

GH BETTIS

SERVICE INSTRUCTIONS

DISASSEMBLY AND REASSEMBLY

FOR THE FOLLOWING MODELS

RP/RPB 250/251, 450/451,

1000/1001 AND 2250/2251

SERIES PNEUMATIC ACTUATORS

PART NUMBER: 087992

REVISION: "D"

DATE: January, 1993

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.

1.0 INTRODUCTION

- 1.1 This service procedure is a guide for general maintenance to be performed on RP/RPB 250 thru 2250 Series Double Acting and Spring Return actuators.
- 1.2 When the model number has a "-S" as a suffix, then the actuator is special and may have some differences that are not included in this procedure.
- 1.3 **TOOLS REQUIRED:** Set of Metric Allen Wrenches, small flat blade screw driver, medium size adjustable wrench and long nose or conventional pliers.
- 1.4 This procedure is applicable with the understanding that all electrical power and pneumatic pressure has been removed from the actuator, allowing the spring to stroke and rotate the torque shaft to the actuators fail position. 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 GENERAL

- 2.1 This procedure is written using the side of the housing with the inlet and outlet ports as a reference and this side will be considered the front of the actuator. The position indicator will be the top of the actuator.
- 2.2 When removing seals from seal grooves, use a small screwdriver with sharp corners rounded off or a commercial seal removing tool.
- 2.3 Use a non-hardening thread sealant on all pipe threads. **CAUTION: Apply the thread sealant per the manufacture's instructions.**
- 2.4 Disassembly of actuator should be done in a clean area on a work bench.
- 2.5 Measure the exposed length of right and left stop screws and record each before loosening or removal.

3.0 ACTUATOR DISASSEMBLY - END CAPS

- 3.1 **END CAP REMOVAL DOUBLE ACTING ACTUATORS:** Remove the socket head cap screws from the end cap assemblies and remove the left and right end cap assemblies.

- 3.2 **END CAP REMOVAL SPRING RETURN ACTUATORS:**

CAUTION: RP SPRING RETURN END CAPS CONTAIN COMPRESSED SPRINGS. TO AVOID PHYSICAL INJURY, EXERCISE CARE IN HANDLING, DISASSEMBLY AND REASSEMBLY.

- 3.3 Visually inspect the actuators SR End Caps for any sign of unusual damage or physical abuse. If cracks or broken components are noticed, **DO NOT DISASSEMBLE** the actuator. Exercise care in handling and contact a GH-Bettis representative.

- 3.4 Loosen but do not remove the hex nut on the SR end cap stop screw. Turn the stop screw counter clockwise (CCW) compressing the internal springs until spring retainer assembly bottoms out against the stop screw.
- 3.5 Carefully release the spring pre load by alternately loosening the four socket head cap screws that retain each SR end cap onto the actuator housing. All spring pre load should be released when the end cap is 1/8" (.125) away from the housing. **CAUTION: IF THE SPRINGS ARE STILL PUSHING AGAINST THE END CAP AT 1/4" INCH, DO NOT CONTINUE THE DISASSEMBLY PROCEDURE BUT RE-TIGHTEN THE END CAP SOCKET HEAD CAP SCREWS.** Exercise care in handling and contact a GH-Bettis representative.
- 3.6 After the SR end caps are removed from the actuator, clean and carefully inspect the inside of the end caps. **CAUTION: IF THE STOP SCREW IS BENT, EXCESSIVE CORROSION OR CRACKS ARE NOTICED DO NOT CONTINUE THE DISASSEMBLY PROCEDURE.** Exercise care in handling and contact a GH-Bettis representative.
- 3.7 The springs do not need to be removed from the end cap for normal maintenance. If the springs are to be removed or changed, remove the hex nut, washer and o-ring seals from the left and right end cap stop screws. **CAUTION: TAKE CARE THAT THE SPRING AND RETAINER ASSEMBLY IS POINTING AWAY FROM ANY PERSONNEL.** From the outboard side of the end caps, using a extra long allen wrench, carefully unscrew the stop screw clockwise (CW) from the end cap until the springs are disassembled from the end caps.
- 3.8 Remove the socket head cap screw, the indicator and the cap from the torque shaft.
- 3.9 Rotate the torque shaft until the pistons are flush with the housing. Mark the torque shaft and housing for ease and reassembly.
- 3.10 After marking torque shaft and housing, rotate the torque shaft until the pistons are disengaged from the torque shaft. Pull on the piston ribs and remove the piston. Using the front of the housing as a reference, record the location (position) of the right and left piston bearing.
- 3.11 Remove the retaining ring from the bottom of the housing and remove the torque shaft out through the bottom of the housing.

4.0 GENERAL REASSEMBLY

- 4.1 Remove and discard all old seals, retaining rings and bearings.
- 4.2 All parts should be cleaned to remove all dirt and other foreign material prior to inspection.
- 4.3 Inspect the inside walls of the housing for wear and scoring, light wear or tracing, barely detectable to touch is acceptable. Inspect the piston and torque shaft teeth for excessive wear. Inspect the torque shaft and housing for excessive wear in the area that they contact each other.
- 4.4 All seals, bearings, retaining rings and a new thrust washer are contained in the GH-Bettis Service kit.
- 4.5 Coat all seals and parts with GH-Bettis ESL5 lubricant before assembling.

5.0 ACTUATOR REASSEMBLY

- 5.1 Install a retaining ring into the top retaining groove of the torque shaft. Install o-ring seals into the seal grooves on each end of the torque shaft. Install the torque shaft through the housing.

- 5.2 Install the thrust washer on the bottom end of the torque shaft and retain with a retaining ring.
- 5.3 Rotate the torque shaft until the marks that were added in step 3.9 line up.
- 5.4 Install a bearing and a o-ring onto both pistons.
- 5.5 **PISTON INSTALLATION:** For double acting and spring return actuators failing close (clockwise), assemble the piston per step 5.6. For spring return actuators failing open (counter clockwise) use step 5.7.
- 5.6 With the front of the housing facing you install a piston into the left end of the housing. The piston should have the bearing against the back side of the housing cylinder. Install the remaining piston into the right end of the housing. This piston should have the bearing against the front side of the housing cylinder.
- 5.7 With the front of the housing facing you, install a piston into the left end of the housing. The piston should have the bearing against the front side of the housing cylinder. Install the remaining piston into the right end of the housing. This piston should have the bearing against the back side of the housing cylinder.
- 5.8 With the torque shaft in the position indicated in step 5.3, push on the end of both pistons and engage the piston teeth with the torque shaft teeth.
- 5.9 **END CAP INSTALLATION - DOUBLE ACTING ACTUATORS:** Install the stop screws into the end caps. Install o-ring, washer and jam nut onto the stop screws. Continue end cap installation at step 5.11.
- 5.10 **END CAP INSTALLATION - SPRING RETURN ACTUATORS:** Turn the stop screw counter clockwise (CCW) compressing the internal springs until spring retainer assembly bottoms out against the stop screw. Install o-ring, washer and jam nut onto the stop screws.
- 5.11 Install a o-ring into the recess in the end cap where the air passage port hole in the housing mates with the end cap.
- 5.12 Install a o-ring onto the outer diameter of the end caps.
- 5.13 Install the end caps onto the actuator housing, retaining with socket head cap screws and using a flat washer on each screw.
- 5.14 Install the cap and indicator onto the torque shaft and retain with a socket head cap screw.
- 5.15 Adjust both stop screws back to settings recorded in section 2.

<u>ECN</u>	<u>DATE</u>	<u>REV</u>		<u>BY *</u>	<u>DATE</u>
13010	January, 1993	D	COMPILED	BC	29 January 1993
			CHECKED	BS	29 January 1993
			APPROVED	RMM	29 January 1993

* Signatures on file Bettis Actuator & Controls, Waller, Texas