

**GH BETTIS**

**INSTALLATION INSTRUCTIONS**

**FOR REMOTE MOUNTING**

**M4 OR M7**

**HYDRAULIC CONTROL PACKAGES**

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1.0 **PURPOSE**

These instructions describe GH Bettis M4 or M7 Hydraulic Control Package remote mounting parameters.

2.0 **ACTUATOR ORIENTATION**

- 2.1 The actuator optimum mounting position is with the Hydraulic Control cylinder horizontal to the ground. The horizontal position allows for ease in system refilling and bleeding of the air out of the system
- 2.2 The actuator will function with the cylinder oriented in any desired position. Many alternate positions will make for difficult system refilling and the bleeding of air out of the system.

3.0 **M4 OR M7 REMOTE MOUNTING**

- 3.1 Mount the M4 or M7 Pump Package adjacent to and above the highest point of the hydraulic control cylinder.
- 3.2 The Pump Package may be mounted within ten (10) feet in any horizontal direction from the hydraulic control cylinder without special considerations. Any distance over ten (10) feet , consult GH Bettis Applications Engineering for your application.
- 3.3 The Pump Package may be mounted up to two (2) feet above the center line of the hydraulic control cylinder and not below the centerline of the hydraulic control cylinder.
- 3.4 The Pump Package must be mounted with reservoir upright with the pump shaft horizontal.
- 3.5 Refilling instructions for the M4 package refer to sections 4.0, 5.0 and 6.0.
- 3.6 Refilling Instructions for the M7 package refer to sections 7.0 and 8.0.

4.0 **M4 REFILLING INSTRUCTIONS**

- 4.1 Refilling of the M4 hydraulic control system and actuator cylinder is best accomplished using a pressure pump. Put the actuator in the closed position (CW) and proceed using the following steps.
- 4.2 Remove the breather from the reservoir.
- 4.3 Attach the pump discharge line to reservoir breather port.
- 4.4 Open both speed control valves.
- 4.5 Open the two bleed valves, located at each end of the hydraulic cylinder.

- 4.6 Slowly pump hydraulic fluid into the reservoir. Approximately three (3) to five (5) PSI will be required. As the hydraulic fluid passes through the M4 control block into the cylinder, air will be displaced.

- 4.7 Close each bleed valve when the air has been displaced and hydraulic fluid appears.
- 4.8 Remove pump discharge line from reservoir breather port.
- 4.9 Adjust fluid level to 1½" (40mm) from top of reservoir with actuator in open (CCW) position.
- 4.10 Re-install breather removed, in step 4.2.

#### 5.0 **M4 ALTERNATE REFILLING INSTRUCTIONS**

- 5.1 Refilling the M4 hydraulic control system, during field service, often must be done without the use of a pressure pump. Proceed as follows:
- 5.2 Put the actuator in the closed position (CW).
- 5.3 Remove the breather from the reservoir.
- 5.4 Fill the reservoir approximately three-fourths (3/4) full.
- 5.5 Open both speed control valves.
- 5.6 Open the bleed valve on the outboard end of the hydraulic cylinder only.
- 5.7 Rotate the handle slowly, clockwise, until all air has escaped from the system.
- 5.8 Close the bleed valve opened in step 5.6. During the fill procedure, it is important that the lowest level be not less than approximately one-fourth (¼) of the reservoir volume at any time.
- 5.9 Open the bleed valve on the inboard end of the hydraulic cylinder.
- 5.10 Rotate the handle slowly, counterclockwise, until all air has escaped from the system.
- 5.11 Close the bleed valve opened in step 5.9. During the fill procedure, the piston will not move. This may be determined by observing the position indicator on the actuator.
- 5.12 Adjust fluid level to 1-1/2" (40mm) from top of reservoir with actuator in open (CCW) positions.
- 5.13 Re-install breather removed in step 5.3.

#### 6.0 **ADDITIONAL M4 INSTRUCTIONS**

- 6.1 These steps are to be performed to insure air is removed from the system (most likely air in pump) and to test the operation of M4 hydraulic control system.
- 6.2 Turn M4 crank arm CW. The actuator should move clockwise as well. Adjust outboard bleed valve to remove air from system.
- 6.3 Turn M4 crank arm CCW. The actuator will move counterclockwise. Adjust inboard bleed valves to remove air from system.

6.4 With bleed valves closed, stroke actuator full 90°, CW and CCW, using M4 override.

#### 7.0 **M7 SYSTEM REFILLING INSTRUCTIONS**

7.1 Refilling of the M7 control system and actuator cylinder is best accomplished using a pressure pump.

7.2 Allow the actuator to fully stroke to fail position.

7.3 Remove the breather from the reservoir.

7.4 Attach the pump discharge line to reservoir breather port. Open both speed control valves.

7.5 Open the two bleed valves located at each end of the hydraulic cylinders.

7.6 Slowly pump hydraulic fluid into the reservoir.. Approximately 3 to 5 psi will be required.

7.7 As the fluid passes through the M7 control module into the cylinder, air will be displaced.

7.8 Close each bleed valve when the air has been displaced and hydraulic fluid appears.

#### 8.0 **M7 ALTERNATE REFILLING INSTRUCTIONS**

8.1 Refilling the M7 control system during field service often must be done without the use of a pressure pump. Proceed as follows:

8.2 On hydraulic cylinder on which M7 override is mounted, the piston must be stroked toward outboard side of the actuator (actuator natural position for spring return actuators).

8.3 Fill hydraulic cylinder(s) with fluid by removing bleed valves at the top of cylinder.

8.4 Fill the reservoir. Maintain at least 1-1½ inches of fluid within the reservoir at all times.

8.5 Close the by-pass valve.

8.6 Close both speed control valves.

8.7 Open outboard end cylinder bleed valve.

8.8 Operate hand pump slowly. Keep handle up for about 4 to 5 seconds before each pressure stroke. This allows time for the pump cylinder to fill in order that full displacement of the pump is utilized. (NOTE: If the pump fails to deliver fluid, open the by-pass valve, rapidly operate the pump 15 to 20 times, close the by-pass valve and continue filling sequence).

8.9 Close the outboard end cylinder bleed valve when fluid appears.

8.10 Open the inboard end cylinder bleed valve.

8.11 Operate the hand pump to fully stroke the actuator. Refill reservoir as required.

8.12 Open by-pass valve.

- 8.13 Slightly open the outboard cylinder (right hand) speed control. As the actuator strokes, fluid will be displaced from the greater volume of the outboard cylinder into the lesser volume of the inboard cylinder. Fluid will begin flowing from the inboard end cylinder bleed valve.
- 8.14 Close the inboard end cylinder bleed valve when fluid appears. **NOTE:** If the actuator completes its stroke and fluid does not appear at the inboard end cylinder bleed valve, omit procedure step 8.13 and proceed as follows:
- 8.15 Close the outboard cylinder (right hand) speed control valve.
- 8.16 Close the by-pass valve.
- 8.17 Open inboard end cylinder bleed.
- 8.18 Operate hand pump as described to cycle actuator.
- 8.19 Close inboard end cylinder bleed valve when fluid appears. Stop operation of pump. (If fluid does not appear, repeat steps 8.9 through 8.15)
- 8.20 Open by-pass valve. Fully open inboard cylinder speed control.
- 8.21 Slowly open outboard speed control.
- 8.22 Allow the actuator to complete its stroke to "fail" position. Add fluid to reservoir so that level is within approximately 1-1½ inches of full. Install breather. Connect power supply lines and cycle the actuator using available power media. Adjust and lock speed controls. Actuator is in normal service.

More detailed information, concerning your particular application, may be obtained by writing GH Bettis, Box 508, Waller, Texas U.S.A. 77484, Telephone: 713/463-5100, Fax 713/463-5103.

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No. 9 Gul Road  
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No.1 Lai Yuan Road  
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Tianjin 301700  
P.R.China  
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***MIDDLE EAST & AFRICA***

P. O. Box 17033  
Dubai  
United Arab Emirates  
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F +971 4 886 5465

P. O. Box 10305  
Jubail 31961  
Saudi Arabia  
T +966 3 340 8650  
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24 Angus Crescent  
Longmeadow Business Estate  
East P.O. Box 6908; Greenstone  
1616 Modderfontein, Extension 5  
South Africa  
T +27 11 451 3700  
F +27 11 451 3800

***EUROPE***

Berenyi u. 72- 100  
Videoton Industry Park,  
Building #230  
Székesfehérvár 8000  
Hungary  
T +36 22 530 950  
F +36 22 543 700

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