



LA-5100 (STYLE-B)  
NEMA 4

I.	General Description.....	2
II.	Description of Operation.....	2
III.	Storage.....	3
IV.	Installation	
	A. Mounting.....	3
	B. Limit Switch Adjustment.....	4
	C. Feedback Potentiometer.....	5
	D. Thrust Limit Switch.....	5
	E. Electrical Connections.....	6
V.	Maintenance.....	6
VI.	Replacements	
	A. Motor.....	6
	B. Limit Switch.....	7
	C. Feedback Potentiometer.....	8
	D. Screw Nut.....	8
	E. Clutch.....	9
	F. Handcrank Sheer Pin.....	10

## I. General Description

The LA-5100 Series Actuator is an actuator designed to operate short stroke linear valves. This actuator combines the outstanding features of the SM-5000 scotch yoke design with a high reliable toggle to translate rotary motion to linear travel. This gives us the advantage of increase thrust-reduced speed at the end of travel where the valve requires the extra force for seating. Because of this non-linear relation of thrust to stroke the following chart will allow you to determine the

seating thrust and stroke time for your valve travel. The actuator can either be operated in the electric drive mode which is the automatic mode or in the handcrank mode which is the manual mode. Depressing the spring plunger next to the handcrank will disengage the clutch and set the actuator to the manual or handcrank mode of operation. The actuator will remain in the handcrank mode of operation until electric power is applied to the motor.

BASIC ACTUATOR	ACTUATOR STROKE (IN)	MID THRUST (LBS)	SEATING THRUST *+	STROKE TIME IN SEC.* FOR DIFFERENT MOTORS			
				5110/50	5120/90	5140	5160
5100	.50	1500	1575	14.5	3.5	4.0	2.5
5100	.75	1500	1665	21.5	5.3	6.0	3.9
5100	1.00	1500	1860	31.5	7.7	8.8	5.7
5100	1.25	1500	2160	43.2	10.5	12.0	7.8
5100	1.50	1500	2670	57.6	14.0	16.0	10.4
5100	1.70	1500	3000	72.0	17.5	20.0	13.0

**NOTE: \*** For strokes other than those shown the seating and stroke time may be interpolated.  
**+** These seating thrust assume a symmetrical travel on each side of mid point. Consult factory for travel alignment if higher thrusts are required up to maximum thrust shown.

## II. Description of Operation

Electric power is applied to the motor which is mounted on motor bracket assembly item 10. A motor pinion gear and clutch release weight assembly are attached to the motor rotor shaft. The motor pinion gear is engaged with a gear (item 5) on the clutch assembly (item 21). Turning clutch gear (item 5) causes clutch gear to rotate which in turn rotates the drive screw gear and the drive screw. The drive nut fixed in the nut housing of the pivot shaft assembly is driven along the drive screw causing the pivot shaft assembly to rotate a maximum of 90° about the pivot shaft. The movement of the pivot shaft assembly and coupled to the output clevis thru clevis pin. Output clevis is coupled to the valve shaft with coupling causing the valve to be positioned. In the event the valve shaft becomes jammed or the

output clevis movement becomes restricted, the pivot shaft assembly will not move and the drive screw while rotating will also move axially compressing the springs in screw thrust assembly depending on the direction of rotation of the drive screw. The axial movement of the screw shaft causes the drive screw gear to move with the screw shaft. Two thrust limit switches sense the position of the gear face with shaft and spring which keeps the tip of the shaft loaded against the gear face. One switch will cut off motor power for a thrust limit in the valve close direction and the other switch activates in the valve open position. These switches are factory set for the specified maximum thrust and should not require re-adjustment.

## II. Description of Operation cont.

Attached to the inside face of the pivot shaft assembly is a spur gear which rotates the position limit switch shaft gear and the feedback potentiometer shaft gear. The position limit switches are customer adjustable for matching the actuator to the valve stroke. The feedback potentiometer is also adjustable and relates to valve position.

The actuator is equipped with a manual handcrank. To use the handcrank the side plunger must be depressed with motor power disconnected. Pressing the plunger will push the clutch yoke latching the yoke in the manual mode, separating the clutch face from the clutch gear. When the yoke moves the clutch, the clutch pinion gear becomes engaged with the handcrank thru a dog on the end of the slide gear and motor power is restored at which time the spinning of the motor shaft will cause two centrifugal weights to hit the yoke latch lever, unlatching the yoke and returning the clutch to the automatic mode of operation.

The actuator and valve are protected from over thrust in the handcrank mode with a shear pin in the handcrank handle. Should this shear pin break there are spare pins in the handle. The shear pin strength is critical and substitute pins should never be used.

## III. Storage

If the actuator will not be installed, it should be stored in a clean, dry area where the ambient temperature is not less than -20° F. The actuator should not be stored in a corrosive environment.

## IV. Installation

### A. Mounting

The outline mounting dimensions for a standard unit are shown on the installation prints supplied with the actuator. The rear cover opposite the position indicator must have clearance so that it may be swung open for adjustments and interconnect wiring. Mounting may be in any position convenient to the driven load. When mounting the unit be sure that no excess axial or side loading force is applied to the

output shaft. Limit switches and the position feedback are connected to the driven load shaft so that no slippage can occur which would cause misalignment or damage.

The actuator is supplied with all the necessary hardware to mount this unit to your valve. Prior to mounting the actuator to the valve, move the manual engagement lever to the manual position. With the actuator in the handcrank mode of operation, turn the crank to retract the adaptor coupling to the stop collars closest to the actuator. The stop collars on either side of the adaptor coupling have been per-set at the factory to your valve specifications. Remove the coupling from the actuator. Mount the valve to the actuator valve plate with the appropriate user supplied hardware. Using the actuator handcrank, position the actuator shaft close to the valve stem and attach the coupling. Torque the bolts on the coupling to 30 to 35 ft. lbs. Handcrank the actuator with the valve attached to the full valve close position. If the valve does not reach the full closed position prior to the coupling hitting the stop collars furthest from the actuator, the stop collars will have to be repositioned, allowing the valve to reach its full closed or seated position. Crank the valve to its full open position and adjust the stop closest to the actuator to stop the coupling with the valve in its full open position. The use of these stop collars is dependent upon the application. You may or may not wish to have the actuator close against the stop collars before fully seating the valve. Adjust the stop collars furthest from the actuator to seat against the coupling and both stop collars furthest from the actuator for torque seated valve set-up.

### B. Limit Switch Adjustment

The key lock limit switch assembly is a method of switch adjustment that after alignment may be adjusted without special tools. Refer to page 18 for parts locations.

## B. Limit Switch Adjustment cont

- 1) Manually crank the actuator to the valve full open position. At the valve full open position, limit switch #1 should have activated with the switch lever just dropping off of the 100% end of the cam. Cam shaft key #3 should be keyed in limit switch cam #1 at the zero position. If it is not keyed at zero, pull the key out of the assembly, rotate the cam to the zero position, and re-insert the key. Switch plate key item #5 should be inserted in switch plate #1 at the zero position. If it is not at the zero position remove key #5 by turning the key counter clockwise until it screws out of the actuator. When it is unscrewed from the actuator, pull it out of the switch holders. Re-insert key #5 in the zero position on switch holder #1 and then any position on switch #2, 3, and 4.
- 2) Loosen two #1/4-20 set screws in the cam shaft. Rotate the cam shaft assembly clockwise until limit switch #1 just activates with the limit switch lever dropping off of the 100% end of the cam. Tighten the two #1/4-20 set screws.

**Note: Ignore steps 3, 4, and 5 if closed position limit switch is not present.**

- 3) Handcrank the actuator until the valve is in its full closed position.
- 4) With the valve in its full closed position limit switch #2 should have activated with the cam just tripping limit switch #2 activating lever. If limit switch #2 has not activated, remove key #3 from the cam, rotate the cam counter clockwise until limit switch #2 just trips, and re-insert key #3.
- 5) Handcrank the actuator back toward the valve open position to reset limit switch #2. After switch #2 has reset, crank the actuator to close the valve once again. With the valve in the closed position, re-check limit switch #2 setting. If it has activated prematurely, loosen key #5 and set it into switch holder #2 at a higher number. Limit switches #3 and #4 are intermediate position switches

which the customer may set for any position between limit switches #1 and #2.

## C. Feedback Potentiometer Alignment

If your unit is equipped with a feedback potentiometer, it may be necessary to re-align the potentiometer in relation to the valve travel. With the valve in the full open position, the feedback pot should have 50 ohms resistance from terminals 13 to 14 at the actuator for verification of the terminal numbers. To adjust the feedback pot loosen the 3 pan head screws which locate the pot mounting disc to the center support assembly. To gain access to the terminal strip and the pot, it will be necessary to open the rear axis cover of the actuator. With the 3 pan head screws loosened, rotate the pot body and the mounting disc until the resistance at terminals 13 and 14 are 50 ohms. Tighten the screws and alignment is then complete.

## D. Thrust Limit Switches

The actuators are supplied with both open and closed thrust limit switch protection. Upon exceeding the rating of the actuator output thrust, one or the other limit switch will trip depending on the direction of travel. The switches are factory set and field adjustment should not be necessary.

Activation of a thrust limit switch can be visually observed by looking at the end of the screw thrust housing nearest the crank. In the center of the screw thrust housing is an indicator rod which is one piece with the main screw shaft running thru the actuator. If the thrust indicator rod is extending out of the screw thrust housing, the thrust limit switch for the valve closed position has activated. If the indicator shaft has retracted into the screw thrust housing, the actuator is seeing a thrust limit condition in the valve open position.

## E. Electrical Connections

The limit switch and feedback area of the actuator depends upon the cover to maintain the NEMA rating. This cover should be removed only when actual work is being done in that area and re-installed immediately thereafter.

The wiring diagram supplied with the actuator shows the interconnect wiring connections for the actuator supplied. The drawing shows the arrangement with torque limit switches, position limit switches, feedback pot, and heater. To meet the special requirements certain items shown may not be supplied and in that case the terminals will be blank. In all instances the wiring diagram appropriate to the equipment will be supplied with the equipment.

The barrier type terminal strip is located under the rear cover of the actuator. One conduit entry is located at each end of the actuator to accommodate standard 1-1/4" NPT pipe connections.

## V. Maintenance

Under normal service conditions the motor, gearing, bearings, and parts are all per-lubricated and should not require periodic maintenance. If for any reason the unit is disassembled in the field, all bushings should be re-saturated with the SAE-10 oil and all gearing should be coated with the Rykon Premium Grease #2 or equal. Care should be taken to ensure that no foreign material is allowed to become entrained with the grease in the gear train which will cause premature failure. The screw shaft must be lubricated with Allex EP - 1L Grease. **DO NOT SUBSTITUTE.**

## VI. Replacements

### A. Motor Replacement

Refer to the engineering drawing at the end of this manual for parts location.

1. Turn off all power to the actuator.
2. Remove feedback cover item #2 from the actuator.

3. Remove the position indicator item #82 and the from cover item #1 from the actuator.
4. Remove the handcrank assembly item #25 from the actuator by removing screw and washer items #4 and #5 which hold the handcrank retaining plate in position.
5. From the output shaft side of the actuator remove 2 screws and washers items #11 and #12 from the center support plate.
6. From the feedback side of the actuator pull out the motor and the motor plate with the clutch assembly.
7. Refer to motor bracket assembly on page 14. Remove retaining screw and washer items #6 and #7. Remove motor pinion assembly item #3.
8. Remove 3 screws item #13 from the upper end of the motor on AC motors or 3 screws and washers item #18 and #22 from the motor bracket on DC motors.
9. Remove the motor and replace it with the new motor reversing the entire procedure.

### B. Limit Switch Replacement

Refer to the limit switch assembly on page 17. On a piece of paper note the location of all cams and switches 1 thru 4 in relation to the keys. Also note the location of all switch holders in relation to key #5.

1. Remove key #3 and key #5 from the limit switch assembly.
2. Remove retaining ring item #11 positioned directly above the upper most cam.
3. Slide off limit switch cam #1 and limit switch holder #1.
4. Slide off any other additional cams and limit switch holders until you can get at the switch which you are replacing.
5. The switch is held to the switch holder with two screws and lockwashers item #9 and #10.
6. Re-assemble the switch assembly in the reverse order in which you took it apart.

## B. Limit Switch Replacement

7. Reset the cams and the switch holders in relation to the keys in the same orientation as they were prior to disassembly.

## C. Feedback Potentiometer Replacement

The feedback potentiometer is located on the center support plate below the motor.

1. Remove the 3 pan head screws which hold the feedback potentiometer disc in place.
2. Remove the potentiometer and disc from the actuator.
3. Measure the location on the gear which is attached to the potentiometer shaft.
4. Using an Allen wrench, remove the gear from the potentiometer shaft.
5. Loosen the nut retaining the potentiometer with the shaft length of the old potentiometer. Cut the shaft of the new potentiometer to match the same length as the old one.
6. Compare the shaft length of the new potentiometer with the shaft length of the old potentiometer. Cut the shaft of the new potentiometer to match the same length as the old one.
7. Mount the new potentiometer on the potentiometer disc and relocate the gear to the same position that it was on the original potentiometer assembly.
8. Mount the potentiometer and disc in the actuator making sure that the potentiometer gear is in proper engagement with the gear that drives it.
9. Align the potentiometer following the feedback potentiometer alignment instructions.

## D. Screw Nut Replacement

1. Disconnect all power from the actuator.
2. Remove rear cover item #2 and from cover item #1 from the actuator.
3. Remove the handcrank assembly item #25 from the actuator by removing the screw and washer item #4 and #5 from the handcrank retaining cap.

4. Remove screw thrust housing item #13 and item #54 from the actuator.
5. Remove screw #71 and #70 from the output shaft yoke.
6. Remove screws and washers #15 and #8 from the center support plate mounting flanges.
7. Remove the entire center support assembly from the actuator.
8. Remove drive screw assembly #17 and pivot shaft assembly #18 from the actuator as one piece.
9. Remove the retaining ring from the end of the screw shaft farthest from the gear item #3.
10. Remove the screw shaft from the pivot shaft assembly.
11. Referring to the pivot shaft assembly on page 13, remove retaining ring item #5 and spacer #4 from one end of the nut housing item #1.
12. Push the screw nut out of the nut housing.
13. Insert the new nut into the nut housing locating it with key #3.
14. Insert spacer #4 and retaining ring #5 in the end of the nut housing.
15. Clean the screw shaft thoroughly and screw it into the nut. After it is screwed sufficiently into the nut, replace the retaining ring on the end of the screw shaft.
16. Assemble the entire actuator in the reverse order of disassembly and lubricate the screw shaft with Allrex EP-1L Grease. Lubricate the rest of the gearing with Rykon Premium Grease #2 or equal.
17. Re-align the entire actuator following the valve alignment procedure, limit switch adjustment procedure and potentiometer alignment procedure.

## E. Clutch Replacement

1. Follow the motor replacement procedure with the exception of - Do Not Remove The Motor From the Mounting Bracket - instead remove the clutch from the mounting bracket. The entire clutch may be replaced as one complete assembly.
2. If it is desired to replace a part of the clutch assembly only, remove retaining ring item #16 and bearing #15 from the clutch shaft.

E. Clutch Replacement cont.

3. Compress the clutch assembly in a suitable device to take the spring pressure off of cotter pin item #17. Remove cotter pin #17 and slowly relieve the spring pressure to allow the clutch parts to become free.
4. Remove washer item #14, spring item #13, gear item #11, clutch drum item #8, and gear item #5 from the clutch assembly.
5. If gear item #5 is being replaced the new gear must spin free on the hub of gear bearing item #4.
6. If clutch disc item #7 is worn or glazed it should be replaced and it is held to clutch drum item #38 using UNIROYAL INDUSTRIAL ADHESIVE.
7. Lubricate clutch shaft item #1 with a SAE-10 oil and slide all of the parts back on to the clutch shaft in the reverse order of disassembly. Compress the spring and re-insert cotter pin. Re-install bearing item #15 and retaining ring #16.
8. Re-install the clutch assembly onto the motor bracket assembly and reverse assemble the entire actuator. Follow the appropriate alignment instructions after re-assembly.

F. Handcrank Sheer Pin Replacement

Refer to the handcrank assembly on page 16. In the event that the actuator is in the manual mode of operation and the handcrank spins free and does not turn the

handcrank shaft, most likely sheer pin item #7 has been broken. To replace the sheer pin the following procedure should be observed.

1. Remove screw item #6 from the handcrank handle.
2. Remove the handcrank handle from the handcrank shaft item #3.
3. Remove the broken sheer pin item #7 from the handcrank shaft item #3.
4. Spare sheer pins are located in the handle assembly under cover plate item #11. The sheer pins used in this actuator are of a special material and should not be substituted.
5. Insert the new sheer pin allowing it to stick out equally on either side of the shaft item #3.
6. Install and handcrank handle over the shaft and the sheer pin aligning the slot in the handle with the sheer pin. Re-install screw item #6 to hold the handle to the shaft.

**NOTE:** The strength of the sheer pin used in this assembly will give the operator an output thrust rating of approximately 3-1/2 times the maximum rated load of this unit prior to the pin sheering.

LA-5100 NEMA 4 STYLE BITEM DESCRIPTION

- 1 Front Cover Assy
- 2 Rear Cover
- 3 Main Housing
- 4 Capscrew Soc. Hd. 1/4-20 x .75 LG.
- 5 Lockwasher Hi-Collar 1/4
- 6 Dowel Pin .188 DIA x .31 LG.
- 7 Output Shaft Support Assembly
- 8 Capscrew Soc. Hd. 1/4-20 x .75 LG.
- 9 Dowel Pin .188 DIA x .75 LG.
- 10 Motor Bracket Assy
- 11 Capscrew Soc. Hd. 3/8-16 x 1.0 LG.
- 12 Lockwasher Hi-Collar 3/8
- 13 Screw Thrust Housing Assembly
- 14 Capscrew Soc. Hd. 5/16-18 x 1.0 LG.
- 15 Lockwasher Hi-Collar 5/16
- 16 "O" Ring
- 17 Drive Screw Assembly
- 18 Pivot Shaft Assembly
- 19 Lockout Arm Assembly
- 20 Spacer - as req'd
- 21 Clutch Assembly
- 22 Spacer
- 23 Flange Bushing
- 24 "O" Ring
- 25 Handcrank Assembly
- 26 Insulator
- 27 Insulator
- 28 Gasket (Front & Rear Cover)
- 29 Terminal Strip Mtg.
- 30 Screw Fl. Hd. #10-24 x .75 LG.
- 31 Terminal Strip - 12 Pin
- 32 Terminal Strip - 16 Pin
- 33 Screw Rd. Hd. #8-32 x .50 LG.
- 34 Lockwasher Hi-Collar #8
- 35 Instruction Labels & Placement
- 36 Clevis Pin
- 37 Cotter Pin 3/32 DIS. x .50 LG.
- 38 Capacitor 10 MFD (5110)
- 38 Capacitor 30 MFD (5120)
- 38 Capacitor 2 MFD (5150)
- 38 Capacitor 10 MFD (5190)
- 39 Terminal Cover
- 40 Screw Rd. Hd. #8-32 x .25 LG.

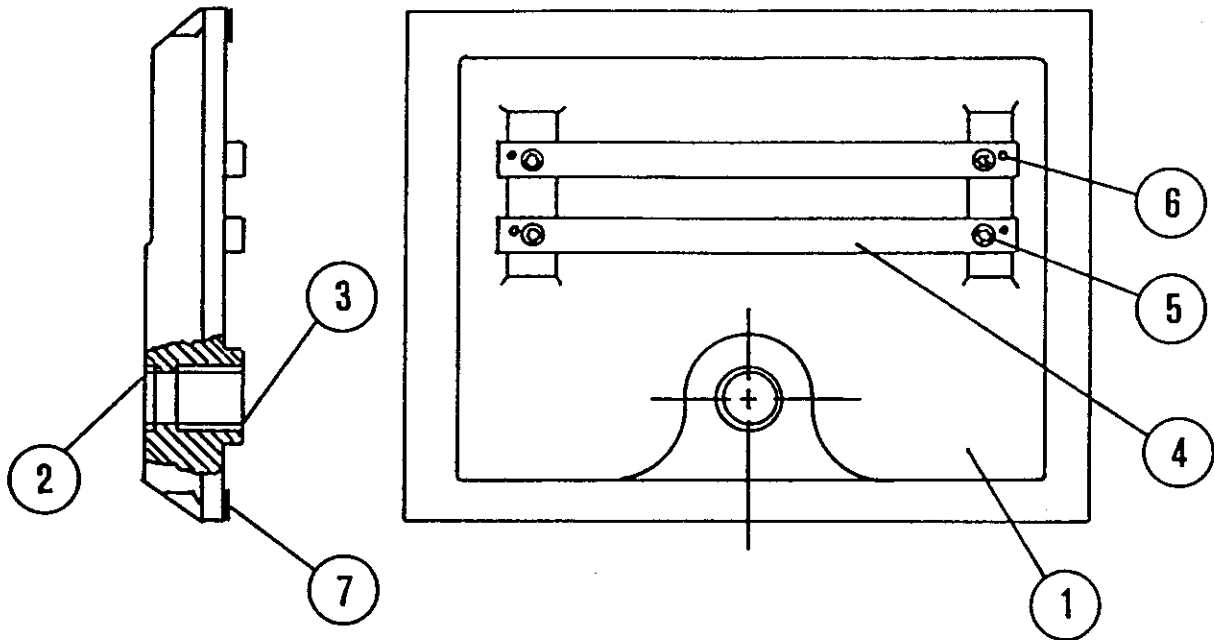
ITEM DESCRIPTION

- 41 Lockwasher #8 St'd
- 42 Capacitor Bracket (5110 & 5150)
- 42 Capacitor Bracket (5120 & 5190)
- 43 Clutch Latching Shaft
- 44 Spring
- 45 Seal
- 46 Washer (Rubber)
- 47 Washer
- 48 Ret. Ring Truarc #5100-50
- 49 Knob
- 50 Set Screw Soc. Hd. #10-24 x .19
- 51 Strain Relief (not shown)
- 52 Screw Fl. Hd. #8-32 x .25 LG.
- 53 Seal Adaptor Bushing
- 54 Screw Thrust Housing Assembly
- 58 Spring
- 59 Shaft
- 60 Torque Limit Switch
- 61 Plunger Screw Assembly
- 62 Bushing
- 63 Lip Seal
- 64 Mounting Flange
- 65 Bushing
- 66 Lip Seal
- 67 Lockwasher 5/16 St'd
- 68 Screw Hex. Hd. 5/16-18 x 1.75 LG.
- 69 Clevis
- 70 Clevis Pin
- 71 Screw Rd. Hd. #10-32 x .19 LG.
- 72 "O" Ring 1-1/2 x 1-5/8
- 73 Split Coupling Assembly
- 74 Stand-off
- 75 Valve Mounting Plate
- 76 Lockwasher 3/4 St'd
- 77 Jam Nut 3/4-10
- 78 Stud 3/4-10
- 79 Stop Rod 3/4-10 x 6.50 LG.
- 80 Set Screw Soc. Hd. 1/4-20 x .25 S.S.
- 81 Stop Collar
- 82 Pointer
- 83 Screw Hex. Hd. 1/4-20 x .62 LG.
- 84 Lockwasher 1/4 St'd
- 85 Limit Switch Assembly



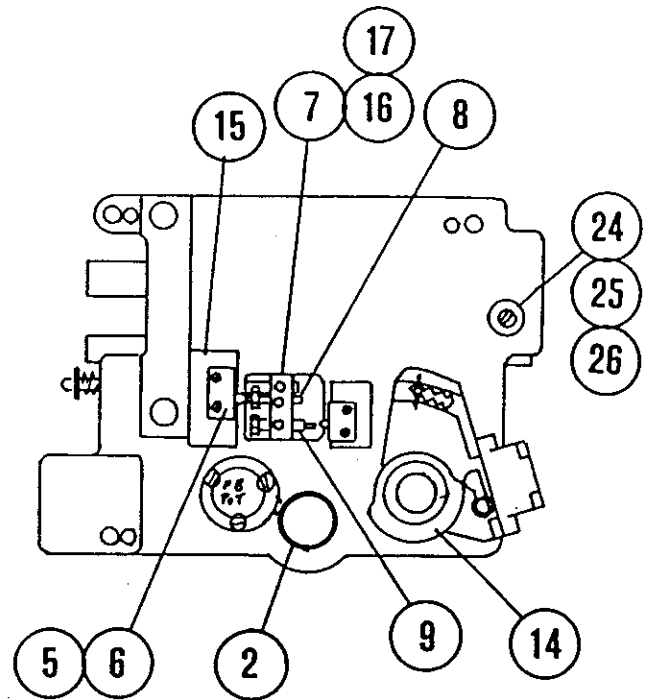
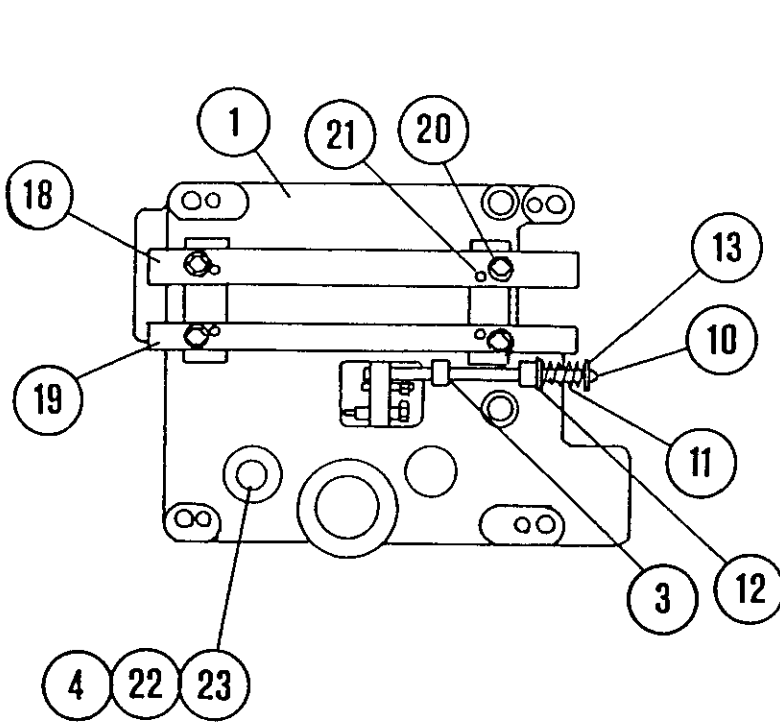
# FRONT COVER ASSEMBLY

<u>ITEM</u>	<u>DESCRIPTION</u>
1	Front Cover
2	Seal
3	Bushing
4	Rail
5	Cap Screw 1/4-20 x 0.50
6	Roll Pin .12 x .75
7	Gasket



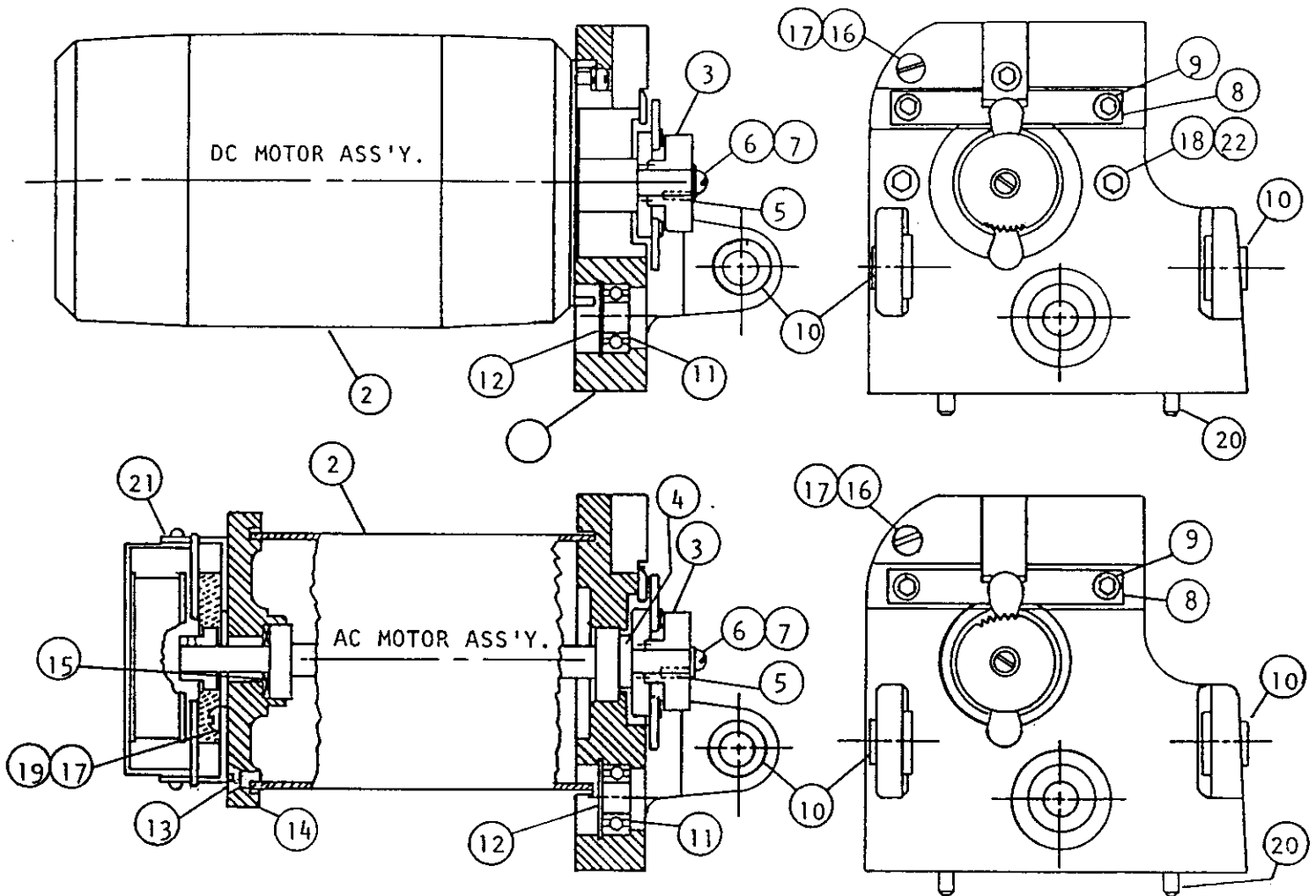
## OUTPUT SHAFT SUPPORT ASSEMBLY

<u>ITEM</u>	<u>DESCRIPTION</u>
1	Output Shaft Support
2	Bushing
3	Bushing
4	Bushing
5	Limit Switch
6	Screw Rd Hd #2-56 x 3/8 lg
7	Actuator Link
8	Stud, Sw. Adjusting
9	Plunger Screw Assembly
10	Torque Limit Switch
11	Spring
12	Bushing
13	"E" Ret. Ring
14	Feedback Assembly
15	Barrier
16	Setscrew, Soc. Hd 1/4-20 x .25 lg
17	Slug
18	Support Rail
19	Support Rail
20	Capscrew Soc. Hd. 1/4-20 x .50 lg
21	Rollpin 1/8 dia x .75 lg
22	Gear 44T-48 P (.75 to 1.0 stroke)
23	Setscrew #10-24 to .19 lg
24	Resistor 10 ohm 50 watt
25	Fiber Washer #10
26	Screw Rd. Hd #10-24 x 4.25 lg



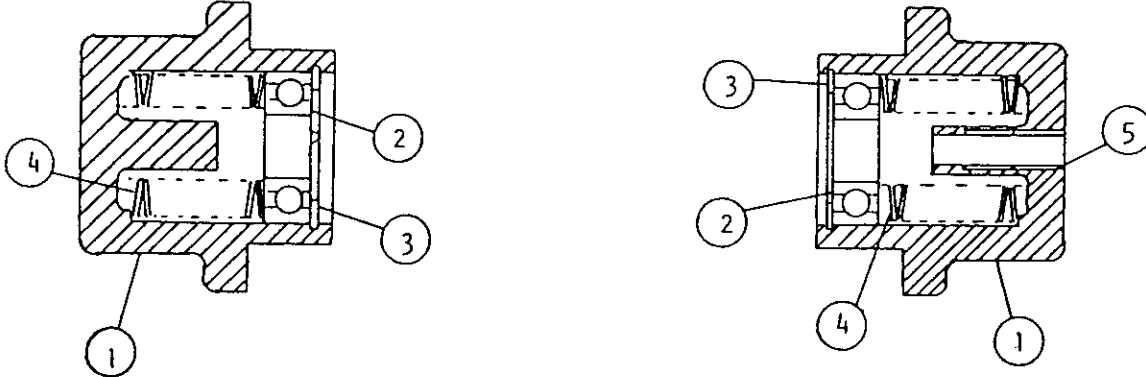
## MOTOR BRACKET ASSEMBLY

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>ITEM</u>	<u>DESCRIPTION</u>
1	Motor Bracket (AC)	10	Bushing
1	Motor Bracket (DC)	11	Bearing
2	Motor (SM-5100)	12	Ret. Ring 500-87
2	Motor (SM-5120)	13	Screw 10-24 x 4.5
2	Motor (SM-5140)		(5110,5120,5150)
2	Motor (SM-5150)	14	Motor Top
2	Motor (SM-5160)	15	Spring Washer
2	Motor (SM-5190)	16	Screw 10-24 x k.38
3	Gear Assy (18-65 sec)	17	Lockwasher #10
3	Gear Assy (13-17 sec)	18	Screw M6 x 17mm
4	Spacer	19	Screw 10-32 x .31
5	Dowel Pin .094 x .38	20	Dowel Pin .188 x .75
6	Flatwasher #6	21	Brake 115 Vac
7	Screw 6-32 x .25	21	Brake 220 Vac
8	Latch Plate	22	Lockwasher 1/4
9	Screw 10-24 x .38		(Hi Col)



## SCREW THRUST HOUSING

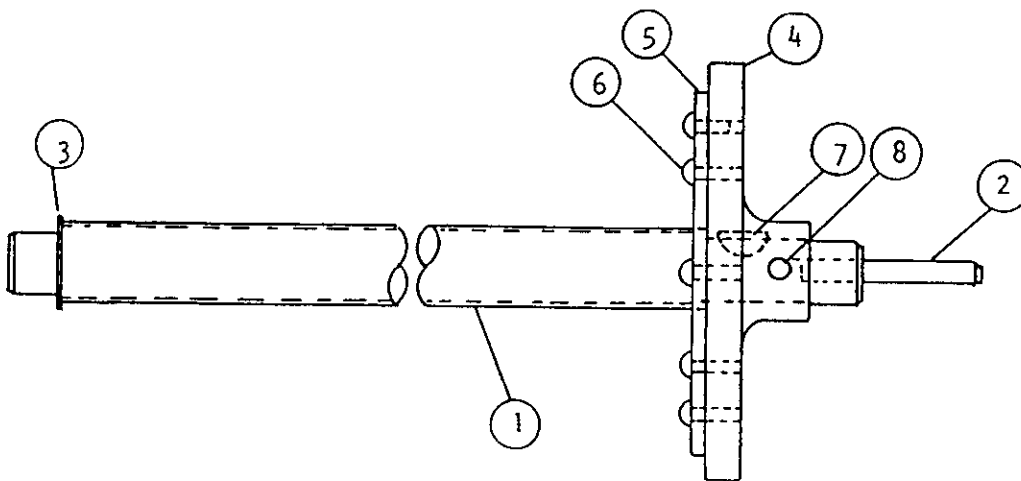
<u>ITEM</u>	<u>DESCRIPTION</u>
1	Housing w/o Indicator
1	Housing w/ Indicator
2	Bearing
3	Retaining Ring
4	Bellville Washer
5	Bushing for Housing w/ Indicator



## DRIVE SCREW ASSEMBLY

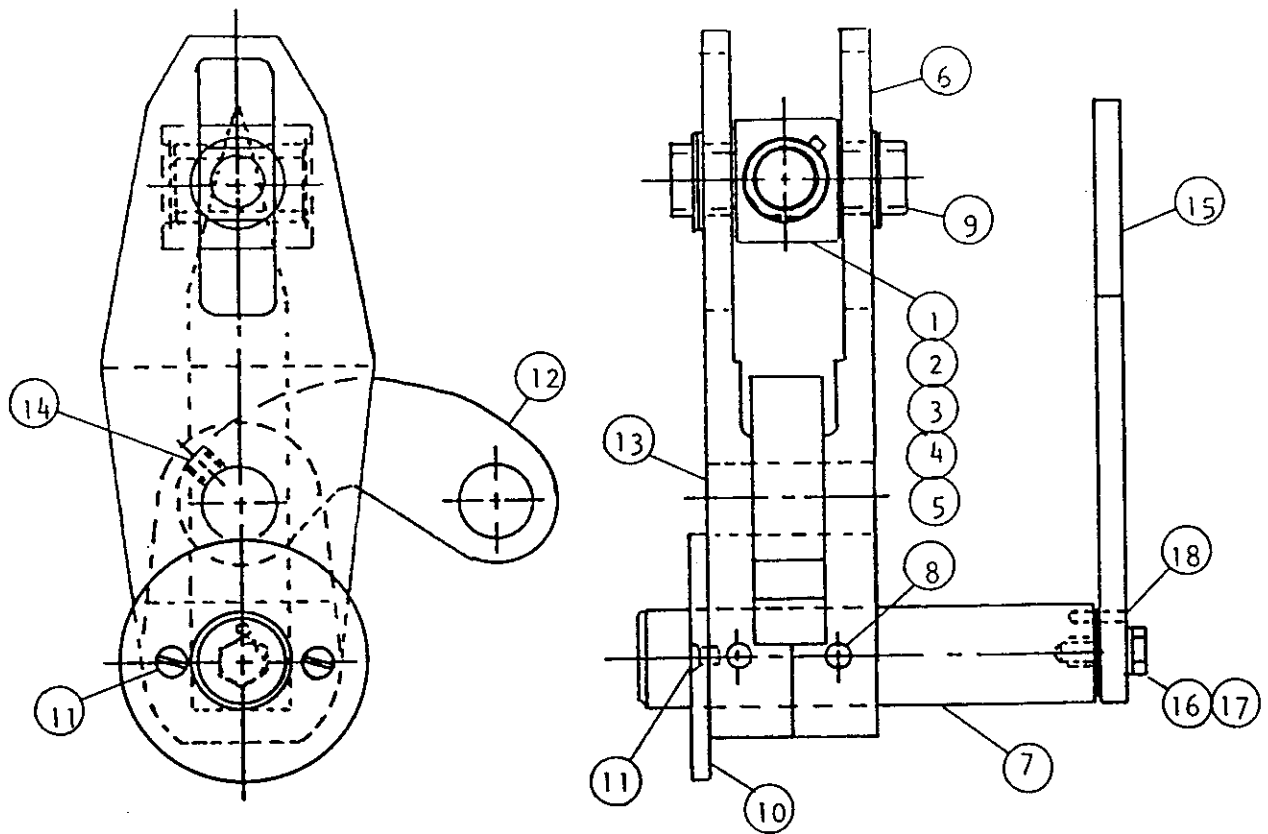
<u>ITEM</u>	<u>DESCRIPTION</u>
1	*Drive Screw 3/4 -10 Thr'd
1	**Drive Screw 3/4-6 Thr'd
2	Indicator Shaft
3	Ret. Ring #5160-59
4	Gear
5	Skid Disc
6	Drive Screw #6U x.38
7	Woodruff Key #404
8	Set Screw 10-24 x .19

\*3/4-10 Thr'd used on 30, 39,54, & 65 Sec Shift (90°) \*\*3/4-6 Thr'd used on 13,17,18,24 & 32 Sec Shift (90°)



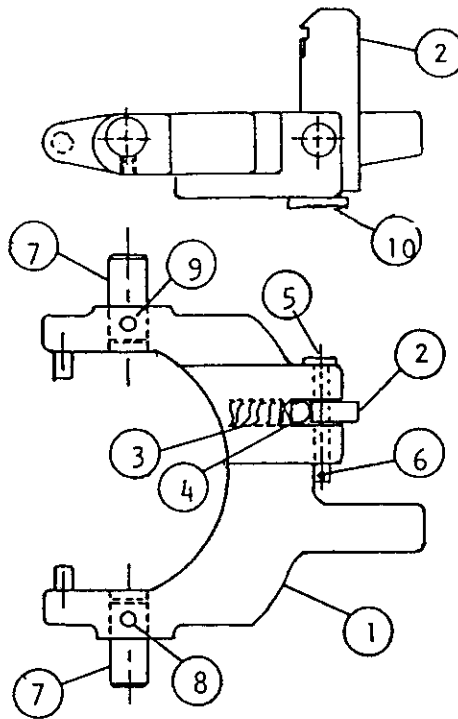
## PIVOT SHAFT ASSEMBLY

<u>ITEM</u>	<u>DESCRIPTION</u>
1	Nut Housing
2	Drive Nut 3/4-10 Thrd
3	Drive Nut 3/4-6 Thrd
4	Spacer
5	Ret. Ring N5008-100
6	Drive Plate
7	Output Shaft
8	Dowel Pin .250 dia x 2.0 lg
9	Pivot Block
10	Gear 132T-48 P (.75 & 1.0 stroke)
10	Gear 120T-48 P (1.25, 1.5 & 1.7 stroke)
10	Gear 115T-48 P (2.0 to 2.25 stroke)
11	Screw Flt Hd #6-32 x .38 lg
12	Link
13	Pin
14	Set Screw Soc. Hd 1/4-20 x .25
15	Pointer
16	Hex Hd screw 1/4-20 x .62
17	Lockwasher 1/4
18	Roll Pin 1/8 x .62



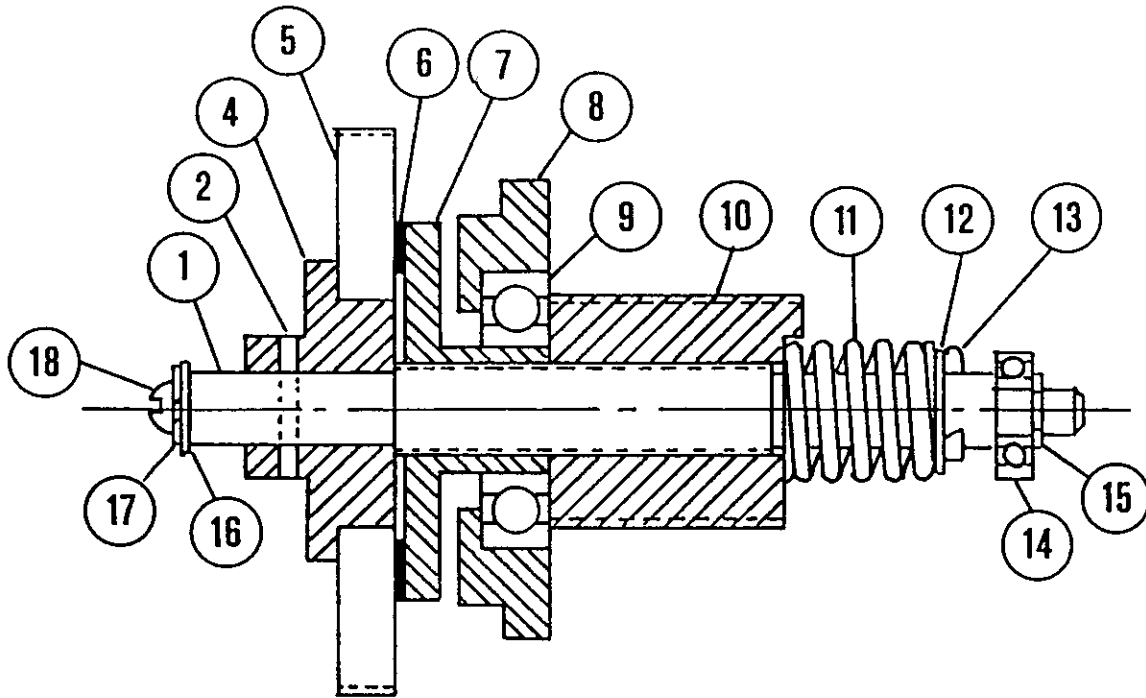
## LOCKOUT ARM ASSEMBLY

<u>ITEM</u>	<u>DESCRIPTION</u>
1	Lockout Arm
2	Latch
3	Spring
4	Latch Pin
5	Pivot Pin
6	Cotter Pin, 1/16 dia x .38 lg
7	Shaft
8	Roll Pin 1/8 dia x .62 lg
9	Set Screw 8-32 x .19 lg
10	Yoke Bumper (Glue On)



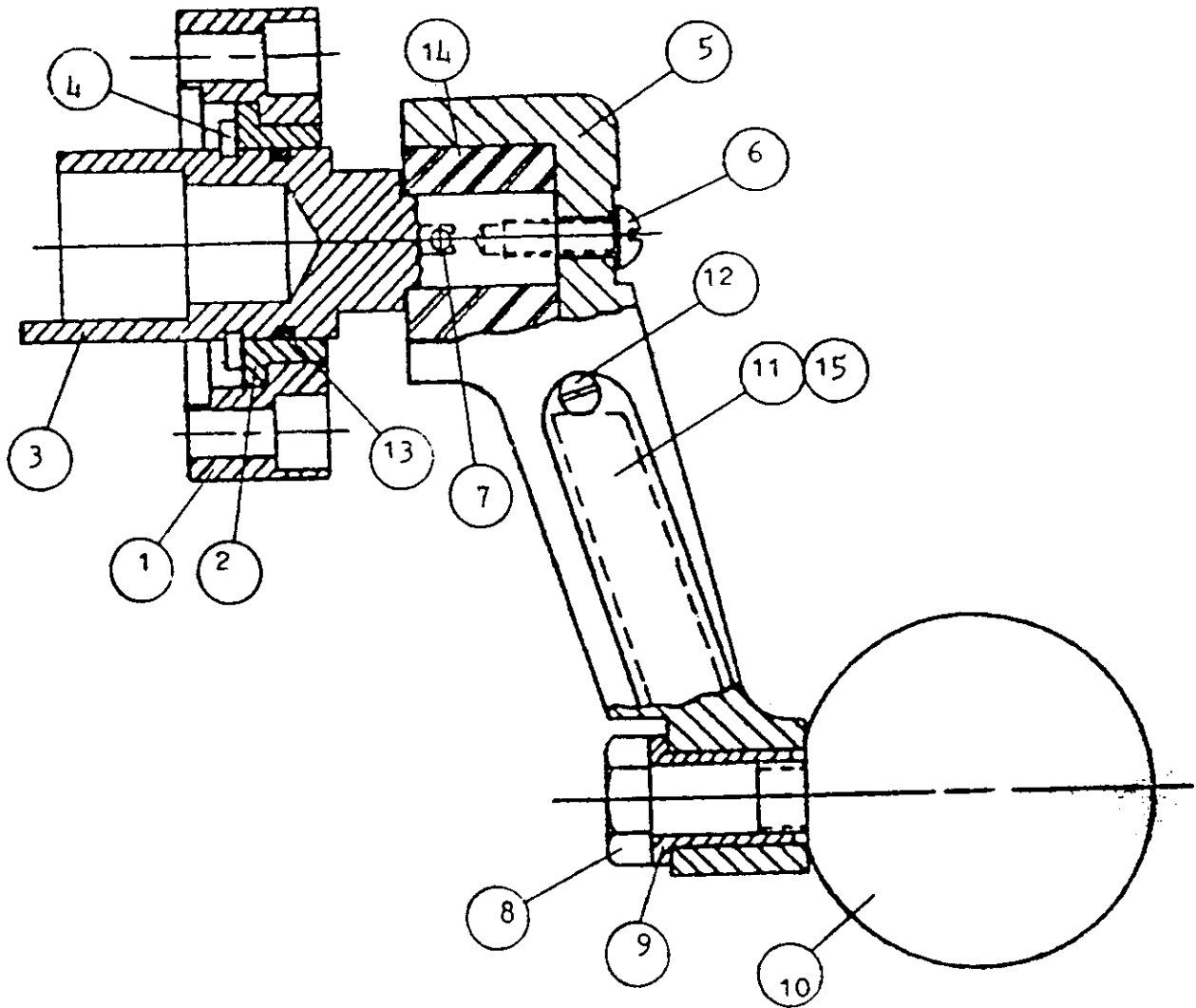
## CLUTCH ASSEMBLY

<u>ITEM</u>	<u>DESCRIPTION</u>
1	Shaft
2	Roll Pin 3/32 x .69
3	Gear Bearing
4	Gear 91T-32P-20° P.A. (18-65 sec.)
5	Gear 79T-32P-20° P.A. (13 & 17 sec.)
6	Clutch Disc
7	Clutch Drum
8	Throw out Slider
9	Bearing
10	Slide Gear, 26T-24P-20° P.A.
11	Die Spring
12	Washer 3/8
13	Cotter Pin 3/32 x 1
14	Bearing
15	Ret. Ring Truarc #5100-25
16	Flatwasher 3/16
17	Lockwasher 1/4
18	Screw 1/4-20 x .38



## HANDCRANK ASSEMBLY

<u>ITEM</u>	<u>DESCRIPTION</u>
1	Collar
2	Bushing
3	Manual Override Shaft
4	Ret. Ring Truarc #5160-98
5	Handcrank
6	Screw, Rd Hd #10-24 x .62 lg
7	Shear Pin
8	Capscrew, Hex Hd 3/8-16 x 1.5 lg
9	Bushing
10	Knob
11	Ret. Plate, Shear Pins
12	Screw, Rd Hd #6-32 x .25 lg
13	O-Ring 7/8 id x 1.0 od
14	Insert - Handcrank
15	Decal





## LIMIT SWITCH ASSEMBLY

<u>ITEM</u>	<u>DESCRIPTION</u>
1	Setscrew 1/4-20 x .38 lg
2	Cam Shaft
3	Key
4	Cam
5	Key
6	Switch Plate
7	Switch Actuator
8	Switch
9	Screw #6-32 x .75 lg
10	Lockwasher #6
11	Retaining Ring #5103-125
12	Retaining Ring #5100-50
13	Inner Shaft
14	Woodruff Key #403 (not shown)

