BETTIS

SERVICE INSTRUCTIONS

FIELD CONVERSION OF SPRING

CARTRIDGE FAIL DIRECTION

CLOCKWISE TO COUNTER-CLOCKWISE

OR THE INVERSE FOR MODELS

HD722-SRXX AND HD732-SRXX

PNEUMATIC SPRING RETURN

SERIES ACTUATORS

PART NUMBER: 074989

REVISION: “A”

RELEASE DATE: November, 1998

REPLACES: Service - 093 (dated March, 1992)

1.0 INTRODUCTION

1.2 This service procedure is offered as a guide to convert the failure direction on a Bettis HD722-SRXX, HD722-SRXX-M3, HD722-SRXX-M3HW, HD732-SRXX, HD732-SRXX-M3, and HD732-SRXX-M3HW 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.

1.3 This procedure is written with the understanding that the actuator has been removed from the valve, the air or power gas has been removed from the power cylinders and all piping and accessories mounted on the actuator have been removed.

NOTES:
1. It may not be necessary to remove those accessories that are mounted on the actuator housing.
2. When the actuator remains on the valve the actuator spring pre-load may not be removed. The pre-load will have to be removed by removing the mounting hardware between the actuator and the actuator mounting bracket or by pulling the key between the valve and the actuator yoke.

2.0 SUPPORT ITEMS AND TOOLS

2.1 Support Items - Commercial leak testing solution and non-hardening thread sealant.

2.2 Tools - All tools are American Standard inch. Small standard screwdriver with corners rounded, rubber or leather mallet, 1-1/4" socket for 52X/72X, 1-5/8" socket for 73X and a chain wrench (Bettis recommends a short handle chain wrench with a 40" chain).

3.0 BETTIS REFERENCE MATERIALS

3.1 Assembly Drawing Part Number 036312 fail close (CW).

3.2 Assembly Drawing Part Number 040906 fail open (CCW).

4.0 GENERAL INFORMATION

4.1 Numbers in parentheses, ( ) indicate the bubble number (reference number) used on the Bettis Assembly Drawing and actuator parts lists.

4.2 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 of the actuator and the housing cover as the top of the actuator.

4.3 Refer to the following table for approximate actuator weights.

ACTUATOR MODEL	APPROXIMATE WEIGHT (LBS) **					
	SR40	SR60	SR80	SR100	SR125	SR150
HD722-SR	215	229	235	249	N/A	N/A
HD722-SR-M3	220	234	240	255	N/A	N/A
HD722-SR-M3HW	225	239	245	259	N/A	N/A
HD732-SR	275	291	316	326	352	366
HD732-SR-M3	280	296	321	331	357	371
HD732-SR-M3HW	285	301	326	336	362	376

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

4.4 When removing seals from seal grooves, use a small screwdriver with sharp edges rounded off or a commercial seal removing tool.

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

5.0 GENERAL DISASSEMBLY

5.1 If not already done remove all operating pressure from actuator cylinder (3-10) and spring cylinder (4-10), allowing the spring to stroke. The spring will rotate the yoke to the fail position.

5.2 If an M3 is installed on the actuator power cylinder (3-10), the M3 jackscrew (3-20) should not contact the end of the piston rod (2-10). If the actuator is equipped with handwheel option, remove hex nut (8-30), lockwasher (8-20), and handwheel (8-10).

5.3 Measure the exposed length of right and left stop screws (1-60) and record each before loosening or removing.

5.4 Remove two breathers (4-20). One is located in the end of spring cylinder (4-10) and the other is located in the port of cylinder adapter (2-30). Refer to note number 5 for additional information.

5.5 Remove the socket cap screws (1-120) from position indicator (1-110) yoke weather cover (6-110) and remove position indicator/yoke weather cover.

6.0 CONVERSION PROCEDURE

WARNING: When the spring cylinder is installed on the actuator the spring is under compression. Do not remove the spring cylinder until the actuator has the "pre-load" removed.

6.1 Remove spring cylinder stop screw "pre-load" as follows:

6.1.1 Locate two stop screws (1-60) and loosen jam nuts (1-70).

6.1.2 Unscrew and remove both stop screws (1-60) with jam nuts (1-70) and seal gaskets (6-90).

WARNING: Under no circumstances should the spring cartridge (5) be cut apart, as the spring is pre-loaded and the spring cartridge welded together.

CAUTION: When setting the cylinders aside, care should be taken to protect the chamfered edge and cylinder threads.

WARNING: Due to the weight and the nature of a preloaded assembly, caution should be exercised when handling the spring cartridge (5). The spring cartridge (5) is unattached and is only contained by the spring cylinder (4-10).

6.2 Secure the chain wrench around the spring cylinder (4-10) as close to the welded end cap as possible. Using a mallet, break the cylinder loose and then remove the cylinder by rotating in a counter clockwise direction.

6.3 Secure the chain wrench around the cylinder (3-10) as close to the welded end cap as possible. Using the mallet, break the cylinder loose and then remove the cylinder by rotating in a counter clockwise direction.

6.4 Unscrew and remove both hex lock nuts (2-70) from each end of piston rod (2-10).

6.5 Remove both pistons (2-20). Leave cup seals (6-10) on the pistons (2-20) and install the pistons on the opposite ends of piston rod (2-10) as they where.

6.6 Rotate the actuator so that the piston where the spring cartridge will be installed is pushed in towards the actuator housing as far as it will go. The piston that will not have a spring cartridge (5) installed will be pushed as far away from the end of housing (1-10) as it will go.

NOTE: Piston (2-20) for spring cylinder (4-10) should have at least one cup seal (6-10) and the cup seal will have its cup (open side) facing cylinder adapter (2-30).

CAUTION: When installing the cylinder into the cylinder adapter be careful not to cross the threads.

6.7 Install spring cylinder assembly (4-10), containing spring cartridge (5), over piston (2-20). Rotate the spring cylinder assembly clockwise and screw into cylinder adapter(2-30).

CAUTION: When using the chain wrench on the cylinder it should be secured as close to the end cap as possible.

6.8 Using a chain wrench tighten spring cylinder assembly (4-10) into cylinder adapter (2-30).

NOTE: While the chain wrench is still positioned on the cylinder and after the cylinder is tight, take a mallet and rap (hit) the chain wrench handle a couple of times. This will seat the cylinder assembly into the o-ring seal located in the cylinder adapter. Repeat this step if during testing the area between the cylinder assembly and the cylinder adapter is leaking pressure at an unacceptable rate.

CAUTION: When installing the cylinder into the cylinder adapter be careful not to cross the threads.

CAUTION: Exercise caution during cylinder installation to prevent pinching lip of the u-cup seal during installation. It is necessary to depress the seal lip while working the cylinder over it.

6.9 Install cylinder assembly (3-10) over piston (2-20). Rotate the cylinder assembly clockwise and screw into cylinder adapter(2-30).

CAUTION: When using the chain wrench on the cylinder it should be secured as close to the end cap as possible.

6.10 Using a chain wrench tighten cylinder assembly (3-10) into cylinder adapter (2-30).

NOTE: While the chain wrench is still positioned on the cylinder and after the cylinder is tight, take a mallet and rap (hit) the chain wrench handle a couple of times. This will seat the cylinder assembly into the o-ring seal located in the cylinder adapter. Repeat this step if during testing the area between the cylinder assembly and the cylinder adapter is leaking pressure at an unacceptable rate.

6.11 Install stop screws (1-60), stop screw gasket seals (6-90) and stop screw jam nuts (1-70).

6.12 POSITION INDICATOR INSTALLATION

6.12.1 For spring to close actuators (clockwise), with the yoke rotated to the full clockwise (CW) position. Position yoke weather cover (6-110) and position indicator (1-110) on yoke (1-140) with the pointer pointing to the piston rod and perpendicular to the cylinder assemblies.

6.12.2 For spring to open actuators (counterclockwise), with the yoke rotated to the full counter-clockwise (CCW) position. Position yoke weather cover (6-110) and position indicator (1-110) on the yoke with the pointer to cylinder (3-10) and parallel to piston rod (2-10).

7.0 ACTUATOR TESTING

7.1 All areas, where leakage to atmosphere may occur, are to be checked using a commercial leak testing solution. A small amount of leakage may be tolerated. Generally, a small bubble, which breaks about three seconds after starting to form, is considered acceptable.

CAUTION: Pressure applied to the actuator is not to exceed the maximum operating pressure rating listed on the actuator name tag.

7.2 Unless otherwise listed all leak testing will use the nominal operating pressure (NOP) as listed on the actuator name tag or the pressure used by the customer to operate actuator during normal operation.

CAUTION: Test the actuator using a properly adjusted self relieving regulator, with gauge.

7.3 Before testing for leaks, alternately apply and release pressure, as defined in step 7.2, to the pressure side of both pistons. Allow each application of pressure to stroke the actuator fully. Repeat this cycle approximately five times. This will allow the new seals to seek their service condition.

7.4 Simultaneously apply pressure, as defined in step 7.2, to the pressure port in the end of cylinder (3-10) and to the pressure port in the SR cylinder adapter (2-30).

7.5 Apply leak testing solution to the following areas:

7.5.1 The breather port hole in the cylinder adapter (2-30) and the breather port hole in the end of the SR cylinder (4-10). Checks the piston to cylinder wall and piston to piston rod seals.

7.5.2 The threaded joint between the SR cylinder (4-10) and cylinder adapter (2-30), checks the cylinder to cylinder adapter o-ring seal.

7.5.3 The joint between the cylinder adapter and the housing.

7.6 Remove pressure from the pressure inlet ports.

8.0 RETURN TO SERVICE

8.1 Install one breather (4-20) in the end of the spring cylinder (4-10).

8.2 Install the remaining breather (4-20) into the cylinder adapter (2-30) of cylinder (3-10).

8.3 Adjust both stop screws (1-60) back to settings recorded in step 5.6 under General Disassembly.

8.4 Tighten both jam nuts (1-70) securely, while holding stop screws (1-60).

8.5 Re-install any piping and accessories that were removed.

8.6 For actuators equipped with a M3 jackscrew override and require an optional handwheel, M3HW, install the handwheel using the following procedure:

8.6.1 Place handwheel (8-10) onto the welded nut (the handwheel hub has a cast hexagon hole that fits over the welded nut).

8.6.2 Place lockwasher (8-20) onto M3 up against handwheel hub.

8.6.3 Place hex nut (8-30) onto M3 and thread up against lockwasher, torque to 250 foot pounds.

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