GH-BETTIS

OPERATING INSTRUCTIONS

M7

HYDRAULIC CONTROL SYSTEM

PART NUMBER: 074951

REVISION: "A"

RELEASE DATE: December, 1993

REPLACES: SE - 086 (Dated 10/87)

CAUTION: The M7 package must be mounted with the pump and reservoir upright and vertical. The reservoir fill plug must be removed and replaced, with the breather supplied, before operation.

1.0 SYSTEM DESCRIPTION

M7 Hydraulic Control System is a compact, modular system designed for use with GH-Bettis spring return actuators. The system incorporates a piston type hand pump, individually adjustable integral speed controls, make-up oil reservoir necessitated by the differential volume of the hydraulic cylinder (the differential volume is due to the inboard piston rod displacement).

2.0 GENERAL INFORMATION

2.1 Numbers in parentheses ( ), indicate the bubble number (reference number) used on the GH-Bettis Assembly Drawing.

2.2 GH-Bettis M7 System Assembly Drawing part number 029235.

2.3 M7 Hydraulic Control System Fluid Requirements: Hydraulic fluids, other than those listed in steps 2.3.1 and 2.3.2, should not be used without prior written approval of GH-Bettis Product Engineering.

2.3.1 Standard and high temperature service (-35°F to +350°F) use Dexron II Automatic Transmission Fluid.

2.3.2 Low temperature service (-65°F to +180°F) Use Exxon Univis J13 Hydraulic Fluid.

2.4 **CAUTION: Apply thread sealant per the manufacture's instructions.** Do not use teflon tape on threads, use a non-hardening thread sealant on all pipe threads.

3.0 ACTUATOR POWER OPERATION

WARNING: Do not attempt to operate the actuator with a power media if the M7 module speed control needle valve screws (40) are adjusted all the way in (clockwise).

3.1 Fully open the M7 by-pass control valve (30). NOTE: The valve is located on the right hand side of the M7 control module.

CAUTION: Do not exceed the maximum operating pressure rating of the actuator.

3.2 Apply a operating media, of the correct pressure, through a control valve to the actuator's power cylinder.

4.0 ACTUATOR M7 MANUAL OPERATION

4.1 Shut off and exhaust the operating media from the actuators power cylinder.

4.2 Fully close the M7 by-pass control valve (30).

4.3 Operate the M7 hand pump (280) until the actuator strokes to the desired degree. NOTE: When the actuator is fully stroked against the travel stops, an increased resistance in pumping effort will be noted. Continued operation of the pump simply circulates fluid through a high pressure relief.

4.4 Fully open the M7 block (10) by-pass control valve (30) to reverse the actuator rotation or to return to normal power operation.

5.0 SPEED CONTROL ADJUSTMENTS

5.1 Power Stroke Speed Control.

5.1.1 Loosen the left side hex jam nut (240) and adjust the left side speed control needle screw (40), with a slot screw driver, until the desired operating speed is attained.

5.1.2 REDUCE SPEED - Turn the left side adjustment screw clockwise.

5.1.3 INCREASE SPEED - Turn the left side adjustment screw counter clockwise.

5.2 Spring Stroke Speed Control.

5.2.1 Loosen the right side hex jam nut (240) and adjust the right side speed control needle screw (40), with a slot screw driver, until the desired operating speed is attained.

5.2.2 REDUCE SPEED - Turn the right side adjustment screw clockwise.

5.2.3 INCREASE SPEED - Turn the right side adjustment screw counter clockwise.

5.3 Tighten the hex jam nuts (240) when speed adjustments are completed.

5.4 Maintain the reservoir fluid level within approximately 1 inch through 1-1/2 inches of the reservoir top with actuator stroked to its "fail" position.

6.0 SYSTEM REFILLING

6.1 Use either Refilling Method Number 1 (steps 6.2) or Refilling Method Number 2 (steps 6.3). Method number 1 is the best, most efficient and the recommended method.

6.2 REFILLING METHOD NUMBER 1. - Refilling of the M7 module and actuator hydraulic cylinder is best accomplished using a pressure pump.

6.2.1 Shut off and exhaust the operating media from the actuators power cylinder.

6.2.2 Allow the actuator to fully stroke to its fail position by opening the M7 by-pass control (30) valve.

6.2.3 Remove the breather (150) from the reservoir end cap (25).

6.2.4 Attach the pump discharge line to the reservoir end cap (25) breather port.

6.2.5 Open both M7 block (10) speed control needle valves (40).

6.2.6 Open the two bleed valves located at each end of the hydraulic cylinder(s).

6.2.7 Slowly pump hydraulic fluid into the reservoir. Approximately 3 to 5 psi will be required. As the fluid passes through the M7 module and into the hydraulic

cylinder, air will be displaced. Close each bleed valve when the air has been displaced and hydraulic fluid appears.

6.3 REFILLING METHOD NUMBER 2. - Refilling the M7 control system during field service often must be done without the use of a pressure pump. Proceed as follows:

6.3.1 Shut off and exhaust the operating media from the actuator's power cylinder.

6.3.2 On the M7 block (10) fully close the by-pass control valve (30).

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

6.3.4 Fill the M7 reservoir. Maintain at lease 1 through 1-1/2 inches of fluid from the top of the reservoir at all times.

6.3.5 On the M7 block (10), close by-pass control valve (30).

6.3.6 Close both M7 block (10) speed control needle valves (40).

6.3.7 Open the hydraulic cylinder outboard bleed valve.

6.3.8 Operate M7 hand pump (280) 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.

6.3.9 Close the hydraulic cylinder outboard bleed valve when fluid appears.

6.3.10 Open the hydraulic cylinder inboard bleed valve.

6.3.11 Operate the M7 hand pump (280) to fully stroke the actuator. Refill the M7 reservoir as required.

6.3.12 Open the M7 block (10) by-pass control valve (30).

6.3.13 Slightly open the M7 block (10), outboard cylinder, right hand speed control needle valve (40). 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 hydraulic cylinder inboard bleed valve.

6.3.14 Close the hydraulic cylinder inboard bleed valve when fluid appears and proceed to step 6.3.23. NOTE: If the actuator completes its stroke and fluid does not appear at the hydraulic cylinder inboard bleed valve, omit steps 6.3.13 and proceed as follows:

6.3.15 Close the M7 block (10), outboard cylinder, right hand speed control needle valve (40).

6.3.16 Close the M7 block (10) by-pass control valve (30).

6.3.17 Open the hydraulic cylinder inboard bleed valve.

6.3.18 Operate the M7 hand pump as described in section 3.0 to cycle actuator.

6.3.19 Close the hydraulic cylinder inboard bleed valve when fluid appears. Stop operation of pump. NOTE: If fluid does not appear, repeat steps 6.3.9 through 6.3.14.

6.3.20 Open the M7 block (10) by-pass control valve (30).

6.3.21 Fully open the M7 block (10), inboard cylinder, left hand speed control needle valve (40).

6.3.22 Slowly open the M7 block (10), outboard cylinder, right hand speed control needle valve (40).

6.3.23 Allow the actuator to complete its stroke to "fail" position.

6.3.24 Add fluid to reservoir so that level is within approximately 1 inch through 1-1/2 inches of fluid from the top of the reservoir.

6.3.25 Install breather (150) back into the reservoir end cap (25) port.

6.3.26 Connect power supply lines back to the actuator control system or power cylinder (s) and cycle the actuator using available power media.

6.3.27 Adjust speed control needle valves (40) to desired speeds.

6.3.28 Holding speed control needle valves (40) tighten hex jam nuts (240). Actuator is ready for normal service.

7.0 MAINTENANCE

GH-Bettis does not recommend periodic field maintenance for the M7 module and pump. The only time the M7 module or pump should be disassembled is when either the pump or the M7 module fails to perform its override function. If maintenance is required and when possible the M7 package should be returned to the factory for maintenance.

More detailed information, concerning your particular application, may be obtained by writing or with a fax to GH-Bettis, P.O. Box 508, Waller, Texas 77484, U.S.A., Telephone: 281/463-5100 or 409/372-3606, FAX: 281/463-5103.

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