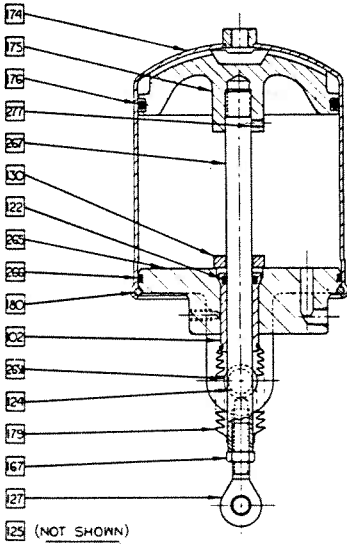
600 SERIES / 300#
MODULATING BALL VALVE



SECTION A-A



600 SERIES / 150#
MODULATING BALL VALVE



PARTS LIST

- 102 GUIDE
- *122 GUIDE "O" RING
- 124 GIMBAL PIN
- 125 GIMBAL PIN SET SCREW
- 127 ROD END
- 130 LOWER TRAVEL STOP
- 167 ROD END LOCK NUT
- 174 PISTON CYLINDER
- 175 PISTON
- *176 PISTON "O" RING
- 179 DUST BOOT
- 180 SNAP RING
- 265 BASE PLATE
- 265A BASE PLATE BEARING
- *266 BASE PLATE "O" RING
- 267 PISTON STEM
- 277 PISTON STEM SET SCREW

*RECOMMENDED SPARE PARTS

PARTS LIST

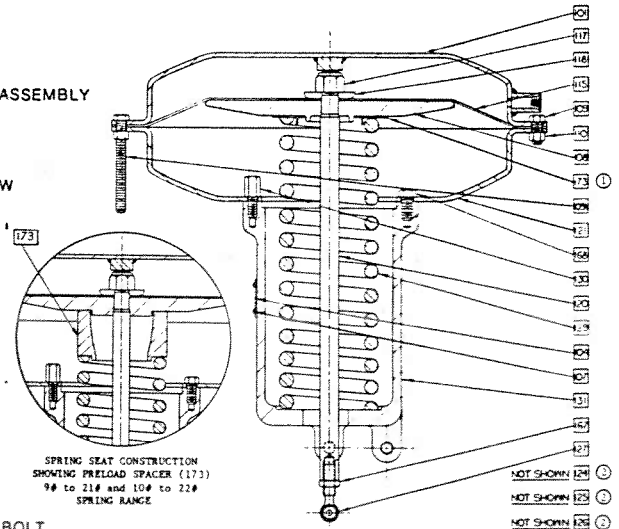
- 1. VALVE BODY
- 3. SEAL RING RETAINER
- 3A. BELL MOUTH RING (SOFT SEAT SEAL RING RETAINER)
- 4. TRUNNION
- *5. SEAL RING
- *5A. SOFT SEAT SEAL RING
- 6. PLUG
- 6A. PLUG BUSHING (PRESS FIT)
- 7. SEAL RING BACK UP RING
- 7A. SOFT SEAT SHIELD
- 8. DRIVE SHAFT
- 9. LINE STUDS
- 10. DRIVE SHAFT RETAINER (SPLIT RING)
- 11. SEAL RING SHIMS
- *12. PACKING
- *12A. TEFLON, MALE ADAPTER
- *12B. TEFLON, "V" RINGS
- *12C. TEFLON, FEMALE ADAPTER (TEFLON PACKING ILLUSTRATED)
- 13. GLAND
- 14. PACKING FOLLOWER
- 15. PACKING FOLLOWER FLANGE
- *18. DRIVE SHAFT BUSHING
- 19. TRAVEL INDICATOR PLATE
- 21. TRUNNION SCREW
- *22. TRUNNION GASKET
- 23. PACKING FOLLOWER STUDS
- 24. PACKING FOLLOWER STUD NUTS
- 26. LEVER
- 27. LEVER SET SCREWS
- 28. BEARING RETAINER
- 29. SPLINE SLEEVE
- 30. OUTBOARD BEARING (PRESS FIT)
- 31. TRAVEL INDICATOR CAP SCREW
- 32. LEVER PIN
- 34. LEVER PIN SNAP RING
- 35. SEAL RING RETAINER SCREW
- 36. POSITION POINTER
- 37. POSITION POINTER SCREW
- 38. LUBRICATOR FITTING
- 39. TRAVEL INDICATOR LOCKWASHER

*Recommended Spare Parts

PARTS LIST

- 101 UPPER DIAPHRAGM CASE ASSEMBLY
- 104 NAME PLATE
- 107 NAME PLATE SCREW
- 108 DIAPHRAGM PLATE
- 109A ACTUATOR JACKING SCREW
- 110 CAP SCREW NUT
- *115 DIAPHRAGM
- 117 ACTUATOR STEM NUT
- 118 DIAPHRAGM WASHER
- 120 ACTUATOR STEM
- 121 LOWER DIAPHRAGM CASE
- 124 CAP SCREWS
- 125 SET SCREW
- 126 CAP SCREW WASHER
- 127 ROD END MALE
- 129 SPRING (3-15)
- 130 TRAVEL STOP
- 131 SPRING BARREL VALVES
- 167 ROD END LOCK NUT
- 168 LOWER DIAPHRAGM CASE BOLT
- 173 SPRING RETAINER

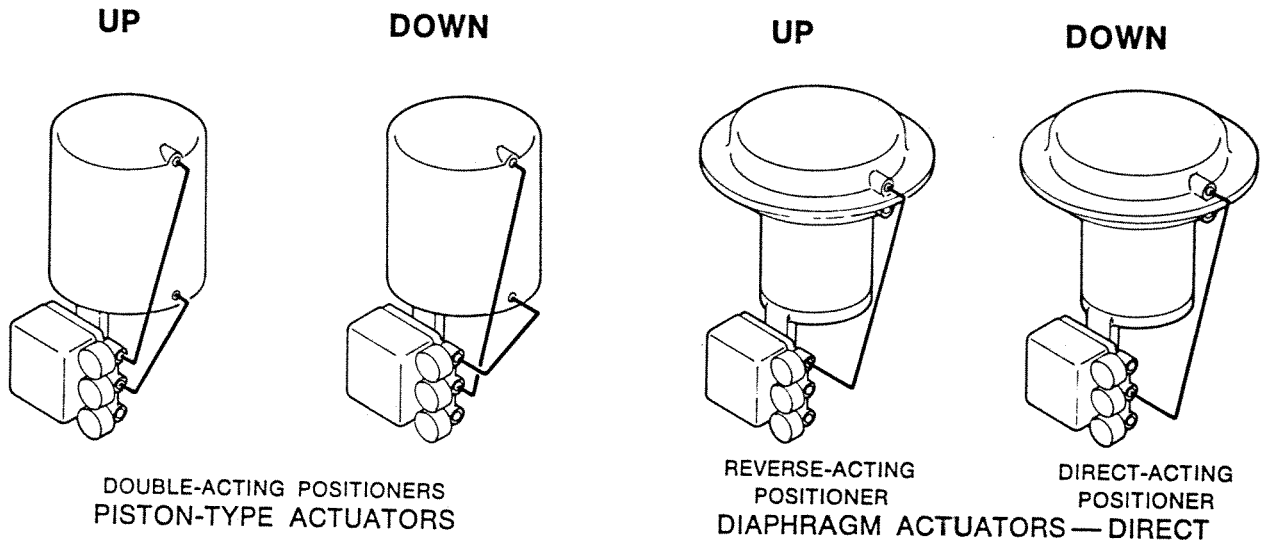
*RECOMMENDED SPARE PARTS



- ① Per 3-15# Spring Range
- ② Per Mounting Actuator to Body Assembly (4 each per valve)

INSTALLATION — PIPING

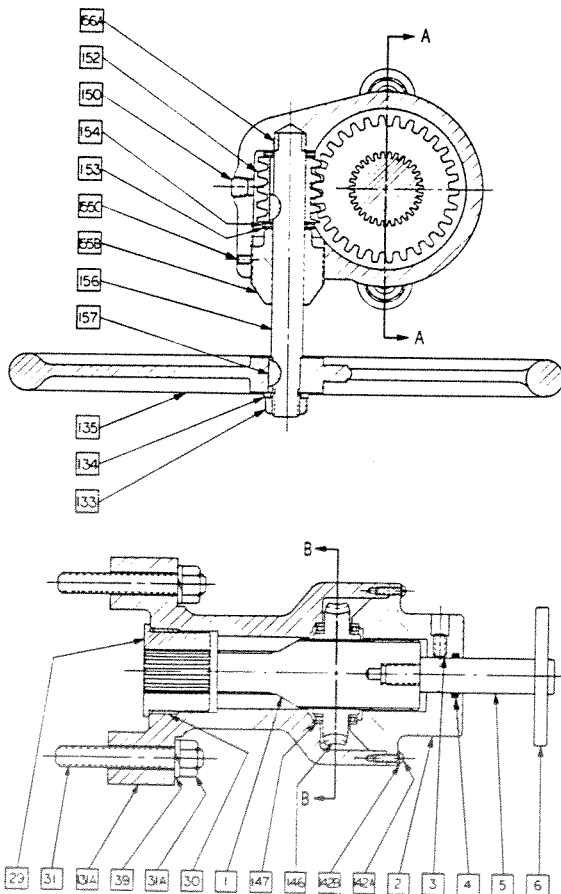
ILLUSTRATIVE INSTALLATIONS



ROTO AND PARTS LIST MANUAL OVERRIDE CLUTCH and GEAR ASSEMBLY

SM-8-1 (3" & 4")
SM-18-1 (6" — 12")

For Series 600 MOD™ Valve
(MODULATING BALL VALVE)



PARTS LIST

- 1. GEAR SHAFT
- 2. BEARING RETAINER
- 3. SPRING PLUNGER
- *4. "O" RING
- 5. HANDLE SHAFT
- 6. HANDLE (OR CLUTCH)
- 29. SPLINE SLEEVE
- 30. OUTBOARD BEARING (PRESS FIT)
- 31. MOUNTING STUD
- 31A. MOUNTING STUD NUT
- 39. MOUNTING STUD LOCKWASHER
- 131A. GEAR HOUSING
- 142A. BEARING RETAINER SCREW
- 142B. BEARING RETAINER LOCKWASHER
- 146. WORM GEAR
- 147. WORM GEAR BEARING

- 133. HANDWHEEL NUT
- 134. HANDWHEEL WASHER
- 135. HANDWHEEL
- 150. PIPE PLUG
- 152. WORM
- *153. THRUST RACE
- *154. THRUST BEARING
- 155B. WORM RETAINER
- 155C. WORM RETAINER SET SCREW
- 156. HANDWHEEL STEM
- *156A. HANDWHEEL STEM BUSHING
- 157. KEY (HANDWHEEL STEM)

*Recommended Spare Parts

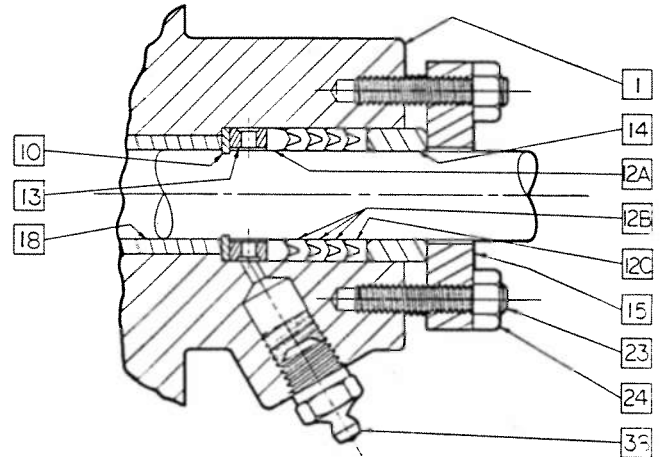
PACKING INSTRUCTIONS

Before proceeding with the appropriate packing assembly as indicated below, clean the valve packing box thoroughly and assemble the valve body as instructed. Teflon packing normally does not require periodic lubrication.

CHEVRON TEFLON ("V" RINGS)

1. Lubricate the five teflon rings lightly with silicone lubricant for ease in assembly (one male adaptor, one female adaptor, and three chevron rings).
2. Assemble the drive shaft as directed in Section V (30# ANSI rated Valve) or Section VI (150# ANSI rated valve).
3. With the drive shaft and drive shaft retainer (10) in position, place the lantern ring (13) over the drive shaft and slide into the packing box.
4. Assemble Teflon packing as shown in the illustration (12A Male adapter, 12B three (3) chevron rings, 12C female adapter).
5. Slide the packing follower (14) over the drive shaft followed by the packing follower flange (15). Secure (finger tight) with packing follower stud nuts (24) to packing follower studs (23).

Finger tightening of the packing follower stud nuts (24) should provide ample sealing pressure to the packing. After placing the valve in service this adjustment should be checked, and the nuts tightened just enough to prevent leakage. Excessive tightening will bind the valve stem and prevent sensitive response.

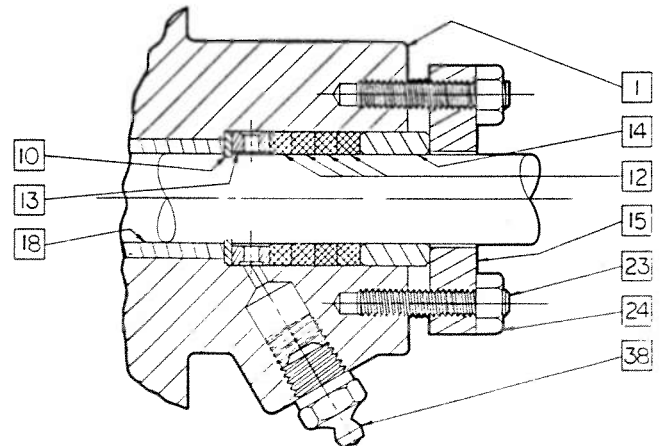


TEFLON PACKING ASSEMBLY

- 1 VALVE BODY
- 10 DRIVE SHAFT RETAINER (SPLIT RING)
- 12A PACKING, MALE ADAPTER
- 12B PACKING, "V" OR CHEVRON RINGS (4)
- 12C PACKING, FEMALE ADAPTER
- 13 LANTERN RING
- 14 PACKING FOLLOWER
- 15 PACKING FOLLOWER FLANGE
- 18 BUSHING (DRIVE SHAFT)
- 23 PACKING FOLLOWER STUDS
- 24 PACKING FOLLOWER STUD NUTS
- 38 LUBRICATOR FITTING

TEFLON IMPREGNATED ASBESTOS

1. For assembly purposes only, lubricate the four packing rings (12) light silicone lubricant.
2. Follow drive shaft assembly procedure (Section V 300# ANSI rated valve or Section VI 150# ANSI rated valve).
3. With the drive shaft and drive retainer (10) in position, place the lantern ring (13) over the drive shaft and slide into the packing box.
4. Slide the four packing rings (12) over the drive shaft into the packing box.
5. Slide the packing follower (14) over the drive shaft followed by the packing follower flange (15). Secure (finger tight) with packing follower stud nuts (24) to packing follower studs (23).



TIA PACKING ASSEMBLY

- 1 VALVE BODY
- 10 DRIVE SHAFT RETAINER (SPLIT RING)
- 12 PACKING (4) RINGS
- 13 LANTERN RING
- 14 PACKING FOLLOWER
- 15 PACKING FOLLOWER FLANGE
- 18 BUSHING (DRIVE SHAFT)
- 23 PACKING FOLLOWER STUDS
- 24 PACKING FOLLOWER STUD NUTS
- 38 LUBRICATOR FITTING



**HAMMEL DAHL
CONOFLOW**

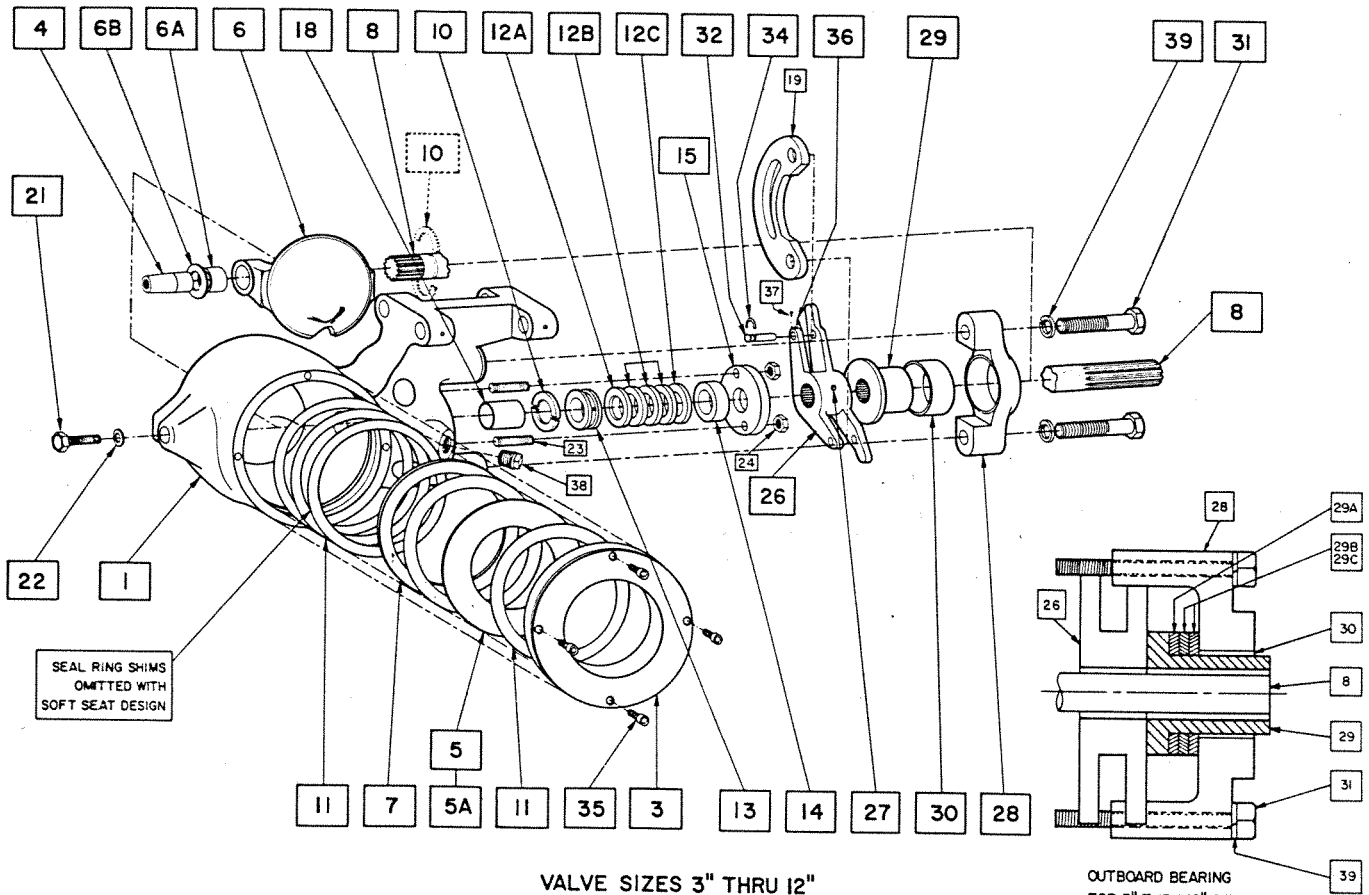
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International Telephone and Telegraph Corporation
175 Post Road, Warwick, Rhode Island 02888

PRICE SCHEDULE

LIST PRICES
F.O.B. WARWICK, R.I.
EFFECTIVE: 11/73
SUPERSEDES: 4/1/73

M56

600 SERIES MODULATING BALL VALVE SPARE PARTS LIST



VALVE SIZES 3" THRU 12"

OUTBOARD BEARING
FOR 3" THRU 12" SIZES

STEEL SPACERS (BLACK OXIDE)
29C 3/32" THICK AND 29B 1/16"
THICK AS REQUIRED.

* RECOMMENDED SPARE PARTS

- | | | | |
|----------------|--|------------------|---|
| 1 | VALVE BODY | 19 | TRAVEL INDICATOR PLATE |
| 3 | SEAL RING RETAINER | 21 | TRUNNION SCREW |
| 4 | TRUNNION | 22 | TRUNNION GASKET |
| 5 | SEAL RING | 23 | PACKING FOLLOWER STUDS |
| 5A | SOFT SEAT SEAL RING | 24 | PACKING FOLLOWER STUD NUTS |
| 6 | PLUG | 26 | LEVER |
| 6A | PLUG BUSHING (PRESS FIT) | 27 | LEVER SET SCREW |
| 6B | PLUG WASHERS | 28 | BEARING RETAINER |
| 7 | SEAL RING BACK-UP RING | 29 | SPLINE SLEEVE |
| 8 | DRIVE SHAFT | 29A | PLASTIC THRUST WASHERS |
| 10 | DRIVE SHAFT RETAINER (SPLIT RING) | 29B/C | SPACERS BL. OX. |
| 11 | SEAL RING SHIMS | 30 | OUTBOARD BEARING (PRESS FIT) |
| 12A | TEFLON PACKING, MALE ADAPTER | 31 | RETAINER CAP SCREW |
| 12B | TEFLON PACKING, "V" RINGS | 32 | LEVER PIN |
| 12C | TEFLON PACKING, FEMALE ADAPTER | 34 | LEVER PIN SNAP RING |
| 13 | GLAND | 35 | SEAL RING RETAINER SCREW |
| 14 | PACKING FOLLOWER | 36 | POSITION POINTER |
| 15 | PACKING FOLLOWER FLANGE | 37 | POSITION POINTER SCREW |
| 18 | DRIVE SHAFT BUSHING | 38 | LUBRICATOR FITTING |
| | | 39 | BEARING RETAINER LOCK WASHER |

29A THRUST WASHER ADDED TO
ALL VALVES EFFECTIVE 10/1/73