GH-BETTIS

SERVICE INSTRUCTIONS

DISASSEMBLY AND REASSEMBLY

FOR MODELS

T5XX-SRX

SPRING RETURN SERIES

PNEUMATIC ACTUATORS

PART NUMBER: 074897

REVISION: "A"

RELEASE DATE: April, 1993

REPLACES: SERVICE-003 (Dated 10-88)

1.0 INTRODUCTION

1.1 This service procedure is offered as a guide to enable general maintenance to be performed on GH-Bettis T5XX-SRX "Scotch-Yoke" type pneumatic series actuators. When the actuator model number has "-S" as a suffix then the actuator is special and may have some differences that are not included in this procedure.

1.2 SAFETY STATEMENT: Products supplied by GH-Bettis, in its "as shipped" condition, are intrinsically safe if the instructions contained within this Service Instruction are strictly adhered to and executed by a well trained, equipped, prepared and competent technician.

WARNING: FOR THE PROTECTION OF PERSONNEL WORKING ON GH-BETTIS ACTUATORS, THIS PROCEDURE SHOULD BE REVIEWED AND IMPLEMENTED FOR SAFE DISASSEMBLY AND REASSEMBLY. CLOSE ATTENTION SHOULD BE NOTED TO THE WARNINGS, CAUTIONS AND NOTES CONTAINED IN THIS PROCEDURE.

1.3 **DEFINITIONS:**

WARNING: If not observed, user incurs a high risk of severe damage to actuator and/or fatal injury to personnel.

CAUTION: If not observed, user may incur damage to actuator and/or injury to personnel.

NOTE: Advisory and information comments provided to assist maintenance personnel to carry out maintenance procedures.

1.4 **BASIC SERVICE INFORMATION: COMPLETE ACTUATOR REFURBISHMENT REQUIRES THE ACTUATOR BE DISMOUNTED FROM THE VALVE OR DEVICE IT IS OPERATING.**

1.5 The maximum recommended service interval for this actuator series is five years. Storage time is counted as part of the service interval.

1.6 This procedure is applicable with the understanding that all electrical power and pneumatic pressure has been removed from the actuator. Also, it is understood that the actuator has been removed from the valve as well as all piping and accessories that are mounted on the actuator have been removed.

2.0 SUPPORT ITEMS AND TOOLS

2.1 Support Items - Service Kit, razor sharp cutting instrument, two each 1-8 UNC hex nuts, commercial leak testing solution, and non-hardening thread sealant.

2.2 Tools - All tools are American Standard inch. Two each medium standard screwdriver, small standard screwdriver with corners rounded, putty knife, rubber or leather mallet and a torque wrench (up to 5,000 in.lbs.). For recommended tool list refer to Chart number 2 on page 11.

3.0 REFERENCE GH BETTIS MATERIALS

3.1 Assembly Drawing 036846 for T5XX-SR (CW) actuator failing closed

3.2 Assembly Drawing 048026 for T5XX-SR (CCW) actuator failing open

3.3 Exploded Detail Drawing Part Number 063415. (Supplied in GH Bettis Service/Seal Kit)

4.0 GENERAL DETAILS

4.1 This procedure should only be implemented by a technically competent technician who should take care to observe good workmanship practices.

4.2 Numbers in parenthesis, ( ), indicate the bubble number (reference number) used on the GH Bettis Assembly Drawing, Exploded Detail Drawing, and actuator parts list.

4.3 This procedure is written using the stop screw side of the housing (1-10) as a reference and this side will be considered the front side of the actuator and the housing cover as the top of the actuator.

4.4 Mating parts should be marked for ease of reassembly, i.e. spring cartridge to housing and cylinder to housing.

4.5 When removing seals from seal groove, use a commercial seal removing tool or use a small standard screwdriver with the sharp edges rounded off.

4.6 Use a non-hardening thread sealant on all pipe threads. **CAUTION: Apply the thread sealant per the manufacture's instructions.**

4.7 Disassembly should be done in a clean area on a work bench.

4.8 Refer to Chart number 1 for actuator weights. **NOTE: Some components of this actuator are very heavy and will require a means of assistance.**

4.9 LUBRICATION REQUIREMENTS

4.9.1 Standard and high temperature service (-20°F to 350°F) use ESL-5 (Kronaplate 100). ESL-5 is contained in the GH-Bettis Service/Seal Kit.

4.9.2 Low temperature service (-50°F to 150°F) use Kronaplate 50. Kronaplate 50 is not contained in the Low Temperature Service/Seal Kit.

4.10 Before starting the general disassembly of the actuator, it is a good practice to operate the actuator with the nominal operating pressure (NOP), as listed on the actuator name tag. Notate and record any abnormal symptoms such as jerky or erratic operation. Also note if the actuators spring rotates back to the full fail position. **NOTE: Pressure is not to exceed the maximum operating pressure rating listed on the name tag.**

5.0 GENERAL DISASSEMBLY

5.1 If not already removed disconnect all operating pressure from actuator power cylinder (2-10), allowing the spring to stroke. The spring will rotate the yoke to the fail position.

5.2 Mark the stop screws (1-60) left and right. The setting of the stop screws (1-60) should be checked and setting recorded before stop screws are loosened or removed.

5.3 Remove socket cap screws (1-180) from position indicator (1-170)/yoke weather cover (3-130) and remove position indicator/yoke weather cover.

6.0 SPRING CARTRIDGE REMOVAL

WARNING: Under no circumstances should the spring cartridge be cut open as the spring is pre-loaded with the end caps and cylinder welded around the loaded spring.

CAUTION: Due to the weight and size of the spring cartridge, support equipment will be required when removing the spring cartridge from the actuator housing.

6.1 When the spring cartridge is installed on the actuator the spring is under compression. **DO NOT** remove the spring cartridge until the actuator has the "pre-load" removed.

6.2 Remove spring cartridge "pre-load" as follows: Apply sufficient operating pressure to the pressure inlet port, located in the cylinder end cap (2-30), to move the actuator yoke off of the stop screw (1-60). Locate the stop screw (1-60) that is on the opposite side of the housing from the spring cartridge (4-10). Loosen jam nut (1-120). Unscrew the stop screw (1-60) until it runs into the inner end cap (2-40). Remove the pressure from the pressure inlet port.

6.3 Remove the hex nuts (10-200) from the back side of the spring brace (10-240). The remaining hex nuts (10-200) may be left on the brace rods (4-80). The brace rods (4-80) will not be removed from the spring cartridge (4-10).

6.4 Remove socket cap screw (4-60), lockwasher (4-50), and nut retainer (4-40) between large hex nut on outboard end of the spring cartridge (4-10).

6.5 Alternately loosen the two large hex nuts on the outboard end of the spring cartridge (4-10). These nuts are welded to the tie bars that extend through the spring cartridge and screw into the spacer (10-250). Unscrew the tie bars until the spring cartridge is free from the spacer. Care should be taken so that the tie bars are not pulled back into the spring cartridge. **NOTE: To keep from inadvertently pulling the tie bars back into the spring cartridge use two each one inch -8 UNC hex nuts and thread them on to the spring cartridge tie bars.** Place the spring cartridge (4-10) to one side.

6.6 The removal of ferry cap screws (10-220) and spacer plate (10-250) is not required to service actuator.

7.0 PRESSURE CYLINDER DISASSEMBLY

7.1 Remove breather (4-30) from inner end cap (2-40).

7.2 Remove socket cap screw (2-120), washer (2-110) and nut retainer (2-100) from the end of the outer end cap (2-30).

7.3 Remove hex nuts (2-90) from tie bars (2-60).

7.4 Remove outer end cap (2-30). The fit between the cylinder (2-10) and the outer end cap is very tight. **NOTE: Break the outer end cap free by tapping with a breaker bar on the lip provided on the end cap. CAUTION: Do not damage o-ring groove on end cap.**

7.5 Pry inner end cap (2-40) away from the housing (1-10). **NOTE: Break the inner end cap free from the cylinder (2-10) by tapping with a breaker bar on the lip provided on the end cap. CAUTION: Do not damage o-ring groove on end cap.**

7.6 Remove the cylinder (2-10). When sliding the cylinder off of the piston, tilt the cylinder 15° to 30° degrees to the piston rod.

7.7 Unscrew the tie bars (2-60) from the housing (1-10). **NOTE: Flats are provided on the outboard end of the tie bars for wrench placement.** Remove the tie bars (2-60) by pulling them out of the piston (2-20). **CAUTION: Do not use a pipe wrench on the tie bars as it will mark the bar and cause seal leakage.**

7.8 Remove the split ring retainer (2-80) and the split ring (2-70) from the outboard side of the piston (2-20). **NOTE: Keep the split rings in matched sets.** Early model actuators used a piston that is retained on the piston rod with a nut instead of the current split rings (Refer to information notes step 15.1).

7.9 Remove the piston (2-20) from the piston rod (2-170). The piston will slide off of the piston rod. Refer to step 7.13 for 24" piston tie bar bushing (2-180) disassembly.

7.10 Remove the piston rod o-ring seal (3-40) from the piston rod (2-170).

7.11 Remove the split ring retainer (2-80) and the split ring (2-70) from the inboard side of the piston. **CAUTION: Keep the split rings in matched sets.**

7.12 Slide the inner end cap (2-40) off the piston rod (2-170).

7.13 Fabricated 24" piston disassembly (refer to assembly drawing detail "A").

7.13.1 Remove the retaining rings (2-190) from the piston.

7.13.2 Remove the piston tie bar bushings (2-180) from the piston. The piston tie bar bushings should be replaced each time the actuator is refurbished (refer to section 1 for recommend service interval). **NOTE: The GH-Bettis Service/Seal Kit should contain new piston tie bar bushings.**

8.0 HOUSING GROUP DISASSEMBLY

8.1 Unscrew and remove the snubber valve (1-190) from the housing cover (1-20).

8.2 Unscrew push rod (4-20) from yoke pin nut (1-30) and remove from housing.

8.3 Unscrew piston rod (2-170) from yoke pin nut (1-30) and remove. Flats are provided on the outboard end of the piston rod for wrench placement. **NOTE: Removal of piston rod may require extra amount of torque for break out due to the use of Loctite - 242 during assembly. CAUTION: DO NOT use a pipe wrench on the piston rod as it will mark the rod and cause seal leakage.**

8.4 Remove rod bushing (2-50) from the housing or the piston rod.

8.5 Remove four cover/spring brace hex cap screws (10-210) and gasket seals (3-100).

8.6 Remove cover hex cap screws (1-90) and gasket seals (3-100).

8.7 Remove the housing cover (1-20). Spring brace (10-240) will come off with cover as cover pins (10-230) fit securely. **NOTE: The cover will have a very tight fit. It is not necessary to remove cover pins (10-230)/(1-130) or separate housing from spring brace (10-240).**

8.8 Remove the top two yoke rollers (1-50) and roller spacer (1-110) from the top of the yoke pin (1-40). **NOTE: Early model actuators did not use roller spacers(refer to information notes step 15.2).**

8.9 Remove the yoke pin (1-40).

8.10 Remove the yoke pin nut (1-30).

8.11 Remove the lower two yoke rollers (1-50) and roller spacers (1-110) from the bottom of the yoke and housing.

8.12 The yoke (1-160) can now be removed by lifting it from the housing.

8.13 Remove the stop screws (1-60), stop nuts (1-120), and gaskets (3-110).

8.14 It is not necessary to remove the pipe plug (1-80), ferry cap screws (10-220), or spacer plate (10-250), to service the actuator.

9.0 GENERAL RE-ASSEMBLY

9.1 Remove and discard all old seals and gaskets, taking care not to scratch or damage seal grooves.

9.2 All parts should be cleaned to remove all dirt and other foreign material prior to inspection.

9.3 Before starting the assembly of an actuator, all parts should be thoroughly cleaned, inspected and de-burred. Particular attention should be directed to threads, sealing surfaces and areas that will be subjected to sliding motion. Sealing surfaces must be free of deep scratches, pitting, corrosion and blistering or flaking coating.

9.4 Before installation coat all moving parts with lubricant. Coat all seals with lubricant, before installing into seal grooves.

9.5 T-seal set installation - The T-seal is composed of one rubber seal and two split skive-cut back-up rings.

9.5.1 Install the T-seal into the seal groove.

9.5.2 Install a back-up ring on each side of the T-seal.

9.5.3 When installing the back-up rings, do not align the skive-cuts.

9.5.4 If the back-up rings are too long and the rings overlap beyond the skive-cuts, then the rings must be trimmed with a razor sharp instrument.

10.0 CENTER HOUSING GROUP RE-ASSEMBLY

10.1 If removed install drain plug (1-80) in actuator housing (1-10).

10.2 If removed, install grease fitting (1-70) in the actuator housing (1-10) and cover (1-20). The fitting in the housing is located on the bottom of the housing, next to the lower yoke bearing area. The fitting in the cover is located on top of the cover in the upper yoke bearing area. **NOTE:** Grease fittings are optional as of March, 1983.

10.3 Coat one of the yoke o-ring seal (3-50) with lubricant and install into the housing (1-10).

10.4 Inside the housing (1-10) apply lubricant to the tracks and yoke bore and arrange the housing with the yoke bore nearest you.

10.5 Apply lubricant to the slots in the upper/lower yoke arms and the lower bearing surface.

10.6 Install the yoke (1-160) into the housing (1-10) as follows: Arrange the yoke arms to approximately a 45° degree position in either direction and lower into the housing. **NOTE: The hub with tapped holes faces up.** Rotate the yoke back to approximately the mid-stroke (center) position.

10.7 Apply lubricant to all surfaces of two of the yoke rollers (1-50) and two roller spacers (1-110). Place one yoke roller in the track in the bottom of the housing and position it under the slot in the yoke arms. Place a roller spacer (1-110) on top of the bottom yoke roller (1-50). Place a second yoke roller on top of the roller spacer in the slot in the lower yoke arm. Place another roller spacer (1-110) on to of the second yoke roller (1-50) and align the holes in the roller spacer and the yoke rollers. For actuators manufactured before 1978 refer to information note step 15.2.

10.8 Coat the upper and lower surfaces of the yoke pin nut (1-30) with lubricant and insert into position between the yoke arms, parallel to the track in the housing. Align the yoke pin hole with the yoke rollers (1-50) and roller spacers (1-110).

10.9 Lubricate the yoke pin (1-40) and insert through the yoke pin nut (1-30), the two yoke rollers (1-50) and the two roller spacers (1-110).

10.10 Apply lubricant to all the surfaces of the two remaining yoke rollers (1-50) and two remaining roller spacers (1-110). Place one roller spacer on top of the yoke pin nut (1-30) then install the third yoke roller (1-50). Place the last roller spacer on top of the third yoke roller (1-50). Place the fourth and final yoke roller on to the yoke pin. The top roller will remain above the yoke arm and will engage the cover track when the cover is installed.

10.11 Lubricate the piston rod (2-170) and slide into the right side of the housing for fail close (CW) actuators or into the left side of the housing for fail open (CCW) actuators. Screw the piston rod into the yoke pin nut (1-30). **(DO NOT TIGHTEN)** Flats are provided on the outboard end of the piston rod. These flats should be used to put a wrench on to tighten the piston rod. **CAUTION: DO NOT use a pipe wrench on the piston rod, as it will cause seal leakage. NOTE: For actuators with stroke (operating) times faster than one second GH-Bettis recommends that Loctite - 242 be applied to the external threads on the piston rod (2-170).**

10.12 Apply lubricant to the rod bushing (2-50), install it over the piston rod and slide it up into the housing.

10.13 Lubricate the push rod (4-20) and slide into the other side of the housing and screw into the yoke pin nut (1-30).

10.14 Place seal gaskets (3-110) and jam nuts (1-120) on the stop screws (1-60). Install both assemblies into the housing.

10.15 Place the housing cover gasket (3-20) on the housing (1-10).

10.16 Coat the remaining yoke o-ring seal (3-50) with lubricant and install into the housing cover (1-20).

10.17 Apply lubricant to the yoke bore and the track in the housing cover (1-20).

10.18 Apply lubricant to the yoke upper bearing surface.

10.19 Install the housing cover (1-20) and spring brace (10-240) being careful not to damage the gasket (3-20) or yoke o-ring seal (3-50).

10.20 Install the cover screws (1-90) and seal gasket (3-100). **LEAVE FINGER TIGHT - DO NOT TIGHTEN**.

10.21 Do this step only if you have pulled the cover pins (1-130) or if you are replacing the cover pins. Drive the two pins (1-130) thru the cover (1-20) and into the housing (1-10) until the pin is flush with the cover. **NOTE: The pins are deeply grooved at one end, tapering to a smooth diameter at the other end. The pin should be installed smooth end first.**

10.22 Do this step only if you have pulled the spring brace/cover pins (10-230) and separated the cover and spring brace. Place the spring brace (10-240) into position and drive the two (2) pins (10-230) thru the brace and cover, into the housing.

10.23 Install brace cover screws (10-210) and seal gaskets (3-100). Tighten the cover screws (1-90) and torque to 16 foot pounds ±5 % percent.

10.24 Tighten the piston rod (2-170) to a torque of approximately 150 foot pounds ±5 per cent. Flats are provided on the outer end for wrenching purposes. **CAUTION: DO NOT USE A PIPE WRENCH OR SIMILAR TOOL TO TIGHTEN PISTON ROD.**

10.25 Tighten the push rod (4-20) securely with a strap wrench.

10.26 Rotate the yoke to a position that will leave a minimum of the piston rod (2-170) protruding from the actuator housing.

11.0 PRESSURE CYLINDER RE-ASSEMBLY

11.1 Coat the rod seal (3-70) with lubricant and install, lip first, into the recess provided in the inner end cap ((2-40). **CAUTION: Install with energizer ring facing outboard side (away from housing).**

11.2 Install one end cap gasket (3-10) over the piston rod (2-170) and rod bushing (2-50).

11.3 Coat two tie bar o-ring seals (3-30) with lubricant and install into the inner end cap (2-40). Refer to information note step 15.3.

11.4 Slide the inner end cap (2-40) over the piston rod (2-170) and the rod bushing (2-50), protruding from the housing. Install with the large raised boss toward the housing (flat side outward). **NOTE: The pressure inlet port should be toward the top of the actuator.**

11.5 Apply lubricant to the end cap o-ring seal (3-60) and install on the inner end cap (2-40).

11.6 Apply lubricant to two sets of piston tie bar T-seal components (3-80) and install into the piston internal seal groove. Refer to step 9.5 for proper installation instructions. Refer to the next step for 24" piston bushing (2-180) reassembly.

11.7 Fabricated 24” piston reassembly (refer to assembly drawing detail "A").

11.7.1 Install the o-ring seals (3-140) into the O.D. groove on piston tie bar bushings (2-180).

11.7.2 Install the rod T-seals (3-80) into the I.D. groove in the piston tie bar bushings (2-180).

11.7.3 Install the piston tie bar bushings (2-180) into the piston.

11.7.4 Install the retaining rings (2-190) into the piston.

11.8 Coat the ends of the piston rod (2-170) with lubricant.

11.9 Apply lubricant to the piston o-ring (3-40) and place onto the piston rod (2-170).

11.10 Install a matched set of split rings (2-70) into the inner most groove in the piston rod and retain with one of the split ring retainers (2-80), retaining ring groove away from piston. **NOTE:** Disregard this step and step 11.12 if the actuator is an early nutted piston model and use the supplied nut to retain the piston on the piston rod.

11.11 Slide the piston (2-20) onto the piston rod against the split ring (2-70). When installing cast pistons install with ribbed section of piston facing away from housing. **CAUTION: When installing 24" inch diameter, or larger, pistons make certain that the smaller diameter plate faces the outer end cap (2-30).**

11.12 Install a matched set of split rings (2-70) into the inner most groove in the piston rod and retain with one of the split ring retainers (2-80), retaining ring groove away from piston.

11.13 Coat the piston T seal components (3-90) with lubricant and install into the piston external seal groove. Refer to section 9 for proper "T" seal installation.

11.14 Apply lubricant to the threads and end of the tie bars (2-60), (end without wrench flat), and install by carefully inserting the tie bars through the piston (2-20) and then through the inner end cap (2-40) and screwing into the housing (1-10). Lubricate all exposed surfaces of piston rod and tie bars. **CAUTION: Tighten the tie bars until the threads bottom out, then back out each tie bar one half-turn.**

11.15 Apply a light coat of lubricant to the bore of the cylinder (2-10).

11.16 Slide the lubricated cylinder (2-10) over the piston (2-20) and onto the inner end cap (2-40). When sliding the cylinder over the piston seal tilt the cylinder 15° to 30° degrees to the piston rod.

CAUTION: Hammer on the end of the cylinder only with a non metallic object.

CAUTION: Make certain the back-up rings (components of the piston seal) are seated into the seal groove. Should the back-up rings or seal member be pinched between the piston and cylinder, the component could be damaged, becoming a potential source of leakage.

11.17 Apply lubricant to two end cap tie bars o-ring seals (3-30) and install into the outer end cap (2-30). Refer to information note step 15.3.

11.18 Apply lubricant to the outer end cap cylinder o-ring seal (3-60) and install onto the outer end cap (2-30).

11.19 Install the outer end cap (2-30) onto the tie bars and into the end of the cylinder (2-10). **NOTE: The pressure inlet port should be toward the top of the actuator.**

11.20 Install the two tie bar hex nuts (2-90) on the tie bars (2-60), using them to draw all of the cylinder components into position. Torque alternately, in 50 ft.lb. increments until a final torque of 90 ±9 foot pounds has been achieved. **CAUTION: While the tie bar nuts are being tightened, do not allow the tie bars to turn.**

11.21 Install the nut retainer (2-100), securing in place with the retainer screw (2-120) and lockwasher (2-110). It is necessary that the flats on the hex nuts (2-90) be aligned and parallel before the nut retainer can be installed.

11.22 Apply ten psig pneumatic pressure to the breather port in the inner end cap (2-40) and stroke the actuator. Remove the air pressure from the breather port.

12.0 SPRING CARTRIDGE INSTALLATION

12.1 If removed, install end cap gasket (3-10), spacer (10-250), ferry cap screws (10-220) and tighten screws.

12.2 Remove the safety nuts, installed at step 6.5, from the spring cartridge tie bars.

12.3 Install the gasket (4-70) onto the spring cartridge (4-10).

12.4 Place the spring cartridge (4-10) on to the push rod (4-20) and align the spring cartridge tie bars with the holes in the spacer (10-250). Also align the brace rods (4-80) with holes in the spring brace (10-240).

12.5 Screw the tie bars into the spacer (10-250). Alternately tighten tie bar nuts in 50 foot pounds increments until the spring cartridge is firmly against the spacer and torque to 90 ±9 foot pounds.

12.6 Install nut retainer (4-40), lockwasher (4-50), and socket cap screw (4-60). **NOTE: It is necessary that the flats on the hex nuts be aligned and parallel before the nut retainer can be installed.**

12.7 Install the hex nuts (10-200) onto the brace rods (4-80) and tighten.

12.8 POSITION INDICATOR ORIENTATION

12.8.1 For spring to close actuators (clockwise) rotate the yoke to the full clockwise (CW) position (as shown on the clockwise assembly drawings) position the yoke weather cover (3-130)/position indicator (1-170) on the yoke with the pointer facing the front and perpendicular with the piston rod (2-170), secure with the socket head cap screws (1-180).

12.8.2 For spring to open actuators (counterclockwise), rotate the yoke to the full counterclockwise (CCW) position (as shown on the counterclockwise assembly drawings), position the yoke weather cover (3-130)/position indicator (1-170) on the yoke with the pointer facing the right and parallel with the piston rod (2-170), secure with the socket head cap screws (1-180).

13.0 ACTUATOR TESTING

13.1 All areas, where leakage to atmosphere may occur, are to be checked using a commercial leak testing solution.

13.2 All leak testing will use the nominal operating pressure (NOP) as listed on the actuator name tag.

13.3 If excessive leakage across the piston is noted (generally a bubble which breaks three seconds or less after starting to form), the actuator must be disassembled and the cause of leakage must be determined and corrected.

13.4 Before testing for leaks, alternately apply and release NOP pressure to the pressure side of the piston to stroke the actuator fully. Repeat this cycle approximately five times. This will allow the new seals to seek their service condition.

13.5 Apply NOP pressure to the pressure port in the outer end cap (2-30).

13.6 Apply a leak testing solution to the following areas:

13.6.1 Joint between the outer end cap (2-30) and the cylinder (2-10). Checks cylinder to end cap o-ring seals.

13.6.2 Around the tie bar nuts (2-90) on the outer end cap (2-30). Checks tie bars to end cap o-ring seals.

13.6.3 The breather port hole in the inner end cap (2-40). Checks piston to cylinder, piston to tie bar, and piston to piston rod seals.

13.6.4 Remove pressure from pressure inlet port in the outer end cap.

13.7 If an actuator was disassembled and repaired, the above leakage test must be performed again.

14.0 RETURN TO SERVICE

14.1 Install breather (4-30) in the inner end cap (2-40).

14.2 Replace the software components of the snubber (1-90) and then install the snubber in the housing cover port.

14.3 Adjust both stop screws (1-60) back to settings recorded in section 5 under General Disassembly.

14.4 Tighten both stop nuts (1-120) securely, while holding stop screw (1-60).

14.5 After the actuator is installed on the valve all accessories should be hooked up and tested for proper operations and replaced, if found defective.

15.0 INFORMATION NOTES

15.1 Actuators manufactured before 1973 will have a hex lock nut retaining the piston on the piston rod. This hex lock nut is used in place of the split rings and split ring retainers. Actuators of this age will use a Service/Seal Kit that has the term "Pre A" in the description after the actuator model number, i.e. SERV K.T516/SR*PRE A*.

15.2 Actuators manufactured before 1978 did not use the roller spacers (1-110). When replacing the rollers on pre 1978 actuators order a complete set of both rollers and roller spacers.

15.3 On outer and inner end caps some tie bar o-rings are held in place by "staked" washers. Check all end caps to ensure washers are secured. If needed re-stake washers.

CHART NO. 1 - ACTUATOR WEIGHTS

ACTUATOR MODEL	APPROXIMATE WEIGHT (POUNDS)** SR1	SR2	SR3	SR4
T510-SRX	1277	1040	878	889
T512-SRX	1306	1079	917	928
T516-SRX	1382	1155	993	1004
T520-SRX	1497	1270	1108	1119
T524-SRX	1792	1525	1403	1414

** Weights listed for each model are for bare actuators without valve mounting and accessories.

CHART NO. 2 - TOOL STYLE AND WRENCH SIZES

ITEM NO.	WRENCH SIZE	QTY	LOCATION	RECOMMENDED WRENCH STYLE
1-60	15/16"	2	Stop Screw	Open end or adjustable
1-90	9/16"	10	Cover Screws	Socket
1-120	1-7/8"	2	Stop Screw nut	Box end (1)
1-180	3/16"	4	Weather cover screws	Allen
1-190	7/8"	1	Snubber	Deep socket
2-60	5/8"	2	Tie bars flats	Open end or adjustable
2-90	1-5/8"	2	Tie bar nuts	Crows foot (1)
None	1-5/8"	2	SR Tie bar nut	Deep socket (2)
2-120	3/16"	1	Nut retainer screw	Allen
2-170	1-3/8"	1	Piston rod flat	Crows foot (1)
4-20	(1)	1	Push rod	Strap wrench
4-60	3/16"	1	Nut retainer screw	Allen
10-200	1-5/8"	8	Nuts for SR brace rods	Open end
10-210	9/16"	4	Cover/Brace screws	Socket

(1) No alternate style recommended or wrench placement not provided.

(2) Some actuators used heavy hex nuts in this location - wrench size will change to 1-7/16".

ECN	DATE	REV		BY *	DATE
Released	04-23-93	A	COMPILED	Bill Cornelius	04-23-93
			CHECKED	Bobby Jumawan	04-23-93
			APPROVED	Robert McEver	04-23-93

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