

## Series 7000 Posi-Tork® Acme Screw Instruction Manual

### Contents

#### Introduction

Introduction and General Information .....	2
Storage Requirements .....	2

#### Installation

Installation Requirements .....	2
Motor Operation .....	3
Geared Position Limit Switch Operation .....	3
Thrust Limit Switch Operation .....	3
Typical Wiring Diagram .....	4

#### Maintenance

Disassembly and Reassembly of Model 7000 Posi-Tork® Actuators .....	7
Geared Position Limit Switch Adjustment .....	9
Thrust Limit Switch Setting Procedure .....	10
Lubrication Instructions .....	11

#### Optional Equipment

Dust-Ignition Proof Enclosure .....	12
Gear Driven Potentiometer .....	12
Limit Switch Compartment Heater .....	12
Integral Motor Starter .....	12
Manual Handwheel Clutch Assembly .....	13
Disassembly & Reassembly of Gear Box Assembly .....	15
Brake Wear Adjustment .....	16
Manual Brake Release .....	16
Brake Removal and Replacement .....	16
Trunnion and Clevis Mounting Information .....	17
Face/Flange Mounting Information .....	18

### Figures

Fig. 1 - Wiring of Motor and Optional Electric Brake .....	4
Fig. 2 - Wiring of Selector Switch and Integral Starter .....	5
Fig. 3 - Acme Screw Actuator Parts Drawing .....	6
Fig. 4 - Geared Position Limit Switch Parts Drawing .....	9
Fig. 5 - Thrust Limit Switch Parts Drawing .....	10
Fig. 6 - Manual Handwheel Clutch Assembly Parts Drawing .....	12
Fig. 7 - Gear Box Assembly Parts Drawing .....	15
Fig. 8 - Electric Brake Parts Drawing .....	16
Fig. 9 - Trunnion and Clevis Mounting .....	17
Fig. 10 - Face/Flange Mounting .....	18

### Tables

Table 1 - Acme Screw Actuator Parts List .....	7
Table 2 - Geared Position Limit Switch Parts List .....	9
Table 3 - Thrust Limit Switch Parts List .....	10
Table 4 - Lubricant Required vs. Actuator Size and Stroke .....	11
Table 5 - Acceptable Standard Lubricants .....	11
Table 6 - Manual Handwheel Clutch Assembly Parts List .....	13
Table 7 - Gear Box Assembly Parts List .....	15
Table 8 - Electric Brake Parts List .....	16
Table 9 - Trunnion and Clevis Mounting .....	17
Table 10 - Face/Flange Mounting .....	18

## INTRODUCTION

This manual describes the general operating principles of the Model 7000 Posi-Tork® Linear Actuators. Information is also provided for installation, operation, servicing, and storage of the actuator. All the information contained herein is essential to safe, successful and long term actuator operation. Please carefully read and thoroughly understand the context of this manual. Failure to follow the instructions provided could void the actuator's Warranty. If the answers to your questions are not contained in this manual, please contact Andco Actuators toll free at 1-800-945-9898, 832-590-2306 or e-mail us at [andco@dresser.com](mailto:andco@dresser.com). Be sure to mention the model and serial number when requesting information.

### General

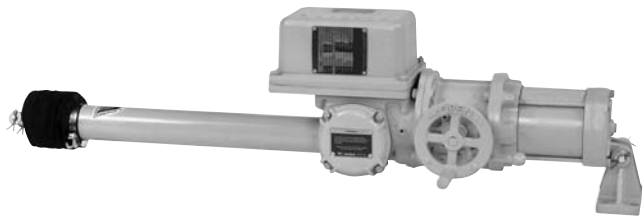
The 7000 Posi-Tork® Linear Actuators are completely self-contained, electro-mechanical devices. These actuators, designed and fabricated for dependable long-life operation, are used for positioning, automation of material handling or flow control equipment.

The actuator is powered by a high starting torque, low inertia electric motor connected to a drive screw through a set of spur gears.

Upon stroke completion, a gear driven position limit switch interrupts power to the motor. If actuator movement is prevented at any point during travel due to an external mechanical overload, a thrust switch will interrupt power to the motor.

### Storage Requirements

1. It is preferable to store actuators indoors in a clean, dry environment. Actuators for indoor dust-ignition proof service **MUST** be stored indoors.
2. If outdoor storage cannot be avoided, actuator must be stored high enough to avoid immersion in snow or water.
3. Compartment heaters (optional) should be temporarily wired and energized if actuator is to be stored in a damp location.
4. All covers must remain securely fastened in place.
5. All pipe plugs must remain tightly in place.
6. The storage location should be selected so actuator is not exposed to mechanical damage.
7. For extended storage (over 3 months outdoors or 6 months indoors), desiccant bags must be placed inside of electrical compartments. Tags must be attached to outside of compartment covers instructing removal of bags before start of operation.



### Model Number Identification

Your actuator is identified by model, serial and order number on the name plate of the actuator. The name plate is located on the limit switch compartment cover. Use all three (3) numbers when ordering parts and making inquiries.

Repair of this actuator is to be done only by an authorized service center or by individuals certified by Andco Actuators. Only routine maintenance can be performed by unauthorized personnel.

## INSTALLATION

### Installation Requirements

1. Mount actuator with limit switch compartment oriented either vertically or horizontally. This prevents lubricant pressure against switch seals.
2. To prevent premature wear of drive nut or extension rod seal and wiper, ensure that alignment between actuator mounting support and driven equipment exerts no side loading on extension rod at any point throughout full stroke.
3. Before operating actuator, make sure all attachments to mounting support and driven equipment are properly secured and all covers are properly tightened.
4. The actuator must be installed and wired in accordance with the National Electrical Code.
5. Route electrical conduit into actuator to prevent internal condensation from running into limit switch compartment.
6. Verify proper motor rotation relative to limit switch actuation and push button operation. Motor rotation may be reversed, if necessary, by reversing motor lead connections. (Refer to geared position limit switch adjustment on page 9 and electrical wiring diagram on page 4).
7. Keep position and thrust switch compartments dry and clean.

### WARNING

**Disconnect all electrical power before removing covers of either position or thrust switch compartments.**

8. Readjust geared position limit switch before operating actuator if switch has been removed from actuator. (Refer to geared position limit switch adjustment on page 9 and electrical wiring diagram on page 4).
9. Keep geared position limit switch contacts clean. Use CRC Lectra Clean® or other suitable solvent on a lint free cloth.
10. Do not use abrasive cloth or paper to clean silver contacts on the position limit switch.

#### WARNING

**DO NOT defeat the purpose of the thrust switch by jumping, bypassing or disconnecting the switch connection wiring (wire numbers 17, 17A, 18 or 18A per electrical wiring diagrams Figures 1 and 2 on page 4). This could cause serious damage to the actuator or the driven equipment.**

11. Do not hammer or gouge outside surface of extension rod. This may damage plating integrity or cause surface irregularities which can damage rod seals.
12. Keep extension rod and clevis pin clean and lubricated.
13. Dust-ignition proof actuators must have all covers secured before electrical circuits are energized.
14. Dust-ignition proof actuators must have grounding lug connected to a suitable grounding system prior to operation.

### Motor Operation

The electric motor (30) has a pinion mounted on it's shaft. This pinion (40) and drive gear (41) are mounted on the end of the drive screw (45). Drive screw has external acme type threads and is engaged in the internal threads of mating drive nut (2). Refer to Figure 3, page 6, and Table 1, page 7.

Drive nut is held from rotating by four tie rods (48). Rotation of drive screw causes an axial movement on drive nut.

A tubular extension rod (47) is fastened on one end of drive nut and is extended or retracted with axial movement of drive nut.

The drive screw is supported by two ball bearings (13), which are spaced apart by multiple belleville springs (33). Belleville springs are preloaded and prevent any axial movement on drive screw. External driven load is fastened to extension rod by clevis (8) and clevis pin (10). When driven force exceeds preload force of belleville springs, drive screw moves axially. Axial movement of drive screw is translated by bearing sleeve (4) to rotational movement of lever of thrust switch (66). Dial setting will interrupt electric circuit to motor for both extend or retract stroke.

### Geared Position Limit Switch Operation

For most applications, the geared position limit switch controls the operating actuator position by interrupting the motor control circuit at the end of the extend and retract strokes. Rotation of drive screw is transmitted through helical gear (6) to geared position limit switch. Limit switch has two independently adjustable trip points normally to control the end positions of the extend and retract strokes. Optional geared position limit switches with four independently adjustable trip points normally use the two intermediate trip points for signal indication or electrical interlocking with other equipment requiring an electrical signal related to intermediate positions of the extend or retract strokes.

Geared position limit switch is driven by direct gearing on drive screw and synchronized at all times with linear movement of extension rod. After initial setting of required extend and retract trip points, as determined by position of extension rod, switch will trip repeatedly at these same points.

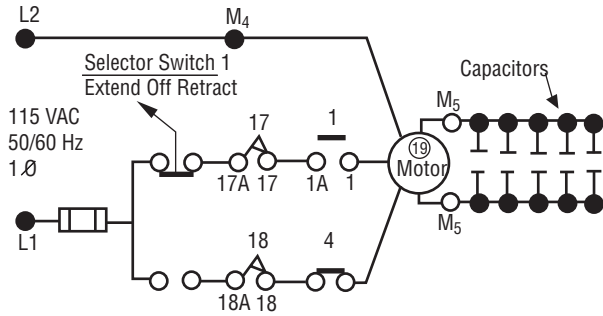
Refer to geared position limit switch adjustment for access and adjustment procedures on page 9.

### Thrust Limit Switch Operation

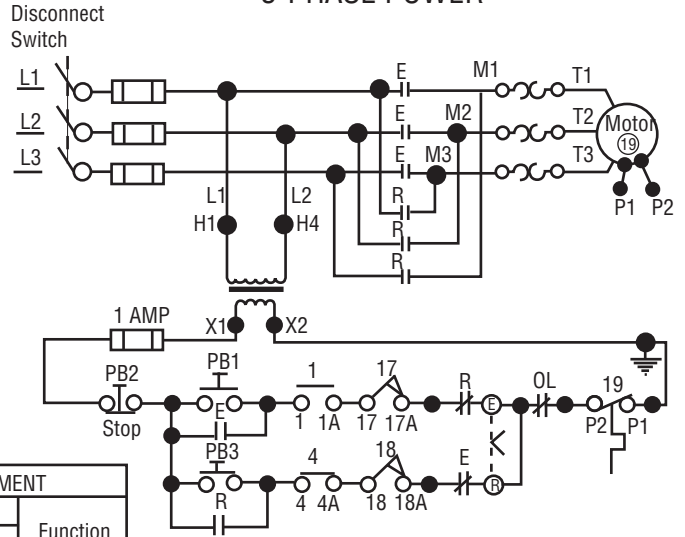
Factory preset thrust switch protects actuator and driven equipment from mechanical overloads. Thrust switch has a dial with pointer type settings which can be field adjusted to increase or decrease thrust load. The higher the number setting on thrust switch, the higher the external thrust force that the switch will sense to interrupt motor circuit.

Refer to thrust limit switch setting adjustment for access and adjustment procedure on page 10.

### SINGLE PHASE POWER



### 3-PHASE POWER



Rotor	Contact	GEARED LIMIT SWITCH CONTACT DEVELOPMENT			Function
		ACTUATOR POSITION			
		Fully Retracted	Intermediate	Fully Extended	
Extend	1	—	—	—	Full Extend Position
	4	—	—	—	Indicating Light
Inter-mediate	2	—	—	—	Spare
	6	—	—	—	Spare
Inter-mediate	3	—	—	—	Spare
	7	—	—	—	Spare
Retract	4	—	—	—	Full Retract Position
	8	—	—	—	Indicating Light

ACTUATOR SHOWN IN FULLY EXTENDED POSITION

— Switch Contact Closed      - - - - - Switch Contact Open

⑰ Extend thrust switch interrupts control circuit if mechanical overload occurs during extend cycles.

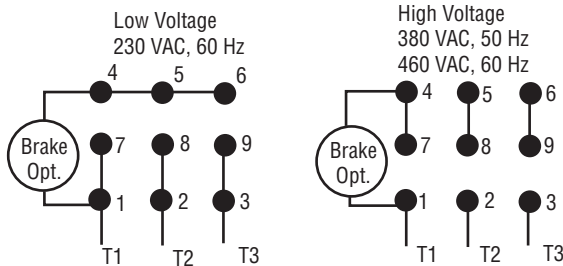
⑱ Retract thrust switch interrupts control circuit if mechanical overload occurs during retract cycles.

Trip points of contacts 2, 6, 3, & 7 are adjustable between the fully retract and fully extended positions.

Contacts on each rotor can be arranged for identical operation.

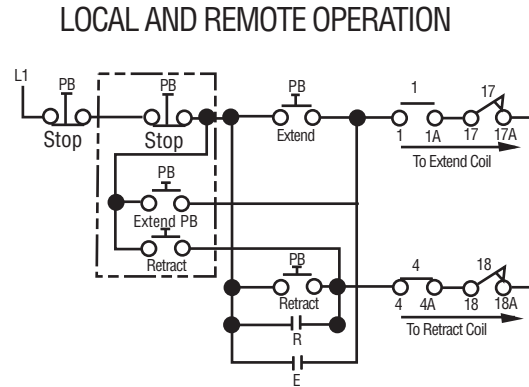
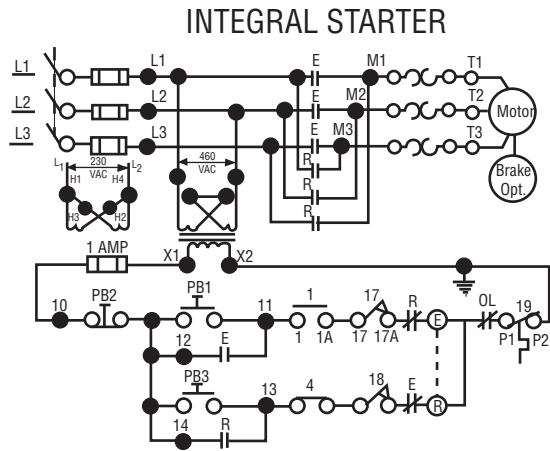
### LEGEND

- — Switch Contacts
- — Wiring Connections
- ⑰ — Extend Position Limit Switch
- ④ — Retract Position Limit Switch
- ⑰ — Extend Thrust Limit Switch
- ⑱ — Retract Thrust Limit Switch
- ⑲ — Thermal Overload
- OL — Overload Relay
- ⓔ — Extend Coil
- Ⓡ — Retract Coil
- ⌘ — Mechanical Interlock
- PB — Pushbutton
- — Fuses or Circuit Breakers
- ⏏ — Disconnect Switch

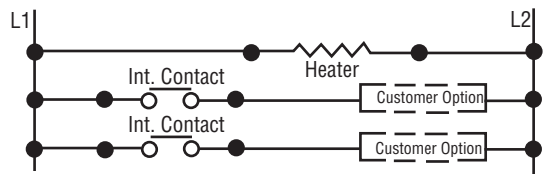


### 3-PHASE MOTOR CONNECTIONS

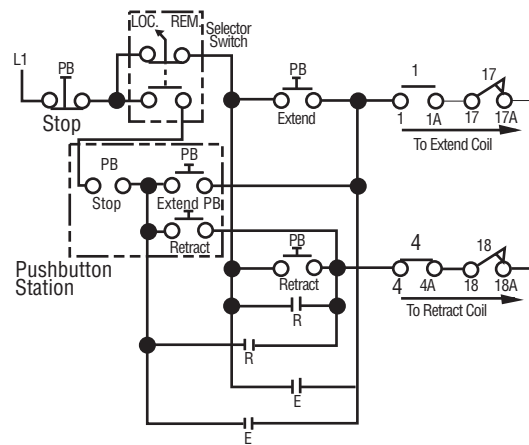
Figure 1 - Wiring of Motor and Optional Electric Brake



### SELECTOR SWITCH FOR LOCAL OR REMOTE OPERATION



OPTIONAL POTENTIOMETER



**Figure 2 - Wiring of Selector Switch and Integral Starter**

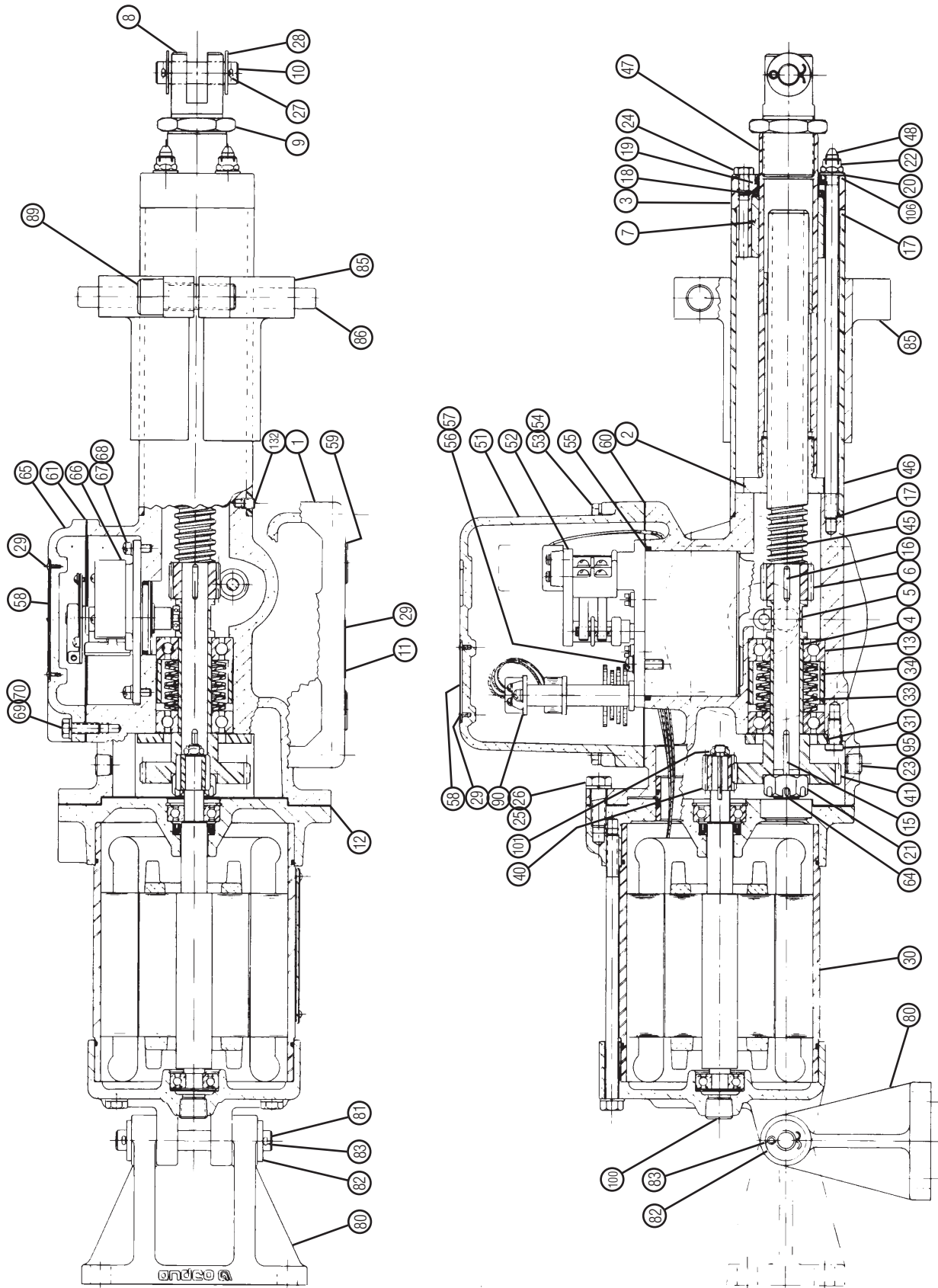


Figure 3 - Acme Screw Actuator Parts Drawing

**Table 1 - Acme Screw Actuator Parts List**

Item Description	Item Description	Item Description	Item Description
1. Body Housing	20. Thread Seal or O-Ring & Washer	47. Extension Rod	67. Socket Head Machine Screw
2. Drive Nut	21. Hex Slotted Nut	48. Tie Rod	68. Internal Tooth Lockwasher
3. End Cap	22. Flexlocnut	51. Limit Switch Compartment Cover	69. Socket Hd Cap Screw
4. Bearing Sleeve	23. Pipe Plug	52. Gear Limit Switch	70. Lockwasher
5. Thrust Switch Sleeve	24. Hex Hd Cap Screw	53. Socket Hd Cap Screw	80. Knife Mounting Brk't
6. Helical Gear	25. Hex Hd Cap Screw	54. Lockwasher	81. Trunnion Pin
7. Bushing for End Cap	26. Lockwasher	55. O-Ring	82. Flat Washer
8. Clevis	27. Cotter Pin	56. Socket Head Cap Screw	83. Cotter Pin
9. Jam Nut	28. Flat Washer	57. Internal Tooth Lockwasher	85. Body Tube Adapter
10. Clevis Pin	29. Drive Studs	58. Warning Plate	86. Dowel Pin
11. Nameplate	30. Motor	59. Pipe Plug	89. Socket Head Cap Screw
12. Motor Gasket	31. Bearing Plate	60. Limit Switch Gasket	90. Potentiometer Sub Assembly
13. Ball Bearing	33. Belleville Springs	61. Thrust Switch Gasket	95. Low Hd Socket Screw
15. Key (for drive gear)	34. Thrust Limit Sleeve	64. Cotter Pin	100. Motor Pipe Plug
16. Key (for helical gear)	40. Motor Pinion	65. Thrust Switch Compartment Cover	101. Flexlocnut
17. O-Ring	41. Drive Gear	66. Thrust Switch	106. O-Ring
18. Polypak Rod Seal	45. Drive Screw		132. Set Screws
19. Rod Wiper	46. Body Tube		

## MAINTENANCE

### Disassembly and Reassembly of Model 7000 Posi-Tork® Actuators

1. Disconnect all electrical power from actuator.
2. Remove position and thrust switch compartment covers (51) and (65).
3. Disconnect leads on gear position limit and thrust switches, making sure they are properly marked for reconnection. Remove pipe plug (23) on side of housing (1) to vent air into housing as switches are being removed. The geared position limit switch is mounted by hardware (56) and (57). Limit switch is removed by rotating switch clockwise approximately 90° while pulling switch up out of housing. This is required to remove switch helical gear input shaft out of mesh with helical gear (6) on drive screw (45). Remove o-ring (55). The thrust switch is mounted by hardware (67) and (68). Remove thrust switch. Both switches must be removed to permit drive screw sub-assembly removal.
4. Replace complete geared position limit switch assembly rather than attempting field repair.
5. Disconnect motor leads making sure they are properly marked for reconnection.
6. Remove motor (30) by unfastening screw (25) and removing lockwasher (26).
7. Remove locknut (101) if motor pinion (40) is to be replaced.
8. With a socket wrench on locknut (21) turn drive screw (45) counterclockwise extending extension rod (47) until rotation becomes difficult from drive nut (2) bottoming against end cap (3).

9. Remove cotter pin (64) and slotted hex nut (21).
10. Pull out drive gear (41) and remove key (15) from drive screw.
11. Remove bearing plate (31) by backing out, equally, four screws.
12. Rotate drive screw (45) by hand approximately 20 to 25 turns counterclockwise so that acme hreaded portion can be disconnected from drive nut (2) and pull out drive screw sub-assembly.
13. Loosen jam nut (9) from face of extension rod (47).
14. Remove clevis (8).
15. Scribe alignment mark on side of housing (1) in line with set screws (132) in body tube (46).
16. Remove locknut (22), washer (20) and where applicable o-ring (106) from tie rods (48).
17. Remove set screws (132) from body tube.
18. While tapping on outside surface of end cap (3), pull out body tube along with end cap.
19. Remove drive nut from extension rod by using a spanner wrench on holes. Threaded portion of extension rod is loctited to drive nut; it may be necessary to heat extension rod outside diameter over threads. If heat is required, do not exceed 350°F.

To reassemble actuator, reverse above procedures and substitute the following:

- Step 19: Use Loctite® 242 on threads when reassembling drive nut to the extension rod.
- Step 18: Realign set screw hole in body tube with alignment mark scribed on side of housing.

Step 12: Use a spacer to compress belleville springs (33) enough to draw following items up tightly; helical gear (6), thrust switch sleeve (5) and bearing sleeve (4). The spacer should match the following dimensions of hub drive gear (41):

Hub outside diameter

Hub inside bore

Length along hub inside bore

Reinstall drive screw into drive nut by rotating drive screw clockwise until outer race of forward ball bearing (13) bears firmly against shoulder machined in housing.

Step 10: With bearing plate (31) in place, remove spacer used above; resume reassembly.

After reassembly, final adjustments can be made by again threading clevis in or out of extension rod as previously mentioned.

The actuator is to be lubricated before being returned to operation. Use acceptable lubricants as listed on page 11. Fill gear cavity under the recess for geared position limit switch (52).

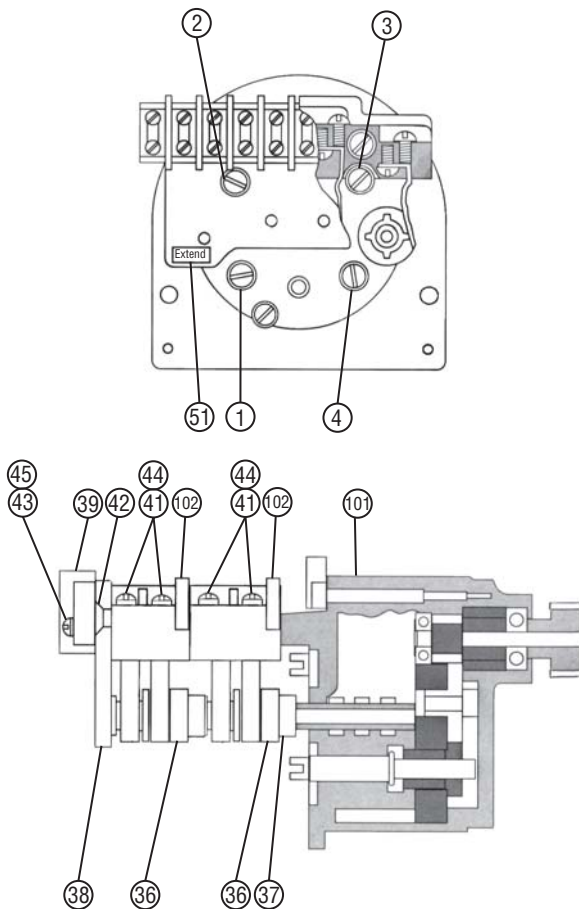
Remove loctited hex head cap screw (24) in end cap. Temporarily install a grease fitting. Add lubricant through this fitting.

When lubrication is completed, remove temporary grease fitting and reinstall screw; applying Loctite® 242 or e equivalent to screw threads.

Remove pipe plugs (23) in bottom and side or top of housing.

Install lubricant through bottom opening until lubricant starts to flow out through side opening. Reinstall pipe plugs.

**Figure 4 - Geared Position Limit Switch Parts Drawing**



**Table 2 - Geared Position Limit Switch Parts List**

Item	Description
1-4.	Slotted Adjustment Shaft
36.	Rotor Sub-Assembly
37.	Rotor Driver
38.	Rotor Plate
39.	Terminal Block
41.	Socket Head Machine Screw
42.	Flat Head Machine Screw
43.	Socket Head Machine Screw
44.	Hi-Collar Lockwasher
45.	Lockwasher
51.	Decal-Extend
101.	Gear Frame Sub-Assembly
102.	Finger Base Sub-Assembly

## Geared Position Limit Switch Adjustment

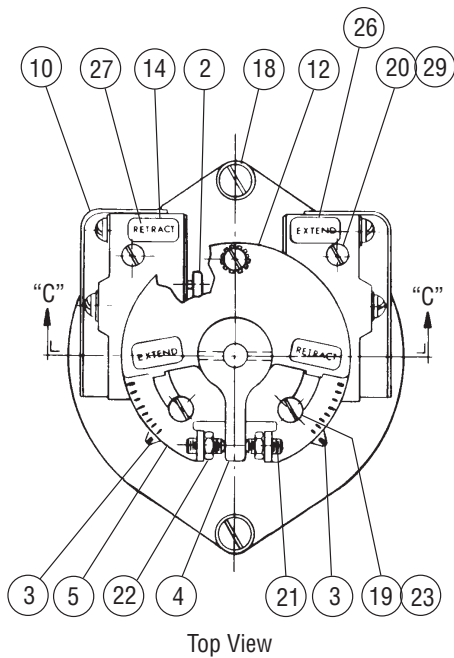
The geared position limit switch has been preset at the factory according to a specified stroke. However, if actuator stroke must be readjusted, proceed as follows:

### WARNING

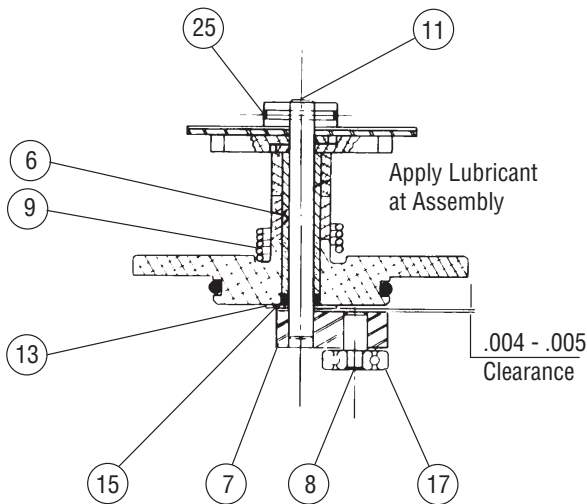
**Disconnect all electrical power to actuator prior to removing position limit switch compartment cover and performing any setting adjustment.**

1. Remove position limit switch compartment cover (51) to gain access to position switch (52).
2. Remove motor pipe plug (100) for access to slot "A" located in end of motor shaft.
3. With a manual or power screw driver, rotate shaft clockwise to extend actuator shaft.
4. If rotor #36-1 contact fingers are closed, open by pushing down slotted shaft "1" and turning clockwise until "extend" rotor turns 90° counterclockwise and shaft is fully extended. If rotor #36-1 has turned so contacts are already open, push and turn slotted shaft "1" counterclockwise until rotor turns about 90° and contacts close. Then push and turn slotted shaft "1" clockwise until rotor turns to open contacts. This rotor is now set to trip and stop actuator in fully extended position.
5. After retracting clevis pin to desired position by rotating motor shaft in a counterclockwise direction, the same procedure is followed for setting rotor #36-4. The only difference now is that all directions of rotation described in No. 4 are reversed.
6. If switch has been supplied with four rotors, additional rotors with their corresponding slotted shafts #2 and #3 are for intermediate tripping points of other electrical circuits. Follow procedure described in No. 4 to set rotors #36-2 and #36-3 at desired clevis pin positions.
7. Make sure mating surfaces of cover and housing are clean. Replace compartment cover and gasket (60) and secure tightly in place with hardware (53) and (54).
8. Replace motor pipe plug tightly.
9. Reconnect all electrical power to actuator. It is ready for use.

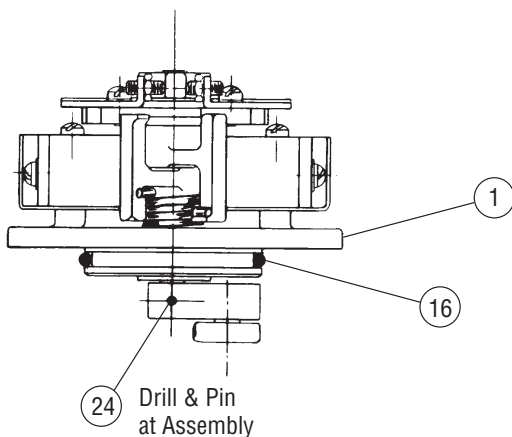
**Figure 5 - Thrust Limit Switch Parts Drawing**



Top View



Side View



Drill & Pin at Assembly

**Table 3 - Thrust Limit Switch Parts List**

Item	Description	Item	Description
1.	Thrust Switch Base	16.	O-Ring
2.	Thrust Switch Arm	17.	Ball Bearing
3.	Pointer	18.	Socket Head Machine Screw
4.	Adjusting Arm	19.	Socket Head Machine Screw
5.	Thrust Switch Dial	20.	Socket Head Machine Screw
6.	Thrust Switch Bushing	21.	Socket Screw
7.	Bearing Lever	22.	Hex Nut
8.	Bearing Lever Pin	23.	Hi-Collar Lockwasher
9.	Torsion Spring	24.	Groove Pin
10.	Insulator	25.	Groove Pin
11.	Thrust Switch Shaft	26.	Decal-Extend
12.	Thrust Limiter Plate	27.	Decal-Retract
13.	Thrust Washer	29.	Lockwasher
14.	Microswitch		
15.	O-Ring		

### Thrust Limit Switch Setting Procedure

The thrust switch has been preset at the factory according to the information provided by the customer. However, for field adjustment to decrease or increase the thrust force that will trip the thrust limit switch to interrupt the electric circuit to the motor, follow the procedure below:

#### WARNING

**Disconnect all electrical power to actuator prior to performing any thrust limit switch adjustment.**

1. Remove thrust limit switch compartment cover (65) to gain access to thrust switch (66).
2. To set thrust load tripping point for extend or retract direction strokes, loosen screw (19) and move appropriate pointer (3) to desired thrust setting. The higher the number, the higher the thrust output of the actuator.
3. Tighten screw.
4. Make sure mating surfaces of cover and housing are clean. Replace compartment cover and gasket (61) and secure tightly in place with hardware (69) and (70).
5. A maximum stop setting is furnished on all actuators. **DO NOT EXCEED THIS SETTING WITHOUT CONSULTING THE FACTORY.**

## Lubrication Instructions

Every Posi-Tork® Linear Actuator has been lubricated at the factory and should not require lubrication if operated at normal duty cycle and in ordinary environmental conditions. Good preventative maintenance practice should be performed at six-month intervals. The lubricant should be inspected to verify proper consistency and quality. The inspection can be made by removing pipe plug (23) located

in the side of housing (1). After completing a satisfactory inspection, tightly replace pipe plug. If lubricant level is low or visibly contaminated, actuator should be further inspected to determine cause.

The amount of lubricant in each actuator depends on size and stroke of actuator. See Table 4.

**Table 4 - Lubricant Required vs. Actuator Size and Stroke**

Actuator Lubricant Amount, Pounds					
Stroke (inches)	7100 ACME	7200 ACME	73-7200 ACME	7300 ACME	74-7300 ACME
6	.50	.75	1.25	1.25	1.50
12	.75	1.25	2.00	2.00	2.25
18	1.00	1.75	2.75	2.75	3.25
24	1.25	2.00	3.50	3.50	4.25
30	–	2.25	4.25	4.25	5.25
36	–	2.75	5.00	5.00	6.25
48	–	–	6.50	6.50	8.00
60	–	–	8.00	8.00	10.00

**Table 5 - Acceptable Standard Lubricants**

Actuator Area	Name	Base	Temperature Range (°F)	Manufacturer
Housing, Gear Box, Thrust Ass'y	Aeroshell 6	Mineral Oil	-40 to 250	Shell
Geared Limit Switch	Mobilgrease 28	polyalphaolefin (PAO) synthetic	-65 to 350	ExxonMobil
Motor Rotor	Sealed & lubricated for life bearings			

Standard lubricants for use in the actuator are shown in Table 5. Some substitute lubricants of the same base are acceptable and are listed.

## Substitute Lubricants

Name	Manufacturer
Litholene HEP1	Arco
Mobilux EP1	Mobil
Gulfcrown EP1	Gulf

## OPTIONAL EQUIPMENT

### Dust-Ignition Proof Enclosure

#### Class II Division I, Groups E, F & G Indoor and Outdoor Hazardous Locations

Actuators that comply with the NEC specification must have electrical access covers to exclude ignitable amounts of dust. When reinstalling these covers, make sure mating seating surfaces and gaskets are clean and attachment bolts are securely tightened. If motor end bell pipe plug has been removed to adjust actuator, pipe plug must be reinstated tightly. The actuator must be able to operate at full rating without developing high surface temperatures to cause excessive dehydration or gradual carbonization of organic dust deposits on actuator enclosure. The motor thermal overload switch must be wired as shown and noted in electrical wiring diagram provided with actuator.

The grounding lug on actuator enclosure exterior must be wired to a suitable grounding system with a minimum of #10 AWG wire as noted in electrical wiring diagram provided.

### Gear Driven Potentiometer

This option enables the actuator to provide a continuous linear output control signal directly proportional to its stroke. The signal can be interfaced with automatic control equipment to position or sense the actuator at any desired stroke position between

fully extended and fully retracted. The potentiometer assembly is mounted directly to, and driven by the geared position limit switch. Input gearing to the potentiometer is factory selected to accommodate the full range of actuator strokes and acme screw pitches. The potentiometer has been factory adjusted so the 0 and 1000 ohm resistance points correspond respectively, to the fully extended and fully retracted rod positions. Field adjustments may be done by loosening the set screw in the drive pinion on the potentiometer shaft, rotating the shaft as required and retightening the set screws.

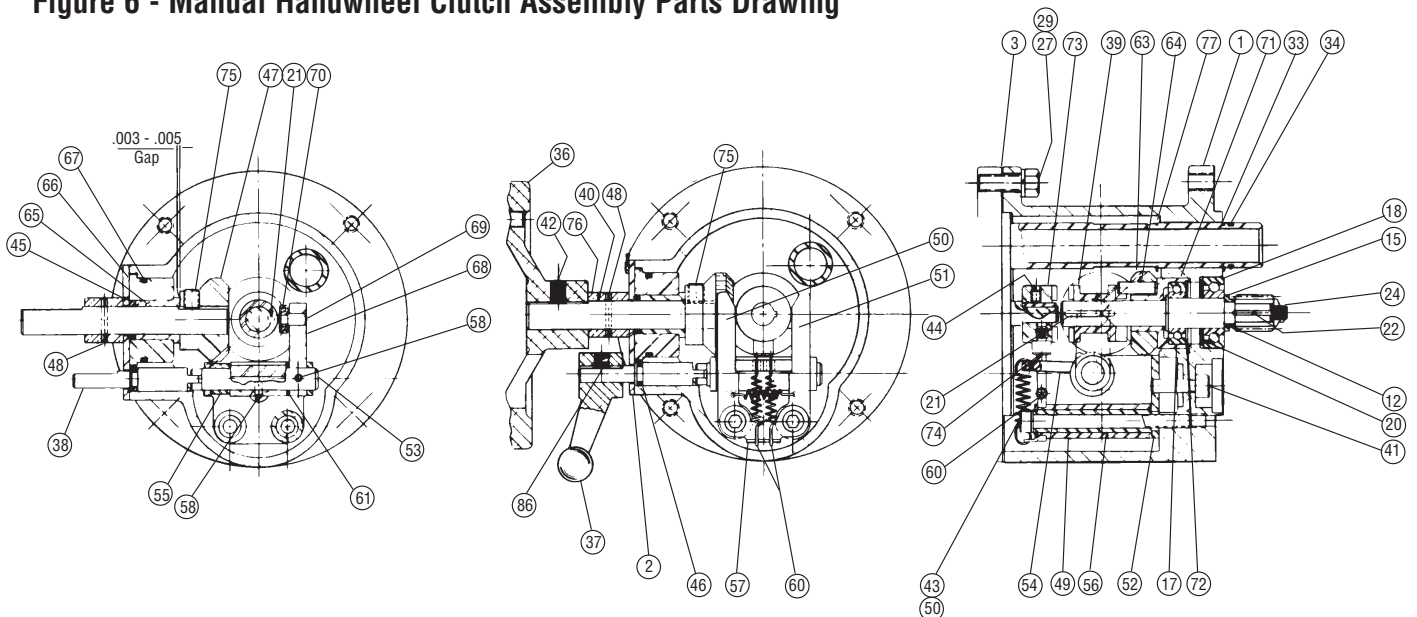
### Limit Switch Compartment Heater

An optional space heater mounted within the geared position limit switch compartment is available for several ambient applications. The heater is powered by 120 VAC. The input voltage is continuous unless externally interrupted.

### Integral Motor Starter

For information concerning the motor starter and any other related control components provided, refer to the electrical wiring diagram provided with actuator.

Figure 6 - Manual Handwheel Clutch Assembly Parts Drawing



**Table 6 - Manual Handwheel Clutch Assembly Parts List**

Item Assembly	Item Assembly	Item Assembly	Item Assembly
1. Housing	33. Retaining Ring	49. Tripper Holder	66. Handwheel Shaft Plug
2. Cover Plate	34. O-Ring	50. Tripper #1	67. O-Ring
3. Motor Gasket	36. Handwheel	51. Tripper #2	68. Shifter
12. Drive Shaft	37. Declutch Lever	52. Clutch Bracket	69. Bearing Lever Pin
15. Collar	38. Declutch Shaft	53. Fork Shaft	70. Bearing
17. Bearing	39. Clutch	54. Latch	71. Bearing Cartridge
18. Bearing	40. Handwheel Shaft	55. Fork Spacer	72. Retaining Ring
20. Bearing Spring	41. Socket Hd Cap Screw	57. Bridge	73. Motor Clutch
21. Round End Key	42. Set Screw	58. Spring Pin	74. Tripper Pin
22. Key	43. Socket Hd Cap Screw	60. Fork Springs	75. Set Screw
24. Pinion Locknut (where applicable)	45. Quad Ring	61. Thrust Washer	76. Bushing
27. Hex Head Cap Screw	46. Quad Ring	63. Clutch Gear	77. Retaining Ring
29. Lockwasher	47. Handwheel Shaft Gear	64. Dowel Pin	80. Lockwasher
	48. Spring Pin	65. Flanged Bearing	86. Set Screw

### Manual Handwheel Clutch Assembly

The manual handwheel clutch assembly permits manual operation of the linear actuator during installation, adjustments and during an electrical power failure. The handwheel clutch assembly is readily engaged for handwheel operation and will automatically disengage from the handwheel and re-engage to the electric motor when electric power is restored.

In normal electrical operation, declutch lever (37) is to the left and clutch (39) is held in engagement with motor clutch (73) by the pull of fork springs (60) on latch (54), which spreads trippers #1 and #2, (50) and (51), away from motor clutch. The latch is pinned (58) to fork shaft (53) as is shifter (68). Bearing (70), mounted in shifter, bears against shoulder of clutch, closest to motor clutch. Lugs on both clutches engage one another to transmit the motor power through key (21) to drive shaft (12).

For manual operation, rotate declutch lever counter-clockwise until a definite “click” is felt. This is the result of

the latch being rotated upward between the two springloaded trippers and past the locking notches in the trippers.

**NOTE:** When the latch is engaged in the tripper locking notches, the declutch lever cannot be manually rotated clockwise. DO NOT ATTEMPT TO FORCE IT!

Declutch lever rotation also turns fork shaft and shifter to slide clutch along drive shaft, out of engagement with motor clutch lugs, into engagement with clutch dowel pin (64). Should declutch lever fail to stay locked in manual operation position, rotate handwheel (36) slightly, in either direction, to clear sliding restriction caused by clutch lugs aligning with gear pins and preventing proper engagement. With clutch properly locked in position, actuator can be operated by rotating handwheel clockwise to extend the rod and counterclockwise to retract the rod. The actuator will remain in manual operation until the motor is energized.

### WARNING

**Disconnect all electrical power to the actuator before disassembly.**

### Removal & Replacement

1. Remove all hex head cap screws (53) and associated lock-washers (54). Remove limit switch compartment cover (51) from actuator assembly.
2. Remove all hex head cap screws (69) and associated lock-washers (70). Remove thrust switch compartment cover (65) from actuator assembly.
3. Disconnect all electrical power leads to motor (30). Remove all carriage bolts and associated lockwashers. Remove motor end bell then motor assembly from actuator.
4. Remove handwheel clutch assembly from actuator.

- NOTES:**
1. Refer to actuator assembly drawing in Figure 3, page 6, for procedure listed above.
  2. To replace the handwheel clutch assembly, use procedures listed above in reversed order.

### WARNING

**Disconnect all electrical power to actuator.**

### Disassembly

1. Shift declutch lever (37) to manual position.
2. Restrain drive shaft (12) from rotating by holding handwheel (36) and remove pinion locknut (24).
3. Loosen set screw (42) and remove handwheel.
4. Loosen set screw (86) and remove declutch lever.
5. Remove cover plate screws.

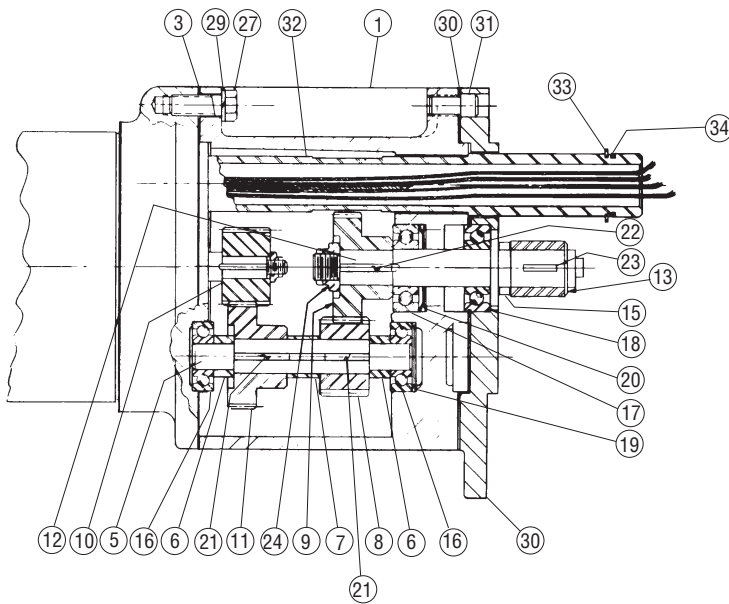
6. Withdraw handwheel shaft assembly including spring pin (48), bushing (76), cover plate (2), quad ring (45), handwheel (36), shaft plug (66), o-ring (67), flanged bearing (65), handwheel shaft gear (47) with associated set screw (75).
7. Withdraw declutch shaft (38) with quad ring (45).
8. Remove trippers and fork springs (60).
9. Remove cap screw (41) and (43) and associated lockwasher (80). Rotate clutch shifter sub-assembly clockwise to disengage bearing (70) from clutch (39) and remove clutch shifter subassembly from housing (1).
10. Slide clutch off drive shaft (12) and remove round ended key (21).
11. Remove key (22) and gear from locknut end of drive shaft.

- NOTES:**
1. Often times the handwheel clutch assembly is provided with a drive shaft having gear teeth machined into it. Disregard No. 2 and 11 if this type drive shaft is present in your sub-assembly.
  2. Refer to parts list for all drive shafts and gears available, page 13.

12. Remove collar (15) or snap ring from locknut end of drive shaft.
13. Withdraw drive shaft with clutch gear (63), dowel pin (64) and bearing cartridge (71). Remove bearing (18).

Reassembly is done by reversing assembly procedure. Upon completion of reassembly, liberally grease all sliding and rotating components before reinstalling manual handwheel clutch assembly on the actuator.

**Figure 7 - Gear Box Assembly Parts Drawing**



If your actuator includes a gear box assembly, it has been selected based on specific conditions of stroke velocity and/or thrust. The gear box assembly is always mounted directly to the actuator housing.

**Disassembly & Reassembly of the Gear Box Assembly**

**WARNING**

**Disconnect all electrical power to the actuator.**

1. Remove position and torque limit switch compartment covers (51) and (65).
2. Disconnect electrical power leads to motor, remove four fasteners retaining motor end bell and stator and remove motor components including rotor with all mounted parts, by withdrawing straight out.
3. Remove gear box assembly from actuator.
4. Ensure bearing (16), supported in motor end of housing, is retained with first set gear shaft (5).
5. Entire first set gear shaft with all mounted gears and spacers can be drawn straight out of housing (1).
6. Model 7200 Actuators: Remove flexlocnut (35), retaining output pinion (13), pinion spacer (15) and key (23).
- 6a. Model 7300 Actuators: Remove housing adapter (30) by removing screw (31).
7. Model 7200 Actuators: Slide drive shaft through support bearing (17) and out of housing.

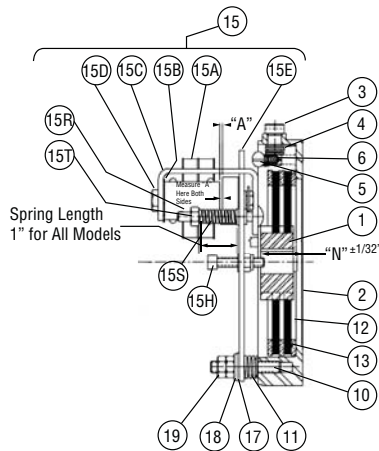
**Table 7 - Gear Box Assembly Parts List**

Item	Description
1.	Housing
2.	Cover Plate (Not Shown)
3.	Motor Gasket
4.	Cover Gasket (Not Shown)
5.	First Set Gear Shaft
6.	Support Washer
7.	Spacer
8.	Set Pinion
9.	Second Set Gear
10.	Set Pinion
11.	Set Gear
12.	Drive Shaft
13.	Output Pinion
15.	Pinion Spacer
16.	Ball Bearing
17.	Ball Bearing
18.	Ball Bearing
19.	Bearing Spring
20.	Spacer
21.	Square End Key
22.	Square Key
23.	Square Key
24.	Flexlocnut
27.	Hex Head Cap Screw
29.	Spring Lockwasher
30.	Housing Adapter
31.	Screw
32.	Conduit Bushing
33.	Retaining Ring
34.	O-Ring
35.	Flexlocnut (Not Shown)

- 7a. Model 7300 Actuators: Remove flexlocnut (24), retaining second set gear (9) and key (22). Slide second set gear off drive shaft (12).

Reassembly is done by reversing the above procedure. When reinstalling gear box assembly on actuator, remove cover plate (2) for access to guide first set gear shaft into bearing. After reinstallation on actuator, fill housing completely with appropriate lubricant, as shown on page 11, and replace cover plate and cover plate gasket (4).

**Figure 8 - Electric Brake Parts Drawing**



**Table 8 - Electric Brake Parts List**

Item	Description
1.	Splined Hub
3.	Release Knob
13.	Friction Disc
15H.	Wear Adjusting Screw
15S.	Spring
15A.	Magnet Assembly
45.	Terminal Strip (Not Shown)

**Brake Wear Adjustment**

Before air gap “A” reaches .100”, adjustment is required. Any delay in adjusting the magnet air gap will result in eventual loss of torque.

- To adjust, remove brake cover to expose square head wear adjusting screws (15H) and expose magnet air gap “A.”
- Measure air gap “A” using 3/8” to 1/2” wide feeler gauge. (Measure at center of magnet.)
- Turn two square head adjusting screws (15H) until the air gap “A” measures:
  - .045/.050 for 3’# models
  - .050/.055 for 6’# models
  - .050/.055 for 10’# models

Air gap should be the same on both sides.

**CAUTION**

**Do not adjust brakes for higher torque, as this will cause premature coil burnout.**

**Manual Brake Release**

The brake may be released manually to permit manual operation of the actuator for limit switch adjustment or during an electrical power failure.

- DISCONNECT ALL ELECTRICAL POWER TO THE ACTUATOR.
- Remove the brake cover and conduit pipe plug from the motor end bell.
- With a flat head screwdriver inserted into the motor end bell conduit port, turn the release knob (3) clockwise to stop position to release the brake. The brake will remain released until the release knob is turned counter-clockwise (approx. 65°) or until the brake coil is energized, automatically resetting the brake.
- Use a screwdriver in the slotted motor shaft to rotate the shaft clockwise to extend the actuator extension rod.
- When the adjustment is completed or power is restored, replace brake cover and conduit pipe plug securely.

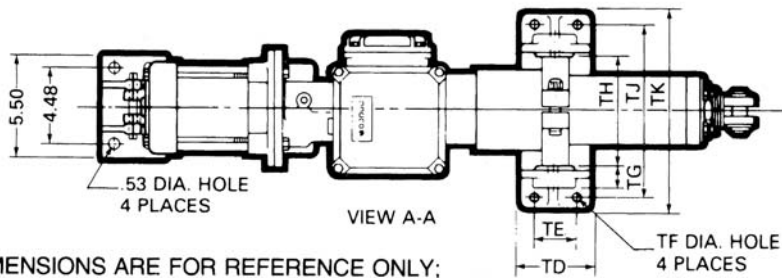
**Brake Removal and Replacement**

Complete replacement of the electric brake is recommended rather than attempting field repairs.

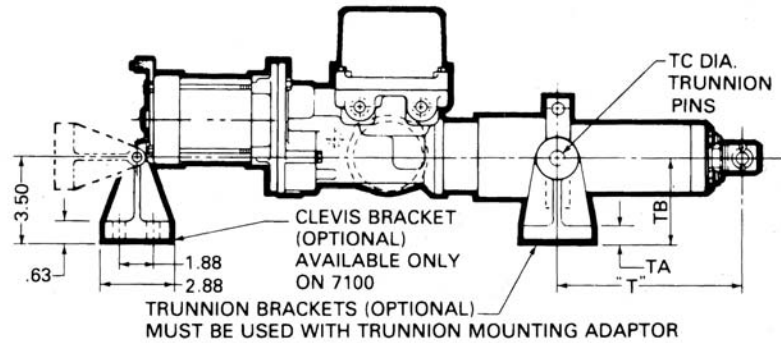
- DISCONNECT ALL ELECTRICAL POWER TO THE ACTUATOR.
- Remove the brake cover from the motor end bell.
- Disconnect the coil power wires, leading into actuator motor housing, from terminal strip.
- Remove the four socket head cap screws and lockwashers securing the brake assembly to the motor end bell. Remove the entire brake assembly.

Replacement of the brake assembly is done by reversing the above procedure.

**Figure 9 - Trunnion and Clevis Mounting**



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**Table 9 - Trunnion Mounting**

Series	TA	TB	TC	TD	TE	TF	TG	TH	TJ	TK
7100-A	0.63	3.50	0.50	4.00	1.88	0.53	0.75	4.75	7.47	9.25
7200-A	0.63	3.50	0.50	4.00	1.88	0.53	0.75	4.75	7.47	9.25
7300-A	0.75	4.66	0.87	7.56	5.50	0.66	1.19	6.50	9.50	11.25
74-7300-A	0.75	4.66	1.00	7.56	5.50	0.66	1.43	7.50	10.50	12.25

**“T” (Shown with actuator fully retracted)**

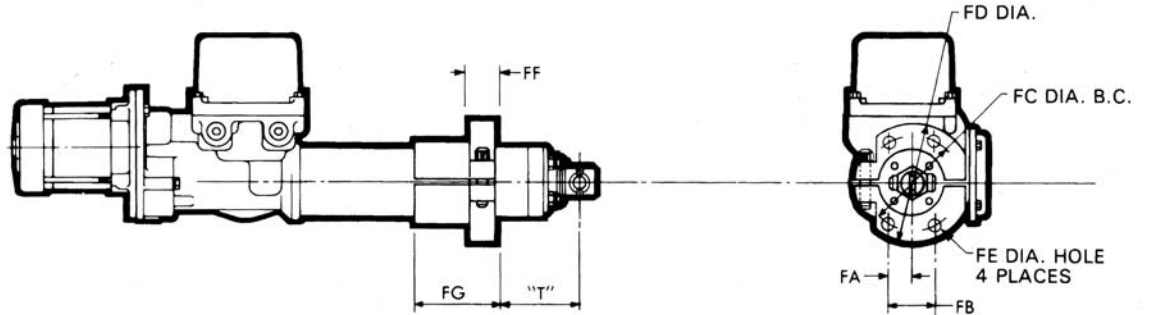
Series	6" Stroke		12" Stroke		18" Stroke		24" Stroke		30" Stroke		36" Stroke		48" Stroke		60" Stroke	
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
7100-A	6.63	7.63	11.63	13.63	16.63	19.63	19.63	25.63	-	-	-	-	-	-	-	-
7200-A	6.63	7.63	11.63	13.63	16.63	19.63	19.63	25.63	25.63	31.63	31.63	37.63	-	-	-	-
7300-A	10.00	11.50	13.50	17.50	17.00	23.50	21.00	29.50	26.00	35.50	32.00	42.50	38.00	53.50	44.00	65.50
74-7300-A	12.00	14.25	17.00	20.25	20.00	26.25	23.00	32.25	26.00	38.25	32.00	44.25	38.00	56.25	44.00	68.25

Notes:

1. An adjustable trunnion mount is standard on 7200, 7300, and 74-7300 Series actuators (optional on 7100 and 7400 Series).  
For 7400 Series ball screw actuators with an adjustable trunnion mount use “T” dimension from the 7400 flange mount table.  
Fixed location trunnion pins are standard on 7400 and 7500 Series actuators.
2. Trunnion brackets are optional on all models.
3. Actuators supplied with adjustable trunnion mounting are set at the maximum dimension unless otherwise specified.

**Figure 10 - Face/Flange Mounting**

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**Table 10 - Face/Flange Mounting**

Series	FA	FB	FC	FD	FE	FF	FG
7100-A	1.00	2.00	4.25	5.50	0.56	1.00	4.00
7200-A	1.00	2.00	4.25	5.50	0.56	1.00	4.00
7300-A	1.50	3.00	5.75	7.00	0.69	1.38	4.00
74-7300-A	2.25	4.50	6.50	8.00	0.81	1.00	5.00

**“T” (Shown with actuator fully retracted)**

Series	6" Stroke		12" Stroke		18" Stroke		24" Stroke		30" Stroke		36" Stroke		48" Stroke		60" Stroke	
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
7100-A	3.32	6.75	3.32	12.75	6.63	18.75	12.63	24.75	-	-	-	-	-	-	-	-
7200-A	3.32	6.75	3.32	12.75	6.63	18.75	12.63	24.75	18.63	30.75	24.63	36.75	-	-	-	-
7300-A	10.00	11.00	16.00	17.00	22.00	23.00	28.00	29.00	34.00	35.00	40.00	41.00	52.00	53.00	64.00	65.00
74-7300-A	11.00	13.25	17.00	19.25	23.00	25.25	29.00	31.25	35.00	37.25	41.00	43.25	53.00	55.25	65.00	67.25

Notes:

1. Face/flange actuator may be rotated 90° from arrangement shown.
2. Face/flange location is set at maximum dimension unless otherwise specified.

## Notes

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