

BETTIS
OPERATING & MAINTENANCE INSTRUCTIONS
FIELD CONVERSION
T-5XX
TO
T-5XX-S
DOUBLE ACTING ACTUATOR

**-S INDICATES LIMIT STOP TO LIMIT OPENING
STROKE TO LESS THAN 10% PERCENT**

PART NUMBER: 068040

DATE: MAY, 1986

ECN	DATE	REV LTR	By *	Date
8782	6 May 1986	A	BC	8 May 1986
			Checked	
			Approved	8 May 1986

1.0 INTRODUCTION

This conversion procedure is offered as a guide to field convert a model T-5XX-Series double acting actuator to a T-5XX-S actuator with travel stop to limit opening travel.

2.0 BASIC TOOLS

All tools are American standard inch. Two large standard screwdrivers. One each of the following: 24 oz. ball peen hammer, 18 inch adjustable wrench, 3/16 inch Allen wrench, 3/4 inch Allen wrench, 9/16 inch open or box end wrench, 1-3/4 inch crowfoot, 3/4 inch hex head driver, 9/16 inch socket, ratchet of same drive size as socket/hex head driver required above, and torque wrench (up to 300 foot pounds).

3.0 REFERENCE MATERIALS

- 3.1 T-5XX assembly drawing part number 036523
- 3.2 T-5XX-S assembly drawing part number 068131
- 3.3 Schematic SK-2369
- 3.4 General Operating & Maintenance Instructions part number 074650.

4.0 CONVERSION PARTS INFORMATION

The following item reference numbers included in this procedure are new parts included in the field conversion kit, reference assembly drawing part number 068131.

ITEM NO.	DESCRIPTION	QTY./ASSY.
1	End Cap Gasket	1
2	O-Ring Seal	1
3	Cover Gasket	1
4	Seal Gasket	12
5	Yoke Weather Cover	1
6-10	Blind End Cap - Special	1
6-20	One Inch Hex Head Screw	2
6-30	Gasket Seal	2
6-40	Special Yoke Nut Screw	1
6-50	Stop Screw - Special	1
6-60	Jam Nut-Special	1
6-70	Spiral Pin	1
6-80	Spiral Pin	1

5.0 **GENERAL DISASSEMBLY**

Numbers in parenthesis, () indicate the bubble number (reference number) used on the Bettis Assembly Drawing and actuator Parts Lists.

- 5.1 For disassembly of actuator use assembly drawing part number 036523.
- 5.2 Put air pressure to the port(s) in the inner end cap (2-40) and close valve or rotate actuator clockwise.
- 5.3 Turn off air or power gas and depressurize power cylinder (2-10). Disable actuator so that the power gas or the dynamic pressure on the valve cannot actuate the actuator while maintenance is being performed.
- 5.4 Remove any accessories mounted on the cover (1-20) of the actuator.
- 5.5 Mark the setting or position of the position indicator (1-170) on the housing cover (1-20).

6.0 **HOUSING GROUP DISASSEMBLY**

- 6.1 Remove four socket cap screws (1-180) from position indicator (1-170)/yoke weather cover (3-130) and remove position indicator and yoke weather cover.
- 6.2 Remove eight cover screws (1-90) and four cover screws (10-90) with gasket seals (3-100).
- 6.3 Remove the housing cover (1-20).

NOTE: Because the housing cover (1-20) has two pins(10-130) on each end that is driven through the housing cover into the housing (1-10) the cover will have a very tight fit. It is not necessary to remove cover pins (10-130) from housing cover (1-20).

- 6.4 Unscrew and remove socket head screw (6-90), lockwasher (6-80), and retainer (6-70).
- 6.5 Unscrew and remove hex head cap screws (6-20), gasket seal (6-30), and remove blind end cap (6-10).
- 6.6 The following items removed in this section will not be reused in reassembly:

ITEM NO.	DESCRIPTION	QTY./ASSY.
3-100	Seal Gasket	12
6-10	Blind End Cap	1
6-20	Hex Head Cap Screw	2
6-30	Seal Gasket	2
6-70	Nut Retainer	1
6-80	Lockwasher	1
6-90	Socket head Screw	1

7.0 **LUBRICATION REQUIREMENTS**

7.1 Standard and high temperature (-20°F to 200°F) use Kronaplate 100 grease (1-150).

7.1.1 For availability of Kronaplate 100 in your area call 800-428-7802.

8.0 **LIMIT STOP PREASSEMBLY**

8.1 Thread jam nut (6-60) onto stop screw (6-50).

8.2 Thread new blind end cap (6-10) onto stop screw (6-50).

8.3 Install washer (6-80) and spiral pin (6-70), as shown on assembly drawing, on stop screw (6-50). The pin should be centered on the end of the stop screw.

8.4 Turn the stop screw (6-50) counterclockwise until the washer (6-80) comes into contact with the blind end cap (6-10).

9.0 **REASSEMBLY**

9.1 For reassembly of actuator use assembly drawing part number 068131.

9.2 Before starting the assembly, all old gaskets and seals should be removed. All parts should be thoroughly inspected, cleaned, and deburred.

9.3 Apply Loctite number 271 or 277 per manufacturers instructions to yoke nut screw (6-40) and install into yoke pin nut (1-30).

9.3.1 Torque yoke nut screw (6-40) to 300 foot pounds.

9.4 Install preassembled limit stop into actuator housing (1-10) using new end cap gasket (1), socket cap screws (6-20), and gasket seals (6-30).

9.5 Coat new yoke o-ring seal (2) with grease, upper yoke seal only, and install in cover (1-20).

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

9.7 Apply grease to the yoke (1-160) upper bearing surface.

9.8 Apply a thin coating of grease to a new housing cover gasket (3) surface.

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

9.10 Install the housing cover (1-20), being careful not to damage the gasket (3) or yoke o-ring seal (2).

9.11 Install the cover screws (1-90), (10-90) and seal gaskets (4). **LEAVE FINGER TIGHT - DO NOT TIGHTEN.**

- 9.12 Do this step ~~only~~ if you have pulled the cover pins (1-130) or if you are replacing the cover pins. Drive the four pins (1-130) through 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.

- 9.13 Tighten the cover screws (1-90) and (10-90); torque to 12 foot pounds.
- 9.14 Place the position indicator (1-170) and new yoke weather cover (5) onto the yoke in the setting or position as marked in step 5.5 and secure with socket head cap screws (1-180).

10.0 **LIMIT STOP SETTING**

- 10.1 Install Pneumatic Test Assembly, per schematic SK-2369, to air inlet ports in cylinder (2-10). Set the regulator to the nominal operating pressure as marked on the actuator nametag or the normal plant operating pressure as long as it does not exceed 140 PSIG pressure.
- 10.2 Using Pneumatic Test Assembly, apply power gas to inner end cap (2-40) port(s) and make sure the actuator is rotated to the full closed position or fully clockwise.
- 10.3 Mark closed position on actuator housing (1-10) and yoke position indicator (1-170).
- 10.4 Using a protractor, or any type of degree indicating device, attach it to the yoke position indicator (1-170) and line zero degree mark with closed mark.
- 10.5 On the Pneumatic Test Assembly, move valve number 1 to the "exhaust" position and move valve number 2 to the power gas "on" position. The actuator should now move to the full counterclockwise or open position.
- 10.6 Take the reading of the protractor or measuring device used. You now should have the total degrees of rotation for the actuator and valve.
- 10.7 Take the percentage of desired degree of open travel (T) times the total degrees of travel (TT) with the results equaling the desired degrees of open travel (TD). FORMULA $T \times TT = TD$.
- 10.8 On the Pneumatic Test Assembly, move valve number 2 to the "exhaust" position and move valve number 1 to the power gas "on" position. The actuator should now move to the full clockwise or close position.
- 10.9 Using the protractor or the measuring device utilized in step 10.4, mark the desired degree of open travel on the actuator housing next to the position indicator (1-170).
- 10.10 Move valve number 1 to the "exhaust" position.

- 10.11 Slowly open valve number 2 and allow the actuator to open. When the yoke position indicator pointer is aligned with the specified degree mark on the housing, close valve number 2. It may be necessary to fine adjust the actuator to this position by alternately opening, exhausting, and closing valves number 1 and 2.
- 10.12 Once the actuator is adjusted to the specified degree setting, adjust stop screw (6-50) by rotating clockwise until the stop contacts the yoke screw nut (6-40). Tighten the jam nut (6-60) down against blind end cap (6-10).
- 10.13 Move valve number 2 to the "exhaust" position and move valve number 1 to the power gas "on" position. The actuator should now move to the full clockwise position or close position.
- 10.14 Move valve number 1 to the "exhaust" position and move valve number 2 to the power gas "on" position. The actuator should now move to the travel stop position.
- 10.15 Check to see if the specified degree of open travel is achieved.
- 10.16 If actuator is not adjusted to the specified percent of opening, then repeat steps 10.10 through 10.15 until the specified setting is achieved.

11.0 **RETURN TO SERVICE**

- 11.1 Re-install any piping and accessories that may have been removed.
- 11.2 The method used in step 5.3 to disable the actuator must now be reversed.
- 11.3 The actuator is now ready to be returned to service.

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