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**COPEP-VULCAN INSTRUCTION MANUAL  
MODEL 700 DIRECT-ACTING ACTUATOR**

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*DIRECT-ACTING 700 ACTUATOR*

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# COPEs-VULCAN INSTRUCTION MANUAL

## MODEL 700 DIRECT-ACTING ACTUATOR

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## 1.0 INTRODUCTION

### 1.1 SCOPE OF MANUAL

This instruction manual provides instructions for all sizes of the direct-acting Model 700 actuator and includes instructions for top-mounted handwheels, side-mounted handwheels, adjustable travel stops and fixed travel stops.

### 1.2 DESCRIPTION

The Model 700 direct-acting pneumatic actuator is a spring-opposed diaphragm actuator that is used for the operation of control valves. The actuators are available in sizes 60, 100, 160, and 160-5, with travel up to 5" (125 mm).

For the direct-acting actuator, the spring tends to retract the actuator stem and air pressure acting on the diaphragm will extend the actuator stem. The initial spring force, or spring preload, is adjustable and, for the case of a direct-acting actuator on a direct-seated valve, the preload is normally set to a low value. The spring preload can be expressed as the diaphragm pressure at which stem movement begins.

The actuator can be attached to the valve bonnet with a screwed ring or with four studs. The valve stem is connected to the actuator by use of a threaded ring which is locked between surfaces of the stem connector.

The top-mounted handwheel is designed to extend the actuator stem against the spring force but not to retract the actuator stem.

The side-mounted handwheel is a worm gear coupled to an ACME thread and provides a large mechanical advantage and the means to both extend and retract the actuator stem.

Two different types of travel stops can be supplied: an adjustable up/down stop and a fixed down stop. The up stop provides a means of preventing the actuator from fully retracting, while the down stop prevents the actuator from fully extending.

For control valve applications, the actuator will almost always require a positioner.

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### 1.3 SPECIFICATIONS

#### GENERAL SPECIFICATIONS - 700 DIRECT-ACTING ACTUATOR

Size	60	100	160	160-5
Effective Area, in <sup>2</sup>	60	100	160	160
Effective Area, cm <sup>2</sup>	387	645	1032	1032
Nominal Travel, in.	1	2	3	5
Nominal Travel, mm	25	50	80	125
Pressure Connection	1/4" NPT	3/8" NPT	1/2" NPT	1/2" NPT
Maximum Operating Air Pressure, psig	80	80	80	80
Maximum Operating Air Pressure, bar	5.5	5.5	5.5	5.5
Maximum Test Air Pressure, psig	100	100	100	100
Maximum Test Air Pressure, bar	7	7	7	7
Maximum Temperature, deg. F	150	150	150	150
Maximum Temperature, deg. C	65	65	65	65
Maximum Spring Adjuster Travel, in.	1.79	2.03	2.12	2.52
Maximum Spring Adjuster Travel, mm	45.5	51.6	53.8	64
Available Stem Diameters, in.	3/4"	3/4"	3/4" & 1" *	3/4" & 1" *
Available Mounting Styles	ring or stud	ring or stud	ring or stud	ring or stud

\* The 1" stem is available only with stud type mounting

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## 2.0 INSTALLATION

### 2.1 ON RECEIPT

When the actuator and valve are shipped together, the actuator normally is mounted on the valve. Follow the valve instructions in the instruction manual when installing the valve in the pipeline. The actuator may be installed vertically or horizontally either above or below the valve, but, whenever possible, the valve assembly should be installed with the actuator located above the valve.

If the actuator is shipped separately from the valve, refer to the following instructions for mounting the actuator to the valve.

### 2.2 ACTUATOR MOUNTING

There are two available methods of mounting the actuator to the valve bonnet: a screwed ring using a 2.75"-12UN thread and a stud connection using four 9/16"-12UNC studs. The mounting styles are not interchangeable. The bonnet and actuator mounting styles must match.

#### 2.2.1 **Screwed Ring Mounting Type** (Refer to Drawing D-360837)

To mount the actuator on the valve using the screwed ring mounting method:

- A. Place the yoke nut on the base of the yoke, then lower the actuator over the valve stem and onto the valve bonnet.
- B. Screw the yoke nut tightly onto the bonnet to secure the actuator to the valve. Use a steel bar and hammer to engage the cast protrusions of the yoke nut to apply torque.

#### 2.2.2 **Stud Mounting Type** (Refer to Drawing D-360837)

To mount the actuator on the valve using the stud mounting method:

- A. Lower the actuator over the valve stem and onto the valve bonnet.
- B. Fully engage the four 9/16"-12UNC studs in the tapped holes in the bonnet. Install the four lockwashers and hex nuts on the studs. Torque the nuts to 54 ft-lb (73 Nm).

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### 2.3 STEM CONNECTOR AND TRAVEL ADJUSTMENT

#### 2.3.1 **Direct-Seated Valve Without Backseat**

A direct-seated valve is closed by applying downward force on the valve stem.

For the case of a direct-seated valve where a valve backseat is not present, the actuator will be set up so that upward, or opening, motion of the valve stem is limited by the internal stop in the actuator and downward, or closing, motion of the stem will be limited by the valve mainseat.

Note that Tandem valve trim, which has an internal valve spring, requires a different procedure than that outlined below and is discussed separately in this section. For other trim types, proceed as follows:

- A. Referring to the assembly drawing and to Figure 1, place the stem lock plate (Item 28) over the valve stem, then thread the stem clamp (Item 27) fully on the valve stem thread. Thread the upper stem weldment (Item 22) onto the actuator stem (Item 16) so that the bottom surface of the upper stem weldment is approximately 0.06" (1.5 mm) above the bottom of the actuator stem.
- B. Refer to the valve specification sheet for the required valve travel. With the actuator fully open and the valve seated, adjust the position of the stem clamp on the valve stem so that the distance from the bottom of the actuator stem to the top surface of the stem clamp is equal to the desired travel. Tighten the setscrew in the stem clamp to 15 ft-lb (20 Nm). Note that, for proper seating to occur, the available travel of the actuator must be larger than the required valve travel.
- C. Connect an air line to the NPT connection in the upper diaphragm casing. Slowly increase air pressure and allow the bottom of the actuator stem to contact the stem clamp on the valve stem. Do not permit air pressure to exceed 80 psig (5.5 bar).

**WARNING! Never exceed the actuator allowable air pressure rating. Property damage, injury or death may occur.**

- D. Pull up the stem lock plate and install the four 7/16"-14 socket head cap screws (Item 23) with lockwashers (Item 24). Torque the cap screws to 24 ft-lb (33 Nm). Maintain parallelism between the stem lock plate and the upper stem flange.
- E. If necessary, adjust the position of the indicator plate (Item 8 on the assembly drawing).

#### 2.3.2 **Direct-Seated Valve With Backseat**

The stem connector is assembled in the same manner as detailed in Section 2.3.1 except that, in Step B, adjust the air pressure so that the actuator stem is approximately 1/8" (3 mm) away from the fully open position. Some trial-and-error adjustment of the position of the stem clamp on the valve stem may be required to assure that proper mainseat and backseat contact is achieved.

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### 2.3 STEM CONNECTOR AND TRAVEL ADJUSTMENT (CONT'D.)

#### 2.3.3 Reverse-Seated Valve

A reverse-seated valve is closed by applying upward force on the valve stem.

For the case of a reverse-seated valve where a valve backseat is not present, the actuator will be set up so that downward, or opening, motion of the valve stem is limited by the internal stop in the actuator and upward, or closing, motion of the stem will be limited by the valve mainseat.

- A. Place the stem lock plate over the valve stem, then thread the stem clamp (Item 27) fully onto the valve stem. Thread the upper stem weldment (Item 22) onto the actuator stem (Item 16) so that the bottom surface of the upper stem weldment is approximately 0.06" (1.5 mm) above the bottom of the actuator stem.
- B. Position the valve stem to the full open position. Tighten the packing nuts as necessary to hold the valve stem in this position. The full open position can be established by first pulling the valve stem up to the seated position, then lowering the stem by an amount equal to the travel given on the valve specification sheet.
- C. Apply sufficient air pressure so that the actuator stem is fully extended, but do not exceed 80 psig (5.5 bar).

**WARNING! Never exceed the actuator allowable air pressure rating. Property damage, injury or death may occur.**

Rotate the stem clamp up on the valve stem so that contact is made with the bottom of the actuator stem. Pull up the stem lock plate and install the four 7/16"-14 socket head cap screws (Item 23) with lockwashers (Item 24). Torque the cap screws to 24 ft-lb (33 Nm). Maintain parallelism between the stem lock plate and the upper stem flange.

- D. If necessary, adjust the position of the indicator plate (Item 8 on the assembly drawing).



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### 2.3 STEM CONNECTOR AND TRAVEL ADJUSTMENT (CONT'D.)

#### 2.3.4 Tandem Trim Valves

Assembly of the stem connector for a tandem trim valve is similar to that for a normal direct-seated valve except that, due to the presence of an internal valve spring, which tends to prevent the valve from seating, a trial-and-error procedure in which the stem clamp is successively moved up on the valve stem will be necessary. Proceed as follows:

- A. Referring to the assembly drawing, place the stem lock plate (Item 28) over the valve stem, then thread the stem clamp (Item 27) fully on the valve stem thread. Thread the upper stem weldment (Item 22) onto the actuator stem (Item 16) so that the bottom surface of the upper stem weldment is approximately 0.06" (1.5 mm) above the bottom of the actuator stem.
- B. Loosen the packing nuts and allow the valve stem to position itself against the valve pilot spring. Mark the location of the valve stem.
- C. With the actuator stem fully retracted, rotate the stem clamp so that the distance from the bottom of the actuator stem to the top surface of the stem clamp is less than the required valve travel. Then, pressurize the actuator so that the actuator stem contacts the valve stem clamp and causes the valve to seat.

**WARNING!** Never exceed the actuator allowable air pressure rating. Property damage, injury or death may occur.

Mark the valve stem position. Release the air pressure from the actuator so that the actuator stem is fully retracted. The inner plug travel is the difference between the two marked locations.

- D. With the valve positioned against the pilot spring as in Step B and the actuator fully retracted, set the distance between the bottom of the actuator stem and the stem clamp equal to the required travel minus the inner plug travel minus 1/8" (3 mm).
- E. If necessary, adjust the position of the indicator plate (Item 8 on the assembly drawing).

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### **2.4 SPRING ADJUSTMENT**

The spring was properly adjusted at the factory and, unless the actuator has been disassembled, only minor adjustments should be necessary.

The initial spring preload (or bench-set) pressure is defined as the pressure at which stem motion is initiated and is set by rotating the spring adjuster (Item 21). Rotate the spring adjuster upward in the actuator yoke to increase the initial spring compression. Spring preload should be set to the value given in the valve specification sheet.

The preload should be set with the stem packing loose or not installed since the value given in the valve specification sheet is based on the assumption that there is no friction. If friction or valve pressure is present, the following procedure should be applied:

- A. Install an accurate pressure gage on the actuator air line.
- B. Slowly pressurize the actuator and record the gage pressure at a point near mid-travel. Continue to increase pressure so that the valve travels past mid-travel.
- C. Slowly decrease air pressure and read the gage pressure when the valve reaches the open position at which the previous pressure reading was made.
- D. The friction force in terms of actuator pressure is equal to one-half the difference in the two pressure readings.
- E. Add this pressure to the value given in the valve specification sheet to obtain the new precompression pressure. For example, if the opening and closing pressure readings were 36 and 30 psig (2.5 and 2.1 bar) respectively and the value in the valve specification sheet was 6 psig (0.4 bar), then the target precompression pressure would be 9 psig (0.6 bar).

### **2.5 AIR CONNECTION**

Accessories such as a positioner, air regulator, etc. will normally be assembled at the factory, and the only air connection required at installation will be the supply line to the air regulator.

The size 100, 160, and 160-5 actuators will normally have 3/8" x 1/4" and 1/2" x 1/4" bushings installed in the diaphragm cover. To increase stroking speed, such as when a volume booster is employed, these bushings may be removed and a larger tubing line installed.

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### **3.0 MAINTENANCE**

#### **3.1 GENERAL**

Actuator parts are subject to normal wear and must be inspected and replaced when necessary. The frequency of inspection and part replacement depends on the severity of the service conditions. Normally, only the diaphragm will require replacement.

#### **3.2 PRECAUTIONS**

Be aware that large pressure and spring forces are required to actuate a valve. Sudden release of these forces or of valve or actuator pressure has the potential to cause personal injury or damage to property.

Before starting to disassemble the actuator, proceed as follows:

- A. Isolate the valve from the line pressure.
- B. Release fluid pressure from the valve.
- C. Release air pressure from the diaphragm chamber of the actuator.
- D. Remove all actuator spring preload. Note that, if the actuator travel has been set up to be less than nominal, it may not be possible to remove all preload with the spring adjuster alone. In this case, it will be necessary to disassemble the stem connector to remove the remaining spring preload.

#### **3.3 DIRECT-ACTING ACTUATOR (Refer to Figure 1 and the Actuator Assembly Drawing)**

##### **3.3.1 Disassembly**

- A. Bypass or isolate the valve and reduce the diaphragm pressure to atmospheric.
- B. Rotate the spring adjuster (Item 21) downward on the actuator stem until all spring preload is removed.
- C. If necessary, remove the stem connector by removing the four socket head cap screws (Item 23). Loosen the setscrew in the stem clamp (Item 27) and remove the stem clamp from the actuator stem.
- D. If necessary, remove the actuator from the valve by unthreading the hold-down nut or studs and nuts, as applicable.
- E. Remove the hex head cap screws (Item 4) and hex nuts (Item 5) and remove the cover (Item 3).

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### **3.3     DIRECT-ACTING ACTUATOR     (Refer to Figure 1 and the Actuator Assembly Drawing)**

#### **3.3.1     Disassembly     (Cont'd.)**

- F.   If the diaphragm is not being replaced, remove the stem and diaphragm plate assembly (Items 11, 12, 13, 14, and 16). If the diaphragm is being replaced, unscrew the flat head screw (Item 11), then remove the diaphragm stop (Item 12), the diaphragm (Item 14), and the diaphragm plate (Item 13).
- G.   If necessary, remove the actuator stem (Item 16), the spring (Item 15), the spring plate (Item 17), and the thrust washer (Item 18).
- H.   If necessary, remove the base (Item 2) by removing the hex head cap screws (Item 7) and lockwashers (Item 10).

#### **3.3.2     Assembly**

- A.   If the diaphragm is being replaced, apply gasket compound (CV P/N 197077 or equivalent) to the surface of the diaphragm (Item 14) where the diaphragm stop (Item 12) seats. Assemble the diaphragm, diaphragm plate (Item 13), and diaphragm stop to the actuator stem (Item 16) using the flat head screw (Item 11). Torque the flat head screw to the value shown on the assembly drawing.
- B.   Install the spring adjuster (Item 21) in the yoke (Item 1).
- C.   Assemble the base (Item 2) to the yoke using hex head cap screws (Item 7) and lockwashers (Item 10). Torque the screws to the value given on the assembly drawing.
- D.   Place the thrust washer (Item 18), the spring plate (Item 17), and the spring (Item 15) in the yoke.
- E.   Place the stem assembly in the yoke and through the spring plate and thrust washer. Align the bolt holes in the diaphragm with the bolt holes in the base.
- F.   Place the cover (Item 3), with bushing (Item 41) when required, on the base and install the hex head cap screws (Item 4), hex nuts (Item 5), and eyebolts (Item 6). Torque the fasteners to the value on the assembly drawing.
- G.   Place the upper stem weldment (Item 22) on the stem so that the bottom surface of the upper stem weldment is approximately 0.06" (1.5 mm) above the bottom of the stem.
- H.   After the actuator is mounted on a valve, place the stem lock plate (Item 28) over the valve stem, then install the stem clamp (Item 27) on the valve stem. Position the stem clamp as required for valve seating and travel, then tighten the setscrew in the stem clamp. Install the socket head cap screws (Item 23) with lockwashers (Item 24). Torque the fasteners to the value on the assembly drawing.

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### **3.3     DIRECT-ACTING ACTUATOR     (Refer to Figure 1 and the Actuator Assembly Drawing)**

#### **3.3.2     **Assembly (Cont'd.)****

- I.   Drill holes in the yoke as directed by the assembly drawing, then install the indicator plate (Item 8) and ID plate (Item 19) using drive screws (Item 20).
- J.   Apply preload to the spring by rotating the spring adjuster.
- K.   Cycle the actuator slowly several times to verify that no binding occurs during operation. Pressurize the actuator from 80 to 100 psig (5.5 to 7 bar) and check for leaks. Binding, noise or leakage is not acceptable.

### **3.4     TOP-MOUNTED HANDWHEEL ASSEMBLY     (Refer to Figure 2)**

#### **3.4.1     **Disassembly****

- A.   Remove the hex nuts and lockwashers (Items A4 and A5). Remove the housing (Item A3).
- B.   If necessary, remove the gasket (Item A2).
- C.   Remove the retaining ring (Item A10), then remove the thrust base (Item A9) and thrust washer (Item A8).
- D.   If necessary, remove the handwheel (Item A14) and key (Item A13) by first removing the upper retaining ring (Item A12).
- E.   Remove the actuator stem (Item A7) from the housing (Item A3).
- F.   Remove the U-cup seal (Item A6) from the housing.
- G.   Proceed with actuator disassembly per Paragraph 3.3.1, if required.

#### **3.4.2     **Assembly****

- A.   Assemble the actuator per Steps A through F in Paragraph 3.3.2.
- B.   Apply gasket compound (CV P/N 197077 or equivalent) to both surfaces of the gasket (Item A2), then place the gasket onto the cover assembly (Item A1).
- C.   Place the thrust washer (Item A8) and thrust base (Item A9) on the actuator stem (Item A7), then install the retaining ring (Item A10).
- D.   Apply o-ring grease to the U-cup seal (Item A6). Install the U-cup seal in the housing (Item A3) with the 'U' facing down.

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### 3.4 TOP-MOUNTED HANDWHEEL ASSEMBLY (Refer to Figure 2)

#### 3.4.2 **Assembly (Cont'd.)**

- E. Carefully push the actuator stem assembly through the U-cup seal and thread the stem fully into the housing.
- F. Place the housing assembly onto the cover assembly and install the lockwashers (Item A4) and hex nuts (Item A5). Torque the nuts to the value shown on the assembly drawing.
- G. Thread the jam nut (Item A11) on the stem, then install the lower retaining ring (Item A12), the handwheel (Item A14), the key (Item A13), and the upper retaining ring (Item A12).
- H. Continue with assembly per Steps G through K in Paragraph 3.3.2.

### 3.5 ADJUSTABLE UP/DOWN TRAVEL STOP (Refer to Figure 4)

#### 3.5.1 **Disassembly**

- A. Remove the wing nut (Item 43), the lockwasher (Item 44), the flat washer (Item 45), and the cover assembly (Item 42).
- B. Remove the upper threaded collar (Item 37)
- C. If necessary, remove the hex nut (Item E11) and cover stud (Item E10).
- D. Remove the four hex bolts (Item E7) and lockwashers (Item E6), then remove the stop plate (Item E9) and four spacers (Item E8).
- E. Remove the lower threaded collar (Item 37).
- F. If necessary, remove the base plate (Item E3) and gasket (Item E2) by first removing the six hex nuts (Item E5) and lockwashers (Item E4).
- G. If necessary, remove the U-cup seal (Item E12) from the base plate.
- H. Proceed with actuator disassembly per Paragraph 3.3.1, if required.

#### 3.5.2 **Assembly**

- A. Assemble the actuator per Steps A through F in Paragraph 3.3.2.
- B. Apply gasket compound (CV P/N 197077 or equivalent) to both surfaces of the gasket (Item E2), then place the gasket onto the cover assembly (Item E1).

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### 3.5 ADJUSTABLE UP/DOWN TRAVEL STOP (Refer to Figure 4)

#### 3.5.2 **Assembly (Cont'd.)**

- C. Apply o-ring grease to the U-cup seal (Item E12), then install the U-cup seal in the base plate (Item E3) with the 'U' facing down.
- D. Place the base plate assembly over the stop stem and onto the cover. Install the lockwashers (Item E4) and hex nuts (Item E5). Torque the nuts to the value shown on the assembly drawing.
- E. If an up stop is required, thread the threaded collar (Item 37) onto the stop stem.
- F. Assemble the spacers (Item E8), stop plate (Item E9), lockwashers (Item E6), and hex bolts (Item E7). Torque the bolts to the value shown on the assembly drawing.
- G. If a down stop is required, thread the threaded collar (Item 37) onto the stop stem.
- H. Thread the cover stud (Item E10) with hex nut (Item E11) into the stop plate, then torque the nut.
- I. Install the cover assembly (Item 42), the flat washer (Item 45), the lockwasher (Item 44), and the wing nut (Item 43).
- J. After the actuator is attached to the valve, set the positions of the threaded collar(s).
- K. Continue with assembly per Steps G through K in Paragraph 3.3.2.

### 3.6 FIXED TRAVEL STOPS (Refer to Drawing D-360436)

Assembly and disassembly of the direct-acting actuator with travel stops is the same as described in Paragraph 3.3 except that the hex head cap screws (Item 7) are replaced with hexagonal fasteners with customized length.

### 3.7 SIDE-MOUNTED HANDWHEEL (Refer to Figure 3)

#### 3.7.1 **Disassembly**

- A. With the handwheel in the open position, remove the cover cap (Item 48), cover nipple (Item 47), and threaded collar (Item 37).
- B. Remove the socket head cap screws (Item C12), lockwashers (Item C13), and top plate (Item C10).
- C. If necessary, remove the handwheel (Item C20) from the worm shaft (Item C16) by removing the retaining rings (Item C19) and handwheel key (Item C18).

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### 3.7 **SIDE-MOUNTED HANDWHEEL** (Refer to Figure 3)

#### 3.7.1 **Disassembly (Cont'd.)**

- D. Remove the two remaining retaining rings (Item C19), remove the two worm shaft bearings (Item C17), then rotate and remove the worm shaft (Item C16).
- E. Lift the threaded sleeve weldment (Item C11) and worm gear (Item C14) subassembly from the gear housing (Item C9).
- F. Remove the socket head cap screws (Item C6), hex nuts (Item C8) and lockwashers (Item C7), then remove the gear housing from the clearance chamber (Item C3).
- G. Remove the clearance chamber (Item C3) by unthreading the hex nuts (Item C5) and lockwashers (Item C4).
- H. If necessary, remove the handwheel actuator stem (Item 11) by unthreading the stem from actuator stem.

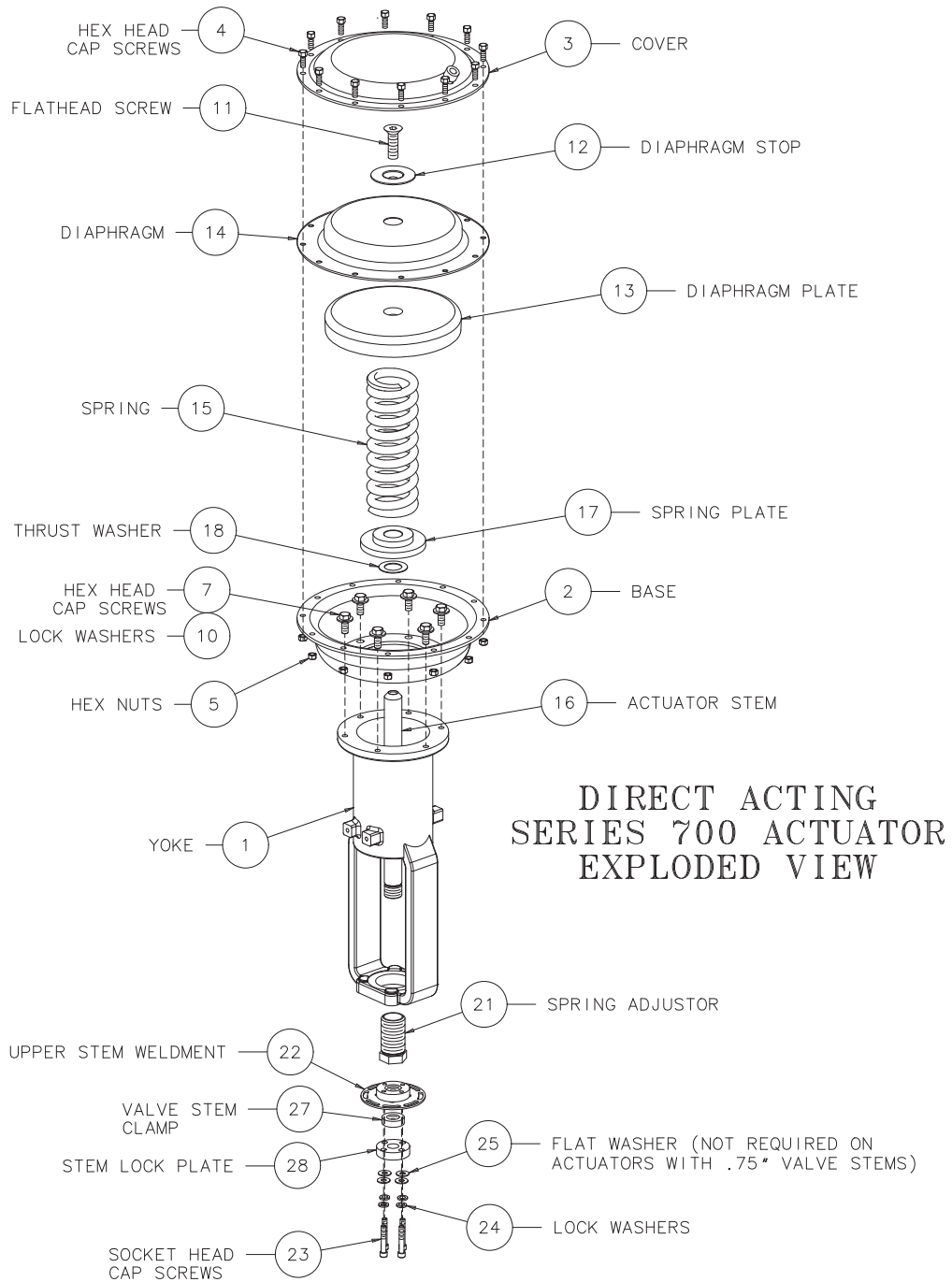
#### 3.7.2 **Assembly**

- A. Assemble the actuator per Steps A through F in Paragraph 3.3.2, except, in Step A, install the handwheel actuator stem (Item 11) instead of the flat head screw (Item 11 in Figure 1). Torque the stem to the value shown on the assembly drawing.
- B. To assemble the handwheel, follow the steps in Paragraph 3.7.1 in reverse order. Apply grease to the worm gear teeth and the threaded sleeve weldment threads. For assembly torques, refer to the assembly drawing.
- C. Set the position of the threaded collar so that, when the actuator is open and the handwheel is in the open position, there is gap of approximately 0.06" (1.5 mm) between the threaded collar and the threaded sleeve weldment (Item C11).



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**Figure 1**

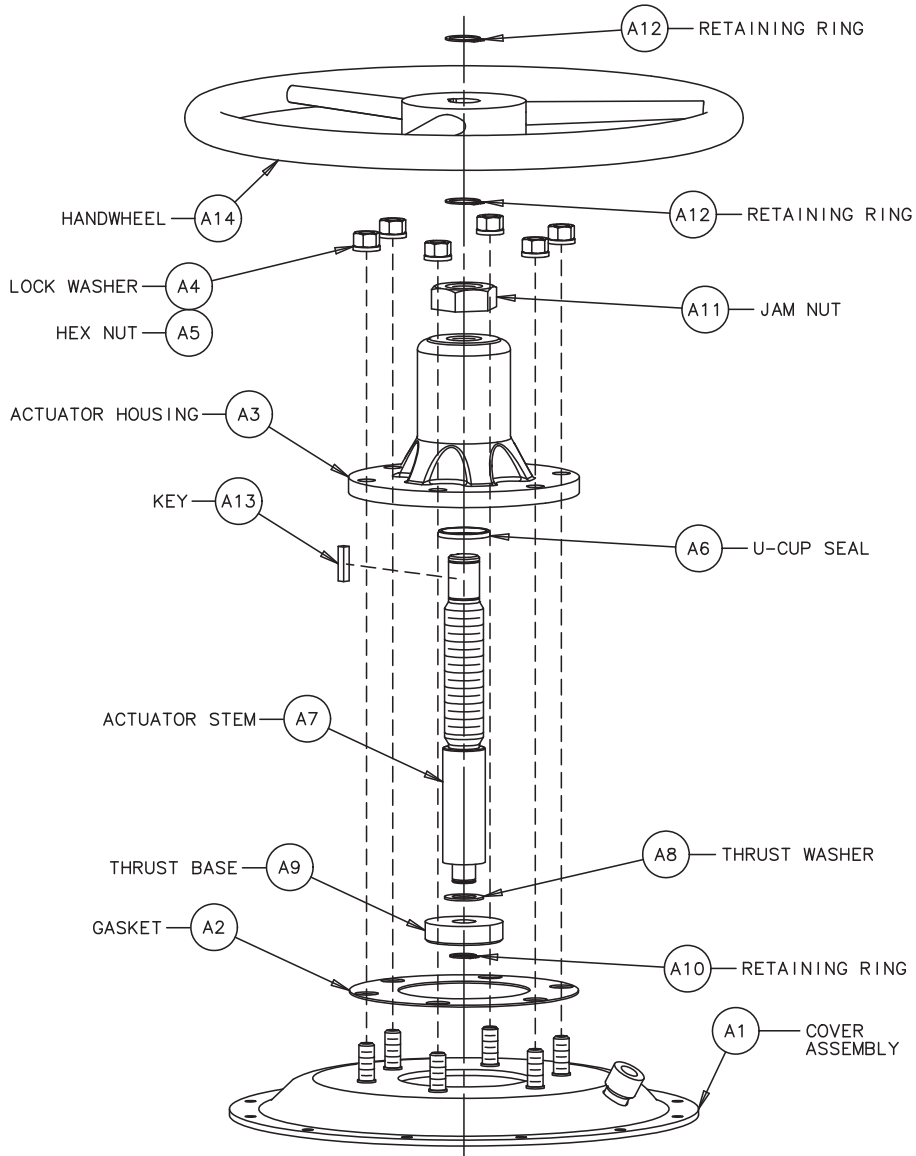


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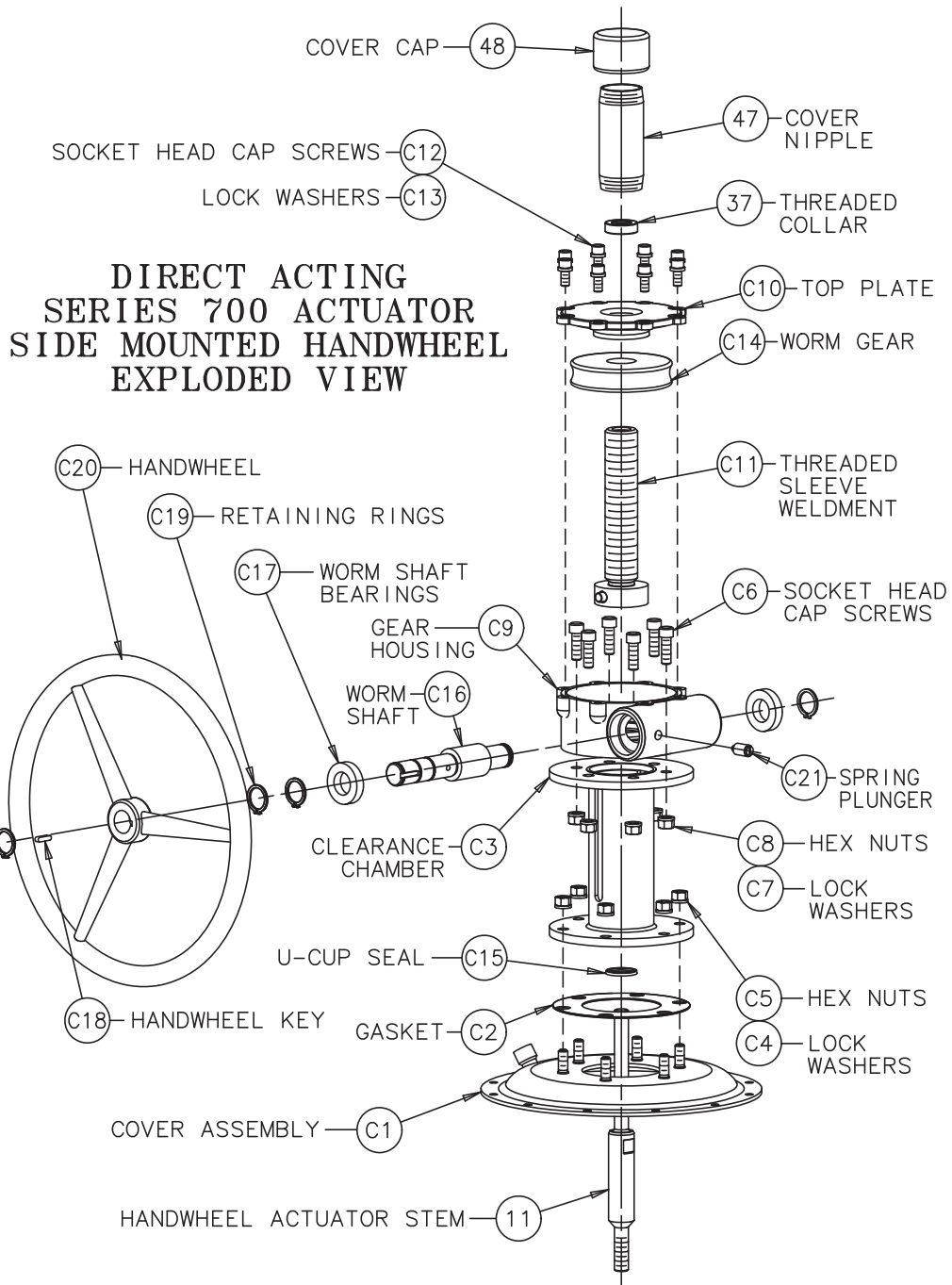
**Figure 2**



**DIRECT ACTING  
SERIES 700 ACTUATOR  
TOP MOUNTED HANDWHEEL  
EXPLODED VIEW**

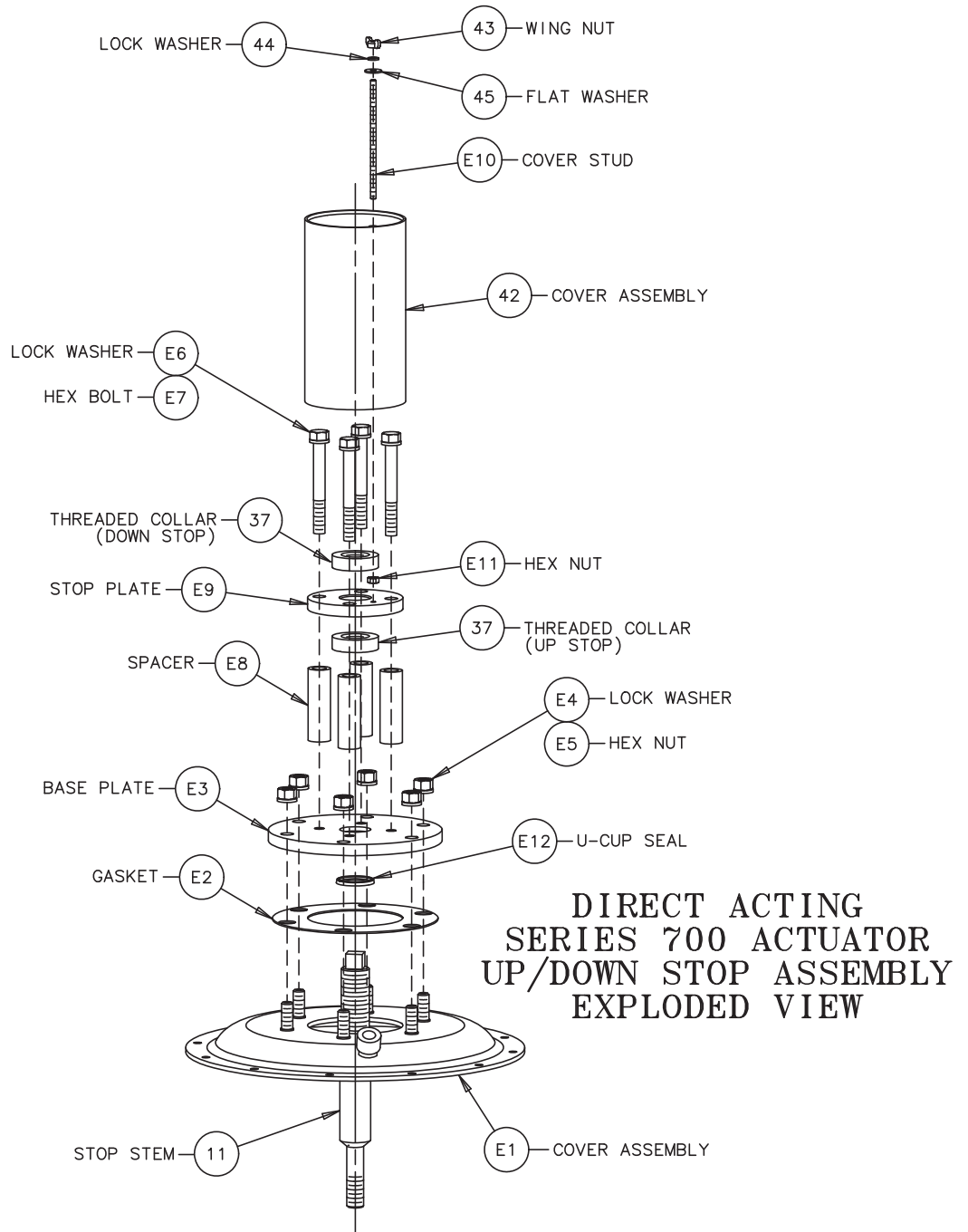
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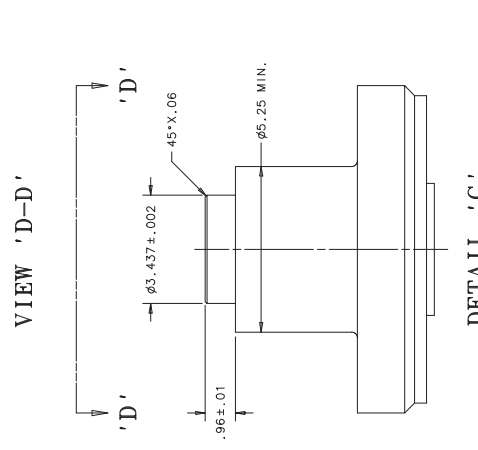
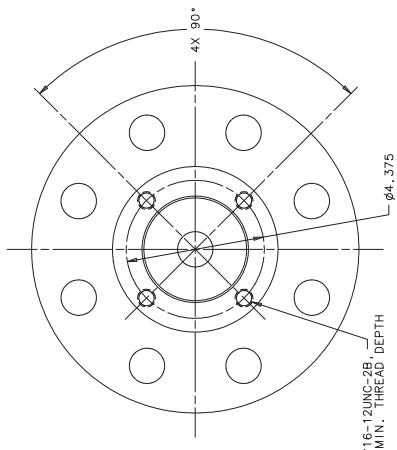
**Figure 3**



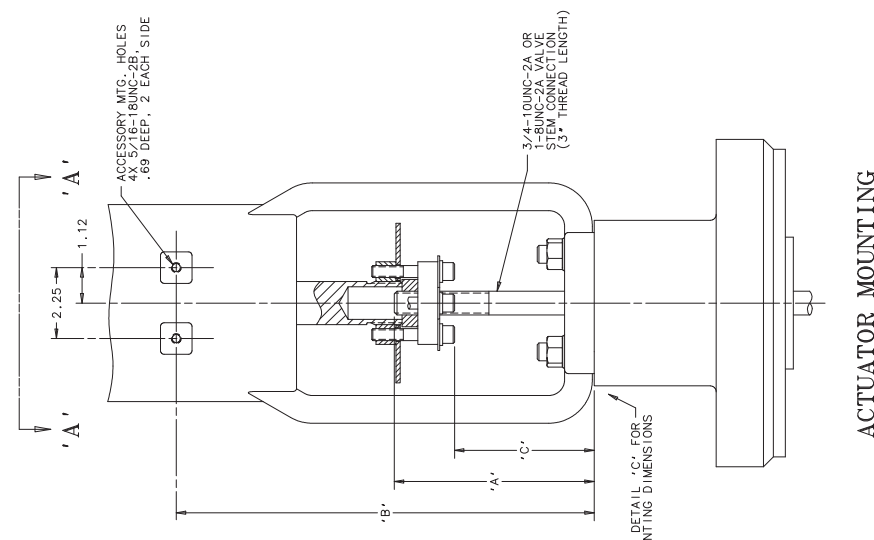
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MODEL 700 DIRECT-ACTING ACTUATOR**

**Figure 4**

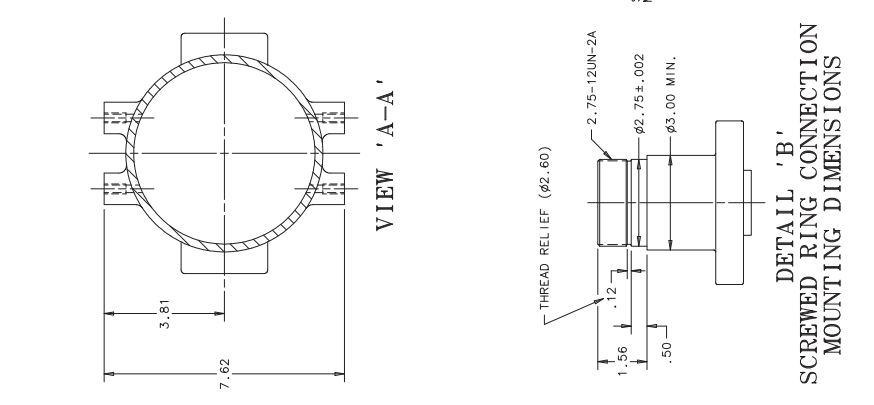




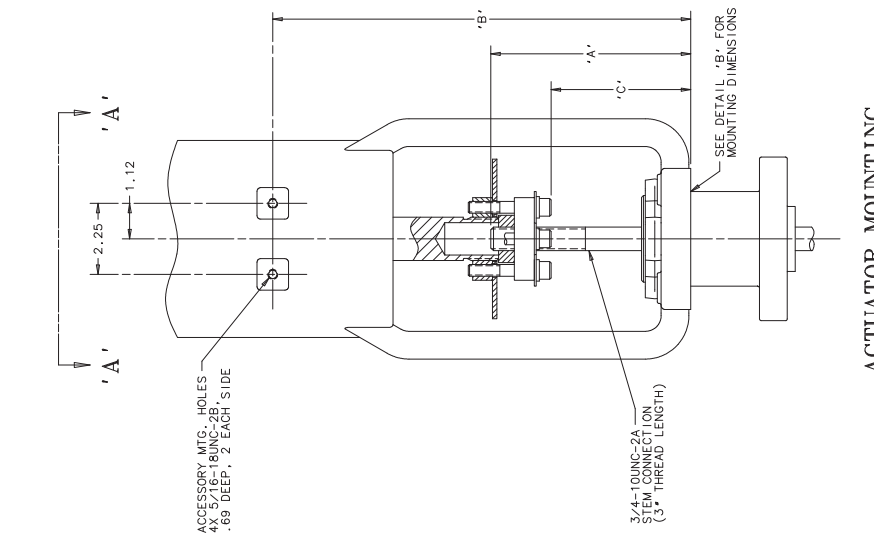
**DETAIL 'C'**  
STUDED CONNECTION  
MOUNTING DIMENSIONS



**ACTUATOR MOUNTING**  
STUDED ARRANGEMENT



**DETAIL 'B'**  
SCREWED RING CONNECTION  
MOUNTING DIMENSIONS



**ACTUATOR MOUNTING**  
SCREWED RING ARRANGEMENT

SIZE (SQ INCH)	'A' (SEE NOTE #1)		'B'		'C'		ACTUATOR TRAVEL
	FULL UP	DOWN	FULL UP	DOWN	FULL UP	DOWN	
60	7.69	6.69	12.12	5.66	4.66	4.66	2.00
100	8.72	6.92	13.26	5.66	4.66	4.66	2.00
160	9.44	6.74	14.26	7.54	4.50	4.50	3.00
160 LONG STROKE	12.31	7.31	16.19	10.35	5.35	5.35	5.00

SIZE (SQ INCH)	'A' (SEE NOTE #1)		'B'		'C'		ACTUATOR TRAVEL
	FULL UP	DOWN	FULL UP	DOWN	FULL UP	DOWN	
60	7.46	6.46	12.78	5.46	4.46	4.46	2.00
100	8.38	6.38	14.50	5.46	4.54	4.54	3.00
160	9.38	6.38	14.60	7.26	4.54	4.54	3.00
160 LONG STROKE	11.81	6.81	18.53	10.00	5.00	5.00	5.00

PROJECT: CUB actuator  
LIBRARY: misc  
DRAWING: d-360837  
THIS DRAWING WAS PRODUCED BY COPES-VULCAN  
DO NOT RE-USE MANUALLY MASTER SERIES

NOTES:  
1. TOLERANCE ON VALVE STEM DIMENSION 'A' IS +.25, .00".  
2. ALL DIMENSIONS ARE IN INCHES.

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COPES-VULCAN  
LME CITY (BEE CO.), PA. U.S.A.

FOR: SERIES 700 ACTUATORS  
MOUNTING ARRANGEMENTS

DFTSM	RMG	DATE 1-28-97	DCR	DATE 2-5-97
CHECKED	DATE	DATE	DATE	DATE
APP'D	DATE	DATE	DATE	DATE
SCALE NONE	DWG. NO. D-360837	REV 1		

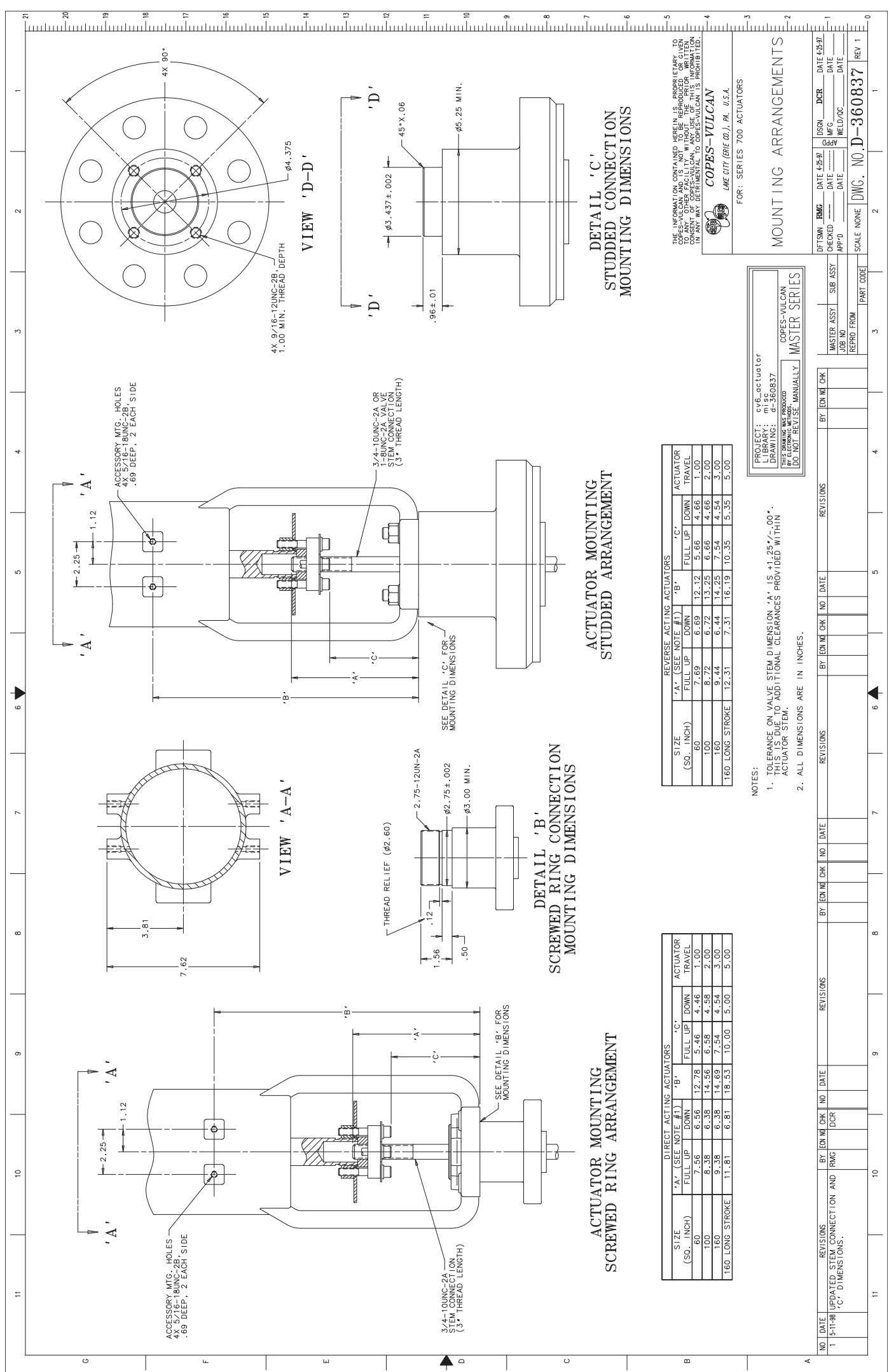
MASTER ASSY	SUB ASSY	BY	EDM	CHK	NO	DATE	REVISIONS
REPRO FROM							

NO	DATE	REVISIONS	BY	EDM	CHK	NO	DATE	REVISIONS
1	5-11-88	UPDATED STEM CONNECTION AND 'C'-DIMENSIONS.						

NO	DATE	REVISIONS	BY	EDM	CHK	NO	DATE	REVISIONS

NO	DATE	REVISIONS	BY	EDM	CHK	NO	DATE	REVISIONS

NO	DATE	REVISIONS	BY	EDM	CHK	NO	DATE	REVISIONS





ACTUATOR SERIES	
10	700 ACTUATOR WITH STUDDER BONNET CONNECTION
11	700 ACTUATOR WITH SCREWED RING CONNECTION
RV	700 ACTUATOR WITH SPECIAL BONNET CONNECTION PER DWG. B-366179

ACTUATOR SIZE	
01	60 SQ IN DIRECT ACTING (3/4" STEM)
02	60 SQ IN REVERSE ACTING (3/4" STEM)
03	100 SQ IN DIRECT ACTING (3/4" STEM)
04	100 SQ IN REVERSE ACTING (3/4" STEM)
05	160 SQ IN DIRECT ACTING (3/4" STEM)
06	160 SQ IN REVERSE ACTING (3/4" STEM)
07	160-5 SQ IN DIRECT ACTING (3/4" STEM)
08	160-5 SQ IN REVERSE ACTING (3/4" STEM)
13	160 SQ IN DIRECT ACTING (1" STEM)
14	160 SQ IN REVERSE ACTING (1" STEM)
15	160-5 SQ IN DIRECT ACTING (1" STEM)
16	160-5 SQ IN REVERSE ACTING (1" STEM)

**\*\* \*\* \***

ITEM NO.	REQ'D	PART NO.	DESCRIPTION	DWG NO.	REMARKS
1	1	198743		M-198743	1/2" TRAVEL
1	1	198742		M-198742	5/8" TRAVEL
1	1	198741		M-198741	3/4" TRAVEL
1	1	198740		M-198740	7/8" TRAVEL
1	1	187019		M-187019	1" TRAVEL
1	1	198745		M-198745	1-1/4" TRAVEL
1	1	198744		M-198744	1-1/2" TRAVEL
1	1	264442		M-264442	1-3/4" TRAVEL
1	1	187020		M-187020	2" TRAVEL
1	1	264441		M-264441	2-1/4" TRAVEL
1	1	198746		M-198746	2-1/2" TRAVEL
1	1	264443		M-264443	2-3/4" TRAVEL
1	1	187021		M-187021	3" TRAVEL
1	1	264513		L-264513	3-1/2" TRAVEL
1	1	264515		L-264515	4" TRAVEL
1	1	264514		L-264514	4-1/2" TRAVEL
1	1	195974		L-195974	5" TRAVEL

ONE OF THE FOLLOWING MUST BE CALLED FOR ON THE SHOP ORDER

60 SQ IN D.A. ACTUATOR	
CODE	SPRING
1	357560 (720 LBS/IN)
2	357561 (1440 LBS/IN)
3	357562 (2560 LBS/IN)
60 SQ IN R.A. ACTUATOR	
CODE	SPRING
4	357563 (720 LBS/IN)
5	357564 (1440 LBS/IN)
6	357565 (2000 LBS/IN)
100 SQ IN D.A. ACTUATOR	
CODE	SPRING
1	357566 (600 LBS/IN)
2	357567 (1200 LBS/IN)
3	357568 (2580 LBS/IN)
100 SQ IN R.A. ACTUATOR	
CODE	SPRING
4	357569 (600 LBS/IN)
5	357570 (1200 LBS/IN)
6	357571 (2750 LBS/IN)
160 SQ IN D.A. ACTUATOR	
CODE	SPRING
1	357572 (640 LBS/IN)
2	357573 (1280 LBS/IN)
3	357574 (2500 LBS/IN)
160 SQ IN R.A. ACTUATOR	
CODE	SPRING
4	357575 (640 LBS/IN)
5	357576 (1280 LBS/IN)
6	357577 (2330 LBS/IN)
7	357578 (3420 LBS/IN)
160 SQ IN LONG STROKE D.A. & R.A. ACTUATOR	
CODE	SPRING
1	357579 (384 LBS/IN)
2	357580 (768 LBS/IN)
3	357581 (1120 LBS/IN)
4	357582 (1440 LBS/IN)
5	357583 (2290 LBS/IN)

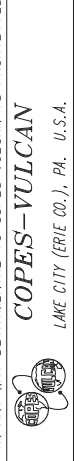
- NOTES:
- REFER TO COMPUTER FILE FOR PART INFORMATION.
  - REFERENCE ACTUATOR ASSEMBLY DWG'S.:  
 C-357183 DIRECT ACTING  
 C-357184 D.A. W/ TOP MTD. HANDWHEEL  
 C-357185 REVERSE ACTING  
 C-357186 R.A. W/ TOP MTD. HANDWHEEL  
 C-360474 D.A. W/ SIDE MTD. HANDWHEEL  
 C-360475 R.A. W/ SIDE MTD. HANDWHEEL  
 C-358062 D.A. W/ ADJ. STOP UP/DOWN  
 C-358066 R.A. W/ ADJ. STOP UP/DOWN  
 C-358070 R.A. W/ ADJ. STOP DOWN  
 C-358074 R.A. W/ ADJ. STOP UP/DOWN  
 C-360436 D.A. W/ FIXED STOP DOWN  
 C-360437 R.A. W/ FIXED STOP UP
  - ACTUATORS REQUIRING 1" STEM SIZE MUST USE STUDDER BONNET CONNECTION ONLY (ACTUATOR SERIES CODE 10) SCREWED RING (ACTUATOR SERIES CODE 11) & SPECIAL BONNET CONNECTION (ACTUATOR SERIES CODE RV) ARE LIMITED FOR USE WITH 3/4" DIA. STEM.

PROJECT: cv6\_actuator  
 LIBRARY: cv6\_misc  
 DRAWING: C-357187

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COPEP-VULCAN  
 MASTER SERIES

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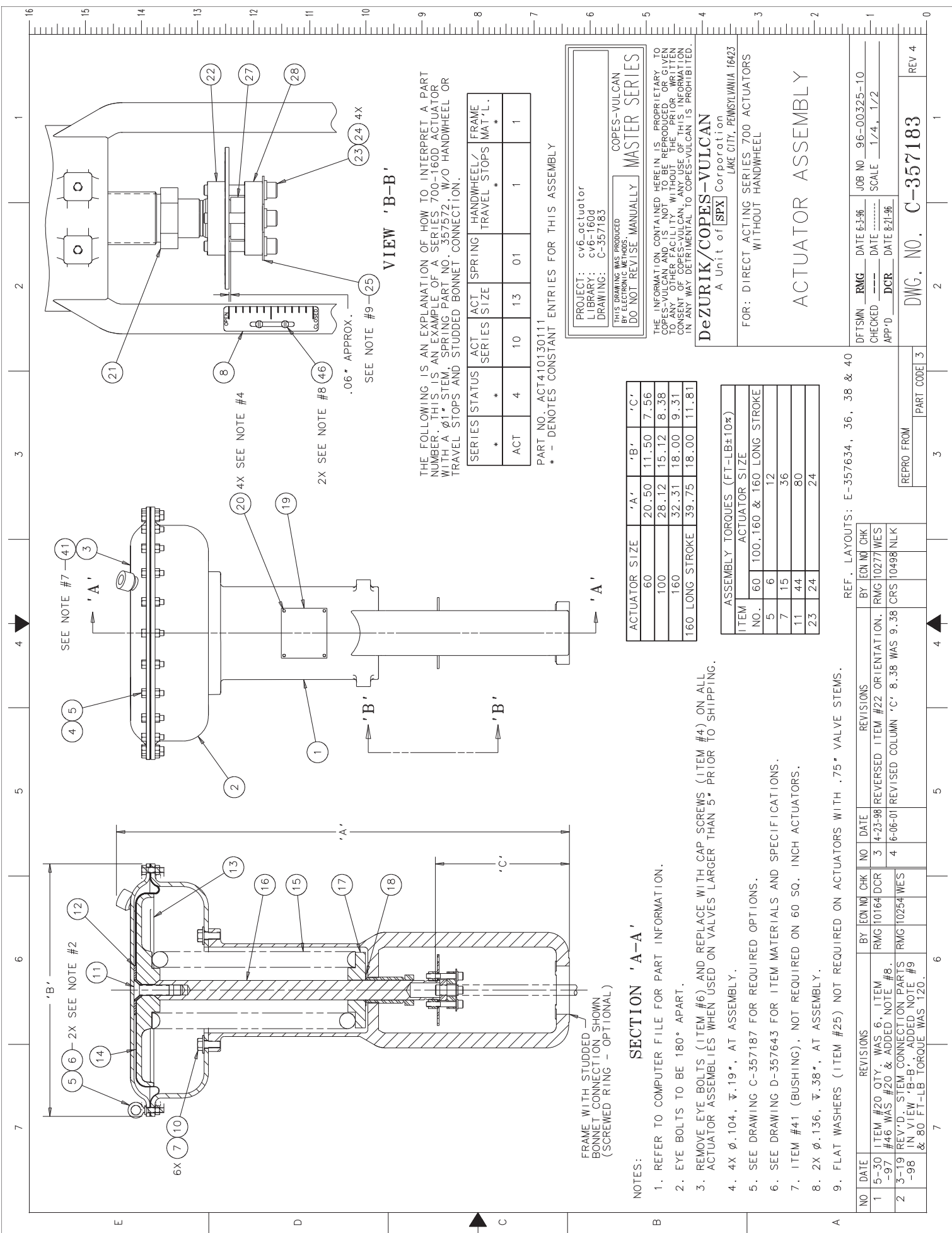
FOR: SERIES 700 ACTUATOR

ACTUATOR OPTION LIST

DFTSMN	RMG	DATE 7-23-96	JOB NO 96-00325-10
CHECKED	---	DATE -----	SCALE NONE
APP'0	DCR	DATE 8-1-96	

REPRO FROM	PART CODE	3
DWG. NO.	C-357187	REV 2

NO	DATE	REVISIONS	BY	ECN NO	CHK	NO	DATE	REVISIONS	BY	ECN NO	CHK
1	6-2-97	ADDED DWG'S. TO NOTE #2 FOR SMHW & FIXED STOP ASSY'S & NOTE #3.	RMG	10164	DCR						
2	6-11-99	ADDED ACTUATOR SERIES CODE RV & UPDATED NOTE #3.	RMG	10408	WES						



**VIEW 'B-B'**

THE FOLLOWING IS AN EXPLANATION OF HOW TO INTERPRET A PART NUMBER. THIS IS AN EXAMPLE OF A SERIES 700-160D ACTUATOR WITH A .01" STEM, SPRING PART NO. 357572, W/O HANDWHEEL OR TRAVEL STOPS AND STUDDED BONNET CONNECTION.

SERIES	STATUS	ACT. SERIES	ACT. SIZE	SPRING	HANDWHEEL/ TRAVEL STOPS	FRAME MAT'L.
ACT	*	4	10	13	01	1

PART NO. ACT410130111

\* - DENOTES CONSTANT ENTRIES FOR THIS ASSEMBLY

PROJECT: cv6\_actuator  
 LIBRARY: cv6-160d  
 DRAWING: C-357183

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COPE-S-VULCAN  
 MASTER SERIES

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**DeZURIK/COPE-S-VULCAN**  
 A Unit of SPX Corporation  
 LAKE CITY, PENNSYLVANIA 16423

FOR: DIRECT ACTING SERIES 700 ACTUATORS WITHOUT HANDWHEEL

**ACTUATOR ASSEMBLY**

ACTUATOR SIZE	'A'	'B'	'C'
60	20.50	11.50	7.56
100	28.12	15.12	8.38
160	32.31	18.00	9.31
160 LONG STROKE	39.75	18.00	11.81

ITEM NO.	ASSEMBLY TORQUES (FT-LB±10%)	
	ACTUATOR SIZE	STROKE
5	6	12
7	15	36
11	44	80
23	24	24

**SECTION 'A-A'**

NOTES:  
 1. REFER TO COMPUTER FILE FOR PART INFORMATION.

2. EYE BOLTS TO BE 180° APART.

3. REMOVE EYE BOLTS (ITEM #6) AND REPLACE WITH CAP SCREWS (ITEM #4) ON ALL ACTUATOR ASSEMBLIES WHEN USED ON VALVES LARGER THAN 5" PRIOR TO SHIPPING.

4. 4X Ø.104, ∓.19", AT ASSEMBLY.

5. SEE DRAWING C-357187 FOR REQUIRED OPTIONS.

6. SEE DRAWING D-357643 FOR ITEM MATERIALS AND SPECIFICATIONS.

7. ITEM #41 (BUSHING), NOT REQUIRED ON 60 SQ. INCH ACTUATORS.

8. 2X Ø.136, ∓.38", AT ASSEMBLY.

9. FLAT WASHERS (ITEM #25) NOT REQUIRED ON ACTUATORS WITH .75" VALVE STEMS.

REF. LAYOUTS: E-357634, 36, 38 & 40

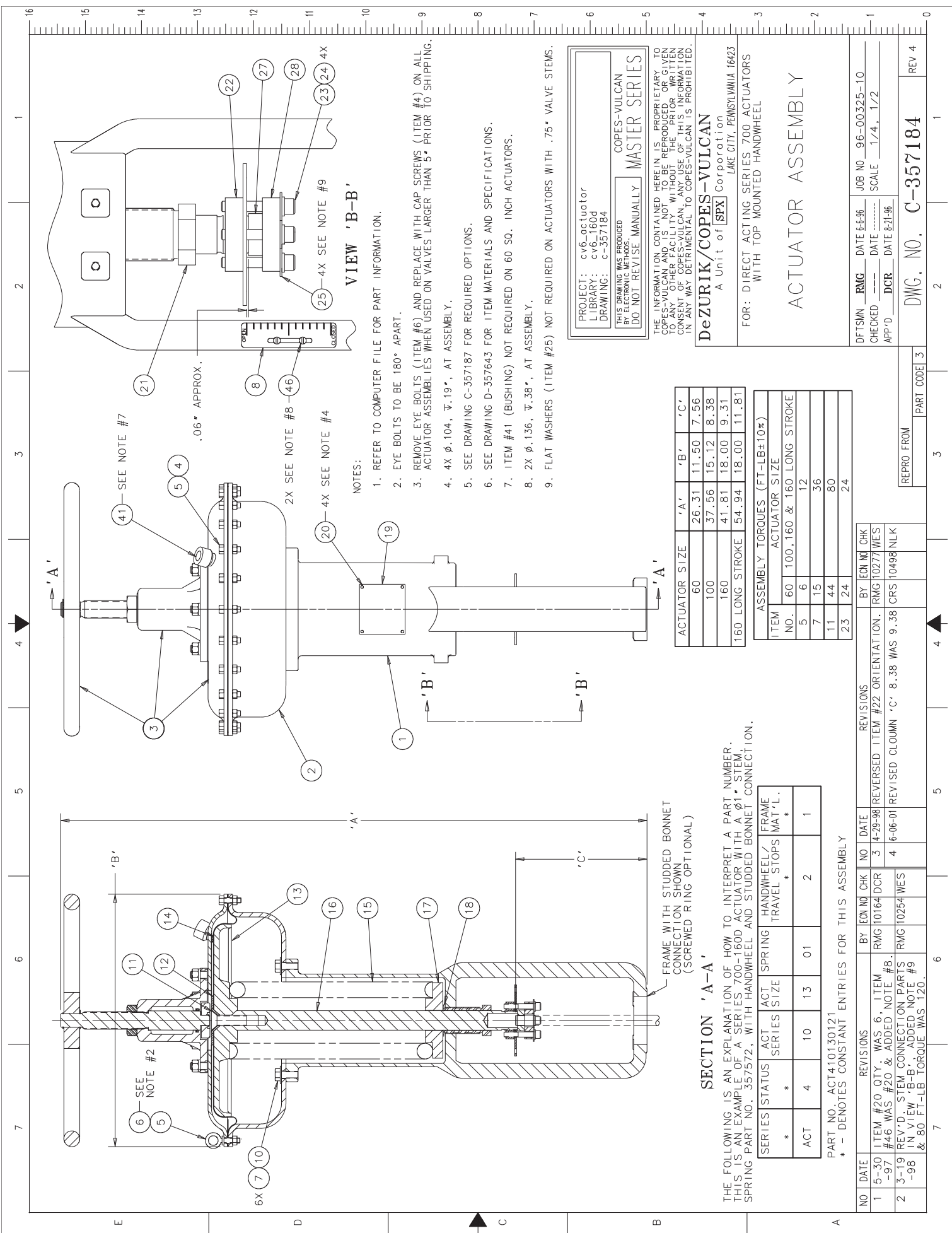
NO	DATE	REVISIONS	BY	ECN NO	CHK	NO	DATE	REVISIONS
1	5-30-97	ITEM #20 QTY. WAS 6, ITEM #46 WAS #20 & ADDED NOTE #8.	RMG	10164	DCR	3	4-23-98	REVERSED ITEM #22 ORIENTATION.
2	3-19-98	REV'D. STEM CONNECTION PARTS IN VIEW 'B-B'. ADDED NOTE #9 & 80 FT-LB TORQUE WAS 120.	RMG	10254	WES	4	6-06-01	REVISED COLUMN 'C' 8.38 WAS 9.38 (CRS 10498) NLK

DFTSMN	RMG	DATE	6-3-96	JOB NO	96-00325-10
CHECKED	---	DATE	-----	SCALE	1/4, 1/2
APP'D	DCR	DATE	8-21-96		

REPRO FROM \_\_\_\_\_ PART CODE 3

DWG. NO. **C-357183** REV 4





**VIEW 'B-B'**

NOTES:

- REFER TO COMPUTER FILE FOR PART INFORMATION.
- EYE BOLTS TO BE 180° APART.
- REMOVE EYE BOLTS (ITEM #6) AND REPLACE WITH CAP SCREWS (ITEM #4) ON ALL ACTUATOR ASSEMBLIES WHEN USED ON VALVES LARGER THAN 5" PRIOR TO SHIPPING.
- 4X  $\phi$ .104,  $\bar{V}$ .19", AT ASSEMBLY.
- SEE DRAWING C-357187 FOR REQUIRED OPTIONS.
- SEE DRAWING D-357643 FOR ITEM MATERIALS AND SPECIFICATIONS.
- ITEM #41 (BUSHING) NOT REQUIRED ON 60 SQ. INCH ACTUATORS.
- 2X  $\phi$ .136,  $\bar{V}$ .38", AT ASSEMBLY.
- FLAT WASHERS (ITEM #25) NOT REQUIRED ON ACTUATORS WITH .75" VALVE STEMS.

ACTUATOR SIZE	'A'	'B'	'C'
60	26.31	11.50	7.56
100	37.56	15.12	8.38
160	41.81	18.00	9.31
160 LONG STROKE	54.94	18.00	11.81

ITEM NO.	ACTUATOR SIZE
5	60, 100, 160 & 160 LONG STROKE
6	12
7	36
11	44
11	80
23	24

SERIES	STATUS	ACT SERIES	ACT SIZE	SPRING	HANDWHEEL/ TRAVEL STOPS	FRAME MAT'L.
ACT	4	10	13	01	2	1

**SECTION 'A-A'**

THE FOLLOWING IS AN EXPLANATION OF HOW TO INTERPRET A PART NUMBER. THIS IS AN EXAMPLE OF A SERIES 700-1600 ACTUATOR WITH A  $\phi$ 1" STEM, SPRING PART NO. 357572, WITH HANDWHEEL AND STUDDED BONNET CONNECTION.

PART NO. ACT410130121  
 \* - DENOTES CONSTANT ENTRIES FOR THIS ASSEMBLY

NO	DATE	REVISIONS	BY	ECN NO	CHK	NO	DATE	REVISIONS
1	5-30-97	ITEM #20 QTY. WAS 6, ITEM #46 WAS #20 & ADDED NOTE #8.	RMG	10164	DCR	3	4-29-98	REVERSED ITEM #22 ORIENTATION.
2	3-19-98	REV'D. STEM CONNECTION PARTS IN VIEW 'B-B', ADDED NOTE #9 & 80 FT-LB TORQUE WAS 120.	RMG	10254	WES	4	6-06-01	REVISED CLOUMN 'C' 8.38 WAS 9.38

PROJECT: cv6-actuator  
 LIBRARY: cv6\_160d  
 DRAWING: c-357184

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COPEES-VULCAN  
**MASTER SERIES**

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 A Unit of **SPX** Corporation  
 LAKE CITY, PENNSYLVANIA 16423

FOR: DIRECT ACTING SERIES 700 ACTUATORS WITH TOP MOUNTED HANDWHEEL

**ACTUATOR ASSEMBLY**

DFTSMN RMG DATE 6-6-96 JOB NO 96-00325-10  
 CHECKED --- DATE --- SCALE 1/4, 1/2  
 APP'D DCR DATE 8-21-96

DWG. NO. **C-357184** REV 4

REPRO FROM PART CODE 3

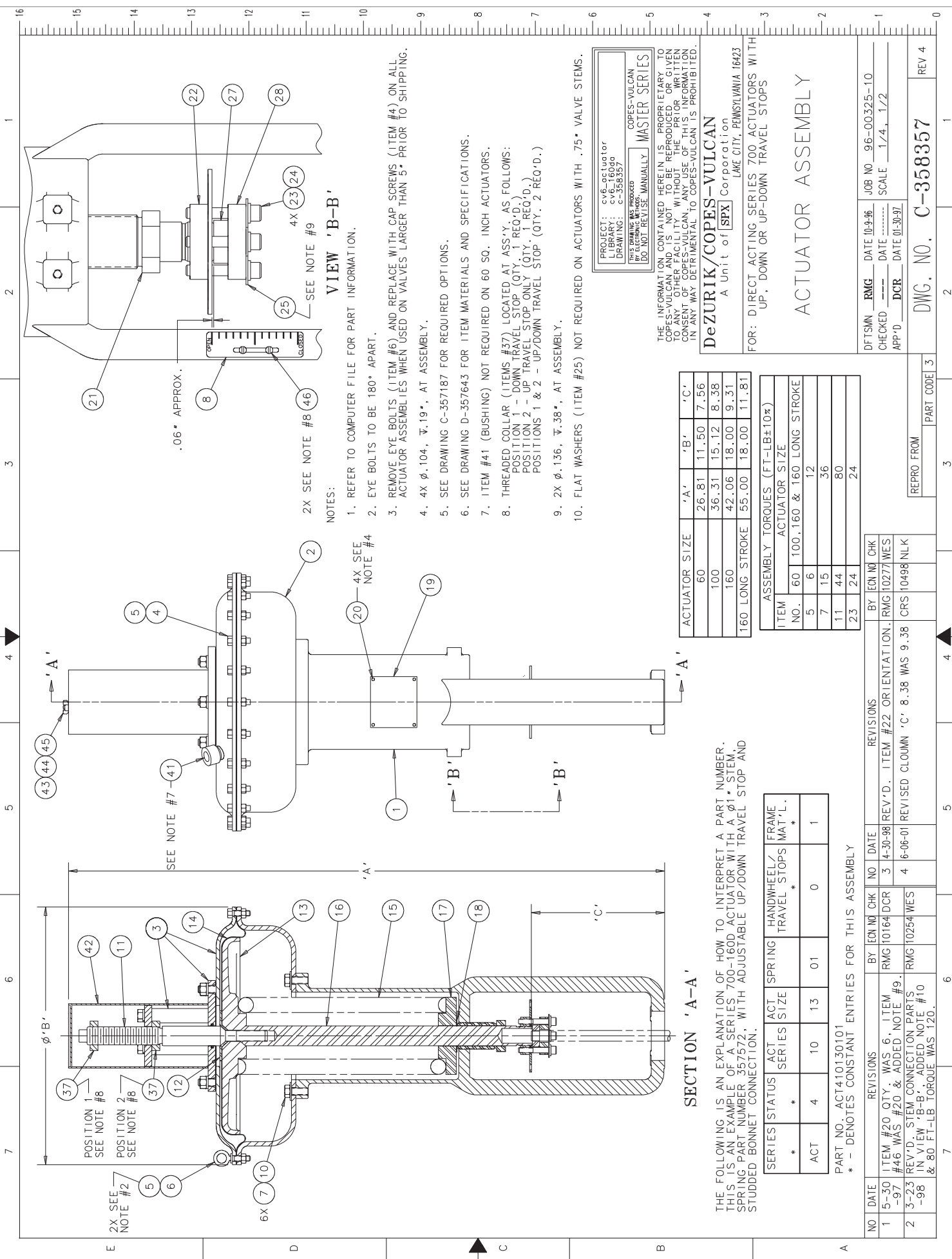
3

4

5

6

7



**VIEW 'B-B'**

NOTES:

- REFER TO COMPUTER FILE FOR PART INFORMATION.
- EYE BOLTS TO BE 180° APART.
- REMOVE EYE BOLTS (ITEM #6) AND REPLACE WITH CAP SCREWS (ITEM #4) ON ALL ACTUATOR ASSEMBLIES WHEN USED ON VALVES LARGER THAN 5" PRIOR TO SHIPPING.
- 4X φ. 104,  $\nabla$ . 19", AT ASSEMBLY.
- SEE DRAWING C-357187 FOR REQUIRED OPTIONS.
- SEE DRAWING D-357643 FOR ITEM MATERIALS AND SPECIFICATIONS.
- ITEM #41 (BUSHING) NOT REQUIRED ON 60 SQ. INCH ACTUATORS.
- THREADED COLLAR (ITEMS #37) LOCATED AT ASS'Y AS FOLLOWS:  
 POSITION 1 - DOWN TRAVEL STOP (QTY. 1 REQ'D.)  
 POSITION 2 - UP TRAVEL STOP ONLY (QTY. 1 REQ'D.)  
 POSITIONS 1 & 2 - UP/DOWN TRAVEL STOP (QTY. 2 REQ'D.)
- 2X φ. 136,  $\nabla$ . 38", AT ASSEMBLY.
- FLAT WASHERS (ITEM #25) NOT REQUIRED ON ACTUATORS WITH .75" VALVE STEMS.

PROJECT: cv6-actuator  
 LIBRARY: cv6-160sq  
 DRAWING: C-358357  
 BY: ELECTRIC WELDING  
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**DeZURIK/COPEES-VULCAN**  
 A Unit of **SPX** Corporation  
 LAKE CITY, PENNSYLVANIA 16423

FOR: DIRECT ACTING SERIES 700 ACTUATORS WITH UP, DOWN OR UP-DOWN TRAVEL STOPS

**ACTUATOR ASSEMBLY**

ACTUATOR SIZE	'A'	'B'	'C'
60	26.81	11.50	7.56
100	36.31	15.12	8.38
160	42.06	18.00	9.31
160 LONG STROKE	55.00	18.00	11.81

ITEM NO.	ASSEMBLY TORQUES (FT-LB±10%)		
	ACTUATOR SIZE		
5	60	100, 160 & 160 LONG STROKE	12
7	15	36	80
11	44	80	24
23	24		

THE FOLLOWING IS AN EXPLANATION OF HOW TO INTERPRET A PART NUMBER. THIS IS AN EXAMPLE OF A SERIES 700-160D ACTUATOR WITH A φ1" STEM, SPRING PART NUMBER 357572, WITH ADJUSTABLE UP/DOWN TRAVEL STOP AND STUDDED BONNET CONNECTION.

SERIES STATUS	ACT. SERIES	ACT. SIZE	SPRING	HANDWHEEL/ TRAVEL STOPS	FRAME MAT'L.
*	4	10	13	01	0
ACT	4	10	13	01	0
*					*
					1

PART NO. ACT410130101  
 \* - DENOTES CONSTANT ENTRIES FOR THIS ASSEMBLY

NO	DATE	REVISIONS	BY	ECN NO	CHK	NO	DATE	REVISIONS
1	5-30-97	ITEM #20 QTY. WAS 6, ITEM #46 WAS #20 & ADDED NOTE #9.	RMG	10164	DCR	3	4-30-98	REV'D. ITEM #22 ORIENTATION.
2	3-23-98	STEM CONNECTION PARTS IN VIEW 'B-B', ADDED NOTE #10 & 80 FT-LB TORQUE WAS 120.	RMG	10254	WES	4	6-06-01	REVISED COLUMN 'C' 8.38 WAS 9.38

DFTSMN RMG DATE 10-9-96 JOB NO 96-00325-10  
 CHECKED --- DATE --- SCALE 1/4, 1/2  
 APP'D DCR DATE 01-30-97

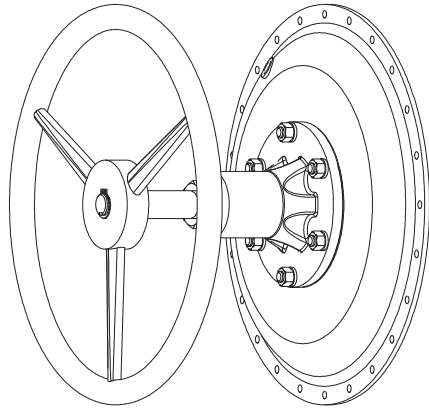
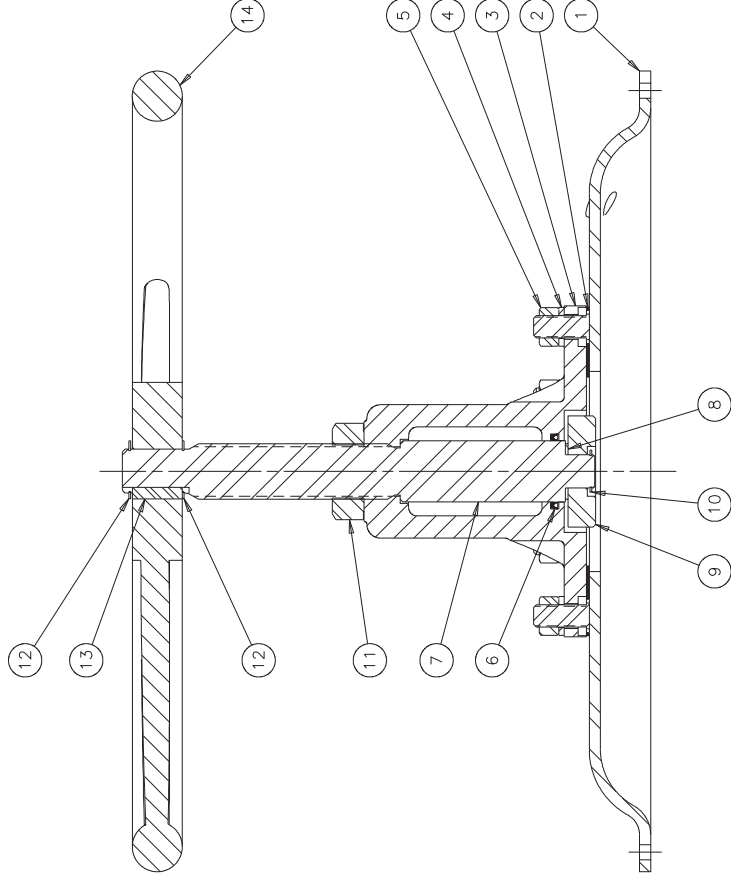
REPRO FROM PART CODE 3

DWG. NO. C-358357

REV 4

ASSEMBLY TORQUE (ft-lbs±10%)	
ITEM NO	ACTUATOR SIZE
5	15
	36

PART NO.	ACTUATOR
357057	60D
357058	100D
357059	160D
357060	160D LONG STROKE



NOTES:  
 1. REFER TO COMPUTER FILE FOR PART INFORMATION.

PROJECT: cv6\_oct  
 LIBRARY: 100d-tmhw  
 DRAWING: c-357058

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**COPEES-VULCAN**  
 LAKE CITY (ERIE CO.), PA. U.S.A.

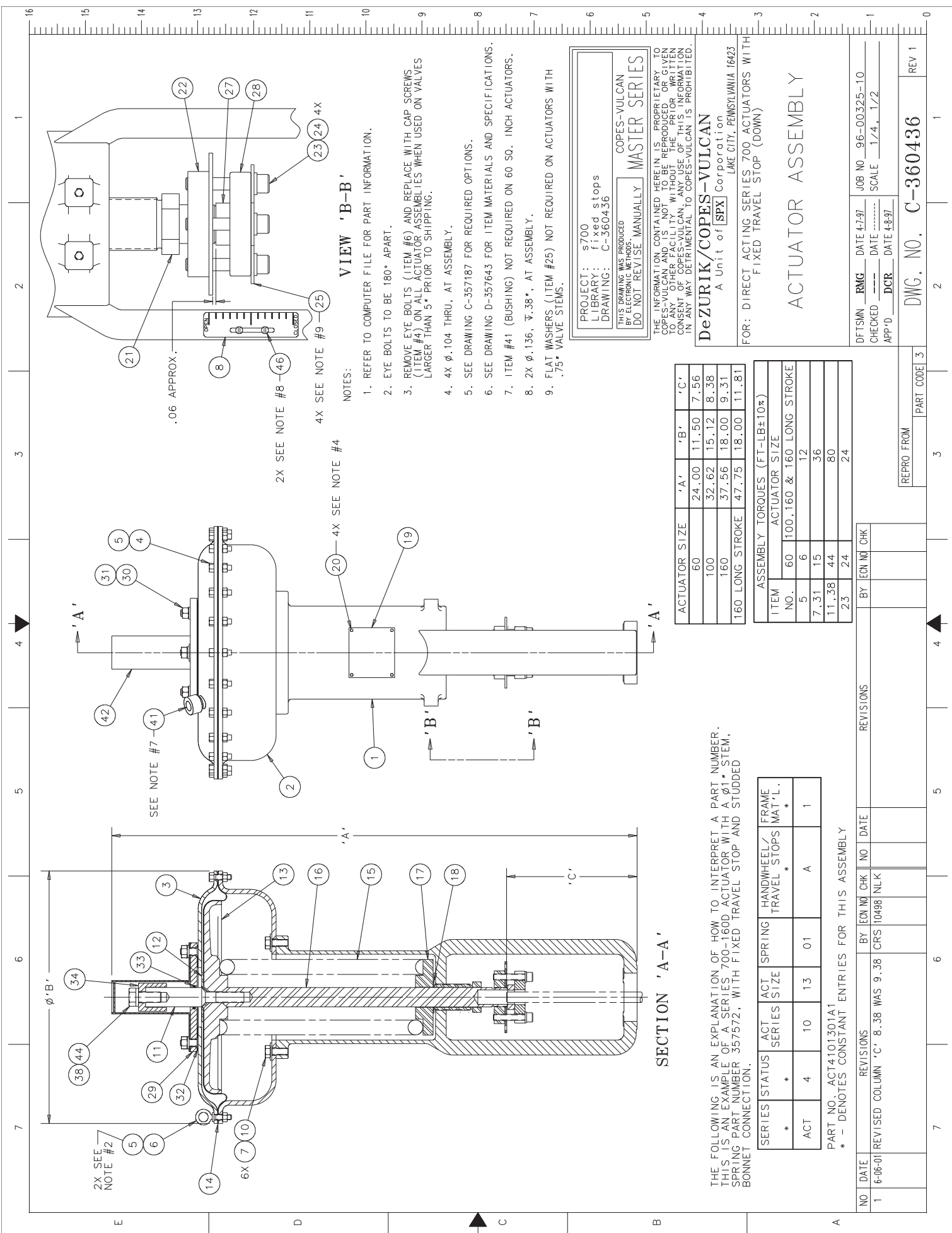
FOR: SERIES 700 DIRECT ACTING ACTUATORS WITH TOP MOUNTED HANDWHEEL

MANUAL ACTUATOR ASSEMBLY

NO	DATE	REVISIONS	BY	ECN NO	CHK	REVISIONS	BY	ECN NO	CHK
1	05-29-97	ADDED TORQUE TABLE	NLK	10166	DCR				

DFTSMN	KRH	DATE	05-24-96	JOB NO	96-00325-10
CHECKED		DATE		SCALE	HALF
APP'D	DCR	DATE	8-7-96		

REPRO FROM: PART CODE 3  
 DWG. NO. C-357058 REV 1



2X SEE NOTE #2

SEE NOTE #7-41

.06 APPROX.

2X SEE NOTE #8-46

4X SEE NOTE #9-25

NOTES:

**VIEW 'B-B'**

1. REFER TO COMPUTER FILE FOR PART INFORMATION.
2. EYE BOLTS TO BE 180° APART.
3. REMOVE EYE BOLTS (ITEM #6) AND REPLACE WITH CAP SCREWS (ITEM #4) ON ALL ACTUATOR ASSEMBLIES WHEN USED ON VALVES LARGER THAN 5" PRIOR TO SHIPPING.
4. 4X φ.104 THRU, AT ASSEMBLY.
5. SEE DRAWING C-357187 FOR REQUIRED OPTIONS.
6. SEE DRAWING D-357643 FOR ITEM MATERIALS AND SPECIFICATIONS.
7. ITEM #41 (BUSHING) NOT REQUIRED ON 60 SQ. INCH ACTUATORS.
8. 2X φ.136, ∇.38", AT ASSEMBLY.
9. FLAT WASHERS (ITEM #25) NOT REQUIRED ON ACTUATORS WITH .75" VALVE STEMS.

**SECTION 'A-A'**

THE FOLLOWING IS AN EXPLANATION OF HOW TO INTERPRET A PART NUMBER. THIS IS AN EXAMPLE OF A SERIES 700-160D ACTUATOR WITH A φ1" STEM, SPRING PART NUMBER 357572, WITH FIXED TRAVEL STOP AND STUDDED BONNET CONNECTION.

SERIES STATUS	ACT SERIES	ACT SIZE	SPRING	HANDWHEEL/ TRAVEL STOPS	FRAME MAT'L.
*	4	10	13	01	A
ACT					1

PART NO. ACT4101301A1

\* - DENOTES CONSTANT ENTRIES FOR THIS ASSEMBLY

ACTUATOR SIZE	'A'	'B'	'C'
60	24.00	11.50	7.56
100	32.62	15.12	8.38
160	37.56	18.00	9.31
160 LONG STROKE	47.75	18.00	11.81

ASSEMBLY TORQUES (FT-LB±10%)	
ITEM NO.	ACTUATOR SIZE
60	100, 160 & 160 LONG STROKE
5	6
7, 31	15
11, 38	44
23	24

BY: ECM NO. CHK

REVISIONS

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1 6-06-01 REVISED COLUMN 'C' 8.38 WAS 9.38 CRS 10498 NLK

PROJECT: s700  
LIBRARY: fixed stops  
DRAWING: C-360436

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COPEX-VULCAN  
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**DeZURIK/COPEX-VULCAN**

A Unit of SPX Corporation  
LAKE CITY, PENNSYLVANIA 16423

FOR: DIRECT ACTING SERIES 700 ACTUATORS WITH FIXED TRAVEL STOP (DOWN)

**ACTUATOR ASSEMBLY**

DFTSMN RMG DATE 4-7-97 JOB NO 96-00325-10  
CHECKED --- DATE --- SCALE 1/4, 1/2  
APP'D DCR DATE 4-8-97

DWG. NO. C-360436

REPRO FROM PART CODE 3

BY: ECM NO. CHK

REVISIONS

NO. DATE

BY: ECM NO. CHK NO. DATE

NO. DATE

1 6-06-01 REVISED COLUMN 'C' 8.38 WAS 9.38 CRS 10498 NLK

REV 1

<b>OPERATION AND MAINTENANCE MANUAL SUPPLEMENTARY INSTRUCTIONS FOR A SIDE MOUNTED HANDWHEEL ON A DIRECT ACTING ACTUATOR</b>
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**SCOPE**

This supplementary manual is for a side mounted handwheel fitted to a Copes-Vulcan 700 series direct acting diaphragm actuator.

**OPERATION**

**WARNING:**  
**KEEP HANDS AWAY FROM EQUIPMENT DURING OPERATION TO AVOID INJURY.**

**DO NOT OPERATE THE HANDWHEEL WHILE THE ACTUATOR IS PRESSURISED.**

The handwheel is of the continuously connected type and operates through a worm gearbox.

When the handwheel is set in the neutral position shown on travel plate (568) the actuator operates through its full stroke in either direction.

When air pressure is not available handwheel can be used to operate the valve manually.

The handwheel is capable of providing operating force in both upward and downward directions.

The handwheel gearbox is totally enclosed and is permanently lubricated.

<b>Actuator Size</b>	<b>Handwheel Assembly Weight</b>	
	lb	kg
60D	50	22
100D	105	48
160D	110	50
160-5D	120	55

## **DRAWINGS AND PARTS LIST**

Figure 1 shows a sectional view of the handwheel fitted to a direct acting diaphragm actuator.

Figure 2 shows the side handwheel assembly part description and identification.

## **MAINTENANCE**

### **Preparation**

**CAUTION:  
DO NOT DISASSEMBLE THE EQUIPMENT  
BEFORE RELEASING THE AIR PRESSURE.**

Before dismantling the actuator for maintenance set the handwheel to the neutral position. Note the distance 'X' (related to the actuator stroke), this must be maintained when re-assembling the unit.

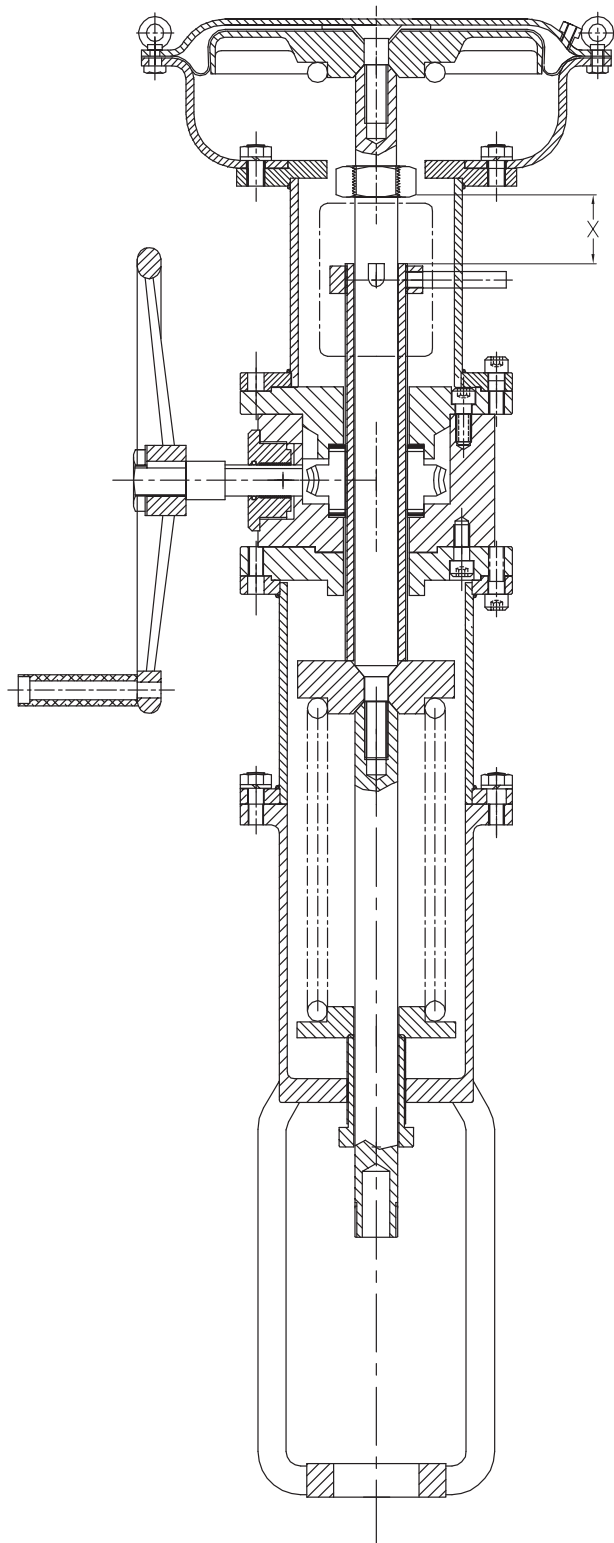
### **Disassembly**

- 1 Following the instructions given in 01-P224-37, release the spring pre-load, open actuator case assembly, remove diaphragm, diaphragm plate and detach casing attached to handwheel unit.
- 2 Disconnect actuator stem from stem extension (041).
- 3 Remove cover plate (540) on screw housing (039).
- 4 Remove indicator stop peg (023) and clamp (641).
- 5 Remove actuator stem nut (629) and pull out stem extension (041).
- 6 Remove hex head screw (026) and screw housing (039).
- 7 Unscrew socket head cap screws (027) and remove gear housing end cap (015) to open gear-housing (602).
- 8 Remove the handwheel locknut (631), indicator plate (640) and handwheel (024) together with the key (632).
- 9 Remove handwheel stem nut (628) and pull out the handwheel stem (627), distance piece (642), worm (634) together with thrust bearings (536).

- 10 Withdraw worm wheel (635) together with needle roller bearings (535) and thrust washers from the housing.
- 11 Examine and replace worn out parts.

### **Re-assembly**

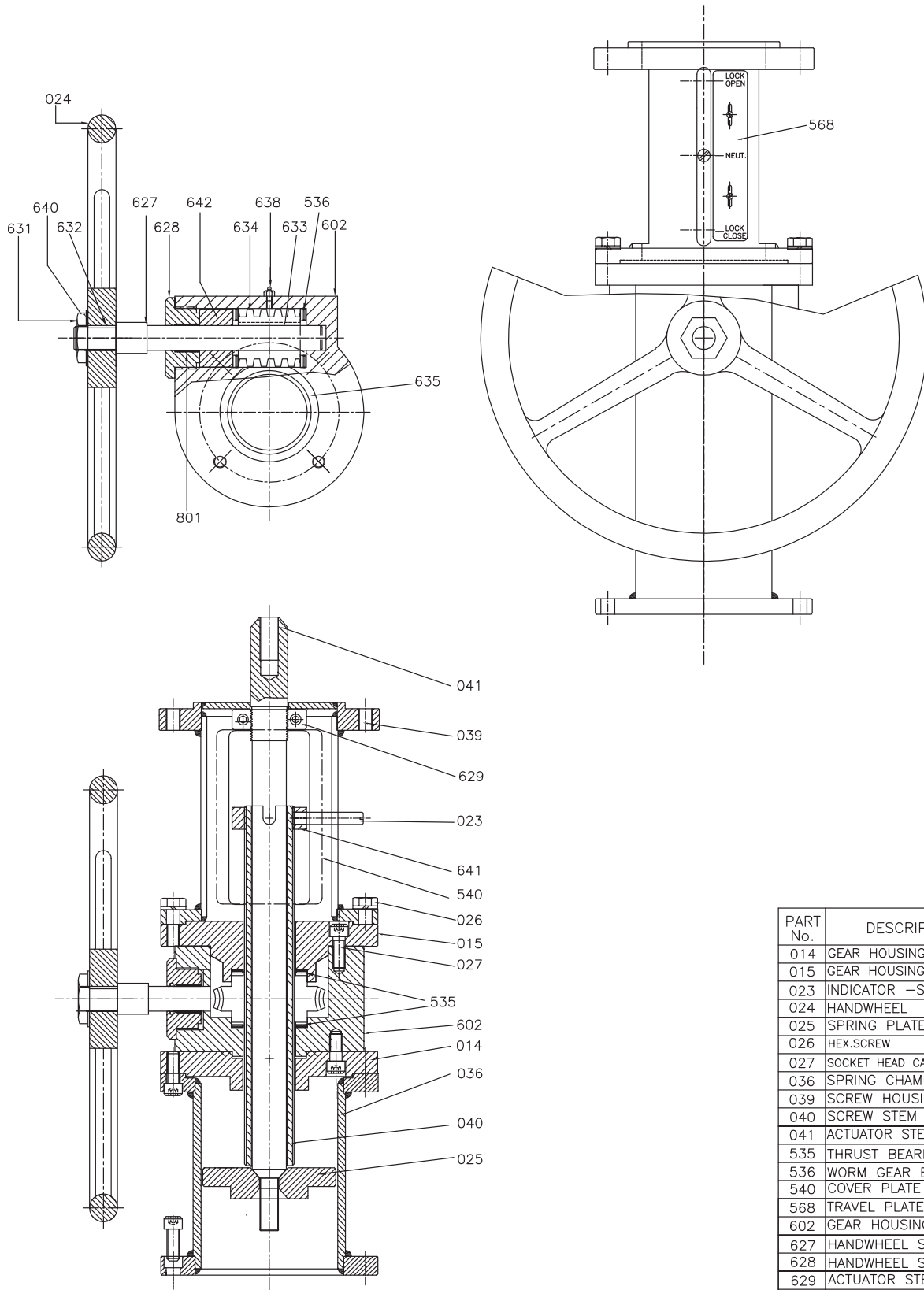
- 1 Fill gearbox with Castrol AP-3 grease or lithium based equivalent.
- 2 Re-assemble the unit in the reverse manner maintaining the settings marked 'X'.
- 3 Ensure that all the moving parts are well greased and protected from dust and dirt.



COPES VULCAN DIRECT ACTING ACTUATOR  
WITH SIDE MOUNTED HANDWHEEL

Fig.1





SIDE MOUNTED HANDWHEEL  
 COPES VULCAN DIRECT ACTING ACTUATOR

Fig.2

PART No.	DESCRIPTION
014	GEAR HOUSING BASE PLATE
015	GEAR HOUSING END CAP
023	INDICATOR -STOP PEG
024	HANDWHEEL
025	SPRING PLATE (UPPER)
026	HEX.SCREW
027	SOCKET HEAD CAP SCREW
036	SPRING CHAMBER
039	SCREW HOUSING
040	SCREW STEM
041	ACTUATOR STEM EXTENSION
535	THRUST BEARING WORM
536	WORM GEAR BEARING
540	COVER PLATE
568	TRAVEL PLATE
602	GEAR HOUSING
627	HANDWHEEL STEM
628	HANDWHEEL STEM NUT
629	ACTUATOR STEM NUT
631	HANDWHEEL LOCKNUT
632	HANDWHEEL KEY
633	WORM KEY
634	WORM
635	WORM WHEEL
638	GREASE NIPPLE
640	HANDWHEEL INDICATOR PLATE
641	SCREW STEM NUT
642	DISTANCE PIECE
801	GUIDE BUSH