



LA-5200
NEMA 4

- I. General Description -2-
- II. Description of Operation -2-
- III. Storage -3-
- IV. Installation -3-
 - A. Mounting -3-
 - B. Limit Switch Adjustment -3-
 - C. Feedback Potentiometer Alignment -4-
 - D. Thrust Limit Switches -4-
 - E. Electrical Connections -4-
- V. Maintenance -5-
- VI. Replacements -5-
 - A. Motor Replacement -5-
 - B. Limit Switch Replacement -5-
 - C. Feedback Potentiometer Replacement -5-
 - D. Screw Nut Replacement -6-
 - E. Clutch Replacement -6-
- Front Cover Assembly -8-
- Center Support Assembly -9-
- Motor Bracket Assembly (Item 11) -10-
- Clutch Assembly (Item 14) -11-
- Handcrank Assembly (Item 18) -12-
- Yoke Assembly (Item 30) -13-
- Drive Screw Assembly (Item 34) -14-
- Pivot Shaft Assembly (Item 36) -15-
- Overload Cap Assembly (Item 38 & 46) -16-
- Limit Switch Assembly -17-

I. General Description

The LA-5200 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 ends 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. Moving the top lever to manual 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	MID	SEATING	STROKE TIME IN SEC* FOR		
5200	1.00	3600	3850	4.8	4.8	4.6
	1.25	3600	4000	6.0	6.0	5.7
	1.50	3600	4200	7.6	7.6	7.2
	1.00	1500	1860	9.2	9.2	8.7
	1.25	1500	2160	11.2	11.2	10.6
	1.50	1500	2670	13.6	13.6	12.9
	1.70	1500	3000	16.0	16.0	15.2

NOTE: * For strokes other than those shown the seating and stroke time may be interpolated.

+ These seating thrusts 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 #11. A motor pinion gear and clutch release weight assembly is attached to the motor rotor shaft. The motor pinion gear is engaged with a gear (item #3) on the clutch assembly (item #14). Turning clutch gear (item #3) causes clutch gear (item #9) to rotate which in turn rotates the drive screw gear and the drive screw (item #34). The drive nut fixed in the nut housing of the pivot shaft assembly (item #36) 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 is converted to linear travel of a link attached to the pivot shaft assembly and coupled to the output clevis (item #57) thru clevis pin (item #58). Output clevis (item #57) is coupled to the valve shaft with coupling (item #61) 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 (item #58 or #46) 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 (item #50) and spring (item #51) which keeps the tip of the shaft loaded against the 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.

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.

II. Description of Operation cont.

The actuator is equipped with a manual handcrank. To use the handcrank the top lever must be moved to the manual position with motor power disconnected. Moving the lever 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 handcrank shaft. The actuator will remain in the handcrank mode of operation until 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.

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°. 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 spun 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 thru gearing to the output shaft of the actuator which should be positively secured 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 collar on either side of the adaptor coupling have been re-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 collars closest to the actuator to stop the coupling with the valve in its full open position. The use of these stop collars is dependant 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 for position limited valve set-up. Allow for a 1/32 inch gap equally between 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 17 for parts location.

- 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.

B. Limit Switch Adjustment cont.

- 2) Loosen two #1/4-20 set screws item #1 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, recheck limit switch #2 setting. If limit switch #2 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 potentiometer should have 50 ohms resistance from terminals 13 to 14 at the actuator interconnect terminal strip. Refer to the wiring diagram supplied with the actuator for verification of the terminal numbers. To adjust the feedback potentiometer, loosen the 3 pan head screws which locate the potentiometer mounting disc to the center support assembly. To gain access to the terminal strip and the potentiometer, it will be necessary to open the rear axis cover of the actuator. With the 3 pan head screws loosened, rotate the potentiometer body and the mounting disc until the resistance at terminals #13 and #14 is 50 ohms. Tighten

the screws, and the alignment is 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 thrust limit switch can be visually observed by looking at the end of the screw thrust housing nearest the handcrank. 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 the 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 potentiometer 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.

A 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.

Refer to the wiring diagrams for additional information and data.

V. Maintenance

Under normal service conditions, the motor, gearing, bearing, and parts are all pre-lubricated and should not require periodic maintenance. If for any reason the unit is disassembled in the field, all bushings should be resaturated with the SAE 10 oil and all gearing should be coated with 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 (page 18).

1. Turn off all power to the actuator.
2. Remove feedback cover item #4 from the actuator.
3. Remove the position indicator item #67 and the front cover item #1 from the actuator.
4. Remove the handcrank assembly item #18 from the actuator by removing screw and washer items #17 and #39 which hold the handcrank retaining plate in position.
5. From the output shaft side of the actuator, remove 2 screws and washers items #12 and #13 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 page 13. Remove roll pin item #8. Remove motor pinion assembly item #9.
8. Remove 4 screws item #3 from the face of the motor bracket.
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 page 17. On a piece of paper, note the location of all cams, 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 lockwasher items #9 and #10.
6. Re-assemble the switch assembly in the reverse order in which you took it apart.
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 of 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 body to the disc and remove the potentiometer from the disc.
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 #4 and front cover item #1 from actuator.
3. Remove the handcrank assembly item #18 from the actuator by removing screw and washer item #17 and #39 from the handcrank retaining cap.
4. Remove screw thrust housing items #38 and #46 from the actuator.
5. Remove screw #59 and pin #58 from the output shaft yoke.
6. Remove screw item #10 from the center support plate mounting flanges.
7. Remove the entire center support assembly from the actuator.
8. Remove drive screw assembly #34 and pivot shaft assembly #36 from the actuator as one piece.
9. Remove the screw shaft from the pivot shaft assembly.
10. Referring to the pivot shaft assembly on page 18, remove retaining ring item #9 and spacer #10 from one end of the nut housing item #6.
11. Push the screw nut out of the nut housing.
12. Insert the new nut into the nut housing locating it with key #8.
13. Insert spacer #10 and retaining ring #9 in the end of the nut housing.
14. Clean the screw shaft thoroughly and screw it into the nut.
15. Assemble the entire actuator in the reverse order of disassembly and lubricate the screw shaft with Allex EP - 1L Grease. Lubricate the rest of the gearing with Rykon Premium Grease #2 or equal.
16. Re-align the entire actuator following the valve alignment procedure, limit switch adjustment procedure and potentiometer alignment procedure.

E. Clutch Replacement

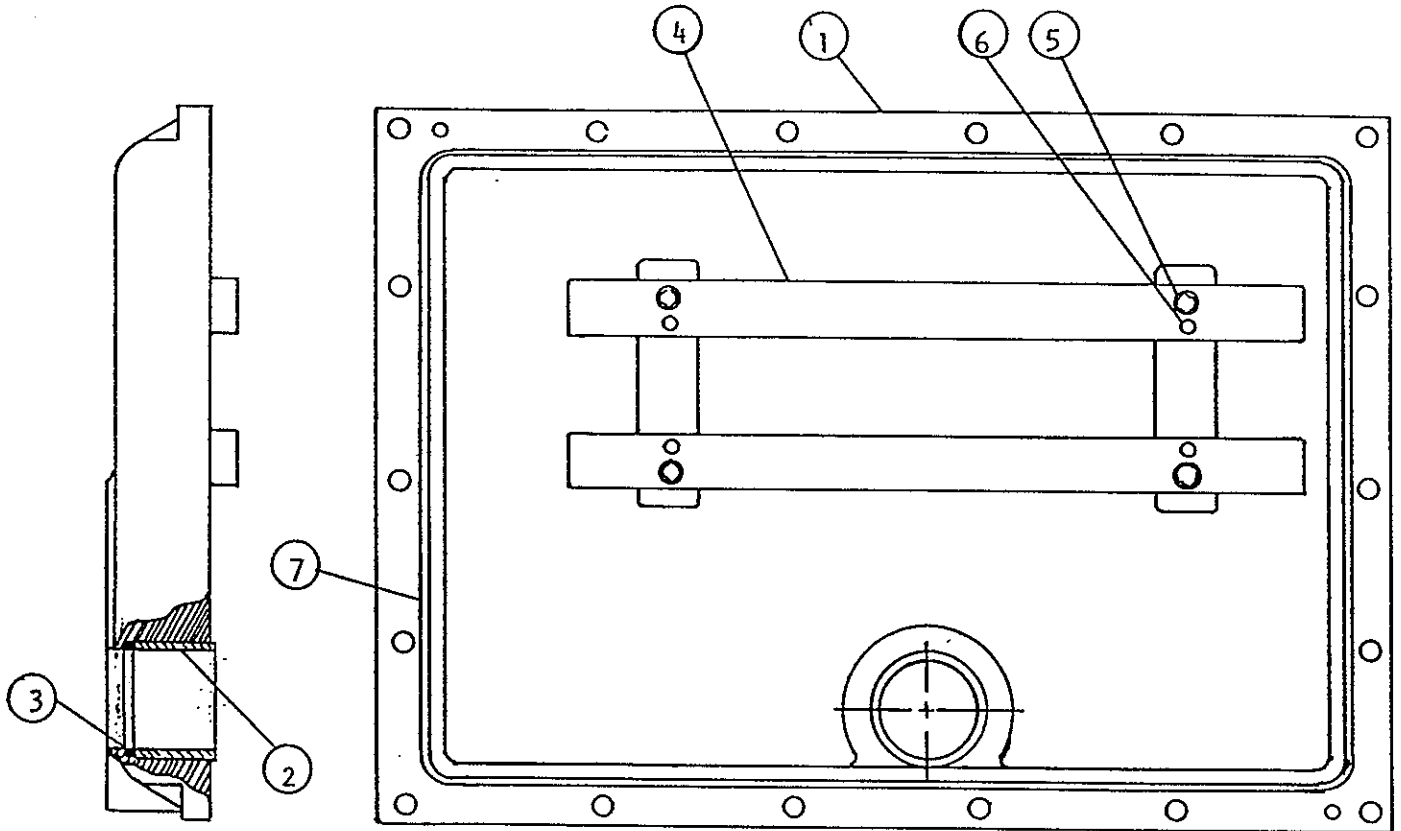
1. Follow the motor replacement procedure with the exception of - **Do Not Remove the Motor from the Mounting Bracket** - instead remove the clutch from the mounting racket. The entire clutch may be replaced as one complete assembly.
2. If it is desired to replace a part of the clutch assembly only, refer to page 11 for parts location.
3. Compress the clutch assembly in a suitable device to take the spring pressure off of cotter pin item #14. Remove cotter pin #14 and slowly relieve the spring pressure to allow the clutch parts to become free.
4. Remove washer item #11, spring item #10, gear item #9, clutch drum item #4, and gear item #3 from the clutch assembly.
5. If gear item #3 is being replaced, the new gear must spin free on the hub of gear bearing item #5.
6. If clutch disc item #2 is worn or glazed, it should be replaced and it is held to clutch drum item #4 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 item #14.
8. Re-install the clutch assembly onto the motor bracket assembly and reverse assemble the entire actuator. Follow the appropriate alignment instructions after reassembly.

LA-5201 NEMA 4

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>ITEM</u>	<u>DESCRIPTION</u>
1	Front Cover Assembly	38	Overload Cap Assembly
2	Sleeve Bushing, 1 3/4 x 2 1/8 x 1 1/2	39	5/16 Hi-Collar Cad. Plated L'washer
3	"O" Ring, 1 3/4 x 2 1/8	40	"O" Ring String 9.4' LG (112.5")
4	Rear Cover	41	Yoke Damper
5	Main Housing	42	"O" Ring
6	3/8-16 x 1 1/4 LG Cad. Plated Soc. Hd.	43	Steel Pipe Plug 1 1/4 (not shown)
7	3/8 Lockwasher, Hi-collar	44	Hardware List
8	.2498/.2500 x 1.0 LG Dowel Pin	45	Bearing
9	Center Support Assembly	46	Overload Cap Assembly
10	5/16-18 x 1" LG. Soc. Hd. Capscrew	47	Stl Pipe Plug 3/4-14 NPT(not shown)
11	Motor Bracket Assembly	48	Thrust Washer
12	3/8-16 x 1 1/4 LG. Soc. Hd. Capscrew	49	Limit Switch (standard)
13	3/8 Lockwasher	49	Limit Switch (high pressure)
14	Clutch Assembly (20 sec)	50	Torque Limit Switch
15	Bushing	51	Spring
16	Gasket	52	Mounting Flange
17	5/16-18 x 1 1/4 LG. Cad. Plt Sch. Scr.	53	Bushing
18	Handcrank Assembly	54	Seal
19	Roll Pin, 3/16 dia. x 1.00 LG	55	Screw Hex. Hd., 3/8-16 x 1.50 LG
20	Terminal Bracket	56	Lockwasher 3/8 std
21	#10-24 x 1/2" LG. Rd. Hd. Screw	57	Clevis
22	#10 Lockwasher	58	Pin
23	Terminal Strip (14 Pin)	59	Screw Rd. Hd. 1/4-20 x .38 LG
24	Insulator	60	"O" Ring 2.50 I.D. x 2.75 O.D.
25	#8-32 x 1/2 LG. Rd. Hd. Screw	61	Split Coupling 3/4-16
26	#8 Lockwasher	62	Stand-off 13.812 LG
27	Terminal Strip (4 Pin)	63	Valve Mounting Plate
28	Insulator	64	Lockwasher 3/4 std.
29	#10-24 x 5/8 LG. Rd. Hd. Screw	65	Jamnut Hex. 3/4-10
30	Yoke Assembly	66	Stud 3/4-10 x 17.38 LG
31	Lock-Out Handle Assembly	67	Pointer
32	Instruction Labels & Placement	68	Screw Hex. Hd. 5/16-18 x .75 LG
33	Collar	69	Stop Rod, 3/4-10 x 8.75 LG
34	Drive Screw Assembly (20 Sec)	70	Setscrew Soc. Hd. 1/4-20 x .25 LG
35	Retaining Ring #5100-78	71	Stop Collar
36	Pivot Shaft Assembly	72	Capacitor 50 MFD
37	Spacer	73	Capacitor Bracket
		74	Terminal Cover

Front Cover Assembly

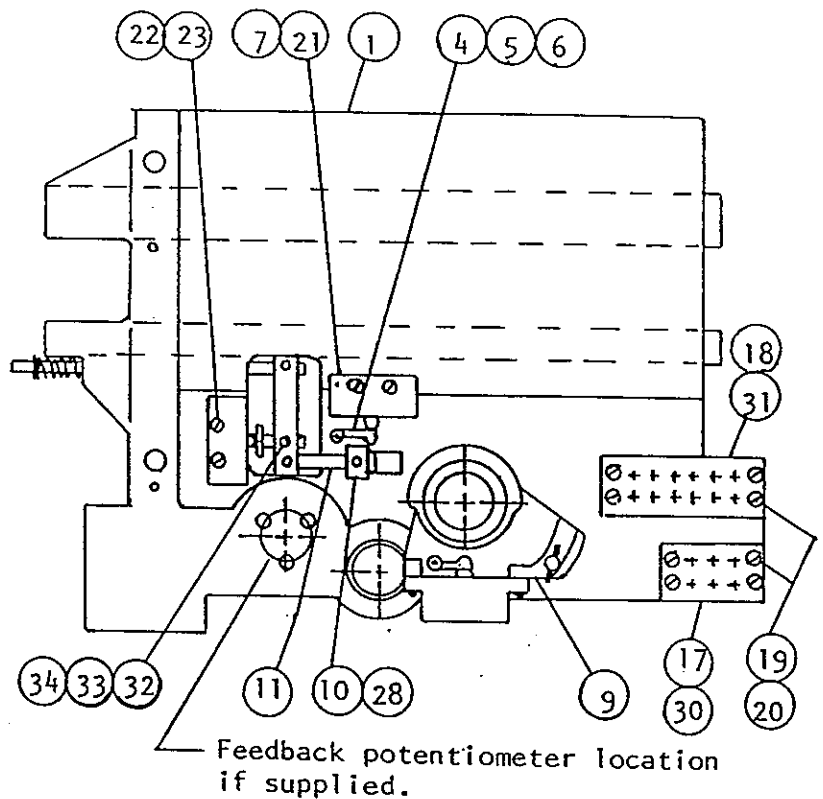
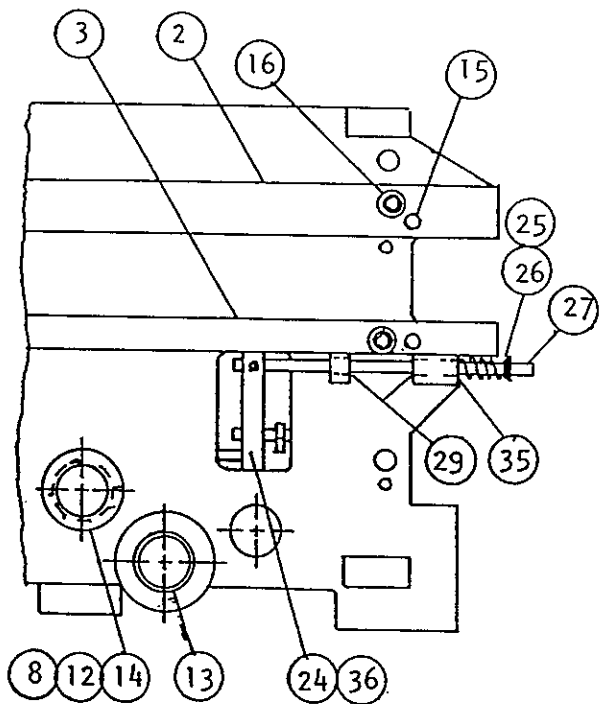
ITEM	DESCRIPTION
1	Front Cover (Al)
1	Front Cover (Iron)
2	Sleeve Bushing
3	O-Ring
4	Support Rail
5	Soc. Hd Screw 1/4-20 x 75
6	Dowel Pin .250 x 1.00
7	O-Ring String 5'



Center Support Assembly

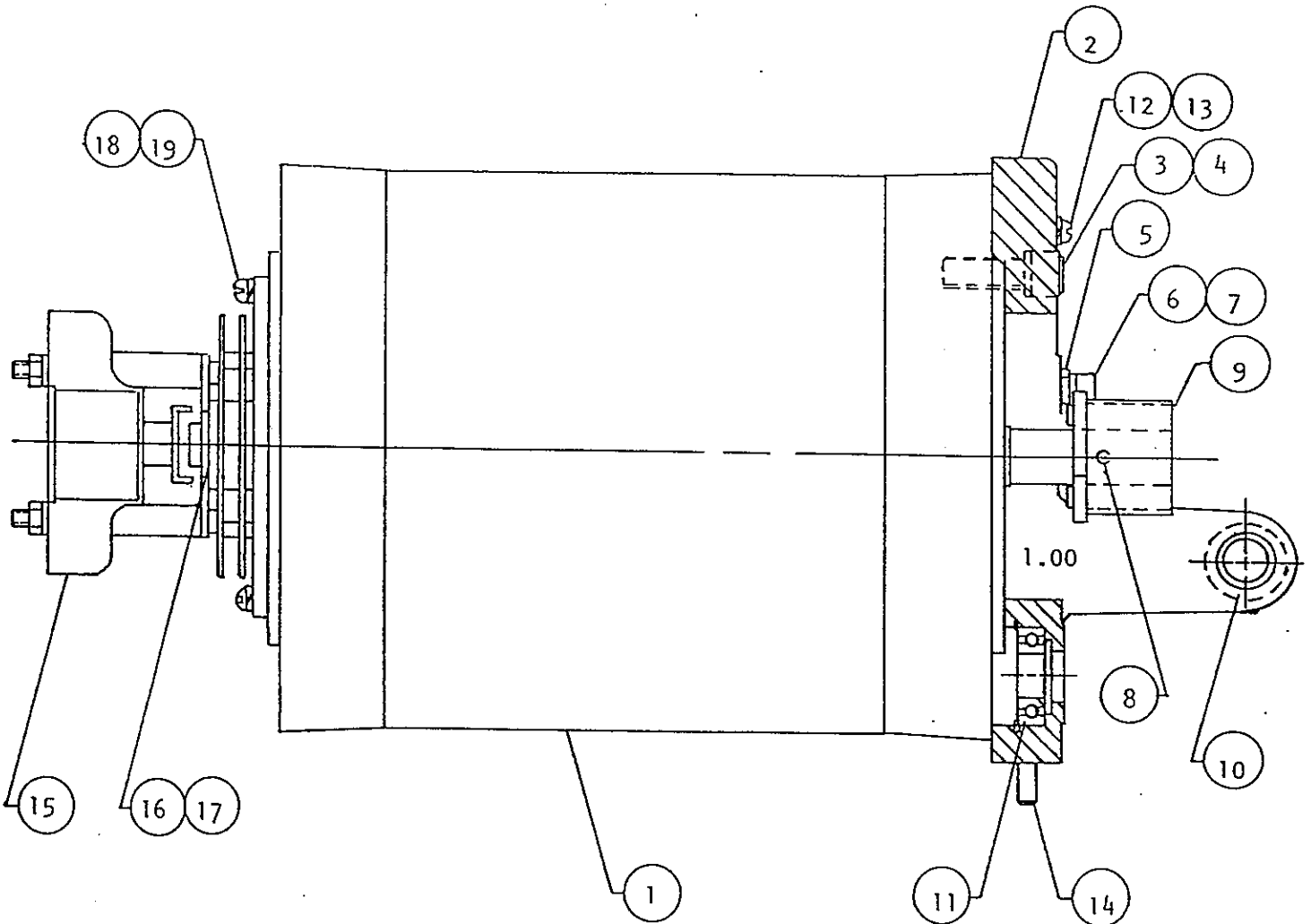
<u>ITEM</u>	<u>DESCRIPTION</u>
1	Center Support Plate
2	Support Rail
3	Support Rail
4	Spacer
5	Switch Lever
6	Rivet
7	Switch Insulator
8	Gear (Switch Shaft)
9	Limit Switch Assembly
10	Collar
11	Shaft
12	Flange Bushing
13	Sleeve Bushing
14	Bushing
15	Dowel Pin .25 x .75
16	Soc. Hd Screw 1/4-20 x .75
17	Terminal (3 Pin)
18	Terminal (6 Pin)

<u>ITEM</u>	<u>DESCRIPTION</u>
19	Screw 8-32 x .62
20	Lockwasher #8
21	Limit Switch
22	Screw 6-32 x 1.25
23	Lockwasher #6
24	Tie Block
25	Spring
26	Ret. Ring
27	Shaft
28	Set Screw 10-24 x .19
29	Bushing
30	Insulator
31	Insulator
32	Slug
33	Screw 10-32 x .75
34	Set Screw 8-32 x .25
35	Flange Bushing
36	Nylon Screw



Motor Bracket Assembly (Item 11)

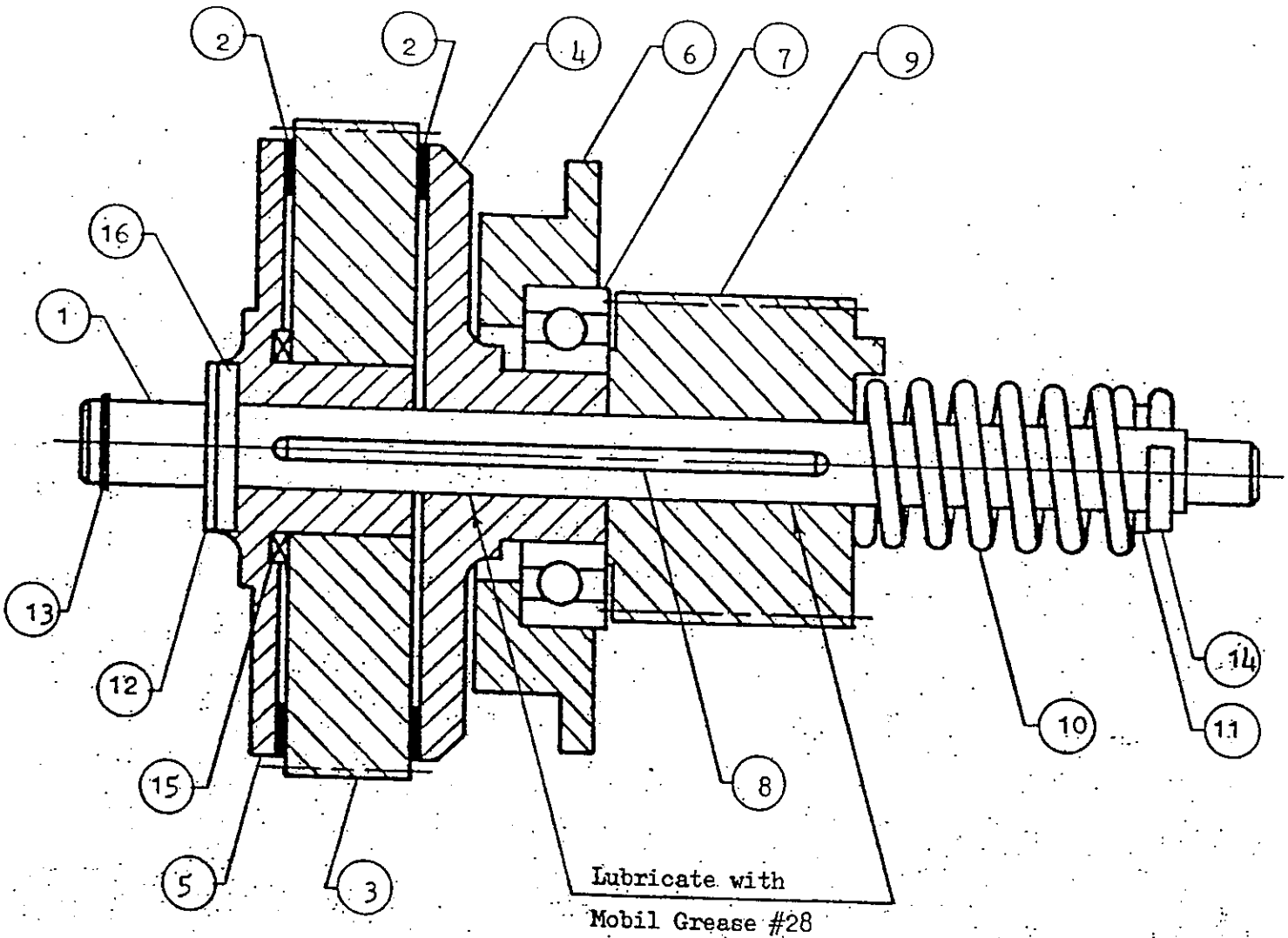
<u>ITEM</u>	<u>DESCRIPTION</u>	<u>ITEM</u>	<u>DESCRIPTION</u>
1	Motor 1/2 HP 230/460V 3 Ph	9	Pinion Assembly
1	Motor 1/2 HP 90 Vdc	10	Bearing
1	Motor 1/2 HP 230/460V 3 Ph Brake	11	Ball Bearing
1	Motor 1/2 HP 115/230V 1 Ph	12	#10-24 x .38 Lg Rd Hd Screw
1	Motor 1/2 HP 115/230V 1 Ph Brake	13	#10 Lockwasher
2	Motor Bracket	14	Dowel Pin .250 dia x 1.0
3	Capscrew, Soc. Hd 3/8-16 x 1.0 Lg	15	Brake 120 Vac
4	Lockwasher, Hi Collar 3/8	15	Brake 240 Vac
5	Latch Plate	16	Ret. Ring 5100-50
6	Capscrew, Soc. Hd 1/4-20 x 1/2 Lg	17	Woodruff Key #303
7	Lockwasher, Hi Collar 1/4	18	Screw 8-32 x 1.00
8	Rollpin .125 dia X 1.25 Lg	19	Lockwasher #8



Clutch Assembly (Item 14)

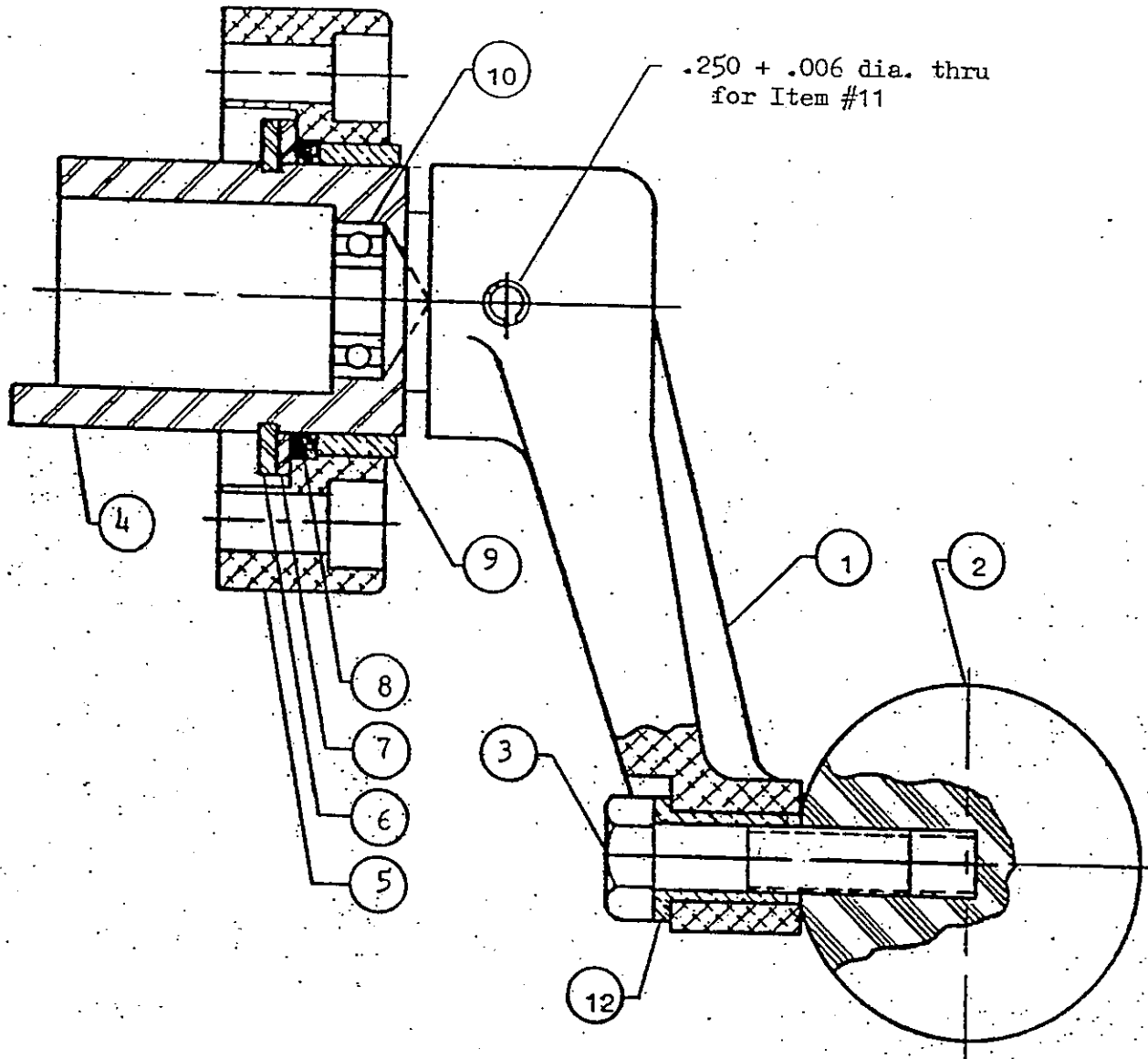
<u>ITEM</u>	<u>DESCRIPTION</u>
1	Idler Shaft
2	Clutch Disc
3	Gear Fiber 120T-32P-20°PA
4	Clutch Drum
5	Drive Disc
6	Throwout Slider
7	Ball Bearing
8	Key 1/8 sq x 3.0 Lg

<u>ITEM</u>	<u>DESCRIPTION</u>
9	Sliding Gear
10	1" x 2" MD Spring
11	Thrust Washer
12	Thrust Washer
13	Retaining Ring
14	Cotter Pin
15	Wave Spring Washer
16	Rollpin



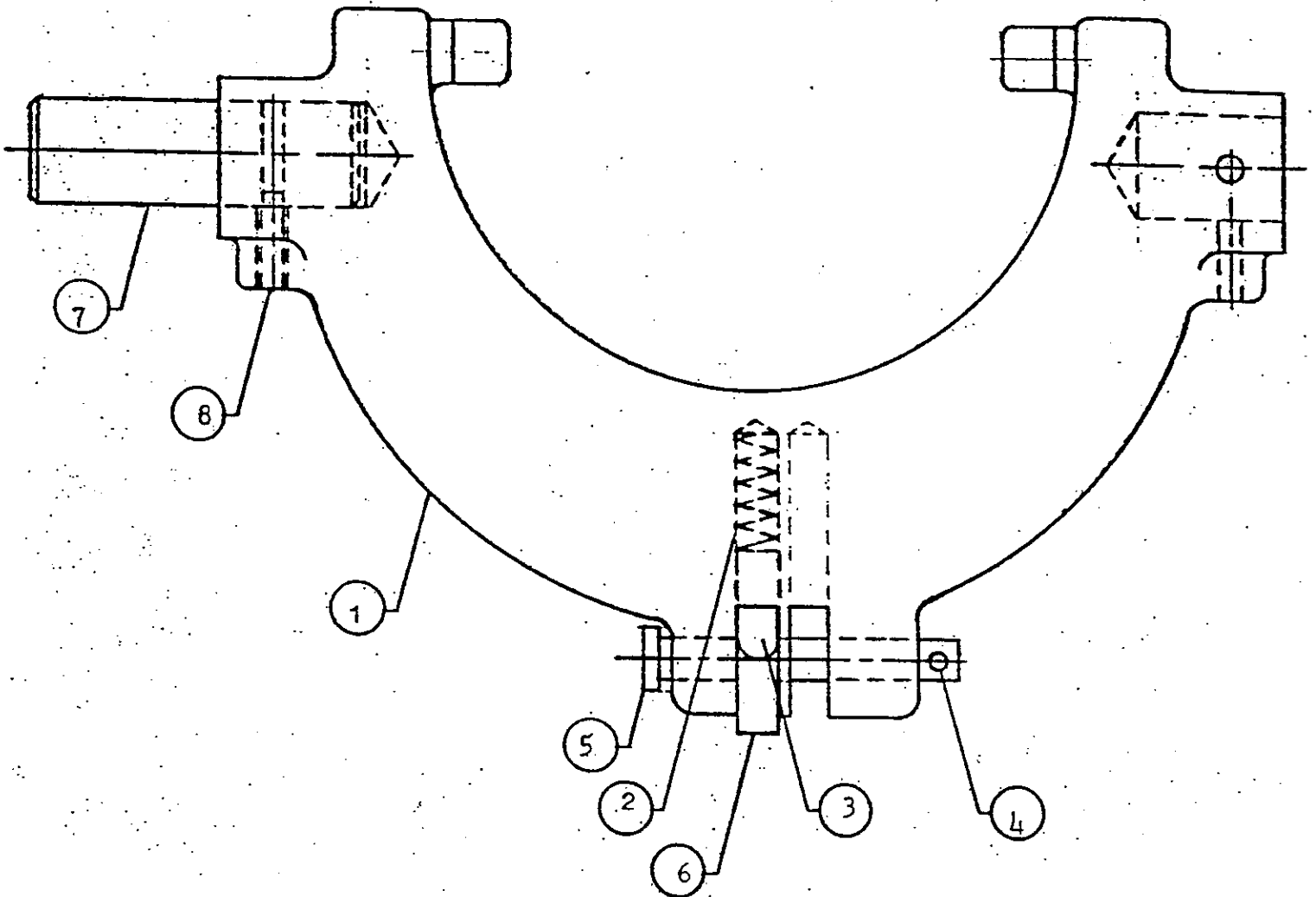
Handcrank Assembly (Item 18)

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>ITEM</u>	<u>DESCRIPTION</u>
1	Handcrank	7	Washer
2	Knob	8	O-Ring
3	Capscrew, Hex Hd	9	Bushing
4	Manual Override Shaft	10	Ball Bearing
5	Cap	11	Rollpin
6	Ret ring	12	Bushing



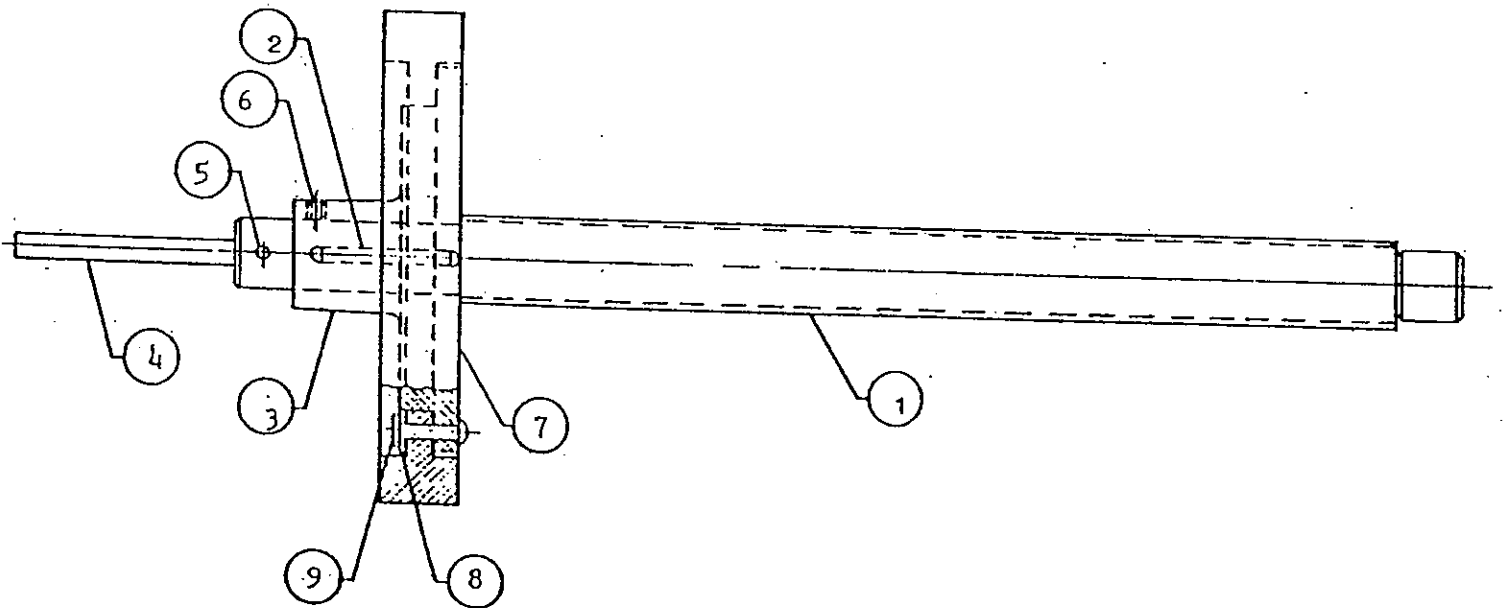
Yoke Assembly (Item 30)

<u>ITEM</u>	<u>DESCRIPTION</u>
1	Clutch Yoke
2	Spring
3	Latch Pin
4	Cotter Pin
5	Clevis Pin
6	Latch
7	Yoke Shaft
8	Setscrew, Soc. Hd Dogpoint



Drive Screw Assembly (Item 34)

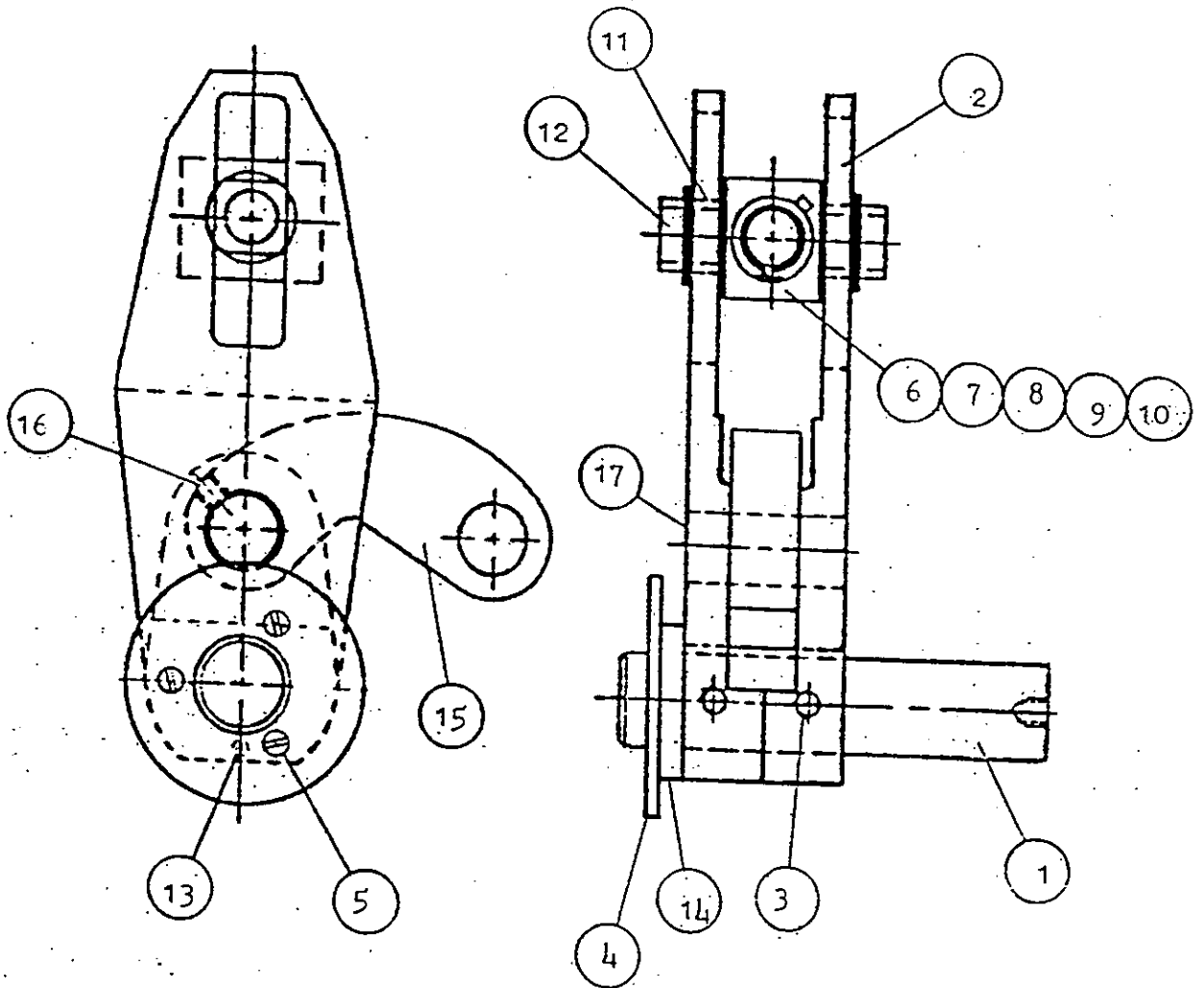
<u>ITEM</u>	<u>DESCRIPTION</u>
1	Screw Shaft
2	Key
3	Gear Hub
4	Indicator Shaft
5	Roll Pin
6	Setscrew, Soc Hd
7	Gear
8	Flatwasher
9	Pop Rivet



Pivot Shaft Assembly (Item 36)

<u>ITEM</u>	<u>DESCRIPTION</u>
1	Output Shaft
2	Pivot Arm
3	Rollpin
4	Gear
5	Screw Fl. Hd
6	Nut Carrier
7	Drive Nut
8	Key
9	Retaining Ring

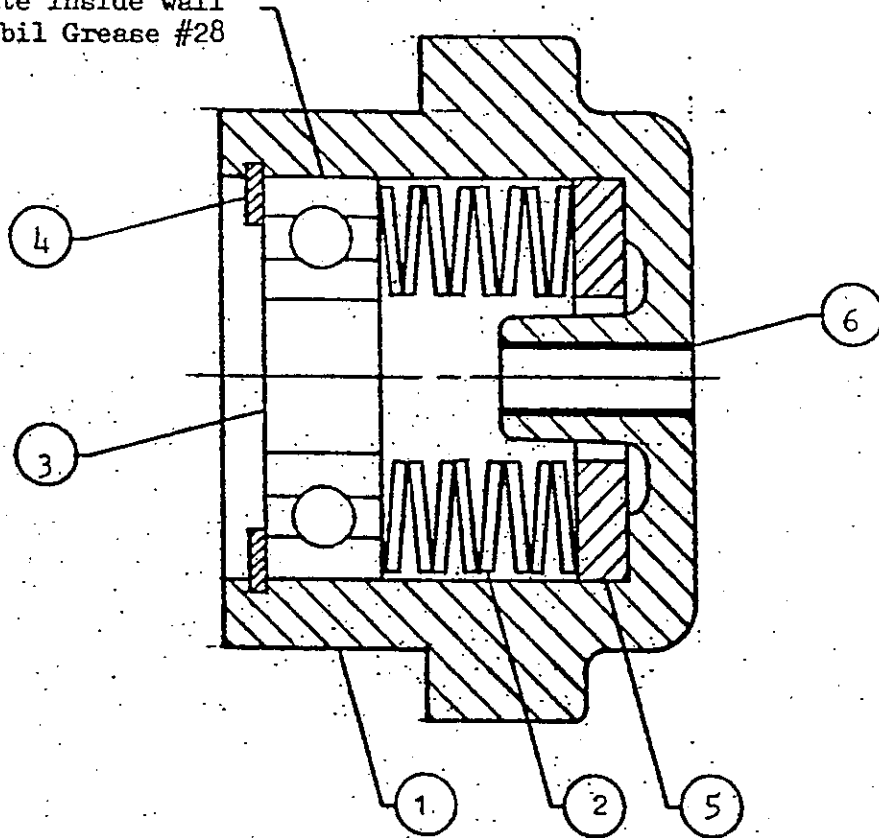
<u>ITEM</u>	<u>DESCRIPTION</u>
10	Spacer - Drive Nut
11	Bearing
12	Bearing
13	Rollpin
14	Gear Spacer
15	Link 4" Travel
16	Setscrew Soc. Hd
17	Link Pin



Overload Cap Assembly (Item 38 & 46)

<u>ITEM</u>	<u>DESCRIPTION</u>
1	Overload Cap (drilled)
1	Overload Cap (plain)
2	Bellville Washer
3	Bearing
4	Retaining Ring
5	Spacer
6	Bushing

Lubricate inside wall
with Mobil Grease #28



Limit Switch Assembly

<u>ITEM</u>	<u>DESCRIPTION</u>
1	Set Screw
2	Cam Shaft
3	Key
4	Cam
5	Key
6	Switch Plate
7	Switch Actuator
8	Switch
9	Screw 6-32
10	Lockwasher
11	Retaining Ring
12	Retaining Ring
13	Inner Shaft
14	Woodruff Key (not shown)

