BETTIS

SERVICE INSTRUCTIONS

DISASSEMBLY AND REASSEMBLY

FOR THE FOLLOWING

"BASIC" AND "A" MODEL

HD522-SR, HD722-SR AND HD732-SR

SPRING RETURN SERIES

PNEUMATIC ACTUATORS

PART NUMBER: 074982

REVISION: "A"

DATE: March 25, 1997

1.0 INTRODUCTION

1.2 This service procedure is offered as a guide to enable general maintenance to be performed on Bettis model revision "BASIC" and "A" for models HD522-SR, HD522-SR-J, HD722-SR, HD722-SR-J, HD732-SR and HD732-SR-J Spring Return Series actuators. When the actuator model number has "X" in it or as a suffix then the actuator is special and may have some differences that are not included in this procedure. Refer to Information Notes, Section 14, at the end of this procedure for product improvement changes and information concerning the difference in model revisions.

1.2 **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.

SR: Spring Cartridge.

J: Jackscrew override. The "J" in the model number has been changed to M3 or to M3HW (HW indicates a 8" inch or 18" inch handwheel attached to the outboard end of the jackscrew). Refer to section 14 steps 14.7 and 14.8 for more information on M3 and M3HW jackscrews.

1.3 **SAFETY STATEMENT:** Products supplied by 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 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.

WARNING: This procedure should not supersede or replace any customers plant safety or work procedures. If a conflict arises between this procedure and the customers procedures the differences should be resolved in writing between an authorized customers representative and a authorized Bettis representative.

1.4 **BASIC SERVICE INFORMATION: Complete actuator refurbishment requires the actuator be dismounted from the valve or device it is operating.**

1.5 Normal recommended service interval for this actuator series is five years to maximum total life cycle.

NOTE: Storage time is counted as part of the service.

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, 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 2,000 inch pounds). For recommended tool list refer to page 11.

3.0 GENERAL

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

3.2 Numbers in parentheses, ( ) indicate the bubble number (reference and item number) used in Chart Number 1 and the sectional drawing located in back of this procedure.

3.3 This procedure is written identifying the front of the actuator being with the yoke bore nearest the technician and the housing cover as the top of the actuator.

3.4 To help in correct re-assembly; that is, with power cylinder on same end of housing as was, cylinder to cylinder adapter, cylinder adapter to housing, right and left stop screws, etc.. mark or tag for ease of re-assembly, also mark mating surfaces.

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

3.6 Use a non-hardening thread sealant on all pipe threads.

CAUTION: Apply the thread sealant per the manufacture's instructions.

3.7 Disassembly of actuator should be done in a clean area on a work bench.

3.8 LUBRICATION REQUIREMENTS: Lubricants, other than those listed in steps 3.8.1, 3.8.2, and 3.8.3, should not be used without prior written approval of Bettis Product Engineering.

3.8.1 Standard temperature service (-20°F to +200°F) use Bettis ESL-5 lubricant. ESL-5 lubricant is contained in the Bettis Service/Seal Kit.

3.8.2 High temperature service (0°F to +350°F) use Bettis ESL-5 lubricant. ESL-5 lubricant is contained in the Bettis Service/Seal Kit.

3.8.3 Low temperature service (-40°F to +150°F) use ESL-4 lubricant contained in the Bettis Low Temperature Service Kit.

CAUTION: Actuator operating pressure is not to exceed the maximum operating pressure rating listed on it's name tag.

3.9 Before starting the general disassembly of the actuator, it is a good practice to operate the actuator with the pressure supplied by the customer to operate the actuator during normal operation. Notate and record any abnormal symptoms such as jerky or erratic operation. Also note, when operating pressure is removed from the air cylinders and exhausted, that the spring rotates the actuator back to it's fail position.

4.0 GENERAL DISASSEMBLY

4.1 If not already done remove all operating pressure from actuator cylinder (9) and spring cylinder (29), allowing the spring to stroke. The spring will rotate the yoke to the fail position.

4.2 Measure the exposed length of right and left stop screws (12) and record each before loosening or removing. Stop screws will be remover later in this procedure.

4.3 If a M3 jackscrew is mounted, the jackscrew should not contact the end of piston rod (6).

4.4 Remove two breathers (22). One is located in the end of spring cylinder (29) and the other is located in the port of cylinder adapter (8). Refer to section 14 step 14.5 for additional information concerning different breathers used by Bettis..

4.5 Remover snubber (22) from top of housing (1).

5.0 SPRING CYLINDER REMOVAL

WARNING: When cylinder assembly (38) is installed on the actuator, the spring cartridge is under compression. Do not remove cylinder assembly (38) until the actuator has the "pre-load" removed.

5.1 Remove spring cylinder stop screw "pre-load" as follows: Locate stop screw (12) that is in cylinder (9). Loosen jam nut (13).

5.2 Unscrew and remove stop screw (12).

CAUTION: Due to the weight and nature of a spring cartridge pre-loaded assembly, caution should be exercised when handling the spring cartridge (30). The spring cartridge (30) is unattached and is only contained by the cylinder assembly (29).

5.3 Secure the chain wrench around spring cylinder (29) 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. When setting spring cylinder (29) aside, care should be taken to protect the chamfered edge and cylinder threads.

5.4 Carefully remove spring cartridge (30) from cylinder assembly (29) by slightly tilting open end of cylinder down.

WARNING: Under no circumstances should the spring cartridge (30) be cut apart, as the spring is pre-loaded and the spring cartridge welded together.

5.5 Unscrew and remove standard hex lock nut (11) from piston rod (6).

5.6 Remove piston (28) from piston rod (6).

5.7 Unscrew and remove four cylinder adapter screws (21) and lock washers (24) from cylinder adapter (8).

5.8 Remove cylinder adapter (8), taking care not to scratch piston rod (6) or disengage rod bushing (10).

6.0 PRESSURE CYLINDER DISASSEMBLY

6.1 Secure the chain wrench around the cylinder (9) 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. When setting the cylinder aside, care should be taken to protect the chamfered edge and cylinder threads.

6.2 Unscrew and remove hex lock nut (11) from the piston rod (6).

6.3 Remove the piston (7).

NOTE: Identify each cylinder adapter (8) left or right and record the inlet port locations.

6.4 Unscrew and remove the four cylinder adapter screws (21) and lock washers (24) from cylinder adapter (8).

6.5 Remove cylinder adapter (8), taking care not to scratch piston rod (6) or disengage rod bushing (10).

6.6 For actuators equipped with M3 or M3HW jackscrew override it is not necessary to remove the M3 for general maintenance.

6.7 It is not necessary to remove cylinder adapter plugs (23).

7.0 HOUSING DISASSEMBLY

7.1 Remove the six cover screws (19) on models 522 and 722. On model 732 remove eight cover screws (19).

7.2 Remove housing cover (3).

7.3 Place the housing with the bottom up and remove the core plug (31).

7.4 Remove the pin retainer (33) from the bottom of the yoke pin (4).

NOTE: When removing pin retainer (33) it will require moving the arms of yoke (2) to a position that will expose the pin retainer in the open hole left when core plug (31) was removed.

7.5 Place the housing with the housing cover area up and remove the yoke pin with the top yoke pin retainer (33) from the yoke (2).

7.6 Remove the upper yoke pin roller (5).

7.7 Holding rod bushings (10) in place, pull the piston rod (6) out through either rod bushing (10).

7.8 Remove both rod bushings (10) from the housing (1).

7.9 Rotate the yoke arms to the center position (centered in housing cavity).

7.10 Remove yoke (2) from housing (1) buy lifting the yoke up and out of the housing.

7.11 Remove lower yoke pin roller (5).

7.12 It is not necessary to remove housing drain plug (32).

8.0 GENERAL REASSEMBLY

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

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

8.3 All parts should be thoroughly inspected. 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.

8.4 Before installing coat all surfaces of actuators moving parts with lubricant.

8.5 Coat all seals with lubricant, before installing into grooves.

9.0 HOUSING REASSEMBLY

9.1 If removed, install drain plug (23) into the drain port of housing (1).

9.2 Apply lubricant to the yoke bore in housing (1) and arrange the housing so that the bore of yoke (2) is nearest to you.

9.3 Lubricate and install o-ring seal (15) into the seal groove in the bore of housing (1).

9.4 Apply a generous amount of lubricant to the slots in the upper and lower yoke arms of yoke (2). Coat the bearing surfaces of the yoke with lubricant and install into the housing.

9.5 Coat the upper and lower bearing surfaces of yoke (2) with lubricant and install into housing (1).

9.6 Coat two rod bushings (10) with lubricant and install one rod bushing into the right side of housing (1) and install second rod bushing into the left side of housing (1).

9.7 Coat one yoke pin roller (5) with lubricant and place into the lower yoke arm slot nearest the cylindrical portion of the yoke.

9.8 Apply a light coat of lubricant to piston rod (6) and install through both bushings (10) in housing (1).

9.9 Turn housing (1) with its bottom side up.

9.10 Align the yoke pin hole in piston rod (6), bottom yoke pin roller (5) and the core plug hole in the bottom of housing (1).

NOTE: Two new pin retainers (33) are provided in the Bettis Service/Seal Kit.

9.11 Place a new pin retainer (33) onto one end of yoke pin (4) and coat the yoke pin with lubricant.

9.12 Install yoke pin (4) down through the housing core plug hole, yoke pin roller (5) and piston rod (6) with pin retainer (33) holding yoke pin (4) in place.

9.13 Turn housing (1) onto its side.

9.14 Coat the remaining yoke pin roller (5) with lubricant and install over yoke pin (4) and into the slot in the upper yoke arm.

9.15 Retain the yoke pin in position with the remaining new pin retainer (33).

NOTE: A new core plug (31) is provided in the Bettis Service/Seal Kit.

9.16 Install new core plug (31) into bottom of housing (1).

9.17 Coat the yoke bore in cover (3) with lubricant.

9.18 Install remaining yoke o-ring seal (15) into cover (3).

9.19 Install cover gasket (18) onto housing (1).

9.20 Install cover (3) on to housing (1).

9.21 On models HD522-SR and HD722-SR install six cover screws (19). On model HD732-SR install eight cover screws (19).

10.0 PNEUMATIC CYLINDER REASSEMBLY

10.1 Coat the piston rod seal (16) with lubricant and install, lip first, into the cylinder adapter (8).

CAUTION: Energizer ring (O-ring) of rod seal (16) must face into cylinder adapter (8) or when cylinder is installed on the actuator the rod seal o-ring will be facing towards piston (7).

10.2 Install two cylinder adapter gaskets (20) over the piston rod, piston rod bushings (10) and up against each end of housing (1).

NOTE: Refer to step 6.4 for correct position for installing cylinder adapter (8).

10.3 Install cylinder adapter (8) over the end of piston rod (6) and over piston rod bushing (10). Retain cylinder adapter (8) with four cylinder adapter screws (21) and lock washers (24). Care should be taken at this point not to scratch the piston rod when installing the cylinder adapter.

10.4 If removed, install pipe plugs (23) into the cylinder adapter pressure ports.

10.5 Install o-ring seal (17) into seal groove at inner end of the cylinder adapter threads of cylinder adapter (8).

10.6 Install o-ring seal (25) onto piston rod (6).

10.7 Install piston (7) onto piston rod (6). NOTE: One side of piston (7) has a raised boss in the center that is counter bored to accept the o-ring installed in step 10.6. The counter bore side of the piston should be installed against the shoulder of piston rod (6) and over o-ring seal (25)

10.8 Install hex lock nut (11) onto piston rod (6).

CAUTION: When installing hex lock nut (11) the flat side of the nut should rest up against piston (7) and the hex lock nut insert should be facing away from piston (7).

10.9 Torque piston retainer nut (11) to 146 foot pounds.

10.10 Piston Seal Installation.

10.10.1 Standard or High Temperature Actuators. Coat two piston seals, U-cup seals, (14) with lubricant and install one seal into the piston innermost piston seal groove. Install the other piston seal (14) into the piston outermost piston seal groove. The lips of the piston seal should point outward toward the outside edges of the piston.

10.10.2 Low Temperature Actuators.

10.10.2.1 Apply lubricant to piston T-seal (14). The seal is composed of rubber seal and two back-up rings. The rings serve as anti-extrusion back-ups.

10.10.2.2 Install T-seal (14) into piston seal groove - outboard end of piston.

10.10.2.3 Install backup ring on each side of T-seal.

10.11 For actuators equipped with M3 jackscrew overrides, and if the M3 was removed, pre-assemble M3 into cylinder (9). NOTE: Refer to section 14 items 14.7 and 14.8 for additional M3 information.

10.12 Apply a coating of lubricant to the cylinder threads and the entire bore of the cylinder (9).

10.13 Install cylinder (9) over piston (7), screw cylinder (9) into cylinder adapter (8). Tighten cylinder (9) with a chain wrench.

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

10.14 Adjust both stop adjusting screws (12) back to settings recorded in section 4 under General Disassembly.

10.15 Tighten both adjusting screw jam nuts (13) securely, while holding stop adjusting screws (12).

11.0 SPRING CYLINDER REASSEMBLY

11.1 Install remaining cylinder adapter gasket (20) over piston rod (6).

11.2 Coat piston rod seal (16) with lubricant and install, lip first, into the cylinder adapter (8).

CAUTION: Energizer ring (O-ring) of rod seal (16) must face into cylinder adapter (8) or when cylinder is installed on the actuator the rod seal o-ring will be facing towards spring piston (28).

NOTE: Refer to step 6.3 for correct position for installing the cylinder adapter (8).

11.3 Install cylinder adapter (8) over the end of piston rod (6) and over piston rod bushing (10). Retain cylinder adapter (8) with four cylinder adapter screws (21) and lock washers (24). Care should be taken at this point not to scratch the piston rod when installing the cylinder adapter.

11.4 If removed, install pipe plug (23) into the cylinder adapter pressure ports.

11.5 Install remaining o-ring seal (17) into the cylinder adapter in the groove at the inner end of the threads.

11.6 Install remaining o-ring seal (25) onto piston rod (6).

11.7 Install spring piston (28) onto piston rod (6). NOTE: One side of spring piston (28) has a raised boss in the center that is counter bored to accept the o-ring installed in step 11.6. The counter bore side of the piston should be installed against the shoulder of piston rod (6) and over o-ring seal (25)

11.8 Install hex lock nut (11) onto piston rod (6). Torque hex lock nut (11) to approximately 146 foot pounds.

CAUTION: When installing hex lock nut (11) the flat side of the nut should rest up against spring piston (28) and the hex lock nut insert should be facing away from spring piston (28).

11.9 Piston Seal Installation

11.9.1 Coat the remaining piston U-cup seals (14) with lubricant and install into the innermost piston groove. The lips of the seal should point outward toward the side of the piston.

11.9.2 Low Temp Actuators

11.9.2.1 Apply lubricant to piston T-seal (14). Seal is composed of rubber seal and two back-up rings. The rings serve as anti-extrusion back-ups.

11.9.2.2 Install T-seal (14) into piston seal groove - outboard end of piston.

11.9.2.3 Install backup ring on each side of T-seal.

11.10 Push the piston in towards the housing as far as it will go.

11.11 Coat the cylinder threads and the entire cylinder bore with lubricant.

11.12 Coat the outside of the spring with lubricant and insert the spring cartridge assembly (30) into the spring cylinder (29). One end of the spring cartridge assembly has a flat face with a deep hole in it, this end should be inserted into the cylinder first.

11.13 Install the spring cylinder, containing the spring cartridge, over the piston and screw into the cylinder adapter (8). Tighten with a chain wrench.

11.14 Install the stop screws (12) and stop screw jam nuts (13).

12.0 ACTUATOR TESTING

12.1 All areas, where leakage to atmosphere may occur, are to be checked using a leak testing solution. If excessive leakage 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.

12.2 All leak testing will use the nominal operating pressure (NOP) as listed on the actuator name tag or the normal customer supply pressure.

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

12.3 Before leak testing may be accomplished, it will be necessary to provide a piping system whereby pressure may be applied simultaneously to all common pressure ports.

12.4 Before testing for leaks, alternately apply and release the pressure as listed in step 12.2 to each side of the pistons to stroke the actuator fully in each direction. Repeat this cycle approximately five times. This will allow the new seals to seek their service condition.

12.5 Simultaneously apply the pressure, as listed in step 12.2, to the pressure port in the end of cylinder (9) and to the SR cylinder adapter (8).

12.6 Apply leak testing solution to the following areas:

12.6.1 The breather port in the cylinder adapter (8), checks piston to cylinder and piston to piston rod seals.

12.6.2 The breather port hole in the end of the SR cylinder (29), checks the piston to cylinder wall and piston to piston rod seals.

12.6.3 The threaded joint between the SR cylinder (29) and SR cylinder adapter (8), checks the cylinder to cylinder adapter o-ring seal.

12.6.4 The joint between the SR cylinder adapter (8) and the housing (1).

12.6.5 The snubber port hole located in the housing, checks the cylinder adapter to piston rod seal.

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

12.8 Remove pressure from the pressure inlet ports.

13.0 RETURN TO SERVICE

13.1 Replace the software components of the snubber valve (22) and then install the snubber into the housing (1).

13.2 After the actuator is refurbished and tested then all accessories should be hooked up and tested for proper operation and replaced, if found defective.

14.0 INFORMATION NOTES

14.1 The "A" revision series actuators went out of production in the late 1960's and was replaced with the "B" revision actuators. The 522B-SR, 722B-SR and 732B-SR series actuators had a new design housing with the stop adjusting screws being moved from the cylinder ends to the housing and a new valve mounting pattern. If the "BASIC" or "A" revision actuator is being replaced with the current series models then a new valve to actuator mounting bracket and stem adapter bushing/yoke modification may be required.

14.2 On HD series BASIC and "A" revision actuators the yoke o-rings (15) where shipped with 70 Durometer seals. The yoke o-ring seals (15/20) provided in the standard Bettis Service/Seal Kit will be 90 Durometer. The 90 Durometer seals are a product improvement and will provide better service life than the original 70 Durometer o-ring.

14.3 These actuators may have been shipped with a rod seal (16) and a anti-extrusion seal (27). This combination is replaced with the current Polypak seal (16). The dimensional stack of the piston rod seal and the anti-extrusion seal is greater than the rod seal provided in the current Service/Seal Kit. This dimensional difference does not affect the ability of the current Polypak seal to provide sealing in this application.

14.4 Basic and "A" revision actuators did not use any gasket seal washers on the housing cover screws (19). The current Service/Seal Kits provide wrought copper alloy (ASTM B-152 C11000) gasket seal washers (100). If the cover screws are long enough then Bettis would recommend that the gasket seals be installed on your actuator housing cover screws (19).

14.5 Basic and "A" revision actuators used lock washers on the cylinder adapter retaining screws (21). During the early 1970's the lock washers where replaced with wrought copper alloy (ASTM B-152 C11000) gasket seal washers (80). The current Service/Seal kits provide these wrought copper alloy washers and Bettis would recommend that they be used in place of the original lock washers.

14.6 All asbestos has been eliminated from the gasket material used in Bettis Actuators. The current gasket material used is Non Asbestos Synthetic Fiber.

14.7 The replacement M3 jackscrews manufactured since July of 1978 have been of a design that allowed the M3 stud to be captivated in the actuator cylinder. All previous M3 stud designs manufactured prior to January, 1991 are obsolete and are only replaceable with the current M3 jackscrew.

14.8 All jackscrew handwheel assemblies manufactured prior to January, 1981 had non-replaceable handwheel. When replacing these M3HW it will require a complete new M3 stud and handwheel option.

14.9 Most HD-SR series actuators manufactured through the 1970's used snubber valves instead of breathers for item (22) when installed in the cylinder adapter and spring cylinder. It is recommended that the snubber valves for these two locations be replaced with a breather, Bettis part number 029198.

CHART NO. 1 - ACTUATOR PARTS LIST

ITEM NO.	ITEM QTY.	ITEM DESCRIPTION	SERVICE KIT ITEM NUMBER (1)
1	1	Housing (2)	
2	1	Yoke (3)	
3	1	Housing Cover (2)	
4	1	Yoke Pin	
5	2	Yoke Pin Roller	
6	1	Piston Rod	
7	1	Piston	
8	2	Cylinder Adapter	
9	1	Cylinder	
10	2	Piston Rod Bushing	
11	2	Piston Retainer Nut	
12	2	Stop Screw	
13	2	Stop screw Jam Nut	
14	3	Piston U-Cup Seal	10
15	2	Yoke O-ring Seal	20
16	2	Piston Rod Seal (4)	30
17	2	Cylinder O-ring Seal	40
18	1	Housing Cover Gasket	60
19	(5)	Housing Cover Screws	
20	2	Cylinder Adapter Gaskets	70
21	8	Cylinder Adapter Screws	
22	3	Snubber Valve (6)	
23	4	Cylinder Adapter Pipe Plugs	
24	8	Cylinder Adapter Screw Lock-washers	
25	2	Piston Head O-ring Seal	50
26	1	Serial Number Tag.	
27	2	Anti-extrusion Seal (4)	
28	1	Spring Piston	
29	1	Spring Cylinder	
30	1	Spring Cartridge Assembly	
31	1	Core Plug	120
32	2	Drain pipe plug	
33	2	Yoke Pin Retainer	

NOTES:
(1) Items provided in Service/Seal Kit by kit item number.
(2) Items no longer available.
(3) When this item is replaced a serial number from the actuator will be required.
(4) For replacement information refer to Section 14, step number 14.3.
(5) Housing cover screw quantity:
A. Model 522A-SR - 6 each.
B. Model 722A-SR - 6 each.
C. Model 732A-SR - 8 each.
(6) For replacement information refer to Section 14, step number Step 14.9.

522-SR & 722-SR TOOL STYLE AND WRENCH SIZE

ITEM NO.	WRENCH SIZE	TOTAL QTY	LOCATION	RECOMMENDED WRENCH STYLE
9	(2)	1	Piston Cylinder	Chain
11	1-1/4"	2	Piston rod lok nut	Socket
12	1"	2	Stop screw	Open End or Adjustable
13	1-1/4"	2	Jam nut	Open End or Adjustable
19	9/16"	6	Cover screws	Socket
21	3/8"	8	Cylinder adapter screws	Hex Socket (1)(3)
22	7/8"	1	Snubber valve	Deep socket
23	7/16"	4	Cylinder adapter plugs	Open End
29	(2)	1	Spring Cylinder	Chain
32	7/16"	1	Drain plug	Open End
-	1-13/16"	1	M3 Seal Nut	Open End or Adjustable
-	1-11/16"	1	M3 Handwheel Jam Nut	Open End or Adjustable

732-SR TOOL STYLE AND WRENCH SIZE

ITEM NO.	WRENCH SIZE	TOTAL QTY	LOCATION	RECOMMENDED WRENCH STYLE
9	(2)	1	Piston Cylinder	Chain
11	1-5/8"	2	Piston rod lok nut	Socket
12	1"	2	Stop screw	Open End or Adjusting
13	1-1/4"	2	Jam nut	Open End or adjustable
19	5/8"	8	Cover screws	Socket
21	3/8"	8	Cylinder adapter screws	Hex Socket (1)(3)
22	7/8"	1	Housing snubber valve	Deep socket
23	7/16"	4	Cylinder adapter plugs	Open End
29	(2)	1	Spring Cylinder	Chain
32	7/16"	1	Drain plug	Open End
-	1-13/16"	1	M3 Seal Nut	Open End or Adjustable
-	1-11/16"	1	M3 Handwheel Jam Nut	Open End or Adjustable

(1) No alternate style recommended.
(2) Bettis recommends a short handle chain wrench with a 40" chain.
(3) Early models used socket head cap screws - wrench style will change to Allen.

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			CHECKED	Bill Cornelius	25 March 1997
			APPROVED	Robert McEver	25 March 1997

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