

**BETTIS**

**GENERAL**

**OPERATING AND MAINTENANCE**

**INSTRUCTIONS**

**FOR**

**HYDRAULIC ROTARY**

**VALVE ACTUATORS**

PART NUMBER: 074651E

REVISION: "C"

DATE: December 2001

## 1.0 GENERAL

- 1.1 Bettis ninety degree rotary actuators are designed for use with quarter turn devices of a broad range of sizes and types, and are applicable over a wide range of pressures, temperatures and environments.
- 1.2 This service procedure is offered as a guide for the following Bettis Double Acting and Spring Return Series Hydraulic Actuators: 121, 221, 231, 331, 2210, 25420, 2521, 2542, 3420, 3531, 3542, 35310, 35420, 4031, 4515, 4531, CRD3515, H35, HD521, HD522, HD721, HD722, HD731, HD732, F, FQ, G, GTO, MR2150, MR3150, T2, T3, T4, T5, T8, ST3, ST4, ST5, ST8, TR10, STR10, TRQ10, and STRQ10. NOTE: The listed actuator series include M2, M3, M4, M6, M7, M9 and M11 Overrides plus the early Bettis model numbers that have an alpha character following the basic model letters and numbers (i.e. HD732A, 301B, T402.0A etc).

## 2.0 STORAGE

Indoor storage recommended for all actuators. Care should be taken to plug all open ports on the actuator and controls to keep out foreign particles and moisture. Also, actuators should not be stored in an atmosphere harmful to resilient seals. For extended storage, contact factory.

## 3.0 INSTALLATION

- 3.1 Since there are many valve and actuator combinations, it is not practical to include detailed instructions for each type. Mountings are designed to be as simple as possible to keep guess work out of installation.
- 3.2 Actuators are shipped from the factory with the travel stops adjusted for approximately ninety degree rotation. Generally it is necessary to make slight travel stop adjustments once the actuator is installed on the valve. Refer to the valve manufacturer's recommendations for specific requirements. When the valve has internal stops, the actuator should be adjusted at the same points. NOTE: The actual "stopping" should be done by the actuator. If the valve does not have internal stops, adjust the actuator to the full open position. Using this as a reference point, rotate the valve closed and adjust to the valve manufacturer's specifications for total rotation.
- 3.3 Good instrument practices are also recommended. Clean regulated hydraulic fluid pressure is essential for long service life and satisfactory operation. It should be noted that new hydraulic lines often have scale and other debris in them and these lines should be purged of all foreign material. NOTE: Scale and debris can damage control valves, solenoids, seals, etc..

## 4.0 START-UP

- 4.1 When actuator is first put into service it should be cycled with regulated hydraulic pressure. This is necessary because the seals have been stationary, causing them to take a "set". Therefore, the actuator should be operated through several cycles, exercising the seals resulting in a service ready condition.
- 4.2 The actuator speed of operation is determined by a number of factors including:
- |   |                                     |
|---|-------------------------------------|
| 1. Power supply line length               | 5. Torque requirements of the valve |
| 2. Power supply line size                 | 6. Size of the actuator             |
| 3. Power supply line pressure             | 7. Setting of speed controls        |
| 4. Control valve and fitting orifice size | 8. Hydraulic Manual Override        |

- 4.3 Due to the interaction of these variables it is difficult to specify a "normal" operating time. Faster operating times may be obtained by using one or more of the following:
1. Larger supply lines
  2. Larger control valve
  3. Higher supply pressure \*
- \* Not to exceed maximum operating pressure of actuator or control components
- 4.4 Slower operating times may be obtained by using flow control valves to meter the return fluid. Excessive exhaust flow metering may cause erratic operation. Normally, incoming supply should not be metered.

## 5.0 OPERATION OF BETTIS ACTUATORS

- 5.1 **Controlled Operation:** Controlled operation is accomplished by pressurizing and/or depressurizing the appropriate cylinder inlet(s) of a double acting or spring return unit by means of an appropriate control valve. Do not exceed pressures indicated on actuator nameplate.
- 5.2 **Manual Operation:** All pressure must be released or equalized on both sides of the hydraulic piston prior to manual operation.

## 6.0 MAINTENANCE

### 6.1 Service Interval

- 6.1.1 Routine maintenance is generally unnecessary. Normal recommended service interval for Bettis actuators is five years.

NOTE: Storage time is considered as part of the Service Interval.

- 6.1.2 It is recommended that Service Kits be ordered approximately three (3) months prior to scheduled maintenance to assure availability.

### 6.2 Lubrication Requirements For use in the actuator Housing Assembly or Drive Module.

NOTE: Lubricant, other than listed in step 6.2.1 should not be used without prior written approval of Bettis Product Engineering.

- 6.2.1. All temperature services (-50°F to +350°F)/(-45.5°C to +176.6°C) use Bettis ESL-5 lubricant. ESL-5 lubricant is contained in the Bettis Module Service Kit in tubes and the tube is marked ESL-4, 5 & 10 lubricant.

### 6.3 Hydraulic Fluid For Actuator Hydraulic Power Cylinder Or Power Module: The following listed fluids are recommended fluids only and does not limit the use of other hydraulic fluids compatible with supplied seals and coatings.

- 6.3.1 Standard temperature And High temperature service (-20°F to +350°F)/(-28.9°C to +176.6°C) use Dexron Automatic Transmission Fluid.
- 6.3.2 Low temperature service (-40°F to +150°F)/(-40°C to +65.6°C) use Exxon Univis J13 Hydraulic Fluid.

6.4 Hydraulic Fluid For Actuator M11 Override System: Hydraulic fluids, other than those listed in steps 6.4.1 should not be used without prior written approval of Bettis Product Engineering.

NOTE: M2, M4, M7 and M9 Override systems use hydraulic fluids as listed in the steps of 6.3

6.4.1 All temperature service (-35 F to +350 F) / (-37.2°C to +176.6°C) use Dexron Automatic Transmission Fluid.

**7.0 SPARE PARTS**

7.1 For availability of replacement parts, contact Bettis or nearest Bettis authorized representative. Assembly drawings are available that identify each individual part by a generic number applicable to each actuator series. NOTE: When ordering spare Service Kits for shelf storage note that the seals are made of resilient material and have a limited shelf life.

7.2 When ordering replacement parts, it is important to include the Actuator Serial Number and if Serial Number is not available then the complete actuator model number and part number. This information is on the actuator name tag.

7.3 More detailed information may be obtained by contacting any of the following locations:

Headquarters  
Bettis Actuator & Controls  
P.O. Box 508  
Waller, Texas 77484 U.S.A.  
Telephone: 01 281/463-5100  
Fax: 01 281/463-5153

Bettis UK Ltd.  
3 Furze Court, Wickham Road  
Fareham, Hampshire P016 7SH  
United Kingdom  
Telephone: 44 1329 848 900  
Fax: 44 1329 848 901

Bettis Canada Ltd.  
4112-91 A Street  
Edmonton, Alberta T6E 5V2  
Canada  
Telephone: 01 780/450-3600  
Fax: 01 780/450-1400

Bettis France  
30/36 Allee du Plateau  
93250 Villemomble  
France  
Telephone: 33 48 12 26 10  
Fax: 33 48 12 26 19

Bettis GmbH  
P.O. Box 1253  
47477 Rheinberg  
Germany  
Telephone: 49 2843-1575  
Fax: 49 2843-1577

Bettis Canada Ltd.  
620,400 – 5<sup>th</sup> Avenue, SW  
Calgary, Alberta T2P 0L6  
Canada  
Telephone: 01 780/266-1422  
Fax: 01 780/450-1400

Website: [www.bettis.com](http://www.bettis.com)

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Released	October 1988	A	COMPILED	B. Cornelius	17 December 2001
16463	June 1998	B	CHECKED	B. Cornelius	17 December 2001
17787	December 2001	C	APPROVED	R. Smith	17 December 2001

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