

BETTIS

SERVICE INSTRUCTIONS

DISASSEMBLY AND REASSEMBLY

FOR MODELS

HDG

DOUBLE ACTING SERIES

ACTUATORS

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SECTION 1 - INTRODUCTION

1.1 GENERAL SERVICE INFORMATION

1.1.1 This service procedure is offered as a guide to enable general maintenance to HDG2502.5 and HDG2503.0 Double Acting Series Actuators. These actuators will have one single Gas Power Cylinder and one single Hydraulic Speed Control cylinder and/or an Override Cylinder.

NOTE: When the model number has "-S" as a suffix then the actuator is special and may have some differences that are not included in this procedure.

1.1.2 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 interval.

1.1.3 This procedure is applicable with the understanding that all electrical power and gas pressure has been removed from the actuator.

1.1.4 Remove all piping and mounted accessories that will interfere with the actuator parts that are to be worked on.

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

1.1.6 Numbers in parentheses, () indicate the bubble number (reference number) used on the Bettis Assembly Drawing and Actuator Parts List.

1.1.7 This procedure is written using the stop screw plug side of the housing (1-10) as a reference and this side will be considered the front side of the actuator. The housing cover (1-20) will be the top of the actuator.

1.1.8 Actuator weights are listed below:

ACTUATOR MODEL	WEIGHT	
	POUNDS	Kg
HDG2502.5	118	53.52
HDG2503.0	123	55.79

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

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

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

1.1.11 Bettis recommends that disassembly of the actuator should be done in a clean area on a work bench.

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.

1.3 **GENERAL SAFETY INFORMATION** 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 well trained, equipped, prepared and competent personnel.

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 an authorized Bettis representative.

1.4 BETTIS REFERENCE MATERIALS

1.4.1 Assembly drawing for HDG Series Actuators use part number 133259.

1.5 SERVICE SUPPORT ITEMS

1.5.1 Bettis actuator Service Kit.

1.5.2 Non-hardening thread sealant.

1.6 LUBRICATION REQUIREMENTS

1.6.1 Bettis ESL-4, 5 & 10 lubricant. Use in the actuator housing and actuator gas power cylinder. NOTE: Bettis ESL-4, 5 & 10 lubricant tube(s) are contained in the Bettis Service Kits.

1.6.2 Lubricants, other than listed in step 1.6.1, should not be used without prior written approval of Bettis Product Engineering.

1.7 FLUID REQUIREMENTS

- 1.7.1 For use in the Oil (Hydraulic) Cylinder use Dexron Automatic Transmission Fluid.
- 1.7.2 This fluid is the recommended fluid only and does not limit the use of other hydraulic fluids compatible with supplied seals and coatings.

1.8 GENERAL TOOL INFORMATION

- 1.8.1 Tools: All tools are American Standard inch. Large adjustable wrench, two (2) large screwdrivers, Allen wrench set, set of open/box-end wrenches, torque wrench (up to 5,000 inch pounds), breaker bar, and a 1/2" drive socket set. For recommended tool and wrench sizes refer to Section 4 table 4.1

SECTION 2 - ACTUATOR DISASSEMBLY

2.1 GENERAL DISASSEMBLY

WARNING: It is very possible, that the actuator may contain a dangerous gas such as (Sour gas/H₂S, Oxygen, Nitrogen, etc.) and/or liquids such as (Condense, Descalers, Petroleum bases, etc.). Ensure that all proper measures have been taken to prevent dangerous exposure or release of these types of residues before commencing any work.

- 2.1.1 Section 2 - Actuator Disassembly is written to either completely disassemble the entire actuator or can be used to disassemble individual Cylinders as needed (Gas Power cylinder or Oil (Hydraulic) cylinder).

CAUTION: Using some means to contain hydraulic fluid as the tubing (piping) is disconnect from the Oil (Hydraulic) cylinder outer end cap (5-60) and inner end cap (5-10).

- 2.1.2 Disconnect all hydraulic fluid lines to oil (hydraulic) cylinder outer end cap (5-60) and inner end cap (5-10). Drain as much of the hydraulic fluid as possible.

WARNING: Do not mix parts from the two cylinder assemblies as the two cylinder assemblies use different coating for gas operation and hydraulic operation.

- 2.1.3 To ensure correct re-assembly; that is, with Gas Power Cylinder or Oil (Hydraulic) cylinder on same end of housing as was, mark or tag right (or left) and mark mating surfaces.

2.2 GAS POWER CYLINDER DISASSEMBLY

NOTE: The following steps may be performed on one cylinder and then on the other cylinder or simultaneously on both cylinders.

NOTE: Review Section 2 notes and steps 2.1.1 through 2.1.3 General Disassembly before proceeding with gas cylinder Disassembly.

WARNING: If not already removed disconnect all operating pressure from actuator gas power cylinder.

- 2.2.1 Mark and record location of the ports on outer end cap (3-60) and end cap cylinder adapter (3-40).
- 2.2.2 The setting of stop screw (3-120) should be checked and setting recorded before stop screws are loosened or removed. NOTE: Stop screws will be removed later in this procedure.
- 2.2.3 Remove the jam nut (3-110) and o-ring seal (4-90) from stop screw (3-120).
- 2.2.4 Remove hex nuts (3-70), with lockwashers (3-80), from tie bars (3-20).
- 2.2.5 Remove outer end cap (3-60) from cylinder (3-50) and tie bars (3-20).
- 2.2.6 Remove the stop screw assembly (3-120) from the inboard side of outer end cap (3-60).
- 2.2.7 Unscrew and remove tie bars (3-20) from inner end cap (3-10).
- 2.2.8 Remove cylinder (3-50) from piston (3-30) and end cap cylinder adapter (3-40).
- 2.2.9 Unscrew and remove hex lock nut (3-130) from piston (3-30) and piston rod (7-10).
- 2.2.10 Remove the piston (3-30) from piston rod (7-10).
- 2.2.11 Remove end cap cylinder adapter (3-40) from piston rod (7-10).
- 2.2.12 Remove socket cap screws (3-90) with lockwashers (3-100) from inner end cap (3-10).
- 2.2.17 Remove inner end cap (3-10) off of piston rod (7-10).
- 2.2.18 It is not necessary to remove pipe plugs (3-140) from outer end cap (3-60) and end cap cylinder adapter (3-40).

2.3 OIL (HYDRAULIC) CYLINDER DISASSEMBLY

NOTE: The following steps may be performed on one cylinder and then on the other cylinder or simultaneously on both cylinders.

NOTE: Review Section 2 notes and steps 2.1.1 through 2.1.3 General Disassembly before proceeding with oil cylinder Disassembly.

- 2.3.1 Mark and record location of the ports on outer end cap (5-60) and end cap cylinder adapter (5-40).

- 2.3.2 The setting of stop screw (5-120) should be checked and setting recorded before stop screws are loosened or removed. NOTE: Stop screws will be removed later in this procedure.
- 2.3.3 Remove the jam nut (5-110) and o-ring seal (6-90) from stop screw (5-120).
- 2.3.4 Remove hex nuts (5-70), with lockwashers (5-80), from tie bars (5-20).
- 2.3.5 Remove outer end cap (5-60) from cylinder (5-50). and tie bars (5-20).
- 2.3.6 Remove the stop screw (5-120) from the outboard side of outer end cap (5-60).
- 2.3.7 Unscrew and remove tie bars (5-20) from inner end cap (5-10).
- 2.3.8 Remove cylinder (5-50) from piston (5-30) and end cap cylinder adapter (5-40).
- 2.3.9 Unscrew and remove hex lock nut (5-130) from piston (5-30) and piston rod (7-10).
- 2.3.10 Remove the piston (5-30) from piston rod (7-10).
- 2.3.11 Remove end cap cylinder adapter (5-40) from piston rod (7-10).
- 2.3.12 Remove socket cap screws (5-90) with lockwashers (5-100) from inner end cap (5-10).
- 2.3.17 Remove inner end cap (5-10) off of piston rod (7-10).
- 2.3.18 It is not necessary to remove pipe plugs (5-140) from outer end cap (5-60) and end cap cylinder adapter (5-40).

2.4 HOUSING DISASSEMBLY

NOTE: Review Section 2 notes and steps 2.1.1 through 2.1.3 General Disassembly before proceeding with housing Disassembly.

- 2.4.1 Remove cover screw (1-30) and gasket seals (2-100).

NOTE: The housing cover has a tight fit and will require the use of two pry bars or screw drivers to assist in removal.

- 2.4.2 Remove housing cover (1-20) from housing (1-10).
- 2.4.3 Rotate the arms of yoke (1-140) to the center position in the cavity of housing (1-10).
- 2.4.4 Remove the upper yoke roller (1-50) from yoke pin (1-40).
- 2.4.5 Remove yoke pin (1-40) from yoke arms of yoke (1-140).
- 2.4.6 Holding rod bushings (4-20) and (6-20) in place, remove piston rod (7-10) out through the rod bushings.
- 2.4.7 Remove both rod bushings (4-20) and (6-20) from housing (1-10).

2.4.8 Remove yoke (1-140) from housing (1-10).

CAUTION: The yoke/housing bearing area must be lubricated and inspected to extend service life and prevent degradation of torque output. This can only be accomplished by removing the yoke from the housing, which requires removing the actuator from the device it is mounted on.

2.4.9 Remove lower yoke roller (1-50) from bottom area of housing cavity.

2.4.10 Remove hex cap screws (1-60) and gasket seals (2-90) from front of housing (1-10).

2.4.11 Remove snubber assembly (1-130) from top of housing (1-10).

2.4.12 It is not necessary to remove pipe plug (1-100) from housing (1-10).

SECTION 3 - ACTUATOR REASSEMBLY

3.1 GENERAL REASSEMBLY

CAUTION: Only new seals, that are still within the seals expectant shelf life, should be installed into actuator being refurbished.

3.1.1 Remove and discard all old seals and gaskets.

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

3.1.3 All parts should be thoroughly inspected for excessive wear, stress cracking, galling and pitting. Attention should be directed to threads, sealing surfaces and areas that will be subjected to sliding or rotating motion. Sealing surfaces of the cylinder and piston rod must be free of deep scratches, pitting, corrosion and blistering or flaking coating.

CAUTION: Actuator parts that reflect any of the above listed characteristics should be replaced with new parts.

3.1.4 Before installation coat all moving parts with a complete film of lubricant. Coat all seals with a complete film of lubricant, before installing into seal grooves.

NOTE: The parts and seals used in the actuator housing and gas power cylinder will be assembled using lubricant as identified in Section 1 step 1.6.1. The parts and seals used in the actuator Oil (Hydraulic) cylinder will be assembled using lubricant as identified in Section 1 step 1.7.1.

3.2 HOUSING REASSEMBLY

3.2.1 If removed, install a pipe plug (1-100) into the drain port of the housing (1-10).

- 3.2.2 In the bottom area of housing (1-10) apply lubricant to the yoke bore and the cast raised ribs. Arrange the housing so that the yoke bore is nearest to you.
 - 3.2.3 Coat one o-ring seal (2-20) with lubricant and install into the seal groove located in the yoke bore in the bottom area of housing (1-10).
 - 3.2.4 Lubricate the yoke (1-140) with a generous amount of lubricant to all bearing surfaces and the slot in the upper and lower arms.
- NOTE: The wide arm of yoke (1-140) should be installed toward the top of housing (1-10).
- 3.2.5 Install yoke (1-140) into the bore located in the bottom area of housing (1-10).
 - 3.2.6 Coat one yoke roller (1-50) with lubricant and place into the lower yoke arm slot nearest the cylindrical portion of the yoke.
 - 3.2.7 Coat two rod bushings (4-20) and (6-20) with lubricant and install one into each end of housing (1-10).
 - 3.2.8 Apply lubricant to piston rod (7-10) and install through both bushings (4-40) and (6-20) in housing (1-10).
 - 3.2.9 Coat yoke pin (1-40) with lubricant and install through the slot in the upper arm of yoke (1-140), through piston rod (7-10) and into lower yoke roller (1-50).
 - 3.2.10 Coat the remaining yoke roller (1-50) with lubricant and install over yoke pin (1-40) and into the slot of the upper arm of yoke (1-140).
 - 3.2.11 Apply lubricant to the yoke bore and seal groove of housing cover (1-20).
 - 3.2.12 Coat o-ring seal (2-20) with lubricant and install into the seal groove in the yoke bore area of housing cover (1-20).
 - 3.2.13 Install cover gasket (2-60) onto top area of housing (1-10).
 - 3.2.15 Install housing cover (1-20) over cover gasket (2-60) and onto top area of housing (1-10).
 - 3.2.16 Install four gasket seals (2-100) onto four hex cap screws (1-30).
 - 3.2.17 Install four hex cap screws (1-30) with gasket seals through housing cover (1-20) and into housing (1-10).
 - 3.2.18 Torque tighten the four hex cap screws (1-30) to 20 foot pounds ($\pm 5\%$).
 - 3.2.19 Install gasket seals (2-90) onto two hex cap screws (1-60).
 - 3.2.20 Install two hex cap screws (1-60) with gasket seals into front of housing (1-10).
 - 3.2.21 Rotate the yoke to the full clockwise (CW) position. Position the yoke weather cover (2-110) and position indicator (1-110) on the yoke (1-140) with the pointer facing the piston rod and perpendicular to the cylinder assemblies.

3.2.22 Install and tighten yoke position indicator/yoke weather cover screws (1-120).

NOTE: Screws (1-120) will need to be rechecked for tightness after the actuator has been cycled.

3.3 GAS POWER CYLINDER REASSEMBLY

WARNING: Do not mix parts from the two cylinder assemblies as the two cylinder assemblies use different coating for gas operation and hydraulic operation.

NOTE: The following steps may be performed on one cylinder and then on the other cylinder or simultaneously on both cylinders using Section 3.3 and 3.4 concurrently.

NOTE: Review Section 2 step 2.1.3 General Disassembly before proceeding with gas power cylinder re-assembly.

3.3.1 Coat the Polypak seal (4-30) with lubricant and install, lip first, into the inner end cap (3-10).

CAUTION: Energizer ring (o-ring) of Polypak seal (4-30) must face into inner end cap (3-10) with the Polypak seal o-ring facing towards piston (3-30).

3.3.2 Install the inner end cap gasket (4-10) over the piston rod (7-10), rod bushing (4-20) and up against the housing (1-10).

CAUTION: Care should be taken to not scratch or damage the piston rod when installing the inner end cap (3-10).

3.3.3 Install the inner end cap (3-10) over the end of the piston rod (7-10) and up against the gasket (4-10) / housing (1-10).

3.3.4 Place lockwashers (3-100) onto socket cap screws (3-90).

3.3.5 Install and tighten socket cap screws (3-90) with lockwashers through inner end cap (3-10) and into housing (1-10).

3.3.6 Coat o-ring seal (4-80) with lubricant and install into the end cap cylinder adapter (3-40).

3.3.7 Install the end cap cylinder adapter (3-40) with o-ring seal (4-80) up against inner end cap (3-10).

3.3.8 Arrange the position of the end cap cylinder adapter (3-40) per the identification recorded in Section 2 step 2.2.1.

3.3.9 Install o-ring seal (4-70) onto the piston rod (7-10). NOTE: The o-ring should be installed against the shoulder of the piston rod.

3.3.10 Install piston (3-30) onto piston rod (7-10). NOTE: One side of piston (3-30) has a counter bore to accept the o-ring installed in step 3.3.9. The counter bore side of the piston should be installed against the shoulder of piston rod (7-10) and over o-ring seal (4-70).

3.3.11 Install hex lock nut (3-130) onto piston rod (7-10).

- 3.3.12 Torque tighten hex lock nut (3-130) to approximately 146 foot pounds.
- 3.3.13 Coat one piston seal (4-60) with lubricant and install into the inboard piston external seal groove.

CAUTION: Install the piston seal with energizer ring facing outside edge of piston (3-30).

- 3.3.14 Coat one piston bearing (4-50) with lubricant and install into the piston external bearing groove.
- 3.3.15 Coat one piston seal (4-60) with lubricant and install into the remaining piston external seal groove.

CAUTION: Install the piston seal with energizer ring facing outside edge of piston (3-30).

- 3.3.16 Coat the o-ring seal (4-40) with lubricant and install onto the end cap cylinder adapter (3-40).

- 3.3.17 Apply a thin coating of lubricant to the bore of the cylinder (3-50).

CAUTION: Exercise care to prevent damage to the Polypak seal lip during cylinder installation. It is necessary to depress the seal lip while working the cylinder over it.

- 3.3.18 Install cylinder (3-50) over piston (3-30) onto end cap cylinder adapter (3-40) and up against o-ring seal (4-40) installed in step 3.3.16.

- 3.3.19 Install tie bars (3-20) into inner end cap (3-10).

- 3.3.20 Lubricate stop screw assembly (3-120) and install into the outer end cap (3-60). NOTE: The stop screw is installed from the inboard side or cylinder side of the outer end cap (3-60).

- 3.3.21 Install o-ring seal (4-90) onto the out board side of the stop screw assembly (3-120).

- 3.3.22 Install jam nut (3-110) onto the out board side of the stop screw assembly (3-120).

NOTE: The pressure inlet ports of the end cap cylinder adapter (3-40) outer end cap (3-60) should be positioned in the same position as recorded in Section 2 step 2.2.1.

- 3.3.23 Install outer end cap (3-60) over tie bars (3-20) and into open end of cylinder (3-50).

- 3.3.24 Install lockwashers (3-80) onto tie bars (3-20) and up against outer end cap (3-60).

- 3.3.25 Install hex nuts (3-70) onto tie bars (3-20) and up against lockwashers (3-80).

- 3.3.26 Torque tighten hex nuts (3-70) until a final lubricated torque of 40 foot pounds or 54 N-m has been achieved.

3.3.27 Adjust stop screw (3-120) back to settings recorded earlier in Section 2 at step 2.2.2.

3.3.28 Tighten jam nut (3-120) securely.

3.3.29 If removed install pipe plugs (3-140) into the end cap cylinder adapter (3-40) and outer end cap (3-60) pressure ports (port locations as recorded in Section 2 step 2.2.1).

3.4 OIL (HYDRAULIC) CYLINDER REASSEMBLY

WARNING: Do not mix parts from the two cylinder assemblies as the two cylinder assemblies use different coating for gas operation and hydraulic operation.

NOTE: The following steps may be performed on one cylinder and then on the other cylinder or simultaneously on both cylinders.

NOTE: Review Section 2 step 2.1.3 General Disassembly before proceeding with oil (hydraulic) cylinder re-assembly.

3.4.1 Coat the Polypak seal (6-30) with lubricant and install, lip first, into the inner end cap (5-10).

CAUTION: Energizer ring (o-ring) of Polypak seal (6-30) must face into inner end cap (3-10) with the Polypak seal o-ring facing towards piston (5-30).

3.4.2 Install the inner end cap gasket (6-10) over the piston rod (7-10), rod bushing (6-20) and up against the housing (1-10).

CAUTION: Care should be taken to not scratch or damage the piston rod when installing the inner end cap (5-10).

3.4.3 Install the inner end cap (5-10) over the end of the piston rod (7-10) and up against the gasket (6-10) / housing (1-10).

3.4.4 Place lockwashers (5-100) onto socket cap screws (5-90).

3.4.5 Install and tighten socket cap screws (5-90) with lockwashers through inner end cap (5-10) and into housing (1-10).

3.4.6 Coat o-ring seal (6-80) with lubricant and install into the end cap cylinder adapter (5-40).

3.4.7 Install the end cap cylinder adapter (5-40) with o-ring seal (6-80) up against inner end cap (5-10).

3.4.8 Arrange the position of the end cap cylinder adapter (5-40) per the identification recorded in Section 2 step 2.3.1.

3.4.9 Install o-ring seal (6-70) onto the piston rod (7-10). NOTE: The o-ring should be installed against the shoulder of the piston rod.

3.4.10 Install piston (5-30) onto piston rod (7-10). NOTE: One side of piston (5-30) has a counter bore to accept the o-ring installed in step 3.4.9. The counter bore side of the piston should be installed against the shoulder of piston rod (7-10) and over o-ring seal (6-70).

3.4.11 Install hex lock nut (5-130) onto piston rod (7-10).

- 3.4.12 Torque tighten hex lock nut (5-130) to approximately 146 foot pounds.
- 3.4.13 Coat one piston bearing (6-50) with lubricant and install into the piston external bearing groove.
- 3.4.14 Coat one piston seal (6-60) with lubricant and install into one of the piston external seal grooves.

CAUTION: Install the piston seal with energizer ring facing outside edge of piston (5-30).

- 3.4.15 Coat one piston seal (6-60) with lubricant and install into the remaining piston external seal groove.

CAUTION: Install the piston seal with energizer ring facing outside edge of piston (5-30).

- 3.4.16 Coat the o-ring seal (6-40) with lubricant and install onto the end cap cylinder adapter (5-40).

- 3.4.17 Apply a thin coating of lubricant to the bore of the cylinder (5-50).

CAUTION: Exercise care to prevent damage to the Polypak seal lip during cylinder installation. It is necessary to depress the seal lip while working the cylinder over it.

- 3.4.18 Install cylinder (5-50) over piston (5-30) onto end cap cylinder adapter (5-40) and up against o-ring seal (6-40) installed in step 3.4.16.

- 3.4.19 Install tie bars (5-20) into inner end cap (5-10).

- 3.4.20 Lubricate stop screw (5-120) and install into the outer end cap (5-60). NOTE: The stop screw is installed from the outboard side of the outer end cap (5-60).

- 3.4.21 Install o-ring seal (6-90) onto the out board side of the stop screw (5-120).

- 3.4.22 Install jam nut (5-110) onto the out board side of the stop screw (5-120).

NOTE: The pressure inlet ports of the end cap cylinder adapter (5-40) outer end cap (5-60) should be positioned in the same position as recorded in Section 2 step 2.3.1.

- 3.4.23 Install outer end cap (5-60) over tie bars (5-20) and into open end of cylinder (5-50).

- 3.4.24 Install lockwashers (5-80) onto tie bars (5-20) and up against outer end cap (5-60).

- 3.4.25 Install hex nuts (5-70) onto tie bars (5-20) and up against lockwashers (5-80).

- 3.4.26 Torque tighten hex nuts (5-70) until a final lubricated torque of 40 foot pounds or 54 N-m has been achieved.

3.4.27 Adjust stop screw (5-120) back to settings recorded earlier in Section 2 at step 2.3.2.

3.4.28 Tighten jam nut (5-120) securely.

- 3.4.29 If removed install a pipe plugs (5-140) into the end cap cylinder adapter (5-40) and outer end cap (5-60) pressure ports (port locations as recorded in Section 2 step 2.3.1.

3.5 ACTUATOR TESTING

- 3.5.1 Leakage Test - All sources of leakage to atmosphere and across piston are to be checked, using pneumatic pressure.
- 3.5.2 Cycle the actuator five times at 10% percent of the operating pressure, as listed on the actuator name tag under max. pressure.

NOTE: If excessive leakage across the piston remains, the actuator must be disassembled and the cause of leakage must be determined and corrected.

- 3.5.3 Apply operating pressure as listed in step 3.5.2 to one side of the piston and allow the actuator to stabilize.
- 3.5.4 Repeat the above procedure for the opposite side of the piston.
- 3.5.5 If an actuator was disassembled and repaired, the above leakage test must be performed again.
- 3.5.6 If an actuator was disassembled and repaired, the above testing must be performed again.
- 3.5.7 After the actuator is installed on the valve all accessories should be hooked up and tested for proper operation and replaced if found defective.

3.6 RETURN TO SERVICE

- 3.6.1 Replace the software components of the snubber (1-130) and then install the snubber into the housing (1-10).

- 3.6.2 Adjust both stop screws back to settings recorded in Section 2 at steps 2.2.2 and 2.3.2.
- 3.6.3 Tighten both jam nuts (3-110) and (5-110) securely, while holding both stop screws (3-120) and (5-120).
- 3.6.4 The actuator is now ready for returning to service.

SECTION 4 - ACTUATOR SUPPORT INFORMATION

HDG25XX.X TOOL STYLE AND WRENCH SIZES				
ITEM NO.	ITEM QTY.	WRENCH SIZE	DESCRIPTION OR LOCATION	RECOMMENDED WRENCH STYLE
1-30	4	9/16"	Cover Screws	Socket
1-60	2	1/2"	Hex Cap Screws	Open End or Adjustable
1-100	1	7/16"	Pipe Plug	Open End
1-120	4	3/16"	Socket Cap Screws	Allen (1)
1-130	1	7/8"	Snubber Valve	Deep Socket
3-70	4	3/4"	Standard Hex Nut	Socket
3-90	4	7/16"	Ferry Cap Screws	12 Point Socket (1)
3-110	1	1-1/8"	Hex Jam Nut	Open End or Adjustable
3-120	1	3/8"	Stop Screw	Open End or Adjustable
3-130	1	1-1/4"	Light Hex Lok Nut	Open End or Adjustable
3-140	2	3/8" Sq.	Pipe Plug	Open End
5-70	4	3/4"	Standard Hex Nut	Socket
5-90	4	7/16"	Ferry Cap Screws	12 Point Socket (1)
5-110	1	1-1/8"	Hex Jam Nut	Open End or Adjustable
5-120	1	3/8"	Stop Screws	Open End or Adjustable
5-130	1	1-1/4"	Light Hex Lok Nut	Open End or Adjustable
5-140	2	3/8" Sq.	Pipe Plug	Open End
(1) No alternate style tool recommended.				

ECN	DATE	REV	BY *	DATE	
Released	August, 2000	A	COMPILED CHECKED APPROVED	<u>Bill Cornelius</u> <u>Bill Cornelius</u> <u>Russell Smith</u>	<u>3 August 2000</u> <u>3 August 2000</u> <u>3 August 2000</u>

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